

Test Report

No. 492011490.006

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

Applicant: **Jiangsu Sunport Power Corp., Ltd.**
No.20, Xishi Road, Xinwu District,
Wuxi City, Jiangsu Province, 214028, P.R. China

File No.: PVP02093/23P-02

Designed: by:
(Project Engineer)

Reviewed: by:
(Technical Certifier)

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Test Report



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Test Report No.: 492011490.006

Applicant..... :	Jiangsu Sunport Power Corp., Ltd. No.20, Xishi Road, Xinwu District, Wuxi City, Jiangsu Province, 214028, P.R. China
Manufacturer 1 :	Xuzhou Sunport Power Co. Ltd. No.1, Fumin Road, High-tech Industrial Development Zone Pizhou, Jiangsu Province, P.R. China
Manufacturer 2 :	Jiangsu Sunport Power Corp., Ltd. No.20, Xishi Road, Xinwu District, Wuxi City, Jiangsu Province, 214028, P.R. China
Order No. :	QT-PVP02093/23P
Date of Application :	02/15/2023
Product :	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
Module type(s)..... :	Flexible PV module with 6" Mono-crystalline MWT Solar Cells: 60 cells: SPPXXXM60S(XXX=305-320W, in increments of 5) 144 cells: SPPXXXQH7S(XXX=400-435W, in increments of 5) 132 cells: SPPXXXQHFS(XXX=365-395W, in increments of 5) 126 cells: SPPXXXQHES(XXX=350-380W, in increments of 5) 110 cells: SPPXXXQH110S(XXX=305-330W, in increments of 5) 70 cells: SPPXXXQH70S(XXX=200-205W, in increments of 5) 42 cells: SPPXXXQH42S(XXX=115-125W, in increments of 5) 36 cells: SPPXXXQH36S(XXX=100-110W, in increments of 5) 30 cells: SPPXXXQH1S(XXX=85-90W, in increments of 5) 138 cells: SPPXXXNHGS(XXX=370-400W, in increments of 5) 126 cells: SPPXXXNHES(XXX=340-365W, in increments of 5) 42 cells: SPPXXXNH42S(XXX=115-120W, in increments of 5) 36 cells: SPPXXXNH36S(XXX=95-105W, in increments of 5) 30 cells: SPPXXXNH1S(XXX=80-85W, in increments 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 :	03/14/2023 - 08/16/2023
Testing Laboratory..... :	TÜV NORD PV Science and Technology Co., Ltd. East side 1st Floor (South), Building 11, South Zone of Modern Industrial Park Wuzhong Science and Technology City, No. 38, Beiguandu Road Wuzhong District, Suzhou,China

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

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

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IEC / EN 61215-1:2016 "Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements"

IEC / EN 61215-1-1:2016 "Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules"

IEC 61215-2:2016 / EN 61215-2:2017 + AC:2017 + AC:2018 "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"

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History of certification	
File no.:	SHV09035/19
Certificate no....:	44 780 20 406749 - 145
Date of issue:	08/05/2020
Report no.:	492011490.001
Module type(s) .:	Flexible PV module with 6" Mono-crystalline MWT Solar Cells: 60 cells: SPPXXXM60S(XXX=305-320W in increments of 5)
Description:	Basic qualification
File no.:	PVP01023/21P
Certificate no....:	44 780 20 406749 - 145R1M1 (replaced certificate 44 780 20 406749 - 145)
Date of issue:	06/10/2021
Report no.:	492011490.002
Module type(s) .:	Flexible PV module with 6" Mono-crystalline MWT Solar Cells: 60 cells: SPPXXXM60S(XXX=305-320W in increments of 5) 144 cells: SPPXXXQH7S(XXX=400-435W in increments of 5) 126 cells: SPPXXXQHES(XXX=350-380W in increments of 5) 42 cells: SPPXXXQH42S(XXX=115-125W in increments of 5) 36 cells: SPPXXXQH36S(XXX=100-110W in increments of 5) 30 cells: SPPXXXQH1S(XXX=85-90W in increments of 5) 138 cells: SPPXXXNHGS(XXX=370-400W in increments of 5) 126 cells: SPPXXXNHES(XXX=340-365W in increments of 5) 42 cells: SPPXXXNH42S(XXX=115-120W in increments of 5) 36 cells: SPPXXXNH36S(XXX=95-105W in increments of 5) 30 cells: SPPXXXNH1S(XXX=80-85W in increments of 5)
Description:	Extend to raw materials and related new module types.
File no.:	PVP07036/21P
Certificate no....:	44 780 20 406749 - 145R1M2 (replaced certificate 44 780 20 406749 - 145R1M1)
Date of issue:	07/22/2021
Report no.:	492011490.003
Module type(s) .:	Same as above
Description:	Extend to raw material
File no.:	PVP12110/22P
Certificate no....:	44 780 20 406749 - 145R2A1M3 (replaced certificate 44 780 20 406749 - 145R1M2)
Date of issue:	02/06/2023
Report no.:	492011490.004
Module type(s) .:	Same as above

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Description:	Extend to raw materials and related new module types.
File no.	PVP02093/23P-01
Certificate no.	44 780 20 406749 - 145R2A1M4 (replaced certificate 44 780 20 406749 - 145R2A1M3)
Date of issue	04/27/2023
Report no.	492011490.005
Module type(s) .:	Same as above
Description:	Extend to raw materials
Supplementary information: N/A	

Summary of testing

According to the enquiry of the applicant based on the previous certificate 44 780 20 406749 - 145R2A1M4 and test report no.492011490.005, extend to new raw materials and PV module types listed as below according to IEC 61215-1:2016, IEC 61215-2:2016, IEC 61215-1-1:2016, IEC 61730-1:2016 and IEC 61730-2:2016.

New raw materials

- Encapsulation material

Type: TF4(between cell and front cover) / TF4 (between cell and rear cover)

Manufacturer: Hangzhou First Applied Material Co., Ltd.

Module type SPP375QHES (BOM1) was selected as representative test samples and conducted with all the related tests.

- Rear cover

Type: FFC-JW30 (plus) (black)

Manufacturer: Jolywood (Suzhou) Sunwatt Co., Ltd.

Module type SPP375QHES (BOM2) was selected as representative test samples and conducted with all the related tests.

New PV module types:

70 cells: SPPXXXQH70S(XXX=200-205W, in increments of 5)

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.

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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	Vmpp - Maximum power voltage
Imp - Maximum power current	Voc - Open circuit voltage
Isc - Short circuit current	FF - Fill Factor
Pmpp - 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
CI - 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:	
<p>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.</p> <p>“(see Annex #)” refers to additional information appended to the report. “(see Table #)” refers to a table appended to the report.</p> <p>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.</p> <p>Throughout this report, a point is used as the decimal separator.</p>	

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General product information

Module type: SPP375QHES

Product Electrical Ratings at STC:	
Nominal maximum power (Pmax) [W] with tolerance	375 ±3%
Nominal open circuit voltage at (Voc) [V] with tolerance ...:	42.8 ± 3%
Nominal maximum power voltage (Vmpp) [V]	35.3
Nominal short circuit current at (Isc) [A] with tolerance	11.23±5%
Nominal maximum power current (Impp) [A]	10.62
Product Safety Ratings:	
Maximum system voltage [V]	1500
Fuse rating [A]	18
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: SPP375QHES (BOM1)

<input type="checkbox"/>	Random sampling from production
<input checked="" type="checkbox"/>	Prototype submitted by client
<input type="checkbox"/>	New module type
<input checked="" type="checkbox"/>	Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)
<input type="checkbox"/>	Modification to frontsheet
<input checked="" type="checkbox"/>	Modification to encapsulation system
<input type="checkbox"/>	Modification to cell technology
<input type="checkbox"/>	Modification to cell and string interconnect material or technique
<input type="checkbox"/>	Modification to backsheet
<input type="checkbox"/>	Modification to electrical termination
<input type="checkbox"/>	Modification to bypass diode
<input type="checkbox"/>	Modification to electrical circuitry
<input type="checkbox"/>	Modification to edge sealing
<input type="checkbox"/>	Modification to frame and/or mounting structure
<input type="checkbox"/>	Change in PV module size
<input type="checkbox"/>	Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process
<input type="checkbox"/>	Increase of over-current protection rating
<input type="checkbox"/>	Increase of system voltage
<input type="checkbox"/>	Change in cell fixing tape
<input type="checkbox"/>	Others
<input type="checkbox"/>	Others
Description of similarity (differences) between the applied model and the previously tested model: Extend to new raw materials	
- Encapsulation material	
Type:	TF4(between cell and front cover) / TF4 (between cell and rear cover)
Manufacturer:	Hangzhou First Applied Material Co., Ltd.

Module type: SPP375QHES (BOM2)

<input type="checkbox"/>	Random sampling from production
<input checked="" type="checkbox"/>	Prototype submitted by client
<input type="checkbox"/>	New module type
<input checked="" type="checkbox"/>	Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)
<input type="checkbox"/>	Modification to frontsheet
<input type="checkbox"/>	Modification to encapsulation system
<input type="checkbox"/>	Modification to cell technology
<input type="checkbox"/>	Modification to cell and string interconnect material or technique
<input checked="" type="checkbox"/>	Modification to backsheet
<input type="checkbox"/>	Modification to electrical termination
<input type="checkbox"/>	Modification to bypass diode
<input type="checkbox"/>	Modification to electrical circuitry
<input type="checkbox"/>	Modification to edge sealing
<input type="checkbox"/>	Modification to frame and/or mounting structure
<input type="checkbox"/>	Change in PV module size
<input type="checkbox"/>	Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process
<input type="checkbox"/>	Increase of over-current protection rating
<input type="checkbox"/>	Increase of system voltage
<input type="checkbox"/>	Change in cell fixing tape
<input type="checkbox"/>	Others
<input type="checkbox"/>	Others
Description of similarity (differences) between the applied model and the previously tested model: Extend to black rear cover	

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Module group assignment

Module type: SPP375QHES (BOM1)

Sample #	Serial number	Dimension (l x w x h) [mm]	Remark
1	41AB20321390	1840 x 1040 x 2.5	REF
2	41AB20330026	1840 x 1040 x 2.5	F2
3	41AB20321375	1840 x 1040 x 2.5	F3
4	41AB20321387	1840 x 1040 x 2.5	C1
5	41AB20321156	1840 x 1040 x 2.5	C2
6	41AB20321386	1840 x 1040 x 2.5	D1
7	41AB20321389	1840 x 1040 x 2.5	D2
8	41AB20321362	1840 x 1040 x 2.5	E1
9	41AB20321357	1840 x 1040 x 2.5	E2
10	41AB20321374	1840 x 1040 x 2.5	F4
11	41AB20321170	1840 x 1040 x 2.5	G
12	41AB20321163	1840 x 1040 x 2.5	I
13	41AB20321164	1840 x 1040 x 2.5	A
14	41AB20321358	1840 x 1040 x 2.5	B
15	41AB20321166	1840 x 1040 x 2.5	B1
16	41AB20330019	1840 x 1040 x 2.5	H
17	41AB20330034	1840 x 1040 x 2.5	H
18	41AB20330021	1840 x 1040 x 2.5	H
19	41AB20330020	1840 x 1040 x 2.5	J

Module type: SPP375QHES (BOM2)

Sample #	Serial number	Dimension (l x w x h) [mm]	Remark
20	40AA29260745	1840 x 1040 x 2.5	F4

Clause	Requirement + Test	Result - Remark	Verdict
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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 including tolerances	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

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-	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)	Nominal module operating temperature (NMOT) is specified	Yes	P
h)	Performance at NMOT (MQT 06.2) is specified	Yes	P
i)	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:			-
j)	The minimum cable diameters for modules intended for field wiring	Yes	P
k)	Any limitations on wiring methods and wire management that apply to the wiring compartment or box;	Yes	P
l)	The size, type, material and temperature rating of the conductors to be used	Yes	P
m)	Type of terminals for field wiring	Yes	P
n)	Specific PV connector model/types and manufacturer to which the module connectors are mated	Yes	P
o)	The bonding method(s) to be used (if applicable); all provided or specified hardware is identified in the documentation	Yes	P
p)	The type and ratings of bypass diode to be used (if applicable)	Yes	P
q)	limitations to the mounting situation (e.g., slope, orientation, mounting means, cooling)	Yes	P
r)	A statement indicating the fire rating(s) and the applied standard as well as the limitations to that rating (e.g., installation slope, sub structure or other applicable installation information)	Yes	P

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s)	A statement indicating the design load per each mechanical means for securing the module as evaluated during the static mechanical load test according to MQT 16. At discretion of the manufacturer the test load and/or the safety factor γ_m may be noted, too	Yes	P
-	The installation instructions include relevant parameters specified by manufacturer or the following statement or the equivalent: <i>"Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of 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."</i>	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			

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Clause	Requirement + Test	Result - Remark	Verdict
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
-	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
-	A module design is judged to have passed the qualification tests and therefore to be approved according to this standard, if each test sample meets all of the following criteria.	Yes	P
7.2 Power output and electric circuitry			-
7.2.1 Verification of rated label values (Gate No. 1)			-
-	After stabilization, each individual module meets: $P_{max}(Lab) \cdot \left(1 + \frac{ m_1 [\%]}{100}\right) \geq P_{max}(NP) \cdot \left(1 - \frac{ t_1 [\%]}{100}\right)$	Yes	P
-	After stabilization: $\bar{P}_{max}(Lab) \cdot \left(1 + \frac{ m_1 [\%]}{100}\right) \geq P_{max}(NP)$	Yes	P
-	After stabilization, each individual module meets: $V_{oc}(Lab) \cdot \left(1 + \frac{ m_2 [\%]}{100}\right) \leq V_{oc}(NP) \cdot \left(1 + \frac{ t_2 [\%]}{100}\right)$	Yes	P
-	After stabilization, each individual module meets: $I_{sc}(Lab) \cdot \left(1 + \frac{ m_3 [\%]}{100}\right) \leq I_{sc}(NP) \cdot \left(1 + \frac{ t_3 [\%]}{100}\right)$	Yes	P
7.2.2 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: $P_{max}(Lab_Gate\#2) \geq 0.95 \times P_{max}(Lab_Gate\#1) \cdot \left(1 - \frac{r[\%]}{100}\right)$	Yes	P
7.2.3 Electrical circuitry			-
-	Samples are not permitted to exhibit an open-circuit during the tests	No open-circuit observed.	P

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Clause	Requirement + Test	Result - Remark	Verdict
7.3 Visual defects			-
-	There is no visual evidence of a major defect.	Yes	P
7.4 Electrical safety			-
-	The insulation test (MQT 03) requirements are met after the tests	Yes	P
-	The wet leakage current test (MQT 15) requirements are met at the beginning and the end of each sequence.	Yes	P
-	Specific requirements (IEC 61215-1-1) of the individual tests are met.	Yes	P
Supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict
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Module type: SPP375QHES (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 4.6.1	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..... :	N/A	N/A
MST11	Accessibility test..... :	See table 10.9	P

Sample 1#			-
MQT04	Measurement of temperature coefficients..... :	See table 4.4	-
MQT06.2	Performance at NMOT..... :	N/A	N/A
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
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 4.14.1	P
MQT14.2/MST42	Test of cord anchorage..... :	N/A	N/A
MST12	Cut susceptibility test..... :	See table 10.10	P

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Clause	Requirement + Test	Result - Remark	Verdict
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Sample 5#			-
MQT10/MST54	UV preconditioning test (15kWh/m ²)	See table 4.10	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
MQT16/MST34	Static mechanical load test	See table 4.16	P
MQT19.3	Stress-Specific Stabilization - BO LID	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
MQT17	Hail test	See table 4.17	P
MQT19.3	Stress-Specific Stabilization - BO LID	N/A	N/A

Sample 10#			-
MST21	Temperature test	See table 10.15	P
MST26	Reverse current overload test	See table 10.20	P

Sample 11#			-
MST14	Impulse voltage test	See table 10.12	P

Sample 12#			-
MST32	Module breakage test	See table 10.21	P

Sample 13#			-
MST37	Materials creep test	See table 10.26	P

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Clause	Requirement + Test	Result - Remark	Verdict
Sample 14#			-
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 (1 st 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 (2 nd round, 10 cycles)..... :	See table 10.29	P
MST12	Cut susceptibility test..... :	See table 10.10	P
Sample 15#			-
MST55	Cold conditioning (1 st round)..... :	See table 10.32	P
MST56	Dry hot conditioning..... :	See table 10.33	P
MQT12/MST52	Humidity freeze (1 st round, 10 cycles)..... :	See table 10.29	P
MST55	Cold conditioning (2 nd round)..... :	See table 10.32	P
MQT12/MST52	Humidity freeze (2 nd round, 10 cycles)..... :	See table 10.29	P
MST12	Cut susceptibility test..... :	See table 10.10	P
Sample 16#, 17#, 18#			-
MST23	Fire test..... :	See table 10.17	P
Sample 19#			-
MST24	Ignitability test..... :	See table 10.18	P
Final examinations			-
MQT06.1/MST02	Performance at STC (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..... :	N/A	N/A
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..... :	See table 10.6	P
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

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Clause	Requirement + Test	Result - Remark	Verdict
MST35	Peel test..... :	N/A	N/A

Module type: SPP375QHES (BOM2)

Initial examinations			-
MQT19.1	Initial stabilization..... :	N/A	N/A
MQT01/MST01	Visual inspection..... :	See table 4.1 & 10.2	P
MQT06.1/MST02	Performance at STC (Gate #1)..... :	N/A	N/A
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..... :	N/A	N/A
MST11	Accessibility test..... :	N/A	N/A

Sample 20#			-
MST21	Temperature test..... :	See table 10.15	P
MST26	Reverse current overload test..... :	N/A	N/A

Final examinations			-
MQT06.1/MST02	Performance at STC (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..... :	See table 10.2	P
MST05	Durability of markings..... :	See table 10.6	P
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

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

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

Module type: SPP375QHES (BOM1)

4.1 Visual inspection (initial) - MQT01/MST01			-
Test date [MM/DD/YYYY].....:		03/14/2023	-
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
Supplementary information: N/A			

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2							
Clause	Requirement + Test		Result - Remark				Verdict
4.19.5 Stabilization (initial) - MQT19.1							
Sample #.....:	1						-
Light exposure method.....:	<input type="checkbox"/> Solar simulator / <input checked="" type="checkbox"/> Natural sunlight / <input type="checkbox"/> Others						-
Test date [MM/DD/YYYY] / start - end ..:	03/14/2023 - 03/20/2023						-
Test cycle	Integrated irradiation [kWh/m ²]	Irradiance [W/m ²]	Module temperature [°C]	Resistive load [Ω]	Pmpp 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	366.5	-	-
1(P2)	5.0	>500	50±10	MPPT	366.6	-	-
2(P3)	5.0	>500	50±10	MPPT	366.6	0.39	Yes
Sample #.....:	2						-
Light exposure method.....:	<input type="checkbox"/> Solar simulator / <input checked="" type="checkbox"/> Natural sunlight / <input type="checkbox"/> Others						-
Test date [MM/DD/YYYY] / start - end ..:	03/14/2023 - 03/20/2023						-
Test cycle	Integrated irradiation [kWh/m ²]	Irradiance [W/m ²]	Module temperature [°C]	Resistive load [Ω]	Pmpp 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	366.1	-	-
1(P2)	5.0	>500	50±10	MPPT	366.6	-	-
2(P3)	5.0	>500	50±10	MPPT	366.6	0.39	Yes
Sample #.....:	3						-
Light exposure method.....:	<input type="checkbox"/> Solar simulator / <input checked="" type="checkbox"/> Natural sunlight / <input type="checkbox"/> Others						-
Test date [MM/DD/YYYY] / start - end ..:	03/14/2023 - 03/20/2023						-
Test cycle	Integrated irradiation [kWh/m ²]	Irradiance [W/m ²]	Module temperature [°C]	Resistive load [Ω]	Pmpp 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	367.1	-	-
1(P2)	5.0	>500	50±10	MPPT	367.2	-	-
2(P3)	5.0	>500	50±10	MPPT	367.2	0.48	Yes
Sample #.....:	4						-
Light exposure method.....:	<input type="checkbox"/> Solar simulator / <input checked="" type="checkbox"/> Natural sunlight / <input type="checkbox"/> Others						-
Test date [MM/DD/YYYY] / start - end ..:	03/14/2023 - 03/20/2023						-
Test cycle	Integrated irradiation [kWh/m ²]	Irradiance [W/m ²]	Module temperature [°C]	Resistive load [Ω]	Pmpp 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	365.8	-	-
1(P2)	5.0	>500	50±10	MPPT	365.9	-	-
2(P3)	5.0	>500	50±10	MPPT	365.9	0.44	Yes

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2							
Clause	Requirement + Test		Result - Remark				Verdict
Sample #.....	5						-
Light exposure method.....	<input type="checkbox"/> Solar simulator / <input checked="" type="checkbox"/> Natural sunlight / <input type="checkbox"/> Others						-
Test date [MM/DD/YYYY] / start - end ..	03/14/2023 - 03/20/2023						-
Test cycle	Integrated irradiation [kWh/m ²]	Irradiance [W/m ²]	Module temperature [°C]	Resistive load [Ω]	Pmpp 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	367.0	-	-
1(P2)	5.0	>500	50±10	MPPT	367.1	-	-
2(P3)	5.0	>500	50±10	MPPT	367.2	0.43	Yes
Sample #.....	6						-
Light exposure method.....	<input type="checkbox"/> Solar simulator / <input checked="" type="checkbox"/> Natural sunlight / <input type="checkbox"/> Others						-
Test date [MM/DD/YYYY] / start - end ..	03/14/2023 - 03/20/2023						-
Test cycle	Integrated irradiation [kWh/m ²]	Irradiance [W/m ²]	Module temperature [°C]	Resistive load [Ω]	Pmpp 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	366.9	-	-
1(P2)	5.0	>500	50±10	MPPT	366.9	-	-
2(P3)	5.0	>500	50±10	MPPT	367.0	0.44	Yes
Sample #.....	7						-
Light exposure method.....	<input type="checkbox"/> Solar simulator / <input checked="" type="checkbox"/> Natural sunlight / <input type="checkbox"/> Others						-
Test date [MM/DD/YYYY] / start - end ..	03/14/2023 - 03/20/2023						-
Test cycle	Integrated irradiation [kWh/m ²]	Irradiance [W/m ²]	Module temperature [°C]	Resistive load [Ω]	Pmpp 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	366.7	-	-
1(P2)	5.0	>500	50±10	MPPT	366.8	-	-
2(P3)	5.0	>500	50±10	MPPT	366.8	0.47	Yes
Sample #.....	8						-
Light exposure method.....	<input type="checkbox"/> Solar simulator / <input checked="" type="checkbox"/> Natural sunlight / <input type="checkbox"/> Others						-
Test date [MM/DD/YYYY] / start - end ..	03/14/2023 - 03/20/2023						-
Test cycle	Integrated irradiation [kWh/m ²]	Irradiance [W/m ²]	Module temperature [°C]	Resistive load [Ω]	Pmpp 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	367.0	-	-
1(P2)	5.0	>500	50±10	MPPT	366.9	-	-
2(P3)	5.0	>500	50±10	MPPT	367.0	0.38	Yes

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2							
Clause	Requirement + Test		Result - Remark				Verdict
Sample #.....:	9						-
Light exposure method.....:	<input type="checkbox"/> Solar simulator / <input checked="" type="checkbox"/> Natural sunlight / <input type="checkbox"/> Others						-
Test date [MM/DD/YYYY] / start - end ..:	03/14/2023 - 03/20/2023						-
Test cycle	Integrated irradiation [kWh/m ²]	Irradiance [W/m ²]	Module temperature [°C]	Resistive load [Ω]	Pmpp 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	367.1	-	-
1(P2)	5.0	>500	50±10	MPPT	367.2	-	-
2(P3)	5.0	>500	50±10	MPPT	367.2	0.49	Yes
Supplementary information: N/A							

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

4.6.1 Performance at STC (after initial stabilization, Gate #1) - MQT06.1/MST02							-
Test date [MM/DD/YYYY].....:		03/20/2023					-
Test method		<input checked="" type="checkbox"/> Simulator / <input type="checkbox"/> Natural sunlight					-
Irradiance [W/m ²].....:		1000					-
Module temperature [°C]		25.0					-
P _{max} (lab) lower limit [W]		354.9					-
P̄ _{max} (lab) lower limit [W]		365.9					-
V _{OC} (lab) upper limit [V]		43.69					-
I _{SC} (lab) upper limit [A]		11.51					-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	-
1	43.09	36.10	10.73	10.16	366.6	79.30	P
2	43.05	36.06	10.69	10.14	365.7	79.47	P
3	43.09	36.07	10.74	10.18	367.2	79.34	P
4	42.99	36.00	10.72	10.16	365.9	79.40	P
5	43.02	36.10	10.74	10.17	367.2	79.45	P
6	43.09	36.09	10.72	10.17	367.0	79.44	P
7	43.09	36.10	10.73	10.16	366.8	79.37	P
8	43.07	36.07	10.74	10.17	367.0	79.31	P
9	43.09	36.12	10.72	10.17	367.2	79.47	P
Average	-	-	-	-	366.7	-	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2				
Clause	Requirement + Test	Result - Remark		Verdict
4.3 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		03/20/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	Verdict
1	20.9	>1000	No	P
2	20.9	>1000	No	P
3	20.9	>1000	No	P
4	20.9	>1000	No	P
5	20.9	>1000	No	P
6	20.9	>1000	No	P
7	20.9	>1000	No	P
8	20.9	>1000	No	P
9	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.15 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:	03/20/2023		-
Test voltage applied [V].....:	2 minutes of 1500		-
Solution resistivity [Ω /cm] / <3500	2036		-
Solution temperature [$^{\circ}$ C] / 22 \pm 2	22.7		-
Sample #	Required [$M\Omega$]	Measured [$M\Omega$]	Verdict
1	20.9	>1000	P
2	20.9	>1000	P
3	20.9	>1000	P
4	20.9	>1000	P
5	20.9	>1000	P
6	20.9	>1000	P
7	20.9	>1000	P
8	20.9	>1000	P
9	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40 $M\Omega \cdot m^2$. Area of the module is 1.91 m^2 .			

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2				
Clause	Requirement + Test	Result - Remark		Verdict
4.4 Measurement of temperature coefficients - MQT04				-
Test date [MM/DD/YYYY].....:		07/12/2023		-
Ambient temperature [°C] / high - low...:		25		-
Module temperature [°C] / high - low....:		55.1 - 25.2		-
Irradiance [W/m ²] / high - low.....:		1000 - 999.2		-
Sample #	α [%/°C]	β [%/°C]	δ [%/°C]	
1	0.049	-0.277	-0.362	-
Supplementary information: N/A				

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2							
Clause	Requirement + Test			Result - Remark			Verdict
4.7 Performance at low irradiance - MQT07							
Test date [MM/DD/YYYY].....:		07/12/2023					-
Test method		<input type="checkbox"/> Directly measured <input checked="" type="checkbox"/> Data corrected to a 25°C cell temperature and 200 W/m ² irradiance					-
Irradiance [W/m ²].....:		200					-
Ambient temperature [°C].....:		25.1					-
Module temperature [°C]		25.0±0.2					-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	-
1	40.25	34.60	2.16	2.04	70.5	80.99	-
Supplementary information: N/A							

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.8 Outdoor exposure test - MQT08			-
Sample #	2		-
Test date [MM/DD/YYYY].....	05/09/2023 - 06/05/2023		-
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].....	06/06/2023		-
Sample #	Nature and position of initial findings - comments or attach photos		-
2	No visual defects		P
Supplementary information: N/A			
4.15 Wet leakage current test (after outdoor exposure test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....	06/06/2023		-
Test voltage applied [V].....	2 minutes of 1500		-
Solution resistivity [Ω /cm] / <3500	<3500		-
Solution temperature [$^{\circ}$ C] / 22 \pm 2	22 \pm 2		-
Sample #	Required [M Ω]	Measured [M Ω]	-
2	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40M Ω ·m ² . Area of the module is 1.91m ² .			

Test Report



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Test Report No.: 492011490.006

IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 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].....	07/06/2023				-
Module temperature [°C]	75				-
Number of diodes in junction box	3				-
Diode manufacturer.....	Jiangsu Tonglin Electric Co., Ltd.				-
Diode type designation.....	PT001D-20				-
Max. permissible junction temperature T _{jmax} [°C].....	200 (according to datasheet)				-
Step 1, determination of V_D versus T_J 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 ± 2	50 ± 2	70 ± 2	90 ± 2	-
Pulsed current [A]	10.50	10.57	10.58	10.68	-
Voltage drop [V]	0.4154	0.3934	0.3715	0.3488	-
V _D versus T _J characteristic.....	$V_D = -10.20 \cdot 10^{-4} T_J + 0.4526$				-
Diode #.....	2				-
Temperature [°C].....	30 ± 2 °C	50 ± 2 °C	70 ± 2 °C	90 ± 2 °C	-
Ambient temperature of the junction box [°C].....	30 ± 2	50 ± 2	70 ± 2	90 ± 2	-
Pulsed current [A]	10.50	10.57	10.58	10.68	-
Voltage drop [V]	0.4132	0.3902	0.3681	0.3459	-
V _D versus T _J characteristic.....	$V_D = -10.20 \cdot 10^{-4} T_J + 0.4504$				-
Diode #.....	3				-
Temperature [°C].....	30 ± 2 °C	50 ± 2 °C	70 ± 2 °C	90 ± 2 °C	-
Ambient temperature of the junction box [°C].....	30 ± 2	50 ± 2	70 ± 2	90 ± 2	-
Pulsed current [A]	10.50	10.57	10.58	10.68	-
Voltage drop [V]	0.4085	0.3855	0.3632	0.3409	-
V _D versus T _J characteristic.....	$V_D = -10.20 \cdot 10^{-4} T_J + 0.4460$				-
Step 2, bypass diode thermal test					-
Diode #.....	1	2	3		-
Current flow applied [A]	10.71	10.71	10.71		-
Voltage drop [V] after 1h.....	0.2808	0.2726	0.2830		-
Calculated max. junction temperature T _{jcalc} [°C].....	141.50	148.17	135.82		-

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2				
Clause	Requirement + Test	Result - Remark		Verdict
$T_{j_{calc}} < T_{j_{max}}?$	Yes	Yes	Yes	P
Current flow (1.25 x I_{sc}) [A]	13.32	13.32	13.32	-
Bypass diode remains functional?	Yes	Yes	Yes	P
Supplementary information: N/A				

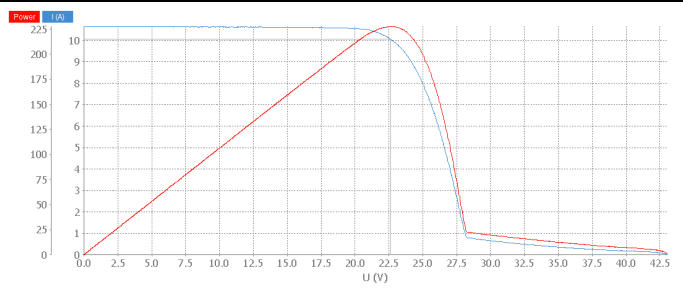
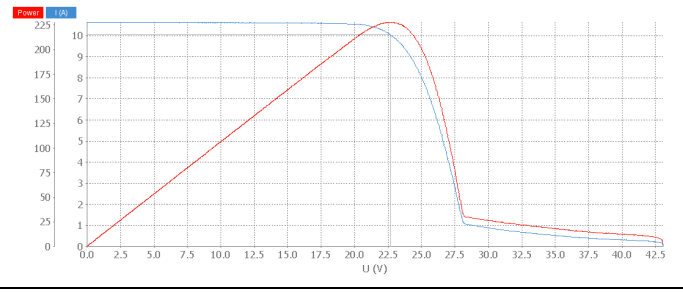
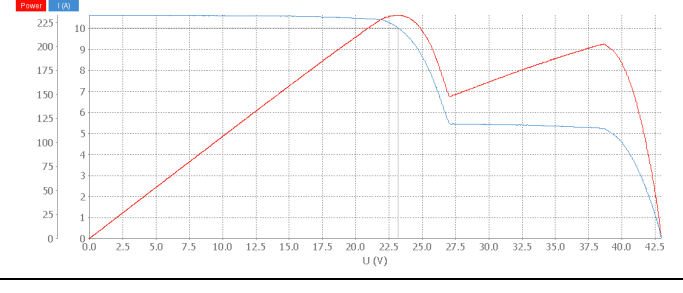
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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.1 Visual inspection (after bypass diode thermal test) - MQT01/MST01			-
Test date [MM/DD/YYYY].....:		07/06/2023	-
Sample #	Nature and position of initial findings - comments or attach photos		-
2	No visual defects		P
Supplementary information: N/A			
4.15 Wet leakage current test (after bypass diode thermal test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		07/06/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω /cm] / <3500		<3500	-
Solution temperature [$^{\circ}$ C] / 22 \pm 2		22 \pm 2	-
Sample #	Required [$M\Omega$]	Measured [$M\Omega$]	-
2	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40 $M\Omega \cdot m^2$. Area of the module is 1.91 m^2 .			

IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 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].....	07/06/2023		-
<input type="checkbox"/> 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
<input checked="" type="checkbox"/> Method B			-
Diode #	IV curve after shading		P
1			P
2			P
3			P
Supplementary information: N/A			

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 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..:	07/06/2023		-
Cell interconnection circuit.....:	<input type="checkbox"/> S / <input type="checkbox"/> SP / <input checked="" type="checkbox"/> SPS		-
Irradiance during each cycle [W/m ²]	1000		-
Test duration for each cycle [hour]	1		-
Module temperature at thermal equilibrium in each cycle [°C]	53.6 - 49.8		-
Maximum measured cell temperature of cell with lowest shunt resistance adjacent to the edge [°C]	B21: 77.6		-
Shading rate of cell with lowest shunt resistance [%]	B21: 5		-
Maximum measured cell temperature of other 2 cells with lowest shunt resistance[°C]	F3: .86.5 F21: 63.9		-
Shading rate of the other 2 cells with lowest shunt resistance [%]	F3: .10 F21: 10		-
Maximum measured cell temperature of cell with highest shunt resistance [°C] .:	E7: 95.4		-
Shading rate of cell with highest shunt resistance [%]	E7: 5		-

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

	1	2	3	4	20	21
A						Junction box		
B								
C								
D								
E								
F								

4.1 Visual inspection (after hot-spot endurance test) - MQT01/MST01			-
Test date [MM/DD/YYYY].....:	07/06/2023		-
Sample #	Nature and position of initial findings - comments or attach photos		-
3	No visual defects		P

Supplementary information: N/A

Test Report

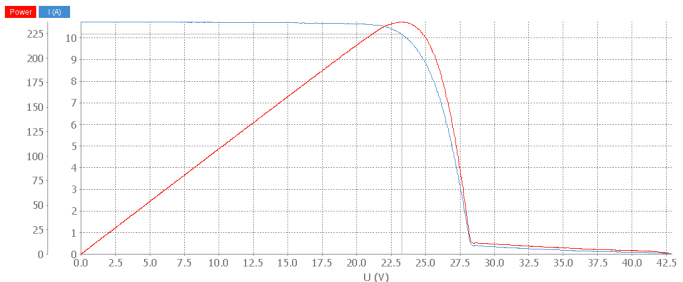
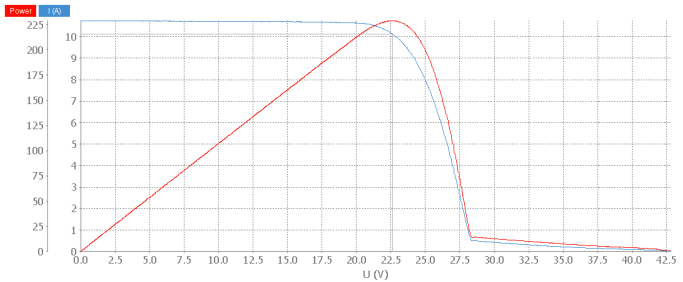
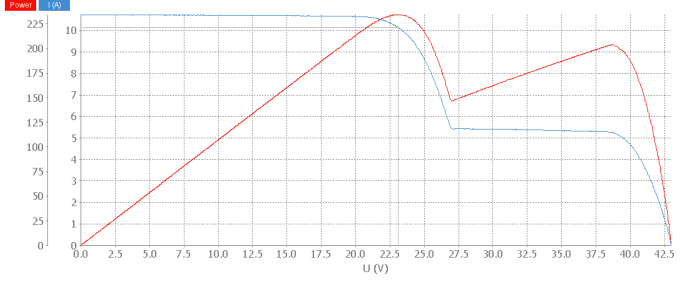


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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2							
Clause	Requirement + Test			Result - Remark			Verdict
4.2 Maximum power determination (after hot-spot endurance test) - MQT02/MST03							
Test date [MM/DD/YYYY].....:		07/06/2023					-
Ambient temperature [°C].....:		Corrected to 25.0					-
Irradiance [W/m ²].....:		Corrected to 1000					-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	
3	43.03	36.14	10.77	10.20	368.8	79.61	-
Supplementary information: N/A							
4.15 Wet leakage current test (after hot-spot endurance test) - MQT15/MST17							
Test date [MM/DD/YYYY].....:		07/06/2023					-
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	20.9		>1000				P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .							

IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 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].....:	07/06/2023		-
<input type="checkbox"/> 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
<input checked="" type="checkbox"/> Method B			-
Diode #	IV curve after shading the string		P
1			P
2			P
3			P
Supplementary information: N/A			

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 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..:	05/19/2023 - 05/23/2023		-
Module temperature [°C] / high - low ..:	61.8 - 57.3		-
UV irradiance (280-400nm) [W/m²].....:	143.5		-
Ratio of UV irradiance (280-320nm) (%):	N/A		-
Total dosage of UV irradiation (280-400nm) [kWh/m²].....:	15.0		-
Module operation condition	<input checked="" type="checkbox"/> Short circuited / <input type="checkbox"/> Pmax		-
Supplementary information: N/A			
4.1 Visual inspection (after UV preconditioning test) - MQT01/MST01			-
Test date [MM/DD/YYYY].....:	05/23/2023		-
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			
4.15 Wet leakage current test (after UV preconditioning 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	22±2		-
Sample #	Required [MΩ]	Measured [MΩ]	-
4	20.9	>1000	P
5	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .			

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.11 Thermal cycling 50 test - MQT11 & MST51			-
Test date [MM/DD/YYYY] / start - end...:		05/24/2023 - 06/01/2023	-
Total cycles		50	-
Current applied [A]		10.13 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: N/A			
4.1 Visual inspection (after thermal cycling 50 test) - MQT01/MST01			-
Test date [MM/DD/YYYY].....:		06/01/2023	-
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			
4.15 Wet leakage current test (after thermal cycling 50 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:		06/01/2023	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω /cm] / <3500		<3500	-
Solution temperature [$^{\circ}$ C] / 22 \pm 2		22 \pm 2	-
Sample #	Required [$M\Omega$]	Measured [$M\Omega$]	-
4	20.9	>1000	P
5	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40M Ω ·m ² . Area of the module is 1.91m ² .			

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.12 Humidity freeze 10 test - MQT12 & MST52			-
Test date [MM/DD/YYYY] / start - end..:	06/11/2023 - 06/21/2023		-
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].....:	06/21/2023		-
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			
4.15 Wet leakage current test (after humidity freeze 10 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:	06/21/2023		-
Test voltage applied [V].....:	2 minutes of 1500		-
Solution resistivity [Ω /cm] / <3500	<3500		-
Solution temperature [$^{\circ}$ C] / 22 \pm 2	22 \pm 2		-
Sample #	Required [M Ω]	Measured [M Ω]	-
4	20.9	>1000	P
5	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40M Ω ·m ² . Area of the module is 1.91m ² .			

Test Report



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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 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].....:	06/21/2023		-
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].....:	06/21/2023		-
Sample #	Nature and position of initial findings - comments or attach photos		-
4	No visual defects		P
Supplementary information: N/A			
4.15 Wet leakage current test (after retention of junction box on mounting surface) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:	06/21/2023		-
Test voltage applied [V].....:	2 minutes of 1500		-
Solution resistivity [Ω /cm] / <3500	<3500		-
Solution temperature [$^{\circ}$ C] / 22 \pm 2	22 \pm 2		-
Sample #	Required [$M\Omega$]	Measured [$M\Omega$]	-
4	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40 $M\Omega \cdot m^2$. Area of the module is 1.91 m^2 .			

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.11 Thermal cycling 200 test - MQT11/MST51			-
Test date [MM/DD/YYYY] / start - end..:	03/21/2023 - 04/23/2023		-
Total cycles	200		-
Current applied [A]	10.16 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: N/A			
4.1 Visual inspection (after thermal cycling 200 test) - MQT01/MST01			-
Test date [MM/DD/YYYY].....:	04/23/2023		-
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			
4.15 Wet leakage current test (after thermal cycling 200 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:	04/23/2023		-
Test voltage applied [V].....:	2 minutes of 1500		-
Solution resistivity [Ω /cm] / <3500	<3500		-
Solution temperature [$^{\circ}$ C] / 22 \pm 2	22 \pm 2		-
Sample #	Required [$M\Omega$]	Measured [$M\Omega$]	-
6	20.9	>1000	P
7	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40 $M\Omega \cdot m^2$. Area of the module is 1.91 m^2 .			

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 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..:	03/16/2023 - 04/28/2023		-
Total hours [hours]	1000		-
Supplementary information: N/A			
4.1 Visual inspection (after damp heat 1000 test) - MQT01/MST01			-
Test date [MM/DD/YYYY].....:	04/28/2023		-
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			
4.15 Wet leakage current test (after damp heat 1000 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:	04/28/2023		-
Test voltage applied [V].....:	2 minutes of 1500		-
Solution resistivity [Ω /cm] / <3500	<3500		-
Solution temperature [$^{\circ}$ C] / 22 \pm 2	22 \pm 2		-
Sample #	Required [$M\Omega$]	Measured [$M\Omega$]	-
8	20.9	>1000	P
9	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40 $M\Omega \cdot m^2$. Area of the module is 1.91 m^2 .			

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
4.16 Static mechanical load test - MQT16/MST34			-
Sample #.....	8		-
Test date [MM/DD/YYYY].....	07/05/2023		-
Designed load (downward / upward) [Pa]	2400 / 1600		-
Safety factor	1.5		-
Mounting method	Clamps (4 points)		-
Load applied to.....	Downward	Upward	-
Mechanical load [Pa].....	3600	2400	-
1 st cycle duration [hours].....	1h	1h	-
Intermittent open-circuit?	No	No	-
2 nd cycle duration [hours].....	1h	1h	-
Intermittent open-circuit?	No	No	-
3 rd 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].....	07/05/2023		-
Sample #	Nature and position of initial findings - comments or attach photos		-
8	No visual defects		P
Supplementary information: N/A			
4.15 Wet leakage current test (after static mechanical load test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....	07/05/2023		-
Test voltage applied [V].....	2 minutes of 1500		-
Solution resistivity [Ω /cm] / <3500	<3500		-
Solution temperature [$^{\circ}$ C] / 22 \pm 2	22 \pm 2		-
Sample #	Required [$M\Omega$]	Measured [$M\Omega$]	-
8	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40 $M\Omega \cdot m^2$. Area of the module is 1.91 m^2 .			

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2							
Clause	Requirement + Test	Result - Remark					Verdict
4.17 Hail impact test - MQT17							-
Sample #.....	9						-
Test date [MM/DD/YYYY].....	07/28/2023						-
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	-
	7.70	7.63	7.52	7.68	7.34	7.14	
	7	8	9	10	11	-	
	7.42	7.63	7.68	7.70	7.55	-	
Ice ball velocity [m/s].....	1	2	3	4	5	6	-
	21.9	23.1	23.1	22.4	22.8	22.9	
	7	8	9	10	11	-	
	23.0	22.9	22.7	22.3	23.4	-	
Supplementary information: N/A							
4.1 Visual inspection (after hail impact test) - MQT01/MST01							-
Test date [MM/DD/YYYY].....	07/28/2023						-
Sample #	Nature and position of initial findings - comments or attach photos					-	
9	No visual defects					P	
Supplementary information: N/A							
4.15 Wet leakage current test (after hail impact test) - MQT15/MST17							-
Test date [MM/DD/YYYY].....	07/28/2023						-
Test voltage applied [V]	2 minutes of 1500						-
Solution resistivity [Ω /cm] / <3500	<3500						-
Solution temperature [$^{\circ}$ C] / 22±2	22±2						-
Sample #	Required [$M\Omega$]	Measured [$M\Omega$]					-
9	20.9	>1000					P
Supplementary information: Minimum requirement according to the standard is $40M\Omega \cdot m^2$. Area of the module is $1.91m^2$.							

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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 61215-2							
Clause	Requirement + Test		Result - Remark			Verdict	
4.6 Performance at STC (final, Gate #2) - MQT06.1/MST02						-	
Test method		<input checked="" type="checkbox"/> Simulator / <input type="checkbox"/> Natural sunlight				-	
Irradiance [W/m ²].....		1000				-	
Module temperature [°C]		25.0				-	
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	-
2	43.01	36.15	10.64	10.11	365.4	79.82	-
4	43.06	36.02	10.68	10.13	364.8	79.36	-
5	43.03	35.90	10.69	10.11	363.0	78.93	-
6	43.05	35.84	10.75	10.17	364.6	78.8	-
7	43.06	35.83	10.75	10.18	364.7	78.78	-
8	42.95	35.86	10.67	10.10	362.1	78.98	-
9	42.93	35.30	10.76	9.88	348.8	75.51	-
Power degradation of each module after each test sequences						-	
Sample #	Pmp (initial) [W]	Pmp (final) [W]	Reproducibility <i>r</i> [%]	Power degradation [%]	Maximum allowed degradation [%]		-
2	365.7	365.4	0.25	-0.10	-5.24	P	
4	365.9	364.8	0.41	-0.30	-5.40	P	
5	367.2	363.0	0.41	-1.14	-5.40	P	
6	367.0	364.6	<0.01	-0.67	-5.00	P	
7	366.8	364.7	<0.01	-0.57	-5.00	P	
8	367.0	362.1	0.25	-1.34	-5.24	P	
9	367.2	348.8	0.25	-5.01	-5.24	P	
Supplementary information: According to Gate #2, Maximum allowed degradation [%] = $-(5 + 0.95 \times r)$							

Test Report



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IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 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	20.9	>1000	No	P
3	20.9	>1000	No	P
4	20.9	>1000	No	P
5	20.9	>1000	No	P
6	20.9	>1000	No	P
7	20.9	>1000	No	P
8	20.9	>1000	No	P
9	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				

Test Report



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Test Report No.: 492011490.006

IEC / EN 61215-1, IEC / EN 61215-1-1 & IEC / EN 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 [$^{\circ}$ C] / 22 \pm 2		22 \pm 2	-
Sample #	Required [$M\Omega$]	Measured [$M\Omega$]	Verdict
2	20.9	>1000	P
3	20.9	>1000	P
4	20.9	>1000	P
5	20.9	>1000	P
6	20.9	>1000	P
7	20.9	>1000	P
8	20.9	>1000	P
9	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40 $M\Omega \cdot m^2$. Area of the module is 1.91 m^2 .			

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

Module type: SPP375QHES (BOM2)

There is no test was required.

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

Test results of IEC / EN 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.

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IEC / EN 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 / EN 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

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IEC / EN 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
-	For Class II and Class 0 PV modules, the following (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 61730-1: 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

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IEC / EN 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 ± 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

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IEC / EN 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 than 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 / EN 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 or IEC 62930	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 or IEC 62930	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

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IEC / EN 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 / EN 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 / EN 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 current-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
	Thread-cutting and thread-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 / EN 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 backsheets 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 / EN 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.	P

IEC / EN 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

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IEC / EN 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	V _{sys} = 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

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IEC / EN 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
a)	<p>Single-layer sheet</p> <ul style="list-style-type: none"> - Minimum thickness according to lines 1b) of Table 3 and Table 4, as applicable depending on class (see table 1). <p>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.</p> <ul style="list-style-type: none"> - RTI / RTE / TI as defined in 5.5.2.3.3. - Dielectric strength for reinforced insulation. 	No such part	N/A
b)	<p>Multi-layer sheets</p> <ul style="list-style-type: none"> - 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). <p>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:</p> <ul style="list-style-type: none"> - RTI / RTE / TI as defined in 5.5.2.3.3. - Dielectric strength for basic insulation. <p>If single layers are not characterized individually the following applies:</p> <p>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).</p> <p>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.</p> <p>Dielectric strength of entire multi-layer sheet providing relied upon insulation shall fulfill requirements for reinforced insulation.</p>	Relevant tests of IEC 61730-2 were passed.	P
Supplementary information: N/A			

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

Test results of IEC / EN 61730-2

Module type: SPP375QHES (BOM1)

10.2 Visual inspection (initial) - MQT01/MST01			-
Test date [MM/DD/YYYY].....:		03/14/2023	-
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
Supplementary information: N/A			

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IEC / EN 61730-2							
Clause	Requirement + Test		Result - Remark				Verdict
10.4 Maximum power determination (initial) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			03/20/2023				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m²].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	-
2	43.05	36.06	10.69	10.14	365.7	79.47	-
3	43.09	36.07	10.74	10.18	367.2	79.34	-
4	42.99	36.00	10.72	10.16	365.9	79.40	-
6	43.09	36.09	10.72	10.17	367.0	79.44	-
8	43.07	36.07	10.74	10.17	367.0	79.31	-
10	43.08	36.08	10.74	10.17	366.9	79.32	-
11	43.09	36.15	10.73	10.17	367.5	79.51	-
13	43.07	36.13	10.72	10.17	367.3	79.57	-
14	43.05	36.09	10.72	10.16	366.5	79.45	-
15	43.04	36.09	10.73	10.17	367.1	79.48	-
Supplementary information: N/A							

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IEC / EN 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
10.13 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		03/20/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	Verdict
2	20.9	>1000	No	P
3	20.9	>1000	No	P
4	20.9	>1000	No	P
6	20.9	>1000	No	P
8	20.9	>1000	No	P
10	20.9	>1000	No	P
11	20.9	>1000	No	P
13	20.9	>1000	No	P
14	20.9	>1000	No	P
15	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module 1.91m ² .				

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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.14 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:	03/20/2023		-
Test voltage applied [V].....:	2 minutes of 1500		-
Solution resistivity [Ω /cm] / <3500	<3500		-
Solution temperature [$^{\circ}$ C] / 22 \pm 2	22 \pm 2		-
Sample #	Required [$M\Omega$]	Measured [$M\Omega$]	Verdict
2	20.9	>1000	P
3	20.9	>1000	P
4	20.9	>1000	P
6	20.9	>1000	P
8	20.9	>1000	P
10	20.9	>1000	P
13	20.9	>1000	P
14	20.9	>1000	P
15	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40 $M\Omega$ ·m ² . Area of the module is 1.91m ² .			

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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.9 Accessibility test (initial) - MST11			-
Test date [MM/DD/YYYY].....:		03/20/2023	-
Sample #	Requirements		-
4	<input checked="" type="checkbox"/> At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. <input checked="" type="checkbox"/> At no time during the test, the probe contacts any live electrical part.		P
6	<input checked="" type="checkbox"/> At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. <input checked="" type="checkbox"/> At no time during the test, the probe contacts any live electrical part.		P
8	<input checked="" type="checkbox"/> At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. <input checked="" type="checkbox"/> At no time during the test, the probe contacts any live electrical part.		P
13	<input checked="" type="checkbox"/> At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. <input checked="" type="checkbox"/> At no time during the test, the probe contacts any live electrical part.		P
14	<input checked="" type="checkbox"/> At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. <input checked="" type="checkbox"/> At no time during the test, the probe contacts any live electrical part.		P
15	<input checked="" type="checkbox"/> At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. <input checked="" type="checkbox"/> At no time during the test, the probe contacts any live electrical part.		P
Supplementary information: N/A			

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IEC / EN 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
10.15 Temperature test - MST21				-
Sample #.....	10			-
Test date [MM/DD/YYYY].....	07/06/2023			-
Reference solar irradiance [W/m ²].....	1000			-
Reference ambient temperature [°C].....	40			-
Spacing between module and black test platform [cm]	6			-
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	72.7	73.1	N/A
B	110	72.3	72.5	P
C	110	58.9	59.2	P
D	N/A	N/A	N/A	N/A
E	110	56.3	56.5	P
F	110	55.8	56.2	P
G	105	60.3	60.7	P
H	200	70.3	70.8	P
I	N/A	N/A	N/A	N/A
J	N/A	N/A	N/A	N/A
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].....	07/06/2023			-
Sample #	Nature and position of initial findings - comments or attach photos			-
10	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].....:		07/06/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
10	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				
10.14 Wet leakage current test (after temperature test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		07/06/2023		-
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]		-
10	20.9	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				

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IEC / EN 61730-2				
Clause	Requirement + Test		Result - Remark	Verdict
10.20 Reverse current overload test - MST26				-
Test date [MM/DD/YYYY].....:		07/06/2023		-
Module over-current protection rating [A]		18		-
Current applied[A]		24.3		-
Voltage applied[V] / high - low		49.7 - 43.2		-
Test duration [hour]		2		-
Sample #	Requirements			-
10	<input checked="" type="checkbox"/> No flaming of the module <input checked="" type="checkbox"/> 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].....:		07/06/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			-
10	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after reverse current overload test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		07/06/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
10	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				
10.14 Wet leakage current test (after reverse current overload test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		07/06/2023		-
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]		-
10	20.9	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				

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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.12 Impulse voltage test - MST14			-
Test date [MM/DD/YYYY].....:	07/06/2023		-
Maximum system voltage [V].....:	1500		-
Maximum impulse voltage [V].....:	16000		-
Thickness of conductive foil [mm].....:	0.05		-
Sample #	Requirements		-
11	<input checked="" type="checkbox"/> 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].....:	07/06/2023		-
Sample #	Nature and position of initial findings - comments or attach photos		-
11	No visual defects		P
Supplementary information: N/A			
10.13 Insulation test (after impulse voltage test) - MQT03/MST16			-
Test date [MM/DD/YYYY].....:	07/06/2023		-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?
11	20.9	>1000	No
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .			

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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.21 Module breakage test - MST32			-
Test date [MM/DD/YYYY].....:	07/03/2023		-
Weight of impactor [kg].....:	45		-
Thickness of module [mm]	4		-
Mounting technique used	Mounting with 4 clamps		-
Module Breakage?	<input checked="" type="checkbox"/> No breakage <input type="checkbox"/> Broke at 300mm		-
Weight of particles in case of breakage [g]	N/A		-
Sample #	Requirements		-
12	<input checked="" type="checkbox"/> The module did not separate from the mounting structure or framing <input checked="" type="checkbox"/> The sample did not break <input type="checkbox"/> Breakage occurred, but no shear or opening large enough for a 76 mm diameter sphere to pass freely has developed. <input type="checkbox"/> Breakage occurred, but no particles larger than 65 cm ² have been ejected from the sample.		P
Supplementary information: N/A			

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IEC / EN 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
10.26 Materials creep test - MST37				-
Sample #.....	13			-
Test date [MM/DD/YYYY] / start - end..:	05/15/2023 - 05/23/2023			-
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].....	05/23/2023			-
Sample #	Nature and position of initial findings - comments or attach photos			-
13	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].....	05/23/2023			-
Test voltage applied [V].....	2 minutes of 1500 and 1 minute of 8000			-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
13	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				
10.14 Wet leakage current test (after materials creep 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	22±2			-
Sample #	Required [MΩ]	Measured [MΩ]		-
13	20.9	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				

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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10. 9 Accessibility test (after materials creep test) - MST11			-
Test date [MM/DD/YYYY].....:		05/23/2023	-
Sample #	Requirements		-
13	<input checked="" type="checkbox"/> At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. <input checked="" type="checkbox"/> At no time during the test, the probe contacts any live electrical part.		P
Supplementary information: N/A			

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IEC / EN 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
10.30 Damp heat test - MQT13/MST53				-
Sample #	14			-
Test date [MM/DD/YYYY] / start - end..:	03/25/2023 - 04/03/2023			-
Total hours [hours]	200			-
Supplementary information: N/A				
10.2 Visual inspection (after damp heat 200 test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:	04/03/2023			-
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 damp heat 200 test) - MQT13/MST16				-
Test date [MM/DD/YYYY].....:	04/03/2023			-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000			-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
14	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				

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IEC / EN 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
10.31 UV test (front side) - MQT10/MST54				-
Sample #	14			-
Test date [MM/DD/YYYY] / start - end..:	04/06/2023 - 04/22/2023			-
Total dosage of UV irradiation (280-400nm) [kWh/m ²].....:	60.0			-
Module operation condition	<input checked="" type="checkbox"/> Short circuited / <input type="checkbox"/> Pmax			-
Supplementary information: N/A				
10.2 Visual inspection (after UV test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:	04/22/2023			-
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 UV test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:	04/22/2023			-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000			-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
14	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				

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IEC / EN 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..:		04/30/2023 - 05/10/2023		-
Total cycles		10		-
Current applied [A]		0.05		-
Sample #	Open circuits?			-
14	No			P
Supplementary information: N/A				
10.2 Visual inspection (after humidity freeze 10 test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		05/10/2023		-
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 humidity freeze 10 test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		05/10/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
14	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				

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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.31 UV test (back side) - MQT10/MST54			-
Sample #.....:	14		-
Test date [MM/DD/YYYY] / start - end..:	05/11/2023 - 05/28/2023		-
Total dosage of UV irradiation (280-400nm) [kWh/m ²].....:	60.0		-
Module operation condition	<input checked="" type="checkbox"/> Short circuited / <input type="checkbox"/> Pmax		-
Supplementary information: N/A			
10.2 Visual inspection (after UV test) - MQT01/MST01			-
Test date [MM/DD/YYYY].....:	05/28/2023		-
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 UV test) - MQT03/MST16			-
Test date [MM/DD/YYYY].....:	05/28/2023		-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?
14	20.9	>1000	No
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m 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..:		06/23/2023 - 07/04/2023		-
Total cycles		10		-
Current applied [A]		0.05		-
Sample #	Open circuits?			-
14	No			P
Supplementary information: N/A				
10.2 Visual inspection (after humidity freeze 10 test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		07/04/2023		-
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 humidity freeze 10 test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		07/04/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
14	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				
10.14 Wet leakage current test (after humidity freeze 10 test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		07/04/2023		-
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]		-
14	20.9	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				

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Clause	Requirement + Test	Result - Remark	Verdict
10.32 Cold conditioning test (1st round) - MST55			-
Sample #.....:	15		-
Test date [MM/DD/YYYY] / start - end..:	03/24/2023 - 03/27/2023		-
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].....:	03/27/2023		-
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 cold conditioning test) - MQT03/MST16			-
Test date [MM/DD/YYYY].....:	03/27/2023		-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?
15	20.9	>1000	No
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .			

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Clause	Requirement + Test	Result - Remark		Verdict
10.33 Dry heat conditioning test - MST56				-
Sample #.....:	15			-
Test date [MM/DD/YYYY] / start - end..:	03/31/2023 - 04/10/2023			-
Applied temperature [°C].....:	102.7 - 103.6			-
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].....:	04/10/2023			-
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 dry heat conditioning test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:	04/10/2023			-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000			-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
15	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				

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IEC / EN 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..:		04/15/2023 - 04/26/2023		-
Total cycles		10		-
Current applied [A]		0.05		-
Sample #	Open circuits?			-
15	No			P
Supplementary information: N/A				
10.2 Visual inspection (after humidity freeze 10 test) - MQT01/MST01				-
Test date [MM/DD/YYYY].....:		04/26/2023		-
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 humidity freeze 10 test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		04/26/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
15	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				

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Clause	Requirement + Test	Result - Remark	Verdict
10.32 Cold conditioning test (2nd round) - MST55			-
Sample #.....:	15		-
Test date [MM/DD/YYYY] / start - end..:	05/28/2023 - 05/30/2023		-
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].....:	05/30/2023		-
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 cold conditioning test) - MQT03/MST16			-
Test date [MM/DD/YYYY].....:	05/30/2023		-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?
15	20.9	>1000	No
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m 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..:	06/23/2023 - 07/04/2023		-
Total cycles	10		-
Current applied [A]	0.05		-
Sample #	Open circuits?		-
15	No		P
Supplementary information: N/A			
10.2 Visual inspection (after humidity freeze 10 test) - MQT01/MST01			-
Test date [MM/DD/YYYY].....:	07/04/2023		-
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 humidity freeze 10 test) - MQT03/MST16			-
Test date [MM/DD/YYYY].....:	07/04/2023		-
Test voltage applied [V].....:	2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?
15	20.9	>1000	No
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .			
10.14 Wet leakage current test (after humidity freeze 10 test) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:	07/04/2023		-
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]	-
15	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m 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
14	No visual defects		P
15	No visual defects		P
Supplementary information: N/A			

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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.17 Fire test - MST23			-
Test date [MM/DD/YYYY].....:	06/12/2023		-
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		-
16	<input checked="" type="checkbox"/> Modules comply with the requirements for the fire test according to above noticed standard		P
17			
18			
Supplementary information: Please refer to Annex 5 for detailed pictures of the samples after test.			

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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.18 Ignitability test - MST24			-
Test date [MM/DD/YYYY].....:	06/12/2023		-
Standard applied	ISO 11925-2:2010		-
Sample #	Requirements		-
19	<input checked="" type="checkbox"/> No ignition of module <input checked="" type="checkbox"/> No flame spread > 150 mm vertically from point of test flame application		P
Supplementary information: N/A			

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IEC / EN 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
10.10 Cut susceptibility test - MST12				-
Test date [MM/DD/YYYY].....:		4#: 06/21/2023; 6#: 04/23/2023; 8#: 07/05/2023; 14#: 07/04/2023; 15#: 07/04/2023		-
Applied force [N].....:		8.9		-
Sample #	Requirements			Verdict
4	<input checked="" type="checkbox"/> No exposure of active circuitry of the module			P
6	<input checked="" type="checkbox"/> No exposure of active circuitry of the module			P
8	<input checked="" type="checkbox"/> No exposure of active circuitry of the module			P
14	<input checked="" type="checkbox"/> No exposure of active circuitry of the module			P
15	<input checked="" type="checkbox"/> 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].....:		4#: 06/21/2023; 6#: 04/23/2023; 8#: 07/05/2023; 14#: 07/04/2023; 15#: 07/04/2023		-
Sample #	Nature and position of initial findings - comments or attach photos			Verdict
4	No visual defects			P
6	No visual defects			P
8	No visual defects			P
14	No visual defects			P
15	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after cut susceptibility test) - MST16				-
Test date [MM/DD/YYYY].....:		4#: 06/21/2023; 6#: 04/23/2023; 8#: 07/05/2023; 14#: 07/04/2023; 15#: 07/04/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	Verdict
4	20.9	>1000	No	P
6	20.9	>1000	No	P
8	20.9	>1000	No	P
14	20.9	>1000	No	P
15	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m2. Area of the module is 1.91m ² .				

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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.14 Wet leakage current test (after cut susceptibility test) - MST17			-
Test date [MM/DD/YYYY].....:	4#: 06/21/2023; 6#: 04/23/2023; 8#: 07/05/2023; 14#: 07/04/2023; 15#: 07/04/2023		-
Test voltage applied [V].....:	2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500	<3500		-
Solution temperature [$^{\circ}C$] / 22 \pm 2	22 \pm 2		-
Sample #	Required [$M\Omega$]	Measured [$M\Omega$]	-
4	20.9	>1000	P
6	20.9	>1000	P
8	20.9	>1000	P
14	20.9	>1000	P
15	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40 $M\Omega \cdot m^2$. Area of the module is 1.91 m^2 .			

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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.9 Accessibility test (final) - MST11			-
Test date [MM/DD/YYYY].....:		4#: 05/08/2023; 6#: 05/03/2023; 8#: 05/11/2023; 13#: 05/04/2023 14#: 06/19/2023 15#: 05/16/2023	-
Sample #	Requirements		-
4	<input checked="" type="checkbox"/> At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. <input checked="" type="checkbox"/> At no time during the test, the probe contacts any live electrical part.		P
6	<input checked="" type="checkbox"/> At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. <input checked="" type="checkbox"/> At no time during the test, the probe contacts any live electrical part.		P
8	<input checked="" type="checkbox"/> At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. <input checked="" type="checkbox"/> At no time during the test, the probe contacts any live electrical part.		P
13	<input checked="" type="checkbox"/> At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. <input checked="" type="checkbox"/> At no time during the test, the probe contacts any live electrical part.		P
14	<input checked="" type="checkbox"/> At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. <input checked="" type="checkbox"/> At no time during the test, the probe contacts any live electrical part.		P
15	<input checked="" type="checkbox"/> At no time during the test, there is a resistance of less than 1MΩ between the test fixture and the PV module live part. <input checked="" type="checkbox"/> At no time during the test, the probe contacts any live electrical part.		P
Supplementary information: N/A			

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IEC / EN 61730-2							
Clause	Requirement + Test		Result - Remark				Verdict
10.4 Maximum power determination (final) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:		2#: 07/06/2023; 3#: 07/06/2023 4#: 06/21/2023 6#: 07/05/2023; 8#: 07/06/2023; 14#, 15: 07/04/2023					-
Ambient temperature [°C].....:		Corrected to 25.0					-
Irradiance [W/m²].....:		Corrected to 1000					-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	-
2	43.01	36.15	10.64	10.11	365.3	79.82	P
3	43.03	36.14	10.77	10.20	368.8	79.61	P
4	43.06	36.02	10.68	10.13	364.8	79.36	P
6	43.05	35.84	10.75	10.17	364.6	78.80	P
8	42.95	35.86	10.67	10.10	362.1	78.98	P
10	43.00	36.13	10.73	10.16	366.9	79.57	P
14	42.84	35.91	10.35	9.80	351.9	79.40	P
15	42.73	35.84	10.66	10.12	362.5	79.63	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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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.6 Durability of markings - MST05			-
Test date [MM/DD/YYYY].....:		2#: 07/06/2023; 4#: 07/06/2023; 6#: 06/21/2023; 1#, 8#: 04/23/2023; 10#: 07/05/2023; 14#: 07/06/2023 15#: 07/04/2023; 3#: 07/04/2023	-
Sample #	Requirements		-
2	<input checked="" type="checkbox"/> Marking is legible <input checked="" type="checkbox"/> Not possible to remove marking plates easily <input checked="" type="checkbox"/> No curling occurred		P
3	<input checked="" type="checkbox"/> Marking is legible <input checked="" type="checkbox"/> Not possible to remove marking plates easily <input checked="" type="checkbox"/> No curling occurred		P
4	<input checked="" type="checkbox"/> Marking is legible <input checked="" type="checkbox"/> Not possible to remove marking plates easily <input checked="" type="checkbox"/> No curling occurred		P
6	<input checked="" type="checkbox"/> Marking is legible <input checked="" type="checkbox"/> Not possible to remove marking plates easily <input checked="" type="checkbox"/> No curling occurred		P
8	<input checked="" type="checkbox"/> Marking is legible <input checked="" type="checkbox"/> Not possible to remove marking plates easily <input checked="" type="checkbox"/> No curling occurred		P
10	<input checked="" type="checkbox"/> Marking is legible <input checked="" type="checkbox"/> Not possible to remove marking plates easily <input checked="" type="checkbox"/> No curling occurred		P
14	<input checked="" type="checkbox"/> Marking is legible <input checked="" type="checkbox"/> Not possible to remove marking plates easily <input checked="" type="checkbox"/> No curling occurred		P
15	<input checked="" type="checkbox"/> Marking is legible <input checked="" type="checkbox"/> Not possible to remove marking plates easily <input checked="" type="checkbox"/> No curling occurred		P
Supplementary information: N/A			

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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.7 Sharp edge test - MST06			-
Test date [MM/DD/YYYY].....:		2#: 07/06/2023; 4#: 07/06/2023; 6#: 06/21/2023; 1#, 8#: 04/23/2023; 10#: 07/05/2023; 14#: 07/06/2023 15#: 07/04/2023; 3#: 07/04/2023	-
Sample #	Requirements		-
2	<input checked="" type="checkbox"/> No sharp edges, burrs, etc. <input checked="" type="checkbox"/> Smooth surfaces		P
3	<input checked="" type="checkbox"/> No sharp edges, burrs, etc. <input checked="" type="checkbox"/> Smooth surfaces		P
4	<input checked="" type="checkbox"/> No sharp edges, burrs, etc. <input checked="" type="checkbox"/> Smooth surfaces		P
6	<input checked="" type="checkbox"/> No sharp edges, burrs, etc. <input checked="" type="checkbox"/> Smooth surfaces		P
8	<input checked="" type="checkbox"/> No sharp edges, burrs, etc. <input checked="" type="checkbox"/> Smooth surfaces		P
10	<input checked="" type="checkbox"/> No sharp edges, burrs, etc. <input checked="" type="checkbox"/> Smooth surfaces		P
14	<input checked="" type="checkbox"/> No sharp edges, burrs, etc. <input checked="" type="checkbox"/> Smooth surfaces		P
15	<input checked="" type="checkbox"/> No sharp edges, burrs, etc. <input checked="" type="checkbox"/> 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 #	2#, 3#, 4#, 6#, 8#, 10# 14#, 15#		-
Test date [MM/DD/YYYY].....	2#: 07/06/2023; 4#: 07/06/2023; 6#: 06/21/2023; 8#: 04/23/2023; 10#: 07/05/2023; 14#: 07/06/2023 15#: 07/04/2023; 3#: 07/04/2023		-
<input type="checkbox"/> 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
<input checked="" type="checkbox"/> Method B			-
Diode #	Diode working properly		P
1	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		P
2	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		P
3	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		P
Supplementary information: N/A			

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IEC / EN 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
10.5 Insulation thickness test - MST04				-
Test date [MM/DD/YYYY].....:		07/13/2023		-
Measuring location.....:		Location A & B & C are at the soldering connections (rear cover)		-
Sample #	Required value [mm]	Location	Measured value [mm]	-
14	0.3087	A	0.3270	P
	0.3087	B	0.3204	
	0.3087	C	0.3279	
Supplementary information: Measurement uncertainty is 2.9% and has been taken into consideration to determine required value.				

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IEC / EN 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
10.5 Insulation thickness test - MST04				-
Test date [MM/DD/YYYY].....:		08/16/2023		-
Measuring location.....:		Location A & B & C are at the soldering connections (front cover)		-
Sample #	Required value [mm]	Location	Measured value [mm]	-
14	0.3087	A	0.3196	P
	0.3087	B	0.3139	
	0.3087	C	0.3142	
Supplementary information: Measurement uncertainty is 2.9% and has been taken into consideration to determine required value.				

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

Module type: SPP375QHES (BOM2)

10.2 Visual inspection (initial) - MQT01/MST01			-
Test date [MM/DD/YYYY].....:		03/14/2023	-
Sample #	Nature and position of initial findings - comments or attach photos		-
20	No visual defects		P
Supplementary information: N/A			

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IEC / EN 61730-2							
Clause	Requirement + Test		Result - Remark				Verdict
10.4 Maximum power determination (initial) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:			03/20/2023				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m ²].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	
20	43.03	35.95	10.58	10.04	361.0	79.32	-
Supplementary information: N/A							

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IEC / EN 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
10.13 Insulation test (initial) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		03/20/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	Verdict
20	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module 1.91m ² .				

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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.14 Wet leakage current test (initial) - MQT15/MST17			-
Test date [MM/DD/YYYY].....:	03/20/2023		-
Test voltage applied [V].....:	2 minutes of 1500		-
Solution resistivity [Ω /cm] / <3500	<3500		-
Solution temperature [$^{\circ}$ C] / 22 \pm 2	22 \pm 2		-
Sample #	Required [$M\Omega$]	Measured [$M\Omega$]	-
20	20.9	>1000	P
Supplementary information: Minimum requirement according to the standard is 40 $M\Omega \cdot m^2$. Area of the module is 1.91 m^2 .			

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File No.: PVP02093/23P-02

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IEC / EN 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
10.15 Temperature test - MST21				-
Sample #.....	20			-
Test date [MM/DD/YYYY].....	07/06/2023			-
Reference solar irradiance [W/m ²].....	1000			-
Reference ambient temperature [°C].....	40			-
Spacing between module and black test platform [cm]	6			-
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	72.9	73.4	N/A
B	110	72.6	72.8	P
C	110	58.4	59.1	P
D	N/A	N/A	N/A	N/A
E	110	57.4	57.9	P
F	110	56.3	56.5	P
G	105	61.2	61.5	P
H	200	71.0	71.4	P
I	N/A	N/A	N/A	N/A
J	N/A	N/A	N/A	N/A
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].....	07/06/2023			-
Sample #	Nature and position of initial findings - comments or attach photos			-
20	No visual defects			P
Supplementary information: N/A				

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IEC / EN 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
10.13 Insulation test (after temperature test) - MQT03/MST16				-
Test date [MM/DD/YYYY].....:		07/06/2023		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
20	20.9	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				
10.14 Wet leakage current test (after temperature test) - MQT15/MST17				-
Test date [MM/DD/YYYY].....:		07/06/2023		-
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]		-
20	20.9	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m ² . Area of the module is 1.91m ² .				

Test Report



File No.: PVP02093/23P-02

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IEC / EN 61730-2							
Clause	Requirement + Test			Result - Remark			Verdict
10.4 Maximum power determination (final) - MQT02/MST03							-
Test date [MM/DD/YYYY].....:		07/06/2023					-
Ambient temperature [°C].....:		Corrected to 25.0					-
Irradiance [W/m²].....:		Corrected to 1000					-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	Verdict
20	42.86	35.92	10.59	10.05	361.1	79.60	P
Supplementary information: The IV curve show no additional kinks or other unusual characteristics as compared to the initial IV curve.							

Test Report



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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.6 Durability of markings - MST05			-
Test date [MM/DD/YYYY].....:		07/06/2023	-
Sample #	Requirements		-
20	<input checked="" type="checkbox"/> Marking is legible <input checked="" type="checkbox"/> Not possible to remove marking plates easily <input checked="" type="checkbox"/> No curling occurred		P
Supplementary information: N/A			

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File No.: PVP02093/23P-02

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IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.7 Sharp edge test - MST06			-
Test date [MM/DD/YYYY].....:		07/06/2023	-
Sample #	Requirements		-
20	<input checked="" type="checkbox"/> No sharp edges, burrs, etc. <input checked="" type="checkbox"/> Smooth surfaces		P
Supplementary information: Compliance is checked by inspection.			

Test Report



File No.: PVP02093/23P-02

Test Report No.: 492011490.006

IEC / EN 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.8 Bypass diode functionality test - MQT18.2/MST07			-
Sample #.....:	20		-
Test date [MM/DD/YYYY].....:	07/06/2023		-
<input type="checkbox"/> 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
<input checked="" type="checkbox"/> Method B			-
Diode #	Diode working properly		P
1	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		P
2	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		P
3	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		P
Supplementary information: N/A			

Annex 1: Constructional Data Form (CDF)

File No.: PVP02093/23P-02 Attached to Test Report No.: 492011490.006

CDF (Constructional Data Form) for Electrical Products

Applicant	Jiangsu Sunport Power Corp., Ltd. No.20, Xishi Road, Xinwu District, Wuxi City, Jiangsu Province, 214028, P.R. China
Manufacturer 1	Xuzhou Sunport Power Co. Ltd. No.1, Fumin Road, High-tech Industrial Development Zone Pizhou, Jiangsu Province, P.R. China
Manufacturer 2	Jiangsu Sunport Power Corp., Ltd. No.20, Xishi Road, Xinwu District, Wuxi City, Jiangsu Province, 214028, P.R. China
Product	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
Standard(s)	IEC / EN 61215-1:2016; IEC / EN 61215-1-1:2016; IEC 61215-2:2016 / EN 61215-2:2017 + AC:2017 + AC:2018; IEC 61730-1:2016 / EN IEC 61730-1:2018 + AC:2018; IEC 61730-2:2016 / EN IEC 61730-2:2018 + AC:2018.
Trade mark	
Module type(s)	Flexible PV module with 6" Mono-crystalline MWT Solar Cells: 60 cells: SPPXXXM60S(XXX=305-320W, in increments of 5) 144 cells: SPPXXXQH7S(XXX=400-435W, in increments of 5) 132 cells: SPPXXXQHFS(XXX=365-395W, in increments of 5) 126 cells: SPPXXXQHES(XXX=350-380W, in increments of 5) 110 cells: SPPXXXQH110S(XXX=305-330W, in increments of 5) 70 cells: SPPXXXQH70S(XXX=200-205W, in increments of 5) 42 cells: SPPXXXQH42S(XXX=115-125W, in increments of 5) 36 cells: SPPXXXQH36S(XXX=100-110W, in increments of 5) 30 cells: SPPXXXQH1S(XXX=85-90W, in increments of 5) 138 cells: SPPXXXNHGS(XXX=370-400W, in increments of 5) 126 cells: SPPXXXNHES(XXX=340-365W, in increments of 5) 42 cells: SPPXXXNH42S(XXX=115-120W, in increments of 5) 36 cells: SPPXXXNH36S(XXX=95-105W, in increments of 5) 30 cells: SPPXXXNH1S(XXX=80-85W, in increments of 5)

Confirmation of the applicant
Wuxi, 08/04/2023 (Place and date)

Yang Huo

(Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT
Shanghai, 08/04/2023 (Place and date)

Bella Liu

数字签名者: Bella
Liu
日期: 2023.08.08
102648+08'00'

(Signature of authorized TÜV NORD CERT engineer)

PV-F-026 CDF
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Test Report



File No.: PVP02093/23P-02

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File No.: PVP02093/23P-02

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Electrical ratings:

Module type	60 cells: SPPXXXM60S(XXX=300-320W, in increments of 5)		
Dimensions [mm] / l x w x h	1660 x 990 x 1.7		
Rated Pmpp [W].....	305; 310; 315; 320	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	39.7; 39.9; 40.1; 40.3	Tolerance of rated Voc [%].....	±3
Rated Isc [A]	9.75; 9.83; 9.90; 9.99	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm]	15.63	Fuse rating [A]	15
Design load [Pa] / front	1600	Safety factor / front	1.5
Design load [Pa] / back.....	1600	Safety factor / back.....	1.5

Module type	144 cells: SPPXXXQH7S(XXX=400-435W, in increments of 5)		
Dimensions [mm] / l x w x h	2090 x 1040 x 2.5		
Rated Pmpp [W].....	400; 405; 410; 415; 420; 425; 430; 435	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	47.1; 47.3; 47.5; 47.7; 47.9; 48.1; 48.3; 48.5	Tolerance of rated Voc [%].....	±3
Rated Isc [A]	10.80; 10.85; 10.90; 10.95; 11.00; 11.05; 11.10; 11.15	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm]	19.5	Fuse rating [A]	18
Design load [Pa] / front	2400	Safety factor / front	1.5
Design load [Pa] / back.....	1600	Safety factor / back.....	1.5

Module type	132 cells: SPPXXXQHFS(XXX=365-395W, in increments of 5)		
Dimensions [mm] / l x w x h	1925 x 1040 x 2.5		
Rated Pmpp [W].....	365; 370; 375; 380; 385; 390; 395;	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	42.40; 42.60; 42.80; 43.00; 43.20; 43.40; 43.60	Tolerance of rated Voc [%].....	±3
Rated Isc [A]	11.09; 11.16; 11.23; 11.30; 11.35; 11.44; 11.50	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm]	19.5	Fuse rating [A]	18
Design load [Pa] / front	2400	Safety factor / front	1.5

Confirmation of the applicant:
Wuxi, 08/04/2023 (Place and date)

Yang Huo

(Applicant's legally authorized signature and stamp)

PV-F-026 CDF

Confirmation of TÜV NORD CERT
Shanghai, 08/04/2023 (Place and date)

数字签名
者: Bella Liu
日期: 2023.08.08
10:27:01 +08'00'

(Signature of authorized TÜV NORD CERT engineer)

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Test Report



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Design load [Pa] / back..... :	1600	Safety factor / back..... :	1.5
--------------------------------	------	-----------------------------	-----

Module type	126 cells: SPPXXQHES(XXX=350-380W, in increments of 5)		
Dimensions [mm] / l x w x h	1840 x 1040 x 2.5 / 1850 x 1070 x 2.5		
Rated Pmpp [W]..... :	350; 355; 360; 365; 370; 375; 380;	Tolerance of rated Pmpp [%]..... :	±3
Rated Voc [V]..... :	41.8; 42.0; 42.2; 42.4; 42.6; 42.8; 43.0	Tolerance of rated Voc [%]..... :	±3
Rated Isc [A]	10.88; 10.95; 11.02; 11.09; 11.16; 11.23; 11.30	Tolerance of rated Isc [%]..... :	±5
Maximum system voltage [V]..... :	1500	Safety class acc. to IEC 61140..... :	Class II
Min-creepage distance [mm]	19.5 / 16.5	Fuse rating [A]	18
Design load [Pa] / front	2400	Safety factor / front	1.5
Design load [Pa] / back	1600	Safety factor / back	1.5

Module type	110 cells: SPPXXQH110S(XXX=305-330W, in increments of 5)		
Dimensions [mm] / l x w x h	1925 x 875 x 2.5		
Rated Pmpp [W]..... :	305; 310; 315; 320; 325; 330	Tolerance of rated Pmpp [%]..... :	±3
Rated Voc [V]..... :	36.30; 36.50; 36.70; 36.90; 37.10; 37.30	Tolerance of rated Voc [%]..... :	±3
Rated Isc [A]	10.95; 11.02; 11.09; 11.16; 11.23; 11.30	Tolerance of rated Isc [%]..... :	±5
Maximum system voltage [V]..... :	1500	Safety class acc. to IEC 61140..... :	Class II
Min-creepage distance [mm]	18	Fuse rating [A]	18
Design load [Pa] / front	2400	Safety factor / front	1.5
Design load [Pa] / back	1600	Safety factor / back	1.5

Module type	70 cells: SPPXXQH70S(XXX=200-205W, in increments of 5)		
Dimensions [mm] / l x w x h	1270 x 900 x 2.5		
Rated Pmpp [W]..... :	200; 205	Tolerance of rated Pmpp [%]..... :	±3
Rated Voc [V]..... :	23.90; 24.10	Tolerance of rated Voc [%]..... :	±3
Rated Isc [A]	10.65; 10.81	Tolerance of rated Isc [%]..... :	±5
Maximum system voltage [V]..... :	1500	Safety class acc. to IEC 61140..... :	Class II
Min-creepage distance [mm]	15	Fuse rating [A]	18
Design load [Pa] / front	2400	Safety factor / front	1.5

Confirmation of the applicant
Wuxi, 08/04/2023 (Place and date)

Yang Huo 200000005324

(Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT
Shanghai, 08/04/2023 (Place and date)

Bella Liu
数字签名
名: Bella Liu
日期: 2023.08.08
10:27:17 +08'00'

(Signature of authorized TÜV NORD CERT engineer)

Test Report



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Test Report No.: 492011490.006



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Attached to Test Report No.: 492011490.006

Design load [Pa] / back	1600	Safety factor / back	1.5
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Module type	42 cells: SPPXXXQH42S(XXX=115-125W, in increments of 5)		
Dimensions [mm] / l x w x h	1040 x 670 x 1.7		
Rated Pmpp [W].....	115; 120; 125	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	28.7; 28.9; 29.1	Tolerance of rated Voc [%].....	±3
Rated Isc [A]	5.42; 5.51; 5.65	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm]	19.5	Fuse rating [A]	10
Design load [Pa] / front	2400	Safety factor / front	1.5
Design load [Pa] / back.....	1600	Safety factor / back	1.5

Module type	36 cells: SPPXXXQH36S(XXX=100-110W, in increments of 5)		
Dimensions [mm] / l x w x h	1080 x 565 x 1.7 / 1075 x 535 x 2.3 / 1075 x 565 x 2.3 / 1040 x 588 x 2.3		
Rated Pmpp [W].....	100; 105; 110	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	24.60; 24.80; 25.00	Tolerance of rated Voc [%].....	±3
Rated Isc [A]	5.22; 5.42; 5.62	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm]	15 / 16 / 14 / 13.5	Fuse rating [A]	18
Design load [Pa] / front	2400	Safety factor / front	1.5
Design load [Pa] / back.....	1600	Safety factor / back.....	1.5

Module type	30 cells: SPPXXXQH1S(XXX=85-90W, in increments of 5)		
Dimensions [mm] / l x w x h	1840 x 295 x 1.7		
Rated Pmpp [W].....	85; 90	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	20.4; 20.6	Tolerance of rated Voc [%].....	±3
Rated Isc [A]	5.38; 5.54	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm]	17.32	Fuse rating [A]	10
Design load [Pa] / front	2400	Safety factor / front	1.5
Design load [Pa] / back.....	1600	Safety factor / back.....	1.5

Module type	138 cells: SPPXXXNHGS(XXX=370-400W, in increments of 5)		
Dimensions [mm] / l x w x h	1980 x 1016 x 2.5		
Rated Pmpp [W].....	370; 375; 380; 385; 390;	Tolerance of rated Pmpp [%].....	±3

Confirmation of the applicant
Wuxi, 08/04/2023 (Place and date)

Yang Huo

(Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT
Shanghai, 08/04/2023 (Place and date)

Bella Liu

(Signature of authorized TÜV NORD CERT engineer)

Test Report



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	395; 400;		
Rated Voc [V]	46.4; 46.6; 46.8; 47.0; 47.2; 47.4; 47.6	Tolerance of rated Voc [%]	±3
Rated Isc [A]	10.48; 10.53; 10.58; 10.63; 10.68; 10.73; 10.78	Tolerance of rated Isc [%]	±5
Maximum system voltage [V]	1500	Safety class acc. to IEC 61140	Class II
Min-creepage distance [mm]	17.25	Fuse rating [A]	15
Design load [Pa] / front	2400	Safety factor / front	1.5
Design load [Pa] / back	1600	Safety factor / back	1.5

Module type	126 cells: SPPXXNHES(XXX=340-365W, in increments of 5)		
Dimensions [mm] / l x w x h	1840 x 1040 x 2.5		
Rated Pmpp [W]	340; 345; 350; 355; 360; 365	Tolerance of rated Pmpp [%]	±3
Rated Voc [V]	41.9; 42.1; 42.3; 42.5; 42.7; 42.9	Tolerance of rated Voc [%]	±3
Rated Isc [A]	10.4; 10.49; 10.58; 10.67; 10.76; 10.85; 10.94;	Tolerance of rated Isc [%]	±5
Maximum system voltage [V]	1500	Safety class acc. to IEC 61140	Class II
Min-creepage distance [mm]	16.25	Fuse rating [A]	15
Design load [Pa] / front	2400	Safety factor / front	1.5
Design load [Pa] / back	1600	Safety factor / back	1.5

Module type	42 cells: SPPXXNH42S(XXX=115-120W, in increments of 5)		
Dimensions [mm] / l x w x h	1220 x 523 x 1.7		
Rated Pmpp [W]	115; 120	Tolerance of rated Pmpp [%]	±3
Rated Voc [V]	28.4; 28.6	Tolerance of rated Voc [%]	±3
Rated Isc [A]	5.10; 5.25	Tolerance of rated Isc [%]	±5
Maximum system voltage [V]	1500	Safety class acc. to IEC 61140	Class II
Min-creepage distance [mm]	15	Fuse rating [A]	9
Design load [Pa] / front	2400	Safety factor / front	1.5
Design load [Pa] / back	1600	Safety factor / back	1.5

Module type	36 cells: SPPXXNH36S(XXX=95-105W, in increments of 5)		
Dimensions [mm] / l x w x h	1070 x 520 x 1.7		
Rated Pmpp [W]	95; 100; 105	Tolerance of rated Pmpp [%]	±3

Confirmation of the applicant
Wuxi, 08/04/2023 (Place and date)

Yang Huo

(Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT
Shanghai, 08/04/2023 (Place and date)

Bella Liu
数字签名
者: Bella Liu
日期: 2023.08.08
10:27:46 +08'00'

(Signature of authorized TÜV NORD CERT engineer)

Test Report



File No.: PVP02093/23P-02

Test Report No.: 492011490.006



File No.: PVP02093/23P-02

Attached to Test Report No.: 492011490.006

Rated Voc [V].....:	24.3; 24.5; 24.7	Tolerance of rated Voc [%].....:	±3
Rated Isc [A]	4.98; 5.22; 5.42	Tolerance of rated Isc [%].....:	±5
Maximum system voltage [V].....:	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm]	15	Fuse rating [A]	9
Design load [Pa] / front	2400	Safety factor / front	1.5
Design load [Pa] / back.....:	1600	Safety factor / back.....:	1.5

Module type	30 cells: SPPXXXNH1S(XXX=80-85W, in increments of 5)		
Dimensions [mm] / l x w x h	1810 x 290 x 1.7		
Rated Pmpp [W].....:	80; 85	Tolerance of rated Pmpp [%].....:	±3
Rated Voc [V].....:	19.9; 20.1	Tolerance of rated Voc [%].....:	±3
Rated Isc [A]	5.22; 5.42	Tolerance of rated Isc [%].....:	±5
Maximum system voltage [V].....:	1500	Safety class acc. to IEC 61140.....:	Class II
Min-creepage distance [mm]	17.32	Fuse rating [A]	9
Design load [Pa] / front	2400	Safety factor / front	1.5
Design load [Pa] / back.....:	1600	Safety factor / back.....:	1.5

Copy of marking plate:

	Maximum Power	###W	Power Selection	0~+5W
	Maximum Power Voltage (Vmp)	##.#V	Operating Temperature	-40~+85°C
	Maximum Power Current (Imp)	##.##A	Nominal Module Operating Temperature (NMOT)	43±2°C
	Open Circuit Voltage (Voc)	##.#V	CAUTION Electricity is generated when this module is exposed to light. All applicable electrical safety precautions are obeyed. Only qualified personnel are allowed to install or perform maintenance work on modules. Be care of dangerous high DC voltage when connecting modules. Do not handle or install modules when wet.	
	Short Circuit Current (Isc)	##.##A		
Model	SPP#####S	Maximum Power Tolerance	±3%	<p>Jiangsu Sunport Power Corp., Ltd. http://www.sunportpower.com Tel:+86-510-81123333 Fax:+86-510-84399226 Made In China</p>
Dimension (L×W×H)	###×###×#.#mm	Open Circuit Voltage Tolerance	±3%	
Weight	#.#Kg	Short Circuit Current Tolerance	±5%	
Maximum System Voltage	DC1500V			
Maximum Series Fuse Rating	##A			
Application Class	Class A			

	Maximum Power	###W	Power Selection	0~+5W
	Maximum Power Voltage (Vmp)	##.#V	Operating Temperature	-40~+85°C
	Maximum Power Current (Imp)	##.##A	Nominal Module Operating Temperature (NMOT)	43±2°C
	Open Circuit Voltage (Voc)	##.#V	CAUTION Electricity is generated when this module is exposed to light. All applicable electrical safety precautions are obeyed. Only qualified personnel are allowed to install or perform maintenance work on modules. Be care of dangerous high DC voltage when connecting modules. Do not handle or install modules when wet.	
	Short Circuit Current (Isc)	##.##A		
Model	SPP#####S (H)	Maximum Power Tolerance	±3%	<p>Jiangsu Sunport Power Corp., Ltd. http://www.sunportpower.com Tel:+86-510-81123333 Fax:+86-510-84399226 Made In China</p>
Dimension (L×W×H)	###×###×#.#mm	Open Circuit Voltage Tolerance	±3%	
Weight	#.#Kg	Short Circuit Current Tolerance	±5%	
Maximum System Voltage	DC1500V			
Maximum Series Fuse Rating	##A			
Application Class	Class A			

Confirmation of the applicant
 Wuxi, 08/04/2023 (Place and date)

Yang Huo

(Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT
 Shanghai, 08/04/2023 (Place and date)

Bella Liu
 日期: 2023.08.08
 10:28:01 +08'00'

(Signature of authorized TÜV NORD CERT engineer)

Test Report



File No.: PVP02093/23P-02

Test Report No.: 492011490.006



File No.: PVP02093/23P-02

Attached to Test Report No.: 492011490.006

List of critical materials and components:

Object	Manufacturer	Type	Technical Data	Remark
Components				
6" mono cell 1	XuZhou Guyang New Energy Co., Ltd.	MWT (MONO)	Dimension (w x l)= 158.75mm x 158.75mm Thickness = 180±20µm Cell area = 249.86cm ² 0 busbars, 36 conductive holes Perc cells	Tested with PV modules
6" mono cell 2	XuZhou Guyang New Energy Co., Ltd.	MWT (MONO)	Dimension (w x l)= 162.75mm x 81.375mm Thickness = 180±20µm Cell area = 132.18cm ² 0 busbars, 18 conductive holes Perc cells	Tested with PV modules
6" mono cell 3	XuZhou Guyang New Energy Co., Ltd. Wuxi Sunport Power Co., Ltd.	MWT (MONO)	Dimension (w x l)= 166mm x 83mm Thickness = 180±20µm Cell area = 137.075cm ² 0 busbars, 18 conductive holes Perc cells	Tested with PV modules
Front cover 1	Jolywood (Suzhou) Sunwatt Co., Ltd.	FFC-JW30 (plus)	Thickness = 0.315±0.015 mm Material: FFC / PET / FFC Thickness = 25µm / 275µm / 15µm Color: Transparent CTI=600	Tested with PV modules CTI report no. 50135655 008
Front cover 2	Cybrid Technologies Inc.	Cynagard 455A(R)	Thickness = 0.320±0.02 mm Material: Polymer resin / PET / Polymer resin Thickness = 15µm / 300µm / 5µm Color: Transparent CTI=600	Tested with PV modules CTI report no. TRPVP07036/21P/01
Rear cover 1	Jolywood (Suzhou) Sunwatt Co., Ltd.	FFC-JW30 (plus)	Thickness = 0.315±0.015 mm Material: FFC / PET / FFC Thickness = 25µm / 275µm / 15µm Color: White / Black CTI=600	Tested with PV modules CTI report no. 50135655 002
Rear cover 2	Jolywood (Suzhou) Sunwatt Co., Ltd.	FFCJW3010 (plus)	Thickness = 0.310±0.015 mm Material: FFC / PET / FFC Thickness = 12µm / 285µm / 13µm Color: White CTI=600	Tested with PV modules Certificate no. R50484166 003
Conductive paste	ELSOLD GmbH & Co. Kg	Solder Paste AP-10	Bi: 57±1.0 Sn:42±1.0, Ag:1±0.2	Tested with PV modules
Conductive core board 1	Xuzhou Sunport Power New Materials Co.,Ltd	Cu	Cu 0.035mm	Tested with PV modules

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Yang Huo 000005324

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数字签名
者: Bella Liu
日期: 2023.08.08
10:28:26 +08'00'

(Signature of authorized TÜV NORD CERT engineer)

Test Report



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Object	Manufacturer	Type	Technical Data	Remark
Conductive core board 2 (Combine with Encapsulation material 1)	Xuzhou Sunport Power New Materials Co.,Ltd	Cu-Al composite foil / EVA	Cu-Al composite foil, thickness is 0.047mm EVA , aerial density is 260g/m ²	Tested with PV modules
Insulation layer	Xuzhou Sunport Power New Materials Co.,Ltd	GPS (between cell and Conductive core board)	Thickness = 0.15mm / 0.17mm	Tested with PV modules
Encapsulation material 1	Cybrid Technologies Inc.	Cybright T22 (between cell and front cover)/ Cybright T22 (between cell and rear cover)	Aerial density = 560g/m ² / 390g/m ² CTI=600	Tested with PV modules CTI report no. 15043899 038
Encapsulation material 2	Cybrid Technologies Inc.	Cybright T22 (between cell and front cover)/ Cybright C22 (between cell and rear cover)	Aerial density = 560g/m ² / 390g/m ² CTI=600	Tested with PV modules CTI report no. 15043899 038 15043899 058
Encapsulation material 3	Hangzhou First PV Material Co.,Ltd.	TF4(between cell and front cover) / TF4 (between cell and rear cover)	Aerial density = 560g/m ² / 390g/m ² CTI=600	Tested with PV modules CTI report no. 15101259 005
Glass fiber grid cloth	Hebei Huaxing Glass Fiber Co., Ltd	between Conductive core board and encapsulation material near the rear cover	Aerial density = 160 (-10 to +20) g/m ²	Tested with PV modules
Internal wiring 1 (for inter-string connection)	Wuxi Sveck Technology Co., Ltd	Copper belt with tin plated	Width =6.0mm Thickness = 0.35mm Sn60%Pb40%	Tested with PV modules
Internal wiring 2 (for inter-string connection)	Suzhou Boneed Photovoltaic Technology Co., Ltd.	Copper belt with tin plated	Width = 6.0mm Thickness = 0.3mm Sn60%Pb40%	Tested with PV modules
Soldering material	Hangzhou Youbang Electronic New Material Co., Ltd.	Sn63PbA	Sn63Pb37	Tested with PV modules
Adhesive (frame)	N/A	N/A	N/A	N/A
Junction box set 1				

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Object	Manufacturer	Type	Technical Data	Remark
Junction box	Jiangsu Tonglin Electric Co., Ltd.	TL-BOX022.3-A-2-1xyzF; TL-BOX022.3-A-2-2xF; TL-BOX022.3-A-2-3xyzF; TL-BOX022.3-B-2-1xyzF; TL-BOX022.3-B-2-2xF; TL-BOX022.3-B-2-3xyzF	Rated voltage = 1500VDC Rated current = 15A (x=1) or 18A (x=2) or 20A (x=3) Number of diodes: 1 for each box	Certificate no. R50539999
Adhesive (junction box)	TONSAN ADHESIVE INC.	1527	Color: white / black	-
	Shanghai Huitian New Material Co., Ltd.	HT906Z	Color: white/ black	-
	Jiangsu Tianchen New Materials Co., Ltd.	HT-8258	Color: white	-
	Jiangsu Crevo Technology Co., Ltd.	CV709	Color: white	-
	Chengdu Guibao Science and Technology Co., Ltd.	888N	Color: white	-
Potting material	TONSAN ADHESIVE INC.	1521	Color: white	-
	TONSAN ADHESIVE INC.	1533	Color: white	-
	Jiangsu Tianchen New Materials Co., Ltd.	HT-6360AB	Color: white	-
	Dupont	Dow-Corning PV-7326	Color: white / black	-
	Shanghai Huitian New Material Co., Ltd.	5299W-S	Color: white	-
	Sika(Jiangsu) Industrial Material Ltd.	CV315	Color: white	-
	Chengdu Guibao Science and Technology Co., Ltd.	4808	Color: white	-
Bypass diodes	Jiangsu Tonglin Electric Co., Ltd.	PT001B-L (x=1)	Tj max = 200°C If = 25A	-
	Jiangsu Tonglin Electric Co., Ltd.	PT001B-H (x=2)	Tj max = 200°C If = 30A	-
	Jiangsu Tonglin Electric Co., Ltd.	PT001B-SH (x=3)	Tj max = 200°C If = 30A	-
Cable	Jiangsu Tonglin Electric Co., Ltd.	62930 IEC 131 1×4.0mm ²	Rated voltage = 1500VDC	Certificate no. R50462100
	Suzhou Baohing Electric Wire & Cable Manufacturer Co., Ltd.	62930 IEC 131 1×4.0mm ²	Rated voltage = 1500VDC	Certificate no. R50464210
	Wuxi Xinhongye Wire & Cable Co., Ltd.	62930 IEC 131 1×4.0mm ²	Rated voltage = 1500VDC	Certificate no. R50439595

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Object	Manufacturer	Type	Technical Data	Remark
	Changshu JHOSIN Communication Technology Co., Ltd.	62930 IEC 131 1×4.0mm ²	Rated voltage = 1500VDC	Certificate no. R50413335
Connectors	Jiangsu Tonglin Electric Co., Ltd.	TL-CABLE01S TL-CABLE01S-F TL-CABLE01S Pro	Rated voltage = 1500VDC Rated current = 41A	Certificate No. R50514839
	Jiangsu Tonglin Electric Co., Ltd.	BIGabc4efgh	Rated voltage = 1500VDC Rated current = 45A	Certificate no. R50524455
	Stäubli Electrical Connectors AG	PV-KST4-EVO 2/xy_UR; PV-KBT4-EVO 2/xy_UR	Rated voltage = 1500VDC Rated current = 45A	Certificate no. R60127169
		PV-KST4-EVO 2A/xy; PV-KBT4-EVO 2A/xy	Rated voltage = 1500VDC Rated current = 45A	
	Amphenol Technology (Shenzhen) Co., Ltd.	UTXCFabcd (female) and UTXCMabcd (male)	Rated voltage = 1500VDC Rated current = 42A	Certificate no. R50340393
Junction box set 2				
Junction box	Jiangsu Tonglin Electric Co., Ltd.	TL-BOX216x (x=F20A or F20A1 or F20B)	Rated voltage = 1500VDC Rated current = 20A Number of diodes: 1 for each box	Certificate no. R50501686
Adhesive (junction box)	TONSAN ADHESIVE INC.	1527	Color: white / black	-
	Shanghai Huitian New Material Co., Ltd.	HT906Z	Color: white/ black	-
	Jiangsu Tianchen New Materials Co., Ltd.	HT-8258	Color: white	-
	Jiangsu Crevo Technology Co., Ltd.	CV709	Color: white	-
	Chengdu Guibao Science and Technology Co., Ltd.	888N	Color: white	-
Potting material	TONSAN ADHESIVE INC.	1521	Color: white	-
	Shanghai Huitian New Material Co., Ltd.	5299W-S	Color: white	-
	TONSAN ADHESIVE INC.	1533	Color: white	-
	Jiangsu Tianchen New Materials Co., Ltd.	HT-6360	Color: white	-
	Sika (Jiangsu) Industrial Material Ltd.	CV315	Color: white	-
	Chengdu Guibao Science and Technology Co., Ltd.	4808	Color: white	-
Bypass diodes	Jiangsu Tonglin Electric Co., Ltd.	PT001D-20 (X=F20A)	Tj max = 200°C If = 30A	-

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Yang Huo 200000005324

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PV-F-026 CDF

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Object	Manufacturer	Type	Technical Data	Remark
	PanJit International Inc.	GF4045 (X=F20B)	Tj max = 200°C If = 40A	-
	Jiangsu Tonglin Electric Co., Ltd.	PT001H-20 (X=F20A1)	Tj max = 200°C If = 25A	-
Cable	Jiangsu Tonglin Electric Co., Ltd.	62930 IEC 131 1×4.0mm ²	Rated voltage = 1500VDC	Certificate no. R50462100
	SUZHOU YONGHAO CABLE CO., LTD.	62930 IEC 131 1×4.0mm ²	Rated voltage = 1500VDC	Certificate no. R50401233
	Suzhou Baohing Electric Wire & Cable Co., Ltd.	62930 IEC 131 1×4.0mm ²	Rated voltage = 1500VDC	Certificate no. R50464210
Connectors	Jiangsu Tonglin Electric Co., Ltd.	TL-CABLE01S TL-CABLE01S-F; TL-CABLE01S-FR; TL-CABLE01S Pro	Rated voltage = 1500VDC Rated current = 30A	Certificate no. R50332964
	Staubli Electrical Connectors AG	PV-KST4-EVO 2/xy_UR; PV-KBT4-EVO 2/xy_UR	Rated voltage = 1500VDC Rated current = 45A	Certificate no. R60127169
		PV-KST4-EVO2A/xy; PV-KBT4-EVO2A/xy	Rated voltage = 1500VDC Rated current = 45A	
	Jiangsu Tonglin Electric Co., Ltd.	BIGabc4efgh	Rated voltage = 1500VDC Rated current = 45A	Certificate no. R50424961

Remark:

- (1) Fire test Class C (MST 23 of IEC 61730-2: 2016) has been evaluated on all the raw materials listed above with installation method that a supporting plate be added on the back of module.
- (2) Pollution degree I (Sequence B1 of IEC 61730-2:2016) 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 -----

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Annex 2: List of measurement equipment

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
Measurement of temperature coefficients	Pulsed Solar Simulator	TNRDEQ001	02/20/2024
	High temperature chamber	TNRDEQ008	03/15/2024
Performance at STC	High temperature chamber	TNRDEQ005	02/20/2024
	Pulsed Solar Simulator	TNRDEQ001	02/20/2024
Performance at low irradiance	Pulsed Solar Simulator	TNRDEQ001	02/20/2024
Outdoor exposure test	PV Module Test System	TNRDTI002	10/13/2023
Hot-spot endurance test	Steady-state solar simulator	TNRDEQ011	03/15/2024
	Pulsed Solar Simulator	TNRDEQ001	02/20/2024
UV-test	UV radiation testing machine	TNRDEQ004	04/11/2024
Humidity freeze test	Temperature/humidity cycling environment chamber	TNRDEQ008	03/15/2024
	DC Power Suppl	TNRDTI025	03/15/2024
Thermal cycling test	High and low temperature chamber	TNRDEQ005	03/15/2024
	DC Power Supply	TNRDTI011	03/15/2024
Robustness of terminations	Digital display push pull meter	TNRDTI003	03/09/2024
	Weight	TNRDTO054	10/13/2023
Damp heat test	High and low temperature chamber	TNRDEQ006	03/15/2024
Wet leakage current test	Withstanding voltage/ Insulation resistance tester	TNRDTI020	02/20/2024
	Conductive meter	TNRDTI004	02/20/2024
Static mechanical load test / Cyclic (dynamic) mechanical load test	Mechanical load tester	TNRDSM001	10/13/2023
Hail test	Hail impact test machine	TNRDEQ007	02/20/2024
Bypass diode thermal test	Humidity cycling environment chamber	TNRDEQ008	03/09/2024
	Diode thermal performance testing system	TNRDTI027	10/13/2023
	Pulsed Solar Simulator	TNRDEQ001	02/20/2024

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Bypass diode functionality test	Pulsed Solar Simulator	TNRDEQ001	02/20/2024
Initial stabilization	Steady-state solar simulator	TNRDEQ011	03/15/2024
	Resistive Load	TNRDTI013	02/20/2024
Potential induced degradation test	High and low temperature chamber	TNRDEQ012	03/09/2024
	PID Tester	TNRDTI018	10/13/2023
Accessibility test	Test finger	TNRDTI010	02/20/2024
Cut susceptibility test	Cut susceptibility tester	TNRDTO015	03/08/2024
Impulse Voltage test	Pulse Voltage Generator	ES21-46	06/18/2023
	Digital phosphor oscilloscopes	ES21-126-02	10/08/2023
Temperature test	Steady-state solar simulator	TNRDEQ011	02/20/2024
Reverse current overload test	DC Power Supply	TNRDTI007	02/20/2024
Module breakage test	Impact tester	TNRDEQ002	02/20/2024
Materials creep test	High and low temperature chamber	TNRDEQ012	03/15/2024
Cold conditioning	humidity cycling environment chamber	TNRDEQ008	03/15/2024
Dry heat conditioning	High and low temperature chamber	TNRDEQ012	03/15/2024
Fire test	Appearance Test Platform	GF-24 WGCS-1	03/02/2024
	Lumen per meter	GF-28 1010A	03/02/2024
	Photovoltaic module combustion test system	GF-112 SCF	03/02/2024
Continuity test of equipotential bonding	Safety tester	TNRDTI020	02/20/2024
Durability of markings	Clock	TNRDTO010	03/21/2024
Sharp edge test	Sharp edge tester	TNRDTO053	03/21/2024
Ignitability test	PV module ignitability tester	GF-117 KRX-V2-P10	03/02/2024

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

The total measuring uncertainty of P_{mpp} is $\leq 2.48\%$

The total measuring uncertainty of I_{sc} is $\leq 2.44\%$

The total measuring uncertainty of V_{oc} is $\leq 0.90\%$

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Annex 4: Photos

Module type: SPP375QHES (BOM1)



Front overview



Back overview

	Maximum Power	375W	Power Selection	0~+5W
	Maximum Power Voltage (Vmp)	35.3V	Operating Temperature	40~+85℃
	Maximum Power Current (Imp)	10.62A	Nominal Module Operating Temperature (NMOT)	43±2℃
	Open Circuit Voltage (Voc)	42.8V	CAUTION Electricity generated within this module is exposed to light. All applicable electrical safety procedures should be followed. Only qualified personnel are permitted to install or perform maintenance work on modules. Be aware of dangerous high DC voltage when connecting modules. Do not handle or install modules when wet.	
	Short Circuit Current (Isc)	11.23A		
	Maximum Power Tolerance	±3%		
Model	SPP375QHES	Open Circuit Voltage Tolerance	±3%	
Dimension (LxWxH)	1840x1040x2.5mm	Short Circuit Current Tolerance	±5%	
Weight	5.7kg	Jiangsu Sunport Power Corp., Ltd. http://www.sunportpower.com Tel:+86-510-8123333 Fax:+86-510-8430926 Made in China		
Maximum System Voltage	DC1500V			
Maximum Series Fuse Rating	18A			
Application Class	Class A			

Label



Solar cell



Edge

N/A

Grounding Mark



Junction box (TL-BOX216x)



Junction box (opened)

N/A

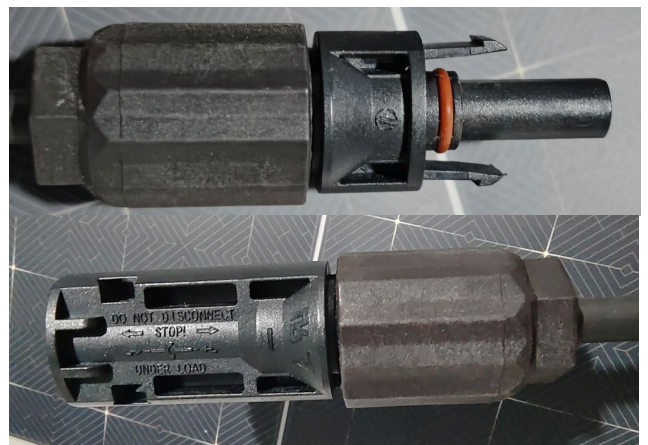


Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

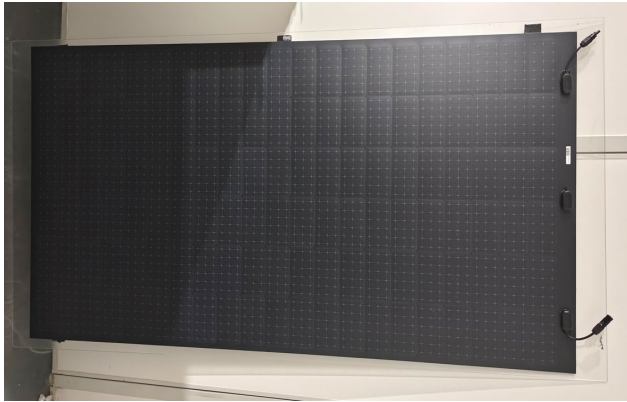


Mark (Do not disconnect under load)

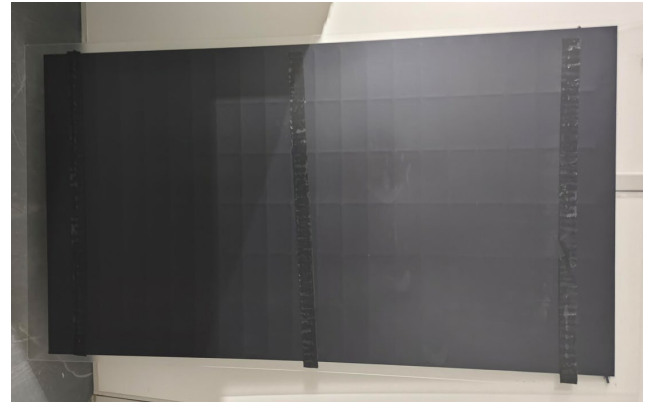


Connectors (TL-CABLE)

Module type: SPP375QHES (BOM2)



Front overview



Back overview

	Maximum Power	375W	Power Selection	0~+5W
	Maximum Power Voltage (Vmp)	35.3V	Operating Temperature	-40~+85℃
	Maximum Power Current (Imp)	10.62A	Nominal Module Operating Temperature (NMOT)	43±2℃
	Open Circuit Voltage (Voc)	42.8V		
Model	SPP375QHES	Short Circuit Current (Isc)	11.23A	
Dimension (L×W×H)	1840×1040×2.5mm	Maximum Power Tolerance	±3%	CAUTION Electricity is generated when this module is exposed to light. All applicable electrical safety precautions are observed. Only qualified personnel are allowed to install or perform maintenance with all modules. Be care of dangerous high DC voltage when connecting modules. Do not handle or install modules alone!
Weight	5.7Kg	Open Circuit Voltage Tolerance	±3%	
Maximum System Voltage	DC1500V	Short Circuit Current Tolerance	±5%	
Maximum Series Fuse Rating	18A			
Application Class	Class A			Jiangsu Sunport Power Corp., Ltd. http://www.sunportpower.com Tel: +86-510-89123333 Fax: +86-510-89100606 Made in China

Label



Solar cell



Edge

N/A

Grounding Mark

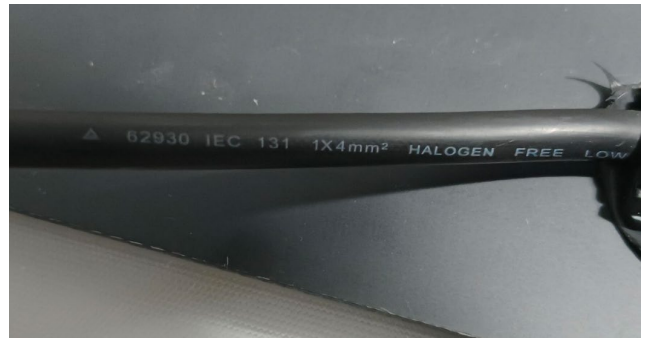


Junction box (TL-BOX216x)



Junction box (opened)

N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

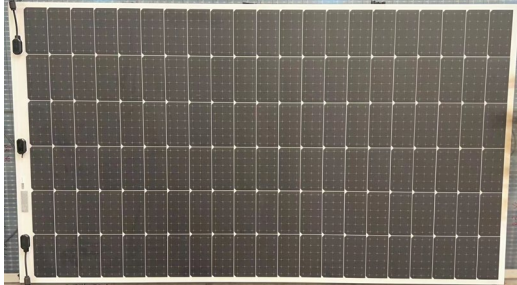


Mark (Do not disconnect under load)



Connectors (TL-CABLE)

Annex 5: Photos of fire test



Sample 16#: Spread of flame test (front)



Sample 16#: Spread of flame test (back)



Sample 18#: Burning brand test (front)



Sample 18#: Burning brand test (back)

----- End of test report -----