WAAREE ENERGIES PVT LTD

Test Report

Report reference No.:SH11100226-001 Issue Date: 2012-05-29

Photovoltaic Module Performance Report

Report Reference No.....:	SH11100226-001
Compiled by (+signature) .....:	Jeck Jing
Approved by (+signature) .....:	Zane Guo
Date of Issue .....:	2012-05-29
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Testing Laboratory.....:	Intertek Testing Service Shanghai
Address.....:	Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, China
Testing location/procedure.....:	Intertek Testing Service Shanghai PV laboratory
Address.....:	1-2F, No. 2, Alley 1218, Wan Rong Road, Shanghai, China 200436
Applicant's name .....:	WAAREE ENERGIES PVT LTD
Address.....:	602, Western Edge-1, Western Express Highway, Borivali(E), Mumbai-400066 Maharashtra India
Test specification.....:	CEC Additional performance testing
Standard.....:	IEC 61215:2005 2nd Edition Sections
Test item description.....:	Photovoltaic(PV) Module(s)
Trade Mark.....:	WAAREE
Model/Type reference.....:	WS-280 / WS-265 / WS-230
Manufacturer.....:	WAAREE ENERGIES PVT LTD
Address.....:	Plot No 231-236 Surat Special Economic Zone, Sachin Surat-394230, Gujarat, India
Rating.....:	See Page2

- The results reported in this test report shall refer only to the sample actually checked and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
- This report shall not be reported except in full without prior authorization from Intertek Testing Services Shanghai.
- The services are provided subject to the terms and condition of the company, which can be furnished upon request.

General Product information:

Description of module construction:

Model No.	Cell technology	Size of cells	No. of cells	Fire class
WS-280	Poly-Si	156×156	72	C
WS-265	Poly-Si	156×156	72	C
WS-230	Poly-Si	156×156	60	C

Product Electrical Rating:

Model No.	Voc (V)	Isc (Amps)	Pmp (W)	Vmp (V)	Imp (Amps)	Maximum series Fuse rating (Amps)
WS-280	43.00	8.68	280	35.00	8.00	15
WS-265	43.00	8.21	265	35.00	7.58	15
WS-230	36.00	8.51	230	29.00	7.94	15

Summary of testing:

Tests performed (name of test and test clause)

Tests	Clause
Maximum Power Determination	IEC 61215: 2005 2nd Edition: Cl. 10.2
Measurement of Temperature Coefficients	IEC 61215: 2005 2nd Edition: Cl. 10.4
Measurement of Nominal Operating Cell Temperature (NOCT)	IEC 61215: 2005 2nd Edition: Cl. 10.5
Performance at STC and NOCT	IEC 61215: 2005 2nd Edition: Cl. 10.6
Performance at low Irradiance	IEC 61215: 2005 2nd Edition: Cl. 10.7

Module group assignment:

Sample	Sample Group ID	Model No.
WSDWS061116165	A	WS-280
WSDWU061113404	A	WS-265
WSDWZ061116198	A	WS-230

Testing results:

Maximum power determination:

Test date (MM/DD/YYYY).....	02/16/2012	—
Module Temperature (℃).....	25	—
Irradiance (W/cm^2).....	1000	—

Serial No.	Voc (V)	Vmp (V)	Isc (A)	Imp (A)	Pmp (W)
WSDWS061116165	44.391	34.521	8.531	7.996	276.030
WSDWU061113404	44.278	34.583	8.380	7.682	265.654
WSDWZ061116198	36.803	28.637	8.262	7.706	220.676

Temperature coefficient:

Test date (MM/DD/YYYY).....	02/16/2012	—
Irradiance (W/cm^2) high/low.....	1000	—
Module temperature (℃) high/low.....	55/25	—

Serial No.	α_{Isc}(%)	β_{Voc}(%)	α_{Impp}(%)	β_{Vmpp}(%)	γ_{Pmp}(%)
WSDWS061116165	0.063	-0.359	-0.014	-0.483	-0.496

Nominal Operating Cell Temperature (NOCT, ℃):

Test date (MM/DD/YYYY).....	02/16/2012 to 05/12/2012	—
Ambient temperature [℃] high/low.....	21/5	—
Irradiance [W/m^2] high/low.....	1020/400	—
Wind velocity [m/s] (average).....	1.3	—
Serial No.	**Average NOCT(℃)**	—
WSDWS061116165	48.8	—

Performance at NOCT:

Test date (MM/DD/YYYY).....	05/16/2012	—
Test method.....	☒indoor ☐outdoor	—
Ambient air temperature (°C).....	20	—
Irradiance (W/m^2) low/high	800	—
Module temperature (°C) high/low.....	49/25	—

Serial No.	Voc (V)	Vmp (V)	Isc (A)	Imp (A)	Pmp (W)
WSDWS061116165	40.263	30.871	6.924	6.461	199.463
WSDWU061113404	40.394	31.119	6.819	6.191	192.667
WSDWZ061116198	33.235	25.463	6.746	6.189	157.578

Performance at low irradiance:		
Test date (MM/DD/YYYY) ..... :	05/16/2012	—
Ambient air temperature (°C) ..... :	20	—
Irradiance (W/m^2) ..... :	200	—
Module temperature (°C) ..... :	25	—

Serial No.	Voc (V)	Vmp (V)	Isc (A)	Imp (A)	Pmp (W)
WSDWS061116165	41.123	34.657	1.695	1.585	54.916
WSDWU061113404	40.922	33.914	1.700	1.521	51.570
WSDWZ061116198	34.061	28.446	1.682	1.538	43.738