

## Test Report No. 492012304.001

**Photovoltaic Module Qualification**  
according to IEC / EN 61215-1, IEC / EN 61215-1-1,  
IEC / EN 61215-2, IEC / EN 61730-1, IEC / EN 61730-2

**Applicant:** Sunpal Power Co., Ltd.  
3rd Floor, Xincheng Electric Power Building, No. 398, Ganquan Road,  
Shushan District, Hefei City, Anhui Province

**File No.:** PVP02068/23P

**Designed:** Feb. 20. 2023 by: Bella Lin  
(Project Engineer)

**Reviewed:** Feb. 20. 2023 by: [Signature]  
(Technical Certifier)

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Applicant..... :	<b>Sunpal Power Co., Ltd.</b> 3rd Floor, Xincheng Electric Power Building, No. 398, Ganquan Road, Shushan District, Hefei City, Anhui Province
Manufacturer .....	<b>Lepton Solar (Changshu) Co., Ltd.</b> No. 9, Sunshine Avenue, Yushan High Technology Industry Zone, Changshu City Jiangsu Province, 215500, P.R. China
Order No. .... :	QT-PVP02068/23P
Date of Application .....	02/14/2023
Product .....	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
Module type(s)..... :	<p><b>PV Modules with 6" Mono-crystalline Silicon Solar Cells:</b></p> <p>72 cells: SP***M-72 (***=310-375, in increment of 5)          60 cells: SP***M-60 (***=260-310, in increment of 5)          54 cells: SP***M-54 (***=235-270, in increment of 5)          48 cells: SP***M-48 (***=205-240, in increment of 5)          42 cells: SP***M-42 (***=185-210, in increment of 5)          36 cells: SP***M-36 (***=160-180, in increment of 5)          30 cells: SP***M-30 (***=135-150, in increment of 5)          72 cells: SP***M-72 (***=380-395, in increment of 5)          60 cells: SP***M-60 (***=320-330, in increment of 5)</p> <p><b>PV Modules with 6" Half Cut Mono-crystalline Silicon Solar Cells:</b></p> <p>144 cells: SP***M-72H (***=365-400, in increment of 5)          132 cells: SP***M-66H (***=335-365, in increment of 5)          120 cells: SP***M-60H (***=305-330, in increment of 5)          144 cells: SP***M-72H (***=405-410, in increment of 5)          132 cells: SP***M-66H (***=360-375, in increment of 5)          120 cells: SP***M-60H (***=325-340, in increment of 5)          144 cells: SP***M-72H (***=420-455, in increment of 5)          132 cells: SP***M-66H (***=385-415, in increment of 5)          120 cells: SP***M-60H (***=350-380, in increment of 5)</p> <p><b>PV Modules with 7" Half Cut Mono-crystalline Silicon Solar Cells:</b></p> <p>156 cells: SP***M-78H (***=560-605, in increment of 5)          144 cells: SP***M-72H (***=515-570, in increment of 5)          132 cells: SP***M-66H (***=475-520, in increment of 5)          120 cells: SP***M-60H (***=430-475, in increment of 5)          108 cells: SP***M-54H (***=390-425, in increment of 5)</p> <p><b>PV Modules with 8" Half Cut Mono-crystalline Silicon Solar Cells:</b></p> <p>132 cells: SP***M-66H (***=630-670, in increment of 5)          120 cells: SP***M-60H (***=575-610, in increment of 5)          108 cells: SP***M-54H (***=515-545, in increment of 5)          96 cells: SP***M-48H (***=460-485, in increment of 5)          84 cells: SP***M-42H (***=400-425, in increment of 5)</p>

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	110 cells: SP***M-55H (***=520-555, in increment of 5) 100 cells: SP***M-50H (***=475-505, in increment of 5) 90 cells: SP***M-45H (***=425-455, in increment of 5) 80 cells: SP***M-40H (***=380-400, in increment of 5)
General Information <ul style="list-style-type: none"> <li>• Maximum System Voltage.... : DC 1500V</li> <li>• Electrical Protection Class.... : Class II</li> <li>• Fire Safety Class ..... : Class C</li> </ul>	
Type of examination .....	Parallel certification for application of TÜV mark
Testing Period .....	N/A
Testing Laboratory.....	N/A

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

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The submitted test samples as described in the reports hereunder are in compliance with the requirements:  
 IEC / EN 61215-1:2016 "Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements"  
 IEC / EN 61215-1-1:2016 "Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules"  
 IEC 61215-2:2016 / EN 61215-2:2017 + AC:2017 + AC:2018 "Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 2: Test procedures"  
 IEC 61730-1:2016 / EN IEC 61730-1:2018 + AC:2018 "Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction"  
 IEC 61730-2:2016 / EN IEC 61730-2:2018 + AC:2018 "Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing"

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<b>History of certification</b>	
File no. ....:	N/A
Certificate no. ....:	N/A
Date of issue ....:	N/A
Report no. ....:	N/A
Module type(s) .:	N/A
Description: .....	N/A
Supplementary information: Basic project	

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## **Summary of testing**

According to the enquiry of the applicant, based on the certificate no. 44 780 19 406749 - 228R5A1M16 of the main license holder, issue the parallel certification of the applicant.

From the results of file reviewing, it is recommended that certification should be granted.

**Detailed product information are to be found in the CDF (constructional data form) in Annex 1 of this report.**

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## General remarks

<b>Test item particulars:</b>	
Accessories and detachable parts included in the evaluation .....	N/A
Options included .....	N/A
<b>Abbreviations used in the report:</b>	
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	$\alpha$ - Current temperature coefficient
NMOT - Nominal Module Operating Temperature	$\beta$ - Voltage temperature coefficient
STC - Standard Test Conditions	$\gamma$ - 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
CI - Clearances	Cr - Creepage distances
PD - Pollution Degree	MG - Material Groups
<b>Possible test case verdicts:</b>	
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)
<b>Other remarks:</b>	
<p>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.</p> <p>“(see Annex #)” refers to additional information appended to the report.                      “(see Table #)” refers to a table appended to the report.</p> <p>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.</p> <p>Throughout this report, a point is used as the decimal separator.</p>	

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## Annex 1: Constructional Data Form (CDF)



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

### CDF (Constructional Data Form) for Electrical Products

Applicant .....	<b>Sunpal Power Co., Ltd.</b> 3rd Floor, Xincheng Electric Power Building, No. 398, Ganquan Road, Shushan District, Hefei City, Anhui Province
Manufacturer .....	<b>Lepton Solar (Changshu) Co., Ltd.</b> No. 9, Sunshine Avenue, Yushan High Technology Industry Zone, Changshu City Jiangsu Province, 215500, P.R. China
Product .....	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
Standard(s) .....	IEC / EN 61215-1:2016; IEC / EN 61215-1-1:2016; IEC 61215-2:2016 / EN 61215-2:2017 + AC:2017 + AC:2018; IEC 61730-1:2016 / EN IEC 61730-1:2018 + AC:2018; IEC 61730-2:2016 / EN IEC 61730-2:2018 + AC:2018.
Trade mark .....	
Module type(s) .....	<p><b>PV Modules with 6" Mono-crystalline Silicon Solar Cells:</b></p> <p>72 cells: SP***M-72 (***=310-375, in increment of 5) 60 cells: SP***M-60 (***=260-310, in increment of 5) 54 cells: SP***M-54 (***=235-270, in increment of 5) 48 cells: SP***M-48 (***=205-240, in increment of 5) 42 cells: SP***M-42 (***=185-210, in increment of 5) 36 cells: SP***M-36 (***=160-180, in increment of 5) 30 cells: SP***M-30 (***=135-150, in increment of 5) 72 cells: SP***M-72 (***=380-395, in increment of 5) 60 cells: SP***M-60 (***=320-330, in increment of 5)</p> <p><b>PV Modules with 6" Half Cut Mono-crystalline Silicon Solar Cells:</b></p> <p>144 cells: SP***M-72H (***=365-400, in increment of 5) 132 cells: SP***M-66H (***=335-365, in increment of 5) 120 cells: SP***M-60H (***=305-330, in increment of 5) 144 cells: SP***M-72H (***=405-410, in increment of 5) 132 cells: SP***M-66H (***=360-375, in increment of 5) 120 cells: SP***M-60H (***=325-340, in increment of 5) 144 cells: SP***M-72H (***=420-455, in increment of 5) 132 cells: SP***M-66H (***=385-415, in increment of 5) 120 cells: SP***M-60H (***=350-380, in increment of 5)</p> <p><b>PV Modules with 7" Half Cut Mono-crystalline Silicon Solar Cells:</b></p>

Confirmation of the applicant  
Andreas (Place and date)

Confirmation of TÜV NORD CERT  
 Shanghai, 2023/02/29 (Place and date)

Silvia Wang  
 (Applicant's legally authorized signature and stamp)

Bala Lin  
 (Signature of authorized TÜV NORD CERT engineer)

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	<p>156 cells: SP***M-78H (***=560-605, in increment of 5) 144 cells: SP***M-72H (***=515-570, in increment of 5) 132 cells: SP***M-66H (***=475-520, in increment of 5) 120 cells: SP***M-60H (***=430-475, in increment of 5) 108 cells: SP***M-54H (***=390-425, in increment of 5)</p> <p><b>PV Modules with 8" Half Cut Mono-crystalline Silicon Solar Cells:</b></p> <p>132 cells: SP***M-66H (***=630-670, in increment of 5) 120 cells: SP***M-60H (***=575-610, in increment of 5) 108 cells: SP***M-54H (***=515-545, in increment of 5) 96 cells: SP***M-48H (***=460-485, in increment of 5) 84 cells: SP***M-42H (***=400-425, in increment of 5) 110 cells: SP***M-55H (***=520-555, in increment of 5) 100 cells: SP***M-50H (***=475-505, in increment of 5) 90 cells: SP***M-45H (***=425-455, in increment of 5) 80 cells: SP***M-40H (***=380-400, in increment of 5)</p>
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Confirmation of the applicant  
[Signature] 02/11/2023 (Place and date)

[Signature]  
(Applicant's legally authorized signature and stamp)



PV-F-026 CDF

Confirmation of TÜV NORD CERT  
Shanghai, 2023/12/20 (Place and date)

[Signature]  
(Signature of authorized TÜV NORD CERT engineer)

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### Electrical ratings:

Module type .....	72 cells: SP***M-72 (**=310-375, in increment of 5)		
Dimensions [mm] / l x w x h .....	1960 x 990 / 992 x 40 1960 x 990 / 992 x 35 / 30 (only for designed load (positive / negative) [Pa]: 3600 / 1600) 4 clamps installed		
Rated Pmpp [W] .....	310, 315, 320, 325, 330, 335, 340, 345, 350, 355, 360, 365, 370, 375	Tolerance of rated Pmpp [%] .....	±3
Rated Voc [V] .....	44.99, 45.10, 45.20, 45.30, 46.20, 46.40, 46.60, 46.80, 47.25, 47.46, 47.67, 47.88, 48.09, 48.30	Tolerance of rated Voc [%] .....	±5
Rated Isc [A] .....	8.95, 9.06, 9.18, 9.29, 9.33, 9.41, 9.49, 9.56, 9.60, 9.68, 9.76, 9.84, 9.92, 10.04	Tolerance of rated Isc [%] .....	±5
Maximum system voltage [V] .....	1500	Safety class acc. to IEC 61140 .....	Class II
Min-creepage distance [mm] .....	15.25	Fuse rating [A] .....	15
Design load (positive) [Pa] .....	a): 5400, b): 3600	Safety factor (positive) .....	1.5
Design load (negative) [Pa] .....	a): 2400, b): 1600	Safety factor (negative) .....	1.5

Module type .....	60 cells: SP***M-60 (**=260-310, in increment of 5)		
Dimensions [mm] / l x w x h .....	1640 x 990 / 992 x 40 / 35 1640 x 990 / 992 x 30 (only for designed load (positive / negative) [Pa]: 3600 / 1600) 4 clamps installed		
Rated Pmpp [W] .....	260, 265, 270, 275, 280, 285, 290, 295, 300, 305, 310	Tolerance of rated Pmpp [%] .....	±3
Rated Voc [V] .....	37.60, 37.70, 37.80, 38.50, 38.70, 38.90, 39.10, 39.65, 39.85, 40.05, 40.25	Tolerance of rated Voc [%] .....	±5
Rated Isc [A] .....	8.94, 9.08, 9.22, 9.38, 9.46, 9.54, 9.63, 9.65, 9.74, 9.85, 9.94	Tolerance of rated Isc [%] .....	±5
Maximum system voltage [V] .....	1500	Safety class acc. to IEC 61140 .....	Class II
Min-creepage distance [mm] .....	15.25	Fuse rating [A] .....	15
Design load (positive) [Pa] .....	a): 5400, b): 3600	Safety factor (positive) .....	1.5
Design load (negative) [Pa] .....	a): 2400, b): 1600	Safety factor (negative) .....	1.5

Confirmation of the applicant  
Benhu, 02/07/20 (Place and date)

Confirmation of TÜV NORD CERT  
 Shanghai, 2023/2/20 (Place and date)

Situa Wang  
 (Applicant's legally authorized signature and stamp)

Beila Liu  
 (Signature of authorized TÜV NORD CERT engineer)

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Module type .....	54 cells: SP***M-54 (***=235-270, in increment of 5)		
Dimensions [mm] / l x w x h .....	1482 x 990 x 40 / 35 1482 x 990 x 30 (only for designed load (positive / negative) [Pa]: 3600 / 1600) 4 clamps installed		
Rated Pmpp [W] .....	235, 240, 245, 250, 255, 260, 265, 270	Tolerance of rated Pmpp [%] .....	±3
Rated Voc [V] .....	33.71, 33.82, 33.93, 35.07, 35.27, 35.47, 35.67, 35.87	Tolerance of rated Voc [%] .....	±5
Rated Isc [A] .....	9.03, 9.18, 9.33, 9.26, 9.38, 9.50, 9.62, 9.74	Tolerance of rated Isc [%] .....	±5
Maximum system voltage [V] .....	1500	Safety class acc. to IEC 61140 .....	Class II
Min-creepage distance [mm] .....	15.25	Fuse rating [A] .....	15
Design load (positive) [Pa] .....	a): 5400, b): 3600	Safety factor (positive) .....	1.5
Design load (negative) [Pa] .....	a): 2400, b): 1600	Safety factor (negative) .....	1.5

Module type .....	48 cells: SP***M-48 (***=205-240, in increment of 5)		
Dimensions [mm] / l x w x h .....	1322 x 990 x 40 / 35 1322 x 990 x 30 (only for designed load (positive / negative) [Pa]: 3600 / 1600) 4 clamps installed		
Rated Pmpp [W] .....	205, 210, 215, 220, 225, 230, 235, 240	Tolerance of rated Pmpp [%] .....	±3
Rated Voc [V] .....	29.90, 30.00, 30.10, 31.10, 31.30, 31.50, 31.70, 31.90,	Tolerance of rated Voc [%] .....	±5
Rated Isc [A] .....	8.95, 9.15, 9.29, 9.22, 9.35, 9.48, 9.61, 9.74	Tolerance of rated Isc [%] .....	±5
Maximum system voltage [V] .....	1500	Safety class acc. to IEC 61140 .....	Class II
Min-creepage distance [mm] .....	15.25	Fuse rating [A] .....	15
Design load (positive) [Pa] .....	a): 5400, b): 3600	Safety factor (positive) .....	1.5
Design load (negative) [Pa] .....	a): 2400, b): 1600	Safety factor (negative) .....	1.5

Module type .....	42 cells: SP***M-42 (***=185-210, in increment of 5)		
Dimensions [mm] / l x w x h .....	1164 x 990 x 40 / 35 1164 x 990 x 30 (only for designed load (positive / negative) [Pa]: 3600 / 1600)		

Confirmation of the applicant  
 (Place and date)

Confirmation of TÜV NORD CERT  
 Shanghai,  (Place and date)

  
 (Applicant's legally authorized signature and stamp)

  
 (Signature of authorized TÜV NORD CERT engineer)

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	4 clamps installed		
Rated Pmpp [W] .....	185, 190, 195, 200, 205, 210	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	26.29, 26.41, 26.95, 27.15, 27.35, 27.60	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	9.08, 9.27, 9.33, 9.48, 9.62, 9.76	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.25	Fuse rating [A] .....	15
Design load (positive) [Pa] .....	a): 5400, b): 3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	a): 2400, b): 1600	Safety factor (negative) .....	1.5

Module type .....	36 cells: SP***M-36 (***=160-180, in increment of 5)		
Dimensions [mm] / l x w x h .....	1006 x 990 x 40 / 35 1006 x 990 x 30 (only for designed load (positive / negative) [Pa]: 3600 / 1600) 4 clamps installed		
Rated Pmpp [W] .....	160, 165, 170, 175, 180	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	22.48, 23.10, 23.30, 23.63, 23.84	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	9.17, 9.33, 9.49, 9.60, 9.76	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.25	Fuse rating [A] .....	15
Design load (positive) [Pa] .....	a): 5400, b): 3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	a): 2400, b): 1600	Safety factor (negative) .....	1.5

Module type .....	30 cells: SP***M-30 (***=135-150, in increment of 5)		
Dimensions [mm] / l x w x h .....	848 x 990 x 40 / 35 848 x 990 x 30 (only for designed load (positive / negative) [Pa]: 3600 / 1600) 4 clamps installed		
Rated Pmpp [W] .....	135, 140, 145, 150	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	18.95, 19.35, 19.55, 19.93	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	9.18, 9.46, 9.63, 9.74	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.25	Fuse rating [A] .....	15

Confirmation of the applicant  
Shanghai, 02/12/2023 (Place and date)

Confirmation of TÜV NORD CERT  
Shanghai, 2023/12/20 (Place and date)

Gilvra Wang  
 (Applicant's legally authorized signature and stamp)

Bala hi  
 (Signature of authorized TÜV NORD CERT engineer)



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Design load (positive) [Pa] .....	a): 5400, b): 3600	Safety factor (positive) .....	1.5
Design load (negative) [Pa] .....	a): 2400, b): 1600	Safety factor (negative) .....	1.5

Module type .....	72 cells: SP***M-72 (***=380-395, in increment of 5) With 6" mono cell 3		
Dimensions [mm] / l x w x h .....	2008 x 1002 x 40 / 35 / 30, 1979 x 1002 x 40 / 35 / 30 4 clamps installed		
Rated Pmpp [W] .....	380, 385, 390, 395	Tolerance of rated Pmpp [%] .....	±3
Rated Voc [V] .....	48.90, 49.10, 49.30, 49.50	Tolerance of rated Voc [%] .....	±5
Rated Isc [A] .....	9.75, 9.92, 10.12, 10.23	Tolerance of rated Isc [%] .....	±5
Maximum system voltage [V] .....	1500	Safety class acc. to IEC 61140 .....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	15
Design load (positive) [Pa] .....	3600	Safety factor (positive) .....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	60 cells: SP***M-60 (***=320-330, in increment of 5) With 6" mono cell 3		
Dimensions [mm] / l x w x h .....	1684 x 1002 x 40 / 35 / 30, 1665 x 1002 x 40 / 35 / 30 4 clamps installed		
Rated Pmpp [W] .....	320, 325, 330	Tolerance of rated Pmpp [%] .....	±3
Rated Voc [V] .....	40.90, 41.10, 41.30	Tolerance of rated Voc [%] .....	±5
Rated Isc [A] .....	10.15, 10.20, 10.31	Tolerance of rated Isc [%] .....	±5
Maximum system voltage [V] .....	1500	Safety class acc. to IEC 61140 .....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	15
Design load (positive) [Pa] .....	3600	Safety factor (positive) .....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	144 cells: SP***M-72H (***=365-400, in increment of 5) With 6" half cut mono cell 4		
Dimensions [mm] / l x w x h .....	2008 x 1002 x 40 / 35 / 30 4 clamps installed		
Rated Pmpp [W] .....	365, 370, 375, 380, 385, 390, 395, 400	Tolerance of rated Pmpp [%] .....	±3
Rated Voc [V] .....	48.30, 48.50, 48.70, 48.90, 49.10, 49.30, 49.50, 49.70	Tolerance of rated Voc [%] .....	±5

Confirmation of the applicant  
Antoni Willy (Place and date)

Confirmation of TÜV NORD CERT  
 Shanghai, 2023/2/24 (Place and date)

S. Wira Wang  
 (Applicant's legally authorized signature and stamp)

Berla Liu  
 (Signature of authorized TÜV NORD CERT engineer)

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Rated Isc [A] .....	9.79, 9.83, 9.87, 9.95, 10.04, 10.12, 10.21, 10.30	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	15 / 20
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	132 cells: SP***M-66H (***=335-365, in increment of 5) With 6" half cut mono cell 5		
Dimensions [mm] / l x w x h .....	1850 x 1002 x 40 / 35 / 30, 1845 x 1002 x 40 / 35 / 30 4 clamps installed		
Rated Pmpp [W] .....	335, 340, 345, 350, 355, 360, 365	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	44.00, 44.30, 44.50, 44.75, 45.00, 45.25, 45.50	Tolerance of rated Voc [%] .....	±5
Rated Isc [A] .....	9.72, 9.81, 9.90, 9.99, 10.09, 10.17, 10.26	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	15 / 20
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	120 cells: SP***M-60H (***=305-330, in increment of 5) With 6" half cut mono cell 5		
Dimensions [mm] / l x w x h .....	1684 x 1002 x 40 / 35 / 30 4 clamps installed		
Rated Pmpp [W] .....	305, 310, 315, 320, 325, 330	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	40.30, 40.50, 40.70, 40.90, 41.10, 41.30	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	9.85, 9.93, 10.02, 10.15, 10.20, 10.24	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	15 / 20
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Confirmation of the applicant  
 [Signature] (Place and date)  
 [Signature] (Applicant's legally authorized signature and stamp)  
 PV-F-026 CDF

Confirmation of TÜV NORD CERT  
 Shanghai. [Signature] (Place and date)  
 [Signature] (Signature of authorized TÜV NORD CERT engineer)

# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

Module type .....	144 cells: SP***M-72H (***=405-410, in increment of 5) With 6" half cut mono cell 5		
Dimensions [mm] / l x w x h .....	2008 x 1002 x 40 / 35 / 30 4 clamps installed		
Rated Pmpp [W] .....	405, 410	Tolerance of rated Pmpp [%] .....	±3
Rated Voc [V] .....	49.80, 50.00	Tolerance of rated Voc [%] .....	±5
Rated Isc [A] .....	10.21, 10.25	Tolerance of rated Isc [%] .....	±5
Maximum system voltage [V] .....	1500	Safety class acc. to IEC 61140 .....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	15 / 20
Design load (positive) [Pa] .....	3600	Safety factor (positive) .....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	132 cells: SP***M-66H (***=360-375, in increment of 5) With 6" half cut mono cell 5		
Dimensions [mm] / l x w x h .....	1850 x 1002 x 40 / 35 / 30, 1845 x 1002 x 40 / 35 / 30 4 clamps installed		
Rated Pmpp [W] .....	360, 365, 370, 375	Tolerance of rated Pmpp [%] .....	±3
Rated Voc [V] .....	45.00, 45.20, 45.40, 45.60	Tolerance of rated Voc [%] .....	±5
Rated Isc [A] .....	10.13, 10.17, 10.22, 10.28	Tolerance of rated Isc [%] .....	±5
Maximum system voltage [V] .....	1500	Safety class acc. to IEC 61140 .....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	15 / 20
Design load (positive) [Pa] .....	3600	Safety factor (positive) .....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	120 cells: SP***M-60H (***=325-340, in increment of 5) With 6" half cut mono cell 5		
Dimensions [mm] / l x w x h .....	1684 x 1002 x 40 / 35 / 30 4 clamps installed		
Rated Pmpp [W] .....	325, 330, 335, 340	Tolerance of rated Pmpp [%] .....	±3
Rated Voc [V] .....	40.40, 40.60, 40.80, 41.10	Tolerance of rated Voc [%] .....	±5
Rated Isc [A] .....	10.30, 10.40, 10.50, 10.60	Tolerance of rated Isc [%] .....	±5
Maximum system voltage [V] .....	1500	Safety class acc. to IEC 61140 .....	Class II

Confirmation of the applicant  
Dinhui, 02/14/2024 (Place and date)

Sihua Wang  
 (Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT  
 Shanghai, 2024/2/14 (Place and date)

Becker Liu  
 (Signature of authorized TÜV NORD CERT engineer)

PV-F-026 CDF

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# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	15 / 20
Design load (positive) [Pa] .....	3600	Safety factor (positive) .....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	144 cells: SP***M-72H (***=420-455, in increment of 5) With 6" half cut mono cell 6		
Dimensions [mm] / l x w x h .....	2108 x 1048 x 35 / 30 4 clamps installed		
Rated Pmpp [W] .....	420, 425, 430, 435, 440, 445, 450, 455	Tolerance of rated Pmpp [%] .....	±3
Rated Voc [V] .....	48.80, 49.00, 49.20, 49.40, 49.60, 49.80, 50.00, 50.20	Tolerance of rated Voc [%] .....	±5
Rated Isc [A] .....	11.04, 11.11, 11.19, 11.26, 11.33, 11.40, 11.47, 11.54	Tolerance of rated Isc [%] .....	±5
Maximum system voltage [V] .....	1500	Safety class acc. to IEC 61140 .....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	20
Design load (positive) [Pa] .....	3600	Safety factor (positive) .....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	132 cells: SP***M-66H (***=385-415, in increment of 5) With 6" half cut mono cell 6		
Dimensions [mm] / l x w x h .....	1936 x 1048 x 35 / 30 4 clamps installed		
Rated Pmpp [W] .....	385, 390, 395, 400, 405, 410, 415	Tolerance of rated Pmpp [%] .....	±3
Rated Voc [V] .....	44.20, 44.40, 44.60, 44.80, 45.00, 45.20, 45.40	Tolerance of rated Voc [%] .....	±5
Rated Isc [A] .....	10.81, 10.90, 10.99, 11.08, 11.17, 11.26, 11.35	Tolerance of rated Isc [%] .....	±5
Maximum system voltage [V] .....	1500	Safety class acc. to IEC 61140 .....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	20
Design load (positive) [Pa] .....	3600	Safety factor (positive) .....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	120 cells: SP***M-60H (***=350-380, in increment of 5)		
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Confirmation of the applicant  
Shanghai, 2023/2/20 (Place and date)

Silvia Wang  
 (Applicant's legally authorized signature and stamp)

PV-F-026 CDF

Confirmation of TÜV NORD CERT  
 Shanghai, 2023/2/20 (Place and date)

Bala Liu  
 (Signature of authorized TÜV NORD CERT engineer)

# Test Report



File No.: PVP02068/23P

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File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

	With 6" half cut mono cell 6		
Dimensions [mm] / l x w x h .....	1765 x 1048 x 35 / 30 4 clamps installed		
Rated Pmpp [W] .....	350, 355, 360, 365, 370, 375, 380	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	40.50, 40.70, 40.90, 41.10, 41.30, 41.50, 41.70	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	11.02, 11.10, 11.20, 11.28, 11.37, 11.46, 11.55	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	20
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5
Module type .....	156 cells: SP***M-78H (***=560-605, in increment of 5) With 7" half cut mono cell 7		
Dimensions [mm] / l x w x h .....	2443 x 1134 x 35, 2472 x 1134 x 35 8 clamps installed		
Rated Pmpp [W] .....	560, 565, 570, 575, 580, 585, 590, 595, 600, 605	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	52.50, 52.70, 52.90, 53.10, 53.30, 53.50, 53.70, 53.90, 54.10, 54.30	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	13.57, 13.63, 13.69, 13.75, 13.81, 13.87, 13.94, 14.01, 14.08, 14.15	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	25/30
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5
Module type .....	144 cells: SP***M-72H (***=515-570, in increment of 5) With 7" half cut mono cell 7		
Dimensions [mm] / l x w x h .....	2256 x 1134 x 35/ 30, 2279 x 1134 x 35/ 30 8 clamps installed		

Confirmation of the applicant  
  
 (Applicant's legally authorized signature and stamp)  
  
 PV-F-026 CDF

Confirmation of TÜV NORD CERT  
 Shanghai,   
 (Signature of authorized TÜV NORD CERT engineer)

# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

Rated Pmpp [W] .....	515, 520, 525, 530, 535, 540, 545, 550, 555, 560, 565, 570	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	48.40, 48.60, 48.80, 49.00, 49.20, 49.40, 49.60, 49.80, 50.00, 50.20, 50.40, 50.60	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	13.61, 13.66, 13.71, 13.76, 13.81, 13.87, 13.93, 13.99, 14.05, 14.11, 14.17, 14.23	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	25/30
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	132 cells: SP***M-66H (***=475-520, in increment of 5) With 7" half cut mono cell 7		
Dimensions [mm] / l x w x h .....	2073 x 1134 x 35/30, 2094 x 1134 x 35/30 4 clamps installed		
Rated Pmpp [W] .....	475, 480, 485, 490, 495, 500, 505, 510, 515, 520	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	44.30, 44.50, 44.70, 44.90, 45.10, 45.30, 45.50, 45.70, 45.90, 46.10	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	13.58, 13.63, 13.68, 13.73, 13.78, 13.83, 13.89, 13.94, 14.01, 14.07	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	25/30
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	120 cells: SP***M-60H (***=430-475, in increment of 5) With 7" half cut mono cell 7		
Dimensions [mm] / l x w x h .....	1890 x 1134 x 35/30, 1909 x 1134 x 35/30 4 clamps installed		
Rated Pmpp [W] .....	430, 435, 440, 445, 450, 455, 460, 465, 470, 475	Tolerance of rated Pmpp [%].....	±3

Confirmation of the applicant  

  
 (Place and date)

Confirmation of TÜV NORD CERT  
 Shanghai: 2023/1/20 (Place and date)

Silvia Wang  
 (Applicant's legally authorized signature and stamp)

Bella Liu  
 (Signature of authorized TÜV NORD CERT engineer)

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# Test Report



File No.: PVP02068/23P

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Rated Voc [V]..... :	40.60, 40.80, 41.00, 41.20, 41.40, 41.60, 41.80, 42.00, 42.20, 42.40	Tolerance of rated Voc [%]..... :	±5
Rated Isc [A] .....	13.48, 13.53, 13.58, 13.63, 13.68, 13.73, 13.78, 13.83, 13.88, 13.93	Tolerance of rated Isc [%]..... :	±5
Maximum system voltage [V]..... :	1500	Safety class acc. to IEC 61140..... :	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	25/30
Design load (positive) [Pa] .....	3600	Safety factor (positive)..... :	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	108 cells: SP***M-54H (***=390-425, in increment of 5) With 7" half cut mono cell 7		
Dimensions [mm] / l x w x h .....	1707 x 1134 x 35/30, 1724 x 1134 x 35/30 4 clamps installed		
Rated Pmpp [W] .....	390, 395, 400, 405, 410, 415, 420, 425	Tolerance of rated Pmpp [%]..... :	±3
Rated Voc [V]..... :	36.54, 36.74, 36.94, 37.14, 37.34, 37.54, 37.74, 37.94	Tolerance of rated Voc [%]..... :	±5
Rated Isc [A] .....	13.50, 13.55, 13.60, 13.65, 13.70, 13.75, 13.80, 13.85	Tolerance of rated Isc [%]..... :	±5
Maximum system voltage [V]..... :	1500	Safety class acc. to IEC 61140..... :	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	25/30
Design load (positive) [Pa] .....	3600	Safety factor (positive)..... :	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	156 cells: SP***M-78H (***=560-600, in increment of 5) With 7" half cut mono cell 8		
Dimensions [mm] / l x w x h .....	2443 x 1134 x 35, 2472 x 1134 x 35 8 clamps installed		
Rated Pmpp [W] .....	560, 565, 570, 575, 580, 585, 590, 595, 600	Tolerance of rated Pmpp [%]..... :	±3
Rated Voc [V]..... :	52.50, 52.70, 52.90, 53.10, 53.30, 53.50, 53.70, 53.90, 54.10	Tolerance of rated Voc [%]..... :	±5

Confirmation of the applicant  
Shanghai, 2023/12/20 (Place and date)

Silvia Wang  
 (Applicant's legally authorized signature and stamp)

PV-F-026 CDF

Confirmation of TÜV NORD CERT  
 Shanghai, 2023/12/20 (Place and date)

Bella Liu  
 (Signature of authorized TÜV NORD CERT engineer)

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Version 1.2

# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

Rated Isc [A] .....	13.57, 13.63, 13.69, 13.75, 13.81, 13.87, 13.94, 14.01, 14.08	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	25/30
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	144 cells: SP***M-72H (***=515-550, in increment of 5) With 7" half cut mono cell 8		
Dimensions [mm] / l x w x h .....	2256 x 1134 x 35/ 30, 2279 x 1134 x 35/ 30 8 clamps installed		
Rated Pmpp [W] .....	515, 520, 525, 530, 535, 540, 545, 550	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	48.40, 48.60, 48.80, 49.00, 49.20, 49.40, 49.60, 49.80	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	13.61, 13.66, 13.71, 13.76, 13.81, 13.87, 13.93, 13.99	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	25/30
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	132 cells:SP***M-66H (***=475-505, in increment of 5) With 7" half cut mono cell 8		
Dimensions [mm] / l x w x h .....	2073 x 1134 x 35/30, 2094 x 1134 x 35/30 4 clamps installed		
Rated Pmpp [W] .....	475, 480, 485, 490, 495, 500, 505	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	44.30, 44.50, 44.70, 44.90, 45.10, 45.30, 45.50	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	13.58, 13.63, 13.68, 13.73, 13.78, 13.83, 13.89	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	25/30
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5

Confirmation of the applicant  
*(Signature)* (Place and date)

Confirmation of TÜV NORD CERT  
 Shanghai, *2023/2/20* (Place and date)

*Sitona Wang*  
 (Applicant's legally authorized signature and stamp)

*Bala Liu*  
 (Signature of authorized TÜV NORD CERT engineer)

PV-F-026 CDF

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Version 1.2

# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5
Module type .....	120 cells: SP***M-60H (***=430-460, in increment of 5) With 7" half cut mono cell 8		
Dimensions [mm] / l x w x h .....	1890 x 1134 x 35/30, 1909 x 1134 x 35/30 4 clamps installed		
Rated Pmpp [W] .....	430, 435, 440, 445, 450, 455, 460	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	40.60, 40.80, 41.00, 41.20, 41.40, 41.60, 41.80	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	13.48, 13.53, 13.58, 13.63, 13.68, 13.73, 13.78	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	25/30
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5
Module type .....	108 cells: SP***M-54H (***=390-415, in increment of 5) With 7" half cut mono cell 8		
Dimensions [mm] / l x w x h .....	1707 x 1134 x 35/30, 1724 x 1134 x 35/30 4 clamps installed		
Rated Pmpp [W] .....	390, 395, 400, 405, 410, 415	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	36.54, 36.74, 36.94, 37.14, 37.34, 37.54	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	13.50, 13.55, 13.60, 13.65, 13.70, 13.75	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	15.5	Fuse rating [A] .....	25/30
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5
Module type .....	132 cells: SP***M-66H (***=630-670, in increment of 5) With 8" half cut mono cell 9		
Dimensions [mm] / l x w x h .....	2384 x 1303 x 35, 2408x 1303 x 35 8 clamps installed		

Confirmation of the applicant  
Shanghai, 2023/4/20 (Place and date)

Gilva Wang  
 (Applicant's legally authorized signature and stamp)

PV-F-026 CDF

Confirmation of TÜV NORD CERT  
Shanghai, 2023/4/20 (Place and date)

Beata Liu  
 (Signature of authorized TÜV NORD CERT engineer)

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Version 1.2

# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

Rated Pmpp [W] .....	630, 635, 640, 645, 650, 655, 660, 665, 670	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	44.78, 44.98, 45.18, 45.38, 45.58, 45.78, 45.98, 46.18, 46.38	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	17.96, 18.01, 18.06, 18.11, 18.16, 18.21, 18.26, 18.31, 18.36	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	12.8	Fuse rating [A] .....	30/35
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	120 cells: SP***M-60H (***=575-610, in increment of 5) With 8" half cut mono cell 9		
Dimensions [mm] / l x w x h .....	2172 x 1303 x 35, 2195x 1303 x 35 8 clamps installed		
Rated Pmpp [W] .....	575, 580, 585, 590, 595, 600, 605, 610	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	40.50, 40.70, 40.90, 41.10, 41.30, 41.50, 41.70, 41.90	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	18.27, 18.32, 18.37, 18.42, 18.47, 18.52, 18.57, 18.62	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	12.8	Fuse rating [A] .....	30/35
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	108 cells: SP***M-54H (***=515-545, in increment of 5) With 8" half cut mono cell 9		
Dimensions [mm] / l x w x h .....	1962 x 1303 x 35, 1980x 1303 x 35 8 clamps installed		
Rated Pmpp [W] .....	515, 520, 525, 530, 535, 540, 545	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	36.40, 36.60, 36.80, 37.00, 37.20, 37.40, 37.60	Tolerance of rated Voc [%].....	±5

Confirmation of the applicant  
Shanghai, 02/14/2023 (Place and date)

Sitona Wang  
 (Applicant's legally authorized signature and stamp)

PV-F-026 CDF

Confirmation of TÜV NORD CERT  
 Shanghai, 2023/2/10 (Place and date)

Beala Liu  
 (Signature of authorized TÜV NORD CERT engineer)

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Version 1.2

# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001


Rated Isc [A] .....	17.91, 17.96, 18.01, 18.06, 18.11, 18.16, 18.21	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	12.8	Fuse rating [A] .....	30/35
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	96 cells: SP***M-48H (***=460-485, in increment of 5) With 8" half cut mono cell 9		
Dimensions [mm] / l x w x h .....	1754 x 1303 x 35, 1767x 1303 x 35 8 clamps installed		
Rated Pmpp [W] .....	460, 465, 470, 475, 480, 485	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	32.52, 32.72, 32.92, 33.12, 33.32, 33.52	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	17.97, 18.02, 18.07, 18.12, 18.17, 18.22	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	12.8	Fuse rating [A] .....	30/35
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	84 cells: SP***M-42H (***=400-425, in increment of 5) With 8" half cut mono cell 9		
Dimensions [mm] / l x w x h .....	1540 x 1303 x 35, 1554x 1303 x 35 8 clamps installed		
Rated Pmpp [W] .....	400, 405, 410, 415, 420, 425	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	28.50, 28.70, 28.90, 29.10, 29.30, 29.50	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	17.81, 17.86, 17.91, 17.96, 18.01, 18.06	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	12.8	Fuse rating [A] .....	30/35
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	110 cells: SP***M-55H (***=520-555, in increment of 5)		
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Confirmation of the applicant  
 (Place and date)

Confirmation of TÜV NORD CERT  
 Shanghai,  (Place and date)

  
  
 (Applicant's legally authorized signature and stamp)

  
 (Signature of authorized TÜV NORD CERT engineer)

PV-F-028 CDF

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# Test Report



File No.: PVP02068/23P

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File No.: PVP02068/23P

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	With 8" half cut mono cell 9		
Dimensions [mm] / l x w x h .....	2384 x 1096 x 35, 2408 x 1096 x 35 4 clamps installed		
Rated Pmpp [W] .....	520, 525, 530, 535, 540, 545, 550, 555	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	37.06, 37.26, 37.46, 37.66, 37.86, 38.06, 38.26, 38.46	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	17.92, 17.97, 18.02, 18.07, 18.12, 18.17, 18.22, 18.27	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	12.8	Fuse rating [A] .....	30/35
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	100 cells: SP***M-50H (***=475-505, in increment of 5) With 8" half cut mono cell 9		
Dimensions [mm] / l x w x h .....	2172 x 1096 x 30/35, 2195 x 1096 x 30/35 4 clamps installed		
Rated Pmpp [W] .....	475, 480, 485, 490, 495, 500, 505	Tolerance of rated Pmpp [%].....	±3
Rated Voc [V].....	33.84, 34.04, 34.24, 34.44, 34.64, 34.84, 35.04	Tolerance of rated Voc [%].....	±5
Rated Isc [A] .....	17.97, 18.02, 18.07, 18.12, 18.17, 18.22, 18.27	Tolerance of rated Isc [%].....	±5
Maximum system voltage [V].....	1500	Safety class acc. to IEC 61140.....	Class II
Min-creepage distance [mm] .....	12.8	Fuse rating [A] .....	30/35
Design load (positive) [Pa] .....	3600	Safety factor (positive).....	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	90 cells: SP***M-45H (***=425-455, in increment of 5) With 8" half cut mono cell 9		
Dimensions [mm] / l x w x h .....	1962 x 1096 x 30/35, 1980 x 1096 x 30/35 4 clamps installed		
Rated Pmpp [W] .....	425, 430, 435, 440, 445, 450, 455	Tolerance of rated Pmpp [%].....	±3

Confirmation of the applicant  
  
 (Place and date)

Confirmation of TÜV NORD CERT  
 Shanghai, 2012/10 (Place and date)

Stina Wang  
 (Applicant's legally authorized signature and stamp)

Beala Lin  
 (Signature of authorized TÜV NORD CERT engineer)

# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001




File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

Rated Voc [V]..... :	30.44, 30.64, 30.84, 31.04, 31.24, 31.44, 31.64	Tolerance of rated Voc [%]..... :	±5
Rated Isc [A] .....	17.73, 17.78, 17.83, 17.88, 17.93, 17.98, 18.03	Tolerance of rated Isc [%]..... :	±5
Maximum system voltage [V]..... :	1500	Safety class acc. to IEC 61140..... :	Class II
Min-creepage distance [mm] .....	12.8	Fuse rating [A] .....	30/35
Design load (positive) [Pa] .....	3600	Safety factor (positive)..... :	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Module type .....	80 cells: SP***M-40H (**=380-400, in increment of 5) With 8" half cut mono cell 9		
Dimensions [mm] / l x w x h .....	1754 x 1096 x 30/35, 1767x 1096 x 30/35 4 clamps installed		
Rated Pmpp [W] .....	380, 385, 390, 395, 400	Tolerance of rated Pmpp [%]..... :	±3
Rated Voc [V]..... :	27.03, 27.23, 27.43, 27.63, 27.83	Tolerance of rated Voc [%]..... :	±5
Rated Isc [A] .....	18.01, 18.06, 18.11, 18.16, 18.21	Tolerance of rated Isc [%]..... :	±5
Maximum system voltage [V]..... :	1500	Safety class acc. to IEC 61140..... :	Class II
Min-creepage distance [mm] .....	12.8	Fuse rating [A] .....	30/35
Design load (positive) [Pa] .....	3600	Safety factor (positive)..... :	1.5
Design load (negative) [Pa] .....	1600	Safety factor (negative) .....	1.5

Confirmation of the applicant  
  
 (Place and date)  
 (Applicant's legally authorized signature and stamp)  
 PV-F-026 CDF

Confirmation of TÜV NORD CERT  
 Shanghai,   
 (Place and date)  
 (Signature of authorized TÜV NORD CERT engineer)

# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

## Copy of marking plate:

		<b>Sunpal Power Co., Ltd.</b> Add: No. 288 Gaoqian Road Hefei, Anhui, China Phone: +86 551 6388 9922 Email: info@sunpalpower.com Web: www.sunpalpower.com	
<b>PHOTOVOLTAIC MODULE</b>			
<b>Solar Module Type:</b>			
Maximum Power	( Pmax )		
Maximum Power Voltage	( Vmp )		
Maximum Power Current	( Imp )		
Nominal Operating Cell Temp	( NOCT )		
Weight			
Dimension			
Open-Circuit Voltage Tolerance	( Voc )		±5%V
Short-Circuit Current Tolerance	( Isc )		±5%A
Maximum System Voltage			DC1500V
Maximum Series Fuse			XXA
Power Production Tolerance			±3%
Application Class			Class A
Test Condition			1000W/m <sup>2</sup> , AM1.5, 25 °C
<b>WARNING-ELECTRIC HAZARD</b>			
Only qualified personnel should install or perform maintenance work on these modules Be aware of dangerous high DC voltage when connecting modules Do not damage or scratch the rear surface of the module			

Confirmation of the applicant  
Shun 02/18/2023 (Place and date)

Silvia Wang  
(Applicant's legally authorized signature and stamp)

PV-F-026 CDF

Confirmation of TÜV NORD CERT  
Shanghai, 2023/1/20 (Place and date)

Beula Liu  
(Signature of authorized TÜV NORD CERT engineer)

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# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001




File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

**List of critical materials and components:**

Object	Manufacturer	Type	Technical Data	Remark
<b>Components</b>				
6" mono cell 1 For PV module types: 72 cells: SP***M-72 (***=310-375) 60 cells: SP***M-60 (***=260-310) 54 cells: SP***M-54 (***=235-270) 48 cells: SP***M-48 (***=205-240) 42 cells: SP***M-42 (***=165-210) 36 cells: SP***M-36 (***=160-180) 30 cells: SP***M-30 (***=135-150)	Jiangyin Guangye PV-Tech Co., Ltd.	156S-03-5BB	Dimension (w x l) = 156.75mm x 156.75mm Thickness = 220 ± 20µm Cell area = 24432mm <sup>2</sup> 5 busbars Design load: 5400/2400Pa	Tested with PV modules
6" mono cell 2 For PV module types: 72 cells: SP***M-72 (***=340-375) 60 cells: SP***M-60 (***=285-310) 54 cells: SP***M-54 (***=255-270) 48 cells: SP***M-48 (***=225-240) 42 cells: SP***M-42 (***=200-210) 36 cells: SP***M-36 (***=170-180) 30 cells: SP***M-30 (***=140-150)	Jiangyin Leapton Energy Co., Ltd.	156S-03-5BB	Dimension (w x l) = 156.75mm x 156.75mm Thickness = 180 ± 20µm Cell area = 24432mm <sup>2</sup> 5 busbars Design load: 3600/1600Pa	Tested with PV modules
6" mono cell 3 For PV module types: 72 cells: SP***M-72 (***=380-395) 60 cells: SP***M-60 (***=320-330)	Jiangyin Leapton Energy Co., Ltd.	158.75M-5BB-PERC-01	Dimension (w x l) = 158.75mm x 158.75mm Thickness = 180 ± 20µm Cell area = 25201mm <sup>2</sup> 5 busbars Design load: 3600/1600Pa	Tested with PV modules
6" half cut mono cell 4 For PV module types: 144 cells: SP***M-72H (***=365-400) 132 cells: SP***M-66H (***=335-365) 120 cells: SP***M-60H (***=305-330)	Jiangyin Leapton Energy Co., Ltd.	158.75M-5BB-PERC-01	Dimension (w x l) = 158.75mm x 79.375mm Thickness = 180 ± 20µm Cell area = 12601mm <sup>2</sup> 5 busbars Design load: 3600/1600Pa	Tested with PV modules

Confirmation of the applicant  
  
 (Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT  
 Shanghai, 2023/12/14 (Place and date)  
  
 (Signature of authorized TÜV NORD CERT engineer)

# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001

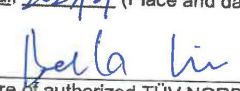


File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

Object	Manufacturer	Type	Technical Data	Remark
6" half cut mono cell 5 For PV module types: 144 cells: SP***M-72H (**=405-410) 132 cells: SP***M-66H (**=360-375) 120 cells: SP***M-60H (**=325-340)	Jiangyin Leapton Energy Co., Ltd.	158.75M-9BB-PERC-01	Dimension (w x l) = 158.75mm x 79.375mm ± 0.25mm Thickness = 190 ± 30µm Cell area = 12601mm <sup>2</sup> 9 busbars Design load: 3600/1600Pa	Tested with PV modules
6" half cut mono cell 6 For PV module types: 144 cells: SP***M-72H (**=420-455) 132 cells: SP***M-66H (**=385-415) 120 cells: SP***M-60H (**=350-380)	Jiangyin Leapton Energy Co., Ltd.	166M-9BB-PERC-01-MH	Dimension (w x l) = 166mm x 83mm ± 0.25mm Thickness = 190 ± 30µm Cell area = 13778mm <sup>2</sup> 9 busbars Design load: 3600/1600Pa	Tested with PV modules
7" half cut mono cell 7	Jiangyin Leapton Energy Co., Ltd.	182M-10BB-PERC-01-MH	Dimension (w x l) = 182mm x 91mm ± 0.5mm Thickness = 190 ± 30µm Cell area = 16507.3mm <sup>2</sup> 10 busbars Design load: 3600/1600Pa	Tested with PV modules
7" half cut mono cell 8 For power range: 156 cells: 560-600 144 cells: 515-550 132 cells: 475-505 120 cells: 430-460 108 cells: 390-415	Jiangyin Leapton Energy Co., Ltd.	182M-11BB-PERC-01-MH	Dimension (w x l) = 182mm x 91mm ± 0.5mm Thickness = 190 ± 30µm Cell area = 16507.3mm <sup>2</sup> 11 busbars Design load: 3600/1600Pa	Tested with PV modules
8" half cut mono cell 9	Jiangyin Leapton Energy Co., Ltd.	210M-12BB-PERC-01-MH	Dimension (w x l) = 210mm x 105mm ± 0.25mm Thickness = 160 ± 30µm Cell area = 22048mm <sup>2</sup> 12 busbars Design load: 3600/1600Pa	Tested with PV modules
Front cover 1	Changzhou Huamei Photovoltaic Materials Co., Ltd.	AR coating tempered glass	Thickness = 3.2mm Design load: 5400/2400Pa	Tested with PV modules
Front cover 2	Zhangjiagang City Guangfeng Glass Co., Ltd.	AR coating tempered glass	Thickness = 3.2mm Design load: 3600/1600Pa	Tested with PV modules
Front cover 3	Wuxi Haida Safety Glass Co., Ltd.	AR coating tempered glass	Thickness = 3.2mm Design load: 3600/1600Pa	Tested with PV modules
Front cover 4	XINYI PV PRODUCTS (ANHUI) HOLDINGS LTD.	AR coating tempered glass	Thickness = 3.2mm Design load: 3600/1600Pa	Tested with PV modules
Front cover 5	Nantong Dongli New Energy Technology Co., Ltd	AR coating tempered glass	Thickness = 3.2mm Design load: 3600/1600Pa	Tested with PV modules

Confirmation of the applicant  
  
 (Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT  
 Shanghai, 2023/11/11 (Place and date)  
  
 (Signature of authorized TÜV NORD CERT engineer)

PV-F-026 CDF

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Version 1.2

# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

Object	Manufacturer	Type	Technical Data	Remark
Rear cover 1	Suzhou Xingfu New Energy Technology Co., Ltd.	XF-300	Material: PVDF/Adhesive/PET/Coating Thickness = 20µm/12µm/300µm/8µm Color: white CTI: 600 (V) Max. System Voltage = 1500VDC	Tested with PV modules CTI report no. 12017DACS00042 issued by CPVT
Rear cover 2	Jolywood (Suzhou) Sunwant Co., Ltd.	FFC-JW3020 (PLUS)	Material: Fluorine resin/PET/Fluorine resin Thickness = 10µm / 300µm / 5µm Color: white CTI: 600 (V) Max. System Voltage = 1500VDC	Tested with PV modules Certificate no. 50405009 0003 issued by TÜV Rheinland
Rear cover 3	Suzhou Xingfu New Energy Technology Co., Ltd.	XF280	Material: PEVE/PET/PEVE Thickness = 17µm / 290µm / 6µm CTI: 400 (V) Max. System Voltage = 1500VDC	Tested with PV modules Certificate no. B 002797 0003 issued by TÜV SUD
Rear cover 4	Cybrid Technologies Inc.	Cynagard 255	Material: Fluorine resin/ PET/ Fluorine resin Thickness = 12µm / 288µm / 4µm CTI: 600 (V) Color: white Max. System Voltage = 1500VDC	Tested with PV modules Certificate no. R 50457791 issued by TÜV Rheinland
Rear cover 5	Chang Zhou Hui Tian New Material Co., Ltd.	PV308C	Material: F-coating / PET / F-coating Thickness = 12µm / 288µm / 6µm CTI: 450 (V) Max. System Voltage = 1500VDC	Tested with PV modules CTI report no. CN212TYP 001 issued by TÜV Rheinland
Rear cover 6	Jolywood (Suzhou) Sunwant Co., Ltd.	FFC-JW30M (plus)	Material: Fluorine resin/PET/Fluorine resin/ Fluorine resin Thickness = 25µm / 275µm / 15µm/20µm Color: Transparent CTI: 600 (V) Max. System Voltage = 1500VDC	Tested with PV modules Certificate no. 50484163 0002 issued by TÜV Rheinland
Encapsulation material 1 (Combined with Rear cover 1, 6) (Combined with mono cell 1, 2, 3, 4, 9)	Changzhou Sveck Photovoltaic New Material Co., Ltd.	SV-15296P (glass side) & SV-15297P (rear side)	SV-15296P Thickness = 0.45mm / 0.55mm SV-15297P Thickness = 0.45mm / 0.55mm CTI = 600 (V)	Tested with PV modules CTI report no. 70.407.17.118.01-00 issued by TÜV SUD
Encapsulation material 2 (Combined with Rear cover 2, 3, 5) (Combined with mono cell 1, 2, 3, 5, 6, 7, 8, 9)	Changzhou Baijia PV Material Co., Ltd.	B601HP (glass side) & B601W-A (rear side)	B601HP: Thickness = 0.60mm / 0.50mm / 0.45mm B601W-A: Thickness = 0.55mm / 0.45mm CTI = 600 (V)	Tested with PV modules CTI report no. 15151527 001 issued by TÜV Rheinland

Confirmation of the applicant  
Antoni 07/14/2019 (Place and date)

Silvia Wang  
 (Applicant's legally authorized signature and stamp)

PV-F-026 GDF

Confirmation of TÜV NORD CERT  
 Shanghai: 2023/4/19 (Place and date)

Bela Liu  
 (Signature of authorized TÜV NORD CERT engineer)

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Version 1.2

# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

Object	Manufacturer	Type	Technical Data	Remark
Encapsulation material 3 (Combined with Rear cover 4) (Combined with mono cell 6, 7)	Cybird Technologies Inc.	Cybright T11 (glass side) & Cybright C11 (rear side)	Cybright T11: Thickness = 0.55mm Cybright C11: Thickness = 0.55mm CTI = 600 (V)	Tested with PV modules CTI report no. 15043899 067 & 15043899 060 issued by TÜV Rheinland
Frame parts 1	Leapton Metal (Suzhou) Co., Ltd.	6063-T5	Material: Aluminium Thickness: 40mm / 35mm Color: Silver Connected by: Corner bracket Design load 1: 5400/2400Pa for thickness 40mm Design load 2: 3600/1600Pa for thickness 35mm	Tested with PV modules
Frame parts 2	Leapton Metal (Jiangyin) Co., Ltd.	6063-T5	Material: Aluminium Thickness: 40mm / 35mm / 30mm Color: Silver Connected by: Corner bracket Design load: 3600/1600Pa	Tested with PV modules
Frame parts 3	Leapton Metal (Jiangyin) Co., Ltd.	6005-T6	Material: Aluminium Thickness: 30mm / 35mm Color: Silver Connected by: Corner bracket Design load: 3600/1600Pa	Tested with PV modules
Frame parts 4	Jiangyin Yuansheng Aluminium Co., Ltd.	6005-T6	Material: Aluminum Thickness: 35mm Color: Silver Connected by: Corner bracket Design load: 3600/1600Pa	Tested with PV modules
Adhesive (frame)	Suzhou Tonsan Adhesive Co., Ltd.	1527	Color: white	Tested with PV modules
	JIANGSU MINGHAO NEW MATERIAL SCI-TECH CORPORATION	MH-3668	Color: white	Tested with PV modules
	Chengdu Guibao Science & Technology Co., Ltd.	888A	Color: white	Tested with PV modules
Internal wiring (for interconnection cell-to-cell bus bar)	Suzhou SanySolar Material Technology Corporation	Copper belt with tin plated	Width = 0.9mm Thickness = 0.25mm Sn60%Pb40%	Tested with PV modules
	Changzhou Greateen New Energy Technology Co., Ltd.	Copper belt with tin plated	Width = 0.9mm Thickness = 0.25mm Sn60%Pb40%	Tested with PV modules
	Jiangsu Lanxin New Energy Technology Co., Ltd.	Copper belt with tin plated	φ0.35mm φ0.30mm Sn60%Pb40%	Tested with PV modules

Confirmation of the applicant  
(Signature, Date and Place)

*Silvia Wang*  
(Applicant's legally authorized signature and stamp)

PV-F-026 CDF

Confirmation of TÜV NORD CERT  
Shanghai, (Signature, Date and Place)

*Bella Liu*  
(Signature of authorized TÜV NORD CERT engineer)

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Version 1.2

# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

Object	Manufacturer	Type	Technical Data	Remark
	Changzhou Greateen New Energy Technology Co., Ltd.	Copper belt with tin plated	φ0.32mm φ0.30mm Sn60%Pb40%	Tested with PV modules
	Wuxi Sveck Technology Co., Ltd	Copper belt with tin plated	φ0.30mm Sn60%Pb40%	Tested with PV modules
Internal wiring (for inter-string connection)	Suzhou Sansolar Material Technology Corporation	Copper belt with tin plated	Width = 6.0mm Thickness = 0.35mm Sn60%Pb40%	Tested with PV modules
	Changzhou Greateen New Energy Technology Co., Ltd.	Copper belt with tin plated	Width = 6.0mm Thickness = 0.35mm Sn60%Pb40%	Tested with PV modules
	Jiangsu Lanxin New Energy Technology Co., Ltd.	Copper belt with tin plated	Width = 6.0mm Thickness = 0.35mm Width = 4.0/6.0mm Thickness = 0.4mm Sn60%Pb40%	Tested with PV modules
			Width = 8.0mm Thickness = 0.3mm Width = 4.0/6.0mm Thickness = 0.35mm Sn60%Pb40%	Tested with PV modules
	Changzhou Greateen New Energy Technology Co., Ltd.	Copper belt with tin plated	Width = 4.0mm Width = 8.0mm Thickness = 0.35mm Sn60%Pb40%	Tested with PV modules
	Wuxi Sveck Technology Co., Ltd	Copper belt with tin plated	Width = 8.0mm Thickness = 0.35mm Width = 4.0mm Thickness = 0.40mm Sn60%Pb40%	Tested with PV modules
Soldering material	N/A	N/A	N/A	N/A
Fluxing agent	ASAHI SOLDER	SF56	-	Tested with PV modules
	HANGZHOU ZHENG MING ENVIRONMENT ALENGINEERING CO., LTD.	NCF-1087	-	Tested with PV modules
	Suzhou Vital Electronics Material Technology Co., Ltd	WTO-PV302A	-	Tested with PV modules
Fixing tape	3M	UV-1	Width = 5mm	Tested with PV modules
<b>Junction box set 1</b>				
Junction box	Ningbo Guangzhixing Photovoltaic Technology Co., Ltd.	PV-GZX156Q	Rated voltage = 1500VDC Rated current = 15A Number of diodes: 3	Certificate no. R 50334056

Confirmation of the applicant  
*Arhavi*, 22/10/2014 (Place and date)

*Silvia Wang*  
 (Applicant's legally authorized signature and stamp)

PV-F-026 CDF

Confirmation of TÜV NORD CERT  
 Shanghai, 2013/11 (Place and date)

*Beila Lin*  
 (Signature of authorized TÜV NORD CERT engineer)

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Version 1.2

# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

Object	Manufacturer	Type	Technical Data	Remark
Adhesive (junction box) (Combined with rear cover 1, 2)	Suzhou Tonsan Adhesive Co., Ltd.	1527	Color: white	Tested with PV modules
Potting material	Suzhou Tonsan Adhesive Co., Ltd.	1533	Color: white	Tested with PV modules
Bypass diodes	Ningbo Guangzhixing Photovoltaic Technology Co., Ltd.	30SQ045T	Tj max = 200°C If = 30A	Tested with PV modules
Cable	Ningbo Guangzhixing Photovoltaic Technology Co., Ltd.	H1Z2Z2-K 1×4.0mm <sup>2</sup>	Rated voltage = 1500VDC	Certificate no. R 50343327
Connectors	Ningbo Guangzhixing Photovoltaic Technology Co., Ltd.	PV-GZX1500	Rated voltage = 1500VDC Rated current = 30A	Certificate no. R 50334058
<b>Junction box set 2</b>				
Junction box	Zhejiang Forsol Energy Co., Ltd.	15T19A-L; 15T19A-M; 15T19A-R	Rated voltage = 1500VDC Rated current = 15A Number of diodes: 1 for each box	Certificate no. R 50340240
Adhesive (junction box) (Combined with rear cover 1, 2)	Beijing Tonsan New Material Technology Co., Ltd.	TS1527	Color: white	Tested with PV modules
Potting material	Beijing Tonsan New Material Technology Co., Ltd.	TS1521	Color: white	Tested with PV modules
Bypass diodes	Yangzhou Yangjie Electronic Technology Co., Ltd.	GFS2045	Tj max = 200°C If = 20A	Tested with PV modules
Cable	Zhejiang Forsol Energy Co., Ltd.	H1Z2Z2-K 1×4.0mm <sup>2</sup>	Rated voltage = 1500VDC	Certificate no. R 50369882
Connectors	Zhejiang Forsol Energy Co., Ltd.	SIKE6	Rated voltage = 1500VDC Rated current = 30A	Certificate no. R 50340749
<b>Junction box set 3</b>				
Junction box	NINGBO GZX PV TECHNOLOGY CO., LTD.	PV-GZX303 PV-GZX306	Rated voltage = 1500VDC Rated current = 25A (for PV-GZX303 & PV-GZX306) 35A & 30A & 25A & 20A (for PV-GZX306) Number of diodes: 3	Certificate no. B 088393 0016
Adhesive (junction box) (Combined with rear cover 1, 2, 3, 4)	Beijing Tonsan New Material Technology Co., Ltd.	TS1527	Color: white	Tested with PV modules
Adhesive (junction box) (Combined with rear cover 6)	Chengdu Guibao Science & Technology Co., Ltd.	888A	Color: white	Tested with PV modules
Potting material	Beijing Tonsan New Material Technology Co., Ltd.	TS1533	Color: white	Tested with PV modules

Confirmation of the applicant  
Shanghai, 2023/11/21 (Place and date)

Silvia Wang  
 (Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT  
Shanghai, 2023/11/21 (Place and date)

Bela Liu  
 (Signature of authorized TÜV NORD CERT engineer)

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# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

Object	Manufacturer	Type	Technical Data	Remark
Cable	Wuxi Xinhongye Wire & Cable Co., Ltd.	H1Z2Z2-K 1×4.0mm <sup>2</sup>	Rated voltage = 1500VDC	Certificate no. R 50439595
Connectors	Jiangsu Tiansheng PV Technology Co., Ltd.	PV-TS02	Rated voltage = 1500VDC Rated current = 30A	Certificate no. B 095207 0016
<b>Junction box set 5</b>				
Junction box	Changshu Friends Connector Technology Co., Ltd.	F20-01	Rated voltage = 1500VDC Rated current = 20A Number of diodes: 3	Certificate no. B 099272 0009
Adhesive (junction box) (Combined with rear cover 1, 3)	Beijing Tonsan New Material Technology Co., Ltd.	TS1527	Color: white	Tested with PV modules
Potting material	Beijing Tonsan New Material Technology Co., Ltd.	TS1533	Color: white	Tested with PV modules
Bypass diodes	Changshu Friends Connector Technology Co., Ltd.	FRD3045	T <sub>J</sub> max = 200°C I <sub>f</sub> = 30A	Tested with PV modules
Cable	Changshu Friends Connector Technology Co., Ltd.	H1Z2Z2-K 1×4.0mm <sup>2</sup>	Rated voltage = 1500VDC	Certificate no. R 50421153
Connectors	Changshu Friends Connector Technology Co., Ltd.	PV3e, PV5e	Rated voltage = 1500VDC Rated current = 30A	Certificate no. B 17 08 99272 006
<b>Junction box set 6</b>				
Junction box	ZHEJIANG FORSOL ENERGY CO., LTD.	F302x (x=D or F)	Rated voltage = 1500VDC Rated current = 20A for F302D 25A for F302F Number of diodes: 3	Certificate no. R 50465822
Adhesive (junction box) (Combined with rear cover 2, 3)	Beijing Tonsan New Material Technology Co., Ltd.	TS1527	Color: white	-
Potting material	TONSAN ADHESIVE, INC	1533	Color: white	-
Bypass diodes for F302D	Panjit Electronics (Wuxi) Co., Ltd.	GF3045T	T <sub>J</sub> max = 200°C I <sub>f</sub> = 30A	-
	ZHEJIANG FORSOL ENERGY CO., LTD.	MK3045	T <sub>J</sub> max = 200°C I <sub>f</sub> = 30A	-
Bypass diodes for F302F	Panjit Electronics (Wuxi) Co., Ltd.	GF5045	T <sub>J</sub> max = 200°C I <sub>f</sub> = 50A	-
	ZHEJIANG FORSOL ENERGY CO., LTD.	MK5045	T <sub>J</sub> max = 200°C I <sub>f</sub> = 50A	-
Cable	Wuxi Xinhongye Wire & Cable Co., Ltd.	62930 IEC 131 1×4.0mm <sup>2</sup> HALOGEN FREE LOW SMOKE	Rated voltage = 1500VDC	Certificate no. R 50439595

Confirmation of the applicant  
Wuxi, 2023/11/20 (Place and date)

Silvia Wang  
 (Applicant's legally authorized signature and stamp)

Confirmation of TÜV NORD CERT  
Shanghai, 2023/11/20 (Place and date)

Bala his  
 (Signature of authorized TÜV NORD CERT engineer)

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# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

Attached to Test Report No.: 492012304.001

Object	Manufacturer	Type	Technical Data	Remark
Connectors	ZHEJIANG FORSOL ENERGY CO., LTD.	SIKE6	Rated voltage = 1500VDC Rated current = 30A	Certificate no. R 50340749
<b>Junction box set 7</b>				
Junction box	Changshu Friends Connector Technology Co., Ltd.	F20-01 002	Rated voltage = 1500VDC Rated current = 25A or 30A Number of diodes: 3	Certificate no. B 099272 009 Rev. 05
Adhesive (junction box) (Combined with rear cover 1, 3)	Beijing Tonsan New Material Technology Co., Ltd.	TS1527	Color: white	-
Potting material	BEIJING TONSAN ADHESIVE, INC	TS1533	Color: white	-
	Beijing Tonsan New Material Technology Co., Ltd.	TS1521	Color: white	-
Bypass diodes	Yangzhou Yangjie Electronic Technology Co., Ltd.	GFMK8045C	Tj max = 200°C If = 80A	-
	Yangzhou Yangjie Electronic Technology Co., Ltd.	GFMK6045C	Tj max = 200°C If = 60A	-
Cable	Changshu Friends Connector Technology Co., Ltd.	H1Z2Z2-K 1x4.0mm <sup>2</sup>	Rated voltage = 1500VDC	Certificate no. R 50421153
Connectors	Changshu Friends Connector Technology Co., Ltd.	PV3e, PV5e	Rated voltage = 1500VDC Rated current = 30A	Certificate no. B 17 08 99272 006
<b>Junction box set 8</b>				
Junction box	Leaplon Solar (Changshu) Co., Ltd.	PV-LP-T01	Rated voltage = 1500VDC Rated current = 20A or 25A or 30A or 35A	Certificate no. B 115611 0002
Adhesive (junction box) (Combined with rear cover 1, 2, 3, 4)	Shanghai Huitian new chemical material Co., Ltd.	HT906Z	Color: white	-
Adhesive (junction box) (Combined with rear cover 1, 2, 3, 4,5,6)	Beijing Tonsan New Material Technology Co., Ltd.	TS1527	Color: white	-
Adhesive (junction box) (Combined with rear cover 1)	Chengdu Guibao Science & Technology Co., Ltd.	888A	Color: white	Tested with PV modules
Potting material	Beijing Tonsan New Material Technology Co., Ltd.	TS1533	Color: white	-
Bypass diodes	NINGBO GZX PV TECHNOLOGY CO., LTD.	GF3545	Tj max = 200°C Rated current: 20A If = 35A	-
		GFMK3545	Tj max = 200°C Rated current: 20A If = 35A	-

Confirmation of the applicant  

 (Place and date)

Confirmation of TÜV NORD CERT  
 Shanghai, (Place and date)

(Applicant's legally authorized signature and stamp)

(Signature of authorized TÜV NORD CERT engineer)

PV-F-026 CDF

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# Test Report



File No.: PVP02068/23P

Test Report No.: 492012304.001



File No.: PVP02068/23P

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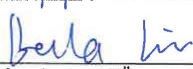
Object	Manufacturer	Type	Technical Data	Remark
		GF5045 Rated current: 25A	Tj max = 200°C If = 50A	-
		GFMK5045 Rated current: 25A	Tj max = 200°C If = 50A	-
		GF5045E Rated current: 25A	Tj max = 200°C If = 50A	-
		GFMK5545 Rated current: 30A	Tj max = 200°C If = 55A	-
		GF6545 Rated current: 35A	Tj max = 200°C If = 65A	-
Cable	Leapton Solar (Changshu) Co., Ltd.	62930 IEC131 1×4.0mm <sup>2</sup>	Rated voltage = 1500VDC	Certificate no. B 115611 0003
Connectors	Leapton Solar (Changshu) Co., Ltd.	PV-LP4	Rated voltage = 1500VDC Rated current = 39A	Certificate no. B 115611 0001

**Remark:**

- (1) Fire test Class C according to ANSI/UL 1703-2018 (MST 23 of IEC / EN 61730-2) has been evaluated on all the raw materials listed above.
- (2) Pollution degree I (Sequence B1 of IEC / EN 61730-2) has been evaluated on all the raw materials listed above.

----- End of CDF -----

Confirmation of the applicant  
Shanghai, 02/14/2024 (Place and date)  
  
 (Applicant's legally authorized signature and stamp)  
 PV-F-026 CDF

Confirmation of TÜV NORD CERT  
 Shanghai, 2024/2/14 (Place and date)  
  
 (Signature of authorized TÜV NORD CERT engineer)

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