
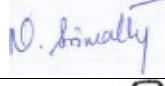





Test Report issued under the responsibility of:



TEST REPORT IEC 61730-2 PV Module Safety Qualification Part 2: Requirements for testing	
Report Number	4786930293.1.1-NABL-MNRE-S1
Date of issue	09/09/2015
Total number of pages	20
Name of Testing Laboratory preparing the Report	UL INDIA PVT. LTD., Bengaluru, KA, INDIA
Applicant's name	ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD
Address	319-320, OFFIZO, 3RD FLOOR, MAGNETO MALL, G.E ROAD, RAIPUR, CHHATTISGARH 492001, INDIA
Test specification:	
Standard	IEC 61730-2 PHOTOVOLTAIC (PV) MODULE SAFETY QUALIFICATION PART 2: REQUIREMENTS FOR TESTING - Edition 1.1 - Issue Date 2012/11/01
Test procedure	N/A
Non-standard test method	N/A
Test Report Form No	IEC61730_2C
Test Report Form(s) Originator	N/A
Master TRF	Dated 2014-08
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General disclaimer:	
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Test item description :	Crystalline Silicon Photovoltaic Modules (Multi-Crystalline)	
Trade Mark :		
Manufacturer	ICON SOLAR-EN POWER TECHNOLOGIES PVT LTD	
Address :	VILLAGE DIGHARI,MANDIR HASAUD,TEHSIL ARANG - 49441,RAIPUR,CHHATTISGARH(INDIA)	
Model/Type reference :	IS-EN 310W	
Ratings :	Please refer to the below tables	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	Testing Laboratory:	
Testing location/address	UL India Pvt. Ltd. Kalyani Platina, Phase I, Whitefield, Bengaluru, KA-560066, INDIA	
Tested by (name, function, signature) :	Srimathy N	
Approved by (name, function, signature) .. :	Mahesh V	
<input type="checkbox"/>	Testing procedure: TMP/CTF Stage 1:	
Testing location/address	N/A	
Tested by (name, function, signature) :	N/A	
Approved by (name, function, signature) .. :	N/A	
<input type="checkbox"/>	Testing procedure: WMT/CTF Stage 2:	
Testing location/address	N/A	
Tested by (name, function, signature) :	N/A	
Witnessed by (name, function, signature) . :	N/A	
Approved by (name, function, signature) .. :	N/A	
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): All tests required for Application Class A as listed in Table - 7 of IEC 61730-2. Model IS-EN 310W, 310Wp was used for test purposes.	Testing location: UL India Pvt. Ltd. Kalyani Platina, Phase I, Whitefield, Bengaluru, KA-560023, INDIA
Summary of compliance with National Differences: N/A	

Model Name	Wattage (Wp)	Maximum System Voltage (V dc)	Open Circuit Voltage @ STC, (V dc)	Rated Voltage @ STC, (V dc)	Rated Current @ STC, (A)	Short Circuit Current @ STC, (A)	Rated Maximum Power at STC, (Watts)	Maximum Series Fuse, (A)
ISEN200	200	1000	44.41	36.18	5.56	5.86	201.2	15
ISEN200	200	1000	29.64	24.14	8.31	8.74	200.6	15
ISEN205	205	1000	29.77	24.24	8.47	8.87	205.3	15
ISEN220	220	1000	33.19	27.06	8.15	8.61	220.5	15
ISEN225	225	1000	33.35	27.16	8.31	8.74	225.7	15
ISEN230	230	1000	33.46	27.25	8.45	8.84	230.3	15
ISEN250	250	1000	44.46	36.18	6.92	7.28	250.4	15
ISEN250	250	1000	37.05	30.12	8.31	8.75	250.3	15
ISEN255	255	1000	37.18	30.27	8.43	8.84	255.2	15
ISEN260	260	1000	37.28	30.58	8.51	8.93	260.2	15
ISEN265	265	1000	37.36	30.69	8.64	9.01	265.2	15
ISEN270	270	1000	40.58	33.08	8.17	8.62	270.3	15
ISEN275	275	1000	40.76	33.20	8.31	8.74	275.9	15
ISEN280	280	1000	40.89	33.29	8.43	8.84	280.6	15
ISEN300	300	1000	44.45	36.18	8.30	8.75	300.3	15
ISEN305	305	1000	44.59	36.33	8.40	8.83	305.2	15
ISEN310	310	1000	44.70	36.43	8.51	8.93	310.0	15
ISEN315	315	1000	44.85	36.52	8.63	9.02	315.2	15
ISEN320	320	1000	45.00	36.59	8.75	9.12	320.2	15
ISEN325	325	1000	45.02	36.73	8.85	9.16	325.1	15
ISEN330	330	1000	45.07	37.2	8.88	9.21	330.3	15

Copy of marking plate:



Test item particulars:	
Accessories and detachable parts included in the evaluation	N/A
Mounting system used	N/A
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 – Relative Thermal 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:	
Date of receipt of test item	04/07/2015
Date (s) of performance of tests.....	See individual test table below

General remarks:	
<p>"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p> <p>This Test Report Form is intended for the investigation of PV modules in accordance with IEC 61730-2. It can only be used together with IEC 61730-1 Test Report.</p>	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 61730-2:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... :	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) :	N/A

General product information:	
PV module type reference	IS-EN 310W
<u>Product Electrical Ratings at STC</u>	
Nominal maximum power (Pmax)	310 Wp
Nominal open circuit voltage at (Voc)	43.20 V
Nominal short circuit current at (Isc)	8.77 A
Nominal maximum power voltage (Vpm).....	38.50 V
Nominal maximum power current (Ipm)	8.10 A
<u>Product Safety Ratings</u>	
Maximum systems operating voltage	1000 Vdc
Maximum over-current protection rating	15 A
Safety application class	Class A
Safety class in accordance with IEC 61140	Class-II
Fire safety class.....	N/A
Recommended maximum series/parallel module configurations	23Nos in Series
<u>Scope of Module Safety Qualification Testing:</u>	
<input type="checkbox"/> Initial module safety qualification	
<input checked="" type="checkbox"/> Extension of module safety qualification	
Original test report ref. no.:	
<u>Model differences and modification:</u>	
<input checked="" 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 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)

IEC 61730-2			
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

6	Sampling		
	<input type="checkbox"/> The modules tested (modules and laminate) were taken at random from a production batch and subjected to manufacturer's normal quality control and inspection for safety testing.	--	N/A
	<input checked="" type="checkbox"/> The modules tested (modules and laminate) were prototypes of a new design and not taken from a production batch.	--	--
	<input checked="" type="checkbox"/> Preconditioning of test samples was performed within IEC 61215 or IEC 61646 performance testing.	All seven modules were subjected to preconditioning	--
	<input type="checkbox"/> Preconditioning of test samples was performed separately from IEC 61215 or IEC 61646 performance testing.	--	N/A

List of test samples

Sample No.	Type / model	UL Serial No.	Module Serial No.	Remark
1	IS-EN 310W	2156790	ICON31036A0105191020	Control Module
2	IS-EN 310W	2156794	ICON31036A0105191011	Seq. B of IEC 61730-2
3	IS-EN 310W	2156788	ICON31036A0105191018	Seq. C of IEC 61730-2
4	IS-EN 310W	2156797	ICON31036A0105191006	Seq. C of IEC 61730-2
5	IS-EN 310W	2156796	ICON31036A0105191016	Seq. C of IEC 61730-2
6	IS-EN 310W	2156800	ICON31036A0105191004	Seq. C of IEC 61730-2
7	IS-EN 310W	2156795	ICON31036A0105191008	Seq. D of IEC 61730-2

Supplementary information: NA

9	Pass Criteria		
	The module under evaluation was judged to have passed all safety qualification test. The test samples met all of the criteria of each individual safety test.	See appended tables	P

Supplementary information: N/A

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10	Test Procedures		
	Safety qualification testing includes the following Module Safety Tests (MST) of IEC 61730-2:		
10.1	MST 01 – Visual inspection	see table 10.1	
10.2	MST 11 – Accessibility test	see table 10.2	
10.3	MST 12 – Cut susceptibility test	see table 10.3	
10.4	MST 13 – Ground continuity test	see table 10.4	
10.5	MST 14 – Impulse voltage test	see table 10.5	
10.6	MST 16 – Dielectric withstand test	see table 10.6	
10.7	MST 21 – Temperature test	see table 10.7	
10.8	MST 23 – Fire test	see table 10.8	
10.9	MST 26 – Reverse current overload Test.....	see table 10.9	
10.10	MST 32 – Module breakage test.....	see table 10.10	
MST 17	MST 17 – Wet leakage current test	see table MST 17	
MST 22	MST 22 – Hot-spot test	see report no.: 4786930293.1.1-NABL-MNRE-S1(IEC 61215)	
MST 34	MST 34 – Mechanical load test	see report no.: 4786930293.1.1-NABL-MNRE-S1(IEC 61215)	
MST 51a	MST 51a – Thermal cycling test (TC200)	see report no.: 4786930293.1.1-NABL-MNRE-S1(IEC 61215)	
MST 51b	MST 51b – Thermal cycling test (TC50)	see report no.: 4786930293.1.1-NABL-MNRE-S1(IEC 61215)	
MST 52	MST 52 – Humidity freeze test	see report no.: 4786930293.1.1-NABL-MNRE-S1(IEC 61215)	
MST 53	MST 53 – Damp heat test.....	see report no.: 4786930293.1.1-NABL-MNRE-S1(IEC 61215)	
MST 54	MST 54 – UV preconditioning test	see report no.: 4786930293.1.1-NABL-MNRE-S1(IEC 61215)	
	Component tests:		
11.1	MST 15 – Partial discharge test.....	see table 11.1	
11.2	MST 33 – Conduit bending test	see table 11.2	
11.3	MST 44 – Terminal box knockout test	see table 11.3	
Supplementary information: NA			

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

10.1	TABLE: Visual Inspection - MST 01 (Initial)		
Sample No.	Nature and position of findings		—
1	No Visual Defects		P
2	No Visual Defects		P
3	No Visual Defects		P
4	No Visual Defects		P
5	No Visual Defects		P
6	No Visual Defects		P
7	No Visual Defects		P
Supplementary information: NA			

10.2	TABLE: Accessibility Test - MST 11 (Initial)		
	Maximum system voltage [V _{DC}]	1000	—
Sample No.	Result [M]		—
3	>1 M .		P
4	>1 M .		P
5	>1 M .		P
6	>1 M .		P
Supplementary information: Required = should be >1 M . During the test, the probe did not touch at any time contact any live electrical part.			

10.4	TABLE: Ground Continuity Test - MST 13 (Initial)		
	Maximum system voltage [V _{DC}]	1000	—
	Current applied [A]	37.5 (2.5 x Fuse Rating - 15A)	—
	Location of designated grounding point.....	Grounding holes on frame	—
	Location of second contacting point.....	NA	—
Sample No.	Voltage [V _{DC}]	Resistance []	—
3	0.26mV	0.0069m	P
4	0.28mV	0.0074m	P
5	0.26mV	0.0069m	P
6	0.32mV	0.0085m	P
Supplementary information: Should be <0.1			

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

10.6	TABLE: Dielectric Withstand Test - MST 16 (Initial)			
	Maximum system voltage [V _{DC}]	1000		—
	Test voltage applied V _{TEST} [V _{DC}].....	6000		—
	Module area A [m ²]	1.916		—
Sample No.	Dielectric breakdown	Insulation resistance at V _{TEST} [G]	Dielectric breakdown Yes / No	—
3	<input type="checkbox"/>	652	No	P
4	<input type="checkbox"/>	1104	No	P
5	<input type="checkbox"/>	601	No	P
6	<input type="checkbox"/>	1263	No	P
Supplementary information: NA				

MST 17	TABLE: Wet Leakage Current Test - MST 17 (Initial)			
	Maximum system voltage [V _{DC}]	1000		—
	Test voltage applied V _{TEST} [V _{DC}].....	1000		—
	Module area A [m ²]	1.916		—
	Resistivity of wetting agent [·cm].....	3499		—
	Average wetting agent temperature [°C].....	25		—
Sample No.	Insulation resistance at V _{TEST} [M]	Required [M]		—
3	330	>20.88		P
4	480	>20.88		P
5	522	>20.88		P
6	420	>20.88		P
Supplementary information: NA				

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

10.3	TABLE: Cut Susceptibility Test - MST 11		
			—
Sample No.			—
3	<input checked="" type="checkbox"/> No exposure of active circuitry of the module		P
4	<input checked="" type="checkbox"/> No exposure of active circuitry of the module		P
Supplementary information: For each part, after the tool was allowed to remain motionless for a period of 1 min, it was drawn across the surface of the sample at a speed of 150 ± 30 mm/s.			

10.1	TABLE: Visual Inspection - MST 01 (after Cut Susceptibility Test)		
Sample No.	Nature and position of findings		—
3	NO VISUAL DEFECTS		P
4	NO VISUAL DEFECTS		P
Supplementary information: NA			

10.2	TABLE: Accessibility test - MST 11 (after cut susceptibility Test)		
	Maximum system voltage [V_{DC}]	1000	
Sample No.	Result [M]		—
3	>1 M		P
4	>1 M		P
Supplementary information: Required = should be >1 M			

10.4	TABLE: Ground Continuity Test - MST 13 (after Cut Susceptibility Test)			
	Maximum system voltage [V_{DC}]	1000		—
	Current applied [A]	37.5 (2.5 x Fuse Rating-15A)		—
	Location of designated grounding point.....	Grounding holes on frame		—
	Location of second contacting point.....	NA		—
Sample No.	Voltage [V_{DC}]	Resistance []	—	
3	0.26mV	0.0069m	P	
4	0.28mV	0.0074m	P	
Supplementary information: Required = should not exceed 0.1				

IEC 61730-2				
Clause	Requirement + Test		Result - Remark	Verdict
10.6	TABLE: Dielectric Withstand Test - MST 16 (after Cut Susceptibility Test)			
	Maximum system voltage [V _{DC}]		1000	—
	Test voltage applied V _{TEST} [V _{DC}]		6000	—
	Module area A [m ²]		1.916	—
Sample No.	Dielectric breakdown	Insulation resistance at V _{TEST} [M]	Dielectric breakdown Yes / No	—
3	<input type="checkbox"/>	0.968G	No	P
4	<input type="checkbox"/>	1.089G	No	P
Supplementary information: NA				

MST 17	TABLE: Wet Leakage Current Test - MST 17 (after Cut Susceptibility Test)			
	Maximum system voltage [V _{DC}]		1000	—
	Test voltage applied V _{TEST} [V _{DC}]		1000	—
	Module area A [m ²]		1.916	—
	Resistivity of wetting agent [Ω·cm]		3499	—
	Average wetting agent temperature [°C]		25	—
Sample No.	Insulation resistance at V _{TEST} [M]	Required [M]	—	
3	257	>20.88	P	
4	310	>20.88	P	
Supplementary information: NA				

10.5	TABLE: Impulse Voltage Test - MST 14			
	Maximum system voltage [V _{DC}]		1000	—
	Impulse voltage [V]		8000	—
	Thickness of conductive foil [mm]		3mm	—
Sample No.	—			
5	<input checked="" type="checkbox"/> No evidence of dielectric breakdown or surface tracking observed			P
Supplementary information: NA				

10.1	TABLE: Visual Inspection - MST 01 (after Impulse Voltage Test)			
Sample No.	Nature and position of findings		—	
5	NO VISUAL DEFECTS		P	
Supplementary information: NA				

IEC 61730-2				
Clause	Requirement + Test		Result - Remark	Verdict
10.6	TABLE: Dielectric Withstand Test - MST 16 (after Impulse Voltage Test)			
	Maximum system voltage [V _{DC}]		1000	—
	Test voltage applied V _{TEST} [V _{DC}].....		6000	—
	Module area A [m ²]		1.916	—
Sample No.	Dielectric breakdown	Insulation resistance at V _{TEST} [M]	Dielectric breakdown Yes / No	—
5	<input type="checkbox"/>	0.867G	No	P
Supplementary information: NA				
10.7	TABLE: Temperature Test - MST 21			
	Sample No.		2	—
	Reference solar irradiance [W/m ²]		1000	—
	Reference ambient temperature [°C]		24.2	—
Measuring location		Component temperature T _{OBS} [°C]	Component temperature limit [°C]	—
Module open-circuited				
Module superstrate above the centre cell		73.6	Reference	P
Module substrate below the centre cell		72.4	100	P
Terminal enclosure interior surface		71.6	Reference	P
Terminal enclosure interior air space		71.9	90	P
Field wiring terminals		42.5	90	P
Insulation of the field wiring leads		42.4	85	P
External connector bodies		41.6	85	P
Diode bodies		64.7	200	P
Module short-circuit				
Module superstrate above the centre cell		68.9	Reference	P
Module substrate below the centre cell		67.6	100	P
Terminal enclosure interior surface		68.4	Reference	P
Terminal enclosure interior air space		68.4	90	P
Field wiring terminals		41.2	90	P
Insulation of the field wiring leads		41.9	85	P
External connector bodies		41.5	85	P
Diode bodies		63.7	200	P
Supplementary info: T _{CON} = T _{OBS} + (40 °C – T _{AMB}), temperature limits are given in Table 9 of IEC 61730-2.				

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

10.8	TABLE: Fire Test - MST 23		
	Module fire resistance class (A, B, C).....:		—
	No. of modules provided to create the test assembly.....:		—
Sample No.			—
	<input type="checkbox"/> Modules comply with the requirements for the fire resistance class		
Supplementary information:			

10.9	TABLE: Reverse Current Overload Test - MST 26		
	Module over-current protection rating [A]	15	—
	Test current [A]	20.25	—
	Range of applied voltage [V].....	42.84	—
	Test duration	2 Hours	—
Sample No.			—
2	<input checked="" type="checkbox"/> No flaming of the module <input checked="" type="checkbox"/> No flaming or charring of the cheesecloth <input checked="" type="checkbox"/> No flaming of the tissue paper		P
Supplementary information: NA			

MST 17	TABLE: Wet Leakage Current Test - MST 17 (after Reverse Current Overload Test)		
	Maximum system voltage [V _{DC}]	1000	—
	Test voltage applied V _{TEST} [V _{DC}].....	1000	—
	Module area A [m ²]	1.916	—
	Resistivity of wetting agent [Ω•cm]	3499	—
	Average wetting agent temperature [°C].....	25.1	—
Sample No.	Insulation resistance at V _{TEST} [M Ω]	Required [M Ω]	—
2	254	>20.88	P
Supplementary information: NA			

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
10.10	TABLE: Module Breakage Test - MST 32		
	Weight of impactor [kg]	45	—
	Thickness of sample [mm]	NA	—
	Mounting technique used.....	For the provided mounting holes	—
	Module breakage	<input type="checkbox"/> No breakage <input type="checkbox"/> Breakage at 300 mm <input type="checkbox"/> Breakage at 450 mm <input checked="" type="checkbox"/> Breakage at 1220 mm	—
	Weight of particles in case of breakage [g]	0.24	—
	Sample No.		—
	<input checked="" type="checkbox"/>	Breakage occurred, but no shear or opening large enough for a 76 mm diameter sphere to pass freely has developed.	P
	<input checked="" type="checkbox"/>	Disintegration occurred, but the ten largest crack-free particles selected 5 min subsequent to the test did not weigh more in grams than 16 times the thickness of the sample in millimetres.	P
	<input checked="" type="checkbox"/>	Breakage occurred, but no particles larger than 6.5 cm ² have been ejected from the sample.	P
Supplementary information: NA			

ANNEX 1: PRODUCT DESCRIPTION SHEET (MANUFACTURERS AND TYPE REFERENCES)

A1.1	MODULE TYPE/S	
	Crystalline Silicon Photovoltaic Modules (Multi-Crystalline) – 310Wp - IS-EN 310W	
A1.2	MODULE DESIGN –DIMENSIONS	
	Module dimensions (L x W x H) [mm]	1956x980x42
A1.3	SOLAR CELL	
	Cell type reference	SUNTECH,STP156M,Polycrystalline
	Cell dimensions L x W x T (\pm %) [mm]	156 X156 +/- 0.5
	Cell thickness [μ m]	180 - 200 +/-20
	Cell area [cm ²]	243.360
A1.4	IDENTIFICATION OF MATERIALS	
	Front cover.....	Gujarat Borosil Limited, Solar Tempered Glass 3.2 +/-0.2mm
	Rear cover	MADICO Specialty Films, Reflekt-Light (Thickness 259 μ m, Wt 285g/sqm, Density 1.14gm/sqcm)
	Encapsulation material	TPI All seasons company Limited , Thailand, Grade ST 308 Fast cure EVA
	Frame parts	ULTRA Aluminum Pvt Ltd, Raipur, Model:6063 T6
	Adhesive for frame	Pentagon Tapes Pvt. Ltd. (BOW tape) , PT390W(1mm Polyethylene foam Double side adhesive)
	Internal wiring:	Luvata Malaysia 1.5x0.18mm Cell Interconnect snpb 60/40 15 to 25 μ m and 5x0.3 mm Bus bar Snpb 60/40 15 to 25 μ m
	Cell connector.....	Luvata Malaysia 1.5x0.18mm Cell Interconnect snpb 60/40 15 to 25 μ m
	String connector	Luvata Malaysia 5x0.3 mm Bus bar Snpb 60/40 15 to 25 μ m
	Soldering material.....	Sri bhavani metals Pvt Ltd, 63/37 Sn/PB single core
	Fluxing agent	Liquid Type - Kester
	Junction box.....	Tyco Electronics Middle East FZE, Model Code: Z-CLA4GBN3K Part No : 8-2152080-6
	Cable	PV1-F, 4 mm2
	Connector	PV 4,1000 VDC ,40 A
	Bypass diode	Schottky Barrier Rectifier – SL1515B, 40V/20A
	Potting material.....	Not Used
	Adhesive for junction box	Sikasil AS-60 CN

	Additional material (e. g. fixing tape, insulation tape).....:	NA
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A1.5	MODULE DESIGN - MINIMUM DISTANCES	
	Between cells.....:	2.39mm
	Between cell and edge of laminate	10.35mm
	Between any current carrying part and edge of laminate	9.20mm

A1.6	MODULE DESIGN - ELECTRICAL CONFIGURATION	
	Total number of cells	72
	Serial-parallel connection of cells	All in Series
	Cells per bypass diode	24
	No. of bypass diodes	3

TEST EQUIPMENT CALIBRATION DETAILS:

Local ID	Equipment Type	Test Title	Last Cal	Next Cal
HB01	HOT BOX (PV LAB)	BY PASS DIODE TEST	06/02/2015	06/02/2016
SPS28	DC Power Supply	BY PASS DIODE TEST	05/26/2015	05/26/2016
TR20	Temperature Recorder	BY PASS DIODE TEST	04/02/2015	04/02/2016
CTT01	CUT TEST TOOL (PV LAB)	CUT TEST	01/23/2015	01/23/2016
H11	Temperature & Humidity Recorder (PV LAB)	CUT TEST	05/30/2015	05/30/2016
SW04	Stop Watch (PV LAB)	CUT TEST	04/06/2015	04/06/2016
TP12	Measuring Tape	CUT TEST	03/07/2015	03/07/2016
EDC01	DAMP HEAT CHAMBER (PV LAB)	DAMP HEAT TEST	01/08/2015	01/08/2016
TR22	Temperature Data Logger	DAMP HEAT TEST	09/05/2014	09/05/2015
DC06	Caliper- Digital (PV Lab)	HAIL TEST	11/26/2014	11/26/2015
HI01	HAIL IMPACT TESTER (PV LAB)	HAIL TEST		
TP12	Measuring Tape	HAIL TEST	03/07/2015	03/07/2016
ECC01	CLIMATIC CHAMBER	HF10 TEST	12/15/2014	12/15/2015
TR15	Temperature Data Logger	HF10 TEST	02/20/2015	02/20/2016
CS01	CONTINUOUS SIMULATOR	HOT SPOT ENDURANCE TEST		
CS01	CONTINUOUS SIMULATOR	HOT SPOT ENDURANCE TEST		
FST01	FLASH SOLAR SIMULATOR (PV LAB)	HOT SPOT ENDURANCE TEST	01/10/2015	01/10/2016
FST01	FLASH SOLAR SIMULATOR (PV LAB)	HOT SPOT ENDURANCE TEST	01/10/2015	01/10/2016
SSS01	FLASH SOLAR SIMULATOR (PV LAB)	HOT SPOT ENDURANCE TEST		
SSS01	FLASH SOLAR SIMULATOR (PV LAB)	HOT SPOT ENDURANCE TEST		
TG01	THERMAL IMAGER (PV LAB)	HOT SPOT ENDURANCE TEST	05/30/2015	05/30/2016
TG01	THERMAL IMAGER (PV LAB)	HOT SPOT ENDURANCE TEST	05/30/2015	05/30/2016
TR13	Temperature Data Logger	HOT SPOT ENDURANCE TEST	11/12/2014	11/12/2015
TR13	Temperature Data Logger	HOT SPOT ENDURANCE TEST	11/12/2014	11/12/2015
DI03	Dielectric Tester (PV Lab)	INITIAL IR TEST	06/16/2015	06/16/2016
H11	Temperature & Humidity Recorder (PV LAB)	INITIAL IR TEST	05/30/2015	05/30/2016
RT02	Insulation Resistance Tester (PV LAB)	INITIAL IR TEST	02/23/2015	02/23/2016
FST01	FLASH SOLAR SIMULATOR (PV LAB)	INITIAL PIV MEASUREMENT	01/10/2015	01/10/2016
H08	Temperature & Humidity Recorder (PV LAB)	INITIAL PIV MEASUREMENT	05/30/2015	05/30/2016
REF300	REFERENCE MODULE (PV LAB)	INITIAL PIV MEASUREMENT		
SSS01	FLASH SOLAR SIMULATOR (PV LAB)	INITIAL PIV MEASUREMENT		
TP12	Measuring Tape	INITIAL PIV MEASUREMENT	03/07/2015	03/07/2016
H15	Temperature & Humidity Recorder (PV LAB)	MECHANICAL LOADING	01/29/2015	01/29/2016
SPS03	DC Power Supply	MECHANICAL LOADING	05/28/2015	05/28/2016
SW04	Stop Watch (PV LAB)	MECHANICAL LOADING	04/06/2015	04/06/2016
WM01	Weighing Device	MECHANICAL LOADING	01/29/2015	01/29/2016
DC06	Caliper- Digital (PV Lab)	MODULE BREAKAGE TEST	11/26/2014	11/26/2015

Local ID	Equipment Type	Test Title	Last Cal	Next Cal
SW04	Stop Watch (PV LAB)	MODULE BREAKAGE TEST	04/06/2015	04/06/2016
TP12	Measuring Tape	MODULE BREAKAGE TEST	03/07/2015	03/07/2016
WM01	Weighing Device	MODULE BREAKAGE TEST	01/29/2015	01/29/2016
FST01	FLASH SOLAR SIMULATOR (PV LAB)	POST LIGHT SOAKING PIV	01/10/2015	01/10/2016
H08	Temperature & Humidity Recorder (PV LAB)	POST LIGHT SOAKING PIV	05/30/2015	05/30/2016
REF300	REFERENCE MODULE (PV LAB)	POST LIGHT SOAKING PIV		
SSS01	FLASH SOLAR SIMULATOR (PV LAB)	POST LIGHT SOAKING PIV		
DC06	Caliper- Digital (PV Lab)	REVERSE CURRENTOVERLOAD TEST	11/26/2014	11/26/2015
SPS03	DC Power Supply	REVERSE CURRENTOVERLOAD TEST	05/28/2015	05/28/2016
SW04	Stop Watch (PV LAB)	REVERSE CURRENTOVERLOAD TEST	04/06/2015	04/06/2016
H11	Temperature & Humidity Recorder (PV LAB)	ROBUSTNESS TEST	05/30/2015	05/30/2016
SS02	DEAD WEIGHT (PV LAB)	ROBUSTNESS TEST	11/25/2014	11/25/2016
SW04	Stop Watch (PV LAB)	ROBUSTNESS TEST	04/06/2015	04/06/2016
SPG01	SALT SPRAY CHAMBER (PV LAB)	SALT MIST TEST	02/12/2015	02/12/2016
SSC01	SALT SPRAY CHAMBER (PV LAB)	SALT MIST TEST	02/12/2015	02/12/2016
ECC05	CLIMATIC CHAMBER	TC 50 TEST	07/10/2015	07/10/2016
TR18	Temperature Data Logger	TC 50 TEST	05/28/2015	05/28/2016
ECC05	CLIMATIC CHAMBER	TC200 TEST	07/10/2015	07/10/2016
TR18	Temperature Data Logger	TC200 TEST	05/28/2015	05/28/2016
UV01	UV CHAMBER	UV PRECONDITIONING TEST		
DC06	Caliper- Digital (PV Lab)	VISUAL INSPECTION	11/26/2014	11/26/2015
LM02	LIGHT METER	VISUAL INSPECTION	04/24/2015	04/24/2016

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