

RED-EMC Test Report

For

E-Power Limited

Bluetooth speaker

Model No.: 12397700, 12397701, BT502, BT503, BT504, BT505, BT506, BT507, BT508, BT509

Prepared For :

Address :

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited

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Date of Test : May 18~29, 2018

Date of Report : May 29, 2018

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. Test Equipment List.....	6
1.6. Measurement Uncertainty.....	7
1.7. Description of Test Facility.....	7
2. Summary of Test Results.....	8
3. Emission Test.....	9
3.1. Conducted Emission Test at Main Ports.....	9
3.1.1. Test Standard and Limit.....	9
3.1.2. Test Setup.....	9
3.1.3. Test Procedure.....	10
3.1.4. Test Data.....	10
3.2. Radiated Emission Test.....	15
3.2.1. Test Standard and Limit.....	15
3.2.2. Test Setup.....	16
3.2.3. Test Procedure.....	16
3.2.4. Test Data.....	17
4. Immunity Test.....	21
4.1. Electrostatic Discharge Test.....	22
4.1.1. Test Standard and Specification.....	22
4.1.2. Test Setup.....	22
4.1.3. Test Procedure.....	23
4.1.4. Test Data.....	23
4.2. Radiated, RF Electromagnetic Fields Test.....	24
4.2.1. Test Standard and Specification.....	24
4.2.2. Test Setup.....	24
4.2.3. Test Procedure.....	24
4.2.4. Test Data.....	25
APPENDIX I -- TEST SETUP PHOTOGRAPH.....	26
APPENDIX II -- EXTERNAL PHOTOGRAPH.....	28
APPENDIX III -- INTERNAL PHOTOGRAPH.....	32

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TEST REPORT

Applicant :
Manufacturer :
Product Name : Bluetooth speaker
Model No. : 12397700, 12397701, BT502, BT503, BT504, BT505, BT506, BT507, BT508, BT509
Trade Mark : N.A.
Rating(s) : Input: DC 5V, 350mA (with DC 3.7V, 1200mAh Battery inside)
Test Standard(s) : ETSI EN 301 489-1 V2.2.0 (2017-03)
EN 55032: 2015
EN 55024: 2010+A1: 2015
ETSI EN 301 489-17 V3.2.0 (2017-03)

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 EN 301 489-1, EN 301 489-17, EN 55032 and EN 55024 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

May 18~29, 2018

Prepared By



Winkey Wang

(Tested Engineer / Winkey Wang)

Reviewer

May Lu

(Project Manager / May Lu)

Approved & Authorized Signer

Tom Chen

(Manager / Tom Chen)

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1. General Information

1.1. Client Information

Applicant	:	
Address	:	
Manufacturer	:	
Address	:	

1.2. Description of Device (EUT)

Product Name	:	Bluetooth speaker	
Model No.	:	12397700, 12397701, BT502, BT503, BT504, BT505, BT506, BT507, BT508, BT509 (Note: All samples are the same except the model number and housing, so we prepare "12397700" for test only.)	
Trade Mark	:	N.A.	
Test Power Supply	:	AC 110V, 50Hz for adapter / AC 230V, 50Hz for adapter DC 3.7V Battery inside	
Product Description	:	Operation Frequency:	2402~2480MHz
		Transfer Rate:	1/2 Mbits/s
		Number of Channel:	79 Channels
		Modulation Type:	GFSK, $\pi/4$ -DQPSK
		Antenna Type:	PCB Antenna
		Antenna Gain(Peak):	1.2 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: ZTE M/N: STC-A2050I1000USBA-C S/N: 201202102100876 Input: 100-240V~50/60Hz 0.3A Output: DC 5V, 1000mA
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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	Charge & BT Mode
Mode 2	AUX Mode

For Conducted Emission	
Final Test Mode	Description
Mode 1	Charge & BT Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	Charge & BT Mode
Mode 2	AUX Mode

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1.5. Test Equipment List

Conducted Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Nov. 17, 2017	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Nov. 17, 2017	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Nov. 17, 2017	1 Year
4.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A

Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Nov. 17, 2017	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 20, 2017	1 Year
3.	Pre-amplifier	SONOMA	310N	186860	Nov. 17, 2017	1 Year
4.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A

Electrostatic Discharge Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Simulators	3Ctest	ESD-30T	ES0131505	Nov. 17, 2017	1 Year

R/S Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	RF Power Meter. Dual Channel	BOONTON	4232A	10539	May 19, 2018	1 year
2	50ohm Diode Power Sensor	BOONTON	51011EMC	34236/36164	May 19, 2018	1 year
3	Broad-Band Horn Antenna	SCHWARZBECK	BBHA9120 L3F	332	May 19, 2018	1 year
4	Power Amplifier (0.08-1G)	MILMEGA	80RF1000-175	1059345	May 19, 2018	1 year
5	Power Amplifier (1-2G)	MILMEGA	AS0102-55	1018770	May 19, 2018	1 year
6	Power Amplifier (2-6G)	MILMEGA	AS1860-50	1059346	May 19, 2018	1 year
7	Signal Generator	Agilent	N5181A	MY50145187	May 19, 2018	1 year
8	Field Strength Meter	HOLADAY	HI-6005	N/A	May 19, 2018	1 year
9	RS232 Fiber Optic Modem	HOLADAY	HI-4413P	N/A	May 19, 2018	1 year
10	Log.-Per. Antenna	SCHWARZBECK	VULP 9118E	N/A	May 19, 2018	1 year

1.6. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 3.9 dB (Horizontal)
		Ur = 3.8 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4 dB
Disturbance Uncertainty		Ud = 2.6 dB

1.7. 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 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, 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

All Emissions tests were performed at
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

EMC Emission				
Test Items	Standard	Basic Standard	Limit	Results
Conducted Emission	ETSI EN 301 489-1 V2.2.0 Clause 8.3 & 8.4	EN 55032: 2015	Class A or B NOTE (2)	PASS
Radiated Emission	ETSI EN 301 489-1 V2.2.0 Clause 8.2	EN 55032: 2015	Class A or B NOTE (2)	PASS
Harmonic Current Emission	ETSI EN 301 489-1 V2.2.0 Clause 8.5	EN 61000-3-2:2014	Class A	N/A
Voltage Fluctuations & Flicker	ETSI EN 301 489-1 V2.2.0 Clause 8.6	EN 61000-3-3:2013	/	N/A
EMC Immunity				
Test Items	Standard	Basic Standard	Performance Criteria	Results
Electrostatic Discharge	ETSI EN 301 489-1 V2.2.0 Clause 9.3	EN 61000-4-2:2009	B	PASS
RF Electromagnetic Field	ETSI EN 301 489-1 V2.2.0 Clause 9.2	EN 61000-4-3:2006 +A1:2008+A2:2010	A	PASS
Fast transients, common mode	ETSI EN 301 489-1 V2.2.0 Clause 9.4	EN 61000-4-4:2012	B	N/A
Surges	ETSI EN 301 489-1 V2.2.0 Clause 9.8	EN 61000-4-5:2014	B	N/A
Radio frequency, common mode	ETSI EN 301 489-1 V2.2.0 Clause 9.5	EN 61000-4-6:2014	A	N/A
Volt. Interruptions Volt. Dips	ETSI EN 301 489-1 V2.2.0 Clause 9.7	EN 61000-4-11:2004	B / C / C NOTE (3)	N/A
NOTE:				
	(1) "N/A" denotes test is not applicable in this Test Report			
	(2) Alternatively, for equipment intended to be used exclusively in an industrial environment or a telecommunication centre, the class A limits may be used.			
	(3) Voltage dip: 100% reduction – Performance Criteria B			
	Voltage dip: 100% reduction – Performance Criteria B			
	Voltage dip: 70% reduction – Performance Criteria C			
	Voltage Interruption: 0% Interruption – Performance Criteria C			

3. Emission Test

3.1. Conducted Emission Test at Main Ports

3.1.1. Test Standard and Limit

Test Standard	ETSI EN 301 489-1 V2.2.0 Clause 8.3 & 8.4
Basic Standard	EN 55032: 2015

Limits for conducted emissions

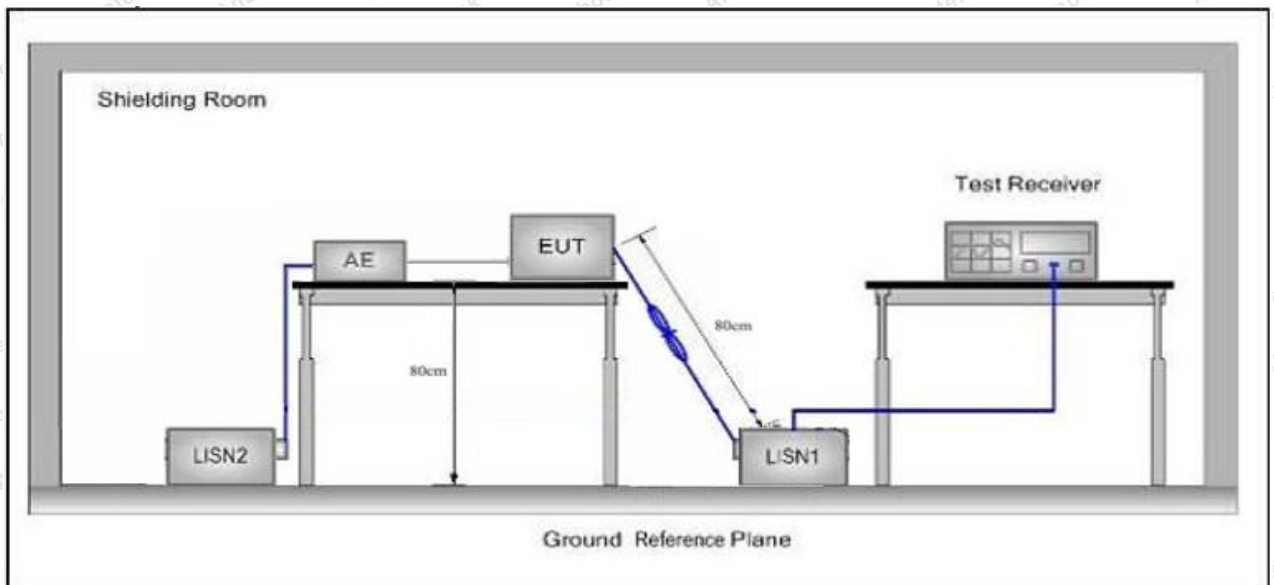
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50

Remark: *Decreasing linearly with logarithm of the frequency.

Limits for conducted emissions of equipment
intended to be used in telecommunication centres and industrial environment

Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	79	66
	500kHz~30MHz	73	60

3.1.2. Test Setup



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3.1.3. 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 ETSI EN 301 489-1 V2.2.0& EN55032: 2015 on Conducted Emission Measurement.

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

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

For the actual test configuration, please refer to the related Item EUT Test Photos.

3.1.4. Test Data

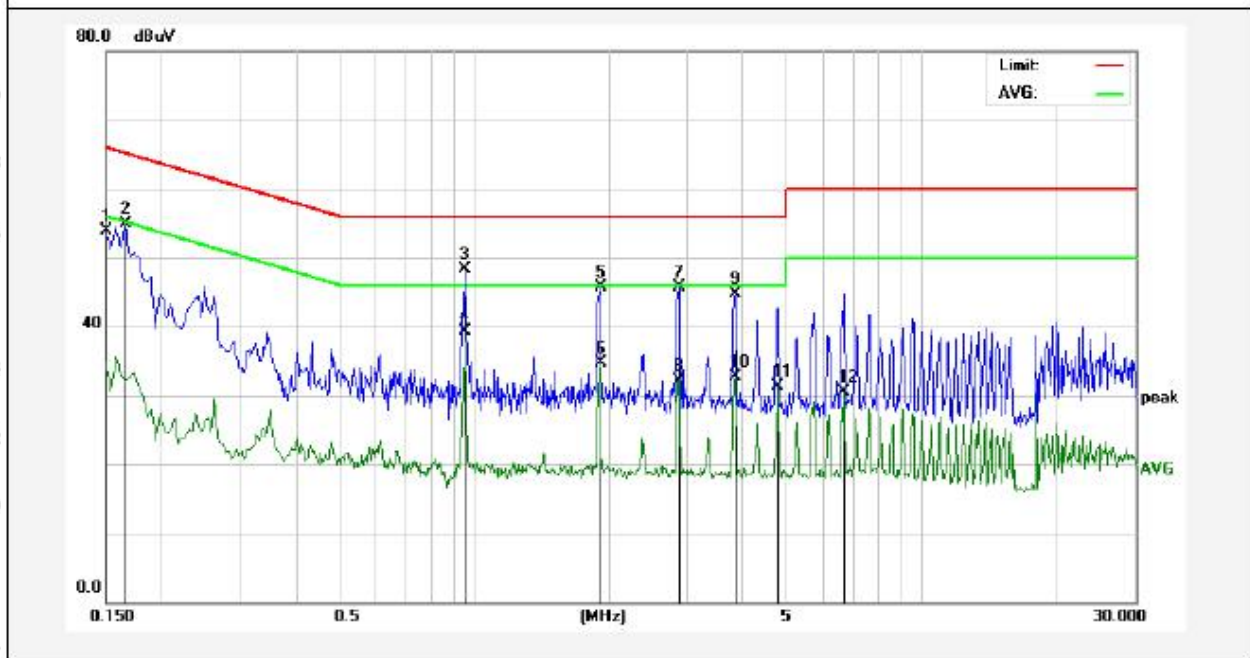
PASS

The EUT should be compliance to the limit of Class B

Only the worst case data was showed in the report, please to see the following pages

Conducted Emission Test Data

Test Site: 1# Shielded Room
 Operating Condition: Mode 1
 Test Specification: AC 110V, 50Hz for adapter
 Comment: Live Line
 Tem.:21.0°C Hum.:56%

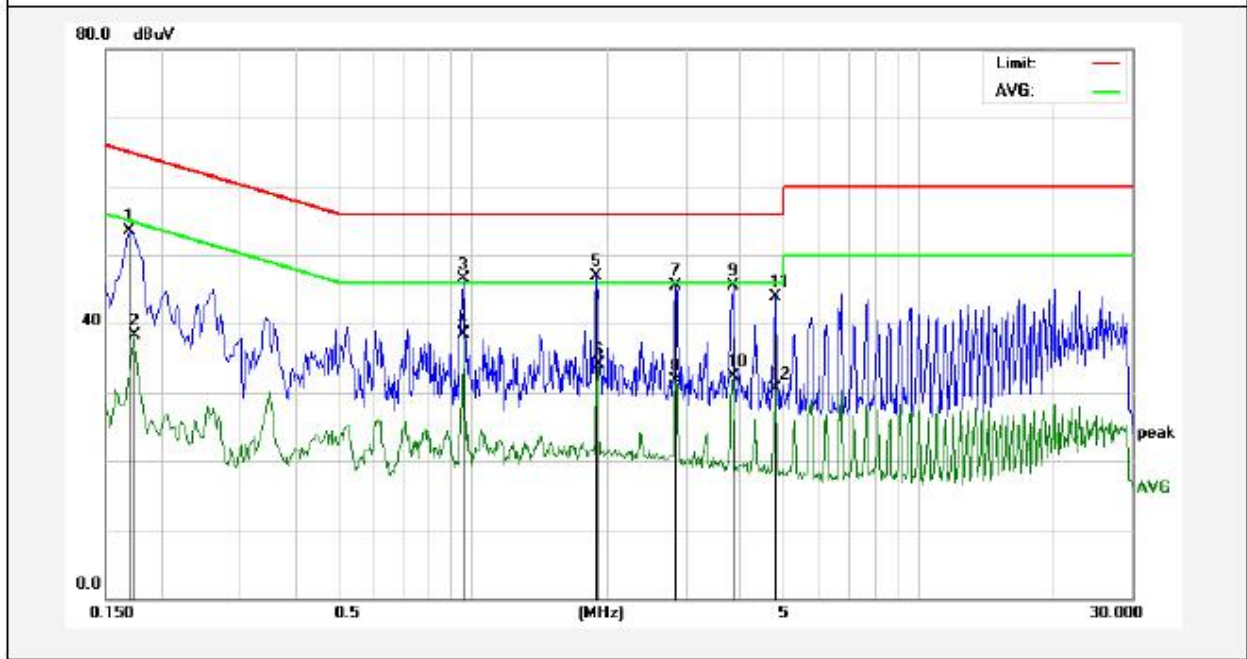


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1499	33.97	19.90	53.87	66.00	-12.13	QP	
2	0.1660	35.03	19.90	54.93	65.15	-10.22	QP	
3	0.9540	28.18	20.11	48.29	56.00	-7.71	QP	
4	0.9540	19.18	20.11	39.29	46.00	-6.71	AVG	
5	1.9100	25.64	20.14	45.78	56.00	-10.22	QP	
6	1.9100	14.50	20.14	34.64	46.00	-11.36	AVG	
7	2.8620	25.45	20.16	45.61	56.00	-10.39	QP	
8	2.8620	12.04	20.16	32.20	46.00	-13.80	AVG	
9	3.8220	24.49	20.18	44.67	56.00	-11.33	QP	
10	3.8220	12.60	20.18	32.78	46.00	-13.22	AVG	
11	4.7779	11.09	20.20	31.29	46.00	-14.71	AVG	
12	6.6859	10.34	20.25	30.59	50.00	-19.41	AVG	

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Conducted Emission Test Data

Test Site: 1# Shielded Room
 Operating Condition: Mode 1
 Test Specification: AC 110V, 50Hz for adapter
 Comment: Neutral Line
 Tem.:21.0°C Hum.:56%

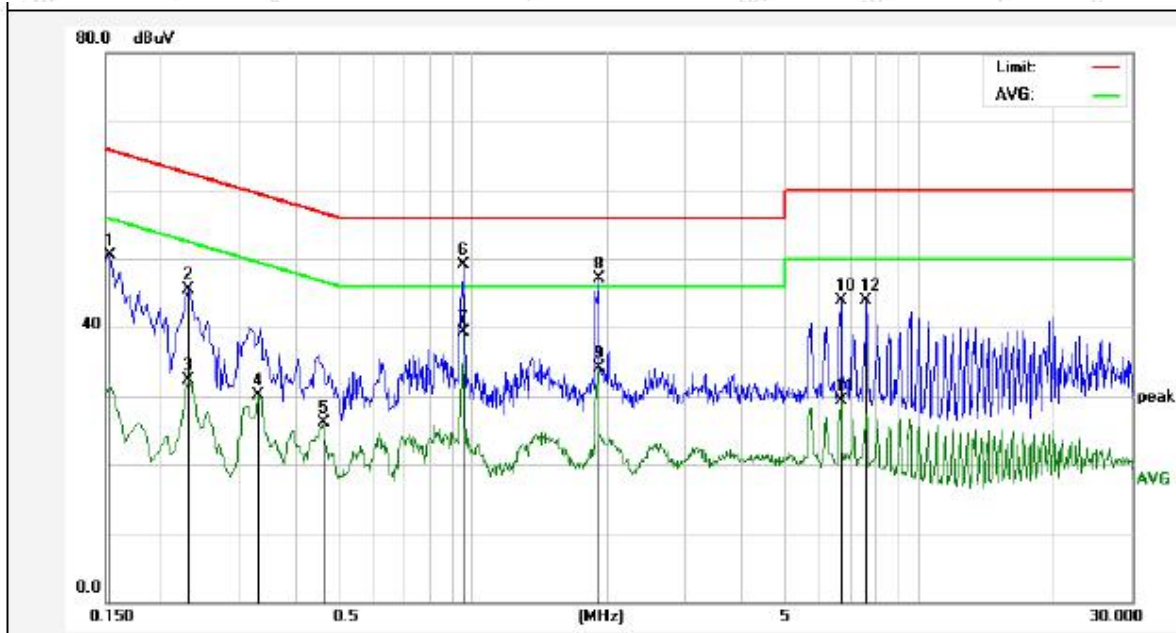


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1700	33.61	19.90	53.51	64.96	-11.45	QP	
2	0.1740	18.31	19.90	38.21	54.76	-16.55	AVG	
3	0.9540	26.43	20.11	46.54	56.00	-9.46	QP	
4	0.9540	18.43	20.11	38.54	46.00	-7.46	AVG	
5	1.8940	26.79	20.14	46.93	56.00	-9.07	QP	
6	1.9100	14.03	20.14	34.17	46.00	-11.83	AVG	
7	2.8540	25.27	20.16	45.43	56.00	-10.57	QP	
8	2.8540	11.52	20.16	31.68	46.00	-14.32	AVG	
9	3.8220	25.25	20.18	45.43	56.00	-10.57	QP	
10	3.8220	12.15	20.18	32.33	46.00	-13.67	AVG	
11	4.7780	23.64	20.20	43.84	56.00	-12.16	QP	
12	4.7780	10.40	20.20	30.60	46.00	-15.40	AVG	

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Conducted Emission Test Data

Test Site: I# Shielded Room
 Operating Condition: Mode 1
 Test Specification: AC 230V, 50Hz for adapter
 Comment: Live Line
 Tem.:21.0°C Hum.:56%

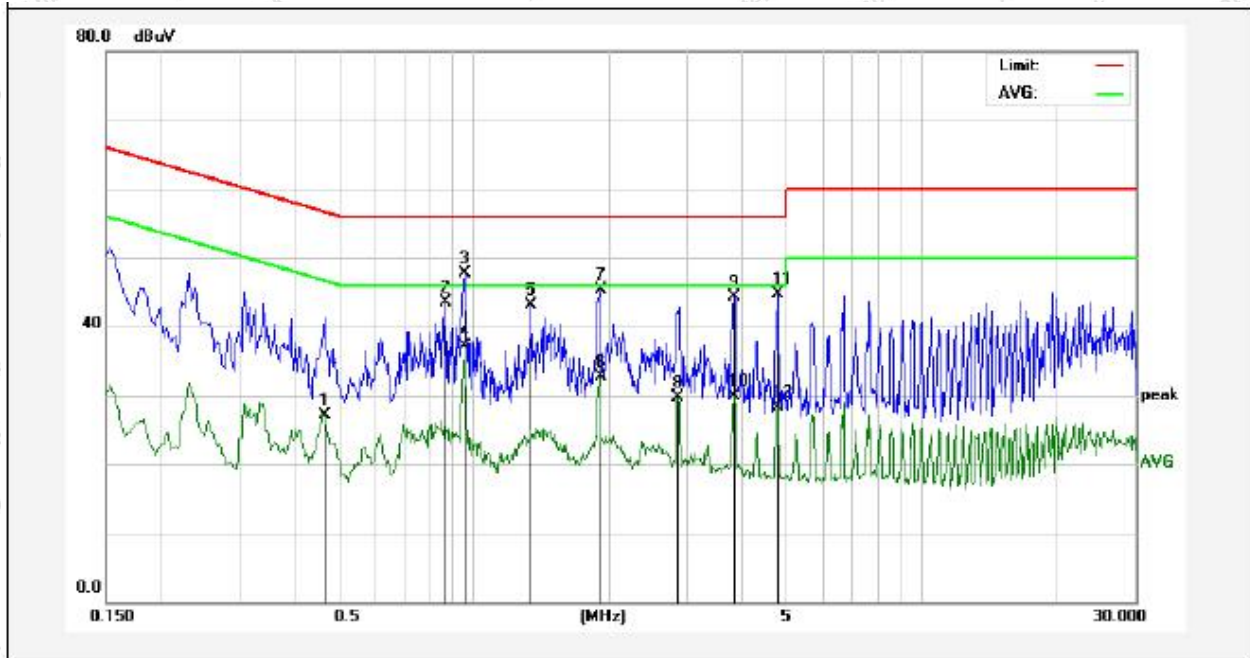


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1539	30.55	19.90	50.45	65.78	-15.33	QP	
2	0.2300	25.56	19.89	45.45	62.45	-17.00	QP	
3	0.2300	12.36	19.89	32.25	52.45	-20.20	AVG	
4	0.3300	10.12	19.90	30.02	49.45	-19.43	AVG	
5	0.4620	6.21	19.96	26.17	46.66	-20.49	AVG	
6	0.9540	28.98	20.11	49.09	56.00	-6.91	QP	
7	0.9540	19.15	20.11	39.26	46.00	-6.74	AVG	
8	1.9100	26.89	20.14	47.03	56.00	-8.97	QP	
9	1.9100	13.98	20.14	34.12	46.00	-11.88	AVG	
10	6.6780	23.57	20.25	43.82	60.00	-16.18	QP	
11	6.6780	8.99	20.25	29.24	50.00	-20.76	AVG	
12	7.6340	23.56	20.28	43.84	60.00	-16.16	QP	

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Conducted Emission Test Data

Test Site: I# Shielded Room
 Operating Condition: Mode 1
 Test Specification: AC 230V, 50Hz for adapter
 Comment: Neutral Line
 Tem.:21.0°C Hum.:56%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.4620	7.19	19.96	27.15	46.66	-19.51	AVG	
2	0.8660	23.34	20.08	43.42	56.00	-12.58	QP	
3	0.9500	27.66	20.11	47.77	56.00	-8.23	QP	
4	0.9540	16.98	20.11	37.09	46.00	-8.91	AVG	
5	1.3420	22.90	20.13	43.03	56.00	-12.97	QP	
6	1.9060	12.54	20.14	32.68	46.00	-13.32	AVG	
7	1.9100	25.10	20.14	45.24	56.00	-10.76	QP	
8	2.8460	9.57	20.16	29.73	46.00	-16.27	AVG	
9	3.8100	24.05	20.18	44.23	56.00	-11.77	QP	
10	3.8100	9.75	20.18	29.93	46.00	-16.07	AVG	
11	4.7660	24.51	20.20	44.71	56.00	-11.29	QP	
12	4.7660	8.18	20.20	28.38	46.00	-17.62	AVG	

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3.2. Radiated Emission Test

3.2.1. Test Standard and Limit

Test Standard	ETSI EN 301 489-1 V2.2.0 Clause 8.2
Basic Standard	EN 55032: 2015

Radiated Emission Test Limit (Below 1000MHz)

Frequency (MHz)	Limit (dB μ V/m)	
	Quasi-peak Level	
	Class B	Class A
30MHz~230MHz	40	50
230MHz~1000MHz	47	57

Remark: 1. The lower limit shall apply at the transition frequency. 2. The test distance is 3m.

Radiated Emission Test Limit (Above 1000MHz)

Frequency (MHz)	Limit (dB μ V/m)			
	Class B		Class A	
	Peak	Average	Peak	Average
1000 MHz -3000 MHz	70	50	76	56
3000 MHz -6000 MHz	74	54	80	60

Remark: 1. The lower limit applies at the transition frequency. 2. The test distance is 3m.

Radiated Emission Test Limit for FM Receivers

Frequency (MHz)	Limit (dB μ V/m)	
	Quasi-peak Level	
	Fundamental	Harmonics
30MHz~230MHz	60	52
230MHz~300MHz	60	52
300MHz~1000MHz	60	56

Remark: 1. The lower limit shall apply at the transition frequency. 2. The test distance is 3m.

Frequency Range of Radiated Measurement

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 6 GHz, whichever is lower

3.2.2. Test Setup

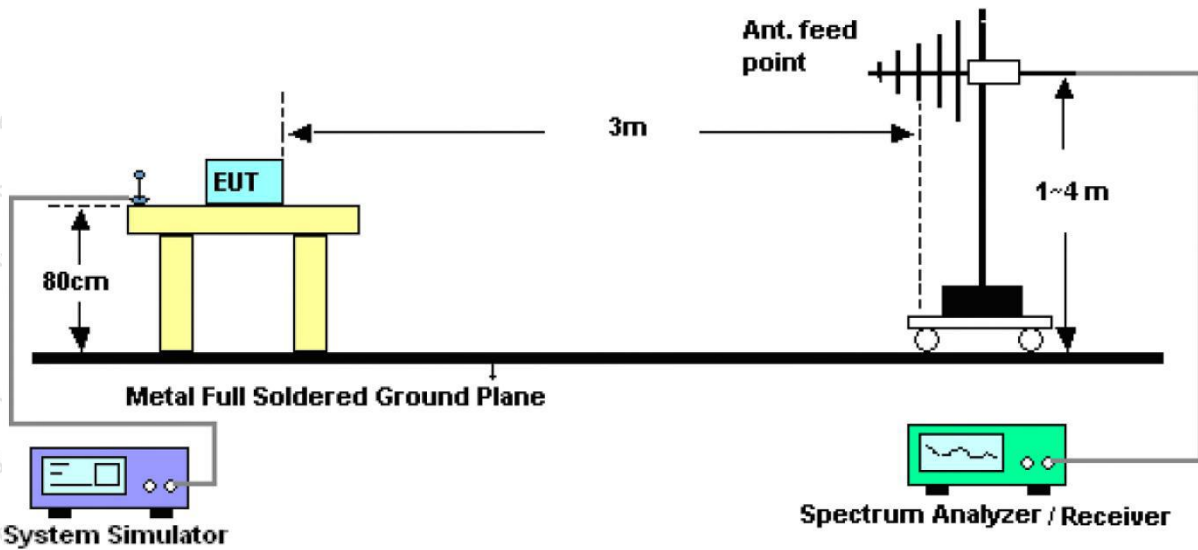


Figure 1. 30MHz to 1GHz

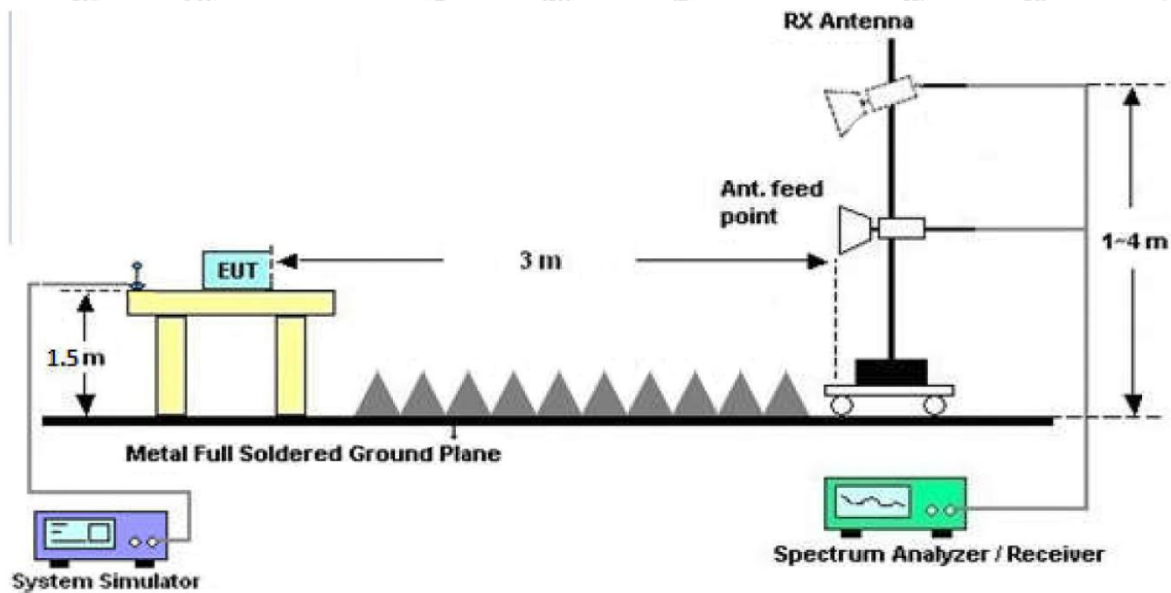


Figure 2. Above 1 GHz

3.2.3. Test Procedure

- 1) The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- 2) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- 3) The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4) The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- 5) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold

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mode when the test frequency is below 1GHz.

The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.

6) For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak/Average detection at frequency above 1GHz.

3.2.4. Test Data

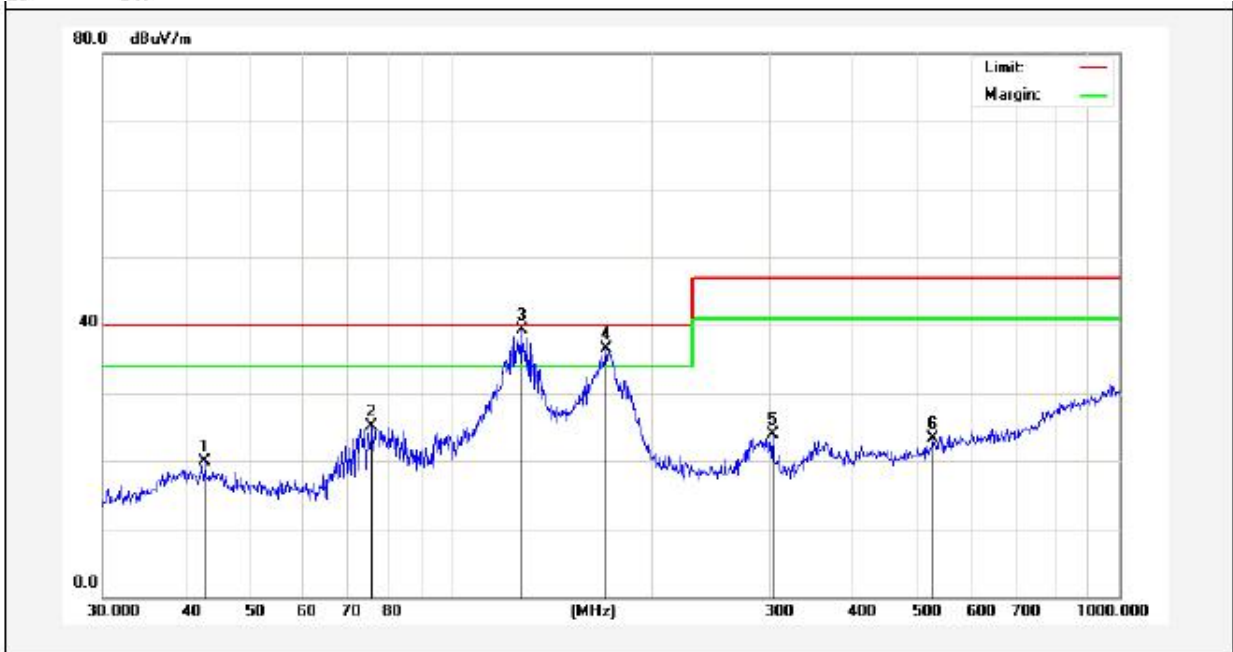
PASS

The EUT should be compliance to the limit of Class B

Only the worst case data was showed in the report, please to see the following pages

Test Results (30~1000MHz)

Job No.: SZAWW180518011 Temp.(°C)/Hum.(%RH): 23.2°C/54%RH
 Standard: EN301489_Class B_3m Power Source: DC 3.7V Battery inside
 Test Mode: Mode 2 Polarization: Vertical

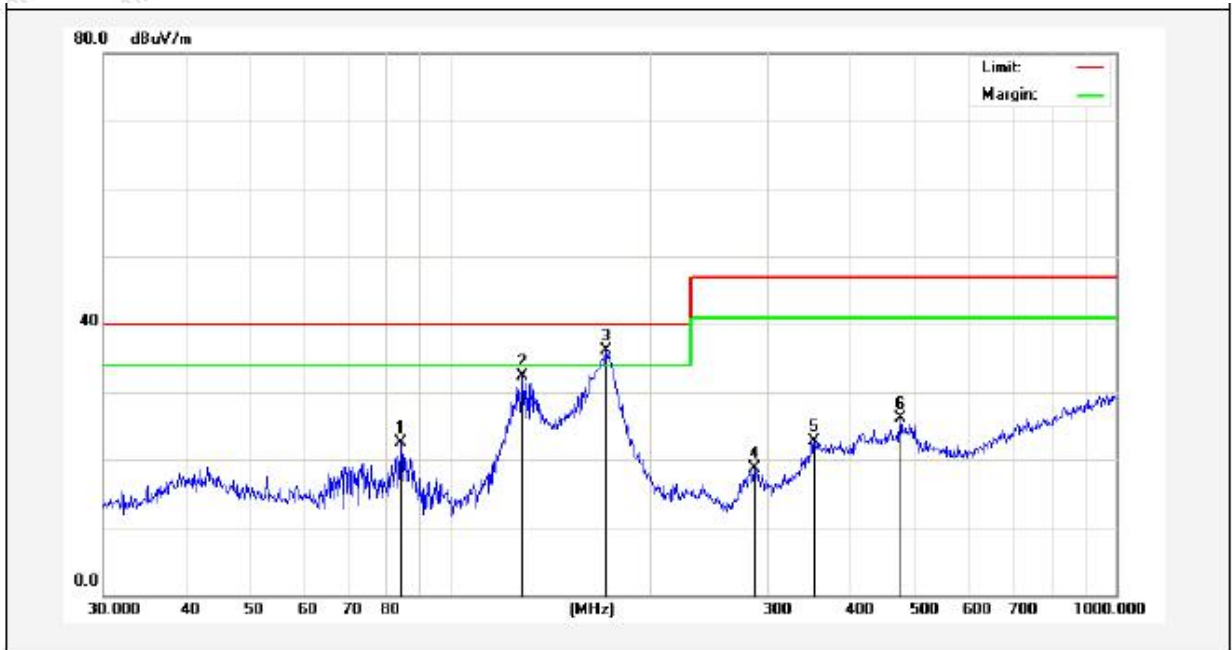


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	42.7496	34.73	-14.90	19.83	40.00	-20.17	peak			
2	75.9770	46.93	-21.83	25.10	40.00	-14.90	peak			
3	127.2176	60.98	-21.60	39.38	40.00	-0.62	peak			
4	170.1947	56.14	-19.57	36.57	40.00	-3.43	peak			
5	302.4812	41.29	-17.39	23.90	47.00	-23.10	peak			
6	524.5538	34.23	-11.02	23.21	47.00	-23.79	peak			

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Test Results (30~1000MHz)

Job No.: SZAWW180518011 Temp.(°C)/Hum.(%RH): 23.2°C/54%RH
 Standard: EN301489_Class B_3m Power Source: DC 3.7V Battery inside
 Test Mode: Mode 2 Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	84.1098	40.71	-18.27	22.44	40.00	-17.56	peak			
2	128.1125	48.78	-16.54	32.24	40.00	-7.76	peak			
3	171.3925	52.62	-16.46	36.16	40.00	-3.84	peak			
4	285.9778	33.53	-14.92	18.61	47.00	-28.39	peak			
5	351.7078	35.69	-12.93	22.76	47.00	-24.24	peak			
6	473.8346	37.86	-11.72	26.14	47.00	-20.86	peak			

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Test Results (1GHz~6GHz)

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Detector
1596.21	50.84	-2.96	47.88	70.00	-22.12	H	PEAK
2135.58	50.17	-2.80	47.37	70.00	-22.63	H	PEAK
2079.60	55.63	-3.66	51.97	70.00	-18.03	H	PEAK
3985.38	48.58	-5.37	43.21	74.00	-30.79	H	PEAK
4674.07	55.53	-4.52	51.01	74.00	-22.99	H	PEAK
4999.71	53.19	-5.40	47.79	74.00	-26.21	H	PEAK
1596.21	41.97	-2.96	39.01	50.00	-10.99	H	AVG
2135.58	44.95	-2.80	42.16	50.00	-7.84	H	AVG
2079.60	37.58	-3.66	33.92	50.00	-16.08	H	AVG
3985.38	42.66	-5.37	37.28	54.00	-16.72	H	AVG
4674.07	43.89	-4.52	39.38	54.00	-14.62	H	AVG
4999.71	41.64	-5.40	36.24	54.00	-17.76	H	AVG
1329.16	46.47	-2.32	44.16	70.00	-25.84	V	PEAK
2080.34	47.64	-2.82	44.82	70.00	-25.18	V	PEAK
2142.39	47.99	-3.89	44.10	70.00	-25.90	V	PEAK
3974.68	51.65	-4.45	47.20	74.00	-26.80	V	PEAK
4387.32	48.30	-5.07	43.23	74.00	-30.77	V	PEAK
5041.62	55.68	-5.38	50.30	74.00	-23.70	V	PEAK
1329.16	37.74	-2.32	35.42	50.00	-14.58	V	AVG
2080.34	39.17	-2.82	36.36	50.00	-13.64	V	AVG
2142.39	38.42	-3.89	34.53	50.00	-15.47	V	AVG
3974.68	42.77	-4.45	38.32	54.00	-15.68	V	AVG
4387.32	39.25	-5.07	34.18	54.00	-19.82	V	AVG
5041.62	42.47	-5.38	37.09	54.00	-16.91	V	AVG

Remark:

1. Level = Receiver Read level + Antenna Factor

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4. Immunity Test

General Performance Criteria

◆ Performance criteria for continuous phenomena applied to transmitters and receivers (CT/CR)

During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

◆ Performance criteria for transient phenomena applied to transmitters and receivers (TT/TR)

After the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer, when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

◆ Performance criteria for equipment which does not provide a continuous communication link

For radio equipment which does not provide a continuous communication link, the performance criteria described in CT/CR and TT/TR are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in CT/CR and TT/TR.

◆ Performance criteria for ancillary equipment tested on a stand alone basis

If ancillary equipment is intended to be tested on a stand alone basis, the performance criteria described in CT/CR and TT/TR are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests.

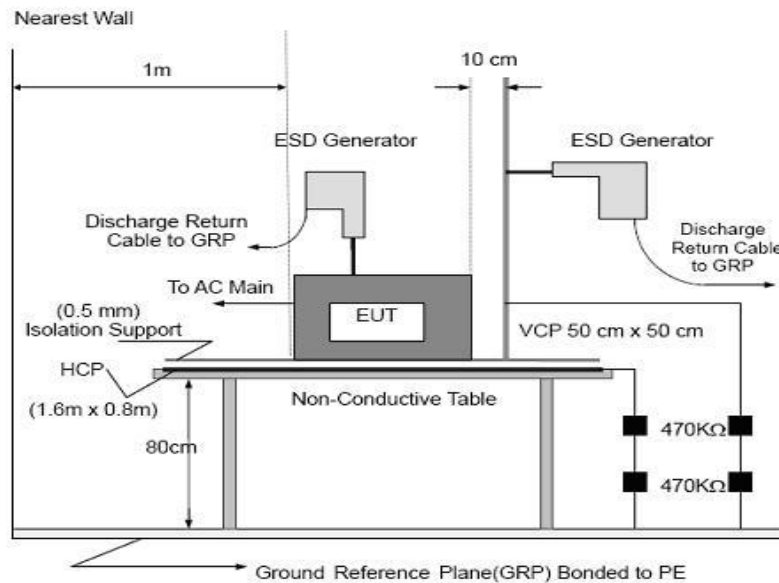
The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in CT/CR and TT/TR.

4.1. Electrostatic Discharge Test

4.1.1. Test Standard and Specification

Test Standard	ETSI EN 301 489-1 V2.2.0 Clause 9.3
Basic Standard	EN 61000-4-2:2009
Discharge Impedance:	330 ohm / 150 pF
Performance Criterion:	CT/CR
Discharge Voltage:	Air Discharge: 2kV/4kV/8kV
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

4.1.2. Test Setup



Note:

TABLE-TOP EQUIPMENT:

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940kohm total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC /EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT:

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2,

and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

4.1.3. Test Procedure

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

1) Contact discharge was applied to conductive surfaces and coupling planes of the EUT.

During the test, it was performed with single discharges. For the single discharge timebetween successive single discharges was at least 1 second.

Vertical Coupling Plane (VCP):

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

2) Air discharges at insulation surfaces of the EUT.

It was at least ten single discharges with positive and negative at the same selected point.

3) For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.4. Test Data

Job No.: SZAWW180518011 Temp.(°C)/Hum.(%RH): 23.2°C/54%RH
 Standard: EN61000-4-2 Power Source: AC 230V, 50Hz for adapter / DC 3.7V Battery inside
 Test Mode: Mode 1, Mode 2

Item	Contact Discharge to conducted surfaces and to coupling planes		Air Discharge at insulating surfaces
	Direct Contact Discharge	Indirect Contact Discharge	
Test Voltage	Reaction of EUT / Result	Reaction of EUT / Result	Reaction of EUT / Result
+2kV	n.r.r. PASS	n.r.r. PASS	n.r.r. PASS
-2kV	n.r.r. PASS	n.r.r. PASS	n.r.r. PASS
+4kV	n.r.r. PASS	n.r.r. PASS	n.r.r. PASS
-4kV	n.r.r. PASS	n.r.r. PASS	n.r.r. PASS
+6kV	-	-	n.r.r. PASS
-6kV	-	-	n.r.r. PASS
+8kV	-	-	n.r.r. PASS
-8kV	-	-	n.r.r. PASS

Remarks: n.r.r. = no reaction recognized

Performance Criteria A observed and No any function degraded during the tests.

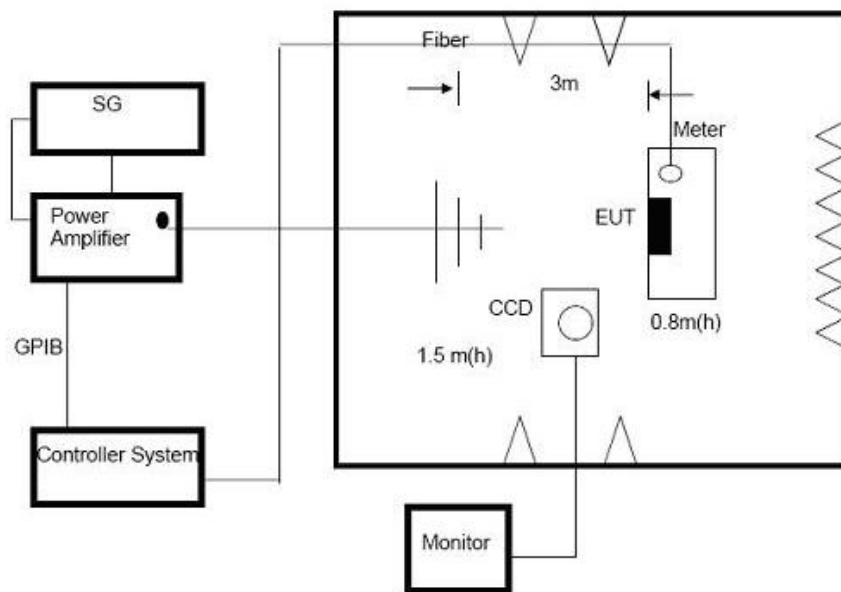
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4.2. Radiated, RF Electromagnetic Fields Test

4.2.1. Test Standard and Specification

Test Standard	ETSI EN 301 489-1 V2.2.0 Clause 9.2
Basic Standard	EN 61000-4-3: 2006+A1:2008+A2:2010
Required Performance	A
Frequency Range	80MHz to 6GHz
Field Strength	3 V/m
Modulation	1kHz Sine Wave, 80%, AM Modulation
Frequency Step	1 % of preceding frequency value
Polarity of Antenna	Horizontal and Vertical
Test Distance	3 m
Antenna Height	1.5 m
Dwell Time	at least 3 seconds

4.2.2. Test Setup



4.2.3. Test Procedure

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber. The testing distance from antenna to the EUT was 3 meters.

- 1) The field strength level was 3V/m
- 2) The frequency range is swept from 80 MHz to 6000 MHz with the signal 80% amplitude modulated with a 1kHz sine wave.
- 3) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond, but shall in no case be less than 0.5s.

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4) The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

4.2.4. Test Data

Job No.: SZAWW180518011 Temp.(°C)/Hum. (%RH): 23.2°C/54%RH
 Standard: EN61000-4-3 Power Source: AC 230V, 50Hz for adapter /
 DC 3.7V Battery inside
 Test Mode: Mode 1, Mode 2

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Observation	Perform. Criteria	Results
80~6000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	CT,CR	A	PASS
			Rear			
			Left			
			Right			

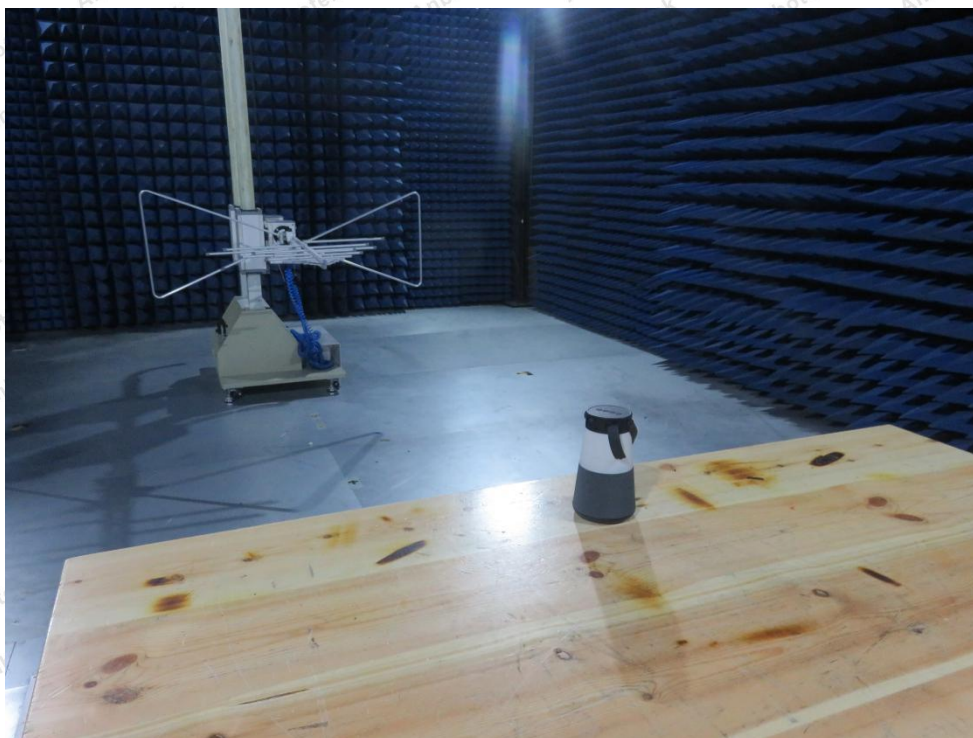
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APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Conducted Emission Test



Photo of Radiation Emission Test



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Photo of Electrostatic Discharge Test

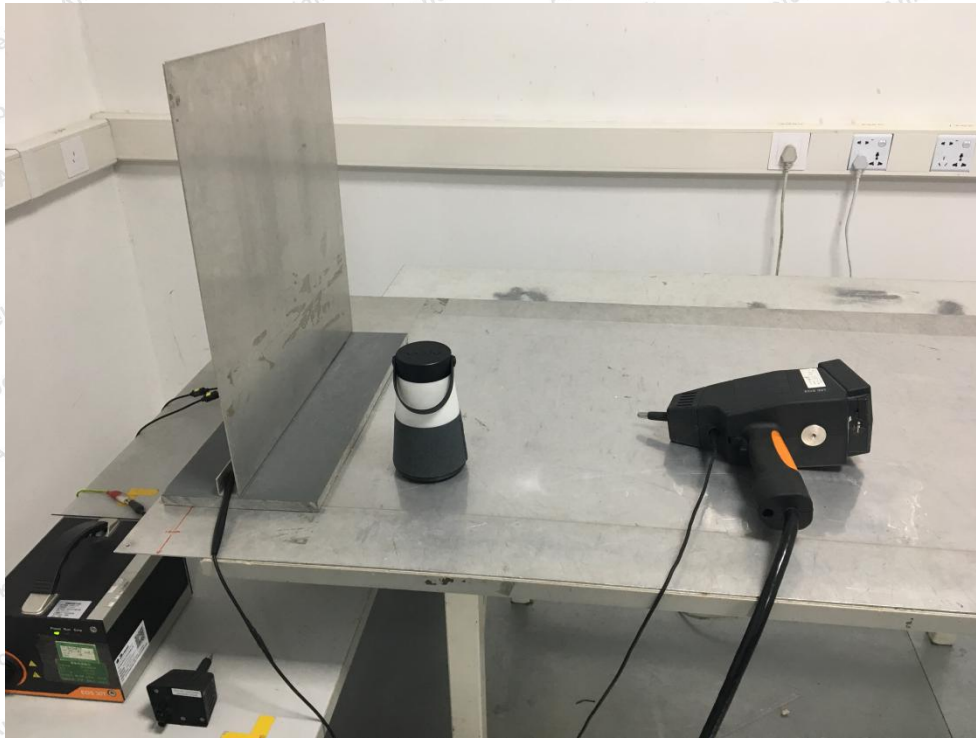
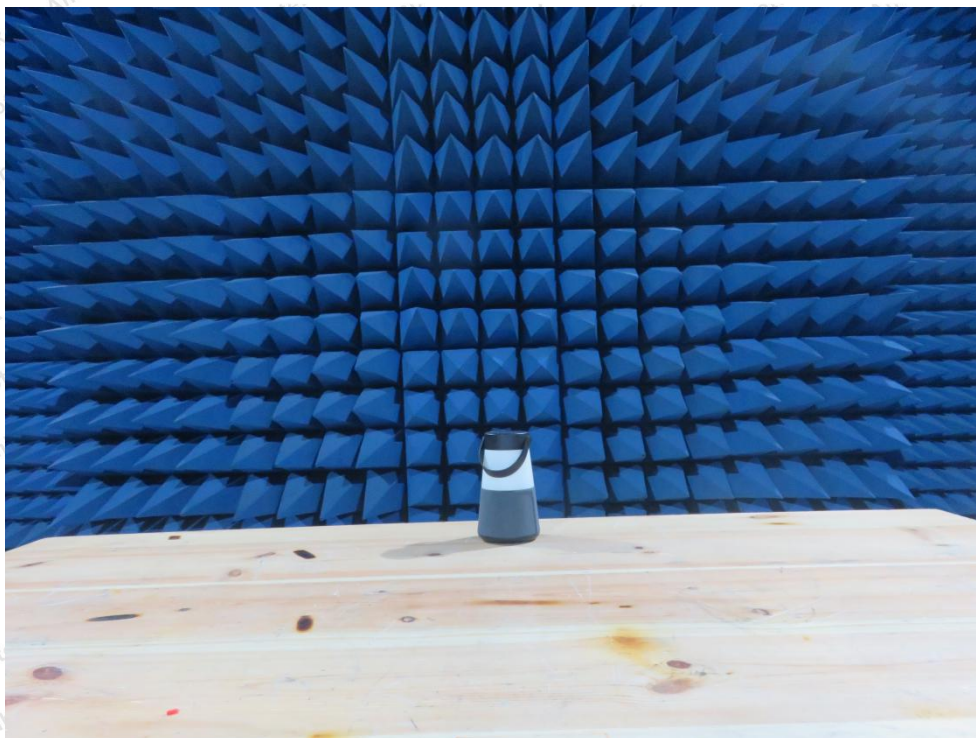
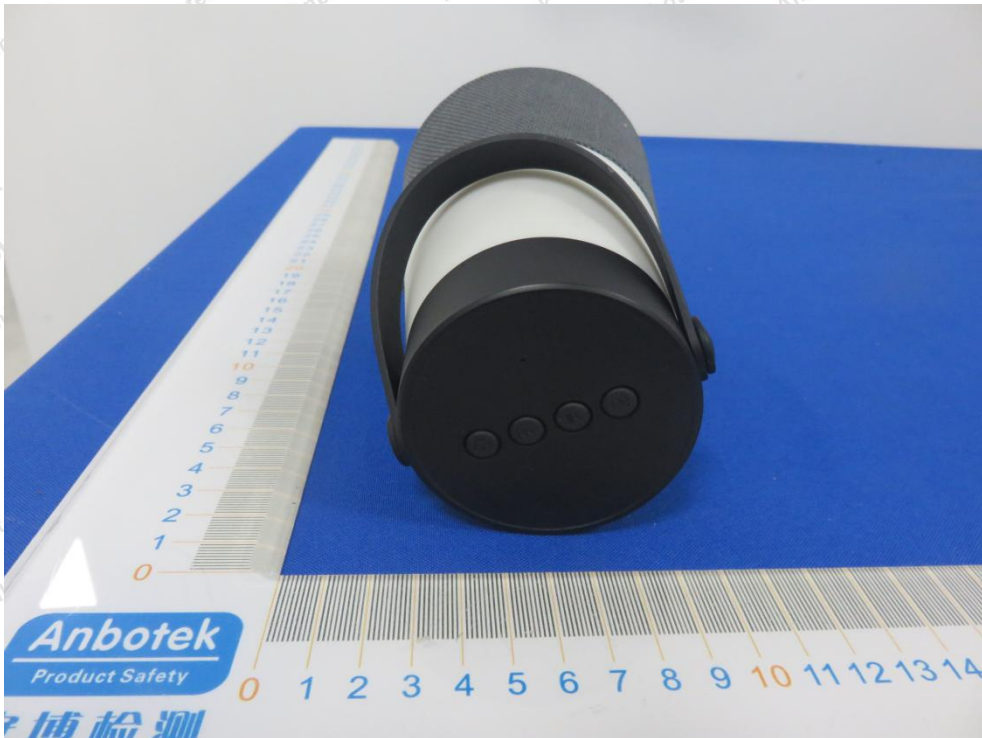
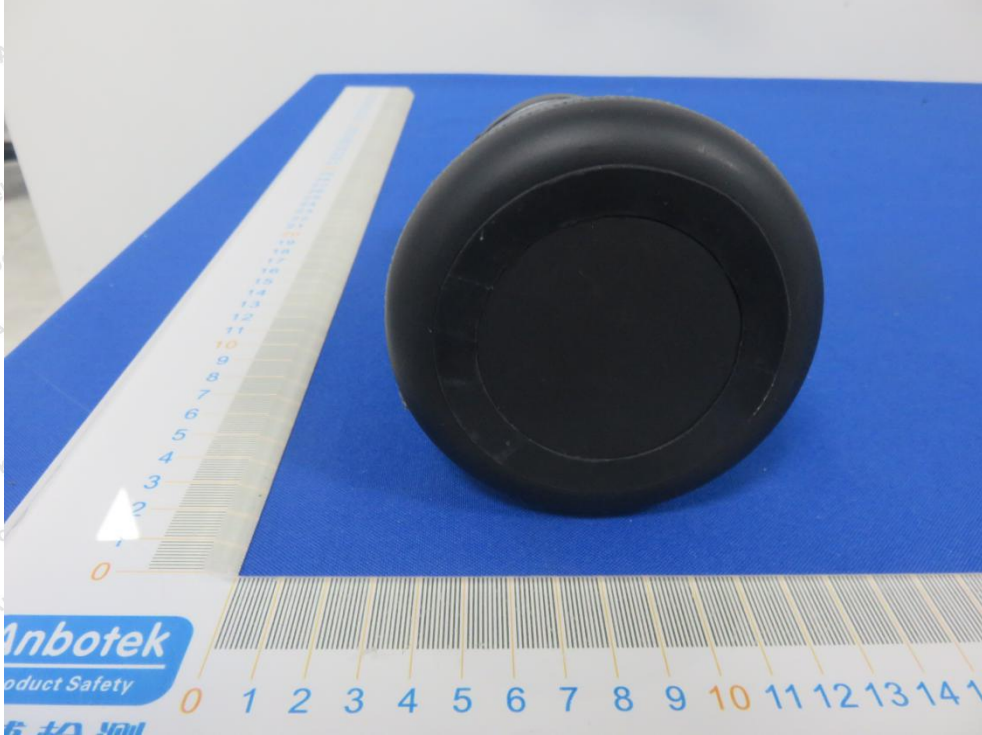


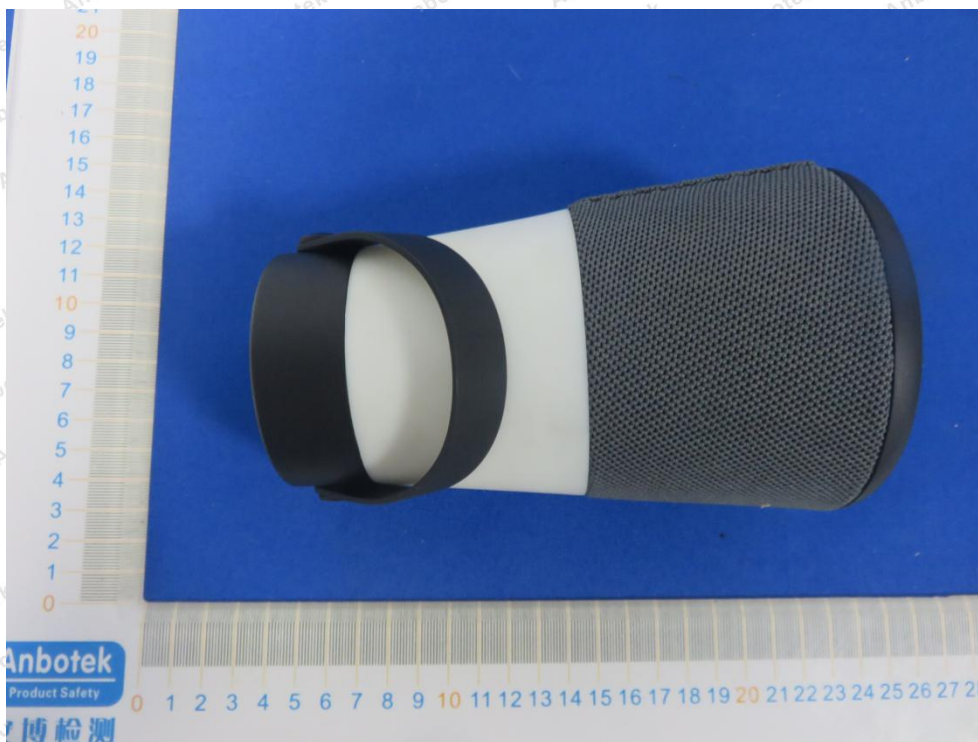
Photo of RF Field Strength Susceptibility Test



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APPENDIX II -- EXTERNAL PHOTOGRAPH





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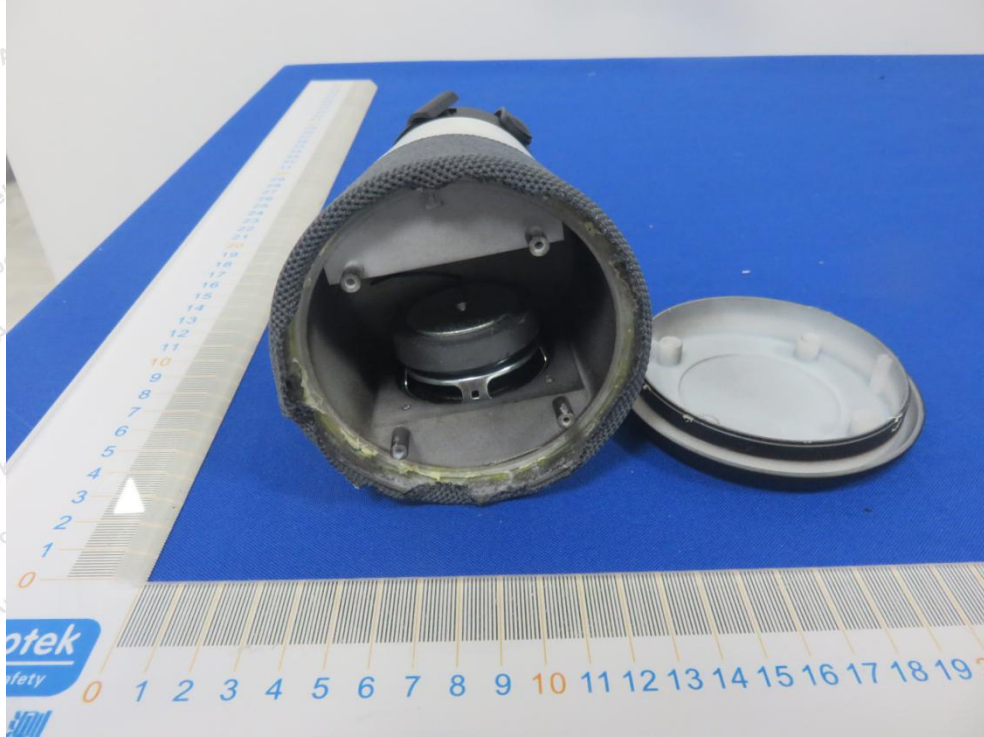


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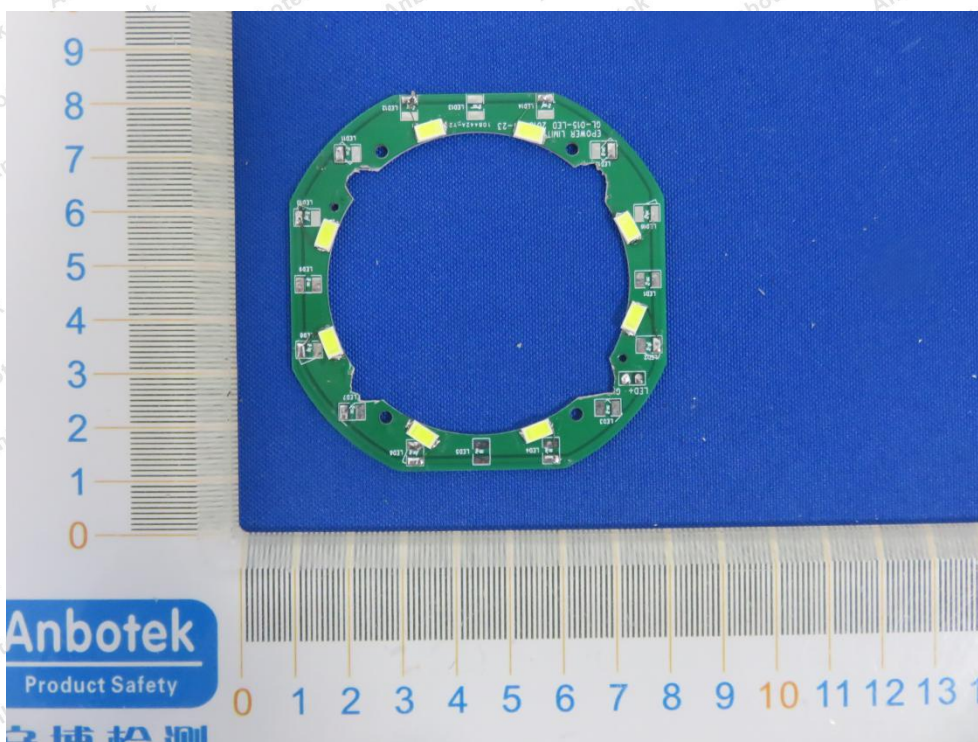
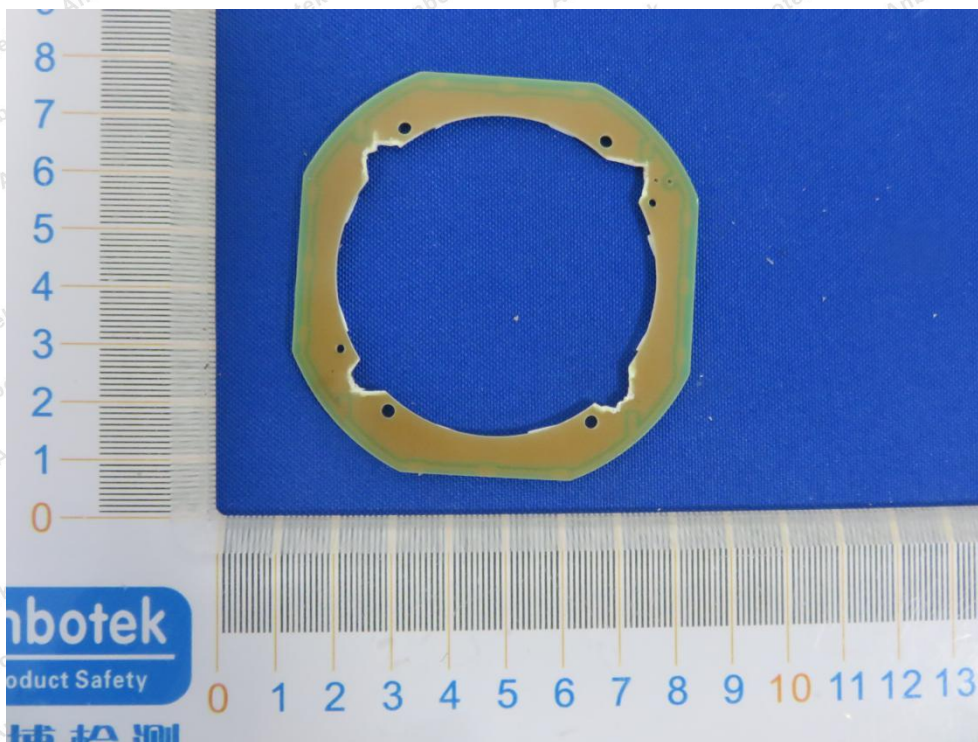


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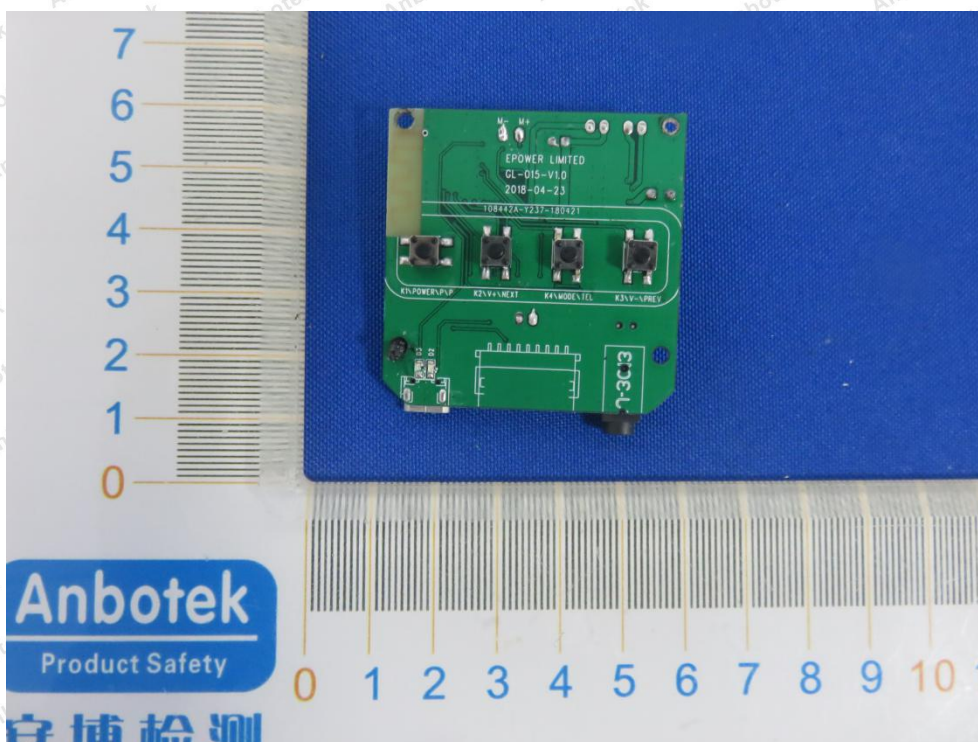
APPENDIX III -- INTERNAL PHOTOGRAPH



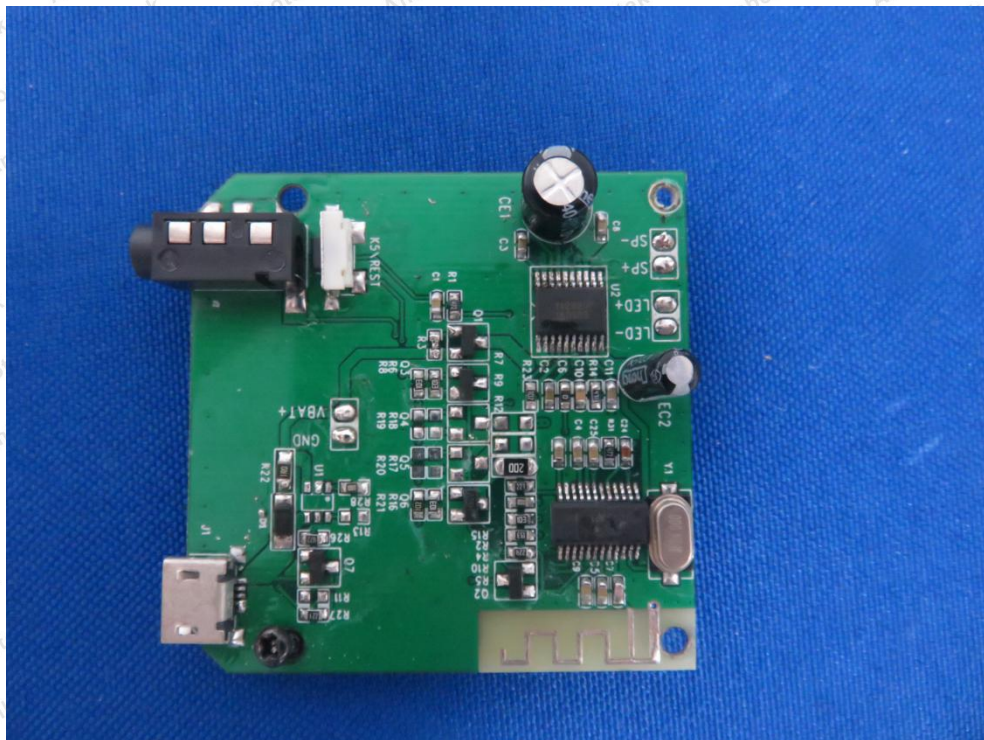
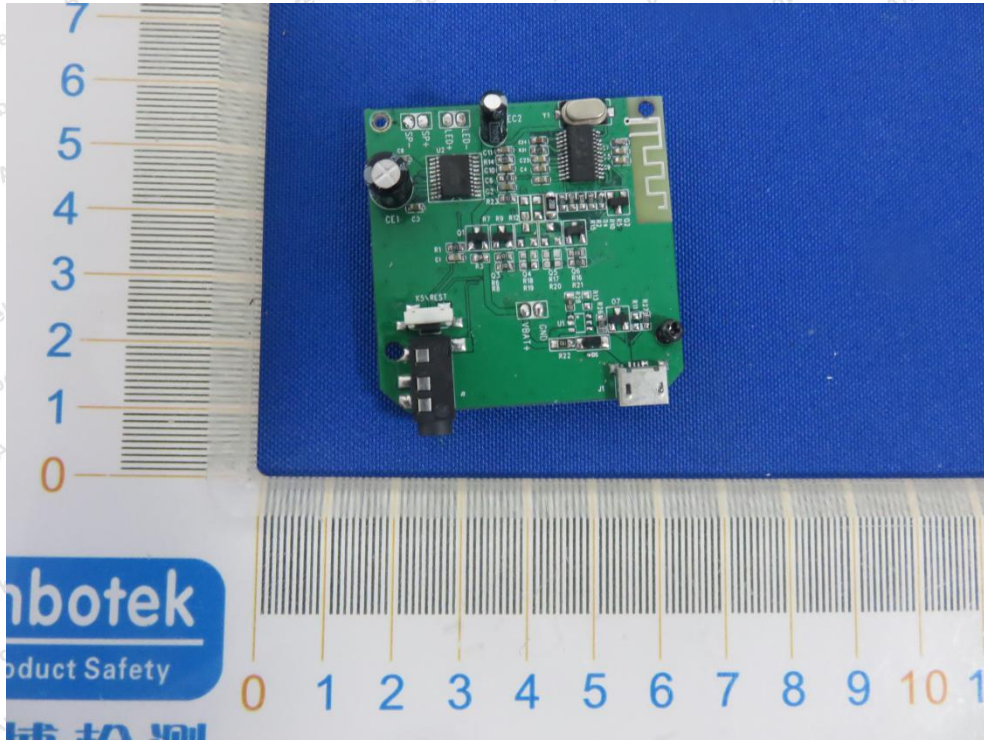
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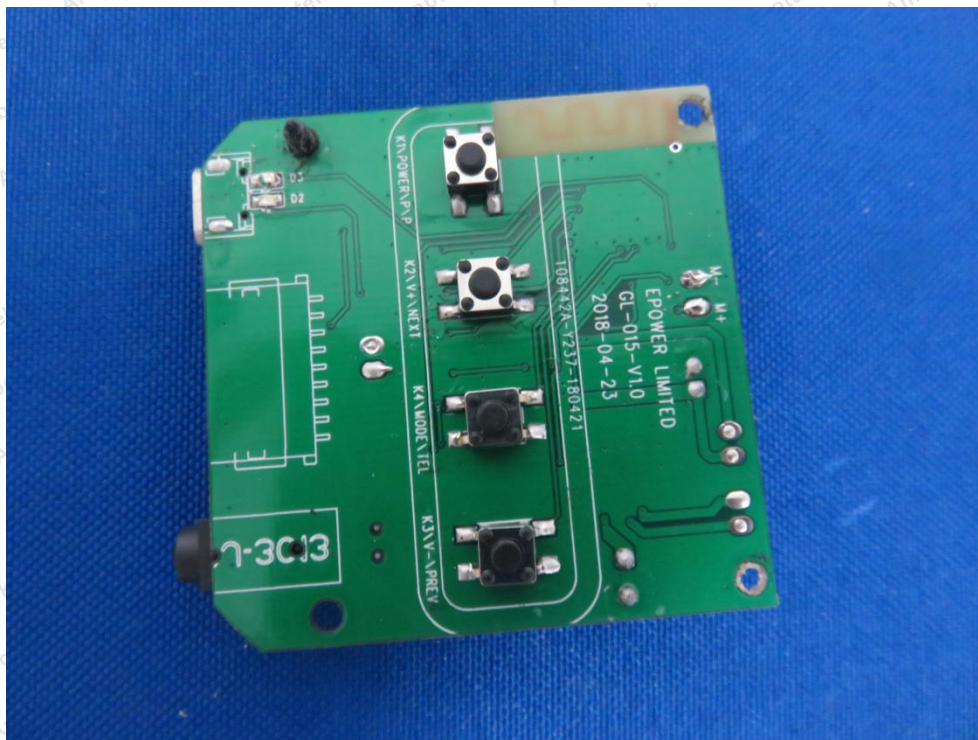
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