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Weiwei Wen
Email: swen@lesso.com
PT LESSO New Energy
Kawasan Industri JIPS blok D Jalan Raya Semarang – Demak KM 14.7 Desa / Kelurahan, Batu, Kec. Karangtengah, kab. Demak Demak Regency, Jawa Tengah 59561, Indonesia

Reference: Project 4791119978
Subject: Letter Report for CEC/CSI PV module Performance Testing

Dear Weiwei Wen,

Samples of the subject product were tested at UL in accordance with the requirements of CEC-300-2018-009-CMF- Guidelines for California's Solar Electric Incentive Programs Pursuant to Senate Bill 1, appendix 1: PV modules, and IEC standard 61215 – Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval, 2nd Edition, 2005-04.

The nameplate nominal parameters are as following:

Model	Open Circuit Voltage at STC, V dc)	Rated Voltage at STC, V dc)	Maximum System Voltage, (V dc)	Rated Current at STC, (A dc)	Short Circuit Current at STC, A dc)	Rated Maximum Power at STC, Watts)
410D(BPM)54(182)	37.30	31.42	1500	13.05	13.75	410
550D(HBD)72(182)	49.78	41.93	1500	13.12	14.01	550

Representative testing was conducted on following selected models to evaluate the performance of the above models:

The following model types / sample numbers were tested:

Model Type	Sample No.	Test Items
410D(BPM)54(182)	6736979	10.1 Visual inspection 10.2 Maximum power determination 10.4 Measurement of temperature coefficients 10.5 Measurement of nominal operating cell temperature (NOCT) 10.6 Performance at STC and NOCT 10.7 Performance at low irradiance
550D(HBD)72(182)	6736980	10.1 Visual inspection 10.2 Maximum power determination 10.4 Measurement of temperature coefficients 10.5 Measurement of nominal operating cell temperature (NOCT) 10.6 Performance at STC and NOCT 10.7 Performance at low irradiance

TEST RESULTS:

The following is a summary of the test results:

1. Maximum Power Determination (IEC 61215 Clause 10.2)

Model No.	Voc (V)	Vmp (V)	Isc (Amps)	Imp (Amps)	Pmp (W)
410D(BPM)54(182)	37.721	31.586	13.489	12.827	405.153
550D(HBD)72(182)	50.098	41.998	13.644	12.979	545.081

2. Measurement of Temperature Coefficients (IEC 61215 Clause 10.4)

Model Tested	410D(BPM)54(182)	550D(HBD)72(182)
Short circuit current (αs) (%/°C)	0.039	0.040
Maximum Power Current (αm) (%/°C)	-0.001	0.002
Open circuit voltage (βo) (%/°C)	-0.247	-0.249
Maximum Power Voltage (βm) (%/°C)	-0.321	-0.322
Peak (max.) power (δ) (%/°C)	-0.320	-0.319

3. Measurement of Nominal Operating Cell Temperature (NOCT) (IEC 61215 Clause 10.5)

Model Tested	410D(BPM)54(182)	550D(HBD)72(182)
Nominal operating cell temperature (NOCT) (°C)	45.55	45.56

4. Performance at Standard Test Conditions (STC) (IEC 61215 Clause 10.6)

TABLE: Performance at STC					
Model No.	Voc (V)	Vmp (V)	Isc (A)	Imp (A)	Pmp (W)
410D(BPM)54(182)	37.827	31.707	13.371	12.724	403.446
550D(HBD)72(182)	50.385	42.197	13.560	12.893	544.056

5. Performance at Nominal Operating Cell Temperature (NOCT) (IEC 61215 Clause 10.6)

TABLE: Performance at NOCT					
Model No.	Voc (V)	Vmp (V)	Isc (A)	Imp (A)	Pmp (W)
410D(BPM)54(182)	35.334	29.227	10.834	10.240	299.300
550D(HBD)72(182)	47.339	39.245	10.958	10.393	407.873

6. Performance at Low Irradiance (IEC 61215 Clause 10.7)

Model No.	Voc (V)	Vmp (V)	Isc (A)	Imp (A)	Pmp (W)
410D(BPM)54(182)	35.952	30.658	2.687	2.559	78.447
550D(HBD)72(182)	47.869	40.763	2.725	2.606	106.221

Should you have any questions or comments concerning the above, please feel free to contact the undersigned.

Sincerely,

Jerry Kan

Jerry Kan
Project Engineer
Energy and Industrial Automation
Jerry.Kan@ul.com

Reviewed by:

Jason You

Jason You
Senior Project Engineer
Energy and Industrial Automation
Jason.You@ul.com