



GSOLAR POWER CO.,LTD

陕西众森电能科技有限公司

Certificate No. GS20190722-01

Calibration Certificate

Customer name : PREMIER SOLAR SYSTEMS PVT LTD,

Machine name : Solar Simulator

Model : XJCM-11A+

Machine SN : GS11MB18090305

Manufacturer : GSOLAR POWER CO.,LTD

Customer Address : SURVEY NO.54/PART, ABOVE G.PULLA REDDY SWEET HOUSE,
KARKHANA MAIN ROAD,SECUNDERABAD-500009 TELANGANA, INDIA

Inspector:VISWAN

Inspection date: 22/07/2019

Calibration due date: 21/07/2020


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	Name		Contacts	Tel No
Inspection party	GSOLAR POWER CO.,LTD		Li Ruihong	029—89150751-803
User party	PREMIER SOLAR SYSTEMS PVT LTD,			
Machine information	Model	XJCM-11A+		
	SN	GS11MB18090305		
Machine indicator		Non-uniformity of irradiance	Temporal instability of irradiance	Spectrum Mismatch
	mention Standard	2%	0.3%	75%—125%
	Measurement value	0.95%	0.08%	91%-105.9%
	Conclusion	Qualified	Qualified	Qualified
<p>Conclusion : The solar simulator is class AAA</p> <div style="text-align: right;">  </div>				
Report: <i>FengQiong</i> Date: 23th. JULY 2019		Detection: VISWAN date: 22th. JULY. 2019		

1. The calibration is made according to below documents:

1.1 JJF1615-2017: Calibration Specification for Solar Simulators

1.2 Photovoltaic Devices- IEC 60904-9, 2007: Solar Simulator performance requirements

1.3 Main Instruments Used in calibration process

Name	Test Range	Uncertainty	Certificate No	Validity of Certification
Fiber optic spectrometer	(400-1100)nm	8% (K=2)	GXfs2018-3553	2019-11-13

2. Test data

2.1 Non-uniformity of Irradiance

Testing tool: a small silicon solar module, 10cm x10cm

Testing method:

Step 1 :divide the illuminated area of solar simulator (2m*1.1m) into 72areas equally.

Step 2: test the Isc of small module in the 72 areas respectively.

Step 3: calculate the Non-uniformity of irradiance by the below formula,

$$\text{Non-uniformity (\%)} = [(\text{MaxIsc} - \text{MinIsc}) / (\text{MaxIsc} + \text{MinIsc})] \times 100\%$$

The test results are as follows :

	1	2	3	4	5	6	7	8	9	10	11	12
A	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.89	0.88	0.89	0.89	0.89
B	0.89	0.89	0.89	0.88	0.89	0.89	0.89	0.89	0.88	0.89	0.89	0.89
C	0.89	0.89	0.88	0.89	0.88	0.88	0.89	0.89	0.89	0.90	0.89	0.89
D	0.88	0.89	0.89	0.89	0.89	0.88	0.88	0.89	0.89	0.89	0.89	0.89
E	0.89	0.89	0.89	0.88	0.89	0.89	0.88	0.88	0.89	0.89	0.89	0.89
F	0.89	0.88	0.88	0.90	0.89	0.89	0.89	0.89	0.90	0.89	0.90	0.89

MAX:0.88

MIN:0.9

Result:0.95%

2.2 Temporal instability of Irradiance

Testing tool: a small silicon solar module

Testing method:

Step 1: test the Isc of the small module for many times in the same area.

Step 2: calculate the temporal instability of irradiance as the below formula

Temporal instability (%) = $[(MaxIsc - MinIsc) / (MaxIsc + MinIsc)] \times 100\%$

The test results are as follows :

9.073065	9.071484	9.072879	9.070691	9.075505	9.072956	9.074127
9.063705	9.074531	9.072538	9.074741	9.06966	9.072393	
9.070137	9.072678	9.070198	9.076559	9.070286	9.075196	
9.079819	9.073109	9.073179	9.074599	9.076161	9.074299	

MAX: 9.079819

MIN: 9.063705

Result:0.08%

2.3 Spectrum Match:

Testing tool: Fiber optic spectrometer

The test results are as follows :

Worst case classification = A

Intervals(nm):	400.0-500.0	500.0-600.0	600.0-700.0	700.0-800.0	800.0-900.0
Ratios:	91.0%	99.9%	104.1%	104.9%	94.1%
Classes:	A	A	A	A	A

Intervals(nm):	900.0-1100.0
Ratios:	105.9%
Classes:	A

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