

FCC PART 15C TEST REPORT FOR CERTIFICATION
On Behalf of

Bang & Olufsen a/s

Bluetooth Speaker

Model Number: Beolit 17

FCC ID: TTUBEOLIT17

Prepared for : Bang & Olufsen a/s
Peter Bangs Vej 15, 7600 Struer, Denmark

Prepared By : EST Technology Co., Ltd.
Santun(guantai Road), Houjie Town, DongGuan City,
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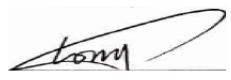

Report Number: ESTE-R1611019
Date of Test : October 21 - November 07, 2016
Date of Report : November 10, 2016

TABLE OF CONTENTS

Description	Page
TEST REPORT VERIFICATION.....	3
1. GENERAL INFORMATION.....	5
1.1. Description of Device (EUT).....	5
2. SUMMARY OF TEST.....	6
2.1. Summary of test result.....	6
2.2. Test Facilities.....	7
2.3. Measurement uncertainty.....	8
2.4. Assistant equipment used for test.....	8
2.5. Block Diagram.....	8
2.6. Test mode.....	9
2.7. Channel List for Bluetooth.....	9
2.8. Test Equipment.....	10
3. POWER LINE CONDUCTED EMISSION TEST.....	11
3.1. Limit.....	11
3.2. Block Diagram of Test Setup.....	11
3.3. Test Procedure.....	11
3.4. Test Result.....	11
3.5. Test data.....	12
4. RADIATED EMISSION TEST.....	16
4.1. Limit.....	16
4.2. Block Diagram of Test setup.....	17
4.3. Test Procedure.....	18
4.4. Test Result.....	18
4.5. Test Data.....	19
5. BAND EDGE COMPLIANCE TEST.....	32
5.1. Limit.....	32
5.2. Block Diagram of Test setup.....	32
5.3. Test Procedure.....	32
5.4. Test Result.....	32
5.5. Test Data.....	33
6. 6dB Bandwidth Test.....	37
6.1. Limit.....	37
6.2. Test Procedure.....	37
6.3. Test Result.....	37
6.4. Test Data.....	38
7. OUTPUT POWER TEST.....	40
7.1. Limit.....	40
7.2. Test Procedure.....	40
7.3. Test Procedure.....	40
7.4. Test Result.....	41
7.5. Test Data.....	42
8. POWER SPECTRAL DENSITY TEST.....	44

8.1	Limit	44
8.2	Test Procedure	44
8.3	Test Result	45
8.4	Test Data	46
9	ANTENNA REQUIREMENTS	48
9.1	Limit	48
9.2	Result	48

Test Report Verification

Applicant:	Bang & Olufsen a/s		
Address:	Peter Bangs Vej 15, 7600 Struer, Denmark		
Manufacturer Address:	Bang & Olufsen a/s Peter Bangs Vej 15, 7600 Struer, Denmark		
E.U.T:	Bluetooth Speaker		
Model Number:	Beolit 17		
Power Supply:	DC 7.2V From Internal Battery DC 15V From USB Type C Adapter Input AC 100~240V 50/60Hz		
Test Voltage:	DC 15V From USB Type C Adapter Input AC 120V/60Hz DC 15V From USB Type C Adapter Input AC 240V/60Hz		
Trade Name:	Bang & Olufsen	Serial No.:	-----
Date of Receipt:	October 21, 2016	Date of Test:	October 21 – November 07, 2016
Test Specification:	FCC Rules and Regulations Part 15 Subpart C:2016 ANSI C63.10:2013		
Test Result:	<p>The device described above is tested by EST Technology Co., Ltd.. The measurement results were contained in this test report and EST Technology Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the FCC Rules and Regulations Part 15 Subpart C requirements.</p> <p>This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd.</p> <p style="text-align: right;">Date: November 10, 2016</p>		
Prepared by:	Tested by:	Approved by:	
			
Ada / Assistant	Tony.Tang/ Engineer	IcemanHu / Manager	
Other Aspects:	None.		
<i>Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested</i>			
<i>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 EST Technology Co., Ltd.</i>			



1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Product Name	:	Bluetooth Speaker	
Model Number	:	Beolit 17	
IC	:	3775B-BEOLIT17	
Operation frequency	:	2402MHz~2480MHz	
Number of channel	:	79	40
Antenna	:	Internal antenna,0.09dBi gain	
Modulation	:	Dual-mode Bluetooth 4.0 BT BDR: GFSK BT EDR: $\pi/4$ -DQPSK BT EDR: 8-DPSK	Dual-mode Bluetooth 4.0 BLE: GFSK
Sample Type	:	Prototype production	

2. SUMMARY OF TEST

2.1. Summary of test result

Description of Test Item	Standard	Results
Power Line Conducted Emission	FCC Part 15: 15.207	PASS
Radiated Emissions	FCC Part 15: 15.209 FCC Part 15: 15.247(d)	PASS
Band Edge Compliance	FCC Part 15: 15.209 FCC Part 15: 15.247(d)	PASS
Conducted spurious emissions	FCC Part 15: 15.247(d)	PASS
6dB Bandwidth	FCC Part 15: 15.247 (a)(2)	PASS
Peak Output Power	FCC Part 15: 15.247 (b)	PASS
Power Spectral Density	FCC Part 15: 15.247 (e)	PASS
Antenna requirement	FCC Part 15: 15.203	PASS

2.2. Test Facilities

EMC Lab	:	Certificated by CNAL, CHINA Registration No.: L5288 Date of registration: December 07, 2015
		Certificated by FCC, USA Registration No.: 989591 Date of registration: November 20, 2013
		Certificated by Industry Canada Registration No.: 9405A-1 Date of registration: December 30, 2015
		Certificated by VCCI, Japan Registration No.: R-3663 & C-4103 Date of registration: July 25, 2011
		Certificated by TUV Rheinland, Germany Registration No.: UA 50195514 0001 Date of registration: January 07, 2011
		Certificated by TUV/PS, Shenzhen Registration No.: SCN1017 Date of registration: January 27, 2011
		Certificated by Intertek ETL SEMKO Registration No.: 2011-RTL-L1-18 Date of registration: April 28, 2011
		Certificated by Siemic, Inc. Registration No.: SLCN021 Date of registration: November 8, 2011
		Certificated by Nemko, Hong Kong Registration No.: 175193 Date of registration: May 4, 2011
Name of Firm	:	EST Technology Co., Ltd.
Site Location	:	San Tun Management Zone, Houjie Town, Dongguan, Guangdong, China

2.3. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.54dB
Uncertainty for Radiation Emission test (30MHz-1GHz)	3.62
Uncertainty for Radiation Emission test (1GHz to 18GHz)	4.86
Uncertainty for radio frequency	7×10^{-8}
Uncertainty for conducted RF Power	0.20dB
Uncertainty for Power density test	0.26dB

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.4. Assistant equipment used for test

2.4.1. USB-C Power Adapter

Manufacturer : Dongguan Dongsong Electronic Co.,Ltd
 M/N : DST450-303
 Input : AC 100-240V~50/60Hz 1.2A Max
 Output : DC 5.0V/3.0A; DC 9.0V/3.0A; DC 15.0V/3.0A

2.4.2. Internal Battery 1

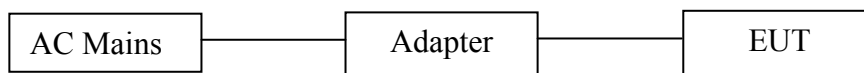
Manufacturer : Simplo Technology Co.,Ltd.
 M/N : J406 2S1P
 Rating : DC 7.2V, 2200mAH

2.4.3. Internal Battery 2

Manufacturer : Guangdong Pow-Tech New Power Co.,Ltd.
 M/N : C196DC
 Rating : DC 7.2V, 2200mAH

2.5. Block Diagram

For radiated emissions test: EUT was placed on a turn table, which is 0.8 or 1.5 meter high above ground. EUT was be set into BT test mode by Bluesuite software before test.



(EUT: Bluetooth Speaker)

2.6. Test mode

The test software was used to control EUT work in Continuous TX mode, and select test channel, wireless mode.

Mode	Channel	Frequency
BT 4.0-BLE GFSK	Low	2402MHz
	Middle	2440MHz
	High	2480MHz

2.7. Channel List for Bluetooth

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2402	2	2404
3	2406	4	2408
5	2410	6	2412
7	2414	8	2416
9	2418	10	2420
11	2422	12	2424
13	2426	14	2428
15	2430	16	2432
17	2434	18	2436
19	2438	20	2440
21	2442	22	2444
23	2446	24	2448
25	2450	26	2452
27	2454	28	2456
29	2458	30	2460
31	2462	32	2464
33	2466	34	2468
35	2470	36	2472
37	2474	38	2476
39	2478	40	2480

2.8. Test Equipment

2.8.1. For conducted emissions test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESHS30	832354	June,25,16	1 Year
Artificial Mains Networ	Rohde & Schwarz	ENV216	101260	June,25,16	1 Year
Pulse Limiter	Rohde & Schwarz	ESDS6-Z2	101100	June,25,16	1 Year

2.8.2. For radiated emission test(9 kHz-30MHz)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESCI	100435	June,25,16	1 Year
Loop Antenna	ETS-LINDGREN	6502	00071730	June,25,16	1 Year

2.8.3. For radiated emissions test (30-1000MHz)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESVS10	100004	June,25,16	1 Year
Spectrum Analyzer	Agilent	E4411B	MY5014069 7	June,25,16	1 Year
Bilog Antenna	Teseq	CBL 6111D	27090	June,28,15	3 Year
Signal Amplifier	Agilent	310N	187037	June,25,16	1 Year

2.8.4. For radio & radiated emissions test (above 1GHz)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Horn Antenna	SCHWARZB ECK	BBHA 9120 D	BBHA9120D1 002	June,28,15	3 Year
Board-Band Horn Antenna	SCHWARZB ECK	BBHA 9170	9170-497	June,28,15	3 Year
Signal Amplifier	SCHWARZB ECK	BBV9718	9718-212	June,25,16	1 Year
Spectrum Analyzer	Agilent	E4408B	MY44211139	June,25,16	1 Year
Spectrum Analyzer	Rohde &Schwarz	FSV	103173	June,25,16	1 Year
RF Cable	Hubersuhner	RG 214/U	513423	June,25,16	1 Year

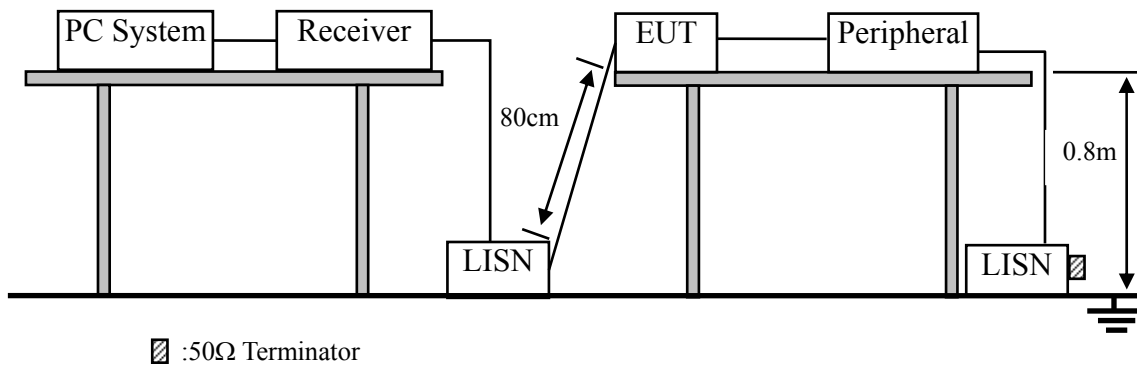
3 POWER LINE CONDUCTED EMISSION TEST

3.1. Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.
 2. The lower limit shall apply at the transition frequencies.

3.2. Block Diagram of Test Setup



3.3 Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#). This provides a 50 ohm coupling impedance for the EUT (Please refer the block diagram of the test setup and photographs). The AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Test.

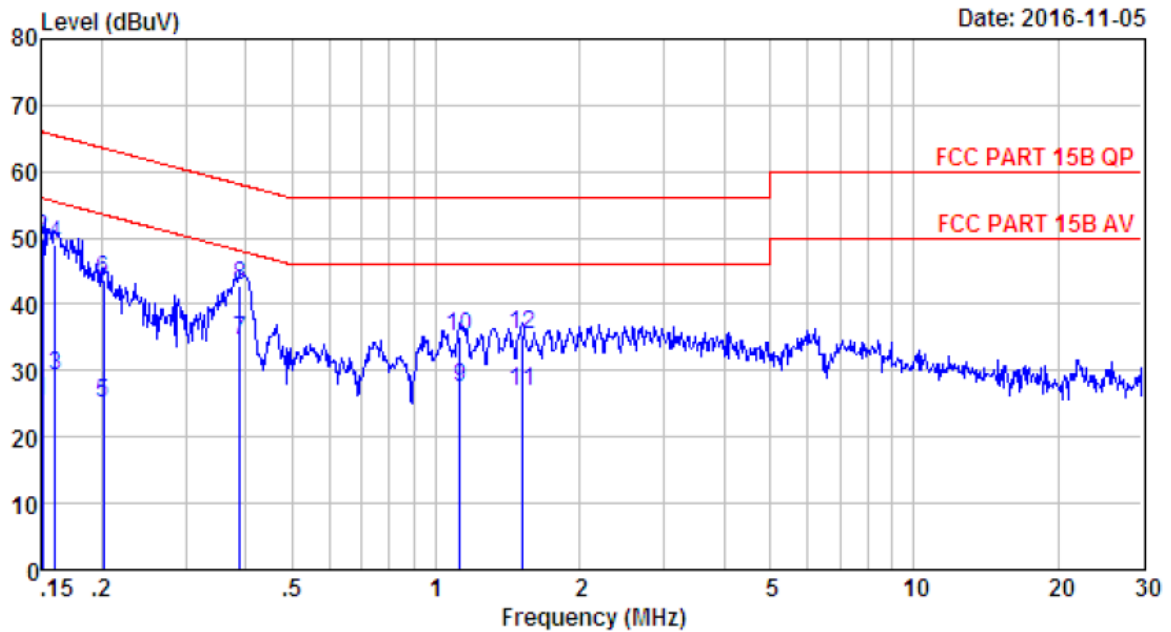
The bandwidth of test receiver (R & S ESHS30) is set at 10kHz.

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

3.4. Test Result

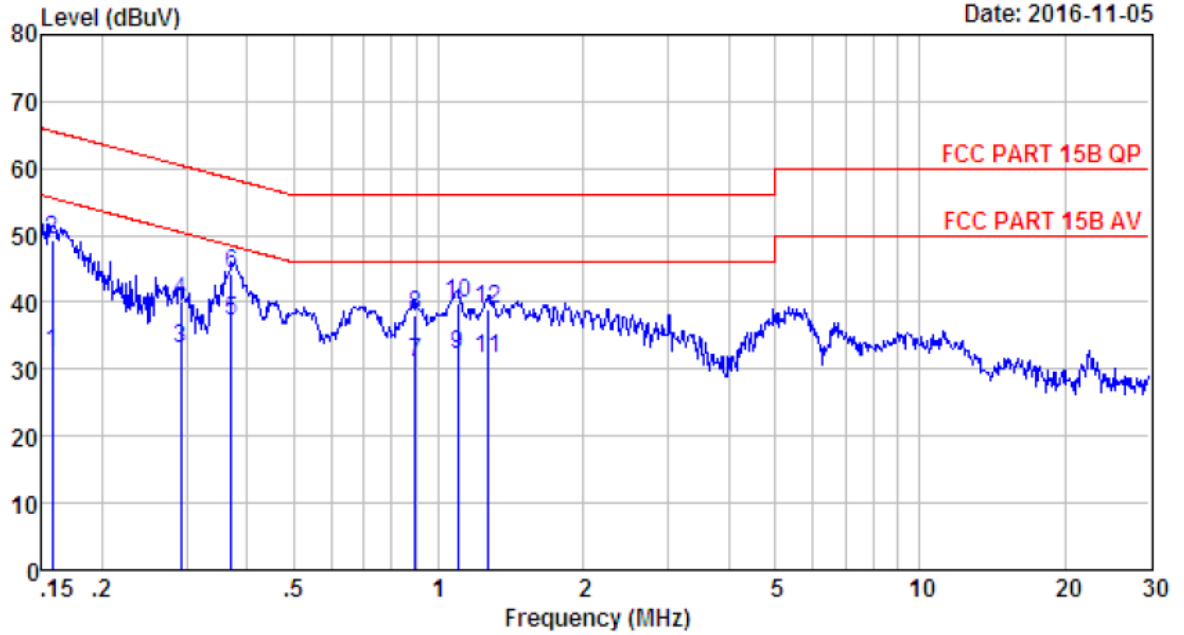
PASS. (All emissions not reported below are too low against the prescribed limits.)

3.5. Test data



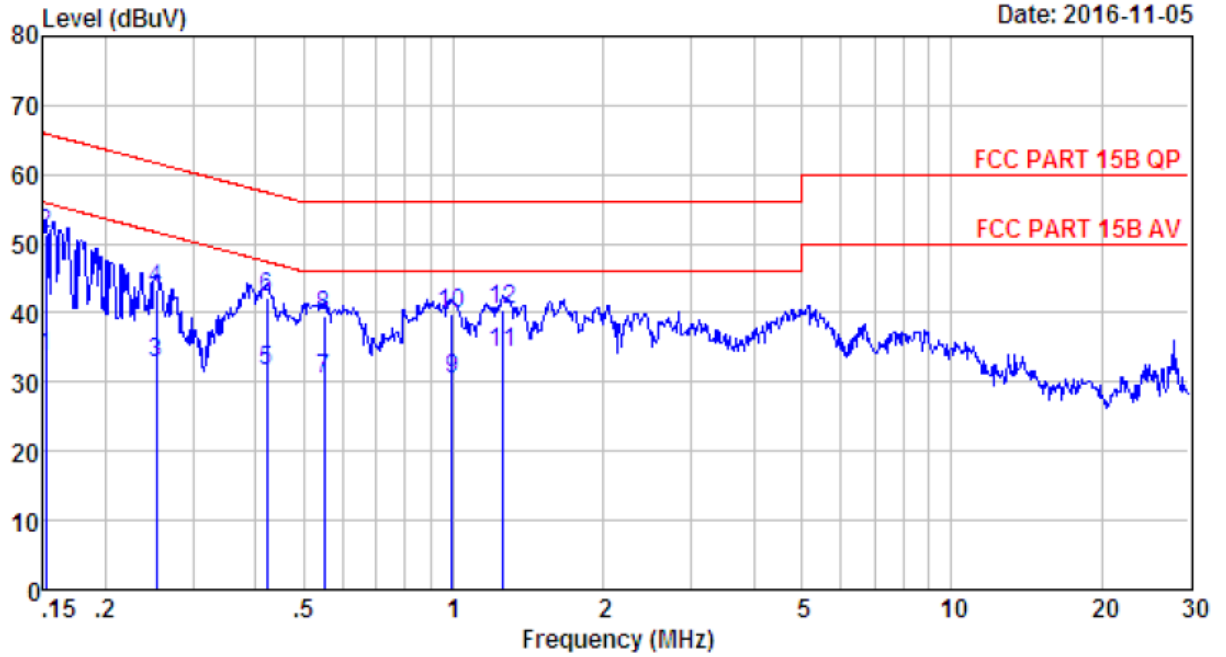
Site no : 844 Shield Room Data no. : 595
 Env. / Ins. : Temp:24.3'C Humi:58% Press:101.50kPa LINE Phase : NEUTRAL
 Limit : FCC PART 15B QP
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : TX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBUV)	Emission Level (dBUV)	Limits (dBUV)	Margin (dB)	Remark
1	0.15	9.46	9.81	6.13	25.40	56.00	30.60	Average
2	0.15	9.46	9.81	30.49	49.76	66.00	16.24	QP
3	0.16	9.49	9.81	9.93	29.23	55.47	26.24	Average
4	0.16	9.49	9.81	29.67	48.97	65.47	16.50	QP
5	0.20	9.60	9.80	5.58	24.98	53.54	28.56	Average
6	0.20	9.60	9.80	24.19	43.59	63.54	19.95	QP
7	0.39	9.59	9.82	15.17	34.58	48.08	13.50	Average
8	0.39	9.59	9.82	23.32	42.73	58.08	15.35	QP
9	1.12	9.61	9.82	8.13	27.56	46.00	18.44	Average
10	1.12	9.61	9.82	15.68	35.11	56.00	20.89	QP
11	1.51	9.62	9.83	7.50	26.95	46.00	19.05	Average
12	1.51	9.62	9.83	15.87	35.32	56.00	20.68	QP



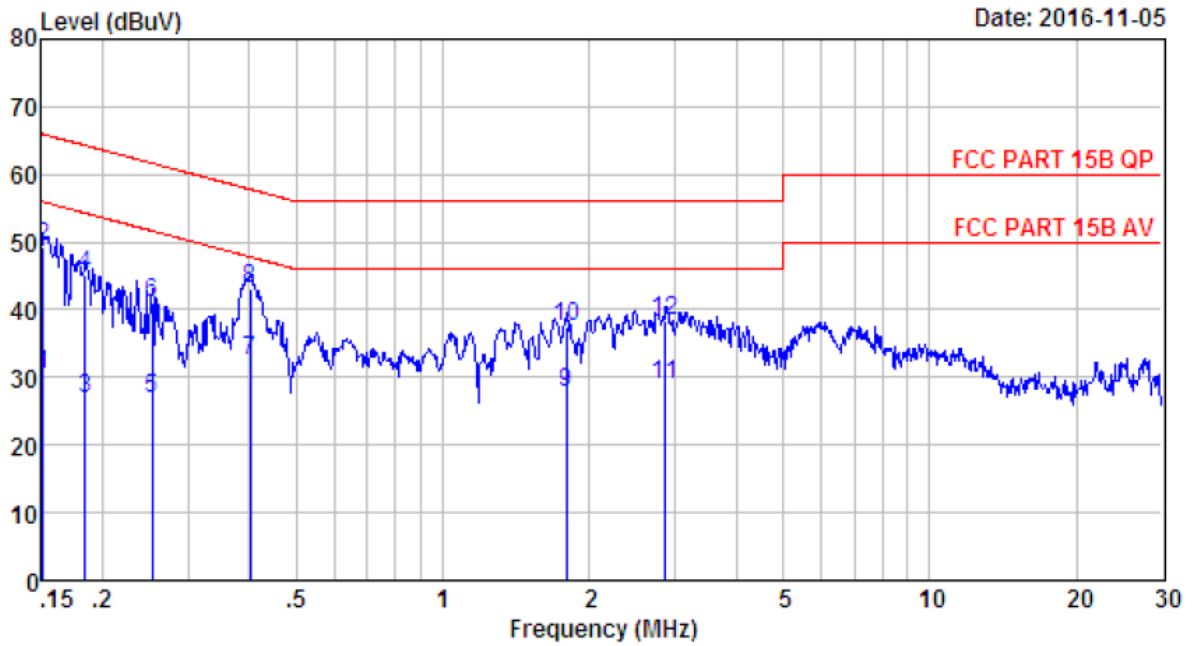
Site no : 844 Shield Room Data no. : 597
 Env. / Ins. : Temp:24.3'C Humi:58% Press:101.50kPa LINE Phase : LINE
 Limit : FCC PART 15B QP
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : TX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.16	9.61	9.81	13.13	32.55	55.60	23.05	Average
2	0.16	9.61	9.81	30.01	49.43	65.60	16.17	QP
3	0.29	9.61	9.83	13.50	32.94	50.50	17.56	Average
4	0.29	9.61	9.83	20.85	40.29	60.50	20.21	QP
5	0.37	9.61	9.82	17.80	37.23	48.47	11.24	Average
6	0.37	9.61	9.82	24.73	44.16	58.47	14.31	QP
7	0.89	9.62	9.82	11.53	30.97	46.00	15.03	Average
8	0.89	9.62	9.82	18.78	38.22	56.00	17.78	QP
9	1.09	9.64	9.83	12.75	32.22	46.00	13.78	Average
10	1.09	9.64	9.83	20.32	39.79	56.00	16.21	QP
11	1.27	9.63	9.83	12.02	31.48	46.00	14.52	Average
12	1.27	9.63	9.83	19.48	38.94	56.00	17.06	QP



Site no : 844 Shield Room Data no. : 599
 Env. / Ins. : Temp:24.3'C Humi:58% Press:101.50kPa LINE Phase : LINE
 Limit : FCC PART 15B QP
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 240V/60Hz
 M/N : Beolit 17
 Test Mode : TX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBUV)	Emission Level (dBUV)	Limits (dBUV)	Margin (dB)	Remark
1	0.15	9.61	9.81	14.13	33.55	55.91	22.36	Average
2	0.15	9.61	9.81	32.06	51.48	65.91	14.43	QP
3	0.25	9.61	9.82	13.25	32.68	51.64	18.96	Average
4	0.25	9.61	9.82	24.06	43.49	61.64	18.15	QP
5	0.42	9.61	9.81	12.10	31.52	47.42	15.90	Average
6	0.42	9.61	9.81	22.91	42.33	57.42	15.09	QP
7	0.55	9.60	9.82	11.07	30.49	46.00	15.51	Average
8	0.55	9.60	9.82	20.21	39.63	56.00	16.37	QP
9	0.99	9.64	9.83	10.96	30.43	46.00	15.57	Average
10	0.99	9.64	9.83	20.48	39.95	56.00	16.05	QP
11	1.25	9.63	9.82	14.66	34.11	46.00	11.89	Average
12	1.25	9.63	9.82	21.01	40.46	56.00	15.54	QP



Site no : 844 Shield Room Data no. : 601
 Env. / Ins. : Temp:24.3'C Humi:58% Press:101.50kPa LINE Phase : NEUTRAL
 Limit : FCC PART 15B QP
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 240V/60Hz
 M/N : Beolit 17
 Test Mode : TX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.15	9.46	9.81	11.13	30.40	55.96	25.56	Average
2	0.15	9.46	9.81	30.09	49.36	65.96	16.60	QP
3	0.18	9.56	9.80	7.57	26.93	54.28	27.35	Average
4	0.18	9.56	9.80	25.75	45.11	64.28	19.17	QP
5	0.25	9.60	9.82	7.50	26.92	51.64	24.72	Average
6	0.25	9.60	9.82	21.69	41.11	61.64	20.53	QP
7	0.40	9.59	9.82	13.21	32.62	47.81	15.19	Average
8	0.40	9.59	9.82	23.64	43.05	57.81	14.76	QP
9	1.79	9.62	9.81	8.35	27.78	46.00	18.22	Average
10	1.79	9.62	9.81	18.18	37.61	56.00	18.39	QP
11	2.87	9.63	9.83	9.34	28.80	46.00	17.20	Average
12	2.87	9.63	9.83	18.97	38.43	56.00	17.57	QP

4 RADIATED EMISSION TEST

4.1 Limit

4.1.1 15.209 limits

Frequency (MHz)	Field strength (μV/m)	Distance (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

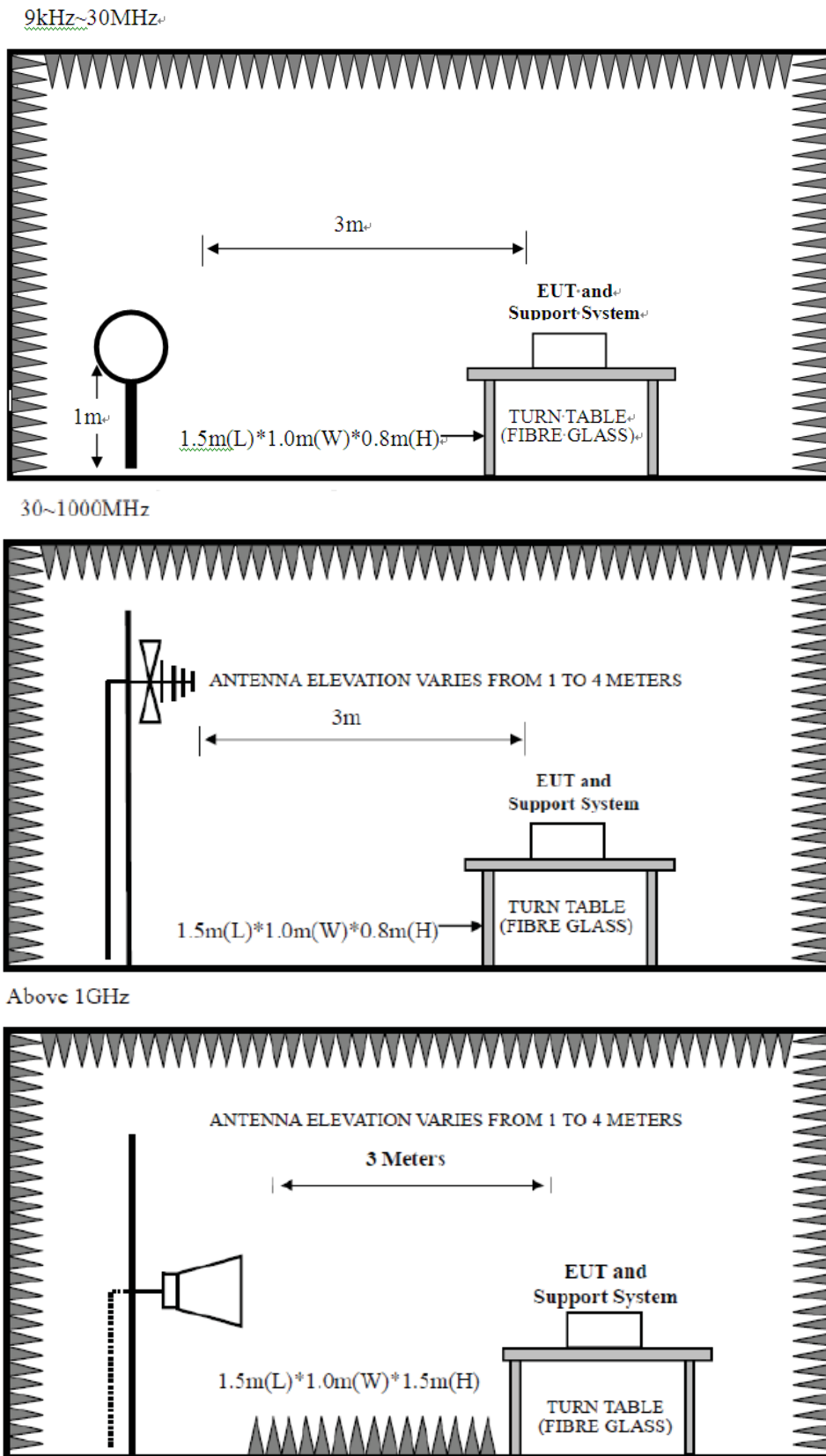
- Remark : (1) Emission level dBμV = 20 log Emission level μV/m
 (2) The smaller limit shall apply at the cross point between two frequency bands.
 (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

4.1.2 15.205 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. Block Diagram of Test setup



4.3. Test Procedure

EUT was placed on a turn table, which is 0.8 meter high above ground for 9kHz~1000MHz test, and which is 1.5 meter high above ground for above 1GHz test. The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

The test frequency analyzer system was set to Peak Detect (300Hz RBW in 9kHz to 150kHz and 10kHz RBW in 150kHz to 30MHz) Function and Specified Bandwidth with Maximum Hold Mode.

The bandwidth of the EMI test receiver (R&S ESVS10) is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 1MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz

PEAK detector, 1MHz/1MHz for PAEK measurement,

PEAK detector, 1MHz/10Hz for Average measurement

The frequency range from 30MHz to 10th harmonic (25GHz) are checked.

4.4. Test Result

PASS.

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

2、 The frequency 2402MHz 、 2440MHz and 2480 MHz is fundamental frequency which no limit, the limit on plots is automatically generated by the software, it's not fundamental limit, we can't remove it.

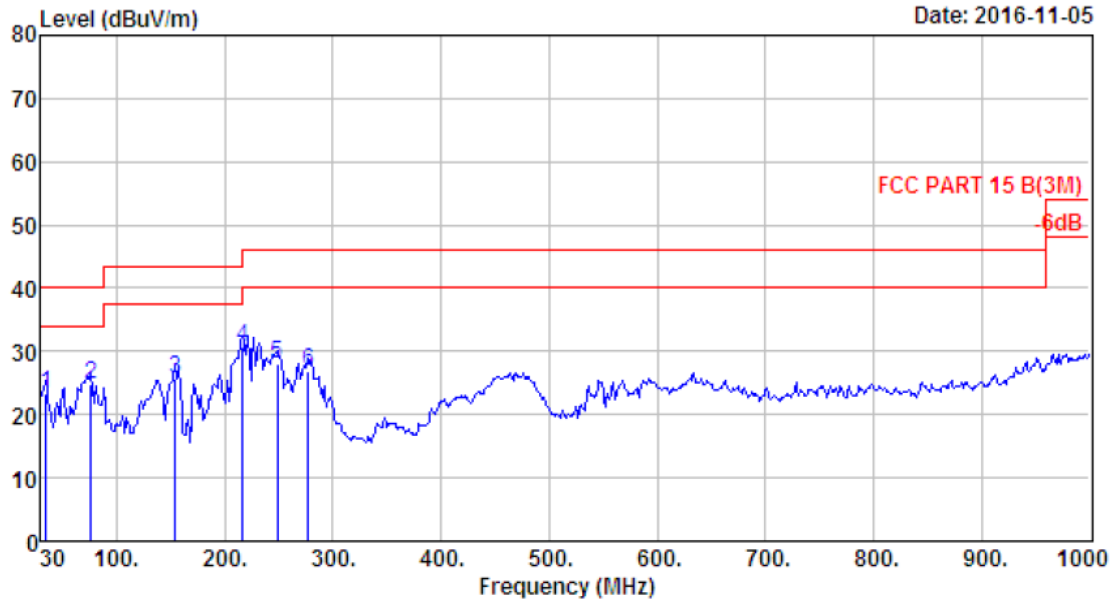
4.5. Test Data

9 kHz – 30 MHz

Pass

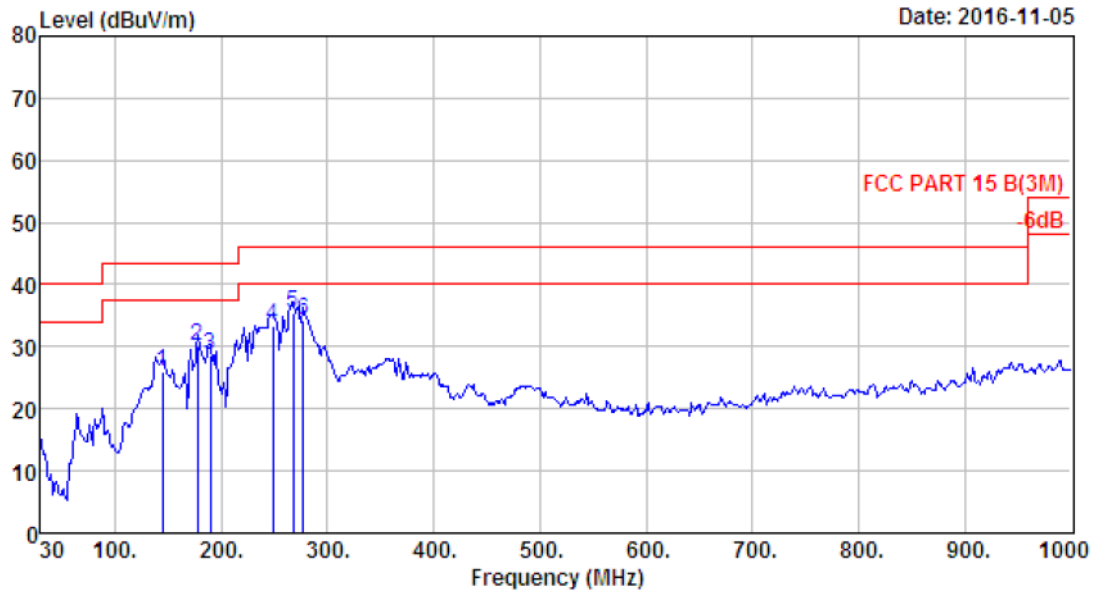
Note: The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

30-1000 MHz



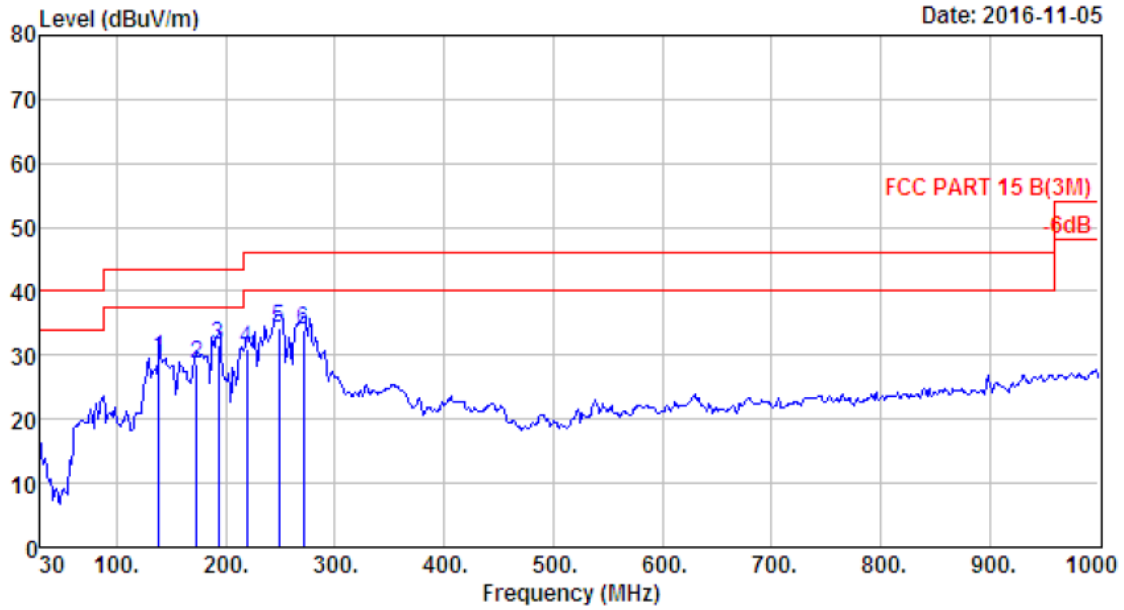
Site no. : 966 1# chamber Data no. : 469
 Dis. / Ant. : 3m 27137 Ant. pol. : VERTICAL
 Limit : FCC PART 15 B(3M)
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2402MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	34.85	15.55	0.72	7.08	23.35	40.00	16.65	QP
2	76.56	6.66	1.19	16.86	24.71	40.00	15.29	QP
3	154.16	10.71	1.66	13.39	25.76	43.50	17.74	QP
4	216.24	8.80	1.95	19.86	30.61	46.00	15.39	QP
5	248.25	11.52	2.13	14.35	28.00	46.00	18.00	QP
6	277.35	12.36	2.25	12.30	26.91	46.00	19.09	QP



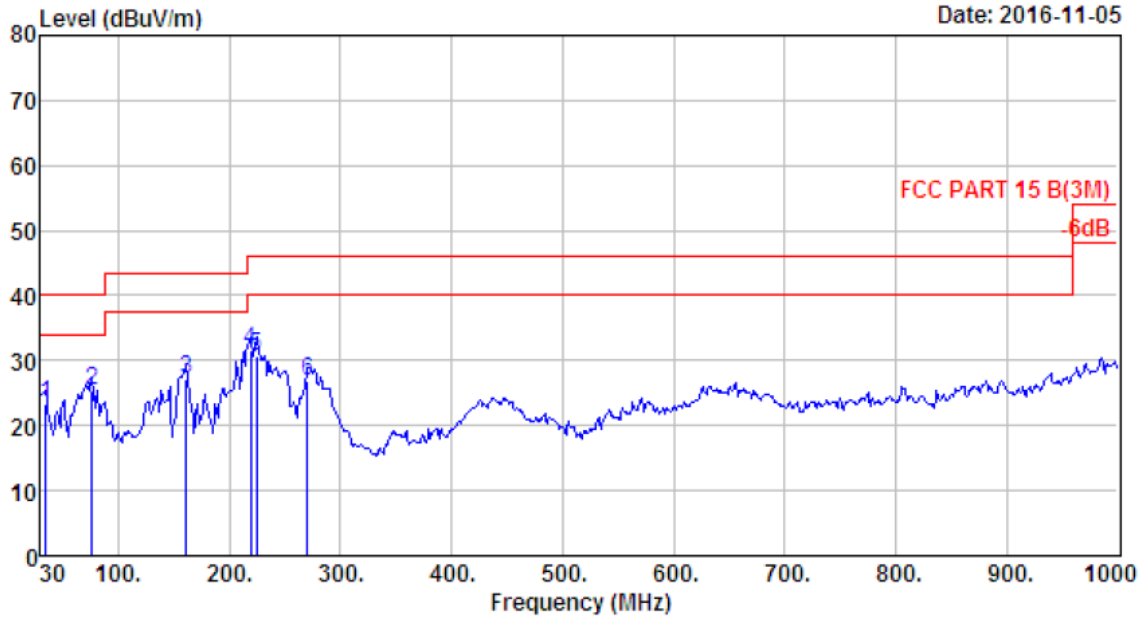
Site no. : 966 1# chamber Data no. : 470
 Dis. / Ant. : 3m 27137 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15 B(3M)
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUI : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2402MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	144.46	11.26	1.54	13.25	26.05	43.50	17.45	QP
2	177.44	8.97	1.67	19.33	29.97	43.50	13.53	QP
3	190.05	7.94	1.76	18.79	28.49	43.50	15.01	QP
4	248.25	11.52	2.13	19.67	33.32	46.00	12.68	QP
5	267.65	12.71	2.26	20.35	35.32	46.00	10.68	QP
6	277.35	12.36	2.25	19.68	34.29	46.00	11.71	QP



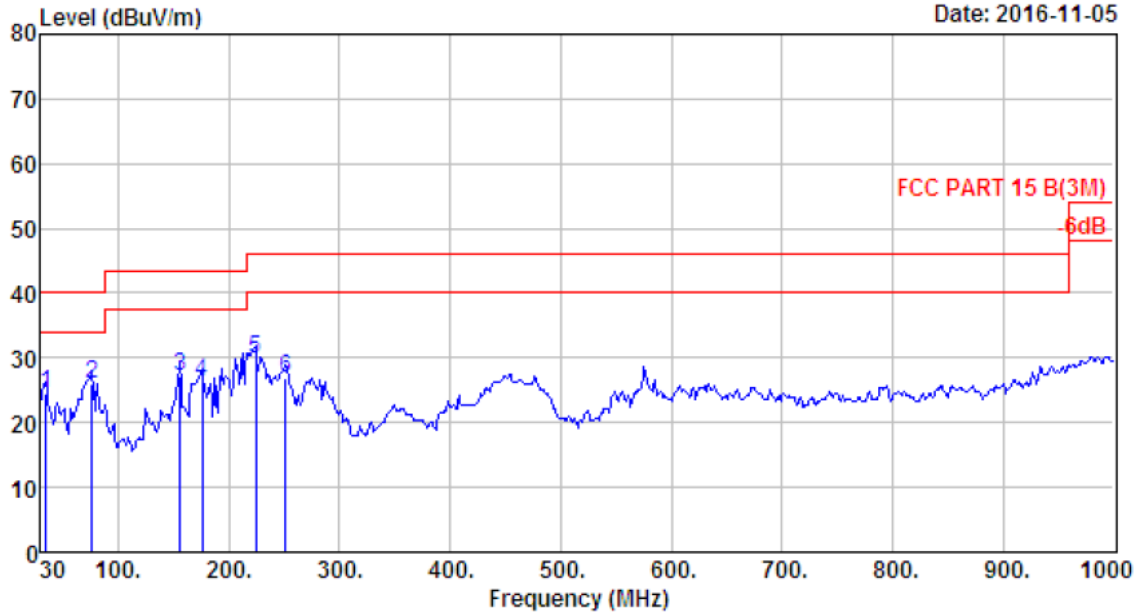
Site no. : 966 1# chamber Data no. : 471
 Dis. / Ant. : 3m 27137 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15 B(3M)
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUI : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2440MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	138.64	11.42	1.54	16.54	29.50	43.50	14.00	QP
2	173.56	9.03	1.68	18.00	28.71	43.50	14.79	QP
3	192.96	7.85	1.77	22.09	31.71	43.50	11.79	QP
4	219.15	9.10	1.94	20.04	31.08	46.00	14.92	QP
5	248.25	11.52	2.13	20.64	34.29	46.00	11.71	QP
6	271.53	12.49	2.29	19.25	34.03	46.00	11.97	QP



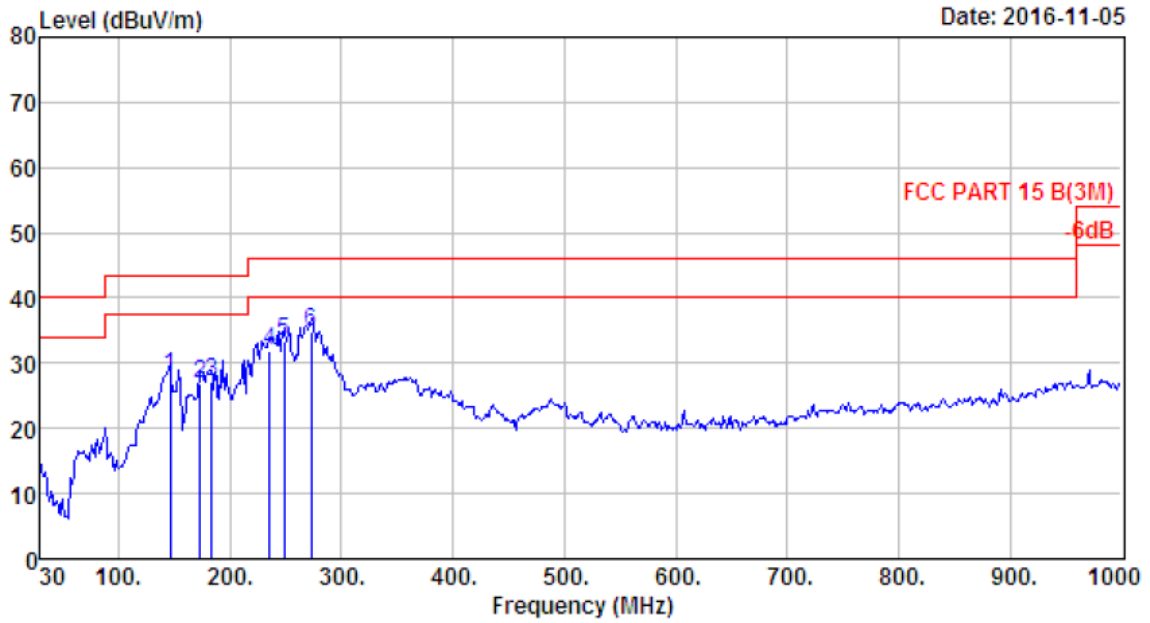
Site no. : 966 1# chamber Data no. : 472
 Dis. / Ant. : 3m 27137 Ant. pol. : VERTICAL
 Limit : FCC PART 15 B(3M)
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2440MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	34.85	15.55	0.72	7.16	23.43	40.00	16.57	QP
2	76.56	6.66	1.19	17.58	25.43	40.00	14.57	QP
3	160.95	10.24	1.70	15.33	27.27	43.50	16.23	QP
4	219.15	9.10	1.94	20.55	31.59	46.00	14.41	QP
5	224.00	9.42	2.01	19.33	30.76	46.00	15.24	QP
6	270.56	12.53	2.27	12.15	26.95	46.00	19.05	QP



Site no. : 966 1# chamber Data no. : 473
 Dis. / Ant. : 3m 27137 Ant. pol. : VERTICAL
 Limit : FCC PART 15 B(3M)
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUI : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2480MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	34.85	15.55	0.72	8.13	24.40	40.00	15.60	QP
2	76.56	6.66	1.19	18.13	25.98	40.00	14.02	QP
3	156.10	10.61	1.67	14.83	27.11	43.50	16.39	QP
4	175.50	8.98	1.68	15.64	26.30	43.50	17.20	QP
5	224.00	9.42	2.01	18.43	29.86	46.00	16.14	QP
6	251.16	11.94	2.15	12.78	26.87	46.00	19.13	QP



Site no. : 966 1# chamber Data no. : 474
 Dis. / Ant. : 3m 27137 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15 B(3M)
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2480MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Remark
1	146.40	11.15	1.58	15.19	27.92	43.50	15.58	QP
2	173.56	9.03	1.68	16.26	26.97	43.50	16.53	QP
3	183.26	8.67	1.69	16.72	27.08	43.50	16.42	QP
4	235.64	9.80	2.09	20.01	31.90	46.00	14.10	QP
5	248.25	11.52	2.13	19.71	33.36	46.00	12.64	QP
6	272.50	12.46	2.26	20.25	34.97	46.00	11.03	QP

Above 1GHz

Site no. : 966 1# chamber Data no. : 503
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.61	6.62	34.64	94.97	94.56	74.00	-20.56	Peak
2	4804.00	31.25	11.77	35.64	33.38	40.76	74.00	33.24	Peak
3	7206.00	36.52	11.54	33.95	28.65	42.76	74.00	31.24	Peak
4	8684.00	37.32	11.45	33.66	28.42	43.53	74.00	30.47	Peak
5	11234.00	39.37	11.12	33.25	25.41	42.65	74.00	31.35	Peak
6	13920.00	41.26	11.00	33.00	24.08	43.34	74.00	30.66	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Site no. : 966 1# chamber Data no. : 504
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.61	6.62	34.64	95.59	95.18	74.00	-21.18	Peak
2	4804.00	31.25	11.77	35.64	31.50	38.88	74.00	35.12	Peak
3	7206.00	36.52	11.54	33.95	29.04	43.15	74.00	30.85	Peak
4	8276.00	36.67	11.43	34.81	29.57	42.86	74.00	31.14	Peak
5	10996.00	39.52	11.29	34.11	25.67	42.37	74.00	31.63	Peak
6	13240.00	39.46	11.46	32.88	25.37	43.41	74.00	30.59	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Site no. : 966 1# chamber Data no. : 505
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2440MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2440.00	27.60	6.67	34.85	96.32	95.74	74.00	-21.74	Peak
2	4880.00	31.37	12.07	35.76	30.62	38.30	74.00	35.70	Peak
3	7320.00	36.55	11.57	34.14	26.98	40.96	74.00	33.04	Peak
4	8684.00	37.32	11.45	33.66	27.54	42.65	74.00	31.35	Peak
5	10180.00	38.42	11.49	34.53	26.80	42.18	74.00	31.82	Peak
6	13614.00	40.40	11.36	32.68	23.80	42.88	74.00	31.12	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Site no. : 966 1# chamber Data no. : 506
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2440MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2440.00	27.60	6.67	34.85	96.05	95.47	74.00	-21.47	Peak
2	4880.00	31.37	12.07	35.76	31.63	39.31	74.00	34.69	Peak
3	7320.00	36.55	11.57	34.14	28.61	42.59	74.00	31.41	Peak
4	8684.00	37.32	11.45	33.66	28.10	43.21	74.00	30.79	Peak
5	11030.00	39.50	11.27	33.98	25.93	42.72	74.00	31.28	Peak
6	13444.00	39.95	11.49	32.74	26.07	44.77	74.00	29.23	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

```

Site no.       : 966 1# chamber           Data no.  : 507
Dis. / Ant.   : 3m  ANT 1-18G           Ant. pol. : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer      : Tony
EUT           : Bluetooth Speaker
Power         : DC 15V From Adapter Input AC 120V/60Hz
M/N           : Beolit 17
Test Mode     : GFSK TX 2480MHz
    
```

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.58	6.71	35.11	97.32	96.50	74.00	-22.50	Peak
2	4960.00	31.49	12.44	36.01	30.44	38.36	74.00	35.64	Peak
3	7440.00	36.54	11.61	34.22	27.88	41.81	74.00	32.19	Peak
4	8650.00	37.27	11.45	33.68	27.87	42.91	74.00	31.09	Peak
5	11285.00	39.33	11.08	33.32	25.99	43.08	74.00	30.92	Peak
6	13546.00	40.21	11.44	32.61	24.82	43.86	74.00	30.14	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Site no. : 966 1# chamber Data no. : 508
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.58	6.71	35.11	97.94	97.12	74.00	-23.12	Peak
2	4960.00	31.49	12.44	36.01	30.41	38.33	74.00	35.67	Peak
3	7440.00	36.54	11.61	34.22	28.50	42.43	74.00	31.57	Peak
4	8735.00	37.40	11.45	33.76	26.45	41.54	74.00	32.46	Peak
5	10656.00	39.15	11.30	34.31	24.95	41.09	74.00	32.91	Peak
6	13665.00	40.55	11.30	32.75	23.46	42.56	74.00	31.44	Peak

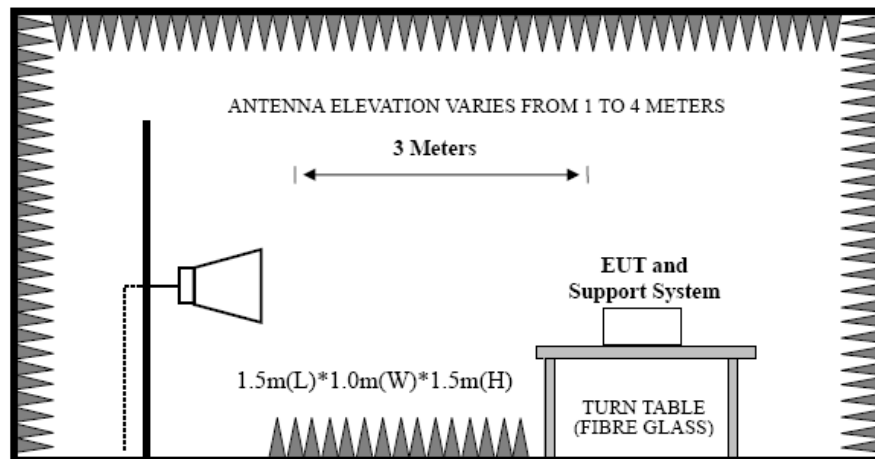
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

5 BAND EDGE COMPLIANCE TEST

5.1 Limit

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 20dB below the fundamental emissions, or comply with 15.209 limits

5.2 Block Diagram of Test setup



5.3 Test Procedure

1. The EUT is placed on a turntable, which is 1.5m above the ground plane and worked at highest radiated power.
2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

Peak : RBW = 1MHz, VBW = 1MHz, Detector=PEAK detector, Sweep time = auto.

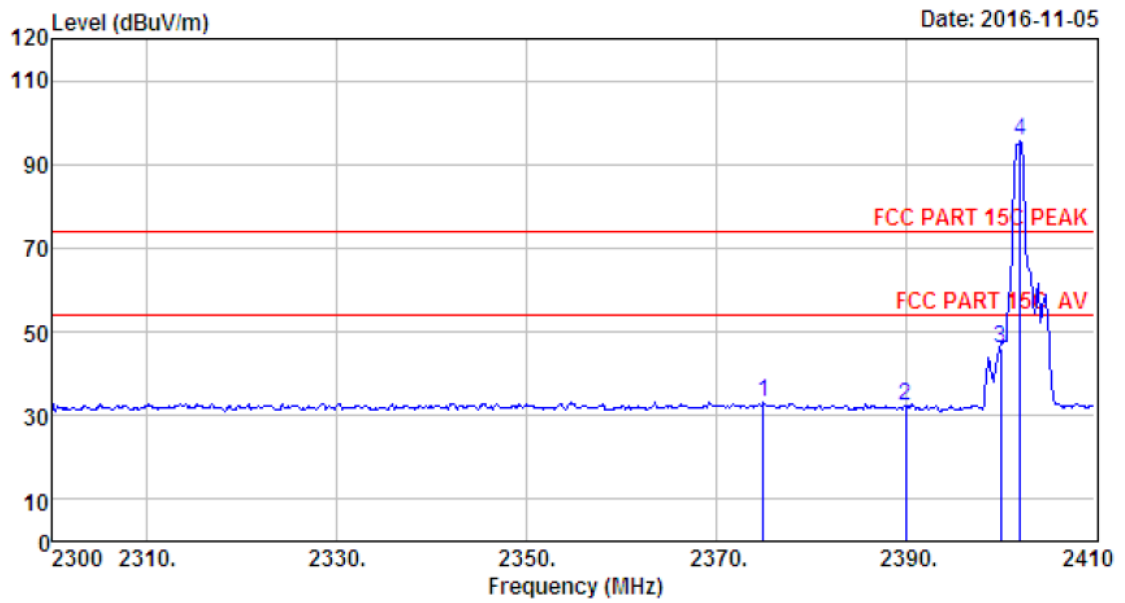
AV : RBW = 1MHz, VBW = 10Hz, Detector=PEAK detector, Sweep time = auto.

5.4 Test Result

Pass (The testing data was attached in the next pages.)

- Note:
- 1、 For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.
 - 2、 The frequency 2402MHz and 2480 MHz is fundamental frequency which no limit, the limit on plots is automatically generated by the software, it's not fundamental limit, we can't remove it.

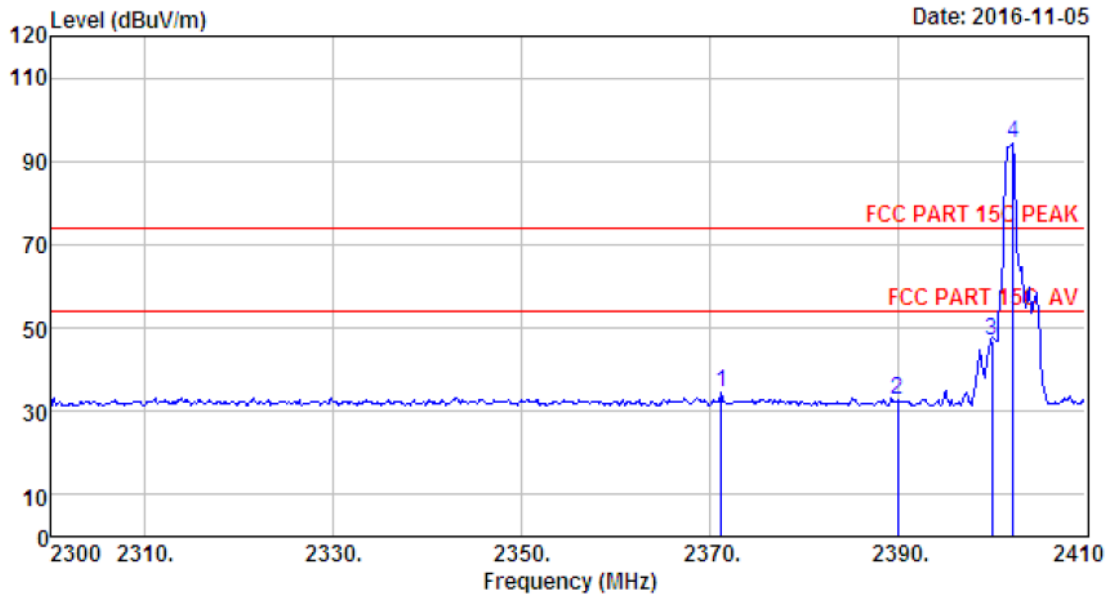
5.5 Test Data



Site no. : 966 1# chamber Data no. : 509
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2375.02	27.64	6.60	34.59	33.63	33.28	74.00	40.72	Peak
2	2390.00	27.64	6.62	34.62	32.82	32.46	74.00	41.54	Peak
3	2400.00	27.61	6.62	34.64	46.55	46.14	74.00	27.86	Peak
4	2402.08	27.61	6.62	34.64	95.95	95.54	74.00	-21.54	Peak

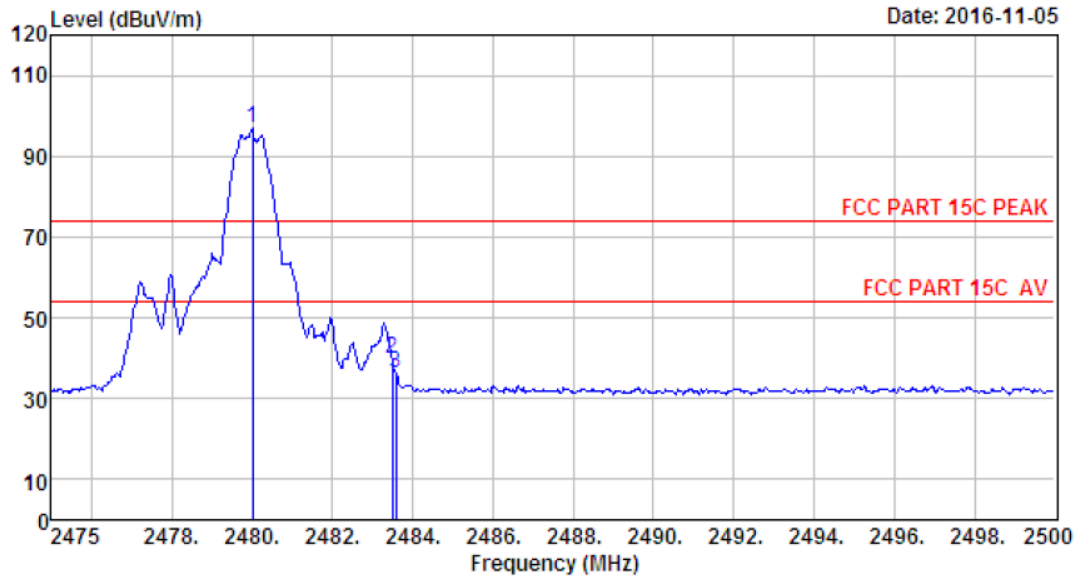
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber Data no. : 510
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2371.28	27.67	6.60	34.59	34.76	34.44	74.00	39.56	Peak
2	2390.00	27.64	6.62	34.62	32.94	32.58	74.00	41.42	Peak
3	2400.00	27.61	6.62	34.64	47.33	46.92	74.00	27.08	Peak
4	2402.30	27.61	6.62	34.64	94.79	94.38	74.00	-20.38	Peak

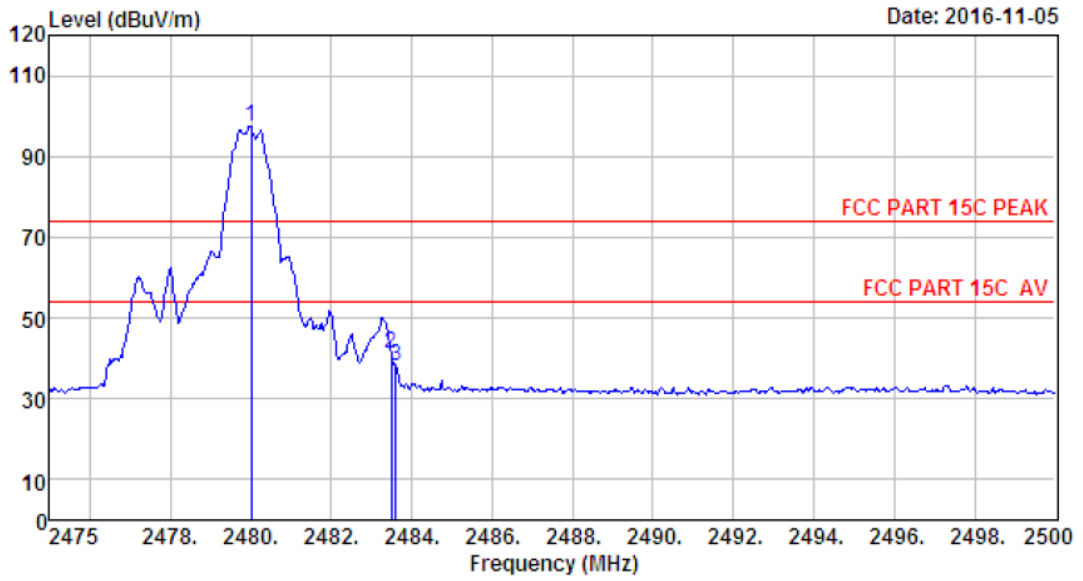
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber Data no. : 511
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.58	6.71	35.11	97.65	96.83	74.00	-22.83	Peak
2	2483.50	27.58	6.71	35.11	40.47	39.65	74.00	34.35	Peak
3	2483.58	27.58	6.71	35.11	37.14	36.32	74.00	37.68	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber Data no. : 512
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
 Engineer : Tony
 EUT : Bluetooth Speaker
 Power : DC 15V From Adapter Input AC 120V/60Hz
 M/N : Beolit 17
 Test Mode : GFSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.58	6.71	35.11	98.43	97.61	74.00	-23.61	Peak
2	2483.50	27.58	6.71	35.11	42.05	41.23	74.00	32.77	Peak
3	2483.60	27.58	6.71	35.11	38.82	38.00	74.00	36.00	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

6 6dB Bandwidth Test

6.1 Limit

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

6.2 Test Procedure

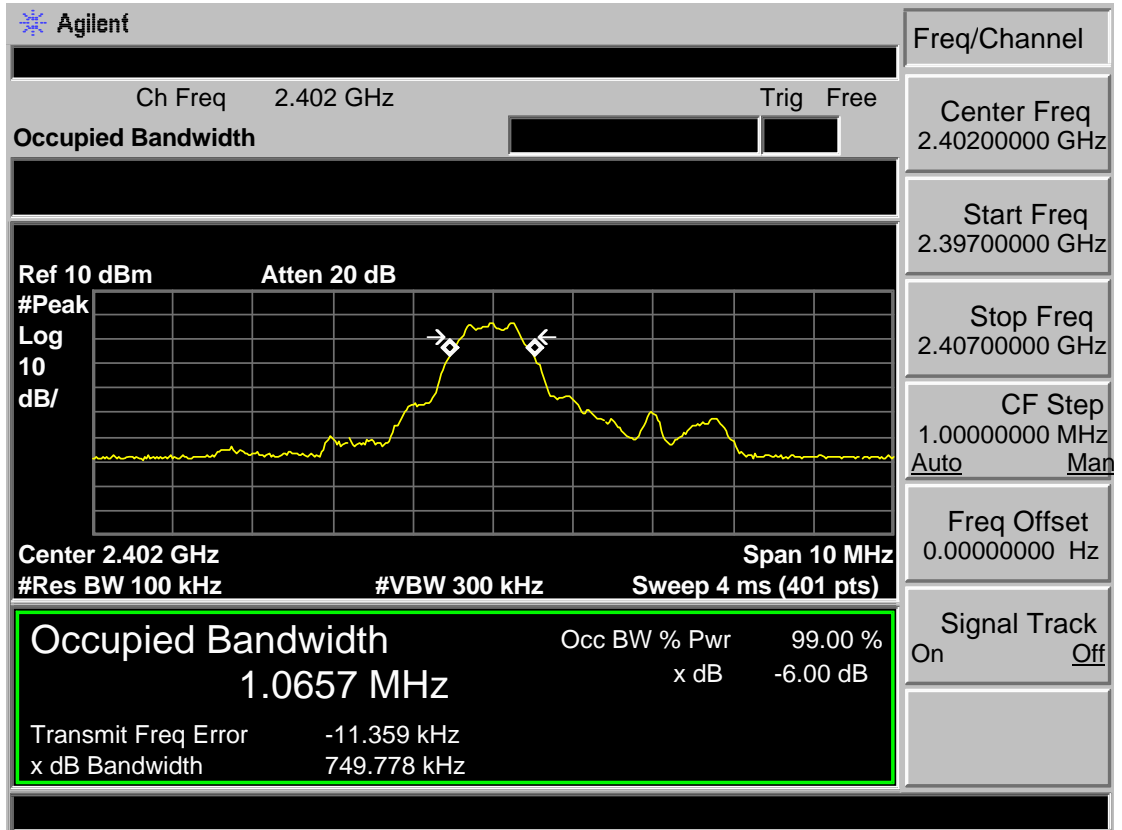
- 1, Connected the EUT's antenna port to spectrum analyzer device.
- 2, Follow the test procedure as described in KDB 558074
 - (1). Set resolution bandwidth (RBW) = 100 kHz.
 - (2). Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
 - (3). Detector = Peak.
 - (4). Trace mode = max hold.
 - (5). Sweep = 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 Test Result

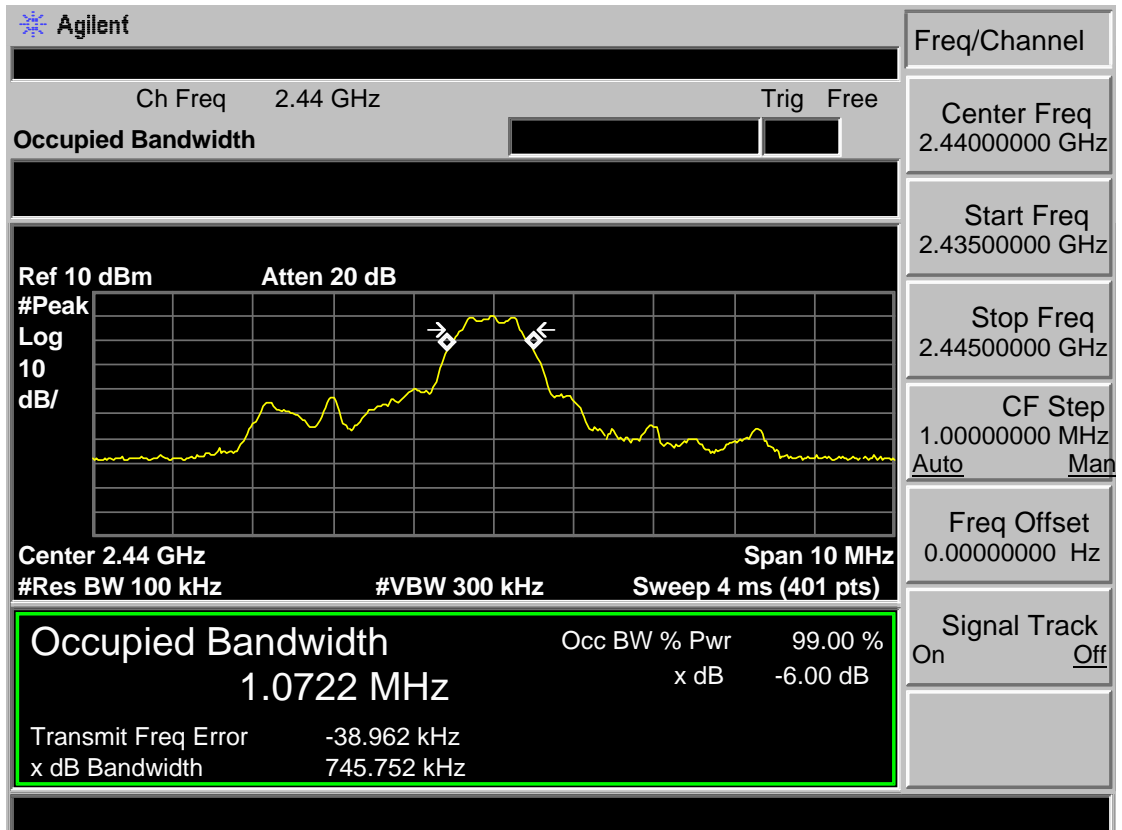
EUT: Bluetooth Speaker			
M/N: Beolit 17			
Test date: 2016-11-02		Tested by: Tony.Tang	
		Test site: RF Site	
Test Mode	CH	6dB bandwidth (MHz)	Limit (KHz)
BT 4.0-BLE GFSK	CH1	0.750	>500
	CH20	0.746	>500
	CH40	0.740	>500
Conclusion : PASS			

6.4 Test Data

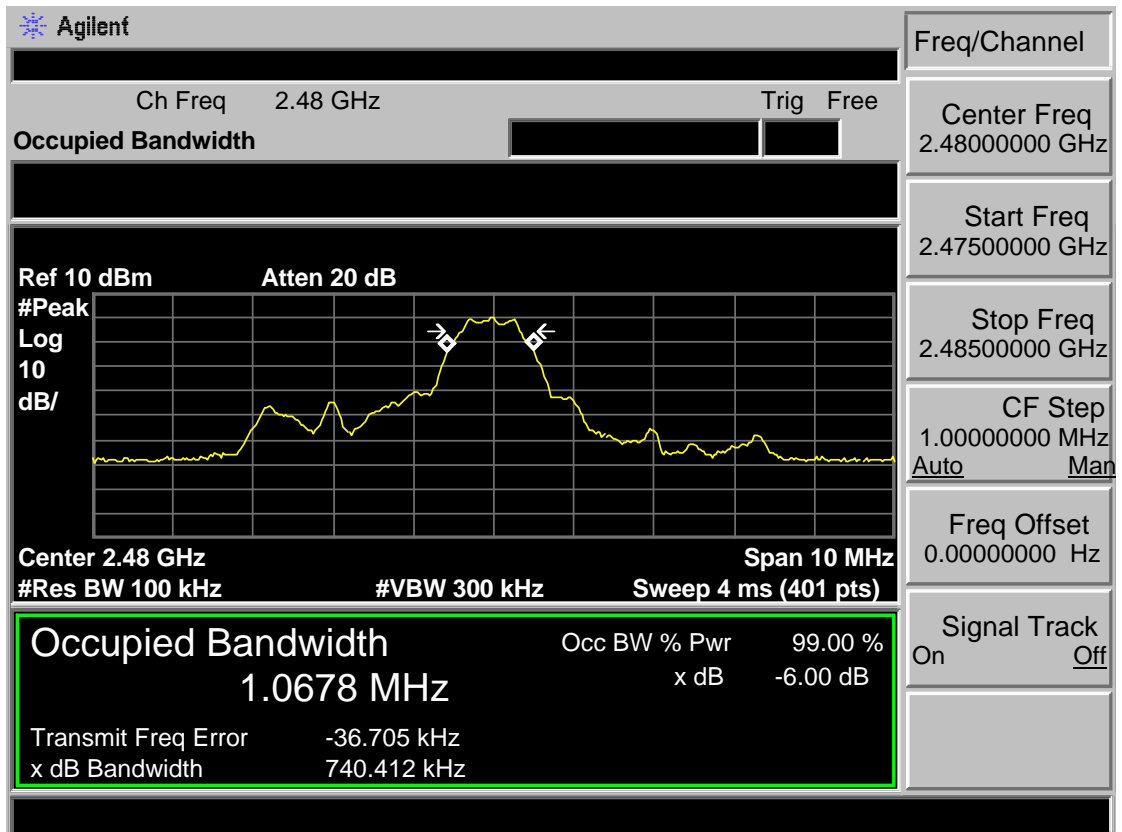
Test Mode: BT 4.0-BLE GFSK 2402MHz



Test Mode: BT 4.0-BLE GFSK 2440MHz



Test Mode: BT 4.0-BLE GFSK 2480MHz



7 OUTPUT POWER TEST

7.1 Limit

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

7.2 Test Procedure

7.3 Test Procedure

- 1, Connected the EUT's antenna port to spectrum analyzer device.
- 2, Follow the test procedure as described in KDB 558074
 - (1). Set the RBW \geq DTS bandwidth.
 - (2). Set VBW \geq 3 x RBW.
 - (3). Set span \geq 3 x RBW.
 - (4). Sweep time = auto couple.
 - (5). Detector = peak.
 - (6). Trace mode = max hold.
 - (7). Allow trace to fully stabilize.
 - (8). Use peak marker function to determine the peak amplitude level.

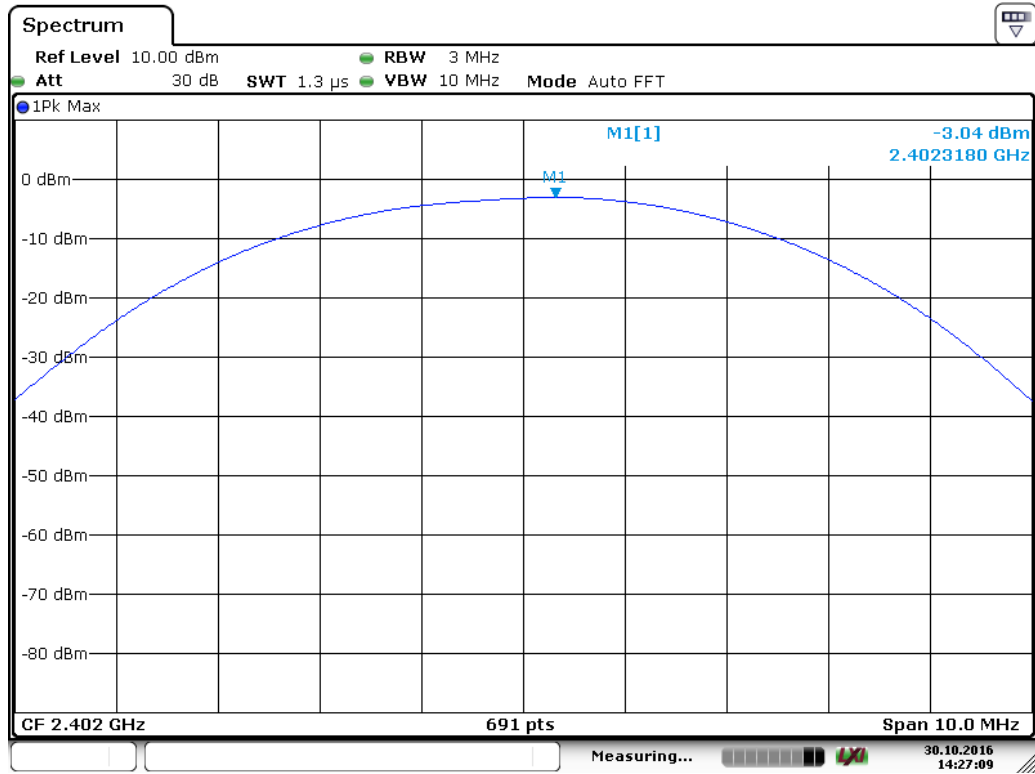
Note: The cable loss and attenuator loss were offset into measure device as an amplitude offs

7.4 Test Result

EUT:Bluetooth Speaker			
M/N:Beolit 17			
Test date: 2016-10-30		Test site: 3m Chamber	Tested by: Tony Tang
Pass			
Test Mode	CH	Peak output Power (dBm)	Limit (dBm)
BT 4.0-BLE GFSK	CH1	-3.04	30
	CH20	-0.23	30
	CH40	-0.36	30
Conclusion : PASS			

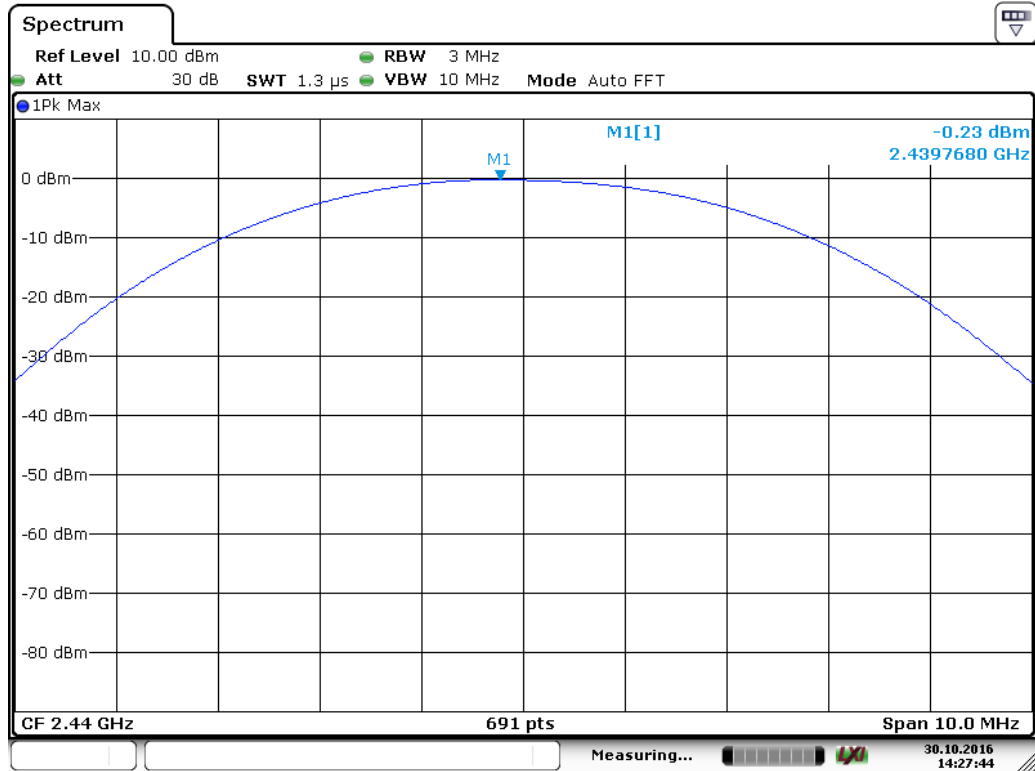
7.5 Test Data

Test Mode: BT 4.0-BLE GFSK 2402MHz



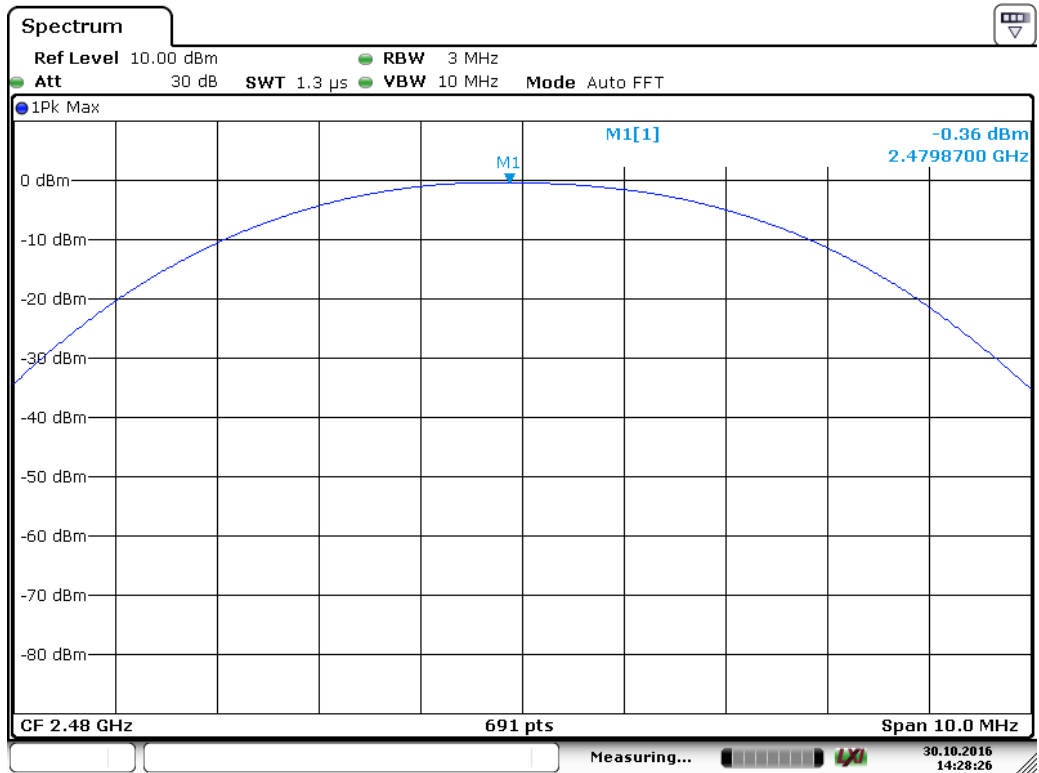
Date: 30.OCT.2016 14:27:09

Test Mode: BT 4.0-BLE GFSK 2440MHz



Date: 30.OCT.2016 14:27:44

Test Mode: BT 4.0-BLE GFSK 2480MHz



Date: 30.OCT.2016 14:28:26

8 POWER SPECTRAL DENSITY TEST

8.1 Limit

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

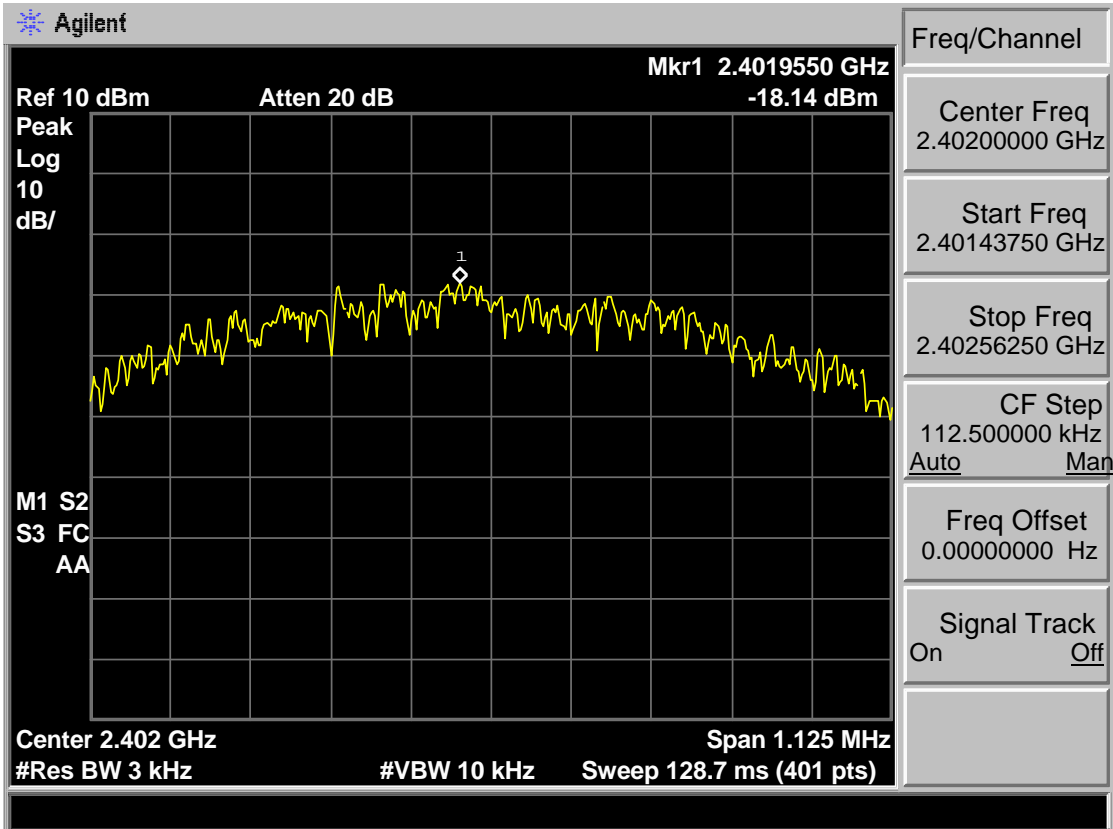
- 1, Connected the EUT's antenna port to spectrum analyzer device.
- 2, Follow the test procedure as described in KDB 558074
 - (1). Set analyzer center frequency to DTS channel center frequency.
 - (2). Set the span to 1.5 times the DTS bandwidth.
 - (3). Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
 - (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.
 - (10). If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

8.3 Test Result

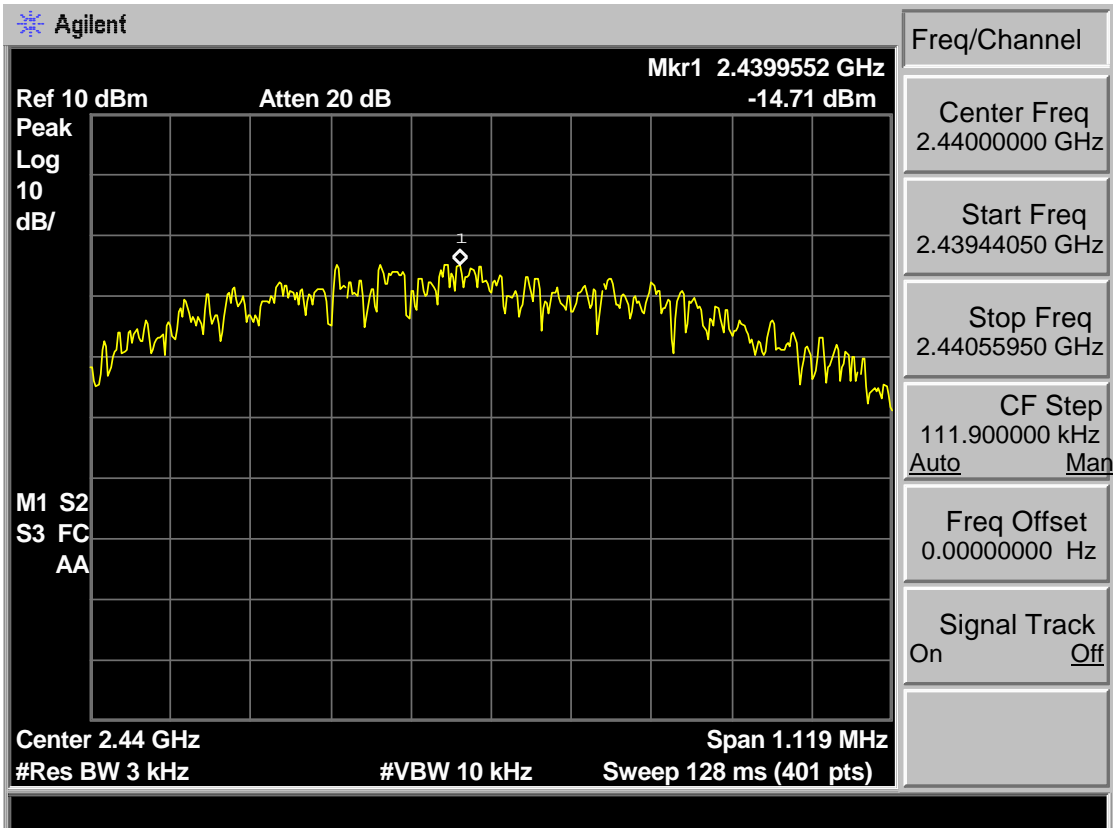
EUT: Bluetooth Speaker			
M/N: Beolit 17			
Test date: 2016-10-30		Test site: 3m Chamber	Tested by: Tony Tang
Pass			
Test Mode	CH	Power density (dBm/3kHz)	Limit (dBm/3kHz)
BT 4.0-BLE GFSK	CH1	-18.14	8
	CH20	-14.71	8
	CH40	-14.79	8
Conclusion : PASS			

8.4 Test Data

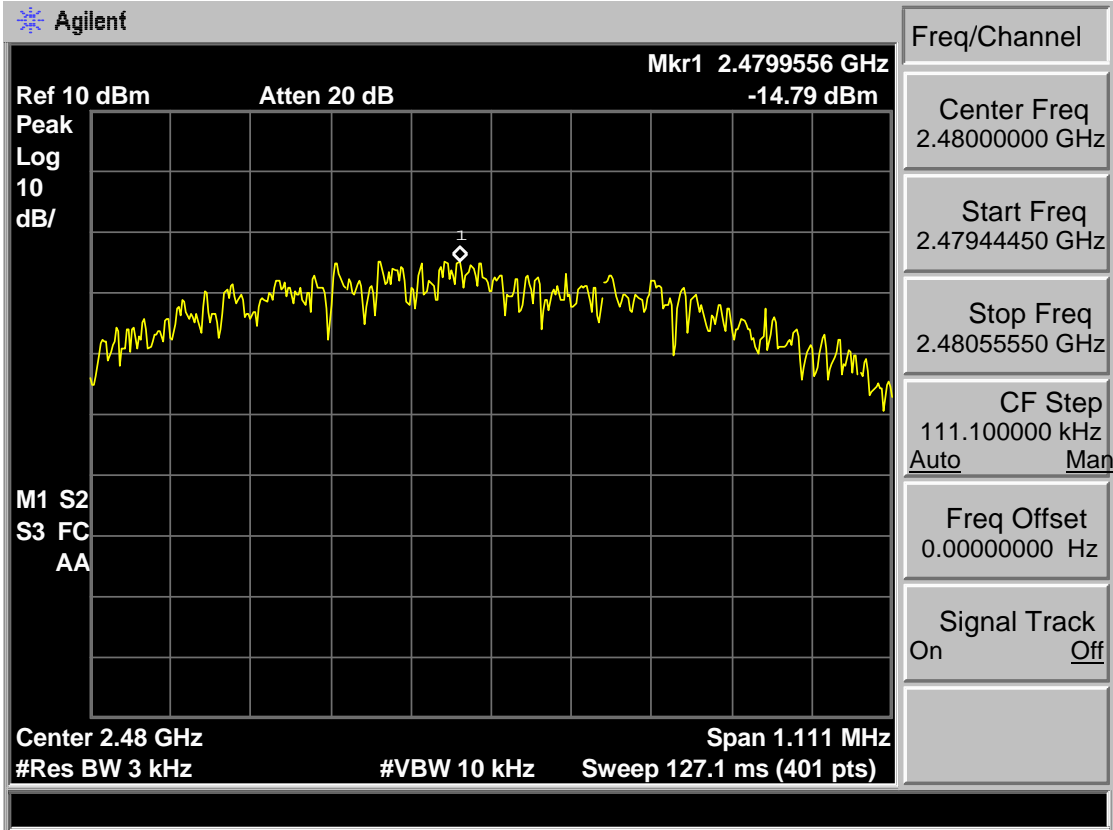
Test Mode: BT 4.0-BLE GFSK 2402MHz



Test Mode: BT 4.0-BLE GFSK 2440MHz



Test Mode: BT 4.0-BLE GFSK 2480MHz



9 ANTENNA REQUIREMENTS

9.1 Limit

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.

9.2 Result

The antennas used for this product are internal 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 2.71dBi.