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Test Report
No. 492012901.001

Photovoltaic Module Qualification
according to IEC 61215-1 / EN IEC 61215-1,
IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2,
IEC 61730-1 / EN IEC 61730-1, IEC 61730-2 / EN IEC 61730-2

Applicant: **Ningbo Osda Solar Co., Ltd.**
1-1, No.136, Haichuan Road, Jiangbei Area
Ningbo City, Zhejiang Province, P.R.China

File No.: PVP03179/23P-06

Designed: Dec 29, 2023 by: Ly Zhy
(Project Engineer)

Reviewed: Dec. 29 2023 by: Bella Li
(Technical Certifier)

Applicant ..... :	**Ningbo Osda Solar Co., Ltd.** 1-1, No.136, Haichuan Road, Jiangbei Area Ningbo City, Zhejiang Province, P.R.China
Manufacturer 1 ..... :	**Ningbo Osda Solar Co., Ltd.** 1-1, No.136, Haichuan Road, Jiangbei Area Ningbo City, Zhejiang Province, P.R.China
Manufacturer 2 ..... :	**Shandong Oushengda New Energy Co., Ltd.** Intersection of Guanzhuang Middle Road and Aeon South Road, Zhengwang Town, Hedong District, Linyi City, Shandong Province
Order No. ..... :	QT-PVP11016/22P, QT-PVP03179/23P, QT-PVP10043/23P
Date of Application ..... :	11/04/2022, 07/24/2023, 10/19/2023
Product ..... :	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
Module type(s)..... :	**PV Modules with Half-cut 210mm Mono-crystalline Silicon Solar Cells:** 132 cells: ODAxxx-33V-MH (xxx=645-700, in increment of 5) 120 cells: ODAxxx-30V-MH (xxx=585-635, in increment of 5) 110 cells: ODAxxx-28V-MH (xxx=530-580, in increment of 5) 100 cells: ODAxxx-25V-MH (xxx=490-530, in increment of 5) 132 cells: ODAxxx-33V-MHB (xxx=645-700, in increment of 5) 120 cells: ODAxxx-30V-MHB (xxx=585-635, in increment of 5) 110 cells: ODAxxx-28V-MHB (xxx=530-580, in increment of 5) 100 cells: ODAxxx-25V-MHB (xxx=490-530, in increment of 5) **PV Modules with Half-cut 182mm Mono-crystalline Silicon Solar Cells:** 156 cells: ODAxxx-39V-MH (xxx=590-620, in increment of 5) 144 cells: ODAxxx-36V-MH (xxx=550-590, in increment of 5) 132 cells: ODAxxx-33V-MH (xxx=500-540, in increment of 5) 120 cells: ODAxxx-30V-MH (xxx=460-490, in increment of 5) 108 cells: ODAxxx-27V-MH (xxx=410-440, in increment of 5) 156 cells: ODAxxx-39V-MHB (xxx=590-620, in increment of 5) 144 cells: ODAxxx-36V-MHB (xxx=550-590, in increment of 5) 132 cells: ODAxxx-33V-MHB (xxx=500-540, in increment of 5) 120 cells: ODAxxx-30V-MHB (xxx=460-490, in increment of 5) 108 cells: ODAxxx-27V-MHB (xxx=410-440, in increment of 5)
General Information • Maximum System Voltage.... : • Electrical Protection Class.... : • Fire Safety Class ..... :	 DC 1500V Class II Class C
Type of examination ..... :	Conformity testing with TÜV mark
Testing Period ..... :	09/25/2022 - 11/13/2023
Testing Laboratory 1..... :	**National Center of Supervision & Inspection on Solar Photovoltaic Products Quality** No.355 Tengfei 2nd Road , West Airport Economic Development Zone,

	Chengdu, Sichuan, China
Testing Laboratory 2..... :	**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

Test results listed in this test report refer exclusively to the mentioned test sample.

The submitted test samples as described in the reports hereunder are in compliance with the requirements:

IEC 61215-1:2021 + COR1:2021 / EN IEC 61215-1:2021 + AC:2021 “Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements”

IEC 61215-1-1:2021 / EN IEC 61215-1-1:2021 “Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules”

IEC 61215-2:2021 / EN IEC 61215-2:2021 “Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 2: Test procedures”

IEC 61730-1:2016 / EN IEC 61730-1:2018 + AC:2018 “Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction”

IEC 61730-2:2016 / EN IEC 61730-2:2018 + AC:2018 “Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing”

List of contents

History of certification	
File no. .....:	N/A
Certificate no. ...:	N/A
Date of issue ....:	N/A
Report no. .....:	N/A
Module type(s) .:	N/A
Description: .....:	N/A
Supplementary information: Basic qualification	

Summary of testing

According to the enquiry of the applicant, a qualification testing and certification was performed according to IEC 61215-1:2021, IEC 61215-2:2021, IEC 61215-1-1:2021, IEC 61730-1:2016 and IEC 61730-2:2016 for PV modules with 156 pcs of half-cut 182mm mono-crystalline silicon solar cells. The thickness of frame is 35mm and the over-current protection rating is 25A.

ODA590-39V-MH(BOM1) was selected as representative test samples and conducted with all the related tests.

ODA620-39V-MH(BOM1) was tested to determine the highest end of power range.

Related module types list below:

PV Modules with Half-cut 182mm Mono-crystalline Silicon Solar Cells:

156 cells: ODAxxx-39V-MH (xxx=590-620, in increment of 5)

144 cells: ODAxxx-36V-MH (xxx=550-570, in increment of 5)

132 cells: ODAxxx-33V-MH (xxx=500-525, in increment of 5)

120 cells: ODAxxx-30V-MH (xxx=460-475, in increment of 5)

108 cells: ODAxxx-27V-MH (xxx=410-430, in increment of 5)

1) Extend to raw materials and combination of BOM2 list below:
   - 210mm mono cell: type: CZJT-210M-18D3, dimension = 210 x 105±0.5mm, 18 busbars, bifacial TOPCon, Manufacturer: Chuzhou Jietai New Energy Technology Co., Ltd.

ODA670-33V-MH(BOM2) was selected as representative test samples and conducted with all the related tests. ODA700-33V-MH was tested to determine the highest end of power range.

Related module types list below:

PV Modules with Half-cut 210mm Mono-crystalline Silicon Solar Cells:

132 cells: ODAxxx-33V-MH (xxx=670-700, in increment of 5)

120 cells: ODAxxx-30V-MH (xxx=610-635, in increment of 5)

110 cells: ODAxxx-28V-MH (xxx=560-580, in increment of 5)

100 cells: ODAxxx-25V-MH (xxx=510-530, in increment of 5)

2) According to the IEC 62790:2020 certificate no.:R 50506655 issued by TÜV Rheinland, extend the j-box PV-JB070xy (y=1 or 2 or 3), manufactured by Ningbo ECONOMIC & TECHNICAL Development ZONE Hengda Electrical Co., Ltd.

3) Extend to raw materials and combination of BOM3 list below:
   - New 210mm mono cell 3: 8S7E1218A-R1 PERC bifacial cell, manufactured by Zhejiang Aiko Solar Energy Technology Co., Ltd.
   - New Encapsulation material 2: EV1050G2 (between front cover and cell) EV1050G1(between cell and rear cover), manufactured by Jiangsu Lushan New Materials Co., Ltd.
   - New front cover 2: AR coating tempered glass, manufactured by Xinyi Photovoltaic Glass Holding (Anhui) Co., Ltd.
   - New internal wiring (for interconnection cell-to-cell bus bar) 2: Copper belt with tin plated (Sn60%Pb40% Φ = 0.26mm±10%), manufactured by Changzhou Greateen New Energy Technology Co., Ltd.
   - New Internal wiring (for inter-string connection) 2: Copper belt with tin plated (Sn60%Pb40% 6.0 x 0.35 mm (middle) for 210mm mono cell, 4.0 x 0.4 mm (middle) for 182mm mono cell, 4.0 x 0.40 mm (both ends)), manufactured by Changzhou Greateen New Energy Technology Co., Ltd.
   - New Fluxing agent 2: SF105, manufactured by Asahi Soldering Tin Science Technology (Wuxi) Co., Ltd.
   - New frame parts 3: 6005-T6(Thickness = 30 mm), manufactured by Jiangsu LEAD Aluminum Industry Co., Ltd.
   - New Adhesive (frame) 2: HT906Z, manufactured by Shanghai Huitian New Material Co., Ltd.

ODA660-33V-MH was selected as representative test samples and conducted with all the related tests.

ODA645-33V-MH and ODA670-33V-MH were tested to determine the lowest and highest end of power range.

Extend to new module types as below, with the same electrical circuit and less solar cells based on the tested module types, no test is required.

PV Modules with Half-cut 210mm PERC Mono-crystalline Silicon Solar Cells:

120 cells: ODAxxx-30V-MH (xxx=585-610 in increment of 5)

110 cells: ODAxxx-28V-MH (xxx=530-555, in increment of 5)

100 cells: ODAxxx-25V-MH (xxx=490-505, in increment of 5)

4) Extend to raw materials of BOM4 list below

- New frame parts 5: 6005-T6(Thickness = 30 mm), manufactured by Changshu Dongneng SOLAR Technology Co., Ltd.

ODA660-33V-MH was selected as representative test samples and conducted with all the related tests.

Based on above module types:

- New frame parts 2: 6005-T6(Thickness = 33 mm), manufactured by Zhangjiagang Shuoyuan Aluminum Technology Co., Ltd.
- New frame parts 4: 6005-T6(Thickness = 33 mm), manufactured by Jiangsu LEAD Aluminum Industry Co., Ltd.
- New frame parts 6: 6005-T6(Thickness = 33 mm), manufactured by Changshu Dongneng SOLAR Technology Co., Ltd.
- New internal wiring (for interconnection cell-to-cell bus bar) 4: Copper belt with tin plated (Sn60%Pb40% Φ = 0.32mm±10%), manufactured by Changzhou Greateen New Energy Technology Co., Ltd.

5) extend to higher power ranges list as below

PV Modules with Half-cut 182mm Mono-crystalline Silicon Solar Cells:

144 cells: ODAxxx-36V-MH (xxx=575-590, in increment of 5)

132 cells: ODAxxx-33V-MH (xxx=530-540, in increment of 5)

120 cells: ODAxxx-30V-MH (xxx=480-490, in increment of 5)

108 cells: ODAxxx-27V-MH (xxx=435-440, in increment of 5)

ODA590-36V-MH (BOM5) were tested to determine the highest end of power range.

6) Add new color of material list as below

- Rear cover: FFC-JW3010(plus) (Color: black) manufactured by Jolywood (Suzhou) Sunwatt Co., Ltd.
- Frame parts: 6005-T6 (Color: black) manufactured by Zhangjiagang Shuoyuan Aluminum Technology Co., Ltd.

ODA555-36V-MHB (BOM6) was selected as representative test samples and conducted with all the related tests.

7) Extend new module types list as below, no additional test is required.

PV Modules with Half-cut 210mm Mono-crystalline Silicon Solar Cells:

132 cells: ODAxxx-33V-MHB (xxx=645-700, in increment of 5)

120 cells: ODAxxx-30V-MHB (xxx=585-635, in increment of 5)

110 cells: ODAxxx-28V-MHB (xxx=530-580, in increment of 5)

100 cells: ODAxxx-25V-MHB (xxx=490-530, in increment of 5)

PV Modules with Half-cut 182mm Mono-crystalline Silicon Solar Cells:

156 cells: ODAxxx-39V-MHB (xxx=590-620, in increment of 5) 144 cells: ODAxxx-36V-MHB (xxx=550-590, in increment of 5) 132 cells: ODAxxx-33V-MHB (xxx=500-540, in increment of 5) 120 cells: ODAxxx-30V-MHB (xxx=460-490, in increment of 5) BOM1-BOM4 was conducted by testing lab 1, BOM5-BOM6 was conducted by testing lab 2. All tests were successfully completed and factory inspection was performed periodically. Therefore, from the result of testing and factory inspection, it is recommended that certification should be granted.
Detailed product information are to be found in the CDF (constructional data form) in Annex 1 of this report.

General remarks

Test item particulars:	
Accessories and detachable parts included in the evaluation .....:	Clamps
Options included .....:	N/A
Abbreviations used in the report:	
HF - Humidity Freeze	TC - Temperature Cycling
DH - Damp Heat	Vmp - Maximum power voltage
Imp - Maximum power current	Voc - Open circuit voltage
Isc - Short circuit current	FF - Fill Factor
Pmax - Maximum power	α - Current temperature coefficient
NMOT - Nominal Module Operating Temperature	β - Voltage temperature coefficient
STC - Standard Test Conditions	γ - Power temperature coefficient
CTI - Comparative Tracking Index	PTI - Proof Tracking Index
RTI - Relative Temperature Index	RTE - Relative Thermal Endurance index
TI - Temperature Index	DTI - Distance through insulation
Cl - Clearances	Cr - Creepage distances
PD - Pollution Degree	MG - Material Groups
Possible test case verdicts:	
Test case does not apply to the test object .....:	Not Applicable (N/A)
Test object does meet the requirement .....:	Pass (P)
Test object does not meet the requirement .....:	Fail (F)
Other remarks:	
The test verdicts presented in this report relate only to the object tested. This report shall not be reproduced except in full, without the written approval of the issuing testing laboratory. “(see Annex #)” refers to additional information appended to the report. “(see Table #)” refers to a table appended to the report. Power degradation data expressed in negative value indicates a reduction of maximum power output. Power degradation data expressed in positive value indicates an increment of maximum power output. Throughout this report, a point is used as the decimal separator.	

General product information

Module type: ODA590-39V-MH (BOM1)

Product Electrical Ratings at STC:	
Nominal maximum power (Pmax) [W] with tolerance .....:	590±3%
Nominal open circuit voltage at (Voc) [V] with tolerance ...:	54.65±3%
Nominal maximum power voltage (Vmpp) [V] .....:	45.19
Nominal short circuit current at (Isc) [A] with tolerance .....:	13.82±3%
Nominal maximum power current (Impp) [A].....:	13.06
Product Safety Ratings:	
Maximum system voltage [V].....:	1500
Fuse rating [A] .....:	25
Safety class in accordance with IEC 61140 .....:	Class II
Fire safety class.....:	Class C
Recommended maximum series module configurations ..:	Written in installation manual
Recommended maximum parallel module configurations :	Written in installation manual

Module type: ODA620-39V-MH (BOM1 higher end)

Product Electrical Ratings at STC:	
Nominal maximum power (Pmax) [W] with tolerance .....:	620±3%
Nominal open circuit voltage at (Voc) [V] with tolerance ...:	55.55±3%
Nominal maximum power voltage (Vmpp) [V] .....:	45.79
Nominal short circuit current at (Isc) [A] with tolerance .....:	14.25±3%
Nominal maximum power current (Impp) [A].....:	13.54
Product Safety Ratings:	
Maximum system voltage [V].....:	1500
Fuse rating [A] .....:	25
Safety class in accordance with IEC 61140 .....:	Class II
Fire safety class.....:	Class C
Recommended maximum series module configurations ..:	Written in installation manual
Recommended maximum parallel module configurations :	Written in installation manual

Module type: ODA670-33V-MH (BOM2)

Product Electrical Ratings at STC:	
Nominal maximum power (Pmax) [W] with tolerance .....:	670±3%
Nominal open circuit voltage at (Voc) [V] with tolerance ...:	47.42±3%
Nominal maximum power voltage (Vmpp) [V] .....:	39.52
Nominal short circuit current at (Isc) [A] with tolerance .....:	17.72±3%
Nominal maximum power current (Impp) [A].....:	16.96
Product Safety Ratings:	
Maximum system voltage [V].....:	1500
Fuse rating [A] .....:	30
Safety class in accordance with IEC 61140 .....:	Class II
Fire safety class.....:	Class C
Recommended maximum series module configurations ..:	Written in installation manual
Recommended maximum parallel module configurations :	Written in installation manual

Module type: ODA700-33V-MH (BOM2 higher end)

Product Electrical Ratings at STC:	
Nominal maximum power (Pmax) [W] with tolerance .....:	700±3%
Nominal open circuit voltage at (Voc) [V] with tolerance ...:	48.96±3%
Nominal maximum power voltage (Vmpp) [V] .....:	40.72
Nominal short circuit current at (Isc) [A] with tolerance .....:	17.97±3%
Nominal maximum power current (Impp) [A].....:	17.20
Product Safety Ratings:	
Maximum system voltage [V].....:	1500
Fuse rating [A] .....:	30
Safety class in accordance with IEC 61140 .....:	Class II
Fire safety class.....:	Class C
Recommended maximum series module configurations ..:	Written in installation manual
Recommended maximum parallel module configurations :	Written in installation manual

Module type: ODA660-33V-MH (BOM3)

Product Electrical Ratings at STC:	
Nominal maximum power (Pmax) [W] with tolerance .....:	660 ± 3%
Nominal open circuit voltage at (Voc) [V] with tolerance ...:	45.60 ± 3%
Nominal maximum power voltage (Vmpp) [V] .....:	37.80
Nominal short circuit current at (Isc) [A] with tolerance .....:	18.55 ± 3%
Nominal maximum power current (Impp) [A].....:	17.47
Product Safety Ratings:	
Maximum system voltage [V].....:	1500
Fuse rating [A] .....:	30
Safety class in accordance with IEC 61140 .....:	Class II
Fire safety class.....:	Class C
Recommended maximum series module configurations ..:	Written in installation manual
Recommended maximum parallel module configurations :	Written in installation manual

Module type: ODA645-33V-MH (BOM3 lower end)

Product Electrical Ratings at STC:	
Nominal maximum power (Pmax) [W] with tolerance .....:	645 ± 3%
Nominal open circuit voltage at (Voc) [V] with tolerance ...:	45.00 ± 3%
Nominal maximum power voltage (Vmpp) [V] .....:	37.20
Nominal short circuit current at (Isc) [A] with tolerance .....:	18.42 ± 3%
Nominal maximum power current (Impp) [A].....:	17.34
Product Safety Ratings:	
Maximum system voltage [V].....:	1500
Fuse rating [A] .....:	30
Safety class in accordance with IEC 61140 .....:	Class II
Fire safety class.....:	Class C
Recommended maximum series module configurations ..:	Written in installation manual
Recommended maximum parallel module configurations :	Written in installation manual

Module type: ODA670-33V-MH (BOM3 higher end)

Product Electrical Ratings at STC:	
Nominal maximum power (Pmax) [W] with tolerance .....:	670 ± 3%
Nominal open circuit voltage at (Voc) [V] with tolerance ...:	46.00 ± 3%
Nominal maximum power voltage (Vmpp) [V] .....:	38.20
Nominal short circuit current at (Isc) [A] with tolerance .....:	18.62 ± 3%
Nominal maximum power current (Impp) [A].....:	17.54
Product Safety Ratings:	
Maximum system voltage [V].....:	1500
Fuse rating [A] .....:	30
Safety class in accordance with IEC 61140 .....:	Class II
Fire safety class.....:	Class C
Recommended maximum series module configurations ..:	Written in installation manual
Recommended maximum parallel module configurations :	Written in installation manual

Module type: ODA660-33V-MH (BOM4)

Product Electrical Ratings at STC:	
Nominal maximum power (Pmax) [W] with tolerance .....:	660 ± 3%
Nominal open circuit voltage at (Voc) [V] with tolerance ...:	45.60 ± 3%
Nominal maximum power voltage (Vmpp) [V] .....:	37.80
Nominal short circuit current at (Isc) [A] with tolerance .....:	18.55 ± 3%
Nominal maximum power current (Impp) [A].....:	17.47
Product Safety Ratings:	
Maximum system voltage [V].....:	1500
Fuse rating [A] .....:	30
Safety class in accordance with IEC 61140 .....:	Class II
Fire safety class.....:	Class C
Recommended maximum series module configurations ..:	Written in installation manual
Recommended maximum parallel module configurations :	Written in installation manual

Module type: ODA590-36V-MH (BOM5)

Product Electrical Ratings at STC:	
Nominal maximum power (Pmax) [W] with tolerance .....:	590 ± 3%
Nominal open circuit voltage at (Voc) [V] with tolerance ...:	51.30 ± 3%
Nominal maximum power voltage (Vmpp) [V] .....:	42.67
Nominal short circuit current at (Isc) [A] with tolerance .....:	14.63 ± 3%
Nominal maximum power current (Impp) [A].....:	13.83
Product Safety Ratings:	
Maximum system voltage [V].....:	1500
Fuse rating [A] .....:	25
Safety class in accordance with IEC 61140 .....:	Class II
Fire safety class.....:	Class C
Recommended maximum series module configurations ..:	Written in installation manual
Recommended maximum parallel module configurations :	Written in installation manual

Module type: ODA555-36V-MHB (BOM6)

Product Electrical Ratings at STC:	
Nominal maximum power (Pmax) [W] with tolerance .....:	555 ± 3%
Nominal open circuit voltage at (Voc) [V] with tolerance ...:	50.34 ± 3%
Nominal maximum power voltage (Vmpp) [V] .....:	41.64
Nominal short circuit current at (Isc) [A] with tolerance .....:	14.00 ± 3%
Nominal maximum power current (Impp) [A].....:	13.26
Product Safety Ratings:	
Maximum system voltage [V].....:	1500
Fuse rating [A] .....:	25
Safety class in accordance with IEC 61140 .....:	Class II
Fire safety class.....:	Class C
Recommended maximum series module configurations ..:	Written in installation manual
Recommended maximum parallel module configurations :	Written in installation manual

Testing procedure

Module type: ODA590-39V-MH (BOM1)

☐	Random sampling from production
☒	Prototype submitted by client
☒	New module type
☐	Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)
☐	Modification to frontsheet
☐	Modification to encapsulation system
☐	Modification to cell technology
☐	Modification to cell and string interconnect material or technique
☐	Modification to backsheet
☐	Modification to electrical termination
☐	Modification to bypass diode
☐	Modification to electrical circuitry
☐	Modification to edge sealing
☐	Modification to frame and/or mounting structure
☐	Change in PV module size
☐	Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process
☐	Increase of over-current protection rating
☐	Increase of system voltage
☐	Change in cell fixing tape
☐	Others
☐	Others

Description of similarity (differences) between the applied model and the previously tested model:

- Basic glass - backsheet module types with half-cut 182mm mono c-Si solar cells

Module type: ODA620-39V-MH (BOM1 higher end)

☐	Random sampling from production
☒	Prototype submitted by client
☐	New module type
☐	Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)
	☐ Modification to frontsheet
	☐ Modification to encapsulation system
	☐ Modification to cell technology
	☐ Modification to cell and string interconnect material or technique
	☐ Modification to backsheet
	☐ Modification to electrical termination
	☐ Modification to bypass diode
	☐ Modification to electrical circuitry
	☐ Modification to edge sealing
	☐ Modification to frame and/or mounting structure
	☐ Change in PV module size
	☐ Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process
	☐ Increase of over-current protection rating
	☐ Increase of system voltage
	☐ Change in cell fixing tape
	☐ Others
☒	Others

Description of similarity (differences) between the applied model and the previously tested model:

- To determine the higher end of power range

Module type: ODA670-33V-MH (BOM2)

☐	Random sampling from production
☒	Prototype submitted by client
☐	New module type
☒	Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)
☐	Modification to frontsheet
☐	Modification to encapsulation system
☒	Modification to cell technology
☐	Modification to cell and string interconnect material or technique
☐	Modification to backsheet
☐	Modification to electrical termination
☐	Modification to bypass diode
☐	Modification to electrical circuitry
☐	Modification to edge sealing
☐	Modification to frame and/or mounting structure
☐	Change in PV module size
☐	Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process
☐	Increase of over-current protection rating
☐	Increase of system voltage
☐	Change in cell fixing tape
☒	Others
☐	Others

Description of similarity (differences) between the applied model and the previously tested model:

- 210mm mono cell
  Type: CZJT-210M-18D3, dimension = 210 x 105±0.5mm, 18 busbars, bifacial TOPCon
  manufactured by Chuzhou Jietai New Energy Technology Co., Ltd.

Module type: ODA700-33V-MH (BOM2 higher end)

☐	Random sampling from production
☒	Prototype submitted by client
☐	New module type
☐	Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)
	☐ Modification to frontsheet
	☐ Modification to encapsulation system
	☐ Modification to cell technology
	☐ Modification to cell and string interconnect material or technique
	☐ Modification to backsheet
	☐ Modification to electrical termination
	☐ Modification to bypass diode
	☐ Modification to electrical circuitry
	☐ Modification to edge sealing
	☐ Modification to frame and/or mounting structure
	☐ Change in PV module size
	☐ Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process
	☐ Increase of over-current protection rating
	☐ Increase of system voltage
	☐ Change in cell fixing tape
	☐ Others
☒	Others

Description of similarity (differences) between the applied model and the previously tested model:

- To determine the higher end of power range

Module type: ODA660-33V-MH (BOM3)

☐	Random sampling from production
☒	Prototype submitted by client
☐	New module type
☒	Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)
☒	Modification to frontsheet
☒	Modification to encapsulation system
☒	Modification to cell technology
☒	Modification to cell and string interconnect material or technique
☐	Modification to backsheet
☐	Modification to electrical termination
☐	Modification to bypass diode
☐	Modification to electrical circuitry
☐	Modification to edge sealing
☒	Modification to frame and/or mounting structure
☐	Change in PV module size
☐	Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process
☐	Increase of over-current protection rating
☐	Increase of system voltage
☐	Change in cell fixing tape
☐	Others
☐	Others

Description of similarity (differences) between the applied model and the previously tested model:

- New 210mm mono cell 3: 8S7E1218A-R1 PERC bifacial cell, manufactured by Zhejiang Aiko Solar Energy Technology Co., Ltd.
- New Encapsulation material 2: EV1050G2 (between front cover and cell) EV1050G1(between cell and rear cover), manufactured by Jiangsu Lushan New Materials Co., Ltd.
- New front cover 2: AR coating tempered glass, manufactured by Xinyi Photovoltaic Glass Holding (Anhui) Co., Ltd.
- New internal wiring (for interconnection cell-to-cell bus bar) 2: Copper belt with tin plated (Sn60%Pb40% Φ = 0.26mm±10%), manufactured by Changzhou Greateen New Energy Technology Co., Ltd.
- New Internal wiring (for inter-string connection) 2: Copper belt with tin plated (Sn60%Pb40% 6.0 x 0.35 mm (middle) for 210mm mono cell, 4.0 x 0.4 mm (middle) for 182mm mono cell, 4.0 x 0.40 mm (both ends)), manufactured by Changzhou Greateen New Energy Technology Co., Ltd.
- New Fluxing agent 2: SF105, manufactured by Asahi Soldering Tin Science Technology (Wuxi) Co., Ltd.
- New frame parts 3: 6005-T6(Thickness = 30 mm), manufactured by Jiangsu LEAD Aluminum Industry Co., Ltd.
- New Adhesive (frame) 2: HT906Z, manufactured by Shanghai Huitian New Material Co., Ltd.

Module type: ODA645-33V-MH (BOM3 lower end)

☐	Random sampling from production
☒	Prototype submitted by client
☐	New module type
☐	Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)
	☐ Modification to frontsheet
	☐ Modification to encapsulation system
	☐ Modification to cell technology
	☐ Modification to cell and string interconnect material or technique
	☐ Modification to backsheet
	☐ Modification to electrical termination
	☐ Modification to bypass diode
	☐ Modification to electrical circuitry
	☐ Modification to edge sealing
	☐ Modification to frame and/or mounting structure
	☐ Change in PV module size
	☐ Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process
	☐ Increase of over-current protection rating
	☐ Increase of system voltage
	☐ Change in cell fixing tape
	☐ Others
☒	Others

Description of similarity (differences) between the applied model and the previously tested model:

- To determine the lower end of power range

Module type: ODA670-33V-MH (BOM3 higher end)

☐	Random sampling from production
☒	Prototype submitted by client
☐	New module type
☐	Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)
	☐ Modification to frontsheet
	☐ Modification to encapsulation system
	☐ Modification to cell technology
	☐ Modification to cell and string interconnect material or technique
	☐ Modification to backsheet
	☐ Modification to electrical termination
	☐ Modification to bypass diode
	☐ Modification to electrical circuitry
	☐ Modification to edge sealing
	☐ Modification to frame and/or mounting structure
	☐ Change in PV module size
	☐ Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process
	☐ Increase of over-current protection rating
	☐ Increase of system voltage
	☐ Change in cell fixing tape
	☐ Others
☒	Others

Description of similarity (differences) between the applied model and the previously tested model:

- To determine the higher end of power range

Module type: ODA660-33V-MH (BOM4)

☐	Random sampling from production
☒	Prototype submitted by client
☐	New module type
☒	Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)
☐	Modification to frontsheet
☐	Modification to encapsulation system
☐	Modification to cell technology
☐	Modification to cell and string interconnect material or technique
☐	Modification to backsheet
☐	Modification to electrical termination
☐	Modification to bypass diode
☐	Modification to electrical circuitry
☐	Modification to edge sealing
☒	Modification to frame and/or mounting structure
☐	Change in PV module size
☐	Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process
☐	Increase of over-current protection rating
☐	Increase of system voltage
☐	Change in cell fixing tape
☐	Others
☐	Others

Description of similarity (differences) between the applied model and the previously tested model:

- New frame parts 5: 6005-T6(Thickness = 30 mm), manufactured by Changshu Dongneng SOLAR Technology Co., Ltd.

Module type: ODA590-36V-MH (BOM5)

☐	Random sampling from production
☒	Prototype submitted by client
☐	New module type
☐	Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)
	☐ Modification to frontsheet
	☐ Modification to encapsulation system
	☐ Modification to cell technology
	☐ Modification to cell and string interconnect material or technique
	☐ Modification to backsheet
	☐ Modification to electrical termination
	☐ Modification to bypass diode
	☐ Modification to electrical circuitry
	☐ Modification to edge sealing
	☐ Modification to frame and/or mounting structure
	☐ Change in PV module size
	☐ Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process
	☐ Increase of over-current protection rating
	☐ Increase of system voltage
	☐ Change in cell fixing tape
	☐ Others
☒	Others

Description of similarity (differences) between the applied model and the previously tested model:

- To determine the higher end of power range

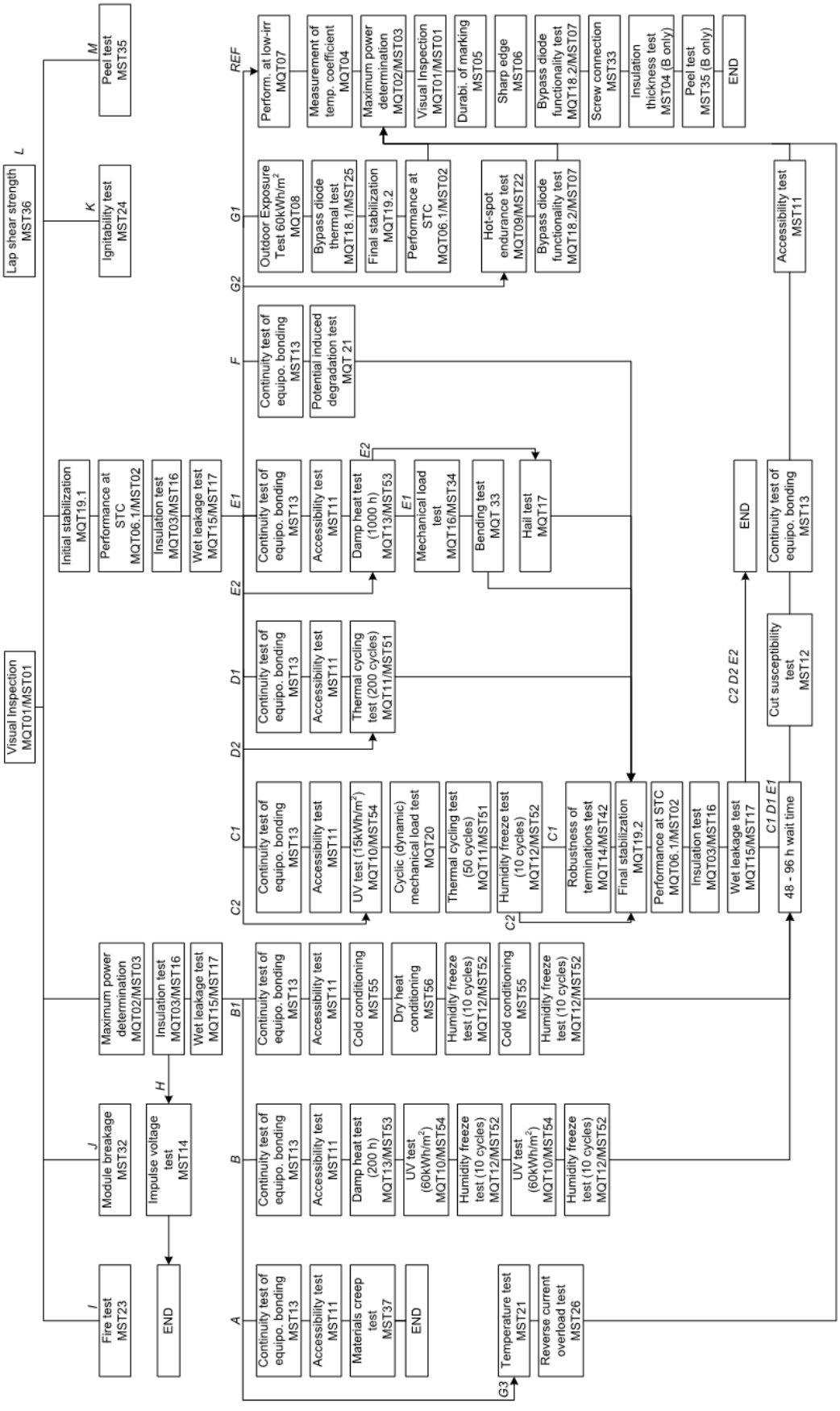
Module type: ODA555-36V-MHB (BOM6)

☐	Random sampling from production
☒	Prototype submitted by client
☐	New module type
☒	Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)
	☐ Modification to frontsheet
	☐ Modification to encapsulation system
	☐ Modification to cell technology
	☐ Modification to cell and string interconnect material or technique
	☐ Modification to backsheet
	☐ Modification to electrical termination
	☐ Modification to bypass diode
	☐ Modification to electrical circuitry
	☐ Modification to edge sealing
	☐ Modification to frame and/or mounting structure
	☐ Change in PV module size
	☐ Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process
	☐ Increase of over-current protection rating
	☐ Increase of system voltage
	☐ Change in cell fixing tape
	☒ Others
☐	Others

Description of similarity (differences) between the applied model and the previously tested model:

- Rear cover: FFC-JW3010(plus) (Color: black) manufactured by Jolywood (Suzhou) Sunwatt Co., Ltd.
- Frame parts: 6005-T6 (Color: black) manufactured by Zhangjiagang Shuoyuan Aluminum Technology Co., Ltd.

Test sequence



Module group assignment

Module type: ODA590-39V-MH (BOM1)

Sample #	Serial number	Dimension (l x w x h) [mm]	Remark
1	GY20220711D78TW182J10001	2465 x 1134 x 30	REF
2	GY20220711D78TW182J10003	2465 x 1134 x 30	G1
3	GY20220711D78TW182J10004	2465 x 1134 x 30	G2
4	GY20220711D78TW182J10006	2465 x 1134 x 30	C1
5	GY20220711D78TW182J10008	2465 x 1134 x 30	C2
6	GY20220711D78TW182J10010	2465 x 1134 x 30	D1
7	GY20220711D78TW182J10011	2465 x 1134 x 30	D2
8	GY20220711D78TW182J10012	2465 x 1134 x 30	E1
9	GY20220711D78TW182J10014	2465 x 1134 x 30	E2
10	GY20220711D78TW182J10016	2465 x 1134 x 30	F1
11	GY20220711D78TW182J10017	2465 x 1134 x 30	F1
12	GY20220711D78TW182J10018	2465 x 1134 x 30	F2
13	GY20220711D78TW182J10019	2465 x 1134 x 30	F2
14	GY20220711D78TW182J10020	2465 x 1134 x 30	G3
15	GY20220711D78TW182J10022	2465 x 1134 x 6	H
16	GY20220711D78TW182J10023	2465 x 1134 x 30	J
17	GY20220711D78TW182J10024	2465 x 1134 x 30	A
18	GY20220711D78TW182J10026	2465 x 1134 x 30	B
19	GY20220711D78TW182J10028	2465 x 1134 x 30	B1
20	GY20220711D78TW182J10029	2465 x 1134 x 30	I
21	GY20220711D78TW182J10031	2465 x 1134 x 30	I
22	GY20220711D78TW182J10032	2465 x 1134 x 30	I
23	GY20220711D78TW182J10033	2465 x 1134 x 30	K

Module type: ODA620-39V-MH (BOM1 higher end)

Sample #	Serial number	Dimension (l x w x h) [mm]	Remark
24	GY20220711D78TW182J10036	2465 x 1134 x 30	Higher end power
25	GY20220711D78TW182J10038	2465 x 1134 x 30	Higher end power

Module type: ODA670-33V-MH (BOM2)

Sample #	Serial number	Dimension (l x w x h) [mm]	Remark
26	GY20221011S66TW210N10010	2384 x 1303 x 30	REF
27	GY20221011S66TW210N10012	2384 x 1303 x 30	G1
28	GY20221011S66TW210N10014	2384 x 1303 x 30	G2
29	GY20221011S66TW210N10021	2384 x 1303 x 30	D1
30	GY20221011S66TW210N10022	2384 x 1303 x 30	D2
31	GY20221011S66TW210N10024	2384 x 1303 x 30	E1
32	GY20221011S66TW210N10026	2384 x 1303 x 30	E2
33	GY20221011S66TW210N10029	2384 x 1303 x 30	G3
34	GY20221011S66TW210N10031	2384 x 1303 x 30	H

Module type: ODA700-33V-MH (BOM2 higher end)

Sample #	Serial number	Dimension (l x w x h) [mm]	Remark
35	GY20221011S66TW210N10044	2384 x 1303 x 30	Higher end power
36	GY20221011S66TW210N10045	2384 x 1303 x 30	Higher end power

Module type: ODA660-33V-MH (BOM3)

Sample #	Serial number	Dimension (l x w x h) [mm]	Remark
3-1	GY2023042S78OD182P10111	2384 x 1303 x 30	REF
3-2	GY2023042S78OD182P10112	2384 x 1303 x 30	G1
3-3	GY2023042S78OD182P10113	2384 x 1303 x 30	G2
3-4	GY2023042S78OD182P10114	2384 x 1303 x 30	C1
3-5	GY2023042S78OD182P10115	2384 x 1303 x 30	C2
3-6	GY2023042S78OD182P10117	2384 x 1303 x 30	D1
3-7	GY2023042S78OD182P10119	2384 x 1303 x 30	D2
3-8	GY2023042S78OD182P10120	2384 x 1303 x 30	E1
3-9	GY2023042S78OD182P10122	2384 x 1303 x 30	E2
3-10	GY2023042S78OD182P10123	2384 x 1303 x 30	F1
3-11	GY2023042S78OD182P10125	2384 x 1303 x 30	F1
3-12	GY2023042S78OD182P10126	2384 x 1303 x 30	F2
3-13	GY2023042S78OD182P10128	2384 x 1303 x 30	F2
3-14	GY2023042S78OD182P10130	2384 x 1303 x 30	G3
3-15	GY2023042S78OD182P10131	2384 x 1303 x 30	H
3-16	GY2023042S78OD182P10133	2384 x 1303 x 30	J
3-17	GY2023042S78OD182P10134	2384 x 1303 x 30	A
3-18	GY2023042S78OD182P10135	2384 x 1303 x 30	B
3-19	GY2023042S78OD182P10137	2384 x 1303 x 30	B1

3-20	GY2023042S78OD182P10138	2384 x 1303 x 30	I
3-21	GY2023042S78OD182P10139	2384 x 1303 x 30	I
3-22	GY2023042S78OD182P10140	2384 x 1303 x 30	I
3-23	GY2023042S78OD182P10142	2384 x 1303 x 30	K

Module type: ODA645-33V-MH (BOM3 lower end)

Sample #	Serial number	Dimension (l x w x h) [mm]	Remark
3-24	GY2023042S78OD182P10143	2384 x 1303 x 30	Lower end power
3-25	GY2023042S78OD182P10145	2384 x 1303 x 30	Lowe end power

Module type: ODA670-33V-MH (BOM3 higher end)

Sample #	Serial number	Dimension (l x w x h) [mm]	Remark
3-26	GY2023042S78OD182P10146	2384 x 1303 x 30	Higher end power
3-27	GY2023042S78OD182P10147	2384 x 1303 x 30	Higher end power

Module type: ODA660-33V-MH (BOM4)

Sample #	Serial number	Dimension (l x w x h) [mm]	Remark
4-1	GY2023042S78OD182P10186	2384 x 1303 x 30	REF
4-2	GY2023042S78OD182P10187	2384 x 1303 x 30	E1
4-3	GY2023042S78OD182P10188	2384 x 1303 x 30	J

Module type: ODA590-36V-MH (BOM5)

Sample #	Serial number	Dimension (l x w x h) [mm]	Remark
5-1	668YP230361212560003	2278 x 1134 x 30	Higher end power
5-2	668YP230361212560021	2278 x 1134 x 30	Higher end power

Module type: ODA555-36V-MHB (BOM6)

Sample #	Serial number	Dimension (l x w x h) [mm]	Remark
6-1	668YP230361212560216	2278 x 1134 x 30	TT

Clause	Requirement + Test	Result - Remark	Verdict

Test result overview

5 Marking and documentation			**-**
5.1 Name Plate			**-**
The module include the following 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	N/A
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 includingbinning and tolerances	Yes	P
k)	For flexible modules, the minimum radius of curvature	Yes	P
-	All electrical data is shown as relative to standard test conditions (1000W/m^2, 25°C, AM1.5 according to IEC TS 61836)	Yes	P
-	International symbols are used where applicable	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 to be given in the documentation			-
a)	All information required under 5.1 e) to i)	Yes	P
b)	Reversed current rating in accordance to IEC / EN 61730-2		-
-	Overcurrent protection device type and rating are e.g. given in IEC 60269-6	Yes	P

Clause	Requirement + Test	Result - Remark	Verdict
-	Maximum series / parallel module configurations 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 is shown as relative to standard test conditions (1000W/m^2, 25°C, AM1.5 according to IEC TS 61836)	Yes	P
g)	Performance at low irradiance (MQT 07) is specified	Yes	P
-	International symbols are used where applicable	Yes	P
-	Compliance is checked by inspection and MQT 04 through MQT 07	Yes	P
The electrical documentation include a detailed description of the electrical installation wiring method to be used, including:			-
h)	The minimum cable diameters for modules intended for field wiring	Yes	P
i)	Any limitations on wiring methods and wire management that apply to the wiring compartment or box	Yes	P
j)	The size, type, material and temperature rating of the conductors to be used	Yes	P
k)	Type of terminals for field wiring	Yes	P
l)	Specific PV connector model/types and manufacturer to which the module connectors are mated. Statement of the connector type only (such as "MC4 compatible ") is not sufficient information to satisfy this requirement. Connector model/types and manufacturers shall be included	Yes	P
m)	The bonding method(s) to be used (if applicable); all provided or specified hardware is identified in the documentation	Yes	P
n)	The type and ratings of bypass diode to be used (if applicable)	Yes	P
o)	limitations to the mounting situation (e.g., slope, orientation, mounting means, cooling)	Yes	P
p)	A statement indicating the fire rating(s) and the applied standard as well as the limitations to that rating (e.g., installation slope, sub structure or other applicable installation information)	Yes	P

Clause	Requirement + Test	Result - Remark	Verdict
q)	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: *"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 ISC and VOC 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."*	Yes	P
5.2.3 Assembly instructions			-
-	These are provided with a product shipped in subassemblies, and are detailed and adequate to the degree required to facilitate complete and safe assembly of the product	Yes	P
Supplementary information: N/A			

6 Testing			**-**
Table 1 Required component test			**-**
The components shall pass the following test:			-
-	Junction box: MQT 14.2, which cites IEC 62790 "Test of cord anchorage."	Yes	P
-	Connectors: IEC 62852. Compliance shall be obtained with the connector in combination with the same cable size and type as used in the modules under test.	Yes	P
Supplementary information: N/A			

7 Pass criteria			**-**
7.1 General			**-**
-	If two or more modules fail to meet the following test criteria, the design is deemed not to have met the qualification requirements	No	P

Clause	Requirement + Test	Result - Remark	Verdict
-	Should one module fail any test, two additional modules meeting the requirements of Clause 4 is subjected to the entire series of tests of the respective test sequence. If one or both of these modules also fail, the design is deemed not to have met the qualification requirements. If, however, both modules pass the test sequence, the design is judged to have met the qualification requirements.	No	P
-	The module design shall meet the requirements of all criteria to be deemed as qualified according to this document. Each test sample shall be subject to the following criteria	Yes	P
7.2 Power output and electric circuitry			-
7.2.2 Verification of rated label values (Gate No. 1)			-
-	After stabilization, each individual module meets: $P_{max}(Lab) \cdot \left(1 + \frac{\lvert m_1 \rvert [\%]}{100}\right) \geq P_{max}(NP) \cdot \left(1 - \frac{\lvert t_1 \rvert [\%]}{100}\right)$	Yes	P
-	After stabilization: $\bar{P}_{max}(Lab) \cdot \left(1 + \frac{\lvert m_1 \rvert [\%]}{100}\right) \geq P_{max}(\mathrm{NP})$	Yes	P
-	After stabilization, each individual module meets: $V_{OC}(Lab) \cdot \left(1 + \frac{\lvert m_2 \rvert [\%]}{100}\right) \leq V_{oc}\,(NP) \cdot \left(1 + \frac{\lvert t_2 \rvert [\%]}{100}\right)$	Yes	P
-	After stabilization, each individual module meets: $I_{SC}(Lab) \cdot \left(1 + \frac{\lvert m_3 \rvert [\%]}{100}\right) \leq I_{SC}\,(NP) \cdot \left(1 + \frac{\lvert t_3 \rvert [\%]}{100}\right)$	Yes	P
-	At the end of each test sequence or for sequence B after bypass diode test, each test sample meets: $P_{max}(\mathrm{Lab\_Gate\#2}) \geq 0.95 \times P_{max}(\mathrm{Lab\_Gate\#1}) \cdot \left(1 - \frac{r[\%]}{100}\right)$	Yes	P
7.2.3 Maximum power degradation during type approval testing (Gate No. 2)			-
-	At the end of each test sequence or for sequence B after bypass diode test, each test sample meets: $P_{max}(\mathrm{Lab\_Gate\#2}) \geq 0.95 \cdot P_{max}(\mathrm{Lab\_Gate\#1}) \cdot \left(1 - \frac{r}{100}\right)$	Yes	P
7.2.4 Electrical circuitry			-
-	Samples are not permitted to exhibit an open-circuit during the tests	No open-circuit observed.	P
7.3 Visual defects			-
-	There is no visual evidence of a major defect.	Yes	P
7.4 Electrical safety			-
a)	The insulation test (MQT 03) requirements are met after the tests	Yes	P

Clause	Requirement + Test	Result - Remark	Verdict
b)	The wet leakage current test (MQT 15) requirements are met at the beginning and the end of each sequence.	Yes	P
c)	Specific requirements (IEC 61215-1-1) of the individual tests are met.	Yes	P
Supplementary information: N/A			

Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA590-39V-MH (BOM1)

Initial examinations			-
MQT19.1	Initial stabilization ..... :	Performed by testing lab, see table 4.19.5	-
MQT01/MST01	Visual inspection ..... :	See table 4.1 & 10.2	P
MQT06.1/MST02	Performance at STC (Gate #1) ..... :	See table 4.6	P
MQT03/MST16	Insulation test ..... :	See table 4.3 & 10.13	P
MQT15/MST17	Wet leakage current test ..... :	See table 4.15 & 10.14	P
MQT02/MST03	Maximum power determination ..... :	See table 10.4	P
MST13	Continuity test for equipotential bonding ..... :	See table 10.11	P
MST11	Accessibility test ..... :	See table 10.9	P

Sample 1#			-
MQT04	Measurement of temperature coefficients ..... :	See table 4.4	-
MQT07	Performance at low irradiance ..... :	See table 4.7	-

Sample 2#			-
MQT08	Outdoor exposure test ..... :	See table 4.8	P
MQT18.1/MST25	Bypass diode thermal test ..... :	See table 4.18.1	P

Sample 3#			-
MQT09/MST22	Hot spot endurance test ..... :	See table 4.9	P
MQT18.2/MST07	Bypass diode functionality test ..... :	See table 4.18.2	P

Sample 4#			-
MQT10/MST54	UV preconditioning test (15kWh/m^2) ..... :	See table 4.10	P
MQT20	Cyclic (dynamic) mechanical load test ..... :	See table 4.20	P
MQT11/MST51	Thermal cycling test (50 cycles) ..... :	See table 4.11	P
MQT12/MST52	Humidity freeze (10 cycles) ..... :	See table 4.12	P
MQT14.1/MST42	Retention of junction box on mounting surface . :	See table 4.14.2	P
MQT14.2/MST42	Test of cord anchorage ..... :	N/A	N/A
MST12	Cut susceptibility test ..... :	See table 10.10	P

Clause	Requirement + Test	Result - Remark	Verdict
Sample 5#			-
MQT10/MST54	UV preconditioning test (15kWh/m^2) ..... :	See table 4.10	P
MQT20	Cyclic (dynamic) mechanical load test ..... :	See table 4.20	P
MQT11/MST51	Thermal cycling test (50 cycles) ..... :	See table 4.11	P
MQT12/MST52	Humidity freeze (10 cycles) ..... :	See table 4.12	P
Sample 6#			-
MQT11/MST 51	Thermal cycling test (200 cycles) ..... :	See table 4.11	P
MST12	Cut susceptibility test ..... :	See table 10.10	P
Sample 7#			-
MQT11/MST 51	Thermal cycling test (200 cycles) ..... :	See table 4.11	P
Sample 8#			-
MQT13/MST53	Damp heat test (1000h) ..... :	See table 4.13	P
MQT19.2	Final stabilization (method 1) ..... :	N/A	N/A
MQT16/MST34	Static mechanical load test ..... :	See table 4.16	P
MQT22	Bending test (for flexible modules only) ..... :	N/A	N/A
MST12	Cut susceptibility test ..... :	See table 10.10	P
Sample 9#			-
MQT13/MST53	Damp heat test (1000h) ..... :	See table 4.13	P
MQT19.2	Final stabilization (method 1) ..... :	N/A	N/A
MQT17	Hail test ..... :	See table 4.17	P
Sample 10#, 11#, 12#, 13#			-
MQT 21	Potential induced degradation test ..... :	See table 4.21	P
MQT19.2	Final stabilization (method 3) ..... :	N/A	N/A
Sample 14#			-
MST21	Temperature test ..... :	See table 10.15	P
MST26	Reverse current overload test ..... :	See table 10.20	P
Sample 15#			-
MST14	Impulse voltage test ..... :	See table 10.12	P

Clause	Requirement + Test	Result - Remark	Verdict
Sample 16#			-
MST32	Module breakage test ..... :	See table 10.21	P
Sample 17#			-
MST37	Materials creep test ..... :	See table 10.26	P
Sample 18#			-
MQT13/MST53	Damp heat test (200h) ..... :	See table 10.30	P
MQT10/MST54	UV preconditioning test (front side, 60kWh/m^2). :	See table 10.31	P
MQT12/MST52	Humidity freeze (1st round, 10 cycles) ..... :	See table 10.29	P
MQT10/MST54	UV preconditioning test (back side, 60kWh/m^2) :	See table 10.31	P
MQT12/MST52	Humidity freeze (2nd round, 10 cycles) ..... :	See table 10.29	P
MST12	Cut susceptibility test ..... :	See table 10.10	P
Sample 19#			-
MST55	Cold conditioning (1st round)..... :	See table 10.32	P
MST56	Dry hot conditioning ..... :	See table 10.33	P
MQT12/MST52	Humidity freeze (1st round, 10 cycles) ..... :	See table 10.29	P
MST55	Cold conditioning (2nd round)..... :	See table 10.32	P
MQT12/MST52	Humidity freeze (2nd round, 10 cycles) ..... :	See table 10.29	P
MST12	Cut susceptibility test ..... :	See table 10.10	P
Sample 20#, 21#, 22#			-
MST23	Fire test ..... :	See table 10.17	P
Sample 23#			-
MST24	Ignitability test ..... :	See table 10.18	P
Final examinations			-
MQT06.1/MST02	Performance at STC (Gate #2)..... :	See table 4.6.1	P
MQT19.2	Final stabilization (method 2)	N/A	N/A
MQT19.2	Final stabilization (method 4)	N/A	N/A
MQT06.1/MST02	Performance at STC (after final stabilization, Gate #2) ..... :	See table 4.6.1	P
MQT03/MST16	Insulation test..... :	See table 4.3	P
MQT15/MST17	Wet leakage current test..... :	See table 4.15	P

Clause	Requirement + Test	Result - Remark	Verdict
MST13	Continuity test for equipotential bonding ..... :	See table 10.11	P
MST11	Accessibility test..... :	See table 10.9	P
-	48-96h wait time	-	-
MQT02/MST03	Maximum power determination..... :	See table 10.4	P
MQT01/MST01	Visual inspection ..... :	See table 10.2	P
MST05	Durability of markings ..... :	N/A	N/A
MST06	Sharp edge test..... :	See table 10.7	P
MQT18.2/MST07	Bypass diode functionality test ..... :	See table 10.19	P
MST33	Screw connections test..... :	N/A	N/A
MST04	Insulation thickness test ..... :	See table 10.5	P
MST35	Peel test..... :	N/A	N/A

Module type: ODA620-39V-MH (BOM1 higher end)

Initial examination			-
MQT19.1	Initial stabilization..... :	Performed by testing lab, see table 4.19.5	-
MQT01/MST01	Visual inspection ..... :	See table 4.1	P
MQT06.1/MST02	Performance at STC (Gate #1)..... :	See table 4.6	P
MQT03/MST16	Insulation test..... :	See table 4.3	P
MQT15/MST17	Wet leakage current test..... :	See table 4.15	P
MST13	Continuity test for equipotential bonding ..... :	N/A	N/A
MST11	Accessibility test..... :	N/A	N/A

Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA670-33V-MH (BOM2)

Initial examinations			-
MQT19.1	Initial stabilization ..... :	Performed by testing lab, see table 4.19.5	-
MQT01/MST01	Visual inspection ..... :	See table 4.1 & 10.2	P
MQT06.1/MST02	Performance at STC (Gate #1) ..... :	See table 4.6	P
MQT03/MST16	Insulation test ..... :	See table 4.3 & 10.13	P
MQT15/MST17	Wet leakage current test ..... :	See table 4.15 & 10.14	P
MQT02/MST03	Maximum power determination ..... :	See table 10.4	P
MST13	Continuity test for equipotential bonding ..... :	See table 10.11	P
MST11	Accessibility test ..... :	See table 10.9	P

Sample 27#			-
MQT08	Outdoor exposure test ..... :	N/A	N/A
MQT18.1/MST25	Bypass diode thermal test ..... :	See table 4.18.1	P

Sample 28#			-
MQT09/MST22	Hot spot endurance test ..... :	See table 4.9	P
MQT18.2/MST07	Bypass diode functionality test ..... :	See table 4.18.2	P

Sample 29#			-
MQT11/MST 51	Thermal cycling test (200 cycles) ..... :	See table 4.11	P
MST12	Cut susceptibility test ..... :	See table 10.10	P

Sample 30#			-
MQT11/MST 51	Thermal cycling test (200 cycles) ..... :	See table 4.11	P

Sample 31#			-
MQT13/MST53	Damp heat test (1000h) ..... :	See table 4.13	P
MQT19.2	Final stabilization (method 1) ..... :	N/A	N/A
MQT16/MST34	Static mechanical load test ..... :	See table 4.16	P
MQT22	Bending test (for flexible modules only) ..... :	N/A	N/A
MST12	Cut susceptibility test ..... :	See table 10.10	P

Sample 32#			-
MQT13/MST53	Damp heat test (1000h) ..... :	See table 4.13	P
MQT19.2	Final stabilization (method 1) ..... :	N/A	N/A

Clause	Requirement + Test	Result - Remark	Verdict
MQT17	Hail test ..... :	See table 4.17	P
Sample 33#			**-**
MST21	Temperature test ..... :	See table 10.15	P
MST26	Reverse current overload test ..... :	See table 10.20	P
Sample 34#			**-**
MST32	Module breakage test ..... :	See table 10.21	P
Final examinations			-
MQT06.1/MST02	Performance at STC (Gate #2) ..... :	See table 4.6.1	P
MQT19.2	Final stabilization (method 2)	N/A	N/A
MQT19.2	Final stabilization (method 4)	N/A	N/A
MQT06.1/MST02	Performance at STC (after final stabilization, Gate #2) ..... :	See table 4.6.1	P
MQT03/MST16	Insulation test ..... :	See table 4.3	P
MQT15/MST17	Wet leakage current test ..... :	See table 4.15	P
MST13	Continuity test for equipotential bonding ..... :	See table 10.11	P
MST11	Accessibility test ..... :	See table 10.9	P
-	48-96h wait time	-	-
MQT02/MST03	Maximum power determination ..... :	See table 10.4	P
MQT01/MST01	Visual inspection ..... :	See table 10.2	P
MST05	Durability of markings ..... :	N/A	N/A
MST06	Sharp edge test ..... :	See table 10.7	P
MQT18.2/MST07	Bypass diode functionality test ..... :	See table 10.19	P
MST33	Screw connections test ..... :	N/A	N/A
MST04	Insulation thickness test ..... :	N/A	N/A
MST35	Peel test ..... :	N/A	N/A

Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA700-33V-MH (BOM2 Higher end)

Initial examinations			-
MQT19.1	Initial stabilization ..... :	Performed by testing lab, see table 4.19.5	-
MQT01/MST01	Visual inspection ..... :	See table 4.1	P
MQT06.1/MST02	Performance at STC (Gate #1) ..... :	See table 4.6	P
MQT03/MST16	Insulation test ..... :	See table 4.3	P
MQT15/MST17	Wet leakage current test ..... :	See table 4.15	P
MST13	Continuity test for equipotential bonding ..... :	N/A	N/A
MST11	Accessibility test ..... :	N/A	N/A

Module type: ODA660-33V-MH (BOM3)

Initial examinations			-
MQT19.1	Initial stabilization ..... :	Performed by testing lab, see table 4.19.5	-
MQT01/MST01	Visual inspection ..... :	See table 4.1 & 10.2	P
MQT06.1/MST02	Performance at STC (Gate #1) ..... :	See table 4.6	P
MQT03/MST16	Insulation test ..... :	See table 4.3 & 10.13	P
MQT15/MST17	Wet leakage current test ..... :	See table 4.15 & 10.14	P
MQT02/MST03	Maximum power determination ..... :	See table 10.4	P
MST13	Continuity test for equipotential bonding ..... :	See table 10.11	P
MST11	Accessibility test ..... :	See table 10.9	P

Sample 3-1#			-
MQT04	Measurement of temperature coefficients ..... :	See table 4.4	-
MQT07	Performance at low irradiance ..... :	See table 4.7	-

Sample 3-2#			-
MQT08	Outdoor exposure test ..... :	See table 4.8	P
MQT18.1/MST25	Bypass diode thermal test ..... :	See table 4.18.1	P

Sample 3-3#			-
MQT09/MST22	Hot spot endurance test ..... :	See table 4.9	P
MQT18.2/MST07	Bypass diode functionality test ..... :	See table 4.18.2	P

Sample 3-4#			-
MQT10/MST54	UV preconditioning test (15kWh/m^2) ..... :	See table 4.10	P

Clause	Requirement + Test	Result - Remark	Verdict
MQT20	Cyclic (dynamic) mechanical load test ..... :	See table 4.20	P
MQT11/MST51	Thermal cycling test (50 cycles) ..... :	See table 4.11	P
MQT12/MST52	Humidity freeze (10 cycles) ..... :	See table 4.12	P
MQT14.1/MST42	Retention of junction box on mounting surface . :	See table 4.14.2	P
MQT14.2/MST42	Test of cord anchorage..... :	N/A	N/A
MST12	Cut susceptibility test..... :	See table 10.10	P
Sample 3-5#			**-**
MQT10/MST54	UV preconditioning test (15kWh/m^2) ..... :	See table 4.10	P
MQT20	Cyclic (dynamic) mechanical load test ..... :	See table 4.20	P
MQT11/MST51	Thermal cycling test (50 cycles) ..... :	See table 4.11	P
MQT12/MST52	Humidity freeze (10 cycles) ..... :	See table 4.12	P
Sample 3-6#			**-**
MQT11/MST 51	Thermal cycling test (200 cycles) ..... :	See table 4.11	P
MST12	Cut susceptibility test..... :	See table 10.10	P
Sample 3-7#			**-**
MQT11/MST 51	Thermal cycling test (200 cycles) ..... :	See table 4.11	P
Sample 3-8#			**-**
MQT13/MST53	Damp heat test (1000h)..... :	See table 4.13	P
MQT19.2	Final stabilization (method 1)..... :	N/A	N/A
MQT16/MST34	Static mechanical load test..... :	See table 4.16	P
MQT22	Bending test (for flexible modules only) ..... :	N/A	N/A
MST12	Cut susceptibility test..... :	See table 10.10	P
Sample 3-9#			**-**
MQT13/MST53	Damp heat test (1000h)..... :	See table 4.13	P
MQT19.2	Final stabilization (method 1)..... :	N/A	N/A
MQT17	Hail test..... :	See table 4.17	P
Sample 3-10#, 3-11#, 3-12#, 3-13#			**-**
MQT 21	Potential induced degradation test ..... :	See table 4.21	P
MQT19.2	Final stabilization (method 3)..... :	N/A	N/A

Clause	Requirement + Test	Result - Remark	Verdict
Sample 3-14#			-
MST21	Temperature test ..... :	See table 10.15	P
MST26	Reverse current overload test ..... :	See table 10.20	P
Sample 3-15#			-
MST14	Impulse voltage test..... :	See table 10.12	P
Sample 3-16#			-
MST32	Module breakage test ..... :	See table 10.21	P
Sample 3-17#			-
MST37	Materials creep test ..... :	See table 10.26	P
Sample 3-18#			-
MQT13/MST53	Damp heat test (200h)..... :	See table 10.30	P
MQT10/MST54	UV preconditioning test (front side, 60kWh/m^2). :	See table 10.31	P
MQT12/MST52	Humidity freeze (1st round, 10 cycles) ..... :	See table 10.29	P
MQT10/MST54	UV preconditioning test (back side, 60kWh/m^2) :	See table 10.31	P
MQT12/MST52	Humidity freeze (2nd round, 10 cycles) ..... :	See table 10.29	P
MST12	Cut susceptibility test..... :	See table 10.10	P
Sample 3-19#			-
MST55	Cold conditioning (1st round)..... :	See table 10.32	P
MST56	Dry hot conditioning ..... :	See table 10.33	P
MQT12/MST52	Humidity freeze (1st round, 10 cycles) ..... :	See table 10.29	P
MST55	Cold conditioning (2nd round)..... :	See table 10.32	P
MQT12/MST52	Humidity freeze (2nd round, 10 cycles) ..... :	See table 10.29	P
MST12	Cut susceptibility test..... :	See table 10.10	P
Sample 3-20#, 3-21#, 3-22#			-
MST23	Fire test..... :	See table 10.17	P
Sample 3-23#			-
MST24	Ignitability test ..... :	See table 10.18	P

Clause	Requirement + Test	Result - Remark	Verdict
Final examinations			-
MQT06.1/MST02	Performance at STC (Gate #2) :	See table 4.6.1	P
MQT19.2	Final stabilization (method 2)	N/A	N/A
MQT19.2	Final stabilization (method 4)	N/A	N/A
MQT06.1/MST02	Performance at STC (after final stabilization, Gate #2) :	See table 4.6.1	P
MQT03/MST16	Insulation test :	See table 4.3	P
MQT15/MST17	Wet leakage current test :	See table 4.15	P
MST13	Continuity test for equipotential bonding :	See table 10.11	P
MST11	Accessibility test :	See table 10.9	P
-	48-96h wait time	-	-
MQT02/MST03	Maximum power determination :	See table 10.4	P
MQT01/MST01	Visual inspection :	See table 10.2	P
MST05	Durability of markings :	N/A	N/A
MST06	Sharp edge test :	See table 10.7	P
MQT18.2/MST07	Bypass diode functionality test :	See table 10.19	P
MST33	Screw connections test :	N/A	N/A
MST04	Insulation thickness test :	See table 10.5	P
MST35	Peel test :	N/A	N/A

Module type: ODA645-33V-MH (BOM3 lower end)

Initial examination			-
MQT19.1	Initial stabilization :	Performed by testing lab, see table 4.19.5	-
MQT01/MST01	Visual inspection :	See table 4.1	P
MQT06.1/MST02	Performance at STC (Gate #1) :	See table 4.6	P
MQT03/MST16	Insulation test :	See table 4.3	P
MQT15/MST17	Wet leakage current test :	See table 4.15	P
MST13	Continuity test for equipotential bonding :	N/A	N/A
MST11	Accessibility test :	N/A	N/A

Module type: ODA670-33V-MH (BOM3 higher end)

Initial examination			-
MQT19.1	Initial stabilization :	Performed by testing lab, see table 4.19.5	-
MQT01/MST01	Visual inspection :	See table 4.1	P
MQT06.1/MST02	Performance at STC (Gate #1) :	See table 4.6	P
MQT03/MST16	Insulation test :	See table 4.3	P

Clause	Requirement + Test	Result - Remark	Verdict
MQT15/MST17	Wet leakage current test ..... :	See table 4.15	P
MST13	Continuity test for equipotential bonding ..... :	N/A	N/A
MST11	Accessibility test..... :	N/A	N/A

Module type: ODA660-33V-MH (BOM4)

Initial examinations			-
MQT19.1	Initial stabilization..... :	Performed by testing lab, see table 4.19.5	-
MQT01/MST01	Visual inspection ..... :	See table 4.1 & 10.2	P
MQT06.1/MST02	Performance at STC (Gate #1)..... :	See table 4.6	P
MQT03/MST16	Insulation test..... :	See table 4.3 & 10.13	P
MQT15/MST17	Wet leakage current test..... :	See table 4.15 & 10.14	P
MQT02/MST03	Maximum power determination..... :	See table 10.4	P
MST13	Continuity test for equipotential bonding ..... :	See table 10.11	P
MST11	Accessibility test..... :	See table 10.9	P

Sample 4-2**#**			**-**
MQT13/MST53	Damp heat test (1000h)..... :	N/A	N/A
MQT19.2	Final stabilization (method 1)..... :	N/A	N/A
MQT16/MST34	Static mechanical load test..... :	See table 4.16	P
MQT22	Bending test (for flexible modules only) ..... :	N/A	N/A
MST12	Cut susceptibility test..... :	See table 10.10	P

Sample 4-3**#**			**-**
MST32	Module breakage test ..... :	See table 10.21	P

Final examinations			-
MQT06.1/MST02	Performance at STC (Gate #2)..... :	See table 4.6.1	P
MQT19.2	Final stabilization (method 2)	N/A	N/A
MQT19.2	Final stabilization (method 4)	N/A	N/A
MQT06.1/MST02	Performance at STC (after final stabilization, Gate #2) ..... :	See table 4.6.1	P
MQT03/MST16	Insulation test..... :	See table 4.3	P
MQT15/MST17	Wet leakage current test..... :	See table 4.15	P
MST13	Continuity test for equipotential bonding ..... :	See table 10.11	P
MST11	Accessibility test..... :	See table 10.9	P
-	48-96h wait time	-	-

Clause	Requirement + Test	Result - Remark	Verdict
MQT02/MST03	Maximum power determination ..... :	See table 10.4	P
MQT01/MST01	Visual inspection ..... :	See table 10.2	P
MST05	Durability of markings ..... :	N/A	N/A
MST06	Sharp edge test ..... :	See table 10.7	P
MQT18.2/MST07	Bypass diode functionality test ..... :	See table 10.19	P
MST33	Screw connections test ..... :	N/A	N/A
MST04	Insulation thickness test ..... :	N/A	N/A
MST35	Peel test ..... :	N/A	N/A

Module type: ODA590-36V-MH (BOM5)

Initial examination			-
MQT19.1	Initial stabilization ..... :	Performed by testing lab, see table 4.19.5	-
MQT01/MST01	Visual inspection ..... :	See table 4.1	P
MQT06.1/MST02	Performance at STC (Gate #1) ..... :	See table 4.6	P
MQT03/MST16	Insulation test ..... :	See table 4.3	P
MQT15/MST17	Wet leakage current test ..... :	See table 4.15	P
MST13	Continuity test for equipotential bonding ..... :	N/A	N/A
MST11	Accessibility test ..... :	N/A	N/A

Module type: ODA555-36V-MHB (BOM6)

Initial examinations			-
MQT19.1	Initial stabilization ..... :	Performed by testing lab, see table 4.19.5	-
MQT01/MST01	Visual inspection ..... :	See table 4.1 & 10.2	P
MQT06.1/MST02	Performance at STC (Gate #1) ..... :	See table 4.6	P
MQT03/MST16	Insulation test ..... :	See table 4.3 & 10.13	P
MQT15/MST17	Wet leakage current test ..... :	See table 4.15 & 10.14	P
MQT02/MST03	Maximum power determination ..... :	See table 10.4	P
MST13	Continuity test for equipotential bonding ..... :	See table 10.11	P
MST11	Accessibility test ..... :	See table 10.9	P

Sample 6-1#			-
MST21	Temperature test ..... :	See table 10.15	P
MST26	Reverse current overload test ..... :	See table 10.20	P

Final examinations	-

Clause	Requirement + Test	Result - Remark	Verdict
MQT06.1/MST02	Performance at STC (Gate #2) :	N/A	N/A
MQT19.2	Final stabilization (method 2)	N/A	N/A
MQT19.2	Final stabilization (method 4)	N/A	N/A
MQT06.1/MST02	Performance at STC (after final stabilization, Gate #2) :	N/A	N/A
MQT03/MST16	Insulation test :	See table 4.3	P
MQT15/MST17	Wet leakage current test :	See table 4.15	P
MST13	Continuity test for equipotential bonding :	N/A	N/A
MST11	Accessibility test :	N/A	N/A
-	48-96h wait time	-	-
MQT02/MST03	Maximum power determination :	See table 10.4	P
MQT01/MST01	Visual inspection :	N/A	N/A
MST05	Durability of markings :	N/A	N/A
MST06	Sharp edge test :	N/A	N/A
MQT18.2/MST07	Bypass diode functionality test :	N/A	N/A
MST33	Screw connections test :	N/A	N/A
MST04	Insulation thickness test :	N/A	N/A
MST35	Peel test :	N/A	N/A

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Test results of IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2

Module type: ODA590-39V-MH (BOM1)

4.1 Visual inspection (initial) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	09/25/2022	-
Sample #	Nature and position of initial findings - comments or attach photos	-
1	No visual defects	P
2	No visual defects	P
3	No visual defects	P
4	No visual defects	P
5	No visual defects	P
6	No visual defects	P
7	No visual defects	P
8	No visual defects	P
9	No visual defects	P
10	No visual defects	P
11	No visual defects	P
12	No visual defects	P
13	No visual defects	P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.19.4 Initial stabilization - MQT19.1							-
Sample #.....:		1					-
Light exposure method.....:		☐ Solar simulator / ☒ Natural sunlight / ☐ Others					-
Test date [MM/DD/YYYY] / start - end .:		09/25/2022 - 09/27/2022					-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	590.8	-	-
1(P2)	5.0	>500	N/A	N/A	589.9	-	-
2(P3)	5.0	>500	N/A	N/A	589.3	0.13	Yes
Sample #.....:		2					-
Light exposure method.....:		☐ Solar simulator / ☒ Natural sunlight / ☐ Others					-
Test date [MM/DD/YYYY] / start - end .:		09/25/2022 - 09/27/2022					-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	592.5	-	-
1(P2)	5.0	>500	N/A	N/A	591.8	-	-
2(P3)	5.0	>500	N/A	N/A	590.6	0.16	Yes
Sample #.....:		3					-
Light exposure method.....:		☐ Solar simulator / ☒ Natural sunlight / ☐ Others					-
Test date [MM/DD/YYYY] / start - end .:		09/25/2022 - 09/27/2022					-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	587.8	-	-
1(P2)	5.0	>500	N/A	N/A	587.6	-	-
2(P3)	5.0	>500	N/A	N/A	585.9	0.16	Yes
Sample #.....:		4					-
Light exposure method.....:		☐ Solar simulator / ☒ Natural sunlight / ☐ Others					-
Test date [MM/DD/YYYY] / start - end .:		09/25/2022 - 09/27/2022					-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	589.6	-	-
1(P2)	5.0	>500	N/A	N/A	588.4	-	-
2(P3)	5.0	>500	N/A	N/A	587.2	0.20	Yes

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:			5				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	590.8	-	-
1(P2)	5.0	>500	N/A	N/A	590.3	-	-
2(P3)	5.0	>500	N/A	N/A	589.7	0.09	Yes
Sample #.....:			6				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	591.4	-	-
1(P2)	5.0	>500	N/A	N/A	590.3	-	-
2(P3)	5.0	>500	N/A	N/A	589.7	0.14	No
Sample #.....:			7				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	593.1	-	-
1(P2)	5.0	>500	N/A	N/A	591.9	-	-
2(P3)	5.0	>500	N/A	N/A	591.2	0.16	Yes
Sample #.....:			8				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	587.2	-	-
1(P2)	5.0	>500	N/A	N/A	586.1	-	-
2(P3)	5.0	>500	N/A	N/A	584.9	0.20	Yes

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:			9				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	592.0	-	-
1(P2)	5.0	>500	N/A	N/A	591.5	-	-
2(P3)	5.0	>500	N/A	N/A	590.0	0.17	Yes
Sample #.....:			10				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	590.2	-	-
1(P2)	5.0	>500	N/A	N/A	589.7	-	-
2(P3)	5.0	>500	N/A	N/A	588.8	0.12	Yes
Sample #.....:			11				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	590.2	-	-
1(P2)	5.0	>500	N/A	N/A	589.1	-	-
2(P3)	5.0	>500	N/A	N/A	587.6	0.22	Yes
Sample #.....:			12				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	590.2	-	-
1(P2)	5.0	>500	N/A	N/A	589.6	-	-
2(P3)	5.0	>500	N/A	N/A	588.5	0.14	Yes

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:			13				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m^2]	Irradiance [W/m^2]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	589.0	-	-
1(P2)	5.0	>500	N/A	N/A	588.4	-	-
2(P3)	5.0	>500	N/A	N/A	586.7	0.20	Yes
Supplementary information: N/A							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.6 Performance at STC (after initial stabilization, Gate #1) - MQT06.1/MST02							-
Test date [MM/DD/YYYY]:			09/27/2022				-
Test method:			☒ Simulator / ☐ Natural sunlight				-
Irradiance [W/m²]:			1000				-
Module temperature [°C]:			25.0				-
t1 [%]:			±3				-
Calculated $P_{max}(lab)$ lower limit for each individual sample [W]:			559.2				-
Calculated $\overline{P}_{max}(lab)$ lower limit for average of samples [W]:			576.5				-
t2 [%]:			±3				-
Calculated $V_{OC}(lab)$ upper limit for each individual sample [V]:			55.57				-
t3 [%]:			±3				-
Calculated $I_{SC}(lab)$ upper limit for each individual sample [A]:			13.93				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
1	54.70	45.33	13.75	13.00	589.3	78.33	P
2	54.67	45.64	13.82	12.94	590.6	78.15	P
3	54.43	44.97	13.77	13.03	585.9	78.20	P
4	54.40	44.96	13.85	13.06	587.2	77.92	P
5	54.65	45.47	13.88	12.97	589.7	77.75	P
6	54.67	45.47	13.75	12.97	589.7	78.47	P
7	54.53	45.62	13.83	12.96	591.2	78.41	P
8	54.48	44.75	13.73	13.07	584.9	78.18	P
9	54.54	45.60	13.86	12.94	590.0	78.05	P
10	54.87	45.40	13.76	12.97	588.8	77.99	P
11	54.77	45.37	13.73	12.95	587.6	78.14	P
12	54.76	45.03	13.79	13.07	588.5	77.96	P
13	54.78	44.89	13.72	13.07	586.7	78.05	P
Average	-	-	-	-	588.5	-	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.3 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		09/27/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
1	14.3	>1000	No	P
2	14.3	>1000	No	P
3	14.3	>1000	No	P
4	14.3	>1000	No	P
5	14.3	>1000	No	P
6	14.3	>1000	No	P
7	14.3	>1000	No	P
8	14.3	>1000	No	P
9	14.3	>1000	No	P
10	14.3	>1000	No	P
11	14.3	>1000	No	P
12	14.3	>1000	No	P
13	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		09/27/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2286	-
Solution temperature [°C] / 22±2 .....:		21.2	-
Sample #	Required [MΩ]	Measured [MΩ]	-
1	14.3	>1000	P
2	14.3	>1000	P
3	14.3	>1000	P
4	14.3	>1000	P
5	14.3	>1000	P
6	14.3	>1000	P
7	14.3	>1000	P
8	14.3	>1000	P
9	14.3	>1000	P
10	14.3	>1000	P
11	14.3	>1000	P
12	14.3	>1000	P
13	14.3	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.4 Measurement of temperature coefficients - MQT04				-
Test date [MM/DD/YYYY].....:		10/11/2022		-
Ambient temperature [°C] / high - low...:		24.9 - 24.8		-
Module temperature [°C] / high - low....:		60.1 - 25.2		-
Irradiance [W/m^2] / high - low.....:		1000 - 999.5		-
Sample #	α [%/°C]	β [%/°C]	δ [%/°C]	-
1	0.050	-0.286	-0.327	-
Supplementary information: N/A				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.7 Performance at low irradiance - MQT07							-
Test date [MM/DD/YYYY].....:			09/28/2022				-
Test method .....:			☐ Directly measured ☒ Data corrected to a 25°C cell temperature and 200 W/m² irradiance				-
Irradiance [W/m²].....:			200				-
Ambient temperature [°C].....:			25.0				-
Module temperature [°C] .....:			25.0				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
1	51.53	43.07	2.81	2.69	115.9	80.01	-
Supplementary information: N/A							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.8 Outdoor exposure test - MQT08							-
Sample #.....:	2						-
Test date [MM/DD/YYYY].....:	10/02/2022 - 10/22/2022						-
Total irradiation dosage [kWh/m^2] .....:	60.0						-
Supplementary information: N/A							
4.1 Visual inspection (after outdoor exposure test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:	10/22/2022						-
Sample #	Nature and position of initial findings - comments or attach photos						-
2	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after outdoor exposure test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:	10/22/2022						-
Ambient temperature [°C].....:	Corrected to 25.0						-
Irradiance [W/m^2].....:	Corrected to 1000						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
2	54.67	45.50	13.71	12.89	586.5	78.25	-
Supplementary information: N/A							
4.15 Wet leakage current test (after outdoor exposure test) - MQT15/MST17							-
Test date [MM/DD/YYYY].....:	10/22/2022						-
Test voltage applied [V].....:	2 minutes of 1500						-
Solution resistivity [Ω/cm] / <3500 .....:	2023						-
Solution temperature [°C] / 22±2 .....:	23.5						-
Sample #	Required [MΩ]		Measured [MΩ]				-
2	14.3		>1000				P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.							

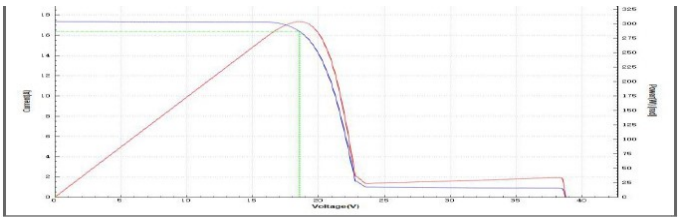
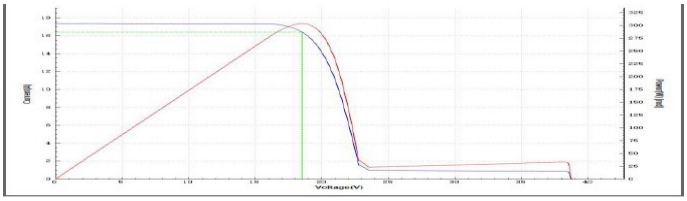
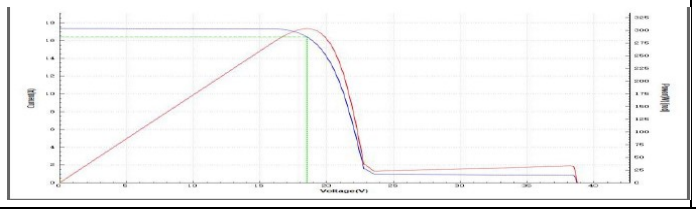
IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.18.1 Bypass diode thermal test - MQT18.1/MST25					-
Sample #.....:	2				-
Test date [MM/DD/YYYY].....:	10/27/2022				-
Module temperature [°C] .....:	75				-
Number of diodes in junction box .....:	3				-
Diode manufacturer.....:	Zhejiang Renhe Photovoltaic Technology Co., Ltd.				-
Diode type designation.....:	RMK4555D				-
Max. permissible junction temperature T_{jmax} [°C].....:	200 (according to datasheet)				-
Step 1, determination of V_D versus Tj characteristic					-
Diode #.....:	1				-
Temperature [°C].....:	30 ± 2°C	50 ± 2°C	70 ± 2°C	90 ± 2°C	-
Ambient temperature of the junction box [°C].....:	30	50	70	90	-
Pulsed current [A] .....:	13.82	13.82	13.82	13.82	-
Voltage drop [V] .....:	0.2295	0.2122	0.1913	0.1892	-
V_D versus Tj characteristic.....:	$V_D=0.2481-7.09*10^{-4}T_J$				
Diode #.....:	2				-
Temperature [°C].....:	30 ± 2°C	50 ± 2°C	70 ± 2°C	90 ± 2°C	-
Ambient temperature of the junction box [°C].....:	30	50	70	90	-
Pulsed current [A] .....:	13.82	13.82	13.82	13.82	-
Voltage drop [V] .....:	0.4893	0.4703	0.4315	0.4105	-
V_D versus Tj characteristic.....:	$V_D=0.5329-1.38*10^{-3}T_J$				
Diode #.....:	3				-
Temperature [°C].....:	30 ± 2°C	50 ± 2°C	70 ± 2°C	90 ± 2°C	-
Ambient temperature of the junction box [°C].....:	30	50	70	90	-
Pulsed current [A] .....:	13.82	13.82	13.82	13.82	-
Voltage drop [V] .....:	0.4798	0.4568	0.4358	0.4235	-
V_D versus Tj characteristic.....:	$V_D=0.5059-9.49*10^{-4}T_J$				
Step 2, bypass diode thermal test					-
Diode #.....:	1	2	3		-
Current flow applied [A] .....:	13.82	13.82	13.82		-
Voltage drop [V] after 1h.....:	0.1695	0.3545	0.3730		-
Calculated max. junction temperature T_{jcalc} [°C].....:	110.9	129.7	140.0		-

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

$Tj_{calc} < Tj_{max}$? .....:			Yes	Yes	N/A		P
Current flow (1.25 x Isc) [A] .....:			17.28	17.28	17.28		-
Bypass diode remains functional? .....:			Yes	Yes	N/A		P
Supplementary information: N/A							
4.1 Visual inspection (after bypass diode thermal test) - MQT01/MST01							-
Test date [MM/DD/YYYY] .....:			10/27/2022				-
Sample #	Nature and position of initial findings - comments or attach photos						-
2	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after bypass diode thermal test) - MQT02/MST03							-
Test date [MM/DD/YYYY] .....:			10/27/2022				-
Ambient temperature [°C] .....:			Corrected to 25.0				-
Irradiance [W/m²] .....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
2	54.62	45.53	13.74	12.88	586.5	78.14	-
Supplementary information: N/A							
4.3 Insulation test (after bypass diode thermal test) - MQT03/MST16							-
Test date [MM/DD/YYYY] .....:			10/27/2022				-
Test voltage applied [V] .....:			2 minutes of 1500 and 1 minute of 8000				-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
2	14.3		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m². Area of the module is 2.80m².							
4.15 Wet leakage current test (after bypass diode thermal test) - MQT15/MST17							-
Test date [MM/DD/YYYY] .....:			10/27/2022				-
Test voltage applied [V] .....:			2 minutes of 1500				-
Solution resistivity [Ω/cm] / <3500 .....:			1907				-
Solution temperature [°C] / 22±2 .....:			22.5				-
Sample #	Required [MΩ]		Measured [MΩ]				-
2	14.3		>1000				P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m². Area of the module is 2.80m².							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.18.2 Bypass diode functionality test (after bypass diode thermal test) - MQT18.2/MST07		-
Sample #.....:	2	-
Test date [MM/DD/YYYY].....:	10/27/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A] .....:	N/A	-
$V_{FMrated}$ [V] .....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1		P
2		P
3		P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.9 Hot-spot endurance test - MQT09/MST22		-
Sample #.....:	3	-
Test date [MM/DD/YYYY] / start - end..:	10/07/2022 - 10/07/2022	-
Cell interconnection circuit.....:	☐ S / ☒ SPS / ☐ PS	-
Irradiance during each cycle [W/m^2].....:	1000	-
Test duration for each cycle [hour].....:	1	-
Module temperature at thermal equilibrium in each cycle [°C].....:	57.9	-
Maximum measured cell temperature of cell with lowest shunt resistance adjacent to the edge [°C].....:	A22: 135.6	-
Shading rate of cell with lowest shunt resistance [%].....:	A22: 50	-
Maximum measured cell temperature of other 2 cells with lowest shunt resistance[°C].....:	C13: 128.2 D17: 163.0	-
Shading rate of the other 2 cells with lowest shunt resistance [%].....:	C13: 50 D17: 55	-
Maximum measured cell temperature of cell with highest shunt resistance [°C].:	A1: 121.3	-
Shading rate of cell with highest shunt resistance [%].....:	A1: 35	-

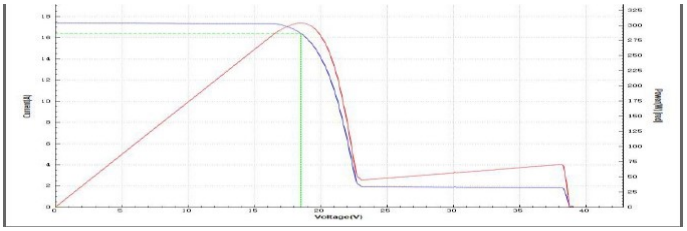
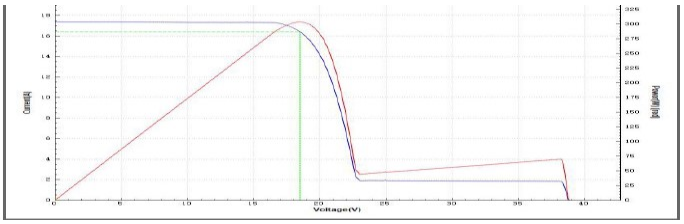
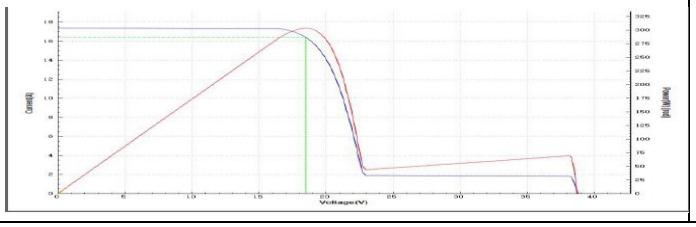
Supplementary information: Position of solar cells (front side view):

	1	2	3	4	5	…	…	22	23	24	25	26
A												
B												
C						Junction box						
D												
E												
F												

4.1 Visual inspection (after hot-spot endurance test) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	10/07/2022	-
Sample #	Nature and position of initial findings - comments or attach photos	-
3	No visual defects	P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2							
Clause	Requirement + Test			Result - Remark			Verdict
4.2 Maximum power determination (after hot-spot endurance test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			10/08/2022				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3	54.42	44.92	13.72	12.98	583.0	78.09	-
Supplementary information: N/A							
4.3 Insulation test (after hot-spot endurance test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:			10/08/2022				-
Test voltage applied [V].....:			2 minutes of 1500 and 1 minute of 8000				-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
3	14.3		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.							
4.15 Wet leakage current test (after hot-spot endurance test) - MQT15/MST17							-
Test date [MM/DD/YYYY].....:			10/08/2022				-
Test voltage applied [V].....:			2 minutes of 1500				-
Solution resistivity [Ω/cm] / <3500 .....:			2724				-
Solution temperature [°C] / 22±2 .....:			21.5				-
Sample #	Required [MΩ]		Measured [MΩ]				-
3	14.3		>1000				P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.18.2 Bypass diode functionality test (after hot-spot endurance test) - MQT18.2/MST07		-
Sample #.....:	3	-
Test date [MM/DD/YYYY].....:	10/08/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A] .....:	N/A	-
$V_{FMrated}$ [V] .....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading the string	P
1		P
2		P
3		P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.10 UV preconditioning test - MQT10 & MST54							-
Sample #.....:	4, 5						-
Test date [MM/DD/YYYY] / start - end..:	10/04/2022 - 10/08/2022						-
Module temperature [°C] / high - low ....:	59.9 - 57.3						-
UV irradiance (280-400nm) [W/m²].....:	159.6						-
Ratio of UV irradiance (280-320nm) (%) .....:	8.1						-
Total dosage of UV irradiation (280-400nm) [kWh/m²].....:	15.0						-
Module operation condition .....:	☒ Short circuited / ☐ Open-circuited						-
Supplementary information: N/A							
4.1 Visual inspection (after UV preconditioning test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:	10/09/2022						-
Sample #	Nature and position of initial findings - comments or attach photos						-
4	No visual defects						P
5	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after UV preconditioning test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:	10/09/2022						-
Ambient temperature [°C].....:	Corrected to 25.0						-
Irradiance [W/m²].....:	Corrected to 1000						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
4	54.15	44.70	13.81	13.06	583.7	78.07	-
5	54.37	45.04	13.91	12.98	584.7	77.30	-
Supplementary information: N/A							
4.3 Insulation test (after UV preconditioning test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:	10/09/2022						-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000						-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
4	14.3		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m². Area of the module is 2.80m².							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after UV preconditioning test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		10/09/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2172	-
Solution temperature [°C] / 22±2 .....:		22.8	-
Sample #	Required [MΩ]	Measured [MΩ]	-
4	14.3	>1000	P
5	14.3	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.20 Cyclic (dynamic) mechanical load test - MQT20							-
Sample #.....:	4, 5						-
Test date [MM/DD/YYYY].....:	10/10/2022						-
Mechanical load change rate .....:	5 cycle(s) per minute						-
Mounting method .....:	Clamps (6 points)						-
Load applied to.....:	Downward			Upward			-
Mechanical load [Pa].....:	1000			1000			-
Total cycles .....:	1000						-
Sample #	Intermittent open-circuit?						-
4	No						P
5	No						P
Supplementary information: N/A							
4.1 Visual inspection (after cyclic (dynamic) mechanical load test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:	10/10/2022						-
Sample #	Nature and position of initial findings - comments or attach photos						-
4	No visual defects						P
5	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after cyclic (dynamic) mechanical load test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:	10/10/2022						-
Ambient temperature [°C].....:	Corrected to 25.0						-
Irradiance [W/m^2].....:	Corrected to 1000						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
4	54.07	44.61	13.81	13.03	581.3	77.84	-
5	54.23	45.17	13.88	12.97	585.8	77.83	-
Supplementary information: N/A							
4.3 Insulation test (after cyclic (dynamic) mechanical load test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:	10/10/2022						-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000						-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
4	14.3		>1000		No		P
5	14.3		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after cyclic (dynamic) mechanical load test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		10/10/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2356	-
Solution temperature [°C] / 22±2 .....:		20.5	-
Sample #	Required [MΩ]	Measured [MΩ]	-
4	14.3	>1000	P
5	14.3	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.11 Thermal cycling 50 test - MQT11 & MST51							-
Test date [MM/DD/YYYY] / start - end..:			10/14/2022 - 10/22/2022				-
Total cycles .....:			50				-
Current applied [A] .....:			13.85 during the heat up stage from -40°C to 80°C 0.05 during others				-
Sample #	Open circuits?						-
4	No						P
5	No						P
Supplementary information: A single 5N weight has been attached to the junction box.							
4.1 Visual inspection (after thermal cycling 50 test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:			10/22/2022				-
Sample #	Nature and position of initial findings - comments or attach photos						-
4	No visual defects						P
5	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after thermal cycling 50 test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			10/22/2022				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
4	54.09	44.66	13.69	12.98	579.7	78.28	-
5	54.43	45.11	13.90	12.98	585.5	77.39	-
Supplementary information: N/A							
4.3 Insulation test (after thermal cycling 50 test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:			10/22/2022				-
Test voltage applied [V].....:			2 minutes of 1500 and 1 minute of 8000				-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
4	14.3		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after thermal cycling 50 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		10/22/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2262	-
Solution temperature [°C] / 22±2 .....:		22.7	-
Sample #	Required [MΩ]	Measured [MΩ]	-
4	14.3	>1000	P
5	14.3	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.12 Humidity freeze 10 test - MQT12 & MST52							-
Test date [MM/DD/YYYY] / start - end..:		10/26/2022 - 11/05/2022					-
Total cycles .....:		10					-
Current applied [A] .....:		0.05					-
Sample #	Open circuits?						-
4	No						P
5	No						P
Supplementary information: N/A							
4.1 Visual inspection (after humidity freeze 10 test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:		11/05/2022					-
Sample #	Nature and position of initial findings - comments or attach photos						-
4	No visual defects						P
5	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after humidity freeze 10 test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:		11/05/2022					-
Ambient temperature [°C].....:		Corrected to 25.0					-
Irradiance [W/m^2].....:		Corrected to 1000					-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
4	54.06	44.75	13.65	12.85	575.1	77.93	-
5	54.57	45.15	13.87	12.91	582.9	77.01	-
Supplementary information: N/A							
4.3 Insulation test (after humidity freeze 10 test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:		11/05/2022					-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000					-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
4	14.3		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after humidity freeze 10 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		11/05/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		1936	-
Solution temperature [°C] / 22±2 .....:		22.6	-
Sample #	Required [MΩ]	Measured [MΩ]	-
4	14.3	>1000	P
5	14.3	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.14.2 Retention of junction box on mounting surface - MQT14.1/MST42				-
Sample #.....:		4		-
Test date [MM/DD/YYYY].....:		11/06/2022		-
Applied force in all directions parallel to the mounting surface parallel to the module edges [N] .....:		40		-
Applied force in a direction perpendicular to the mounting surface [N] .....:		40		-
Supplementary information: N/A				
4.1 Visual inspection (after retention of junction box on mounting surface) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		11/06/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
4	No visual defects			P
Supplementary information: N/A				
4.3 Insulation test (after retention of junction box on mounting surface) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		11/06/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
4	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				
4.15 Wet leakage current test (after retention of junction box on mounting surface) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		11/06/2022		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		2071		-
Solution temperature [°C] / 22±2 .....:		21.4		-
Sample #	Required [MΩ]	Measured [MΩ]		-
4	14.3	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.11 Thermal cycling 200 test - MQT11/MST51							-
Test date [MM/DD/YYYY] / start - end..:			09/30/2022 - 11/02/2022				-
Total cycles .....:			200				-
Current applied [A] .....:			13.85 during the heat up stage from -40°C to 80°C 0.05 during others				-
Sample #	Open circuits?						-
6	No						P
7	No						P
Supplementary information: A single 5N weight has been attached to the junction box.							
4.1 Visual inspection (after thermal cycling 200 test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:			11/02/2022				-
Sample #	Nature and position of initial findings - comments or attach photos						-
6	No visual defects						P
7	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after thermal cycling 200 test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			11/02/2022				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
6	54.66	45.88	13.58	12.83	588.6	79.30	-
7	54.66	45.27	13.70	12.97	587.1	78.41	-
Supplementary information: N/A							
4.3 Insulation test (after thermal cycling 200 test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:			11/02/2022				-
Test voltage applied [V].....:			2 minutes of 1500 and 1 minute of 8000				-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
6	14.3		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after thermal cycling 200 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		11/02/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2708	-
Solution temperature [°C] / 22±2 .....:		21.4	-
Sample #	Required [MΩ]	Measured [MΩ]	-
6	14.3	>1000	P
7	14.3	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.13 Damp heat 1000 test - MQT13/MST53							-
Sample #.....:	8, 9						-
Test date [MM/DD/YYYY] / start - end..:	10/05/2022 - 11/16/2022						-
Total hours [hours] .....:	1000						-
Supplementary information: N/A							
4.1 Visual inspection (after damp heat 1000 test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:	11/16/2022						-
Sample #	Nature and position of initial findings - comments or attach photos						-
8	No visual defects						P
9	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after damp heat 1000 test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:	11/16/2022						-
Ambient temperature [°C].....:	Corrected to 25.0						-
Irradiance [W/m^2].....:	Corrected to 1000						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
8	54.15	44.27	13.57	12.98	574.6	78.20	-
9	54.31	44.30	13.62	12.93	572.7	77.44	-
Supplementary information: N/A							
4.3 Insulation test (after damp heat 1000 test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:	11/16/2022						-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000						-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
8	14.3		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after damp heat 1000 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		11/16/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2177	-
Solution temperature [°C] / 22±2 .....:		23.3	-
Sample #	Required [MΩ]	Measured [MΩ]	-
8	14.3	>1000	P
9	14.3	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.16 Static mechanical load test - MQT16/MST34							-
Sample #.....:			8				-
Test date [MM/DD/YYYY].....:			11/18/2022				-
Designed load (downward / upward) [Pa] .....:			3600 / 1600				-
Safety factor .....:			1.5				-
Mounting method .....:			Clamps (6 points)				-
Load applied to.....:			Downward		Upward		-
Mechanical load [Pa].....:			5400		2400		-
1st cycle duration [hours].....:			1h		1h		-
Intermittent open-circuit? .....:			No		No		-
2nd cycle duration [hours].....:			1h		1h		-
Intermittent open-circuit? .....:			No		No		-
3rd cycle duration [hours] .....:			1h		1h		-
Intermittent open-circuit? .....:			No		No		-
Supplementary information: N/A							
4.1 Visual inspection (after static mechanical load test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:			11/18/2022				-
Sample #	Nature and position of initial findings - comments or attach photos						-
8	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after statistic mechanical load test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			11/18/2022				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m²].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
8	54.60	43.34	13.66	12.95	561.2	75.25	-
Supplementary information: N/A							
4.3 Insulation test (after static mechanical load test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:			11/18/2022				-
Test voltage applied [V].....:			2 minutes of 1500 and 1 minute of 8000				-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
8	14.3		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m². Area of the module is 2.80m².							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after static mechanical load test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		11/18/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2633	-
Solution temperature [°C] / 22±2 .....:		22.3	-
Sample #	Required [MΩ]	Measured [MΩ]	-
8	14.3	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2								
Clause	Requirement + Test				Result - Remark			Verdict
4.17 Hail impact test - MQT17								-
Sample #.....:	9							-
Test date [MM/DD/YYYY].....:	11/17/2022							-
Number of impact locations .....:	11							-
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		-
	7.59	7.51	7.52	7.60	7.55	7.66		
	7	8	9	10	11	-		
	7.62	7.59	7.61	7.60	7.62	-		
Ice ball velocity [m/s].....:	1	2	3	4	5	6		-
	23.2	22.9	23.4	23.5	23.1	23.2		
	7	8	9	10	11	-		
	23.1	22.8	23.4	23.0	23.1	-		
Supplementary information: N/A								
4.1 Visual inspection (after hail impact test) - MQT01/MST01								-
Test date [MM/DD/YYYY].....:	11/17/2022							-
Sample #	Nature and position of initial findings - comments or attach photos							-
9	No visual defects							P
Supplementary information: N/A								
4.2 Maximum power determination (after hail impact test) - MQT02/MST03								-
Test date [MM/DD/YYYY].....:	11/17/2022							-
Ambient temperature [°C].....:	Corrected to 25.0							-
Irradiance [W/m²].....:	Corrected to 1000							-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]		-
9	54.47	43.85	13.66	12.89	565.2	75.97		-
Supplementary information: N/A								

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after hail impact test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		11/17/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2456	-
Solution temperature [°C] / 22±2 .....:		20.6	-
Sample #	Required [MΩ]	Measured [MΩ]	-
9	14.3	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.21 Potential induced degradation test - MQT21			-
Test date [MM/DD/YYYY] / start - end..:	10/26/2022- 10/31/2022		-
Sample #.....:	10, 11	12, 13	-
Voltage polarity .....:	negative	positive	-
Applied Voltage [V].....:	1500		-
Total duration [hour] .....:	96		-
Chamber air temperature [°C] .....:	85		-
Chamber relative humidity [%].....:	85		-
Supplementary information: The test is performed according to IEC TS 62804-1:2015, method a). Negative bias voltage: With positive voltage terminal of power source connected to the grounding hole of frame. Positive bias voltage: With negative voltage terminal of power source connected to the grounding hole of frame			

4.1 Visual inspection (after potential induced degradation test) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	10/31/2022	-
Sample #	Nature and position of initial findings - comments or attach photos	-
10	No visual defects	P
11	No visual defects	P
12	No visual defects	P
13	No visual defects	P
Supplementary information: N/A		

4.2 Maximum power determination (after potential induced degradation test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:	10/31/2022						-
Ambient temperature [°C].....:	Corrected to 25.0						-
Irradiance [W/m^2].....:	Corrected to 1000						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
10	54.23	45.17	13.88	12.97	585.8	77.83	-
11	54.07	44.61	13.81	13.03	581.3	77.84	-
12	54.43	45.11	13.90	12.98	585.5	77.39	-
13	54.09	44.66	13.69	12.98	579.7	78.28	-
Supplementary information: N/A							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after potential induced degradation test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		10/31/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2655	-
Solution temperature [°C] / 22±2 .....:		22.3	-
Sample #	Required [MΩ]	Measured [MΩ]	-
10	14.3	>1000	P
11	14.3	>1000	P
12	14.3	>1000	P
13	14.3	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.6 Performance at STC (final, Gate #2) - MQT06.1/MST02							-
Test method .....:			☒ Simulator / ☐ Natural sunlight				-
Irradiance [W/m²].....:			1000				-
Module temperature [°C] .....:			25.0				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
2	54.62	45.53	13.74	12.88	586.5	78.14	-
3	54.42	44.92	13.72	12.98	583.0	78.09	
4	54.06	44.75	13.65	12.85	575.1	77.93	-
5	54.57	45.15	13.87	12.91	582.9	77.01	-
6	54.66	45.88	13.58	12.83	588.6	79.30	-
7	54.66	45.27	13.70	12.97	587.1	78.41	-
8	54.60	43.34	13.66	12.95	561.2	75.25	-
9	54.47	43.85	13.66	12.89	565.2	75.97	-
10	54.23	45.17	13.88	12.97	585.8	77.83	-
11	54.07	44.61	13.81	13.03	581.3	77.84	-
12	54.43	45.11	13.90	12.98	585.5	77.39	-
13	54.09	44.66	13.69	12.98	579.7	78.28	-

Power degradation of each module after each test sequences						-
Sample #	Pmax (initial) [W]	Pmax (final) [W]	Reproducibility *r* [%]	Power degradation [%]	Maximum allowed degradation [%]	-
2	590.6	586.5	0.08	-0.70	-5.08	P
3	585.9	583.0	0.17	-0.49	-5.16	
4	587.2	575.1	0.05	-2.06	-5.05	P
5	589.7	582.9	0.05	-1.16	-5.05	P
6	589.7	588.6	0.18	-0.18	-5.17	P
7	591.2	587.1	0.18	-0.69	-5.17	P
8	584.9	561.2	0.09	-4.05	-5.09	P
9	590.0	565.2	0.09	-4.21	-5.09	P
10	588.8	585.8	<0.01	-0.50	-5.00	P
11	587.6	581.3	<0.00	-1.07	-5.00	P
12	588.5	585.5	<0.00	-0.51	-5.00	P
13	586.7	579.7	<0.00	-1.19	-5.00	P

Supplementary information: According to Gate #2, Maximum allowed degradation [%] = -(5 + 0.95 x *r*)

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.3 Insulation test (final) - MQT03/MST16				-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
2	14.3	>1000	No	P
4	14.3	>1000	No	P
5	14.3	>1000	No	P
6	14.3	>1000	No	P
7	14.3	>1000	No	P
8	14.3	>1000	No	P
9	14.3	>1000	No	P
10	14.3	>1000	No	P
11	14.3	>1000	No	P
12	14.3	>1000	No	P
13	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (final) - MQT15/MST17			-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		<3500	-
Solution temperature [°C] / 22±2 .....:		22±2	-
Sample #	Required [MΩ]	Measured [MΩ]	-
2	14.3	>1000	P
4	14.3	>1000	P
5	14.3	>1000	P
6	14.3	>1000	P
7	14.3	>1000	P
8	14.3	>1000	P
9	14.3	>1000	P
10	14.3	>1000	P
11	14.3	>1000	P
12	14.3	>1000	P
13	14.3	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA620-39V-MH (BOM1 higher end)

4.1 Visual inspection (initial) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	09/25/2022	-
Sample #	Nature and position of initial findings - comments or attach photos	-
24	No visual defects	P
25	No visual defects	P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.19.5 Initial stabilization - MQT19.1							-
Sample #.....:			24				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	610.0	-	-
1(P2)	5.0	>500	N/A	N/A	608.9	-	-
2(P3)	5.0	>500	N/A	N/A	606.8	0.26	Yes
Sample #.....:			25				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	610.6	-	-
1(P2)	5.0	>500	N/A	N/A	609.6	-	-
2(P3)	5.0	>500	N/A	N/A	607.3	0.27	Yes
Supplementary information: N/A							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.6 Performance at STC (after initial stabilization, Gate #1) - MQT06.1/MST02							-
Test date [MM/DD/YYYY].....:			09/27/2022				-
Test method .....:			☒ Simulator / ☐ Natural sunlight				-
Irradiance [W/m^2].....:			1000				-
Module temperature [°C] .....:			25.0				-
t1 [%].....:			±3				-
Calculated $P_{max}(lab)$ lower limit for each individual sample [W].....:			587.6				-
Calculated $\overline{P}_{max}(lab)$ lower limit for average of samples [W].....:			605.8				-
t2 [%].....:			±3				-
Calculated $V_{OC}(lab)$ upper limit for each individual sample [V].....:			56.48				-
t3 [%].....:			±3				-
Calculated $I_{SC}(lab)$ upper limit for each individual sample [A].....:			14.36				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
24	55.31	45.39	14.08	13.37	606.8	77.94	P
25	55.48	45.80	14.00	13.26	607.3	78.17	P
Average	-	-	-	-	607.1	-	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.3 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		09/27/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
24	14.3	>1000	No	P
25	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		09/27/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2286	-
Solution temperature [°C] / 22±2 .....:		21.2	-
Sample #	Required [MΩ]	Measured [MΩ]	-
24	14.3	>1000	P
25	14.3	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA670-33V-MH (BOM2)

4.1 Visual inspection (initial) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	09/25/2022	-
Sample #	Nature and position of initial findings - comments or attach photos	-
26	No visual defects	P
27	No visual defects	P
28	No visual defects	P
29	No visual defects	P
30	No visual defects	P
31	No visual defects	P
32	No visual defects	P
33	No visual defects	P
34	No visual defects	P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.19.4 Initial stabilization - MQT19.1							-
Sample #.....:			26				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	671.3	-	-
1(P2)	5.0	>500	N/A	N/A	670.8	-	-
2(P3)	5.0	>500	N/A	N/A	669.5	0.13	Yes
Sample #.....:			27				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	673.4	-	-
1(P2)	5.0	>500	N/A	N/A	672.2	-	-
2(P3)	5.0	>500	N/A	N/A	670.7	0.20	Yes
Sample #.....:			28				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	669.3	-	-
1(P2)	5.0	>500	N/A	N/A	668.5	-	-
2(P3)	5.0	>500	N/A	N/A	667.4	0.14	Yes
Sample #.....:			29				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	674.0	-	-
1(P2)	5.0	>500	N/A	N/A	673.4	-	-
2(P3)	5.0	>500	N/A	N/A	672.6	0.10	Yes

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:			30				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	670.7	-	-
1(P2)	5.0	>500	N/A	N/A	669.8	-	-
2(P3)	5.0	>500	N/A	N/A	668.5	0.16	Yes
Sample #.....:			31				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	670.0	-	-
1(P2)	5.0	>500	N/A	N/A	669.9	-	-
2(P3)	5.0	>500	N/A	N/A	668.6	0.10	No
Sample #.....:			32				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others s				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	672.7	-	-
1(P2)	5.0	>500	N/A	N/A	672.0	-	-
2(P3)	5.0	>500	N/A	N/A	671.3	0.10	Yes
Supplementary information: N/A							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.6 Performance at STC (after initial stabilization, Gate #1) - MQT06.1/MST02							-
Test date [MM/DD/YYYY]....:			09/27/2022				-
Test method ....:			☒ Simulator / ☐ Natural sunlight				-
Irradiance [W/m^2]....:			1000				-
Module temperature [°C] ....:			25.0				-
t1 [%]....:			±3				-
Calculated $P_{max}(lab)$ lower limit for each individual sample [W]....:			635.0				-
Calculated $\overline{P}_{max}(lab)$ lower limit for average of samples [W]....:			654.6				-
t2 [%]....:			±3				-
Calculated $V_{OC}(lab)$ upper limit for each individual sample [V]....:			48.22				-
t3 [%]....:			±3				-
Calculated $I_{SC}(lab)$ upper limit for each individual sample [A]....:			17.86				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
26	47.63	39.48	17.66	16.96	669.5	79.59	P
27	47.06	39.22	17.80	17.10	670.7	79.63	P
28	47.64	39.33	17.57	16.97	667.4	79.74	P
29	46.93	39.43	17.77	17.06	672.6	80.22	P
30	47.51	39.44	17.54	16.95	668.5	80.21	P
31	47.12	39.15	17.76	17.08	668.6	79.92	P
32	46.92	39.12	17.81	17.16	671.3	79.48	P
Average	-	-	-	-	669.8	-	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.3 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		09/27/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
26	12.9	>1000	No	P
27	12.9	>1000	No	P
28	12.9	>1000	No	P
29	12.9	>1000	No	P
30	12.9	>1000	No	P
31	12.9	>1000	No	P
32	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		09/27/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2158	-
Solution temperature [°C] / 22±2 .....:		22.1	-
Sample #	Required [MΩ]	Measured [MΩ]	-
26	12.9	>1000	P
27	12.9	>1000	P
28	12.9	>1000	P
29	12.9	>1000	P
30	12.9	>1000	P
31	12.9	>1000	P
32	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

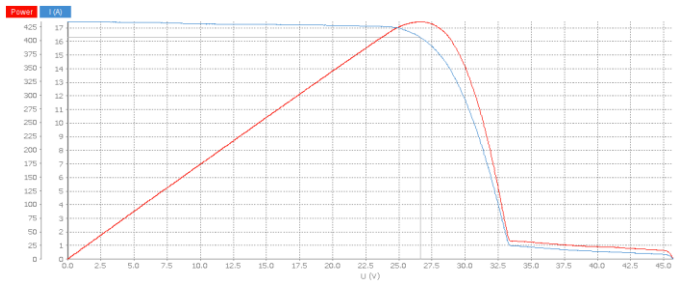
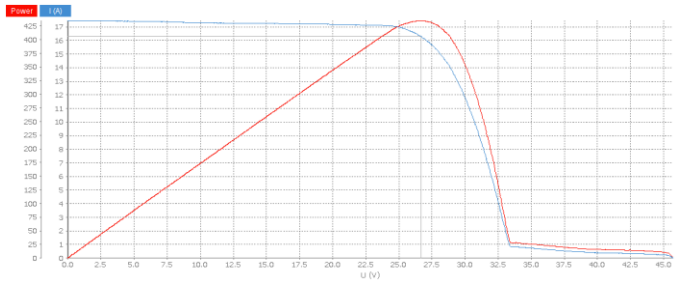
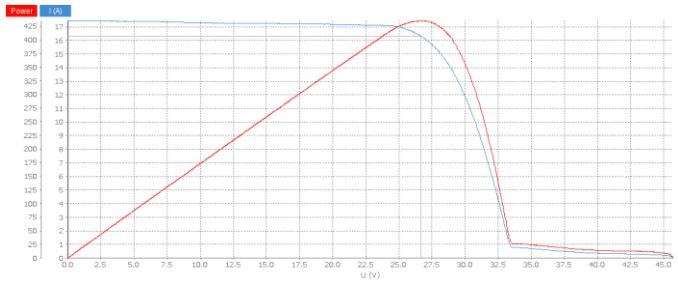
IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.18.1 Bypass diode thermal test - MQT18.1/MST25					-
Sample #.....:	27				-
Test date [MM/DD/YYYY].....:	10/03/2022				-
Module temperature [°C] .....:	75				-
Number of diodes in junction box .....:	3				-
Diode manufacturer.....:	Zhejiang Renhe Photovoltaic Technology Co., Ltd.				-
Diode type designation.....:	RMK4555D				-
Max. permissible junction temperature T_{jmax} [°C].....:	200 (according to datasheet)				-
Step 1, determination of V_D versus Tj characteristic					-
Diode #.....:	1				-
Temperature [°C].....:	30 ± 2°C	50 ± 2°C	70 ± 2°C	90 ± 2°C	-
Ambient temperature of the junction box [°C].....:	30	50	70	90	-
Pulsed current [A] .....:	17.8	17.8	17.8	17.8	-
Voltage drop [V] .....:	0.4981	0.4799	0.4510	0.4390	-
V_D versus Tj characteristic.....:	$V_D=0.5289 - 1.03 \times 10^{-3} T_J$				
Diode #.....:	2				-
Temperature [°C].....:	30 ± 2°C	50 ± 2°C	70 ± 2°C	90 ± 2°C	-
Ambient temperature of the junction box [°C].....:	30	50	70	90	-
Pulsed current [A] .....:	17.8	17.8	17.8	17.8	-
Voltage drop [V] .....:	0.4065	0.3873	0.3628	0.3373	-
V_D versus Tj characteristic.....:	$V_D=0.4431 - 1.16*10^{-3} T_J$				
Diode #.....:	3				-
Temperature [°C].....:	30 ± 2°C	50 ± 2°C	70 ± 2°C	90 ± 2°C	-
Ambient temperature of the junction box [°C].....:	30	50	70	90	-
Pulsed current [A] .....:	17.8	17.8	17.8	17.8	-
Voltage drop [V] .....:	0.4517	0.4438	0.4361	0.4272	-
V_D versus Tj characteristic.....:	$V_D=0.4640 – 4.05*10^{-4} T_J$				
Step 2, bypass diode thermal test					-
Diode #.....:	1	2	3		-
Current flow applied [A] .....:	17.8	17.8	17.8		-
Voltage drop [V] after 1h.....:	0.3792	0.2753	0.4072		-
Calculated max. junction temperature T_{jcalc} [°C].....:	145.3	144.7	140.2		-

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

$Tj_{calc} < Tj_{max}$? .....:		Yes	Yes	N/A		P
Current flow (1.25 x Isc) [A] .....:		22.5	22.5	22.5		-
Bypass diode remains functional? .....:		Yes	Yes	N/A		P
Supplementary information: N/A						
4.1 Visual inspection (after bypass diode thermal test) - MQT01/MST01						-
Test date [MM/DD/YYYY] .....:		10/03/2022				-
Sample #	Nature and position of initial findings - comments or attach photos					-
27	No visual defects					P
Supplementary information: N/A						
4.2 Maximum power determination (after bypass diode thermal test) - MQT02/MST03						-
Test date [MM/DD/YYYY] .....:		10/03/2022				-
Ambient temperature [°C] .....:		Corrected to 25.0				-
Irradiance [W/m²] .....:		Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
27	47.06	39.02	17.71	17.07	666.0	79.92	-
Supplementary information: N/A						
4.3 Insulation test (after bypass diode thermal test) - MQT03/MST16						-
Test date [MM/DD/YYYY] .....:		10/03/2022				-
Test voltage applied [V] .....:		2 minutes of 1500 and 1 minute of 8000				-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?			-
27	12.9	>1000	No			P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m². Area of the module is 3.11m².						
4.15 Wet leakage current test (after bypass diode thermal test) - MQT15/MST17						-
Test date [MM/DD/YYYY] .....:		10/03/2022				-
Test voltage applied [V] .....:		2 minutes of 1500				-
Solution resistivity [Ω/cm] / <3500 .....:		2011				-
Solution temperature [°C] / 22±2 .....:		21.5				-
Sample #	Required [MΩ]	Measured [MΩ]				-
27	12.9	>1000				P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m². Area of the module is 3.11m².						

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.18.2 Bypass diode functionality test (after bypass diode thermal test) - MQT18.2/MST07		-
Sample #.....:	27	-
Test date [MM/DD/YYYY].....:	10/03/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A] .....:	N/A	-
$V_{FMrated}$ [V] .....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1		P
2		P
3		P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.9 Hot-spot endurance test - MQT09/MST22		-
Sample #.....:	28	-
Test date [MM/DD/YYYY] / start - end..:	10/11/2022 - 10/11/2022	-
Cell interconnection circuit.....:	☐ S / ☒ SPS / ☐ PS	-
Irradiance during each cycle [W/m^2].....:	1000	-
Test duration for each cycle [hour].....:	1	-
Module temperature at thermal equilibrium in each cycle [°C].....:	57.2	-
Maximum measured cell temperature of cell with lowest shunt resistance adjacent to the edge [°C].....:	A19: 105.8	-
Shading rate of cell with lowest shunt resistance [%].....:	A19: 45	-
Maximum measured cell temperature of other 2 cells with lowest shunt resistance[°C].....:	D12: 122.9 C9: 163.2	-
Shading rate of the other 2 cells with lowest shunt resistance [%].....:	D12: 40 C9: 50	-
Maximum measured cell temperature of cell with highest shunt resistance [°C].:	A2: 97.6	-
Shading rate of cell with highest shunt resistance [%].....:	A2: 45	-

Supplementary information: Position of solar cells (front side view):

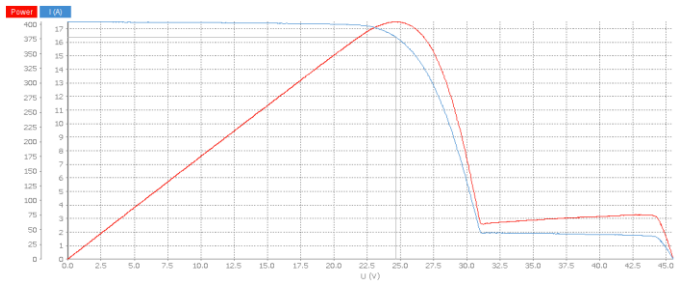
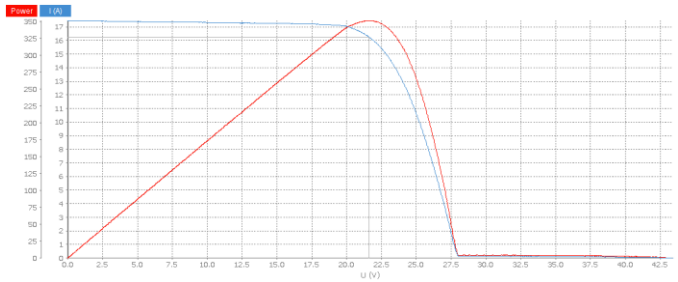
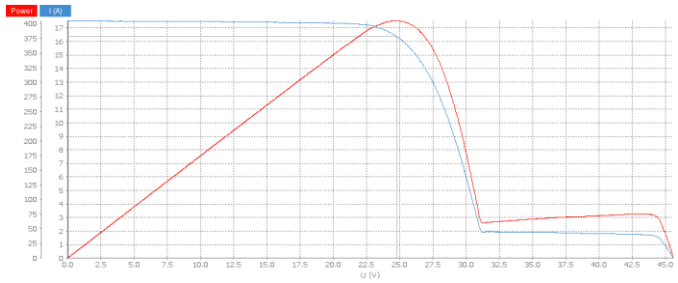
	1	2	3	4	5	…	…	18	19	20	21	22
A												
B												
C						Junction box						
D												
E												
F												

4.1 Visual inspection (after hot-spot endurance test) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	10/12/2022	-
Sample #	Nature and position of initial findings - comments or attach photos	-
28	No visual defects	P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.2 Maximum power determination (after hot-spot endurance test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			10/12/2022				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
28	47.63	39.41	17.54	16.92	666.8	79.82	-
Supplementary information: N/A							
4.3 Insulation test (after hot-spot endurance test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:			10/12/2022				-
Test voltage applied [V].....:			2 minutes of 1500 and 1 minute of 8000				-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
28	12.9		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.							
4.15 Wet leakage current test (after hot-spot endurance test) - MQT15/MST17							-
Test date [MM/DD/YYYY].....:			10/12/2022				-
Test voltage applied [V].....:			2 minutes of 1500				-
Solution resistivity [Ω/cm] / <3500 .....:			2538				-
Solution temperature [°C] / 22±2 .....:			22.9				-
Sample #	Required [MΩ]		Measured [MΩ]				-
28	12.9		>1000				P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.18.2 Bypass diode functionality test (after hot-spot endurance test) - MQT18.2/MST07		-
Sample #.....:	28	-
Test date [MM/DD/YYYY].....:	10/12/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A] .....:	N/A	-
$V_{FMrated}$ [V] .....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading the string	P
1		P
2		P
3		P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.11 Thermal cycling 200 test - MQT11/MST51							-
Test date [MM/DD/YYYY] / start - end..:			09/30/2022 - 11/02/2022				-
Total cycles .....:			200				-
Current applied [A] .....:			17.77 during the heat up stage from -40°C to 80°C 0.05 during others				-
Sample #	Open circuits?						-
29	No						P
30	No						P
Supplementary information: A single 5N weight has been attached to the junction box.							
4.1 Visual inspection (after thermal cycling 200 test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:			11/02/2022				-
Sample #	Nature and position of initial findings - comments or attach photos						-
29	No visual defects						P
30	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after thermal cycling 200 test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			11/02/2022				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
29	46.87	39.38	17.63	16.98	668.7	80.92	-
30	46.87	39.26	17.72	17.01	667.8	80.41	-
Supplementary information: N/A							
4.3 Insulation test (after thermal cycling 200 test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:			11/02/2022				-
Test voltage applied [V].....:			2 minutes of 1500 and 1 minute of 8000				-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
29	12.9		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after thermal cycling 200 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		11/02/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2240	-
Solution temperature [°C] / 22±2 .....:		22.4	-
Sample #	Required [MΩ]	Measured [MΩ]	-
29	12.9	>1000	P
30	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.13 Damp heat 1000 test - MQT13/MST53							-
Sample #.....:	31, 32						-
Test date [MM/DD/YYYY] / start - end..:	10/05/2022 - 11/14/2022						-
Total hours [hours] .....:	1000						-
Supplementary information: N/A							
4.1 Visual inspection (after damp heat 1000 test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:	11/14/2022						-
Sample #	Nature and position of initial findings - comments or attach photos						-
31	No visual defects						P
32	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after damp heat 1000 test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:	11/14/2022						-
Ambient temperature [°C].....:	Corrected to 25.0						-
Irradiance [W/m^2].....:	Corrected to 1000						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
31	46.88	38.78	17.63	16.97	658.2	79.63	-
32	46.97	38.88	17.63	16.93	658.2	79.49	-
Supplementary information: N/A							
4.3 Insulation test (after damp heat 1000 test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:	11/14/2022						-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000						-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
31	12.9		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after damp heat 1000 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		11/14/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2007	-
Solution temperature [°C] / 22±2 .....:		20.6	-
Sample #	Required [MΩ]	Measured [MΩ]	-
31	12.9	>1000	P
32	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.16 Static mechanical load test - MQT16/MST34							-
Sample #.....:	31						-
Test date [MM/DD/YYYY].....:	11/16/2022						-
Designed load (downward / upward) [Pa] .....:	3600 / 1600						-
Safety factor .....:	1.5						-
Mounting method .....:	Clamps (6 points)						-
Load applied to.....:	Downward				Upward		-
Mechanical load [Pa].....:	5400				2400		-
1st cycle duration [hours].....:	1h				1h		-
Intermittent open-circuit? .....:	No				No		-
2nd cycle duration [hours].....:	1h				1h		-
Intermittent open-circuit? .....:	No				No		-
3rd cycle duration [hours] .....:	1h				1h		-
Intermittent open-circuit? .....:	No				No		-
Supplementary information: N/A							
4.1 Visual inspection (after static mechanical load test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:	11/16/2022						-
Sample #	Nature and position of initial findings - comments or attach photos						-
31	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after statistic mechanical load test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:	11/16/2022						-
Ambient temperature [°C].....:	Corrected to 25.0						-
Irradiance [W/m²].....:	Corrected to 1000						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
31	47.27	37.75	17.72	17.03	642.8	76.71	-
Supplementary information: N/A							
4.3 Insulation test (after static mechanical load test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:	11/16/2022						-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000						-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
31	12.9		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m². Area of the module is 3.11m².							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after static mechanical load test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		11/16/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2340	-
Solution temperature [°C] / 22±2 .....:		22.5	-
Sample #	Required [MΩ]	Measured [MΩ]	-
31	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2								
Clause	Requirement + Test				Result - Remark			Verdict
4.17 Hail impact test - MQT17								-
Sample #.....:	9							-
Test date [MM/DD/YYYY].....:	11/17/2022							-
Number of impact locations .....:	11							-
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		-
	7.59	7.51	7.52	7.60	7.55	7.66		
	7	8	9	10	11	-		
	7.62	7.59	7.61	7.60	7.62	-		
Ice ball velocity [m/s].....:	1	2	3	4	5	6		-
	23.2	22.9	23.4	23.5	23.1	23.2		
	7	8	9	10	11	-		
	23.1	22.8	23.4	23.0	23.1	-		
Supplementary information: N/A								
4.1 Visual inspection (after hail impact test) - MQT01/MST01								-
Test date [MM/DD/YYYY].....:	11/19/2022							-
Sample #	Nature and position of initial findings - comments or attach photos							-
32	No visual defects							P
Supplementary information: N/A								
4.2 Maximum power determination (after hail impact test) - MQT02/MST03								-
Test date [MM/DD/YYYY].....:	11/19/2022							-
Ambient temperature [°C].....:	Corrected to 25.0							-
Irradiance [W/m^2].....:	Corrected to 1000							-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]		-
32	47.06	38.46	17.63	16.90	650.0	78.34		-
Supplementary information: N/A								

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after hail impact test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		11/19/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2407	-
Solution temperature [°C] / 22±2 .....:		22.2	-
Sample #	Required [MΩ]	Measured [MΩ]	-
32	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.6 Performance at STC (final, Gate #2) - MQT06.1/MST02							-
Test method .....:		☒ Simulator / ☐ Natural sunlight					-
Irradiance [W/m²].....:		1000					-
Module temperature [°C] .....:		25.0					-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
27	47.06	39.02	17.71	17.07	666.0	79.92	-
28	47.63	39.41	17.54	16.92	666.8	79.82	-
29	46.87	39.38	17.63	16.98	668.7	80.92	-
30	46.87	39.26	17.72	17.01	667.8	80.41	-
31	47.27	37.75	17.73	17.03	642.8	76.71	-
32	47.06	38.46	17.63	16.90	650.0	78.34	-

Power degradation of each module after each test sequences						-
Sample #	Pmax (initial) [W]	Pmax (final) [W]	Reproducibility *r* [%]	Power degradation [%]	Maximum allowed degradation [%]	-
27	670.7	666.0	0.16	-0.70	-5.15	P
28	667.4	666.8	0.08	-0.09	-5.09	P
29	672.6	668.7	0.18	-0.58	-5.17	P
30	668.5	667.8	0.18	-0.10	-5.17	P
31	668.6	642.8	0.21	-3.86	-5.20	P
32	671.3	650.0	0.21	-3.17	-5.20	P
Supplementary information: According to Gate #2, Maximum allowed degradation [%] = -(5 + 0.95 x *r*)						

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.3 Insulation test (final) - MQT03/MST16				-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
27	12.9	>1000	No	P
28	12.9	>1000	No	P
29	12.9	>1000	No	P
30	12.9	>1000	No	P
31	12.9	>1000	No	P
32	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (final) - MQT15/MST17			-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		<3500	-
Solution temperature [°C] / 22±2 .....:		22±2	-
Sample #	Required [MΩ]	Measured [MΩ]	-
27	12.9	>1000	P
28	12.9	>1000	P
29	12.9	>1000	P
30	12.9	>1000	P
31	12.9	>1000	P
32	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA700-33V-MH (BOM2 Higher end)

4.1 Visual inspection (initial) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	09/25/2022	-
Sample #	Nature and position of initial findings - comments or attach photos	-
35	No visual defects	P
36	No visual defects	P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.19.5 Initial stabilization - MQT19.1							-
Sample #.....:			35				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	691.4	-	-
1(P2)	5.0	>500	N/A	N/A	690.6	-	-
2(P3)	5.0	>500	N/A	N/A	688.5	0.21	Yes
Sample #.....:			36				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			09/25/2022 - 09/27/2022				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	687.2	-	-
1(P2)	5.0	>500	N/A	N/A	685.8	-	-
2(P3)	5.0	>500	N/A	N/A	684.5	0.20	Yes
Supplementary information: N/A							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.6 Performance at STC (after initial stabilization, Gate #1) - MQT06.1/MST02							-
Test date [MM/DD/YYYY]....:	09/27/2022						-
Test method ....:	☒ Simulator / ☐ Natural sunlight						-
Irradiance [W/m^2]....:	1000						-
Module temperature [°C] ....:	25.0						-
t1 [%]....:	±3						-
Calculated $P_{max}(lab)$ lower limit for each individual sample [W]....:	663.4						-
Calculated $\overline{P}_{max}(lab)$ lower limit for average of samples [W]....:	683.9						-
t2 [%]....:	±3						-
Calculated $V_{OC}(lab)$ upper limit for each individual sample [V]....:	49.68						-
t3 [%]....:	±3						-
Calculated $I_{SC}(lab)$ upper limit for each individual sample [A]....:	18.11						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
35	49.20	42.42	17.28	16.23	688.5	80.96	P
36	49.64	42.28	17.15	16.19	684.5	80.42	P
Average	-	-	-	-	686.5	-	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.3 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		09/27/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
35	12.9	>1000	No	P
36	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		09/27/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2158	-
Solution temperature [°C] / 22±2 .....:		21.1	-
Sample #	Required [MΩ]	Measured [MΩ]	-
35	12.9	>1000	P
36	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA660-33V-MH (BOM3)

4.1 Visual inspection (initial) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	04/29/2023	-
Sample #	Nature and position of initial findings - comments or attach photos	-
3-1	No visual defects	P
3-2	No visual defects	P
3-3	No visual defects	P
3-4	No visual defects	P
3-5	No visual defects	P
3-6	No visual defects	P
3-7	No visual defects	P
3-8	No visual defects	P
3-9	No visual defects	P
3-10	No visual defects	P
3-11	No visual defects	P
3-12	No visual defects	P
3-13	No visual defects	P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.19.4 Initial stabilization - MQT19.1							-
Sample #.....:		3-1					-
Light exposure method.....:		☐ Solar simulator / ☒ Natural sunlight / ☐ Others					-
Test date [MM/DD/YYYY] / start - end .:		04/29/2023 - 05/03/2023					-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	660.0	-	-
1(P2)	5.0	>500	N/A	MPPT	658.2	-	-
2(P3)	5.0	>500	N/A	MPPT	657.4	0.20	Yes
Sample #.....:		3-2					-
Light exposure method.....:		☐ Solar simulator / ☒ Natural sunlight / ☐ Others					-
Test date [MM/DD/YYYY] / start - end .:		04/29/2023 - 05/03/2023					-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	659.3	-	-
1(P2)	5.0	>500	N/A	MPPT	658.0	-	-
2(P3)	5.0	>500	N/A	MPPT	657.2	0.17	Yes
Sample #.....:		3-3					-
Light exposure method.....:		☐ Solar simulator / ☒ Natural sunlight / ☐ Others					-
Test date [MM/DD/YYYY] / start - end .:		04/29/2023 - 05/03/2023					-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	660.7	-	-
1(P2)	5.0	>500	N/A	MPPT	659.0	-	-
2(P3)	5.0	>500	N/A	MPPT	658.4	0.17	Yes
Sample #.....:		3-4					-
Light exposure method.....:		☐ Solar simulator / ☒ Natural sunlight / ☐ Others					-
Test date [MM/DD/YYYY] / start - end .:		04/29/2023 - 05/03/2023					-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	660.0	-	-
1(P2)	5.0	>500	N/A	MPPT	658.3	-	-
2(P3)	5.0	>500	N/A	MPPT	657.4	0.20	Yes

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:			3-5				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			04/29/2023 - 05/03/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	659.3	-	-
1(P2)	5.0	>500	N/A	MPPT	657.6	-	-
2(P3)	5.0	>500	N/A	MPPT	656.3	0.23	Yes
Sample #.....:			3-6				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			04/29/2023 - 05/03/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	660.0	-	-
1(P2)	5.0	>500	N/A	MPPT	658.1	-	-
2(P3)	5.0	>500	N/A	MPPT	657.2	0.21	Yes
Sample #.....:			3-7				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			04/29/2023 - 05/03/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	661.3	-	-
1(P2)	5.0	>500	N/A	MPPT	659.5	-	-
2(P3)	5.0	>500	N/A	MPPT	658.5	0.21	Yes
Sample #.....:			3-8				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			04/29/2023 - 05/03/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	660.0	-	-
1(P2)	5.0	>500	N/A	MPPT	658.5	-	-
2(P3)	5.0	>500	N/A	MPPT	657.8	0.17	Yes

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:			3-9				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			04/29/2023 - 05/03/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	661.3	-	-
1(P2)	5.0	>500	N/A	MPPT	659.4	-	-
2(P3)	5.0	>500	N/A	MPPT	658.7	0.20	Yes
Sample #.....:			3-10				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			04/29/2023 - 05/03/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	660.7	-	
1(P2)	5.0	>500	N/A	MPPT	658.7	-	
2(P3)	5.0	>500	N/A	MPPT	657.8	0.21	Yes
Sample #.....:			3-11				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			04/29/2023 - 05/03/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	659.3	-	-
1(P2)	5.0	>500	N/A	MPPT	657.6	-	-
2(P3)	5.0	>500	N/A	MPPT	656.9	0.19	Yes
Sample #.....:			3-12				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			04/29/2023 - 05/03/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	658.7	-	-
1(P2)	5.0	>500	N/A	MPPT	657.0	-	-
2(P3)	5.0	>500	N/A	MPPT	655.9	0.21	Yes

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:			3-13				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			04/29/2023 - 05/03/2023				-
Test cycle	Integrated irradiation [kWh/m^2]	Irradiance [W/m^2]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	658.7	-	-
1(P2)	5.0	>500	N/A	MPPT	657.1	-	-
2(P3)	5.0	>500	N/A	MPPT	656.2	0.19	Yes
Supplementary information: N/A							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.6 Performance at STC (after initial stabilization, Gate #1) - MQT06.1/MST02							-
Test date [MM/DD/YYYY]:			05/03/2023				-
Test method:			☒ Simulator / ☐ Natural sunlight				-
Irradiance [W/m²]:			1000				-
Module temperature [°C]:			25.0				-
t1 [%]:			±3				-
Calculated $P_{max}(lab)$ lower limit for each individual sample [W]:			626.0				-
Calculated $\overline{P}_{max}(lab)$ lower limit for average of samples [W]:			645.4				-
t2 [%]:			±3				-
Calculated $V_{OC}(lab)$ upper limit for each individual sample [V]:			46.40				-
t3 [%]:			±3				-
Calculated $I_{SC}(lab)$ upper limit for each individual sample [A]:			18.74				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-1	45.69	37.80	18.33	17.39	657.4	78.47	P
3-2	45.56	37.70	18.46	17.43	657.2	78.15	P
3-3	45.74	37.88	18.38	17.38	658.4	78.30	P
3-4	45.52	37.89	18.45	17.35	657.4	78.28	P
3-5	45.67	37.63	18.45	17.44	656.3	77.90	P
3-6	45.55	37.86	18.42	17.36	657.2	78.33	P
3-7	45.51	37.78	18.61	17.43	658.5	77.75	P
3-8	45.72	37.74	18.50	17.43	657.8	77.79	P
3-9	45.59	37.85	18.53	17.40	658.7	77.94	P
3-10	45.73	37.91	18.40	17.35	657.8	78.17	P
3-11	45.50	37.82	18.54	17.37	656.9	77.87	P
3-12	45.68	37.76	18.32	17.37	655.9	78.37	P
3-13	45.47	37.71	18.42	17.40	656.2	78.35	P
Average	-	-	-	-	657.4	-	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.3 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		05/03/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-1	12.9	>1000	No	P
3-2	12.9	>1000	No	P
3-3	12.9	>1000	No	P
3-4	12.9	>1000	No	P
3-5	12.9	>1000	No	P
3-6	12.9	>1000	No	P
3-7	12.9	>1000	No	P
3-8	12.9	>1000	No	P
3-9	12.9	>1000	No	P
3-10	12.9	>1000	No	P
3-11	12.9	>1000	No	P
3-12	12.9	>1000	No	P
3-13	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		05/03/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2260	-
Solution temperature [°C] / 22±2 .....:		22.8	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-1	12.9	>1000	P
3-2	12.9	>1000	P
3-3	12.9	>1000	P
3-4	12.9	>1000	P
3-5	12.9	>1000	P
3-6	12.9	>1000	P
3-7	12.9	>1000	P
3-8	12.9	>1000	P
3-9	12.9	>1000	P
3-10	12.9	>1000	P
3-11	12.9	>1000	P
3-12	12.9	>1000	P
3-13	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.4 Measurement of temperature coefficients - MQT04				-
Test date [MM/DD/YYYY].....:		05/16/2023		-
Ambient temperature [°C] / high - low...:		24.9 - 24.9		-
Module temperature [°C] / high - low....:		60.2 - 25.2		-
Irradiance [W/m^2] / high - low.....:		1000 - 999.4		-
Sample #	α [%/°C]	β [%/°C]	δ [%/°C]	-
3-1	0.048	-0.281	-0.342	-
Supplementary information: N/A				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.7 Performance at low irradiance - MQT07							-
Test date [MM/DD/YYYY]..... :			05/04/2023				-
Test method ..... :			☐ Directly measured ☒ Data corrected to a 25°C cell temperature and 200 W/m² irradiance				-
Irradiance [W/m²]..... :			200				-
Ambient temperature [°C]..... :			25.0				-
Module temperature [°C] ..... :			25.0				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-1	42.40	35.08	3.63	3.53	123.9	80.46	-
Supplementary information: N/A							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.8 Outdoor exposure test - MQT08							-
Sample #.....:	3-2						-
Test date [MM/DD/YYYY].....:	05/06/2023 - 05/30/2023						-
Total irradiation dosage [kWh/m^2] .....:	60.0						-
Supplementary information: N/A							
4.1 Visual inspection (after outdoor exposure test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:	05/30/2023						-
Sample #	Nature and position of initial findings - comments or attach photos						-
3-2	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after outdoor exposure test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:	05/30/2023						-
Ambient temperature [°C].....:	Corrected to 25.0						-
Irradiance [W/m^2].....:	Corrected to 1000						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-2	45.51	37.98	17.91	16.92	642.7	78.84	-
Supplementary information: N/A							
4.15 Wet leakage current test (after outdoor exposure test) - MQT15/MST17							-
Test date [MM/DD/YYYY].....:	05/30/2023						-
Test voltage applied [V].....:	2 minutes of 1500						-
Solution resistivity [Ω/cm] / <3500 .....:	2023						-
Solution temperature [°C] / 22±2 .....:	23.5						-
Sample #	Required [MΩ]		Measured [MΩ]				-
3-2	12.9		>1000				P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.							

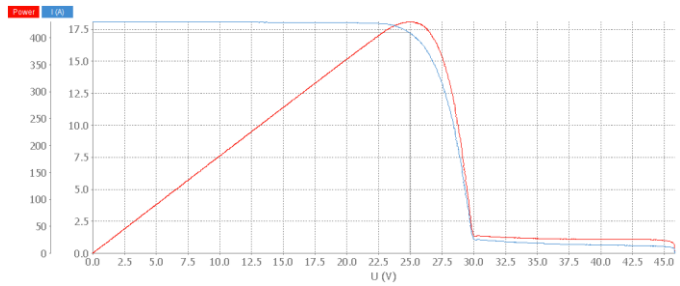
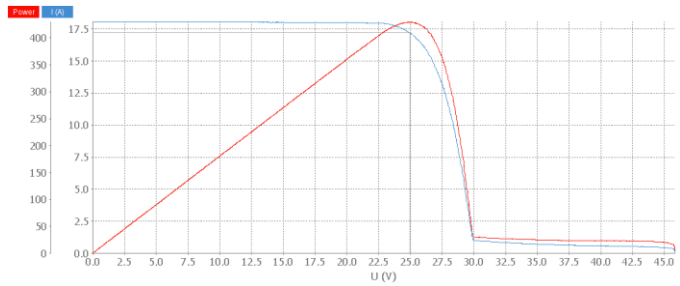
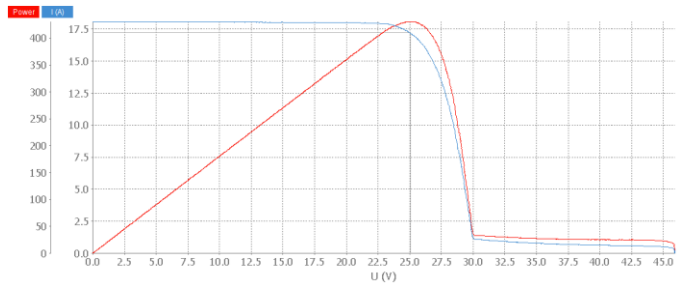
IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.18.1 Bypass diode thermal test - MQT18.1/MST25					-
Sample #.....:	3-2				-
Test date [MM/DD/YYYY].....:	06/01/2023				-
Module temperature [°C] .....:	75				-
Number of diodes in junction box .....:	3				-
Diode manufacturer.....:	Zhejiang Renhe Photovoltaic Technology Co., Ltd.				-
Diode type designation.....:	RMK4555D				-
Max. permissible junction temperature T_{jmax} [°C].....:	200 (according to datasheet)				-
Step 1, determination of V_D versus Tj characteristic					-
Diode #.....:	1				-
Temperature [°C].....:	30 ± 2°C	50 ± 2°C	70 ± 2°C	90 ± 2°C	-
Ambient temperature of the junction box [°C].....:	30	50	70	90	-
Pulsed current [A] .....:	18.46	18.46	18.46	18.46	-
Voltage drop [V] .....:	0.4359	0.4202	0.4027	0.3867	-
V_D versus Tj characteristic.....:	$V_D = 0.4609 - 8.26 \times 10^{-4} T_J$				
Diode #.....:	2				-
Temperature [°C].....:	30 ± 2°C	50 ± 2°C	70 ± 2°C	90 ± 2°C	-
Ambient temperature of the junction box [°C].....:	30	50	70	90	-
Pulsed current [A] .....:	18.46	18.46	18.46	18.46	-
Voltage drop [V] .....:	0.4341	0.4191	0.4003	0.3852	-
V_D versus Tj characteristic.....:	$V_D = 0.4593 - 8.28 \times 10^{-4} T_J$				
Diode #.....:	3				-
Temperature [°C].....:	30 ± 2°C	50 ± 2°C	70 ± 2°C	90 ± 2°C	-
Ambient temperature of the junction box [°C].....:	30	50	70	90	-
Pulsed current [A] .....:	18.46	18.46	18.46	18.46	-
Voltage drop [V] .....:	0.4398	0.4211	0.4065	0.3872	-
V_D versus Tj characteristic.....:	$V_D = 0.4654 - 8.62 \times 10^{-4} T_J$				-
Step 2, bypass diode thermal test					-
Diode #.....:	1	2	3		-
Current flow applied [A] .....:	18.46	18.46	18.46		-
Voltage drop [V] after 1h.....:	0.3230	0.3180	0.3200		-
Calculated max. junction temperature T_{jcalc} [°C].....:	167.0	170.6	168.4		-

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

$Tj_{calc} < Tj_{max}$? .....:			Yes	Yes	Yes		P
Current flow (1.25 x Isc) [A] .....:			23.08	23.08	23.08		-
Bypass diode remains functional? .....:			Yes	Yes	Yes		P
Supplementary information: N/A							
4.1 Visual inspection (after bypass diode thermal test) - MQT01/MST01							-
Test date [MM/DD/YYYY] .....:			06/01/2023				-
Sample #	Nature and position of initial findings - comments or attach photos						-
3-2	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after bypass diode thermal test) - MQT02/MST03							-
Test date [MM/DD/YYYY] .....:			06/01/2023				-
Ambient temperature [°C] .....:			Corrected to 25.0				-
Irradiance [W/m²] .....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-2	45.56	38.06	17.94	16.87	642.1	78.56	-
Supplementary information: N/A							
4.3 Insulation test (after bypass diode thermal test) - MQT03/MST16							-
Test date [MM/DD/YYYY] .....:			06/01/2023				-
Test voltage applied [V] .....:			2 minutes of 1500 and 1 minute of 8000				-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
3-2	12.9		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m². Area of the module is 3.11m².							
4.15 Wet leakage current test (after bypass diode thermal test) - MQT15/MST17							-
Test date [MM/DD/YYYY] .....:			06/01/2023				-
Test voltage applied [V] .....:			2 minutes of 1500				-
Solution resistivity [Ω/cm] / <3500 .....:			2324				-
Solution temperature [°C] / 22±2 .....:			22.4				-
Sample #	Required [MΩ]		Measured [MΩ]				-
3-2	12.9		>1000				P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m². Area of the module is 3.11m².							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.18.2 Bypass diode functionality test (after bypass diode thermal test) - MQT18.2/MST07		-
Sample #.....:	3-2	-
Test date [MM/DD/YYYY].....:	06/01/2023	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A] .....:	N/A	-
$V_{FMrated}$ [V] .....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1		P
2		P
3		P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.9 Hot-spot endurance test - MQT09/MST22		-
Sample #.....:	3-3	-
Test date [MM/DD/YYYY] / start - end..:	05/13/2023	-
Cell interconnection circuit.....:	☐ S / ☒ SPS / ☐ PS	-
Irradiance during each cycle [W/m^2].....:	1000	-
Test duration for each cycle [hour].....:	1	-
Module temperature at thermal equilibrium in each cycle [°C].....:	59.0 - 58.0	-
Maximum measured cell temperature of cell with lowest shunt resistance adjacent to the edge [°C].....:	A4: 120.7	-
Shading rate of cell with lowest shunt resistance [%].....:	A4: 50	-
Maximum measured cell temperature of other 2 cells with lowest shunt resistance[°C].....:	C11: 131.7 D17: 106.6	-
Shading rate of the other 2 cells with lowest shunt resistance [%].....:	C11: 40 D17: 45	-
Maximum measured cell temperature of cell with highest shunt resistance [°C].:	A12: 156.0	-
Shading rate of cell with highest shunt resistance [%].....:	A12: 35	-

Supplementary information: Position of solar cells (front side view):

	1	2	3	4	5	…	…	18	19	20	21	22
A						Junction box						
B												
C												
D												
E												
F												

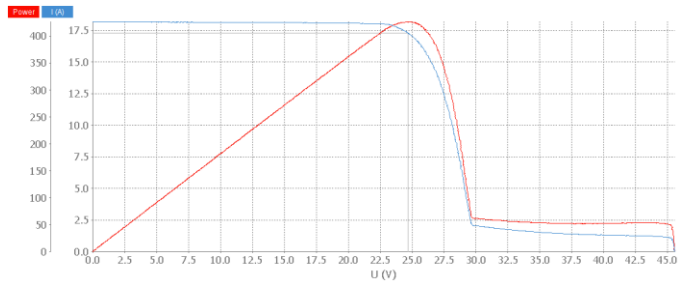
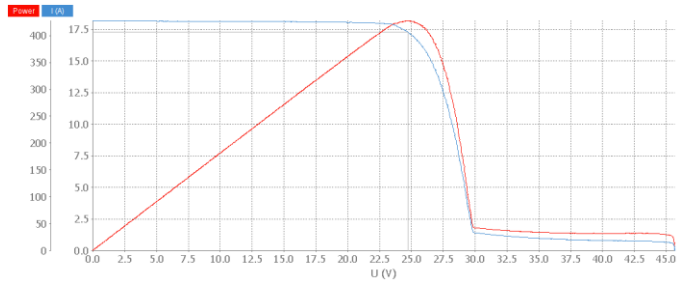
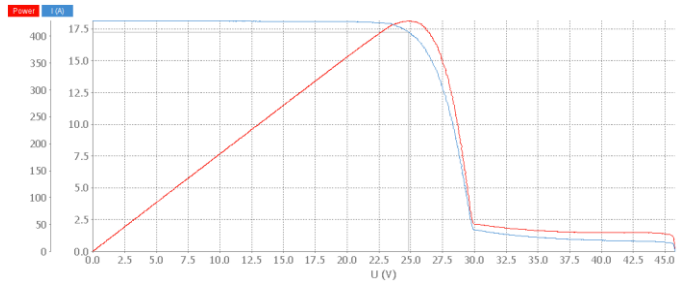
4.1 Visual inspection (after hot-spot endurance test) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	05/13/2023	-
Sample #	Nature and position of initial findings - comments or attach photos	-
3-3	No visual defects	P

Supplementary information: N/A

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.2 Maximum power determination (after hot-spot endurance test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			05/14/2023				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-3	45.68	37.99	18.29	17.33	658.4	78.80	-
Supplementary information: N/A							
4.3 Insulation test (after hot-spot endurance test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:			05/14/2023				-
Test voltage applied [V].....:			2 minutes of 1500 and 1 minute of 8000				-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
3-3	12.9		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.							
4.15 Wet leakage current test (after hot-spot endurance test) - MQT15/MST17							-
Test date [MM/DD/YYYY].....:			05/14/2023				-
Test voltage applied [V].....:			2 minutes of 1500				-
Solution resistivity [Ω/cm] / <3500 .....:			2036				-
Solution temperature [°C] / 22±2 .....:			22.5				-
Sample #	Required [MΩ]		Measured [MΩ]				-
3-3	12.9		>1000				P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.18.2 Bypass diode functionality test (after hot-spot endurance test) - MQT18.2/MST07		-
Sample #.....:	3-3	-
Test date [MM/DD/YYYY].....:	05/14/2023	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A] .....:	N/A	-
$V_{FMrated}$ [V] .....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading the string	P
1		P
2		P
3		P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.10 UV preconditioning test - MQT10 & MST54							-
Sample #.....:	3-4, 3-5						-
Test date [MM/DD/YYYY] / start - end..:	05/08/2023 - 05/12/2023						-
Module temperature [°C] / high - low ....:	59.6 - 57.7						-
UV irradiance (280-400nm) [W/m²].....:	159.3						-
Ratio of UV irradiance (280-320nm) (%) .....:	8.1						-
Total dosage of UV irradiation (280-400nm) [kWh/m²].....:	15.0						-
Module operation condition .....:	☒ Short circuited / ☐ Open-circuited						-
Supplementary information: N/A							
4.1 Visual inspection (after UV preconditioning test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:	05/13/2023						-
Sample #	Nature and position of initial findings - comments or attach photos						-
3-4	No visual defects						P
3-5	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after UV preconditioning test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:	05/13/2023						-
Ambient temperature [°C].....:	Corrected to 25.0						-
Irradiance [W/m²].....:	Corrected to 1000						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-4	45.31	37.67	18.38	17.38	654.8	78.62	-
3-5	45.44	37.42	18.48	17.37	650.1	77.40	-
Supplementary information: N/A							
4.3 Insulation test (after UV preconditioning test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:	05/13/2023						-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000						-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
3-4	12.9		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m². Area of the module is 3.11 m².							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after UV preconditioning test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		05/13/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		1926	-
Solution temperature [°C] / 22±2 .....:		21.4	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-4	12.9	>1000	P
3-5	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.20 Cyclic (dynamic) mechanical load test - MQT20							-
Sample #.....:	3-4, 3-5						-
Test date [MM/DD/YYYY].....:	05/16/2023						-
Mechanical load change rate .....:	5 cycle(s) per minute						-
Mounting method .....:	Clamps (6 points)						-
Load applied to.....:	Downward			Upward			-
Mechanical load [Pa].....:	1000			1000			-
Total cycles .....:	1000						-
Sample #	Intermittent open-circuit?						-
3-4	No						P
3-5	No						P
Supplementary information: N/A							
4.1 Visual inspection (after cyclic (dynamic) mechanical load test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:	05/16/2023						-
Sample #	Nature and position of initial findings - comments or attach photos						-
3-4	No visual defects						P
3-5	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after cyclic (dynamic) mechanical load test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:	05/16/2023						-
Ambient temperature [°C].....:	Corrected to 25.0						-
Irradiance [W/m^2].....:	Corrected to 1000						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-4	45.20	37.88	18.47	17.32	656.0	78.59	-
3-5	45.32	37.35	18.47	17.42	650.7	77.73	-
Supplementary information: N/A							
4.3 Insulation test (after cyclic (dynamic) mechanical load test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:	05/16/2023						-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000						-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
3-4	12.9		>1000		No		P
3-5	12.9		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after cyclic (dynamic) mechanical load test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		05/16/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2317	-
Solution temperature [°C] / 22±2 .....:		23.0	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-4	12.9	>1000	P
3-5	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.11 Thermal cycling 50 test - MQT11 & MST51							-
Test date [MM/DD/YYYY] / start - end..:			05/21/2023 - 05/29/2023				-
Total cycles .....:			50				-
Current applied [A] .....:			18.45 during the heat up stage from -40°C to 80°C 0.05 during others				-
Sample #	Open circuits?						-
3-4	No						P
3-5	No						P
Supplementary information: A single 5N weight has been attached to the junction box.							
4.1 Visual inspection (after thermal cycling 50 test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:			05/29/2023				-
Sample #	Nature and position of initial findings - comments or attach photos						-
3-4	No visual defects						P
3-5	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after thermal cycling 50 test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			05/29/2023				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-4	45.17	37.82	18.37	17.28	653.6	78.76	-
3-5	45.44	37.28	18.50	17.46	651.0	77.43	-
Supplementary information: N/A							
4.3 Insulation test (after thermal cycling 50 test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:			05/29/2023				-
Test voltage applied [V].....:			2 minutes of 1500 and 1 minute of 8000				-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
3-4	12.9		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after thermal cycling 50 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		05/29/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		1914	-
Solution temperature [°C] / 22±2 .....:		22.5	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-4	12.9	>1000	P
3-5	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.12 Humidity freeze 10 test - MQT12 & MST52							-
Test date [MM/DD/YYYY] / start - end..:			06/02/2023 - 06/13/2023				-
Total cycles .....:			10				-
Current applied [A] .....:			0.05				-
Sample #	Open circuits?						-
3-4	No						P
3-5	No						P
Supplementary information: N/A							
4.1 Visual inspection (after humidity freeze 10 test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:			06/13/2023				-
Sample #	Nature and position of initial findings - comments or attach photos						-
3-4	No visual defects						P
3-5	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after humidity freeze 10 test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			06/13/2023				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-4	45.14	37.58	18.30	17.13	643.8	77.93	-
3-5	45.56	37.10	18.42	17.38	644.8	76.83	-
Supplementary information: N/A							
4.3 Insulation test (after humidity freeze 10 test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:			06/13/2023				-
Test voltage applied [V].....:			2 minutes of 1500 and 1 minute of 8000				-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
3-4	12.9		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after humidity freeze 10 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		06/13/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2359	-
Solution temperature [°C] / 22±2 .....:		22.4	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-4	12.9	>1000	P
3-5	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.14.2 Retention of junction box on mounting surface - MQT14.1/MST42				-
Sample #.....:		3-4		-
Test date [MM/DD/YYYY].....:		06/13/2023		-
Applied force in all directions parallel to the mounting surface parallel to the module edges [N] .....:		40		-
Applied force in a direction perpendicular to the mounting surface [N] .....:		40		-
Supplementary information: N/A				
4.1 Visual inspection (after retention of junction box on mounting surface) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		06/13/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-4	No visual defects			P
Supplementary information: N/A				
4.3 Insulation test (after retention of junction box on mounting surface) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		06/13/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-4	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				
4.15 Wet leakage current test (after retention of junction box on mounting surface) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		06/13/2023		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		2383		-
Solution temperature [°C] / 22±2 .....:		22.5		-
Sample #	Required [MΩ]	Measured [MΩ]		-
3-4	12.9	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.11 Thermal cycling 200 test - MQT11/MST51							-
Test date [MM/DD/YYYY] / start - end..:			05/08/2023 - 06/10/2023				-
Total cycles .....:			200				-
Current applied [A] .....:			18.45 during the heat up stage from -40°C to 80°C 0.05 during others				-
Sample #	Open circuits?						-
3-6	No						P
3-7	No						P
Supplementary information: A single 5N weight has been attached to the junction box.							
4.1 Visual inspection (after thermal cycling 200 test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:			06/10/2023				-
Sample #	Nature and position of initial findings - comments or attach photos						-
3-6	No visual defects						P
3-7	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after thermal cycling 200 test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			06/10/2023				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-6	45.49	37.59	18.29	17.19	646.1	77.66	-
3-7	45.49	37.45	18.28	17.35	649.7	78.14	-
Supplementary information: N/A							
4.3 Insulation test (after thermal cycling 200 test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:			06/10/2023				-
Test voltage applied [V].....:			2 minutes of 1500 and 1 minute of 8000				-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
3-6	12.9		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after thermal cycling 200 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		06/10/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2134	-
Solution temperature [°C] / 22±2 .....:		20.7	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-6	12.9	>1000	P
3-7	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.13 Damp heat 1000 test - MQT13/MST53							-
Sample #.....:	3-8, 3-9						-
Test date [MM/DD/YYYY] / start - end..:	05/13/2023 - 06/24/2023						-
Total hours [hours] .....:	1000						-
Supplementary information: N/A							
4.1 Visual inspection (after damp heat 1000 test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:	06/24/2023						-
Sample #	Nature and position of initial findings - comments or attach photos						-
3-8	No visual defects						P
3-9	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after damp heat 1000 test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:	06/24/2023						-
Ambient temperature [°C].....:	Corrected to 25.0						-
Irradiance [W/m^2].....:	Corrected to 1000						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-8	45.44	37.05	18.36	17.28	640.3	76.74	-
3-9	45.57	36.94	18.37	17.28	638.4	76.25	-
Supplementary information: N/A							
4.3 Insulation test (after damp heat 1000 test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:	06/24/2023						-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000						-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
3-8	12.9		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after damp heat 1000 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		06/24/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2436	-
Solution temperature [°C] / 22±2 .....:		22.4	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-8	12.9	>1000	P
3-9	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.16 Static mechanical load test - MQT16/MST34							-
Sample #.....:	3-8						-
Test date [MM/DD/YYYY].....:	06/29/2023						-
Designed load (downward / upward) [Pa] .....:	3600 / 1600						-
Safety factor .....:	1.5						-
Mounting method .....:	Clamps (6 points)						-
Load applied to.....:	Downward			Upward			-
Mechanical load [Pa].....:	5400			2400			-
1st cycle duration [hours].....:	1h			1h			-
Intermittent open-circuit? .....:	No			No			-
2nd cycle duration [hours].....:	1h			1h			-
Intermittent open-circuit? .....:	No			No			-
3rd cycle duration [hours] .....:	1h			1h			-
Intermittent open-circuit? .....:	No			No			-
Supplementary information: N/A							
4.1 Visual inspection (after static mechanical load test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:	06/29/2023						-
Sample #	Nature and position of initial findings - comments or attach photos						-
3-8	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after statistic mechanical load test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:	06/29/2023						-
Ambient temperature [°C].....:	Corrected to 25.0						-
Irradiance [W/m²].....:	Corrected to 1000						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-8	45.86	36.72	18.43	17.26	633.7	74.99	-
Supplementary information: N/A							
4.3 Insulation test (after static mechanical load test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:	06/29/2023						-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000						-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
3-8	12.9		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m². Area of the module is 3.11 m².							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after static mechanical load test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		06/29/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2369	-
Solution temperature [°C] / 22±2 .....:		23.1	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-8	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2								
Clause	Requirement + Test				Result - Remark			Verdict
4.17 Hail impact test - MQT17								-
Sample #.....:	3-9							-
Test date [MM/DD/YYYY].....:	06/27/2023							-
Number of impact locations .....:	11							-
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		-
	7.61	7.53	7.45	7.45	7.53	7.45		
	7	8	9	10	11	-		
	7.45	7.53	7.61	7.53	7.53	-		
Ice ball velocity [m/s].....:	1	2	3	4	5	6		-
	23.0	23.2	22.8	23.0	22.8	22.8		
	7	8	9	10	11	-		
	22.8	23.0	23.2	23.0	23.0	-		
Supplementary information: N/A								
4.1 Visual inspection (after hail impact test) - MQT01/MST01								-
Test date [MM/DD/YYYY].....:	06/27/2023							-
Sample #	Nature and position of initial findings - comments or attach photos							-
3-9	No visual defects							P
Supplementary information: N/A								
4.2 Maximum power determination (after hail impact test) - MQT02/MST03								-
Test date [MM/DD/YYYY].....:	06/27/2023							-
Ambient temperature [°C].....:	Corrected to 25.0							-
Irradiance [W/m^2].....:	Corrected to 1000							-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]		-
3-9	45.66	36.82	18.35	17.14	631.1	75.32		-
Supplementary information: N/A								

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after hail impact test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		06/27/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		1931	-
Solution temperature [°C] / 22±2 .....:		20.8	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-9	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.21 Potential induced degradation test - MQT21			-
Test date [MM/DD/YYYY] / start - end..:	05/30/2023 - 06/04/2023		-
Sample #.....:	3-12, 3-13	3-10, 3-11	-
Voltage polarity .....:	negative	positive	-
Applied Voltage [V] .....:	1500		-
Total duration [hour] .....:	96		-
Chamber air temperature [°C] .....:	85		-
Chamber relative humidity [%].....:	85		-
Supplementary information: The test is performed according to IEC TS 62804-1:2015, method a). Negative bias voltage: With positive voltage terminal of power source connected to the grounding hole of frame. Positive bias voltage: With negative voltage terminal of power source connected to the grounding hole of frame			

4.1 Visual inspection (after potential induced degradation test) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	06/04/2023	-
Sample #	Nature and position of initial findings - comments or attach photos	-
3-10	No visual defects	P
3-11	No visual defects	P
3-12	No visual defects	P
3-13	No visual defects	P
Supplementary information: N/A		

4.2 Maximum power determination (after potential induced degradation test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:	06/04/2023						-
Ambient temperature [°C].....:	Corrected to 25.0						-
Irradiance [W/m^2].....:	Corrected to 1000						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-10	45.77	37.80	18.22	17.21	650.6	78.01	-
3-11	45.93	37.88	18.28	17.20	651.5	77.60	-
3-12	45.61	37.92	18.14	17.12	649.3	78.46	-
3-13	45.83	37.95	18.15	17.17	651.6	78.33	-
Supplementary information: N/A							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after potential induced degradation test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		06/04/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2416	-
Solution temperature [°C] / 22±2 .....:		22.6	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-10	12.9	>1000	P
3-11	12.9	>1000	P
3-12	12.9	>1000	P
3-13	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.6 Performance at STC (final, Gate #2) - MQT06.1/MST02							-
Test method .....:			☒ Simulator / ☐ Natural sunlight				-
Irradiance [W/m²].....:			1000				-
Module temperature [°C] .....:			25.0				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-2	45.56	37.93	17.85	16.96	643.4	79.10	-
3-4	45.23	37.51	18.35	17.11	641.8	77.33	-
3-5	45.65	36.97	18.45	17.46	645.5	76.64	-
3-6	45.49	37.41	18.22	17.27	646.1	77.95	-
3-7	45.54	37.53	18.34	17.33	650.4	77.87	-
3-8	45.86	36.72	18.43	17.26	633.7	74.99	-
3-9	45.66	36.82	18.35	17.14	631.1	75.32	-
3-10	45.72	37.76	18.14	17.21	649.9	78.36	-
3-11	45.93	37.99	18.20	17.15	651.5	77.94	-
3-12	45.57	37.81	18.18	17.12	647.3	78.13	-
3-13	45.83	37.93	18.21	17.13	649.7	77.85	-

Power degradation of each module after each test sequences						-
Sample #	Pmax (initial) [W]	Pmax (final) [W]	Reproducibility *r* [%]	Power degradation [%]	Maximum allowed degradation [%]	-
3-2	657.2	643.4	0.05	-2.10	-5.05	P
3-4	657.4	641.8	<0.01	-2.37	-5.00	P
3-5	656.3	645.5	<0.01	-1.65	-5.00	P
3-6	657.2	646.1	0.06	-1.69	-5.06	P
3-7	658.5	650.4	0.06	-1.23	-5.06	P
3-8	657.8	633.7	0.16	-3.66	-5.15	P
3-9	658.7	631.1	0.16	-4.19	-5.15	P
3-10	657.8	649.9	0.10	-1.20	-5.10	P
3-11	656.9	651.5	0.10	-0.82	-5.10	P
3-12	655.9	647.3	0.10	-1.31	-5.10	P
3-13	656.2	649.7	0.10	-0.99	-5.10	P
Supplementary information: According to Gate #2, Maximum allowed degradation [%] = -(5 + 0.95 x *r*)						

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.3 Insulation test (final) - MQT03/MST16				-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-2	12.9	>1000	No	P
3-4	12.9	>1000	No	P
3-5	12.9	>1000	No	P
3-6	12.9	>1000	No	P
3-7	12.9	>1000	No	P
3-8	12.9	>1000	No	P
3-9	12.9	>1000	No	P
3-10	12.9	>1000	No	P
3-11	12.9	>1000	No	P
3-12	12.9	>1000	No	P
3-13	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (final) - MQT15/MST17			-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		<3500	-
Solution temperature [°C] / 22±2 .....:		22±2	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-2	12.9	>1000	P
3-4	12.9	>1000	P
3-5	12.9	>1000	P
3-6	12.9	>1000	P
3-7	12.9	>1000	P
3-8	12.9	>1000	P
3-9	12.9	>1000	P
3-10	12.9	>1000	P
3-11	12.9	>1000	P
3-12	12.9	>1000	P
3-13	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA645-33V-MH (BOM3 lower end)

4.1 Visual inspection (initial) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	04/29/2023	-
Sample #	Nature and position of initial findings - comments or attach photos	-
3-24	No visual defects	P
3-25	No visual defects	P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.19.5 Initial stabilization - MQT19.1							-
Sample #.....:			3-24				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			04/29/2023 - 05/03/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	643.7	-	-
1(P2)	5.0	>500	N/A	MPPT	642.4	-	-
2(P3)	5.0	>500	N/A	MPPT	641.1	0.20	Yes
Sample #.....:			3-25				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			04/29/2023 - 05/03/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	645.0	-	-
1(P2)	5.0	>500	N/A	MPPT	643.4	-	-
2(P3)	5.0	>500	N/A	MPPT	641.5	0.27	Yes
Supplementary information: N/A							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.6 Performance at STC (after initial stabilization, Gate #1) - MQT06.1/MST02							-
Test date [MM/DD/YYYY]:	05/03/2023						-
Test method:	☒ Simulator / ☐ Natural sunlight						-
Irradiance [W/m²]:	1000						-
Module temperature [°C]:	25.0						-
t1 [%]:	±3						-
Calculated $P_{max}(lab)$ lower limit for each individual sample [W]:	611.8						-
Calculated $\overline{P}_{max}(lab)$ lower limit for average of samples [W]:	630.7						-
t4 [%]:	±3						
Calculated $\overline{P}_{max}(lab)$ upper limit for average of samples [W]:	679.7						
t2 [%]:	±3						-
Calculated $V_{OC}(lab)$ upper limit for each individual sample [V]:	45.79						-
t3 [%]:	±3						-
Calculated $I_{SC}(lab)$ upper limit for each individual sample [A]:	18.61						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-24	45.13	37.10	18.33	17.28	641.1	77.51	P
3-25	45.05	37.10	18.23	17.29	641.5	78.10	P
Average	-	-	-	-	641.3	-	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.3 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		05/03/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-24	12.9	>1000	No	P
3-25	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		05/03/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2260	-
Solution temperature [°C] / 22±2 .....:		22.8	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-24	12.9	>1000	P
3-25	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA670-33V-MH (BOM3 higher end)

4.1 Visual inspection (initial) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	04/29/2023	-
Sample #	Nature and position of initial findings - comments or attach photos	-
3-26	No visual defects	P
3-27	No visual defects	P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.19.5 Initial stabilization - MQT19.1							-
Sample #.....:			3-26				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			04/29/2023 - 05/03/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	643.7	-	-
1(P2)	5.0	>500	N/A	MPPT	642.4	-	-
2(P3)	5.0	>500	N/A	MPPT	641.1	0.20	Yes
Sample #.....:			3-27				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			04/29/2023 - 05/03/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	645.0	-	-
1(P2)	5.0	>500	N/A	MPPT	643.4	-	-
2(P3)	5.0	>500	N/A	MPPT	641.5	0.27	Yes
Supplementary information: N/A							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.6 Performance at STC (after initial stabilization, Gate #1) - MQT06.1/MST02							-
Test date [MM/DD/YYYY]....:	05/03/2023						-
Test method ....:	☒ Simulator / ☐ Natural sunlight						-
Irradiance [W/m^2]....:	1000						-
Module temperature [°C] ....:	25.0						-
t1 [%]....:	±3						-
Calculated $P_{max}(lab)$ lower limit for each individual sample [W]....:	635.5						-
Calculated $\overline{P}_{max}(lab)$ lower limit for average of samples [W]....:	655.2						-
t2 [%]....:	±3						-
Calculated $V_{OC}(lab)$ upper limit for each individual sample [V]....:	46.81						-
t3 [%]....:	±3						-
Calculated $I_{SC}(lab)$ upper limit for each individual sample [A]....:	18.81						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-26	45.84	38.19	18.45	17.47	667.2	78.87	P
3-27	45.91	38.30	18.36	17.42	667.2	79.16	P
Average	-	-	-	-	667.2	-	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.3 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		05/03/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-26	12.9	>1000	No	P
3-27	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		05/03/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2260	-
Solution temperature [°C] / 22±2 .....:		22.8	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-26	12.9	>1000	P
3-27	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA660-33V-MH (BOM4)

4.1 Visual inspection (initial) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	05/12/2023	-
Sample #	Nature and position of initial findings - comments or attach photos	-
4-1	No visual defects	P
4-2	No visual defects	P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.19.4 Initial stabilization - MQT19.1							-
Sample #.....:			4-1				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			05/12/2023 - 05/16/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	661.5	-	-
1(P2)	5.0	>500	N/A	MPPT	659.5	-	-
2(P3)	5.0	>500	N/A	MPPT	658.5	0.23	Yes
Sample #.....:			4-2				-
Light exposure method.....:			☐ Solar simulator / ☒ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			05/12/2023 - 05/16/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	660.9	-	-
1(P2)	5.0	>500	N/A	MPPT	659.1	-	-
2(P3)	5.0	>500	N/A	MPPT	657.8	0.23	Yes
Supplementary information: N/A							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.6 Performance at STC (after initial stabilization, Gate #1) - MQT06.1/MST02							-
Test date [MM/DD/YYYY]....:	05/16/2023						-
Test method ....:	☒ Simulator / ☐ Natural sunlight						-
Irradiance [W/m^2]....:	1000						-
Module temperature [°C] ....:	25.0						-
t1 [%]....:	±3						-
Calculated $P_{max}(lab)$ lower limit for each individual sample [W]....:	626.0						-
Calculated $\overline{P}_{max}(lab)$ lower limit for average of samples [W]....:	645.4						-
t2 [%]....:	±3						-
Calculated $V_{OC}(lab)$ upper limit for each individual sample [V]....:	46.40						-
t3 [%]....:	±3						-
Calculated $I_{SC}(lab)$ upper limit for each individual sample [A]....:	18.74						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
4-1	45.51	37.71	18.53	17.46	658.5	78.07	P
4-2	45.63	37.89	18.55	17.36	657.8	77.69	P
Average	-	-	-	-	658.2	-	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.3 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		05/16/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
4-1	12.9	>1000	No	P
4-2	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		05/16/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2785	-
Solution temperature [°C] / 22±2 .....:		21.3	-
Sample #	Required [MΩ]	Measured [MΩ]	-
4-1	12.9	>1000	P
4-2	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.16 Static mechanical load test - MQT16/MST34							-
Sample #.....:	4-2						-
Test date [MM/DD/YYYY].....:	07/11/2023						-
Designed load (downward / upward) [Pa] .....:	3600 / 1600						-
Safety factor .....:	1.5						-
Mounting method .....:	Clamps (6 points)						-
Load applied to.....:	Downward				Upward		-
Mechanical load [Pa].....:	5400				2400		-
1st cycle duration [hours].....:	1h				1h		-
Intermittent open-circuit? .....:	No				No		-
2nd cycle duration [hours].....:	1h				1h		-
Intermittent open-circuit? .....:	No				No		-
3rd cycle duration [hours] .....:	1h				1h		-
Intermittent open-circuit? .....:	No				No		-
Supplementary information: N/A							
4.1 Visual inspection (after static mechanical load test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....:	07/11/2023						-
Sample #	Nature and position of initial findings - comments or attach photos						-
4-2	No visual defects						P
Supplementary information: N/A							
4.2 Maximum power determination (after statistic mechanical load test) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:	07/11/2023						-
Ambient temperature [°C].....:	Corrected to 25.0						-
Irradiance [W/m²].....:	Corrected to 1000						-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
4-2	45.48	37.21	18.42	17.19	639.6	76.35	-
Supplementary information: N/A							
4.3 Insulation test (after static mechanical load test) - MQT03/MST16							-
Test date [MM/DD/YYYY].....:	07/11/2023						-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000						-
Sample #	Required [MΩ]		Measured [MΩ]		Dielectric breakdown?		-
4-2	12.9		>1000		No		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m². Area of the module is 3.11m².							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (after static mechanical load test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		07/11/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2762	-
Solution temperature [°C] / 22±2 .....:		23.1	-
Sample #	Required [MΩ]	Measured [MΩ]	-
4-2	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.6 Performance at STC (final, Gate #2) - MQT06.1/MST02							-
Test method .....:			☒ Simulator / ☐ Natural sunlight				-
Irradiance [W/m²].....:			1000				-
Module temperature [°C] .....:			25.0				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
4-2	45.48	37.21	18.42	17.19	639.6	76.35	-
Power degradation of each module after each test sequences							-

Sample #	Pmax (initial) [W]	Pmax (final) [W]	Reproducibility *r* [%]	Power degradation [%]	Maximum allowed degradation [%]	-
4-2	657.8	639.6	0.13	-2.77	-5.12	P
Supplementary information: According to Gate #2, Maximum allowed degradation [%] = -(5 + 0.95 x *r*)						

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.3 Insulation test (final) - MQT03/MST16				-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
4-2	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (final) - MQT15/MST17			-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		<3500	-
Solution temperature [°C] / 22±2 .....:		22±2	-
Sample #	Required [MΩ]	Measured [MΩ]	-
4-2	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA590-36V-MH (BOM5)

4.1 Visual inspection (initial) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	11/07/2023	-
Sample #	Nature and position of initial findings - comments or attach photos	-
5-1	No visual defects	P
5-2	No visual defects	P
Supplementary information: N/A		

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.19.5 Initial stabilization - MQT19.1							-
Sample #.....:			5-1				-
Light exposure method.....:			☒ Solar simulator / ☐ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			11/07/2023 - 11/10/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	580.9	-	-
1(P2)	5.0	927	50 ± 10	MPPT	580.0	-	-
2(P3)	5.0	919	50 ± 10	MPPT	580.6	0.16	Yes
Sample #.....:			5-1				-
Light exposure method.....:			☒ Solar simulator / ☐ Natural sunlight / ☐ Others				-
Test date [MM/DD/YYYY] / start - end .:			11/07/2023 - 11/10/2023				-
Test cycle	Integrated irradiation [kWh/m²]	Irradiance [W/m²]	Module temperature [°C]	Resistive load [Ω]	Pmax at the end of cycle [W]	(P_{max} - P_{min}) / $P_{average}$ [%]	Stable? [Y / N]
Initial(P1)	N/A	N/A	N/A	N/A	583.3	-	-
1(P2)	5.0	927	50 ± 10	MPPT	582.2	-	-
2(P3)	5.0	919	50 ± 10	MPPT	583.0	0.19	Yes
Supplementary information: N/A							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.6 Performance at STC (after initial stabilization, Gate #1) - MQT06.1/MST02							-
Test date [MM/DD/YYYY]:			11/10/2023				-
Test method:			☒ Simulator / ☐ Natural sunlight				-
Irradiance [W/m²]:			1000				-
Module temperature [°C]:			25.0				-
t1 [%]:			±3				-
Calculated $P_{max}(lab)$ lower limit for each individual sample [W]:			560.8				-
Calculated $\overline{P}_{max}(lab)$ lower limit for average of samples [W]:			578.2				-
t2 [%]:			±3				-
Calculated $V_{OC}(lab)$ upper limit for each individual sample [V]:			52.59				-
t3 [%]:			±3				-
Calculated $I_{SC}(lab)$ upper limit for each individual sample [A]:			14.85				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
5-1	52.33	44.79	13.63	12.96	580.6	81.42	P
5-2	52.35	45.11	13.58	12.92	583.0	82.03	P
Average	-	-	-	-	581.8	-	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.3 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		11/10/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
5-1	15.5	>1000	No	P
5-2	15.5	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.58m^2.				

IEC 61215-1 / EN IEC 61215-1, IEC 61215-1-1 / EN IEC 61215-1-1, IEC 61215-2 / EN IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict

4.15 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		11/10/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2097	-
Solution temperature [°C] / 22±2 .....:		23.3	-
Sample #	Required [MΩ]	Measured [MΩ]	-
5-1	15.5	>1000	P
5-2	15.5	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.58m^2.			

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict

Test results of IEC 61730-1 / EN IEC 61730-1

4 Classification, application and intended use			**-**
4.1 General			-
-	The module has been evaluated for the following Class (IEC 61140).....:	II	-
4.5 Intended use			-
PV modules are installed in the following special applications:			-
a)	Building attached PV (BAPV)	N/A	-
b)	Building integrated PV (BIPV)	N/A	-
c)	Applications in areas where snow and / or wind load exceeding loads as tested in IEC 61730-2 are expected	N/A	-
d)	Applications at environmental temperature exceeding the limits indicated in 5.1 of IEC 61730-1	N/A	-
e) - j)	Other (e to j as listed in 4.5 of IEC 61730-1, please specify)	N/A	-
Supplementary information: N/A			-

Remark:

Classification as in IEC 61730-1:

Class 0: Modules rated for use in this classification have individual and/or system level electrical outputs at hazardous levels of voltage, current and power. Class 0 PV modules are intended for use in restricted access areas that are protected from public access by fences or other measures of the location that prevent general access.

Class II: Modules rated for use in this classification II have individual and/or system level electrical outputs at hazardous levels of voltage, current and power. These PV modules are intended for installation where general user access and contact to insulated live parts is anticipated.

Class III: Modules rated for use in this classification shall not have electrical ratings greater than 240W where the open-circuit voltage does not exceed 35VDC and the short-circuit current does not exceed 8 A when tested under standard test conditions. These PV modules are intended for installation where general user access and contact to uninsulated live parts is anticipated.

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
5 Requirements for design and construction			**-**
5.1 General			**-**
-	All PV modules shall be suitable for operation in outdoor non-weather protected locations, exposed to direct and indirect (albedo) solar radiation, in an environmental temperature range of at least -40°C to +40°C and up to 100 % relative humidity as well as rain.	IEC 61215 and IEC 61730-2, all tests were passed.	P
-	A PV module can either be completely assembled when shipped from the factory, or be provided in subassemblies. The provided assemblies of the product shall not involve any action that is likely to affect compliance with the requirements of the IEC 61730 series. Incorporation of a PV module into the final assembly shall not require any alteration of the PV module from its originally evaluated form.	No assembly part is present.	N/A
-	The construction of a PV module shall be such that equipotential bonding continuity, if applicable, is not interrupted by installation	IEC 61730-2, MST 13 was passed	P
-	Any adjustable or movable structural part shall be provided with a locking device to reduce the likelihood of unintentional movement, if any such movement may result in a risk of fire, electric shock, or injury to persons.	No such part	N/A
-	PV modules shall not have accessible burrs, sharp edges or sharp points that can cause injury to users or service persons. Edges and points that appear to be sharp by inspection, shall comply with the sharp edge test (MST 06).	IEC 61730-2, MST06 test was passed.	P
-	Parts shall be prevented from loosening or turning if such loosening or turning may result in a risk of fire, electric shock, or injury to persons. Compliance for components is verified by specific tests described in the relevant standards or screw connection test (MST 33).	No such part	N/A

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.2 Marking and documentation			-
5.2.1 General			-
-	Instructions related to safety shall be in an official language of the country where the equipment is to be installed.	Installation manual with English.	P
5.2.2 Marking			-
5.2.2.1 General			-
Each PV module includes the following clear and indelible markings:			-
a)	Name, registered trade name, or registered trade mark of manufacturer	Written on the nameplate.	P
b)	Type or model number designation	Written on the nameplate.	P
c)	Serial number	Stuck beside the string connectors.	P
d)	Date and place of manufacture; alternatively serial number assuring traceability of date and place of manufacture	Traceable from serial number.	P
e)	Polarity of terminals or leads	Polarized by color / tag.	P
f)	“Maximum system voltage” or ”V_{sys}”	Written on the nameplate.	P
g)	Class of protection against electrical shock, in accordance with Clause 4 of IEC 61730-1:2016	Written on the nameplate.	P
h)	“Voltage at open-circuit” or “V_{oc}” including manufacturing tolerances	Written on the nameplate.	P
i)	“Current at short-circuit” or “I_{sc}” including manufacturing tolerances	Written on the nameplate.	P
j)	“PV module maximum power” or “P_{max}” including manufacturing tolerances	Written on the nameplate.	P
k)	“Maximum overcurrent protection rating” (compliance is verified by reverse current overload test (MST 26))	Written on the nameplate.	P
-	All electrical data shall be shown as relative to standard test conditions (STC: 1000W/m^2, 25±2°C, AM 1.5 according to IEC 60904-3).	Written on the nameplate.	P
-	International symbols shall be used where applicable.	Written on the nameplate.	P
-	PV connectors or wiring shall be marked in accordance to IEC 62852 with a symbol „Do not disconnect under load“, as given in Annex A. Symbol or warning notice shall be imprinted or labelled close to connector.	“Do not disconnect under load” is written on the connector.	P
-	PV connectors shall be clearly marked indicating the terminal polarity.	The terminal polarity is marked on the PV connectors.	P

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
-	For Class II and Class 0 PV modules, the folowing (IEC 60417-6042: Caution, risk of electric shock) symbol shall be applied near the PV module electrical connection means. 	Written on the nameplate.	P
-	PV modules shall be marked to indicate the class according to IEC 61730-I: 2016.	Written on the nameplate.	P
-	PV modules provided with a functional earth connection shall be provided with a symbol according to 5.2.2.2.2, Figure 3.	No functional earth connection	N/A
-	PV modules provided with terminals for field wiring rated only for use with copper wire shall be marked, at or adjacent to the terminals, with the statement "Use copper wire only", "Cu only", or the equivalent.	Not required	N/A
-	PV modules provided with terminals for field wiring rated only for use with a different specific wiring material shall be marked with a similar statement referring to the rated material.	Not required	N/A
5.2.2.2 Symbols			-
5.2.2.2.1 Equipotential bonding			-
-	A wiring terminal or bonding location of a PV module intended to accommodate a field installed bonding conductor for equipotential bonding is identified with the appropriate symbol IEC 60417-5021 (DB:2002-10) (Figure 2)). Alternatively IEC 60417-5017 (Figure 1) can be used. No other terminal or location shall be identified in this manner.	Printed on the frame	N/A
5.2.2.2.2 Functional earthing			-
-	A wiring terminal or bonding location of a PV module intended to accommodate a field installed functional earthing conductor is identified with the appropriate symbol (IEC 60417-5018 (DB: 2002-10) (Figure 3).	No Functional earthing	N/A
5.2.3 Documentation			-
-	PV modules shall be supplied with documentation describing the methods of electrical and mechanical installation as well as the electrical ratings of the PV module.	Written in installation manual.	P
-	The documentation shall state the Class under which the PV module was qualified and any specific limitations required for that Class.	Written in installation manual.	P
-	The documentation shall state the environmental conditions to which the module has been qualified which by default includes a temperature range of -40°C to +40°C.	Written in installation manual.	P

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
-	The documentation shall state the environmental conditions to which the module has been qualified which by default includes wind / snow load including safety factor.	Written in installation manual.	P
-	It shall be ensured that appropriate documentation for safe installation, use, and maintenance is available to installers and operators.	Written in installation manual.	P
The documentation shall contain the following information:			-
-	All information required by 5.2.2.1 with exception of c), d) and e)	See above	P
-	Recommended maximum series / parallel PV module configurations	Written in installation manual.	P
-	The current rating of overcurrent protection, as determined in MST 26	Written on the nameplate.	P
-	Manufacturer's stated tolerance for V_{oc}, I_{sc} and maximum power output P_{max} under standard test conditions	Written on the nameplate.	P
-	Temperature coefficient for voltage at open-circuit.	Written in installation manual.	P
-	Temperature coefficient for maximum power.	Written in installation manual.	P
-	Temperature coefficient for short-circuit current.	Written in installation manual.	P
-	All electrical data shall be shown as relative to standard test conditions (1000 W/m^2, (25 $\pm$ 2)°C, AM 1.5 according to IEC 60904-3).	Written on the nameplate.	P
-	International symbols shall be used where applicable.	Written on the nameplate.	P
The electrical documentation shall include a detailed description of the electrical installation wiring method to be used. This description shall include:			-
-	The minimum cable diameters for PV modules intended for field wiring	Written in installation manual.	P
-	Any limitations on wiring methods and wire management that apply to the junction box for the PV module	Written in installation manual.	P
-	The size, type, material, and temperature rating of the conductors to be used	Written in installation manual.	P
-	Type of terminals for field wiring	Written in installation manual.	P
-	Specific PV connector model / types and manufacturer to which the PV module connectors can be mated	Written in installation manual.	P
-	The bonding method(s) to be used (if applicable) shall be specified. All provided or specified hardware shall be identified in the documentation.	Written in installation manual.	P
-	The type and ratings of bypass diode to be used (if applicable)	Written in installation manual.	P
-	Limitations to the mounting situation (e.g. slope,	Written in installation manual.	P

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	mounting means, cooling)		
-	A statement indicating the fire rating(s) and the applied standard, or a statement that resistance to external fire sources was not evaluated, as well as the limitations to that rating (e.g. installation slope, sub structure or other applicable installation information)	Written in installation manual.	P
-	A statement indicating the minimum mechanical means for securing the PV module (as evaluated during the mechanical load test (MST 34))	Written in installation manual.	P
-	A statement indicating the maximum altitude the PV module is designed for. De-ratings can be applied.	Written in installation manual.	P
The documentation for roof mounting shall include:			-
-	A statement indicating the minimum mechanical means for securing the PV module to the roof (as evaluated during the mechanical load test according (MST 34)	Written in installation manual.	P
-	Details of the specific parameter(s) when the fire rating is dependent on a specific mounting structure, specific spacing, or specific means of attachment to the roof or structure.	Written in installation manual.	P
-	The documentation shall include a statement advising that external or otherwise artificially concentrated sunlight shall not be directed onto the front or back face of the PV module (if not qualified for).	Written in installation manual.	P
-	Assembly instructions shall be provided with a product shipped in subassemblies, and shall be detailed and adequate to the degree required to facilitate complete and safe assembly of the product to specifications set forth in the IEC 61730 standard series.	Not applicable	N/A
-	To facilitate proper system sizing the manufacturer shall include relevant parameters in the installation instructions that allow system layout based not only on STC values given in the documentation. For example a safety factor for V_{oc} and I_{sc} of 1.25 is recommended since irradiance is often higher then 1000 W/m^2 and temperature below 25°C may raise V_{oc}. A statement as suggested in IEC 61730:2016 is recommended.	Written in installation manual.	P

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.3 Electrical components and insulation			-
5.3.2 Internal wiring			-
-	Internal wiring shall have sufficient current carrying capacity for the relevant application.	Cable was certified according to EN 50618	P
5.3.4 Connectors			-
-	External DC connectors shall fulfil the requirements of IEC 62852.	Connector was certified according to IEC 62852.	P
5.3.5 Junction boxes for PV modules			-
-	Junction boxes for PV modules shall fulfil the requirements of IEC 62790.	Junction box was certified according to IEC 62790.	P
5.3.6 Frontsheets and backsheets			-
-	Polymeric frontsheets and backsheets shall meet relevant requirements of section 5.5.2	Relevant test of IEC 61730-2 was passed.	P
-	If these sheets are used as relied upon insulation they shall fulfil requirements of 5.6.4.3 and 5.5.2.3 for insulation in thin layers	Relevant test of IEC 61730-2 was passed.	P
5.3.7 Insulation barriers			-
-	A polymeric insulation barrier shall meet the relevant requirements of 5.5.2	Relevant test of IEC 61730-2 was passed.	P
5.3.8 Electrical connections			-
5.3.8.1 General			-
-	External wires and cables shall fulfil the requirements of EN 50618 or IEC 62930.	Cable was certified according to EN 50618	P
-	External DC connectors shall fulfil the requirements of IEC 62852.	Connectors was certified according to IEC 62852.	P
-	Junction boxes for PV modules shall fulfil the requirements of IEC 62790.	Junction box is certified according to IEC 62790.	P
-	Prevention shall be taken that connections do not become loose, e.g. by using a washer.	No such terminal.	N/A
-	Precautions shall be taken that under operation clamping units or other terminations are prevented from thermal and mechanical stress which might impair electrical conductivity.	No such terminal.	N/A
5.3.8.2 Terminals for external cables and PV connector ribbons			-
-	Terminals for electrical connections shall be suitable for the type and range of conductor cross-sectional areas according to specification of the manufacturer. They shall meet the requirements of IEC 62790.	Junction box is certified according to IEC 62790.	P
-	Insulated terminals shall be designed in a manner where a possible displacement that may result in a reduction of clearances and creepage distances is prevented.	Junction box is certified according to IEC 62790.	P

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.3.8.3 Splices and connections inside a PV module			-
-	Splices and connections inside a PV module other than those for terminals of external cables and PV connector ribbons shall be mechanically secured and shall provide electrical continuity. Electrical connections shall be soldered, welded, conductively adhered, crimped, or otherwise securely connected. A soldered or conductively adhered joint shall be additionally mechanically secured.	No splice. Electrical connections is soldered.	P
5.3.9 Encapsulants			-
a)	The rated operating temperature range of the encapsulant shall include the temperature range of the intended application.	Relevant test of IEC 61730-2 was passed.	P
b)	The material group, the insulation resistance and the dielectric strength of the encapsulant shall be suitable for the intended application.	Relevant test of IEC 61730-2 was passed.	P
5.3.10 Bypass diodes			-
-	Bypass diodes shall be rated to withstand the current and voltage for their intended use.	IEC 61730-2, MST25 test was passed.	P

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.4 Mechanical and electromechanical connections			-
5.4.1 General			-
-	Mechanical connections shall be able to durably withstand the thermal, mechanical, and environmental stresses occurring in the application without decreasing the integrity of the connection below safe levels.	Connections are mechanically secure.	P
-	Parts intended to be removed shall only be detachable with the aid of tools.	No such part.	N/A
-	For mechanical connections friction between surfaces, such as simple spring pressure, is not acceptable as the sole means to inhibit the turning or loosening of a part.	No such part.	N/A
5.4.2 Screw connections			-
-	Screws and mechanical connections, the failure of which might cause the PV module to become unsafe, shall withstand the mechanical stresses occurring in normal use. Screws shall not be made of a material which is soft or liable to creep.	No screw is used.	N/A
-	Screws used to provide mechanical stability and continuity for equipotential bonding, e.g. fixing screws in frames and other components, shall withstand the mechanical stresses occurring in normal use. At least one screw per electrical- mechanical connection shall ensure the electrical connection between the metallic components.	No screw is used.	N/A
-	Screws used for mechanical and electrical connections with a nominal diameter of less than 3 mm shall screw into metal.	No screw is used.	N/A
-	For screws used for mechanical and electrical connections two full threads shall engage into the metal.	No screw is used.	N/A
-	Screwed and other fixed connections between different parts of the PV module shall be made in such a way that they do not come loose through torsion, bending stresses, vibration, etc., as may occur in normal use.	No screw is used.	N/A
5.4.3 Rivets			-
-	Rivets which serve as electrical as well as mechanical connections are locked against loosening. A noncircular shank or an appropriate notch may be sufficient.	No rivets is used.	N/A

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.4.4 Thread-cutting screws			-
-	Thread-cutting screws and self-tapping screws shall not be used for the interconnection of current-carrying parts made of metal which is soft or liable to creep, such as zinc or aluminium.	No screw is used.	N/A
	Thread-forming screws (sheet metal screws) shall not be used for the connection of cur3rent-carrying part, unless they clamp these parts directly in contact with each other, and are provided with suitable locking means.	No screw is used.	N/A
	Thread-cutting (self-tapping) screws shall not be used for the connection of current-carrying parts unless they generate a full form standard machine screw thread. However, screws of the latter type shall not be used if they are likely to be operated by the user or installer	No screw is used.	N/A
	Threat-cutting and threat-forming screws, used to provide continuity for equipotential bonding, shall be such that it is not necessary to disturb the connection in normal use.	No screw is used.	N/A
	For equipotential bonding one screw is permitted if two full threads engaged the metal.	No screw is used.	N/A
5.4.5 Form/press / tight fit			-
-	Form/press/tight fits of metallic components not separately equipotential bonded need to be electrically connected.	No such part	N/A
5.4.6 Connections by adhesives			-
-	Adhesion of a polymer relied upon for insulation to another insulating layer shall be appropriate for the application.	No such part	N/A
-	If the connection by adhesive should be considered as cemented joint the requirements according to 5.6.4.2 shall be applied.	No such part	N/A
5.4.7 Other connections			-
-	Other connections such as, for example, welded or soldered, were investigated by visual inspection (MST 01). Other connections which are relied upon for equipotential bonding were checked with test of continuity of equipotential bonding (MST 13). Materials and processes for creating the connections shall be appropriate for the intended use.	No such part	N/A

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.5 Materials			-
5.5.2 Polymeric materials			-
5.5.2.1 General			-
-	Polymeric parts which ensure either the electrical or mechanical safety of the PV module, or both, shall be resistant to electrical and mechanical property degradation and shall apply with the requirement of the materials creep test (MST37) depending on their constructive function in the PV module.	Relevant tests of IEC 61730-2 were passed.	P
5.5.2.3 Polymeric materials used as electrical insulation			-
5.5.2.3.3 Endurance to thermal stress - RTE(RTI) or TI (mechanical / electrical)			-
-	Materials used as relied upon insulation shall have a minimum relative thermal endurance, relative thermal index or temperature index (RTE/RTI or TI) in accordance with IEC 60216-5 or IEC 60216-1 equal to or greater than the maximum normalized operating temperature of the material as measured in the particular mounting situation (e.g. roof mounted) during the temperature test (MST 21), or 90 °C, whichever is higher.	RTE/RTI or TI of backsheet is above the test values during the temperature test (MST 21), or above 90 °C, whichever is higher.	P
5.5.2.3.4 Polymeric insulating materials used as external parts			-
External polymeric parts of the PV module whose deterioration could impair the safety shall meet the following additional requirements:			-
a)	Flammability class minimum V-1 according to IEC 60695-11-10 (not applicable to insulation in thin layers; those are covered only by MST 24)	Not applicable.	N/A
b)	Ball pressure test according to IEC 60695-10-2 with a temperature of 75 °C (not applicable to insulation in thin layers)	Not applicable.	N/A
c)	Ignitability test (MST 24) in final application (laminated or the PV module)	IEC 61730-2 MST24 was passed.	P
d)	Peel test for proof of cemented joints according to IEC 61730-2 (MST 35), where applicable.	Not applicable.	N/A
e)	Lap shear strength test (MST 36), where applicable.	Not applicable.	N/A
5.5.2.3.5 Polymeric insulating parts supporting live parts			-
-	External parts of non-metallic material, parts of insulating material supporting live parts including connections, and parts of polymeric material providing supplementary insulation or reinforced insulation, shall be sufficiently resistant to heat if their deterioration could cause the PV module to fail to comply with this standard.	Yes	P

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.5.2.4 Polymeric materials used for mechanical functions			-
-	Materials used for mechanical functions shall have a minimum mechanical relative thermal endurance, relative thermal index or temperature index (RTE/RTI or TI) equal or greater than the max. normalized operating temperature of the material as measured in the particular mounting situation during temperature test (MST21), or 90°C, whichever is higher.	Yes	P
5.5.3 Metallic materials			-
5.5.3.1 General			-
-	In accordance with IEC 60950-1 metal parts designed for applications in climates with wet or humid ambient conditions shall not be in contact to metal parts that have a difference of their electrochemical potentials of more than 600 mV. Larger electrochemical potential differences are permissible if the contact points of these materials are designed to remain dry.	The frame is Anodized aluminum alloy. Relevant tests of IEC 61730-2 were passed.	P
-	Iron or mild steel as a part of the product shall be plated, painted, or enamelled for protection against corrosion. The corrosion protection at a minimum shall be at least equivalent to a zinc coating of 0.015 mm thickness.	Relevant tests of IEC 61730-2 were passed.	P
5.5.3.2 Current carrying parts			-
-	Under normal operation current-carrying parts shall have a sufficient mechanical strength and electrical conductivity. If environmental conditions may cause corrosion current-carrying materials (metal, polymeric based, etc.) shall be protected against corrosion, e.g. by coating.	Relevant tests of IEC 61730-2 were passed.	P
-	In case of current-carrying parts consisting of corrosion protective coated metal the coating shall be capable of preventing corrosion according to either one of ISO 1456, ISO 1461, ISO 2081 or ISO 2093. If the current-carrying parts may be stressed by abrasion, coated metal parts are not allowed.	Relevant tests of IEC 61730-2 were passed.	P
5.5.4 Adhesives			-
-	Adhesives shall be appropriate for the application. Compliance is checked by relevant tests of IEC 61730-2, including lap shear strength test (MST 36), peel test (MST 35), robustness of terminations test (MST 42), mechanical load test (MST 34), and visual inspection (MST 01), accessibility test (MST 11), wet leakage current test (MST 17) pre- and post-test sequences, where applicable.	Relevant tests of IEC 61730-2 were passed.	P
-	Additionally, if an adhesive is part of the relied upon electrical insulation it has to meet the requirements of 5.5.2.3.3.	Relevant tests of IEC 61730-2 were passed.	

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.6 Protection against electric shock			-
5.6.1 General			-
-	PV modules shall be provided with adequate protection against contact with hazardous live parts and shall pose no risk of electric shock.	Relevant tests of IEC 61730-2 were passed.	P
5.6.2 Protection against accessibility to hazardous live parts			-
5.6.2.1 General			-
-	PV modules shall be constructed to provide adequate protection against accessibility to hazardous live parts (>35V DC).	Relevant tests of IEC 61730-2 were passed.	P
-	For Class 0 PV modules, accessible parts shall be separated from hazardous live parts by at least basic insulation. Compliance is checked by visual inspection (MST 01) and by accessibility test (MST 11).	Not applicable.	N/A
-	Class II PV modules shall be so constructed and enclosed that only parts separated from hazardous live parts by double or reinforced insulation are accessible. Compliance is checked by visual inspection (MST 01) and by accessibility test (MST 11).	Class II, compliance is checked by visual inspection (MST 01) and by accessibility test (MST 11).	P
-	In Class III PV modules live parts are not considered as hazardous, so a separation from accessible parts is not needed. To ensure sufficient functionality and protection against hazardous lighting arc, live parts of different polarity shall be separated by at least functional insulation. Compliance is checked by visual inspection (MST 01) and by accessibility test (MST 11).	Not applicable.	N/A
-	Materials used for realizing protection against accessibility of hazardous live parts by means of enclosure, insulation barrier or relied upon insulation shall comply with the requirements of 5.5.2 due to their application.	Relevant tests of IEC 61730-2 were passed.	P
5.6.2.2 Protection by means of enclosures and insulation barriers			-
-	Enclosures or insulation barriers shall be so designed that, after mounting, the live parts are not accessible.	Relevant tests of IEC 61730-2 were passed.	P
5.6.2.3 Protection by means of insulation of live parts			-
-	An insulation material providing the sole insulation between a live part and an accessible metal part, or between uninsulated live parts not of the same potential, shall be of adequate thickness and of a material appropriate for the application.	Relevant tests of IEC 61730-2 were passed.	P

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.6.3 Insulation coordination			-
5.6.3.1 General			-
-	Position	Edge of module	-
5.6.3.2 Pollution degree			-
-	Pollution degree	1	-
5.6.3.3 Material group			-
-	Material group	I	-
5.6.3.4 Clearances (cl) and creepage distances (cr)			-
-	Min. determined creepage distance	13.5 mm	P
-	The module type has been evaluated for the following system voltage .....:	Vsys = 1500V	-
-	The modules are intended for a maximum operating altitude (meters above sea level) of [m] .....:	2000	-
5.6.4 Distance through insulation (dti)			-
5.6.4.1 General			-
-	The solid insulation properties of polymeric materials were verified through the tests outlined in IEC 61730-2.	Relevant tests of IEC 61730-2 were passed.	P
-	The distances through insulation (dti) are required for supplementary, double or reinforced insulation only as shown in lines 4 of Table 3 and 4 of IEC 61730-1	N/A	N/A
-	Polymeric materials for cemented insulation parts and insulation in thin layers shall withstand environmental, thermal, electrical and mechanical stresses as far as they occur. They shall comply with requirements according to 5.5.2 The insulation shall fulfil the material classification as given in IEC 60216-1, IEC 60216-2 and IEC 60216-5 (RTI/RTE/TI).	Relevant tests of IEC 61730-2 were passed.	P
5.6.4.2 Cemented joints			-
-	Cemented joints were considered	No	N/A
5.6.4.3 Insulation in thin layers			-
-	Thickness of relied upon insulation was checked by insulation thickness test (MST 04) in final application.	Relevant tests of IEC 61730-2 were passed.	P

IEC 61730-1 / EN IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
a)	Single-layer sheet - Minimum thickness according to lines 1b) of Table 3 and Table 4, as applicable depending on class (see table 1). Exception: The minimum thickness for a single layer is 30µm, even for system voltages < 600 V, since pinholes may be present. For thicknesses < 30µm a multilayer concept shall be adopted to mitigate risk. - RTI / RTE / TI as defined in 5.5.2.3.3. - Dielectric strength for reinforced insulation.	No such part	N/A
b)	Multi-layer sheets - The sum of thickness of all layers providing relied upon insulation shall be in compliance with values according to lines 1b) of Table 3 and Table 4, as applicable depending on class (see table 1). Each layer of a multi-layer (e.g. 2 layers, see Figure 4, example b1) and b2)) sheet providing relied upon insulation shall meet the following requirements: - RTI / RTE / TI as defined in 5.5.2.3.3. - Dielectric strength for basic insulation. If single layers are not characterized individually the following applies: The combined thickness of all layers (more and including 2 layers, see Figure 4, example b1), b2) and c)) providing relied upon insulation shall be in compliance with values according to Table 3 and Table 4 as applicable depending on class (see Table 1). RTI / RTE / TI shall be determined in the full layer stack or each layer providing relied upon insulation shall meet RTI / RTE / TI as defined in 5.5.2.3.3. Any changes in the stack or application require a new RTI / RTE / TI evaluation. Dielectric strength of entire multi-layer sheet providing relied upon insulation shall fulfill requirements for reinforced insulation.	Relevant tests of IEC 61730-2 were passed.	P
Supplementary information: N/A			

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Test results of IEC 61730-2 / EN IEC 61730-2

Module type: ODA590-39V-MH (BOM1)

10.2 Visual inspection (initial) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	09/27/2022	-
Sample #	Nature and position of initial findings - comments or attach photos	-
1	No visual defects	P
2	No visual defects	P
3	No visual defects	P
4	No visual defects	P
6	No visual defects	P
8	No visual defects	P
10	No visual defects	P
11	No visual defects	P
12	No visual defects	P
13	No visual defects	P
14	No visual defects	P
15	No visual defects	P
16	No visual defects	P
17	No visual defects	P
18	No visual defects	P
19	No visual defects	P
20	No visual defects	P
21	No visual defects	P
22	No visual defects	P
23	No visual defects	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.4 Maximum power determination (initial) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			09/27/2022				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
2	54.67	45.64	13.82	12.94	590.6	78.15	-
3	54.43	44.97	13.77	13.03	585.9	78.20	-
4	54.40	44.96	13.85	13.06	587.2	77.92	-
6	54.67	45.47	13.75	12.97	589.7	78.47	-
8	54.48	44.75	13.73	13.07	584.9	78.18	-
10	54.87	45.40	13.76	12.97	588.8	77.99	-
11	54.77	45.37	13.73	12.95	587.6	78.14	-
12	54.76	45.03	13.79	13.07	588.5	77.96	-
13	54.78	44.89	13.72	13.07	586.7	78.05	-
14	54.70	45.51	13.79	12.99	591.1	78.35	-
17	54.76	45.33	13.78	13.00	589.3	78.10	-
18	54.70	45.42	13.74	12.96	588.7	78.33	-
19	54.65	45.29	13.76	13.00	588.7	78.30	-
Supplementary information: N/A							

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.13 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		09/27/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
2	14.3	>1000	No	P
3	14.3	>1000	No	P
4	14.3	>1000	No	P
6	14.3	>1000	No	P
8	14.3	>1000	No	P
10	14.3	>1000	No	P
11	14.3	>1000	No	P
12	14.3	>1000	No	P
13	14.3	>1000	No	P
14	14.3	>1000	No	P
17	14.3	>1000	No	P
18	14.3	>1000	No	P
19	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.14 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		09/27/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		<3500	-
Solution temperature [°C] / 22±2 .....:		21.2	-
Sample #	Required [MΩ]	Measured [MΩ]	-
2	14.3	>1000	P
3	14.3	>1000	P
4	14.3	>1000	P
4	14.3	>1000	P
6	14.3	>1000	P
8	14.3	>1000	P
10	14.3	>1000	P
11	14.3	>1000	P
12	14.3	>1000	P
13	14.3	>1000	P
17	14.3	>1000	P
18	14.3	>1000	P
19	14.3	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.11 Continuity test of equipotential bonding (initial) - MST13				-
Test date [MM/DD/YYYY].....:		09/27/2022		-
Current applied [A] .....:		62.5		-
Location of designated grounding point :		The ground hole of one longer side		-
Location of second contacting point .....:		A: The center of another longer side B: Adjacent shorter side with greatest distance from the grounding point C: Another adjacent shorter side with greatest distance from the grounding point		-
Sample #	Required resistance [Ω]	Measured voltage [V]	Calculated resistance [Ω]	-
4	<0.1	A: 0.034 B: 0.020 C: 0.026	A: 0.001 B: 0.001 C: 0.001	P
6	<0.1	A: 0.041 B: 0.037 C: 0.021	A: 0.001 B: 0.001 C: 0.001	P
8	<0.1	A: 0.041 B: 0.037 C: 0.019	A: 0.001 B: 0.001 C: 0.001	P
10	<0.1	A: 0.036 B: 0.026 C: 0.021	A: 0.001 B: 0.001 C: 0.001	P
11	<0.1	A: 0.033 B: 0.043 C: 0.032	A: 0.001 B: 0.001 C: 0.001	P
12	<0.1	A: 0.031 B: 0.023 C: 0.035	A: 0.001 B: 0.001 C: 0.001	P
13	<0.1	A: 0.030 B: 0.020 C: 0.042	A: 0.001 B: 0.001 C: 0.001	P
17	<0.1	A: 0.020 B: 0.039 C: 0.033	A: 0.001 B: 0.001 C: 0.001	P
18	<0.1	A: 0.038 B: 0.019 C: 0.030	A: 0.001 B: 0.001 C: 0.001	P
19	<0.1	A: 0.038 B: 0.034 C: 0.019	A: 0.001 B: 0.001 C: 0.001	P

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information: N/A

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.9 Accessibility test (initial) - MST11		-
Test date [MM/DD/YYYY].....:	09/27/2022	-
Sample #	Requirements	-
4	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
6	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
8	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
10	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
11	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
12	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
13	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
17	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
18	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
19	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.15 Temperature test - MST21				-
Sample #.....:		14		-
Test date [MM/DD/YYYY].....:		10/08/2022		-
Reference solar irradiance [W/m²].....:		1000		-
Reference ambient temperature [°C]....:		40		-
Spacing between module and black test platform [cm] .....:		0		-
Measuring location.....:		A: Module superstrate above the center cell B: Module substrate below the center cell C: Terminal enclosure interior surface D: Terminal enclosure interior air space E: Field wiring terminals F: Insulation of the field wiring leads G: External connector bodies H: Diode bodies I: The boundary between frame and silica gel J: Ambient temperature		-
Measuring location	Component temperature limit [°C]	Component temperature T_{OBS} [°C]	Normalized temperature T_{CON} [°C]	-
A	N/A	72.3	72.8	N/A
B	120	72.8	73.3	P
C	120	69.9	70.4	P
D	N/A	N/A	N/A	N/A
E	120	77.2	77.7	P
F	120	69.6	70.1	P
G	120	69.8	70.3	P
H	200	77.8	78.3	P
I	N/A	N/A	N/A	N/A
J	20 - 55	39.5	40.0	P
Supplementary information: $T_{CON} = T_{OBS} + (40\ °C - T_{ENV})$, Solar simulator method used.				
10.2 Visual inspection (after temperature test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		10/08/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
14	No visual defects			P
Supplementary information: N/A				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.13 Insulation test (after temperature test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		10/08/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
14	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m2. Area of the module is 2.80m^2.				
10.14 Wet leakage current test (after temperature test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		10/08/2022		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		<3500		-
Solution temperature [°C] / 22±2 .....:		23.4		-
Sample #	Required [MΩ]	Measured [MΩ]		-
14	14.3	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.20 Reverse current overload test - MST26				-
Sample #.....:		14		-
Test date [MM/DD/YYYY].....:		10/11/2022		-
Module over-current protection rating [A] .....:		25		-
Ambient air temperature [°C] / 23±5 .....:		25.3 - 25.0		-
Step 1, determination of hottest point(s)				-
Current applied[A] .....:		33.75		-
Voltage applied[V] / high - low .....:		56.3 - 52.1		-
Test duration [hour] .....:		1		-
Step 2, reverse current overload test of hottest point(s)				-
Current applied[A] .....:		33.75		-
Voltage applied[V] / high - low .....:		56.7 - 53.1		-
Test duration [hour] .....:		1		-
The maximum external module surface temperature [°C].....:		137.3		-
Sample #	Requirements			-
14	☒ No flaming of the module ☒ No flaming or charring of the tissue paper ☒ The maximum external module surface temperature shall not exceed 150 °C			P
Supplementary information: This test is conducted with the significant technical change that the IEC TC82 latest draft of IEC 61730-2.				
10.2 Visual inspection (after reverse current overload test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		10/11/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
14	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after reverse current overload test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		10/11/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
14	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m2. Area of the module is 2.80m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.14 Wet leakage current test (after reverse current overload test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		10/11/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		<3500	-
Solution temperature [°C] / 22±2 .....:		22.0	-
Sample #	Required [MΩ]	Measured [MΩ]	-
14	15.5	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.12 Impulse voltage test - MST14				-
Test date [MM/DD/YYYY].....:		10/08/2022		-
Maximum system voltage [V].....:		1500		-
Maximum impulse voltage [V].....:		16000		-
Thickness of conductive foil [mm].....:		0.05		-
Sample #	Requirements			-
15	☒ No evidence of dielectric breakdown or surface tracking observed			P
Supplementary information: N/A				
10.2 Visual inspection (after impulse voltage test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		10/08/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
15	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after impulse voltage test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		10/08/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
15	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.21 Module breakage test - MST32		-
Test date [MM/DD/YYYY].....:	10/20/2022	-
Weight of impactor [kg].....:	45.5	-
Thickness of module [mm] .....:	30	-
Mounting technique used .....:	Mounting with 6 clamps	-
Module Breakage? .....:	☒ No breakage ☐ Broke at 300mm	-
Weight of particles in case of breakage [g].....:	N/A	-
Sample #	Requirements	-
16	☒ The module did not separate from the mounting structure or framing ☒ The sample did not break ☐ Breakage occurred, but no shear or opening large enough for a 76 mm diameter sphere to pass freely has developed. ☐ Breakage occurred, but no particles larger than 65 cm² have been ejected from the sample.	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.26 Materials creep test - MST37				-
Sample #.....:		17		-
Test date [MM/DD/YYYY] / start - end..:		10/18/2022 - 10/27/2022		-
Applied temperature [°C].....:		105		-
Relative humidity [%].....:		<50		-
Mounting angle [°].....:		90		-
Test time [hour].....:		200		-
Supplementary information: N/A				
10.2 Visual inspection (after materials creep test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		10/27/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
17	No visual defects			P
Supplementary information: Creepage distance and clearances after the test met the requirement specified in Table 3 of IEC 61730-1:2016				
10.13 Insulation test (after materials creep test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		10/27/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
17	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				
10.14 Wet leakage current test (after materials creep test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		10/27/2022		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		<3500		-
Solution temperature [°C] / 22±2 .....:		22.9		-
Sample #	Required [MΩ]	Measured [MΩ]		-
17	14.3	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

IEC 61730-2 / EN IEC 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
10.11 Continuity test of equipotential bonding (after materials creep test) - MST13				-
Test date [MM/DD/YYYY].....:		10/27/2022		-
Current applied [A] .....:		62.5		-
Location of designated grounding point :		The ground hole of one longer side		-
Location of second contacting point .....:		A: The center of another longer side B: Adjacent shorter side with greatest distance from the grounding point C: Another adjacent shorter side with greatest distance from the grounding point		-
Sample #	Required resistance [Ω]	Measured voltage [V]	Calculated resistance [Ω]	-
17	<0.1	A: 0.029 B: 0.023 C: 0.039	A: 0.001 B: 0.001 C: 0.001	P
Supplementary information: N/A				
10. 9 Accessibility test (after materials creep test) - MST11				-
Test date [MM/DD/YYYY].....:		10/27/2022		-
Sample #	Requirements			-
17	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.			P
Supplementary information: N/A				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.30 Damp heat test - MQT13/MST53				-
Sample #.....:		18		-
Test date [MM/DD/YYYY] / start - end..:		09/30/2022 - 10/08/2022		-
Total hours [hours] .....:		200		-
Supplementary information: N/A				
10.2 Visual inspection (after damp heat 200 test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		10/08/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
18	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after damp heat 200 test) - MQT13/MST16				-
Test date [MM/DD/YYYY].....:		10/08/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
18	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.31 UV test (front side) - MQT10/MST54				-
Sample #.....:		18		-
Test date [MM/DD/YYYY] / start - end..:		10/11/2022 - 10/28/2022		-
Total dosage of UV irradiation (280-400nm) [kWh/m^2].....:		60.0		-
Module operation condition .....:		☒ Short circuited / ☐ Pmax		-
Supplementary information: N/A				
10.2 Visual inspection (after UV test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		10/28/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
18	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after UV test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		10/28/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
18	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

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Clause	Requirement + Test	Result - Remark	Verdict

10.29 Humidity freeze 10 test (1st round) - MQT12/MST52				-
Test date [MM/DD/YYYY] / start - end..:		10/31/2022 - 11/11/2022		-
Total cycles .....:		10		-
Current applied [A] .....:		0.05		-
Sample #	Open circuits?			-
18	No			P
Supplementary information: N/A				
10.2 Visual inspection (after humidity freeze 10 test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		11/11/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
18	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after humidity freeze 10 test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		11/11/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
18	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

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Clause	Requirement + Test	Result - Remark	Verdict

10.31 UV test (back side) - MQT10/MST54				-
Sample #.....:		18		-
Test date [MM/DD/YYYY] / start - end..:		11/14/2022 - 11/30/2022		-
Total dosage of UV irradiation (280-400nm) [kWh/m^2].....:		60.0		-
Module operation condition .....:		☒ Short circuited / ☐ Pmax		-
Supplementary information: N/A				
10.2 Visual inspection (after UV test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		11/30/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
18	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after UV test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		11/30/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
18	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

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Clause	Requirement + Test	Result - Remark	Verdict

10.29 Humidity freeze 10 test (2nd round) - MQT12/MST52				-
Test date [MM/DD/YYYY] / start - end..:		12/10/2022 - 12/20/2022		-
Total cycles .....:		10		-
Current applied [A] .....:		0.04		-
Sample #	Open circuits?			-
18	No			P
Supplementary information: N/A				
10.2 Visual inspection (after humidity freeze 10 test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		12/20/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
18	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after humidity freeze 10 test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		12/20/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
18	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.58m^2.				
10.14 Wet leakage current test (after humidity freeze 10 test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		12/20/2022		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		<3500		-
Solution temperature [°C] / 22±2 .....:		22.1		-
Sample #	Required [MΩ]	Measured [MΩ]		-
18	14.3	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

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Clause	Requirement + Test	Result - Remark	Verdict

10.32 Cold conditioning test (1st round) - MST55				-
Sample #.....:		19		-
Test date [MM/DD/YYYY] / start - end..:		09/28/2022 - 09/30/2022		-
Applied temperature [°C].....:		-40		-
Test time [hour].....:		48		-
Supplementary information: N/A				
10.2 Visual inspection (after cold conditioning test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		09/30/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
19	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after cold conditioning test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		09/30/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
19	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

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Clause	Requirement + Test	Result - Remark	Verdict

10.33 Dry heat conditioning test - MST56				-
Sample #.....:		19		-
Test date [MM/DD/YYYY] / start - end..:		10/05/2022 - 10/15/2022		-
Applied temperature [°C].....:		105		-
Relative humidity [%].....:		<50		-
Test time [hour] .....:		200		-
Supplementary information: N/A				
10.2 Visual inspection (after dry heat conditioning test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		10/15/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
19	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after dry heat conditioning test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		10/15/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
19	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

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Clause	Requirement + Test	Result - Remark	Verdict

10.29 Humidity freeze 10 test (1st round) - MQT12/MST52				-
Test date [MM/DD/YYYY] / start - end..:		10/19/2022 - 10/29/2022		-
Total cycles .....:		10		-
Current applied [A] .....:		0.05		-
Sample #	Open circuits?			-
19	No			P
Supplementary information: N/A				
10.2 Visual inspection (after humidity freeze 10 test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		10/29/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
19	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after humidity freeze 10 test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		10/29/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
19	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

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Clause	Requirement + Test	Result - Remark	Verdict

10.32 Cold conditioning test (2nd round) - MST55				-
Sample #.....:		19		-
Test date [MM/DD/YYYY] / start - end..:		10/31/2022 - 11/02/2022		-
Applied temperature [°C].....:		-40		-
Test time [hour].....:		48		-
Supplementary information: N/A				
10.2 Visual inspection (after cold conditioning test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		11/02/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
19	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after cold conditioning test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		11/02/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
19	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

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Clause	Requirement + Test	Result - Remark	Verdict

10.29 Humidity freeze 10 test (2nd round) - MQT12/MST52				-
Test date [MM/DD/YYYY] / start - end..:		11/06/2022 - 11/16/2022		-
Total cycles .....:		10		-
Current applied [A] .....:		0.04		-
Sample #	Open circuits?			-
19	No			P
Supplementary information: N/A				
10.2 Visual inspection (after humidity freeze 10 test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		11/16/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
19	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after humidity freeze 10 test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		11/16/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
19	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				
10.14 Wet leakage current test (after humidity freeze 10 test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		11/16/2022		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		<3500		-
Solution temperature [°C] / 22±2 .....:		20.5		-
Sample #	Required [MΩ]	Measured [MΩ]		-
19	14.3	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.				

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Clause	Requirement + Test	Result - Remark	Verdict

10.2 Visual inspection (final, after 48-96h wait time) - MQT01/MST01		-
Sample #	Nature and position of initial findings - comments or attach photos	-
4	No visual defects	P
6	No visual defects	P
8	No visual defects	P
18	No visual defects	P
19	No visual defects	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

10.17 Fire test - MST23			-
Test date [MM/DD/YYYY].....:		10/22/2022	-
Standard applied .....:		UL 1703, Class C	-
No. of modules provided to create the test assembly .....:		2 for spread of flame test 1 for burning brand test	-
Sample #	Requirements		-
20	☒ Modules comply with the requirements for the fire test according to above noticed standard		P
21			
22			
Supplementary information: This test is subcontracted to CTC. Please refer to Annex 5 for detailed pictures of the samples after test.			

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Clause	Requirement + Test	Result - Remark	Verdict

10.18 Ignitability test - MST24		-
Test date [MM/DD/YYYY].....:	10/21/2022	-
Standard applied .....:	ISO 11925-2:2010	-
Sample #	Requirements	-
23	☒ No ignition of module ☒ No flame spread > 150 mm vertically from point of test flame application	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

10.10 Cut susceptibility test - MST12				-
Test date [MM/DD/YYYY].....:		11/10/2022 for 4#;11/04/2022 for 6#; 11/17/2022 for 8#;12/21/2022 for 18#; 11/20/2022 for 19#		-
Applied force [N].....:		8.9		-
Sample #	Requirements			-
4	☒ No exposure of active circuitry of the module			P
6	☒ No exposure of active circuitry of the module			P
8	☒ No exposure of active circuitry of the module			P
18	☒ No exposure of active circuitry of the module			P
19	☒ No exposure of active circuitry of the module			P
Supplementary information: N/A				
10.2 Visual inspection (after cut susceptibility test) - MST01				-
Test date [MM/DD/YYYY].....:		11/10/2022 for 4#;11/04/2022 for 6#; 11/17/2022 for 8#;12/21/2022 for 18#; 11/20/2022 for 19#		-
Sample #	Nature and position of initial findings - comments or attach photos			-
4	No visual defects			P
6	No visual defects			P
8	No visual defects			P
18	No visual defects			P
19	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after cut susceptibility test) - MST16				-
Test date [MM/DD/YYYY].....:		11/10/2022 for 4#;11/04/2022 for 6#; 11/17/2022 for 8#;12/21/2022 for 18#; 11/20/2022 for 19#		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
4	14.3	>1000	No	P
6	14.3	>1000	No	P
8	14.3	>1000	No	P
18	14.3	>1000	No	P
19	14.3	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m2. Area of the module is 2.80m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.14 Wet leakage current test (after cut susceptibility test) - MST17			-
Test date [MM/DD/YYYY].....:		11/10/2022 for 4#;11/04/2022 for 6#; 11/17/2022 for 8#;12/21/2022 for 18#; 11/20/2022 for 19#	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		<3500	-
Solution temperature [°C] / 22±2 .....:		22.6 for 4#;21.4 for 6#; 22.3 for 8#;122.1 for 18#; 20.5 for 19#	-
Sample #	Required [MΩ]	Measured [MΩ]	-
4	14.3	>1000	P
6	14.3	>1000	P
8	14.3	>1000	P
18	14.3	>1000	P
19	14.3	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.80m^2.			

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Clause	Requirement + Test	Result - Remark	Verdict

10.11 Continuity test of equipotential bonding (final) - MST13				-
Test date [MM/DD/YYYY].....:		11/10/2022 for 4#;11/04/2022 for 6#; 11/17/2022 for 8#;12/21/2022 for 18#; 11/20/2022 for 19#		-
Current applied [A] .....:		62.5		-
Location of designated grounding point :		The ground hole of one longer side		-
Location of second contacting point .....:		A: The center of another longer side B: Adjacent shorter side with greatest distance from the grounding point C: Another adjacent shorter side with greatest distance from the grounding point		-
Sample #	Required resistance [Ω]	Measured voltage [V]	Calculated resistance [Ω]	-
4	<0.1	A: 0.038 B: 0.002 C: 0.034	A: 0.006 B: 0.006 C: 0.005	P
6	<0.1	A: 0.037 B: 0.036 C: 0.036	A: 0.007 B: 0.005 C: 0.007	P
8	<0.1	A: 0.044 B: 0.036 C: 0.038	A: 0.006 B: 0.006 C: 0.007	P
18	<0.1	A: 0.037 B: 0.031 C: 0.034	A: 0.007 B: 0.007 C: 0.007	P
19	<0.1	A: 0.045 B: 0.035 C: 0.042	A: 0.005 B: 0.005 C: 0.006	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

10.9 Accessibility test (final) - MST11		-
Test date [MM/DD/YYYY].....:	11/10/2022 for 4#;11/04/2022 for 6#; 11/17/2022 for 8#;12/21/2022 for 18#; 11/20/2022 for 19#	-
Sample #	Requirements	-
4	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
6	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
8	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
18	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
19	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

10.4 Maximum power determination (final) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			11/10/2022 for 2#;10/09/2022 for 3#; 11/10/2022 for 4#;11/04/2022 for 6#; 11/17/2022 for 8#;10/18/2022 for 14#; 2/21/2022 for 18#;11/20/2022 for 19#				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m²].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
2	54.67	45.74	13.72	12.86	588.2	78.42	P
3	54.36	45.19	13.72	12.94	584.8	78.40	P
4	54.06	44.78	13.65	12.92	578.5	78.40	P
6	54.60	45.69	13.64	12.83	586.3	78.71	P
8	54.15	44.48	13.59	12.93	575.2	78.15	P
14	54.76	45.24	13.79	13.03	589.3	78.05	P
18	54.76	45.47	13.76	12.99	590.5	78.38	P
19	54.70	45.38	13.78	13.00	589.9	78.27	P
Supplementary information: The IV curve show no additional kinks or other unusual characteristics as compared to the initial IV curve.							

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Clause	Requirement + Test	Result - Remark	Verdict

10.6 Durability of markings - MST05		-
Test date [MM/DD/YYYY].....:	11/10/2022 for 1#;11/10/2022 for 2#; 10/09/2022 for 3#;11/10/2022 for 4#; 11/04/2022 for 6#;11/17/2022 for 8#; 10/18/2022 for 14#;12/21/2022 for 18#; 11/20/2022 for 19#	-
Sample #	Requirements	-
1	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
2	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
3	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
4	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
6	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
8	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
14	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
18	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
19	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

10.7 Sharp edge test - MST06		-
Test date [MM/DD/YYYY].....:	11/10/2022 for 1#;11/10/2022 for 2#; 10/09/2022 for 3#;11/10/2022 for 4#; 11/04/2022 for 6#;11/17/2022 for 8#; 10/18/2022 for 14#;12/21/2022 for 18#; 11/20/2022 for 19#	-
Sample #	Requirements	-
1	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
2	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
3	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
4	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
6	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
8	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
14	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
18	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
19	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
Supplementary information: Compliance is checked by inspection.		

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Clause	Requirement + Test	Result - Remark	Verdict

10.8 Bypass diode functionality test - MQT18.2/MST07		-
Sample #.....:	1	-
Test date [MM/DD/YYYY].....:	11/10/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A] .....:	N/A	-
$V_{FMrated}$ [V] .....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	2	-
Test date [MM/DD/YYYY].....:	11/10/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	3	-
Test date [MM/DD/YYYY].....:	10/09/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	4	-
Test date [MM/DD/YYYY].....:	1/10/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	6	-
Test date [MM/DD/YYYY].....:	11/04/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	8	-
Test date [MM/DD/YYYY].....:	11/17/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	14	-
Test date [MM/DD/YYYY].....:	10/18/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	18	-
Test date [MM/DD/YYYY].....:	12/21/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	19	-
Test date [MM/DD/YYYY].....:	11/20/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.5 Insulation thickness test - MST04				-
Test date [MM/DD/YYYY].....:		12/23/2022		-
Measuring location.....:		Location A & B & C are at the soldering connections		-
Sample #	Required value [mm]	Location	Measured value [mm]	-
18	0.3144	A	0.3578	P
	0.3144	B	0.3487	
	0.3144	C	0.3682	
Supplementary information: Measurement uncertainty is 2.9% and has been taken into consideration to determine required value.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA670-33V-MH (BOM2)

10.2 Visual inspection (initial) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	09/27/2022	-
Sample #	Nature and position of initial findings - comments or attach photos	-
29	No visual defects	P
31	No visual defects	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.4 Maximum power determination (initial) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			09/27/2022				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
29	46.93	39.43	17.77	17.06	672.6	80.22	-
31	47.12	39.15	17.76	17.08	668.6	79.92	-
Supplementary information: N/A							

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.13 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		09/27/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
29	12.9	>1000	No	P
31	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.14 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		09/27/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		<3500	-
Solution temperature [°C] / 22±2 .....:		22.7	-
Sample #	Required [MΩ]	Measured [MΩ]	-
29	12.9	>1000	P
31	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.11 Continuity test of equipotential bonding (initial) - MST13				-
Test date [MM/DD/YYYY].....:		09/27/2022		-
Current applied [A] .....:		75		-
Location of designated grounding point :		The ground hole of one longer side		-
Location of second contacting point .....:		A: The center of another longer side B: Adjacent shorter side with greatest distance from the grounding point C: Another adjacent shorter side with greatest distance from the grounding point		-
Sample #	Required resistance [Ω]	Measured voltage [V]	Calculated resistance [Ω]	-
29	<0.1	A: 0.020 B: 0.019 C: 0.022	A: 0.001 B: 0.001 C: 0.001	P
31	<0.1	A: 0.036 B: 0.034 C: 0.033	A: 0.001 B: 0.001 C: 0.001	P
Supplementary information: N/A				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.9 Accessibility test (initial) - MST11		-
Test date [MM/DD/YYYY].....:	09/27/2022	-
Sample #	Requirements	-
29	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
31	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.15 Temperature test - MST21				-
Sample #.....:		33		-
Test date [MM/DD/YYYY].....:		10/10/2022		-
Reference solar irradiance [W/m²].....:		1000		-
Reference ambient temperature [°C]....:		40		-
Spacing between module and black test platform [cm] .....:		0		-
Measuring location.....:		A: Module superstrate above the center cell B: Module substrate below the center cell C: Terminal enclosure interior surface D: Terminal enclosure interior air space E: Field wiring terminals F: Insulation of the field wiring leads G: External connector bodies H: Diode bodies I: The boundary between frame and silica gel J: Ambient temperature		-
Measuring location	Component temperature limit [°C]	Component temperature T_{OBS} [°C]	Normalized temperature T_{CON} [°C]	-
A	N/A	72.8	74.3	N/A
B	120	75.0	76.5	P
C	120	70.8	72.3	P
D	N/A	N/A	N/A	N/A
E	120	78.0	79.5	P
F	120	70.0	71.5	P
G	120	70.7	72.2	P
H	200	77.5	79.0	P
I	N/A	N/A	N/A	N/A
J	20 - 55	38.5	40.0	P
Supplementary information: $T_{CON} = T_{OBS} + (40\ °C - T_{ENV})$, Solar simulator method used.				
10.2 Visual inspection (after temperature test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		10/10/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
33	No visual defects			P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

10.13 Insulation test (after temperature test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		10/10/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
33	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m2. Area of the module is 3.11m^2.				
10.14 Wet leakage current test (after temperature test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		10/10/2022		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		<3500		-
Solution temperature [°C] / 22±2 .....:		23.2		-
Sample #	Required [MΩ]	Measured [MΩ]		-
33	12.9	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.20 Reverse current overload test - MST26				-
Sample #.....:		33		-
Test date [MM/DD/YYYY].....:		10/16/2022		-
Module over-current protection rating [A] .....:		30		-
Ambient air temperature [°C] / 23±5 .....:		24.8 - 25.2		-
Step 1, determination of hottest point(s)				-
Current applied[A] .....:		40.5		-
Voltage applied[V] / high - low .....:		48.5 - 44.6		-
Test duration [hour] .....:		1		-
Step 2, reverse current overload test of hottest point(s)				-
Current applied[A] .....:		40.5		-
Voltage applied[V] / high - low .....:		49.6 - 45.2		-
Test duration [hour] .....:		1		-
The maximum external module surface temperature [°C].....:		131.2		-
Sample #	Requirements			-
33	☒ No flaming of the module ☒ No flaming or charring of the tissue paper ☒ The maximum external module surface temperature shall not exceed 150 °C			P
Supplementary information: This test is conducted with the significant technical change that the IEC TC82 latest draft of IEC 61730-2.				
10.2 Visual inspection (after reverse current overload test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		10/16/2022		-
Sample #	Nature and position of initial findings - comments or attach photos			-
33	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after reverse current overload test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		10/16/2022		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
33	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m2. Area of the module is 3.11m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.14 Wet leakage current test (after reverse current overload test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		10/16/2022	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		<3500	-
Solution temperature [°C] / 22±2 .....:		20.6	-
Sample #	Required [MΩ]	Measured [MΩ]	-
33	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.21 Module breakage test - MST32		-
Test date [MM/DD/YYYY].....:	10/21/2022	-
Weight of impactor [kg].....:	45.5	-
Thickness of module [mm] .....:	30	-
Mounting technique used .....:	Mounting with 6 clamps	-
Module Breakage? .....:	☒ No breakage ☐ Broke at 300mm	-
Weight of particles in case of breakage [g].....:	N/A	-
Sample #	Requirements	-
34	☒ The module did not separate from the mounting structure or framing ☒ The sample did not break ☐ Breakage occurred, but no shear or opening large enough for a 76 mm diameter sphere to pass freely has developed. ☐ Breakage occurred, but no particles larger than 65 cm² have been ejected from the sample.	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict
10.2 Visual inspection (final, after 48-96h wait time) - MQT01/MST01			-
Sample #	Nature and position of initial findings - comments or attach photos		-
29	No visual defects		P
31	No visual defects		P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

10.10 Cut susceptibility test - MST12				-
Test date [MM/DD/YYYY].....:		11/05/2022 for 29#;11/13/2022 for 31#		-
Applied force [N].....:		8.9		-
Sample #	Requirements			-
29	☒ No exposure of active circuitry of the module			P
31	☒ No exposure of active circuitry of the module			P
Supplementary information: N/A				
10.2 Visual inspection (after cut susceptibility test) - MST01				-
Test date [MM/DD/YYYY].....:		11/05/2022 for 29#;11/13/2022 for 31#		-
Sample #	Nature and position of initial findings - comments or attach photos			-
29	No visual defects			P
31	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after cut susceptibility test) - MST16				-
Test date [MM/DD/YYYY].....:		11/05/2022 for 29#;11/13/2022 for 31#		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
29	12.9	>1000	No	P
31	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m2. Area of the module is 3.11m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.14 Wet leakage current test (after cut susceptibility test) - MST17			-
Test date [MM/DD/YYYY].....:		11/05/2022 for 29#;11/13/2022 for 31#	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		<3500	-
Solution temperature [°C] / 22±2 .....:		20.8	-
Sample #	Required [MΩ]	Measured [MΩ]	-
29	12.9	>1000	P
31	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

IEC 61730-2 / EN IEC 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
10.11 Continuity test of equipotential bonding (final) - MST13				-
Test date [MM/DD/YYYY].....:		11/05/2022 for 29#;11/13/2022 for 31#		-
Current applied [A] .....:		75		-
Location of designated grounding point :		The ground hole of one longer side		-
Location of second contacting point .....:		A: The center of another longer side B: Adjacent shorter side with greatest distance from the grounding point C: Another adjacent shorter side with greatest distance from the grounding point		-
Sample #	Required resistance [Ω]	Measured voltage [V]	Calculated resistance [Ω]	-
29	<0.1	A: 0.043 B: 0.035 C: 0.044	A: 0.001 B: 0.001 C: 0.001	P
31	<0.1	A: 0.042 B: 0.026 C: 0.021	A: 0.001 B: 0.001 C: 0.001	P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

10.9 Accessibility test (final) - MST11		-
Test date [MM/DD/YYYY].....:	11/05/2022 for 29#;11/13/2022 for 31#	-
Sample #	Requirements	-
29	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
31	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

10.4 Maximum power determination (final) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			10/05/2022 for 27#, 10/14/2022 for 28#; 11/05/2022 for 29#;11/13/2022 for 31#; 10/14/2022 for 33#;				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
27	47.06	39.42	17.73	16.98	669.4	80.22	P
28	47.58	39.41	17.47	16.92	666.8	80.22	P
29	46.93	39.43	17.70	17.00	670.3	80.70	P
31	46.87	39.39	17.66	16.96	668.0	80.71	P
33	46.88	38.87	17.52	16.93	658.2	80.12	P
Supplementary information: The IV curve show no additional kinks or other unusual characteristics as compared to the initial IV curve.							

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.6 Durability of markings - MST05		-
Test date [MM/DD/YYYY].....:	10/05/2022 for 27#, 10/14/2022 for 28#; 11/05/2022 for 29#;11/13/2022 for 31#; 10/14/2022 for 33#;	-
Sample #	Requirements	-
26	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
27	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
28	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
29	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
31	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

10.7 Sharp edge test - MST06		-
Test date [MM/DD/YYYY].....:		10/05/2022 for 27#, 10/14/2022 for 28#; 11/05/2022 for 29#;11/13/2022 for 31#; 10/14/2022 for 33#;	-
Sample #	Requirements		-
26	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces		P
27	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces		P
28	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces		P
29	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces		P
31	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces		P
Supplementary information: Compliance is checked by inspection.			

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.8 Bypass diode functionality test - MQT18.2/MST07		-
Sample #.....:	27	-
Test date [MM/DD/YYYY].....:	10/05/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A] .....:	N/A	-
$V_{FMrated}$ [V] .....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	28	-
Test date [MM/DD/YYYY].....:	10/14/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	29	-
Test date [MM/DD/YYYY].....:	01/05/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	31	-
Test date [MM/DD/YYYY].....:	11/13/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	33	-
Test date [MM/DD/YYYY].....:	10/14/2022	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA660-33V-MH (BOM3)

10.2 Visual inspection (initial) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	04/29/2023	-
Sample #	Nature and position of initial findings - comments or attach photos	-
3-1	No visual defects	P
3-2	No visual defects	P
3-3	No visual defects	P
3-4	No visual defects	P
3-6	No visual defects	P
3-8	No visual defects	P
3-10	No visual defects	P
3-11	No visual defects	P
3-12	No visual defects	P
3-13	No visual defects	P
3-14	No visual defects	P
3-15	No visual defects	P
3-16	No visual defects	P
3-17	No visual defects	P
3-18	No visual defects	P
3-19	No visual defects	P
3-20	No visual defects	P
3-21	No visual defects	P
3-22	No visual defects	P
3-23	No visual defects	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.4 Maximum power determination (initial) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			05/03/2023				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-2	45.56	37.70	18.46	17.43	657.2	78.15	-
3-3	45.74	37.88	18.38	17.38	658.4	78.30	-
3-4	45.52	37.89	18.45	17.35	657.4	78.28	-
3-6	45.55	37.86	18.42	17.36	657.2	78.33	-
3-8	45.72	37.74	18.50	17.43	657.8	77.79	-
3-10	45.73	37.91	18.40	17.35	657.8	78.17	-
3-11	45.50	37.82	18.54	17.37	656.9	77.87	-
3-12	45.68	37.76	18.32	17.37	655.9	78.37	-
3-13	45.47	37.71	18.42	17.40	656.2	78.35	-
3-14	45.64	37.73	18.33	17.41	656.7	78.50	-
3-17	45.69	38.03	18.37	17.34	659.3	78.56	-
3-18	45.74	37.73	18.28	17.41	656.7	78.56	-
3-19	45.69	37.88	18.28	17.34	656.7	78.63	-
Supplementary information: N/A							

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.13 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		05/03/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-2	12.9	>1000	No	P
3-3	12.9	>1000	No	P
3-4	12.9	>1000	No	P
3-6	12.9	>1000	No	P
3-8	12.9	>1000	No	P
3-10	12.9	>1000	No	P
3-11	12.9	>1000	No	P
3-12	12.9	>1000	No	P
3-13	12.9	>1000	No	P
3-14	12.9	>1000	No	P
3-17	12.9	>1000	No	P
3-18	12.9	>1000	No	P
3-19	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.14 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		05/03/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2260	-
Solution temperature [°C] / 22±2 .....:		22.8	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-2	12.9	>1000	P
3-3	12.9	>1000	P
3-4	12.9	>1000	P
3-6	12.9	>1000	P
3-8	12.9	>1000	P
3-10	12.9	>1000	P
3-11	12.9	>1000	P
3-12	12.9	>1000	P
3-13	12.9	>1000	P
3-14	12.9	>1000	P
3-17	12.9	>1000	P
3-18	12.9	>1000	P
3-19	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.			

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.11 Continuity test of equipotential bonding (initial) - MST13				-
Test date [MM/DD/YYYY].....:		05/03/2023		-
Current applied [A] .....:		75		-
Location of designated grounding point :		The ground hole of one longer side		-
Location of second contacting point .....:		A: The center of another longer side B: Adjacent shorter side with greatest distance from the grounding point C: The center of the other shorter side		-
Sample #	Required resistance [Ω]	Measured voltage [V]	Calculated resistance [Ω]	-
3-4	<0.1	A: 0.041 B: 0.042 C: 0.020	A:0.001 B:0.001 C:<0.001	P
3-6	<0.1	A:0.024 B:0.026 C:0.021	A:<0.001 B:<0.001 C:<0.001	P
3-8	<0.1	A:0.038 B:0.031 C:0.041	A:0.001 B:<0.001 C:0.001	P
3-10	<0.1	A:0.023 B:0.031 C:0.041	A:<0.001 B:<0.001 C:0.001	P
3-11	<0.1	A:0.027 B:0.045 C:0.044	A:<0.001 B:0.001 C:0.001	P
3-12	<0.1	A:0.044 B:0.019 C:0.032	A:0.001 B:<0.001 C:<0.001	P
3-13	<0.1	A:0.034 B:0.021 C:0.042	A:<0.001 B:<0.001 C:0.001	P
3-17	<0.1	A:0.034 B:0.031 C:0.036	A:<0.001 B:<0.001 C:<0.001	P
3-18	<0.1	A:0.041 B:0.042 C:0.024	A:0.001 B:0.001 C:<0.001	P
3-19	<0.1	A:0.038 B:0.040 C:0.027	A:0.001 B:0.001 C:<0.001	P
Supplementary information: N/A				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.9 Accessibility test (initial) - MST11		-
Test date [MM/DD/YYYY].....:	05/03/2023	-
Sample #	Requirements	-
3-4	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
3-6	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
3-8	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
3-10	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
3-11	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
3-12	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
3-13	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
3-17	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
3-18	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
3-19	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.15 Temperature test - MST21				-
Sample #.....:		3-14		-
Test date [MM/DD/YYYY].....:		05/18/2023		-
Reference solar irradiance [W/m²].....:		1000		-
Reference ambient temperature [°C]....:		40		-
Spacing between module and black test platform [cm] .....:		0		-
Measuring location.....:		A: Module superstrate above the center cell B: Module substrate below the center cell C: Terminal enclosure interior surface D: Terminal enclosure interior air space E: Field wiring terminals F: Insulation of the field wiring leads G: External connector bodies H: Diode bodies I: The boundary between frame and silica gel J: Ambient temperature		-
Measuring location	Component temperature limit [°C]	Component temperature T_{OBS} [°C]	Normalized temperature T_{CON} [°C]	-
A	N/A	71.8	73.8	N/A
B	120	70.5	72.5	P
C	120	69.0	71.0	P
D	N/A	N/A	N/A	N/A
E	120	77.7	79.7	P
F	120	69.7	71.7	P
G	120	69.1	71.1	P
H	200	77.8	79.8	P
I	N/A	N/A	N/A	N/A
J	20 - 55	38.0	40.0	P
Supplementary information: $T_{CON} = T_{OBS} + (40\ °C - T_{ENV})$, Solar simulator method used.				
10.2 Visual inspection (after temperature test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		05/18/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-14	No visual defects			P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

10.13 Insulation test (after temperature test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		05/18/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-14	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m2. Area of the module is 3.11 m^2.				
10.14 Wet leakage current test (after temperature test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		05/18/2023		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		<3500		-
Solution temperature [°C] / 22±2 .....:		22.8		-
Sample #	Required [MΩ]	Measured [MΩ]		-
3-14	12.9	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.20 Reverse current overload test - MST26				-
Test date [MM/DD/YYYY].....:		05/23/2023		-
Module over-current protection rating [A] .....:		30		-
Current applied[A] .....:		40.5		-
Voltage applied[V] / high - low .....:		45.56 - 44.19		-
Test duration [hour] .....:		2		-
Sample #	Requirements			-
3-14	☒ No flaming of the module ☒ No flaming or charring of the tissue paper			P
Supplementary information: N/A				
10.2 Visual inspection (after reverse current overload test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		05/23/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-14	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after reverse current overload test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		05/23/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-14	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m2. Area of the module is 3.11 m^2.				
10.14 Wet leakage current test (after reverse current overload test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		05/23/2023		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		<3500		-
Solution temperature [°C] / 22±2 .....:		21.7		-
Sample #	Required [MΩ]	Measured [MΩ]		-
3-14	12.9	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.12 Impulse voltage test - MST14				-
Test date [MM/DD/YYYY].....:		05/13/2023		-
Maximum system voltage [V].....:		1500		-
Maximum impulse voltage [V].....:		16000		-
Thickness of conductive foil [mm].....:		0.05		-
Sample #	Requirements			-
3-15	☒ No evidence of dielectric breakdown or surface tracking observed			P
Supplementary information: N/A				
10.2 Visual inspection (after impulse voltage test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		05/13/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-15	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after impulse voltage test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		05/13/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-15	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

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Clause	Requirement + Test	Result - Remark	Verdict

10.21 Module breakage test - MST32		-
Test date [MM/DD/YYYY].....:	05/13/2023	-
Weight of impactor [kg].....:	45.5	-
Thickness of module [mm] .....:	30	-
Mounting technique used .....:	Mounting with 6 clamps	-
Module Breakage? .....:	☒ No breakage ☐ Broke at 300mm	-
Weight of particles in case of breakage [g].....:	N/A	-
Sample #	Requirements	-
3-16	☒ The module did not separate from the mounting structure or framing ☒ The sample did not break ☐ Breakage occurred, but no shear or opening large enough for a 76 mm diameter sphere to pass freely has developed. ☐ Breakage occurred, but no particles larger than 65 cm² have been ejected from the sample.	P
Supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

10.26 Materials creep test - MST37				-
Sample #.....:		3-17		-
Test date [MM/DD/YYYY] / start - end..:		06/01/2023 - 06/10/2023		-
Applied temperature [°C].....:		105		-
Relative humidity [%].....:		<50		-
Mounting angle [°].....:		90		-
Test time [hour].....:		200		-
Supplementary information: N/A				
10.2 Visual inspection (after materials creep test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		06/10/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-17	No visual defects			P
Supplementary information: Creepage distance and clearances after the test met the requirement specified in Table 3 of IEC 61730-1:2016				
10.13 Insulation test (after materials creep test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		06/10/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-17	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				
10.14 Wet leakage current test (after materials creep test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		06/10/2023		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		<3500		-
Solution temperature [°C] / 22±2 .....:		22.0		-
Sample #	Required [MΩ]	Measured [MΩ]		-
3-17	12.9	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

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Clause	Requirement + Test	Result - Remark	Verdict

10.11 Continuity test of equipotential bonding (after materials creep test) - MST13				-
Test date [MM/DD/YYYY].....:		06/10/2023		-
Current applied [A] .....:		75		-
Location of designated grounding point :		The ground hole of one longer side		-
Location of second contacting point .....:		A: The center of another longer side B: Adjacent shorter side with greatest distance from the grounding point C: The center of the other shorter side		-
Sample #	Required resistance [Ω]	Measured voltage [V]	Calculated resistance [Ω]	-
3-17	<0.1	A:0.034 B:0.031 C:0.036	A:<0.001 B:<0.001 C:<0.001	P
Supplementary information: N/A				
10. 9 Accessibility test (after materials creep test) - MST11				-
Test date [MM/DD/YYYY].....:		06/10/2023		-
Sample #	Requirements			-
3-17	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.			P
Supplementary information: N/A				

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Clause	Requirement + Test	Result - Remark	Verdict

10.30 Damp heat test - MQT13/MST53				-
Sample #.....:		3-18		-
Test date [MM/DD/YYYY] / start - end..:		05/08/2023 - 05/16/2023		-
Total hours [hours] .....:		200		-
Supplementary information: N/A				
10.2 Visual inspection (after damp heat 200 test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		05/16/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-18	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after damp heat 200 test) - MQT13/MST16				-
Test date [MM/DD/YYYY].....:		05/16/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-18	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

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Clause	Requirement + Test	Result - Remark	Verdict

10.31 UV test (front side) - MQT10/MST54				-
Sample #.....:		3-18		-
Test date [MM/DD/YYYY] / start - end..:		05/19/2023 - 06/05/2023		-
Total dosage of UV irradiation (280-400nm) [kWh/m^2].....:		60.0		-
Module operation condition .....:		☒ Short circuited / ☐ Pmax		-
Supplementary information: N/A				
10.2 Visual inspection (after UV test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		06/05/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-18	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after UV test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		06/05/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-18	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.29 Humidity freeze 10 test (1st round) - MQT12/MST52				-
Test date [MM/DD/YYYY] / start - end..:		06/07/2023 - 06/18/2023		-
Total cycles .....:		10		-
Current applied [A] .....:		0.05		-
Sample #	Open circuits?			-
3-18	No			P
Supplementary information: N/A				
10.2 Visual inspection (after humidity freeze 10 test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		06/18/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-18	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after humidity freeze 10 test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		06/18/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-18	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.31 UV test (back side) - MQT10/MST54				-
Sample #.....:		3-18		-
Test date [MM/DD/YYYY] / start - end..:		06/21/2023 - 07/07/2023		-
Total dosage of UV irradiation (280-400nm) [kWh/m^2].....:		60.0		-
Module operation condition .....:		☒ Short circuited / ☐ Pmax		-
Supplementary information: N/A				
10.2 Visual inspection (after UV test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		07/07/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-18	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after UV test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		07/07/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-18	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.29 Humidity freeze 10 test (2nd round) - MQT12/MST52				-
Test date [MM/DD/YYYY] / start - end..:		07/14/2023 - 07/25/2023		-
Total cycles .....:		10		-
Current applied [A] .....:		0.05		-
Sample #	Open circuits?			-
3-18	No			P
Supplementary information: N/A				
10.2 Visual inspection (after humidity freeze 10 test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		07/25/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-18	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after humidity freeze 10 test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		07/25/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-18	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				
10.14 Wet leakage current test (after humidity freeze 10 test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		07/25/2023		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		<3500		-
Solution temperature [°C] / 22±2 .....:		21.4		-
Sample #	Required [MΩ]	Measured [MΩ]		-
3-18	12.9	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

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Clause	Requirement + Test	Result - Remark	Verdict

10.32 Cold conditioning test (1st round) - MST55				-
Sample #.....:		3-19		-
Test date [MM/DD/YYYY] / start - end..:		05/04/2023 - 05/06/2023		-
Applied temperature [°C].....:		-40		-
Test time [hour].....:		48		-
Supplementary information: N/A				
10.2 Visual inspection (after cold conditioning test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		05/06/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-19	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after cold conditioning test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		05/06/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-19	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.33 Dry heat conditioning test - MST56				-
Sample #.....:		3-19		-
Test date [MM/DD/YYYY] / start - end..:		05/11/2023 - 05/20/2023		-
Applied temperature [°C].....:		105		-
Relative humidity [%].....:		<50		-
Test time [hour] .....:		200		-
Supplementary information: N/A				
10.2 Visual inspection (after dry heat conditioning test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		05/20/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-19	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after dry heat conditioning test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		05/20/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-19	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.29 Humidity freeze 10 test (1st round) - MQT12/MST52				-
Test date [MM/DD/YYYY] / start - end..:		05/25/2023 - 06/05/2023		-
Total cycles .....:		10		-
Current applied [A] .....:		0.05		-
Sample #	Open circuits?			-
3-19	No			P
Supplementary information: N/A				
10.2 Visual inspection (after humidity freeze 10 test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		06/05/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-19	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after humidity freeze 10 test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		06/05/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-19	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.32 Cold conditioning test (2nd round) - MST55				-
Sample #.....:		3-19		-
Test date [MM/DD/YYYY] / start - end..:		06/10/2023 - 06/13/2023		-
Applied temperature [°C].....:		-40		-
Test time [hour].....:		48		-
Supplementary information: N/A				
10.2 Visual inspection (after cold conditioning test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		06/13/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-19	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after cold conditioning test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		06/13/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-19	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.29 Humidity freeze 10 test (2nd round) - MQT12/MST52				-
Test date [MM/DD/YYYY] / start - end..:		06/15/2023 - 06/26/2023		-
Total cycles .....:		10		-
Current applied [A] .....:		0.05		-
Sample #	Open circuits?			-
3-19	No			P
Supplementary information: N/A				
10.2 Visual inspection (after humidity freeze 10 test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		06/26/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-19	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after humidity freeze 10 test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		06/26/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-19	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				
10.14 Wet leakage current test (after humidity freeze 10 test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		06/26/2023		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		<3500		-
Solution temperature [°C] / 22±2 .....:		22.9		-
Sample #	Required [MΩ]	Measured [MΩ]		-
3-19	12.9	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.2 Visual inspection (final, after 48-96h wait time) - MQT01/MST01		-
Sample #	Nature and position of initial findings - comments or attach photos	-
3-4	No visual defects	P
3-6	No visual defects	P
3-8	No visual defects	P
3-18	No visual defects	P
3-19	No visual defects	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.17 Fire test - MST23			-
Test date [MM/DD/YYYY].....:		05/25/2023	-
Standard applied .....:		UL 1703, Class C	-
No. of modules provided to create the test assembly .....:		2 for spread of flame test 1 for burning brand test	-
Sample #	Requirements		-
3-20	☒ Modules comply with the requirements for the fire test according to above noticed standard		P
3-21			
3-22			
Supplementary information: This test is subcontracted to Zhejiang Gather Uni Test Technology Co., Ltd. Please refer to Annex 5 for detailed pictures of the samples after test.			

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.18 Ignitability test - MST24		-
Test date [MM/DD/YYYY].....:	05/24/2023	-
Standard applied .....:	ISO 11925-2:2010	-
Sample #	Requirements	-
3-23	☒ No ignition of module ☒ No flame spread > 150 mm vertically from point of test flame application	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.10 Cut susceptibility test - MST12				-
Test date [MM/DD/YYYY].....:		06/15/2023 for 3-4#; 06/12/2023 for 3-6# 07/03/2023 for 3-8#; 07/27/2023 for 3-18# 06/28/2023 for 3-19#		-
Applied force [N].....:		8.9		-
Sample #	Requirements			-
3-4	☒ No exposure of active circuitry of the module			P
3-6	☒ No exposure of active circuitry of the module			P
3-8	☒ No exposure of active circuitry of the module			P
3-18	☒ No exposure of active circuitry of the module			P
3-19	☒ No exposure of active circuitry of the module			P
Supplementary information: N/A				
10.2 Visual inspection (after cut susceptibility test) - MST01				-
Test date [MM/DD/YYYY].....:		06/15/2023 for 3-4#; 06/12/2023 for 3-6# 07/03/2023 for 3-8#; 07/27/2023 for 3-18# 06/28/2023 for 3-19#		-
Sample #	Nature and position of initial findings - comments or attach photos			-
3-4	No visual defects			P
3-6	No visual defects			P
3-8	No visual defects			P
3-18	No visual defects			P
3-19	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after cut susceptibility test) - MST16				-
Test date [MM/DD/YYYY].....:		06/15/2023 for 3-4#; 06/12/2023 for 3-6# 07/03/2023 for 3-8#; 07/27/2023 for 3-18# 06/28/2023 for 3-19#		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
3-4	12.9	>1000	No	P
3-6	12.9	>1000	No	P
3-8	12.9	>1000	No	P
3-18	12.9	>1000	No	P
3-19	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m2. Area of the module is 3.11 m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.14 Wet leakage current test (after cut susceptibility test) - MST17			-
Test date [MM/DD/YYYY].....:		06/15/2023 for 3-4#; 06/12/2023 for 3-6# 07/03/2023 for 3-8#; 07/27/2023 for 3-18# 06/28/2023 for 3-19#	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		<3500	-
Solution temperature [°C] / 22±2 .....:		22±2	-
Sample #	Required [MΩ]	Measured [MΩ]	-
3-4	12.9	>1000	P
3-6	12.9	>1000	P
3-8	12.9	>1000	P
3-18	12.9	>1000	P
3-19	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11 m^2.			

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.11 Continuity test of equipotential bonding (final) - MST13				-
Test date [MM/DD/YYYY].....:		06/15/2023 for 3-4#; 06/12/2023 for 3-6# 07/03/2023 for 3-8#; 07/27/2023 for 3-18# 06/28/2023 for 3-19#		-
Current applied [A] .....:		75		-
Location of designated grounding point :		The ground hole of one longer side		-
Location of second contacting point .....:		A: The center of another longer side B: Adjacent shorter side with greatest distance from the grounding point C: The center of the other shorter side		-
Sample #	Required resistance [Ω]	Measured voltage [V]	Calculated resistance [Ω]	-
3-4	<0.1	A:0.037 B:0.026 C:0.040	A:<0.001 B:<0.001 C:0.001	P
3-6	<0.1	A:0.042 B:0.038 C:0.042	A:0.001 B:0.001 C:0.001	P
3-8	<0.1	A:0.041 B:0.028 C:0.019	A:0.001 B:<0.001 C:<0.001	P
3-18	<0.1	A:0.022 B:0.039 C:0.031	A:<0.001 B:0.001 C:<0.001	P
3-19	<0.1	A:0.032 B:0.027 C:0.021	A:<0.001 B:<0.001 C:<0.001	P
Supplementary information: N/A				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.9 Accessibility test (final) - MST11		-
Test date [MM/DD/YYYY].....:	06/15/2023 for 3-4#; 06/12/2023 for 3-6# 07/03/2023 for 3-8#; 07/27/2023 for 3-18# 06/28/2023 for 3-19#	-
Sample #	Requirements	-
3-4	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
3-6	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
3-8	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
3-18	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
3-19	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.4 Maximum power determination (final) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			06/03/2023 for 3-2#; 05/16/2023 for 3-3# 06/15/2023 for 3-4#; 06/12/2023 for 3-6# 07/03/2023 for 3-8#; 05/25/2023 for 3-14# 07/27/2023 for 3-18#; 06/28/2023 for 3-19#				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
3-2	45.51	38.17	17.91	16.89	644.7	79.10	P
3-3	45.73	37.83	18.36	17.30	654.5	77.95	P
3-4	45.23	37.65	18.05	16.98	639.3	78.31	P
3-6	45.49	37.59	18.23	17.26	648.7	78.24	P
3-8	45.86	36.72	18.43	17.26	633.7	74.99	P
3-14	45.74	37.80	18.37	17.34	655.4	78.00	P
3-18	45.64	37.73	18.29	17.39	656.0	78.59	P
3-19	45.69	37.69	18.29	17.41	656.0	78.51	P
Supplementary information: The IV curve show no additional kinks or other unusual characteristics as compared to the initial IV curve.							

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.6 Durability of markings - MST05		-
Test date [MM/DD/YYYY].....:		06/03/2023 for 3-2#; 05/16/2023 for 3-3# 06/15/2023 for 3-4#; 06/12/2023 for 3-6# 07/03/2023 for 3-8#; 05/25/2023 for 3-14# 07/27/2023 for 3-1#, 3-18#; 06/28/2023 for 3-19#	-
Sample #	Requirements		-
3-1	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred		P
3-2	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred		P
3-3	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred		P
3-4	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred		P
3-6	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred		P
3-8	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred		P
3-14	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred		P
3-18	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred		P
3-19	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred		P
Supplementary information: N/A			

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.7 Sharp edge test - MST06		-
Test date [MM/DD/YYYY].....:	06/03/2023 for 3-2#; 05/16/2023 for 3-3# 06/15/2023 for 3-4#; 06/12/2023 for 3-6# 07/03/2023 for 3-8#; 05/25/2023 for 3-14# 07/27/2023 for 3-1#, 3-18#; 06/28/2023 for 3-19#	-
Sample #	Requirements	-
3-1	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
3-2	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
3-3	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
3-4	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
3-6	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
3-8	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
3-14	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
3-18	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
3-19	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
Supplementary information: Compliance is checked by inspection.		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.8 Bypass diode functionality test - MQT18.2/MST07		-
Sample #.....:	3-1	-
Test date [MM/DD/YYYY].....:	07/27/2023	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A] .....:	N/A	-
$V_{FMrated}$ [V] .....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	3-2	-
Test date [MM/DD/YYYY].....:	06/03/2023	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	3-3	-
Test date [MM/DD/YYYY].....:	05/16/2023	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	3-4	-
Test date [MM/DD/YYYY].....:	06/15/2023	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	3-6	-
Test date [MM/DD/YYYY].....:	06/12/2023	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	3-8	-
Test date [MM/DD/YYYY].....:	07/03/2023	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	3-14	-
Test date [MM/DD/YYYY].....:	05/25/2023	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	3-18	-
Test date [MM/DD/YYYY].....:	07/27/2023	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	3-19	-
Test date [MM/DD/YYYY].....:	06/28/2023	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.5 Insulation thickness test - MST04				-
Test date [MM/DD/YYYY].....:		07/27/2023		-
Measuring location.....:		Location A & B & C are at the soldering connections		-
Sample #	Required value [mm]	Location	Measured value [mm]	-
3-18	0.3144	A	0.3511	P
	0.3144	B	0.3557	
	0.3144	C	0.3366	
Supplementary information: Measurement uncertainty is 4.8% and has been taken into consideration to determine required value.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA660-33V-MH (BOM4)

10.2 Visual inspection (initial) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	05/12/2023	-
Sample #	Nature and position of initial findings - comments or attach photos	-
4-1	No visual defects	P
4-2	No visual defects	P
4-3	No visual defects	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.4 Maximum power determination (initial) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			05/16/2023				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
4-2	45.63	37.89	18.55	17.36	657.8	77.69	-
Supplementary information: N/A							

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.13 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		05/16/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
4-2	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.14 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		05/16/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2785	-
Solution temperature [°C] / 22±2 .....:		21.3	-
Sample #	Required [MΩ]	Measured [MΩ]	-
4-2	12.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.			

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.11 Continuity test of equipotential bonding (initial) - MST13				-
Test date [MM/DD/YYYY].....:		05/16/2023		-
Current applied [A] .....:		75		-
Location of designated grounding point :		The ground hole of one longer side		-
Location of second contacting point .....:		A: The center of another longer side B: Adjacent shorter side with greatest distance from the grounding point C: The center of the other shorter side		-
Sample #	Required resistance [Ω]	Measured voltage [V]	Calculated resistance [Ω]	-
4-2	<0.1	A:0.035 B:0.033 C:0.029	A:<0.001 B:<0.001 C:<0.001	P
Supplementary information: N/A				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.9 Accessibility test (initial) - MST11		-
Test date [MM/DD/YYYY].....:	05/16/2023	-
Sample #	Requirements	-
4-2	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.21 Module breakage test - MST32		-
Test date [MM/DD/YYYY].....:	08/15/2023	-
Weight of impactor [kg].....:	45.5	-
Thickness of module [mm] .....:	30	-
Mounting technique used .....:	Mounting with 6 clamps	-
Module Breakage? .....:	☒ No breakage ☐ Broke at 300mm	-
Weight of particles in case of breakage [g].....:	N/A	-
Sample #	Requirements	-
4-3	☒ The module did not separate from the mounting structure or framing ☒ The sample did not break ☐ Breakage occurred, but no shear or opening large enough for a 76 mm diameter sphere to pass freely has developed. ☐ Breakage occurred, but no particles larger than 65 cm² have been ejected from the sample.	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.2 Visual inspection (final, after 48-96h wait time) - MQT01/MST01		-
Sample #	Nature and position of initial findings - comments or attach photos	-
4-2	No visual defects	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.10 Cut susceptibility test - MST12				-
Test date [MM/DD/YYYY].....:		07/13/2023		-
Applied force [N].....:		8.9		-
Sample #	Requirements			-
4-2	☒ No exposure of active circuitry of the module			P
Supplementary information: N/A				
10.2 Visual inspection (after cut susceptibility test) - MST01				-
Test date [MM/DD/YYYY].....:		07/13/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
4-2	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after cut susceptibility test) - MST16				-
Test date [MM/DD/YYYY].....:		07/13/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
4-2	12.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m2. Area of the module is 3.11m^2.				
10.14 Wet leakage current test (after cut susceptibility test) - MST17				-
Test date [MM/DD/YYYY].....:		07/13/2023		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		<3500		-
Solution temperature [°C] / 22±2 .....:		20.5		-
Sample #	Required [MΩ]	Measured [MΩ]		-
4-2	12.9	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 3.11m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.11 Continuity test of equipotential bonding (final) - MST13				-
Test date [MM/DD/YYYY].....:		07/13/2023		-
Current applied [A] .....:		75		-
Location of designated grounding point :		The ground hole of one longer side		-
Location of second contacting point .....:		A: The center of another longer side B: Adjacent shorter side with greatest distance from the grounding point C: The center of the other shorter side		-
Sample #	Required resistance [Ω]	Measured voltage [V]	Calculated resistance [Ω]	-
4-2	<0.1	A:0.028 B:0.023 C:0.039	A:<0.001 B:<0.001 C:0.001	P
Supplementary information: N/A				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.9 Accessibility test (final) - MST11		-
Test date [MM/DD/YYYY].....:	07/13/2023	-
Sample #	Requirements	-
4-2	☒ At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. ☒ At no time during the test, the probe contacts any live electrical part.	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.4 Maximum power determination (final) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			07/13/2023				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
4-2	45.48	37.21	18.42	17.19	639.6	76.35	P
Supplementary information: The IV curve show no additional kinks or other unusual characteristics as compared to the initial IV curve.							

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.6 Durability of markings - MST05		-
Test date [MM/DD/YYYY].....:	07/13/2023	-
Sample #	Requirements	-
4-1	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
4-2	☒ Marking is legible ☒ Not possible to remove marking plates easily ☒ No curling occurred	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.7 Sharp edge test - MST06		-
Test date [MM/DD/YYYY].....:	07/13/2023	-
Sample #	Requirements	-
4-1	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
4-2	☒ No sharp edges, burrs, etc. ☒ Smooth surfaces	P
Supplementary information: Compliance is checked by inspection.		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.8 Bypass diode functionality test - MQT18.2/MST07		-
Sample #.....:	4-1	-
Test date [MM/DD/YYYY].....:	07/13/2023	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A] .....:	N/A	-
$V_{FMrated}$ [V] .....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Sample #.....:	4-2	-
Test date [MM/DD/YYYY].....:	07/13/2023	-
☐ Method A		-
Ambient temperature [°C].....:	N/A	-
Current flow applied [A].....:	N/A	-
$V_{FMrated}$ [V].....:	N/A	-
N x $V_{FMrated}$ [V].....:	N/A	-
Measured VFM [V].....:	N/A	N/A
☒ Method B		-
Diode #	IV curve after shading	P
1	☒ Yes ☐ No	P
2	☒ Yes ☐ No	P
3	☒ Yes ☐ No	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA590-36V-MH (BOM5)

No test was required of this part.

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Module type: ODA555-36V-MHB (BOM6)

10.2 Visual inspection (initial) - MQT01/MST01		-
Test date [MM/DD/YYYY].....:	11/07/2023	-
Sample #	Nature and position of initial findings - comments or attach photos	-
6-1	No visual defects	P
Supplementary information: N/A		

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.4 Maximum power determination (initial) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			11/10/2023				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
6-1	52.21	44.97	12.94	12.35	555.3	82.23	-
Supplementary information: N/A							

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.13 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		11/10/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
6-1	15.5	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.58m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.14 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		11/10/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2097	-
Solution temperature [°C] / 22±2 .....:		23.3	-
Sample #	Required [MΩ]	Measured [MΩ]	-
6-1	15.5	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.58 m^2.			

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.15 Temperature test - MST21				-
Sample #.....:		6-1		-
Test date [MM/DD/YYYY].....:		11/13/2023		-
Reference solar irradiance [W/m²].....:		978		-
Reference ambient temperature [°C]....:		40.7		-
Spacing between module and black test platform [cm] .....:		0		-
Measuring location.....:		A: Module superstrate above the center cell B: Module substrate below the center cell C: Terminal enclosure interior surface D: Terminal enclosure interior air space E: Field wiring terminals F: Insulation of the field wiring leads G: External connector bodies H: Diode bodies I: The boundary between frame and silica gel J: Ambient temperature		-
Measuring location	Component temperature limit [°C]	Component temperature T_{OBS} [°C]	Normalized temperature T_{CON} [°C]	-
A	N/A	73.5	73.3	N/A
B	120	74.1	73.9	P
C	120	62.7	62.6	P
D	N/A	N/A	N/A	N/A
E	120	57.8	57.5	P
F	120	62.9	62.8	P
G	120	56.1	55.9	P
H	N/A	N/A	N/A	N/A
I	90	57.5	57.4	P
J	20 - 55	40.7	40.4	P
Supplementary information: $T_{CON} = T_{OBS} + (40\ °C - T_{ENV})$, Solar simulator method used.				
10.2 Visual inspection (after temperature test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		11/13/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
6-1	No visual defects			P
Supplementary information: N/A				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.13 Insulation test (after temperature test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		11/13/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
6-1	15.5	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m2. Area of the module is 2.58 m^2.				
10.14 Wet leakage current test (after temperature test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		11/13/2023		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		1986		-
Solution temperature [°C] / 22±2 .....:		22.3		-
Sample #	Required [MΩ]	Measured [MΩ]		-
6-1	15.5	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.58 m^2.				

IEC 61730-2 / EN IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

10.4 Maximum power determination (final) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			11/13/2023				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmax [W]	FF [%]	-
6-1	52.22	45.00	12.93	12.35	555.6	82.28	P
Supplementary information: The IV curve show no additional kinks or other unusual characteristics as compared to the initial IV curve.							

Annex 1: Constructional Data Form (CDF)

File No.: PVP03179/23P-06 Attached to Test Report No.: 492012901.001

CDF (Constructional Data Form) for Electrical Products

Applicant ..... :	**Ningbo Osda Solar Co., Ltd.** 1-1, No.136, Haichuan Road, Jiangbei Area Ningbo City, Zhejiang Province, P.R.China
Manufacturer 1 ..... :	**Ningbo Osda Solar Co., Ltd.** 1-1, No.136, Haichuan Road, Jiangbei Area Ningbo City, Zhejiang Province, P.R.China
Manufacturer 2 ..... :	**Shandong Oushengda New Energy Co., Ltd.** Intersection of Guanzhuang Middle Road and Aeon South Road, Zhengwang Town, Hedong District, Linyi City, Shandong Province
Product ..... :	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
Standard(s) ..... :	IEC 61215-1:2021 + COR1:2021 / EN IEC 61215-1:2021 + AC:2021; IEC 61215-1-1:2021 / EN IEC 61215-1-1:2021; IEC 61215-2:2021 / EN IEC 61215-2:2021; IEC 61730-1:2016 / EN IEC 61730-1:2018 + AC:2018; IEC 61730-2:2016 / EN IEC 61730-2:2018 + AC:2018.
Trade mark ..... :	Osda
Module type(s) ..... :	**PV Modules with Half-cut 210mm Mono-crystalline Silicon Solar Cells:** 132 cells: ODAxxx-33V-MH (xxx=645-700, in increment of 5) 120 cells: ODAxxx-30V-MH (xxx=585-635, in increment of 5) 110 cells: ODAxxx-28V-MH (xxx=530-580, in increment of 5) 100 cells: ODAxxx-25V-MH (xxx=490-530, in increment of 5) 132 cells: ODAxxx-33V-MHB (xxx=645-700, in increment of 5) 120 cells: ODAxxx-30V-MHB (xxx=585-635, in increment of 5) 110 cells: ODAxxx-28V-MHB (xxx=530-580, in increment of 5) 100 cells: ODAxxx-25V-MHB (xxx=490-530, in increment of 5) **PV Modules with Half-cut 182mm Mono-crystalline Silicon Solar Cells:** 156 cells: ODAxxx-39V-MH (xxx=590-620, in increment of 5) 144 cells: ODAxxx-36V-MH (xxx=550-590, in increment of 5) 132 cells: ODAxxx-33V-MH (xxx=500-540, in increment of 5) 120 cells: ODAxxx-30V-MH (xxx=460-490, in increment of 5) 108 cells: ODAxxx-27V-MH (xxx=410-440, in increment of 5) 156 cells: ODAxxx-39V-MHB (xxx=590-620, in increment of 5) 144 cells: ODAxxx-36V-MHB (xxx=550-590, in increment of 5) 132 cells: ODAxxx-33V-MHB (xxx=500-540, in increment of 5)

Confirmation of the applicant
Ningbo, 12/27/2023 (Place and date)

(Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT
Shanghai, _____ (Place and date)

Nancy Zhang 数字签名者：Nancy Zhang 日期：2023.12.29 17:43:37 +08'00'

(Signature of authorized TÜV NORD CERT engineer)

PV-F-039 CDF Page 1 of 12 Version 1.0

	120 cells: ODAxxx-30V-MHB (xxx=460-490, in increment of 5) 108 cells: ODAxxx-27V-MHB (xxx=410-440, in increment of 5)

Ratings:

PV Modules with Half-cut 210mm Mono-crystalline Silicon Solar Cells:

Module type ..... :	132 cells: ODAxxx-33V-MH (xxx=670-700, in increment of 5) 132 cells: ODAxxx-33V-MHB (xxx=670-700, in increment of 5) for mono cell 1		
Dimensions [mm] / l x w x h ..... :	2384 x 1303 x 30 / 33		
Maximum system voltage [V] ..... :	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm] ..... :	13.5	Fuse rating [A] .....:	30
Design load (positive) [Pa] ..... :	3600	Safety factor (positive).....:	1.5
Design load (negative) [Pa] ..... :	1600	Safety factor (negative) .....:	1.5
Electrical ratings at irradiance level at STC			
Rated Pmax at STC [W]..... :	670, 675, 680, 685, 690, 695, 700		
Rated Voc at STC [V]..... :	47.42, 47.66, 47.90, 48.14, 48.38, 48.62, 48.86		
Rated Vmp at STC [V] ..... :	39.52, 39.72, 39.92, 40.12, 40.32, 40.52, 40.72		
Rated Isc at STC [A] ..... :	17.72, 17,76, 17.80, 17.84, 17.88, 17.93, 17.97		
Rated Imp at STC [A] ..... :	16.96, 17.00, 17.04, 17.08, 17.12, 17.16, 17.20		
Tolerance of rated electrical parameters at STC [%] ..... :	Tolerance of rated Pmax at STC is ±3% Tolerance of rated Voc at STC is ±3% Tolerance of rated Isc at STC is ±3%		

Module type ..... :	120 cells: ODAxxx-30V-MH (xxx=610-635, in increment of 5) 120 cells: ODAxxx-30V-MHB (xxx=610-635, in increment of 5) for mono cell 1		
Dimensions [mm] / l x w x h ..... :	2172 x 1303 x 30 / 33		
Maximum system voltage [V] ..... :	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm] ..... :	13.5	Fuse rating [A] .....:	30
Design load (positive) [Pa] ..... :	3600	Safety factor (positive).....:	1.5
Design load (negative) [Pa] ..... :	1600	Safety factor (negative) .....:	1.5
Electrical ratings at irradiance level at STC			
Rated Pmax at STC [W]..... :	610, 615, 620, 625, 630, 635		
Rated Voc at STC [V]..... :	43.18, 43.42, 43.66, 43.99, 44.14, 44.38		
Rated Vmp at STC [V] ..... :	35.98, 36.18, 36.38, 36.58, 36.78, 36.98		
Rated Isc at STC [A] ..... :	17.72, 17.76, 17.81, 17.85, 17.89, 17.95		

Confirmation of the applicant
Ningbo, 12/27/2023 (Place and date)

(Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT
Shanghai, _____ (Place and date)

Nancy Zhang 数字签名者：Nancy Zhang 日期：2023.12.29 17:43:51 +08'00'

(Signature of authorized TÜV NORD CERT engineer)

Rated Imp at STC [A] ..... :	16.96, 17.00, 17.05, 17.09, 17.13, 17.18
Tolerance of rated electrical parameters at STC [%] ..... :	Tolerance of rated Pmax at STC is ±3% Tolerance of rated Voc at STC is ±3% Tolerance of rated Isc at STC is ±3%

Module type ..... :	110 cells: ODAxxx-28V-MH (xxx=560-580, in increment of 5) 110 cells: ODAxxx-28V-MHB (xxx=560-580, in increment of 5) for mono cell 1		
Dimensions [mm] / l x w x h ..... :	2384 x 1096 x 30 / 33		
Maximum system voltage [V]..... :	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm] ..... :	13.0	Fuse rating [A] .....:	30
Design load (positive) [Pa] ..... :	3600	Safety factor (positive).....:	1.5
Design load (negative) [Pa] ..... :	1600	Safety factor (negative) .....:	1.5
Electrical ratings at irradiance level at STC			
Rated Pmax at STC [W]..... :	560, 565, 570, 575, 580		
Rated Voc at STC [V]..... :	39.67, 39.91, 40.15, 40.39, 40.63		
Rated Vmp at STC [V] ..... :	33.06, 33.26, 33.46, 33.66, 33.86		
Rated Isc at STC [A] ..... :	17.70, 17.75, 17.80, 17.85, 17.89		
Rated Imp at STC [A] ..... :	16.94, 16.99, 17.04, 17.09, 17.13		
Tolerance of rated electrical parameters at STC [%] ..... :	Tolerance of rated Pmax at STC is ±3% Tolerance of rated Voc at STC is ±3% Tolerance of rated Isc at STC is ±3%		

Module type ..... :	100 cells: ODAxxx-25V-MH (xxx=510-530, in increment of 5) 100 cells: ODAxxx-25V-MHB (xxx=510-530, in increment of 5) for mono cell 1		
Dimensions [mm] / l x w x h ..... :	2176 x 1096 x 30 / 33		
Maximum system voltage [V]..... :	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm] ..... :	13.0	Fuse rating [A] .....:	30
Design load (positive) [Pa] ..... :	3600	Safety factor (positive).....:	1.5
Design load (negative) [Pa] ..... :	1600	Safety factor (negative) .....:	1.5
Electrical ratings at irradiance level at STC			
Rated Pmax at STC [W]..... :	510, 515, 520, 525, 530		
Rated Voc at STC [V]..... :	36.18, 36.42, 36.66, 36.90, 37.14		
Rated Vmp at STC [V] ..... :	30.15, 30.35, 30.55, 30.75, 30.95		
Rated Isc at STC [A] ..... :	17.67, 17.73, 17.79, 17.84, 17.89		

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Rated Imp at STC [A] ..... :	16.92, 16.97, 17.03, 17.08, 17.13
Tolerance of rated electrical parameters at STC [%] ..... :	Tolerance of rated Pmax at STC is ±3% Tolerance of rated Voc at STC is ±3% Tolerance of rated Isc at STC is ±3%

Module type ..... :	132 cells: ODAxxx-33V-MH (xxx=645-670, in increment of 5) 132 cells: ODAxxx-33V-MHB (xxx=645-670, in increment of 5) for mono cell 3		
Dimensions [mm] / l x w x h ..... :	2384 x 1303 x 30 / 33		
Maximum system voltage [V]..... :	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm] ..... :	13.5	Fuse rating [A] .....:	30
Design load (positive) [Pa] ..... :	3600	Safety factor (positive).....:	1.5
Design load (negative) [Pa] ..... :	1600	Safety factor (negative) .....:	1.5
Electrical ratings at irradiance level at STC			
Rated Pmax at STC [W]..... :	645, 650, 655, 660, 665, 670		
Rated Voc at STC [V]..... :	45.00, 45.20, 45.40, 45.60, 45.80, 46.00		
Rated Vmp at STC [V] ..... :	37.20, 37.40, 37.60, 37.80, 38.00, 38.20		
Rated Isc at STC [A] ..... :	18.42, 18,46, 18.51, 18.55, 18.58, 18.62		
Rated Imp at STC [A] ..... :	17.34, 17,38, 17.43, 17.47, 17.50, 17.54		
Tolerance of rated electrical parameters at STC [%] ..... :	Tolerance of rated Pmax at STC is ±3% Tolerance of rated Voc at STC is ±3% Tolerance of rated Isc at STC is ±3%		

Module type ..... :	120 cells: ODAxxx-30V-MH (xxx=585-610, in increment of 5) 120 cells: ODAxxx-30V-MHB (xxx=585-610, in increment of 5) for mono cell 3		
Dimensions [mm] / l x w x h ..... :	2172 x 1303 x 30 / 33		
Maximum system voltage [V]..... :	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm] ..... :	13.5	Fuse rating [A] .....:	30
Design load (positive) [Pa] ..... :	3600	Safety factor (positive).....:	1.5
Design load (negative) [Pa] ..... :	1600	Safety factor (negative) .....:	1.5
Electrical ratings at irradiance level at STC			
Rated Pmax at STC [W]..... :	585, 590, 595, 600, 605, 610		
Rated Voc at STC [V]..... :	40.90, 41.10, 41.30, 41.50, 41.70, 41.90		
Rated Vmp at STC [V] ..... :	33.80, 34.00, 34.20, 34.40, 34.60, 34.80		

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Rated Isc at STC [A] ..... :	18.37, 18.42, 18.47, 18.52 18.57, 18.62
Rated Imp at STC [A] ..... :	17.31, 17.35, 17.40, 17.44 17.49, 17.53
Tolerance of rated electrical parameters at STC [%] ..... :	Tolerance of rated Pmax at STC is ±3% Tolerance of rated Voc at STC is ±3% Tolerance of rated Isc at STC is ±3%

Module type ..... :	110 cells: ODAxxx-28V-MH (xxx=530-555, in increment of 5) 110 cells: ODAxxx-28V-MHB (xxx=530-555, in increment of 5) for mono cell 3		
Dimensions [mm] / l x w x h ..... :	2384 x 1096 x 30 / 33		
Maximum system voltage [V]..... :	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm] ..... :	13.0	Fuse rating [A] .....:	30
Design load (positive) [Pa] ..... :	3600	Safety factor (positive).....:	1.5
Design load (negative) [Pa] ..... :	1600	Safety factor (negative) .....:	1.5
Electrical ratings at irradiance level at STC			
Rated Pmax at STC [W]..... :	530, 535, 540, 545, 550, 555		
Rated Voc at STC [V]..... :	37.10, 37.30, 37.50, 37.70, 37.90, 38.10,		
Rated Vmp at STC [V] ..... :	30.80, 31.00, 31.20, 31.40, 31.60, 31.80		
Rated Isc at STC [A] ..... :	18.31, 18.36, 18.41, 18.47, 18.52, 18.56		
Rated Imp at STC [A] ..... :	17.21, 17.28, 17.33, 17.37, 17.40, 17.45		
Tolerance of rated electrical parameters at STC [%] ..... :	Tolerance of rated Pmax at STC is ±3% Tolerance of rated Voc at STC is ±3% Tolerance of rated Isc at STC is ±3%		

Module type ..... :	100 cells: ODAxxx-25V-MH (xxx=490-505, in increment of 5) 100 cells: ODAxxx-25V-MHB (xxx=490-505, in increment of 5) for mono cell 3		
Dimensions [mm] / l x w x h ..... :	2176 x 1096 x 30 / 33		
Maximum system voltage [V]..... :	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm] ..... :	13.0	Fuse rating [A] .....:	30
Design load (positive) [Pa] ..... :	3600	Safety factor (positive).....:	1.5
Design load (negative) [Pa] ..... :	1600	Safety factor (negative) .....:	1.5
Electrical ratings at irradiance level at STC			
Rated Pmax at STC [W]..... :	490, 495, 500, 505		
Rated Voc at STC [V]..... :	34.20, 34.40, 34.60, 34.80		
Rated Vmp at STC [V] ..... :	28.30, 28.50, 28.70, 28.90		

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Rated Isc at STC [A] ..... :	18.39, 18.44, 18.49, 18.54
Rated Imp at STC [A] ..... :	17.32, 17.37, 17.43, 17.48
Tolerance of rated electrical parameters at STC [%] ..... :	Tolerance of rated Pmax at STC is ±3% Tolerance of rated Voc at STC is ±3% Tolerance of rated Isc at STC is ±3%

PV Modules with Half-cut 182mm Mono-crystalline Silicon Solar Cells:

Module type ..... :	156 cells: ODAxxx-39V-MH (xxx=590-620, in increment of 5) 156 cells: ODAxxx-39V-MHB (xxx=590-620, in increment of 5) for mono cell 2		
Dimensions [mm] / l x w x h ..... :	2465 x 1134 x 30 / 33		
Maximum system voltage [V] ..... :	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm] ..... :	13.0	Fuse rating [A] .....:	25
Design load (positive) [Pa] ..... :	3600	Safety factor (positive).....:	1.5
Design load (negative) [Pa] ..... :	1600	Safety factor (negative) .....:	1.5
Electrical ratings at irradiance level at STC			
Rated Pmax at STC [W]..... :	590, 595, 600, 605, 610, 615, 620		
Rated Voc at STC [V]..... :	54.65, 54.80, 54.95, 55.10, 55.25, 55.40, 55.55		
Rated Vmp at STC [V] ..... :	45.19, 45.29, 45.39, 45.49, 45.59, 45.69, 45.79		
Rated Isc at STC [A] ..... :	13.82, 13.90, 13.97, 14.04, 14.11, 14.18, 14.25		
Rated Imp at STC [A] ..... :	13.06, 13.14, 13.22, 13.30, 13.38, 13.46, 13.54		
Tolerance of rated electrical parameters at STC [%] ..... :	Tolerance of rated Pmax at STC is ±3% Tolerance of rated Voc at STC is ±3% Tolerance of rated Isc at STC is ±3%		

Module type ..... :	144 cells: ODAxxx-36V-MH (xxx=550-590, in increment of 5) 144 cells: ODAxxx-36V-MHB (xxx=550-590, in increment of 5) for mono cell 2		
Dimensions [mm] / l x w x h ..... :	2278 x 1134 x 30 / 33		
Maximum system voltage [V] ..... :	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm] ..... :	13.0	Fuse rating [A] .....:	25
Design load (positive) [Pa] ..... :	3600	Safety factor (positive).....:	1.5
Design load (negative) [Pa] ..... :	1600	Safety factor (negative) .....:	1.5
Electrical ratings at irradiance level at STC			
Rated Pmax at STC [W]..... :	550, 555, 560, 565, 570, 575, 580, 585, 590		
Rated Voc at STC [V]..... :	50.21, 50.34, 50.47, 50.60, 50.74, 50.88, 51.02, 51.16, 51.30		

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Rated Vmp at STC [V] ..... :	41.50, 41.64, 41.77, 41.92, 42.07, 42.22, 42.37, 42.52, 42.67
Rated Isc at STC [A] ..... :	14.00, 14.07, 14.15, 14.23, 14.31, 14.39, 14.47, 14.55, 14.63
Rated Imp at STC [A] ..... :	13.26, 13.33, 13.41, 13.48, 13.55, 13.62, 13.69, 13.76, 13.83
Tolerance of rated electrical parameters at STC [%] ..... :	Tolerance of rated Pmax at STC is ±3% Tolerance of rated Voc at STC is ±3% Tolerance of rated Isc at STC is ±3%

Module type ..... :	132 cells: ODAxxx-33V-MH (xxx=500-540, in increment of 5) 132 cells: ODAxxx-33V-MHB (xxx=500-540, in increment of 5) for mono cell 2		
Dimensions [mm] / l x w x h ..... :	2094 x 1134 x 30 / 33		
Maximum system voltage [V] ..... :	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm] ..... :	13.0	Fuse rating [A] .....:	25
Design load (positive) [Pa] ..... :	3600	Safety factor (positive).....:	1.5
Design load (negative) [Pa] ..... :	1600	Safety factor (negative) .....:	1.5
Electrical ratings at irradiance level at STC			
Rated Pmax at STC [W]..... :	500, 505, 510, 515, 520, 525, 530, 535, 540		
Rated Voc at STC [V]..... :	46.08, 46.27, 46.46, 46.65, 46.84, 47.04, 47.24, 47.44, 47.64		
Rated Vmp at STC [V] ..... :	38.16, 38.32, 38.48, 38.64, 38.80, 38.96, 39.12, 39.28, 39.44		
Rated Isc at STC [A] ..... :	13.82, 13.90, 13.99, 14.06, 14.15, 14.22, 14.30, 14.37, 14.44		
Rated Imp at STC [A] ..... :	13.10, 13.18, 13.26, 13.33, 13.41, 13.48, 13.55, 13.62, 13.70		
Tolerance of rated electrical parameters at STC [%] ..... :	Tolerance of rated Pmax at STC is ±3% Tolerance of rated Voc at STC is ±3% Tolerance of rated Isc at STC is ±3%		

Module type ..... :	120 cells: ODAxxx-30V-MH (xxx=460-490, in increment of 5) 120 cells: ODAxxx-30V-MHB (xxx=460-490, in increment of 5) for mono cell 2		
Dimensions [mm] / l x w x h ..... :	1903 x 1134 x 30 / 33		
Maximum system voltage [V] ..... :	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm] ..... :	13.0	Fuse rating [A] .....:	25
Design load (positive) [Pa] ..... :	3600	Safety factor (positive).....:	1.5
Design load (negative) [Pa] ..... :	1600	Safety factor (negative) .....:	1.5
Electrical ratings at irradiance level at STC			
Rated Pmax at STC [W]..... :	460, 465, 470, 475, 480, 485, 490		
Rated Voc at STC [V]..... :	42.05, 42.22, 42.38, 42.54, 42.70, 42.86, 43.03		

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Rated Vmp at STC [V] ..... :	34.72, 34.89, 35.05, 35.21, 35.37, 35.53, 35.70
Rated Isc at STC [A] ..... :	13.99, 14.07, 14.15, 14.23, 14.31, 14.39, 14.47
Rated Imp at STC [A] ..... :	13.25, 13.33, 13.41, 13.49, 13.57, 13.65, 13.73
Tolerance of rated electrical parameters at STC [%] ..... :	Tolerance of rated Pmax at STC is ±3% Tolerance of rated Voc at STC is ±3% Tolerance of rated Isc at STC is ±3%

Module type ..... :	108 cells: ODAxxx-27V-MH (xxx=410-440, in increment of 5) 108 cells: ODAxxx-27V-MHB (xxx=410-440, in increment of 5) for mono cell 2		
Dimensions [mm] / l x w x h ..... :	1722 x 1134 x 30 / 33		
Maximum system voltage [V]..... :	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm] ..... :	13.0	Fuse rating [A] .....:	25
Design load (positive) [Pa] ..... :	3600	Safety factor (positive).....:	1.5
Design load (negative) [Pa] ..... :	1600	Safety factor (negative) .....:	1.5
Electrical ratings at irradiance level at STC			
Rated Pmax at STC [W]..... :	410, 415, 420, 425, 430, 435, 440		
Rated Voc at STC [V]..... :	37.73, 37.92, 38.11, 38.30, 38.49, 38.68, 38.87		
Rated Vmp at STC [V] ..... :	31.13, 31.32, 31.51, 31.70, 31.88, 32.06, 32.24		
Rated Isc at STC [A] ..... :	13.91, 13.99, 14.07, 14.15, 14.23, 14.31, 14.39		
Rated Imp at STC [A] ..... :	13.17, 13.25, 13.33, 13.41, 13.49, 13.57, 13.65		
Tolerance of rated electrical parameters at STC [%] ..... :	Tolerance of rated Pmax at STC is ±3% Tolerance of rated Voc at STC is ±3% Tolerance of rated Isc at STC is ±3%		

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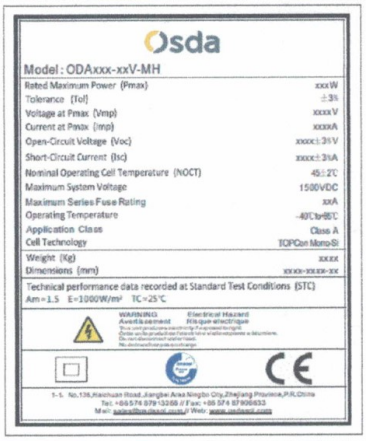
File No.: PVP03179/23P-06 Attached to Test Report No.: 492012901.001

Copy of marking plate:



List of critical materials and components:

Object	Manufacturer	Type	Technical Data	Remark
Components				
mono cell 1	Chuzhou Jietai New Energy Technology Co., Ltd.	CZJT-210M-18D3 n-type TOPCon bifacial cell	Dimension (w x l) = 210mm x 105mm Cell area = 22050mm² Thickness = 170±20µm 18 busbars	Tested with PV modules
mono cell 2	Chuzhou Jietai New Energy Technology Co., Ltd.	CZJT-182M-16D1 n-type TOPCon bifacial cell	Dimension (w x l) = 182mm x 91mm Cell area = 16507mm² Thickness = 130±13µm 16 busbars	Tested with PV modules
mono cell 3	Zhejiang Aiko Solar Energy Technology Co., Ltd.	8S7E1218A-R1 PERC bifacial cell	Dimension (w x l) = 210mm x 105mm Cell area = 22050mm² Thickness = 165±17.5µm 12 busbars	Tested with PV modules
Front cover	Flat Glass Group Co., Ltd.	AR coating tempered glass	Thickness = 3.2 mm	Tested with PV modules
Front cover 2	Xinyi Photovoltaic Glass Holding (Anhui) Co., Ltd.	AR coating tempered glass	Thickness = 3.2mm	Tested with PV modules
Rear cover	Jolywood (Suzhou) Sunwatt Co., Ltd.	FFC-JW3010(plus)	Fluorine resin / PET / Fluorine resin 13µm / 285µm / 12µm 310µm in total CTI = 600 (V) Color is white or black	Tested with PV modules CTI report no. 60427675 001 issued by TUV Rheinland

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Object	Manufacturer	Type	Technical Data	Remark
Encapsulation material 1 (Combine with mono cell 1, 2)	Cybrid Technologies (Zhejiang) Inc.	Cybright T11 (between front cover and cell) Cybright C11 (between cell and rear cover)	Thickness = 0.4-0.7 mm CTI = 600 (V) Color is transparent	Tested with PV modules CTI report no. 15043899 067 issued by TÜV Rheinland for Cybright T11 CTI report no. 15043899 060 issued by TÜV Rheinland for Cybright C11
Encapsulation material 2 (Combine with mono cell 3)	Jiangsu Lushan New Materials Co., Ltd.	EV1050G2 (between front cover and cell) EV1050G1 (between cell and rear cover)	Thickness = 0.45-0.6 mm CTI = 600 (V) Color is transparent	Tested with PV modules CTI report no. 70.407.20.100.01-00 issued by TÜV SÜD for EV1050G2 and EV1050G1
Frame parts 1	Zhangjiagang Shuoyuan Aluminum Technology Co., Ltd.	6005-T6	Thickness = 30 mm Color is silvery or black Assembled by corner brace	Tested with PV modules
Frame parts 2	Zhangjiagang Shuoyuan Aluminum Technology Co., Ltd.	6005-T6	Thickness = 33 mm Color:silvery or black Assembled by corner brace	Covered by tested PV modules
Frame parts 3	Jiangsu LEAD Aluminum Industry Co., Ltd.	6005-T6	Thickness = 30 mm Color:silvery Assembled by corner brace	Tested with PV modules
Frame parts 4	Jiangsu LEAD Aluminum Industry Co., Ltd.	6005-T6	Thickness = 33 mm Color:silvery Assembled by corner brace	Covered by tested PV modules
Frame parts 5	Changshu Dongneng SOLAR Technology Co., Ltd.	6005-T6	Thickness = 30 mm Color:silvery Assembled by corner brace	Tested with PV modules
Frame parts 6	Changshu Dongneng SOLAR Technology Co., Ltd.	6005-T6	Thickness = 33 mm Color:silvery Assembled by corner brace	Covered by tested PV modules
Adhesive (frame) 1	Suzhou Tonsan Adhesive Ltd.	1527	Color is white	Tested with PV modules
Adhesive (frame) 2	Shanghai Huitian New Material Co., Ltd.	HT906Z	Color is white or black	Tested with PV modules
Internal wiring (for interconnection cell-to-cell bus bar) 1	Ningbo Jiaming METAL Products Co., Ltd.	Copper belt with tin plated	Φ = 0.26 mm Sn60%Pb40% Color is silvery	Tested with PV modules
Internal wiring (for interconnection cell-to-cell bus bar) 2	Changzhou Greateen New Energy Technology Co., Ltd.	Copper belt with tin platde	Φ = 0.32mm Sn60%Pb40% Color is silvery	Tested with PV modules
Internal wiring (for interconnection cell-to-cell bus bar) 3	Changzhou Greateen New Energy Technology Co., Ltd.	Copper belt with tin platde	Φ = 0.26mm Sn60%Pb40% Color is silvery	Covered by tested PV modules

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Object	Manufacturer	Type	Technical Data	Remark
Internal wiring (for inter-string connection 1	Ningbo Jiaming METAL Products Co., Ltd.	Copper belt with tin plated	6.0 x 0.35 mm (middle) for 210mm mono cell 4.0 x 0.40 mm (middle) for 182mm mono cell 4.0 x 0.40 mm (both ends) Sn60%Pb40% Color is silvery	Tested with PV modules
Internal wiring (for inter-string connection) 2	Changzhou Greateen New Energy Technology Co., Ltd.	Copper belt with tin platde	6.0 x 0.35 mm (middle) for 210mm mono cell 4.0 x 0.40 mm (middle) for 182mm mono cell 4.0 x 0.40 mm (both ends) Sn60%Pb40% Color is silvery	Tested with PV modules
Soldering material	Ningbo Xihan Tin Solder Co., Ltd.	Sn50Pb50 (2#)	Φ = 2.0 mm Sn50%Pb50% Only used for J-box	Tested with PV modules
Fluxing agent 1	Shenzhen Tongfang Electronic New Material Co., Ltd..	TFHF9200	-	Tested with PV modules
Fluxing agent 2	Asahi Soldering Tin Science Technology (Wuxi) Co., Ltd.	SF105	-	Tested with PV modules
Fixing tape	Mecca Electrical Materials (Shanghai) Co., Ltd.	MK-8	Thickness = 0.065mm Width=10mm	Tested with PV modules
Junction box set 1				
Junction box	Ningbo ECONOMIC & TECHNICAL Development ZONE Hengda Electrical Co., Ltd.	PV-JB070xy (y=1 or 2 or 3)	Rated voltage = 1500VDC Rated current = 20A (y=1) Rated current = 25A (y=2) Rated current = 30A (y=3) RTI = 110°C Number of diodes: 3	Certificate no.: R 50506655
Adhesive (junction box) 1	Suzhou Tonsan New Material and Technology Co., Ltd.	TS1527	Color is white	-
Adhesive (junction box) 2	Shanghai Huitian New Material Co., Ltd.	HT906Z	Color is white or black	-
Potting material	Shanghai Huitian New Chemical Material Co., Ltd.	5299W-S	Color is white or black	-
Bypass diodes	Suzhou Good-ark Electronics Co., Ltd.	GFT3050SM (y=1)	Tj max = 200°C If = 30A	-
	Suzhou Good-ark Electronics Co., Ltd.	GFT4050SM (y=2)	Tj max = 200°C If = 40A	-
	Suzhou Good-ark Electronics Co., Ltd.	GFT5050ST (y=3)	Tj max = 200°C If = 50A	-
	Wuxi Honghu Semiconductor Co., Ltd.	GFT5050DT (y=3)	Tj max = 200° C If = 50A	-
Cable	Wuxi Xinhongye Wire & Cable Co., Ltd.	62930 IEC 131 1x4.0 mm²	Rated voltage = 1500VDC	Certificate no.: R 50439595

Confirmation of the applicant
Ningbo, 12/27/2023 (Place and date)

(Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT
Shanghai, _____ (Place and date)

Nancy Zhang
数字签名者：Nancy Zhang
日期：2023.12.29 17:45:43 +08'00'

(Signature of authorized TÜV NORD CERT engineer)

File No.: PVP03179/23P-06 Attached to Test Report No.: 492012901.001

Object	Manufacturer	Type	Technical Data	Remark
	Huzhou Shangfu Wire & Cable High Technology Co., Ltd.	62930 IEC 131 1x4.0 mm²	Rated voltage = 1500VDC	Certificate no.: R 50444396
	Ningbo Kibor Wire&Cable Co., Ltd.	62930 IEC 131 1x4.0 mm²	Rated voltage = 1500VDC	Certificate no. R 50413678
Connectors	Ningbo ECONOMIC&TECHNICAL Development ZONE Hengda Electrical Co., Ltd.	PV-ST101	Rated Voltage = 1500VDC Rated Current = 30A	Certificate no.: R 50386195
Junction box set 2				
Junction box	Zhejiang Renhe Photovoltaic Technology Co., Ltd.	FT60xy (x = 2, y = B or D)	Rated Voltage = 1500VDC Rated current = 30A Reverse current = 41A RTI = 110°C Number of diodes: 3	Certificate no. R 50497914
Adhesive (junction box)	TONSAN ADHESIVE INC. H.B. FULLER (SUZHOU) ADVANCED MATERIAL CO., LTD	TS1527	Color is white	-
	Shanghai Huitian New Chemical Material Co., Ltd.	HT906Z	Color is white or black	-
Potting material	Shanghai Huitian New Chemical Material Co., Ltd.	5299W-S	Color is white or black	-
	TONSAN ADHESIVE, INC H.B. FULLER (SUZHOU) ADVANCED MATERIAL CO., LTD	TS1521	Color is white	-
Bypass diodes	Zhejiang Renhe Photovoltaic Technology Co., Ltd.	RMK4555D	Tj max = 200°C If = 45A	-
	Zhejiang Renhe Photovoltaic Technology Co., Ltd.	RMK4545D	Tj max = 200°C If = 45A	-
	Zhejiang Renhe Photovoltaic Technology Co., Ltd.	RMK4550D	Tj max = 200°C If = 45A	-
Cable	Zhejiang Renhe Photovoltaic Technology Co., Ltd.	H1Z2Z2-K 1x4.0 mm²	Rated voltage = 1500VDC	Certificate no.: R 50318681
	Zhejiang Renhe Photovoltaic Technology Co., Ltd.	62930 IEC 131 1x4.0 mm²	Rated voltage = 1500VDC	Certificate no.: R 50452023
Connectors	Zhejiang Renhe Photovoltaic Technology Co., Ltd.	RHC2xyzu	Rated current = 35A (4.0mm²)	Certificate no.: R 50473621

Remark:

(1) Fire test Class C according to ANSI/UL 1703-2018 (MST 23 of IEC / EN 61730-2) has been evaluated on all the raw materials listed above.

(2) Pollution degree I (Sequence B1 of IEC / EN 61730-2) has been evaluated on all the raw materials listed above.

(3) Those materials marked in blue are added in most recent project.

---------- End of CDF ----------

Confirmation of the applicant
Ningbo, 12/27/2023 (Place and date)

(Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT
Shanghai, (Place and date)
数字签名者：Nancy Zhang
日期：2023.12.29 17:45:55 +08'00'

(Signature of authorized TÜV NORD CERT engineer)

Annex 2: List of measurement equipment

Testing Laboratory 1:

Measurement / testing	Measuring equipment	Equipment ID	Calibration due date
Visual inspectionMaterials creep testOthers	Appearance Tester	Z30042000	/
	Luminometer	Z30042001	10/10/2023
Maximum power determination	Steady state solar simulator	Z10S00800	11/30/2023
Insulation test	Withstand voltage tester	Z10289600	09/22/2023
Measurement of temperature coefficients	Steady state solar simulator	Z10S00800	11/30/2023
Performance at STC	Steady state solar simulator	Z10S00800	11/30/2023
Performance at low irradiance	Steady state solar simulator	Z10S00800	11/30/2023
Outdoor exposure Test	NMOT Test System	Z25032700	06/06/2023
Hot-spot endurance test	Steady state solar simulator	Z10S00800	11/30/2023
	Hot spot temperature light stability test chamber	Z25031600	10/26/2023
UV-test	Accelerated UV radiation testing machine	Z25031700	11/30/2023
	MPPT	Z25031800	03/16/2023
Humidity freeze test	Walking high and low temperature alternating humidity heat environment test chamber	Z25031400	09/20/2023
	Current Continuity Monitoring System	Z25032800	03/16/2023
Thermal cycling test	High and low temperature alternating humidity heat environment test chamber	Z10S03800	09/20/2023
	Current Continuity Monitoring System	Z25032800	03/16/2023
Damp heat test	Constant temperature and humidity chamber	Z10S03600	09/20/2023
Robustness of terminations	Digital dynamometer	Z10S06106	09/22/2023
	Strength Testing Machine for Lead-out End	Z25032200	03/08/2023
	Torque Testing Machine for Lead-out End	Z25032100	09/22/2023
Wet leakage current test	Withstand voltage tester	Z10289600	09/20/2023
	Conductivity meter	Z10S05002	09/22/2023
	Thermometer	J10S01600	03/14/2023
Static mechanical load test	Dynamic Mechanical Load Tester	Z30055000	04/13/2023
	Measurement display controller	Z30055001	09/21/2023

Hail test	Hail impact test machine	Z25032600	10/28/2023
	Electronic balance	Z10S00502	09/22/2023
	Vernier calliper	J10055500	09/22/2023
Bypass diode thermal test	High and low temperature alternating humidity heat environment test chamber	Z10S03800	09/20/2023
	Pulse DC Power Supply	Z30134700	03/16/2023
	Digital oscilloscope	Z10289700	10/07/2023
	Current probe	Z30139900	06/05/2023
	Data collector	Z10S00902	03/15/2023
Bypass diode functionality test	Steady state solar simulator	Z10S00800	11/30/2023
Initial stabilization	Hot spot temperature light stability test chamber	Z25031600	10/26/2023
	MPPT	Z25031800	03/16/2023
	Steady state solar simulator	Z10S00800	11/30/2023
Continuity test of equipotential bonding	earth resistance tester	Z30063000	09/22/2023
Accessibility test	Digital multimeter	Z10S03400	03/13/2023
	Test finger	Z25032500	10/12/2023
Impulse Voltage test	Impulse voltage generator	Z30111400	10/26/2023
	High pressure probe	Z10289701	09/29/2023
	Digital oscilloscope	Z10289700	10/07/2023
Temperature test	Hot spot temperature light stability test chamber	Z25031600	10/25/2023
Reverse current overload test	DC power supply	Z25032000	03/21/2023
Module breakage test	Impact tester	Z10S05300	/
Materials creep test	Walking high and low temperature alternating humidity heat environment test chamber	Z25031500	09/20/2023
Cold conditioning	humiditWalking high and low temperature alternating humidity heat environment test chambery cycling environment chamber	Z25031400	09/20/2023
Dry heat conditioning	humiditWalking high and low temperature alternating humidity heat environment test chambery cycling environment chamber	Z25031400	09/20/2023
Ignitability test	Full scale component burnable testing machine	Z30138100	/
	Cronometro	J30009100	03/15/2023

	straight steel ruler	J30075100	10/10/2023
Cut susceptibility test	shear testing machine	Z30041900	/
	Cronometro	J30009100	03/15/2023
	straight steel ruler	J30075200	03/20/2023
Sharp edge test	Edge edge detector	Z25032400	10/10/2023
Others	Temperature-hydrometer	Z30041750	09/22/2023
		JJ10S00300	09/22/2023
	Tower ruler	J30075300	10/09/2023
		J30075400	10/09/2023
	straight steel ruler	J30074900	03/20/2023
		J30075000	03/20/2023
	Vernier calliper	J10055500	09/22/2023

Testing Laboratory 2:

Measurement / testing	**Measuring equipment**	**Equipment ID**	**Calibration due date**
Visual inspection	Luminometer	TNRDTO002	02/20/2024
Maximum power determination	Pulsed Solar Simulator	TNRDEQ001	02/20/2024
Insulation test	Withstanding voltage/Insulation resistance tester	TNRDTI001	02/20/2024
	Thermometer	TNRDTO003	02/20/2024
Performance at STC	High temperature chamber	TNRDEQ005	02/20/2024
	Pulsed Solar Simulator	TNRDEQ001	02/20/2024
Wet leakage current test	Withstanding voltage/ Insulation resistance tester	TNRDTI020	02/20/2024
	Conductive meter	TNRDTI004	02/20/2024
Initial stabilization	Steady-state solar simulator	TNRDEQ011	03/15/2024
	Resistive Load	TNRDTI013	02/20/2024
Temperature test	Steady-state solar simulator	TNRDEQ011	03/27/2024
Others	Temperature-hydrometer	TNRDTO007	10/10/2024
	Steel Tape	TNRDTO004	10/15/2024
	Caliper	TNRDTO014	10/18/2024
	Straight ruler	TNRDTO048	03/09/2024
	Electronic balance	TNRDTO009	10/18/2024

Annex 3: Statement of the estimated uncertainty of the test results

BOM1, BOM2, BOM3, BOM4 were conducted by Testing Laboratory 1:

For BOM1&BOM2:

The total measuring uncertainty of Pmax (m_1) is ≤ 2.85%

The total measuring uncertainty of Isc (m_2) is ≤ 2.69%

The total measuring uncertainty of Voc (m_3) is ≤ 1.57%

For BOM3&BOM4:

The total measuring uncertainty of Pmax (m_1) is ≤ 2.74%

The total measuring uncertainty of Isc (m_3) is ≤ 2.36%

The total measuring uncertainty of Voc (m_2) is ≤ 1.48%

BOM5, BOM6 were conducted by Testing Laboratory 1:

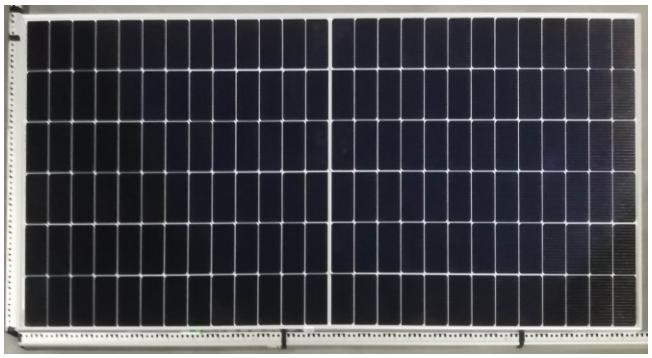
For BOM5&BOM6:

The total measuring uncertainty of Pmax (m_1) is ≤ 2.48%

The total measuring uncertainty of Isc (m_3) is ≤ 2.44%

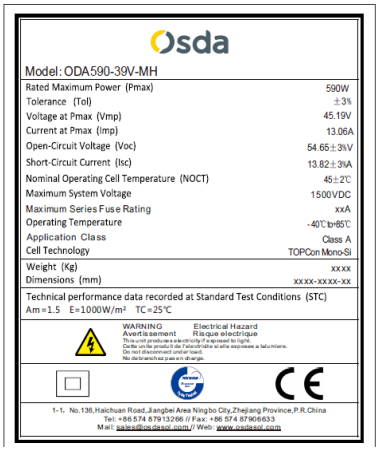
The total measuring uncertainty of Voc (m_2) is ≤ 0.90%

Annex 4: Photos
Module type: ODA590-39V-MH (BOM1)



Front overview

Back overview



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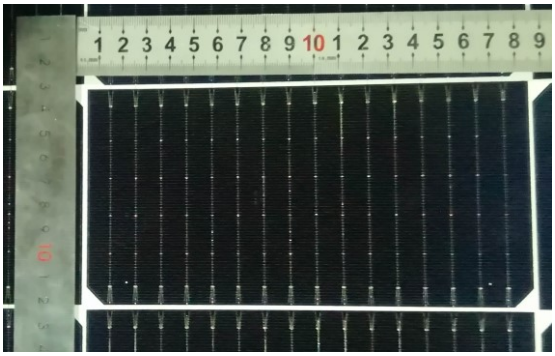
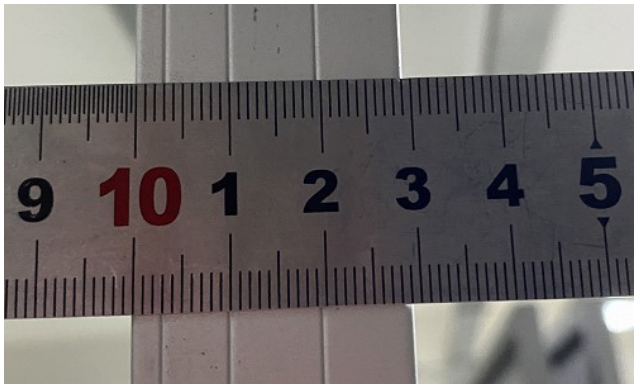
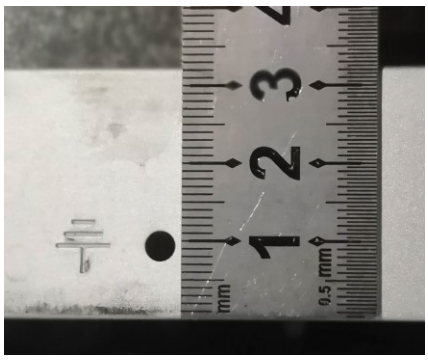


Solar cell

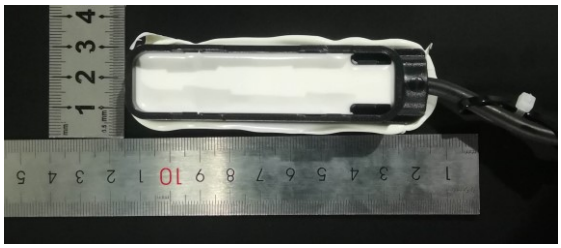


Frame



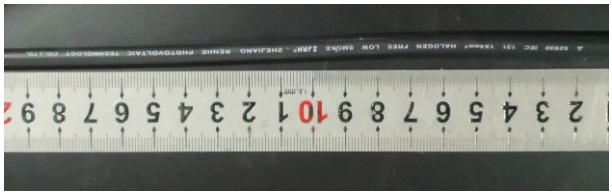
Grounding Mark

Junction box (FT60xy)



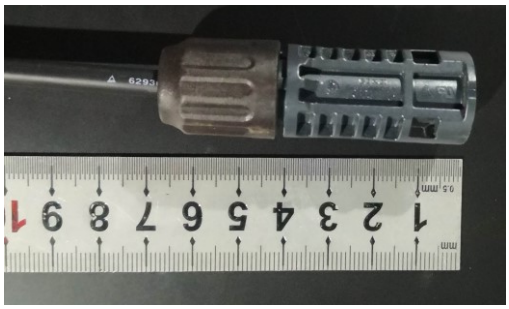
Junction box (opened)

N/A



Bypass diode (Junction box is potted)

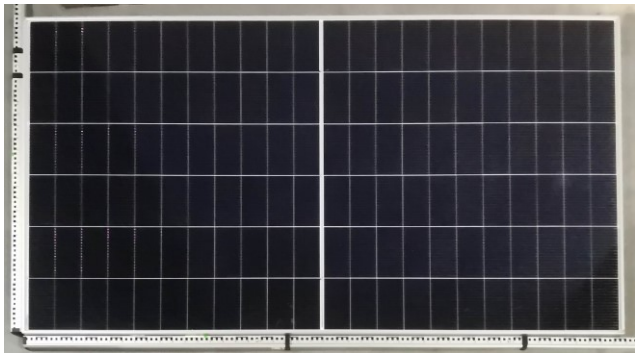
Cable (H1Z2Z2-K 1x4.0mm²)



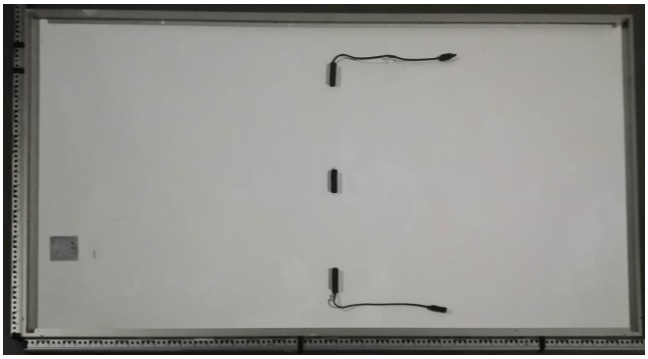
Mark (Do not disconnect under load)

Connectors (RHC2)

Module type: ODA670-33V-MH (BOM2)

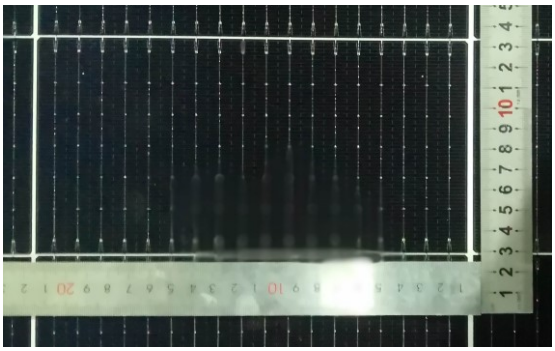


Front overview



Back overview

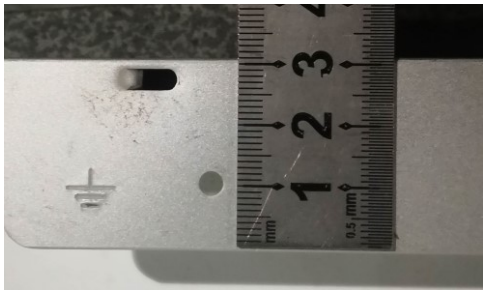
N/A



Label

Solar cell

Frame



Grounding Mark

Junction box (FT60xy)

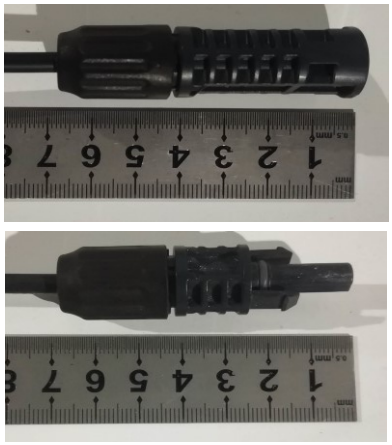
Junction box (opened)

N/A

Bypass diode (Junction box is potted)

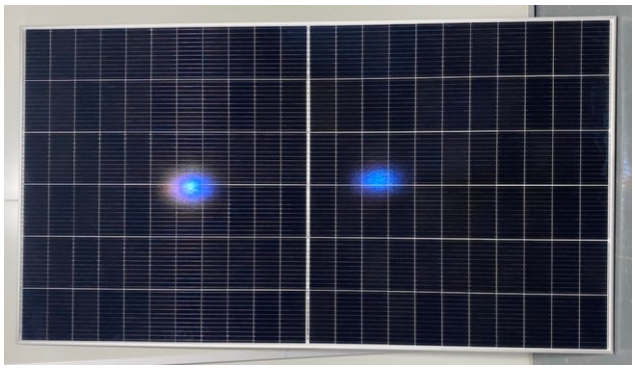
Cable (H1Z2Z2-K 1x4.0mm²)

Mark (Do not disconnect under load)

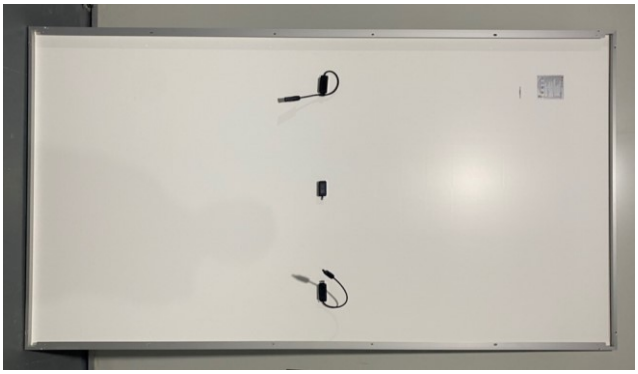


Connectors RHC2)

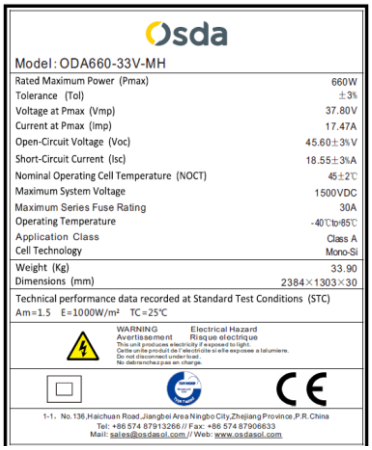
Module type: ODA660-33V-MH (BOM3)



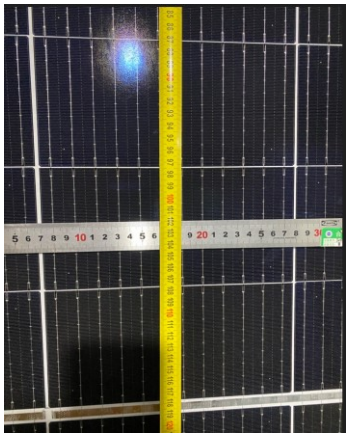
Front overview



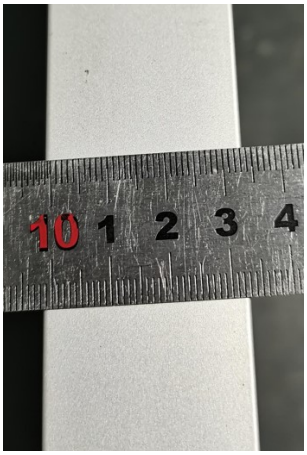
Back overview



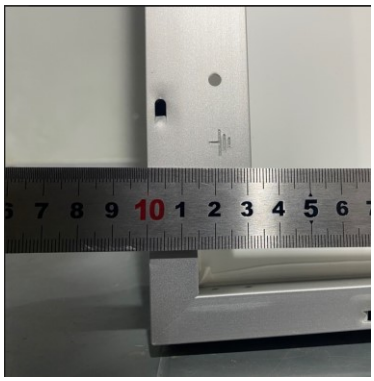
Label



Solar cell



Frame



Grounding Mark

Junction box (FT70xy)

Junction box (opened)

N/A

Bypass diode (Junction box is potted)

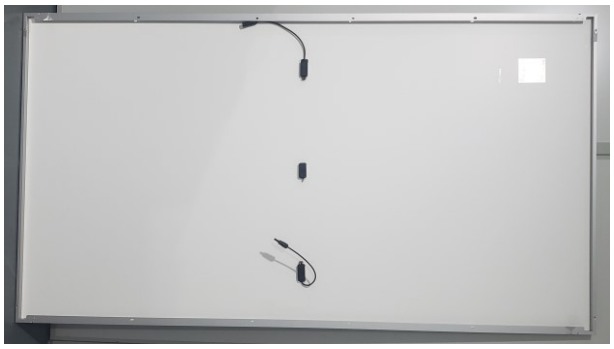
Cable (62930 IEC 131 1x4.0mm²)

Mark (Do not disconnect under load)

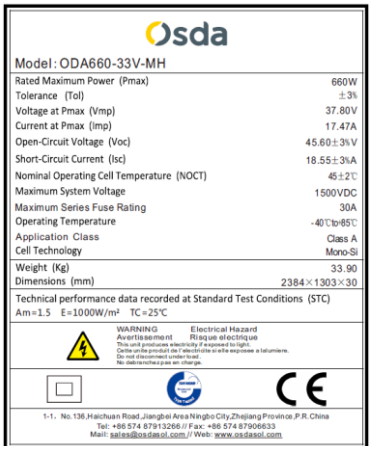
Connectors (RHC2)

Module type: ODA660-33V-MH (BOM4)

Front overview



Back overview



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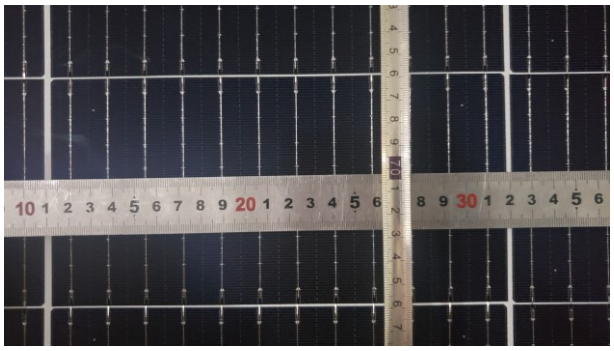
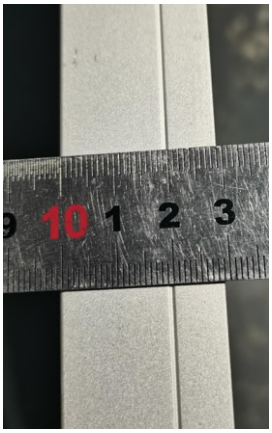
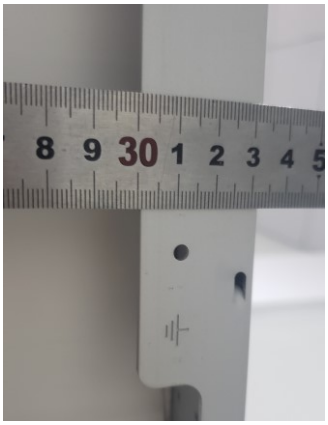


Solar cell



Frame



Grounding Mark

Junction box (FT70xy)

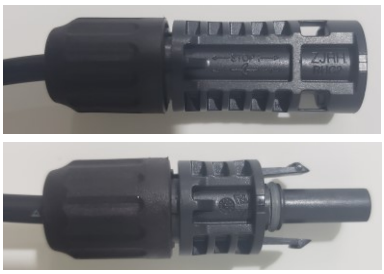
Junction box (opened)

N/A

Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

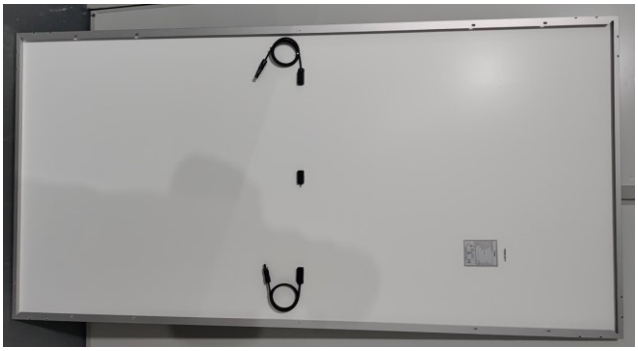
Mark (Do not disconnect under load)



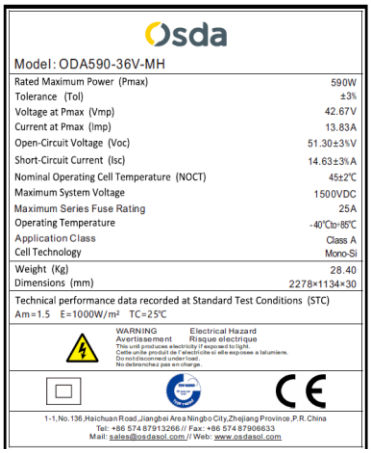
Connectors (RHC2)

Module type: ODA590-36V-MH (BOM5)

Front overview



Back overview



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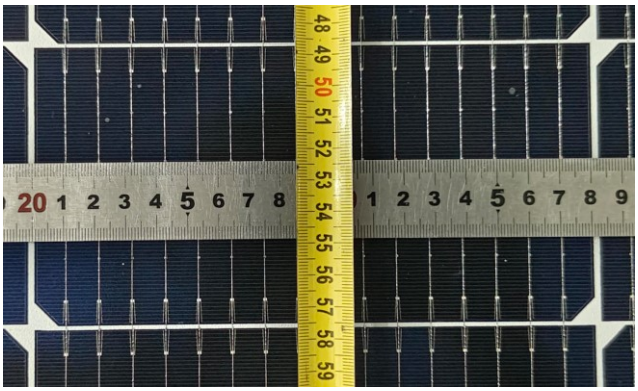
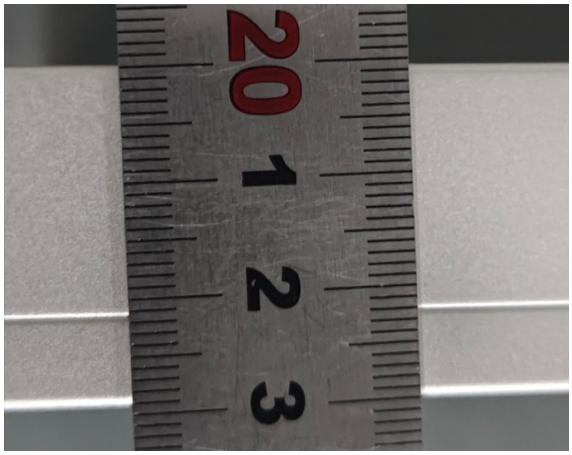
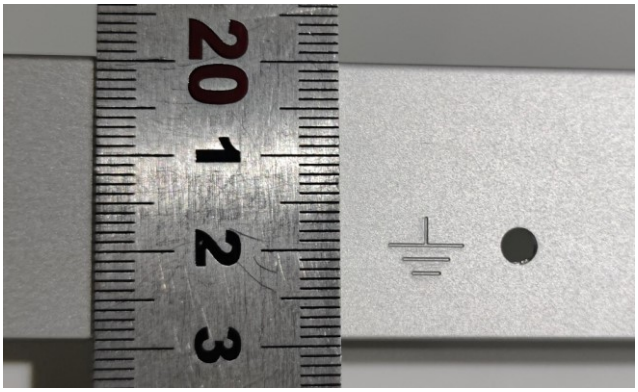


Solar cell



Frame



Grounding Mark

Junction box (PV-JB070xy)

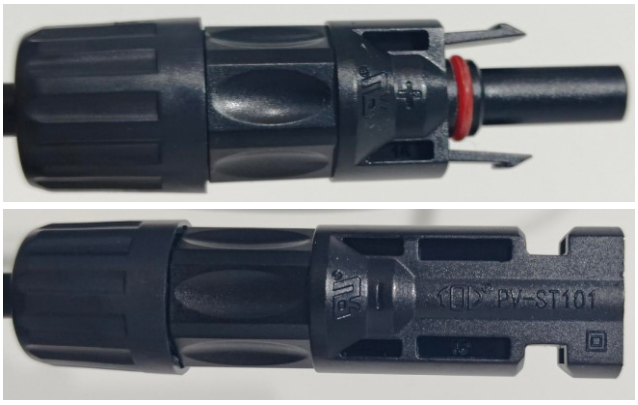
Junction box (opened)

N/A

Bypass diode (Junction box is potted)

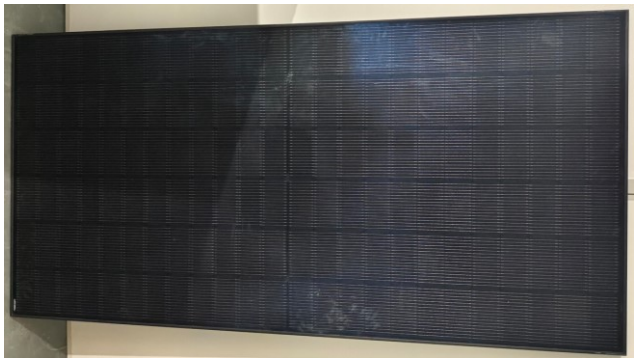
Cable (62930 IEC 131 1x4.0mm²)

Mark (Do not disconnect under load)



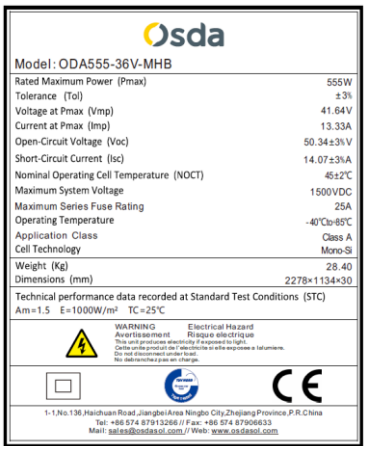
Connectors (PV-ST101)

Module type: ODA555-36V-MHB (BOM6)

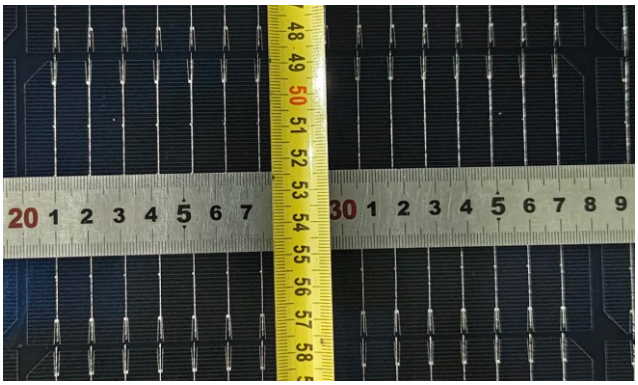


Front overview

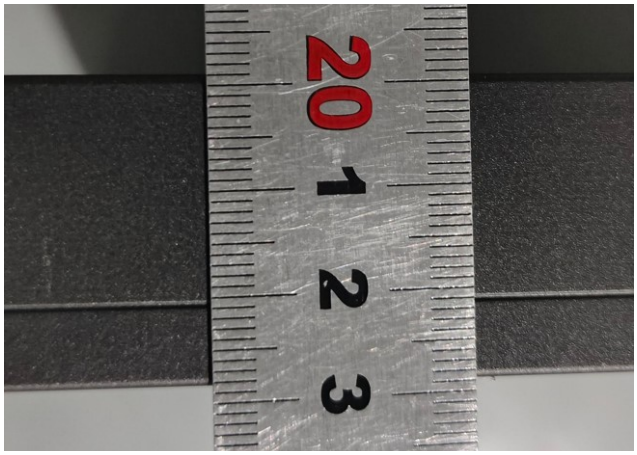
Back overview



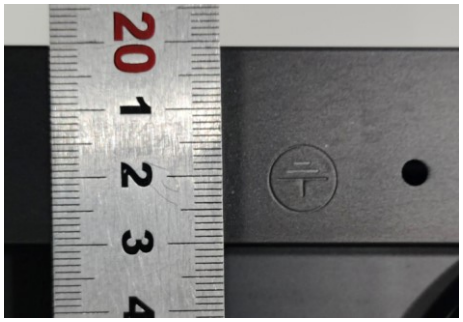
Label



Solar cell



Frame



Grounding Mark

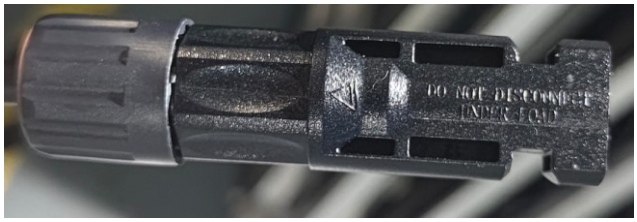
Junction box (PV-JB070xy)

Junction box (opened)

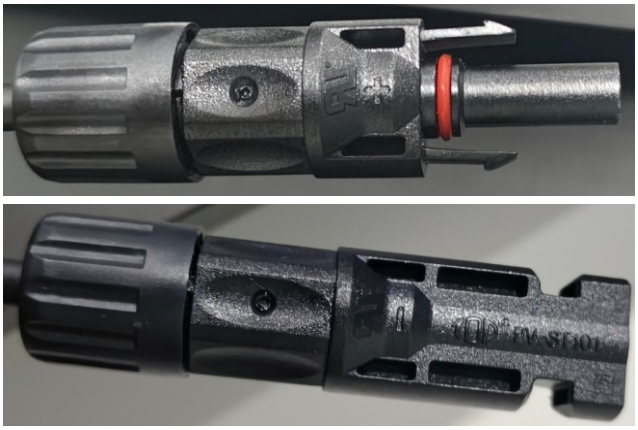
N/A

Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

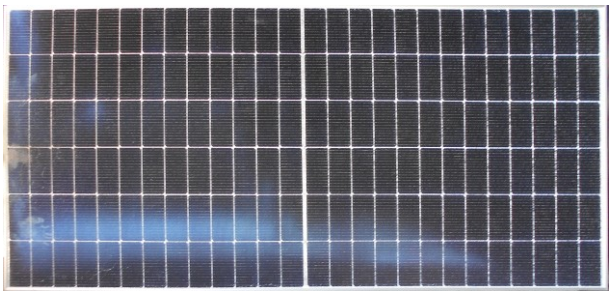


Mark (Do not disconnect under load)



Connectors (PV-ST101)

Annex 5: Photos of fire test
Module type: ODA590-39V-MH (BOM1)



Sample 20#: Spread of flame test (front)

Sample 20#: Spread of flame test (back)

Sample 22#: Burning brand test (front)

Sample 22#: Burning brand test (back)

Module type: ODA660-33V-MH (BOM3)

Sample 3-20#: Spread of flame test (front)

Sample 3-20#: Spread of flame test (back)

Sample 3-22#: Burning brand test (front)

Sample 3-22#: Burning brand test (back)

---------- End of test report ----------