

# Test Report

## DEV INTERNATIONAL

REPORT NUMBER: 4786848820-NABL-S1

PROJECT NUMBER: 4786848820



T1431, T1432, T2215,  
T2216, T2233, T2234

Location (a)

UL India Lab,

UL India Pvt Limited,

Laboratory building,

Kalyani Platina

Campus, Sy.no.129/4,

EPIP Zone, Phase II,

Whitefield,

Bangalore - 560 066

Location (b)

UL India Pvt Limited,


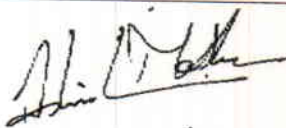
413 Sector-8, IMT

Manesar, Gurgaon.

**TEST DISCIPLINE: ELECTRONICS****General details**

<b>Customer</b>	DEV INTERNATIONAL		
<b>Manufacturer</b>	DEV INTERNATIONAL		
<b>Program</b>	NABL		
<b>Test Lab Location</b>	(a) UL Bangalore	Refer to Cover page for the Location address	
<b>Item Under Test</b>	Solar Photovoltaic (PV) Modules		
<b>Type / Model</b>	250W60C20		
<b>Number of samples</b>	ONE (01 NO')		
<b>Sample Identification</b>	2080263		
<b>Serial Number (If any)</b>	2015031333		
<b>Condition of IUT on receipt</b>	Good		
<b>Date of Receipt</b>	19 March 2015		
<b>Applicable Standard</b>	IEC 61215 (Clause 10.2)		
<b>Date of Testing (Start date )</b>	19 March 2015	<b>End Date</b>	19 March 2015
<b>Lab general* ambient condition</b>	<b>Temperature in °C</b>	23±5°C	
	<b>Relative humidity in %</b>	<70%	
<b>Date of Reporting</b>	19 March 2015		
<b>Test In-charge</b>	SRIMATHY.N		

# Fill in the rows with information or add hyphen (-)

 Lab Technician <b>Reviewed by</b>	 Lab Manager <b>Authorized signatory</b>
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**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 or partial without the written approval of the 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.*

**General Remarks (If any)**

-NA-

**Description of Item under Test (IUT)**

Solar Photovoltaic (PV) Modules

**Test methodology adopted****10.2 Maximum power determination****Test samples**

Same sample after Visual Inspection were subjected to Maximum Power determinations

**Test configuration**

The following equipment was used to perform I-V characteristic measurements in simulated sunlight (solar simulator):

- a) Class A solar simulator in accordance with IEC 60904-9. The designated test area was greater than the area that is spanned by the test specimen.
- b) A PV reference solar module in accordance with IEC 60904-2 was used to calibrate the sun simulator
- c) The means for monitoring the temperature of the test specimen and the reference device to an accuracy of  $\pm 1^\circ\text{C}$  and repeatability of  $\pm 0.5^\circ\text{C}$ .
- d) An irradiance sensor that tracks the instantaneous irradiance was placed in the test plane. This irradiance sensor was linear in the range of irradiances over which the measurements were taken.
- e) The temperature of the reference device and the specimen was measured using instrumentation with accuracy of  $\pm 1^\circ\text{C}$  with repeatability of  $\pm 0.5^\circ\text{C}$ .
- f) Equipment for measuring the current of the test specimen and reference device to an accuracy of  $\pm 0.2\%$  of the reading.
- g) Equipment for measuring the voltage of the test specimen and reference device to an accuracy of  $\pm 0.2\%$  of the reading.

**Compliance Criteria –**

The Solar modules underwent the Maximum power determination test in order to record the Electrical data (Maximum Power).

Reviewed by signature:

12-LO-F0851, Issue

3.0



## Equipment and Calibration details

Test Equipment	Inst.ID No.	Function/Range	Manufacturer	Last Cal. Date	Next Cal. Date
Flash Solar Simulator	SSS01	1000W/m <sup>2</sup>	SPIRE CORPORATION	Used Reference module for calibration	
Flash solar simulator Thermometer	FST01	25deg to 100deg	OMEGA	01/12/2014	01/12/2015
Temperature & Humidity Recorder	H08	15-40 Deg/30-90 % RH	OMEGA	06/02/2014	06/02/2015
Reference Module	REF300	300 Watts	BHEL	NA (Calibration on Demand)	
Measuring Tape	TP05	0 – 3000mm	TAJIMA	06/29/2014	06/29/2015

## Test Results

Test Parameter	Standard & Clause Number	Sample ID	Date of testing	Result
PIV MEASUREMENT AT STC CONDITION	IEC 61215 Clause 10.2	2080263	March 19, 2015	NA

P: Meets the requirements    F: Does not meet the requirement    NA: Not applicable

**Results –****MODEL NO: 250W60C20**

10.2		TABLE: Maximum Power Determination						
Cell temperature (°C) :		25						
Irradiance (W/m <sup>2</sup> ) :		1000						
Sample No.	Serial No.	Voc (V)	Isc (Amps)	Pmp (W)	Vmp (V)	Imp (Amps)	Module Efficiency (%)	FF (%)
2080263	2015031333	37.896	8.701	252.982	30.590	8.270	15.385	76.7

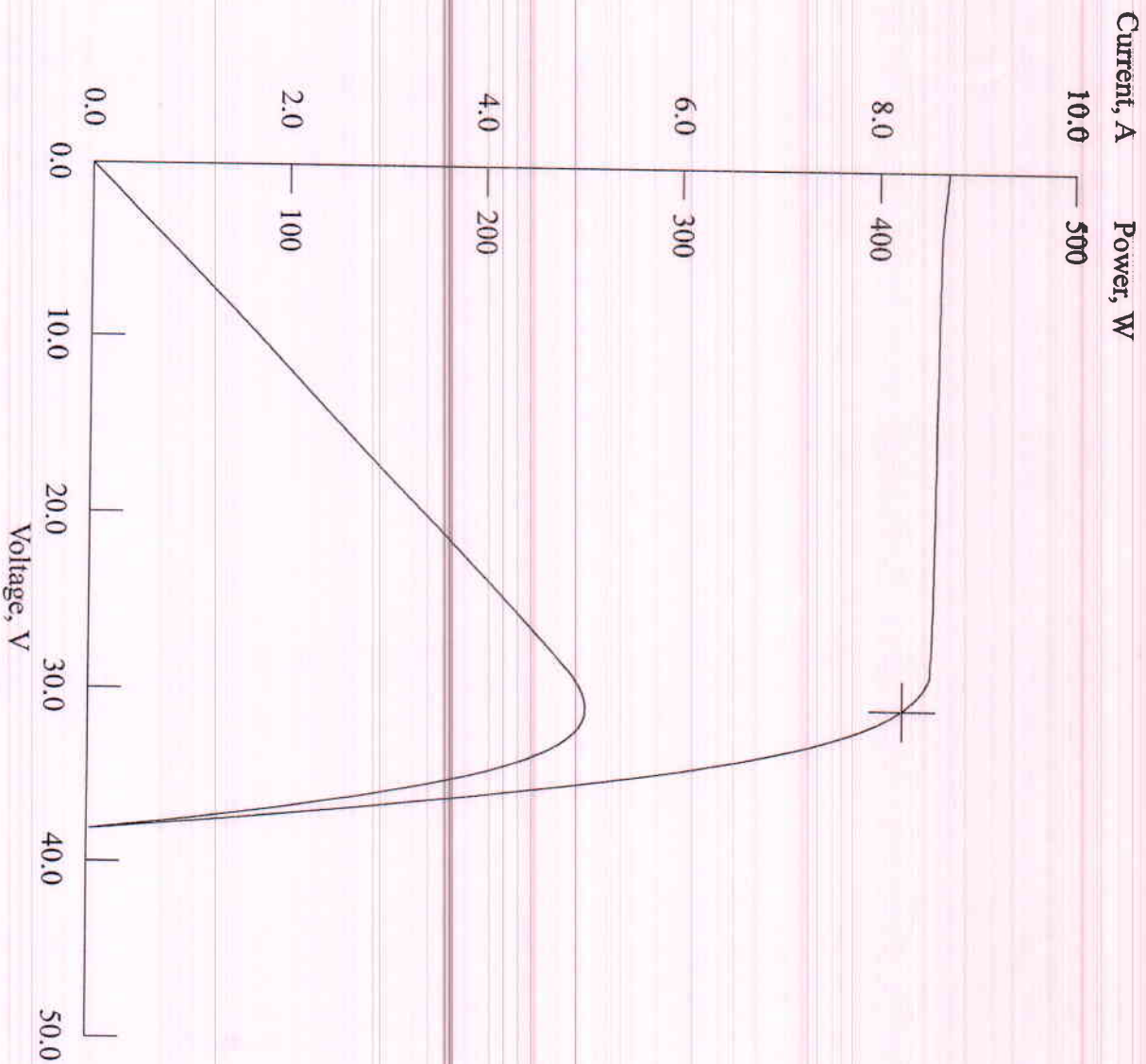
**Test Observation (If any)****-NA-****Appendix****Page No.06 for PIV graph.**

\*\*\*\*\*End of Report\*\*\*\*\*

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3.0



#### SPI-Sun Simulator 4600 SLP

##### Title: DEV

Comment: PIV MEASUREMENT

ID: 2080263 (2015031333)

13:13:55 3/19/2015

Measured Temperature = 24.6°C

Corrected Temperature = 25.0°C

Irr Meas = 100.0mW/cm<sup>2</sup>

Irr Corr = 100.0mW/cm<sup>2</sup>

Voc = 37.896V

Isc = 8.701A

Pmax = 252.982W

Vpm = 30.590V

Ipm = 8.270A

FF = 0.767

Eff.m = 15.385%

Eff.c = 17.326%

Rs = 0.472 Ohm

Rsh = 53.826 Ohm

IV Points: 3377