

TEST REPORT IEC 61215 series:2021 TUV SUD Test Report for Terrestrial photovoltaic (PV) modules – Design qualification and type approval	
Report No.:	704062316712-01 part 1 of 2
Date of issue:	October 28, 2024
Project handler:	Rongwei Jing
Testing laboratory:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
Address:	No. 151 Heng Tong Road, Shanghai 200070, P. R. China
Testing location:	Yangzhou Opto-Electrical Products Testing Institute No. 10 West Kaifa Road, Yangzhou, 225009 Jiangsu, P. R. China
Client:	Q-SUN Anhui Co., Ltd.
Client number:	104991
Address:	West of Jingliu Road, North of Weisan Road, 239300 Tianchang City, Anhui Province, PEOPLE'S REPUBLIC OF CHINA
Standard:	This TUV SUD test report form is based on the following requirements: ☒ 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
TRF number and revision:	TRF IEC 61215:2021 Rev.2:2024
eDoc_ID:	154095
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General disclaimer:	This test report is based on the content of the standard (see above). The test report considered selected clauses of the a.m. standard(s) and experience gained with product testing. It was prepared by TUV SUD Product Service. TUV SUD Group takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context. This report is the result of a single examination of the object in question and is not generally applicable evaluation of the quality of other products in regular production.
Scheme:	☒ TUV Mark ☐ without certification ☐ AoC/CoC for EU-Directive / EU-Regulation: ☐ GS Mark ☐ NRTL Mark ☐ other:
Non-standard test method:	☒ No ☐ Yes, see details under <i>Summary of testing</i> The product fulfils the requirements of
National deviations:	EN IEC 61215-1:2021/AC:2021-06, EN IEC 61215-1-1:2021 & EN IEC 61215-2:2021
Number of pages (Report):	82

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Compiled by: (+ signature)	Rongwei Jing <i>Rongwei Jing</i>	Approved by: (+ signature)	Ning Tang <i>Ning Tang</i>
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Test sample:	Photovoltaic (PV) Module(s)
Type of test object:	Mono-Crystalline Silicon Photovoltaic Module
Trademark:	Q-SUN solar
Model and/or type reference:	QN-720HT-01, QN-615HT-05, QN-650HT-06 (representative testing models)
Rating(s):	refer to pages 10~15
Manufacturer:	Q-SUN Anhui Co., Ltd.
Manufacturer number:	104991
Address:	West of Jingliu Road, North of Weisan Road, 239300 Tianchang City, Anhui Province, PEOPLE'S REPUBLIC OF CHINA
Name and address of factory(ies) 1. Q-SUN Anhui Co., Ltd. West of Jingliu Road, North of Weisan Road, 239300 Tianchang City, Anhui Province, PEOPLE'S REPUBLIC OF CHINA Factory No.: 104991 2. Q-SUN Jiangsu Co., Ltd. Fengfu No. 4 Road, Precision Manufacturing Industrial Park, 224200 DongTai City, Jiangsu Province, PEOPLE'S REPUBLIC OF CHINA Factory No.: 118795	
Order description:	☒ Complete test according to TRF
	☐ Partial test according to manufacturer's specifications
	☐ Preliminary test
	☐ Spot check
	☐ Others:
Date of order:	October 17, 2024
Date of receipt of test item:	October 12, 2024
Date(s) of performance of test:	October 21, 2024 to October 23, 2024
Test item particulars: See below for details	
Characteristic data (not shown on the marking plate): N/A	

Attachments:

	attachment number / number of pages
Installation manual	QN3-TD-046 Installation Manual for Photovoltaic Modules, Ver: A2, total 39 pages
Drawings mechanical	N/A
Circuit diagram	N/A
Photographs	N/A
Component datasheets / certificates	N/A
Others:	N/A
Product Description Sheet (Manufacturers and type references)	Annex 1, _9_ pages
Test table for verifying other stabilization procedure	Annex 2, _N/A_ pages
Lower and higher output power modules	Annex 3, _6_ pages
List of test equipment used	Annex 4, _N/A_ pages

If additional information is necessary, please provide

N/A

Copy of marking plate:



Q-SUN ANHUI CO.,LTD

Read the installation and operating manual before installing, operating or service unit.

WARNING
Made in China

www.q-sunsolar.com

PTYPE	STC	BNPI
Pmax:	720W*	794W*
Vmp :	41.12V	41.12V
Imp:	17.51A	19.31A
Voc:	48.69V*	48.69V*
Isc:	18.64A*	20.55A*

*Considering LID,the power range of the Certification,tolerance(Pmax)±3%,(Voc)±3%,(Isc)±3%,BSI(Isc)±3%.

Product: Mono Solar Module
Type: QN-720HT-01

Power Selection 0~5W
Max. System Voltage 1500 VDC
Max. Series Fuse Rating 35A
PV module Classification Class II
Fire safety Class C
Isc(BSI) 22.89A*

STC Condition: 1000W/m²,25°C, AM1.5
BSI: front 1000W/m², rear 300W/m²

Cell Technology Mono
Min. design load -1600Pa/+3600Pa
PV module 98th percentile operating temp. 70°C
PV connector manufacture: JM THY
PV connector type: PV-JM608
PV connector: see manual for designated connectors
Field Wiring: Copper only 1X4mm² min,insulated for 90°C min
Bifacial coefficients

φPmax=0.8±10%, φVoc=0.98±5%, φIsc=0.8±10%
BNPI Condition: front 1000W/m², rear 135W/m², 25°C, AM1.5

Picture of the product:

N/A

Summary of testing:

Based on previous project 704062316712-00, following modifications were included:

1. Extended the power range and updated the ratings for below model families (within 10%):

QN-xxxHT-01, xxx = 670 to 720 in steps of 5;

QN-xxxHT-01, xxx = 610 to 655 in steps of 5;

QN-xxxHT-05, xxx = 570 to 615 in steps of 5;

QN-xxxHT-05, xxx = 520 to 565 in steps of 5;

QN-xxxHT-05, xxx = 470 to 515 in steps of 5;

QN-xxxHT-05, xxx = 425 to 460 in steps of 5;

QN-xxxHT-06, xxx = 605 to 650 in steps of 5;

QN-xxxHT-06, xxx = 555 to 600 in steps of 5;

QN-xxxHT-06, xxx = 510 to 550 in steps of 5;

QN-xxxHT-06, xxx = 465 to 500 in steps of 5;

QN-xxxHT-06, xxx = 415 to 450 in steps of 5;

QN-xxxHT-06, xxx = 370 to 400 in steps of 5;

QN-720HT-01, QN-615HT-05 & QN-650HT-06 were selected as the representative models for qualification of higher end power class.

☐ deviation(s) found

☒ no deviations found

Additional information on Non-standard test method(s)

Sub clause: N/A

Page: N/A

Rational: N/A

Possible test case verdicts:

test case does not apply to the test object: N/A (not applicable / not included in the order)

test object does meet the requirement: P (Pass)

test object does not meet the requirement: F (Fail)

General remarks:

"(see remark #)" refers to a remark appended to the report.

"(see appended table)" refers to a table appended to the report.

Throughout this report **a comma** is used as the decimal separator.

The test results presented in this report relate only to the object tested.

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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: For Verification of rated label values (Gate No. 1), uncertainty of measurement application is required and specified in IEC 61215-2: 2021.

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.

Test item particulars..... : N/A	
Accessories and detachable parts included in the evaluation	
Mounting system used.....	Refer to user 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 _{FM} rated – Rated diode(s) forward voltage
V _{FM} – 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	RTE – Relative thermal endurance index
RTI – Relative temperature index	
TI – Temperature index	

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Testing Dates (YYYY-MM-DD)	
Date of first test item received	2024-10-12
Dates of tests (beginning/end).....	2024-10-21 to 2024-10-23

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 IECCE CB 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 IECCE 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):			Refer to page 3	
Product Electrical Ratings:				
<u>Monofacial Module:</u>				
Module type	-			
V _{oc} [V] /Tolerance	-			
V _{mp} [V]	-			
I _{mp} [Adc]	-			
I _{sc} [Adc] /Tolerance	-			
P _{max} [W] /Tolerance	-			
Maximum system voltage [V]	-			
Maximum Over-Current Protection Rating [A]	-			
Note: Further qualification for higher and/or lower output power see annex 3				

Bifacial Module:

	Module type	QN-715HT-01	QN-720HT-01	QN-650HT-01	QN-655HT-01
STC condition	$P_{\max}$ [W] /Tolerance	715± 3%	720± 3%	650.00±3%	655±3%
	V_{oc} [V] /Tolerance	48.60±3%	48.69±3%	44.47±3%	44.52±3%
	I_{sc} [A] /Tolerance	18.58±3%	18.64±3%	18.46±3%	18.52±3%
	V_{mp} [V]	40.95	41.12	37.27	37.45
	I_{mp} [A]	17.46	17.51	17.44	17.49
BNPI condition	$P_{\max}$ [W] /Tolerance	788±3%	794±3%	717±3%	722±3%
	V_{oc} [V] /Tolerance	48.60±3%	48.69±3%	44.47±3%	44.52±3%
	I_{sc} [A] /Tolerance	20.49±3%	20.55±3%	20.35±3%	20.42±3%
Bifaciality coefficient	$\phi P_{\max}$	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	ϕV_{oc}	0.98±5%	0.98±5%	0.98±5%	0.98±5%
	ϕI_{sc}	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	35	35	35	35

	Module type	QN-605HT-05	QN-610HT-05	QN-615HT-05	QN-555HT-05
STC condition	$P_{\max}$ [W] /Tolerance	605±3%	610±3%	615±3%	555±3%
	V_{oc} [V] /Tolerance	52.31±3%	52.40±3%	52.49±3%	48.29±3%
	I_{sc} [A] /Tolerance	14.60±3%	14.66±3%	14.72±3%	14.50±3%
	V_{mp} [V]	44.32	44.53	44.73	40.72
	I_{mp} [A]	13.65	13.70	13.75	13.63
BNPI condition	$P_{\max}$ [W] /Tolerance	667±3%	673±3%	678±3%	612±3%
	V_{oc} [V] /Tolerance	52.31±3%	52.4±3%	52.49±3%	48.29±3%
	I_{sc} [A] /Tolerance	16.10±3%	16.16±3%	16.23±3%	15.99±3%
Bifaciality coefficient	$\phi P_{\max}$	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	ϕV_{oc}	0.98±5%	0.98±5%	0.98±5%	0.98±5%
	ϕI_{sc}	0.8±10%	0.8±10%	0.8±10%	0.8±10%

	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	QN-560HT-05	QN-565HT-05	QN-505HT-05	QN-510HT-05
STC condition	$P_{\max}$ [W] /Tolerance	560±3%	565±3%	505±3%	510±3%
	V_{oc} [V] /Tolerance	48.47±3%	48.65±3%	44.21±3%	44.43±3%
	I_{sc} [A] /Tolerance	14.56±3%	14.62±3%	14.40±3%	14.46±3%
	V_{mp} [V]	40.94	41.15	37.11	37.34
	I_{mp} [A]	13.68	13.73	13.61	13.66
BNPI condition	$P_{\max}$ [W] /Tolerance	617±3%	623±3%	557±3%	562±3%
	V_{oc} [V] /Tolerance	48.47±3%	48.65±3%	44.21±3%	44.43±3%
	I_{sc} [A] /Tolerance	16.05±3%	16.12±3%	15.88±3%	15.94±3%
Bifaciality coefficient	$\phi P_{\max}$	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	ϕV_{oc}	0.98±5%	0.98±5%	0.98±5%	0.98±5%
	ϕI_{sc}	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	QN-515HT-05	QN-455HT-05	QN-460HT-05	QN-640HT-06
STC condition	$P_{\max}$ [W] /Tolerance	515±3%	455±3%	460±3%	640±3%
	V_{oc} [V] /Tolerance	44.65±3%	40.08±3%	40.37±3%	56.33±3%
	I_{sc} [A] /Tolerance	14.52±3%	14.30±3%	14.36±3%	14.34±3%
	V_{mp} [V]	37.56	33.48	33.72	47.98
	I_{mp} [A]	13.71	13.59	13.64	13.34
BNPI condition	$P_{\max}$ [W] /Tolerance	568±3%	502±3%	507±3%	706±3%
	V_{oc} [V] /Tolerance	44.65±3%	40.08±3%	40.37±3%	56.33±3%
	I_{sc} [A] /Tolerance	16.01±3%	15.77±3%	15.84±3%	15.82±3%

Bifaciality coefficient	$\phi P_{\max}$	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	ϕV_{oc}	0.98±5%	0.98±5%	0.98±5%	0.98±5%
	ϕI_{sc}	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	QN-645HT-06	QN-650HT-06	QN-555HT-06	QN-560HT-06
STC condition	$P_{\max}$ [W] /Tolerance	645±3%	650±3%	555±3%	560±3%
	V_{oc} [V] /Tolerance	56.44±3%	56.52±3%	50.62±3%	50.86±3%
	I_{sc} [A _{dc}] /Tolerance	14.40±3%	14.46±3%	13.82±3%	13.88±3%
	V_{mp} [V]	48.17	48.36	42.86	43.08
	I_{mp} [A _{dc}]	13.39	13.44	12.95	13.00
BNPI condition	$P_{\max}$ [W] /Tolerance	711±3%	717±3%	612±3%	617±3%
	V_{oc} [V] /Tolerance	56.44±3%	56.52±3%	50.62±3%	50.86±3%
	I_{sc} [A _{dc}] /Tolerance	15.88±3%	15.94±3%	15.24±3%	15.30±3%
Bifaciality coefficient	$\phi P_{\max}$	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	ϕV_{oc}	0.98±5%	0.98±5%	0.98±5%	0.98±5%
	ϕI_{sc}	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	QN-565HT-06	QN-570HT-06	QN-575HT-06	QN-580HT-06
STC condition	$P_{\max}$ [W] /Tolerance	565±3%	570±3%	575±3%	580±3%
	V_{oc} [V] /Tolerance	51.13±3%	51.41±3%	51.63±3%	51.86±3%
	I_{sc} [A _{dc}] /Tolerance	13.94±3%	13.99±3%	14.05±3%	14.11±3%
	V_{mp} [V]	43.30	43.51	43.73	43.91
	I_{mp} [A _{dc}]	13.05	13.10	13.15	13.20

BNPI condition	$P_{\max}$ [W] /Tolerance	623±3%	628±3%	634±3%	639±3%
	V_{oc} [V] /Tolerance	51.13±3%	51.41±3%	51.63±3%	51.86±3%
	I_{sc} [A _{dc}] /Tolerance	15.37±3%	15.43±3%	15.49±3%	15.56±3%
Bifaciality coefficient	$\phi P_{\max}$	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	ϕV_{oc}	0.98±5%	0.98±5%	0.98±5%	0.98±5%
	ϕI_{sc}	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	QN-585HT-06	QN-590HT-06	QN-595HT-06	QN-600HT-06
STC condition	$P_{\max}$ [W] /Tolerance	585±3%	590±3%	595±3%	600±3%
	V_{oc} [V] /Tolerance	52.10±3%	52.31±3%	52.40±3%	52.55±3%
	I_{sc} [A _{dc}] /Tolerance	14.17±3%	14.23±3%	14.28±3%	14.34±3%
	V_{mp} [V]	44.15	44.36	44.57	44.78
	I_{mp} [A _{dc}]	13.25	13.30	13.35	13.40
BNPI condition	$P_{\max}$ [W] /Tolerance	645±3%	651±3%	656±3%	662±3%
	V_{oc} [V] /Tolerance	52.10±3%	52.31±3%	52.40±3%	52.55±3%
	I_{sc} [A _{dc}] /Tolerance	15.62±3%	15.69±3%	15.75±3%	15.81±3%
Bifaciality coefficient	$\phi P_{\max}$	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	ϕV_{oc}	0.98±5%	0.98±5%	0.98±5%	0.98±5%
	ϕI_{sc}	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	QN-540HT-06	QN-545HT-06	QN-550HT-06	QN-490HT-06
STC condition	$P_{\max}$ [W] /Tolerance	540±3%	545±3%	550±3%	490±3%
	V_{oc} [V] /Tolerance	48.37±3%	48.54±3%	48.72±3%	44.33±3%

	I_{sc} [A _{dc}] /Tolerance	14.08±3%	14.14±3%	14.19±3%	13.95±3%
	V_{mp} [V]	40.82	41.04	41.26	37.18
	I_{mp} [A _{dc}]	13.23	13.28	13.33	13.18
BNPI condition	P_{max} [W] /Tolerance	595±3%	601±3%	606±3%	540±3%
	V_{oc} [V] /Tolerance	48.37±3%	48.54±3%	48.72±3%	44.33±3%
	I_{sc} [A _{dc}] /Tolerance	15.52±3%	15.59±3%	15.65±3%	15.38±3%
Bifaciality coefficient	ϕP_{max}	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	ϕV_{oc}	0.98±5%	0.98±5%	0.98±5%	0.98±5%
	ϕI_{sc}	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

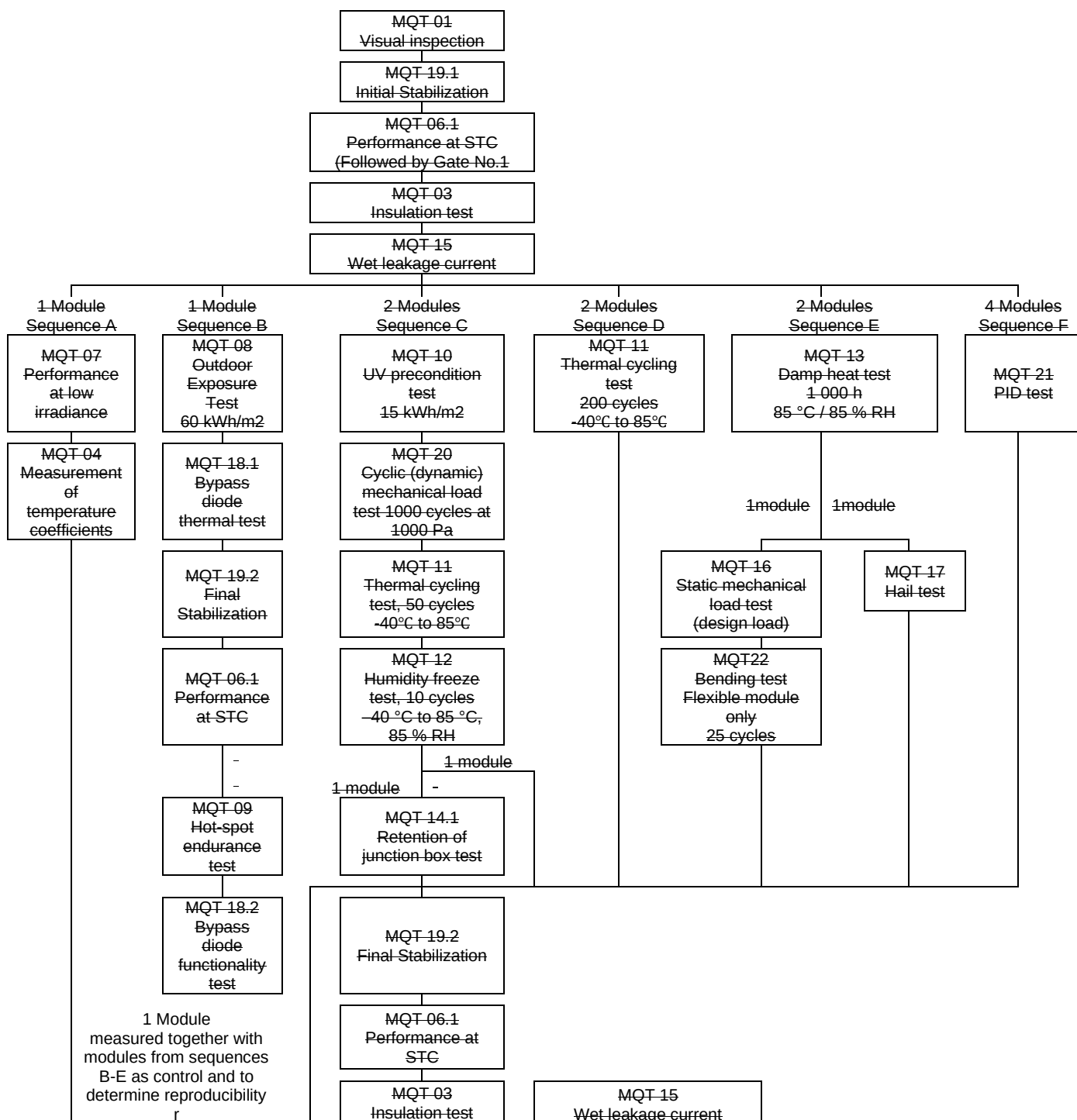
	Module type	QN-495HT-06	QN-500HT-06	QN-445HT-06	QN-450HT-06
STC condition	P_{max} [W] /Tolerance	495±3%	500±3%	445±3%	450±3%
	V_{oc} [V] /Tolerance	44.52±3%	44.71±3%	40.39±3%	40.68±3%
	I_{sc} [A _{dc}] /Tolerance	14.01±3%	14.06±3%	13.89±3%	13.95±3%
	V_{mp} [V]	37.41	37.65	33.74	33.99
	I_{mp} [A _{dc}]	13.23	13.28	13.19	13.24
BNPI condition	P_{max} [W] /Tolerance	546±3%	551±3%	491±3%	496±3%
	V_{oc} [V] /Tolerance	44.52±3%	44.71±3%	40.39±3%	40.68±3%
	I_{sc} [A _{dc}] /Tolerance	15.44±3%	15.51±3%	15.31±3%	15.38±3%
Bifaciality coefficient	ϕP_{max}	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	ϕV_{oc}	0.98±5%	0.98±5%	0.98±5%	0.98±5%
	ϕI_{sc}	0.8±10%	0.8±10%	0.8±10%	0.8±10%
	Maximum system voltage [V]	1500	1500	1500	1500
	Maximum Over-Current Protection Rating [A]	30	30	30	30

	Module type	QN-395HT-06	QN-400HT-06	-	
STC condition	$P_{\max}$ [W] /Tolerance	395±3%	400±3%	-	
	V_{oc} [V] /Tolerance	36.15±3%	36.41±3%	-	
	I_{sc} [A] /Tolerance	13.79±3%	13.85±3%	-	
	V_{mp} [V]	29.99	30.26	-	
	I_{mp} [A]	13.17	13.22	-	
BNPI condition	$P_{\max}$ [W] /Tolerance	436±3%	441±3%	-	
	V_{oc} [V] /Tolerance	36.15±3%	36.41±3%	-	
	I_{sc} [A] /Tolerance	15.20±3%	15.27±3%	-	
Bifaciality coefficient	$\phi P_{\max}$	0.8±10%	0.8±10%	-	
	ϕV_{oc}	0.98±5%	0.98±5%	-	
	ϕI_{sc}	0.8±10%	0.8±10%	-	
	Maximum system voltage [V]	1500	1500	-	
	Maximum Over-Current Protection Rating [A]	30	30	-	

General product information and other remarks:	
<u>Modifications:</u> ☐ Initial module design qualification ☒ Extension of module design qualification ☒ Original test report ref. No.: 704062316712-00 <u>Model differences and modification:</u> ☒ Test programs for crystalline silicon PV modules ☐ 4.2.1 Modification to frontsheet ☐ 4.2.2 Modification to encapsulation system ☐ 4.2.3 Modification to cell technology ☐ 4.2.4 Modification to cell and string interconnect material or technique ☐ 4.2.5 Modification to backsheet ☐ 4.2.6 Modification to electrical termination ☐ 4.2.7 Modification to bypass diode ☐ 4.2.8 Modification to electrical circuitry ☐ 4.2.9 Modification to edge sealing ☐ 4.2.10 Modification to frame and/or mounting structure ☐ 4.2.11 Change in PV module size ☐ 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process ☐ 4.2.13 Increase of over-current protection rating ☐ 4.2.14 Increase of system voltage ☐ 4.2.15 Change in cell fixing tape ☒ Others (see summary of testing) ☐ Test programs for thin-film PV modules ☐ 4.3.1 Modification to frontsheet ☐ 4.3.2 Modification to encapsulation system ☐ 4.3.3 Modification to front contact (e. g. TCO) ☐ 4.3.4 Modification to cell technology ☐ 4.3.5 Modification to cell layout ☐ 4.3.6 Modification to back contact ☐ 4.3.7 Modification to edge deletion ☐ 4.3.8 Modification to interconnect material or technique ☐ 4.3.9 Modification to backsheet ☐ 4.3.10 Modification to electrical termination ☐ 4.3.11 Modification to bypass diode ☐ 4.3.12 Modification to edge sealing ☐ 4.3.13 Modification to frame and/or mounting structure ☐ 4.3.14 Change in PV module size ☐ 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size ☐ 4.3.16 Increase of over-current protection rating ☐ 4.3.17 Increase of system voltage	
Note: This clause refers to modifications extracted from IEC TS 62915	

Module group assignment:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
GDP240732-1	High 1-1	QN-720HT-01	26240993375903	Higher end power class
GDP240732-2	High 1-2	QN-720HT-01	26240993376195	Higher end power class
GDP240732-3	High 2-1	QN-615HT-05	26240993376223	Higher end power class
GDP240732-4	High 2-2	QN-615HT-05	26240993376227	Higher end power class
GDP240732-5	High 3-1	QN-650HT-06	26240993376215	Higher end power class
GDP240732-6	High 3-2	QN-650HT-06	26240993376241	Higher end power class
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			P
5.1	Name Plate		
	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).	Marked on label	P
	International symbols are used where applicable.	Marked on label	P
	The module includes clear and indelible markings:		
	a. Name, registered trade name or registered trade mark of manufacturer	QSUN Solar (logo)	P
	b. Type or model number designation	Marked on label	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	Marked on label	P
	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	Marked on label	P
	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	Marked on label	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 ϕ_{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		P

IEC 61215-1			
Clause	Requirement + Test	Result - Remark	Verdict
	k. For flexible modules, the minimum radius of curvature		N/A
5.2	Documentation		P
5.2.1	Minimum requirements		—
	Modules are supplied with documentation describing the methods of electrical and mechanical installation as well as the electrical ratings of the module		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		—
	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		N/A
	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		—
	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		N/A
	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		—
	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: N/A			

7. PASS CRITERIA			P
7.2	Power output and electric circuitry		P
7.2.1	Verification of rated label values (Gate No. 1)		P
	Manufacturer's tolerances and Laboratory uncertainties		P

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Clause	Requirement + Test		Result - Remark			Verdict
		t_1	t_2	t_3	t_4	—
	manufacturer's rated lower/upper production tolerance in %	-3	+3	+3	+3	
		m_1	m_2	m_3		
	measurement uncertainty in % of the laboratory	2.24	1.10	1.84		
	Laboratory reproducibility r:	0.26				
	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					P
	The wet leakage current test (MQT 15) requirements met at the beginning and at the end of each sequence					P
	Specific requirements of the individual tests are met					P
Supplementary information: N/A						

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Clause	Requirement + Test	Result - Remark	Verdict

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

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

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

Sequence C	2 Modules	Samples C1; C2	N/A
4.10	UV preconditioning test (MQT 10)	See Table 12.1 - 12.6	N/A
4.20	Cyclic (dynamic) mechanical load test (MQT 20)	See Table 13	N/A
4.11	Thermal cycling test 50 cycles (MQT 11).....	See Table 14	N/A
4.12	Humidity-freeze test (MQT 12).....	See Table 15	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Sequence C1	1 Module	Sample C1	N/A
4.14.2	Retention of junction box on mounting surface (MQT 14.1)	See Table 16	N/A
4.14.3	Test of cord anchorage (MQT 14.2)		N/A
4.14.3.1	The junction box, separate from the module, shall be tested to IEC 62790 "Test of cord anchorage" and shall meet the requirements therein	See list of attachments	N/A
Sequence D	2 Modules	Samples D1; D2	N/A
4.11	Thermal cycling test 200 cycles (MQT 11)	See Table 17	N/A
Sequence E	2 Modules	Samples E1; E2	N/A
4.13	Damp heat test (MQT 13)	See Table 18	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 23.3	N/A
Sequence E1	1 Module	Sample E1	N/A
4.16	Static mechanical load test (MQT 16)	See Table 19	N/A
4.22	Bending test (MQT 22)	See Table 20	N/A
Sequence E2	1 Module	Sample E2	N/A
4.17	Hail test (MQT 17)	See Table 21	N/A
Sequence F	4 Modules	Samples F1; F2; F3; F4	N/A
4.21	Potential induced degradation test (MQT 21)	See Table 22	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 23.4, 23.6, 23.7	N/A
	Final measurement	All modules for Sequence C, D, E, F; Control module for Sequence A	N/A
4.19.6	Final stabilization (MQT 19.2)	See Table 23.1 - 23.2	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
4.6	Performance at STC&BNPI (MQT 06.1)	See Table 23.5, 23.8	N/A
4.3	Insulation test (MQT 03)	See Table 23.9	N/A
4.15	Wet leakage current test (MQT 15)	See Table 23.10	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 01: MQT 01 ini: Initial Visual inspection			N/A
Test Date [YYYY-MM-DD]..... :			—
Sample #	Nature and position of initial findings – comments or attach photos		—
			—
			—
			—
			—
Supplementary information:			

TABLE 02: MQT 19.1 ini: Initial stabilization							N/A
TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Front side)							N/A
Test Date [YYYY-MM-DD]..... :							—
Test method..... :			☐ Solar simulator ☐ Natural sunlight				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
							—
							—
							—
							—
Supplementary information:							
TABLE 02.2: MQT 06.1 ini: Performance at STC before initial stabilization (Back side)							N/A
Test Date [YYYY-MM-DD]..... :							—
Test method..... :			☐ Solar simulator ☐ Natural sunlight				—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Result
							—
							—
							—
							—
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							N/A
Test Date [YYYY-MM-DD]..... :							—

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Clause	Requirement + Test				Result - Remark	Verdict	
Test method			☐ Solar simulator ☐ Natural sunlight			—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
							—
							—
							—
							—
Supplementary information:							
TABLE 02.4: MQT 19.1: Initial Stabilization procedure							N/A
Light exposure method			☐ Solar simulator ☐ Natural sunlight				
Stabilization criterion x per IEC 61215-1-x							
Sample #	Test Date (YYYY-MM-DD) start/end						
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							
2							
3							
4						—	—

Sample #	Test Date (YYYY-MM-DD) start/end						
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							
2							
3							
4						—	—

Sample #	Test Date (YYYY-MM-DD) start/end						
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	P_{max} (W) at the end of cycle	$(P_{max} - P_{min}) / P_{average}$ (%)	Stable (Yes/No)

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Clause	Requirement + Test				Result - Remark		Verdict
Initial	—	—	—	—		—	—
1							
2							
3							
4						—	—

Sample #	Test Date (YYYY-MM-DD) start/end						
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							
2							
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 03.1: MQT 06.1 ini: Performance at STC after initial stabilization (Front side)		N/A
Test Date [YYYY-MM-DD]		—
P _{max} lower limit (W)	See table below: P _{max} [W] – Min calc.	—
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	—

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Clause	Requirement + Test						Result - Remark		Verdict	
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	P_{max} [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
										—
										—
										—
										—
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)										N/A
Test Date [YYYY-MM-DD]										—
Test method:					☐ Solar simulator ☐ Natural sunlight					—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	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										N/A
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					—

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Clause	Requirement + Test						Result - Remark		Verdict	
Sample #	I_{sc} [A]		V_{oc} [V]		I_{mp} [A]	V_{mp} [V]	P_{max} [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
										—
										—
										—
										—
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				N/A
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 05: MQT 15: Initial Wet leakage current test					N/A
Test Date [YYYY-MM-DD]					—
Test Voltage applied [V]					—
Solution temperature [°C]					—
Solution resistivity [Ω cm]					—
Size of module [m ²]					—
Sample #	Required Resistance [MΩ]		Measured [MΩ]		Result
					—

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

TABLE 06.1: MQT 07 - Performance at low irradiance (Front side)						N/A
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 [%]
						—
Supplementary information:						

TABLE 06.2: MQT 07 - Performance at low irradiance (Back side)									N/A
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:									

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Clause	Requirement + Test		Result - Remark	Verdict
TABLE 07: MQT 04 - Measurement of temperature coefficients				N/A
Test Date [YYYY-MM-DD]				—
Ambient air temperature [°C] high/low				—
Irradiance [W/m²] high/low				—
Module temperature [°C] high/low				—
Sample #	α [%/°C]	β [%/°C]	δ [%/°C]	—
				—
Supplementary information:				

TABLE 08: MQT 08 - Outdoor exposure test		N/A
Test Date [YYYY-MM-DD] start/end		—
Sample #		—
Total irradiation dosage [kWh/m²]		—
Angle of tilt the test module		—
Electrical load:	☐ Restive load ☐ MPPT	—
Supplementary information:		

Table 08.1: MQT 01: Visual inspection after outdoor exposure test		N/A
Test Date [YYYY-MM-DD]:		—
Sample #	Nature and position of initial findings – comments or attach photos	—
		—
Supplementary information:		

Table 08.2: MQT 15: Wet leakage current test after outdoor exposure test				N/A
Test Date [YYYY-MM-DD]				—
Test Voltage applied [V]				—
Solution temperature [°C]				—
Size of module [m ²]				—
Solution resistivity [Ω cm]				—
Sample #	Measured [M Ω]	Limit [M Ω]	Result	
			—	

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

Supplementary information:

Table 08.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional							N/A
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 08.4: MQT 03 - Insulation test after outdoor exposure test - Optional					N/A
Test Date [YYYY-MM-DD]					—
Test Voltage applied [V]					—
Size of module [m²]					—
Required Resistance [MΩ].....					—
Sample #	Measured	Required (MΩ)	Dielectric breakdown		Result
	(MΩ)	(MΩ)	Yes (description)	No	
					—
Supplementary information:					

TABLE 09: MQT 18: Bypass diode thermal test					N/A
Test Date [YYYY-MM-DD] start/end					—
Sample #					—
Module temperature [°C]					—
Number of diodes in junction box					—
Diode manufacturer					—
Diode type designation					—
Max. permissible junction temperature, T_{jmax} [°C] (according to diode datasheet)					—
Detailed description of sample preparation procedure					—
Step 1, Determination of V_D versus T_J characteristic					—
		30 ± 2 °C	50 ± 2 °C	70 ± 2 °C	90 ± 2 °C

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

TABLE 09.1: MQT 01 - Visual inspection after bypass diode thermal test			N/A
Test Date [YYYY-MM-DD]			—
Sample #	Nature and position of initial findings – comments or attach photos		—
			—
Supplementary information:			

TABLE 09.2: MQT 15 - Wet leakage current test after bypass diode thermal test			N/A
Test Date [YYYY-MM-DD]			—
Test Voltage applied [V]			—
Solution temperature [°C]			—
Size of module [m ²]			—

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

TABLE 09.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional							N/A
Test Date [YYYY-MM-DD].....:							—
Module temperature [$^{\circ}\text{C}$].....:							—
Irradiance [W/m^2].....:							—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	—
							—
Supplementary information:							

TABLE 09.4: MQT 03 - Insulation test after bypass diode thermal test - Optional					N/A
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:					

TABLE 10: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test					N/A
Test Date [YYYY-MM-DD]					—
☐ Method A					—
Ambient temperature [°C]					—
Current flow applied [A]					—
Sample #	VFM	VFM _{rated}	VFM = (N × VFM _{rated}) ± 10 %		Result

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Clause	Requirement + Test	Result - Remark	Verdict
		☐ Yes ☐ No	—
Supplementary information:			
☐ Method B			—
	IV curve after shading		Result
Diode 1			—
Diode 2			—
Diode 3			—
Supplementary information:			

TABLE 10.1: MQT 19.1: Final stabilization							N/A
TABLE 10.2: MQT 06.1: Performance at STC before final 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 [%]	—
							—
Supplementary information:							

TABLE 10.3: MQT 19.1 Final Stabilization procedure							N/A
Light exposure method				☐ Solar simulator ☐ Natural sunlight			—
Stabilization criterion x per IEC 61215-1-x ..							—
Sample #		Test Date (YYYY-MM-DD) start/end					
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							
2							
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 11: MQT 09 - Hot-spot endurance test		N/A
Test Date [YYYY-MM-DD] start/end		—
Sample #		—
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] .:		—

TABLE 11.1: MQT 09 - Hot-spot endurance test for WBT						N/A
Selected hot-spot cells	Low	Low	Low	High	Permanent	—
Shading rate [%].....						—
Max. measured cell temperature in each cell [°C]						—
Test duration of each shading [h]						—
Irradiance during shading [W/m²]						—
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						

TABLE 11.2: MQT 09 - Hot-spot endurance test for MLI		N/A
Selected hot-spot cells.....		—
Number of cells shaded		—
Max. measured cell temperature [°C]		—
Test duration during shading [h]		—

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Clause	Requirement + Test	Result - Remark	Verdict
Irradiance during shading [W/m ²]			—
Supplementary information:			

TABLE 11.3: MQT 01 - Visual inspection after hot-spot endurance test			N/A
Test Date [YYYY-MM-DD]			—
Sample #	Nature and position of initial findings – comments or attach photos		—
			—
Supplementary information:			

TABLE 11.4: MQT 02 - Maximum power determination after hot-spot endurance test							N/A
Test Date [YYYY-MM-DD]							—
Module temperature [°C]							—
Irradiance [W/m ²]							—
Sample #	<i>I</i> _{sc} [A]	<i>V</i> _{oc} [V]	<i>I</i> _{mp} [A]	<i>V</i> _{mp} [V]	<i>P</i> _{max} [W]	FF [%]	—
							—
Supplementary information:							

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

TABLE 11.6: MQT 03 - Insulation test after hot-spot endurance test					N/A
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	

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Clause	Requirement + Test	Result - Remark		Verdict
				—

TABLE 11.7: MQT 15 - Wet leakage current test after hot-spot endurance test			N/A
Test Date [YYYY-MM-DD].....:			—
Test Voltage applied [V]			—
Solution temperature [°C].....:			—
Size of module [m²]			—
Solution resistivity [Ω cm].....:			—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
			—
Supplementary information:			

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

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Clause	Requirement + Test	Result - Remark	Verdict
TABLE 12.1: MQT 10 - UV preconditioning test (Front side)			N/A
Test Date (YYYY-MM-DD) start/end			—
Module temperature [°C]			—
UV irradiance (280-400nm) [W/m ²]			—
UV dose (280-320nm) [kWh/ m ²]			—
Module operation condition		☐ Short circuited ☐ Open circuited	—
Supplementary information:			

TABLE 12.2: MQT 10 - UV preconditioning test (Back side)			N/A
Test Date (YYYY-MM-DD) start/end			—
Module temperature [°C]			—
UV irradiance (280-400nm) [W/m ²]			—
UV dose (280-320nm) [kWh/ m ²]			—
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			N/A
Test Date [YYYY-MM-DD]			—
Sample #	Nature and position of initial findings – comments or attach photos		—
			—
			—

TABLE 12.4: MQT 15 - Wet leakage current test after UV preconditioning test			N/A
Test Date [YYYY-MM-DD]			—
Test Voltage applied [V]			—
Solution temperature [°C]			—
Size of module [m ²]			—
Solution resistivity [Ω cm]			—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
			—
			—
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							N/A
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 [%]	Result
							—
							—
Supplementary information:							

TABLE 12.6: MQT 03 - Insulation test after UV preconditioning test - Optional					N/A
Test Date [YYYY-MM-DD]					—
Test Voltage applied [V]					—
Size of module [m ²]					—
Required Resistance [MΩ].....					—
Sample #	Measured		Dielectric breakdown		Result
	[MΩ]		Yes (description)	No	
					—
					—
Supplementary information:					

TABLE 13: MQT 20 - Cyclic (dynamic) mechanical Load test						N/A
Test Date [MM/DD/YYYY]						—
Sample #						—
Temperature of tested module(°C):						—
Maximum pressure (Pa) :						—
Pressure tolerance(Pa) :						—
Monitoring current (A) :						—
Rate per minute(cycles) :						—
Number of cycles						—
Pressure provider (Air pressure or vacuum)						—
Cell and alive part broken/ not						—
Current continuous (continuous/ disconnection occurred)						—

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information: N/A

TABLE 13.1: MQT 01 - Visual inspection after Cyclic (dynamic) mechanical Load test			N/A
Test Date [YYYY-MM-DD]			—
Sample #	Nature and position of initial findings – comments or attach photos		—
			—
			—
Supplementary information:			

TABLE 13.2: MQT 15 - Wet leakage current test after Cyclic (dynamic) mechanical Load test			N/A
Test Date [YYYY-MM-DD]			—
Test Voltage applied [V]			—
Solution temperature [°C]			—
Size of module [m²]			—
Solution resistivity [Ω cm]			—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
			—
			—
Supplementary information:			

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

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 14.1: MQT 01 - Visual inspection after thermal cycling 50 test			N/A
Test Date [YYYY-MM-DD]			—
Sample #	Nature and position of initial findings – comments or attach photos		—
			—
			—
Supplementary information:			

TABLE 14.2: MQT 15 - Wet leakage current test after thermal cycling 50 test			N/A
Test Date [YYYY-MM-DD]			—
Test Voltage applied [V]			—
Solution temperature [°C]			—
Size of module [m²]			—
Solution resistivity [Ω cm]			—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
			—
			—
Supplementary information:			

TABLE 14.3: MQT 03 – Max. power determination after thermal cycling 50 test - Optional						N/A
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:						

TABLE 14.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional			N/A
Test Date [YYYY-MM-DD]			—
Test Voltage applied [V]			—
Size of module [m²]			—

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Clause	Requirement + Test		Result - Remark	Verdict
Required Resistance [MΩ]..... :				—
Sample #	Measured	Dielectric breakdown		Result
	[MΩ]	Yes (description)	No	
				—
				—
Supplementary information:				

TABLE 15: MQT 12 - Humidity freeze 10 test		N/A
Test Date [YYYY-MM-DD] start/end:		—
Total cycles (10):		—
Applied current (A):		—
Dwell time at high temperature:		—
Dwell time at low temperature.....:		—
Sample #	Open circuits (yes/no)	—
		—
		—
Supplementary information:		

TABLE 15.1: MQT 01 - Visual inspection after humidity freeze 10 test		N/A
Test Date [YYYY-MM-DD]:		—
Sample #	Nature and position of initial findings – comments or attach photos	—
		—
		—
Supplementary information:		

TABLE 15.2: MQT 15 - Wet leakage current test after humidity freeze 10 test				N/A
Test Date [YYYY-MM-DD].....				—
Test Voltage applied [V]				—
Solution temperature [°C].....				—
Size of module [m²]				—
Solution resistivity [Ω cm].....				—
Sample #	Measured [MΩ]	Limit [MΩ]	Result	

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

TABLE 15.3: MQT 02 - Maximum power determination after humidity freeze 10 test -Optional						N/A
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 15.4: MQT 03 Insulation test after humidity freeze 10 test) -Optional					N/A
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			N/A
Test Date [YYYY-MM-DD] start/end			—
Sample #			—
Supplementary information:			

TABLE 16.1: MQT 01 - Visual inspection after retention of junction box on mounting surface			N/A
Test Date [YYYY-MM-DD]			—

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Clause	Requirement + Test	Result - Remark	Verdict
Sample #	Nature and position of initial findings – comments or attach photos		—
			—
Supplementary information:			

TABLE 16.2: MQT 15 - Wet leakage current test after retention of junction box on mounting surface			N/A
Test Date [YYYY-MM-DD]			—
Test Voltage applied [V]			—
Solution temperature [°C].....			—
Size of module [m²]			—
Solution resistivity [Ω cm].....			—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
			—
Supplementary information:			

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

TABLE 17.1: MQT 01 - Visual inspection after thermal cycling 200 test			N/A
Test Date [YYYY-MM-DD]			—
Sample #	Nature and position of initial findings – comments or attach photos		—
			—

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

TABLE 17.2: MQT 15 - Wet leakage current test after thermal cycling 200 test			N/A
Test Date [YYYY-MM-DD]			—
Test Voltage applied [V]			—
Solution temperature [°C].....			—
Size of module [m²]			—
Solution resistivity [Ω cm].....			—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
			—
			—
Supplementary information:			

TABLE 18: MQT 13 - Damp heat 1000 test			N/A
Test Date [YYYY-MM-DD] start/end			—
Total hours (1000h)			—
Sample #			—
			—
			—
Supplementary information:			

TABLE 18.1: MQT 01 - Visual inspection after damp heat 1000 test			N/A
Test Date [YYYY-MM-DD]			—
Sample #	Nature and position of initial findings – comments or attach photos		—
			—
			—
Supplementary information:			

TABLE 18.2: MQT 15 - Wet leakage current test after damp heat 1000 test			N/A
Test Date [YYYY-MM-DD]			—
Test Voltage applied [V]			—
Solution temperature [°C].....			—

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Clause	Requirement + Test	Result - Remark	Verdict
Size of module [m ²]			—
Solution resistivity [Ω cm].....			—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
			—
			—
Supplementary information:			

TABLE 18.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional							N/A
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 [%]	Result
							—
							—
Supplementary information:							

TABLE 18.4: MQT 03 - Insulation test after damp heat 1000 test - Optional					N/A
Test Date [YYYY-MM-DD]					—
Test Voltage applied [V]					—
Size of module [m²]					—
Sample #	Measured	Required Resistance	Dielectric breakdown		Result
	[MΩ]	[MΩ]	Yes (description)	No	
					—
					—
Supplementary information:					

TABLE 19: MQT 16 Static mechanical load test			N/A
Sample # :			—
Design load(front side/ back side).....			—
Safety factors			—
Test Date [YYYY-MM-DD]			—
Mounting method			—
Load applied to.....		front side	back side
			—

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Clause	Requirement + Test	Result - Remark	Verdict
Mechanical load [Pa].....:			—
First cycle time (start/end).....:			—
Intermittent open-circuit (yes/no)			—
Second cycle time (start/end)			—
Intermittent open-circuit (yes/no)			—
Third cycle time (start/end)			—
Intermittent open-circuit (yes/no)			—
Supplementary information: may need to be performed with each mounting situation			

TABLE 19.1: MQT 01 - Visual inspection after static mechanical load test			N/A
Test Date [YYYY-MM-DD].....:			—
Sample #	Nature and position of initial findings – comments or attach photos		—
			—
Supplementary information:			

TABLE 19.2: MQT 15 - Wet leakage current test after static mechanical load test			N/A
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:			

TABLE 20: MQT 22 Bending test			N/A
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			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 20.1: MQT 01 - Visual inspection after bending test			N/A
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			N/A
Test Date [YYYY-MM-DD]			—
Test Voltage applied [V]			—
Solution temperature [°C]			—
Size of module [m²]			—
Solution resistivity [Ω cm]			—
Sample #	Measured [MΩ]	Limit [MΩ]	Result
			—
Supplementary information:			

TABLE 21: MQT 17 - Hail impact test							N/A
Test Date [YYYY-MM-DD]							—
Sample #							—
Ice ball size [mm]	1	2	3	4	5	6	—
	7	8	9	10	11		
Ice ball weight [g]	1	2	3	4	5	6	—
	7	8	9	10	11		
Ice ball velocity [m/s]	1	2	3	4	5	6	—
	7	8	9	10	11		
Number of impact locations							—

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information: (impact location descriptions)

TABLE 21.1: MQT 01 - Visual inspection after hail impact test			N/A
Test Date [YYYY-MM-DD]			—
Sample #	Nature and position of initial findings – comments or attach photos		—
			—
Supplementary information:			

TABLE 21.2: MQT 15 - Wet leakage current test after hail impact test			N/A
Test Date [YYYY-MM-DD]			—
Test Voltage applied [V]			—
Solution temperature [°C]			—
Size of module [m²]			—
Solution resistivity [Ω cm]			—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
			—
Supplementary information:			

TABLE 22: MQT 21 -Potential induced degradation test		N/A
Test Date [MM/DD/YYYY] start/end..... :		—
Chamber air temperature (°C) :		—
Chamber relative humidity (% RH) :		—
Test duration hours (h) :		—
Sample #	Applied voltage stress (V) and polarities	—
		—
		—
		—
		—
Supplementary information:		

TABLE 22.1: MQT 01 - Visual inspection after potential induced degradation test			N/A
Test Date [YYYY-MM-DD]			—

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Clause	Requirement + Test	Result - Remark	Verdict
Sample #	Nature and position of initial findings – comments or attach photos		—
			—
			—
			—
			—
Supplementary information:			

TABLE 22.2: MQT 15 - Wet leakage current test after potential induced degradation test			N/A
Test Date [YYYY-MM-DD]			—
Test Voltage applied [V]			—
Solution temperature [°C]			—
Size of module [m²]			—
Solution resistivity [Ω cm]			—
Sample #	Measured [MΩ]	Required Resistance [MΩ]	Result
			—
			—
			—
			—
Supplementary information:			

TABLE 23: MQT 19.2: Final stabilization							N/A
TABLE 23.1: MQT 06.1: Performance at STC before final stabilization							N/A
Test Date [YYYY-MM-DD]							—
Test method	☐ Solar simulator		☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
							—
							—
							—
							—
Supplementary information:							

TABLE 23.2: MQT 19.1 Final Stabilization procedure	N/A
--	-----

IEC 61215-2							
Clause	Requirement + Test	Result - Remark	Verdict				
☐ IEC 61215-1-2 ☐ IEC 61215-1-3 ☐ IEC 61215-1-4			N/A				
Light exposure method:		☐ Solar simulator ☐ Natural sunlight					
Stabilization criterion x per IEC 61215-1-x :							
Sample #	Test Date (YYYY-MM-DD) start/end..:						
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							
2							
3							
4						—	—
Sample #	Test Date (YYYY-MM-DD) start/end						
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							
2							
3							
4						—	—
Sample #	Test Date (YYYY-MM-DD) start/end						
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							
2							
3							
4						—	—
Supplementary information:							
☐ Other stabilization procedures							
Sample #	Test Date (YYYY-MM-DD) start/end						

IEC 61215-2			
Clause	Requirement + Test	Result - Remark	Verdict
	—		
	—		
	—		
	—		
Test method description:			
Supplementary information: see Annex 3 for verification of this alternative stabilization procedure			

TABLE 23.3: MQT 19.2: Final stabilization									N/A
☐IEC 61215-1-1									N/A
☐Method 1									N/A
Stress-specific stabilization – BO LID (MQT 19.3)									N/A
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 [%]	Pmax [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 [%]	Pmax [W] (LabGateNo.1)	Power Degradation	Result
									—
									—
Supplementary information:									

IEC 61215-2										
Clause	Requirement + Test						Result - Remark	Verdict		
☐ 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)									N/A	
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									N/A	
Test Date [YYYY-MM-DD]										—
Test method				☐ Solar simulator			☐ Natural sunlight		—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
									—	
									—	
Supplementary information:										
TABLE 23.4: MQT 19.2: Final stabilization									N/A	
☐ Method 3									N/A	
Test Date (YYYY-MM-DD) start/end										—
Test duration (h)										—
Module temperature [°C]										—
UV irradiance (280-400nm) [W/m²]										—
UV dose (280-320nm) [kWh/ m²]										—
UV dose (280-400nm) [kWh/ m²]										—
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									N/A	
Test Date [YYYY-MM-DD]										—
Test method				☐ Solar simulator			☐ Natural sunlight		—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result	
									—	
									—	
									—	
									—	
Performance at BNPI after final stabilization — for bifacial modules									N/A	
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									N/A
Performance at STC before final stabilization— for monofacial modules									N/A
Test Date [YYYY-MM-DD]				—					
Test method				☐ Solar simulator ☐ Natural sunlight				—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
									—
									—
									—
									—
Performance at BNPI before final stabilization — for bifacial modules									N/A
Test Date [YYYY-MM-DD]				—					
Test method				☐ Solar simulator ☐ Natural sunlight				—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
									—
									—
									—
									—
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									N/A
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									N/A
Test Date [YYYY-MM-DD]								—	
Test method				☐ Solar simulator ☐ Natural sunlight				—	
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	P_{max} [W] (Lab Gate No.1)	Power Degradation	Result
									—
									—
									—
									—
Supplementary information:									

IEC 61215-2									
Clause		Requirement + Test					Result - Remark		Verdict
TABLE 23.5: MQT 06.1: Final Performance at STC									N/A
Test Date [YYYY-MM-DD] :									—
Test method:				☐ Solar simulator		☐ Natural sunlight			—
Sample #	I _{sc} [A]	V _{oc} [V]	I _{mp} [A]	V _{mp} [V]	P _{max} [W]	FF [%]	Pmax [W] (Lab Gate No.1)	Power Degradation [%]	Result
									—
									—
									—
									—
Supplementary information: Pmax [W] (Lab_GateNo.1) is calculated by considering the reproducibility <i>r</i> of control module.									

For bifacial modules							N/A			
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)							N/A			
Test Date [YYYY-MM-DD]							—			
Test method.....			☐ Solar simulator		☐ Natural sunlight		—			
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	ϕI_{sc}	ϕV_{oc}	ϕP_{max}	Result
										—
										—
										—
										—
Supplementary information:										

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

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

TABLE 23.9: MQT 03 fin: Final Insulation test					N/A
Test Date [YYYY-MM-DD] :					—
Test Voltage applied [V] :					—
Size of module [m²] :					—
Sample #	Required	Measured	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
					—
					—
					—
					—
Supplementary information:					

TABLE 23.10: MQT 15 fin: Final Wet leakage current test					N/A
Test Date [YYYY-MM-DD]..... :					—
Test Voltage applied [V]					—
Solution temperature [°C]..... :					—
Size of module [m ²]					—
Solution resistivity [Ω cm]..... :					—

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Clause	Requirement + Test	Result - Remark	Verdict
Sample #	Measured [MΩ]	Limit [MΩ]	Result
			—
			—
			—
			—
Supplementary information:			

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

A1.1	MODULE TYPE/S
	QN-720HT-01

A1.2	MODULE DESIGN
	Module dimensions (L x W x H) [mm] : 2384 x 1303 x 35
	Weights..... : 38.0 ±3% Kg (approx.)
	Front/Rear cover bonding classification : ☐ rigid/flexible ☒ rigid/rigid ☐ flexible/flexible

A1.3	SOLAR CELL
	Cell type reference : CHUZHOU JIETAI NEW ENERGY TECHNOLOGY CO., LTD Cell type: CZJT-210M-18D1, N type mono crystalline silicon, 18 busbars
	Cell dimensions L x W x T (± %) [mm] : 210 ±0.5 x 105 ±0.5 x 0.13 ±0.013
	Cell thickness [µm] : 130 ± 13
	Cell area [cm²] : 220.48

A1.4	IDENTIFICATION OF MATERIALS
	Front cover..... : Nantong Dongli New Energy Technology Co., Ltd. Type: Heat strengthened AR-coated glass, patterned solar glass, Thickness: 2.0 mm
	Rear cover : Nantong Dongli New Energy Technology Co., Ltd. Type: Heat strengthened glass with white glaze, patterned solar glass, Thickness: 2.0 mm
	Encapsulation material front side : Kunshan Tianyang New Materials Co., Ltd. Type: JCC-305T, material: EVA/POE/EVA, Thickness: 0.6±0.1 mm
	Encapsulation material back side : Kunshan Tianyang New Materials Co., Ltd. Type: JCC-105P-T, material: EVA, Thickness: 0.6±0.1 mm

IEC 61215-2		
	Frame parts	Frame (Jiangsu) PV Materials Manufacturing Co., Ltd Anodized aluminum alloy, 6005-T6, silver colour, assembled by key corners
	Mounting parts	N/A
	Adhesive for frame	Jiangxi Fenfa Technology Co Ltd Type: FS-996, Rated HB at min. 3.0 mm thick, RTI=105, HWI=2, HAI=0 UL certified, No. E518743
	Edge sealing	N/A
	Internal wiring	N/A
	Cell connector	Tianwei Technology Dongtai Co., Ltd Cross section: $\Phi 0.26$ mm, round wire ribbon, Material: Base Cu ($\geq 99.95\%$), coating: Sn(60 ± 3)%Pb(40 ± 3)%, coating thickness 0.018 (-0.005, +0.01) mm at each side.
	String connector	Tianwei Technology Dongtai Co., Ltd Cross section: 0.3×4 & 0.35×6 mm, Material: Base Cu ($\geq 99.97\%$), coating Sn63%Pb37%, coating thickness 0.025 ± 0.0025 mm at each side.
	Soldering material	Sn(60 ± 3)%Pb(40 ± 3)%
	Fluxing agent	Anhui Costar Technology Co., Ltd. Type: FD-309, no clean halogen free liquid flux.
	Junction box	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co. Ltd Type: JM37xy (x=A, y=C), DC 1500 V, 30A, IP 68(1m, 1h), -40 °C to 85 °C, TÜV SÜD certified, No. B 097074 0006 Rev. 01
	Cable	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co. Ltd Type: H1Z2Z2-K $1 \times 4 \text{mm}^2$, 1500V DC, -40 °C to 90 °C, TÜV Rheinland certified, No. R 50334928
	Connector	Stäubli Electrical Connectors AG Type: PV-KST4-EVO2A/xy, PV-KBT4-EVO2A/xy, 1500VDC, 45A (4mm^2), IP68(1m, 1h), -40°C to 85°C TÜV Rheinland certified, No. R 60127169

IEC 61215-2		
	Bypass diode	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co. Ltd. Type: MK5050, Max. peak reverse voltage 50 V, Max. average forward current 50 A, Max. junction temperature 200 °C.
	Potting material.....	Jiangxi Fenfa Technology Co Ltd Type: FS-8206A, white colour, Rated V-1 at min. 6.0 mm thick, RTI=105, HWI=1, HAI=0 UL certified, No. E518743
	Adhesive for junction box	Jiangxi Fenfa Technology Co Ltd Type: FS-996, Rated HB at min. 3.0 mm thick, RTI=105, HWI=2, HAI=0 UL certified, No. E518743
	Additional material (e. g. fixing tape, insulation tape).....	1) Fixing tape: Suzhou temosun PV Material Co., Ltd. Type: T5065 2) Marking label: Suzhou ZhengAo Packing Material Limited Company Type: AVERY PET

A1.5	MODULE DESIGN - MINIMUM DISTANCES	
	Between cells.....	0.45 mm
	Between cell and accessible surfaces.....	10.5 mm
	Between any current carrying part and accessible surfaces	10.5 mm

A1.6	MODULE DESIGN - ELECTRICAL CONFIGURATION	
	Total number of cells	132
	Serial-parallel connection of cells	SPS
	Cells per bypass diode	44
	No. of bypass diodes	3

Remark: for tested samples High 1-x

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Annex 1-2: Product Description Sheet (Manufacturers and type references)

A1.1	MODULE TYPE/S
	QN-615HT-05

A1.2	MODULE DESIGN
	Module dimensions (L x W x H) [mm] : 2384 x 1134 x 30
	Weights..... : 32.5 ±3% Kg (approx.)
	Front/Rear cover bonding classification : ☐ rigid/flexible ☒ rigid/rigid ☐ flexible/flexible

A1.3	SOLAR CELL
	Cell type reference : Jinko Solar Co., Ltd. Cell type: 182R MBB NFH-TBNU, N type mono crystalline silicon, 16 busbars
	Cell dimensions L x W x T (± %) [mm] : 182 ±0.5 x 93.4 ±0.5 x 0.16 ±0.016
	Cell thickness [µm] : 160 ± 16
	Cell area [cm²] : 167.0

A1.4	IDENTIFICATION OF MATERIALS
	Front cover..... : Flat Solar Glass Group Co., Ltd. Type: AR Coated Heat strengthened glass, patterned solar glass, Thickness: 2.0 mm
	Rear cover : Flat Solar Glass Group Co., Ltd. Type: Heat strengthened glass with white glaze, patterned solar glass, Thickness: 2.0 mm
	Encapsulation material front side : Jiangsu Lushan New Materials Co., Ltd. Type: S102, material: EVA/POE/EVA thickness: 0.6±0.1mm
	Encapsulation material back side : Jiangsu Lushan New Materials Co., Ltd. Type: S101, material: EVA/POE/EVA thickness: 0.6±0.1mm
	Frame parts : Jiangsu Chengqing New Energy Co., Ltd. Anodized aluminum alloy, 6005-T6, black colour, assembled by key corners
	Mounting parts..... : N/A

IEC 61215-2		
	Adhesive for frame	Shanghai Huitian New Material Co., Ltd. Type: HT906Z, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0 UL certified, No. E248611
	Edge sealing	N/A
	Internal wiring	N/A
	Cell connector	Suzhou Boneed Photovoltaic Technology Co., Ltd. Cross section: ϕ 0.26 (-0.01, +0.02) mm, round wire ribbon, Material: Base Cu ($\geq 99.95\%$), coating: Sn(60 $\pm$ 3)%Pb(40 $\pm$ 3)%, coating thickness 0.018 (-0.005, +0.01) mm at each side.
	String connector	Suzhou Boneed Photovoltaic Technology Co., Ltd. Cross section: 0.3 $\pm$ 0.015 $\times$ 4 $\pm$ 0.05 & 0.35 $\pm$ 0.015 $\times$ 6 $\pm$ 0.05 mm, Material: Base Cu ($\geq 99.95\%$), coating Sn60%Pb40%, coating thickness 0.023(-0.005, + 0.01)mm at each side.
	Soldering material.....	Sn(60 $\pm$ 3)%Pb(40 $\pm$ 3)%
	Fluxing agent	Shenzhen Vital New Material Company Limited Type: WTO-PV107, no clean halogen free liquid flux.
	Junction box.....	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co. Ltd Type: JM07w, Rated DC 1500 V, 25A, IP 68 (1m, 1h), -40 °C to 85 °C, TÜV SÜD certified, No. B 097074 0004 Rev. 02
	Cable	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co. Ltd Type: 62930 IEC 131 1 $\times$ 4mm ² , 1500V DC, -40 °C to 90 °C, TÜV Rheinland certified, No. R 50507377
	Connector	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co. Ltd Type: HQC4, Rated DC 1500V, 30A, IP68 (1m, 1h), -40°C to 85°C TÜV SÜD certified, No. B 097074 0005 Rev. 01

IEC 61215-2		
	Bypass diode	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co. Ltd Type: THY4050, Schottky, Max. peak reverse voltage 50 V, Max. average forward current 40 A, Max. junction temperature 200 °C.
	Potting material.....	Shanghai Huitian New Material Co., Ltd. Type: 5299W-S, white colour, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0 UL certified, No. E248611
	Adhesive for junction box	Shanghai Huitian New Material Co., Ltd. Type: HT906Z, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0 UL certified, No. E248611
	Additional material (e. g. fixing tape, insulation tape).....	1) Fixing tape: Suzhou temosun PV Material Co., Ltd. Type: T5065, TEMOSUN Adhesive tapes, transparency, 0.06±0.02mm thick. 2) Marking label: Suzhou ZhengAo Packing Material Limited Company Type: AVERY PET

A1.5	MODULE DESIGN - MINIMUM DISTANCES	
	Between cells.....	2.0 mm
	Between cell and accessible surfaces.....	10.5 mm
	Between any current carrying part and accessible surfaces	10.5 mm

A1.6	MODULE DESIGN - ELECTRICAL CONFIGURATION	
	Total number of cells	144
	Serial-parallel connection of cells	SPS
	Cells per bypass diode	48
	No. of bypass diodes	3

Remark: for tested samples High 2-x

IEC 61215-2

Annex 1-3: Product Description Sheet (Manufacturers and type references)

A1.1	MODULE TYPE/S
	QN-650HT-06

A1.2	MODULE DESIGN
	Module dimensions (L x W x H) [mm] : 2465 x 1134 x 30
	Weights..... : 33.7 ±3% Kg (approx.)
	Front/Rear cover bonding classification : ☐ rigid/flexible ☒ rigid/rigid ☐ flexible/flexible

A1.3	SOLAR CELL
	Cell type reference : Jinko Solar Co., Ltd. Cell type: 182M 247 16BB 10SEG NFJ-TBNU, N type mono crystalline silicon, 16 busbars
	Cell dimensions L x W x T (± %) [mm] : 182 ±0.5 x 91 ±0.5 x 0.16 ±0.016
	Cell thickness [µm] : 160 ± 16
	Cell area [cm²] : 165.6

A1.4	IDENTIFICATION OF MATERIALS
	Front cover..... : Flat Solar Glass Group Co., Ltd. Type: AR Coated Heat strengthened glass, patterned solar glass, Thickness: 2.0 mm
	Rear cover : Flat Solar Glass Group Co., Ltd. Type: Heat strengthened glass with white glaze, patterned solar glass, Thickness: 2.0 mm
	Encapsulation material front side : Jiangsu Lushan New Materials Co., Ltd. Type: S102, material: EVA/POE/EVA thickness: 0.6±0.1mm
	Encapsulation material back side : Jiangsu Lushan New Materials Co., Ltd. Type: S101, material: EVA/POE/EVA thickness: 0.6±0.1mm
	Frame parts : Jiangsu Chengqing New Energy Co., Ltd. Anodized aluminum alloy, 6005-T6, silvery colour, assembled by key corners

IEC 61215-2		
	Mounting parts	N/A
	Adhesive for frame	Shanghai Huitian New Material Co., Ltd. Type: HT906Z, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0 UL certified, No. E248611
	Edge sealing	N/A
	Internal wiring	N/A
	Cell connector	Suzhou Boneed Photovoltaic Technology Co., Ltd. Cross section: ϕ 0.26 (-0.01, +0.02) mm, round wire ribbon, Material: Base Cu ($\geq 99.95\%$), coating: Sn(60 $\pm$ 3)%Pb(40 $\pm$ 3)%, coating thickness 0.018 (-0.005, +0.01) mm at each side.
	String connector	Suzhou Boneed Photovoltaic Technology Co., Ltd. Cross section: 0.3 $\pm$ 0.015 $\times$ 4 $\pm$ 0.05 & 0.35 $\pm$ 0.015 $\times$ 6 $\pm$ 0.05 mm, Material: Base Cu ($\geq 99.95\%$), coating Sn60%Pb40%, coating thickness 0.023(-0.005, + 0.01)mm at each side.
	Soldering material.....	Sn(60 $\pm$ 3)%Pb(40 $\pm$ 3)%
	Fluxing agent	Shenzhen Vital New Material Company Limited Type: WTO-PV107, no clean halogen free liquid flux.
	Junction box.....	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co. Ltd Type: JM07w, Rated DC 1500 V, 25A, IP 68 (1m, 1h), -40 °C to 85 °C, TÜV SÜD certified, No. B 097074 0004 Rev. 02
	Cable	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co. Ltd Type: 62930 IEC 131 1 $\times$ 4mm ² , 1500V DC, -40 °C to 90 °C, TÜV Rheinland certified, No. R 50507377
	Connector	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co. Ltd Type: HQC4, Rated DC 1500V, 30A, IP68 (1m, 1h), -40°C to 85°C TÜV SÜD certified, No. B 097074 0005 Rev. 01

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	Bypass diode	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co. Ltd Type: THY4050, Schottky, Max. peak reverse voltage 50 V, Max. average forward current 40 A, Max. junction temperature 200 °C.
	Potting material.....	Shanghai Huitian New Material Co., Ltd. Type: 5299W-S, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0 UL certified, No. E248611
	Adhesive for junction box	Shanghai Huitian New Material Co., Ltd. Type: HT906Z, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0 UL certified, No. E248611
	Additional material (e. g. fixing tape, insulation tape).....	1) Fixing tape: Suzhou temosun PV Material Co., Ltd. Type: T5065, TEMOSUN Adhesive tapes, transparency, 0.06±0.02mm thick. 2) Marking label: Suzhou ZhengAo Packing Material Limited Company Type: AVERY PET

A1.5	MODULE DESIGN - MINIMUM DISTANCES	
	Between cells.....	0.7 mm
	Between cell and accessible surfaces.....	10.5 mm
	Between any current carrying part and accessible surfaces	10.5 mm

A1.6	MODULE DESIGN - ELECTRICAL CONFIGURATION	
	Total number of cells	156
	Serial-parallel connection of cells	SPS
	Cells per bypass diode	52
	No. of bypass diodes	3

Remark: for tested samples High 3-x

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Clause	Requirement + Test	Result - Remark	Verdict

Annex 2: Test table for verifying other alternative stabilization procedure

Step 1: Alternative stabilization									N/A
Test Date (YYYY-MM-DD) start/end:									—
Test method description:									—
		Sample		Sample		Sample			—
Power before alternative stabilization (W)		L.		M.		N.			—
Power after alternative stabilization (W)		O.		P.		Q.			—
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									

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

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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)							P
Test Date [YYYY-MM-DD]				2024-10-21			—
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 1-1	17.537	49.491	16.878	42.067	710.007	81.81	—
High 1-2	17.518	49.546	16.823	42.277	711.226	81.94	—
High 2-1	14.732	51.720	13.965	43.864	612.561	80.39	—
High 2-2	14.737	51.698	13.962	43.879	612.639	80.41	—
High 3-1	13.634	57.622	13.044	49.304	643.121	81.86	—
High 3-2	13.696	57.596	13.102	49.111	643.452	81.57	—
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)							P
Test Date [YYYY-MM-DD]				2024-10-21			—
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 1-1	14.895	49.284	13.760	42.945	590.923	80.50	—
High 1-2	14.823	49.344	13.915	42.961	597.802	81.73	—
High 2-1	11.546	51.240	10.107	45.077	455.593	77.01	—
High 2-2	11.529	51.234	10.203	44.928	458.400	77.61	—
High 3-1	10.693	57.045	9.632	50.101	482.573	79.11	—
High 3-2	10.696	57.076	9.588	50.155	480.886	78.77	—
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							P
Test Date [YYYY-MM-DD]				2024-10-21			—
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 [%]	Result
High 1-1	19.468	49.611	18.708	42.036	786.409	81.42	—
High 1-2	19.450	49.678	18.657	42.206	787.437	81.50	—
High 2-1	16.194	51.868	15.342	43.923	673.867	80.23	—
High 2-2	16.209	51.861	15.354	43.879	673.718	80.15	—
High 3-1	15.083	57.618	14.381	49.241	708.135	81.48	—
High 3-2	15.022	57.649	14.376	49.220	707.587	81.71	—
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							P
Light exposure method				☒ Solar simulator ☐ Natural sunlight			—
Stabilization criterion x per IEC 61215-1-x :				0.01			—
Sample #	High 1-1	Test Date (YYYY-MM-DD) start/end			2024-10-21 / 2024-10-23		
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	—	—	—	—	710.007	—	—
1	5	800~1000	50 ± 10	MPPT	708.599	—	—
2	5	800~1000	50 ± 10	MPPT	707.734	0.321	Yes
3							
4						—	—
Sample #	High 1-2	Test Date (YYYY-MM-DD) start/end			2024-10-21 / 2024-10-23		
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	—	—	—	—	711.226	—	—
1	5	800~1000	50 ± 10	MPPT	709.595	—	—
2	5	800~1000	50 ± 10	MPPT	708.922	0.325	Yes
3							
4						—	—
Sample #	High 2-1	Test Date (YYYY-MM-DD) start/end			2024-10-21 / 2024-10-23		

IEC 61215-2							
Clause	Requirement + Test				Result - Remark		Verdict
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	—	—	—	—	612.561	—	—
1	5	800~1000	50 ± 10	MPPT	611.153	—	—
2	5	800~1000	50 ± 10	MPPT	609.052	0.574	Yes
3							
4						—	—
Sample #	High 2-2	Test Date (YYYY-MM-DD) start/end:			2024-10-21 / 2024-10-23		
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	—	—	—	—	612.639	—	—
1	5	800~1000	50 ± 10	MPPT	610.277	—	—
2	5	800~1000	50 ± 10	MPPT	608.733	0.640	Yes
3							
4						—	—
Sample #	High 3-1	Test Date (YYYY-MM-DD) start/end:			2024-10-21 / 2024-10-23		
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	—	—	—	—	643.121	—	—
1	5	800~1000	50 ± 10	MPPT	641.158	—	—
2	5	800~1000	50 ± 10	MPPT	639.883	0.505	Yes
3							
4						—	—
Sample #	High 3-2	Test Date (YYYY-MM-DD) start/end:			2024-10-21 / 2024-10-23		
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	—	—	—	—	643.452	—	—
1	5	800~1000	50 ± 10	MPPT	640.610	—	—
2	5	800~1000	50 ± 10	MPPT	639.997	0.539	Yes
3							
4						—	—

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Clause	Requirement + Test	Result - Remark	Verdict
Supplementary information: N/A			
☐ 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			

TABLE A.4.7: MQT 6.1 Performance at STC after initial stabilization (Front side)							P
Test Date [YYYY-MM-DD]		2024-10-23					—
		Lower end power class		Higher end power class			—
$P_{max}(lab)$ (W)	$\leq$ —	$\geq$ —	$\geq$ 685.728				—
$\bar{P}_{max}(lab)$ $\bar{P}_{max}(Lab)$ (W)	$\geq$ —	$\geq$ 706.936					—
$P_{max4}(NP)$ (W)	-		725				
$V_{oc}(lab)$ (V)	$\leq$ —	$\leq$ 49.700					—
$I_{sc}(lab)$ (A)	$\leq$ —	$\leq$ 18.912					—
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 1-1	17.540	49.343	16.887	41.910	707.734	81.77	P
High 1-2	17.539	49.401	16.829	42.125	708.922	81.82	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

TABLE A.4.8: MQT 6.1 Performance at STC after initial stabilization (Back side)							P
Test Date [YYYY-MM-DD]		2024-10-23					—
		Lower end power class		Higher end power class			—
$P_{max}(lab)$ (W)	$\leq$ —	$\geq$ —	$\geq$ —				—
$\bar{P}_{max}(lab)$ $\bar{P}_{max}(Lab)$ (W)	$\geq$ —	$\geq$ —					—
$V_{oc}(lab)$ (V)	$\leq$ —	$\leq$ —					—
$I_{sc}(lab)$ (A)	$\leq$ —	$\leq$ —					—

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Clause	Requirement + Test				Result - Remark		Verdict
Test method			☒ Solar simulator ☐ Natural sunlight				—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	P_{max} [W]	FF [%]	Result
High 1-1	14.922	49.140	13.739	42.759	587.466	80.12	—
High 1-2	14.842	49.237	13.946	42.763	596.373	81.61	—
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							P
Test Date [YYYY-MM-DD]..... :			2024-10-23				—
			Lower end power class		Higher end power class		—
$P_{\max}(\text{lab})$ (W) :			$\leq$ ____	$\geq$ ____	$\geq$ ____ 756.205 ____		—
$\bar{P}_{\max}(\text{lab})$ $\bar{P}_{\max}(\text{Lab})(\text{W})$:			$\geq$ ____ - ____		$\geq$ ____ 779.593 ____		—
$V_{\text{oc}}(\text{lab})$ (V) :			$\leq$ ____ - ____		$\leq$ ____ 49.700 ____		—
$I_{\text{sc}}(\text{lab})$ (A) :			$\leq$ ____ - ____		$\leq$ ____ 20.850 ____		—
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 1-1	19.465	49.479	18.714	41.869	783.536	81.35	P
High 1-2	19.450	49.541	18.668	42.073	785.419	81.51	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

TABLE A.4.7: MQT 6.1 Performance at STC after initial stabilization (Front side)							P
Test Date [YYYY-MM-DD] :			2024-10-23				—
			Lower end power class		Higher end power class		—
$P_{\max}(\text{lab})$ (W) :			$\leq$ <u> - </u> ,	$\geq$ <u> - </u>	$\geq$ <u> 585.726 </u> ,		—
$\bar{P}_{\max}(\text{lab})$ $\bar{P}_{\max}(\text{Lab})(W)$:			$\geq$ <u> - </u> ,		$\geq$ <u> 603.841 </u> ,		—
$P_{\max 4}(\text{NP})$ (W) :			-		620		
$V_{oc}(\text{lab})$ (V) :			$\leq$ <u> - </u> ,		$\leq$ <u> 53.578 </u> ,		—
I_{sc} (lab) (A) :			$\leq$ <u> - </u> ,		$\leq$ <u> 14.935 </u> ,		—
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 2-1	14.741	51.688	13.955	43.644	609.052	79.94	P

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Clause	Requirement + Test				Result - Remark		Verdict
High 2-2	14.739	51.677	13.948	43.643	608.733	79.92	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

TABLE A.4.8: MQT 6.1 Performance at STC after initial stabilization (Back side)							P
Test Date [YYYY-MM-DD]				2024-10-23			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				$\leq$ -	$\geq$ -	$\geq$ -	—
$\bar{P}_{\max}(\text{lab})$ $\bar{P}_{\max}(\text{Lab})(W)$				$\geq$ -	$\geq$ -	$\geq$ -	—
$V_{oc}(\text{lab})$ (V)				$\leq$ -	$\leq$ -	$\leq$ -	—
$I_{sc}(\text{lab})$ (A)				$\leq$ -	$\leq$ -	$\leq$ -	—
Test method				☒ Solar simulator ☐ Natural sunlight			—
Sample #	I_{sc} [A]	V_{oc} [V]	I_{mp} [A]	V_{mp} [V]	$P_{\max}$ [W]	FF [%]	Result
High 2-1	11.542	51.218	10.144	44.810	454.553	76.89	—
High 2-2	11.533	51.210	10.187	44.714	455.502	77.12	—
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							P
Test Date [YYYY-MM-DD]				2024-10-23			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				$\leq$ -	$\geq$ -	$\geq$ 645.727	—
$\bar{P}_{\max}(\text{lab})$ $\bar{P}_{\max}(\text{Lab})(W)$				$\geq$ -	$\geq$ -	$\geq$ 665.698	—
$V_{oc}(\text{lab})$ (V)				$\leq$ -	$\leq$ -	$\leq$ 53.578	—
$I_{sc}(\text{lab})$ (A)				$\leq$ -	$\leq$ -	$\leq$ 16.467	—
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 2-1	16.193	51.845	15.307	43.738	669.498	79.75	P
High 2-2	16.201	51.839	15.377	43.656	671.298	79.93	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

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Clause	Requirement + Test				Result - Remark		Verdict
TABLE A.4.7: MQT 6.1 Performance at STC after initial stabilization (Front side)							P
Test Date [YYYY-MM-DD]			2024-10-23				—
			Lower end power class		Higher end power class		—
$P_{\max}(\text{lab})$ (W)			$\leq$ - ,	$\geq$ -	$\geq$ 619.060 ,		—
$\bar{P}_{\max}(\text{lab})$ $\bar{P}_{\max}(\text{Lab})(W)$			$\geq$ -		$\geq$ 638.206 ,		—
$P_{\max 4}(\text{NP})$ (W)			-		655		
$V_{\text{oc}}(\text{lab})$ (V)			$\leq$ -		$\leq$ 57.692 ,		—
$I_{\text{sc}}(\text{lab})$ (A)			$\leq$ -		$\leq$ 14.671 ,		—
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 3-1	13.628	57.593	13.041	49.067	639.883	81.53	P
High 3-2	13.695	57.569	13.086	48.907	639.997	81.18	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

TABLE A.4.8: MQT 6.1 Performance at STC after initial stabilization (Back side)							P
Test Date [YYYY-MM-DD]				2024-10-23			—
				Lower end power class		Higher end power class	—
$P_{\max}(\text{lab})$ (W)				$\leq$ - , $\geq$ -	$\geq$ -		—
$\bar{P}_{\max}(\text{lab}) \bar{P}_{\max}(\text{Lab})(W)$				$\geq$ -		$\geq$ -	—
$V_{\text{oc}}(\text{lab})$ (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
High 3-1	10.683	57.013	9.606	49.897	479.311	78.70	—
High 3-2	10.688	57.046	9.560	49.923	477.264	78.28	—
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							P
Test Date [YYYY-MM-DD]				2024-10-23			—
				Lower end power class		Higher end power class	—

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Clause		Requirement + Test			Result - Remark		Verdict
$P_{\max}(\text{lab})$ (W)		$\leq$ _____	$\geq$ _____	$\geq$ 682.871 _____		—	
$\bar{P}_{\max}(\text{lab})$ $\bar{P}_{\max}(\text{Lab})(W)$		$\geq$ _____		$\geq$ 703.990 _____		—	
$V_{oc}(\text{lab})$ (V)		$\leq$ _____		$\leq$ 57.692 _____		—	
I_{sc} (lab) (A)		$\leq$ _____		$\leq$ 16.173 _____		—	
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 3-1	15.079	57.586	14.411	48.951	705.433	81.24	P
High 3-2	15.018	57.621	14.412	48.924	705.093	81.48	P
Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.							

IEC 61215-2**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.

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
N/A	N/A	N/A	N/A	N/A	N/A

IEC 61215-2**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*
4.2	Maximum power determination	3 (k=2)	2.01% (k=2)
4.6	Performance at STC	Pmax: 3 (k=2)	Pmax: 2.01% (k=2) Voc: 0.73% (k=2) Isc: 1.99% (k=2)