



Letter of Attestation

Document: 70092418

Master Contract: 235284

Project: 70167134

Date Issued: December 13, 2017

Issued to: Huawei Technologies Co., Ltd.
Huawei Industrial Base
Bantian Town
Longgang District
Shenzhen, 518129
China
Attention: Mr. Li Wen

*CSA Group, Certification and Testing hereby confirms that it has completed an evaluation of
Transformerless Utility Interactive Inverter*

Model SUN2000-45KTL-US-HV-D0

*CSA Group, Certification and Testing hereby attests that the products identified above and described
in CSA report 70167134, dated December 13, 2017
complies with the following standards/tests, to the extent applicable:*

The testing of the subject inverters were completed according to the following sections of the test protocol entitled "Performance Test Protocol for Evaluating Inverters Used in Grid-Connected Photovoltaic Systems" prepared by "Sandia National Laboratories, Endecon Engineering, BEW Engineering, and Institute for Sustainable Technology", dated October 14, 2004 as modified by the "CEC Guideline for the use of the Performance Test Protocol for Evaluating Inverters Used in Grid-Connected Photovoltaic Systems - (draft for immediate use)" prepared by KEMA-Xenergy, and BEW Engineering, dated March 1, 2005 with deviations according to the requirements of the Guidelines for California's Solar Electric Incentive Programs (Senate Bill1) Fourth Edition (CEC-300-2011-005-CMF), Appendix 1- "Inverters":

- **Maximum Continuous Power (performed with 50kW output power)**
- **Conversion Efficiency**
- **Tare Losses**

Notes:

1. Units verified against CSA report 70167134, dated December 13, 2017.
2. Refer to test report (5 Pages) and Attachment A (4 pages) for test results and setup details.

Issued by:

Allen Yao

Allen Yao, Certifier

THIS LETTER OF ATTESTATION DOES NOT AUTHORIZE THE USE OF THE CSA MARK ON THE SUBJECT PRODUCTS. QUOTATIONS FROM THE TEST REPORT OR THE USE OF THE NAME OF THE CANADIAN STANDARDS ASSOCIATION AND CSA GROUP OR ITS REGISTERED TRADEMARK, IN ANY WAY, IS NOT PERMITTED WITHOUT PRIOR WRITTEN CONSENT OF THE CANADIAN STANDARDS ASSOCIATION OPERATING AS CSA GROUP, CERTIFICATION AND TESTING DIVISION.

Manufacturer: Huawei Technologies Co., Ltd

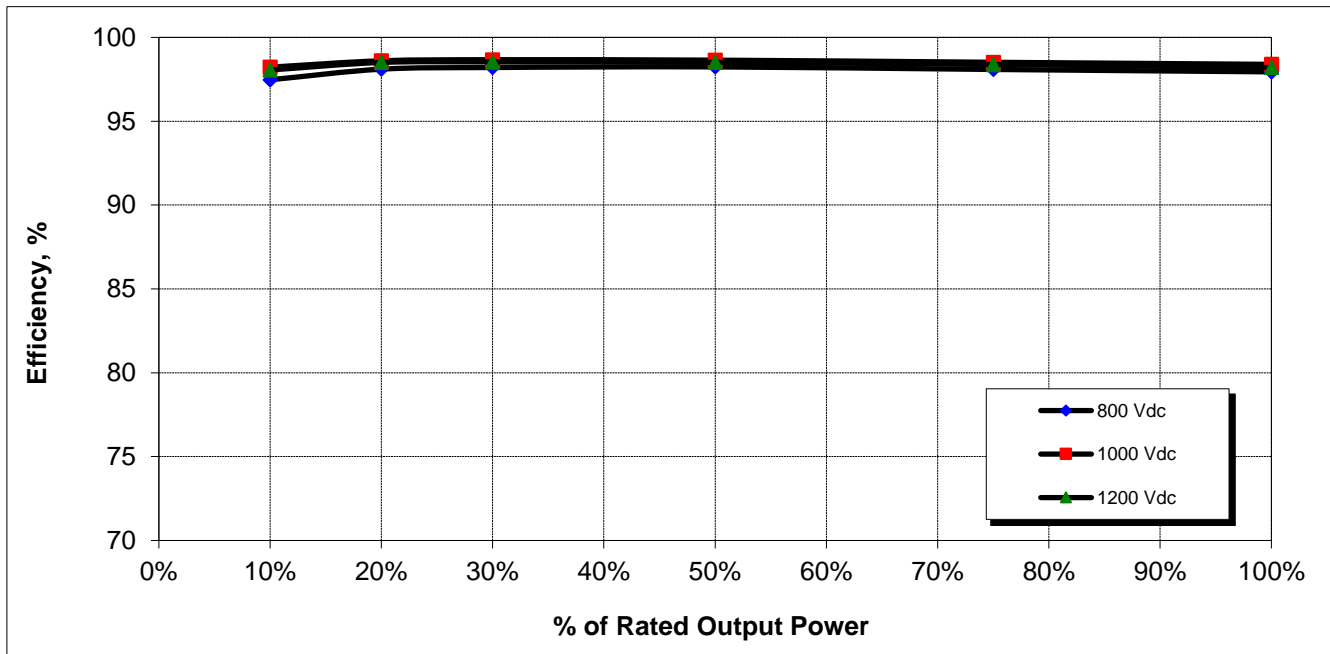
Model #: SUN2000-45KTL-US-HV-D0

Rated Maximum Continuous Output Power: 45.00 kW Night Tare Loss: 1.11 W

Vmin: 800 Vdc Vnom: 1000 Vdc Vmax: 1200 Vdc

Input Voltage (Vdc)	Power Level (%; kW)						Wtd
	10%	20%	30%	50%	75%	100%	
Vmin 800	4.50	9.00	13.50	22.50	33.75	45.00	98.1
Vnom 1000	97.5	98.1	98.2	98.2	98.1	97.9	98.5
Vmax 1200	98.2	98.6	98.7	98.6	98.5	98.4	98.4

CEC Efficiency = 98.5%



MAXIMUM CONTINUOUS OUTPUT POWER

Manufacturer: Huawei Technologies Co., Ltd

Model: SUN2000-45KTL-US-HV-D0

Samples	Time	Vin (Vdc)	Iin (A dc)	Pin (W)	Vout (a)	Vout (b)	Vout (c)	Vout (avg)	Iout (a)	Iout (b)	Iout (c)	Iout (avg)	Freq (Hz)	Pout (W)	HS1 (C)	HS2 (C)	Amb (C)
	Averages																
1	5	1004.6	51.1	51283.2	347.3	348.0	347.2	347.5	48.3	48.4	48.4	48.3	60.0	50393.6	55.5	60.4	39.8
2	10	1008.0	51.0	51302.8	347.3	348.0	347.2	347.5	48.3	48.4	48.4	48.4	60.0	50410.0	55.6	60.4	40.0
3	15	999.2	51.4	51312.6	347.3	348.0	347.2	347.5	48.3	48.4	48.4	48.4	60.0	50424.8	55.6	60.5	39.9
4	20	1008.2	51.0	51299.6	347.3	348.0	347.2	347.5	48.3	48.4	48.4	48.4	60.0	50409.8	55.4	60.4	39.6
5	25	1004.5	51.2	51351.2	347.3	348.0	347.2	347.5	48.4	48.4	48.4	48.4	60.0	50460.2	55.5	60.5	39.9
6	30	1002.8	51.2	51287.4	347.3	348.0	347.2	347.5	48.3	48.4	48.4	48.4	60.0	50398.2	55.6	60.5	39.9
7	35	1008.1	51.0	51302.0	347.3	348.0	347.2	347.5	48.3	48.4	48.4	48.4	60.0	50413.0	55.5	60.4	39.7
8	40	1006.3	51.1	51306.4	347.3	348.0	347.2	347.5	48.3	48.4	48.4	48.4	60.0	50416.0	55.5	60.3	39.8
9	45	1002.8	51.3	51313.2	347.3	348.0	347.2	347.5	48.3	48.4	48.4	48.4	60.0	50424.4	55.4	60.4	40.0
10	50	1008.0	51.0	51303.4	347.3	348.0	347.2	347.5	48.3	48.4	48.4	48.4	60.0	50415.0	55.5	60.6	40.0
11	55	997.4	51.6	51366.6	347.3	348.0	347.2	347.5	48.4	48.4	48.4	48.4	60.0	50480.2	55.6	60.5	39.9
12	60	1002.8	51.3	51355.4	347.4	348.0	347.2	347.5	48.4	48.4	48.4	48.4	60.0	50467.0	55.4	60.4	39.9
13	65	1004.7	51.2	51308.0	347.3	348.0	347.2	347.5	48.3	48.4	48.4	48.4	60.0	50415.4	55.6	60.6	40.0
14	70	999.3	51.4	51295.0	347.4	348.0	347.2	347.5	48.3	48.4	48.4	48.4	60.0	50409.2	55.5	60.5	39.6
15	75	1001.1	51.4	51357.4	347.4	348.0	347.2	347.5	48.4	48.4	48.4	48.4	60.0	50464.4	55.5	60.5	39.9
16	80	1001.1	51.4	51359.0	347.3	348.0	347.2	347.5	48.4	48.4	48.4	48.4	60.0	50465.2	55.5	60.6	40.0
17	85	1004.6	51.2	51350.6	347.4	348.0	347.2	347.5	48.4	48.4	48.4	48.4	60.0	50458.6	55.6	60.6	40.0
18	90	1004.5	51.2	51351.8	347.4	348.0	347.3	347.5	48.4	48.4	48.4	48.4	60.0	50461.2	55.8	60.7	39.9
19	95	1006.4	51.0	51237.4	347.4	348.0	347.3	347.5	48.3	48.3	48.3	48.3	60.0	50348.8	55.6	60.5	40.0
20	100	1009.9	50.8	51255.2	347.4	348.0	347.3	347.5	48.3	48.3	48.3	48.3	60.0	50365.8	55.6	60.6	40.4
21	105	999.5	51.4	51308.0	347.4	348.0	347.2	347.5	48.3	48.4	48.4	48.4	60.0	50406.0	55.7	60.7	40.1
22	110	1002.8	51.2	51293.4	347.3	348.0	347.2	347.5	48.3	48.4	48.4	48.3	60.0	50399.0	55.8	60.7	40.1
23	115	1000.9	51.4	51367.6	347.4	348.0	347.2	347.5	48.4	48.4	48.4	48.4	60.0	50473.2	55.7	60.7	40.2
24	120	1002.7	51.3	51360.8	347.4	348.0	347.2	347.5	48.4	48.4	48.4	48.4	60.0	50465.6	55.8	60.7	40.0
25	125	997.4	51.5	51318.4	347.4	348.0	347.2	347.5	48.4	48.4	48.4	48.4	60.0	50429.6	55.8	60.8	40.3
26	130	1006.2	51.1	51348.8	347.4	348.0	347.2	347.5	48.4	48.4	48.4	48.4	60.0	50455.0	55.8	60.8	40.1
27	135	1002.7	51.3	51356.2	347.4	348.0	347.2	347.5	48.4	48.4	48.4	48.4	60.0	50465.4	55.8	60.7	40.2
28	140	1001.0	51.3	51269.8	347.4	348.0	347.2	347.5	48.3	48.3	48.4	48.3	60.0	50383.2	55.7	60.7	39.7
29	145	1005.4	51.1	51308.2	347.4	348.0	347.2	347.5	48.3	48.4	48.4	48.4	60.0	50412.2	55.7	60.7	39.8
30	150	1001.9	51.3	51340.4	347.4	348.0	347.3	347.5	48.3	48.4	48.4	48.4	60.0	50426.0	55.7	60.6	40.1
31	155	1005.5	51.1	51325.4	347.4	348.0	347.3	347.5	48.3	48.4	48.4	48.4	60.0	50417.6	55.8	60.7	39.8
32	160	1002.0	51.4	51363.2	347.4	348.0	347.2	347.5	48.4	48.4	48.4	48.4	60.0	50465.0	55.7	60.7	40.1
33	165	1003.8	51.2	51293.0	347.4	348.0	347.2	347.5	48.3	48.3	48.4	48.3	60.0	50377.4	55.7	60.6	40.0
34	170	1003.6	51.2	51326.8	347.4	348.0	347.3	347.5	48.3	48.4	48.4	48.4	60.0	50417.8	55.6	60.7	40.1
35	175	998.3	51.5	51336.8	347.4	348.0	347.2	347.5	48.4	48.4	48.4	48.4	60.0	50428.6	55.6	60.7	40.2
36	180	998.3	51.5	51334.8	347.4	348.0	347.3	347.5	48.4	48.4	48.4	48.4	60.0	50429.2	55.6	60.7	40.0

Max Continuous AC Output Power (W)

50,349

TARE LOSSES

Manufacturer: Huawei Technologies Co., Ltd
Model: SUN2000-45KTL-US-HV-D0

Inverter Stand by Mode																
Date	Time	Vin(Vdc)	Iin (A dc)	Pin (W)	Vout (a)	Vout (b)	Vout (c)	Vout (avg)	Iout (a)	Iout (b)	Iout (c)	Iout (avg)	Freq (Hz)	Pout (W)	Amb (C)	
2016/11/23	20:23:10	0.00	0.00	0.00	347.00	347.00	348.00	347.00	0.01	0.02	0.02	0.01	60.01	1.08	23.77	

Minimum Array Voltage																
Date	Time	Vin(Vdc)	Iin (A dc)	Pin (W)	Vout (a)	Vout (b)	Vout (c)	Vout (avg)	Iout (a)	Iout (b)	Iout (c)	Iout (avg)	Freq (Hz)	Pout (W)	Amb (C)	
2016/11/23	20:25:34	799.80	0.01	3.10	347.00	347.00	348.00	347.00	0.01	0.02	0.02	0.01	60.00	1.11	23.77	

Nominal Array Voltage																
Date	Time	Vin(Vdc)	Iin (A dc)	Pin (W)	Vout (a)	Vout (b)	Vout (c)	Vout (avg)	Iout (a)	Iout (b)	Iout (c)	Iout (avg)	Freq (Hz)	Pout (W)	Amb (C)	
2016/11/23	20:38:22	999.80	0.01	5.40	347.00	347.00	348.00	347.00	0.01	0.02	0.02	0.01	60.00	1.08	23.77	

Maximum Array Voltage																
Date	Time	Vin(Vdc)	Iin (A dc)	Pin (W)	Vout (a)	Vout (b)	Vout (c)	Vout (avg)	Iout (a)	Iout (b)	Iout (c)	Iout (avg)	Freq (Hz)	Pout (W)	Amb (C)	
2016/11/23	20:27:57	1199.70	0.01	5.70	347.00	347.00	348.00	347.00	0.01	0.02	0.02	0.01	60.02	1.08	23.77	

Input power before Start-up																
Date	Time	Vin(Vdc)	Iin (A dc)	Pin (W)	Vout (a)	Vout (b)	Vout (c)	Vout (avg)	Iout (a)	Iout (b)	Iout (c)	Iout (avg)	Freq (Hz)	Pout (W)	Amb (C)	

Unable to perform

Input power after Start-up																
Date	Time	Vin(Vdc)	Iin (A dc)	Pin (W)	Vout (a)	Vout (b)	Vout (c)	Vout (avg)	Iout (a)	Iout (b)	Iout (c)	Iout (avg)	Freq (Hz)	Pout (W)	Amb (C)	

Unable to perform