

FCC TEST REPORT

Client Name : Shenzhen Minsuo Industrial Co.,Ltd
Address : 12th floor, Block B, Tengyao Building, No. 268 Gushu 2nd
road,Xixiang Town, Bao'an, Shenzhen, Guangdong,
China
Product Name : Wireless Charging Pad
Date : Jul. 31, 2019

Shenzhen Anbotech Compliance Laboratory Limited

Contents

1. General Information.....	4
1.1. Client Information.....	4
1.2. Description of Device (EUT).....	4
1.3. Auxiliary Equipment Used During Test.....	4
1.4. Description of Test Modes.....	5
1.5. Description Of Test Setup.....	6
1.6. Test Equipment List.....	7
1.7. Measurement Uncertainty.....	8
1.8. Description of Test Facility.....	8
2. Summary of Test Results.....	9
3. Conducted Emission Test.....	10
3.1. Test Standard and Limit.....	10
3.2. Test Setup.....	10
3.3. Test Procedure.....	10
3.4. Test Data.....	10
4. Radiation Spurious Emission and Band Edge.....	15
4.1. Test Standard and Limit.....	15
4.2. Test Setup.....	15
4.3. Test Procedure.....	16
4.4. Test Data.....	17
5. Antenna Requirement.....	23
5.1. Test Standard and Requirement.....	23
5.2. Antenna Connected Construction.....	23
APPENDIX I -- TEST SETUP PHOTOGRAPH.....	24
APPENDIX II -- EXTERNAL PHOTOGRAPH.....	26
APPENDIX III -- INTERNAL PHOTOGRAPH.....	30

TEST REPORT

Applicant : Shenzhen Minsuo Industrial Co.,Ltd
Manufacturer : Shenzhen Minsuo Industrial Co.,Ltd
Product Name : Wireless Charging Pad
Model No. : MP-226
Trade Mark : N.A.
Rating(s) : Input: 5V--- 2A
Output: 5V--- 1A

Test Standard(s) : FCC Part15 Subpart C 2018, Paragraph 15.209

Test Method(s) : ANSI C63.10: 2013

The device described above is tested by Shenzhen Anbotech Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotech Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotech Compliance Laboratory Limited.

Date of Receipt

Jun. 27, 2019

Date of Test

Jun. 27~Jul. 19, 2019

Prepared By



Oliay Yang

(Engineer / Oliay Yang)

Reviewer

Snowy Meng

(Supervisor / Snowy Meng)

Approved & Authorized Signer

Sally Zhang

(Manager / Sally Zhang)

1. General Information

1.1. Client Information

Applicant	:	Shenzhen Minsuo Industrial Co.,Ltd
Address	:	12th floor, Block B, Tengyao Building, No. 268 Gushu 2nd road,Xixiang Town, Bao'an, Shenzhen, Guangdong, China
Manufacturer	:	Shenzhen Minsuo Industrial Co.,Ltd
Address	:	12th floor, Block B, Tengyao Building, No. 268 Gushu 2nd road,Xixiang Town, Bao'an, Shenzhen, Guangdong, China
Factory	:	Shenzhen Minsuo Industrial Co.,Ltd
Address	:	12th floor, Block B, Tengyao Building, No. 268 Gushu 2nd road,Xixiang Town, Bao'an, Shenzhen, Guangdong, China

1.2. Description of Device (EUT)

Product Name	:	Wireless Charging Pad
Model No.	:	MP-226
Trade Mark	:	N.A.
Test Power Supply	:	AC 240V, 60Hz for adapter/ AC 120V, 60Hz for adapter
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)
Product Description	Operation Frequency:	110.1-205KHz
	Modulation Type:	MSK
	Antenna Type:	Inductive loop coil Antenna
	Antenna Gain(Peak):	0 dBi
Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.		

1.3. Auxiliary Equipment Used During Test

Adapter	:	Manufacturer: Samsung M/N: ETA-U90CBC S/N: RT6FB17ZS/B-E Input: 100-240V~ 50-60Hz, 0.35A Output: DC 5V, 2A
Mobile Phone	:	iPhone 7

1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Full load, wireless charger module

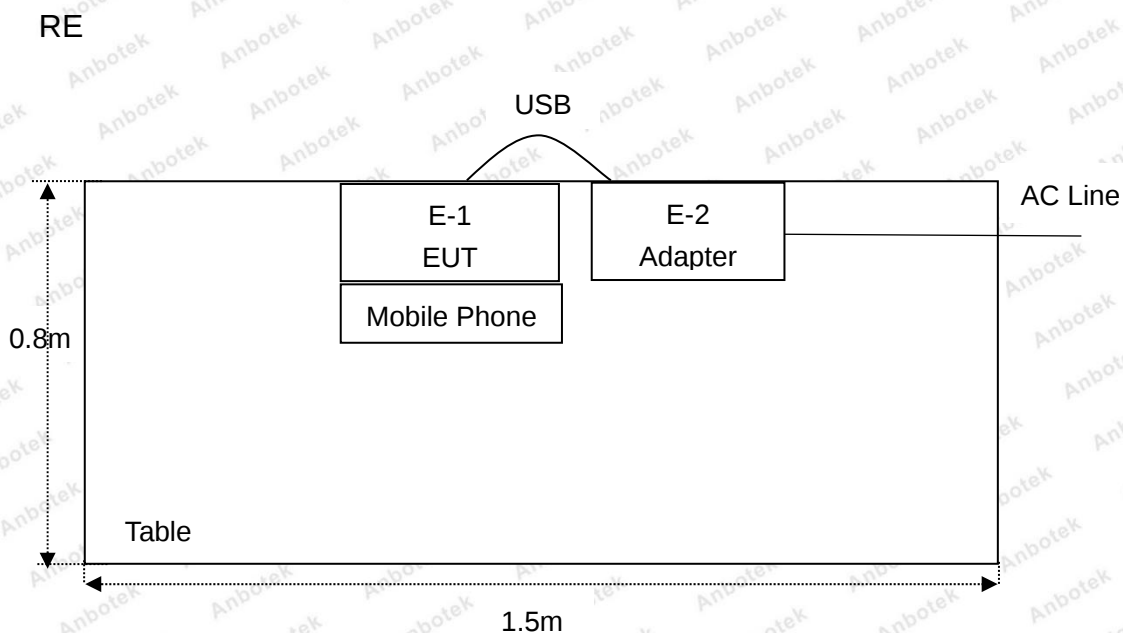
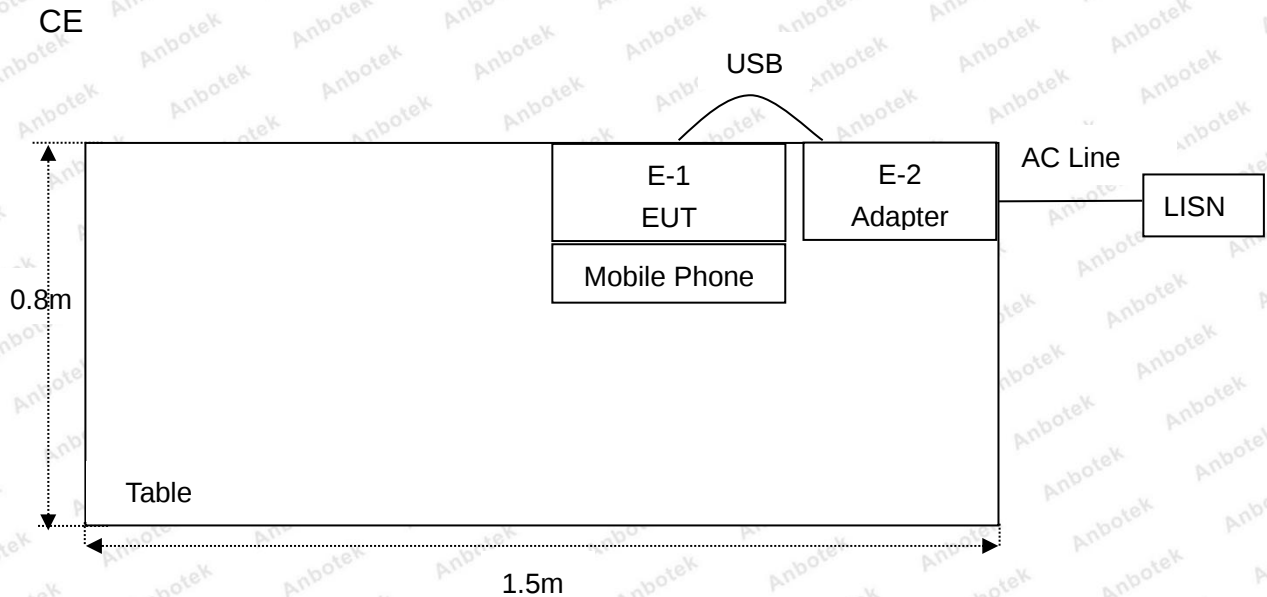
For Conducted Emission	
Final Test Mode	Description
Mode 1	Full load, wireless charger module

For Radiated Emission	
Final Test Mode	Description
Mode 1	Full load, wireless charger module

Note: (1)Test channel is 0.1499MHz.

(2) All the situation(full load, half load and empty load) has been tested,only the worst situation (full load) was recorded in the report.

1.5. Description Of Test Setup



1.6. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Nov. 26, 2018	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESPI3	101604	Nov. 05, 2018	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Nov. 05, 2018	1 Year
4.	Spectrum Analysis	Agilent	E4407B	US39390582	Nov. 05, 2018	1 Year
5.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 05, 2018	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30 D	KD17503	Nov. 05, 2018	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 20, 2018	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 19, 2018	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Nov. 20, 2018	1 Year
10.	Horn Antenna	A-INFO	LB-180400- KF	J211060628	Nov. 20, 2018	1 Year
11.	Pre-amplifier	SONOMA	310N	186860	Nov. 05, 2018	1 Year
12.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
13.	RF Test Control System	YIHENG	YH3000	2017430	Nov. 05, 2018	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN045	Nov. 05, 2018	1 Year
15.	Power Sensor	DAER	RPR3006W	15I00041SN046	Nov. 05, 2018	1 Year
16.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 05, 2018	1 Year
17.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Nov. 05, 2018	1 Year
18.	Signal Generator	Agilent	E4421B	MY41000743	Nov. 05, 2018	1 Year
19.	DC Power Supply	LW	TPR-6420D	374470	Oct. 31, 2018	1 Year
20.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80 B	N/A	Nov. 01, 2018	1 Year

1.7. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 3.9 dB (Horizontal)
		Ur = 3.8 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4 dB

1.8. Description of Test Facility

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

FCC-Registration No.: 184111

Shenzhen Anbotech Compliance Laboratory Limited, 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 No. 184111, September 30, 2018.

ISED-Registration No.: 8058A-1

Shenzhen Anbotech Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A-1, March 07, 2019.

Test Location

Shenzhen Anbotech Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102

2. Summary of Test Results

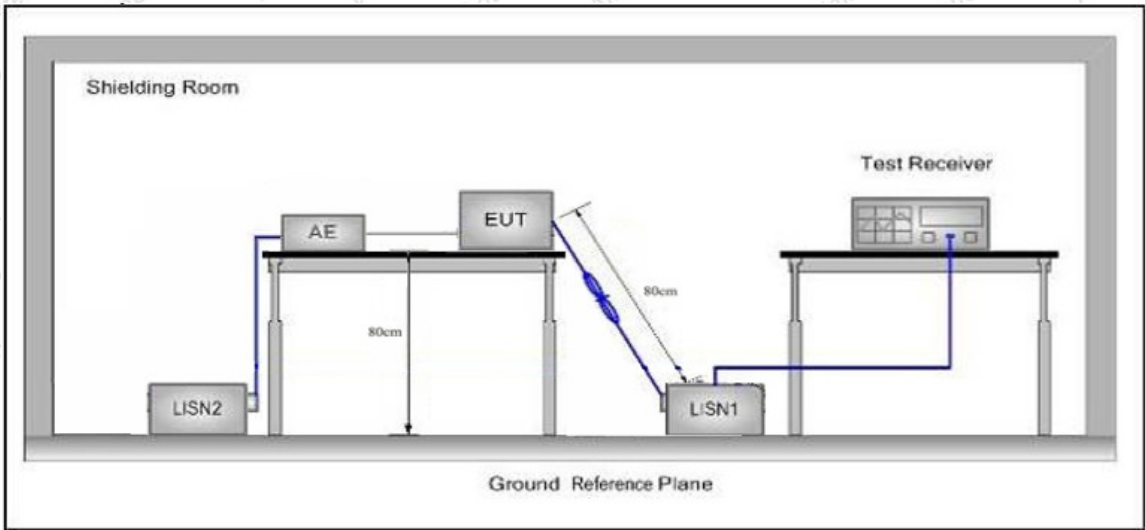
Standard Section	Test Item	Result
FCC Part 15, Paragraph 15.207	Conducted Emission Test	PASS
FCC Part 15, Paragraph 15.209(a)(f)	Spurious Emission	PASS
Part 15.203	Antenna Requirement	PASS

3. Conducted Emission Test

3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207		
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50
Remark: (1) *Decreasing linearly with logarithm of the frequency. (2) The lower limit shall apply at the transition frequency.			

3.2. Test Setup



3.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10-2013 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

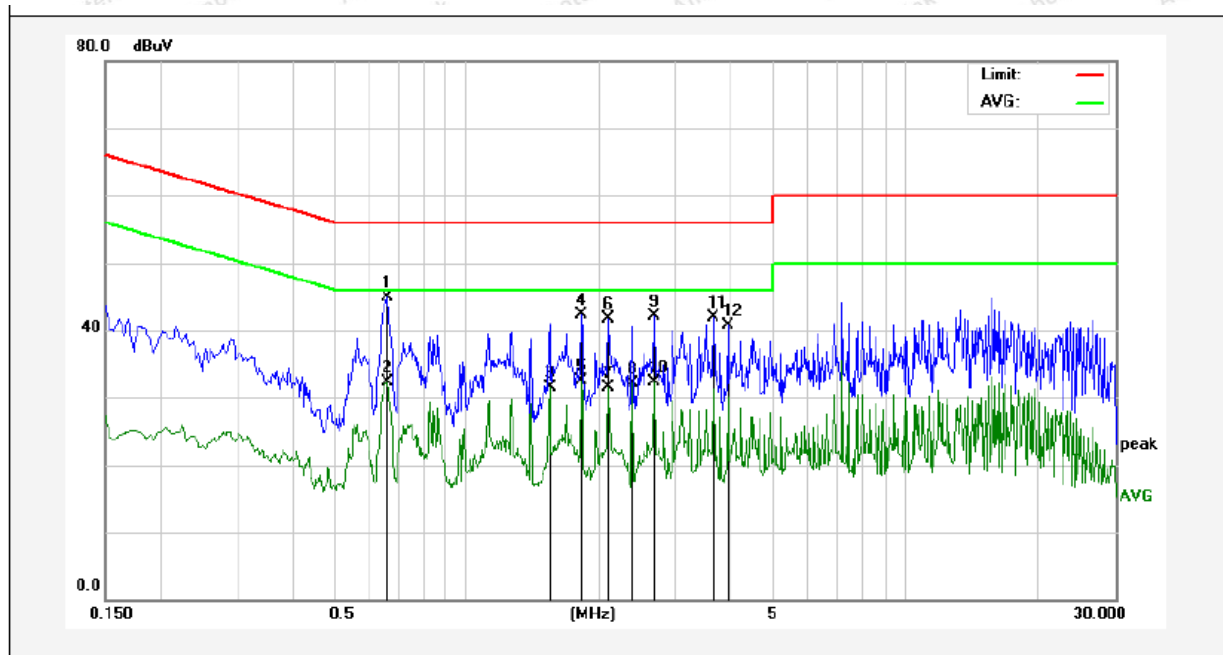
The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

Please to see the following pages

Conducted Emission Test Data

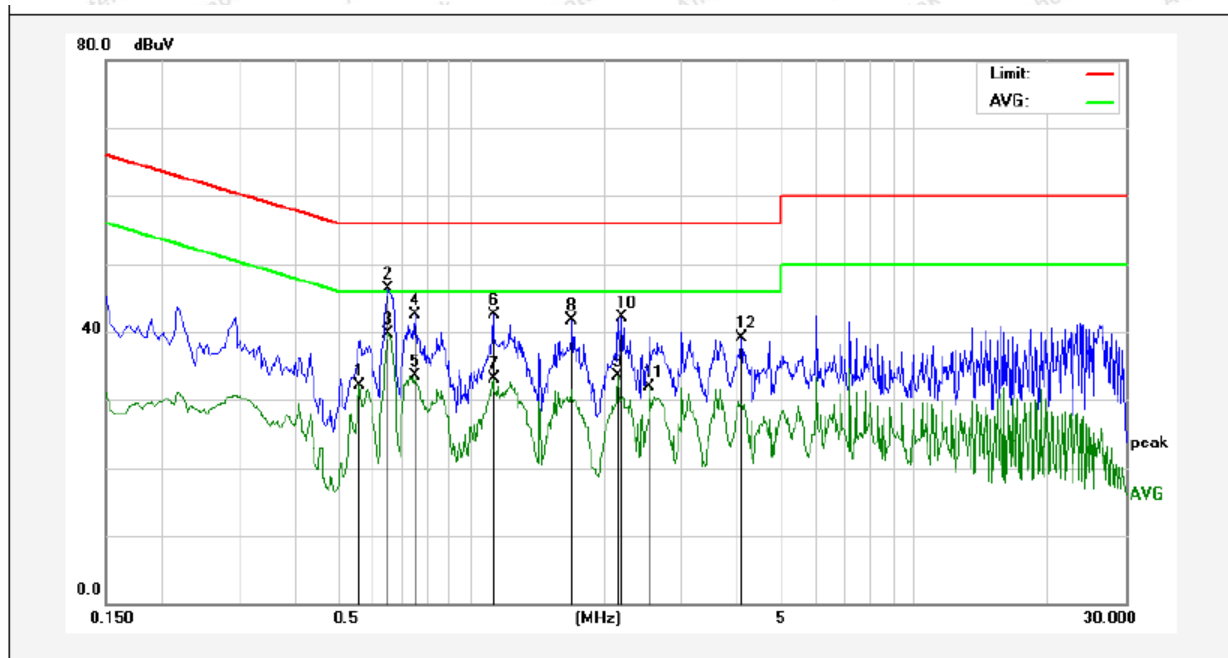
Test Site: 1# Shielded Room
Operating Condition: Mode 1
Test Specification: AC 240V, 60Hz for adapter
Comment: Live Line
Tem.: 22.3°C Hum.: 63%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.6580	24.78	20.03	44.81	56.00	-11.19	QP	
2	0.6580	12.24	20.03	32.27	46.00	-13.73	AVG	
3	1.5460	11.36	20.13	31.49	46.00	-14.51	AVG	
4	1.8260	22.10	20.14	42.24	56.00	-13.76	QP	
5	1.8260	12.39	20.14	32.53	46.00	-13.47	AVG	
6	2.1099	21.53	20.14	41.67	56.00	-14.33	QP	
7	2.1099	11.45	20.14	31.59	46.00	-14.41	AVG	
8	2.3900	11.92	20.15	32.07	46.00	-13.93	AVG	
9	2.6700	21.96	20.15	42.11	56.00	-13.89	QP	
10	2.6700	12.24	20.15	32.39	46.00	-13.61	AVG	
11	3.6540	21.73	20.17	41.90	56.00	-14.10	QP	
12	3.9340	20.55	20.18	40.73	56.00	-15.27	QP	

Conducted Emission Test Data

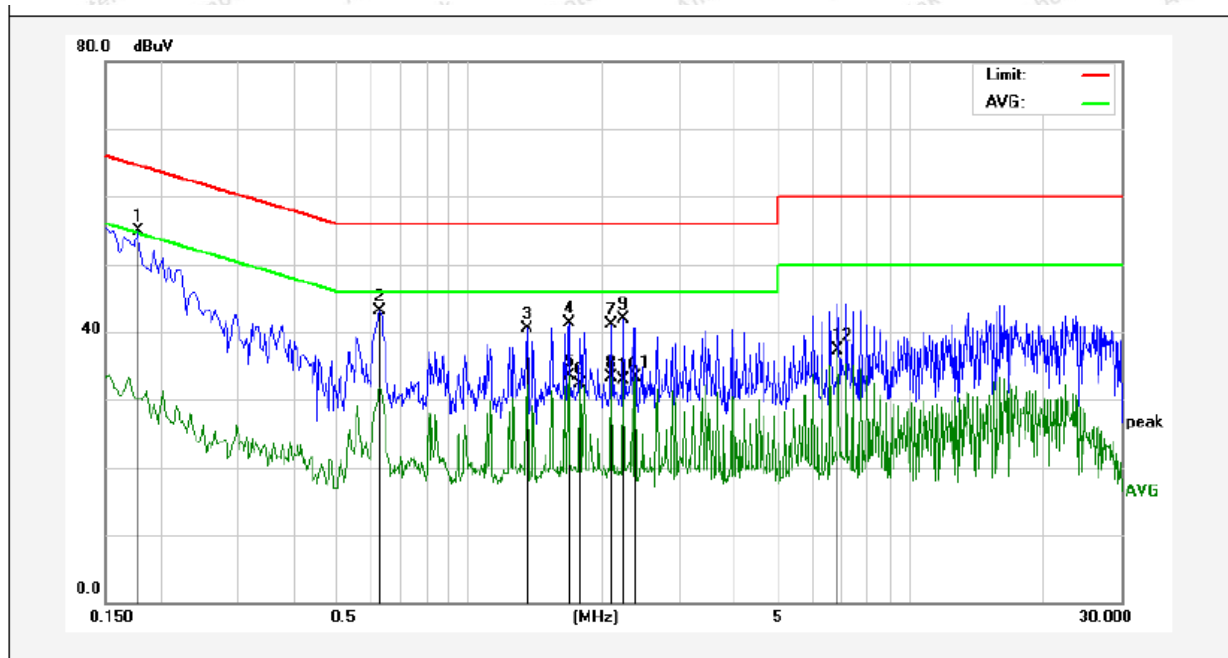
Test Site: 1# Shielded Room
Operating Condition: Mode 1
Test Specification: AC 240V, 60Hz for adapter
Comment: Neutral Line
Tem.: 22.3°C Hum.: 63%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.5620	12.05	20.00	32.05	46.00	-13.95	AVG	
2	0.6540	26.35	20.03	46.38	56.00	-9.62	QP	
3	0.6540	19.72	20.03	39.75	46.00	-6.25	AVG	
4	0.7500	22.40	20.05	42.45	56.00	-13.55	QP	
5	0.7500	13.36	20.05	33.41	46.00	-12.59	AVG	
6	1.1260	22.35	20.12	42.47	56.00	-13.53	QP	
7	1.1260	13.06	20.12	33.18	46.00	-12.82	AVG	
8	1.6900	21.50	20.13	41.63	56.00	-14.37	QP	
9	2.1460	13.38	20.14	33.52	46.00	-12.48	AVG	
10	2.1980	22.00	20.14	42.14	56.00	-13.86	QP	
11	2.5300	11.67	20.15	31.82	46.00	-14.18	AVG	
12	4.0820	18.86	20.18	39.04	56.00	-16.96	QP	

Conducted Emission Test Data

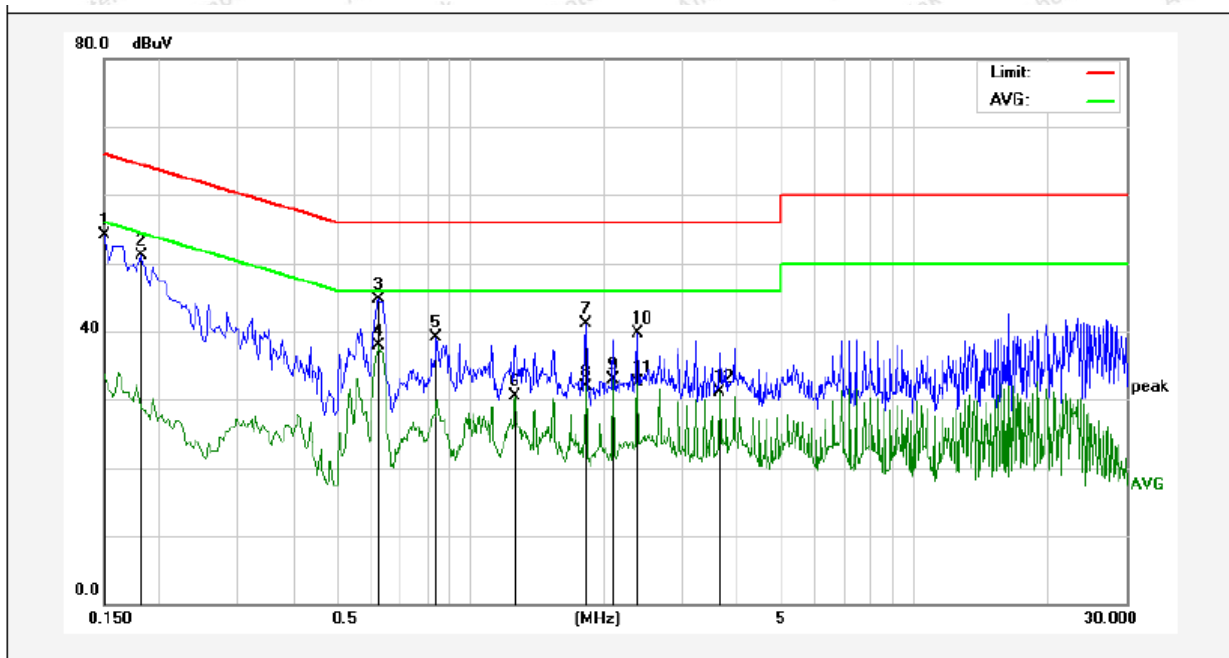
Test Site: 1# Shielded Room
Operating Condition: Mode 1
Test Specification: AC 120V, 60Hz for adapter
Comment: Live Line
Tem.: 22.3°C Hum.: 63%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1780	35.01	19.90	54.91	64.57	-9.66	QP	
2	0.6300	23.13	20.02	43.15	56.00	-12.85	QP	
3	1.3540	20.34	20.13	40.47	56.00	-15.53	QP	
4	1.6820	21.14	20.13	41.27	56.00	-14.73	QP	
5	1.6820	13.38	20.13	33.51	46.00	-12.49	AVG	
6	1.7900	12.14	20.14	32.28	46.00	-13.72	AVG	
7	2.1060	21.02	20.14	41.16	56.00	-14.84	QP	
8	2.1060	13.11	20.14	33.25	46.00	-12.75	AVG	
9	2.2420	21.68	20.14	41.82	56.00	-14.18	QP	
10	2.2420	12.77	20.14	32.91	46.00	-13.09	AVG	
11	2.3860	13.13	20.15	33.28	46.00	-12.72	AVG	
12	6.8660	17.00	20.26	37.26	50.00	-12.74	AVG	

Conducted Emission Test Data

Test Site: 1# Shielded Room
Operating Condition: Mode 1
Test Specification: AC 120V, 60Hz for adapter
Comment: Neutral Line
Tem.: 22.3°C Hum.: 63%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1500	34.24	19.90	54.14	65.99	-11.85	QP	
2	0.1819	31.23	19.90	51.13	64.39	-13.26	QP	
3	0.6220	24.75	20.02	44.77	56.00	-11.23	QP	
4	0.6260	17.79	20.02	37.81	46.00	-8.19	AVG	
5	0.8420	19.05	20.08	39.13	56.00	-16.87	QP	
6	1.2660	10.29	20.13	30.42	46.00	-15.58	AVG	
7	1.8260	20.87	20.14	41.01	56.00	-14.99	QP	
8	1.8260	11.69	20.14	31.83	46.00	-14.17	AVG	
9	2.1060	12.70	20.14	32.84	46.00	-13.16	AVG	
10	2.3860	19.58	20.15	39.73	56.00	-16.27	QP	
11	2.3860	12.43	20.15	32.58	46.00	-13.42	AVG	
12	3.6500	11.00	20.17	31.17	46.00	-14.83	AVG	

4. Radiation Spurious Emission and Band Edge

4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.209 and 15.205				
Test Limit	Frequency (MHz)	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz~0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz~1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz~30MHz	30	-	-	30
	30MHz~88MHz	100	40.0	Quasi-peak	3
	88MHz~216MHz	150	43.5	Quasi-peak	3
	216MHz~960MHz	200	46.0	Quasi-peak	3
	960MHz~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	74.0	Peak	3

Remark:

(1)The lower limit shall apply at the transition frequency.

(2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

4.2. Test Setup

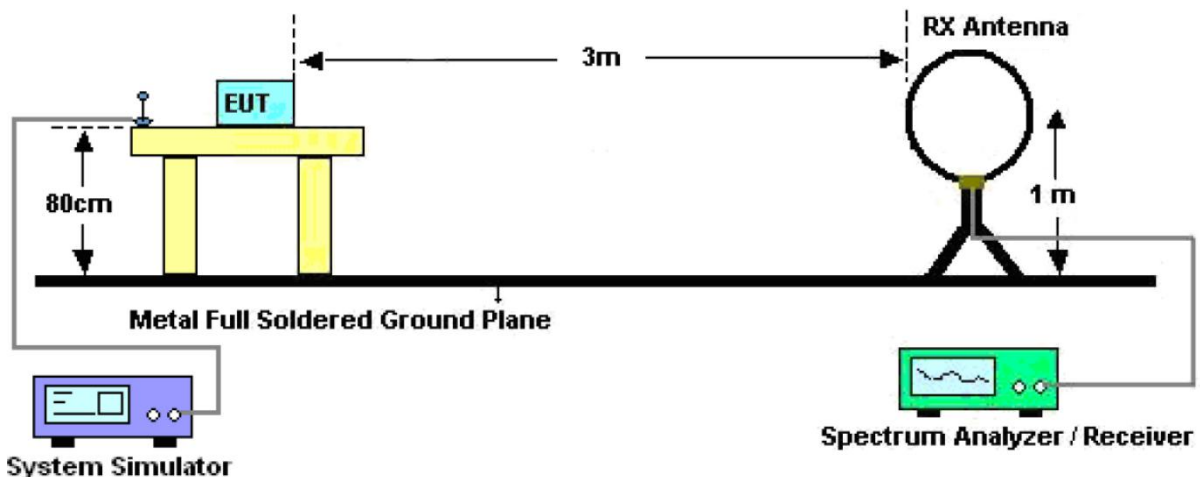


Figure 1. Below 30MHz

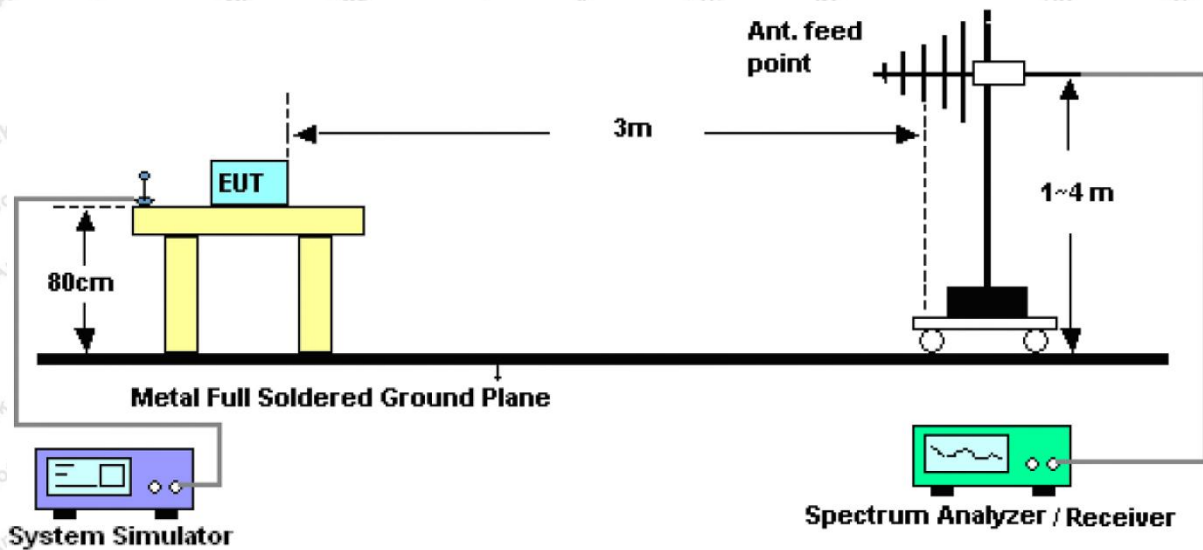


Figure 2. 30MHz to 1GHz

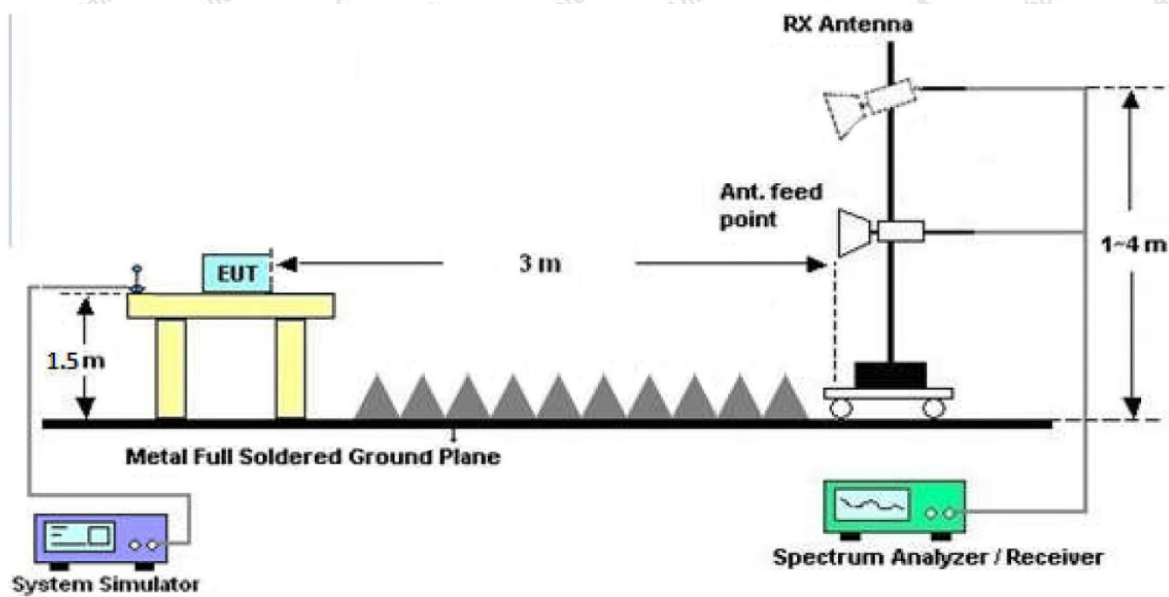


Figure 3. Above 1 GHz

4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.

For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

For 9kHz to 150kHz, Set the spectrum analyzer as:

RBW = 200Hz, VBW = 1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:

RBW = 9KHz, VBW = 30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:

RBW = 100kHz, VBW = 300kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

4.4. Test Data

PASS

Note: The data is in TX mode, and this is the worst mode.

Report No.: SZAWW190627001-01

FCC ID: 2AOV6-MP226

Page 18 of 32

Test Results

(Between 9KHz – 30MHz)

Test Mode: Mode 1

Power Source: AC 120V, 60Hz for adapter

Temp.(°C)/Hum.(%RH): 25.4°C/54%RH



Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	degree (dgc)
0.0158	61.84	19.27	2.53	0	83.64	143.46	-59.82	Peak	320
0.0158	58.41	19.27	2.53	0	80.21	123.46	-43.25	AV	320
0.0354	48.05	19.30	2.53	0	69.88	136.50	-66.62	Peak	141
0.0354	37.34	19.30	2.53	0	59.17	116.50	-57.33	AV	141
0.0782	43.57	19.35	2.55	0	65.47	129.65	-64.18	Peak	39
0.0782	33.71	19.35	2.55	0	55.61	109.65	-54.04	AV	39
0.0990	40.89	19.35	2.55	0	62.79	127.61	-64.82	Peak	124
0.0990	31.44	19.35	2.55	0	53.34	107.61	-54.27	AV	124
0.1499	41.33	19.62	2.59	0	63.54	124.03	-60.49	Peak	245
0.1499	31.42	19.62	2.59	0	53.63	104.03	-50.40	AV	245
0.1940	43.78	20.73	2.60	0	67.11	121.80	-54.69	Peak	100
0.1940	34.68	20.73	2.60	0	58.01	101.80	-43.79	AV	100

Remark: According to FCC PART 15.209 (d), the emission limits 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.

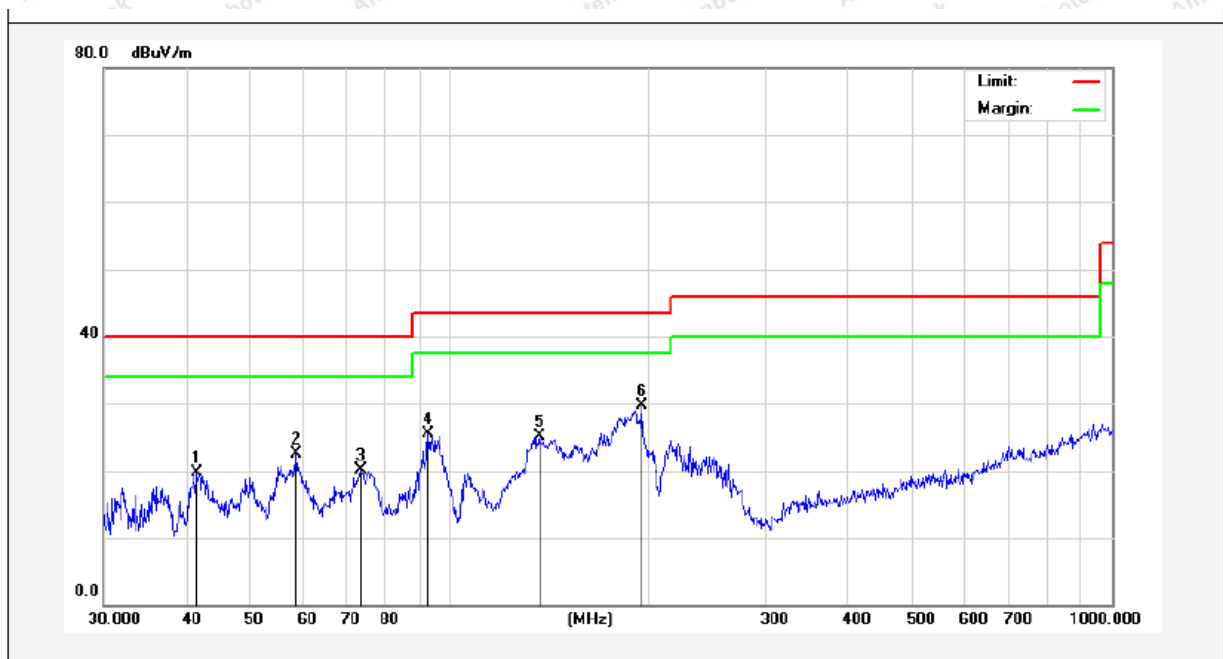
(Between 30MHz –1000 MHz)

Test Mode: Mode 1

Power Source: AC 240V, 60Hz for adapter

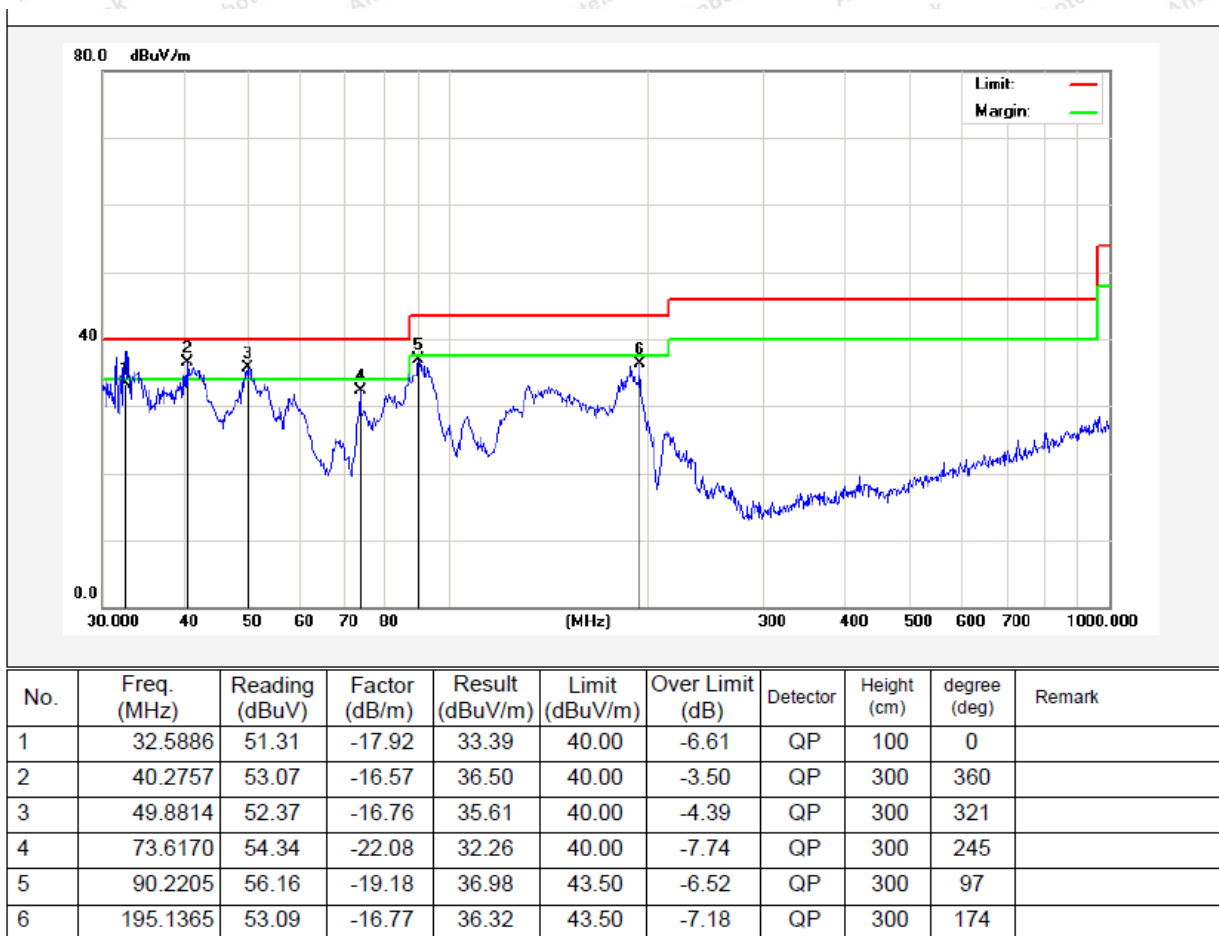
Polarization: Horizontal

Temp.(°C)/Hum.(%RH): 24.9°C/51%RH



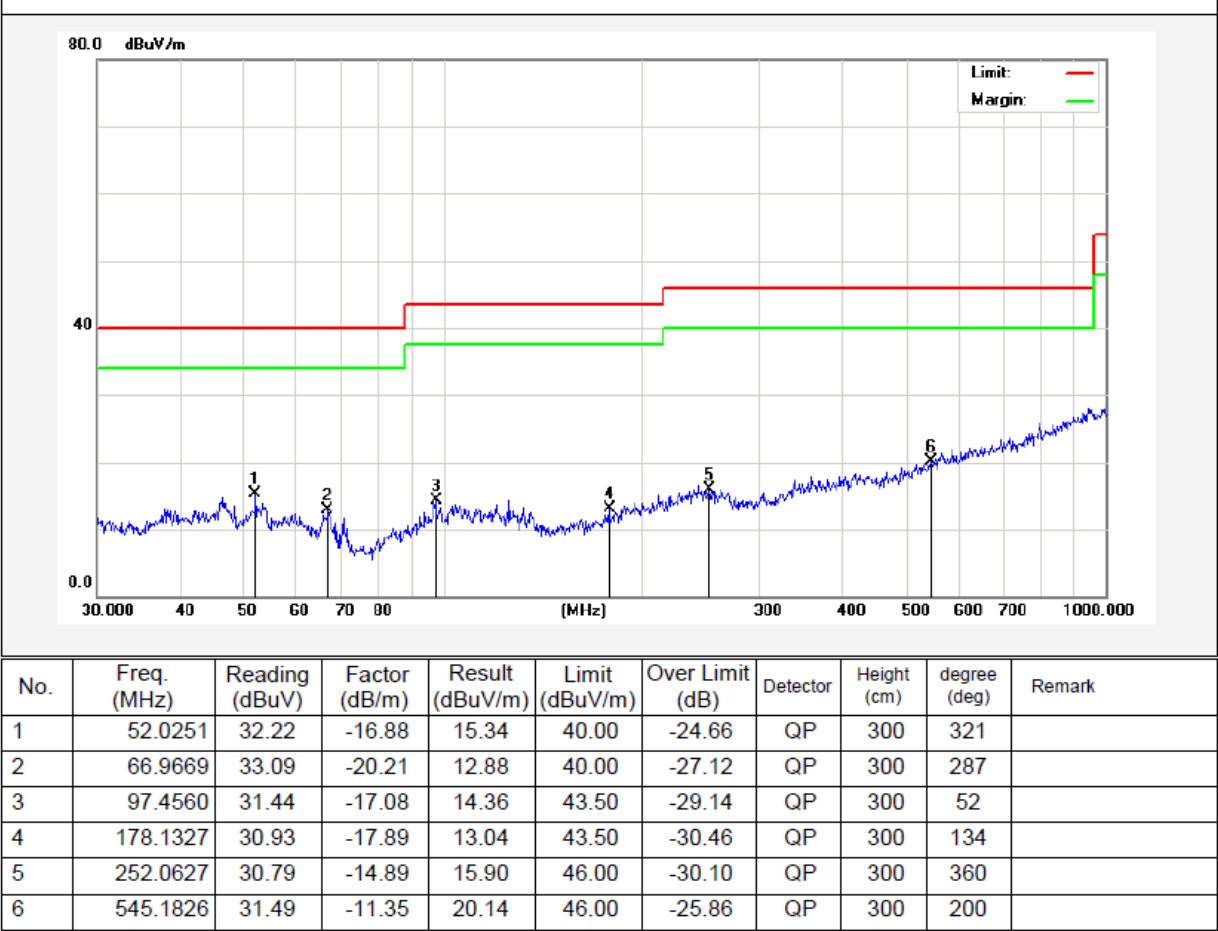
No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	41.5670	37.28	-17.56	19.72	40.00	-20.28	QP	300	360	
2	58.6126	40.81	-18.31	22.50	40.00	-17.50	QP	300	52	
3	73.3593	43.08	-23.05	20.03	40.00	-19.97	QP	300	146	
4	92.7871	49.58	-24.15	25.43	43.50	-18.07	QP	300	279	
5	136.4598	48.61	-23.60	25.01	43.50	-18.49	QP	300	164	
6	195.1365	50.95	-21.26	29.69	43.50	-13.81	QP	300	263	

Test Mode: Mode 1
Power Source: AC 240V, 60Hz for adapter
Polarization: Vertical
Temp.(°C)/Hum.(%RH): 24.9°C/51%RH

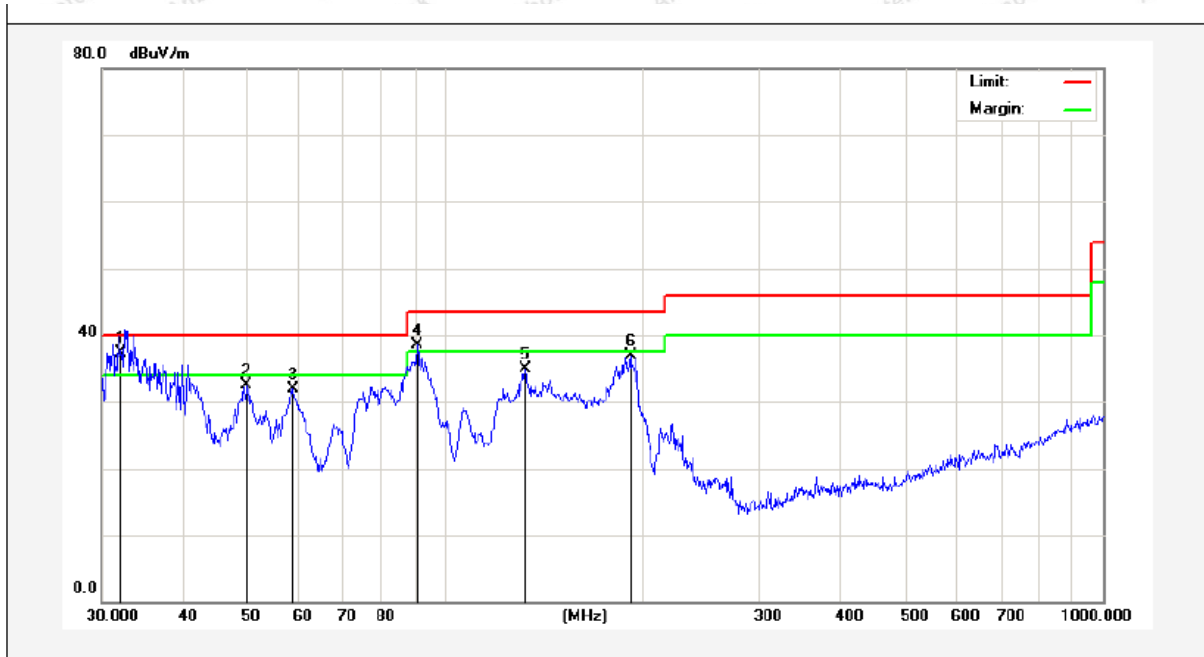


Test Mode:
Power Source:
Polarization:
Temp.(°C)/Hum.(%RH):

Mode 1
AC 120V, 60Hz for adapter
Horizontal
24.9°C/51%RH



Test Mode: Mode 1
Power Source: AC 120V, 60Hz for adapter
Polarization: Vertical
Temp.(°C)/Hum.(%RH): 24.9°C/51%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	32.0698	55.20	-17.92	37.28	40.00	-2.72	QP	100	0	
2	49.8814	49.28	-16.76	32.52	40.00	-7.48	QP	300	360	
3	58.6126	49.18	-17.31	31.87	40.00	-8.13	QP	300	245	
4	90.5374	57.61	-19.05	38.56	43.50	-4.94	QP	300	213	
5	132.2206	53.83	-18.99	34.84	43.50	-8.66	QP	300	97	
6	191.0738	53.65	-16.80	36.85	43.50	-6.65	QP	300	281	

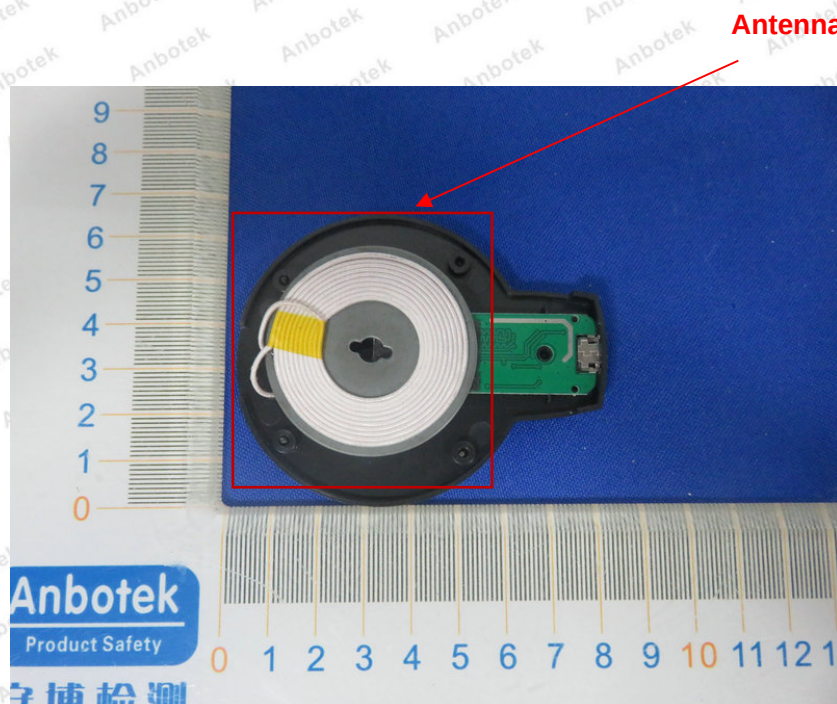
5. Antenna Requirement

5.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203
Requirement	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.

5.2. Antenna Connected Construction

The antenna is a Inductive loop coil Antenna which permanently attached, and the best case gain of the antenna is 0 dBi. It complies with the standard requirement.



APPENDIX I -- TEST SETUP PHOTOGRAPH

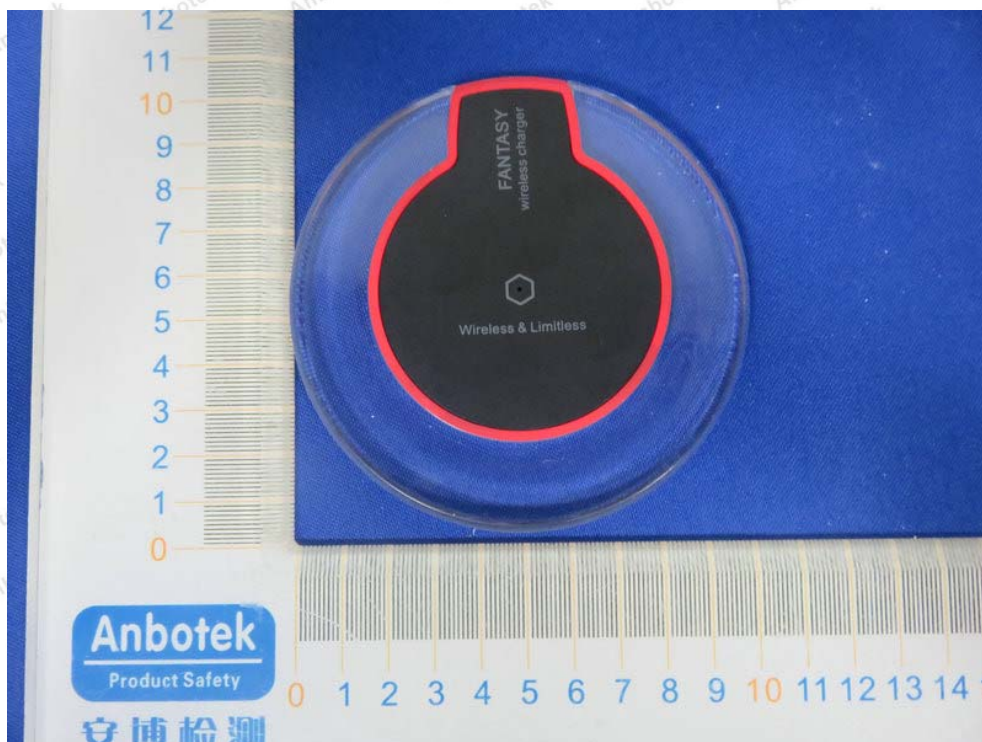
Photo of Conducted Emission Measurement

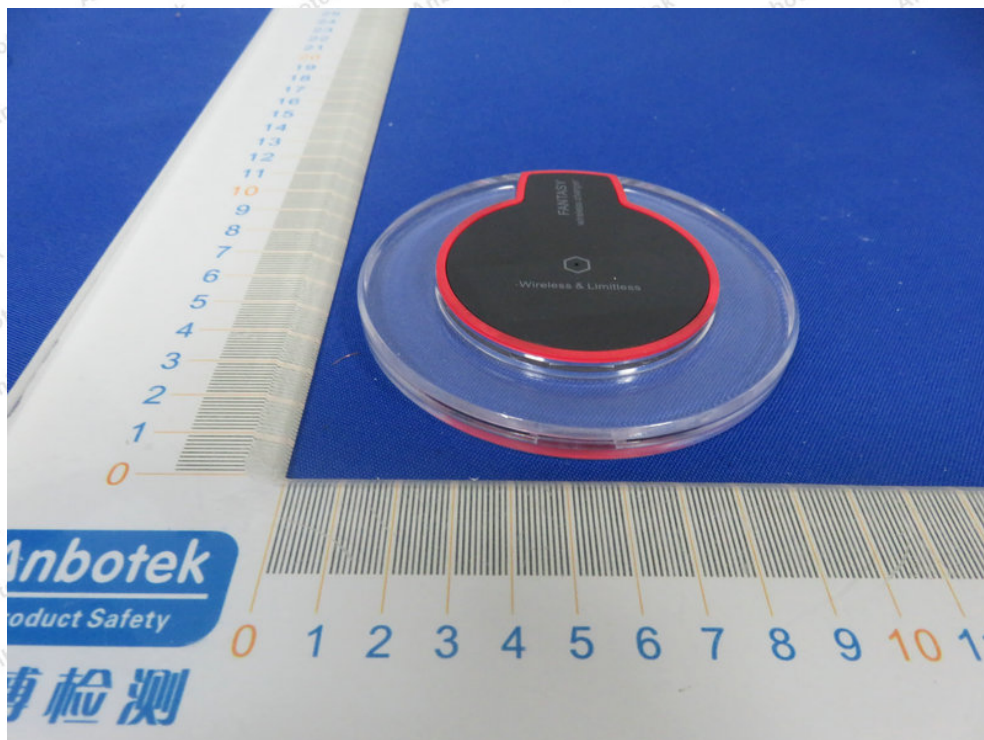


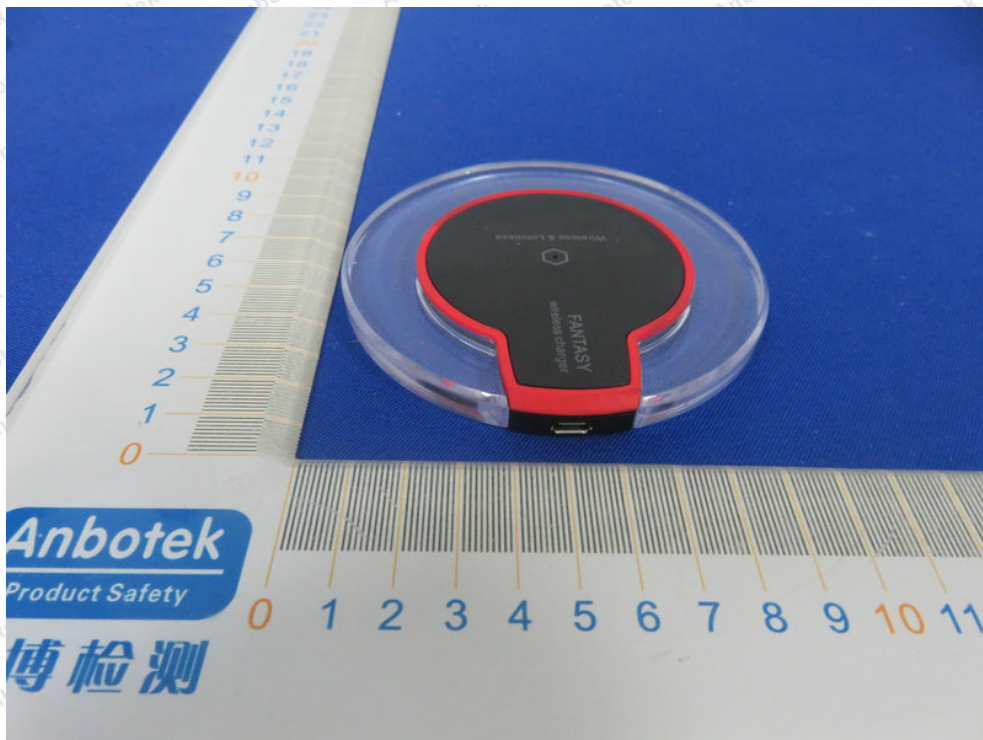
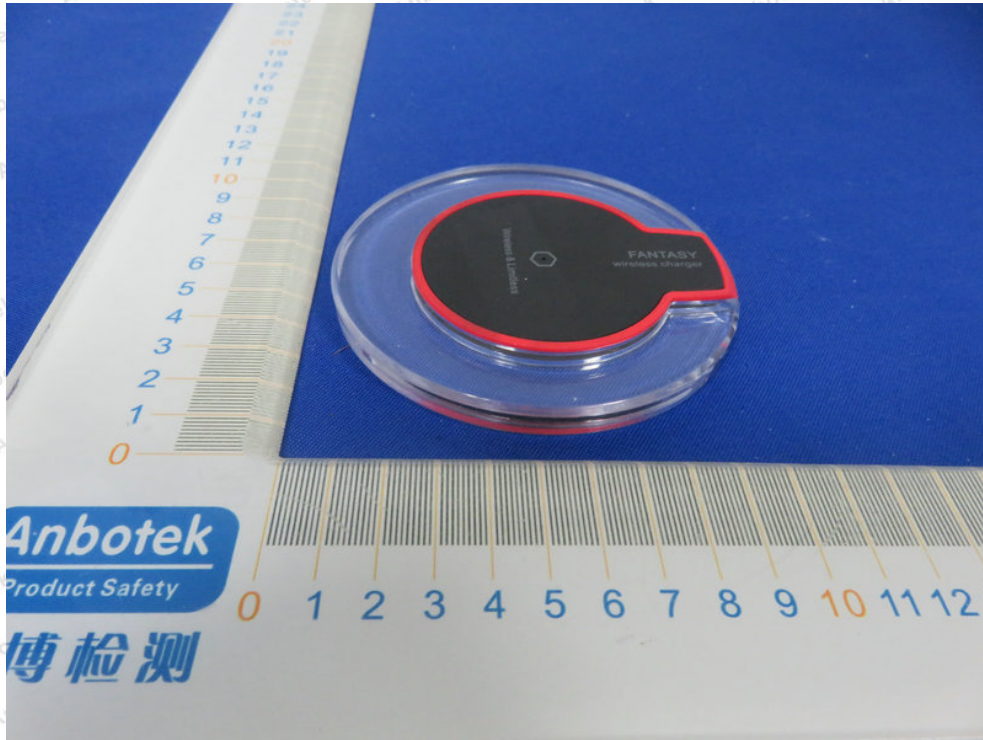
Photo of Radiation Emission Test

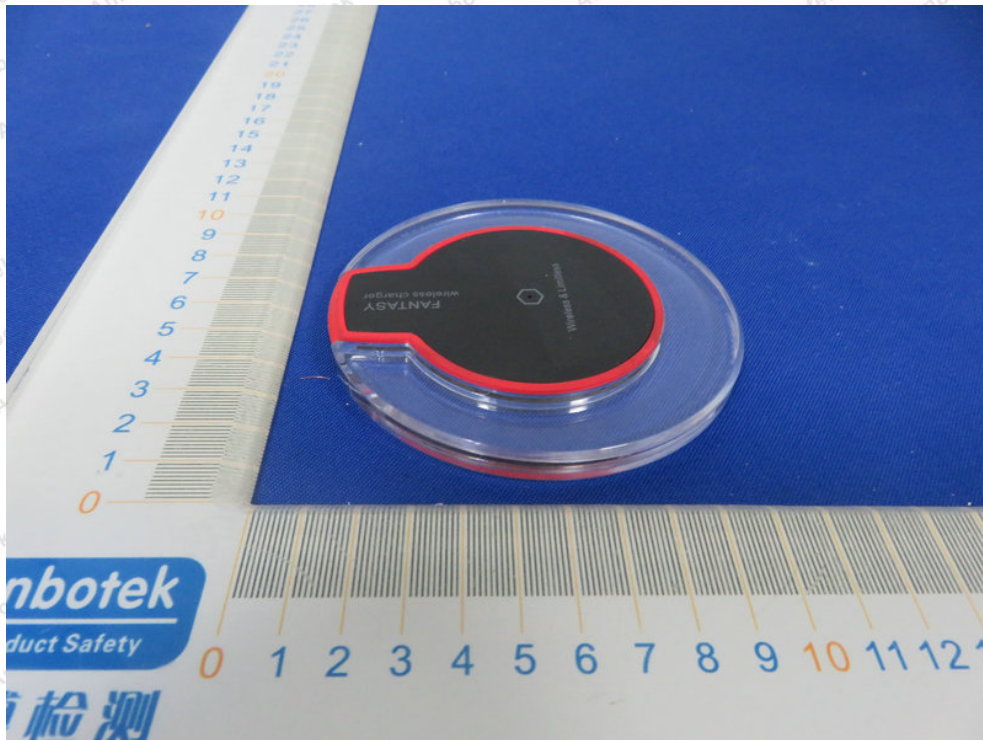


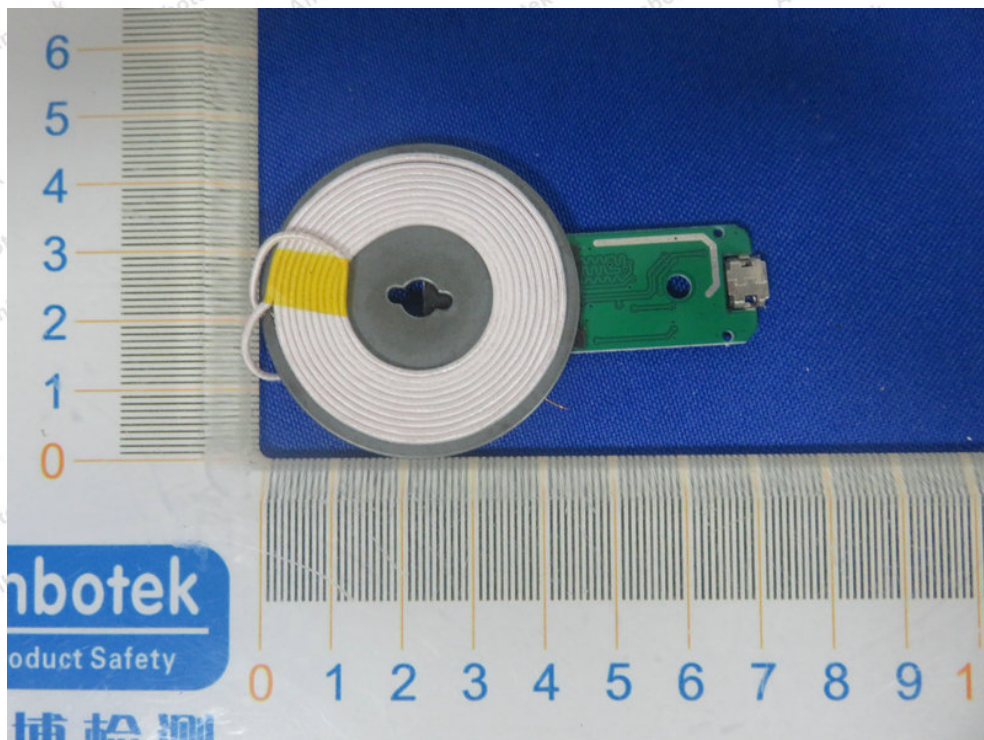
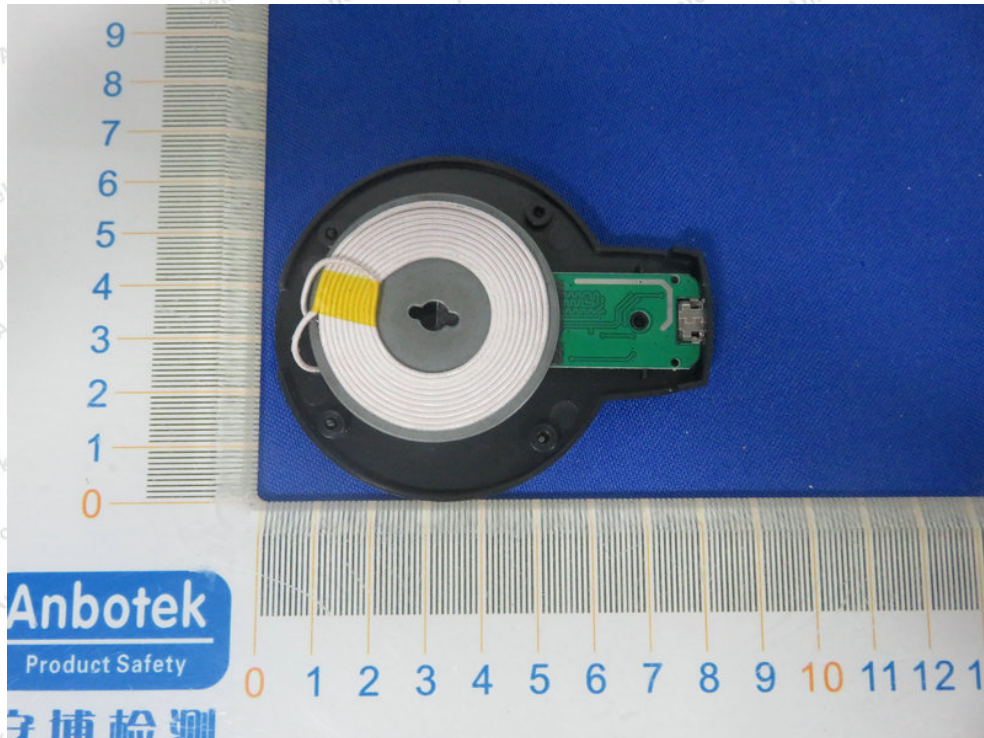


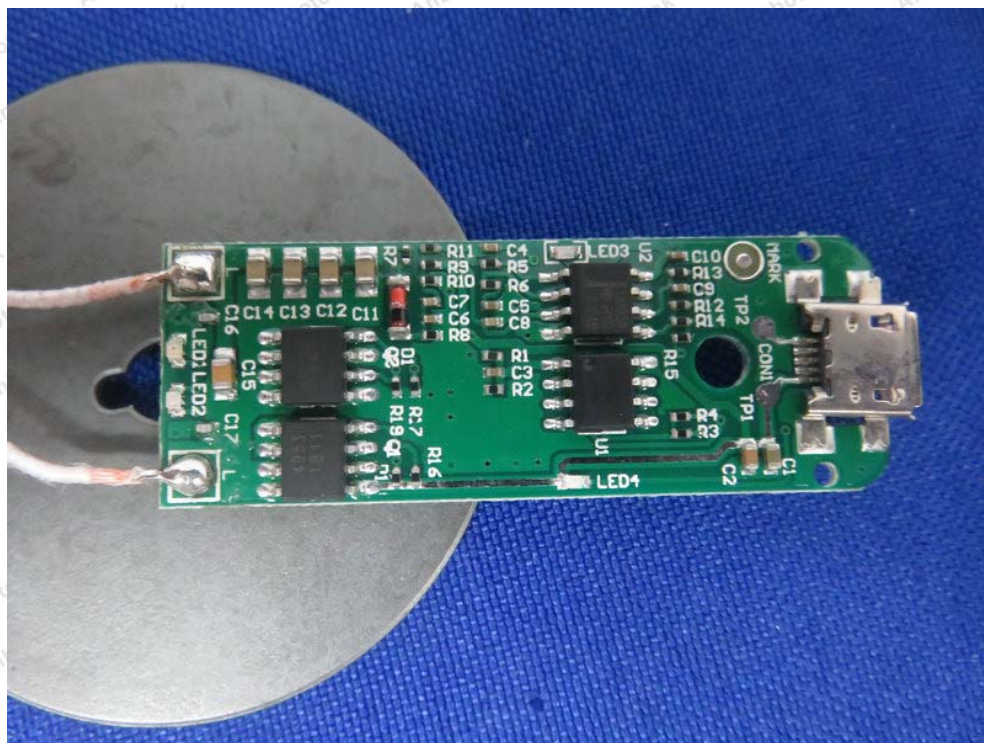
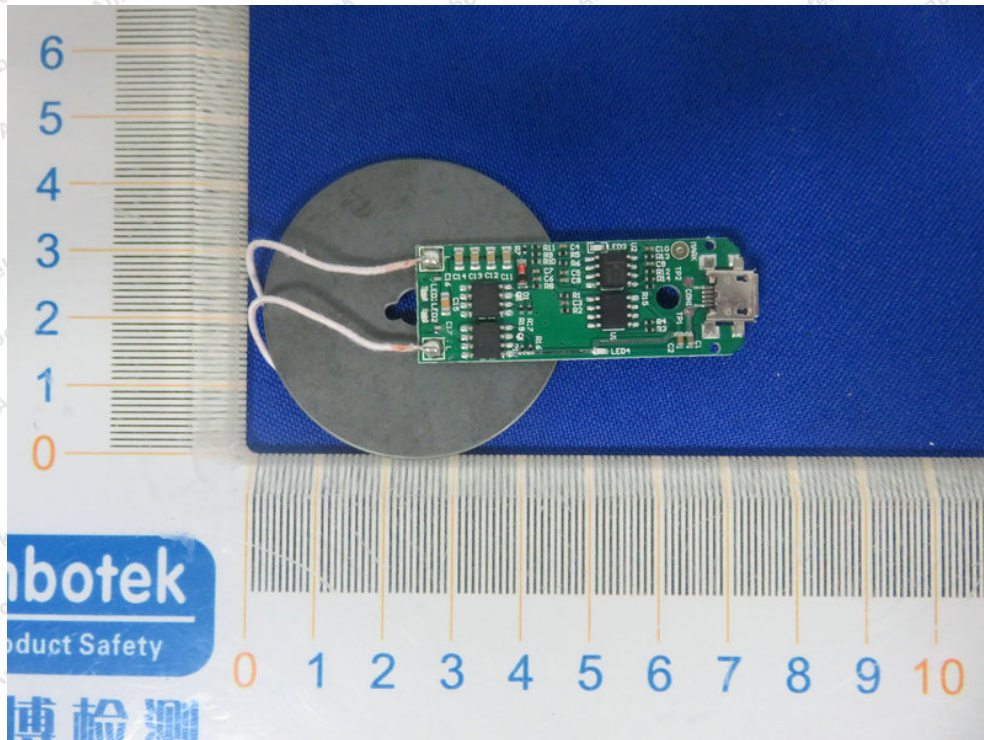
APPENDIX II -- EXTERNAL PHOTOGRAPH

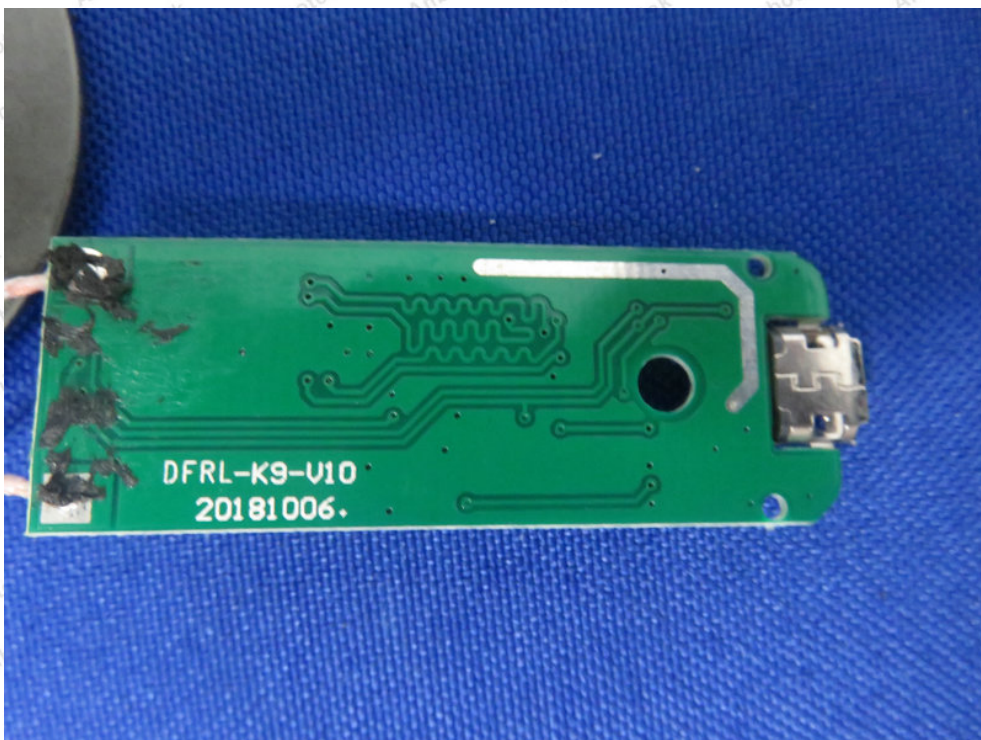
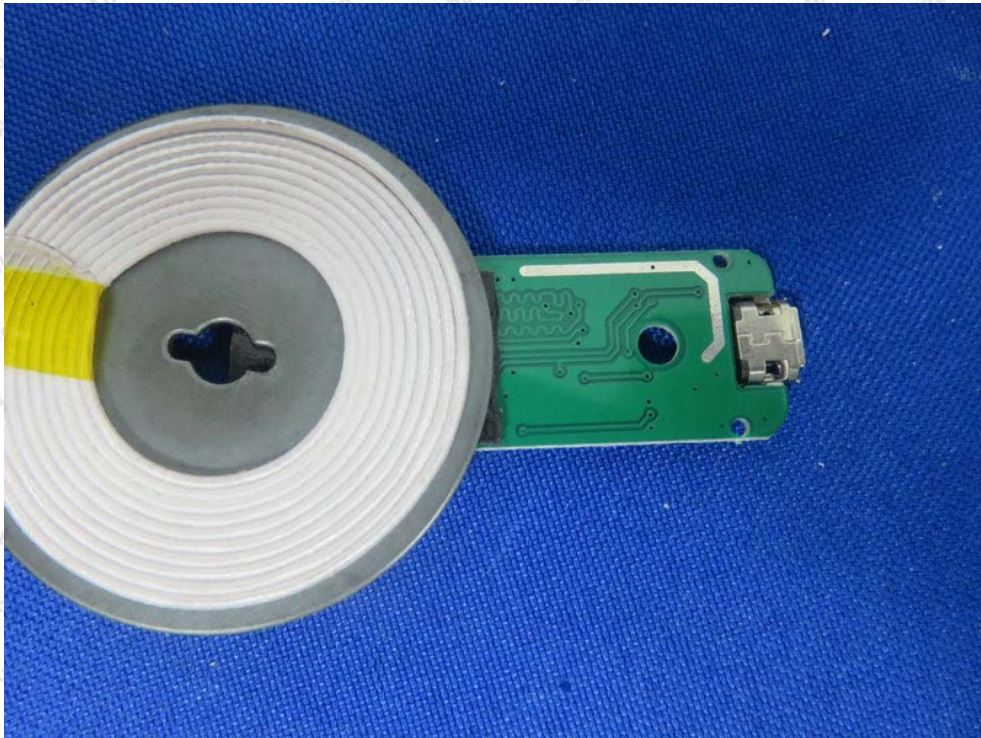






APPENDIX III -- INTERNAL PHOTOGRAPH





----- End of Report -----

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