

Technical Report No.: 7040620006108-00

Date: 2020-09-21

Client: Shanghai JA Solar Technology Co., Ltd.
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Contact person: Ms. Wenli Gong

Shanghai JA Solar Technology Co., Ltd. (072092)
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Hefei JA Solar Technology Co., Ltd (079395)
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Manufacturing place: JA SOLAR CO., LTD. (072056)
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JA Solar (Xingtai) Co., Ltd (095903)
No. 1688, Chang An Road, Xingtai Economic Development Area,
054000 Xingtai City, Hebei Province, PEOPLE'S REPUBLIC OF
CHINA

JA Solar New Energy Yangzhou Co., Ltd.
No.1, Jianhua Road, Economic Development Zone, 225000
Yangzhou City, Jiangsu Province, PEOPLE'S REPUBLIC OF
CHINA
Contact person: Ms. Wenli Gong

Test subject: Product: Crystalline Silicon Photovoltaic modules
Type: JAM72S30-525/MR, JAM72D30-525/MB

Test specification: IEC 61215-2:2016, Clause 4.1 Visual Inspection (MQT 01)
IEC 61215-2:2016, Clause 4.6 Performance at STC (MQT 06)
IEC 61215-2:2016, Clause 4.3 Insulation test (MQT 03)
IEC 61215-2:2016, Clause 4.15 Wet leakage current test (MQT
15)
IEC 61215-2:2016, Clause 4.17 Hail test (MQT 17)
IEC 61215-2:2016, Clause 4.19 Stabilization (MQT 19.1)

Purpose of examination: Test according to the test specification

Test result: The present test results show in clause 3.

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Report No.: 7040620006108
Rev.: 00
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Shanghai Branch
SMN
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Shanghai 200070, P. R. China
Telephone: +86 21 6141-0100

1. Description of the test subject

1.1 Function

Manufacturer's specification for intended use:

The PV modules for electricity generation systems with max. voltage of 1500 V DC.

Manufacturer's specification for predictive use:

N/A

1.2 Consideration of the foreseeable use

- ☒ Not applicable
- ☐ Covered through the applied standard
- ☐ Covered by the following comment
- ☐ Covered by attached risk analysis

1.3 Technical Data

Sample No.	Model serial No.	Model type
Sample 1 (HA2020TL-538-001X)	2070108310000237	JAM72S30-525/MR
Sample 2 (HA2020TL-538-002X)	2070108310000222	JAM72S30-525/MR
Sample 3 (HA2020TL-539-001X)	2070108310000086	JAM72D30-525/MB
Sample 4 (HA2020TL-539-002X)	2070108310000028	JAM72D30-525/MB

Following modules were involved due to identical components and similar construction:

JAM72S30-xxx/MR, JAM72S30-xxx/MR/1500V, JAM72S30-xxx/MR/1000V, xxx = 510 to 550 in steps of 5

JAM66S30-xxx/MR, JAM66S30-xxx/MR/1500V, JAM66S30-xxx/MR/1000V, xxx = 470 to 505 in steps of 5

JAM60S30-xxx/MR, JAM60S30-xxx/MR/1500V, JAM60S30-xxx/MR/1000V, xxx = 435 to 460 in steps of 5

JAM72D30-xxx/MB, JAM72D30-xxx/MB/1500V, JAM72D30-xxx/MB/1000V, xxx = 505 to 545 in steps of 5

JAM66D30-xxx/MB, JAM66D30-xxx/MB/1500V, JAM66D30-xxx/MB/1000V, xxx = 465 to 500 in steps of 5

JAM60D30-xxx/MB, JAM60D30-xxx/MB/1500V, JAM60D30-xxx/MB/1000V, xxx = 435 to 455 in steps of 5
xxx is standing for rated output power at STC

2. Order

2.1 Date of Purchase Order, Customer's Reference

The order dated 2020-08-05

2.2 Receipt of Test Sample, Condition, Location

2020-07-17

Changzhou HuaYang Inspection and Testing Technology Co., Ltd
No.8 Lanxiang Road, Wujin Economic Development Zone, Changzhou, Jiangsu, China

2.3 Date of Testing 2020-08-06 to 2020-09-01

2.4 Location of Testing Changzhou HuaYang Inspection and Testing Technology Co., Ltd
No.8 Lanxiang Road, Wujin Economic Development Zone, Changzhou, Jiangsu, China

2.5 Points of Non-Compliance or Exceptions of the Test Procedure

N/A

3. Test Results

3.1	TABLE 01: MQT 01 ini - Initial Visual inspection		P
Test Date [YYYY-MM-DD].....:		2020-08-28	—
Sample No.	Nature and position of initial findings – comments or attach photos		Verdict
1	No major visual defects found		P
2	No major visual defects found		P
3	No major visual defects found		P
4	No major visual defects found		P
Supplementary information: N/A			

3.2	TABLE 02: MQT 19.1 ini - Initial stabilization						P
3.2.1.1	TABLE 02.1: MQT 06.1 - ini: Performance at STC before initial stabilization (single-side front)						P
Test Date [YYYY-MM-DD].....:		2020-08-06 for sample #1, #3 2020-08-28 for sample #2, #4					—
Test method.....:		☒ Simulator ☐ Natural sunlight					—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmax [W]	FF [%]	Result
1	13.228	49.374	12.611	41.621	524.878	80.36	—
2	13.172	49.356	12.573	41.397	520.461	80.06	—
3	13.299	49.110	12.631	41.082	518.903	79.45	—
4	13.273	49.219	12.608	41.367	521.556	79.84	—
Supplementary information: N/A							

3.2.1.2	TABLE 02.2: MQT 06.1 ini - Performance at STC before initial stabilization (single-side back)						P
Test Date [YYYY-MM-DD].....:		2020-08-06 for sample #3 2020-08-28 for sample #4					—
Test method.....:		☒ Simulator ☐ Natural sunlight					—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmax [W]	FF [%]	Result
3	8.443	48.321	8.025	41.100	329.840	80.85	—
4	8.465	48.444	8.126	41.200	334.791	81.64	—
Supplementary information: N/A							

3.2.2		TABLE 02.3: MQT 19.1 ini - Initial Stabilization procedure						P
Light exposure method.....:				☒ Simulator ☐ Natural sunlight				
Abbreviation: Regarding light source “S” for Solar simulator and “N” for Natural sunlight								
Stabilization criterion x per IEC 61215-1-x				1				
Sample #	1	Test Date (YYYY-MM-DD) start/end			2020-08-06 / 2020-08-09			
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	P _{max} – P _{min} / P _{average} (%)	Stable (Yes/No)	
Initial	—	—	—	—	524.878	—	—	
1	5	800~1000	50 ± 10	MPPT	521.019	—	—	
2	5	800~1000	50 ± 10	MPPT	519.834	0.97	Yes	
3								
4						—	—	
Sample #	2	Test Date (YYYY-MM-DD) start/end			2020-08-28 / 2020-08-31			
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	P _{max} – P _{min} / P _{average} (%)	Stable (Yes/No)	
Initial	—	—	—	—	520.461	—	—	
1	5	800~1000	50 ± 10	MPPT	519.758	—	—	
2	5	800~1000	50 ± 10	MPPT	518.284	0.42	Yes	
3								
4						—	—	
Sample #	3	Test Date (YYYY-MM-DD) start/end			2020-08-06 / 2020-08-09			
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	P _{max} – P _{min} / P _{average} (%)	Stable (Yes/No)	
Initial (F)	—	—	—	—	518.903	—	—	
1	5	800~1000	50 ± 10	MPPT	515.626	—	—	
2	5	800~1000	50 ± 10	MPPT	513.946	0.96	Yes	
Initial (R)	—	—	—	—	329.840	—	—	
1	5	800~1000	50 ± 10	MPPT	327.751	—	—	
2	5	800~1000	50 ± 10	MPPT	326.699	0.96	Yes	

Sample #	4	Test Date (YYYY-MM-DD) start/end:			2020-08-06 / 2020-08-09		
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 (F)	—	—	—	—	521.556	—	—
1	5	800~1000	50 ± 10	MPPT	520.496	—	—
2	5	800~1000	50 ± 10	MPPT	519.812	0.34	Yes
Initial (R)	—	—	—	—	334.791	—	—
1	5	800~1000	50 ± 10	MPPT	333.733	—	—
2	5	800~1000	50 ± 10	MPPT	333.219	0.47	Yes
Supplementary information: N/A							
☐ 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							

3.3.1		TABLE 03.1: MQT 06.1 ini - Performance at STC after initial stabilization (single-side front)								P
Test Date [YYYY-MM-DD].....:					2020-08-31					—
P _{max} (lab) lower limit (W)					See table below: P _{max} [W] – Min calc.					—
$\bar{P}_{max}(Lab)$ lower limit (W)					513.297					—
Voc(lab) upper limit (V)					See table below: Voc [V] Max. calc.					—
Isc (lab) upper limit (A)					See table below: Isc [A] Max. calc.					—
Test method.....:					☒ Simulator ☐ Natural sunlight					—
Sample #	Isc [A]		Voc [V]		Imp [A]	Vmp [V]	P _{max} [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
1	13.162	13.931	49.321	49.597	12.567	41.366	519.834	497.898	80.08	P
2	13.146	13.931	49.295	49.597	12.549	41.301	518.284	497.898	79.98	P
Average	—						519.059	513.297	—	P
3	13.211	13.931	49.058	49.597	12.557	40.928	513.946	497.898	79.30	P

4	13.266	13.931	49.204	49.597	12.587	41.299	519.812	497.898	79.63	P
Average	—						516.879	513.297	—	P
Supplementary information: The limit values are calculated considering manufacturer's tolerances <i>t</i> of rated nameplate values and laboratory measurement uncertainties <i>m</i> .										

3.3.2		TABLE 03.2: MQT 06.1 ini - Performance at STC after initial stabilization (single-side rear)								P
Test Date [YYYY-MM-DD].....:					2020-08-31					—
Pmax(lab) lower limit (W)					See table below: Pmax [W] – Min calc.					—
$\bar{P}_{max}(Lab)$ lower limit (W)					—					—
Voc(lab) upper limit (V)					See table below: Voc [V] Max. calc.					—
Isc (lab) upper limit (A)					See table below: Isc [A] Max. calc.					—
Test method.....:					☒ Simulator ☐ Natural sunlight					—
Sample #	Isc [A]		Voc [V]		Imp [A]	Vmp [V]	Pmax [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		
3	8.343	—	48.253	—	7.975	40.967	326.699	—	81.15	—
4	8.438	—	48.411	—	8.100	41.137	333.219	—	81.57	—
Average	—						329.959	—	—	—
Supplementary information: The limit values are calculated considering manufacturer's tolerances t of rated nameplate values and laboratory measurement uncertainties m .										

3.3.3	TABLE 03.3: MQT 06.1 ini - Performance at STC after initial stabilization (Equivalent irradiance)									P
Test Date [YYYY-MM-DD].....:						2020-08-31				—
Pmax(lab) lower limit (W)						See table below: Pmax [W] – Min calc.				—
$\bar{P}_{max}(Lab)$ lower limit (W)						—				—
Voc(lab) upper limit (V)						See table below: Voc [V] Max. calc.				—
Isc (lab) upper limit (A)						See table below: Isc [A] Max. calc.				—
Test method.....:						☒ Simulator ☐ Natural sunlight				—
Sample #	Isc [A]		Voc [V]		Imp [A]	Vmp [V]	Pmax [W]		FF [%]	Result
	Meas.	Max. calc.	Meas.	Max. calc.			Meas.	Min. calc.		

3	14.343	—	48.978	—	13.663	40.574	554.357	—	78.91	—
4	14.530	—	49.049	—	13.758	40.823	561.659	—	78.81	—
Average	—						558.008	—	—	—

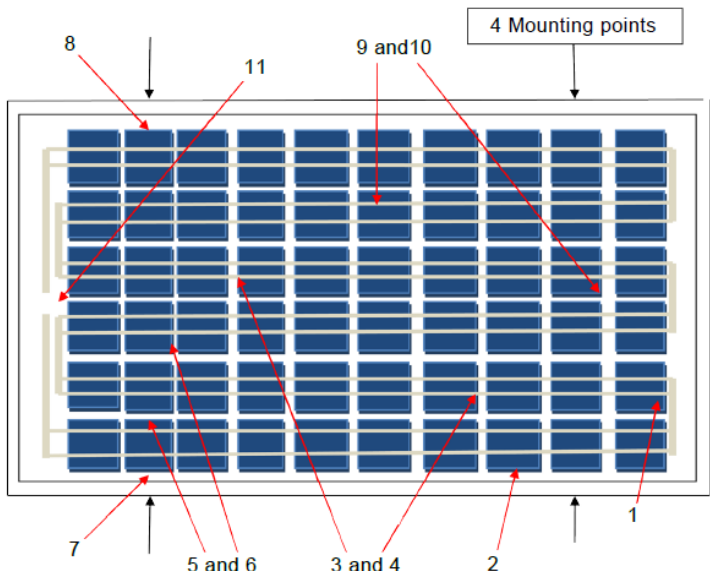
Supplementary information: The limit values are calculated considering manufacturer's tolerances t of rated nameplate values and laboratory measurement uncertainties m .
equivalent irradiance is the effective value calculated when backside irradiance is 135W/m².

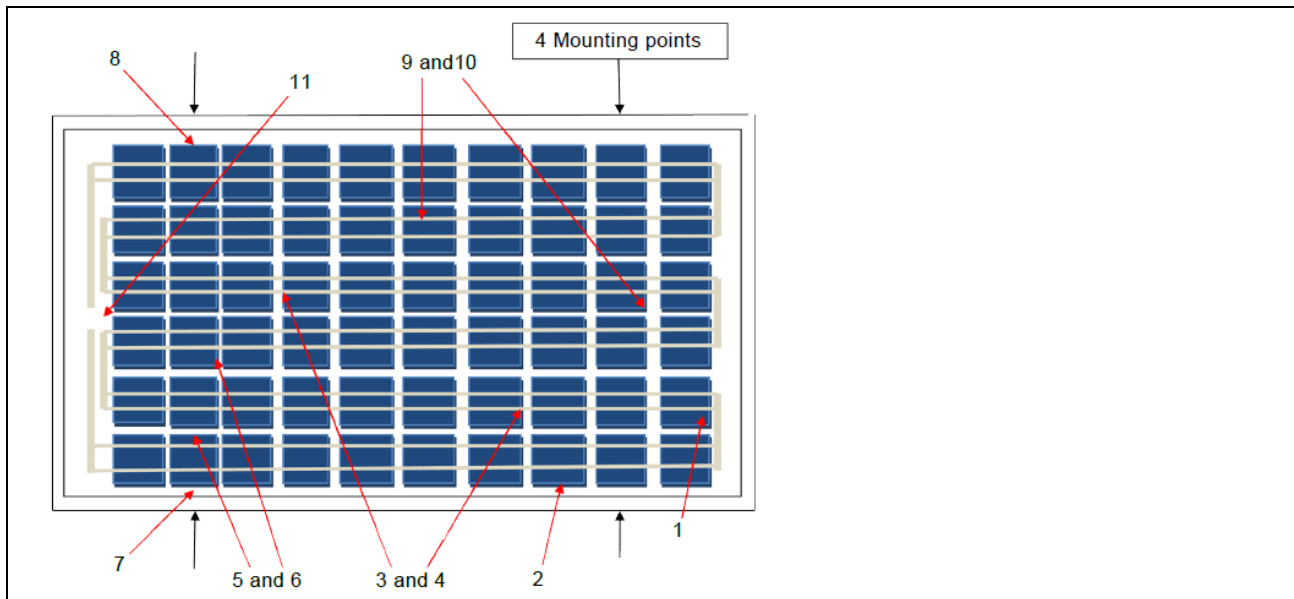
3.4		TABLE 04: MQT 03 ini - Initial Insulation test			P
Test Date [YYYY-MM-DD].....:		2020-08-31			—
Test Voltage applied [V]		8000/1500			—
Size of module [m²].....:		2.54 for sample #1, 2 2.59 for sample #3, 4			—
Required Resistance [MΩ] :		15.75 for sample #1, 2 15.44 for sample #3, 4			—
Sample #	Measured	Dielectric breakdown		Result	
	MΩ	Yes (description)	No		
1	>2000		No	P	
2	>2000		No	P	
3	>2000		No	P	
4	>2000		No	P	
Supplementary information: the maximum resistance measurement range is 2000MΩ.					

3.5		TABLE 05: MQT 15 ini - Initial Wet leakage current test		P
Test Date [YYYY-MM-DD]		2020-08-31		—
Test Voltage applied [V].....		1500		—
Solution temperature [°C]		22.6 for sample #1, 2 22.3 for sample #3, 4		—
Size of module [m²]		2.54 for sample #1, 2 2.59 for sample #3, 4		—
Sample #	Required Resistance [MΩ]		Measured [MΩ]	Result
1	15.75		>2000	P
2	15.75		>2000	P
3	15.44		>2000	P

4	15.44	>2000	P
Supplementary information: Solution resistivity [$\Omega \cdot \text{cm}$] 2011 for sample #1, #2, 2075 for sample #3, #4, the maximum resistance measurement range is 2000M Ω .			

3.6	TABLE 06: MQT 17 - Hail impact test						P
Test Date [YYYY-MM-DD]	2020-09-01						—
Sample #	2						—
Ice ball size [mm]	1	2	3	4	5	6	—
	34.9	34.7	34.7	34.7	34.7	34.9	
	7	8	9	10	11		
	35.2	35.2	34.8	34.7	35.1		
Ice ball weight [g]	1	2	3	4	5	6	—
	20.9	20.5	20.8	20.4	20.3	20.3	
	7	8	9	10	11		
	20.6	20.9	20.6	20.6	20.5		
Ice ball velocity [m/s].....	1	2	3	4	5	6	—
	27.1	27.3	27.1	26.9	27.2	26.8	
	7	8	9	10	11		
	27.1	26.9	27.2	27.2	27.1		
Number of impact locations	11						—
Supplementary information: (impact location descriptions)							

								
Test Date [YYYY-MM-DD]		2020-09-01						—
Sample #		4						—
Ice ball size [mm]		1	2	3	4	5	6	—
		35.2	34.6	35.1	33.9	34.2	34.5	
		7	8	9	10	11		
		34.8	34.7	35.1	34.6	34.9		
Ice ball weight [g]		1	2	3	4	5	6	—
		20.6	20.5	20.8	20.9	19.9	19.8	
		7	8	9	10	11		
		20.1	20.6	20.4	20.7	20.5		
Ice ball velocity [m/s].....		1	2	3	4	5	6	—
		27.3	27.1	26.9	26.8	26.6	27.1	
		7	8	9	10	11		
		26.4	26.5	26.8	27.2	26.7		
Number of impact locations		11						—
Supplementary information: (impact location descriptions)								



3.7	TABLE 07: MQT 01 - Visual inspection after hail impact test	F
TABLE 19.9: MQT 01 - Visual inspection after hail impact test		F
Test Date [YYYY-MM-DD].....:	2020-09-01	—
Sample #	Nature and position of initial findings – comments or attach photos	—
2	No major visual defects found	P
4	No major visual defects found	P
Supplementary information: N/A		

3.8		TABLE 08: MQT 15 - Wet leakage current test after hail impact test		P
Test Date [YYYY-MM-DD].....:		2020-09-01		—
Test Voltage applied [V]		1500		—
Solution temperature [°C]		23.5 for sample #1, 2 22.5 for sample #3, 4		—
Size of module [m²].....:		2.54 for sample #1, 2 2.59 for sample #3, 4		—
Sample #	Measured [MΩ]		Required Resistance [MΩ]	Result
1	>2000		15.75	P
2	>2000		15.75	P
3	>2000		15.44	P
4	>2000		15.44	P
Supplementary information: Solution resistivity 2337 [Ω·cm], the maximum resistance measurement range is 2000MΩ.				

3.9		TABLE 09: MQT 03 - Insulation test after hail impact test			P
Test Date [YYYY-MM-DD].....:		2020-09-01			—
Test Voltage applied [V]		8000/1500			—
Size of module [m²].....:		2.54 for sample #1, 2 2.59 for sample #3, 4			—
Required Resistance [MΩ] :		15.75 for sample #1, 2 15.44 for sample #3, 4			—
Sample #	Measured	Dielectric breakdown			Result
	MΩ	Yes (description)		No	

1	>2000		No	P
2	>2000		No	P
3	>2000		No	P
4	>2000		No	P
Supplementary information: the maximum resistance measurement range is 2000MΩ.				

3.10.1	TABLE 10.1: MQT 06.1 - Final Performance at STC (single-side front)								P
Test Date [YYYY-MM-DD].....:				2020-09-01					—
Test method.....:				☒ Simulator ☐ Natural sunlight					—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmax [W]	FF [%]	Pmax [W] (Lab GateNo.1)	Power Degradation [%]	Result
1	13.150	49.311	12.561	41.361	519.548	80.12	519.834	-0.06	P
2	13.134	49.273	12.513	41.292	516.704	79.85	518.284	-0.30	P
3	13.199	49.039	12.551	40.922	513.615	79.35	513.946	-0.06	P
4	13.264	49.199	12.563	41.283	518.647	79.48	519.812	-0.22	P
Supplementary information: The IV curves (didn't not) show any additional kinks or other unusual characteristics as compared to the initial IV curve.									

3.10.2	TABLE 10.2: MQT 06.1 - Final Performance at STC (single-side rear)								P
Test Date [YYYY-MM-DD].....:				2020-09-01					—
Test method.....:				☒ Simulator ☐ Natural sunlight					—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmax [W]	FF [%]	Pmax [W] (Lab GateNo.1)	Power Degradation [%]	Result
3	8.342	48.234	7.972	40.946	326.438	81.13	326.699	-0.08	P
4	8.421	48.405	8.084	41.114	332.370	81.54	333.219	-0.26	P
Supplementary information: The IV curves (didn't not) show any additional kinks or other unusual characteristics as compared to the initial IV curve.									

3.10.3	TABLE 10.3: MQT 06.1 - Final Performance at STC (Equivalent irradiance)								P
Test Date [YYYY-MM-DD].....:				2020-09-01					—
Test method.....:				☒ Simulator ☐ Natural sunlight					—

Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmax [W]	FF [%]	Pmax [W] (Lab _GateNo.1)	Power Degradation [%]	Result
3	14.334	48.955	13.633	40.567	553.054	78.81	554.357	-0.24	P
4	14.517	49.033	13.728	40.801	560.126	78.69	561.659	-0.27	P

Supplementary information: The IV curves (didn't not) show any additional kinks or other unusual characteristics as compared to the initial IV curve.
equivalent irradiance is the effective value calculated when backside irradiance is 135W/m².

3.11	TABLE 11: MQT 01 - Final Visual inspection		P
Test Date [YYYY-MM-DD].....:		2020-09-01	—
Sample No.	Nature and position of initial findings – comments or attach photos		Verdict
1	No major visual defects found		P
2	No major visual defects found		P
3	No major visual defects found		P
4	No major visual defects found		P
Supplementary information: N/A			

TABLE 13.7: MQT 18.2 - Bypass diode functionality test					P
Test Date [YYYY-MM-DD].....:			2020-09-01		—
☐ 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	Turn on				P
Diode 2	Turn on				P
Diode 3	Turn on				P
Supplementary information: N/A					



4. Remark

N/A

5. Appendix

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

A1.1	MODULE TYPE/S
	JAM72S30-525/MR

A1.2	MODULE DESIGN
	Module dimensions (L x W x H) [mm] : 2267x1122x35
	Weights : 28.5±3%
	Front/Rear cover bonding classification : ☒ rigid/flexible ☐ rigid/rigid ☐ flexible/flexible

A1.3	SOLAR CELL
	Cell type reference : JA Solar Technology Yangzhou Co., Ltd. Cell type: JACMDBP-B, P type mono crystalline silicon, 11 busbars
	Cell dimensions L x W x T (± %) [mm] : 180±1.5 x 90±1.5 x 0.18±0.018
	Cell thickness [μm] : 180 ± 18
	Cell area [cm²] : 161.195

A1.4	IDENTIFICATION OF MATERIALS
	Front cover : Caihong (Hefei) Photovoltaic Co., Ltd. Type: Coating tempered glass Thickness: 3.2 mm
	Rear cover : Cybird Technology Inc. Type: Cynagard 205A(R), Layers: PVDF /PET/Fluoridecoating Thickness: 22.5um/ (275~300)um/ 4um, total 0.315 ~0.340mm
	Encapsulation material front side : Hangzhou First Applied Material Co., Ltd. Type: F406P, material: EVA, thickness: 0.6±0.05 mm

	Encapsulation material back side..... :	Hangzhou First Applied Material Co., Ltd. Type: F806S, material: EVA, thickness: 0.6±0.05 mm
	Frame parts :	Zhaoqing Asia Aluminum Factory Co., Ltd. Anodized aluminum alloy, 6005-T6, silvery colour, assembled by key corners
	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 :	TaiCang JuRen PV Material Co., Ltd Cross section: $\Phi 0.30 \pm 0.02$ mm thick, round wire ribbon, Material: Base Cu ($\geq 99.97\%$), coating: 63%Sn/37%Pb
	String connector :	TaiCang JuRen PV Material Co., Ltd Cross section: 0.4×6 & 0.4×4 mm, Material: Base Cu ($\geq 99.97\%$), Coating Sn63%Pb37%, coating thickness 0.025 mm per side
	Soldering material :	Sn63%Pb37%
	Fluxing agent..... :	Shenzhen Vital New Material Co., Ltd. Type: WTO-PV105A, no clean halogen free liquid flux.
	Junction box :	Shanghai JA Solar Technology Co., Ltd. Type: PVJB-JA-004, DC 1500 V, 15A, IP 68(1m, 1h), -40 °C to 85 °C, TÜV SÜD certified, No. B 0720920287 Rev.03
	Cable :	Shanghai JA Solar technology co., Ltd. Type: H1Z2Z2-K 1×4mm ² , 1500V DC, -40 °C to 90 °C, TÜV SÜD certified, No. B 072092 0283 Rev. 02
	Connector :	QC Solar (Suzhou) Corporation Type: QC 4.10-35, DC 1500V, 41A, IP 68(1m, 1h), -40 °C to 85 °C TÜV Rheinland certified, No. R 50353779

	Bypass diode	Panjit International Inc. Type: SB3045DY, Schottky, Max. peak reverse voltage 45 V, Max. average forward current 30 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: 3M Company Type: UV-1 2) Marking label: AVERY (CHINA) CO LTD Type: 72826T, 50 microns Bright Silver PET TC/S333(c)(d) 3) Insulation sheet: Suzhou First PV Material Co., Ltd. Type: BEC-201

A1.5	MODULE DESIGN - MINIMUM DISTANCES	
	Between cells	0.8 mm
	Between cell and accessible surfaces	12 mm
	Between any current carrying part and accessible surfaces	12 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

Appendix 2: Product Description Sheet (Manufacturers and type references)

A1.1	MODULE TYPE/S
	JAM72D30-525/MB

A1.2	MODULE DESIGN
	Module dimensions (L x W x H) [mm] : 2293x1131x35
	Weights : 32±3%
	Front/Rear cover bonding classification : ☐ rigid/flexible ☒ rigid/rigid ☐ flexible/flexible

A1.3	SOLAR CELL
	Cell type reference : JA Solar Technology Yangzhou Co., Ltd. Cell type: JACMDBP-B, P type mono crystalline silicon, 11 busbars
	Cell dimensions L x W x T (± %) [mm] : 180±1.5 x 90±1.5 x 0.18±0.018
	Cell thickness [μm] : 180 ± 18
	Cell area [cm²] : 161.195

A1.4	IDENTIFICATION OF MATERIALS
	Front cover : Caihong (Hefei) Photovoltaic Co., Ltd. Type: Heat strengthened AR-coated glass, Thickness: 2.0 mm
	Rear cover : Caihong (Hefei) Photovoltaic Co., Ltd. Type: Heat strengthened glass with white glaze, Thickness: 2.0 mm
	Encapsulation material front side : Hangzhou First Applied Material Co., Ltd. Type: TF4, material: PO, thickness: 0.65±0.15 mm
	Encapsulation material back side..... : Hangzhou First Applied Material Co., Ltd. Type: TF4, material: PO, thickness: 0.65±0.15 mm

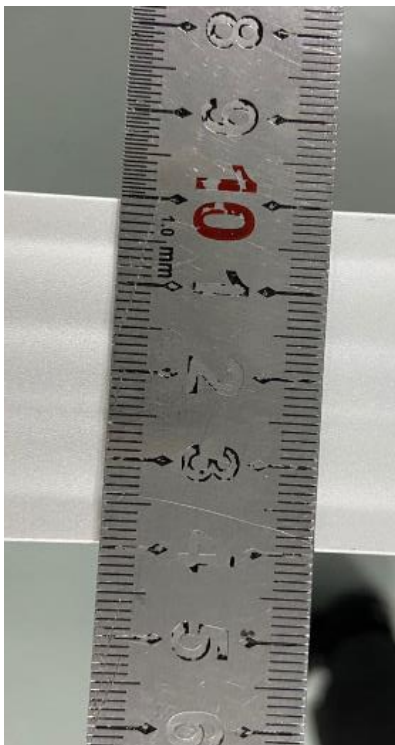
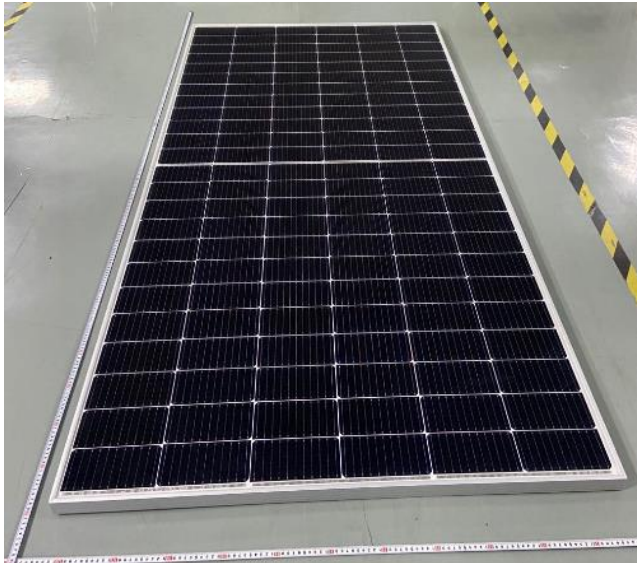
	Frame parts	Zhaoqing Asia Aluminum Factory Co., Ltd. Anodized aluminum alloy, 6005-T6, silvery colour, assembled by key corners
	Mounting parts.....	N/A
	Adhesive for frame	Jiangsu Tianchen New Materials CO., LTD Type: HT-8258, Rated HB at min. 2.0 mm thick, RTI=105, CTI=0 UL certified, No. E344820
	Edge sealing.....	N/A
	Internal wiring	N/A
	Cell connector	TaiCang JuRen PV Material Co., Ltd Cross section: $\Phi 0.30 \pm 0.02$ mm thick, round wire ribbon, Material: Base Cu ($\geq 99.97\%$), coating: 63%Sn/37%Pb
	String connector	TaiCang JuRen PV Material Co., Ltd Cross section: 0.4×6 & 0.4×4 mm, Material: Base Cu ($\geq 99.97\%$), Coating Sn63%Pb37%, coating thickness 0.025 mm per side
	Soldering material	Sn63%Pb37%
	Fluxing agent.....	Shenzhen Vital New Material Co., Ltd. Type: WTO-PV105A, no clean halogen free liquid flux.
	Junction box	Shanghai JA Solar Technology Co., Ltd. Type: PVJB-JA-004, DC 1500 V, 15A, IP 68(1m, 1h), -40 °C to 85 °C, TÜV SÜD certified, No. B 0720920287 Rev.03
	Cable	Shanghai JA Solar technology co., Ltd. Type: H1Z2Z2-K $1 \times 4 \text{ mm}^2$, 1500V DC, -40 °C to 90 °C, TÜV SÜD certified, No. B 072092 0283 Rev. 02
	Connector	QC Solar (Suzhou) Corporation Type: QC 4.10-35, DC 1500V, 41A, IP 68(1m, 1h), -40 °C to 85 °C TÜV Rheinland certified, No. R 50353779

	Bypass diode	Panjit International Inc. Type: SBT4050DY, Schottky, Max. peak reverse voltage 50 V, Max. average forward current 40 A, Max. junction temperature 200 °C.
	Potting material	Jiangsu Tianchen New Materials CO., LTD Type: HT-6360A/HT-6360B, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0 UL certified, No. E344820
	Adhesive for junction box	Jiangsu Tianchen New Materials CO., LTD Type: HT-8258, Rated HB at min. 2.0 mm thick, RTI=105, CTI=0 UL certified, No. E344820
	Additional material (e. g. fixing tape, insulation tape)	1) Fixing tape: Cybrid Technologies Inc. Type: FF-3665 2) Marking label: AVERY (CHINA) CO LTD Type: 72826T, 50 microns Bright Silver PET TC/S333(c)(d)

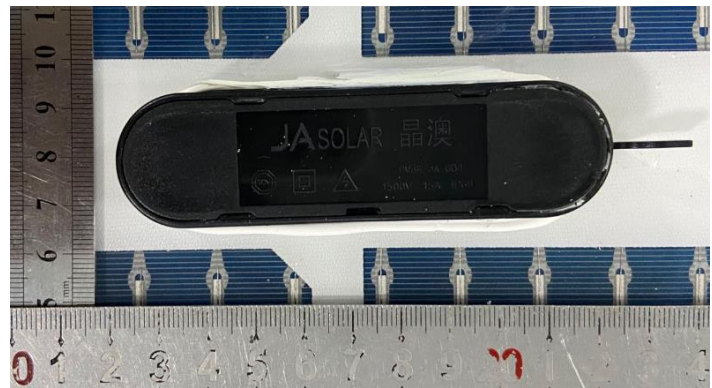
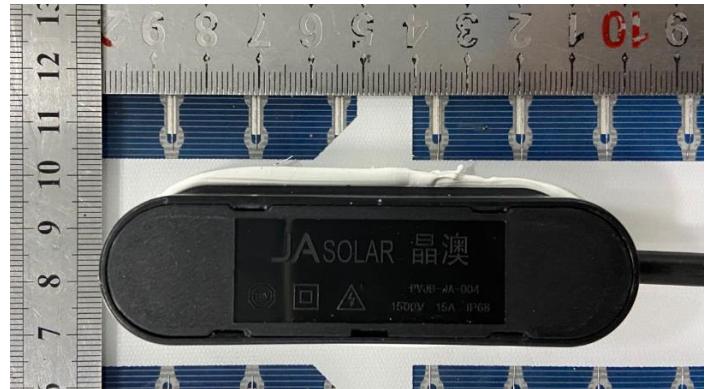
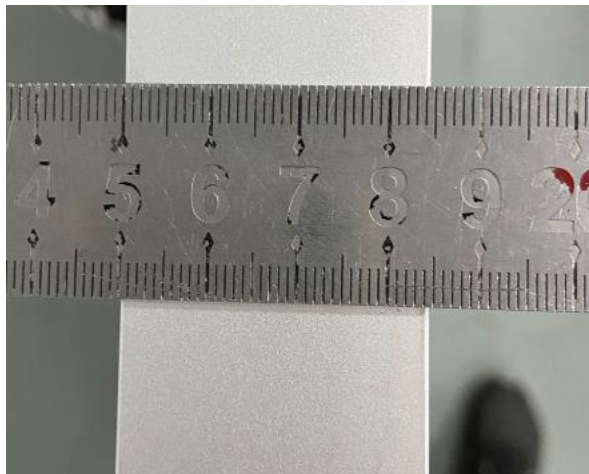
A1.5	MODULE DESIGN - MINIMUM DISTANCES	
	Between cells	0.8 mm
	Between cell and accessible surfaces	12 mm
	Between any current carrying part and accessible surfaces	12 mm

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

Appendix 2-1: Photos of JAM72S30-525/MR



Appendix 2-2: Photos of JAM72D30-515/MB



Appendix 3: List of measurement equipment

No.	Test Item	Main testing Equipment	Calibrate until
1	Visual inspection	Visual inspection table HYJC-YS-033	2020-09-14
2	Visual inspection	Illumination photometer HYJC-YS-070	2021-06-11
3	Performance at STC Bypass diode functionality test	Module pulse simulator HYJC-YS-021	2020-12-19
4	Insulation test Wet leakage current test	Programmable control voltage insulation meter HYJC-YS-155	2020-09-14
5	Wet leakage current test	Conductance meter HYJC-YS-171	2020-09-14
6	Hail test	Hail tester HYJC-YS-036	2020-09-16
7	Stabilization	level C steady state simulator HYJC-YS-006	2021-06-30
All equipment used for tests having a significant effect on the accuracy or validity of the result of the test is calibrated before being put into service.			

Appendix 4: Statement of the estimated uncertainty of the test results

The power measurement uncertainty is 2.12% (K=2)

6. Summary

N/A

TÜV SÜD Certification and Testing (China)Co., Ltd. Shanghai Branch

Tested by:

Rongwei Jing *Ting Rongwei*
printed name, function & signature

Approved by:

Guangxia Fu
printed name, function & signature

Report No.: 7040620006108
Rev.: 00
Date: 2020-09-21

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