TC- 6168

SUMMARY OF TEST REPORT No. 4789949365-BIS-S1, DATED (mm/dd/yyyy): 10/28/2021

ULR No. TC616821100000892F

(Number of pages in test report: Page no.1 to 68)

TEST FORMAT AS PER IS 14286: 2010

1. Name of manufacturer:	Visaka Industries Limited (Atum Division)
2. Product:	Crystalline Silicon Photovoltaic (PV) Modules
3. Models:	72 Full Cell Mono crystalline models **Representative Model: VIL-375M** Series Model: VIL-370M
4. Model differences provided	YES
5. Model differences verified as per MNRE Guidelines for series formulation	YES
6. Test Results:	

SL. No.	TEST REQUIREMENTS	CLAUSE	VERDICT
1	Marking	4	P
2	Visual Inspection	10.1	P
3	Maximum Power Determination	10.2	P
4	Insulation Test	10.3	P
5	Measurement of Temperature Coefficients.	10.4	P
6	Measurement of NOCT	10.5	P
7	Performance at STC and NOCT	10.6	P
8	Performance at low irradiance.	10.7	P
9	Outdoor exposure test	10.8	P
10	Hot-spot endurance test	10.9	P
11	UV preconditioning	10.10	P
12	Thermal cycling test	10.11	P
13	Humidity freeze test	10.12	P
14	Damp heat test	10.13	P
15	Robustness of termination test	10.14	P
16	Wet leakage current test	10.15	P
17	Mechanical load test	10.16	P
18	Hail test	10.17	P
19	Bypass diode thermal test	10.18	P

SUMMARY OF TEST REPORT No. 4789949365-BIS-S1, DATED (mm/dd/yyyy): 10/28/2021

ULR No. TC616821100000892F

General Information:

1. The conformity certificates of critical components are verified to ensure complete testing of apparatus 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 14286 : 2010 (First Revision): Yes

~~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 14286: 2010 (First Revision)~~/does not meet the requirements stated above at 2) of conclusion~~. If any deviation is found, suitable punitive action may be taken by BIS.

Srimathy N Digitally signed by Srimathy N Date: 2021.10.28 18:57:51 +05'30'

Date(mm/dd/yyyy): 10/28/2021 **(Signature of Authorized person)**

UL India Private Limited
Registered Office: Kalyani Platina - Block I, 3rd Floor
No. 24, EPIP Zone, Phase II, Whitefield, Bangalore - 560066, India
T: 91.80.4138.4400 / F: 91.80.2841.3759 / W: ul.com
CIN: U74200KA1997PTC023189

TC- 6168

Test Report issued under the responsibility of:

TEST REPORT **IS 14286: 2010** **Crystalline Silicon Terrestrial Photovoltaic (PV) Modules** **- Design Qualification and Type Approval**	
Report Number.....:	4789949365-BIS-S1
ULR. Number .....:	TC616821100000892F
Test Request No.....:	SC21SPI00507
Date of issue :	10/28/2021
Total number of pages	68
Testing Laboratory:	UL INDIA PVT LTD
Address :	Laboratory Building, Kalyani Platina Campus, Survey. No. 129/4, EPIP Zone, Phase II, Whitefield, IN-560066, Bangalore, India
Applicant's name.....:	VISAKA INDUSTRIES LIMITED (ATUM DIVISION)
Address .....:	Survey No 95 & 96, Adjacent to Kukkadam Railway Station, Kukkadam Post, Gajalapur, Madugulapally, Nalgonda-508207, Telangana, India.
Test specification .....:	
Standard.....:	IS 14286: 2010
Test procedure .....:	IS 14286: 2010
Non-standard test method.....:	N/A
Test Report Form No. .....:	IS 14286_V1.0
Test Report Form Originator .....:	BIS
Master TRF.....:	Dated: 19.02.2018

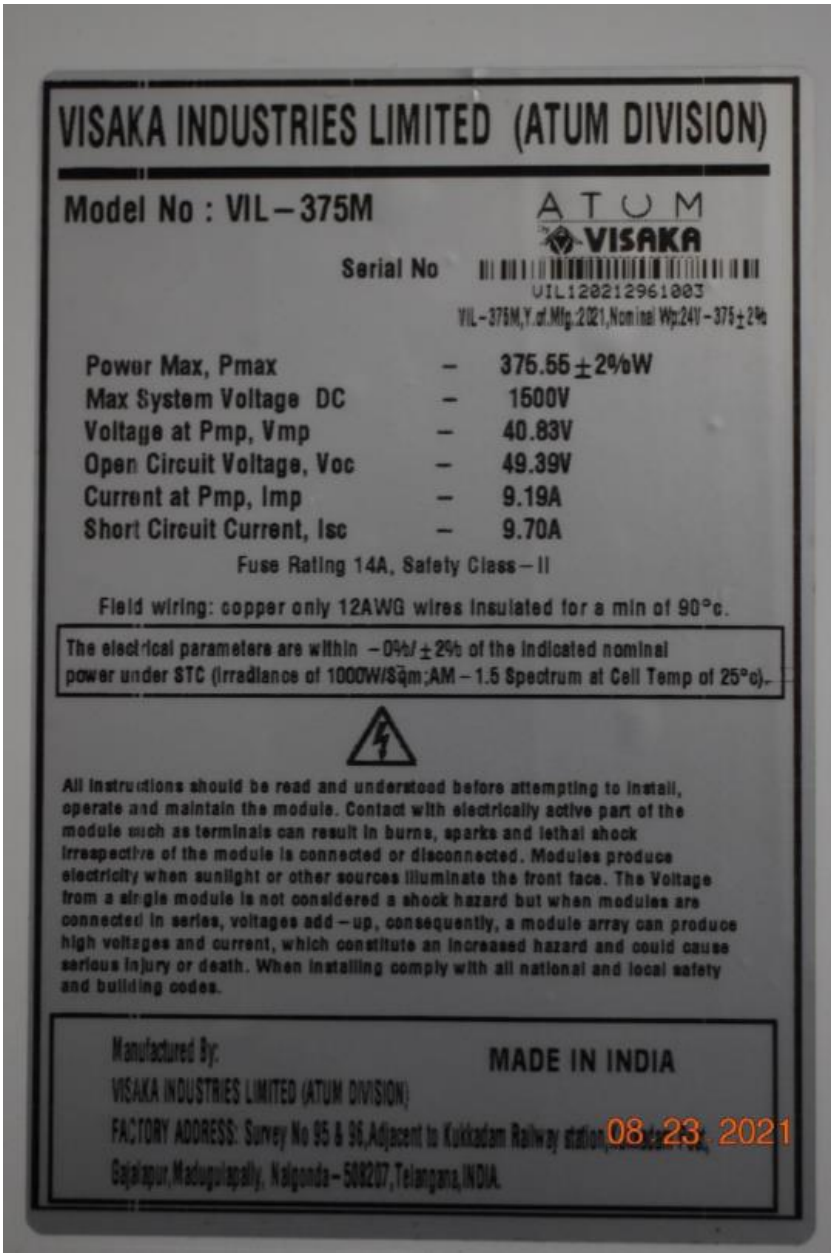
Test item description ..... **:**	Photovoltaic (PV) Module(s)
Trade Mark .....:	ATUM by VISAKA
Manufacturer .....:	VISAKA INDUSTRIES LIMITED (ATUM DIVISION)
Factory.....:	Survey No 95 & 96, Adjacent to Kukkadam Railway Station, Kukkadam Post, Gajalapur, Madugulapally, Nalgonda-508207, Telangana, India.
Model/Type reference .....:	Representative Model: **VIL-375M** Series Model: VIL-370M
Ratings .....:	Maximum System Voltage: 1500V Maximum over current protection rating: 14A See specific model rating in General Product information

Testing procedure and testing location:		
☒ **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).....:	Viswanathan K	K. Viswanathan Digitally signed by K. Viswanathan Date: 2021.10.28 18:23:53 +05'30'
Approved by (name + signature).....:	N Srimathy	Srimathy N Digitally signed by Srimathy N Date: 2021.10.28 18:58:11 +05'30'
Issued by (name + signature).....:	Kantha Raju H S	Kantha Raju Digitally signed by Kantha Raju Date: 2021.10.28 19:04:48 +05'30'

Summary of testing:	
Tests performed (name of test and test clause): Model VIL-375M from Mono cell families were considered as representative of all series with same component All models are same in construction except output power and electrical ratings.	**Testing location:** UL India Pvt. Ltd. Laboratory Building, Kalyani Platina Campus, Survey. No. 129/4, EPIP Zone, Phase II, Whitefield, IN-560066, Bangalore, India
10.1 Visual Inspection	
10.2 Maximum Power Determination	
10.3 Insulation Test	
10.4 Measurement of Temperature Coefficients.	
10.5 Measurement of NOCT	
10.6 Performance at STC and NOCT	
10.7 Performance at low irradiance.	
10.8 Outdoor exposure test	
10.9 Hot-spot endurance test	
10.10 UV preconditioning	
10.1 Visual Inspection	
10.11 Thermal cycling test	
10.12 Humidity freeze test	
10.13 Damp heat test	
10.14 Robustness of termination test	
10.15 Wet leakage current test	
10.16 Mechanical load test	
10.17 Hail test	
10.18 Bypass diode thermal test	

Copy of marking plate:

Representative Model: VIL-375M:



Note: Photo Date format (mm/dd/yyyy)

Marking label photo inside Laminate:

Inside laminate marking label with serial No. “VIL120212961003”.
as declared by the manufacturer, 5th to 8th digits from left “2021” representing manufactured Year, 9th and 10th digit from left “29” representing manufactured week of the year, 11th digit “6” represents the day of the week (That is Saturday).

Note: Photo Date format (mm/dd/yyyy)

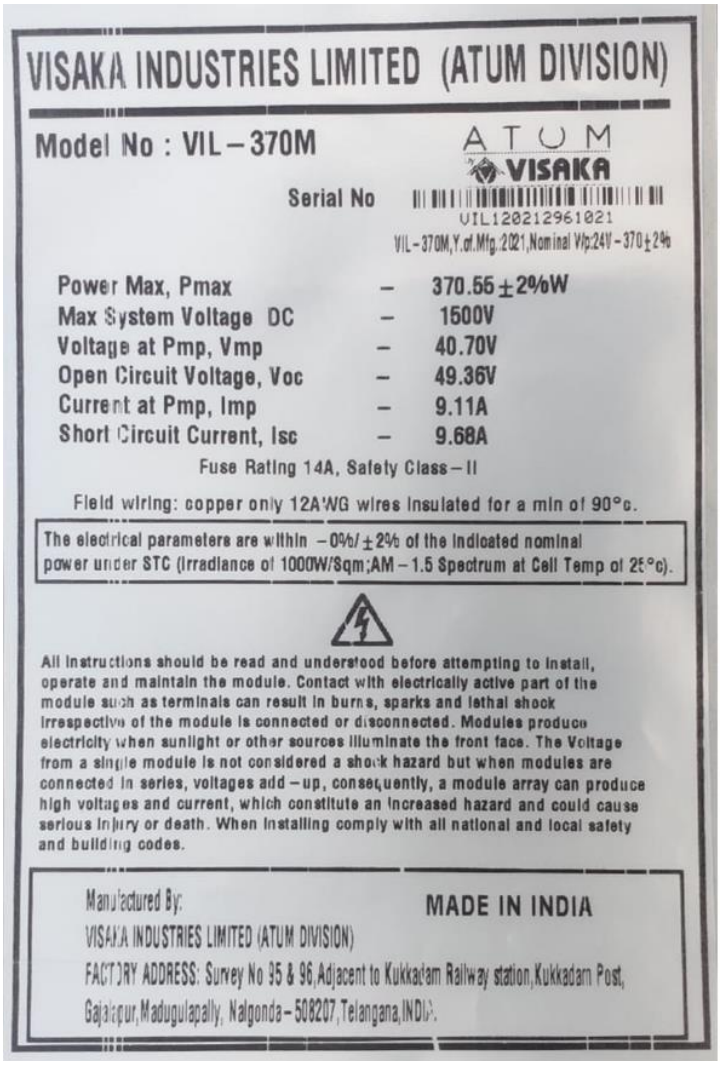
Polarity marked on the Junction Box

Note: Photo Date format (mm/dd/yyyy)

Polarity marked on the Connectors

Note: Photo Date format (mm/dd/yyyy)

Series Back Label:



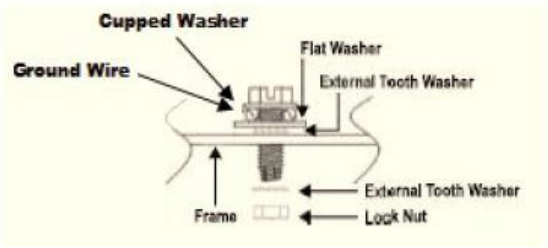
Inside Laminate of model series:

Logo of Make in India:

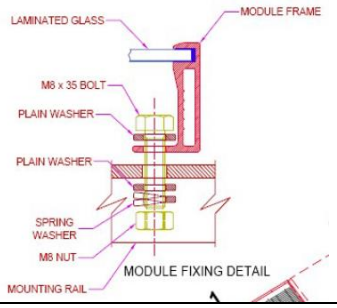
Logo is common for all the models

The marking plate above represents all models covered by this report except for difference in electrical ratings and model designation. See “General product information” for electrical ratings for all models.

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

GENERAL INFORMATION	
Test item particulars:	
Accessories and detachable parts included in the evaluation..... :	**Grounding the Array:** Attach a separate conductor to one of the 4mm diameter grounding holes marked on the Module frame with a screw and nut that incorporates an external tooth washer. This is to ensure positive electrical contact with the frame. It is recommended to ground each module frame at the provided grounding holes (4 mm or 5/32-inch diameter, marked with the grounding symbol). The modules can be connected at the grounding holes using stainless steel nut, bolt, start washer and flat washer of size M4  The grounding screw, bolt or other parts are separately used from the mounting parts of the module. The grounding is achieved through securement to the array frame. The torque rating provided for grounding means is 2.8 Nm [25 in.–lbs].

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Mounting system used……:	**Mounting Method:** The frame of each Module has 8mm x 12mm mounting holes used to secure the modules to supporting structure. The Module frame must be attached to a supporting structure using M8 stainless steel bolt hardware together with hex nut, spring washers and 2nos of plain washers in four places (i.e. minimum number holes to be used are 4 mounting holes) symmetrical on the SPV Module. The applied torque is about 8 Newton-meters. 
Options included ..... :	N/A
Possible test case verdicts:	N/A
Abbreviations used in the report:	N/A
HF – Humidity Freeze	TC – Temperature Cycling
DH – Damp Heat	Vmp – Maximum power voltage
Imp – Maximum power current	Voc – Open circuit voltage
Isc - Short circuit current	FF – Fill Factor
Pmp – Maximum power	α – Current temperature coefficient
NOCT – Nominal Operating Cell Temperature	β – Voltage temperature coefficient
STC – Standard Test Conditions	δ – power temperature coefficient
Possible test case verdicts: - test case does not apply to the test object :	N/A
- test object does meet the requirement:	Pass (P)
- test object does not meet the requirement:	Fail (F)
Testing:	Refer individual test date
Date of receipt of test item….(mm-dd-yyyy):	07-30-2021
Date (s) of performance of tests (mm-dd-yyyy):	08-13-2021 to 10-20-2021
*Note: Preconditioning test was carried out on – 08-13-2021 to 08-14-2021	
General remarks: The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report. Throughout this report a point is used as the decimal separator	

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

General product information:		All models are same in construction output power and electrical ratings System Voltage: 1500V
PV module type reference ..... :		**VIL-375M (Representative Model)**
Product Electrical Ratings at STC		
Nominal maximum power (Pmax) :		375.55 W
Nominal open circuit voltage at (Voc) :		49.39 V
Nominal short circuit current at (Isc) :		9.70 A
Nominal maximum power voltage (Vpm) :		40.83 V
Nominal maximum power current (Ipm) :		9.19 A
Product Safety Ratings		
Maximum systems operating voltage :		1500 V
Maximum over-current protection rating :		14 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..... :		24 modules in series for 72 cell series Note: Refer Annex 5 for all electrical ratings of all series model

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Description of module construction: (Manufactories and part numbers, unless otherwise specified)	
Sample..... :	Random sampling from production ☒ Prototype submitted by client ☐
Module	Representative Model: VIL-375M Series Model: VIL-370M
Front Cover :	Manufactured by: Borosil Renewables Limited, Type: AR Coated (Low-iron) Textured Tempered Solar Glass. Thickness: 3.2mm
Rear Cover :	Manufactured by: Renewsys India Private Limited, Type: Preserv 1 300 WD, Thickness: 0.395mm, Color: WT, RTI: 140, Flame Spread Index: 30, Partial Discharge: 4.17kV
Encapsulation material :	Manufactured by: Renewsys India Private Limited, Type: CONSERV P 360-14FC, Thickness: 0.45- 0.5mm, HWI=4, HAI=0, RTI:50, Color : NC
Frame:	Manufactured by: Satya Surya Aluminium Industries Ltd. Type 6063–T6
Dimensions (l x w x h) [mm] :	1981x991x35
Module area [m²] :	1.96
Minimum distance between current-carrying parts and module edge [mm]	13.2
Cell	Mono-crystalline PERC Manufactured by: ADANI SOLAR CELLS (Mundra Solar Pvt Ltd)
Cell (include type) :	MSPVLM2M5
Cells (l x w) [mm] :	156.75 mm x 156.75 mm ± 0.25 mm
Cell thickness [µm] :	190 µm ± 30 µm
Cell area [cm²] :	245.70
Number of cells :	72
Components and other	
Cells per bypass diode :	24
Type of bypass diode :	30SQ 045T
No. of bypass diodes :	03
Cell- and string connectors :	Manufactured by: NEOCAB-PV, AB Industries Cell Connectors Type: Cross section: 0.9X0.20 mm, Material: Base Cu ≥ 99.95%, Coating Sn60%Pb40%. String Connectors Type: Cross section: 0.3X5.0 mm, Material: Base Cu ≥ 99.95%, Coating Sn60%Pb40%,
Junction box :	Manufactured by: Ningbo GZX Photovoltaic Technology Co., Ltd, Type: PV-GZX156V, 1500Vdc, 14A, Reverse Current 30A, -40°C to 85°C, IP65/68
Cable :	Manufactured by: Ningbo GZX Photovoltaic Technology Co., Ltd, Type: 62930 IEC 131, 1500Vdc, -40°C to 90°C, 120°C
Connectors :	Manufactured by: Ningbo GZX Photovoltaic Technology Co., Ltd Type: PV- GZX 1500, 1500VDC, 30A, IP68

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Adhesives (frame) :	Manufactured by: Sika India Pvt Ltd, Type: Sikasil AS 60 IN, Thickness: 1.5 mm min, Flame Class: HB, HWI: 3, HAI:0, RTI:105, color: WT
Adhesives (junction box) :	Manufactured by: Sika India Pvt Ltd, Type: Sikasil AS 60 IN, Thickness: 1.5 mm min, Flame Class: HB, HWI: 3, HAI:0, RTI:105, color: WT
Potting material (junction box) :	Manufactured by: Shanghai Huitian new material Co., Ltd Type: 5299W-S, Thickness: 3.0 mm min, Flame Class: V-0, HWI: 1, HAI:0, RTI:105, color: WT, IPT:2.5kV
Others :	Aluminium corner Key: Manufactured by: Satya Surya Aluminium Industries Ltd. Type D-6606. Back Label: Speckgrap India Pvt. Ltd, Type: 2M MAT CH PET TC/S-730 Internal Label: Speckgrap India Pvt. Ltd. Type: PET WHITE TC 50 -RC18

Testing procedure

☒ New module type

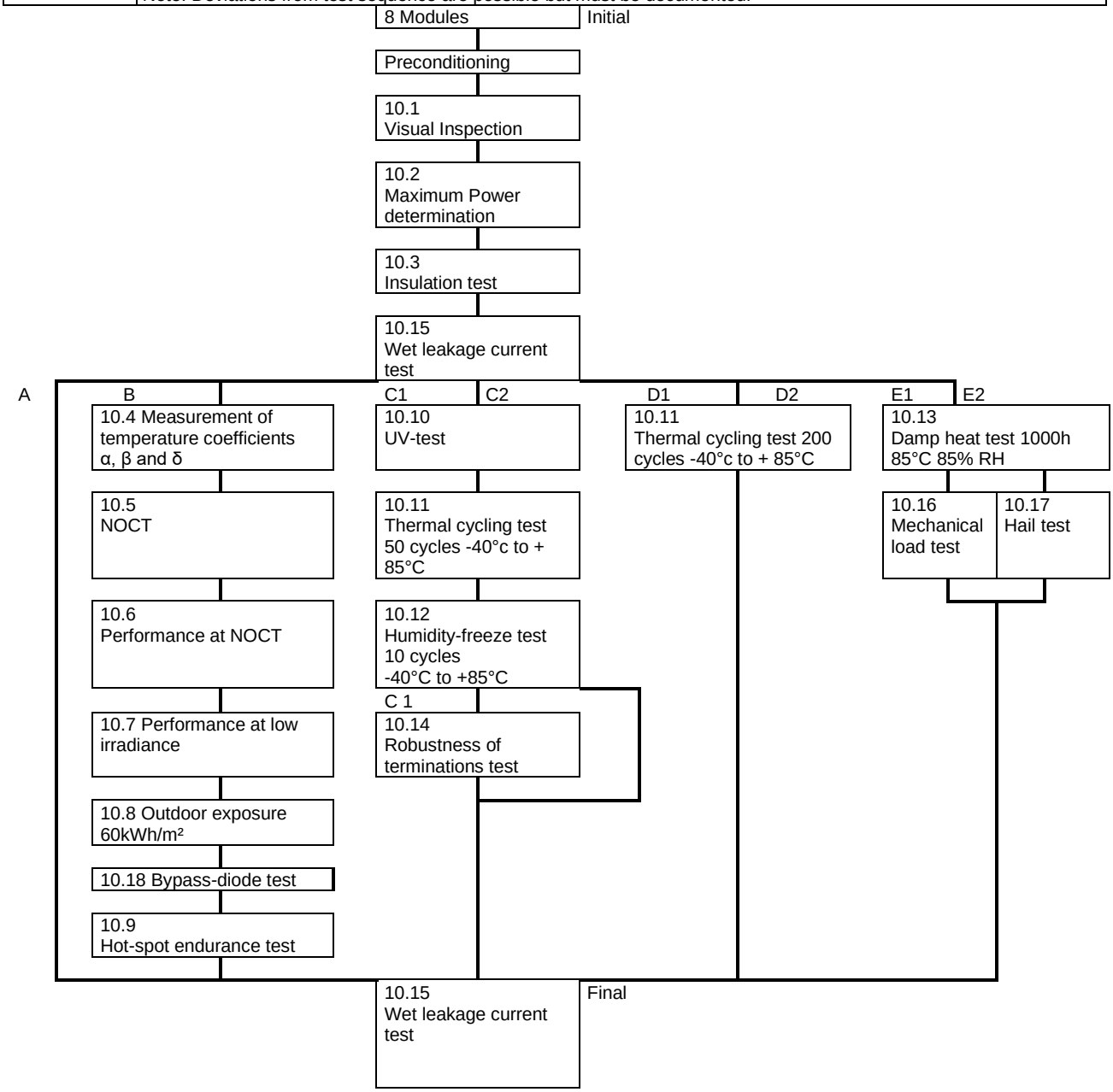
☐ Modifications (if yes, please choose the applicable modification according to the Retesting Guideline)

- ☐ Change in cell technology
- ☐ Modification to encapsulation system
- ☐ Modification to superstrate
- ☐ Increase in module size
- ☐ Modification to back sheet/ substrate
- ☐ Modification to frame and/ or mounting structure
- ☐ Modification to junction box/ electrical termination
- ☐ Change in cell interconnect materials or technique
- ☐ Change in electrical circuit of an identical package
- ☐ Higher or lower power output (by 10%) in the identical package including size and using the identical cell process
- ☐ Qualification of a frameless module after the design has received certification as a framed module
- ☐ Change in bypass diode or number of diodes

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Module group assignment:		
Sample #	Sample Group ID	Sample No. & S/N
4110288	A	Model No: VIL-375M, Sl No: VIL120212961003
4110289	B	Model No: VIL-375M, Sl No: VIL120212961002
4110290	C1	Model No: VIL-375M, Sl No: VIL120212961006
4110291	C2	Model No: VIL-375M, Sl No: VIL120212961008
4110292	D1	Model No: VIL-375M, Sl No: VIL120212961013
4110293	D2	Model No: VIL-375M, Sl No: VIL120212961010
4110294	E1	Model No: VIL-375M, Sl No: VIL120212961011
4110295	E2	Model No: VIL-375M, Sl No: VIL120212961014
4110296	B	Model No: VIL-375M, Sl No: VIL120212961020 (Bypass Diode Test)

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict
10	TEST PROCEDURES (if it is not a full test, strikethrough non-performed test) Note: Deviations from test sequence are possible but must be documented.		



IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict
4	MARKING		P
	Name, monogram or symbol of manufacturer :	VISAKA INDUSTRIES LIMITED (ATUM DIVISION) 	P
	Type or model number :	VIL-375M Provided in inside laminate in front side of the module and on backside marking plate	P
	Serial number :	VIL120212961003 Provided in inside laminate in front side of the module marking plate.	P
	Polarity of terminals or leads :	“+” and "-" provided on Junction Box and connectors	P
	Maximum system voltage :	1500V	P
	The date and place of manufacture :	Provided. The Date of manufacturing are traceable through serial number provided in inside laminate marking plate. VIL120212961003 VIL1-VISAKA INDUSTRIES LTD (ATUM DIVISION) Line 1 2021-Year of Manufacture 29-Week of the Year 6-Day of the Weak Place and year of manufacturing is mentioned in inside laminate marking plate and also in back label.	P

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict
	Initial examination	All modules	P
10	Preconditioning ..... :	5.0 kWh/m²	P
10.1	Visual inspection ..... :	See table 10.1 Int	P
10.2	Maximum power determination..... :	See table 10.2 Int	P
10.3	Insulation test..... :	See table 10.3 Int	P
10.15	Wet leakage current test	See table 10.15 Int	P
Group A	Control Module	Sample Group ID A	P
Group B	1 Module	Sample Group ID B	P
10.4	Measurement of temperature coefficients	See table 10.4 B	P
10.5	Measurement of Nominal Operating Cell Temperature [NOCT, °C] ..... :	See table 10.5 B	P
10.6	Performance at STC and NOCT..... :	See table 10.6 B	P
10.7	Performance at low irradiance ..... :	See table 10.7 B	P
10.8	Outdoor exposure test	See table 10.8 B	P
10.18	Bypass diode thermal test	See table 10.18 B	P
	Maximum allowed junction temperature ..... :	200 °C	P
	Measured junction temperature ..... :	139.7 ºC	P
10.9	Hot spot endurance test..... :	See table 10.9 B	P
Group C	2 Modules	Sample Group ID C1, C2	P
10.10	UV test..... :	15 kWh/m²	P
	Final measurements	See table 10.10 C	P
10.11	Thermal cycling test (50 cycles) ..... :	50	P
	Final measurements	See appended table 10.11 C	P
10.12	Humidity freeze (10 cycles) ..... :	10	P
	Final measurements	See table 10.12 C	P
Group C1	1 Module	Sample Group ID C1	P
10.14	Robustness of terminations test ..... :	Type A	P
	Final measurements	See table 10.14 C1	P
Group D	2 Modules	Sample Group ID D1, D2	P
10.11	Thermal cycling test (200 cycles) ..... :	200	P
	Final measurements	See table 10.11 D	P

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict
Group E	2 Modules	Sample Group ID E1, E2	P
10.13	Damp heat test ..... :	1000h	P
	Final measurements	See table 10.13 E	P
Group E1	1 Module	Sample Group ID E1	P
10.16	Mechanical load test ..... :	5400Pa	P
10.16.4	-No open-circuits or ground faults detected	Yes	P
	Final measurements	See table 10.16 E1	P
Group E2	1 Module	Sample Group ID E2	P
10.17	Hail test	25 mm	P
	Number of points impacted..... :	11	P
	Final measurements	See table 10.17 E2	P
	Final measurement	All modules	P
10.15	Wet leakage current test	See table 10.15 F	P

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

10.1 Initial	**TABLE: Visual inspection (Initial)**	P
Test Date [MM/DD/YYYY] :	8/16/2021	—
Sample #	Nature and position of initial findings – comments or attach photos	—
4110288	No Visual defects found	P
4110289	No Visual defects found	P
4110290	No Visual defects found	P
4110291	No Visual defects found	P
4110292	No Visual defects found	P
4110293	No Visual defects found	P
4110294	No Visual defects found	P
4110295	No Visual defects found	P
4110296	No Visual defects found	P
Supplementary information: N/A		

10.2 Initial	**TABLE: Maximum power determination (Initial)**	
Test Date [MM/DD/YYYY] ..... :	08/23/2021	—
Module temperature [°C] ..... :	25	—
Irradiance [W/m²) ..... :	1000	—

Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]
4110288	48.44	39.97	9.85	9.24	369.20	77
4110289	48.45	39.83	9.85	9.31	370.71	78
4110290	48.45	39.88	9.86	9.29	370.36	78
4110291	48.48	39.97	9.89	9.33	372.88	78
4110292	48.51	39.82	9.85	9.26	368.89	77
4110293	48.54	39.93	9.87	9.32	372.15	78
4110294	48.47	39.84	9.87	9.36	372.89	78
4110295	48.61	40.06	9.88	9.29	372.04	77
4110296	48.55	39.95	9.90	9.33	372.89	78
Supplementary information: N/A						

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

10.3 Initial	**Table: Insulation test (initial)**				P
Test Date [MM/DD/YYYY]..... :			08/23/2021		—
Test Voltage applied [V] ..... :			IR = 1500V Dielectric = 4000		—
Sample #	**Measured**	**Required**	**Dielectric breakdown**		**Result**
	GΩ	**MΩ**	**Yes (description) / No**		**—**
4110288	9.63	20.40	-	No	P
4110289	8.72	20.40	-	No	P
4110290	9.05	20.40	-	No	P
4110291	9.36	20.40	-	No	P
4110292	8.92	20.40	-	No	P
4110293	9.06	20.40	-	No	P
4110294	9.63	20.40	-	No	P
4110295	8.82	20.40	-	No	P
4110296	9.76	20.40	-	No	P
Supplementary information: Size of module [m²] : 1.96					

10.15 Initial	**TABLE: Wet leakage current test (Initial)**			P
Test Date [MM/DD/YYYY]..... :		08/23/2021		—
Test Voltage applied [V]..... :		1500V		—
Solution resistivity [Ω cm)..... :		< 3,500 Ω cm at 22 ± 3°C	2190	—
Surface tension [Nm^{-2}) ..... :		< 0.03 Nm^{-2} at 22 ± 3°C	—	—
Solution temperature [°C]..... :		23.8		—
Sample #	**Measured [GΩ]**	**Limit [MΩ]**		**Result**
4110288	5.66	20.40		P
4110289	4.93	20.40		P
4110290	5.82	20.40		P
4110291	5.27	20.40		P
4110292	4.98	20.40		P
4110293	5.02	20.40		P
4110294	5.17	20.40		P
4110295	6.81	20.40		P
4110296	5.73	20.40		P
Supplementary information: Size of module [m²] : 1.96				

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

10.4 B	**TABLE: Measurement of temperature coefficients**					P
Test Date [MM/DD/YYYY]..... :		08/30/2021				—
Ambient air temperature [°C] ..... :		----				—
Irradiance [W/m²]..... :		1000				—
Module temperature [°C] high/low..... :		70.30/29.5				—
Sample #	**Parameter**	**Calculated Value**				—
4110289	Short circuit current α [%/°C].....:	0.0281				P
	Open circuit voltage β [%/°C].....:	-0.2340				P
	Peak power δ [%/°C].....:	-0.3355				P
Supplementary information: N/A						
10.5 B	**TABLE: Measurement of Nominal Operating Cell Temperature [NOCT, °C)**					P
Test Date [MM/DD/YYYY]..... :		09/10/2021	09/17/2021	09/18/2021		—
Wind velocity [m/s]high/low..... :		1.63/0.30	1.72/0.30	1.74/0.30		—
Ambient temperature [°C] high/low . :		28.42/23.72	30.28/23.22	30.89/24.46		—
Irradiance [W/m²]high/low..... :		856.00/405.20	790.40/400.90	871.00/400.60		—
Module temperature [°C] high/low... :		50.05/34.80	57.02/35.72	61.38/38.73		—
Wind velocity [m/s](average)..... :		0.964	0.991	0.853		—
Ambient temperature [°C] (average) :		26.012	27.467	27.648		—
NOCT correction factor [°C] ..... :		0	1	0		—
Calculated NOCT [°C] ..... :		42.83	46.66	46.91		—
Sample #		**Average NOCT [°C]**				—
4110289		45.46				P
Supplementary information: N/A						
10.6 B	**TABLE: Performance at STC and NOCT**					P
Test Date [MM/DD/YYYY]..... :		09/20/2021				—
Wind velocity [m/s]high/low ..... :		N/A				—
Test method ..... :		☒ indoor ☐ outdoor				—
Ambient air temperature [°C] ..... :		---				—
Irradiance [W/m²]..... :		1000→ STC, 800→ NOCT				—
Module temperature [°C] high/low..... :		25.00/ 45.40				—

Condition	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]
STC (4110289)	48.46	39.59	9.82	9.31	368.50	77
NOCT (4110289)	49.00	40.09	7.82	7.43	297.72	78

Supplementary information: N/A

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

10.7 B	**TABLE: Performance at low irradiance**						P
Test Date [MM/DD/YYYY] ..... :			09/20/2021				—
Ambient air temperature [°C] ..... :			N/A				—
Irradiance [W/m²](200 W/m²) ..... :			200				—
Module temperature [°C] ..... :			25.0				—
Test method ..... :			☒ Data corrected to a 25°C cell temperature and 200 W/m² irradiance ☐ Directly measured				—
Sample #	**Voc [V]**	**Vmp [V]**	**Isc [A]**	**Imp [A]**	**Pmp [W]**	**FF [%]**	
4110289	45.19	38.91	1.97	1.88	72.97	82	
Supplementary information: N/A							

10.8 B	**TABLE: Outdoor exposure test**						P
Sample #			4110289				---
Test Date [MM/DD/YYYY] start/end ..... :			09/21/2021 to 10/07/2021				
Total irradiation dosage [kWh/m²] ..... :			61.05				P
Supplementary information: N/A							
(10.1 Visual inspection after outdoor exposure test)							P
Test Date [MM/DD/YYYY] ..... :			10/07/2021				—
Sample #	**Nature and position of initial findings – comments or attach photos**						—
4110289	No Visual defects found						P
Supplementary information: N/A							
(10.2 Maximum power determination after outdoor exposure test)							P
Test Date [MM/DD/YYYY] ..... :			10/11/2021				—
Module temperature [°C] ..... :			25				—
Irradiance [W/m²) ..... :			1000				—
Sample #	**Voc [V]**	**Vmp [V]**	**Isc [A]**	**Imp [A]**	**Pmp [W]**	**FF [%]**	
4110289	48.45	39.39	9.82	9.29	366.06	77	
4110288 (control)	48.44	39.66	9.79	9.29	368.41	78	
Pmp degradation after this test [%] ≤ 5% .... :			-1.25				P

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Clause	Requirement + Test	Result - Remark	Verdict

(10.3 Insulation test after outdoor exposure test)					
Test Date [MM/DD/YYYY] :			10/11/2021		—
Test Voltage applied [V] .....:			IR = 1500 Dielectric = 4000		—
Sample #	**Measured**	**Required**	**Dielectric breakdown**		**Result**
	GΩ	**MΩ**	**Yes (description)**	**No**	**—**
4110289	5.27	20.40	-	No	P
Supplementary information: Size of module [m²] : 1.96					

10.18 B	TABLE: Bypass diode thermal test			
Sample #	4110296			—
Test Date [MM/DD/YYYY] start/end .....:	09/22/2021			
Module temperature [°C] ..... :	75°C ± 5 °C			—
Number of diodes in junction box..... :	3			—
Diode manufacturer ..... :	Ningbo Guangzhixing Photovoltaic Tech. Co.Ltd			—
Diode type designation ..... :	30SQ045T			—
Max. permissible junction temperature T_{jmax} [°C] (according to diode datasheet)..... :	200			—
	Diode 1	Diode 2	Diode 3	Result
Current flow applied [A] ..... :	9.70	9.70	9.70	-
Max. diode surface temperature [°C] a or b : a	130.7	128.9	134.5	-
Voltage drop [V]..... :	0.3680	0.3670	0.3590	-
Power dissipation [W] ..... :	3.57	3.56	3.48	-
Thermal resistance junction to leads (R_{THJL})/to case (R_{THJC}) [K/W] (according to datasheet) : (R_{THJC})	1.5	1.5	1.5	-
Calculated max. junction temperature T_{jcalc} [°C] a or b..... : a	136.1	134.2	139.7	-
T_{jcalc} < T_{jmax} (test passed)? yes/no ..... :	YES	YES	YES	P
Current flow (1.25 * Isc) [A] ..... :	12.13	12.13	12.13	-
Max. diode surface temperature [°C] a or b : a	136.1	141.9	147.5	P
Remarks: ([a] measured at diode case or ambient near diode case, [b] measured atdiode leads)				

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

(10.1 Visual inspection after bypass diode thermal test)						P
Test Date [MM/DD/YYYY] ..... :	09/22/2021					—
Sample #	Nature and position of initial findings – comments or attach photos					—
4110296	No Visual defects found					P
Supplementary information: N/A						
(10.2 Maximum power determination after bypass diode thermal test)						P
Test Date [MM/DD/YYYY]..... :	09/23/2021					—
Module temperature [°C] ..... :	25					—
Irradiance [W/m²) ..... :	1000					—
Sample #	**Voc [V]**	**Vmp [V]**	**Isc [A]**	**Imp [A]**	**Pmp [W]**	**FF [%]**
4110296	48.51	39.78	9.85	9.32	370.80	78
4110288 (control)	48.39	39.57	9.80	9.32	368.69	78
Pmp degradation after this test [%] ≤ 5% .....:	-0.56					P
Supplementary information: N/A						
(10.3 Insulation test after bypass diode thermal test)						P
Test Date [MM/DD/YYYY]..... :	09/23/2021					—
Test Voltage applied [V] ..... :	IR = 1500V Dielectric = 4000					—
Sample #	**Measured**	**Required**	**Dielectric breakdown**			**Result**
	GΩ	MΩ	Yes (description)	No		—
4110296	6.28	20.40	-	No		P
Supplementary information: Size of module [m²] : 1.96						

10.9 B	**TABLE: Hot-spot endurance test**		P
Sample #	4110289		—
Test Date [MM/DD/YYYY] start/end .....:	10/13/2021		—
Cell interconnection circuit.....:	☒ S ☐ SP ☐ SPS		—
Module temperature at thermal equilibrium [°C] .....:	44.7		—
Determination of worst case cell			—
Maximum measured cell temperature in 5 hours [°C] :	81.9		—
Shading rate [%]..... :	100		—
Supplementary information: Note (+): N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

(10.1 Visual inspection after hot-spot endurance test)		P
Test Date [MM/DD/YYYY] :	10/13/2021	—
Sample #	Nature and position of initial findings – comments or attach photos	—
4110289	No Visual defects found	P
Supplementary information: N/A		

(10.2 Maximum power determination after hot-spot endurance test)						P
Test Date [MM/DD/YYYY] .....:	10/13/2021					—
Module temperature [°C] .....:	25					—
Irradiance [W/m²) .....:	1000					—
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]
4110289	48.44	38.79	9.81	9.35	362.71	76
4110288 (control)	48.46	39.63	9.79	9.30	368.44	78
Pmp degradation after this test [%] ≤ 5%.....:	-0.92					P
Supplementary information: A solar simulator was used for the measurements.						

(10.3 Insulation test after hot-spot endurance test)					P
Test Date [MM/DD/YYYY] ..... :	10/13/2021				—
Test Voltage applied [V] ..... :	IR = 1500 Dielectric = 4000				—
Sample #	Measured	Required	Dielectric breakdown		Result
	GΩ	MΩ	Yes (description)	No	—
4110289	4.27	20.40	-	No	P
Supplementary information: Size of module [m²] : 1.96					

10.10 C	**TABLE: UV preconditioning test**	P
Test Date [MM/DD/YYYY] start/end .....:	08/26/2021 to 09/06/2021	—
Module temperature [°C] ..... :	Min - 55.2 Max – 65.0	—
Irradiation 280 - 400 nm [kWh/ m²] UV-A ..... :	15.53	—
Irradiation 280 - 320 nm [kWh/ m²] UV-B ..... :	0.79	—
Sample #	Open circuits (yes/no)	—
4110290	No Open circuits found	P
4110291	No Open circuits found	P
Supplementary information:N/A		

(10.1 Visual inspection after UV preconditioning test)		P
Test Date [MM/DD/YYYY].....:	09/06/2021	—
Sample #	Nature and position of initial findings – comments or attach photos	—
4110290	No Visual Defects found	P
4110291	No Visual Defects found	P
Supplementary information: N/A		

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

(10.2 Maximum power determination after UV preconditioning test)						P
Test Date [MM/DD/YYYY] ..... :			09/07/2021			—
Module temperature [°C]..... :			25			—
Irradiance [W/m²) ..... :			1000			—
Sample #	**Voc [V]**	**Vmp [V]**	**Isc [A]**	**Imp [A]**	**Pmp [W]**	**FF [%]**
4110290	48.41	39.88	9.83	9.25	368.81	77
4110291	48.41	39.97	9.86	9.27	370.70	78
4110288 (Control)	48.44	39.82	9.79	9.26	368.64	78
Pmp degradation after this test [%] ≤ 5% ..... :			4110290: -0.42 4110291: -0.58			P
Supplementary information: N/A						
(10.3 Insulation test after UV preconditioning test)						P
Test Date [MM/DD/YYYY] .....:			09/07/2021			—
Test Voltage applied [V] .....:			IR = 1500 DIELECTRIC = 4000			—
Sample #	**Measured**	**Required**	**Dielectric breakdown**			**Result**
	GΩ	MΩ	Yes (description)	No		—
4110290	5.26	20.40	-	No		P
4110291	6.04	20.40	-	No		P
Supplementary information: Size of module [m²] : 1.96						

10.11 C	**TABLE: Thermal cycling 50 test**	P
Test Date [MM/DD/YYYY] start/end ..... :	09/17/2021 to 09/27/2021	—
Total cycles (50) ..... :	50	—
Sample #	**Open circuits (yes/no)**	—
4110290	No Open circuits found	P
4110291	No Open circuits found	P
Supplementary information: N/A		
(10.1 Visual inspection after thermal cycling 50 test)		P
Test Date [MM/DD/YYYY] .....:	09/27/2021	—
Sample #	Nature and position of initial findings – comments or attach photos	—
4110290	No Visual Defects found	P
4110291	No Visual Defects found	P
Supplementary information: N/A		

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

(10.2 Maximum power determination after thermal cycling 50 test)						P
Test Date [MM/DD/YYYY] ..... :			09/27/2021			—
Module temperature [°C]..... :			25			—
Irradiance [W/m²) ..... :			1000			—
Sample #	**Voc [V]**	**Vmp [V]**	**Isc [A]**	**Imp [A]**	**Pmp [W]**	**FF [%]**
4110290	48.34	39.22	9.83	9.34	366.25	77
4110291	48.42	39.52	9.84	9.33	368.55	77
4110288 (Control)	48.43	39.66	9.80	9.30	368.78	78
Pmp degradation after this test [%] ≤ 5% ..... :			4110290: -0.69 4110291: -0.58			P
Supplementary information: N/A						

(10.3 Insulation test after thermal cycling 50 test)					P
Test Date [MM/DD/YYYY] ..... :			09/27/2021		—
Test Voltage applied [V] ..... :			IR =1500 DIELECTRIC = 4000		—
Sample #	**Measured**	**Required**	**Dielectric breakdown**		**Result**
	GΩ	MΩ	Yes (description)	No	—
4110290	4.37	20.40	-	No	P
4110291	5.15	20.40	-	No	P
Supplementary information: Size of module [m²] : 1.96					

10.12 C	**TABLE: Humidity freeze 10 test**	P
Test Date [MM/DD/YYYY] start/end ..... :	10/01/2021 to 10/12/2021	—
Total cycles (10) ..... :	10	—
Sample #	**Open circuits (yes/no)**	—
4110290	No Open circuits found	P
4110291	No Open circuits found	P
Supplementary information: N/A		
(10.1 Visual inspection after humidity freeze 10 test)		P
Test Date [MM/DD/YYYY] ..... :	10/12/2021	—
Sample #	Nature and position of initial findings – comments or attach photos	—
4110290	No Visual Defects found	P
4110291	No Visual Defects found	P
Supplementary information: N/A		

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

(10.2 Maximum power determination after humidity freeze 10 test)						P
Test Date [MM/DD/YYYY] ..... :			10/12/2021			—
Module temperature [°C]..... :			25			—
Irradiance [W/m²) ..... :			1000			—
Sample #	**Voc [V]**	**Vmp [V]**	**Isc [A]**	**Imp [A]**	**Pmp [W]**	**FF [%]**
4110290	48.19	39.34	9.71	9.16	360.32	77
4110291	48.39	39.71	9.77	9.18	364.71	77
4110288 (Control)	48.40	39.51	9.80	9.33	368.54	78
Pmp degradation after this test [%] ≤ 5% ..... :			4110290: -1.62 4110291: -1.04			P
Supplementary information: A solar simulator was used for the measurements.						
10.3 Insulation test after humidity freeze 10 test)						P
Test Date [MM/DD/YYYY] .....:			10/12/2021			—
Test Voltage applied [V] .....:			IR = 1500V DIELECTRIC = 4000			—

Sample #	**Measured**	**Required**	**Dielectric breakdown**		**Result**
	GΩ	MΩ	Yes (description)	No	—
4110290	3.51	20.40	-	No	P
4110291	3.84	20.40	-	No	P
Supplementary information: Size of module [m²] : 1.96					

10.14 C1	**TABLE: Robustness of terminations test**	P
Test Date [MM/DD/YYYY] start/end :	10/13/2021	—
Types of terminations	☒Type A: wire of flying lead ☐Type B: tags, threaded stubs, screws, etc. ☐Type C: connector	—
Applied force in all directions [N]... :	40 N TENSILE TEST 20 N BENDING TEST	P

Sample #	**Open circuits (yes/no)**	—
4110290	No Open circuits found	P
Supplementary information: N/A		

(10.1 Visual inspection after robustness of terminations test)		P
Test Date [MM/DD/YYYY] ..... :	10/13/2021	—
Sample #	Nature and position of initial findings – comments or attach photos	—
4110290	No Visual Defects found	P
Supplementary information: N/A		

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

(10.2 Maximum power determination after robustness of terminations test)						—
Test Date [MM/DD/YYYY] ..... :			10/13/2021			—
Module temperature [°C]..... :			25			—
Irradiance [W/m²) ..... :			1000			—
Sample #	**Voc [V]**	**Vmp [V]**	**Isc [A]**	**Imp [A]**	**Pmp [W]**	**FF [%]**
4110290	48.20	38.99	9.70	9.17	357.67	77
4110288 (Control)	48.48	39.65	9.79	9.30	368.65	78
Pmp degradation after this test [%] ≤ 5% ..... :			4110290: -0.74			P
Supplementary information: N/A						
(10.3 Insulation test after robustness of terminations test)						P
Test Date [MM/DD/YYYY] ..... :			10/13/2021			—
Test Voltage applied [V] ..... :			IR = 1500V DIELECTRIC = 4000			—
Sample #	**Measured**	**Required**	**Dielectric breakdown**			—
	GΩ	MΩ	Yes (description)	No		—
4110290	3.27	20.40	-	No		P
Supplementary information: Size of module [m²] : 1.96						

10.11 D	**TABLE: Thermal cycling 200 test**		P
Test Date [MM/DD/YYYY] start/end ..... :		09/04/2021 to 10/07/2021	—
Total cycles (200) ..... :		200	—
Applied current [A] ..... :		9.19	—
Sample #	Open circuits (yes/no)		—
4110294	No Open circuits found		P
4110295	No Open circuits found		P
Supplementary information: Limiting voltage [V] : 52.7 Vdc			
(10.1 Visual inspection after thermal cycling 200 test)			P
Test Date [MM/DD/YYYY] ..... :		10/07/2021	—
Sample #	Nature and position of initial findings – comments or attach photos		—
4110294	No Visual defects found		P
4110295	No Visual defects found		P
Supplementary information: N/A			

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

(10.2 Maximum power determination after thermal cycling 200 test)						P
Test Date [MM/DD/YYYY] ..... :			10/07/2021			—
Module temperature [°C]..... :			25			—
Irradiance [W/m²) ..... :			1000			—
Sample #	**Voc [V]**	**Vmp [V]**	**Isc [A]**	**Imp [A]**	**Pmp [W]**	**FF [%]**
4110294	48.65	39.52	9.84	9.31	367.91	77
4110295	48.46	39.34	9.82	9.31	366.31	77
4110288 (Control)	48.41	39.65	9.79	9.30	368.69	78
Pmp degradation after this test [%] ≤ 5% ..... :			4110294: -1.34 4110295: -1.54			P
Supplementary information: N/A						
(10.3 Insulation test after thermal cycling 200 test)						P
Test Date [MM/DD/YYYY] ..... :			10/07/2021			—
Test Voltage applied [V]..... :			IR = 1500V DIELECTRIC = 4000			—

Sample #	**Measured**	**Required**	**Dielectric breakdown**		**Result**
	GΩ	MΩ	Yes (description)	No	—
4110294	3.73	20.40	-	No	P
4110295	3.50	20.40	-	No	P
Supplementary information: Size of module [m²] : 1.96					

10.13 E	**TABLE: Damp heat 1000 test**		P
Test Date [MM/DD/YYYY] start/end :		08/30/2021 to 10/11/2021	—
Total hours (1000) ..... :		1000	—
Sample #	Open circuits (yes/no)		—
4110292	No Open circuits found		P
4110293	No Open circuits found		P
Supplementary information: N/A			
(10.1 Visual inspection after damp heat 1000 test)			P
Test Date [MM/DD/YYYY] ..... :		10/11/2021	—
Sample #	Nature and position of initial findings – comments or attach photos		—
4110292	No Visual defects found		P
4110293	No Visual defects found		P
Supplementary information: N/A			

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

(10.3 Insulation test after damp heat 1000 test)						P
Test Date [MM/DD/YYYY] .....:			10/11/2021			—
Test Voltage applied [V] .....:			IR = 1500V DIELECTRIC = 4000			—
Sample #	**Measured**	**Required**	**Dielectric breakdown**			**Result**
	GΩ	MΩ	Yes (description)	No		—
4110292	3.26	20.40	-	No		P
4110293	2.85	20.40	-	No		P
Supplementary information: Size of module [m²] : 1.96						
(10.15 Wet leakage current test after damp heat 1000 test)						P
Test Date [MM/DD/YYYY] .....:			10/11/2021			—
Test Voltage applied [V] .....:			1500V			—
Solution resistivity [Ω cm) .....:			< 3,500 Ω cm at 22 ± 3°C	2180		—
Surface tension [Nm^{-2}) .....:			< 0.03 Nm^{-2} at 22 ± 3°C	---		—
Solution temperature [°C] .....:			23.6			—
Sample #	Measured [GΩ]		Limit [MΩ]			Result
4110292	2.03		20.40			P
4110293	2.17		20.40			P
Supplementary information: N/A						
(10.2 Maximum power determination after damp heat 1000 test)						P
Test Date [MM/DD/YYYY] .....:			10/11/2021			—
Module temperature [°C].....:			25			—
Irradiance [W/m^2) .....:			1000			—
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]
4110292	48.62	39.65	9.77	9.21	365.17	77
4110293	48.60	39.97	9.78	9.23	369.04	78
4110288 (Control)	48.40	39.62	9.80	9.30	368.54	78
Pmp degradation after this test [%] ≤ 5%..... :			4110292: -1.01 4110293: -0.84			P
Supplementary information: N/A						

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

10.16 E1	**TABLE: Mechanical load test**			P
Sample # ..... :		4110292		—
Test Date [MM/DD/YYYY] ..... :		10/13/2021		—
Mounting method ..... :		Refer installation manual Nut-Bolt Method	Refer installation manual Nut-Bolt Method	—
Load applied to ..... :		Front side	Back side	—
Mechanical load [Pa] ..... :		2400	2400	P
First cycle time (start/end) ..... :		09:30/10:30	10:50/11:50	—
Intermittent open-circuit (yes/no) ..... :		No	No	P
Mechanical load [Pa] ..... :		2400	2400	P
Second cycle time (start/end) ..... :		12:10/13:10	13:30/14:30	—
Intermittent open-circuit (yes/no) ..... :		No	No	P
Mechanical load [Pa] ..... :		5400	2400	P
Third cycle time (start/end) ..... :		15:30/16:30	16:50/17:50	—
Intermittent open-circuit (yes/no) ..... :		No	No	P
Supplementary information: N/A				

(10.1 Visual inspection after mechanical load test)						P
Test Date [MM/DD/YYYY] :			10/13/2021			—
Sample #	Nature and position of initial findings – comments or attach photos					—
4110292	No Visual defects found					P
Supplementary information: N/A						
(10.2 Maximum power determination after mechanical load test)						P
Test Date [MM/DD/YYYY] ..... :			10/14/2021			—
Module temperature [°C]..... :			25			—
Irradiance [W/m²) ..... :			1000			—
Sample #	**Voc [V]**	**Vmp [V]**	**Isc [A]**	**Imp [A]**	**Pmp [W]**	**FF [%]**
4110292	48.55	38.65	9.77	9.27	358.13	76
4110288 (Control)	48.44	39.73	9.79	9.27	368.35	78
Pmp degradation after this test [%] ≤ 5% ..... :			411029: -1.93			P
Supplementary information: N/A						
(10.3 Insulation test after mechanical load test)						**P**
Test Date [MM/DD/YYYY] ..... :			10/14/2021			—
Test Voltage applied [V] ..... :			IR = 1500			—

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Clause	Requirement + Test	Result - Remark	Verdict

			Dielectric = 4000		
Sample #	**Measured**	**Required**	**Dielectric breakdown**		**Result**
	GΩ	MΩ	Yes (description)	No	—
4110292	2.17	20.40	-	No	P
Supplementary information: Size of module [m²] : 1.96					

10.17 E2	**TABLE: Hail impact test**					P
Test Date [MM/DD/YYYY]..... :			10/13/2021			—
Ice ball size [mm] :			25			—
Ice ball weight [g] :			7.53			—
Ice ball velocity [m/s] :			22.85			—
Number of impact locations :			11			—
Sample #	Open circuits (yes/no)					—
4110293	No Open circuits found					P
Supplementary information: N/A						
(10.1 Visual inspection after hail impact test)						P
Test Date [MM/DD/YYYY]..... :			10/13/2021			—
Sample #	Nature and position of initial findings – comments or attach photos					—
4110293	No visual defects found					P
Supplementary information: N/A						
(10.2 Maximum power determination after hail impact test)						P
Test Date [MM/DD/YYYY]..... :			10/13/2021			—
Module temperature [°C] ..... :			25			—
Irradiance [W/m²) ..... :			1000			—
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	Pmp [W]	FF [%]
4110293	48.45	39.81	9.78	9.24	367.76	78
4110288 (Control)	48.46	39.73	9.79	9.28	368.49	78
Pmp degradation after this test [%] ≤ 5%:			4110293: -0.35			P
Supplementary information: N/A						

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

(10.3 Insulation test after hail impact test)					**P**
Test Date [MM/DD/YYYY].....:			10/13/2021		—
Test Voltage applied [V] .....:			IR =1500V DIELECTRIC = 4000		—
Sample #	**Measured**	**Required**	**Dielectric breakdown**		**Result**
	GΩ	MΩ	Yes (description)	No	—
4110293	2.68	20.40	-	No	P
Supplementary information: Size of module [m²] : 1.96					

10.2 F	**TABLE: Maximum power determination (Final)**							P
Test Date [MM/DD/YYYY].....:			Refer Supplementary information:					—
Module temperature [°C] .....:			25					—
Irradiance [W/m²) .....:			1000					—
Sample #	Voc [V]	Vmp [V]	Isc [A]	Imp [A]	FF [%]	Pmp [W]	Degradation [%]	Limit [%]
4110289	48.44	38.79	9.81	9.35	76	362.71	-2.16	-8
4110290	48.20	38.99	9.70	9.17	77	357.67	-3.43	-8
4110291	48.39	39.71	9.77	9.18	77	364.71	-2.19	-8
4110292	48.55	38.65	9.77	9.27	76	358.13	-2.92	-8
4110293	48.45	39.81	9.78	9.24	78	367.76	-1.18	-8
4110294	48.65	39.52	9.84	9.31	77	367.91	-1.34	-8
4110295	48.46	39.34	9.82	9.31	77	366.31	-1.54	-8
4110296	48.51	39.78	9.85	9.32	78	370.80	-0.56	-8

Supplementary information: Test date

4110296: 09/23/2021

4110294, 4110295: 10/07/2021
4110291: 10/12/2021
4110289, 4110290, 4110293: 10/13/2021
4110292: 10/14/2021

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

10.15 Wet leakage current test (final)			P
Test Date [MM/DD/YYYY].....:	10/20/2021		—
Test Voltage applied [V] ..... :	1500V		—
Solution resistivity [Ω cm]..... :	< 3,500 Ω cm at 22 ± 3°C	2190	—
Surface tension [Nm^{-2}] (optional per DSH0757):	< 0.03 Nm^{-2} at 22 ± 3°C	--	—
Solution temperature [°C] ..... :	24.1		—

Sample #	Measured [GΩ]	Limit [MΩ]	Result
4110288	2.98	20.40	P
4110289	1.25	20.40	P
4110290	1.18	20.40	P
4110291	1.05	20.40	P
4110292	1.27	20.40	P
4110293	1.93	20.40	P
4110294	1.57	20.40	P
4110295	2.04	20.40	P
4110296	1.83	20.40	P

Supplementary information: N/A

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

List of Annexes

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Annex 3: Statement of the estimated uncertainty of the test results - Page 46

Annex 4: Enclosures – 21 Pages (47 to 67)

Annex 5: Electrical Ratings - Page 68

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Annex 1: List of measurement equipment

Description	Identification	Test Name
Apparatus, Generic	54584	Pre conditioning
Datalogger	168531	Pre conditioning
Fixture, For Testing, Metal Plate	175795	Pre conditioning
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection
Apparatus, Generic	54584	Pre conditioning
Datalogger	168531	Pre conditioning
Fixture, For Testing, Metal Plate	175795	Pre conditioning
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection
Apparatus, Solar Simulator	199796	Maximum Power determination
Thermometer, Infrared	148434	Maximum Power determination
Measuring Tool, Rigid Ruler	176846	Maximum Power determination
Datalogger, RH & Temperature	68610	Maximum Power determination
Reference Standard, Voltage or Current	201396	Maximum Power determination
Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test
Meter, pH, Digital or Analog	177914	Wet Insulation Resistance test
Fixture, For Testing, Water Tank	167776	Wet Insulation Resistance test
Stopwatch, Digital or Analog	159551	Wet Insulation Resistance test
Apparatus, Dielectric Strength Test	169917	Wet Insulation Resistance test
Radiometer	199438	UV Preconditioning Test
Datalogger	72942	UV Preconditioning Test
Chamber, Conditioning, UV	74011	UV Preconditioning Test
Chamber, Climatic, Temp and RH	169223	Damp heat
Datalogger	168532	Damp heat
Thermometer, Infrared	148434	Measurement of Temp. Coefficient Test
Chamber, Climatic, Temp	70192	Measurement of Temp. Coefficient Test

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Measuring Tool, Rigid Ruler	177816	Measurement of Temp. Coefficient Test
Apparatus, Solar Simulator	199796	Measurement of Temp. Coefficient Test
Datalogger, RH & Temperature	68610	Measurement of Temp. Coefficient Test
Reference Standard, Voltage or Current	201396	Measurement of Temp. Coefficient Test
Chamber, Climatic, Temp and RH	169218	Thermal Cycling Test-200
Datalogger	69922	Thermal Cycling Test-200
Shunt, Current	76386	Thermal Cycling Test-200
Shunt, Current	76382	Thermal Cycling Test-200
Shunt, Current	76384	Thermal Cycling Test-200
Power Supply, DC	69871	Thermal Cycling Test-200
Power Supply, DC	69872	Thermal Cycling Test-200
Power Supply, DC	69873	Thermal Cycling Test-200
Radiometer	199438	UV Preconditioning Test
Datalogger	72942	UV Preconditioning Test
Chamber, Conditioning, UV	74011	UV Preconditioning Test
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection
Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test
Measuring Tool, Rigid Ruler	177816	Measurement of NOCT
Anemometer, Digital or Analog, W/Probe	71858	Measurement of NOCT
Gauge, Inclinometer, Digital or Analog	69891	Measurement of NOCT
Datalogger	170638	Measurement of NOCT
Fixture, For Testing, Support	175617	Measurement of NOCT
Apparatus, Generic	76157	Measurement of NOCT
Apparatus, Solar Simulator	199796	Maximum Power determination
Thermometer, Infrared	148434	Maximum Power determination
Measuring Tool, Rigid Ruler	176846	Maximum Power determination
Datalogger, RH & Temperature	68610	Maximum Power determination
Reference Standard, Voltage or Current	201396	Maximum Power determination

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test
Datalogger	70818	Thermal Cycling 50
Chamber, Climatic, Temp and RH	169217	Thermal Cycling 50
Measuring Tool, Rigid Ruler	177816	Measurement of NOCT
Anemometer, Digital or Analog, W/Probe	71858	Measurement of NOCT
Gauge, Inclinometer, Digital or Analog	69891	Measurement of NOCT
Datalogger	170638	Measurement of NOCT
Fixture, For Testing, Support	175617	Measurement of NOCT
Apparatus, Generic	76157	Measurement of NOCT
Apparatus, Solar Simulator	199796	Performance @ STC & NOCT
Thermometer, Infrared	148434	Performance @ STC & NOCT
Measuring Tool, Rigid Ruler	177816	Performance @ STC & NOCT
Datalogger, RH & Temperature	68610	Performance @ STC & NOCT
Chamber, Climatic, Temp	70192	Performance @ STC & NOCT
Reference Standard, Voltage or Current	202616	Performance @ STC & NOCT
Apparatus, Solar Simulator	199796	Performance @ Low Irradiance
Datalogger, RH & Temperature	68610	Performance @ Low Irradiance
Thermometer, Infrared	148434	Performance @ Low Irradiance
Measuring Tool, Rigid Ruler	177816	Performance @ Low Irradiance
Reference Standard, Voltage or Current	202616	Performance @ Low Irradiance
Apparatus, Generic	54584	Outdoor Exposure Test
Fixture, For Testing, Metal Plate	175794	Outdoor Exposure Test
Load, Resistive, Variable	175615	Outdoor Exposure Test
Datalogger	168531	Outdoor Exposure Test
Chamber, Climatic, Temp	70192	Bypass Diode Test
Power Supply, DC	88419	Bypass Diode Test
Power Supply, DC	88424	Bypass Diode Test
Datalogger	70334	Bypass Diode Test
Multimeter, Digital, Handheld	68599	Bypass Diode Test
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection
Apparatus, Solar Simulator	199796	Maximum Power determination

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Thermometer, Infrared	148434	Maximum Power determination
Measuring Tool, Rigid Ruler	176846	Maximum Power determination
Datalogger, RH & Temperature	68610	Maximum Power determination
Reference Standard, Voltage or Current	210178	Maximum Power determination
Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test
Datalogger	70818	Thermal Cycling 50
Chamber, Climatic, Temp and RH	169217	Thermal Cycling 50
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection
Apparatus, Solar Simulator	199796	Maximum Power determination
Thermometer, Infrared	148434	Maximum Power determination
Measuring Tool, Rigid Ruler	176846	Maximum Power determination
Datalogger, RH & Temperature	68610	Maximum Power determination
Reference Standard, Voltage or Current	210178	Maximum Power determination
Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test
Datalogger	70818	HF-10 Cycling
Chamber, Climatic, Temp and RH	169217	HF-10 Cycling
INSTRUMENT RACK (PV LAB)	70492	HF-10 Cycling
Camera, Infrared	168290	Hotspot Test
Power Supply, DC	70580	Hotspot Test
Datalogger	70334	Hotspot Test
CONTINOUS SIMULATOR	71790	Hotspot Test
PYRANOMETER	167578	Hotspot Test
BLACK VINYL TAPE	75646	Hotspot Test
Timer, Digital or Analog, Wound or Battery Powered	69762	Hotspot Test
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection
Chamber, Climatic, Temp and RH	169218	Thermal Cycling Test-200

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Datalogger	69922	Thermal Cycling Test-200
Shunt, Current	76386	Thermal Cycling Test-200
Shunt, Current	76382	Thermal Cycling Test-200
Shunt, Current	76384	Thermal Cycling Test-200
Power Supply, DC	69871	Thermal Cycling Test-200
Power Supply, DC	69872	Thermal Cycling Test-200
Power Supply, DC	69873	Thermal Cycling Test-200
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection
Apparatus, Solar Simulator	199796	Maximum Power determination
Thermometer, Infrared	148434	Maximum Power determination
Measuring Tool, Rigid Ruler	176846	Maximum Power determination
Datalogger, RH & Temperature	68610	Maximum Power determination
Reference Standard, Voltage or Current	210178	Maximum Power determination
Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test
Apparatus, Generic	54584	Outdoor Exposure Test
Fixture, For Testing, Metal Plate	175794	Outdoor Exposure Test
Load, Resistive, Variable	175615	Outdoor Exposure Test
Datalogger	168531	Outdoor Exposure Test
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection
Chamber, Climatic, Temp and RH	169223	Damp heat
Datalogger	168532	Damp heat
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection
Apparatus, Solar Simulator	199796	Maximum Power determination
Thermometer, Infrared	148434	Maximum Power determination
Measuring Tool, Rigid Ruler	176846	Maximum Power determination
Datalogger, RH & Temperature	68610	Maximum Power determination
Reference Standard, Voltage or Current	210178	Maximum Power determination

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test
Meter, pH, Digital or Analog	177914	Wet Insulation Resistance test
Fixture, For Testing, Water Tank	167776	Wet Insulation Resistance test
Stopwatch, Digital or Analog	159551	Wet Insulation Resistance test
Apparatus, Dielectric Strength Test	169917	Wet Insulation Resistance test
Apparatus, Solar Simulator	199796	Maximum Power determination
Thermometer, Infrared	148434	Maximum Power determination
Measuring Tool, Rigid Ruler	176846	Maximum Power determination
Datalogger, RH & Temperature	68610	Maximum Power determination
Reference Standard, Voltage or Current	210178	Maximum Power determination
Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test
Datalogger	70818	HF-10 Cycling
Chamber, Climatic, Temp and RH	169217	HF-10 Cycling
INSTRUMENT RACK (PV LAB)	70492	HF-10 Cycling
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection
Apparatus, Solar Simulator	199796	Maximum Power determination
Thermometer, Infrared	148434	Maximum Power determination
Measuring Tool, Rigid Ruler	176846	Maximum Power determination
Datalogger, RH & Temperature	68610	Maximum Power determination
Reference Standard, Voltage or Current	210178	Maximum Power determination
Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test
Camera, Infrared	168290	Hotspot Test
Power Supply, DC	70580	Hotspot Test
Datalogger	70334	Hotspot Test
CONTINOUS SIMULATOR	71790	Hotspot Test
PYRANOMETER	167578	Hotspot Test
BLACK VINYL TAPE	75646	Hotspot Test

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Timer, Digital or Analog, Wound or Battery Powered	69762	Hotspot Test
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection
Apparatus, Solar Simulator	199796	Maximum Power determination
Thermometer, Infrared	148434	Maximum Power determination
Measuring Tool, Rigid Ruler	176846	Maximum Power determination
Datalogger, RH & Temperature	68610	Maximum Power determination
Reference Standard, Voltage or Current	210178	Maximum Power determination
Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test
Meter, pH, Digital or Analog	177914	Wet Insulation Resistance test
Fixture, For Testing, Water Tank	167776	Wet Insulation Resistance test
Stopwatch, Digital or Analog	159551	Wet Insulation Resistance test
Apparatus, Dielectric Strength Test	169917	Wet Insulation Resistance test
Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test
Meter, pH, Digital or Analog	177914	Wet Insulation Resistance test
Fixture, For Testing, Water Tank	167776	Wet Insulation Resistance test
Stopwatch, Digital or Analog	159551	Wet Insulation Resistance test
Apparatus, Dielectric Strength Test	169917	Wet Insulation Resistance test
MECHANICAL LOADING FIXTURE	171618	Mechanical load test
Power Supply, DC	147761	Mechanical load test
Weighing Device, Scale or Balance, Analog or Digital	31818	Mechanical load test
Timer, Digital or Analog, Wound or Battery Powered	159549	Mechanical load test
Measuring Tool, Rigid Ruler	177816	Mechanical load test
Tool, Torque, Wrench	199818	Mechanical load test
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection
Force Gauge, Digital	88737	Robustness of Termination test

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Weight	156992	Robustness of Termination test
Weight	156993	Robustness of Termination test
Measuring Tool, Rigid Ruler	177816	Robustness of Termination test
Timer, Digital or Analog, Wound or Battery Powered	159549	Robustness of Termination test
Apparatus, Strain Relief Test	70751	Robustness of Termination test
Measuring Tool, Caliper, Digital or Analog	69881	Robustness of Termination test
Apparatus, Impact, Drop	70574	Hail Impact Test
Power Supply, DC	147761	Hail Impact Test
Apparatus, Hailstone Creator	160913	Hail Impact Test
Measuring Tool, Caliper, Digital or Analog	69881	Hail Impact Test
Fixture, For Testing, Refrigerator	70749	Hail Impact Test
Weighing Device, Scale or Balance, Analog or Digital	159968	Hail Impact Test
Oscilloscope, Scope Meter	127264	Hail Impact Test
Measuring Tool, Rigid Ruler	177816	Hail Impact Test
Gauge, Dimensional, Radius	155553	Hail Impact Test
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection
Apparatus, Solar Simulator	199796	Maximum Power determination
Thermometer, Infrared	148434	Maximum Power determination
Measuring Tool, Rigid Ruler	176846	Maximum Power determination
Datalogger, RH & Temperature	68610	Maximum Power determination
Reference Standard, Voltage or Current	210178	Maximum Power determination
Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test
Apparatus, Solar Simulator	199796	Maximum Power determination
Thermometer, Infrared	148434	Maximum Power determination
Measuring Tool, Rigid Ruler	176846	Maximum Power determination
Datalogger, RH & Temperature	68610	Maximum Power determination
Reference Standard, Voltage or Current	210178	Maximum Power determination
Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Apparatus, Solar Simulator	199796	Maximum Power determination
Thermometer, Infrared	148434	Maximum Power determination
Measuring Tool, Rigid Ruler	176846	Maximum Power determination
Datalogger, RH & Temperature	68610	Maximum Power determination
Reference Standard, Voltage or Current	210178	Maximum Power determination
Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test
Meter, pH, Digital or Analog	177914	Wet Insulation Resistance test
Fixture, For Testing, Water Tank	167776	Wet Insulation Resistance test
Stopwatch, Digital or Analog	159551	Wet Insulation Resistance test
Apparatus, Dielectric Strength Test	169917	Wet Insulation Resistance test
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection
Apparatus, Dielectric Strength Test	169917	IR and Dielectric test
Stopwatch, Digital or Analog	159551	IR and Dielectric test
Datalogger, RH & Temperature	68610	IR and Dielectric test
Meter, pH, Digital or Analog	177914	Wet Insulation Resistance test
Fixture, For Testing, Water Tank	167776	Wet Insulation Resistance test
Stopwatch, Digital or Analog	159551	Wet Insulation Resistance test
Apparatus, Dielectric Strength Test	169917	Wet Insulation Resistance test
Meter, pH, Digital or Analog	177914	Wet Insulation Resistance test
Fixture, For Testing, Water Tank	167776	Wet Insulation Resistance test
Stopwatch, Digital or Analog	159551	Wet Insulation Resistance test
Apparatus, Dielectric Strength Test	169917	Wet Insulation Resistance test
Measuring Tool, Caliper, Digital or Analog	69881	Creepage Measuring
Magnifying Lens, Without Ruler	76645	Creepage Measuring
Datalogger, RH & Temperature	68611	Creepage Measuring
Meter and/or Sensor, Light	180089	Visual Inspection
Fixture, For Testing, Table	160912	Visual Inspection
Magnifying Lens, Without Ruler	76645	Visual Inspection

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Annex 2: Spectrum of the lamp used for the UV pre-screening test (Optional) – N/A

Annex 3: Statement of the estimated uncertainty of the test results

1) The Uncertainty of Voc is ±1.3%

2) The Uncertainty of Isc is ±1.4%

3) The Uncertainty of Pmp is ±1.6%

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Annex 4: Enclosures

Type	Supplement ID	Description
Figure	1-01	Front view of PV Module (VIL-375M)
Figure	1-02	Rear view of PV Module (VIL-375M)
Figure	1-03	PV Module Junction Box – Close and open view Manufactured by: Ningbo GZX Photovoltaic Technology Co., Ltd, Type: PV-GZX156V, 1500Vdc, 14A, Reverse Current 30A, -40°C to 85°C, IP65/68.
Figure	1-04	PV Module Connectors (Male & Female) Manufactured by: Ningbo GZX Photovoltaic Technology Co., Ltd Type: PV- GZX 1500, 1500VDC, 30A, IP68.
Illustration	2-01	Cell Datasheet Mono-crystalline PERC Manufactured by: ADANI SOLAR Type: MSPVLM2M5
Illustration	2-02	Diode Datasheet: Manufactured by: Ningbo GZX Photvoltaic Technology Co. Ltd Type: 30SQ 045T, 45V, 30A
Illustration	2-03	Frame Diagram for 72 cell - (VIL-375M)
Report/ Certificate	3-01	Junction Box: Manufactured by: Ningbo GZX Photovoltaic Technology Co., Ltd, Type: PV-GZX156V, 1500Vdc, 14A, Reverse Current 30A, -40°C to 85°C, IP65/68.
Report/ Certificate	3-02	Cables: Manufactured by: Ningbo GZX Photovoltaic Technology Co., Ltd, Type: 62930 IEC 131, 1500Vdc, -40°C to 90°C, 120°C
Report/ Certificate	3-03	Connectors: Manufactured by: Ningbo GZX Photovoltaic Technology Co., Ltd Type: PV- GZX 1500, 1500VDC, 30A, IP68.
Report/ Certificate	3-04	Sealant: Manufactured by: Sika India Pvt Ltd, Type: Sikasil AS 60 IN, Thickness: 1.5 mm min, Flame Class: HB, HWI: 3, HAI:0, RTI:105, color: WT
Report/ Certificate	3-05	Potting material: Manufactured by: Shanghai Huitian new material Co., Ltd Type: 5299W-S, Thickness: 3.0 mm min, Flame Class: V-0, HWI: 1, HAI:0, RTI:105, color: WT
Report/ Certificate	3-06	EVA: Manufactured by: Renewsys India Private Limited, Type: CONSERV P 360-14FC, Thickness: 0.45- 0.5mm, HWI=4, HAI=0, RTI:50, Color : NC
Report/ Certificate	3-07	Back sheet: Manufactured by: Renewsys India Private Limited, Type: Preserv 1 300 WD, Thickness: 0.395mm, Color: WT, RTI: 140, Flame Spread Index: 30, Partial Discharge: 4.17kV

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Figure – 1-01

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Figure – 1-02

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

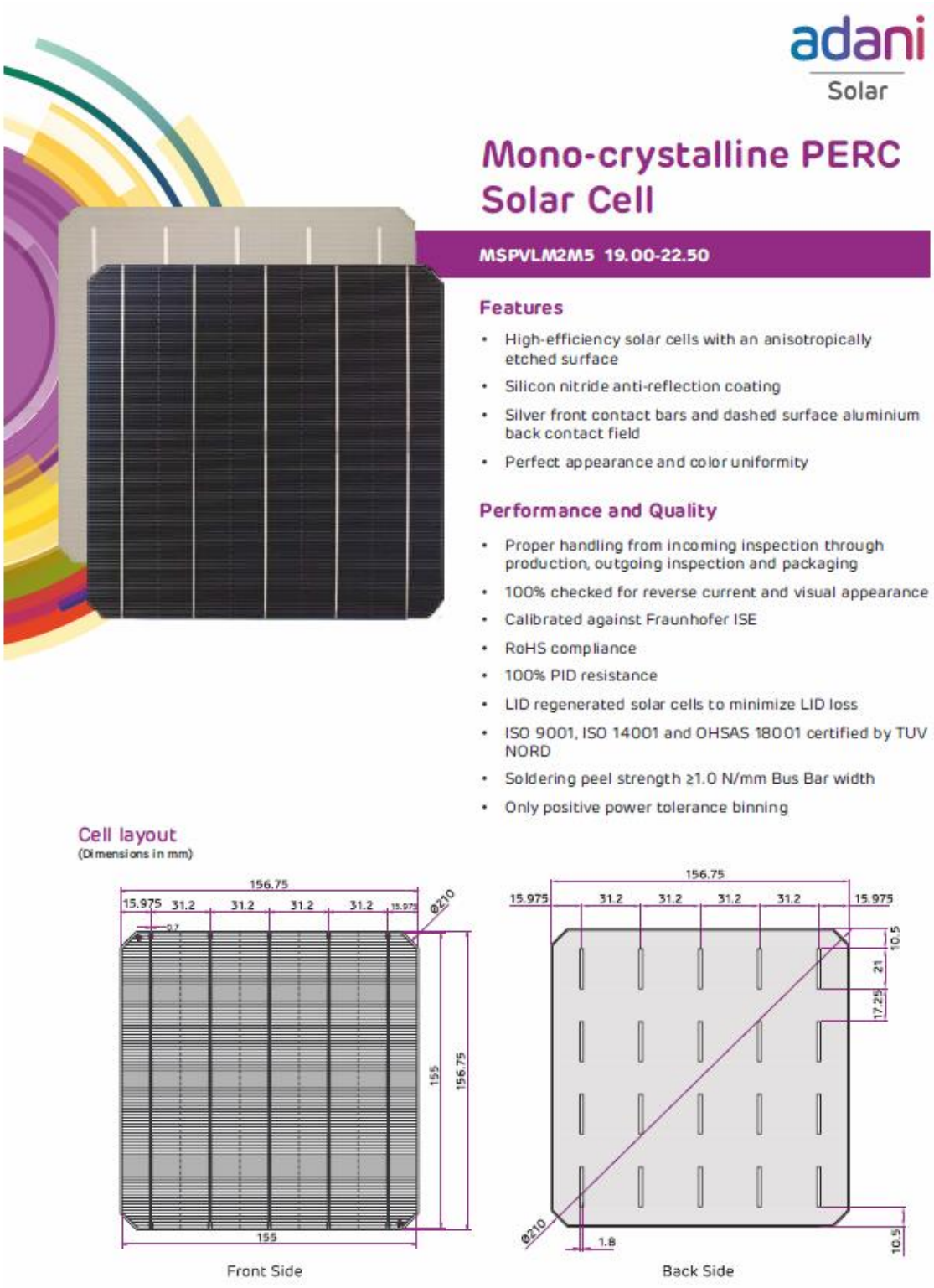
Figure – 1-03

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Figure – 1-04

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Illustration – 1-01 Mono Crystalline



IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

www.adanisolar.com

adani Solar

Technical Data

Electric Performance

Class	Efficiency Range (%)	Rated Power (Wp)	*Maximum Power Current (A)	*Short Circuit Current (A)	*Maximum Power Voltage (V)	*Open Circuit Voltage (V)
A-195	19.5-19.6	4.76	8.956	9.557	0.532	0.640
A-196	19.6-19.7	4.79	8.985	9.559	0.533	0.641
A-197	19.7-19.8	4.81	8.998	9.566	0.535	0.642
A-198	19.8-19.9	4.84	9.013	9.570	0.537	0.643
A-199	19.9-20.0	4.86	9.024	9.574	0.539	0.644
A-200	20.0-20.1	4.89	9.038	9.575	0.541	0.645
A-201	20.1-20.2	4.91	9.045	9.578	0.543	0.646
A-202	20.2-20.3	4.94	9.052	9.583	0.546	0.647
A-203	20.3-20.4	4.96	9.058	9.586	0.548	0.648
A-204	20.4-20.5	4.98	9.063	9.589	0.550	0.649
A-205	20.5-20.6	5.01	9.072	9.593	0.552	0.650
A-206	20.6-20.7	5.03	9.082	9.596	0.554	0.651
A-207	20.7-20.8	5.06	9.094	9.600	0.556	0.652
A-208	20.8-20.9	5.08	9.112	9.603	0.558	0.653
A-209	20.9-21.0	5.11	9.121	9.606	0.560	0.654
A-210	21.0-21.1	5.13	9.129	9.610	0.562	0.655
A-211	21.1-21.2	5.16	9.142	9.614	0.564	0.656
A-212	21.2-21.3	5.18	9.148	9.617	0.567	0.657
A-213	21.3-21.4	5.20	9.153	9.620	0.569	0.658
A-214	21.4-21.5	5.23	9.167	9.624	0.571	0.659
A-215	21.5-21.6	5.25	9.176	9.627	0.572	0.660

Test condition: 1000 W/m², AM 1.5, 25°C; Power measuring tolerance: ±1.5% rel

Physical Characteristics

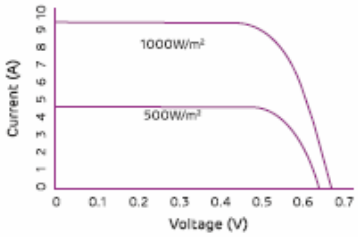
Dimension	156.75 mm x 156.75 mm ± 0.25 mm
Diagonal	210 mm ± 0.5 mm
Thickness (si)	190 µm ± 30 µm
Front Side (-)	Silicon nitride anti-reflection coating 0.7 mm silver Bus Bar
Back Side (-)	Passivated Emitter(SiON and SiNx dual layer) Rear Contact 1.8 mm (silver) discontinuous soldering pads

Temperature Coefficients

Current Temperature Coefficient	0.03 %/K
Voltage Temperature Coefficient	-0.35 %/K
Power Temperature Coefficient	-0.41 %/K

Light Intensity Dependence

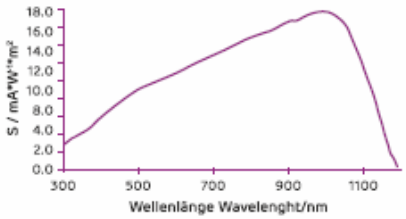
Intensity(W/m2)	Vmpp(%)	Impp(%)
1000	100.0	100.0
900	99.8	90.00
500	98.4	50.00
300	96.2	30.00
200	94.1	20.00



Packaging

Minimize the risk of broken cells with special design

Label with product information



Note:
- The specifications included in this datasheet are subject to change without notice. Adani Solar reserves the right for the final interpretation of all figures reported in this document.

* "Adani Solar" is the brand name for legal entity "Mundra Solar PV Ltd." having its registered office at "Adani Corporate House, Shantigram, S G Highway, Ahmedabad-382 421, Gujarat, India" and manufacturing unit at "Revenue Survey No: 180/P City: Kutch Taluka: Mundra, Village: Tunda, Post office: Bidada; Pin: 370535".

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

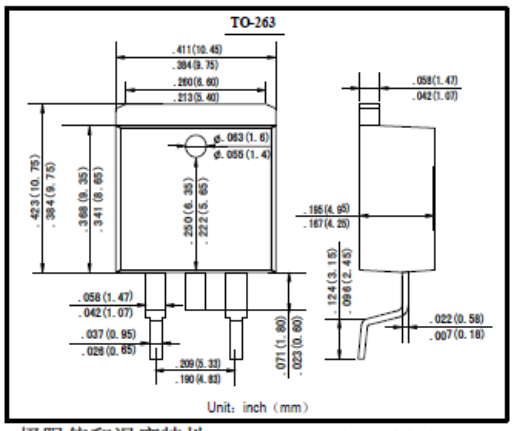
Illustration 2-02

GZX

30SQ045T

肖特基二极管
反向电压 45V
正向电流 30A

Schottky Barrier Reifier
Reverse Voltage 45 V
Forward Current 30 A



特征 Features
- 大电流承受能力。High Current Capability
- 正向压降低。Low Forward Voltage Drop
- 低功耗高效率。Low Power Loss，High Efficiency

机械数据 Mechanical Data
- 封装: 塑料封装 Case: Molded Plastic
- 极性: 标记模压或印于本体 Polarity: Symbols molded or marked on body
- 安装位置: 任意 Mounting Position: Any
- 重量: 2.00 克 Weight: 2.00Grams

极限值和温度特性 TA = 25℃ 除非另有规定。
Maximum Ratings & Thermal Charaeristics Ratings at 25℃ ambient temperature unless otherwise specified.

	符号 Symbols	30SQ 045T	单位 Unit
最大可重复峰值反向电压 Maximum repetitive peak reverse voltage	V_{RRM}	45	V
最大均方根电压 Maximum RMS voltage	V_{RMS}	31.5	V
最大直流阻断电压 Maximum DC blocking voltage	V_{DC}	45	V
最大正向平均整流电流 Maximum average forward reified current	$I_{F(AV)}$	30	A
峰值正向浪涌电流 8.3ms单一正弦半波 Peak forward surge current 8.3 ms single half sine-wave	I_{FSM}	250	A
典型热阻 Typical thermal resistance	$R_{\theta Jc}$	1.5	℃/W
工作结温和存储温度 Operating junion and storage temperature range	Tj, TSTG	-55 — +200	℃

电特性 TA = 25℃ 除非另有规定。
Elerical Charaeristics Ratings at 25℃ ambient temperature unless otherwise specified.

		符号 Symbols	30SQ 045T	单位 Unit
最大正向电压 Maximum forward voltage	I_F = 30A	V_F	0.63	V
最大反向电流 Maximum reverse current	TA= 25℃ TA=100℃	I_R	0.1 15	mA
典型结电容 V_R = 4.0V, f = 1MHz Type junion capacitance		Cj	400	pF

备注: 芯片尺寸：158 mil
NOTE: The chip size is 158 mil.

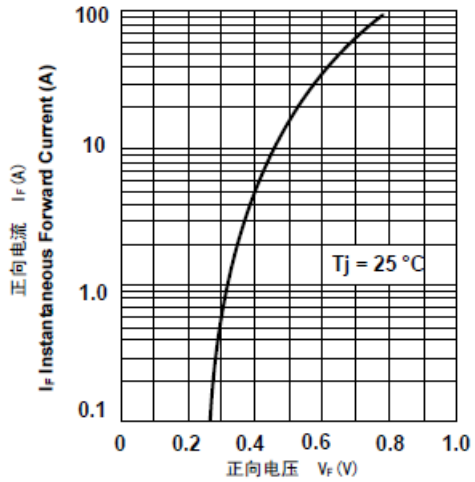
IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

GZX

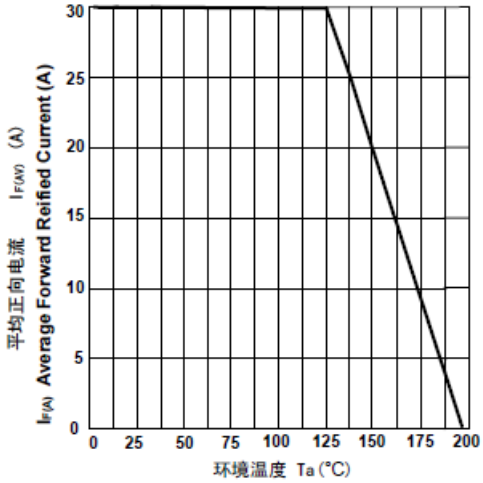
30SQ045T

特性曲线 Charaeristic Curves

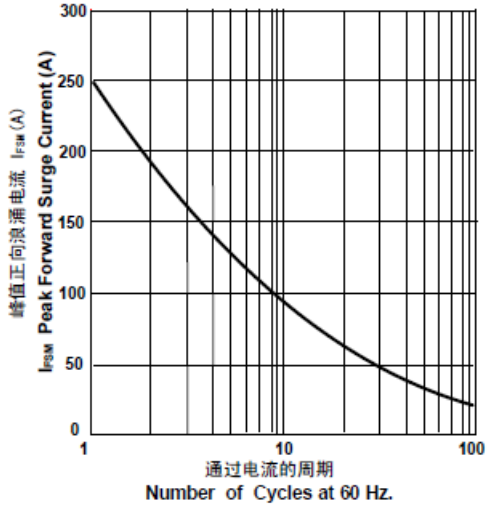
正向特性曲线（典型值）
TYPICAL FORWARD CHARACTERISTIC



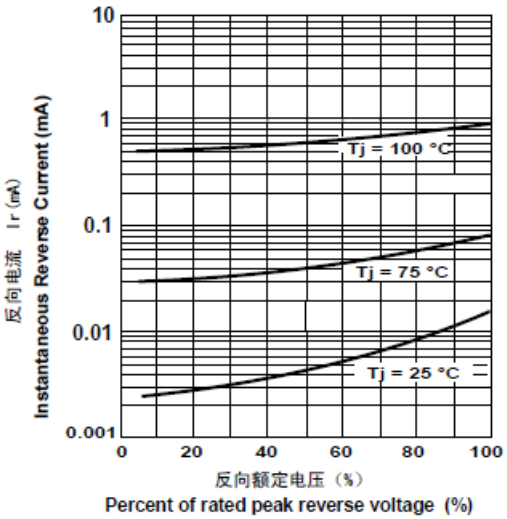
正向电流降额曲线
FORWARD CURRENT DERATING CURVE



浪涌特性曲线（最大值）
MAXIMUM NON REPETITIVE
PEAK FORWARD SURGE CURRENT

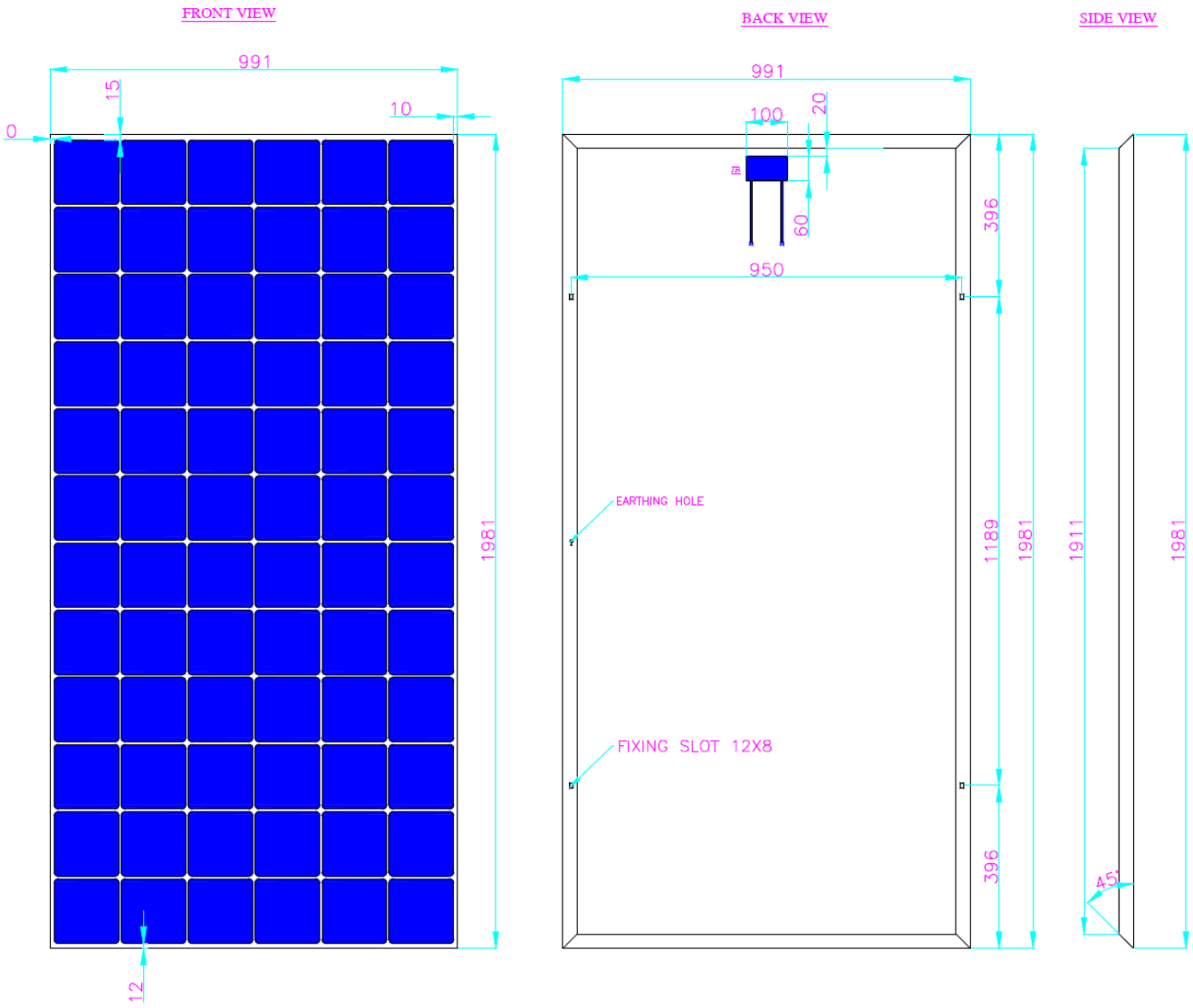


反向电流特性曲线
MAXIMUM NON REPETITIVE SURGE CURRENT

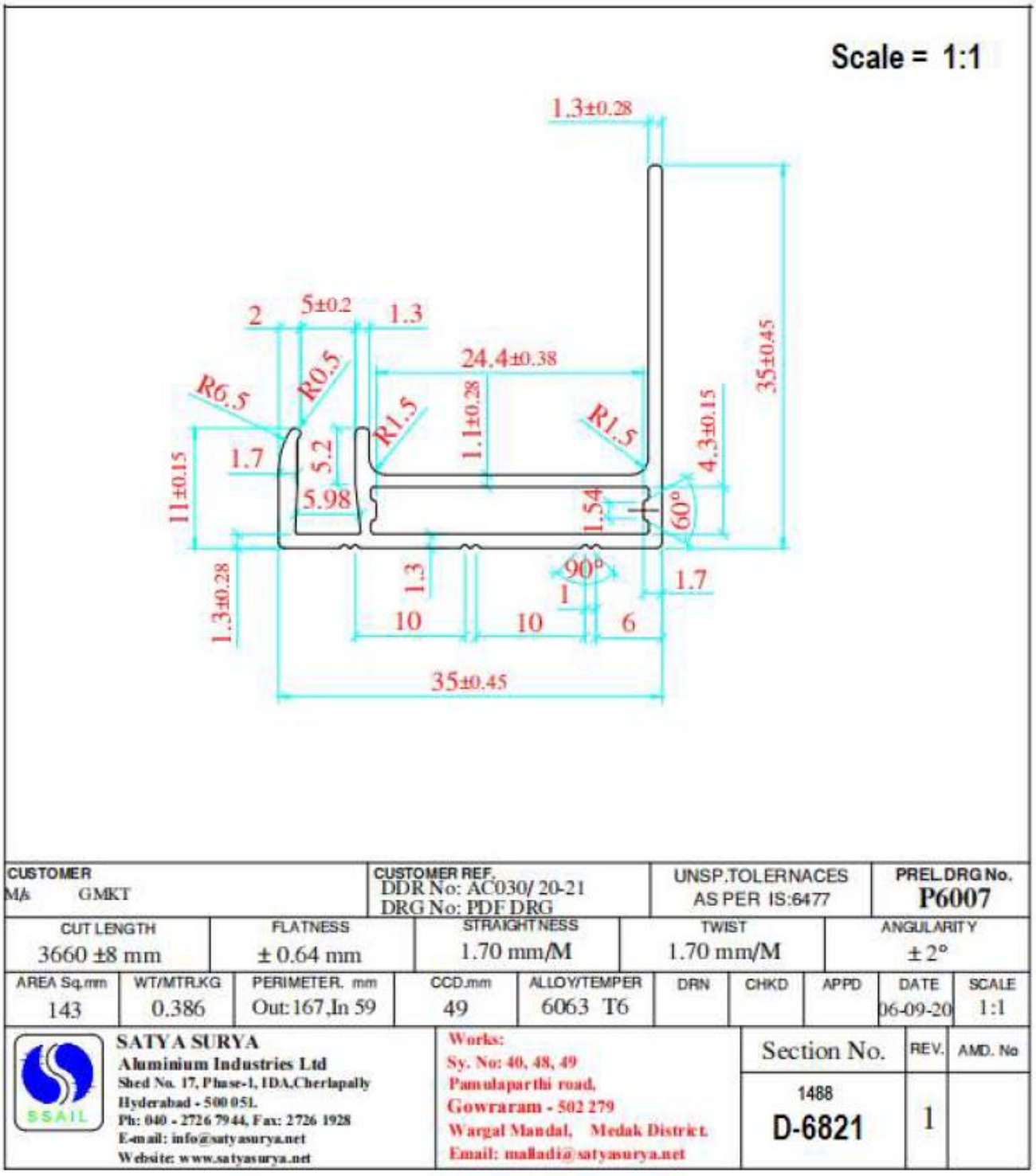


IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Illustration 2-03



IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict



IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Reports/ certificates 3-01

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

CERTIFICATE

No. B 088393 0014 Rev. 01

Holder of Certificate: NINGBO GZX PV TECHNOLOGY CO., LTD
No. 28, Binhai 5th, Road
Hangzhou Bay New District
315336 Ningbo, Zhejiang
PEOPLE'S REPUBLIC OF CHINA

Production Facility(ies): 088393

Certification Mark:

Product: Installation box
Junction Box for PV Module

Model(s): PV-GZX156Q, PV-GZX156Q1, PV-GZX156V, PV-GZX156V1, PV-GZX156H.

Parameters:

Rated Voltage:	1500VDC
Rated Current:	14 A for PV-GZX156V 15 A for PV-GZX156Q and PV-GZX156H 16 A for PV-GZX156Q1 and PVGZX156V1
Reverse Current:	30A
Application Class	A
Protection Class:	II
Degree of Protection:	IP65/IP68(1m,1h) for PV-GZX156Q PV-GZX156Q1; PV-GZX156V PV-GZX156V1; IP65/IP67 for PV-GZX156H
Ambient Temperature:	-40°C ~ +85°C

Tested according to: IEC 62790(ed.1)
EN 62790:2015

The product was tested on a voluntary basis and complies with the essential requirements. The certification mark shown above can be affixed on the product. It is not permitted to alter the certification mark in any way. In addition, the certification holder must not transfer the certificate to third parties. This certificate is valid until the listed date, unless it is cancelled earlier. All applicable requirements of the testing and certification regulations of TÜV SÜD Group have to be complied. For details see: www.tuvsud.com/ps-cert

Test report no.: 704071614002-03
Valid until: 2025-08-06
Date, 2020-08-10

(Yaqun Alex Liu)

Page 1 of 1
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IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Reports/certificates 3-02

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

CERTIFICATE

No. B 088393 0020 Rev. 00

Holder of Certificate: NINGBO GZX PV TECHNOLOGY CO., LTD
No. 28, Binhai 5th, Road
Hangzhou Bay New District
315336 Ningbo, Zhejiang
PEOPLE'S REPUBLIC OF CHINA

Production Facility(ies): 107732

Certification Mark:

Product: Electric Cables

Electric cables for photovoltaic systems with a voltage rating of 1,5kV DC

Model(s): 62930 IEC 131 1×1.5mm², 1×2.5mm², 1×4mm²
1×6mm², 1×10mm², 1×16mm², 1×25mm²

Parameters:

Rated Voltage:	DC 1500V (between conductors and between conductor and earth)
Application Class:	A
Protection Class:	II
Ambient Temperature:	-40°C ~+90°C
Max. Temperature at conductor:	120°C

Tested according to: IEC 62930(ed.1)

The product was tested on a voluntary basis and complies with the essential requirements. The certification mark shown above can be affixed on the product. It is not permitted to alter the certification mark in any way. In addition, the certification holder must not transfer the certificate to third parties. This certificate is valid until the listed date, unless it is cancelled earlier. All applicable requirements of the testing and certification regulations of TÜV SÜD Group have to be complied. For details see: www.tuvsud.com/ps-cert

Test report no.: 704072015801-00

Valid until: 2025-07-05
Date, 2020-07-06

(Yaqun Alex Liu)

Page 1 of 1
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IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Reports/certificates 3-03

Product Service

CERTIFICATE

No. B 088393 0019 Rev. 01

Holder of Certificate: **NINGBO GZX PV TECHNOLOGY CO., LTD**
No. 28, Binhai 5th, Road
Hangzhou Bay New District
315336 Ningbo, Zhejiang
PEOPLE'S REPUBLIC OF CHINA

Production Facility(ies): 088393

Certification Mark:

Product: **Connector**
Connectors for Photovoltaic Systems

Model(s): **PV-GZX1500, PV-GZX1500A, PV-GZX0601-1**

Parameters:

Rated Voltage:	1500VDC for PV-GZX1500, 1500VDC for PV-GZX1500A, 1000VDC for PV-GZX0601-1
Rated Current:	30A for PV-GZX1500 30A for PV-GZX1500A 30A for PV-GZX0601-1
Application Class:	A
Protection Class:	II
Degree of Protection:	IP68(1m,1h) for PV-GZX1500 IP67 for PV-GZX1500A IP67 for PV-GZX0601-1
Ambient Temperature :	-40°C ~ +85°C

Tested according to: IEC 62852(ed.1)
EN 62852:2015

The product was tested on a voluntary basis and complies with the essential requirements. The certification mark shown above can be affixed on the product. It is not permitted to alter the certification mark in any way. In addition the certification holder must not transfer the certificate to third parties. See also notes overleaf.

Test report no.: 704071614001-02

Valid until: 2024-12-30

Date, 2020-01-17 (Yaqun Alex Liu)

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Reports/certificates 3-04

Component - Plastics E504802

Guide Information

Sika India Pvt. Ltd.

B 501 & 502, Lotus Corporate Park, Off. Western Express Highway, Goregaon East, TTC Industrial Area,Turbhe-Indranagar, Mumbai Maharashtra 400063 IN

Sikasil AS 60 IN

Silicone "Room Temperature Vulcanizing" (RTV), furnished as two paste components

Color	Min. Thk (mm)	Flame Class	HWI	HAI	RTI Elec	RTI Imp	RTI Str
WT	1.5	HB	3	0	105	105	105
	3.0	HB	2	0	105	105	105

Comparative Tracking Index (CTI): -
Dielectric Strength (kV/mm): 22
High-Voltage Arc Tracking Rate (HVTR): 0
Dimensional Stability (%): -
Inclined Plane Tracking (IPT) kV: -
Volume Resistivity (10^X ohm-cm): -
High Volt, Low Current Arc Resis (D495): -

ANSI/UL 94 small-scale test data does not pertain to building materials, furnishings and related contents. ANSI/UL 94 small-scale test data is intended solely for determining the flammability of plastic materials used in the components and parts of end-product devices and appliances, where the acceptability of the combination is determined by UL.

Report Date: 2019-03-29
Last Revised: 2019-03-29

IEC and ISO Test Methods

Test Name	Test Method	Units	Thk (mm)	Value
Flammability	IEC 60695-11-10	Class (color)	1.5	HB75 (WT)
			3.0	HB40 (WT)
Glow-Wire Flammability (GWFI)	IEC 60695-2-12	°C	-	-
Glow-Wire Ignition (GWIT)	IEC 60695-2-13	°C	-	-
IEC Comparative Tracking Index	IEC 60112	Volts (Max)	-	-
IEC Ball Pressure	IEC 60695-10-2	°C	-	-
ISO Heat Deflection (1.80 MPa)	ISO 75-2	°C	-	-
ISO Tensile Strength	ISO 527-2	MPa	-	-
ISO Flexural Strength	ISO 178	MPa	-	-
ISO Tensile Impact	ISO 8256	kJ/m^2	-	-
ISO Izod Impact	ISO 180	kJ/m^2	-	-
ISO Charpy Impact	ISO 179-2	kJ/m^2	-	-

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Reports/certificates 3-05

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PROSPECTOR® CLICK TO CONTINUE

View additional material information including performance and processing data

Component - Plastics E248611

Guide Information

Shanghai Huitian New Material Co Ltd

251 Wenji Rd, Songjiang, Shanghai 201616 CN

5299W-S

Silicone "Room Temperature Vulcanizing" (RTV), furnished as two liquid components

Color	Min. Thk (mm)	Flame Class	HWI	HAI	RTI Elec	RTI Imp	RTI Str
WT, BK	3.0	V-0	1	0	105	105	105
	6.0	V-0	0	0	105	105	105
	13.0	V-0	0	0	105	105	105

Comparative Tracking Index (CTI): 0
Dielectric Strength (kV/mm): -
High-Voltage Arc Tracking Rate (HVTR): -
Dimensional Change (%): -

Inclined Plane Tracking (IPT) kV: 2.5
Volume Resistivity (10^x ohm-cm): -
Surface Resistivity (10^x ohms/square): -
High Volt, Low Current Arc Resis (D495): -

ANSI/UL 94 small-scale test data does not pertain to building materials, furnishings and related contents. ANSI/UL 94 small-scale test data is intended solely for determining the flammability of plastic materials used in the components and parts of end-product devices and appliances, where the acceptability of the combination is determined by UL.

Report Date: 2012-05-16
Last Revised: 2015-11-11

IEC and ISO Test Methods

Test Name	Test Method	Units	Thk (mm)	Value
Flammability	IEC 60695-11-10	Class (color)	3.0	V-0 (WT, BK)
			6.0	V-0 (WT, BK)
			13.0	V-0 (WT, BK)
Glow-Wire Flammability (GWFI)	IEC 60695-2-12	°C	-	-
Glow-Wire Ignition (GWIT)	IEC 60695-2-13	°C	-	-
IEC Comparative Tracking Index	IEC 60112	Volts (Max)	-	-
IEC Ball Pressure	IEC 60695-10-2	°C	-	-
ISO Heat Deflection (1.80 MPa)	ISO 75-2	°C	-	-
ISO Tensile Strength	ISO 527-2	MPa	-	-
ISO Flexural Strength	ISO 178	MPa	-	-
ISO Tensile Impact	ISO 8256	kJ/m^2	-	-
ISO Izod Impact	ISO 180	kJ/m^2	-	-
ISO Charpy Impact	ISO 179-1	kJ/m^2	-	-

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Reports/certificates 3-06

10/21/21, 1:14 PM UL Certification: E353124 - Photovoltaic Polymeric Materials

iq.ul.com

Photovoltaic Polymeric Materials E353124

Guide Information

RENEWSYS INDIA PRIVATE LIMITED

Plot No 21, 22 & 23, Bommasandra - Jigani Link Road, Industrial Area, Taluk Anekal, Bangalore Karnataka 562105 IN

CONSERV P 360-14FC

Ethylene Vinyl Acetate (E/VAC), uncured, furnished as sheets

Color	Min. Thk (mm)	Flame Class	HWI	HAI	RTI Elec	RTI Imp	RTI Str
NC	0.45-0.5	-	4	0	50	50	50

Comparative Tracking Index (CTI): 0
Dielectric Strength (kV/mm): -
High-Voltage Arc Tracking Rate (HVTR): -
Dimensional Change (%): -
Inclined Plane Tracking (IPT) kV: -
Volume Resistivity (10^x ohm-cm): -
High Volt, Low Current Arc Resis (D495): -

ANSI/UL 94 small-scale test data does not pertain to building materials, furnishings and related contents. ANSI/UL 94 small-scale test data is intended solely for determining the flammability of plastic materials used in the components and parts of end-product devices and appliances, where the acceptability of the combination is determined by UL.

Report Date: 2014-09-12
Last Revised: 2014-09-12

IEC and ISO Test Methods

Test Name	Test Method	Units	Thk (mm)	Value
Flammability	IEC 60695-11-10	Class (color)	-	-
Glow-Wire Flammability (GWFI)	IEC 60695-2-12	°C	-	-
Glow-Wire Ignition (GWIT)	IEC 60695-2-13	°C	-	-
IEC Partial Discharge	IEC 61730-2, MST 15	Max System Voltage (V)	-	-
IEC Comparative Tracking Index	IEC 60112	Volts (Max)	-	-
IEC Ball Pressure	IEC 60695-10-2	°C	-	-
ISO Heat Deflection (1.80 MPa)	ISO 75-2	°C	-	-
ISO Tensile Strength	ISO 527-2	MPa	-	-
ISO Flexural Strength	ISO 178	MPa	-	-
ISO Tensile Impact	ISO 8256	kJ/m^2	-	-
ISO Izod Impact	ISO 180	kJ/m^2	-	-
ISO Charpy Impact	ISO 179-1	kJ/m^2	-	-

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Reports/Certificate 3-07

Letter Report

2018-10-19

Mr. Ashish Kumar Singh
RENEWSYS INDIA PRIVATE LIMITED
Plot No 21, 22 & 23
Bommasandra - Jigani Link Road, Taluk Anekal
Bangalore , Karnataka 562105, India

Reference: Project 4788556277.1.1
Subject: Partial Discharge test of grade PREVERV 1-300WD

Mr. Ashish Kumar Singh

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

For the subject project, we have completed the testing at UL India lab . The summary is as follows.

Grade name	Test	Results
PREVERV 1-300WD	Partial Discharge test IEC 61730-2: Ed-1	Measured Extinction voltage (Mean)-4.17kV

Disclaimer

*The results of testing in this report apply only to the sample product/item, which was tested. UL Lab has not participated in the sample selection. This Test report shall not be reproduced except in full without the written approval of the UL Lab. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties. *The applicable standard ambient condition supersedes the lab general ambient conditions.*

UL India Pvt Ltd
Kalyani Platina, 3rd Floor, Block I, EPIP Zone, Phase II, Whitefield, Bangalore – 560066, India
T: 91.80.41384400 / F: 91.80.28413759 / W: ul.com

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Letter Report

2018-09-21

Mr. Ashish Kumar Singh
RENEWSYS INDIA PRIVATE LIMITED
Plot No 21, 22 & 23
Bommasandra - Jigani Link Road, Taluk Anekal
Bangalore , Karnataka 562105, India

Reference: Project 4788556277.1.1
Subject: Radiant Panel test of grade PRESERV 1 300 WD

Mr. Ashish Kumar Singh

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

For the subject project, we have completed the testing at UL Northbrook . The summary is as follows.

Grade name	Test	Results
PRESERV 1 300 WD (on Air side)	Radiant Panel test Test as per ASTME162-08	Average Valid Test Flame Index - Rounded to the nearest multiple of five [RP]: 30

Disclaimer

*The results of testing in this report apply only to the sample product/item, which was tested. UL Lab has not participated in the sample selection. This Test report shall not be reproduced except in full without the written approval of the UL Lab. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties. *The applicable standard ambient condition supersedes the lab general ambient conditions.*

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

RenewSys™
let there be light

Renewsys India Pvt. Ltd.
Division: Bengaluru.
Plot Nos. 21, 22, 23, Bommasandra - Jigani Link Road Industrial Area,Taluk Anekal,
Bengaluru -560105, Karnataka, India.
Tel.: + 91 80 33494545, Fax: + 91 80 33494552. CIN No. U36990MH2011PTC220771
Email: renewsys@renewsysindia.com, Web: www.renewsysworld.com

DATE: 27/07/2018

TO WHOMSOEVER IT MAY CONCERN

Any Single film layer component of a multilayer back sheet meets the UL 1703 par. 7.3 requirements, the composite back sheet which incorporates the film layer is also considered to meet these same requirements.

Based on the highest rated film layer in the respective constructions, the Backsheet RTI (electrical) is 140°C and RTI (strength) is 150°C. The below listed Backsheet's are acceptable for use for PV modules with module operating temperature not to exceed 120° C.

PRESERV 1 150 WD

PRESERV 1 190 WD

PRESERV 1 300 WD

RENEWSYS INDIA PRIVATE LTD. Bangalore

Authorised Signatory.

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

9/24/2018 UL Certification: E353124 - Photovoltaic Polymeric Materials

iq.ul.com

Photovoltaic Polymeric Materials E353124

Guide Information

RENEWSYS INDIA PRIVATE LIMITED

Plot No 21, 22 & 23, Bommasandra - Jigani Link Road, Industrial Area, Taluk Anekal, Bangalore Karnataka 562105 IN

Preserv 1 300 WD

PVDF/PET/EVAPE, Photovoltaic Backsheets, furnished as sheets

Air-side Color	Cell-side Color	Nom Thk (mm)	Flame Class	HWI	HAI	RTI Elec	RTI Str
WT	WT	0.395	-	-	-	-	-

Comparative Tracking Index (CTI): -
Dielectric Strength (kV/mm): -
High-Voltage Arc Tracking Rate (HVTR): -
Dimensional Stability (%): -
Inclined Plane Tracking (IPT) kV: -
Volume Resistivity (10^x ohm-cm): -
High Volt, Low Current Arc Resis (D495): -

ANSI/UL 94 small-scale test data does not pertain to building materials, furnishings and related contents. ANSI/UL 94 small-scale test data is intended solely for determining the flammability of plastic materials used in the components and parts of end-product devices and appliances, where the acceptability of the combination is determined by UL.

Report Date: 2013-05-31
Last Revised: 2017-09-18

IEC and ISO Test Methods

Test Name	Test Method	Units	Thk (mm)	Value
Flammability	IEC 60695-11-10	Class (color)	-	-
Glow-Wire Flammability (GWFI)	IEC 60695-2-12	°C	-	-
Glow-Wire Ignition (GWIT)	IEC 60695-2-13	°C	-	-
IEC Partial Discharge	IEC 61730-2, MST 15	Max System Voltage (V)	-	-
IEC Comparative Tracking Index	IEC 60112	Volts (Max)	-	-
IEC Ball Pressure	IEC 60695-10-2	°C	-	-
ISO Heat Deflection (1.80 MPa)	ISO 75-2	°C	-	-
ISO Tensile Strength	ISO 527-2	MPa	-	-
ISO Flexural Strength	ISO 178	MPa	-	-
ISO Tensile Impact	ISO 8256	kJ/m^2	-	-
ISO Izod Impact	ISO 180	kJ/m^2	-	-
ISO Charpy Impact	ISO 179-2	kJ/m^2	-	-

IS 14286: 2010			
Clause	Requirement + Test	Result - Remark	Verdict

Annex: 5 Electrical data table.

PV Module Type Name	Open Circuit Voltage @ STC, (Voc)	Rated Voltage @ STC/Vmp (V dc)	Maximum System Voltage, (V dc)	Rated Current @ STC/Imp (A)	Short Circuit Current @ STC/Isc (A)	Rated Maximum Power at STC, (Watts)	Maximum Series Fuse, (A)
72 cell series (Monocrystalline)							
VIL-370M	49.36	40.70	1500	9.11	9.68	370	14

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