

# TEST REPORT

**Report No.**.....: KS2205S2080E

**FCC ID**.....: 2A6T7-JSTAR4

**Applicant**.....: **Guangdong Boltpower Energy Co.,Ltd**

Address.....: No.22 Xinfu Road, Lincun, Tangxia Town, Dongguan City, Guangdong Province, China.523710

Manufacturer.....: Guangdong Boltpower Energy Co.,Ltd

Address.....: No.22 Xinfu Road, Lincun, Tangxia Town, Dongguan City, Guangdong Province, China.523710

**Product Name**.....: **Portable Emergency Jump Starter**

Trade Mark.....: N/A

Model/Type reference.....: Jstar 4

Listed Model(s).....: G56

**Standard**.....: **FCC Rules and Regulations Part 15 Subpart C (Section 15.209),  
ANSI C63.10: 2013**

Date of Receipt.....: May 24, 2022

Date of Test Date.....: May 24, 2022 - Jun. 9, 2022

Date of issue.....: Jun. 9, 2022

**Test result**.....: **Pass**

Prepared by:  
( Printed name+ signature)

Sky Dong  
*Sky Dong*

Approved by:  
( Printed name + Signature)

Neil Wan  
*Neil Wan*

**Testing Laboratory Name**.....: **KSIGN(Guangdong) Testing Co., Ltd.**

Address.....: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, People's Republic of China

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## 1. TEST SUMMARY

### 1.1. Test Standards

The tests were performed according to following standards:

**FCC Rules Part 15 Subpart C:** Operation within the bands 115~205 KHz .

**ANSI C63.10-2020:** American National Standard for Testing Unlicensed Wireless Devices.

### 1.2. Report version

Revised No.	Date of issue	Description
01	Jun. 09, 2022	Original

### 1.3. Test Description

EMC Emission			
Test Item	FCC Rules	Result	Test Engineer
Conducted Emission	§15.207	Pass	Cyril Cai
Radiated Emission	§15.209	Pass	Cyril Cai
Antenna Application	§15.203	Pass	Cyril Cai

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

## 1.4. 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 TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the KSIGN(Guangdong) Testing Co., Ltd. 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. Below is the best measurement capability for KSIGN(Guangdong) Testing Co., Ltd.

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth	2.80 dB	(1)

**Note (1):** This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

## 1.5. Environmental conditions

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

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

## 2. GENERAL INFORMATION

### 2.1. Client Information

Applicant:	Guangdong Boltpower Energy Co.,Ltd
Address:	No.22 Xinfu Road, Lincun, Tangxia Town, Dongguan City, Guangdong Province, China.523710
Manufacturer:	Guangdong Boltpower Energy Co.,Ltd
Address:	No.22 Xinfu Road, Lincun, Tangxia Town, Dongguan City, Guangdong Province, China.523710

### 2.2. General Description of EUT

Test Sample Number:	1-1-1(Normal Sample)
Product Name:	Portable Emergency Jump Starte
Trade Mark:	N/A
Model/Type reference:	Jstar 4
Listed Model(s):	G56
Model Different:	All models have the same circuit and RF module, except for the different name.
Power supply(Battery) :	Jump Start Output : 12V Type-C Input / Output : 5V/3A USB1 Output: 5V/3A, 9V/2A, 12V/1.5A USB2 Output: 5V/2.1A Wireless Output : 10W(Max) DC Output : 12-16V/10A
Hardware version:	V1.0
Software version:	V1.0.0

#### Specification

Frequency range	115KHz~205KHz
Modulation:	FSK
Antenna type:	Coil Antenna
Antenna gain:	0 dBi

## 2.3. Description of Test Modes

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

Operation Frequency range: 115KHz~205KHz

### Test mode

MODE	TEST MODE DESCRIPTION	
Mode 1	Charging+Wireless Charging(5W)	Recorded
Mode 2	Charging+Wireless Charging(7.5W)	Recorded
Mode 3	Charging+Wireless Charging(10W)	Recorded
Mode 4	Wireless Charging(5W)	Recorded
Mode 5	Wireless Charging(7.5W)	Recorded
Mode 6	Wireless Charging(10W)	Recorded
Mode 7	Standby	Pre-tested

Note: All test modes were pre-tested, but we only recorded the worst case in this report. Mode 3 is the worst Mode.

## 2.4. Measurement Instruments List

Tonscend JS0806-2 Test system					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	Spectrum Analyzer	R&S	FSV40-N	101798	03/04/2023
2	Wideband Radio Communication Tester	R&S	CMW500	157282	03/04/2023
3	Climate Chamber	Angul	AGNH80L	1903042120	03/04/2023
4	Dual Output DC Power Supply	Agilent	E3646A	MY40009992	03/04/2023

Transmitter spurious emissions & Receiver spurious emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	EMI Test Receiver	R&S	ESR	102525	03/04/2023
2	Spectrum Analyzer	HP	8593E	3831U02087	03/04/2023
3	Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	01230	12/04/2023
4	Loop Antenna	Beijin ZHINAN	ZN30900C	18050	03/05/2023
5	Spectrum Analyzer	R&S	FSV40-N	101798	03/04/2023
7	Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	03/04/2023
8	Pre-Amplifier	EMCI	EMC051835SE	980662	03/04/2023

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	LISN	R&S	ENV432	1326.6105.02	03/04/2023
2	EMI Test Receiver	R&S	ESR	102525	03/04/2023
3	Manual RF Switch	JS TOYO	/	MSW-01/002	03/04/2023

Note:

1)The Cal. Interval was one year.

2)The cable loss has calculated in test result which connection between each test instruments.

Auxiliary test equipment				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Adapter	EP-TA20CBC	Input:AC 100-240V 50/60Hz Output:DC 5V=3A, 9V=2.22A	/	/
Wireless charging load	EESON	5W/7.5W/10W	/	/

## 2.5. Test Software

Software name	Model	Version
Conducted emission Measurement Software	EZ-EMC	EMC-Con 3A1.1
Radiated emission Measurement Software	EZ-EMC	FA-03A.2.RE

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### 3. TEST ITEM AND RESULTS

#### 3.1. Antenna requirement

##### Requirement

##### **FCC CFR Title 47 Part 15 Subpart C Section 15.203:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Systems operating in the 115KHz~205KHz band that is used exclusively for fixed.

##### Test Result

The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.

Note: The antenna is permanently fixed to the EUT

### 3.2. Conducted Emission

## Limit

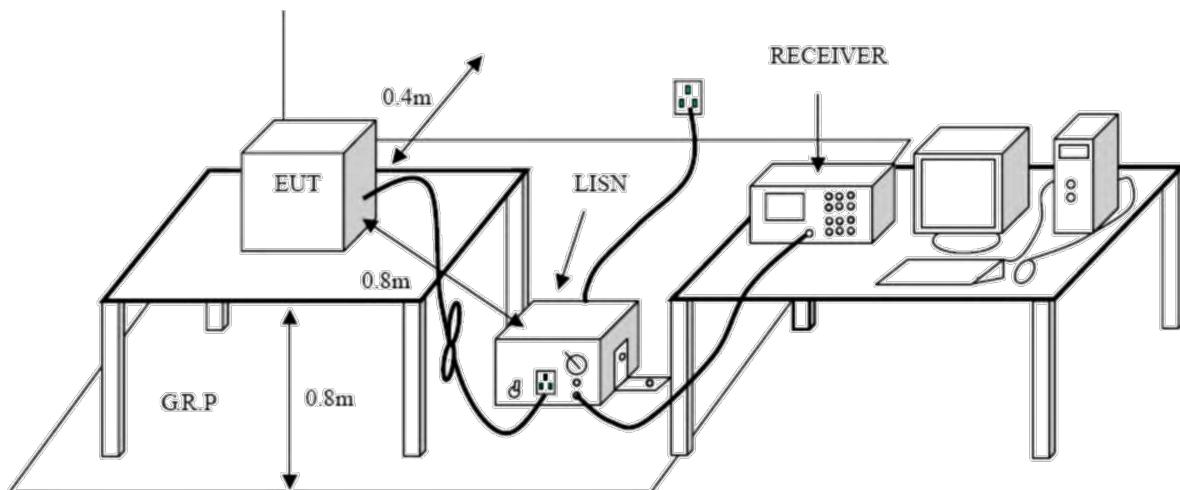
### Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dB $\mu$ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

### Notes:

- (1) \*Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

## Test Configuration



## Test Procedure

1. The EUT was setup according to ANSI C63.10:2020 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment.  
The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
7. During the above scans, the emissions were maximized by cable manipulation.

## Test Mode:

Please refer to the clause 2.3.

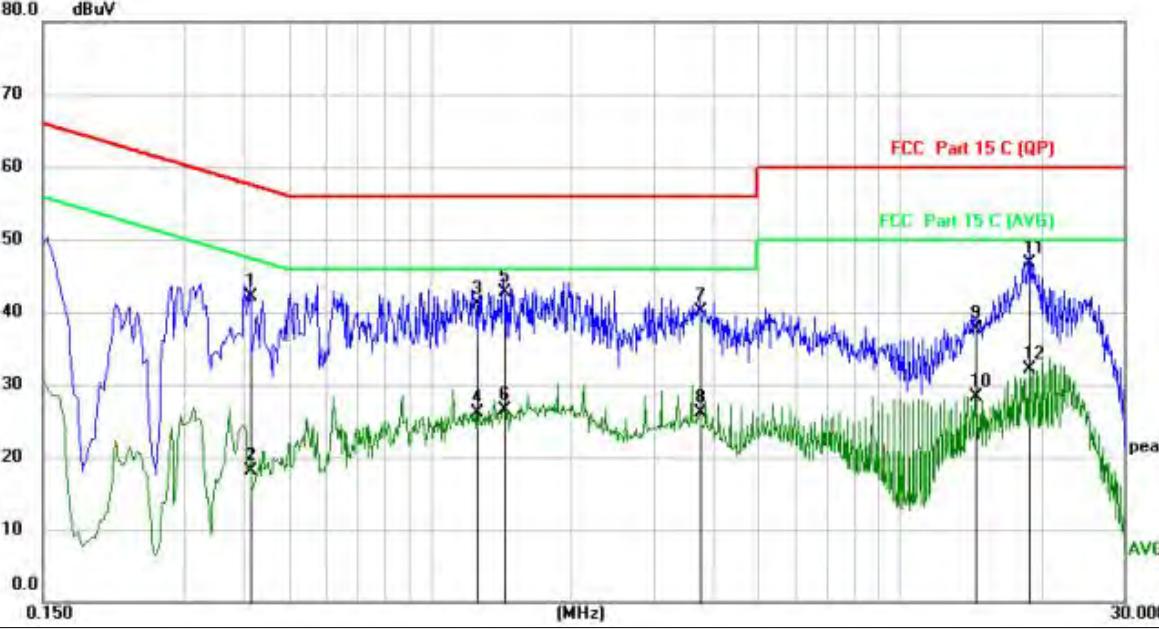
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**Test Results**

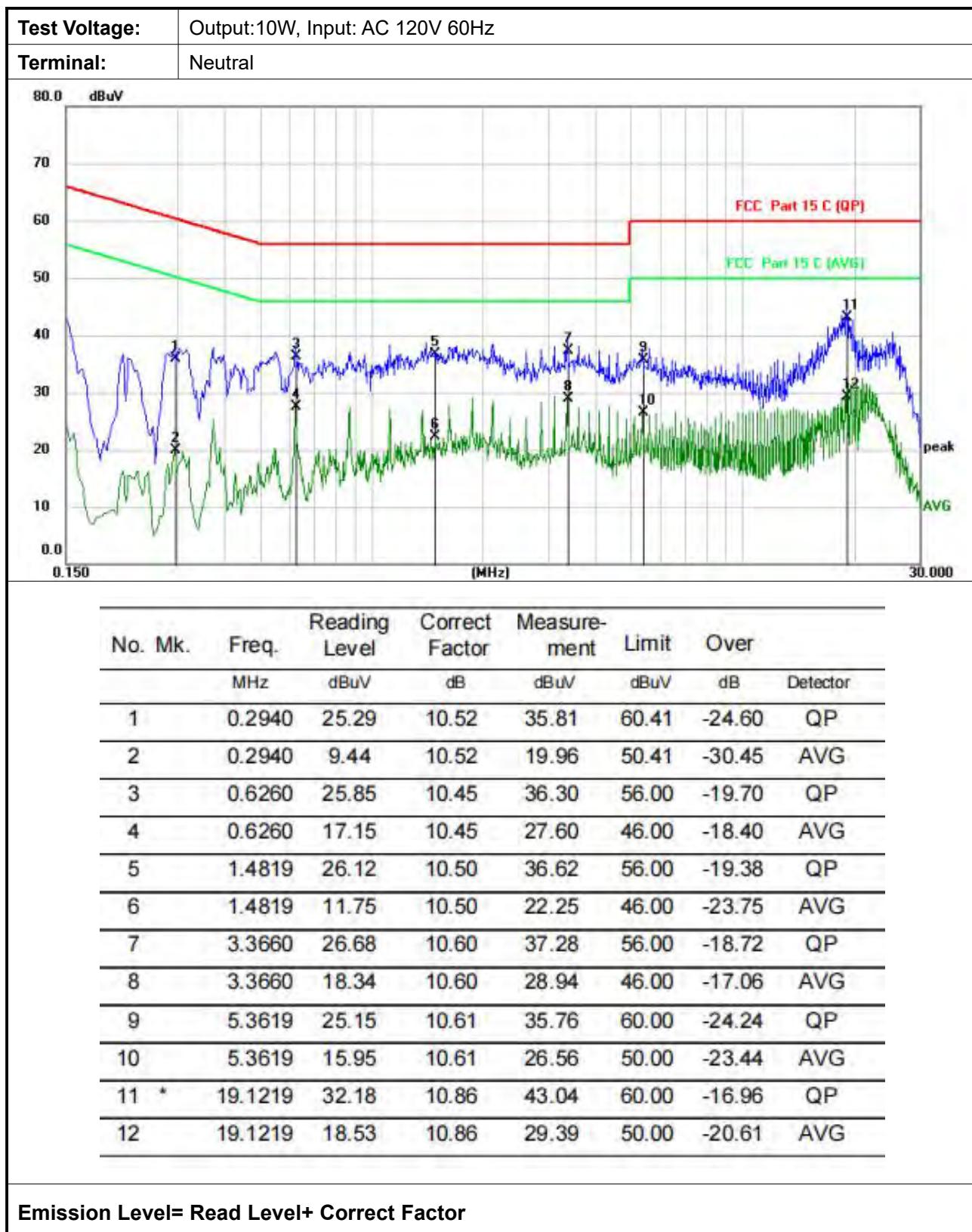
All test modes were pre-tested, but we only recorded the worst case in this report. Mode 3 is the worst Mode.

<b>Test Voltage:</b>	Output:10W, Input: AC 120V 60Hz																																																																																																																																		
<b>Terminal:</b>	Line																																																																																																																																		
																																																																																																																																			
	<table border="1"> <thead> <tr> <th>No.</th> <th>Mk.</th> <th>Freq.</th> <th>Reading Level</th> <th>Correct Factor</th> <th>Measure-ment</th> <th>Limit</th> <th>Over</th> </tr> <tr> <th></th> <th></th> <th>MHz</th> <th>dBuV</th> <th>dB</th> <th>dBuV</th> <th>dB</th> <th>Detector</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td>0.4148</td> <td>31.52</td> <td>10.51</td> <td>42.03</td> <td>57.55</td> <td>-15.52</td> <td>QP</td> </tr> <tr> <td>2</td> <td></td> <td>0.4148</td> <td>7.52</td> <td>10.51</td> <td>18.03</td> <td>47.55</td> <td>-29.52</td> <td>AVG</td> </tr> <tr> <td>3</td> <td></td> <td>1.2579</td> <td>30.77</td> <td>10.41</td> <td>41.18</td> <td>56.00</td> <td>-14.82</td> <td>QP</td> </tr> <tr> <td>4</td> <td></td> <td>1.2579</td> <td>15.69</td> <td>10.41</td> <td>26.10</td> <td>46.00</td> <td>-19.90</td> <td>AVG</td> </tr> <tr> <td>5</td> <td>*</td> <td>1.4340</td> <td>32.38</td> <td>10.42</td> <td>42.80</td> <td>56.00</td> <td>-13.20</td> <td>QP</td> </tr> <tr> <td>6</td> <td></td> <td>1.4340</td> <td>15.99</td> <td>10.42</td> <td>26.41</td> <td>46.00</td> <td>-19.59</td> <td>AVG</td> </tr> <tr> <td>7</td> <td></td> <td>3.7420</td> <td>29.49</td> <td>10.61</td> <td>40.10</td> <td>56.00</td> <td>-15.90</td> <td>QP</td> </tr> <tr> <td>8</td> <td></td> <td>3.7420</td> <td>15.49</td> <td>10.61</td> <td>26.10</td> <td>46.00</td> <td>-19.90</td> <td>AVG</td> </tr> <tr> <td>9</td> <td></td> <td>14.4659</td> <td>27.01</td> <td>10.76</td> <td>37.77</td> <td>60.00</td> <td>-22.23</td> <td>QP</td> </tr> <tr> <td>10</td> <td></td> <td>14.4659</td> <td>17.48</td> <td>10.76</td> <td>28.24</td> <td>50.00</td> <td>-21.76</td> <td>AVG</td> </tr> <tr> <td>11</td> <td></td> <td>18.8300</td> <td>36.00</td> <td>10.63</td> <td>46.63</td> <td>60.00</td> <td>-13.37</td> <td>QP</td> </tr> <tr> <td>12</td> <td></td> <td>18.8300</td> <td>21.55</td> <td>10.63</td> <td>32.18</td> <td>50.00</td> <td>-17.82</td> <td>AVG</td> </tr> </tbody> </table>							No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over			MHz	dBuV	dB	dBuV	dB	Detector	1		0.4148	31.52	10.51	42.03	57.55	-15.52	QP	2		0.4148	7.52	10.51	18.03	47.55	-29.52	AVG	3		1.2579	30.77	10.41	41.18	56.00	-14.82	QP	4		1.2579	15.69	10.41	26.10	46.00	-19.90	AVG	5	*	1.4340	32.38	10.42	42.80	56.00	-13.20	QP	6		1.4340	15.99	10.42	26.41	46.00	-19.59	AVG	7		3.7420	29.49	10.61	40.10	56.00	-15.90	QP	8		3.7420	15.49	10.61	26.10	46.00	-19.90	AVG	9		14.4659	27.01	10.76	37.77	60.00	-22.23	QP	10		14.4659	17.48	10.76	28.24	50.00	-21.76	AVG	11		18.8300	36.00	10.63	46.63	60.00	-13.37	QP	12		18.8300	21.55	10.63	32.18	50.00	-17.82	AVG
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### 3.3. Radiated Spurious Emissions

#### LIMIT

#### FCC CFR Title 47 Part 15 Subpart C Section 15.209(a) and 15.205(a)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

#### 15.209(a)

Frequencies (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

#### 15.205 Restricted bands of operation:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

#### Notes:

(1).Measurement was performed at an antenna to the closed point of EUT distance of meters.

(2).Emission level (dBuV/m)=20log Emission level (uV/m).

(3).Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

(4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

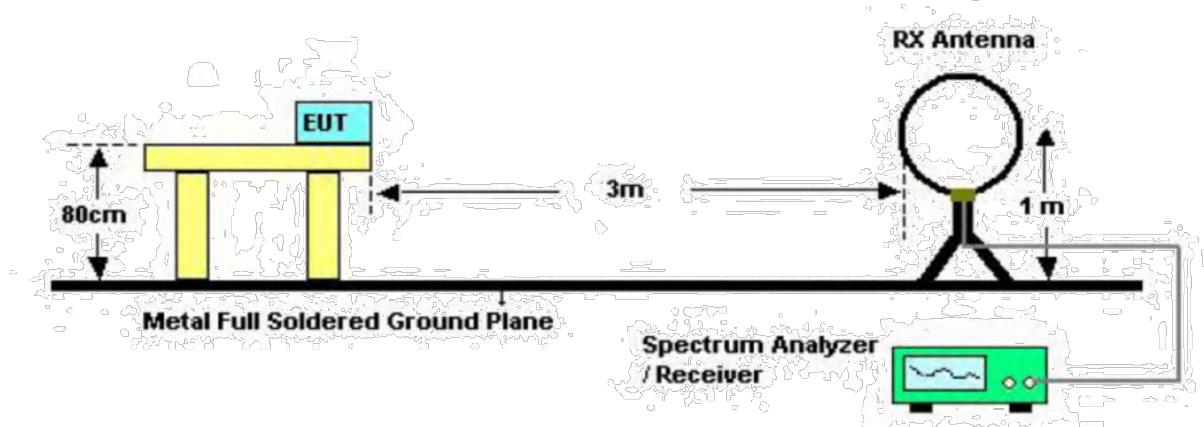
#### FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 <sup>th</sup> harmonic of the highest frequency or 40 GHz, whichever is lower

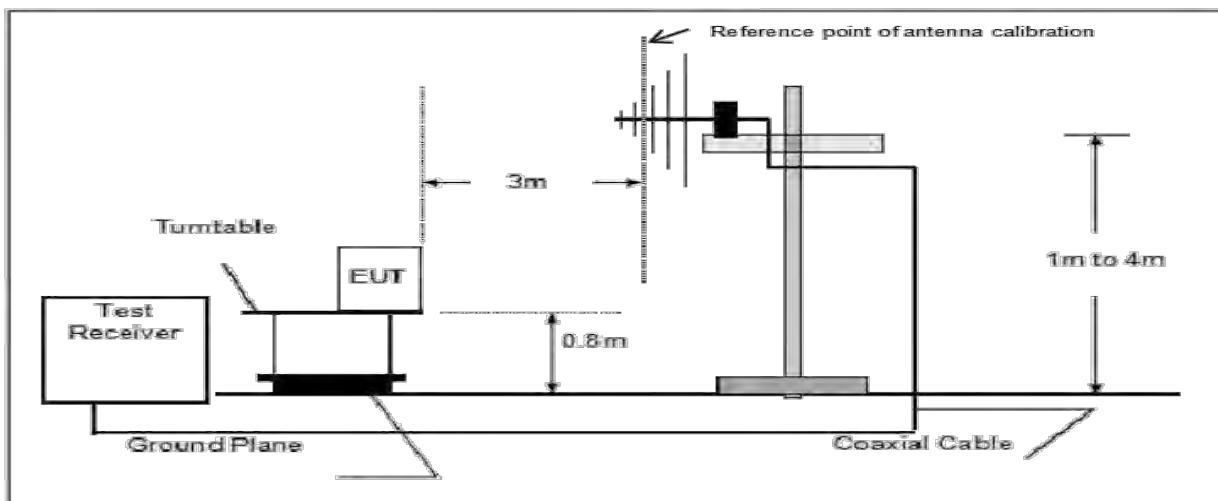
Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

#### Test Configuration



Below 30MHz Test Setup



Below 1GHz Test Setup

### Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2020
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Below 1 GHz:  
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;  
If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
  - (3) From 1 GHz to 10<sup>th</sup> harmonic:  
RBW=1MHz, VBW=3MHz Peak detector for Peak value.  
RBW=1MHz, VBW=10Hz Peak detector for Average value.

### TEST MODE:

Please refer to the clause 2.3

### TEST RESULTS

Passed  Not Applicable

#### **9 KHz~30 MHz and 30MHz~1GHz**

From 9 KHz~30 MHz and 30MHz~1GHz: Conclusion: PASS

Note:

- 1) Final level = Reading level + Correct Factor

Correct Factor=Antenna Factor + Cable Loss -Preamplifier Factor

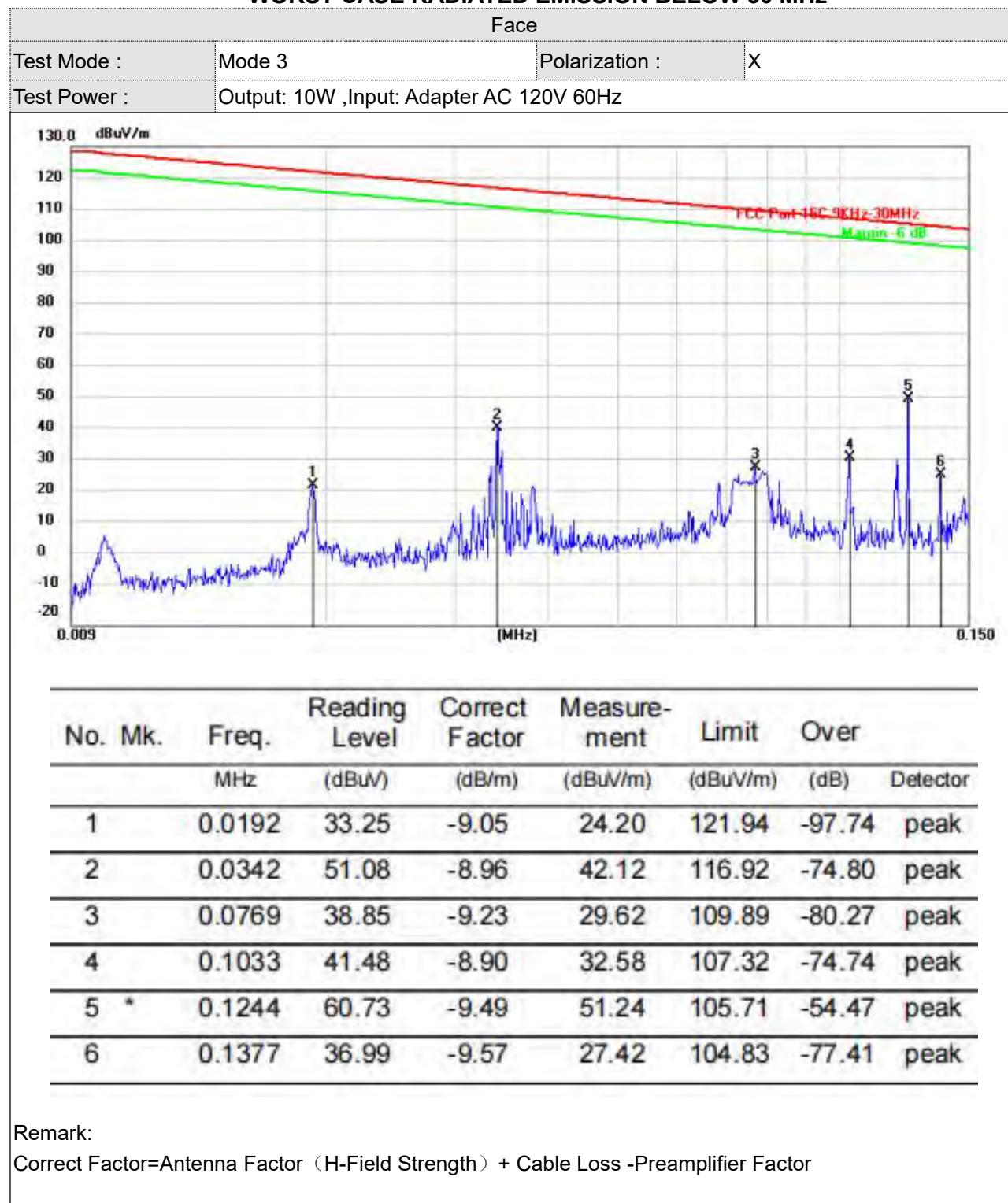
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For 9 KHz-30MHz

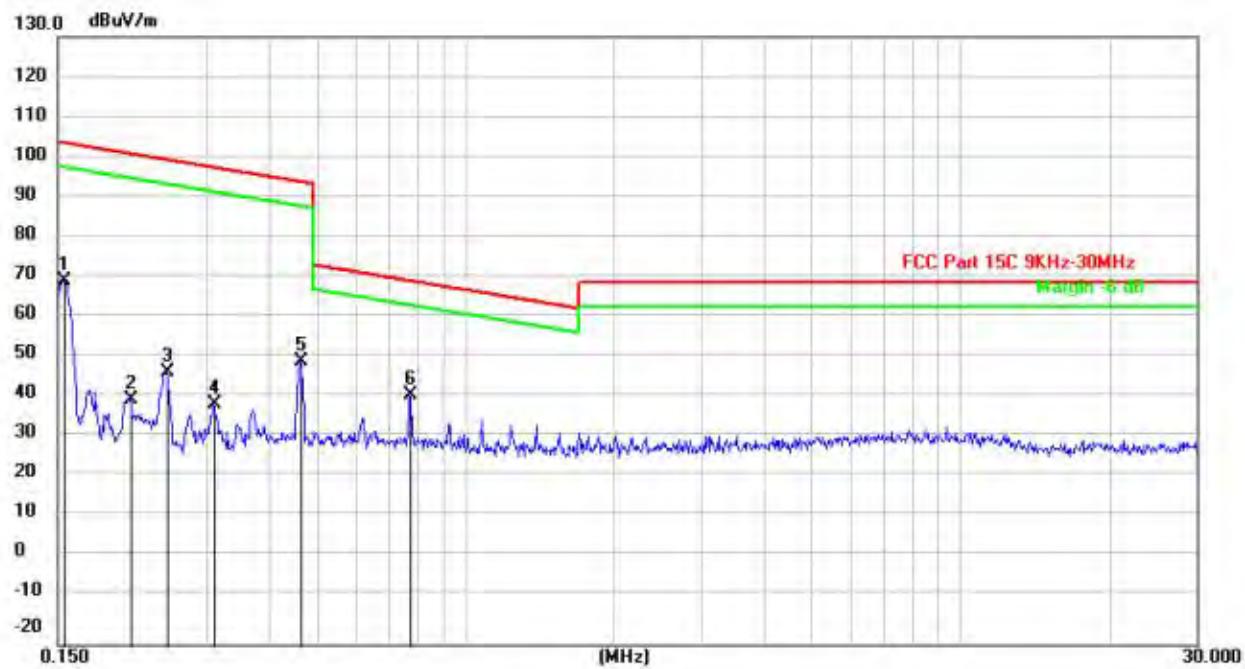
## WORST-CASE RADIATED EMISSION BELOW 30 MHz



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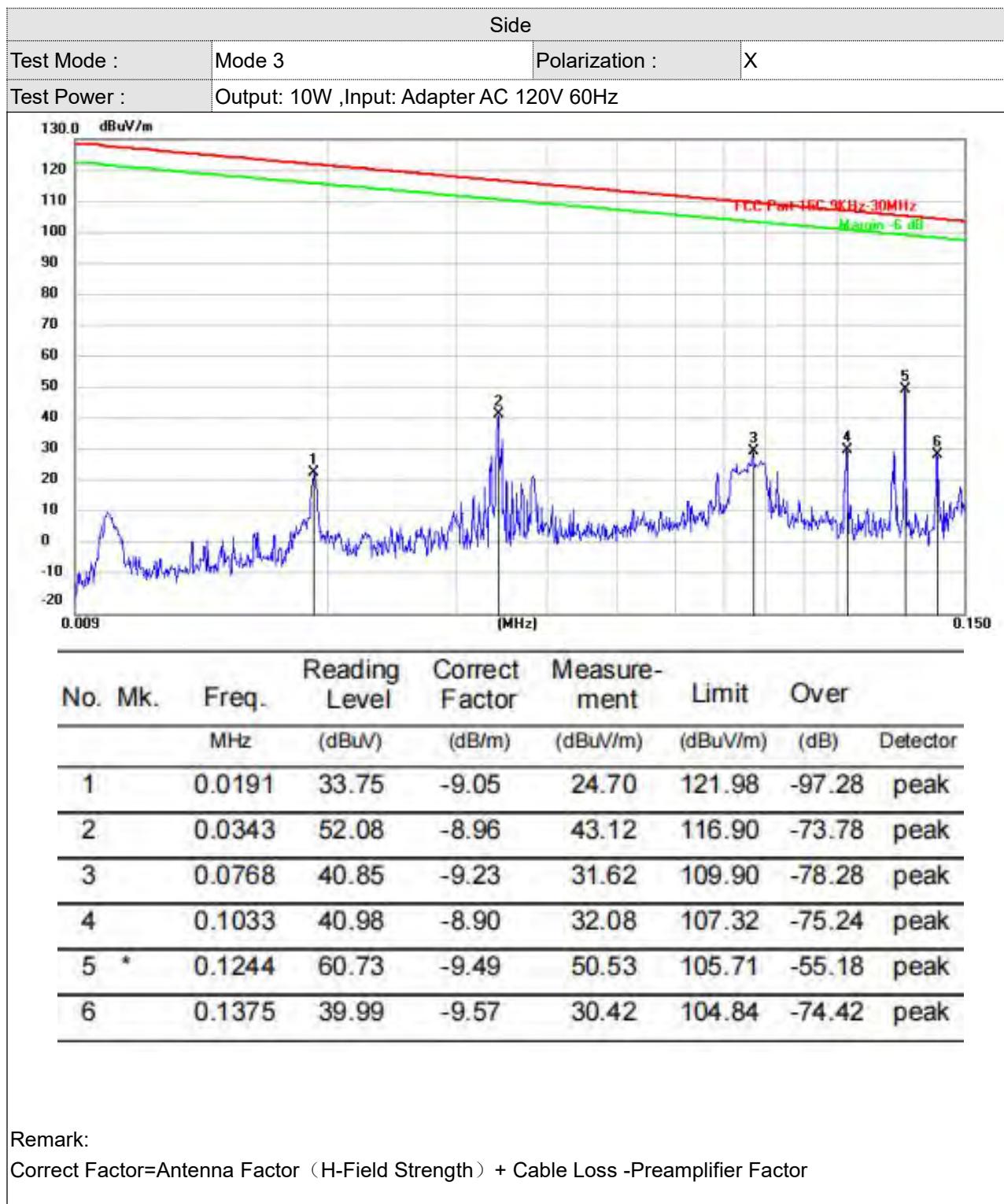
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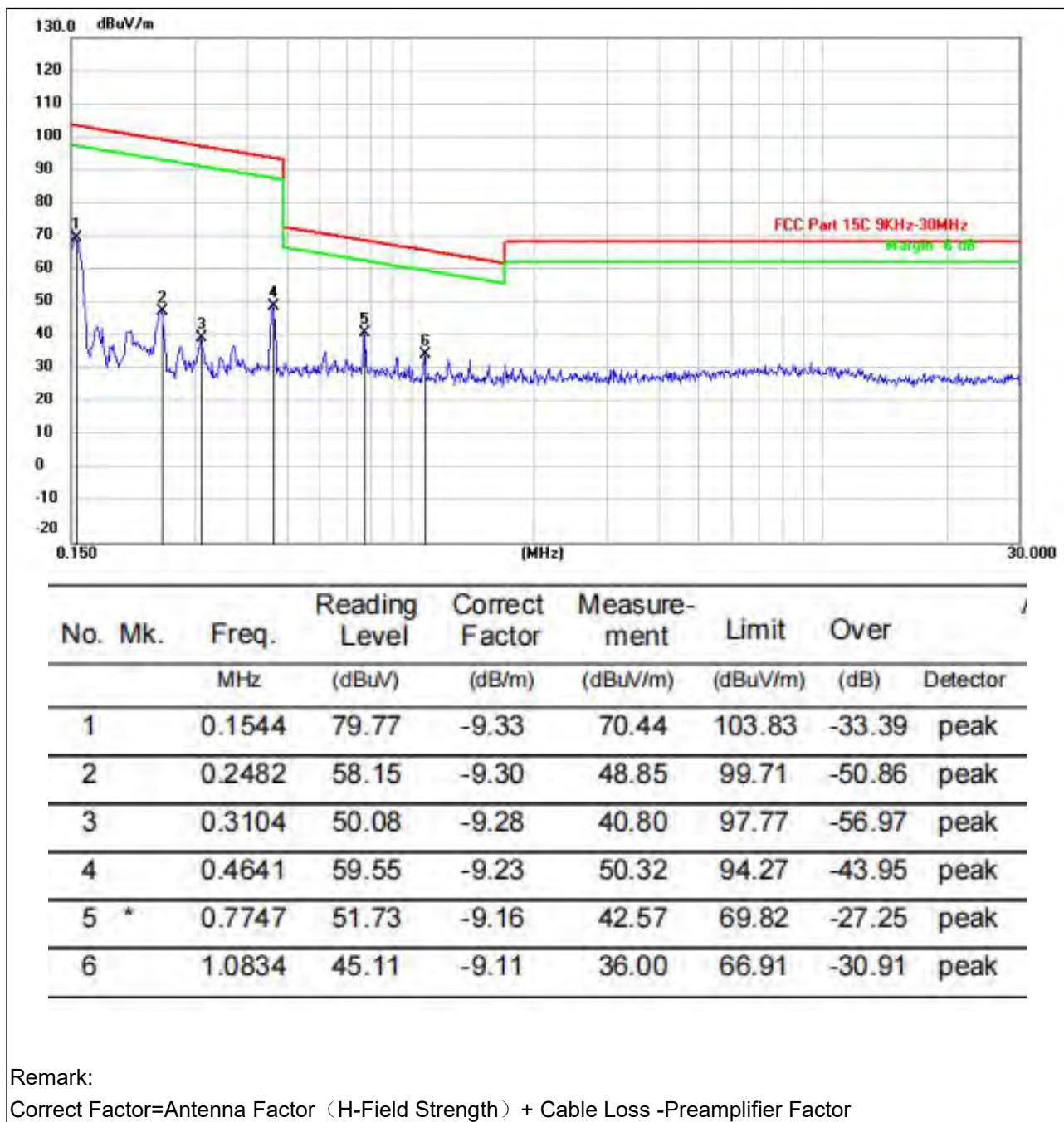


No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over
			Level	Factor	ment		
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dB)	Detector
1		0.1545	79.27	-9.33	69.94	103.83	-33.89 peak
2		0.2099	49.89	-9.31	40.58	101.16	-60.58 peak
3		0.2483	56.65	-9.30	47.35	99.70	-52.35 peak
4		0.3105	48.58	-9.28	39.30	97.76	-58.46 peak
5		0.4642	59.05	-9.23	49.82	94.27	-44.45 peak
6	*	0.7748	50.73	-9.16	41.57	69.82	-28.25 peak

Remark:

Correct Factor=Antenna Factor (H-Field Strength) + Cable Loss -Preamplifier Factor





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## 30MHz-1GHz

<b>Test Voltage:</b>	Output: 10W, Input: AC 120V 60Hz							
<b>Ant. Pol.</b>	Horizontal							
<b>Test Mode:</b>	Mode 3 worse case							
No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measure- ment (dBuV/m)	Limit (dBuV/m)	Over (dB)	Over Detector
1	127.6197	36.42	-20.58	15.84	43.50	-27.66	QP	
2	188.0825	52.63	-18.56	34.07	43.50	-9.43	QP	
3	*	208.4340	53.09	-17.63	35.46	43.50	-8.04	QP
4		362.9844	36.68	-12.11	24.57	46.00	-21.43	QP
5		423.3918	36.99	-10.63	26.36	46.00	-19.64	QP
6		701.2690	29.22	-7.14	22.08	46.00	-23.92	QP
<b>Emission Level= Read Level+ Correct Factor</b>								

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<b>Test Voltage:</b>	Output: 10W, Input: AC 120V 60Hz						
<b>Ant. Pol.</b>	Vertical						
<b>Test Mode:</b>	Mode 3 worse case						
No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measure- ment (dBuV/m)	Limit (dBuV/m) (dB)	Over Detector
1	*	33.3513	47.92	-18.85	29.07	40.00	-10.93
2		71.7313	42.85	-19.89	22.96	40.00	-17.04
3		88.9951	41.35	-20.00	21.35	43.50	-22.15
4		127.5303	42.14	-20.57	21.57	43.50	-21.93
5		180.7122	48.91	-19.01	29.90	43.50	-13.60
6		588.4922	29.48	-7.95	21.53	46.00	-24.47
<b>Emission Level= Read Level+ Correct Factor</b>							

Note:

1. 30MHz-1GHz, Pre-test the X, Y, Z axis to find X axis is worst case, so only record X axis test data.
2. All test modes were pre-tested, but we only recorded the worst case in this report. Mode 3 is the worst Mode.

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## 4. PHOTOGRAPHS OF TEST SETUP

Radiated Measurement (9kHz~30MHz)



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## Radiated Measurement (30MHz~1000MHz)

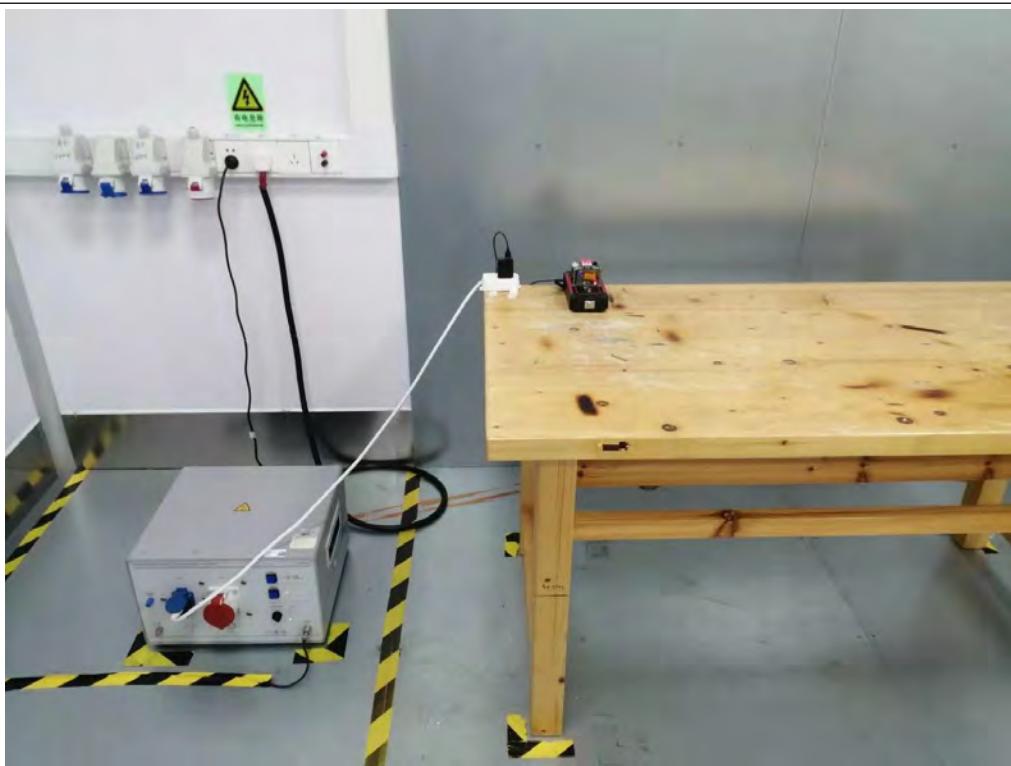


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## Conducted Emission



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## 5.PHOTOGRAPHS OF EUT CONSTRUCTIONAL

External photos



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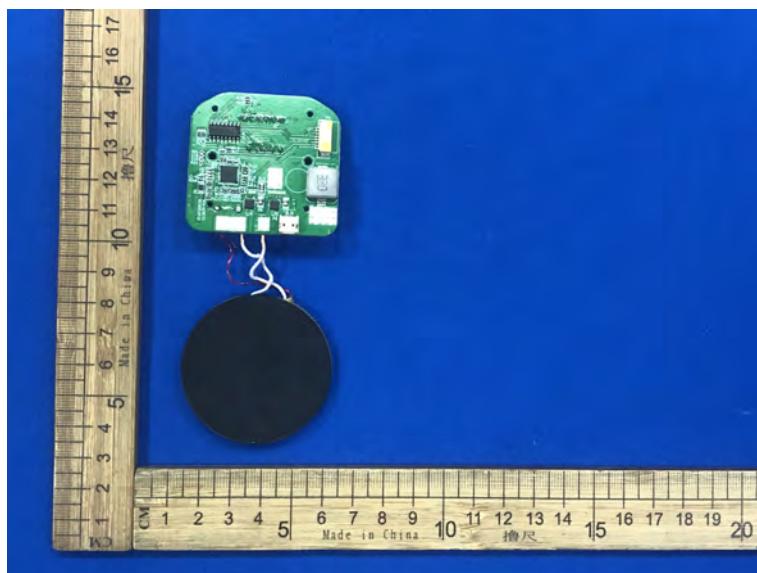
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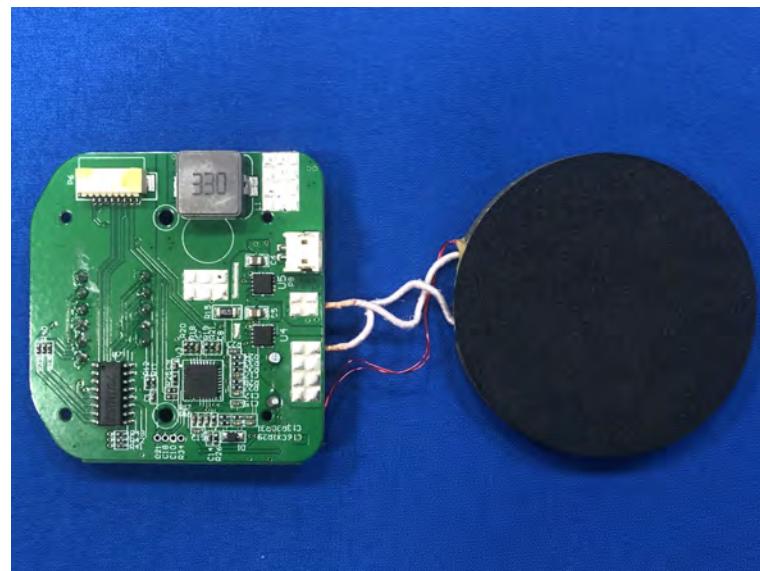
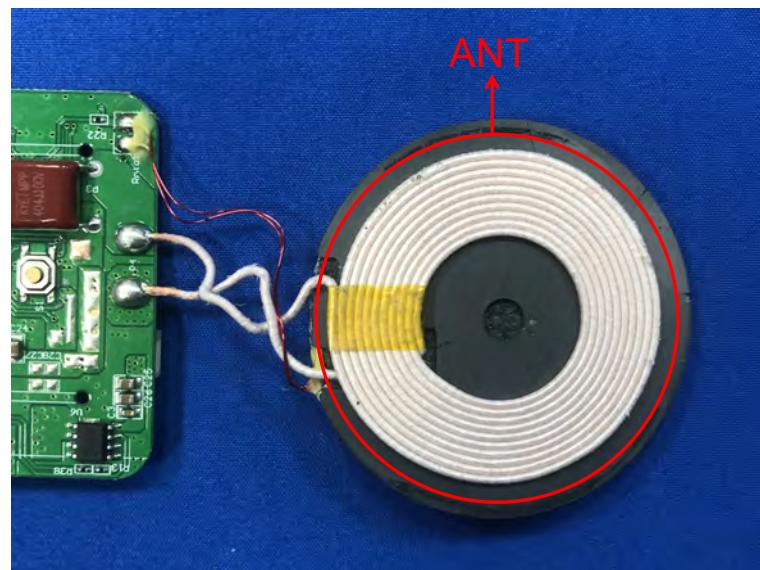
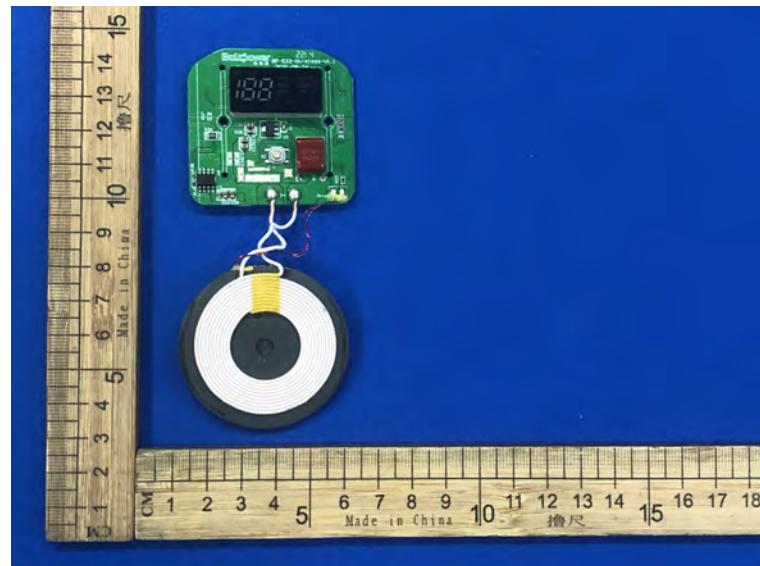
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**Internal photos**

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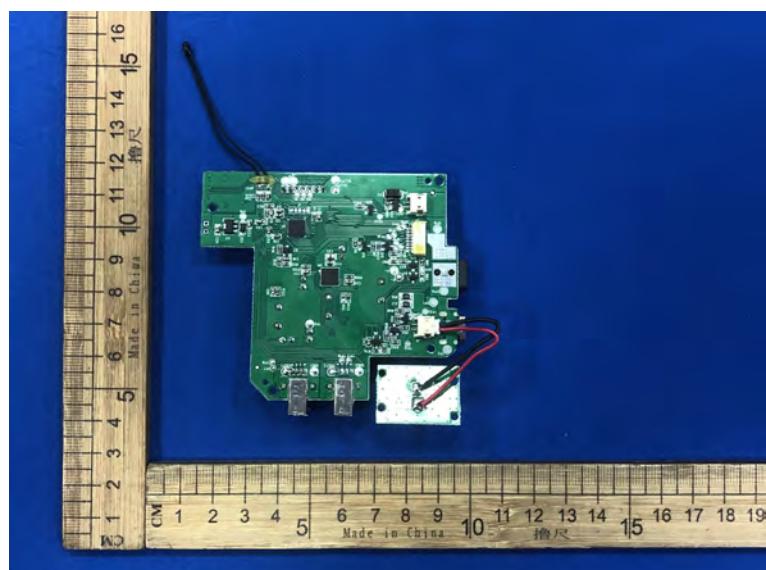
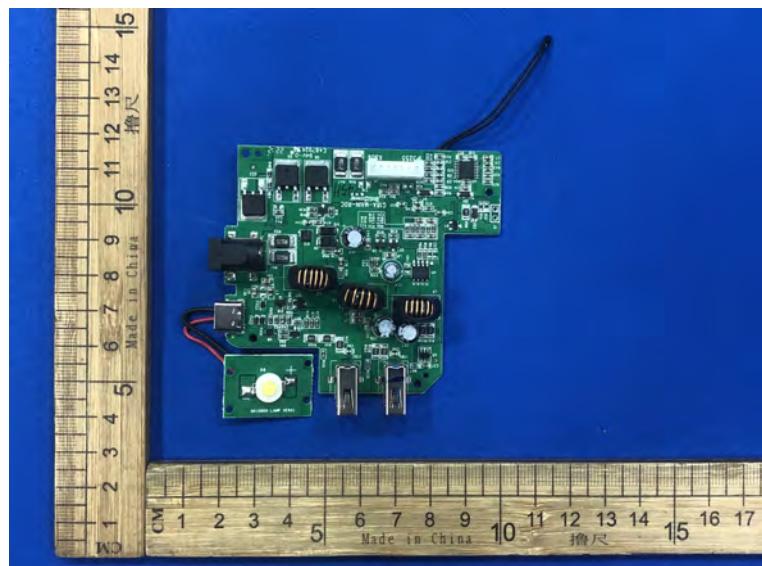
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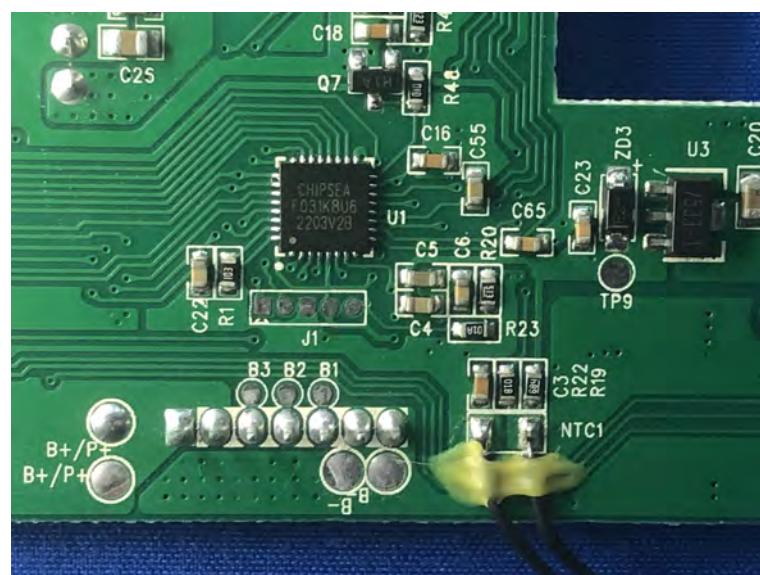
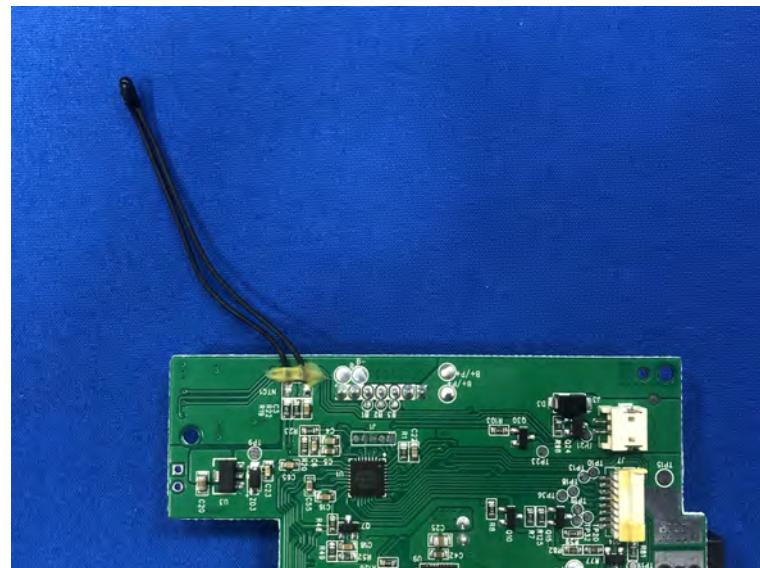
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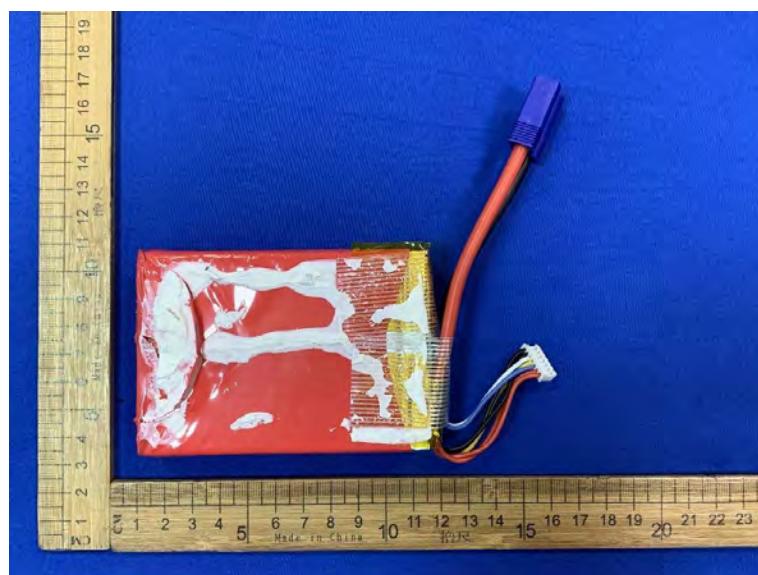
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