

FCC TEST REPORT(Bluetooth)

for

The Source (Bell) Electronics Inc.

Bluetooth Speaker

Model Number: 8050174

Serial Number: 8050176, 8050177

FCC ID: ZHW-8050174
IC ID :255A-8050174

Prepared for : The Source (Bell) Electronics Inc.

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Report No. : 16KWE114734F

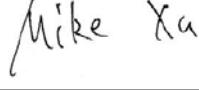
Date of Test : Nov. 17~26, 2016

Date of Report : Nov. 28, 2016

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Keyway Testing Technology Co., Ltd.

Applicant:	The Source (Bell) Electronics Inc. 279 Bayview Drive,P.O.Box 34000,Barrie,On.Canada, L4M 4W5		
Manufacturer:	Dong Guan ShengYu Electronic Technology Co.,Ltd Tian Sheng Hu Industry,Luo Ma Village committee,Qing Xi Town,DongGuan City ,GuangDong Province,China		
E.U.T:	Bluetooth Speaker		
Model Number:	8050174		
Serial Model:	8050176, 8050177		
Trade Name:	HeadRush	Serial No.:	-----
Date of Receipt:	Nov. 17, 2016	Date of Test:	Nov. 17~26, 2016
Test Specification:	FCC Part 15, Subpart C Section 15.247: 2015 ANSI C63.10:2013 RSS-247 Issue 1 May 2015 RSS-Gen Issue 4 November 2014		
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied.		
Issue Date: Nov. 28, 2016			
Tested by:	Reviewed by:	Approved by:	
			
Keven Wu / Engineer	Mike Xu / Supervisor	Andy Gao / Supervisor	
Other Aspects:	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.			

1.TEST SUMMARY

Test Items	Test Requirement	Result
Conducted Emissions	15.207 & RSS-247 § 3.1/ RSS-Gen § 8.8	PASS
Radiated Emissions	15.205(a) /15.209/15.247(d) & RSS-247 § 3.1/RSS-Gen § 6.13	PASS
6dB&99% Bandwidth	15.247(a)(2) & RSS-247 § 5.2(1)/ RSS-Gen § 6.6	PASS
Power density	15.247(e) & RSS-247 § 5.2(2)	PASS
Maximum Peak Output Power	15.247(b)(3) & RSS-247 § 5.4/ RSS-Gen § 6.12	PASS
Emissions from out of band	15.247(d) & RSS-247 § 5.5	PASS
Antenna Requirement	15.203 & RSS-247 § 3.1/ RSS-Gen § 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.:	8050174
Serial Model:	8050176, 8050177
Model Difference	Only the product model is different, the other is the same
Operation Frequency:	BT: 2402MHz~2480MHz
Channel numbers:	BT: 40 Channels
Modulation technology:	BT: GFSK
Antenna Type:	PCB antenna
Antenna gain:	1.0dBi
Power supply:	DC 3.7V or DC 5V from adapter
Adapter:	N/A

2.3. Independent Operation Modes

The basic operation modes are:

2.3.1. EUT work BT mode, and Test Mode as below:

Final Test 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	V1.1
Product HW version	V1.1
Radio SW version	V4.0
Radio HW version	V1.1
Test SW Version	Blue Test3
RF power setting in TEST SW	0dBm

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. 9,2016	Apr. 9,2017
Artificial Mains Network	Rohde&Schwarz	ENV216	101315	Apr. 9,2016	Apr. 9,2017
Artificial Mains Network (AUX)	Rohde&Schwarz	ENV216	101314	Apr. 9,2016	Apr. 9,2017
RF Cable	FUJIKURA	3D-2W	944 Cable	Apr. 9,2016	Apr. 9,2017

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. 9,2016	Apr. 9,2017
System Simulator	Agilent	E5515C	GB43130245	Apr. 9,2016	Apr. 9,2017
Power Splitter	Weinschel	1506A	NW425	Apr. 9,2016	Apr. 9,2017
Bilog Antenna	ETS-LINDGREEN	3142D	135452	Apr. 9,2016	Apr. 9,2017
Spectrum Analyzer	Keysight	N9020A	MY56070279	Jul. 26,2016	Jul. 26,2017
Spectrum Analyzer	Agilent	E4411B	MY4511304	Apr. 09,16	Apr. 09,17
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	Apr. 9,2016	Apr. 9,2017
Signal Amplifier	SONOMA	310	187016	Apr. 9,2016	Apr. 9,2017
Signal Amplifier	Agilent	8449B	3008A00251	Apr. 9,2016	Apr. 9,2017
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. 9,2016	Apr. 9,2017
Horn Antenna	SCHWARZBECK	BBHA9170	9170-068	Apr. 9,2016	Apr. 9,2017
Spectrum Analyzer	Agilent	8593E	3911A04271	Apr. 9,2016	Apr. 9,2017
Spectrum Analyzer	Agilent	E4408B	MY44211125	Apr. 9,2016	Apr. 9,2017
Signal Amplifier	DAZE	ZN3380C	11001	Apr. 9,2016	Apr. 9,2017
High Pass filter	Micro	HPM50111	324216	Apr. 9,2016	Apr. 9,2017
Filter	COM-MW	ZBSF-C836.5-25-X	KW032	Apr. 9,2016	Apr. 9,2017
Filter	COM-MW	ZBSF-C1747.5-75-X2	KW035	Apr. 9,2016	Apr. 9,2017
Filter	COM-MW	ZBSF-C1880-60-X2	KW037	Apr. 9,2016	Apr. 9,2017
DC Power Supply	LongWei	PS-305D	010964729	Apr. 9,2016	Apr. 9,2017
Constant temperature and humidity box	GF	GTH-800-40-1P	MAA9906-005	Apr. 9,2016	Apr. 9,2017
Splitter	Agilent	11636B	0025164	Apr. 9,2016	Apr. 9,2017
Loop Antenna	ARA	PLA-1030/B	1029	Apr. 9,2016	Apr. 9,2017
Power Meter	Anritsu	ML2495A	1204003	Apr. 9,2016	Apr. 9,2017
Power Sensor	Anritsu	MA2411B	1126150	Apr. 9,2016	Apr. 9,2017

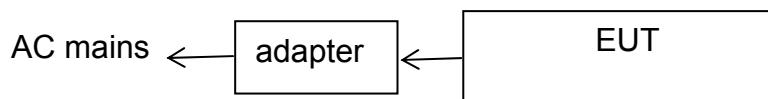
3. TEST SET-UP AND OPERATION MODES

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



3.3. Test Operation Mode and Test Software

None.

3.4. Special Accessories and Auxiliary Equipment

Adapter:	Model:BSY012U050200U U1USB INPUT:AC 100-240V, 50/60Hz, 0.3A OUTPUT:DC 5V/2A
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3.5. Countermeasures to Achieve EMC Compliance

N/A.

4. EMISSION TEST RESULTS

4.1. Conducted Emission at the Mains Terminals Test

4.1.1. Limit 15.207 & RSS-247 § 3.1/ RSS-Gen § 8.8

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

4.1.2. Test Setup

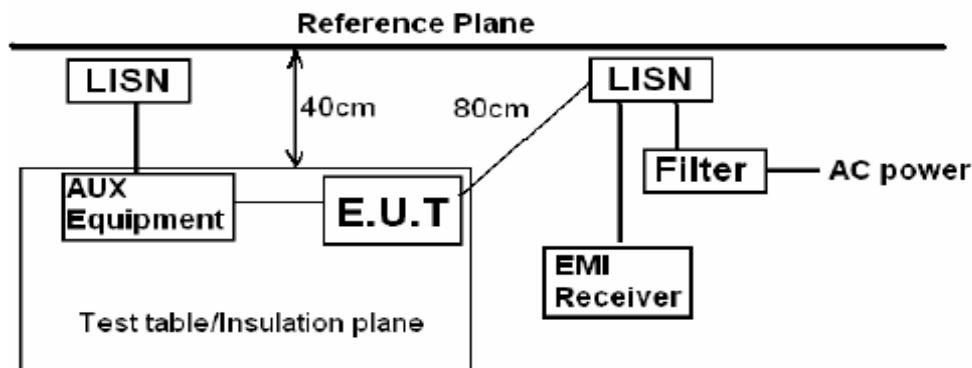
The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 0.8 m, the excess was folded back and forth parallel to the cable at the centre so as to form a bundle no longer than 0.4 m.

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.

The frequency range from 150 kHz to 30 MHz was investigated.

The bandwidth of the test receiver was set at 9 kHz.

Pretest for all mode, The test data of the worst case condition(s) was reported on the following page.



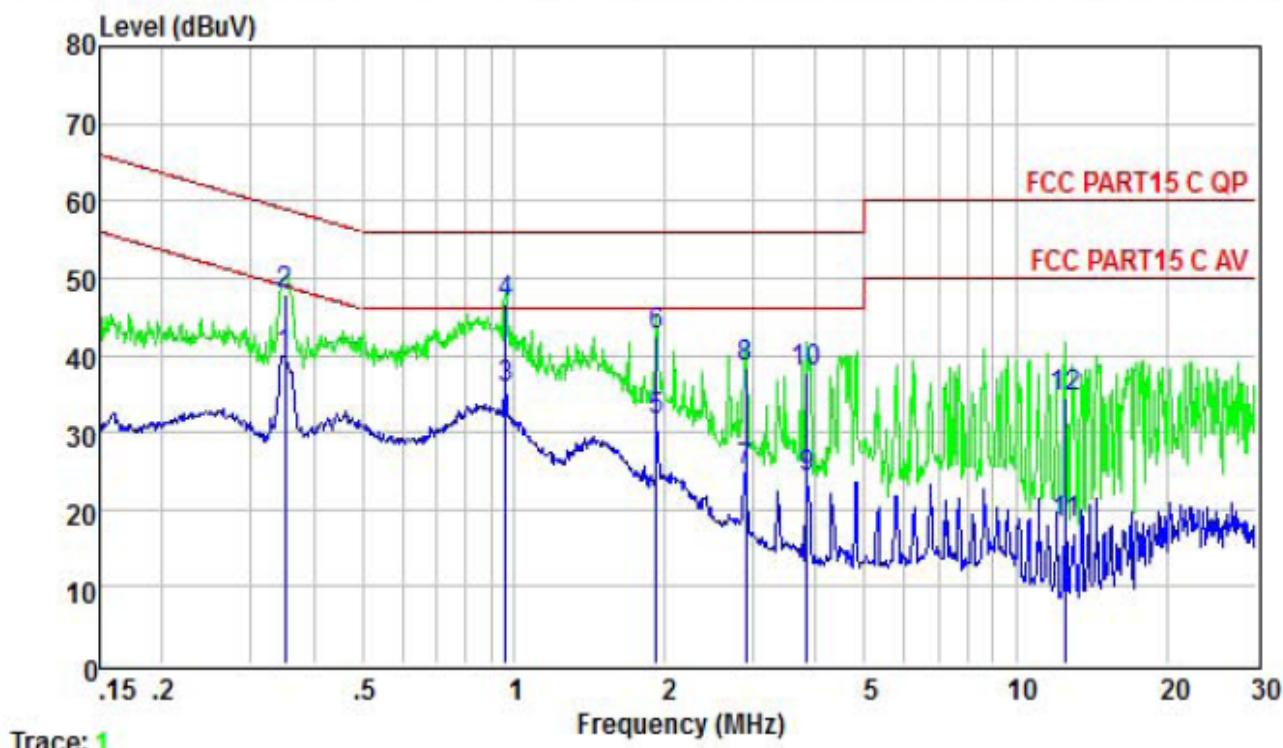
Remark:

E.U.T: Equipment Under Test

LISN: Line Impedance Stabilization Network

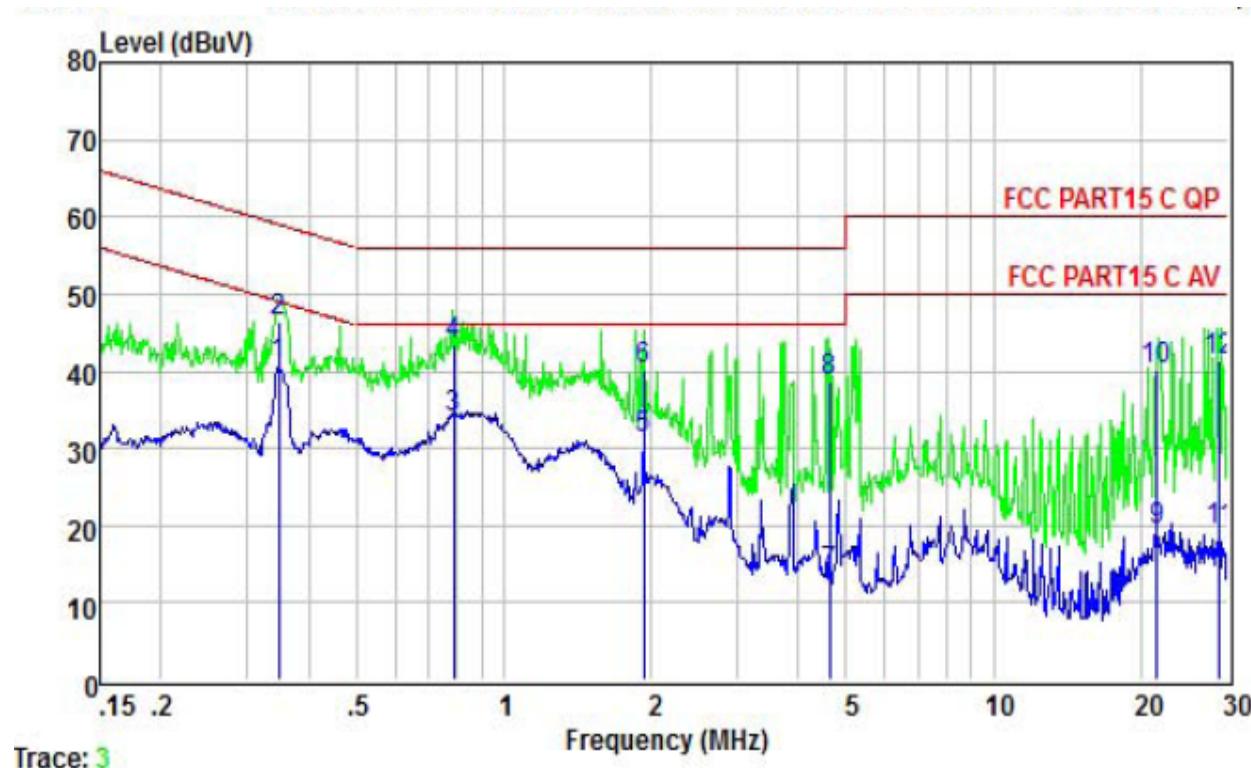
Test table height=0.8m

EUT :	Bluetooth Speaker	Model Name :	8050174
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 5.0V form Adapter AC 120V/60Hz	Test Mode :	Mode 4



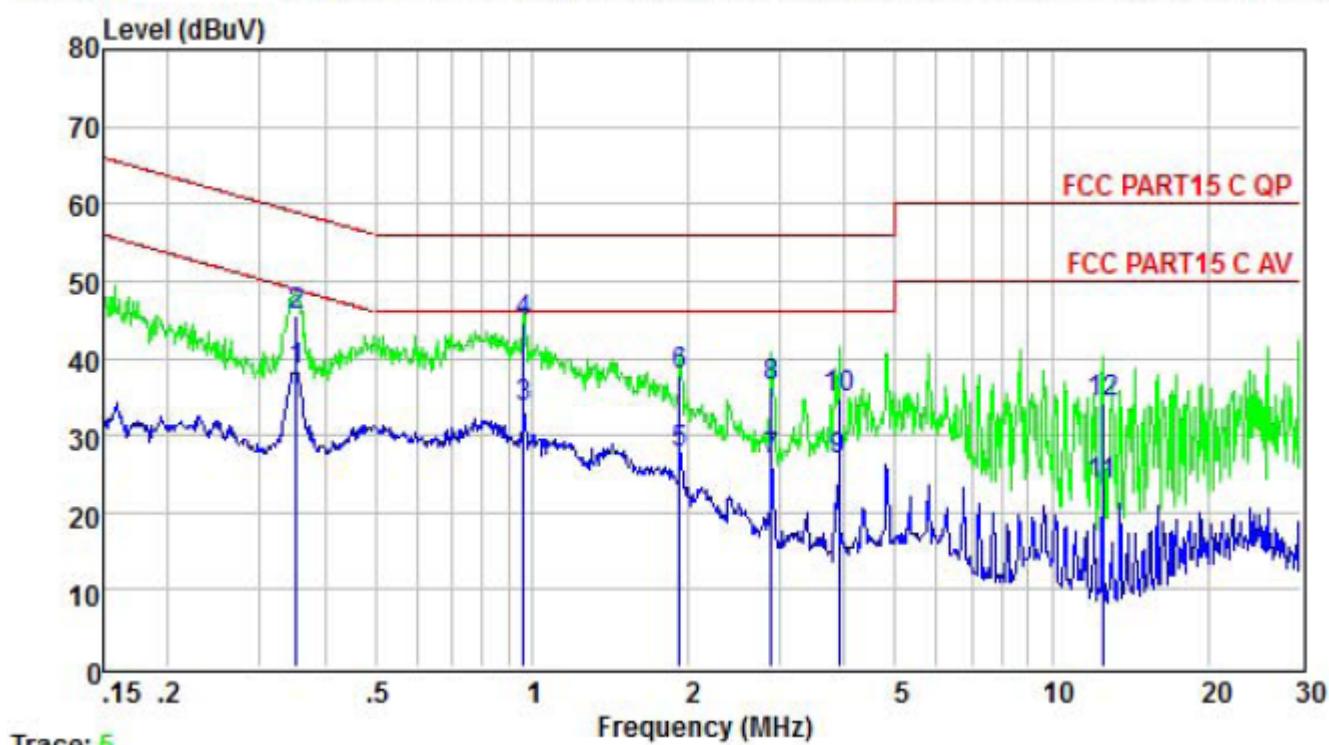
Freq	Level	Limit		Over	Remark
		Line	dBuV		
		MHz	dBuV	dB	
1	0.350	39.99	48.96	-8.97	Average
2	0.350	47.99	58.96	-10.97	QP
3	0.963	35.66	46.00	-10.34	Average
4	0.963	46.55	56.00	-9.45	QP
5	1.918	31.67	46.00	-14.33	Average
6	1.918	42.67	56.00	-13.33	QP
7	2.900	25.06	46.00	-20.94	Average
8	2.900	38.48	56.00	-17.52	QP
9	3.840	23.96	46.00	-22.04	Average
10	3.840	37.82	56.00	-18.18	QP
11	12.582	18.23	50.00	-31.77	Average
12	12.582	34.59	60.00	-25.41	QP

EUT :	Bluetooth Speaker	Model Name :	8050174
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 5.0V form Adapter AC 120V/60Hz	Test Mode :	Mode 4



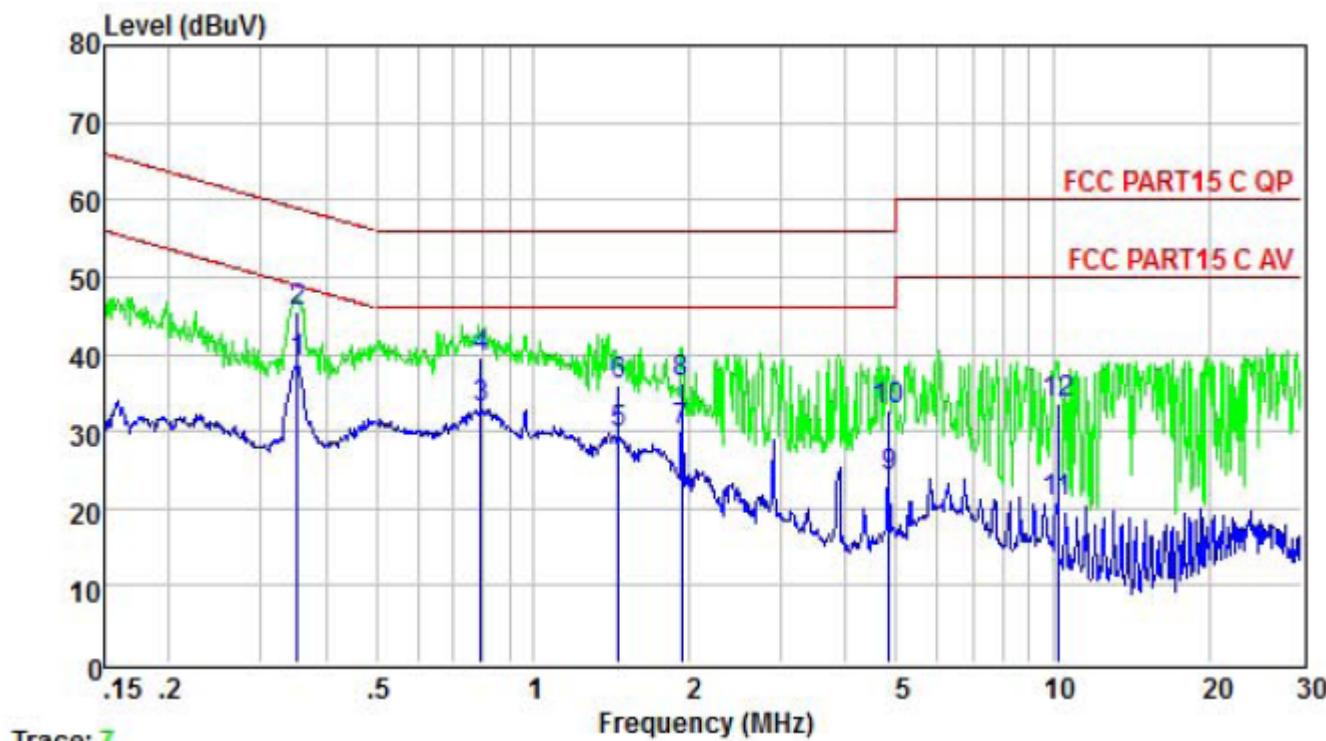
Freq	Level	Limit		Over	Remark
		Line	dBuV		
MHz	dBuV	dBuV			
1	0.348	40.78	49.00	-8.22	Average
2	0.348	46.32	59.00	-12.68	QP
3	0.792	33.81	46.00	-12.19	Average
4	0.792	43.55	56.00	-12.45	QP
5	1.928	31.29	46.00	-14.71	Average
6	1.928	40.08	56.00	-15.92	QP
7	4.622	13.64	46.00	-32.36	Average
8	4.622	38.55	56.00	-17.45	QP
9	21.486	19.27	50.00	-30.73	Average
10	21.486	40.29	60.00	-19.71	QP
11	28.908	19.27	50.00	-30.73	Average
12	28.908	41.38	60.00	-18.62	QP

EUT :	Bluetooth Speaker	Model Name :	8050174
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 5.0V form Adapter AC 240V/60Hz	Test Mode :	Mode 4



Freq	Level	Limit		Over Limit	Remark
		MHz	dBuV	Line	dB
1	0.352	38.45	48.91	-10.46	Average
2	0.352	45.64	58.91	-13.27	QP
3	0.963	33.53	46.00	-12.47	Average
4	0.963	44.58	56.00	-11.42	QP
5	1.918	27.70	46.00	-18.30	Average
6	1.918	37.72	56.00	-18.28	QP
7	2.884	26.90	46.00	-19.10	Average
8	2.884	36.42	56.00	-19.58	QP
9	3.881	26.86	46.00	-19.14	Average
10	3.881	34.76	56.00	-21.24	QP
11	12.516	23.62	50.00	-26.38	Average
12	12.516	34.18	60.00	-25.82	QP

EUT :	Bluetooth Speaker	Model Name :	8050174
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 5.0V form Adapter AC 240V/60Hz	Test Mode :	Mode 4



Freq	Level	Limit		Over	Remark
		MHz	dBuV	dBuV	dB
1	0.352	38.82	48.91	-10.09	Average
2	0.352	45.48	58.91	-13.43	QP
3	0.796	32.87	46.00	-13.13	Average
4	0.796	39.45	56.00	-16.55	QP
5	1.464	29.71	46.00	-16.29	Average
6	1.464	35.89	56.00	-20.11	QP
7	1.928	30.18	46.00	-15.82	Average
8	1.928	36.41	56.00	-19.59	QP
9	4.848	24.01	46.00	-21.99	Average
10	4.848	32.75	56.00	-23.25	QP
11	10.179	20.76	50.00	-29.24	Average
12	10.179	33.49	60.00	-26.51	QP

4.2. Radiated Emission Test

4.2.1. Limit 15.205(a) /15.209/ 15.247(d) & RSS-247 § 3.1/ RSS-Gen § 6.13

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/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	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

4.2.2. Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 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	(²)

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 setup

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.

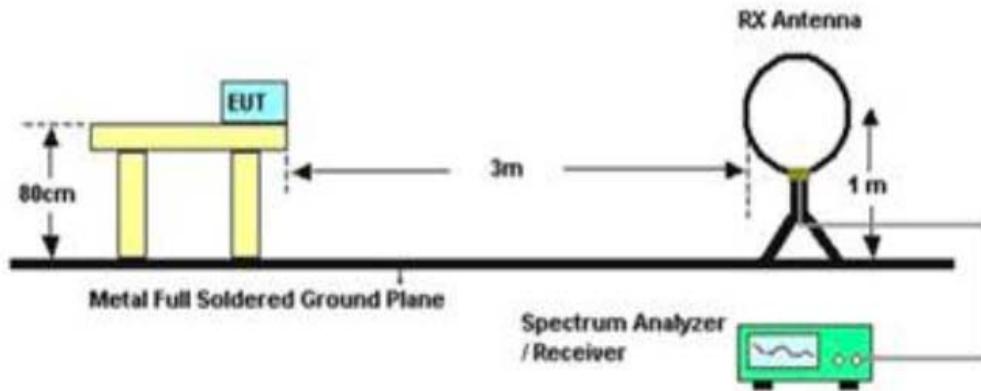
The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

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.

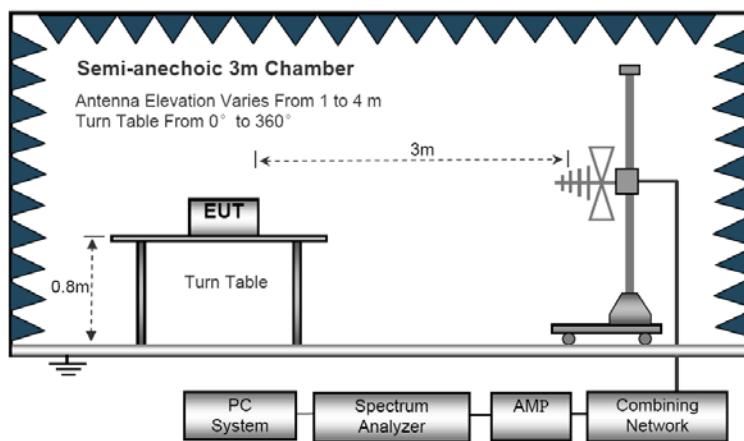
The frequency range from 30MHz to 10th harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

- Notes:
1. Emission Level = Antenna Factor + Cable Loss + Meter Reading-Preamp Factor.
 2. Measurement Uncertainty: ± 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).

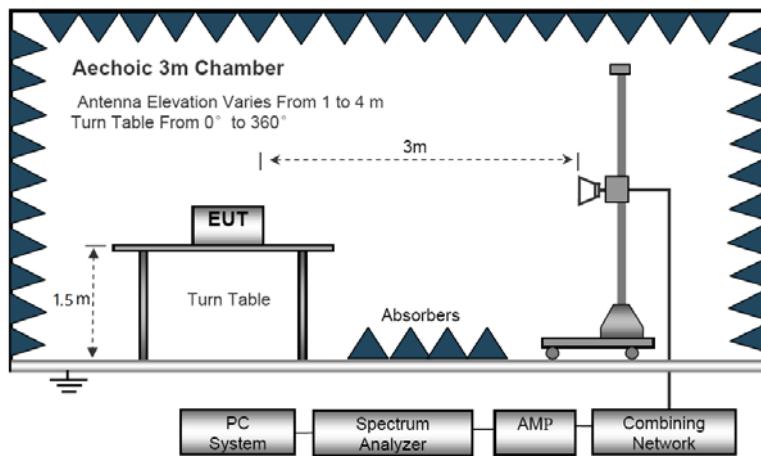
Radiated Emission Test-Up Frequency Below 30MHz



30MHz- 1GHz



Above 1GHz



Below 30MHz

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

Note:

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

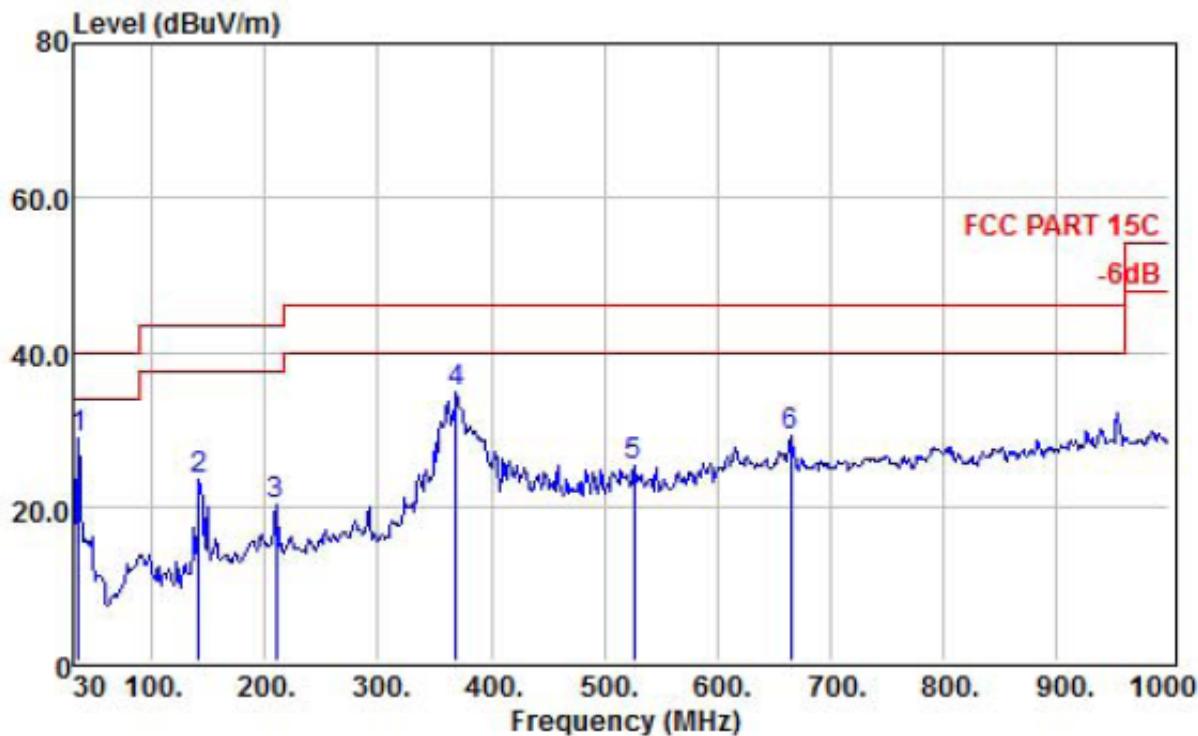
Distance extrapolation factor = $40 \log (\text{specific distance/test distance})$ (dB);

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

EUT :	Bluetooth Speaker	Model Name :	8050174
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	TX
Test Voltage :	DC 3.7V		

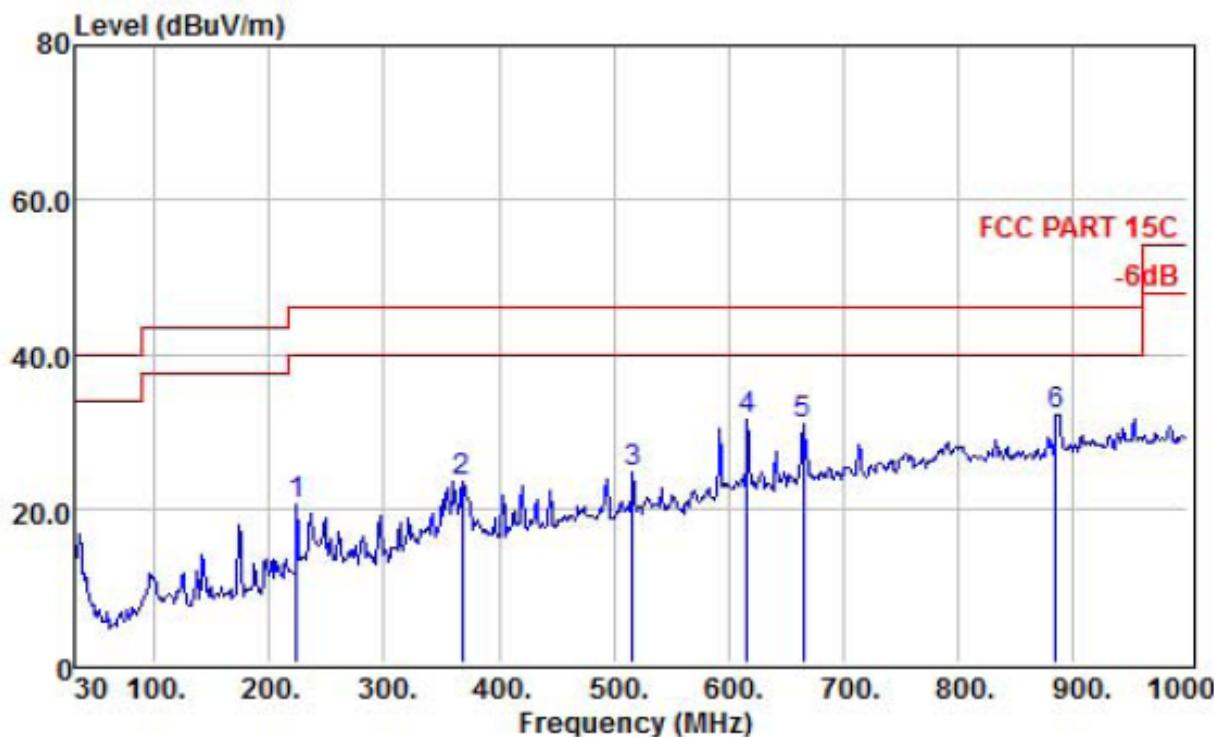
30-1GHz

Vertical



Freq	Read		Preamp	Antenna	Cable	Limit	Over Line	Over Limit	Remark
	MHz	dBuV	Level	Factor	Factor				
1	34.85	43.84	31.38	15.94	0.56	28.96	40.00	-11.04	QP
2	141.55	45.05	31.22	8.49	1.22	23.54	43.50	-19.96	QP
3	209.45	38.43	31.08	11.45	1.53	20.33	43.50	-23.17	QP
4	369.50	47.12	30.62	16.16	2.18	34.84	46.00	-11.16	QP
5	526.64	33.95	30.72	19.22	2.94	25.39	46.00	-20.61	QP
6	665.35	34.55	30.80	21.77	3.69	29.21	46.00	-16.79	QP

Horizontal



Freq	Read	Preamp	Antenna	Cable	Limit		Over	Remark
	Level	Factor	Factor	Loss	Level	Line	Limit	
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB
1	224.00	37.71	30.95	12.15	1.53	20.44	46.00	-25.56 QP
2	367.56	35.85	30.61	16.15	2.18	23.57	46.00	-22.43 QP
3	516.94	33.38	30.65	19.04	2.94	24.71	46.00	-21.29 QP
4	616.85	37.72	30.64	21.07	3.38	31.53	46.00	-14.47 QP
5	665.35	36.38	30.80	21.77	3.69	31.04	46.00	-14.96 QP
6	885.54	33.93	30.15	23.71	4.76	32.25	46.00	-13.75 QP

NOTE:

Absolute Level= ReadingLevel+antenna Factor+cable loss+preamp factor,

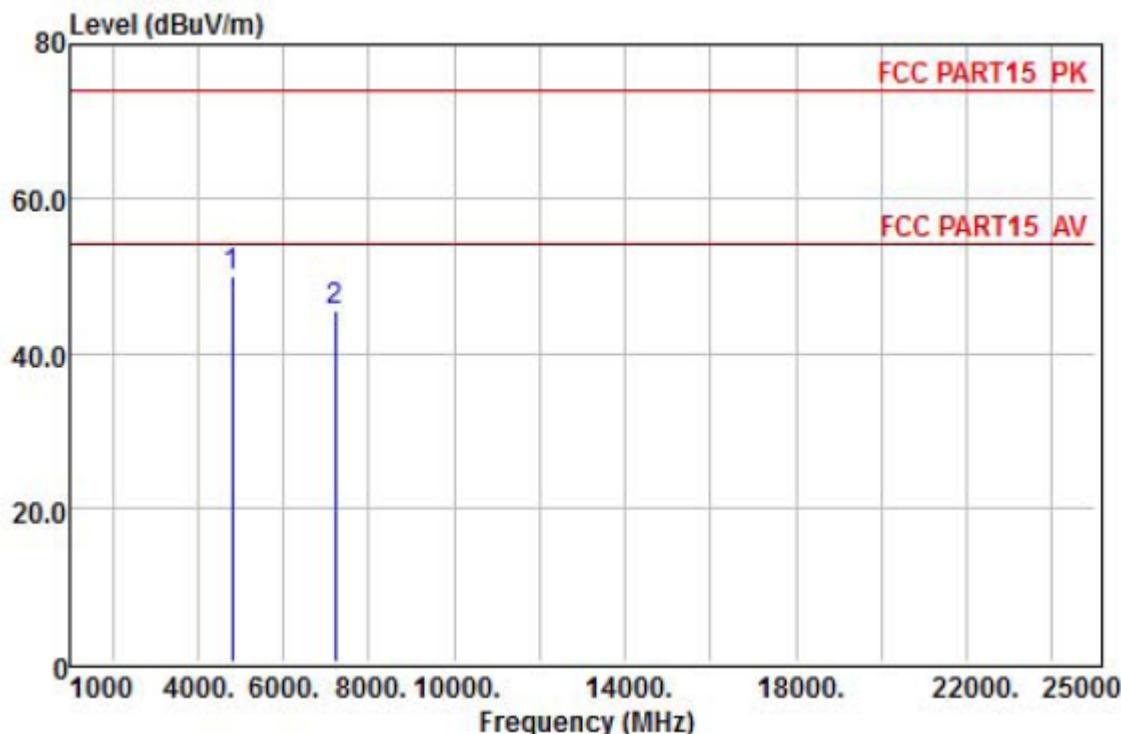
Over Limit= Absolute Level – Limit

Mode 1 is the worst mode. Only worst case is presented in the report .

Above 1GHz

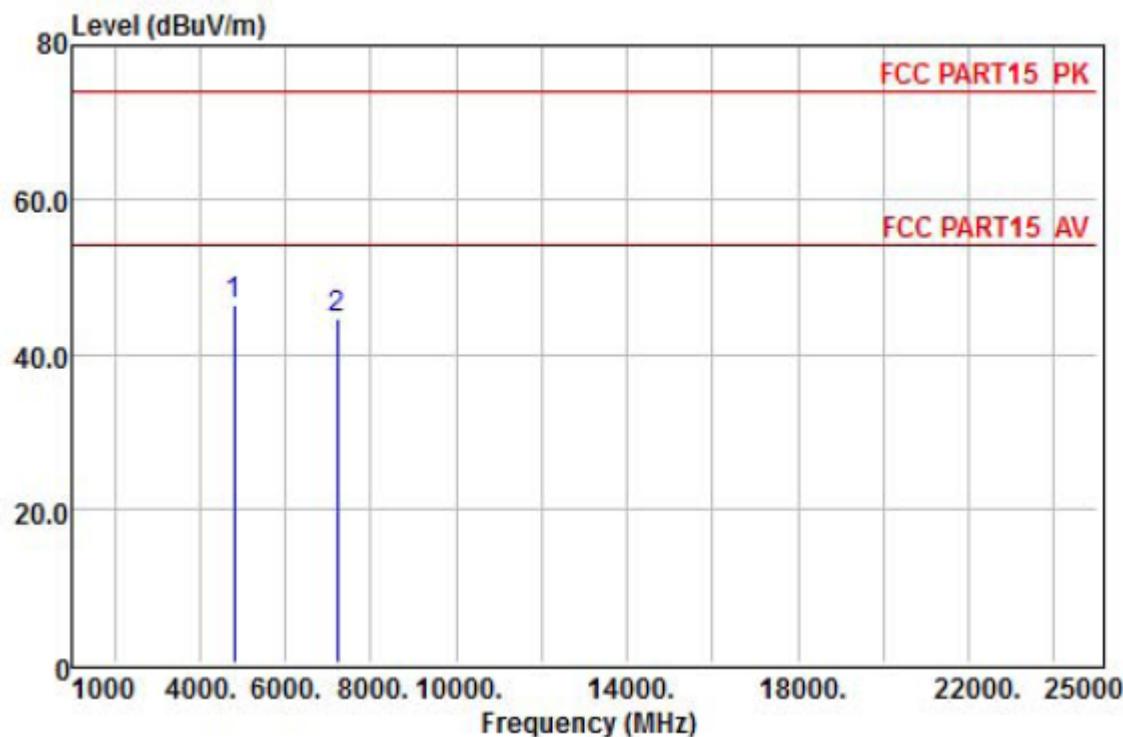
EUT :	Bluetooth Speaker	Model Name :	8050174
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	TX-2402
Test Voltage :	DC 3.7V		

Vertical



	Read	Preamp	Antenna	Cable	Limit	Over		
Freq	Level	Factor	Factor	Loss	Level	Line	Limit Remark	
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB
1	4804.00	32.43	27.49	32.94	11.96	49.84	74.00	-24.16 Peak
2	7206.00	31.42	27.94	25.28	16.61	45.37	74.00	-28.63 Peak

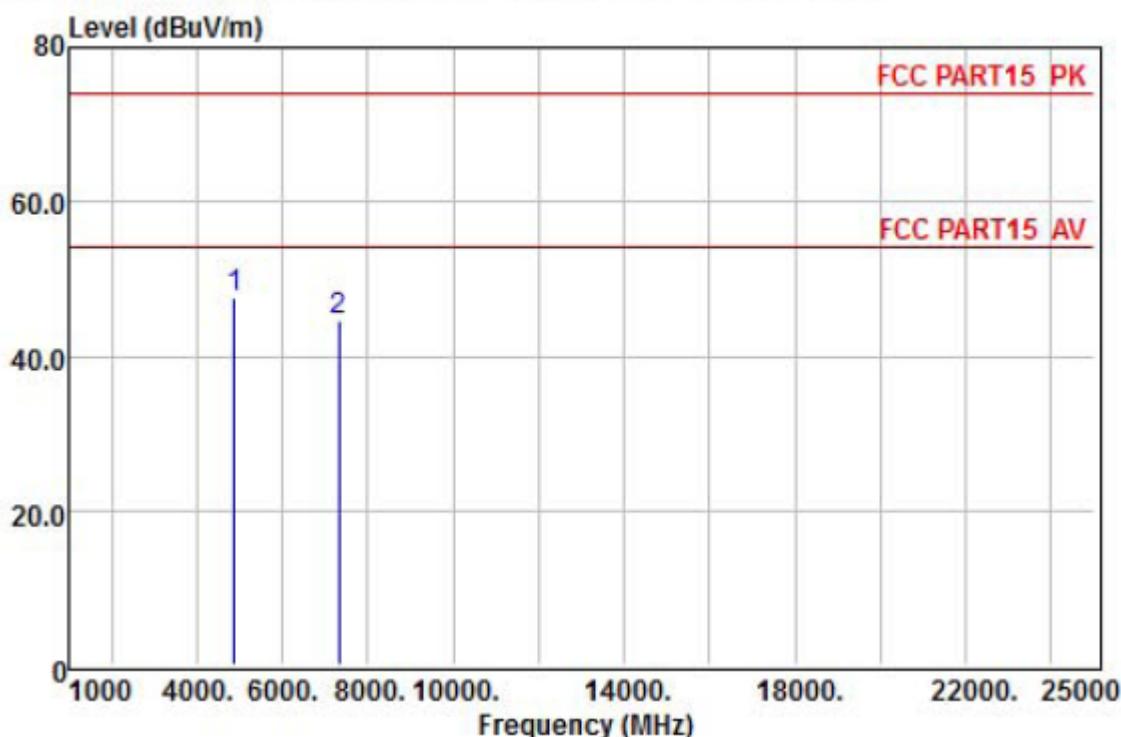
Horizontal



	Read Freq	Preamp Level	Antenna Factor	Cable Factor	Loss	Limit Level	Line Limit	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	4804.00	29.12	27.49	32.94	11.96	46.53	74.00	-27.47	Peak
2	7206.00	30.72	27.94	25.28	16.61	44.67	74.00	-29.33	Peak

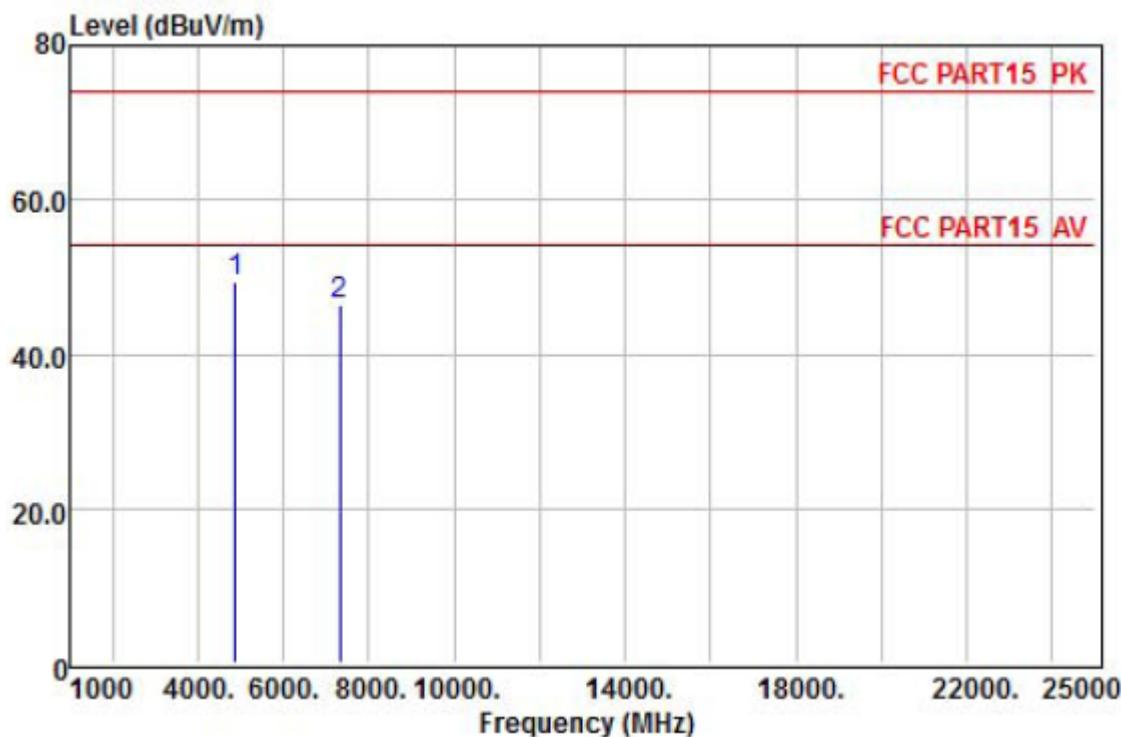
EUT :	Bluetooth Speaker	Model Name :	8050174
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	TX-2440
Test Voltage :	DC 3.7V		

Vertical



	Read Freq	Preamp Level	Antenna Factor	Cable Factor	Cable Loss	Limit Level	Line Limit	Over Line Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	4880.00	30.84	27.53	32.11	12.14	47.56	74.00	-26.44	Peak
2	7320.00	31.74	27.96	24.33	16.62	44.73	74.00	-29.27	Peak

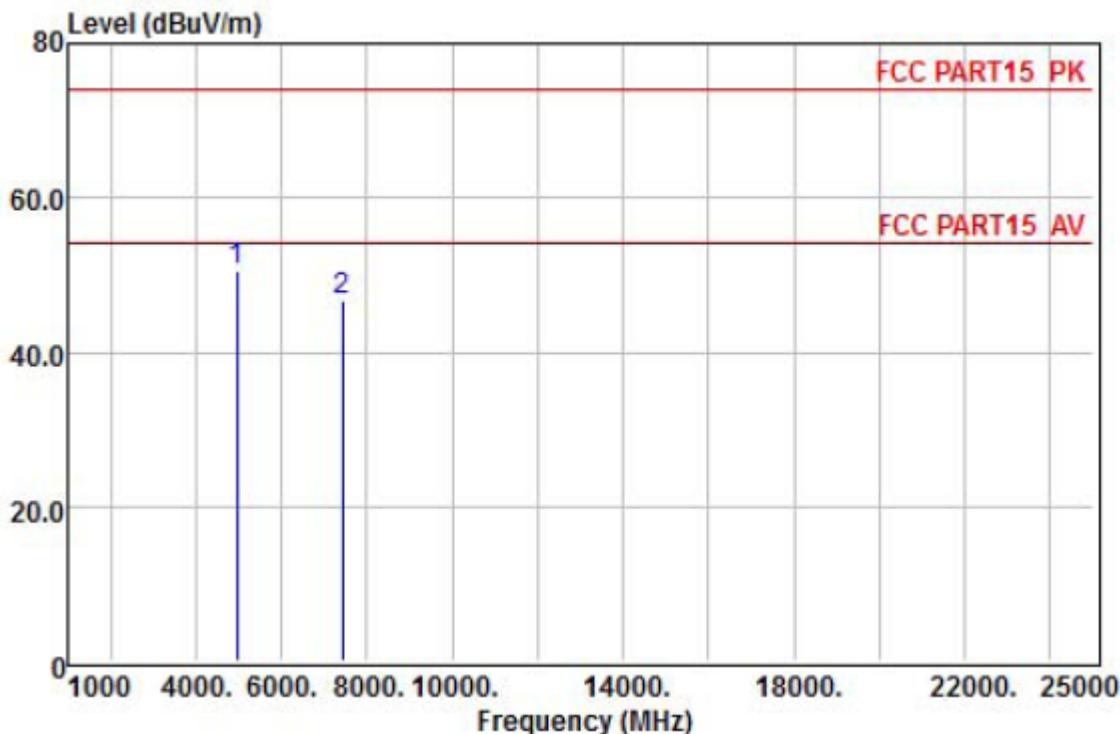
Horizontal



Freq	Read	Preamp	Antenna	Cable	Limit	Over	Remark	
	Level	Factor	Factor	Loss				
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB
1	4880.00	32.75	27.53	32.11	12.14	49.47	74.00	-24.53 Peak
2	7320.00	33.30	27.96	24.33	16.62	46.29	74.00	-27.71 Peak

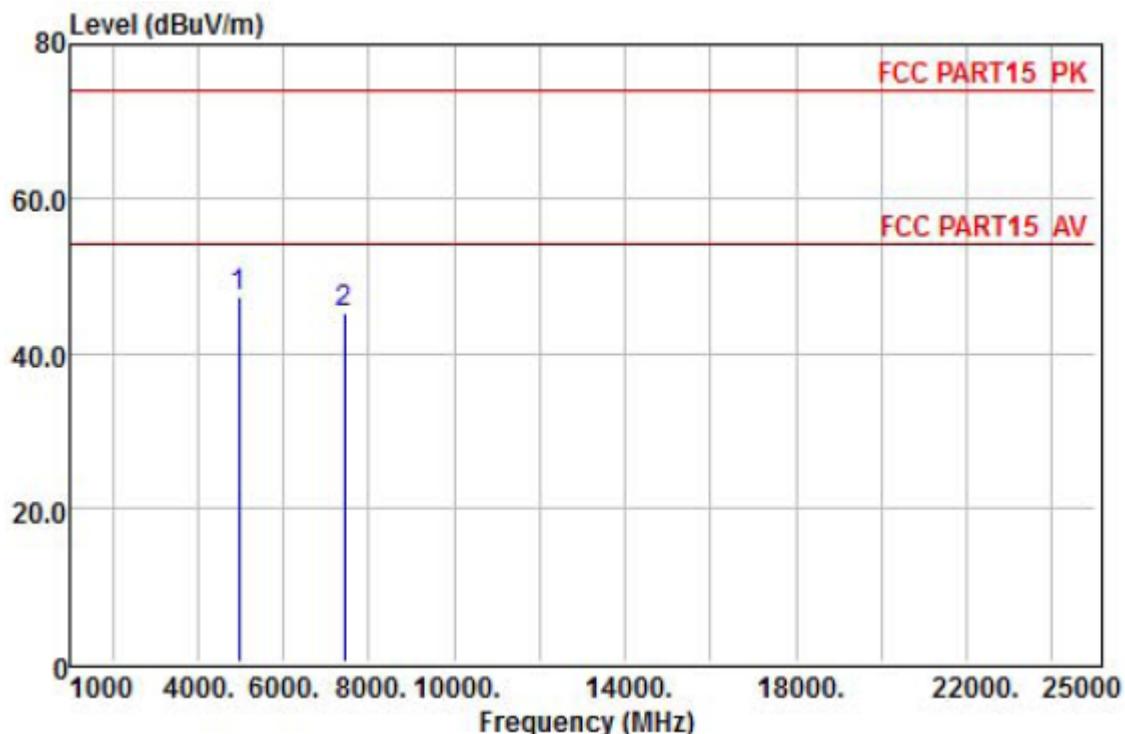
EUT :	Bluetooth Speaker	Model Name :	8050174
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	TX-2480
Test Voltage :	DC 3.7V		

Vertical



Freq	Read Level		Preamp Factor	Antenna Factor	Cable Loss	Limit Level	Line Limit	Over Limit	Remark
	MHz	dBuV			dB	dBuV/m	dBuV/m	dB	
1	4960.00	34.42	27.58	31.32	12.36	50.52	74.00	-23.48	Peak
2	7440.00	33.60	27.99	24.38	16.62	46.61	74.00	-27.39	Peak

Horizontal



Freq	Read Level		Preamp Factor		Antenna Factor		Cable Loss		Limit Level	Over Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB				
1	4960.00	31.15	27.58	31.32	12.36	47.25	74.00	-26.75	Peak			
2	7440.00	32.10	27.99	24.38	16.62	45.11	74.00	-28.89	Peak			

NOTE:

Absolute Level= ReadingLevel+antenna Factor+cable loss-preamp factor,

Over Limit= Absolute Level – Limit

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

5. BAND EDGE COMPLIANCE TEST

5.1. Limits 15.247(d) & RSS-247 § 5.5

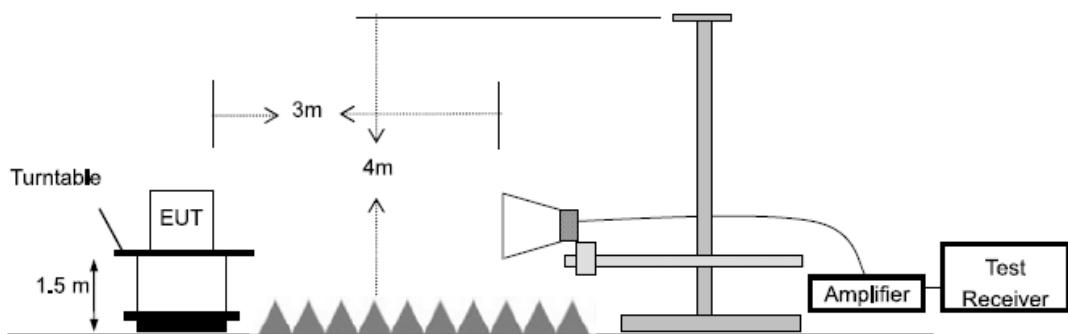
All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 30dB below the fundamental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

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

The EUT was placed on a styrofoam table which is 1.5m above ground plane.

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 maximum 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 limit for the emissions in the unrestricted band. A maximum-peak-detector marks the highest emission in the unrestricted band next to the band edge.

The measurements were performed at the lower end of the 2.4GHz band.

Use the following spectrum analyzer settings:

For Restricted Band, When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz:

EMI Test Receiver	Setting
Attenuation	Auto
RBW	1MHz
VBW	3MHz
Detector	Peak
Trace	Max hold

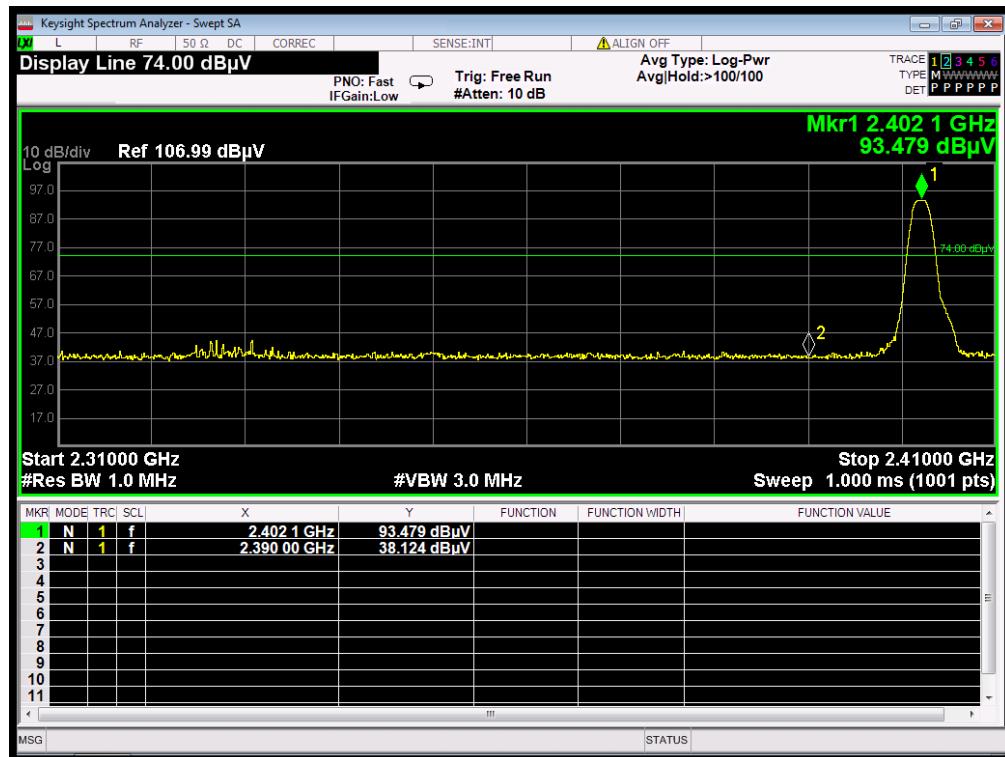
For Non-Restricted Band, When spectrum scanned above 1GHz setting resolution bandwidth 100KHz, video bandwidth 300KHz:

EMI Test Receiver	Setting
Attenuation	Auto
RBW	100KHz
VBW	300KHz
Detector	Peak
Trace	Max hold

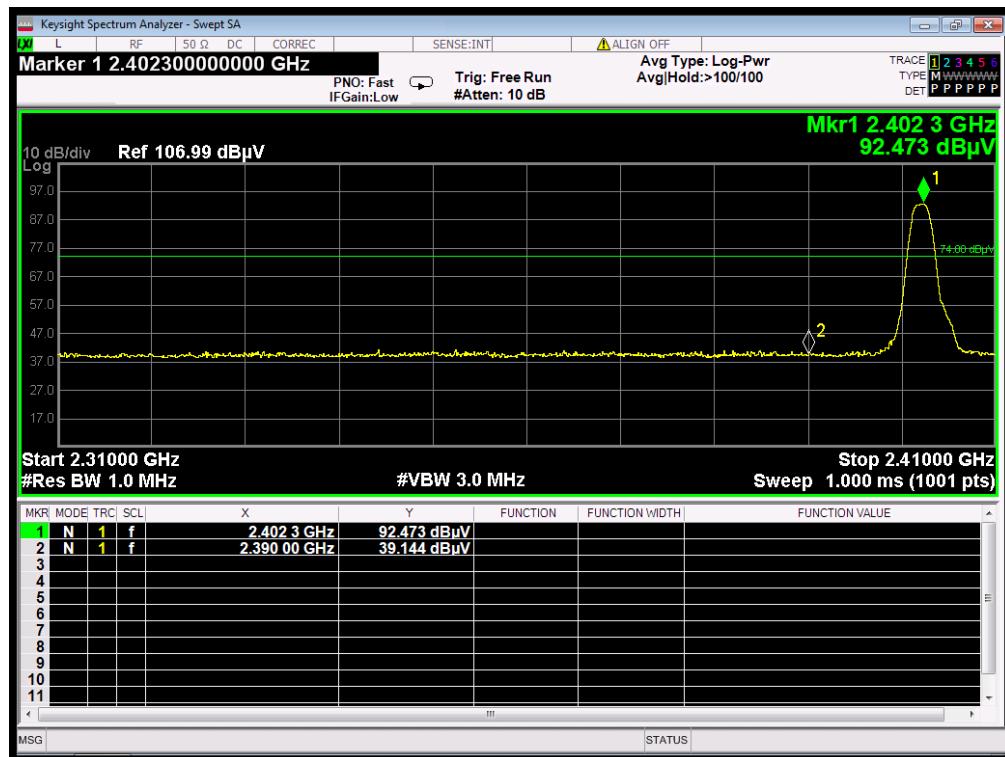
For radiated test as follows:

CH00

Vertical

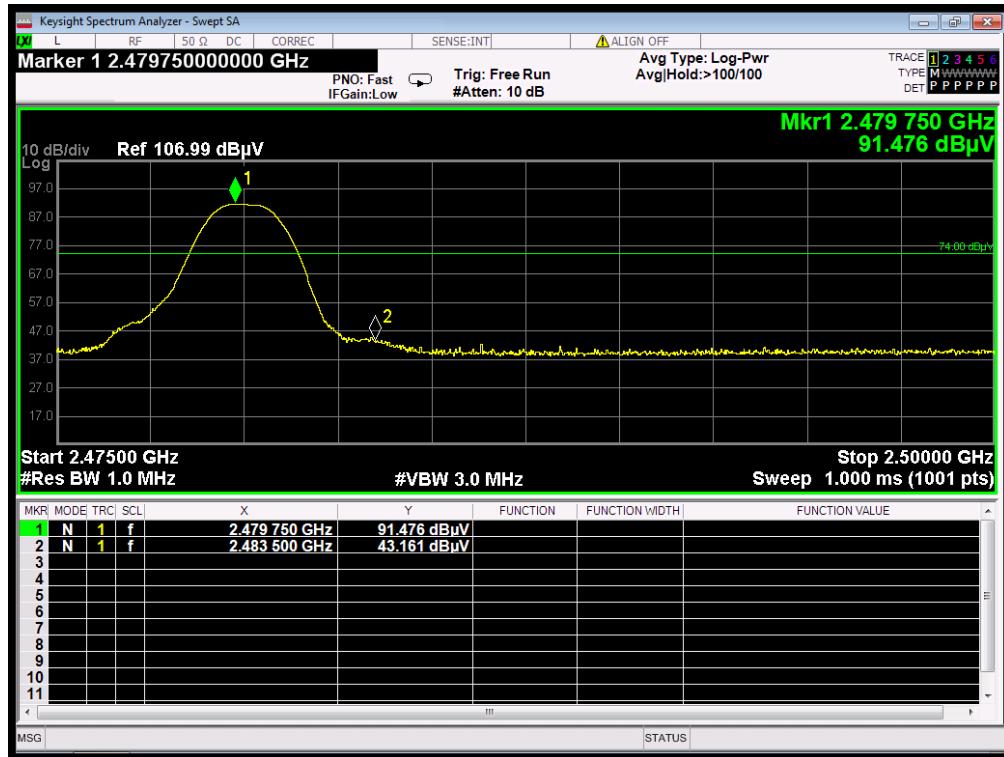


Horizontal

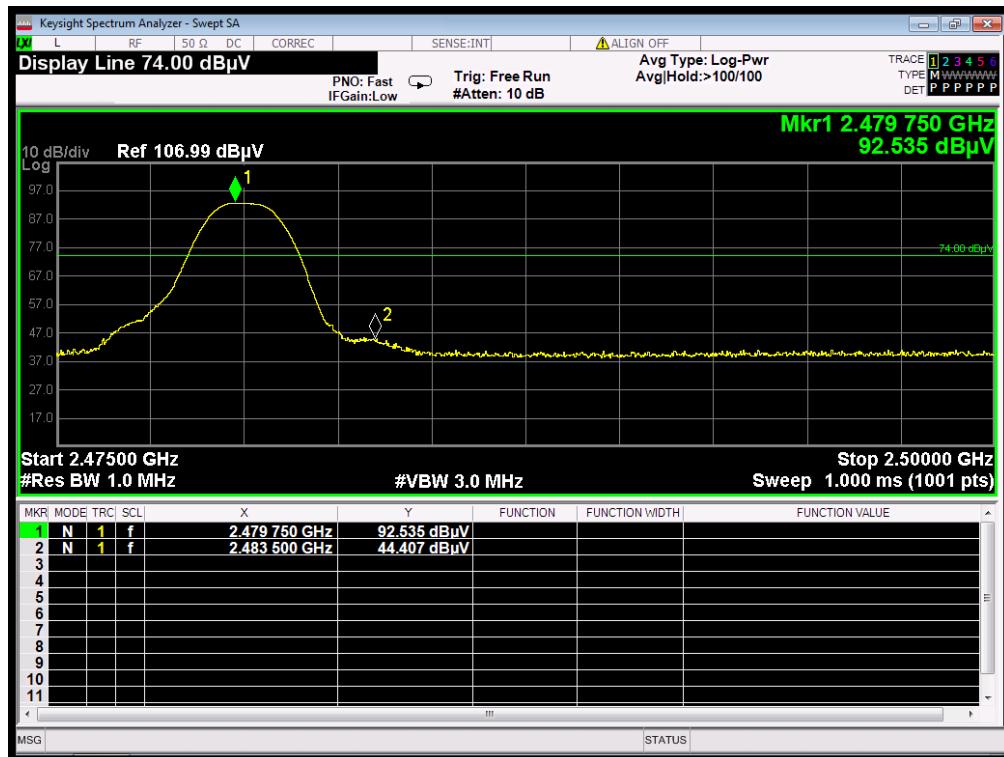


CH39

Vertical



Horizontal

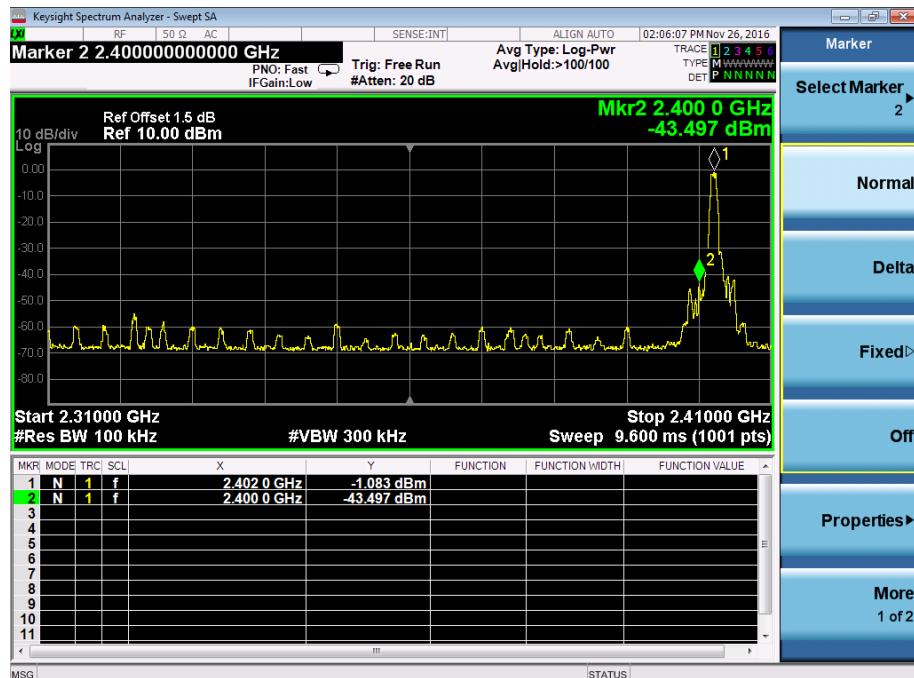


If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

conduction band-edge

Frequency Band	Delta Peak to band emission (dBc)	>Limit (dBc)	Result
Left-band	42.414	20	Pass
Right-band	54.239	20	Pass

Left Side



Right Side



6. 6DB OCCUPY BANDWIDTH

6.1. Limits 15.247(a)(2) & RSS-247§5.2(1)/ RSS-Gen§6.6

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

6.2. TEST PROCEDURE

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.

Test data:

Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (KHz)	Result
2402	0.696	500	Pass
2440	0.697	500	Pass
2480	0.693	500	Pass

Test plot as follows:

2402MHz



2440 MHz



2480 MHz



7. OUTPUT POWER TEST

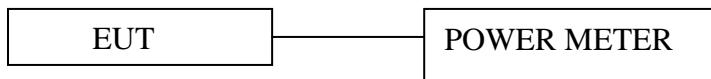
7.1. Limits 15.247(b)(3) & RSS-247 § 5.4/ RSS-Gen § 6.12

For systems using digital modulation in the 2400~2483.5MHz, The out put Power shall not exceed 1W (30dBm)

7.2. Test setup

1. The Transmitter output (antenna port) was connected to the power meter.
2. Turn on the EUT and power meter and then record the power value.
3. Repeat above procedures on all channels needed to be tested.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.



7.3. Test result

Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)	AVG Output Power (dBm)	EIRP (dBm)	Limit (dBm)
2402	-1.151	30	-2.984	-1.984	36
2440	0.394	30	-1.540	-0.540	36
2480	0.725	30	-1.176	-0.176	36

8. DUTY CYCLE

8.1. Test Procedure

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW \geq OBW if possible; otherwise, set RBW to the largest available value. Set VBW \geq RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

The transmitter output is connected to the Spectrum Analyzer. We tested according to the zero-span measurement method, 6.0(b) in KDB 558074(issued 06/09/2015)

The largest available value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if $T \leq 6.25$ microseconds. ($50/6.25 = 8$)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are $> 50/T$.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Use the following spectrum analyzer settings:

Span = Zero Span

RBW = 1MHz

VBW = 1MHz

Number of points in Sweep >100

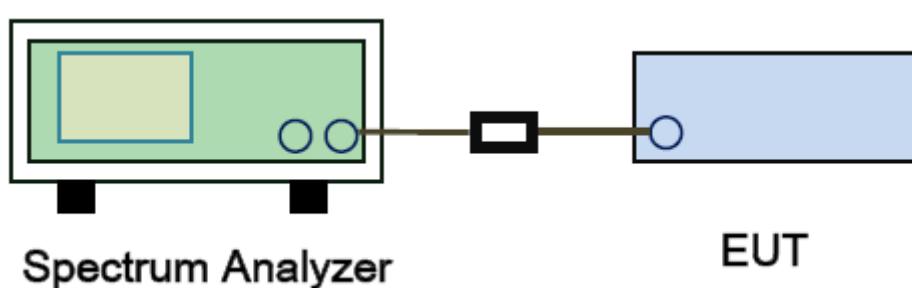
Detector function = peak

Trace = Clear write

Measure T_{total} and T_{on}

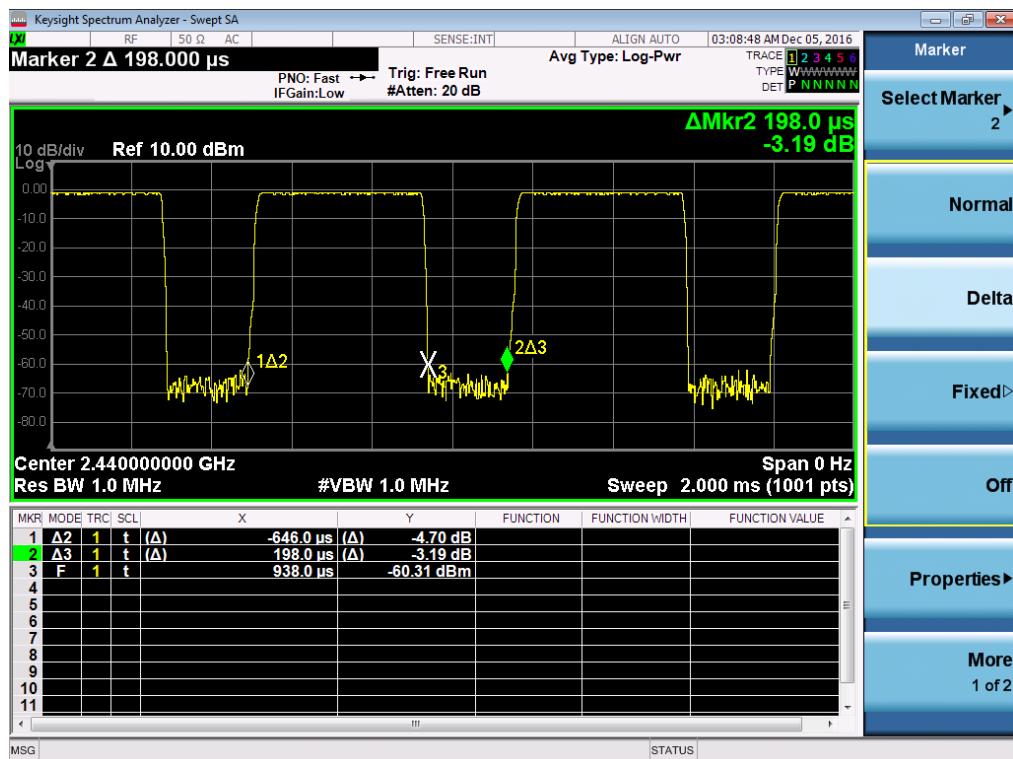
Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor= $10 * \log(1/\text{Duty Cycle})$

8.2. Test Setup



EUT :	Bluetooth Speaker	Model Name :	8050174
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	TX-2440
Test Voltage :	DC 3.7V		

Modulation Mode	Data rate	Ton	Ttotal	Duty Cycle	Duty Cycle Factor(db)
GFSK	1Mbps	448	646	0.69	1.59



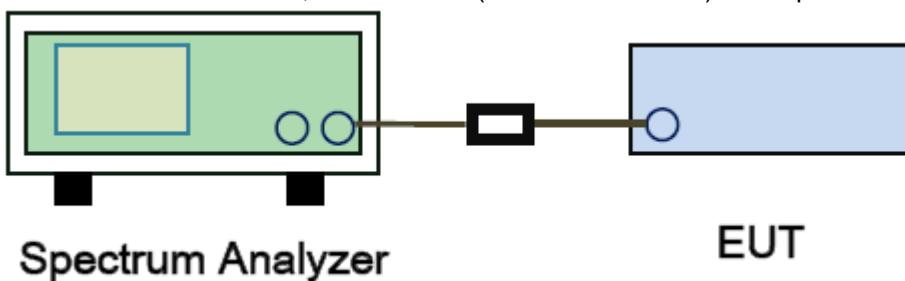
9. POWER SPECTRAL DENSITY TEST

9.1. Limits 15.247(e) & RSS-247 § 5.2(2)

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.

9.2. Test setup

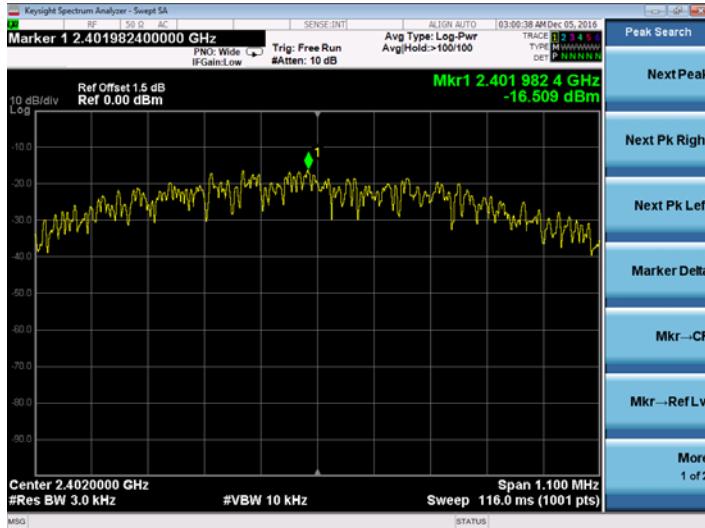
1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \text{ RBW}$
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



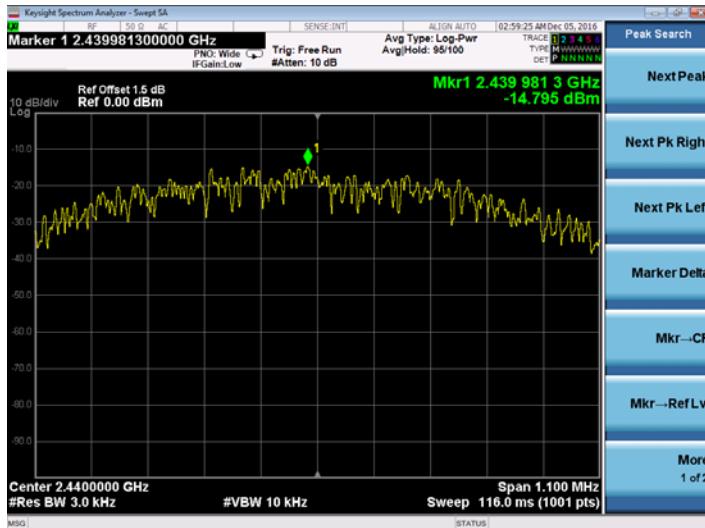
9.3. Test result

Channel Frequency (MHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2402	-16.799	8	Pass
2440	-15.205	8	Pass
2480	-14.538	8	Pass

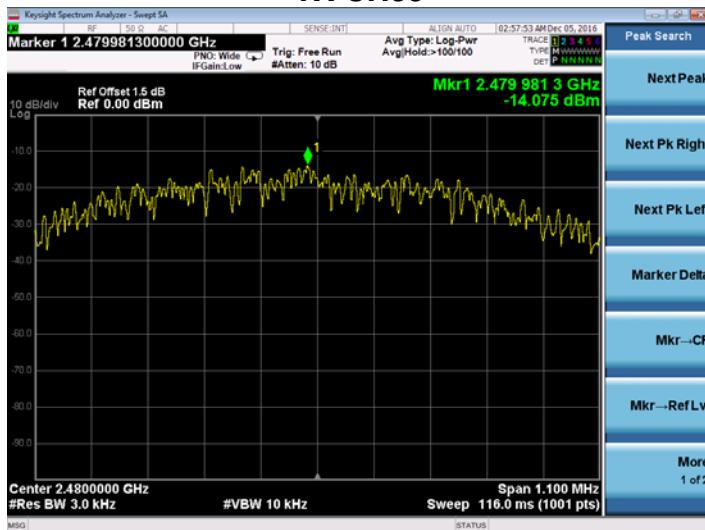
TX CH00



TX CH 19



TX CH39



10. ANTENNA REQUIREMENTS

10.1. Limits 15.203 & RSS-247§3.1/ RSS-Gen§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.

10.2. 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.

10.PHOTOGRAPHS OF TEST SET-UP

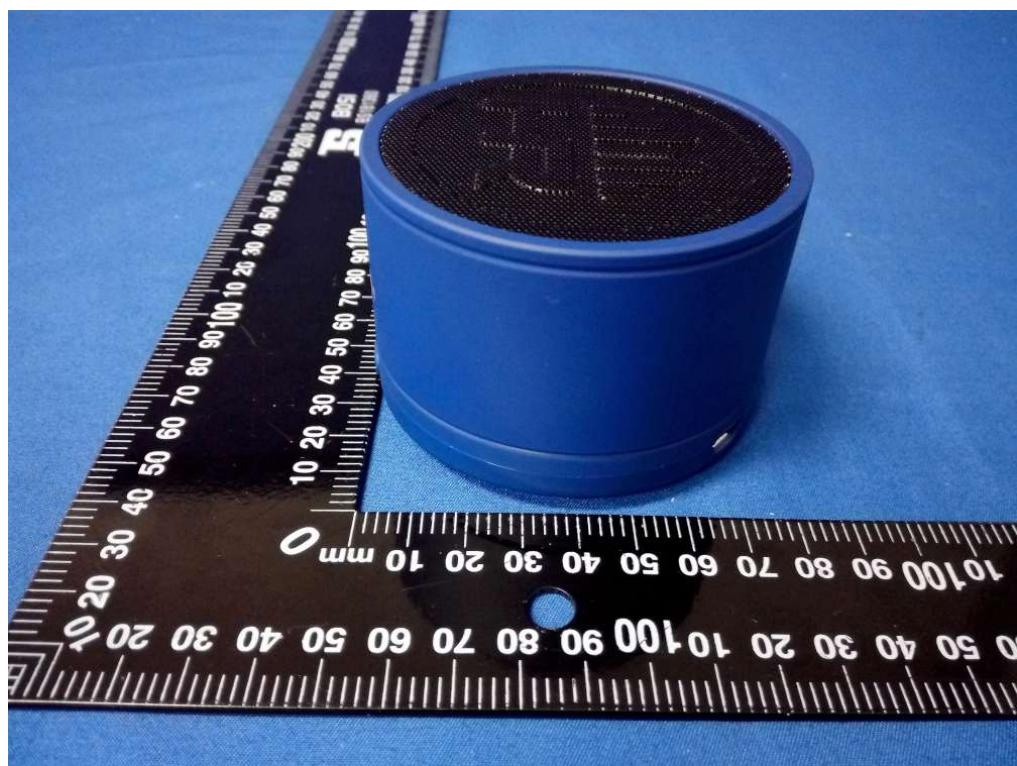
Conducted Emission



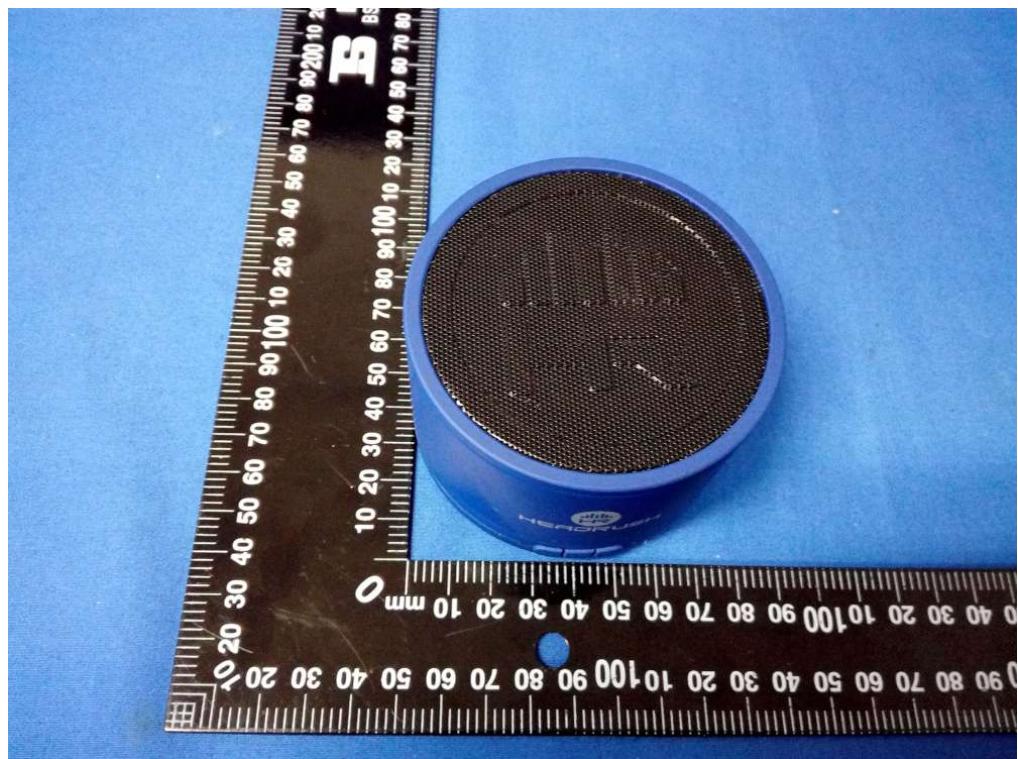
Radiated Emission Test

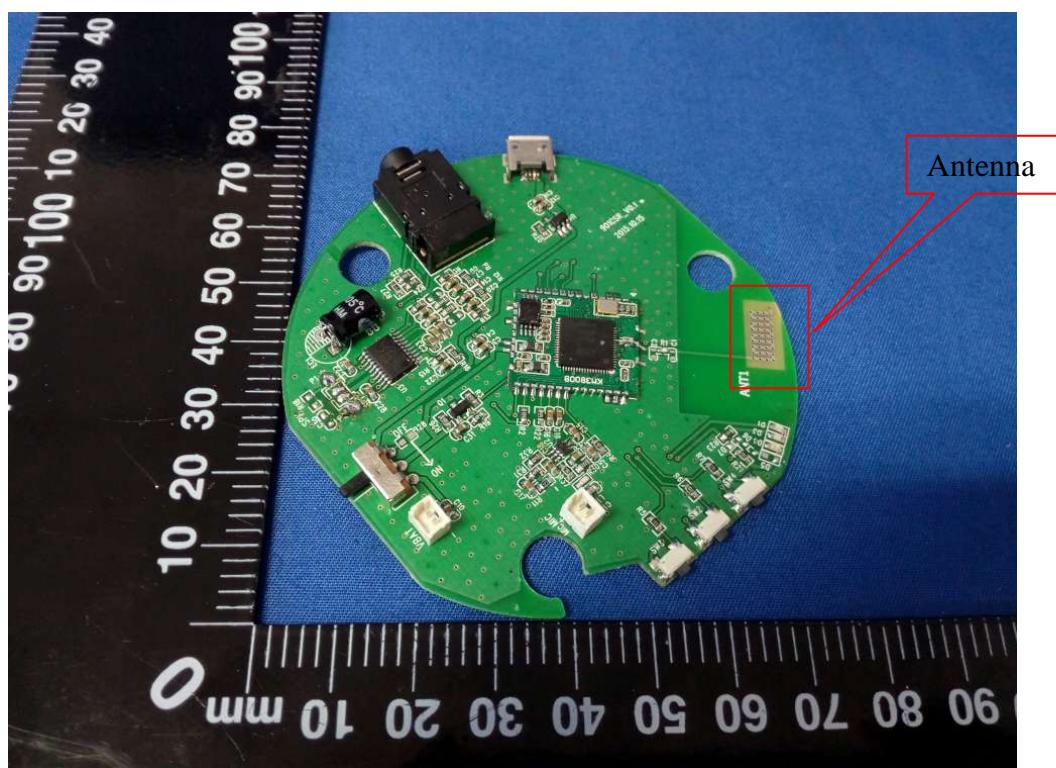
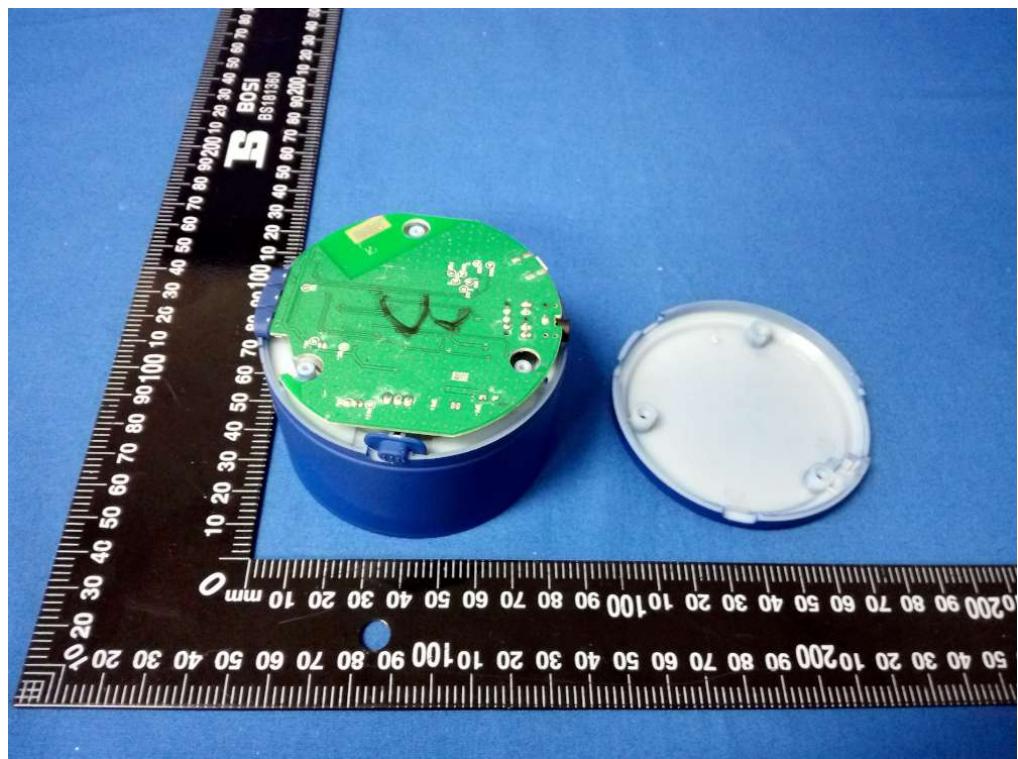


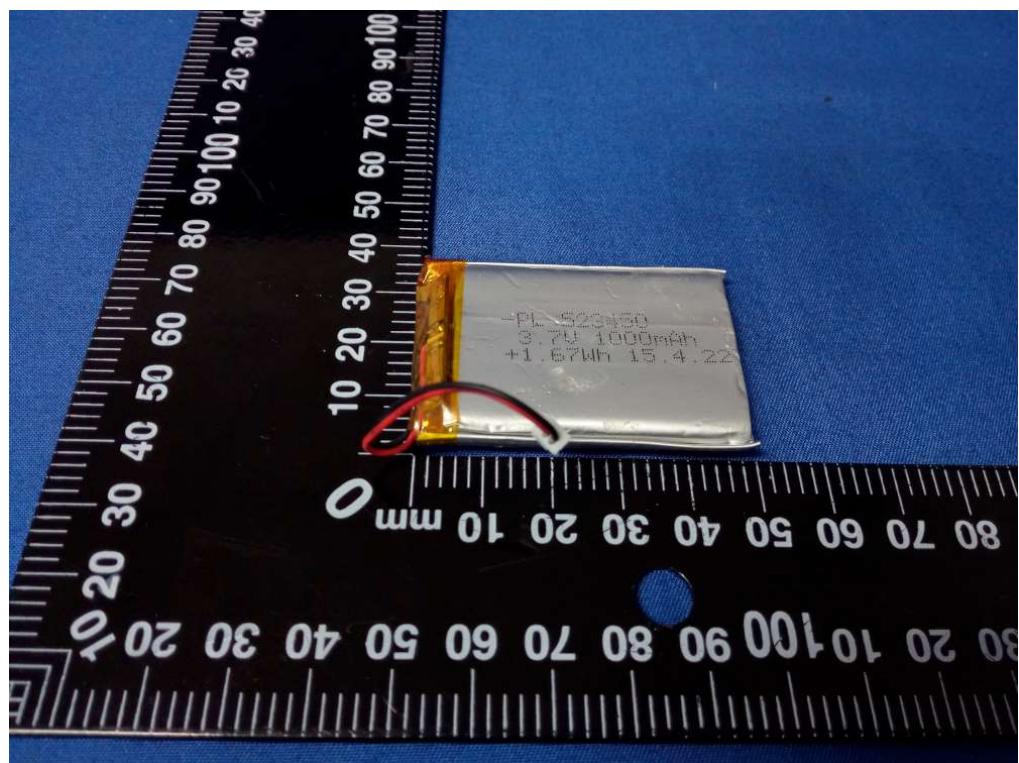
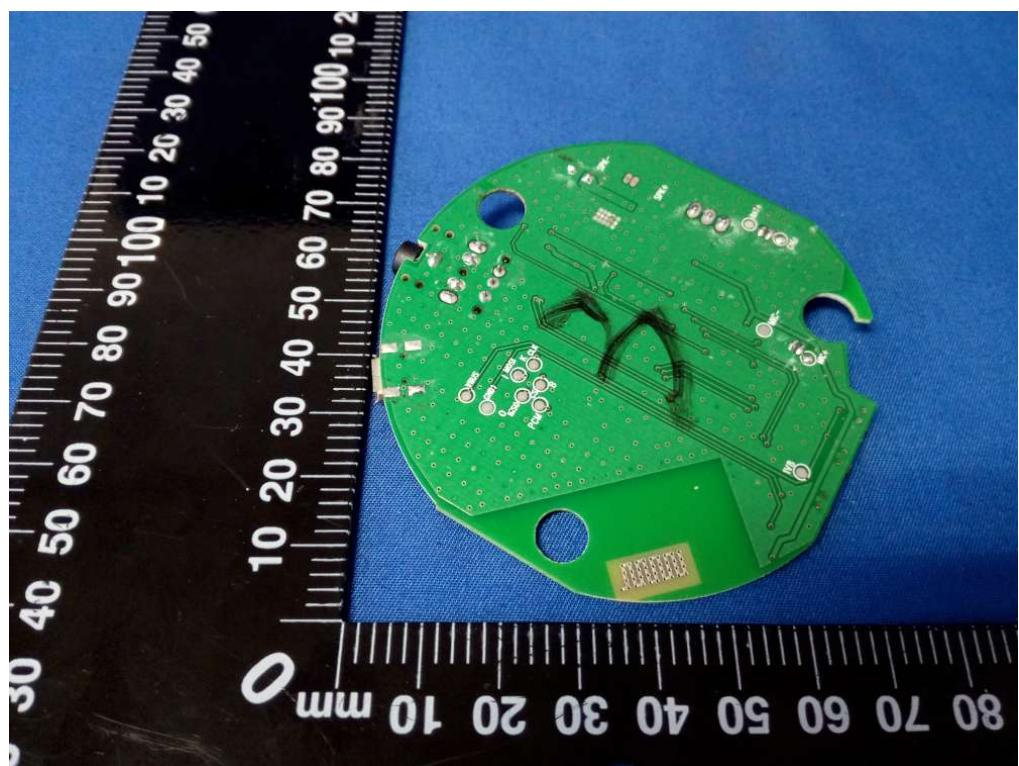
11. PHOTOGRAPHS OF THE EUT











*** the end of report ***