

**SUMMARY OF TEST REPORT No. 4788560221-BIS-S2 DATED(mm/dd/yyyy):12/27/2018
ULR No: TC616818000000232F**

(Number of pages in test report: Page no.1 to 66)

TEST FORMAT AS PER IS/IEC 61730-1:2004 (First Edition) + A1:2011 + A2:2013

1. Name of manufacturer:	Icon Solar- En Power Technologies Private Limited
2. Product:	Photovoltaic (PV) Modules
3. Model:	<p>ISEN320 (Representative model)</p> <p>ISEN350, ISEN345, ISEN340, ISEN335, ISEN330, ISEN325, ISEN315, ISEN310, ISEN305, ISEN300, ISEN250, ISEN250X, ISEN200, ISEN150</p> <p>(72 cell series)</p> <p>ISEN335X, ISEN330X, ISEN325X, ISEN320X, ISEN300X, ISEN250X, ISEN225X, ISEN220X, ISEN200X (144 cell series)</p> <p>ISEN300N, ISEN295, ISEN290, ISEN285, ISEN280 (66 cell series)</p> <p>ISEN275, ISEN270, ISEN265, ISEN260, ISEN255, ISEN250(60 cell series)</p> <p>ISEN250Y(120 cell series)</p> <p>ISEN250N, ISEN245, ISEN240, ISEN235, ISEN230, ISEN225(54 cell series)</p> <p>ISEN220, ISEN215, ISEN210, ISEN205, ISEN200 (48 cell series)</p> <p>ISEN200N, ISEN195, ISEN190 (44 cell series)</p> <p>ISEN185, ISEN180, ISEN175, ISEN170 (40 cell series)</p> <p>ISEN165, ISEN160, ISEN155, ISEN150, ISEN135, ISEN130, ISEN125, ISEN110, ISEN100, ISEN80, ISEN75, ISEN60, ISEN50, ISEN40, ISEN20, ISEN10(36 cell series)</p> <p>ISEN5, ISEN3 (18 cell series)</p>
4. Model differences provided (if applicable): Yes/No	YES
5. Model differences verified as per MNRE Guidelines for series formulation: Yes/No	YES
6. Test Results:	



**SUMMARY OF TEST REPORT No. 4788560221-BIS-S2 DATED(mm/dd/yyyy):12/27/2018
ULR No: TC616818000000232F**

SL. NO.	TEST REQUIREMENTS	CLAUSE	VERDICT
1	Application Classes	3	P
2	Construction Requirements	4	P
3	Polymeric Materials	5	P
4	Internal Wiring and current-carrying Parts	6	P
5	Connections	7	P
6	Bonding and Grounding	8	P
7	Creepage and clearance distances	9	P
8	Field Wiring compartments with covers	10	P
9	Marking	11	P
10	Requirements for supplied documents	12	P

General Information:

1. The conformity certificates of critical components are verified to ensure complete testing of Product under test and details regarding harmonized IEC/UL Standards (where IS standards are not available) are also provided in the list of critical component.

CONCLUSION:

1. Sample meets all relevant requirements of IS/IEC 61730-1:2004 (First Edition) + A1:2011 + A2:2013.
2. ~~Sample fails to meet the following test requirements~~

I, hereby, undertake that the verdict stated in the test reports for all the tests matches with the test results. The sample meets all relevant requirements of IS/IEC 61730-1:2004 (First Edition) + A1:2011 + A2:2013/does not meet the requirements stated above at 2) of conclusion. If any deviation is found, suitable punitive action may be taken by BIS.

Date(mm/dd/yyyy): 12/27/2018

(Signature of Authorized person with stamp)




Test Report issued under the responsibility of:



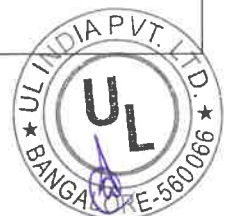
TEST REPORT IS/IEC 61730-1:2004 PV Module Safety Qualification Part 1: Requirements for construction	
Report Number	4788560221-BIS-S2
ULR No.	TC616818000000232F
Date of issue(mm/dd/yyyy):	12/27/2018
Total number of pages	66
Applicant's name	Icon Solar- En Power Technologies Private Limited
Address	319-320, Offizo, 3rd floor, Magneto Mall, G.E. Road., Raipur(C.G)-492001.
Test specification:	
Standard	IS/IEC 61730-1:2004 (First Edition) + A1:2011 + A2:2013
Test procedure	IS/IEC 61730-1:2004 (First Edition) + A1:2011 + A2:2013
Non-standard test method	N/A
Test Report Form No.	TRF No. IS/IEC61730-1_V1.0
Test Report Form(s) Originator	BIS
Master TRF	Dated 19.02.2018



Test item description	Photovoltaic (PV) Module(s)
Trade Mark	
Manufacturer	Icon Solar- En Power Technologies Private Limited
Address	319-320, Offizo, 3rd floor, , Magneto Mall, G.E. Road., Raipur(C.G)-492001.
Model/Type reference	ISEN350, ISEN345, ISEN340, ISEN335, ISEN330, ISEN325, ISEN320, ISEN315, ISEN310, ISEN305, ISEN300, ISEN250, ISEN250X, ISEN200, ISEN150 ISEN335X, ISEN330X, ISEN325X, ISEN320X, ISEN300X ISEN250X, ISEN225X, ISEN220X, ISEN200X ISEN300N, ISEN295, ISEN290, ISEN285, ISEN280 ISEN275, ISEN270, ISEN265, ISEN260, ISEN255, ISEN250 ISEN250Y ISEN250N, ISEN245, ISEN240, ISEN235, ISEN230, ISEN225 ISEN220, ISEN215, ISEN210, ISEN205, ISEN200 ISEN200N, ISEN195, ISEN190 ISEN185, ISEN180, ISEN175, ISEN170 ISEN165, ISEN160, ISEN155, ISEN150, ISEN135, ISEN130, ISEN125, ISEN110, ISEN100, ISEN80, ISEN75, ISEN60, ISEN50, ISEN40, ISEN20, ISEN10 ISEN5, ISEN3
Ratings	72, 144, 66, 60, 120, 54, 48, 44 Cell Series Maximum System Voltage: 1500V Maximum over current protection rating: 15A 40, 36 Cell Series Maximum System Voltage: 1000V Maximum over current protection rating: 15A 36 Cell Series Maximum System Voltage: 600V Maximum over current protection rating: 10A 18 cell series Maximum System Voltage: 48V Maximum over current protection rating: 5A See specific model rating in General Product information





Testing procedure and testing location:	
<input checked="" type="checkbox"/> Testing Laboratory:	
Testing location/address	UL INDIA PVT. LTD. LABORATORY BUILDING, KALYANI PLATINA CAMPUS, SURVEY. NO. 129/4, EPIP ZONE, PHASE II, WHITEFIELD, IN-560066, BANGALORE, INDIA
Tested by (name + signature).....	Jyothi Swaroop <i>Jyothi Swaroop</i> 12/27/18
Approved by (name + signature)	Sriparn Saurabh <i>Sriparn Saurabh</i> 12/27/18
List of Attachments (including a total number of pages in each attachment): N/A	
Summary of testing:	
Tests performed (name of test and test clause): Model ISEN320 from poly cell families were used for test purposes and all models are same in construction except number of cell, overall dimension, no of bypass diode and output power". MST 01 - Visual inspection MST 11 - Accessibility test MST 12 - Cut susceptibility test MST 13 - Ground continuity test MST 14 - Impulse voltage test MST 16 - Dielectric withstand test MST 21 - Temperature test MST 26 - Reverse current overload Test MST 32 - Module breakage test MST 17 - Wet leakage current test	Testing location: UL INDIA PVT. LTD. LABORATORY BUILDING, KALYANI PLATINA CAMPUS, SURVEY. NO. 129/4, EPIP ZONE, PHASE II, WHITEFIELD, IN- 560066, BANGALORE, INDIA
Fire test (MST 23)	UL Northbrook 333 Pfingsten Road, Northbrook, IL 60062-2096, USA
<input checked="" type="checkbox"/> The product fulfils the requirements of <u>IS/IEC 61730-1:2004 (First Edition) + A1:2011 + A2:2013</u> (insert standard number and edition and delete the text in parenthesis, leave it blank or delete the whole sentence, if not applicable)	



Test item particulars.....:	
Accessories and detachable parts included in the evaluation:	Grounding Method1: Long frame rails are equipped with pre-drilled grounding holes in their centre. Stainless steel grounding bolts or grounding lugs
Mounting system used :	Mounting: 1. Installation using the frame mounting holes using 4 pre-drilled mounting holes of Dia 10mm. M8 stainless steel hardware, spring washers, flat washer with torque 10Nm. 2. Using Pressure clamp: • Fixing on the long side: The clamps must be mounted along the frame at the position of the mounting hole, with a tolerance of 10% of the module total length to the edge of the frame. • Fixing on the short side: The clamps must be mounted along the frame at the edges of the module, with a tolerance of 25% of the module total width to the middle of the frame.
Other options included....:	N/A
Possible test case verdicts:	
- test case does not apply to the test object..... : N/A	
- test object does meet the requirement : P (Pass)	
- test object does not meet the requirement..... : F (Fail)	
Abbreviations used in the report:	
Pmax – Maximum power	PD – Partial Discharge
Vpm – Maximum power voltage	RTI/RTE – Relative Thermal Endurance Index
Ipm – Maximum power current	STC – Standard Test Conditions
Isc – Short circuit current	TC – Thermal Cycling
Voc – Open circuit voltage	CTI – Comparative Tracking Index
FF – Fill factor	MST – Module Safety Test
Testing : : Refer individual test date	
Date of receipt of test item(mm/dd/yyyy): : 08/02/2018	
Date (s) of performance of tests...(mm/dd/yyyy): : 10/12/2018 to 12/19/2018	
General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator. This Test Report Form is intended for the investigation of PV modules in accordance with IS/IEC 61730-1. It can only be used together with IS/IEC 61730-2 Test Report.	
Name and address of factory (ies).....: Icon Solar- En Power Technologies Private Limited 319-320, 3rd floor, Offizo , Magneto Mall, G.E. Road., Raipur-492001	



Copy of marking plate:

		Icon Solar-En Power Technologies Pvt.Ltd. Office Address : 319-320,Office,3rd Floor, Magneto Mall, G.E. Road,Raipur(C.G.) Pin: 492001 INDIA Tel: +91771-4065755 www.iconolar-en.com
MODEL NO	ISEN320	
MAXIMUM POWER (Pmax)	320 Wp ±3%	
OPEN CIRCUIT VOLTAGE (Voc)	45.00 V	
SHORT CIRCUIT CURRENT (Isc)	9.12 A	
VOLTAGE AT MAXIMUM POWER (Vmp)	36.59 V	
CURRENT AT MAXIMUM POWER (Imp)	8.75 A	
MAXIMUM SYSTEM VOLTAGE	1500 V	
SERIES FUSE RATING	15 A	
MAXIMUM DESIGN LOAD	5400 Pa	
APPLICATION CLASS	CLASS A	
SAFETY CLASS	CLASS II	
POWER SORTING	0 - 5 W	
MODULE SERIAL NO : INSIDE OF THE MODULE IN FRONT		
 WARNING ELECTRICAL HAZARD THIS UNIT PRODUCES ELECTRICITY WHEN EXPOSED TO LIGHT. COVER GLASS BEFORE CONNECTING TO THE LOAD.		
POWER SPECIFICATION MEASURED AT STANDARD TEST CONDITION. (Cell Temperature 25°C, Irradiance 1000W/m² & AM 1.5)		
Made in India		

10/18/2018

Note: Label date format (mm/dd/yyyy)



General product information:	
PV module type reference	ISEN350
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)	350.23 W
Nominal open circuit voltage at (Voc)	45.78 V
Nominal short circuit current at (Isc)	9.69 A
Nominal maximum power voltage (Vpm).....	37.14 V
Nominal maximum power current (Ipm).....	9.43 A
PV module type reference	ISEN345
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)	345.21 W
Nominal open circuit voltage at (Voc)	45.66 V
Nominal short circuit current at (Isc)	9.59 A
Nominal maximum power voltage (Vpm).....	37.04 V
Nominal maximum power current (Ipm).....	9.32 A
PV module type reference	ISEN340
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)	340.12 W
Nominal open circuit voltage at (Voc)	45.52 V
Nominal short circuit current at (Isc)	9.50 A
Nominal maximum power voltage (Vpm).....	36.97 V
Nominal maximum power current (Ipm).....	9.20 A
PV module type reference	ISEN335
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)	335.15 W
Nominal open circuit voltage at (Voc)	45.40 V
Nominal short circuit current at (Isc)	9.41 A
Nominal maximum power voltage (Vpm).....	36.87 V
Nominal maximum power current (Ipm).....	9.09 A
PV module type reference	ISEN330
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)	330.10 W
Nominal open circuit voltage at (Voc)	45.25 V
Nominal short circuit current at (Isc)	9.31 A
Nominal maximum power voltage (Vpm).....	36.80 V
Nominal maximum power current (Ipm).....	8.97 A



PV module type reference	ISEN325
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)	325.07 W
Nominal open circuit voltage at (Voc)	45.14 V
Nominal short circuit current at (Isc)	9.23 A
Nominal maximum power voltage (Vpm).....	36.69 V
Nominal maximum power current (Ipm).....	8.86 A
PV module type reference	ISEN320
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)	320.16 W
Nominal open circuit voltage at (Voc)	45.00 V
Nominal short circuit current at (Isc)	9.12 A
Nominal maximum power voltage (Vpm).....	36.59 V
Nominal maximum power current (Ipm)	8.75 A
PV module type reference	ISEN315
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)	315.17 W
Nominal open circuit voltage at (Voc)	44.85 V
Nominal short circuit current at (Isc)	9.02 A
Nominal maximum power voltage (Vpm).....	36.52 V
Nominal maximum power current (Ipm).....	8.63 A
PV module type reference	ISEN310
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)	310.02 W
Nominal open circuit voltage at (Voc)	44.70 V
Nominal short circuit current at (Isc)	8.93 A
Nominal maximum power voltage (Vpm).....	36.43 V
Nominal maximum power current (Ipm).....	8.51 A
PV module type reference.....	ISEN305
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	305.17 W
Nominal open circuit voltage at (Voc).....	44.59 V
Nominal short circuit current at (Isc).....	8.83 A
Nominal maximum power voltage (Vpm)	36.33 V
Nominal maximum power current (Ipm)	8.40 A



PV module type reference..... :	ISEN300
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	300.29 W
Nominal open circuit voltage at (Voc)..... :	44.45 V
Nominal short circuit current at (Isc)..... :	8.75 A
Nominal maximum power voltage (Vpm)..... :	36.18 V
Nominal maximum power current (Ipm)..... :	8.30 A
PV module type reference..... :	ISEN250
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	250.37 W
Nominal open circuit voltage at (Voc)..... :	44.46 V
Nominal short circuit current at (Isc)..... :	7.28 A
Nominal maximum power voltage (Vpm)..... :	36.18 V
Nominal maximum power current (Ipm)..... :	6.92 A
PV module type reference..... :	ISEN250X
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	250.37 W
Nominal open circuit voltage at (Voc)..... :	44.46 V
Nominal short circuit current at (Isc)..... :	7.28 A
Nominal maximum power voltage (Vpm)..... :	36.18 V
Nominal maximum power current (Ipm)..... :	6.92 A
PV module type reference..... :	ISEN200
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	201.16 W
Nominal open circuit voltage at (Voc)..... :	44.41 V
Nominal short circuit current at (Isc)..... :	5.86 A
Nominal maximum power voltage (Vpm)..... :	36.18 V
Nominal maximum power current (Ipm)..... :	5.56 A
PV module type reference..... :	ISEN150
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	150.31 W
Nominal open circuit voltage at (Voc)..... :	44.46 V
Nominal short circuit current at (Isc)..... :	4.37 A
Nominal maximum power voltage (Vpm)..... :	36.22 V
Nominal maximum power current (Ipm)..... :	4.15 A



PV module type reference.....	ISEN335X
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	335.1 W
Nominal open circuit voltage at (Voc).....	45.4 V
Nominal short circuit current at (Isc).....	9.41 A
Nominal maximum power voltage (Vpm).....	36.87 V
Nominal maximum power current (Ipm).....	9.09 A
PV module type reference.....	ISEN330X
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	330.1 W
Nominal open circuit voltage at (Voc).....	45.25 V
Nominal short circuit current at (Isc).....	9.31 A
Nominal maximum power voltage (Vpm).....	36.8 V
Nominal maximum power current (Ipm).....	8.97 A
PV module type reference.....	ISEN325X
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	325.1 W
Nominal open circuit voltage at (Voc).....	45.14 V
Nominal short circuit current at (Isc).....	9.23 A
Nominal maximum power voltage (Vpm).....	36.69 V
Nominal maximum power current (Ipm).....	8.86 A
PV module type reference.....	ISEN320X
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	320.2 W
Nominal open circuit voltage at (Voc).....	45.00 V
Nominal short circuit current at (Isc).....	9.12 A
Nominal maximum power voltage (Vpm).....	36.59 V
Nominal maximum power current (Ipm).....	8.75 A
PV module type reference.....	ISEN300X
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	300.3 W
Nominal open circuit voltage at (Voc).....	88.90 V
Nominal short circuit current at (Isc).....	4.38 A
Nominal maximum power voltage (Vpm).....	72.36 V
Nominal maximum power current (Ipm).....	4.15 A



PV module type reference.....	ISEN250X
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	250.3 W
Nominal open circuit voltage at (Voc).....	89.19 V
Nominal short circuit current at (Isc).....	3.63 A
Nominal maximum power voltage (Vpm)	72.56 V
Nominal maximum power current (Ipm)	3.45 A
PV module type reference.....	ISEN225X
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	225.2 W
Nominal open circuit voltage at (Voc).....	91.09 V
Nominal short circuit current at (Isc).....	3.16 A
Nominal maximum power voltage (Vpm)	73.61 V
Nominal maximum power current (Ipm)	3.06 A
PV module type reference.....	ISEN220X
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	220.0 W
Nominal open circuit voltage at (Voc).....	90.6 V
Nominal short circuit current at (Isc).....	3.11 A
Nominal maximum power voltage (Vpm)	73.32 V
Nominal maximum power current (Ipm)	3.00 A
PV module type reference.....	ISEN200X
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	200.4 W
Nominal open circuit voltage at (Voc).....	88.89 V
Nominal short circuit current at (Isc).....	2.92 A
Nominal maximum power voltage (Vpm)	72.36 V
Nominal maximum power current (Ipm)	2.77 A
PV module type reference.....	ISEN300N
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	300.3 W
Nominal open circuit voltage at (Voc).....	41.43 V
Nominal short circuit current at (Isc).....	9.26 A
Nominal maximum power voltage (Vpm)	33.67 V
Nominal maximum power current (Ipm)	8.92 A



PV module type reference.....	ISEN295
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	295.1 W
Nominal open circuit voltage at (Voc).....	41.30 V
Nominal short circuit current at (Isc).....	9.16 A
Nominal maximum power voltage (Vpm)	33.57 V
Nominal maximum power current (Ipm)	8.79 A
PV module type reference.....	ISEN290
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	290.3 W
Nominal open circuit voltage at (Voc).....	41.16 V
Nominal short circuit current at (Isc).....	9.06 A
Nominal maximum power voltage (Vpm)	33.48 V
Nominal maximum power current (Ipm)	8.67 A
PV module type reference.....	ISEN285
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	285.2 W
Nominal open circuit voltage at (Voc).....	41.05 V
Nominal short circuit current at (Isc).....	8.97 A
Nominal maximum power voltage (Vpm)	33.36 V
Nominal maximum power current (Ipm)	8.55 A
PV module type reference.....	ISEN280
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	280.0 W
Nominal open circuit voltage at (Voc).....	40.93 V
Nominal short circuit current at (Isc).....	8.85 A
Nominal maximum power voltage (Vpm)	33.26 V
Nominal maximum power current (Ipm)	8.42 A
PV module type reference.....	ISEN275
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	275.0 W
Nominal open circuit voltage at (Voc).....	37.71 V
Nominal short circuit current at (Isc).....	9.31 A
Nominal maximum power voltage (Vpm)	30.62 V
Nominal maximum power current (Ipm)	8.98 A



PV module type reference..... :	ISEN270
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	270.2 W
Nominal open circuit voltage at (Voc)..... :	37.58 V
Nominal short circuit current at (Isc)..... :	9.19 A
Nominal maximum power voltage (Vpm)..... :	30.56 V
Nominal maximum power current (Ipm)..... :	8.84 A
PV module type reference..... :	ISEN265
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	265.3 W
Nominal open circuit voltage at (Voc)..... :	37.46 V
Nominal short circuit current at (Isc)..... :	9.09 A
Nominal maximum power voltage (Vpm)..... :	30.46 V
Nominal maximum power current (Ipm)..... :	8.71 A
PV module type reference..... :	ISEN260
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	260.2 W
Nominal open circuit voltage at (Voc)..... :	37.30 V
Nominal short circuit current at (Isc)..... :	9.01 A
Nominal maximum power voltage (Vpm)..... :	30.36 V
Nominal maximum power current (Ipm)..... :	8.57 A
PV module type reference..... :	ISEN255
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	255.2 W
Nominal open circuit voltage at (Voc)..... :	37.18 V
Nominal short circuit current at (Isc)..... :	8.84 A
Nominal maximum power voltage (Vpm)..... :	30.27 V
Nominal maximum power current (Ipm)..... :	8.43 A
PV module type reference..... :	ISEN250
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	250.3 W
Nominal open circuit voltage at (Voc)..... :	37.05 V
Nominal short circuit current at (Isc)..... :	8.75 A
Nominal maximum power voltage (Vpm)..... :	30.12 V
Nominal maximum power current (Ipm)..... :	8.31 A



PV module type reference.....	ISEN250Y
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	250.3 W
Nominal open circuit voltage at (Voc).....	74.10 V
Nominal short circuit current at (Isc).....	4.38 A
Nominal maximum power voltage (Vpm).....	60.24 V
Nominal maximum power current (Ipm).....	4.16 A
PV module type reference.....	ISEN250N
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	250.2 W
Nominal open circuit voltage at (Voc).....	34.01 V
Nominal short circuit current at (Isc).....	9.38 A
Nominal maximum power voltage (Vpm).....	27.62 V
Nominal maximum power current (Ipm).....	9.06 A
PV module type reference.....	ISEN245
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	245.2 W
Nominal open circuit voltage at (Voc).....	33.89 V
Nominal short circuit current at (Isc).....	9.24 A
Nominal maximum power voltage (Vpm).....	27.52 V
Nominal maximum power current (Ipm).....	8.91 A
PV module type reference.....	ISEN240
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	240.1 W
Nominal open circuit voltage at (Voc).....	33.75 V
Nominal short circuit current at (Isc).....	9.12 A
Nominal maximum power voltage (Vpm).....	27.44 V
Nominal maximum power current (Ipm).....	8.75 A
PV module type reference.....	ISEN235
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	235.1 W
Nominal open circuit voltage at (Voc).....	33.61 V
Nominal short circuit current at (Isc).....	8.98 A
Nominal maximum power voltage (Vpm).....	27.31 V
Nominal maximum power current (Ipm).....	8.61 A



PV module type reference..... :	ISEN230
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	230.3 W
Nominal open circuit voltage at (Voc)..... :	33.49 V
Nominal short circuit current at (Isc)..... :	8.89 A
Nominal maximum power voltage (Vpm)..... :	27.22 V
Nominal maximum power current (Ipm)..... :	8.46 A
PV module type reference..... :	ISEN225
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	225.2 W
Nominal open circuit voltage at (Voc)..... :	33.33 V
Nominal short circuit current at (Isc)..... :	8.75 A
Nominal maximum power voltage (Vpm)..... :	27.13 V
Nominal maximum power current (Ipm)..... :	8.3 A
PV module type reference..... :	ISEN220
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	220.1 W
Nominal open circuit voltage at (Voc)..... :	30.18 V
Nominal short circuit current at (Isc)..... :	9.31 A
Nominal maximum power voltage (Vpm)..... :	24.51 V
Nominal maximum power current (Ipm)..... :	8.98 A
PV module type reference..... :	ISEN215
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	215.1 W
Nominal open circuit voltage at (Voc)..... :	30.06 V
Nominal short circuit current at (Isc)..... :	9.17 A
Nominal maximum power voltage (Vpm)..... :	24.42 V
Nominal maximum power current (Ipm)..... :	8.81 A
PV module type reference..... :	ISEN210
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	210.1 W
Nominal open circuit voltage at (Voc)..... :	29.9 V
Nominal short circuit current at (Isc)..... :	9.04 A
Nominal maximum power voltage (Vpm)..... :	24.32 V
Nominal maximum power current (Ipm)..... :	8.64 A



PV module type reference.....	ISEN205
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	205.0 W
Nominal open circuit voltage at (Voc).....	29.76 V
Nominal short circuit current at (Isc).....	8.89 A
Nominal maximum power voltage (Vpm).....	24.23 V
Nominal maximum power current (Ipm).....	8.46 A
PV module type reference.....	ISEN200
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	200.6 W
Nominal open circuit voltage at (Voc).....	29.64 V
Nominal short circuit current at (Isc).....	8.74 A
Nominal maximum power voltage (Vpm).....	24.14 V
Nominal maximum power current (Ipm).....	8.31 A
PV module type reference.....	ISEN200N
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	200.3 W
Nominal open circuit voltage at (Voc).....	27.62 V
Nominal short circuit current at (Isc).....	9.27 A
Nominal maximum power voltage (Vpm).....	22.43 V
Nominal maximum power current (Ipm).....	8.93 A
PV module type reference.....	ISEN195
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	195.2 W
Nominal open circuit voltage at (Voc).....	27.49 V
Nominal short circuit current at (Isc).....	9.07 A
Nominal maximum power voltage (Vpm).....	22.33 V
Nominal maximum power current (Ipm).....	8.74 A
PV module type reference.....	ISEN190
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	190.2 W
Nominal open circuit voltage at (Voc).....	27.36 V
Nominal short circuit current at (Isc).....	8.96 A
Nominal maximum power voltage (Vpm).....	22.25 V
Nominal maximum power current (Ipm).....	8.55 A



PV module type reference..... :	ISEN185
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	185.0 W
Nominal open circuit voltage at (Voc)..... :	25.21 V
Nominal short circuit current at (Isc)..... :	9.37 A
Nominal maximum power voltage (Vpm)..... :	20.44 V
Nominal maximum power current (Ipm)..... :	9.05 A
PV module type reference..... :	ISEN180
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	180.1 W
Nominal open circuit voltage at (Voc)..... :	25.06 V
Nominal short circuit current at (Isc)..... :	9.22 A
Nominal maximum power voltage (Vpm)..... :	20.37 V
Nominal maximum power current (Ipm)..... :	8.84 A
PV module type reference..... :	ISEN175
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	175.0 W
Nominal open circuit voltage at (Voc)..... :	24.89 V
Nominal short circuit current at (Isc)..... :	9.01 A
Nominal maximum power voltage (Vpm)..... :	20.23 V
Nominal maximum power current (Ipm)..... :	8.65 A
PV module type reference..... :	ISEN170
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	170.2 W
Nominal open circuit voltage at (Voc)..... :	24.81 V
Nominal short circuit current at (Isc)..... :	8.89 A
Nominal maximum power voltage (Vpm)..... :	20.17 V
Nominal maximum power current (Ipm)..... :	8.44 A
PV module type reference..... :	ISEN165
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	165.4 W
Nominal open circuit voltage at (Voc)..... :	22.65 V
Nominal short circuit current at (Isc)..... :	9.33 A
Nominal maximum power voltage (Vpm)..... :	18.4 V
Nominal maximum power current (Ipm)..... :	8.99 A



PV module type reference.....	ISEN160
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	160.0 W
Nominal open circuit voltage at (Voc).....	22.5 V
Nominal short circuit current at (Isc).....	9.12 A
Nominal maximum power voltage (Vpm)	18.29 V
Nominal maximum power current (Ipm)	8.75 A
PV module type reference.....	ISEN155
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	155.5 W
Nominal open circuit voltage at (Voc).....	22.37 V
Nominal short circuit current at (Isc).....	8.95 A
Nominal maximum power voltage (Vpm)	18.21 V
Nominal maximum power current (Ipm)	8.54 A
PV module type reference.....	ISEN150
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	150.5 W
Nominal open circuit voltage at (Voc).....	22.23 V
Nominal short circuit current at (Isc).....	8.74 A
Nominal maximum power voltage (Vpm)	18.11 V
Nominal maximum power current (Ipm)	8.31 A
PV module type reference.....	ISEN135
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	135.1 W
Nominal open circuit voltage at (Voc).....	22.58 V
Nominal short circuit current at (Isc).....	7.67 A
Nominal maximum power voltage (Vpm)	18.33 V
Nominal maximum power current (Ipm)	7.37 A
PV module type reference.....	ISEN130
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	130.4 W
Nominal open circuit voltage at (Voc).....	22.2 V
Nominal short circuit current at (Isc).....	7.59 A
Nominal maximum power voltage (Vpm)	18.09 V
Nominal maximum power current (Ipm)	7.21 A



PV module type reference..... :	ISEN125
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	125.5 W
Nominal open circuit voltage at (Voc)..... :	22.2 V
Nominal short circuit current at (Isc)..... :	7.31 A
Nominal maximum power voltage (Vpm)..... :	18.09 V
Nominal maximum power current (Ipm)..... :	6.94 A
PV module type reference..... :	ISEN110
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	110.3 W
Nominal open circuit voltage at (Voc)..... :	22.42 V
Nominal short circuit current at (Isc)..... :	6.33 A
Nominal maximum power voltage (Vpm)..... :	18.23 V
Nominal maximum power current (Ipm)..... :	6.05 A
PV module type reference..... :	ISEN100
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	100.6 W
Nominal open circuit voltage at (Voc)..... :	22.2 V
Nominal short circuit current at (Isc)..... :	5.86 A
Nominal maximum power voltage (Vpm)..... :	18.09 V
Nominal maximum power current (Ipm)..... :	5.56 A
PV module type reference..... :	ISEN80
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	80.5 W
Nominal open circuit voltage at (Voc)..... :	22.1 V
Nominal short circuit current at (Isc)..... :	4.73 A
Nominal maximum power voltage (Vpm)..... :	18.02 V
Nominal maximum power current (Ipm)..... :	4.47 A
PV module type reference..... :	ISEN75
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)..... :	75.2 W
Nominal open circuit voltage at (Voc)..... :	22.18 V
Nominal short circuit current at (Isc)..... :	4.34 A
Nominal maximum power voltage (Vpm)..... :	18.07 V
Nominal maximum power current (Ipm)..... :	4.16 A



PV module type reference.....	ISEN60
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	60.3 W
Nominal open circuit voltage at (Voc).....	22.13 V
Nominal short circuit current at (Isc).....	3.53 A
Nominal maximum power voltage (Vpm).....	18.04 V
Nominal maximum power current (Ipm).....	3.34 A
PV module type reference.....	ISEN50
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	50.1 W
Nominal open circuit voltage at (Voc).....	22.2 V
Nominal short circuit current at (Isc).....	2.9 A
Nominal maximum power voltage (Vpm).....	18.09 V
Nominal maximum power current (Ipm).....	2.77 A
PV module type reference.....	ISEN40
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	40.4 W
Nominal open circuit voltage at (Voc).....	22.18 V
Nominal short circuit current at (Isc).....	2.36 A
Nominal maximum power voltage (Vpm).....	18.02 V
Nominal maximum power current (Ipm).....	2.24 A
PV module type reference.....	ISEN20
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	20.5 W
Nominal open circuit voltage at (Voc).....	22.08 V
Nominal short circuit current at (Isc).....	1.2 A
Nominal maximum power voltage (Vpm).....	18 V
Nominal maximum power current (Ipm).....	1.14 A
PV module type reference.....	ISEN10
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	10.6 W
Nominal open circuit voltage at (Voc).....	22 V
Nominal short circuit current at (Isc).....	0.64 A
Nominal maximum power voltage (Vpm).....	18 V
Nominal maximum power current (Ipm).....	0.59 A



PV module type reference.....	ISEN5
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	5.5 W
Nominal open circuit voltage at (Voc).....	11.06 V
Nominal short circuit current at (Isc).....	0.64 A
Nominal maximum power voltage (Vpm)	9.02 V
Nominal maximum power current (Ipm)	0.61 A
PV module type reference.....	ISEN3
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax).....	3.3 W
Nominal open circuit voltage at (Voc).....	11.06 V
Nominal short circuit current at (Isc).....	0.39 A
Nominal maximum power voltage (Vpm)	9.02 V
Nominal maximum power current (Ipm)	0.37 A
<u>Product Safety Ratings</u>	For 72, 144 , 66, 60,120, 54, 48, 44 cell modules
Maximum systems operating voltage	1500 V
Maximum over-current protection rating	15 A
Safety application class	Class A
Safety class in accordance with IEC 61140.....	Class II
Fire safety class	Class C
Recommended maximum series/parallel module configurations	26 modules in series for 72 cell modules 27 modules in series for 144 cell modules 30 modules in series for 66 cell modules 32 modules in series for 60 cell modules 16 modules in series for 120 cell modules 35 modules in series for 54 cell modules 40 modules in series for 48 cell modules 47 modules I in series for 44 cell modules
<u>Product Safety Ratings</u>	For 40,36 cell modules
Maximum systems operating voltage	1000 V
Maximum over-current protection rating	15 A
Safety application class	Class A
Safety class in accordance with IEC 61140.....	Class II
Fire safety class	Class C
Recommended maximum series/parallel module configurations	32 modules in series for 40 cell modules 36 modules in series for 36 cell modules



Product Safety Ratings	For 36, 18 cell modules
Maximum systems operating voltage	600 V
Maximum over-current protection rating	10/5 A
Safety application class	Class A
Safety class in accordance with IEC 61140	Class II
Fire safety class	Class C
Recommended maximum series/parallel module configurations	22 modules in series for 36 cell modules 3 modules in series for 18 cell modules



Scope of Module Safety Qualification Testing:	
<input checked="" type="checkbox"/> Initial module safety qualification	
<input type="checkbox"/> Extension of module safety qualification	
Original test report ref. no.:	
Model differences and modification:	
<input type="checkbox"/> Change in cell technology	<input type="checkbox"/> Change in cell interconnect materials/technique
<input type="checkbox"/> Modification to encapsulation system	<input checked="" type="checkbox"/> Modification to junction box/el. termination
<input type="checkbox"/> Modification to superstrate	<input type="checkbox"/> Change in el. circuit of an identical package
<input type="checkbox"/> Modification to backsheet/substrate	<input type="checkbox"/> Higher or lower output by 10 %
<input checked="" type="checkbox"/> Modification to frame/mounting structure	<input type="checkbox"/> Increase in module size
<input type="checkbox"/> Removal of frame	

- Note (1)** Use the "General product information" field to give any information on model differences within a product type family covered by the test report.
- Note (2)** Use the "General product information" field to describe the range of electrical and safety ratings, if the TRF covers a type family of modules.
- Note (3)** Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference)



IS/IEC 61730-1: 2004			
Clause	Requirement + Test	Result - Remark	Verdict
3	Application Classes		---
	The module has been evaluated for the following Application Class (Class A, B, C)	Class A	P
4	Construction Requirements		---
4.1	General requirements		---
4.1.1	It is stated that the module is able to operate under environmental condition type AB8 according to IEC 60364-5-51.	Air temperature: -50°C to 40°C Rel. Humidity: 15 to 100%	P
4.1.2	The module/s is/are completely assembled when shipped from the factory.		P
	The module is provided in subassemblies.		N/A
4.1.3	Incorporation of a module into the final assembly does not require any alteration of the module from its originally evaluated form. If YES, specific details describing necessary modification(s) are provided in the installation instructions.	No modification required	P
4.1.4	If the module must bear a definite relationship to another module, it is constructed to permit incorporation into the final assembly without the need for alteration.		N/A
4.1.5	The construction of the module is such that ground continuity is not interrupted by installation.		N/A
4.1.6	Parts of the module are prevented from loosening or turning, if such loosening or turning may result in a risk of fire, electric shock, or injury to persons.	JB is secured by adhesive material to back skin	P
4.1.7	Friction between surfaces is not used as the sole means to inhibit the turning or loosening of a part.		P
4.1.8	Any adjustable or movable structural part is provided with a locking device to reduce the likelihood of unintentional movement.		N/A
4.2	Metal parts		---
4.2.1	Metals used in locations that are exposed to moisture shall not be employed alone or in combinations that could result in deterioration, such that the product would not comply with the requirements in this standard.	Only Aluminium and stainless steel used	P
4.2.2	Iron or mild steel serving as a necessary part of the module but not exposed to the weather are plated, painted, or enamelled for protection against corrosion.		N/A
4.2.3	Simple sheared or cut edges and punched holes are not required to be additionally protected.		N/A



IS/IEC 61730-1: 2004			
Clause	Requirement + Test	Result - Remark	Verdict
5	Polymeric Materials		—
5.1	General		—
	Polymeric materials serving as an enclosure for live metal parts	See Subclause 5.2	—
	Polymeric materials serving as support for live metal parts	See Subclause 5.3	—
	Polymeric materials serving as the outer surface for the module	See Subclause 5.4	—
	Polymeric materials serving as superstrate or a substrate which provide rigid reinforcement or serve as the carrier for the active cells		—
	a) If the superstrate or substrate polymers are intended for contact with active cells	See Subclause 5.3	—
	b) If the superstrate or substrate polymers are intended for use as an outer surface	See Subclause 5.4	—
	c) If superstrate or substrate polymers are intended for both contact with active cells or other circuit elements and for use as the outer surface	See Subclause 5.3 and 5.4	—
	Polymeric materials serving as barriers	See Subclause 5.5	—
	All polymeric materials have a minimum relative thermal endurance index (electrical and mechanical, as defined by IEC 60216-5) of 20 °C above the maximum measured operating temperature of said material in application, as measured during the Temperature Test MST 21 given in IS/IEC 61730-2.	All materials are at least 20°C above maximum measured temperature.	P
5.2	Polymers serving as an enclosure for live parts		---
	Information is provided that polymers serving as an enclosure for live parts comply with:		—
	a) 5-V flammability rating (IEC 60695-11-20)	Junction Box base and cover 5VA rated	P
	b) 5-V flammability rating, after water immersion and exposure of the end-product (IEC 60695-11-20)	Suitable for outdoor use with respect to exposure to UV and Water Exposure based on UL 746C. Still maintains 5-VA rating.	P
	c) Ultraviolet radiation resistance (ANSI/UL 746C or ISO 4892-2)	Junction Box base and cover material f1 rated in accordance with UL 746C	P
	d) Minimum hot wire ignition rating of 30 (IEC 60695-2-20)	Hot wire ignition rating of Junction Box base and cover material is ≥ 120 (In accordance with UL 746C)	P

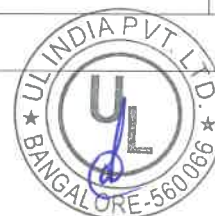


IS/IEC 61730-1: 2004			
Clause	Requirement + Test	Result - Remark	Verdict
5.3	Polymers serving to support live parts		—
	Information is provided that polymers serving to support live parts comply with:		—
	a) Flammability classification and high-current arc ignition rating (IEC 60695-11-10) as given in Table 1 of IS/IEC 61730-1	Junction Box base and cover flammability rating is 5VA, HAI ≥ 120	P
	b) Comparative Tracking Index (CTI) ≥ 250	System Voltage is above 600 V	N/A
	Comparative Tracking Index (IEC 60112)	N/A	—
	c) Inclined plane tracking rating of 1 h, using the time to track method at 2.5 kV (IEC 60587), if the maximum system operating voltage rating is in the range 600 V – 1500 V.		P
	Maximum system operating voltage rating (V):	1500V/1000V/600V	—
	d) Ultraviolet radiation resistance (ANSI/UL 746C or ISO 4892-2)	Junction Box base and cover material f1 rated in accordance with UL 746C.	P
5.4	Polymers serving as an outer surface		---
	Information is provided that polymeric substrates or superstrates used in the module have:		—
5.4.1	A relative thermal endurance index, both electrical and mechanical, as determined in accordance with IEC 60216 of at least 90 °C.....	Manufactured by Renewsys India Pvt. Ltd Division of positive Packaging Industries Ltd Model: "Preserv A 275WN Rated RTI= 120°C, overall thickness is 0.30mm.	P
	A relative thermal endurance index of at least 20 °C above the maximum measured operating temperature of the material as measured during the Temperature Test MST21 of IS/IEC 61730-2.		P
5.4.2	Polymeric materials that serve as the outer enclosure for a module that (1) is intended to be installed in a multi-module or -panel system or (2) have an exposed surface area greater than 1 m ² or a single dimension larger than 2 m, has a maximum flame spread index of 100 as determined under ASTM E162-1990.....	Manufactured by Renewsys India Pvt. Ltd Division of positive Packaging Industries Ltd Model: "Preserv A 275WN Rated RTI= 120°C, overall thickness is 0.30mm.	---
5.4.3	If exposed to direct sunlight in the application, the polymeric material has been evaluated for ultraviolet (UV) radiation resistance as determined in accordance with ANSI/UL 746C or ISO 4892-2.	Not exposed to direct sunlight.	N/A
5.4.4	Polymeric materials intended for use as a superstrate or substrate, without appropriate IEC insulation pre-qualification, comply with the requirements of the Partial Discharge Test MST 15 of IS/IEC 61730-2.		P



IS/IEC 61730-1: 2004			
Clause	Requirement + Test	Result - Remark	Verdict
5.5	Polymers serving as barriers		---
	Insulation barriers are of adequate thickness and of a material appropriate for the application, as defined by IEC 61140	See Annex 1 for constructional details	N/A
	Barriers or liners are held in place and are not adversely affected	No Barriers/ Liners	N/A
5.6	Polymers serving as structural glazing materials		N/A
	Polymers serving as structural glazing materials comply with the requirements for safety glazing by material certification (ANSI Z97.1-93) or by testing in accordance with Module Breakage Test MST 32 of IS/IEC 61730-2.		N/A
Supplementary information: N/A			

6	Internal Wiring And Current-Carrying Parts		---
	Any current-carrying part and wiring has the mechanical strength and current-carrying capacity necessary for its application.	Make Make: Xi'an Telison Electronic New Materials Co. Ltd, Solder tin plated copper ribbons, Sn/Pb of 60%/40% composition	P
6.1	Internal wiring		---
6.1.1	Wiring used within a module has an insulation rating for a minimum of 90 °C, with a gauge and voltage rating acceptable for the application as defined by the requirements of IEC 60189-2.	See Annex 1 for constructional details	P
6.1.2	The wiring of a module is located so that after installation of the module in the intended manner the insulation is not exposed to degrading effects of direct sunlight.	Wire is sunlight resistant	P
6.2	Splices		---
	Splices are insulated equivalent to that required for the wiring involved.	No Splices	N/A
6.3	Mechanical securement		
6.3.1	Joints or connections are mechanically secure and provide electrical contact without strain on connections and terminals.	Tabbing are connected to terminals without any strain.	P
6.3.2	Uninsulated live parts are secured to its supporting surface so that they are prevented from turning or shifting in position.		N/A
Supplementary information: N/A			



IS/IEC 61730-1: 2004			
Clause	Requirement + Test	Result - Remark	Verdict
7	Connections		---
7.1	Field connections - general requirements		---
7.1.1	The module is provided with wiring terminals, connectors, or leads to accommodate current-carrying conductors of the load circuit.	Leads are provided	P
7.1.2	Field connections are rated for exposure to direct sunlight as defined in Clause 5 of IS/IEC 61730-1.	Connectors are sunlight resistant.	P
	Field connections are exposed to the degrading effects of direct sunlight.		N/A
7.2	Field wiring terminals		---
7.2.1	Field wiring terminal blocks are rated for the appropriate voltage and current for the application and constructed in compliance with IEC 60947-1.	See Annex 1 for constructional details	N/A
7.2.2	Wiring terminals integral to the construction of the terminal enclosure comply with the following requirements:		N/A
7.2.2.1	Screws and nuts which clamp external conductors have a thread conforming with ISO 261 or ISO 262 (or comparable standards)	See Annex 1 for constructional details for Grounding Connection	P
	The screws and nuts used for field wiring do not serve to fix any other component.		P
7.2.2.2	Terminal screws have a minimum nominal thread diameter as shown in Table 2 of IS/IEC 61730-1.	See Annex 1 for constructional details	N/A
	Stud terminals are provided with nuts and washers.		N/A
7.2.2.3	Terminals are designed that they clamp the conductor between metal surfaces with sufficient contact pressure and without damage to the conductor.		N/A
	Terminals are designed or located that the conductor cannot slip out when the clamping screws or nuts are tightened.		N/A
	Terminals are fixed suitably when the means of clamping the conductor is tightened or loosened:		N/A
	a) the terminal itself does not work loose,		N/A
	b) internal wiring is not subjected to stress,		N/A
	c) creepage distances and clearances are not reduced below the values specified in clause 9 of IS/IEC 61730-1.		N/A



IS/IEC 61730-1: 2004			
Clause	Requirement + Test	Result - Remark	Verdict
7.3	Connectors		---
7.3.1	The connector intended for use in the output circuit of the module is rated for the appropriate voltage and current, as per the requirements of the IEC 61984 series.	See Annex 1 for constructional details	P
	Connectors comply with the requirements of Clause 5 of IS/IEC 61730-1, with respect to flammability, comparative tracking index and relative thermal endurance index for the support of live parts.		P
7.3.2	The connector has been appropriately evaluated for disconnect overload performance.	Connector is suitable for assembly only. Marking according to clause 11.3 "Do not disconnect under load" has been provided.	P
7.3.3	Connectors intended for exposure to the outdoor environment are enclosed by material which complies with the following:		---
	a) UV resistance in accordance with the requirements of Clause 5.		P
	b) Resistance to inclusion of water acc. to IEC 60529 (equivalent to IP55)	IP68	P
	c) Steel ball impact test acc. to IEC 60065, subclause 12.1.3 and Figure 8 with a vertical drop distance of 1 m.		P
	d) Accessibility Test MST 11 of IS/IEC 61730-2		P
7.3.4	Separable multi-pole connectors are polarised.		N/A
	If two or more separable connectors are provided, they are configured or arranged so that the other will not accept the mating connector for one.		N/A
7.3.5	For a connector incorporating a grounding member, the grounding member is the first to make and the last to break contact with the mating connector.		N/A
7.3.6	Connectors that can be separated without the use of a tool do not have accessible conductive parts, as determined under the Accessibility Test MST 11 of IS/IEC 61730-2.		P
7.4	Output lead or cables		---
	Leads extending from the module are rated for the appropriate system voltage, ampacity, wet locations, temperature and sunlight resistance.	The output cables are 1500V rated, H1Z2Z2-K, 1 x 4.0mm ² sizes. 120°C wet or dry sunlight resistant.	P
Supplementary information: N/A			



IS/IEC 61730-1: 2004			
Clause	Requirement + Test	Result - Remark	Verdict
8	Bonding And Grounding		---
8.1	If accessible conductive parts of the module form a perimeter framing or mounting system, or if the module has a conductive surface area of greater than 10 cm ² accessible after installation, then the module has provisions for grounding.	2 grounding holes provided, with grounding symbol	P
8.2	If the module is rated as safety class II and provided with provisions for functional grounding, the functional grounding is isolated from live parts by reinforced insulation (Subclause 7.3.2.2 of IEC 61140).	Application Class A, provides safety class II acc. to sec. 3.2.	P
8.3	Each exposed conductive part of the module, that is assessable during normal operation, is bonded together, as verified by Ground Continuity Test MST 13 of IS/IEC 61730-2. <i>Note: If conductive materials are used only as fasteners for installation and separated from the conductive components of the module by both appropriate insulation and spacings, they are not required to be bonded.</i>	Complete Aluminium frame	P
8.4	Routine maintenance of the module does not involve breaking or disturbing the bonding path.		P
	A bolt, screw, or other part used for bonding purposes is not intended for securing the complete device.	Separate holes for grounding and mounting provided	P
8.5	Bonding is by a positive means, such as clamping, riveting, bolted or screwed connections, or welding, soldering or brazing.		P
	The bonding connection penetrates all nonconductive coatings, such as paint, anodised coatings or vitreous enamel.		P
8.6	All joints in the bonding path are mechanically secure.	Frame and corner pieces are crimped together.	P
8.7	If the bonding connection depends upon screw threads, two or more screws or two full threads of a single screw engage the metal.	Bolt and nut M4 used	P
8.8	The diameter of the grounding screw or bolt is sized appropriately to the gauge of the bonding conductor, as per Table 2 of IS/IEC 61730-1.	See Annex 1 for construction details	P
8.9	Ferrous metal parts in the grounding path are protected against corrosion by metallic or non-metallic coatings.	No ferrous material used	N/A
8.10	The module has metal-to-metal multiple-bearing pin-type hinges. These are considered to be an acceptable means for bonding.		N/A



IS/IEC 61730-1: 2004			
Clause	Requirement + Test	Result - Remark	Verdict
8.11	A wiring terminal or bonding location is identified with the appropriate symbol (IEC 60417-5019) or has a green-coloured part.	Provided adjacent to grounding holes	P
	No other terminal or location is identified in this manner.		P
8.12	If a marking is used to identify an equipment grounding terminal, it is located on or adjacent to the terminal, or on a wiring diagram affixed to the module or panel near the terminal.		P
Supplementary information: N/A			

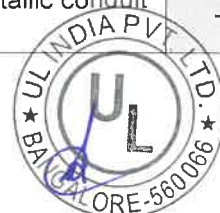
9 Creepage and clearance distances			
9.1	Creepage and clearance distances between uninsulated live parts not of the same potential and between a live part and an accessible metal part, are not less than the values specified in Tables 3 and 4 of IS/IEC 61730-1.	Application class A, Clearance of min.11 mm is required for a system voltage of 1500 Vdc	P
	Minimum measured creepage and clearance distances between field wiring terminals (mm).....:	N/A	—
	Minimum measured clearance distances between internal current carrying parts and accessible points (mm).....:	Minimum measured clearance: 13.56 mm	—
9.2	Creepage and clearance distances at field wiring terminals have been judged on module open-circuit voltage (Voc).::		N/A
	If additional unmarked terminals exist in the terminal block, or if wiring terminals are marked specifically for grounding, the creepage and clearance distances have been judged on the basis of the maximum system operating voltage.		N/A
9.3	The spacings at a field-wiring terminal have been measured with and without wire connected to the terminal.		N/A
	If the terminal will properly accommodate it, and if the product was not marked to restrict its use, the wire is one size larger than that required, otherwise, the wire is of the required size.		N/A
9.4	Surfaces separated by a gap of 0.4 mm or less have been considered to be in contact with each other.		N/A
Supplementary information: N/A			



IS/IEC 61730-1: 2004			
Clause	Requirement + Test	Result - Remark	Verdict
10	Field Wiring Compartments With Covers		---
10.1	General		---
	If the module is designed for the application of a permanently attached wiring system by an installer in the field, it is to be provided with an enclosed wiring compartment.		N/A
10.2	Wall thickness		---
	If the wiring compartment is intended for the attachment of a field-applied permanent wiring system, the minimum wall thickness for the material complies with Table 5 of IS/IEC 61730-1.	See Annex 1 for constructional details	N/A
10.3	Internal volume		---
	The internal volume for each intended conductor complies with the requirements of Table 6 of IS/IEC 61730-1.	See Annex 1 for constructional details	N/A
	In the space comprising the minimum required volume, no enclosure dimension is less than 20 mm.		N/A
10.4	Openings		---
	All openings are provided with appropriate coverings, whose functions comply with the requirements of:		---
	Subclause 5.2.1 of IS/IEC 61730-1		N/A
	Wet leakage Current test of Subclause 10.20 of IS 16077:2013/IEC 61646:2008 or 10.17 of IS 14286 (2010).		N/A
	Accessibility test MST 11 of IS/IEC 61730-2		N/A
	Coverings can only be removed by the use of a tool		N/A
10.5	Gaskets and seals		---
	Gaskets and seals do not deteriorate beyond limits during accelerated ageing, and are not used where they may be subject to flexing during normal operation.		N/A
10.6	Strain relief		---
	Any strain relief is provided so that stress on a lead intended for field connection, or otherwise likely to be handled in the field, including a flexible cord, is not transmitted to the electrical connection inside the module. <i>Note: Mechanical securement means which comply with Subclause 10.14 (Robustness of Terminations Test) of IS 14286 (2010) meet this requirement.</i>	MST 42	P




IS/IEC 61730-1: 2004			
Clause	Requirement + Test	Result - Remark	Verdict
10.7	Sharp edges		---
10.7.1	The enclosure is smooth and free from sharp edges, burrs, or the like that may damage insulation or conductors.		P
10.7.2	The inner edges of conduit openings and knockouts are smooth and free from sharp edges, burrs, or the like that may damage insulation or conductors.		N/A
10.8	Conduit applications - Metallic		---
10.8.1	Any threaded hole in a metal wiring compartment intended for the connection of rigid metal conduit is reinforced to provide metal not less than 6,4 mm thick.		N/A
	Any threaded hole is tapered unless a conduit end stop is provided.		N/A
10.8.2	If threads for the connection of conduit are tapped all the way through a hole in a compartment wall, there are not less than 3.5 nor more than 5 threads in the metal and the construction. was such that a conduit bushing can be attached as intended.		N/A
	The construction is such that a conduit bushing can be attached as intended.		N/A
10.8.3	If threads for the connection of conduit are not tapped all the way through a hole in a compartment wall, there are not less than 5 full threads in the metal. and there was a smooth, rounded inlet hole for the conductors.		N/A
	There are smooth, rounded inlet holes for the conductors.		N/A
10.8.4	For a non-threaded opening in a metal wiring compartment intended to accommodate rigid metallic conduit, a flat surface of sufficient area is provided around the opening to accept the bearing surfaces of the bushing and lock washer.		N/A
10.8.5	Conduit complies with the Conduit bending test MST 33 of IS/IEC 61730-2.		N/A
10.9	Conduit applications - Non-metallic		---
10.9.1	The thickness of sides, end walls, and bottom of a non-metallic wiring enclosure specified for conduit applications is not less than the values specified in Table 7 of IS/IEC 61730-1.		N/A
10.9.2	A non-metallic wiring compartment intended to accommodate non-metallic conduit fulfils the following requirements:		—



IS/IEC 61730-1: 2004			
Clause	Requirement + Test	Result - Remark	Verdict
	a) It has one or more unthreaded conduit-connection sockets;		N/A
	b) It has one or more threaded or unthreaded openings for a conduit-connection socket, or one or more knockouts that comply with the requirements of Knockout Test MST 44 of IS/IEC 61730-2;		N/A
	c) It complies with the Conduit Bending Test MST 33 of IS/IEC 61730-2, if intended for rigid non-metallic conduit.		N/A
10.9.3	Sockets for the connection of non-metallic conduit provide a positive end stop for the conduit.		N/A
	The socket diameters, the throat diameter at the entrance to the box, the socket depths, and the wall thickness of the socket are within the limits specified in the applicable conduit system.		N/A
10.9.4	A knockout or opening in a non-metallic wiring compartment intended to accommodate rigid non-metallic conduit complies with the dimensional requirements of the applicable conduit system.		N/A
Supplementary information: N/A			



IS/IEC 61730-1: 2004			
Clause	Requirement + Test	Result - Remark	Verdict
11	Marking		---
11.1	The module includes the following clear and indelible markings:		---
	Name, monogram or symbol of manufacturer		P
	Type or model number	Provided	P
	Serial number	Provided	P
	Polarity of terminals or leads	"+" and "-" provided on connector & Junction Box	P
	Maximum system voltage	1500Vdc	P
	Safety class (IEC 61140)	Provided	P
	The date and place of manufacture are marked on the module or are traceable from the serial number.	Provided	P
11.2	The following additional markings are applied to either the module or placed into the instruction and installation data (required documents).		---
	Voltage at open-circuit	provided	P
	Current at short-circuit	provided	P
	Maximum over-current protection rating, as verified by the Reverse Current Overload Test MST 26 of IS/IEC 61730-2	provided	P
	Recommended maximum series/parallel module configurations	see installation manual	P
	Application class	"A" provided	P
	All electrical data are given relative to Standard Test Conditions (1000 W/m ² @ 25 °C)	provided	P
11.3	Connectors suitable only for field assembly of modules are marked "Do not disconnect under load".	provided	P
11.4	For modules with open-circuit voltage in excess of 50 V, and/or modules rated for maximum system voltage in excess of 50 V, a highly visible warning label regarding the shock hazard is applied near the means of connection to the module.	Max. open circuit voltage 45.78V @ STC	N/A
Supplementary information: N/A			



IS/IEC 61730-1: 2004			
Clause	Requirement + Test	Result - Remark	Verdict
12	Requirements for supplied documents		---
12.1	The module or panel is supplied with installation instructions describing the methods of electrical and mechanical installation and the electrical ratings of the module.	provided	P
	The instructions state the application class under which the module was qualified and any specific limitations required for that application class.	provided	P
12.2	When the fire rating is dependent on a specific mounting structure, specific spacing, or specific means of attachment to the roof or structure, details of the specific parameter or parameters are included in the instructions.	provided	P
12.3	The electrical installation instructions include a detailed description of the wiring method.	provided	P
	The description of the wiring method includes the following information:		—
	Grounding method	provided	P
	Size, type, and temperature rating of the conductors	provided	P
	Recommended maximum series/parallel module configurations	provided	P
	Type of over-current protection and diode bypassing to be used	fuse rating 15 A provided, Diode provided with the module	P
	Minimum cable diameters when the wiring method is cable	4 mm ² cable provided with the module	N/A
	Any limitations on wiring methods that apply to the wiring compartment or box	Cables are not interchangeable	N/A
12.4	The mechanical installation instructions for roof mounting include:		—
	A statement indicating the minimum mechanical means for securing the module or panel to the roof	Provided	—
	A statement that the assembly is to be mounted over a fire resistant roof covering rated for the application (only for non-integral modules or panels)	provided	P
	Indication of any slope required for maintaining a fire class rating	No Slope required	P
12.5	The installation instructions include a statement advising that artificially concentrated sunlight shall not be directed on the module or panel.	Provided	P



IS/IEC 61730-1: 2004			
Clause	Requirement + Test	Result - Remark	Verdict
12.6	Assembly instructions are provided with a product shipped in subassemblies, and are detailed and adequate to the degree required to facilitate total assembly of the product.	No subassemblies	N/A
12.7	The installation instructions include the proposed statement given in this Subclause (or equivalent) to allow for increased output of the module resulting from certain conditions of use.	provided	P
Supplementary information: N/A			



ANNEX 1: CONSTRUCTIONAL DETAILS

A1.1	MODULE TYPE/S
	ISEN350, ISEN345, ISEN340, ISEN335, ISEN330, ISEN325, ISEN320, ISEN315, ISEN310, ISEN305, ISEN300, ISEN250, ISEN250X, ISEN200, ISEN150 ISEN335X, ISEN330X, ISEN325X, ISEN320X, ISEN300X ISEN250X, ISEN225X, ISEN220X, ISEN200X ISEN300N, ISEN295, ISEN290, ISEN285, ISEN280 ISEN275, ISEN270, ISEN265, ISEN260, ISEN255, ISEN250 ISEN250Y ISEN250N, ISEN245, ISEN240, ISEN235, ISEN230, ISEN225 ISEN220, ISEN215, ISEN210, ISEN205, ISEN200 ISEN200N, ISEN195, ISEN190 ISEN185, ISEN180, ISEN175, ISEN170 ISEN165, ISEN160, ISEN155, ISEN150, ISEN135, ISEN130, ISEN125, ISEN110, ISEN100, ISEN80, ISEN75, ISEN60, ISEN50, ISEN40, ISEN20, ISEN10 ISEN5, ISEN3

A1.2	MODULE DESIGN –DIMENSIONS	
	Module dimensions (L x W x H) [mm] :	ISEN350 to ISEN300: 1964 x 986 x 35 ISEN250: 1524 x 986 x 35 ISEN250X: 1650 x 986 x 35 ISEN200: 1336 x 986 x 35 ISEN150: 1486 x 666 x 35 ISEN335X to ISEN300X: 1964 x 986 x 35 ISEN225X to ISEN200X: 1336 x 986 x 35 ISEN300N to ISEN280: 1806 x 986 x 35 ISEN275 to ISEN250: 1650 x 986 x 35 ISEN250Y: 1650 x 986 x 35 ISEN250N to ISEN225: 1486 x 986 x 35 ISEN220 to ISEN200: 1336 x 986 x 35 ISEN200N to ISEN190: 1806 x 666 x 35 ISEN185 to ISEN170: 1650 x 666 x 35 ISEN 165 to ISEN150: 1486 x 666 x 35 ISEN135 to ISEN125 : 1250 x 666 x 35 ISEN110: 1036 x 666 x 35 ISEN100: 980 x 666 x 35 ISEN80 to ISEN75: 800 x 666 x 35 ISEN60: 610 x 666 x 22 ISEN50: 548 x 666 x 22 ISEN40: 428 x 666 x 22 ISEN20: 432 x 356 x 22 ISEN10: 450 x 196 x 22 ISEN5: 256 x 196 x 22 ISEN3: 242 x 142 x 22



A1.3	SOLAR CELL	
	Cell type reference	Polycrystalline solar cell, type 5BB manufactured by Sichuan Yingfa Solar Energy Technology Co., Ltd
	Cell dimensions L x W x T (\pm %) [mm]	156.75 X 156.75 \pm 0.25mm
	Cell thickness [μ m]	200 μ m \pm 20 μ m
	Cell area [cm ²]	245.70

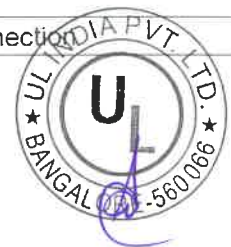
A1.4	IDENTIFICATION OF MATERIALS	
	Front cover	Manufactured by Gujarat Borosil LTD , Toughened glass, 3.2 mm \pm 0.2mm thick.
	Rear cover	Manufactured by Renewsys India Private LTD, Model: "Preserv A 275WN/ Preserv A 125 WN1 Rated RTI= 120°C, overall thickness is 0.30mm
	Encapsulation material	Ethyl-Vinyl-acetate (EVA), Manufactured by Renewsys India Private LTD, Type: Conserv P 360-14FC, thickness 0.45 \pm 5%.
	Frame parts	Extruded aluminum frame, Manufactured by Alom Extrusions Ltd Aluminium Technology Co., Ltd(Haida Group), Type: 6063-T6
	Mounting parts	4 pre-drilled mounting holes of Dia 10mm. M8 stainless steel hardware, spring washers, flat washer with torque 10Nm.
	Adhesive for frame	Type " HT906Z", manufactured by Shanghai Huitian New Material Co. Ltd. rated RTI=105°C, HAI=0, HWI=1, White color, minimum 3mm thickness, flame class is V-0.
	Cell connector	Make: Xi'an Telison Electronic New Materials Co. Ltd Solder tin plated copper ribbons, Sn/Pb of 60%/40% composition
	String connector	Make: Xi'an Telison Electronic New Materials Co. Ltd Solder tin plated copper ribbons, Sn/Pb of 60%/40% composition
	Soldering material	Manufactured by Kester, Type: 952-S
	Fluxing agent	Manufactured by Kester, Type: 952-S
	Junction box	Manufactured by Zhejiang Chuangyuan Photovoltaic Technology Co., Ltd. Type PV-CY802-D, Rated 1500 Vdc, 13.5A max, IP68 Manufactured by QC Solar(Suzhou) Corporation. Type QC102032, Rated 1000 Vdc, 14A max, IP68



Cable	Make: Zhejiang Chuangyuan Photovoltaic Technology Co., Ltd Type PV wire, Rated Sunlight resistant, 120°C wet or dry, 1500 V, H1Z2Z2-K, 1 x 4.0mm ²
Connector	Make: Zhejiang Chuangyuan Photovoltaic Technology Co., Ltd Type PV-CY30L Connectors, rated for 1500Vdc and 30A max
Bypass diode	Diode, manufactured by Yangzhou Yangjie Electronic Technology Co., Ltd , Type 30SQ045, rated 30A, 45V and Type 20SQ045, rated 20A, 45V
Potting material	NA
Adhesive for junction box	Type " HT906Z", manufactured by Shanghai Huitian New Material Co. Ltd. rated RTI=105°C, HAI=0, HWI=1, White color, minimum 3mm thickness, flame class is V-0.
Additional material (e. g. fixing tape, insulation tape)	N/A

A1.5	MODULE DESIGN - MINIMUM DISTANCES	
	Between cells	2.67
	Between cell and edge of laminate	12.66
	Between any current carrying part and edge of laminate	13.56

A1.6	MODULE DESIGN - ELECTRICAL CONFIGURATION	
	Total number of cells	ISEN350 to ISEN150: 72 ISEN335X to ISEN200X: 144 ISEN300N to ISEN280: 66 ISEN275 to ISEN250: 60 ISEN250Y:120 ISEN250N to ISEN225: 54 ISEN220 to ISEN200: 48 ISEN200N to ISEN190: 44 ISEN185 to ISEN170: 40 ISEN 165 to ISEN10: 36 ISEN5 to ISEN 3: 18
	Serial-parallel connection of cells.....	Series/ parallel connection



	Cells per bypass diode..... :	ISEN350 to ISEN150: 24 ISEN335X to ISEN320X: 24 ISEN300X:48 ISEN300N to ISEN280: 22 ISEN275 to ISEN250: 20 ISEN250Y:40 ISEN250N to ISEN225: 18 ISEN220 to ISEN200: 16 ISEN200N to ISEN190: 22 ISEN185 to ISEN170: 20 ISEN 165 to ISEN10: 18 ISEN5 to ISEN 3: N/A
	No. of bypass diodes..... :	ISEN350 to ISEN150: 3 ISEN335X to ISEN320X: 3 ISEN300X: 3 ISEN300N to ISEN280: 3 ISEN275 to ISEN250: 3 ISEN250Y: 3 ISEN250N to ISEN225: 3 ISEN220 to ISEN200: 3 ISEN200N to ISEN190: 3 ISEN185 to ISEN170: 2 ISEN 165 to ISEN10: 2 ISEN5 to ISEN 3: 1

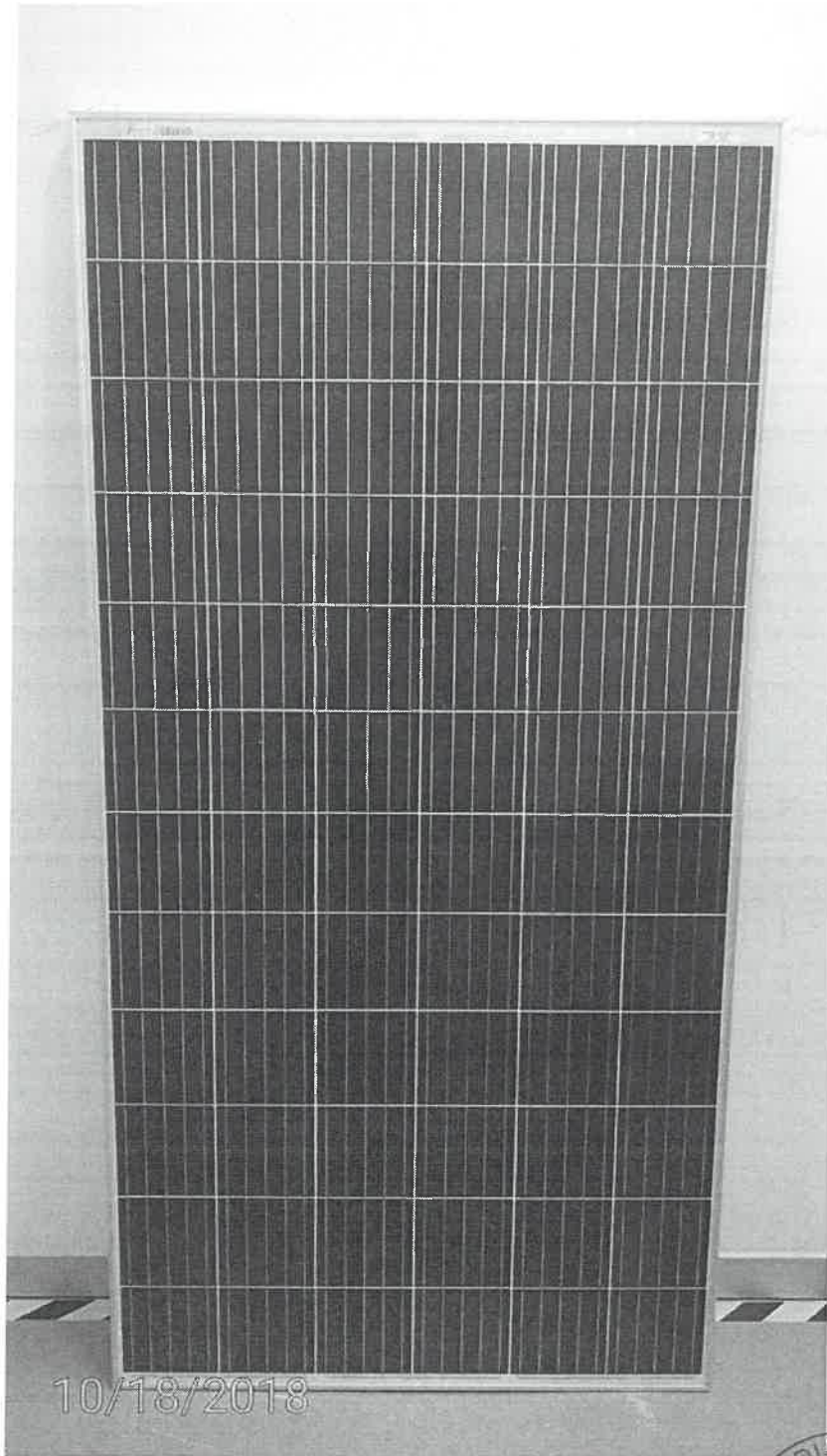


Annex 4: Enclosures

Type	Supplement ID	Description
Figure	1-01	Front view of model, 72 cells
Figure	1-02	Rear view of model, 72 cells
Figure	1-03	Complete view of Junction Box, Manufactured by Zhejiang Chuangyuan Photovoltaic Technology Co., Ltd. Type PV-CY802-D
Figure	1-04	Open View of Junction Box, Manufactured by Zhejiang Chuangyuan Photovoltaic Technology Co., Ltd. Type PV-CY802-D
Figure	1-05	Overall view of PV connector Make: Zhejiang Chuangyuan Photovoltaic Technology Co., Ltd Type PV-CY30L Connectors
Illustration	2-01	Module overall diagram for 72 cell family
Illustration	2-02	Frame cross sectional and Corner key diagram for 72 cell family
Illustration	2-03	Cell data sheet: Polycrystalline solar cell, manufactured by Sichuan Yingfa Solar Energy Technology Co., Ltd
Illustration	2-04	Diode, manufactured by Yangzhou Yangjie Electronic Technology Co., Ltd , Type 30SQ045
Certificate	3-01	Junction Box Test Reports/ Certificates
Certificate	3-02	Used Cables Test Reports/Certificates
Certificate	3-03	Used Connector Test Reports/Certificates
Certificate	3-04	Partial Discharge test and flame spread index certificate for backsheet
Certificate	3-05	Potting material test certificate, Type " HT906Z", manufactured by Shanghai Huitian New Material Co. Ltd
Manual	4-01	Installation Manual



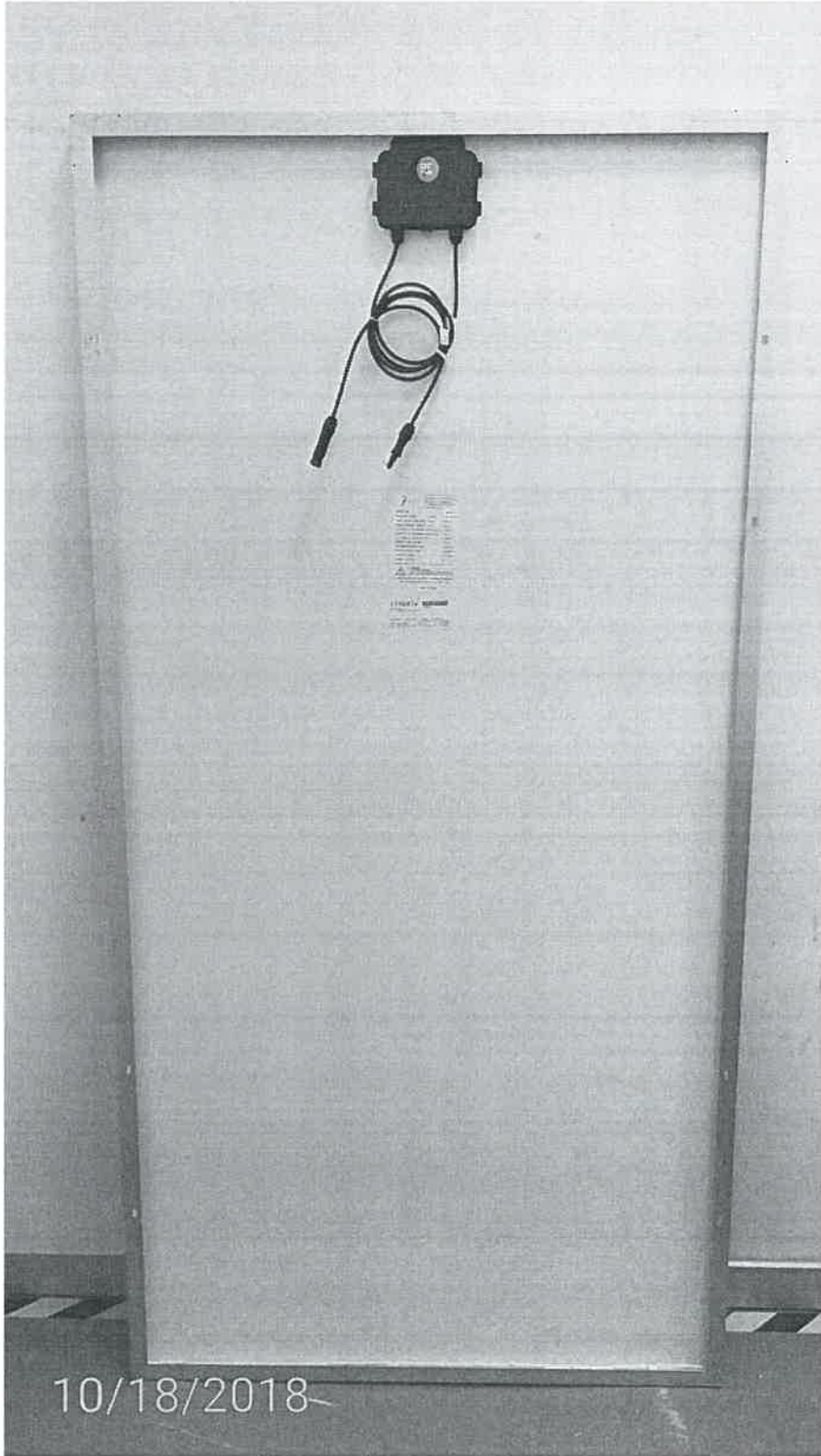
Figure ID 1-01



Note: All Figure Date format (mm/dd/yyyy)



Figure ID 1-02



10/18/2018

Note: All Figure Date format (mm/dd/yyyy)



Figure ID 1-03

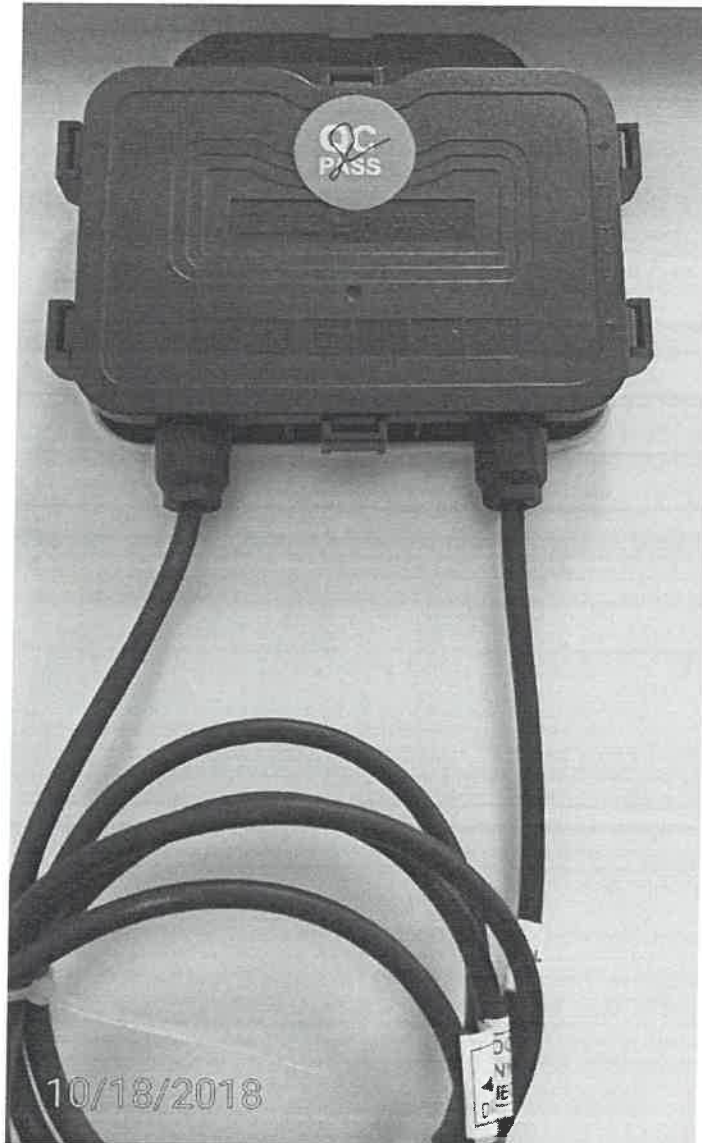


Figure ID 1-04

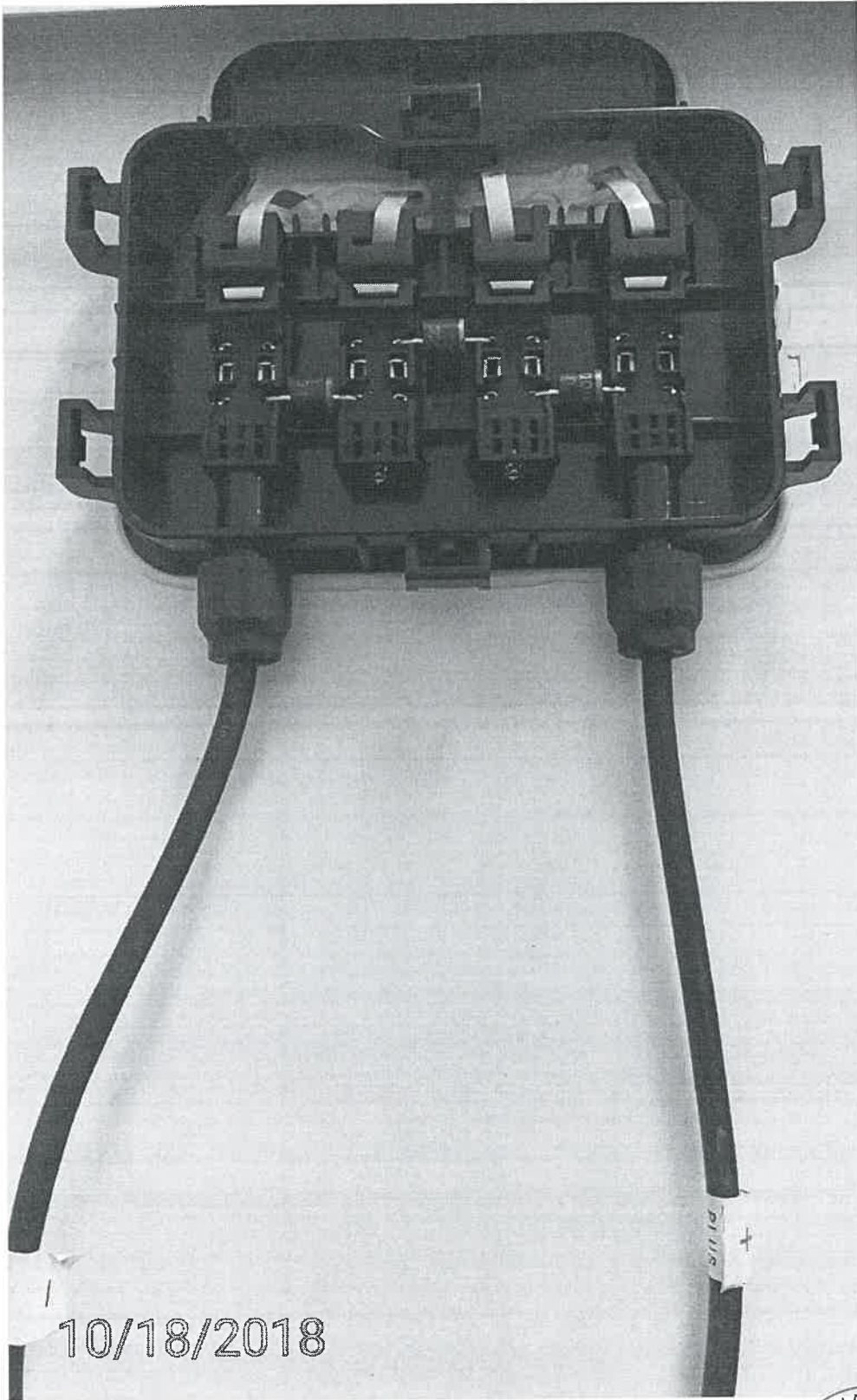


Figure 1-05



Illustration ID 2-01

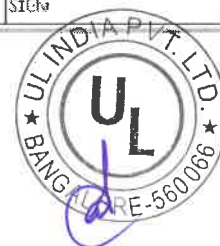
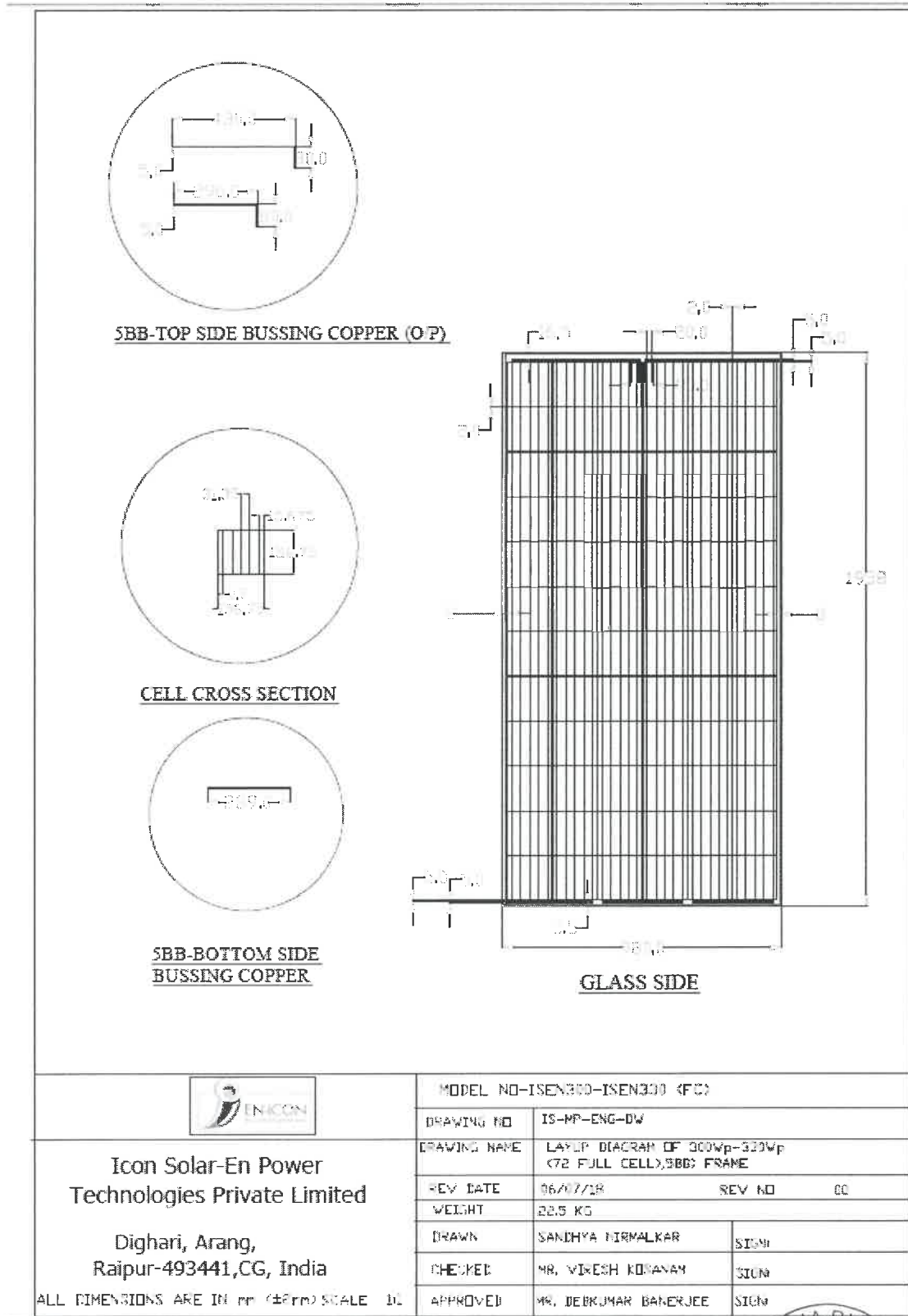
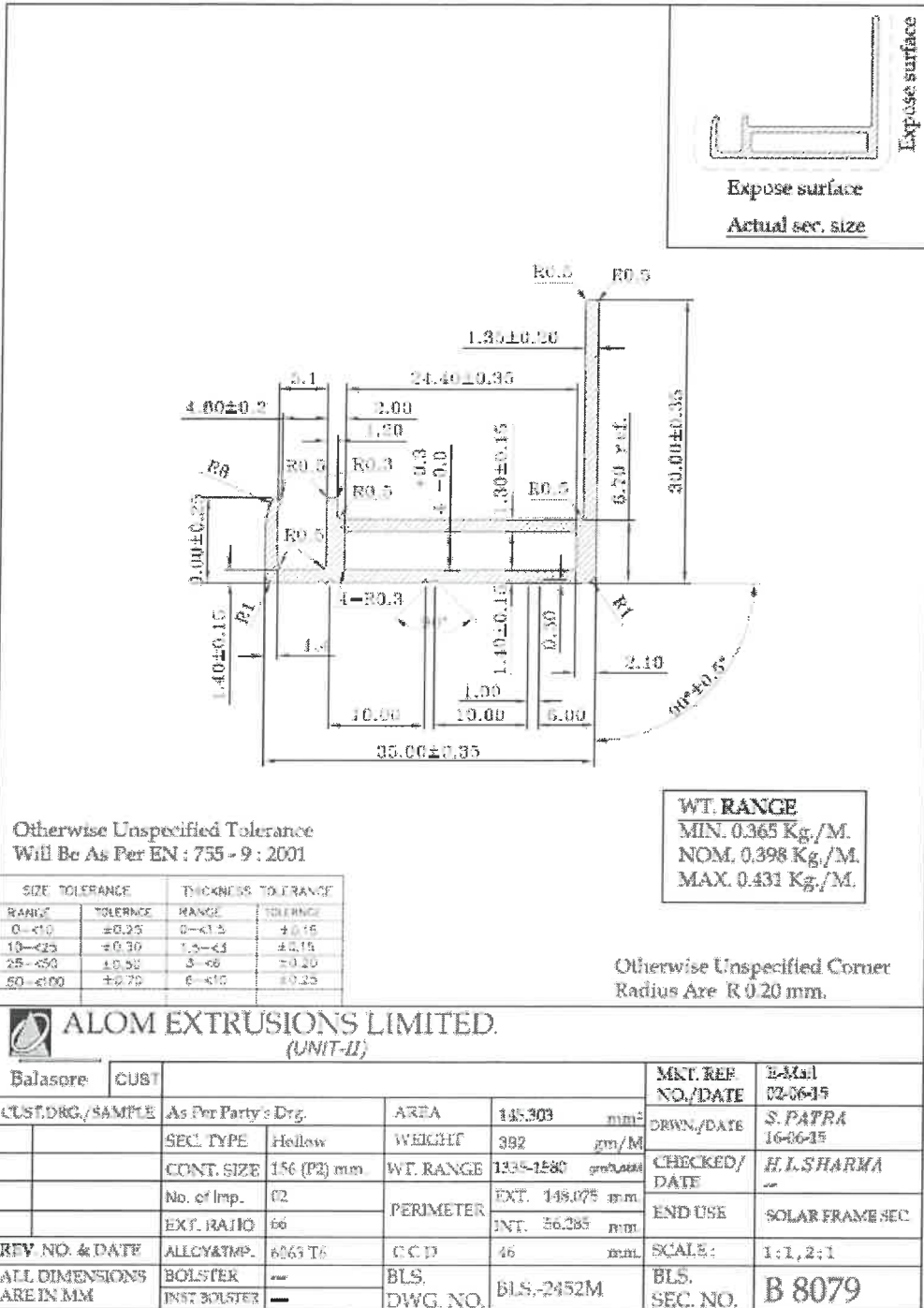
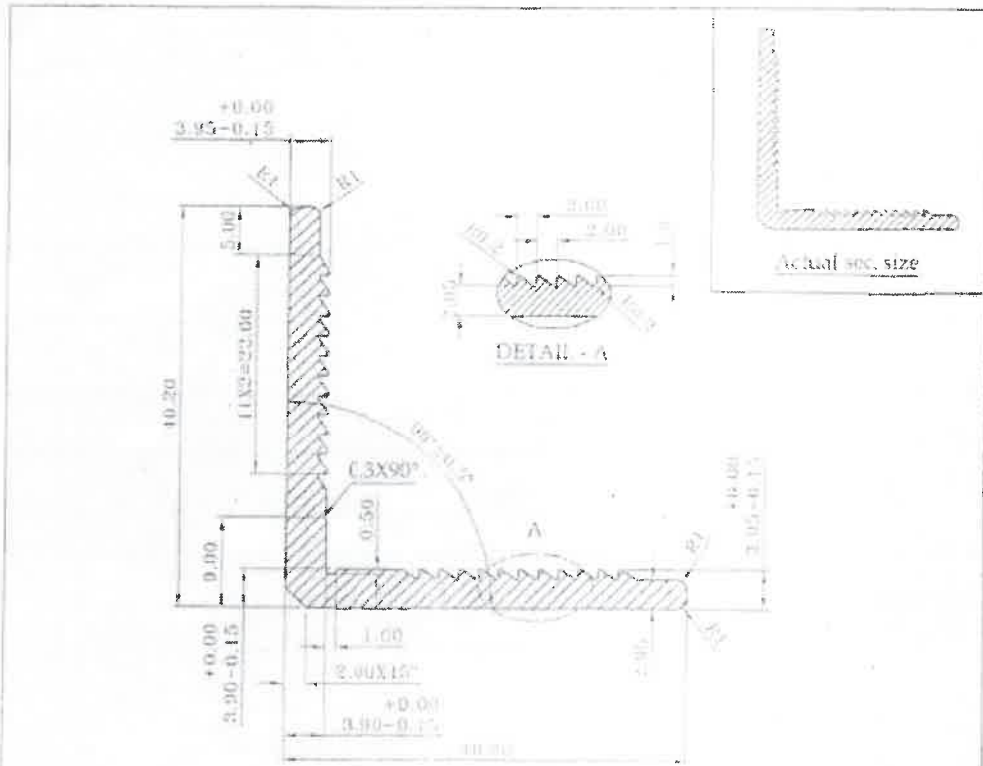


Illustration ID 2-02





Otherwise Unspecified Tolerance
Will Be As Per EN : 755 - 9 : 2001

SIZE TOLERANCE CLASS		THICKNESS TOLERANCE CLASS	
RANGE	TOLERANCE	RANGE	TOLERANCE
0-10	±0.20	0-1.5	±0.15
10-25	±0.30	1.5-3	±0.15
25-50	±0.50	3-6	±0.20
50-100	±0.70	6-10	±0.25

WT. RANGE
MIN. 0.676 Kg/M
NOM. 0.694 Kg/M
MAX. 0.712 Kg/M

Otherwise Unspecified Corner
Radius Arc: R 0.25 mm

ALOM EXTRUSIONS LIMITED
(UNIT-II)

Bolavare	QUGT	AREA	WEIGHT	EXT. RATIO	INT.	KEY NO. & DATE	ALLOY/TMP.	BOLSTER	INSULATED
CUST DRG./SAMPLE	--	2x1922	712	182.54	--	3.71774 12/06-15	6063 T6	---	---
SEC. TYPE	Solid	WT. RANGE	2075 2005	72	---	H.S. SHARMA	---	---	---
CONT. SIZE	150 (P2) 150x150	PERIMETER	---	---	---	---	---	---	---
No. of Imp.	01	---	---	---	---	---	---	---	---
KEY NO. & DATE	---	---	---	---	---	---	---	---	---
ALL DIMENSIONS ARE IN MM	---	---	---	---	---	---	---	---	---



Illustration 2-03



YF P5 5BB 156.75×156.75

MULTICRYSTALLINE SILICON SOLAR CELLS

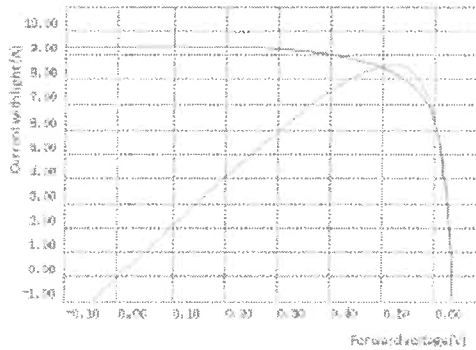
MECHANICAL DATA & DESIGN

Format 156.75mm²±156.75mm±0.25mm
Thickness 200µm±20µm
Front(-) Blue silicon nitride AR coating, 0.7mm silver bus bars
Back(+) 2.0mm wide soldering pads(silver) back surface(aluminum)

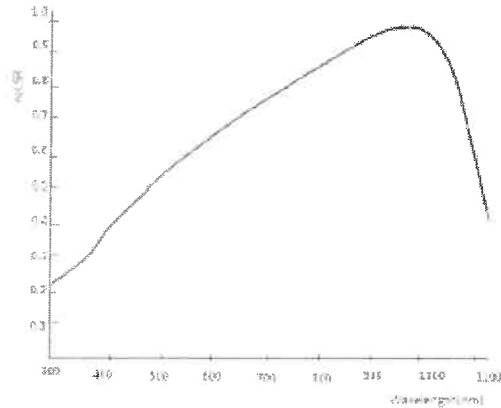


YF P5 156.75×156.75	η _a (%)	P _{mp} (W _p)	I _{mp} (A)	U _{mp} (V)	U _{oc} (V)	I _{sc} (A)	FF (%)
A1890	18.9	4.64	8.4381	0.5503	0.6411	8.9401	81.02
A1880	18.8	4.62	8.4331	0.5477	0.6376	8.9382	81.06
A1870	18.7	4.59	8.4172	0.5459	0.6363	8.9133	81.00
A1860	18.6	4.57	8.3858	0.5451	0.6357	8.8963	80.83
A1850	18.5	4.55	8.3707	0.543	0.6337	8.8755	80.81
A1840	18.4	4.52	8.3437	0.5418	0.6345	8.8123	80.85
A1820	18.2	4.47	8.277	0.5404	0.6306	8.7748	80.83
A1800	18.0	4.42	8.2714	0.5348	0.6269	8.7445	80.71
A1780	17.8	4.37	8.2459	0.5305	0.6227	8.7117	80.63
A1750	17.5	4.50	8.2358	0.5221	0.6205	8.6370	80.24
A1700	17.0	4.18	8.1587	0.5121	0.6054	8.6219	80.05

I-V CURVE



SPECTRAL RESPONSE

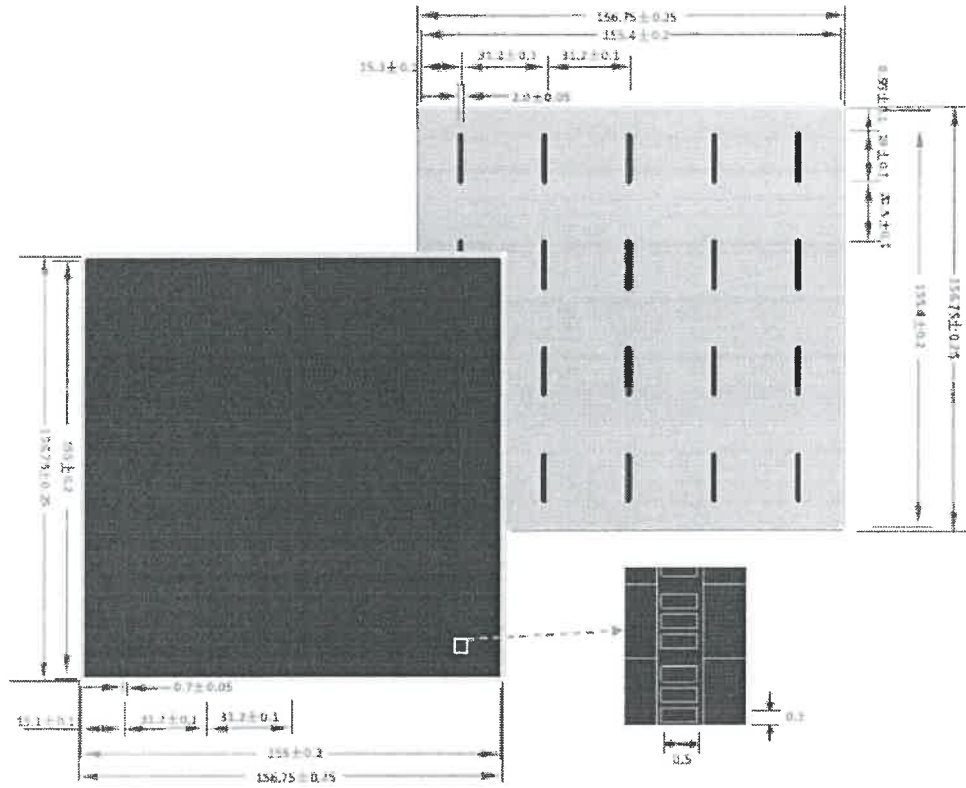


Sichuan Yingfa Solar reserves the rights of final interpretation and revision of the datasheet.





YF P5 5BB 156.75×156.75
MULTICRYSTALLINE SILICON SOLAR CELLS



TEMPERATURE COEFFICIENTS

TkVoltage	-0.327%/°C
TkCurrent	+0.055%/°C
TkPower	-0.42%/°C

INTENSITY DEPENDENCE

Intensity(W/m ²)	Isc[mA]	Voc[mV]
1000	1.05	1.005
900	0.92	0.989
500	0.50	0.963
300	0.30	0.939
200	0.20	0.920

*Ratio of Voc(Isc) at reduced intensity to Voc(Isc) at 1000W/m²

四川英发太阳能科技有限公司
 Sichuan Yingfa Solar Energy Technology Co., Ltd
 No 1, Tianwei Road, Southwest Airport Economic Development Zone, Chengdu, China 610200
 www.yingfa.com



Illustration 2-04



30SQ045

RoHS
COMPLIANT

Schottky Diodes



Features

- High frequency operation
- Low forward voltage drop
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Solder dip 275 °C max. 7s, per JESD 22-B106

Typical Applications

Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection

Mechanical Data

- Package: R-6
- Molding compound meets UL 94 V-0 flammability rating, RoHS-compliant
- Terminals: Tin plated leads, solderable per J-STD-032 and JESD22-B102
- Polarity: Color band denotes cathode end

■ Maximum Ratings ($T_A=25^\circ\text{C}$ Unless otherwise specified)

PARAMETER	SYMBOL	UNIT	30SQ045
Device Marking Code			30SQ045
Repetitive Peak Reverse Voltage	VRRM	V	45
Average Rectified Output Current @60Hz sine wave, R-load, $T_A=25^\circ\text{C}$	IO	A	30
Surge (Non-repetitive) Forward Current @60Hz half sine wave, 1 cycle, $T_A=25^\circ\text{C}$	IFSM	A	360
Current Squared Time @ $t_{rms} \leq 8.3ms$, $T_J=25^\circ\text{C}$	I^2t	A ² s	530
Storage Temperature	Tstg	°C	-55 ~ +150
Junction Temperature (in DC Forward Mode-Forward Operations without reverse bias, $t \leq 1h$ (Fig. 13))	TJ	°C	-55 ~ +200

NOTE

- Meets the requirements of IEC 61215 Ed. 2 bypass diode thermal test.

■ Electrical Characteristics ($T_A=25^\circ\text{C}$ Unless otherwise specified)

PARAMETER	SYMBOL	UNIT	TEST CONDITIONS	30SQ045
Maximum instantaneous forward voltage drop per diode	VFM	V	IFM=30.0A	0.53
Maximum DC reverse current at rated DC blocking voltage per diode	IRRM1	mA	VFM=VRRM $T_A=25^\circ\text{C}$	0.5
	IRRM2		VFM=VRRM $T_A=100^\circ\text{C}$	50

1 / 4

S-A904
Rev. 1.0, 22-Mar-18

Yangzhou Yangjie Electronic Technology Co., Ltd.

www.21yangjie.com





30SQ045

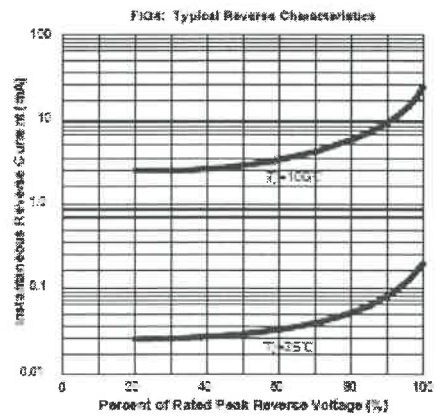
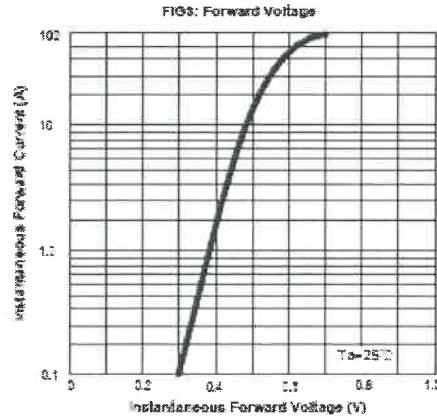
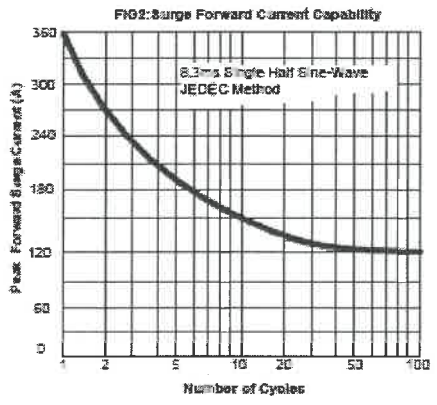
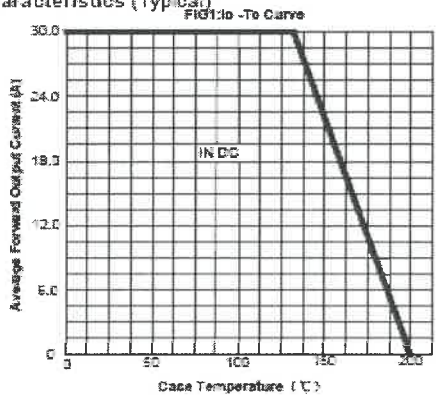
■ Thermal Characteristics ($T_a=25^{\circ}\text{C}$ Unless otherwise specified)

PARAMETER		SYMBOL	UNIT	30SQ045
Thermal Resistance	Between junction and case	$R_{\theta\text{-C}}$	$^{\circ}\text{C/W}$	1.0

■ Ordering Information (Example)

PREFERRED PIN	UNIT WEIGHT(g)	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
30SQ045	Approximate 1.944	500	/	5000	Tape
30SQ045	Approximate 1.944	750	/	3000	Reel

■ Characteristics (Typical)



Certificate 3-01

Zertifikat

Certificate



Zertifikat Nr. / Certificate No. R 50384629
Blatt / Sheet 0001

Hr Zeichen / Client Reference	Unser Zeichen / Our Reference	Ausstellungsdatum / Date of Issue	(day/month/yr)
H.D.J.	01-TKQ-15105620 001	23.08.2017	

Genehmigungsinhaber / License Holder	Fertigungsstätte / Manufacturing Plant
ZheJiang ChuangYuan Photovoltaic Technology Co., Ltd. No.580 Binhai 4th Road, Hangzhou-bay New Area Ningbo City, Zhejiang Province 315336 P. R. China	ZheJiang ChuangYuan Photovoltaic Technology Co., Ltd. No.580 Binhai 4th Road, Hangzhou-bay New Area Ningbo City, Zhejiang Province 315336 P. R. China

Prüfzeichen / Test Mark



Geprüft nach / Tested acc. to
IEC 62790:2014
EN 62790:2015

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Anschlussdose (Junction Box for PV Module)

Type Designation	: PV-CY802x (x-Blank or -S; or -D; or -M) (2JCY)	9
Rated Voltage	: 1500VDC for PV-CY802-D; 1000VDC for PV-CY802; PV-CY802-B and PV-CY802-M	
Rated Current	: 12A for PV-CY802 and PV-CY802-B; 13,5A for PV-CY802-D and PV-CY802-M	
Reverse Current	: 30A	
Application Class	: Class A	
Protection Class	: Class II	
Protection Degree	: IP67	
Ambient Temperature	: -40°C to +85°C	

Remark: The labelling requirements according to EU Directive 2001/95 have to be observed for distribution within the EEA.

9

ANLAGE (Appendix): 1.0

Dem Zertifizierten Hersteller/Prüf- und Zertifizierungsanstalt zugrunde und er bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, werden mitgeteilt.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements or countries where the product is going to be marketed have to be considered separately. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH, Tillystraße 1, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: tun-yul@tuev.com
Fax: +49 221 806-3935 http://www.tuv.com/safety



Dipl.-Ing. (FH) Bernd Schöner



Certificate 3-02

Zertifikat

Certificate



Zertifikat Nr. Certificate No. Blatt Page
R 50337137 0001

Ihr Zeichen Client Reference	Unser Zeichen Our Reference	Ausstellungsdatum Date of Issue
Z.J.S.	01-JJX-15095493 001	13.07.2016 (day/month/year)

Genehmigungsinhaber License Holder	Fertigungsstätte Manufacturing Plant
ZheJiang ChuangYuan Photovoltaic Technology Co., Ltd. No.580 Binhai 4th Road, Hangzhou-bay New Area Ningbo City, Zhejiang Province 315336 P.R. China	ZheJiang ChuangYuan Photovoltaic Technology Co., Ltd. No.580 Binhai 4th Road, Hangzhou-bay New Area Ningbo City, Zhejiang Province 315336 P.R. China

Prüfzeichen Test Mark Geprüft nach Tested acc. to
EN 50618:2014



Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Leitungen (Electric Cables for Photovoltaic Systems)

Type Designation : H1Z222-K 1X4,0mm²
Zhejiang Chuangyuan Photovoltaic Technology Co., Ltd. 5

Rated Voltage : DC 1,5kV
AC 1,0/1,0kV

Ambient Temperature : -40°C to +90°C

Max. Temperature at Conductor : 120°C

5

ANLAGE (Appendix): 1.0

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsverordnung zugrunde und es beruht auf der Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzlich sind Informationen in Ländern in denen das Produkt in Verkehr gebracht werden soll, unseren zuständigen Behörden vorzulegen. Die Herstellung des zertifizierten Produktes wird überwacht.

This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland IGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel: +49 201 896-1571 e-mail: cert.validation@de.tuv.com
Fax: +49 201 896-5935 http://www.tuv.com/safety

Zertifizierungsstelle



Certificate 3-03

Zertifikat		Certificate			
Zertifikat Nr. / Certificate No. R 50378729		Blatt / Sheet 0001			
Das Zeichen / Client Reference H. D. J.	Unser Zeichen / Our Reference 01-TKQ-15104439 001		Ausstellungsdatum / Date of Issue 12.06.2017		(day/month)
Genehmigungsinhaber / License Holder Zhejiang ChuangYuan Photovoltaic Technology Co., Ltd. No. 580 Binhai 4th Road, Hangzhou-bay New Area Ningbo City, Zhejiang Province 315336 P. R. China			Fertigungsstätte / Manufacturing Plant Zhejiang ChuangYuan Photovoltaic Technology Co., Ltd. No. 580 Binhai 4th Road, Hangzhou-bay New Area Ningbo City, Zhejiang Province 315336 P. R. China		
Prüfzeichen / Test Mark 		Geprüft nach / Tested acc. to IEC 62852:2014 EN 62852:2015			
Zertifiziertes Produkt (Ge) (Product Identification) <u>Steckverbinder</u> (Connector for Photovoltaic System)			Lizenzentgelte - Einheit / License Fee - Unit		
Type Designation : PV-CY03L ; PV-CY05L (ZJCY)			?		
Rated Voltage : 1500VDC for PV-CY03L; 1000VDC for PV-CY05L					
Rated Current : 30A					
Ambient Temperature : -40°C to +85°C					
Upper Limit Temperature: 100°C					
Cross Section Range : 1 x 4,0mm ²					
Protection Degree : IP68 (1m, 1h)					
Application Class : Class A					
Remark: The labelling requirements acc. to EU Directive 2001/95 have to be observed for distribution within the EEA.					
?					
ANLAGE (Appendix): 1.0					
<p><small>Dem Zertifikat liegt unsere Prüf- und Bestätigungsprüfung zugrunde auf der bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfverfahren. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich beachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.</small></p> <p><small>The certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.</small></p>					
TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg					
Tel: +49 221 896-1371 email: cert.validation@tue.com Fax: +49 221 896-3933 http://www.tue.com/certify			Dipl.-Ing. D. Löffler		



Certificate 3-04

Produkte
Products



Prüfbericht-Nr.: Test Report No.:	19616627 001	Auftrags-Nr.: Order No.:	1803272369	Seite 1 von 3 Page 1 of 3
Kunden-Referenz-Nr.: Client Reference No.:	465811	Auftragsdatum: Order date:	2017-11-16	
Auftraggeber: Client:	Renewsys India Pvt. Ltd. Plot No. 21,22,23, Bommasandra Jigani Link Road, Industrial Area, Anekal Taluk Bangalore-560105, India			
Prüfgegenstand: Test item:	Backsheet			
Bezeichnung / Typ-Nr.: Identification / Type No.:	PRESERV A-275WN			
Auftrags-Inhalt: Order content:	Comparative tracking indices of solid insulating materials			
Prüfgrundlage: Test specification:	IEC 60112:2003+A1:2009			
Wareneingangsdatum: Date of receipt:	2017-10-28			
Prüfmuster-Nr.: Test sample No.:	1803272369 - 02			
Prüfzeitraum: Testing period:	2017-11-14			
Ort der Prüfung: Place of testing:	TÜV Rheinland (India) Pvt. Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (India) Pvt. Ltd.			
Prüfergebnis*: Test result*:	See page 2 and 3			
geprüft von / tested by:	kontrolliert von / reviewed by:			
2017-11-23	Gireshanaji A / Engineer	2017-11-23	Manu Kumar B B / Senior Engineer	
Datum Date	Name / Stellung Name / Position	Unterschrift Signature	Datum Date	Name / Stellung Name / Position
Sonstiges/ Other Aspects:				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
* Legende: 1 = sehr gut (Platz) = entspricht o.g. Prüfgrundlage) / 2 = gut (Platz) = entspricht o.g. Prüfgrundlage) / 3 = befriedigend (Platz) = entspricht nicht o.g. Prüfgrundlage) / 4 = ausreichend (Platz) = entspricht nicht o.g. Prüfgrundlage) / 5 = mangelhaft (Platz) = entspricht nicht o.g. Prüfgrundlage) / NT = nicht getestet / Legend: 1 = very good (Platz) = corresponds to o.g. test specification) / 2 = good (Platz) = corresponds to o.g. test specification) / 3 = satisfactory (Platz) = does not correspond to o.g. test specification) / 4 = sufficient (Platz) = does not correspond to o.g. test specification) / 5 = poor (Platz) = does not correspond to o.g. test specification) / NT = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the o.g. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.				

TÜV Rheinland (India) Pvt. Ltd. - 52/A, West Wing, 3rd Main Road, - Electronic City Phase 1, - Bangalore - 560100
Tel: +91 80 3689 8888 - Fax: +91 80 3055 4342 - Web: www.tuv.com - Rev.: 1.0 2012 - Kalyan Varma 08-01 / approved: 9





Page 2 of 3

Report No. 19616627 001

IEC 60112:2003+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict
IEC 60112 - Tracking test			
Clause	Requirement - test	Result - Remark	Verdict
9	Determination of erosion		P
	Erosion depths	See table 1	P
11	Determination of comparative tracking index (CTI)		P
11.2	Determination of the 100 drop point		N/A
	Using the basic procedure described in IEC 60112 clause 8, set the voltage at a selected level and make the test until at least 25s elapsed after the one hundredth drop has fallen or until previous failure occurs		N/A
11.3	Determination of the 50 drop point		P
	By inference from the 100 drop data, repeat the test procedure at an appropriate test voltage, using a new site/specimen and determine whether the specimen withstands the test for the period up to at least 25s after the 50th drop has fallen	CTI: 600V See table 1	P





Page 3 of 3

Report No. 19816627 001

IEC 60112:2003+A1:2009			
Clause	Requirement + Test	Result - Remark	Verdict

Table 1							
Part	Material	Material thickness [mm]	Colour	Test solution A	Voltage [V]	Erosion depth [mm]	Result
Backsheet	PRESERV A - 275WN	>3mm	White	50 drops	600V	0.05	P
Backsheet	PRESERV A - 275WN	>3mm	White	50 drops	600V	0.04	P
Backsheet	PRESERV A - 275WN	>3mm	White	50 drops	600V	0.06	P
Backsheet	PRESERV A - 275WN	>3mm	White	50 drops	600V	0.03	P
Backsheet	PRESERV A - 275WN	>3mm	White	50 drops	600V	0.05	P

Remark:

- Solution A : Ammonium chloride
- Test samples are conditioned for 24hrs at 23°C ± 5K with (50 ± 10)%RH
- 8 samples are stacked to achieve thickness > 3mm during testing
- Tested on the cell side of the backsheet samples

Test Results:

At 600V, all 5 samples are withstood the 50drops of solution A without flaming or tracking.

End Report



Certificate 3-05

2010/10

QMFZ2.E248611 - Plastics - Component



ONLINE CERTIFICATIONS DIRECTORY

**QMFZ2.E248611
Plastics - Component**

For enhanced search functionality, please visit UL's [Q77 Family of Databases](#).
Click on a product designation for complete information.

[Page Bottom](#)

Plastics - Component

[See General Information for Plastics - Component](#)

SHANGHAI HUITIAN NEW MATERIAL CO LTD
251 Wenji Rd
Song Jiang
201616 Shanghai, CHINA

E248611

Material Dsg	Color	Thk mm	Flame Class	H H		RTI			H D		
				W	A	Elec	Mech	T	9	T	
				I	I	Imp	Str	R	5	I	
Epoxy Potting Compound (EP - Potting), furnished as one liquid component.											
E312	BK	3.6	V-0	-	-	90	90	90	-	-	-
Epoxy Potting Compound (EP - Potting), furnished as two liquid components.											
6203A/6203B	NC	3.0	V-0	-	-	50	90	90	-	-	-
Silicone "Room Temperature Vulcanizing" (RTV), furnished as Paste.											
4061	NC, BK	0.4	HB	4	1	105	105	105	-	-	0
		3.0	HB	3	1	105	105	105			
Silicone "Room Temperature Vulcanizing" (RTV), furnished as paste.											
9061	ALL	0.4	HB	4	0	105	105	105	-	-	-
		3.0	HB	3	0	105	105	105			
916	WT	0.4	HB	4	2	105	105	105	-	-	3
		3.0	HB	3	0	105	105	105			
9661	NC, BK	0.4	HB	4	3	105	105	105	-	-	-
	ALL	1.5	HB	4	3	105	105	105			
		3.0	HB	3	0	105	105	105			
HT906Z	BK, WT	3.0	V-0	1	0	105	105	105	-	-	0
Silicone "Room Temperature Vulcanizing" (RTV), furnished as two liquid components.											
5299VA/B	BK	3.0	V-1	1	0	105	105	105	-	-	0
5299W	BK	3.0	V-0	1	0	105	105	105	-	-	0
		6.0	V-0	0	0	105	105	105			
	BK, WT	13.0	V-0	0	0	105	105	105			
	WT	3.0	V-1	1	0	105	105	105			
5299W-S	WT, BK	3.0	V-0	1	0	105	105	105	-	-	0
		6.0	V-0	0	0	105	105	105			
		13.0	V-0	0	0	105	105	105			

<http://database.ul.com/cgi-bin/XYUL.plac/LISEXT/F/FRANCE/xyzpage.html?name=QMFZ2.E248611&certno=UL-Plastics-Component&style=127>



Manual 4-01**1. Introduction**

This manual contains information regarding the safe installation and handling of photovoltaic (PV) modules produced by ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD. All the instructions given in this manual should be read carefully and understood before attempting to install the modules. If there are any questions, please contact us for further explanation. The instructions and requirements of this manual refer to the following crystalline modules manufactured by ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD.

Polycrystalline:
ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD Module Series ranging from 3W to 350W.

Disclaimer of liability

The use of this manual and the conditions or methods of installation, operation, utilization and maintenance of PV product are beyond ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD control. Therefore, ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD will not accept any responsibility and expressly denies any liability damage, or expense arising out of or in any way connected with such installation, operation, utilization or maintenance.

No responsibilities will be assumed by ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD for any infringement of patents or other rights of third parties, which may result from use of the PV module. No license is granted by implication or otherwise under any patent or patent rights. The information in this manual is based on ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD knowledge and experience and it is believed to be reliable. Nevertheless, such information including product specification (without limitations) and suggestions do not constitute a warranty, expressed or implied. ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD reserves the right to change the manual, the PV module, the specifications, or product information sheets without prior notice.

Product identification

Each module can be identified by means of the following embedded information:

Nameplate:

It is located on the reverse side of the module. According to IS 14286, IS 61730 & IS 61701 Ed 1 directives it gives information about the main parameters of the module: Product Type, Maximum Power, Current at Maximum Power, Voltage at Maximum power, Open Circuit Voltage, Short Circuit Current, all as measured under Standard Test Conditions, weight, dimensions, Maximum System Voltage, etc.

Serial number:

Each individual module is identified by a unique serial number accompanied with a barcode. They are permanently inserted inside the laminate, under the front glass of the module, visible when viewed from the front of the module. There is only one unique serial number accompanied with one barcode on the module.

Quality and Safety Standards

ICON SOLAR photovoltaic modules meet all the requirements of the following official Standards in terms of Quality and Safety:

- IS 14286: design qualification and type approval
- IS 61730-1 and 2: photovoltaic module safety qualification
- IS 61701- Standard for Salt Mist Corrosion Testing of Photovoltaic (PV) Modules. First Edition, Issued on 1995

Limited warranty

The warranty conditions applied to the module by ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD are described in the document: "Limited Warranty for PV Modules" – the current version is available on our website. Ignoring the instructions in this manual may give ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD cause to invalidate the warranty where negligence can be proven (improper installation or use). Please contact us for any question about warranties.

Beyond the obligatory requirements imposed by ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD for installation and use of the modules covered by ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD Limited Warranty, this manual carries out a series of recommendations in order to facilitate, optimize or increase security and effectiveness of the module installation. In these cases in which ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD is giving just suggestions and not specific obligations, different technical choices by the installer may not cause the withdrawal of the warranty.

ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD.
319-320, 3rd Floor, Magneto Mall, G.E Road, Raipur-492001, Chhattisgarh (India)
Email: iconsolaren@gmail.com, Website: www.iconsolar-en.com
Works: Village Dighari, Mandir Hasaud, Tehsil Arang -49441, Raipur, Chhattisgarh (India)





2. Safety

ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD PV modules have passed all the required safety tests according to the IS EN 51730 Directive with Application Class A and they are certified as Safety Class II.)

General Safety

- All PV modules should be installed according to all local and national applicable standards, codes and regulations.
- Installation should be performed only by qualified persons. Installers should assume the risk of all injury that might occur during installation including, without limitation, the risk of electric shock.
- All safety precautions specified even for the other components of the system should be checked and followed.
- Rooftop installations should be placed over fire resistant roof coverings only.
- Do not attempt to disassemble the modules, and do not remove any attached nameplates or components from the modules.
- Do not apply paint or adhesive to module top surface.
- Do not use mirrors or other magnifiers to artificially concentrate sunlight on the modules. Do not expose back sheet foils directly to sunlight.



Handling Safety

- Do not exceed the maximum height of pallets stacked on top of each other. Maximum height is 2 pallets. Standard packaging for shipment in 40 ft. High-Cube Containers (Check this for your suitability)
- Do not damage or scratch the PV module surfaces.
- Do not use the junction boxes and the cables as a grip.
- Do not stand or step on module.
- Do not drop module or allow objects to fall on module.
- To avoid glass breakage, do not place any heavy objects on the module.
- Do not set the module down hard on any surface.
- Inappropriate transport and installation may break modules.



Installation Safety

- Installing solar PV systems requires specialized skills and knowledge.
- One individual module may generate DC voltages greater than 30 V when exposed to light of any intensity. Contact with a DC voltage of 30 V or more is potentially hazardous.
- To avoid electrical arcing, do not disconnect modules under load. Keep connectors dry and clean.
- PV modules will generate electricity whilst exposed to light. Generation will only stop when the PV module is either removed from light or covered with a dark opaque material. When working with modules without any cover, regard the safety regulations for live electrical equipment.
- Do not wear metallic rings, watchbands, ear, nose, lip rings or other metallic devices while installing or troubleshooting PV systems in order to avoid risk of electric shock.
- Use only insulated tools that are approved for working on electrical installations. Abide with the safety regulations for all other components used in the PV system, including wiring and cables, connectors, charging regulators, inverters, storage batteries and rechargeable batteries, etc.
- Use only equipment, connectors, wiring and support frames suitable for a solar electric system. Always use the same type of module within a particular PV system.
- Do not attempt to repair any part of the PV module.



3. Installation

Design considerations

To maximize efficiency, PV modules should be installed in a location where they will receive the maximum amount of sunlight throughout the year. In the Northern Hemisphere modules should face the South, while in the Southern Hemisphere modules should face the North. Therefore, modules facing more than 30 degrees away from true South (or North) could lose approximately 10% to 30% of their power output (depending on the latitude of the installation site: the higher the latitude, the higher the loss).

ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD.
 319-320 3RD Floor, Magneto Mall, G.E Road, Raipur-492001, Chhattisgarh(India)
 Email:-iconsolaren@gmail.com, Website:www.iconsolar-en.com
 Works: Village Dighari, Mandir Hasaud, Tehsil Arang -49441, Raipur, Chhattisgarh(India)





It is recommended that where PV modules are connected in series they should be installed at same orientation and tilt angle.

Different orientations or angles may cause a loss of power output due to the change in sunlight exposure.

While designing the final layout of the modules in the PV system (on the ground or on the roof), we recommend the designer to keep suitable access space to allow easy maintenance and inspection works.

Ensure that ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD PV modules are installed and stored in the following conditions:

- Operating ambient temperature: from -40°C to +85°C
- Storage temperature: from -40°C to +30°C
- Humidity: below 85% RH

Provide adequate ventilation under a module for cooling. ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD recommends 10 cm minimum air space between module and mounting surface. ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD recommends that PV modules are mounted at a minimum tilt angle of 10° with respect to the horizon, in order to facilitate the self cleaning of their front glass from dirt during ordinary raining. ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD Modules should not be mounted in mobile applications (except solar trackers) or in locations where aggressive substances such as salt or salt-water or any other type of corrosive agent could affect the performance and/or safety of the PV modules.

Mechanical installation

Use always structures and materials specifically developed and certified for PV modules installation.

We can connect total 23 modules in a series, the minimum distance between two fixed modules for linear thermal expansion of the module frames should be 5 mm. Nevertheless, the recommended distance between two modules is 20 mm to allow wind circulation, in order to reduce pressure loads and improve module ventilation. The PV module should not be mounted in such a way that the drain holes of the module can become blocked.

ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD PV modules are suitable for mechanical mounting both in portrait and landscape orientation. In choosing the orientation, please keep in mind the internal PV module by-pass diode configuration to ensure the optimum electrical behavior from any potential shading over the modules.

Galvanic corrosion can occur between the aluminum frame of the PV module and the mounting hardware if such hardware is composed of dissimilar metals, especially in harsh environments such as high humidity. In these cases, to prevent corrosion, neoprene tape, PVC washers or stainless steel washers should be placed between the PV module frame and the support structure.

Additionally, all module support structures used to support PV modules at correct tilt angles should be wind and snow load rated by appropriate local and civil Directives prior to installation.

NOTICE: Do not disassemble the PV module and do not remove, drill or modify the frame in any way as this will invalidate the warranty. Please contact us if module mounting procedure is not clear.

Installation using the frame mounting holes

Modules must be securely fixed to the mounting structure using the four pre-drilled mounting holes Dia 10.00 mm placed in the long frame rails at 400 mm from the top and bottom frames. Use M8 stainless steel hardware, spring washers and flat washers with a torque of approximately 10 Newton meter (Nm) for normal installation. Galvanized or hot dipped zinc plated hardware is also acceptable.

Installation using pressure clamps

Installation using pressure clamps may be executed along both sides of the module.

The obligatory position of the clips along the frame depends on which side of the module is used for the installation as follows:

- Fixing on the long side: The clamps must be mounted along the frame at the position of the mounting hole, with a tolerance of 10% of the module total length to the edge of the frame.
- Fixing on the short side: The clamps must be mounted along the frame at the edges of the module, with a tolerance of 25% of the module total width to the middle of the frame.

Note that on both sides of the module the pressure clamps always should be mounted in a symmetric position with respect to the center line for a proper load distribution.



ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD.
319-320, 3rd Floor, Magneto Mall, G.E Road, RaIPUR-492001, Chhattisgarh (India)
Email: iconsolare@gmail.com, Website: www.iconsolar-en.com
Works: Village Dighari, Mandir Hasaud, Tehsil Arang -49441, Raipur, Chhattisgarh (India)





Clamps must be installed according to the manufacturer's specific instructions. Do not apply excessive pressure on the frame such that the frame deforms. ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD recommends a torque of approximately 10 Newton meter [Nm].

The clamps should have contact only with the module frame and, to avoid shadowing effects and possible damage, should not overlap onto or over the module glass.

Do not install the modules with pressure clamps mounted out of the specified areas, otherwise the module mechanical resistance may be affected.

Insertion systems

Insertion systems on the short sides of the module may be used with a limitation on the maximum load resistance of 2400 Pa. Insertion systems on the long side of the module are not affected by any limitation and may be used with a maximum of 5400 Pa for snow load.

When using insertion systems where the modules are installed sliding through the inner side of the rails, ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD recommends the use of PVC frame protectors in order to prevent damage to the anodized surface of the frame.

Module load resistance

Wind Load: 2400 Pa – (best for Indian Conditions)

Snow Load: 5400 Pa – (Talks about snow loading and may not be required for Indian conditions)

According to IS 14286 Directive, 2400 Pa corresponds to a wind pressure of 130 km/h (approximately +/-800 Pa) with a safety factor of 3 for gusty winds.

Electrical installation

Modules electrically connected together in a series/parallel configuration generate DC electrical energy which may be converted to AC by means of a solar inverter. The resulting PV system may be therefore connected to the local utility grid system. As local utilities' policies and technical rules on connecting a renewable energy system to their power grids vary from region to region, consult a qualified system designer or integrator to design such a system to comply with the Directives. Permits are normally required for installing a PV system and the utility will formally approve and inspect the system before its connection to the grid can be accepted.

The PV system electrical installation should be executed in accordance with the respective National Electrical Code or applicable National Regulations.

Use only insulated tools that are approved for working on electrical installations. Abide by the safety regulations for all the components used in the system, including wiring and cables, connectors, charge regulators, inverters, storage batteries etc.

General considerations

Modules are fitted with two pre-assembled sunlight resistant cable leads, which are terminated with PV fast connectors. The positive (+) terminal has a female connector while the negative (-) terminal has a male connector. These cable leads and connectors must not be removed or cut off.

Several modules are connected in series and then in parallel to form a PV array, especially for applications with high operating voltage. When modules are connected in series, the total voltage of the resulting string is the sum of the individual voltages of the modules. Do not use different types of modules in the same circuit as this will cause mismatch, power loss and/or damage to the PV system.

When selecting the size of the cables that connect the module strings to the solar inverter, it is recommended to refer to the Name plate electrical parameters of the related module type.

For electrical design considerations, the values given in the module label or datasheet of the related model type should be multiplied by a factor of 1.25 for Short Circuit Current (Isc) and 1.10 for Open Circuit Voltage (Voc), when determining component voltage ratings, conductor current ratings, fuse sizes and the rest of electrical hardware connected to the module strings.

Nevertheless, consult rated local wiring regulations to determine system wire size, type, and temperature allowed for your installation.

ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD.
 319-320, 3rd Floor, Magneto Mall, G.E Road, RaIPUR-492001, Chhattisgarh(India)
 Email: iconsolareu@gmail.com, Website: www.iconsolar-en.com
 Works: Village Dighari, Mandir Hasaud, Tehsil Arang-19441, Raipur, Chhattisgarh(India)





Bypass diodes

When a module is connected in series with other modules, partial shading can cause a reverse voltage across the shaded area of the module. The current generated is therefore forced through the shaded area by the other modules.

When a bypass diode is wired in parallel with the PV cell strings, such a forced current will flow through the diode and bypass the current generated by the non-shaded cells, thereby minimizing module heating, current losses, and damage to the module.

ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD modules are fitted with internal bypass diodes wired inside the junction box to reduce the effects of partial shadings. Do not open the junction box to change the diodes even if they are defective. This should be done only by qualified personnel.

PV System Grounding

ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD Modules are certified for Class A applications, Safety Class II, 1500Vdc Maximum System Voltage. Refer to respective National Electrical Code requirements and standards for safety-related grounding of racking system and/or module frames.

When executing the grounding of the module frames, ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD recommends taking into account the following considerations:

- The long frame rails are equipped with pre-drilled grounding holes in their centre (Dia 5mm). These holes should be used only for grounding purposes and not for mounting purposes.
- Proper grounding is achieved by connecting the module frame(s) and structural members contiguously using a suitable grounding conductor. The grounding wire should be properly fastened to the module frame to assure good electrical contact. Use copper, copper alloy or any other conductive material accepted by the applicable National Electrical Regulation.
- Make electrical contact by penetrating the anodized coating of the aluminum frame. To break the anodized layer, ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD suggests a stainless steel toothed washer to be inserted between the nut and the frame.
- When carrying out the grounding of the modules, the aluminum frame must not be in permanent direct contact with dissimilar Metals, this could result in a galvanic corrosion. Stainless steel flat washers may be inserted between frame and grounding lug.
- ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD recommends the use of stainless steel grounding bolts or grounding lugs specifically designed for PV applications.

4. Commissioning and maintenance

Test all electrical and electronic components of the system before using it. Follow the instructions in the manuals supplied with the components and equipment. Commission and Maintenance works should only be performed by specialized and properly trained personnel.

Commissioning

Check the Open Circuit Voltage of every string of modules connected in series with a digital multi meter. The measured overall values should correspond to the sum of the Open Circuit Voltage of the individual modules.

Be aware that the measured overall voltage can be lower than expected, due the normal decrease of Open Circuit Voltage of the individual modules, caused by the temperature rising of solar cells or low irradiance. The rated voltage at STC will be found in the name plate or technical datasheet of the module type used in the PV system.

In any case, the measured overall voltage should be never below 20% of the estimated one. Excessively low voltage is typically caused by improper connections at the terminals or defective bypass diodes. Please contact us if the problem cannot be resolved.

Once the commissioning has been executed, check the operating current through every series of the PV installation. It can be measured directly by a DC clamp meter. All measurements should be in the same value range, but they may vary from the maximum current measured at STC specified in the datasheet. The measured values are dependent on the solar inverter, but they should be proportional to the solar irradiance present at the moment.

ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD.
319-320, 3rd Floor, Magneto Mall, G.E Road, Raipur-492001, Chhattisgarh (India)
Email: iconsolare@gmail.com, Website: www.iconsolar-en.com
Works: Village Dighari, Mandir Hasand, Tebsil Arang -49441, Raipur, Chhattisgarh (India)





Maintenance

ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD recommends the following maintenance in order to ensure optimum performance of the module:

- Check the electrical and mechanical connections every six months to verify that they are clean, secure and undamaged;
- Check that mounting hardware, terminal screws and grounding components are tightly secured with no corrosion;
- Check that modules are not shaded by vegetation or any unwanted obstacles;
- Do not touch live parts of cables and connectors;
- Use appropriate safety equipment (insulated tools, insulating gloves, etc.) when handling modules;
- If any problem with the system or individual module arises, have them investigated by a competent specialist;
- Replacement modules must be the same type of those to be replaced;
- Modules generate high voltage when exposed to sunlight. Please cover the front surface of modules with an opaque non scratch material when repairing. Repairing works must be performed by specialized and properly trained personnel only;

NOTICE: Follow the maintenance instructions for all components used in the system, such as support frames, charge regulators, inverters, batteries etc.

4.2.1. Cleaning

Dirt and dust can accumulate on the glass surface of the PV module over time, particularly in low inclination installations. This can cause a general decrease of power output and also sedimentation on the lower edge of the modules due to dirt accumulation. ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD recommends periodic cleaning of PV modules to ensure maximum power output, especially in regions with high quantity of dust in the air or low precipitations, as follows:

- Under most weather conditions, normal rainfall is enough to keep the PV module glass surface clean. Clean the glass surface of the module as necessary and consider that lower inclination requires more cleaning frequency;
- Always use water and a soft sponge or cloth for cleaning. A mild, non-abrasive cleaning agent can be used to remove stubborn dirt. High mineral content water is not recommended, as it may leave residual deposits on the module;
- To avoid any damage to this layer do not clean the modules with high pressure washers, steam or corrosive chemicals. Do not use abrasive sponges or aggressive tools that could scratch the module surface;
- To avoid a possible thermal shock clean the modules during early morning, when the module is still cold. This is specially recommended in regions with hotter temperatures;
- In cold environments with snow do not try to remove the frozen snow or ice from the module scratching on the front glass. Only soft snow can be removed gently with a soft brush in order to improve the production;
- Do not clean modules having broken glass or exposed wiring. This could cause a general electrical failure of the module and/or electrical shock hazards.

ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD.
 319-320, 3rd Floor, Magneto Mall, G.E Road, RaIPUR-492001, Chhattisgarh(India)
 Email: iconsolarena@gmail.com, Website: www.icon-solar-en.com
 Works: Village Dighari, Mandir Hasaud, Tehsil Arang -49441, Raipur, Chhattisgarh(India)

----- End of TRF -----

