

# FCC TEST REPORT(Bluetooth)

for

Soundcast LLC

Bluetooth Speaker

Model Number : VG3

FCC ID: SUD-VGBT03A

Prepared for : Soundcast LLC  
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Suite E San Diego, California, United States 92124

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Report No. : TR17060135-E-002  
Date of Test : Jul.3~10, 2017  
Date of Report : Jul.11, 2017

## Keyway Testing Technology Co., Ltd.

<b>Applicant:</b>	Soundcast LLC		
<b>Address:</b>	9771 Clairemont Mesa Blvd, Suite E San Diego, California, United States 92124		
<b>Manufacturer:</b>	Dongguan Longjoin Electronics Co. Ltd.		
<b>Address:</b>	Shuilang Village, Dalingshan Town, Dongguan City, Guangdong Province, PRC		
<b>E.U.T:</b>	Bluetooth Speaker		
<b>Model Number:</b>	VG3		
<b>Trade Name:</b>	-----		
<b>Date of Receipt:</b>	Jul. 3, 2017	<b>Date of Test:</b>	Jul. 3~10, 2017
<b>Test Specification:</b>	FCC Part 15, Subpart C Section 15.247: 2017 ANSI C63.10:2013 KDB558074 D01 DTS Meas Guidance v04 RSS-247 Issue 2: February 2017 RSS-Gen Issue 4: November 2014		
<b>Test Result:</b>	The equipment under test was found to be compliance with the requirements of the standards applied.		
		<b>Issue Date: Jul. 11, 2017</b>	
Tested by:	Reviewed by:	Approved by:	
			
Keven Wu / Engineer	Moore Cai / Supervisor	Andy Gao / Supervisor	
<b>Other Aspects:</b>	None.		
Abbreviations: OK/P=passed    fail/F=failed    n.a/N=not applicable    E.U.T=equipment under tested			
This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Keyway Testing Technology Co., Ltd.			

## TABLE OF CONTENTS

	Page
Test Report Declaration	4
<b>1. TEST SUMMARY .....</b>	<b>4</b>
<b>2. GENERAL PRODUCT INFORMATION .....</b>	<b>5</b>
2.1. Product Function.....	5
2.2. Description of Device (EUT) .....	5
2.3. Independent Operation Modes.....	5
2.4. Product Version .....	6
2.5. Test Sites.....	6
2.6. List of Test and Measurement Instruments .....	7
<b>3. TEST SET-UP AND OPERATION MODES.....</b>	<b>8</b>
3.1. Principle of Configuration Selection.....	8
3.2. Block Diagram of Test Set-up.....	8
3.3. Test Operation Mode and Test Software.....	8
3.4. Special Accessories and Auxiliary Equipment.....	8
3.5. Test Environment: .....	8
<b>4. EMISSION TEST RESULTS .....</b>	<b>9</b>
4.1. Conducted Emission at the Mains Terminals Test.....	9
4.2. Radiated Emission Test.....	12
<b>5. BAND EDGE COMPLIANCE TEST.....</b>	<b>19</b>
5.1. Limits .....	19
5.2. Test Setup .....	19
5.3. Test Procedure .....	20
5.4. Deviation from standard .....	20
5.5. Test Results.....	21
<b>6. OCCUPY BANDWIDTH TEST .....</b>	<b>26</b>
6.1. Limits .....	26
6.2. Test Procedure .....	26
6.3. Deviation from standard .....	26
6.4. Test Setup .....	26
6.5. Test Results.....	26
<b>7. OUTPUT POWER TEST .....</b>	<b>29</b>
7.1. Limits .....	29
7.2. Test Procedure .....	29
7.3. Deviation from standard .....	29
7.4. Test Setup .....	29
7.5. Test Result.....	29
<b>8. POWER SPECTRAL DENSITY TEST.....</b>	<b>32</b>
8.1. Limits .....	32
8.2. Test Procedure .....	32
8.3. Deviation from standard .....	32
8.4. Test Setup .....	32
8.5. Test Result.....	32
<b>9. ANTENNA REQUIREMENTS .....</b>	<b>34</b>
9.1. Limits .....	34
9.2. Test Result.....	34
<b>10.PHOTOGRAPHS OF TEST SET-UP .....</b>	<b>35</b>
<b>11. PHOTOGRAPHS OF THE EUT.....</b>	<b>37</b>

## 1.TEST SUMMARY

Test Items	Test Requirement	Result
Conducted Emissions	15.207/ RSS-Gen clause 8.8	PASS
Radiated Emissions	15.205(a),15.209,15.247(d) /RSS-Gen clause 8.9 & 8.10	PASS
Occupied Bandwidth	15.247(a)(2)/ RSS-247 Issue 2:5.2(1)	PASS
Peak Power Density	15.247(e)/ RSS-247 Issue 2:5.2(2)	PASS
Maximum Peak Output Power	15.247(b)(3)/ RSS-247 Issue 2:5.4(4)	PASS
Emissions from out of band	15.247(d)	PASS
Antenna Requirement	15.203/ RSS-Gen clause 8.3	PASS

## 2. GENERAL PRODUCT INFORMATION

### 2.1. Product Function

Refer to Technical Construction Form and User Manual.

### 2.2. Description of Device (EUT)

Product Name:	Bluetooth Speaker
Model No.:	VG3
Operation Frequency:	2402MHz~2480MHz
Channel numbers:	40 Channels
Channel spacing	2MHz
Modulation technology:	GFSK
Antenna Type:	PCB Antenna
Antenna gain:	1.0dBi
Power supply:	DC 5V/2A from adapter, DC 3.65V from battery(5700mAh/20.805Wh)

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
2	2406MHz	12	2426MHz	22	2446MHz	32	2466MHz
3	2408MHz	13	2428MHz	23	2448MHz	33	2468MHz
4	2410MHz	14	2430MHz	24	2450MHz	34	2470MHz
5	2412MHz	15	2432MHz	25	2452MHz	35	2472MHz
6	2414MHz	16	2434MHz	26	2454MHz	36	2474MHz
7	2416MHz	17	2436MHz	27	2456MHz	37	2476MHz
8	2418MHz	18	2438MHz	28	2458MHz	38	2478MHz
9	2420MHz	19	2440MHz	29	2460MHz	39	2480MHz

### 2.3. Independent Operation Modes

EUT work in BT mode, and test mode as below:

Pretest Mode	Description
Mode 1	CH00
Mode 2	CH19
Mode 3	CH39
Mode 4	Link Mode

Remark: According to ANSI C63.10 standards, the test results are both the “worst case” and “worst setup”.

## 2.4. Product Version

Product SW version	V1.0
Product HW version	1-110-007-03
Radio SW version	V001B002
Radio HW version	JS-BTM8670-V0.01D
Test SW Version	Blue Test 3

Note: SW means software, HW means hardware.

## 2.5. Test Sites

### 2.5.1. Test Facilities

Lab Qualifications : Certificated by Industry Canada  
 Registration No.: 9868A  
 Date of registration: December 8, 2011

Certificated by FCC, USA  
 Registration No.: 370994  
 Date of registration: February 21, 2012

Certificated by CNAS China  
 Registration No.: CNAS L5783  
 Date of registration: August 8, 2012

## 2.6. List of Test and Measurement Instruments

### 2.6.1. For conducted emission at the mains terminals test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 08,17	Apr. 08,18
Artificial Mains Network	Rohde&Schwarz	ENV216	101315	Apr. 08,17	Apr. 08,18
Artificial Mains Network (AUX)	Rohde&Schwarz	ENV216	101314	Apr. 08,17	Apr. 08,18
RF Cable	FUJIKURA	3D-2W	944 Cable	Apr. 08,17	Apr. 08,18

### 2.6.2. For radiated emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 08,17	Apr. 08,18
System Simulator	Agilent	E5515C	GB43130245	Apr. 08,17	Apr. 08,18
Power Splitter	Weinschel	1506A	NW425	Apr. 08,17	Apr. 08,18
Bilog Antenna	ETS-LINDGREEN	3142D	135452	Apr. 09,17	Apr. 09,18
Spectrum Analyzer	Agilent	E4411B	MY4511304	Apr. 08,17	Apr. 08,18
Spectrum Analyzer	R&S	FSV40	132.1.3008K39-100967	Apr. 08,17	Apr. 08,18
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	Apr. 09,17	Apr. 09,18
Signal Amplifier	SONOMA	310	187016	Apr. 08,17	Apr. 08,18
Signal Amplifier	Agilent	8449B	3008A00251	Apr. 08,17	Apr. 08,18
RF Cable	IMRO	IMRO-400	966 Cable 1#	N/A	N/A
MULTI-DEVICE Controller	ETS-LINDGREEN	2090	126913	N/A	N/A
Horn Antenna	DAZE	ZN30701	11003	Apr. 09,17	Apr. 09,18
Horn Antenna	SCHWARZBECK	BBHA9170	9170-068	Apr. 09,17	Apr. 09,18
Spectrum Analyzer	Agilent	8593E	3911A04271	Apr. 08,17	Apr. 08,18
Spectrum Analyzer	Agilent	E4408B	MY44211125	Apr. 08,17	Apr. 08,18
Signal Amplifier	DAZE	ZN3380C	11001	Apr. 08,17	Apr. 08,18
High Pass filter	Micro	HPM50111	324216	Apr. 08,17	Apr. 08,18
Filter	COM-MW	ZBSF-C836.5-25-X	KW032	Apr. 08,17	Apr. 08,18
Filter	COM-MW	ZBSF-C1747.5-75-X2	KW035	Apr. 08,17	Apr. 08,18
Filter	COM-MW	ZBSF-C1880-60-X2	KW037	Apr. 08,17	Apr. 08,18
DC Power Supply	LongWei	PS-305D	010964729	Apr. 08,17	Apr. 08,18
Constant temperature and humidity box	GF	GTH-800-40-1P	MAA9906-005	Apr. 08,17	Apr. 08,18
Splitter	Agilent	11636B	0025164	Apr. 08,17	Apr. 08,18
Loop Antenna	ARA	PLA-1030/B	1029	Apr. 08,17	Apr. 08,18
Power Meter	Anritsu	ML2495A	1204003	Apr. 08,17	Apr. 08,18
Power Sensor	Anritsu	MA2411B	1126150	Apr. 08,17	Apr. 08,18

### 3. TEST SET-UP AND OPERATION MODES

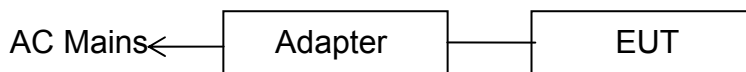
#### 3.1. Principle of Configuration Selection

**Emission:** The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

#### 3.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators

Conducted Emission:



Radiated Emission:



(EUT: Bluetooth Speaker)

#### 3.3. Test Operation Mode and Test Software

Final Test Mode	Description
Mode 1	CH00
Mode 2	CH19
Mode 3	CH39
Mode 4	Link Mode
Test Software	BlueTest3

#### 3.4. Special Accessories and Auxiliary Equipment

**Adapter:**

Manufacturer:	HUIZHOU PUAN ELECTRONICS CO.,LTD
Model Number:	KSAS0100500150HU
Input:	100-240V~ 50/60Hz, 0.4A
Output:	5.0V, 2.0A
DC Line:	Unshielded, detachable 0.8m

#### 3.5. Test Environment:

Ambient conditions in the test laboratory:

Items	Actual
Temperature (°C)	21~23
Humidity (%RH)	50~65



## 4. EMISSION TEST RESULTS

### 4.1. Conducted Emission at the Mains Terminals Test

#### 4.1.1. Limit

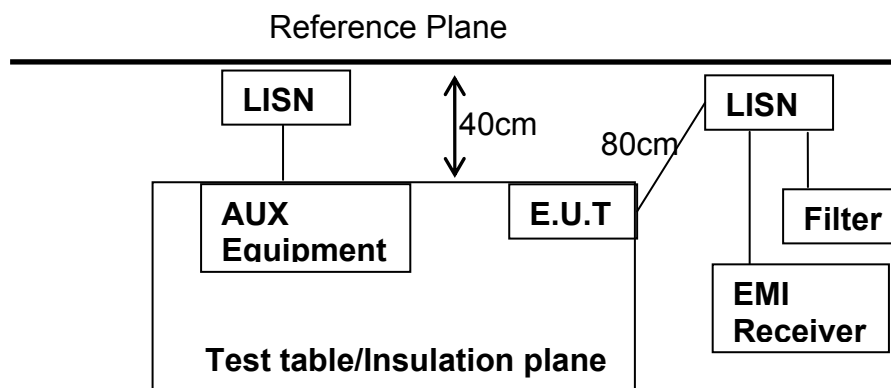
Frequency MHz	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

NOTE: 1.The lower limit shall apply at the transition frequencies.  
2.The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.

#### 4.1.2. Test Procedure

- 1.The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 0.8 m, the excess was folded back and forth parallel to the cable at the center so as to form a bundle no longer than 0.4 m.
- 2.The EUT was kept 0.4 m from any other earthed conducting surface. Both sides of AC line were checked to find out the maximum conducted emission levels according to the test procedure during the conducted emission test.
- 3.The frequency range from 150 kHz to 30 MHz was investigated.
- 4.The bandwidth of the test receiver was set at 9 kHz.
- 5.Pretest for all mode, the test data of the worst case condition(s) was reported on the following page.

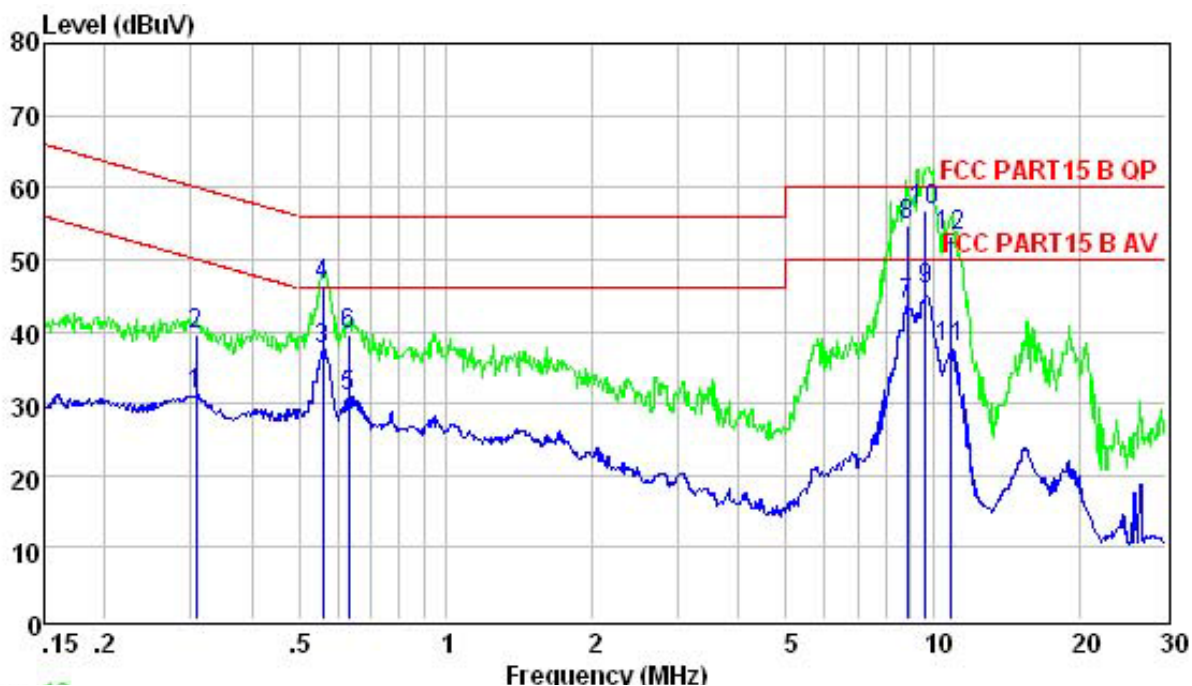
#### 4.1.3. Test Setup



Remark: E.U.T. :Equipment Under Test  
LISN: Line Impedance Stabilization Network  
Test table height: 0.8m.

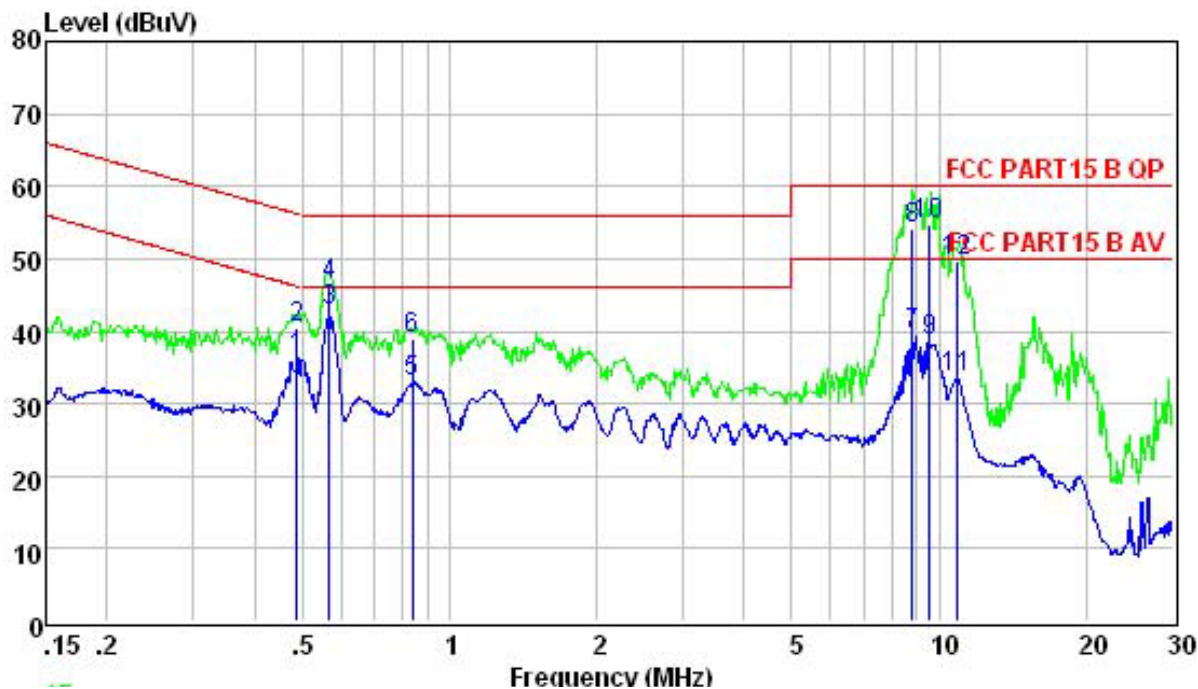
4.1.4. Test Results

EUT :	Bluetooth Speaker	Model Name :	VG3
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	Line
Test Voltage :	DC 5.0V from adapter AC 120V/60Hz for adapter	Test Mode :	Mode 4(worst case)



	Freq	Level	Limit	Over	Remark
	MHz	dBuV	dBuV	dB	
1	0.308	31.09	50.02	-18.93	Average
2	0.308	39.60	60.02	-20.42	QP
3	0.561	37.57	46.00	-8.43	Average
4	0.561	46.30	56.00	-9.70	QP
5	0.634	30.98	46.00	-15.02	Average
6	0.634	39.60	56.00	-16.40	QP
7	8.869	43.83	50.00	-6.17	Average
8	8.869	54.70	60.00	-5.30	QP
9	9.654	45.80	50.00	-4.20	Average
10	9.654	56.70	60.00	-3.30	QP
11	10.847	37.74	50.00	-12.26	Average
12	10.847	53.20	60.00	-6.80	QP

EUT :	Bluetooth Speaker	Model Name :	VG3
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	Neutral
Test Voltage :	DC 5.0V from adapter AC 120V/60Hz for adapter	Test Mode :	Mode 4(worst case)



	Freq	Level	Limit	Over	Remark
	MHz	dBuV	dBuV	dB	
1	0.489	36.22	46.19	-9.97	Average
2	0.489	40.30	56.19	-15.89	QP
3	0.567	42.90	46.00	-3.10	Average
4	0.567	46.30	56.00	-9.70	QP
5	0.839	33.04	46.00	-12.96	Average
6	0.839	38.90	56.00	-17.10	QP
7	8.822	39.50	50.00	-10.50	Average
8	8.822	54.10	60.00	-5.90	QP
9	9.552	38.58	50.00	-11.42	Average
10	9.552	54.70	60.00	-5.30	QP
11	10.905	33.56	50.00	-16.44	Average
12	10.905	49.60	60.00	-10.40	QP

## 4.2. Radiated Emission Test

### 4.2.1. Limit

#### 15.209 limits

Frequency MHz	Distance Meters	Filed Strengths Limit	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
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	74.0dB( $\mu\text{V}$ )/m(Peak) 54.0dB( $\mu\text{V}$ )/m(Average)	

#### RSS-Gen 8.9 limits

Frequency of Emission (MHz)	Field Strength		Measurement Distance (meters)
	$\mu\text{V}/\text{m}$	$\text{dB}\mu\text{V}/\text{m}$	
0.009-0.49	2400/F(kHz)		300
0.49-1.705	24000/F(kHz)		30
1.705-30	30		30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

### 4.2.2. Restricted bands of operation

MHz	MHz	MHz	GHz
0.009-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

### 4.2.3. Test Procedure

The EUT was placed on a turn table which was 0.8 m (above 1GHz, the table was 1.5m) above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector.

The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz, Both PK and AV measure, PK detector is used.

The frequency range from 30MHz to 10<sup>th</sup> harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

Notes: 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading-Preamp Factor.

2. Measurement Uncertainty:  $\pm 3.2$  dB at a level of confidence of 95%.

3. For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

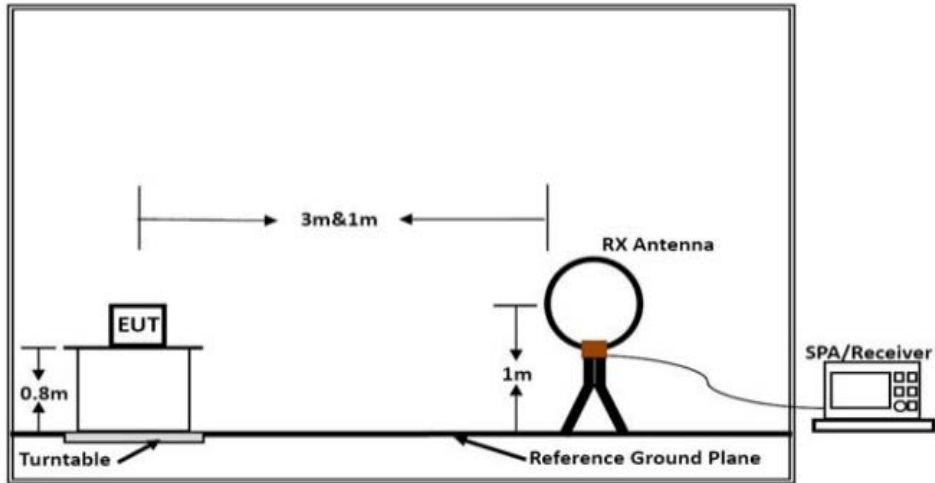
4. For emissions below 1GHz, pretest for all mode, The test data of the worst case condition(s) was reported on the following pages.

5. For Both PK and AV value above 1GHz, PK detector is used.

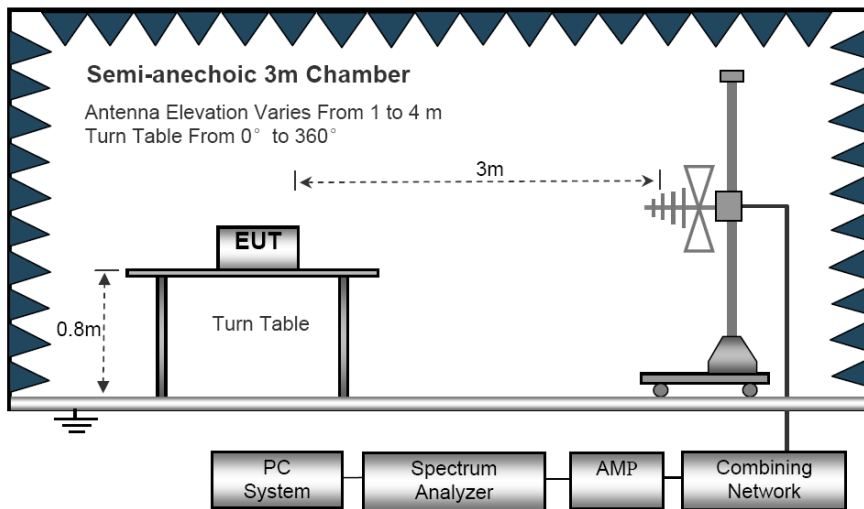
6. EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report (Z orientation).

4.2.4. Test Setup

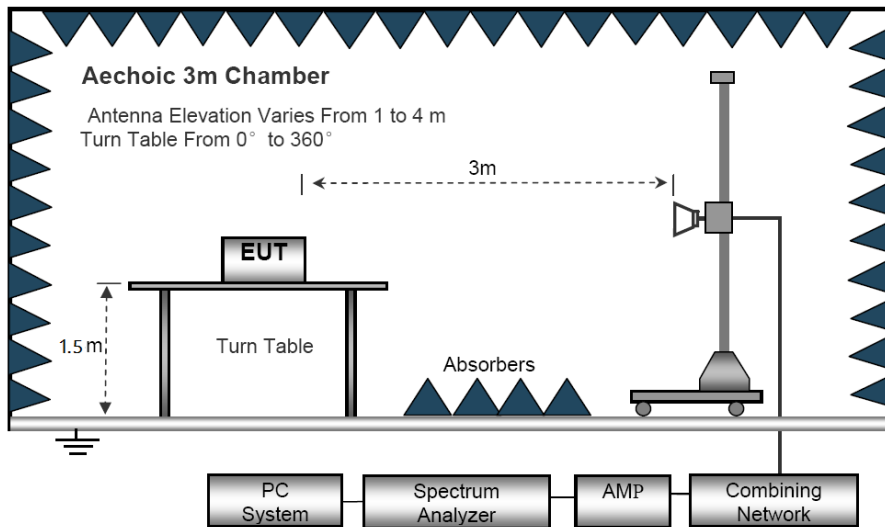
**Below 30MHz**



**30MHz- 1GHz**



**Above 1GHz**



## 4.2.5. Test Results

**Below 30MHz**

<b>Freq.</b>	<b>Reading</b>	<b>Limit</b>	<b>Margin</b>	<b>State</b>
<b>(MHz)</b>	<b>(dBuV/m)</b>	<b>(dBuV/m)</b>	<b>(dB)</b>	<b>P/F</b>
--	--	--	--	<b>P</b>
--	--	--	--	<b>P</b>

**Note:**

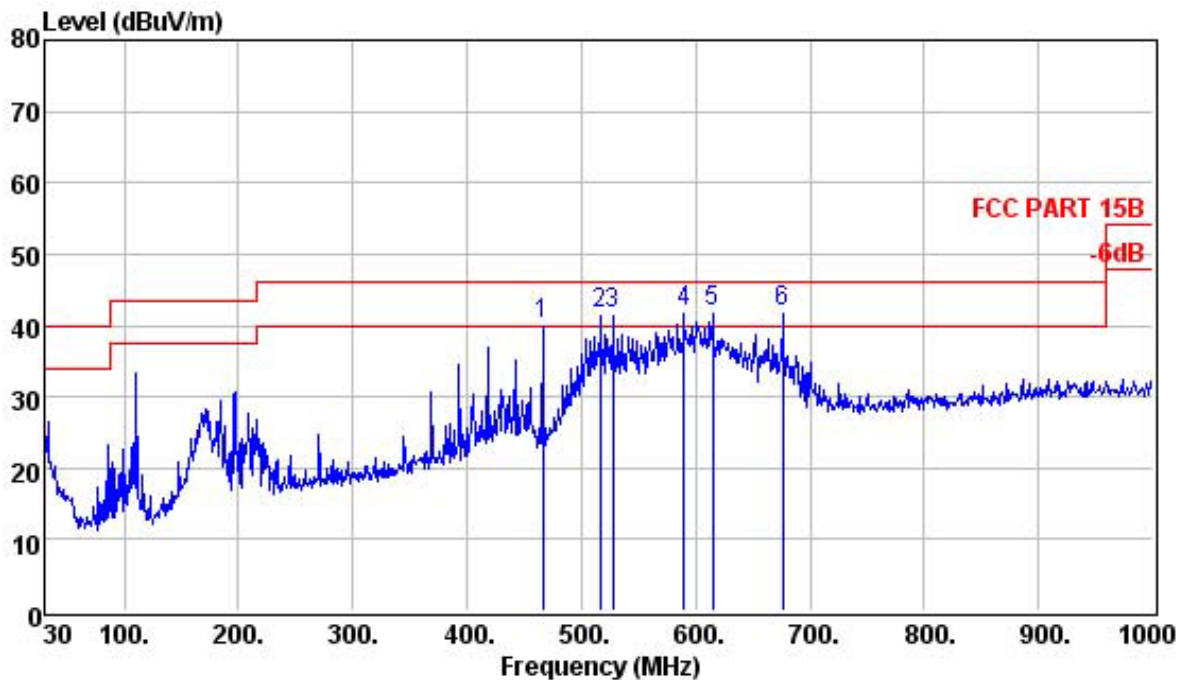
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log (\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

Below 1GHz			
EUT :	Bluetooth Speaker	Model Name :	VG3
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	TX- 2480
Test Voltage :	DC 3.65V		

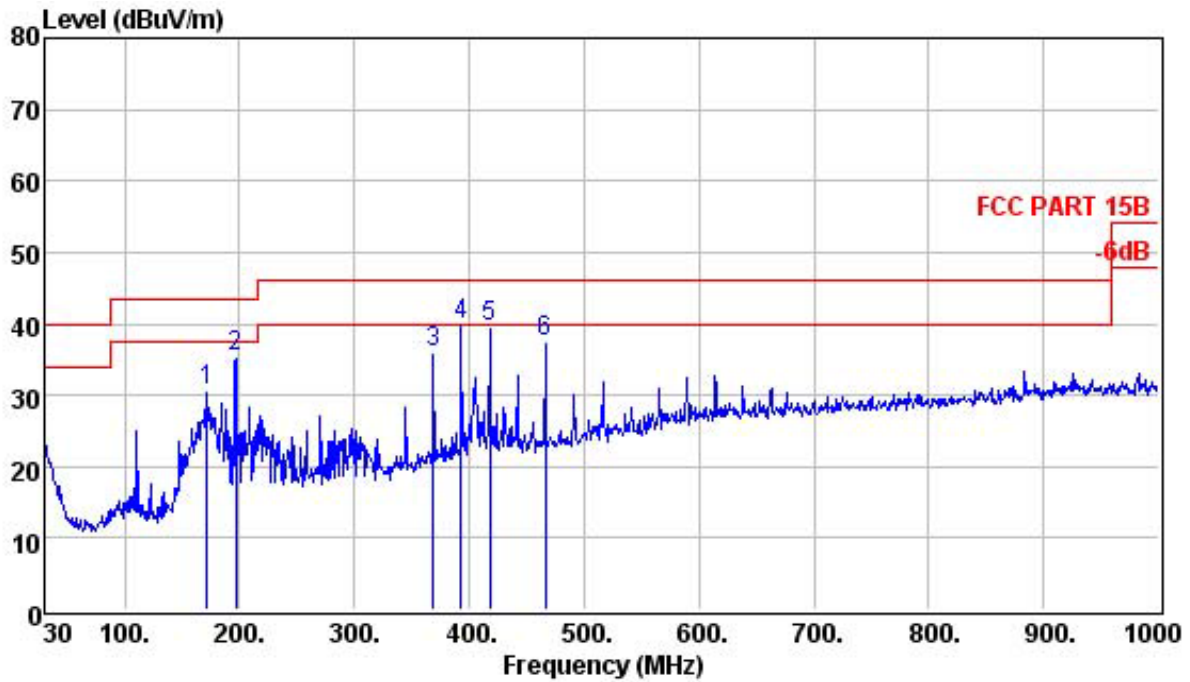
Vertical



	Read Freq	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1 !	466.500	19.46	2.69	18.06	40.21	46.00	-5.79	QP
2 !	515.970	19.55	2.94	19.02	41.51	46.00	-4.49	QP
3 !	527.610	19.37	2.94	19.23	41.54	46.00	-4.46	QP
4 !	589.690	18.44	3.29	20.27	42.00	46.00	-4.00	QP
5 !	614.910	17.64	3.38	21.02	42.04	46.00	-3.96	QP
6 !	676.020	16.19	3.69	22.00	41.88	46.00	-4.12	QP



### Horizontal



	Read	Cable	Antenna		Limit	Over	
Freq	Level	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	171.620	19.18	1.30	10.15	30.63	43.50	-12.87 QP
2	196.840	23.36	1.46	10.72	35.54	43.50	-7.96 QP
3	368.530	17.61	2.18	16.15	35.94	46.00	-10.06 QP
4	392.780	21.14	2.37	16.27	39.78	46.00	-6.22 QP
5	418.000	20.28	2.48	16.88	39.64	46.00	-6.36 QP
6	466.500	16.58	2.69	18.06	37.33	46.00	-8.67 QP

NOTE: Absolute Level= Reading Level + Antenna Factor + Cable Loss,  
 Over Limit= Absolute Level – Limit;  
 Mode 1 is the worst mode, and only the worst case is presented in the report .

Above 1GHz			
EUT :	Bluetooth Speaker	Model Name :	VG3
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	TX-GFSK
Test Voltage :	DC 3.65V		

Frequency	Meter Reading	Antenna Factor	Cable loss	Preamp factor	Emission Level	Limits	Margin	Detector Type	Comment
(MHz)	(dBμV)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
TX-2402									
4804	28.64	32.94	11.94	27.49	46.03	54	-7.97	Average	Vertical
4804	41.06	32.94	11.94	27.49	58.45	74	-15.55	peak	Vertical
7206	25.72	25.28	18.04	27.94	41.10	54	-12.90	Average	Vertical
7206	41.43	25.28	18.04	27.94	56.81	74	-17.19	peak	Vertical
4804	29.05	32.94	11.94	27.49	46.44	54	-7.56	Average	Horizontal
4804	39.32	32.94	11.94	27.49	56.71	74	-17.29	peak	Horizontal
7206	29.22	25.28	18.04	27.94	44.60	54	-9.40	Average	Horizontal
7206	41.77	25.28	18.04	27.94	57.15	74	-16.85	peak	Horizontal
TX-2440									
4880	28.97	32.11	12.15	27.53	45.70	54	-8.30	Average	Vertical
4880	40.19	32.11	12.15	27.53	56.92	74	-17.08	peak	Vertical
7320	27.55	24.33	18.09	27.96	42.01	54	-11.99	Average	Vertical
7320	41.65	24.33	18.09	27.96	56.11	74	-17.89	peak	Vertical
4880	25.83	32.11	12.15	27.53	42.56	54	-11.44	Average	Horizontal
4880	41.28	32.11	12.15	27.53	58.01	74	-15.99	peak	Horizontal
7320	24.76	24.33	18.09	27.96	39.22	54	-14.78	Average	Horizontal
7320	39.39	24.33	18.09	27.96	53.85	74	-20.15	peak	Horizontal
TX-2480									
4960	30.63	31.32	12.31	27.58	46.68	54	-7.32	Average	Vertical
4960	40.64	31.32	12.31	27.58	56.69	74	-17.31	peak	Vertical
7440	29.87	24.38	18.16	27.99	44.42	54	-9.58	Average	Vertical
7440	39.62	24.38	18.16	27.99	54.17	74	-19.83	peak	Vertical
4960	30.18	31.32	12.31	27.58	46.23	54	-7.77	Average	Horizontal
4960	40.15	31.32	12.31	27.58	56.20	74	-17.80	peak	Horizontal
7440	30.35	24.38	18.16	27.99	44.90	54	-9.10	Average	Horizontal
7440	40.56	24.38	18.16	27.99	55.11	74	-18.89	peak	Horizontal

NOTE:1.Absolute Level= ReadingLevel+antenna Factor+cable loss-preamp factor.

2.Over Limit= Absolute Level – Limit.

3.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has not to be reported.

4.EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report (Z orientation)

## 5. BAND EDGE COMPLIANCE TEST

### 5.1. Limits

For FCC ID:

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 30dB below the fundamental emissions, or comply with 15.209 limits.

For IC ID:

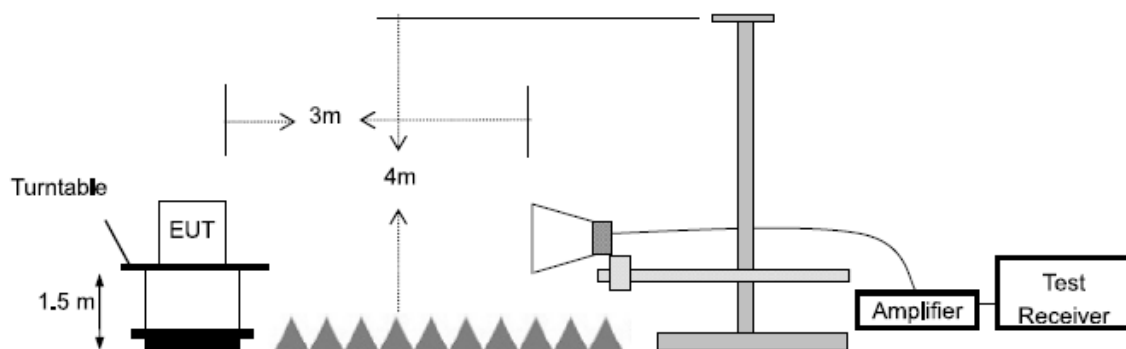
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30dB instead of 20dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

### 5.2. Test Setup

For Conducted Test



For Radiated emission Test



### 5.3. Test Procedure

For Conducted Test		
1.	The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100KHz. The video bandwidth is set to 300KHz.	
2.	The spectrum from 30MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.	
EMI Test receiver	Setting	
Attenuation	Auto	
RBW	100KHz	
VBW	300KHz	
Detector	Peak	
trace	Max hold	
For Radiated Emission Test		
1.	The EUT was placed on a styrofoam table which is 1.5m above ground plane.	
2.	The measurement procedure at the ban edges was simplified by performing the measurement in just one plot. Both, the in-band-emission and the unwanted emission were be encompassed by the span. After trace stabilization, the maxium peak was be determined by a peak detector and the value was marked by an appropriate limit line. The second limit line, which is 20dB below the first, marks the limits for the emissions in the unrestricted band next to the band edge.	
3.	The measurements were performed at the lower end of the 2.4GHz band.	
4.	Use the following spectrum analyzer settings	
EMI Test receiver	Setting	
Attenuation	Auto	Auto
RBW	1MHz	1MHz
VBW	3MHz	10Hz
Detector	Peak	Average
trace	Max hold	Max hold

### 5.4. Deviation from standard

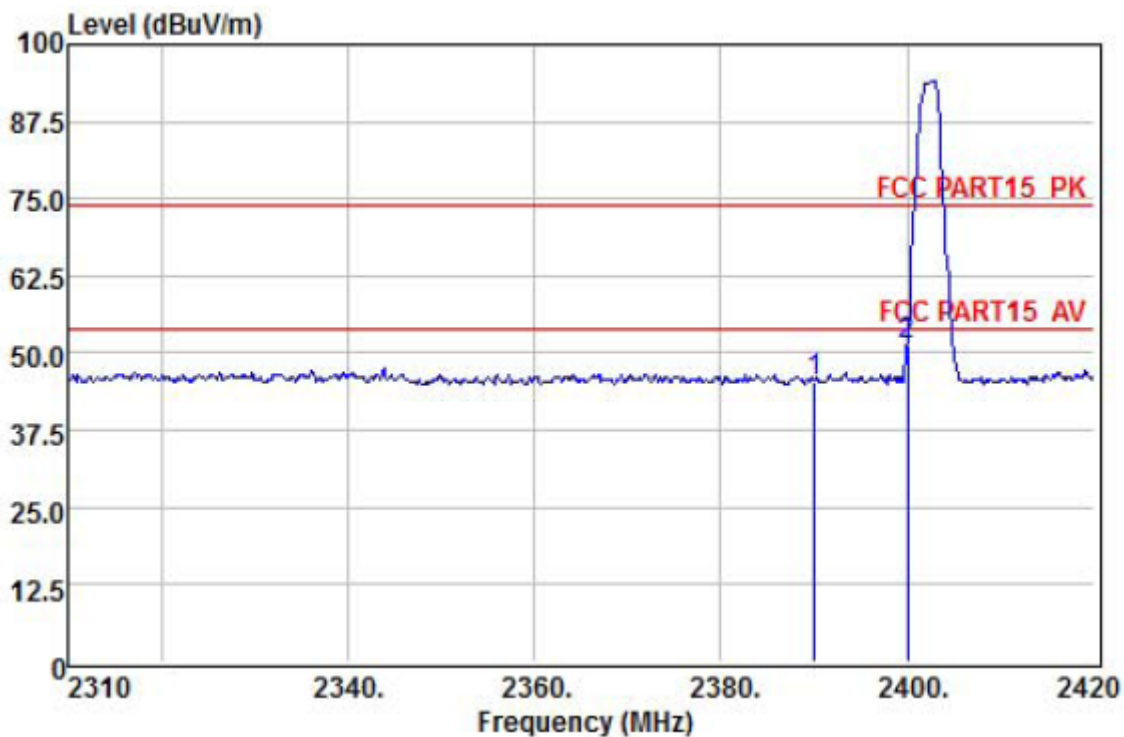
No deviation.

### 5.5. Test Results

#### Radiated band-edge test results

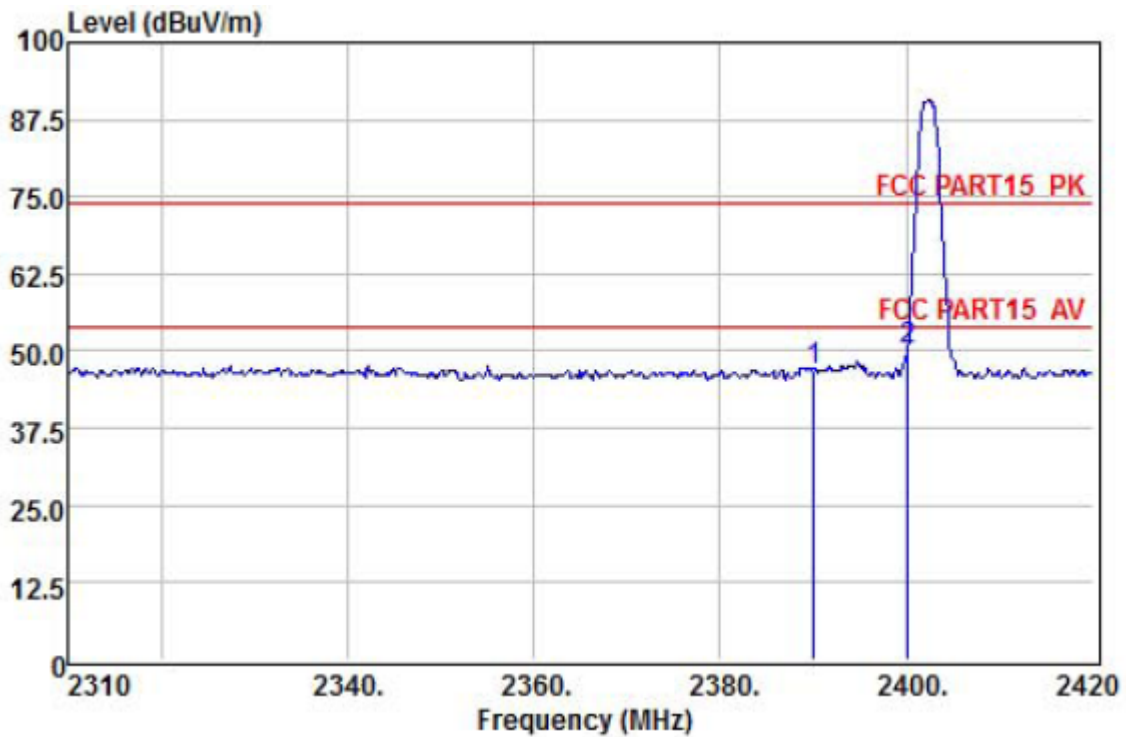
EUT :	Bluetooth Speaker	Model Name :	VG3
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	TX-2402
Test Voltage :	DC 3.65V		

#### Vertical



	Freq	Read Level	Preamp Factor	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB/m	dBuV/m	dBuV/m	dB	
1	2390.00	41.05	26.32	3.36	28.72	46.81	74.00	-27.19	Peak
2	2400.09	44.41	26.32	3.38	28.72	50.19	74.00	-23.81	Peak

### Horizontal

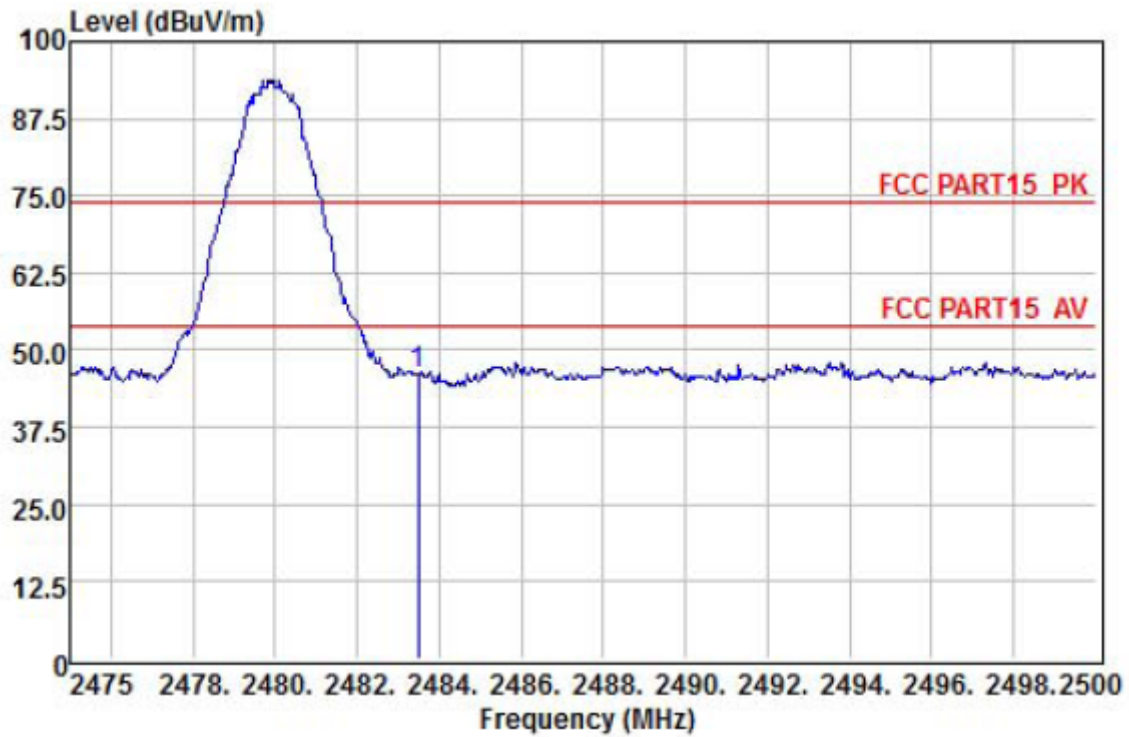


	Read Freq	Preamp Level	Preamp Factor	Cable Loss	Antenna Loss	Level	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB/m	dBuV/m	dBuV/m	dB	
1	2390.00	39.63	26.32	3.36	28.72	45.39	74.00	-28.61	Peak
2	2400.00	45.49	26.32	3.38	28.72	51.27	74.00	-22.73	Peak

NOTE: 1. Absolute Level= Reading Level+Antenna Factor+Cable Loss-Preamp Factor,  
 Over Limit= Absolute Level – Limit;  
 2. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has not to be reported.  
 3. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

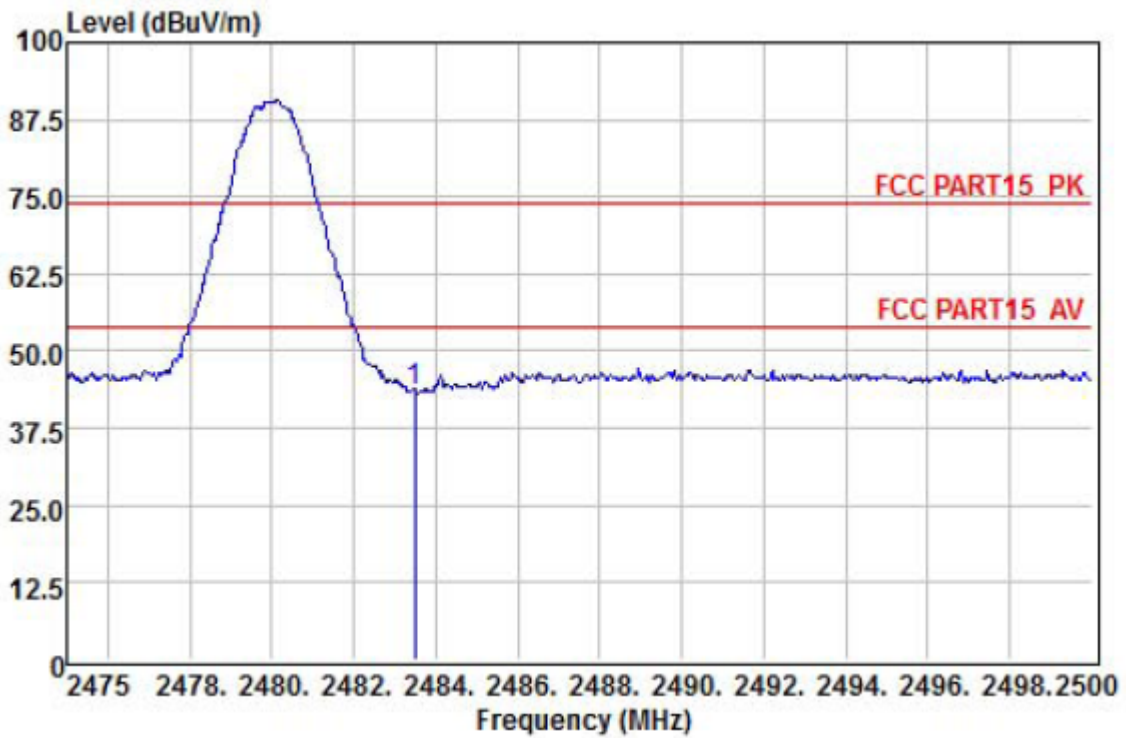
EUT :	Bluetooth Speaker	Model Name :	VG3
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	TX-2480
Test Voltage :	DC 3.65V		

**Vertical**



	Read Freq	Preamp Level	Antenna Factor	Cable Loss	Antenna Factor	Limit Level	Over Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB/m	dBuV/m	dBuV/m	dB	
1	2483.50	40.31	26.34	3.48	28.79	46.24	74.00	-27.76	Peak

Horizontal



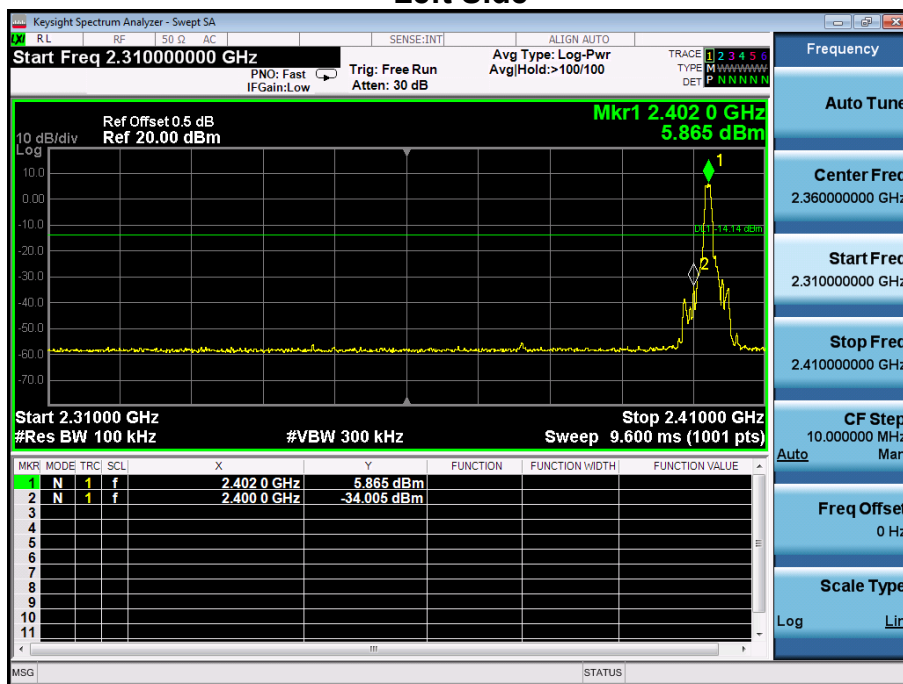
	Read Freq	Preamp Level	Preamp Factor	Cable Loss	Antenna Loss	Level	Limit	Over Limit	Remark
	MHz	dBuV	dB	dB	dB/m	dBuV/m	dBuV/m	dB	
1	2483.50	37.66	26.34	3.48	28.79	43.59	74.00	-30.41	Peak

NOTE: 1.Absolute Level= Reading Level+Fntenna Factor+Cable Loss-Preamp Factor,  
 Over Limit= Absolute Level – Limit;  
 2.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has not to be reported.  
 3.If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

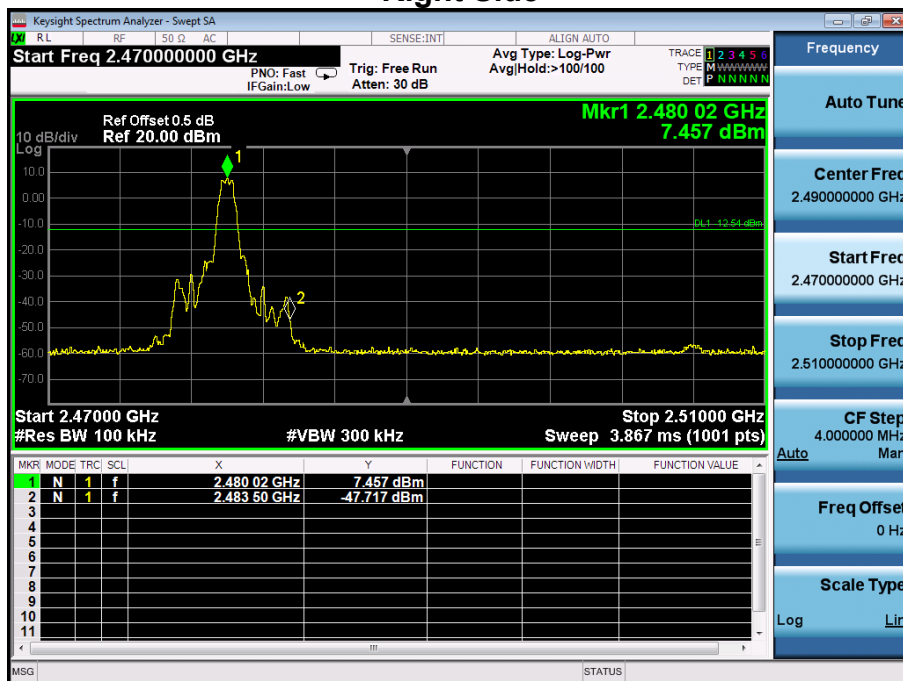


### Conducted band-edge test results

#### Left Side



#### Right Side



## 6. OCCUPY BANDWIDTH TEST

### 6.1. Limits

DTSs include systems that employ digital modulation techniques resulting in spectral characteristics similar to direct sequence systems. The following applies to the bands 902-928 MHz and 2400- 2483. 5 MHz.

The minimum 6 dB bandwidth shall be 500 kHz

### 6.2. Test Procedure

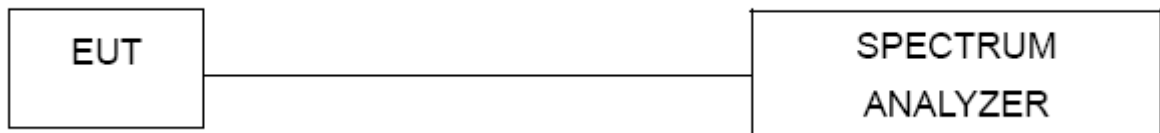
The testing follows FCC KDB publication No. 558074 D01 DTS Meas. Guidance v04.

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### 6.3. Deviation from standard

No deviation.

### 6.4. Test Setup

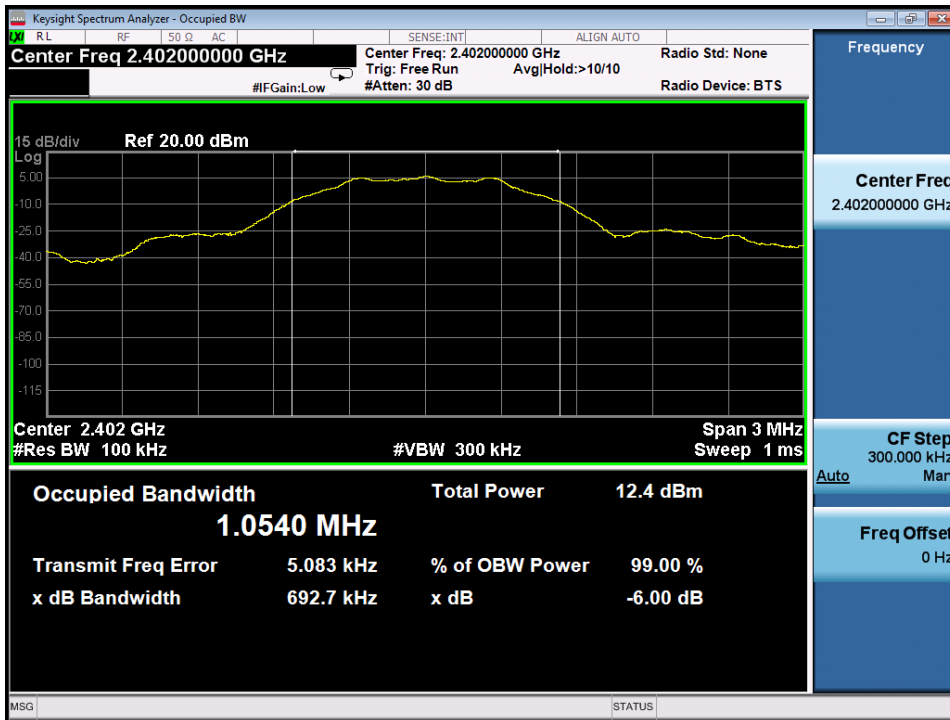


### 6.5. Test Results

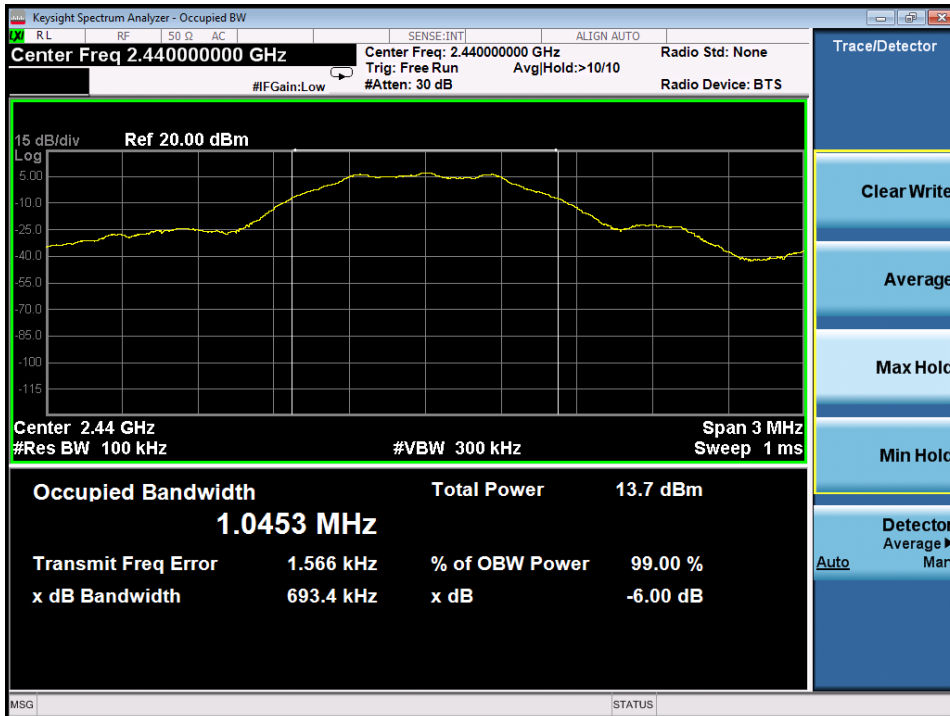
Channel Frequency (MHz)	-6dB Bandwidth (KHz)	Limit (KHz)	Result
2402	692.7	500	Pass
2440	693.4	500	Pass
2480	690.8	500	Pass

Test plot as follows

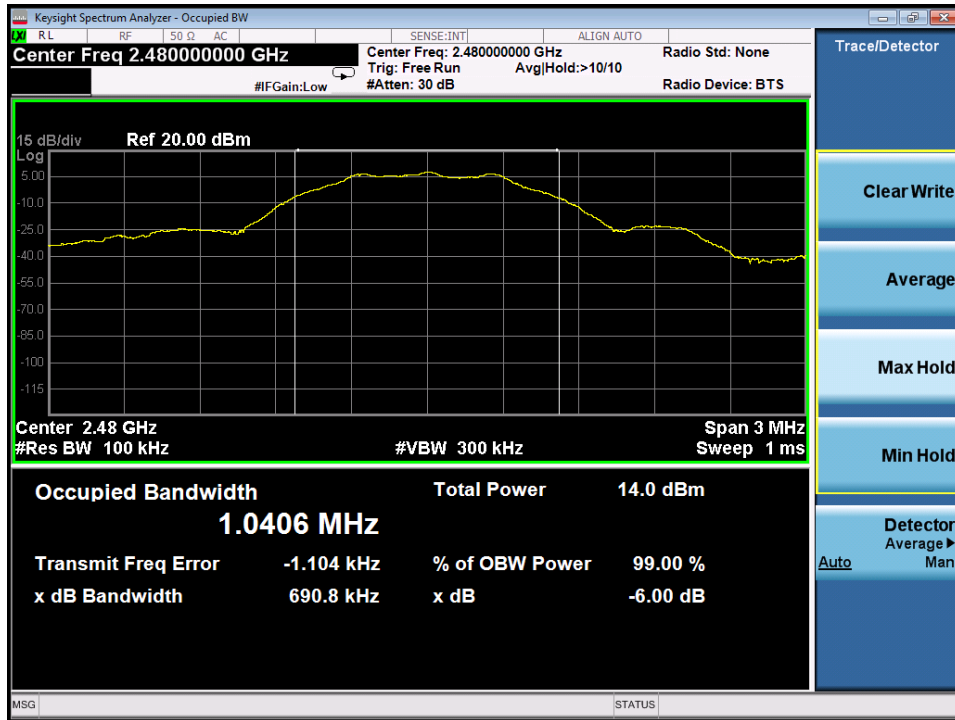
### 2402MHz



### 2440 MHz



### 2480 MHz



## 7. OUTPUT POWER TEST

### 7.1. Limits

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the e.i.r.p. shall not exceed 4 W.

### 7.2. Test Procedure

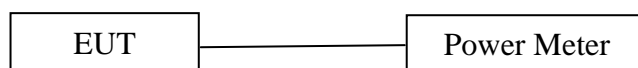
The testing follows FCC KDB publication No. 558074 D01 DTS Meas. Guidance v04

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
2. Spectrum Setting:  $RBW \geq \text{Bandwidth}$ ,  $VBW \geq 3 \times RBW$ , Sweep time = Auto,  $\text{Span} \geq 3 \times RBW$ ,
3. Detector = peak. Trace mode = max hold.
4. Use peak marker function to determine the peak amplitude level.

### 7.3. Deviation from standard

No deviation.

### 7.4. Test Setup

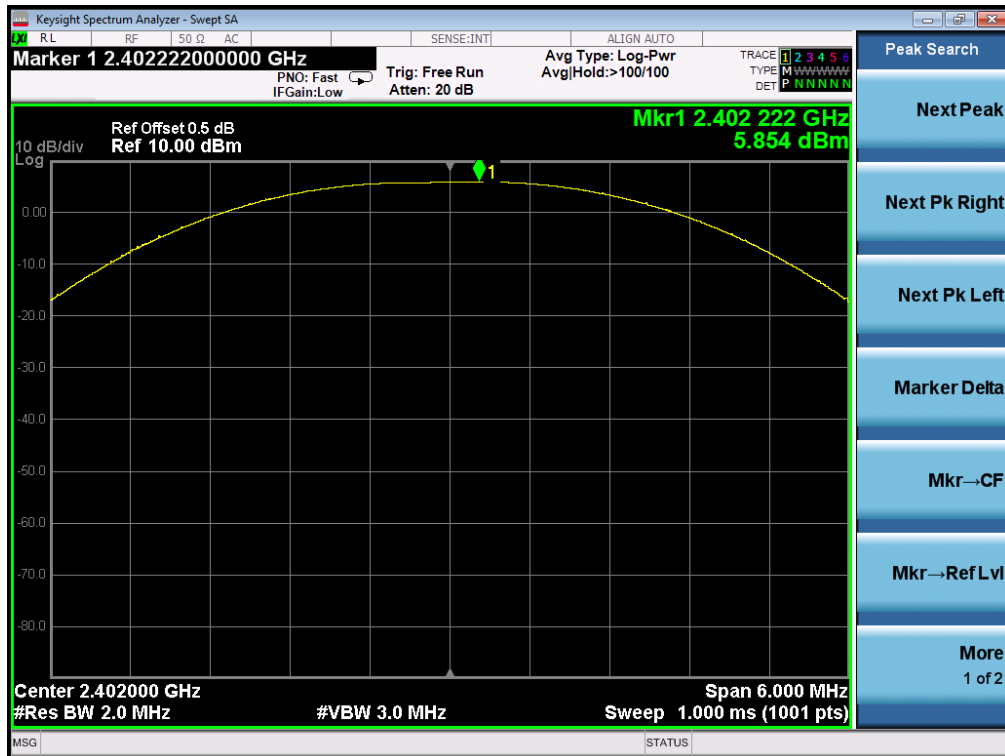


### 7.5. Test Result

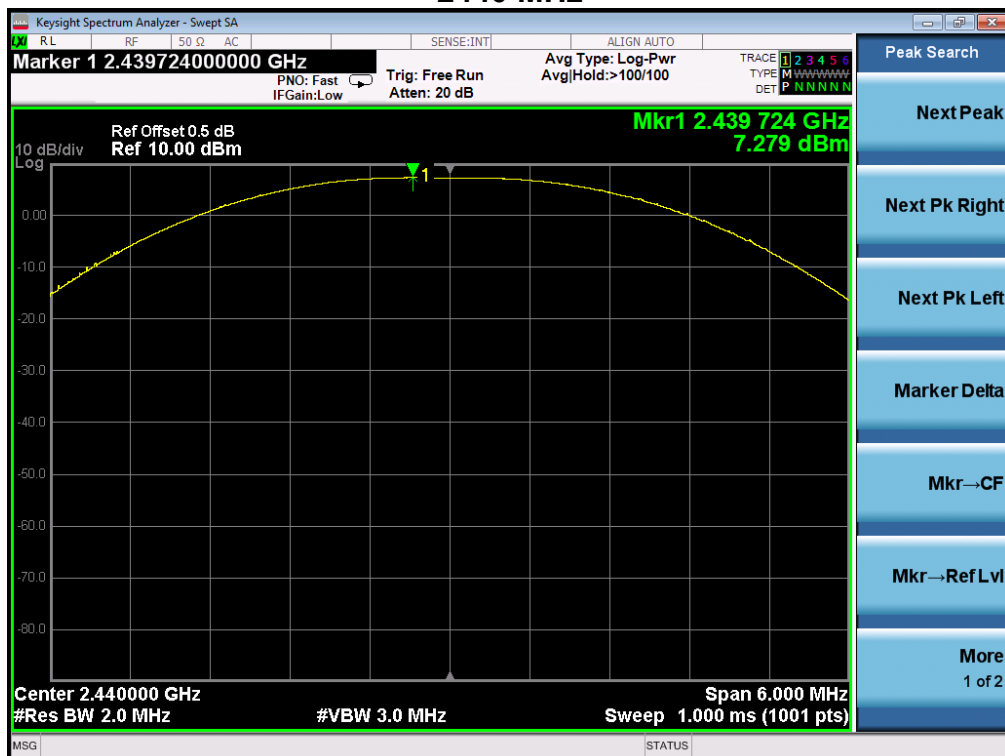
Test Mode	Frequency (MHz)	Conducted Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
GFSK	2402	5.854	1.0	6.854	30	Pass
	2440	7.279		8.279	30	Pass
	2480	7.663		8.663	30	Pass

Test plot as follows:

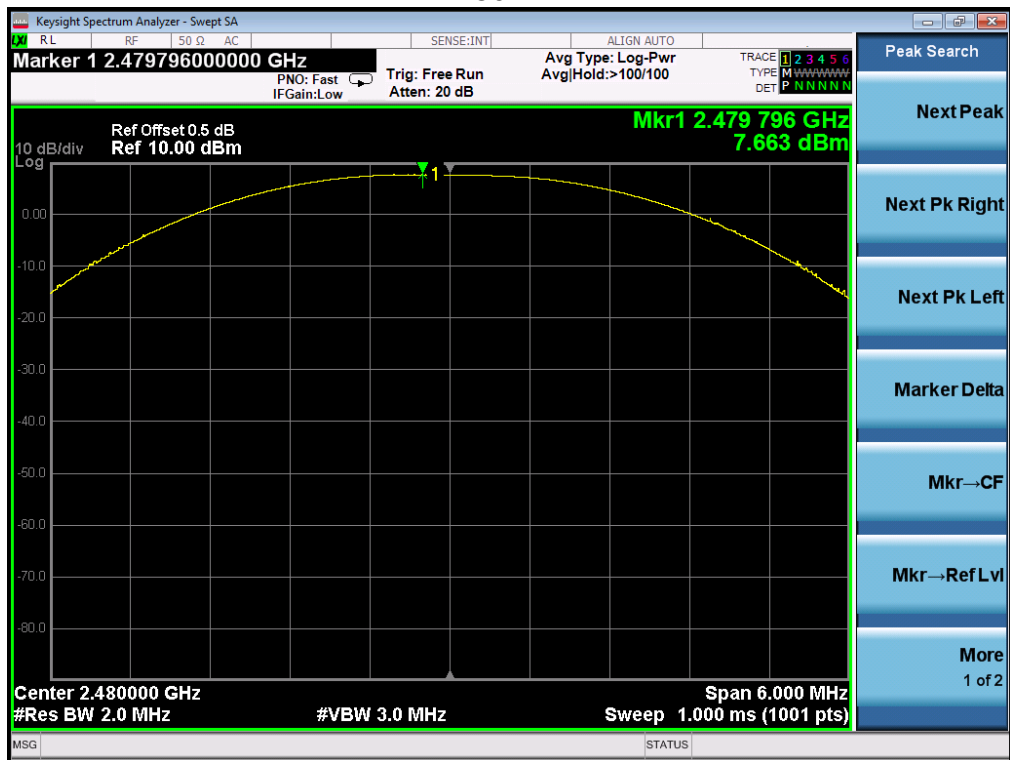
### 2402MHz



### 2440 MHz



### 2480 MHz



## 8. POWER SPECTRAL DENSITY TEST

### 8.1. Limits

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

### 8.2. Test Procedure

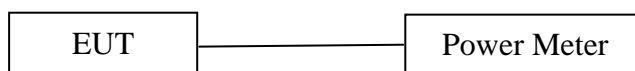
The testing follows Measurement procedure 10.2 Method PKPSD of FCC KDB publication No. 558074 D01 DTS Meas. Guidance v04.

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
2. Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as center frequency to channel center frequency, span=1.5 times the bandwidth, detector = peak,  $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$ ,  $\text{VBW} \geq 3 \times \text{RBW}$  kHz, Sweep time=Auto.
3. Trace mode = max hold. Mark the peak.
4. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 8.3. Deviation from standard

No deviation.

### 8.4. Test Setup

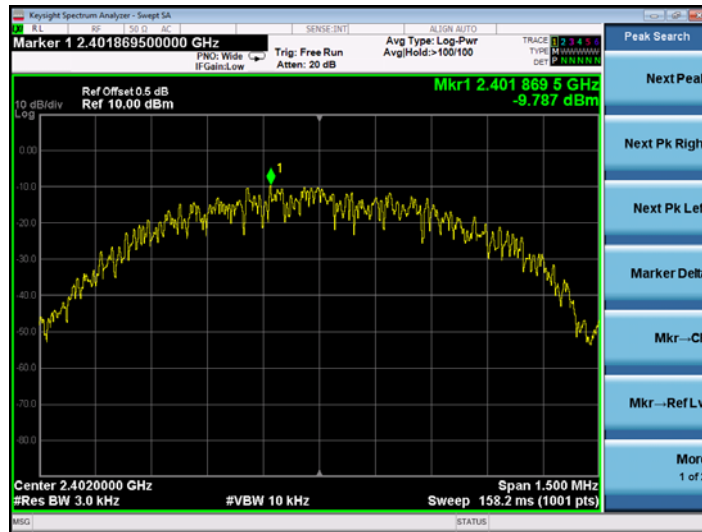


### 8.5. Test Result

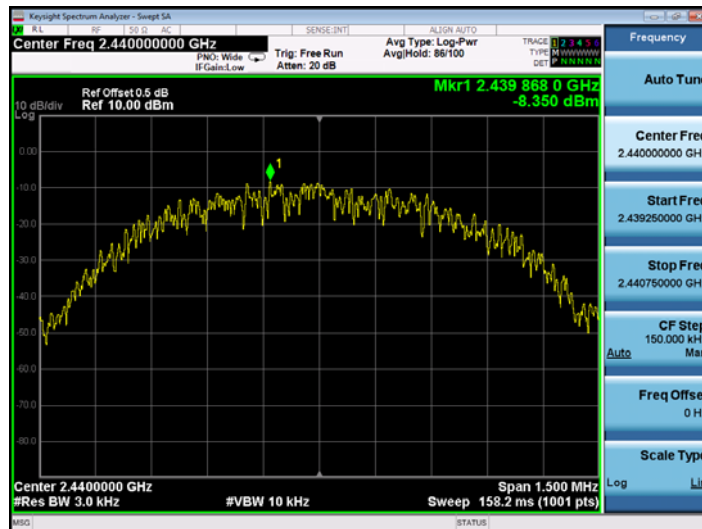
Channel Frequency (MHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2402	-9.787	8	Pass
2440	-8.350	8	Pass
2480	-8.141	8	Pass



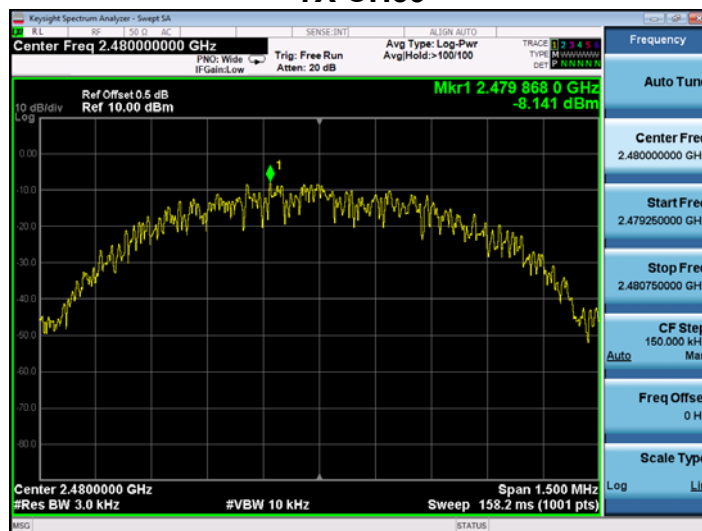
### TX CH00



### TX CH 19



### TX CH39



## 9. ANTENNA REQUIREMENTS

### 9.1. Limits

For intentional device, according to FCC 47 CFR Section 15.203, 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

According to RSS-GEN section 8.3

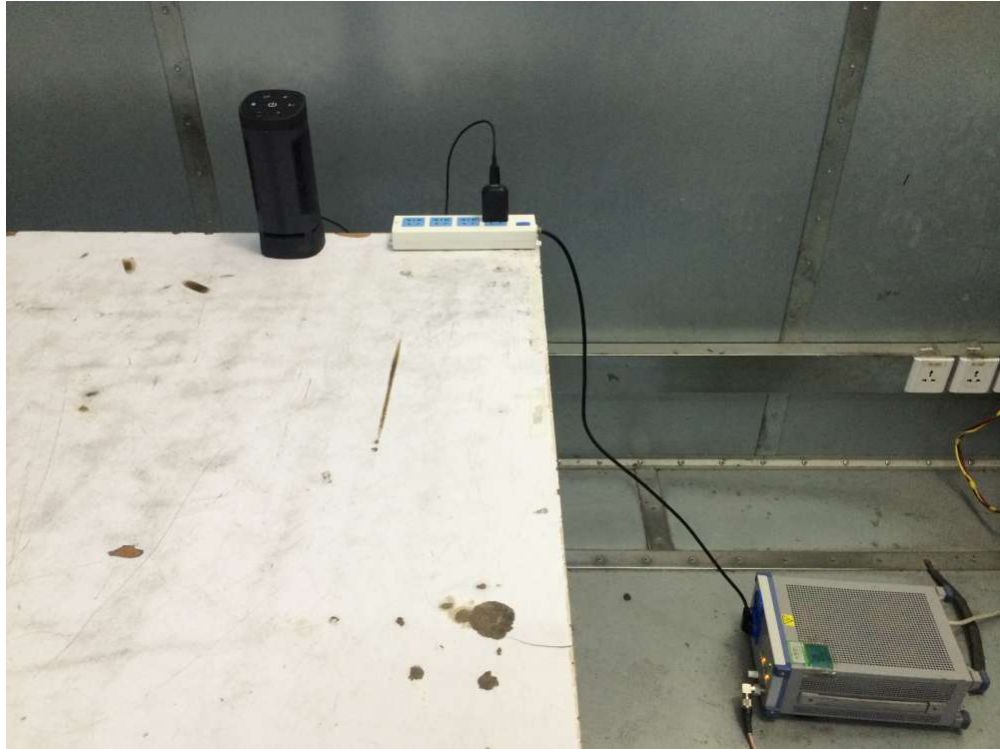
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### 9.2. Test Result

The antennas used for this product is PCB antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 1.0dBi. The unit does meet the requirements.

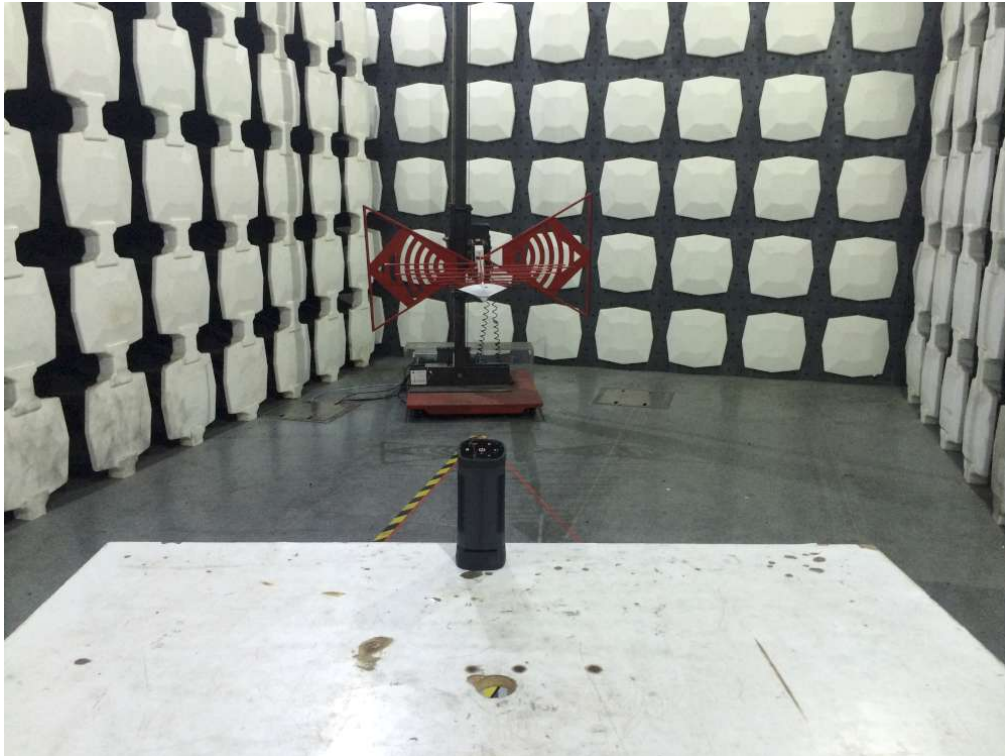
## 10.PHOTOGRAPHS OF TEST SET-UP

Conducted Emission



## Radiated Emission Test

Below 1GHz

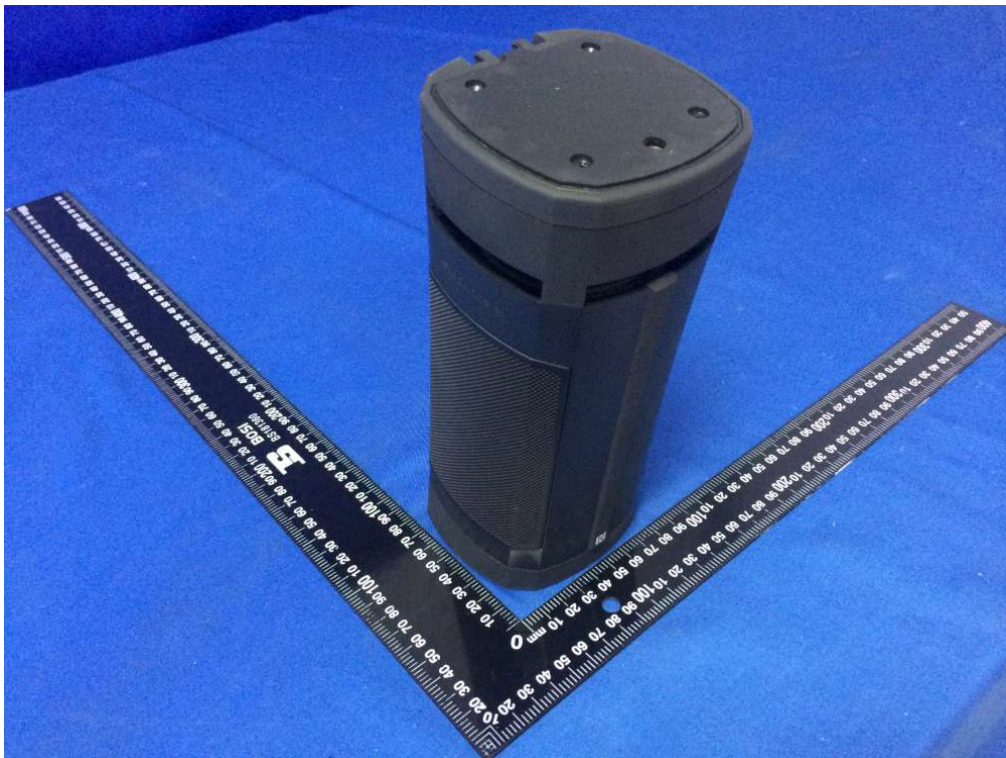


Above 1GHz



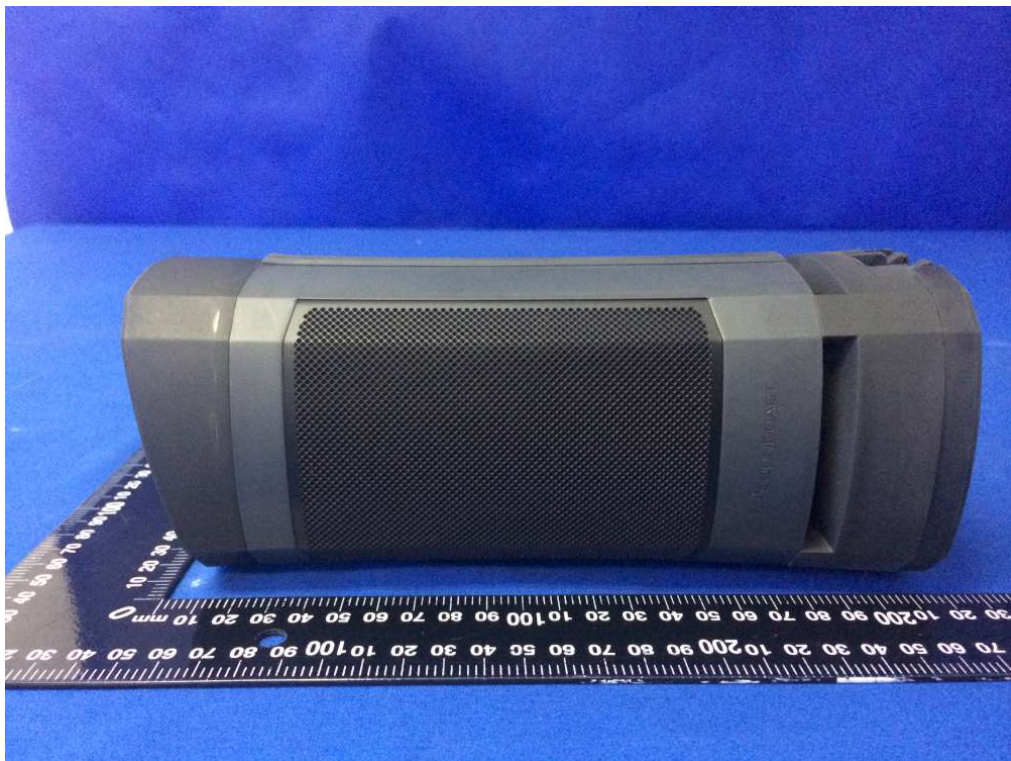


## 11. PHOTOGRAPHS OF THE EUT





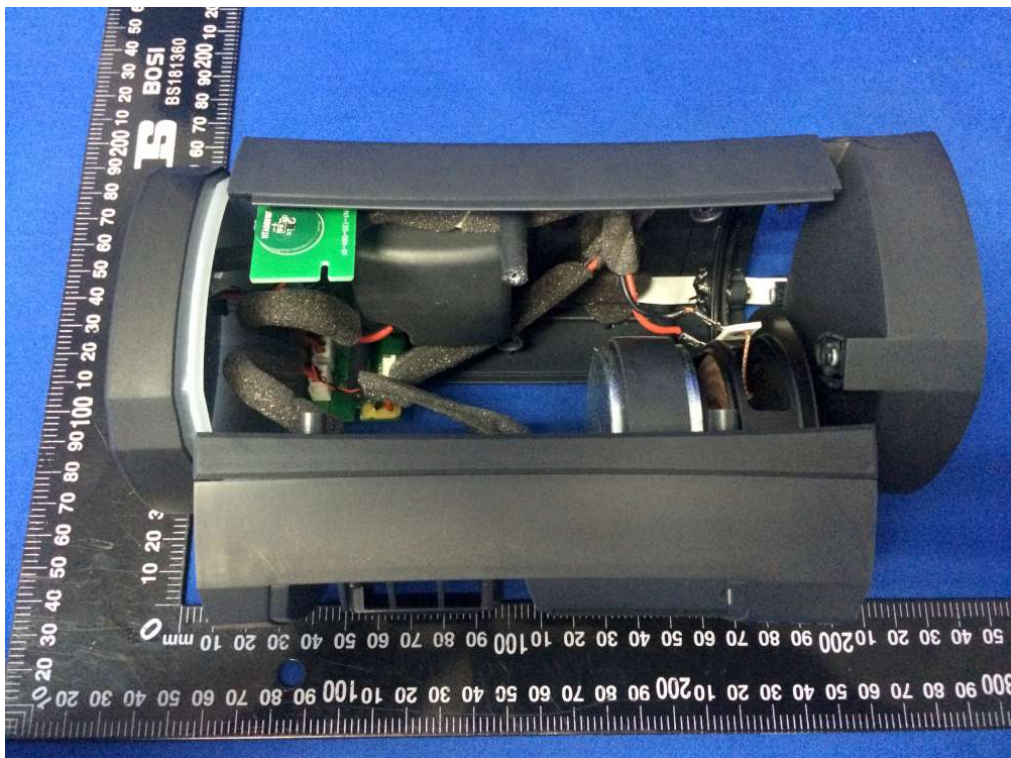






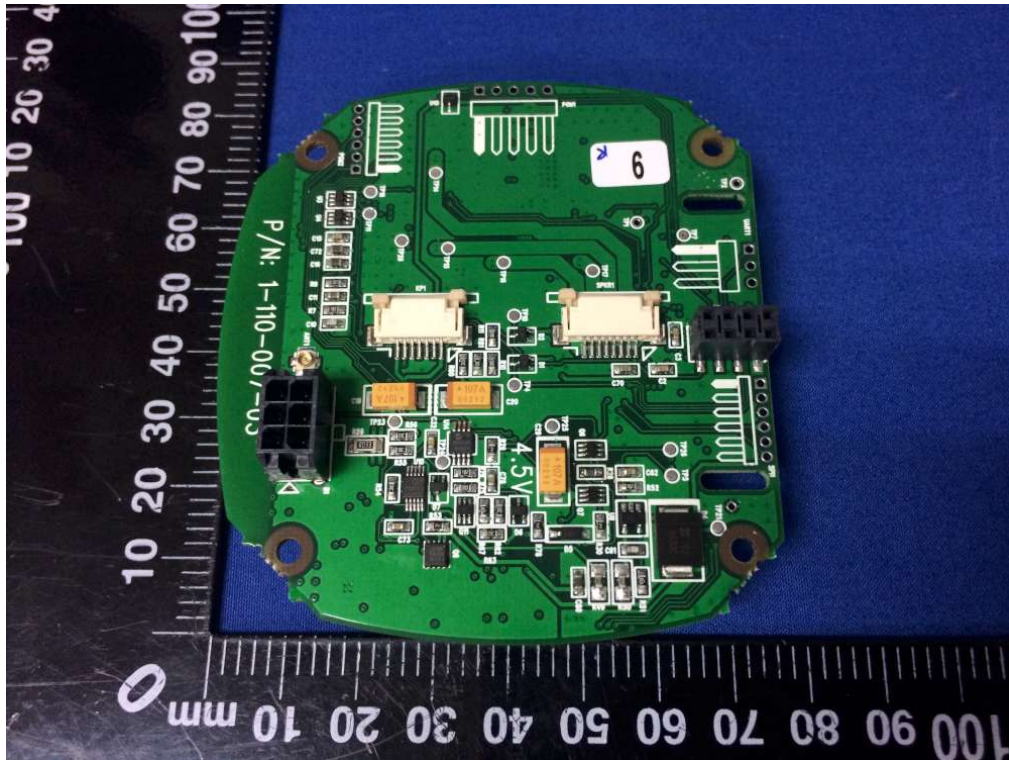


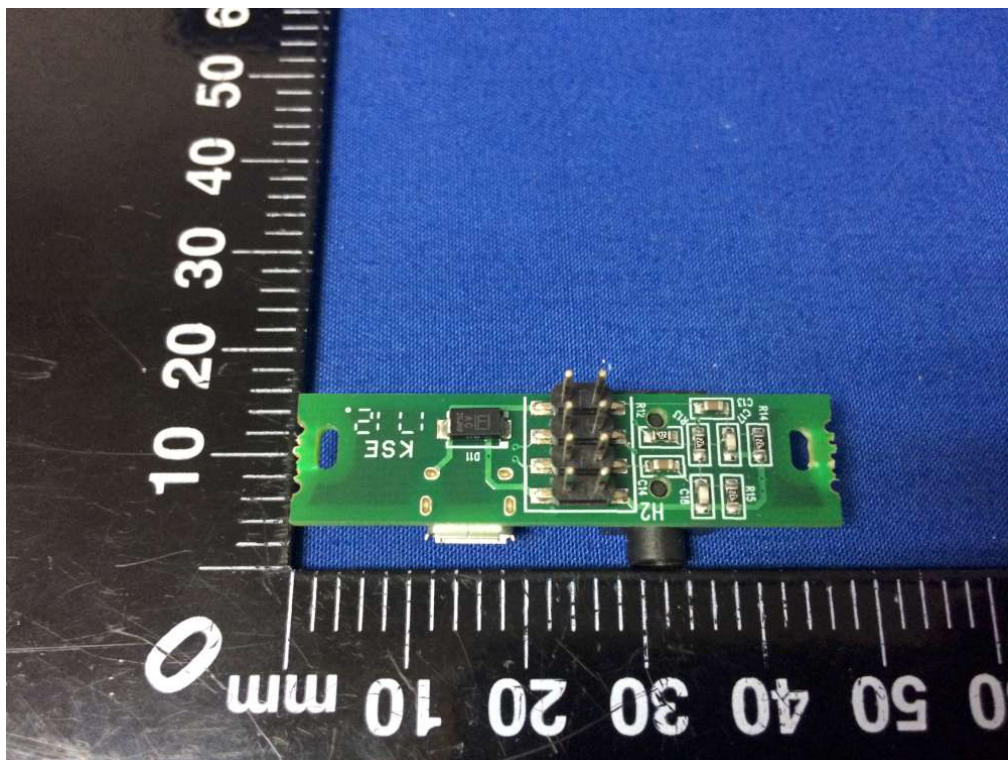
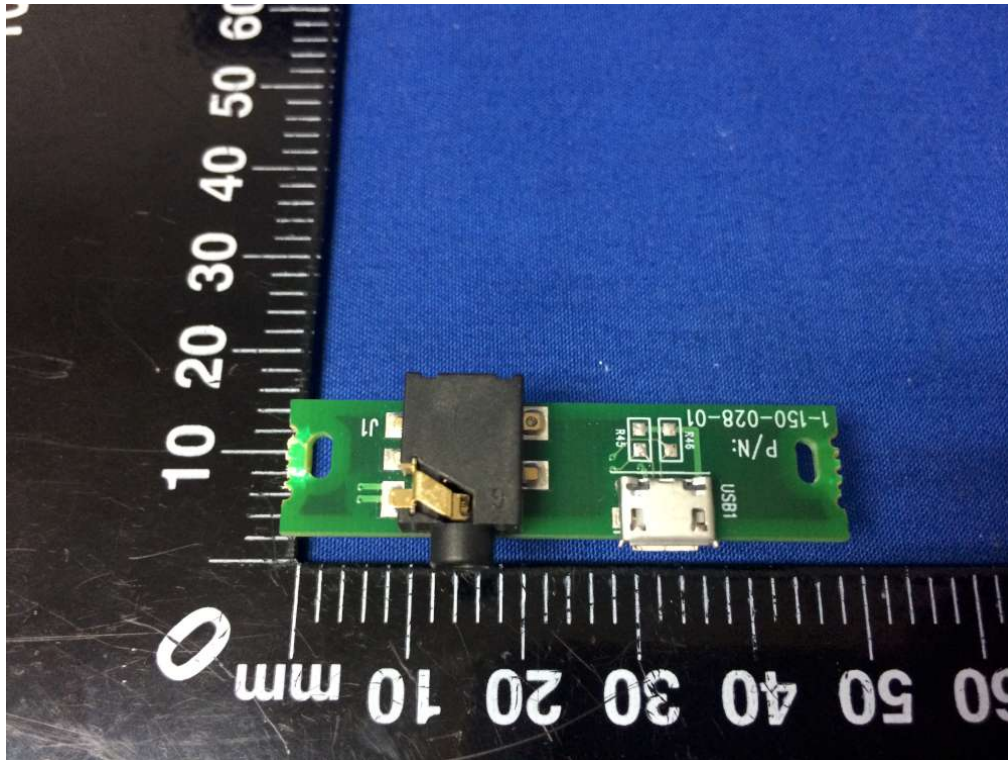




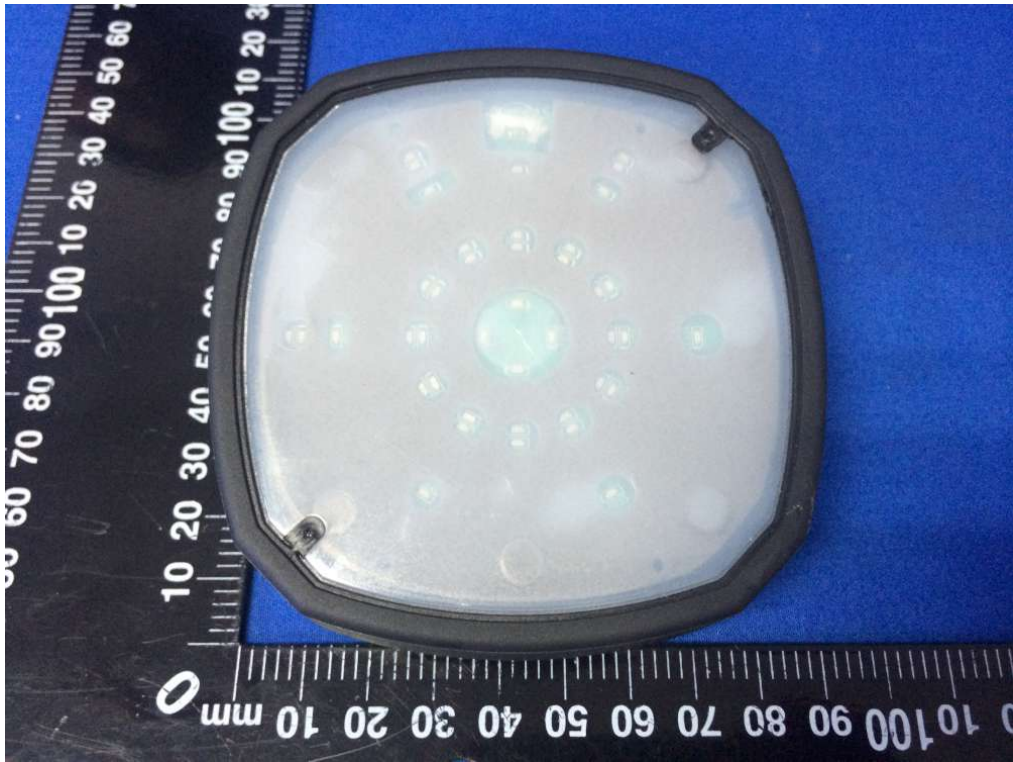




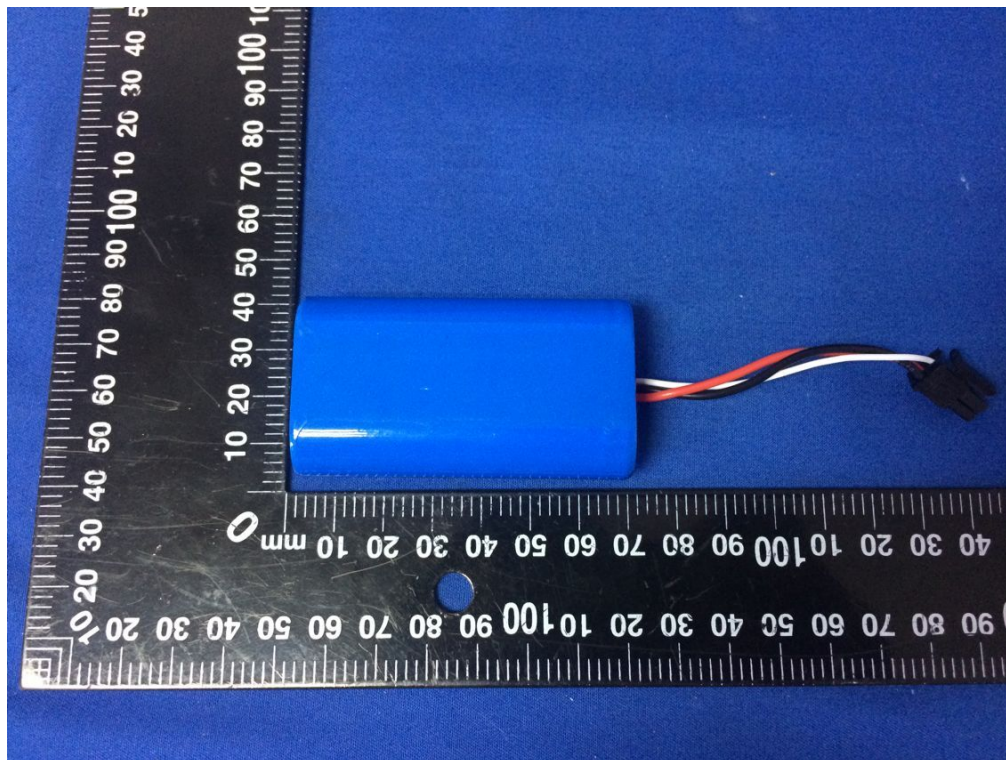
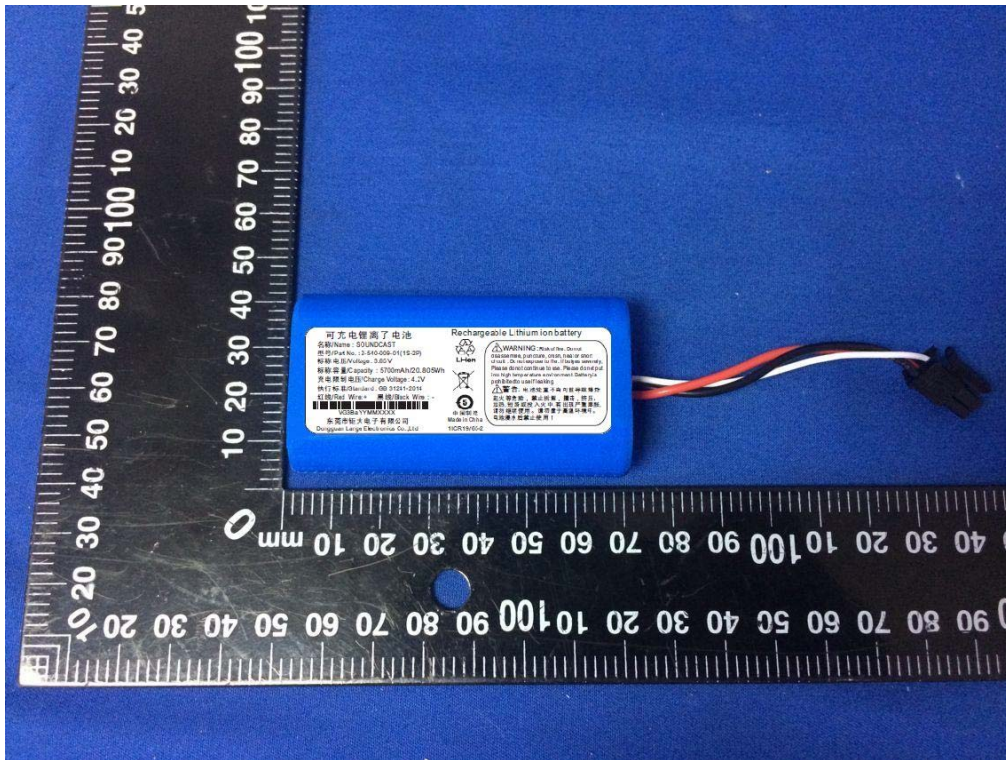












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