FCC TEST REPORT

For

Shenzhen Shiling Digital Technology Co., Ltd

Wireless PowerBank

Model No.: stm-931-217Z-01, SL-1821

Prepared For	:	Shenzhen Shiling Digital Technology Co., Ltd
Address	:	No.2 Building, KaiJie Industrial Zone, Longhua, Dalang Street, Baoan District, Shenzhen, China
Prepared By	:	Shenzhen Anbotek Compliance Laboratory Limited
Address	:	1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102 Tel: (86) 755-26066440 Fax: (86) 755-26014772
Report Number	:	SZAWW190122008-01
Date of Receipt	:	Jan. 22, 2019
Date of Test	:	Jan. 22~Mar. 08, 2019
Date of Report	:	Mar. 08, 2019

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....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....27

TEST REPORT

Applicant	:	Shenzhen Shiling Digital Technology Co., Ltd
Manufacturer	:	Shenzhen Shiling Digital Technology Co., Ltd
Product Name	:	Wireless PowerBank
Model No.	:	stm-931-217Z-01, SL-1821
Trade Mark	:	N.A.
Rating(s)	:	Type-C input: DC 5V, 3A; output: DC 5V, 2.4A Micro input: DC 5V, 2A Output USB1 USB 2 Total: DC 5V, 2.1A Wireless charger output: DC 5V, 1.2A (with DC 3.7V, 10000 mAh Battery inside)
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 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 Test: Jan. 22~Mar. 08, 2019

Prepared By: (Engineer / Oliay Yang)

Reviewer: (Supervisor / Snowy Meng)

Approved & Authorized Signer: (Manager / Sally Zhang)

1. General Information

1.1. Client Information

Applicant	:	Shenzhen Shiling Digital Technology Co., Ltd
Address	:	No.2 Building, KaiJie Industrial Zone, Longhua, Dalang Street, Baoan District, Shenzhen, China
Manufacturer	:	Shenzhen Shiling Digital Technology Co., Ltd
Address	:	No.2 Building, KaiJie Industrial Zone, Longhua, Dalang Street, Baoan District, Shenzhen, China
Factory	:	Shenzhen Shiling Digital Technology Co., Ltd
Address	:	No.2 Building, KaiJie Industrial Zone, Longhua, Dalang Street, Baoan District, Shenzhen, China

1.2. Description of Device (EUT)

Product Name	:	Wireless PowerBank	
Model No.	:	stm-931-217Z-01, SL-1821 (Note: All samples are the same except the name, so we prepare "stm-931-217Z-01" for test only.)	
Trade Mark	:	N.A.	
Test Power Supply	:	AC 240V, 60Hz for adapter/ AC 120V, 60Hz for adapter/ DC 3.7V battery inside	
Test Sample No.	:	S1(Normal Sample), S2(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 8

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.

Remark: All the conditions have been tested. It is found that 5W is the worst mode, and the data in the report only reflects the worst mode.

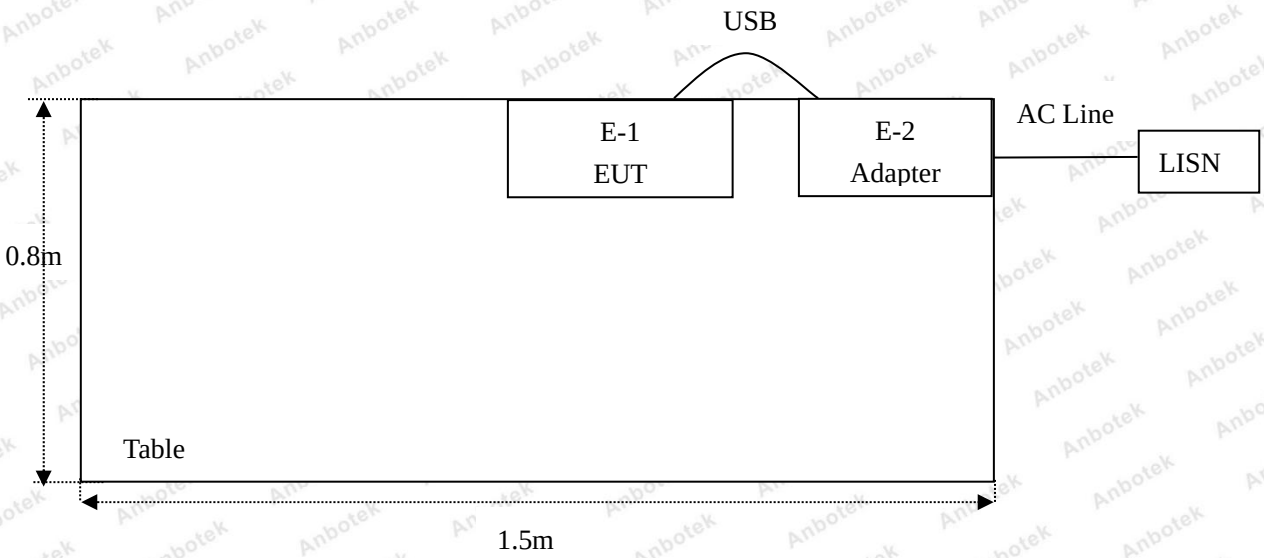
Pretest Mode	Description
Mode 1	TX Mode

For Conducted Emission	
Final Test Mode	Description
Mode 1	TX Mode

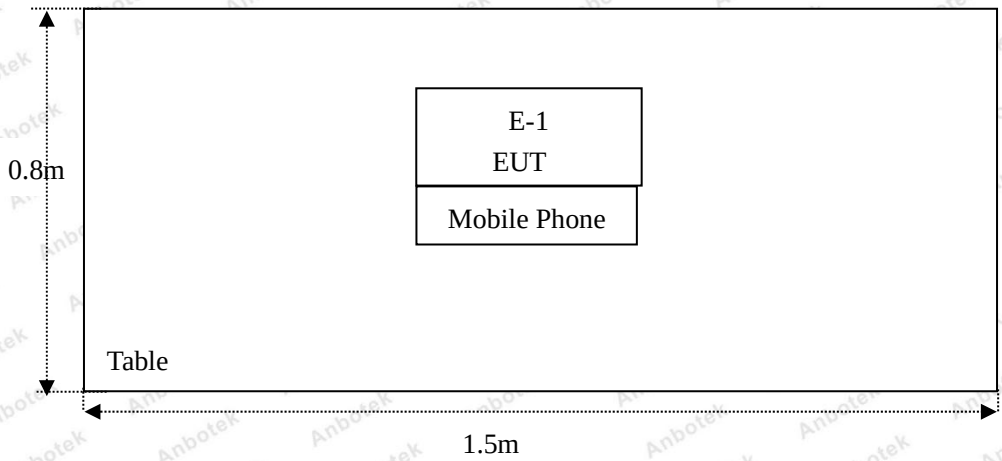
For Radiated Emission	
Final Test Mode	Description
Mode 1	TX Mode

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. 05, 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	BK1G18G30D	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	IVYTECH	IV3605	1804D360510	Apr. 02, 2018	1 Year
20.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80B	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 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, July 31, 2017.

ISED-Registration No.: 8058A-1

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-1, June 13, 2016.

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

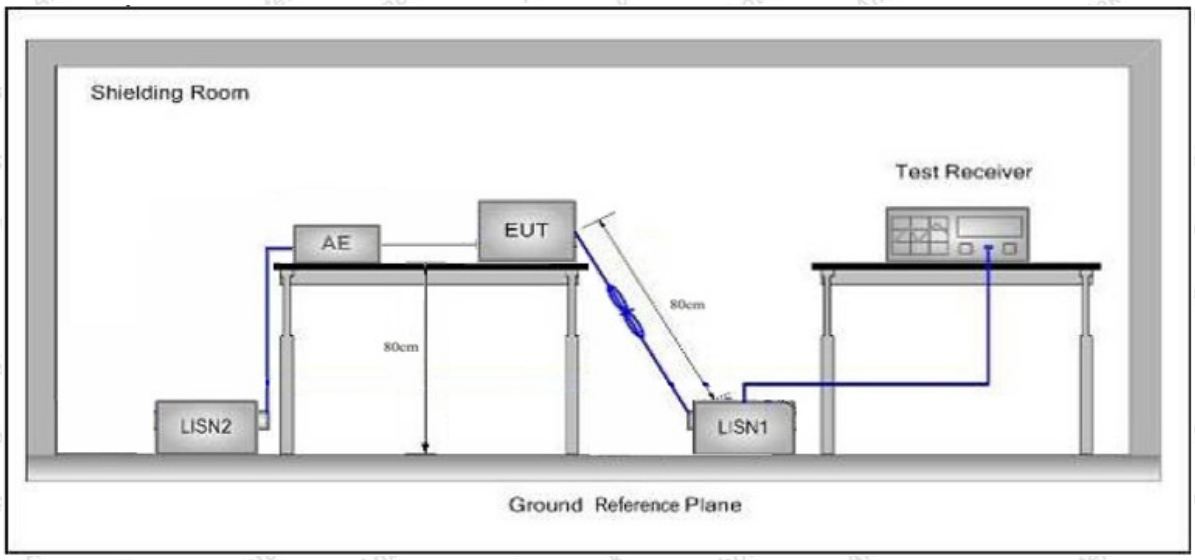
Standard Section	Test Item	Result
FCC Part 15, Paragraph 15.207	Conducted Emission Test	PASS
FCC Part 15, Paragraph 15.209(a)(f)	Spurious Emission	PASS
Part 15.203	Antenna Requirement	PASS

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.

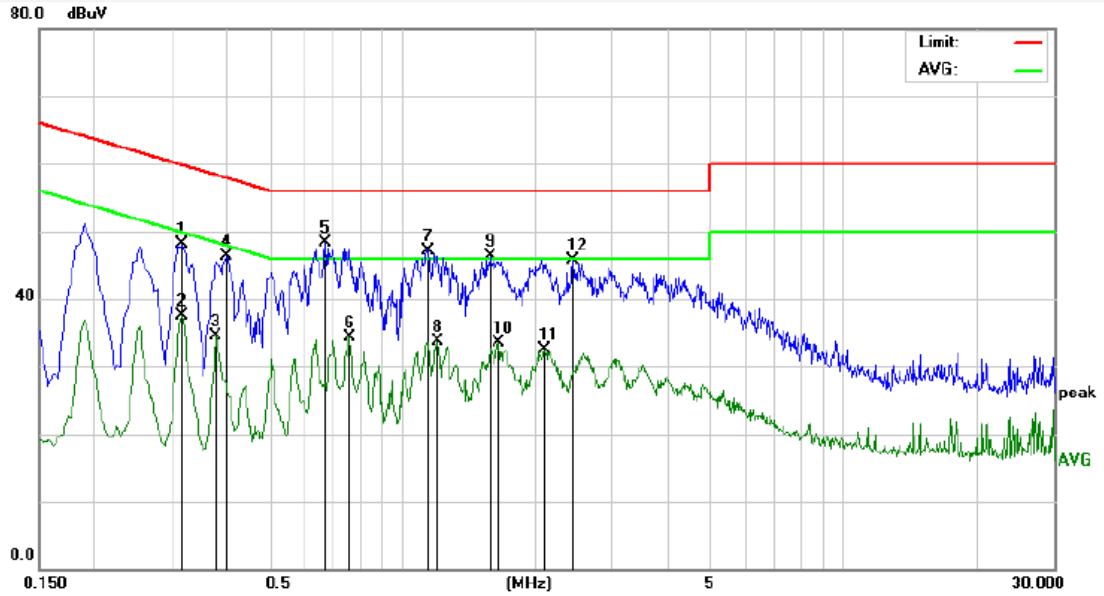
The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

Please to see the following pages

Conducted Emission Test Data

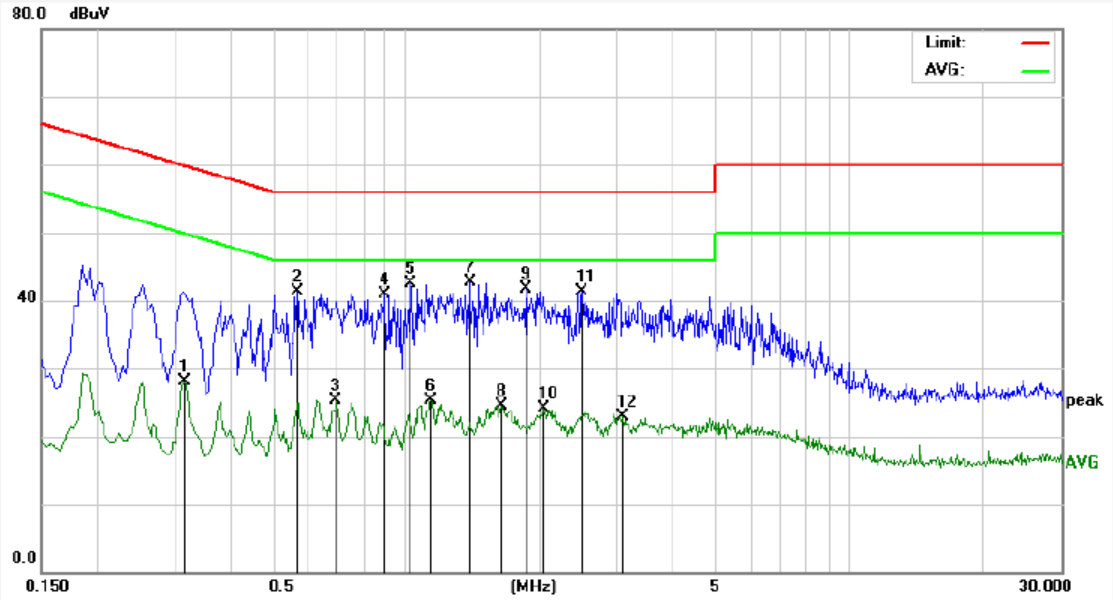
Test Site: 1# Shielded Room
Operating Condition: TX Mode
Test Specification: AC 240V, 60Hz for adapter
Comment: Live Line
Tem.: 16.7℃ Hum.: 49%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.3180	48.05	0.00	48.05	59.76	-11.71	QP	
2	0.3180	37.48	0.00	37.48	49.76	-12.28	AVG	
3	0.3780	34.43	0.00	34.43	48.32	-13.89	AVG	
4	0.3980	46.21	0.00	46.21	57.89	-11.68	QP	
5	0.6700	48.23	0.00	48.23	56.00	-7.77	QP	
6	0.7620	34.22	0.00	34.22	46.00	-11.78	AVG	
7	1.1420	47.10	0.00	47.10	56.00	-8.90	QP	
8	1.2020	33.74	0.00	33.74	46.00	-12.26	AVG	
9	1.5820	46.27	0.00	46.27	56.00	-9.73	QP	
10	1.6460	33.43	0.00	33.43	46.00	-12.57	AVG	
11	2.1020	32.52	0.00	32.52	46.00	-13.48	AVG	
12	2.4420	45.67	0.00	45.67	56.00	-10.33	QP	

Conducted Emission Test Data

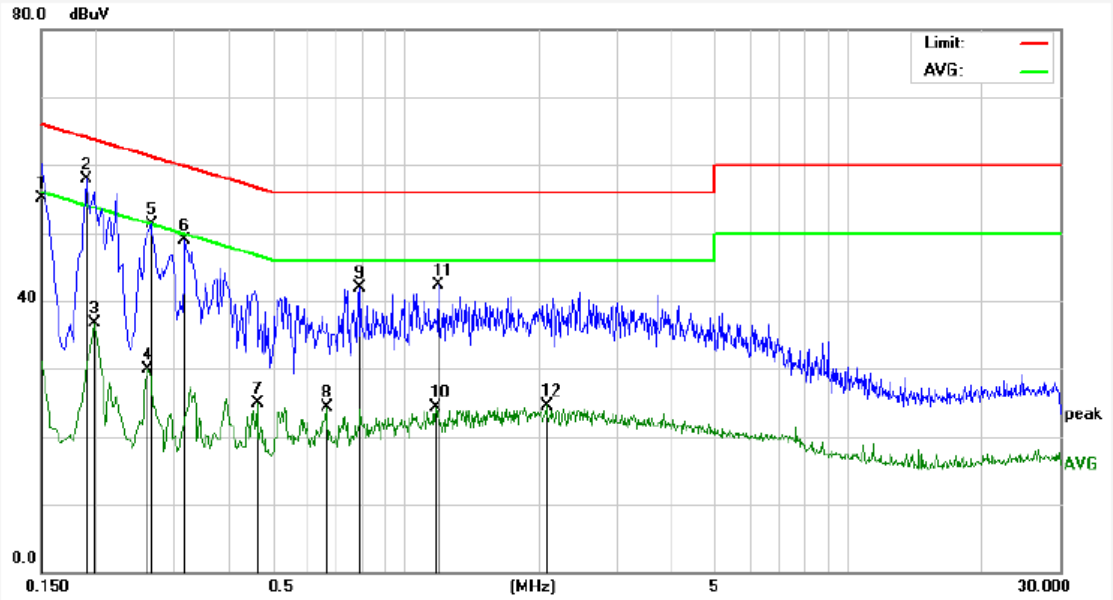
Test Site:	1# Shielded Room
Operating Condition:	TX Mode
Test Specification:	AC 240V, 60Hz for adapter
Comment:	Neutral Line
	Tem.: 16.7℃ Hum.: 49%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.3180	28.05	0.00	28.05	49.76	-21.71	AVG	
2	0.5700	41.28	0.00	41.28	56.00	-14.72	QP	
3	0.6940	25.27	0.00	25.27	46.00	-20.73	AVG	
4	0.8980	41.00	0.00	41.00	56.00	-15.00	QP	
5	1.0220	42.56	0.00	42.56	56.00	-13.44	QP	
6	1.1380	25.33	0.00	25.33	46.00	-20.67	AVG	
7	1.3900	42.79	0.00	42.79	56.00	-13.21	QP	
8	1.6380	24.52	0.00	24.52	46.00	-21.48	AVG	
9	1.8660	41.78	0.00	41.78	56.00	-14.22	QP	
10	2.0380	24.20	0.00	24.20	46.00	-21.80	AVG	
11	2.4980	41.32	0.00	41.32	56.00	-14.68	QP	
12	3.0780	22.90	0.00	22.90	46.00	-23.10	AVG	

Conducted Emission Test Data

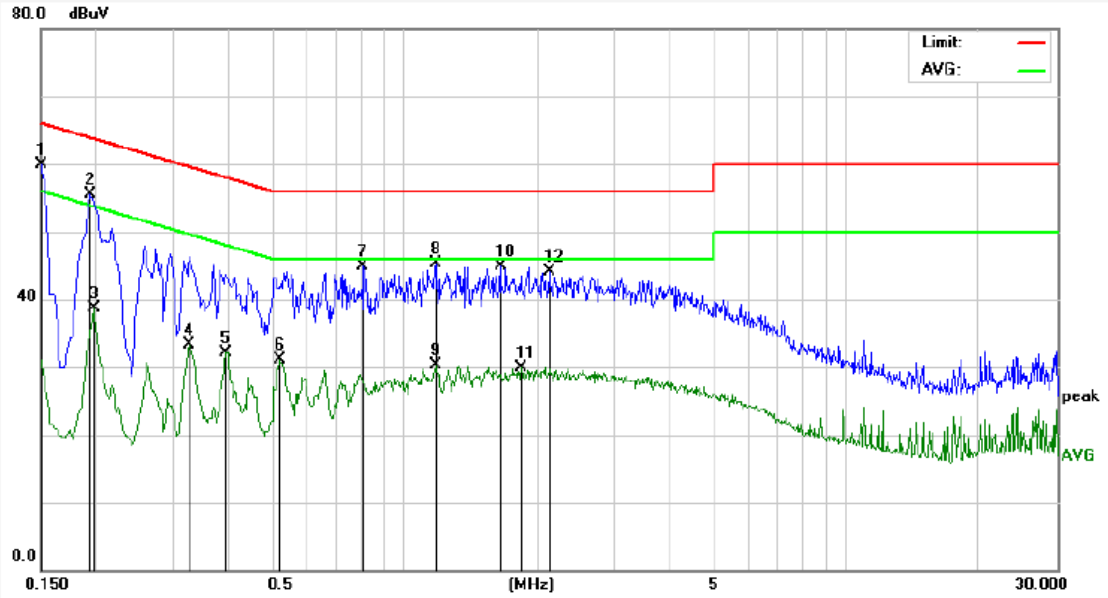
Test Site: 1# Shielded Room
Operating Condition: TX Mode
Test Specification: AC 120V, 60Hz for adapter
Comment: Live Line
Tem.: 16.7℃ Hum.: 49%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1500	55.04	0.00	55.04	65.99	-10.95	QP	
2	0.1900	57.94	0.00	57.94	64.03	-6.09	QP	
3	0.1980	36.76	0.00	36.76	53.69	-16.93	AVG	
4	0.2620	30.00	0.00	30.00	51.36	-21.36	AVG	
5	0.2660	51.26	0.00	51.26	61.24	-9.98	QP	
6	0.3180	48.97	0.00	48.97	59.76	-10.79	QP	
7	0.4620	24.91	0.00	24.91	46.66	-21.75	AVG	
8	0.6620	24.23	0.00	24.23	46.00	-21.77	AVG	
9	0.7900	41.86	0.00	41.86	56.00	-14.14	QP	
10	1.1700	24.23	0.00	24.23	46.00	-21.77	AVG	
11	1.1860	42.26	0.00	42.26	56.00	-13.74	QP	
12	2.0860	24.60	0.00	24.60	46.00	-21.40	AVG	

Conducted Emission Test Data

Test Site:	1# Shielded Room
Operating Condition:	TX Mode
Test Specification:	AC 120V, 60Hz for adapter
Comment:	Neutral Line
	Tem.: 16.7℃ Hum.: 49%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1500	59.93	0.00	59.93	65.99	-6.06	QP	
2	0.1940	55.55	0.00	55.55	63.86	-8.31	QP	
3	0.1980	38.63	0.00	38.63	53.69	-15.06	AVG	
4	0.3260	33.32	0.00	33.32	49.55	-16.23	AVG	
5	0.3940	32.13	0.00	32.13	47.98	-15.85	AVG	
6	0.5220	31.02	0.00	31.02	46.00	-14.98	AVG	
7	0.8059	44.99	0.00	44.99	56.00	-11.01	QP	
8	1.1740	45.34	0.00	45.34	56.00	-10.66	QP	
9	1.1740	30.34	0.00	30.34	46.00	-15.66	AVG	
10	1.6460	44.90	0.00	44.90	56.00	-11.10	QP	
11	1.8420	29.91	0.00	29.91	46.00	-16.09	AVG	
12	2.1260	44.06	0.00	44.06	56.00	-11.94	QP	

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

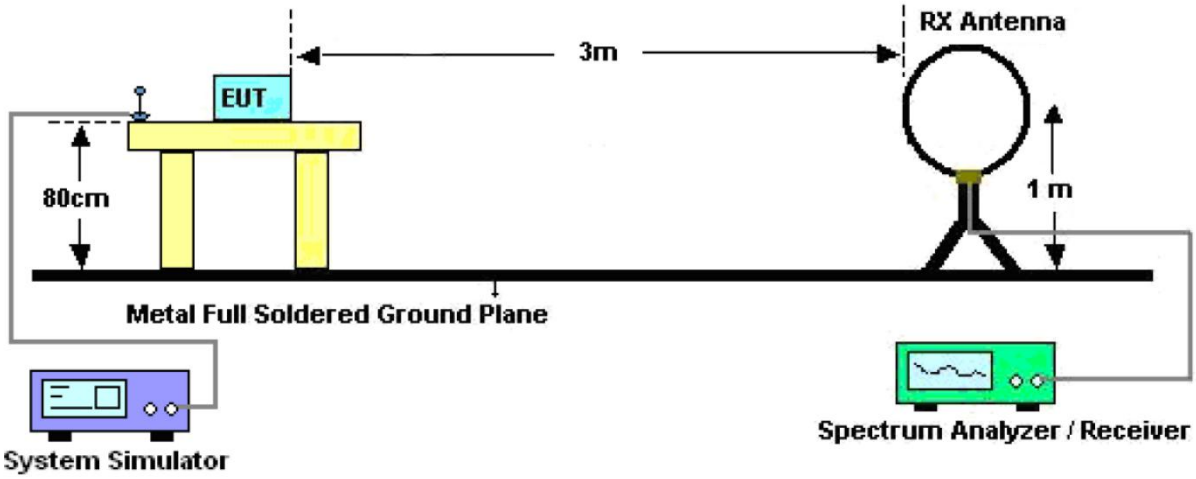


Figure 1. Below 30MHz

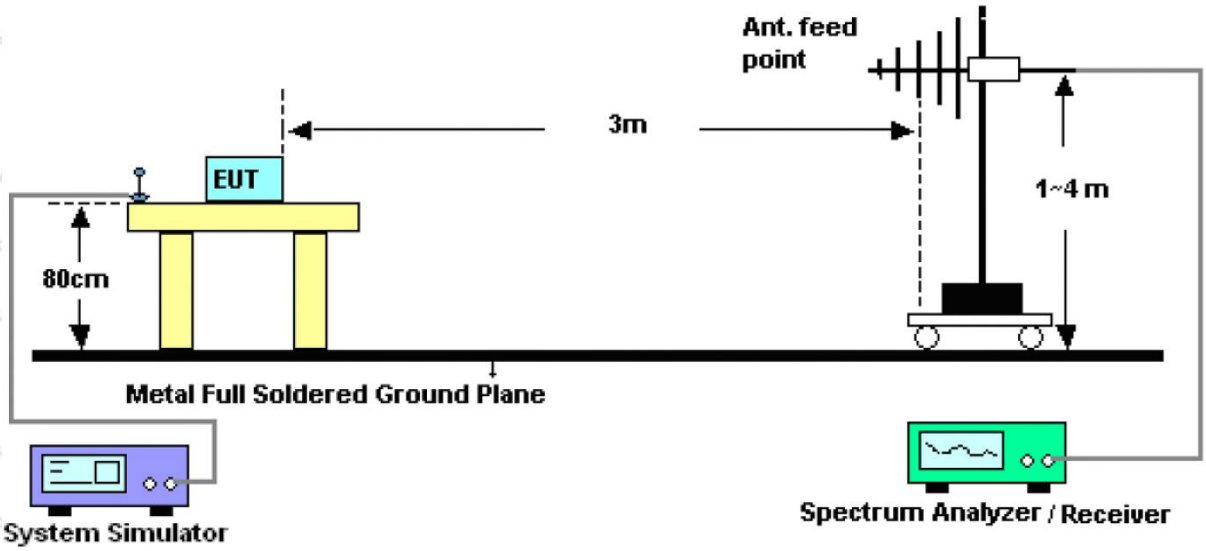


Figure 2. 30MHz to 1GHz

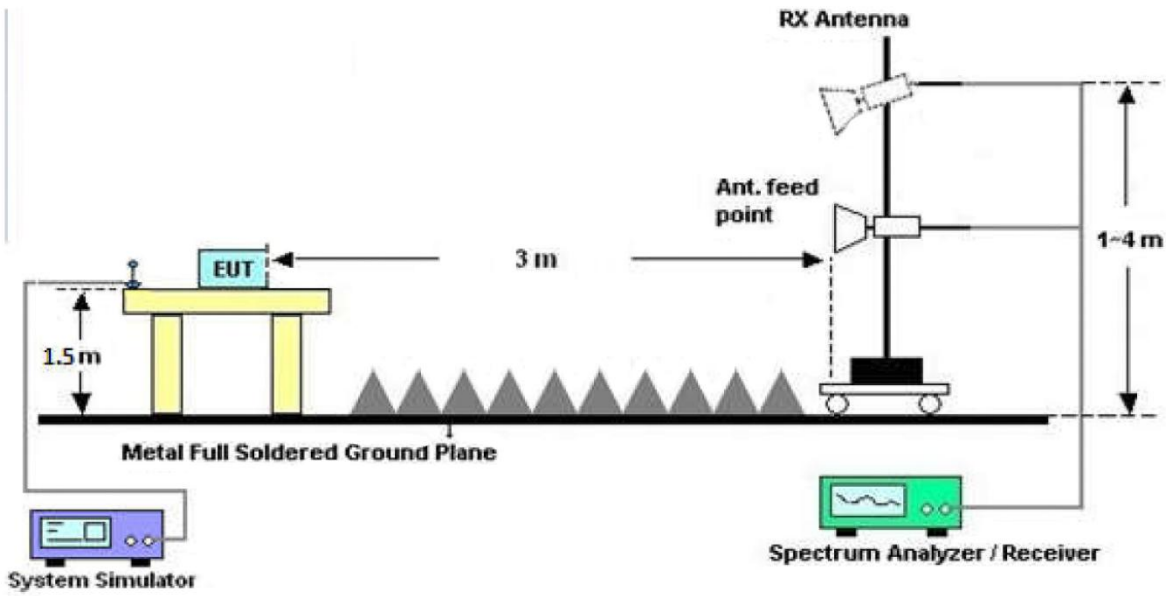


Figure 3. Above 1 GHz

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

Test Results

(Between 9KHz – 30MHz)

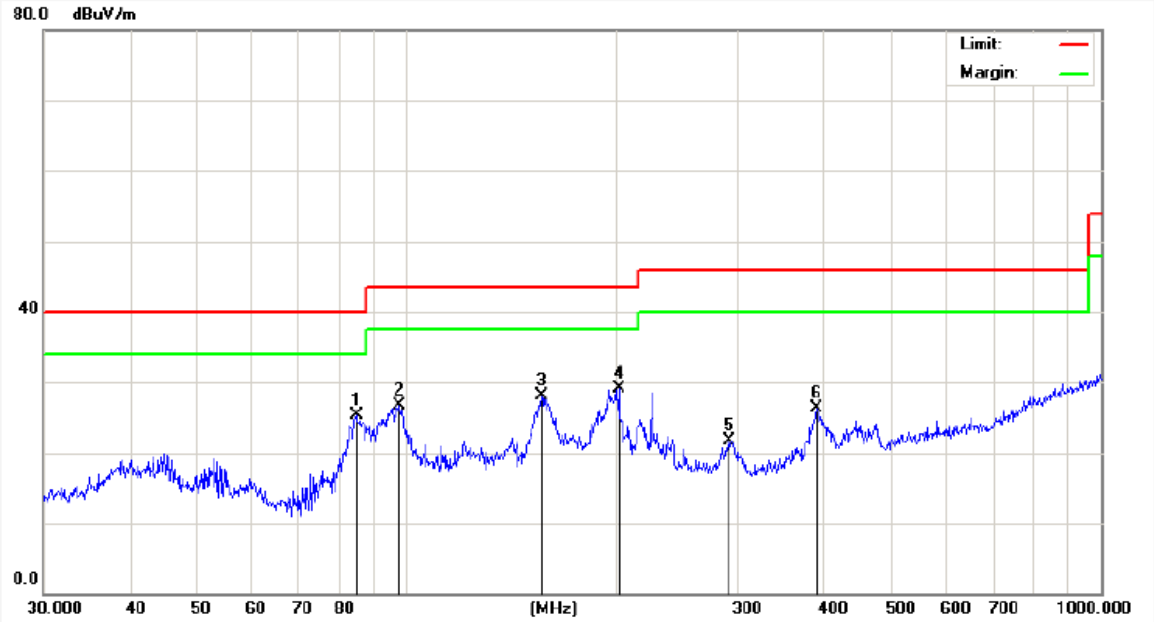
Job No.:	**SZAWW190122008-01**		
Standard:	**FCC PART15 C _3m**	**Power Source:**	**AC 120V, 60Hz for adapter**
Test item:	**Radiation Test**	**Temp.(C)/Hum.(%RH):**	**24.1℃/52%RH**
Test Mode:	**Mode 1**	**Distance:**	**3m**

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)
0.0497	52.06	19.30	2.53	0	73.89	133.57	-59.68	Peak	100
0.0497	32.14	19.30	2.53	0	53.97	113.57	-59.60	AV	100
0.0756	45.95	19.35	2.55	0	67.85	129.94	-62.09	Peak	250
0.0756	32.42	19.35	2.55	0	54.32	109.94	-55.62	AV	250
0.1270	63.05	20.01	2.60	0	85.66	125.46	-39.80	Peak	110
0.1270	52.77	20.01	2.60	0	75.38	105.46	-30.08	AV	110
0.1737	42.27	20.01	2.61	0	64.89	122.76	-57.87	Peak	15
0.1737	22.35	20.01	2.61	0	44.97	102.76	-57.79	AV	15
0.7459	16.78	21.03	2.72	0	40.53	70.15	-29.62	QP	90
1.2137	14.07	21.06	2.74	0	37.87	65.92	-28.05	QP	90

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.

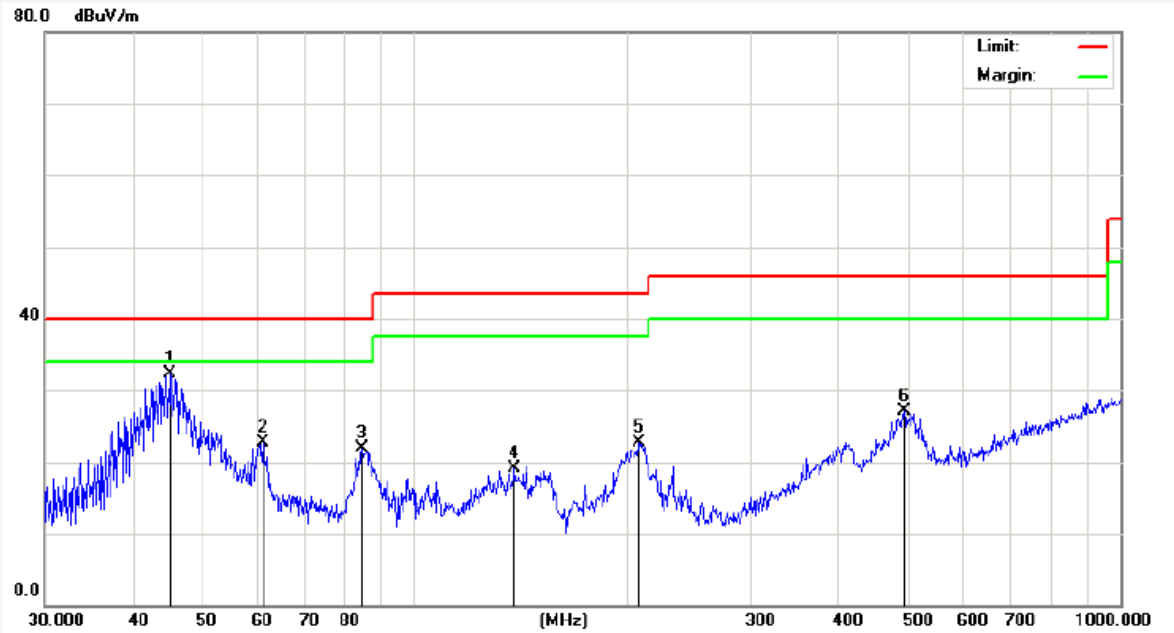
(Between 30MHz –1000 MHz)

Job No.:	**SZAWW190122008-01**	**Polarization:**	**Horizontal**
Standard:	**FCC PART15 C _3m**	**Power Source:**	**DC 3.7V battery inside**
Test item:	**Radiation Test**	**Temp.(C)/Hum.(%RH):**	**24.3℃/54%RH**
Test Mode:	**Mode 1**	**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	84.7019	47.44	-22.06	25.38	40.00	-14.62	peak			
2	97.7983	48.58	-21.97	26.61	43.50	-16.89	peak			
3	156.4578	50.08	-22.04	28.04	43.50	-15.46	peak			
4	202.1005	48.93	-19.92	29.01	43.50	-14.49	peak			
5	291.0360	40.62	-18.83	21.79	46.00	-24.21	peak			
6	389.3549	39.53	-13.19	26.34	46.00	-19.66	peak			

Job No.:	**SZAWW190122008-01**	**Polarization:**	**Vertical**
Standard:	**FCC PART15 C _3m**	**Power Source:**	**DC 3.7V battery inside**
Test item:	**Radiation Test**	**Temp.(C)/Hum.(%RH):**	**24.3℃/54%RH**
Test Mode:	**Mode 1**	**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	45.2166	47.16	-14.90	32.26	40.00	-7.74	peak			
2	61.1316	40.09	-17.43	22.66	40.00	-17.34	peak			
3	84.4054	41.00	-19.16	21.84	40.00	-18.16	peak			
4	138.8735	37.58	-18.41	19.17	43.50	-24.33	peak			
5	207.8501	38.33	-15.65	22.68	43.50	-20.82	peak			
6	494.1984	38.15	-11.13	27.02	46.00	-18.98	peak			

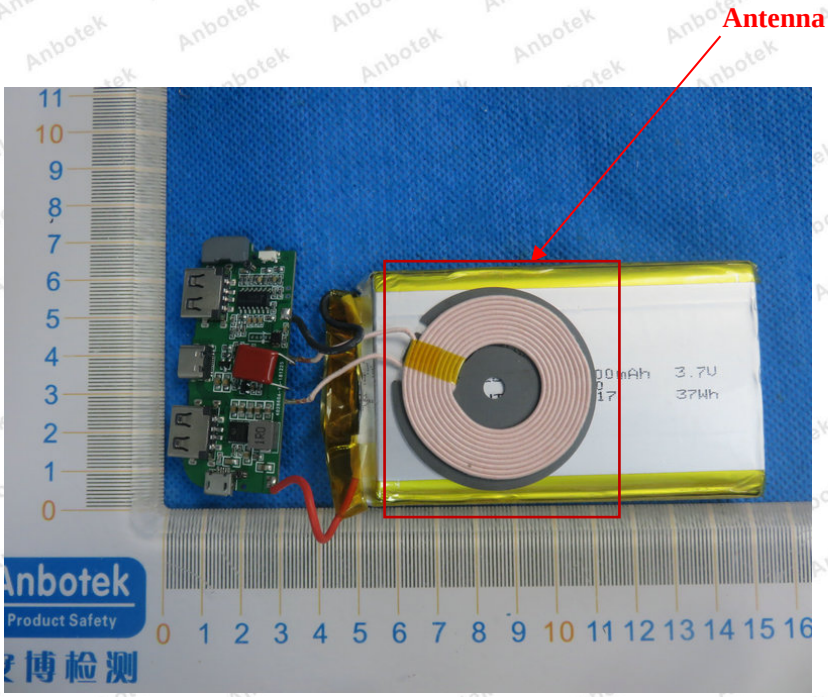
5. Antenna Requirement

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

5.2. Antenna Connected Construction

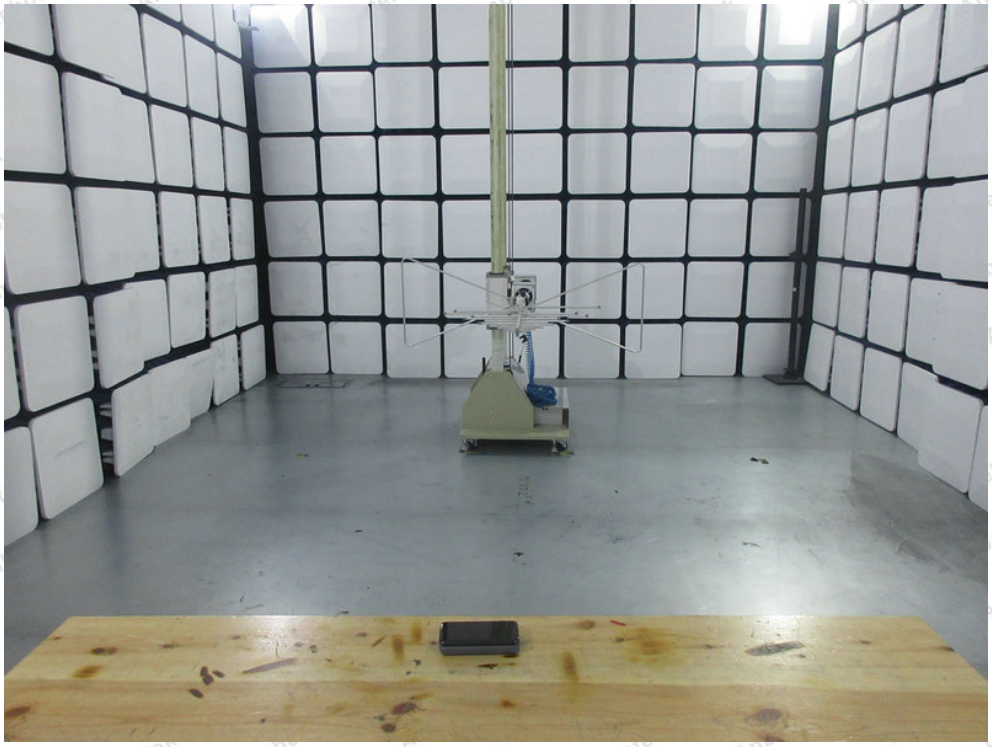
The Wireless Charging antenna is a Inductive loop coil Antenna which permanently attached, and the best case gain of the antenna is 0 dBi. It complies with the standard requirement.



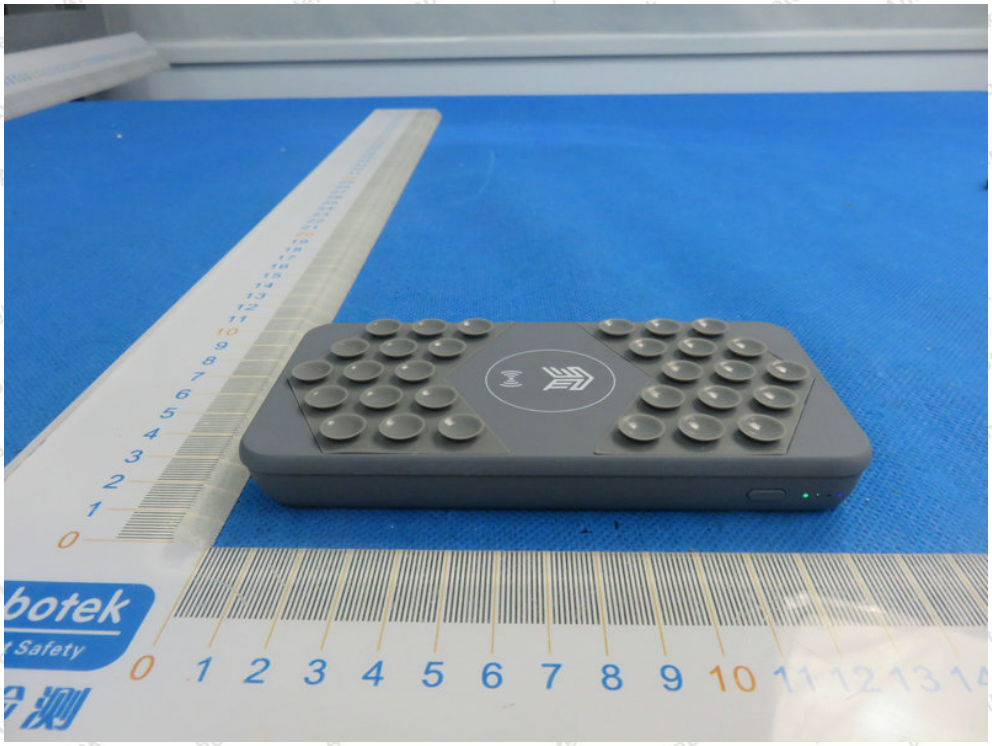
APPENDIX I -- TEST SETUP PHOTOGRAPH

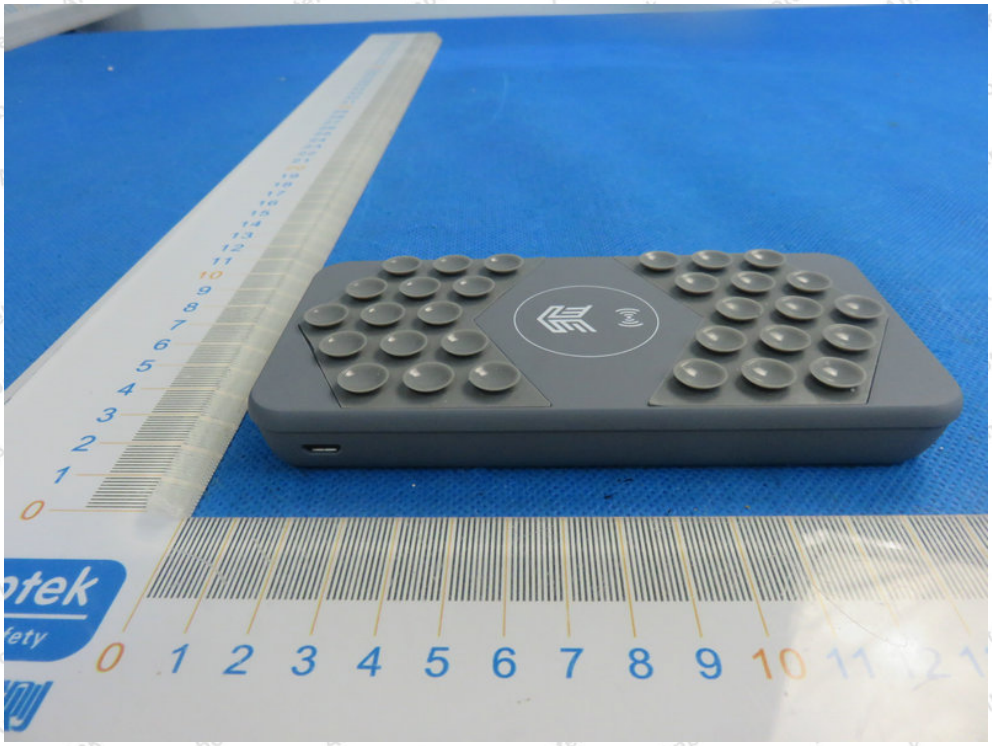
Photo of Conducted Emission Measurement

Photo of Radiation Emission Test

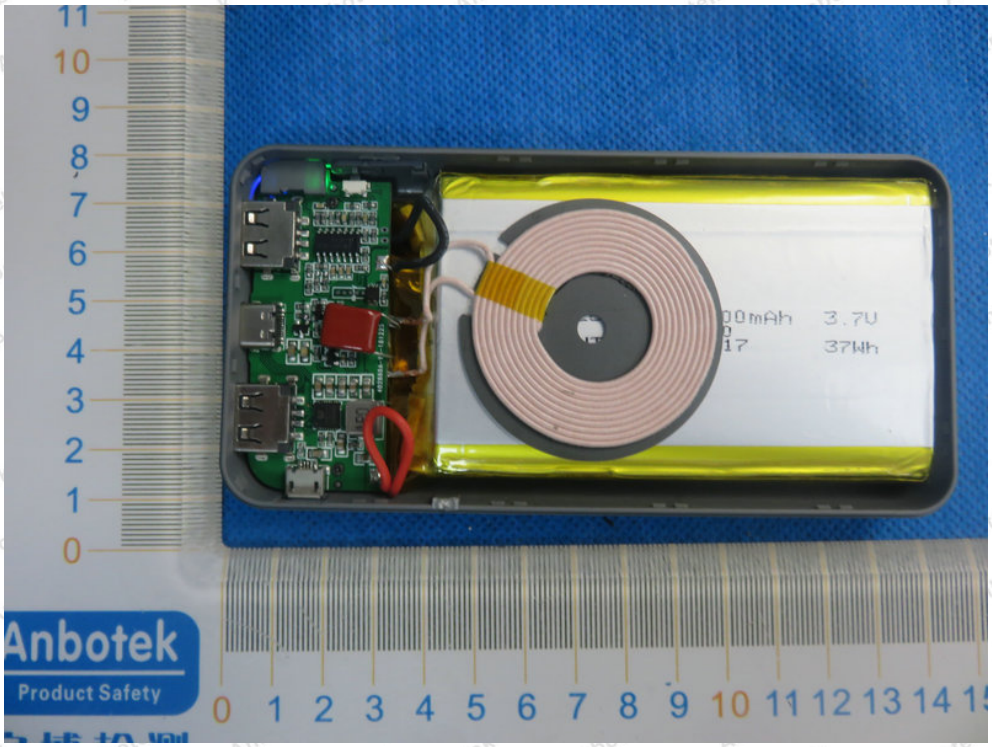


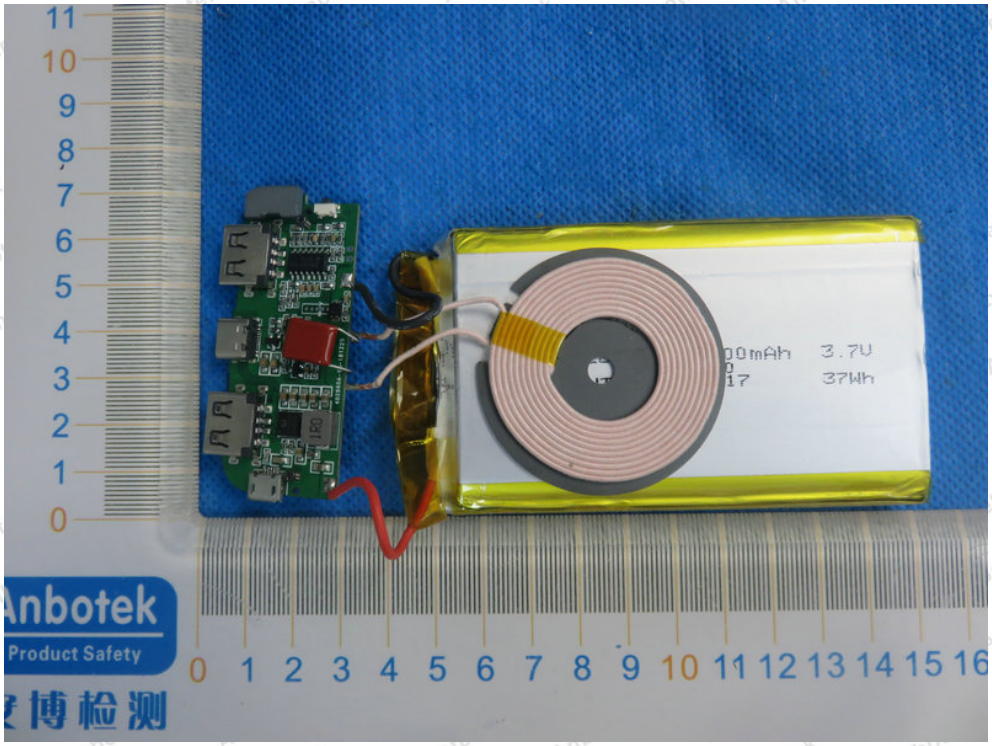
APPENDIX II -- EXTERNAL PHOTOGRAPH

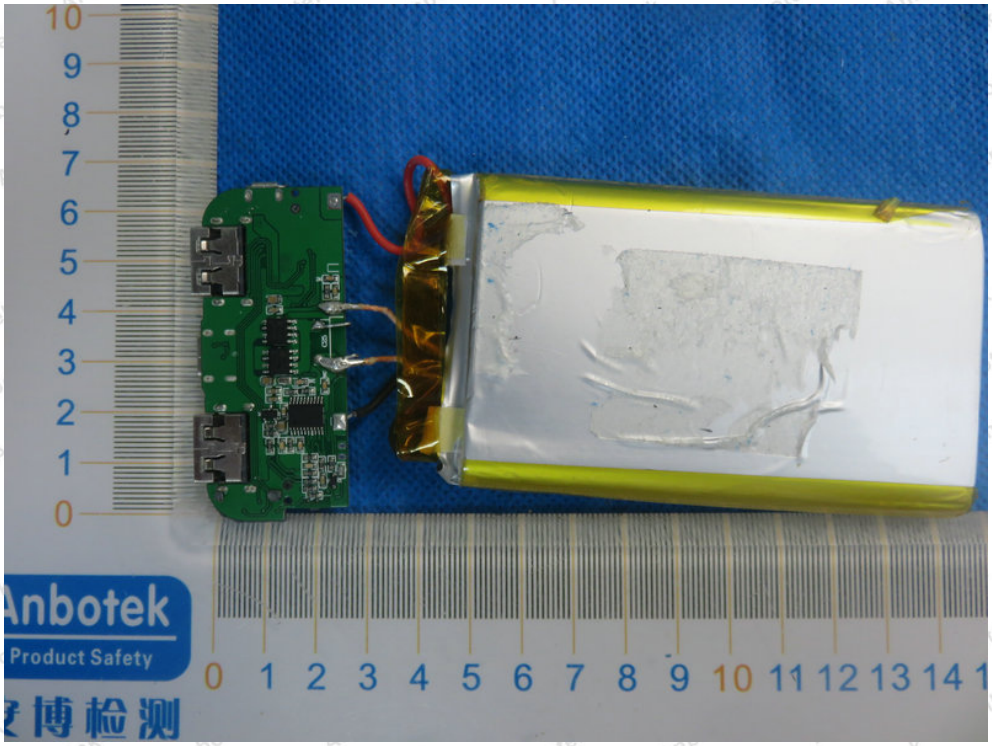


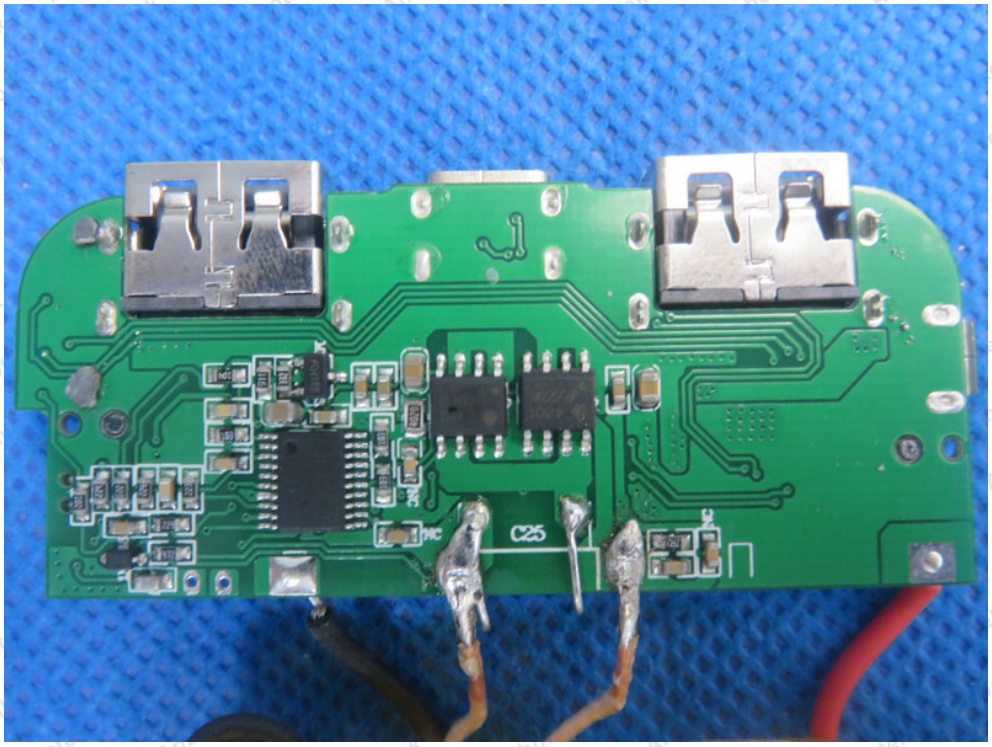


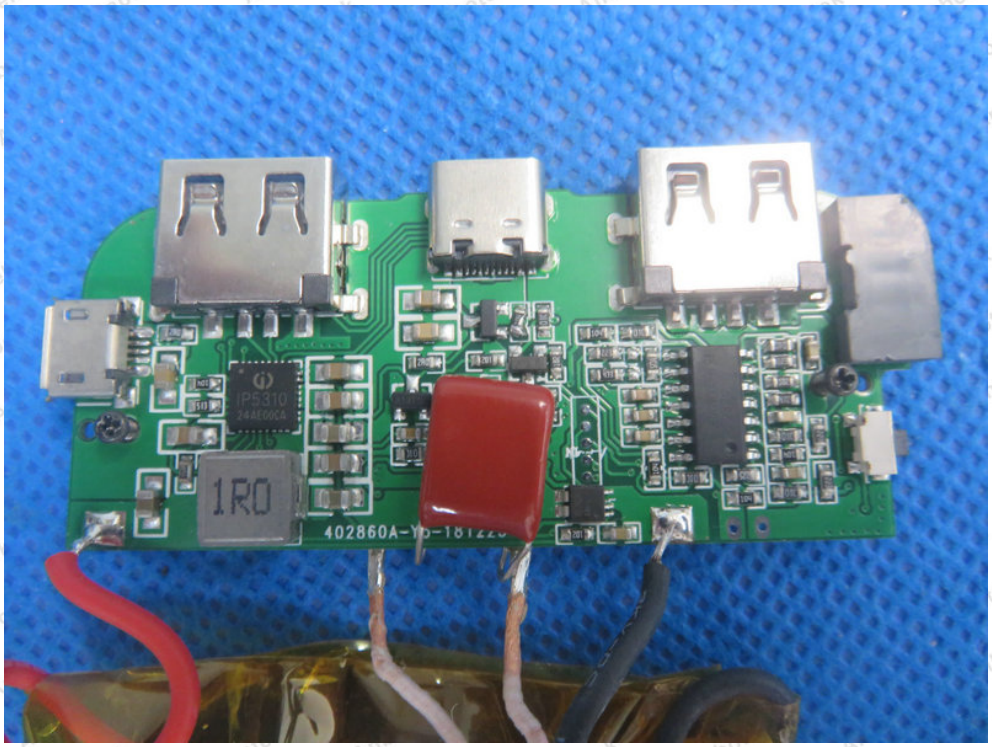
APPENDIX III -- INTERNAL PHOTOGRAPH






Anbotek
Product Safety


C25



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