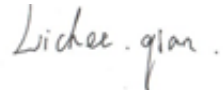




Test Report issued under the responsibility of:



TEST REPORT IEC 61215 series:2021 Terrestrial photovoltaic (PV) modules – Design qualification and type approval	
Report Number..... :	GCTC2024WT00158-01-02
Date of issue..... :	2024-09-30
Total number of pages	79
Name of Testing Laboratory preparing the Report	Guoce Testing Technology (Suzhou) Co., Ltd.
Applicant's name	PROMOD ENERJI URETIM SAN VE TIC A.S.
Address..... :	Kayseri O.S.B. Mah. 29. Cad. No.27 Melikgazi, KAYSERI, Türkiye.
Test specification:	
Standard	☒ IEC 61215-1:2021 ☒ IEC 61215-2:2021 ☒ IEC 61215-1-1:2021 ☐ IEC 61215-1-2:2021 ☐ IEC 61215-1-3:2021 ☐ IEC 61215-1-4:2021
Test procedure	CB Scheme
Non-standard test method	N/A
TRF template used	IECEE OD-2020-F1:2021, Ed.1.4
Test Report Form No. :	IEC61215F_SE
Test Report Form(s) Originator :	TÜV SÜD Product Service GmbH
Master TRF	2021-08-31
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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 the Issuing NCB. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.	

Test item description	Photovoltaic (PV) Module(s)	
Trade Mark		
Manufacturer	PROMOD ENERJI URETIM SAN VE TIC A.S. Kayseri O.S.B. Mah. 29. Cad. No.27 Melikgazi, KAYSERİ, Türkiye.	
Model/Type reference	PRDxxx-120MTN (xxx=385-415, in steps of 5, 120 cells, 1/3 cut) PRDxxx-108MT (xxx=440-460, in steps of 5, 108 cells, 1/2 cut) PRDxxx-110MT (xxx=525-570, in steps of 5, 110 cells, 1/2 cut) PRDxxx-120MT (xxx=620-645, in steps of 5, 120 cells, 1/2 cut) PRDxxx-132MT (xxx=650-710, in steps of 5, 132 cells, 1/2 cut)	
Ratings	Max. System voltage: 1500V Maximum Over-Current Protection: 25A/30A/35A	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒ CB Testing Laboratory:	Guoce Testing Technology (Suzhou) Co., Ltd.	
Testing location/address	2/F., Building 11, No.18, YaoFeng East Road, Mudu, Wuzhong District, Suzhou, Jiangsu, China	
Tested by (name, function, signature)	Project Engineer Bin Cao	
Approved by (name, function, signature) ...:	Reviewer Lichun Qian	
Testing procedure: CTF Stage 1:		
Testing location/address		
Tested by (name, function, signature)		
Approved by (name, function, signature) ...:		
Testing procedure: CTF Stage 2:		
Testing location/address		
Tested by (name + signature)		
Witnessed by (name, function, signature) .:		
Approved by (name, function, signature) ...:		
Testing procedure: CTF Stage 3 or 4:		
Testing location/address		
Tested by (name, function, signature)		
Witnessed by (name, function, signature) .:		

Approved by (name, function, signature)... :		
Supervised by (name, function, signature) :		

List of Attachments (including a total number of pages in each attachment):	
	Attachment number / number of pages
Installation manual	Attachment 1/ 18 pages
Drawings mechanical	Attachment 2/ 4 pages
Circuit diagram	/
Photographs	Attachment 6 / 9 pages
Component datasheets / certificates	Attachment 3: certificate of junction box, 1 page. Attachment 4: certificate of cable, 1 page. Attachment 5: certificate of connector, 1 page.
Others:	Attachment 7: CDF No. GCTC2024WT0158.01, 9 pages
Product Description Sheet (Manufacturers and type references)	Annex 1 / 3 pages
Test table for verifying other stabilization procedure	Annex 2 / 2 pages
Lower and higher output power modules	Annex 3 / 7 pages
List of test equipment used	Annex 4 / 1 pages

Summary of testing:	
Tests performed (name of test and test clause): IEC 61215-1:2021 IEC 61215-2:2021 IEC 61215-1-1:2021 All clauses were tested.	Testing location: Guoce Testing Technology (Suzhou) Co., Ltd. 2/F, Building 11, No.18, YaoFeng East Road, Mudu, Wuzhong District, Suzhou, Jiangsu, China

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

The text of IEC 61215-1:2021 was approved by CENELEC as EN 61215-1:2021 without any modification.

The text of IEC 61215-1-1:2021 was approved by CENELEC as EN 61215-1-1:2021 without any modification.

The text of IEC 61215-2:2021 was approved by CENELEC as EN 61215-2:2021 without any modification.

☐ The product fulfils the requirements of EN 61215-1:2021, EN 61215-1-1:2021, EN 61215-2:2021

Use of uncertainty of measurement for decisions on conformity (decision rule) :

☐ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☒ Other:... (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:

The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.

IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

Copy of marking plate:

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

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

PROMOD ENERJİ		Rated Max. Power (Pmax+3%)	415W	Dimensions	1755*1038*35 mm
		Voltage at Pmax	36.23V	Weight	20 KG
		Current at Pmax	11.47A	Safety class	Class II
Module type: PRD415-120MTN STC: E=1000 W/m2, AM 1.5 Tc: 25°C.		Open-Circuit Voltage(Voc+3%)	43.27V	Standarts	IEC
		Short-Circuit Current(Isc+3%)	11.95A		WARNING: This module produces electricity when exposed the light. Follow all applicable electrical safety precautions.
		Maximum System Voltage	1500V		
		Maximum Overcurrent Protection Rating	25A		
		PROMOD ENERJİ ÜRETİM SA. VE TİC. A.Ş. Add: Kayseri OSB mah. 29. Cad. no:27 Melikgazi / Kayseri /TÜRKİYE www.promodenerji.com			
MADE IN TURKEY					

PROMOD ENERJİ		Rated Max. Power (Pmax+3%)	550W	Dimensions	2278*1134*35 mm
		Voltage at Pmax	33.89V	Weight	27.5KG
		Current at Pmax	16.23A	Safety class	Class II
Module type: PRD550-110MT STC: E=1000 W/m2, AM 1.5 Tc: 25°C.		Open-Circuit Voltage(Voc+3%)	40.42V	Standarts	IEC
		Short-Circuit Current(Isc+3%)	16.44A		WARNING: This module produces electricity when exposed the light. Follow all applicable electrical safety precautions.
		Maximum System Voltage	1500V		
		Maximum Overcurrent Protection Rating	25A		
		PROMOD ENERJİ ÜRETİM SA. VE TİC. A.Ş. Add: Kayseri OSB mah. 29. Cad. no:27 Melikgazi / Kayseri /TÜRKİYE www.promodenerji.com			
MADE IN TURKEY					

PROMOD ENERJİ		Rated Max. Power (Pmax+3%)	650W	Dimensions	2394*1303*35 mm
		Voltage at Pmax	38.00V	Weight	39.5KG
		Current at Pmax	17.11A	Safety class	Class II
Module type: PRD650-132MT STC: E=1000 W/m2, AM 1.5 Tc: 25°C.		Open-Circuit Voltage(Voc+3%)	45.90V	Standarts	IEC
		Short-Circuit Current(Isc+3%)	17.99A		WARNING: This module produces electricity when exposed the light. Follow all applicable electrical safety precautions.
		Maximum System Voltage	1500V		
		Maximum Overcurrent Protection Rating	35A		
		PROMOD ENERJİ ÜRETİM SA. VE TİC. A.Ş. Add: Kayseri OSB mah. 29. Cad. no:27 Melikgazi / Kayseri /TÜRKİYE www.promodenerji.com			
MADE IN TURKEY					

PROMOD ENERJİ		Rated Max. Power (Pmax+3%)	670W	Dimensions	2394*1303*35 mm
		Voltage at Pmax	38.80V	Weight	39.5KG
		Current at Pmax	17.27A	Safety class	Class II
Module type: PRD670-132MT STC: E=1000 W/m2, AM 1.5 Tc: 25°C.		Open-Circuit Voltage(Voc+3%)	46.70V	Standarts	IEC
		Short-Circuit Current(Isc+3%)	18.19A		WARNING: This module produces electricity when exposed the light. Follow all applicable electrical safety precautions.
		Maximum System Voltage	1500V		
		Maximum Overcurrent Protection Rating	35A		
		PROMOD ENERJİ ÜRETİM SA. VE TİC. A.Ş. Add: Kayseri OSB mah. 29. Cad. no:27 Melikgazi / Kayseri /TÜRKİYE www.promodenerji.com			
MADE IN TURKEY					

PROMOD ENERJİ		Rated Max. Power (Pmax+3%)	710W	Dimensions	2394*1303*35 mm
		Voltage at Pmax	40.40V	Weight	39.5KG
		Current at Pmax	17.59A	Safety class	Class II
Module type: PRD710-132MT STC: E=1000 W/m2, AM 1.5 Tc: 25°C.		Open-Circuit Voltage(Voc+3%)	48.30V	Standarts	IEC
		Short-Circuit Current(Isc+3%)	18.59A		WARNING: This module produces electricity when exposed the light. Follow all applicable electrical safety precautions.
		Maximum System Voltage	1500V		
		Maximum Overcurrent Protection Rating	35A		
		PROMOD ENERJİ ÜRETİM SA. VE TİC. A.Ş. Add: Kayseri OSB mah. 29. Cad. no:27 Melikgazi / Kayseri /TÜRKİYE www.promodenerji.com			
MADE IN TURKEY					

Marking plates

Test item particulars.....	: N/A
Accessories and detachable parts included in the evaluation	: N/A
Mounting system used	: Refer to Installation manual
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/m ²)	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	t_4 – the manufacturer's rated upper production tolerance in % for P_{max4} (NP)
ϕV_{oc} - open-circuit voltage bifaciality coefficient	ϕP_{max} - the maximum power bifaciality coefficient
ϕI_{sc} – the short circuit current 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
BNPI - for bifacial modules, corresponding to 1 000 W/m ² on the module front and 135 W/m ² on the module rear	
RTI – Relative temperature index	RTE – Relative thermal endurance index
TI – Temperature index	

Testing Dates (YYYY-MM-DD)	
Date of first test item received	2024-05-21
Dates of tests (beginning/end).....	2024-05-21 / 2024-07-24

GENERAL REMARKS:					
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. This TRF has been created in cooperation with CTL ETF-9 and German National Committee (DKE). The originator's responsibility of this TRF in IECCEB Scheme has been assigned to TÜV SÜD Product Service GmbH. Throughout this report a ☐ comma / ☒ point is used as the decimal separator.					
Manufacturer's Declaration per sub-clause 4.2.5 of IECCEB 02:					
The application for obtaining a CB Test 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).....:			PROMOD ENERJİ ÜRETİM SAN VE TİC A.Ş. Kayseri O.S.B. Mah. 29. Cad. No.27 Melikgazi, KAYSERİ, Türkiye.		
PRODUCT ELECTRICAL RATINGS:					
<u>Monofacial Module:</u>					
Module type	PRD650-132MT	PRD670-132MT	PRD415-120MT	PRD550-110MT	PRD710-132MT
V_{oc} [V] /Tolerance $\pm 3\%$	45.90	46.70	43.27	40.42	48.30
V_{mp} [V]	38.00	38.80	36.23	33.89	40.40
I_{mp} [A]	17.11	17.27	11.47	16.23	17.59
I_{sc} [A] /Tolerance $\pm 3\%$	17.99	18.19	11.95	16.44	18.59
P_{max} [W] /Tolerance $\pm 3\%$	650	670	415	550	710
Maximum system voltage [V]	1500	1500	1500	1500	1500
Maximum Over-Current Protection Rating [A]	35	35	25	25	35
Note: Further qualification for higher and/or lower output power see annex 3					

Bifacial Module:

	Module type	—	—	—	—
STC condition	$P_{\max}$ [W] /Tolerance	—	—	—	—
	V_{oc} [V] /Tolerance	—	—	—	—
	I_{sc} [A] /Tolerance	—	—	—	—
	V_{mp} [V]	—	—	—	—
	I_{mp} [A]	—	—	—	—
BNPI condition	$P_{\max}$ [W] /Tolerance	—	—	—	—
	V_{oc} [V] /Tolerance	—	—	—	—
	I_{sc} [A] /Tolerance	—	—	—	—
Bifaciality coefficient	$\phi P_{\max}$	—	—	—	—
	ϕV_{oc}	—	—	—	—
	ϕI_{sc}	—	—	—	—
	Maximum system voltage [V]	—	—	—	—
	Maximum Over-Current Protection Rating [A]	—	—	—	—

GENERAL PRODUCT INFORMATION AND OTHER REMARKS:Modifications:

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

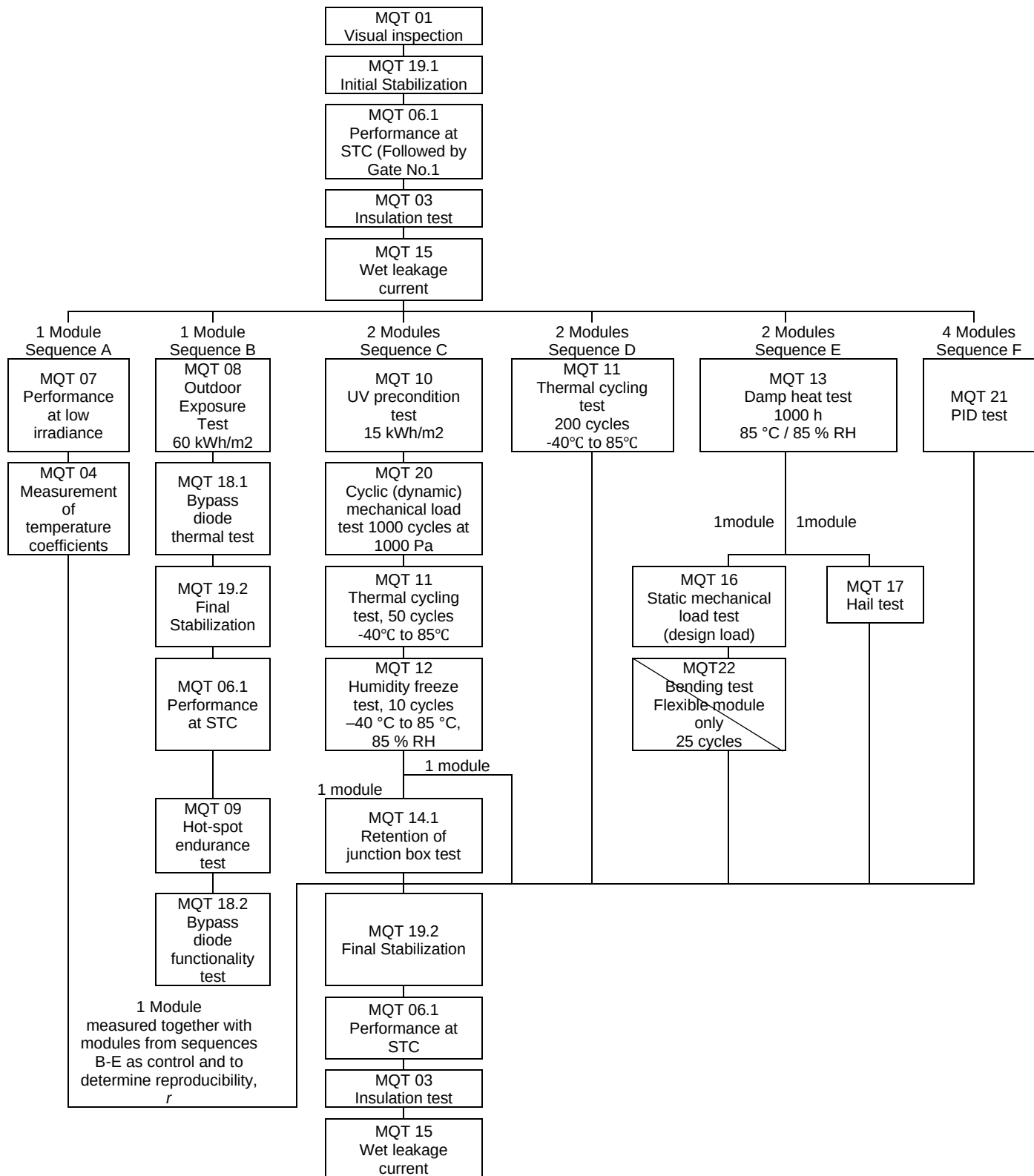
Model differences and modification:

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

Note: This clause refers to modifications extracted from IEC TS 62915

MODULE GROUP ASSIGNMENT:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
01	A	PRD670-132MT	482028I2602062	—
02	B1	PRD670-132MT	482028I2608643	—
46	B1	PRD670-132MT	481202I2603247	—
03	C1	PRD670-132MT	482028I2609007	—
04	C2	PRD670-132MT	482028I2608956	—
05	D1	PRD670-132MT	482028I2607191	—
06	D2	PRD670-132MT	482101I2602055	—
07	E1	PRD670-132MT	482101I2602114	—
08	E2	PRD670-132MT	482101I2602590	—
09	F1	PRD670-132MT	482030I2611194	—
10	F2	PRD670-132MT	482101I2601499	—
11	F3	PRD670-132MT	482101I2601049	—
12	F4	PRD670-132MT	482030I2613395	—
13	Others	PRD710-132MT	481202I2603859	High Power
14	Others	PRD710-132MT	481202I2603516	High Power
15	Others	PRD650-132MT	482029I2602945	Low Power
16	Others	PRD650-132MT	482029I2603422	Low Power
17	Others	PRD415-120MTN	481410I3322058	Low Power
18	Others	PRD415-120MTN	481403I3331328	Low Power
19	Others	PRD550-110MT	471905I4314242	Low Power
20	Others	PRD550-110MT	471905I4313927	Low Power
Supplementary information: Further qualification for higher and/or lower output power see annex 3				
Note (1)	Use the “General product information” field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.			
Note (3)	Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).			
Note (4)	The module numbers/identifiers are set in accordance to IEC TS 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3			

11	TEST FLOW (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible, but must be documented.
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IEC 61215-1			
Clause	Requirement + Test	Result - Remark	Verdict
5. MARKING AND DOCUMENTATION			—
5.1	Name Plate		P
	All electrical data shall be shown as relative to STC (1 000 W/m ² , 25 °C, AM1.5 according to IEC TS 61836), except for bifacial modules where two irradiance levels are required, 1 000 W/m ² and BNPI (higher irradiance at which nameplate verification is performed for bifacial modules, corresponding to 1 000 W/m ² on the module front and 135 W/m ² on the module rear, applied in any method allowed by IEC TS 60904-1-2).		P
	International symbols are used where applicable.		P
	The module includes clear and indelible markings:		P
	a. Name, registered trade name or registered trade mark of manufacturer		N/A
	b. Type or model number designation		P
	c. Serial number (unless marked on other part of product)	Provided under superstrate near the top rail of frame	P
	d. Date and place of manufacture, alternatively serial number allowing to trace the date and place of manufacture;	Serial number allowing to trace the date and place of manufacture	P
	e. Maximum system voltage	1500V DC	P
	f. Class of protection against electrical shock	Class II	P
	g. Voltage at open-circuit or V_{oc} including tolerances. For bifacial modules, open-circuit voltage shall be reported at two irradiance levels. The first required irradiance level is 1 000 W/m ² . The second required irradiance is BNPI		N/A
	h. Current at short-circuit or I_{sc} including tolerances. For bifacial modules, short-circuit current shall be reported at two irradiance levels, defined in 5.1g		N/A
	i. Module maximum power or P_{max} including tolerances. For bifacial modules, P_{max} shall be reported at the two irradiance levels, defined in 5.1g		P
	j. For bifacial modules the following information including tolerances, shall be given on the nameplate: The values for the short-circuit current bifaciality coefficient ϕI_{sc} , the opencircuit voltage bifaciality coefficient ϕV_{oc} , and the maximum power bifaciality coefficient ϕP_{max} , measured at STC as defined in IEC TS 60904-1-2	/	N/A
	k. For flexible modules, the minimum radius of curvature	/	N/A

IEC 61215-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.2	Documentation		P
5.2.1	Minimum requirements		P
	Modules are supplied with documentation describing the methods of electrical and mechanical installation as well as the electrical ratings of the module		P
	The documentation states the class of protection against electrical shock under which the module has been qualified and any specific limitations required for that class.		P
	The documentation assures that installers and operators receive appropriate and sufficient documentation for safe installation, use, and maintenance of the PV modules.		P
5.2.2	Information given in the documentation		P
	a. All information required under 5.1 e) to i)		P
	b. Overcurrent protection device type and rating are e.g. given in IEC 60269-6		P
	Maximum series/parallel module configuration is recommended		P
	c. Manufacturer's stated tolerance for V_{oc} , I_{sc} and maximum power output under standard test conditions		P
	d. Temperature coefficient for voltage at open-circuit		P
	e. Temperature coefficient for maximum power		P
	f. Temperature coefficient for short-circuit current		P
	All electrical data mentioned above shown as relative to standard test conditions (1 000 W/m ² , 25 °C, AM 1,5 according to IEC TS 61836)		P
	g. Performance at low irradiance (MQT 07) is specified		P
	International symbols used where applicable		P
	Compliance checked by inspection and MQT 04 through MQT 07		P
	The electrical documentation includes a detailed description of the electrical installation wiring method to be used		P
	h. The minimum cable diameters for modules intended for field wiring		P
	i. Any limitations on wiring methods and wire management that apply to the wiring compartment or box;		P

IEC 61215-1			
Clause	Requirement + Test	Result - Remark	Verdict
	j. The size, type, material and temperature rating of the conductors to be used		P
	k. Type of terminals for field wiring		P
	l. Specific PV connector model/types and manufacturer to which the module connectors are mated		P
	m. The bonding method(s) to be used (if applicable); all provided or specified hardware is identified in the documentation		P
	n. The type and ratings of bypass diode to be used (if applicable)		P
	o. limitations to the mounting situation (e.g., slope, orientation, mounting means, cooling)		P
	p. A statement indicating the fire rating(s) and the applied standard and the limitations to that rating (e.g., installation slope, sub-structure or other applicable installation information)		P
	q. A statement indicating the design load per each mechanical means for securing the module as evaluated during the static mechanical load test according to MQT 16. At discretion of the manufacturer the test load and/or the safety factor γ_m may be noted, too		P
	The installation instructions include relevant parameters specified by manufacturer or the following statement or the equivalent: <i>"Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of I_{sc} and V_{oc} marked on this module should be multiplied by a factor of 1,25 when determining component voltage ratings, conductor current ratings, and size of controls connected to the PV output."</i>		P
5.2.3	Assembly instructions		P
	Provided with a product shipped in subassemblies, detailed and adequate to the degree required to facilitate complete and safe assembly of the product		P
Supplementary information:None.			

7. PASS CRITERIA			P
7.2	Power output and electric circuitry		—
7.2.1	Verification of rated label values (Gate No. 1)		—

IEC 61215-1						
Clause	Requirement + Test		Result - Remark			Verdict
	Manufacturer's tolerances and Laboratory uncertainties					—
		t_1	t_2	t_3	t_4	—
	manufacturer's rated lower/upper production tolerance in %	3	3	3	/	
		m_1	m_2	m_3		
	measurement uncertainty in % of the laboratory	2.6	2.4	1.0		
	Laboratory reproducibility r:	0.9%				
	After stabilization, each individual module meets the requirements					P
	$P_{\max}$		See Table 03.1, Table 03.3			P
	V_{oc}		See Table 03.1, Table 03.3			P
	I_{sc}:		See Table 03.1, Table 03.3			P
	After stabilization the arithmetic average $\bar{P}_{\max}$ $\bar{P}_{\max}$ of all modules meet the requirements.		See Table 03.1, Table 03.3			P
7.2.2	Maximum power degradation during type approval testing (Gate #2)					P
	At the end of each test sequence or for sequence B after bypass diode test, each test sample meets the requirements for $P_{\max}$					P
7.2.3	Electrical circuitry					P
	Samples do not exhibit an open-circuit during the tests					P
7.3	Visual defects					P
	There is no visual evidence of a major defect.					P
7.4	Electrical safety					P
	The insulation test (MQT 03) requirements are met at the beginning and the end of each sequence		See each Table of the test			P
	The wet leakage current test (MQT 15) requirements met at the beginning and at the end of each sequence		See each Table of the test			P
	Specific requirements of the individual tests are met		See each Table of the test			P
Supplementary information:						

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Clause	Requirement + Test	Result - Remark	Verdict

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

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

Sequence B	1 Module	Sample 2	P
4.8	Outdoor exposure test (MQT 08):	See Table 08	P
4.18.1	Bypass diode thermal test (MQT 18.1)		P
	Maximum allowed junction temperature:		—
	Calculated junction temperature:		—
	Final measurements.....:	See Table 09	P
4.18.2	Bypass diode functionality test (MQT 18.2):	See Table 10	P
4.19.6	Final stabilization (MQT 19.2):	See Table 10.1 – 10.3	P
4.9	Hot spot endurance test (MQT 09):	See Table 11	P

Sequence C	2 Modules	Samples 3,4	P
4.10	UV preconditioning test (MQT 10):	See Table 12.1 - 12.6	P
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	P
4.11	Thermal cycling test 50 cycles (MQT 11).....:	See Table 14	P
4.12	Humidity-freeze test (MQT 12).....:	See Table 15	P

Sequence C1	1 Module	Sample 3	P
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Clause	Requirement + Test	Result - Remark	Verdict
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	P
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	See list of attachments	P

Sequence D	2 Modules	Samples 5,6	P
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	P

Sequence E	2 Modules	Samples 7,8	P
4.13	Damp heat test (MQT 13)	See Table 18	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	P

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

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

Sequence F	4 Modules	Samples 9,10,11,12	P
4.21	Potential induced degradation test (MQT 21)	See Table 22	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.4, 23.6, 23.7	P

	Final measurement	All modules for Sequence C, D, E, F; Control module for Sequence A	P
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	P
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	P
4.3	Insulation test (MQT 03)	See Table 23.9	P
4.15	Wet leakage current test (MQT 15)	See Table 23.10	P

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 01: MQT 01 ini: Initial Visual inspection			—
Test Date [YYYY-MM-DD] :		2024-05-21	—
Sample #	Nature and position of initial findings – comments or attach photos		—
01	No visual defects found		P
46	No visual defects found		P
02	No visual defects found		P
03	No visual defects found		P
04	No visual defects found		P
05	No visual defects found		P
06	No visual defects found		P
07	No visual defects found		P
08	No visual defects found		P
09	No visual defects found		P
10	No visual defects found		P
11	No visual defects found		P
12	No visual defects found		P
Supplementary information: —			

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 02: MQT 19.1 ini: Initial stabilization							—
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							—
Test Date [YYYY-MM-DD]..... :			2024-05-21				—
Test method..... :			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
01	18.37	46.06	16.76	39.78	666.8	78.80	—
02	18.47	46.18	16.81	39.87	670.2	78.57	—
46	18.37	46.04	16.95	39.75	673.8	79.65	—
03	18.40	46.19	16.83	39.87	671.1	78.97	—
04	18.41	46.23	16.88	39.93	674.0	79.18	—
05	18.45	46.12	16.63	39.80	661.9	77.77	—
06	18.30	46.19	16.51	39.96	659.6	78.04	—
07	18.31	46.29	16.60	40.02	664.3	78.37	—
08	18.31	46.25	16.58	39.96	662.5	78.21	—
09	18.39	46.23	16.56	39.93	661.2	77.77	—
10	18.34	46.17	16.57	39.84	660.0	77.94	—
11	18.38	46.13	16.58	39.79	659.8	77.83	—
12	18.28	46.17	16.65	39.83	663.3	78.59	—
Supplementary information:							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							
Test Date [YYYY-MM-DD]..... :			—				—
Test method..... :			☐ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—

IEC 61215-2							
Clause	Requirement + Test				Result - Remark		Verdict
—	—	—	—	—	—	—	—
Supplementary information:							
TABLE 02.3: MQT 06.1 ini: Performance at BNPI (front side irradiance 1 000 W/m², back side irradiance 135 W/m², 25 °C, AM 1.5) before initial stabilization							
Test Date [YYYY-MM-DD]				—			—
Test method				☐ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
Supplementary information:							
TABLE 02.4: MQT 19.1: Initial Stabilization procedure							—
Light exposure method				☐ Solar simulator ☒ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x				1%			
Sample #	01	Test Date (YYYY-MM-DD) start/end.....			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	666.8	—	—
1	5.2	>500	—	2.4	664.8	—	—
2	5.1	>500	—	2.4	663.6	0.48	Yes
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	02	Test Date (YYYY-MM-DD) start/end.....			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)
Initial	—	—	—	—	670.2	—	—

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Clause	Requirement + Test				Result - Remark		Verdict
1	5.2	>500	—	2.4	667.7	—	—
2	5.1	>500	—	2.4	666.4	0.57	Yes
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	46	Test Date (YYYY-MM-DD) start/end..... :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	673.8	—	—
1	5.2	>500	—	2.4	671.9	—	—
2	5.1	>500	—	2.4	671.2	0.39	Yes
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	03	Test Date (YYYY-MM-DD) start/end :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	671.1	—	—
1	5.2	>500	—	2.4	668.4	—	—
2	5.1	>500	—	2.4	667.5	0.54	Yes
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	04	Test Date (YYYY-MM-DD) start/end..... :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	674.0	—	—
1	5.2	>500	—	2.4	672.1	—	—
2	5.1	>500	—	2.4	671.7	0.34	Yes
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	05	Test Date (YYYY-MM-DD) start/end..... :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	661.9	—	—
1	5.2	>500	—	2.4	659.8	—	—

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Clause	Requirement + Test				Result - Remark		Verdict
2	5.1	>500	—	2.4	659.2	0.41	Yes
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	06	Test Date (YYYY-MM-DD) start/end..... :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	659.6	—	—
1	5.2	>500	—	2.4	656.2	—	—
2	5.1	>500	—	2.4	655.9	0.56	Yes
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	07	Test Date (YYYY-MM-DD) start/end..... :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	664.3	—	—
1	5.2	>500	—	2.4	661.4	—	—
2	5.1	>500	—	2.4	660.9	0.51	Yes
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	08	Test Date (YYYY-MM-DD) start/end..... :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	662.5	—	—
1	5.2	>500	—	2.4	660.3	—	—
2	5.1	>500	—	2.4	659.1	0.51	Yes
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	09	Test Date (YYYY-MM-DD) start/end..... :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	661.2	—	—
1	5.2	>500	—	2.4	659.0	—	—
2	5.1	>500	—	2.4	658.7	0.38	Yes

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Clause	Requirement + Test				Result - Remark		Verdict
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	10	Test Date (YYYY-MM-DD) start/end..... :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	660.0	—	—
1	5.2	>500	—	2.4	658.8	—	—
2	5.1	>500	—	2.4	658.1	0.29	Yes
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	11	Test Date (YYYY-MM-DD) start/end..... :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	659.8	—	—
1	5.2	>500	—	2.4	656.8	—	—
2	5.1	>500	—	2.4	656.5	0.50	Yes
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	12	Test Date (YYYY-MM-DD) start/end..... :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	663.3	—	—
1	5.2	>500	—	2.4	660.8	—	—
2	5.1	>500	—	2.4	660.9	0.36	Yes
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Supplementary information: —							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
—	—						
—	—						
—	—						
—	—						

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Clause	Requirement + Test	Result - Remark	Verdict
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
Test method description:—			
Supplementary information: see Annex 3 for verification of this alternative stabilization procedure			

TABLE 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)										
Test Date [YYYY-MM-DD]..... :					2024-06-03					—
$P_{\max}$ lower limit (W)					See table below: $P_{\max}$ [W] – Min calc.					—
$\bar{P}_{\max}$ (lab) lower limit (V)					657.523					—
V_{oc} (lab) upper limit (V)					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A)					See table below: I_{sc} [A] Max. calc.					—
Test method					☒ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
01	18.33	18.682	45.97	46.550	16.71	39.71	663.6	618.759	78.75	P
02	18.40	18.682	46.09	46.550	16.71	39.88	666.4	618.759	78.58	P
46	18.25	18.887	45.98	46.550	16.86	39.81	671.2	618.759	79.99	P
03	18.36	18.682	46.12	46.550	16.75	39.85	667.5	618.759	78.83	P
04	18.38	18.682	46.21	46.550	16.80	39.98	671.7	618.759	79.08	P
05	18.43	18.682	46.04	46.550	16.57	39.78	659.2	618.759	77.68	P
06	18.29	18.682	46.06	46.550	16.43	39.92	655.9	618.759	77.86	P
07	18.27	18.682	46.21	46.550	16.53	39.98	660.9	618.759	78.28	P
08	18.25	18.682	46.19	46.550	16.47	40.02	659.1	618.759	78.19	P
09	18.31	18.682	46.12	46.550	16.50	39.92	658.7	618.759	78.00	P
10	18.32	18.682	46.07	46.550	16.51	39.86	658.1	618.759	77.97	P
11	18.36	18.682	46.04	46.550	16.49	39.81	656.5	618.759	77.66	P
12	18.26	18.682	46.08	46.550	16.59	39.84	660.9	618.759	78.55	P

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Clause	Requirement + Test		Result - Remark		Verdict
Average	—		—	—	—
Supplementary information: The limit values are calculated considering manufacturer's tolerances t of rated nameplate values and laboratory measurement uncertainties m .					

TABLE 03.2: MQT 06.1: Performance at STC after initial stabilization (Back side)										
Test Date [YYYY-MM-DD]..... :					—					—
Test method :					☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
Supplementary information:										

TABLE 03.3: MQT 06.1: Performance at BNPI (front side irradiance 1 000 W/m ² , backside irradiance 135 W/m ² , 25 °C, AM 1.5) after initial stabilization										
Test Date [YYYY-MM-DD]..... :					—					—
P_{max} lower limit (W)					See table below: P_{max} [W] – Min calc.					—
$\bar{P}_{max}$ (lab) lower limit (V)					—					—
V_{oc} (lab) upper limit (V)					See table below: V_{oc} [V] Max. calc.					—
I_{sc} (lab) upper limit (A)					See table below: I_{sc} [A] Max. calc.					—
Test method					☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	P_{max} [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—

IEC 61215-2										
Clause	Requirement + Test						Result - Remark			Verdict
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
Average	—						—	—	—	—
Supplementary information: The limit values are calculated considering manufacturer's tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

TABLE 04: MQT 03: Initial Insulation test				
Test Date [YYYY-MM-DD]		2024-06-03		—
Test Voltage applied [V]		8000/1500		—
Size of module [m²]		3.11		—
Required Resistance [MΩ].....		≥12.86		—
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
01	27890	—	No	P
02	31120	—	No	P
46	28750	—	No	P
03	27440	—	No	P
04	26990	—	No	P
05	32210	—	No	P
06	30210	—	No	P
07	31280	—	No	P
08	28770	—	No	P
09	29110	—	No	P
10	26770	—	No	P
11	28150	—	No	P
12	29870	—	No	P
Supplementary information:				

IEC 61215-2				
Clause	Requirement + Test		Result - Remark	Verdict
TABLE 05: MQT 15: Initial Wet leakage current test				
Test Date [YYYY-MM-DD]		2024-06-03		—
Test Voltage applied [V]		1500		—
Solution temperature [°C].....		23.2		—
Solution resistivity [Ω cm]		1978		—
Size of module [m²]		3.11		—
Sample #	Required Resistance [MΩ]		Measured [MΩ]	Result
01	≥12.86		5611	P
02	≥12.86		7823	P
46	≥12.86		6026	P
03	≥12.86		6338	P
04	≥12.86		5295	P
05	≥12.86		5711	P
06	≥12.86		5926	P
07	≥12.86		6382	P
08	≥12.86		6021	P
09	≥12.86		5955	P
10	≥12.86		6382	P
11	≥12.86		4598	P
12	≥12.86		6332	P
Supplementary information:				

IEC 61215-2						
Clause	Requirement + Test			Result - Remark		Verdict
TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)						
Test Date [YYYY-MM-DD]				2024-06-04		—
Test method ...:	☐ Outdoor measurement					—
	Ambient air temperature [°C]:		—			
	Irradiance [W/m²]:		—			
	Module temperature [°C]:		—			
	☒ Data corrected to a 25°C cell temperature and 200 W/m² irradiance					—
	☐ Directly measured					
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]
01	3.64	43.10	3.49	36.95	128.86	82.24
Supplementary information: —						

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

TABLE 07: MQT 04 - Measurement of temperature coefficients				
Test Date [YYYY-MM-DD]		2024-06-04		
Ambient air temperature [°C] high/low		25.8 / 24.6		
Irradiance [W/m ²] high/low		1000.2/999.8		
Module temperature [°C] high/low		65.1 / 25.0		
Sample #	α [%/°C]	β [%/°C]	δ [%/°C]	
				—

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Clause	Requirement + Test		Result - Remark	Verdict
01	0.0679	-0.2819	-0.5440	—
Supplementary information:—				

TABLE 08: MQT 08 - Outdoor exposure test		
Test Date [YYYY-MM-DD] start/end	2024-06-04/2024-07-04	—
Sample #	02	—
Total irradiation dosage [kWh/m²]	60.0	—
Angle of tilt the test module	40.2	—
Electrical load:	☐ Restive load ☒ MPPT	—
Supplementary information:		

Table 08.1: MQT 01: Visual inspection after outdoor exposure test		
Test Date [YYYY-MM-DD]: 2024-07-04		—
Sample #	Nature and position of initial findings – comments or attach photos	—
02	No major visual defects	P
Supplementary information:		

Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test				
Test Date [YYYY-MM-DD]		2024-07-04		—
Test Voltage applied [V]		1500		—
Solution temperature [°C]		22.9		—
Size of module [m²]		3.11		—
Solution resistivity [Ω cm]		2321		—
Sample #	Measured [MΩ]		Limit [MΩ]	Result
02	6238		≥12.86	P
Supplementary information: None.				

Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional			
Test Date [YYYY-MM-DD]	2024-07-04		—
Module temperature [°C]	25		—
Irradiance [W/m ²]	1000		—

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Clause	Requirement + Test			Result - Remark		Verdict
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]
02	18.29	45.92	16.58	39.81	660.2	78.61
Supplementary information: None.						

Table 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional					
Test Date [YYYY-MM-DD]		—			—
Test Voltage applied [V]		—			—
Size of module [m ²]		—			—
Required Resistance [MΩ]		—			—
Sample #	Measured	Required (MΩ)	Dielectric breakdown		Result
	(MΩ)	(MΩ)	Yes (description)	No	
—	—	—	—	—	—
Supplementary information: None.					

TABLE 09: MQT 18: Bypass diode thermal test					
Test Date [YYYY-MM-DD] start/end	2024-07-05				—
Sample #	02				—
Module temperature [°C].....	75				—
Number of diodes in junction box	3				—
Diode manufacturer	N/A				—
Diode type designation	N/A				—
Max. permissible junction temperature, T_{Jmax} [°C] (according to diode datasheet)	200				—
Detailed description of sample preparation procedure	performed on full module				—
Step 1, Determination of V_D versus T_J characteristic					—
	30 ± 2 °C	50 ± 2 °C	70 ± 2 °C	90 ± 2 °C	
Ambient temperature of the junction box ... :	30.0	50.0	70.0	90.0	
Pulsed current.....	18.3	18.3	18.3	18.3	
Voltage drop, V_D [V]	0.408	0.402	0.400	0.395	
	0.405	0.400	0.396	0.392	
	0.411	0.407	0.404	0.400	
V_D versus T_J characteristic	$V_D=0.4136 - 0.0002T_J$ $V_D=0.4112 - 0.0002T_J$ $V_D=0.4163 - 0.0002T_J$				—
Max. permissible junction temperature T_{Jmax} [°C]	200				—

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Clause	Requirement + Test	Result - Remark		Verdict
(according to diode datasheet) :				
Step 2, Bypass diode thermal test				
	Diode 1	Diode 2	Diode 3	Result
Current flow applied [A] :	18.3	18.3	18.3	—
Max. diode surface temperature allowed T_{jmax} [°C] :	200	200	200	—
Voltage drop, V_D [V] after 1h..... :	0.378	0.380	0.378	—
Calculated max. junction temperature T_{jcalc} [°C] :	178.0	156.0	191.5	P
$T_{Jcalc} < T_{Jmax}$ (test passed)? yes/no :	Yes	Yes	Yes	P
Current flow ($1.25 * I_{sc}$) [A] :	22.79	22.79	22.79	—
Bypass diode remain(s) functional (yes/no) :	Yes	Yes	Yes	P
Remarks: See Table 10 for the test details of bypass diode functionality test. 3 Diodes are considered as representative number. These diodes have to be selected as worst case. In case that additional bypass diodes tests are performed the results shall be listed in an attachment. For bifacial modules, use the value of the short-circuit current at elevated irradiance BSI (equivalent to 1 000 W/m ² on the front side and 300 W/m ² on the back side). Extrapolate I_{sc-BSI} , these quantities are combined as follows: $I_{sc-BSI}=I_{sc-BNPI}+(I_{sc-BNPI}-I_{sc})(G_{BSI}-G_{BNPI})/(G_{BNPI}-1\ 000)$, $G_{BSI}=1\ 000+300\phi$, $G_{BNPI}=1\ 000+135\phi$, $\phi=Min(\phi/I_{sc}, \phi/P_{max})$				

TABLE 09.1: MQT 01 - Visual inspection after bypass diode thermal test		
Test Date [YYYY-MM-DD]	2024-07-05	—
Sample #	Nature and position of initial findings – comments or attach photos	—
02	No major visual defects	P
Supplementary information: None.		

TABLE 09.2: MQT 15 - Wet leakage current test after bypass diode thermal test			
Test Date [YYYY-MM-DD]	2024-07-05	—	
Test Voltage applied [V]	1500	—	
Solution temperature [°C]	23.1	—	
Size of module [m ²]	3.11	—	
Solution resistivity [Ω cm].....	2112	—	
Sample #	Measured [M Ω]	Limit [M Ω]	Result
02	7712	≥ 12.86	P
Supplementary information: None.			

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Clause	Requirement + Test			Result - Remark			Verdict
TABLE 09.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional							
Test Date [YYYY-MM-DD].....:			—				—
Module temperature [°C].....:			—				—
Irradiance [W/m²):			—				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	—
—	—	—	—	—	—	—	—
Supplementary information: None.							

TABLE 09.4: MQT 03 - Insulation test after bypass diode thermal test - Optional					
Test Date [YYYY-MM-DD].....:		—			—
Test Voltage applied [V]		—			—
Size of module [m²]		—			—
Required Resistance [MΩ].....:		—			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
—	—	—	—	—	—
Supplementary information: None.					

TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test					
Test Date [YYYY-MM-DD]			2024-07-05		—
☐ Method A					—
Ambient temperature [°C]			—		—
Current flow applied [A]			—		—
Sample #	VFM	VFM _{rated}	VFM = (N × VFM _{rated}) ± 10 %		Result
—	—	—	☐ Yes ☐ No		—
Supplementary information: None.					
☒ Method B					—
	IV curve after shading				Result

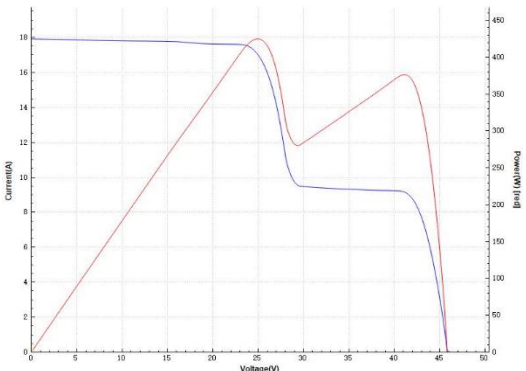
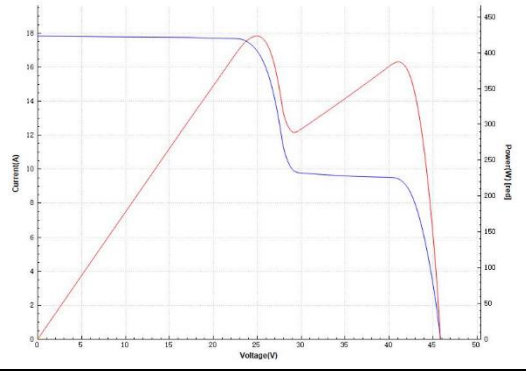
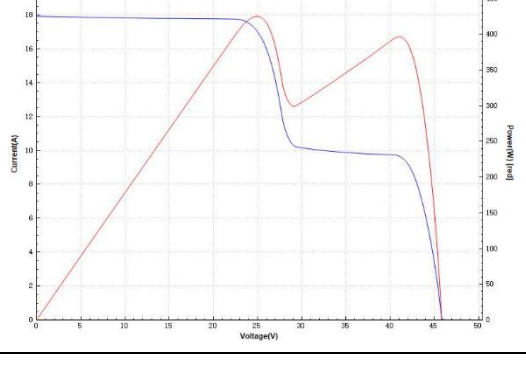
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Clause	Requirement + Test	Result - Remark	Verdict
Diode 1			P
Diode 2			P
Diode 3			P
Supplementary information:None.			

TABLE 10.1: MQT 19.2: Final stabilization							
TABLE 10.2: MQT 06.1: Performance at STC before final stabilization							
Test Date [YYYY-MM-DD].....:				2024-07-05			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	—
02	18.29	45.92	16.58	39.81	660.2	78.61	—
Supplementary information:							

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE 10.3: MQT 19.2 Final Stabilization procedure							
Light exposure method				☐ Solar simulator ☒ Natural sunlight		—	
Stabilization criterion x per IEC 61215-1-x ..				1%		—	
Sample #	02	Test Date (YYYY-MM-DD) start/end			2024-07-05/2024-07-07		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	P _{max} – P _{min} / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	—	—	—
1	5.3	>500	—	2.4	660.2	—	—
2	5.3	>500	—	2.4	659.3	0.14	Yes
Supplementary information:—							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
—	—						
—	—						
—	—						
—	—						
Test method description:—							
Supplementary information: See Annex 3 for verification of this alternative stabilization procedure							

TABLE 11: MQT 09 - Hot-spot endurance test		
Test Date [YYYY-MM-DD] start/end	2024-07-08 / 2024-07-10	—
Sample #	02	—
Procedure of technology	☒ wafer-based technologies (WBT) MQT 09.1 ☐ monolithically integrated (MLI) thin film technologies MQT 09.2	—
Cell interconnection circuit	☐ S ☒ SP ☐ PS	—
Type of light source	☐ Pulse solar simulator ☒ Steady state solar simulator ☐ Natural sunlight	—
Module temperature at thermal equilibrium [°C] .:	52.6	—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						
Selected hot-spot cells	Low	Low	Low	High	Permanent	—
	B1	M3	S1	D4	—	

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Clause	Requirement + Test				Result - Remark	Verdict
Shading rate [%].....:	45	50	50	50	—	—
Max. measured cell temperature in each cell [°C]:	151	149	155	159	—	—
Test duration of each shading [h]	1	1	1	1	—	—
Irradiance during shading [W/m ²]	1000	1000	1000	1000	—	—
Supplementary information: For bifacial modules, determination of the cell shading percent and the prolonged exposure are performed at the elevated irradiance BSI. If double-side illumination is used to produce BSI, both the back and the front of the cell are shaded in the same way. During cell selection, any cell that is permanently shaded by a module feature (such as the junction box) is added to the list of selected cells Superstrate						
Test Date [YYYY-MM-DD] start/end	2024-07-08 / 2024-07-10					—
Sample #	46					—
Procedure of technology	☒ wafer-based technologies (WBT) MQT 09.1 ☐ monolithically integrated (MLI) thin film technologies MQT 09.2					—
Cell interconnection circuit	☐ S ☒ SP ☐ PS					—
Type of light source	☐ Pulse solar simulator ☒ Steady state solar simulator ☐ Natural sunlight					—
Module temperature at thermal equilibrium [°C] .:	54.2					—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						
Selected hot-spot cells.....:	Low	Low	Low	High	Permanent	—
	4V	1V	1G	5J	—	
Shading rate [%].....:	55	55	55	50	—	—

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information: —

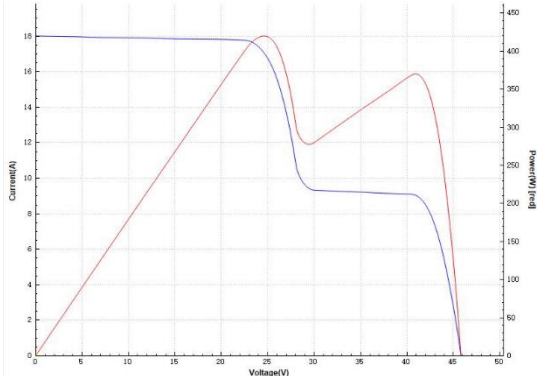
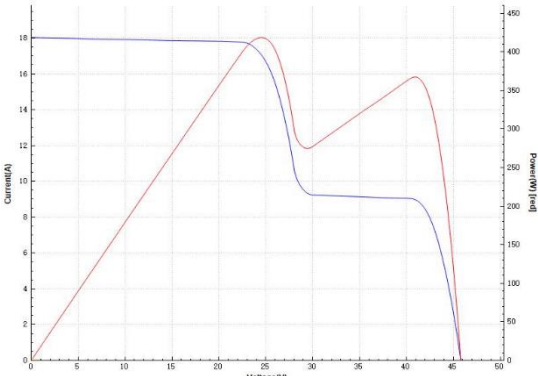
TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test							
Test Date [YYYY-MM-DD]				2024-07-10			—
Module temperature [°C]				Corrected to 25			—
Irradiance [W/m ²]				Corrected to 1000			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	—
02	18.26	45.87	16.55	39.71	657.4	78.48	—
46	18.18	45.81	16.79	39.72	666.8	80.07	—
Supplementary information: —							

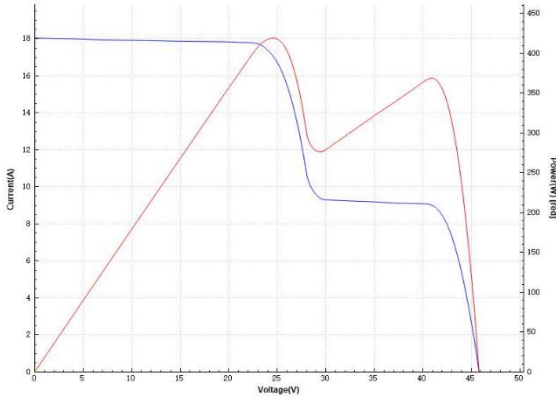
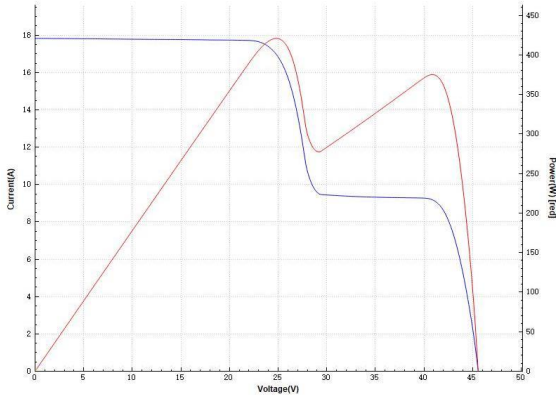
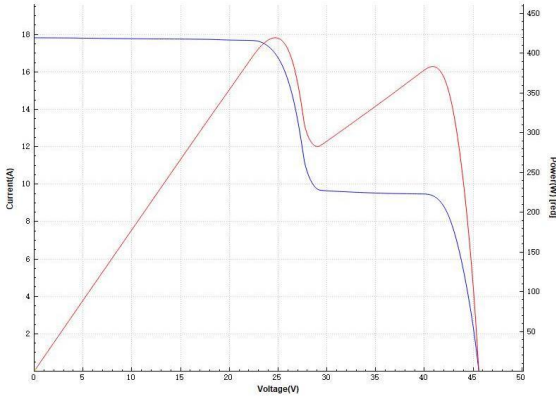
TABLE 11.5: MQT 02 - Maximum power determination after hot-spot endurance test (at BNPI)							
Test Date [YYYY-MM-DD]				—			—
Module temperature [°C]				—			—
Irradiance [W/m ²]				—			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
Supplementary information: —							

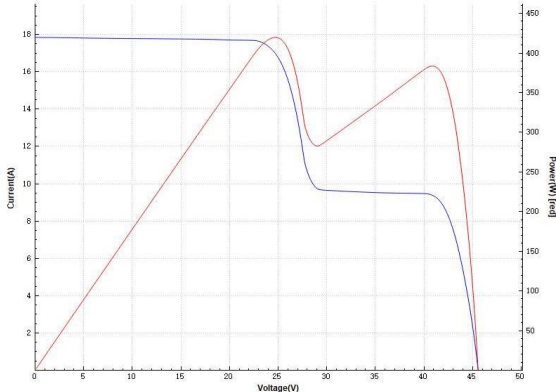
TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test					
Test Date [YYYY-MM-DD]				2024-07-11	
Test Voltage applied [V]				8000/1500	
Size of module [m ²]				3.11	
Required Resistance [MΩ]				≥12.86	
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
02	31440	≥12.86	—	No	P
46	28770	≥12.86	—	No	P

TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test		
Test Date [YYYY-MM-DD]		2024-07-11
Test Voltage applied [V]		1500
Solution temperature [°C]		22.6

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Clause	Requirement + Test		Verdict
Size of module [m²].....:		3.11	—
Solution resistivity [Ω cm]		2107	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
02	7029	≥12.86	P
46	8716	≥12.86	P
Supplementary information: —			

TABLE 11.8: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test					
Test Date [YYYY-MM-DD].....:		2024-07-11			—
☐ Method A					—
Ambient temperature [°C]		—			—
Current flow applied [A]		—			—
Sample #	VFM	VFMrated	VFM = (N × VFMrated) ± 10 %		Result
—	—	—	☐ Yes ☐ No		—
Supplementary information:—					
☐ Method B					—
02#	IV curve after shading				Result
Diode 1					P
Diode 2					P

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Clause	Requirement + Test	Result - Remark	Verdict
Diode 3			P
46#			
Diode 1			P
Diode 2			P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
Diode 3			P

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			
Test Date (YYYY-MM-DD) start/end	2024-06-04/2024-06-08		—
Module temperature [°C]	60.2		—
UV irradiance (280-400nm) [W/m²]	139.2		—
UV dose (280-320nm) [kWh/ m²]	15		—
Module operation condition	☒ Short circuited ☐ Open circuited		—
Supplementary information:			

TABLE 12.2: MQT 10 - UV preconditioning test (Back side)			
Test Date (YYYY-MM-DD) start/end	—		—
Module temperature [°C]	—		—
UV irradiance (280-400nm) [W/m²]	—		—
UV dose (280-320nm) [kWh/ m²]	—		—
Module operation condition	☐ Short circuited ☐ Open circuited		—
Supplementary information: For bifacial modules repeat the procedure of UV irradiation on the rear-side of the modules.			

TABLE 12.3: MQT 01 - Visual inspection after UV preconditioning test			
Test Date [YYYY-MM-DD]	2024-06-08		—
Sample #	Nature and position of initial findings – comments or attach photos		—
03	No major visual defects found		P
04	No major visual defects found		P
TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			
Test Date [YYYY-MM-DD]	2024-06-08		—
Test Voltage applied [V]	1500		—
Solution temperature [°C]	22.7		—
Size of module [m²]	3.11		—
Solution resistivity [Ω cm]	2239		—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
03	5906	≥12.86	P
04	5802	≥12.86	P
Supplementary information: —			

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Clause	Requirement + Test			Result - Remark			Verdict
TABLE 12.5: MQT 02 – Max. power determination after UV preconditioning test - Optional							
Test Date [YYYY-MM-DD]				2024-06-08			—
Module temperature [°C]				25			—
Irradiance [W/m²]				1000			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
03	18.37	46.12	16.71	39.86	666.2	78.64	—
04	18.38	46.17	16.79	39.94	670.6	79.02	—
Supplementary information: —							

TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional					
Test Date [YYYY-MM-DD].....:			—		—
Test Voltage applied [V]			—		—
Size of module [m²]			—		—
Required Resistance [MΩ].....:			—		—
Sample #	Measured		Dielectric breakdown		Result
	[MΩ]		Yes (description)	No	
—	—	—	—	—	—
—	—	—	—	—	—
Supplementary information: —					

TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test			
Test Date [MM/DD/YYYY]		2024-06-11/2024-06-13	—
Sample #		03,04	—
Temperature of tested module(°C):		28.1-28.3	—
Maximum pressure (Pa) :		1000	—
Pressure tolerance(Pa) :		± 100	—
Monitoring current (A) :		0.1	—
Rate per minute(cycles) :		4	—
Number of cycles		1000	—
Pressure provider (Air pressure or vacuum)		Air pressure	—
Cell and alive part broken/ not		Not	P
Current continuous (continuous/ disconnection occurred)		Continuous	P
Supplementary information:—			

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Clause	Requirement + Test		Result - Remark	Verdict
TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test				
Test Date [YYYY-MM-DD].....:		2024-06-13		—
Sample #	Nature and position of initial findings – comments or attach photos			—
03	No major visual defects found			P
04	No major visual defects found			P
Supplementary information: —				

TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			
Test Date [YYYY-MM-DD]		2024-06-13	—
Test Voltage applied [V]		1500	—
Solution temperature [°C]		22.7	—
Size of module [m²]		3.11	—
Solution resistivity [Ω cm]		2231	—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
03	5323	≥12.86	P
04	4997	≥12.86	P
Supplementary information: —			

TABLE 14: MQT 11 - Thermal cycling 50 test			
Test Date [YYYY-MM-DD] start/end		2024-06-14/ 2024-06-22	—
Total cycles (50)		50	—
Weight attached (N)		5	—
Applied current (A)	During the heat up cycle from -40 °C to 80 °C	18.3	—
	Other stages	0.1	—
Dwell time at high temperature.....		20min	—
Dwell time at low temperature.....		20min	—
Sample #	Open circuits (yes/no)		—
03	No		P
04	No		P
Supplementary information:—			

TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test			
Test Date [YYYY-MM-DD]		2024-06-22	—

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Clause	Requirement + Test	Result - Remark	Verdict
Sample #	Nature and position of initial findings – comments or attach photos		—
03	No major visual defects found		P
04	No major visual defects found		P
Supplementary information: —			

TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			
Test Date [YYYY-MM-DD]		2024-06-22	—
Test Voltage applied [V]		1500	—
Solution temperature [°C]		22.7	—
Size of module [m²]		3.11	—
Solution resistivity [Ω cm]		2397	—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
03	6012	≥12.86	P
04	5992	≥12.86	P
Supplementary information: —			

TABLE 14.3: MQT 03 – Max. power determination after thermal cycling 50 test - Optional						
Test Date [YYYY-MM-DD]		2024-06-22				—
Module temperature [°C]		25				—
Irradiance [W/m²]		1000				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]
03	18.28	45.93	16.63	39.74	661.0	78.73
04	18.27	46.09	16.72	39.84	666.1	79.11
Supplementary information: —						

TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional				
Test Date [YYYY-MM-DD]		—		—
Test Voltage applied [V]		—		—
Size of module [m²]		—		—
Required Resistance [MΩ]		—		—
Sample #	Measured	Dielectric breakdown		Result
	[MΩ]	Yes (description)	No	
—	—	—	—	—
—	—	—	—	—

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information: —

TABLE 15: MQT 12 - Humidity freeze 10 test			—
Test Date [YYYY-MM-DD] start/end	2024-06-24 / 2024-07-04		—
Total cycles (10)	10		—
Applied current (A)	0.1		—
Dwell time at high temperature	20.5h		—
Dwell time at low temperature.....	35min		—
Sample #	Open circuits (yes/no)		—
03	No		P
04	No		P

Supplementary information:—

TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test			—
Test Date [YYYY-MM-DD]	2024-07-04		—
Sample #	Nature and position of initial findings – comments or attach photos		—
03	No major visual defects found		P
04	No major visual defects found		P

Supplementary information: —

TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test				—
Test Date [YYYY-MM-DD]	2024-07-04			—
Test Voltage applied [V]	1500			—
Solution temperature [°C].....	22.5			—
Size of module [m²]	3.11			—
Solution resistivity [Ω cm].....	2107			—
Sample #	Measured [MΩ]	Limit [MΩ]	Result	
03	4975	≥12.86	P	
04	6233	≥12.86	P	

Supplementary information: —

TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test -Optional			—
Test Date [YYYY-MM-DD]	2024-07-04		—
Module temperature [°C].....	25		—

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Clause	Requirement + Test			Result - Remark		Verdict
Irradiance [W/m²):			1000			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]
03	18.21	45.87	16.55	39.67	656.5	78.60
04	18.18	45.96	16.65	39.72	661.3	79.15
Supplementary information: —						

TABLE 15.4: MQT 03 Insulation test after humidity freeze 10 test -Optional					—
Test Date [YYYY-MM-DD]		—			—
Test Voltage applied [V]		—			—
Size of module [m ²]		—			—
Required Resistance [MΩ]		—			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
—	—	—	—	—	—
—	—	—	—	—	—
Supplementary information: —					

TABLE 16: MQT 14.1 Retention of junction box on mounting surface			—
Test Date [YYYY-MM-DD] start/end		2024-07-04	—
Sample #	03		—
Supplementary information: —			

TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface		—
Test Date [YYYY-MM-DD] : 2024-07-04		—
Sample #	Nature and position of initial findings – comments or attach photos	—
03	No major visual defects found	P
Supplementary information: —		

TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface					—
Test Date [YYYY-MM-DD]		2024-07-04			—
Test Voltage applied [V]		1500			—
Solution temperature [°C]		23.7			—
Size of module [m ²]		3.11			—

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Clause	Requirement + Test	Result - Remark	Verdict
Solution resistivity [Ω cm]..... :		2039	—
Sample #	Measured [$M\Omega$]	Limit [$M\Omega$]	Result
03	5711	≥ 12.86	P
Supplementary information: —			

TABLE 17: MQT 11 - Thermal cycling 200 test				
Test Date [YYYY-MM-DD] start/end		2024-06-04/2024-07-06		—
Total cycles (200)		200		—
Weight attached (N)		5		—
Applied current (A)		During the heat up cycle from –40 °C to 80 °C	18.3	—
		Other stages	0.1	—
Dwell time at high temperature		20min		—
Dwell time at low temperature.....		20min		—
Sample #	Open circuits (yes/no)			—
05	No			P
06	No			P
Supplementary information:—				

TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test		—
Test Date [YYYY-MM-DD].....: 2024-07-06		—
Sample #	Nature and position of initial findings – comments or attach photos	—
05	No major visual defects found	P
06	No major visual defects found	P
Supplementary information:—		

TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test				—
Test Date [YYYY-MM-DD]		2024-07-06		—
Test Voltage applied [V]		1500		—
Solution temperature [°C].....		22.3		—
Size of module [m^2]		3.11		—
Solution resistivity [Ω cm].....		1906		—
Sample #	Measured [$M\Omega$]	Limit [$M\Omega$]	Result	
05	5038	≥ 12.86	P	
06	5112	≥ 12.86	P	

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Clause	Requirement + Test	Result - Remark	Verdict
Supplementary information: —			

TABLE 18: MQT 13 - Damp heat 1000 test			
Test Date [YYYY-MM-DD] start/end	2024-06-04/2024-07-16		—
Total hours (1000h)	1000		—
Sample #	Open circuits (yes/no)		—
07	No		P
08	No		P
Supplementary information:—			

TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			
Test Date [YYYY-MM-DD]	2024-07-16		—
Sample #	Nature and position of initial findings – comments or attach photos		—
07	No major visual defects found		P
08	No major visual defects found		P
Supplementary information: —			

TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test				
Test Date [YYYY-MM-DD]	2024-07-16			—
Test Voltage applied [V]	1500			—
Solution temperature [°C]	23.5			—
Size of module [m²]	3.11			—
Solution resistivity [Ω cm]	2037			—
Sample #	Measured [MΩ]	Limit [MΩ]		Result
07	4399	≥12.86		P
08	5933	≥12.86		P
Supplementary information: —				

TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional								
Test Date [YYYY-MM-DD]	2024-07-16							—
Module temperature [°C]	25							—
Irradiance [W/m²]	1000							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]		Result
07	18.09	45.93	16.27	39.71	646.1	77.76		—
08	18.11	45.87	16.20	39.79	644.6	77.60		—

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information: —

TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional					
Test Date [YYYY-MM-DD]					—
Test Voltage applied [V]					—
Size of module [m ²]					—
Sample #	Measured	Required Resistance	Dielectric breakdown		Result
	[MΩ]	[MΩ]	Yes (description)	No	
—	—	—	—	—	—
—	—	—	—	—	—
Supplementary information: —					

TABLE 19: MQT 16 Static mechanical load test				
Sample # :		07		—
Design load(front side/ back side).....		2400/1600		—
Safety factors		1.5		—
Test Date [YYYY-MM-DD]		2024-07-17		—
Mounting method		Clamps mounting (4 points)		—
Load applied to.....		front side	back side	—
Mechanical load [Pa].....		3600	2400	—
First cycle time (start/end).....		9:30 / 10:30	10:30 / 11:30	—
Intermittent open-circuit (yes/no)		No	No	P
Second cycle time (start/end)		11:30 / 12:30	12:30 / 13:30	—
Intermittent open-circuit (yes/no)		No	No	P
Third cycle time (start/end)		13:30 / 14:30	14:30 / 15:30	—
Intermittent open-circuit (yes/no)		No	No	P
Supplementary information: may need to be performed with each mounting situation.				

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test		
Test Date [YYYY-MM-DD].....:		2024-07-17
Sample #	Nature and position of initial findings – comments or attach photos	—
07	No major visual defects found	P
Supplementary information: —		

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			
Test Date [YYYY-MM-DD]	2024-07-17		—
Test Voltage applied [V]	1500		—
Solution temperature [°C]	22.8		—
Size of module [m ²]	3.11		—
Solution resistivity [Ω cm]	1976		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
07	5023	≥12.86	P
Supplementary information: —			

TABLE 20: MQT 22 Bending test			
Test Date [YYYY-MM-DD]	—		—
Sample # :	—		—
Specified radius of curvature	—		—
Bending radius	—		—
Total cycles	—		—
Intermittent open-circuit (yes/no)	—		—
Supplementary information: may need to be performed with each mounting situation			

TABLE 20.1: MQT 01 - Visual inspection after bending test			
Test Date [YYYY-MM-DD]	—		—
Sample #	Nature and position of initial findings – comments or attach photos		—
—	—		—
Supplementary information: —			

TABLE 20.2: MQT 15 - Wet leakage current test after bending test			
Test Date [YYYY-MM-DD]	—		—
Test Voltage applied [V]	—		—
Solution temperature [°C]	—		—
Size of module [m ²]	—		—
Solution resistivity [Ω cm]	—		—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
—	—	—	—
Supplementary information: —			

IEC 61215-2							
Clause	Requirement + Test				Result - Remark		Verdict
TABLE 21: MQT 17 - Hail impact test							
Test Date [YYYY-MM-DD]..... :		2024-07-17					—
Sample #		08					—
Ice ball size [mm] :	1	2	3	4	5	6	—
	24.72	24.55	24.89	24.92	24.58	24.62	
	7	8	9	10	11	—	
	24.78	24.92	24.56	24.62	24.89	—	
Ice ball weight [g] :	1	2	3	4	5	6	—
	7.22	7.25	7.31	7.32	7.45	7.40	
	7	8	9	10	11	—	
	7.18	7.26	7.42	7.33	7.40	—	
Ice ball velocity [m/s]..... :	1	2	3	4	5	6	—
	23.45	22.05	23.02	23.92	22.18	22.74	
	7	8	9	10	11	—	
	22.56	23.92	24.01	23.75	22.69	—	
Number of impact locations :		11					—
TABLE 21.1: MQT 01 - Visual inspection after hail impact test							
Test Date [YYYY-MM-DD]..... :		2024-07-17					—
Sample #	Nature and position of initial findings – comments or attach photos					—	
08	No major visual defects found					P	
Supplementary information: —							

TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test				
Test Date [YYYY-MM-DD]..... :		2024-07-17		—
Test Voltage applied [V]..... :		1500		—
Solution temperature [°C]..... :		22.9		—
Size of module [m²] :		3.11		—
Solution resistivity [Ω cm] :		2037		—
Sample #	Measured [MΩ]		Required Resistance [MΩ]	Result
08	6223		≥12.86	P
Supplementary information: —				

TABLE 22: MQT 21 -Potential induced degradation test							—
Test Date [MM/DD/YYYY] start/end.....	2024-06-04/2024-06-09						—

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Clause	Requirement + Test		Result - Remark	Verdict	
Chamber air temperature (°C) :				85	—
Chamber relative humidity (% RH) :				85	—
Test duration hours (h) :				96	—
Sample #	Applied voltage stress (V) and polarities				—
09	1500/+				P
10	1500/+				P
11	1500/-				P
12	1500/-				P
Supplementary information: —					

TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test		
Test Date [YYYY-MM-DD]: 2024-06-09		—
Sample #	Nature and position of initial findings – comments or attach photos	—
09	No major visual defects found	P
10	No major visual defects found	P
11	No major visual defects found	P
12	No major visual defects found	P
Supplementary information: —		

TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test				
Test Date [YYYY-MM-DD]..... :		2024-06-09		—
Test Voltage applied [V]..... :		1500		—
Solution temperature [°C]..... :		22.8		—
Size of module [m²] :		3.11		—
Solution resistivity [Ω cm] :		1937		—
Sample #	Measured [MΩ]		Required Resistance [MΩ]	Result
09	5939		≥12.86	P
10	5029		≥12.86	P
11	6233		≥12.86	P
12	4298		≥12.86	P
Supplementary information: —				

IEC 61215-2							
Clause	Requirement + Test				Result - Remark		Verdict
TABLE 23: MQT 19.2: Final stabilization							
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization							
Test Date [YYYY-MM-DD]..... :			2024-07-17				—
Test method..... :			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
01	18.35	45.98	16.70	39.69	662.9	78.57	—
03	18.21	45.87	16.55	39.67	656.5	78.60	—
04	18.18	45.96	16.65	39.72	661.3	79.15	—
05	18.29	45.88	16.43	39.83	654.4	77.98	—
06	18.14	45.89	16.34	39.82	650.7	78.16	—
07	18.04	45.95	16.24	39.74	645.4	77.86	—
08	18.07	45.82	16.18	39.81	644.1	77.80	—
09	18.16	45.91	16.34	39.74	649.4	77.89	—
10	18.12	45.87	16.32	39.71	648.1	77.97	—
11	18.09	45.83	16.23	39.67	643.8	77.66	—
12	18.06	45.79	16.31	39.71	647.7	78.32	—
46	18.18	45.81	16.79	39.72	666.8	80.07	—
Supplementary information:—							

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

TABLE 23.2: MQT 19.2 Final Stabilization procedure							
☒ IEC 61215-1-1 ☐ IEC 61215-1-2 ☐ IEC 61215-1-3 ☐ IEC 61215-1-4							
Light exposure method:				☐ Solar simulator ☒ Natural sunlight			
Stabilization criterion x per IEC 61215-1-x :				1%			
Sample #	01	Test Date (YYYY-MM-DD) start/end...:			2024-07-17/2024-07-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	662.9	—	—
1	5.0	>500	—	2.4	662.0	—	Yes
2	5.0	>500	—	2.4	661.5	0.18	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	03	Test Date (YYYY-MM-DD) start/end			2024-07-17/2024-07-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	656.5	—	—
1	5.0	>500	—	2.4	656.0	—	Yes
2	5.0	>500	—	2.4	655.7	0.13	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	04	Test Date (YYYY-MM-DD) start/end			2024-07-17/2024-07-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	661.3	—	—
1	5.0	>500	—	2.4	660.9	—	Yes
2	5.0	>500	—	2.4	660.4	0.14	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	05	Test Date (YYYY-MM-DD) start/end...:			2024-07-17/2024-07-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	654.4	—	—

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Clause	Requirement + Test				Result - Remark		Verdict
1	5.0	>500	—	2.4	653.3	—	Yes
2	5.0	>500	—	2.4	652.7	0.26	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	06	Test Date (YYYY-MM-DD) start/end			2024-07-17/2024-07-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	650.7	—	—
1	5.0	>500	—	2.4	649.5	—	Yes
2	5.0	>500	—	2.4	648.9	0.27	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	07	Test Date (YYYY-MM-DD) start/end..... :			2024-07-17/2024-07-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	645.4	—	—
1	5.0	>500	—	2.4	644.7	—	Yes
2	5.0	>500	—	2.4	644.3	0.17	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	08	Test Date (YYYY-MM-DD) start/end			2024-07-17/2024-07-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	644.1	—	—
1	5.0	>500	—	2.4	643.9	—	Yes
2	5.0	>500	—	2.4	643.6	0.09	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	09	Test Date (YYYY-MM-DD) start/end			2024-07-17/2024-07-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	649.4	—	—
1	5.0	>500	—	2.4	648.5	—	Yes

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Clause	Requirement + Test				Result - Remark		Verdict
2	5.0	>500	—	2.4	647.8	0.25	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	10	Test Date (YYYY-MM-DD) start/end...:			2024-07-17/2024-07-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	648.1	—	—
1	5.0	>500	—	2.4	647.4	—	Yes
2	5.0	>500	—	2.4	647.1	0.15	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	11	Test Date (YYYY-MM-DD) start/end			2024-07-17/2024-07-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	643.8	—	—
1	5.0	>500	—	2.4	643.0	—	Yes
2	5.0	>500	—	2.4	642.3	0.23	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	12	Test Date (YYYY-MM-DD) start/end.....:			2024-07-17/2024-07-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	647.7	—	—
1	5.0	>500	—	2.4	647.1	—	Yes
2	5.0	>500	—	2.4	646.7	0.16	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	46	Test Date (YYYY-MM-DD) start/end			2024-07-17/2024-07-22		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} - P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	666.8	—	—
1	5.0	>500	—	2.4	666.2	—	Yes
2	5.0	>500	—	2.4	665.9	0.14	—

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Clause	Requirement + Test					Result - Remark	Verdict
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Supplementary information: —							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						
—	—						
—	—						
—	—						
—	—						
Test method description:—							
Supplementary information: see Annex 3 for verification of this alternative stabilization procedure							

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

IEC 61215-2										
Clause	Requirement + Test						Result - Remark	Verdict		
—	—	—	—	—	—	—	—	—		
Supplementary information:—										
☐ Method 2									—	
Performance at STC before final stabilization— for monofacial modules									—	
Test Date [YYYY-MM-DD]				—						—
Test method				☐ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
Performance at BNPI before final stabilization — for bifacial modules									—	
Test Date [YYYY-MM-DD]				—						—
Test method				☐ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to destabilization artifacts.										
If Power Degradation $\geq$ 5%, then perform stress-specific stabilization MQT 19.3 in method 1										
Stress-specific stabilization – BO LID (MQT 19.3)										
Test Date [YYYY-MM-DD]				—						—
Applied current (A)				—						—
Module temperature [°C].....				—						—
Total hours (48h)				—						—
Performance at STC after final stabilization — for monofacial modules										
Test Date [YYYY-MM-DD]				—						—
Test method				☐ Solar simulator ☐ Natural sunlight						—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
—	—	—	—	—	—	—	—	—	—	

IEC 61215-2									
Clause	Requirement + Test						Result - Remark	Verdict	
—	—	—	—	—	—	—	—	—	—
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]				—					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
Supplementary information:—									
TABLE 23.4: MQT 19.2: Final stabilization									
☐ Method 3									
Test Date (YYYY-MM-DD) start/end				—					—
Test duration (h)				—					—
Module temperature [°C]				—					—
UV irradiance (280-400nm) [W/m ²]				—					—
UV dose (280-320nm) [kWh/ m ²]				—					—
UV dose (280-400nm) [kWh/ m ²]				—					—
Side exposed				☐ Front side ☐ Rear side					—
Module operation condition				☐ Short circuited ☐ Open circuited					—
Supplementary information: For bifacial modules, the irradiance shall be applied to the rear side, whereas for monofacial modules, the irradiance shall be applied to the front side.									
Performance at STC after final stabilization— for monofacial modules									
Test Date [YYYY-MM-DD]				—					—
Test method				☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
Performance at BNPI after final stabilization — for bifacial modules									
Test Date [YYYY-MM-DD]				—					—

IEC 61215-2										
Clause	Requirement + Test						Result - Remark	Verdict		
Test method				☐ Solar simulator ☐ Natural sunlight					—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
Supplementary information:										
☐ Method 4										
Performance at STC before final stabilization— for monofacial modules										
Test Date [YYYY-MM-DD]				—						—
Test method				☐ Solar simulator ☐ Natural sunlight					—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
Performance at BNPI before final stabilization — for bifacial modules										
Test Date [YYYY-MM-DD]				—						—
Test method				☐ Solar simulator ☐ Natural sunlight					—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
Supplementary information: This module was not stabilized, and therefore the amount of degradation observed may be larger than what would have been obtained if the module had been stabilized, due to polarization artifacts										

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

TABLE 23.5: MQT 06.1: Final Performance at STC

Test Date [YYYY-MM-DD] : 2024-07-22

—

IEC 61215-2									
Clause		Requirement + Test				Result - Remark			Verdict
Test method :					☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation [%]	Result
01	18.32	45.99	16.67	39.75	662.6	78.65	666.8	-0.63	P
03	18.20	45.85	16.52	39.71	656.0	78.61	671.1	-2.17	P
04	18.19	45.92	16.63	39.74	660.9	79.12	674.0	-1.88	P
05	18.26	45.91	16.41	39.81	653.3	77.93	661.9	-1.13	P
06	18.15	45.85	16.32	39.80	649.5	78.05	659.6	-1.36	P
07	18.05	45.91	16.22	39.75	644.7	77.80	664.3	-2.85	P
08	18.05	45.81	16.19	39.77	643.9	77.87	662.5	-2.77	P
09	18.14	45.94	16.31	39.76	648.5	77.82	661.2	-1.79	P
10	18.13	45.85	16.29	39.74	647.4	77.88	660.0	-1.81	P
11	18.04	45.88	16.20	39.69	643.0	77.68	659.8	-2.42	P
12	18.05	45.77	16.28	39.75	647.1	78.33	663.3	-2.36	P
46	18.19	45.77	16.78	39.70	666.2	80.01	673.8	-1.13	P
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.									

For bifacial modules							
TABLE 23.6: MQT 06.1 ini: Performance at STC after final stabilization (Front side)							
Test Date [YYYY-MM-DD].....:			—				—
Test method			☐ Solar simulator		☐ Natural sunlight		—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
Supplementary information: —							
TABLE 23.7: MQT 06.1 ini: Performance at STC after final stabilization (Back side)							
Test Date [YYYY-MM-DD]..... :			—				—
Test method			☐ Solar simulator		☐ Natural sunlight		—

IEC 61215-2										
Clause		Requirement + Test					Result - Remark			Verdict
:										
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
Supplementary information:										

TABLE 23.8: MQT 06.1: Final Performance at BNPI										
Test Date [YYYY-MM-DD]..... :					—					—
Test method :					☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation [%]		Result
—	—	—	—	—	—	—	—	—		—
—	—	—	—	—	—	—	—	—		—
—	—	—	—	—	—	—	—	—		—
—	—	—	—	—	—	—	—	—		—
—	—	—	—	—	—	—	—	—		—
—	—	—	—	—	—	—	—	—		—
—	—	—	—	—	—	—	—	—		—
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility r of control module.										

TABLE 23.9: MQT 03 fin: Final Insulation test						
Test Date [YYYY-MM-DD]..... :			2024-07-22			—
Test Voltage applied [V]			8000/1500			—
Size of module [m ²]			3.11			—
Sample #	Required	Measured	Dielectric breakdown			Result
	MΩ	MΩ	Yes (description)		No	
01	≥12.86	25880	—		No	P
03	≥12.86	30620	—		No	P

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Clause	Requirement + Test		Result - Remark		Verdict
04	≥12.86	27830	—	No	P
05	≥12.86	32970	—	No	P
06	≥12.86	23870	—	No	P
07	≥12.86	22590	—	No	P
08	≥12.86	22560	—	No	P
09	≥12.86	29970	—	No	P
10	≥12.86	30710	—	No	P
11	≥12.86	24380	—	No	P
12	≥12.86	29720	—	No	P
46	≥12.86	22310	—	No	P
Supplementary information:					

TABLE 23.10: MQT 15 fin: Final Wet leakage current test			
Test Date [YYYY-MM-DD]		2024-07-22	—
Test Voltage applied [V]		1500	—
Solution temperature [°C]		22.8	—
Size of module [m²]		3.11	—
Solution resistivity [Ω cm]		2010	—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
01	4766	≥12.86	P
03	5091	≥12.86	P
04	6235	≥12.86	P
05	5011	≥12.86	P
06	4379	≥12.86	P
07	4988	≥12.86	P
08	5393	≥12.86	P
09	5712	≥12.86	P
10	5012	≥12.86	P
11	4392	≥12.86	P
12	7233	≥12.86	P
46	5688	≥12.86	P
Supplementary information: —			

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

Annex 1: Product Description Sheet (Manufacturers and type references)

A1.1	MODULE TYPE/S
	PRDxxx-120MTN (xxx=385-415, in steps of 5, 120cells, 1/3 cut) PRDxxx-108MT (xxx=440-460, in steps of 5, 108cells, 1/2 cut) PRDxxx-110MT (xxx=525-570, in steps of 5, 110cells, 1/2 cut) PRDxxx-120MT (xxx=620-645, in steps of 5, 120cells, 1/2 cut) PRDxxx-132MT (xxx=650-710, in steps of 5, 132 cells, 1/2 cut)

A1.2	MODULE DESIGN
	Module dimensions (L x W x H) [mm] : 1755x1038x35mm 1800x1134x30mm 2278x1134x35mm 2172x1303x35mm 2384x1303x35mm
	Weights..... : Refer to manual document
	Front/Rear cover bonding classification : ☒ rigid/flexible ☐ rigid/rigid ☐ flexible/flexible

A1.3	SOLAR CELL
	Cell type reference : Hanwha Q CELLS Korea Mono c-Si Bifacial cell Dimension=210x105mm Area=220,5cm ² Thickness= 150±18um
	Cell dimensions L x W x T (± %) [mm] : Dimension=210x105mm
	Cell thickness [µm] : 150 (±18)
	Cell area [cm ²] : 220.5

A1.4	IDENTIFICATION OF MATERIALS
	Front cover..... : TÜRKİYE ŞİŞE VE CAM FABRİKALARI A.Ş. Type: Low iron solar textured tempered glass Thickness: 3.2±0.2mm

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Clause	Requirement + Test	Result - Remark	Verdict
	Rear cover	Hanwha Solutions Advanced Materials Division Type: UFC – Ultra Face Cure Thickness= 250µm ±55 Max. voltage=1500V	
	Encapsulation material front side	Hanwha Solutions Advanced Materials Division Type: UFC – Ultra Face Cure Thickness= 520µm ±10% Max. voltage=1500V	
	Encapsulation material back side	Hanwha Solutions Advanced Materials Division Type: UFC – Ultra Face Cure Thickness= 520µm ±10% Max. voltage=1500V	
	Frame parts	Arkat Aluminyum San. Tic. A.S. Material: Anodized Aluminum alloy 6063-T5	
	Mounting parts	N/A	
	Adhesive for frame	Shanghai Huitian New Material Co., Ltd. Material: Silicone Sealant, white Type: HT906Z	
	Edge sealing	N/A	
	Internal wiring	N/A	
	Cell connector	Ulbrich Germany Type: Tinned Copper PV ribbon Dimension=0,35mm Material: Sn60%Pb40%	
	String connector	Ulbrich Germany Type: Tinned Copper BUS ribbon Dimension=4/6 mm Material: Sn60%Pb40%	
	Soldering material	N/A	
	Fluxing agent	Kester Type: 952-S	
	Junction box	ZHEJIANG TWINSEL ELECTRONIC TECHNOLOGY CO., LTD. Type: PV-SY030, DC1500V, 30A, IP68, -40°C to 85°C	
	Cable	ZHEJIANG TWINSEL ELECTRONIC TECHNOLOGY CO., LTD. H1Z2Z2-K PV Cable 4mm² , DC1500V, -40°C to 90°C	
	Connector	ZHEJIANG TWINSEL ELECTRONIC TECHNOLOGY CO., LTD. Type: PV-SY02, DC1500V, 30A, IP68	

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Clause	Requirement + Test	Result - Remark	Verdict
	Bypass diode	YANGZHOU YANGJIE Type: 40SQ045, 30A. Tj max=200 °C	
	Potting material.....	Shanghai Huitian New Material Co., Ltd. Type: 5299W-S	
	Adhesive for junction box	Shanghai Huitian New Material Co., Ltd. Type: HT906Z Colour: White	
	Additional material (e. g. fixing tape, insulation tape).....	N/A	

A1.5	MODULE DESIGN - MINIMUM DISTANCES		
	Between cells.....	1.8±0.20mm	
	Between cell and accessible surfaces.....	13mm	
	Between any current carrying part and accessible surfaces	13mm	

A1.6	MODULE DESIGN - ELECTRICAL CONFIGURATION		
	Total number of cells	Refer to installation manual	
	Serial-parallel connection of cells	Refer to installation manual	
	Cells per bypass diode	Refer to installation manual	
	No. of bypass diodes	Refer to installation manual	

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

Annex 2: Test table for verifying other alternative stabilization procedure

Step 1: Alternative stabilization									
Test Date (YYYY-MM-DD) start/end:									—
Test method description:									—
	Sample	Sample	Sample						—
Power before alternative stabilization (W)	—	—	—						—
Power after alternative stabilization (W)	—	—	—						—
Supplementary information:									
Step 2: Light exposure									
☐ Solar simulator ☐ Natural sunlight									
Sample		Test Date (YYYY-MM-DD) start/end.....:							
Test cycle	Light source	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)	
Initial	—	—	—	—	—	—	—	—	
1	—	—	—	—	—	—	—	—	
2	—	—	—	—	—	—	—	—	
Supplementary information:									
Sample		Test Date (YYYY-MM-DD) start/end.....:							
Test cycle	Light source	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)	
Initial	—	—	—	—	—	—	—	—	
1	—	—	—	—	—	—	—	—	
2	—	—	—	—	—	—	—	—	
Supplementary information:									
Sample		Test Date (YYYY-MM-DD) start/end.....:							
Test cycle	Light source	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)	
Initial	—	—	—	—	—	—	—	—	
1	—	—	—	—	—	—	—	—	
2	—	—	—	—	—	—	—	—	
Supplementary information:									

IEC 61215-2				
Clause	Requirement + Test	Result - Remark		Verdict
Step 3: Stabilization determination				
	Sample	Sample	Sample	Result
Stable power P _{max1} after alternative stabilization (W)	—	—	—	—
Stable power P _{max2} after light exposure (W)	—	—	—	—
Power change P _{max2} to P _{max1} (%)	—	—	—	—
Allowed power change P _{max2} to P _{max1} (%)	—	—	—	—
Is alternative stabilization method valid? (Yes/No)	—	—	—	—
Supplementary information:				

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

Annex 3: Lower and higher output power modules

TABLE A.4.1 Performance at STC before initial stabilization (Front side)							
Test Date [YYYY-MM-DD]				2024-05-21			—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
High 1	18.76	46.99	40.67	17.59	715.3	81.14	—
High 2	18.74	46.87	40.58	17.63	715.4	81.46	—
Low 1	18.18	44.42	16.89	38.77	655.0	81.11	—
Low 2	18.19	44.26	16.85	38.85	654.8	81.35	—
Low 3	12.11	42.82	11.31	37.02	418.8	80.80	—
Low 4	12.06	42.85	11.29	37.04	418.3	80.94	—
Low 5	16.83	39.93	16.19	34.28	554.9	82.58	—
Low 6	16.70	39.85	16.29	34.07	554.9	83.37	—
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

TABLE A.4.2 Performance at STC before initial stabilization (Back side)							
Test Date [YYYY-MM-DD]				—			—
Test method				☐ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
Low 1	—	—	—	—	—	—	—
Low 2	—	—	—	—	—	—	—
High 1	—	—	—	—	—	—	—
High 2	—	—	—	—	—	—	—
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

TABLE A.4.3 Performance at BNPI before initial stabilization							
Test Date [YYYY-MM-DD]				—			—
Test method				☐ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result

IEC 61215-2							
Clause	Requirement + Test				Result - Remark		Verdict
Low 1	—	—	—	—	—	—	—
Low 2	—	—	—	—	—	—	—
High 1	—	—	—	—	—	—	—
High 2	—	—	—	—	—	—	—
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

TABLE A.4.4: MQT 19.1 ini: Initial Stabilization procedure							
Light exposure method				☐ Solar simulator ☒ Natural sunlight			—
Stabilization criterion x per IEC 61215-1-x :				1%			—
Sample #	High 1	Test Date (YYYY-MM-DD) start/end			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	715.3	—	—
1	5.2	>500	—	—	713.0	—	—
2	5.1	>500	—	—	713.4	0.32	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	High 2	Test Date (YYYY-MM-DD) start/end			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	715.4	—	—
1	5.2	>500	—	—	714.2	—	—
2	5.1	>500	—	—	712.1	0.46	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	Low 1	Test Date (YYYY-MM-DD) start/end			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	655.0	—	—
1	5.2	>500	—	—	652.8	—	—
2	5.1	>500	—	—	653.6	0.34	—

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Clause	Requirement + Test				Result - Remark		Verdict
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	Low 2	Test Date (YYYY-MM-DD) start/end :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	654.8	—	—
1	5.2	>500	—	—	654.3	—	—
2	5.1	>500	—	—	651.3	0.54	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	Low 3	Test Date (YYYY-MM-DD) start/end :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	418.8	—	—
1	5.2	>500	—	—	417.6	—	—
2	5.1	>500	—	—	417.9	0.29	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	Low 4	Test Date (YYYY-MM-DD) start/end :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	418.3	—	—
1	5.2	>500	—	—	417.2	—	—
2	5.1	>500	—	—	416.3	0.48	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	Low 5	Test Date (YYYY-MM-DD) start/end :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	554.9	—	—
1	5.2	>500	—	—	552.7	—	—
2	5.1	>500	—	—	551.3	0.65	—

IEC 61215-2							
Clause	Requirement + Test				Result - Remark		Verdict
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Sample #	Low 6	Test Date (YYYY-MM-DD) start/end :			2024-05-22/2024-05-31		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	(P _{max} – P _{min}) / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	554.9	—	—
1	5.2	>500	—	—	553.6	—	—
2	5.1	>500	—	—	551.2	0.67	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
Supplementary information:							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end :				—		
Low 1					—		
Low 2					—		
High 1					—		
High 2					—		
Test method description:—							
Supplementary information: see Annex 3 for verification of this alternative stabilization procedure							

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

TABLE A.4.7.1: MQT 6.1 Performance at STC after initial stabilization (Front side)							
Test Date [YYYY-MM-DD]				2024-05-31			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				$\geq$ 617.260		$\geq$ 674.238	—
$\bar{P}_{\max}(\text{lab})$ (W)				$\geq$ 636.350		$\geq$ 695.09	—
$P_{\max4}(\text{la})$ (W)				—		—	—
$V_{\text{oc}}(\text{lab})$ (V)				$\leq$ 45.349		$\leq$ 48.701	—
$I_{\text{sc}}(\text{lab})$ (A)				$\leq$ 18.326		$\leq$ 19.305	—
Test method				☐ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
Low 1	18.12	44.32	16.76	38.99	653.6	81.41	P
Low 2	17.99	44.29	16.81	38.75	651.3	81.76	P
High 1	18.55	46.87	40.34	17.69	713.4	82.05	P
High 2	18.65	46.91	40.45	17.60	712.1	81.39	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

TABLE A.4.7.2: MQT 6.1 Performance at STC after initial stabilization (Front side)							
Test Date [YYYY-MM-DD]				2024-05-31			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				$\geq$ 394.097		$\geq$ /	—
$\bar{P}_{\max}(\text{lab})$ (W)				$\geq$ 406.285		$\geq$ /	—
$P_{\max4}(\text{la})$ (W)				—		—	—
$V_{\text{oc}}(\text{lab})$ (V)				$\leq$ 43.703		$\leq$ /	—
$I_{\text{sc}}(\text{lab})$ (A)				$\leq$ 12.187		$\leq$ /	—
Test method				☐ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
Low 3	11.90	42.87	11.36	36.80	417.9	81.95	P
Low 4	12.05	42.72	11.41	36.49	416.3	80.87	P
High 1	—	—	—	—	—	—	—
High 2	—	—	—	—	—	—	—

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Clause	Requirement + Test	Result - Remark	Verdict
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.			

TABLE A.4.7.3: MQT 6.1 Performance at STC after initial stabilization (Front side)							
Test Date [YYYY-MM-DD]				2024-05-31			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				$\geq$ 522.297		$\geq$ /	—
$\bar{P}_{\max}(\text{lab})$ (W)				$\geq$ 538.450		$\geq$ /	—
$P_{\max 4}(\text{la})$ (W)				—		—	—
$V_{\text{oc}}(\text{lab})$ (V)				$\leq$ 40.824		$\leq$ /	—
$I_{\text{sc}}(\text{lab})$ (A)				$\leq$ 16.766		$\leq$ /	—
Test method				☐ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
Low 5	16.65	39.79	16.13	34.19	551.3	83.24	P
Low 6	16.68	39.82	16.15	34.13	551.2	83.01	P
High 1	—	—	—	—	—	—	—
High 2	—	—	—	—	—	—	—
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

TABLE A.4.8: MQT 6.1 Performance at STC after initial stabilization (Back side)							
Test Date [YYYY-MM-DD]				—			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				$\leq$ _____	$\geq$ _____	$\geq$ _____	—
$\bar{P}_{\max}(\text{lab})$ (W)				$\geq$ _____		$\geq$ _____	—
$V_{\text{oc}}(\text{lab})$ (V)				$\leq$ _____		$\leq$ _____	—
$I_{\text{sc}}(\text{lab})$ (A)				$\leq$ _____		$\leq$ _____	—
Test method				☐ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
Low 1	—	—	—	—	—	—	—
Low 2	—	—	—	—	—	—	—
High 1	—	—	—	—	—	—	—

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Clause	Requirement + Test				Result - Remark		Verdict
High 2	—	—	—	—	—	—	—
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

TABLE A.4.9: MQT 6.1 Performance at BNPI after initial stabilization							
Test Date [YYYY-MM-DD]				—			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				$\leq$ _____,	$\geq$ _____	$\geq$ _____,	—
$\bar{P}_{\max}(\text{lab})$ (W)				$\geq$ _____,		$\geq$ _____,	—
$V_{\text{oc}}(\text{lab})$ (V)				$\leq$ _____,		$\leq$ _____,	—
$I_{\text{sc}}(\text{lab})$ (A)				$\leq$ _____,		$\leq$ _____,	—
Test method				☐ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
Low 1	—	—	—	—	—	—	—
Low 2	—	—	—	—	—	—	—
High 1	—	—	—	—	—	—	—
High 2	—	—	—	—	—	—	—
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

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Annex 4: List of measurement equipment

A completed list of used test equipment shall be provided in the Test Reports when a Manufacturer Testing Laboratory according to CTF stage 1 or CTF stage 2 procedure has been used.

Note: This page may be removed when CTF stage 1 or CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

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Statement of Measurement Uncertainty

The Test Report shall include a statement concerning the uncertainty of the measurement systems used for the tests conducted when it is required by the standard, client or other authorities.
In such cases, the table below is to be used for reporting the Uncertainty in Measurement.

This page may be removed from the final Test Report when not required. See also clause 4.8 in OD 2020 for more details.

Clause #	Parameter/ Measurement / test method	Requirement % or k	Calculated U of M*
MQT02/MQT06	Pmpp (m ₁)	k=2	2.6%
MQT02/MQT06	Voc (m ₂)	k=2	2.4%
MQT02/MQT06	Isc (m ₃)	k=2	1.0%

*Note: Calculations leading to the reported value are on file with the NCB