Shenzhen CTL Testing Technology Co., Ltd.
Tel: +86-755-89486194 E-mail: ctl@ctl-lab.com

TEST REPORT

FCC PART 15 SUBPART C

Report Reference No. :	**CTL2112027053-WF**
Compiled by (position+printed name+signature)	Happy Guo (File administrators)
Supervised by (position+printed name+signature)	Cary Gao (Test Engineer)
Approved by (position+printed name+signature)	Ivan Xie (Manager)

Applicant's name :	**SUMEC MACHINERY & ELECTRIC CO., LTD.**
Address of applicant :	CHANGJIANG ROAD 198 Nanjing, China
Test Firm :	**Shenzhen CTL Testing Technology Co., Ltd.**
Address :	Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055
Test specification :	
Standard :	FCC Part 15C
Master TRF :	Dated 2011-01
Test item description :	Portable Power Station
FCC ID :	2ABXM-E201001
Trade Mark :	FIRMAN
Model/Type reference :	E201001
List Model(s) :	B104201
Hardware Version :	V1.0
Software Version :	V1.0
Transmit Frequency :	115~205KHz
Antenna type :	Loop antenna
Date of receipt of test item :	Feb. 15, 2022
Date of Test Date :	Feb. 15, 2022–Mar. 14, 2022
Date of Issue :	Mar. 15, 2022
Result :	**Pass**

TEST REPORT

Test Report No. :	CTL2112027053-WF	Mar. 15, 2022 Date of issue

Equipment under Test	:	Portable Power Station
Sample No	:	CTL211202705-1-S001
Type / Model(s)	:	E201001
Listed Models	:	B104201
Applicant	:	**SUMEC MACHINERY & ELECTRIC CO., LTD.**
Address	:	CHANGJIANG ROAD 198 Nanjing, China
Manufacturer	:	**Sunwoda Energy Solution Co.,Ltd.**
Address	:	Room 201, Building C,Sunwoda Electronic Factory, Tangjia Community, Fenghuang Street, Guangming District, Shenzhen, China

Test result	Pass *

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

Contents

1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.207,15.209, 15.215(c)

ANSI C63.10-2013

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Feb. 15, 2022
Testing commenced on	:	Feb. 15, 2022
Testing concluded on	:	Mar. 14, 2022

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage	:	Input: AC input:90V~140V 50Hz/60Hz 15A Max; DC input:11V~50V 10A 400W Max (Solar MPPT Charging) 12V/24V 10A 240W Max(Car Charging); USB C:5V 3A/9V 3A/12V 3A/15V 3A/20V 4.95A(99W); Output: AC output：120V 60Hz 2000W; DC output: USB C:5V 3A/9V 3A/12V 3A/15V 3A/20V 4.95A(99W); USB A:5V 3.1A; DC(5521):12V 10A Max; Car outlet:12V 10A Max; Wireless output:5V 1A/9V 1.12A(10W) B104201: Input: DC(XT60):46.8V 20A Max; USB C:5V 3A/9V 3A/12V 3A/15V 3A/20V 4.95A(99W); Output: USB C: 5V 3A/9V 3A/12V 3A/15V 3A/20V 4.95A (99W)

2.3. Short description of the Equipment under Test (EUT)

Portable Power Station work frequency range 115-205 KHz.

For more details, refer to the user's manual of the EUT.

Serial number: E201001, B104201

EUT operation mode

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting mode for testing.

Test Mode：	Adapter power supply

2.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- ● - supplied by the manufacturer
- ○ - supplied by the lab

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2ABXM-E201001 fileing to comply with FCC Part 15, Subpart C Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

2.7. Summary of Test Results

The EUT is night light with wireless charger, The test summary of the EUT listed as below:

	Test Standards	Test Result
Electric Field Radiated Emissions	FCC Part 15 C (Section15.209)	PASS
20dB Bandwidth/99% Bandwidth	FCC Part 15 C (Section15.215(c))	PASS
Conducted Emissions	FCC Part 15 C (Section15.207)	PASS

Remark: The measurement uncertainty is not included in the test result.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: 9618B

CAB identifier: CN0041

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9618B on Jan. 22, 2019.

FCC-Registration No.: 399832

Designation No.: CN1216

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 399832, December 08, 2017.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	Above 1GHz	4.32dB	(1)
Conducted Disturbance	0.15~30MHz	3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.5. Equipments Used during the Test

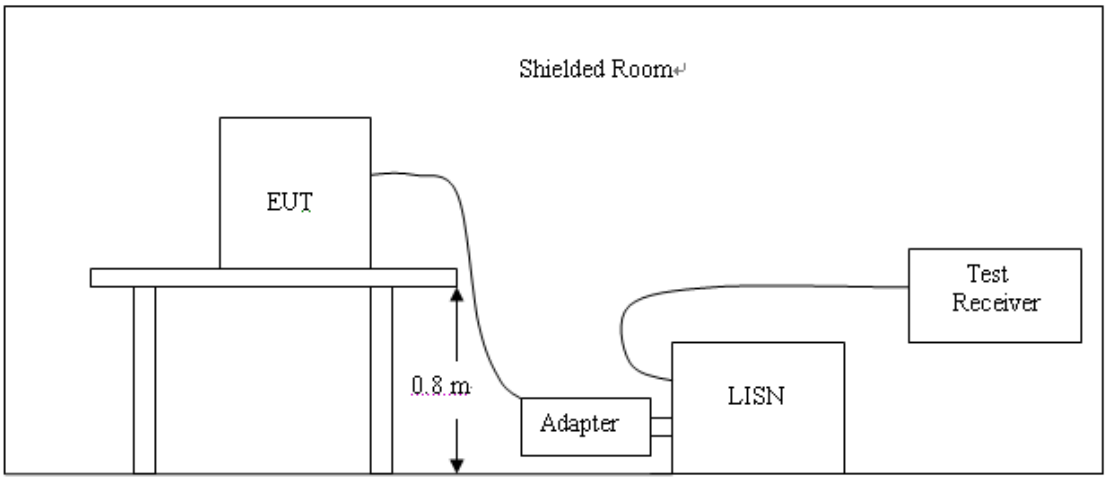
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ESH2-Z5	860014/010	2021/05/10	2022/05/09
LISN	R&S	ENV216	3560.6550.12	2021/05/10	2022/05/09
Double cone logarithmic antenna	Schwarzbeck	VULB 9168	824	2021/05/10	2022/05/09
EMI Test Receiver	R&S	ESCI	1166.5950.03	2021/05/10	2022/05/09
Spectrum Analyzer	Agilent	N9020A	US46220290	2021/05/14	2022/05/13
Spectrum Analyzer	Keysight	N9020A	MY53420874	2021/05/14	2022/05/13
Controller	EM Electronics	EM 1000	060859	2021/05/14	2022/05/13
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2021/05/20	2024/05/19
Active Loop Antenna	Da Ze	ZN30900A	/	2021/05/20	2022/05/19
Amplifier	Agilent	8449B	3008A02306	2021/05/10	2022/05/09
Amplifier	Agilent	8447D	2944A10176	2021/05/10	2022/05/09
Temperature/Humidity Meter	Gangxing	CTH-608	02	2021/05/11	2022/05/10
Spectrum Analyzer	RS	FSP	1164.4391.38	2021/05/14	2022/05/13

The calibration interval was one year

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
2 Support equipment, if needed, was placed as per ANSI C63.10-2013
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
4 The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

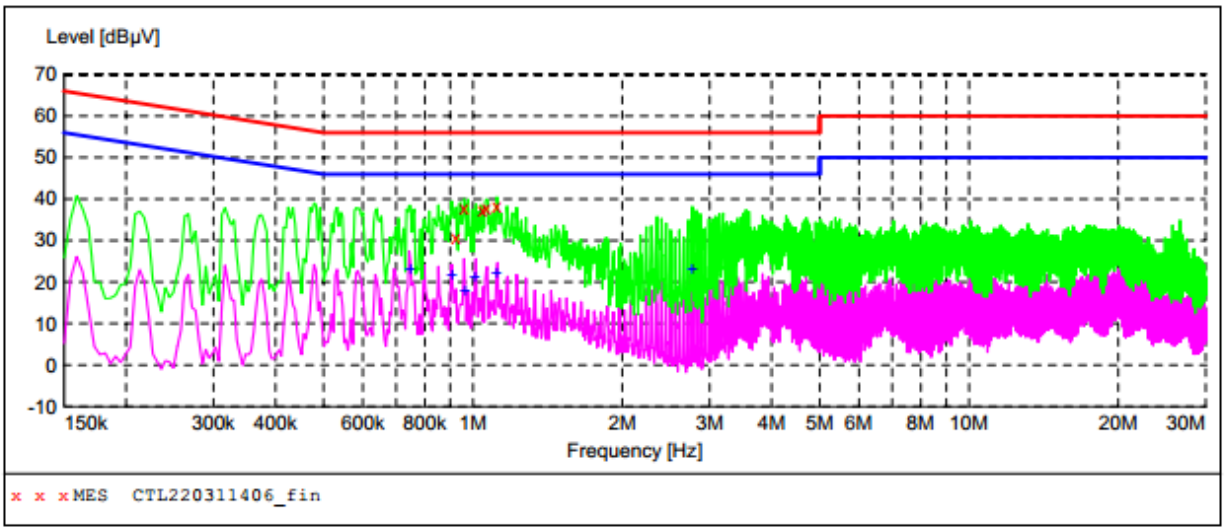
* Decreasing linearly with the logarithm of the frequency

TEST RESULTS

Line:	L

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL220311406_fin"

3/11/2022 9:31AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.924000	30.60	11.2	56	25.4	QP	L1	GND
0.960000	37.70	11.2	56	18.3	QP	L1	GND
1.045500	37.10	11.2	56	18.9	QP	L1	GND
1.063500	37.90	11.2	56	18.1	QP	L1	GND
1.117500	38.30	11.2	56	17.7	QP	L1	GND

MEASUREMENT RESULT: "CTL220311406_fin2"

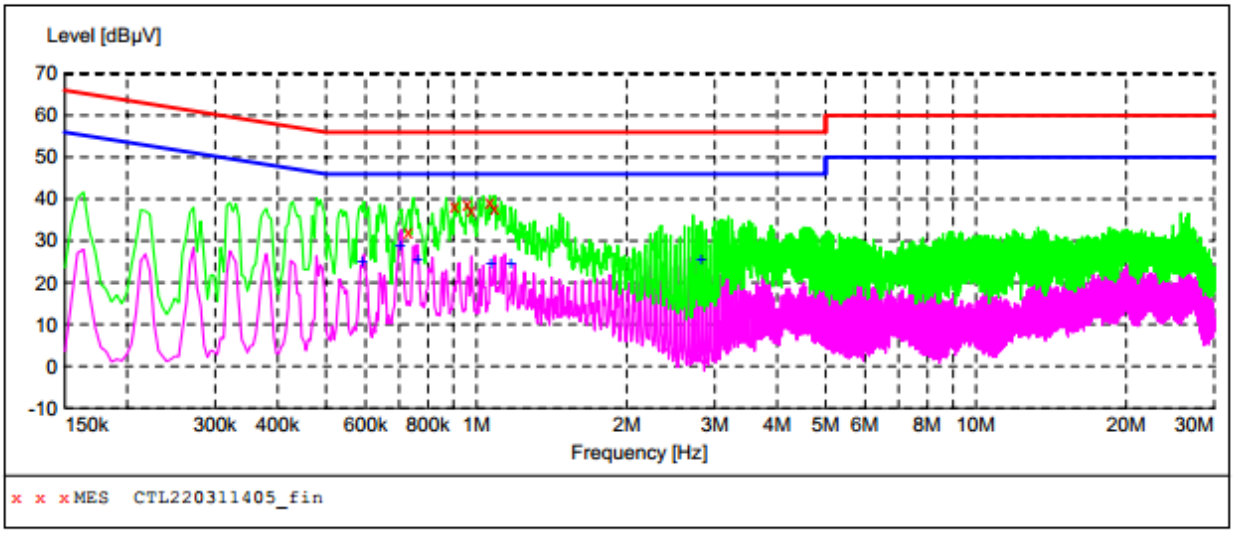
3/11/2022 9:31AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.748500	23.30	11.2	46	22.7	AV	L1	GND
0.906000	21.80	11.2	46	24.2	AV	L1	GND
0.964500	17.70	11.2	46	28.3	AV	L1	GND
1.009500	21.10	11.2	46	24.9	AV	L1	GND
1.117500	21.90	11.2	46	24.1	AV	L1	GND
2.769000	23.30	11.3	46	22.7	AV	L1	GND

Line:	N

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL220311405_fin"

3/11/2022 9:28AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.730500	32.00	11.2	56	24.0	QP	N	GND
0.906000	38.50	11.2	56	17.5	QP	N	GND
0.960000	38.60	11.2	56	17.4	QP	N	GND
0.978000	37.10	11.2	56	18.9	QP	N	GND
1.063500	39.00	11.2	56	17.0	QP	N	GND
1.086000	37.80	11.2	56	18.2	QP	N	GND

MEASUREMENT RESULT: "CTL220311405_fin2"

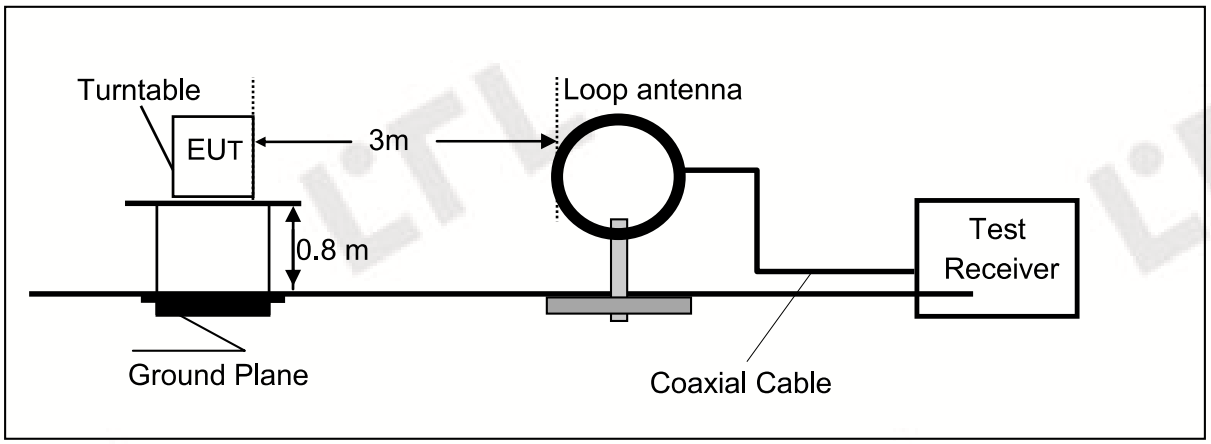
3/11/2022 9:28AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.591000	25.20	11.2	46	20.8	AV	N	GND
0.703500	28.80	11.2	46	17.2	AV	N	GND
0.762000	25.50	11.2	46	20.5	AV	N	GND
1.068000	24.50	11.2	46	21.5	AV	N	GND
1.171500	24.30	11.2	46	21.7	AV	N	GND
2.823000	25.50	11.3	46	20.5	AV	N	GND

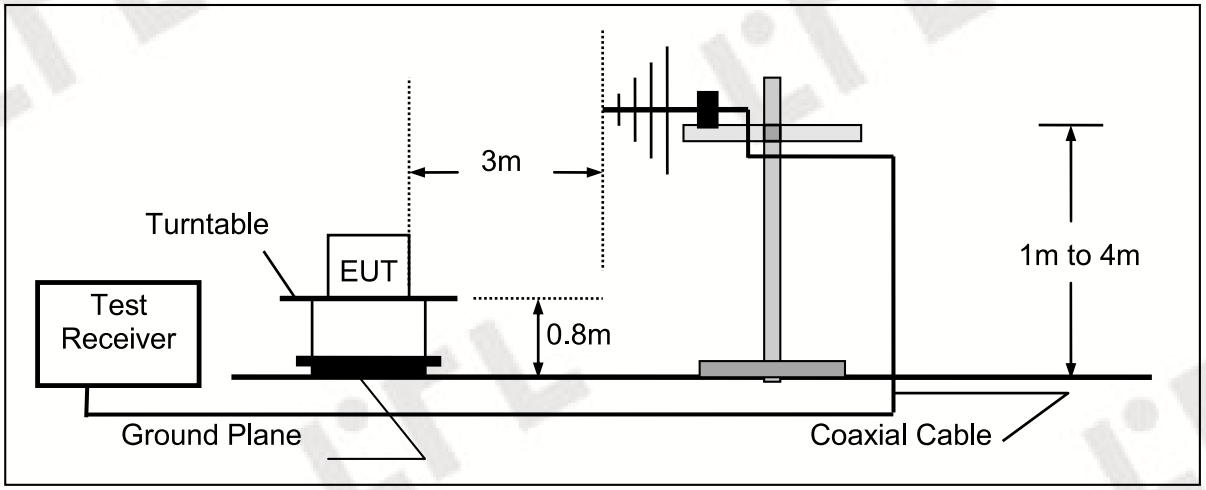
4.2. Radiated Emission

TEST CONFIGURATION

Radiated Emission Test Set-Up
Frequency range 9KHz – 30MHz



Frequency range 30MHz – 1000MHz



TEST PROCEDURE

1 The EUT was placed on a turn table which is 0.8m above ground plane.
2 Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3 And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4 Repeat above procedures until all frequency measurements have been completed.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL – AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

For example

Frequency (MHz)	FS (dBμV/m)	RA (dBμV/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
300.00	40	58.1	12.2	1.6	31.90	-18.1

Transd=AF +CL-AG

RADIATION LIMIT

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

9k~30MHz:

Frequency Range (MHz)	E-field Strength Limit @ 30m (mV/m)	E-field Strength Limit @ 3m (dBμV/m)
0.009-0.490	2400/F(kHz)	129-94
0.490-1.705	24000/F(kHz)	74-63
1.705-30	30	70
Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula: $\text{Extrapolation(dB)} = 40\log_{10}(\text{Measurement Distance}/\text{Specification Distance})$		

Note:
(1) The tighter limit shall apply at the edge between two frequency bands.
(2) dBuV/m = 20*log(uV/m)

30M~1GHz:

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

Note:
(1) The tighter limit shall apply at the edge between two frequency bands.
(2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

TEST RESULTS

WORST-CASE RADIATED EMISSION BELOW 30 MHz

Frequency	Reading	Polar	Antenna Factor	Cable Loss	Emission Levels	Limits at 3m	Detector Mode
(MHz)	(dBμV/m)	Loop	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	
0.1468(F)	62.02	Loop	23.64	0.01	85.67	105.33	PK
0.1468(F)	53.18	Loop	23.64	0.01	76.83	85.33	AV
0.167	43.03	Loop	23.55	0.01	66.59	106.78	PK
0.167	38.15	Loop	23.55	0.01	61.71	83.18	AV
1.245	36.22	Loop	25.07	-0.17	61.12	65.70	QP
1.589	31.05	Loop	27.12	-0.25	57.92	63.58	QP
13.452	41.02	Loop	23.91	-0.24	64.69	70.00	QP

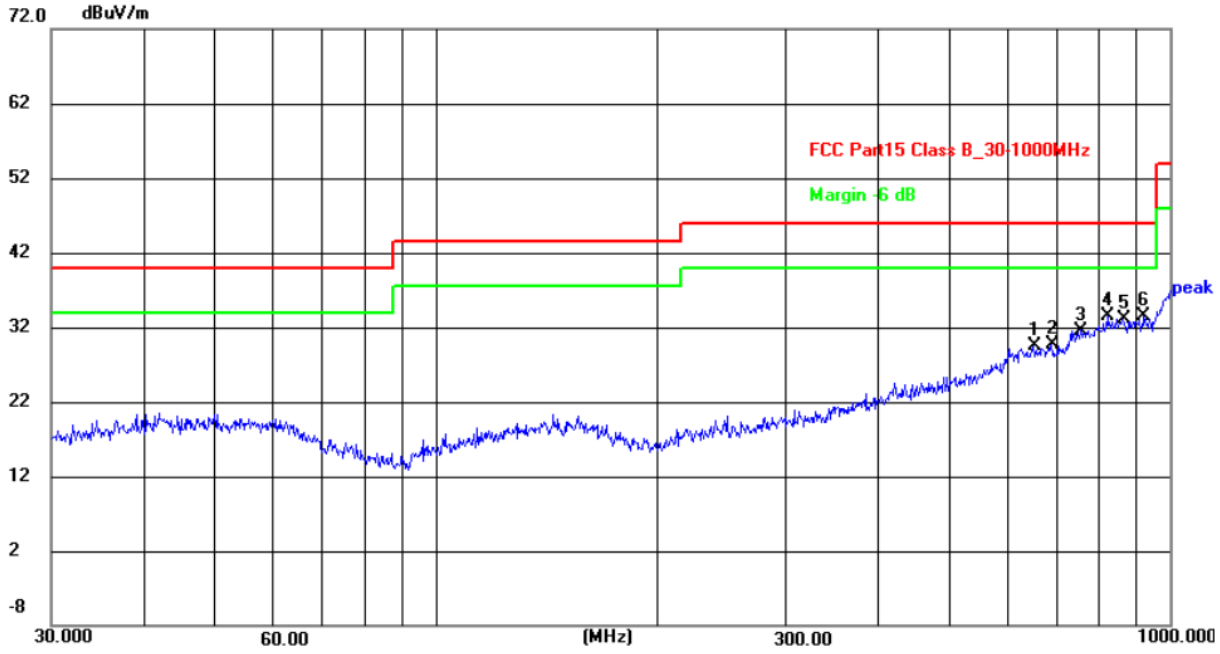
Remark: 1. Data of measurement within this frequency range shown " -" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
2. The test limit distance is 3m limit.
3. PK means Peak Value, QP means Quasi Peak Value, AV means Average Value.
4. F means Fundamental Frequency.

Radiated Emission Test Data 30-1000MHz:

Horizontal

Radiated Emission Measurement

File :RF Data :#2295 Date: 2022/03/10 Time: 20:18:22

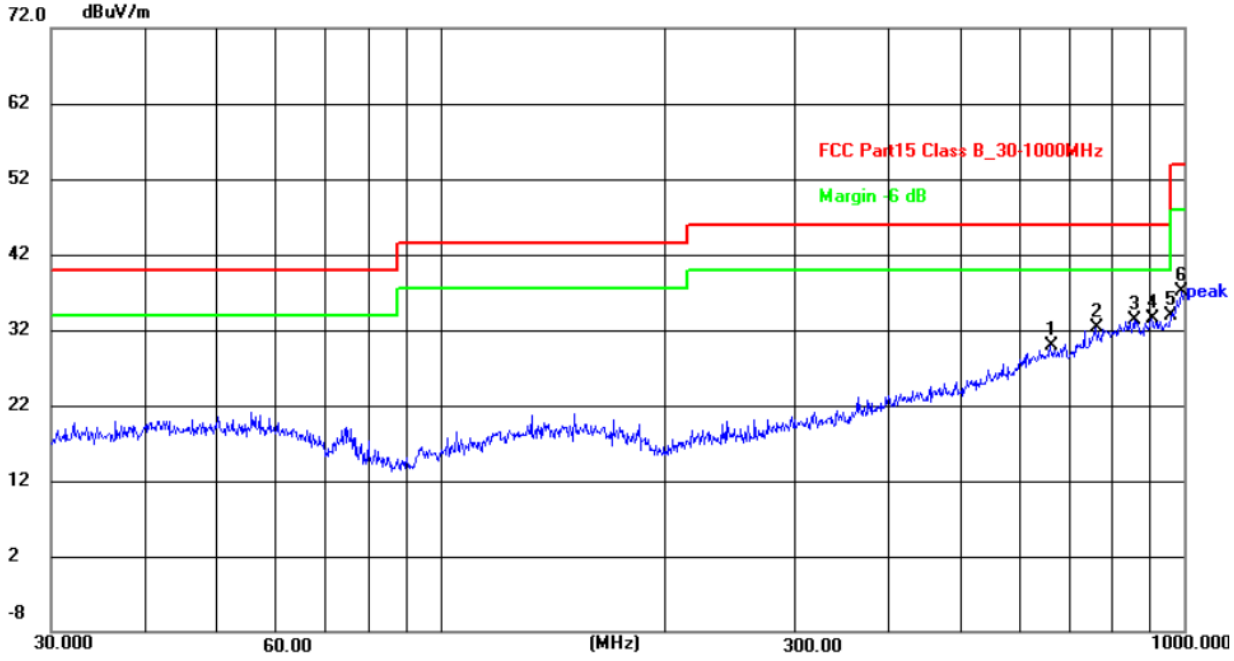


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F
1	651.9417	7.39	22.17	29.56	46.00	16.44	peak	100	353	P
2	689.5644	7.42	22.36	29.78	46.00	16.22	peak	100	199	P
3	758.0407	7.29	24.31	31.60	46.00	14.40	peak	100	4	P
4	821.7103	7.92	25.57	33.49	46.00	12.51	peak	100	325	P
5	863.0562	7.04	26.00	33.04	46.00	12.96	peak	100	71	P
6	922.5157	7.13	26.36	33.49	46.00	12.51	peak	100	205	P

Vertical

Radiated Emission Measurement

File :RF Data :#2296 Date: 2022/03/10 Time: 20:19:39



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F
1	661.1505	7.68	22.22	29.90	46.00	16.10	peak	100	101	P
2	760.7036	7.97	24.40	32.37	46.00	13.63	peak	100	183	P
3	857.0247	7.43	25.92	33.35	46.00	12.65	peak	100	162	P
4	903.3094	7.22	26.21	33.43	46.00	12.57	peak	100	291	P
5	958.7943	6.65	27.20	33.85	46.00	12.15	peak	100	71	P
6	993.0114	7.42	29.59	37.01	54.00	16.99	peak	100	260	P

4.3. 20dB Bandwidth/99% Bandwidth

Limit

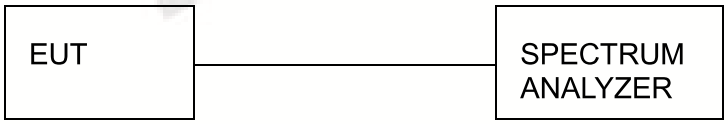
The 20dB bandwidth shall be less than 80% of the permitted frequency band.

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 1 KHz RBW and 3 KHz VBW.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

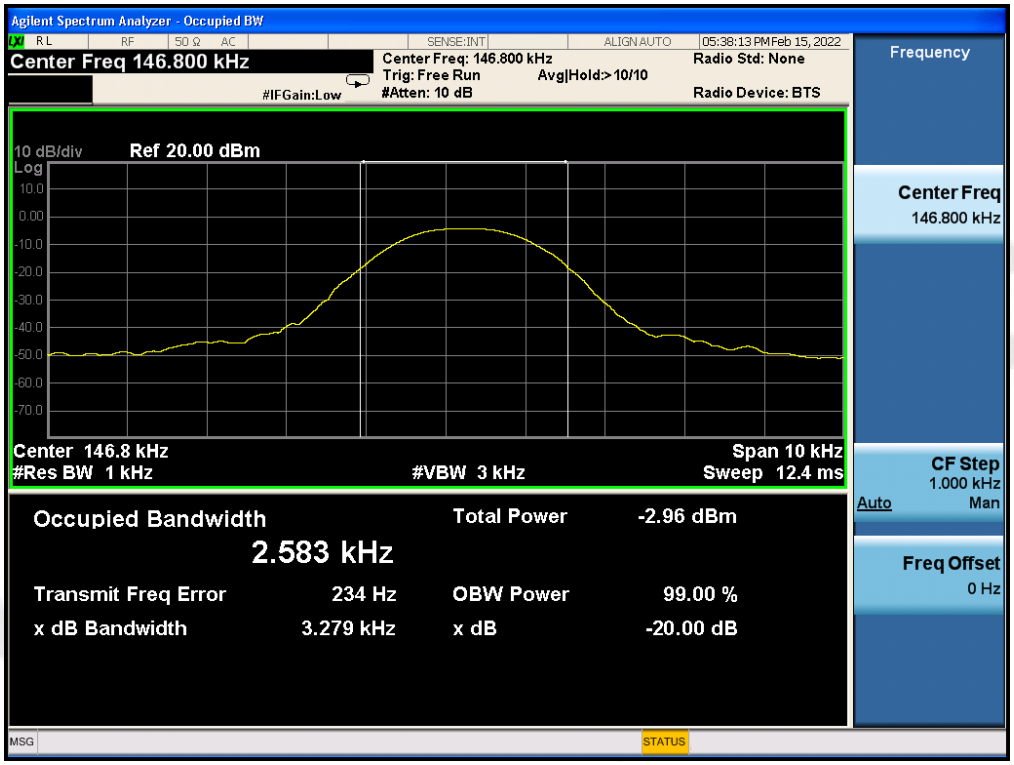
Test Configuration



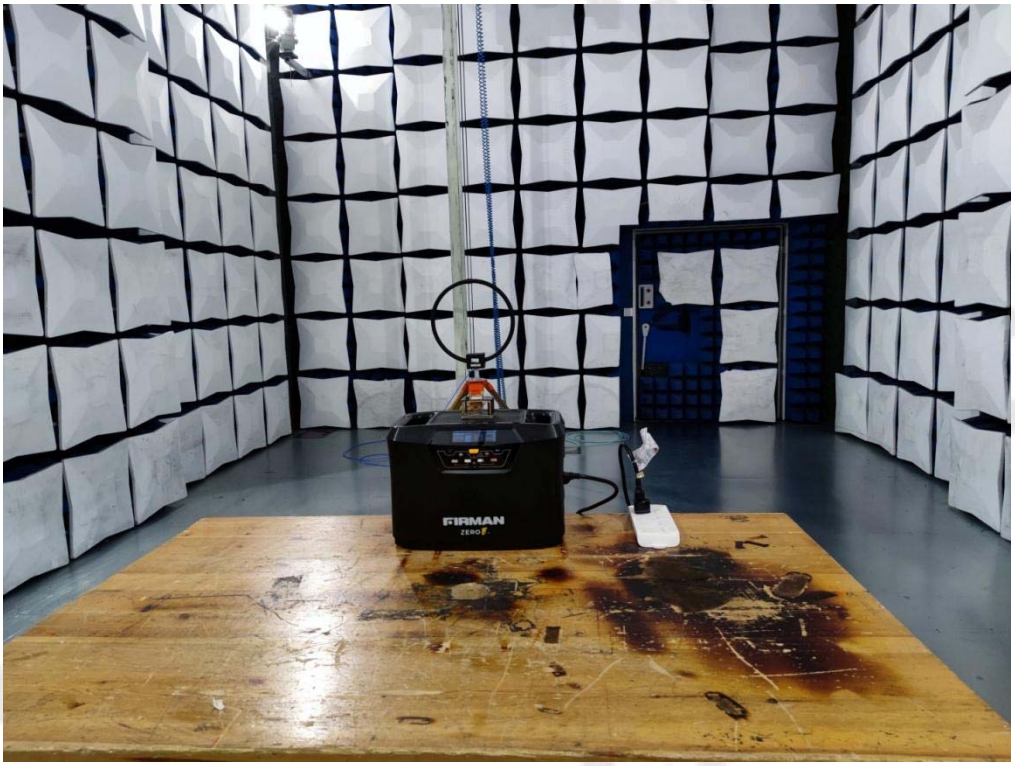
Test Results

Frequency(MHz)	20dB bandwidth(KHz)	99% OBW(KHz)	Result
0.1468	3.279	2.583	Pass

146.8 KHz



5. Test Setup Photos of the EUT




FIRMAN

6. External and Internal Photos of the EUT

External photos


FIRMAN
ZERO

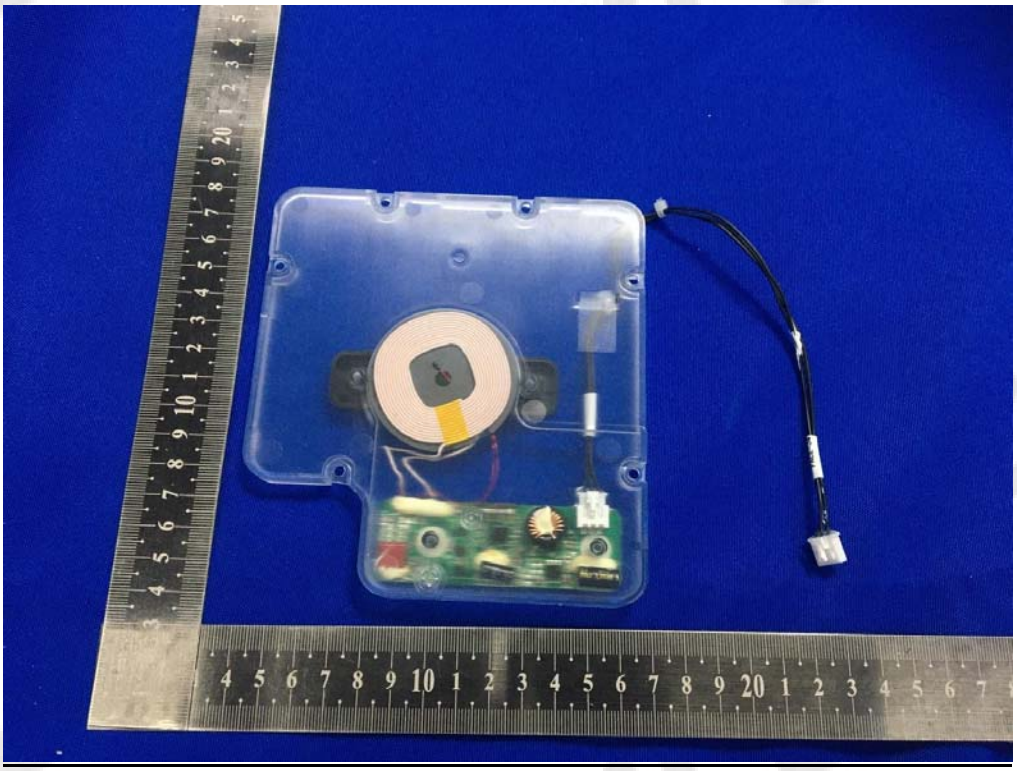

RIRMAN

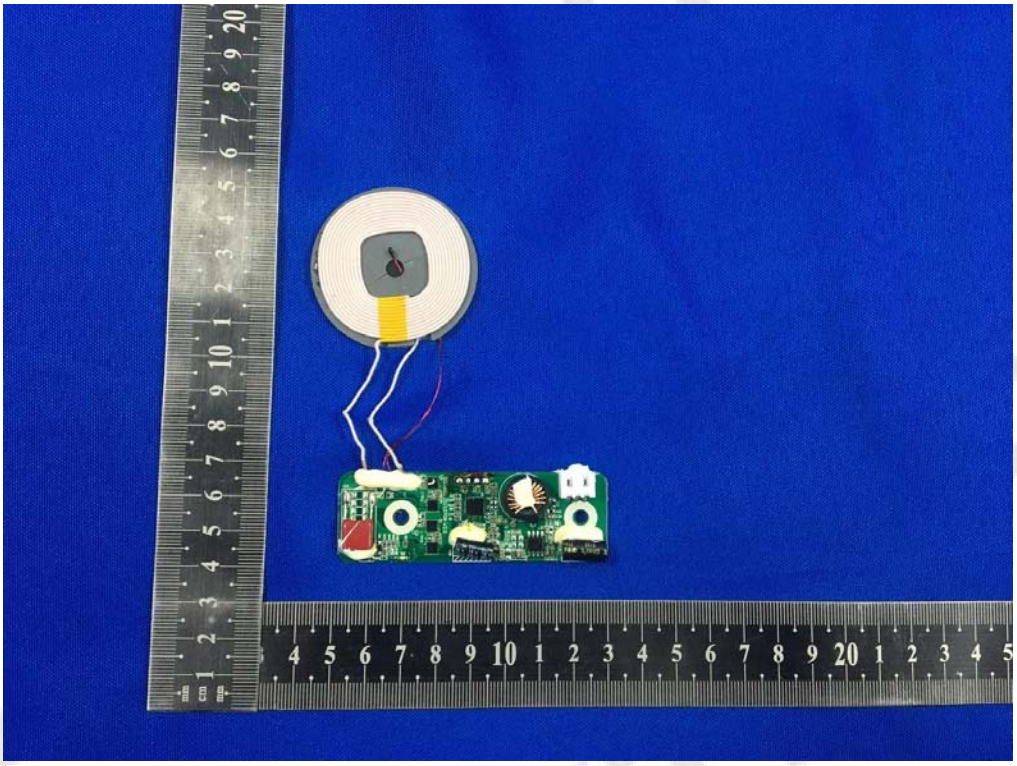

2000W
1040Wh
4000
Starting Watts
Watts au Démarrage
Vatios de Arranque
Pure Sine Wave
Onde Sinusoïdale Pure
Pura Onda Sinusoidal
4000W
120VAC 20A
RECREATIONAL VEHICLE USE ONLY
RESET
PRESS
30
20
DC5521
12V 10A
12V 10A

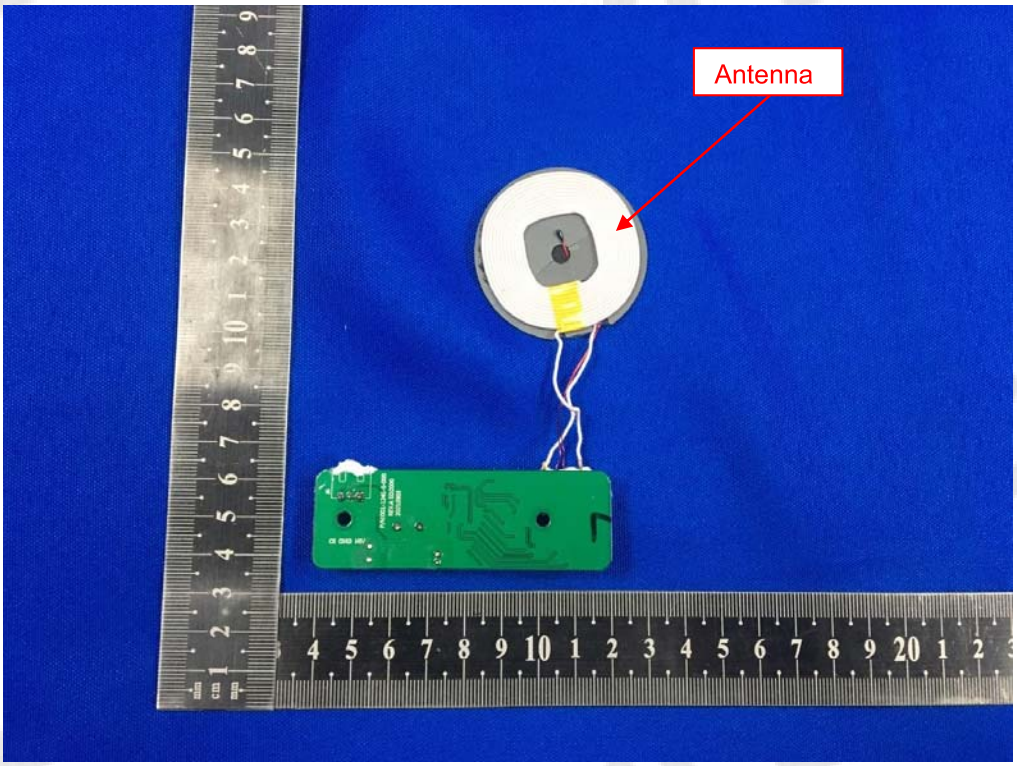

AC INPUT
ENTRÉE C.A
ENTRADA C.A
AC / C.A / C.A
5-15P 120VAC 15A MAX
DC INPUT
ENTRÉE C.C
ENTRADA C.C
Solar / Solaire / Solar
400W
Car / Véhicule / Vehículo
12V / 24V / 10A
NOTICE / AVIS / AVISO
DO NOT EXCEED 70VDC
NE PAS DÉPASSER 70VDC
NO EXCEDAR 70VDC
15

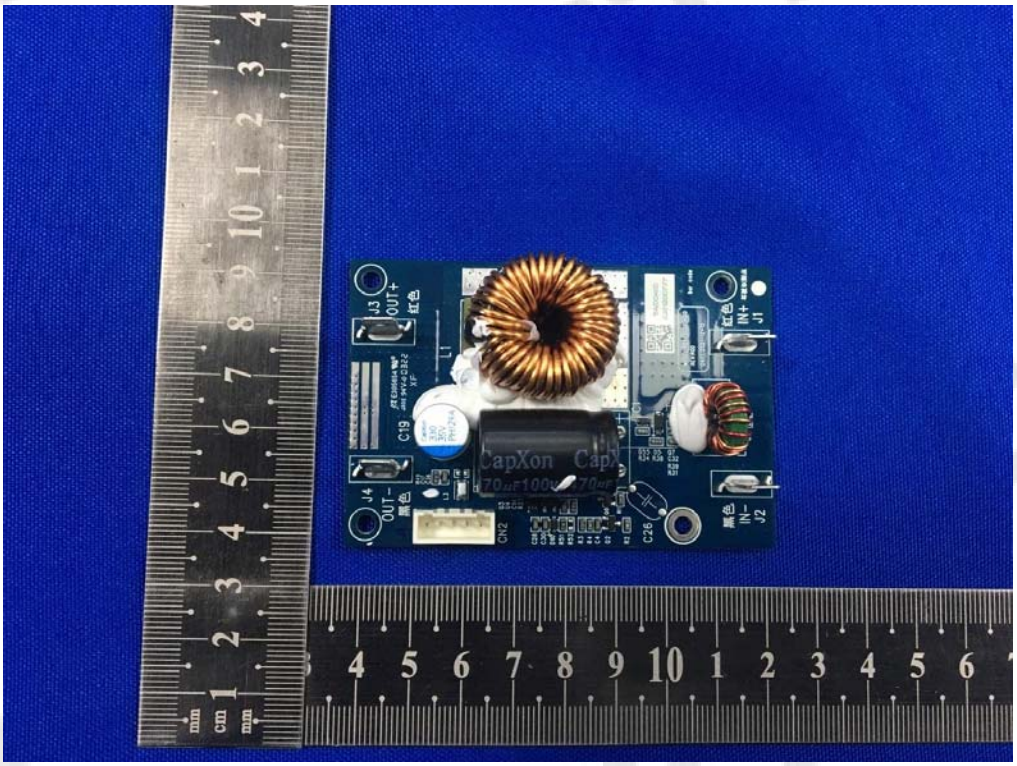

99W
USB-C
IN / OUT
ENTRÉE / SORTIE
ENTRADA / SALIDA
99W
5V 3.1A
5V 3.1A
USB

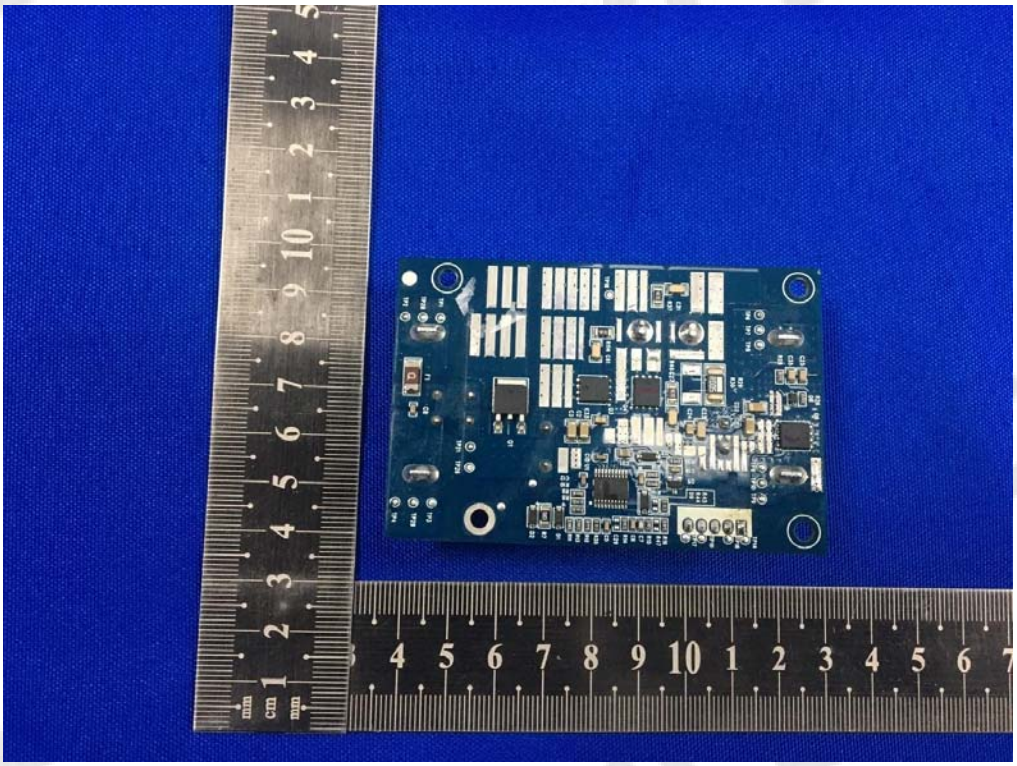
Internal photos

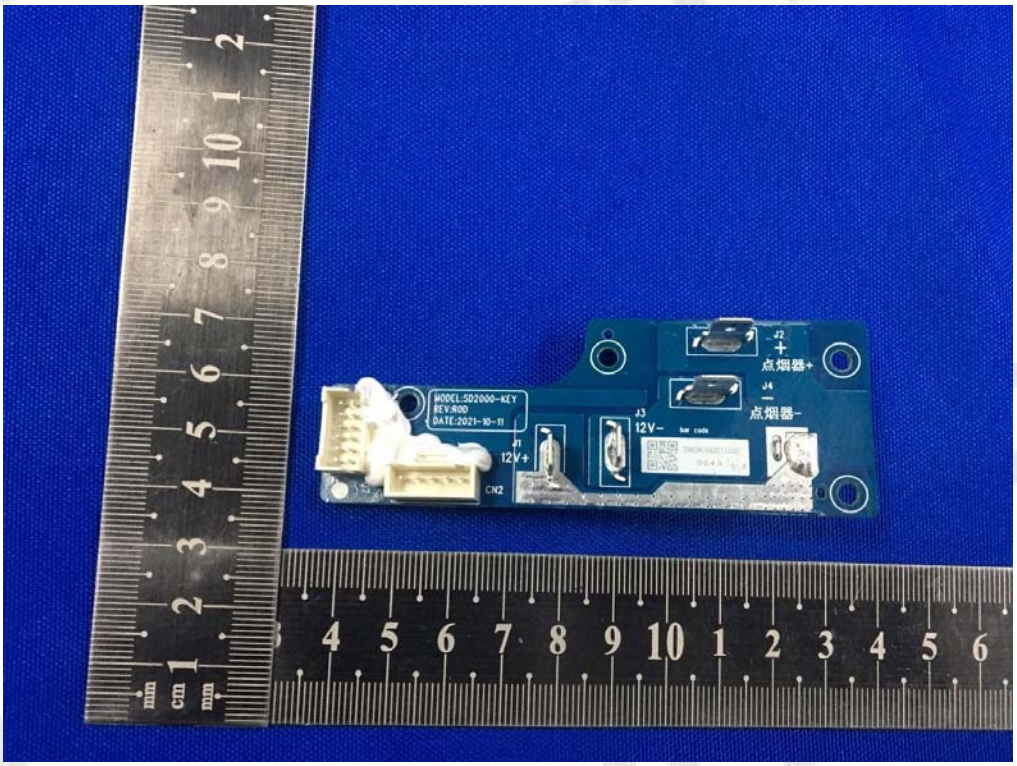


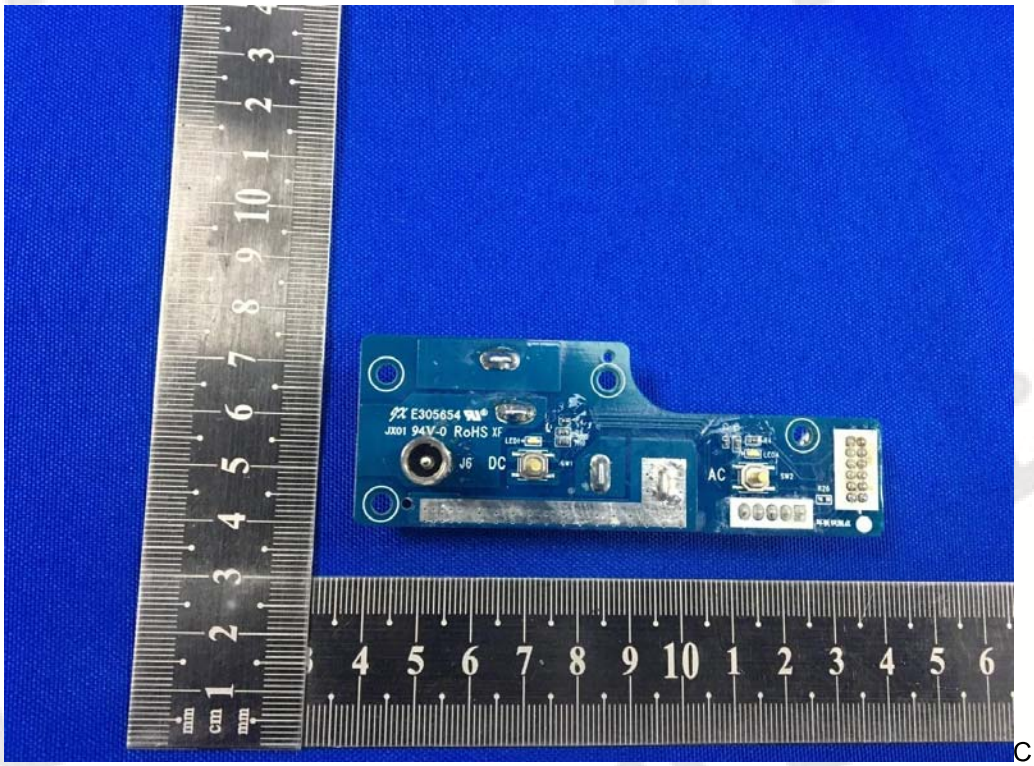



Antenna

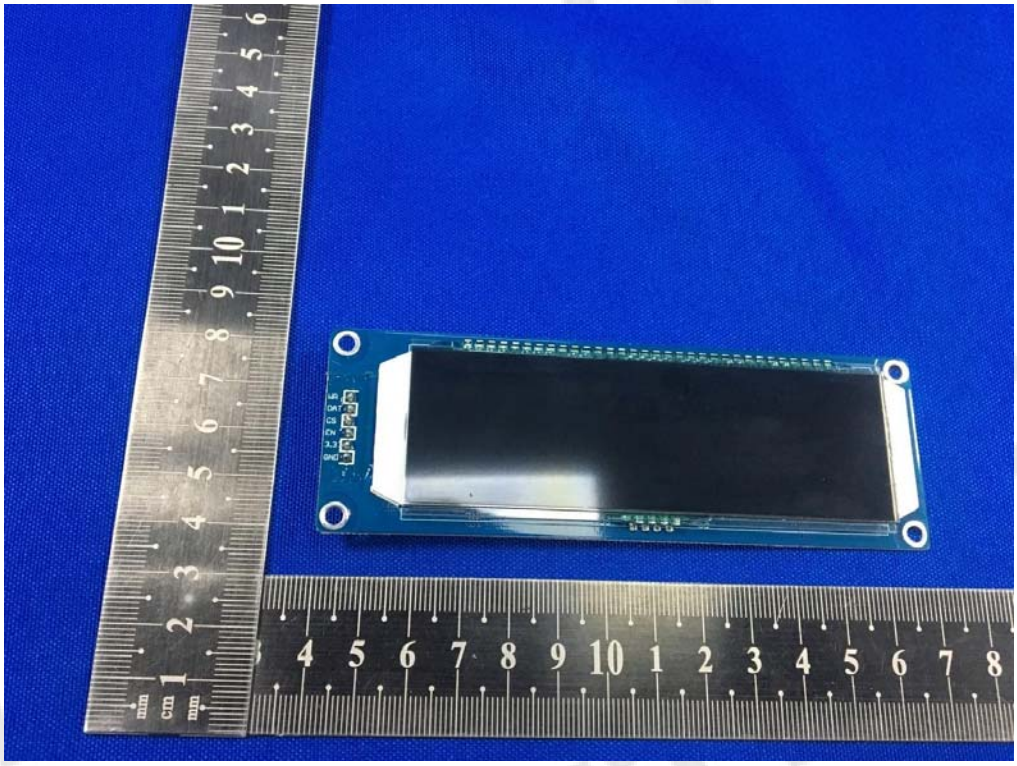

J3
OUT+
J4
OUT-
J1
IN+
J2
IN-
CN2
C19
C26
CapXon

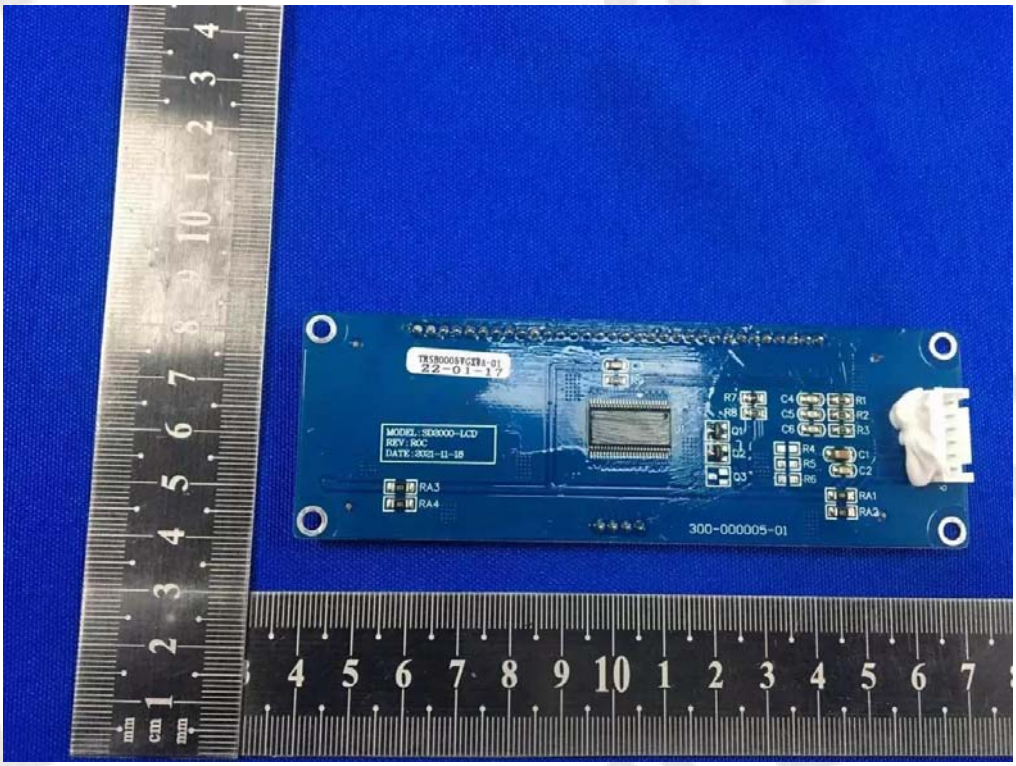



MODEL:SD2000-KEY
REV:R00
DATE:2021-10-11
J1
12V+
CN2
J3
12V-
J2
+
点烟器+
J4
-
点烟器-



C

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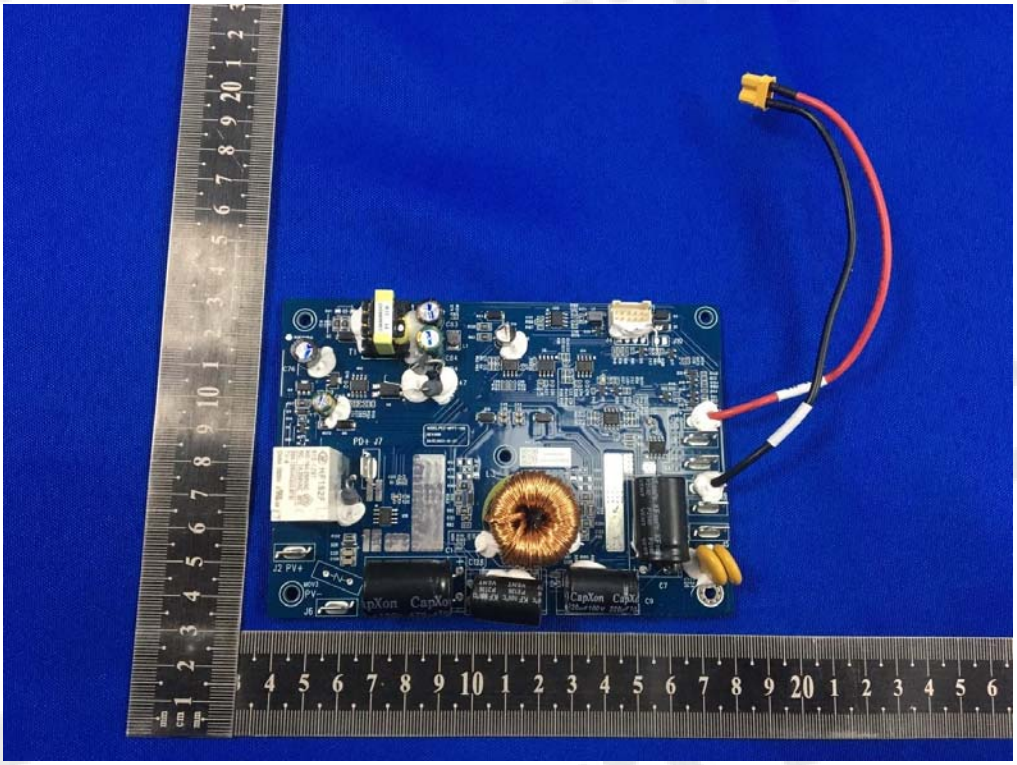
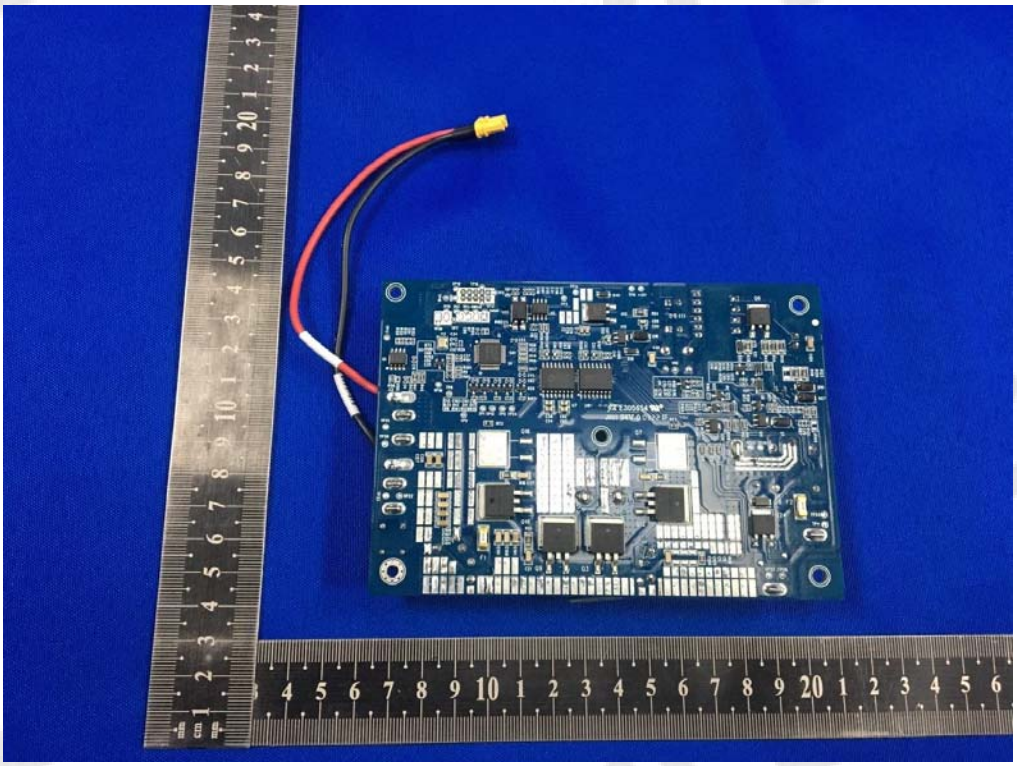
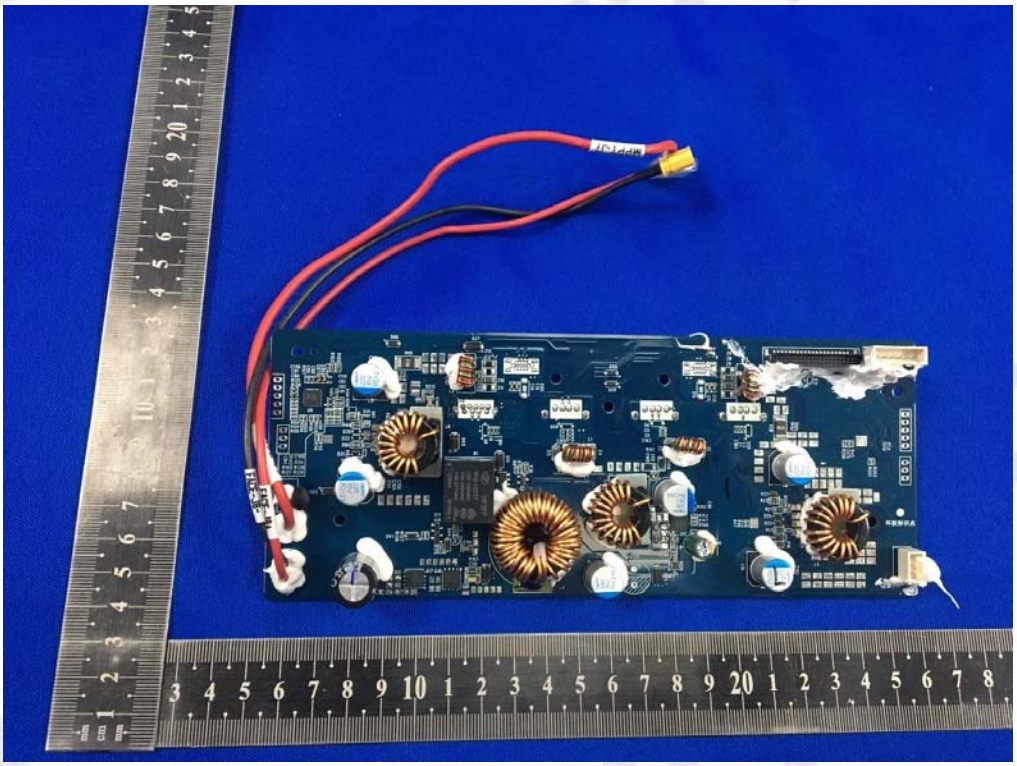
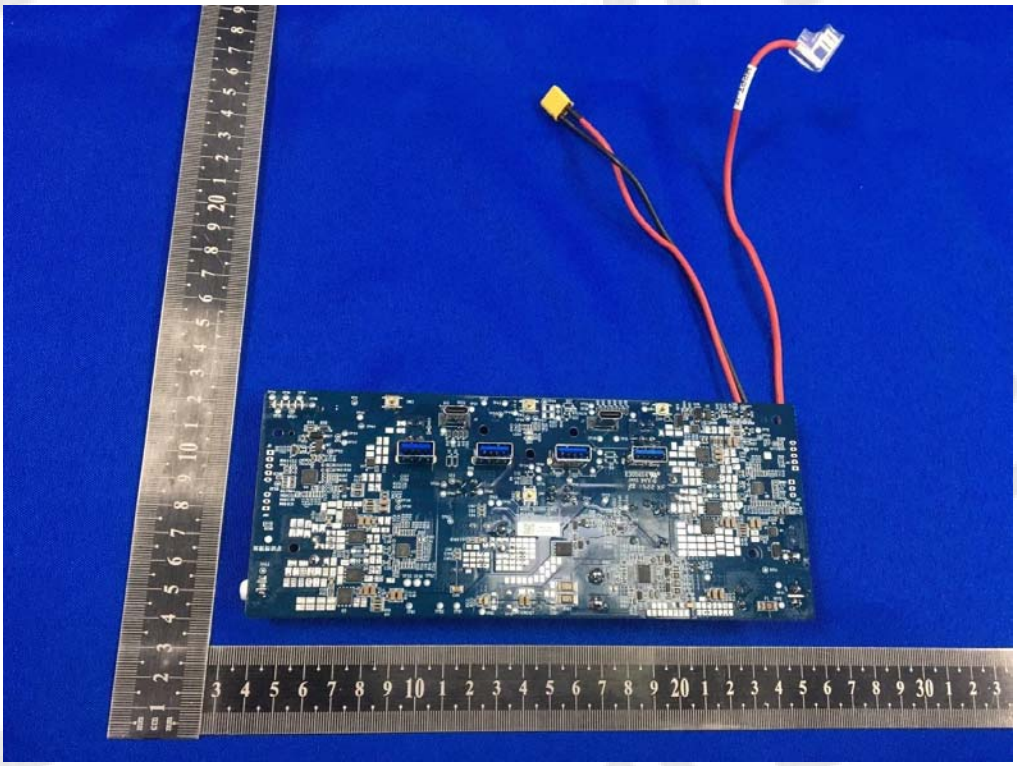
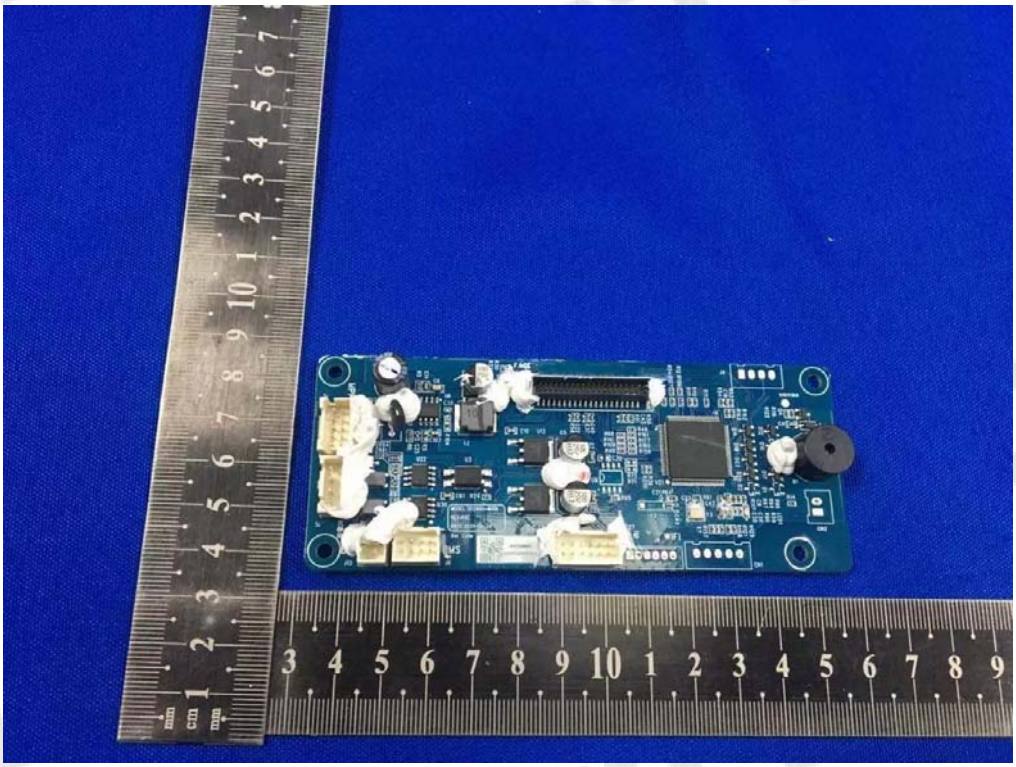
REV: ROC
DATE: 2021-11-18
300-000005-01

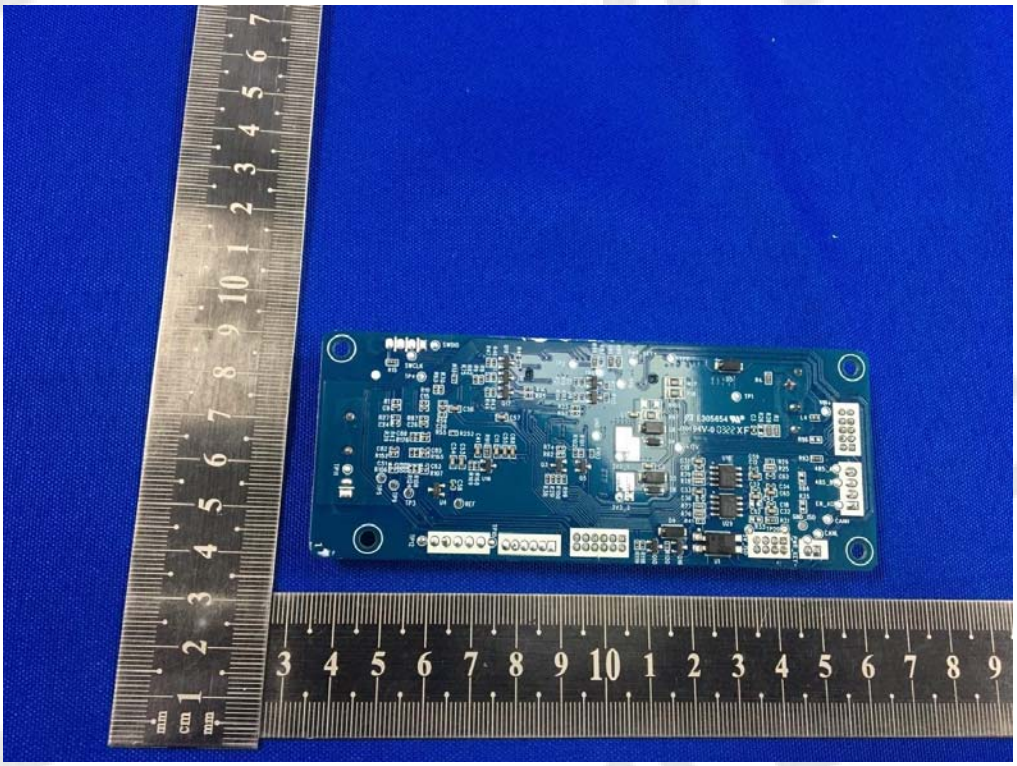


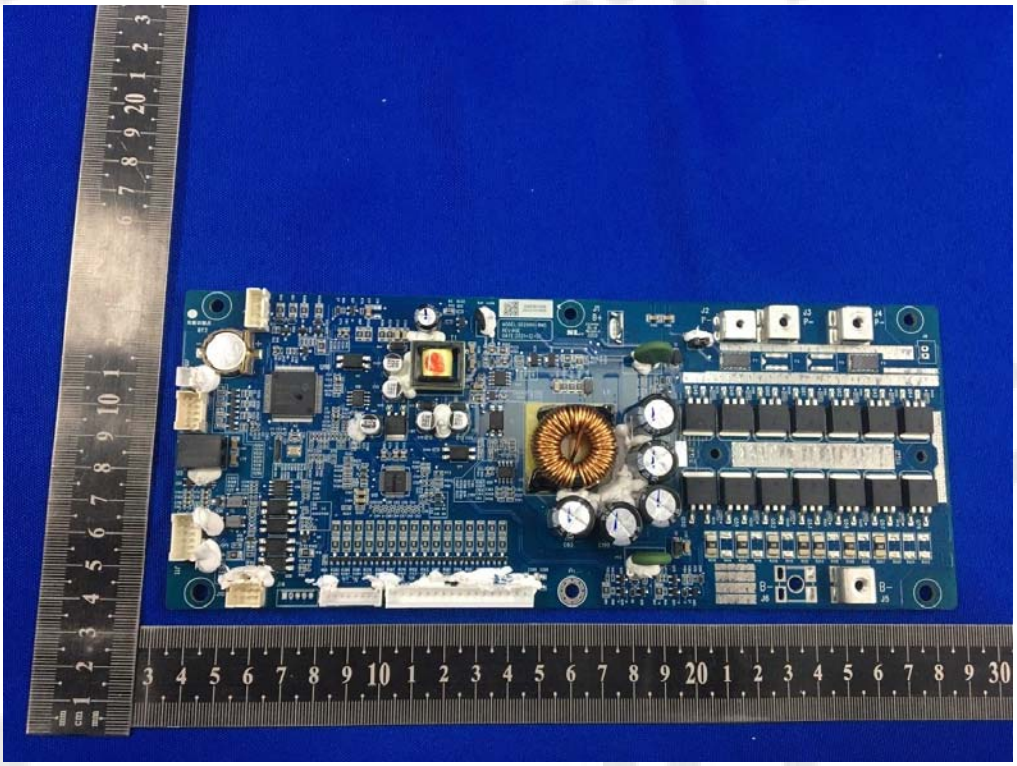


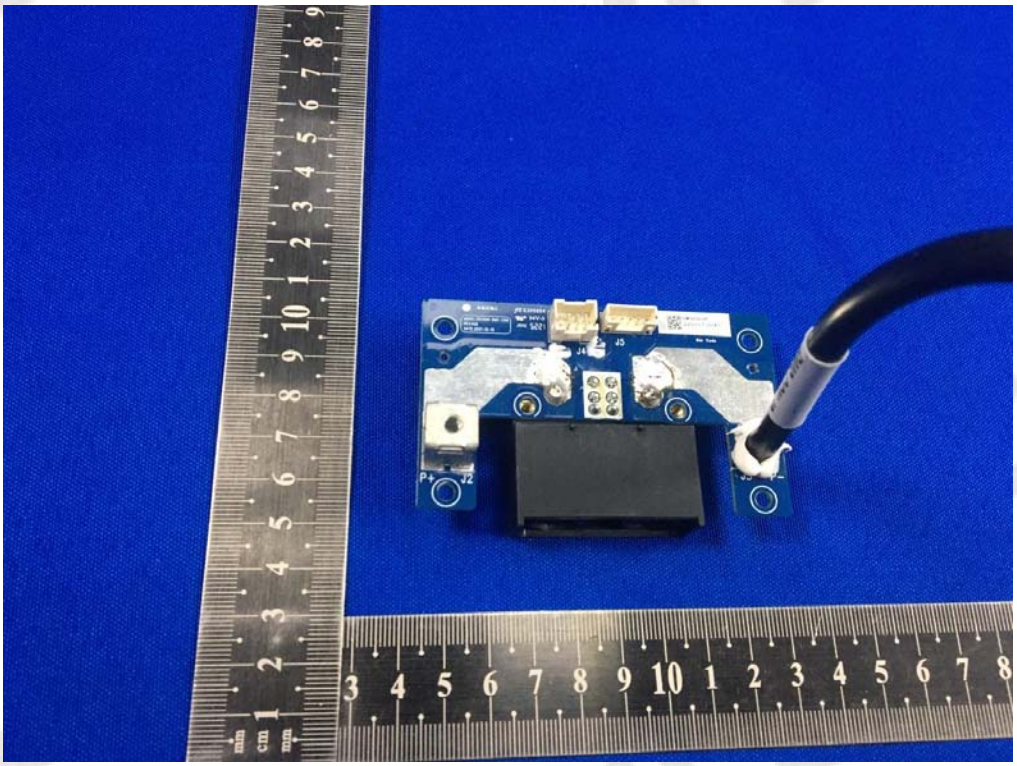


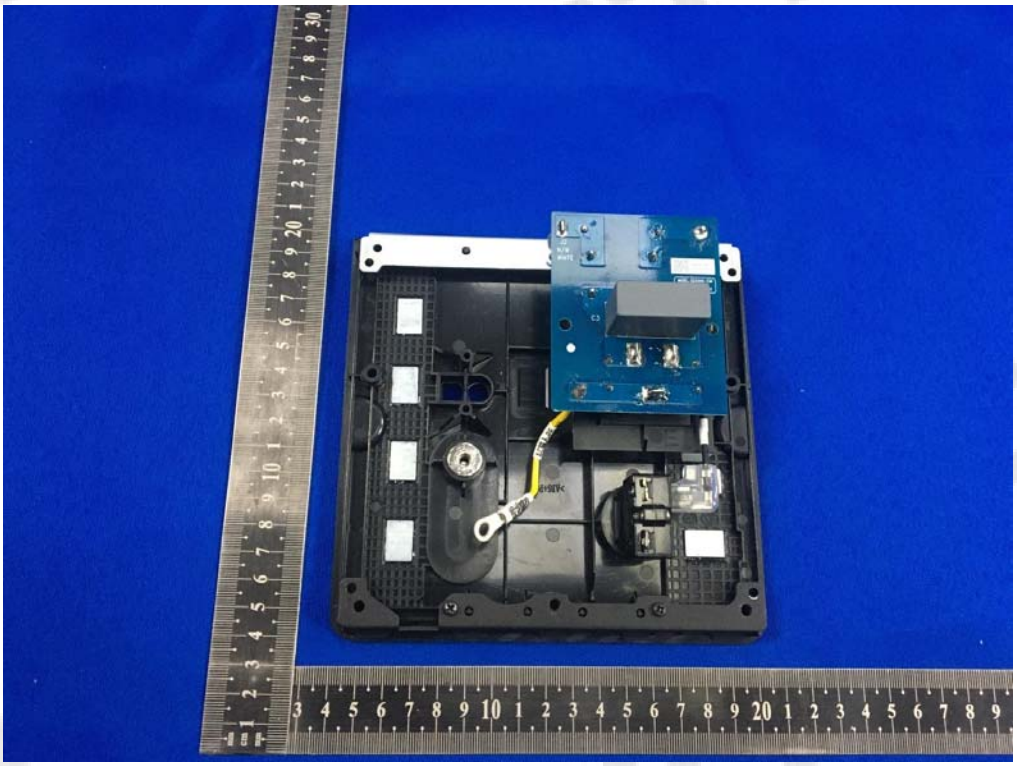


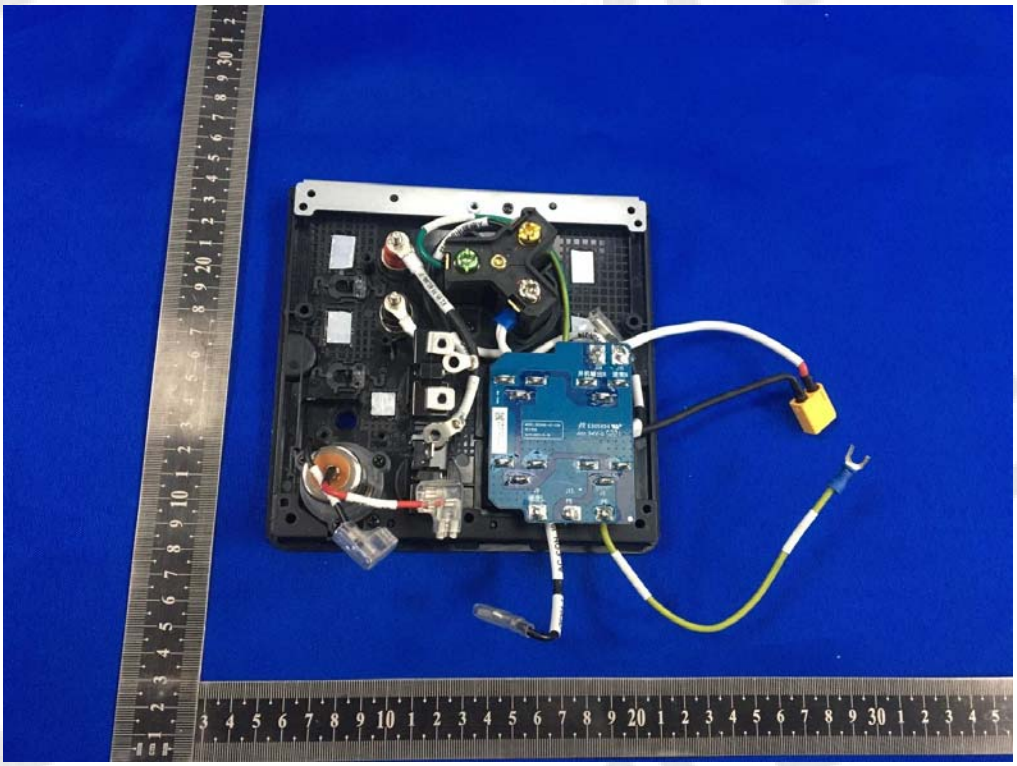


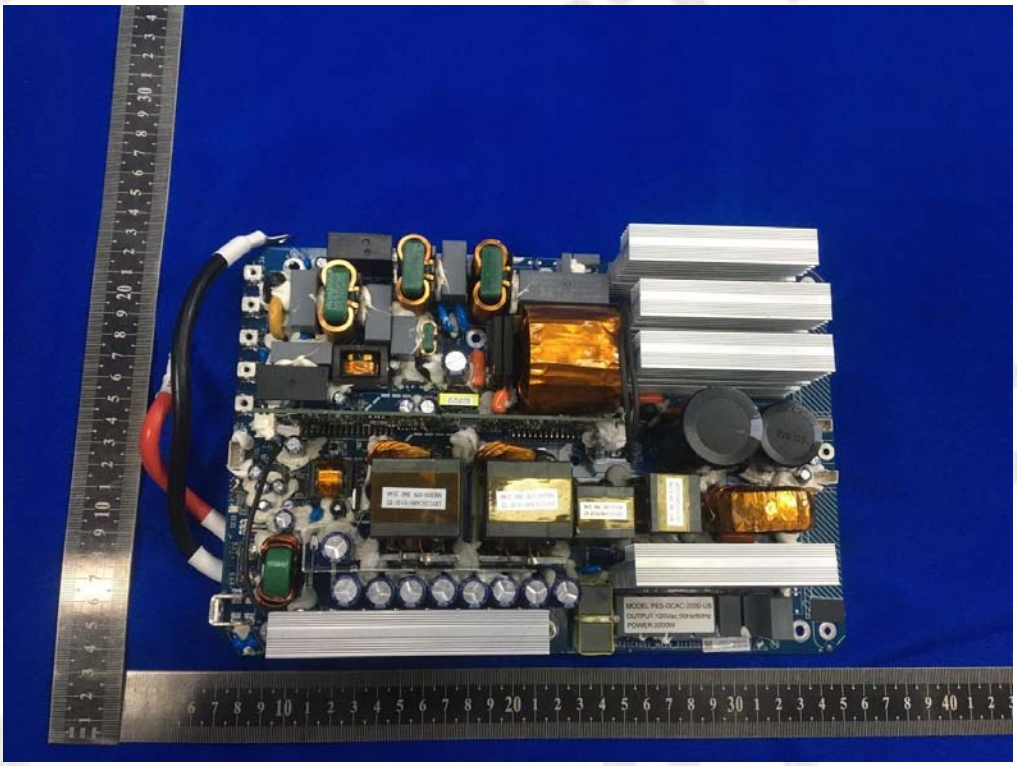


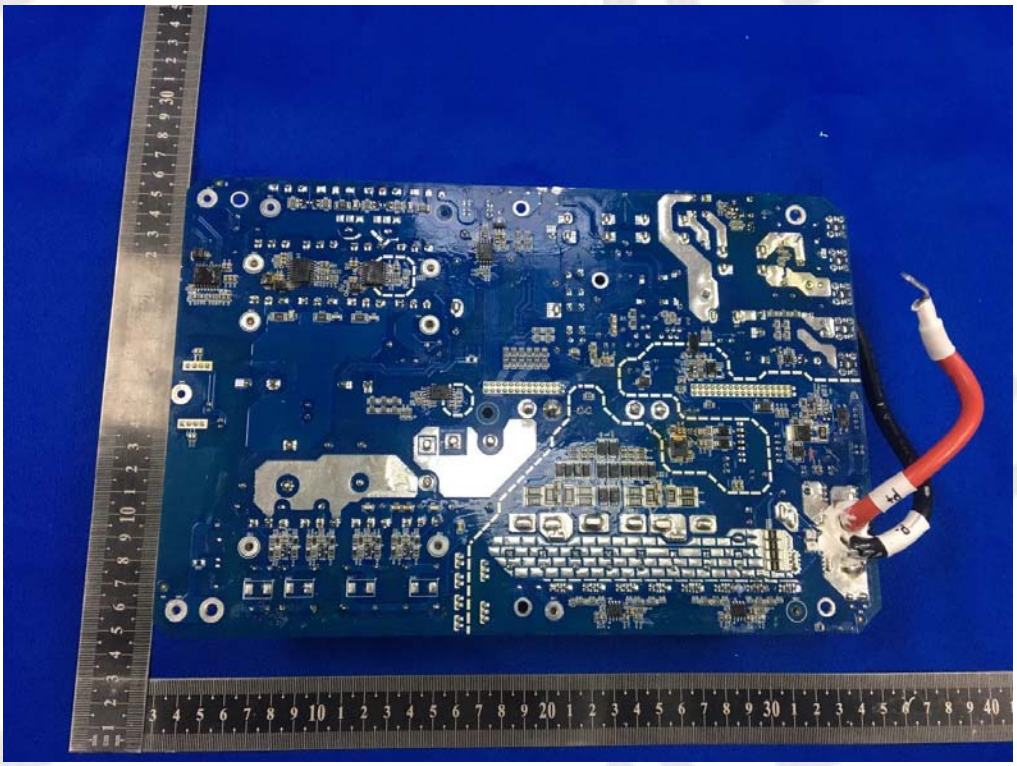












********** End of Report **********