Test Report issued under the responsibility of:

TÜVNORD

TEST REPORT
IEC 61730 series:2023
Photovoltaic (PV) Module Safety Qualification

Report Number..... :	492013048.001 part 2 of 2
Date of issue ..... :	2024-04-16
Total number of pages.....:	136
Applicant's name..... :	**Sunova Solar Technology Co., Ltd.**
Address..... :	Building H, Phase II, Standard Workshop, Runzhou Road, Huishan Industrial Transformation and Agglomeration Area 214115 Wuxi, Jiangsu Province, P.R. China
Test specification:	
Standards ..... :	IEC 61730-1:2023 IEC 61730-2:2023
Test procedure ..... :	TÜV NORD Mark
Non-standard test method..... :	N/A

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of TÜV NORD (Hangzhou) Co., Ltd. The authenticity of this Test Report and its contents can be verified by contacting TÜV NORD (Hangzhou) Co., Ltd., responsible for this Test Report.

Test item description .....:	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
Trade Mark .....:	SUNOVA SOLAR Pv Tech Expert. THORNOVA solar
Manufacturer.....:	**Sunova Solar Technology Co., Ltd.**
Address .....:	Building H, Phase II, Standard Workshop, Runzhou Road, Huishan Industrial Transformation and Agglomeration Area 214115 Wuxi, Jiangsu Province, P.R. China
Model/Type reference .....:	**PV Modules with Half-cut 182mm TOPCon Mono-crystalline Silicon Solar Cells:** 156 cells: SS-BGxxx-78MDH(T) (xxx=610-635, in steps of 5) 156 cells: TS-BGT78(xxx) (xxx=610-635, in steps of 5) 144 cells: SS-BGxxx-72MDH(T) (xxx=565-585, in steps of 5) 144 cells: TS-BGT72(xxx)(xxx=565-585, in steps of 5) 132 cells: SS-BGxxx-66MDH(T) (xxx=520-535, in steps of 5) 132 cells: TS-BGT66(xxx) (xxx=520-535, in steps of 5) 120 cells: SS-BGxxx-60MDH(T) (xxx=470-485, in steps of 5) 120 cells: TS-BGT60(xxx) (xxx=470-485, in steps of 5) 108 cells: SS-BGxxx-54MDH(T) (xxx=425-440, in steps of 5) 108 cells: TS-BGT54(xxx) (xxx=425-440, in steps of 5) 72 cells: SS-BGxxx-36MDH(T) (xxx=280-290, in steps of 5) 72 cells: TS-BGT36(xxx) (xxx=280-290, in steps of 5) **PV Modules with Half-cut 210mm TOPCon Mono-crystalline Silicon Solar Cells:** 132 cells: SS-BGxxx-66MDH-G12(T) (xxx=680-710, in steps of 5) 132 cells: TS-BGT66(xxx)-G12 (xxx=680-710, in steps of 5) 120 cells: SS-BGxxx-60MDH-G12(T) (xxx=615-645, in steps of 5) 120 cells: TS-BGT60(xxx)-G12 (xxx=615-645, in steps of 5) **PV Modules with Half-cut 191.6mm TOPCon Mono-crystalline Silicon Solar Cells:** 144 cells: SS-BGxxx-72MDH-G10(T)(xxx = 595-615, in increment of 5) 144 cells: TS-BGT72(xxx)-G10(xxx = 595-615, in increment of 5) 132 cells: SS-BGxxx-66MDH-G10(T)(xxx = 545-560, in increment of 5) 132 cells: TS-BGT66(xxx)-G10(xxx = 545-560, in increment of 5) 120 cells: SS-BGxxx-60MDH-G10(T)(xxx = 495-510, in increment of 5) 120 cells: TS-BGT60(xxx)-G10(xxx = 495-510, in increment of 5) 108 cells: SS-BGxxx-54MDH-G10(T)(xxx = 445-460, in increment of 5)

Ratings .....:	108 cells: TS-BGT54(xxx)-G10(xxx = 445-460, in increment of 5) Remark: xxx indicates output power from the front side only Refer to Constructional Data Form (CDF) with the same file no.

Designed by (name, function, signature) ...:	Nancy Zhang (Project Engineer)	Nancy Zhang 数字签名者：Nancy Zhang 日期：2024.04.16 11:20:43 +08'00'
Reviewed by (name, function, signature) ...:	Bella Liu (Technical Certifier)	Bella Liu 数字签名者：Bella Liu 日期：2024.04.16 13:12:09 +08'00'

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):	
Testing Laboratory ..... :	**National Photovoltaic Products Quality Supervision and Inspection Center (Attached to Chengdu Institute of Product Quality Inspection Co., Ltd.)**
Testing location/address ..... :	No. 355 Tengfei 2nd Road, West Airport Economic Development Zone, Shuangliu, Chengdu, Sichuan, China
Remark: N/A	

List of Annexes

List of Annexes (including a total number of pages in each attachment):	
	Annex number / number of pages
Installation manual:	30 pages, refer to project folder
Drawings mechanical:	Annex 1, 13 pages
Circuit diagram:	Annex 1, 3 pages
Sample Photographs:	Annex 4, 6 pages
Component datasheets / certificates	Refer to project folder
Others:	
List of test equipment used	Annex 2, 3 pages
Constructional details	Annex 1, 17 pages
Photos of fire test	Annex 3, 1 page
Constructional Data Form (CDF)	Attached to this test report with the same file no., 8 pages

Summary

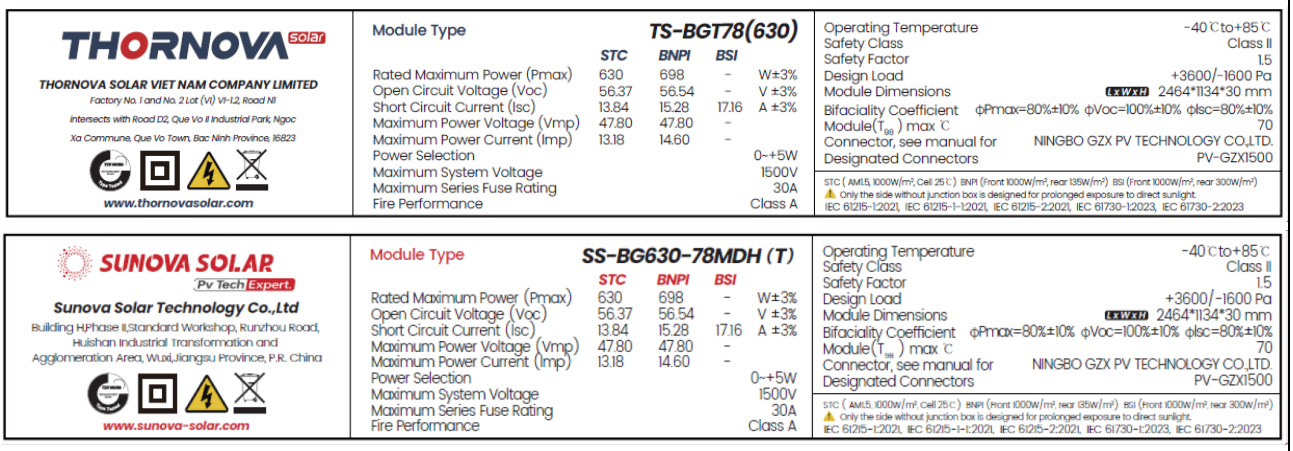
Summary of testing:	
Tests performed (name of test and test clause): According to the enquiry of the applicant, a qualification testing and certification was performed. The thickness of frame is 35mm and the over-current protection rating is 30A. The designed load (upward / downward): 3600Pa / 1600Pa, safety factor is 1.5. and fire test of Class A and Class C are both conducted. 1. Module type SS-BG610-78MDH(T) (BOM1) (module dimension: 2465mm x 1134mm x 35mm) was selected as representative test samples and conducted with all the related tests. SS-BG635-78MDH(T) (BOM1) (module dimension: 2465mm x 1134mm x 35mm) was tested to determine the highest end of power range. Remark: Junction box PV-CY21xyz and connectors PV-CY20L has no influence on the test for the extension of raw materials listed above. 2. Extend to new materials of BOM2 list as below: - New Cell 3: N210AG18D1 (Dimension (w x l) = 210mm x 105mm±0.5mm) manufactured by Jietai Technology Module type SS-BG680-66MDH-G12(T) (BOM2) (module dimension: 2384mm x 1303mm x 35mm) was selected as representative test samples and conducted with all the related tests. SS-BG710-66MDH-G12(T) (BOM2) (module dimension: 2384mm x 1303mm x 35mm) was tested to determine the highest end of power range. Remark: Junction box FT60xy and connectors RHC2 has no influence on the test for the extension of raw materials listed above. 3. Extend to new materials of BOM3 list as below: - New Cell 3: NJ16BF05B3 (Dimension (w x l) = 182.2mm x 95.8mm±0.5mm) manufactured by Jietai Technology SS-BG595-72MDH-G10(T) (BOM3) (module dimension: 2382mm x 1134mm x 35mm) and SS-BG615-72MDH-G10(T) (BOM3) (module dimension: 2382mm x 1134mm x 35mm) was tested to determine the lowest end and highest end of power range, respectively. Remark: Junction box PV-DA01-XY and connectors PV-DA01M2-XY has no influence on the test for the extension of raw materials listed above. 4. Extend to new materials list as below	**Test location:** **National Photovoltaic Products Quality Supervision and Inspection Center (Attached to Chengdu Institute of Product Quality Inspection Co., Ltd.)** No. 355 Tengfei 2nd Road, West Airport Economic Development Zone, Shuangliu, Chengdu, Sichuan, China **China Photovoltaic Product Test Center (CPTC) (only for fire test A)** No.1, South side of Yanmi Road, economic development zone, Miyun District, Beijing，P.R. China. **Zhe jiang Gather Uni test technological Co., Ltd. (only for fire test C)** First Floor, Building, No.473. Shuguang Road, Economic Developmengt Zone, Jiaxing City, Zhejiang Province

- New Cell 2: N182CG16D1 (Dimension (w x l) = 182.2mm x 91.875mm±0.5mm) manufactured by Jietai Technology and no more test is required. 5. Extend to three junction box set list as below, relevant test has been done by junction box manufacturer according to IEC 62790:2020, and no additional test is required. - New Junction box set 1: PV-GZX306 manufactured by NINGBO GZX PV TECHNOLOGY CO., LTD. Certificate no. B 088393 0016 - New Junction box set 2: GT903xy manufactured by Changzhou Greateen New Energy Technology Co., Ltd Certificate no. R 50488884 0002 - New Junction box set 3: YC001xymanufactured by Sunova Solar Technology Co.,Ltd Certificate no. R 50612012 0001 **Test items:** BOM1 Refer to Page 46, Table 5 Overview of MST items for each test sample for details BOM2 Refer to Page 49, Table 5 Overview of MST items for each test sample for details All tests were successfully passed.	
Summary of compliance with National Differences (List of countries addressed): N/A	

Marking Plate

Copy of marking plate:

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



THORNOVA Solar

THORNOVA SOLAR VIET NAM COMPANY LIMITED

Factory No. 1 and No. 2 Lot (VI) VI-1.2, Road N1 intersects with Road D2, Que Vo II Industrial Park, Ngoc Xa Commune, Que Vo Town, Bac Ninh Province, 16823

www.thornovasolar.com

Module Type	STC	BNPI	BSI	
		TS-BGT78(630)		
Rated Maximum Power (Pmax)	630	698	-	W±3%
Open Circuit Voltage (Voc)	56.37	56.54	-	V ±3%
Short Circuit Current (Isc)	13.84	15.28	17.16	A ±3%
Maximum Power Voltage (Vmp)	47.80	47.80	-	
Maximum Power Current (Imp)	13.18	14.60	-	
Power Selection				0~+5W
Maximum System Voltage				1500V
Maximum Series Fuse Rating				30A
Fire Performance				Class A

Operating Temperature	-40℃to+85℃
Safety Class	Class II
Safety Factor	1.5
Design Load	+3600/-1600 Pa
Module Dimensions	L×W×H 2464*1134*30 mm
Bifaciality Coefficient	ΦPmax=80%±10% ΦVoc=100%±10% ΦIsc=80%±10%
Module(T_{BS}) max ℃	70
Connector, see manual for	NINGBO GZX PV TECHNOLOGY CO.,LTD.
Designated Connectors	PV-GZX1500

STC (AM1.5, 1000W/m², Cell 25℃) BNPI (Front 1000W/m², rear 135W/m²) BSI (Front 1000W/m², rear 300W/m²)

⚠ Only the side without junction box is designed for prolonged exposure to direct sunlight.

IEC 61215-1:2021, IEC 61215-1-1:2021, IEC 61215-2:2021, IEC 61730-1:2023, IEC 61730-2:2023

SUNOVA SOLAR

Pv Tech Expert

Sunova Solar Technology Co.,Ltd

Building H,Phase II,Standard Workshop, Runzhou Road, Huishan Industrial Transformation and Agglomeration Area, Wuxi,Jiangsu Province, P.R. China

www.sunova-solar.com

Module Type	STC	BNPI	BSI	
		SS-BG630-78MDH (T)		
Rated Maximum Power (Pmax)	630	698	-	W±3%
Open Circuit Voltage (Voc)	56.37	56.54	-	V ±3%
Short Circuit Current (Isc)	13.84	15.28	17.16	A ±3%
Maximum Power Voltage (Vmp)	47.80	47.80	-	
Maximum Power Current (Imp)	13.18	14.60	-	
Power Selection				0~+5W
Maximum System Voltage				1500V
Maximum Series Fuse Rating				30A
Fire Performance				Class A

Operating Temperature	-40℃to+85℃
Safety Class	Class II
Safety Factor	1.5
Design Load	+3600/-1600 Pa
Module Dimensions	L×W×H 2464*1134*30 mm
Bifaciality Coefficient	ΦPmax=80%±10% ΦVoc=100%±10% ΦIsc=80%±10%
Module(T_{BS}) max ℃	70
Connector, see manual for	NINGBO GZX PV TECHNOLOGY CO.,LTD.
Designated Connectors	PV-GZX1500

STC (AM1.5, 1000W/m², Cell 25℃) BNPI (Front 1000W/m², rear 135W/m²) BSI (Front 1000W/m², rear 300W/m²)

⚠ Only the side without junction box is designed for prolonged exposure to direct sunlight.

IEC 61215-1:2021, IEC 61215-1-1:2021, IEC 61215-2:2021, IEC 61730-1:2023, IEC 61730-2:2023

General Remarks

Test item particulars..... :	N/A
Accessories and detachable parts included in the evaluation ..... :	N/A
Mounting system used..... :	Clamps
Other options included..... :	N/A
Possible test case verdicts:	
- test case does not apply to the test object..... :	N/A
- test object does meet the requirement ..... :	P (Pass)
- test object does not meet the requirement ..... :	F (Fail)
Abbreviations used in the report:	
P_{max} – Maximum power	HF – Humidity Freeze
V_{mp} – Maximum power voltage	DH – Damp Heat
I_{mp} – Maximum power current	TC – Thermal Cycling
I_{sc} – Short circuit current	α – Current temperature coefficient
V_{oc} – Open circuit voltage	β – Voltage temperature coefficient
FF – Fill factor	δ – power temperature coefficient
STC – Standard Test Conditions (25°C, 1 000 W/m²)	TCO – Transparent conductive oxide TRF – Test report form
MQT – Module Quality Tests	$V_{FMrated}$ – Rated diode(s) forward voltage
VFM – Measured diode(s) forward voltage	NP – Nameplate
P_{max} (Lab) – the measured maximum power of each module	P_{max} (NP) – the minimum rated nameplate power of each module without tolerances
$\bar{P}_{max}$ (Lab) – the arithmetic average of the measured maximum power of the modules	V_{oc} (Lab) – the measured maximum V_{oc}
I_{sc} (Lab) – the measured maximum I_{sc}	V_{oc} (NP) – the maximum rated nameplate V_{oc} of each module without tolerances
I_{sc} (NP) – the maximum rated nameplate I_{sc} without tolerances	P_{max4}(NP) – the maximum rated nameplate power of each lowest power class module, without tolerances
m_1 – the measurement uncertainty in % of laboratory for P_{max}	m_2 – the measurement uncertainty in % of laboratory for V_{oc}
m_3 – the measurement uncertainty in % of laboratory for I_{sc}	t_1 – the manufacturer's rated lower production tolerance in % for P_{max}
t_2 – the manufacturer's rated upper production tolerance in % for V_{oc}	t_3– the manufacturer's rated upper production tolerance in % for I_{sc}

r – P_{max} measurement reproducibility φV_{oc} - open-circuit voltage bifaciality coefficient φI_{sc} - the short circuit current bifaciality coefficient BNPI - for bifacial modules, corresponding to 1 000 W/m^2 on the module front and 135 W/m^2 on the module rear aBSI - for stress on bifacial modules, corresponding to 1 000 W/m^2 on the module front and more than 300 W/m^2 or the manufacturer's claimed irradiance value on the module rear	t_4 – the manufacturer's rated upper production tolerance in % for P_{max4}(NP) φP_{max} - the maximum power bifaciality coefficient BSI - for stress on bifacial modules, corresponding to 1 000 W/m^2 on the module front and 300 W/m^2 on the module rear RTE – Relative thermal endurance index RTI – Relative temperature index TI – Temperature index
Testing Dates (YYYY-MM-DD)	
Date of first test item received ..... :	2023-12-15
Dates of tests (beginning/end)..... :	2023-12-21/2024-03-21

General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a ☐ comma / ☒ point is used as the decimal separator. This TRF is based on TRF IEC 61730_2E.	
Manufacturer's Declaration	
The application for obtaining a TÜV NORD Mark Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... :	☒ Yes ☐ Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (factories)..... :	**Sunova Solar Technology Co., Ltd.** Building H, Phase II, Standard Workshop, Runzhou Road, Huishan Industrial Transformation and Agglomeration Area 214115 Wuxi, Jiangsu Province, P.R. China **THORNOVA SOLAR VIET NAM COMPANY LIMITED** Factory No. 1 and No. 2 Lot (VI) VI-1.2, Road N1 intersects with Road D2, Que Vo II Industrial Park, Ngoc Xa Commune, Que Vo Town, Bac Ninh Province, Vietnam

Product Electrical Ratings:

Monofacial Module:

Module type	N/A	N/A	N/A	N/A
V_{oc} [V] /Tolerance	N/A	N/A	N/A	N/A
V_{mp} [V]	N/A	N/A	N/A	N/A
I_{mp} [Adc]	N/A	N/A	N/A	N/A
I_{sc} [Adc] /Tolerance	N/A	N/A	N/A	N/A
P_{max} [W] /Tolerance	N/A	N/A	N/A	N/A
Maximum system voltage [V]	N/A	N/A	N/A	N/A
Maximum Over-Current Protection Rating [A]	N/A	N/A	N/A	N/A

Note: N/A

Bifacial Module:

	Module type	SS-BG610-78MDH(T)	SS-BG635-78MDH(T)	SS-BG680-66MDH-G12(T)	SS-BG710-66MDH-G12(T)

STC condition	P_{max} [W] /Tolerance	610±3%	635±3%	680±3%	710±3%
	V_{oc} [V] /Tolerance	55.59±3%	56,56±3%	47.50±3%	49.00±3%
	I_{sc} [Adc] /Tolerance	13.64±3%	13.23±3%	18.18±3%	18.40±3%
	V_{mp} [V]	47.04	41.71	39.60	40.90
	I_{mp} [Adc]	12.97	13.19	17.17	17.36
BNPI condition	P_{max} [W] /Tolerance	676±3%	704±3%	753±3%	786±3%
	V_{oc} [V] /Tolerance	55.71±3%	56.75±3%	47.50±3%	49.00±3%
	I_{sc} [Adc] /Tolerance	15.04±3%	14.66±3%	20.14±3%	20.39±3%
	V_{mp} [V]	47.04	42.24	39.60	40.88
	I_{mp} [Adc]	14.37	14.44	19.03	19.23
aBSI condition	I_{sc} [Adc] /Tolerance	16.91	16.98	22.54	22.82
Bifaciality coefficient	φP_{max} /Tolerance	80%±10%	80%±10%	80%±10%	80%±10%
	φV_{oc} /Tolerance	100%±50%	100%±50%	100%±50%	100%±50%
	φI_{sc} /Tolerance	80%±10%	80%±10%	80%±10%	80%±10%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30
	Module type	SS-BG595-72MDH-G10(T)	SS-BG615-72MDH-G10(T)	N/A	N/A
STC condition	P_{max} [W] /Tolerance	595±3%	615±3%	N/A	N/A
	V_{oc} [V] /Tolerance	52.25±3%	52.90±3%	N/A	N/A
	I_{sc} [Adc] /Tolerance	14.41±3%	14.71±3%	N/A	N/A
	V_{mp} [V]	44.11	44.84	N/A	N/A
	I_{mp} [Adc]	13.49	13.83	N/A	N/A
BNPI condition	P_{max} [W] /Tolerance	659±3%	687±3%	N/A	N/A
	V_{oc} [V] /Tolerance	52.25±3%	52.90±3%	N/A	N/A
	I_{sc} [Adc] /Tolerance	15.96±3%	16.30±3%	N/A	N/A
	V_{mp} [V]	44.11	44.84	N/A	N/A
	I_{mp} [Adc]	14.95	15.32	N/A	N/A

aBSI condition	I_{sc} [Adc] /Tolerance	22.03	22.95	N/A	N/A
Bifaciality coefficient	φP_{max} /Tolerance	80%±10%	80%±10%	N/A	N/A
	φV_{oc} /Tolerance	100%±50%	100%±50%	N/A	N/A
	φI_{sc} /Tolerance	80%±10%	80%±10%	N/A	N/A
	Maximum system voltage [V]	1500	1500	N/A	N/A
	Maximum Over-Current Protection Rating [A]	30	30	N/A	N/A
Note: Further qualification for higher and/or lower output power see annex 3 of test report no. 492013048.001 part 1 of 2					

Product Safety Ratings

Maximum systems voltage (Vsys).....:	1500	V
Maximum over-current protection rating .....:	30	A
Class in accordance with IEC 61140 .....:	See clause 5.1	
Intended use (list details) .....:	See clause 5.5	
The modules are intended for a maximum operating altitude [meters above sea level] of .....:	≤ 2000	m
Recommended maximum series/parallel module configurations.....:	refer to installation manual	

General Product Information:

Module type: SS-BG610-78MDH(T) (BOM1)

General product information:

Modifications:

☒ Initial module design qualification

☐ Extension of module design qualification

☐ Original test report ref. no. .....:

Model differences and modification:

☐ Test programs for crystalline silicon PV modules

- ☐ 4.2.1 Modification to frontsheet
- ☐ 4.2.2 Modification to encapsulation system
- ☐ 4.2.3 Modification to cell technology (specific to WBT)
- ☐ 4.2.4 Modification to cell and string interconnect material (specific to WBT)
- ☐ 4.2.5 Modification to backsheet
- ☐ 4.2.6 Modification to electrical termination
- ☐ 4.2.7 Modification to bypass diode
- ☐ 4.2.8 Modification to electrical circuitry (specific to WBT)
- ☐ 4.2.9 Modification to edge sealing
- ☐ 4.2.10 Modification to frame and/or mounting structure
- ☐ 4.2.11 Change in PV module size
- ☐ 4.2.12 Higher or lower output power with the identical design and size
- ☐ 4.2.13 Increase of over-current protection rating
- ☐ 4.2.14 Increase of system voltage by more than 5%
- ☐ 4.2.15 Change in cell fixing tape or internal insulation tape (specific to WBT)
- ☐ 4.2.16 Change in label material (external nameplate label)
- ☐ 4.2.17 Change from monofacial to bifacial module
- ☐ 4.2.18 Changes to module operating temperature
- ☐ 4.2.19 Changes affecting system compatibility with variants of the same model

☐ Test programs for thin-film PV modules

- ☐ 4.3.1 Modification to frontsheet
- ☐ 4.3.2 Modification to encapsulation system
- ☐ 4.3.3 Modification to front contact (e. g. TCO)
- ☐ 4.3.4 Modification to cell technology
- ☐ 4.3.5 Modification to cell layout
- ☐ 4.3.6 Modification to back contact
- ☐ 4.3.7 Modification to edge deletion
- ☐ 4.3.8 Modification to interconnect material or technique
- ☐ 4.3.9 Modification to backsheet
- ☐ 4.3.10 Modification to electrical termination
- ☐ 4.3.11 Modification to bypass diode
- ☐ 4.3.12 Modification to edge sealing
- ☐ 4.3.13 Modification to frame and/or mounting structure
- ☐ 4.3.14 Change in PV module size
- ☐ 4.3.15 Higher or lower output power with the identical design and size
- ☐ 4.3.16 Increase of over-current protection rating
- ☐ 4.3.17 Increase of system voltage
- ☐ 4.3.18 Change in label material (external nameplate label)
- ☐ 4.3.19 Change from monofacial to bifacial module

NOTE: The clause references for modifications are excerpted from IEC TS 62915

Module type: SS-BG680-66MDH-G12(T) (BOM2)

General product information:

Modifications:

☐ Initial module design qualification

☒ Extension of module design qualification

☐ Original test report ref. no. .....:

Model differences and modification:

☒ Test programs for crystalline silicon PV modules

- ☐ 4.2.1 Modification to frontsheet
- ☐ 4.2.2 Modification to encapsulation system
- ☒ 4.2.3 Modification to cell technology (specific to WBT)
- ☐ 4.2.4 Modification to cell and string interconnect material (specific to WBT)
- ☐ 4.2.5 Modification to backsheet
- ☐ 4.2.6 Modification to electrical termination
- ☐ 4.2.7 Modification to bypass diode
- ☐ 4.2.8 Modification to electrical circuitry (specific to WBT)
- ☐ 4.2.9 Modification to edge sealing
- ☐ 4.2.10 Modification to frame and/or mounting structure
- ☐ 4.2.11 Change in PV module size
- ☐ 4.2.12 Higher or lower output power with the identical design and size
- ☐ 4.2.13 Increase of over-current protection rating
- ☐ 4.2.14 Increase of system voltage by more than 5%
- ☐ 4.2.15 Change in cell fixing tape or internal insulation tape (specific to WBT)
- ☐ 4.2.16 Change in label material (external nameplate label)
- ☐ 4.2.17 Change from monofacial to bifacial module
- ☐ 4.2.18 Changes to module operating temperature
- ☐ 4.2.19 Changes affecting system compatibility with variants of the same model

☐ Test programs for thin-film PV modules

- ☐ 4.3.1 Modification to frontsheet
- ☐ 4.3.2 Modification to encapsulation system
- ☐ 4.3.3 Modification to front contact (e. g. TCO)
- ☐ 4.3.4 Modification to cell technology
- ☐ 4.3.5 Modification to cell layout
- ☐ 4.3.6 Modification to back contact
- ☐ 4.3.7 Modification to edge deletion
- ☐ 4.3.8 Modification to interconnect material or technique
- ☐ 4.3.9 Modification to backsheet
- ☐ 4.3.10 Modification to electrical termination
- ☐ 4.3.11 Modification to bypass diode
- ☐ 4.3.12 Modification to edge sealing
- ☐ 4.3.13 Modification to frame and/or mounting structure
- ☐ 4.3.14 Change in PV module size
- ☐ 4.3.15 Higher or lower output power with the identical design and size
- ☐ 4.3.16 Increase of over-current protection rating
- ☐ 4.3.17 Increase of system voltage
- ☐ 4.3.18 Change in label material (external nameplate label)
- ☐ 4.3.19 Change from monofacial to bifacial module

NOTE: The clause references for modifications are excerpted from IEC TS 62915

Module Group Assignment:

6 SAMPLING			
	☐ The modules tested (modules and laminate) were taken at random from a production batch and subjected to manufacturer's normal quality control and inspection for safety testing		N/A
	☒ The modules tested (modules and laminate) were prototypes of a new design and not taken from a production batch.		P
	☒ Preconditioning of test samples was performed within IEC 61215 performance testing		P
	☐ Preconditioning of test samples was performed separately from IEC 61215 performance testing		N/A
Supplementary information: N/A			

Module group assignment:

Sample #	Sample Group ID	Type/model	Sample S/N	Remark
BOM1				
1-M10	Control	SS-BG610-78MDH(T)	M778W011123000012	Control
1-M1	A	SS-BG610-78MDH(T)	M778W011123000001	MC
1-M2-1	B	SS-BG610-78MDH(T)	M778W011123000002	B sequence, UV exposed on the front & back side
1-M3	B1	SS-BG610-78MDH(T)	M778W011123000004	B1 sequence
1-M4	C	SS-BG610-78MDH(T)	M778W011123000005	UV, TC50, HF10
1-M6	D	SS-BG610-78MDH(T)	M778W011123000007	DH, ML
1-M8	E	SS-BG610-78MDH(T)	M778W011123000010	TC200
1-M11	F1	SS-BG610-78MDH(T)	M778W011123000013	BDT,HS
1-M13	F3	SS-BG610-78MDH(T)	M778W011123000016	RC
1-M14-1	G1	SS-BG610-78MDH(T)	M778W011123000017	IV,MST57
1-M15	Module Breakage	SS-BG610-78MDH(T)	M778W011123000020	MB
1-M16	Ignitability	SS-BG610-78MDH(T)	M778W011123000021	Ignitability
1-fire 1	Fire C	SS-BG610-78MDH(T)	M778W011123000027	Spread of flame
1-fire 2	Fire C	SS-BG610-78MDH(T)	M778W011123000028	Spread of flame
1-fire 3	Fire C	SS-BG610-78MDH(T)	M778W011123000019	Burning brand
1-fire 4	Fire A	SS-BG610-78MDH(T)	M778W22123600003	Spread of flame
1-fire 5	Fire A	SS-BG610-78MDH(T)	M778W22123600004	Spread of flame
1-fire 6	Fire A	SS-BG610-78MDH(T)	M778W22123600005	Burning brand
Remarks: Continuity test of equipotential bonding (MST 13) were also performed on sampe 1-M18~1-M21, which are assigned to do Potential Induced Degradation tests (MQT 21).				

BOM2				
2-M10	Control	SS-705-66MDH-G12(T)	M766W021123000007	Control
2-M4	C	SS-705-66MDH-G12(T)	M766W021123000001	TC50, HF10
2-M6	D	SS-705-66MDH-G12(T)	M766W021123000003	DH, ML
2-M8	E	SS-705-66MDH-G12(T)	M766W021123000005	TC200
2-M12	F2	SS-705-66MDH-G12(T)	M766W021123000008	HS
2-M13	F3	SS-705-66MDH-G12(T)	M766W021123000009	RC
Remarks: N/A				

Note (1) Use the “General product information” field to give any information on model differences within a product type family covered by the test report and describe the range of electrical and safety ratings, if the TRF covers a type family of modules.

Note (2) Use Annex 2 to list the used materials and components of the module (manufacturer/supplier and type reference)

Note (3) The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3 of IEC 62915

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

IEC 61730 PART 1: REQUIREMENTS FOR CONSTRUCTION

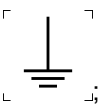
5 CLASSIFICATION, APPLICATIONS AND INTENDED USE			
5.1 General			
	The module has been evaluated for the following Class (IEC 61140)	☐ Class 0 ☒ Class II ☐ Class III	—
	In relation to to this, the PV modules are marked in accordance with 6.2.2	☐ is marked on the external nameplate	P
5.2 PV modules of Class 0			
5.2.1 General			
	Class 0 PV modules have individual and/or system level electrical outputs at hazardous levels of voltage, current and power.	N/A	N/A
5.2.2 Insulation			
	These PV modules are provided with basic insulation only as provision for basic protection and with no provisions for fault protection. All conductive components that are not separated from hazardous live parts by at least basic insulation is treated as if they are hazardous live parts.	N/A	N/A
5.2.3 Application			
	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. Such PV modules are only to be accessed by persons knowledgeable of the inherent hazards associated with their use and failure modes.	N/A	N/A
5.3 PV modules of Class II			
5.3.1 General			
	Class II PV modules have individual and/or system level electrical outputs at hazardous levels of voltage, current and power.	yes, Vsys larger than 35V	P
5.3.2 Insulation			

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	These PV modules are provided with: • basic insulation as basic protection, and • supplementary insulation as precaution for fault protection,or • double insulation as basic and supplementary insulation, or reinforced insulation	Compliance is verified by successfully pass tests in IEC 61730-2	P
	Accessible conductive parts and accessible surfaces of insulation material are: • separated from hazardous live parts by double or reinforced insulation, or • designed with constructional measures which provide comparable protection	Compliance is verified by successfully pass tests in IEC 61730-2	P
	All conductive parts which are separated from hazardous live parts only by basic insulation or by constructional design means which provide comparable protection is separated from accessible surfaces by supplementary insulation. All conductive parts which are not separated from hazardous live parts at least by basic insulation shall be considered as hazardous live parts.	YES	P
5.3.3 Application			
	These PV modules are intended for installations where non-restricted access to the PV module and contact to insulated live parts can occur	YES	P
5.4 PV modules of Class III			
5.4.1 General			
	Class III PV modules do not have electrical ratings larger than: – 240 W for the maximum power point, – 35 V DC for the open-circuit voltage, and – 8 A for the short-circuit current, when tested under STC. The three maximum rating conditions shall apply concurrently	N/A	N/A
5.4.2 Insulation			
	Class III PV modules have inherently limited capability of electrical output. Based upon these electrical output limitations, no requirements for construction or insulation are given beyond functional insulation.	N/A	N/A
5.4.3 Application			

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	These PV modules are intended for installations where non-restricted access to the PV module and contact to uninsulated live parts can occur. these PV modules are not combined in series strings operating at more than 35 V in V_{OC} and do not have a system voltage rating above 35 V. These PV modules are not intended for use in parallel with other PV modules or energy sources unless their combination provides protection from reverse current and from overvoltage protection	N/A	N/A
5.5 Rating categories and special applications			
	PV modules are installed in the following special applications:		—
	Modules are intended for use in the temperature range from a lower environmental temperatureof −40 °C to the upper-limit set by a 98th percentile module operating temperature of ☒ 70 °C ☐ 80 °C ☐ 90 °C		—
	Building attached PV (BAPV)	☐ yes ☒ no	—
	Building integrated PV (BIPV)	☐ yes ☒ no	—
	Applications in areas where snow and / or wind load exceeding loads as tested in IEC 61730-2 are expected	☐ yes ☒ no	—
	For concentration levels above 3X, see IEC 62688.	☐ yes ☒ no	—
	Module-applied electronics (see IEC 62109-3).	☐ yes ☒ no	—
	other (please specify)	☐ yes, as follows: ☒ no	—
6 REQUIREMENTS FOR DESIGN AND CONSTRUCTION			
6.1 General			—
	PV module suitable for operation at a 98th percentile module operating tesmperature of 70 °C or less	Yes	—
	Where applicable, materials and components comply with the safety requirements specified in the relevant IEC standards. However, compliance with the IEC standard relevant for the material and/or component does not necessarily ensure compliance with the requirements of this document	Compliance is further verified by successfully pass tests in IEC 61730-2	P

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	All PV modules are suitable for operation in unprotected outdoor locations, i.e. exposed to direct and indirect (albedo) solar radiation and up to 100 % relative humidity as well as to rain.	Compliance is verified by successfully pass tests in IEC 61730-2	P
	PV modules are designed to withstand the electrical, mechanical, thermal and environmental (temperature, mechanical load, humidity, UV/weather, pollution, etc.) stresses occurring in their intended use. They do not present any danger to the user or to the environment.	Compliance is verified by successfully pass tests in IEC 61730-2 and by evaluation of materials, components' datasheets and certificates	P
	Product shipped from the factory as	☒ completely assembled ☐ subassemblies	—
	The provided subassemblies of the product do not involve any action that is likely to affect compliance with the requirements of the IEC 61730 series	No subassembly part is present.	N/A
	Incorporation of a PV module into the final assembly does not require any alteration of the PV module from its originally evaluated form.	Yes	P
	All methods of PV module mounting and wiring that are specified in the installation instructions are evaluated for compliance with the IEC 61730 series.	Compliance is verified by successfully pass tests in IEC 61730-2	P
	The construction of a PV module is equipotential bonding continuity, and is not interrupted by installation.	IEC 61730-2, MST 13 was passed	P
	Any adjustable or movable structural part are provided with a locking device	No such part	N/A
	PV modules have no accessible burrs, sharp edges or sharp points	IEC 61730-2, MST06 was passed	P
	The parts of a PV module is prevented from loosening or turning	Compliance is verified, junction box has been qualificated according to IEC 62790	P
	All electrical data to be reported in the marking or in the documentation accompanying a PV module is given for STC. For bifacial PV modules, all electrical data are shown as relative to STC, BNPI and aBSI on the front side of the module, plus bifaciality coefficients at STC	Compliance is check by MST 01 visula inspection.	P
6.2 Marking and documentation			—
6.2.1 General			
	Instructions related to safety are in an official language of the country where the equipment is to be installed.	Installation manual with English and / or Chinese.	P

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.2.2 Marking			
6.2.2.1 General			
	Each PV module's nameplate includes the following clear and indelible markings together with their values, where applicable:		—
	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) “Maximum system voltage” or ”Vsys”	Written on the nameplate.	P
	f) Class of protection against electrical shock, in accordance with Clause 5 of IEC 61730-1:2023	Class II symbol marked on the nameplate.	P
	g) “Voltage at open-circuit” or “Voc” including manufacturing tolerances, for bifacial modules, open-circuit voltage at STC and BNPI	Written on the nameplate.	P
	h) “Current at short-circuit” or “Isc” including manufacturing tolerances, for bifacial modules, short-circuit current at STC, BNPI and aBSI	Written on the nameplate.	P
	i) “PV module maximum power” or “Pmax” including manufacturing tolerances, for bifacial modules, Pmax at STC and BNPI	Written on the nameplate.	P
	j) For bifacial modules, a clear indication which side is designed as the front side, or if both are designed for prolonged exposure to direct sunlight (> 300 W/m^2)	Compliance is verified by MST 01 visual inspection	P
	k) For flexible modules, the minimum radius of curvature	N/A	N/A
	l) positive ("+" or downward) and negative ("−" or upward) design load ratings in pascal (Pa)	written on the nameplate	P
	m) “Maximum overcurrent protection rating”	Written on the nameplate.	P
	n) A module termperature rating of 70 °C	Written on the nameplate.	P
	o) Connector manufacturer and model used; refer to manual for designated mating connectors	Written on the nameplate.	P

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	p) A link (website or QR code) to required documentation if a paper copy of the documentation required in 6.2.3 is not included with the module.	Written on the nameplate	P
	International symbols are used where applicable.	Compliance is verified by MST 01 visual inspection	P
	PV connectors or wiring are marked in accordance to IEC 62852 with a symbol “Do not disconnect under load”.	Symbol and/or the warning notice is imprinted on the connector	P
	PV connectors are clearly marked indicating the terminal polarity.	The terminal polarity is imprinted on the PV connectors.	P
	For Class II and Class 0 PV modules, the  (IEC 60417-6042: Caution, risk of electric shock) symbol is applied near the PV module electrical connection means.	Written on the nameplate.	P
	PV modules are marked to indicate the class	☒ class II:  ☐ class III:  ☐ class 0: no symbol	P
	PV modules provided with a functional earth terminal shall be provided with a symbol (IEC 60417-5018:2011-07) 	No functional earth connection	N/A
	PV modules with terminals for field wiring rated only for use with copper wire are 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 with terminals for field wiring rated only for use with a different specific wiring material are marked with a similar statement referring to the rated material.	Not required	N/A
6.2.2.2 Symbols			
6.2.2.2.1 Equipotential bonding			
	Bonding conductor for equipotential bonding is identified with:	☒  ; ☐ 	P
	No other terminal or location is identified in this manner	Compliance is verified by MST 01 Visual inspection	P
6.2.2.2.2 Functional earthing			
	Field installed functional earthing conductor is identified with the symbol:	No Functional earthing	N/A

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.2.3 Documentation			
6.2.3.1 General			
	Documentation concerning electrical and mechanical installation as well as their electrical, thermal, and mechanical ratings provided	Written in installation manual	P
	Class of protection against electric shock is stated, including specific limitations required for that Class.	Written in installation manual.	P
	Supplied in at least one of the official languages of the country where the PV modules will be installed.	English	P
	International symbols shall be used where applicable	Compliance is verified by reviewing the documentation	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.	Do not need to assemble	N/A
	The documentation contains the following information:		—
	– All information as required by 6.2.2.1 with exception of c) and d)	Written on the nameplate.	P
	– Recommended maximum series/parallel module configurations	Written on the installation manual	P
	– Temperature coefficient for open-circuit voltage	Written on module's datasheet	P
	– Temperature coefficient for maximum power	Written on module's datasheet	P
	– Temperature coefficient for short-circuit current	Written on module's datasheet	P
6.2.3.2 Suitable environmental and mounting conditions			
	The documentation shall state the environmental and mounting conditions for which the module has been qualified, which by default always include:		—
	– The maximum rated altitude the PV module is designed for; de-ratings may be applied;	Written in installation manual.	P
	– A statement indicating the negative (upward) and positive (downward) design load ratings for each mechanical means for securing the module as evaluated during the static mechanical load test according to MST 34.	Written in installation manual.	P
	– For bifacial modules, designation of which side(s) of the module have been tested for front side exposures.	Written in installation manual.	P

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	– A temperature range from a lower limit of environmental temperature of −40 °C to the upper limit set by a 98th percentile module operating temperature of 70 °C, (80 °C or 90 °C if tested to Level 1 or Level 2 conditions as described in IEC TS 63126);	Written in installation manual and nameplate.	P
	– Guidance on geographic areas, mounting conditions and system design and installation factors where the anticipated 98th percentile module operating temperature will be greater than 70 °C; (or 80 °C or 90 °C if tested to Level 1 or Level 2 conditions)	Written in installation manual.	P
	– A statement about the factors that can increase voltage or current beyond the STC values given in the documentation.	Written in installation manual.	P
	– A statement that artificially concentrated sunlight producing a PV module's current above the value reported on the nameplate shall not be directed onto the front side or the back side of the PV module.	Written in installation manual.	P
	– A statement if the the PV modules were evaluated according to the following standards, including which specific testing sequences were used.		—
	■ IEC 61701, Photovoltaic (PV) modules – Salt mist corrosion testingInclude which test method used (based on corrosivity classification).	N/A	N/A
	■ IEC 62716, Photovoltaic (PV) modules – Ammonia corrosion testing Include test sequence 1 or 2 (crystalline Si or thin-film).	N/A	N/A
	■ IEC 62109-3, Safety of power converters for use in photovoltaic power systems – Part 3:particular requirements for electronic devices in combination with photovoltaic elements Include MIE Type A or B (depending on whether electronics can be tested separately from the module).	N/A	N/A

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	■ IEC TS 63126, Guidelines for qualifying PV modules, components and materials for operation at high temperatures Include temperature Level 1 or 2 (based on selection of testing for combinations of deployment location and mounting configuration).	Level 1 or Level 2 evaluated	P
6.2.3.3. Mounting			
	Documentation shall include adequate information and instructions for each mounting method as listed in the manufacturer's mounting instructions, additionally:	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) of IEC 61730-2) and the conformity to the mechanical load requirements of the series IEC 61215, as applicable	Written in installation manual	P
	– Limitations to the mounting situation (e.g. slope, orientation, mounting means, cooling, specific spacing and any other condition that can influence the safety of the PV module installation);	Written in installation manual	P
	– if adhesives are used for mounting (i.e. for flexible modules), the type of adhesive and the allowable substrates;	Written in installation manual	P
	– if adhesives are specified for use in the field to provide mechanical securement to specific roof coverings or mounting systems (such as flexible modules adhered to a roof membrane or modules adhered to metal rails), the manufacturer and unique part number of the adhesive, as well as the required surface preparation, adhesive application process, and curing conditions	Written in installation manual	P
6.2.3.4 Connectors/wiring			
	Documentation shall include a detailed description of the following information related to the connectors and wiring method:		—
	– The minimum cable diameters, rated voltage, current and temperature rating of cables for PV modules intended for field wiring and that cables used need to comply with IEC 62930, type 131 or type 133; or EN 50618	Written in installation manual	P

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	– Any limitations on wiring methods and wire management that apply to the junction box for the PV module;	Written in installation manual	P
	– A statement that wiring to interconnect modules shall be rated for the application	Written in installation manual	P
	– Type of terminals for field wiring;	Written in installation manual	P
	– Specific model/types together with the manufacturer name/brand of the PV connector(s) to which the PV module connectors can be mated;	Written in installation manual	P
	– The bonding method(s) to be used (if applicable).	Written in installation manual	P
	– The type and ratings of bypass diode to be used (if applicable).	Written in installation manual	P
6.2.3.5 Fire ratings			
	– A statement indicating	☒ fire rating(s) and applied standards ☐ statement regarding resistance to external fire sources not evaluated	P
	– A statement shall also indicate the limitations to the achieved rating (e.g. installation slope, substructure or other applicable installation information)	Written in installation manual	P
	The documentation for roof mounting includes:		—
	– Specific parameter(s) when the fire rating is dependent on a specific mounting structure are provided e.g. specific spacing, or specific means of attachment to the roof or structure.	Written in installation manual	P
6.3 Electrical components and insulation			—
6.3.2 Internal wiring			
	Internal wiring has sufficient current carrying capacity for the relevant application.	See Table 34	P
6.3.3 External wiring and cables			
	External wires and cables fulfil the requirements of	☒ EN 50618 ☒ IEC 62930	P
6.3.4 Module overcurrent protection rating			
	Nominal fuse ratings (I_n) are typically equal to or larger than 1,4 times I_{SC}. For bifacial PV modules, the rating shall be evaluated for $I_{SC\text{-}aBSI}$	See Table 34, larger than 1.4 times Isc or Isc_{-aBSI} -	P

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.3.5 Connectors			
	External DC connectors fulfil the requirements of IEC 62852 and additional requirements in 6.5.2.2.	Connector was certified according to IEC 62852. See 6.5.2.2	P
6.3.6 Junction boxes for PV modules			
	Junction boxes for PV modules fulfil the requirements of IEC 62790 and additional requirements in 6.5.2.2.3.	Junction box was certified according to IEC 62790. see 6.5.2.2.3	P
	Module level testing after installation and termination of the ribbons is required to validate adhesion/connection of the junction box to the module and minimum clearance and creepage distances.	See Table 27 See Table 35.1	P
6.3.7 Frontsheets and backsheets			
	Frontsheet:		—
	Material Frontsheet:	☒ Glass ☐ Polymeric material ☐ Others.	—
	Frontsheet construction (if polymeric material):	☐ single-layer constructions ☐ multilayer constructions ☒ Others.	—
	Polymeric frontsheets fulfil the requirements of IEC 62788-2-1, which includes:		—
	Breakdown voltage for complete frontsheet shall meet:		
	If a combined single-layer construction, the whole frontsheet has appropriate dielectric strength: ☐ $[V_{BD}]$req=1.0kV + 2 x $[V_{sys}]$max (basic insulation or Class 0 or Class III) ☒ $[V_{BD}]$req=1.0Kv + 4 x $[V_{sys}]$max (reinforced insulation or Class II)	frontsheet is glass, not applicable	N/A
	If a multilayer construction, the adjusted value has appropriate dielectric strength: ☐ $[V_{BD}]$req=1.0Kv + 4 x $[V_{sys}]$max (reinforced insulation or Class II) ☒ $[V_{BD}]$req=1.0Kv + 4 x $[V_{sys}]$max (reinforced insulation or Class II)	frontsheet is glass, not applicable	N/A
	Each RUI layer has a thermal endurance rating via TI or RTE or RTI:		—
	For T98 ≤ 70°C, TI or RTE(RTI) ≥ 90°C	frontsheet is glass, not applicable	N/A
	For T98 ≤ 80°C, TI or RTE(RTI) ≥ 100°C	N/A	N/A
	For T98 ≤ 90°C, TI or RTE(RTI) ≥ 110°C	N/A	N/A

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The sum of the thickness of all RUI layers (after the lamination protrusion test) shall meet: ☐ T_{DTI}=0.15mm (Vsys=1000V) ☒ T_{DTI}=0.30mm (Vsys=1500V)	Front sheet is glass, not applicable.	N/A
	Adhesion to encapsulant or glass is appropriate	Compliance is checked by test sequences of IEC 61730-2 listed in this report.	P
	Backsheet:		—
	Material Backsheet:	☒ Glass ☐ Polymeric material ☐ Others.	—
	Frontsheet construction (if polymeric material):	☐ single-layer constructions ☐ multilayer constructions ☒ Others.	—
	Polymeric backsheets fulfil the requirements of IEC 62788-2-1, which includes:		—
	Breakdown voltage for complete backsheet meets:		—
	If a combined single-layer construction, the whole frontsheet has appropriate dielectric strength: ☐ $[V_{BD}]$req=1.0kV + 2 x $[V_{sys}]$max (basic insulation or Class 0 or Class III) ☒ $[V_{BD}]$req=1.0kV + 4 x $[V_{sys}]$max (reinforced insulation or Class II)	frontsheet is glass, not applicable	N/A
	If a multilayer construction, the adjusted value has appropriate dielectric strength: ☐ $[V_{BD}]$req=1.0Kv + 4 x $[V_{sys}]$max (reinforced insulation or Class II) ☒ $[V_{BD}]$req=1.0Kv + 4 x $[V_{sys}]$max (reinforced insulation or Class II)	frontsheet is glass, not applicable	N/A
	The complete sheet has a thermal endurance rating via TI or RTE or RTI:		—
	For T98 ≤ 70°C, TI or RTE(RTI) ≥ 90°C	backsheet is glass, not applicable	N/A
	For T98 ≤ 80°C, TI or RTE(RTI) ≥ 100°C	N/A	N/A
	For T98 ≤ 90°C, TI or RTE(RTI) ≥ 110°C	N/A	N/A
	The sum of the thickness of all RUI layers (after the lamination protrusion test) shall meet: ☐ T_{DTI}=0.15mm (Vsys=1000V) ☒ T_{DTI}=0.30mm (Vsys=1500V)	backsheet is glass, not applicable.	N/A
	Adhesion to encapsulant or glass is appropriate	Compliance is checked by test sequences of IEC 61730-2 listed in this report.	P

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.3.8 Insulation barriers			
	Polymeric insulation barrier meets the relevant requirements of 6.5.2	See 6.5.2	P
	Barrier held in place while keeping its required electrical and mechanical properties	Compliance is checked by test sequences of IEC 61730-2 listed in this report.	P
	Removal of barrier only possible by using a tool	Tool is needed for removal of the insulation barrier.	P
6.3.9 Electrical connections			
6.3.9.1 General			
	Terminations are so designed, that the contact pressure is not transmitted through insulating material except ceramic, mica or other adequate material.	Compliance is checked by MST 01	P
	Measures are taken to prevent connections becoming loose, e.g. by using a washer.	See Table 11 and Table 48	P
	End of a stranded conductor is not consolidated by soft soldering.	Relevant test of IEC 61730-2 was passed	P
	Measures are taken to prevent contact stress impairing electrical conductivity.	Relevant test of IEC 61730-2 was passed	P
6.3.9.2 Terminals for external cables and PV connector ribbons			
	Terminals for electrical connections are suitable for the type and range of conductor cross-sectional areas and meet the relevant requirements of IEC 62790.	Junction box set is certified according to IEC 62790.	P
	Terminals for electrical connections meet the requirements of TI, RTI or RTE: ☐ For T98 ≤ 70°C, TI or RTE(RTI) ≥ 90°C ☐ For T98 ≤ 80°C, TI or RTE(RTI) ≥ 100°C ☐ For T98 ≤ 90°C, TI or RTE(RTI) ≥ 110°C	Junction box ☒TI: 110°C ☐RTI: ☐RTE:	P
	Insulated terminals are designed such that a reduction of clearances and creepage distances by displacement is prevented.	Junction box set is certified according to IEC 62790.	P
6.3.9.3 Splices and connections inside a PV module			
	Splices and connections are mechanically secured and provide electrical continuity.	No splice.	N/A
	Electrical connections are soldered, welded, conductively adhered, crimped, or otherwise securely connected.	Electrical connections are soldered and securely connected	P
	A soldered or conductively adhered joint is additionally mechanically secured.	A soldered is additionally mechanically secured by encapsulation	P

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.3.10 Encapsulants			
	Technical properties are sufficient for intended application.	Relevant test of IEC 61730-2 was passed.	P
	The insulation properties are able to maintain spacings	Relevant test of IEC 61730-2 was passed.	P
6.3.11 Bypass diodes			
	Bypass diodes are rated to withstand the current and voltage for their intended use.	See Table 31 and Table 46	P
6.4 Mechanical and electromechanical connections			—
6.4.1 General			
	Type of connection:	☒ Connection within frame ☒ Mounting interfaces via adhesive ☒ frame to clamp a mounting system ☒ Equipotential bonding ☒ Attachment of junction box ☒ mechanical connections within the laminate:	P
	Mechanical connections are durable to withstand the thermal, mechanical, and environmental stresses occurring in the application.	See Table 38, Table 13 and Table 11	P
	Removable parts are only detachable with the aid of tools.		P
	Lids attached without screws have one or several detectable facilities for enabling tools.		P
	No contact of tools with the live parts when the lid is removed.		P
	No friction between surfaces as the sole means to inhibit the turning or loosening of a part, unless provisions to prevent unintended movement or rotation of the component is given.	No friction between surfaces on tis own	P
6.4.2 Screw connections			
	Screws and mechanical connections withstand the mechanical stresses occurring in normal use.	No screw is used. Mechanical connections can withstand the mechanical stresses, compliance is verified by successfully past relevant tests in IEC 61730-2	P
	Screws are not made of a material which is soft or liable to creep.	No screw is used.	N/A

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Screws used to provide mechanical stability and continuity for equipotential bonding withstand the mechanical stresses occurring in normal use.	No screw is used.	N/A
	At least one screw per electrical- mechanical connection ensures 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 are screwed into metal.	No screw is used.	N/A
	For screws used for mechanical and electrical connections two full threads are engaged into the metal.	No screw is used.	N/A
	Screwed and other fixed connections are in such a way that they do not come loose through torsion, bending stresses, vibration, etc.	No screw is used. Other fixed connections can prevent from loose from torsion, etc.	P
6.4.3 Rivets			
	Rivets which serve as electrical as well as mechanical connections are locked against loosening.	No rivets are used.	N/A
6.4.4 Thread-cutting screws			
	Thread-cutting and self-tapping screws are not used for interconnection of current-carrying parts made of a material which is soft or liable to creep.	No screw is used.	N/A
	No thread-forming or thread-cutting (self-tapping) screws (sheet metal screws) are used for the connection of current-carrying parts.	No screw is used.	N/A
	Thread-cutting (self-tapping) screws 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, are 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 engage the metal	No screw is used.	N/A
6.4.5 Form/press / tight fit			
	Form/press/tight fits of metallic components which are not separately equipotentially bonded are electrically connected.	See Table 11	P
	Requirements of MST 32 and MST 34 are met, continuity of equipotential bonding (MST 13) is provided before and after the MST 32 and MST 34 tests	See Table 38, Table 39 and Table 11	P

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.4.6 Connections by adhesives			
	Type of connection by adhesive:	☒ mounting of junction box ☒ Mounting of backrails or frames ☐ fix of backsheet and/or frontsheet to edge seals ☒ fix of backsheet and/or frontsheet to the encapsulant ☐ fix of the module to a substrate relied upon for mounting	—
	Connections by adhesive for mounting means are sufficient.	See Table 38, Table 39 and Table 11	P
	Fixing of junction box by adhesive is sufficient.	See Table 27, and Table 10	P
	Adhesion of a polymer relied upon for insulation to another insulating layer is appropriate for the application.	No such part	N/A
	Requirements for adhesive materials are met	See 5.5.4	P
	Connection by adhesive which is considered as cemented joint fulfils the requirements of 5.6.4.2.	no cemented joints, not applicable	N/A
6.4.7 Other connections			
	Other connections such as, welded or soldered, as well as Materials and processes for creating the connections are appropriate for the application and for the intended use.	See Table 6 and Table 43	P
	Other connections which are relied upon for equipotential bonding fulfil the requirements of (MST 13).	see Table 11	P
6.5 Materials			—
6.5.2 Polymeric materials			
6.5.2.1 General			
	Polymeric materials are able to durably and safely withstand the electrical, mechanical, thermal, environmental, and corrosive stresses occurring in the application.	compliance is verified by successfully passed tests in IEC 61730-2	P
	Polymeric materials are resistant to electrical and mechanical property degradation.	Test results see subsequent sections	P

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	They comply with the requirements given in individual International Standards.	frontsheets and backseets are glass junction boxes are qualified according to IEC 62790 connectors are qualified according to IEC 62852 cables are qualified according to IEC 62930 or EN 50618	P
6.5.2.2 Polymeric materials used as electrical insulation			
6.5.2.2.1 General			
	Insulation function type polymeric materials serve as:	Insulation to external parts and insulation between ☒ internal live parts and accessible conductive parts ☒ live parts and accessible surfaces ☒ internal live parts at different potential	—
	A material which serves as functional insulation is appropriate according to 6.6.4.4	See 6.6.4.4	P
	A material relied upon for insulation in thin layers is appropriate for the application according to 6.6.4.2.	See 6.6.4.2	P
	Insulation do not be impaired by short-term or long-term thermal stresses that can occur in manufacturing processes, transportation, and during normal operation, by electrical stress and weathering to an extent that it does not comply with the requirements in this document.	Relevant tests of IEC 61730-2 are passed	P
6.5.2.2.2 Endurance to electrical stress			
	Materials used as electrical insulation are able to withstand electrical stresses which occur in the application.	Relevant tests of IEC 61730-2 are passed (MST 16, MST 17, MST 14)	P
	Materials relied upon for insulation (RUI) have sufficient breakdown strength and comply with 6.6.4.2.	See 6.6.4.2 and 6.3.7	P
	A polymeric material which is part of a potential tracking path is resistant to surface tracking, in coordination with the design dimensions in 6.6.3	Pollution degree 1 is demonstrated, materials groups are not relevant	P
6.5.2.3.3 Endurance to thermal stress – RTE (RTI) or TI (mechanical/electrical)			
	Materials used as relied upon insulation have a mechanical and electrical relative thermal endurance, relative thermal index or temperature index (RTE/RTI or TI) appropriate for the application, at least 90 °C.	double glass module, no materials used as relied upon insulation	N/A

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.5.2.2.4 Endurance to environmental stress			
	Polymeric materials are durable to environmental stresses occurring in the application.	Compliance is verified by successfully pass the tests of IEC 61730-2	P
	Components comply with the requirements in the individual applicable International Standards.	junction boxes are qualified according to IEC 62790 connectors are qualified according to IEC 62852 cables are qualified according to IEC 62930 or EN 50618	P
6.5.2.3 Flammability			
	PV modules are tested for their fire resistance against exposure to a fire source originating from outside the PV module	Fire class C & A according to UL790 has passed	P
	BIPV and BAPV are subject to specific fire-related safety requirements originating from national building codes	Not used as BIPV or BAPV	N/A
	External polymeric parts of the PV module whose deterioration could impair the safety comply with all the following additional requirements		
	-minimum flammability class: V-1	V-0 or 5VB for junction box	P
	-ignitability test in final application	See Table 37	P
6.5.2.4 Rigid polymeric materials used for mechanical functions			
	Rigid polymeric materials used for mechanical functions pass the following tests:		-
	-Mechanical strength at lower temperatures, IEC 62790:2020, 5.3.8 followed by MST 01 (visual inspection) of IEC 61730-2.	Not applicable	N/A
	-Weather resistance test, IEC 62790:2020, 5.3.11 followed by MST 01 (visual inspection) of IEC 61730-2.	Not applicable	N/A
	-Flammability class, IEC 60695-11-M10 (minimum V-1).	Not applicable	N/A
	-Ball pressure test, IEC 60695-10-2 (90 °C, < 2 mm diameter).	Not applicable	N/A
	-RTI/RTE/TI (≥ 90 °C)	Not applicable	N/A
6.5.3 Metallic materials			
6.5.3.1 General			
	Metallic components in PV modules are designed to withstand a minimum corrosion atmospheric category level C2 as specified in Table B.1 in ISO 9224:2012, Annex B		P

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Metal parts are not in contact to metal parts having a difference of their electrochemical potentials of more than 600 mV.		P
	Iron or mild steel are plated, painted, or enamelled for protection against corrosion.	no such part	N/A
	Corrosion protection is at least equivalent to a zinc coating of 0.015 mm thickness	no Iron or mild steel used	N/A
5.5.3.2 Current carrying parts			
	Assessed parts:	internal wire, cell connector, string connector	—
	Current-carrying parts have sufficient mechanical strength and electrical conductivity.	See Table 34 See Table 11	P
	Current-carrying materials are protected against corrosion.	Relevant tests of IEC 61730-2 were passed.	P
	The coating for protective coated metal is capable of preventing corrosion according to either one of the listed standards.	☐ ISO 1456 ☐ ISO 1461 ☐ ISO 2081 ☒ ISO 2093	P
	Coated metal not used if the current-carrying parts are stressed by abrasion.	yes, compliance is verified by MST 01 visual inspection	P
6.5.4 Adhesives			
	Adhesives are appropriate for the application.	See Tables 40, Table 39, Table 27, Table 29, Table 12, and Table 10	P
	Adhesive as part of the relied upon electrical insulation meets the requirements of 6.5.2.3.3	no adhesive used as part of the relied upon electrical insulation	N/A
6.6 Protection against electric shock			—
6.6.1 General			
	Adequate protection against contact with hazardous live parts provided	Relevant tests of IEC 61730-2 were passed.	P
	Specimen pose no risk of electric shock.	Relevant tests of IEC 61730-2 were passed.	P
6.6.2 Protection against accessibility to hazardous live parts			
6.6.2.1 General			
	Class of module	Class II	—
	For class 0 and Class II modules adequate protection against accessibility to hazardous live parts (> 35 V DC) provided.	See Table 12	P

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
Table 2 of 6.6.2.3	For Class 0 PV modules, accessible metal parts and accessible surfaces as well as live parts of different potential of the same circuit are separated by at least basic insulation.	Not applicable.	N/A
	For Class II PV modules construction provide separation between accessible parts or accessible surfaces and hazardous live parts by double or reinforced insulation.	Compliance is checked by visual inspection (MST 01) and by accessibility test (MST 11).	P
Table 2 of 6.6.2.3	For Class II PV modules, live parts of different potential of the same circuit are separated by double or reinforced insulation.		P
	For Class III PV modules separation between accessible parts or accessible surfaces and hazardous live parts by functional insulation.	Not applicable.	N/A
Table 2 of 6.6.2.3	In Class III PV modules live parts of different polarity are separated by at least functional insulation.	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 comply with the requirements of 6.5.2 due to their application.	See 6.5.2	P
6.6.2.2 Protection by means of enclosures and insulation barriers			
	Enclosures or insulation barriers are so designed that, after mounting, the live parts are not accessible (even after possible deformation)	Relevant tests of IEC 61730-2 were passed.	P
	Degree of protection of the housing is not impaired by any possible deformation.	Relevant tests of IEC 61730-2 were passed.	P
	Parts of enclosures and insulation barriers that provide protection are not removable without the use of a tool.		P
	Lids which are attached without screws have one or several detectable features, e.g. recesses,	Compliance is verified by MST 01 visual inspection	P
	Tool to open the lid do not come into contact with the live parts if lid is removed correctly.		P
	Insulation barrier are held in place and are not affected by influences expected during normal operation. Electrical and mechanical properties don't fall below the minimum acceptable values for the application.	no insulation barrier	N/A
	Parts are prevented from loosening or turning.	Relevant tests of IEC 61730-2 were passed.	P
5.6.2.3 Protection by means of insulation of live parts			

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Insulation materials providing the sole insulation between a live part and an accessible metal part, or between uninsulated live parts not of the same potential, are of adequate thickness and of a material appropriate for the application.	See table 35.1	P
6.6.3 Insulation coordination			
6.6.3.1	A backsheet containing an aluminium layer is used	☐ yes ☒ no	—
	System voltage:	1500V DC	—
6.6.3.2 Influencing factors			
6.6.3.2.1	Pollution degree	I	—
6.6.3.2.2	Material group	I	—
6.6.3.3	Creepage distance (distance between internal live parts and outer accessible surface)	see table 1, 2	P
	Creepage distance (distance between live parts of different potential inside a PV module, if two different encapsulants used)	see table1, 2	P
6.6.3.4	Clearance (distance between internal live parts and outer accessible surface)	see table 1, 2	P
	Creepage distance (distance between live parts of different potential inside a PV module, if two different encapsulants used)	see table 1, 2	P
	Derating factor for altitude above 2000 m is considered	No	N/A
6.6.4 Distance through functional and relied upon insulation			
6.6.4.2 Thin layers – relied upon insulation			
	Relied upon insulation in thin layers is applied at	☐ Backsheet ☐ Front sheet ☐ Insulation within laminate ☒ Others	—
	Design requirements for frontsheets and backsheets are fulfill IEC 62788-2-1.	Not applicable	N/A
	Other materials which are used as relied upon insulation, the thickness is verified by insulation thickness test (MST 04) in the final application.	Not applicable	N/A
	Electric shock has been protected against in case of cutting stress	Not applicable	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.	Not applicable	N/A

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The thickness requirement (DTI) of row 4) of Table 3 and Table 4 is fuifilled.	Not applicable	N/A
	The RUI layers contributing to the DTI fulfil the following requirements:		—
	For a component with a single-layer construction:		—
	-RTE, RTI, or TI comply with 6.5.2.2.3.	Not applicable	N/A
	-Dielectric strength Class II (reinforced insulation): 2kV+4 x [Vsys] Class 0 (functional or basic insulation): 1kV+2 x [Vsys]	Not applicable	N/A
	-Minimum thickness comply with thin-layers requirements in Table 3 or Table 4 as applicable (no less than 0.3mm for 1500V DC)	Not applicable	N/A
	For a component consisting of multiple layers, each layer providing RUI meet the following requirements:		—
	-RTE, RTI, or TI comply with 6.5.2.2.3.	Not applicable	N/A
	-At least one layer meets the dielectric strength requirements for reinforced insulation or at least two layers each meet the dielectric strength requirements for basic insulation	Not applicable	N/A
	For a component consisting of multiple layers, the full multilayer construction meets the following requirements:		—
	- The DTI value is in compliance with values according to line 4) "DTI" of Table 3 and Table 4.	Not applicable	N/A
	- The dielectric strength of the construction adjusted by taking the percentage of the measured value equal to the percentage of thickness of RUI layers making up the full thickness of the component; this adjusted value have appropriate dielectric strength according to Table 2: Class II (reinforced insulation): 2kV + 4 x [Vsys]; Class 0 or III (functional or basic insulation): 1kV + 2 x [Vsys]	Not applicable	N/A
6.6.4.3 Cemented joints			
	Cemented joints were considered as	☐ Edge seal ☐ Interface between Junction Box and mounting surface ☐ others ☒ No such part	N/A
	Distances along cemented joints comply with the minimum distances as required in table 3 or table 4:	No such part	N/A

IEC 61730-1			
Clause	Requirement + Test	Result - Remark	Verdict
	System voltage…….:	See safety ratings	N/A
	Distance along cemented joints req./meas. (mm):	N/A	N/A
	A distance can be considered as cemented joint if following requirements are met:		—
	- Neither cracks nor voids in the insulating compounds have been occurred which either by themselves or in combination reduces the distances through the cemented joint below the required values.	N/A	N/A
	- No breakdown at MST 16 (initial and final test)with a 1,35 times higher tests voltage:	N/A	N/A
	Test voltage (V):	N/A	—
	No breakdown at MST 17 (initial and final test)with a 1,35 times higher tests voltage:	N/A	N/A
	Test voltage (V):	N/A	—
	The electrically insulating adhesive/sealant have a volume resistivity:	N/A	—
	-of greater than 50 × 10^6 Ω cm (dry)	N/A	N/A
	-and greater than 10 × 10^6 Ω cm (wet).	N/A	N/A
	☐ rigid / rigid: lap shear test MST 36 ☐ rigid / flexible: peel test MST 35	N/A	N/A
	A distance can be considered as cemented joint used for junction boxes if the following requirements is fulfilled:		—
	- distance through cemented joints at adhesive area of junction box	N/A	N/A
	Supplement information: Above mentioned tests must be performed for each cemented joint. Also, the materials and their properties have to be listed in Constructional Data Form (CDF) attached to this report with same file no.		
6.6.4.4	**Distance through functional insulation**		—
	functional insulation is applied at	☒ encapsulant ☐ others	—
	Type of encapsulants is used?	☐ two different encapsulants ☒ one encapsulant	—
	If one encapsulant is used, the minimum distance between live parts of different potential complies with the following requirements concerning thickness described in table 3 or 4 row 3(minimum 0.2 mm)	See Table 1, Table 2	P
	If two different encapsulants are used, the minimum distance between live parts of different potential complies with the following requirements concerning thickness described in table 3 or 4 row 2 (Minimum 0.2mm (if pollution degree I))	See Table 1, Table 2	P

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

6.6.3.4: Clearance and creepage distances

Table 1: Design evaluation

Clearance (cl) and creepage distance (cr) at/of/between:	Line of table 3or 4	Type of insulation	Pollution degree	CTI Material group	Working voltage	Clearance cl (mm)		Creepage cr (mm)	
						Required	Design[a]	Required	Design[a]
Position 1: Internal live parts and outer accessible surfaces	1	☐ Functional ☐ Basic ☐ Suppl. ☒ Reinforced	☒ 1 ☐ 2 ☐ 3	☐ I ☐ II ☐ IIIa	1500VDC	10.4	13.5	10.4	13.5
Position 2: Live parts of different potential inside a PV module	2	☒ Functional ☐ Basic ☐ Suppl. ☐ Reinforced	☒ 1 ☐ 2 ☐ 3	☐ I ☐ II ☐ IIIa	<35VDC	0.1	1.8	0.2	1.8
Position 3: DTFI	3	☒ Functional ☐ Basic ☐ Suppl. ☐ Reinforced	☐ 1 ☐ 2 ☐ 3	☐ I ☐ II ☐ IIIa	<35VDC	n/a	n/a	n/a	n/a
Position 4: Thin films	4	☐ Functional ☐ Basic ☐ Suppl. ☒ Reinforced	☐ 1 ☐ 2 ☐ 3	☐ I ☐ II ☐ IIIa	1500VDC	n/a	n/a	n/a	n/a
Position 5: Cemented joint	5	☐ Functional ☐ Basic ☐ Suppl. ☒ Reinforced	☐ 1 ☐ 2 ☐ 3	☐ I ☐ II ☐ IIIa	n/a	n/a	n/a	n/a	n/a

Supplementary information:

See photographs/drawings/illustrations on annex 1

Junction box is potted and fulfils the requirements of IEC 62790

Pollution degree I is verified, CTI material group doesnot influence the requirement of creepage distance.

[a] List relevant position and test voltage for each clearence which is verified by impulse voltage test according to IEC 60664-1:

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

6.6.3.4: Clearance and creepage distances

Table 2: PV module evaluation MST 01 initial

Sample #: 1-M14-1

Clearance (cl) and creepage distance (cr) at/of/between:	Line of table 3or 4	Type of insulation	Pollution degree	CTI Material group	Working voltage	Clearance cl (mm)		Creepage cr (mm)	
						Required	Meas.[a] / sample #	Required	Meas.[a] / sample #
Position 1: Internal live parts and outer accessible surfaces	1	☐ Functional ☐ Basic ☐ Suppl. ☒ Reinforced	☒ 1 ☐ 2 ☐ 3	☐ I ☐ II ☐ IIIa	1500VDC	10.4	13.5	10.4	13.5
Position 2: Live parts of different potential inside a PV module	2	☒ Functional ☐ Basic ☐ Suppl. ☐ Reinforced	☒ 1 ☐ 2 ☐ 3	☐ I ☐ II ☐ IIIa	<35VDC	0.1	1.8	0.2	1.8
Position 3: DTFI	3	☒ Functional ☐ Basic ☐ Suppl. ☐ Reinforced	☒ 1 ☐ 2 ☐ 3	☐ I ☐ II ☐ IIIa	<35VDC	n/a	n/a	n/a	n/a
Position 4: Thin films	4	☐ Functional ☐ Basic ☐ Suppl. ☒ Reinforced	☒ 1 ☐ 2 ☐ 3	☐ I ☐ II ☐ IIIa	1500VDC	n/a	n/a	n/a	n/a
Position 5: Cemented joint	5	☐ Functional ☐ Basic ☐ Suppl. ☒ Reinforced	☒ 1 ☐ 2 ☐ 3	☐ I ☐ II ☐ IIIa	n/a	n/a	n/a	n/a	n/a

Supplementary information:

See photographs/drawings/illustrations on annex 1

Junction box is potted and fulfils the requirements of IEC 62790

Pollution degree I is verified, CTI material group does not influence the requirement of creepage distance.

[a] Report the smallest measured distance and sample #.

List relevant position and test voltage for each clearence which is verified by impulse voltage test according to IEC 60664-1, Impulse voltage test (18720V) is conducted on sample# 1-M14-1.

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

IEC 61730 PART 2: REQUIREMENTS FOR TESTING

8 Testing
Test sequences see IEC 61730-2 Deviations from test sequence are possible but must be documented. See also table 5-

Test Procedures

Module type: SS-BG610-78MDH(T) (BOM1)

10 TEST PROCEDURES			
10.1 General: Safety qualification testing included the following Module Safety Tests (MST) of IEC 61730-2			
Initial Testing			
10.2	MST 01 – Visual inspection .....:	See appended Table 6	P
10.3	MST 02 – Performance at STC .....:	See appended Table 7	P
10.4	MST 03 – Maximum power determination .....:	See appended Table 8	P
10.13	MST 16 – Insulation test .....:	See appended Table 9	P
10.14	MST 17 – Wet leakage current test .....:	See appended Table 10	P
10.11	MST 13 – Continuity test of equipotential bonding:	See appended Table 11	P
10.9	MST 11 – Accessibility test.....:	See appended Table 12	P
Sequence A			
10.26	MST 37 – Materials creep test.....:	See appended Table 13	P
10.11	MST 13 – Continuity test of equipotential bonding:	See appended Table 11	P
10.9	MST 11 – Accessibility test.....:	See appended Table 12	P
Sequence B			
10.30	MST 53 – Damp heat test 200h.....:	See appended Table 14	P
10.31	MST 54 – UV test 60kWh/m² .....:	See appended Table 15	P
10.29	MST 52 – Humidity freeze test .....:	See appended Table 16	P
10.31	MST 54 – UV test 60kWh/m² .....:	See appended Table 17	P
10.29	MST 52 – Humidity freeze test .....:	See appended Table 18	P
Sequence B1			
10.32	MST 55 – Cold conditioning.....:	See appended Table 19	P
10.33	MST 56 – Dry heat conditioning .....:	See appended Table 20	P
10.29	MST 52 – Humidity freeze test .....:	See appended Table 21	P

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.32	MST 55 – Cold conditioning.....:	See appended Table 22	P
10.29	MST 52 – Humidity freeze test .....:	See appended Table 23	P
Sequence C			
10.31	MST 54 – UV test 15kWh/m² .....:	See appended Table 24	P
10.28	MST 51 – Thermal cycling 50 test .....:	See appended Table 25	P
10.29	MST 52 – Humidity freeze test .....:	See appended Table 26	P
10.27	MST 42 – Robustness of terminations test.....:	See appended Table 27	P
Sequence D			
10.30	MST 53 – Damp heat test.....:	See appended Table 28	P
10.23	MST 34 – Static mechanical load test .....:	See appended Table 29	P
Sequence E			
10.28	MST 51 – Thermal cycling 200 test .....:	See appended Table 30	P
Sequence F			
10.19	MST 25 – Bypass diode thermal test.....:	See appended Table 31	P
10.16	MST 22 – Hot-spot endurance Test.....:	See appended Table 33	P
10.20	MST 26 – Reverse current overload test .....:	See appended Table 34	P
Sequence G1			
10.12	MST 14 – Impulse voltage test .....:	See appended Table 35.2	P
Sequence G2			
10.34	MST 57 – Evaluation of insulation coordination	See appended Table 35.1	P
Other tests			
10.17	MST 23 – Fire Test .....:	See appended Table 36	P
10.18	MST 24 – Ignitability test.....:	See appended Table 37	P
10.21	MST 32 – Module breakage test.....:	See appended Table 38	P
10.24	MST 35 – Peel test .....:	See appended Table 39	N/A
10.25	MST 36 – Lap shear strength test .....:	See appended Table 40	N/A
Final Testing			
10.10	MST 12 – Cut susceptibility test .....:	See appended Table 41	N/A
10.11	MST 13 – Continuity test of equipotential bonding:	See appended Table 11	P
10.9	MST 11 – Accessibility test.....:	See appended Table 12	P
10.4	MST 03 – Maximum power determination .....:	See appended Table 42	P
10.1	MST 01 – Visual inspection .....:	See appended Table 43	P

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.6	MST 05 – Durability of markings.....:	See appended Table 44	P
10.7	MST 06 – Sharp edge test.....:	See appended Table 45	P
10.8	MST 07 – Bypass diode functionality test.....:	See appended Table 46	P
10.22	MST 33a – General screw connections test.....:	See appended Table 47	N/A
10.22	MST 33b – Locking Screw connections test.....:	See appended Table 48	N/A
10.5	MST 04 – Insulation thickness test.....:	See appended Table 49	N/A
Supplementary information: N/A			

Table 5: Overview of MST items for each test sample																
MST item	Sample No.															
	1-M1	1-M2-1	1-M3	1-M4	1-M6	1-M8	1-M10	1-M11	1-M12	1-M13	1-M14-1	1-M15	1-M16	1-fire 1, 2, 3	1-fire 4, 5, 6	
Control module							X									
MST 01 – Visual inspection	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
MST 02 – Performance at STC							X									
MST 03 – Maximum power determination	X	X	X	X	X	X		X	X	X	X					
MST 04 – Insulation thickness test																
MST 05 – Durability of markings	X	X	X	X	X	X		X	X	X						
MST 06 – Sharp edge test	X	X	X	X	X	X		X	X	X						
MST 07 – Bypass diode functionality test	X	X	X	X	X	X		X	X	X						
MST 11 – Accessibility test	X	X	X	X	X	X										
MST 12 – Cut susceptibility test																
MST 13 – Continuity test of equipotential bonding	X	X	X	X	X	X						X				
MST 14 – Impulse voltage test											X					
MST 16 – Insulation test	X	X	X	X	X	X	X	X	X	X	X					
MST 17 – Wet leakage current test	X	X	X	X	X	X	X	X	X	X						
MST 22 – Hot-spot endurance Test									X							
MST 23 – Fire Test														X	X	
MST 24 – Ignitability test													X			
MST 25 – Bypass diode thermal test								X								
MST 26 – Reverse current overload test										X						
MST 32 – Module breakage test												X				
MST 33 – Screw connections test																
MST 34 – Static mechanical load test					X											
MST 35 – Peel test																
MST 36 – Lap shear strength test:																
MST 37 – Materials creep test:	X															
MST 42 – Robustness of terminations test				X												
MST 51 – Thermal cycling test 50				X												
MST 51 - Thermal cycling test 200						X										
MST 52 – Humidity freeze test		X	X	X												
MST 53 – Damp heat test 200 h		X														
MST 53 – Damp heat test 1000 h					X											
MST 54 – UV test 15 KWh/m²				X												
MST 54 – UV test 60 KWh/m²		X														
MST 55 – Cold conditioning			X													
MST 56 – Dry heat conditioning			X													
MST 57 – Evaluation of insulation coordination											X					
Legend: X Test performed,																

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

Module type: SS-BG680-66MDH-G12(T) (BOM2)

10 TEST PROCEDURES			
10.1 General: Safety qualification testing included the following Module Safety Tests (MST) of IEC 61730-2			
Initial Testing			
10.2	MST 01 – Visual inspection..... :	See appended Table 6	P
10.3	MST 02 - Performance at STC..... :	See appended Table 7	P
10.4	MST 03 – Maximum power determination ..... :	See appended Table 8	P
10.13	MST 16 – Insulation test ..... :	See appended Table 9	P
10.14	MST 17 – Wet leakage current test..... :	See appended Table 10	P
10.11	MST 13 – Continuity test of equipotential bonding:	See appended Table 11	P
10.9	MST 11 – Accessibility test ..... :	See appended Table 12	P
Sequence A			
10.26	MST 37 – Materials creep test ..... :	See appended Table 13	N/A
10.11	MST 13 – Continuity test of equipotential bonding:	See appended Table 11	N/A
10.9	MST 11 – Accessibility test ..... :	See appended Table 12	N/A
Sequence B			
10.30	MST 53 – Damp heat test 200h ..... :	See appended Table 14	N/A
10.31	MST 54 – UV test 60kWh/m² ..... :	See appended Table 15	N/A
10.29	MST 52 – Humidity freeze test..... :	See appended Table 16	N/A
10.31	MST 54 – UV test 60kWh/m² ..... :	See appended Table 17	N/A
10.29	MST 52 – Humidity freeze test..... :	See appended Table 18	N/A
Sequence B1			
10.32	MST 55 – Cold conditioning ..... :	See appended Table 19	N/A
10.33	MST 56 – Dry heat conditioning..... :	See appended Table 20	N/A
10.29	MST 52 – Humidity freeze test..... :	See appended Table 21	N/A
10.32	MST 55 – Cold conditioning ..... :	See appended Table 22	N/A
10.29	MST 52 – Humidity freeze test..... :	See appended Table 23	N/A
Sequence C			
10.31	MST 54 – UV test 15kWh/m² ..... :	See appended Table 24	N/A
10.28	MST 51 – Thermal cycling 50 test..... :	See appended Table 25	P
10.29	MST 52 – Humidity freeze test..... :	See appended Table 26	P
10.27	MST 42 – Robustness of terminations test ..... :	See appended Table 27	P

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
Sequence D			
10.30	MST 53 – Damp heat test ..... :	See appended Table 28	P
10.23	MST 34 – Static mechanical load test..... :	See appended Table 29	P
Sequence E			
10.28	MST 51 – Thermal cycling 200 test..... :	See appended Table 30	P
Sequence F			
10.19	MST 25 – Bypass diode thermal test ..... :	See appended Table 31	P
10.16	MST 22 – Hot-spot endurance Test ..... :	See appended Table 33	P
10.20	MST 26 – Reverse current overload test ..... :	See appended Table 34	P
Sequence G1			
10.12	MST 14 – Impuls voltage test..... :	See appended Table 35.2	N/A
Sequence G2			
10.34	MST 57 – Evaluation of insulation coordination	See appended Table 35.1	N/A
Other tests			
10.17	MST 23 – Fire Test..... :	See appended Table 36	N/A
10.18	MST 24 – Ignitability test..... :	See appended Table 37	N/A
10.21	MST 32 – Module breakage test ..... :	See appended Table 38	N/A
10.24	MST 35 – Peel test..... :	See appended Table 39	N/A
10.25	MST 36 – Lap shear strength test..... :	See appended Table 40	N/A
Final Testing			
10.10	MST 12 – Cut susceptibility test..... :	See appended Table 41	N/A
10.11	MST 13 – Continuity test of equipotential bonding:	See appended Table 11	P
10.9	MST 11 – Accessibility test ..... :	See appended Table 12	P
10.4	MST 03 – Maximum power determination ..... :	See appended Table 42	P
10.1	MST 01 – Visual inspection..... :	See appended Table 43	P
10.6	MST 05 – Durability of markings ..... :	See appended Table 44	P
10.7	MST 06 – Sharp edge test ..... :	See appended Table 45	P
10.8	MST 07 – Bypass diode functionality test ..... :	See appended Table 46	P
10.22	MST 33a – General screw connections test ..... :	See appended Table 47	N/A
10.22	MST 33b – Locking Screw connections test ..... :	See appended Table 48	N/A
10.5	MST 04 – Insulation thickness test ..... :	See appended Table 49	N/A
Supplementary information: N/A			

Table 5: Overview of MST items for each test sample																
MST item	Sample No.															
	2-M4	2-M6	2-M8	2-M10	2-M12	2-M13										
Control module				X												
MST 01 – Visual inspection	X	X	X	X	X	X										
MST 02 – Performance at STC				X												
MST 03 – Maximum power determination	X	X	X		X	X										
MST 04 – Insulation thickness test																
MST 05 – Durability of markings	X	X	X		X	X										
MST 06 – Sharp edge test	X	X	X		X	X										
MST 07 – Bypass diode functionality test	X	X	X		X	X										
MST 11 – Accessibility test	X	X	X													
MST 12 – Cut susceptibility test																
MST 13 – Continuity test of equipotential bonding	X	X	X													
MST 14 – Impulse voltage test																
MST 16 – Insulation test	X	X	X	X	X	X										
MST 17 – Wet leakage current test	X	X	X	X	X	X										
MST 22 – Hot-spot endurance Test					X											
MST 23 – Fire Test																
MST 24 – Ignitability test																
MST 25 – Bypass diode thermal test																
MST 26 – Reverse current overload test						X										
MST 32 – Module breakage test																
MST 33 – Screw connections test																
MST 34 – Static mechanical load test		X														
MST 35 – Peel test																
MST 36 – Lap shear strength test:																
MST 37 – Materials creep test:																
MST 42 – Robustness of terminations test	X															
MST 51 – Thermal cycling test 50	X															
MST 51 - Thermal cycling test 200			X													
MST 52 – Humidity freeze test	X					X										
MST 53 – Damp heat test 200 h						X										
MST 53 – Damp heat test 1000 h		X														
MST 54 – UV test 15 KWh/m²	X															
MST 54 – UV test 60 KWh/m²						X										
MST 55 – Cold conditioning																
MST 56 – Dry heat conditioning																
MST 57 – Evaluation of insulation coordination																

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

Test Results

Module type: SS-BG610-78MDH(T) (BOM1)

Table 6: MST 01 - Initial Visual inspection			P
Test Date (YYYY-MM-DD) ..... :		2024-01-09 for 1-fire 4#, 1-fire 5#,1-fire 6# 12023-12-21 for others	—
Sample # 1-M1	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M2-1	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M3	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M4	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M6	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M8	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M10	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M11	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M13	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M14-1	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M15	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
Sample # 1-M16	Findings.....	☐ Yes..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-fire 1	Findings.....	☐ Yes..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-fire 2	Findings.....	☐ Yes..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-fire 3	Findings.....	☐ Yes..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-fire 4	Findings.....	☐ Yes..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-fire 5	Findings.....	☐ Yes..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-fire 6	Findings.....	☐ Yes..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Supplementary information: for creepage distances and clearances see Table 1, Table 2, Table 3 and Table 4			

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

Table 7: MST 02 - Performance at STC and BNPI							
Sample	1-M10						—
Test Date [YYYY-MM-DD].....	2023-12-27						—
Irradiance (W/m2)	1000 or G_{BNPI}						—
Module temperature (°C)	25						—
Test method.....	☒ Simulator ☐ Natural sunlight						—
Rated Isc including manufacturing tolerances	13.64A ± 3%						—
Rated Voc including manufacturing tolerances...	55.59V ± 3%						—
	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]	Result
Front	13.47	56.60	12.84	48.35	620.8	81.43	—
Rear	10.66	56.15	9.92	48.89	485.0	81.03	—
BNPI	14.85	56.82	14.17	48.38	685.5	81.25	—
Supplementary information: N/A							

Table 8: MST 03 - Maximum power determination							
Test Date [YYYY-MM-DD].....	2023-12-27						—
Irradiance (W/m2)	1000						—
Module temperature (°C)	25						—
Test method.....	☒ Simulator ☐ Natural sunlight						—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]	Result
1-M1	13.48	56.69	12.84	48.31	620.3	81.17	—
1-M2-1	13.42	56.60	12.79	48.46	619.8	81.60	—
1-M3	13.50	56.67	12.88	48.22	621.1	81.18	—
1-M4	13.49	56.68	12.85	48.29	620.5	81.16	—
1-M6	13.53	56.59	12.89	48.18	621.1	81.11	—
1-M8	13.48	56.53	12.83	48.36	620.5	81.42	—
1-M11	13.51	56.61	12.89	48.21	621.4	81.25	—
1-M13	13.49	56.63	12.88	48.14	620.1	81.16	—
1-M14-1	13.45	56.58	12.81	48.38	619.7	81.44	—
Supplementary information: N/A							

Table 9: MST 16 - Initial Insulation test		
Test Date (YYYY-MM-DD).....	2023-12-27	—
Test Voltage applied (V, DC)	2 minutes of 1500 and 1 minute of 8000	—

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

Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
1-M1	>1000	>14.3	No breakdown	×	P
1-M2-1	>1000	>14.3	No breakdown	×	P
1-M3	>1000	>14.3	No breakdown	×	P
1-M4	>1000	>14.3	No breakdown	×	P
1-M6	>1000	>14.3	No breakdown	×	P
1-M8	>1000	>14.3	No breakdown	×	P
1-M10	>1000	>14.3	No breakdown	×	P
1-M11	>1000	>14.3	No breakdown	×	P
1-M13	>1000	>14.3	No breakdown	×	P
1-M14-1	>1000	>14.3	No breakdown	×	P
Supplementary information: Size of module 2.80 [m²]					

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

Table 10: MST 17 - Initial Wet leakage current test			
Test Date (YYYY-MM-DD)		2023-12-27	—
Test Voltage applied (V, dc)		2 minutes of 1500	—
Solution resistivity (Ω cm)		2382	—
Solution temperature (°C)		21.4	—
Sample #	Measured (MΩ)	Required (MΩ)	Result
1-M1	>1000	>14.3	P
1-M2-1	>1000	>14.3	P
1-M3	>1000	>14.3	P
1-M4	>1000	>14.3	P
1-M6	>1000	>14.3	P
1-M8	>1000	>14.3	P
1-M10	>1000	>14.3	P
1-M11	>1000	>14.3	P
1-M13	>1000	>14.3	P
Supplementary information: Size of module 2.80 [m²]			

Table 11: MST 13 - Continuity test of equipotential bonding				
Test Date Initial examination (YYYY-MM-DD)		2023-12-27 for1-M1#~1-M4#,1-M6#,1-M8#,1-M15#; 2024-01-10 for 1-M18#~1-M21#;		—
Test Date Final examination (YYYY-MM-DD)		2024-01-07 for 1-M1#;2024-03-21 for 1-M2-1#; 2024-01-18 for 1-M3#;2024-02-22 for 1-M4#; 2024-02-26 for 1-M6#;2024-02-07 for 1-M8#; 2024-01-02 for 1-M15#; 2024-01-16 for 1-M18#~1-M21#;		—
Maximum over-current protection rating (A)		30		—
Current applied (A)		75		—
Location of designated grounding point.....		The ground hole of one longer side		—
Location of second contacting point		A: The center of another longer side B: Adjacent shorter side with greatest distance from the grounding point C:The center of the other shorter side		—
Sample #	Position in test sequence:	Voltage [V]	Resistance [Ω]	
1-M1	Initial examination	A: 0.156 B: 0.075 C: 0.069	A: 0.002 B: 0.001 C: 0.001	P

IEC 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
	Preconditioning: MST 37			—
	Final examination	A: 0.236 B: 0.157 C: 0.305	A: 0.003 B: 0.002 C: 0.004	P
1-M2-1	Initial examination	A: 0.078 B: 0.068 C: 0.75	A: 0.001 B: 0.001 C: 0.001	P
	Preconditioning: MST 53, MST 54, MST 52, MST 12			—
	Final examination	A: 0.459 B: 0.382 C: 0.536	A: 0.006 B: 0.005 C: 0.007	P
1-M3	Initial examination	A: 0.078 B: 0.074 C: 0.069	A: 0.001 B: 0.001 C: 0.001	P
	Preconditioning:MST 55, MST 56, MST 52, MST 55, MST 52, MST 12			—
	Final examination	A: 0.234 B: 0.260 C: 0.307	A: 0.003 B: 0.003 C: 0.004	P
1-M4	Initial examination	A: 0.074 B: 0.153 C: 0.080	A: 0.001 B: 0.002 C: 0.001	P
	Preconditioning: MST 54, MST 51, MST 52, MST 12			—
	Final examination	A: 0.154 B: 0.149 C: 0.078	A: 0.002 B: 0.002 C: 0.001	P
1-M6	Initial examination	A: 0.069 B: 0.085 C: 0.066	A: 0.001 B: 0.001 C: 0.001	P
	Preconditioning: MST 53, MST 34, MST 12			—
	Final examination	A: 0.381 B: 0.227 C: 0.308	A: 0.005 B: 0.003 C: 0.004	P
1-M8	Initial examination	A: 0.074 B: 0.076 C: 0.069	A: 0.001 B: 0.001 C: 0.001	P
	Preconditioning: MST 51, MST 12			—

IEC 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
	Final examination	A: 0.461 B: 0.228 C: 0.382	A: 0.006 B: 0.003 C: 0.005	P
1-M15	Initial examination	A: 0.076 B: 0.081 C: 0.069	A: 0.001 B: 0.001 C: 0.001	P
	Preconditioning: MST 32			—
	Final examination	A: 0.534 B: 0.610 C: 0.602	A: 0.007 B: 0.008 C: 0.008	P
1-M18	Initial examination	A: 0.074 B: 0.068 C: 0.072	A: 0.001 B: 0.001 C: 0.001	P
	Preconditioning: MQT 21			—
	Final examination	A: 0.080 B: 0.067 C: 0.069	A: 0.001 B: 0.001 C: 0.001	P
1-M19	Initial examination	A: 0.098 B: 0.075 C: 0.153	A: 0.001 B: 0.001 C: 0.002	P
	Preconditioning: MQT 21			—
	Final examination	A: 0.159 B: 0.157 C: 0.235	A: 0.002 B: 0.002 C: 0.003	P
1-M20	Initial examination	A: 0.068 B: 0.071 C: 0.68	A: 0.001 B: 0.001 C: 0.001	P
	Preconditioning: MQT 21			—
	Final examination	A: 0.241 B: 0.304 C: 0.229	A: 0.003 B: 0.004 C: 0.003	P
1-M21	Initial examination	A: 0.074 B: 0.069 C: 0.078	A: 0.001 B: 0.001 C: 0.001	P
	Preconditioning: MQT 21			—
	Final examination	A: 0.074 B: 0.076 C: 0.159	A: 0.001 B: 0.001 C: 0.002	P
Supplementary information: N/A				

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
Table 12: MST 11 - Accessibility test			
Test Date **Initial** examination (YYYY-MM-DD)....		2023-12-27	—
Test Date **Final** examination (YYYY-MM-DD).....		2024-01-07 for 1-M1#;2024-03-21 for 1-M2-1#; 2024-01-18 for 1-M3#;2024-02-22 for 1-M4#; 2024-02-26 for 1-M6#;2024-02-07 for 1-M8#;	—
Sample #	Position in test sequence:		
1-M1	Initial examination, access?	☐ Yes ☒ No	P
	Preconditioning: MST 37, MST 13		—
	Final examination, access?	☐ Yes ☒ No	P
1-M2-1	Initial examination, access?	☐ Yes ☒ No	P
	Preconditioning: MST 53, MST 54, MST 52, MST 12, MST 13		—
	Final examination, access?	☐ Yes ☒ No	P
1-M3	Initial examination, access?	☐ Yes ☒ No	P
	Preconditioning: MST 55, MST 56, MST 52, MST 55, MST 52, MST 12, MST 13		—
	Final examination, access?	☐ Yes ☒ No	P
1-M4	Initial examination, access?	☐ Yes ☒ No	P
	Preconditioning: MST 54, MST 51, MST 52, MST 12, MST 13		—
	Final examination, access?	☐ Yes ☒ No	P
1-M6	Initial examination, access?	☐ Yes ☒ No	P
	Preconditioning: MST 53, MST 34, MST 12, MST 13		—
	Final examination, access?	☐ Yes ☒ No	P
1-M8	Initial examination, access?	☐ Yes ☒ No	P
	Preconditioning: MST 51, MST 12, MST 13		—
	Final examination, access?	☐ Yes ☒ No	P
Supplementary information: N/A			

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

SEQUENCE A				
Sample #	1-M1			—
Table 13: MST 37 - Materials creep test				P
Test Date (YYYY-MM-DD) start/end .....:		2023-12-29/2024-01-07		—
Duration [h] .....:		200		—
Applied temperature [°C] .....:		90 ± 3		—
MST 01: Visual inspection after materials creep test				—
Test Date (YYYY-MM-DD) .....:		2024-01-07		—
Findings ..... :		☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos		No visual defects		—
Supplementary information: for clearance and creepage distances see table 3.				
MST 16: Insulation test after materials creep test				—
Test Date (YYYY-MM-DD) .....:		2024-01-07		—
Test Voltage applied (V, dc) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P
MST 17: Wet leakage current test after materials creep test				—
Test Date (YYYY-MM-DD) .....:		2024-01-07		—
Test Voltage applied (V, dc) .....:		2 minutes of 1500		—
Solution resistivity (Ω cm) .....:		2351		—
Solution temperature (°C) .....:		21.8		—
Measured(MΩ)		Required (MΩ)		Result
>1000		>14.3		P
Supplementary information: module size: 2.80 m^2				

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

SEQUENCE B					
Sample #	1-M2-1				—
Table 14: MST 53 - Damp heat test					P
Test Date (YYYY-MM-DD) start/end .....:	2024-01-05/2024-01-14				—
Duration [h] .....:	200				—
MST 01: Visual inspection after Damp heat test					—
Test Date (YYYY-MM-DD) .....:	2024-01-14				—
Findings ..... :	☐ Yes ..... ☒ No				P
Nature and position of findings – comments or attach photos	No visual defects				—
MST 16: Insulation test after Damp heat test					—
Test Date (YYYY-MM-DD) .....:	2024-01-14				—
Test Voltage applied (V, DC) .....:	2 minutes of 1500 and 1 minute of 8000				—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
1-M2-1	>1000	>14.3	No breakdown	×	P
Supplementary information: module size: 2.80 m^2					

Table 15: MST 54 - UV (front test) test					P
Test Date (YYYY-MM-DD) start/end .....:	2024-01-17/2024-01-31				—
Module temperature [°C] .....:	60				—
Irradiation total [kWh/ m²] .....:	60				—
Open circuits .....:	☐ Yes ☒ No				—
Supplimentary information:N/A					
MST 01: Visual inspection after UV test					—
Test Date (YYYY-MM-DD) .....:	2024-01-31				—
Findings ..... :	☐ Yes ..... ☒ No				P
Nature and position of findings – comments or attach photos	No visual defects				—
MST 16: Insulation test after UV test					—
Test Date (YYYY-MM-DD) .....:	2024-01-31				—
Test Voltage applied (V, DC) .....:	2 minutes of 1500 and 1 minute of 8000				—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	

IEC 61730-2					
Clause	Requirement + Test		Result - Remark		Verdict
1-M2-1	>1000	>14.3	No breakdown	×	P
Supplementary information: module size 2.80 m²					

Table 18: MST 52 - Humidity freeze test					P
Test Date (YYYY-MM-DD) start/end .....:	2024-02-02/2024-02-12				—
Total cycles (10) .....:	10				—
Open circuits .....:	☐ Yes ☒ No				—
MST 01: Visual inspection after Humidity freeze test					—
Test Date (YYYY-MM-DD) .....:	2024-02-12				—
Findings ..... :	☐ Yes ..... ☒ No				P
Nature and position of findings – comments or attach photos	No visual defects				—
MST 16: Insulation test after Humidity freeze test					—
Test Date (YYYY-MM-DD) .....:	2024-02-12				—
Test Voltage applied (V, DC) .....:	2 minutes of 1500 and 1 minute of 8000				—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
1-M2-1	>1000	>14.3	No breakdown	×	P
Supplementary information: module size: 2.80 m²					
MST 17: Wet leakage current test after humidity freeze 10 test					—
Test Date (YYYY-MM-DD) .....:	2024-02-12				—
Test Voltage applied (V, dc) .....:	2 minutes of 1500				—
Solution resistivity (Ω cm) .....:	2380				—
Solution temperature (°C).....:	22.1				—
Sample #	Measured (MΩ)		Required (MΩ)		Result
1-M2-1	>1000		>14.3		P
Supplementary information: module size: 2.80 m²					

Table 15: MST 54 - UV (rear test) test		P
Test Date (YYYY-MM-DD) start/end .....:	2024-02-16/2024-03-01	—
Module temperature [°C] .....:	60	—
Irradiation total [kWh/ m²] .....:	60	—
Open circuits .....:	☐ Yes ☒ No	—
Supplimentary information: N/A		

IEC 61730-2					
Clause	Requirement + Test		Result - Remark		Verdict
MST 01: Visual inspection after UV test					—
Test Date (YYYY-MM-DD) .....:			2024-03-01		—
Findings ..... :			☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos			No visual defects		—
MST 16: Insulation test after UV test					—
Test Date (YYYY-MM-DD) .....:			2024-03-01		—
Test Voltage applied (V, DC) .....:			2 minutes of 1500 and 1 minute of 8000		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
1-M2-1	>1000	>14.3	No breakdown	×	P
Supplementary information: module size 2.80 m^2					

Table 18: MST 52 - Humidity freeze test					P
Test Date (YYYY-MM-DD) start/end .....:			2024-03-06/2024-03-16		—
Total cycles (10) .....:			10		—
Open circuits .....:			☐ Yes ☒ No		—
MST 01: Visual inspection after Humidity freeze test					—
Test Date (YYYY-MM-DD) .....:			2024-03-16		—
Findings ..... :			☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos			No visual defects		—
MST 16: Insulation test after Humidity freeze test					—
Test Date (YYYY-MM-DD) .....:			2024-03-16		—
Test Voltage applied (V, DC) .....:			2 minutes of 1500 and 1 minute of 8000		—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
1-M2-1	>1000	>14.3	No breakdown	×	P
Supplementary information: module size: 2.80 m^2					
MST 17: Wet leakage current test after humidity freeze 10 test					—
Test Date (YYYY-MM-DD) .....:			2024-03-16		—
Test Voltage applied (V, dc) .....:			2 minutes of 1500		—
Solution resistivity (Ω cm) .....:			2365		—
Solution temperature (°C) .....:			22.5		—

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

Sample #	Measured (MΩ)	Required (MΩ)	Result
1-M2-1	>1000	>14.3	P
Supplementary information: module size: 2.80 m^2			

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

SEQUENCE B1				
Sample #	1-M3			—
Table 19: MST 55 - Cold conditioning				P
Test Date (YYYY-MM-DD) start/end .....:		2023-12-28/2023-12-30		—
Temperature [°C] Duration [h] .....:		-40 / 48		—
MST 01: Visual inspection after Cold conditioning				—
Test Date (YYYY-MM-DD) .....:		2023-12-30		—
Findings ..... :		☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after Cold conditioning				—
Test Date (YYYY-MM-DD) .....:		2023-12-30		—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P
Supplementary information: module size: 2.80 m^2				

Table 20: MST 56 - Dry heat conditioning				P
Test Date (YYYY-MM-DD) start/end .....:		2024-01-03/2024-01-12		—
Temperature [°C] Duration [h] ..... :		90 ± 3 / 200		—
MST 01: Visual inspection after Dry heat conditioning				—
Test Date (YYYY-MM-DD) .....:		2024-01-12		—
Findings ..... :		☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after Dry heat conditioning				—
Test Date (YYYY-MM-DD) .....:		2024-01-12		—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P
Supplementary information: module size: 2.80 m^2				

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

Table 21: MST 52 - Humidity freeze test				P
Test Date (YYYY-MM-DD) start/end .....:		20204-01-16/2024-01-26		—
Total cycles (10) ..... :		10		—
Open circuits ..... :		☐ Yes ☒ No		—
MST 01: Visual inspection after Humidity freeze test				—
Test Date (YYYY-MM-DD) .....:		2024-01-26		—
Findings ..... :		☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after Humidity freeze test				—
Test Date (YYYY-MM-DD) .....:		2024-01-26		—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P
Supplementary information: module size: 2.80 m^2				

Table 22: MST 55 - Cold conditioning				P
Test Date (YYYY-MM-DD) start/end .....:		2024-01-29/2024-01-31		—
Temperature [°C] / Duration [h] ..... :		-40 / 48		—
MST 01: Visual inspection after Cold conditioning				—
Test Date (YYYY-MM-DD) .....:		2024-01-31		—
Findings ..... :		☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after Cold conditioning				—
Test Date (YYYY-MM-DD) .....:		2024-01-31		—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P
Supplementary information: module size: 2.80 m^2				

Table 23: MST 52 - Humidity freeze test		
Test Date (YYYY-MM-DD) start/end .....:	2024-02-02/2024-02-12	—

IEC 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
Total cycles (10) .....:		10		—
Open circuits .....:		☐ Yes ☒ No		P
MST 01: Visual inspection after Humidity freeze test				—
Test Date (YYYY-MM-DD) .....:		2024-02-12		—
Findings ..... :		☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after Humidity freeze test				—
Test Date (YYYY-MM-DD) .....:		2024-02-12		—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P
MST 17: Wet leakage current test after humidity freeze test				—
Test Date (YYYY-MM-DD) .....:		2024-02-12		—
Test Voltage applied (V, dc) .....:		2 minutes of 1500		—
Solution resistivity (Ω cm) .....:		2350		—
Solution temperature (°C) .....:		22.2		—
Measured (MΩ)		Required (MΩ)		Result
>1000		>14.3		P
Supplementary information: module size: 2.80 m^2				

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

SEQUENCE C				
Sample #	1-M4			—
Table 24: MST 54 - UV test				P
Front side				
Test Date (YYYY-MM-DD) start/end .....:		2024-01-03/2024-01-07		—
Module temperature [°C] .....:		61.4		—
Irradiation total [kWh/ m²] .....:		15.0		—
Open circuits .....:		☐ Yes ☒ No		P
Back side (only for bifacial modules)				
Test Date (YYYY-MM-DD) start/end .....:		2024-01-11/2024-01-15		—
Module temperature [°C] .....:		61.7		—
Irradiation total [kWh/ m²] .....:		15.0		—
Open circuits .....:		☐ Yes ☒ No		P
MST 01: Visual inspection after UV test				—
Test Date (YYYY-MM-DD) .....:		2024-01-15		—
Findings ..... :		☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after UV test				—
Test Date (YYYY-MM-DD) .....:		2024-01-15		—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P
Supplementary information: module size: 2.80 m²				

Table 25: MST 51 - Thermal cycling test		
Test Date (YYYY-MM-DD) start/end .....:	2024-01-19/2024-01-28	—
Total cycles (50) .....:	50	—
Applied current (A) .....:	16.91 during the heat up cycle from 40 °C to 80 °C 0.05 during other stages	—
Limiting voltage (V) .....:	62.8	—
Open circuits .....:	☐ Yes ☒ No	—

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
MST 01: Visual inspection after Thermal cycling test			—
Test Date (YYYY-MM-DD) .....:		2024-01-28	—
Findings ..... :		☐ Yes ..... ☒ No	P
Nature and position of findings – comments or attach photos		No visual defects	—
MST 16: Insulation test after Thermal cycling test			—
Test Date (YYYY-MM-DD) .....:		2024-01-28	—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000	—

Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P

Supplementary information: This test is conducted in compliance with IEC 61215-2:2021 / EN IEC 61215-2:2021. A single 5N weight has been attached to the junction box. for bifacial modules, shall be equal to the peak power current at elevated irradiance BSI.

module size: 2.80 m^2

Table 26: MST 52 - Humidity freeze test			P
Test Date (YYYY-MM-DD) start/end .....:		2024-02-06/2024-02-16	—
Total cycles (10) .....:		10	—
Open circuits .....:		☐ Yes ☒ No	P
MST 01: Visual inspection after Humidity freeze test			—
Test Date (YYYY-MM-DD) .....:		2024-02-16	—
Findings ..... :		☐ Yes ..... ☒ No	P
Nature and position of findings – comments or attach photos		No visual defects	—
MST 16: Insulation test after Humidity freeze test			—
Test Date (YYYY-MM-DD) .....:		2024-02-16	—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000	—

Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P

MST 17: Wet leakage current test after humidity freeze test			—
Test Date (YYYY-MM-DD) .....:		2024-02-16	—
Test Voltage applied (V, dc) .....:		2 minutes of 1500	—
Solution resistivity (Ω cm) .....:		2355	—

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
Solution temperature (°C) .....:		22.3	—
Measured (MΩ)		Required (MΩ)	Result
>1000		>14.3	P
Supplementary information: module size: 2.80 m^2			

Table 27: MST 42 - Robustness of terminations test				P
Test Date (YYYY-MM-DD) .....:		2024-02-18		—
MQT 14.1: Retention of junction box on mounting surface				
Supplementary information: N/A				
MST 01: Visual inspection after retention of junction box on mounting surface				
Test Date (YYYY-MM-DD) .....:		2024-02-18		—
Findings ..... :		☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after retention of junction box on mounting surface				—
Test Date (YYYY-MM-DD) .....:		2024-02-18		—
Test Voltage applied (V, DC) .....:		2 minutes of 2025 and 1 minute of 10800		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P
MST 17: Wet leakage current test after retention of junction box on mounting surface				
Test Date (YYYY-MM-DD) .....:		2024-02-18		—
Test Voltage applied [V] .....:		2 minutes of 2025		—
Solution resistivity (Ω cm) .....:		2298		—
Solution temperature (°C) .....:		22.4		—
Measured [MΩ]		Required [MΩ]		Result
>1000		>14.3		P
Supplementary information: 1.35Utest is applied for MST 15 Insulation test and MST 17 Wet leakage current test after MQT14.1 Retention of junction box module size: 2.80 m^2				

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

SEQUENCE D				
Sample #	1-M6			—
Table 28: MST 53 - Damp heat test				P
Test Date (YYYY-MM-DD) start/end .....:		2024-01-05/2024-02-18		—
Total hours (1000) .....:		1000		—
MST 01: Visual inspection after damp heat test				—
Test Date (YYYY-MM-DD) .....:		2024-02-18		—
Findings ..... :		☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after damp heat test				—
Test Date (YYYY-MM-DD) .....:		2024-02-18		—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P
MST 17: Wet leakage current test after damp heat test				—
Test Date (YYYY-MM-DD) .....:		2024-02-18		—
Test Voltage applied (V, dc) .....:		2 minutes of 1500		—
Solution resistivity (Ω cm) .....:		2398		—
Solution temperature (°C) .....:		22.3		—
Measured (MΩ)		Required (MΩ)		Result
>1000		>14.3		P
Supplementary information: A single 5N weight has been attached to the junction box. module size: 2.80 m^2				

Table 27: MST 42 - Robustness of terminations test		
Test Date (YYYY-MM-DD) .....:	2024-02-18	—
MQT 14.1: Retention of junction box on mounting surface		
Supplementary information: N/A		
MST 01: Visual inspection after retention of junction box on mounting surface		
Test Date (YYYY-MM-DD) .....:	2024-02-18	—
Findings ..... :	☐ Yes ..... ☒ No	P
Nature and position of findings – comments or	No visual defects	—

IEC 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
attach photos				
MST 16: Insulation test after retention of junction box on mounting surface				—
Test Date (YYYY-MM-DD) .....:		2024-02-18		—
Test Voltage applied (V, DC) .....:		2 minutes of 2025 and 1 minute of 10800		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P
MST 17: Wet leakage current test after retention of junction box on mounting surface				
Test Date (YYYY-MM-DD) .....:		2024-02-18		—
Test Voltage applied [V] .....:		2 minutes of 2025		—
Solution resistivity (Ω cm) .....:		2379		—
Solution temperature (°C).....:		22.2		—
Measured [MΩ]		Required [MΩ]		Result
>1000		>14.3		P
Supplementary information: 1.35Utest is applied for MST 15 Insulation test and MST 17 Wet leakage current test after MQT14.1 Retention of junction box module size: 2.80 m^2				

Table 29: MST 34 - Static mechanical load test			P
Test Date (YYYY-MM-DD) .....:	2024-02-19		—
Mounting method .....:	Clamps mounting (4 points)		—
Design Load [Pa] / Safety factor γm.....:	front side 3600/1.5 back side 1600/1.5		—
Load applied to.....:	front side	back side	—
Mechanical load [Pa].....:	5400	2400	—
First cycle duration time [h].....:	1h	1h	—
Intermittent open-circuit (yes/no).....:	No	No	P
Second cycle duration time [h] .....:	1h	1h	—
Intermittent open-circuit (yes/no).....:	No	No	P
Third cycle duration time [h].....:	1h	1h	—
Intermittent open-circuit (yes/no).....:	No	No	P
Supplementary information: N/A			
MST 01: Visual inspection after Static mechanical load test			—
Test Date (YYYY-MM-DD) .....:	2024-02-19		—

IEC 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
Findings ..... :		☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after Static mechanical load test				—
Test Date (YYYY-MM-DD) .....:		2024-02-19		—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P
MST 17: Wet leakage current test after Static mechanical load test				—
Test Date (YYYY-MM-DD) .....:		2024-02-19		—
Test Voltage applied (V, dc) ..... :		2 minutes of 1500		—
Solution resistivity (Ω cm) .....:		2389		—
Solution temperature (°C) ..... :		22.5		—
Measured (MΩ)		Required (MΩ)		Result
>1000		>14.3		P
Supplementary information: module size: 2.80 m^2				

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

SEQUENCE E				
Sample #	1-M8			—
Table 30: MST 51 - Thermal cycling test				P
Test Date (YYYY-MM-DD) start/end .....:		2023-12-29/2024-02-04		—
Total cycles (200) .....:		200		—
Applied current (A) .....:		16.61 during the heat up cycle from 40 °C to 80 °C 0.05 during other stages		—
Limiting voltage (V) .....:		63.81		—
Open circuits .....:		☒ Yes ☐ No		P
MST 01: Visual inspection after Thermal cycling test				—
Test Date (YYYY-MM-DD) .....:		2024-02-04		—
Findings ..... :		☒ Yes ..... ☐ No		
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after Thermal cycling test				—
Test Date (YYYY-MM-DD) .....:		2024-02-04		—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P
MST 17: Wet leakage current test after Thermal cycling test				—
Test Date (YYYY-MM-DD) .....:		2024-02-04		—
Test Voltage applied (V, dc) .....:		2 minutes of 1500		—
Solution resistivity (Ω cm) .....:		2389		—
Solution temperature (°C).....:		22.5		—
Measured (MΩ)		Required (MΩ)		Result
>1000		>14.3		P
Supplementary information: This test is conducted in compliance with IEC 61215-2:2021 / EN IEC 61215-2:2021. A single 5N weight has been attached to the junction box. for bifacial modules, shall be equal to the peak power current at elevated irradiance BSI. module size: 2.80 m^2				

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

SEQUENCE F					
Sample #	1-M11				—
Table 31: MST 25 - Bypass diode thermal test					P
Test Date [YYYY-MM-DD] start/end .....:	2024-02-19				—
Module temperature [°C] .....:	75				—
Number of diodes in junction box .....:	3				—
Diode manufacturer .....:	Zhejiang Chuangyuan Photovoltaic Technology Co., Ltd.				—
Diode type designation .....:	40SQ045				—
Max. permissible junction temperature Tjmax [°C] (according to diode datasheet).....:	200				—
Step 1, Determination of *VD* versus *TJ* characteristic					—
Diode	**1**				
Ambient temperature of the junction box [°C]....:	30 ± 2	50 ± 2	70 ± 2	90 ± 2	—
Pulsed current .....:	16.58	16.58	16.58	16.58	—
Voltage drop [V] .....:	0.5289	0.5012	0.4758	0.4493	—
VD versus TJ characteristic.....:	V_D=0.5681 - 1.32 x 10^{-3} T_J				
Max. permissible junction temperature T_{jmax} [°C] (according to diode datasheet) ..... :	200				—
Diode	**2**				
Ambient temperature of the junction box [°C]....:	30 ± 2	50 ± 2	70 ± 2	90 ± 2	—
Pulsed current .....:	16.58	16.58	16.58	16.58	—
Voltage drop [V] .....:	0.5371	0.5099	0.4810	0.4537	—
VD versus TJ characteristic.....:	V_D=0.5792 - 1.40 x 10^{-3} T_J				
Max. permissible junction temperature T_{jmax} [°C] (according to diode datasheet) ..... :	200				—
Diode	**3**				
Ambient temperature of the junction box [°C]....:	30 ± 2	50 ± 2	70 ± 2	90 ± 2	—
Pulsed current .....:	16.58	16.58	16.58	16.58	—
Voltage drop [V] .....:	0.5325	0.4997	0.4792	0.4478	—
VD versus TJ characteristic.....:	V_D=0.5722 - 1.37 x 10^{-3} T_J				
Max. permissible junction temperature T_{jmax} [°C] (according to diode datasheet) ..... :	200				—
Step 2, Bypass diode thermal test					—
	Diode 1	Diode 2	Diode 3		Result
Current flow applied [A] .....:	16.58	16.58	16.58		—

IEC 61730-2					
Clause	Requirement + Test	Result - Remark			Verdict
Max. diode surface temperature allowed Tjmax [°C],.....:		200	200	200	—
Voltage drop [V] after 1h.....:		0.3871	0.3958	0.3904	—
Calculated max. junction temperature Tjcalc [°C] .....:		137.1	123.1	137.8	—
Tjcalc < Tjmax (test passed)? yes/no.....:		Yes	Yes	Yes	P
Current flow (1.25 * Isc) [A].....:		20.73	20.73	20.73	—
Bypass diode remain(s) functional (yes/no).....:		Yes	Yes	Yes	P
Remarks: See Table 46 for the test details of bypass diode functionality test					
MST 01: Visual inspection after Bypass diode thermal test					—
Test Date [YYYY-MM-DD].....:		2024-02-19			—
Findings ..... :		☐ Yes ..... ☒ No			P
Nature and position of findings – comments or attach photos		No visual defects			—
MST 16: Insulation test after Bypass diode thermal test					—
Test Date (YYYY-MM-DD) .....:		2024-02-19			—
Test Voltage applied (V, DC).....:		2 minutes of 1500 and 1 minute of 8000			—
Measured	Required	Dielectric breakdown			Result
MΩ	MΩ	Yes (description)		No	
>1000	>14.3	No breakdown		×	P
MST 17: Wet leakage current test after Bypass diode thermal test					—
Test Date [YYYY-MM-DD]:.....		2024-02-19			—
Test Voltage applied [V]:.....		2 minutes of 1500			—
Solution resistivity [Ω cm) .....:		2341			—
Solution temperature [°C] .....:		22.7			—
Measured [MΩ]		Required [MΩ]			Result
>1000		>14.3			P
Supplementary information: This test is conducted in compliance with IEC 61215-2:2021 / EN IEC 61215-2:2021. module size: 2.80 m^2					

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

Sample #	1-M12					—
Table 33: MST 22 - Hot-spot endurance test						P
Test Date (YYYY-MM-DD) start/end .....:	2024-02-21/2024-02-22					—
Cell interconnection circuit .....:	☐ S ☒ SPS ☐ PS					—
Irradiance during each cycle……. .....:	1234					—
Module temperature at thermal equilibrium in each cycle [°C] .....:	62.5/61.7					—
Determination of worst case cell						—
Maximum measured cell temperature in each cycle [°C] .....:	F14:129.8; D02:130.5; B25:124.3; E17:127.0;					—
Shading rate [%] or number of cells shaded .....:	F14:35; D02:125; B25:40; E17:30;					—
Test hours for each cycle.....:	1					—
MST 01: Visual inspection after hot-spot endurance test						—
Test Date (YYYY-MM-DD) .....:	2024-02-22					—
Findings ..... :	☐ Yes ..... ☒ No					P
Nature and position of findings – comments or attach photos	No visual defects					—
MST 02: Maximum power determination after hot-spot endurance test						—
Test Date [YYYY-MM-DD].....:	2024-02-22					—
Module temperature [°C].....:	Corrected to 25.0					—
Irradiance [W/m²].....:	Corrected to 1000					—
Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]		FF [%]
13.33	56.28	12.72	47.90	609.3		81.22
MST 16: Insulation test after hot-spot endurance test						—
Test Date (YYYY-MM-DD) .....:	2024-02-22					—
Test Voltage applied [V] .....:	2 minutes of 1500 and 1 minute of 8000					—
Measured	Required	Dielectric breakdown				Result
MΩ	MΩ	Yes (description)			No	
>1000	>14.3	No breakdown			×	P
MST 17: Wet leakage current test after hot-spot endurance test						—
Test Date (YYYY-MM-DD) .....:	2024-02-22					—
Test Voltage applied [V] .....:	2 minutes of 1500					—
Solution resistivity [Ω cm) .....:	2308					—
Solution temperature [°C] .....:	22.1					—

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

Measured [MΩ]	Required [MΩ]	Result
>1000	>14.3	P

Supplementary information:

(1) Position of solar cells (front side view):

	1	2	3	4	…	13		14	…	23	24	25	26
A							Junction box						
B													
C													
D													
E													
F													

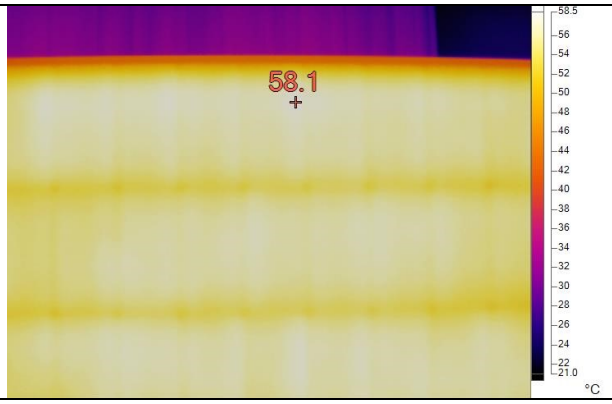
(2) The irradiance during each cycle (G_{BSI}) is conducted in compliance with IEC 61215-2:2021 / EN IEC 61215-2:2021.

module size: 2.80 m^2

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

Sample #	1-M13				—
Table 32: MST 21 - Temperature Test					P
Reference solar irradiance (W/m²) .....:	1000 W/m²				—
Reference ambient temperature (°C) .....:	40				—
Module at MPP					
Measuring location:	Component temperature T_{OBS} (°C)	Normalized temperature T_{CON} (°C)	Component temperature limit (°C)		—
PV module frontsheet above the centre cell	73.5	73.1	Glass		—
PV module backsheet below the centre cell	72.4	72.0	Glass		—
Terminal enclosure interior surface	70.1	69.7	110		P
Field wiring terminals	N/A	N/A	N/A		N/A
Insulation of the field wiring leads	68.6	68.2	110		P
External connector bodies	67.9	67.5	110		P
Bypass diode bodies	N/A	N/A	N/A		N/A
MST 01: Visual inspection after Temperature Test					—
Test Date (YYYY-MM-DD) .....:	2023-12-29				—
Findings ..... :	☐ Yes ..... ☒ No				P
Nature and position of findings – comments or attach photos	No visual defects				—
MST 16: Insulation test after Temperature Test					—
Test Date (YYYY-MM-DD) .....:	2023-12-29				—
Test Voltage applied (V, DC) .....:	2 minutes of 1500 and 1 minute of 8000				—
Measured	Required	Dielectric breakdown			Result
MΩ	MΩ	Yes (description)		No	
>1000	>14.3	No breakdown		×	P
MST 17: Wet leakage current test after Temperature Test					—
Test Date (YYYY-MM-DD) .....:	2023-12-29				—
Test Voltage applied (V, dc) .....:	2 minutes of 1500				—
Solution resistivity (Ω cm) .....:	2367				—
Solution temperature (°C) .....:	21.3				—
Measured (MΩ)	Required (MΩ)				Result
>1000	>14.3				P
Supplementary information: module size 2.80 m²					

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

Sample #	1-M13		—
Table 34: MST 26 - Reverse current overload test			P
Test Date (YYYY-MM-DD)..... :	2023-12-29		—
Module over-current protection rating (A) .....:	30		—
Test current (A) .....:	40.5		—
Range of applied voltage (V).....:	63.24-57.01		—
Test duration .....:	2 hours		—
Mounting method .....:	Front / rear surface mounted to the test structure		—
Max. measured temperature (°C) <170°C .....:	58.1		P
Hottest point(s).....:			—
Observations			Result
☒ No flaming of the module			P
☒ No flaming or charring of the cheesecloth			
☒ No flaming of the tissue paper			
☒ MST 17 requirements fulfilled (see appended Table MST17)			
Supplementary information: N/A			
MST 01: Visual inspection after Reverse current overload test			—
Test Date (YYYY-MM-DD) .....:	2023-12-29		—
Findings ..... :	☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos	No visual defects		—
MST 16: Insulation test after Reverse current overload test			—
Test Date (YYYY-MM-DD) .....:	2023-12-29		—
Test Voltage applied (V, DC) .....:	2 minutes of 1500 and 1 minute of 8000		—

Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	

IEC 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
>1000	>14.3	No breakdown	×	P
MST 17: Wet leakage current test after Reverse current overload test				—
Test Date (YYYY-MM-DD) .....:		2023-12-29		—
Test Voltage applied (V, dc) .....:		2 minutes of 1500		—
Solution resistivity (Ω cm) .....:		2348		—
Solution temperature (°C) .....:		21.5		—
Measured (MΩ)		Required (MΩ)		Result
>1000		>14.3		P
Supplementary information: module size: 2.80 m^2				

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

SEQUENCE G1				
Sample #:	1-M14-1			—
Table 35.2: MST 14 - Impulse voltage test				P
Test Date (YYYY-MM-DD) .....:	2024-01-03			—
Maximum system voltage (V).....:	*1500*			—
Required Impulse voltage (V) .....:	*18720*			—
Measured Impulse voltage (V).....:	*18720*			—
T_1 (µs).....:	*1.2*			—
T_2 (µs).....:	*50*			—
Thickness of conductive foil (mm) .....:	0.05			—
Results				
☒ No evidence of dielectric breakdown or surface tracking observed ☒ No evidence of major visual defects (see table MST 01 below)				P
MST 01: Visual inspection after Impulse voltage test				—
Test Date (YYYY-MM-DD).....:	2024-01-03			—
Findings ..... :	☐ Yes ..... ☒ No			P
Nature and position of findings – comments or attach photos	No visual defects			—
MST 16: Insulation test after Impulse voltage test				—
Test Date (YYYY-MM-DD) .....:	2024-01-03			—
Test Voltage applied (V, DC) .....:	2 minutes of 1500 and 1 minute of 8000			—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>14.3	No breakdown	×	P
Supplementary information: module size: 2.80 m^2				

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

SEQUENCE G2		
Sample #:	1-M14-1 for distance measurement of (a)~(d), 1-M13 for distance measurement of (e)	—
Table 35.1: MST 57 - Evaluation of insulation coordination		P
Test Date (YYYY-MM-DD)	2023-12-27	—
Measurement uncertainty	2.44%	—
Minimum distance between [mm]:		—
(a1) Cell to inner edge of A-side frame (mean value, only for framed module) .....:	N/A	—
(a2) Inner edge of A-side frames of the two long sides..... :	N/A	—
(a3) Cell to laminate edge .....:	11.98mm	P
(b1) String connector to inner edge of A-side frame (mean value, only for framed module) .....:	N/A	—
(b2) inner edge of A-side frames of the two short sides.....:	N/A	—
(b3) String connector to laminate edge.....:	10.96mm	P
(c) String space .....:	1.04mm	P
(d) String connector to string connector.....:	6.02mm	P
(e) String connector inside the junction box to the outer surface of the junction box .....:	15.98mm	P
Supplementary information: lamination diagram is listed in Annex 1.		

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

OTHER TESTS		
Sample #:	1-fire 1, 1-fire 2, 1-fire 3	—
Table 36: MST 23 - Fire test		P
Test Date (YYYY-MM-DD) ..... :	2024-01-16	—
Module fire resistance class (A, B, C) ..... :	C	—
No. of modules provided to create the test assembly ..... :	2 for spread of flame test 1 for burning brand test	—
☒ The module complies with the requirements for the fire resistance class		P
Supplementary information: Fire test was substract to Zhe jiang Gather		

OTHER TESTS		
Sample #:	1-fire 1, 1-fire 2, 1-fire 3	—
Table 36: MST 23 - Fire test		P
Test Date (YYYY-MM-DD) ..... :	2024-01-11	—
Module fire resistance class (A, B, C) ..... :	A	—
No. of modules provided to create the test assembly ..... :	2 for spread of flame test 1 for burning brand test	—
☒ The module complies with the requirements for the fire resistance class		P
Supplementary information: Fire test was substract to CPTC		

Sample #:	1-M16	—
Table 37: MST 24 - Ignitability test		P
Test Date (YYYY-MM-DD) ..... :	2024-01-25	—
Flame application point ..... :	-	—
Surface exposure ..... :	☒ Yes ☐ No	—
Backsheet foil exposure ..... :	☐ Yes ☒ No	—
Frame adhesive exposure ..... :	☒ Yes ☐ No	—
Edge exposure ..... :	☐ Yes ☒ No	—
Junction box adhesive exposure ..... :	☒ Yes ☐ No	—
Type label exposure ..... :	☐ Yes ☒ No	—
Backrail adhesive exposure ..... :	☐ Yes ☒ No	—
Ignition occurs ..... :	☐ Yes ☒ No	—

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
Flame spread less as 150 mm		☒ Yes ☐ No	P
Length of destroyed area.....:		N/A	P
Supplementary information: N/A			

Sample #:	1-M15		—
Table 38: MST 32 - Module breakage test			P
Test Date (YYYY-MM-DD).....:		2023-12-29	—
Weight of impactor (kg).....:		45	—
Thickness of sample (mm) .....:		35	—
Mounting technique used .....:		Clamps mounting (4 points)	—
Module breakage .....:	☒	No breakage	—
	☒	No separation from frame or mounting structure	—
	☐	Breakage occurred, no shear or opening large enough for a 76 mm diameter sphere to pass freely developed	—
	☐	Breakage occurred, no particles larger than 65 cm² ejected from sample	—
	☐	Continuity of equipotential bonding provided, see table 10.11	—
Nature and position of findings – comments or attach photos			Result
No visual defects			P
Supplementary information: N/A			

Table 41: MST 12 - Cut susceptibility test	N/A

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

Table 42: MST 03 - Maximum power determination final						—
Test Date (YYYY-MM-DD) .....:		2024-03-21 for 1-M2-1#;2024-01-18 for 1-M3#; 2024-02-22 for 1-M4#;2024-02-26 for 1-M6#; 2024-02-07 for 1-M8#;2024-02-26 for 1-M11#; 2024-01-03 for 1-M13#;				—
Module temperature (°C) .....:		25				—
Irradiance (W/m²) .....:		1000				—
Sample #	Isc (A)	Voc (V)	Imp (A)	Vmp (V)	Pmp (W)	FF (%)
1-M2-1	13.07	56.02	12.43	47.93	595.8	81.37
1-M3	13.20	56.25	12.57	47.80	600.9	80.93
1-M4	13.20	56.17	12.54	47.79	599.3	80.83
1-M6	13.21	56.19	12.55	47.80	599.9	80.82
1-M8	13.34	56.35	12.70	48.17	611.8	81.39
1-M11	13.32	56.29	12.72	47.88	609.0	81.22
1-M13	13.45	56.56	12.83	48.06	616.6	81.05
Supplementary information: N/A						

Table 43: MST 01 - Final Visual inspection			
Test Date (YYYY-MM-DD) .....:		2024-03-21 for 1-M2-1#;2024-01-18 for 1-M3#; 2024-02-22 for 1-M4#;2024-02-26 for 1-M6#; 2024-02-07 for 1-M8#;2024-02-26 for 1-M10,1-M11#; 2024-01-03 for 1-M13#;	—
Sample # 1-M2-1	Findings .....:	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M3	Findings .....:	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M4	Findings .....:	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M6	Findings .....:	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M8	Findings .....:	☐ Yes ..... ☒ No	P
	Nature and position of findings –	No visual defects	—

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
	comments or attach photos		
Sample # 1-M10	Findings .....:	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M11	Findings .....:	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 1-M13	Findings .....:	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Supplementary information: N/A			

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

Table 44: MST 05 - Durability of markings							—
Test Date (YYYY-MM-DD) .....:			2024-03-21 for 1-M2-1#;2024-01-18 for 1-M3#; 2024-02-22 for 1-M4#;2024-02-26 for 1-M6#; 2024-02-07 for 1-M8#;2024-02-26 for 1-M10,1-M11#; 2024-01-03 for 1-M13#;				—
Sample #	Markings legible		Not easily removable		No curling		Result
1-M2-1	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes	☐ No	P
1-M3	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes	☐ No	P
1-M4	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes	☐ No	P
1-M6	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes	☐ No	P
1-M8	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes	☐ No	P
1-M10	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes	☐ No	P
1-M11	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes	☐ No	P
1-M13	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes	☐ No	P
Supplementary information: N/A							

Table 45: MST 06 - Sharp edge test			—
Test Date (YYYY-MM-DD) .....:		2024-03-21 for 1-M2-1#;2024-01-18 for 1-M3#; 2024-02-22 for 1-M4#;2024-02-26 for 1-M6#; 2024-02-07 for 1-M8#;2024-02-26 for 1-M10,1-M11#; 2024-01-03 for 1-M13#;	—
Sample #	Accessible surfaces free of sharp edges, burrs etc.		Result
1-M2-1	☒ Yes	☐ No	P
1-M3	☒ Yes	☐ No	P
1-M4	☒ Yes	☐ No	P
1-M6	☒ Yes	☐ No	P
1-M8	☒ Yes	☐ No	P
1-M10	☒ Yes	☐ No	P
1-M11	☒ Yes	☐ No	P
1-M13	☒ Yes	☐ No	P
Supplementary information: N/A			

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
Table 46: MST 07 - Bypass diode functionality test			—
Test Date (YYYY-MM-DD) .....:		2024-03-21 for 1-M2-1#;2024-01-18 for 1-M3#; 2024-02-22 for 1-M4#;2024-02-26 for 1-M6#; 2024-02-07 for 1-M8#;2024-02-26 for 1-M10,1-M11#; 2024-01-03 for 1-M13#;	—
☐ **Method A**			—
Ambient temperature [°C] .....:		N/A	—
Current flow applied [A] .....:		N/A	—

Sample #	VFM	VFMrated	VFM = (N × VFMrated) ± 10 %	Result
N/A	N/A	N/A	☐ Yes ☐ No	N/A

☒ **Method B** —

Sample #	IV curve after shading			Result
	Diode 1 working properly	Diode 2 working properly	Diode 3 working properly	
1-M2-1	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
1-M3	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
1-M4	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
1-M6	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
1-M8	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
1-M10	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
1-M11	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P
1-M13	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	P

Supplementary information: for bifacial modules tested according to Method A the value for short circuit current shall be Isc-BSI.

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

Module type: SS-BG680-66MDH-G12(T) (BOM2)

Table 6: MST 01 - Initial Visual inspection			P
Test Date (YYYY-MM-DD) ..... :		2023-12-21	—
Sample # 2-M4	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 2-M6	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 2-M8	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 2-M10	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 2-M12	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 2-M13	Findings ..... :	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Supplementary information: for creepage distances and clearances see Table 1, Table 2, Table 3 and Table 4			

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

Table 7: MST 02 - Performance at STC and BNPI							
Sample	2-M10						—
Test Date [YYYY-MM-DD].....	2023-12-27						—
Irradiance (W/m2)	1000 or G_{BNPI}						—
Module temperature (°C)	25						—
Test method.....	☒ Simulator ☐ Natural sunlight						—
Rated Isc including manufacturing tolerances	18.18A ± 3%						—
Rated Voc including manufacturing tolerances...	47.50V ± 3%						—
	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]	Result
Front	18.20	47.93	17.18	40.17	690.2	79.11	—
Rear	14.12	47.57	12.74	41.36	526.9	78.45	—
BNPI	19.97	48.16	18.64	40.85	761.5	79.17	—
Supplementary information: N/A							

Table 8: MST 03 - Maximum power determination							
Test Date [YYYY-MM-DD].....	2023-12-27						—
Irradiance (W/m2)	1000						—
Module temperature (°C)	25						—
Test method.....	☒ Simulator ☐ Natural sunlight						—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]	Result
2-M4	18.20	47.93	17.16	40.22	690.1	79.12	—
2-M6	18.22	47.94	17.18	40.19	690.5	79.05	—
2-M8	18.20	47.87	17.20	40.09	689.6	79.15	—
2-M12	18.19	47.88	17.20	40.08	689.3	79.15	—
2-M13	18.27	48.05	17.21	40.23	692.4	78.87	—
Supplementary information: N/A							

Table 9: MST 16 - Initial Insulation test					
Test Date (YYYY-MM-DD).....	2023-12-27				—
Test Voltage applied (V, DC)	2 minutes of 1500 and 1 minute of 8000				—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
2-M4	>1000	>12.9	No breakdown	×	P
2-M6	>1000	>12.9	No breakdown	×	P

IEC 61730-2					
Clause	Requirement + Test		Result - Remark		Verdict
2-M8	>1000	>12.9	No breakdown	×	P
2-M10	>1000	>12.9	No breakdown	×	P
2-M12	>1000	>12.9	No breakdown	×	P
2-M13	>1000	>12.9	No breakdown	×	P
Supplementary information: Size of module 3.11 [m²]					

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

Table 10: MST 17 - Initial Wet leakage current test			
Test Date (YYYY-MM-DD)		2023-12-27	—
Test Voltage applied (V, dc)		2 minutes of 1500	—
Solution resistivity (Ω cm)		2385	—
Solution temperature (°C)		21.8	—
Sample #	Measured (MΩ)	Required (MΩ)	Result
2-M4	>1000	>12.9	P
2-M6	>1000	>12.9	P
2-M8	>1000	>12.9	P
2-M10	>1000	>12.9	P
2-M12	>1000	>12.9	P
2-M13	>1000	>12.9	P
Supplementary information: Size of module 3.11 [m²]			

Table 11: MST 13 - Continuity test of equipotential bonding				
Test Date Initial examination (YYYY-MM-DD)		2023-12-27		—
Test Date Final examination (YYYY-MM-DD)		2024-02-07 for 2-M4#;2024-02-28 for 2-M6#; 2024-02-07 for 2-M8#;		—
Maximum over-current protection rating (A)		35		—
Current applied (A)		87.5		—
Location of designated grounding point.....		The ground hole of one longer side		—
Location of second contacting point		A: The center of another longer side B: Adjacent shorter side with greatest distance from the grounding point C:The center of the other shorter side		—
Sample #	Position in test sequence:		Voltage [V]	Resistance [Ω]
2-M4	Initial examination		A: 0.075 B: 0.082 C: 0.084	A: 0.001 B: 0.001 C: 0.001	P
	Preconditioning: MST 54, MST 51, MST 52, MST 12				—
	Final examination		A: 0.181 B: 0.259 C: 0.091	A: 0.002 B: 0.003 C: 0.001	P

IEC 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
2-M6	Initial examination	A: 0.087 B: 0.182 C: 0.090	A: 0.001 B: 0.002 C: 0.001	P
	Preconditioning: MST 53, MST 34, MST 12			—
	Final examination	A: 0.358 B: 0.354 C: 0.190	A: 0.004 B: 0.004 C: 0.002	P
2-M8	Initial examination	A: 0.078 B: 0.085 C: 0.083	A: 0.001 B: 0.001 C: 0.001	P
	Preconditioning: MST 51, MST 12			—
	Final examination	A: 0.174 B: 0.076 C: 0.085	A: 0.002 B: 0.001 C: 0.001	P
Supplementary information: N/A				

Table 12: MST 11 - Accessibility test			
Test Date **Initial** examination (YYYY-MM-DD)....	2023-12-27		—
Test Date **Final** examination (YYYY-MM-DD).....	2024-02-07 for 2-M4#;2024-02-28 for 2-M6#; 2024-02-07 for 2-M8#;		—
Sample #	Position in test sequence:		
2-M4	Initial examination, access?	☐ Yes ☒ No	P
	Preconditioning: MST 54, MST 51, MST 52, MST 12, MST 13		—
	Final examination, access?	☐ Yes ☒ No	P
2-M6	Initial examination, access?	☐ Yes ☒ No	P
	Preconditioning: MST 53, MST 34, MST 12, MST 13		—
	Final examination, access?	☐ Yes ☒ No	P
2-M8	Initial examination, access?	☐ Yes ☒ No	P
	Preconditioning: MST 51, MST 12, MST 13		—
	Final examination, access?	☐ Yes ☒ No	P
Supplementary information: N/A			

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

SEQUENCE C		
Sample #	2-M4	—
Table 24: MST 54 - UV test		NA

Table 25: MST 51 - Thermal cycling test				P
Test Date (YYYY-MM-DD) start/end .....:		2024-01-09/2024-01-18		—
Total cycles (50) .....:		50		—
Applied current (A) .....:		22.54 during the heat up cycle from 40 °C to 80 °C 0.05 during other stages		—
Limiting voltage (V) .....:		51.82		—
Open circuits .....:		☐ Yes ☒ No		—
MST 01: Visual inspection after Thermal cycling test				—
Test Date (YYYY-MM-DD) .....:		2024-01-18		—
Findings ..... :		☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after Thermal cycling test				—
Test Date (YYYY-MM-DD) .....:		2024-01-18		—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>12.9	No breakdown	×	P
Supplementary information: This test is conducted in compliance with IEC 61215-2:2021 / EN IEC 61215-2:2021. A single 5N weight has been attached to the junction box. for bifacial modules, shall be equal to the peak power current at elevated irradiance BSI. module size: 3.11 m^2				

Table 26: MST 52 - Humidity freeze test		
Test Date (YYYY-MM-DD) start/end .....:	2024-01-22/2024-02-01	—
Total cycles (10) .....:	10	—
Open circuits .....:	☐ Yes ☒ No	P
MST 01: Visual inspection after Humidity freeze test		—
Test Date (YYYY-MM-DD) .....:	2024-02-01	—
Findings ..... :	☐ Yes ..... ☒ No	P

IEC 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after Humidity freeze test				—
Test Date (YYYY-MM-DD) .....:		2024-02-01		—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>12.9	No breakdown	×	P
MST 17: Wet leakage current test after humidity freeze test				—
Test Date (YYYY-MM-DD) .....:		2024-02-01		—
Test Voltage applied (V, dc) .....:		2 minutes of 1500		—
Solution resistivity (Ω cm) .....:		2257		—
Solution temperature (°C) .....:		21.8		—
Measured (MΩ)		Required (MΩ)		Result
>1000		>12.9		P
Supplementary information: module size: 3.11 m^2				

Table 27: MST 42 - Robustness of terminations test				P
Test Date (YYYY-MM-DD) .....:		2024-02-02		—
MQT 14.1: Retention of junction box on mounting surface				
Supplementary information: N/A				
MST 01: Visual inspection after retention of junction box on mounting surface				
Test Date (YYYY-MM-DD) .....:		2024-02-02		—
Findings ..... :		☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after retention of junction box on mounting surface				—
Test Date (YYYY-MM-DD) .....:		2024-02-02		—
Test Voltage applied (V, DC) .....:		2 minutes of 2025 and 1 minute of 10800		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>12.9	No breakdown	×	P
MST 17: Wet leakage current test after retention of junction box on mounting surface				
Test Date (YYYY-MM-DD) .....:		2024-02-02		—

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
Test Voltage applied [V] .....:		2 minutes of 2025	—
Solution resistivity (Ω cm) .....:		2350	—
Solution temperature (°C) .....:		22.5	—
Measured [MΩ]		Required [MΩ]	Result
>1000		>12.9	P
Supplementary information: 1.35Utest is applied for MST 15 Insulation test and MST 17 Wet leakage current test after MQT14.1 Retention of junction box module size: 3.11 m^2			

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

SEQUENCE D				
Sample #	2-M6			—
Table 28: MST 53 - Damp heat test				P
Test Date (YYYY-MM-DD) start/end .....:		2024-01-05/2024-02-18		—
Total hours (1000) .....:		1000		—
MST 01: Visual inspection after damp heat test				—
Test Date (YYYY-MM-DD) .....:		2024-02-18		—
Findings ..... :		☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after damp heat test				—
Test Date (YYYY-MM-DD) .....:		2024-02-18		—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>12.9	No breakdown	×	P
MST 17: Wet leakage current test after damp heat test				—
Test Date (YYYY-MM-DD) .....:		2024-02-18		—
Test Voltage applied (V, dc) .....:		2 minutes of 1500		—
Solution resistivity (Ω cm) .....:		2405		—
Solution temperature (°C) .....:		22.3		—
Measured (MΩ)		Required (MΩ)		Result
>1000		>12.9		P
Supplementary information: A single 5N weight has been attached to the junction box. module size: 3.11 m^2				

Table 27: MST 42 - Robustness of terminations test		
Test Date (YYYY-MM-DD) .....:	2024-02-18	—
MQT 14.1: Retention of junction box on mounting surface		
Supplementary information: N/A		
MST 01: Visual inspection after retention of junction box on mounting surface		
Test Date (YYYY-MM-DD) .....:	2024-02-18	—
Findings ..... :	☐ Yes ..... ☒ No	P
Nature and position of findings – comments or	No visual defects	—

IEC 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
attach photos				
MST 16: Insulation test after retention of junction box on mounting surface				—
Test Date (YYYY-MM-DD) .....:		2024-02-18		—
Test Voltage applied (V, DC) .....:		2 minutes of 2025 and 1 minute of 10800		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>12.9	No breakdown	×	P
MST 17: Wet leakage current test after retention of junction box on mounting surface				
Test Date (YYYY-MM-DD) .....:		2024-02-18		—
Test Voltage applied [V] .....:		2 minutes of 2025		—
Solution resistivity (Ω cm) .....:		2398		—
Solution temperature (°C).....:		22.1		—
Measured [MΩ]		Required [MΩ]		Result
>1000		>12.9		P
Supplementary information: 1.35Utest is applied for MST 15 Insulation test and MST 17 Wet leakage current test after MQT14.1 Retention of junction box module size: 3.11 m^2				

Table 29: MST 34 - Static mechanical load test			P
Test Date (YYYY-MM-DD) .....:	2024-02-20		—
Mounting method .....:	Clamps mounting (4 points)		—
Design Load [Pa] / Safety factor γm.....:	front side 3600/1.5 back side 1600/1.5		—
Load applied to.....:	front side	back side	—
Mechanical load [Pa].....:	5400	2400	—
First cycle duration time [h].....:	1h	1h	—
Intermittent open-circuit (yes/no).....:	No	No	P
Second cycle duration time [h] .....:	1h	1h	—
Intermittent open-circuit (yes/no).....:	No	No	P
Third cycle duration time [h].....:	1h	1h	—
Intermittent open-circuit (yes/no).....:	No	No	P
Supplementary information: N/A			
MST 01: Visual inspection after Static mechanical load test			—
Test Date (YYYY-MM-DD) .....:	2024-02-20		—

IEC 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
Findings ..... :		☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after Static mechanical load test				—
Test Date (YYYY-MM-DD) .....:		2024-02-20		—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>12.9	No breakdown	×	P
MST 17: Wet leakage current test after Static mechanical load test				—
Test Date (YYYY-MM-DD) .....:		2024-02-20		—
Test Voltage applied (V, dc) ..... :		2 minutes of 1500		—
Solution resistivity (Ω cm) .....:		2362		—
Solution temperature (°C) ..... :		22.4		—
Measured (MΩ)		Required (MΩ)		Result
>1000		>12.9		P
Supplementary information: module size: 3.11 m^2				

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

SEQUENCE E				
Sample #	2-M8			—
Table 30: MST 51 - Thermal cycling test				P
Test Date (YYYY-MM-DD) start/end .....:		2023-12-29/2024-02-04		—
Total cycles (200) .....:		200		—
Applied current (A) .....:		22.54 during the heat up cycle from 40 °C to 80 °C 0.05 during other stages		—
Limiting voltage (V) .....:		53.17		—
Open circuits .....:		☒ Yes ☐ No		P
MST 01: Visual inspection after Thermal cycling test				—
Test Date (YYYY-MM-DD) .....:		2024-02-04		—
Findings ..... :		☒ Yes ..... ☐ No		
Nature and position of findings – comments or attach photos		No visual defects		—
MST 16: Insulation test after Thermal cycling test				—
Test Date (YYYY-MM-DD) .....:		2024-02-04		—
Test Voltage applied (V, DC) .....:		2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
>1000	>12.9	No breakdown	×	P
MST 17: Wet leakage current test after Thermal cycling test				—
Test Date (YYYY-MM-DD) .....:		2024-02-04		—
Test Voltage applied (V, dc) .....:		2 minutes of 1500		—
Solution resistivity (Ω cm) .....:		2393		—
Solution temperature (°C).....:		22.4		—
Measured (MΩ)		Required (MΩ)		Result
>1000		>12.9		P
Supplementary information: This test is conducted in compliance with IEC 61215-2:2021 / EN IEC 61215-2:2021. A single 5N weight has been attached to the junction box. for bifacial modules, shall be equal to the peak power current at elevated irradiance BSI. module size: 3.11 m^2				

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

Sample #	2-M12					—
Table 33: MST 22 - Hot-spot endurance test						P
Test Date (YYYY-MM-DD) start/end .....:	2024-01-05/2024-01-06					—
Cell interconnection circuit.....:	☐ S ☒ SPS ☐ PS					—
Irradiance during each cycle……..…..:	1228					—
Module temperature at thermal equilibrium in each cycle [°C] .....:	63.4/61.5					—
Determination of worst case cell						—
Maximum measured cell temperature in each cycle [°C] .....:	B01:129.8; D15:127.5; E08:130.0: F12:128.1;					—
Shading rate [%] or number of cells shaded.....:	B01:35; D15:30; E08:30: F12:25;					—
Test hours for each cycle.....:	1					—
MST 01: Visual inspection after hot-spot endurance test						—
Test Date (YYYY-MM-DD) .....:	2024-01-06					—
Findings ..... :	☐ Yes ..... ☒ No					P
Nature and position of findings – comments or attach photos	No visual defects					—
MST 02: Maximum power determination after hot-spot endurance test						—
Test Date [YYYY-MM-DD].....:	2024-01-06					—
Module temperature [°C].....:	Corrected to 25.0					—
Irradiance [W/m²].....:	Corrected to 1000					—
Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]		FF [%]
18.11	47.74	17.13	39.94	684.1		79.13
MST 16: Insulation test after hot-spot endurance test						—
Test Date (YYYY-MM-DD) .....:	2024-01-06					—
Test Voltage applied [V] .....:	2 minutes of 1500 and 1 minute of 8000					—
Measured	Required	Dielectric breakdown				Result
MΩ	MΩ	Yes (description)			No	
>1000	>12.9	No breakdown			×	P
MST 17: Wet leakage current test after hot-spot endurance test						—
Test Date (YYYY-MM-DD) .....:	2024-01-06					—
Test Voltage applied [V] .....:	2 minutes of 1500					—
Solution resistivity [Ω cm) .....:	2297					—
Solution temperature [°C] .....:	21.7					—

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

Measured [MΩ]	Required [MΩ]	Result
>1000	>12.9	P

Supplementary information:

(1) Position of solar cells (front side view):

	1	2	3	4	…	11		12	…	19	20	21	22
A							Junction box						
B													
C													
D													
E													
F													

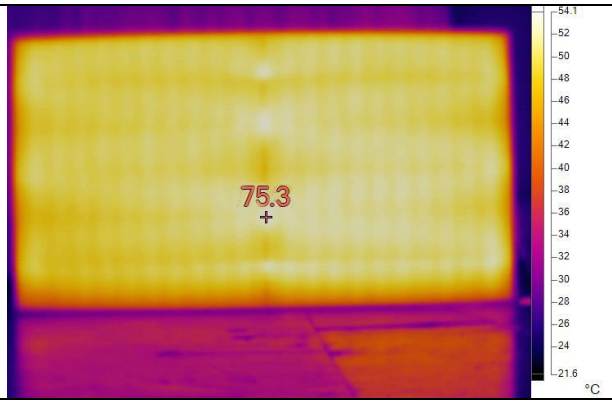
(2) The irradiance during each cycle (G_{BSI}) is conducted in compliance with IEC 61215-2:2021 / EN IEC 61215-2:2021.

module size: 3.11 m^2

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

Sample #	2-M13				—
Table 32: MST 21 - Temperature Test					P
Reference solar irradiance (W/m²) .....:	1000 W/m²				—
Reference ambient temperature (°C) .....:	40				—
Module at MPP					
Measuring location:	Component temperature T_{OBS} (°C)	Normalized temperature T_{CON} (°C)	Component temperature limit (°C)		—
PV module frontsheet above the centre cell	74.5	73.9	Glass		—
PV module backsheet below the centre cell	72.0	71.4	Glass		P
Terminal enclosure interior surface	68.7	68.3	110		P
Field wiring terminals	N/A	N/A	N/A		N/A
Insulation of the field wiring leads	67.3	66.9	110		P
External connector bodies	67.8	67.4	110		P
Bypass diode bodies	N/A	N/A	N/A		N/A
MST 01: Visual inspection after Temperature Test					—
Test Date (YYYY-MM-DD) .....:	2023-12-29				—
Findings ..... :	☐ Yes ..... ☒ No				P
Nature and position of findings – comments or attach photos	No visual defects				—
MST 16: Insulation test after Temperature Test					—
Test Date (YYYY-MM-DD) .....:	2023-12-29				—
Test Voltage applied (V, DC) .....:	2 minutes of 1500 and 1 minute of 8000				—
Measured	Required	Dielectric breakdown			Result
MΩ	MΩ	Yes (description)		No	
>1000	>12.9	No breakdown		×	P
MST 17: Wet leakage current test after Temperature Test					—
Test Date (YYYY-MM-DD) .....:	2023-12-29				—
Test Voltage applied (V, dc) .....:	2 minutes of 1500				—
Solution resistivity (Ω cm) .....:	2285				—
Solution temperature (°C) .....:	21.9				—
Measured (MΩ)	Required (MΩ)				Result
>1000	>12.9				P
Supplementary information: module size 3.11 m²					

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

Sample #	2-M13		—
Table 34: MST 26 - Reverse current overload test			P
Test Date (YYYY-MM-DD)..... :	2023-12-29		—
Module over-current protection rating (A) .....:	35		—
Test current (A) .....:	47.25		—
Range of applied voltage (V).....:	60.24/54.81		—
Test duration .....:	2 hours		—
Mounting method .....:	Front / rear surface mounted to the test structure		—
Max. measured temperature (°C) <170°C .....:	75.3		P
Hottest point(s).....:			—
Observations			Result
☒ No flaming of the module			P
☒ No flaming or charring of the cheesecloth			
☒ No flaming of the tissue paper			
☒ MST 17 requirements fulfilled (see appended Table MST17)			
Supplementary information: N/A			
MST 01: Visual inspection after Reverse current overload test			—
Test Date (YYYY-MM-DD) .....:	2023-12-29		—
Findings ..... :	☐ Yes ..... ☒ No		P
Nature and position of findings – comments or attach photos	No visual defects		—
MST 16: Insulation test after Reverse current overload test			—
Test Date (YYYY-MM-DD) .....:	2023-12-29		—
Test Voltage applied (V, DC) .....:	2 minutes of 1500 and 1 minute of 8000		—
Measured	Required	Dielectric breakdown	Result
MΩ	MΩ	Yes (description) / No	

IEC 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
>1000	>12.9	No breakdown	×	P
MST 17: Wet leakage current test after Reverse current overload test				—
Test Date (YYYY-MM-DD) .....:		2023-12-29		—
Test Voltage applied (V, dc) .....:		2 minutes of 1500		—
Solution resistivity (Ω cm) .....:		2301		—
Solution temperature (°C) .....:		22.0		—
Measured (MΩ)		Required (MΩ)		Result
>1000		>12.9		P
Supplementary information: module size: 3.11 m^2				

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

Table 41: MST 12 - Cut susceptibility test	N/A

Table 42: MST 03 - Maximum power determination final						—
Test Date (YYYY-MM-DD) .....:	2024-02-07 for 2-M4#;2024-02-28 for 2-M6#; 2024-02-07 for 2-M8#;2024-01-07 for 2-M12#; 2024-01-03 for 2-M13#					—
Module temperature (°C) .....:	25					—
Irradiance (W/m²) .....:	1000					—
Sample #	Isc (A)	Voc (V)	Imp (A)	Vmp (V)	Pmp (W)	FF (%)
2-M4	17.90	47.45	16.86	39.74	670.1	78.90
2-M6	17.92	47.40	16.87	39.66	669.0	78.76
2-M8	18.07	47.61	17.08	39.81	680.0	79.04
2-M12	18.10	47.75	17.13	39.92	683.9	79.13
2-M13	18.23	47.95	17.18	40.14	689.6	78.89
Supplementary information: N/A						

Table 43: MST 01 - Final Visual inspection			—
Test Date (YYYY-MM-DD) .....:		2024-02-07 for 2-M4#;2024-02-28 for 2-M6#,2-M10#; 2024-02-07 for 2-M8#;2024-01-07 for 2-M12#; 2024-01-03 for 2-M13#	—
Sample # 2-M4	Findings .....:	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 2-M6	Findings .....:	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 2-M8	Findings .....:	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 2-M10	Findings .....:	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Sample # 2-M12	Findings .....:	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
Sample # 2-M13	Findings .....:	☐ Yes ..... ☒ No	P
	Nature and position of findings – comments or attach photos	No visual defects	—
Supplementary information: N/A			

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

Table 44: MST 05 - Durability of markings							—
Test Date (YYYY-MM-DD) .....:			2024-02-07 for 2-M4#;2024-02-28 for 2-M6#,2-M10#; 2024-02-07 for 2-M8#;2024-01-07 for 2-M12#; 2024-01-03 for 2-M13#				—
Sample #	Markings legible		Not easily removable		No curling		Result
2-M4	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes	☐ No	P
2-M6	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes	☐ No	P
2-M8	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes	☐ No	P
2-M10	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes	☐ No	P
2-M12	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes	☐ No	P
2-M13	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes	☐ No	P
Supplementary information: N/A							

Table 45: MST 06 - Sharp edge test				—
Test Date (YYYY-MM-DD) .....:		2024-02-07 for 2-M4#;2024-02-28 for 2-M6#,2-M10#; 2024-02-07 for 2-M8#;2024-01-07 for 2-M12#; 2024-01-03 for 2-M13#		—
Sample #	Accessible surfaces free of sharp edges, burrs etc.			Result
2-M4	☒ Yes	☐ No		P
2-M6	☒ Yes	☐ No		P
2-M8	☒ Yes	☐ No		P
2-M10	☒ Yes	☐ No		P
2-M12	☒ Yes	☐ No		P
2-M13	☒ Yes	☐ No		P
Supplementary information: N/A				

Table 46: MST 07 - Bypass diode functionality test		—
Test Date (YYYY-MM-DD) .....:	2024-02-07 for 2-M4#;2024-02-28 for 2-M6#,2-M10#; 2024-02-07 for 2-M8#;2024-01-07 for 2-M12#; 2024-01-03 for 2-M13#	—
☐ **Method A**		—
Ambient temperature [°C] .....:	N/A	—

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

Current flow applied [A] .....:	N/A			—
Sample #	VFM	VFMrated	VFM = (N × VFMrated) ± 10 %	Result
N/A	N/A	N/A	☐ Yes ☐ No	N/A

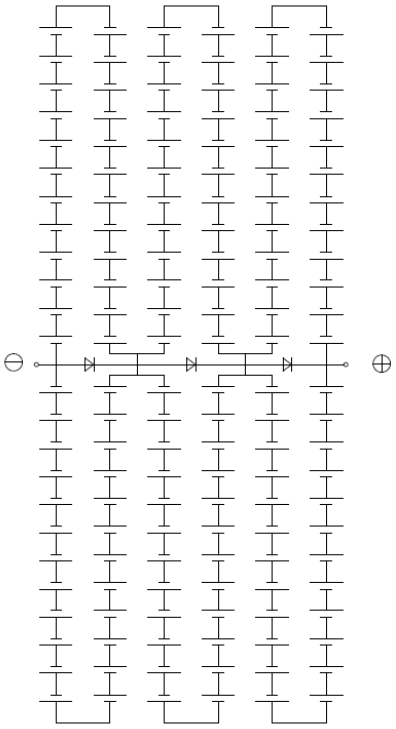
☒ **Method B**						—
Sample #	IV curve after shading					Result
	Diode 1 working properly		Diode 2 working properly		Diode 3 working properly	
2-M4	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes ☐ No	P
2-M6	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes ☐ No	P
2-M8	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes ☐ No	P
2-M10	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes ☐ No	P
2-M12	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes ☐ No	P
2-M13	☒ Yes	☐ No	☒ Yes	☐ No	☒ Yes ☐ No	P
Supplementary information: for bifacial modules tested according to Method A the value for short circuit current shall be Isc-BSI.						

Table 47: MST 33a - Test for general screw connections			**—**
Test Date (YYYY-MM-DD) ..... :	N/A		—
Sample #	Thread diameter [mm]	Torque [Nm]	Result
N/A	N/A	N/A	N/A
Supplementary information: N/A			

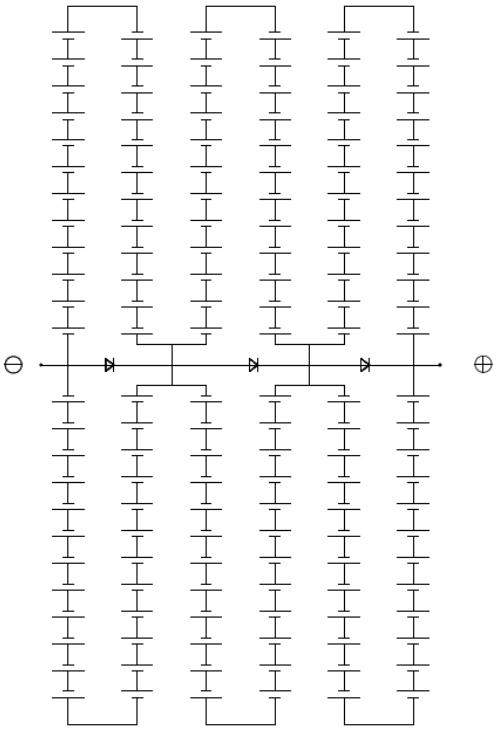
Table 48: MST 33b - Test for locking screws			**—**
Test Date (YYYY-MM-DD) ..... :	N/A		—
Sample #	Thread diameter [mm]	Torque [Nm]	Result
N/A	N/A	N/A	N/A
Supplementary information: N/A			

Sample #	N/A	N/A
Table 49: MST 04 - Insulation thickness test		**N/A**

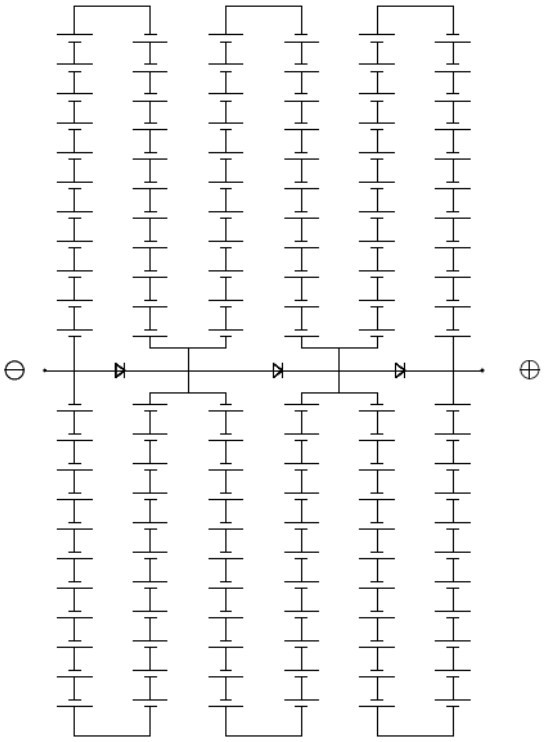
Annex 1: Constructional Details
Circuit diagram



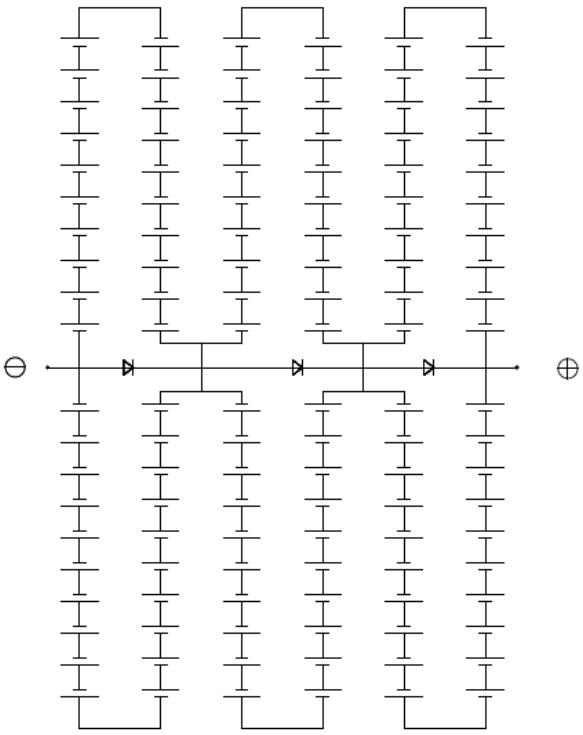
Module type: SS-BGxxx-78MDH(T)



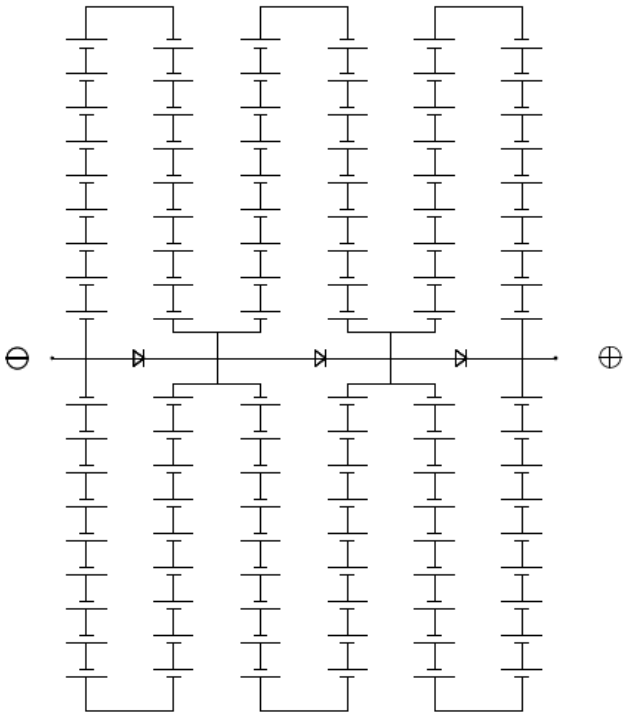
Module type: SS-BGxxx-72MDH(T)



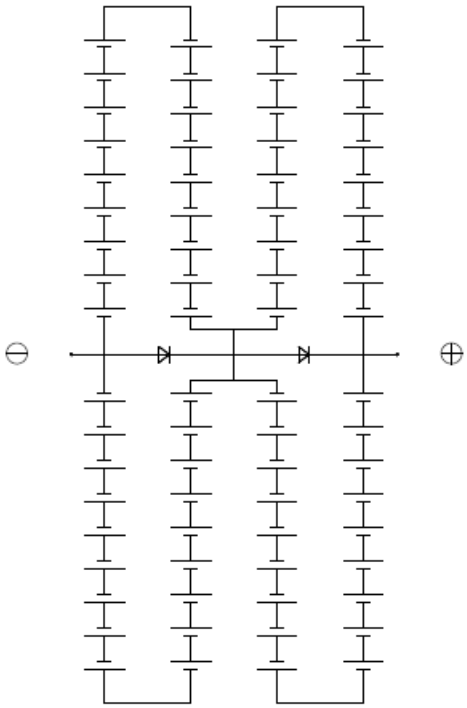
Module type: SS-BGxxx-66MDH(T)



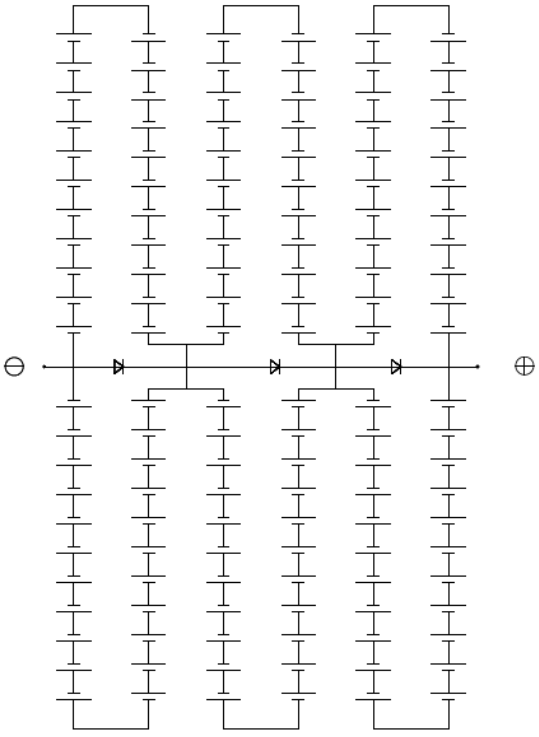
Module type: SS-BGxxx-60MDH(T)



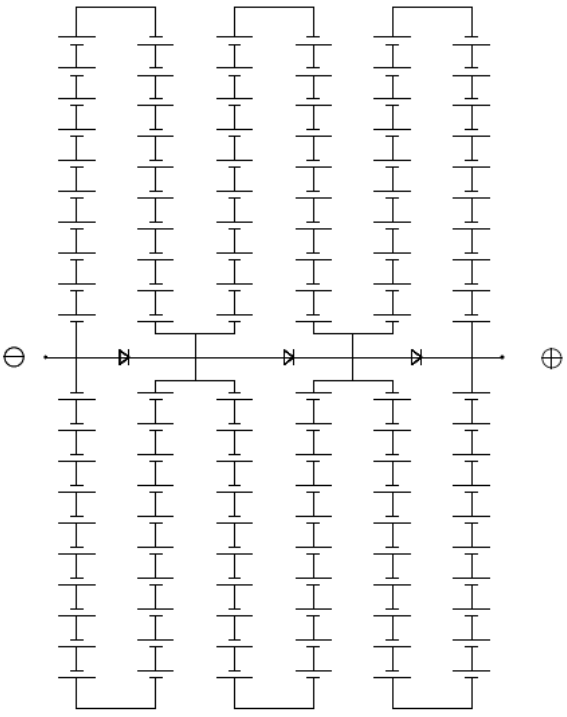
Module type: SS-BGxxx-54MDH(T)



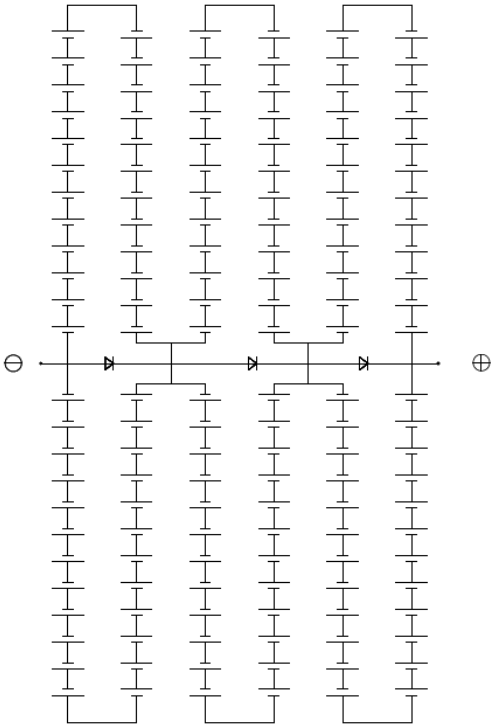
Module type: SS-BGxxx-36MDH(T)



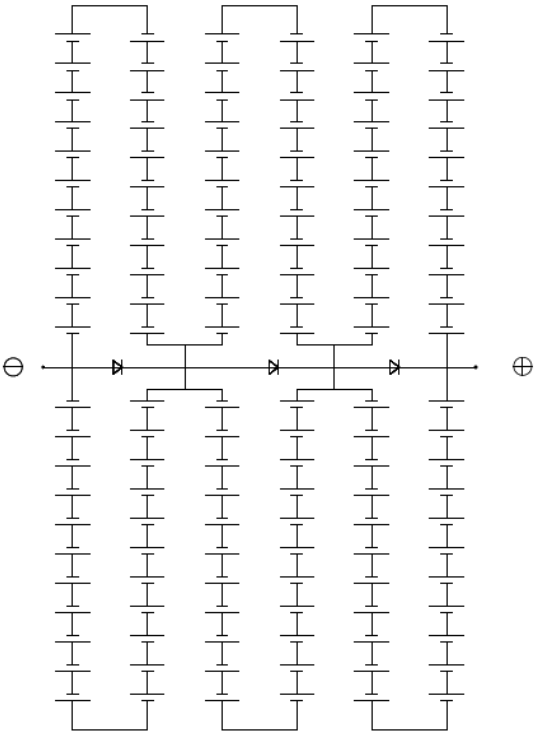
Module type: SS-BGxxx-66MDH-G12(T)



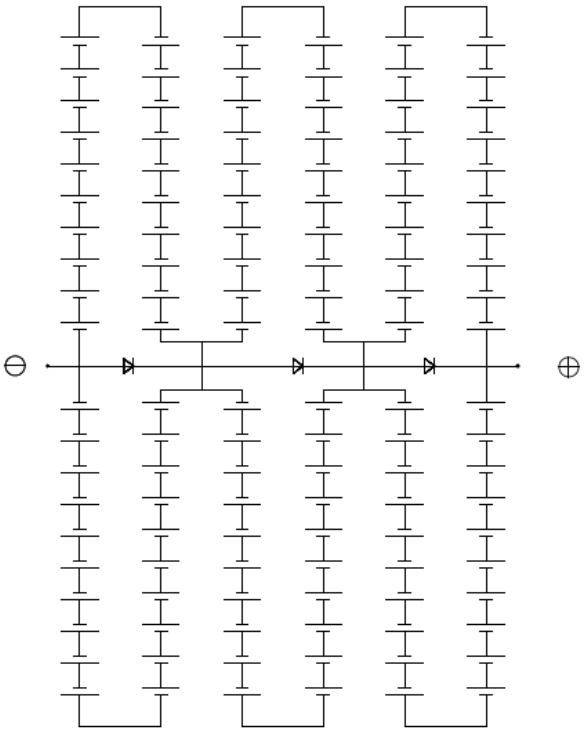
Module type: SS-BGxxx-60MDH-G12(T)



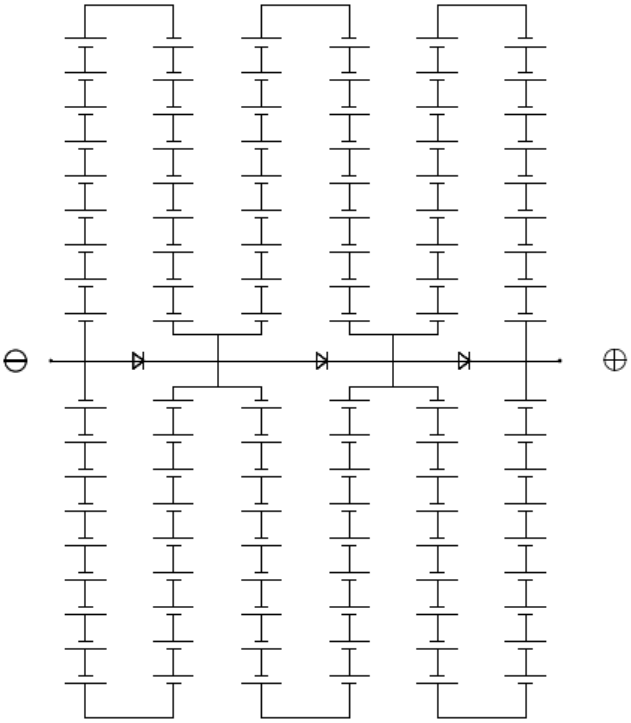
Module type: SS-BGxxx-72MDH-G10(T)



Module type: SS-BGxxx-66MDH-G10(T)

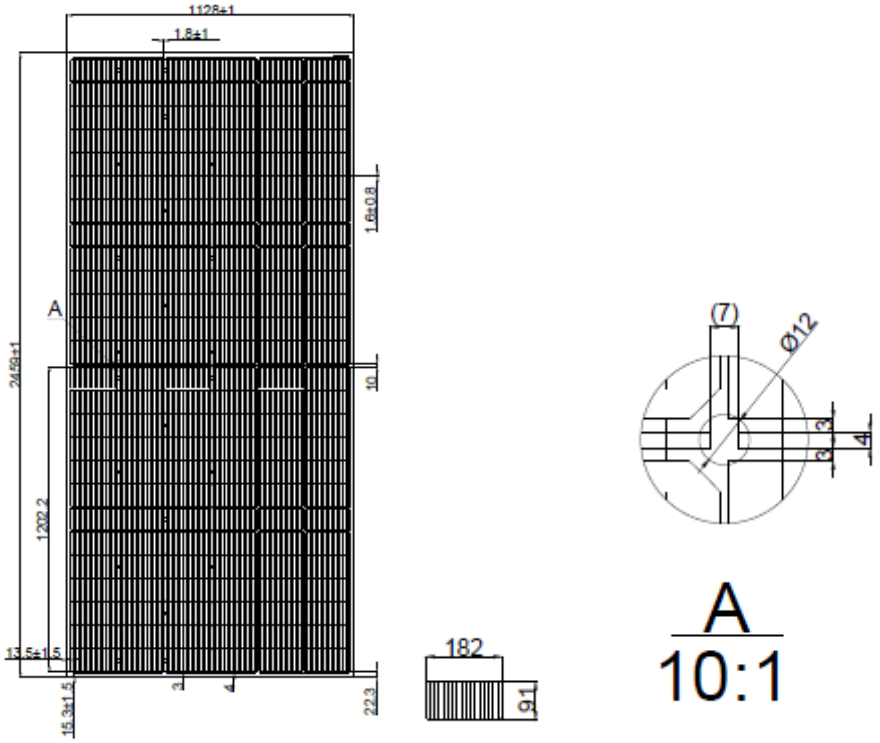


Module type: SS-BGxxx-60MDH-G10(T)

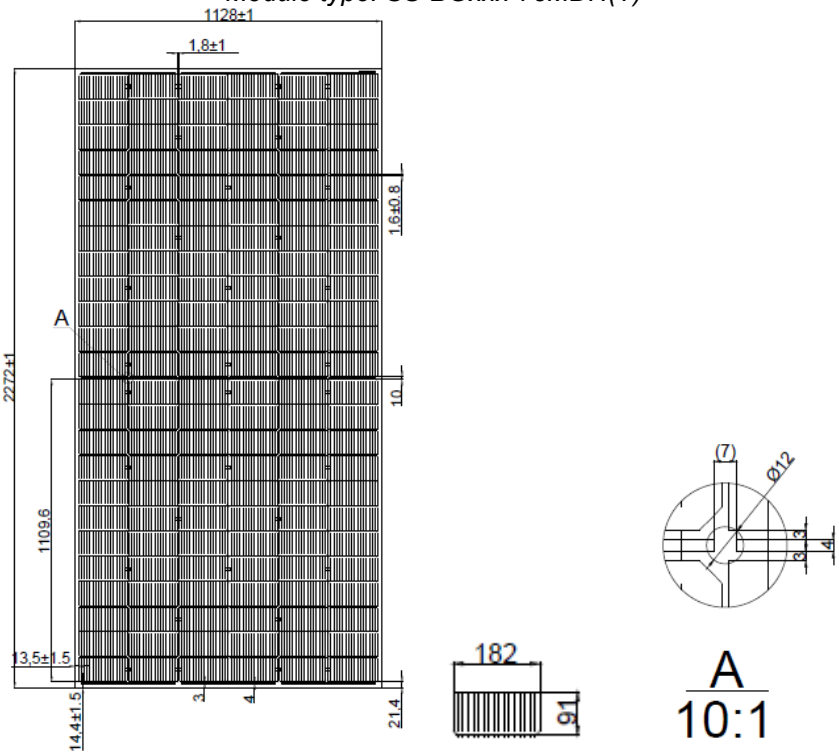


Module type: SS-BGxxx-54MDH-G10(T)

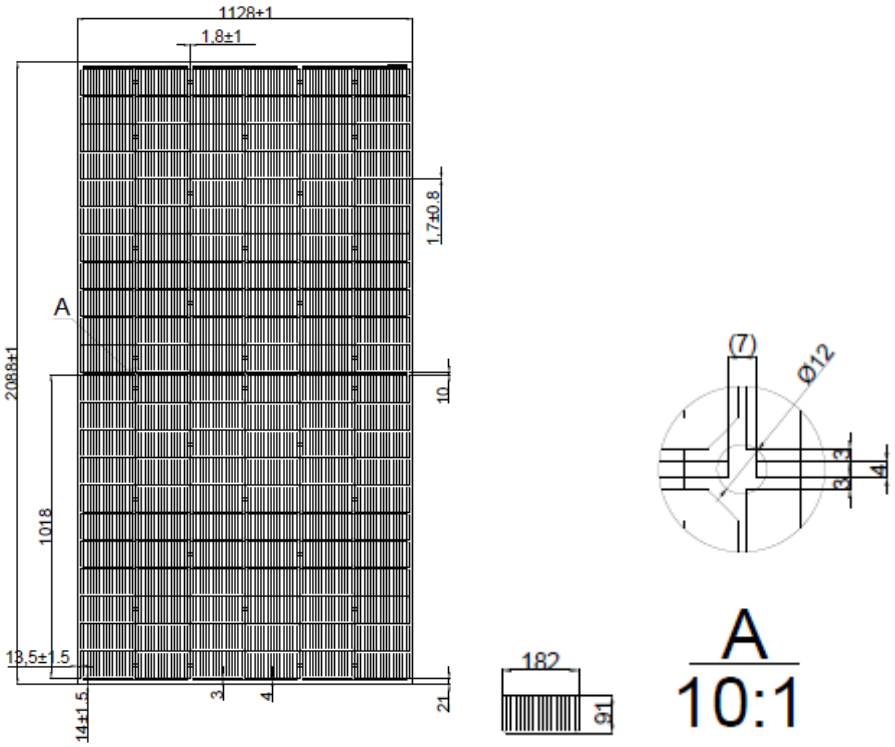
Layout drawing



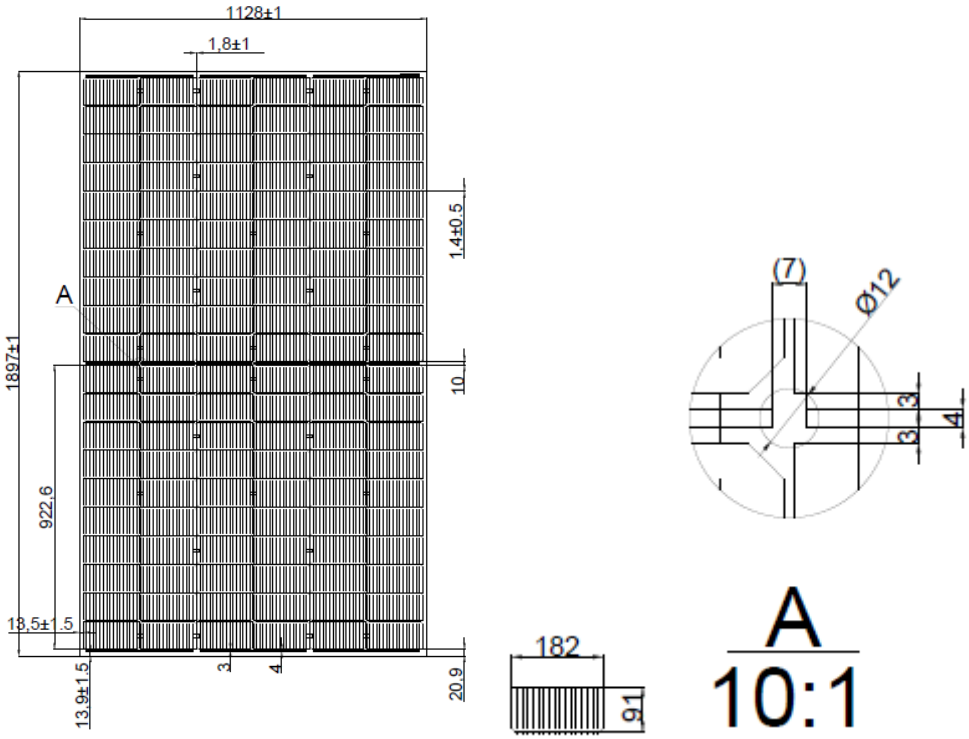
Module type: SS-BGxxx-78MDH(T)



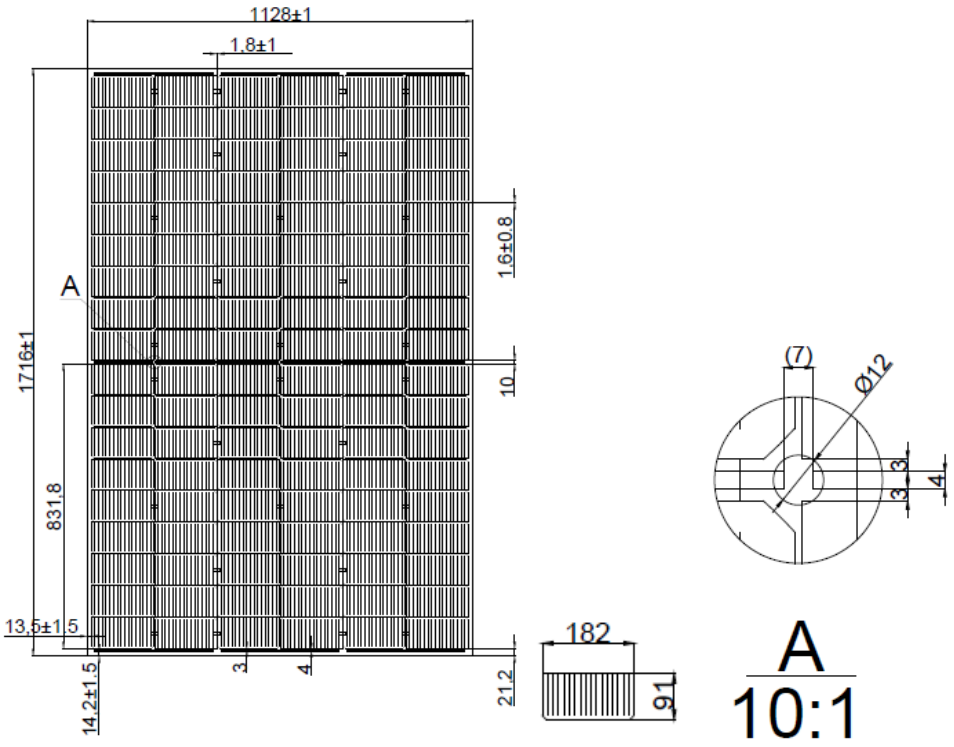
Module type: SS-BGxxx-72MDH(T)



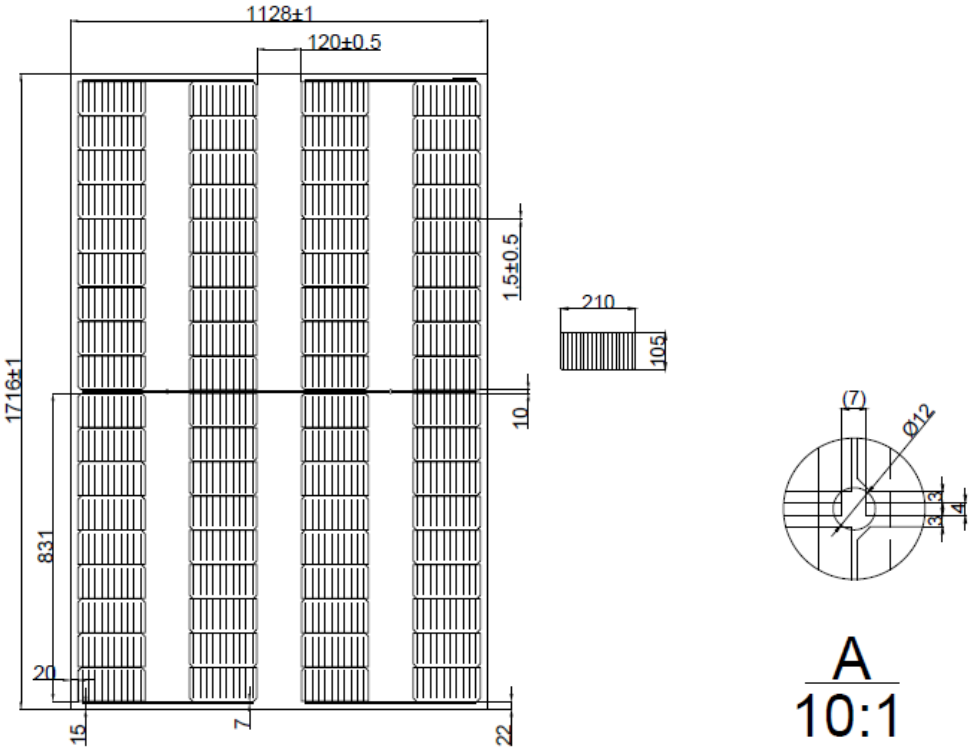
Module type: SS-BGxxx-66MDH(T)



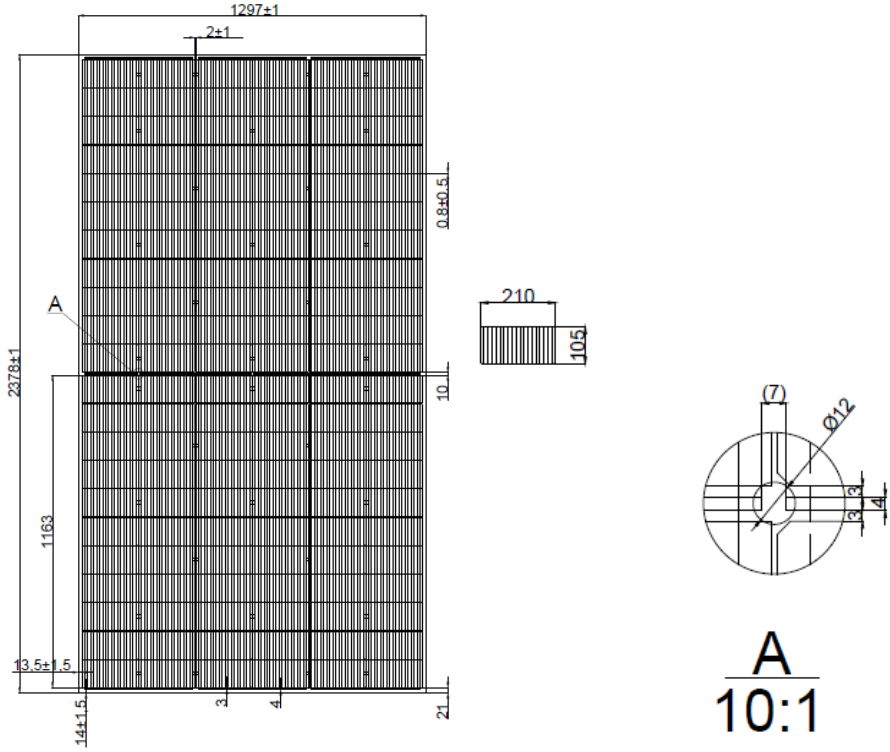
Module type: SS-BGxxx-60MDH(T)



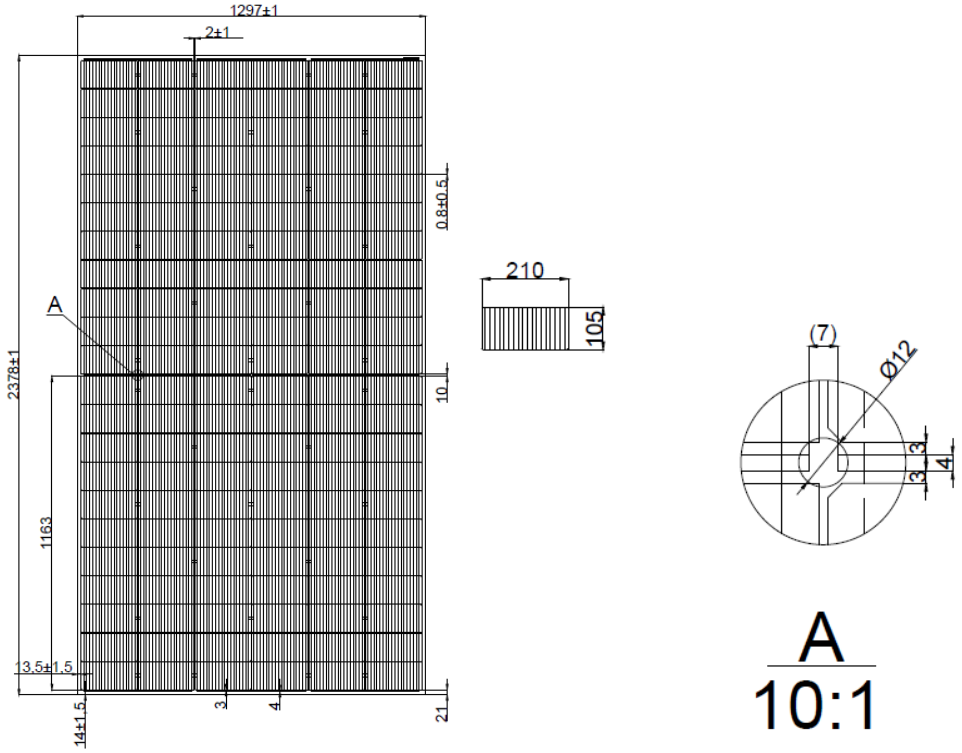
Module type: SS-BGxxx-54MDH(T)



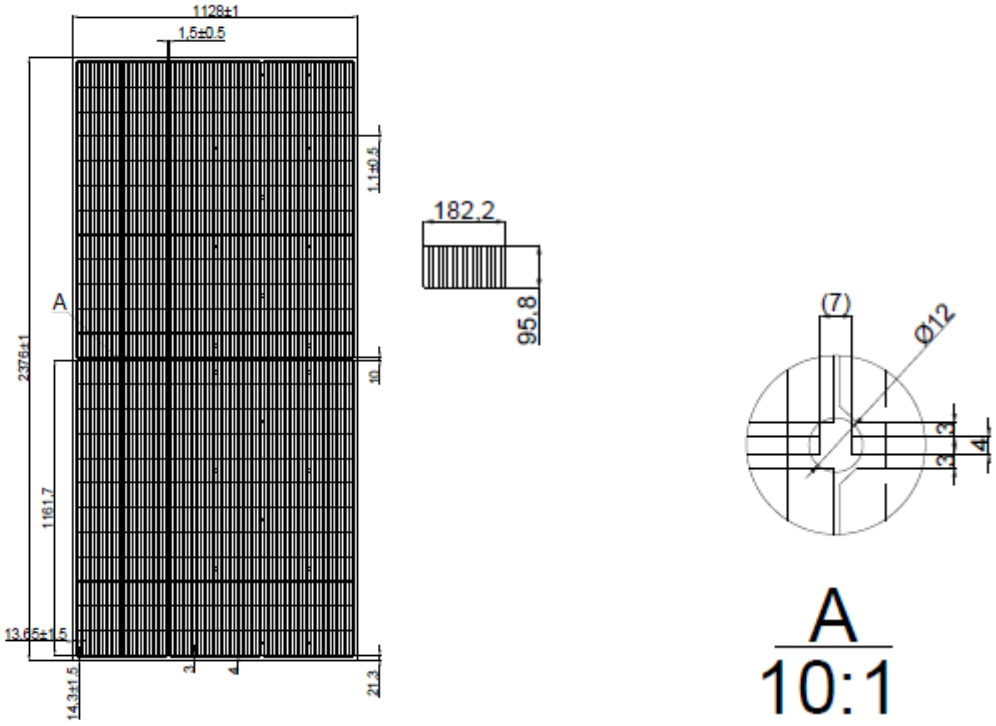
Module type: SS-BGxxx-36MDH(T)



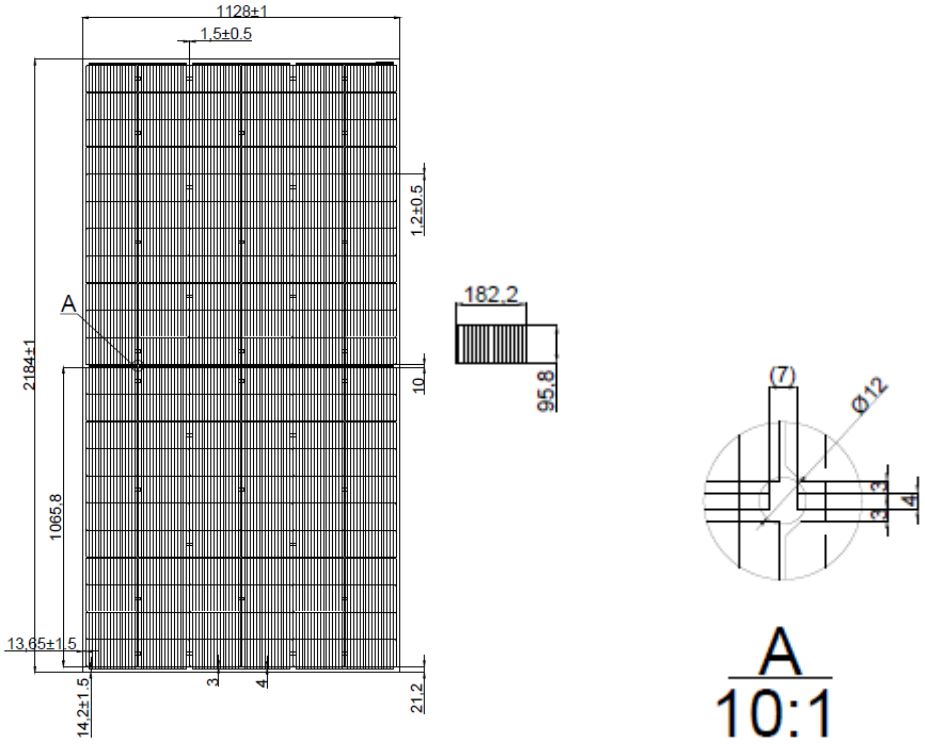
Module type: SS-BGxxx-66MDH-G12(T)



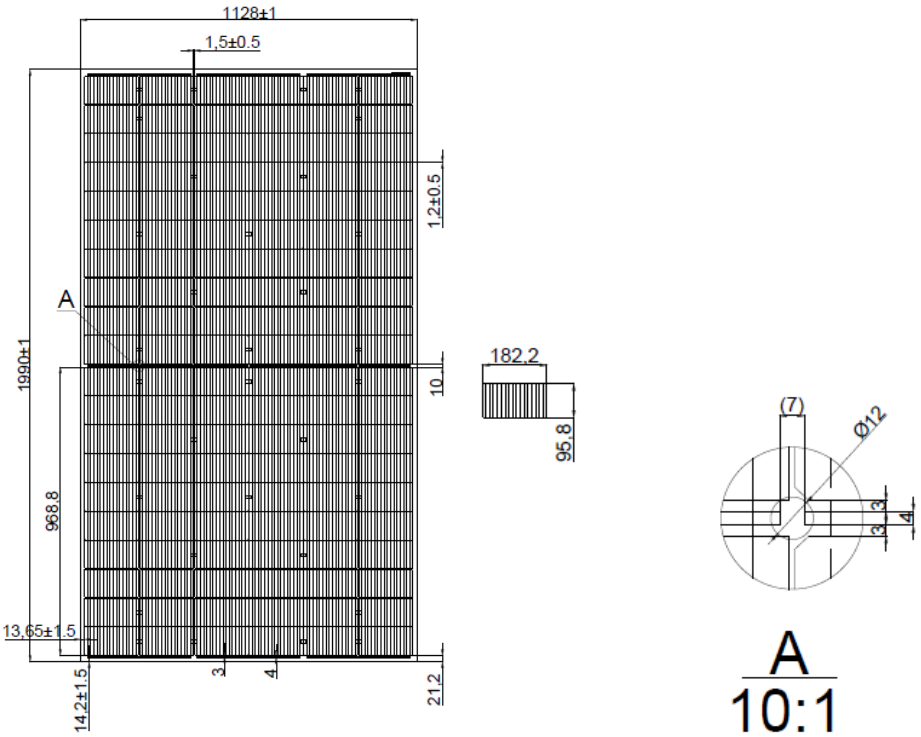
Module type: SS-BGxxx-60MDH-G12(T)



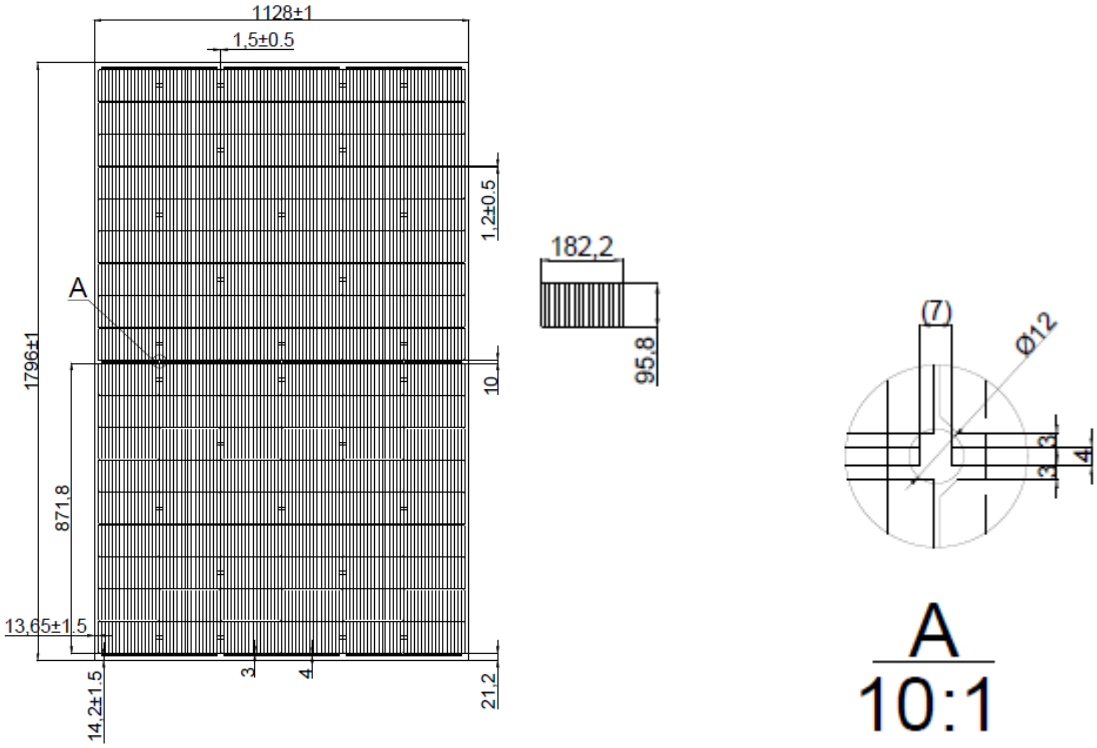
Module type: SS-BGxxx-72MDH-G10(T)



Module type: SS-BGxxx-66MDH-G10(T)

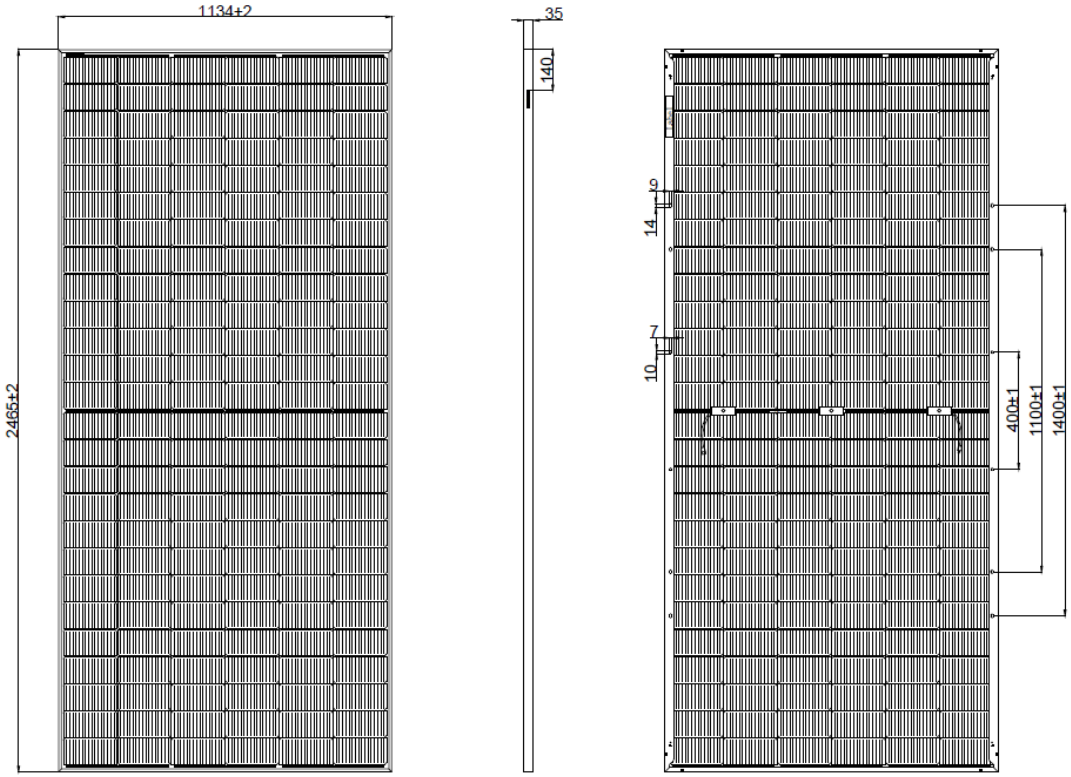


Module type: SS-BGxxx-60MDH-G10(T)

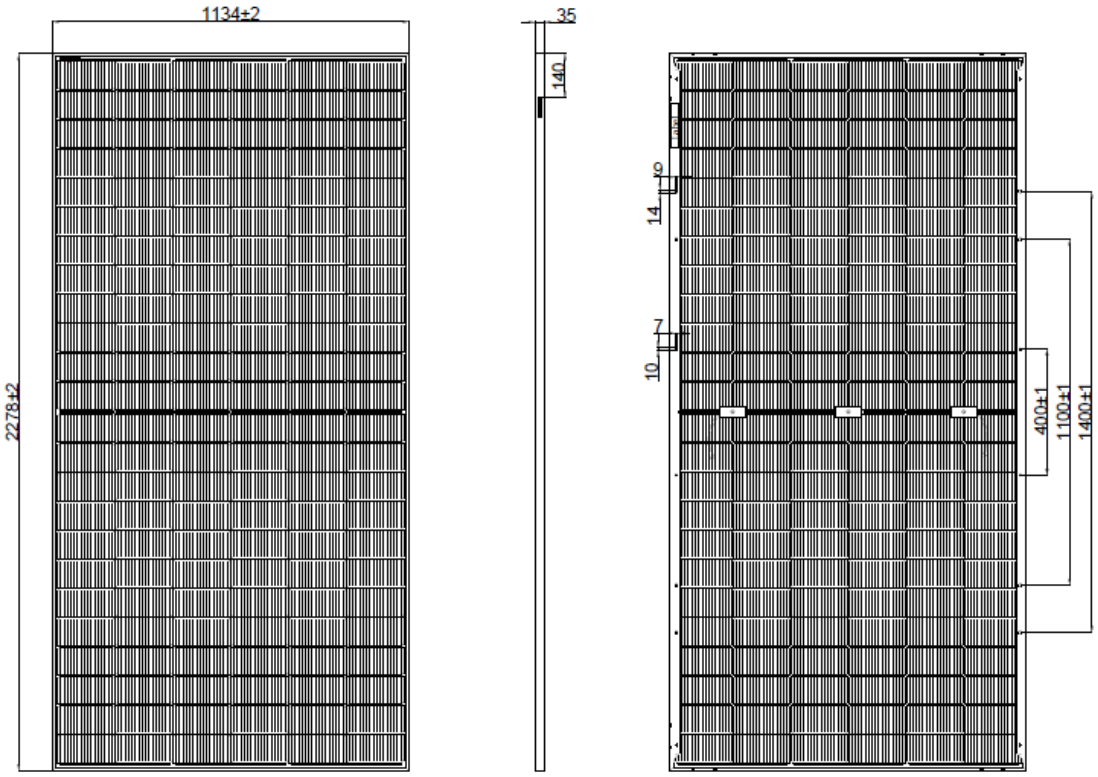


Module type: SS-BGxxx-54MDH-G10(T)

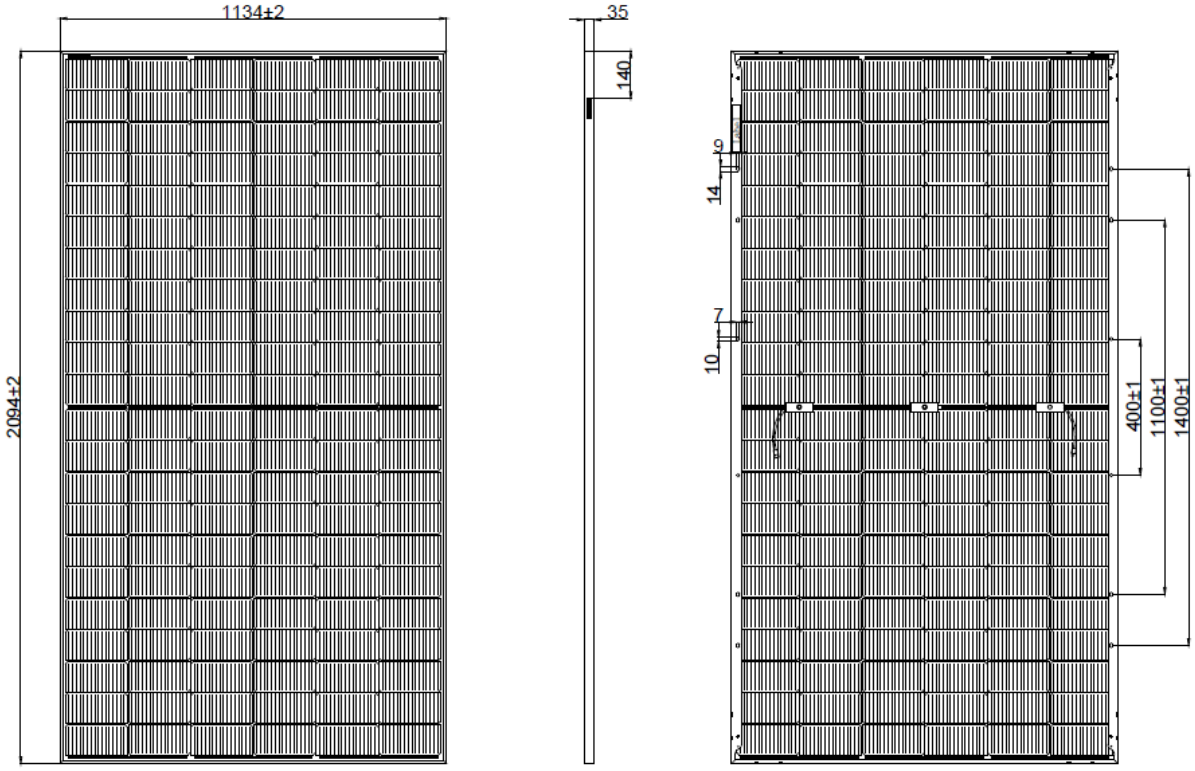
Assembly drawing



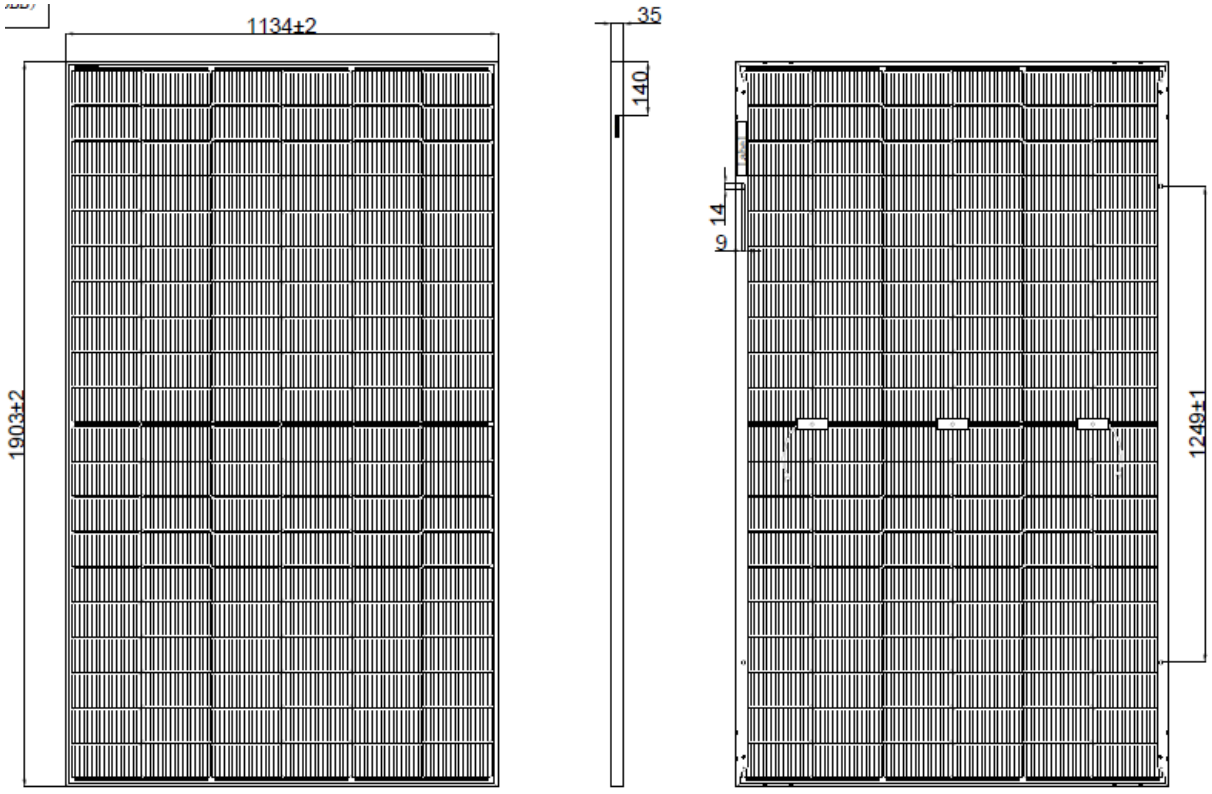
Module type: SS-BGxxx-78MDH(T)



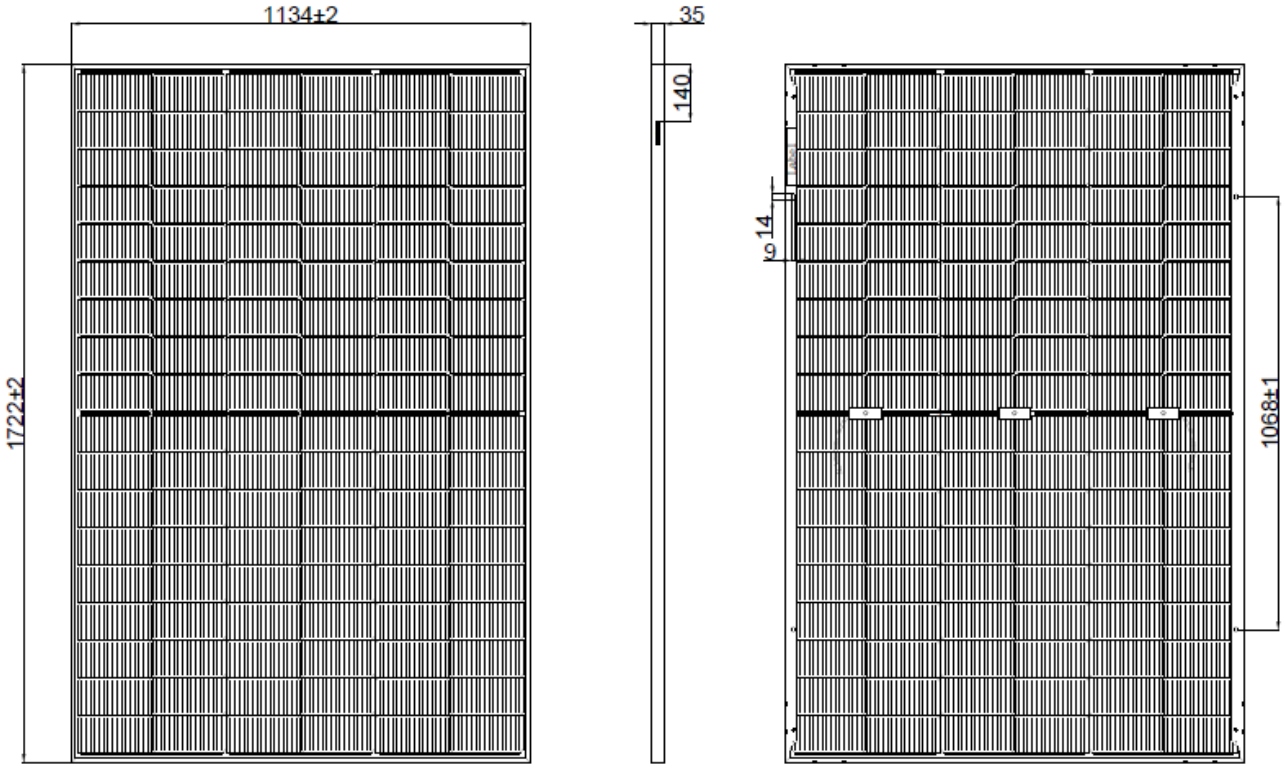
Module type: SS-BGxxx-72MDH(T)



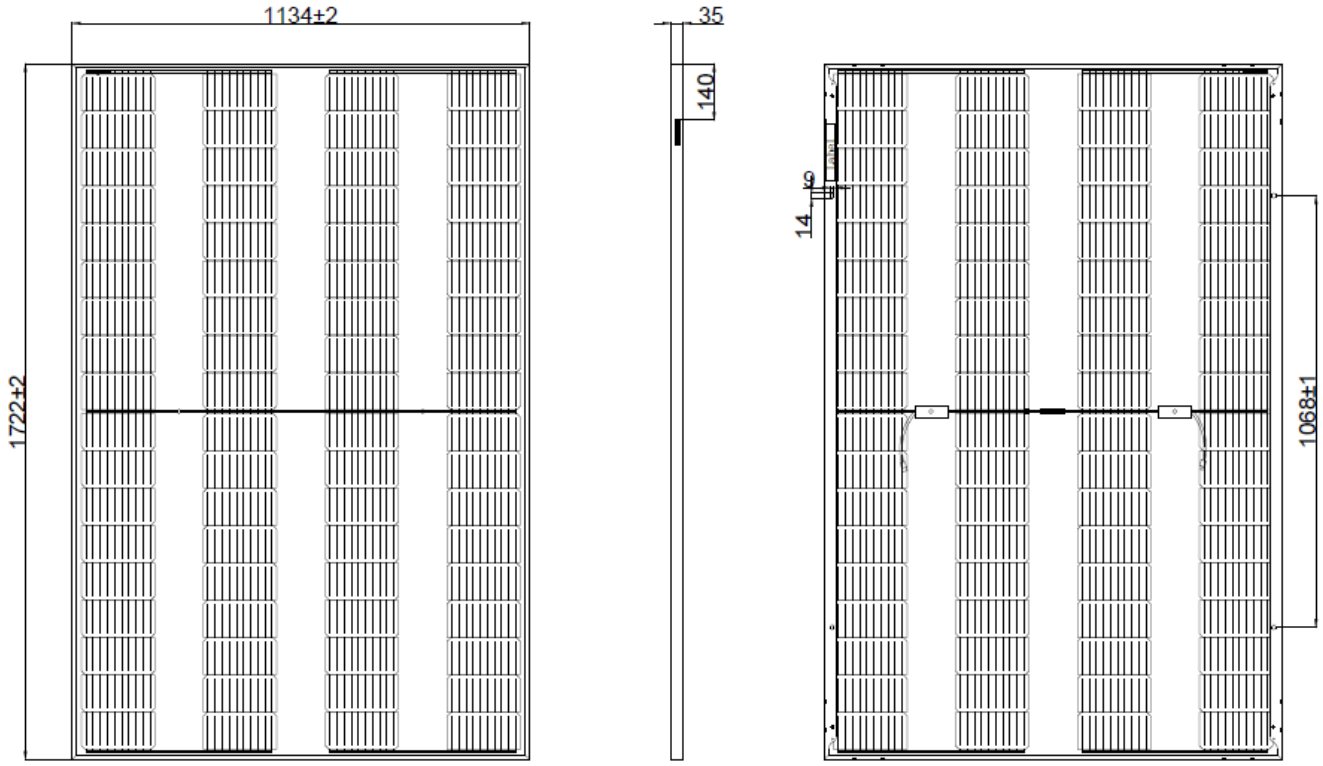
Module type: SS-BGxxx-66MDH(T)



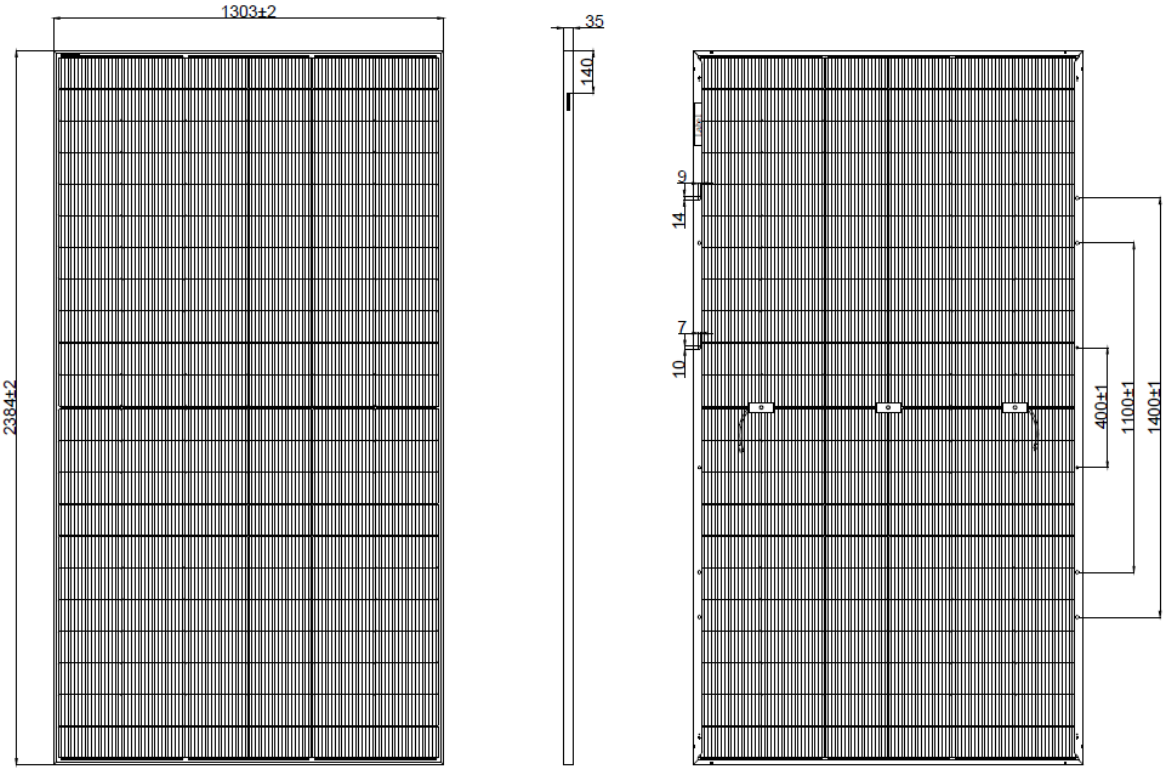
Module type: SS-BGxxx-60MDH(T)



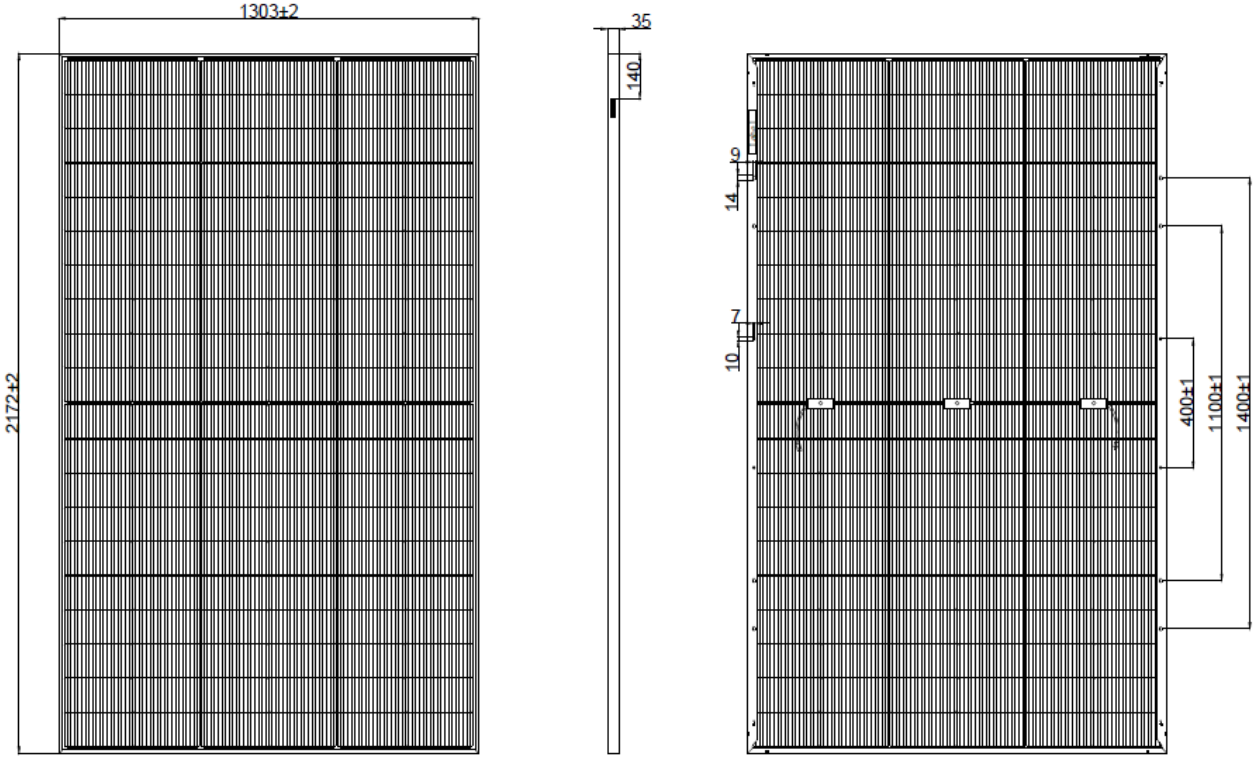
Module type: SS-BGxxx-54MDH(T)



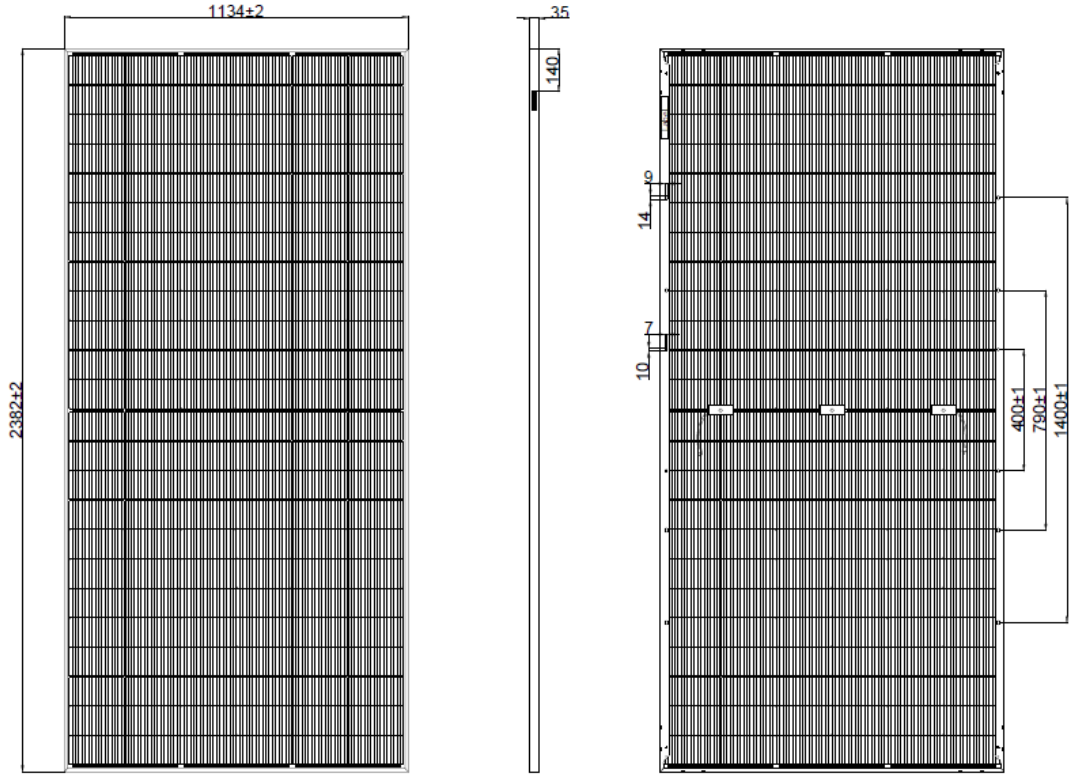
Module type: SS-BGxxx-36MDH(T)



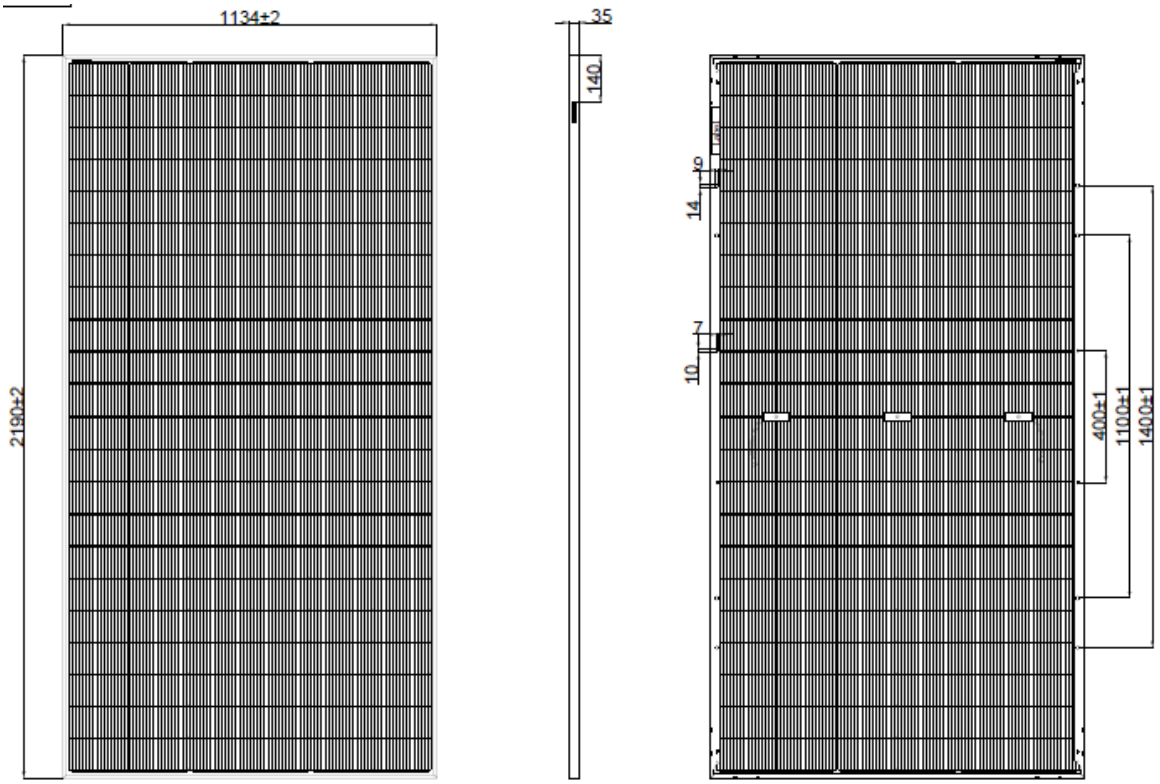
Module type: SS-BGxxx-66MDH-G12(T)



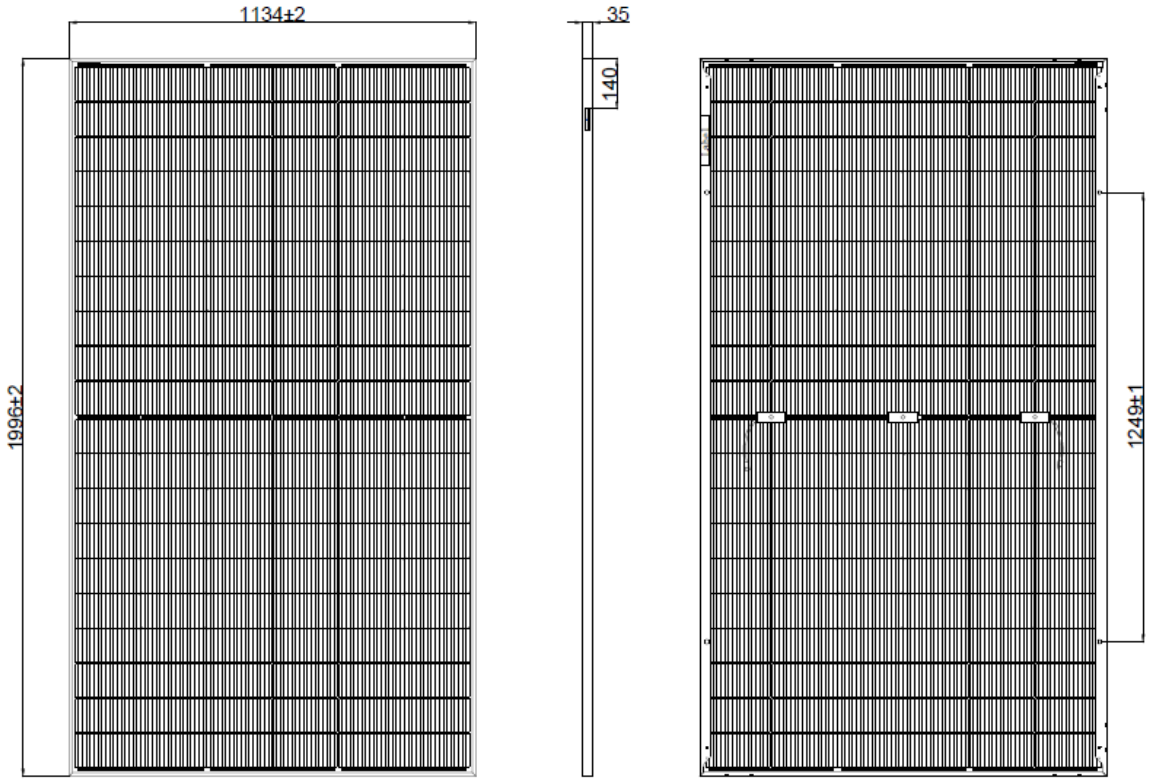
Module type: SS-BGxxx-60MDH-G12(T)



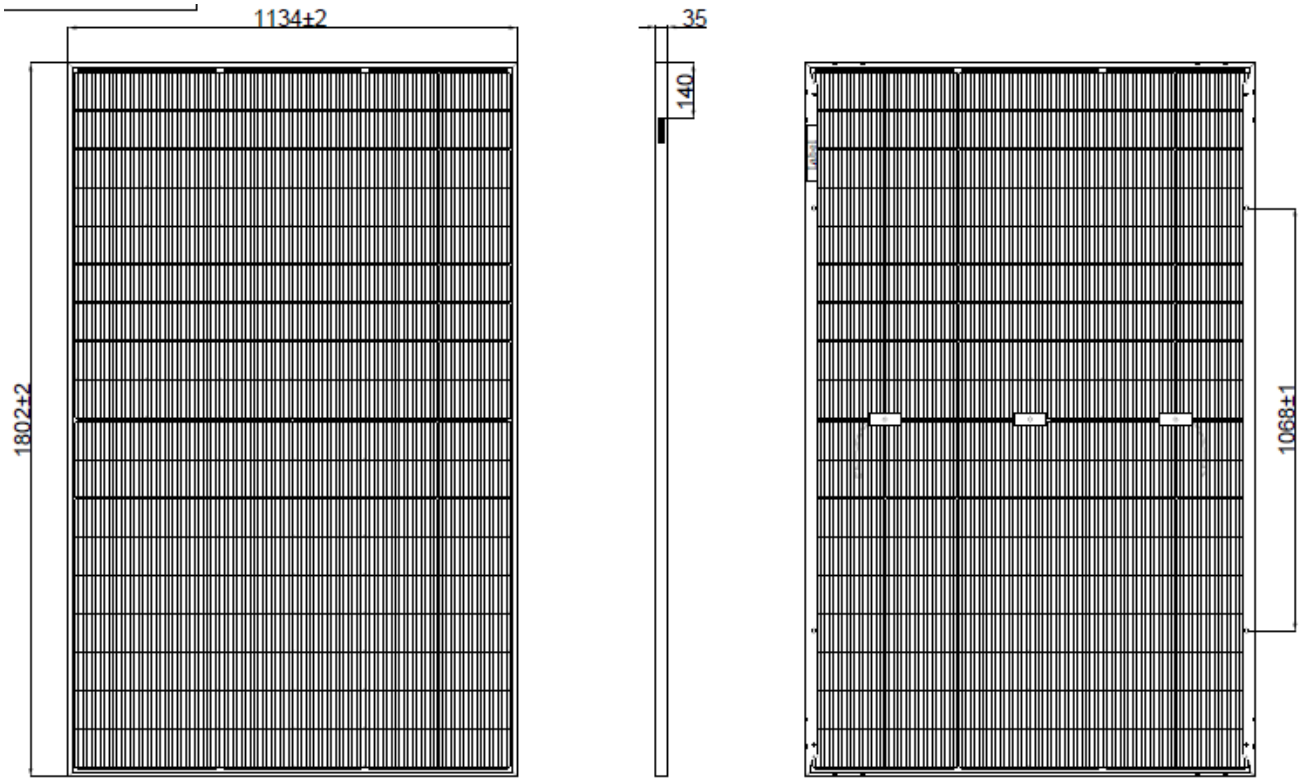
Module type: SS-BGxxx-72MDH-G10(T)



Module type: SS-BGxxx-66MDH-G10(T)

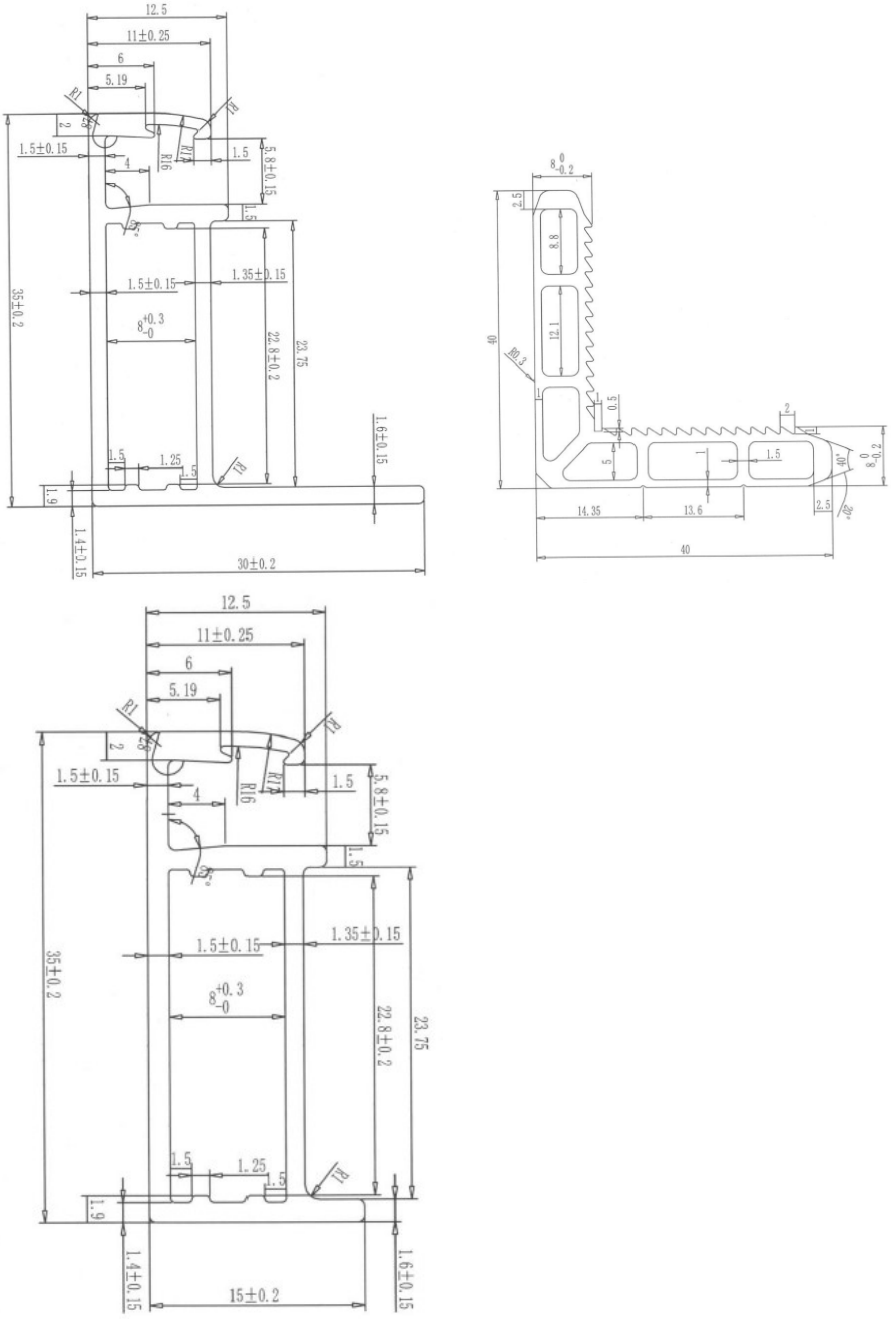


Module type: SS-BGxxx-60MDH-G10(T)



Module type: SS-BGxxx-54MDH-G10(T)

Frame cross section and key corner



Annex 2: List of Test Equipment Used

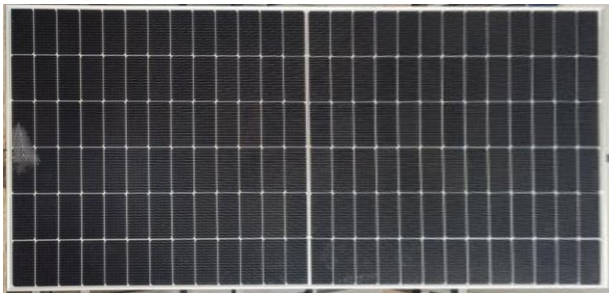
Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
10.2	Visual inspection	Appearance Tester	N/A	N/A	N/A
		Luminometer （Z10S06102）	0-20000lx	2023-09-25	2024-09-25
10.3	Performance at STC	AAA Long Pulse Simulator (Solar Cell Module Tester)(Z10315800)	100~1400 W/m^2	2023-09-12	2024-09-11
10.4	Maximum power determination	AAA Long Pulse Simulator (Solar Cell Module Tester)(Z10315800)	100~1400 W/m^2	2023-09-12	2024-09-11
10.6	Durability of markings	Electronic stopwatch (J30009100)	0~3600s	2023-02-22	2024-02-21
10.7	Sharp edge test	Edge edge detector (Z25032400)	0~10N	2023-10-07	2024-10-06
10.8	Bypass diode functionality test	AAA Long Pulse Simulator (Solar Cell Module Tester)(Z10315800)	100~1400 W/m^2	2023-09-12	2024-09-11
10.9	Accessibility test	Digital multimeter (Z30010500)	0-1000V	2023-04-07	2024-04-06
		Test finger (Z25032500)	0-10N	2023-10-08	2024-10-07
10.11	Continuity test of equipotential bonding	DC Power Supply (Z25032000)	0~60V 0~100A	2023-04-07	2024-04-06
10.12	Impulse voltage test	Impulse voltage generator (Z30111400)	0~20KV	2023-10-25	2024-10-24
		High pressure probe (Z10289701)	N/A	2023-09-25	2024-09-24
		Digital oscilloscope (Z10289700)	N/A	2023-09-26	2024-09-25
10.13	Insulation test	Withstand voltage tester (Z30233600)	0~12 kV 0.1MΩ~50GMΩ	2022-12-18	2023-12-17
10.14	Wet leakage current test	Withstand voltage tester (Z30233600)	0~12 kV 0.1MΩ~50GMΩ	2022-12-18	2023-12-17
		Conductive meter (Z10S05002)	20~2000 μS/cm	2023-09-26	2024-09-25
		Thermometer (J10S01600)	0~100℃	2023-04-14	2024-04-13

10.15	Temperature test	AAA steady state simulator measurement system (Z10S00800)	200~1300 W/m2	2022-12-07	2024-12-06
10.16	Hot-spot endurance test	AAA steady state simulator measurement system (Z10S00800)	200~1300 W/m2	2022-12-07	2024-12-06
10.18	Ignitability test	Full scale component burnable testing machine (Z30138100)	N/A	N/A	N/A
		Cronometro (J30009100)	N/A	2023-02-22	2024-02-21
		straight steel ruler (J30075200)	0-300mm	2023-04-07	2024-04-06
10.19	Bypass diode thermal test	High and low temperature alternating humidity heat environment test chamber (Z10S03800)	-45~90 °C 10%~98%RH	2023-09-22	2024-09-21
		Pulse DC Power Supply (Z30134700)	N/A	2023-04-07	2024-04-06
		Current probe (Z30139900)	N/A	2023-09-26	2024-09-25
		Data collector (Z10S00902)	N/A	2023-04-11	2024-04-10
		Digital oscilloscope (Z10289700)	N/A	2023-09-26	2024-09-25
10.20	Reverse current overload test	DC power supply (Z30232100)	0~80 V 0~60 A	2023-10-30	2024-10-29
10.21	Module breakage test	Impact tester (Z10S05300)	45.5 kg	N/A	N/A
10.23	Static mechanical load test	Large scale dynamic mechanical load testing machine (Z10315900)	0~200 (kg)	2023-09-18	2024-09-17
10.26	Materials creep test	Walk-in high and low temperature alternating humidity and heat environment test chamber (Z25031400)	-50℃~120 °C	2023-09-22	2024-09-21
10.27	Robustness of terminations test	Digital dynamometer (Z10S06106)	0 ~ 200 N	2023-09-28	2024-09-27
		Weight (Z10290701)	40 N	2023-03-09	2024-03-08

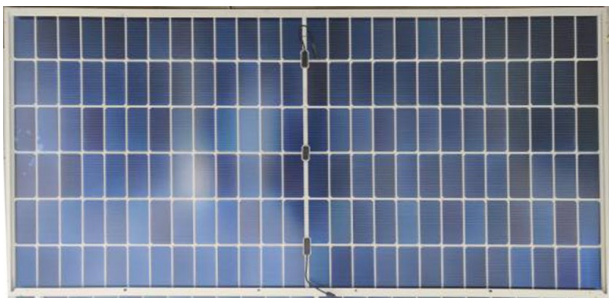
10.28	Thermal cycling test	High and low temperature alternating humidity heat environment test chamber (Z10S03800)	-50~100 °C 0~98%RH	2023-09-22	2024-09-21
		Current Continuity Monitoring System (Z25032800)	N/A	2023-08-23	2024-08-22
		Weight (G30213600)	500g	N/A	N/A
10.29	Humidity freeze test	Walk-in high and low temperature alternating humidity and heat environment test chamber (Z25031400)	-70℃~105 °C	2023-09-22	2024-09-21
		Current Continuity Monitoring System (Z25032800)	N/A	2023-08-23	2024-08-22
10.30	Damp heat test	Walk-in constant temperature and humidity box (Z10S03600)	0~95 °C 0~98%RH	2023-09-22	2024-09-21
10.31	UV test	Accelerated UV wet heat test chamber (Z25031700)	280~400 nm	2022-12-07	2024-12-06
		Ultraviolet pretreatment laboratory (Z10301300)	280~400 nm	2023-11-27	2024-11-26
10.32	Cold conditioning	Walk-in high and low temperature alternating humidity and heat environment test chamber (Z25031500)	-50℃~120 °C	2023-09-22	2024-09-21
10.33	Dry heat conditioning	Walk-in high and low temperature alternating humidity and heat environment test chamber (Z25031500)	-50℃~120 °C	2023-09-22	2024-09-21
10.34	Fire test (for Class A)	PV module combustion test system GF-112-1 SCF	N/A	2023-05-24	2024-05-23
		Handheld anemometer GF-112-2 TES-1340	N/A	2023-05-29	2024-05-28
		Electric blast drying oven GF-112-8	N/A	2023-10-24	2024-10-23
		Electronic balance GF-190 LBA-5200	N/A	2023-03-06	2024-03-05

		Temperature and humidity recorder GF-270-3 TH20R	N/A	2023-11-06	2024-11-05
		Mechanical stopwatch GF-120 803	N/A	2023-09-18	2024-09-17
	Fire test (for Class C)	Fire test Equipment (2020AL0425)	/	/	/
		Thermocouple (on the desk) (ZLJC-EM-061)	0~2000℃	2023-06-21	2024-06-20
		Thermocouple (with oven container) (ZLJC-EM-034)	0~2000℃	2023-05-22	2024-05-21
		Wind speed transmitter (ZLJC-EM-053)	0~100%RH -20℃~40℃	2023-07-03	2024-07-02
		Wind speed transmitter (ZLJC-EM-053)	0~100%RH -20℃~40℃	2023-07-03	2024-07-02
		Wind speed transmitter (ZLJC-EM-053)	0~100%RH -20℃~40℃	2023-07-03	2024-07-02

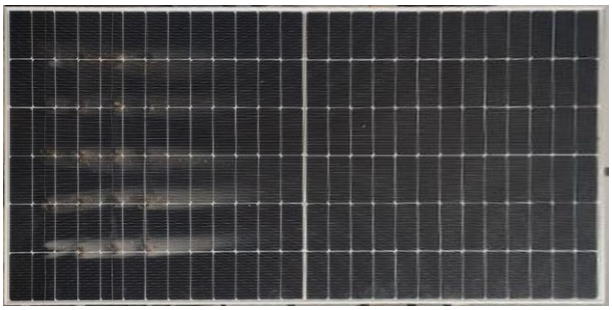
Annex 3: Photos of Fire Test
Module type: SS-BG610-78MDH(T) (BOM1)



Sample# 1-fire 1: Spread of flame test (front)



Sample# 1-fire 1: Spread of flame test (back)

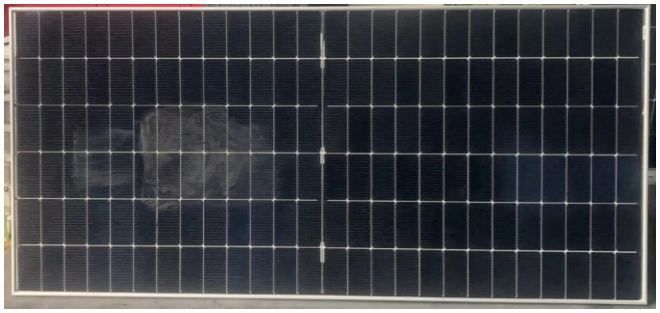


Sample# 1-fire 3: Burning brand test (front)

Sample #1-fire 3: Burning brand test (back)

Sample# 1-fire 4: Spread of flame test (front)

Sample# 1-fire 4: Spread of flame test (back)

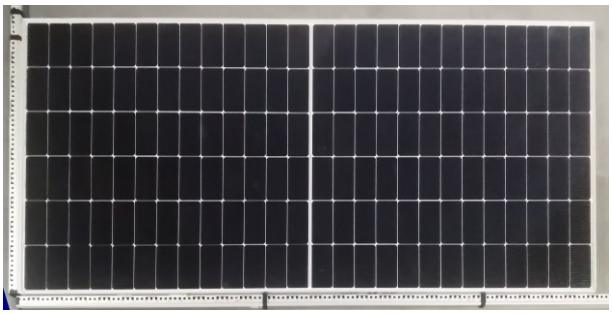


Sample# 1-fire 6: Burning brand test (front)

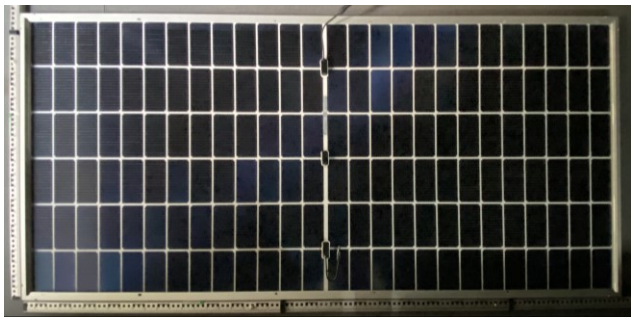
Sample #1-fire 6: Burning brand test (back)

Annex 4: Sample Photos

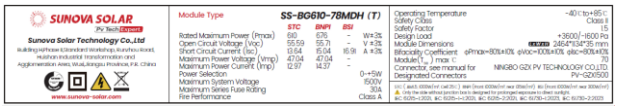
Module type: SS-BG610-78MDH(T) (BOM1)



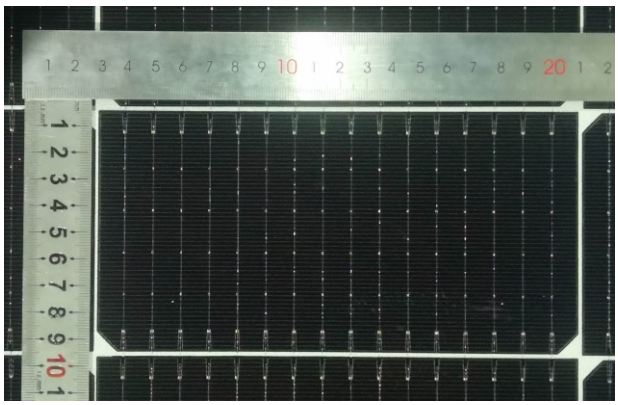
Front overview



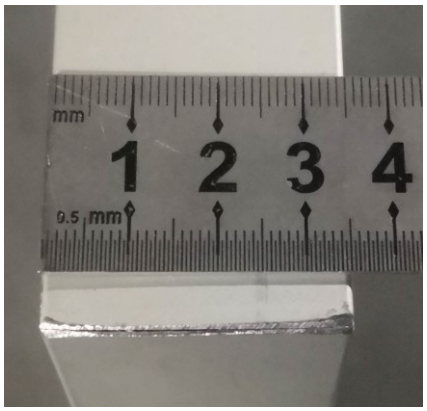
Back overview



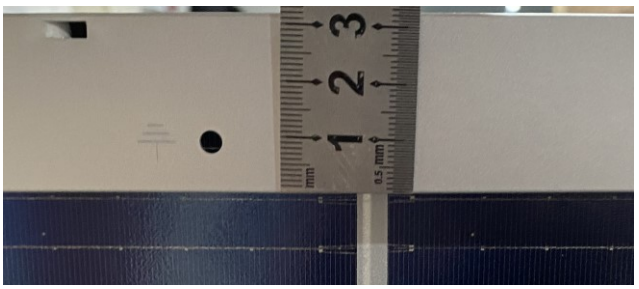
Label



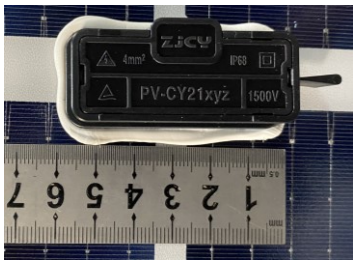
Solar cell



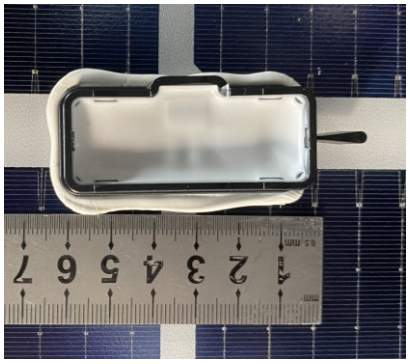
Frame



Grounding Mark



Junction box (PV-CY21xyz)

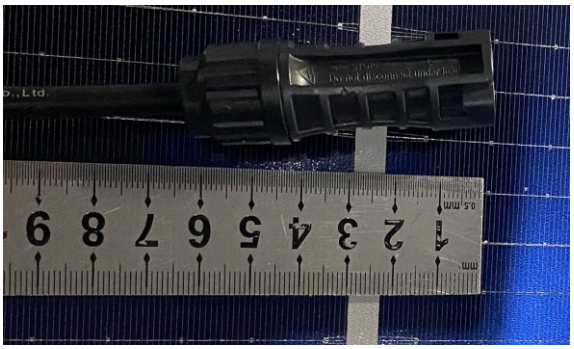


Junction box (opened)

N/A

Bypass diode (Junction box is potted)

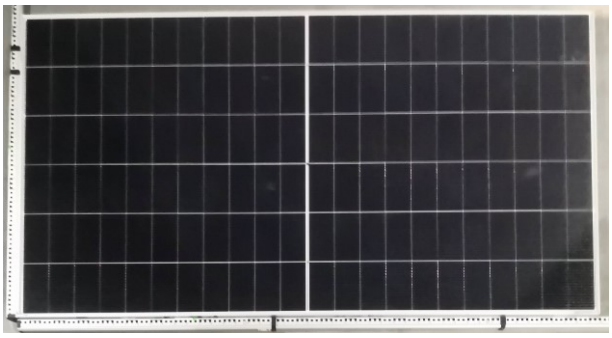
Cable (62930 IEC 131 1x4mm²)



Mark (Do not disconnect under load)

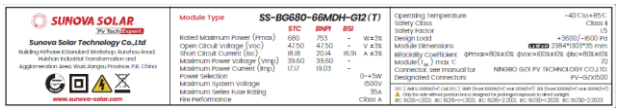
Connectors (PV-CY20L)

Module type: SS-BG680-66MDH-G12(T) (BOM2)

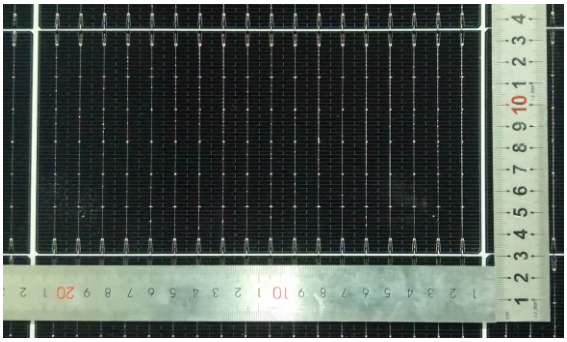


Front overview

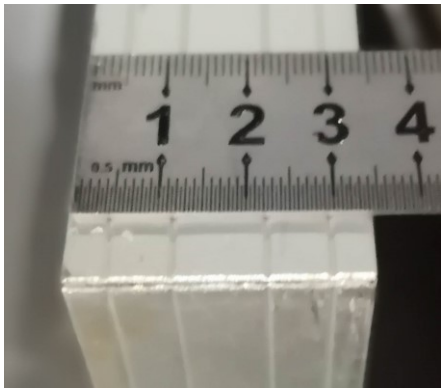
Back overview



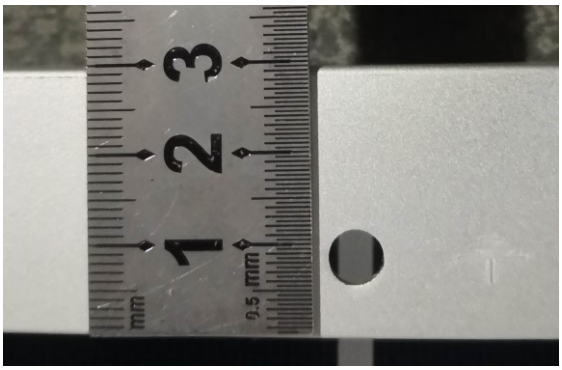
Label



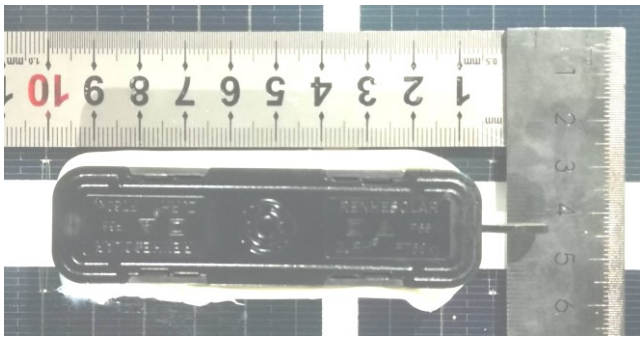
Solar cell



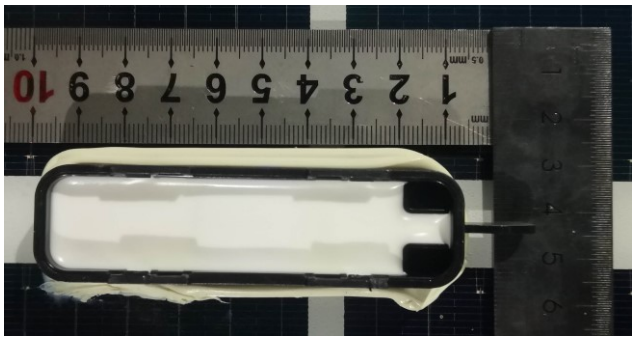
Frame



Grounding Mark

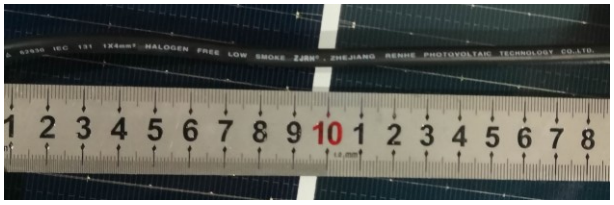


Junction box (FT60xy)



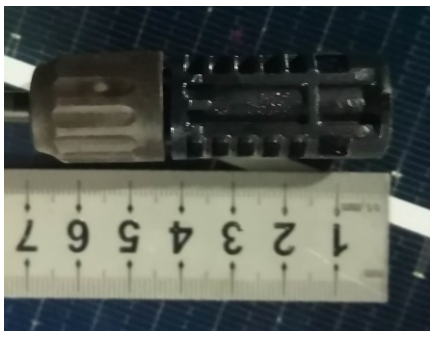
Junction box (opened)

N/A

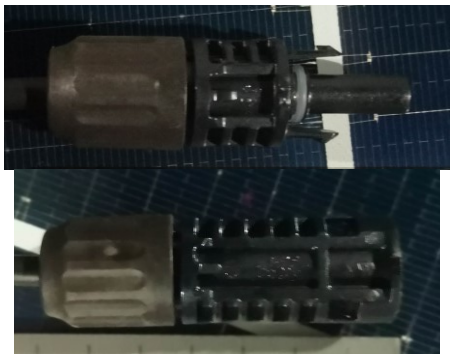


Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4mm²)

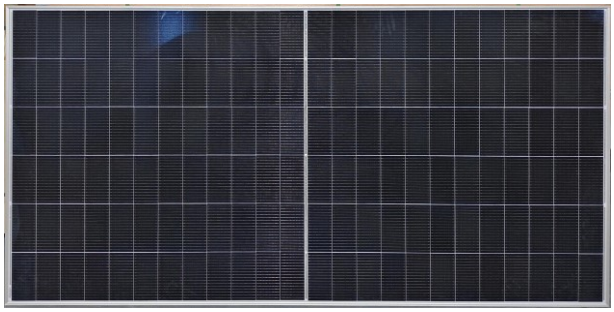


Mark (Do not disconnect under load)



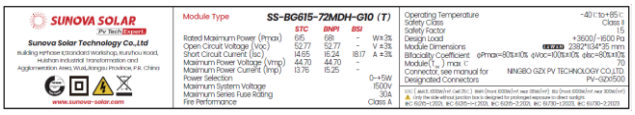
Connectors (RHC2)

Module type: SS-BG615-72MDH-G10(T) (BOM3)

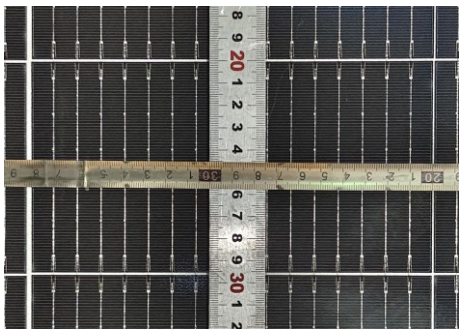


Front overview

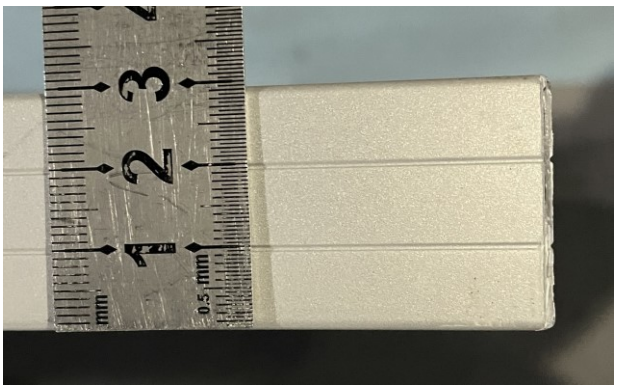
Back overview



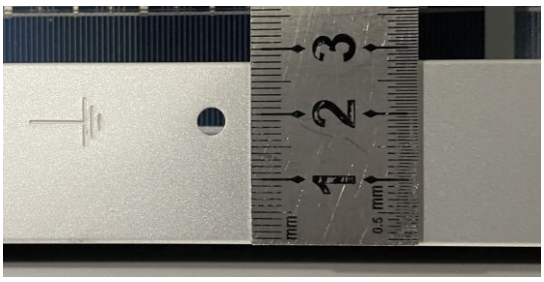
Label



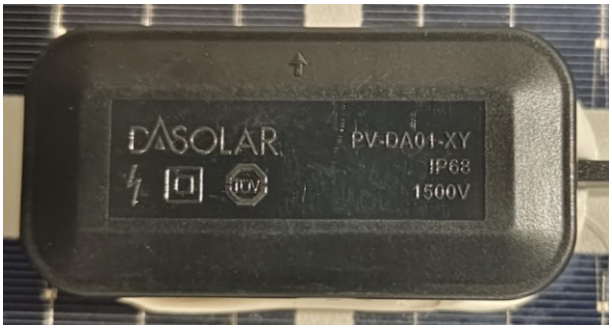
Solar cell



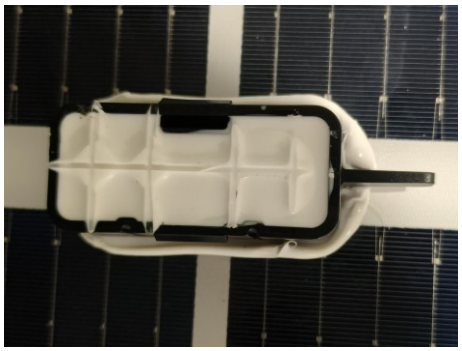
Frame



Grounding Mark

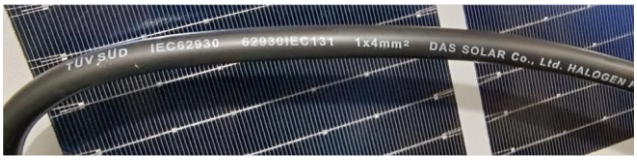


Junction box (PV-DA01-XY)



Junction box (opened)

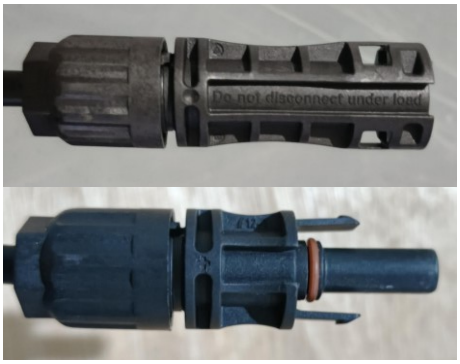
N/A



Bypass diode (Junction box is potted)

Cable (62930 IEC 131 1x4.0mm²)

Mark (Do not disconnect under load)



Connectors (PV-DA01M2-XY)

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