FCC TEST REPORT

Client Name	:	DongGuan Sogoode Computer System Co., Ltd
Address	:	United Finance Building 20th floor KeJi Road NO.10 Songshan Lake High-tech Development Zone Dongguan, Guangdong, China
Product Name	:	Car wireless charger
Date	:	Aug. 04, 2020

Shenzhen Anbotek 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....5
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....21
5.1. Test Standard and Requirement....21
5.2. Antenna Connected Construction....21
APPENDIX I -- TEST SETUP PHOTOGRAPH....22
APPENDIX II -- EXTERNAL PHOTOGRAPH....24
APPENDIX III -- INTERNAL PHOTOGRAPH....28

TEST REPORT

Applicant	:	DongGuan Sogoode Computer System Co., Ltd
Manufacturer	:	Shenzhen Whakin Innovation Technology Co., Ltd
Product Name	:	Car wireless charger
Model No.	:	AH-01, AH-01B, AH-02, AH-02A, LAH-01
Trade Mark	:	Liorque
Rating(s)	:	Input: DC 5V, 2A, DC 9V, 1.67A Output: 5W/7.5W/10W
Test Standard(s)	**:**	**FCC Part15 Subpart C 2019, Paragraph 15.209**
Test Method(s)	**:**	**ANSI C63.10: 2013**

The device described above is tested by Shenzhen Anbotek 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 Anbotek 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 Anbotek Compliance Laboratory Limited.

Date of Receipt	Jul. 14, 2020
Date of Test	Jul. 14~30, 2020
Prepared By	(Engineer / Dolly Mo)
Reviewer	(Supervisor / Bibo Zhang)
Approved & Authorized Signer	(Manager / Tom Chen)

1. General Information

1.1. Client Information

Applicant	:	DongGuan Sogoode Computer System Co., Ltd
Address	:	United Finance Building 20th floor KeJi Road NO.10 Songshan Lake High-tech Development Zone Dongguan, Guangdong, China
Manufacturer	:	Shenzhen Whakin Innovation Technology Co., Ltd
Address	:	4th Floor, Type L, Jingtie Science And Technology Industrial Park, No. 49, Changjiangpu Road, Yuanshan Street, Longgang District, Shenzhen, Guangdong, CN
Factory	:	Shenzhen Whakin Innovation Technology Co., Ltd
Address	:	4th Floor, Type L, Jingtie Science And Technology Industrial Park, No. 49, Changjiangpu Road, Yuanshan Street, Longgang District, Shenzhen, Guangdong, CN

1.2. Description of Device (EUT)

Product Name	:	Car wireless charger	
Model No.	:	AH-01, AH-01B, AH-02, AH-02A, LAH-01 (Note: All samples are the same except the appearance color, so we prepare "AH-01" for test only.)	
Trade Mark	:	Liorque	
Test Power Supply	:	AC 120V, 60Hz for adapter / AC 240V, 60Hz for adapter	
Test Sample No.	:	1-2-1(Normal Sample), 1-2-1(Engineering Sample)	
Product Description	:	Operation Frequency:	110.1-205KHz
		Modulation Type:	QI
		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: Anker
		M/N: A2013 Input: 100-240V-0.7A 50-60Hz Output: 3.6-5.5V⎓ 3A / 6.5-9V⎓ 2A / 9-12V⎓ 1.5A

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

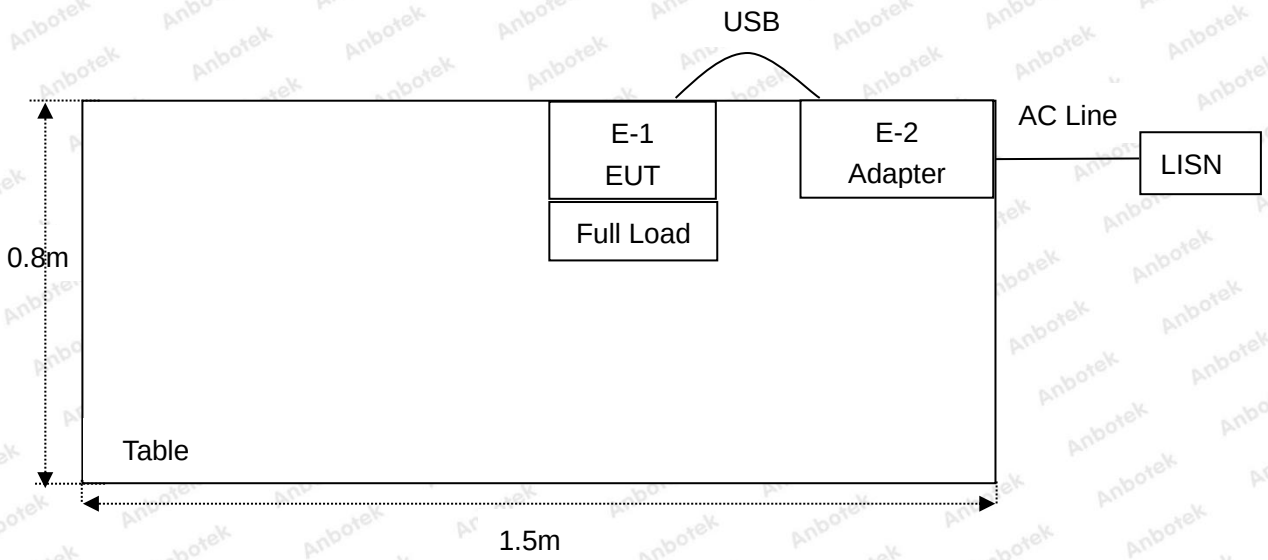
For Radiated Emission	
Final Test Mode	Description
Mode 1	Full load, Wireless charger module

Note: (1)Test channel is 0.1184MHz.

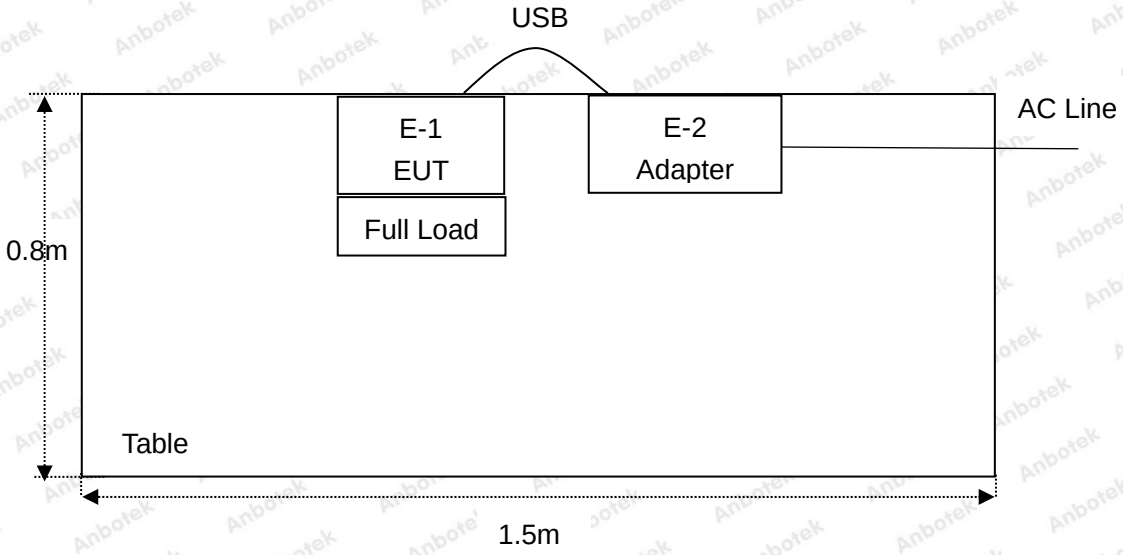
(2)All the situation(full load, half load and empty load) has been tested,only the worst situation (full load, Wireless Output: 10W) was recorded in the report.

1.5. Description Of Test Setup

CE



RE



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. 04, 2019	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESPI3	101604	Nov. 04, 2019	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Nov. 04, 2019	1 Year
4.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 04, 2019	1 Year
5.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	Nov. 04, 2019	1 Year
6.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 01, 2019	1 Year
7.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 01, 2019	1 Year
8.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Nov. 01, 2019	1 Year
9.	Horn Antenna	A-INFO	LB-180400-KF	J211060628	Nov. 01, 2019	1 Year
10.	Pre-amplifier	SONOMA	310N	186860	Nov. 04, 2019	1 Year
11.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
12.	RF Test Control System	YIHENG	YH3000	2017430	Nov. 04, 2019	1 Year
13.	Power Sensor	DAER	RPR3006W	15I00041SN045	Nov. 04, 2019	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN046	Nov. 04, 2019	1 Year
15.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 04, 2019	1 Year
16.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Nov. 04, 2019	1 Year
17.	Signal Generator	Agilent	E4421B	MY41000743	Nov. 04, 2019	1 Year
18.	DC Power Supply	LW	TPR-6420D	374470	Nov. 04, 2019	1 Year
19.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80B	N/A	Nov. 04, 2019	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 Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed 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 27, 2019.

ISED-Registration No.: 8058A

Shenzhen Anbotek 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, March 07, 2019.

Test Location

Shenzhen Anbotek 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

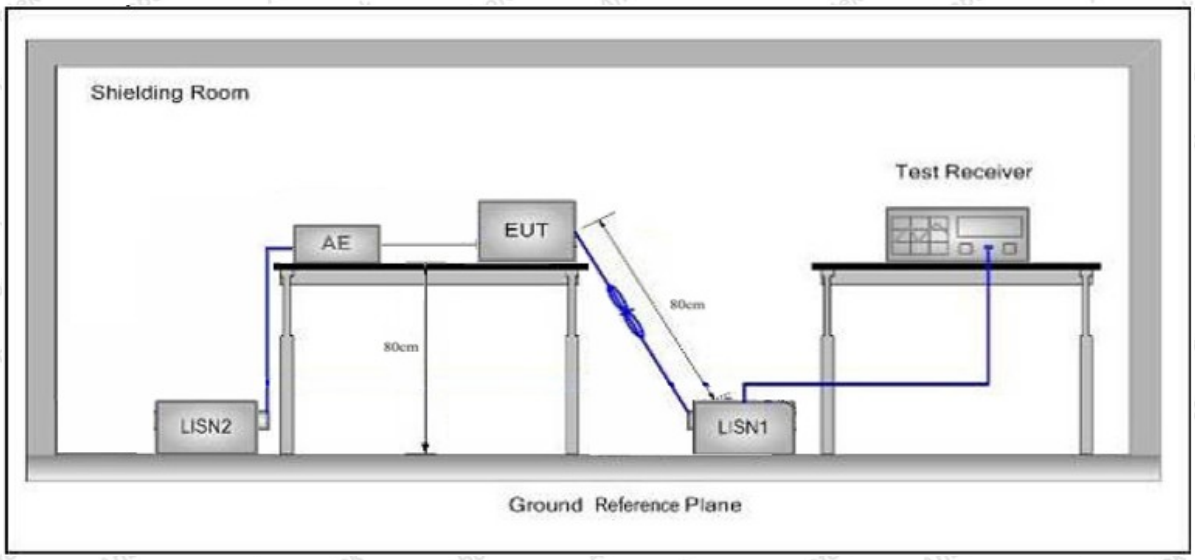
Standard Section	Test Item	Result
FCC Part 15, Paragraph 15.207	Conducted Emission Test	PASS
FCC Part 15, Paragraph 15.209(a)(f)	Spurious Emission	PASS
Part 15.203	Antenna Requirement	PASS

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.

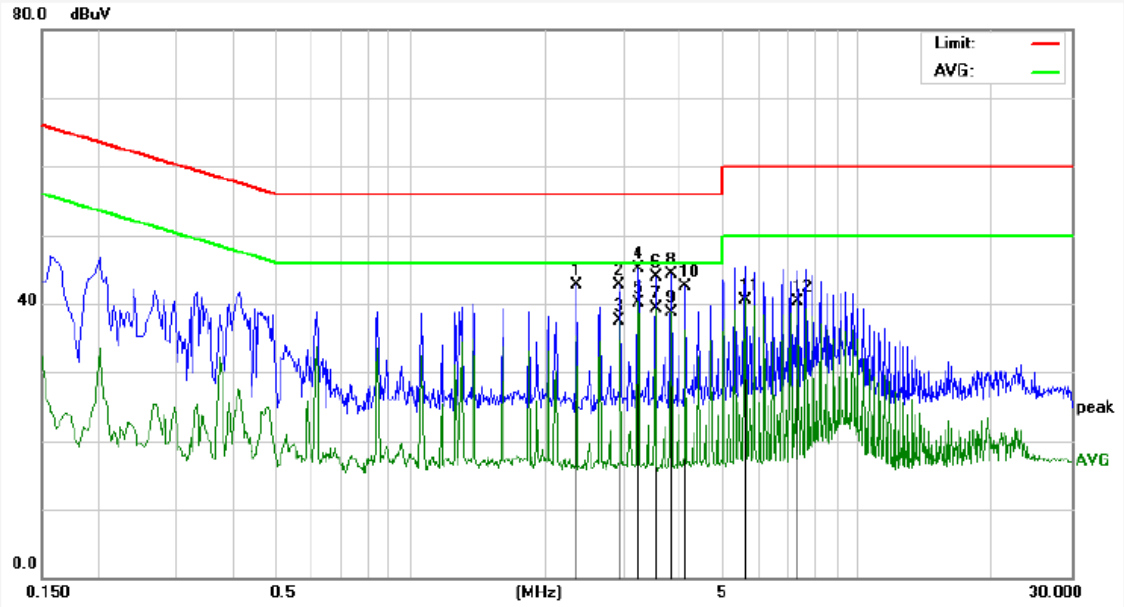
The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

Please to see the following pages

Conducted Emission Test Data

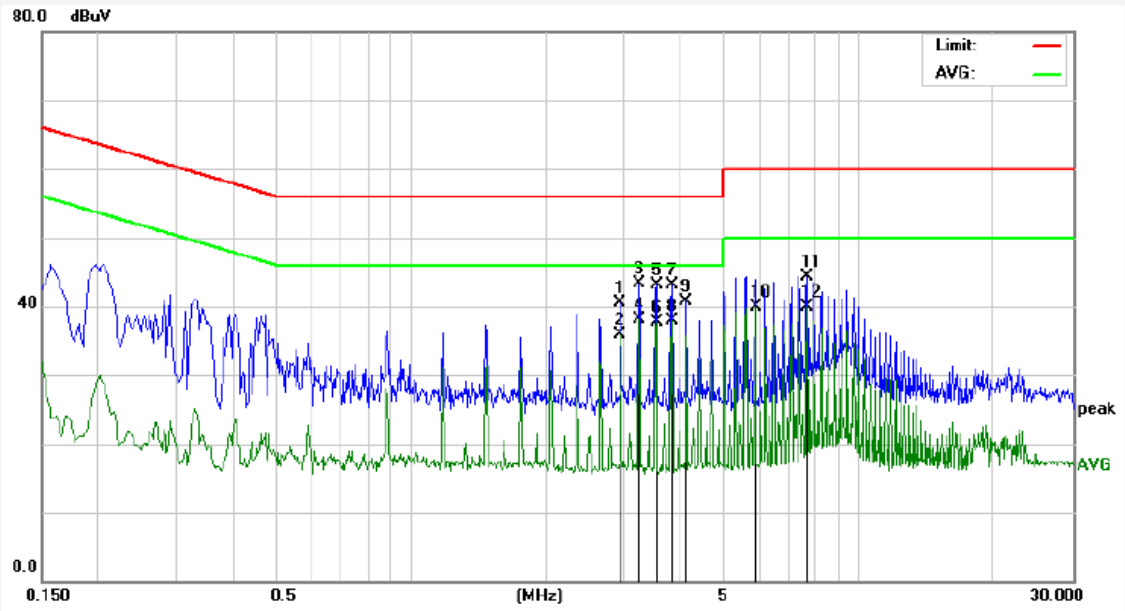
Test Site: 1# Shielded Room
Operating Condition: Mode 1
Test Specification: AC 120V, 60Hz for adapter
Comment: Live Line
Tem.: 21.6℃ Hum.: 58%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	2.3540	22.62	20.15	42.77	56.00	-13.23	QP	
2	2.9460	22.46	20.16	42.62	56.00	-13.38	QP	
3	2.9460	17.40	20.16	37.56	46.00	-8.44	AVG	
4	3.2380	24.98	20.16	45.14	56.00	-10.86	QP	
5	3.2380	20.04	20.16	40.20	46.00	-5.80	AVG	
6	3.5340	23.74	20.17	43.91	56.00	-12.09	QP	
7	3.5340	19.16	20.17	39.33	46.00	-6.67	AVG	
8	3.8300	24.22	20.18	44.40	56.00	-11.60	QP	
9	3.8300	18.62	20.18	38.80	46.00	-7.20	AVG	
10	4.1220	22.34	20.18	42.52	56.00	-13.48	QP	
11	5.5980	20.38	20.22	40.60	50.00	-9.40	AVG	
12	7.3620	19.94	20.27	40.21	50.00	-9.79	AVG	

Conducted Emission Test Data

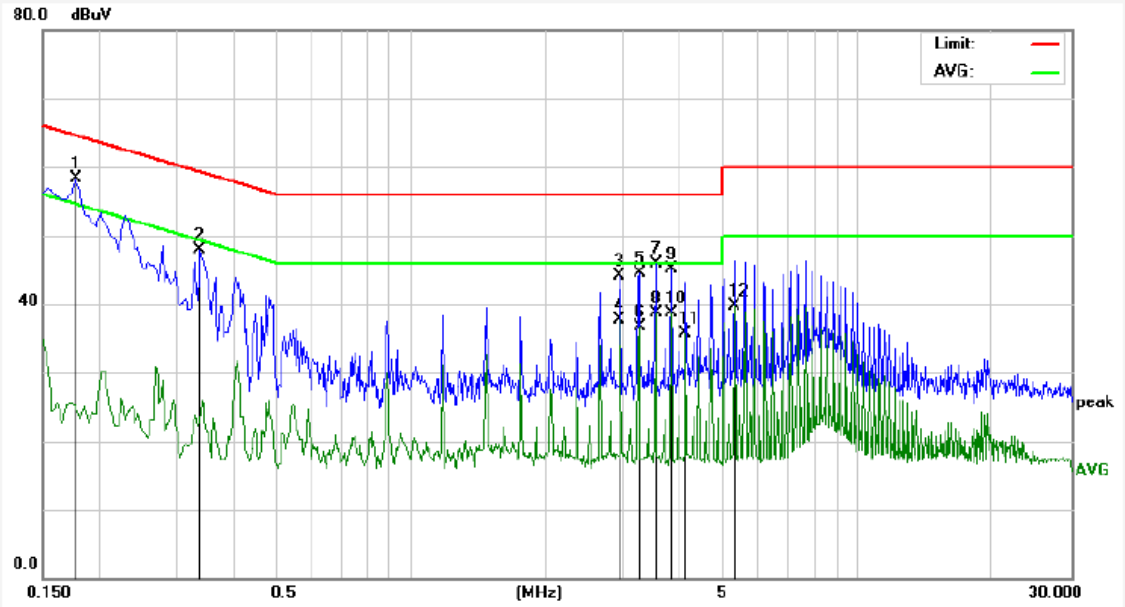
Test Site: 1# Shielded Room
Operating Condition: Mode 1
Test Specification: AC 120V, 60Hz for adapter
Comment: Neutral Line
Tem.: 21.6℃ Hum.: 58%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	2.9420	20.31	20.16	40.47	56.00	-15.53	QP	
2	2.9420	15.75	20.16	35.91	46.00	-10.09	AVG	
3	3.2340	23.07	20.16	43.23	56.00	-12.77	QP	
4	3.2340	17.99	20.16	38.15	46.00	-7.85	AVG	
5	3.5300	23.03	20.17	43.20	56.00	-12.80	QP	
6	3.5300	17.46	20.17	37.63	46.00	-8.37	AVG	
7	3.8220	22.89	20.18	43.07	56.00	-12.93	QP	
8	3.8220	17.81	20.18	37.99	46.00	-8.01	AVG	
9	4.1180	20.53	20.18	40.71	56.00	-15.29	QP	
10	5.8859	19.65	20.23	39.88	50.00	-10.12	AVG	
11	7.6540	24.04	20.28	44.32	60.00	-15.68	QP	
12	7.6540	19.58	20.28	39.86	50.00	-10.14	AVG	

Conducted Emission Test Data

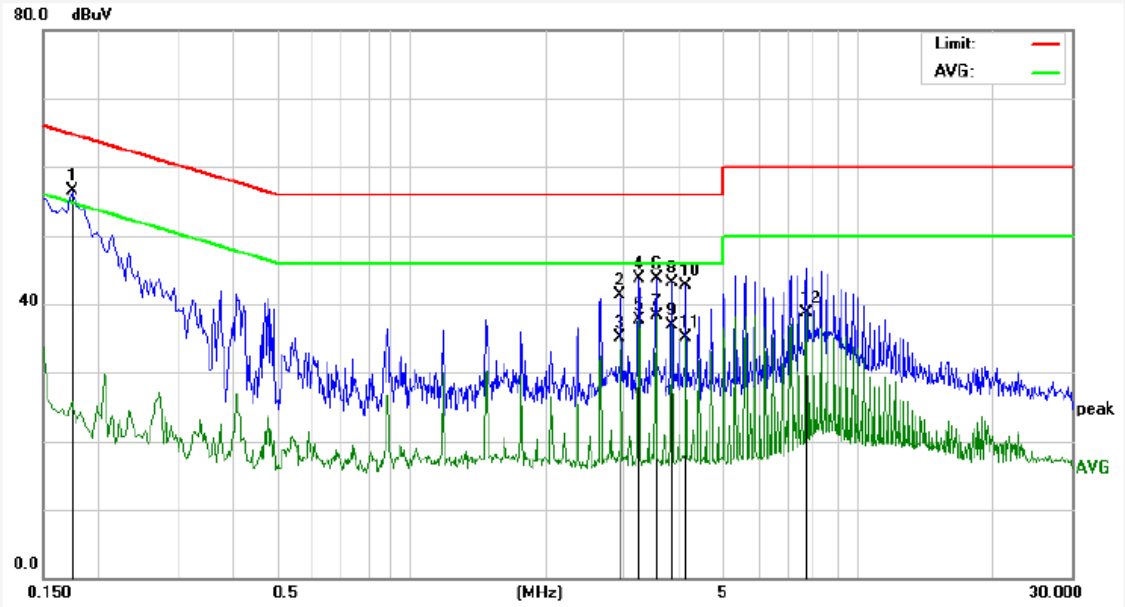
Test Site: 1# Shielded Room
Operating Condition: Mode 1
Test Specification: AC 240V, 60Hz for adapter
Comment: Live Line
Tem.: 21.6℃ Hum.: 58%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1780	38.46	19.90	58.36	64.57	-6.21	QP	
2	0.3379	27.99	19.91	47.90	59.25	-11.35	QP	
3	2.9460	23.85	20.16	44.01	56.00	-11.99	QP	
4	2.9460	17.53	20.16	37.69	46.00	-8.31	AVG	
5	3.2420	24.39	20.16	44.55	56.00	-11.45	QP	
6	3.2420	16.64	20.16	36.80	46.00	-9.20	AVG	
7	3.5340	25.75	20.17	45.92	56.00	-10.08	QP	
8	3.5340	18.46	20.17	38.63	46.00	-7.37	AVG	
9	3.8300	24.93	20.18	45.11	56.00	-10.89	QP	
10	3.8300	18.48	20.18	38.66	46.00	-7.34	AVG	
11	4.1260	15.58	20.18	35.76	46.00	-10.24	AVG	
12	5.3060	19.53	20.21	39.74	50.00	-10.26	AVG	

Conducted Emission Test Data

Test Site: 1# Shielded Room
Operating Condition: Mode 1
Test Specification: AC 240V, 60Hz for adapter
Comment: Neutral Line
Tem.: 21.6℃ Hum.: 58%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1740	36.55	19.90	56.45	64.76	-8.31	QP	
2	2.9460	21.23	20.16	41.39	56.00	-14.61	QP	
3	2.9460	14.92	20.16	35.08	46.00	-10.92	AVG	
4	3.2380	23.62	20.16	43.78	56.00	-12.22	QP	
5	3.2380	17.59	20.16	37.75	46.00	-8.25	AVG	
6	3.5340	23.57	20.17	43.74	56.00	-12.26	QP	
7	3.5340	18.10	20.17	38.27	46.00	-7.73	AVG	
8	3.8260	23.01	20.18	43.19	56.00	-12.81	QP	
9	3.8260	16.80	20.18	36.98	46.00	-9.02	AVG	
10	4.1180	22.61	20.18	42.79	56.00	-13.21	QP	
11	4.1180	14.99	20.18	35.17	46.00	-10.83	AVG	
12	7.6500	18.52	20.28	38.80	50.00	-11.20	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

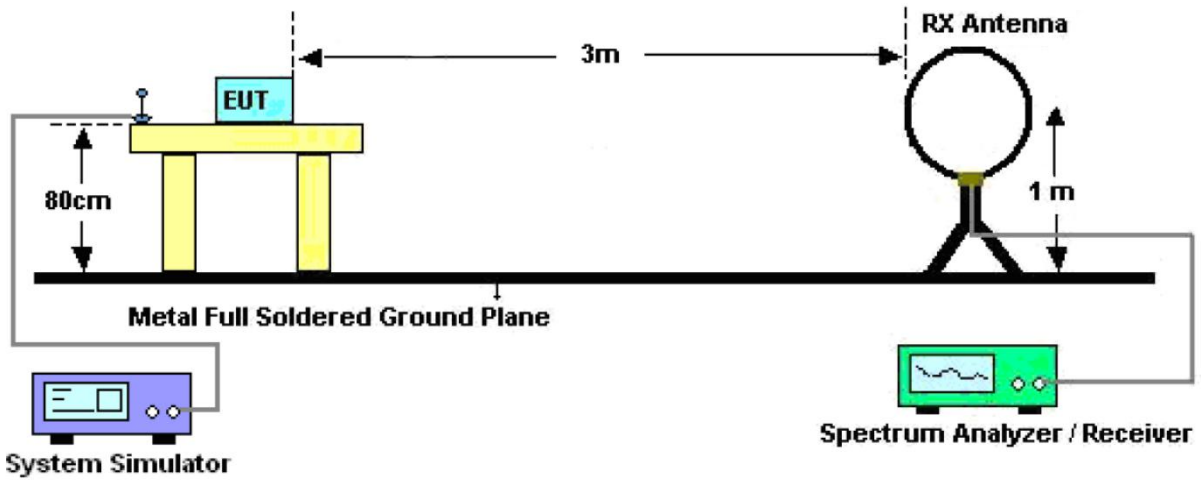


Figure 1. Below 30MHz

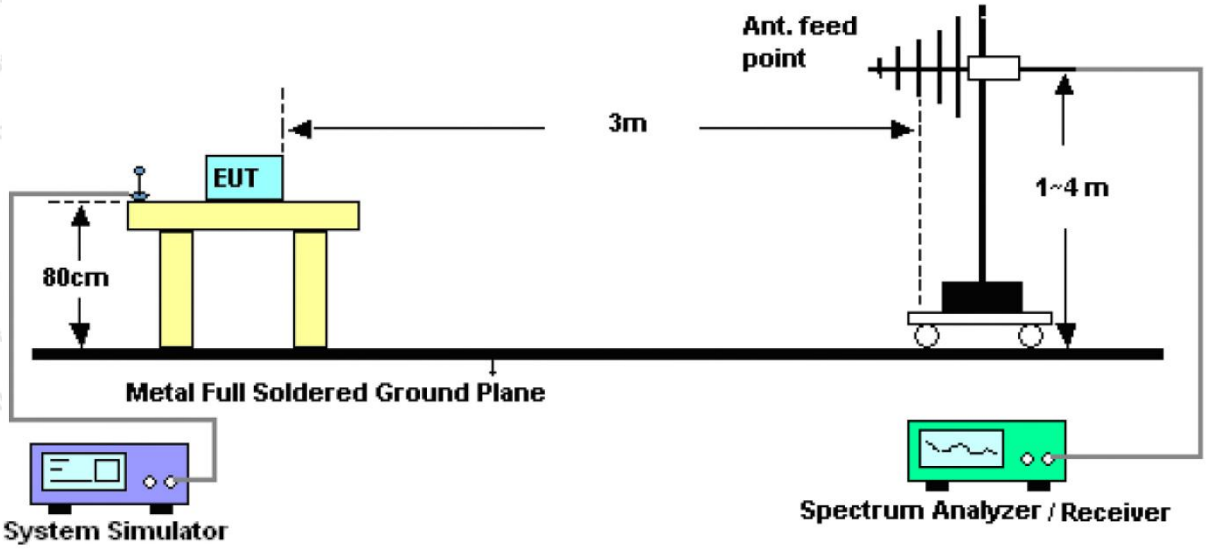


Figure 2. 30MHz to 1GHz

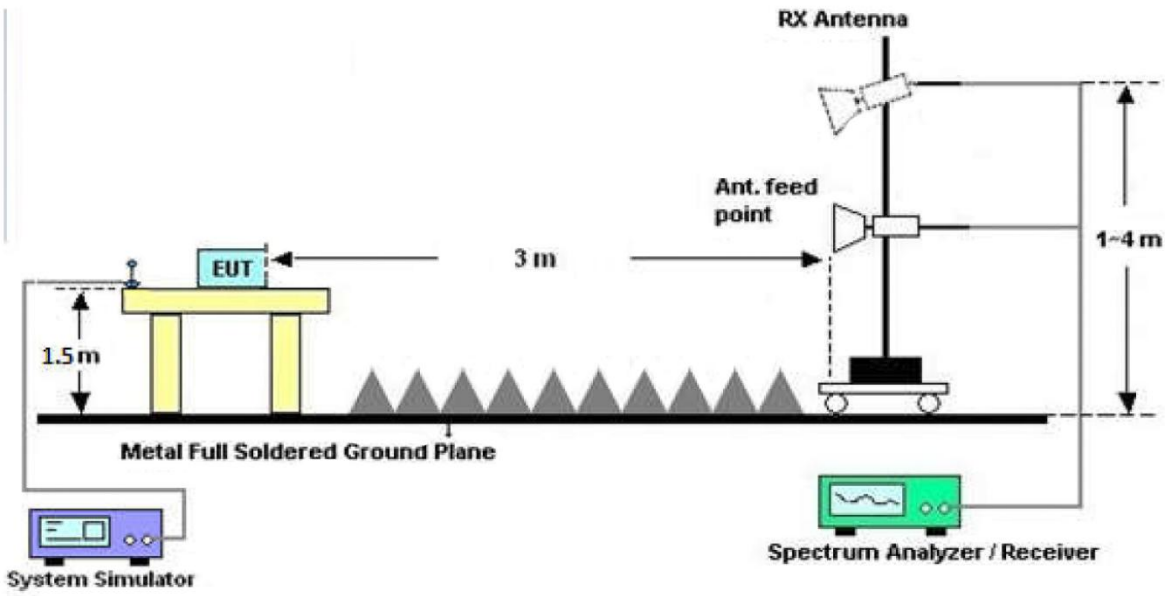


Figure 3. Above 1 GHz

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.

Test Results (9K~30MHz)

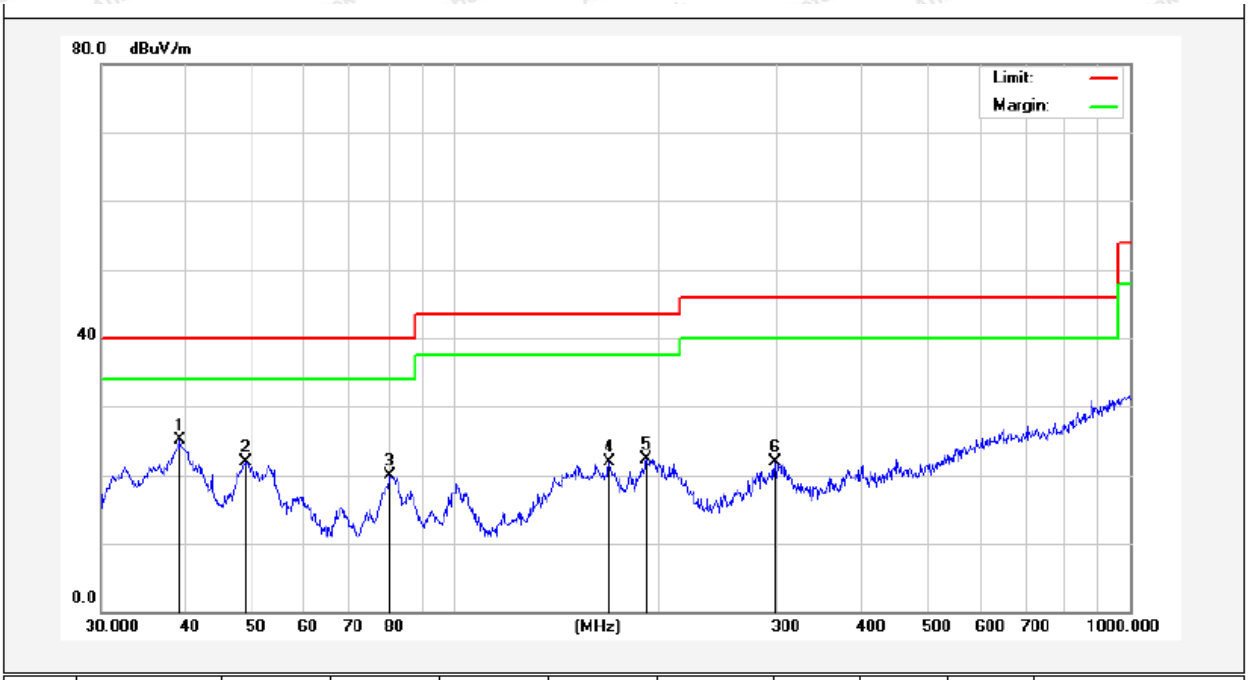
Test Mode:	Mode 1
Power Source:	AC 120V, 60Hz for adapter
Temp.(℃)/Hum.(%RH):	23.2℃/50%RH
Distance:	3m

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 (dge)
0.0592	58.53	19.30	2.53	0	80.36	132.05	-51.69	Peak	60
0.0592	34.12	19.30	2.53	0	55.95	112.05	-56.10	AV	60
0.0792	38.01	19.32	2.55	0	59.88	129.54	-69.66	Peak	40
0.0792	29.54	19.32	2.55	0	51.41	109.54	-58.13	AV	40
0.1184	68.81	19.32	2.55	0	90.68	126.07	-35.39	Peak	78
0.1184	56.85	19.32	2.55	0	78.72	106.07	-27.35	AV	78
0.3618	38.86	19.36	2.62	0	60.84	116.42	-55.58	Peak	150
0.3618	24.97	19.36	2.62	0	46.95	96.42	-49.47	AV	150
1.0500	21.95	19.37	2.63	0	43.95	67.18	-23.23	QP	60
3.6219	18.36	19.37	2.63	0	40.36	69.54	-29.18	QP	79

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.

Test Results (30~1000MHz)

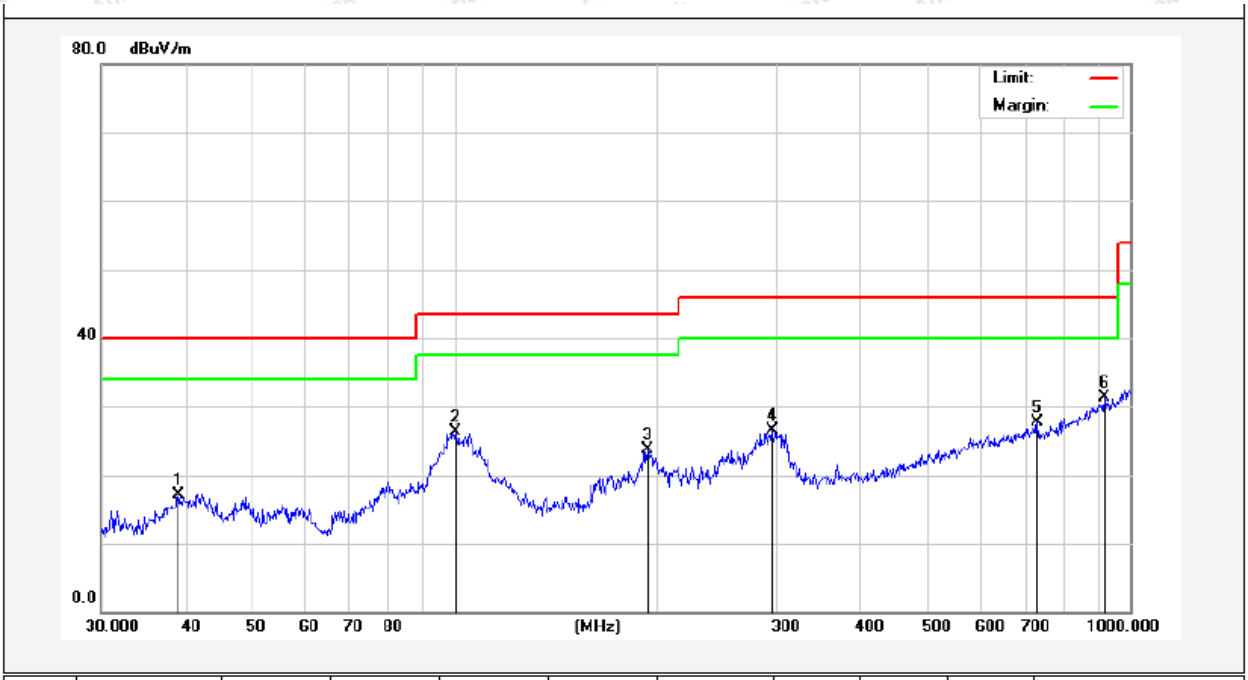
Test Mode:	Mode 1
Power Source:	AC 120V, 60Hz for adapter
Polarization:	Vertical
Temp.(℃)/Hum.(%RH):	23.2℃/50%RH
Distance:	3m



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	39.1616	39.20	-14.03	25.17	40.00	-14.83	QP	100	360	
2	49.1865	36.66	-14.73	21.93	40.00	-18.07	QP	100	0	
3	80.3619	37.57	-17.63	19.94	40.00	-20.06	QP	100	360	
4	169.5990	40.79	-18.87	21.92	43.50	-21.58	QP	100	0	
5	192.4186	39.81	-17.60	22.21	43.50	-21.29	QP	100	360	
6	298.2681	35.43	-13.46	21.97	46.00	-24.03	QP	100	0	

Test Results (30~1000MHz)

Test Mode:	Mode 1
Power Source:	AC 120V, 60Hz for adapter
Polarization:	Horizontal
Temp.(℃)/Hum.(%RH):	23.2℃/50%RH
Distance:	3m



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	39.0245	32.60	-15.54	17.06	40.00	-22.94	QP	100	0	
2	100.2286	45.68	-19.41	26.27	43.50	-17.23	QP	100	360	
3	193.0945	43.86	-20.20	23.66	43.50	-19.84	QP	100	0	
4	295.1469	41.32	-14.75	26.57	46.00	-19.43	QP	100	360	
5	729.3583	33.21	-5.56	27.65	46.00	-18.35	QP	100	0	
6	916.0687	32.70	-1.43	31.27	46.00	-14.73	QP	100	360	

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

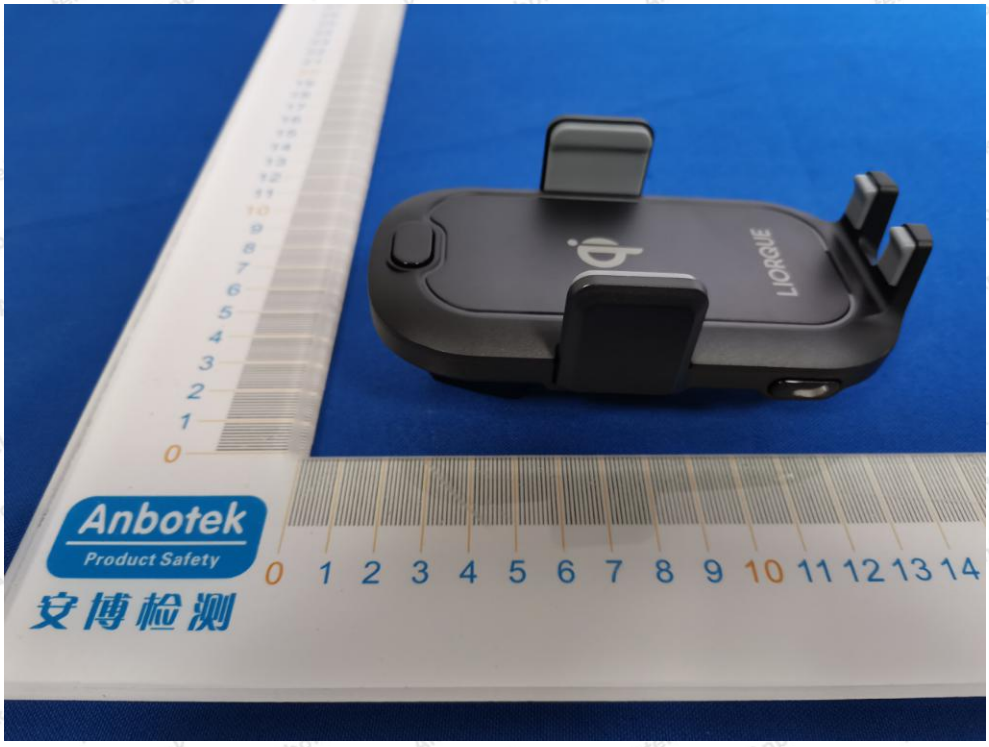
Photo of Conducted Emission Measurement

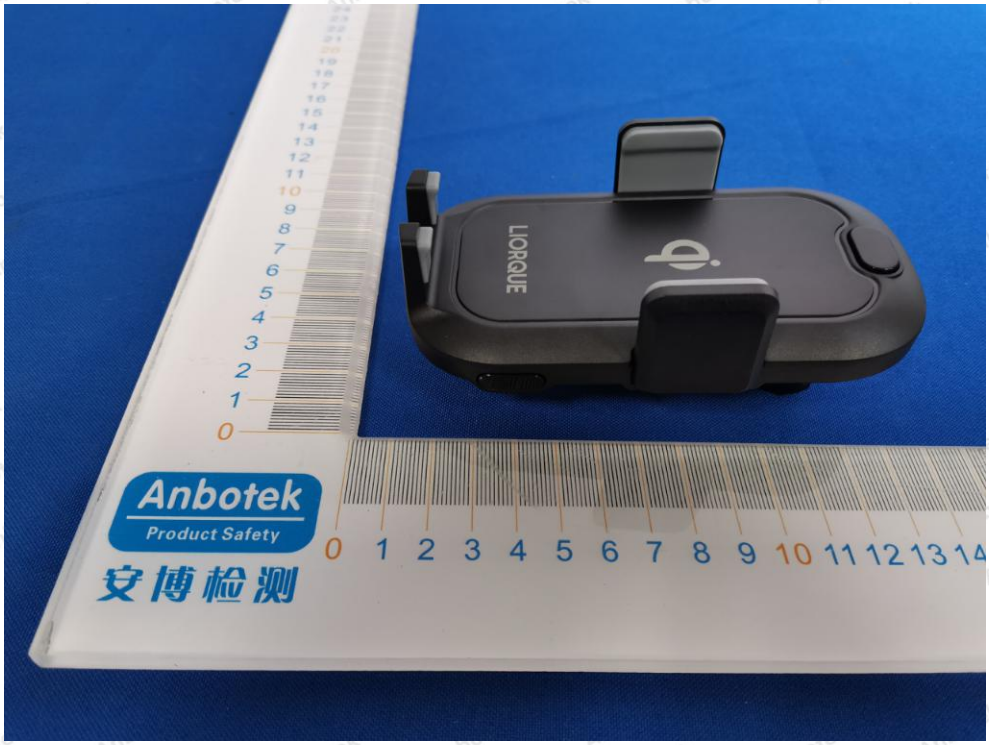
Photo of Radiation Emission Test

Anbotek
Product Safety

APPENDIX II -- EXTERNAL PHOTOGRAPH

Anbotek
Product Safety
安博检测
MADE IN CHINA

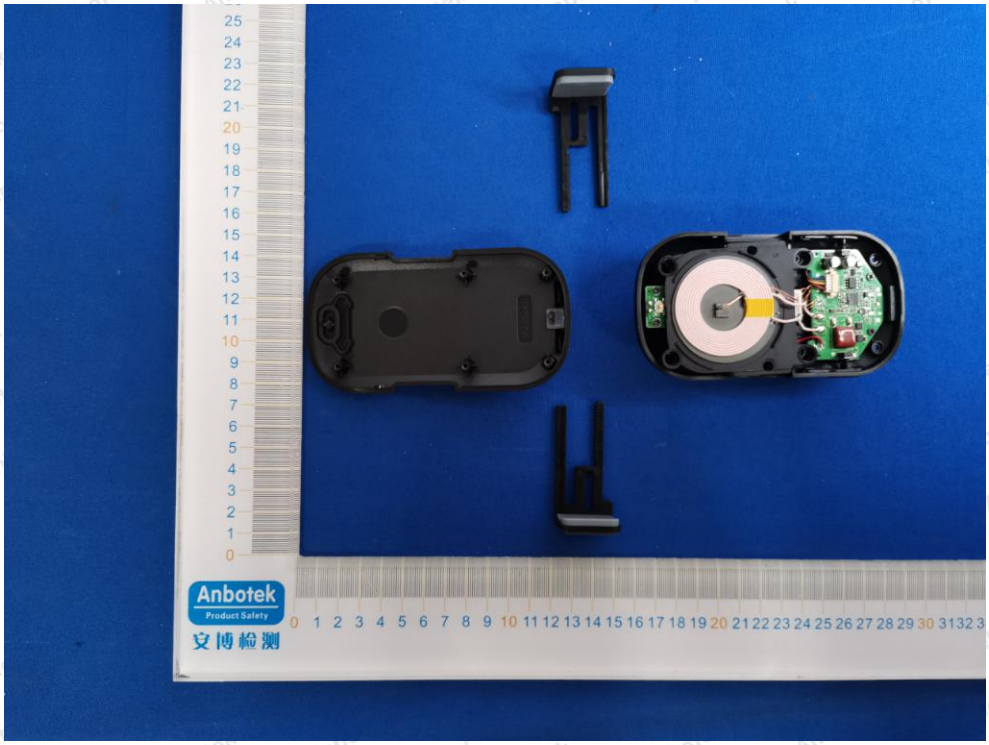

Anbotek
Product Safety
安博检测
LIORUE

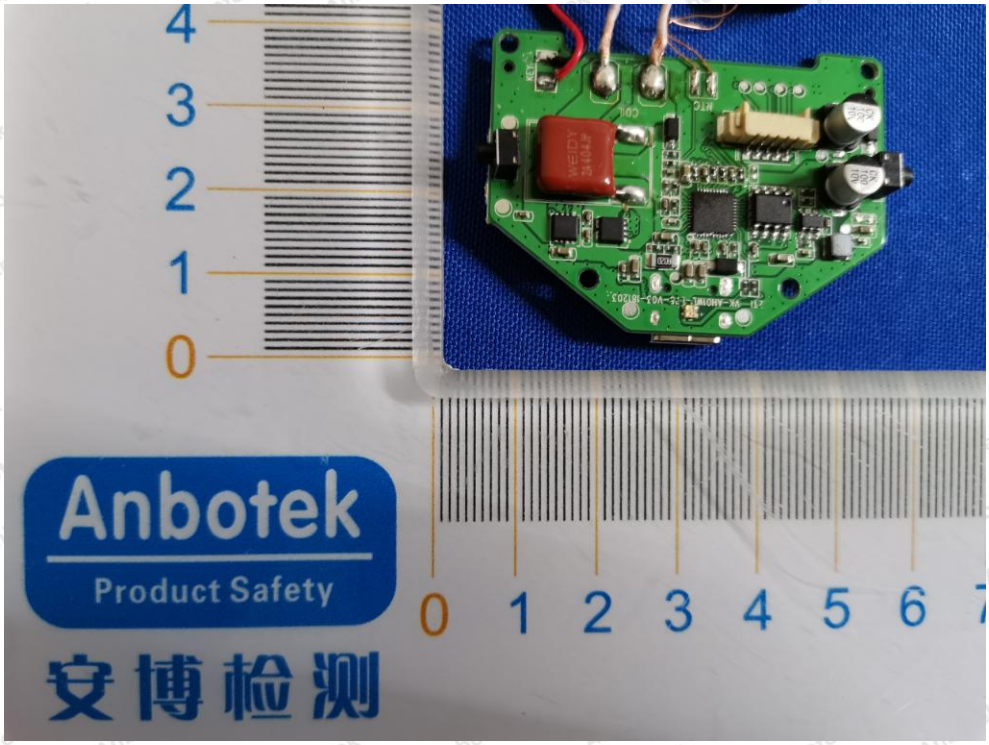

LIORQUE
Anbotek
Product Safety
安博检测

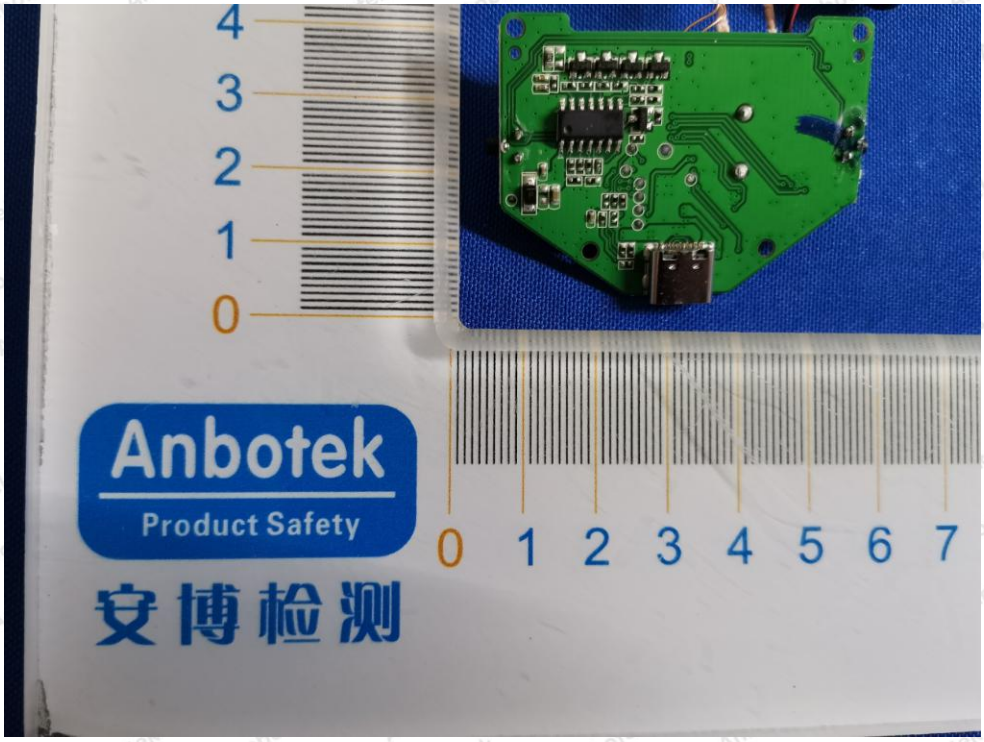
LIORQUE
Anbotek
Product Safety
安博检测

LIORQUE
Anbotek
Product Safety
安博检测

APPENDIX III -- INTERNAL PHOTOGRAPH







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