Letter of Attestation

Document: 70178126 **Master Contract:** 235284

Project: 70178126 **Date Issued:** March 26, 2018

Issued to: **Huawei Technologies Co., Ltd.**
Huawei Industrial Base
Bantian Town
Longgang District
Shenzhen, Guangdong, 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 SUN2000-100KTL-USH0

CSA Group, Certification and Testing hereby attests that the products identified above and described in test report 70178126 dated March 26, 2018
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 "Guidelines for the use of the Performance Test Protocol for Evaluating Inverters Used in Grid-Connected Photovoltaic Systems" prepared by KEMA-Xenergy, and BEW Engineering, dated March 1, 2005 with deviations according to the requirements of the California Energy Commission New Solar Homes Partnership Guidebook Sixth Edition (CEC-300-2016-008-CMF), Appendix III section C – "Inverters". Following tests are performed:

- ***Maximum Continuous Power***
- ***Conversion Efficiency***
- ***Tare Losses***

Notes:

1. Units verified against CSA report 70178126, dated March 26, 2018.
2. Refer to test report and Attachment 1 for test results and setup details.

Issued by: Allen Yao

Allen Yao

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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.

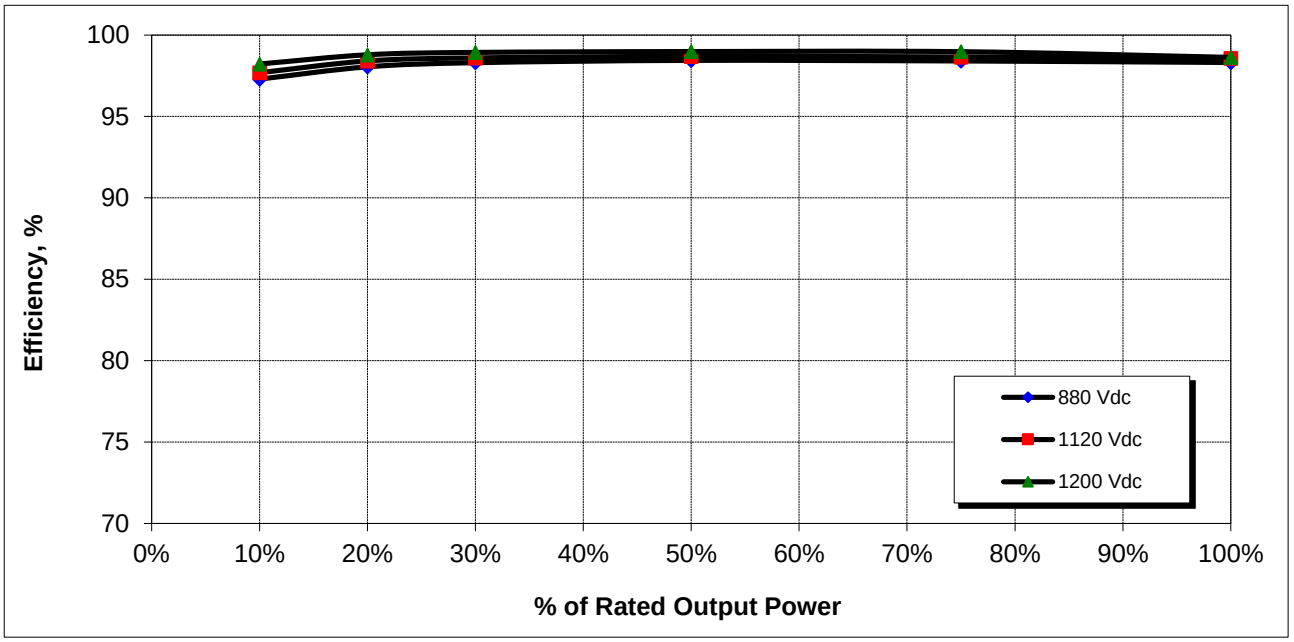
Model #: SUN2000-100KTL-USH0

Rated Maximum Continuous Output Power: 100.00 kW Night Tare Loss: -2.61 W

Vmin: 880 Vdc Vnom: 1120 Vdc Vmax: 1200 Vdc

		Power Level (%; kW)						
		10%	20%	30%	50%	75%	100%	
Input Voltage (Vdc)		10.00	20.00	30.00	50.00	75.00	100.00	Wtd
Vmin	880	97.3	98.0	98.3	98.4	98.4	98.3	98.3
Vnom	1120	97.7	98.4	98.6	98.7	98.7	98.6	98.6
Vmax	1200	98.2	98.8	98.9	99.0	99.0	98.6	98.9

CEC Efficiency = 98.5%



Inverter Efficiency Data

Minimum of 5 samples required

Specified		Sample #1			Sample #2			Sample #3			Sample #4			Sample #5		
Output Power	Input Voltage	Output Power	Input Voltage	Efficiency	Output Power	Input Voltage	Efficiency	Output Power	Input Voltage	Efficiency	Output Power	Input Voltage	Efficiency	Output Power	Input Voltage	Efficiency
(% of rated)	(Vdc)	(W)	(Vdc)	(%)	(W)	(Vdc)	(%)	(W)	(Vdc)	(%)	(W)	(Vdc)	(%)	(W)	(Vdc)	(%)
10%	Vmin	9695.33	884.86	97.29	9695.67	884.88	97.26	9698.67	884.86	97.31	9693.00	884.87	97.31	9694.33	884.88	97.31
20%	Vmin	19719.00	884.70	98.06	19721.33	884.70	98.05	19722.33	884.70	98.04	19718.00	884.69	98.04	19714.00	884.70	98.03
30%	Vmin	29764.67	884.50	98.29	29766.67	884.50	98.31	29767.00	884.51	98.29	29763.33	884.51	98.31	29767.33	884.51	98.30
50%	Vmin	49839.00	884.07	98.45	49832.67	884.09	98.44	49840.00	884.10	98.46	49835.67	884.09	98.45	49831.00	884.10	98.45
75%	Vmin	74926.00	885.48	98.41	74922.00	885.49	98.41	74922.67	885.49	98.40	74912.00	885.50	98.41	74915.00	885.49	98.40
100%	Vmin	101027.00	883.64	98.33	101017.67	883.50	98.31	101001.67	883.66	98.32	100999.00	883.68	98.32	101023.00	883.40	98.31
10%	Vnom	9693.67	1115.92	97.70	9696.00	1115.93	97.67	9699.33	1115.92	97.67	9697.33	1115.92	97.71	9694.33	1115.92	97.71
20%	Vnom	19717.67	1115.79	98.42	19721.00	1115.78	98.42	19721.00	1115.78	98.41	19718.00	1115.79	98.41	19720.00	1115.79	98.41
30%	Vnom	29767.33	1115.65	98.59	29767.00	1115.64	98.63	29763.00	1115.65	98.60	29769.67	1115.65	98.59	29767.00	1115.64	98.61
50%	Vnom	49836.00	1116.37	98.69	49835.00	1116.37	98.69	49836.00	1116.36	98.70	49841.67	1116.36	98.70	49839.00	1116.37	98.68
75%	Vnom	74917.67	1117.20	98.66	74920.00	1117.20	98.67	74920.00	1117.20	98.66	74914.00	1117.20	98.65	74915.00	1117.21	98.66
100%	Vnom	101035.67	1115.28	98.58	101035.33	1115.28	98.57	101034.67	1115.28	98.57	101040.33	1115.28	98.58	101028.33	1115.28	98.57
10%	Vmax	9705.67	1194.98	98.27	9707.00	1194.98	98.23	9708.00	1194.99	98.19	9704.00	1194.98	98.24	9708.67	1194.98	98.21
20%	Vmax	19731.00	1194.86	98.78	19732.67	1194.86	98.78	19728.67	1194.86	98.78	19728.33	1194.85	98.79	19728.00	1194.85	98.81
30%	Vmax	29774.67	1194.72	98.94	29773.67	1194.74	98.94	29776.33	1194.72	98.94	29773.67	1194.73	98.96	29780.33	1194.73	98.91
50%	Vmax	49855.67	1194.47	98.98	49852.67	1194.46	98.99	49856.67	1194.47	99.00	49855.67	1194.46	99.00	49854.33	1194.47	98.97
75%	Vmax	74928.00	1196.37	98.98	74919.67	1196.38	98.98	74927.00	1196.37	98.98	74923.00	1196.38	98.98	74931.00	1196.37	98.98
100%	Vmax	101070.67	1193.93	98.63	101079.00	1193.84	98.63	101074.67	1193.89	98.63	101081.33	1193.83	98.63	101078.33	1193.91	98.63

Specified		Sample #6			Sample #7			Sample #8			Sample #9			Sample #10		
Output Power	Input Voltage	Output Power	Input Voltage	Efficiency	Output Power	Input Voltage	Efficiency	Output Power	Input Voltage	Efficiency	Output Power	Input Voltage	Efficiency	Output Power	Input Voltage	Efficiency
(% of rated)	(Vdc)	(W)	(Vdc)	(%)	(W)	(Vdc)	(%)	(W)	(Vdc)	(%)	(W)	(Vdc)	(%)	(W)	(Vdc)	(%)
10%	Vmin	9696.67	884.88	97.28	9691.67	884.86	97.32									
20%	Vmin	19724.00	884.69	98.05	19723.00	884.69	98.07									
30%	Vmin	29767.33	884.50	98.32	29758.33	884.51	98.31									
50%	Vmin	49833.00	884.08	98.44	49834.33	884.10	98.44									
75%	Vmin	74918.67	885.49	98.41	74922.00	885.49	98.42									
100%	Vmin	101030.33	883.44	98.32	101022.67	883.42	98.31									
10%	Vnom	9696.00	1115.92	97.69	9696.67	1115.92	97.69									
20%	Vnom	19721.00	1115.79	98.40	19715.00	1115.78	98.41									
30%	Vnom	29764.67	1115.65	98.59	29763.67	1115.65	98.59									
50%	Vnom	49839.00	1116.36	98.70	49838.33	1116.36	98.69									
75%	Vnom	74918.00	1117.20	98.66	74920.67	1117.19	98.65									
100%	Vnom	101038.67	1115.29	98.58	101034.67	1115.28	98.57									
10%	Vmax	9708.33	1194.98	98.18	9708.67	1194.98	98.27									
20%	Vmax	19731.33	1194.86	98.78	19731.33	1194.85	98.81									
30%	Vmax	29777.67	1194.73	98.92	29774.67	1194.73	98.94									
50%	Vmax	49857.00	1194.47	98.99	49854.00	1194.48	98.98									
75%	Vmax	74927.67	1196.37	98.98	74923.00	1196.38	98.98									
100%	Vmax	101070.67	1193.96	98.63	101071.67	1193.94	98.63									

Tested by:	Long Ma	Witnessed by:	Rohana Yang, Allen Yao	Compliance:	Yes
Equipment:	160811252/140201347/140201351/140201244/160922608/3605030255			Date:	2018/3/17

MAXIMUM CONTINUOUS OUTPUT POWER

Manufacturer: Huawei Technologies Co., Ltd.
Model: SUN2000-100KTL-USH0

Samples	Time	Vin(Vdc)	Iin (Adc)	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**	1115.1	92.0	102576.0	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101061.0	82.4	80.8	42.2
2	**10**	1115.1	92.0	102575.2	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101062.8	82.6	80.7	42.3
3	**15**	1115.1	92.0	102577.4	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101063.2	82.3	80.7	42.2
4	**20**	1115.1	92.0	102577.4	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101063.0	82.4	80.7	42.3
5	**25**	1115.1	92.0	102575.6	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101061.6	82.5	80.6	42.2
6	**30**	1115.1	92.0	102580.4	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101065.0	82.5	80.7	42.3
7	**35**	1115.1	92.0	102578.6	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101066.8	82.5	80.8	42.3
8	**40**	1115.2	92.0	102573.2	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101058.6	82.3	80.9	42.3
9	**45**	1115.1	92.0	102576.4	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101062.6	82.7	80.8	42.4
10	**50**	1115.2	92.0	102571.6	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101056.2	82.6	80.8	42.2
11	**55**	1115.1	92.0	102579.0	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101063.4	82.5	80.8	42.2
12	**60**	1115.1	92.0	102569.4	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101058.4	82.5	80.8	42.1
13	**65**	1115.1	92.0	102576.4	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101063.6	82.4	80.8	42.2
14	**70**	1115.1	92.0	102575.8	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101063.8	82.5	80.8	42.2
15	**75**	1115.1	92.0	102576.4	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101061.2	82.4	80.7	42.2
16	**80**	1115.1	92.0	102576.2	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101063.0	82.4	80.6	42.2
17	**85**	1115.1	92.0	102578.2	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101062.2	82.5	80.7	42.3
18	**90**	1115.1	92.0	102577.4	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101063.0	82.5	80.8	42.3
19	**95**	1115.1	92.0	102573.2	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101061.2	82.6	80.8	42.4
20	**100**	1115.1	92.0	102575.2	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101059.4	82.6	80.8	42.4
21	**105**	1115.0	92.0	102571.4	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.5	60.0	101054.6	82.5	80.8	42.4
22	**110**	1115.0	92.0	102573.4	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101063.2	82.5	80.8	42.4
23	**115**	1115.0	92.0	102574.4	464.0	463.2	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101056.8	82.6	80.7	42.3
24	**120**	1115.0	92.0	102569.8	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101058.4	82.5	80.8	42.3
25	**125**	1115.0	92.0	102572.0	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.5	60.0	101059.4	82.5	80.9	42.3
26	**130**	1115.0	92.0	102570.6	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101062.6	82.6	80.8	42.2
27	**135**	1115.0	92.0	102570.4	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101057.8	82.5	80.7	42.1
28	**140**	1115.0	92.0	102569.6	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101058.2	82.6	80.8	42.3
29	**145**	1115.0	92.0	102577.2	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101065.8	82.7	80.8	42.3
30	**150**	1115.0	92.0	102571.4	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101061.8	82.5	80.7	42.3
31	**155**	1115.0	92.0	102576.0	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101063.4	82.4	80.6	42.3
32	**160**	1115.0	92.0	102572.2	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101062.6	82.4	80.8	42.3
33	**165**	1115.0	92.0	102574.8	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101064.8	82.4	80.7	42.2
34	**170**	1115.0	92.0	102576.2	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101061.2	82.5	80.9	42.3
35	**175**	1115.0	92.0	102580.2	464.0	463.3	463.5	464.1	72.8	72.8	72.4	72.6	60.0	101064.4	82.7	80.9	42.3
36	**180**	1115.0	92.0	102580.2	464.0	463.3	463.5	464.0	72.8	72.8	72.4	72.6	60.0	101067.2	82.5	80.7	42.3

Max Continuous AC Output Power (W)					**101,055**

Tested by:	Long Ma	Witnessed by:	Rohana Yang,Allen Yao	Compliance:	Yes
Equipment:	160811252/140201347/140201351/140201244/160922608/3605030255			Date:	2018/3/17

TARE LOSSES

Manufacturer: Huawei Technologies Co., Ltd.
Model: SUN2000-100KTL-USH0

Inverter Stand by Mode

Date	Time	Vin(Vdc)	Iin (Adc)	Pin (W)	Vout (a)	Vout (b)	Vout (c)	Vout (avg)	Iout (a)	Iout (b)	Iout (c)	Iout (avg)	Freq (Hz)	Pout (W)	Amb (C)
2018/3/17	15:01:57	0.08	0.00	0.00	463.00	462.00	462.00	462.00	0.35	0.35	0.35	0.35	60.00	-2.61	24.77

Minimum Array Voltage

Date	Time	Vin(Vdc)	Iin (Adc)	Pin (W)	Vout (a)	Vout (b)	Vout (c)	Vout (avg)	Iout (a)	Iout (b)	Iout (c)	Iout (avg)	Freq (Hz)	Pout (W)	Amb (C)
2018/3/17	15:12:51	885.03	0.02	19.61	462.50	461.78	461.87	461.97	0.35	0.35	0.35	0.35	60.00	-2.15	25.15

Nominal Array Voltage

Date	Time	Vin(Vdc)	Iin (Adc)	Pin (W)	Vout (a)	Vout (b)	Vout (c)	Vout (avg)	Iout (a)	Iout (b)	Iout (c)	Iout (avg)	Freq (Hz)	Pout (W)	Amb (C)
2018/3/17	15:21:14	1116.03	0.02	21.21	462.56	461.79	461.89	461.99	0.35	0.35	0.35	0.35	60.00	-2.11	25.14

Maximum Array Voltage

Date	Time	Vin(Vdc)	Iin (Adc)	Pin (W)	Vout (a)	Vout (b)	Vout (c)	Vout (avg)	Iout (a)	Iout (b)	Iout (c)	Iout (avg)	Freq (Hz)	Pout (W)	Amb (C)
2018/3/17	15:43:02	1195.08	0.02	22.23	462.54	461.80	461.90	461.99	0.35	0.35	0.35	0.35	60.00	-2.23	25.10

Input power before Start-up

Date	Time	Vin(Vdc)	Iin (Adc)	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 with PV Array

Input power after Start-up

Date	Time	Vin(Vdc)	Iin (Adc)	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 with PV Array

Tested by:	Long Ma	Witnessed by:	Rohana Yang,Allen Yao	Compliance:	Yes
Equipment:	160811252/140201347/140201351/140201244/160922608/3605030255			Date:	2018/3/17