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Test Report
No. TRPVP07062/20P/05

Commission Testing
according to IEC / EN 61730-2

Applicant: **Sunrise energy Co., Ltd.**
No.20 Tongzi River West Road, Zhonglou Development Zone,
Changzhou Jiangsu, 213023 P.R. China

File No.: PVP07062/20P-05

Designed: Nov. 16. 2020 by:

Reviewed: Nov. 17. 2020 by:

Applicant ..... :	**Sunrise energy Co., Ltd.** No.20 Tongzi River West Road, Zhonglou Development Zone, Changzhou Jiangsu, 213023 P.R. China
Manufacturer ..... :	**Sunrise energy Co., Ltd.** No.20 Tongzi River West Road, Zhonglou Development Zone, Changzhou Jiangsu, 213023 P.R. China
Order No. ..... :	QT-PVP07062/20P_R1
Date of Application ..... :	09/16/2020
Product ..... :	Crystalline Silicon Photovoltaic Modules
Module type(s) ..... :	**PV Modules with 6" Half-cut Mono-crystalline Silicon Solar Cells:** 144 cells: SR-M672430HLP
General Information • Maximum System Voltage.... : • Electrical Protection Class.... : • Fire Safety Class ..... :	 DC 1500V Class II N/A
Type of examination ..... :	Commission testing only
Testing Period ..... :	09/07/2020 - 09/22/2020
Testing Laboratory..... :	**TÜV Nord PV Science and Technology Co., Ltd.** 2/F., Building 4, No. 880, Ziyue Road, Minhang District, Shanghai, China

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

The submitted test samples as described in the reports hereunder are based on the requirements:
IEC 61730-2:2016 / EN IEC 61730-2:2018 + AC:2018 “Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing”

List of contents

Summary of testing
According to the enquiry of the applicant, a commission test was performed according to IEC 61730-2:2016. Test items see page 7 for details. Module type SR-M672430HLP was delivered to lab and was conducted with all the related tests. All tests were successfully completed.

General remarks

Test item particulars:	
Accessories and detachable parts included in the evaluation .....:	N/A
Options included.....:	N/A
Abbreviations used in the report:	
HF - Humidity Freeze	TC - Temperature Cycling
DH - Damp Heat	Vmpp - Maximum power voltage
Impp - Maximum power current	Voc - Open circuit voltage
Isc - Short circuit current	FF - Fill Factor
Pmpp - Maximum power	α - Current temperature coefficient
NMOT - Nominal Module Operating Temperature	β - Voltage temperature coefficient
STC - Standard Test Conditions	γ - Power temperature coefficient
CTI - Comparative Tracking Index	PTI - Proof Tracking Index
RTI - Relative Temperature Index	RTE - Relative Thermal Endurance index
TI - Temperature Index	DTI - Distance through insulation
Cl - Clearances	Cr - Creepage distances
PD - Pollution Degree	MG - Material Groups
Possible test case verdicts:	
Test case does not apply to the test object.....:	Not Applicable (N/A)
Test object does meet the requirement.....:	Pass (P)
Test object does not meet the requirement.....:	Fail (F)
Other remarks:	
The test verdicts presented in this report relate only to the object tested. This report shall not be reproduced except in full, without the written approval of the issuing testing laboratory. “(see Annex #)” refers to additional information appended to the report. “(see Table #)” refers to a table appended to the report. Power degradation data expressed in negative value indicates a reduction of maximum power output. Power degradation data expressed in positive value indicates an increment of maximum power output. Throughout this report, a point is used as the decimal separator.	

General product information

Module type: SR-M672430HLP

Product Electrical Ratings at STC:	
Nominal maximum power (Pmax) [W] with tolerance .....:	430 (0 ~ +3%)
Nominal open circuit voltage at (Voc) [V] with tolerance...:	49.22 ±3%
Nominal maximum power voltage (Vmpp) [V].....:	40.59
Nominal short circuit current at (Isc) [A] with tolerance.....:	11.21 ±3%
Nominal maximum power current (Impp) [A].....:	10.60
Product Safety Ratings:	
Maximum system voltage [V].....:	1500
Fuse rating [A] .....:	20
Safety class in accordance with IEC 61140 .....:	Class II
Fire safety class.....:	N/A
Recommended maximum series module configurations ..:	N/A
Recommended maximum parallel module configurations :	N/A

Module group assignment

Module type: SR-M672430HLP

Sample #	Serial number	Dimension (l x w x h) [mm]	Remark
1	H72MMA20071610002	2115 x 1052 x 40	RC

Clause	Requirement + Test	Result - Remark	Verdict

Test result overview

Module type: SR-M672430HLP

Initial examinations			-
MST01	Visual inspection ..... :	See table 10.2	P
MST16	Insulation test..... :	See table 10.13	P
MST17	Wet leakage current test..... :	See table 10.14	P
MST03	Maximum power determination..... :	See table 10.4	P

Sample 1#			-
MST26	Reverse current overload test ..... :	See table 10.20	P

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

Test results of IEC / EN 61730-2
Module type: SR-M672430HLP

10.2 Visual inspection (initial) - MST01		-
Test date [MM/DD/YYYY].....:	09/22/2020	-
Sample #	Nature and position of initial findings - comments or attach photos	-
1	No visual defects	P
Supplementary information: N/A		

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

10.4 Maximum power determination (initial) - MST03							-
Test date [MM/DD/YYYY].....:			09/22/2020				-
Ambient temperature [°C].....:			Corrected to 25.0				-
Irradiance [W/m^2].....:			Corrected to 1000				-
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]	-
1	48.94	41.34	10.76	10.24	423.2	80.37	-
Supplementary information: N/A							

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

10.13 Insulation test (initial) - MST16				-
Test date [MM/DD/YYYY].....:		09/22/2020		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
1	18.0	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.22m^2.				

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

10.14 Wet leakage current test (initial) - MST17			-
Test date [MM/DD/YYYY].....:		09/22/2020	-
Test voltage applied [V].....:		2 minutes of 1500	-
Solution resistivity [Ω/cm] / <3500 .....:		2002	-
Solution temperature [°C] / 22±2 .....:		22.0	-
Sample #	Required [MΩ]	Measured [MΩ]	-
1	18.0	>1000	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.22m^2.			

IEC / EN 61730-2				
Clause	Requirement + Test	Result - Remark		Verdict
10.20 Reverse current overload test - MST26				-
Test date [MM/DD/YYYY].....:		09/22/2020		-
Module over-current protection rating [A] .....:		20		-
Current applied[A] .....:		27		-
Voltage applied[V] / high - low .....:		56.5 - 49.9		-
Test duration [hour] .....:		2		-
Sample #	Requirements			-
1	☒ No flaming of the module ☒ No flaming or charring of the tissue paper			P
Supplementary information: N/A				
10.2 Visual inspection (after reverse current overload test) - MST01				-
Test date [MM/DD/YYYY].....:		09/22/2020		-
Sample #	Nature and position of initial findings - comments or attach photos			-
1	No visual defects			P
Supplementary information: N/A				
10.13 Insulation test (after reverse current overload test) - MST16				-
Test date [MM/DD/YYYY].....:		09/22/2020		-
Test voltage applied [V].....:		2 minutes of 1500 and 1 minute of 8000		-
Sample #	Required [MΩ]	Measured [MΩ]	Dielectric breakdown?	-
1	18.0	>1000	No	P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m2. Area of the module is 2.22m^2.				
10.14 Wet leakage current test (after reverse current overload test) - MST17				-
Test date [MM/DD/YYYY].....:		09/22/2020		-
Test voltage applied [V].....:		2 minutes of 1500		-
Solution resistivity [Ω/cm] / <3500 .....:		2042		-
Solution temperature [°C] / 22±2 .....:		22.2		-
Sample #	Required [MΩ]	Measured [MΩ]		-
1	18.0	>1000		P
Supplementary information: Minimum requirement according to the standard is 40MΩ·m^2. Area of the module is 2.22m^2.				

Annex 1: List of measurement equipment

Measurement / testing	Measuring equipment	Equipment ID	Calibration due date
Visual inspection	Luminometer	TNRDTO002	12/18/2020
Maximum power determination	Pulsed Solar Simulator	TNRDEQ001	11/06/2020
Insulation test	Withstanding voltage/Insulation resistance tester	TNRDTI020	09/28/2021
Wet leakage current test	Withstanding voltage/ Insulation resistance tester	TNRDTI020	09/28/2021
	Conductive meter	TNRDTI004	12/16/2020
Reverse current overload test	DC Power Supply	TNRDTI011	12/22/2020

Annex 2: Statement of the estimated uncertainty of the test results

The total measuring uncertainty of Pmpp is ≤ 2.68%

The total measuring uncertainty of Isc is ≤ 2.12%

The total measuring uncertainty of Voc is ≤ 0.82%

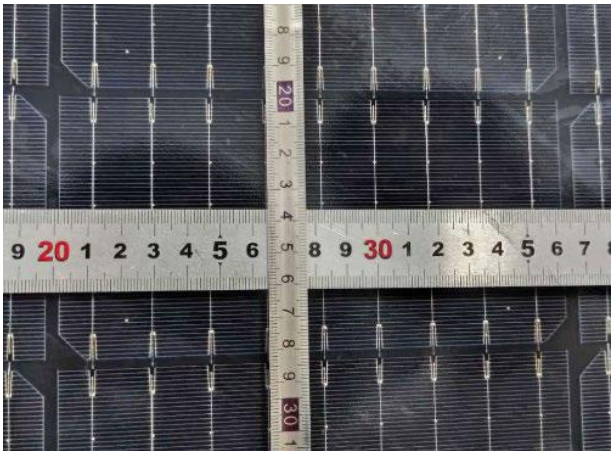
Annex 3: Photos

Module type: SR-M672430HLP

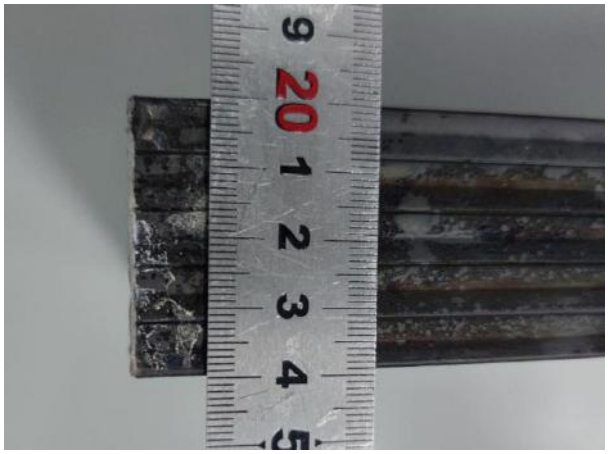
Front overview

Back overview

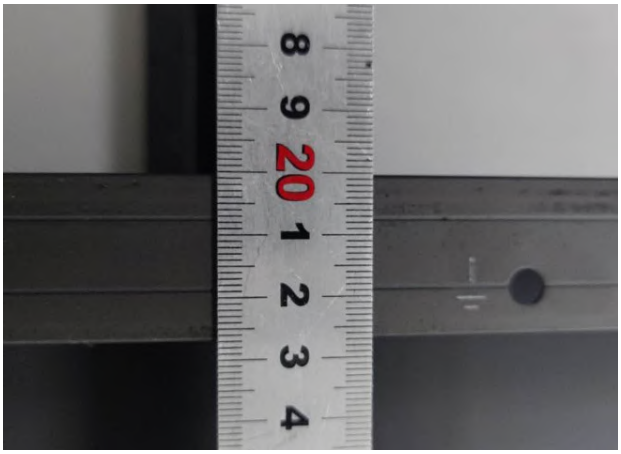
Label



Solar cell



Frame



Grounding Mark

Junction box (FT20xv)

Junction box (opened)

N/A

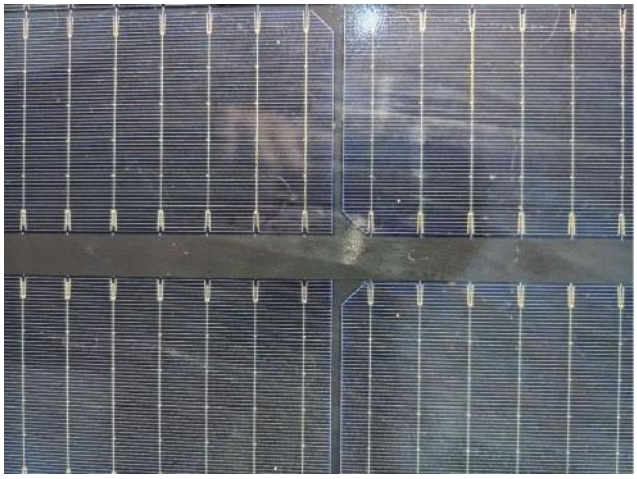
Bypass diode (Junction box is potted)

Cable (H1Z2Z2-K 1x4.0mm²)

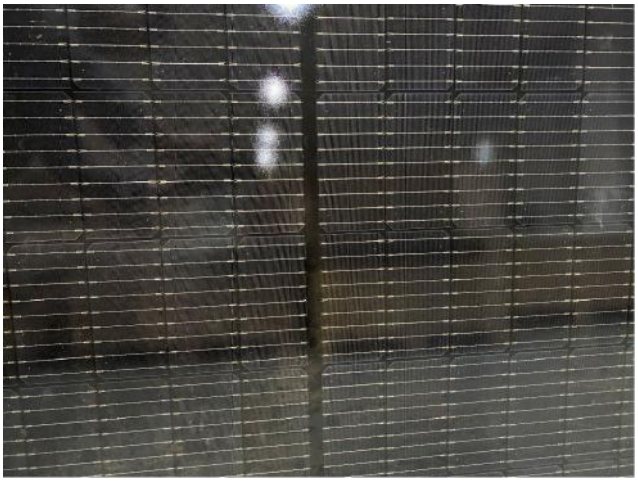
Mark (Do not disconnect under load)

Connectors (not specified)

Annex 4: Photos of insulation tape



Sample #1



Sample #1

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