

TEST REPORT IEC 61215 series:2016 Terrestrial photovoltaic (PV) modules – Design qualification and type approval	
Report Number.	492012695.015 part 1 of 2
Date of issue	2024-08-12
Total number of pages	715
Applicant's name	Tongwei Co., Ltd.
Address	No. 588, Middle Section Tianfu Avenue, High-Tech Zone, Chengdu, China (Sichuan) Pilot Free Trade Zone
Test specification:	
Standards	☒ IEC / EN 61215-1:2016 ☒ IEC / EN 61215-1-1:2016 ☐ IEC 61215-1-2 / EN 61215-1-2:2017 ☐ IEC 61215-1-3:2016 / EN 61215-1-3:2017 ☐ IEC 61215-1-4:2016 / EN 61215-1-4:2017 ☒ IEC 61215-2:2016 / EN 61215-2:2017
Test procedure	TÜV NORD Mark
Non-standard test method	N/A
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Test item description..... :	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
Trade Mark..... :	 通威太阳能 TW SOLAR  TW SOLAR
Manufacturer	Tongwei Co., Ltd.
Address..... :	No. 588, Middle Section Tianfu Avenue, High-Tech Zone, Chengdu, China (Sichuan) Pilot Free Trade Zone
Model/Type reference	Double Glass PV Modules with Segmented 6" Mono-crystalline Silicon Solar Cells: 408 cells: THxxxCM5-72SD (xxx = 350-390, in increment of 5) 340 cells: THxxxCM5-60SD (xxx = 290-325, in increment of 5) Double Glass PV Modules with Segmented 6" PERC Mono-crystalline Silicon Solar Cells: 408 cells: THxxxPM5-72SD (xxx = 390-410, in increment of 5) 408 cells: THxxxPM5-72SDA (xxx = 410-440, in increment of 5) 408 cells: THxxxPM5-72SDA-F (xxx = 410-440, in increment of 5) 408 cells: THxxxPMB5-72SD (xxx = 390-410, in increment of 5) 408 cells: THxxxPMB5-72SDA (xxx = 410-440, in increment of 5) 408 cells: THxxxPMB5-72SDA-F (xxx = 410-440, in increment of 5) 340 cells: THxxxPM5-60SD (xxx = 325-340, in increment of 5) 340 cells: THxxxPM5-60SDA (xxx = 340-365, in increment of 5) 340 cells: THxxxPM5-60SDA-F (xxx = 340-365, in increment of 5) 340 cells: THxxxPMB5-60SD (xxx = 325-340, in increment of 5) 340 cells: THxxxPMB5-60SDA (xxx = 340-365, in increment of 5) 340 cells: THxxxPMB5-60SDA-F (xxx = 340-365, in increment of 5) Double Glass PV Modules with Segmented 8" PERC Mono-crystalline Silicon Solar Cells: 414 cells: THxxxPMB6-69SDC (xxx = 635-670, in increment of 5) 408 cells: THxxxPMB6-68SDC (xxx = 625-660, in increment of 5) 390 cells: THxxxPMB6-65SDC (xxx = 600-630, in increment of 5) 345 cells: THxxxPMB6-58SDC (xxx = 530-555, in increment of 5) 340 cells: THxxxPMB6-57SDC (xxx = 520-550, in increment of 5) 325 cells: THxxxPMB6-54SDC (xxx = 500-525, in increment of 5) Double Glass PV Modules with Half-cut 7" PERC Mono-crystalline Silicon Solar Cells: 156 cells: TWMPD-78HDxxx (xxx = 570-615, in increment of 5) 156 cells: TWxxxMBAP-156-D (xxx = 575-615, in increment of 5) 156 cells: TWxxxMBGP-156-D (xxx = 570-610, in increment of 5) 144 cells: TWMPD-72HDxxx (xxx = 525-565, in increment of 5) 144 cells: TWxxxMBAP-144-D (xxx = 530-565, in increment of 5) 144 cells: TWxxxMBGP-144-D (xxx = 525-560, in increment of 5) 132 cells: TWMPD-66HDxxx (xxx = 480-520, in increment of 5) 132 cells: TWxxxMBAP-132-D (xxx = 485-520, in increment of 5) 132 cells: TWxxxMBGP-132-D (xxx = 480-515, in increment of 5) 120 cells: TWMPD-60HDxxx (xxx = 440-470, in increment of 5)

120 cells: TWxxxMBAP-120-D (xxx = 440-470, in increment of 5)
 120 cells: TWxxxMBGP-120-D (xxx = 440-470, in increment of 5)
 108 cells: TWMPD-54HDxxx (xxx = 395-425, in increment of 5)
 108 cells: TWxxxMBAP-108-D (xxx = 400-425, in increment of 5)
 108 cells: TWxxxMBGP-108-D (xxx = 395-420, in increment of 5)
 144 cells: TWMPG-72HDxxx (xxx = 560-590, in increment of 5)
 108 cells: TWMPG-54HDxxx (xxx = 420-440, in increment of 5)
 108 cells: TWMPG-54HCxxx (xxx = 420-440, in increment of 5)
 132 cells: TWMPH-66HDxxx (xxx = 575-590, in increment of 5)
 120 cells: TWMPH-60HDxxx (xxx = 525-535, in increment of 5)
 96 cells: TWMPH-48HDxxx (xxx = 420-430, in increment of 5)
 96 cells: TWMPH-48HCxxx (xxx = 420-430, in increment of 5)

Double Glass PV Modules with Half-cut 7" TOPCon Mono-crystalline Silicon Solar Cells:

156 cells: TWMND-78HDxxx (xxx = 580-650, in increment of 5)
 156 cells: TWxxxMBGT-156-D (xxx = 580-650, in increment of 5)
 144 cells: TWMND-72HDxxx (xxx = 535-605, in increment of 5)
 144 cells: TWxxxMBGT-144-D (xxx = 535-605, in increment of 5)
 132 cells: TWMND-66HDxxx (xxx = 490-555, in increment of 5)
 132 cells: TWxxxMBGT-132-D (xxx = 490-555, in increment of 5)
 120 cells: TWMND-60HDxxx (xxx = 445-505, in increment of 5)
 120 cells: TWxxxMBGT-120-D (xxx = 445-505, in increment of 5)
 108 cells: TWMND-54HDxxx (xxx = 400-450, in increment of 5)
 108 cells: TWxxxMBGT-108-D (xxx = 400-450, in increment of 5)
 144 cells: THxxxTMBI-72ZDD (xxx = 545-560, in increment of 5)
 144 cells: THxxxTMBI-72ZDDF (xxx = 545-560, in increment of 5)
 132 cells: THxxxTMBI-66ZDD (xxx = 500-510, in increment of 5)
 132 cells: THxxxTMBI-66ZDDF (xxx = 500-510, in increment of 5)
 120 cells: THxxxTMBI-60ZDD (xxx = 455-465, in increment of 5)
 120 cells: THxxxTMBI-60ZDDF (xxx = 455-465, in increment of 5)
 108 cells: THxxxTMBI-54ZDD (xxx = 410-420, in increment of 5)
 108 cells: THxxxTMBI-54ZDDF (xxx = 410-420, in increment of 5)
 144 cells: TWMNG-72HDxxx (xxx = 580-620, in increment of 5)
 120 cells: TWMNG-60HDxxx (xxx = 485-515, in increment of 5)
 120 cells: TWMNG-60HCxxx (xxx = 485-515, in increment of 5)
 108 cells: TWMNG-54HDxxx (xxx = 435-465, in increment of 5)
 108 cells: TWMNG-54HCxxx (xxx = 435-465, in increment of 5)
 132 cells: TWMNH-66HDxxx (xxx = 580-630, in increment of 5)
 120 cells: TWMNH-60HDxxx (xxx = 530-570, in increment of 5)
 108 cells: TWMNH-54HDxxx (xxx = 475-515, in increment of 5)
 108 cells: TWMNH-54HCxxx (xxx = 475-515, in increment of 5)
 96 cells: TWMNH-48HDxxx (xxx = 420-455, in increment of 5)
 96 cells: TWMNH-48HCxxx (xxx = 420-455, in increment of 5)

Double Glass PV Modules with Half-cut 8" PERC Mono-crystalline Silicon Solar Cells:

132 cells: TWMPF-66HDxxx (xxx = 635-685, in increment of 5)

	132 cells: TWxxxMBCP-132-D (xxx = 635-675, in increment of 5) 132 cells: TWxxxMBIP-132-D (xxx = 635-685, in increment of 5) 120 cells: TWMPF-60HDxxx (xxx = 580-620, in increment of 5) 120 cells: TWxxxMBCP-120-D (xxx = 580-610, in increment of 5) 120 cells: TWxxxMBIP-120-D (xxx = 580-620, in increment of 5) 108 cells: TWMPF-54HDxxx (xxx = 520-560, in increment of 5) 108 cells: TWxxxMBCP-108-D (xxx = 520-550, in increment of 5) 108 cells: TWxxxMBIP-108-D (xxx = 520-560, in increment of 5) 110 cells: TWMPF-55HDxxx (xxx = 530-570, in increment of 5) 110 cells: TWxxxMBCP-110-D (xxx = 530-560, in increment of 5) 110 cells: TWxxxMBIP-110-D (xxx = 530-570, in increment of 5) 100 cells: TWMPF-50HDxxx (xxx = 480-515, in increment of 5) 100 cells: TWxxxMBCP-100-D (xxx = 480-510, in increment of 5) 100 cells: TWxxxMBIP-100-D (xxx = 480-515, in increment of 5) Double Glass PV Modules with Half-cut 8" TOPCon Mono-crystalline Silicon Solar Cells: 132 cells: TWMNF-66HDxxx (xxx = 665-725, in increment of 5) 132 cells: TWxxxMBIT-132-D (xxx = 665-725, in increment of 5) 120 cells: TWMNF-60HDxxx (xxx = 605-660, in increment of 5) 120 cells: TWxxxMBIT-120-D (xxx = 605-660, in increment of 5) 108 cells: TWMNF-54HDxxx (xxx = 545-590, in increment of 5) 108 cells: TWxxxMBIT-108-D (xxx = 545-590, in increment of 5) 110 cells: TWMNF-55HDxxx (xxx = 530-570, in increment of 5) 110 cells: TWxxxMBIT-110-D (xxx = 530-570, in increment of 5) 100 cells: TWMNF-50HDxxx (xxx = 480-515, in increment of 5) 100 cells: TWxxxMBIT-100-D (xxx = 480-515, in increment of 5) Double Glass PV Modules with Half-cut 8" HJT Mono-crystalline Silicon Solar Cells: 132 cells: TWMHF-66HDxxx (xxx = 670-740, in increment of 5) 120 cells: TWMHF-60HDxxx (xxx = 605-670, in increment of 5) Remark: xxx indicates output power from the front side only.	
Ratings	Refer to Constructional Data Form (CDF) with the same file no.	
Designed by (name, function, signature) ...:	Cara Chen (Project Engineer)	 数字签名者: Cara Chen 日期: 2024.08.12 18:22:39 +08'00'
Reviewed by (name, function, signature) ...:	Leon Liu (Technical Certifier)	 Digitally signed by Leon Liu Date: 2024.08.12 20:11:16 +08'00'
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
Testing Laboratory 1	TÜV NORD Testing (Suzhou) Co., Ltd.	
Testing location/address	Zone E, 1st Floor, East side of South Building 3, No. 50, Beiguandu Road, Yuexi Street, Suzhou, Jiangsu Province, China	
Testing Laboratory 2	National Photovoltaic Products Quality Supervision and Inspection Center (Attached to Chengdu Institute of Product Quality Inspection Co., Ltd.)	

Testing location/address	No.355, Tengfei 2nd Road, West Airport Economic Development Zone, Shuangliu, Chengdu, Sichuan, China
Remark: N/A	

List of Annexes

List of Annexes (including a total number of pages in each attachment):	
	attachment number / number of pages
Installation manual	No update compared with the previous report
Drawings mechanical	N/A
Circuit diagram	N/A
Photographs	Annex 5, 36 pages
Component datasheets / certificates	Refer to project folder
Others:	
Statement of Measurement Uncertainty	Annex 1, 1 page
Test table for verifying other stabilization procedure	Annex 2, 0 page
Lower and higher output power modules	Annex 3, 16 pages
List of test equipment used	Annex 4, 6 pages
Constructional Data Form (CDF)	Attached to this report with same file no., 101 pages

Summary

Summary of testing:	
Tests performed (name of test and test clause): According to the enquiry of the applicant, based on previous report no. 492012695.014 and certificate no. 4478023406749-283R8A2M13, perform the following extensions. BOM1 - New frame parts: 6005-T6(thickness =30mm), manufactured by Shandong Lide New Energy Technology Co., Ltd Module type TWMND-72HD570 (BOM1, module dimension: 2278 x 1134 x 30 mm) were selected as representative test samples and conducted with all the related tests. Remark: extend frame parts as following, same material specifications with tested frame parts, only thickness increased, no additional test is required. - New frame parts: 6005-T6 (thickness =33/35mm), manufactured by Shandong Lide New Energy Technology Co., Ltd BOM2 - New frame parts: 6005-T6(thickness =30mm), manufactured by Sichuan Chengfeng Aluminium Products Co.,Ltd Module type TWMND-72HD580 (BOM2, module dimension: 2278 x 1134 x 30 mm) were selected as representative test samples and conducted with all the related tests. Remark: extend frame parts as following, same material specifications with tested re frame parts, only thickness increased, no additional test is required. - New frame parts: 6005-T6 (thickness =33/35mm), manufactured by Sichuan Chengfeng Aluminium Products Co.,Ltd BOM3 - New frame parts: 6005-T6(thickness =30mm), manufactured by Jiangsu Kuna New Energy Co Ltd Module type TWMND-72HD585 (BOM3, module dimension: 2278 x 1134 x 30 mm) were selected as representative test samples and conducted with all the related tests.	Testing location: BOM1 - BOM5, BOM13, BOM16, BOM18, BOM19, BOM22 TÜV NORD Testing (Suzhou) Co., Ltd. Zone E, 1st Floor, East side of South Building 3, No. 50, Beiguandu Road, Yuexi Street, Suzhou, Jiangsu Province, China BOM6 - BOM8, BOM14, BOM15, BOM17, BOM20, BOM21 National Photovoltaic Products Quality Supervision and Inspection Center (Attached to Chengdu Institute of Product Quality Inspection Co., Ltd.) No.355, Tengfei 2nd Road, West Airport Economic Development Zone, Shuangliu, Chengdu, Sichuan, China

Remark: extend frame parts as following, same material specifications with tested re frame parts, only thickness increased, no additional test is required.

- New frame parts: 6005-T6(thickness =33/35mm), manufactured by Jiangsu Kuna New Energy Co Ltd

BOM4

- New encapsulation material: B601HP (front side) B601HP (rear side), manufactured by Changzhou Betterial Film Technologies Co., Ltd.

Module type TWMND-72HD570 (BOM4, module size 2278mm x 1134mm x 30mm) were selected as representative test samples and conducted with all the related tests.

BOM5

- New encapsulation material: EVA9110T (front side) EVA9110T (rear side) manufactured by Changzhou Betterial Film Technologies Co., Ltd.

Module type TWMND-72HD570 (BOM5, module size 2278mm x 1134mm x 30mm) were selected as representative test samples and conducted with all the related tests.

Meanwhile, extend the following raw materials, which are co-license model/ type of some of the previous certificated raw materials, therefore, no additional test is required.:

- New encapsulation material: TWET05 (front side) TWET05 (rear side), manufactured by Tongwei Solar (Hefei) Co., Ltd.

Remark: co-license type of B601HP (front side) B601HP (rear side), manufactured by Changzhou Betterial Film Technologies Co., Ltd., certified by TÜV SÜD, the corresponding report no. 70.407.23.090.22-01.

- New encapsulation material: TWET04 (front side) TWET04 (rear side), manufactured by Tongwei Solar (Hefei) Co., Ltd.

Remark: co-license type of EVA9110T (front side) EVA9110T (rear side), manufactured by 3M China Limited / Zhejiang Sinopont Technology Co., Ltd.certified by TÜV SÜD, the corresponding report no. 70.407.23.090.18-00.

BOM6

- New Encapsulation material: F406P (front

side, EVA) F406P (rear side, EVA), manufactured by Hangzhou First PV Material Co., Ltd. /Hangzhou First Applied Material Co., Ltd. - New internal wiring (for inter-string connection): Copper belt with tin plated (Sn60%Pb40%, $0.40\pm 10\%$ x $4.3\pm 10\%$ mm (middle), color: silver), manufactured by Changzhou Greateen New Energy Technology Co., Ltd. - New Gap reflective film: JX-05, manufactured by TonyShare (Suzhou) Electronic Material Technology Co., Ltd. Combination of raw material of the tested sample: - Encapsulation material: F406P (front side, EVA) F406P (rear side, EVA), manufactured by Hangzhou First PV Material Co., Ltd. /Hangzhou First Applied Material Co., Ltd. - 7" mono cell:M182GBTCONBP TOPCON bifacial cell (Dimension (w x l) = $182\pm 3\text{mm}$ x $91\pm 10\%\text{mm}$), manufactured by Tongwei Solar. Remark: Encapsulation material: F406P (front side, EVA) F406P (rear side, EVA) can combine with 7" mono cell M182GBTCONBP TOPCON bifacial cell (Dimension (w x l) = $182\pm 3\text{mm}$ x $91\pm 10\%\text{mm}$), M182AGBTCONBP TOPCON bifacial cell (Dimension (w x l) = $182\pm 3\text{mm}$ x $105\pm 3\text{mm}$) and 8" mono cell M210IBTCONBP TOPCON bifacial cell (Dimension (w x l) = $210\pm 3\text{mm}$ x $105\pm 3\text{mm}$) manufactured by Tongwei Solar, because the outer surface of these cells is chemically identical (metallization and AR coating). Module type TWMND-72HD570 (BOM6, module size 2278mm x 1134mm x 30mm) were selected as representative test samples and conducted with all the related tests. BOM7 - New Encapsulation material: S201MT1 (EVA, front side) S201MT1 (EVA, rear side), manufactured by Shanghai HIUV New Materials Co., Ltd - New internal wiring (for inter-string connection): Copper belt with tin plated (Sn60%Pb40%, $0.32\pm 10\%$ x $4.0\pm 10\%$ mm, 0.3 x 4.0mm (both ends) $0.40\pm 10\%$ x $4.3\pm 10\%$ mm (middle), color: silver), manufactured by Jiangsu Sun Technology Corp., Ltd. - New Gap reflective film: JX-05,manufactured by TonyShare (Suzhou) Electronic Material Technology Co., Ltd.	

Combination of raw material of the tested sample:

- Encapsulation material: S201MT1 (EVA, front side) S201MT1 (EVA, rear side), manufactured by Shanghai HIUV New Materials Co., Ltd
- 7" mono cell: M182GBTCONBP TOPCON bifacial cell (Dimension (w x l) = 182±3mm x 91±10%mm), manufactured by Tongwei Solar.

Remark: Encapsulation material: S201MT1 (EVA, front side) S201MT1 (EVA, rear side) can combine with 7" mono cell M182GBTCONBP TOPCON bifacial cell (Dimension (w x l) = 182±3mm x 91±10%mm), M182AGBTCONBP TOPCON bifacial cell (Dimension (w x l) = 182±3mm x 105±3mm) and 8" mono cell M210IBTCONBP TOPCON bifacial cell (Dimension (w x l) = 210±3mm x 105±3mm) manufactured by Tongwei Solar, because the outer surface of these cells is chemically identical (metallization and AR coating).

Module type TWMND-72HD570 (BOM7, module size 2278mm x 1134mm x 30mm) were selected as representative test samples and conducted with all the related tests.

BOM8

- New Encapsulation material: SV-15296P (front side, EVA) SV-15296P (rear side, EVA), manufactured by Changzhou Sveck PV New Material Co., Ltd.
- New internal wiring (for inter-string connection): Copper belt with tin plated (Sn60%Pb40%, 0.40±10% x 4.3±10% mm (middle), color: silver), manufactured by Xi'an Telison New Materials Co., Ltd.
- New Gap reflective film: JX-05, manufactured by TonyShare (Suzhou) Electronic Material Technology Co., Ltd.

Combination of raw material of the tested sample:

- Encapsulation material: SV-15296P (front side, EVA) SV-15296P (rear side, EVA), manufactured by Changzhou Sveck PV New Material Co., Ltd.
- 7" mono cell: M182GBTCONBP TOPCON bifacial cell (Dimension (w x l) = 182±3mm x 91±10%mm), manufactured by Tongwei Solar.

Remark: Encapsulation material: SV-15296P (front side, EVA) SV-15296P (rear side, EVA) can combine with 7" mono cell M182GBTCONBP TOPCON bifacial cell (Dimension (w x l) = 182±3mm x 91±10%mm), M182AGBTCONBP TOPCON bifacial cell (Dimension (w x l) = 182±3mm x 105±3mm) and 8" mono cell

M210IBTCONBP TOPCON bifacial cell (Dimension (w x l) = 210±3mm x 105±3mm) manufactured by Tongwei Solar, because the outer surface of these cells is chemically identical (metallization and AR coating).

Module type TWMND-72HD570 (BOM8, module size 2278mm x 1134mm x 30mm) were selected as representative test samples and conducted with all the related tests.

Meanwhile, extend the following raw materials, which are co-license model/ type of some of the previous certificated raw materials, therefore, no additional test is required.:

- New encapsulation material: TWET01, manufactured by Tongwei Solar (Hefei) Co., Ltd.

Remark: co-license type of F406P, manufactured by Hangzhou First PV Material Co., Ltd. /Hangzhou First Applied Material Co., Ltd., certified by TÜV Rheinland, the corresponding report no. 15101259 002.

- New encapsulation material: TWET02, manufactured by Tongwei Solar (Hefei) Co., Ltd.

Remark: co-license type of S201MT1, manufactured by Shanghai HIUV New Materials Co., Ltd, certified by TÜV Rheinland, the corresponding report no. 15101526 006.

- New encapsulation material: TWET03, manufactured by Tongwei Solar (Hefei) Co., Ltd.

Remark: co-license type of SV-15296P manufactured by Changzhou Sveck PV New Material Co., Ltd., certified by TÜV SUD, the corresponding report no. 70.407.17.118.01-00.

BOM9

Perform Fire Rating Class A on the following materials:

- Front cover: AR coating tempered glass (Thickness =1.6mm), manufactured by Flat Glass Group Co., Ltd.
- Encapsulation material: EP304 (front side, EVA-POE multilayer) F406P (rear side, EVA), manufactured by Hangzhou First PV Material Co., Ltd./Hangzhou First Applied Material Co., Ltd.
- Rear cover: Semi tempered glass (black grid) (Thickness =1.6mm), manufactured by Flat

Glass Group Co., Ltd. No test is required for IEC 61215 series. test results listed in report no. 492012695.015 part 2 of 2. BOM10 Perform Fire Rating Class A on the following materials: - Front cover: AR coating tempered glass (Thickness =2.0mm), manufactured by Flat Glass Group Co., Ltd. - Encapsulation material: F406P (front side, EVA) F406P (rear side, EVA), manufactured by Hangzhou First PV Material Co., Ltd./Hangzhou First Applied Material Co., Ltd. - Rear cover: Semi tempered glass (white grid) (Thickness =2.0mm), manufactured by Flat Glass Group Co., Ltd. No test is required for IEC 61215 series. Please refer to report no. 492012695.015 part 2 of 2 for details. BOM11 Perform Fire Rating Class A on the following materials: - Front cover: AR coating tempered glass (Thickness =2.0mm), manufactured by Xinyi PV Products Holding Ltd. - Encapsulation material: S201MT1 (EVA, front side) S201MT1 (EVA, rear side), manufactured by Shanghai HIUV New Materials Co., Ltd - Rear cover: Semi tempered glass (white grid) (Thickness =2.0mm), manufactured by Xinyi PV Products Holding Ltd. No test is required for IEC 61215 series. test results listed in report no. 492012695.015 part 2 of 2. BOM12 Perform Fire Rating Class A on the following materials: - Front cover: AR coating tempered glass (Thickness =2.0mm), manufactured by Wujun Chongqing Solar Energy Co., Ltd - Encapsulation material: P507 (EPE, front side) S201MT1 (EVA, rear side), manufactured by Shanghai HIUV New Materials Co., Ltd - Rear cover: Semi tempered glass (white grid) (Thickness =2.0mm), manufactured by Wujun Chongqing Solar Energy Co., Ltd. No test is required for IEC 61215 series. test	

results listed in report no. 492012695.015 part 2 of 2.

Meanwhile, extend the following raw materials, which are co-license model/ type of some of the previous certificated raw materials, therefore, no additional test is required.:

New encapsulation material: TWET01, manufactured by Tongwei Solar (Hefei) Co., Ltd.

Remark: co-license type of F406P, manufactured by Hangzhou First PV Material Co., Ltd. /Hangzhou First Applied Material Co., Ltd., certified by TÜV Rheinland, the corresponding report no. 15101259 002

New encapsulation material: TWPT02, manufactured by Tongwei Solar (Hefei) Co., Ltd.

Remark: co-license type of TF4, manufactured by Hangzhou First PV Material Co., Ltd. /Hangzhou First Applied Material Co., Ltd., certified by TÜV SÜD, the corresponding report no. 70.126.23.090.09-00

New encapsulation material: TWPET01 (front side) +TWET01 (rear side), manufactured by Tongwei Solar (Hefei) Co., Ltd.

Remark: co-license type of EP304 (front side) +F406P (rear side) manufactured by Hangzhou First PV Material Co., Ltd. /Hangzhou First Applied Material Co., Ltd., certified by TÜV Rheinland, the corresponding report no. 15101259 006/15101259 002

New encapsulation material: TWPET02 (EPE front side) +TWET02(rear side), manufactured by Tongwei Solar (Hefei) Co., Ltd.

Remark: co-license type of P507 (EPE front side) +S201MT1 (rear side) manufactured by Shanghai HIUV New Materials Co., Ltd., certified by TÜV Rheinland, the corresponding report no. 15101526 007/15101526 006

New encapsulation material: TWET02, manufactured by Tongwei Solar (Hefei) Co., Ltd.

Remark: co-license type of S201MT1 (rear side) manufactured by Shanghai HIUV New Materials Co., Ltd., certified by TÜV Rheinland, the corresponding report no. 15101526 006

BOM13

New front cover: AR coating tempered glass (Thickness = 1.6±10% mm), manufactured by Changzhou Almaden Co., Ltd.

- New rear cover: Semi tempered glass (black grid) (Thickness = $1.6 \pm 10\%$ mm), manufactured by Changzhou Almaden Co., Ltd. Remark: Extend two rear covers as following, same material specifications with tested rear cover, only change grid color of rear cover, no additional test is required. - New rear cover: Semi tempered glass (white grid) (Thickness = $1.6 \pm 10\%$ mm), manufactured by Changzhou Almaden Co., Ltd. - New rear cover: Semi tempered glass (Thickness = $1.6 \pm 10\%$ mm), manufactured by Flat Changzhou Almaden Co., Ltd. Module type TWMNH-48HC435 (BOM13, module dimension: 1762 x 1134 x 30 mm) were selected as representative test samples and conducted with all the related tests. BOM14 - New mono cell: TW210Y224 HJT bifacial cell (Dimension (w x l) = $210 \pm 3\text{mm} \times 105 \pm 3\text{mm}$ Thickness = $110 \pm 20\mu\text{m}$), manufactured by Tongwei Solar (Meishan) Co., Ltd. - New Encapsulation material: SZ-247 (front side, EVA) SV-15296P (rear side, EVA), manufactured by Changzhou Sveck PV New Material Co., Ltd. - New gap reflective film: WM800 (Surrounding the interior of PV module, Thickness=$0.075\text{-}0.16\text{mm}$), manufactured by Heyu Renewable Technology Co., Ltd. - New Water blocking and edge sealing tape: EB60 (Width = $10 \pm 3\text{ mm}$, Thickness = $60 \pm 10\mu\text{m}$), manufactured by Heyu Renewable Technology Co., Ltd. - New internal wiring (for interconnection cell-to-cell bus bar): Copper belt with tin plated (Sn37%Pb42%Bi21%, $\Phi = 0.24\text{mm} \pm 10\%$, color: silver), manufactured by Suzhou YourBest New-type Materials Co., Ltd. - New Transparent hot-melt adhesive: GZ-2330(Fixed mono cell and bus bar), manufactured by Shenzhen Earlysun Technology Co., Ltd. - New Insulation tape: SE-556 (Material = POE, Thickness = $0.55\text{-}0.75\text{mm}$), manufactured by Changzhou Sveck PV New Material Co., Ltd. Combine list of raw materials: - Gap reflective film: BC81 (between cell string,	

Thickness=0.08-0.135mm), manufactured by Heyu Renewable Technology Co., Ltd. - Fluxing agent: FC10V16, manufactured by Shaoxing Tuobang New Energy Co., Ltd. Module type TWMHF-66HD715 (BOM14, module size 2384mm x 1303mm x 33mm) were selected as representative test samples and conducted with all the related tests. BOM15 - New gap reflective film: SVK-JX01W (Surrounding the interior of PV module, Thickness=0.07-0.15mm), manufactured by Changzhou Sveck PV New Material Co., Ltd. - New Water blocking and edge sealing tape: SVK-ALJD2404 (Width = 10±3 mm, Thickness = 60±10 µm), manufactured by Changzhou Sveck PV New Material Co., Ltd. - New Transparent hot-melt adhesive: 6309U (Fixed mono cell and bus bar), manufactured by Darbond Technology Co., Ltd. - New Insulation tape: TF4 (Material = POE, Thickness = 0.50±0.05mm), manufactured by Hangzhou First PV Material Co., Ltd. - New fluxing agent: WTO-PV109, manufactured by Suzhou Vital Electronics Material Technology Co., Ltd. - New internal wiring (for interconnection cell-to-cell bus bar): Copper belt with tin plated (Sn43%Pb43%Bi14%, Φ = 0.24mm±10%, color: silver), manufactured by Suzhou YourBest New-type Materials Co., Ltd. Combine list of raw materials for the tested sample: - Mono cell: TW210Y224 HJT bifacial cell (Dimension (w x l) = 210±3mm x 105±3mm Thickness = 110±20µm), manufactured by Tongwei Solar (Meishan) Co., Ltd. - New Encapsulation material: SZ-247 (front side, EVA) SV-15296P (rear side, EVA), manufactured by Changzhou Sveck PV New Material Co., Ltd. - Gap reflective film: SVK-JX02 (between cell string, Thickness=0.08-0.135mm), manufactured by Changzhou Sveck PV New Material Co., Ltd. - Fluxing agent: FC10V16, manufactured by Shaoxing Tuobang New Energy Co., Ltd. Module type TWMHF-66HD715 (BOM15, module size 2384mm x 1303mm x 33mm) were selected as representative test samples and conducted with	

all the related tests.

BOM16

- 8" mono cell: M210IBTCONBP TOPCon bifacial cell (Thickness=110±20µm, the thickness reduced from 150±20µm to 110±20µm), manufactured by Tongwei Solar (Meishan) Co., Ltd.

Module type TWMNF-66HD705 (BOM16, module size: 2384mm x 1303mm x 33mm) was selected as representative test samples and conducted with all the related tests.

BOM17

Update higher power range and tolerance of rated Voc, Isc (from ±3% to ±5%) for Double Glass PV Modules with Half-cut 8" HJT Mono-crystalline Silicon Solar Cells. refer to CDF with same file no. for details.

Module type TWMHF-66HD740(BOM17, module size: 2384mm x 1303mmx 33mm) was tested to determine the highest end of power range.

- The updated module types:

132 cells: TWMHF-66HDxxx (xxx = 670-740, in increment of 5)

120 cells: TWMHF-60HDxxx (xxx = 605-670, in increment of 5)

BOM18

Update higher power range and tolerance of rated Voc, Isc (from ±3% to ±5%) for below Double Glass PV Modules with Half-cut 7" TOPCon Mono-crystalline Silicon Solar Cells. refer to CDF with same file no. for details.

Module type TWMNH-66HD630 (BOM18, module size: 2382mm x 1134mm x 30mm) was tested to determine the highest end of power range.

- The updated module types:

132 cells: TWMNH-66HDxxx (xxx = 580-630, in increment of 5)

120 cells: TWMNH-60HDxxx (xxx = 530-570, in increment of 5)

108 cells: TWMNH-54HDxxx (xxx = 475-515, in increment of 5)

108 cells: TWMNH-54HCxxx (xxx = 475-515, in increment of 5)

96 cells: TWMNH-48HDxxx (xxx = 420-455, in increment of 5)

96 cells: TWMNH-48HCxxx (xxx = 420-455, in increment of 5)

BOM19

Update higher power range and tolerance of rated Voc, Isc (from $\pm 3\%$ to $\pm 5\%$) for Double Glass PV Modules with Half-cut 8 TOPCon Mono-crystalline Silicon Solar Cells. refer to CDF with same file no. for details.

Module type TWMNF-66HD725 (BOM19, module size: 2384 x 1303x 33mm) was tested to determine the highest end of power range.

- The updated module types:

132 cells: TWMNF-66HDxxx (xxx = 665-725, in increment of 5)

120 cells: TWMNF-60HDxxx (xxx = 605-660, in increment of 5)

BOM20

- New Encapsulation material: B602M (EPE front side) B601HP (EVA rear side), manufactured by Changzhou Betterial Film Technologies Co., Ltd.
- New adhesive (frame): 5166, manufactured by Shanghai Huitian New Material Co., Ltd.
- New internal wiring (for inter-string connection): Copper belt with tin plated (Sn60%Pb40%, $0.40 \pm 10\% \times 4.3 \pm 10\%$ mm (middle), color: silver), manufactured by Suzhou YourBest New-type Materials Co., Ltd.
- New fluxing agent: FD-309, manufactured by SUZHOU COSTAR ELECTRONIC MATERIAL CO.,LTD

Module type TWMND-72HD575 (BOM21, module size 2278mm x 1134mm x 30mm) were selected as representative test samples and conducted with all the related tests.

BOM21

- New Encapsulation material: PO8110e (EPE front side) EVA9110T (EVA rear side), manufactured by 3M China Limited/Zhejiang Sinopont Technology Co., Ltd.
- New adhesive (frame): SW-4G, manufactured by Cybrid Technologies Inc.
- New internal wiring (for inter-string connection): Copper belt with tin plated (Sn60%Pb40%, $0.40 \pm 10\% \times 4.3 \pm 10\%$ mm (middle), color: silver), manufactured by TonyShare (Suzhou) Electronic Material Technology Co., Ltd.
- New fluxing agent: Golf703-C, manufactured by YIK SHING TAT SOLDER MANUFACTURER (KUNSHAN) Co., LTD.

Module type TWMND-72HD575 (BOM22, module size 2278mm x 1134mm x 30mm) were selected

as representative test samples and conducted with all the related tests.

Meanwhile, extend the following raw materials, which are co-license model/ type of some of the previous certificated raw materials, therefore, no additional test is required.:

- New encapsulation material: TWPET05 (front side) & TWET05 (rear side), manufactured by Tongwei Solar (Hefei) Co., Ltd.

Remark: co-license type of B602M (front side) & B601HP (rear side), manufactured by Changzhou Betterial Film Technologies Co., Ltd., certified by TÜV SUD the corresponding report no. 70.407.23.090.22-01.

- New encapsulation material: TWPET04 (front side) & TWET04 (rear side), manufactured by Tongwei Solar (Hefei) Co., Ltd.

Remark: co-license type of PO8110e (front side) & EVA9110T (rear side), manufactured by 3M China Limited/Zhejiang Sinopont Technology Co., Ltd., certified by TÜV SUD the corresponding report no. 70.407.23.090.18-00.

BOM22

- New mono cell: M182GBTCONBP (dimension (w x l) = 182±3mm x 105±3mm, thickness = 130±20µm, 20 Busbars) manufactured by Tongwei Solar Co., Ltd.
- Encapsulation material: EP304 (front side, EVA-POE multilayer) F406P (rear side, EVA), (thickness = 0.3-0.7mm) manufactured by Hangzhou First PV Material Co.,Ltd.
- New fluxing agent: TF-SJ-041, manufactured by Shenzhen Tong fang Electronic New Material Co., Ltd.
- New internal wiring (for inter-string connection): Copper belt with tin plated (Sn60%Pb40%, 0.30±10% x 4.0±10% mm (both ends ,0.30±10% x 7.0±10% mm (middle), color: silver(reflective)), manufactured by TonyShare (Suzhou) Electronic Material Technology Co., Ltd.
- New Internal wiring (for interconnection cell-to-cell bus bar): Copper belt with tin plated (Sn60%Pb40%, Φ = 0.22mm±10%), manufactured by TonyShare (Suzhou) Electronic Material Technology Co., Ltd.
- New junction box set: PV-ZH001, manufactured by Zhejiang Zhonghuan Sunter PV Technology Co., Ltd

Module type TWMNH-66HD615(BOM23, 2382mm x 1134mm x 30mm) was selected as representative test samples and conducted with all

the related tests. Module type TWMNH-66HD580 (module size: 2382mm x 1134mm x 30mm) and TWMNH-66HD630(module size: 2382mm x 1134mm x 30mm) were tested to determine the highest and lowest end of power range.

Test items:

Refer to pages 85- 120, TESTING OVERVIEW of each BOM.

All tests were successfully passed.

Summary of compliance with National Differences (List of countries addressed):

N/A

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☒ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Expanded measurement uncertainty statement for Maximum power measurement:

The expanded measurement uncertainty resulting from the standard measurement uncertainty multiplied with a factor $k=2$ is specified, denoting the deviations of the measurement value within a probability of 95%.

☐ **Statement not required by the standard used for type testing**

(Note: When IEC or ISO standard requires a statement concerning the uncertainty of the measurement systems used for tests, this should be reported above. The informative text in parenthesis should be delete in both cases after selecting the applicable option)

Marking Plate

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

(Note: The marking plate represents all models covered by this report except for difference in electrical ratings and model designation. See "General product information" for electrical ratings for all models. As there will be other lower wattages to be covered under same report which follows same back label format.)

  Tongwei Co., Ltd. 	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules Module Type: ##### Maximum Power(Pm)(±3%): ##### Open Circuit Voltage(Voc)(±3%): #### Short Circuit Current(Isc)(±3%): #### Maximum Power Voltage(Vm): #### Maximum Power Current(I m): #### ##### www.tw-solar.com PV Changes the World	STC: 1000W/m ² , 25°C, AM1.5,Positive Test Power Selection: 0~+5W Fire Rating/Module Fire Performance: Class C MAX. System Voltage: 1500V According to: IEC 61215:2016 & IEC 61730:2016 Module Classification: Class II Series Fuse Rating: ### Add.:No.588,Middle Section Tianfu Avenue,High-Tech Zone, Chengdu,China(Sichuan)Pilot Free Trade Zone	   
  通威股份有限公司 	地面用晶硅光伏组件 组件型号: ##### 最大功率 (Pm)(±3%): ##### 开路电压 (Voc)(±3%): #### 短路电流 (Isc)(±3%): #### 最大功率点电压 (Vm): #### 最大功率点电流 (Im): #### ##### www.tw-solar.com 光伏改变世界	标准测试条件: 1000W/m ² , 25°C, AM1.5,正面测试 功率分档: 0~+5W 组件防火等级: Class C 最大系统电压: 1500V 生产依据标准: IEC61215:2016 & IEC61730:2016 组件等级: Class II 最大保险丝额定电流: ### 地址:中国(四川)自由贸易试验区成都市高新区天府大道中段588号	   
  Tongwei Co., Ltd. 	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules Module Type: ##### Maximum Power(Pm)(±3%): ##### Open Circuit Voltage(Voc)(±3%): #### Short Circuit Current(Isc)(±3%): #### Maximum Power Voltage(Vm): #### Maximum Power Current(I m): #### ##### www.tw-solar.com PV Changes the World	STC: 1000W/m ² , 25°C, AM1.5,Positive Test Power Selection: 0~+5W Fire Rating/Module Fire Performance: Class C MAX. System Voltage: 1500V According to: IEC 61215:2016 & IEC 61730:2016 Module Classification: Class II Series Fuse Rating: ### Add.:No.588,Middle Section Tianfu Avenue,High-Tech Zone, Chengdu,China(Sichuan)Pilot Free Trade Zone	   
  通威股份有限公司 	地面用晶硅光伏组件 组件型号: ##### 最大功率 (Pm)(±3%): ##### 开路电压 (Voc)(±3%): #### 短路电流 (Isc)(±3%): #### 最大功率点电压 (Vm): #### 最大功率点电流 (Im): #### ##### www.tw-solar.com 光伏改变世界	标准测试条件: 1000W/m ² , 25°C, AM1.5,正面测试 功率分档: 0~+5W 组件防火等级: Class C 最大系统电压: 1500V 生产依据标准: IEC61215:2016 & IEC61730:2016 组件等级: Class II 最大保险丝额定电流: ### 地址:中国(四川)自由贸易试验区成都市高新区天府大道中段588号	   
  Tongwei Co., Ltd. 	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules Module Type: ##### Maximum Power(Pm)(±3%): ##### Open Circuit Voltage(Voc)(±3%): #### Short Circuit Current(Isc)(±3%): #### Maximum Power Voltage(Vm): #### Maximum Power Current(I m): #### ##### www.tw-solar.com PV Changes the World	STC: 1000W/m ² , 25°C, AM1.5,Positive Test Power Selection: 0~+3% Fire Rating/Module Fire Performance: Class C MAX. System Voltage: 1500V According to: IEC 61215:2016 & IEC 61730:2016 Module Classification: Class II Series Fuse Rating: ### Add.:No.588,Middle Section Tianfu Avenue,High-Tech Zone, Chengdu,China(Sichuan)Pilot Free Trade Zone	   
  通威股份有限公司 	地面用晶硅光伏组件 组件型号: ##### 最大功率 (Pm)(±3%): ##### 开路电压 (Voc)(±5%): #### 短路电流 (Isc)(±5%): #### 最大功率点电压 (Vm): #### 最大功率点电流 (Im): #### ##### www.tw-solar.com 光伏改变世界	标准测试条件: 1000W/m ² , 25°C, AM1.5,正面测试 功率分档: 0~+3% 组件防火等级: Class C 最大系统电压: 1500V 生产依据标准: IEC61215:2016 & IEC61730:2016 组件等级: Class II 最大保险丝额定电流: ### 地址:中国(四川)自由贸易试验区成都市高新区天府大道中段588号	   
  Tongwei Co., Ltd. 	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules Module Type: ##### Maximum Power(Pm)(±3%): ##### Open Circuit Voltage(Voc)(±5%): #### Short Circuit Current(Isc)(±5%): #### Maximum Power Voltage(Vm): #### Maximum Power Current(I m): #### ##### www.tw-solar.com PV Changes the World	STC: 1000W/m ² , 25°C, AM1.5,Positive Test Power Selection: 0~+3% Fire Rating/Module Fire Performance: Class C MAX. System Voltage: 1500V According to: IEC 61215:2016 & IEC 61730:2016 Module Classification: Class II Series Fuse Rating: ### Add.:No.588,Middle Section Tianfu Avenue,High-Tech Zone, Chengdu,China(Sichuan)Pilot Free Trade Zone	   

Test item particulars..... : N/A	
Accessories and detachable parts included in the evaluation	N/A
Mounting system used.....	Clamps
Other options included.....	N/A
Possible test case verdicts:	
- test case does not apply to the test object.....	N/A
- test object does meet the requirement	P (Pass)
- test object does not meet the requirement	F (Fail)
Abbreviations used in the report:	
Pmax – Maximum power	HF – Humidity Freeze
Vmp – Maximum power voltage	DH – Damp Heat
Imp – Maximum power current	TC – Thermal Cycling
Isc – Short circuit current	α – Current temperature coefficient
Voc – Open circuit voltage	β – Voltage temperature coefficient
FF – Fill factor	δ – power temperature coefficient
STC – Standard Test Conditions (25°C, 1 000 W/m²)	NMOT – Nominal Module Operating Temperature (20°C, 800 W/m²)
MQT – Module Quality Tests	VFM _{rated} – Rated diode(s) forward voltage
VFM – Measured diode(s) forward voltage	NP – Nameplate
m_1 – the measurement uncertainty in % of laboratory for Pmax	m_2 – the measurement uncertainty in % of laboratory for Voc
m_3 – the measurement uncertainty in % of laboratory for Isc	t_1 – the manufacturer's rated lower production tolerance in % for Pmax
t_2 – the manufacturer's rated upper production tolerance in % for Voc	t_3 – the manufacturer's rated upper production tolerance in % for Isc
r – Pmax measurement reproducibility	
Testing Dates (YYYY-MM-DD)	
Date of first test item received	2024-01-10
Dates of tests (beginning/end).....	2024-01-10/2024-07-11

General Remarks

GENERAL REMARKS:				
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a ☐ comma / ☒ point is used as the decimal separator. This TRF is based on TRF IEC 61215F_SE				
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 61215F_SE:				
The application for obtaining a TÜV NORD Mark Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... :			☐ Yes ☒ Not applicable	
When differences exist; they shall be identified in the General product information section.				
Name and address of factory (factories..... :			Tongwei Solar (Hefei) Co., Ltd. No.888, Changning Road, High-tech District, Hefei City, Anhui Province, 230088, P.R. China Tongwei Solar (Yancheng) Co., Ltd. No.88, Jiuhuashan Road, Economic Development Zone, Yancheng City, Jiangsu Province, China Tongwei Solar (Sichuan) Co., Ltd. No.888, Jilin East Road, Huai Kou Street, Jintang County, Chengdu City, Sichuan Province Tongwei Solar (Nantong) Co., LTD No. 8, Bonded 10 Road, Economic Development Zone, Nantong City, Jiangsu Province, P. R. China Tongwei Solar (Chengdu) Co., LTD No. 888, Linjiaci Road, Huangjia Subdistrict, Shuangliu District, Chengdu City, Sichuan Province, China	
PRODUCT ELECTRICAL RATINGS:				
MONOFACIAL MODULE:				
Module type	N/A	N/A	N/A	N/A
V _{oc} [V] /Tolerance	N/A	N/A	N/A	N/A
V _{mp} [V]	N/A	N/A	N/A	N/A
I _{mp} [Adc]	N/A	N/A	N/A	N/A
I _{sc} [Adc] /Tolerance	N/A	N/A	N/A	N/A

$P_{\max}$ [W] /Tolerance		N/A	N/A	N/A	N/A
Maximum system voltage [V]		N/A	N/A	N/A	N/A
Maximum Over-Current Protection Rating [A]		N/A	N/A	N/A	N/A
Note: Further qualification for higher and/or lower output power see annex 3					
BIFACIAL MODULE:					
	Module type	TWMND-72HD570	TWMND-72HD580	TWMND-72HD585	TWMND-78HD650
STC condition	$P_{\max}$ [W] /Tolerance	570±3%	580±3%	585±3%	650±3%
	V_{oc} [V] /Tolerance	51.90±3%	52.30±3%	52.50±3%	57.80±3%
	I_{sc} [A _{dc}] /Tolerance	13.75±3%	13.85±3%	13.90±3%	14.10±3%
	V_{mp} [V]	43.60	43.93	44.10	48.52
	I_{mp} [A _{dc}]	13.08	13.21	13.27	13.40
BNPI condition	$P_{\max}$ [W] /Tolerance	629.5±3%	640.5±3%	646.1±3%	717.6±3%
	V_{oc} [V] /Tolerance	51.90±3%	52.30±3%	52.50±3%	57.80±3%
	I_{sc} [A _{dc}] /Tolerance	15.18±3%	15.29±3%	15.34±3%	15.57±3%
	V_{mp} [V]	43.60	43.93	44.10	48.52
	I_{mp} [A _{dc}]	14.44	14.58	14.65	14.79
aBSI condition	I_{sc} [A _{dc}] /Tolerance	16.93±3%	17.05±3%	17.11±3%	17.36±3%
Bifaciality coefficient	$\phi P_{\max}$ /Tolerance	80%±5%	80%±5%	80%±5%	80%±5%
	ϕV_{oc} /Tolerance	98%±5%	98%±5%	98%±5%	98%±5%
	ϕI_{sc} /Tolerance	80%±5%	80%±5%	80%±5%	80%±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30
	Module type	TWMNF-66HD670	TWMNH-48HC435	TWMHF-66HD715	TWMNF-66HD705
STC condition	Pmax [W] /Tolerance	670±3%	435±3%	715±3%	705±3%
	Voc [V] /Tolerance	47.10±3%	34.49±3%	50.22±5%	48.77±5%
	Isc [A _{dc}] /Tolerance	18.10±3%	15.90±3%	17.98±5%	18.40±5%
	Vmp [V]	39.30	29.54	41.84	40.52

	Imp [A _{dc}]	17.05	14.73	17.09	17.40
BNPI condition	P _{max} [W] /Tolerance	745.4±3%	480.4±3%	797.1±3%	778.4±3%
	V _{oc} [V] /Tolerance	47.10±3%	34.49±3%	50.22±5%	48.77±5%
	I _{sc} [A _{dc}] /Tolerance	19.98±3%	17.55±3%	20.04±5%	20.31±5%
	V _{mp} [V]	39.30	29.54	41.84	40.52
	Imp [A _{dc}]	18.82	16.26	19.05	19.21
aBSI condition	I _{sc} [A _{dc}] /Tolerance	22.28±3%	19.57±3%	22.56±5%	22.65±5%
Bifaciality coefficient	φP _{max} /Tolerance	80%±5%	80%±5%	85%±5%	80%±5%
	φV _{oc} /Tolerance	98%±5%	98%±5%	98%±5%	98%±5%
	φI _{sc} /Tolerance	80%±5%	80%±5%	85%±5%	80%±5%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	35	30	35	35
	Module type	TWMHF-66HD735	TWMNH-66HD630	TWMNF-66HD725	TWMND-72HD575
STC condition	P _{max} [W] /Tolerance	735±3%	630±3%	725±3%	575±3%
	V _{oc} [V] /Tolerance	50.54±5%	49.50±5%	49.45±5%	52.10±3%
	I _{sc} [A _{dc}] /Tolerance	18.37±5%	16.18±5%	18.60±5%	13.80±3%
	V _{mp} [V]	42.22	41.10	41.20	43.76
	Imp [A _{dc}]	17.41	15.33	17.60	13.14
BNPI condition	P _{max} [W] /Tolerance	819.5±3%	696±3%	805.9±3%	645.0±3%
	V _{oc} [V] /Tolerance	50.54±5%	49.50±5%	49.62±5%	52.10±3%
	I _{sc} [A _{dc}] /Tolerance	20.48±5%	17.86±5%	20.59±5%	15.23±3%
	V _{mp} [V]	42.22	41.10	41.37	43.76
	Imp [A _{dc}]	19.41	16.92	19.48	14.51
aBSI condition	I _{sc} [A _{dc}] /Tolerance	23.05±5%	19.92±5%	22.96±5%	16.99±3%
Bifaciality coefficient	φP _{max} /Tolerance	85%±5%	80%±5%	80%±5%	80%±5%
	φV _{oc} /Tolerance	98%±5%	98%±5%	98%±5%	98%±5%
	φI _{sc} /Tolerance	85%±5%	80%±5%	80%±5%	80%±5%
	Maximum system voltage [V]	1500	1500	1500	1500

	Maximum Over-Current Protection Rating [A]	35	30	35	30
	Module type	TWMNH-66HD615	TWMNH-66HD580	TWMNH-66HD625	N/A
STC condition	P _{max} [W] /Tolerance	615±3%	580±3%	625±3%	N/A
	V _{oc} [V] /Tolerance	48.90±5%	47.50±5%	49.30±5%	N/A
	I _{sc} [A _{dc}] /Tolerance	16.00±5%	15.58±5%	16.12±5%	N/A
	V _{mp} [V]	40.65	39.43	40.96	N/A
	I _{mp} [A _{dc}]	15.13	14.71	15.26	N/A
BNPI condition	P _{max} [W] /Tolerance	678.9±3%	640.3±3%	690.2±3%	N/A
	V _{oc} [V] /Tolerance	48.90±5%	47.50±5%	49.30±5%	N/A
	I _{sc} [A _{dc}] /Tolerance	17.66±5%	17.20±5%	17.80±5%	N/A
	V _{mp} [V]	40.65	39.43	40.96	N/A
	I _{mp} [A _{dc}]	16.70	16.24	16.85	N/A
aBSI condition	I _{sc} [A _{dc}] /Tolerance	19.70±5%	19.18±5%	19.55±5%	N/A
Bifaciality coefficient	φP _{max} /Tolerance	80%±5%	80%±5%	80%±5%	N/A
	φV _{oc} /Tolerance	98%±5%	98%±5%	98%±5%	N/A
	φI _{sc} /Tolerance	80%±5%	80%±5%	80%±5%	N/A
	Maximum system voltage [V]	1500	1500	1500	N/A
	Maximum Over-Current Protection Rating [A]	35	35	35	N/A
Note: Further qualification for higher and /or lower output power see annex 3					

General Product Information:

Module type: TWMND-72HD570 (BOM1)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules ☐ 4.2.1 Modification to frontsheet ☐ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☐ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☒ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☐ 4.2.16 Others	☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMND-72HD580 (BOM2)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules	☐ Test programs for thin-film PV modules
☐ 4.2.1 Modification to frontsheet ☐ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☐ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☒ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☐ 4.2.16 Others	☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMND-72HD585 (BOM3)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules ☐ 4.2.1 Modification to frontsheet ☐ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☐ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☒ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☐ 4.2.16 Others	☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMND-72HD570 (BOM4)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules ☐ 4.2.1 Modification to frontsheet ☒ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☐ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☐ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☐ 4.2.16 Others	☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMND-72HD570 (BOM5)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules ☐ 4.2.1 Modification to frontsheet ☒ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☐ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☐ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☐ 4.2.16 Others	☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMND-72HD570 (BOM6)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules ☐ 4.2.1 Modification to frontsheet ☒ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☒ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☐ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☒ 4.2.16 Others	☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMND-72HD570 (BOM7)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules ☐ 4.2.1 Modification to frontsheet ☒ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☒ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☐ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☒ 4.2.16 Others	☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMND-72HD570 (BOM8)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules	☐ Test programs for thin-film PV modules
☐ 4.2.1 Modification to frontsheet ☒ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☒ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☐ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☒ 4.2.16 Others	☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMNH-48HC435 (BOM13)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules ☒ 4.2.1 Modification to frontsheet ☐ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☒ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☐ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☐ 4.2.16 Others	☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMHF-66HD715 (BOM14)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules ☐ 4.2.1 Modification to frontsheet ☒ 4.2.2 Modification to encapsulation system ☒ 4.2.3 Modification to cell technology ☒ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☒ 4.2.9 Modification to edge sealing ☐ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☒ 4.2.16 Others	☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMHF-66HD715 (BOM15)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules ☐ 4.2.1 Modification to frontsheet ☐ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☒ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☒ 4.2.9 Modification to edge sealing ☐ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☒ 4.2.16 Others	☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMNF-66HD705 (BOM16)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules ☐ 4.2.1 Modification to frontsheet ☐ 4.2.2 Modification to encapsulation system ☒ 4.2.3 Modification to cell technology ☐ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☐ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☐ 4.2.16 Others	☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMHF-66HD740 (BOM17 higher end)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules	☐ Test programs for thin-film PV modules
☐ 4.2.1 Modification to frontsheet ☐ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☐ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☐ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☒ 4.2.16 Others	☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMNH-66HD630 (BOM18 higher end)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules ☐ 4.2.1 Modification to frontsheet ☐ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☐ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☐ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☒ 4.2.16 Others	☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMNF-66HD725 (BOM19 higher end)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules ☐ 4.2.1 Modification to frontsheet ☐ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☐ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☐ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☒ 4.2.16 Others	☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMND-72HD575 (BOM20)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules ☐ 4.2.1 Modification to frontsheet ☒ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☒ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☒ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☐ 4.2.16 Others	☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMND-72HD575 (BOM21)

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:	
<u>Modifications:</u>	
☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 492012695.015	
<u>Model differences and modification:</u>	
☒ Test programs for crystalline silicon PV modules ☐ 4.2.1 Modification to frontsheet ☒ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☒ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☒ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☐ 4.2.16 Others	☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage
Note: The clause references modifications extracted from IEC 62915	

Module type: TWMNH-66HD615 (BOM22)**GENERAL PRODUCT INFORMATION AND OTHER REMARKS:**Modifications:

- ☐ Initial module design qualification
- ☒ Extension of module design qualification
- ☒ Original test report ref. No.: 492012695.015

Model differences and modification:

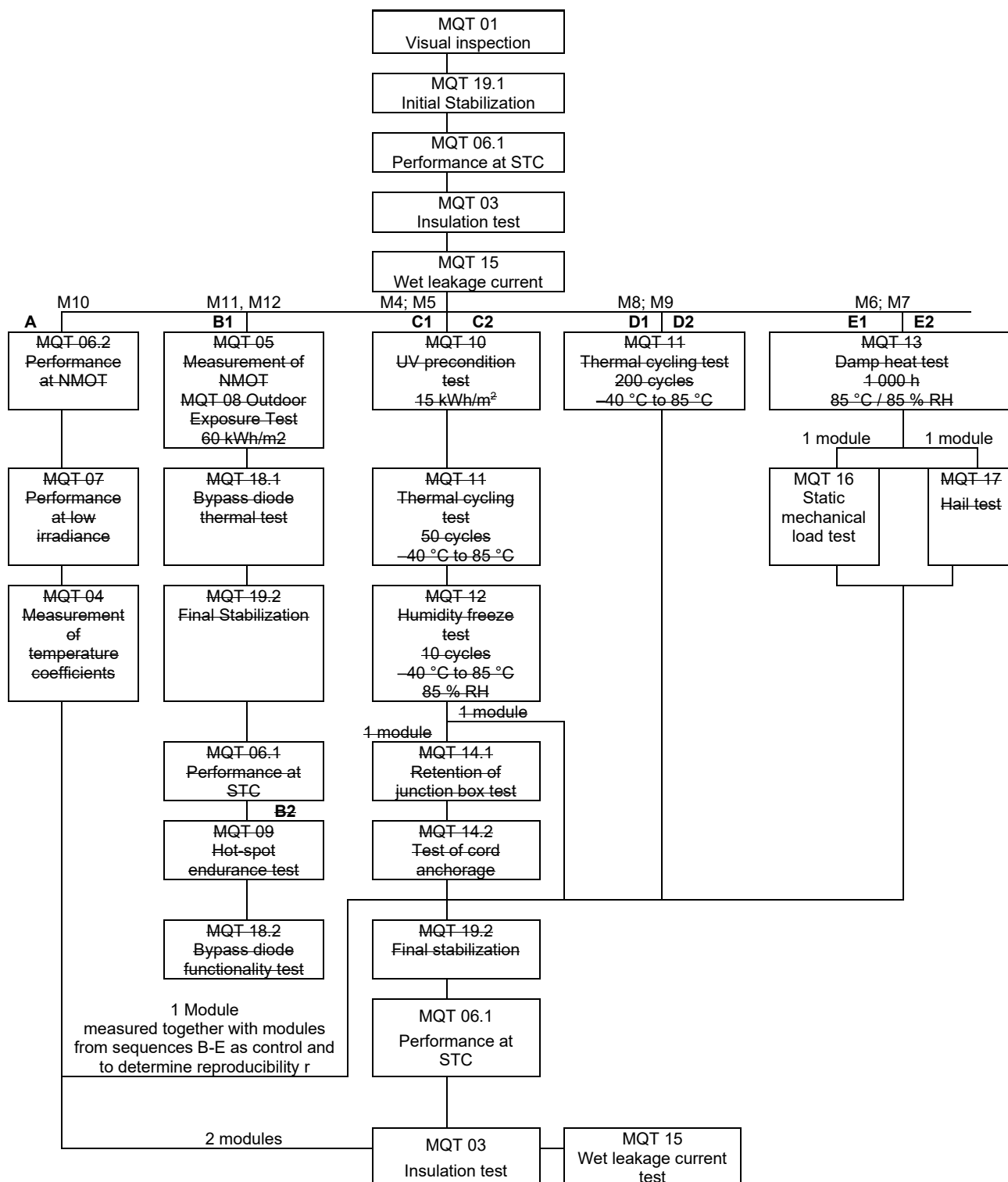
☒ Test programs for crystalline silicon PV modules	☐ Test programs for thin-film PV modules
☐ 4.2.1 Modification to frontsheet	☐ 4.3.1 Modification to frontsheet
☒ 4.2.2 Modification to encapsulation system	☐ 4.3.2 Modification to encapsulation system
☒ 4.2.3 Modification to cell technology	☐ 4.3.3 Modification to front contact (e. g. TCO)
☒ 4.2.4 Modification to cell and string interconnect material or technique	☐ 4.3.4 Modification to cell technology
☐ 4.2.5 Modification to backsheet	☐ 4.3.5 Modification to cell layout
☐ 4.2.6 Modification to electrical termination	☐ 4.3.6 Modification to back contact
☐ 4.2.7 Modification to bypass diode	☐ 4.3.7 Modification to edge deletion
☐ 4.2.8 Modification to electrical circuitry	☐ 4.3.8 Modification to interconnect material or technique
☐ 4.2.9 Modification to edge sealing	☐ 4.3.9 Modification to backsheet
☐ 4.2.10 Modification to frame and/or mounting structure	☐ 4.3.10 Modification to electrical termination
☐ 4.2.11 Change in PV module size	☐ 4.3.11 Modification to bypass diode
☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process	☐ 4.3.12 Modification to edge sealing
☐ 4.2.13 Increase of over-current protection rating	☐ 4.3.13 Modification to frame and/or mounting structure
☐ 4.2.14 Increase of system voltage	☐ 4.3.14 Change in PV module size
☐ 4.2.15 Change in cell fixing tape	☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size
☐ 4.2.16 Others	☐ 4.3.16 Increase of over-current protection rating
	☐ 4.3.17 Increase of system voltage

Note: The clause references modifications extracted from IEC 62915

Module Group Assignment:**Module type: TWMND-72HD570 (BOM1)**

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
1-M6	E1	TWMND-72HD570	Y2E241004000378	ML
1-M10	A	TWMND-72HD570	Y2E241004000393	control
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

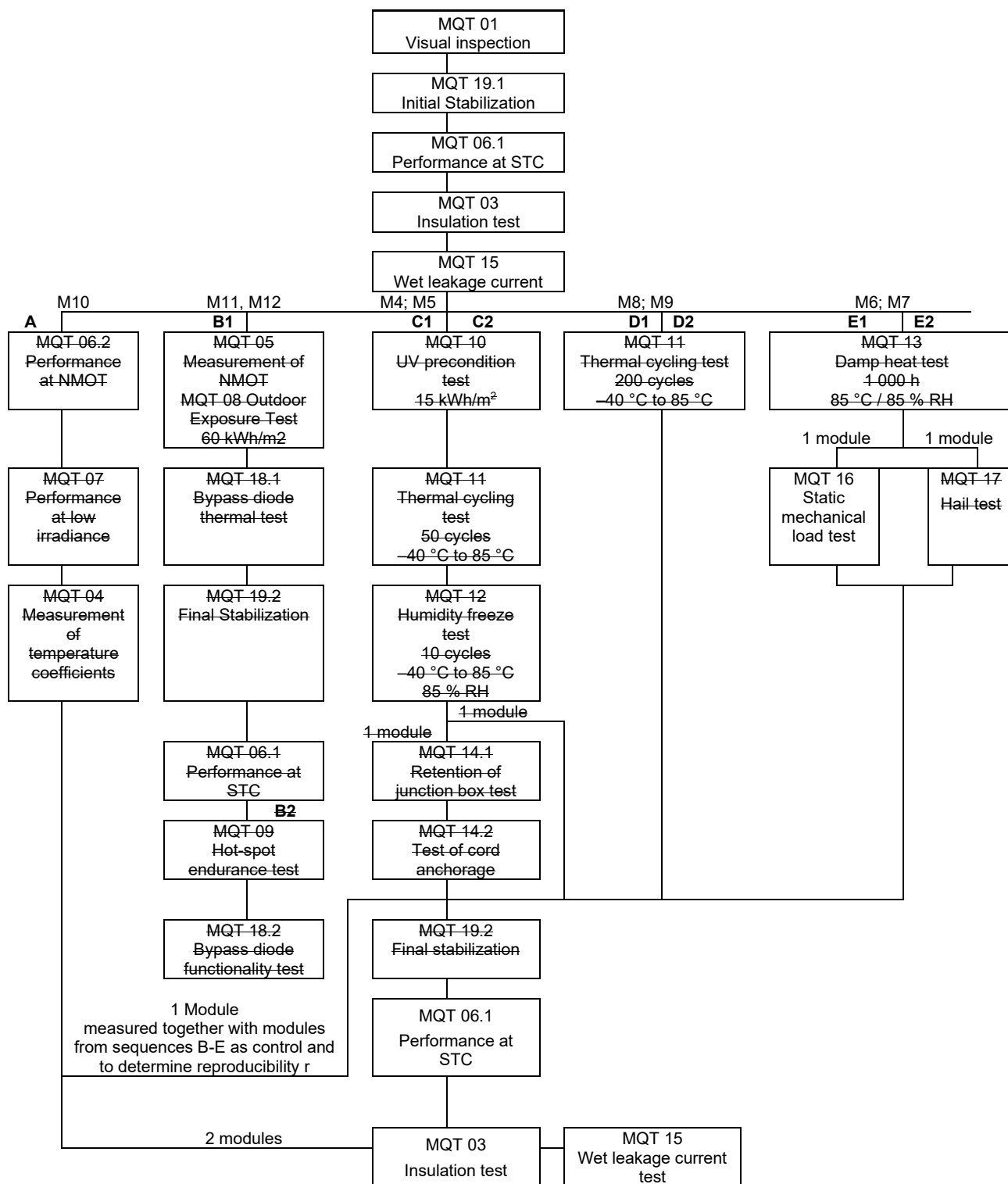
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible, but must be documented.



Module type: TWMND-72HD580 (BOM2)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
2-M6	E1	TWMND-72HD580	S1E242001000190	ML
2-M10	A	TWMND-72HD580	S1E242001000193	control
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

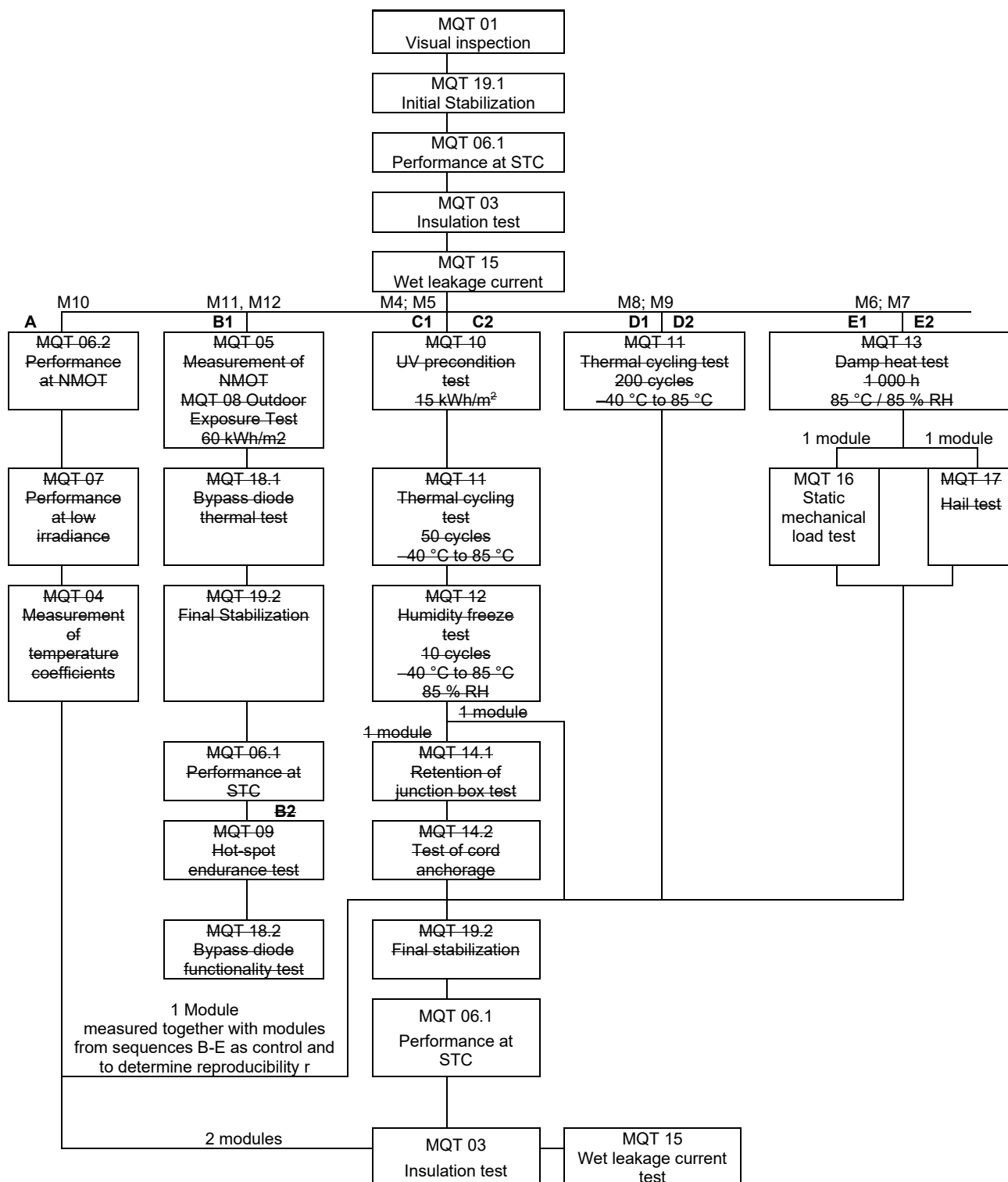
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible, but must be documented.



Module type: TWMND-72HD585 (BOM3)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
3-M6	E1	TWMND-72HD585	Y1E243001000063	ML
3-M10	A	TWMND-72HD585	Y1E243001000065	control
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

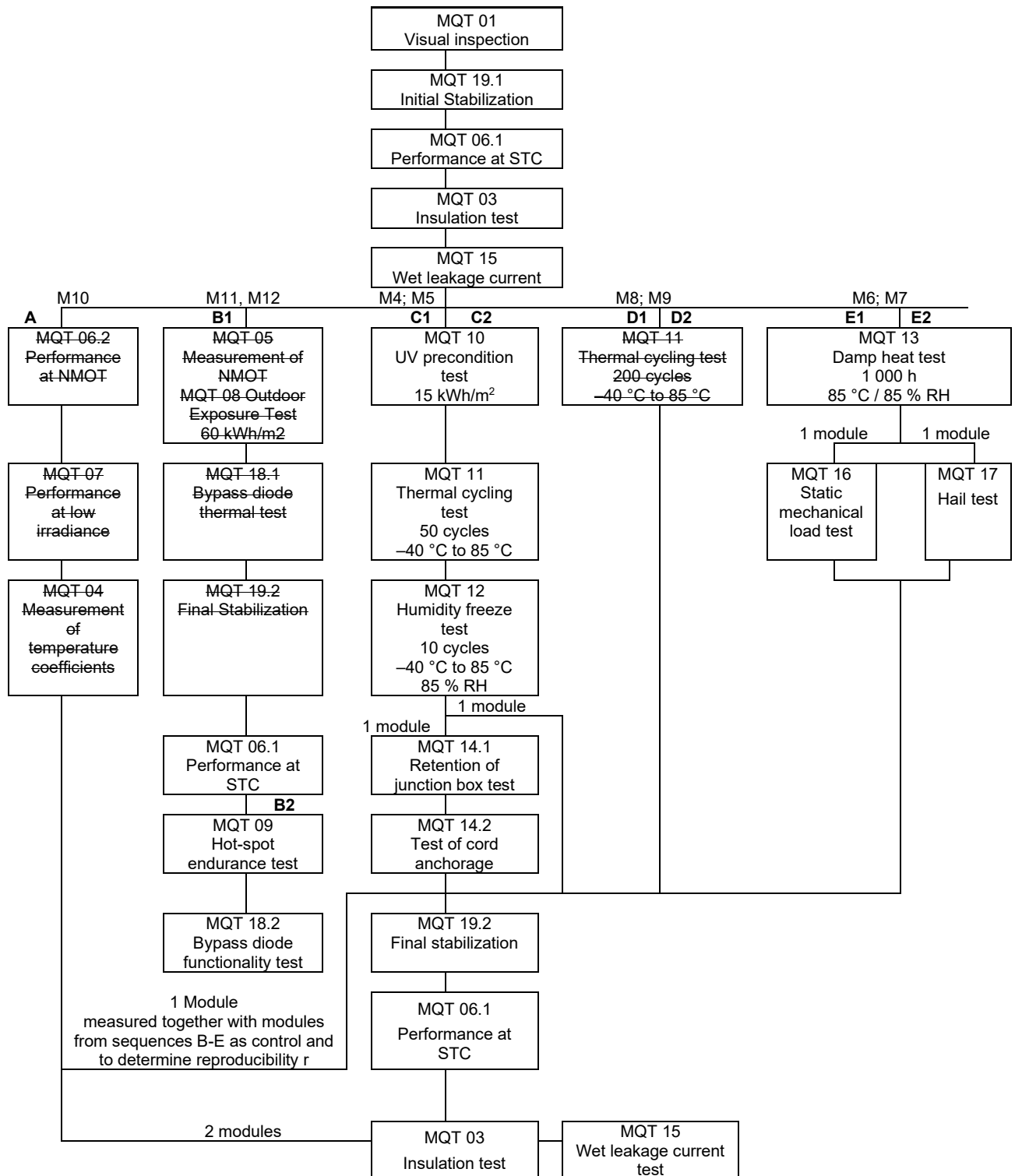
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible, but must be documented.



Module type: TWMND-72HD570 (BOM4)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
4-M4	C1	TWMND-72HD570	H5E236003000225	UV, DML, TC50, HF10, RT
4-M5	C2	TWMND-72HD570	H5E236003000483	UV, DML, TC50, HF10
4-M6	E1	TWMND-72HD570	H5E236003000484	DH, ML
4-M7	E2	TWMND-72HD570	H5E236003000485	DH, HI
4-M10	A	TWMND-72HD570	H5E236003000227	Control
4-M12	B2	TWMND-72HD570	H5E236003000226	HS, BDF
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

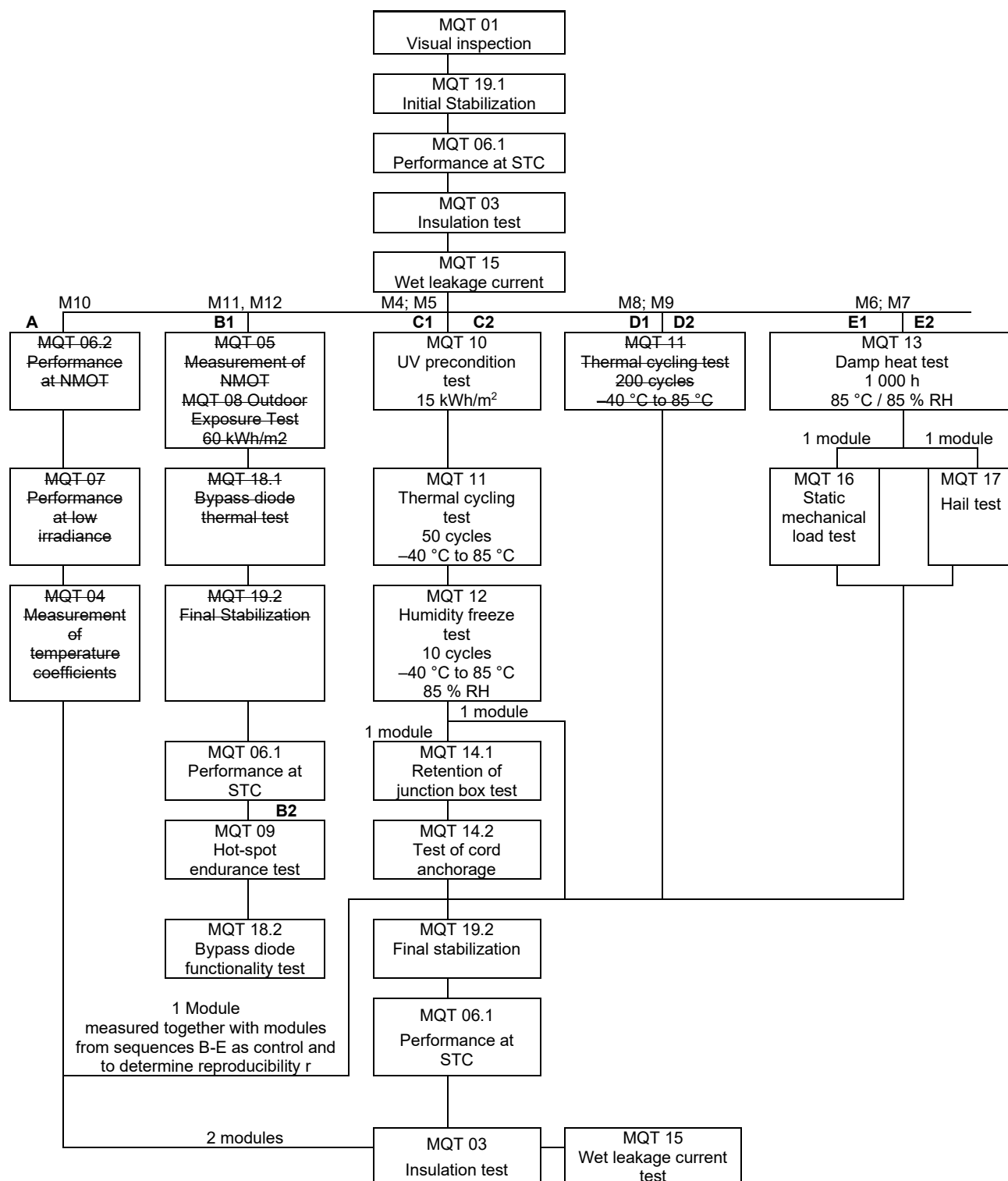
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.



Module type: TWMND-72HD570 (BOM5)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
5-M4	C1	TWMND-72HD570	H5E236003000545	UV, DML, TC50, HF10, RT
5-M5	C2	TWMND-72HD570	H5E236003000205	UV, DML, TC50, HF10
5-M6	E1	TWMND-72HD570	H5E236003000390	DH, ML
5-M7	E2	TWMND-72HD570	H5E236003000384	DH, HI
5-M10	A	TWMND-72HD570	H5E236003000213	Control
5-M12	B2	TWMND-72HD570	H5E236003000471	HS, BDF
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

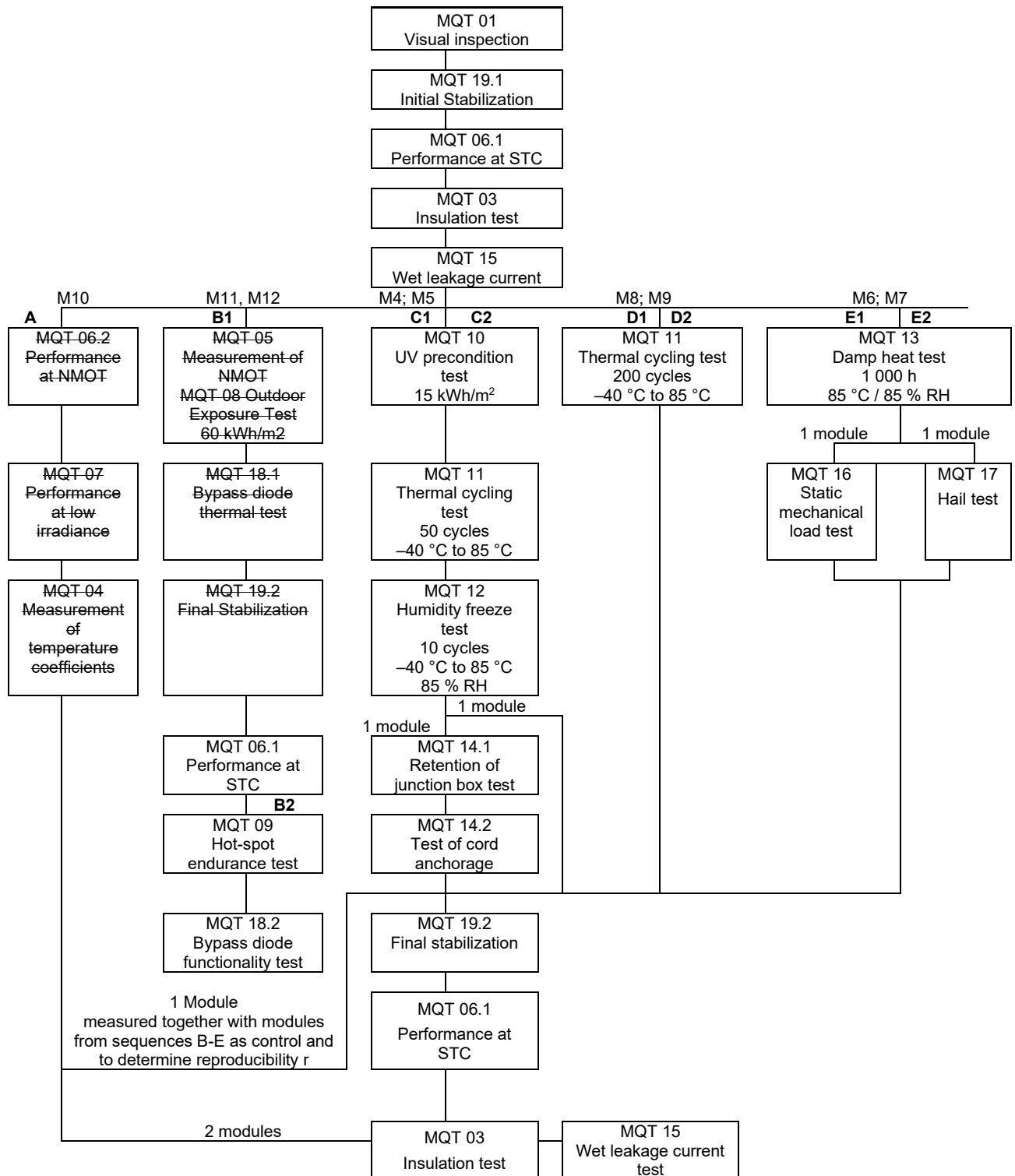
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.



Module type: TWMND-72HD570 (BOM6)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
6-M4	C1	TWMND-72HD570	H5E236003000408	UV, DML, TC50, HF10, RT
6-M5	C2	TWMND-72HD570	H5E236003000312	UV, DML, TC50, HF10
6-M6	E1	TWMND-72HD570	H5E236003000382	DH, ML
6-M7	E2	TWMND-72HD570	H5E236003000047	DH, HI
6-M8	D1	TWMND-72HD570	H5E236003000326	TC200
6-M9	D2	TWMND-72HD570	H5E236003000316	TC200
6-M10	A	TWMND-72HD570	H5E236003000344	Control
6-M12	B2	TWMND-72HD570	H5E236003000112	HS, BDF
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

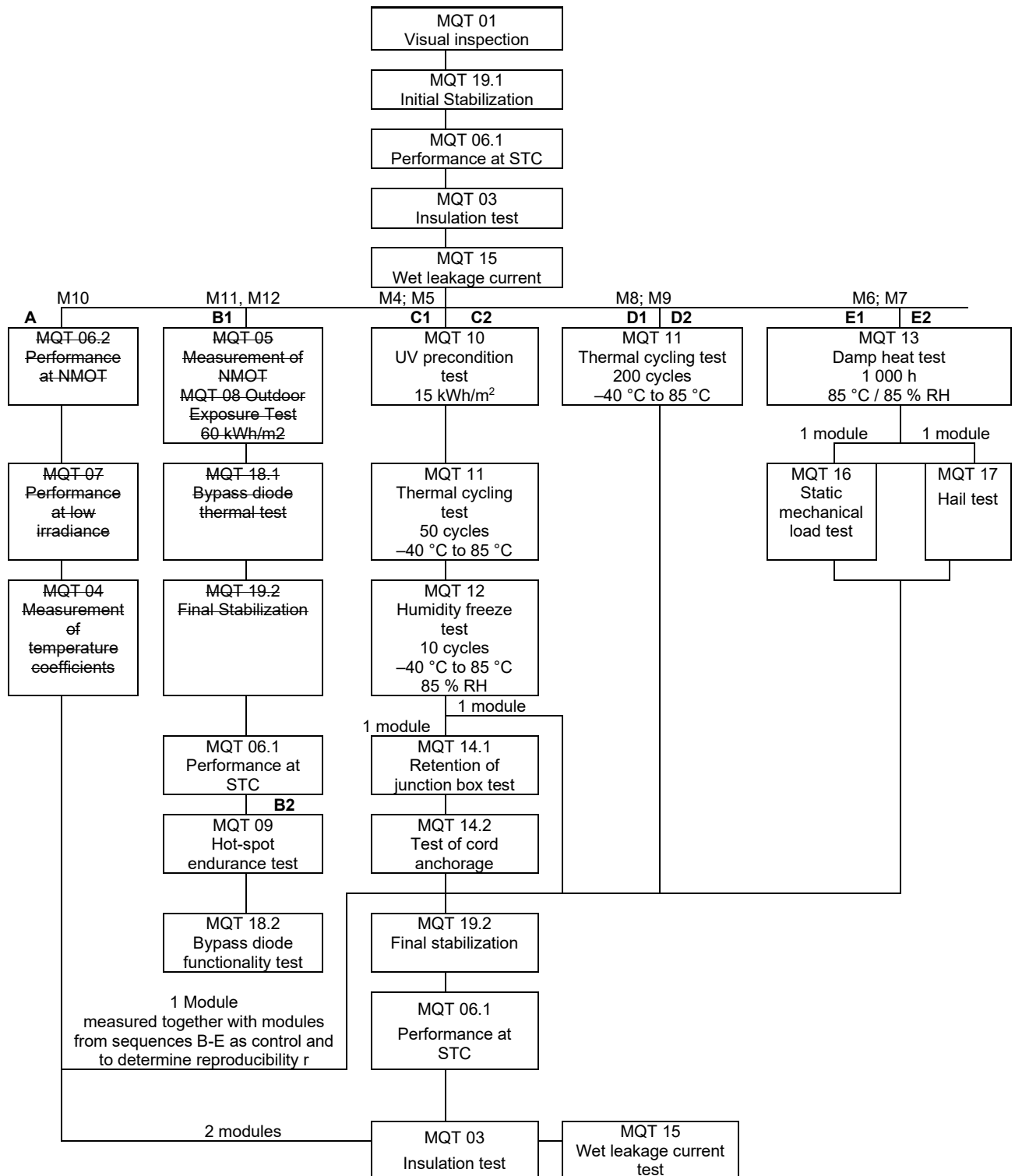
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.



Module type: TWMND-72HD570 (BOM7)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
7-M4	C1	TWMND-72HD570	H5E236003000303	UV, DML, TC50, HF10, RT
7-M5	C2	TWMND-72HD570	H5E236003000239	UV, DML, TC50, HF10
7-M6	E1	TWMND-72HD570	H5E236003000168	DH, ML
7-M7	E2	TWMND-72HD570	H5E236003000259	DH, HI
7-M8	D1	TWMND-72HD570	H5E236003000594	TC200
7-M9	D2	TWMND-72HD570	H5E236003000103	TC200
7-M10	A	TWMND-72HD570	H5E236003000010	Control
7-M12	B2	TWMND-72HD570	H5E236003000083	HS, BDF
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

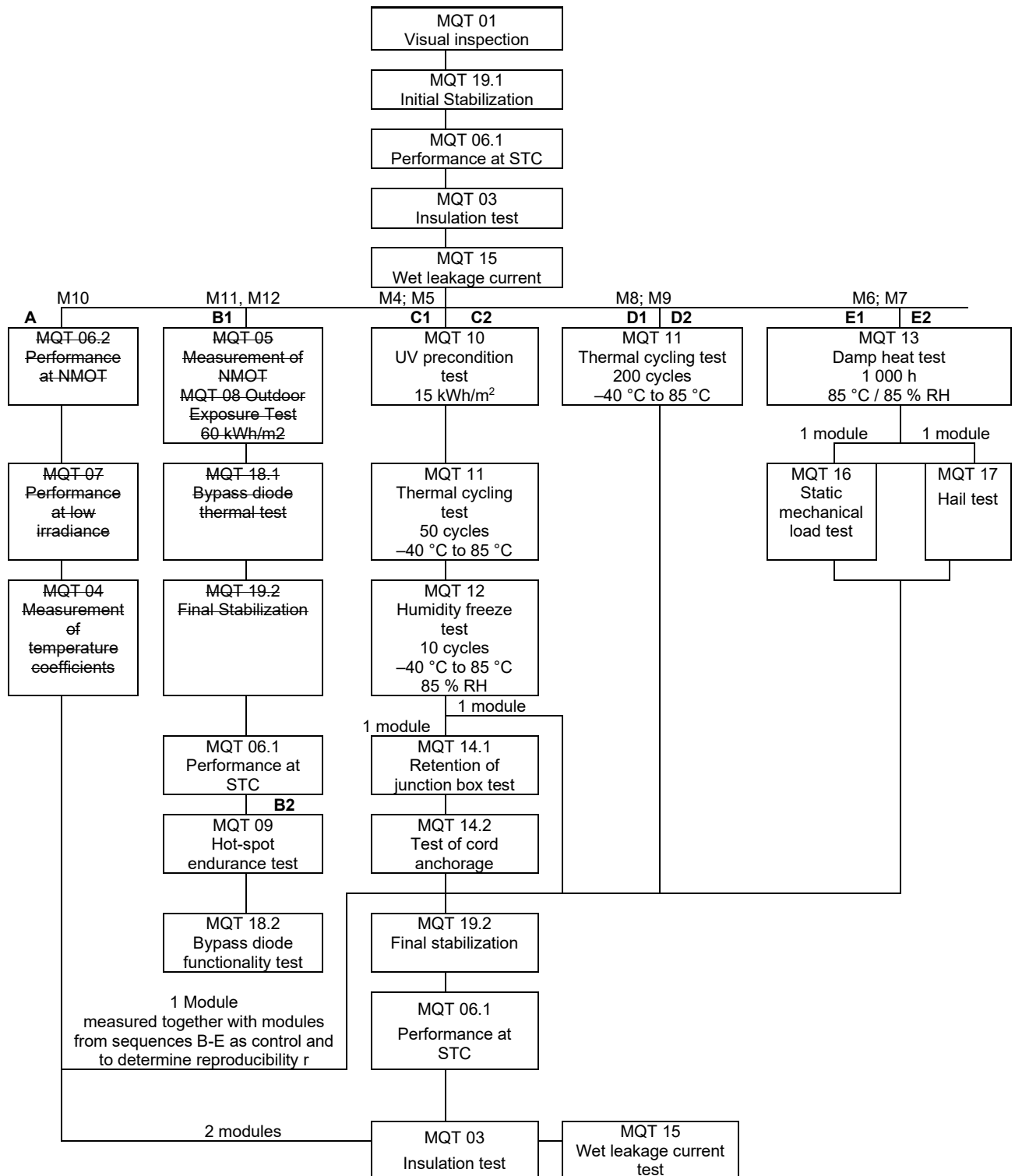
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.



Module type: TWMND-72HD570 (BOM8)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
8-M4	C1	TWMND-72HD570	H5E236003000077	UV, DML, TC50, HF10, RT
8-M5	C2	TWMND-72HD570	H5E236003000065	UV, DML, TC50, HF10
8-M6	E1	TWMND-72HD570	H5E236003000329	DH, ML
8-M7	E2	TWMND-72HD570	H5E236003000530	DH, HI
8-M8	D1	TWMND-72HD570	H5E236003000411	TC200
8-M9	D2	TWMND-72HD570	H5E236003000429	TC200
8-M10	A	TWMND-72HD570	H5E236003000375	Control
8-M12	B2	TWMND-72HD570	H5E236003000368	HS, BDF
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

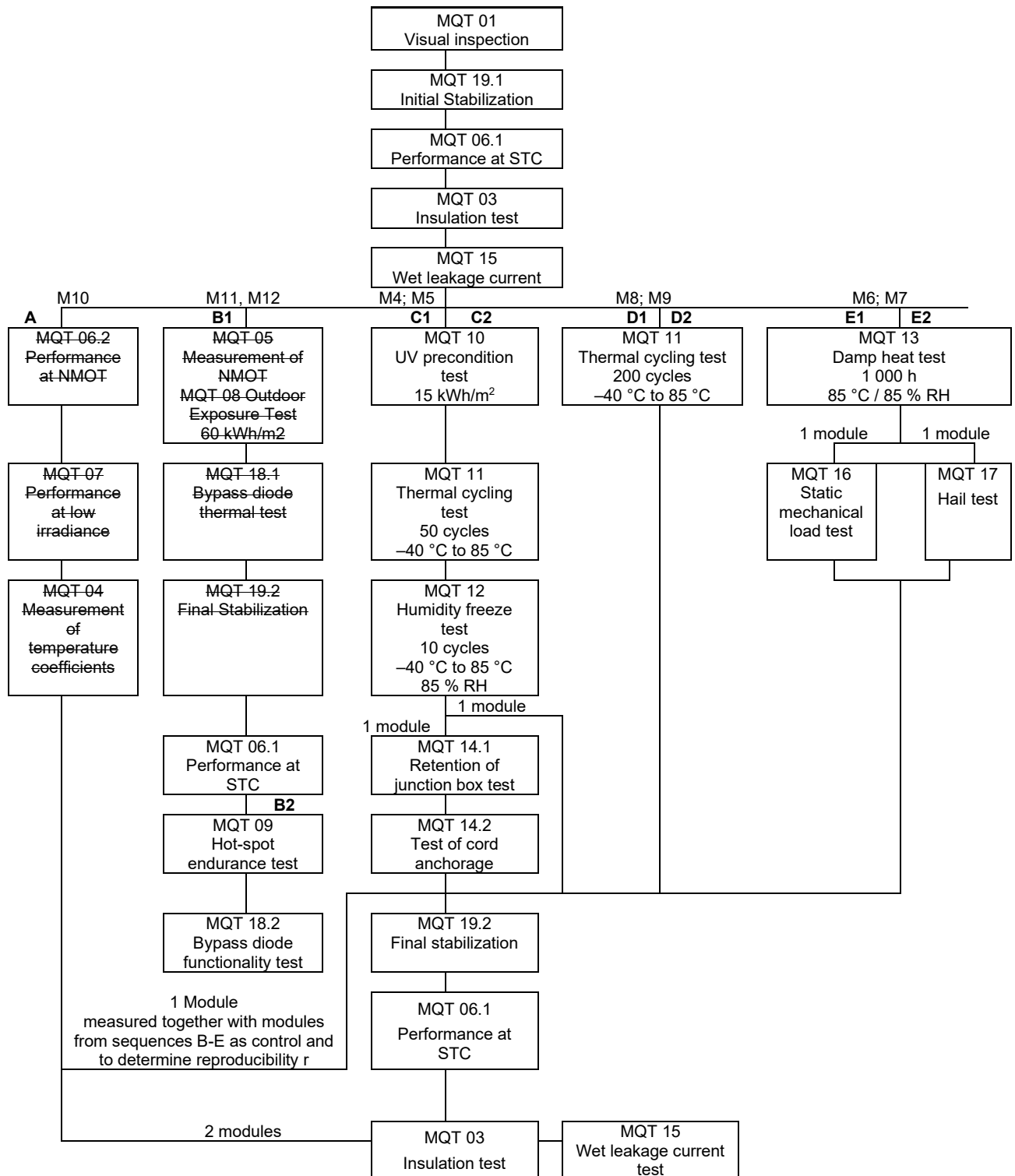
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.



Module type: TWMNH-48HC435 (BOM13)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
13-M4	C1	TWMNH-48HC435	YF202401250004S48TW182E21 6SY2621	UV, DML, TC50, HF10, RT
13-M5	C2	TWMNH-48HC435	YF202401250004S48TW182E21 6SY2629	UV, DML, TC50, HF10
13-M6	E1	TWMNH-48HC435	YF202401250004S48TW182E21 6SY2622	DH, ML
13-M7	E2	TWMNH-48HC435	YF202401250004S48TW182E21 6SY2631	DH, HI
13-M8	D1	TWMNH-48HC435	YF202401250004S48TW182E21 6SY2633	TC200
13-M9	D2	TWMNH-48HC435	YF202401250004S48TW182E21 6SY2634	TC200
13-M10	A	TWMNH-48HC435	YF202401250004S48TW182E21 6SY2636	Control
13-M12	B2	TWMNH-48HC435	YF202401250004S48TW182E21 6SY2638	HS, BDF
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

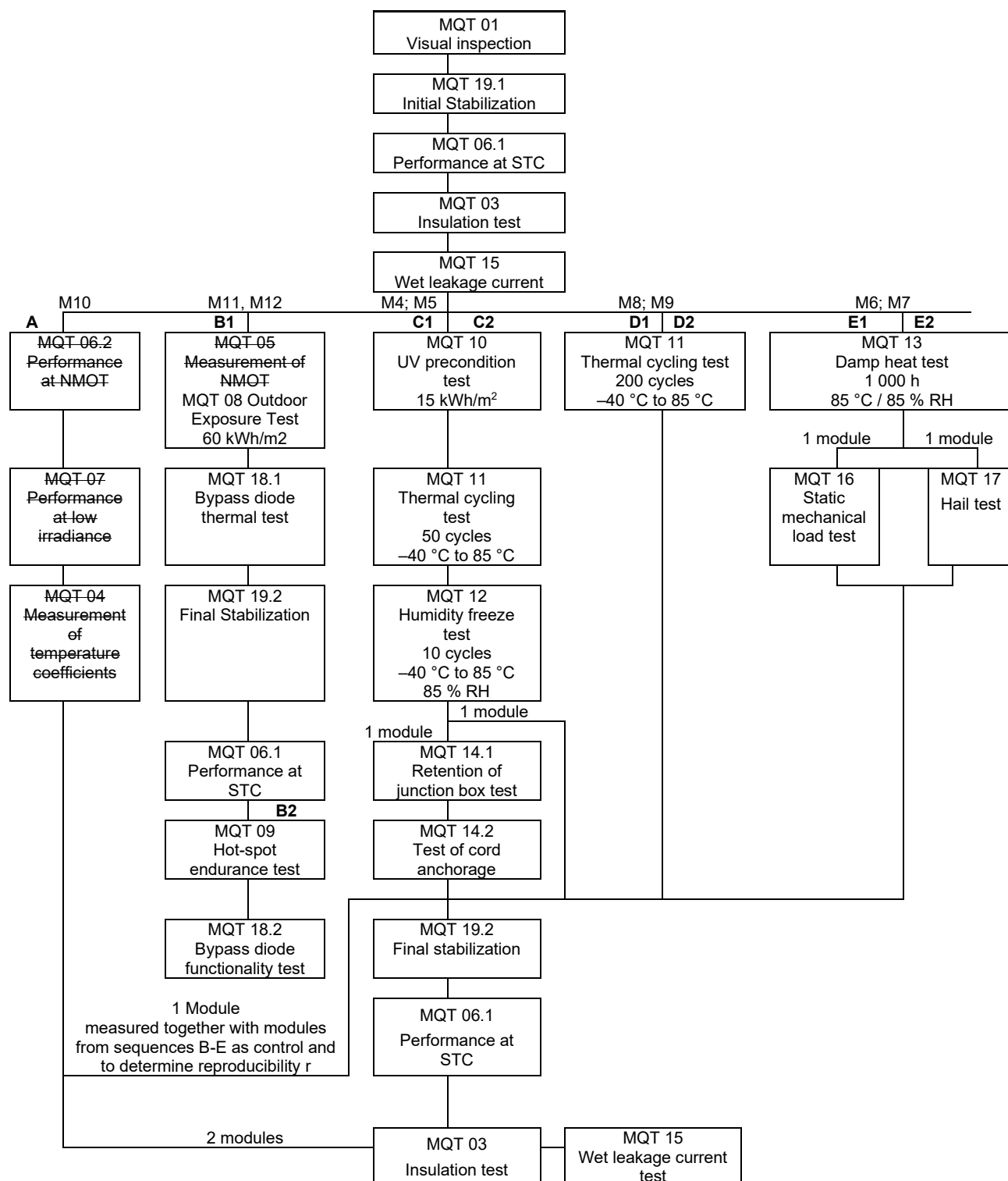
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.



Module type: TWMHF-66HD715 (BOM14)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
14-M4	C1	TWMHF-66HD715	H1E241006000092	UV, DML, TC50, HF10, RT
14-M5	C2	TWMHF-66HD715	H1E241006000093	UV, DML, TC50, HF10
14-M6	E1	TWMHF-66HD715	H1E241004000120	DH, ML
14-M7	E2	TWMHF-66HD715	H1E241001000094	DH, HI
14-M8	D1	TWMHF-66HD715	H1E23B005000002	TC200
14-M9	D2	TWMHF-66HD715	H1E241001000087	TC200
14-M10	A	TWMHF-66HD715	H1E23C002000148	Control
14-M11	B1	TWMHF-66HD715	H1E241001000088	OD, BDT
14-M12	B2	TWMHF-66HD715	H1E23C002000085	HS, BDF
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

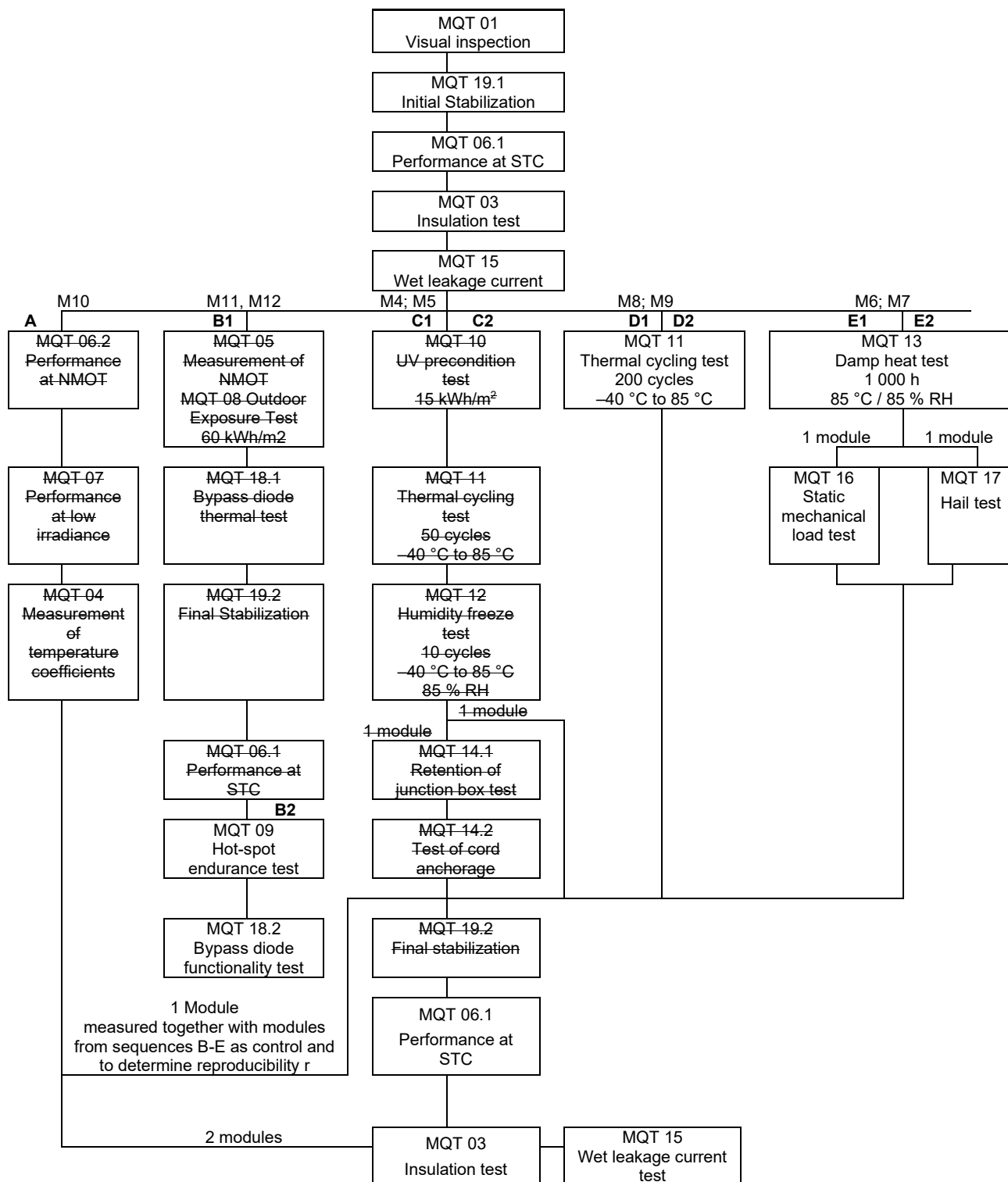
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.



Module type: TWMHF-66HD715 (BOM15)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
15-M6	E1	TWMHF-66HD715	C1M241003000495	DH, ML
15-M7	E2	TWMHF-66HD715	C1M241003000497	DH, HI
15-M8	D1	TWMHF-66HD715	C1M241003000493	TC200
15-M9	D2	TWMHF-66HD715	C1M241003000499	TC200
15-M10	A	TWMHF-66HD715	C1M241003000500	Control
15-M12	B2	TWMHF-66HD715	C1M241003000494	HS, BDF
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

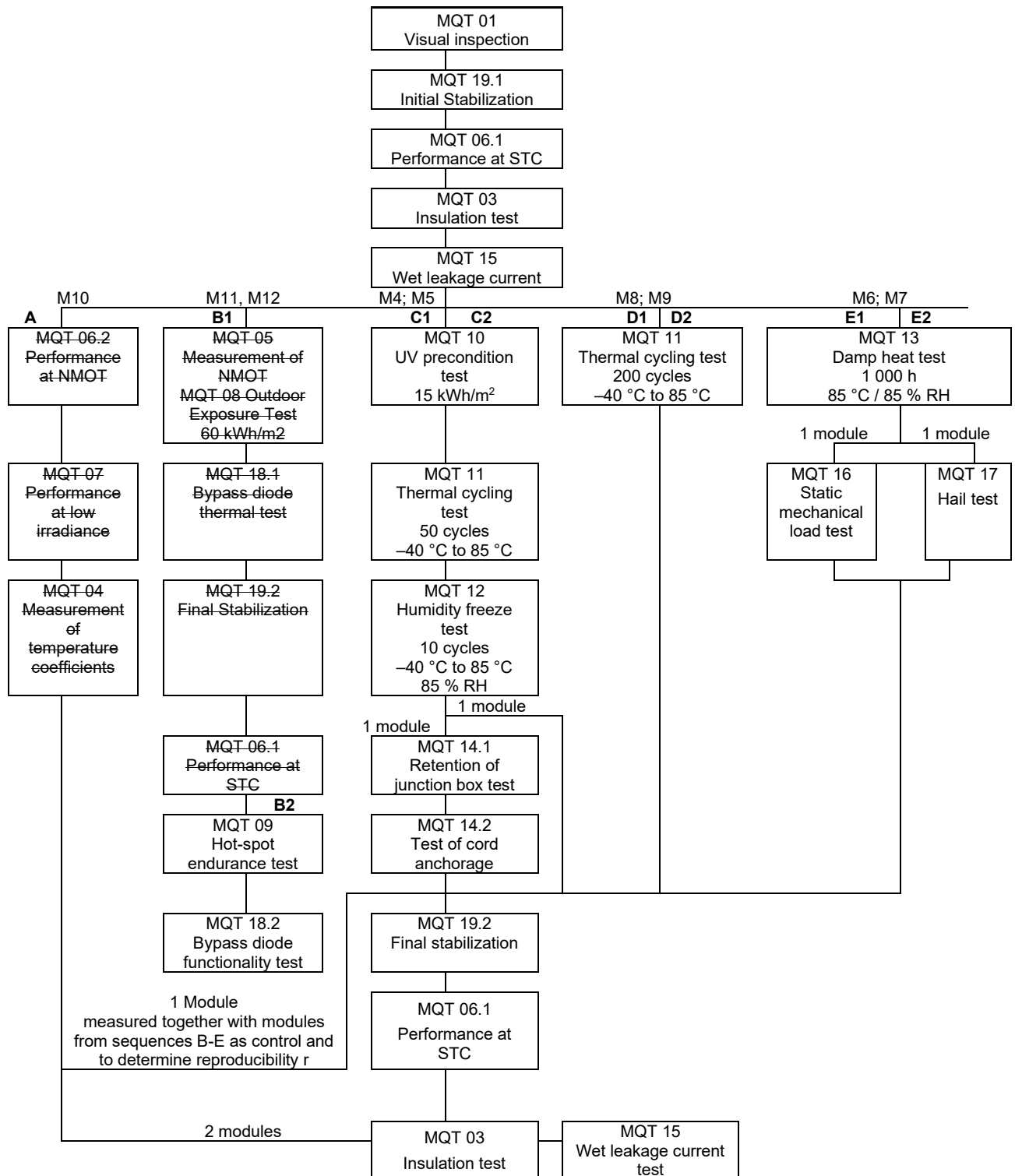
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.



Module type: TWMNF-66HD705 (BOM16)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
16-M4	C1	TWMNF-66HD705	C1M241008000102	UV, DML, TC50, HF10, RT
16-M5	C2	TWMNF-66HD705	C1M241008000097	UV, DML, TC50, HF10
16-M6	E1	TWMNF-66HD705	C1M241008000106	DH, ML
16-M7	E2	TWMNF-66HD705	C1M241008000045	DH, HI
16-M8	D1	TWMNF-66HD705	C1M241008000131	TC200
16-M9	D2	TWMNF-66HD705	C1M241008000112	TC200
16-M10	A	TWMNF-66HD705	C1M241008000130	Control
16-M12	B2	TWMNF-66HD705	C1M241008000110	HS, BDF
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

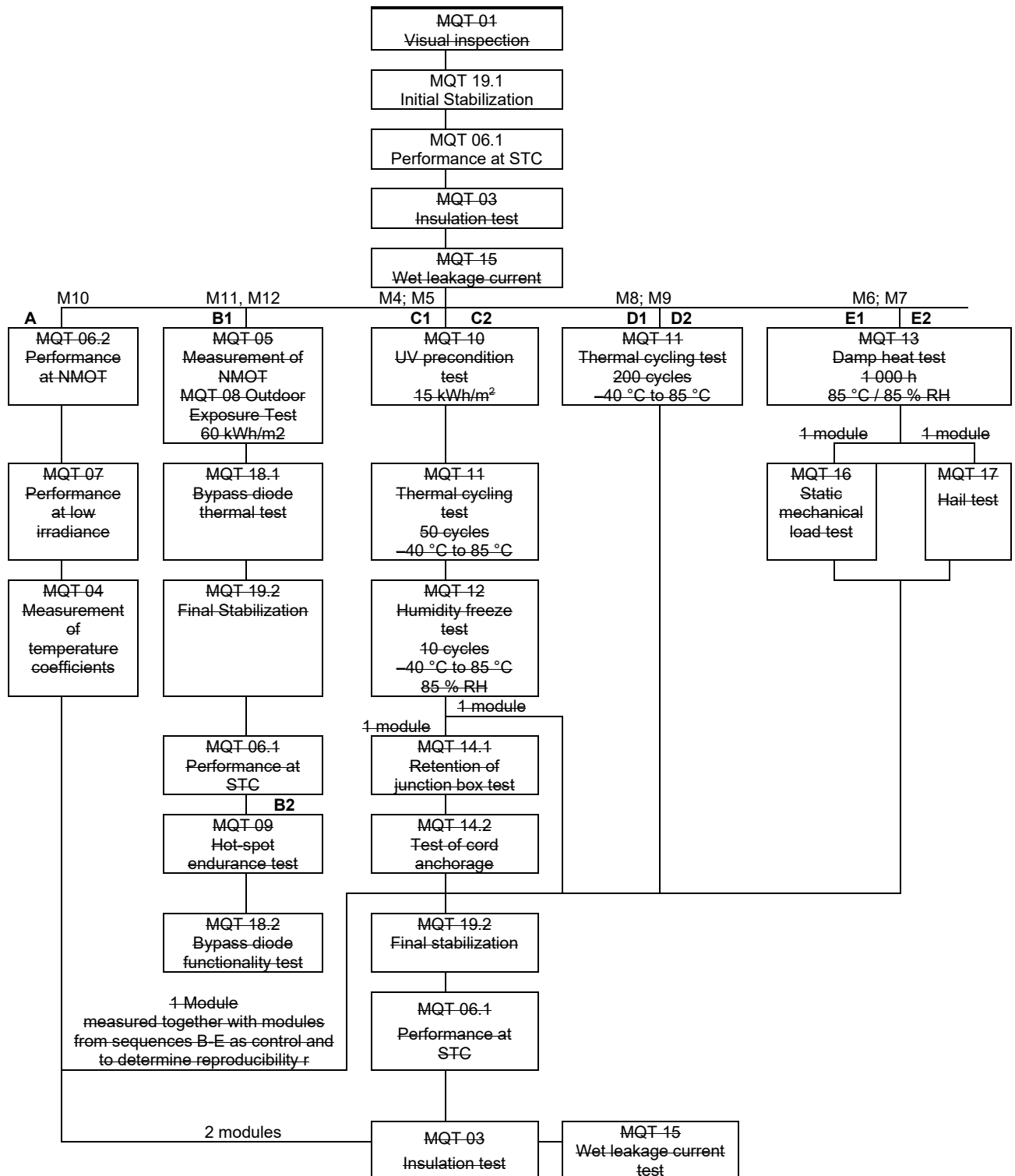
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.



Module type: TWMHF-66HD740 (BOM17 higher end)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
17-high1	higher end power	TWMNF-66HD740	H1E245006000122	Refer to annex 3
17-high2	higher end power	TWMNF-66HD740	H1E245006000123	Refer to annex 3
Note (1)	Use the “General product information” field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

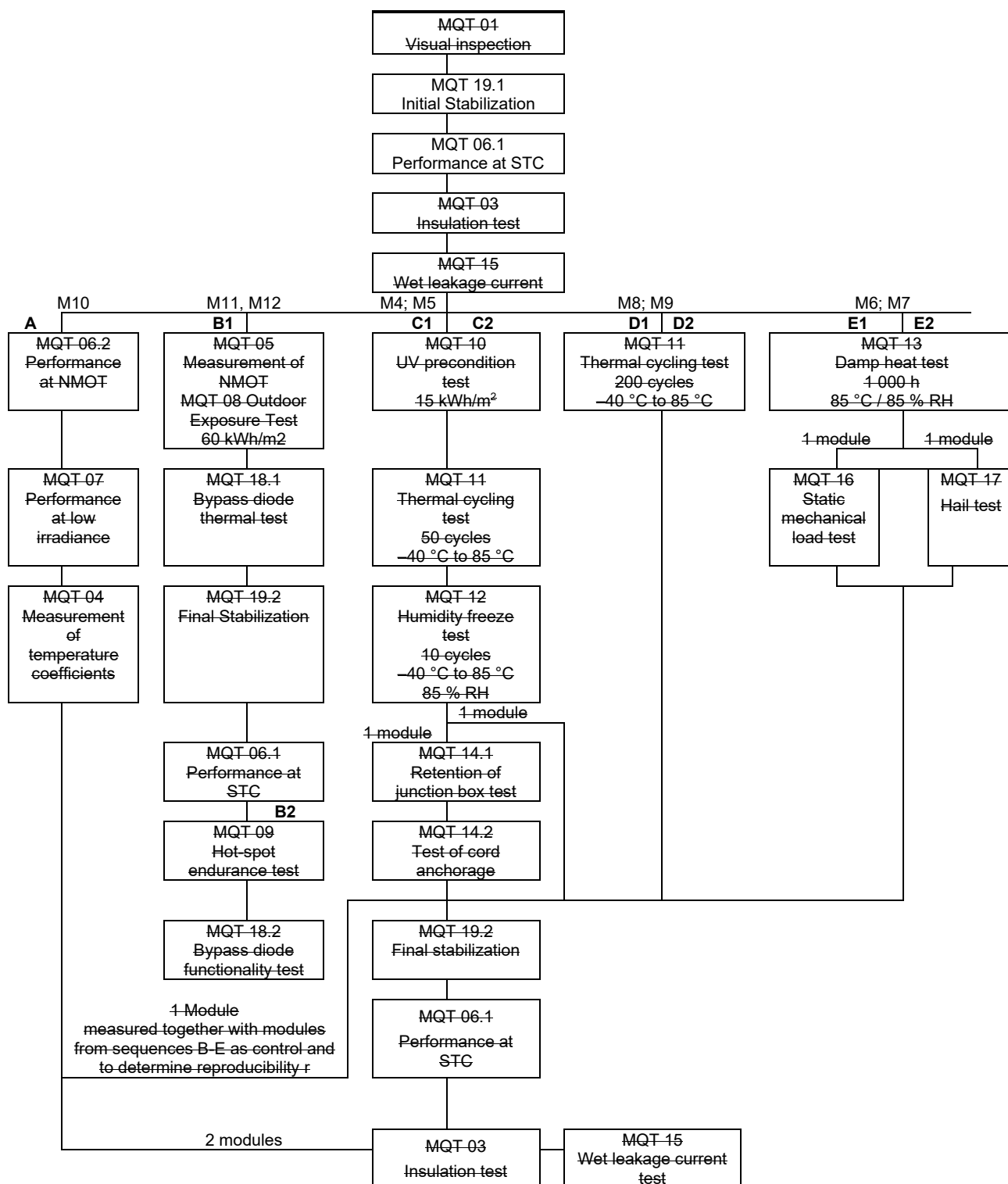
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.



Module type: TWMNH-66HD630 (BOM18 higher end)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
18-high1	higher end power	TWMNH-66HD630	YF202405140003S66TW210AT 2161519	Refer to annex 3
18-high2	higher end power	TWMNH-66HD630	YF202405140003S66TW210AT 2161524	Refer to annex 3
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

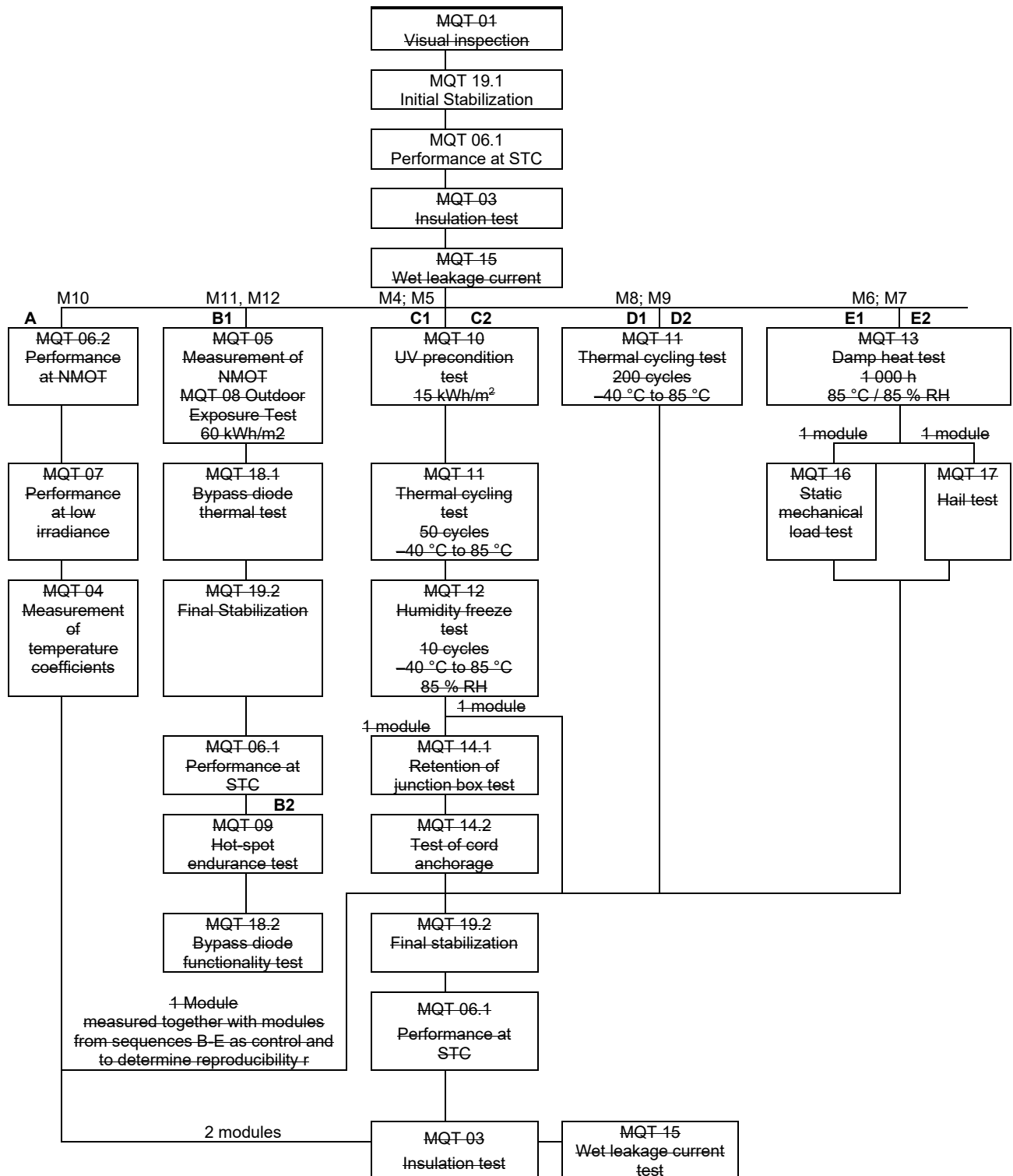
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.



Module type: TWMNF-66HD725 (BOM19 higher end)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
19-high1	higher end power	TWMNF-66HD725	YF202405140003S66TW210T21 8E1503	Refer to annex 3
19-high2	higher end power	TWMNF-66HD725	YF202405140003S66TW210T21 8E1502	Refer to annex 3
Note (1)	Use the “General product information” field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

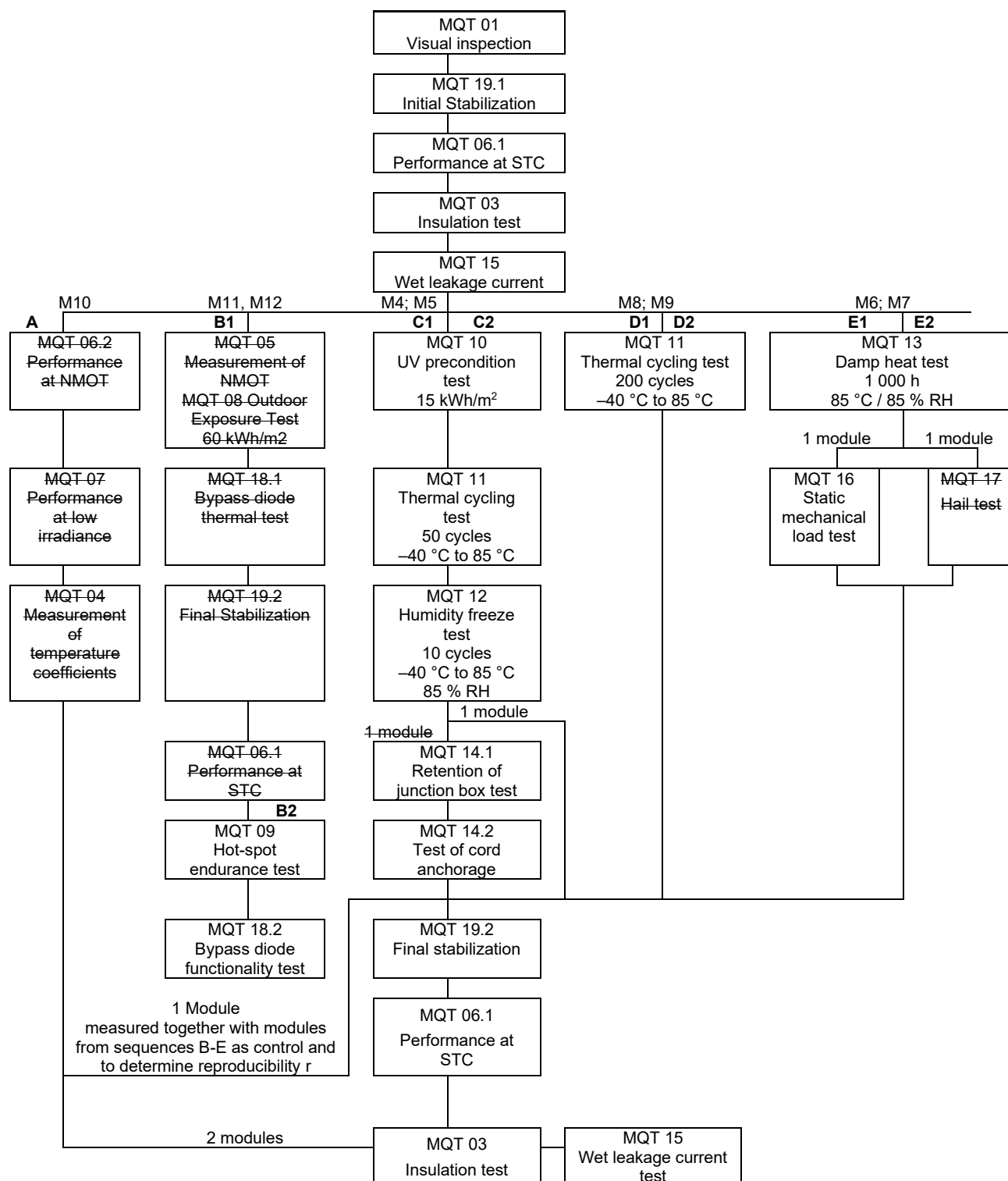
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.



Module type: TWMND-72HD575 (BOM20)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
20-M4	C1	TWMND-72HD575	H5E236003000175	UV, DML, TC50, HF10, RT
20-M5	C2	TWMND-72HD575	H5E236003000558	UV, DML, TC50, HF10
20-M6	E1	TWMND-72HD575	H5E236003000256	DH, ML
20-M7	E2	TWMND-72HD575	H5E236003000197	DH
20-M8	D1	TWMND-72HD575	H5E236003000055	TC200
20-M9	D2	TWMND-72HD575	H5E236003000407	TC200
20-M10	A	TWMND-72HD575	H5E236003000563	Control
20-M12	B2	TWMND-72HD575	H5E236003000294	HS, BDF
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

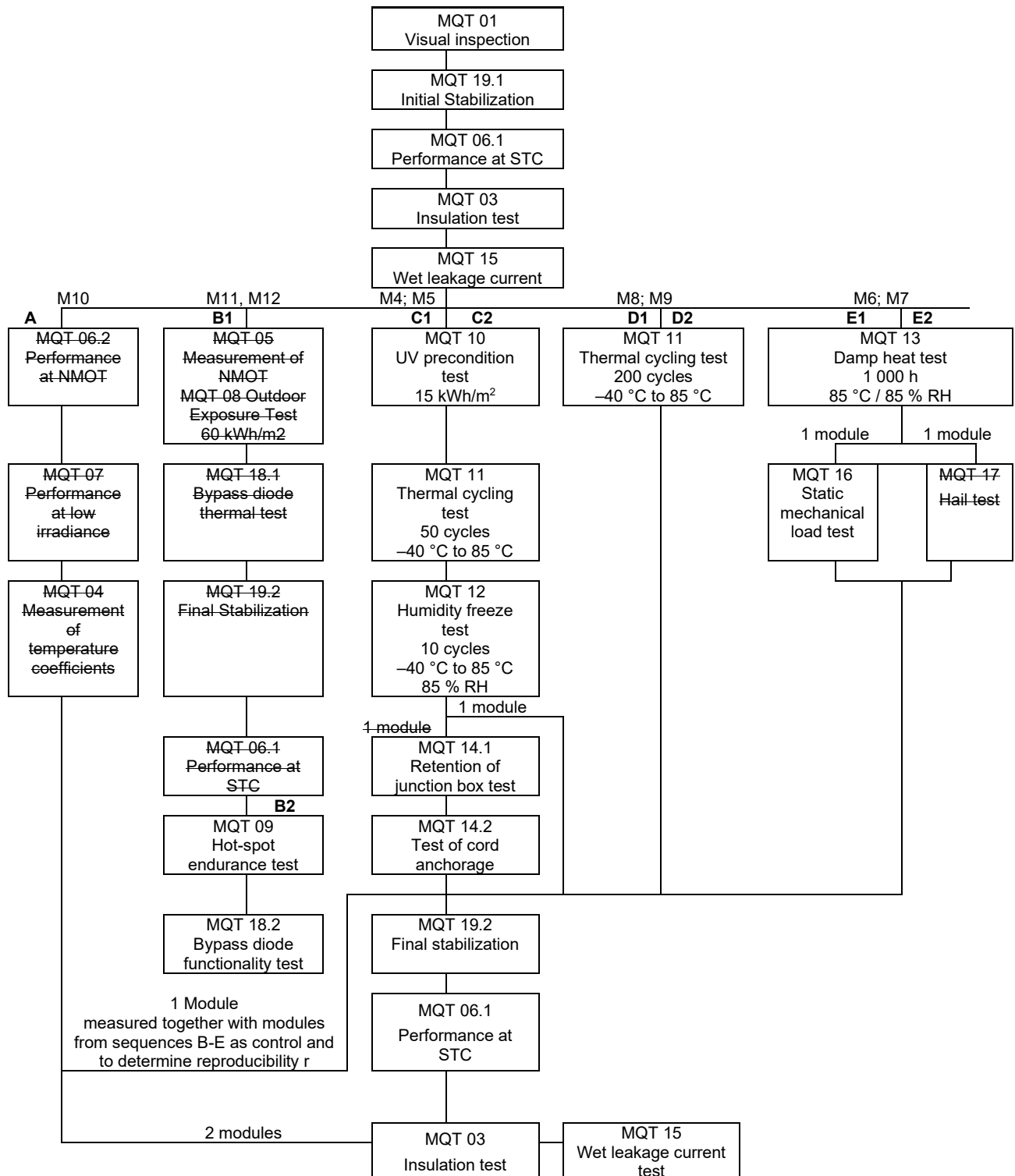
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.



Module type: TWMND-72HD575 (BOM22)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
21-M4	C1	TWMND-72HD575	H5E236003000180	UV, DML, TC50, HF10, RT
21-M5	C2	TWMND-72HD575	H5E236003000560	UV, DML, TC50, HF10
21-M6	E1	TWMND-72HD575	H5E236003000261	DH, ML
21-M7	E2	TWMND-72HD575	H5E236003000437	DH
21-M8	D1	TWMND-72HD575	H5E236003000572	TC200
21-M9	D2	TWMND-72HD575	H5E236003000419	TC200
21-M10	A	TWMND-72HD575	H5E236003000564	Control
21-M12	B2	TWMND-72HD575	H5E236003000260	HS, BDF
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (2)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (3)	The module numbers/identifiers are set in accordance to IEC TS 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

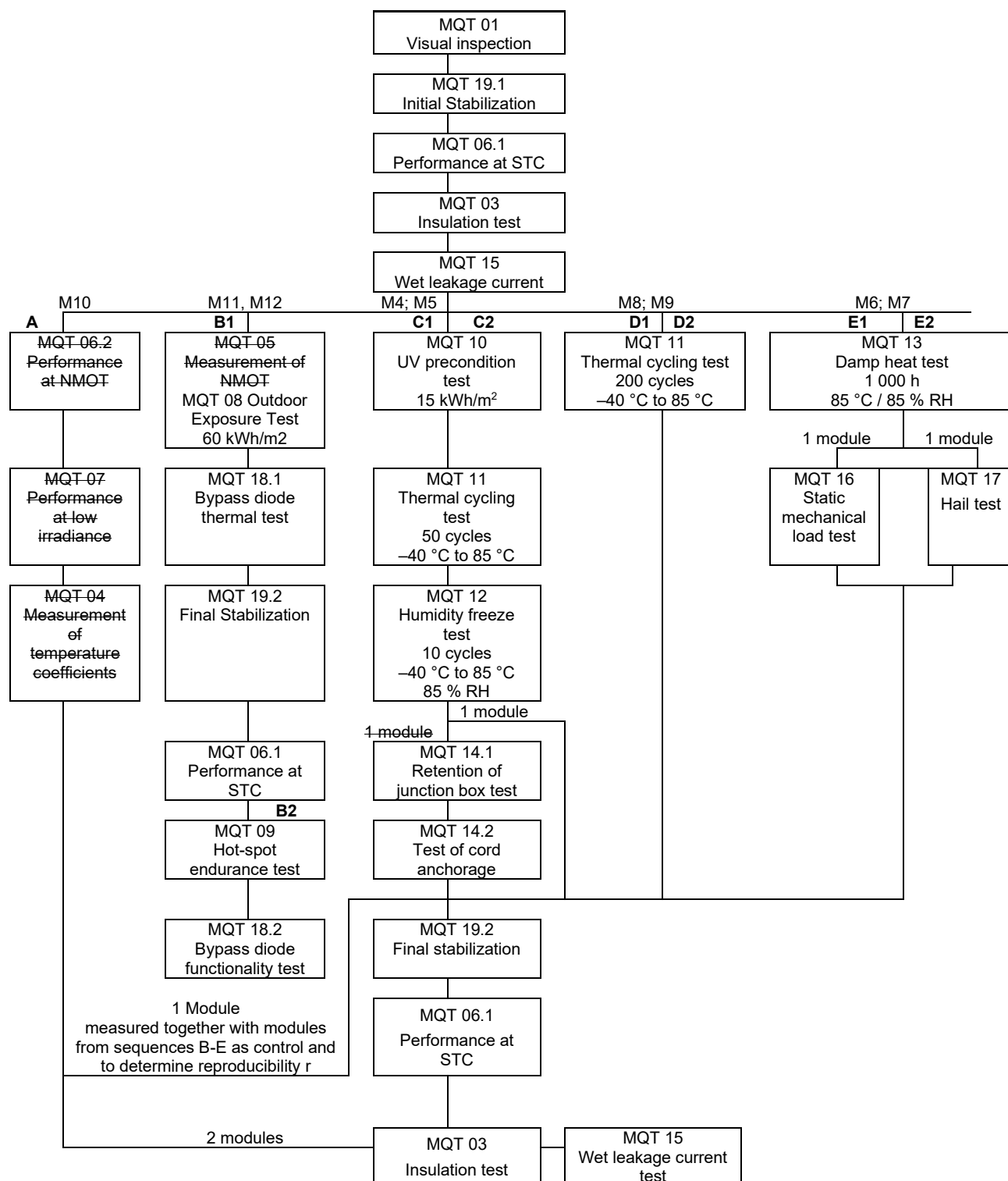
11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.



Module type: TWMNH-66HD615 (BOM23)

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
22-M4	C1	TWMNH-66HD615	YF20240201S66TW210AT2200121	UV, DML, TC50, HF10, RT
22-M5	C2	TWMNH-66HD615	YF20240201S66TW210AT2200122	UV, DML, TC50, HF10
22-M6	E1	TWMNH-66HD615	YF20240201S66TW210AT2200111	DH, ML
22-M7	E2	TWMNH-66HD615	YF20240201S66TW210AT2200115	DH, HI
22-M8	D1	TWMNH-66HD615	YF20240201S66TW210AT2200119	TC200
22-M9	D2	TWMNH-66HD615	YF20240201S66TW210AT2200120	TC200
22-M10	A	TWMNH-66HD615	YF202402220002S66TW210AT2202228	control
22-M11	B1	TWMNH-66HD615	YF202402220002S66TW210AT2202230	OD, BDT
22-M12	B2	TWMNH-66HD615	YF20240201S66TW210AT2200109	HS, BDF
22-high1	higher end power	TWMNH-66HD625	YF202402220002S66TW210AT2202224	Refer to annex 3
22-high2	higher end power	TWMNH-66HD625	YF202402220002S66TW210AT2202234	Refer to annex 3
22-low1	lower end power	TWMNH-66HD580	YF202402220002S66TW210AT2202202	Refer to annex 3
22-low2	lower end power	TWMNH-66HD580	YF202402220002S66TW210AT2202226	Refer to annex 3
Note (1)	Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible, but must be documented.



5. MARKING AND DOCUMENTATION			
5.1	Name Plate		
	All electrical data is shown as relative to standard test conditions (1 000 W/m ² , 25 °C, AM 1,5 according to IEC TS 61836).	Yes	P
	International symbols are used where applicable.	Yes	P
	The module includes clear and indelible markings:		
	a. Name, registered trade name or registered trade mark of manufacturer	Yes	P
	b. Type or model number designation	Yes	P
	c. Serial number (unless marked on other part of product)	Laminated inside	P
	d. Date and place of manufacture, alternatively serial number allowing to trace the date and place of manufacture;	Traceable by SN	P
	e. Maximum system voltage	Yes	P
	f. Class of protection against electrical shock	Yes	P
	g. Voltage at open-circuit or Voc including tolerances.	Yes	P
	h. Current at short-circuit or Isc including tolerances	Yes	P
	i. Module maximum power or Pmax including tolerances	Yes	P
5.2	Documentation		
5.2.1	Minimum requirements		
	Modules are supplied with documentation describing the methods of electrical and mechanical installation as well as the electrical ratings of the module	Yes	P
	The documentation states the class of protection against electrical shock under which the module has been qualified and any specific limitations required for that class.	Yes	P
	The documentation assures that installers and operators receive appropriate and sufficient documentation for safe installation, use, and maintenance of the PV modules.	Yes	P
5.2.2	Information given in the documentation		
	a. All information required under 5.1 e) to i)	Yes	P
	b. Overcurrent protection device type and rating are e.g. given in IEC 60269-6	Yes	P
	Maximum series/parallel module configuration is recommended	Yes	P

	c. Manufacturer's stated tolerance for Voc, Isc and maximum power output under standard test conditions	Yes	P
	d. Temperature coefficient for voltage at open-circuit	Yes	P
	e. Temperature coefficient for maximum power	Yes	P
	f. Temperature coefficient for short-circuit current	Yes	P
	All electrical data mentioned above shown as relative to standard test conditions (1 000 W/m ² , 25 °C, AM 1,5 according to IEC TS 61836)	Yes	P
	g. Nominal module operating temperature (NMOT) is specified	N/A	N/A
	h. Performance at NMOT (MQT 06.2) is specified	N/A	N/A
	i. Performance at low irradiance (MQT 07) is specified	Yes	P
	International symbols used where applicable	Yes	P
	Compliance checked by inspection and MQT 04 through MQT 07	Yes	P
	The electrical documentation includes a detailed description of the electrical installation wiring method to be used		
	j. The minimum cable diameters for modules intended for field wiring	Yes	P
	k. Any limitations on wiring methods and wire management that apply to the wiring compartment or box;	Yes	P
	l. The size, type, material and temperature rating of the conductors to be used	Yes	P
	m. Type of terminals for field wiring	Yes	P
	n. Specific PV connector model/types and manufacturer to which the module connectors are mated	Yes	P
	o. The bonding method(s) to be used (if applicable); all provided or specified hardware is identified in the documentation	Yes	P
	p. The type and ratings of bypass diode to be used (if applicable)	Yes	P
	q. limitations to the mounting situation (e.g., slope, orientation, mounting means, cooling)	Yes	P
	r. A statement indicating the fire rating(s) and the applied standard and the limitations to that rating (e.g., installation slope, sub-structure or other applicable installation information)	Yes	P

	s. A statement indicating the design load per each mechanical means for securing the module as evaluated during the static mechanical load test according to MQT 16. At discretion of the manufacturer the test load and/or the safety factor γ_m may be noted, too	Yes	P
	The installation instructions include relevant parameters specified by manufacturer or the following statement or the equivalent: <i>"Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of I_{sc} and V_{oc} marked on this module should be multiplied by a factor of 1,25 when determining component voltage ratings, conductor current ratings, and size of controls connected to the PV output."</i>	Yes	P
5.2.3	Assembly instructions		N/A
	Provided with a product shipped in subassemblies, detailed and adequate to the degree required to facilitate complete and safe assembly of the product	N/A	N/A
Supplementary information: N/A			

7. PASS CRITERIA					
7.2	Power output and electric circuitry				—
7.2.1	Verification of rated label values (Gate No. 1)				—
	Manufacturer's tolerances and Laboratory uncertainties				—
		t ₁	t ₂	t ₃	—
	manufacturer's rated lower/upper production tolerance in %	3	3 or 5	3 or 5	
		m ₁	m ₂	m ₃	
	measurement uncertainty in % of laboratory	Refer to Annex 1 for details.			

	Laboratory reproducibility r	1-M6#: -0.57 2-M6#: 0.08 3-M6#: 0.26 4-M4#, 4-M5#: 0.22 4-M6#, 4-M7#: 0.29 5-M4#, 5-M5#: 0.20 5-M6#, 5-M7#: 0.13 6-M4#, 6-M5#: 0.15 6-M6#, 6-M7#: 0.10 6-M8#, 6-M9#: 0.21 7-M4#, 7-M5#: 0.12 7-M6#, 7-M7#: 0.16 7-M8#, 7-M9#: 0.20 8-M4#, 8-M5#: 0.17 8-M6#, 8-M7#: 0.13 8-M8#, 8-M9#: 0.24 13-M4#, 13-M5#: -0.05 13-M6#: 0.21 13-M7#: -0.36 13-M8#, 13-M9#: 0.22 14-M4#, 14-M5#: 0.11 14-M6#, 14-M7#: 0.03 14-M8#, 14-M9#: 0.09 14-M11#: 0.12 15-M6#, 15-M7#: 0.14 15-M8#, 15-M9#: 0.11 16-M4#, 16-M5#: 0.06 16-M6#, 16-M7#: 0.09 16-M8#, 16-M9#: 0.11 20-M4#, 20-M5#: 0.12 20-M6#, 20-M7#: 0.17 20-M8#, 20-M9#: 0.08 21-M4#, 21-M5#: 0.09 21-M6#, 21-M7#: 0.12 21-M8#, 21-M9#: 0.17 22-M4#, 22-M5#: 0.18 22-M6#, 22-M7#: 0.21 22-M8#, 22-M9#: 0.26	
	After stabilization, each individual module meets the requirements	—	
	P _{max}	See Table 03	P
	V _{oc}	See Table 03	P
	I _{sc}	See Table 03	P

	After stabilization the arithmetic average $\bar{P}_{\max}$ of all modules meet the requirements.	See Table 03	P
7.2.2	Maximum power degradation during type approval testing (Gate #2)		—
	At the end of each test sequence or for sequence B after bypass diode test, each test sample meets the requirements for $P_{\max}$		P
7.2.3	Electrical circuitry		—
	Samples do not exhibit an open-circuit during the tests		P
7.3	Visual defects		—
	There is no visual evidence of a major defect.		P
7.4	Electrical safety		—
	The insulation test (MQT 03) requirements are met after the tests		P
	The wet leakage current test (MQT 15) requirements met at the beginning and at the end of each sequence		P
	Specific requirements of the individual tests are met		P
Supplementary information: N/A			

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Testing Overview**Module type: TWMND-72HD570 (BOM1)**

4. Testing Overview			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 1-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# N/A	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	N/A

Sequence C	2 Modules	Sample# N/A	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	N/A
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	N/A
4.12	Humidity-freeze test (MQT 12).....	See Table 15	N/A

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
Sequence C1	1 Module	Sample# N/A	—
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	N/A	N/A

Sequence D	2 Modules	Sample# N/A	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	N/A

Sequence E	2 Modules	Samples N/A	—
4.13	Damp heat test (MQT 13)	See Table 18	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	N/A

Sequence E1	1 Module	Sample 1-M6	—
4.16	Static mechanical load test (MQT 16).....	See Table 19	P
4.22	Bending test (MQT 22).....	See Table 20	N/A

Sequence E2	1 Module	Sample N/A	—
4.17	Hail test (MQT 17)	See Table 21	N/A

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD580 (BOM2)

4. Testing Overview			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 2-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# N/A	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	N/A

Sequence C	2 Modules	Sample# N/A	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	N/A
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	N/A
4.12	Humidity-freeze test (MQT 12).....	See Table 15	N/A

Sequence C1	1 Module	Sample# N/A	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	N/A	N/A

Sequence D	2 Modules	Sample# N/A	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	N/A

Sequence E	2 Modules	Samples N/A	—
4.13	Damp heat test (MQT 13)	See Table 18	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	N/A

Sequence E1	1 Module	Sample 2-M6	—
4.16	Static mechanical load test (MQT 16).....	See Table 19	P
4.22	Bending test (MQT 22).....	See Table 20	N/A

Sequence E2	1 Module	Sample N/A	—
4.17	Hail test (MQT 17)	See Table 21	N/A

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD585 (BOM3)

4. Testing Overview			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 3-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# N/A	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	N/A

Sequence C	2 Modules	Sample# N/A	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	N/A
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	N/A
4.12	Humidity-freeze test (MQT 12).....	See Table 15	N/A

Sequence C1	1 Module	Sample# N/A	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	N/A	N/A

Sequence D	2 Modules	Sample# N/A	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	N/A

Sequence E	2 Modules	Samples N/A	—
4.13	Damp heat test (MQT 13)	See Table 18	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	N/A

Sequence E1	1 Module	Sample 3-M6	—
4.16	Static mechanical load test (MQT 16)	See Table 19	P
4.22	Bending test (MQT 22)	See Table 20	N/A

Sequence E2	1 Module	Sample N/A	—
4.17	Hail test (MQT 17)	See Table 21	N/A

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD570 (BOM4)

4. TESTING OVERVIEW			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 4-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# 4-M12	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	P

Sequence C	2 Modules	Sample# 4-M4, 4-M5	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	P
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	P
4.12	Humidity-freeze test (MQT 12).....	See Table 15	P

Sequence C1	1 Module	Sample# 4-M4	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	TW-PVJB01-ab, Certificate no. B 090075 0017	N/A

Sequence D	2 Modules	Sample# N/A	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	N/A

Sequence E	2 Modules	Sample# 4-M6, 4-M7	—
4.13	Damp heat test (MQT 13)	See Table 18	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	P

Sequence E1	1 Module	Sample# 4-M6	—
4.16	Static mechanical load test (MQT 16).....	See Table 19	P
4.22	Bending test (MQT 22).....	See Table 20	N/A

Sequence E2	1 Module	Sample# 4-M7	—
4.17	Hail test (MQT 17)	See Table 21	P

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD570 (BOM5)

4. TESTING OVERVIEW			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 5-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# 5-M12	—
4.8	Outdoor exposure test (MQT 08).....	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	P

Sequence C	2 Modules	Sample# 5-M4, 5-M5	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	P
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	P
4.12	Humidity-freeze test (MQT 12).....	See Table 15	P

Sequence C1	1 Module	Sample# 5-M4	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	TW-PVJB01-ab Certificate no. B 090075 0017	N/A

Sequence D	2 Modules	Sample# N/A	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	N/A

Sequence E	2 Modules	Sample# 5-M6, 5-M7	—
4.13	Damp heat test (MQT 13)	See Table 18	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	P

Sequence E1	1 Module	Sample# 5-M6	—
4.16	Static mechanical load test (MQT 16).....	See Table 19	P
4.22	Bending test (MQT 22).....	See Table 20	N/A

Sequence E2	1 Module	Sample# 5-M7	—
4.17	Hail test (MQT 17)	See Table 21	P

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD570 (BOM6)

4. TESTING OVERVIEW			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 6-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# 6-M12	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	P

Sequence C	2 Modules	Sample# 6-M4, 6-M5	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	P
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	P
4.12	Humidity-freeze test (MQT 12).....	See Table 15	P

Sequence C1	1 Module	Sample# 6-M4	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	TW-PVJB01-ab, Certificate no.: B 090075 0017	N/A

Sequence D	2 Modules	Sample# 6-M8, 6-M9	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	P

Sequence E	2 Modules	Sample# 6-M6, 6-M7	—
4.13	Damp heat test (MQT 13)	See Table 18	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	P

Sequence E1	1 Module	Sample# 6-M6	—
4.16	Static mechanical load test (MQT 16)	See Table 19	P
4.22	Bending test (MQT 22)	See Table 20	N/A

Sequence E2	1 Module	Sample# 6-M7	—
4.17	Hail test (MQT 17)	See Table 21	P

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD570 (BOM7)

4. TESTING OVERVIEW			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 7-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# 7-M12	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	P

Sequence C	2 Modules	Sample# 7-M4, 7-M5	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	P
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	P
4.12	Humidity-freeze test (MQT 12).....	See Table 15	P

Sequence C1	1 Module	Sample# 7-M4	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	TW-PVJB01-ab, Certificate no.: B 090075 0017	N/A

Sequence D	2 Modules	Sample# 7-M8, 7-M9	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	P

Sequence E	2 Modules	Sample# 7-M6, 7-M7	—
4.13	Damp heat test (MQT 13)	See Table 18	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	P

Sequence E1	1 Module	Sample# 7-M6	—
4.16	Static mechanical load test (MQT 16)	See Table 19	P
4.22	Bending test (MQT 22)	See Table 20	N/A

Sequence E2	1 Module	Sample# 7-M7	—
4.17	Hail test (MQT 17)	See Table 21	P

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD570 (BOM8)

4. TESTING OVERVIEW			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 8-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# 8-M12	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	P

Sequence C	2 Modules	Sample# 8-M4, 8-M5	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	P
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	P
4.12	Humidity-freeze test (MQT 12).....	See Table 15	P

Sequence C1	1 Module	Sample# 8-M4	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	TW-PVJB01-ab, Certificate no.: B 090075 0017	N/A

Sequence D	2 Modules	Sample# 8-M8, 8-M9	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	P

Sequence E	2 Modules	Sample# 8-M6, 8-M7	—
4.13	Damp heat test (MQT 13)	See Table 18	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	P

Sequence E1	1 Module	Sample# 8-M6	—
4.16	Static mechanical load test (MQT 16).....	See Table 19	P
4.22	Bending test (MQT 22).....	See Table 20	N/A

Sequence E2	1 Module	Sample# 8-M7	—
4.17	Hail test (MQT 17)	See Table 21	P

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMNH-48HC435 (BOM13)

4. TESTING OVERVIEW			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 13-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# 13-M12	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	P

Sequence C	2 Modules	Sample# 13-M4, 13-M5	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	P
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	P
4.12	Humidity-freeze test (MQT 12).....	See Table 15	P

Sequence C1	1 Module	Sample# 13-M4	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	TW-PVJB01-ab, Certificate no.: B 090075 0017	N/A

Sequence D	2 Modules	Sample# 13-M8, 13-M9	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	P

Sequence E	2 Modules	Sample# 13-M6, 13-M7	—
4.13	Damp heat test (MQT 13)	See Table 18	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	P

Sequence E1	1 Module	Sample# 13-M6	—
4.16	Static mechanical load test (MQT 16)	See Table 19	P
4.22	Bending test (MQT 22)	See Table 20	N/A

Sequence E2	1 Module	Sample# 13-M7	—
4.17	Hail test (MQT 17)	See Table 21	P

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMHF-66HD715 (BOM14)

4. TESTING OVERVIEW			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 14-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# 14-M11, 14-M12	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	P
4.18.1	Bypass diode thermal test (MQT 18.1)		P
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	P
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	P
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	P

Sequence C	2 Modules	Sample# 14-M4, 14-M5	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	P
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	P
4.12	Humidity-freeze test (MQT 12).....	See Table 15	P

Sequence C1	1 Module	Sample# 14-M4	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	TW-PVJB01-ab, Certificate no.: B 090075 0017	N/A

Sequence D	2 Modules	Sample# 14-M8, 14-M9	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	P

Sequence E	2 Modules	Sample# 14-M6, 14-M7	—
4.13	Damp heat test (MQT 13)	See Table 18	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	P

Sequence E1	1 Module	Sample# 14-M6	—
4.16	Static mechanical load test (MQT 16)	See Table 19	P
4.22	Bending test (MQT 22)	See Table 20	N/A

Sequence E2	1 Module	Sample# 14-M7	—
4.17	Hail test (MQT 17)	See Table 21	P

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMHF-66HD715 (BOM15)

4. TESTING OVERVIEW			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 15-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# 15-M12	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	P

Sequence C	2 Modules	Sample# N/A	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	N/A
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	N/A
4.12	Humidity-freeze test (MQT 12).....	See Table 15	N/A

Sequence C1	1 Module	Sample# N/A	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	N/A	N/A

Sequence D	2 Modules	Sample# 15-M8, 15-M9	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	P

Sequence E	2 Modules	Sample# 15-M6, 15-M7	—
4.13	Damp heat test (MQT 13)	See Table 18	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	P

Sequence E1	1 Module	Sample# 15-M6	—
4.16	Static mechanical load test (MQT 16)	See Table 19	P
4.22	Bending test (MQT 22)	See Table 20	N/A

Sequence E2	1 Module	Sample# 15-M7	—
4.17	Hail test (MQT 17)	See Table 21	P

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMNF-66HD705 (BOM16)

4. TESTING OVERVIEW			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 16-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# 16-M12	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	P

Sequence C	2 Modules	Sample# 16-M4, 16-M5	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	P
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	P
4.12	Humidity-freeze test (MQT 12).....	See Table 15	P

Sequence C1	1 Module	Sample# 16-M4	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	TW-PVJB01-ab, Certificate no.: B 090075 0017	N/A

Sequence D	2 Modules	Sample# 16-M8, 16-M9	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	P

Sequence E	2 Modules	Sample# 16-M6, 16-M7	—
4.13	Damp heat test (MQT 13)	See Table 18	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	P

Sequence E1	1 Module	Sample# 16-M6	—
4.16	Static mechanical load test (MQT 16)	See Table 19	P
4.22	Bending test (MQT 22)	See Table 20	N/A

Sequence E2	1 Module	Sample# 16-M7	—
4.17	Hail test (MQT 17)	See Table 21	P

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMHF-66HD740 (BOM17 higher end)

4. Testing Overview			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	N/A
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	N/A
4.15	Wet leakage current test (MQT 15)	See Table 05	N/A

Sequence A	1 Module	Sample# N/A	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# N/A	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	N/A

Sequence C	2 Modules	Sample# N/A	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	N/A
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	N/A
4.12	Humidity-freeze test (MQT 12).....	See Table 15	N/A

Sequence C1	1 Module	Sample# N/A	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	N/A
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	N/A	N/A

Sequence D	2 Modules	Sample# N/A	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	N/A

Sequence E	2 Modules	Samples N/A	—
4.13	Damp heat test (MQT 13)	See Table 18	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	N/A

Sequence E1	1 Module	Sample N/A	—
4.16	Static mechanical load test (MQT 16).....	See Table 19	N/A
4.22	Bending test (MQT 22).....	See Table 20	N/A

Sequence E2	1 Module	Sample N/A	—
4.17	Hail test (MQT 17)	See Table 21	N/A

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	N/A
4.3	Insulation test (MQT 03)	See Table 23.9	N/A
4.15	Wet leakage current test (MQT 15)	See Table 23.10	N/A

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMNH-66HD630 (BOM18 higher end)

4. Testing Overview			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	N/A
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	N/A
4.15	Wet leakage current test (MQT 15)	See Table 05	N/A

Sequence A	1 Module	Sample# N/A	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# N/A	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	N/A

Sequence C	2 Modules	Sample# N/A	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	N/A
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	N/A
4.12	Humidity-freeze test (MQT 12).....	See Table 15	N/A

Sequence C1	1 Module	Sample# N/A	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	N/A
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	N/A	N/A

Sequence D	2 Modules	Sample# N/A	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	N/A

Sequence E	2 Modules	Samples N/A	—
4.13	Damp heat test (MQT 13)	See Table 18	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	N/A

Sequence E1	1 Module	Sample N/A	—
4.16	Static mechanical load test (MQT 16).....	See Table 19	N/A
4.22	Bending test (MQT 22).....	See Table 20	N/A

Sequence E2	1 Module	Sample N/A	—
4.17	Hail test (MQT 17)	See Table 21	N/A

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	N/A
4.3	Insulation test (MQT 03)	See Table 23.9	N/A
4.15	Wet leakage current test (MQT 15)	See Table 23.10	N/A

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMNF-66HD725(BOM19 higher end)

4. Testing Overview			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	N/A
4.15	Wet leakage current test (MQT 15)	See Table 05	N/A

Sequence A	1 Module	Sample# N/A	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# N/A	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	N/A

Sequence C	2 Modules	Sample# N/A	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	N/A
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	N/A
4.12	Humidity-freeze test (MQT 12).....	See Table 15	N/A

Sequence C1	1 Module	Sample# N/A	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	N/A
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	N/A	N/A

Sequence D	2 Modules	Sample# N/A	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	N/A

Sequence E	2 Modules	Samples N/A	—
4.13	Damp heat test (MQT 13)	See Table 18	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	N/A

Sequence E1	1 Module	Sample N/A	—
4.16	Static mechanical load test (MQT 16).....	See Table 19	N/A
4.22	Bending test (MQT 22).....	See Table 20	N/A

Sequence E2	1 Module	Sample N/A	—
4.17	Hail test (MQT 17)	See Table 21	N/A

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	N/A
4.3	Insulation test (MQT 03)	See Table 23.9	N/A
4.15	Wet leakage current test (MQT 15)	See Table 23.10	N/A

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD575 (BOM20)

4. TESTING OVERVIEW			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 20-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# 20-M12	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	P

Sequence C	2 Modules	Sample# 20-M4, 20-M5	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	P
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	P
4.12	Humidity-freeze test (MQT 12).....	See Table 15	P

Sequence C1	1 Module	Sample# 20-M4	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	TW-PVJB01-ab, Certificate no.: B 090075 0017	N/A

Sequence D	2 Modules	Sample# 20-M8, 20-M9	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	P

Sequence E	2 Modules	Sample# 20-M6, 20-M7	—
4.13	Damp heat test (MQT 13)	See Table 18	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	P

Sequence E1	1 Module	Sample# 20-M6	—
4.16	Static mechanical load test (MQT 16)	See Table 19	P
4.22	Bending test (MQT 22)	See Table 20	N/A

Sequence E2	1 Module	Sample# N/A	—
4.17	Hail test (MQT 17)	See Table 21	N/A

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD575 (BOM21)

4. TESTING OVERVIEW			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 21-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	1 Module	Sample# 21-M12	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	N/A
4.18.1	Bypass diode thermal test (MQT 18.1)		N/A
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	N/A
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	P

Sequence C	2 Modules	Sample# 21-M4, 21-M5	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	P
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	P
4.12	Humidity-freeze test (MQT 12).....	See Table 15	P

Sequence C1	1 Module	Sample# 21-M4	—

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	TW-PVJB01-ab, Certificate no.: B 090075 0017	N/A

Sequence D	2 Modules	Sample# 21-M8, 21-M9	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	P

Sequence E	2 Modules	Sample# 21-M6, 21-M7	—
4.13	Damp heat test (MQT 13)	See Table 18	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	P

Sequence E1	1 Module	Sample# 21-M6	—
4.16	Static mechanical load test (MQT 16).....	See Table 19	P
4.22	Bending test (MQT 22).....	See Table 20	N/A

Sequence E2	1 Module	Sample# N/A	—
4.17	Hail test (MQT 17)	See Table 21	N/A

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

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Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMNH-66HD615 (BOM22)

4. TESTING OVERVIEW			—
	Initial examination	All modules	—
4.1	Visual inspection (MQT 01))	See Table 01	P
4.19.5	Initial stabilization (MQT 19.1)	See Table 02.1 - 02.4 and Table A.4.1 - A.4.4	—
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 03.1 - 03.3 and Tables A.4.7 – A.4.9	P
4.3	Insulation test (MQT 03)	See Table 04	P
4.15	Wet leakage current test (MQT 15)	See Table 05	P

Sequence A	1 Module	Sample# 22-M10	—
4.7	Performance at low irradiance (MQT 07).....	See Table 06.1 - 06.2	—
4.4	Measurement of temperature coefficients (MQT 04)	See Table 07	—

Sequence B	2 Module	Sample# 22-M11, 22-M12	—
4.8	Outdoor exposure test (MQT 08)	See Table 08	P
4.18.1	Bypass diode thermal test (MQT 18.1)		P
	Maximum allowed junction temperature	See Table 09	—
	Calculated junction temperature	See Table 09	—
	Final measurements.....	See Table 09	P
4.18.2	Bypass diode functionality test (MQT 18.2)	See Table 10	P
4.19.6	Final stabilization (MQT 19.2)	See Table 10.1 – 10.3	N/A
4.9	Hot spot endurance test (MQT 09)	See Table 11	P

Sequence C	2 Modules	Sample# 22-M4, 22-M5	—
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	P
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	P
4.12	Humidity-freeze test (MQT 12).....	See Table 15	P

Sequence C1	1 Module	Sample# 22-M4	—

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Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	TW-PVJB01-ab, Certificate no.: B 090075 0017	N/A

Sequence D	2 Modules	Sample# 22-M8, 22-M9	—
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	P

Sequence E	2 Modules	Sample# 22-M6, 22-M7	—
4.13	Damp heat test (MQT 13)	See Table 18	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	P

Sequence E1	1 Module	Sample# 22-M6	—
4.16	Static mechanical load test (MQT 16)	See Table 19	P
4.22	Bending test (MQT 22)	See Table 20	N/A

Sequence E2	1 Module	Sample# 22-M7	—
4.17	Hail test (MQT 17)	See Table 21	P

	Final measurement	All modules	—
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Test Results**Module type: TWMND-72HD570 (BOM1)**

TABLE 01: MQT 01 ini: Initial Visual inspection		P
Test Date [YYYY-MM-DD] : 2024-04-09		—
Sample #	Nature and position of initial findings – comments or attach photos	—
1-M6	No visual defects	P
1-M10	No visual defects	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]				2024-04-09			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
1-M6	13.58	51.87	12.89	43.99	567.1	80.51	—
1-M10	13.56	51.94	12.87	43.94	565.4	80.27	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							
Test Date [YYYY-MM-DD]				2024-04-09			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
1-M6	10.81	51.45	9.40	45.61	428.9	77.12	—
1-M10	10.81	51.49	9.44	45.55	429.8	77.25	—
Supplementary information: N/A							
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]				2024-04-09			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
1-M6	14.95	52.07	14.19	44.06	625.1	80.28	—
1-M10	14.95	52.15	14.16	44.09	624.4	80.08	—
Supplementary information: N/A							
TABLE 02.4: MQT 19.1: Initial Stabilization procedure							
Light exposure method				☒ Solar simulator ☐ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x				1%			
Sample #	1-M6	Test Date (YYYY-MM-DD) start/end			2024-04-09/2024-04-11		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	567.1	—	—
1	5.0	800 - 1000	50 ± 10	MPPT	567.5	—	—
2	5.0	800 - 1000	50 ± 10	MPPT	567.6	0.08	Yes

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #	1-M10	Test Date (YYYY-MM-DD) start/end:			2024-04-09/2024-04-11		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	565.4	—	—
1	5.0	800 - 1000	50 ± 10	MPPT	567.4	—	—
2	5.0	800 - 1000	50 ± 10	MPPT	567.6	0.39	Yes

Supplementary information: N/A

☐ Other stabilization procedures

Sample #	Test Date (YYYY-MM-DD) start/end
N/A	N/A

Test method description: N/A

Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]					2024-04-11					—
$P_{\max}$ lower limit (W)					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V)					557.0					—
V_{oc} (lab) upper limit (V)					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A)					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
1-M6	13.58	13.85	51.89	53.04	12.89	44.03	567.6	540.3	80.56	P
1-M10	13.58	13.85	51.98	53.04	12.88	44.08	567.6	540.3	80.42	P
Average	—						567.6	557.0	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										N/A
Test Date [YYYY-MM-DD]					2024-04-11					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
1-M6	10.80	51.45	9.40	45.61	428.8	77.16	79.54%	98.98%	75.55%	—
1-M10	10.81	51.49	9.43	45.56	429.7	77.23	79.60%	99.06%	75.70%	—
Supplementary information: N/A										

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m ² , backside irradiance 135 W/m ² , 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]					2024-04-11					—
$P_{\max}$ lower limit (W)					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V)					617.6					—
V_{oc} (lab) upper limit (V)					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A)					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
1-M6	14.96	15.35	52.07	53.12	14.19	44.07	625.2	599.1	80.29	—
1-M10	14.97	15.35	52.18	53.12	14.17	44.16	626.0	599.1	80.17	—
Average	—						625.6	617.6	—	N/A
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD].....:		2024-04-11		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]		2.58		—
Required Resistance [MΩ].....:		≥15.5		—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
1-M6	>1000	No breakdown	x	P
1-M10	>1000	No breakdown	x	P
Supplementary information: N/A				

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]	2024-04-11		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	23.3		—
Solution resistivity [Ω cm]	2312		—
Size of module [m ²]	2.58		—
Sample #	Required Resistance [$M\Omega$]	Measured [$M\Omega$]	Result
1-M6	≥ 15.5	> 1000	P
1-M10	≥ 15.5	> 1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)			N/A
TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)			N/A
TABLE 07: MQT 04 - Measurement of temperature coefficients			N/A
TABLE 08: MQT 08 - Outdoor exposure test			N/A
Table 08.1: MQT 01: Visual inspection after outdoor exposure test			N/A
Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			N/A
Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional			N/A
Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional			N/A
TABLE 09: MQT 18: Bypass diode thermal test			N/A
TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test			N/A
TABLE 10.1: MQT 19.1: Final stabilization			N/A
TABLE 10.2: MQT 06.1: Performance at STC before final stabilization			N/A
TABLE 10.3: MQT 19.1 Final Stabilization procedure			N/A
TABLE 11: MQT 09 - Hot-spot endurance test			N/A
TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT			N/A
TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI			N/A
TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test			N/A
TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test			N/A
TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test			N/A
TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test			N/A
TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			N/A
TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			N/A
TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			N/A
TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			N/A
TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional			N/A
TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional			N/A
TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional			N/A
TABLE 14: MQT 11 - Thermal cycling 50 test			N/A
TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test			N/A
TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			N/A
TABLE 14.3: MQT 03 – Max. power determination after thermal cycling 50 test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional			N/A
TABLE 15: MQT 12 - Humidity freeze 10 test			N/A
TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test			N/A
TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			N/A
TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional			N/A
TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional			N/A
TABLE 16: MQT 14.1 Retention of junction box on mounting surface			N/A
TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface			N/A
TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			N/A
TABLE 16.4: MQT 14.2 - Test of cord anchorage			N/A
TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage			N/A
TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage			N/A
TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage			N/A
TABLE 17: MQT 11 - Thermal cycling 200 test			N/A
TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test			N/A
TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional			N/A
TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional			N/A
TABLE 18: MQT 13 - Damp heat 1000 test			N/A
TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			N/A
TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			N/A
TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional			N/A
TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	1-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-04-12		—
Mounting method	Clamps mounting (8 points on long side with two beams across the module at the long side)		—
Load applied to.....	front side	back side	—
Mechanical load [Pa].....	5400	2400	—
First cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test		P
Test Date [YYYY-MM-DD]: 2024-04-12		—
Sample #	Nature and position of initial findings – comments or attach photos	—
1-M6	No visual defects	P
Supplementary information: N/A		

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-04-12		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	23.4		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	2325		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
1-M6	>1000	≥15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-04-12			—
Module temperature [°C].....				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
1-M6-front	13.56	52.05	12.94	44.21	571.9	81.00	—
1-M6-rear	10.64	51.52	9.70	45.32	439.5	80.19	—
1-M6-BNPI	14.98	52.26	14.28	44.29	632.3	80.75	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD]			2024-04-12		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.58		—
Required Resistance [MΩ].....			≥15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
1-M6	>1000	≥15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 20: MQT 22 Bending test			N/A
TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
TABLE 20.2: MQT 15 - Wet leakage current test after bending test			N/A
TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional			N/A
TABLE 20.4: MQT 03 Insulation test after bending test - Optional			N/A
TABLE 21: MQT 17 - Hail impact test			N/A
TABLE 21.1: MQT 01 - Visual inspection after hail impact test			N/A
TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test			N/A
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional			N/A
TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional			N/A
TABLE 22: MQT 21 -Potential induced degradation test			N/A
TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test			N/A
TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test			N/A
TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test – Optional			N/A
TABLE 22.4: MQT 03 Insulation test after potential induced degradation test – Optional			N/A
TABLE 23: MQT 19.2: Final stabilization			N/A
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization			N/A

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Clause	Requirement + Test					Result - Remark			Verdict	
TABLE 23.2: MQT 19.1 Final Stabilization procedure									N/A	
TABLE 23.3: MQT 19.2: Final stabilization									N/A	
TABLE 23.4: MQT 19.2: Final stabilization									N/A	
For monofacial modules										
TABLE 23.5: MQT 06.1: Final Performance at STC									N/A	
For bifacial modules									—	
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)									—	
Test Date [YYYY-MM-DD]				2024-04-12						—
Test method				☒ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]			Result	
1-M6	13.56	52.05	12.94	44.21	571.9	81.00			—	
Supplementary information: N/A										
TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)										
Test Date [YYYY-MM-DD]				2024-04-12						—
Test method				☒ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
1-M6	10.64	51.52	9.70	45.32	439.5	80.19	71.00%	98.58%	69.50%	—
Supplementary information: N/A										
TABLE 23.8: MQT 06.1: Final Performance at BNPI									P	
Test Date [YYYY-MM-DD]				2024-04-12						—
Test method				☒ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation [%]	Result	
1-M6	14.98	52.26	14.28	44.29	632.3	80.75	629.6	+0.43	P	
Supplementary information: P_{max} [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		2024-04-12			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
1-M6	>1000	≥15.5	No breakdown	x	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	2024-04-12	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22 ± 2	—
Size of module [m²]	:	2.58	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
1-M6	>1000	≥15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD580 (BOM2)

TABLE 01: MQT 01 ini: Initial Visual inspection		P
Test Date [YYYY-MM-DD]..... :	2024-04-09	—
Sample #	Nature and position of initial findings – comments or attach photos	—
2-M6	No visual defects	P
2-M10	No visual defects	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]				2024-04-09			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
2-M6	13.61	52.96	12.95	44.74	579.3	80.36	—
2-M10	13.61	53.07	12.96	44.84	580.8	80.43	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							
Test Date [YYYY-MM-DD]				2024-04-09			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
2-M6	10.57	52.50	9.88	45.76	452.0	81.43	—
2-M10	10.43	52.64	9.77	45.98	449.2	81.83	—
Supplementary information: N/A							
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]				2024-04-09			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
2-M6	15.03	53.25	14.24	44.92	639.8	79.97	—
2-M10	15.03	53.27	14.27	44.89	640.4	79.99	—
Supplementary information: N/A							
TABLE 02.4: MQT 19.1: Initial Stabilization procedure							
Light exposure method				☒ Solar simulator ☐ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x				1%			
Sample #	2-M6	Test Date (YYYY-MM-DD) start/end			2024-04-09/2024-04-11		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	579.3	—	—
1	5.0	800 - 1000	50 ± 10	MPPT	579.9	—	—
2	5.0	800 - 1000	50 ± 10	MPPT	580.0	0.12	Yes

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #	2-M10	Test Date (YYYY-MM-DD) start/end:			2024-04-09/2024-04-11		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	580.8	—	—
1	5.0	800 - 1000	50 ± 10	MPPT	580.8	—	—
2	5.0	800 - 1000	50 ± 10	MPPT	581.0	0.04	Yes
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable							

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]..... :					2024-04-11					—
$P_{\max}$ lower limit (W) :					See table below: $P_{\max}$ [W] – Min calc.					—
$\overline{P}_{\max}$ (lab) lower limit (V) :					566.7					—
V_{oc} (lab) upper limit (V) :					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A) :					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
2-M6	13.61	13.95	51.89	53.45	12.96	44.75	580.0	549.7	80.38	P
2-M10	13.61	13.95	51.98	53.45	12.96	44.83	581.0	549.7	80.40	P
Average	—						580.5	566.7	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										N/A
Test Date [YYYY-MM-DD]					2024-04-11					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
2-M6	10.58	52.52	9.88	45.77	452.5	81.44	77.70%	99.09%	78.12%	—
2-M10	10.44	52.63	9.78	46.00	450.0	81.91	76.68%	99.14%	77.45%	—
Supplementary information: N/A										

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m ² , backside irradiance 135 W/m ² , 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]					2024-04-11					—
$P_{\max}$ lower limit (W)					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V)					628.6					—
V_{oc} (lab) upper limit (V)					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A)					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
2-M6	15.03	15.46	53.27	53.53	14.27	44.89	640.7	609.7	80.02	—
2-M10	15.03	15.46	53.26	53.53	14.28	44.84	640.4	609.7	79.99	—
Average	—						640.6	628.6	—	N/A
Supplementary information: The limit values are calculated considering manufacturer's tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD].....:		2024-04-11		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]		2.58		—
Required Resistance [MΩ].....:		≥15.5		—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
2-M6	>1000	No breakdown	x	P
2-M10	>1000	No breakdown	x	P
Supplementary information: N/A				

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]	2024-04-11		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	23.3		—
Solution resistivity [Ω cm]	2312		—
Size of module [m ²]	2.58		—
Sample #	Required Resistance [$M\Omega$]	Measured [$M\Omega$]	Result
2-M6	≥ 15.5	> 1000	P
2-M10	≥ 15.5	> 1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)			N/A
TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)			N/A
TABLE 07: MQT 04 - Measurement of temperature coefficients			N/A
TABLE 08: MQT 08 - Outdoor exposure test			N/A
Table 08.1: MQT 01: Visual inspection after outdoor exposure test			N/A
Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			N/A
Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional			N/A
Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional			N/A
TABLE 09: MQT 18: Bypass diode thermal test			N/A
TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test			N/A
TABLE 10.1: MQT 19.1: Final stabilization			N/A
TABLE 10.2: MQT 06.1: Performance at STC before final stabilization			N/A
TABLE 10.3: MQT 19.1 Final Stabilization procedure			N/A
TABLE 11: MQT 09 - Hot-spot endurance test			N/A
TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT			N/A
TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI			N/A
TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test			N/A
TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test			N/A
TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test			N/A
TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test			N/A
TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			N/A
TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			N/A
TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			N/A
TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			N/A
TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional			N/A
TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional			N/A
TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional			N/A
TABLE 14: MQT 11 - Thermal cycling 50 test			N/A
TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test			N/A
TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			N/A
TABLE 14.3: MQT 03 – Max. power determination after thermal cycling 50 test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional			N/A
TABLE 15: MQT 12 - Humidity freeze 10 test			N/A
TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test			N/A
TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			N/A
TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional			N/A
TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional			N/A
TABLE 16: MQT 14.1 Retention of junction box on mounting surface			N/A
TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface			N/A
TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			N/A
TABLE 16.4: MQT 14.2 - Test of cord anchorage			N/A
TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage			N/A
TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage			N/A
TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage			N/A
TABLE 17: MQT 11 - Thermal cycling 200 test			N/A
TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test			N/A
TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional			N/A
TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional			N/A
TABLE 18: MQT 13 - Damp heat 1000 test			N/A
TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			N/A
TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			N/A
TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional			N/A
TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	2-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-04-12		—
Mounting method	Clamps mounting (8 points on long side with two beams across the module at the long side)		—
Load applied to	front side	back side	—
Mechanical load [Pa]	5400	2400	—
First cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test		P
Test Date [YYYY-MM-DD]: 2024-04-12		—
Sample #	Nature and position of initial findings – comments or attach photos	—
2-M6	No visual defects	P
Supplementary information: N/A		

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-04-12		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	23.4		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2325		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
2-M6	>1000	≥15.5	P
Supplementary information: N/A			

IEC 61215-2							
Clause	Requirement + Test				Result - Remark		Verdict
TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-04-12			—
Module temperature [°C].....				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
2-M6-front	13.64	53.14	12.91	44.92	579.8	80.02	—
2-M6-rear	10.44	52.73	9.67	46.27	447.3	81.24	—
2-M6-BNPI	15.07	53.33	14.27	44.88	640.2	79.69	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD].....:			2024-04-12		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²].....:			2.58		—
Required Resistance [MΩ].....:			≥15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
2-M6	>1000	≥15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 20: MQT 22 Bending test			N/A
TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
TABLE 20.2: MQT 15 - Wet leakage current test after bending test			N/A
TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional			N/A
TABLE 20.4: MQT 03 Insulation test after bending test - Optional			N/A
TABLE 21: MQT 17 - Hail impact test			N/A
TABLE 21.1: MQT 01 - Visual inspection after hail impact test			N/A
TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test			N/A
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional			N/A
TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional			N/A
TABLE 22: MQT 21 -Potential induced degradation test			N/A
TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test			N/A
TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test			N/A
TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test – Optional			N/A
TABLE 22.4: MQT 03 Insulation test after potential induced degradation test – Optional			N/A
TABLE 23: MQT 19.2: Final stabilization			N/A
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization			N/A

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Clause	Requirement + Test					Result - Remark			Verdict			
TABLE 23.2: MQT 19.1 Final Stabilization procedure									N/A			
TABLE 23.3: MQT 19.2: Final stabilization									N/A			
TABLE 23.4: MQT 19.2: Final stabilization									N/A			
For monofacial modules												
TABLE 23.5: MQT 06.1: Final Performance at STC									N/A			
For bifacial modules									—			
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)									—			
Test Date [YYYY-MM-DD]				2024-04-12							—	
Test method				☒ Solar simulator ☐ Natural sunlight							—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]			Result			
2-M6	13.64	53.14	12.91	44.92	579.8	80.02			—			
Supplementary information: N/A												
TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)												
Test Date [YYYY-MM-DD]				2024-04-12							—	
Test method				☒ Solar simulator ☐ Natural sunlight							—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result		
2-M6	10.44	52.73	9.67	46.27	447.3	81.24	69.56%	99.05%	70.21%	—		
Supplementary information: N/A												
TABLE 23.8: MQT 06.1: Final Performance at BNPI									P			
Test Date [YYYY-MM-DD]				2024-04-12							—	
Test method				☒ Solar simulator ☐ Natural sunlight							—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation [%]	Result			
2-M6	15.01	53.23	44.37	14.36	637.0	79.73	640.2	-0.50	P			
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.												

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		2024-04-12			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
2-M6	>1000	≥15.5	No breakdown	×	P
Supplementary information: N/A					

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	2024-04-12	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22 ± 2	—
Size of module [m²]	:	2.58	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
2-M6	>1000	≥15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD585 (BOM3)

TABLE 01: MQT 01 ini: Initial Visual inspection		P
Test Date [YYYY-MM-DD]..... :	2024-04-01	—
Sample #	Nature and position of initial findings – comments or attach photos	—
3-M6	No visual defects	P
3-M10	No visual defects	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]				2024-04-01			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
3-M6	13.62	53.15	12.87	45.52	585.8	80.92	—
3-M10	13.59	53.05	12.87	45.60	586.7	81.39	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							
Test Date [YYYY-MM-DD]				2024-04-01			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
3-M6	10.53	52.74	9.93	46.29	459.8	82.82	—
3-M10	10.49	52.65	9.98	46.30	462.2	83.66	—
Supplementary information: N/A							
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]				2024-04-01			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
3-M6	15.04	53.36	14.17	45.64	646.8	80.59	—
3-M10	15.01	53.25	14.17	45.73	648.1	81.07	—
Supplementary information: N/A							
TABLE 02.4: MQT 19.1: Initial Stabilization procedure							
Light exposure method				☒ Solar simulator ☐ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x				1%			
Sample #	3-M6	Test Date (YYYY-MM-DD) start/end			2024-04-01/2024-04-03		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	585.8	—	—
1	5.0	800 - 1000	50 ± 10	MPPT	587.1	—	—
2	5.0	800 - 1000	50 ± 10	MPPT	586.5	0.23	Yes

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #	3-M10	Test Date (YYYY-MM-DD) start/end:			2024-04-01/2024-04-03		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	586.7	—	—
1	5.0	800 - 1000	50 ± 10	MPPT	586.1	—	—
2	5.0	800 - 1000	50 ± 10	MPPT	587.1	0.18	Yes

Supplementary information: N/A

☐ Other stabilization procedures

Sample #	Test Date (YYYY-MM-DD) start/end
N/A	N/A

Test method description: N/A

Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]..... :					2024-04-03					—
$P_{\max}$ lower limit (W) :					See table below: $P_{\max}$ [W] – Min calc.					—
$\overline{P}_{\max}$ (lab) lower limit (V) :					571.6					—
V_{oc} (lab) upper limit (V) :					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A) :					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
3-M6	13.63	14.00	53.15	53.66	12.89	45.52	586.5	554.5	80.96	P
3-M10	13.59	14.00	53.06	53.66	12.90	45.52	587.1	554.5	81.39	P
Average	—						586.8	571.6	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										N/A
Test Date [YYYY-MM-DD]					2024-04-03					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
3-M6	12.87	44.83	12.05	38.48	463.8	80.38	77.00%	99.22%	78.43%	—
3-M10	13.04	44.85	12.25	38.13	467.1	79.87	77.00%	99.22%	78.88%	—
Supplementary information: N/A										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m ² , backside irradiance 135 W/m ² , 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]					2024-04-03					—
$P_{\max}$ lower limit (W)					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V)					633.8					—
V_{oc} (lab) upper limit (V)					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A)					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
3-M6	15.04	15.46	53.37	53.53	14.19	45.60	646.9	614.8	80.58	—
3-M10	15.02	15.46	53.24	53.53	14.21	45.61	648.1	614.8	81.07	—
Average	—						647.5	633.8	—	N/A
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD].....:		2024-04-03		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]		2.58		—
Required Resistance [MΩ].....:		≥15.5		—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
3-M6	>1000	No breakdown	x	P
3-M10	>1000	No breakdown	x	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]	2024-04-03		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	23.6		—
Solution resistivity [Ω cm]	2325		—
Size of module [m^2]	2.58		—
Sample #	Required Resistance [$M\Omega$]	Measured [$M\Omega$]	Result
3-M6	≥ 15.5	> 1000	P
3-M10	≥ 15.5	> 1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)			N/A
TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)			N/A
TABLE 07: MQT 04 - Measurement of temperature coefficients			N/A
TABLE 08: MQT 08 - Outdoor exposure test			N/A
Table 08.1: MQT 01: Visual inspection after outdoor exposure test			N/A
Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			N/A
Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional			N/A
Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional			N/A
TABLE 09: MQT 18: Bypass diode thermal test			N/A
TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test			N/A
TABLE 10.1: MQT 19.1: Final stabilization			N/A
TABLE 10.2: MQT 06.1: Performance at STC before final stabilization			N/A
TABLE 10.3: MQT 19.1 Final Stabilization procedure			N/A
TABLE 11: MQT 09 - Hot-spot endurance test			N/A
TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT			N/A
TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI			N/A
TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test			N/A
TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test			N/A
TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test			N/A
TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test			N/A
TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			N/A
TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			N/A
TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			N/A
TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			N/A
TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional			N/A
TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional			N/A
TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional			N/A
TABLE 14: MQT 11 - Thermal cycling 50 test			N/A
TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test			N/A
TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			N/A
TABLE 14.3: MQT 03 – Max. power determination after thermal cycling 50 test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional			N/A
TABLE 15: MQT 12 - Humidity freeze 10 test			N/A
TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test			N/A
TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			N/A
TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional			N/A
TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional			N/A
TABLE 16: MQT 14.1 Retention of junction box on mounting surface			N/A
TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface			N/A
TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			N/A
TABLE 16.4: MQT 14.2 - Test of cord anchorage			N/A
TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage			N/A
TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage			N/A
TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage			N/A
TABLE 17: MQT 11 - Thermal cycling 200 test			N/A
TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test			N/A
TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional			N/A
TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional			N/A
TABLE 18: MQT 13 - Damp heat 1000 test			N/A
TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			N/A
TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			N/A
TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional			N/A
TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	3-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-04-03		—
Mounting method	Clamps mounting (8 points on long side with two beams across the module at the long side)		—
Load applied to	front side	back side	—
Mechanical load [Pa]	5400	2400	—
First cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test		P
Test Date [YYYY-MM-DD]: 2024-04-03		—
Sample #	Nature and position of initial findings – comments or attach photos	—
3-M6	No visual defects	P
Supplementary information: N/A		

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-04-03		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	20.9		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2083		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
3-M6	>1000	≥15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-04-03			—
Module temperature [°C].....				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
3-M6-front	13.58	53.09	12.85	45.68	587.1	81.44	—
3-M6-rear	10.50	52.68	9.94	46.65	463.5	83.83	—
3-M6-BNPI	15.01	53.24	14.20	45.59	647.3	81.01	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD].....:			2024-04-03		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²].....:			2.58		—
Required Resistance [MΩ].....:			≥15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
3-M6	>1000	≥15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 20: MQT 22 Bending test			N/A
TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
TABLE 20.2: MQT 15 - Wet leakage current test after bending test			N/A
TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional			N/A
TABLE 20.4: MQT 03 Insulation test after bending test - Optional			N/A
TABLE 21: MQT 17 - Hail impact test			N/A
TABLE 21.1: MQT 01 - Visual inspection after hail impact test			N/A
TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test			N/A
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional			N/A
TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional			N/A
TABLE 22: MQT 21 -Potential induced degradation test			N/A
TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test			N/A
TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test			N/A
TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test – Optional			N/A
TABLE 22.4: MQT 03 Insulation test after potential induced degradation test – Optional			N/A
TABLE 23: MQT 19.2: Final stabilization			N/A
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization			N/A

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Clause	Requirement + Test					Result - Remark			Verdict			
TABLE 23.2: MQT 19.1 Final Stabilization procedure										N/A		
TABLE 23.3: MQT 19.2: Final stabilization										N/A		
TABLE 23.4: MQT 19.2: Final stabilization										N/A		
For monofacial modules												
TABLE 23.5: MQT 06.1: Final Performance at STC										N/A		
For bifacial modules										—		
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)										—		
Test Date [YYYY-MM-DD]				2024-04-03							—	
Test method				☒ Solar simulator ☐ Natural sunlight							—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]				Result		
3-M6	13.58	53.09	12.85	45.68	587.1	81.44				—		
Supplementary information: N/A												
TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)												
Test Date [YYYY-MM-DD]				2024-04-03							—	
Test method				☒ Solar simulator ☐ Natural sunlight							—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result		
3-M6	10.50	52.68	9.94	46.65	463.5	83.83	71.75%	98.92%	71.63%	—		
Supplementary information: N/A												
TABLE 23.8: MQT 06.1: Final Performance at BNPI										P		
Test Date [YYYY-MM-DD]				2024-04-03							—	
Test method				☒ Solar simulator ☐ Natural sunlight							—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation [%]	Result			
3-M6	15.01	53.24	14.20	45.59	647.3	81.01	645.2	+0.32	P			
Supplementary information: P_{max} [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.												

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		2024-04-12			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
3-M6	>1000	≥15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	2024-04-12	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22 ± 2	—
Size of module [m²]	:	2.58	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
3-M6	>1000	≥15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD570 (BOM4)

TABLE 01: MQT 01 ini: Initial Visual inspection		P
Test Date [YYYY-MM-DD]..... :	2024-01-11	—
Sample #	Nature and position of initial findings – comments or attach photos	—
4-M4	No visual defects	P
4-M5	No visual defects	P
4-M6	No visual defects	P
4-M7	No visual defects	P
4-M10	No visual defects	P
4-M12	No visual defects	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]				2024-01-03			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
4-M4	13.54	51.73	12.88	44.19	569.2	81.28	—
4-M5	13.54	51.74	12.86	44.15	567.7	81.05	—
4-M6	13.56	51.69	12.88	44.15	568.7	81.14	—
4-M7	13.53	51.72	12.86	44.15	567.6	81.11	—
4-M10	13.53	51.77	12.91	44.15	570.0	81.40	—
4-M12	13.55	51.69	12.90	44.14	569.4	81.33	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							
Test Date [YYYY-MM-DD]				2024-01-03			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
4-M4	10.29	51.28	9.53	45.30	431.6	81.83	—
4-M5	10.42	51.30	9.63	44.79	431.3	80.66	—
4-M6	10.36	51.24	9.51	45.15	429.3	80.83	—
4-M7	10.35	51.26	9.55	45.18	431.6	81.37	—
4-M10	10.39	51.35	9.60	45.09	432.8	81.16	—
4-M12	10.37	51.24	9.71	44.78	434.8	81.85	—
Supplementary information: N/A							
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]				2024-01-03			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
4-M4	14.92	51.94	14.16	44.24	626.4	81.14	—
4-M5	14.95	51.87	14.17	44.28	627.2	80.84	—
4-M6	14.91	51.87	14.14	44.28	626.0	80.90	—
4-M7	14.91	51.94	14.19	44.28	628.4	80.93	—

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Clause	Requirement + Test				Result - Remark		Verdict
4-M10	14.93	51.88	14.20	44.24	628.4	81.15	—
4-M12	14.93	51.85	14.14	44.24	625.5	81.11	—
Supplementary information: N/A							
TABLE 02.4: MQT 19.1: Initial Stabilization procedure							
Light exposure method				☐ Solar simulator ☒ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x				1%			
Sample #	4-M4	Test Date (YYYY-MM-DD) start/end			2024-01-03/2024-01-11		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	569.2	—	—
1	5.0	>500	N/A	MPPT	567.2	—	—
2	5.0	>500	N/A	MPPT	566.5	0.48	Yes

Sample #	4-M5	Test Date (YYYY-MM-DD) start/end			2024-01-03/2024-01-11		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	567.7	—	—
1	5.0	>500	N/A	MPPT	566.5	—	—
2	5.0	>500	N/A	MPPT	566.3	0.23	Yes

Sample #	4-M6	Test Date (YYYY-MM-DD) start/end			2024-01-03/2024-01-11		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	568.7	—	—
1	5.0	>500	N/A	MPPT	567.8	—	—
2	5.0	>500	N/A	MPPT	568.2	0.17	Yes

Sample #	4-M7	Test Date (YYYY-MM-DD) start/end			2024-01-03/2024-01-11		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	567.6	—	—
1	5.0	>500	N/A	MPPT	566.8	—	—
2	5.0	>500	N/A	MPPT	567.2	0.14	Yes

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #	4-M10	Test Date (YYYY-MM-DD) start/end			2024-01-10/2024-01-11		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	570.0	—	—
1	5.0	>500	N/A	MPPT	570.4	—	—
2	5.0	>500	N/A	MPPT	569.8	0.11	Yes

Sample #	4-M12	Test Date (YYYY-MM-DD) start/end			2024-01-03/2024-01-11		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	569.4	—	—
1	5.0	>500	N/A	MPPT	568.9	—	—
2	5.0	>500	N/A	MPPT	568.9	0.09	Yes

Supplementary information: N/A

☐ Other stabilization procedures

Sample #	Test Date (YYYY-MM-DD) start/end
N/A	N/A

Test method description: N/A

Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]..... :					2024-01-11					—
$P_{\max}$ lower limit (W) :					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V) :					559.2					—
V_{oc} (lab) upper limit (V) :					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A) :					See table below: I_{sc} [A] Max. calc.					—
Test method..... :					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
4-M4	13.45	13.91	51.70	53.12	12.84	44.11	566.5	542.4	81.46	P
4-M5	13.51	13.91	51.72	53.12	12.84	44.10	566.3	542.4	81.06	P
4-M6	13.54	13.91	51.68	53.12	12.87	44.15	568.2	542.4	81.18	P
4-M7	13.52	13.91	51.69	53.12	12.85	44.14	567.2	542.4	81.16	P
4-M10	13.52	13.91	51.77	53.12	12.87	44.27	569.8	542.4	81.38	P
4-M12	13.54	13.91	51.68	53.12	12.89	44.15	568.9	542.4	81.31	P
Average	—						567.8	559.2	—	P
Supplementary information: The limit values are calculated considering manufacturer's tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										N/A
Test Date [YYYY-MM-DD]					2024-01-11					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
4-M4	10.30	51.29	9.53	45.31	432.0	81.81	76.54%	99.20%	76.25%	—
4-M5	10.43	51.29	9.63	44.79	431.4	80.61	77.24%	99.17%	76.17%	—
4-M6	10.37	51.25	9.52	45.10	429.3	80.75	76.58%	99.17%	75.55%	—
4-M7	10.36	51.26	9.56	45.14	431.6	81.29	76.61%	99.16%	76.08%	—
4-M10	10.40	51.34	9.63	45.02	433.7	81.28	76.87%	99.16%	76.13%	—
4-M12	10.38	51.24	9.71	44.81	435.1	81.83	76.64%	99.16%	76.47%	—
Supplementary information: N/A										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m ² , backside irradiance 135 W/m ² , 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]..... :					2024-01-11					—
$P_{\max}$ lower limit (W)					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V)					617.6					—
V_{oc} (lab) upper limit (V)					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A)					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
4-M4	14.93	15.35	51.90	53.12	14.18	44.24	627.5	599.1	80.96	P
4-M5	14.92	15.35	51.90	53.12	14.13	44.28	625.5	599.1	80.78	P
4-M6	14.94	15.35	51.85	53.12	14.16	44.28	626.8	599.1	80.93	P
4-M7	14.91	15.35	51.89	53.12	14.15	44.24	625.9	599.1	80.89	P
4-M10	14.91	15.35	51.95	53.12	14.20	44.28	628.9	599.1	81.20	P
4-M12	14.92	15.35	51.86	53.12	14.18	44.24	627.4	599.1	81.06	P
Average	—						627.0	617.6	—	P
Supplementary information: The limit values are calculated considering manufacturer's tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD]		2024-01-11		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]		2.58		—
Required Resistance [MΩ]		>15.5		—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
4-M4	>1000	No breakdown	x	P
4-M5	>1000	No breakdown	x	P
4-M6	>1000	No breakdown	x	P
4-M7	>1000	No breakdown	x	P
4-M10	>1000	No breakdown	x	P
4-M12	>1000	No breakdown	x	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]	2024-01-11		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	22.8		—
Solution resistivity [Ω cm]	1982		—
Size of module [m ²]	2.58		—
Sample #	Required Resistance [$M\Omega$]	Measured [$M\Omega$]	Result
4-M4	>15.5	>1000	P
4-M5	>15.5	>1000	P
4-M6	>15.5	>1000	P
4-M7	>15.5	>1000	P
4-M10	>15.5	>1000	P
4-M12	>15.5	>1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)							—
Test Date [YYYY-MM-DD]					2024-04-10		—
Test method ...:	☐ Outdoor measurement						—
	Ambient air temperature [°C]:			N/A			
	Irradiance [W/m²]:			N/A			
	Module temperature [°C]:			N/A			
	☒ Data corrected to a 25°C cell temperature and 200 W/m² irradiance						—
	☐ Directly measured						
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	
4-M10	2.70	48.83	2.56	42.38	108.4	82.12	
Supplementary information: N/A							

TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)										—
Test Date [YYYY-MM-DD] :					2024-04-10					—
Test method ...:	☐ Outdoor measurement									—
	Ambient air temperature [°C]:				N/A					
	Irradiance [W/m²]:				N/A					
	Module temperature [°C]:				N/A					
	☒ Data corrected to a 25°C cell temperature and 200 W/m² irradiance									—
	☐ Directly measured									
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	
4-M10	2.04	48.29	1.87	42.29	79.2	80.38	75.53%	98.89%	73.10%	
Supplementary information: N/A										

TABLE 07: MQT 04 - Measurement of temperature coefficients					—
Test Date [YYYY-MM-DD] : 2024-04-09					—
Ambient air temperature [°C] high/low : 25.0/25.0					—
Irradiance [W/m²] high/low : 1000/999.9					—
Module temperature [°C] high/low : 45.1/15.0					—
Sample #	α [%/°C]	β [%/°C]	δ [%/°C]		—
4-M10	0.001	-0.022	-0.318		—
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 08: MQT 08 - Outdoor exposure test			N/A
Table 08.1: MQT 01: Visual inspection after outdoor exposure test			N/A
Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			N/A
Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional			N/A
Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional			N/A
TABLE 09: MQT 18: Bypass diode thermal test			N/A
TABLE 09.1: MQT 01 - Visual inspection after bypass diode thermal test			N/A
TABLE 09.2: MQT 15 - Wet leakage current test after bypass diode thermal test			N/A
TABLE 09.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional			N/A
TABLE 09.4: MQT 03 - Insulation test after bypass diode thermal test - Optional			N/A
TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test			N/A
TABLE 10.1: MQT 19.1: Final stabilization			N/A
TABLE 10.2: MQT 06.1: Performance at STC before final stabilization			N/A
TABLE 10.3: MQT 19.1 Final Stabilization procedure			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11: MQT 09 - Hot-spot endurance test			P
Test Date [YYYY-MM-DD] start/end	2024-04-01		—
Sample #	4-M12		—
Procedure of technology	☒ wafer-based technologies (WBT) MQT 09.1 ☐ monolithically integrated (MLI) thin film technologies MQT 09.2		—
Cell interconnection circuit	☐ S ☒ SPS ☐ PS		—
Type of light source	☐ Pulse solar simulator ☒ Steady state solar simulator ☐ Natural sunlight		—
Module temperature at thermal equilibrium [°C] ..	52.3/48.4		—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						P
Selected hot-spot cells	Low	Low	Low	High	Permanent	—
	D1	F24	E24	C15	N/A	
Shading rate [%]	39	35	33	29	N/A	—
Max. measured cell temperature in each cell [°C]:	156.2	112.5	95.1	165.9	N/A	—
Test duration of each shading [h]	1	1	1	1	N/A	—
Irradiance during shading [W/m²]	1221	1221	1221	1221	N/A	—

Supplementary information:

Position of solar cells (front side view):

	1	2	3	4	...	12	13	...	21	22	23	24
A												
B												
C												
D												
E												
F												

for bifacial modules, determination of the cell shading percent and the prolonged exposure are performed at the elevated irradiance BSI. If double-side illumination is used to produce BSI, both the back and the front of the cell are shaded in the same way. During cell selection, any cell that is permanently shaded by a module feature (such as the junction box) is added to the list of selected cells.

TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI		N/A
Selected hot-spot cells	N/A	—

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Clause	Requirement + Test	Result - Remark	Verdict
Number of cells shaded		N/A	—
Max. measured cell temperature [°C]		N/A	—
Test duration during shading [h]		N/A	—
Irradiance during shading [W/m ²]		N/A	—
Supplementary information: N/A			

TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test		P
Test Date [YYYY-MM-DD]: 2024-04-01		—
Sample #	Nature and position of initial findings – comments or attach photos	—
4-M12	No visual defects	P
Supplementary information: N/A		

TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test							—
Test Date [YYYY-MM-DD]		2024-04-01					—
Module temperature [°C]		Corrected to 25.0					—
Irradiance [W/m ²]		Corrected to 1000 or G _{BNPI}					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
4-M12-front	13.49	51.72	12.89	44.15	569.0	81.56	—
4-M12-rear	10.38	51.29	9.83	44.53	437.8	82.21	—
4-M12-BNPI	14.87	51.88	14.19	44.20	627.1	81.28	—
Supplementary information: N/A							

TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test					P
Test Date [YYYY-MM-DD]		2024-04-01			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
4-M12	>1000	>15.5	No breakdown	×	P

TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test			P
Test Date [YYYY-MM-DD]		2024-04-01	—
Test Voltage applied [V]		2 minutes of 1500	—

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Clause	Requirement + Test	Result - Remark	Verdict
Solution temperature [°C]	23.6		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	1879		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
4-M12	>1000	>15.5	P
Supplementary information: N/A			

TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test				P
Test Date [YYYY-MM-DD]	2024-04-01			—
☐ Method A				—
Ambient temperature [°C]	N/A			—
Current flow applied [A]	N/A			—
Sample #	VFM	VFMrated	VFM = (N × VFMrated) ± 10 %	Result
N/A	N/A	N/A	☐ Yes ☐ No	N/A
Supplementary information: N/A				
☒ Method B				—
Sample #	IV curve after shading			Result
	Diode 1 working properly	Diode 2 working properly	Diode 3 working properly	—
4-M12	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			P
Test Date (YYYY-MM-DD) start/end	2024-01-20/2024-01-25		—
Module temperature [°C]	60.2/57.9		—
UV irradiance (280-400nm) [W/m²]	112.0		—
Ratio of UV irradiance (280-320nm) [W/m²] :	9.0		—
UV dose (280-400nm) [kWh/ m²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: N/A			

TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			P
Test Date (YYYY-MM-DD) start/end	2024-01-25/2024-01-30		—
Module temperature [°C]	59.5/56.9		—
UV irradiance (280-400nm) [W/m²]	111.0		—
Ratio of UV irradiance (280-320nm) [W/m²] :	9.0		—
UV dose (280-400nm) [kWh/ m²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: for bifacial modules repeat the procedure of UV irradiation on the rear-side of the modules.			

TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-01-30		—
Sample #	Nature and position of initial findings – comments or attach photos		—
4-M4	No visual defects		P
4-M5	No visual defects		P
Supplementary information: N/A			

TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-01-30		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	23.1		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	1964		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
4-M4	>1000	>15.5	P

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Clause	Requirement + Test	Result - Remark	Verdict
4-M5	>1000	>15.5	P
Supplementary information: N/A			

TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional							—
Test Date [YYYY-MM-DD]				2024-01-30			—
Module temperature [°C]				Corrected to 25.0			—
Irradiance [W/m ²]				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
4-M4-front	13.43	51.21	12.83	43.36	556.3	80.91	—
4-M4-rear	10.26	50.78	9.68	44.04	426.2	81.78	—
4-M4-BNPI	14.81	51.42	14.12	43.44	613.4	80.55	—
4-M5-front	13.45	51.31	12.87	43.35	557.9	80.83	—
4-M5-rear	10.41	50.86	9.42	44.72	421.4	79.60	—
4-M5-BNPI	14.84	51.47	14.15	43.40	614.1	80.42	—
Supplementary information: N/A							

TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional					P
Test Date [YYYY-MM-DD]			2024-01-30		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.58		—
Required Resistance [MΩ].....			>15.5		—
Sample #	Measured		Dielectric breakdown		Result
	[MΩ]		Yes (description)	No	
4-M4	>1000	>15.5	No breakdown	×	P
4-M5	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 14: MQT 11 - Thermal cycling 50 test			P
Test Date [YYYY-MM-DD] start/end		2024-03-08/2024-03-19	—
Total cycles (50).....		50	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from 40 °C to 80 °C	14.10	—
	Other stages	0.05	—
Dwell time at high temperature.....		15 min	—
Dwell time at low temperature.....		15 min	—
Sample #	Open circuits (yes/no)		—
4-M4	no		P
4-M5	no		P
Supplementary information: N/A			

TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test		P
Test Date [YYYY-MM-DD].....:	2024-03-19	—
Sample #	Nature and position of initial findings – comments or attach photos	—
4-M4	No visual defects	P
4-M5	No visual defects	P
Supplementary information: N/A		

TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			P
Test Date [YYYY-MM-DD]	2024-03-19		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.7		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2041		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
4-M4	>1000	>15.5	P
4-M5	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test			Result - Remark		Verdict
TABLE 15.5: MQT 03 – Max. power determination after thermal cycling 50 test - Optional						—
Test Date [YYYY-MM-DD].....:		2024-03-19				—
Module temperature [°C].....:		Corrected to 25.0				—
Irradiance [W/m²):		Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
4-M4-front	13.47	51.12	12.86	43.20	555.6	80.68
4-M4-rear	10.30	50.64	9.55	44.34	423.4	81.18
4-M4-BNPI	14.87	51.39	14.16	43.36	614.1	80.39
4-M5-front	13.40	50.98	12.77	43.15	551.1	80.69
4-M5-rear	10.42	50.47	9.57	43.82	419.5	79.80
4-M5-BNPI	14.84	51.65	14.21	43.44	617.4	80.56
Supplementary information: N/A						

TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional				P
Test Date [YYYY-MM-DD]		2024-03-19		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]		2.58		—
Required Resistance [MΩ]		>15.5		—
Sample #	Measured	Dielectric breakdown		Result
	[MΩ]	Yes (description)	No	
4-M4	>1000	No breakdown	×	P
4-M5	>1000	No breakdown	×	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 15: MQT 12 - Humidity freeze 10 test			P
Test Date [YYYY-MM-DD] start/end	2024-03-29/2024-04-09		—
Total cycles (10)	10		—
Applied current (A)	0.05		—
Dwell time at high temperature	20 h		—
Dwell time at low temperature.....	30 min		—
Sample #	Open circuits (yes/no)		—
4-M4	no		P
4-M5	no		P
Supplementary information: N/A			

TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test			P
Test Date [YYYY-MM-DD]	2024-04-09		—
Sample #	Nature and position of initial findings – comments or attach photos		—
4-M4	No visual defects		P
4-M5	No visual defects		P
Supplementary information: N/A			

TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			P
Test Date [YYYY-MM-DD]	2024-04-09		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	23.5		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	1935		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
4-M4	>1000	>15.5	P
4-M5	>1000	>15.5	P
Supplementary information: N/A			

TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional			—
Test Date [YYYY-MM-DD]	2024-04-09		—
Module temperature [°C].....	Corrected to 25.0		—

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Clause	Requirement + Test			Result - Remark		Verdict
Irradiance [W/m ²):				Corrected to 1000 or G _{BNPI}		—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
4-M4-front	13.47	51.38	12.89	43.40	559.4	80.81
4-M4-rear	10.45	50.93	9.63	44.42	427.9	80.37
4-M4-BNPI	14.86	51.57	14.17	43.54	617.1	80.53
4-M5-front	13.44	51.05	12.81	43.27	554.3	80.78
4-M5-rear	10.30	50.57	9.52	44.42	422.7	81.13
4-M5-BNPI	14.83	51.30	14.11	43.41	612.4	80.48
Supplementary information: N/A						

TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional					P
Test Date [YYYY-MM-DD]		2024-04-09			—
Test Voltage applied [V]		2 minutes of 1500			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
4-M4	>1000	>15.5	No breakdown	×	P
4-M5	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 16: MQT 14.1 Retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD] start/end		2024-04-09	—
Sample #	4-M4		—
Supplementary information: N/A			

TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface		P
Test Date [YYYY-MM-DD] : 2024-04-09		—
Sample #	Nature and position of initial findings – comments or attach photos	—
4-M4	No visual defects	P
Supplementary information: N/A		

TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD]		2024-04-09	—
Test Voltage applied [V]		2 minutes of 2025	—
Solution temperature [°C]		23.7	—
Size of module [m²]		2.58	—
Solution resistivity [Ω cm]		1937	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
4-M4	>1000	>15.5	P
Supplementary information: N/A			

TABLE 16.4: MQT 14.2 - Test of cord anchorage	N/A

TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage	N/A

TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage	N/A

TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 17: MQT 11 - Thermal cycling 200 test	N/A

TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test	N/A

TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test	N/A

TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional	N/A

TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 18: MQT 13 - Damp heat 1000 test			P
Test Date [YYYY-MM-DD] start/end	2024-01-17/2024-02-29		—
Total hours (1000h)	1000		—
Sample #	—		—
4-M6	—		P
4-M7	—		P
Supplementary information: N/A			

TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-02-29		—
Sample #	Nature and position of initial findings – comments or attach photos		—
4-M6	No visual defects		P
4-M7	No visual defects		P
Supplementary information: N/A			

TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-02-29		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.8		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2385		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
4-M6	>1000	>15.5	P
4-M7	>1000	>15.5	P
Supplementary information: N/A			

TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional							—
Test Date [YYYY-MM-DD]	2024-02-29						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
4-M6-front	13.54	51.56	12.81	43.56	558.1	79.94	—
4-M6-rear	11.31	51.12	9.67	44.86	433.9	75.07	—
4-M6-BNPI	14.82	51.77	14.12	43.64	616.1	80.29	—

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Clause	Requirement + Test				Result - Remark		Verdict
4-M7-front	13.59	51.58	12.80	43.56	557.6	79.55	—
4-M7-rear	11.28	51.14	9.69	44.70	433.2	75.12	—
4-M7-BNPI	14.81	51.78	14.12	43.64	616.1	80.32	—
Supplementary information: N/A							

TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional					P
Test Date [YYYY-MM-DD]		2024-02-29			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Measured	Required Resistance	Dielectric breakdown		Result
	[MΩ]	[MΩ]	Yes (description)	No	
4-M6	>1000	>15.5	No breakdown	×	P
4-M7	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	4-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-03-29		—
Mounting method	Clamps mounting (8 points on long side with two beams across the module at the long side)		—
Load applied to.....	front side	back side	—
Mechanical load [Pa].....	5400	2400	—
First cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test		P
Test Date [YYYY-MM-DD]	2024-04-01	—
Sample #	Nature and position of initial findings – comments or attach photos	—
4-M6	No visual defects	P
Supplementary information: N/A		

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-04-01		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	23.6		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	1879		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
4-M6	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-04-01			—
Module temperature [°C].....:				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
4-M6-front	13.34	51.63	12.69	44.02	558.8	81.17	—
4-M6-rear	10.54	51.21	9.67	44.97	434.9	80.53	—
4-M6-BNPI	14.71	51.82	13.96	44.15	616.3	80.84	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD]			2024-04-01		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]			2.58		—
Required Resistance [MΩ]			>15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
4-M6	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 20: MQT 22 Bending test			N/A
TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
TABLE 20.2: MQT 15 - Wet leakage current test after bending test			N/A
TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional			N/A
TABLE 20.4: MQT 03 Insulation test after bending test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 21: MQT 17 - Hail impact test							P
Test Date [YYYY-MM-DD]..... :	2024-03-29						—
Sample #	4-M7						—
Ice ball size [mm] :	1	2	3	4	5	6	—
	25±5%	25±5%	25±5%	25±5%	25±5%	25±5%	
	7	8	9	10	11	—	
	25±5%	25±5%	25±5%	25±5%	25±5%	—	
Ice ball weight [g] :	1	2	3	4	5	6	—
	7.66	7.73	7.70	7.71	7.68	7.62	
	7	8	9	10	11	—	
	7.60	7.71	7.69	7.60	7.55	—	
Ice ball velocity [m/s] :	1	2	3	4	5	6	—
	22.3	22.4	22.5	22.6	22.9	22.6	
	7	8	9	10	11	—	
	22.3	22.2	22.4	22.2	22.8	—	
Number of impact locations :	11						—
Supplementary information: N/A							

TABLE 21.1: MQT 01 - Visual inspection after hail impact test		P
Test Date [YYYY-MM-DD].....: 2024-04-01		—
Sample #	Nature and position of initial findings – comments or attach photos	—
4-M7	No visual defects	P
Supplementary information: N/A		

TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test				P
Test Date [YYYY-MM-DD]		2024-04-01		—
Test Voltage applied [V]		2 minutes of 1500		—
Solution temperature [°C].....		23.6		—
Size of module [m²]		2.58		—
Solution resistivity [Ω cm]		1879		—
Sample #	Measured [MΩ]		Required Resistance [MΩ]	Result
4-M7	>1000		>15.5	P
Supplementary information: N/A				

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional							—
Test Date [YYYY-MM-DD].....:			2024-04-01				—
Module temperature [°C].....:			Corrected to 25.0				—
Irradiance [W/m²):			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
4-M7-front	13.32	51.67	12.69	44.06	559.1	81.27	—
4-M7-rear	10.50	51.26	9.65	44.89	433.3	80.49	—
4-M7-BNPI	14.69	51.86	13.97	44.16	616.9	81.00	—
Supplementary information: N/A							

TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional					P
Test Date [YYYY-MM-DD]			2024-04-01		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.58		—
Required Resistance [MΩ].....			>15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
4-M7	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 22: MQT 21 -Potential induced degradation test	P

TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test	P

TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test	P

TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test - Optional	—

TABLE 22.4: MQT 03 Insulation test after potential induced degradation test - Optional	P

TABLE 23: MQT 19.2: Final stabilization							—
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization							—
Test Date [YYYY-MM-DD]			2024-04-01				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
4-M6-front	13.34	51.63	12.69	44.02	558.8	81.17	—
4-M6-rear	10.54	51.21	9.67	44.97	434.9	80.53	—
4-M6-BNPI	14.71	51.82	13.96	44.15	616.3	80.84	—
4-M7-front	13.32	51.67	12.69	44.06	559.1	81.27	—
4-M7-rear	10.50	51.26	9.65	44.89	433.3	80.49	—
4-M7-BNPI	14.69	51.86	13.97	44.16	616.9	81.00	—
Supplementary information: N/A							

TABLE 23.2: MQT 19.1 Final Stabilization procedure							—
☐ IEC 61215-1-2 ☐ IEC 61215-1-3 ☐ IEC 61215-1-4							—
Light exposure method:				☐ Solar simulator ☐ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x :				N/A			
Sample #	N/A	Test Date (YYYY-MM-DD) start/end...:			N/A		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test				Result - Remark		Verdict
2	N/A	N/A	N/A	N/A	N/A	—	—
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure							

TABLE 23.3: MQT 19.2: Final stabilization									
☒ IEC 61215-1-1									
☐ Method 1									N/A
Stress-specific stabilization – BO LID (MQT 19.3)									N/A
Test Date [YYYY-MM-DD]..... :				N/A					—
Applied current (A)				N/A					—
Module temperature [°C]..... :				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]..... :				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]..... :				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 2									—
Performance at STC before final stabilization— for monofacial modules									—
Test Date [YYYY-MM-DD]..... :									—
Test method				☐ Solar simulator ☐ Natural sunlight					—

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Clause	Requirement + Test						Result - Remark	Verdict	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]				2024-04-01					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
4-M6	14.71	51.82	13.96	44.15	616.3	80.84	624.9	-1.38	P
4-M7	14.67	51.86	13.97	44.16	616.9	81.00	624.1	-1.16	P
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to destabilization artifacts.									
If Power Degradation $\geq$ 5%, then perform stress-specific stabilization MQT 19.3 in method 1									
Stress-specific stabilization – BO LID (MQT 19.3)									—
Test Date [YYYY-MM-DD]				N/A					—
Applied current (A)				N/A					—
Module temperature [°C]				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization — for monofacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									

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Clause	Requirement + Test							Result - Remark	Verdict
TABLE 23.4: MQT 19.2: Final stabilization									
☐ Method 3									
Test Date (YYYY-MM-DD) start/end		N/A							—
Test duration [h]		N/A							—
Module temperature [°C]		N/A							—
UV irradiance (280-400nm) [W/m²]		N/A							—
UV dose (280-320nm) [kWh/ m²]		N/A							—
UV dose (280-400nm) [kWh/ m²]		N/A							—
Side exposed		☐ Front side ☐ Rear side							—
Module operation condition		☐ Short circuited ☐ Open circuited							—
Supplementary information: for bifacial modules, the irradiance shall be applied to the rear side, whereas for monofacial modules, the irradiance shall be applied to the front side.									
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 4									
Performance at STC before final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☒ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									

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Clause	Requirement + Test						Result - Remark	Verdict	
Test Date [YYYY-MM-DD]				2024-02-28				—	
Test method				☒ Solar simulator ☐ Natural sunlight				—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to polarization artifacts									
If Power Degradation $\geq 5\%$, then perform method 3 final stabilization									
Method 3									
Test Date [YYYY-MM-DD]				N/A				—	
Test duration [h]				N/A				—	
Module temperature [°C]				N/A				—	
UV irradiance (280-400nm) [W/m²]				N/A				—	
UV dose (280-320nm) [kWh/ m²]				N/A				—	
UV dose (280-400nm) [kWh/ m²]				N/A				—	
Side exposed				☐ Front side ☐ Rear side				—	
Module operation condition				☐ Short circuited ☐ Open circuited				—	
Performance at STC after final stabilization — for monofacial modules									
Test Date [YYYY-MM-DD]				N/A				—	
Test method				☐ Solar simulator ☐ Natural sunlight				—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]								—	
Test method				☐ Solar simulator ☐ Natural sunlight				—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information: N/A

for monofacial modules									
TABLE 23.5: MQT 06.1: Final Performance at STC									N/A
Test Date [YYYY-MM-DD].....:					—				
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation [%]	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: P_{max} [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

for bifacial modules							—			
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)							—			
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result			
4-M4	13.47	51.38	12.89	43.40	559.4	80.81	—			
4-M5	13.44	51.05	12.81	43.27	554.3	80.78	—			
4-M6	13.34	51.63	12.69	44.02	558.8	81.17	—			
4-M7	13.32	51.67	12.69	44.06	559.1	81.27	—			
Supplementary information: N/A										
TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)										
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
4-M4	10.45	50.93	9.63	44.42	427.9	80.37	77.58%	99.13%	76.49%	—
4-M5	10.30	50.57	9.52	44.42	422.7	81.13	76.63%	99.07%	76.25%	—
4-M6	10.54	51.21	9.67	44.97	434.9	80.53	79.07%	99.20%	77.82%	—
4-M7	10.50	51.26	9.65	44.89	433.3	80.49	78.87%	99.22%	77.50%	—
Supplementary information: N/A										

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Clause		Requirement + Test					Result - Remark		Verdict
TABLE 23.8: MQT 06.1: Final Performance at BNPI									P
Test Date [YYYY-MM-DD]..... :				—					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation [%]	Result
4-M4	14.86	51.57	14.17	43.54	617.1	80.53	626.1	-1.44	P
4-M5	14.83	51.30	14.11	43.41	612.4	80.48	624.1	-1.87	P
4-M6	14.71	51.82	13.96	44.15	616.3	80.84	624.9	-1.38	P
4-M7	14.69	51.86	13.97	44.16	616.9	81.00	624.1	-1.16	P
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		—			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
4-M4	>1000	>15.5	No breakdown	×	P
4-M5	>1000	>15.5	No breakdown	×	P
4-M6	>1000	>15.5	No breakdown	×	P
4-M7	>1000	>15.5	No breakdown	×	P
4-M8	>1000	>15.5	No breakdown	×	P
4-M9	>1000	>15.5	No breakdown	×	P
4-M10	>1000	>15.5	No breakdown	×	P
4-M12	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	—	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22±2	—
Size of module [m²]	:	2.58	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
4-M4	>1000	>15.5	P
4-M5	>1000	>15.5	P
4-M6	>1000	>15.5	P
4-M7	>1000	>15.5	P
4-M8	>1000	>15.5	P
4-M9	>1000	>15.5	P
4-M10	>1000	>15.5	P
4-M12	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD570 (BOM5)

TABLE 01: MQT 01 ini: Initial Visual inspection		P
Test Date [YYYY-MM-DD]..... : 2024-01-15		—
Sample #	Nature and position of initial findings – comments or attach photos	—
5-M4	No visual defects	P
5-M5	No visual defects	P
5-M6	No visual defects	P
5-M7	No visual defects	P
5-M10	No visual defects	P
5-M12	No visual defects	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]			2024-01-15				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
5-M4	13.54	51.70	12.88	44.04	567.0	81.01	—
5-M5	13.51	51.65	12.84	44.04	565.2	81.02	—
5-M6	13.51	51.72	12.84	44.04	565.3	80.91	—
5-M7	13.50	51.70	12.86	44.04	566.5	81.17	—
5-M10	13.56	51.61	12.85	44.04	565.8	80.85	—
5-M12	13.51	51.72	12.87	44.04	566.8	81.11	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							
Test Date [YYYY-MM-DD]			2024-01-15				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
5-M4	10.34	51.30	9.72	44.69	434.4	81.94	—
5-M5	10.33	51.24	9.73	44.46	432.4	81.69	—
5-M6	10.26	51.32	9.59	44.80	429.6	81.61	—
5-M7	10.38	51.30	9.58	44.87	430.0	80.75	—
5-M10	10.45	51.23	9.63	44.71	430.5	80.44	—
5-M12	10.34	51.35	9.63	44.84	431.8	81.30	—
Supplementary information: N/A							
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]			2024-01-15				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
5-M4	14.93	51.91	14.18	44.17	626.4	80.85	—
5-M5	14.89	51.85	14.14	44.12	624.0	80.81	—
5-M6	14.90	51.92	14.15	44.13	624.4	80.69	—

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Clause	Requirement + Test				Result - Remark		Verdict
5-M7	14.92	51.90	14.18	44.13	625.8	80.82	—
5-M10	14.96	51.84	14.18	44.13	625.8	80.68	—
5-M12	14.91	51.95	14.17	44.17	625.8	80.78	—

Supplementary information: N/A

TABLE 02.4: MQT 19.1: Initial Stabilization procedure

Light exposure method				☐ Solar simulator ☒ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x				1%			
Sample #	5-M4	Test Date (YYYY-MM-DD) start/end			2024-01-15/2024-01-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	567.0	—	—
1	5.0	>500	N/A	MPPT	567.4	—	—
2	5.0	>500	N/A	MPPT	567.7	0.12	Yes

Sample #	5-M5	Test Date (YYYY-MM-DD) start/end			2024-01-15/2024-01-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	565.2	—	—
1	5.0	>500	N/A	MPPT	565.4	—	—
2	5.0	>500	N/A	MPPT	565.8	0.10	Yes

Sample #	5-M6	Test Date (YYYY-MM-DD) start/end			2024-01-15/2024-01-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	565.3	—	—
1	5.0	>500	N/A	MPPT	565.5	—	—
2	5.0	>500	N/A	MPPT	565.8	0.10	Yes

Sample #	5-M7	Test Date (YYYY-MM-DD) start/end			2024-01-15/2024-01-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.5	—	—

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Clause	Requirement + Test				Result - Remark		Verdict
1	5.0	>500	N/A	MPPT	566.9	—	—
2	5.0	>500	N/A	MPPT	567.3	0.15	Yes

Sample #	5-M10	Test Date (YYYY-MM-DD) start/end			2024-01-15/2024-01-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	565.8	—	—
1	5.0	>500	N/A	MPPT	566.2	—	—
2	5.0	>500	N/A	MPPT	567.0	0.21	Yes

Sample #	5-M12	Test Date (YYYY-MM-DD) start/end			2024-01-15/2024-01-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.8	—	—
1	5.0	>500	N/A	MPPT	567.1	—	—
2	5.0	>500	N/A	MPPT	567.8	0.17	Yes

Supplementary information: N/A

☐ Other stabilization procedures

Sample #	Test Date (YYYY-MM-DD) start/end
N/A	N/A

Test method description: N/A

Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]..... :					2024-01-22					—
$P_{\max}$ lower limit (W) :					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V) :					559.20					—
V_{oc} (lab) upper limit (V) :					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A) :					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
5-M4	13.54	13.91	51.73	53.12	12.88	44.08	567.7	542.4	81.06	P
5-M5	13.51	13.91	51.69	53.12	12.84	44.08	565.8	542.4	81.02	P
5-M6	13.50	13.91	51.76	53.12	12.85	44.04	565.8	542.4	80.97	P
5-M7	13.51	13.91	51.75	53.12	12.88	44.04	567.3	542.4	81.16	P
5-M10	13.55	13.91	51.67	53.12	12.88	44.04	567.0	542.4	80.97	P
5-M12	13.50	13.91	51.80	53.12	12.88	44.08	567.8	542.4	81.19	P
Average	—						566.9	559.2	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										N/A
Test Date [YYYY-MM-DD]					2024-01-22					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
5-M4	10.34	51.29	9.72	44.64	433.8	81.80	76.37%	99.15%	76.41%	—
5-M5	10.33	51.23	9.72	44.46	432.1	81.60	76.50%	99.12%	76.37%	—
5-M6	10.26	51.31	9.58	44.85	429.4	81.57	76.00%	99.13%	75.89%	—
5-M7	10.38	51.30	9.58	44.84	429.6	80.67	76.86%	99.12%	75.73%	—
5-M10	10.45	51.21	9.61	44.81	430.4	80.44	77.10%	99.11%	75.91%	—
5-M12	10.35	51.33	9.62	44.85	431.5	81.24	76.64%	99.11%	76.00%	—
Supplementary information: N/A										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m ² , backside irradiance 135 W/m ² , 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]..... :					2024-01-22					—
$P_{\max}$ lower limit (W)					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V)					617.6					—
V_{oc} (lab) upper limit (V)					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A)					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
5-M4	14.93	15.35	51.93	53.12	14.19	44.17	626.6	599.1	80.82	P
5-M5	14.90	15.35	51.87	53.12	14.15	44.12	624.2	599.1	80.77	P
5-M6	14.90	15.35	51.93	53.12	14.15	44.13	624.3	599.1	80.71	P
5-M7	14.90	15.35	51.94	53.12	14.19	44.13	626.3	599.1	80.93	P
5-M10	14.96	15.35	51.87	53.12	14.20	44.08	625.8	599.1	80.66	P
5-M12	14.89	15.35	51.98	53.12	14.19	44.13	626.2	599.1	80.88	P
Average	—						625.6	617.6	—	N/A
Supplementary information: The limit values are calculated considering manufacturer's tolerances <i>t</i> of rated nameplate values and laboratory measurement uncertainties <i>m</i> .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD].....:		2024-01-22		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]		2.58		—
Required Resistance [MΩ].....:		>15.5		—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
5-M4	>1000	No breakdown	x	P
5-M5	>1000	No breakdown	x	P
5-M6	>1000	No breakdown	x	P
5-M7	>1000	No breakdown	x	P
5-M10	>1000	No breakdown	x	P
5-M12	>1000	No breakdown	x	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]	2024-01-22		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.7		—
Solution resistivity [Ω cm]	2276		—
Size of module [m ²]	2.58		—
Sample #	Required Resistance [$M\Omega$]	Measured [$M\Omega$]	Result
5-M4	>15.5	>1000	P
5-M5	>15.5	>1000	P
5-M6	>15.5	>1000	P
5-M7	>15.5	>1000	P
5-M10	>15.5	>1000	P
5-M12	>15.5	>1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)							—
Test Date [YYYY-MM-DD] :					2024-02-28		—
Test method ...:	☐ Outdoor measurement						—
	Ambient air temperature [°C]:			N/A			
	Irradiance [W/m²]:			N/A			
	Module temperature [°C]:			N/A			
	☒ Data corrected to a 25°C cell temperature and 200 W/m² irradiance						—
	☐ Directly measured						
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	
5-M10	2.69	49.09	2.54	42.04	107.0	80.89	
Supplementary information: N/A							

TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)										—
Test Date [YYYY-MM-DD]					2024-02-28					—
Test method ...:	☐ Outdoor measurement									—
	Ambient air temperature [°C]:				N/A					
	Irradiance [W/m²]:				N/A					
	Module temperature [°C]:				N/A					
	☒ Data corrected to a 25°C cell temperature and 200 W/m² irradiance									—
	☐ Directly measured									
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	
5-M10	2.07	48.65	1.90	42.78	81.2	80.52	76.95%	99.11%	74.61%	
Supplementary information: N/A										

TABLE 07: MQT 04 - Measurement of temperature coefficients					—
Test Date [YYYY-MM-DD] : 2024-02-28					—
Ambient air temperature [°C] high/low : 25.0/25.0					—
Irradiance [W/m²] high/low : 1000/999.8					—
Module temperature [°C] high/low : 55.3/25.2					—
Sample #	α [%/°C]	β [%/°C]	δ [%/°C]		—
5-M10	0.047	-0.238	-0.305		—
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 08: MQT 08 - Outdoor exposure test			N/A
Table 08.1: MQT 01: Visual inspection after outdoor exposure test			N/A
Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			N/A
Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional			N/A
Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional			N/A
TABLE 09: MQT 18: Bypass diode thermal test			N/A
TABLE 09.1: MQT 01 - Visual inspection after bypass diode thermal test			N/A
TABLE 09.2: MQT 15 - Wet leakage current test after bypass diode thermal test			N/A
TABLE 09.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional			N/A
TABLE 09.4: MQT 03 - Insulation test after bypass diode thermal test - Optional			N/A
TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test			N/A
TABLE 10.1: MQT 19.1: Final stabilization			N/A
TABLE 10.2: MQT 06.1: Performance at STC before final stabilization			N/A
TABLE 10.3: MQT 19.1 Final Stabilization procedure			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11: MQT 09 - Hot-spot endurance test			P
Test Date [YYYY-MM-DD] start/end	2024-04-01		—
Sample #	5-M12		—
Procedure of technology	☒ wafer-based technologies (WBT) MQT 09.1 ☐ monolithically integrated (MLI) thin film technologies MQT 09.2		—
Cell interconnection circuit	☐ S ☒ SPS ☐ PS		—
Type of light source	☐ Pulse solar simulator ☒ Steady state solar simulator ☐ Natural sunlight		—
Module temperature at thermal equilibrium [°C] .:	53.2/51.3		—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						P						
Selected hot-spot cells	Low	Low	Low	High	Permanent	—						
	A7	F10	F21	D5	N/A							
Shading rate [%].....	20	20	15	15	N/A	—						
Max. measured cell temperature in each cell [°C]:	123.5	148.6	156.5	132.4	N/A	—						
Test duration of each shading [h]	1	1	1	1	N/A	—						
Irradiance during shading [W/m²]	1228	1228	1228	1228	N/A	—						
Supplementary information:												
Position of solar cells (front side view):												
	1	2	3	4	...	12	13	...	21	22	23	24
A							Junction box					
B												
C												
D												
E												
F												
For bifacial modules, determination of the cell shading percent and the prolonged exposure are performed at the elevated irradiance BSI. If double-side illumination is used to produce BSI, both the back and the front of the cell are shaded in the same way. During cell selection, any cell that is permanently shaded by a module feature (such as the junction box) is added to the list of selected cells.												

TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test			P
Test Date [YYYY-MM-DD]		2024-04-02	—
Sample #	Nature and position of initial findings – comments or attach photos		—
5-M12	No visual defects		P
Supplementary information: N/A			

TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test							—
Test Date [YYYY-MM-DD]		2024-04-02					—
Module temperature [°C]		Corrected to 25.0					—
Irradiance [W/m²]		Corrected to 1000 or G _{BNPI}					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
5-M12-front	13.52	51.72	12.83	44.11	565.9	80.93	—
5-M12-rear	10.40	51.18	9.61	44.90	431.6	81.11	—
5-M12-BNPI	14.89	51.90	14.11	44.16	623.2	80.67	—
Supplementary information: N/A							

TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test					P
Test Date [YYYY-MM-DD].....:		2024-04-02			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²].....:		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
5-M12	>1000	>15.5	No breakdown	×	P

TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test			P
Test Date [YYYY-MM-DD].....:		2024-04-02	—
Test Voltage applied [V]		2 minutes of 1500	—
Solution temperature [°C]		21.6	—
Size of module [m²].....:		2.58	—
Solution resistivity [Ω cm]		2165	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
5-M12	>1000	>12.9	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test				P
Test Date [YYYY-MM-DD].....:		2024-04-02		—
☐ Method A				—
Ambient temperature [°C]		N/A		—
Current flow applied [A]		N/A		—
Sample #	VFM	VFM _{rated}	VFM = (N × VFM _{rated}) ± 10 %	Result
N/A	N/A	N/A	☐ Yes ☐ No	N/A
Supplementary information: N/A				
☒ Method B				—
Sample #	IV curve after shading			Result
	Diode 1 working properly	Diode 2 working properly	Diode 3 working properly	—
5-M12	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			P
Test Date (YYYY-MM-DD) start/end	2024-01-29/2024-02-05		—
Module temperature [°C]	60.8		—
UV irradiance (280-400nm) [W/m ²]	128.6		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	9.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: N/A			

TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			P
Test Date (YYYY-MM-DD) start/end	2024-02-17/2024-02-23		—
Module temperature [°C]	61.4		—
UV irradiance (280-400nm) [W/m ²]	138.6		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	9.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: For bifacial modules repeat the procedure of UV irradiation on the rear-side of the modules.			

TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-02-23		—
Sample #	Nature and position of initial findings – comments or attach photos		—
5-M4	No visual defects		P
5-M5	No visual defects		P
Supplementary information: N/A			

TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-02-23		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.7		—
Size of module [m ²]	2.58		—
Solution resistivity [Ω cm]	2235		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
5-M4	>1000	>15.5	P

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Clause	Requirement + Test	Result - Remark	Verdict
5-M5	>1000	>15.5	P
Supplementary information: N/A			

TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional							—
Test Date [YYYY-MM-DD]				2024-02-23			—
Module temperature [°C]				Corrected to 25.0			—
Irradiance [W/m ²]				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
5-M4-front	13.52	51.22	12.92	43.50	561.8	81.10	—
5-M4-rear	10.40	51.18	9.61	44.90	431.6	81.11	—
5-M4-BNPI	14.89	51.91	14.12	44.12	623.2	80.66	—
5-M5-front	13.54	51.23	12.92	43.52	562.4	81.11	—
5-M5-rear	10.41	51.18	9.69	44.31	429.3	80.59	—
5-M5-BNPI	14.87	51.92	14.10	44.20	623.3	80.75	—
Supplementary information: N/A							

TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional					P
Test Date [YYYY-MM-DD]			2024-02-23		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.58		—
Required Resistance [MΩ].....			>15.5		—
Sample #	Measured		Dielectric breakdown		Result
	[MΩ]		Yes (description)	No	
5-M4	>1000	>15.5	No breakdown	×	P
5-M5	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			P
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			P
TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			P
TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional			—

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 14: MQT 11 - Thermal cycling 50 test			P
Test Date [YYYY-MM-DD] start/end		2024-03-08/2024-03-15	—
Total cycles (50).....		50	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from 40 °C to 80 °C	15.66	—
	Other stages	0.05	—
Dwell time at high temperature.....		10 min	
Dwell time at low temperature.....		10 min	
Sample #	Open circuits (yes/no)		—
5-M4	no		P
5-M5	no		P
Supplementary information: N/A			

TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test			P
Test Date [YYYY-MM-DD].....:		2024-03-15	—
Sample #	Nature and position of initial findings – comments or attach photos		—
5-M4	No visual defects		P
5-M5	No visual defects		P
Supplementary information: N/A			

TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			P
Test Date [YYYY-MM-DD]	2024-03-15		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.7		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2162		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
5-M4	>1000	>15.5	P
5-M5	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test			Result - Remark		Verdict
TABLE 14.3: MQT 03 – Max. power determination after thermal cycling 50 test - Optional						—
Test Date [YYYY-MM-DD].....:			2024-03-15			—
Module temperature [°C].....:			Corrected to 25.0			—
Irradiance [W/m²):			Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
5-M4-front	13.47	51.15	12.81	43.39	555.7	80.64
5-M4-rear	10.35	50.66	9.55	44.66	426.3	81.30
5-M4-BNPI	14.84	51.49	14.10	43.84	618.2	80.90
5-M5-front	13.54	51.20	12.81	43.46	556.8	80.34
5-M5-rear	10.39	51.16	9.66	44.02	425.4	80.06
5-M5-BNPI	14.87	51.92	14.10	43.92	619.3	80.23
Supplementary information: N/A						

TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional				P
Test Date [YYYY-MM-DD]		2024-03-15		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]		2.58		—
Required Resistance [MΩ]		>15.5		—
Sample #	Measured	Dielectric breakdown		Result
	[MΩ]	Yes (description)	No	
5-M4	>1000	No breakdown	×	P
5-M5	>1000	No breakdown	×	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 15: MQT 12 - Humidity freeze 10 test		P
Test Date [YYYY-MM-DD] start/end	2024-04-01/2024-04-11	—
Total cycles (10)	10	—
Applied current (A)	0.05	—
Dwell time at high temperature	20 h	—
Dwell time at low temperature	30 min	—
Sample #	Open circuits (yes/no)	—
5-M4	no	P
5-M5	no	P
Supplementary information: N/A		

TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test		P
Test Date [YYYY-MM-DD].....: 2024-04-11		—
Sample #	Nature and position of initial findings – comments or attach photos	—
5-M4	No visual defects	P
5-M5	No visual defects	P
Supplementary information: N/A		

TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			P
Test Date [YYYY-MM-DD]	2024-04-11		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	22.6		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	2235		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
5-M4	>1000	>15.5	P
5-M5	>1000	>15.5	P
Supplementary information: N/A			

TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional			—
Test Date [YYYY-MM-DD]	2024-04-11		—
Module temperature [°C].....	Corrected to 25.0		—

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Clause	Requirement + Test			Result - Remark		Verdict
Irradiance [W/m ²]:				Corrected to 1000 or G _{BNPI}		—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
5-M4-front	13.47	51.14	12.81	43.16	552.7	80.27
5-M4-rear	10.35	50.57	9.52	44.14	420.3	80.33
5-M4-BNPI	14.84	51.38	14.10	43.42	612.2	80.31
5-M5-front	13.55	51.12	12.81	43.23	553.8	79.97
5-M5-rear	10.39	50.78	9.66	43.60	421.4	79.84
5-M5-BNPI	14.85	51.90	14.10	43.49	613.3	79.55
Supplementary information: N/A						

TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional					P
Test Date [YYYY-MM-DD]		2024-04-11			—
Test Voltage applied [V]		2 minutes of 1500			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
5-M4	>1000	>15.5	No breakdown	×	P
5-M5	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 16: MQT 14.1 Retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD] start/end		2024-04-11	—
Sample #	5-M4		—
Supplementary information: N/A			

TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface		P
Test Date [YYYY-MM-DD]..... : 2024-04-11		—
Sample #	Nature and position of initial findings – comments or attach photos	—
5-M4	No visual defects	P
Supplementary information: N/A		

TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD]		2024-04-11	—
Test Voltage applied [V]		2 minutes of 2025	—
Solution temperature [°C]		22.8	—
Size of module [m²]		2.58	—
Solution resistivity [Ω cm]		2175	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
5-M4	>1000	>15.5	P
Supplementary information: N/A			

TABLE 16.4: MQT 14.2 - Test of cord anchorage	N/A

TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage	N/A

TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage	N/A

TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 17: MQT 11 - Thermal cycling 200 test	N/A

TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test	N/A

TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test	N/A

TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional	N/A

TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 18: MQT 13 - Damp heat 1000 test			P
Test Date [YYYY-MM-DD] start/end	2024-02-02/2024-03-19		—
Total hours (1000h)	1000		—
Sample #	—		—
5-M6	—		P
5-M7	—		P
Supplementary information: N/A			

TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-03-19		—
Sample #	Nature and position of initial findings – comments or attach photos		—
5-M6	No visual defects		P
5-M7	No visual defects		P
Supplementary information: N/A			

TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-03-19		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.5		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2234		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
5-M6	>1000	>15.5	P
5-M7	>1000	>15.5	P
Supplementary information: N/A			

TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional							—
Test Date [YYYY-MM-DD]	2024-03-19						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
5-M6-front	13.40	51.50	12.79	43.74	559.4	81.03	—
5-M6-rear	10.38	51.17	9.48	44.80	424.6	79.96	—
5-M6-BNPI	14.83	51.91	14.07	43.78	616.2	80.08	—
5-M7-front	13.41	51.57	12.80	43.89	561.8	81.24	—

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Clause	Requirement + Test				Result - Remark		Verdict
5-M7-rear	10.38	51.17	9.48	44.83	425.1	80.02	—
5-M7-BNPI	14.83	51.89	14.08	43.87	617.7	80.28	—
Supplementary information: N/A							

TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional					P
Test Date [YYYY-MM-DD]		2024-03-19			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Measured	Required Resistance	Dielectric breakdown		Result
	[MΩ]	[MΩ]	Yes (description)	No	
5-M6	>1000	>15.5	No breakdown	×	P
5-M7	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	5-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-03-21		—
Mounting method	Clamps mounting (8 points on long side with two beams across the module at the long side)		—
Load applied to.....	front side	back side	—
Mechanical load [Pa].....	5400	2400	—
First cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test		P
Test Date [YYYY-MM-DD]: 2024-03-21		—
Sample #	Nature and position of initial findings – comments or attach photos	—
5-M6	No visual defects	P
Supplementary information: N/A		

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-03-21		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	21.7		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	2166		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
5-M6	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test			Result - Remark			Verdict
TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-03-21			—
Module temperature [°C]				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
5-M6-front	13.39	51.49	12.78	43.73	558.9	81.08	—
5-M6-rear	10.37	51.16	9.47	44.71	423.5	79.79	—
5-M6-BNPI	14.82	51.89	14.07	43.74	615.3	80.00	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD].....:			2024-03-21		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²].....:			2.58		—
Required Resistance [MΩ].....:			>15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
5-M6	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 20: MQT 22 Bending test			N/A
TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
TABLE 20.2: MQT 15 - Wet leakage current test after bending test			N/A
TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional			N/A
TABLE 20.4: MQT 03 Insulation test after bending test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 21: MQT 17 - Hail impact test							P
Test Date [YYYY-MM-DD]	2024-03-22						—
Sample #	5-M7						—
Ice ball size [mm]	1	2	3	4	5	6	—
	25±5%	25±5%	25±5%	25±5%	25±5%	25±5%	
	7	8	9	10	11	—	
	25±5%	25±5%	25±5%	25±5%	25±5%	—	
Ice ball weight [g]	1	2	3	4	5	6	—
	7.58	7.66	7.42	7.49	7.53	7.67	
	7	8	9	10	11	—	
	7.61	7.65	7.44	7.51	7.63	—	
Ice ball velocity [m/s]	1	2	3	4	5	6	—
	23.4	22.6	22.8	23.7	23.9	23.2	
	7	8	9	10	11	—	
	23.6	22.8	22.5	22.8	23.4	—	
Number of impact locations	11						—
Supplementary information: N/A							

TABLE 21.1: MQT 01 - Visual inspection after hail impact test		P
Test Date [YYYY-MM-DD]: 2024-03-22		—
Sample #	Nature and position of initial findings – comments or attach photos	—
5-M7	No visual defects	P
Supplementary information: N/A		

TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test				P
Test Date [YYYY-MM-DD]		2024-03-22		—
Test Voltage applied [V]		2 minutes of 1500		—
Solution temperature [°C].....		22.4		—
Size of module [m²]		2.58		—
Solution resistivity [Ω cm]		2274		—
Sample #	Measured [MΩ]		Required Resistance [MΩ]	Result
5-M7	>1000		>15.5	P
Supplementary information: N/A				

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional							—
Test Date [YYYY-MM-DD].....:			2024-03-22				—
Module temperature [°C].....:			Corrected to 25.0				—
Irradiance [W/m²):			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
5-M7-front	13.39	51.58	12.79	43.90	561.7	81.31	—
5-M7-rear	10.38	51.17	9.48	44.75	424.2	79.89	—
5-M7-BNPI	14.82	51.89	14.08	43.82	616.9	80.21	—
Supplementary information: N/A							

TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional					P
Test Date [YYYY-MM-DD]			2024-03-22		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.58		—
Required Resistance [MΩ].....			>15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
5-M7	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 22: MQT 21 -Potential induced degradation test	P

TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test	P

TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test	P

TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test - Optional	—

TABLE 22.4: MQT 03 Insulation test after potential induced degradation test - Optional	P

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23: MQT 19.2: Final stabilization							—
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization							—
Test Date [YYYY-MM-DD]			2024-03-21 for 5-M6#, 2024-03-22 for 5-M7#				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
5-M6-front	13.39	51.49	12.78	43.73	558.9	81.08	—
5-M6-rear	10.37	51.16	9.47	44.71	423.5	79.79	—
5-M6-BNPI	14.82	51.89	14.07	43.74	615.3	80.00	—
5-M7-front	13.39	51.58	12.79	43.90	561.7	81.31	—
5-M7-rear	10.38	51.17	9.48	44.75	424.2	79.89	—
5-M7-BNPI	14.82	51.89	14.08	43.82	616.9	80.21	—
Supplementary information: N/A							

TABLE 23.2: MQT 19.1 Final Stabilization procedure							—
☐ IEC 61215-1-2 ☐ IEC 61215-1-3 ☐ IEC 61215-1-4							—
Light exposure method:				☐ Solar simulator			☐ Natural sunlight
Stabilization criterion x per IEC 61215-1-x :				N/A			
Sample #	N/A	Test Date (YYYY-MM-DD) start/end...:			N/A		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A	—	—
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure							

IEC 61215-2									
Clause	Requirement + Test						Result - Remark	Verdict	
TABLE 23.3: MQT 19.2: Final stabilization									
☒ IEC 61215-1-1									
☐ Method 1									
Stress-specific stabilization – BO LID (MQT 19.3)									
Test Date [YYYY-MM-DD]						N/A		—	
Applied current (A)						N/A		—	
Module temperature [°C]						N/A		—	
Total hours (48h)						N/A		—	
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]						N/A		—	
Test method						☐ Solar simulator ☐ Natural sunlight		—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]						N/A		—	
Test method						☐ Solar simulator ☐ Natural sunlight		—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 2									
Performance at STC before final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]						2024-03-21 for 8-M6#, 2024-03-22 for 8-M7#		—	
Test method						☐ Solar simulator ☐ Natural sunlight		—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]						2024-03-21 for 5-M6#, 2024-03-22 for 5-M7#		—	
Test method						☒ Solar simulator ☐ Natural sunlight		—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result

IEC 61215-2										
Clause	Requirement + Test						Result - Remark	Verdict		
							No.1)			
5-M6	14.82	51.89	14.07	43.74	615.3	80.00	623.5	-1.32	P	
5-M7	14.82	51.89	14.08	43.82	616.9	80.21	625.5	-1.38	P	
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to destabilization artifacts.										
If Power Degradation ≥ 5%, then perform stress-specific stabilization MQT 19.3 in method 1										
Stress-specific stabilization – BO LID (MQT 19.3)									—	
Test Date [YYYY-MM-DD]				N/A						—
Applied current (A)				N/A						—
Module temperature [°C]				N/A						—
Total hours (48h)				N/A						—
Performance at STC after final stabilization — for monofacial modules									—	
Test Date [YYYY-MM-DD]				N/A						—
Test method				☐ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Performance at BNPI after final stabilization — for bifacial modules										
Test Date [YYYY-MM-DD]				N/A						—
Test method				☐ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Supplementary information: N/A										
TABLE 23.4: MQT 19.2: Final stabilization										
☐ Method 3										
Test Date (YYYY-MM-DD) start/end				N/A						—
Test duration [h]				N/A						—
Module temperature [°C]				N/A						—
UV irradiance (280-400nm) [W/m²]				N/A						—
UV dose (280-320nm) [kWh/ m²]				N/A						—
UV dose (280-400nm) [kWh/ m²]				N/A						—
Side exposed				☐ Front side ☐ Rear side						—

IEC 61215-2									
Clause	Requirement + Test						Result - Remark	Verdict	
Module operation condition		☐ Short circuited ☐ Open circuited						—	
Supplementary information: for bifacial modules, the irradiance shall be applied to the rear side, whereas for monofacial modules, the irradiance shall be applied to the front side.									
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A						—	
Test method		☐ Solar simulator ☐ Natural sunlight						—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]		N/A						—	
Test method		☐ Solar simulator ☐ Natural sunlight						—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 4									
Performance at STC before final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A						—	
Test method		☒ Solar simulator ☐ Natural sunlight						—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]		N/A						—	
Test method		☒ Solar simulator ☐ Natural sunlight						—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: This module was not stabilized, and therefore the amount of degradation									

IEC 61215-2									
Clause	Requirement + Test						Result - Remark	Verdict	
observed may be larger than what would have been obtained if the module had been stabilized, due to polarization artifacts									
If Power Degradation $\geq 5\%$, then perform method 3 final stabilization									
Method 3									
Test Date [YYYY-MM-DD]		N/A						—	
Test duration [h]		N/A						—	
Module temperature [$^{\circ}\text{C}$]		N/A						—	
UV irradiance (280-400nm) [W/m^2]		N/A						—	
UV dose (280-320nm) [kWh/m^2]		N/A						—	
UV dose (280-400nm) [kWh/m^2]		N/A						—	
Side exposed		☐ Front side ☐ Rear side						—	
Module operation condition		☐ Short circuited ☐ Open circuited						—	
Performance at STC after final stabilization — for monofacial modules									
Test Date [YYYY-MM-DD]		N/A						—	
Test method		☐ Solar simulator ☐ Natural sunlight						—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]								—	
Test method		☐ Solar simulator ☐ Natural sunlight						—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									

For monofacial modules									
TABLE 23.5: MQT 06.1: Final Performance at STC									N/A
Test Date [YYYY-MM-DD]		—						—	
Test method		☒ Solar simulator ☐ Natural sunlight						—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation [%]	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility <i>r</i> of control module.			

For bifacial modules							—			
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)							—			
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result			
5-M4	13.47	51.14	12.81	43.16	552.7	80.27	—			
5-M5	13.55	51.12	12.81	43.23	553.8	79.97	—			
5-M6	13.39	51.49	12.78	43.73	558.9	81.08	—			
5-M7	13.39	51.58	12.79	43.90	561.7	81.31	—			
Supplementary information: N/A										
TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)										
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
5-M4	10.35	50.57	9.52	44.14	420.3	80.33	76.84%	98.90%	76.05%	—
5-M5	10.39	50.78	9.66	43.60	421.4	79.84	76.72%	99.33%	76.08%	—
5-M6	10.37	51.16	9.47	44.71	423.5	79.79	77.48%	99.37%	75.77%	—
5-M7	10.38	51.17	9.48	44.75	424.2	79.89	77.49%	99.20%	75.52%	—
Supplementary information: N/A										

TABLE 23.8: MQT 06.1: Final Performance at BNPI									P
Test Date [YYYY-MM-DD].....:					—				—
Test method.....:					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation [%]	Result
5-M4	14.84	51.38	14.10	43.42	612.2	80.31	625.4	-2.10	P
5-M5	14.85	51.90	14.10	43.49	613.3	79.55	622.9	-1.55	P
5-M6	14.82	51.89	14.07	43.74	615.3	80.00	623.5	-1.32	P
5-M7	14.82	51.89	14.08	43.82	616.9	80.21	625.5	-1.38	P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility <i>r</i> of control module.			

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		—			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
5-M4	>1000	>15.5	No breakdown	×	P
5-M5	>1000	>15.5	No breakdown	×	P
5-M6	>1000	>15.5	No breakdown	×	P
5-M7	>1000	>15.5	No breakdown	×	P
5-M10	>1000	>15.5	No breakdown	×	P
5-M12	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	—	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22 ± 2	—
Size of module [m²]	:	2.58	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
5-M4	>1000	>15.5	P
5-M5	>1000	>15.5	P
5-M6	>1000	>15.5	P
5-M7	>1000	>15.5	P
5-M10	>1000	>15.5	P
5-M12	>1000	>15.5	P
Supplementary information: N/A			

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD570 (BOM6)

TABLE 01: MQT 01 ini: Initial Visual inspection		P
Test Date [YYYY-MM-DD] : 2024-01-10 for 6-M4#, 6-M5#, 6-M6#, 6-M7#, 6-M10#, 6-M12# 2024-03-22 for 6-M8#, 6-M9#		—
Sample #	Nature and position of initial findings – comments or attach photos	—
6-M4	No visual defects	P
6-M5	No visual defects	P
6-M6	No visual defects	P
6-M7	No visual defects	P
6-M8	No visual defects	P
6-M9	No visual defects	P
6-M10	No visual defects	P
6-M12	No visual defects	P
Supplementary information: N/A		

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]		2024-01-17 for 6-M4#,6-M5#; 2024-01-10 for 6-M6#,9-M7#,6-M10#; 2024-01-24 for 6-M12#, 2024-03-22 for 6-M8#, 6-M9#					—
Test method		☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
6-M4	13.49	51.66	12.88	43.83	564.5	81.00	—
6-M5	13.51	51.68	12.92	43.85	566.5	81.14	—
6-M6	13.49	51.67	12.90	43.85	565.7	81.16	—
6-M7	13.50	51.64	12.92	43.82	566.2	81.22	—
6-M8	13.49	51.68	12.89	43.86	565.4	81.10	—
6-M9	13.51	51.67	12.90	43.88	566.1	81.10	—
6-M10	13.50	51.64	12.92	43.80	565.9	81.17	—
6-M12	13.52	51.66	12.90	43.84	565.5	80.97	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							
Test Date [YYYY-MM-DD]		2024-01-17 for 6-M4#,6-M5#; 2024-01-10 for 6-M6#,9-M7#,6-M10#; 2024-01-24 for 6-M12#, 2024-03-22 for 6-M8#, 6-M9#					—
Test method		☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
6-M4	10.51	51.22	9.77	44.29	432.7	80.38	—
6-M5	10.53	51.19	9.76	44.30	432.4	80.22	—
6-M6	10.50	51.17	9.80	44.07	431.9	80.39	—
6-M7	10.59	51.19	9.77	44.28	432.6	79.80	—
6-M8	10.53	51.21	9.77	44.33	433.1	80.32	—
6-M9	10.56	51.23	9.79	44.31	433.8	80.19	—
6-M10	10.55	51.20	9.79	44.20	432.7	80.11	—
6-M12	10.55	51.18	9.81	44.25	434.1	80.40	—
Supplementary information: N/A							

IEC 61215-2							
Clause	Requirement + Test				Result - Remark		Verdict
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]			2024-01-17 for 6-M4#,6-M5#; 2024-01-10 for 6-M6#,9-M7#,6-M10#; 2024-01-24 for 6-M12#, 2024-03-22 for 6-M8#, 6-M9#				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
6-M4	14.89	51.84	14.16	44.00	623.0	80.71	—
6-M5	14.90	51.89	14.18	44.07	624.9	80.82	—
6-M6	14.89	51.86	14.20	43.95	624.1	80.82	—
6-M7	14.89	51.82	14.20	44.01	624.9	80.99	—
6-M8	14.91	51.84	14.17	44.04	624.0	80.74	—
6-M9	14.92	51.87	14.19	44.03	624.8	80.74	—
6-M10	14.89	51.87	14.18	44.03	624.3	80.83	—
6-M12	14.91	51.84	14.18	44.01	624.0	80.73	—
Supplementary information: N/A							
TABLE 02.4: MQT 19.1: Initial Stabilization procedure							
Light exposure method				☐ Solar simulator ☒ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x				1%			
Sample #	6-M4	Test Date (YYYY-MM-DD) start/end			2024-01-17/2024-01-22		
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	564.5	—	—
1	5.0	>500	N/A	MPPT	563.8	—	—
2	5.0	>500	N/A	MPPT	563.3	0.21	Yes
Sample #	6-M5	Test Date (YYYY-MM-DD) start/end			2024-01-17/2024-01-22		
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.5	—	—
1	5.0	>500	N/A	MPPT	565.7	—	—
2	5.0	>500	N/A	MPPT	565.3	0.21	Yes

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #	6-M6	Test Date (YYYY-MM-DD) start/end			2024-01-10/2024-01-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	565.7	—	—
1	5.0	>500	N/A	MPPT	564.5	—	—
2	5.0	>500	N/A	MPPT	564.0	0.30	Yes

Sample #	6-M7	Test Date (YYYY-MM-DD) start/end			2024-01-10/2024-01-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.2	—	—
1	5.0	>500	N/A	MPPT	565.0	—	—
2	5.0	>500	N/A	MPPT	564.5	0.30	Yes

Sample #	6-M8	Test Date (YYYY-MM-DD) start/end			2024-03-22/2024-03-27		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	565.4	—	—
1	5.0	>500	N/A	MPPT	564.5	—	—
2	5.0	>500	N/A	MPPT	563.9	0.27	Yes

Sample #	6-M9	Test Date (YYYY-MM-DD) start/end			2024-03-22/2024-03-27		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.1	—	—
1	5.0	>500	N/A	MPPT	565.0	—	—
2	5.0	>500	N/A	MPPT	564.4	0.30	Yes

Sample #	6-M10	Test Date (YYYY-MM-DD) start/end			2024-01-10/2024-01-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	565.9	—	—

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Clause	Requirement + Test				Result - Remark		Verdict
1	5.0	>500	N/A	MPPT	564.3	—	—
2	5.0	>500	N/A	MPPT	563.8	0.37	Yes

Sample #	6-M12	Test Date (YYYY-MM-DD) start/end:			2024-01-24/2024-01-30		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	565.5	—	—
1	5.0	>500	N/A	MPPT	564.4	—	—
2	5.0	>500	N/A	MPPT	563.8	0.30	Yes
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable							

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]..... :					2024-01-22 for 6-M4#,6-M5#; 2024-01-16 for 6-M6#,6-M7#,6-M10#; 2024-01-30 for 6-M12#, 2024-03-27 for 6-M8#, 6-M9#					—
$P_{\max}$ lower limit (W) :					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V) :					559.0					—
V_{oc} (lab) upper limit (V) :					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A) :					See table below: I_{sc} [A] Max. calc.					—
Test method..... :					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
6-M4	13.47	13.95	51.58	52.98	12.87	43.77	563.3	542.3	81.08	P
6-M5	13.50	13.95	51.65	52.98	12.90	43.82	565.3	542.3	81.07	P
6-M6	13.48	13.95	51.60	52.98	12.88	43.79	564.0	542.3	81.08	P
6-M7	13.48	13.95	51.57	52.98	12.90	43.76	564.5	542.3	81.20	P
6-M8	13.47	13.95	51.62	52.98	12.87	43.82	563.9	542.3	81.10	P
6-M9	13.50	13.95	51.63	52.98	12.88	43.82	564.4	542.3	80.98	P
6-M10	13.48	13.95	51.52	52.98	12.91	43.67	563.8	542.3	81.18	P
6-M12	13.50	13.95	51.49	52.98	12.88	43.77	563.8	542.3	81.11	P
Average	—						564.1	559.0	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances <i>t</i> of rated nameplate values and laboratory measurement uncertainties <i>m</i> .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										N/A
Test Date [YYYY-MM-DD]..... :					2024-01-22 for 6-M4#,6-M5#; 2024-01-16 for 6-M6#,6-M7#,6-M10#; 2024-01-30 for 6-M12#, 2024-03-27 for 6-M8#, 6-M9#					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
6-M4	10.48	51.14	9.75	44.19	430.9	80.40	77.80%	99.15%	76.50%	—
6-M5	10.50	51.11	9.75	44.21	431.0	80.31	77.78%	98.95%	76.24%	—
6-M6	10.49	51.15	9.77	44.09	430.8	80.29	77.82%	99.13%	76.38%	—
6-M7	10.56	51.08	9.77	44.15	431.3	79.96	78.34%	99.05%	76.40%	—
6-M8	10.50	51.15	9.74	44.39	432.4	80.51	77.95%	99.09%	76.68%	—
6-M9	10.54	51.17	9.76	44.27	432.1	80.12	78.07%	99.11%	76.56%	—
6-M10	10.53	51.14	9.78	44.13	431.6	80.15	78.12%	99.26%	76.55%	—
6-M12	10.54	51.09	9.80	44.17	432.9	80.39	78.07%	99.22%	76.78%	—
Supplementary information: N/A										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m ² , backside irradiance 135 W/m ² , 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]..... :				2024-01-22 for 6-M4#,6-M5#; 2024-01-16 for 6-M6#,6-M7#,6-M10#; 2024-01-30 for 6-M12#, 2024-03-27 for 6-M8#, 6-M9#						—
$P_{\max}$ lower limit (W) :				See table below: $P_{\max}$ [W] – Min calc.						—
$\bar{P}_{\max}$ (lab) lower limit (V) :				617.4						—
V_{oc} (lab) upper limit (V) :				See table below: V_{oc} [V] Max. calc.						—
I_{sc} (lab) upper limit (A) :				See table below: I_{sc} [A] Max. calc.						—
Test method..... :				☒ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
6-M4	14.86	15.40	51.78	52.98	14.14	43.95	621.5	598.9	80.77	P
6-M5	14.87	15.40	51.82	52.98	14.16	44.03	623.5	598.9	80.91	P
6-M6	14.86	15.40	51.78	52.98	14.18	43.88	622.2	598.9	80.86	P
6-M7	14.87	15.40	51.75	52.98	14.17	43.94	622.7	598.9	80.92	P
6-M8	14.89	15.40	51.78	52.98	14.15	43.99	622.4	598.9	80.73	P
6-M9	14.90	15.40	51.81	52.98	14.17	43.96	622.9	598.9	80.69	P
6-M10	14.86	15.40	51.78	52.98	14.16	43.93	622.1	598.9	80.85	P
6-M12	14.90	15.40	51.77	52.98	14.17	43.92	622.3	598.9	80.67	P
Average	—						622.5	617.4	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD]	2024-01-22 for 6-M4#,6-M5#; 2024-01-16 for 6-M6#,6-M7#,6-M10#; 2024-01-30 for 6-M12#, 2024-03-27 for 6-M8#, 6-M9#			—
Test Voltage applied [V]	2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]	2.58			—
Required Resistance [MΩ]	>15.5			—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
6-M4	>1000	No breakdown	x	P
6-M5	>1000	No breakdown	x	P
6-M6	>1000	No breakdown	x	P
6-M7	>1000	No breakdown	x	P
6-M8	>1000	No breakdown	x	P
6-M9	>1000	No breakdown	x	P
6-M10	>1000	No breakdown	x	P
6-M12	>1000	No breakdown	x	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]	2024-01-22 for 6-M4#,6-M5#; 2024-01-16 for 6-M6#,6-M7#,6-M10#; 2024-01-30 for 6-M12#, 2024-03-27 for 6-M8#, 6-M9#		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.5 for 6-M4#,6-M5#; 22.3 for 6-M6#,6-M7#, 6-M10#; 22.2 for 6-M12# 22.6 for 6-M8#, 6-M9#		—
Solution resistivity [Ω cm]	2252 for 6-M4#,6-M5#; 2317 for 6-M6#,6-M7#,6-M10#; 2236 for 6-M12#, 2219 for 6-M8#, 6-M9#		—
Size of module [m ²]	2.58		—
Sample #	Required Resistance [M Ω]	Measured [M Ω]	Result
6-M4	>15.5	>1000	P
6-M5	>15.5	>1000	P
6-M6	>15.5	>1000	P
6-M7	>15.5	>1000	P
6-M8	>15.5	>1000	P
6-M9	>15.5	>1000	P
6-M10	>15.5	>1000	P
6-M12	>15.5	>1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)			—
TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)			—
TABLE 07: MQT 04 - Measurement of temperature coefficients			—
TABLE 08: MQT 08 - Outdoor exposure test			N/A
Table 08.1: MQT 01: Visual inspection after outdoor exposure test			N/A
Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			N/A
Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional			N/A
Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional			N/A
TABLE 09: MQT 18: Bypass diode thermal test			N/A
TABLE 09.1: MQT 01 - Visual inspection after bypass diode thermal test			N/A
TABLE 09.2: MQT 15 - Wet leakage current test after bypass diode thermal test			N/A
TABLE 09.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional			N/A
TABLE 09.4: MQT 03 - Insulation test after bypass diode thermal test - Optional			N/A
TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test			N/A
TABLE 10.1: MQT 19.1: Final stabilization			N/A
TABLE 10.2: MQT 06.1: Performance at STC before final stabilization			N/A
TABLE 10.3: MQT 19.1 Final Stabilization procedure			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11: MQT 09 - Hot-spot endurance test			P
Test Date [YYYY-MM-DD] start/end	2024-02-05/2024-02-06		—
Sample #	6-M12		—
Procedure of technology	☒ wafer-based technologies (WBT) MQT 09.1 ☐ monolithically integrated (MLI) thin film technologies MQT 09.2		—
Cell interconnection circuit	☐ S ☒ SPS ☐ PS		—
Type of light source	☐ Pulse solar simulator ☒ Steady state solar simulator ☐ Natural sunlight		—
Module temperature at thermal equilibrium [°C] ..	60.9/59.7		—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						P
Selected hot-spot cells	Low	Low	Low	High	Permanent	—
	A12	D8	E20	B2	N/A	
Shading rate [%]	30	25	35	30	N/A	—
Max. measured cell temperature in each cell [°C]:	128.9	117.5	130.5	125.2	N/A	—
Test duration of each shading [h]	1	1	1	1	N/A	—
Irradiance during shading [W/m²]	1230	1230	1230	1230	N/A	—

Supplementary information:

Position of solar cells (front side view):

	1	2	3	4	...	12	13	...	21	22	23	24
A												
B												
C												
D												
E												
F												

for bifacial modules, determination of the cell shading percent and the prolonged exposure are performed at the elevated irradiance BSI. If double-side illumination is used to produce BSI, both the back and the front of the cell are shaded in the same way. During cell selection, any cell that is permanently shaded by a module feature (such as the junction box) is added to the list of selected cells.

TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI		N/A
Selected hot-spot cells	N/A	—

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Clause	Requirement + Test	Result - Remark	Verdict
Number of cells shaded		N/A	—
Max. measured cell temperature [°C]		N/A	—
Test duration during shading [h]		N/A	—
Irradiance during shading [W/m²]		N/A	—
Supplementary information: N/A			

TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test		P
Test Date [YYYY-MM-DD]: 2024-02-06		—
Sample #	Nature and position of initial findings – comments or attach photos	—
6-M12	No visual defects	P
Supplementary information: N/A		

TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test							—
Test Date [YYYY-MM-DD]		2024-02-06					—
Module temperature [°C]		Corrected to 25.0					—
Irradiance [W/m²]		Corrected to 1000 or G _{BNPI}					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
6-M12-front	13.46	51.43	12.85	43.70	561.5	81.11	—
6-M12-rear	10.53	51.02	9.78	44.11	431.4	80.30	—
6-M12-BNPI	14.84	51.69	14.14	43.83	619.8	80.80	—
Supplementary information: N/A							

TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test					P
Test Date [YYYY-MM-DD]		2024-02-06			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
6-M12	>1000	>15.5	No breakdown	×	P

TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test			P
Test Date [YYYY-MM-DD]		2024-02-06	—
Test Voltage applied [V]		2 minutes of 1500	—

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Clause	Requirement + Test	Result - Remark	Verdict
Solution temperature [°C]	22.5		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2287		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
6-M12	>1000	>15.5	P
Supplementary information: N/A			

TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test				P
Test Date [YYYY-MM-DD]	2024-02-06			—
☐ Method A				—
Ambient temperature [°C]	N/A			—
Current flow applied [A]	N/A			—
Sample #	VFM	VFMrated	VFM = (N × VFMrated) ± 10 %	Result
N/A	N/A	N/A	☐ Yes ☐ No	N/A
Supplementary information: N/A				
☒ Method B				—
Sample #	IV curve after shading			Result
	Diode 1 working properly	Diode 2 working properly	Diode 3 working properly	—
6-M12	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			P
Test Date (YYYY-MM-DD) start/end	2024-01-23/2024-01-27		—
Module temperature [°C]	63.2		—
UV irradiance (280-400nm) [W/m ²]	157.0		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	6.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: N/A			

TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			P
Test Date (YYYY-MM-DD) start/end	2024-01-29/2024-02-02		—
Module temperature [°C]	61.7		—
UV irradiance (280-400nm) [W/m ²]	157.0		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	6.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: for bifacial modules repeat the procedure of UV irradiation on the rear-side of the modules.			

TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-02-02		—
Sample #	Nature and position of initial findings – comments or attach photos		—
6-M4	No visual defects		P
6-M5	No visual defects		P
Supplementary information: N/A			

TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-02-02		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.5		—
Size of module [m ²]	2.58		—
Solution resistivity [Ω cm]	2302		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
6-M4	>1000	>15.5	P

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Clause	Requirement + Test	Result - Remark	Verdict
6-M5	>1000	>15.5	P
Supplementary information: N/A			

TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional							—
Test Date [YYYY-MM-DD]			2024-02-02				—
Module temperature [°C]			Corrected to 25.0				—
Irradiance [W/m ²]			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
6-M4-front	13.41	51.44	12.82	43.62	559.2	81.07	—
6-M4-rear	10.44	51.01	9.70	44.07	427.5	80.27	—
6-M4-BNPI	14.81	51.67	14.08	43.83	617.1	80.64	—
6-M5-front	13.45	51.50	12.84	43.68	560.8	80.96	—
6-M5-rear	10.46	50.97	9.70	44.06	427.4	80.17	—
6-M5-BNPI	14.80	51.68	14.09	43.90	618.6	80.88	—
Supplementary information: N/A							

TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional					P
Test Date [YYYY-MM-DD]		2024-02-02			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured		Dielectric breakdown		Result
	[MΩ]		Yes (description)	No	
6-M4	>1000	>15.5	No breakdown	×	P
6-M5	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			P
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			P
TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			P
TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional			—

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 14: MQT 11 - Thermal cycling 50 test			P
Test Date [YYYY-MM-DD] start/end		2024-02-08/2024-02-18	—
Total cycles (50).....		50	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from 40 °C to 80 °C	15.73	—
	Other stages	0.05	—
Dwell time at high temperature.....		15 min	—
Dwell time at low temperature.....		15 min	—
Sample #	Open circuits (yes/no)		—
6-M4	no		P
6-M5	no		P
Supplementary information: N/A			

TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test		P
Test Date [YYYY-MM-DD].....:	2024-02-18	—
Sample #	Nature and position of initial findings – comments or attach photos	—
6-M4	No visual defects	P
6-M5	No visual defects	P
Supplementary information: N/A		

TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			P
Test Date [YYYY-MM-DD]	2024-02-18		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.8		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2355		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
6-M4	>1000	>15.5	P
6-M5	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test			Result - Remark		Verdict
TABLE 15.5: MQT 03 – Max. power determination after thermal cycling 50 test - Optional						—
Test Date [YYYY-MM-DD].....:		2024-02-18				—
Module temperature [°C].....:		Corrected to 25.0				—
Irradiance [W/m²):		Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
6-M4-front	13.33	51.14	12.73	43.32	551.5	80.90
6-M4-rear	10.34	50.72	9.62	43.79	421.3	80.33
6-M4-BNPI	14.70	51.41	13.96	43.59	608.5	80.52
6-M5-front	13.32	51.20	12.72	43.40	552.0	80.94
6-M5-rear	10.37	50.73	9.60	43.80	420.5	79.93
6-M5-BNPI	14.65	51.35	13.97	43.59	608.9	80.94
Supplementary information: N/A						

TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional				P
Test Date [YYYY-MM-DD]		2024-02-18		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]		2.58		—
Required Resistance [MΩ]		>15.5		—
Sample #	Measured	Dielectric breakdown		Result
	[MΩ]	Yes (description)	No	
6-M4	>1000	No breakdown	×	P
6-M5	>1000	No breakdown	×	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 15: MQT 12 - Humidity freeze 10 test		P
Test Date [YYYY-MM-DD] start/end	2024-02-20/2024-03-01	—
Total cycles (10)	10	—
Applied current (A)	0.05	—
Dwell time at high temperature	20 h	—
Dwell time at low temperature	40 min	—
Sample #	Open circuits (yes/no)	—
6-M4	no	P
6-M5	no	P
Supplementary information: N/A		

TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test		P
Test Date [YYYY-MM-DD]: 2024-03-01		—
Sample #	Nature and position of initial findings – comments or attach photos	—
6-M4	No visual defects	P
6-M5	No visual defects	P
Supplementary information: N/A		

TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			P
Test Date [YYYY-MM-DD]	2024-03-01		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	22.2		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	2305		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
6-M4	>1000	>15.5	P
6-M5	>1000	>15.5	P
Supplementary information: N/A			

TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional			—
Test Date [YYYY-MM-DD]	2024-03-01		—
Module temperature [°C].....	Corrected to 25.0		—

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Clause	Requirement + Test			Result - Remark		Verdict
Irradiance [W/m ²):			Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
6-M4-front	13.26	50.95	12.65	43.13	545.6	80.76
6-M4-rear	10.27	50.58	9.56	43.61	416.9	80.26
6-M4-BNPI	14.61	51.24	13.87	43.41	602.1	80.43
6-M5-front	13.25	51.03	12.64	43.20	546.0	80.75
6-M5-rear	10.32	50.62	9.53	43.70	416.5	79.73
6-M5-BNPI	14.58	51.09	13.90	43.33	602.3	80.86
Supplementary information: N/A						

TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional					P
Test Date [YYYY-MM-DD]		2024-03-01			—
Test Voltage applied [V]		2 minutes of 1500			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
6-M4	>1000	>15.5	No breakdown	×	P
6-M5	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 16: MQT 14.1 Retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD] start/end		2024-03-02	—
Sample #	6-M4		—
Supplementary information: N/A			

TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface		P
Test Date [YYYY-MM-DD].....: 2024-03-02		—
Sample #	Nature and position of initial findings – comments or attach photos	—
6-M4	No visual defects	P
Supplementary information: N/A		

TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD]		2024-03-02	—
Test Voltage applied [V]		2 minutes of 2025	—
Solution temperature [°C]		22.5	—
Size of module [m²]		2.58	—
Solution resistivity [Ω cm]		2467	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
6-M4	>1000	>15.5	P
Supplementary information: N/A			

TABLE 16.4: MQT 14.2 - Test of cord anchorage	N/A

TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage	N/A

TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage	N/A

TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 17: MQT 11 - Thermal cycling 200 test			P
Test Date [YYYY-MM-DD] start/end		2024-03-29/2024-05-06	—
Total cycles (200).....		200	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from – 40 °C to 80 °C	15.83	—
	Other stages	0.05	—
Dwell time at high temperature		15 min	—
Dwell time at low temperature		15 min	—
Sample #	Open circuits (yes/no)		—
6-M8	no		P
6-M9	no		P
Supplementary information: N/A			

TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test		P
Test Date [YYYY-MM-DD].....: 2024-05-06		—
Sample #	Nature and position of initial findings – comments or attach photos	—
6-M8	No visual defects	P
6-M9	No visual defects	P
Supplementary information: N/A		

TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test			P
Test Date [YYYY-MM-DD]	2024-05-06		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.9		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2380		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
6-M8	>1000	>15.5	P
6-M9	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional							—
Test Date [YYYY-MM-DD]				2024-05-06			—
Module temperature [°C]				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
6-M8-front	13.37	51.41	12.76	43.60	556.3	80.94	—
6-M8-rear	10.41	50.97	9.66	44.20	427.0	80.47	—
6-M8-BNPI	14.78	51.56	14.03	43.77	614.2	80.59	—
6-M9-front	13.40	51.45	12.77	43.63	557.1	80.81	—
6-M9-rear	10.47	50.99	9.68	44.08	426.7	79.92	—
6-M9-BNPI	14.79	51.63	14.05	43.76	614.9	80.52	—
Supplementary information: N/A							

TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional					P
Test Date [YYYY-MM-DD]		2024-05-06			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
6-M8	>1000	>15.5	No breakdown	×	P
6-M9	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 18: MQT 13 - Damp heat 1000 test			P
Test Date [YYYY-MM-DD] start/end	2024-01-17/2024-02-29		—
Total hours (1000h)	1000		—
Sample #	—		—
6-M6	—		P
6-M7	—		P
Supplementary information: N/A			

TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-02-29		—
Sample #	Nature and position of initial findings – comments or attach photos		—
6-M6	No visual defects		P
6-M7	No visual defects		P
Supplementary information: N/A			

TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-02-29		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.6		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2381		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
6-M6	>1000	>15.5	P
6-M7	>1000	>15.5	P
Supplementary information: N/A			

TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional							—
Test Date [YYYY-MM-DD]	2024-02-29						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
6-M6-front	13.34	51.33	12.75	43.51	554.8	81.02	—
6-M6-rear	10.38	50.96	9.66	43.90	424.1	80.18	—
6-M6-BNPI	14.73	51.49	14.04	43.60	612.2	80.72	—

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Clause	Requirement + Test				Result - Remark		Verdict
6-M7-front	13.35	51.35	12.76	43.54	555.6	81.05	—
6-M7-rear	10.46	50.84	9.66	43.91	424.2	79.77	—
6-M7-BNPI	14.74	51.50	14.03	43.69	613.0	80.75	—
Supplementary information: N/A							

TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional					P
Test Date [YYYY-MM-DD]		2024-02-29			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Measured	Required Resistance	Dielectric breakdown		Result
	[MΩ]	[MΩ]	Yes (description)	No	
6-M6	>1000	>15.5	No breakdown	×	P
6-M7	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	6-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-03-04		—
Mounting method	Clamps mounting (4 points on long side with two beams across the module at the long side)		—
Load applied to.....	front side	back side	—
Mechanical load [Pa].....	5400	2400	—
First cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test		P
Test Date [YYYY-MM-DD]	2024-03-04	—
Sample #	Nature and position of initial findings – comments or attach photos	—
6-M6	No visual defects	P
Supplementary information: N/A		

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-03-04		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	21.5		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	2275		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
6-M6	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test			Result - Remark			Verdict
TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-03-04			—
Module temperature [°C].....:				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
6-M6-front	13.26	51.20	12.67	43.39	549.7	80.97	—
6-M6-rear	10.32	50.80	9.60	43.75	420.0	80.11	—
6-M6-BNPI	14.63	51.29	13.97	43.41	606.5	80.83	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD]			2024-03-04		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]			2.58		—
Required Resistance [MΩ]			>15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
6-M6	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 20: MQT 22 Bending test			N/A
TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
TABLE 20.2: MQT 15 - Wet leakage current test after bending test			N/A
TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional			N/A
TABLE 20.4: MQT 03 Insulation test after bending test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 21: MQT 17 - Hail impact test							P
Test Date [YYYY-MM-DD]	2024-03-04						—
Sample #	6-M7						—
Ice ball size [mm]	1	2	3	4	5	6	—
	25±5%	25±5%	25±5%	25±5%	25±5%	25±5%	
	7	8	9	10	11	—	
	25±5%	25±5%	25±5%	25±5%	25±5%	—	
Ice ball weight [g]	1	2	3	4	5	6	—
	7.53	7.61	7.45	7.45	7.53	7.61	
	7	8	9	10	11	—	
	7.61	7.61	7.53	7.53	7.61	—	
Ice ball velocity [m/s]	1	2	3	4	5	6	—
	23.0	22.8	22.8	23.0	23.2	23.2	
	7	8	9	10	11	—	
	23.2	22.8	22.8	22.8	23.0	—	
Number of impact locations	11						—
Supplementary information: N/A							

TABLE 21.1: MQT 01 - Visual inspection after hail impact test		P
Test Date [YYYY-MM-DD]: 2024-03-04		—
Sample #	Nature and position of initial findings – comments or attach photos	—
6-M7	No visual defects	P
Supplementary information: N/A		

TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test				P
Test Date [YYYY-MM-DD]		2024-03-04		—
Test Voltage applied [V]		2 minutes of 1500		—
Solution temperature [°C]		22.3		—
Size of module [m²]		2.58		—
Solution resistivity [Ω cm]		2328		—
Sample #	Measured [MΩ]		Required Resistance [MΩ]	Result
6-M7	>1000		>15.5	P
Supplementary information: N/A				

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional							—
Test Date [YYYY-MM-DD].....:			2024-03-04				—
Module temperature [°C].....:			Corrected to 25.0				—
Irradiance [W/m²):			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
6-M7-front	13.34	51.30	12.73	43.51	553.9	80.94	—
6-M7-rear	10.43	50.78	9.64	43.85	422.7	79.81	—
6-M7-BNPI	14.72	51.44	14.00	43.65	611.1	80.71	—
Supplementary information: N/A							

TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional					P
Test Date [YYYY-MM-DD]			2024-03-04		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.58		—
Required Resistance [MΩ].....			>15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
6-M7	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 22: MQT 21 -Potential induced degradation test	P

TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test	P

TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test	P

TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test - Optional	—

TABLE 22.4: MQT 03 Insulation test after potential induced degradation test - Optional	P

TABLE 23: MQT 19.2: Final stabilization							—
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization							—
Test Date [YYYY-MM-DD]			2024-02-29				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
6-M6-front	13.34	51.33	12.75	43.51	554.8	81.02	—
6-M6-rear	10.38	50.96	9.66	43.90	424.1	80.18	—
6-M6-BNPI	14.73	51.49	14.04	43.60	612.2	80.72	—
6-M7-front	13.35	51.35	12.76	43.54	555.6	81.05	—
6-M7-rear	10.46	50.84	9.66	43.91	424.2	79.77	—
6-M7-BNPI	14.74	51.50	14.03	43.69	613.0	80.75	—
Supplementary information: N/A							

TABLE 23.2: MQT 19.1 Final Stabilization procedure							—
☐ IEC 61215-1-2 ☐ IEC 61215-1-3 ☐ IEC 61215-1-4							—
Light exposure method:				☐ Solar simulator ☐ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x :				N/A			
Sample #	N/A	Test Date (YYYY-MM-DD) start/end...:			N/A		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test				Result - Remark		Verdict
2	N/A	N/A	N/A	N/A	N/A	—	—
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure							

TABLE 23.3: MQT 19.2: Final stabilization										
☒ IEC 61215-1-1										
☐ Method 1										N/A
Stress-specific stabilization – BO LID (MQT 19.3)										N/A
Test Date [YYYY-MM-DD]				N/A						—
Applied current (A)				N/A						—
Module temperature [°C].....				N/A						—
Total hours (48h)				N/A						—
Performance at STC after final stabilization— for monofacial modules										
Test Date [YYYY-MM-DD]				N/A						—
Test method				☐ Solar simulator ☐ Natural sunlight						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	P _{max} [W] (Lab Gate No.1)	Power Degradation	Result	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Performance at BNPI after final stabilization — for bifacial modules										—
Test Date [YYYY-MM-DD]				N/A						—
Test method				☐ Solar simulator ☐ Natural sunlight						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	P _{max} [W] (Lab Gate No.1)	Power Degradation	Result	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Supplementary information: N/A										
☒ Method 2										—
Performance at STC before final stabilization— for monofacial modules										—
Test Date [YYYY-MM-DD]										—
Test method				☐ Solar simulator ☐ Natural sunlight						—

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Clause	Requirement + Test						Result - Remark	Verdict	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]				2024-02-29					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
6-M6	14.73	51.49	14.04	43.60	612.2	80.72	622.2	-1.61	P
6-M7	14.74	51.50	14.03	43.69	613.0	80.75	622.7	-1.56	P
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to destabilization artifacts.									
If Power Degradation $\geq 5\%$, then perform stress-specific stabilization MQT 19.3 in method 1									
Stress-specific stabilization – BO LID (MQT 19.3)									—
Test Date [YYYY-MM-DD]				N/A					—
Applied current (A)				N/A					—
Module temperature [°C]				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization — for monofacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									

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Clause	Requirement + Test							Result - Remark	Verdict
TABLE 23.4: MQT 19.2: Final stabilization									
☐ Method 3									
Test Date (YYYY-MM-DD) start/end		N/A							—
Test duration [h]		N/A							—
Module temperature [°C]		N/A							—
UV irradiance (280-400nm) [W/m²]		N/A							—
UV dose (280-320nm) [kWh/ m²]		N/A							—
UV dose (280-400nm) [kWh/ m²]		N/A							—
Side exposed		☐ Front side ☐ Rear side							—
Module operation condition		☐ Short circuited ☐ Open circuited							—
Supplementary information: for bifacial modules, the irradiance shall be applied to the rear side, whereas for monofacial modules, the irradiance shall be applied to the front side.									
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 4									
Performance at STC before final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☒ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									

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Clause	Requirement + Test						Result - Remark	Verdict	
Test Date [YYYY-MM-DD]				N/A					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to polarization artifacts									
If Power Degradation $\geq 5\%$, then perform method 3 final stabilization									
Method 3									
Test Date [YYYY-MM-DD]				N/A					—
Test duration [h]				N/A					—
Module temperature [°C]				N/A					—
UV irradiance (280-400nm) [W/m ²]				N/A					—
UV dose (280-320nm) [kWh/ m ²]				N/A					—
UV dose (280-400nm) [kWh/ m ²]				N/A					—
Side exposed				☐ Front side ☐ Rear side					—
Module operation condition				☐ Short circuited ☐ Open circuited					—
Performance at STC after final stabilization — for monofacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]									—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information: N/A

for monofacial modules									
TABLE 23.5: MQT 06.1: Final Performance at STC									N/A
Test Date [YYYY-MM-DD].....:					—				—
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation [%]	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: P_{max} [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

for bifacial modules							—			
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)							—			
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result			
6-M4	13.25	50.89	12.65	42.58	545.4	80.88	—			
6-M5	13.25	51.03	12.64	43.20	546.0	80.75	—			
6-M6	13.26	51.20	12.67	43.39	549.7	80.97	—			
6-M7	13.34	51.30	12.73	43.51	553.9	80.94	—			
6-M8	13.37	51.41	12.76	43.60	556.3	80.94	—			
6-M9	13.40	51.45	12.77	43.63	557.1	80.81	—			
Supplementary information: N/A										
TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)										
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
6-M4	10.27	50.55	9.55	43.63	416.7	80.27	77.51%	99.33%	76.40%	—
6-M5	10.32	50.62	9.53	43.70	416.5	79.73	77.89%	99.20%	76.28%	—
6-M6	10.32	50.80	9.60	43.75	420.0	80.11	77.83%	99.22%	76.41%	—
6-M7	10.43	50.78	9.64	43.85	422.7	79.81	78.19%	98.99%	76.31%	—
6-M8	10.41	50.97	9.66	44.20	427.0	80.47	77.86%	99.14%	76.75%	—

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Clause	Requirement + Test						Result - Remark			Verdict
6-M9	10.47	50.99	9.68	44.08	426.7	79.92	78.135	99.11%	76.58%	—
Supplementary information: N/A										

TABLE 23.8: MQT 06.1: Final Performance at BNPI									P
Test Date [YYYY-MM-DD]					—				—
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation [%]	Result
6-M4	14.59	51.20	13.86	43.42	601.8	80.56	620.6	-3.02	P
6-M5	14.58	51.09	13.90	43.33	602.3	80.86	622.6	-3.26	P
6-M6	14.63	51.29	13.97	43.41	606.5	80.83	621.6	-2.43	P
6-M7	14.72	51.44	14.00	43.65	611.1	80.71	622.1	-1.76	P
6-M8	14.78	51.56	14.03	43.77	614.2	80.59	621.1	-1.11	P
6-M9	14.79	51.63	14.05	43.76	614.9	80.52	621.6	-1.08	P
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		—			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		2.58			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
6-M4	>1000	>15.5	No breakdown	×	P
6-M5	>1000	>15.5	No breakdown	×	P
6-M6	>1000	>15.5	No breakdown	×	P
6-M7	>1000	>15.5	No breakdown	×	P
6-M8	>1000	>15.5	No breakdown	×	P
6-M9	>1000	>15.5	No breakdown	×	P
6-M10	>1000	>15.5	No breakdown	×	P
6-M12	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	—	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22±2	—
Size of module [m²]	:	2.58	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
6-M4	>1000	>15.5	P
6-M5	>1000	>15.5	P
6-M6	>1000	>15.5	P
6-M7	>1000	>15.5	P
6-M8	>1000	>15.5	P
6-M9	>1000	>15.5	P
6-M10	>1000	>15.5	P
6-M12	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD570 (BOM7)

TABLE 01: MQT 01 ini: Initial Visual inspection		P
Test Date [YYYY-MM-DD]..... :	2024-01-10 for 7-M4#, 7-M5#, 7-M6#, 7-M7#, 7-M10#, 7-M12#, 2024-03-22 for 7-M8#, 7-M9#	—
Sample #	Nature and position of initial findings – comments or attach photos	—
7-M4	No visual defects	P
7-M5	No visual defects	P
7-M6	No visual defects	P
7-M7	No visual defects	P
7-M8	No visual defects	P
7-M9	No visual defects	P
7-M10	No visual defects	P
7-M12	No visual defects	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]		2024-01-17 for 7-M4#, 7-M5#; 2024-01-10 for 7-M6#, 7-M7#, 7-M10#; 2024-01-24 for 7-M12#, 2024-03-22 for 7-M8#, 7-M9#					—
Test method		☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
7-M4	13.51	51.65	12.91	43.87	566.4	81.17	—
7-M5	13.49	51.61	12.88	43.80	564.2	81.04	—
7-M6	13.54	51.66	12.92	43.85	566.6	81.00	—
7-M7	13.50	51.63	12.89	43.89	565.8	81.18	—
7-M8	13.52	51.67	12.91	43.84	566.0	81.02	—
7-M9	13.54	51.69	12.93	43.83	566.7	80.97	—
7-M10	13.49	51.62	12.89	43.85	565.2	81.17	—
7-M12	13.56	51.70	12.92	43.87	566.8	80.85	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							
Test Date [YYYY-MM-DD]		2024-01-17 for 7-M4#, 7-M5#; 2024-01-10 for 7-M6#, 7-M7#, 7-M10#; 2024-01-24 for 7-M12#, 2024-03-22 for 7-M8#, 7-M9#					—
Test method		☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
7-M4	10.65	51.16	9.84	44.21	435.0	79.84	—
7-M5	10.66	51.14	9.85	44.22	435.6	79.90	—
7-M6	10.66	51.23	9.80	44.31	434.2	79.51	—
7-M7	10.67	51.20	9.82	44.22	434.2	79.48	—
7-M8	10.68	51.14	9.81	44.26	434.2	79.50	—
7-M9	10.69	51.16	9.82	44.28	434.8	79.50	—
7-M10	10.65	51.18	9.81	44.15	433.1	79.46	—
7-M12	10.55	51.24	9.87	44.31	437.3	80.89	—
Supplementary information: N/A							

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]..... :			2024-01-17 for 7-M4#,7-M5#; 2024-01-10 for 7-M6#,7-M7#,7-M10#; 2024-01-24 for 7-M12#, 2024-03-22 for 7-M8#, 7-M9#				—
Test method..... :			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
7-M4	14.93	51.83	14.19	44.07	625.3	80.81	—
7-M5	14.89	51.82	14.17	43.99	623.3	80.78	—
7-M6	14.94	51.84	14.20	44.01	624.9	80.69	—
7-M7	14.91	51.81	14.18	44.06	624.7	80.87	—
7-M8	14.89	51.85	14.19	44.03	624.8	80.93	—
7-M9	14.92	51.88	14.22	43.99	625.6	80.82	—
7-M10	14.89	51.85	14.17	44.02	623.8	80.80	—
7-M12	14.97	51.87	14.21	44.03	625.7	80.58	—
Supplementary information: N/A							
TABLE 02.4: MQT 19.1: Initial Stabilization procedure							
Light exposure method..... :			☐ Solar simulator ☒ Natural sunlight				
Stabilization criterion x per IEC 61215-1-x..... :			1%				
Sample #	7-M4	Test Date (YYYY-MM-DD) start/end.....:			2024-01-17/2024-01-22		
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.4	—	—
1	5.0	>500	N/A	MPPT	565.2	—	—
2	5.0	>500	N/A	MPPT	564.8	0.28	Yes

Sample #	7-M5	Test Date (YYYY-MM-DD) start/end			2024-01-17/2024-01-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	564.2	—	—
1	5.0	>500	N/A	MPPT	563.1	—	—
2	5.0	>500	N/A	MPPT	562.7	0.27	Yes

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #	7-M6	Test Date (YYYY-MM-DD) start/end			2024-01-10/2024-01-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.6	—	—
1	5.0	>500	N/A	MPPT	565.5	—	—
2	5.0	>500	N/A	MPPT	564.9	0.30	Yes

Sample #	7-M7	Test Date (YYYY-MM-DD) start/end			2024-01-10/2024-01-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	565.8	—	—
1	5.0	>500	N/A	MPPT	564.6	—	—
2	5.0	>500	N/A	MPPT	564.0	0.32	Yes

Sample #	7-M8	Test Date (YYYY-MM-DD) start/end			2024-03-22/2024-03-27		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.0	—	—
1	5.0	>500	N/A	MPPT	564.9	—	—
2	5.0	>500	N/A	MPPT	564.3	0.30	Yes

Sample #	7-M9	Test Date (YYYY-MM-DD) start/end			2024-03-22/2024-03-27		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.7	—	—
1	5.0	>500	N/A	MPPT	565.6	—	—
2	5.0	>500	N/A	MPPT	565.2	0.27	Yes

Sample #	7-M10	Test Date (YYYY-MM-DD) start/end			2024-01-10/2024-01-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	565.2	—	—

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Clause	Requirement + Test				Result - Remark		Verdict
1	5.0	>500	N/A	MPPT	564.0	—	—
2	5.0	>500	N/A	MPPT	563.3	0.34	Yes

Sample #	7-M12	Test Date (YYYY-MM-DD) start/end:			2024-01-24/2024-01-30		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.8	—	—
1	5.0	>500	N/A	MPPT	565.3	—	—
2	5.0	>500	N/A	MPPT	564.7	0.37	Yes
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable							

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]..... :					2024-01-22 for 7-M4#,7-M5#; 2024-01-16 for 7-M6#,7-M7#,7-M10#; 2024-01-30 for 7-M12#, 2024-03-22 for 7-M8#, 7-M9#					—
$P_{\max}$ lower limit (W) :					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V) :					559.0					—
V_{oc} (lab) upper limit (V) :					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A) :					See table below: I_{sc} [A] Max. calc.					—
Test method..... :					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
7-M4	13.49	13.95	51.57	52.98	12.90	43.77	564.8	542.3	81.19	P
7-M5	13.47	13.95	51.53	52.98	12.87	43.72	562.7	542.3	81.07	P
7-M6	13.51	13.95	51.56	52.98	12.92	43.72	564.9	542.3	81.10	P
7-M7	13.47	13.95	51.54	52.98	12.88	43.79	564.0	542.3	81.24	P
7-M8	13.50	13.95	51.60	52.98	12.89	43.78	564.3	542.3	81.01	P
7-M9	13.52	13.95	51.58	52.98	12.91	43.78	565.2	542.3	81.05	P
7-M10	13.47	13.95	51.48	52.98	12.90	43.67	563.3	542.3	81.23	P
7-M12	13.54	13.95	51.62	52.98	12.90	43.78	564.7	542.3	80.79	P
Average	—						564.2	559.0	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										N/A
Test Date [YYYY-MM-DD]					2024-01-22 for 7-M4#,7-M5#; 2024-01-16 for 7-M6#,7-M7#,7-M10#; 2024-01-30 for 7-M12#, 2024-03-22 for 7-M8#, 7-M9#					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
7-M4	10.63	51.05	9.80	44.10	432.2	79.64	78.80%	98.99%	76.52%	—
7-M5	10.65	51.13	9.82	44.22	434.2	79.74	79.06%	99.22%	77.16%	—
7-M6	10.63	51.20	9.79	44.29	433.6	79.67	78.68%	99.30%	76.76%	—
7-M7	10.64	51.20	9.80	44.23	433.5	79.58	78.99%	99.34%	76.86%	—
7-M8	10.67	51.09	9.80	44.18	433.0	79.43	79.04%	99.01%	76.73%	—
7-M9	10.67	51.10	9.81	44.19	433.5	79.51	78.92%	99.07%	76.70%	—
7-M10	10.63	51.14	9.78	44.17	432.0	79.47	78.92%	99.34%	76.69%	—
7-M12	10.52	51.23	9.86	44.30	436.8	81.05	77.70%	99.24%	77.35%	—
Supplementary information: N/A										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m ² , backside irradiance 135 W/m ² , 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]..... :				2024-01-22 for 7-M4#,7-M5#; 2024-01-16 for 7-M6#,7-M7#,7-M10#; 2024-01-30 for 7-M12#, 2024-03-22 for 7-M8#, 7-M9#						—
$P_{\max}$ lower limit (W)				See table below: $P_{\max}$ [W] – Min calc.						—
$\bar{P}_{\max}$ (lab) lower limit (V)				617.4						—
V_{oc} (lab) upper limit (V)				See table below: V_{oc} [V] Max. calc.						—
I_{sc} (lab) upper limit (A)				See table below: I_{sc} [A] Max. calc.						—
Test method				☒ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
7-M4	14.91	15.40	51.74	52.98	14.17	43.99	623.3	598.9	80.80	P
7-M5	14.86	15.40	51.74	52.98	14.16	43.88	621.4	598.9	80.82	P
7-M6	14.90	15.40	51.79	52.98	14.18	43.97	623.5	598.9	80.80	P
7-M7	14.88	15.40	51.67	52.98	14.18	43.91	622.6	598.9	80.98	P
7-M8	14.88	15.40	51.78	52.98	14.17	43.96	622.9	598.9	80.85	P
7-M9	14.90	15.40	51.80	52.98	14.20	43.94	623.9	598.9	80.83	P
7-M10	14.89	15.40	51.75	52.98	14.15	43.94	621.7	598.9	80.68	P
7-M12	14.95	15.40	51.80	52.98	14.19	43.96	623.8	598.9	80.55	P
Average	—						622.9	617.4	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD]	2024-01-22 for 7-M4#,7-M5#; 2024-01-16 for 7-M6#,7-M7#,7-M10#; 2024-01-30 for 7-M12#, 2024-03-22 for 7-M8#, 7-M9#			—
Test Voltage applied [V]	2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]	2.58			—
Required Resistance [MΩ]	>15.5			—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
7-M4	>1000	No breakdown	×	P
7-M5	>1000	No breakdown	×	P
7-M6	>1000	No breakdown	×	P
7-M7	>1000	No breakdown	×	P
7-M8	>1000	No breakdown	×	P
7-M9	>1000	No breakdown	×	P
7-M10	>1000	No breakdown	×	P
7-M12	>1000	No breakdown	×	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]	2024-01-22 for 7-M4#,7-M5#; 2024-01-16 for 7-M6#,7-M7#,7-M10#; 2024-01-30 for 7-M12#, 2024-03-22 for 7-M8#, 7-M9#		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.5 for 7-M4#,7-M5#; 22.3 for 7-M6#,7-M7#,7-M10#; 22.2 for 7-M12#, 22.6 for 7-M8#, 7-M9#		—
Solution resistivity [Ω cm]	2252 for 7-M4#,7-M5#; 2317 for 7-M6#,7-M7#,7-M10#; 2236 for 7-M12#, 2219 for 7-M8#, 7-M9#		—
Size of module [m ²]	2.58		—
Sample #	Required Resistance [M Ω]	Measured [M Ω]	Result
7-M4	>15.5	>1000	P
7-M5	>15.5	>1000	P
7-M6	>15.5	>1000	P
7-M7	>15.5	>1000	P
7-M8	>15.5	>1000	P
7-M9	>15.5	>1000	P
7-M10	>15.5	>1000	P
7-M12	>15.5	>1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)			N/A
TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)			N/A
TABLE 07: MQT 04 - Measurement of temperature coefficients			N/A
TABLE 08: MQT 08 - Outdoor exposure test			N/A
Table 08.1: MQT 01: Visual inspection after outdoor exposure test			N/A
Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			N/A
Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional			N/A
Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional			N/A
TABLE 09: MQT 18: Bypass diode thermal test			N/A
TABLE 09.1: MQT 01 - Visual inspection after bypass diode thermal test			N/A
TABLE 09.2: MQT 15 - Wet leakage current test after bypass diode thermal test			N/A
TABLE 09.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional			N/A
TABLE 09.4: MQT 03 - Insulation test after bypass diode thermal test - Optional			N/A
TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test			N/A
TABLE 10.1: MQT 19.1: Final stabilization			N/A
TABLE 10.2: MQT 06.1: Performance at STC before final stabilization			N/A
TABLE 10.3: MQT 19.1 Final Stabilization procedure			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11: MQT 09 - Hot-spot endurance test			P
Test Date [YYYY-MM-DD] start/end	2024-02-05/2024-02-06		—
Sample #	7-M12		—
Procedure of technology	☒ wafer-based technologies (WBT) MQT 09.1 ☐ monolithically integrated (MLI) thin film technologies MQT 09.2		—
Cell interconnection circuit	☐ S ☒ SPS ☐ PS		—
Type of light source	☐ Pulse solar simulator ☒ Steady state solar simulator ☐ Natural sunlight		—
Module temperature at thermal equilibrium [°C] ..	60.9/59.7		—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						P
Selected hot-spot cells	Low	Low	Low	High	Permanent	—
	F13	D5	E23	A21	N/A	
Shading rate [%]	35	45	30	35	N/A	—
Max. measured cell temperature in each cell [°C]:	124.7	123.0	119.8	121.5	N/A	—
Test duration of each shading [h]	1	1	1	1	N/A	—
Irradiance during shading [W/m²]	1232	1232	1232	1232	N/A	—

Supplementary information:

Position of solar cells (front side view):

	1	2	3	4	...	12		13	...	21	22	23	24
A							Junction box						
B													
C													
D													
E													
F													

for bifacial modules, determination of the cell shading percent and the prolonged exposure are performed at the elevated irradiance BSI. If double-side illumination is used to produce BSI, both the back and the front of the cell are shaded in the same way. During cell selection, any cell that is permanently shaded by a module feature (such as the junction box) is added to the list of selected cells.

TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI		N/A
Selected hot-spot cells	N/A	—

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Clause	Requirement + Test	Result - Remark	Verdict
Number of cells shaded		N/A	—
Max. measured cell temperature [°C]		N/A	—
Test duration during shading [h]		N/A	—
Irradiance during shading [W/m ²]		N/A	—
Supplementary information: N/A			

TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test		P
Test Date [YYYY-MM-DD]: 2024-02-06		—
Sample #	Nature and position of initial findings – comments or attach photos	—
7-M12	No visual defects	P
Supplementary information: N/A		

TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test							—
Test Date [YYYY-MM-DD]		2024-02-06					—
Module temperature [°C]		Corrected to 25.0					—
Irradiance [W/m ²]		Corrected to 1000 or G _{BNPI}					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
7-M12-front	13.51	51.50	12.86	43.67	561.6	80.72	—
7-M12-rear	10.49	51.11	9.84	44.19	434.8	81.10	—
7-M12-BNPI	14.90	51.73	14.14	43.88	620.4	80.49	—
Supplementary information: N/A							

TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test					P
Test Date [YYYY-MM-DD]		2024-02-06			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
7-M12	>1000	>15.5	No breakdown	×	P

TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test			P
Test Date [YYYY-MM-DD]		2024-02-06	—
Test Voltage applied [V]		2 minutes of 1500	—

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Clause	Requirement + Test	Result - Remark	Verdict
Solution temperature [°C]	22.3		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2432		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
7-M12	>1000	>15.5	P
Supplementary information: N/A			

TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test				P
Test Date [YYYY-MM-DD]	2024-02-06			—
☐ Method A				—
Ambient temperature [°C]	N/A			—
Current flow applied [A]	N/A			—
Sample #	VFM	VFMrated	VFM = (N × VFMrated) ± 10 %	Result
N/A	N/A	N/A	☐ Yes ☐ No	N/A
Supplementary information: N/A				
☒ Method B				—
Sample #	IV curve after shading			Result
	Diode 1 working properly	Diode 2 working properly	Diode 3 working properly	—
7-M12	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			P
Test Date (YYYY-MM-DD) start/end	2024-01-23/2024-01-27		—
Module temperature [°C]	63.2		—
UV irradiance (280-400nm) [W/m ²]	157.0		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	6.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: N/A			

TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			P
Test Date (YYYY-MM-DD) start/end	2024-01-29/2024-02-02		—
Module temperature [°C]	61.7		—
UV irradiance (280-400nm) [W/m ²]	157.0		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	6.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: for bifacial modules repeat the procedure of UV irradiation on the rear-side of the modules.			

TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-02-02		—
Sample #	Nature and position of initial findings – comments or attach photos		—
7-M4	No visual defects		P
7-M5	No visual defects		P
Supplementary information: N/A			

TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-02-02		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.5		—
Size of module [m ²]	2.58		—
Solution resistivity [Ω cm]	2302		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
7-M4	>1000	>15.5	P

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Clause	Requirement + Test	Result - Remark	Verdict
7-M5	>1000	>15.5	P
Supplementary information: N/A			

TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional							—
Test Date [YYYY-MM-DD]				2024-02-02			—
Module temperature [°C]				Corrected to 25.0			—
Irradiance [W/m ²]				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
7-M4-front	13.43	51.42	12.85	43.61	560.4	81.15	—
7-M4-rear	10.59	50.91	9.76	43.95	429.0	79.57	—
7-M4-BNPI	14.84	51.59	14.11	43.83	618.4	80.77	—
7-M5-front	13.44	51.42	12.82	43.62	559.2	80.92	—
7-M5-rear	10.61	51.00	9.78	44.06	430.9	79.63	—
7-M5-BNPI	14.82	51.63	14.11	43.76	617.5	80.70	—
Supplementary information: N/A							

TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional					P
Test Date [YYYY-MM-DD]			2024-02-02		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.58		—
Required Resistance [MΩ].....			>15.5		—
Sample #	Measured		Dielectric breakdown		Result
	[MΩ]		Yes (description)	No	
7-M4	>1000	>15.5	No breakdown	×	P
7-M5	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 14: MQT 11 - Thermal cycling 50 test			P
Test Date [YYYY-MM-DD] start/end		2024-02-08/2024-02-18	—
Total cycles (50).....		50	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from 40 °C to 80 °C	15.74	—
	Other stages	0.05	—
Dwell time at high temperature.....		15 min	—
Dwell time at low temperature.....		15 min	—
Sample #	Open circuits (yes/no)		—
7-M4	no		P
7-M5	no		P
Supplementary information: N/A			

TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test		P
Test Date [YYYY-MM-DD].....: 2024-02-18		—
Sample #	Nature and position of initial findings – comments or attach photos	—
7-M4	No visual defects	P
7-M5	No visual defects	P
Supplementary information: N/A		

TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			P
Test Date [YYYY-MM-DD]	2024-02-18		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.8		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2355		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
7-M4	>1000	>15.5	P
7-M5	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test			Result - Remark		Verdict
TABLE 15.5: MQT 03 – Max. power determination after thermal cycling 50 test - Optional						—
Test Date [YYYY-MM-DD].....:		2024-02-18				—
Module temperature [°C].....:		Corrected to 25.0				—
Irradiance [W/m²):		Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
7-M4-front	13.31	51.24	12.73	43.43	552.9	81.07
7-M4-rear	10.52	50.68	9.68	43.74	423.4	79.41
7-M4-BNPI	14.71	51.42	13.97	43.68	610.2	80.67
7-M5-front	13.34	51.24	12.70	43.43	551.6	80.70
7-M5-rear	10.53	50.70	9.70	43.73	424.2	79.46
7-M5-BNPI	14.70	51.39	13.99	43.52	608.9	80.60
Supplementary information: N/A						

TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional				P
Test Date [YYYY-MM-DD]		2024-02-18		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]		2.58		—
Required Resistance [MΩ]		>15.5		—
Sample #	Measured	Dielectric breakdown		Result
	[MΩ]	Yes (description)	No	
7-M4	>1000	No breakdown	×	P
7-M5	>1000	No breakdown	×	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 15: MQT 12 - Humidity freeze 10 test		P
Test Date [YYYY-MM-DD] start/end	2024-02-20/2024-03-01	—
Total cycles (10)	10	—
Applied current (A)	0.05	—
Dwell time at high temperature	20 h	—
Dwell time at low temperature.....	40 min	—
Sample #	Open circuits (yes/no)	—
7-M4	no	P
7-M5	no	P
Supplementary information: N/A		

TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test		P
Test Date [YYYY-MM-DD].....: 2024-03-01		—
Sample #	Nature and position of initial findings – comments or attach photos	—
7-M4	No visual defects	P
7-M5	No visual defects	P
Supplementary information: N/A		

TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			P
Test Date [YYYY-MM-DD]	2024-03-01		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	22.2		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	2305		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
7-M4	>1000	>15.5	P
7-M5	>1000	>15.5	P
Supplementary information: N/A			

TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional			—
Test Date [YYYY-MM-DD]	2024-03-01		—
Module temperature [°C].....	Corrected to 25.0		—

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Clause	Requirement + Test			Result - Remark		Verdict
Irradiance [W/m ²]:				Corrected to 1000 or G _{BNPI}		—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
7-M4-front	13.23	51.10	12.64	43.30	547.3	80.96
7-M4-rear	10.47	50.53	9.63	43.59	419.8	79.35
7-M4-BNPI	14.62	51.29	13.88	43.53	604.2	80.58
7-M5-front	13.25	51.06	12.62	43.23	545.5	80.63
7-M5-rear	10.47	50.51	9.64	43.49	419.2	79.27
7-M5-BNPI	14.61	51.20	13.90	43.32	602.2	80.50
Supplementary information: N/A						

TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional					P
Test Date [YYYY-MM-DD]		2024-03-01			—
Test Voltage applied [V]		2 minutes of 1500			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
7-M4	>1000	>15.5	No breakdown	×	P
7-M5	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 16: MQT 14.1 Retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD] start/end		2024-03-02	—
Sample #	7-M4		—
Supplementary information: N/A			

TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface		P
Test Date [YYYY-MM-DD]..... : 2024-03-02		—
Sample #	Nature and position of initial findings – comments or attach photos	—
7-M4	No visual defects	P
Supplementary information: N/A		

TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD]		2024-03-02	—
Test Voltage applied [V]		2 minutes of 2025	—
Solution temperature [°C]		22.5	—
Size of module [m²]		2.58	—
Solution resistivity [Ω cm]		2467	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
7-M4	>1000	>15.5	P
Supplementary information: N/A			

TABLE 16.4: MQT 14.2 - Test of cord anchorage	N/A

TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage	N/A

TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage	N/A

TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 17: MQT 11 - Thermal cycling 200 test			P
Test Date [YYYY-MM-DD] start/end		2024-03-29/2024-05-06	—
Total cycles (200).....		200	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from – 40 °C to 80 °C	15.87	—
	Other stages	0.05	—
Dwell time at high temperature		15 min	—
Dwell time at low temperature		15 min	—
Sample #	Open circuits (yes/no)		—
7-M8	no		P
7-M9	no		P
Supplementary information: N/A			

TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test			P
Test Date [YYYY-MM-DD].....:		2024-05-06	—
Sample #	Nature and position of initial findings – comments or attach photos		—
7-M8	No visual defects		P
7-M9	No visual defects		P
Supplementary information: N/A			

TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test			P
Test Date [YYYY-MM-DD]	2024-05-06		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.9		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2380		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
7-M8	>1000	>15.5	P
7-M9	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional							—
Test Date [YYYY-MM-DD]				2024-05-06			—
Module temperature [°C].....				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
7-M8-front	13.39	51.45	12.76	43.60	556.3	80.76	—
7-M8-rear	10.58	50.91	9.70	43.99	426.7	79.22	—
7-M8-BNPI	14.76	51.57	14.04	43.74	614.1	80.68	—
7-M9-front	13.40	51.42	12.79	43.60	557.7	80.94	—
7-M9-rear	10.57	50.94	9.72	44.02	427.9	79.46	—
7-M9-BNPI	14.77	51.63	14.07	43.75	615.6	80.73	—
Supplementary information: N/A							

TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional					P
Test Date [YYYY-MM-DD]		2024-05-06			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
7-M8	>1000	>15.5	No breakdown	×	P
7-M9	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 18: MQT 13 - Damp heat 1000 test			P
Test Date [YYYY-MM-DD] start/end	2024-01-17/2024-02-29		—
Total hours (1000h)	1000		—
Sample #	—		—
7-M6	—		P
7-M7	—		P
Supplementary information: N/A			

TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-02-29		—
Sample #	Nature and position of initial findings – comments or attach photos		—
7-M6	No visual defects		P
7-M7	No visual defects		P
Supplementary information: N/A			

TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-02-29		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.6		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2381		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
7-M6	>1000	>15.5	P
7-M7	>1000	>15.5	P
Supplementary information: N/A			

TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional							—
Test Date [YYYY-MM-DD]	2024-02-29						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
7-M6-front	13.38	51.30	12.80	43.45	556.1	81.02	—
7-M6-rear	10.55	50.98	9.70	44.02	427.0	79.39	—
7-M6-BNPI	14.81	51.47	14.08	43.59	613.8	80.52	—

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Clause	Requirement + Test				Result - Remark		Verdict
7-M7-front	13.34	51.25	12.76	43.49	554.9	81.16	—
7-M7-rear	10.54	50.94	9.69	43.96	426.0	79.34	—
7-M7-BNPI	14.76	51.33	14.05	43.59	612.4	80.83	—
Supplementary information: N/A							

TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional					P
Test Date [YYYY-MM-DD]		2024-02-29			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Measured	Required Resistance	Dielectric breakdown		Result
	[MΩ]	[MΩ]	Yes (description)	No	
7-M6	>1000	>15.5	No breakdown	×	P
7-M7	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	7-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-03-03		—
Mounting method	Clamps mounting (4 points on long side with two beams across the module at the long side)		—
Load applied to.....	front side	back side	—
Mechanical load [Pa].....	5400	2400	—
First cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test		P
Test Date [YYYY-MM-DD]		2024-03-03
Sample #	Nature and position of initial findings – comments or attach photos	—
7-M6	No visual defects	P
Supplementary information: N/A		

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-03-03		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	22.6		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	2559		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
7-M6	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-03-03			—
Module temperature [°C].....:				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
7-M6-front	13.31	51.12	12.74	43.27	551.2	81.01	—
7-M6-rear	10.49	50.71	9.65	43.84	423.1	79.54	—
7-M6-BNPI	14.73	51.34	14.00	43.46	608.4	80.45	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD]			2024-03-03		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]			2.58		—
Required Resistance [MΩ]			>15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
7-M6	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 20: MQT 22 Bending test			N/A
TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
TABLE 20.2: MQT 15 - Wet leakage current test after bending test			N/A
TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional			N/A
TABLE 20.4: MQT 03 Insulation test after bending test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 21: MQT 17 - Hail impact test							P
Test Date [YYYY-MM-DD]	2024-03-04						—
Sample #	7-M7						—
Ice ball size [mm]	1	2	3	4	5	6	—
	25±5%	25±5%	25±5%	25±5%	25±5%	25±5%	
	7	8	9	10	11	—	
	25±5%	25±5%	25±5%	25±5%	25±5%	—	
Ice ball weight [g]	1	2	3	4	5	6	—
	7.53	7.61	7.45	7.45	7.53	7.61	
	7	8	9	10	11	—	
	7.61	7.61	7.53	7.53	7.61	—	
Ice ball velocity [m/s]	1	2	3	4	5	6	—
	23.0	22.8	22.8	23.0	23.2	23.2	
	7	8	9	10	11	—	
	23.2	22.8	22.8	22.8	23.0	—	
Number of impact locations	11						—
Supplementary information: N/A							

TABLE 21.1: MQT 01 - Visual inspection after hail impact test		P
Test Date [YYYY-MM-DD]: 2024-03-04		—
Sample #	Nature and position of initial findings – comments or attach photos	—
7-M7	No visual defects	P
Supplementary information: N/A		

TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test				P
Test Date [YYYY-MM-DD]		2024-03-04		—
Test Voltage applied [V]		2 minutes of 1500		—
Solution temperature [°C]		22.3		—
Size of module [m²]		2.58		—
Solution resistivity [Ω cm]		2328		—
Sample #	Measured [MΩ]		Required Resistance [MΩ]	Result
7-M7	>1000		>15.5	P
Supplementary information: N/A				

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional							—
Test Date [YYYY-MM-DD].....:			2024-03-04				—
Module temperature [°C].....:			Corrected to 25.0				—
Irradiance [W/m²):			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
7-M7-front	13.29	51.20	12.72	43.44	552.6	81.21	—
7-M7-rear	10.52	50.85	9.68	43.86	424.6	79.37	—
7-M7-BNPI	14.74	51.29	14.01	43.55	610.1	80.70	—
Supplementary information: N/A							

TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional					P
Test Date [YYYY-MM-DD]			2024-03-04		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.58		—
Required Resistance [MΩ].....			>15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
7-M7	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 22: MQT 21 -Potential induced degradation test	N/A

TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test	N/A

TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test	N/A

TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test - Optional	N/A

TABLE 22.4: MQT 03 Insulation test after potential induced degradation test - Optional	N/A

TABLE 23: MQT 19.2: Final stabilization							—
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization							—
Test Date [YYYY-MM-DD]			2024-02-29				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
7-M6-front	13.38	51.30	12.80	43.45	556.1	81.02	—
7-M6-rear	10.55	50.98	9.70	44.02	427.0	79.39	—
7-M6-BNPI	14.81	51.47	14.08	43.59	613.8	80.52	—
7-M7-front	13.34	51.25	12.76	43.49	554.9	81.16	—
7-M7-rear	10.54	50.94	9.69	43.96	426.0	79.34	—
7-M7-BNPI	14.76	51.33	14.05	43.59	612.4	80.83	—
Supplementary information: N/A							

TABLE 23.2: MQT 19.1 Final Stabilization procedure							—
☐ IEC 61215-1-2 ☐ IEC 61215-1-3 ☐ IEC 61215-1-4							—
Light exposure method:				☐ Solar simulator ☐ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x :				N/A			
Sample #	N/A	Test Date (YYYY-MM-DD) start/end...:			N/A		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test				Result - Remark		Verdict
2	N/A	N/A	N/A	N/A	N/A	—	—
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure							

TABLE 23.3: MQT 19.2: Final stabilization									
☒ IEC 61215-1-1									
☐ Method 1									N/A
Stress-specific stabilization – BO LID (MQT 19.3)									N/A
Test Date [YYYY-MM-DD]					N/A				—
Applied current (A)					N/A				—
Module temperature [°C].....					N/A				—
Total hours (48h)					N/A				—
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]					N/A				—
Test method					☐ Solar simulator ☐ Natural sunlight				—
Sample #	<i>I</i> _{sc} [A]	<i>V</i> _{oc} [V]	<i>I</i> _{mp} [A]	<i>V</i> _{mp} [V]	<i>P</i> _{max} [W]	FF [%]	<i>P</i> _{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]					N/A				—
Test method					☐ Solar simulator ☐ Natural sunlight				—
Sample #	<i>I</i> _{sc} [A]	<i>V</i> _{oc} [V]	<i>I</i> _{mp} [A]	<i>V</i> _{mp} [V]	<i>P</i> _{max} [W]	FF [%]	<i>P</i> _{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 2									—
Performance at STC before final stabilization— for monofacial modules									—
Test Date [YYYY-MM-DD]									—
Test method					☐ Solar simulator ☐ Natural sunlight				—

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Clause	Requirement + Test						Result - Remark	Verdict	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]				2024-02-29					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
7-M6	14.81	51.47	14.08	43.59	613.8	80.52	623.5	-1.56	P
7-M7	14.76	51.33	14.05	43.59	612.4	80.83	622.6	-1.64	P
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to destabilization artifacts.									
If Power Degradation $\geq$ 5%, then perform stress-specific stabilization MQT 19.3 in method 1									
Stress-specific stabilization – BO LID (MQT 19.3)									—
Test Date [YYYY-MM-DD]				N/A					—
Applied current (A)				N/A					—
Module temperature [°C]				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization — for monofacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									

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Clause	Requirement + Test							Result - Remark	Verdict
TABLE 23.4: MQT 19.2: Final stabilization									
☐ Method 3									
Test Date (YYYY-MM-DD) start/end		N/A							—
Test duration [h]		N/A							—
Module temperature [°C]		N/A							—
UV irradiance (280-400nm) [W/m²]		N/A							—
UV dose (280-320nm) [kWh/ m²]		N/A							—
UV dose (280-400nm) [kWh/ m²]		N/A							—
Side exposed		☐ Front side ☐ Rear side							—
Module operation condition		☐ Short circuited ☐ Open circuited							—
Supplementary information: for bifacial modules, the irradiance shall be applied to the rear side, whereas for monofacial modules, the irradiance shall be applied to the front side.									
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 4									
Performance at STC before final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☒ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									

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Clause	Requirement + Test						Result - Remark	Verdict	
Test Date [YYYY-MM-DD]				N/A					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to polarization artifacts									
If Power Degradation $\geq 5\%$, then perform method 3 final stabilization									
Method 3									
Test Date [YYYY-MM-DD]				N/A					—
Test duration [h]				N/A					—
Module temperature [°C]				N/A					—
UV irradiance (280-400nm) [W/m²]				N/A					—
UV dose (280-320nm) [kWh/ m²]				N/A					—
UV dose (280-400nm) [kWh/ m²]				N/A					—
Side exposed				☐ Front side ☐ Rear side					—
Module operation condition				☐ Short circuited ☐ Open circuited					—
Performance at STC after final stabilization — for monofacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]									—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information: N/A

for monofacial modules									
TABLE 23.5: MQT 06.1: Final Performance at STC									N/A
Test Date [YYYY-MM-DD].....:					—				—
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation [%]	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: P_{max} [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

for bifacial modules							—			
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)							—			
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result			
7-M4	13.22	51.08	12.63	43.32	547.1	81.02	—			
7-M5	13.25	51.06	12.62	43.23	545.5	80.63	—			
7-M6	13.31	51.12	12.74	43.27	551.2	81.01	—			
7-M7	13.29	51.20	12.72	43.44	552.6	81.21	—			
7-M8	13.39	51.45	12.76	43.60	556.3	80.76	—			
7-M9	13.40	51.42	12.79	43.60	557.7	80.94	—			
Supplementary information: N/A										
TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)										
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
7-M4	10.47	50.50	9.63	43.59	419.8	79.40	79.20%	98.86%	76.73%	—
7-M5	10.47	50.51	9.64	43.49	419.2	79.27	79.02%	98.92%	76.85%	—
7-M6	10.49	50.71	9.65	43.84	423.1	79.54	78.81%	99.20%	76.76%	—
7-M7	10.52	50.85	9.68	43.86	424.6	79.37	79.16%	99.32%	76.84%	—
7-M8	10.58	50.91	9.70	43.99	426.7	79.22	79.01%	98.95%	76.69%	—

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Clause	Requirement + Test						Result - Remark			Verdict
7-M9	10.57	50.94	9.72	44.02	427.9	79.46	78.88%	99.07%	76.72%	—
Supplementary information: N/A										

TABLE 23.8: MQT 06.1: Final Performance at BNPI									P
Test Date [YYYY-MM-DD]					—				—
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation [%]	Result
7-M4	14.61	51.29	13.87	43.54	603.9	80.59	622.6	-3.00	P
7-M5	14.61	51.20	13.90	43.32	602.2	80.50	620.7	-2.97	P
7-M6	14.73	51.34	14.00	43.46	608.4	80.45	622.5	-2.27	P
7-M7	14.74	51.29	14.01	43.55	610.1	80.70	621.6	-1.85	P
7-M8	14.76	51.57	14.04	43.74	614.1	80.68	621.7	-1.22	P
7-M9	14.77	51.63	14.07	43.75	615.6	80.73	622.7	-1.13	P
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		—			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
7-M4	>1000	>15.5	No breakdown	×	P
7-M5	>1000	>15.5	No breakdown	×	P
7-M6	>1000	>15.5	No breakdown	×	P
7-M7	>1000	>15.5	No breakdown	×	P
7-M8	>1000	>15.5	No breakdown	×	P
7-M9	>1000	>15.5	No breakdown	×	P
7-M10	>1000	>15.5	No breakdown	×	P
7-M12	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	—	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22±2	—
Size of module [m²]	:	2.58	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
7-M4	>1000	>15.5	P
7-M5	>1000	>15.5	P
7-M6	>1000	>15.5	P
7-M7	>1000	>15.5	P
7-M8	>1000	>15.5	P
7-M9	>1000	>15.5	P
7-M10	>1000	>15.5	P
7-M12	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD570 (BOM8)

TABLE 01: MQT 01 ini: Initial Visual inspection		P
Test Date [YYYY-MM-DD]..... :	2024-01-10 for 8-M4#, 8-M5#, 8-M6#, 8-M7#, 8-M10#, 8-M12#, 2024-03-22 for 8-M8#, 8-M9#	—
Sample #	Nature and position of initial findings – comments or attach photos	—
8-M4	No visual defects	P
8-M5	No visual defects	P
8-M6	No visual defects	P
8-M7	No visual defects	P
8-M8	No visual defects	P
8-M9	No visual defects	P
8-M10	No visual defects	P
8-M12	No visual defects	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]		2024-01-17 for 8-M4#,8-M5#; 2024-01-10 for 8-M6#,8-M7#,8-M10#; 2024-02-19 for 8-M12#, 2024-03-22 for 8-M8#, 8-M9#					—
Test method		☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
8-M4	13.51	51.62	12.88	43.84	564.6	80.96	—
8-M5	13.52	51.77	12.88	43.94	566.0	80.87	—
8-M6	13.50	51.68	12.89	43.85	565.2	81.01	—
8-M7	13.58	51.70	12.87	43.89	564.9	80.46	—
8-M8	13.53	51.74	12.88	43.92	565.7	80.81	—
8-M9	13.56	51.76	12.91	43.86	566.2	80.67	—
8-M10	13.52	51.84	12.85	43.98	565.2	80.64	—
8-M12	13.54	51.75	12.86	44.00	565.9	80.76	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							
Test Date [YYYY-MM-DD]		2024-01-17 for 8-M4#,8-M5#; 2024-01-10 for 8-M6#,8-M7#,8-M10#; 2024-02-19 for 8-M12#, 2024-03-22 for 8-M8#, 8-M9#					—
Test method		☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
8-M4	10.59	51.08	9.84	44.17	434.6	80.34	—
8-M5	10.66	51.10	9.82	44.25	434.5	79.76	—
8-M6	10.58	51.03	9.83	44.20	434.5	80.48	—
8-M7	10.57	51.09	9.85	44.14	434.8	80.52	—
8-M8	10.58	51.08	9.85	44.24	435.8	80.64	—
8-M9	10.60	51.10	9.86	44.21	435.9	80.47	—
8-M10	10.62	51.06	9.85	44.45	437.8	80.74	—
8-M12	10.58	51.09	9.83	44.23	434.8	80.44	—
Supplementary information: N/A							

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]			2024-01-17 for 8-M4#,8-M5#; 2024-01-10 for 8-M6#,8-M7#,8-M10#; 2024-02-19 for 8-M12#, 2024-03-22 for 8-M8#, 8-M9#				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
8-M4	14.92	51.83	14.18	43.99	623.8	80.67	—
8-M5	14.93	51.97	14.17	44.13	625.3	80.59	—
8-M6	14.91	51.94	14.15	44.10	624.0	80.58	—
8-M7	14.89	51.98	14.13	44.14	623.7	80.58	—
8-M8	14.95	51.93	14.18	44.06	624.7	80.47	—
8-M9	14.98	51.95	14.20	44.03	625.2	80.34	—
8-M10	14.92	52.01	14.12	44.16	623.5	80.35	—
8-M12	14.90	51.89	14.17	44.09	624.7	80.80	—
Supplementary information: N/A							
TABLE 02.4: MQT 19.1: Initial Stabilization procedure							
Light exposure method				☐ Solar simulator ☒ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x				1%			
Sample #	8-M4	Test Date (YYYY-MM-DD) start/end			2024-01-17/2024-01-22		
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	564.6	—	—
1	5.0	>500	N/A	MPPT	563.9	—	—
2	5.0	>500	N/A	MPPT	563.3	0.23	Yes
Sample #	8-M5	Test Date (YYYY-MM-DD) start/end			2024-01-17/2024-01-22		
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.0	—	—
1	5.0	>500	N/A	MPPT	564.7	—	—
2	5.0	>500	N/A	MPPT	564.1	0.34	Yes

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #	8-M6	Test Date (YYYY-MM-DD) start/end			2024-01-10/2024-01-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	565.2	—	—
1	5.0	>500	N/A	MPPT	564.0	—	—
2	5.0	>500	N/A	MPPT	563.5	0.30	Yes

Sample #	8-M7	Test Date (YYYY-MM-DD) start/end			2024-01-10/2024-01-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	564.9	—	—
1	5.0	>500	N/A	MPPT	563.8	—	—
2	5.0	>500	N/A	MPPT	563.3	0.28	Yes

Sample #	8-M8	Test Date (YYYY-MM-DD) start/end			2024-03-22/2024-03-27		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	565.7	—	—
1	5.0	>500	N/A	MPPT	564.6	—	—
2	5.0	>500	N/A	MPPT	564.2	0.27	Yes

Sample #	8-M9	Test Date (YYYY-MM-DD) start/end			2024-03-22/2024-03-27		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.2	—	—
1	5.0	>500	N/A	MPPT	565.0	—	—
2	5.0	>500	N/A	MPPT	564.5	0.30	Yes

Sample #	8-M10	Test Date (YYYY-MM-DD) start/end			2024-01-10/2024-01-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	565.2	—	—

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Clause	Requirement + Test				Result - Remark		Verdict
1	5.0	>500	N/A	MPPT	563.7	—	—
2	5.0	>500	N/A	MPPT	563.4	0.32	Yes

Sample #	8-M12	Test Date (YYYY-MM-DD) start/end:			2024-02-19/2024-02-25		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	565.9	—	—
1	5.0	>500	N/A	MPPT	564.5	—	—
2	5.0	>500	N/A	MPPT	563.9	0.35	Yes
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable							

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]..... :					2024-01-22 for 8-M4#,8-M5#; 2024-01-16 for 8-M6#,8-M7#,8-M10#; 2024-02-25 for 8-M12#, 2024-03-27 for 8-M8#, 8-M9#					—
$P_{\max}$ lower limit (W) :					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V) :					559.0					—
V_{oc} (lab) upper limit (V) :					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A) :					See table below: I_{sc} [A] Max. calc.					—
Test method..... :					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
8-M4	13.49	13.95	51.59	52.98	12.86	43.80	563.3	542.3	80.94	P
8-M5	13.49	13.95	51.67	52.98	12.87	43.83	564.1	542.3	80.93	P
8-M6	13.48	13.95	51.60	52.98	12.87	43.78	563.5	542.3	81.01	P
8-M7	13.56	13.95	51.63	52.98	12.86	43.80	563.3	542.3	80.46	P
8-M8	13.51	13.95	51.67	52.98	12.87	43.84	564.2	542.3	80.82	P
8-M9	13.55	13.95	51.69	52.98	12.90	43.76	564.5	542.3	80.60	P
8-M10	13.49	13.95	51.79	52.98	12.82	43.95	563.4	542.3	80.64	P
8-M12	13.52	13.95	51.64	52.98	12.86	43.85	563.9	542.3	80.77	P
Average	—						563.8	559.0	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										N/A
Test Date [YYYY-MM-DD]					2024-01-22 for 8-M4#,8-M5#; 2024-01-16 for 8-M6#,8-M7#,8-M10#; 2024-02-25 for 8-M12#, 2024-03-27 for 8-M8#, 8-M9#					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
8-M4	10.58	50.98	9.83	44.06	433.1	80.30	78.43%	98.82%	76.89%	—
8-M5	10.64	51.08	9.80	44.24	433.6	79.78	78.87%	98.86%	76.87%	—
8-M6	10.56	51.05	9.81	44.24	434.0	80.51	78.34%	98.93%	77.02%	—
8-M7	10.55	51.07	9.83	44.16	434.1	80.57	77.80%	98.92%	77.06%	—
8-M8	10.57	50.99	9.85	44.16	435.0	80.71	78.24%	98.68%	77.10%	—
8-M9	10.59	51.02	9.85	44.14	434.8	80.47	78.15%	97.70%	77.02%	—
8-M10	10.60	51.03	9.83	44.45	436.9	80.77	78.58%	98.53%	77.55%	—
8-M12	10.56	51.02	9.80	44.27	433.8	80.52	78.11%	98.80%	76.93%	—
Supplementary information: N/A										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m ² , backside irradiance 135 W/m ² , 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]..... :				2024-01-22 for 8-M4#,8-M5#; 2024-01-16 for 8-M6#,8-M7#,8-M10#; 2024-02-25 for 8-M12#, 2024-03-27 for 8-M8#, 8-M9#						—
$P_{\max}$ lower limit (W) :				See table below: $P_{\max}$ [W] – Min calc.						—
$\bar{P}_{\max}$ (lab) lower limit (V) :				617.4						—
V_{oc} (lab) upper limit (V) :				See table below: V_{oc} [V] Max. calc.						—
I_{sc} (lab) upper limit (A) :				See table below: I_{sc} [A] Max. calc.						—
Test method..... :				☒ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
8-M4	14.92	15.40	51.75	52.98	14.17	43.89	621.9	598.9	80.55	P
8-M5	14.91	15.40	51.89	52.98	14.15	44.01	622.8	598.9	80.50	P
8-M6	14.90	15.40	51.87	52.98	14.13	44.04	622.3	598.9	80.52	P
8-M7	14.87	15.40	51.94	52.98	14.10	44.11	621.9	598.9	80.52	P
8-M8	14.94	15.40	51.84	52.98	14.17	43.97	623.1	598.9	80.45	P
8-M9	14.97	15.40	51.86	52.98	14.19	43.93	623.4	598.9	80.30	P
8-M10	14.91	15.40	51.99	52.98	14.09	44.18	622.5	598.9	80.30	P
8-M12	14.88	15.40	51.80	52.98	14.18	43.91	622.6	598.9	80.77	P
Average	—						622.6	617.4	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD]	2024-01-22 for 8-M4#,8-M5#; 2024-01-16 for 8-M6#,8-M7#,8-M10#; 2024-02-25 for 8-M12#, 2024-03-27 for 8-M8#, 8-M9#			—
Test Voltage applied [V]	2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]	2.58			—
Required Resistance [MΩ]	>15.5			—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
8-M4	>1000	No breakdown	×	P
8-M5	>1000	No breakdown	×	P
8-M6	>1000	No breakdown	×	P
8-M7	>1000	No breakdown	×	P
8-M8	>1000	No breakdown	×	P
8-M9	>1000	No breakdown	×	P
8-M10	>1000	No breakdown	×	P
8-M12	>1000	No breakdown	×	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]	2024-01-22 for 8-M4#,8-M5#; 2024-01-16 for 8-M6#,8-M7#,8-M10#; 2024-02-25 for 8-M12#, 2024-03-27 for 8-M8#, 8-M9#		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.5 for 8-M4#,8-M5#; 22.3 for 8-M6#,8-M7#,8-M10#; 22.1 for 8-M12#, 22.6 for 8-M8#, 8-M9#		—
Solution resistivity [Ω cm]	2252 for 8-M4#,8-M5#; 2317 for 8-M6#,8-M7#,8-M10#; 2235 for 8-M12#, 2219 for 8-M8#, 8-M9#		—
Size of module [m ²]	2.58		—
Sample #	Required Resistance [M Ω]	Measured [M Ω]	Result
8-M4	>15.5	>1000	P
8-M5	>15.5	>1000	P
8-M6	>15.5	>1000	P
8-M7	>15.5	>1000	P
8-M8	>15.5	>1000	P
8-M9	>15.5	>1000	P
8-M10	>15.5	>1000	P
8-M12	>15.5	>1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)			N/A
TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)			N/A
TABLE 07: MQT 04 - Measurement of temperature coefficients			N/A
TABLE 08: MQT 08 - Outdoor exposure test			N/A
Table 08.1: MQT 01: Visual inspection after outdoor exposure test			N/A
Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			N/A
Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional			N/A
Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional			N/A
TABLE 09: MQT 18: Bypass diode thermal test			N/A
TABLE 09.1: MQT 01 - Visual inspection after bypass diode thermal test			N/A
TABLE 09.2: MQT 15 - Wet leakage current test after bypass diode thermal test			N/A
TABLE 09.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional			N/A
TABLE 09.4: MQT 03 - Insulation test after bypass diode thermal test - Optional			N/A
TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test			N/A
TABLE 10.1: MQT 19.1: Final stabilization			N/A
TABLE 10.2: MQT 06.1: Performance at STC before final stabilization			N/A
TABLE 10.3: MQT 19.1 Final Stabilization procedure			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11: MQT 09 - Hot-spot endurance test			P
Test Date [YYYY-MM-DD] start/end	2024-02-27/2024-02-28		—
Sample #	8-M12		—
Procedure of technology	☒ wafer-based technologies (WBT) MQT 09.1 ☐ monolithically integrated (MLI) thin film technologies MQT 09.2		—
Cell interconnection circuit	☐ S ☒ SPS ☐ PS		—
Type of light source	☐ Pulse solar simulator ☒ Steady state solar simulator ☐ Natural sunlight		—
Module temperature at thermal equilibrium [°C] ..	60.9/59.7		—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						P
Selected hot-spot cells	Low	Low	Low	High	Permanent	—
	C24	D12	E9	A13	N/A	
Shading rate [%]	30	45	35	30	N/A	—
Max. measured cell temperature in each cell [°C]:	119.8	120.5	121.3	123.7	N/A	—
Test duration of each shading [h]	1	1	1	1	N/A	—
Irradiance during shading [W/m²]	1231	1231	1231	1231	N/A	—

Supplementary information:

Position of solar cells (front side view):

	1	2	3	4	...	12		13	...	21	22	23	24
A							Junction box						
B													
C													
D													
E													
F													

for bifacial modules, determination of the cell shading percent and the prolonged exposure are performed at the elevated irradiance BSI. If double-side illumination is used to produce BSI, both the back and the front of the cell are shaded in the same way. During cell selection, any cell that is permanently shaded by a module feature (such as the junction box) is added to the list of selected cells.

TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI		N/A
Selected hot-spot cells	N/A	—

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Clause	Requirement + Test	Result - Remark	Verdict
Number of cells shaded		N/A	—
Max. measured cell temperature [°C]		N/A	—
Test duration during shading [h]		N/A	—
Irradiance during shading [W/m ²]		N/A	—
Supplementary information: N/A			

TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test		P
Test Date [YYYY-MM-DD]: 2024-02-28		—
Sample #	Nature and position of initial findings – comments or attach photos	—
8-M12	No visual defects	P
Supplementary information: N/A		

TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test							—
Test Date [YYYY-MM-DD]		2024-02-28					—
Module temperature [°C]		Corrected to 25.0					—
Irradiance [W/m ²]		Corrected to 1000 or G _{BNPI}					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
8-M12-front	13.48	51.56	12.82	43.78	561.3	80.76	—
8-M12-rear	10.53	50.93	9.78	44.19	432.2	80.59	—
8-M12-BNPI	14.83	51.73	14.14	43.83	619.8	80.79	—
Supplementary information: N/A							

TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test					P
Test Date [YYYY-MM-DD]		2024-02-28			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
8-M12	>1000	>15.5	No breakdown	×	P

TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test			P
Test Date [YYYY-MM-DD]		2024-02-28	—
Test Voltage applied [V]		2 minutes of 1500	—

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Clause	Requirement + Test	Result - Remark	Verdict
Solution temperature [°C]	22.7		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2476		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
8-M12	>1000	>15.5	P
Supplementary information: N/A			

TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test				P
Test Date [YYYY-MM-DD]	2024-02-28			—
☐ Method A				—
Ambient temperature [°C]	N/A			—
Current flow applied [A]	N/A			—
Sample #	VFM	VFMrated	VFM = (N × VFMrated) ± 10 %	Result
N/A	N/A	N/A	☐ Yes ☐ No	N/A
Supplementary information: N/A				
☒ Method B				—
Sample #	IV curve after shading			Result
	Diode 1 working properly	Diode 2 working properly	Diode 3 working properly	—
8-M12	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			P
Test Date (YYYY-MM-DD) start/end	2024-01-23/2024-01-27		—
Module temperature [°C]	61.7		—
UV irradiance (280-400nm) [W/m ²]	157.0		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	6.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: N/A			

TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			P
Test Date (YYYY-MM-DD) start/end	2024-01-29/2024-02-02		—
Module temperature [°C]	62.0		—
UV irradiance (280-400nm) [W/m ²]	157.0		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	6.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: for bifacial modules repeat the procedure of UV irradiation on the rear-side of the modules.			

TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-02-02		—
Sample #	Nature and position of initial findings – comments or attach photos		—
8-M4	No visual defects		P
8-M5	No visual defects		P
Supplementary information: N/A			

TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-02-02		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.5		—
Size of module [m ²]	2.58		—
Solution resistivity [Ω cm]	2302		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
8-M4	>1000	>15.5	P

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Clause	Requirement + Test	Result - Remark	Verdict
8-M5	>1000	>15.5	P
Supplementary information: N/A			

TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional							—
Test Date [YYYY-MM-DD]			2024-02-02				—
Module temperature [°C]			Corrected to 25.0				—
Irradiance [W/m ²]			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
8-M4-front	13.39	51.40	12.75	43.62	556.1	80.80	—
8-M4-rear	10.50	50.81	9.75	43.88	427.8	80.19	—
8-M4-BNPI	14.81	51.54	14.05	43.70	614.0	80.44	—
8-M5-front	13.40	51.50	12.77	43.66	557.5	80.79	—
8-M5-rear	10.57	50.88	9.73	44.03	428.4	79.66	—
8-M5-BNPI	14.79	51.74	14.04	43.84	615.5	80.43	—
Supplementary information: N/A							

TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional					P
Test Date [YYYY-MM-DD]		2024-02-02			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured		Dielectric breakdown		Result
	[MΩ]		Yes (description)	No	
8-M4	>1000	>15.5	No breakdown	×	P
8-M5	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 14: MQT 11 - Thermal cycling 50 test			P
Test Date [YYYY-MM-DD] start/end	2024-02-08/2024-02-18		—
Total cycles (50).....	50		—
Weight attached (N)	5		—
Applied current (A)	During the heat up cycle from 40 °C to 80 °C	15.65	—
	Other stages	0.05	—
Dwell time at high temperature.....	15 min		—
Dwell time at low temperature.....	15 min		—
Sample #	Open circuits (yes/no)		—
8-M4	no		P
8-M5	no		P
Supplementary information: N/A			

TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test		P
Test Date [YYYY-MM-DD].....:	2024-02-18	—
Sample #	Nature and position of initial findings – comments or attach photos	—
8-M4	No visual defects	P
8-M5	No visual defects	P
Supplementary information: N/A		

TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			P
Test Date [YYYY-MM-DD]	2024-02-18		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.8		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2355		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
8-M4	>1000	>15.5	P
8-M5	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test			Result - Remark		Verdict
TABLE 15.5: MQT 03 – Max. power determination after thermal cycling 50 test - Optional						—
Test Date [YYYY-MM-DD].....:		2024-02-18				—
Module temperature [°C].....:		Corrected to 25.0				—
Irradiance [W/m²):		Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
8-M4-front	13.28	51.17	12.65	43.39	548.9	80.78
8-M4-rear	10.43	50.52	9.69	43.57	422.2	80.13
8-M4-BNPI	14.70	51.33	13.93	43.50	606.0	80.31
8-M5-front	13.31	51.19	12.67	43.37	549.5	80.65
8-M5-rear	10.48	50.65	9.64	43.82	422.4	79.58
8-M5-BNPI	14.67	51.47	13.93	43.55	606.6	80.34
Supplementary information: N/A						

TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional				P
Test Date [YYYY-MM-DD]		2024-02-18		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]		2.58		—
Required Resistance [MΩ]		>15.5		—
Sample #	Measured	Dielectric breakdown		Result
	[MΩ]	Yes (description)	No	
8-M4	>1000	No breakdown	×	P
8-M5	>1000	No breakdown	×	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 15: MQT 12 - Humidity freeze 10 test		P
Test Date [YYYY-MM-DD] start/end	2024-02-20/2024-03-01	—
Total cycles (10)	10	—
Applied current (A)	0.05	—
Dwell time at high temperature	20 h	—
Dwell time at low temperature.....	40 min	—
Sample #	Open circuits (yes/no)	—
8-M4	no	P
8-M5	no	P
Supplementary information: N/A		

TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test		P
Test Date [YYYY-MM-DD].....: 2024-03-01		—
Sample #	Nature and position of initial findings – comments or attach photos	—
8-M4	No visual defects	P
8-M5	No visual defects	P
Supplementary information: N/A		

TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			P
Test Date [YYYY-MM-DD]	2024-03-01		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	22.2		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	2305		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
8-M4	>1000	>15.5	P
8-M5	>1000	>15.5	P
Supplementary information: N/A			

TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional			—
Test Date [YYYY-MM-DD]	2024-03-01		—
Module temperature [°C].....	Corrected to 25.0		—

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Clause	Requirement + Test			Result - Remark		Verdict
Irradiance [W/m ²):				Corrected to 1000 or G _{BNPI}		—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
8-M4-front	13.19	51.05	12.56	43.26	543.3	80.69
8-M4-rear	10.36	50.39	9.62	43.45	418.0	80.07
8-M4-BNPI	14.61	51.20	13.83	43.38	599.9	80.20
8-M5-front	13.22	51.05	12.57	43.22	543.3	80.50
8-M5-rear	10.43	50.44	9.58	43.61	417.8	79.42
8-M5-BNPI	14.56	51.35	13.81	43.43	599.8	80.22
Supplementary information: N/A						

TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional					P
Test Date [YYYY-MM-DD]		2024-03-01			—
Test Voltage applied [V]		2 minutes of 1500			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
8-M4	>1000	>15.5	No breakdown	×	P
8-M5	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 16: MQT 14.1 Retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD] start/end		2024-03-02	—
Sample #	8-M4		—
Supplementary information: N/A			

TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface		P
Test Date [YYYY-MM-DD].....: 2024-03-02		—
Sample #	Nature and position of initial findings – comments or attach photos	—
8-M4	No visual defects	P
Supplementary information: N/A		

TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD]		2024-03-02	—
Test Voltage applied [V]		2 minutes of 2025	—
Solution temperature [°C]		22.5	—
Size of module [m²]		2.58	—
Solution resistivity [Ω cm]		2467	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
8-M4	>1000	>15.5	P
Supplementary information: N/A			

TABLE 16.4: MQT 14.2 - Test of cord anchorage	N/A

TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage	N/A

TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage	N/A

TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 17: MQT 11 - Thermal cycling 200 test			P
Test Date [YYYY-MM-DD] start/end	2024-03-29/2024-05-06		—
Total cycles (200).....	200		—
Weight attached (N)	5		—
Applied current (A)	During the heat up cycle from – 40 °C to 80 °C	15.86	—
	Other stages	0.05	—
Dwell time at high temperature	15 min		—
Dwell time at low temperature.....	15 min		—
Sample #	Open circuits (yes/no)		—
8-M8	no		P
8-M9	no		P
Supplementary information: N/A			

TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test			P
Test Date [YYYY-MM-DD].....:		2024-05-06	—
Sample #	Nature and position of initial findings – comments or attach photos		—
8-M8	No visual defects		P
8-M9	No visual defects		P
Supplementary information: N/A			

TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test			P
Test Date [YYYY-MM-DD]	2024-05-06		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.9		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2380		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
8-M8	>1000	>15.5	P
8-M9	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional							—
Test Date [YYYY-MM-DD]				2024-05-06			—
Module temperature [°C].....				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
8-M8-front	13.41	51.49	12.76	43.65	557.0	80.67	—
8-M8-rear	10.47	50.86	9.75	44.01	429.1	80.59	—
8-M8-BNPI	14.82	51.67	14.04	43.81	615.1	80.33	—
8-M9-front	13.44	51.50	12.78	43.56	556.7	80.42	—
8-M9-rear	10.48	50.89	9.74	44.01	428.7	80.38	—
8-M9-BNPI	14.84	51.70	14.05	43.75	614.7	80.12	—
Supplementary information: N/A							

TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional					P
Test Date [YYYY-MM-DD]		2024-05-06			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
8-M8	>1000	>15.5	No breakdown	×	P
8-M9	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 18: MQT 13 - Damp heat 1000 test			P
Test Date [YYYY-MM-DD] start/end	2024-01-17/2024-02-29		—
Total hours (1000h)	1000		—
Sample #	—		—
8-M6	—		P
8-M7	—		P
Supplementary information: N/A			

TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-02-29		—
Sample #	Nature and position of initial findings – comments or attach photos		—
8-M6	No visual defects		P
8-M7	No visual defects		P
Supplementary information: N/A			

TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-02-29		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.8		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2385		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
8-M6	>1000	>15.5	P
8-M7	>1000	>15.5	P
Supplementary information: N/A			

TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional							—
Test Date [YYYY-MM-DD]	2024-02-29						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
8-M6-front	13.30	51.13	12.70	43.40	551.2	81.06	—
8-M6-rear	10.46	50.82	9.70	43.81	425.0	79.95	—
8-M6-BNPI	14.76	51.48	13.95	43.63	608.7	80.11	—

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Clause	Requirement + Test				Result - Remark		Verdict
8-M7-front	13.40	51.09	12.71	43.25	549.7	80.29	—
8-M7-rear	10.39	50.60	9.68	43.70	423.0	80.46	—
8-M7-BNPI	14.70	51.38	13.94	43.54	606.9	80.35	—
Supplementary information: N/A							

TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional					P
Test Date [YYYY-MM-DD]		2024-02-29			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Measured	Required Resistance	Dielectric breakdown		Result
	[MΩ]	[MΩ]	Yes (description)	No	
8-M6	>1000	>15.5	No breakdown	×	P
8-M7	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	8-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-03-05		—
Mounting method	Clamps mounting (4 points on long side with two beams across the module at the long side)		—
Load applied to.....	front side	back side	—
Mechanical load [Pa].....	5400	2400	—
First cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test		P
Test Date [YYYY-MM-DD]		2024-03-05
Test Date [YYYY-MM-DD]	2024-03-05	—
Sample #	Nature and position of initial findings – comments or attach photos	—
8-M6	No visual defects	P
Supplementary information: N/A		

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-03-05		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	23.3		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	2535		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
8-M6	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-03-05			—
Module temperature [°C].....:				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
8-M6-front	13.25	50.99	12.65	43.26	547.3	81.01	—
8-M6-rear	10.43	50.65	9.66	43.64	421.6	79.81	—
8-M6-BNPI	14.70	51.37	13.89	43.51	604.3	80.03	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD]			2024-03-05		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.58		—
Required Resistance [MΩ].....			>15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
8-M6	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 20: MQT 22 Bending test			N/A
TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
TABLE 20.2: MQT 15 - Wet leakage current test after bending test			N/A
TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional			N/A
TABLE 20.4: MQT 03 Insulation test after bending test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 21: MQT 17 - Hail impact test							P
Test Date [YYYY-MM-DD]	2024-03-05						—
Sample #	8-M7						—
Ice ball size [mm]	1	2	3	4	5	6	—
	25±5%	25±5%	25±5%	25±5%	25±5%	25±5%	
	7	8	9	10	11	—	
	25±5%	25±5%	25±5%	25±5%	25±5%	—	
Ice ball weight [g]	1	2	3	4	5	6	—
	7.53	7.61	7.45	7.45	7.53	7.61	
	7	8	9	10	11	—	
	7.61	7.61	7.53	7.53	7.61	—	
Ice ball velocity [m/s]	1	2	3	4	5	6	—
	23.0	22.8	22.8	23.0	23.2	23.2	
	7	8	9	10	11	—	
	23.2	22.8	22.8	22.8	23.0	—	
Number of impact locations	11						—
Supplementary information: N/A							

TABLE 21.1: MQT 01 - Visual inspection after hail impact test		P
Test Date [YYYY-MM-DD]: 2024-03-05		—
Sample #	Nature and position of initial findings – comments or attach photos	—
8-M7	No visual defects	P
Supplementary information: N/A		

TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test				P
Test Date [YYYY-MM-DD]		2024-03-05		—
Test Voltage applied [V]		2 minutes of 1500		—
Solution temperature [°C].....		22.9		—
Size of module [m²]		2.58		—
Solution resistivity [Ω cm]		2483		—
Sample #	Measured [MΩ]		Required Resistance [MΩ]	Result
8-M7	>1000		>15.5	P
Supplementary information: N/A				

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional							—
Test Date [YYYY-MM-DD].....:			2024-03-05				—
Module temperature [°C].....:			Corrected to 25.0				—
Irradiance [W/m²):			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
8-M7-front	13.37	51.00	12.68	43.15	547.2	80.25	—
8-M7-rear	10.36	50.52	9.66	43.63	421.5	80.53	—
8-M7-BNPI	14.65	51.31	13.90	43.47	604.2	80.38	—
Supplementary information: N/A							

TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional					P
Test Date [YYYY-MM-DD]			2024-03-05		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.58		—
Required Resistance [MΩ].....			>15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
8-M7	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 22: MQT 21 -Potential induced degradation test	N/A

TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test	N/A

TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test	N/A

TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test - Optional	N/A

TABLE 22.4: MQT 03 Insulation test after potential induced degradation test - Optional	N/A

TABLE 23: MQT 19.2: Final stabilization							—
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization							—
Test Date [YYYY-MM-DD]			2024-02-29				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
8-M6-front	13.30	51.13	12.70	43.40	551.2	81.06	—
8-M6-rear	10.46	50.82	9.70	43.81	425.0	79.95	—
8-M6-BNPI	14.76	51.48	13.95	43.63	608.7	80.11	—
8-M7-front	13.40	51.09	12.71	43.25	549.7	80.29	—
8-M7-rear	10.39	50.60	9.68	43.70	423.0	80.46	—
8-M7-BNPI	14.70	51.38	13.94	43.54	606.9	80.35	—
Supplementary information: N/A							

TABLE 23.2: MQT 19.1 Final Stabilization procedure							—
☐ IEC 61215-1-2 ☐ IEC 61215-1-3 ☐ IEC 61215-1-4							—
Light exposure method:				☐ Solar simulator ☐ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x :				N/A			
Sample #	N/A	Test Date (YYYY-MM-DD) start/end...:			N/A		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test				Result - Remark		Verdict
2	N/A	N/A	N/A	N/A	N/A	—	—
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure							

TABLE 23.3: MQT 19.2: Final stabilization									
☒ IEC 61215-1-1									
☐ Method 1									N/A
Stress-specific stabilization – BO LID (MQT 19.3)									N/A
Test Date [YYYY-MM-DD]..... :				N/A					—
Applied current (A)				N/A					—
Module temperature [°C]..... :				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]..... :				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	<i>I</i> _{sc} [A]	<i>V</i> _{oc} [V]	<i>I</i> _{mp} [A]	<i>V</i> _{mp} [V]	<i>P</i> _{max} [W]	FF [%]	<i>P</i> _{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]..... :				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	<i>I</i> _{sc} [A]	<i>V</i> _{oc} [V]	<i>I</i> _{mp} [A]	<i>V</i> _{mp} [V]	<i>P</i> _{max} [W]	FF [%]	<i>P</i> _{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 2									—
Performance at STC before final stabilization— for monofacial modules									—
Test Date [YYYY-MM-DD]..... :									—
Test method				☐ Solar simulator ☐ Natural sunlight					—

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Clause	Requirement + Test						Result - Remark	Verdict	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]				2024-02-29					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
8-M6	14.76	51.48	13.95	43.63	608.7	80.11	622.3	-2.19	P
8-M7	14.70	51.38	13.94	43.54	606.9	80.35	621.9	-2.41	P
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to destabilization artifacts.									
If Power Degradation $\geq 5\%$, then perform stress-specific stabilization MQT 19.3 in method 1									
Stress-specific stabilization – BO LID (MQT 19.3)									—
Test Date [YYYY-MM-DD]				N/A					—
Applied current (A)				N/A					—
Module temperature [°C]				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization — for monofacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									

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Clause	Requirement + Test							Result - Remark	Verdict
TABLE 23.4: MQT 19.2: Final stabilization									
☐ Method 3									
Test Date (YYYY-MM-DD) start/end		N/A							—
Test duration [h]		N/A							—
Module temperature [°C]		N/A							—
UV irradiance (280-400nm) [W/m²]		N/A							—
UV dose (280-320nm) [kWh/ m²]		N/A							—
UV dose (280-400nm) [kWh/ m²]		N/A							—
Side exposed		☐ Front side ☐ Rear side							—
Module operation condition		☐ Short circuited ☐ Open circuited							—
Supplementary information: for bifacial modules, the irradiance shall be applied to the rear side, whereas for monofacial modules, the irradiance shall be applied to the front side.									
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 4									
Performance at STC before final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☒ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									

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Clause	Requirement + Test						Result - Remark	Verdict	
Test Date [YYYY-MM-DD]				N/A					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to polarization artifacts									
If Power Degradation $\geq 5\%$, then perform method 3 final stabilization									
Method 3									
Test Date [YYYY-MM-DD]				N/A					—
Test duration [h]				N/A					—
Module temperature [°C]				N/A					—
UV irradiance (280-400nm) [W/m ²]				N/A					—
UV dose (280-320nm) [kWh/ m ²]				N/A					—
UV dose (280-400nm) [kWh/ m ²]				N/A					—
Side exposed				☐ Front side ☐ Rear side					—
Module operation condition				☐ Short circuited ☐ Open circuited					—
Performance at STC after final stabilization — for monofacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]									—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information: N/A

for monofacial modules									
TABLE 23.5: MQT 06.1: Final Performance at STC									N/A
Test Date [YYYY-MM-DD].....:					—				
Test method					☒ Solar simulator				☐ Natural sunlight
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation [%]	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: P_{max} [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

for bifacial modules							—			
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)							—			
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result			
8-M4	13.19	51.04	12.55	43.27	543.1	80.67	—			
8-M5	13.22	51.05	12.57	43.22	543.3	80.50	—			
8-M6	13.25	50.99	12.65	43.26	547.3	81.01	—			
8-M7	13.37	51.00	12.68	43.15	547.2	80.25	—			
8-M8	13.41	51.49	12.76	43.65	557.0	80.67	—			
8-M9	13.44	51.50	12.78	43.56	556.7	80.42	—			
Supplementary information: N/A										
TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)										
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
8-M4	10.35	50.40	9.62	43.43	417.8	80.09	78.47%	98.75%	76.93%	—
8-M5	10.43	50.44	9.58	43.61	417.8	79.42	78.90%	98.81%	76.90%	—
8-M6	10.43	50.65	9.66	43.64	421.6	79.81	78.72%	99.33%	77.03%	—
8-M7	10.36	50.52	9.66	43.63	421.5	80.53	77.49%	99.06%	77.03%	—
8-M8	10.47	50.86	9.75	44.01	429.1	80.59	78.09%	98.78%	77.04%	—

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Clause	Requirement + Test						Result - Remark			Verdict
8-M9	10.48	50.89	9.74	44.01	428.7	80.38	77.98%	98.82%	77.01%	—
Supplementary information: N/A										

TABLE 23.8: MQT 06.1: Final Performance at BNPI									P
Test Date [YYYY-MM-DD]					—				—
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation [%]	Result
8-M4	14.60	51.21	13.83	43.36	599.6	80.20	620.8	-3.42	P
8-M5	14.56	51.35	13.81	43.43	599.8	80.22	621.7	-3.53	P
8-M6	14.70	51.37	13.89	43.51	604.3	80.03	621.5	-2.77	P
8-M7	14.65	51.31	13.90	43.47	604.2	80.38	621.1	-2.72	P
8-M8	14.82	51.67	14.04	43.81	615.1	80.33	621.6	-1.05	P
8-M9	14.84	51.70	14.05	43.75	614.7	80.12	621.9	-1.16	P
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		—			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
8-M4	>1000	>15.5	No breakdown	×	P
8-M5	>1000	>15.5	No breakdown	×	P
8-M6	>1000	>15.5	No breakdown	×	P
8-M7	>1000	>15.5	No breakdown	×	P
8-M8	>1000	>15.5	No breakdown	×	P
8-M9	>1000	>15.5	No breakdown	×	P
8-M10	>1000	>15.5	No breakdown	×	P
8-M12	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	—	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22±2	—
Size of module [m²]	:	2.58	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
8-M4	>1000	>15.5	P
8-M5	>1000	>15.5	P
8-M6	>1000	>15.5	P
8-M7	>1000	>15.5	P
8-M8	>1000	>15.5	P
8-M9	>1000	>15.5	P
8-M10	>1000	>15.5	P
8-M12	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMNH-48HC435 (BOM13)

TABLE 01: MQT 01 ini: Initial Visual inspection		P
Test Date [YYYY-MM-DD]..... :	2024-03-05	—
Sample #	Nature and position of initial findings – comments or attach photos	—
13-M4	No visual defects	P
13-M5	No visual defects	P
13-M6	No visual defects	P
13-M7	No visual defects	P
13-M8	No visual defects	P
13-M9	No visual defects	P
13-M10	No visual defects	P
13-M12	No visual defects	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]				2024-03-05			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
13-M4	15.23	34.90	14.59	29.82	435.1	81.83	—
13-M5	15.24	34.86	14.60	29.71	433.6	81.61	—
13-M6	15.23	34.87	14.62	29.67	433.7	81.66	—
13-M7	15.16	34.86	14.60	29.67	433.1	81.97	—
13-M8	15.21	34.88	14.59	29.75	434.1	81.84	—
13-M9	15.24	34.90	14.62	29.71	434.3	81.68	—
13-M10	15.23	34.91	14.63	29.75	435.1	81.81	—
13-M12	15.24	34.91	14.57	29.82	434.5	81.67	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							
Test Date [YYYY-MM-DD]				2022-11-23			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
13-M4	11.22	34.54	10.76	29.97	322.4	83.18	—
13-M5	11.17	34.50	10.73	29.80	319.7	82.94	—
13-M6	11.10	34.52	10.68	30.01	320.4	83.61	—
13-M7	11.18	34.53	10.73	29.88	320.7	83.07	—
13-M8	11.23	34.53	10.63	29.99	318.6	82.18	—
13-M9	11.18	34.54	10.75	30.06	323.2	83.68	—
13-M10	11.16	34.56	10.84	29.75	322.4	83.58	—
13-M12	11.17	34.57	10.57	30.17	318.9	82.61	—
Supplementary information: N/A							
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]				2022-11-23			—
Test method				☒ Solar simulator ☐ Natural sunlight			—

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
13-M4	16.70	35.00	16.03	29.76	477.0	81.60	—
13-M5	16.70	34.98	16.04	29.72	476.6	81.60	—
13-M6	16.76	35.03	16.05	29.76	477.8	81.37	—
13-M7	16.74	35.00	16.04	29.72	476.7	81.35	—
13-M8	16.78	35.01	16.06	29.76	477.9	81.36	—
13-M9	16.77	35.03	16.06	29.76	478.1	81.41	—
13-M10	16.79	35.05	16.06	29.80	478.6	81.31	—
13-M12	16.77	35.04	16.04	29.80	478.1	81.37	—

Supplementary information: N/A

TABLE 02.4: MQT 19.1: Initial Stabilization procedure

Light exposure method				☐ Solar simulator ☒ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x				1%			
Sample #	13-M4	Test Date (YYYY-MM-DD) start/end			2024-03-05/2024-03-07		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	435.1	—	—
1	5.0	>500	N/A	MPPT	436.4	—	—
2	5.0	>500	N/A	MPPT	433.7	0.50	Yes

Sample #	13-M5	Test Date (YYYY-MM-DD) start/end			2024-03-05/2024-03-07		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	433.6	—	—
1	5.0	>500	N/A	MPPT	436.4	—	—
2	5.0	>500	N/A	MPPT	433.7	0.65	Yes

Sample #	13-M6	Test Date (YYYY-MM-DD) start/end			2024-03-05/2024-03-07		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	433.7	—	—
1	5.0	>500	N/A	MPPT	435.8	—	—

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Clause	Requirement + Test				Result - Remark		Verdict
2	5.0	>500	N/A	MPPT	434.3	0.48	Yes

Sample #	13-M7	Test Date (YYYY-MM-DD) start/end			2024-03-05/2024-03-07		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	433.1	—	—
1	5.0	>500	N/A	MPPT	436.4	—	—
2	5.0	>500	N/A	MPPT	433.6	0.76	Yes

Sample #	13-M8	Test Date (YYYY-MM-DD) start/end			2024-03-05/2024-03-07		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	434.1	—	—
1	5.0	>500	N/A	MPPT	436.5	—	—
2	5.0	>500	N/A	MPPT	434.7	0.55	Yes

Sample #	13-M9	Test Date (YYYY-MM-DD) start/end			2024-03-05/2024-03-07		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	434.3	—	—
1	5.0	>500	N/A	MPPT	436.4	—	—
2	5.0	>500	N/A	MPPT	435.3	0.47	Yes

Sample #	13-M10	Test Date (YYYY-MM-DD) start/end			2024-03-05/2024-03-07		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	435.1	—	—
1	5.0	>500	N/A	MPPT	437.8	—	—
2	5.0	>500	N/A	MPPT	435.0	0.63	Yes

Sample #	13-M12	Test Date (YYYY-MM-DD) start/end			2024-03-05/2024-03-07		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)

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Clause	Requirement + Test				Result - Remark		Verdict
Initial	—	—	—	—	434.5	—	—
1	5.0	>500	N/A	MPPT	437.5	—	—
2	5.0	>500	N/A	MPPT	434.3	0.72	Yes
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable							

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]					2024-03-07					—
$P_{\max}$ lower limit (W)					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V)					424.5					—
V_{oc} (lab) upper limit (V)					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A)					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
13-M4	15.22	15.99	34.99	35.21	14.61	29.72	434.2	411.7	81.51	P
13-M5	15.22	15.99	34.97	35.21	14.59	29.72	433.7	411.7	81.51	P
13-M6	15.26	15.99	34.99	35.21	14.63	29.68	434.3	411.7	81.32	P
13-M7	15.23	15.99	34.99	35.21	14.59	29.72	433.6	411.7	81.36	P
13-M8	15.25	15.99	35.01	35.21	14.63	29.72	434.7	411.7	81.40	P
13-M9	15.25	15.99	35.03	35.21	14.63	29.76	435.3	411.7	81.48	P
13-M10	15.24	15.99	35.02	35.21	14.64	29.72	435.0	411.7	81.52	P
13-M12	15.24	15.99	35.02	35.21	14.62	29.72	434.3	411.7	81.39	P
Average	—						434.4	424.5	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										N/A
Test Date [YYYY-MM-DD]					2024-03-07					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
13-M4	11.20	34.65	10.58	30.15	319.1	82.23	73.58%	99.03%	73.51%	—
13-M5	11.20	34.64	10.65	29.92	318.6	82.14	73.61%	99.05%	73.46%	—
13-M6	11.13	34.64	10.42	30.35	316.3	82.06	72.92%	99.00%	72.85%	—
13-M7	11.21	34.66	10.40	30.45	316.8	81.54	73.59%	99.06%	73.05%	—
13-M8	11.24	34.68	10.63	30.08	319.6	82.03	73.65%	99.05%	73.52%	—
13-M9	11.19	34.68	10.73	29.84	320.1	82.49	73.35%	99.00%	73.53%	—
13-M10	11.19	34.69	10.75	29.89	321.2	82.79	73.41%	99.05%	73.84%	—
13-M12	11.20	34.69	10.62	30.15	320.1	82.38	73.51%	99.06%	73.69%	—
Supplementary information: N/A										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m ² , backside irradiance 135 W/m ² , 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]					2024-03-07					—
$P_{\max}$ lower limit (W)					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V)					470.8					—
V_{oc} (lab) upper limit (V)					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A)					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
13-M4	16.69	17.72	35.06	35.26	16.00	29.77	476.4	456.6	81.42	P
13-M5	16.75	17.72	35.06	35.26	16.02	29.77	477.0	456.6	81.24	P
13-M6	16.77	17.72	35.09	35.26	16.01	29.81	477.3	456.6	81.09	P
13-M7	16.75	17.72	35.06	35.26	15.99	29.80	476.5	456.6	81.15	P
13-M8	16.75	17.72	35.10	35.26	16.02	29.84	478.0	456.6	81.28	P
13-M9	16.74	17.72	35.11	35.26	16.04	29.81	478.0	456.6	81.31	P
13-M10	16.73	17.72	35.12	35.26	16.01	29.85	478.0	456.6	81.33	P
13-M12	16.77	17.72	35.12	35.26	16.01	29.85	478.0	456.6	81.17	P
Average	—						477.4	470.8	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD]		2024-03-07		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]		1.99		—
Required Resistance [MΩ]		>20.1		—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
13-M4	>1000	No breakdown	x	P
13-M5	>1000	No breakdown	x	P
13-M6	>1000	No breakdown	x	P
13-M7	>1000	No breakdown	x	P
13-M8	>1000	No breakdown	x	P
13-M9	>1000	No breakdown	x	P
13-M10	>1000	No breakdown	x	P
13-M12	>1000	No breakdown	x	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]	2024-03-07		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.6		—
Solution resistivity [Ω cm]	2125		—
Size of module [m ²]	1.99		—
Sample #	Required Resistance [$M\Omega$]	Measured [$M\Omega$]	Result
13-M4	>20.1	>1000	P
13-M5	>20.1	>1000	P
13-M6	>20.1	>1000	P
13-M7	>20.1	>1000	P
13-M8	>20.1	>1000	P
13-M9	>20.1	>1000	P
13-M10	>20.1	>1000	P
13-M12	>20.1	>1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)							—
Test Date [YYYY-MM-DD]				2024-05-09		—	
Test method ...:	☐ Outdoor measurement						—
	Ambient air temperature [°C]:			N/A			
	Irradiance [W/m²]:			N/A			
	Module temperature [°C]:			N/A			
	☒ Data corrected to a 25°C cell temperature and 200 W/m² irradiance						—
	☐ Directly measured						
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	
13-M10	3.02	33.03	2.87	28.72	82.45	82.63	
Supplementary information: N/A							

TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)									—
Test Date [YYYY-MM-DD]					2024-05-09				—
Test method ...:	☐ Outdoor measurement								—
	Ambient air temperature [°C]:				N/A				
	Irradiance [W/m²]:				N/A				
	Module temperature [°C]:				N/A				
	☒ Data corrected to a 25°C cell temperature and 200 W/m² irradiance								—
☐ Directly measured									
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}
13-M10	2.25	32.66	2.12	28.77	60.95	83.01	74.50%	98.88%	73.92%
Supplementary information:									

TABLE 07: MQT 04 - Measurement of temperature coefficients					—
Test Date [YYYY-MM-DD] : 2024-06-06					—
Ambient air temperature [°C] high/low : 25.0/25.0					—
Irradiance [W/m²] high/low : 1000/999.9					—
Module temperature [°C] high/low : 65.4/25.8					—
Sample #	α [%/°C]	β [%/°C]	δ [%/°C]		—
13-M10	0.0505	-0.2684	-0.3696		—
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 08: MQT 08 - Outdoor exposure test			N/A
Table 08.1: MQT 01: Visual inspection after outdoor exposure test			N/A
Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			N/A
Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional			N/A
Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional			N/A
TABLE 09: MQT 18: Bypass diode thermal test			N/A
TABLE 09.1: MQT 01 - Visual inspection after bypass diode thermal test			N/A
TABLE 09.2: MQT 15 - Wet leakage current test after bypass diode thermal test			N/A
TABLE 09.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional			N/A
TABLE 09.4: MQT 03 - Insulation test after bypass diode thermal test - Optional			N/A
Supplementary information: N/A			
TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test			N/A
TABLE 10.1: MQT 19.1: Final stabilization			N/A
TABLE 10.3: MQT 19.1 Final Stabilization procedure			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11: MQT 09 - Hot-spot endurance test		P
Test Date [YYYY-MM-DD] start/end	2024-05-30	—
Sample #	13-M12	—
Procedure of technology	☒ wafer-based technologies (WBT) MQT 09.1 ☐ monolithically integrated (MLI) thin film technologies MQT 09.2	—
Cell interconnection circuit	☐ S ☒ SPS ☐ PS	—
Type of light source	☐ Pulse solar simulator ☒ Steady state solar simulator ☐ Natural sunlight	—
Module temperature at thermal equilibrium [°C] .:	59.1 - 57.6	—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						P						
Selected hot-spot cells.....:	Low	Low	Low	High	Permanent	—						
	D11	E13	E15	A2	N/A							
Shading rate [%].....:	17	19	19	8	N/A	—						
Max. measured cell temperature in each cell [°C]:	123.6	123.8	110.4	96.6	N/A	—						
Test duration of each shading [h]	1	1	1	1	N/A	—						
Irradiance during shading [W/m²]	1220	1220	1220	1220	N/A	—						
Supplementary information:												
Position of solar cells (front side view):												
	1	2	3	4	...	8	9	...	13	14	15	16
A							Junction box					
B												
C												
D												
E												
F												
For bifacial modules, determination of the cell shading percent and the prolonged exposure are performed at the elevated irradiance BSI. If double-side illumination is used to produce BSI, both the back and the front of the cell are shaded in the same way. During cell selection, any cell that is permanently shaded by a module feature (such as the junction box) is added to the list of selected cells.												

TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test			P
Test Date [YYYY-MM-DD]		2024-05-30	—
Sample #	Nature and position of initial findings – comments or attach photos		—
13-M12	No visual defects		P
Supplementary information: N/A			

TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test							—
Test Date [YYYY-MM-DD]		2024-05-30					—
Module temperature [°C]		Corrected to 25.0					—
Irradiance [W/m ²]		Corrected to 1000 or G _{BNPI}					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
13-M12-front	15.37	34.97	14.67	29.71	435.9	81.14	—
13-M12-rear	11.28	34.72	10.64	30.47	324.0	82.75	—
13-M12-BNPI	16.90	35.08	16.14	29.67	478.9	80.79	—
Supplementary information: N/A							

TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test					P
Test Date [YYYY-MM-DD].....:			2024-05-30		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			1.99		—
Required Resistance [MΩ]			>20.1		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
13-M12	>1000	>20.1	No breakdown	×	P

TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test				P
Test Date [YYYY-MM-DD].....:		2024-05-30		—
Test Voltage applied [V]		2 minutes of 1500		—
Solution temperature [°C]		22.8		—
Size of module [m²].....:		1.99		—
Solution resistivity [Ω cm]		2217		—
Sample #	Measured [MΩ]		Limit [MΩ]	Result
13-M12	>1000		>20.1	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test					P
Test Date [YYYY-MM-DD].....:		2024-05-30			—
☐ Method A					—
Ambient temperature [°C]		N/A			—
Current flow applied [A]		N/A			—
Sample #	VFM	VFMrated	VFM = (N × VFMrated) ± 10 %		Result
N/A	N/A	N/A	☐ Yes ☐ No		N/A
Supplementary information: N/A					
☒ Method B					—
Sample #	IV curve after shading				Result
	Diode 1 working properly	Diode 2 working properly		Diode 3 working properly	—
13-M12	☒ Yes ☐ No	☒ Yes ☐ No		☒ Yes ☐ No	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			P
Test Date (YYYY-MM-DD) start/end	2024-03-18/2024-03-22		—
Module temperature [°C]	60.1		—
UV irradiance (280-400nm) [W/m ²]	132.0		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	9.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: N/A			

TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			P
Test Date (YYYY-MM-DD) start/end	2024-03-22/2024-03-25		—
Module temperature [°C]	59.8		—
UV irradiance (280-400nm) [W/m ²]	130.0		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	9.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: For bifacial modules repeat the procedure of UV irradiation on the rear-side of the modules.			

TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-03-25		—
Sample #	Nature and position of initial findings – comments or attach photos		—
13-M4	No visual defects		P
13-M5	No visual defects		P
Supplementary information: N/A			

TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-03-25		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.6		—
Size of module [m ²]	1.99		—
Solution resistivity [Ω cm]	2298		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
13-M4	>1000	>20.1	P

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Clause	Requirement + Test	Result - Remark	Verdict
13-M5	>1000	>20.1	P
Supplementary information: N/A			

TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional							—
Test Date [YYYY-MM-DD]				2024-03-25			—
Module temperature [°C]				Corrected to 25.0			—
Irradiance [W/m ²]				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
13-M4-front	15.08	34.34	14.44	28.99	418.4	80.83	—
13-M4-rear	11.23	33.96	10.52	29.32	308.3	80.84	—
13-M4-BNPI	16.59	34.56	15.91	29.07	462.6	80.70	—
13-M5-front	15.24	34.54	14.46	29.30	423.7	80.48	—
13-M5-rear	11.19	34.16	10.38	29.80	309.4	80.92	—
13-M5-BNPI	16.70	34.68	15.95	29.23	466.2	80.50	—
Supplementary information: N/A							

TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional					P
Test Date [YYYY-MM-DD]		2024-03-25			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		1.99			—
Required Resistance [MΩ].....		>20.1			—
Sample #	Measured		Dielectric breakdown		Result
	[MΩ]		Yes (description)	No	
13-M4	>1000	>20.1	No breakdown	×	P
13-M5	>1000	>20.1	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 14: MQT 11 - Thermal cycling 50 test			P
Test Date [YYYY-MM-DD] start/end	2024-04-12/2024-04-19		—
Total cycles (50).....	50		—
Weight attached (N)	5		—
Applied current (A)	During the heat up cycle from 40 °C to 80 °C	17.76	—
	Other stages	0.05	—
Dwell time at high temperature.....	10 min		
Dwell time at low temperature.....	10 min		
Sample #	Open circuits (yes/no)		—
13-M4	no		P
13-M5	no		P
Supplementary information: N/A			

TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test		P
Test Date [YYYY-MM-DD].....:	2024-04-19	—
Sample #	Nature and position of initial findings – comments or attach photos	—
13-M4	No visual defects	P
13-M5	No visual defects	P
Supplementary information: N/A		

TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			P
Test Date [YYYY-MM-DD]	2024-04-19		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.4		—
Size of module [m²]	1.99		—
Solution resistivity [Ω cm]	2177		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
13-M4	>1000	>20.1	P
13-M5	>1000	>20.1	P
Supplementary information: N/A			

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Clause	Requirement + Test			Result - Remark		Verdict
TABLE 14.3: MQT 03 – Max. power determination after thermal cycling 50 test - Optional						—
Test Date [YYYY-MM-DD].....:			2024-04-19			—
Module temperature [°C].....:			Corrected to 25.0			—
Irradiance [W/m²):			Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
13-M4-front	15.17	34.67	14.49	29.47	427.0	81.18
13-M4-rear	11.23	34.31	10.27	30.18	309.8	80.42
13-M4-BNPI	16.72	34.80	15.94	29.51	470.3	80.80
13-M5-front	15.18	34.77	14.55	29.55	429.8	81.46
13-M5-rear	11.18	34.42	10.45	30.10	314.6	81.78
13-M5-BNPI	16.70	34.90	15.94	29.64	472.4	81.09
Supplementary information: N/A						

TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional				P
Test Date [YYYY-MM-DD]		2024-04-19		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]		1.99		—
Required Resistance [MΩ]		>20.1		—
Sample #	Measured	Dielectric breakdown		Result
	[MΩ]	Yes (description)	No	
13-M4	>1000	No breakdown	×	P
13-M5	>1000	No breakdown	×	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 15: MQT 12 - Humidity freeze 10 test		P
Test Date [YYYY-MM-DD] start/end	2024-04-26/2024-05-06	—
Total cycles (10)	10	—
Applied current (A)	0.05	—
Dwell time at high temperature	20 h	—
Dwell time at low temperature.....	20 min	—
Sample #	Open circuits (yes/no)	—
13-M4	no	P
13-M5	no	P
Supplementary information: N/A		

TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test		P
Test Date [YYYY-MM-DD]: 2024-05-06		—
Sample #	Nature and position of initial findings – comments or attach photos	—
13-M4	No visual defects	P
13-M5	No visual defects	P
Supplementary information: N/A		

TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			P
Test Date [YYYY-MM-DD]	2024-05-06		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	23.5		—
Size of module [m²]	1.99		—
Solution resistivity [Ω cm].....	2208		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
13-M4	>1000	>20.1	P
13-M5	>1000	>20.1	P
Supplementary information: N/A			

TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional			—
Test Date [YYYY-MM-DD]	2024-05-06		—
Module temperature [°C].....	Corrected to 25.0		—

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Clause	Requirement + Test			Result - Remark		Verdict
Irradiance [W/m ²):				Corrected to 1000 or G _{BNPI}		—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
13-M4-front	15.23	34.65	14.49	29.36	425.5	80.65
13-M4-rear	11.26	34.27	10.38	29.85	309.8	80.25
13-M4-BNPI	16.74	34.73	15.86	29.32	464.9	79.97
13-M5-front	15.26	34.87	14.63	29.44	430.8	80.94
13-M5-rear	11.23	34.53	10.46	30.22	316.1	81.55
13-M5-BNPI	16.74	34.96	15.87	29.62	469.8	80.30
Supplementary information: N/A						

TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional					P
Test Date [YYYY-MM-DD]		2024-05-06			—
Test Voltage applied [V]		2 minutes of 1500			—
Size of module [m ²]		1.99			—
Required Resistance [MΩ]		>20.1			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
13-M4	>1000	>20.1	No breakdown	×	P
13-M5	>1000	>20.1	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 16: MQT 14.1 Retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD] start/end		2024-05-06	—
Sample #	13-M4		—
Supplementary information: N/A			

TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface		P
Test Date [YYYY-MM-DD]..... : 2024-05-06		—
Sample #	Nature and position of initial findings – comments or attach photos	—
13-M4	No visual defects	P
Supplementary information: N/A		

TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD]		2024-05-06	—
Test Voltage applied [V]		2 minutes of 2025	—
Solution temperature [°C]		22.3	—
Size of module [m²]		1.99	—
Solution resistivity [Ω cm]		2327	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
13-M4	>1000	>20.1	P
Supplementary information: N/A			

TABLE 16.4: MQT 14.2 - Test of cord anchorage	N/A

TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage	N/A

TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage	N/A

TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 17: MQT 11 - Thermal cycling 200 test			P
Test Date [YYYY-MM-DD] start/end		2024-04-12/2024-05-13	—
Total cycles (200).....		200	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from – 40 °C to 80 °C	17.76	—
	Other stages	0.05	—
Dwell time at high temperature		10 min	—
Dwell time at low temperature.....		10 min	—
Sample #	Open circuits (yes/no)		—
13-M8	no		P
13-M9	no		P
Supplementary information: N/A			

TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test		P
Test Date [YYYY-MM-DD].....: 2024-05-13		—
Sample #	Nature and position of initial findings – comments or attach photos	—
13-M8	No visual defects	P
13-M9	No visual defects	P
Supplementary information: N/A		

TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test			P
Test Date [YYYY-MM-DD]	2024-05-13		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.3		—
Size of module [m²]	1.99		—
Solution resistivity [Ω cm]	2382		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
13-M8	>1000	>20.1	P
13-M9	>1000	>20.1	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional							—
Test Date [YYYY-MM-DD]				2024-05-13			—
Module temperature [°C].....				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
13-M8-front	15.21	34.91	14.59	29.71	433.4	81.61	—
13-M8-rear	11.21	34.57	10.21	30.65	312.8	80.71	—
13-M8-BNPI	16.74	35.02	15.99	29.80	476.5	81.30	—
13-M9-front	15.22	34.99	14.62	29.83	436.1	81.88	—
13-M9-rear	11.18	34.65	10.69	30.31	324.0	83.61	—
13-M9-BNPI	16.77	35.09	16.06	29.84	479.3	81.46	—
Supplementary information: N/A							

TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional					P
Test Date [YYYY-MM-DD]		2024-05-13			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		1.99			—
Required Resistance [MΩ]		>20.1			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
13-M8	>1000	>20.1	No breakdown	×	P
13-M9	>1000	>20.1	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 18: MQT 13 - Damp heat 1000 test			P
Test Date [YYYY-MM-DD] start/end	2024-03-25/2024-05-06		—
Total hours (1000h)	1000		—
Sample #	—		—
13-M6	—		P
13-M7	—		P
Supplementary information: N/A			

TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-05-06		—
Sample #	Nature and position of initial findings – comments or attach photos		—
13-M6	No visual defects		P
13-M7	No visual defects		P
Supplementary information: N/A			

TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-05-06		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.2		—
Size of module [m²]	1.99		—
Solution resistivity [Ω cm]	2403		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
13-M6	>1000	>20.1	P
13-M7	>1000	>20.1	P
Supplementary information: N/A			

TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional							—
Test Date [YYYY-MM-DD]	2024-05-06						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
13-M6-front	15.07	34.86	14.33	29.60	424.2	80.75	—
13-M6-rear	11.17	34.53	10.53	29.98	315.6	81.82	—
13-M6-BNPI	16.58	35.00	15.74	29.69	467.3	80.52	—
13-M7-front	15.09	34.85	14.32	29.60	423.8	80.62	—

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Clause	Requirement + Test				Result - Remark		Verdict
13-M7-rear	11.25	34.49	10.30	30.31	312.2	80.45	—
13-M7-BNPI	16.50	34.99	15.70	29.72	466.6	80.82	—
Supplementary information: N/A							

TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional					P
Test Date [YYYY-MM-DD]		2024-05-06			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		1.99			—
Sample #	Measured	Required Resistance	Dielectric breakdown		Result
	[MΩ]	[MΩ]	Yes (description)	No	
13-M6	>1000	>20.1	No breakdown	×	P
13-M7	>1000	>20.1	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	13-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-06-07		—
Mounting method	Clamps mounting (4 points on long side with two beams across the module at the long side)		—
Load applied to.....	front side	back side	—
Mechanical load [Pa].....	5400	2400	—
First cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test		P
Test Date [YYYY-MM-DD]	2024-06-07	—
Sample #	Nature and position of initial findings – comments or attach photos	—
13-M6	No visual defects	P
Supplementary information: N/A		

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-06-07		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	22.5		—
Size of module [m²]	1.99		—
Solution resistivity [Ω cm].....	2352		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
13-M6	>1000	>20.1	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-06-07			—
Module temperature [°C].....				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
13-M6-front	15.13	34.90	14.41	29.60	426.6	80.80	—
13-M6-rear	11.20	34.56	10.69	29.94	320.1	82.69	—
13-M6-BNPI	16.71	35.01	15.90	29.52	469.3	80.24	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD]			2024-06-07		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			1.99		—
Required Resistance [MΩ].....			>20.1		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
13-M6	>1000	>20.1	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 20: MQT 22 Bending test			N/A
TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
TABLE 20.2: MQT 15 - Wet leakage current test after bending test			N/A
TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional			N/A
TABLE 20.4: MQT 03 Insulation test after bending test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 21: MQT 17 - Hail impact test							P
Test Date [YYYY-MM-DD]..... :	2024-06-11						—
Sample #	13-M7						—
Ice ball size [mm] :	1	2	3	4	5	6	—
	25±5%	25±5%	25±5%	25±5%	25±5%	25±5%	
	7	8	9	10	11	—	
	25±5%	25±5%	25±5%	25±5%	25±5%	—	
Ice ball weight [g] :	1	2	3	4	5	6	—
	7.50	7.61	7.48	7.45	7.52	7.61	
	7	8	9	10	11	—	
	7.60	7.55	7.51	7.54	7.55	—	
Ice ball velocity [m/s] :	1	2	3	4	5	6	—
	23.4	22.9	22.7	23.7	23.6	23.2	
	7	8	9	10	11	—	
	23.2	22.7	23.5	22.8	23.6	—	
Number of impact locations :	11						—
Supplementary information: N/A							

TABLE 21.1: MQT 01 - Visual inspection after hail impact test		P
Test Date [YYYY-MM-DD]: 2024-06-11		—
Sample #	Nature and position of initial findings – comments or attach photos	—
13-M7	No visual defects	P
Supplementary information: N/A		

TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test				P
Test Date [YYYY-MM-DD]..... :		2024-06-11		—
Test Voltage applied [V]..... :		2 minutes of 1500		—
Solution temperature [°C]..... :		23.4		—
Size of module [m²]..... :		1.99		—
Solution resistivity [Ω cm]..... :		2366		—
Sample #	Measured [MΩ]		Required Resistance [MΩ]	Result
13-M7	>1000		>20.1	P
Supplementary information: N/A				

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional							—
Test Date [YYYY-MM-DD].....:			2024-06-11				—
Module temperature [°C].....:			Corrected to 25.0				—
Irradiance [W/m²):			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
13-M7-front	15.09	34.88	14.35	29.60	424.7	80.69	—
13-M7-rear	11.26	34.50	10.32	30.32	312.9	80.55	—
13-M7-BNPI	16.52	34.99	15.71	29.73	467.1	80.82	—
Supplementary information: N/A							

TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional					P
Test Date [YYYY-MM-DD]			2024-06-11		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			1.99		—
Required Resistance [MΩ].....			>20.1		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
13-M7	>1000	>20.1	No breakdown	×	P
Supplementary information: N/A					

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 22: MQT 21 -Potential induced degradation test	N/A

TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test	N/A

TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test	N/A

TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test - Optional	N/A

TABLE 22.4: MQT 03 Insulation test after potential induced degradation test - Optional	N/A

TABLE 23: MQT 19.2: Final stabilization							—
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization							—
Test Date [YYYY-MM-DD]			2024-06-07 for 13-M6#, 2024-06-11 for 13-M7#				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
13-M6-front	15.13	34.90	14.41	29.60	426.6	80.80	—
13-M6-rear	11.20	34.56	10.69	29.94	320.1	82.69	—
13-M6-BNPI	16.71	35.01	15.90	29.52	469.3	80.24	—
13-M7-front	15.09	34.88	14.35	29.60	424.7	80.69	—
13-M7-rear	11.26	34.50	10.32	30.32	312.9	80.55	—
13-M7-BNPI	16.52	34.99	15.71	29.73	467.1	80.82	—
Supplementary information: N/A							

TABLE 23.2: MQT 19.1 Final Stabilization procedure							—
☐ IEC 61215-1-2 ☐ IEC 61215-1-3 ☐ IEC 61215-1-4							—
Light exposure method:				☐ Solar simulator ☐ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x :				N/A			
Sample #	N/A	Test Date (YYYY-MM-DD) start/end..:			N/A		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	N/A	—	—

IEC 61215-2							
Clause	Requirement + Test				Result - Remark		Verdict
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A	—	—
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure							

TABLE 23.3: MQT 19.2: Final stabilization										
☒IEC 61215-1-1										
☐Method 1										
Stress-specific stabilization – BO LID (MQT 19.3)										
Test Date [YYYY-MM-DD]..... :				N/A						—
Applied current (A)				N/A						—
Module temperature [°C]..... :				N/A						—
Total hours (48h)				N/A						—
Performance at STC after final stabilization— for monofacial modules										
Test Date [YYYY-MM-DD]..... :				N/A						—
Test method				☐ Solar simulator ☐ Natural sunlight						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	P _{max} [W] (Lab Gate No.1)	Power Degradation	Result	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Performance at BNPI after final stabilization — for bifacial modules										—
Test Date [YYYY-MM-DD]..... :				N/A						—
Test method				☐ Solar simulator ☐ Natural sunlight						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	P _{max} [W] (LabGateN o.1)	Power Degradation	Result	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Supplementary information:										
☒Method 2										—
Performance at STC before final stabilization— for monofacial modules										—
Test Date [YYYY-MM-DD]..... :				N/A						—

IEC 61215-2										
Clause	Requirement + Test						Result - Remark	Verdict		
Test method				☐ Solar simulator ☐ Natural sunlight				—		
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Performance at BNPI before final stabilization — for bifacial modules									—	
Test Date [YYYY-MM-DD]				2024-06-07 for 13-M6#, 2024-06-11 for 13-M7#						—
Test method				☒ Solar simulator ☐ Natural sunlight				—		
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
13-M6	16.71	35.01	15.90	29.52	469.3	80.24	477.3	-1.66	P	
13-M7	16.52	34.99	15.71	29.73	467.1	80.82	476.5	1.95	P	
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to destabilization artifacts.										
If Power Degradation $\geq 5\%$, then perform stress-specific stabilization MQT 19.3 in method 1										
Stress-specific stabilization – BO LID (MQT 19.3)									—	
Test Date [YYYY-MM-DD]				N/A						—
Applied current (A)				N/A						—
Module temperature [°C]				N/A						—
Total hours (48h)				N/A						—
Performance at STC after final stabilization — for monofacial modules									—	
Test Date [YYYY-MM-DD]				N/A						—
Test method				☐ Solar simulator ☐ Natural sunlight				—		
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Performance at BNPI after final stabilization — for bifacial modules									—	
Test Date [YYYY-MM-DD]				N/A						—
Test method				☐ Solar simulator ☐ Natural sunlight				—		
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

IEC 61215-2									
Clause	Requirement + Test						Result - Remark	Verdict	
Supplementary information: N/A									
TABLE 23.4: MQT 19.2: Final stabilization									
☐ Method 3									
Test Date (YYYY-MM-DD) start/end				N/A					—
Test duration [h]				N/A					—
Module temperature [°C]				N/A					—
UV irradiance (280-400nm) [W/m²]				N/A					—
UV dose (280-320nm) [kWh/ m²]				N/A					—
UV dose (280-400nm) [kWh/ m²]				N/A					—
Side exposed				☐ Front side ☐ Rear side					—
Module operation condition				☐ Short circuited ☐ Open circuited					—
Supplementary information: For bifacial modules, the irradiance shall be applied to the rear side, whereas for monofacial modules, the irradiance shall be applied to the front side.									
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 4									
Performance at STC before final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result

IEC 61215-2									
Clause	Requirement + Test						Result - Remark	Verdict	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to polarization artifacts									
If Power Degradation $\geq 5\%$, then perform method 3 final stabilization									
Method 3									
Test Date [YYYY-MM-DD]				N/A					—
Test duration [h]				N/A					—
Module temperature [°C]				N/A					—
UV irradiance (280-400nm) [W/m ²]				N/A					—
UV dose (280-320nm) [kWh/ m ²]				N/A					—
UV dose (280-400nm) [kWh/ m ²]				N/A					—
Side exposed				☐ Front side ☐ Rear side					—
Module operation condition				☐ Short circuited ☐ Open circuited					—
Performance at STC after final stabilization — for monofacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]									—
Test method				☐ Solar simulator ☐ Natural sunlight					—

IEC 61215-2									
Clause	Requirement + Test					Result - Remark		Verdict	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

For monofacial modules	
TABLE 23.5: MQT 06.1: Final Performance at STC	N/A

For bifacial modules							—			
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)							—			
Test Date [YYYY-MM-DD]			—				—			
Test method			☒ Solar simulator		☐ Natural sunlight		—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result			
13-M4	15.23	34.65	14.49	29.36	425.5	80.65	—			
13-M5	15.26	34.87	14.63	29.44	430.8	80.94	—			
13-M6	15.13	34.90	14.41	29.60	426.6	80.80	—			
13-M7	15.09	34.88	14.35	29.60	424.7	80.69	—			
13-M8	15.21	34.91	14.59	29.71	433.4	81.61	—			
13-M9	15.22	34.99	14.62	29.83	436.1	81.88	—			
Supplementary information: N/A										
TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)										
Test Date [YYYY-MM-DD]			—				—			
Test method			☒ Solar simulator		☐ Natural sunlight		—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
13-M4	11.26	34.27	10.38	29.85	309.8	80.25	73.97%	98.91%	72.80%	—
13-M5	11.23	34.53	10.46	30.22	316.1	81.55	73.56%	99.01%	73.38%	—
13-M6	11.20	34.56	10.69	29.94	320.1	82.69	74.03%	99.03%	75.03%	—
13-M7	11.26	34.50	10.32	30.32	312.9	80.55	74.62%	98.92%	73.69%	—
13-M8	11.21	34.57	10.21	30.65	312.8	80.71	73.70%	99.02%	72.17%	—
13-M9	11.18	34.65	10.69	30.31	324.0	83.61	73.47%	99.03%	74.29%	—
Supplementary information: N/A										

TABLE 23.8: MQT 06.1: Final Performance at BNPI										P
Test Date [YYYY-MM-DD]				—						—
Test method				☒ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate)	Power Degradation	Result	

IEC 61215-2									
Clause	Requirement + Test						Result - Remark		Verdict
							No.1)	[%]	
13-M4	16.74	34.73	15.86	29.32	464.9	79.97	476.4	-2.42	P
13-M5	16.74	34.96	15.87	29.62	469.8	80.30	477.0	-1.51	P
13-M6	16.71	35.01	15.90	29.52	469.3	80.24	477.3	-1.66	P
13-M7	16.52	34.99	15.71	29.73	467.1	80.82	476.5	1.95	P
13-M8	16.74	35.02	15.99	29.80	476.5	81.30	478.0	-0.31	P
13-M9	16.77	35.09	16.06	29.84	479.3	81.46	478.0	0.27	P
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility <i>r</i> of control module.									

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		—			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		1.99			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
13-M4	>1000	>20.1	No breakdown	×	P
13-M5	>1000	>20.1	No breakdown	×	P
13-M6	>1000	>20.1	No breakdown	×	P
13-M7	>1000	>20.1	No breakdown	×	P
13-M8	>1000	>20.1	No breakdown	×	P
13-M9	>1000	>20.1	No breakdown	×	P
13-M10	>1000	>20.1	No breakdown	×	P
13-M12	>1000	>20.1	No breakdown	×	P
Supplementary information: N/A					

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	—	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22 ± 2	—
Size of module [m²]	:	1.99	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
13-M4	>1000	>20.1	P
13-M5	>1000	>20.1	P
13-M6	>1000	>20.1	P
13-M7	>1000	>20.1	P
13-M8	>1000	>20.1	P
13-M9	>1000	>20.1	P
13-M10	>1000	>20.1	P
13-M12	>1000	>20.1	P
Supplementary information: N/A			

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMHF-66HD715 (BOM14)

TABLE 01: MQT 01 ini: Initial Visual inspection		P
Test Date [YYYY-MM-DD]..... :	2024-02-29	—
Sample #	Nature and position of initial findings – comments or attach photos	—
14-M4	No visual defects	P
14-M5	No visual defects	P
14-M6	No visual defects	P
14-M7	No visual defects	P
14-M8	No visual defects	P
14-M9	No visual defects	P
14-M10	No visual defects	P
14-M11	No visual defects	P
14-M12	No visual defects	P
Supplementary information: N/A		

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]				2024-02-29			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
14-M4	17.43	49.85	16.65	42.88	713.9	82.16	—
14-M5	17.48	49.88	16.67	42.90	715.2	82.03	—
14-M6	17.44	49.87	16.65	42.90	714.3	82.13	—
14-M7	17.48	49.90	16.68	42.93	716.0	82.09	—
14-M8	17.43	49.85	16.64	42.86	713.2	82.08	—
14-M9	17.45	49.87	16.66	42.88	714.4	82.09	—
14-M10	17.42	49.86	16.64	42.89	713.7	82.17	—
14-M11	17.45	49.91	16.65	42.93	714.8	82.07	—
14-M12	17.45	49.90	16.66	42.93	715.2	82.14	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							—
Test Date [YYYY-MM-DD]				2024-02-29			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
14-M4	15.15	49.59	14.09	43.01	606.2	80.69	—
14-M5	15.19	49.63	14.13	43.07	608.4	80.70	—
14-M6	15.17	49.61	14.10	43.04	606.9	80.64	—
14-M7	15.20	49.64	14.10	43.08	607.4	80.50	—
14-M8	15.14	49.63	14.09	42.99	605.9	80.64	—
14-M9	15.15	49.59	14.06	43.01	604.8	80.50	—
14-M10	15.16	49.60	14.05	43.06	605.1	80.47	—
14-M11	15.15	49.64	14.09	43.03	606.2	80.61	—
14-M12	15.16	49.62	14.07	43.07	605.9	80.55	—
Supplementary information: N/A							
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]				2024-02-29			—

IEC 61215-2							
Clause	Requirement + Test				Result - Remark		Verdict
Test method :			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
14-M4	19.42	49.98	18.51	42.95	794.9	81.90	—
14-M5	19.46	50.04	18.53	42.98	796.5	81.79	—
14-M6	19.45	50.03	18.52	42.95	795.3	81.73	—
14-M7	19.46	50.05	18.55	42.97	797.1	81.84	—
14-M8	19.43	49.99	18.50	42.92	794.1	81.76	—
14-M9	19.45	50.01	18.52	42.94	795.2	81.75	—
14-M10	19.44	50.00	18.50	42.94	794.5	81.74	—
14-M11	19.45	50.03	18.51	42.98	795.7	81.77	—
14-M12	19.46	50.05	18.52	42.98	796.1	81.74	—
Supplementary information: N/A							
TABLE 02.4: MQT 19.1: Initial Stabilization procedure							
Light exposure method :			☐ Solar simulator ☒ Natural sunlight				
Stabilization criterion x per IEC 61215-1-x :			1%				
Sample #	14-M4	Test Date (YYYY-MM-DD) start/end:			2024-03-01/2024-03-06		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	713.9	—	—
1	5.0	>500	N/A	MPPT	712.8	—	—
2	5.0	>500	N/A	MPPT	712.2	0.24	Yes

Sample #	14-M5	Test Date (YYYY-MM-DD) start/end			2024-03-01/2024-03-06		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	715.2	—	—
1	5.0	>500	N/A	MPPT	714.0	—	—
2	5.0	>500	N/A	MPPT	713.7	0.21	Yes

Sample #	14-M6	Test Date (YYYY-MM-DD) start/end			2024-03-01/2024-03-06		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)

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Clause	Requirement + Test				Result - Remark		Verdict
Initial	—	—	—	—	714.3	—	—
1	5.0	>500	N/A	MPPT	713.1	—	—
2	5.0	>500	N/A	MPPT	712.8	0.21	Yes

Sample #	14-M7	Test Date (YYYY-MM-DD) start/end			2024-03-01/2024-03-06		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	716.0	—	—
1	5.0	>500	N/A	MPPT	714.9	—	—
2	5.0	>500	N/A	MPPT	714.6	0.20	Yes

Sample #	14-M8	Test Date (YYYY-MM-DD) start/end			2024-03-01/2024-03-06		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	713.2	—	—
1	5.0	>500	N/A	MPPT	712.0	—	—
2	5.0	>500	N/A	MPPT	711.9	0.18	Yes

Sample #	14-M9	Test Date (YYYY-MM-DD) start/end			2024-03-01/2024-03-06		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	714.4	—	—
1	5.0	>500	N/A	MPPT	713.0	—	—
2	5.0	>500	N/A	MPPT	712.5	0.27	Yes

Sample #	14-M10	Test Date (YYYY-MM-DD) start/end			2024-03-01/2024-03-06		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	713.7	—	—
1	5.0	>500	N/A	MPPT	712.3	—	—
2	5.0	>500	N/A	MPPT	712.0	0.24	Yes

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Clause	Requirement + Test				Result - Remark		Verdict
Sample #	14-M11	Test Date (YYYY-MM-DD) start/end			2024-03-01/2024-03-06		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	714.8	—	—
1	5.0	>500	N/A	MPPT	713.4	—	—
2	5.0	>500	N/A	MPPT	713.0	0.25	Yes

Sample #	14-M12	Test Date (YYYY-MM-DD) start/end			2024-03-01/2024-03-06		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	715.2	—	—
1	5.0	>500	N/A	MPPT	713.9	—	—
2	5.0	>500	N/A	MPPT	713.6	0.22	Yes

Supplementary information: N/A

☐ Other stabilization procedures

Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						

Test method description: N/A

Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]..... :					2024-03-06					—
$P_{\max}$ lower limit (W) :					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V) :					701.3					—
V_{oc} (lab) upper limit (V) :					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A) :					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
14-M4	17.41	18.59	49.74	52.26	16.63	42.83	712.2	680.2	82.24	P
14-M5	17.45	18.59	49.76	52.26	16.65	42.86	713.7	680.2	82.19	P
14-M6	17.42	18.59	49.75	52.26	16.63	42.86	712.8	680.2	82.25	P
14-M7	17.46	18.59	49.78	52.26	16.66	42.89	714.6	680.2	82.22	P
14-M8	17.41	18.59	49.70	52.26	16.62	42.83	711.9	680.2	82.27	P
14-M9	17.43	18.59	49.74	52.26	16.65	42.79	712.5	680.2	82.18	P
14-M10	17.40	18.59	49.72	52.26	16.63	42.81	712.0	680.2	82.30	P
14-M11	17.43	18.59	49.75	52.26	16.64	42.85	713.0	680.2	82.22	P
14-M12	17.44	18.59	49.76	52.26	16.63	42.91	713.6	680.2	82.23	P
Average	—						712.9	701.3	—	P
Supplementary information: The limit values are calculated considering manufacturer's tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										N/A
Test Date [YYYY-MM-DD]					2024-03-06					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
14-M4	15.12	49.50	14.07	42.96	604.5	80.77	86.85%	99.52%	84.88%	—
14-M5	15.16	49.54	14.10	43.04	606.8	80.80	86.88%	99.56%	85.02%	—
14-M6	15.14	49.53	14.08	42.99	605.3	80.72	86.91%	99.56%	84.92%	—
14-M7	15.18	49.55	14.07	43.08	606.1	80.58	86.94%	99.54%	84.82%	—
14-M8	15.12	49.49	14.08	42.93	604.5	80.78	86.85%	99.58%	84.91%	—
14-M9	15.12	49.41	14.04	42.94	602.9	80.70	86.75%	99.34%	84.62%	—
14-M10	15.14	49.44	14.03	43.04	603.8	80.67	87.01%	99.44%	84.80%	—
14-M11	15.14	49.46	14.07	42.99	604.9	80.78	86.86%	99.42%	84.84%	—
14-M12	15.14	49.45	14.04	43.04	604.3	80.72	86.81%	99.38%	84.68%	—
Supplementary information: N/A										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m ² , backside irradiance 135 W/m ² , 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]..... :					2024-03-06					—
$P_{\max}$ lower limit (W)					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V)					781.8					—
V_{oc} (lab) upper limit (V)					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A)					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
14-M4	19.40	20.72	49.89	52.26	18.49	42.89	793.0	758.3	81.93	P
14-M5	19.44	20.72	49.93	52.26	18.51	42.94	794.8	758.3	81.88	P
14-M6	19.42	20.72	49.91	52.26	18.50	42.90	793.6	758.3	81.88	P
14-M7	19.43	20.72	49.96	52.26	18.53	42.93	795.5	758.3	81.95	P
14-M8	19.41	20.72	49.87	52.26	18.47	42.91	792.6	758.3	81.88	P
14-M9	19.43	20.72	49.90	52.26	18.50	42.86	793.0	758.3	81.79	P
14-M10	19.52	20.72	49.89	52.26	18.47	42.91	792.6	758.3	81.39	P
14-M11	19.42	20.72	49.91	52.26	18.49	42.93	793.8	758.3	81.89	P
14-M12	19.43	20.72	49.93	52.26	18.49	42.96	794.3	758.3	81.87	P
Average	—						793.7	781.8	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD]		2024-03-06		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]		3.11		—
Required Resistance [MΩ]		>12.9		—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
14-M4	>1000	No breakdown	x	P
14-M5	>1000	No breakdown	x	P
14-M6	>1000	No breakdown	x	P
14-M7	>1000	No breakdown	x	P
14-M8	>1000	No breakdown	x	P
14-M9	>1000	No breakdown	x	P
14-M10	>1000	No breakdown	x	P
14-M11	>1000	No breakdown	x	P
14-M12	>1000	No breakdown	x	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]..... :		2024-03-06	—
Test Voltage applied [V].....:		2 minutes of 1500	—
Solution temperature [°C].....:		22±2	—
Solution resistivity [Ω cm]		<3500	—
Size of module [m ²]		3.11	—
Sample #	Required Resistance [$M\Omega$]	Measured [$M\Omega$]	Result
14-M4	>12.9	>1000	P
14-M5	>12.9	>1000	P
14-M6	>12.9	>1000	P
14-M7	>12.9	>1000	P
14-M8	>12.9	>1000	P
14-M9	>12.9	>1000	P
14-M10	>12.9	>1000	P
14-M11	>12.9	>1000	P
14-M12	>12.9	>1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)							—
Test Date [YYYY-MM-DD]					2024-03-12		—
Test method ...:	☐ Outdoor measurement						—
	Ambient air temperature [°C]:				N/A		
	Irradiance [W/m²]:				N/A		
	Module temperature [°C]:				N/A		
	☐ Data corrected to a 25°C cell temperature and 200 W/m² irradiance						—
	☒ Directly measured						
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	
14-M10	3.48	49.59	3.33	42.67	142.1	82.34	
Supplementary information: N/A							

TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)										—
Test Date [YYYY-MM-DD]					2024-03-12					—
Test method ...:	☐ Outdoor measurement									—
	Ambient air temperature [°C]:				N/A					
	Irradiance [W/m²]:				N/A					
	Module temperature [°C]:				N/A					
	☐ Data corrected to a 25°C cell temperature and 200 W/m² irradiance									—
	☒ Directly measured									
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	
14-M10	3.03	49.30	2.81	42.88	120.5	80.67	87.07%	99.42%	84.80%	
Supplementary information: N/A										

TABLE 07: MQT 04 - Measurement of temperature coefficients					—
Test Date [YYYY-MM-DD] : 2024-03-15					—
Ambient air temperature [°C] high/low : 25.0/25.0					—
Irradiance [W/m²] high/low : 1007/999.1					—
Module temperature [°C] high/low : 60.7/24.9					—
Sample #	α [%/°C]	β [%/°C]	δ [%/°C]		—
14-M10	0.040	-0.222	-0.256		—
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 08: MQT 08 - Outdoor exposure test		P
Test Date [YYYY-MM-DD] start/end	2024-03-07/2024-02-24	—
Sample #	17-M11	—
Total irradiation dosage [kWh/m²]	60.0	—
Angle of tilt the test module	30	—
Electrical load:	☐ Restive load ☒ 5	—
Supplementary information: N/A		

Table 08.1: MQT 01: Visual inspection after outdoor exposure test		P
Test Date [YYYY-MM-DD]: 2024-04-24		—
Sample #	Nature and position of initial findings – comments or attach photos	—
14-M11	No visual defects	P
Supplementary information: N/A		

Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			P
Test Date [YYYY-MM-DD]	2024-04-24		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.5		—
Size of module [m ²]	3.11		—
Solution resistivity [Ω cm]	2287		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
14-M11	>1000	>12.9	P
Supplementary information: N/A			

Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional							—
Test Date [YYYY-MM-DD]	2024-04-24						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m ²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	
14-M11-front	17.36	49.62	16.56	42.71	707.2	82.10	
14-M11-rear	15.09	49.36	14.01	42.89	600.8	80.67	
14-M11-BNPI	19.34	49.78	18.40	42.80	787.4	81.79	

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Clause	Requirement + Test	Result - Remark	Verdict
Supplementary information: N/A			

Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional					P
Test Date [YYYY-MM-DD]		2024-04-24			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		3.11			—
Required Resistance [MΩ]		>12.9			—
Sample #	Measured	Required (MΩ)	Dielectric breakdown		Result
	(MΩ)	(MΩ)	Yes (description)	No	
14-M11	>1000	>12.9	No breakdown	x	P
Supplementary information: N/A					

TABLE 09: MQT 18: Bypass diode thermal test					P
Test Date [YYYY-MM-DD] start/end	2024-04-26				—
Sample #	14-M11				—
Module temperature [°C].....	75				—
Number of diodes in junction box	3				—
Diode manufacturer	Tongwei Solar (Hefei) Co., Ltd.				—
Diode type designation	40SQ045				—
Max. permissible junction temperature, T _{Jmax} [°C] (according to diode datasheet)	200				—
Detailed description of sample preparation procedure	performed on full module				—
Step 1, Determination of V _D versus T _J characteristic					—
Diode	1				
	30 ± 2 °C	50 ± 2 °C	70 ± 2 °C	90 ± 2 °C	
Ambient temperature of the junction box ... :	30	50	70	90	
Pulsed current.....	21.88	21.88	21.88	21.88	
Voltage drop, V _D [V]	0.5019	0.4763	0.4380	0.4119	
V _D versus T _J characteristic	V _D =0.5495 - 1.54 x 10 ⁻³ T _J				—
Max. permissible junction temperature T _{Jmax} [°C] (according to diode datasheet)	200				—
Diode	2				
	30 ± 2 °C	50 ± 2 °C	70 ± 2 °C	90 ± 2 °C	
Ambient temperature of the junction box ... :	30	50	70	90	

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Clause	Requirement + Test		Result - Remark	
Pulsed current.....:	21.88	21.88	21.88	21.88
Voltage drop, V_D [V]	0.4986	0.4705	0.4299	0.4087
V_D versus T_J characteristic	$V_D=0.5450 - 1.55 \times 10^{-3} T_J$			—
Max. permissible junction temperature T_{Jmax} [°C] (according to diode datasheet)	200			—
Diode	3			
	30 ± 2 °C	50 ± 2 °C	70 ± 2 °C	90 ± 2 °C
Ambient temperature of the junction box ... :	30	50	70	90
Pulsed current.....:	21.88	21.88	21.88	21.88
Voltage drop, V_D [V]	0.4902	0.4750	0.4236	0.4049
V_D versus T_J characteristic	$V_D=0.5406 - 1.54 \times 10^{-3} T_J$			—
Max. permissible junction temperature T_{Jmax} [°C] (according to diode datasheet)	200			—

Step 2, Bypass diode thermal test				
	Diode 1	Diode 2	Diode 3	Result
Current flow applied [A]	21.88	21.88	21.88	—
Max. diode surface temperature allowed T_{jmax} [°C] :	200	200	200	—
Voltage drop, V_D [V] after 1h.....:	0.3652	0.3509	0.3574	—
Calculated max. junction temperature T_{jcalc} [°C]:	119.7	125.2	119.0	—
$T_{jcalc} < T_{jmax}$ (test passed)? yes/no	Yes	Yes	Yes	P
Current flow ($1.25 \cdot I_{sc}$) [A]	27.35	27.35	27.35	—
Bypass diode remain(s) functional (yes/no)	Yes	Yes	Yes	P
Remarks: See Table 10 for the test details of bypass diode functionality test. 3 Diodes are considered as representative number. These diodes have to be selected as worst case. In case that additional bypass diodes tests are performed the results shall be listed in an attachment. for bifacial modules, use the value of the short-circuit current at elevated irradiance BSI (equivalent to 1 000 W/m ² on the front side and 300 W/m ² on the back side). Extrapolate I_{sc-BSI} , these quantities are combined as follows: $I_{sc-BSI}=I_{sc-BNPI}+(I_{sc-BNPI}-I_{sc})(G_{BSI}-G_{BNPI})/(G_{BNPI}-1\ 000)$, $G_{BSI}=1\ 000+300\phi$, $G_{BNPI}=1\ 000+135\phi$, $\phi=\text{Min}(\phi_{sc}, \phi_{Pmax})$				

TABLE 09.1: MQT 01 - Visual inspection after bypass diode thermal test			P
Test Date [YYYY-MM-DD]	2024-04-26		—
Sample #	Nature and position of initial findings – comments or attach photos		—
14-M11	No visual defects		P

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Clause	Requirement + Test	Result - Remark	Verdict
Supplementary information: N/A			

TABLE 09.2: MQT 15 - Wet leakage current test after bypass diode thermal test			P
Test Date [YYYY-MM-DD]		2024-04-26	—
Test Voltage applied [V]		2 minutes of 1500	—
Solution temperature [°C]		22.7	—
Size of module [m²]		3.11	—
Solution resistivity [Ω cm].....		2382	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
14-M11	>1000	>12.9	P
Supplementary information: N/A			

TABLE 09.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional							—
Test Date [YYYY-MM-DD]		2024-04-26					—
Module temperature [°C]		Corrected to 25.0					—
Irradiance [W/m²]		Corrected to 1000 or G_{BNPI}					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	—
14-M11-front	17.33	49.54	16.52	42.63	704.3	82.03	—
14-M11-rear	15.05	49.31	13.97	42.84	598.4	80.64	—
14-M11-BNPI	19.29	49.71	18.35	42.73	784.1	81.77	—
Supplementary information: N/A							

TABLE 09.4: MQT 03 - Insulation test after bypass diode thermal test - Optional					P
Test Date [YYYY-MM-DD]		2024-04-26			—
Test Voltage applied [V]		2 minutes of 1500			—
Size of module [m²]		3.11			—
Required Resistance [MΩ]		>12.9			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
14-M11	>1000	>12.9	No breakdown	x	P
Supplementary information: N/A					

TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test		P
Test Date [YYYY-MM-DD]		2024-04-26
		—

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Clause	Requirement + Test		Result - Remark	Verdict
☐ Method A				—
Ambient temperature [°C]		N/A		—
Current flow applied [A]		N/A		—
Sample #	VFM	VFM _{rated}	VFM = (N × VFM _{rated}) ± 10 %	Result
N/A	N/A	N/A	☐ Yes ☐ No	N/A
Supplementary information: N/A				
☒ Method B				—
Sample #	IV curve after shading			Result
	Diode 1 working properly	Diode 2 working properly	Diode 3 working properly	
14-M11	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11: MQT 09 - Hot-spot endurance test			P
Test Date [YYYY-MM-DD] start/end	2024-03-11/2024-03-12		—
Sample #	14-M12		—
Procedure of technology	☒ wafer-based technologies (WBT) MQT 09.1 ☐ monolithically integrated (MLI) thin film technologies MQT 09.2		—
Cell interconnection circuit	☐ S ☒ SPS ☐ PS		—
Type of light source	☐ Pulse solar simulator ☒ Steady state solar simulator ☐ Natural sunlight		—
Module temperature at thermal equilibrium [°C] ..	61.9/60.2		—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						P
Selected hot-spot cells	Low	Low	Low	High	Permanent	—
	A01	C22	D25	E22	N/A	
Shading rate [%]	25	30	35	30	N/A	—
Max. measured cell temperature in each cell [°C]:	136.2	129.8	132.7	130.2	N/A	—
Test duration of each shading [h]	1	1	1	1	N/A	—
Irradiance during shading [W/m²]	1255	1255	1255	1255	N/A	—

Supplementary information:

Position of solar cells (front side view):

	1	2	3	4	...	11		12	...	19	20	21	22
A							Junction box						
B													
C													
D													
E													
F													

for bifacial modules, determination of the cell shading percent and the prolonged exposure are performed at the elevated irradiance BSI. If double-side illumination is used to produce BSI, both the back and the front of the cell are shaded in the same way. During cell selection, any cell that is permanently shaded by a module feature (such as the junction box) is added to the list of selected cells.

TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI		N/A
Selected hot-spot cells	N/A	—

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Clause	Requirement + Test	Result - Remark	Verdict
Number of cells shaded		N/A	—
Max. measured cell temperature [°C]		N/A	—
Test duration during shading [h]		N/A	—
Irradiance during shading [W/m²]		N/A	—
Supplementary information: N/A			

TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test		P
Test Date [YYYY-MM-DD]: 2024-03-12		—
Sample #	Nature and position of initial findings – comments or attach photos	—
14-M12	No visual defects	P
Supplementary information: N/A		

TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test							—
Test Date [YYYY-MM-DD]		2024-03-12					—
Module temperature [°C]		Corrected to 25.0					—
Irradiance [W/m²]		Corrected to 1000 or G _{BNPI}					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
14-M12-front	17.39	49.65	16.58	42.79	709.4	82.16	—
14-M12-rear	15.10	49.38	14.00	42.97	601.6	80.69	—
14-M12-BNPI	19.37	49.82	18.43	42.85	789.7	81.83	—
Supplementary information: N/A							

TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test					P
Test Date [YYYY-MM-DD]		2024-03-12			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		3.11			—
Required Resistance [MΩ]		>12.9			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
14-M12	>1000	>12.9	No breakdown	×	P

TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test			P
Test Date [YYYY-MM-DD]		2024-03-12	—
Test Voltage applied [V]		2 minutes of 1500	—

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Clause	Requirement + Test	Result - Remark	Verdict
Solution temperature [°C]	22.1		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm]	2280		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
14-M12	>1000	>12.9	P
Supplementary information: N/A			

TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test					P
Test Date [YYYY-MM-DD].....:		2024-03-12			—
☐ Method A					—
Ambient temperature [°C]		N/A			—
Current flow applied [A]		N/A			—
Sample #	VFM	VFMrated	VFM = (N × VFMrated) ± 10 %		Result
N/A	N/A	N/A	☐ Yes ☐ No		N/A
Supplementary information: N/A					
☒ Method B					—
Sample #	IV curve after shading				Result
	Diode 1 working properly	Diode 2 working properly	Diode 3 working properly		—
14-M12	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No		P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			P
Test Date (YYYY-MM-DD) start/end	2024-03-12/2024-03-16		—
Module temperature [°C]	60.8		—
UV irradiance (280-400nm) [W/m ²]	157.0		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	6.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: N/A			

TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			P
Test Date (YYYY-MM-DD) start/end	2024-03-20/2024-03-24		—
Module temperature [°C]	61.2		—
UV irradiance (280-400nm) [W/m ²]	157.0		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	6.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: for bifacial modules repeat the procedure of UV irradiation on the rear-side of the modules.			

TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-03-24		—
Sample #	Nature and position of initial findings – comments or attach photos		—
14-M4	No visual defects		P
14-M5	No visual defects		P
Supplementary information: N/A			

TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-03-24		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.7		—
Size of module [m ²]	3.11		—
Solution resistivity [Ω cm]	2275		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
14-M4	>1000	>12.9	P

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Clause	Requirement + Test	Result - Remark	Verdict
14-M5	>1000	>12.9	P
Supplementary information: N/A			

TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional							—
Test Date [YYYY-MM-DD]			2024-03-24				—
Module temperature [°C]			Corrected to 25.0				—
Irradiance [W/m ²]			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
14-M4-front	17.34	49.61	16.55	42.70	706.6	82.15	—
14-M4-rear	15.05	49.40	13.99	42.86	599.6	80.65	—
14-M4-BNPI	19.32	49.75	18.40	42.76	786.8	81.86	—
14-M5-front	17.35	49.62	16.56	42.73	707.6	82.20	—
14-M5-rear	15.07	49.31	14.02	42.90	601.5	80.94	—
14-M5-BNPI	19.34	49.80	18.41	42.80	788.0	81.81	—
Supplementary information: N/A							

TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional					P
Test Date [YYYY-MM-DD]			2024-03-24		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]			3.11		—
Required Resistance [MΩ]			>12.9		—
Sample #	Measured		Dielectric breakdown		Result
	[MΩ]		Yes (description)	No	
14-M4	>1000	>12.9	No breakdown	×	P
14-M5	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 14: MQT 11 - Thermal cycling 50 test			P
Test Date [YYYY-MM-DD] start/end		2024-04-01/2024-04-09	—
Total cycles (50).....		50	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from 40 °C to 80 °C	20.69	—
	Other stages	0.05	—
Dwell time at high temperature.....		15 min	—
Dwell time at low temperature.....		15 min	—
Sample #	Open circuits (yes/no)		—
14-M4	no		P
14-M5	no		P
Supplementary information: N/A			

TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test		P
Test Date [YYYY-MM-DD].....: 2024-04-09		—
Sample #	Nature and position of initial findings – comments or attach photos	—
14-M4	No visual defects	P
14-M5	No visual defects	P
Supplementary information: N/A		

TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			P
Test Date [YYYY-MM-DD]	2024-04-09		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	23.5		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm]	2387		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
14-M4	>1000	>12.9	P
14-M5	>1000	>12.9	P
Supplementary information: N/A			

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Clause	Requirement + Test			Result - Remark		Verdict
TABLE 15.5: MQT 03 – Max. power determination after thermal cycling 50 test - Optional						—
Test Date [YYYY-MM-DD].....:			2024-04-09			—
Module temperature [°C].....:			Corrected to 25.0			—
Irradiance [W/m²):			Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
14-M4-front	17.19	49.36	16.40	42.45	696.2	82.05
14-M4-rear	14.93	49.17	13.87	42.62	591.1	80.52
14-M4-BNPI	19.18	49.48	18.24	42.50	775.2	81.69
14-M5-front	17.21	49.35	16.41	42.46	696.7	82.03
14-M5-rear	14.94	49.06	13.89	42.65	592.4	80.82
14-M5-BNPI	19.16	49.57	18.23	42.56	775.8	81.69
Supplementary information: N/A						

TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional				P
Test Date [YYYY-MM-DD]		2024-04-09		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]		3.11		—
Required Resistance [MΩ]		>12.9		—
Sample #	Measured	Dielectric breakdown		Result
	[MΩ]	Yes (description)	No	
14-M4	>1000	No breakdown	×	P
14-M5	>1000	No breakdown	×	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 15: MQT 12 - Humidity freeze 10 test		P
Test Date [YYYY-MM-DD] start/end	2024-04-15/2024-04-25	—
Total cycles (10)	10	—
Applied current (A)	0.05	—
Dwell time at high temperature	20 h	—
Dwell time at low temperature.....	40 min	—
Sample #	Open circuits (yes/no)	—
14-M4	no	P
14-M5	no	P
Supplementary information: N/A		

TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test		P
Test Date [YYYY-MM-DD].....: 2024-04-25		—
Sample #	Nature and position of initial findings – comments or attach photos	—
14-M4	No visual defects	P
14-M5	No visual defects	P
Supplementary information: N/A		

TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			P
Test Date [YYYY-MM-DD]	2024-04-25		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	22.8		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm].....	2337		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
14-M4	>1000	>12.9	P
14-M5	>1000	>12.9	P
Supplementary information: N/A			

TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional			—
Test Date [YYYY-MM-DD]	2024-04-25		—
Module temperature [°C].....	Corrected to 25.0		—

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Clause	Requirement + Test			Result - Remark		Verdict
Irradiance [W/m ²):				Corrected to 1000 or G _{BNPI}		—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
14-M4-front	17.08	49.22	16.29	42.30	689.1	81.97
14-M4-rear	14.84	49.02	13.79	42.46	585.5	80.49
14-M4-BNPI	19.06	49.33	18.12	42.35	767.4	81.62
14-M5-front	17.10	49.21	16.30	42.32	689.9	81.98
14-M5-rear	14.87	48.95	13.82	42.53	587.8	80.75
14-M5-BNPI	19.05	49.42	18.12	42.40	768.4	81.62
Supplementary information: N/A						

TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional					P
Test Date [YYYY-MM-DD]		2024-04-25			—
Test Voltage applied [V]		2 minutes of 1500			—
Size of module [m ²]		3.11			—
Required Resistance [MΩ]		>12.9			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
14-M4	>1000	>12.9	No breakdown	×	P
14-M5	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 16: MQT 14.1 Retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD] start/end		2024-04-26	—
Sample #	14-M4		—
Supplementary information: N/A			

TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface		P
Test Date [YYYY-MM-DD] : 2024-04-26		—
Sample #	Nature and position of initial findings – comments or attach photos	—
14-M4	No visual defects	P
Supplementary information: N/A		

TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD]		2024-03-02	—
Test Voltage applied [V]		2 minutes of 2025	—
Solution temperature [°C]		22.9	—
Size of module [m²]		3.11	—
Solution resistivity [Ω cm]		2358	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
14-M4	>1000	>12.9	P
Supplementary information: N/A			

TABLE 16.4: MQT 14.2 - Test of cord anchorage	N/A

TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage	N/A

TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage	N/A

TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 17: MQT 11 - Thermal cycling 200 test			P
Test Date [YYYY-MM-DD] start/end		2024-03-11/2024-04-17	—
Total cycles (200).....		200	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from – 40 °C to 80 °C	20.87	—
	Other stages	0.05	—
Dwell time at high temperature		15 min	—
Dwell time at low temperature.....		15 min	—
Sample #	Open circuits (yes/no)		—
14-M8	no		P
14-M9	no		P
Supplementary information: N/A			

TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test			P
Test Date [YYYY-MM-DD].....:		2024-04-17	—
Sample #	Nature and position of initial findings – comments or attach photos		—
14-M8	No visual defects		P
14-M9	No visual defects		P
Supplementary information: N/A			

TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test			P
Test Date [YYYY-MM-DD]	2024-04-17		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.8		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm]	2349		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
14-M8	>1000	>12.9	P
14-M9	>1000	>12.9	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional							—
Test Date [YYYY-MM-DD]				2024-04-17			—
Module temperature [°C].....				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
14-M8-front	17.28	49.45	16.48	42.59	701.9	82.14	—
14-M8-rear	15.00	49.21	13.96	42.64	595.3	80.65	—
14-M8-BNPI	19.26	49.62	18.32	42.65	781.3	81.76	—
14-M9-front	17.30	49.57	16.51	42.61	703.5	82.03	—
14-M9-rear	15.02	49.23	13.94	42.73	595.7	80.56	—
14-M9-BNPI	19.29	49.70	18.35	42.67	783.0	81.67	—
Supplementary information: N/A							

TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional					P
Test Date [YYYY-MM-DD]			2024-04-17		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			3.11		—
Required Resistance [MΩ].....			>12.9		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
14-M8	>1000	>12.9	No breakdown	×	P
14-M9	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 18: MQT 13 - Damp heat 1000 test			P
Test Date [YYYY-MM-DD] start/end	2024-03-07/2024-04-19		—
Total hours (1000h)	1000		—
Sample #	—		—
14-M6	—		P
14-M7	—		P
Supplementary information: N/A			

TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-04-19		—
Sample #	Nature and position of initial findings – comments or attach photos		—
14-M6	No visual defects		P
14-M7	No visual defects		P
Supplementary information: N/A			

TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-04-19		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.9		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm]	2381		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
14-M6	>1000	>12.9	P
14-M7	>1000	>12.9	P
Supplementary information: N/A			

TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional							—
Test Date [YYYY-MM-DD]	2024-04-19						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
14-M6-front	17.20	49.37	16.39	42.49	696.3	82.00	—
14-M6-rear	14.97	49.25	13.90	42.68	593.3	80.47	—
14-M6-BNPI	19.17	49.52	18.25	42.49	775.5	81.69	—

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Clause	Requirement + Test				Result - Remark		Verdict
14-M7-front	17.25	49.34	16.42	42.40	696.2	81.80	—
14-M7-rear	14.94	49.21	13.81	42.84	591.6	80.47	—
14-M7-BNPI	19.17	49.48	18.27	42.43	775.2	81.73	—
Supplementary information: N/A							

TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional					P
Test Date [YYYY-MM-DD]		2024-04-19			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		3.11			—
Sample #	Measured	Required Resistance	Dielectric breakdown		Result
	[MΩ]	[MΩ]	Yes (description)	No	
14-M6	>1000	>12.9	No breakdown	×	P
14-M7	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	14-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-04-23		—
Mounting method	Clamps mounting (4 points on long side with two beams across the module at the long side)		—
Load applied to.....	front side	back side	—
Mechanical load [Pa].....	5400	2400	—
First cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test			P
Test Date [YYYY-MM-DD]		2024-04-23	—
Sample #	Nature and position of initial findings – comments or attach photos		—
14-M6	No visual defects		P
Supplementary information: N/A			

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-04-23		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	23.0		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm].....	2321		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
14-M6	>1000	>12.9	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-04-23			—
Module temperature [°C].....:				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
14-M6-front	17.13	49.21	16.32	42.33	690.9	81.96	—
14-M6-rear	14.92	49.18	13.85	42.61	590.2	80.43	—
14-M6-BNPI	19.09	49.40	18.17	42.36	769.7	81.62	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD]			2024-04-23		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			3.11		—
Required Resistance [MΩ].....			>12.9		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
14-M6	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 20: MQT 22 Bending test			N/A
TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
TABLE 20.2: MQT 15 - Wet leakage current test after bending test			N/A
TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional			N/A
TABLE 20.4: MQT 03 Insulation test after bending test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 21: MQT 17 - Hail impact test							P
Test Date [YYYY-MM-DD]	2024-04-23						—
Sample #	14-M7						—
Ice ball size [mm]	1	2	3	4	5	6	—
	25±5%	25±5%	25±5%	25±5%	25±5%	25±5%	
	7	8	9	10	11	—	
	25±5%	25±5%	25±5%	25±5%	25±5%	—	
Ice ball weight [g]	1	2	3	4	5	6	—
	7.5±5%	7.5±5%	7.5±5%	7.5±5%	7.5±5%	7.5±5%	
	7	8	9	10	11	—	
	7.5±5%	7.5±5%	7.5±5%	7.5±5%	7.5±5%	—	
Ice ball velocity [m/s]	1	2	3	4	5	6	—
	23±5%	23±5%	23±5%	23±5%	23±5%	23±5%	
	7	8	9	10	11	—	
	23±5%	23±5%	23±5%	23±5%	23±5%	—	
Number of impact locations	11						—
Supplementary information: N/A							

TABLE 21.1: MQT 01 - Visual inspection after hail impact test		P
Test Date [YYYY-MM-DD]: 2024-04-23		—
Sample #	Nature and position of initial findings – comments or attach photos	—
14-M7	No visual defects	P
Supplementary information: N/A		

TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test				P
Test Date [YYYY-MM-DD]		2024-04-23		—
Test Voltage applied [V]		2 minutes of 1500		—
Solution temperature [°C]		22.2		—
Size of module [m²]		3.11		—
Solution resistivity [Ω cm]		2309		—
Sample #	Measured [MΩ]		Required Resistance [MΩ]	Result
14-M7	>1000		>12.9	P
Supplementary information: N/A				

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional							—
Test Date [YYYY-MM-DD].....:			2024-04-23				—
Module temperature [°C].....:			Corrected to 25.0				—
Irradiance [W/m²):			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
14-M7-front	17.22	49.28	16.39	42.34	694.0	81.78	—
14-M7-rear	14.92	49.14	13.80	42.76	590.1	80.49	—
14-M7-BNPI	19.13	49.43	18.23	42.39	772.8	81.72	—
Supplementary information: N/A							

TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional					P
Test Date [YYYY-MM-DD]			2024-04-23		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			3.11		—
Required Resistance [MΩ].....			>12.9		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
14-M7	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 22: MQT 21 -Potential induced degradation test	P

TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test	P

TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test	P

TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test - Optional	—

TABLE 22.4: MQT 03 Insulation test after potential induced degradation test - Optional	P

TABLE 23: MQT 19.2: Final stabilization							—
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization							—
Test Date [YYYY-MM-DD]			2024-04-23				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
14-M6-front	17.13	49.21	16.32	42.33	690.9	81.96	—
14-M6-rear	14.92	49.18	13.85	42.61	590.2	80.43	—
14-M6-BNPI	19.09	49.40	18.17	42.36	769.7	81.62	—
14-M7-front	17.22	49.28	16.39	42.34	694.0	81.78	—
14-M7-rear	14.92	49.14	13.80	42.76	590.1	80.49	—
14-M7-BNPI	19.13	49.43	18.23	42.39	772.8	81.72	—
Supplementary information: N/A							

TABLE 23.2: MQT 19.1 Final Stabilization procedure							—
, IEC 61215-1-2 ☐ IEC 61215-1-3 ☐ IEC 61215-1-4							—
Light exposure method:				☐ Solar simulator ☐ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x :				N/A			
Sample #	N/A	Test Date (YYYY-MM-DD) start/end...:			N/A		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test				Result - Remark		Verdict
2	N/A	N/A	N/A	N/A	N/A	—	—
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure							

TABLE 23.3: MQT 19.2: Final stabilization									
☒ IEC 61215-1-1									
☐ Method 1									N/A
Stress-specific stabilization – BO LID (MQT 19.3)									N/A
Test Date [YYYY-MM-DD]				N/A					—
Applied current (A)				N/A					—
Module temperature [°C].....				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 2									—
Performance at STC before final stabilization— for monofacial modules									—
Test Date [YYYY-MM-DD]									—
Test method				☐ Solar simulator ☐ Natural sunlight					—

IEC 61215-2									
Clause	Requirement + Test						Result - Remark	Verdict	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]				2024-04-23					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
14-M6	19.09	49.40	18.17	42.36	769.7	81.62	793.6	-3.01	P
14-M7	19.13	49.43	18.23	42.39	772.8	81.72	795.5	-2.85	P
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to destabilization artifacts.									
If Power Degradation $\geq$ 5%, then perform stress-specific stabilization MQT 19.3 in method 1									
Stress-specific stabilization – BO LID (MQT 19.3)									—
Test Date [YYYY-MM-DD]				N/A					—
Applied current (A)				N/A					—
Module temperature [°C]				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization — for monofacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									

IEC 61215-2									
Clause	Requirement + Test							Result - Remark	Verdict
TABLE 23.4: MQT 19.2: Final stabilization									
☐ Method 3									
Test Date (YYYY-MM-DD) start/end		N/A							—
Test duration [h]		N/A							—
Module temperature [°C]		N/A							—
UV irradiance (280-400nm) [W/m²]		N/A							—
UV dose (280-320nm) [kWh/ m²]		N/A							—
UV dose (280-400nm) [kWh/ m²]		N/A							—
Side exposed		☐ Front side ☐ Rear side							—
Module operation condition		☐ Short circuited ☐ Open circuited							—
Supplementary information: for bifacial modules, the irradiance shall be applied to the rear side, whereas for monofacial modules, the irradiance shall be applied to the front side.									
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 4									
Performance at STC before final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☒ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									

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Clause	Requirement + Test						Result - Remark	Verdict	
Test Date [YYYY-MM-DD]				N/A					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to polarization artifacts									
If Power Degradation $\geq 5\%$, then perform method 3 final stabilization									
Method 3									
Test Date [YYYY-MM-DD]				N/A					—
Test duration [h]				N/A					—
Module temperature [°C]				N/A					—
UV irradiance (280-400nm) [W/m ²]				N/A					—
UV dose (280-320nm) [kWh/ m ²]				N/A					—
UV dose (280-400nm) [kWh/ m ²]				N/A					—
Side exposed				☐ Front side ☐ Rear side					—
Module operation condition				☐ Short circuited ☐ Open circuited					—
Performance at STC after final stabilization — for monofacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information: N/A

For monofacial modules									
TABLE 23.5: MQT 06.1: Final Performance at STC									N/A
Test Date [YYYY-MM-DD].....:					—				—
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation [%]	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: P_{max} [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

For bifacial modules							—			
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)							—			
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result			
14-M4	17.08	49.23	16.30	42.26	688.9	81.93	—			
14-M5	17.10	49.21	16.30	42.32	689.9	81.98	—			
14-M6	17.13	49.21	16.32	42.33	690.9	81.96	—			
14-M7	17.22	49.28	16.39	42.34	694.0	81.78	—			
14-M8	17.28	49.45	16.48	42.59	701.9	82.14	—			
14-M9	17.30	49.57	16.51	42.61	703.5	82.03	—			
14-M11	17.33	49.52	16.51	42.65	704.2	82.06	—			
Supplementary information: N/A										
TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)										
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
14-M4	14.84	49.01	13.78	42.47	585.3	80.47	86.89%	99.55%	84.96%	—
14-M5	14.87	48.95	13.82	42.53	587.8	80.75	86.96%	99.47%	85.20%	—
14-M6	14.92	49.18	13.85	42.61	590.2	80.43	87.10%	99.94%	85.42%	—
14-M7	14.92	49.14	13.80	42.76	590.1	80.49	86.64%	99.72%	85.03%	—

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Clause	Requirement + Test						Result - Remark			Verdict
14-M8	15.00	49.21	13.96	42.64	595.3	80.65	86.81%	99.51%	84.81%	—
14-M9	15.02	49.23	13.94	42.73	595.7	80.56	86.82%	99.31%	84.68%	—
14-M11	15.05	49.31	13.97	42.84	598.4	80.64	86.84%	99.58%	84.98%	
Supplementary information: N/A										

TABLE 23.8: MQT 06.1: Final Performance at BNPI									P
Test Date [YYYY-MM-DD]					—				—
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation [%]	Result
14-M4	19.05	49.31	18.11	42.37	767.3	81.68	793.0	-3.24	P
14-M5	19.05	49.42	18.12	42.40	768.4	81.62	794.8	-3.32	P
14-M6	19.09	49.40	18.17	42.36	769.7	81.62	793.6	-3.01	P
14-M7	19.13	49.43	18.23	42.39	772.8	81.72	795.5	-2.85	P
14-M8	19.26	49.62	18.32	42.65	781.3	81.76	792.6	-1.43	P
14-M9	19.29	49.70	18.35	42.67	783.0	81.67	793.0	-1.26	P
14-M11	19.29	49.71	18.35	42.73	784.1	81.77	793.8	-1.22	P
Supplementary information: P_{max} [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		—			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		3.11			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
14-M4	>1000	>12.9	No breakdown	×	P
14-M5	>1000	>12.9	No breakdown	×	P
14-M6	>1000	>12.9	No breakdown	×	P
14-M7	>1000	>12.9	No breakdown	×	P
14-M8	>1000	>12.9	No breakdown	×	P
14-M9	>1000	>12.9	No breakdown	×	P
14-M10	>1000	>12.9	No breakdown	×	P
14-M11	>1000	>12.9	No breakdown	×	P
14-M12	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	—	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22±2	—
Size of module [m²]	:	3.11	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
14-M4	>1000	>12.9	P
14-M5	>1000	>12.9	P
14-M6	>1000	>12.9	P
14-M7	>1000	>12.9	P
14-M8	>1000	>12.9	P
14-M9	>1000	>12.9	P
14-M10	>1000	>12.9	P
14-M11	>1000	>12.9	P
14-M12	>1000	>12.9	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMHF-66HD715 (BOM15)

TABLE 01: MQT 01 ini: Initial Visual inspection			P
Test Date [YYYY-MM-DD]..... : 2024-02-29			—
Sample #	Nature and position of initial findings – comments or attach photos		—
15-M6	No visual defects		P
15-M7	No visual defects		P
15-M8	No visual defects		P
15-M9	No visual defects		P
15-M10	No visual defects		P
15-M12	No visual defects		P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]			2024-02-29				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
15-M6	17.48	49.75	16.69	42.82	714.7	82.18	—
15-M7	17.50	49.76	16.66	42.87	714.2	82.02	—
15-M8	17.45	49.74	16.65	42.86	713.6	82.22	—
15-M9	17.48	49.79	16.69	42.83	714.9	82.14	—
15-M10	17.50	49.81	16.70	42.86	715.8	82.12	—
15-M12	17.49	49.77	16.67	42.89	714.9	82.13	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							
Test Date [YYYY-MM-DD]			2024-02-29				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
15-M6	15.15	49.63	14.08	43.14	607.4	80.78	—
15-M7	15.21	49.68	14.07	43.04	605.6	80.14	—
15-M8	15.15	49.64	14.04	43.11	605.2	80.47	—
15-M9	15.16	49.67	14.06	43.11	606.1	80.49	—
15-M10	15.19	49.66	14.11	43.05	607.5	80.53	—
15-M12	15.16	49.65	14.05	43.10	605.6	80.46	—
Supplementary information: N/A							
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]			2024-02-29				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
15-M6	19.46	50.02	18.52	42.97	795.8	81.76	—
15-M7	19.49	50.03	18.52	42.93	795.1	81.54	—
15-M8	19.43	50.01	18.48	42.99	794.4	81.76	—
15-M9	19.45	50.07	18.51	43.00	795.8	81.72	—

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Clause	Requirement + Test				Result - Remark		Verdict
15-M10	19.46	50.80	18.53	43.01	796.9	80.61	—
15-M12	19.45	50.07	18.50	43.01	795.8	81.71	—
Supplementary information: N/A							
TABLE 02.4: MQT 19.1: Initial Stabilization procedure							
Light exposure method				☐ Solar simulator ☒ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x				1%			
Sample #	15-M6	Test Date (YYYY-MM-DD) start/end			2024-03-15/2024-03-20		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	714.7	—	—
1	5.0	>500	N/A	MPPT	713.5	—	—
2	5.0	>500	N/A	MPPT	713.1	0.22	Yes

Sample #	15-M7	Test Date (YYYY-MM-DD) start/end			2024-03-15/2024-03-20		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	714.2	—	—
1	5.0	>500	N/A	MPPT	713.0	—	—
2	5.0	>500	N/A	MPPT	712.8	0.20	Yes

Sample #	15-M8	Test Date (YYYY-MM-DD) start/end			2024-03-15/2024-03-20		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	713.6	—	—
1	5.0	>500	N/A	MPPT	712.4	—	—
2	5.0	>500	N/A	MPPT	712.1	0.21	Yes

Sample #	15-M9	Test Date (YYYY-MM-DD) start/end			2024-03-15/2024-03-20		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	714.9	—	—
1	5.0	>500	N/A	MPPT	713.6	—	—

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Clause	Requirement + Test				Result - Remark		Verdict
2	5.0	>500	N/A	MPPT	713.2	0.24	Yes

Sample #	15-M10	Test Date (YYYY-MM-DD) start/end			2024-03-15/2024-03-20		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	715.8	—	—
1	5.0	>500	N/A	MPPT	714.4	—	—
2	5.0	>500	N/A	MPPT	714.0	0.24	Yes

Sample #	15-M12	Test Date (YYYY-MM-DD) start/end			2024-03-15/2024-03-20		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	714.9	—	—
1	5.0	>500	N/A	MPPT	713.8	—	—
2	5.0	>500	N/A	MPPT	713.4	0.21	Yes

Supplementary information: N/A

☐ Other stabilization procedures

Sample #	Test Date (YYYY-MM-DD) start/end
N/A	N/A

Test method description: N/A

Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]..... :					2024-03-20					—
$P_{\max}$ lower limit (W) :					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V) :					701.3					—
V_{oc} (lab) upper limit (V) :					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A) :					See table below: I_{sc} [A] Max. calc.					—
Test method..... :					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
15-M6	17.46	18.59	49.67	52.26	16.67	42.78	713.1	680.2	82.23	P
15-M7	17.48	18.59	49.64	52.26	16.64	42.84	712.8	680.2	82.15	P
15-M8	17.44	18.59	49.62	52.26	16.63	42.82	712.1	680.2	82.29	P
15-M9	17.46	18.59	49.68	52.26	16.66	42.81	713.2	680.2	82.22	P
15-M10	17.48	18.59	49.70	52.26	16.68	42.81	714.0	680.2	82.19	P
15-M12	17.47	18.59	49.66	52.26	16.65	42.85	713.4	680.2	82.23	P
Average	—						713.1	701.3	—	P
Supplementary information: The limit values are calculated considering manufacturer's tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										N/A
Test Date [YYYY-MM-DD]					2024-03-20					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
15-M6	15.14	49.54	14.07	43.02	605.1	80.68	86.71%	99.74%	84.85%	—
15-M7	15.18	49.51	14.04	43.02	604.2	80.39	86.84%	99.74%	84.76%	—
15-M8	15.13	49.49	14.03	43.05	603.9	80.65	86.75%	99.74%	84.81%	—
15-M9	15.15	49.53	14.04	43.06	604.5	80.56	86.77%	99.70%	84.76%	—
15-M10	15.18	49.58	14.09	43.03	606.5	80.58	86.84%	99.76%	84.94%	—
15-M12	15.14	49.51	14.04	43.02	603.8	80.55	86.66%	99.70%	84.64%	—
Supplementary information: N/A										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m ² , backside irradiance 135 W/m ² , 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]..... :					2024-03-20					—
$P_{\max}$ lower limit (W)					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V)					781.8					—
V_{oc} (lab) upper limit (V)					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A)					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
15-M6	19.43	20.72	49.91	52.26	18.51	42.90	793.9	758.3	81.87	P
15-M7	19.47	20.72	49.89	52.26	18.50	42.91	793.7	758.3	81.71	P
15-M8	19.41	20.72	49.87	52.26	18.46	42.94	792.7	758.3	81.90	P
15-M9	19.43	20.72	49.92	52.26	18.48	42.95	793.9	758.3	81.85	P
15-M10	19.45	20.72	49.96	52.26	18.50	42.97	795.0	758.3	81.81	P
15-M12	19.44	20.72	49.92	52.26	18.48	42.96	794.0	758.3	81.82	P
Average	—						793.9	781.8	—	P
Supplementary information: The limit values are calculated considering manufacturer's tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD]		2024-03-20		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]		3.11		—
Required Resistance [MΩ]		>12.9		—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
15-M6	>1000	No breakdown	x	P
15-M7	>1000	No breakdown	x	P
15-M8	>1000	No breakdown	x	P
15-M9	>1000	No breakdown	x	P
15-M10	>1000	No breakdown	x	P
15-M12	>1000	No breakdown	x	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]..... :		2024-03-20	—
Test Voltage applied [V].....:		2 minutes of 1500	—
Solution temperature [°C].....:		2349	—
Solution resistivity [Ω cm]		3.11	—
Size of module [m²]		3.11	—
Sample #	Required Resistance [MΩ]	Measured [MΩ]	Result
15-M6	>12.9	>1000	P
15-M7	>12.9	>1000	P
15-M8	>12.9	>1000	P
15-M9	>12.9	>1000	P
15-M10	>12.9	>1000	P
15-M12	>12.9	>1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)			N/A
TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)			N/A
TABLE 07: MQT 04 - Measurement of temperature coefficients			N/A
TABLE 08: MQT 08 - Outdoor exposure test			N/A
Table 08.1: MQT 01: Visual inspection after outdoor exposure test			N/A
Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			N/A
Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional			N/A
Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional			N/A
TABLE 09: MQT 18: Bypass diode thermal test			N/A
TABLE 09.1: MQT 01 - Visual inspection after bypass diode thermal test			N/A
TABLE 09.2: MQT 15 - Wet leakage current test after bypass diode thermal test			N/A
TABLE 09.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional			N/A
TABLE 09.4: MQT 03 - Insulation test after bypass diode thermal test - Optional			N/A
TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test			N/A
TABLE 10.1: MQT 19.1: Final stabilization			N/A
TABLE 10.2: MQT 06.1: Performance at STC before final stabilization			N/A
TABLE 10.3: MQT 19.1 Final Stabilization procedure			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11: MQT 09 - Hot-spot endurance test			P
Test Date [YYYY-MM-DD] start/end	2024-03-27/2024-03-28		—
Sample #	15-M12		—
Procedure of technology	☒ wafer-based technologies (WBT) MQT 09.1 ☐ monolithically integrated (MLI) thin film technologies MQT 09.2		—
Cell interconnection circuit	☐ S ☒ SPS ☐ PS		—
Type of light source	☐ Pulse solar simulator ☒ Steady state solar simulator ☐ Natural sunlight		—
Module temperature at thermal equilibrium [°C] ..	60.9/59.7		—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						P
Selected hot-spot cells	Low	Low	Low	High	Permanent	—
	F13	C01	E11	A18	N/A	
Shading rate [%]	30	25	35	40	N/A	—
Max. measured cell temperature in each cell [°C]:	141.0	135.7	129.8	138.0	N/A	—
Test duration of each shading [h]	1	1	1	1	N/A	—
Irradiance during shading [W/m²]	1255	1255	1255	1255	N/A	—

Supplementary information:

Position of solar cells (front side view):

	1	2	3	4	...	11		12	...	19	20	21	22
A							Junction box						
B													
C													
D													
E													
F													

for bifacial modules, determination of the cell shading percent and the prolonged exposure are performed at the elevated irradiance BSI. If double-side illumination is used to produce BSI, both the back and the front of the cell are shaded in the same way. During cell selection, any cell that is permanently shaded by a module feature (such as the junction box) is added to the list of selected cells.

TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI		N/A
Selected hot-spot cells	N/A	—

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Clause	Requirement + Test	Result - Remark	Verdict
Number of cells shaded		N/A	—
Max. measured cell temperature [°C]		N/A	—
Test duration during shading [h]		N/A	—
Irradiance during shading [W/m ²]		N/A	—
Supplementary information: N/A			

TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test		P
Test Date [YYYY-MM-DD]: 2024-03-28		—
Sample #	Nature and position of initial findings – comments or attach photos	—
15-M12	No visual defects	P
Supplementary information: N/A		

TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test							—
Test Date [YYYY-MM-DD]		2024-03-28					—
Module temperature [°C]		Corrected to 25.0					—
Irradiance [W/m ²]		Corrected to 1000 or G _{BNPI}					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
15-M12-front	17.41	49.57	16.58	42.75	708.8	82.13	—
15-M12-rear	15.10	49.44	14.00	42.94	601.2	80.53	—
15-M12-BNPI	19.36	49.83	18.41	42.86	789.1	81.80	—
Supplementary information: N/A							

TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test					P
Test Date [YYYY-MM-DD]		2024-03-28			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		3.11			—
Required Resistance [MΩ]		>12.9			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
15-M12	>1000	>12.9	No breakdown	×	P

TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test			P
Test Date [YYYY-MM-DD]		2024-03-28	—
Test Voltage applied [V]		2 minutes of 1500	—

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Clause	Requirement + Test	Result - Remark	Verdict
Solution temperature [°C]	22.3		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm]	2378		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
15-M12	>1000	>12.9	P
Supplementary information: N/A			

TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test				P
Test Date [YYYY-MM-DD]	2024-03-28			—
☐ Method A				—
Ambient temperature [°C]	N/A			—
Current flow applied [A]	N/A			—
Sample #	VFM	VFMrated	VFM = (N × VFMrated) ± 10 %	Result
N/A	N/A	N/A	☐ Yes ☐ No	N/A
Supplementary information: N/A				
☒ Method B				—
Sample #	IV curve after shading			Result
	Diode 1 working properly	Diode 2 working properly	Diode 3 working properly	—
15-M12	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			N/A
TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			N/A
TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			N/A
TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			N/A
TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional			N/A
TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional			N/A
TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional			N/A
TABLE 14: MQT 11 - Thermal cycling 50 test			N/A
TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test			N/A
TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			N/A
TABLE 15.5: MQT 03 – Max. power determination after thermal cycling 50 test - Optional			N/A
TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional			N/A
TABLE 15: MQT 12 - Humidity freeze 10 test			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test			N/A
TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			N/A
TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional			N/A
TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional			N/A
TABLE 16: MQT 14.1 Retention of junction box on mounting surface			N/A
TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface			N/A
TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			N/A
TABLE 16.4: MQT 14.2 - Test of cord anchorage			N/A
TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage			N/A
TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage			N/A
TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 17: MQT 11 - Thermal cycling 200 test			P
Test Date [YYYY-MM-DD] start/end		2024-03-25/2024-04-30	—
Total cycles (200).....		200	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from – 40 °C to 80 °C	20.90	—
	Other stages	0.05	—
Dwell time at high temperature		15 min	—
Dwell time at low temperature.....		15 min	—
Sample #	Open circuits (yes/no)		—
15-M8	no		P
15-M9	no		P
Supplementary information: N/A			

TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test		P
Test Date [YYYY-MM-DD].....: 2024-04-30		—
Sample #	Nature and position of initial findings – comments or attach photos	—
15-M8	No visual defects	P
15-M9	No visual defects	P
Supplementary information: N/A		

TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test			P
Test Date [YYYY-MM-DD]	2024-04-30		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.8		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm]	2349		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
15-M8	>1000	>12.9	P
15-M9	>1000	>12.9	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional							—
Test Date [YYYY-MM-DD]				2024-04-30			—
Module temperature [°C].....				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
15-M8-front	17.32	49.33	16.50	42.52	701.6	82.11	—
15-M8-rear	15.02	49.29	13.91	42.84	595.9	80.49	—
15-M8-BNPI	19.28	49.58	18.32	42.64	781.1	81.72	—
15-M9-front	17.32	49.39	16.51	42.50	701.6	82.02	—
15-M9-rear	15.04	49.30	13.93	42.84	596.8	80.49	—
15-M9-BNPI	19.28	49.64	18.32	42.65	781.3	81.64	—
Supplementary information: N/A							

TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional					P
Test Date [YYYY-MM-DD]			2024-04-30		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			3.11		—
Required Resistance [MΩ].....			>12.9		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
15-M8	>1000	>12.9	No breakdown	×	P
15-M9	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 18: MQT 13 - Damp heat 1000 test			P
Test Date [YYYY-MM-DD] start/end		2024-03-26/2024-05-08	—
Total hours (1000h)		1000	—
Sample #	—		—
15-M6	—		P
15-M7	—		P
Supplementary information: N/A			

TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test		P
Test Date [YYYY-MM-DD]: 2024-05-08		—
Sample #	Nature and position of initial findings – comments or attach photos	—
15-M6	No visual defects	P
15-M7	No visual defects	P
Supplementary information: N/A		

TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-05-08		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	23.1		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm]	2381		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
15-M6	>1000	>12.9	P
15-M7	>1000	>12.9	P
Supplementary information: N/A			

TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional							—
Test Date [YYYY-MM-DD]	2024-05-08						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
15-M6-front	17.29	49.31	16.46	42.30	696.2	81.66	—
15-M6-rear	14.96	49.24	13.85	42.63	590.5	80.16	—
15-M6-BNPI	19.21	49.58	18.29	42.37	775.0	81.37	—

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Clause	Requirement + Test				Result - Remark		Verdict
15-M7-front	17.30	49.23	16.47	42.34	697.3	81.87	—
15-M7-rear	15.01	49.19	13.86	42.68	591.5	80.11	—
15-M7-BNPI	19.29	49.51	18.32	42.37	776.2	81.28	—
Supplementary information: N/A							

TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional					P
Test Date [YYYY-MM-DD]		2024-05-08			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		3.11			—
Sample #	Measured	Required Resistance	Dielectric breakdown		Result
	[MΩ]	[MΩ]	Yes (description)	No	
15-M6	>1000	>12.9	No breakdown	×	P
15-M7	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	15-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-05-11		—
Mounting method	Clamps mounting (4 points on long side with two beams across the module at the long side)		—
Load applied to.....	front side	back side	—
Mechanical load [Pa].....	5400	2400	—
First cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test		P
Test Date [YYYY-MM-DD]		2024-05-11
Sample #	Nature and position of initial findings – comments or attach photos	—
15-M6	No visual defects	P
Supplementary information: N/A		

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-05-11		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	22.2		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm].....	2308		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
15-M6	>1000	>12.9	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-05-11			—
Module temperature [°C].....:				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
15-M6-front	17.23	49.20	16.39	42.18	691.3	81.54	—
15-M6-rear	14.90	49.17	13.79	42.57	587.0	80.13	—
15-M6-BNPI	19.13	49.47	18.21	42.26	769.6	81.32	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD]			2024-05-11		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]			3.11		—
Required Resistance [MΩ]			>12.9		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
18-M6	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 20: MQT 22 Bending test			N/A
TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
TABLE 20.2: MQT 15 - Wet leakage current test after bending test			N/A
TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional			N/A
TABLE 20.4: MQT 03 Insulation test after bending test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 21: MQT 17 - Hail impact test							P
Test Date [YYYY-MM-DD]	2024-05-11						—
Sample #	15-M7						—
Ice ball size [mm]	1	2	3	4	5	6	—
	25±5%	25±5%	25±5%	25±5%	25±5%	25±5%	
	7	8	9	10	11	—	
	25±5%	25±5%	25±5%	25±5%	25±5%	—	
Ice ball weight [g]	1	2	3	4	5	6	—
	7.5±5%	23±5%	23±5%	23±5%	23±5%	23±5%	
	7	8	9	10	11	—	
	23±5%	23±5%	23±5%	23±5%	23±5%	—	
Ice ball velocity [m/s]	1	2	3	4	5	6	—
	23±5%	23±5%	23±5%	23±5%	23±5%	23±5%	
	7	8	9	10	11	—	
	23±5%	23±5%	23±5%	23±5%	23±5%	—	
Number of impact locations	11						—
Supplementary information: N/A							

TABLE 21.1: MQT 01 - Visual inspection after hail impact test		P
Test Date [YYYY-MM-DD]: 2024-05-11		—
Sample #	Nature and position of initial findings – comments or attach photos	—
15-M7	No visual defects	P
Supplementary information: N/A		

TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test				P
Test Date [YYYY-MM-DD]		2024-05-11		—
Test Voltage applied [V]		2 minutes of 1500		—
Solution temperature [°C]		22.2		—
Size of module [m²]		3.11		—
Solution resistivity [Ω cm]		2309		—
Sample #	Measured [MΩ]		Required Resistance [MΩ]	Result
15-M7	>1000		>12.9	P
Supplementary information: N/A				

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional							—
Test Date [YYYY-MM-DD].....:			2024-05-11				—
Module temperature [°C].....:			Corrected to 25.0				—
Irradiance [W/m²):			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
15-M7-front	17.26	49.17	16.44	42.27	694.9	81.88	—
15-M7-rear	14.97	49.15	13.83	42.64	589.7	80.15	—
15-M7-BNPI	19.25	49.46	18.28	42.32	773.6	81.25	—
Supplementary information: N/A							

TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional					P
Test Date [YYYY-MM-DD]			2024-05-11		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			3.11		—
Required Resistance [MΩ].....			>12.9		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
15-M7	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 22: MQT 21 -Potential induced degradation test	P

TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test	P

TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test	P

TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test - Optional	—

TABLE 22.4: MQT 03 Insulation test after potential induced degradation test - Optional	P

TABLE 23: MQT 19.2: Final stabilization							—
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization							—
Test Date [YYYY-MM-DD]				2024-05-11			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
15-M6-front	17.29	49.31	16.46	42.30	696.2	81.66	—
15-M6-rear	14.96	49.24	13.85	42.63	590.5	80.16	—
15-M6-BNPI	19.21	49.58	18.29	42.37	775.0	81.37	—
15-M7-front	17.30	49.23	16.47	42.34	697.3	81.87	—
15-M7-rear	15.01	49.19	13.86	42.68	591.5	80.11	—
15-M7-BNPI	19.29	49.51	18.32	42.37	776.2	81.28	—
Supplementary information: N/A							

TABLE 23.2: MQT 19.1 Final Stabilization procedure							—
☐ IEC 61215-1-2 ☐ IEC 61215-1-3 ☐ IEC 61215-1-4							—
Light exposure method:				☐ Solar simulator ☐ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x :				N/A			
Sample #	N/A	Test Date (YYYY-MM-DD) start/end...:			N/A		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test				Result - Remark		Verdict
2	N/A	N/A	N/A	N/A	N/A	—	—
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure							

TABLE 23.3: MQT 19.2: Final stabilization									
☒ IEC 61215-1-1									
☐ Method 1									N/A
Stress-specific stabilization – BO LID (MQT 19.3)									N/A
Test Date [YYYY-MM-DD]				N/A					—
Applied current (A)				N/A					—
Module temperature [°C].....				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	<i>I</i> _{sc} [A]	<i>V</i> _{oc} [V]	<i>I</i> _{mp} [A]	<i>V</i> _{mp} [V]	<i>P</i> _{max} [W]	FF [%]	<i>P</i> _{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	<i>I</i> _{sc} [A]	<i>V</i> _{oc} [V]	<i>I</i> _{mp} [A]	<i>V</i> _{mp} [V]	<i>P</i> _{max} [W]	FF [%]	<i>P</i> _{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 2									—
Performance at STC before final stabilization— for monofacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—

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Clause	Requirement + Test						Result - Remark	Verdict	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]				2024-05-11					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
15-M6	19.21	49.58	18.29	42.37	775.0	19.21	793.9	-2.38	P
15-M7	19.29	49.51	18.32	42.37	776.2	81.28	793.7	-2.20	P
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to destabilization artifacts.									
If Power Degradation $\geq$ 5%, then perform stress-specific stabilization MQT 19.3 in method 1									
Stress-specific stabilization – BO LID (MQT 19.3)									—
Test Date [YYYY-MM-DD]				N/A					—
Applied current (A)				N/A					—
Module temperature [°C]				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization — for monofacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									

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Clause	Requirement + Test							Result - Remark	Verdict
TABLE 23.4: MQT 19.2: Final stabilization									
☐ Method 3									
Test Date (YYYY-MM-DD) start/end		N/A							—
Test duration [h]		N/A							—
Module temperature [°C]		N/A							—
UV irradiance (280-400nm) [W/m²]		N/A							—
UV dose (280-320nm) [kWh/ m²]		N/A							—
UV dose (280-400nm) [kWh/ m²]		N/A							—
Side exposed		☐ Front side ☐ Rear side							—
Module operation condition		☐ Short circuited ☐ Open circuited							—
Supplementary information: for bifacial modules, the irradiance shall be applied to the rear side, whereas for monofacial modules, the irradiance shall be applied to the front side.									
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 4									
Performance at STC before final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☒ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									

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Clause	Requirement + Test						Result - Remark	Verdict	
Test Date [YYYY-MM-DD]				N/A					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to polarization artifacts									
If Power Degradation $\geq 5\%$, then perform method 3 final stabilization									
Method 3									
Test Date [YYYY-MM-DD]				N/A					—
Test duration [h]				N/A					—
Module temperature [°C]				N/A					—
UV irradiance (280-400nm) [W/m ²]				N/A					—
UV dose (280-320nm) [kWh/ m ²]				N/A					—
UV dose (280-400nm) [kWh/ m ²]				N/A					—
Side exposed				☐ Front side ☐ Rear side					—
Module operation condition				☐ Short circuited ☐ Open circuited					—
Performance at STC after final stabilization — for monofacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information: N/A

For monofacial modules									
TABLE 23.5: MQT 06.1: Final Performance at STC									N/A
Test Date [YYYY-MM-DD].....:					—				—
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation [%]	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: P_{max} [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

For bifacial modules							—			
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)							—			
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result			
15-M6	17.23	49.20	16.39	42.18	691.3	81.54	—			
15-M7	17.26	49.17	16.44	42.27	694.9	81.88	—			
15-M6	17.32	49.33	16.50	42.52	701.6	82.11	—			
15-M7	17.32	49.39	16.51	42.50	701.6	82.02	—			
Supplementary information: N/A										
TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)										
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
15-M6	14.90	49.17	13.79	42.57	587.0	80.13	86.48%	99.94%	84.91%	—
15-M7	14.97	49.15	13.83	42.64	589.7	80.15	86.73%	99.96%	84.86%	—
15-M6	15.02	49.29	13.91	42.84	595.9	80.49	86.72%	99.92%	84.93%	—
15-M7	15.04	49.30	13.93	42.84	596.8	80.49	86.84%	99.82%	85.06%	—
Supplementary information: N/A										

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Clause		Requirement + Test					Result - Remark		Verdict
TABLE 23.8: MQT 06.1: Final Performance at BNPI									P
Test Date [YYYY-MM-DD]..... :				—					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation [%]	Result
15-M6	19.13	49.47	18.21	42.26	769.6	81.32	793.9	-3.06	P
15-M7	19.25	49.46	18.28	42.32	773.6	81.25	793.7	-2.53	P
15-M6	19.28	49.58	18.32	42.64	781.1	81.72	792.7	-1.46	P
15-M7	19.28	49.64	18.32	42.65	781.3	81.64	793.9	-1.59	P
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		—			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		3.11			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
15-M6	>1000	>12.9	No breakdown	×	P
15-M7	>1000	>12.9	No breakdown	×	P
15-M8	>1000	>12.9	No breakdown	×	P
15-M9	>1000	>12.9	No breakdown	×	P
15-M10	>1000	>12.9	No breakdown	×	P
15-M12	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	—	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22±2	—
Size of module [m²]	:	3.11	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
15-M6	>1000	>12.9	P
15-M7	>1000	>12.9	P
15-M8	>1000	>12.9	P
15-M9	>1000	>12.9	P
15-M10	>1000	>12.9	P
15-M12	>1000	>12.9	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMNF-66HD705 (BOM16)

TABLE 01: MQT 01 ini: Initial Visual inspection		P
Test Date [YYYY-MM-DD]..... :	2024-04-01	—
Sample #	Nature and position of initial findings – comments or attach photos	—
16-M4	No visual defects	P
16-M5	No visual defects	P
16-M6	No visual defects	P
16-M7	No visual defects	P
16-M8	No visual defects	P
16-M9	No visual defects	P
16-M10	No visual defects	P
16-M12	No visual defects	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]			2024-04-01				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
16-M4	18.25	48.67	17.24	41.42	714.1	80.41	—
16-M5	18.24	48.65	17.19	41.46	712.7	80.31	—
16-M6	18.24	48.66	17.24	41.46	714.6	80.54	—
16-M7	18.24	48.65	17.21	41.42	712.7	80.32	—
16-M8	18.21	48.65	17.23	41.46	714.6	80.64	—
16-M9	18.24	48.65	17.21	41.46	713.5	80.43	—
16-M10	18.23	48.65	17.20	41.50	713.9	80.52	—
16-M12	18.26	48.66	17.21	41.46	713.5	80.32	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							
Test Date [YYYY-MM-DD]			2024-04-01				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
16-M4	14.51	48.29	13.73	41.29	567.0	80.90	—
16-M5	14.48	48.29	13.71	41.31	566.2	80.96	—
16-M6	14.42	48.31	13.73	41.37	567.8	81.54	—
16-M7	14.45	48.28	13.73	41.29	566.8	81.23	—
16-M8	14.35	48.28	13.58	41.43	562.7	81.21	—
16-M9	14.48	48.28	13.68	41.36	565.9	80.93	—
16-M10	14.44	48.26	13.69	41.23	564.4	81.00	—
16-M12	14.46	48.29	13.68	41.31	565.0	80.90	—
Supplementary information: N/A							
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]			2024-04-01				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result

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Clause	Requirement + Test				Result - Remark		Verdict
16-M4	20.20	48.82	19.06	41.42	789.4	80.03	—
16-M5	20.19	48.82	19.26	40.91	787.9	79.94	—
16-M6	20.12	48.82	19.00	41.56	789.7	80.39	—
16-M7	20.20	48.82	19.30	40.84	788.4	79.97	—
16-M8	20.16	48.80	19.06	41.47	790.3	80.34	—
16-M9	20.19	48.79	19.00	41.52	788.9	80.10	—
16-M10	20.18	48.81	19.00	41.56	789.6	80.18	—
16-M12	20.21	48.82	19.24	40.99	788.7	79.95	—

Supplementary information: N/A

TABLE 02.4: MQT 19.1: Initial Stabilization procedure

Light exposure method				☐ Solar simulator ☒ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x				1%			
Sample #	16-M4	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-18		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	714.1	—	—
1	5.0	>500	N/A	MPPT	713.9	—	—
2	5.0	>500	N/A	MPPT	713.3	0.11	Yes

Sample #	16-M5	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-18		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	712.7	—	—
1	5.0	>500	N/A	MPPT	712.5	—	—
2	5.0	>500	N/A	MPPT	712.2	0.06	Yes

Sample #	16-M6	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-18		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	714.6	—	—
1	5.0	>500	N/A	MPPT	714.4	—	—
2	5.0	>500	N/A	MPPT	714.3	0.05	Yes

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #	16-M7	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-18		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	712.7	—	—
1	5.0	>500	N/A	MPPT	712.8	—	—
2	5.0	>500	N/A	MPPT	712.1	0.10	Yes

Sample #	16-M8	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-18		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	714.6	—	—
1	5.0	>500	N/A	MPPT	714.4	—	—
2	5.0	>500	N/A	MPPT	713.8	0.11	Yes

Sample #	16-M9	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-18		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	713.5	—	—
1	5.0	>500	N/A	MPPT	713.1	—	—
2	5.0	>500	N/A	MPPT	712.7	0.11	Yes

Sample #	16-M10	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-18		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	713.9	—	—
1	5.0	>500	N/A	MPPT	713.1	—	—
2	5.0	>500	N/A	MPPT	712.5	0.19	Yes

Sample #	16-M12	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-18		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	713.5	—	—

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Clause	Requirement + Test				Result - Remark		Verdict
1	5.0	>500	N/A	MPPT	713.4	—	—
2	5.0	>500	N/A	MPPT	712.9	0.10	Yes
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable							

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]					2024-04-19					—
$P_{\max}$ lower limit (W)					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V)					690.9					—
V_{oc} (lab) upper limit (V)					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A)					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
16-M4	18.25	18.94	48.64	50.83	17.22	41.42	713.3	670.1	80.36	P
16-M5	18.24	18.94	48.64	50.83	17.19	41.43	712.2	670.1	80.29	P
16-M6	18.24	18.94	48.65	50.83	17.21	41.50	714.3	670.1	80.51	P
16-M7	18.24	18.94	48.63	50.83	17.17	41.47	712.1	670.1	80.28	P
16-M8	18.21	18.94	48.64	50.83	17.18	41.55	713.8	670.1	80.59	P
16-M9	18.23	18.94	48.64	50.83	17.17	41.50	712.7	670.1	80.37	P
16-M10	18.22	18.94	48.63	50.83	17.19	41.45	712.5	670.1	80.44	P
16-M12	18.25	18.94	48.65	50.83	17.21	41.42	712.9	670.1	80.28	P
Average	—						713.0	690.9	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										N/A
Test Date [YYYY-MM-DD]					2024-04-19					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
16-M4	14.50	48.29	13.71	41.29	566.2	80.83	79.48%	99.28%	79.37%	—
16-M5	14.47	48.28	13.70	41.28	565.3	80.93	79.33%	99.26%	79.37%	—
16-M6	14.40	48.30	13.70	41.31	566.0	81.38	78.95%	99.28%	79.24%	—
16-M7	14.44	48.27	13.69	41.32	565.6	81.15	79.16%	99.26%	79.43%	—
16-M8	14.34	48.28	13.54	41.49	561.7	81.13	78.75%	99.26%	78.69%	—
16-M9	14.47	48.26	13.65	41.35	564.4	80.83	79.36%	99.22%	79.19%	—
16-M10	14.42	48.26	13.64	41.30	563.2	80.97	79.13%	99.24%	79.05%	—
16-M12	14.45	48.29	13.66	41.31	564.1	80.85	79.17%	99.25%	79.13%	—
Supplementary information: N/A										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m ² , backside irradiance 135 W/m ² , 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]..... :					2024-04-19					—
$P_{\max}$ lower limit (W)					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V)					762.8					—
V_{oc} (lab) upper limit (V)					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A)					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
16-M4	20.20	20.90	48.81	50.83	19.10	41.29	788.8	739.9	80.02	P
16-M5	20.18	20.90	48.81	50.83	19.24	40.92	787.2	739.9	79.91	P
16-M6	20.12	20.90	48.81	50.83	19.07	41.39	789.1	739.9	80.36	P
16-M7	20.19	20.90	48.80	50.83	19.29	40.84	787.6	739.9	79.93	P
16-M8	20.15	20.90	48.78	50.83	19.12	41.29	789.4	739.9	80.30	P
16-M9	20.18	20.90	48.79	50.83	19.05	41.38	788.3	739.9	80.05	P
16-M10	20.18	20.90	48.80	50.83	19.09	41.34	788.9	739.9	80.13	P
16-M12	20.20	20.90	48.82	50.83	19.23	40.99	788.1	739.9	79.92	P
Average	—						793.7	762.8	—	P
Supplementary information: The limit values are calculated considering manufacturer's tolerances <i>t</i> of rated nameplate values and laboratory measurement uncertainties <i>m</i> .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD]		2024-04-19		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]		3.11		—
Required Resistance [MΩ]		>12.9		—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
16-M4	>1000	No breakdown	x	P
16-M5	>1000	No breakdown	x	P
16-M6	>1000	No breakdown	x	P
16-M7	>1000	No breakdown	x	P
16-M8	>1000	No breakdown	x	P
16-M9	>1000	No breakdown	x	P
16-M10	>1000	No breakdown	x	P
16-M12	>1000	No breakdown	x	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]..... :		2024-04-19	—
Test Voltage applied [V]..... :		2 minutes of 1500	—
Solution temperature [°C]..... :		22.2	—
Solution resistivity [Ω cm]		2242	—
Size of module [m ²]		3.11	—
Sample #	Required Resistance [$M\Omega$]	Measured [$M\Omega$]	Result
16-M4	>12.9	>1000	P
16-M5	>12.9	>1000	P
16-M6	>12.9	>1000	P
16-M7	>12.9	>1000	P
16-M8	>12.9	>1000	P
16-M9	>12.9	>1000	P
16-M10	>12.9	>1000	P
16-M12	>12.9	>1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)							—
Test Date [YYYY-MM-DD]				2024-06-24			—
Test method ...:	☐ Outdoor measurement						—
	Ambient air temperature [°C]:			N/A			
	Irradiance [W/m²]:			N/A			
	Module temperature [°C]:			N/A			
	☐ Data corrected to a 25°C cell temperature and 200 W/m² irradiance						—
	☒ Directly measured						
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	
16-M10	3.60	46.07	3.41	40.11	136.6	82.45	
Supplementary information: N/A							

TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)										—
Test Date [YYYY-MM-DD]					2024-06-24					—
Test method ...:	☐ Outdoor measurement									—
	Ambient air temperature [°C]:				N/A					
	Irradiance [W/m²]:				N/A					
	Module temperature [°C]:				N/A					
	☐ Data corrected to a 25°C cell temperature and 200 W/m² irradiance									—
	☒ Directly measured									
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	
16-M10	2.80	45.63	2.63	39.49	104.0	81.43	77.78%	99.04%	76.13%	
Supplementary information: N/A										

TABLE 07: MQT 04 - Measurement of temperature coefficients					—
Test Date [YYYY-MM-DD] : 2024-06-18					—
Ambient air temperature [°C] high/low : 25.0/25.0					—
Irradiance [W/m ²] high/low : 1200/1197					—
Module temperature [°C] high/low : 60.1/25.2					—
Sample #	α [%/°C]	β [%/°C]	δ [%/°C]		—
16-M10	0.041	-0.268	-0.279		—
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 08: MQT 08 - Outdoor exposure test			N/A
Table 08.1: MQT 01: Visual inspection after outdoor exposure test			N/A
Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			N/A
Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional			N/A
Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional			N/A
TABLE 09: MQT 18: Bypass diode thermal test			N/A
TABLE 09.1: MQT 01 - Visual inspection after bypass diode thermal test			N/A
TABLE 09.2: MQT 15 - Wet leakage current test after bypass diode thermal test			N/A
TABLE 09.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional			N/A
TABLE 09.4: MQT 03 - Insulation test after bypass diode thermal test - Optional			N/A
TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11: MQT 09 - Hot-spot endurance test		P
Test Date [YYYY-MM-DD] start/end	2024-06-17/2024-06-17	—
Sample #	16-M12	—
Procedure of technology	☒ wafer-based technologies (WBT) MQT 09.1 ☐ monolithically integrated (MLI) thin film technologies MQT 09.2	—
Cell interconnection circuit	☐ S ☒ SPS ☐ PS	—
Type of light source	☐ Pulse solar simulator ☒ Steady state solar simulator ☐ Natural sunlight	—
Module temperature at thermal equilibrium [°C] .:	59.1 /57.0	—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						P						
Selected hot-spot cells.....:	Low	Low	Low	High	Permanent	—						
	B1	F22	A22	C13	N/A							
Shading rate [%].....:	30	17	17	17	N/A	—						
Max. measured cell temperature in each cell [°C]:	64.1	122.3	122.1	134.3	N/A	—						
Test duration of each shading [h]	1	1	1	1	N/A	—						
Irradiance during shading [W/m²]	1200	1200	1200	1200	N/A	—						
Supplementary information:												
Position of solar cells (front side view):												
	1	2	3	4	...	11	12	...	19	20	21	22
A							Junction box					
B												
C												
D												
E												
F												
For bifacial modules, determination of the cell shading percent and the prolonged exposure are performed at the elevated irradiance BSI. If double-side illumination is used to produce BSI, both the back and the front of the cell are shaded in the same way. During cell selection, any cell that is permanently shaded by a module feature (such as the junction box) is added to the list of selected cells.												

TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI		N/A
Selected hot-spot cells	N/A	—

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Clause	Requirement + Test	Result - Remark	Verdict
Number of cells shaded		N/A	—
Max. measured cell temperature [°C]		N/A	—
Test duration during shading [h]		N/A	—
Irradiance during shading [W/m ²]		N/A	—
Supplementary information: N/A			

TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test		P
Test Date [YYYY-MM-DD]: 2024-06-24		—
Sample #	Nature and position of initial findings – comments or attach photos	—
16-M12	No visual defects	P
Supplementary information: N/A		

TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test							—
Test Date [YYYY-MM-DD]		2024-06-24					—
Module temperature [°C]		Corrected to 25.0					—
Irradiance [W/m ²]		Corrected to 1000 or G _{BNPI}					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
16-M12-front	18.11	48.64	17.09	41.59	710.6	80.68	—
16-M12-rear	14.39	48.27	13.50	41.67	562.3	80.98	—
16-M12-BNPI	20.03	48.83	19.12	41.13	786.4	80.39	—
Supplementary information: N/A							

TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test					P
Test Date [YYYY-MM-DD]		2024-06-24			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		3.11			—
Required Resistance [MΩ]		>12.9			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
16-M12	>1000	>12.9	No breakdown	×	P

TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test			P
Test Date [YYYY-MM-DD]		2024-06-24	—
Test Voltage applied [V]		2 minutes of 1500	—

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Clause	Requirement + Test	Result - Remark	Verdict
Solution temperature [°C]	22.1		—
Size of module [m ²]	3.11		—
Solution resistivity [Ω cm]	2179		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
16-M12	>1000	>12.9	P
Supplementary information: N/A			

TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test				P
Test Date [YYYY-MM-DD]	2024-06-24			—
☐ Method A				—
Ambient temperature [°C]	N/A			—
Current flow applied [A]	N/A			—
Sample #	VFM	VFM _{rated}	VFM = (N × VFM _{rated}) ± 10 %	Result
N/A	N/A	N/A	☐ Yes ☐ No	N/A
Supplementary information: N/A				
☒ Method B				—
Sample #	IV curve after shading			Result
	Diode 1 working properly	Diode 2 working properly	Diode 3 working properly	—
16-M12	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			P
Test Date (YYYY-MM-DD) start/end	2024-04-23/2024-04-28		—
Module temperature [°C]	61.3		—
UV irradiance (280-400nm) [W/m ²]	130.5		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	9.2		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: N/A			

TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			P
Test Date (YYYY-MM-DD) start/end	2024-05-06/2024-05-11		—
Module temperature [°C]	60.3		—
UV irradiance (280-400nm) [W/m ²]	130.5		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	9.2		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: For bifacial modules repeat the procedure of UV irradiation on the rear-side of the modules.			

TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-05-11		—
Sample #	Nature and position of initial findings – comments or attach photos		—
16-M4	No visual defects		P
16-M5	No visual defects		P
Supplementary information: N/A			

TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-05-11		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.2		—
Size of module [m ²]	3.11		—
Solution resistivity [Ω cm]	2797		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result

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Clause	Requirement + Test	Result - Remark	Verdict
16-M4	>1000	>12.9	P
16-M5	>1000	>12.9	P
Supplementary information: N/A			

TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional							—
Test Date [YYYY-MM-DD]				2024-05-11			—
Module temperature [°C]				Corrected to 25.0			—
Irradiance [W/m ²]				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
16-M4-front	18.24	48.13	17.27	40.32	696.5	79.34	—
16-M4-rear	14.45	47.70	13.14	41.32	542.9	78.78	—
16-M4-BNPI	20.16	48.30	19.05	39.14	745.6	76.58	—
16-M5-front	18.19	47.54	17.35	39.17	679.8	78.61	—
16-M5-rear	14.43	47.09	13.43	39.85	535.1	78.73	—
16-M5-BNPI	20.14	47.98	18.95	39.00	738.9	76.47	—
Supplementary information: N/A							

TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional					P
Test Date [YYYY-MM-DD]			2024-05-11		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			3.11		—
Required Resistance [MΩ].....			>12.9		—
Sample #	Measured		Dielectric breakdown		Result
	[MΩ]		Yes (description)	No	
16-M4	>1000	>12.9	No breakdown	×	P
16-M5	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 14: MQT 11 - Thermal cycling 50 test			P
Test Date [YYYY-MM-DD] start/end		2024-05-31/2024-06-07	—
Total cycles (50).....		50	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from 40 °C to 80 °C	17.25	—
	Other stages	0.05	—
Dwell time at high temperature.....		10 min	
Dwell time at low temperature.....		10 min	
Sample #	Open circuits (yes/no)		—
16-M4	no		P
16-M5	no		P
Supplementary information: N/A			

TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test		P
Test Date [YYYY-MM-DD]	2024-06-07	—
Sample #	Nature and position of initial findings – comments or attach photos	—
16-M4	No visual defects	P
16-M5	No visual defects	P
Supplementary information: N/A		

TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			P
Test Date [YYYY-MM-DD]	2024-06-07		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.1		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm]	2118		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
16-M4	>1000	>12.9	P
16-M5	>1000	>12.9	P
Supplementary information: N/A			

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Clause	Requirement + Test			Result - Remark		Verdict
TABLE 14.3: MQT 03 – Max. power determination after thermal cycling 50 test - Optional						—
Test Date [YYYY-MM-DD].....:		2024-06-07				—
Module temperature [°C].....:		Corrected to 25.0				—
Irradiance [W/m²):		Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
16-M4-front	18.05	47.98	17.21	40.22	692.0	79.92
16-M4-rear	14.37	47.58	13.09	41.33	541.1	79.17
16-M4-BNPI	19.97	48.20	18.89	39.21	740.9	76.96
16-M5-front	18.05	47.56	17.09	39.84	680.9	79.32
16-M5-rear	14.34	47.12	12.96	40.89	530.0	78.47
16-M5-BNPI	19.96	47.85	18.78	39.07	733.7	76.84
Supplementary information: N/A						

TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional				P
Test Date [YYYY-MM-DD]		2024-06-07		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]		3.11		—
Required Resistance [MΩ]		>12.9		—
Sample #	Measured	Dielectric breakdown		Result
	[MΩ]	Yes (description)	No	
16-M4	>1000	No breakdown	×	P
16-M5	>1000	No breakdown	×	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 15: MQT 12 - Humidity freeze 10 test		P
Test Date [YYYY-MM-DD] start/end	2024-06-12/2024-06-22	—
Total cycles (10)	10	—
Applied current (A)	0.05	—
Dwell time at high temperature	20 h	—
Dwell time at low temperature.....	30 min	—
Sample #	Open circuits (yes/no)	—
16-M4	no	P
16-M5	no	P
Supplementary information: N/A		

TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test		P
Test Date [YYYY-MM-DD]: 2024-06-22		—
Sample #	Nature and position of initial findings – comments or attach photos	—
16-M4	No visual defects	P
16-M5	No visual defects	P
Supplementary information: N/A		

TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			P
Test Date [YYYY-MM-DD]	2024-06-22		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	22.4		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm].....	2691		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
16-M4	>1000	>12.9	P
16-M5	>1000	>12.9	P
Supplementary information: N/A			

TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional			—
Test Date [YYYY-MM-DD]	2024-06-22		—
Module temperature [°C].....	Corrected to 25.0		—

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Clause	Requirement + Test			Result - Remark		Verdict
Irradiance [W/m ²]:				Corrected to 1000 or G _{BNPI}		—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
16-M4-front	18.08	48.01	17.13	40.49	693.3	79.86
16-M4-rear	14.37	47.59	13.25	41.18	545.6	79.79
16-M4-BNPI	20.03	48.15	19.07	40.24	767.5	79.57
16-M5-front	18.08	47.63	17.07	40.06	683.6	79.39
16-M5-rear	14.32	47.16	13.30	40.37	537.0	79.53
16-M5-BNPI	19.96	47.83	18.84	40.12	755.7	79.15
Supplementary information: N/A						

TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional					P
Test Date [YYYY-MM-DD]		2024-06-22			—
Test Voltage applied [V]		2 minutes of 1500			—
Size of module [m ²]		3.11			—
Required Resistance [MΩ]		>12.9			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
16-M4	>1000	>12.9	No breakdown	×	P
16-M5	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 16: MQT 14.1 Retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD] start/end		2024-06-22	—
Sample #	19-M4		—
Supplementary information: N/A			

TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface		P
Test Date [YYYY-MM-DD]..... : 2024-06-22		—
Sample #	Nature and position of initial findings – comments or attach photos	—
19-M4	No visual defects	P
Supplementary information: N/A		

TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD]		2024-06-22	—
Test Voltage applied [V]		2 minutes of 2025	—
Solution temperature [°C]		22.4	—
Size of module [m²]		3.11	—
Solution resistivity [Ω cm]		1978	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
19-M4	>1000	>12.9	P
Supplementary information: N/A			

TABLE 16.4: MQT 14.2 - Test of cord anchorage	N/A

TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage	N/A

TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage	N/A

TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 17: MQT 11 - Thermal cycling 200 test			P
Test Date [YYYY-MM-DD] start/end	2024-04-23/2024-05-23		—
Total cycles (200).....	200		—
Weight attached (N)	5		—
Applied current (A)	During the heat up cycle from – 40 °C to 80 °C	17.27	—
	Other stages	0.05	—
Dwell time at high temperature	10 min		—
Dwell time at low temperature.....	10 min		—
Sample #	Open circuits (yes/no)		—
16-M8	no		P
16-M9	no		P
Supplementary information: N/A			

TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test		P
Test Date [YYYY-MM-DD].....: 2024-05-23		—
Sample #	Nature and position of initial findings – comments or attach photos	—
16-M8	No visual defects	P
16-M9	No visual defects	P
Supplementary information: N/A		

TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test			P
Test Date [YYYY-MM-DD]	2024-05-23		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.1		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm]	2354		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
16-M8	>1000	>12.9	P
16-M9	>1000	>12.9	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional							—
Test Date [YYYY-MM-DD]				2024-05-23			—
Module temperature [°C].....				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
16-M8-front	18.21	48.63	17.26	40.42	697.7	78.79	—
16-M8-rear	14.32	48.26	13.57	40.67	551.8	79.84	—
16-M8-BNPI	20.17	48.77	19.09	40.35	770.3	78.31	—
16-M9-front	18.23	48.64	17.18	41.09	705.9	79.60	—
16-M9-rear	14.47	48.25	13.47	41.62	560.7	80.34	—
16-M9-BNPI	20.21	48.80	19.26	40.56	781.1	79.22	—
Supplementary information: N/A							

TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional					P
Test Date [YYYY-MM-DD]		2024-05-23			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		3.11			—
Required Resistance [MΩ]		>12.9			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
16-M8	>1000	>12.9	No breakdown	×	P
16-M9	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 18: MQT 13 - Damp heat 1000 test			P
Test Date [YYYY-MM-DD] start/end		2024-04-23/2024-06-07	—
Total hours (1000h)		1000	—
Sample #	—		—
16-M6	—		P
16-M7	—		P
Supplementary information: N/A			

TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			P
Test Date [YYYY-MM-DD].....:		2024-06-07	—
Sample #	Nature and position of initial findings – comments or attach photos		—
16-M6	No visual defects		P
16-M7	No visual defects		P
Supplementary information: N/A			

TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-06-07		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.8		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm]	2614		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
16-M6	>1000	>12.9	P
16-M7	>1000	>12.9	P
Supplementary information: N/A			

TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional							—
Test Date [YYYY-MM-DD]	2024-06-07						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
16-M6-front	17.99	48.63	16.90	41.13	695.0	79.43	—
16-M6-rear	14.57	48.30	13.76	41.24	567.4	80.64	—
16-M6-BNPI	19.91	48.72	18.93	40.53	767.2	79.09	—

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Clause	Requirement + Test				Result - Remark		Verdict
16-M7-front	17.98	48.57	17.09	40.41	690.4	79.07	—
16-M7-rear	14.65	48.25	13.83	41.08	568.2	80.40	—
16-M7-BNPI	19.92	48.69	18.82	40.52	762.4	78.63	—
Supplementary information: N/A							

TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional					P
Test Date [YYYY-MM-DD]		2024-06-07			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		3.11			—
Sample #	Measured	Required Resistance	Dielectric breakdown		Result
	[MΩ]	[MΩ]	Yes (description)	No	
16-M6	>1000	>12.9	No breakdown	×	P
16-M7	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	16-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-06-17		—
Mounting method	Clamps mounting (8 points on long side with two beams across the module at the long side)		—
Load applied to.....	front side	back side	—
Mechanical load [Pa].....	5400	2400	—
First cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test		P
Test Date [YYYY-MM-DD]: 2024-06-17		—
Sample #	Nature and position of initial findings – comments or attach photos	—
16-M6	No visual defects	P
Supplementary information: N/A		

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-06-17		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	22.1		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm].....	2356		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
16-M6	>1000	>12.9	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-06-17			—
Module temperature [°C]				Corrected to 25.0			—
Irradiance [W/m ²]				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
16-M6-front	17.80	48.58	16.85	41.36	697.1	80.62	—
16-M6-rear	14.47	48.26	13.70	41.43	567.4	81.29	—
16-M6-BNPI	19.66	48.77	18.47	39.96	773.5	76.99	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD]			2024-06-17		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			3.11		—
Required Resistance [MΩ].....			>12.9		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
16-M6	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

TABLE 20: MQT 22 Bending test	N/A

TABLE 20.1: MQT 01 - Visual inspection after bending test	N/A

TABLE 20.2: MQT 15 - Wet leakage current test after bending test	N/A

TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional	N/A

TABLE 20.4: MQT 03 Insulation test after bending test - Optional	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 21: MQT 17 - Hail impact test							P
Test Date [YYYY-MM-DD]..... :	2024-06-17						—
Sample #	16-M7						—
Ice ball size [mm] :	1	2	3	4	5	6	—
	25±5%	25±5%	25±5%	25±5%	25±5%	25±5%	
	7	8	9	10	11	—	
	25±5%	25±5%	25±5%	25±5%	25±5%	—	
Ice ball weight [g] :	1	2	3	4	5	6	—
	7.58	7.63	7.47	7.48	7.56	7.64	
	7	8	9	10	11	—	
	7.63	7.62	7.55	7.56	7.62	—	
Ice ball velocity [m/s] :	1	2	3	4	5	6	—
	23.3	22.6	22.7	23.2	23.1	23.4	
	7	8	9	10	11	—	
	23.7	22.7	22.6	22.5	23.3	—	
Number of impact locations :	11						—
Supplementary information: N/A							

TABLE 21.1: MQT 01 - Visual inspection after hail impact test		P
Test Date [YYYY-MM-DD]: 2024-06-17		—
Sample #	Nature and position of initial findings – comments or attach photos	—
16-M7	No visual defects	P
Supplementary information: N/A		

TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test				P
Test Date [YYYY-MM-DD]		2024-06-17		—
Test Voltage applied [V]		2 minutes of 1500		—
Solution temperature [°C].....		22.6		—
Size of module [m²]		3.11		—
Solution resistivity [Ω cm]		2341		—
Sample #	Measured [MΩ]		Required Resistance [MΩ]	Result
16-M7	>1000		>12.9	P
Supplementary information: N/A				

IEC 61215-2							
Clause	Requirement + Test				Result - Remark		Verdict
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional							—
Test Date [YYYY-MM-DD].....:			2024-06-17				—
Module temperature [°C].....:			Corrected to 25.0				—
Irradiance [W/m²):			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
16-M7-front	17.78	48.57	16.95	40.94	693.8	80.35	—
16-M7-rear	14.57	48.24	13.61	41.78	568.7	80.89	—
16-M7-BNPI	19.69	48.73	18.43	39.93	770.6	76.68	—
Supplementary information: N/A							

TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional					P
Test Date [YYYY-MM-DD]			2024-06-17		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			3.11		—
Required Resistance [MΩ].....			>12.9		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
16-M7	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 22: MQT 21 -Potential induced degradation test			N/A
TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test			N/A
TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test			N/A
TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test - Optional			N/A
TABLE 22.4: MQT 03 Insulation test after potential induced degradation test - Optional			N/A

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23: MQT 19.2: Final stabilization							—
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization							—
Test Date [YYYY-MM-DD]				2024-06-17			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
16-M6-front	17.80	48.58	16.85	41.36	697.1	80.62	—
16-M6-rear	14.47	48.26	13.70	41.43	567.4	81.29	—
16-M6-BNPI	19.66	48.77	18.47	39.96	773.5	76.99	—
16-M7-front	17.78	48.57	16.95	40.94	693.8	80.35	—
16-M7-rear	14.57	48.24	13.61	41.78	568.7	80.89	—
16-M7-BNPI	19.69	48.73	18.43	39.93	770.6	76.68	—
Supplementary information: N/A							

TABLE 23.2: MQT 19.1 Final Stabilization procedure							—
☐ IEC 61215-1-2 ☐ IEC 61215-1-3 ☐ IEC 61215-1-4							—
Light exposure method:				☐ Solar simulator ☐ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x :				N/A			
Sample #	N/A	Test Date (YYYY-MM-DD) start/end ...:			N/A		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A	—	—
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure							

TABLE 23.3: MQT 19.2: Final stabilization	
☒ IEC 61215-1-1	

IEC 61215-2										
Clause	Requirement + Test						Result - Remark		Verdict	
☐ Method 1									N/A	
Stress-specific stabilization – BO LID (MQT 19.3)									N/A	
Test Date [YYYY-MM-DD]				N/A						—
Applied current (A)				N/A						—
Module temperature [°C]				N/A						—
Total hours (48h)				N/A						—
Performance at STC after final stabilization— for monofacial modules										
Test Date [YYYY-MM-DD]				N/A						—
Test method				☐ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Performance at BNPI after final stabilization — for bifacial modules									—	
Test Date [YYYY-MM-DD]				N/A						—
Test method				☐ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Supplementary information: N/A										
☒ Method 2									—	
Performance at STC before final stabilization— for monofacial modules									—	
Test Date [YYYY-MM-DD]				N/A						—
Test method				☐ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Performance at BNPI before final stabilization — for bifacial modules									—	
Test Date [YYYY-MM-DD]				2024-06-17						—
Test method				☒ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
16-M6	19.66	48.77	18.47	39.96	773.5	76.99	789.1	-1.97	P	

IEC 61215-2									
Clause	Requirement + Test						Result - Remark		Verdict
16-M7	19.69	48.73	18.43	39.93	770.6	76.68	787.6	-2.17	P
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to destabilization artifacts.									
If Power Degradation≥5%, then perform stress-specific stabilization MQT 19.3 in method 1									
Stress-specific stabilization – BO LID (MQT 19.3)									—
Test Date [YYYY-MM-DD]..... :				N/A					—
Applied current (A)				N/A					—
Module temperature [°C]..... :				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization — for monofacial modules									—
Test Date [YYYY-MM-DD]..... :				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	P _{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]..... :				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	P _{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									

TABLE 23.4: MQT 19.2: Final stabilization	N/A
For monofacial modules	
TABLE 23.5: MQT 06.1: Final Performance at STC	N/A

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

For bifacial modules							—			
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)							—			
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result			
16-M4	18.08	48.01	17.13	40.49	693.3	79.86	—			
16-M5	18.08	47.63	17.07	40.06	683.6	79.39	—			
16-M6	17.80	48.58	16.85	41.36	697.1	80.62	—			
16-M7	17.78	48.57	16.95	40.94	693.8	80.35	—			
16-M8	18.21	48.63	17.26	40.42	697.7	78.79	—			
16-M9	18.23	48.64	17.18	41.09	705.9	79.60	—			
Supplementary information: N/A										
TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)										
Test Date [YYYY-MM-DD]..... :			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
16-M4	14.37	47.59	13.25	41.18	545.6	79.79	79.46%	99.12%	78.69%	—
16-M5	14.32	47.16	13.30	40.37	537.0	79.53	79.20%	99.00%	78.55%	—
16-M6	14.47	48.26	13.70	41.43	567.4	81.29	81.27%	99.33%	81.41%	—
16-M7	14.57	48.24	13.61	41.78	568.7	80.89	81.98%	99.31%	81.97%	—
16-M8	14.32	48.26	13.57	40.67	551.8	79.84	78.66%	99.23%	79.09%	—
16-M9	14.47	48.25	13.47	41.62	560.7	80.34	79.34%	99.19%	79.43%	—
Supplementary information: N/A										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.8: MQT 06.1: Final Performance at BNPI									P
Test Date [YYYY-MM-DD]					—				—
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation [%]	Result
16-M4	20.03	48.15	19.07	40.24	767.5	79.57	788.8	-2.70	P
16-M5	19.96	47.83	18.84	40.12	755.7	79.15	787.2	-4.00	P
16-M6	19.66	48.77	18.47	39.96	773.5	76.99	789.1	-1.97	P
16-M7	19.69	48.73	18.43	39.93	770.6	76.68	787.6	-2.17	P
16-M8	20.17	48.77	19.09	40.35	770.3	78.31	789.4	-2.42	P
16-M9	20.21	48.80	19.26	40.56	781.1	79.22	788.3	-0.91	P
Supplementary information: P_{max} [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		—			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		3.11			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
16-M4	>1000	>12.9	No breakdown	×	P
16-M5	>1000	>12.9	No breakdown	×	P
16-M6	>1000	>12.9	No breakdown	×	P
16-M7	>1000	>12.9	No breakdown	×	P
16-M8	>1000	>12.9	No breakdown	×	P
16-M9	>1000	>12.9	No breakdown	×	P
16-M10	>1000	>12.9	No breakdown	×	P
16-M12	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	—	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22 ± 2	—
Size of module [m²]	:	3.11	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
16-M4	>1000	>12.9	P
16-M5	>1000	>12.9	P
16-M6	>1000	>12.9	P
16-M7	>1000	>12.9	P
16-M8	>1000	>12.9	P
16-M9	>1000	>12.9	P
16-M10	>1000	>12.9	P
16-M12	>1000	>12.9	P
Supplementary information: N/A			

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD575 (BOM20)

TABLE 01: MQT 01 ini: Initial Visual inspection		P
Test Date [YYYY-MM-DD]	2024-03-07	—
Sample #	Nature and position of initial findings – comments or attach photos	—
20-M4	No visual defects	P
20-M5	No visual defects	P
20-M6	No visual defects	P
20-M7	No visual defects	P
20-M8	No visual defects	P
20-M9	No visual defects	P
20-M10	No visual defects	P
20-M12	No visual defects	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]				2024-03-07			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
20-M4	13.51	51.95	12.88	44.03	567.1	80.80	—
20-M5	13.55	51.97	12.91	44.01	568.2	80.69	—
20-M6	13.55	51.98	12.90	44.02	567.8	80.62	—
20-M7	13.50	51.95	12.90	43.94	566.8	80.82	—
20-M8	13.52	51.98	12.90	43.99	567.5	80.75	—
20-M9	13.48	51.96	12.88	43.97	566.3	80.85	—
20-M10	13.54	51.99	12.92	44.02	568.7	80.79	—
20-M12	13.50	51.93	12.93	43.96	568.4	81.08	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							—
Test Date [YYYY-MM-DD]				2024-03-07			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
20-M4	10.64	51.53	9.77	44.61	435.8	79.49	—
20-M5	10.67	51.52	9.72	44.65	434.0	78.95	—
20-M6	10.59	51.47	9.73	44.57	433.7	79.57	—
20-M7	10.58	51.47	9.72	44.53	432.8	79.48	—
20-M8	10.61	51.48	9.75	44.61	434.9	79.62	—
20-M9	10.59	51.48	9.75	44.62	435.0	79.79	—
20-M10	10.62	51.44	9.73	44.66	434.5	79.54	—
20-M12	10.59	51.48	9.82	44.59	437.9	80.32	—
Supplementary information: N/A							
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]				2024-02-29			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result

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Clause	Requirement + Test				Result - Remark		Verdict
20-M4	14.94	52.15	14.16	44.18	625.6	80.30	—
20-M5	14.94	52.11	14.15	44.27	626.4	80.46	—
20-M6	14.96	52.16	14.17	44.18	626.0	80.22	—
20-M7	14.92	52.13	14.15	44.18	625.1	80.37	—
20-M8	14.94	52.14	14.16	44.20	625.9	80.35	—
20-M9	14.91	52.12	14.14	44.19	624.8	80.40	—
20-M10	14.97	52.19	14.17	44.24	626.9	80.24	—
20-M12	14.96	52.12	14.17	44.26	627.2	80.44	—

Supplementary information: N/A

TABLE 02.4: MQT 19.1: Initial Stabilization procedure

Light exposure method				☐ Solar simulator ☒ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x				1%			
Sample #	20-M4	Test Date (YYYY-MM-DD) start/end			2024-03-08/2024-03-14		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	567.1	—	—
1	5.0	>500	N/A	MPPT	566.3	—	—
2	5.0	>500	N/A	MPPT	565.8	0.22	Yes

Sample #	20-M5	Test Date (YYYY-MM-DD) start/end			2024-03-08/2024-03-14		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	568.2	—	—
1	5.0	>500	N/A	MPPT	567.0	—	—
2	5.0	>500	N/A	MPPT	566.7	0.26	Yes

Sample #	20-M6	Test Date (YYYY-MM-DD) start/end			2024-03-08/2024-03-14		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	567.8	—	—
1	5.0	>500	N/A	MPPT	566.7	—	—
2	5.0	>500	N/A	MPPT	566.3	0.26	Yes

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #	20-M7	Test Date (YYYY-MM-DD) start/end			2024-03-08/2024-03-14		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.8	—	—
1	5.0	>500	N/A	MPPT	565.6	—	—
2	5.0	>500	N/A	MPPT	565.2	0.28	Yes

Sample #	20-M8	Test Date (YYYY-MM-DD) start/end			2024-03-08/2024-03-14		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	567.5	—	—
1	5.0	>500	N/A	MPPT	566.3	—	—
2	5.0	>500	N/A	MPPT	565.9	0.28	Yes

Sample #	20-M9	Test Date (YYYY-MM-DD) start/end			2024-03-08/2024-03-14		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.3	—	—
1	5.0	>500	N/A	MPPT	565.2	—	—
2	5.0	>500	N/A	MPPT	564.8	0.27	Yes

Sample #	20-M10	Test Date (YYYY-MM-DD) start/end			2024-03-08/2024-03-14		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	568.7	—	—
1	5.0	>500	N/A	MPPT	567.4	—	—
2	5.0	>500	N/A	MPPT	567.1	0.28	Yes

Sample #	20-M12	Test Date (YYYY-MM-DD) start/end			2024-03-08/2024-03-14		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	568.4	—	—

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Clause	Requirement + Test				Result - Remark		Verdict
1	5.0	>500	N/A	MPPT	567.3	—	—
2	5.0	>500	N/A	MPPT	566.9	0.22	Yes
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable							

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]..... :					2024-03-14 for 20-M4 - 20-M7,20-M10,20-M12; 2024-05-20 for 20-M8 - 211-M9;					—
$P_{\max}$ lower limit (W) :					See table below: $P_{\max}$ [W] – Min calc.					—
$\overline{P}_{\max}$ (lab) lower limit (V) :					561.7					—
V_{oc} (lab) upper limit (V) :					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A) :					See table below: I_{sc} [A] Max. calc.					—
Test method..... :					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
20-M4	13.49	14.23	51.81	54.11	12.87	43.96	565.8	544.8	80.95	P
20-M5	13.53	14.23	51.84	54.11	12.89	43.98	566.7	544.8	80.82	P
20-M6	13.52	14.23	51.85	54.11	12.89	43.93	566.3	544.8	80.78	P
20-M7	13.48	14.23	51.83	54.11	12.87	43.92	565.2	544.8	80.90	P
20-M8	13.50	14.23	51.84	54.11	12.88	43.94	565.9	544.8	80.86	P
20-M9	13.47	14.23	51.81	54.11	12.86	43.92	564.8	544.8	80.93	P
20-M10	13.53	14.23	51.88	54.11	12.91	43.93	567.1	544.8	80.79	P
20-M12	13.48	14.23	51.80	54.11	12.90	43.96	566.9	544.8	81.21	P
Average	—						566.1	561.7	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										N/A
Test Date [YYYY-MM-DD]					2024-03-14 for 20-M4 - 20-M7,20-M10,20-M12; 2024-05-20 for 20-M8 - 211-M9;					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
20-M4	10.63	51.42	9.76	44.56	434.9	79.57	78.80%	99.25%	76.86%	—
20-M5	10.65	51.40	9.71	44.49	432.2	78.92	78.71%	99.15%	76.27%	—
20-M6	10.57	51.35	9.72	44.44	432.0	79.59	78.18%	99.04%	76.28%	—
20-M7	10.56	51.33	9.70	44.52	431.8	79.66	78.34%	99.04%	76.40%	—
20-M8	10.59	51.34	9.74	44.53	433.7	79.77	78.44%	99.04%	76.64%	—
20-M9	10.57	51.37	9.74	44.57	434.1	79.95	78.47%	99.15%	76.86%	—
20-M10	10.60	51.33	9.72	44.52	432.7	79.53	78.34%	98.94%	76.30%	—
20-M12	10.58	51.37	9.82	44.42	436.4	80.26	78.49%	99.17%	76.98%	—
Supplementary information: N/A										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m², backside irradiance 135 W/m², 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]..... :				2024-03-14 for 20-M4 - 20-M7,20-M10,20-M12; 2024-05-20 for 20-M8 - 211-M9;						—
$P_{\max}$ lower limit (W) :				See table below: $P_{\max}$ [W] – Min calc.						—
$\overline{P}_{\max}$ (lab) lower limit (V) :				622.8						—
V_{oc} (lab) upper limit (V) :				See table below: V_{oc} [V] Max. calc.						—
I_{sc} (lab) upper limit (A) :				See table below: I_{sc} [A] Max. calc.						—
Test method..... :				☒ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
20-M4	14.92	15.75	51.98	54.21	14.15	44.12	624.3	604.1	80.50	P
20-M5	14.92	15.75	52.00	54.21	14.15	44.13	624.5	604.1	80.49	P
20-M6	14.93	15.75	52.04	54.21	14.16	44.10	624.5	604.1	80.38	P
20-M7	14.90	15.75	52.01	54.21	14.13	44.10	623.1	604.1	80.41	P
20-M8	14.92	15.75	51.99	54.21	14.15	44.11	624.2	604.1	80.47	P
20-M9	14.89	15.75	51.97	54.21	14.12	44.12	623.0	604.1	80.51	P
20-M10	14.95	15.75	52.06	54.21	14.15	44.19	625.3	604.1	80.34	P
20-M12	14.94	15.75	51.99	54.21	14.16	44.17	625.4	604.1	80.52	P
Average	—						624.3	622.8	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD]	2024-03-14 for 20-M4 - 20-M7,20-M10,20-M12; 2024-05-20 for 20-M8 - 211-M9;			—
Test Voltage applied [V]	2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]	2.58			—
Required Resistance [MΩ]	>15.5			—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
20-M4	>1000	No breakdown	×	P
20-M5	>1000	No breakdown	×	P
20-M6	>1000	No breakdown	×	P
20-M7	>1000	No breakdown	×	P
20-M8	>1000	No breakdown	×	P
20-M9	>1000	No breakdown	×	P
20-M10	>1000	No breakdown	×	P
20-M12	>1000	No breakdown	×	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]	2024-03-14 for 20-M4 - 20-M7,20-M10,20-M12; 2024-05-20 for 20-M8 - 211-M9;		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22±2		—
Solution resistivity [Ω cm]	<3500		—
Size of module [m ²]	2.58		—
Sample #	Required Resistance [M Ω]	Measured [M Ω]	Result
20-M4	>15.5	>1000	P
20-M5	>15.5	>1000	P
20-M6	>15.5	>1000	P
20-M7	>15.5	>1000	P
20-M8	>15.5	>1000	P
20-M9	>15.5	>1000	P
20-M10	>15.5	>1000	P
20-M12	>15.5	>1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)			—
TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)			—
TABLE 07: MQT 04 - Measurement of temperature coefficients			—
TABLE 08: MQT 08 - Outdoor exposure test			N/A
Table 08.1: MQT 01: Visual inspection after outdoor exposure test			N/A
Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			N/A
Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional			N/A
Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional			N/A
TABLE 09: MQT 18: Bypass diode thermal test			N/A
TABLE 09.1: MQT 01 - Visual inspection after bypass diode thermal test			N/A
TABLE 09.2: MQT 15 - Wet leakage current test after bypass diode thermal test			N/A
TABLE 09.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional			N/A
TABLE 09.4: MQT 03 - Insulation test after bypass diode thermal test - Optional			N/A
TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11: MQT 09 - Hot-spot endurance test			P
Test Date [YYYY-MM-DD] start/end	2024-03-18/2024-03-19		—
Sample #	20-M12		—
Procedure of technology	☒ wafer-based technologies (WBT) MQT 09.1 ☐ monolithically integrated (MLI) thin film technologies MQT 09.2		—
Cell interconnection circuit	☐ S ☒ SPS ☐ PS		—
Type of light source	☐ Pulse solar simulator ☒ Steady state solar simulator ☐ Natural sunlight		—
Module temperature at thermal equilibrium [°C] ..	61.5/58.2		—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						P
Selected hot-spot cells	Low	Low	Low	High	Permanent	—
	D01	A13	C22	D05	N/A	
Shading rate [%]	20	15	25	20	N/A	—
Max. measured cell temperature in each cell [°C]:	138.7	134.0	142.5	136.4	N/A	—
Test duration of each shading [h]	1	1	1	1	N/A	—
Irradiance during shading [W/m²]	1233	1233	1233	1233	N/A	—

Supplementary information:

Position of solar cells (front side view):

	1	2	3	4	...	12		13	...	20	21	22	24
A							Junction box						
B													
C													
D													
E													
F													

for bifacial modules, determination of the cell shading percent and the prolonged exposure are performed at the elevated irradiance BSI. If double-side illumination is used to produce BSI, both the back and the front of the cell are shaded in the same way. During cell selection, any cell that is permanently shaded by a module feature (such as the junction box) is added to the list of selected cells.

TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI		N/A
Selected hot-spot cells	N/A	—

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Clause	Requirement + Test	Result - Remark	Verdict
Number of cells shaded		N/A	—
Max. measured cell temperature [°C]		N/A	—
Test duration during shading [h]		N/A	—
Irradiance during shading [W/m ²]		N/A	—
Supplementary information: N/A			

TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test		P
Test Date [YYYY-MM-DD]: 2024-03-19		—
Sample #	Nature and position of initial findings – comments or attach photos	—
20-M12	No visual defects	P
Supplementary information: N/A		

TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test							—
Test Date [YYYY-MM-DD]		2024-03-19					—
Module temperature [°C]		Corrected to 25.0					—
Irradiance [W/m ²]		Corrected to 1000 or G _{BNPI}					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
20-M12-front	13.42	51.69	12.84	43.84	562.9	81.15	—
20-M12-rear	10.55	51.32	9.78	44.37	433.9	80.14	—
20-M12-BNPI	14.88	51.87	14.09	44.05	620.6	80.41	—
Supplementary information: N/A							

TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test					P
Test Date [YYYY-MM-DD]		2024-03-19			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
20-M12	>1000	>15.5	No breakdown	×	P

TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test			P
Test Date [YYYY-MM-DD]		2024-03-19	—
Test Voltage applied [V]		2 minutes of 1500	—

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Clause	Requirement + Test	Result - Remark	Verdict
Solution temperature [°C]	21.9		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2280		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
20-M12	>1000	>15.5	P
Supplementary information: N/A			

TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test				P
Test Date [YYYY-MM-DD]	2024-03-19			—
☐ Method A				—
Ambient temperature [°C]	N/A			—
Current flow applied [A]	N/A			—
Sample #	VFM	VFMrated	VFM = (N × VFMrated) ± 10 %	Result
N/A	N/A	N/A	☐ Yes ☐ No	N/A
Supplementary information: N/A				
☒ Method B				—
Sample #	IV curve after shading			Result
	Diode 1 working properly	Diode 2 working properly	Diode 3 working properly	—
20-M12	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			P
Test Date (YYYY-MM-DD) start/end	2024-03-19/2024-03-23		—
Module temperature [°C]	60.7		—
UV irradiance (280-400nm) [W/m ²]	157		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	6.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: N/A			

TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			P
Test Date (YYYY-MM-DD) start/end	2024-03-27/2024-03-31		—
Module temperature [°C]	60.3		—
UV irradiance (280-400nm) [W/m ²]	157		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	6.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: for bifacial modules repeat the procedure of UV irradiation on the rear-side of the modules.			

TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-03-31		—
Sample #	Nature and position of initial findings – comments or attach photos		—
20-M4	No visual defects		P
20-M5	No visual defects		P
Supplementary information: N/A			

TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-03-31		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.7		—
Size of module [m ²]	2.58		—
Solution resistivity [Ω cm]	2275		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
20-M4	>1000	>15.5	P

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Clause	Requirement + Test	Result - Remark	Verdict
20-M5	>1000	>15.5	P
Supplementary information: N/A			

TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional							—
Test Date [YYYY-MM-DD]				2024-03-31			—
Module temperature [°C]				Corrected to 25.0			—
Irradiance [W/m ²]				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
20-M4-front	13.45	51.69	12.82	43.86	562.3	80.89	—
20-M4-rear	10.60	51.30	9.73	44.42	432.2	79.47	—
20-M4-BNPI	14.87	51.88	14.09	44.03	620.4	80.42	—
20-M5-front	13.48	51.75	12.84	43.88	563.4	80.77	—
20-M5-rear	10.60	51.33	9.67	44.43	429.6	78.96	—
20-M5-BNPI	14.87	51.92	14.09	44.04	620.6	80.38	—
Supplementary information: N/A							

TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional					P
Test Date [YYYY-MM-DD]			2024-03-31		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.58		—
Required Resistance [MΩ].....			>15.5		—
Sample #	Measured		Dielectric breakdown		Result
	[MΩ]		Yes (description)	No	
20-M4	>1000	>15.5	No breakdown	×	P
20-M5	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			M/A
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 14: MQT 11 - Thermal cycling 50 test			P
Test Date [YYYY-MM-DD] start/end		2024-04-09/2024-04-18	—
Total cycles (50).....		50	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from 40 °C to 80 °C	15.74	—
	Other stages	0.05	—
Dwell time at high temperature.....		15 min	—
Dwell time at low temperature.....		15 min	—
Sample #	Open circuits (yes/no)		—
20-M4	no		P
20-M5	no		P
Supplementary information: N/A			

TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test		P
Test Date [YYYY-MM-DD].....: 2024-04-18		—
Sample #	Nature and position of initial findings – comments or attach photos	—
20-M4	No visual defects	P
20-M5	No visual defects	P
Supplementary information: N/A		

TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			P
Test Date [YYYY-MM-DD]	2024-04-18		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	23.5		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2387		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
20-M4	>1000	>15.5	P
20-M5	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test			Result - Remark		Verdict
TABLE 15.5: MQT 03 – Max. power determination after thermal cycling 50 test - Optional						—
Test Date [YYYY-MM-DD].....:		2024-04-18				—
Module temperature [°C].....:		Corrected to 25.0				—
Irradiance [W/m²):		Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
20-M4-front	13.35	51.51	12.70	43.68	554.7	80.67
20-M4-rear	10.51	51.16	9.63	44.27	426.3	79.28
20-M4-BNPI	14.75	51.73	13.95	43.87	612.0	80.21
20-M5-front	13.36	51.56	12.71	43.68	555.2	80.60
20-M5-rear	10.49	51.15	9.57	44.24	423.4	78.91
20-M5-BNPI	14.74	51.74	13.95	43.86	611.9	80.23
Supplementary information: N/A						

TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional				P
Test Date [YYYY-MM-DD]		2024-04-18		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]		2.58		—
Required Resistance [MΩ]		>15.5		—
Sample #	Measured	Dielectric breakdown		Result
	[MΩ]	Yes (description)	No	
20-M4	>1000	No breakdown	×	P
20-M5	>1000	No breakdown	×	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 15: MQT 12 - Humidity freeze 10 test		P
Test Date [YYYY-MM-DD] start/end	2024-04-22/2024-05-02	—
Total cycles (10)	10	—
Applied current (A)	0.05	—
Dwell time at high temperature	20 h	—
Dwell time at low temperature.....	40 min	—
Sample #	Open circuits (yes/no)	—
20-M4	no	P
20-M5	no	P
Supplementary information: N/A		

TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test		P
Test Date [YYYY-MM-DD].....: 2024-05-02		—
Sample #	Nature and position of initial findings – comments or attach photos	—
20-M4	No visual defects	P
20-M5	No visual defects	P
Supplementary information: N/A		

TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			P
Test Date [YYYY-MM-DD]	2024-05-02		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	22.3		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	2370		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
20-M4	>1000	>15.5	P
20-M5	>1000	>15.5	P
Supplementary information: N/A			

TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional			—
Test Date [YYYY-MM-DD]	2024-05-02		—
Module temperature [°C].....	Corrected to 25.0		—

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Clause	Requirement + Test			Result - Remark		Verdict
Irradiance [W/m ²):			Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
20-M4-front	13.26	51.38	12.61	43.54	549.1	80.59
20-M4-rear	10.43	51.05	9.55	44.15	421.6	79.18
20-M4-BNPI	14.65	51.63	13.84	43.76	605.7	80.08
20-M5-front	13.27	51.40	12.62	43.51	549.1	80.50
20-M5-rear	10.41	51.04	9.49	44.13	418.8	78.83
20-M5-BNPI	14.64	51.58	13.85	43.70	605.3	80.16
Supplementary information: N/A						

TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional					P
Test Date [YYYY-MM-DD]		2024-05-02			—
Test Voltage applied [V]		2 minutes of 1500			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
20-M4	>1000	>15.5	No breakdown	×	P
20-M5	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 16: MQT 14.1 Retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD] start/end		2024-05-06	—
Sample #	20-M4		—
Supplementary information: N/A			

TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface		P
Test Date [YYYY-MM-DD]..... : 2024-05-06		—
Sample #	Nature and position of initial findings – comments or attach photos	—
20-M4	No visual defects	P
Supplementary information: N/A		

TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD]		2024-05-06	—
Test Voltage applied [V]		2 minutes of 2025	—
Solution temperature [°C]		23.0	—
Size of module [m²]		2.58	—
Solution resistivity [Ω cm]		2350	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
20-M4	>1000	>15.5	P
Supplementary information: N/A			

TABLE 16.4: MQT 14.2 - Test of cord anchorage	N/A

TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage	N/A

TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage	N/A

TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 17: MQT 11 - Thermal cycling 200 test			P
Test Date [YYYY-MM-DD] start/end		2024-05-21/2024-06-26	—
Total cycles (200).....		200	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from – 40 °C to 80 °C	15.83	—
	Other stages	0.05	—
Dwell time at high temperature		15 min	—
Dwell time at low temperature		15 min	—
Sample #	Open circuits (yes/no)		—
20-M8	no		P
20-M9	no		P
Supplementary information: N/A			

TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test			P
Test Date [YYYY-MM-DD].....:		2024-06-26	—
Sample #	Nature and position of initial findings – comments or attach photos		—
20-M8	No visual defects		P
20-M9	No visual defects		P
Supplementary information: N/A			

TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test			P
Test Date [YYYY-MM-DD]	2024-06-26		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	23.4		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2349		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
20-M8	>1000	>15.5	P
20-M9	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional							—
Test Date [YYYY-MM-DD]				2024-06-26			—
Module temperature [°C].....				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
20-M8-front	13.40	51.68	12.77	43.78	559.1	80.73	—
20-M8-rear	10.51	51.23	9.66	44.41	429.0	79.68	—
20-M8-BNPI	14.80	51.87	14.02	43.99	616.7	80.33	—
20-M9-front	13.37	51.65	12.76	43.75	558.3	80.85	—
20-M9-rear	10.51	51.29	9.65	44.49	429.3	79.64	—
20-M9-BNPI	14.98	51.84	14.00	43.99	615.9	79.31	—
Supplementary information: N/A							

TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional					P
Test Date [YYYY-MM-DD]		2024-06-26			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
20-M8	>1000	>15.5	No breakdown	×	P
20-M9	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 18: MQT 13 - Damp heat 1000 test			P
Test Date [YYYY-MM-DD] start/end	2024-03-18/2024-04-30		—
Total hours (1000h)	1000		—
Sample #	—		—
20-M6	—		P
20-M7	—		P
Supplementary information: N/A			

TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-04-30		—
Sample #	Nature and position of initial findings – comments or attach photos		—
20-M6	No visual defects		P
20-M7	No visual defects		P
Supplementary information: N/A			

TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-04-30		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.9		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2381		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
20-M6	>1000	>15.5	P
20-M7	>1000	>15.5	P
Supplementary information: N/A			

TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional							—
Test Date [YYYY-MM-DD]	2024-04-30						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
20-M6-front	13.34	51.57	12.70	43.62	554.0	80.53	—
20-M6-rear	10.43	51.09	9.59	44.15	423.4	79.46	—
20-M6-BNPI	14.76	51.71	13.95	43.75	610.3	79.96	—

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Clause	Requirement + Test				Result - Remark		Verdict
20-M7-front	13.28	51.54	12.66	43.62	552.2	80.68	—
20-M7-rear	10.40	51.09	9.53	44.28	422.0	79.41	—
20-M7-BNPI	14.67	51.68	13.90	43.76	608.3	80.23	—
Supplementary information: N/A							

TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional					P
Test Date [YYYY-MM-DD]		2024-04-30			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Measured	Required Resistance	Dielectric breakdown		Result
	[MΩ]	[MΩ]	Yes (description)	No	
20-M6	>1000	>15.5	No breakdown	×	P
20-M7	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	20-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-07-06		—
Mounting method	Clamps mounting (4 points on long side with two beams across the module at the long side)		—
Load applied to.....	front side	back side	—
Mechanical load [Pa].....	5400	2400	—
First cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test			P
Test Date [YYYY-MM-DD]		2024-07-06	—
Sample #	Nature and position of initial findings – comments or attach photos		—
20-M6	No visual defects		P
Supplementary information: N/A			

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-07-06		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	23.2		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	2378		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
20-M6	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-07-06			—
Module temperature [°C].....:				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
20-M6-front	13.28	51.44	12.63	43.47	549.1	80.38	—
20-M6-rear	10.38	50.97	9.53	44.02	419.5	79.29	—
20-M6-BNPI	14.69	51.58	13.87	43.61	604.8	79.82	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD]			2024-07-06		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.58		—
Required Resistance [MΩ].....			>15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
20-M6	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 20: MQT 22 Bending test			N/A
TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
TABLE 20.2: MQT 15 - Wet leakage current test after bending test			N/A
TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional			N/A
TABLE 20.4: MQT 03 Insulation test after bending test - Optional			N/A
TABLE 21: MQT 17 - Hail impact test			N/A
TABLE 21.1: MQT 01 - Visual inspection after hail impact test			N/A
TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test			N/A
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional			N/A
TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 22: MQT 21 -Potential induced degradation test	P

TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test	P

TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test	P

TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test - Optional	—

TABLE 22.4: MQT 03 Insulation test after potential induced degradation test - Optional	P

TABLE 23: MQT 19.2: Final stabilization							—
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization							—
Test Date [YYYY-MM-DD]			2024-04-30 20-M7#; 2024-07-06 for 20-M6#				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
20-M6-front	13.28	51.44	12.63	43.47	549.1	80.38	—
20-M6-rear	10.38	50.97	9.53	44.02	419.5	79.29	—
20-M6-BNPI	14.69	51.58	13.87	43.61	604.8	79.82	—
20-M7-front	13.28	51.54	12.66	43.62	552.2	80.68	—
20-M7-rear	10.40	51.09	9.53	44.28	422.0	79.41	—
20-M7-BNPI	14.67	51.68	13.90	43.76	608.3	80.23	—
Supplementary information: N/A							

TABLE 23.2: MQT 19.1 Final Stabilization procedure							—
☐ IEC 61215-1-2 ☐ IEC 61215-1-3 ☐ IEC 61215-1-4							—
Light exposure method:				☐ Solar simulator ☐ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x :				N/A			
Sample #	N/A	Test Date (YYYY-MM-DD) start/end...:			N/A		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test				Result - Remark		Verdict
2	N/A	N/A	N/A	N/A	N/A	—	—
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure							

TABLE 23.3: MQT 19.2: Final stabilization									
☒ IEC 61215-1-1									
☐ Method 1									N/A
Stress-specific stabilization – BO LID (MQT 19.3)									N/A
Test Date [YYYY-MM-DD]				N/A					—
Applied current (A)				N/A					—
Module temperature [°C].....				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	<i>I</i> _{sc} [A]	<i>V</i> _{oc} [V]	<i>I</i> _{mp} [A]	<i>V</i> _{mp} [V]	<i>P</i> _{max} [W]	FF [%]	<i>P</i> _{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	<i>I</i> _{sc} [A]	<i>V</i> _{oc} [V]	<i>I</i> _{mp} [A]	<i>V</i> _{mp} [V]	<i>P</i> _{max} [W]	FF [%]	<i>P</i> _{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 2									—
Performance at STC before final stabilization— for monofacial modules									—
Test Date [YYYY-MM-DD]									—
Test method				☐ Solar simulator ☐ Natural sunlight					—

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Clause	Requirement + Test						Result - Remark	Verdict	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]				2024-04-30 20-M7#; 2024-07-06 for 20-M6#					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
20-M6	14.69	51.58	13.87	43.61	604.8	79.82	624.5	-3.15	P
20-M7	14.67	51.68	13.90	43.76	608.3	80.23	623.1	-2.38	P
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to destabilization artifacts.									
If Power Degradation $\geq$ 5%, then perform stress-specific stabilization MQT 19.3 in method 1									
Stress-specific stabilization – BO LID (MQT 19.3)									—
Test Date [YYYY-MM-DD]				N/A					—
Applied current (A)				N/A					—
Module temperature [°C]				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization — for monofacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									

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Clause	Requirement + Test							Result - Remark	Verdict
TABLE 23.4: MQT 19.2: Final stabilization									
☐ Method 3									
Test Date (YYYY-MM-DD) start/end		N/A							—
Test duration [h]		N/A							—
Module temperature [°C]		N/A							—
UV irradiance (280-400nm) [W/m²]		N/A							—
UV dose (280-320nm) [kWh/ m²]		N/A							—
UV dose (280-400nm) [kWh/ m²]		N/A							—
Side exposed		☐ Front side ☐ Rear side							—
Module operation condition		☐ Short circuited ☐ Open circuited							—
Supplementary information: for bifacial modules, the irradiance shall be applied to the rear side, whereas for monofacial modules, the irradiance shall be applied to the front side.									
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 4									
Performance at STC before final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☒ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									

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Clause	Requirement + Test						Result - Remark	Verdict	
Test Date [YYYY-MM-DD]				N/A					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to polarization artifacts									
If Power Degradation $\geq 5\%$, then perform method 3 final stabilization									
Method 3									
Test Date [YYYY-MM-DD]				N/A					—
Test duration [h]				N/A					—
Module temperature [°C]				N/A					—
UV irradiance (280-400nm) [W/m²]				N/A					—
UV dose (280-320nm) [kWh/ m²]				N/A					—
UV dose (280-400nm) [kWh/ m²]				N/A					—
Side exposed				☐ Front side ☐ Rear side					—
Module operation condition				☐ Short circuited ☐ Open circuited					—
Performance at STC after final stabilization — for monofacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]									—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information: N/A

for monofacial modules									
TABLE 23.5: MQT 06.1: Final Performance at STC									N/A
Test Date [YYYY-MM-DD]					—				—
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation [%]	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: P_{max} [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

for bifacial modules								—			
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)										—	
Test Date [YYYY-MM-DD].....:					—					—	
Test method					☒ Solar simulator ☐ Natural sunlight					—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]		V_{mp} [V]		P_{max} [W]		FF [%]		Result
20-M4	13.26	51.36	12.61		43.53		548.9		80.60		—
20-M5	13.27	51.40	12.62		43.51		549.1		80.50		—
20-M6	13.28	51.44	12.63		43.47		549.1		80.38		—
20-M7	13.28	51.54	12.66		43.62		552.2		80.68		—
20-M8	13.40	51.68	12.77		43.78		559.1		80.73		—
20-M9	13.37	51.65	12.76		43.75		558.3		80.85		—
Supplementary information: N/A											
TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)											
Test Date [YYYY-MM-DD].....:					—					—	
Test method					☒ Solar simulator ☐ Natural sunlight					—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result	
20-M4	10.43	51.04	9.55	44.14	421.5	79.18	78.66%	99.38%	76.79%	—	
20-M5	10.41	51.04	9.49	44.13	418.8	78.83	78.45%	99.30%	76.27%	—	
20-M6	10.38	50.97	9.53	44.02	419.5	79.29	78.16%	99.09%	76.40%	—	
20-M7	10.40	51.09	9.53	44.28	422.0	79.41	78.31%	99.13%	76.42%	—	
20-M8	10.51	51.23	9.66	44.41	429.0	79.68	78.43%	99.13%	76.73%	—	

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Clause	Requirement + Test						Result - Remark			Verdict
20-M9	10.51	51.29	9.65	44.49	429.3	79.64	78.61%	99.30%	76.89%	—
Supplementary information: N/A										

TABLE 23.8: MQT 06.1: Final Performance at BNPI									P
Test Date [YYYY-MM-DD]					—				—
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation [%]	Result
20-M4	14.64	51.65	13.83	43.79	605.6	80.09	624.3	-3.00	P
20-M5	14.64	51.58	13.85	43.70	605.3	80.16	624.5	-3.07	P
20-M6	14.69	51.58	13.87	43.61	604.8	79.82	624.5	-3.15	P
20-M7	14.67	51.68	13.90	43.76	608.3	80.23	623.1	-2.38	P
20-M8	14.80	51.87	14.02	43.99	616.7	80.33	624.2	-1.20	P
20-M9	14.98	51.84	14.00	43.99	615.9	79.31	623.0	-1.14	P
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		—			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
20-M4	>1000	>15.5	No breakdown	×	P
20-M5	>1000	>15.5	No breakdown	×	P
20-M6	>1000	>15.5	No breakdown	×	P
20-M7	>1000	>15.5	No breakdown	×	P
20-M8	>1000	>15.5	No breakdown	×	P
20-M9	>1000	>15.5	No breakdown	×	P
20-M10	>1000	>15.5	No breakdown	×	P
20-M12	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	—	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22±2	—
Size of module [m²]	:	2.58	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
20-M4	>1000	>15.5	P
20-M5	>1000	>15.5	P
20-M6	>1000	>15.5	P
20-M7	>1000	>15.5	P
20-M8	>1000	>15.5	P
20-M9	>1000	>15.5	P
20-M10	>1000	>15.5	P
20-M12	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMND-72HD575 (BOM21)

TABLE 01: MQT 01 ini: Initial Visual inspection		P
Test Date [YYYY-MM-DD]..... :	2024-02-26	—
Sample #	Nature and position of initial findings – comments or attach photos	—
21-M4	No visual defects	P
21-M5	No visual defects	P
21-M6	No visual defects	P
21-M7	No visual defects	P
21-M8	No visual defects	P
21-M9	No visual defects	P
21-M10	No visual defects	P
21-M12	No visual defects	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]			2024-02-26				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
21-M4	13.56	51.86	12.90	44.03	568.0	80.77	—
21-M5	13.57	51.83	12.87	44.13	567.9	80.74	—
21-M6	13.56	51.84	12.87	44.09	567.5	80.73	—
21-M7	13.55	51.82	12.86	44.11	567.2	80.78	—
21-M8	13.56	51.87	12.89	44.08	568.2	80.78	—
21-M9	13.52	51.80	12.85	44.11	566.8	80.93	—
21-M10	13.54	51.83	12.86	44.09	567.0	80.79	—
21-M12	13.51	51.81	12.84	44.10	566.3	80.91	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							—
Test Date [YYYY-MM-DD]			2024-02-26				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
21-M4	10.66	51.50	9.80	44.51	436.2	79.45	—
21-M5	10.63	51.47	9.79	44.50	435.7	79.63	—
21-M6	10.64	51.48	9.80	44.48	435.9	79.58	—
21-M7	10.62	51.46	9.78	44.54	435.6	79.71	—
21-M8	10.64	51.48	9.82	44.40	436.0	79.60	—
21-M9	10.62	51.45	9.79	44.47	435.4	79.69	—
21-M10	10.65	51.47	9.81	44.45	436.1	79.56	—
21-M12	10.63	51.45	9.77	44.61	435.8	79.68	—
Supplementary information: N/A							
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]			2024-02-26				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result

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Clause	Requirement + Test				Result - Remark		Verdict
21-M4	14.97	52.09	14.21	44.09	626.5	80.34	—
21-M5	14.96	52.05	14.16	44.23	626.3	80.43	—
21-M6	14.93	52.06	14.17	44.17	625.9	80.53	—
21-M7	14.91	52.05	14.13	44.27	625.6	80.61	—
21-M8	14.95	52.08	14.15	44.29	626.6	80.48	—
21-M9	14.93	52.04	14.12	44.28	625.2	80.46	—
21-M10	14.94	52.03	14.13	44.26	625.5	80.46	—
21-M12	14.92	52.03	14.10	44.31	624.7	80.47	—

Supplementary information: N/A

TABLE 02.4: MQT 19.1: Initial Stabilization procedure

Light exposure method				☐ Solar simulator ☒ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x				1%			
Sample #	21-M4	Test Date (YYYY-MM-DD) start/end			2024-02-27/2024-03-04		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	568.0	—	—
1	5.0	>500	N/A	MPPT	566.8	—	—
2	5.0	>500	N/A	MPPT	566.3	0.30	Yes

Sample #	21-M5	Test Date (YYYY-MM-DD) start/end			2024-02-27/2024-03-04		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	567.9	—	—
1	5.0	>500	N/A	MPPT	566.5	—	—
2	5.0	>500	N/A	MPPT	566.0	0.34	Yes

Sample #	21-M6	Test Date (YYYY-MM-DD) start/end			2024-02-27/2024-03-04		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	567.5	—	—
1	5.0	>500	N/A	MPPT	566.2	—	—
2	5.0	>500	N/A	MPPT	565.9	0.28	Yes

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #	21-M7	Test Date (YYYY-MM-DD) start/end			2024-02-27/2024-03-04		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	567.2	—	—
1	5.0	>500	N/A	MPPT	566.0	—	—
2	5.0	>500	N/A	MPPT	565.6	0.28	Yes

Sample #	21-M8	Test Date (YYYY-MM-DD) start/end			2024-02-27/2024-03-04		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	568.2	—	—
1	5.0	>500	N/A	MPPT	566.9	—	—
2	5.0	>500	N/A	MPPT	566.4	0.32	Yes

Sample #	21-M9	Test Date (YYYY-MM-DD) start/end			2024-02-27/2024-03-04		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.8	—	—
1	5.0	>500	N/A	MPPT	565.7	—	—
2	5.0	>500	N/A	MPPT	565.3	0.27	Yes

Sample #	21-M10	Test Date (YYYY-MM-DD) start/end			2024-02-27/2024-03-04		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	567.0	—	—
1	5.0	>500	N/A	MPPT	565.8	—	—
2	5.0	>500	N/A	MPPT	565.4	0.28	Yes

Sample #	21-M12	Test Date (YYYY-MM-DD) start/end			2024-02-27/2024-03-04		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	566.3	—	—

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Clause	Requirement + Test				Result - Remark		Verdict
1	5.0	>500	N/A	MPPT	565.0	—	—
2	5.0	>500	N/A	MPPT	564.7	0.28	Yes
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable							

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]..... :					2024-03-04 for 21-M4 - 21-M7,21-M10,21-M12; 2024-05-20 for 21-M8,21-M9;					—
$P_{\max}$ lower limit (W) :					See table below: $P_{\max}$ [W] – Min calc.					—
$\overline{P}_{\max}$ (lab) lower limit (V) :					561.7					—
V_{oc} (lab) upper limit (V) :					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A) :					See table below: I_{sc} [A] Max. calc.					—
Test method..... :					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
21-M4	13.54	14.23	51.80	54.11	12.88	43.97	566.3	544.8	80.74	P
21-M5	13.55	14.23	51.79	54.11	12.86	44.01	566.0	544.8	80.65	P
21-M6	13.54	14.23	51.78	54.11	12.85	44.04	565.9	544.8	80.72	P
21-M7	13.53	14.23	51.76	54.11	12.83	44.08	565.6	544.8	80.76	P
21-M8	13.54	14.23	51.83	54.11	12.86	44.04	566.4	544.8	80.71	P
21-M9	13.50	14.23	51.75	54.11	12.83	44.06	565.3	544.8	80.92	P
21-M10	13.52	14.23	51.78	54.11	12.84	44.03	565.4	544.8	80.76	P
21-M12	13.49	14.23	51.76	54.11	12.82	44.05	564.7	544.8	80.87	P
Average	—						565.7	561.7	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										N/A
Test Date [YYYY-MM-DD]					2024-03-04 for 21-M4 - 21-M7, 21-M10, 21-M12; 2024-05-20 for 21-M8, 21-M9;					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
21-M4	10.63	51.47	9.77	44.52	435.0	79.51	78.51%	99.36%	76.81%	—
21-M5	10.60	51.42	9.76	44.55	434.8	79.77	78.23%	99.29%	76.82%	—
21-M6	10.62	51.43	9.78	44.45	434.7	79.59	78.43%	99.32%	76.82%	—
21-M7	10.60	51.40	9.75	44.51	434.0	79.66	78.34%	99.30%	76.73%	—
21-M8	10.62	51.45	9.80	44.36	434.7	79.56	78.43%	99.27%	76.75%	—
21-M9	10.59	51.40	9.76	44.47	434.0	79.73	78.44%	99.32%	76.77%	—
21-M10	10.63	51.42	9.79	44.44	435.1	79.60	78.62%	99.30%	76.95%	—
21-M12	10.61	51.39	9.76	44.52	434.5	79.69	78.65%	99.29%	76.94%	—
Supplementary information: N/A										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m², backside irradiance 135 W/m², 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]..... :					2024-03-04 for 21-M4 - 21-M7,21-M10,21-M12; 2024-05-20 for 21-M8,21-M9;					—
$P_{\max}$ lower limit (W) :					See table below: $P_{\max}$ [W] – Min calc.					—
$\overline{P}_{\max}$ (lab) lower limit (V) :					622.8					—
V_{oc} (lab) upper limit (V) :					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A) :					See table below: I_{sc} [A] Max. calc.					—
Test method..... :					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
21-M4	14.95	15.75	52.06	54.21	14.18	44.05	624.6	604.1	80.26	P
21-M5	14.93	15.75	51.99	54.21	14.14	44.15	624.3	604.1	80.43	P
21-M6	14.90	15.75	51.98	54.21	14.15	44.11	624.2	604.1	80.59	P
21-M7	14.89	15.75	52.00	54.21	14.11	44.21	623.8	604.1	80.56	P
21-M8	14.93	15.75	52.04	54.21	14.12	44.24	624.7	604.1	80.40	P
21-M9	14.91	15.75	51.99	54.21	14.10	44.22	623.5	604.1	80.43	P
21-M10	14.91	15.75	51.97	54.21	14.11	44.21	623.7	604.1	80.50	P
21-M12	14.91	15.75	51.96	54.21	14.09	44.21	623.0	604.1	80.41	P
Average	—						624.0	622.8	—	P
Supplementary information: The limit values are calculated considering manufacturer’s tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD]	2024-03-04 for 21-M4 - 21-M7,21-M10,21-M12; 2024-05-20 for 21-M8,21-M9;			—
Test Voltage applied [V]	2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]	2.58			—
Required Resistance [MΩ]	>15.5			—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
21-M4	>1000	No breakdown	×	P
21-M5	>1000	No breakdown	×	P
21-M6	>1000	No breakdown	×	P
21-M7	>1000	No breakdown	×	P
21-M8	>1000	No breakdown	×	P
21-M9	>1000	No breakdown	×	P
21-M10	>1000	No breakdown	×	P
21-M12	>1000	No breakdown	×	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]..... :	2024-03-04 for 21-M4 - 21-M7,21-M10,21-M12; 2024-05-20 for 21-M8,21-M9;		—
Test Voltage applied [V]..... :	2 minutes of 1500		—
Solution temperature [°C]..... :	22±2		—
Solution resistivity [Ω cm]	<3500		—
Size of module [m ²]	2.58		—
Sample #	Required Resistance [M Ω]	Measured [M Ω]	Result
21-M4	>15.5	>1000	P
21-M5	>15.5	>1000	P
21-M6	>15.5	>1000	P
21-M7	>15.5	>1000	P
21-M8	>15.5	>1000	P
21-M9	>15.5	>1000	P
21-M10	>15.5	>1000	P
21-M12	>15.5	>1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)			N/A
TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)			N/A
Supplementary information: N/A			
TABLE 07: MQT 04 - Measurement of temperature coefficients			N/A
TABLE 08: MQT 08 - Outdoor exposure test			N/A
Table 08.1: MQT 01: Visual inspection after outdoor exposure test			N/A
Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			N/A
Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional			N/A
Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional			N/A
TABLE 09: MQT 18: Bypass diode thermal test			N/A
TABLE 09.1: MQT 01 - Visual inspection after bypass diode thermal test			N/A
TABLE 09.2: MQT 15 - Wet leakage current test after bypass diode thermal test			N/A
TABLE 09.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional			N/A
TABLE 09.4: MQT 03 - Insulation test after bypass diode thermal test - Optional			N/A
TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test			N/A
TABLE 10.1: MQT 19.1: Final stabilization			N/A
TABLE 10.2: MQT 06.1: Performance at STC before final stabilization			N/A
TABLE 10.3: MQT 19.1 Final Stabilization procedure			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11: MQT 09 - Hot-spot endurance test			P
Test Date [YYYY-MM-DD] start/end	2024-03-06/2024-03-07		—
Sample #	21-M12		—
Procedure of technology	☒ wafer-based technologies (WBT) MQT 09.1 ☐ monolithically integrated (MLI) thin film technologies MQT 09.2		—
Cell interconnection circuit	☐ S ☒ SPS ☐ PS		—
Type of light source	☐ Pulse solar simulator ☒ Steady state solar simulator ☐ Natural sunlight		—
Module temperature at thermal equilibrium [°C] ..	61.5/59.0		—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						P
Selected hot-spot cells	Low	Low	Low	High	Permanent	—
	A13	D01	C12	B09	N/A	
Shading rate [%]	143.1	138.9	137.8	140.5	N/A	—
Max. measured cell temperature in each cell [°C]:	15	25	20	25	N/A	—
Test duration of each shading [h]	1	1	1	1	N/A	—
Irradiance during shading [W/m²]	1232	1232	1232	1232	N/A	—

Supplementary information:

Position of solar cells (front side view):

	1	2	3	4	...	12		13	...	21	22	23	24
A							Junction box						
B													
C													
D													
E													
F													

for bifacial modules, determination of the cell shading percent and the prolonged exposure are performed at the elevated irradiance BSI. If double-side illumination is used to produce BSI, both the back and the front of the cell are shaded in the same way. During cell selection, any cell that is permanently shaded by a module feature (such as the junction box) is added to the list of selected cells.

TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI		N/A
Selected hot-spot cells	N/A	—

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Clause	Requirement + Test	Result - Remark	Verdict
Number of cells shaded		N/A	—
Max. measured cell temperature [°C]		N/A	—
Test duration during shading [h]		N/A	—
Irradiance during shading [W/m ²]		N/A	—
Supplementary information: N/A			

TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test		P
Test Date [YYYY-MM-DD]: 2024-03-07		—
Sample #	Nature and position of initial findings – comments or attach photos	—
21-M12	No visual defects	P
Supplementary information: N/A		

TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test							—
Test Date [YYYY-MM-DD]		2024-03-07					—
Module temperature [°C]		Corrected to 25.0					—
Irradiance [W/m ²]		Corrected to 1000 or G _{BNPI}					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
21-M12-front	13.45	51.68	12.77	43.94	561.1	80.72	—
21-M12-rear	10.58	51.30	9.73	44.42	432.2	79.64	—
21-M12-BNPI	14.86	51.83	14.04	44.09	619.0	80.37	—
Supplementary information: N/A							

TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test					P
Test Date [YYYY-MM-DD]		2024-03-07			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
21-M12	>1000	>15.5	No breakdown	×	P

TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test			P
Test Date [YYYY-MM-DD]		2024-03-07	—
Test Voltage applied [V]		2 minutes of 1500	—

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Clause	Requirement + Test	Result - Remark	Verdict
Solution temperature [°C]	21.8		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2280		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
21-M12	>1000	>15.5	P
Supplementary information: N/A			

TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test				P
Test Date [YYYY-MM-DD]	2024-03-07			—
☐ Method A				—
Ambient temperature [°C]	N/A			—
Current flow applied [A]	N/A			—
Sample #	VFM	VFMrated	VFM = (N × VFMrated) ± 10 %	Result
N/A	N/A	N/A	☐ Yes ☐ No	N/A
Supplementary information: N/A				
☒ Method B				—
Sample #	IV curve after shading			Result
	Diode 1 working properly	Diode 2 working properly	Diode 3 working properly	—
21-M12	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			P
Test Date (YYYY-MM-DD) start/end	2024-03-06/2024-03-10		—
Module temperature [°C]	61.2		—
UV irradiance (280-400nm) [W/m ²]	192		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	5.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: N/A			

TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			P
Test Date (YYYY-MM-DD) start/end	2024-03-13/2024-03-17		—
Module temperature [°C]	60.7		—
UV irradiance (280-400nm) [W/m ²]	192		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	5.4		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: for bifacial modules repeat the procedure of UV irradiation on the rear-side of the modules.			

TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-03-17		—
Sample #	Nature and position of initial findings – comments or attach photos		—
21-M4	No visual defects		P
21-M5	No visual defects		P
Supplementary information: N/A			

TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-03-17		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.7		—
Size of module [m ²]	2.58		—
Solution resistivity [Ω cm]	2275		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
21-M4	>1000	>15.5	P

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Clause	Requirement + Test				Result - Remark		Verdict
21-M5	>1000			>15.5			P
Supplementary information: N/A							
TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional							—
Test Date [YYYY-MM-DD].....:			2024-03-17				—
Module temperature [°C].....:			Corrected to 25.0				—
Irradiance [W/m²].....:			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
21-M4-front	13.49	51.70	12.82	43.86	562.2	80.61	—
21-M4-rear	10.60	51.39	9.73	44.44	432.4	79.38	—
21-M4-BNPI	14.90	51.95	14.12	43.92	620.2	80.12	—
21-M5-front	13.51	51.72	12.81	43.90	562.4	80.48	—
21-M5-rear	10.57	51.36	9.73	44.47	432.7	79.71	—
21-M5-BNPI	14.88	51.91	14.08	44.06	620.4	80.32	—
Supplementary information: N/A							

TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional					P
Test Date [YYYY-MM-DD]			2024-03-17		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.58		—
Required Resistance [MΩ].....			>15.5		—
Sample #	Measured		Dielectric breakdown		Result
	[MΩ]		Yes (description)	No	
21-M4	>1000	>15.5	No breakdown	×	P
21-M5	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test	N/A

TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test	N/A

TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test	N/A

TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional	N/A

TABLE 14: MQT 11 - Thermal cycling 50 test			P
Test Date [YYYY-MM-DD] start/end	2024-03-25/2024-04-03		—
Total cycles (50).....	50		—
Weight attached (N)	5		—
Applied current (A)	During the heat up cycle from 40 °C to 80 °C	15.76	—
	Other stages	0.05	—
Dwell time at high temperature.....	15 min		
Dwell time at low temperature.....	15 min		
Sample #	Open circuits (yes/no)		—
21-M4	no		P
21-M5	no		P
Supplementary information: N/A			

TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test		P
Test Date [YYYY-MM-DD].....:	2024-04-03	—
Sample #	Nature and position of initial findings – comments or attach photos	—
21-M4	No visual defects	P
21-M5	No visual defects	P
Supplementary information: N/A		

TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			P
Test Date [YYYY-MM-DD]	2024-04-03		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.5		—

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Clause	Requirement + Test	Result - Remark	Verdict
Size of module [m ²]		2.58	—
Solution resistivity [Ω cm]		2387	—
Sample #	Measured [$M\Omega$]	Required Resistance [$M\Omega$]	Result
21-M4	>1000	>15.5	P
21-M5	>1000	>15.5	P
Supplementary information: N/A			

TABLE 15.5: MQT 03 – Max. power determination after thermal cycling 50 test - Optional							—
Test Date [YYYY-MM-DD]		2024-04-03					—
Module temperature [°C]		Corrected to 25.0					—
Irradiance [W/m ²]		Corrected to 1000 or G _{BNPI}					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	
21-M4-front	13.39	51.48	12.71	43.60	554.2	80.39	
21-M4-rear	10.52	51.19	9.64	44.22	426.3	79.16	
21-M4-BNPI	14.78	51.72	14.00	43.66	611.3	79.97	
21-M5-front	13.42	51.49	12.70	43.64	554.2	80.20	
21-M5-rear	10.48	51.11	9.65	44.19	426.4	79.61	
21-M5-BNPI	14.76	51.70	13.95	43.82	611.3	80.11	
Supplementary information: N/A							

TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional				P
Test Date [YYYY-MM-DD]		2024-04-03		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]		2.58		—
Required Resistance [MΩ].....		>15.5		—
Sample #	Measured	Dielectric breakdown		Result
	[MΩ]	Yes (description)	No	
21-M4	>1000	No breakdown	×	P
21-M5	>1000	No breakdown	×	P
Supplementary information: N/A				

TABLE 15: MQT 12 - Humidity freeze 10 test				P
Test Date [YYYY-MM-DD] start/end		2024-04-08/2024-04-18		—
Total cycles (10)		10		—

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Clause	Requirement + Test	Result - Remark	Verdict
Applied current (A)	0.05		—
Dwell time at high temperature	20 h		—
Dwell time at low temperature.....	40 min		—
Sample #	Open circuits (yes/no)		—
21-M4	no		P
21-M5	no		P
Supplementary information: N/A			

TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test			P
Test Date [YYYY-MM-DD]	2024-04-18		—
Sample #	Nature and position of initial findings – comments or attach photos		—
21-M4	No visual defects		P
21-M5	No visual defects		P
Supplementary information: N/A			

TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			P
Test Date [YYYY-MM-DD]	2024-04-18		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	22.3		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	2370		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
21-M4	>1000	>15.5	P
21-M5	>1000	>15.5	P
Supplementary information: N/A			

TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional							—
Test Date [YYYY-MM-DD]	2024-04-18						—
Module temperature [°C].....	Corrected to 25.0						—
Irradiance [W/m²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	
21-M4-front	13.29	51.30	12.61	43.41	547.4	80.30	
21-M4-rear	10.45	51.09	9.57	44.11	422.1	79.07	

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Clause	Requirement + Test			Result - Remark		Verdict
21-M4-BNPI	14.68	51.57	13.89	43.49	604.0	79.79
21-M5-front	13.32	51.36	12.59	43.50	547.7	80.06
21-M5-rear	10.43	50.98	9.58	44.05	422.0	79.37
21-M5-BNPI	14.64	51.58	13.83	43.69	604.3	80.02
Supplementary information: N/A						

TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional					P
Test Date [YYYY-MM-DD]		2024-04-18			—
Test Voltage applied [V]		2 minutes of 1500			—
Size of module [m²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
21-M4	>1000	>15.5	No breakdown	×	P
21-M5	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

TABLE 16: MQT 14.1 Retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD] start/end		2024-04-19	—
Sample #	21-M4		—
Supplementary information: N/A			

TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface		P
Test Date [YYYY-MM-DD] : 2024-04-19		—
Sample #	Nature and position of initial findings – comments or attach photos	—
21-M4	No visual defects	P
Supplementary information: N/A		

TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface					P
Test Date [YYYY-MM-DD]		2024-04-19			—
Test Voltage applied [V]		2 minutes of 2025			—
Solution temperature [°C]		22.3			—
Size of module [m²]		2.58			—

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Clause	Requirement + Test	Result - Remark	Verdict
Solution resistivity [Ω cm] :		2350	—
Sample #	Measured [$M\Omega$]	Limit [$M\Omega$]	Result
21-M4	>1000	>15.5	P
Supplementary information: N/A			

TABLE 16.4: MQT 14.2 - Test of cord anchorage	N/A
TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage	N/A
TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage	N/A
TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 17: MQT 11 - Thermal cycling 200 test			P
Test Date [YYYY-MM-DD] start/end		2024-05-21/2024-06-26	—
Total cycles (200).....		200	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from – 40 °C to 80 °C	15.81	—
	Other stages	0.05	—
Dwell time at high temperature		15 min	—
Dwell time at low temperature.....		15 min	—
Sample #	Open circuits (yes/no)		—
21-M8	no		P
21-M9	no		P
Supplementary information: N/A			

TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test			P
Test Date [YYYY-MM-DD].....:		2024-06-26	—
Sample #	Nature and position of initial findings – comments or attach photos		—
21-M8	No visual defects		P
21-M9	No visual defects		P
Supplementary information: N/A			

TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test			P
Test Date [YYYY-MM-DD]	2024-06-26		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.8		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2349		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
21-M8	>1000	>15.5	P
21-M9	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional							—
Test Date [YYYY-MM-DD]				2024-06-26			—
Module temperature [°C]				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
21-M8-front	13.45	51.68	12.75	43.89	559.7	80.52	—
21-M8-rear	10.57	51.30	9.74	44.22	430.7	79.44	—
21-M8-BNPI	14.82	51.91	14.00	44.10	617.4	80.25	—
21-M9-front	13.39	51.58	12.71	43.87	557.6	80.74	—
21-M9-rear	10.55	51.26	9.70	44.30	429.7	79.47	—
21-M9-BNPI	14.79	51.79	13.98	44.01	615.2	80.32	—
Supplementary information: N/A							

TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional					P
Test Date [YYYY-MM-DD]		2024-06-26			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		2.58			—
Required Resistance [MΩ]		>15.5			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
21-M8	>1000	>15.5	No breakdown	×	P
21-M9	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 18: MQT 13 - Damp heat 1000 test			P
Test Date [YYYY-MM-DD] start/end	2024-03-18/2024-04-30		—
Total hours (1000h)	1000		—
Sample #	—		—
21-M6	—		P
21-M7	—		P
Supplementary information: N/A			

TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-04-30		—
Sample #	Nature and position of initial findings – comments or attach photos		—
21-M6	No visual defects		P
21-M7	No visual defects		P
Supplementary information: N/A			

TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-04-30		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.9		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm]	2381		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
21-M6	>1000	>15.5	P
21-M7	>1000	>15.5	P
Supplementary information: N/A			

TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional							—
Test Date [YYYY-MM-DD]	2024-04-30						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
21-M6-front	13.39	51.53	12.67	43.65	553.0	80.15	—
21-M6-rear	10.46	51.22	9.60	44.19	424.2	79.18	—
21-M6-BNPI	14.74	51.60	13.96	43.69	609.9	80.18	—

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Clause	Requirement + Test				Result - Remark		Verdict
21-M7-front	13.37	51.42	12.63	43.72	552.2	80.32	—
21-M7-rear	10.48	51.09	9.58	44.17	423.2	79.03	—
21-M7-BNPI	14.69	51.71	13.89	43.84	608.9	80.16	—
Supplementary information: N/A							

TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional					P
Test Date [YYYY-MM-DD]		2024-04-30			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Measured	Required Resistance	Dielectric breakdown		Result
	[MΩ]	[MΩ]	Yes (description)	No	
21-M6	>1000	>15.5	No breakdown	×	P
21-M7	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	21-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-07-07		—
Mounting method	Clamps mounting (4 points on long side with two beams across the module at the long side)		—
Load applied to.....	front side	back side	—
Mechanical load [Pa].....	5400	2400	—
First cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours].....	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test		P
Test Date [YYYY-MM-DD].....		2024-07-07
Sample #	Nature and position of initial findings – comments or attach photos	—
21-M6	No visual defects	P
Supplementary information: N/A		

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-07-07		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	23.5		—
Size of module [m²]	2.58		—
Solution resistivity [Ω cm].....	2309		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
21-M6	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-07-07			—
Module temperature [°C].....:				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
21-M6-front	13.33	51.42	12.59	43.52	548.0	79.94	—
21-M6-rear	10.40	51.11	9.54	44.08	420.5	79.11	—
21-M6-BNPI	14.66	51.49	13.87	43.57	604.3	80.06	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD]			2024-07-07		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]			2.58		—
Required Resistance [MΩ]			>15.5		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
21-M6	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 20: MQT 22 Bending test			N/A
TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
TABLE 20.2: MQT 15 - Wet leakage current test after bending test			N/A
TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional			N/A
TABLE 20.4: MQT 03 Insulation test after bending test - Optional			N/A
TABLE 21: MQT 17 - Hail impact test			N/A
TABLE 21.1: MQT 01 - Visual inspection after hail impact test			N/A
TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test			N/A
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional			N/A
TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 22: MQT 21 -Potential induced degradation test	N/A

TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test	N/A

TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test	N/A

TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test - Optional	N/A

TABLE 22.4: MQT 03 Insulation test after potential induced degradation test - Optional	N/A

TABLE 23: MQT 19.2: Final stabilization							—
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization							—
Test Date [YYYY-MM-DD]			2024-04-30 for 21-M7#; 2024-07-07 for 21-M6#				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
21-M6-front	13.33	51.42	12.59	43.52	548.0	79.94	—
21-M6-rear	10.40	51.11	9.54	44.08	420.5	79.11	—
21-M6-BNPI	14.66	51.49	13.87	43.57	604.3	80.06	—
21-M7-front	13.37	51.42	12.63	43.72	552.2	80.32	—
21-M7-rear	10.48	51.09	9.58	44.17	423.2	79.03	—
21-M7-BNPI	14.69	51.71	13.89	43.84	608.9	80.16	—
Supplementary information: N/A							

TABLE 23.2: MQT 19.1 Final Stabilization procedure							—
☐ IEC 61215-1-2 ☐ IEC 61215-1-3 ☐ IEC 61215-1-4							—
Light exposure method:				☐ Solar simulator ☐ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x :				N/A			
Sample #	N/A	Test Date (YYYY-MM-DD) start/end ..:			N/A		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test				Result - Remark		Verdict
2	N/A	N/A	N/A	N/A	N/A	—	—
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure							

TABLE 23.3: MQT 19.2: Final stabilization									
☒ IEC 61215-1-1									
☐ Method 1									N/A
Stress-specific stabilization – BO LID (MQT 19.3)									N/A
Test Date [YYYY-MM-DD]				N/A					—
Applied current (A)				N/A					—
Module temperature [°C].....				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 2									—
Performance at STC before final stabilization— for monofacial modules									—
Test Date [YYYY-MM-DD]									—
Test method				☐ Solar simulator ☐ Natural sunlight					—

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Clause	Requirement + Test						Result - Remark	Verdict	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									—
Test Date [YYYY-MM-DD]				2024-04-30 for 21-M7#; 2024-07-07 for 21-M6#					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
21-M6	14.66	51.49	13.87	43.57	604.3	80.06	624.2	-3.19	P
21-M7	14.69	51.71	13.89	43.84	608.9	80.16	623.8	-2.39	P
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to destabilization artifacts.									
If Power Degradation $\geq 5\%$, then perform stress-specific stabilization MQT 19.3 in method 1									
Stress-specific stabilization – BO LID (MQT 19.3)									—
Test Date [YYYY-MM-DD]				N/A					—
Applied current (A)				N/A					—
Module temperature [°C]				N/A					—
Total hours (48h)				N/A					—
Performance at STC after final stabilization — for monofacial modules									—
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									

IEC 61215-2									
Clause	Requirement + Test							Result - Remark	Verdict
TABLE 23.4: MQT 19.2: Final stabilization									
☐ Method 3									
Test Date (YYYY-MM-DD) start/end		N/A							—
Test duration [h]		N/A							—
Module temperature [°C]		N/A							—
UV irradiance (280-400nm) [W/m²]		N/A							—
UV dose (280-320nm) [kWh/ m²]		N/A							—
UV dose (280-400nm) [kWh/ m²]		N/A							—
Side exposed		☐ Front side ☐ Rear side							—
Module operation condition		☐ Short circuited ☐ Open circuited							—
Supplementary information: for bifacial modules, the irradiance shall be applied to the rear side, whereas for monofacial modules, the irradiance shall be applied to the front side.									
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☐ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 4									
Performance at STC before final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]		N/A							—
Test method		☒ Solar simulator ☐ Natural sunlight							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									

IEC 61215-2									
Clause	Requirement + Test						Result - Remark	Verdict	
Test Date [YYYY-MM-DD]				N/A					—
Test method				☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to polarization artifacts									
If Power Degradation $\geq 5\%$, then perform method 3 final stabilization									
Method 3									
Test Date [YYYY-MM-DD]				N/A					—
Test duration [h]				N/A					—
Module temperature [°C]				N/A					—
UV irradiance (280-400nm) [W/m²]				N/A					—
UV dose (280-320nm) [kWh/ m²]				N/A					—
UV dose (280-400nm) [kWh/ m²]				N/A					—
Side exposed				☐ Front side ☐ Rear side					—
Module operation condition				☐ Short circuited ☐ Open circuited					—
Performance at STC after final stabilization — for monofacial modules									
Test Date [YYYY-MM-DD]				N/A					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]									—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information: N/A

for monofacial modules									
TABLE 23.5: MQT 06.1: Final Performance at STC									N/A
Test Date [YYYY-MM-DD].....:					—				—
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation [%]	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: P_{max} [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

for bifacial modules							—			
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)							—			
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result			
21-M4	13.29	51.29	12.61	43.40	547.3	80.29	—			
21-M5	13.32	51.36	12.59	43.50	547.7	80.06	—			
21-M6	13.33	51.42	12.59	43.52	548.0	79.94	—			
21-M7	13.37	51.42	12.63	43.72	552.2	80.32	—			
21-M8	13.45	51.68	12.75	43.89	559.7	80.52	—			
21-M9	13.39	51.58	12.71	43.87	557.6	80.74	—			
Supplementary information: N/A										
TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)										
Test Date [YYYY-MM-DD].....:			—				—			
Test method			☒ Solar simulator ☐ Natural sunlight				—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
21-M4	10.44	51.09	9.56	44.13	421.9	79.10	78.56%	99.61%	77.09%	—
21-M5	10.43	50.98	9.58	44.05	422.0	79.37	78.30%	99.26%	77.05%	—
21-M6	10.40	51.11	9.54	44.08	420.5	79.11	78.24%	99.14%	77.01%	—
21-M7	10.48	51.09	9.58	44.17	423.2	79.03	78.38%	99.36%	76.63%	—
21-M8	10.57	51.30	9.74	44.22	430.7	79.44	78.59%	99.26%	76.97%	—

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Clause	Requirement + Test						Result - Remark			Verdict
21-M9	10.55	51.26	9.70	44.30	429.7	79.47	78.79%	99.38%	77.07%	—
Supplementary information: N/A										

TABLE 23.8: MQT 06.1: Final Performance at BNPI									P
Test Date [YYYY-MM-DD]					—				—
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation [%]	Result
21-M4	14.68	51.52	13.90	43.44	603.8	79.84	624.6	-3.45	P
21-M5	14.64	51.58	13.83	43.69	604.3	80.02	624.3	-3.31	P
21-M6	14.66	51.49	13.87	43.57	604.3	80.06	624.2	-3.19	P
21-M7	14.69	51.71	13.89	43.84	608.9	80.16	623.8	-2.45	P
21-M8	14.82	51.91	14.00	44.10	617.4	80.25	624.7	-1.18	P
21-M9	14.79	51.79	13.98	44.01	615.2	80.32	623.5	-1.35	P
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		—			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.58			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
21-M4	>1000	>15.5	No breakdown	×	P
21-M5	>1000	>15.5	No breakdown	×	P
21-M6	>1000	>15.5	No breakdown	×	P
21-M7	>1000	>15.5	No breakdown	×	P
21-M8	>1000	>15.5	No breakdown	×	P
21-M9	>1000	>15.5	No breakdown	×	P
21-M10	>1000	>15.5	No breakdown	×	P
21-M12	>1000	>15.5	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	—	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22±2	—
Size of module [m²]	:	2.58	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
21-M4	>1000	>15.5	P
21-M5	>1000	>15.5	P
21-M6	>1000	>15.5	P
21-M7	>1000	>15.5	P
21-M8	>1000	>15.5	P
21-M9	>1000	>15.5	P
21-M10	>1000	>15.5	P
21-M12	>1000	>15.5	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMNH-66HD615 (BOM22)

TABLE 01: MQT 01 ini: Initial Visual inspection		P
Test Date [YYYY-MM-DD]..... :	2024-04-07	—
Sample #	Nature and position of initial findings – comments or attach photos	—
22-M4	No visual defects	P
22-M5	No visual defects	P
22-M6	No visual defects	P
22-M7	No visual defects	P
22-M8	No visual defects	P
22-M9	No visual defects	P
22-M10	No visual defects	P
22-M11	No visual defects	P
22-M12	No visual defects	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]				2024-04-07			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
22-M4	15.43	48.66	14.82	41.57	616.0	82.06	—
22-M5	15.47	48.71	14.86	41.57	617.7	81.96	—
22-M6	15.48	48.54	14.79	41.45	612.9	81.58	—
22-M7	15.54	48.53	14.80	41.45	613.3	81.36	—
22-M8	15.49	48.54	14.85	41.38	614.3	81.69	—
22-M9	15.48	48.71	14.87	41.50	616.8	81.81	—
22-M10	15.45	48.65	14.84	41.53	616.4	81.99	—
22-M11	15.53	48.64	14.86	41.50	616.6	81.63	—
22-M12	15.50	48.59	14.82	41.49	614.7	81.60	—
Supplementary information: N/A							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							—
Test Date [YYYY-MM-DD]				2024-04-07			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
22-M4	12.25	48.28	11.54	42.12	486.0	82.14	—
22-M5	12.23	48.33	11.58	42.03	486.7	82.35	—
22-M6	12.25	48.15	11.65	41.52	483.6	81.98	—
22-M7	12.26	48.14	11.47	42.02	481.9	81.62	—
22-M8	12.28	48.16	11.58	42.05	486.8	82.33	—
22-M9	12.19	48.34	11.53	41.99	484.0	82.17	—
22-M10	12.28	48.30	11.61	41.92	486.7	82.07	—
22-M11	12.26	48.27	11.64	41.92	488.0	82.47	—
22-M12	12.21	48.21	11.60	41.95	486.6	82.67	—
Supplementary information: N/A							
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							—
Test Date [YYYY-MM-DD]				2024-04-07			—

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Clause	Requirement + Test				Result - Remark		Verdict
Test method :			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
22-M4	17.03	48.72	16.42	41.33	678.5	81.79	—
22-M5	17.08	48.76	16.46	41.28	679.6	81.59	—
22-M6	17.12	48.56	16.36	41.29	675.5	81.26	—
22-M7	17.10	48.60	16.37	41.29	675.7	81.29	—
22-M8	17.18	48.68	16.42	41.31	678.5	81.13	—
22-M9	17.05	48.76	16.41	41.40	679.3	81.73	—
22-M10	17.15	48.72	16.45	41.31	679.5	81.32	—
22-M11	17.16	48.72	16.42	41.37	679.2	81.25	—
22-M12	17.14	48.60	16.40	41.25	676.5	81.23	—
Supplementary information: N/A							
TABLE 02.4: MQT 19.1: Initial Stabilization procedure							
Light exposure method :			☐ Solar simulator ☒ Natural sunlight				
Stabilization criterion x per IEC 61215-1-x :			1%				
Sample #	22-M4	Test Date (YYYY-MM-DD) start/end:			2024-04-07/2024-04-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	616.0	—	—
1	5.0	>500	N/A	MPPT	618.0	—	—
2	5.0	>500	N/A	MPPT	614.3	0.60	Yes

Sample #	22-M5	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	617.7	—	—
1	5.0	>500	N/A	MPPT	620.0	—	—
2	5.0	>500	N/A	MPPT	618.1	0.37	Yes

Sample #	22-M6	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)

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Clause	Requirement + Test				Result - Remark		Verdict
Initial	—	—	—	—	612.9	—	—
1	5.0	>500	N/A	MPPT	616.1	—	—
2	5.0	>500	N/A	MPPT	614.1	0.52	Yes

Sample #	22-M7	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	613.3	—	—
1	5.0	>500	N/A	MPPT	615.8	—	—
2	5.0	>500	N/A	MPPT	612.9	0.48	Yes

Sample #	22-M8	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	614.3	—	—
1	5.0	>500	N/A	MPPT	618.1	—	—
2	5.0	>500	N/A	MPPT	615.3	0.62	Yes

Sample #	22-M9	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	616.8	—	—
1	5.0	>500	N/A	MPPT	620.2	—	—
2	5.0	>500	N/A	MPPT	616.6	0.58	Yes

Sample #	22-M10	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	616.4	—	—
1	5.0	>500	N/A	MPPT	617.7	—	—
2	5.0	>500	N/A	MPPT	616.5	0.20	Yes

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Clause	Requirement + Test				Result - Remark		Verdict
Sample #	22-M11	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	616.6	—	—
1	5.0	>500	N/A	MPPT	619.1	—	—
2	5.0	>500	N/A	MPPT	616.3	0.45	Yes
Sample #	22-M12	Test Date (YYYY-MM-DD) start/end			2024-04-07/2024-04-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	614.7	—	—
1	5.0	>500	N/A	MPPT	614.9	—	—
2	5.0	>500	N/A	MPPT	614.2	0.10	Yes
Supplementary information: N/A							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
N/A	N/A						
Test method description: N/A							
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure if applicable							

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										P
Test Date [YYYY-MM-DD]..... :					2024-04-16					—
$P_{\max}$ lower limit (W) :					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V) :					593.5					—
V_{oc} (lab) upper limit (V) :					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A) :					See table below: I_{sc} [A] Max. calc.					—
Test method :					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
22-M4	15.45	16.37	48.66	50.60	14.84	41.41	614.3	575.7	81.69	P
22-M5	15.51	16.37	48.71	50.60	14.91	41.45	618.1	575.7	81.80	P
22-M6	15.48	16.37	48.56	50.60	14.86	41.33	614.1	575.7	81.72	P
22-M7	15.61	16.37	48.52	50.60	14.80	41.41	612.9	575.7	80.93	P
22-M8	15.49	16.37	48.65	50.60	14.84	41.45	615.3	575.7	81.64	P
22-M9	15.61	16.37	48.67	50.60	14.89	41.41	616.6	575.7	81.16	P
22-M10	15.48	16.37	48.68	50.60	14.87	41.45	616.5	575.7	81.79	P
22-M11	15.58	16.37	48.65	50.60	14.88	41.41	616.3	575.7	81.31	P
22-M12	15.53	16.37	48.54	50.60	14.83	41.41	614.2	575.7	81.50	P
Average	—						615.4	593.5	—	P
Supplementary information: The limit values are calculated considering manufacturer's tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										—
Test Date [YYYY-MM-DD]					2024-04-16					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
22-M4	12.21	48.29	11.65	41.92	488.5	82.84	79.04%	99.23%	79.53%	—
22-M5	12.26	48.35	11.63	41.97	488.3	82.39	79.02%	99.25%	78.99%	—
22-M6	12.28	48.19	11.74	41.62	488.6	82.54	79.38%	99.24%	79.56%	—
22-M7	12.23	48.13	11.58	41.73	483.3	82.10	78.37%	99.19%	78.85%	—
22-M8	12.29	48.29	11.72	41.77	489.4	82.47	79.33%	99.26%	79.54%	—
22-M9	12.22	48.30	11.63	41.91	487.2	82.52	78.29%	99.25%	79.00%	—
22-M10	12.31	48.31	11.67	41.91	488.9	82.18	79.53%	99.24%	79.31%	—
22-M11	12.22	48.27	11.64	41.92	488.1	82.72	78.45%	99.22%	79.19%	—
22-M12	12.22	48.17	11.67	41.80	487.9	82.86	78.73%	99.24%	79.44%	—
Supplementary information: N/A										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m², backside irradiance 135 W/m², 25 °C, AM 1.5) after initial stabilization										P
Test Date [YYYY-MM-DD]..... :					2024-04-16					—
$P_{\max}$ lower limit (W) :					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V) :					655.3					—
V_{oc} (lab) upper limit (V) :					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A) :					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
22-M4	17.05	18.07	48.72	50.60	16.38	41.21	675.1	635.6	81.25	P
22-M5	17.13	18.07	48.72	50.60	16.46	41.29	679.4	635.6	81.39	P
22-M6	17.14	18.07	48.60	50.60	16.38	41.20	674.7	635.6	81.00	P
22-M7	17.09	18.07	48.56	50.60	16.37	41.13	673.3	635.6	81.11	P
22-M8	17.14	18.07	48.68	50.60	16.42	41.18	676.3	635.6	81.04	P
22-M9	17.26	18.07	48.72	50.60	16.47	41.20	678.6	635.6	80.71	P
22-M10	17.09	18.07	48.72	50.60	16.47	41.18	678.4	635.6	81.49	P
22-M11	17.10	18.07	48.68	50.60	16.43	41.20	677.0	635.6	81.34	P
22-M12	17.16	18.07	48.60	50.60	16.43	41.08	675.1	635.6	80.95	P
Average	—						676.1	655.3	—	N/A
Supplementary information: The limit values are calculated considering manufacturer's tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 04: MQT 03: Initial Insulation test				P
Test Date [YYYY-MM-DD]		2024-04-16		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]		2.70		—
Required Resistance [MΩ]		>14.8		—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
22-M4	>1000	No breakdown	x	P
22-M5	>1000	No breakdown	x	P
22-M6	>1000	No breakdown	x	P
22-M7	>1000	No breakdown	x	P
22-M8	>1000	No breakdown	x	P
22-M9	>1000	No breakdown	x	P
22-M10	>1000	No breakdown	x	P
22-M11	>1000	No breakdown	x	P
22-M12	>1000	No breakdown	x	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 05: MQT 15: Initial Wet leakage current test			P
Test Date [YYYY-MM-DD]	2024-04-16		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.7		—
Solution resistivity [Ω cm]	1846		—
Size of module [m ²]	2.70		—
Sample #	Required Resistance [$M\Omega$]	Measured [$M\Omega$]	Result
22-M4	>14.8	>1000	P
22-M5	>14.8	>1000	P
22-M6	>14.8	>1000	P
22-M7	>14.8	>1000	P
22-M8	>14.8	>1000	P
22-M9	>14.8	>1000	P
22-M10	>14.8	>1000	P
22-M11	>14.8	>1000	P
22-M12	>14.8	>1000	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)							—
Test Date [YYYY-MM-DD]				2024-06-12		—	
Test method ...:	☐ Outdoor measurement						—
	Ambient air temperature [°C]:			N/A			
	Irradiance [W/m²]:			N/A			
	Module temperature [°C]:			N/A			
	☒ Data corrected to a 25°C cell temperature and 200 W/m² irradiance						—
	☐ Directly measured						
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	
22-M10	3.128	46.246	3.005	39.082	117.43	81.19	
Supplementary information: N/A							

TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)										—
Test Date [YYYY-MM-DD]					2024-06-12					—
Test method ...:	☐ Outdoor measurement									—
	Ambient air temperature [°C]:				N/A					
	Irradiance [W/m²]:				N/A					
	Module temperature [°C]:				N/A					
	☒ Data corrected to a 25°C cell temperature and 200 W/m² irradiance									—
	☐ Directly measured									
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	
22-M10	2.475	45.895	2.391	38.577	92.249	81.206	79.14%	99.24%	78.56%	
Supplementary information:										

TABLE 07: MQT 04 - Measurement of temperature coefficients					—
Test Date [YYYY-MM-DD] : 2024-06-12					—
Ambient air temperature [°C] high/low : 25.0/25.0					—
Irradiance [W/m²] high/low : 1000.1/999.8					—
Module temperature [°C] high/low : 50.4/15.3					—
Sample #	α [%/°C]	β [%/°C]	δ [%/°C]		—
22-M10	0.042	-0.275	-0.304		—
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 08: MQT 08 - Outdoor exposure test		P
Test Date [YYYY-MM-DD] start/end	2024-04-25 / 2024-05-23	—
Sample #	26-M11	—
Total irradiation dosage [kWh/m²]	60.0	—
Angle of tilt the test module	35	—
Electrical load:	☐ Restive load ☒ MPPT	—
Supplementary information: N/A		

Table 08.1: MQT 01: Visual inspection after outdoor exposure test		P
Test Date [YYYY-MM-DD]: 2024-05-24		—
Sample #	Nature and position of initial findings – comments or attach photos	—
22-M11	No visual defects	P
Supplementary information: N/A		

Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test			P
Test Date [YYYY-MM-DD]	2024-05-24		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.5		—
Size of module [m ²]	2.70		—
Solution resistivity [Ω cm]	1943		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
22-M11	>1000	>14.8	P
Supplementary information: N/A			

Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional							—
Test Date [YYYY-MM-DD]	2024-05-24						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m ²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	
22-M11-front	15.906	48.273	14.875	41.257	613.69	79.93	
22-M11-rear	12.485	48.299	11.646	41.596	484.45	80.34	
22-M11-BNPI	17.497	48.220	16.492	40.962	675.52	80.07	

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Clause	Requirement + Test	Result - Remark	Verdict
Supplementary information: N/A			

Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional					P
Test Date [YYYY-MM-DD]		2024-05-24			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.70			—
Required Resistance [MΩ]		>14.8			—
Sample #	Measured	Required (MΩ)	Dielectric breakdown		Result
	(MΩ)	(MΩ)	Yes (description)	No	
22-M11	>1000	>14.8	No breakdown	x	P
Supplementary information: N/A					

TABLE 09: MQT 18: Bypass diode thermal test					P
Test Date [YYYY-MM-DD] start/end	2024-06-04				—
Sample #	22-M11				—
Module temperature [°C].....	75				—
Number of diodes in junction box	3				—
Diode manufacturer	Tongwei Solar (Hefei) Co., Ltd.				—
Diode type designation	40SQ045				—
Max. permissible junction temperature, T _{Jmax} [°C] (according to diode datasheet)	200				—
Detailed description of sample preparation procedure	performed on full module				—
Step 1, Determination of V _D versus T _J characteristic					—
Diode	1				
	30 ± 2 °C	50 ± 2 °C	70 ± 2 °C	90 ± 2 °C	
Ambient temperature of the junction box ... :	30	50	70	90	
Pulsed current.....	19.44	19.44	19.44	19.44	
Voltage drop, V _D [V]	0.3421	0.3218	0.2984	0.2765	
V _D versus T _J characteristic	V _D =0.3758 - 1.1 x 10 ⁻³ T _J				—
Max. permissible junction temperature T _{Jmax} [°C] (according to diode datasheet)	200				—
Diode	2				
	30 ± 2 °C	50 ± 2 °C	70 ± 2 °C	90 ± 2 °C	
Ambient temperature of the junction box ... :	30	50	70	90	

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Clause	Requirement + Test		Result - Remark	
Pulsed current.....:	19.44	19.44	19.44	19.44
Voltage drop, V_D [V]	0.3532	0.3344	0.3126	0.2887
V_D versus T_J characteristic	$V_D=0.3868 - 1.1 \times 10^{-3} T_J$			—
Max. permissible junction temperature T_{Jmax} [°C] (according to diode datasheet)	200			—
Diode	3			
	30 ± 2 °C	50 ± 2 °C	70 ± 2 °C	90 ± 2 °C
Ambient temperature of the junction box ... :	30	50	70	90
Pulsed current.....:	19.44	19.44	19.44	19.44
Voltage drop, V_D [V]	0.3476	0.3265	0.3014	0.2843
V_D versus T_J characteristic	$V_D=0.3795 - 1.1 \times 10^{-3} T_J$			—
Max. permissible junction temperature T_{Jmax} [°C] (according to diode datasheet)	200			—

Step 2, Bypass diode thermal test				
	Diode 1	Diode 2	Diode 3	Result
Current flow applied [A]	19.44	19.44	19.44	—
Max. diode surface temperature allowed T_{jmax} [°C] :	200	200	200	—
Voltage drop, V_D [V] after 1h.....:	0.2123	0.2334	0.2123	—
Calculated max. junction temperature T_{jcalc} [°C]:	148.6	139.5	156.5	—
$T_{jcalc} < T_{jmax}$ (test passed)? yes/no	Yes	Yes	Yes	P
Current flow ($1.25 \cdot I_{sc}$) [A]	24.30	24.30	24.30	—
Bypass diode remain(s) functional (yes/no)	Yes	Yes	Yes	P
Remarks: See Table 10 for the test details of bypass diode functionality test. 3 Diodes are considered as representative number. These diodes have to be selected as worst case. In case that additional bypass diodes tests are performed the results shall be listed in an attachment. For bifacial modules, use the value of the short-circuit current at elevated irradiance BSI (equivalent to 1 000 W/m ² on the front side and 300 W/m ² on the back side). Extrapolate I_{sc-BSI} , these quantities are combined as follows: $I_{sc-BSI}=I_{sc-BNPI}+(I_{sc-BNPI}-I_{sc})(G_{BSI}-G_{BNPI})/(G_{BNPI}-1\ 000)$, $G_{BSI}=1\ 000+300\phi$, $G_{BNPI}=1\ 000+135\phi$, $\phi=\text{Min}(\phi/I_{sc}, \phi/P_{max})$				

TABLE 09.1: MQT 01 - Visual inspection after bypass diode thermal test		P
Test Date [YYYY-MM-DD] : 2024-06-04		—
Sample #	Nature and position of initial findings – comments or attach photos	—
22-M11	No visual defects	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 09.2: MQT 15 - Wet leakage current test after bypass diode thermal test			P
Test Date [YYYY-MM-DD]	2024-06-04		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.6		—
Size of module [m²]	2.70		—
Solution resistivity [Ω cm]	1865		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
22-M11	>1000	>14.8	P
Supplementary information: N/A			

TABLE 09.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional							—
Test Date [YYYY-MM-DD]	2024-06-05						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m²]	Corrected to 1000 or G_{BNPI}						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	—
22-M11-front	15.853	48.265	14.868	41.243	613.21	80.14	—
22-M11-rear	12.475	48.287	11.637	41.578	483.86	80.32	—
22-M11-BNPI	17.487	48.214	16.477	40.946	674.68	80.02	—
Supplementary information: N/A							

TABLE 09.4: MQT 03 - Insulation test after bypass diode thermal test - Optional					P
Test Date [YYYY-MM-DD]			2024-06-05		—
Test Voltage applied [V]			2 minutes of 1500		—
Size of module [m²]			3.11		—
Required Resistance [MΩ].....			>12.9		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
22-M11	>1000	>12.9	No breakdown	×	P
Supplementary information: N/A					

TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test		P
Test Date [YYYY-MM-DD]	2024-06-05	—
☐ Method A		—

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Clause	Requirement + Test			Verdict
Ambient temperature [°C]	N/A			—
Current flow applied [A]	N/A			—
Sample #	VFM	VFM _{rated}	VFM = (N × VFM _{rated}) ± 10 %	Result
N/A	N/A	N/A	☐ Yes ☐ No	N/A
Supplementary information: N/A				
☒ Method B				—
Sample #	IV curve after shading			Result
	Diode 1 working properly	Diode 2 working properly	Diode 3 working properly	
22-M11	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
Supplementary information: N/A				

TABLE 10.1: MQT 19.1: Final stabilization	N/A
TABLE 10.2: MQT 06.1: Performance at STC before final stabilization	N/A

TABLE 10.3: MQT 19.1 Final Stabilization procedure	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11: MQT 09 - Hot-spot endurance test		P
Test Date [YYYY-MM-DD] start/end	2024-06-10	—
Sample #	22-M12	—
Procedure of technology	☒ wafer-based technologies (WBT) MQT 09.1 ☐ monolithically integrated (MLI) thin film technologies MQT 09.2	—
Cell interconnection circuit	☐ S ☒ SPS ☐ PS	—
Type of light source	☐ Pulse solar simulator ☒ Steady state solar simulator ☐ Natural sunlight	—
Module temperature at thermal equilibrium [°C] .:	54.2 – 51.6	—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						P							
Selected hot-spot cells	Low	Low	Low	High	Permanent	—							
	A7	F10	B21	C5	A11								
Shading rate [%].....	20	20	20	15	20	—							
Max. measured cell temperature in each cell [°C]:	134.7	146.4	152.3	126.8	142.5	—							
Test duration of each shading [h]	1	1	1	1	1	—							
Irradiance during shading [W/m²]	1236	1236	1236	1236	1236	—							
Supplementary information:													
Position of solar cells (front side view):													
	1	2	3	4	...	11	12	...	19	20	21	22	
A							Junction box						
B													
C													
D													
E													
F													
For bifacial modules, determination of the cell shading percent and the prolonged exposure are performed at the elevated irradiance BSI. If double-side illumination is used to produce BSI, both the back and the front of the cell are shaded in the same way. During cell selection, any cell that is permanently shaded by a module feature (such as the junction box) is added to the list of selected cells.													

TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test			P
Test Date [YYYY-MM-DD]		2024-06-11	—
Sample #	Nature and position of initial findings – comments or attach photos		—
22-M12	No visual defects		P
Supplementary information: N/A			

TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test							—
Test Date [YYYY-MM-DD]		2024-06-11					—
Module temperature [°C]		Corrected to 25.0					—
Irradiance [W/m²]		Corrected to 1000 or G _{BNPI}					—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
22-M12-front	15.516	48.501	14.873	41.341	614.32	81.63	—
22-M12-rear	12.227	48.119	11.671	41.907	489.08	83.13	—
22-M12-BNPI	17.258	48.663	16.484	41.203	679.21	80.88	—
Supplementary information: N/A							

TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test					P
Test Date [YYYY-MM-DD].....:			2024-06-11		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.70		—
Required Resistance [MΩ]			>14.8		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
22-M12	>1000	>14.8	No breakdown	×	P

TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test				P
Test Date [YYYY-MM-DD].....:		2024-06-11		—
Test Voltage applied [V]		2 minutes of 1500		—
Solution temperature [°C]		22.7		—
Size of module [m²]		2.70		—
Solution resistivity [Ω cm]		1923		—
Sample #	Measured [MΩ]	Limit [MΩ]		Result
22-M12	>1000	>14.8		P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test					P
Test Date [YYYY-MM-DD].....:		2024-06-11			—
☐ Method A					—
Ambient temperature [°C]		N/A			—
Current flow applied [A]		N/A			—
Sample #	VFM	VFM _{rated}	VFM = (N × VFM _{rated}) ± 10 %		Result
N/A	N/A	N/A	☐ Yes ☐ No		N/A
Supplementary information: N/A					
☒ Method B					—
Sample #	IV curve after shading				Result
	Diode 1 working properly	Diode 2 working properly	Diode 3 working properly		—
22-M12	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No		P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			P
Test Date (YYYY-MM-DD) start/end	2024-04-23/2024-04-29		—
Module temperature [°C]	60.7		—
UV irradiance (280-400nm) [W/m ²]	130.5		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	9.1		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: N/A			

TABLE 12.2: MQT 10 - UV preconditioning test (Back side, if bifacial modules)			P
Test Date (YYYY-MM-DD) start/end	2024-04-30/2024-05-06		—
Module temperature [°C]	60.4		—
UV irradiance (280-400nm) [W/m ²]	130.5		—
Ratio of UV irradiance (280-320nm) [W/m ²] :	9.1		—
UV dose (280-400nm) [kWh/ m ²]	15.0		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information: For bifacial modules repeat the procedure of UV irradiation on the rear-side of the modules.			

TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-05-06		—
Sample #	Nature and position of initial findings – comments or attach photos		—
22-M4	No visual defects		P
22-M5	No visual defects		P
Supplementary information: N/A			

TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			P
Test Date [YYYY-MM-DD]	2024-05-10		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.5		—
Size of module [m ²]	2.70		—
Solution resistivity [Ω cm]	1857		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
22-M4	>1000	>14.8	P

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Clause	Requirement + Test	Result - Remark	Verdict
22-M5	>1000	>14.8	P
Supplementary information: N/A			

TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional							—
Test Date [YYYY-MM-DD]			2024-05-10				—
Module temperature [°C]			Corrected to 25.0				—
Irradiance [W/m ²]			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
22-M4-front	15.510	48.355	14.936	40.538	605.47	80.73	—
22-M4-rear	12.253	47.953	11.446	41.494	474.95	80.83	—
22-M4-BNPI	17.237	48.440	16.519	40.311	665.89	79.75	—
22-M5-front	15.561	48.362	14.976	40.537	607.09	80.67	—
22-M5-rear	12.256	47.959	11.417	41.573	474.63	80.75	—
22-M5-BNPI	17.193	48.400	16.539	40.233	665.43	79.97	—
Supplementary information: N/A							

TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional					P
Test Date [YYYY-MM-DD]			2024-05-10		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]			2.70		—
Required Resistance [MΩ]			>14.8		—
Sample #	Measured		Dielectric breakdown		Result
	[MΩ]		Yes (description)	No	
22-M4	>1000	>14.8	No breakdown	×	P
22-M5	>1000	>14.8	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			N/A
TABLE 13.3: MQT 02 - Maximum power determination after Cyclic (dynamic) mechanical Load test - Optional			N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 14: MQT 11 - Thermal cycling 50 test			P
Test Date [YYYY-MM-DD] start/end		2024-05-15 / 2024-05-23	—
Total cycles (50).....		50	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from 40 °C to 80 °C	18.55	—
	Other stages	0.10	—
Dwell time at high temperature.....		20 min	—
Dwell time at low temperature.....		20 min	—
Sample #	Open circuits (yes/no)		—
22-M4	no		P
22-M5	no		P
Supplementary information: N/A			

TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test		P
Test Date [YYYY-MM-DD].....: 2024-05-23		—
Sample #	Nature and position of initial findings – comments or attach photos	—
22-M4	No visual defects	P
22-M5	No visual defects	P
Supplementary information: N/A		

TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			P
Test Date [YYYY-MM-DD]	2024-05-24		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.7		—
Size of module [m²]	2.70		—
Solution resistivity [Ω cm]	1976		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
22-M4	>1000	>14.8	P
22-M5	>1000	>14.8	P
Supplementary information: N/A			

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Clause	Requirement + Test			Result - Remark		Verdict
TABLE 14.3: MQT 03 – Max. power determination after thermal cycling 50 test - Optional						—
Test Date [YYYY-MM-DD].....:		2024-05-24				—
Module temperature [°C].....:		Corrected to 25.0				—
Irradiance [W/m²):		Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
22-M4-front	15.687	47.954	14.935	40.274	601.50	79.96
22-M4-rear	12.356	47.874	11.451	41.115	470.80	79.59
22-M4-BNPI	17.343	48.235	16.365	40.435	661.70	79.10
22-M5-front	15.696	48.213	14.936	40.386	603.20	79.71
22-M5-rear	12.362	47.834	11.428	41.165	470.43	79.56
22-M5-BNPI	17.438	48.325	16.518	40.307	665.80	79.01
Supplementary information: N/A						

TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional				P
Test Date [YYYY-MM-DD]		2024-05-24		—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000		—
Size of module [m ²]		2.70		—
Required Resistance [MΩ]		>14.8		—
Sample #	Measured	Dielectric breakdown		Result
	[MΩ]	Yes (description)	No	
22-M4	>1000	No breakdown	×	P
22-M5	>1000	No breakdown	×	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 15: MQT 12 - Humidity freeze 10 test		P
Test Date [YYYY-MM-DD] start/end	2024-05-24/2024-06-05	—
Total cycles (10)	10	—
Applied current (A)	0.05	—
Dwell time at high temperature	20 h	—
Dwell time at low temperature.....	30 min	—
Sample #	Open circuits (yes/no)	—
22-M4	no	P
22-M5	no	P
Supplementary information: N/A		

TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test		P
Test Date [YYYY-MM-DD]: 2024-06-05		—
Sample #	Nature and position of initial findings – comments or attach photos	—
22-M4	No visual defects	P
22-M5	No visual defects	P
Supplementary information: N/A		

TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test			P
Test Date [YYYY-MM-DD]	2024-06-05		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C].....	22.8		—
Size of module [m²]	2.70		—
Solution resistivity [Ω cm].....	1845		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
22-M4	>1000	>14.8	P
22-M5	>1000	>14.8	P
Supplementary information: N/A			

TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test - Optional			—
Test Date [YYYY-MM-DD]	2024-06-05		—
Module temperature [°C].....	Corrected to 25.0		—

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Clause	Requirement + Test			Result - Remark		Verdict
Irradiance [W/m ²):				Corrected to 1000 or G _{BNPI}		—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
22-M4-front	15.642	47.805	14.806	40.260	596.09	79.72
22-M4-rear	12.312	47.372	11.305	41.086	464.48	79.64
22-M4-BNPI	17.305	48.093	16.361	40.400	661.00	79.42
22-M5-front	15.657	47.956	14.860	40.342	599.50	79.84
22-M5-rear	12.324	47.564	11.394	41.124	468.57	79.94
22-M5-BNPI	17.397	48.112	16.432	40.257	661.50	79.03
Supplementary information: N/A						

TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test) - Optional					P
Test Date [YYYY-MM-DD]		2024-06-05			—
Test Voltage applied [V]		2 minutes of 1500			—
Size of module [m ²]		2.70			—
Required Resistance [MΩ]		>14.8			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
22-M4	>1000	>14.8	No breakdown	×	P
22-M5	>1000	>14.8	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 16: MQT 14.1 Retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD] start/end		2024-06-05	—
Sample #	22-M4		—
Supplementary information: N/A			

TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface		P
Test Date [YYYY-MM-DD]..... : 2024-06-05		—
Sample #	Nature and position of initial findings – comments or attach photos	—
22-M4	No visual defects	P
Supplementary information: N/A		

TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			P
Test Date [YYYY-MM-DD]		2024-06-05	—
Test Voltage applied [V]		2 minutes of 1500	—
Solution temperature [°C]		22.7	—
Size of module [m²]		2.70	—
Solution resistivity [Ω cm]		1984	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
22-M4	>1000	>14.8	P
Supplementary information: N/A			

TABLE 16.4: MQT 14.2 - Test of cord anchorage	N/A

TABLE 16.5: MQT 01 - Visual inspection after retention of test of cord anchorage	N/A

TABLE 16.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage	N/A

TABLE 16.7: MQT 03 - Insulation test after test of cord anchorage	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 17: MQT 11 - Thermal cycling 200 test			P
Test Date [YYYY-MM-DD] start/end		2024-04-30/2024-06-06	—
Total cycles (200).....		200	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from – 40 °C to 80 °C	18.35	—
	Other stages	0.10	—
Dwell time at high temperature		10 min	—
Dwell time at low temperature		20 min	—
Sample #	Open circuits (yes/no)		—
22-M8	no		P
22-M9	no		P
Supplementary information: N/A			

TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test			P
Test Date [YYYY-MM-DD].....:		2024-06-06	—
Sample #	Nature and position of initial findings – comments or attach photos		—
22-M8	No visual defects		P
22-M9	No visual defects		P
Supplementary information: N/A			

TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test			P
Test Date [YYYY-MM-DD]	2024-06-06		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.8		—
Size of module [m²]	2.70		—
Solution resistivity [Ω cm]	1931		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
22-M8	>1000	>14.8	P
22-M9	>1000	>14.8	P
Supplementary information: N/A			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 17.3: MQT 02 - Maximum power determination after thermal cycling 200 test - Optional							—
Test Date [YYYY-MM-DD]				2024-06-07			—
Module temperature [°C].....				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
22-M8-front	15.617	48.715	14.918	40.922	610.49	80.25	—
22-M8-rear	12.314	48.338	11.526	42.257	487.04	81.82	—
22-M8-BNPI	17.295	48.853	16.467	40.949	674.32	79.81	—
22-M9-front	15.645	48.740	14.810	41.425	613.50	80.45	—
22-M9-rear	12.274	48.368	11.588	41.989	486.58	81.96	—
22-M9-BNPI	17.320	48.884	16.501	40.984	676.28	79.87	—
Supplementary information: N/A							

TABLE 17.4: MQT 03 Insulation test after thermal cycling 200 test - Optional					P
Test Date [YYYY-MM-DD]		2024-06-07			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m ²]		2.70			—
Required Resistance [MΩ]		>14.8			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
22-M8	>1000	>14.8	No breakdown	×	P
22-M9	>1000	>14.8	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 18: MQT 13 - Damp heat 1000 test			P
Test Date [YYYY-MM-DD] start/end	2024-04-23/2024-06-06		—
Total hours (1000h)	1000		—
Sample #	—		—
22-M6	—		P
22-M7	—		P
Supplementary information: N/A			

TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-06-06		—
Sample #	Nature and position of initial findings – comments or attach photos		—
22-M6	No visual defects		P
22-M7	No visual defects		P
Supplementary information: N/A			

TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			P
Test Date [YYYY-MM-DD]	2024-06-06		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	22.8		—
Size of module [m²]	2.70		—
Solution resistivity [Ω cm]	1934		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
22-M6	>1000	>14.8	P
22-M7	>1000	>14.8	P
Supplementary information: N/A			

TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional							—
Test Date [YYYY-MM-DD]	2024-06-07						—
Module temperature [°C]	Corrected to 25.0						—
Irradiance [W/m²]	Corrected to 1000 or G _{BNPI}						—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
22-M6-front	15.390	48.463	14.550	41.343	601.52	80.65	—
22-M6-rear	12.436	48.120	11.764	41.715	490.73	82.00	—
22-M6-BNPI	17.044	48.655	16.249	40.944	665.28	80.22	—
22-M7-front	15.423	48.430	14.693	40.835	600.00	80.33	—

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Clause	Requirement + Test				Result - Remark		Verdict
22-M7-rear	12.414	48.061	11.476	42.039	482.45	80.86	—
22-M7-BNPI	17.073	48.619	16.204	41.012	664.57	80.06	—
Supplementary information: N/A							

TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional					P
Test Date [YYYY-MM-DD]		2024-06-07			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.70			—
Sample #	Measured	Required Resistance	Dielectric breakdown		Result
	[MΩ]	[MΩ]	Yes (description)	No	
22-M6	>1000	>14.8	No breakdown	×	P
22-M7	>1000	>14.8	No breakdown	×	P
Supplementary information: N/A					

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 19: MQT 16 Static mechanical load test			P
Sample #	22-M6		—
Design load(front side/ back side) [Pa]	3600/1600		—
Safety factors	1.5		—
Test Date [YYYY-MM-DD]	2024-06-10		—
Mounting method	Clamps mounting (8 points on long side with two beams across the module at the long side)		—
Load applied to	front side	back side	—
Mechanical load [Pa]	5400	2400	—
First cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Second cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Third cycle duration [hours]	1h	1h	—
Intermittent open-circuit (yes/no)	no	no	P
Supplementary information: N/A			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test		P
Test Date [YYYY-MM-DD]: 2024-06-10		—
Sample #	Nature and position of initial findings – comments or attach photos	—
22-M6	No visual defects	P
Supplementary information: N/A		

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			P
Test Date [YYYY-MM-DD]	2024-06-10		—
Test Voltage applied [V]	2 minutes of 1500		—
Solution temperature [°C]	21.9		—
Size of module [m²]	2.70		—
Solution resistivity [Ω cm]	1965		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
22-M6	>1000	>14.8	P
Supplementary information: N/A			

IEC 61215-2							
Clause	Requirement + Test				Result - Remark		Verdict
TABLE 19.3: MQT 02 - Maximum power determination after static mechanical load test - Optional							—
Test Date [YYYY-MM-DD]				2024-06-10			—
Module temperature [°C].....				Corrected to 25.0			—
Irradiance [W/m²)				Corrected to 1000 or G _{BNPI}			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
22-M6-front	15.386	48.458	14.456	41.321	597.34	80.12	—
22-M6-rear	12.428	48.115	11.693	41.704	487.65	81.55	—
22-M6-BNPI	17.025	48.627	16.160	40.937	661.53	79.91	—
Supplementary information: N/A							

TABLE 19.4: MQT 03 Insulation test after static mechanical load test - Optional					P
Test Date [YYYY-MM-DD].....:			2024-06-10		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²].....:			2.70		—
Required Resistance [MΩ].....:			>14.8		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
22-M6	>1000	>14.8	No breakdown	×	P
Supplementary information: N/A					

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
TABLE 20: MQT 22 Bending test			N/A
TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
TABLE 20.2: MQT 15 - Wet leakage current test after bending test			N/A
TABLE 20.3: MQT 02 - Maximum power determination after bending test - Optional			N/A
TABLE 20.4: MQT 03 Insulation test after bending test - Optional			N/A

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 21: MQT 17 - Hail impact test							P
Test Date [YYYY-MM-DD]..... :	2024-06-11						—
Sample #	22-M7						—
Ice ball size [mm] :	1	2	3	4	5	6	—
	25±5%	25±5%	25±5%	25±5%	25±5%	25±5%	
	7	8	9	10	11	—	
	25±5%	25±5%	25±5%	25±5%	25±5%	—	
Ice ball weight [g] :	1	2	3	4	5	6	—
	7.46	7.53	7.41	7.45	7.57	7.67	
	7	8	9	10	11	—	
	7.61	7.66	7.52	7.44	7.63	—	
Ice ball velocity [m/s] :	1	2	3	4	5	6	—
	23.5	22.7	22.9	23.4	23.2	23.1	
	7	8	9	10	11	—	
	23.6	22.5	23.1	22.6	23.3	—	
Number of impact locations :	11						—
Supplementary information: N/A							

TABLE 21.1: MQT 01 - Visual inspection after hail impact test		P
Test Date [YYYY-MM-DD]: 2024-06-11		—
Sample #	Nature and position of initial findings – comments or attach photos	—
22-M7	No visual defects	P
Supplementary information: N/A		

TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test				P
Test Date [YYYY-MM-DD]..... :		2024-06-11		—
Test Voltage applied [V]..... :		2 minutes of 1500		—
Solution temperature [°C]..... :		22.4		—
Size of module [m²] :		2.70		—
Solution resistivity [Ω cm] :		1866		—
Sample #	Measured [MΩ]		Required Resistance [MΩ]	Result
22-M7	>1000		>14.8	P
Supplementary information: N/A				

IEC 61215-2							
Clause	Requirement + Test				Result - Remark		Verdict
TABLE 21.3: MQT 02 - Maximum power determination after hail impact test - Optional							—
Test Date [YYYY-MM-DD].....:			2024-06-11				—
Module temperature [°C].....:			Corrected to 25.0				—
Irradiance [W/m²):			Corrected to 1000 or G _{BNPI}				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	—
22-M7-front	15.423	48.420	14.663	40.835	598.76	80.18	—
22-M7-rear	12.408	48.051	11.462	42.039	481.85	80.82	—
22-M7-BNPI	17.056	48.603	16.184	41.012	663.75	80.07	—
Supplementary information: N/A							

TABLE 21.4: MQT 03 Insulation test after hail impact test - Optional					P
Test Date [YYYY-MM-DD]			2024-06-11		—
Test Voltage applied [V]			2 minutes of 1500 and 1 minute of 8000		—
Size of module [m²]			2.70		—
Required Resistance [MΩ].....			>14.8		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
22-M7	>1000	>14.8	No breakdown	×	P
Supplementary information: N/A					

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
TABLE 22: MQT 21 -Potential induced degradation test			N/A
TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test			N/A
TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test			N/A
TABLE 22.3: MQT 02 - Maximum power determination after potential induced degradation test - Optional			N/A
TABLE 22.4: MQT 03 Insulation test after potential induced degradation test - Optional			N/A

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23: MQT 19.2: Final stabilization							—
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization							—
Test Date [YYYY-MM-DD]			2024-06-10 for 22-M6#, 2024-06-11 for 22-M7#				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
22-M6-front	15.386	48.458	14.456	41.321	597.34	80.12	—
22-M6-rear	12.428	48.115	11.693	41.704	487.65	81.55	—
22-M6-BNPI	17.025	48.627	16.160	40.937	661.53	79.91	—
22-M7-front	15.423	48.420	14.663	40.835	598.76	80.18	—
22-M7-rear	12.408	48.051	11.462	42.039	481.85	80.82	—
22-M7-BNPI	17.056	48.603	16.184	41.012	663.75	80.07	—
Supplementary information: N/A							

TABLE 23.2: MQT 19.1 Final Stabilization procedure								—
☐ IEC 61215-1-2 ☐ IEC 61215-1-3 ☐ IEC 61215-1-4								—
Light exposure method:				☐ Solar simulator ☐ Natural sunlight				
Stabilization criterion x per IEC 61215-1-x :				N/A				
Sample #	N/A	Test Date (YYYY-MM-DD) start/end...:			N/A			
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)	
Initial	—	—	—	—	N/A	—	—	
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2	N/A	N/A	N/A	N/A	N/A	—	—	
Supplementary information: N/A								
☐ Other stabilization procedures								
Sample #	Test Date (YYYY-MM-DD) start/end							
N/A	N/A							
Test method description: N/A								
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure								

IEC 61215-2									
Clause	Requirement + Test						Result - Remark	Verdict	
TABLE 23.3: MQT 19.2: Final stabilization									
☒ IEC 61215-1-1									
☐ Method 1									
Stress-specific stabilization – BO LID (MQT 19.3)									
Test Date [YYYY-MM-DD]				N/A				—	
Applied current (A)				N/A				—	
Module temperature [°C]				N/A				—	
Total hours (48h)				N/A				—	
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]				N/A				—	
Test method				☐ Solar simulator ☐ Natural sunlight				—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]				N/A				—	
Test method				☐ Solar simulator ☐ Natural sunlight				—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (LabGateNo.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 2									
Performance at STC before final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]				N/A				—	
Test method				☐ Solar simulator ☐ Natural sunlight				—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]				2024-06-10 for 22-M6#, 2024-06-11 for 22-M7#				—	
Test method				☒ Solar simulator ☐ Natural sunlight				—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate	Power Degradation	Result

IEC 61215-2										
Clause	Requirement + Test						Result - Remark	Verdict		
							No.1)			
22-M6	17.025	48.627	16.160	40.937	661.53	79.91	674.71	-1.95	P	
22-M7	17.056	48.603	16.184	41.012	663.75	80.07	673.27	-1.41	P	
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to destabilization artifacts.										
If Power Degradation $\geq$ 5%, then perform stress-specific stabilization MQT 19.3 in method 1										
Stress-specific stabilization – BO LID (MQT 19.3)									—	
Test Date [YYYY-MM-DD]				N/A						—
Applied current (A)				N/A						—
Module temperature [°C]				N/A						—
Total hours (48h)				N/A						—
Performance at STC after final stabilization — for monofacial modules									—	
Test Date [YYYY-MM-DD]				N/A						—
Test method				☐ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Performance at BNPI after final stabilization — for bifacial modules										
Test Date [YYYY-MM-DD]				N/A						—
Test method				☐ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Supplementary information: N/A										
TABLE 23.4: MQT 19.2: Final stabilization										
☐ Method 3										
Test Date (YYYY-MM-DD) start/end				N/A						—
Test duration [h]				N/A						—
Module temperature [°C]				N/A						—
UV irradiance (280-400nm) [W/m ²]				N/A						—
UV dose (280-320nm) [kWh/ m ²]				N/A						—
UV dose (280-400nm) [kWh/ m ²]				N/A						—
Side exposed				☐ Front side ☐ Rear side						—

IEC 61215-2									
Clause	Requirement + Test						Result - Remark	Verdict	
Module operation condition						☐ Short circuited ☐ Open circuited		—	
Supplementary information: For bifacial modules, the irradiance shall be applied to the rear side, whereas for monofacial modules, the irradiance shall be applied to the front side.									
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]						N/A		—	
Test method						☐ Solar simulator ☐ Natural sunlight		—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]						N/A		—	
Test method						☐ Solar simulator ☐ Natural sunlight		—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									
☒ Method 4									
Performance at STC before final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]						N/A		—	
Test method						☐ Solar simulator ☐ Natural sunlight		—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI before final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]						N/A		—	
Test method						☒ Solar simulator ☐ Natural sunlight		—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

IEC 61215-2									
Clause	Requirement + Test						Result - Remark	Verdict	
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to polarization artifacts									
If Power Degradation $\geq 5\%$, then perform method 3 final stabilization									
Method 3									
Test Date [YYYY-MM-DD]						N/A		—	
Test duration [h]						N/A		—	
Module temperature [$^{\circ}\text{C}$]						N/A		—	
UV irradiance (280-400nm) [W/m^2]						N/A		—	
UV dose (280-320nm) [kWh/m^2]						N/A		—	
UV dose (280-400nm) [kWh/m^2]						N/A		—	
Side exposed						☐ Front side ☐ Rear side		—	
Module operation condition						☐ Short circuited ☐ Open circuited		—	
Performance at STC after final stabilization — for monofacial modules									
Test Date [YYYY-MM-DD]						N/A		—	
Test method						☐ Solar simulator ☐ Natural sunlight		—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]								—	
Test method						☐ Solar simulator ☐ Natural sunlight		—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A									

For monofacial modules									
TABLE 23.5: MQT 06.1: Final Performance at STC									N/A
Test Date [YYYY-MM-DD]								—	
Test method						☐ Solar simulator ☐ Natural sunlight		—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation [%]	Result

IEC 61215-2									
Clause	Requirement + Test						Result - Remark		Verdict
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility <i>r</i> of control module.									

For bifacial modules							—
TABLE 23.6: MQT 06.1 fin: Performance at STC after final stabilization (Front side)							—
Test Date [YYYY-MM-DD].....:				—			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
22-M4	15.64	47.81	14.81	40.26	596.1	79.72	—
22-M5	15.66	47.96	14.86	40.34	599.5	79.84	—
22-M6	15.39	48.46	14.46	41.32	597.3	80.12	—
22-M7	15.42	48.42	14.66	40.84	598.8	80.18	—
22-M8	15.62	48.72	14.92	40.92	610.5	80.25	—
22-M9	15.65	48.74	14.81	41.43	613.5	80.45	—
22-M11	15.85	48.27	14.87	41.24	613.2	80.14	—
Supplementary information: N/A							

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.7: MQT 06.1 fin: Performance at STC after final stabilization (Back side)										
Test Date [YYYY-MM-DD]					—					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
22-M4	12.31	47.37	11.31	41.09	464.5	79.64	78.71%	99.09%	77.92%	—
22-M5	12.32	47.56	11.39	41.12	468.6	79.94	78.71%	99.18%	78.16%	—
22-M6	12.43	48.12	11.69	41.70	487.7	81.55	80.77%	99.29%	81.64%	—
22-M7	12.41	48.05	11.46	42.04	481.9	80.82	80.45%	99.24%	80.47%	—
22-M8	12.31	48.34	11.53	42.26	487.0	81.82	78.86%	99.23%	79.78%	—
22-M9	12.27	48.37	11.59	41.99	486.6	81.96	78.45%	99.24%	79.31%	—
22-M11	12.48	48.29	11.64	41.58	483.9	80.32	78.69%	100.05%	78.91%	—
Supplementary information: N/A										

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.8: MQT 06.1: Final Performance at BNPI									P
Test Date [YYYY-MM-DD]					—				—
Test method					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation [%]	Result
22-M4	17.31	48.09	16.36	40.40	661.0	79.42	675.1	-2.08	P
22-M5	17.40	48.11	16.43	40.26	661.5	79.03	679.4	-2.63	P
22-M6	17.03	48.63	16.16	40.94	661.5	79.91	674.7	-1.95	P
22-M7	17.06	48.60	16.18	41.01	663.8	80.07	673.3	-1.41	P
22-M8	17.30	48.85	16.47	40.95	674.3	79.81	676.3	-0.30	P
22-M9	17.32	48.88	16.50	40.98	676.3	79.87	678.6	-0.34	P
22-M11	17.49	48.21	16.48	40.95	674.7	80.02	677.0	-0.34	P
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.9: MQT 03 fin: Final Insulation test					P
Test Date [YYYY-MM-DD]		—			—
Test Voltage applied [V]		2 minutes of 1500 and 1 minute of 8000			—
Size of module [m²]		2.70			—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
22-M4	>1000	>14.8	No breakdown	×	P
22-M5	>1000	>14.8	No breakdown	×	P
22-M6	>1000	>14.8	No breakdown	×	P
22-M7	>1000	>14.8	No breakdown	×	P
22-M8	>1000	>14.8	No breakdown	×	P
22-M9	>1000	>14.8	No breakdown	×	P
22-M10	>1000	>14.8	No breakdown	×	P
22-M11	>1000	>14.8	No breakdown	×	P
22-M12	>1000	>14.8	No breakdown	×	P
Supplementary information: N/A					

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			P
Test Date [YYYY-MM-DD]	:	—	—
Test Voltage applied [V]	:	2 minutes of 1500	—
Solution temperature [°C]	:	22 ± 2	—
Size of module [m²]	:	2.70	—
Solution resistivity [Ω cm]	:	<3500	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
22-M4	>1000	>14.8	P
22-M5	>1000	>14.8	P
22-M6	>1000	>14.8	P
22-M7	>1000	>14.8	P
22-M8	>1000	>14.8	P
22-M9	>1000	>14.8	P
22-M10	>1000	>14.8	P
22-M11	>1000	>14.8	P
22-M12	>1000	>14.8	P
Supplementary information: N/A			

Annex 1: Statement of Measurement Uncertainty**TÜV NORD Testing (Suzhou) Co., Ltd. (BOM1 - BOM5, BOM18, BOM19, BOM23)**

Clause #	Parameter/ Measurement / test method	Requirement % or k	Calculated U of M*
MQT02/MQT06	Pmpp (m_1)	k=2	2.34%
MQT02/MQT06	Voc (m_2)	k=2	0.78%
MQT02/MQT06	Isc (m_3)	k=2	2.24%

TÜV NORD Testing (Suzhou) Co., Ltd. (BOM13, BOM16)

Clause #	Parameter/ Measurement / test method	Requirement % or k	Calculated U of M*
MQT02/MQT06	Pmpp (m_1)	k=2	2.48%
MQT02/MQT06	Voc (m_2)	k=2	0.90%
MQT02/MQT06	Isc (m_3)	k=2	2.44%

National Photovoltaic Products Quality Supervision and Inspection Center (Attached to Chengdu Institute of Product Quality Inspection Co., Ltd.) (BOM6 – BOM8, BOM14, BOM15, BOM17, BOM21, BOM22)

Clause #	Parameter/ Measurement / test method	Requirement % or k	Calculated U of M*
MQT02/MQT06	Pmpp (m_1)	k=2	2.376%
MQT02/MQT06	Voc (m_2)	k=2	1.102%
MQT02/MQT06	Isc (m_3)	k=2	1.860%

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Annex 2: Test Table For Verifying Other Alternative Stabilization Procedure

Step 1: Alternative stabilization								N/A
Test Date (YYYY-MM-DD) start/end: N/A								—
Test method description: N/A								—
		Sample		Sample		Sample		—
Power before alternative stabilization (W)		N/A		N/A		N/A		—
Power after alternative stabilization (W)		N/A		N/A		N/A		—
Supplementary information: N/A								
Step 2: Light exposure								N/A
☐ Solar simulator ☐ Natural sunlight								
Sample		Test Date (YYYY-MM-DD) start/end.....:					N/A	
Test cycle	Light source	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	N/A	—	—
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A								
Sample		Test Date (YYYY-MM-DD) start/end.....:					N/A	
Test cycle	Light source	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	N/A	—	—
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A								
Sample		Test Date (YYYY-MM-DD) start/end.....:					N/A	
Test cycle	Light source	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	N/A	—	—
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A								

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Step 3: Stabilization determination				N/A
	Sample	Sample	Sample	Result
Stable power $P_{\max1}$ after alternative stabilization (W)	N/A	N/A	N/A	N/A
Stable power $P_{\max2}$ after light exposure (W)	N/A	N/A	N/A	N/A
Power change $P_{\max2}$ to $P_{\max1}$ (%)	N/A	N/A	N/A	N/A
Allowed power change $P_{\max2}$ to $P_{\max1}$ (%)	N/A	N/A	N/A	N/A
Is alternative stabilization method valid? (Yes/No)	N/A	N/A	N/A	N/A
Supplementary information: N/A				

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Annex 3: Lower and Higher Output Power Modules**Module type: TWMHF-66HD740(BOM17 higher end)**

TABLE A.4.1 Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]				2024-06-20			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
17-high1	17.52	50.11	16.64	43.68	726.8	82.79	—
17-high2	17.53	50.18	16.66	43.66	727.4	82.69	—
17-low1	N/A	N/A	N/A	N/A	N/A	N/A	—
17-low2	N/A	N/A	N/A	N/A	N/A	N/A	—
Supplementary information: N/A							

TABLE A.4.2 Performance at STC before initial stabilization (Back side)							—
Test Date [YYYY-MM-DD]				2024-06-20			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
17-high1	15.30	49.79	13.99	43.70	611.4	80.26	—
17-high2	15.32	49.75	14.01	43.69	612.1	80.31	—
17-low1	N/A	N/A	N/A	N/A	N/A	N/A	—
17-low2	N/A	N/A	N/A	N/A	N/A	N/A	—
Supplementary information: N/A							

TABLE A.4.3 Performance at BNPI before initial stabilization							—
Test Date [YYYY-MM-DD]				2024-06-20			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
17-high1	19.62	50.33	18.49	43.74	808.7	81.90	—
17-high2	19.60	50.39	18.51	43.73	809.4	81.95	—
17-low1	N/A	N/A	N/A	N/A	N/A	N/A	—
17-low2	N/A	N/A	N/A	N/A	N/A	N/A	—
Supplementary information: N/A							

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE A.4.4: MQT 19.1 ini: Initial Stabilization procedure							
Light exposure method			☒ Solar simulator ☐ Natural sunlight				—
Stabilization criterion x per IEC 61215-1-x ..			1%				—
Sample #	17-high 1	Test Date (YYYY-MM-DD) start/end			2024-06-20/2024-06-21		
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	726.8	—	—
1	5.0	1000	54.3	MPPT	725.5	—	—
2	5.0	1000	54.7	MPPT	724.9	0.26	Yes
Sample #	17-high 2	Test Date (YYYY-MM-DD) start/end			2024-06-20/2024-06-21		
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	727.4	—	—
1	5.0	1000	54.3	MPPT	726.2	—	—
2	5.0	1000	54.7	MPPT	725.6	0.25	Yes
Sample #	17-low 1	Test Date (YYYY-MM-DD) start/end			N/A		
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	—	—
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample #	17-low 2	Test Date (YYYY-MM-DD) start/end			N/A		
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	N/A	—	—
1	N/A	N/A	N/A	N/A	N/A	—	—
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: N/A							

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

☐ Other stabilization procedures		
Sample #	Test Date (YYYY-MM-DD) start/end	N/A
N/A	N/A	
Test method description: N/A		
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure		

TABLE A.4.7: MQT 6.1 Performance at STC after initial stabilization (Front side)							P
Test Date [YYYY-MM-DD]				2024-06-21			—
				Lower end power class	Higher end power class		—
$P_{\max}(\text{lab})$ (W)				N/A	≥ 701.1		—
$\bar{P}_{\max}(\text{lab})$ (W)				N/A	≥ 722.8		—
$V_{\text{oc}}(\text{lab})$ (V)				N/A	≤ 52.57		—
$I_{\text{sc}}(\text{lab})$ (A)				N/A	≤ 19.04		—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
17-high1	17.51	50.05	16.62	43.62	724.9	82.72	P
17-high2	17.51	50.13	16.64	43.61	725.6	82.66	P
17-low1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
17-low2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE A.4.8: MQT 6.1 Performance at STC after initial stabilization (Back side)							—
Test Date [YYYY-MM-DD]				2024-06-21			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				N/A	N/A	N/A	—
$\bar{P}_{\max}(\text{lab})$ (W)				N/A		N/A	—
$V_{\text{oc}}(\text{lab})$ (V)				N/A		N/A	—
$I_{\text{sc}}(\text{lab})$ (A)				N/A		N/A	—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
17-high1	15.28	49.75	13.97	43.65	609.8	80.22	—
17-high2	15.31	49.67	14.01	43.58	610.5	80.28	—
17-low1	N/A	N/A	N/A	N/A	N/A	N/A	—
17-low2	N/A	N/A	N/A	N/A	N/A	N/A	—
Supplementary information: N/A							

TABLE A.4.9: MQT 6.1 Performance at BNPI after initial stabilization							P
Test Date [YYYY-MM-DD]				2024-06-21			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				N/A	N/A	≥ 779.2	—
$\bar{P}_{\max}(\text{lab})$ (W)				N/A		≥ 803.3	—
$V_{\text{oc}}(\text{lab})$ (V)				N/A		≤ 52.59	—
$I_{\text{sc}}(\text{lab})$ (A)				N/A		≤ 21.18	—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
17-high1	19.60	50.27	18.46	43.69	806.6	81.86	P
17-high2	19.58	50.32	18.48	43.69	807.3	81.94	P
17-low1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
17-low2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMNH-66HD630 (BOM18 higher end)

TABLE A.4.1 Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]			2024-06-20				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
18-high1	15.78	48.60	15.07	41.55	626.3	81.65	—
18-high2	15.79	48.61	15.08	41.55	626.5	81.63	—
18-low1	N/A	N/A	N/A	N/A	N/A	N/A	—
18-low2	N/A	N/A	N/A	N/A	N/A	N/A	—
Supplementary information: N/A							

TABLE A.4.2 Performance at STC before initial stabilization (Back side)							—
Test Date [YYYY-MM-DD]			2024-06-20				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
18-high1	12.40	48.25	11.96	41.83	500.4	83.62	—
18-high2	12.46	48.25	11.78	42.43	499.6	83.08	—
18-low1	N/A	N/A	N/A	N/A	N/A	N/A	—
18-low2	N/A	N/A	N/A	N/A	N/A	N/A	—
Supplementary information: N/A							

TABLE A.4.3 Performance at BNPI before initial stabilization							—
Test Date [YYYY-MM-DD]			2024-06-20				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
18-high1	17.46	48.77	16.61	41.69	692.6	81.32	—
18-high2	17.48	48.76	16.68	41.54	692.8	81.30	—
18-low1	N/A	N/A	N/A	N/A	N/A	N/A	—
18-low2	N/A	N/A	N/A	N/A	N/A	N/A	—
Supplementary information: N/A							

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE A.4.4: MQT 19.1 ini: Initial Stabilization procedure								
Light exposure method			☐ Solar simulator ☒ Natural sunlight					—
Stabilization criterion x per IEC 61215-1-x ..			1%					—
Sample #	18-high 1	Test Date (YYYY-MM-DD) start/end			2024-06-20/2024-06-25			
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)	
Initial	—	—	—	—	626.3	—	—	
1	5.0	>500	N/A	MPPT	624.6	—	—	
2	5.0	>500	N/A	MPPT	626.5	0.31	Yes	
Sample #	18-high 2	Test Date (YYYY-MM-DD) start/end			2024-06-20/2024-06-25			
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)	
Initial	—	—	—	—	626.5	—	—	
1	5.0	>500	N/A	MPPT	626.7	—	—	
2	5.0	>500	N/A	MPPT	626.8	0.04	Yes	
Sample #	18-low 1	Test Date (YYYY-MM-DD) start/end			N/A			
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)	
Initial	—	—	—	—	N/A	—	—	
1	N/A	N/A	N/A	N/A	N/A	—	—	
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Sample #	18-low 2	Test Date (YYYY-MM-DD) start/end			N/A			
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)	
Initial	—	—	—	—	N/A	—	—	
1	N/A	N/A	N/A	N/A	N/A	—	—	
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Supplementary information: N/A								

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

☐ Other stabilization procedures

Sample #	Test Date (YYYY-MM-DD) start/end	N/A
N/A	N/A	
Test method description: N/A		
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure		

TABLE A.4.7: MQT 6.1 Performance at STC after initial stabilization (Front side)							P
Test Date [YYYY-MM-DD]..... :			2024-06-25				—
			Lower end power class		Higher end power class		—
$P_{\max}(\text{lab})$ (W) :			N/A		≥ 597.1		—
$\bar{P}_{\max}(\text{lab})$ (W) :			N/A		≥ 615.6		—
$V_{\text{oc}}(\text{lab})$ (V) :			N/A		≤ 50.59		—
I_{sc} (lab) (A) :			N/A		≤ 16.30		—
Test method..... :			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
18-high1	15.77	48.61	15.08	41.56	626.5	81.75	P
18-high2	15.79	48.60	15.03	41.71	626.8	81.66	P
18-low1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
18-low2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE A.4.8: MQT 6.1 Performance at STC after initial stabilization (Back side)							—
Test Date [YYYY-MM-DD]				2024-06-25			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				N/A	N/A	N/A	—
$\bar{P}_{\max}(\text{lab})$ (W)				N/A		N/A	—
$V_{\text{oc}}(\text{lab})$ (V)				N/A		N/A	—
$I_{\text{sc}}(\text{lab})$ (A)				N/A		N/A	—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
18-high1	12.40	48.27	11.97	41.87	501.0	83.74	—
18-high2	12.46	48.24	11.81	42.43	501.1	83.36	—
18-low1	N/A	N/A	N/A	N/A	N/A	N/A	—
18-low2	N/A	N/A	N/A	N/A	N/A	N/A	—
Supplementary information: N/A							

TABLE A.4.9: MQT 6.1 Performance at BNPI after initial stabilization							P
Test Date [YYYY-MM-DD]				2024-06-25			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				N/A	N/A	≥ 661.76	—
$\bar{P}_{\max}(\text{lab})$ (W)				N/A		≥ 682.23	—
$V_{\text{oc}}(\text{lab})$ (V)				N/A		≤ 51.643	—
$I_{\text{sc}}(\text{lab})$ (A)				N/A		≤ 18.413	—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
18-high1	17.45	48.78	16.68	41.58	693.5	81.50	P
18-high2	17.45	48.77	16.67	41.54	692.6	81.36	P
18-low1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
18-low2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMNF-66HD725 (BOM19 higher end)

TABLE A.4.1 Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]			2024-06-20				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
19-high1	18.12	48.50	17.24	41.54	716.0	81.48	—
19-high2	18.15	48.53	17.25	41.59	717.5	81.48	—
19-low1	N/A	N/A	N/A	N/A	N/A	N/A	—
19-low2	N/A	N/A	N/A	N/A	N/A	N/A	—
Supplementary information: N/A							

TABLE A.4.2 Performance at STC before initial stabilization (Back side)							—
Test Date [YYYY-MM-DD]			2024-06-20				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
19-high1	14.31	48.17	13.76	41.92	576.7	83.67	—
19-high2	14.44	48.16	13.90	41.53	577.1	83.01	—
19-low1	N/A	N/A	N/A	N/A	N/A	N/A	—
19-low2	N/A	N/A	N/A	N/A	N/A	N/A	—
Supplementary information: N/A							

TABLE A.4.3 Performance at BNPI before initial stabilization							—
Test Date [YYYY-MM-DD]			2024-06-20				—
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
19-high1	20.10	48.66	19.00	41.68	791.7	80.97	—
19-high2	20.01	48.67	18.97	41.73	791.4	81.24	—
19-low1	N/A	N/A	N/A	N/A	N/A	N/A	—
19-low2	N/A	N/A	N/A	N/A	N/A	N/A	—
Supplementary information: N/A							

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE A.4.4: MQT 19.1 ini: Initial Stabilization procedure								
Light exposure method			☐ Solar simulator ☒ Natural sunlight					—
Stabilization criterion x per IEC 61215-1-x ..			1%					—
Sample #	19-high 1	Test Date (YYYY-MM-DD) start/end			2024-06-20/2024-06-25			
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)	
Initial	—	—	—	—	716.0	—	—	
1	5.0	>500	N/A	MPPT	716.7	—	—	
2	5.0	>500	N/A	MPPT	717.1	0.16	Yes	
Sample #	19-high 2	Test Date (YYYY-MM-DD) start/end			2024-06-20/2024-06-25			
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)	
Initial	—	—	—	—	717.5	—	—	
1	5.0	>500	N/A	MPPT	717.9	—	—	
2	5.0	>500	N/A	MPPT	718.1	0.09	Yes	
Sample #	19-low 1	Test Date (YYYY-MM-DD) start/end			N/A			
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)	
Initial	—	—	—	—	N/A	—	—	
1	N/A	N/A	N/A	N/A	N/A	—	—	
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Sample #	19-low 2	Test Date (YYYY-MM-DD) start/end			N/A			
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)	
Initial	—	—	—	—	N/A	—	—	
1	N/A	N/A	N/A	N/A	N/A	—	—	
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Supplementary information: N/A								

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

☐ Other stabilization procedures		
Sample #	Test Date (YYYY-MM-DD) start/end	N/A
N/A	N/A	
Test method description: N/A		
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure		

TABLE A.4.7: MQT 6.1 Performance at STC after initial stabilization (Front side)							P
Test Date [YYYY-MM-DD]				2024-06-25			—
				Lower end power class	Higher end power class		—
$P_{\max}(\text{lab})$ (W)				N/A	≥ 686.2		—
$\bar{P}_{\max}(\text{lab})$ (W)				N/A	≥ 707.5		—
$V_{\text{oc}}(\text{lab})$ (V)				N/A	≤ 51.46		—
$I_{\text{sc}}(\text{lab})$ (A)				N/A	≤ 19.07		—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
19-high1	18.17	48.51	17.25	41.58	717.1	81.38	P
19-high2	18.17	48.52	17.27	41.59	718.1	81.46	P
19-low1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19-low2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE A.4.8: MQT 6.1 Performance at STC after initial stabilization (Back side)							—
Test Date [YYYY-MM-DD]				2024-06-25			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				N/A	N/A	N/A	—
$\bar{P}_{\max}(\text{lab})$ (W)				N/A		N/A	—
$V_{\text{oc}}(\text{lab})$ (V)				N/A		N/A	—
$I_{\text{sc}}(\text{lab})$ (A)				N/A		N/A	—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
19-high1	14.312	48.18	13.76	41.96	577.1	83.69	—
19-high2	14.42	48.16	13.87	41.71	578.5	83.31	—
19-low1	N/A	N/A	N/A	N/A	N/A	N/A	—
19-low2	N/A	N/A	N/A	N/A	N/A	N/A	—
Supplementary information: N/A							

TABLE A.4.9: MQT 6.1 Performance at BNPI after initial stabilization							P
Test Date [YYYY-MM-DD]				2024-06-25			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				N/A	N/A	≥ 766.9	—
$\bar{P}_{\max}(\text{lab})$ (W)				N/A		≥ 790.6	—
$V_{\text{oc}}(\text{lab})$ (V)				N/A		≤ 51.77	—
$I_{\text{sc}}(\text{lab})$ (A)				N/A		≤ 21.23	—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
19-high1	20.06	48.67	19.04	41.60	791.8	81.10	P
19-high2	20.12	48.67	19.08	41.60	793.8	81.07	P
19-low1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19-low2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

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Clause	Requirement + Test	Result - Remark	Verdict

Module type: TWMNH-66HD625 (BOM22 higher end) TWMNH-66HD580(BOM22 lower end)

TABLE A.4.1 Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]				2024-04-07			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
22-high1	15.49	48.63	14.84	41.46	615.0	81.60	—
22-high2	15.46	48.65	14.83	41.57	616.7	81.98	—
22-low1	15.49	48.63	14.83	41.53	615.9	81.75	—
22-low2	15.48	48.65	14.84	41.49	615.6	81.74	—
Supplementary information: N/A							

TABLE A.4.2 Performance at STC before initial stabilization (Back side)							—
Test Date [YYYY-MM-DD]				2024-04-07			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
22-high1	12.29	48.28	11.65	41.91	488.3	82.30	—
22-high2	12.28	48.27	11.71	41.72	488.5	82.40	—
22-low1	12.24	48.26	11.68	41.92	489.7	82.93	—
22-low2	12.24	48.29	11.68	41.91	489.5	82.86	—
Supplementary information: N/A							

TABLE A.4.3 Performance at BNPI before initial stabilization							—
Test Date [YYYY-MM-DD]				2024-04-07			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
22-high1	17.09	48.72	16.40	41.29	677.1	81.31	—
22-high2	17.12	48.72	16.43	41.40	680.0	81.55	—
22-low1	17.13	48.72	16.43	41.33	678.9	81.35	—
22-low2	17.07	48.72	16.41	41.28	677.3	81.46	—
Supplementary information: N/A							

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE A.4.4: MQT 19.1 ini: Initial Stabilization procedure							
Light exposure method				☐ Solar simulator ☒ Natural sunlight		—	
Stabilization criterion x per IEC 61215-1-x ..				1%		—	
Sample #	22-high 1	Test Date (YYYY-MM-DD) start/end			2024-04-07 / 2024-04-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	615.0	—	—
1	5.0	>500	N/A	MPPT	618.7	—	—
2	5.0	>500	N/A	MPPT	614.9	0.61	Yes
Sample #	22-high 2	Test Date (YYYY-MM-DD) start/end			2024-04-07 / 2024-04-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	616.7	—	—
1	5.0	>500	N/A	MPPT	620.2	—	—
2	5.0	>500	N/A	MPPT	618.0	0.58	Yes
Sample #	22-low 1	Test Date (YYYY-MM-DD) start/end			2024-04-07 / 2024-04-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	615.9	—	—
1	5.0	>500	N/A	MPPT	618.8	—	—
2	5.0	>500	N/A	MPPT	614.7	0.67	Yes
Sample #	22-low 2	Test Date (YYYY-MM-DD) start/end			2024-04-07 / 2024-04-16		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	615.6	—	—
1	5.0	>500	N/A	MPPT	618.8	—	—
2	5.0	>500	N/A	MPPT	615.1	0.60	Yes
Supplementary information: N/A							
☐ Other stabilization procedures							

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #	Test Date (YYYY-MM-DD) start/end	N/A	
N/A	N/A		
Test method description: N/A			
Supplementary information: see Annex 2 for verification of this alternative stabilization procedure			

TABLE A.4.7: MQT 6.1 Performance at STC after initial stabilization (Front side)							P
Test Date [YYYY-MM-DD]				2024-04-16			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				≥ 549.7		≥ 592.4	—
$\bar{P}_{\max}(\text{lab})$ (W)				≥ 566.7		≥ 610.7	—
$V_{\text{oc}}(\text{lab})$ (V)				≤ 49.49		≤ 51.36	—
$I_{\text{sc}}(\text{lab})$ (A)				≤ 16.00		≤ 16.56	—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
22-high1	15.49	48.67	14.85	41.41	614.9	81.56	P
22-high2	15.60	48.64	14.93	41.41	618.0	81.45	P
22-low1	15.52	48.62	14.87	41.33	614.7	81.48	P
22-low2	15.51	48.65	14.87	41.36	615.1	81.51	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

TABLE A.4.8: MQT 6.1 Performance at STC after initial stabilization (Back side)							
Test Date [YYYY-MM-DD]				2024-04-16			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				N/A	N/A	N/A	—
$\bar{P}_{\max}(\text{lab})$ (W)				N/A		N/A	—
$V_{\text{oc}}(\text{lab})$ (V)				N/A		N/A	—
$I_{\text{sc}}(\text{lab})$ (A)				N/A		N/A	—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
22-high1	12.30	48.30	11.54	42.05	485.5	81.70	—

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Clause	Requirement + Test				Result - Remark		Verdict
22-high2	12.30	48.26	11.77	41.69	490.7	82.66	—
22-low1	12.18	48.24	11.70	41.78	488.6	83.17	—
22-low2	12.23	48.28	11.69	41.96	490.7	83.12	—
Supplementary information: N/A							

TABLE A.4.9: MQT 6.1 Performance at BNPI after initial stabilization							P
Test Date [YYYY-MM-DD]				2024-04-16			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				$\leq$ 609.3	$\geq$ N/A	$\geq$ 656.8	—
$\bar{P}_{\max}(\text{lab})$ (W)				$\geq$ 628.1		$\geq$ 677.1	—
$V_{\text{oc}}(\text{lab})$ (V)				$\leq$ 49.56		$\leq$ 51.43	—
$I_{\text{sc}}(\text{lab})$ (A)				$\leq$ 17.73		$\leq$ 18.35	—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
22-high1	17.20	48.72	16.40	41.39	678.8	81.01	P
22-high2	17.16	48.72	16.44	41.31	679.2	81.25	P
22-low1	17.21	48.72	16.43	41.30	678.7	80.94	P
22-low2	17.20	48.76	16.40	41.40	679.1	81.00	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

Annex 4: List of Measurement Equipment**TÜV NORD Testing (Suzhou) Co., Ltd.**

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
4.1	Visual inspection	Luminometer (TNRD0002)	0~1500 Lux	2024-03-26	2025-03-25
4.2	Maximum power determination	Pulsed Solar Simulator (TNRDEQ043)	100 - 1200 W/m ²	2023-12-01	2024-11-30
		Pulsed Solar Simulator (TNRDEQ001)	100~1200 W/m ²	2024-03-25	2025-03-24
4.3	Insulation test	Withstanding voltage / Insulation resistance tester (TNRDTI020)	0 - 12 kV 0 - 999 MΩ	2023-10-09	2024-10-08
		Thermometer (TNRD0003)	0 - 50 °C 20 - 90%RH	2024-03-13	2025-03-12
4.4	Measurement of temperature coefficients	High and low temperature chamber (TNRDEQ012)	25 - 105 °C 85%RH	2024-03-12	2025-03-11
		Pulsed Solar Simulator (TNRDEQ043)	100 - 1200 W/m ²	2023-12-01	2024-11-30
4.6	Performance at STC	Pulsed Solar Simulator (TNRDEQ043)	100 - 1200 W/m ²	2023-12-01	2024-11-30
		Pulsed Solar Simulator (TNRDEQ001)	100~1200 W/m ²	2024-03-25	2025-03-24
4.7	Performance at low irradiance	Pulsed Solar Simulator (TNRDEQ043)	100 - 1200 W/m ²	2023-12-01	2024-11-30
4.8	Outdoor exposure test	PV Module Test System (TNRDTI002)	-200 - 2000 W/m ²	2023-07-09	2024-07-08
4.9	Hot-spot endurance test	Steady-state solar simulator (TNRDEQ011)	600 - 1400 W/m ²	2024-03-25	2025-03-24
		Pulsed Solar Simulator (TNRDEQ043)	100 - 1200 W/m ²	2023-12-01	2024-11-30
		IR Camera (TNRDTI014)	25 - 200°C	2023-10-13	2024-10-12
4.10	UV preconditioning test	UV radiation testing machine (TNRDEQ041)	280 - 400 nm	2024-03-25	2025-03-24
4.11	Thermal cycling test	High and low temperature chamber (TNRDEQ005)	-40 - 85 °C 85%RH	2024-03-13	2025-03-12

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
		DC Power Supply (TNRDTI011)	0 - 80V 0 - 50A	2024-03-10	2025-03-09
		Weight (TNRDTO061)	5N	2023-07-17	2024-07-16
4.12	Humidity freeze test	Temperature/humidity cycling environment chamber (TNRDEQ008)	-40 - 85 °C 85%RH	2024-03-13	2025-03-12
		DC Power Supply (TNRDTI030)	0 - 100 V 0 - 100 mA	2023-10-09	2024-10-08
4.13	Damp heat test	High and low temperature chamber (TNRDEQ006)	60 - 85°C 85%RH	2024-03-12	2025-03-11
		Weight (TNRDTO061)	5N	2023-07-17	2024-07-16
4.14	Robustness of terminations	Digital display push pull meter (TNRDTI003)	0 - 100 N	2024-03-12	2025-03-11
		Weight (TNRDTO054)	40 N	2023-07-17	2024-07-16
4.15	Wet leakage current	Withstanding voltage/ Insulation resistance tester (TNRDTI020)	0 - 12 kV 0 - 999 MΩ	2023-10-09	2024-10-08
		Conductive meter (TNRDTI004)	0 - 10000 μS/cm	2024-03-13	2025-03-12
4.16	Static mechanical load test	Mechanical load tester (TNRDSM001)	100 - 500 kgf	2023-10-09	2024-10-08
4.17	Hail impact test	Hail impact test machine (TNRDEQ007)	16 - 40 m/s	2024-03-10	2025-03-09
		Electronic balance (TNRDTO009)	0 - 1000 g	2023-10-09	2024-10-08
4.18.1	Bypass diode thermal test	High and low temperature chamber (TNRDEQ012)	25 - 105 °C 85%RH	2024-03-12	2025-03-11
		Pulsed Solar Simulator (TNRDEQ043)	100 - 1200 W/m ²	2023-12-01	2024-11-30
		Diode thermal performance testing system (TNRDTI027)	0 - 25 A 800 μs	2023-07-09	2024-07-08

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
4.18.2	Bypass diode functionality test	Pulsed Solar Simulator (TNRDEQ043)	100 - 1200 W/m ²	2023-12-01	2024-11-30
		Pulsed Solar Simulator (TNRDEQ001)	100~1200 W/m ²	2024-03-25	2025-03-24
4.19.5	Initial stabilization	Steady-state solar simulator (TNRDEQ011)	600 - 1200 W/m ²	2024-03-25	2025-03-24
4.20	Cyclic (dynamic) mechanical load test	Mechanical load tester (TNRDSM001)	100 - 500 kgf	2023-10-09	2024-10-08
4.21	Potential induced degradation test	High and low temperature chamber (TNRDEQ012)	20~105 °C 60~90%RH	2024-03-12	2025-03-11
		PID Tester (TNRDTI018)	-1500 - +1500 V	2023-10-09	2024-10-08

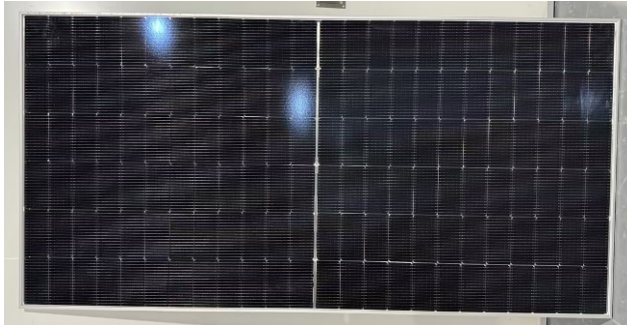
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Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
4.1	Visual inspection	Luminometer (Z10S06102)	0 - 20000lx	2023-09-25	2024-09-25
4.2	Maximum power determination	AAA Long Pulse Simulator (Z10315800)	100 - 1400 W/m ²	2023-09-12	2024-09-11
4.3	Insulation test	Withstand voltage tester (Z30233600)	0 - 12 kV 0.1MΩ - 50GMΩ	2022-12-18	2024-12-17
4.4	Measurement of temperature coefficients	High and low temperature alternating humidity heat environment test chamber (Z10S03800)	-50 - 100 °C 10% - 98%RH	2023-09-22	2024-09-21
		AAA Long Pulse Simulator (Z10315800)	100 - 1400 W/m ²	2023-09-12	2024-09-11
4.6	Performance at STC	AAA Long Pulse Simulator (Z10315800)	100 - 1400 W/m ²	2023-09-12	2024-09-11
4.7	Performance at low irradiance	AAA Long Pulse Simulator (Z10315800)	100 - 1400 W/m ²	2023-09-12	2024-09-11
4.8	Outdoor exposure test	NMOT Test System (Z25032700)	N/A	2023-06-05	2024-06-04
4.9	Hot-spot endurance test	AAA steady state simulator measurement system (Z10S00800)	200 - 1300 W/m ²	2022-12-07	2024-12-06
		AAA Long Pulse Simulator (Z10315800)	100 - 1400 W/m ²	2023-09-12	2024-09-11
		IR Camera (Z25029800)	-20 - +1200°C	2023-04-10	2024-04-09
4.10	UV preconditioning test	Accelerated UV wet heat test chamber (Z25031700)	280 - 400 nm	2022-12-07	2024-12-06
4.11	Thermal cycling test	High and low temperature alternating humidity heat environment test chamber (Z10S03800)	-50 - 100 °C 0 - 98%RH	2023-09-22	2024-09-21
		Current Continuity Monitoring System (Z25032800)	N/A	2023-08-23	2024-08-22

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
		Weight (G30213600)	500g	N/A	N/A
4.12	Humidity-freeze test	High and low temperature alternating humidity and heat environment test chamber (Z25031400)	-50 - 120 °C	2023-09-22	2024-09-21
		Current Continuity Monitoring System (Z25032800)	N/A	2023-08-23	2024-08-22
4.13	Damp heat test	Constant temperature and humidity Chamber (Z10S03600)	0 - 95 °C 0 - 98%RH	2023-09-22	2024-09-21
4.14	Robustness of terminations	Digital dynamometer (Z10S06106)	0 ~ 200 N	2023-09-28	2024-09-27
		Weight (Z1029701)	40 N	2023-03-09	2024-03-08
4.15	Wet leakage current test	Withstand voltage tester (Z30233600)	0 - 12 kV 0.1MΩ - 50GMΩ	2022-12-18	2024-12-17
		Conductive meter (Z10S05002)	20 - 2000 μS/cm	2023-09-26	2024-09-25
		Thermometer (J10S01600)	0 - 100°C	2023-04-14	2024-04-13
4.16	Static mechanical load test	Mechanical load testing machine (Z10315900)	0 ~ 100 kg	2023-09-18	2024-09-17
4.17	Hail test	Hail impact test machine (Z25032600)	10-50 m/s	2023-10-24	2024-10-23
		Electronic balance (Z10S00502)	0 - 60Kg	2023-09-26	2024-09-25
		Vernier calliper (J28860200)	0-150mm	2023-04-10	2024-04-09
4.18.1	Bypass diode thermal test	High and low temperature alternating humidity heat environment test chamber (Z10S03800)	-50 - 100 °C 0 - 98%RH	2023-09-22	2024-09-21
		Pulse DC Power Supply (Z30134700)	N/A	2023-04-07	2024-04-06
		Current probe (Z30139900)	N/A	2023-09-26	2024-09-25

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
		Data collector (Z10S00902)	N/A	2023-04-11	2024-04-10
		Digital oscilloscope (Z10289700)	N/A	2023-09-26	2024-09-25
4.18.2	Bypass diode functionality test	AAA Long Pulse Simulator (Z10315800)	100 - 1400 W/m ²	2023-09-12	2024-09-11
4.19	Initial Stabilization	MPPT (Z25031800)	N/A	2023-03-16	2024-03-15
		AAA Long Pulse Simulator (Z10315800)	100 - 1400 W/m ²	2023-09-12	2024-09-11
4.20	Cyclic (dynamic) mechanical load test	mechanical load testing machine (Z10315900)	0 - 100 kg	2023-09-18	2024-09-17
4.21	Potential induced degradation test	Constant temperature and humidity chamber (Z10S03600)	0 - 95 °C 0 - 98%RH	2023-09-22	2024-09-21
		Power supply (Z30041720)	0 - +1500 V	2023-02-22	2024-02-21
		Power supply (Z30041760)	0 - +1500 V	2023-02-22	2024-02-21
		Power supply (Z30041770)	0 - +1500 V	2023-02-22	2024-02-21
		Power supply (Z30041780)	0 - +1500 V	2023-02-22	2024-02-21

Module type: TWMND-72HD570 (BOM1)



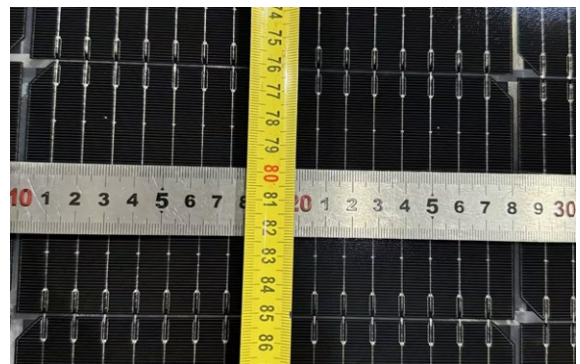
Front overview



[Back overview](#)



Label



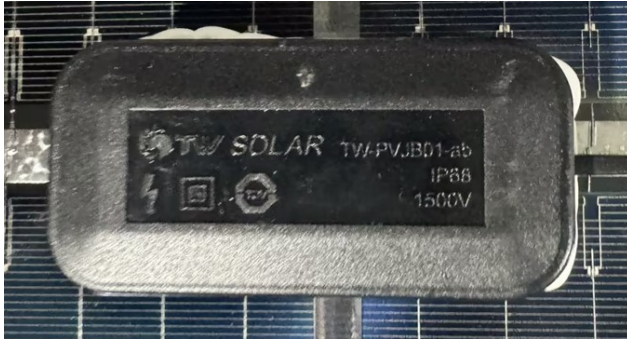
Solar cell



Frame



Grounding Mark



Junction box (TW-PVJB01-ab)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 1x4.0mm²)



Mark (Do not disconnect under load)



Connectors (TW-PVCON-01)

Module type: TWMND-72HD580 (BOM2)



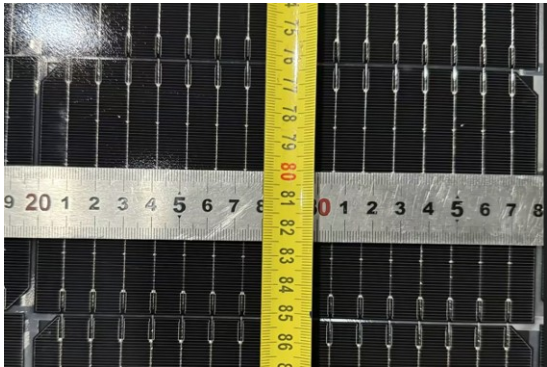
Front overview



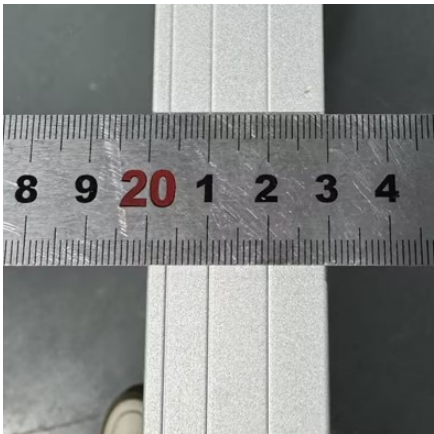
Back overview



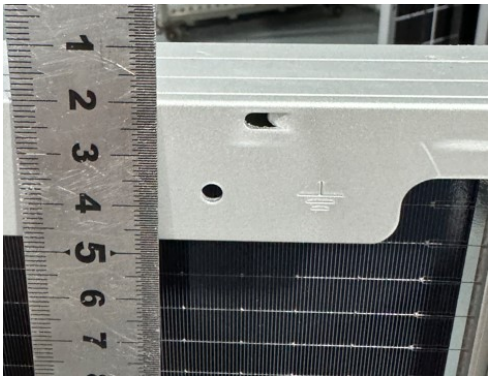
Label



Solar cell



Frame



Grounding Mark



Junction box (TW-PVJB01-ab)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 1x4.0mm²)

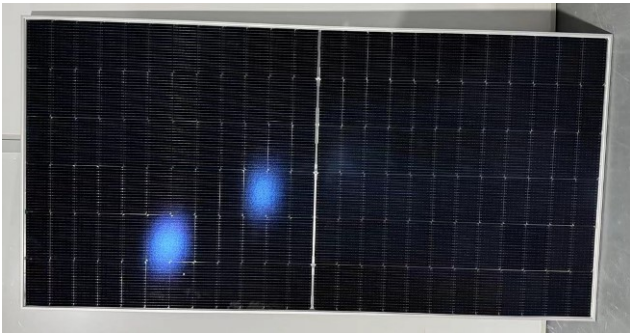


Mark (Do not disconnect under load)



Connectors (TW-PVCON-01)

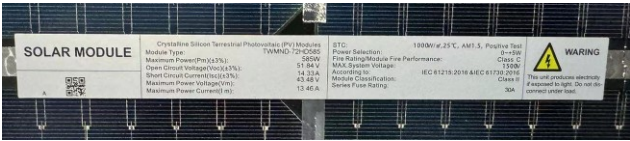
Module type: TWMND-72HD585 (BOM3)



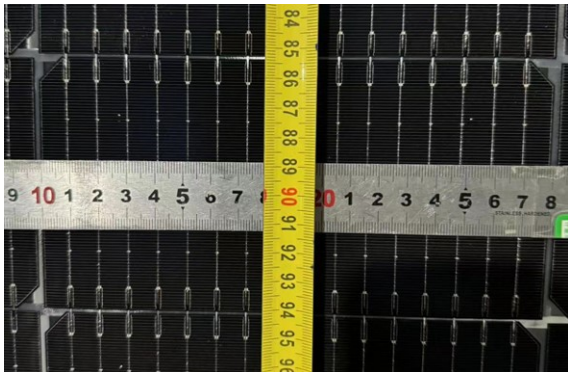
Front overview



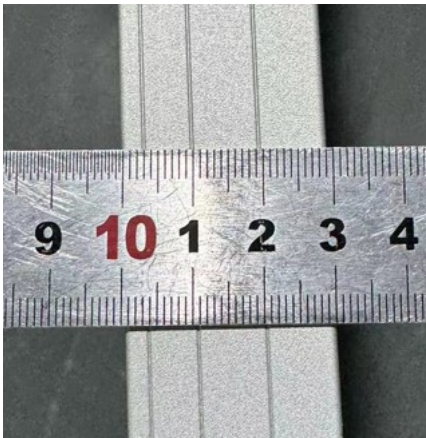
Back overview



Label



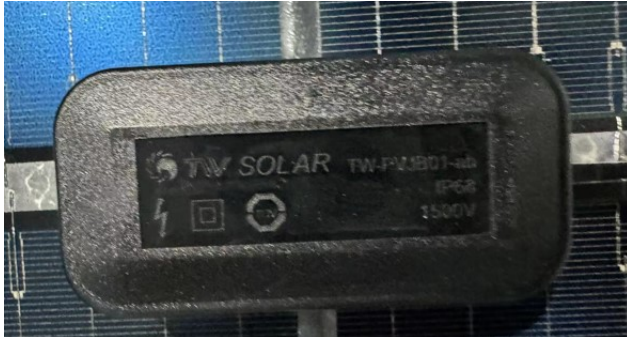
Solar cell



Frame



Grounding Mark



Junction box (TW-PVJB01-ab)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 1x4.0mm²)

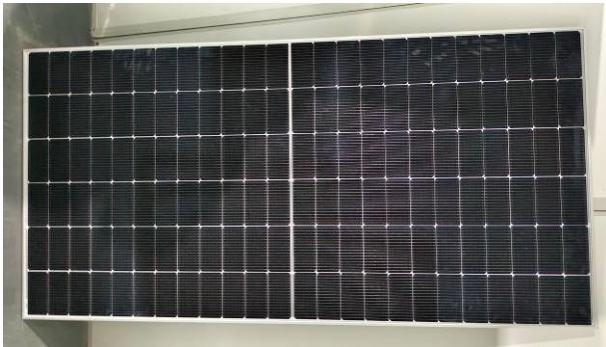


Mark (Do not disconnect under load)



Connectors (TW-PVCON-01)

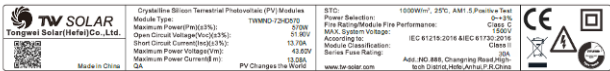
Module type: TWMND-72HD570 (BOM4)



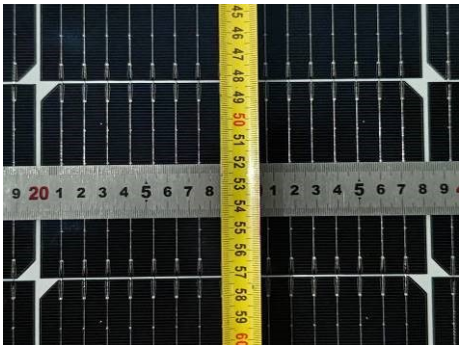
Front overview



Back overview



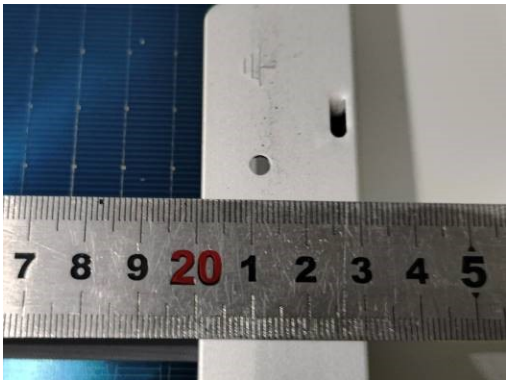
Label



Solar cell



Frame



Grounding Mark



Junction box (TW-PVJB01-ab)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

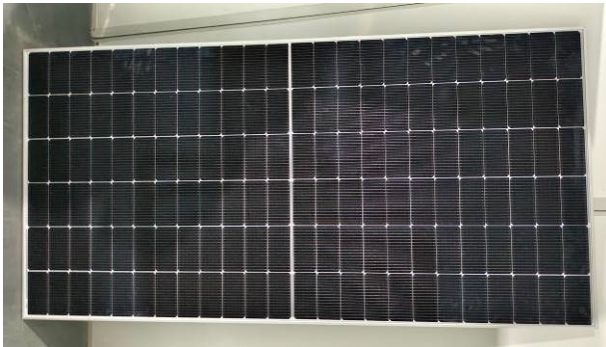


Mark (Do not disconnect under load)



Connectors (PV-ZH202B)

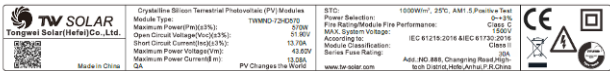
Module type: TWMND-72HD570 (BOM5)



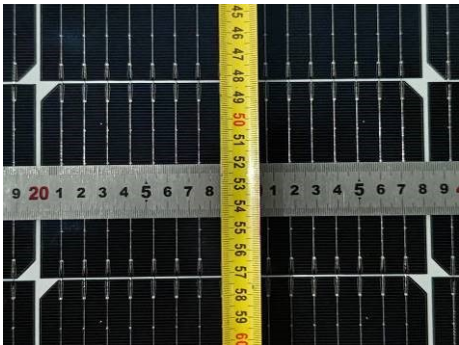
Front overview



Back overview



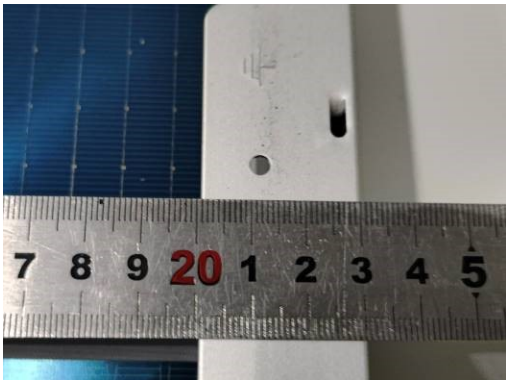
Label



Solar cell



Frame



Grounding Mark



Junction box (TW-PVJB01-ab)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

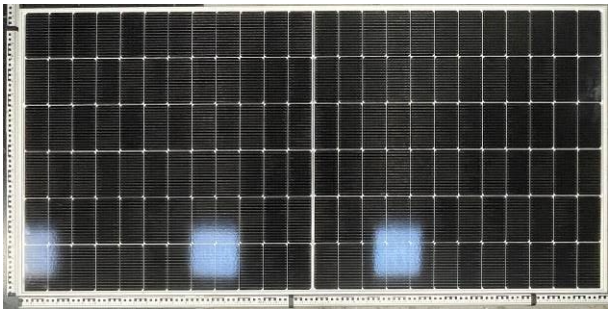


Mark (Do not disconnect under load)

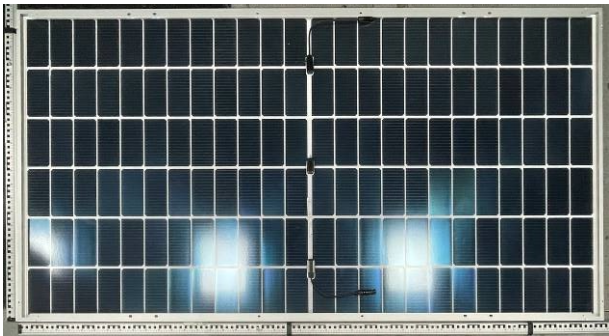


Connectors (PV-ZH202B)

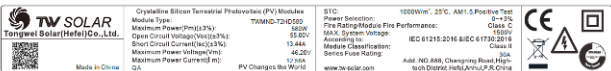
Module type: TWMND-72HD570 (BOM6)



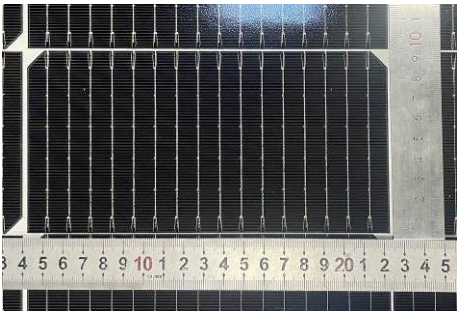
Front overview



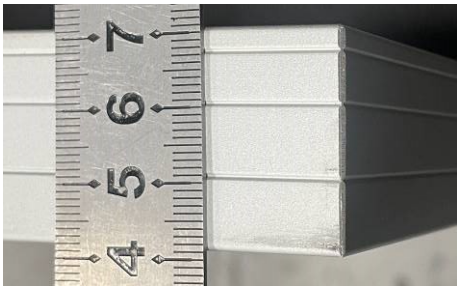
Back overview



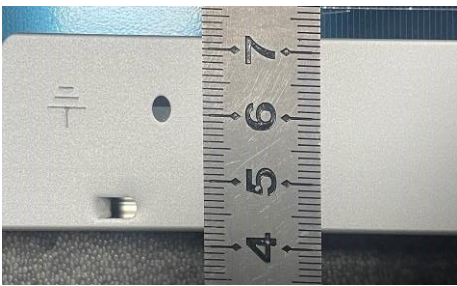
Label



Solar cell



Frame



Grounding Mark



Junction box (TW-PVJB01-ab)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

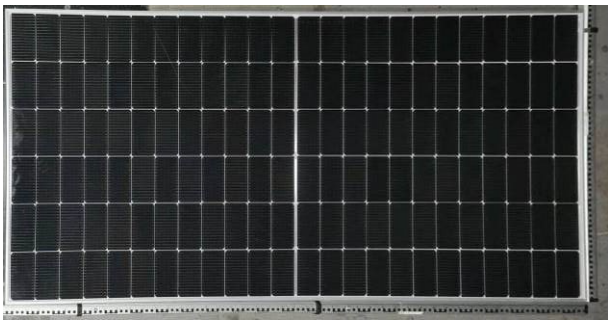


Mark (Do not disconnect under load)

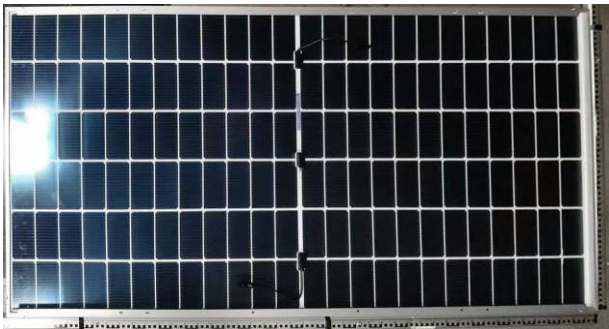


Connectors (TW-PVCON-01)

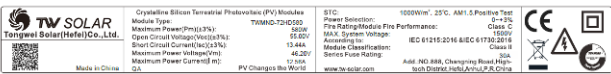
Module type: TWMND-72HD570 (BOM7)



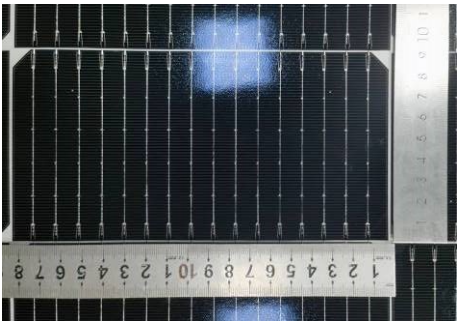
Front overview



Back overview



Label



Solar cell



Frame



Grounding Mark



Junction box (TW-PVJB01-ab)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

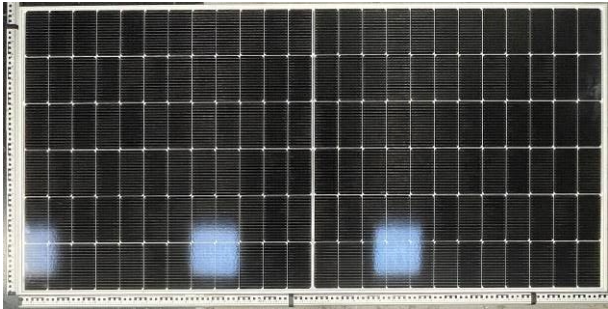


Mark (Do not disconnect under load)



Connectors (TW-PVCON-01)

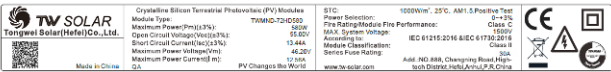
Module type: TWMND-72HD570 (BOM8)



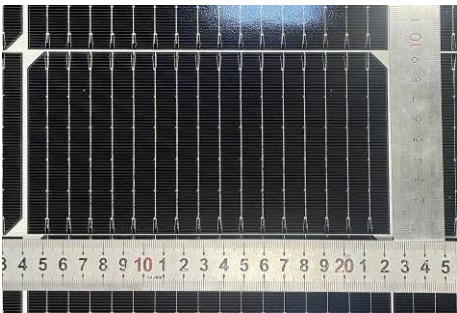
Front overview



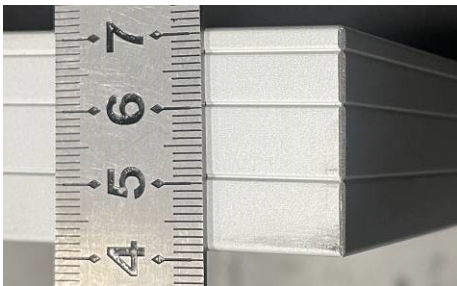
Back overview



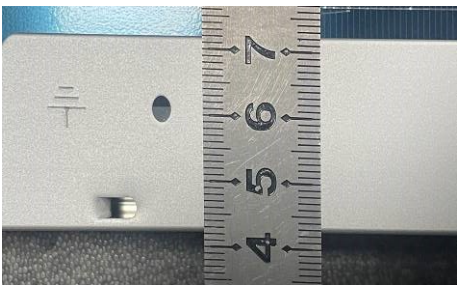
Label



Solar cell



Frame



Grounding Mark



Junction box (TW-PVJB01-ab)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

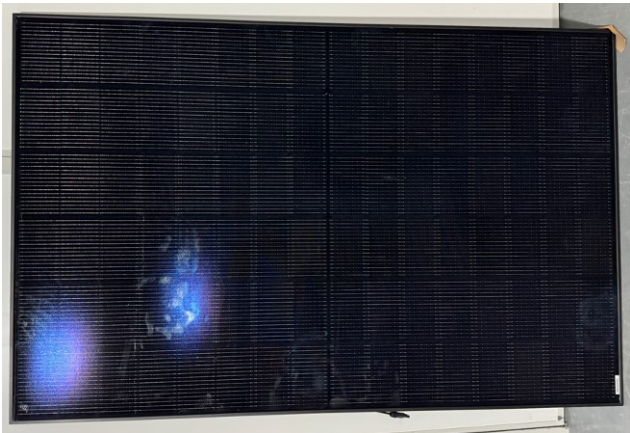


Mark (Do not disconnect under load)

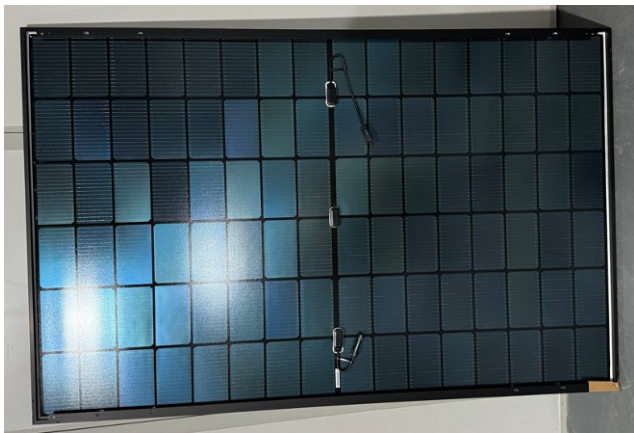


Connectors (TW-PVCON-01)

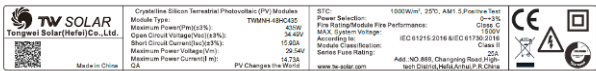
Module type: TWMNH-48HC435 (BOM13)



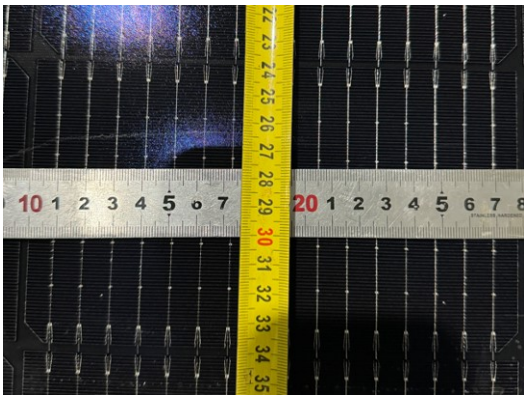
Front overview



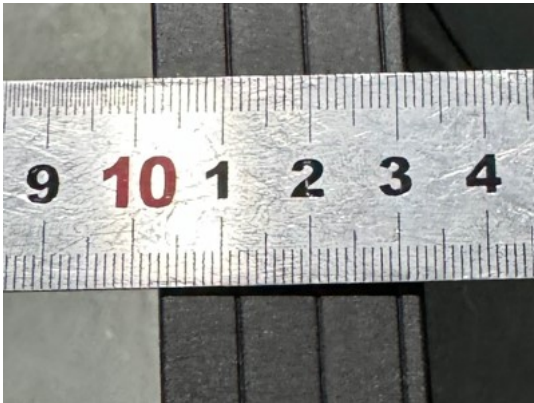
Back overview



Label



Solar cell



Frame



Grounding Mark



Junction box (TW-PVJB01-ab)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 1x4.0mm²)

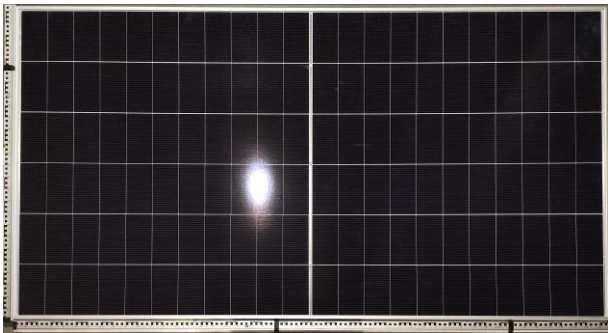


Mark (Do not disconnect under load)

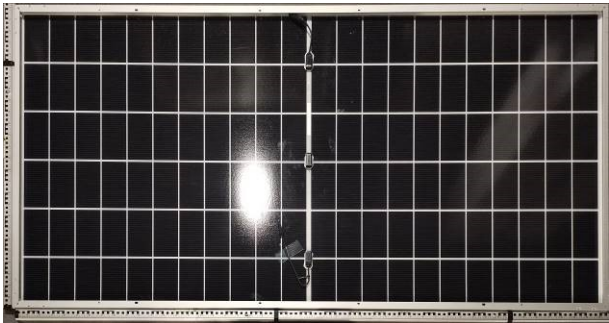


Connectors (TW-PVCON-01)

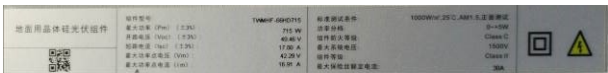
Module type: TWMHF-66HD715 (BOM14)



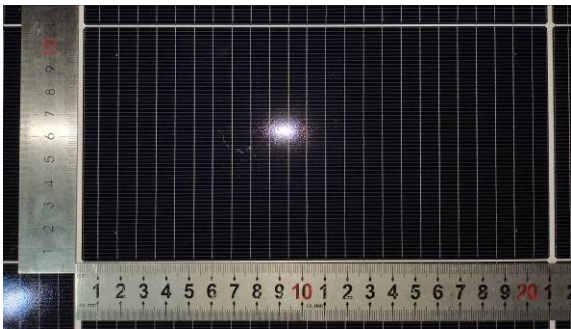
Front overview



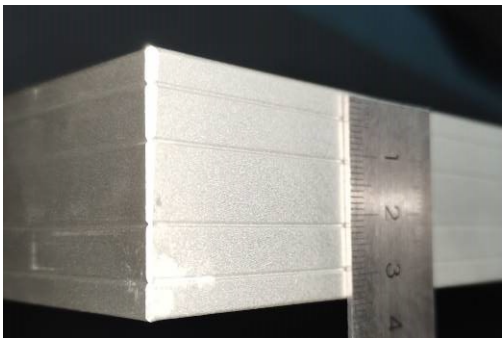
Back overview



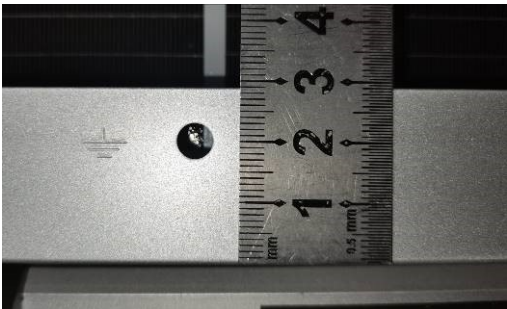
Label



Solar cell



Frame



Grounding Mark



Junction box (TW-PVJB01-ab)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)



Mark (Do not disconnect under load)



Connectors (TW-PVCON-01)



Junction box (PV-ZH011C-5)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

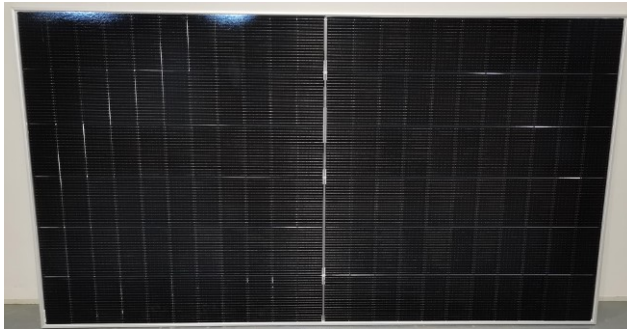


Mark (Do not disconnect under load)

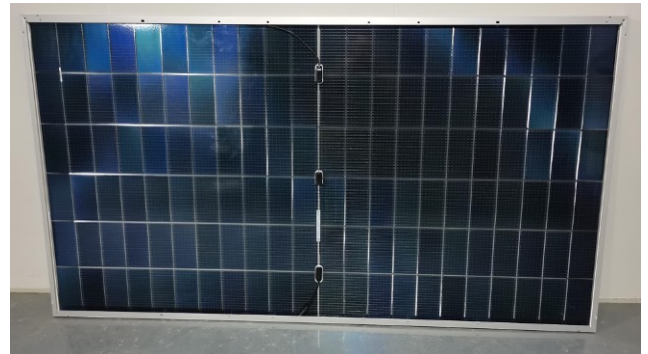


Connectors (TW-PVCON-01)

Module type: TWMNF-66HD705 (BOM16)



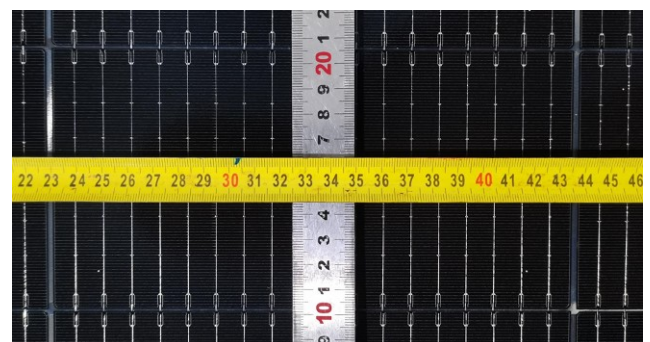
Front overview



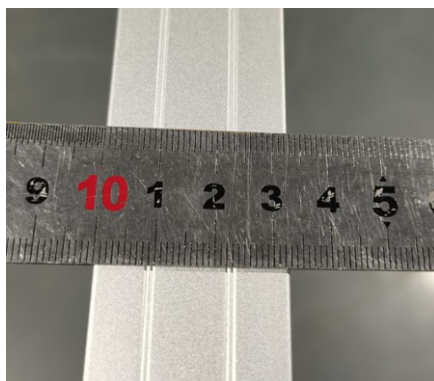
[Back overview](#)



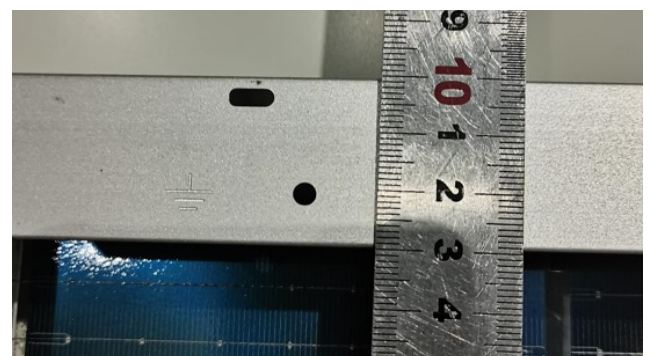
Label



Solar cell



Frame



Grounding Mark



Junction box (PV-ZH011C-5)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

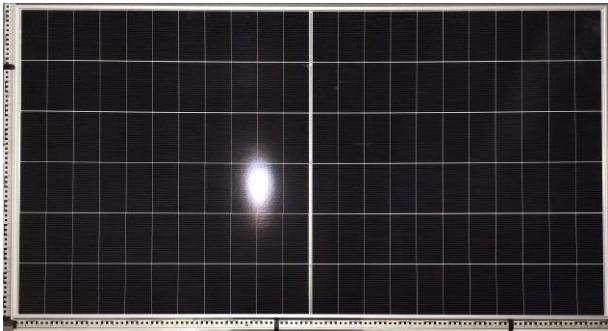


Mark (Do not disconnect under load)



Connectors (TW-PVCON-01)

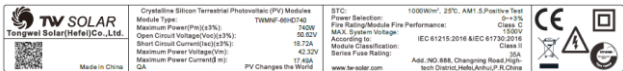
Module type: TWMHF-66HD740 (BOM17 higher end)



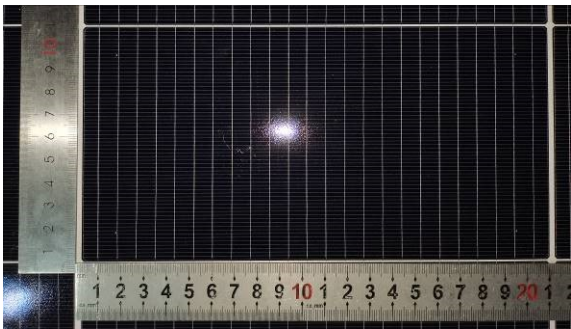
Front overview



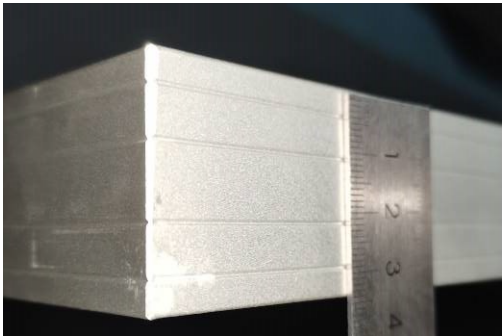
Back overview



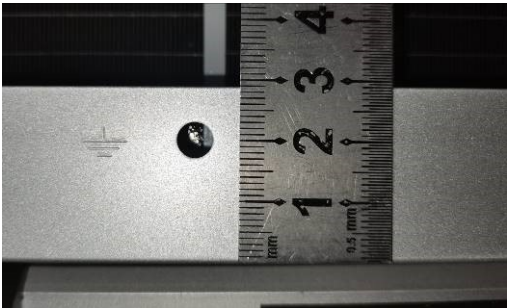
Label



Solar cell



Frame



Grounding Mark



Junction box (TW-PVJB01-ab)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

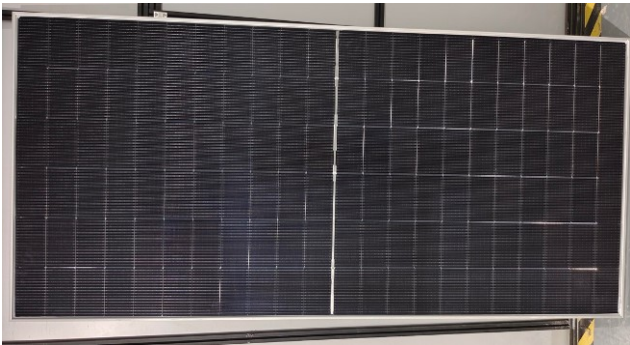


Mark (Do not disconnect under load)



Connectors (TW-PVCON-01)

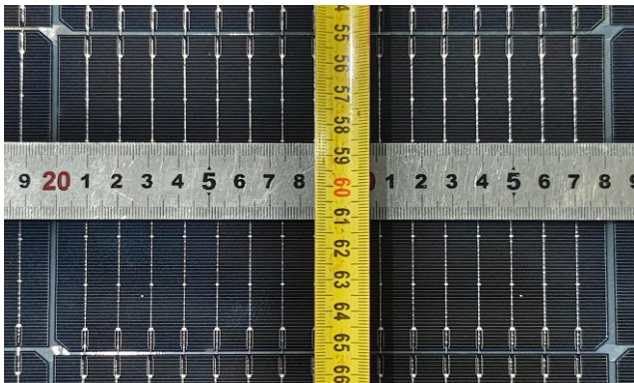
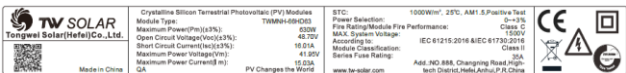
Module type: TWMNH-66HD630 (BOM18 higher end)



Front overview



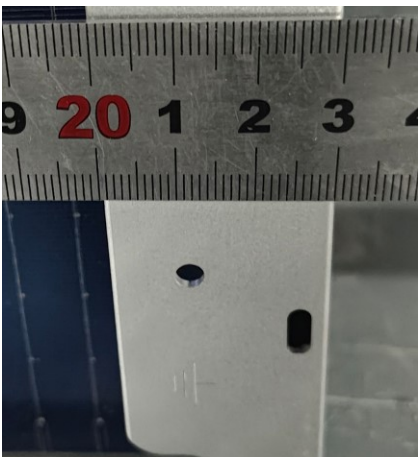
Back overview



Label



Frame



Grounding Mark



Junction box (PV-ZH011C-5)



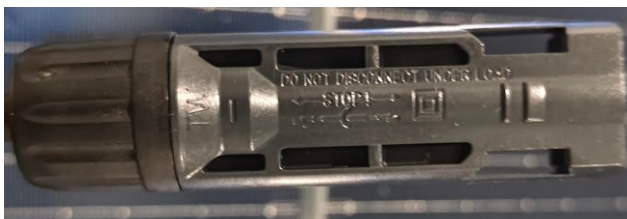
Junction box (opened)

N/A

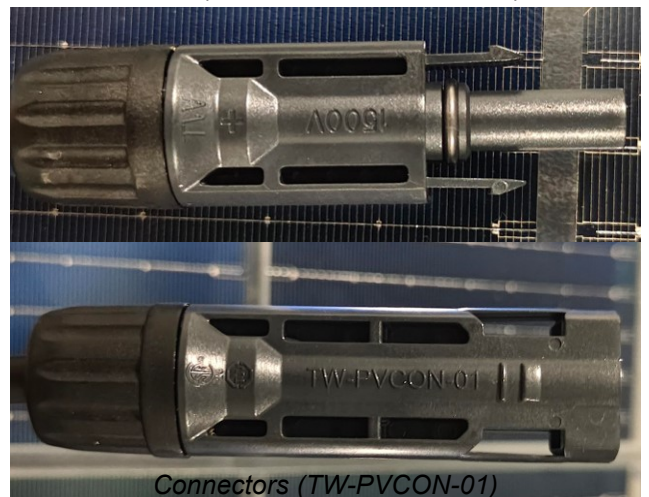


Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

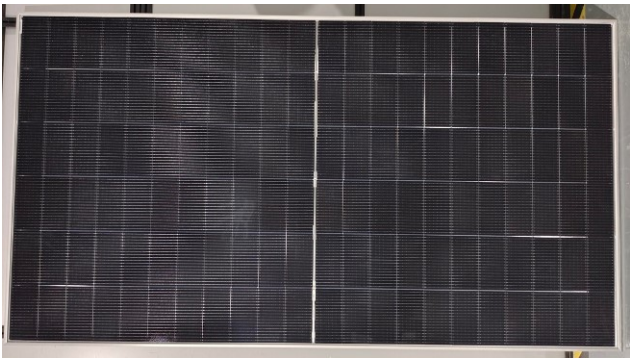


Mark (Do not disconnect under load)

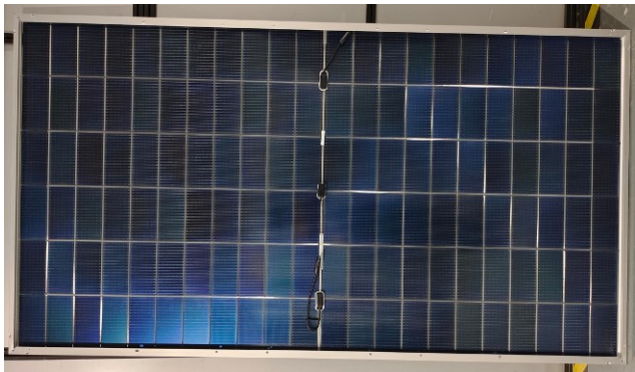


Connectors (TW-PVCON-01)

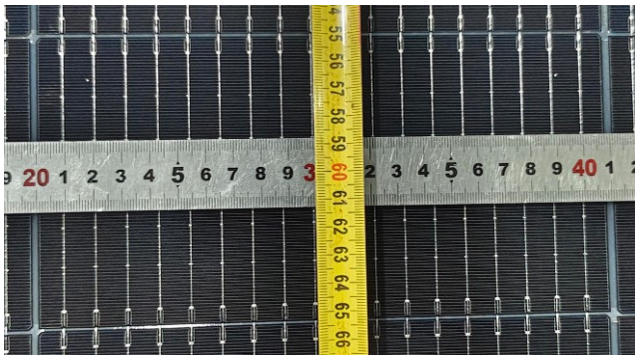
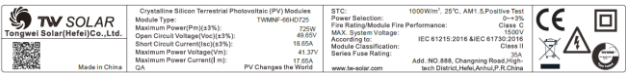
Module type: TWMNF-66HD725 (BOM19 higher end)



Front overview



Back overview

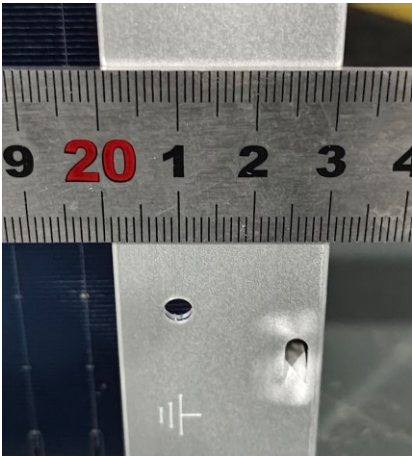


Label



Frame

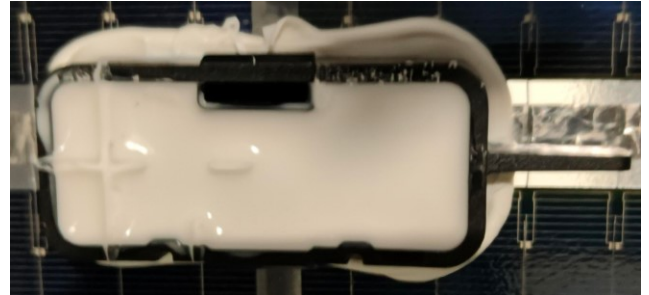
Solar cell



Grounding Mark



Junction box (PV-ZH011C-5)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

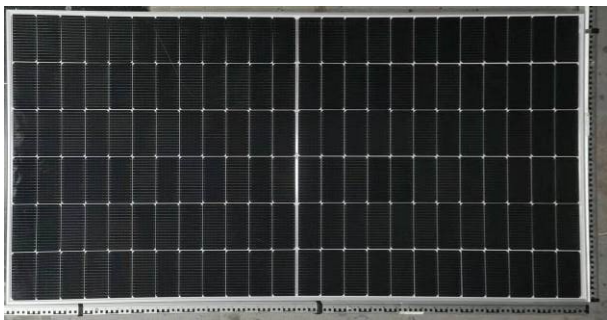


Mark (Do not disconnect under load)

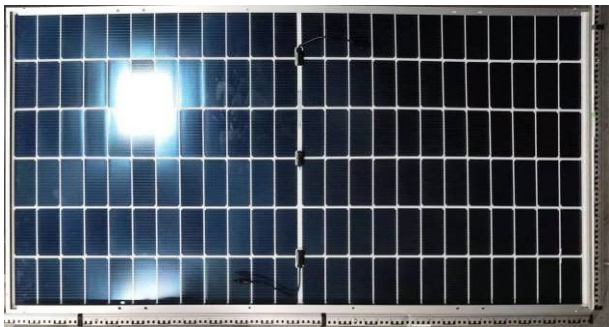


Connectors (TW-PVCON-01)

Module type: TWMND-72HD575 (BOM20)



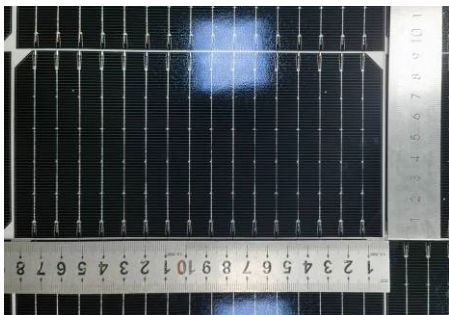
Front overview



Back overview



Label



Solar cell



Frame



Grounding Mark



Junction box (TW-PVJB01-ab)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4mm²)

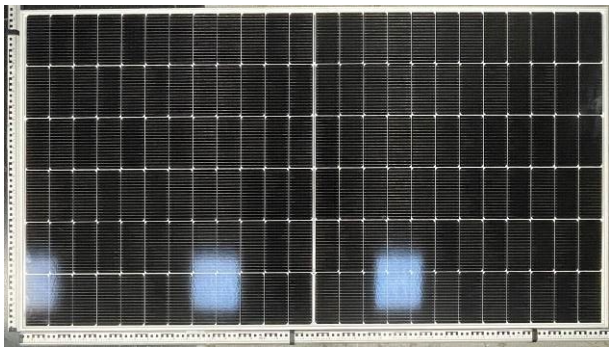


Mark (Do not disconnect under load)

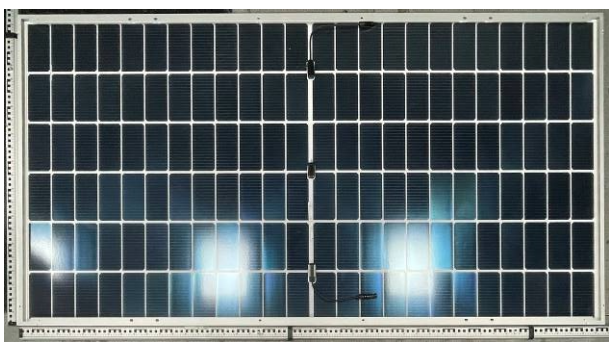


Connectors (PV-ZH202B)

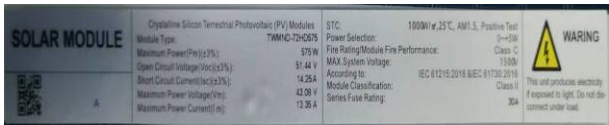
Module type: TWMND-72HD575 (BOM21)



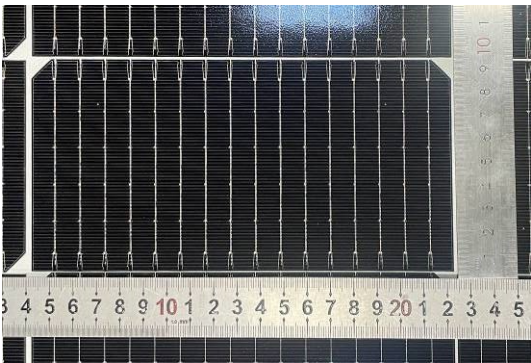
Front overview



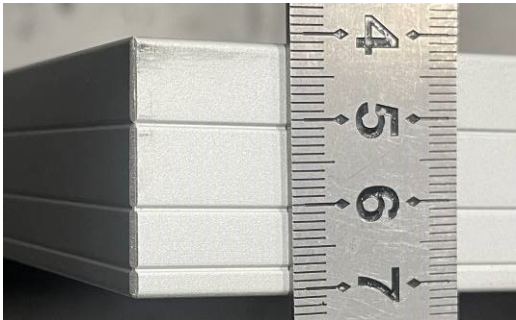
Back overview



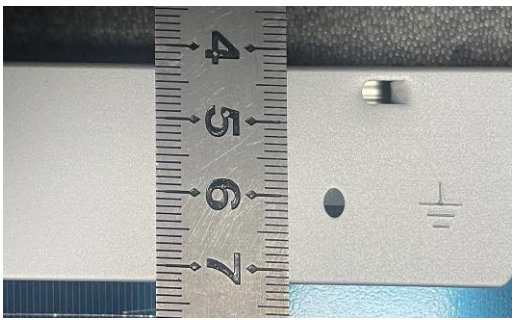
Label



Solar cell



Frame



Grounding Mark



Junction box (TW-PVJB01-ab)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4mm²)

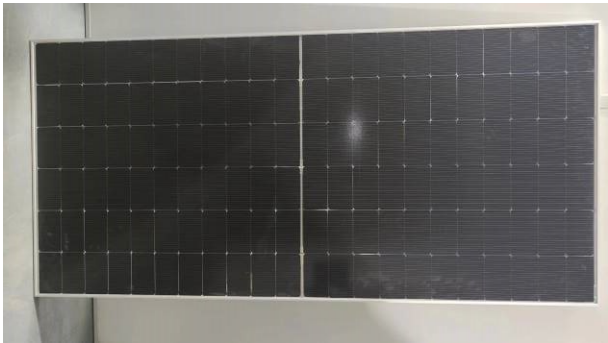


Mark (Do not disconnect under load)



Connectors (PV-ZH202B)

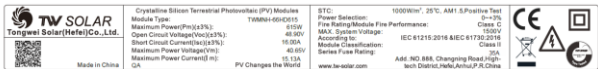
Module type: TWMNH-66HD615 (BOM22)



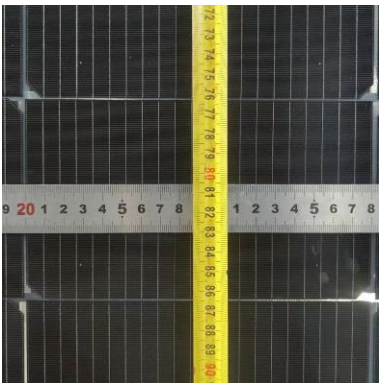
Front overview



Back overview



Label



Solar cell



Frame



Grounding Mark



Junction box (TW-PVJB01-ab)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4mm²)



Mark (Do not disconnect under load)



Connectors (TW-PVCON01)

-----End of report -----