

# FCC Test Report

Report No.: AGC02728190203FE03

**FCC ID** : 2AIN9MMA3748  
**APPLICATION PURPOSE** : Original Equipment  
**PRODUCT DESIGNATION** : Bluetooth speaker  
**BRAND NAME** : CRAIG, MAGNAVOX  
**MOFDEL NAME** : MMA3748, CMA3748, CS-089, CS-089A, CS-089B, CS-089C, CS-089D  
**CLIENT** : GXTSONIC TECHNOLOGY (HK) LIMITED  
**DATE OF ISSUE** : Mar. 11, 2019  
**STANDARD(S)** : FCC Part 15 Subpart C Section 15.249  
**TEST PROCEDURE(S)** :  
**REPORT VERSION** : V1.0

## Attestation of Global Compliance (Shenzhen) Co., Ltd

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**Report Revise Record**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Mar. 11, 2019	Valid	Initial release

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**1. VERIFICATION OF CONFORMITY**

<b>Applicant</b>	GXTSONIC TECHNOLOGY (HK) LIMITED
<b>Address</b>	FLAT/RM812, 8/F, HARRY INDUSTRIAL BUILDING 49-51 AU PUI WAN STREET FOTAN, NT, HONGKONG
<b>Manufacturer</b>	SHENZHEN GXTSONIC TECHNOLOGY CO., LTD
<b>Address</b>	1F, Building 3, Tianxin Shuichan Industrial Park, Gushu Village, Xixiang Town, Bao`an District, Shenzhen, CHINA
<b>Factory</b>	SHENZHEN GXTSONIC TECHNOLOGY CO., LTD
<b>Address</b>	1F, Building 3, Tianxin Shuichan Industrial Park, Gushu Village, Xixiang Town, Bao`an District, Shenzhen, CHINA
<b>Product Designation</b>	Bluetooth speaker
<b>Brand Name</b>	CRAIG, MAGNAVOX
<b>Test Model</b>	MMA3748
<b>Series Model</b>	CMA3748, CS-089, CS-089A , CS-089B, CS-089C, CS-089D
<b>Difference description</b>	All the same except for the appearance structure and model name
<b>Date of test</b>	Feb. 28, 2019 to Mar. 07, 2019
<b>Deviation</b>	None
<b>Condition of Test Sample</b>	Normal
<b>Test Result</b>	Pass
<b>Report Template</b>	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.249. The test results of this report relate only to the tested sample identified in this report.

Tested By



Erik Yang(Yang Jianmin) Mar. 07, 2019

Reviewed By



Bart Xie(Xie Xiaobin) Mar. 11, 2019

Approved By



Forrest Lei(Lei Yonggang)  
 Authorized Officer Mar. 11, 2019

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## 2. GENERAL INFORMATION

### 2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

<b>Operation Frequency</b>	2.402 GHz to 2.480GHz
<b>Bluetooth Version</b>	V4.2
<b>Modulation</b>	BR <input checked="" type="checkbox"/> GFSK, EDR <input checked="" type="checkbox"/> π /4-DQPSK, <input type="checkbox"/> 8DPSK BLE <input type="checkbox"/> GFSK
<b>Number of channels</b>	79 for BR/EDR
<b>Hardware Version</b>	HF-9100
<b>Software Version</b>	V2
<b>Antenna Designation</b>	PCB Antenna
<b>Antenna Gain</b>	-0.68dBi
<b>Power Supply</b>	DC 3.7V by battery
Note: 1. The USB port only used for charging and can't be used to transfer data with PC. 2. The standard USB port only can read data from U-disk and can't be used to transfer data with PC	

### 2.2. TABLE OF CARRIER FREQUENCIES

BR/EDR channel List

Frequency Band	Channel Number	Frequency
2400~2483.5MHz	00	2402MHz
	01	2403MHz
	:	:
	38	2440 MHz
	39	2441 MHz
	40	2442 MHz
	:	:
	77	2479 MHz
	78	2480 MHz

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### 3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%.

- Uncertainty of Conducted Emission,  $U_c = \pm 3.2$  dB
- Uncertainty of Radiated Emission below 1GHz,  $U_c = \pm 3.9$  dB
- Uncertainty of Radiated Emission above 1GHz,  $U_c = \pm 4.8$  dB

### 4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Low channel $\pi/4$ -DQPSK
5	Middle channel $\pi/4$ -DQPSK
6	High channel $\pi/4$ -DQPSK
7	BT Link with charging
8	BT Link

Note: 1. All the test modes can be supply by battery, only the result of the worst case was recorded in the report, if no other cases.  
 2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.  
 3. The EUT used fully-charged battery when tested.  
 4. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

Software Setting

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## 5. SYSTEM TEST CONFIGURATION

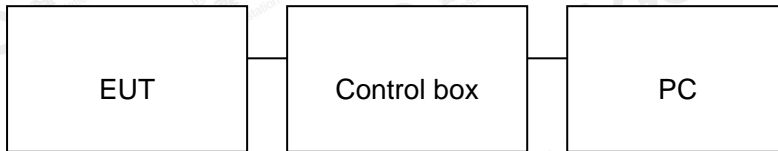
### 5.1. CONFIGURATION OF EUT SYSTEM

Configure 1: (Normal hopping)



**Note:** Owing to the EUT has own battery, testing may be performed while PC or adapter removed.

Configure 2: (Control continuous TX)



### 5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	Bluetooth speaker	CRAIG, MAGNAVOX	MMA3748	EUT
2	Battery	CXY	503048	Accessory
3	Ipod	APPLE	A1367	A.E
4	Control box	DOFLY	LY-USB-TIL V2.2	A.E
5	Adapter	N/A	XCMS03-05101	A.E
6	USB Cable	N/A	1m unshielded	A.E
7	U-Disk	Kingston	DT 101G2/16GB	A.E
8	TF Card	Kingston	SDA10/16GB	A.E

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**5.3. SUMMARY OF TEST RESULTS**

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.249(a) §15.209	Radiated Emission	Compliant
§15.249(d)	Band Edges	Compliant
§15.207	Conduction Emission	Compliant
§15.215	Bandwidth	Compliant

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## 6. TEST FACILITY

<b>Test Site</b>	Attestation of Global Compliance (Shenzhen) Co., Ltd
<b>Location</b>	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
<b>Designation Number</b>	CN1259
<b>A2LA Cert. No.</b>	5054.02
<b>FCC Test Firm Registration Number</b>	975832
<b>Description</b>	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

## 7. TEST METHOD

All measurements contained in this report were conducted with ANSI C63.10-2013

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## 8. TEST EQUIPMENT LIST

### TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Jun. 12, 2018	Jun. 11, 2019
LISN	R&S	ESH2-Z5	100086	Aug. 28, 2018	Aug. 27, 2019

### TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun. 12, 2018	Jun. 11, 2019
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 20, 2018	Dec. 19, 2019
2.4GHz Fliter	Micro-tronics	087	N/A	Jun. 12, 2018	Jun. 11, 2019
Attenuator	Weinachel Corp	58-30-33	N/A	Jun. 12, 2018	Jun. 11, 2019
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 21, 2017	Sep. 20, 2020
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Jun. 14, 2018	Jun. 13, 2020
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May. 26, 2018	May. 25, 2020
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Oct. 25, 2018	Oct. 24, 2019
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep. 28, 2017	Sep. 27, 2019

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## 9. RADIATED EMISSION

### 9.1 TEST LIMIT

#### Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

#### Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		$\mu$ V/m	dB( $\mu$ V)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB( $\mu$ V)/m (Peak) 54.0 dB( $\mu$ V)/m (Average)	

Remark:

- (1) Emission level  $\text{dB } \mu \text{V} = 20 \log \text{ Emission level } \mu \text{V/m}$
- (2) The smaller limit shall apply at the cross point between two frequency bands.
- (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

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## 9.2. MEASUREMENT PROCEDURE

1. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Below 1GHz)
2. The measuring distance of 3m shall used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Above 1GHz)
3. The height of the test antenna shall vary between 1m to 4m.Both horizontal and vertical polarization Of the antenna are set to make the measurement.
4. The initial step in collecting radiated emission data is a receive peak detector mode. Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
5. All readings are peak unless otherwise stated QP in column of Note. Peak denoted that the Peak reading compliance with the QP limits and then QP Mode measurement didn't perform(Below 1GHz)
6. All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value compliance with the Peak limits and lower than AVG Limits, the EUT shall be deemed to meet Peak & AVG limits and then only Peak mode was measured, but AVG mode didn't perform.(Above 1GHz)

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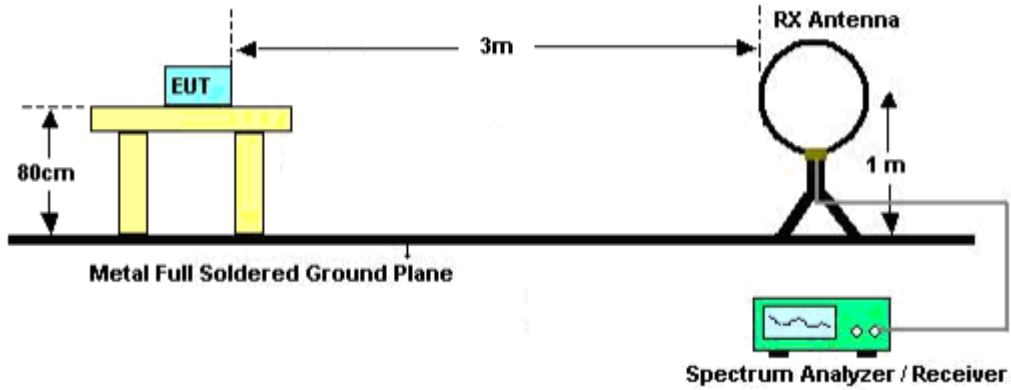
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	Fundamental: 2.4~2.483GHz RBW 2MHz/ VBW 6MHz for Peak, RBW 2MHz/ VBW 10Hz for Average Harmonics: 1GHz~25GHz RBW 1MHz/ VBW 3MHz for Peak, RBW 1MHz/ VBW 10Hz for Average
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

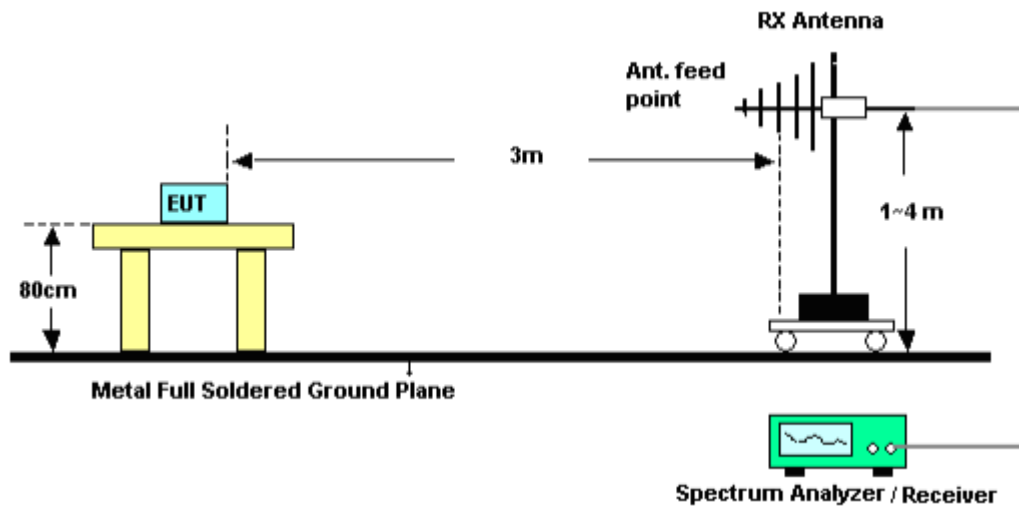
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**9.3. TEST SETUP**

**Radiated Emission Test-Setup Frequency Below 30MHz**



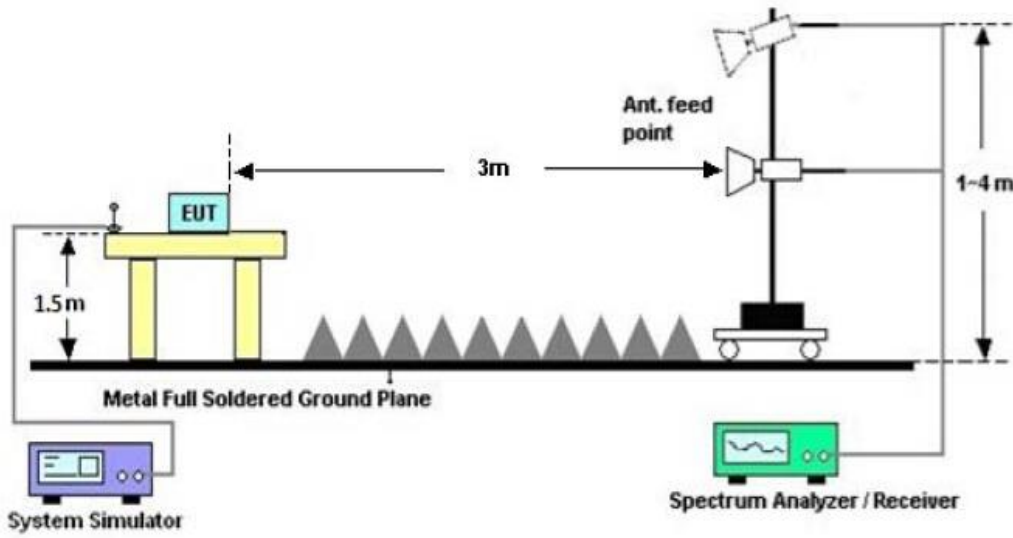
**RADIATED EMISSION TEST SETUP 30MHz-1000MHz**



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RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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**9.4. TEST RESULT**

**FOR BR/EDR**

**(Worst modulation: GFSK)**

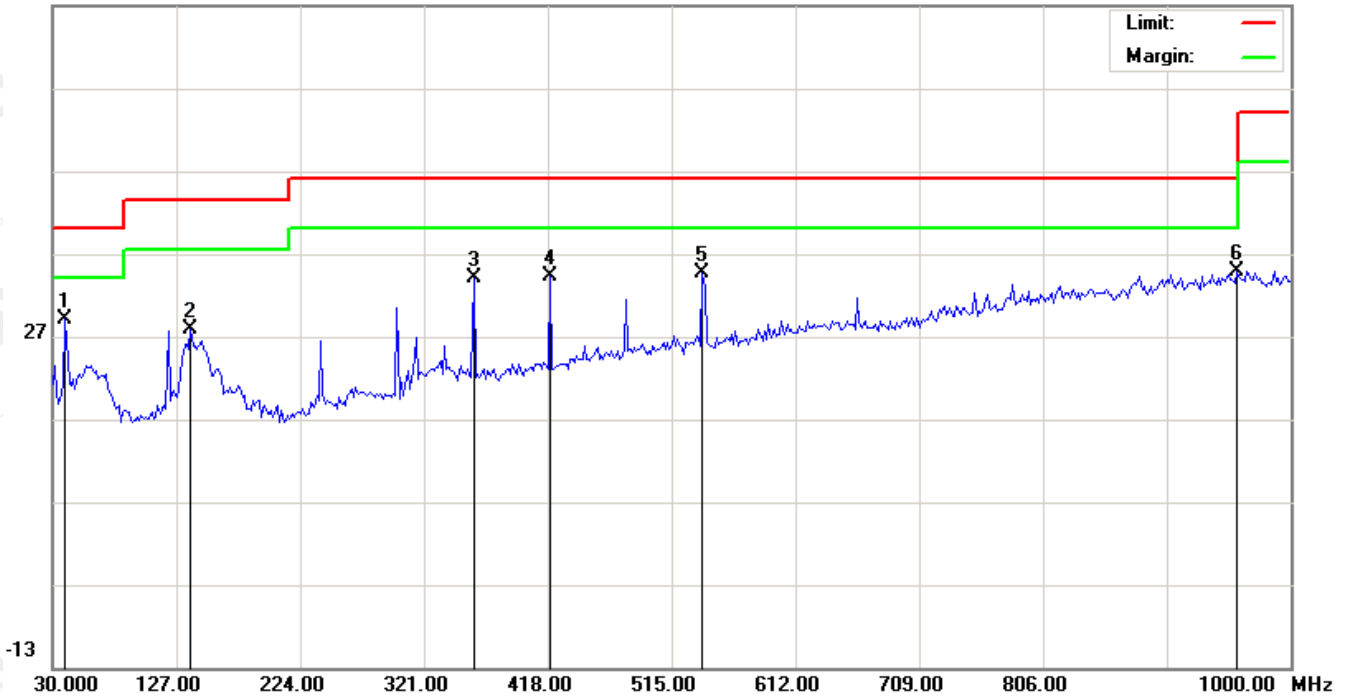
**RADIATED EMISSION BELOW 30MHz**

No emission found between lowest internal used/generated frequencies to 30MHz.

**RADIATED EMISSION 30MHz- 1GHz FOR BR/EDR**

EUT :	Bluetooth speaker	Model Name. :	MMA3748
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	Mode 1	Polarization :	Horizontal

66.9 dBuV/m



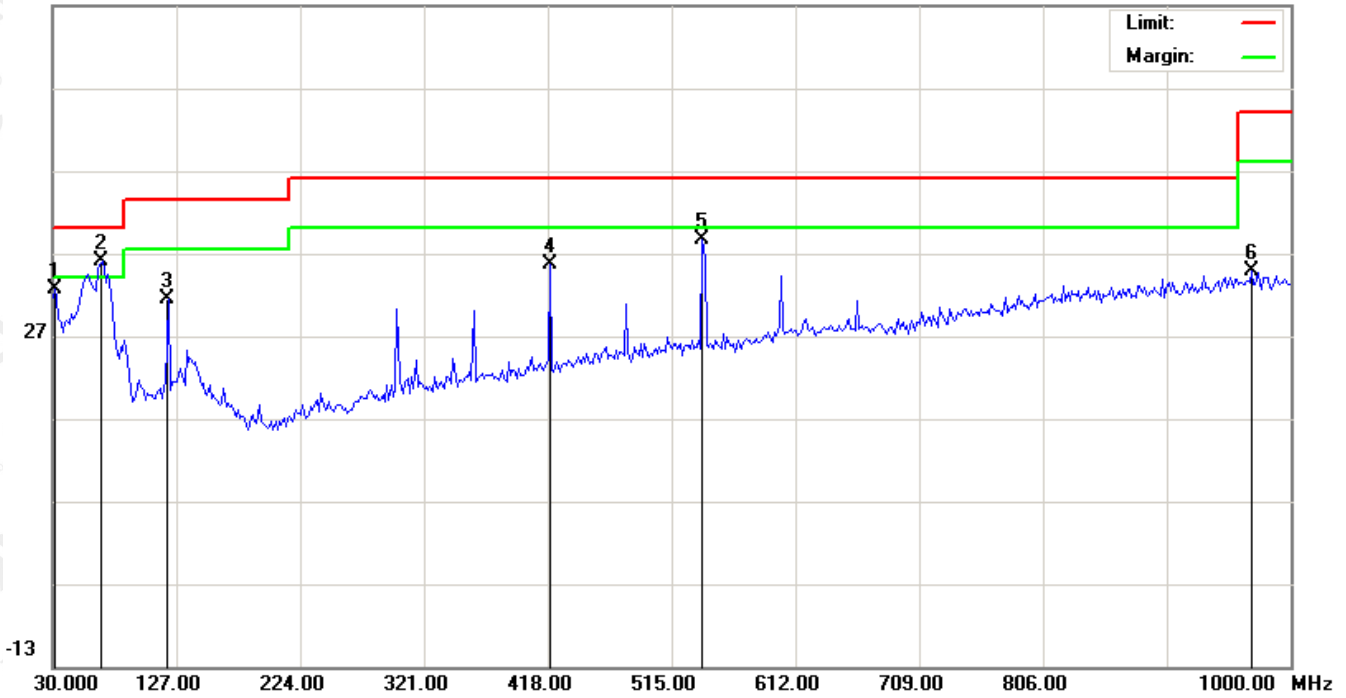
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	39.7000	9.07	19.98	29.05	40.00	-10.95	peak			
2		138.3166	8.61	19.12	27.73	43.50	-15.77	peak			
3		359.8000	12.37	21.57	33.94	46.00	-12.06	peak			
4		419.6166	10.83	23.37	34.20	46.00	-11.80	peak			
5		539.2500	8.83	25.76	34.59	46.00	-11.41	peak			
6		957.9666	2.68	32.20	34.88	46.00	-11.12	peak			

**RESULT: PASS**

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EUT :	Bluetooth speaker	Model Name. :	MMA3748
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	Mode 1	Polarization :	Vertical

66.9 dBuV/m



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		31.6167	14.29	18.22	32.51	40.00	-7.49	peak			
2	*	68.7999	18.70	17.32	36.02	40.00	-3.98	peak			
3		120.5332	13.38	18.00	31.38	43.50	-12.12	peak			
4		419.6166	12.26	23.37	35.63	46.00	-10.37	peak			
5		539.2500	12.76	25.76	38.52	46.00	-7.48	peak			
6		969.2833	2.45	32.30	34.75	54.00	-19.25	peak			

**RESULT: PASS**

**Note:** 1. Factor=Antenna Factor + Cable loss, Over=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.
3. The mode 1 is the worst case, and only the data of the worst case recorded in this test report.

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**FIELD STRENGTH OF FUNDAMENTAL FOR BR/EDR**

EUT :	Bluetooth speaker	Model Name. :	MMA3748
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Modulation :	GFSK	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2402.021	78.12	13.46	91.58	114.00	-22.42	peak
2402.021	70.19	13.46	83.65	94.00	-10.35	AVG
2441.021	77.81	13.88	91.69	114.00	-22.31	peak
2441.021	69.90	13.88	83.78	94.00	-10.22	AVG
2480.021	77.09	14.11	91.20	114.00	-22.80	peak
2480.021	69.16	14.11	83.27	94.00	-10.73	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT :	Bluetooth speaker	Model Name. :	MMA3748
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Modulation :	GFSK	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2402.021	77.63	13.46	91.09	114.00	-22.91	peak
2402.021	69.67	13.46	83.13	94.00	-10.87	AVG
2441.021	77.33	13.88	91.21	114.00	-22.79	peak
2441.021	69.38	13.88	83.26	94.00	-10.74	AVG
2480.021	76.64	14.11	90.75	114.00	-23.25	peak
2480.021	68.59	14.11	82.70	94.00	-11.30	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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EUT :	Bluetooth speaker	Model Name. :	MMA3748
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Modulation :	$\pi/4$ -DQPSK	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Value Type
2402.021	77.12	13.46	90.58	114.00	-23.42	peak
2402.021	69.13	13.46	82.59	94.00	-11.41	AVG
2441.021	76.91	13.88	90.79	114.00	-23.21	peak
2441.021	68.89	13.88	82.77	94.00	-11.23	AVG
2480.021	76.12	14.11	90.23	114.00	-23.77	peak
2480.021	68.12	14.11	82.23	94.00	-11.77	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT :	Bluetooth speaker	Model Name. :	MMA3748
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Modulation :	$\pi/4$ -DQPSK	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Value Type
2402.021	76.65	13.46	90.11	114.00	-23.89	peak
2402.021	68.69	13.46	82.15	94.00	-11.85	AVG
2441.021	76.38	13.88	90.26	114.00	-23.74	peak
2441.021	68.32	13.88	82.20	94.00	-11.80	AVG
2480.021	75.63	14.11	89.74	114.00	-24.26	peak
2480.021	67.61	14.11	81.72	94.00	-12.28	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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**RADIATED EMISSION ABOVE 1GHZ FOR BR/EDR**

EUT :	Bluetooth speaker	Model Name. :	MMA3748
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	Mode 1	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Value Type
4804.026	42.45	7.12	49.57	74	-24.43	peak
4804.026	40.23	7.12	47.35	54	-6.65	AVG
7206.039	35.34	9.84	45.18	74	-28.82	peak
7206.039	32.18	9.84	42.02	54	-11.98	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT :	Bluetooth speaker	Model Name. :	MMA3748
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	Mode 1	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Value Type
4804.026	43.29	7.12	50.41	74	-23.59	peak
4804.026	40.23	7.12	47.35	54	-6.65	AVG
7206.039	35.53	9.84	45.37	74	-28.63	peak
7206.039	32.45	9.84	42.29	54	-11.71	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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EUT :	Bluetooth speaker	Model Name. :	MMA3748
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	Mode 2	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4882.032	42.35	7.12	49.47	74	-24.53	peak
4882.032	39.26	7.12	46.38	54	-7.62	AVG
7323.048	37.45	9.84	47.29	74	-26.71	peak
7323.048	35.32	9.84	45.16	54	-8.84	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT :	Bluetooth speaker	Model Name. :	MMA3748
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	Mode 2	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4882.032	42.65	7.12	49.77	74	-24.23	peak
4882.032	40.56	7.12	47.68	54	-6.32	AVG
7323.048	35.46	9.84	45.30	74	-28.70	peak
7323.048	33.53	9.84	43.37	54	-10.63	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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EUT :	Bluetooth speaker	Model Name. :	MMA3748
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	Mode 3	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4960.042	42.75	7.12	49.87	74	-24.13	peak
4960.042	38.89	7.12	46.01	54	-7.99	AVG
7440.063	37.21	9.84	47.05	74	-26.95	peak
7440.063	36.05	9.84	45.89	54	-8.11	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT :	Bluetooth speaker	Model Name. :	MMA3748
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	Mode 3	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4960.042	41.98	7.12	49.10	74	-24.90	peak
4960.042	40.23	7.12	47.35	54	-6.65	AVG
7440.063	36.74	9.84	46.58	74	-27.42	peak
7440.063	35.63	9.84	45.47	54	-8.53	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**Note:** Other emissions from 8G to 25 GHz are considered as ambient noise. No recording in the test report.

Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

The GFSK modulation was the worst case and only the data of worst recorded in this report.

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## 10. BAND EDGE EMISSION

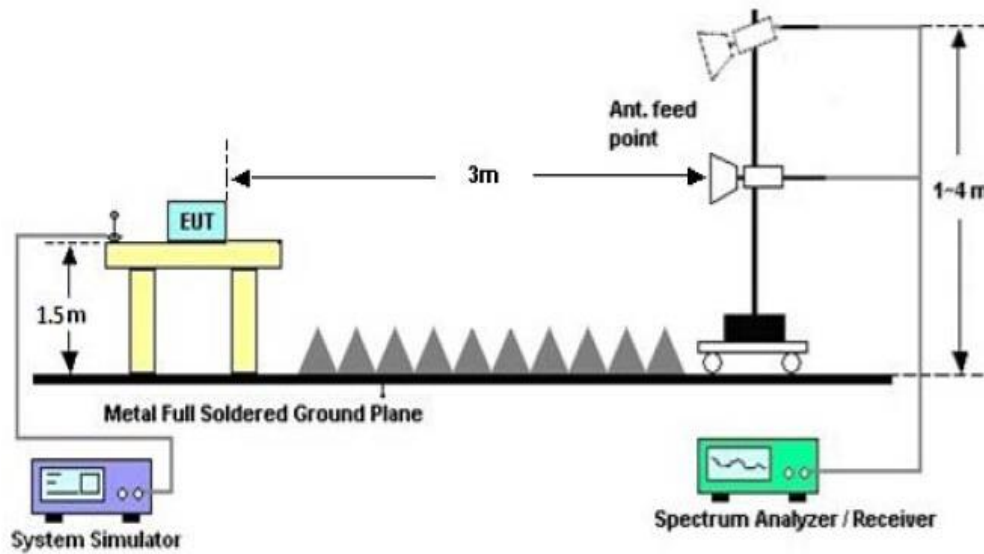
### 10.1. MEASUREMENT PROCEDURE

1. The EUT operates at hopping-off test mode. The lowest or highest channels are tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.
2. Max hold the trace of the setup 1, and the EUT operates at hopping-on test mode to verify the largest spurious emissions power.
3. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission.

Start frequency(MHz)	Stop frequency(MHz)
2200	2405
2478	2500

### 10.2 TEST SETUP

RADIATED EMISSION TEST SETUP



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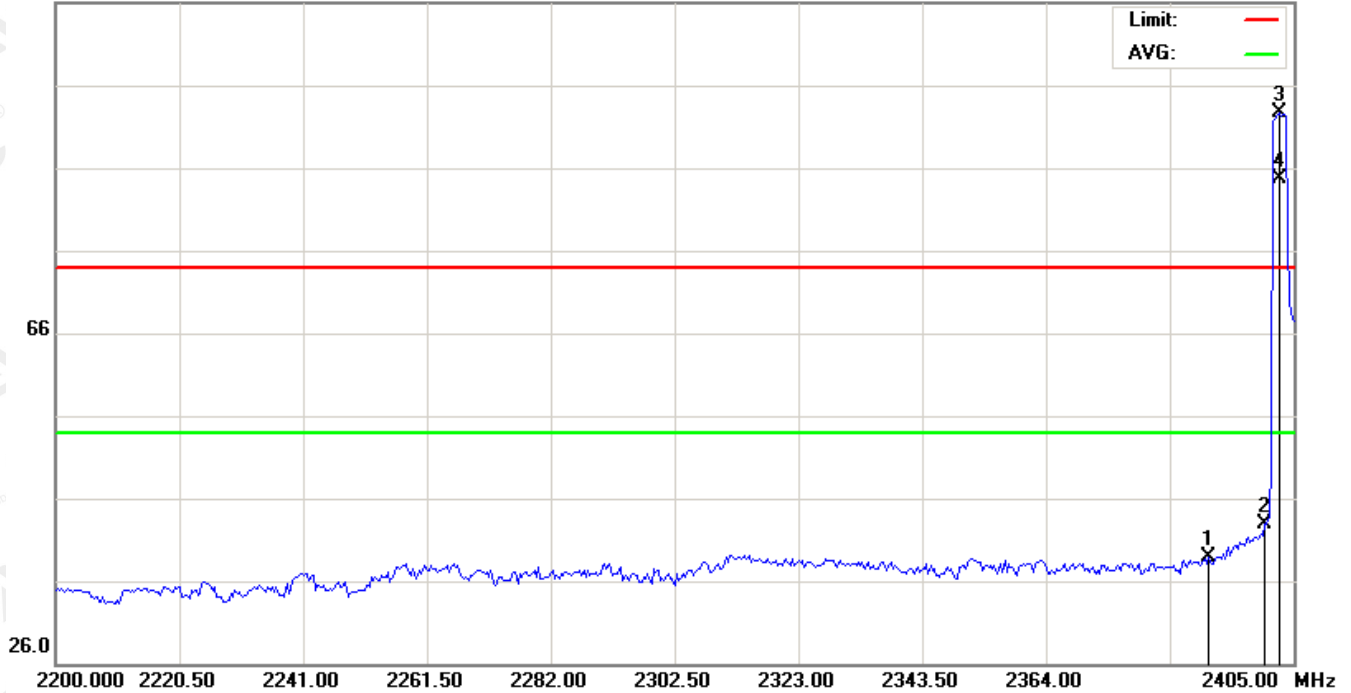
**10.3 RADIATED TEST RESULT**

**FOR BR/EDR**

**(Worst modulation: GFSK)**

**TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal**

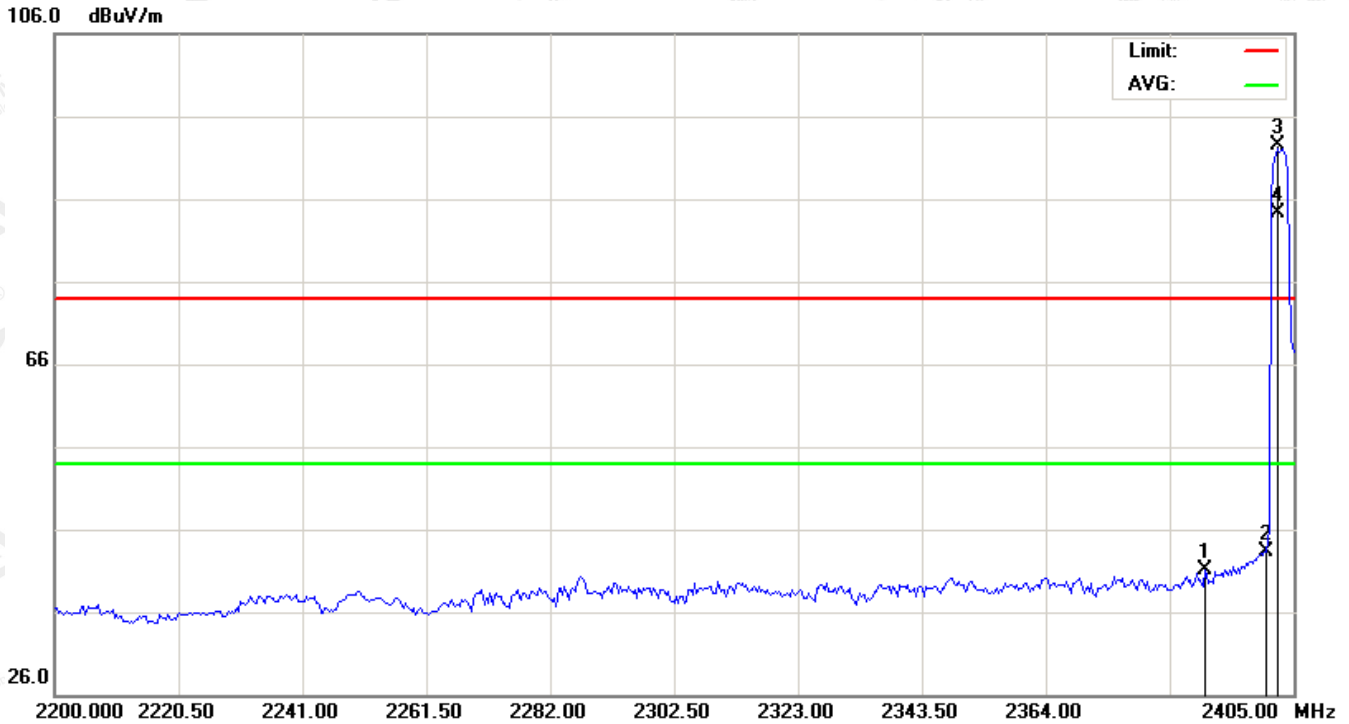
106.0 dBuV/m



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2390.992	25.52	13.46	38.98	74.00	-35.02	peak			
2		2400.217	29.44	13.46	42.90	74.00	-31.10	peak			
3	X	2402.608	79.20	13.46	92.66	74.00	18.66	peak			
4	*	2402.608	71.23	13.46	84.69	54.00	30.69	AVG	100	267	

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TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical

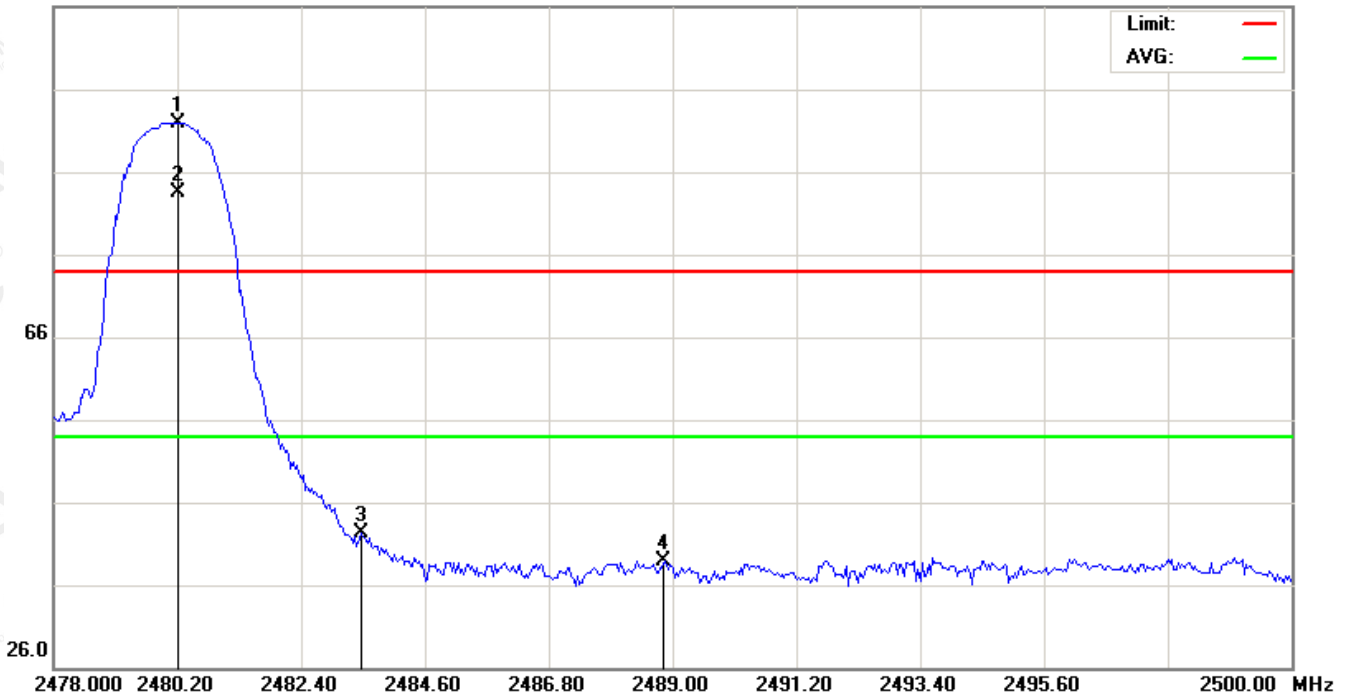


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna	Table	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		Height	Degree	
1		2390.308	27.67	13.46	41.13	74.00	-32.87	peak			
2		2400.558	29.94	13.46	43.40	74.00	-30.60	peak			
3	X	2402.267	79.09	13.46	92.55	74.00	18.55	peak			
4	*	2402.267	70.82	13.46	84.28	54.00	30.28	AVG	100	291	

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TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal

106.0 dBuV/m



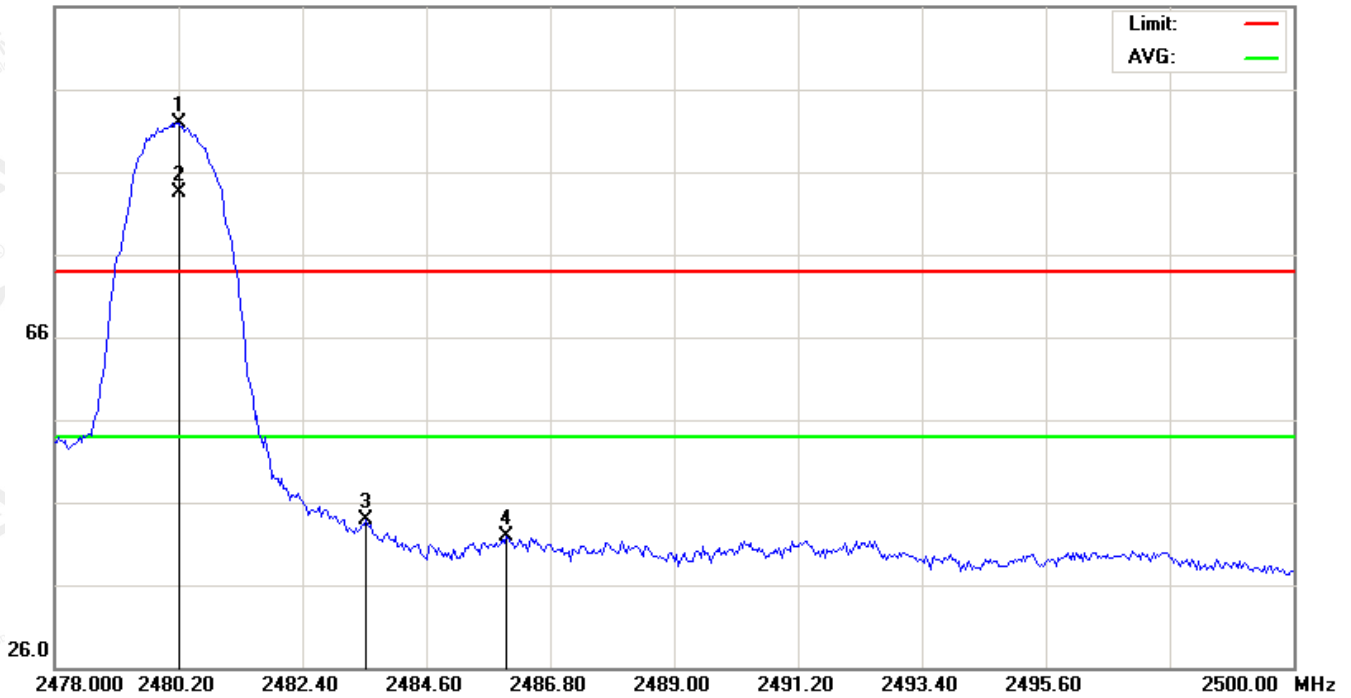
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	X	2480.200	77.83	14.11	91.94	74.00	17.94	peak			
2	*	2480.200	69.46	14.11	83.57	54.00	29.57	AVG	100	137	
3		2483.463	28.23	14.13	42.36	74.00	-31.64	peak			
4		2488.853	24.81	14.16	38.97	74.00	-35.03	peak			

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TEST PLOT OF BAND EDGE FOR HIGH CHANNEL-Vertical

106.0 dBuV/m



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	X	2480.200	77.83	14.11	91.94	74.00	17.94	peak			
2	*	2480.200	69.40	14.11	83.51	54.00	29.51	AVG	100	253	
3		2483.537	29.87	14.13	44.00	74.00	-30.00	peak			
4		2486.030	27.73	14.15	41.88	74.00	-32.12	peak			

**RESULT: PASS**

**Note:** Factor=Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

Hopping on mode and Hopping off mode have been tested, but only worst case reported.

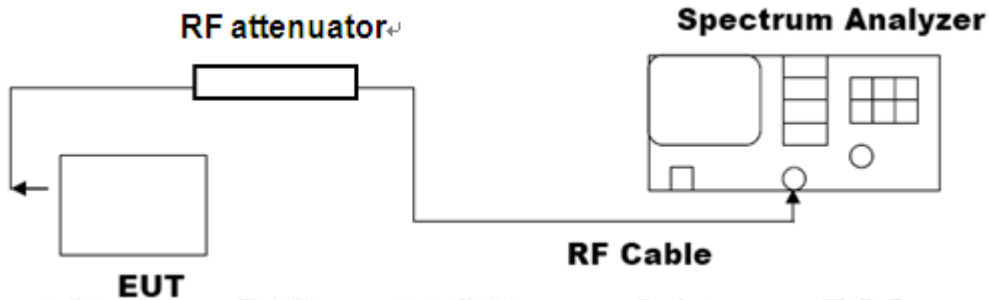
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## 11. 20DB BANDWIDTH

### 11.1. MEASUREMENT PROCEDURE

1. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
2. Set Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hoping channel  
RBW  $\geq$  1% of the 20 dB bandwidth, VBW  $\geq$  3RBW; Sweep = auto; Detector function = peak
3. Set SPA Trace 1 Max hold, then View.

### 11.2. TEST SET-UP



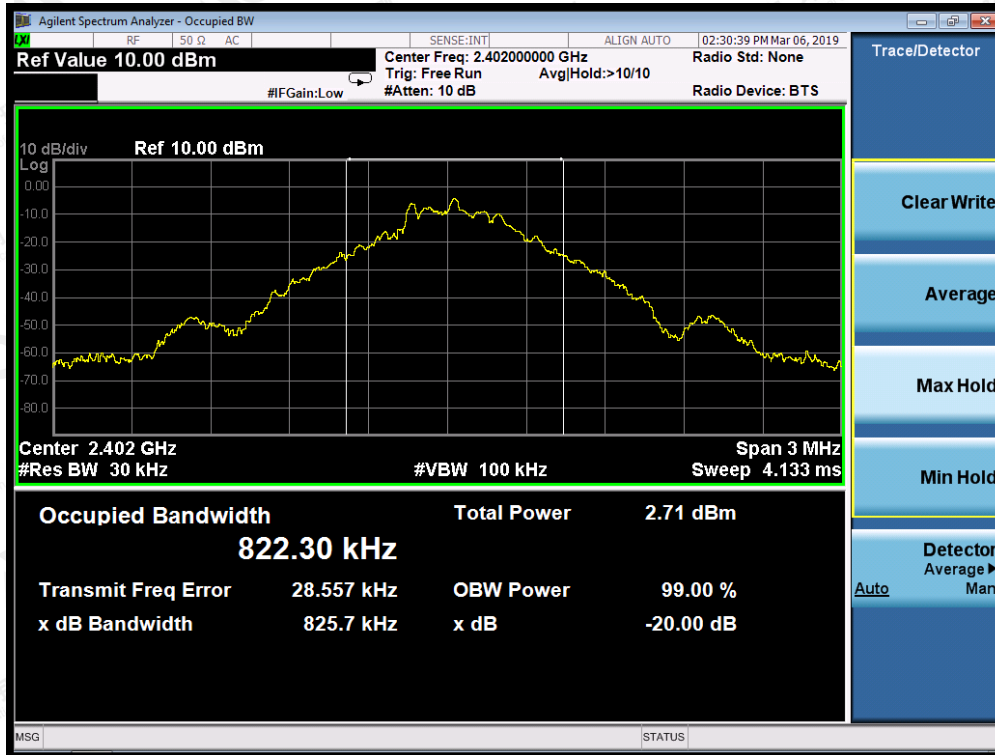
### 11.3. LIMITS AND MEASUREMENT RESULTS

TEST ITEM	20DB BANDWIDTH
TEST MODULATION	GFSK for BR/EDR

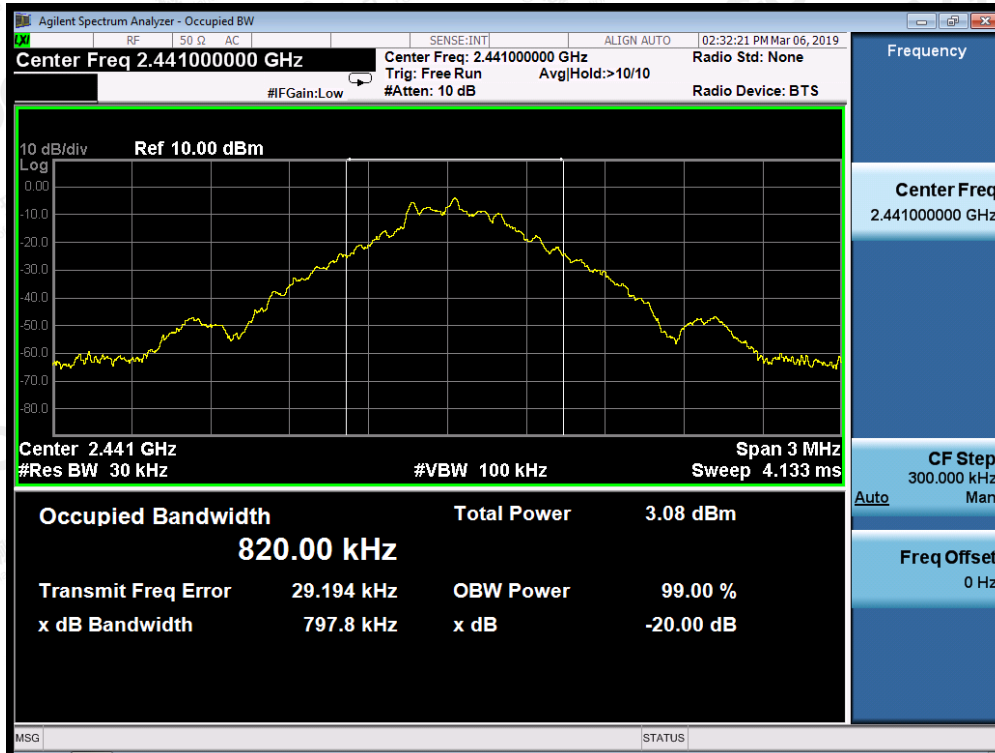
Test Data (MHz)		Criteria
Low Channel	0.826	PASS
Middle Channel	0.798	PASS
High Channel	0.839	PASS

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TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



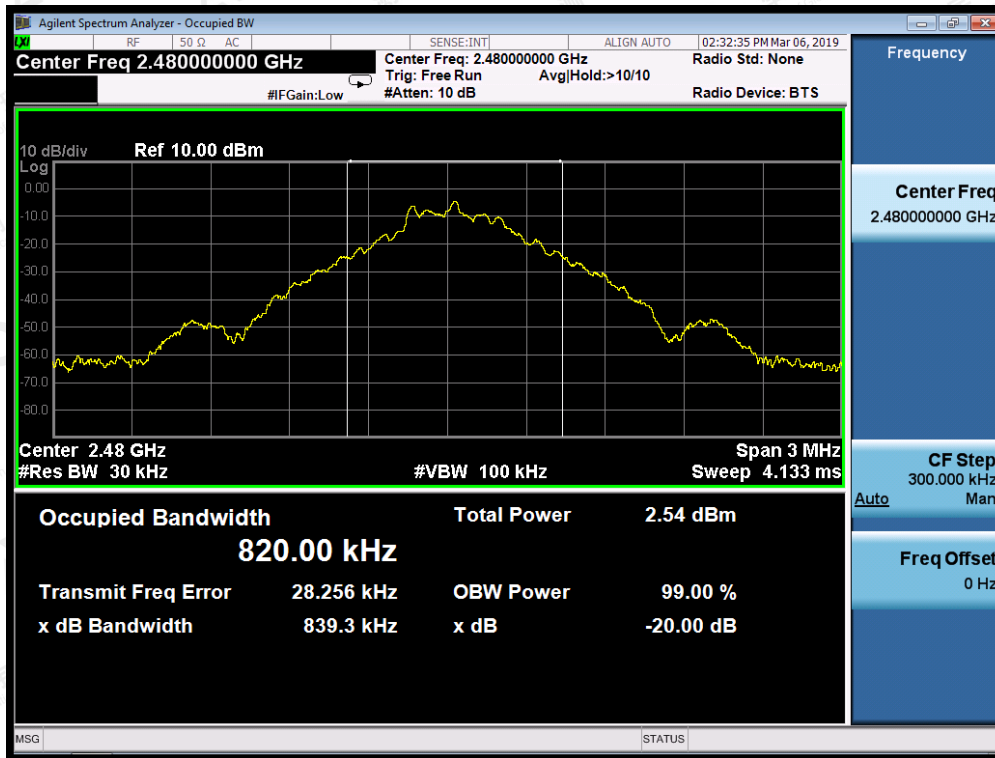
TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



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TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

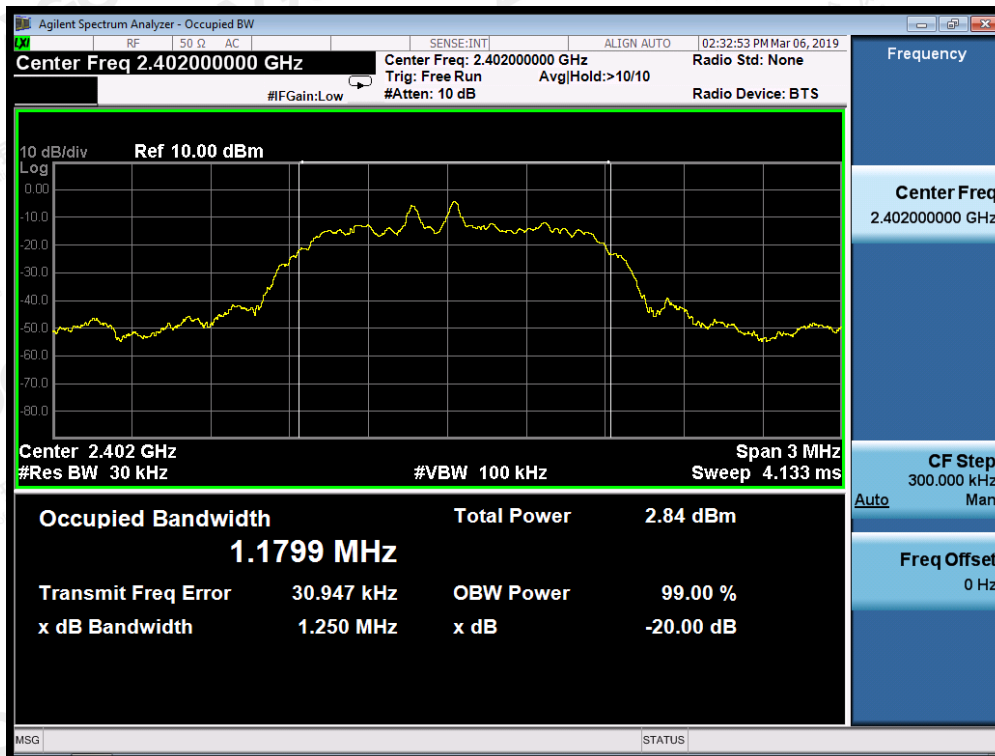


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<b>TEST ITEM</b>	20DB BANDWIDTH
<b>TEST MODULATION</b>	$\pi/4$ -DQPSK for BR/EDR

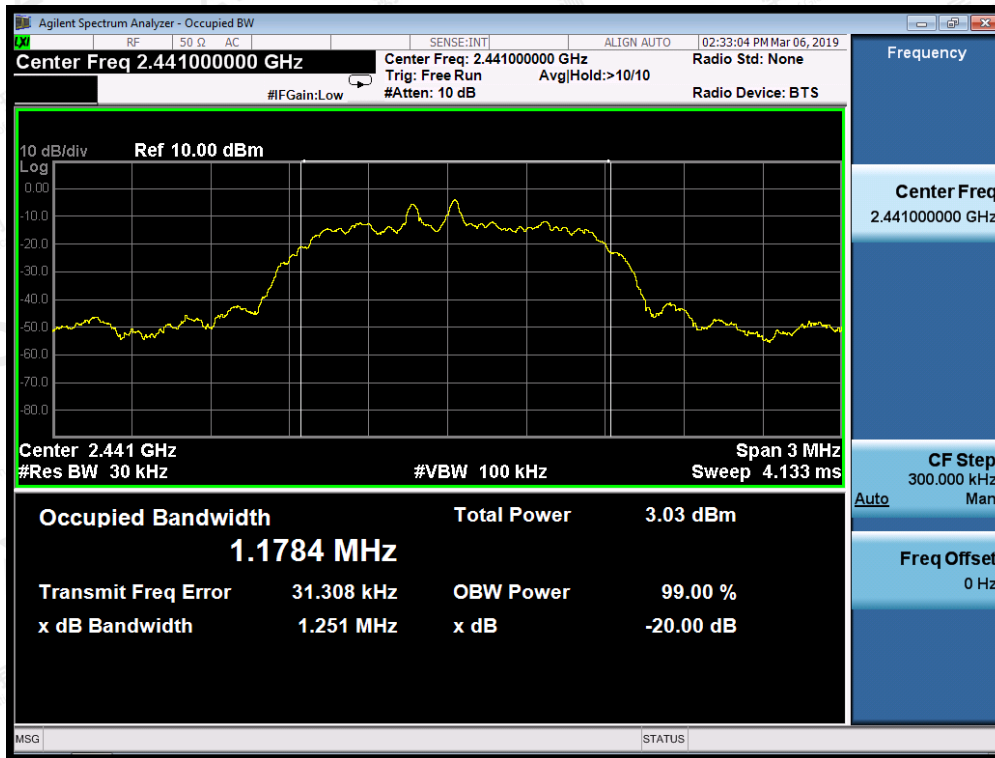
Test Data (MHz)		Criteria
Low Channel	1.250	PASS
Middle Channel	1.251	PASS
High Channel	1.251	PASS

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

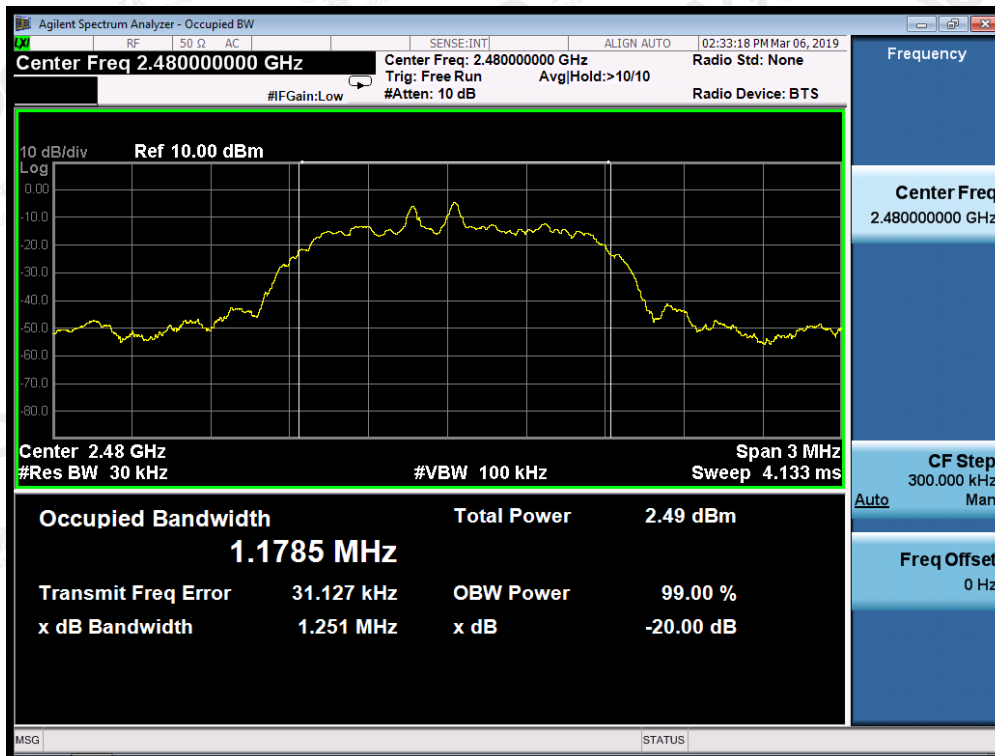


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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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## 12. FCC LINE CONDUCTED EMISSION TEST

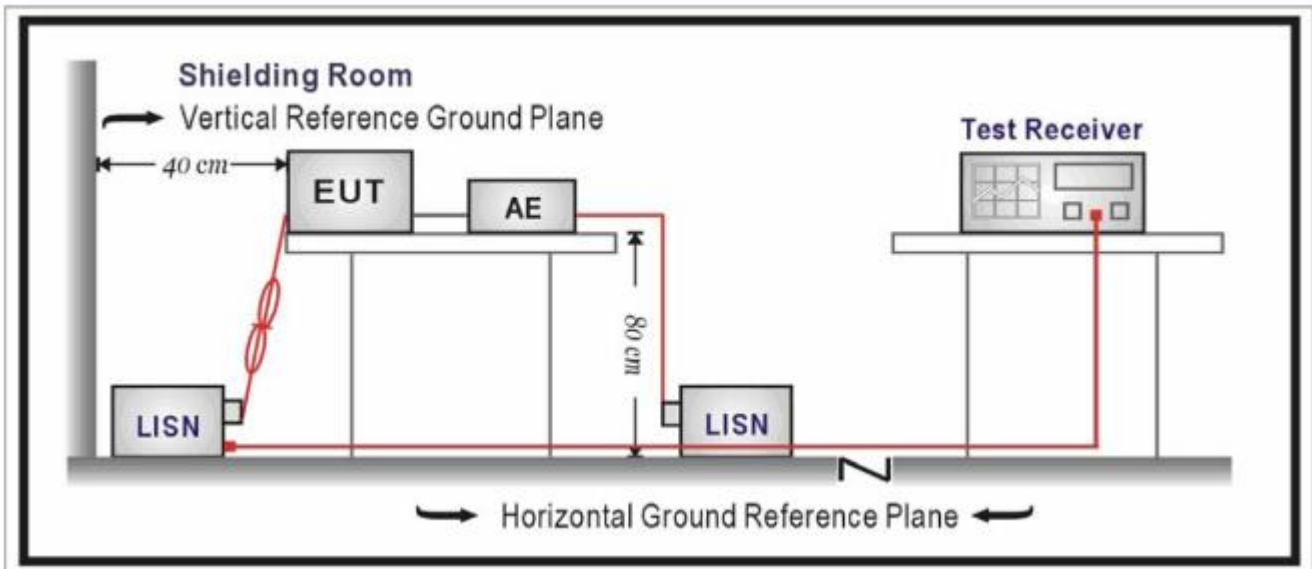
### 12.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.( dBuV)	Average( dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### 12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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### 12.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10-2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC 5V power by adapter which received AC120V/60Hz power by a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

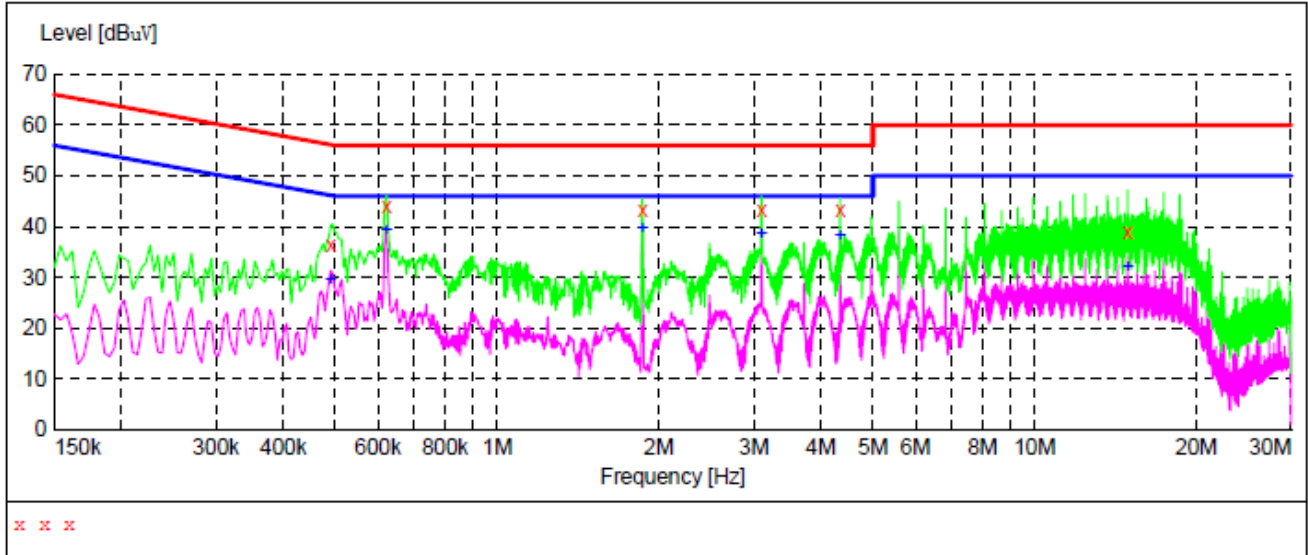
### 12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

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**12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST**

Line Conducted Emission Test Line 1-L



**MEASUREMENT RESULT**

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line
0.490000	36.40	10.3	56	19.8	QP	L1
0.622000	44.10	10.3	56	11.9	QP	L1
1.862000	43.40	10.4	56	12.6	QP	L1
3.106000	43.30	10.4	56	12.7	QP	L1
4.346000	43.40	10.4	56	12.6	QP	L1
14.894000	38.80	10.9	60	21.2	QP	L1

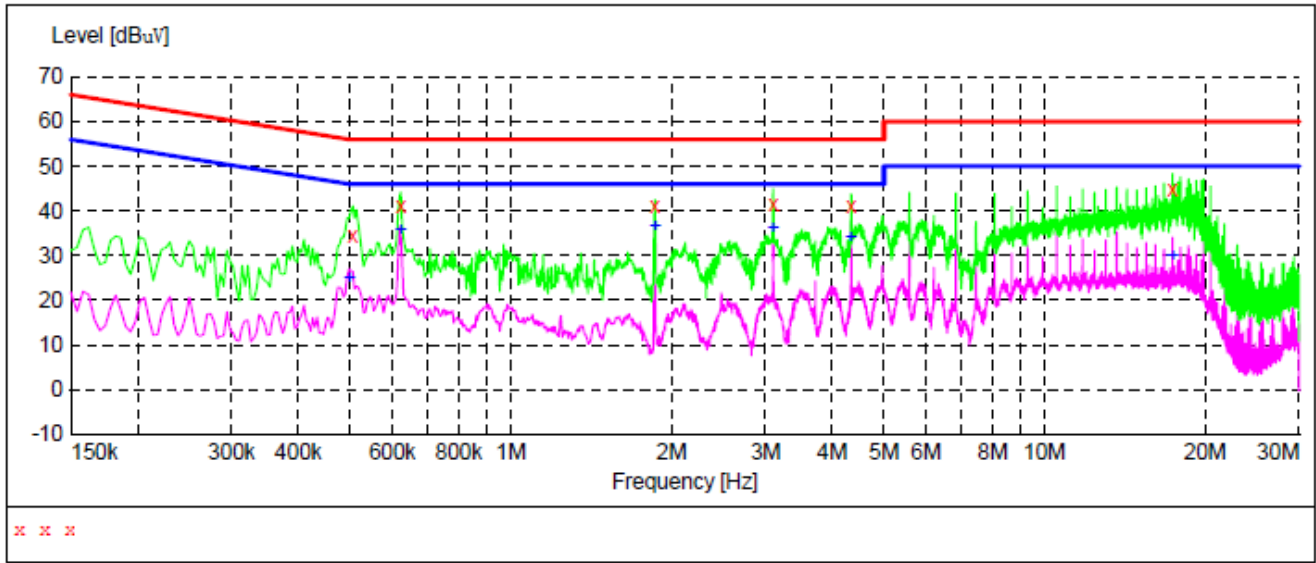
**MEASUREMENT RESULT**

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line
0.490000	29.60	10.3	46	16.6	AV	L1
0.622000	39.30	10.3	46	6.7	AV	L1
1.862000	39.70	10.4	46	6.3	AV	L1
3.106000	38.60	10.4	46	7.4	AV	L1
4.346000	38.30	10.4	46	7.7	AV	L1
14.898000	32.20	10.9	50	17.8	AV	L1

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Line Conducted Emission Test Line 2-N



**MEASUREMENT RESULT**

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line
0.506000	34.40	10.3	56	21.6	QP	N
0.622000	41.10	10.3	56	14.9	QP	N
1.862000	41.30	10.4	56	14.7	QP	N
3.102000	41.70	10.4	56	14.3	QP	N
4.346000	41.30	10.4	56	14.7	QP	N
17.374000	44.80	11.0	60	15.2	QP	N

**MEASUREMENT RESULT**

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line
0.498000	24.90	10.3	46	21.1	AV	N
0.622000	35.70	10.3	46	10.3	AV	N
1.862000	36.60	10.4	46	9.4	AV	N
3.102000	36.00	10.4	46	10.0	AV	N
4.342000	34.20	10.4	46	11.8	AV	N
17.374000	29.80	11.0	50	20.2	AV	N

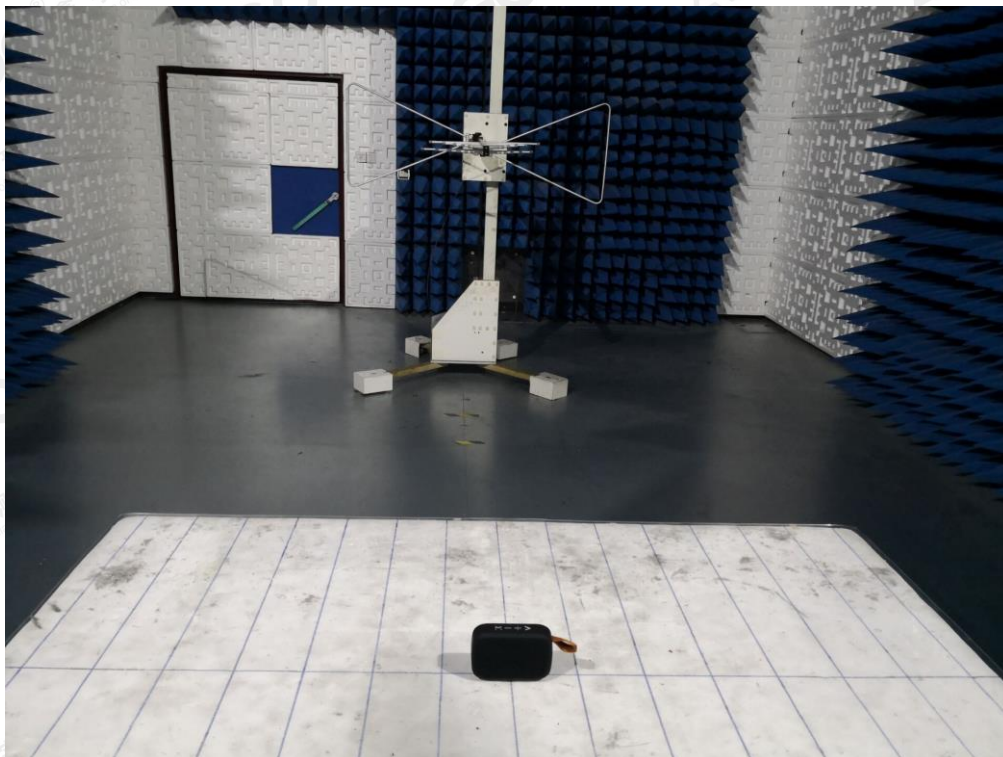
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**APPENDIX A: PHOTOGRAPHS OF TEST SETUP**

**FCC LINE CONDUCTED EMISSION TEST SETUP**

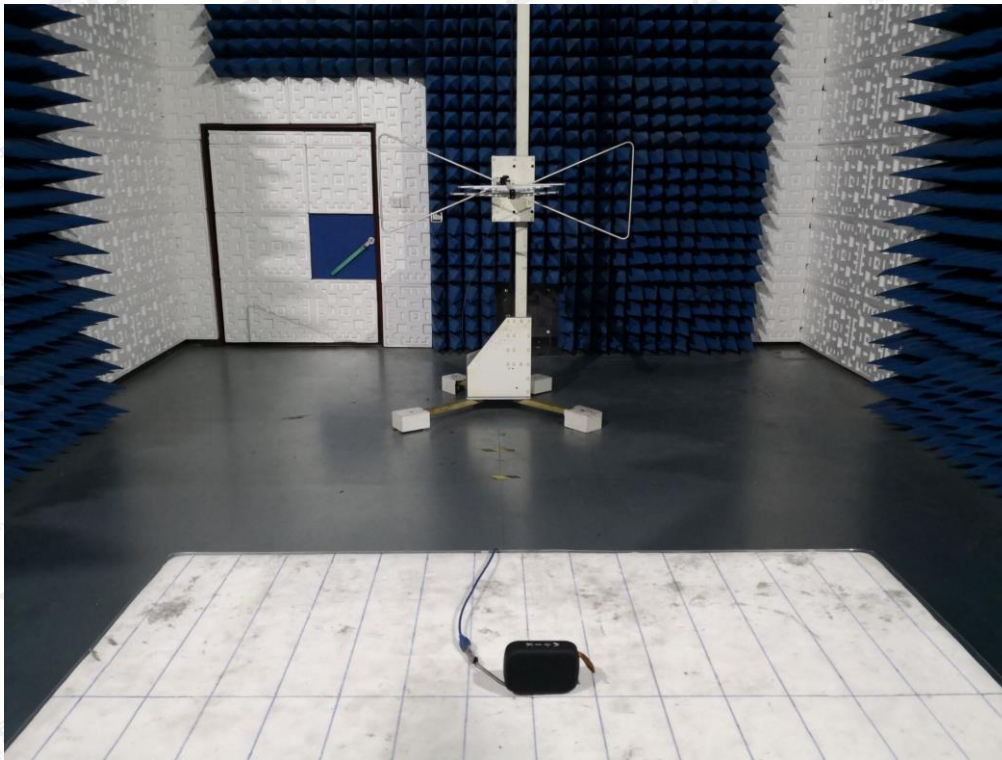


**FCC RADIATED EMISSION TEST SETUP**



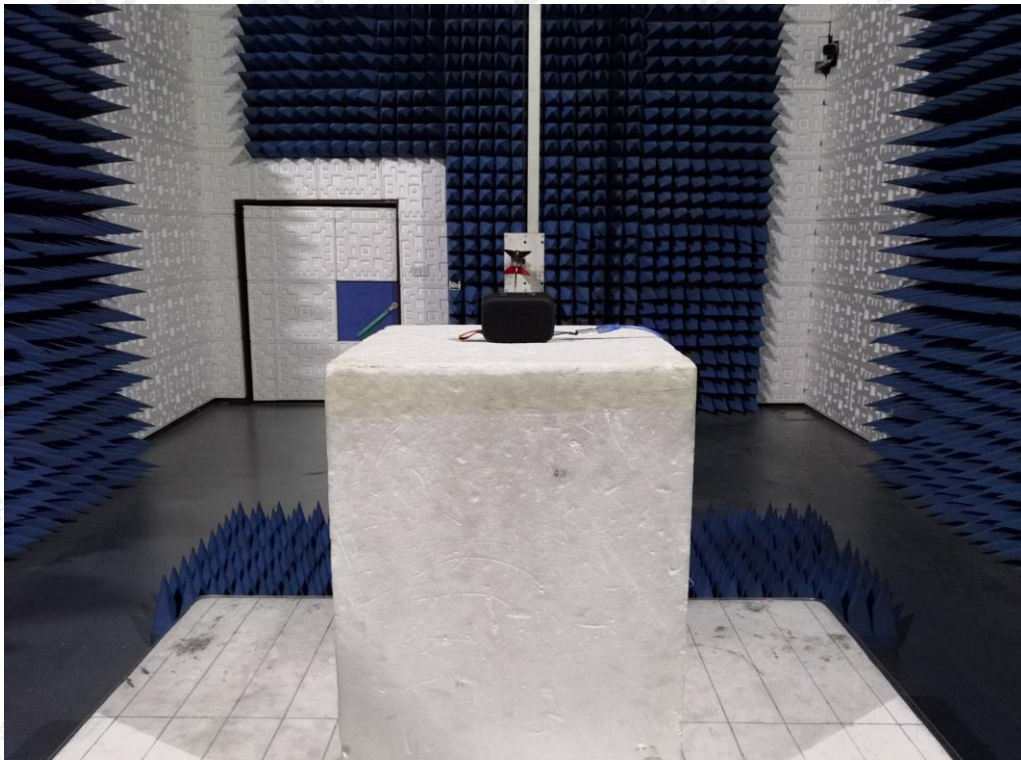
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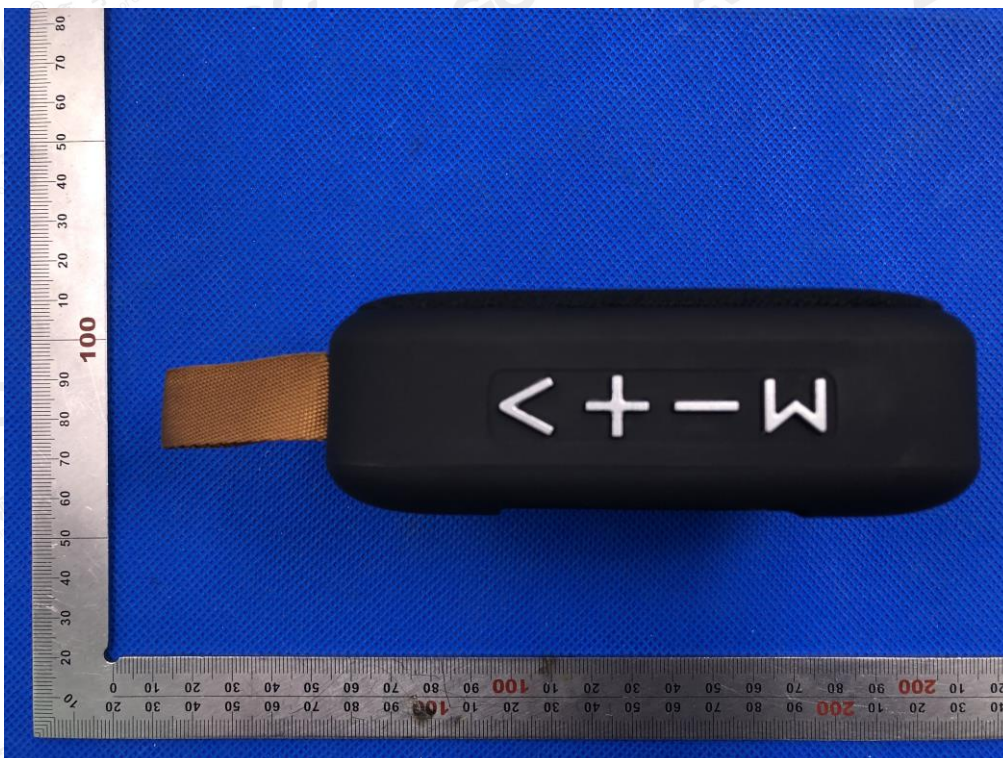


**APPENDIX B: PHOTOGRAPHS OF EUT**

TOTAL VIEW OF EUT



TOP VIEW OF EUT



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BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



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BACK VIEW OF EUT



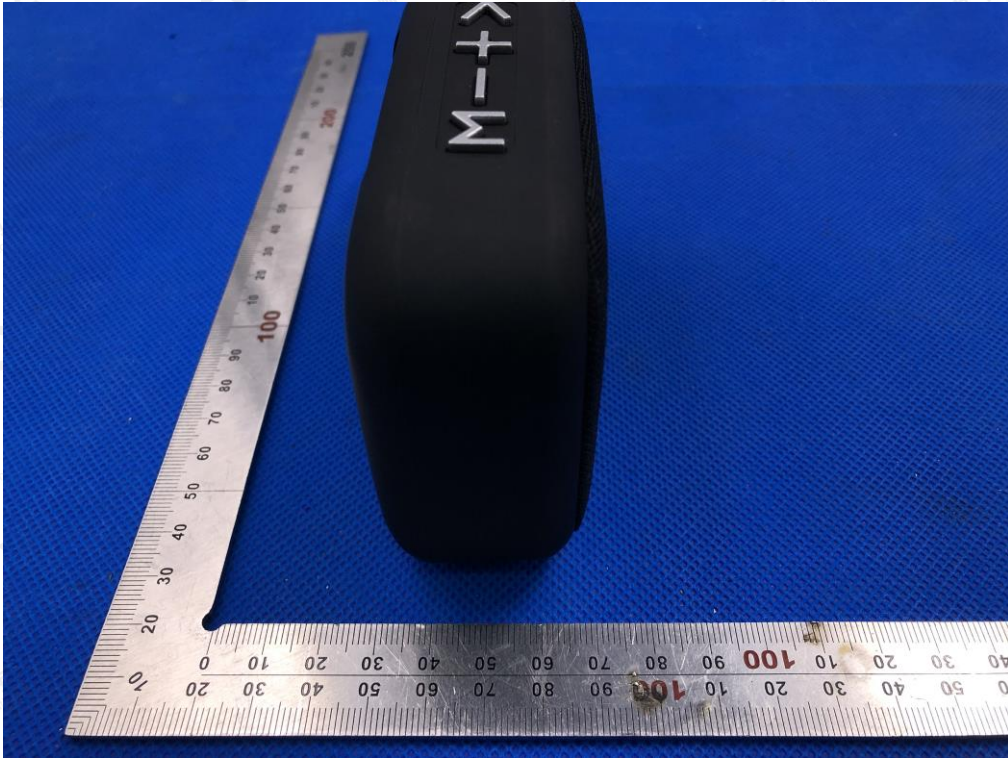
LEFT VIEW OF EUT



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RIGHT VIEW OF EUT



VIEW OF EUT (PORT)



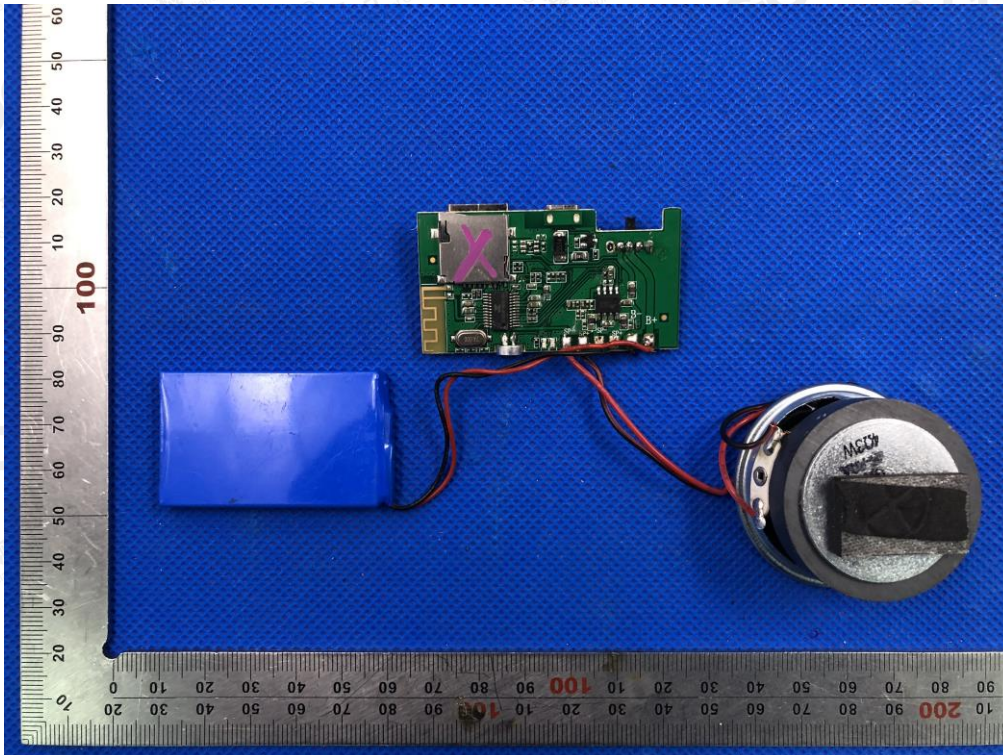
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OPEN VIEW OF EUT-1



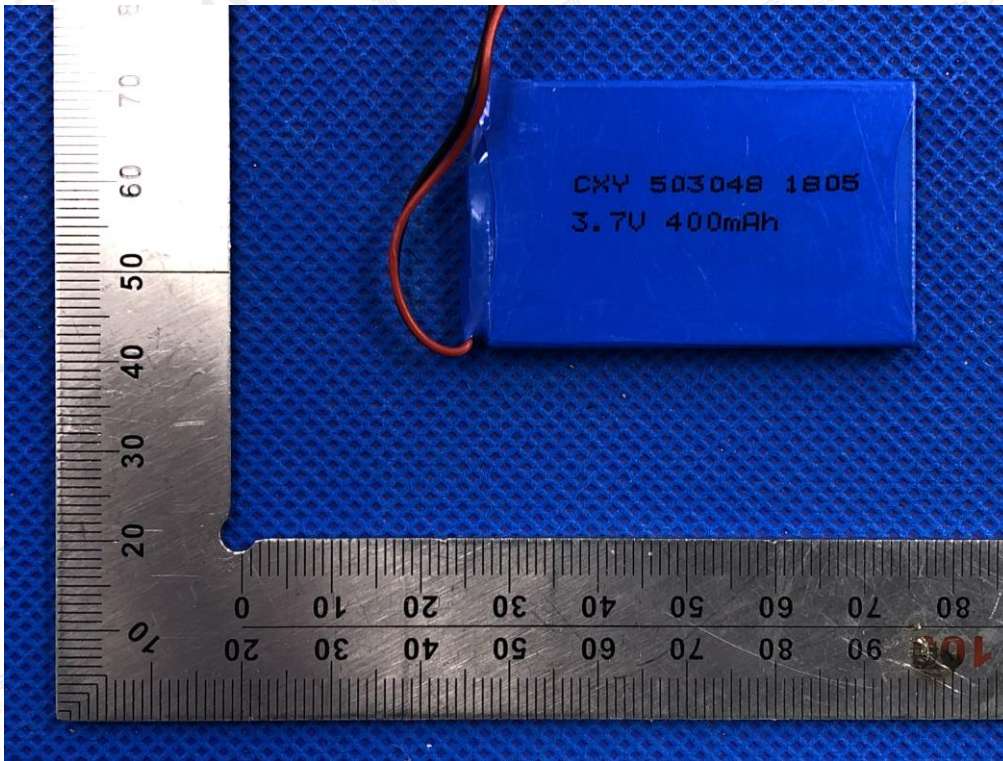
OPEN VIEW OF EUT-2



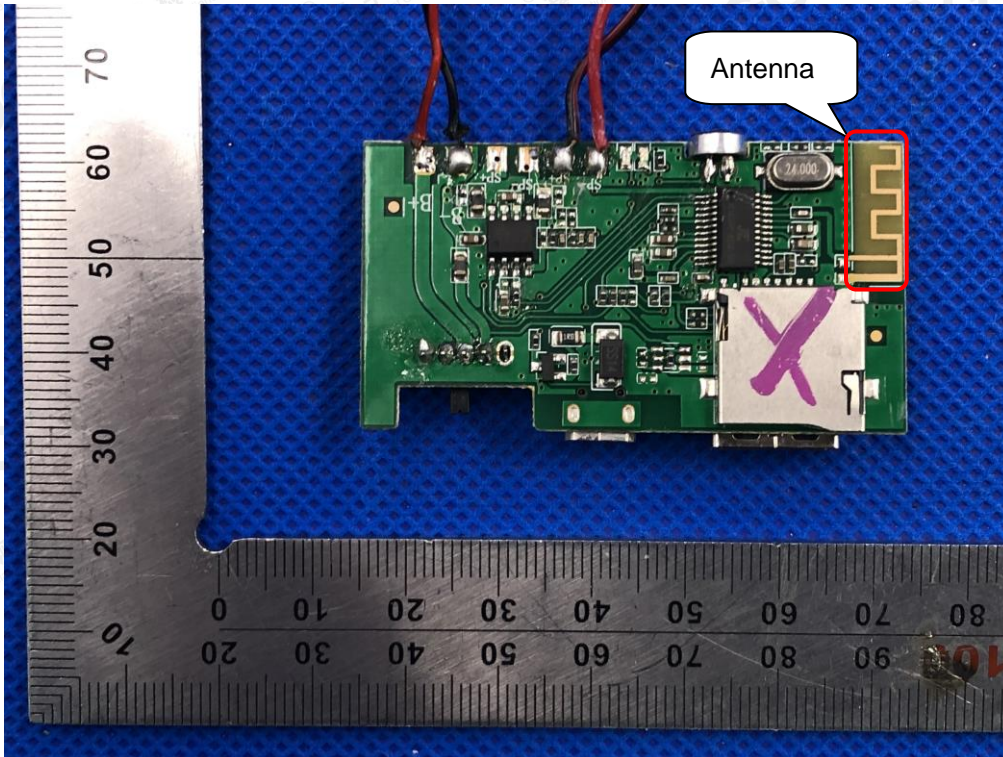
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by AGC, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.agc-cert.com>.



VIEW OF BATTERY



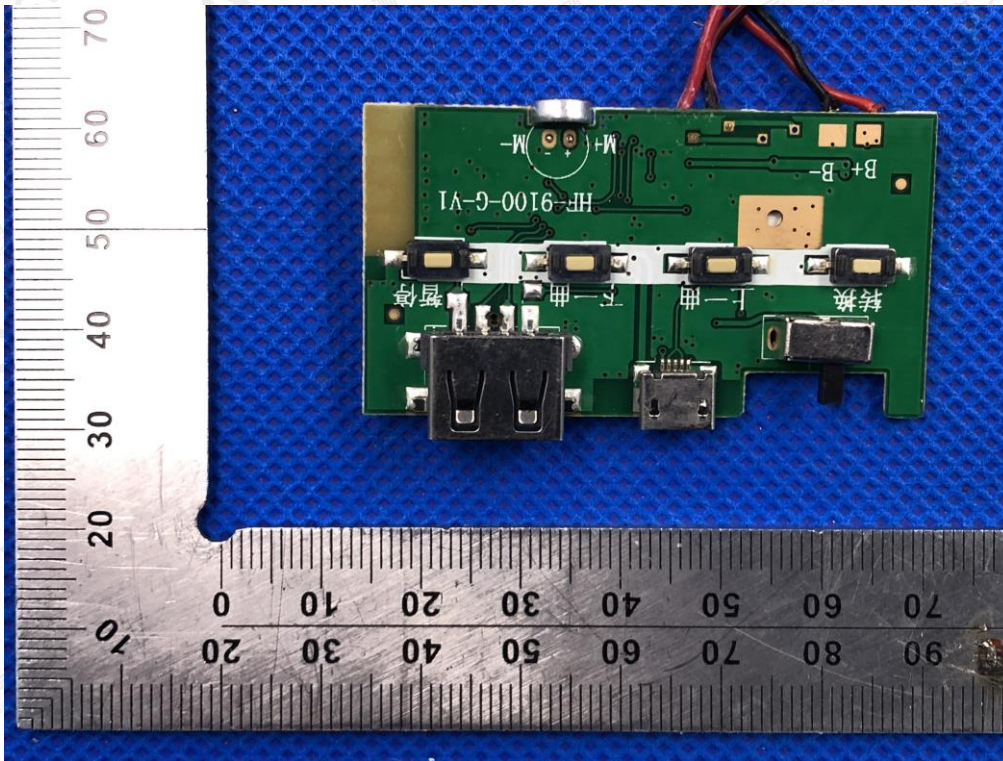
INTERNAL VIEW OF EUT-1



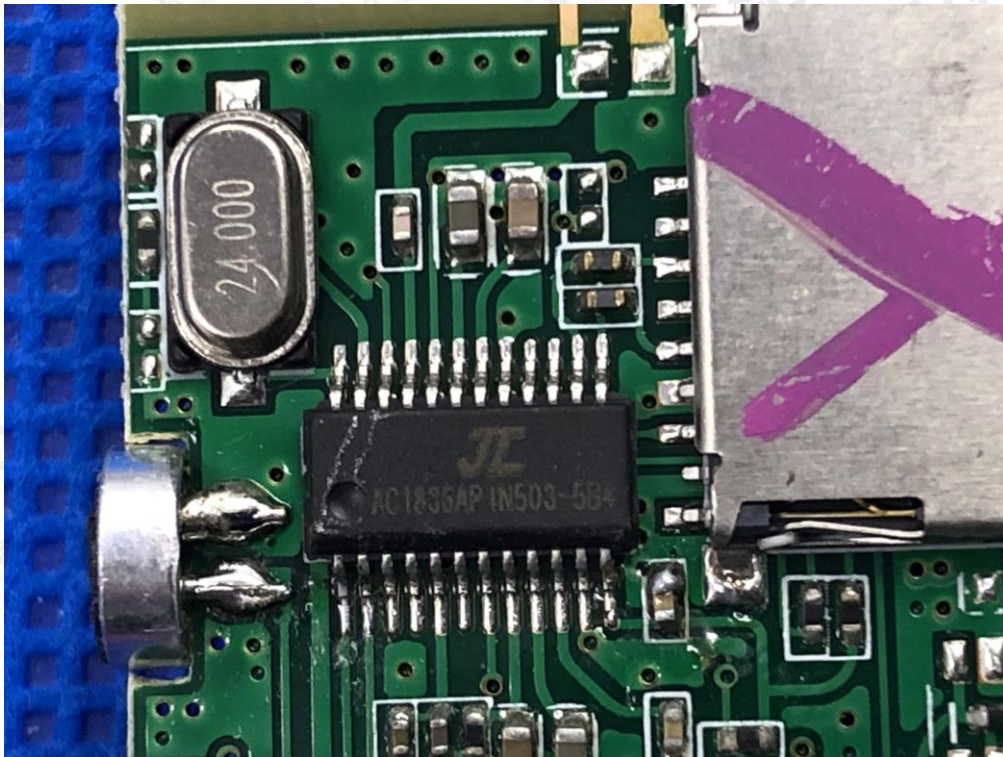
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INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



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VIEW OF ADAPTER(AE)



The adapter was supplied by AGC

----END OF REPORT----

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