

FCC RADIO TEST REPORT

FCC ID: 2AHYVCRSHMICRO


Report Reference No..... : 17FAS05047 21
Date of issue : 2017-6-19
FCC 2.948 No : 923232
Testing Laboratory : ATT Product Service Co., Ltd.
Address : No. 3, ChangLianShan Industrial Park, ChangAn Town,
DongGuan City, GuangDong, China.

Applicant's name..... : PEAG LLC DBA JLABAUDIO
Address..... : 3402 piazza d'oro way, suite 230 oceanside, ca 92056
Manufacturer..... : Musilab Electronic (DongGuan) Co., Ltd

Test specification:

Test item description..... : Speaker with bluetooth
Trade Mark..... : Jlab
Model/Type reference : Crasher Micro
Ratings : I/P: 3.7V by inside the battery

Responsible Engineer :


Smile Wang

Authorized Signatory:

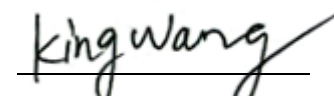

Maoxing Wang

TABLE OF CONTENTS

TEST REPORT DECLARE	3
1. Summary of test Standards and results	4
2.1. Accretations.....	5
2.2. Description of EUT	5
2.3. Accessories of EUT	5
2.4. Assistant equipment used for test.....	5
2.5. Block diagram of EUT configuration for test.....	6
2.6. Test environment conditions.....	6
2.7. Measurement uncertainty.....	7
3. 6dB Bandwidth and 99% Occupied Bandwidth.....	7
3.1. Test equipment	7
3.2. Block diagram of test setup.....	7
3.3. Limits	7
3.4. Test Procedure	7
3.5. Test Result.....	8
3.6. Original test data.....	8
4. Maximum Peak Output Power	10
4.1. Test equipment	10
4.2. Block diagram of test setup.....	10
4.3. Limits	10
4.4. Test Procedure	10
4.5. Test Result.....	11
4.6 Original test data.....	12
5. Power Spectral Density.....	14
5.1. Test equipment	14
5.2. Block diagram of test setup.....	14
5.3. Limits	14
5.5. Test Result.....	15
5.6. Original test data.....	16
6. Spurious Emissions	18
6.1. Test equipment	18
6.2. Block diagram of test setup.....	18
6.3. Limit	19
6.5. Test result	22
7. 100 kHz Bandwidth of Frequency Band Edge.....	28
7.1. Test equipment.....	28

7.2. Block diagram of test setup.....	28
7.3. Limit	28
7.4. Test Procedure	29
7.5. Test result	29
8 Power Line Conducted Emission.....	31
8.1 Test equipment	31
8.2 Block diagram of test setup.....	31
8.3 Power Line Conducted Emission Limits(Class B)	31
8.4 Test Procedure.....	32
8.5 Test Result.....	32
Note2: “-----” means peak detection; “-----” mans average detection	32
9. Antenna Requirements	35
9.1. Limit	35
9.2. Result	35

TEST REPORT DECLARE

Applicant	:	PEAG LLC DBA JLABAUDIO
Address	:	3402 piazza d'oro way, suite 230 oceanside, ca 92056
Equipment under Test	:	Speaker with bluetooth
Test Model No	:	Crasher Micro
Manufacturer	:	Musilab Electronic (DongGuan) Co., Ltd
Address	:	No.5 Huanwei Street,Fugang,Qingxi Town, Dongguan,Guangdong,China

Test Standard Used: FCC Rules and Regulations Part 15 Subpart C :2015

Test procedure used: ANSI C63.4: 2014, ANSI C63.10-2013 , DA 00-705.

We Declare:

The equipment described above is tested by ATT Product Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and ATT Product Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No:	17FAS05047 21		
Date of Test:	2017-6-11 To 2017-6-11	Date of Report:	2017-6-19

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of ATT Product Service Co., Ltd.

1. Summary of test Standards and results

The EUT have been tested according to the applicable standards as referenced below.

Description of Test Item	Standard	Results
6dB Bandwidth And 99% Occupied Bandwidth	§15.247 (a)(2)	PASS
Peak Output Power	§15.247(b)(3)	PASS
Power Spectral Density	§15.247(e)	PASS
Spurious Emissions at Antenna Port	§15.247(d)	PASS
Spurious Emissions	§15.205, §15.209, §15.247(d)	PASS
100 kHz Bandwidth of Frequency Band Edge	§15.247(d)	PASS
AC Line Conducted Emissions	§15.207 (a)	PASS
Antenna requirement	FCC Part 15: 15.203	PASS

2. GENERAL TEST INFORMATION

2.1. Accreditations

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

USA

FCC

Registration Number :923232

2.2. Description of EUT

EUT* Name	:	Speaker with bluetooth
Model Number	:	Crasher Micro
Trade Mark	:	Jlab
EUT function description	:	Please reference user manual of this device
Power supply	:	3.7V by inside the battery
Radio Specification	:	BLE
Operation frequency	:	2402 MHz -2480MHz
Modulation	:	GFSK
Antenna Type	:	PIFA antenna,maximum PK gain: 0dBi
Date of Receipt	:	2017-05-21
Sample Type	:	Series production

Note: EUT is the ab. of equipment under test.

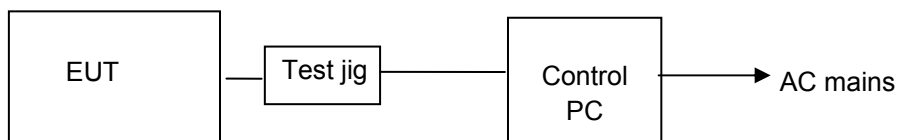
2.3. Accessories of EUT

Description of Accessories	Manufacturer	Model number or Type	Other
/	/	/	/

2.4. Assistant equipment used for test

Description of Assistant equipment	Manufacturer	Model number or Type	Other
Notebook	acer	Aspire E1-472G	FCC DoC

2.5. Block diagram of EUT configuration for test



EUT was connected to control to a special test jig provided by manufacturer which has a standard RSS-232 connector to connect to Notebook, and the Notebook will run a special test software “BT FCC” provided by manufacturer to control EUT work in test mode as blow table.

Mode	Channel	Frequency (MHz)
BLE	Low :CH1	2402
	Middle: CH19	2440
	High: CH39	2480

2.6. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25℃
Humidity range:	40-75%
Pressure range:	86-106kPa

2.7. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.44dB
Uncertainty for Radiation Emission test (150KHz-30MHz)	3.21dB
Uncertainty for Radiation Emission test (30MHz-1GHz)	3.14 dB (Polarize: V)
	3.16 dB (Polarize: H)
Uncertainty for Radiation Emission test (1GHz to 25GHz)	2.08dB(Polarize: V)
	2.56dB (Polarize: H)
Uncertainty for radio frequency	1×10-9
Uncertainty for conducted RF Power	0.65dB

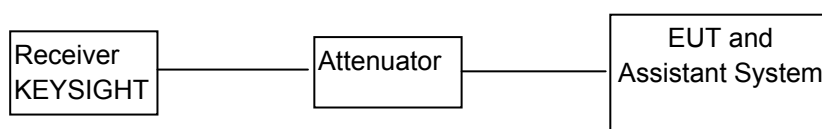
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. 6dB Bandwidth and 99% Occupied Bandwidth

3.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2018/05/26	1 Year
2	Attenuator	Mini-Circuits	BW-S10W2	101109	2017/12/18	1 Year
3	RF Cable	Micable	C10-01-01-1	100309	2017/12/18	1 Year

3.2. Block diagram of test setup



3.3. Limits

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

3.4. Test Procedure

- (1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- (2) Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- (3) Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.

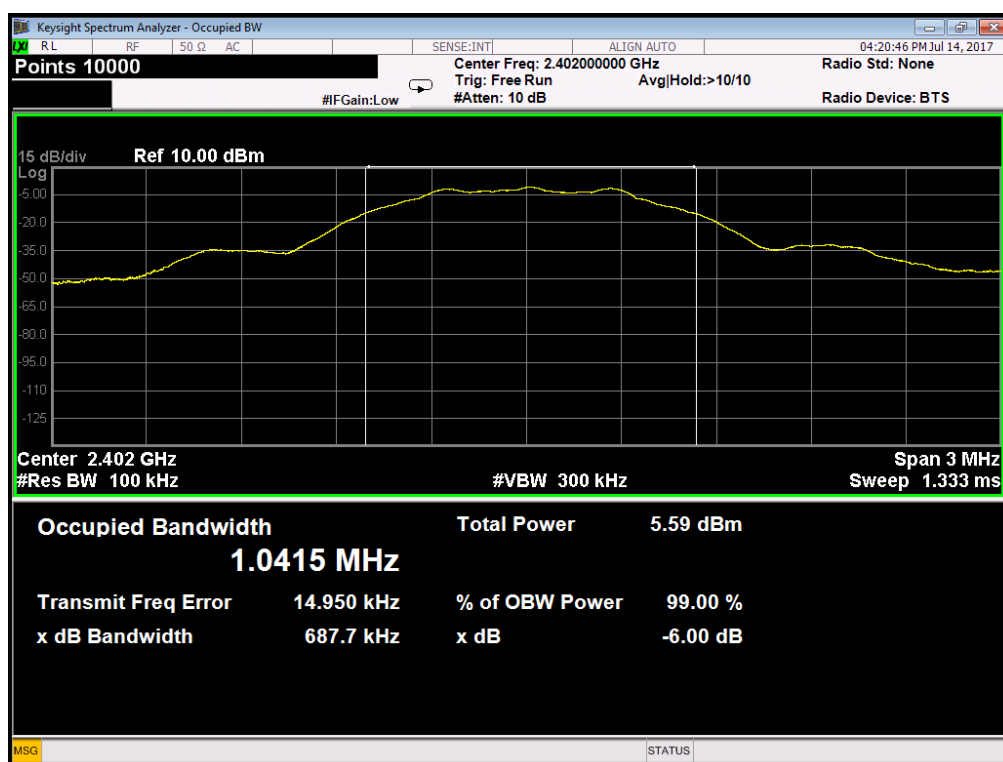
(4) Repeat above procedures until all frequencies measured were complete.

3.5. Test Result

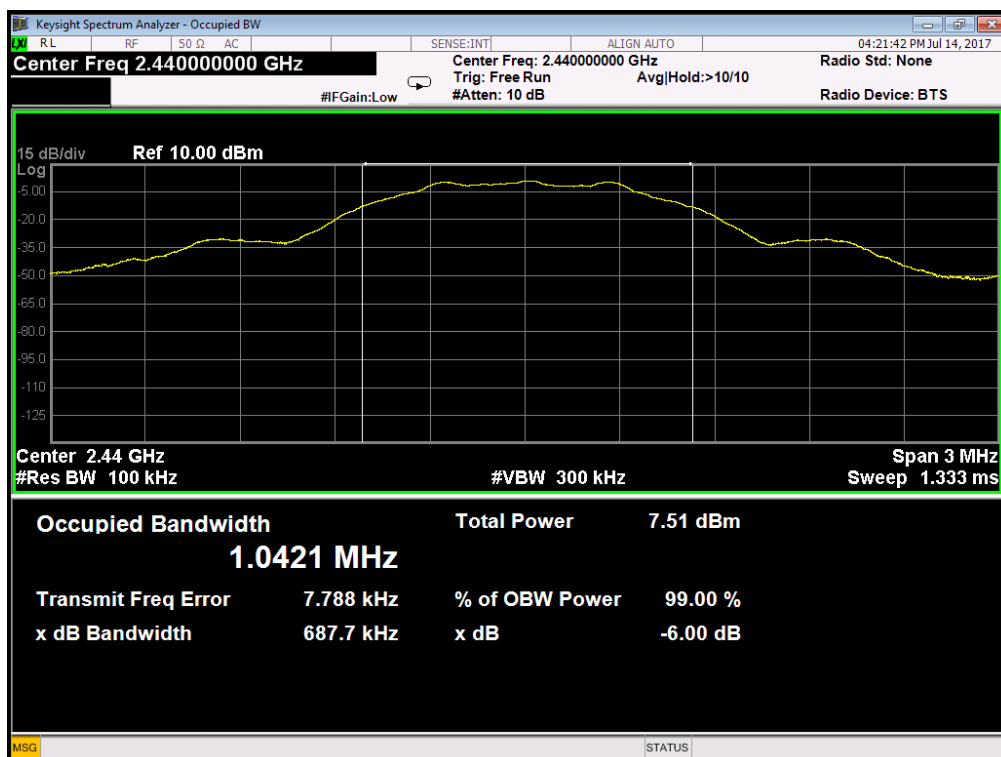
EUT Set Mode	CH or Frequency	6 dB bandwidth	99% dB bandwidth	Limt	Conclusion
		Result (MHz)	Result (MHz)		
BLE	CH0	0.69	1.04	>500KHz	PASS
	CH19	0.69	1.04	>500KHz	PASS
	CH39	0.69	1.04	>500KHz	PASS

3.6. Original test data

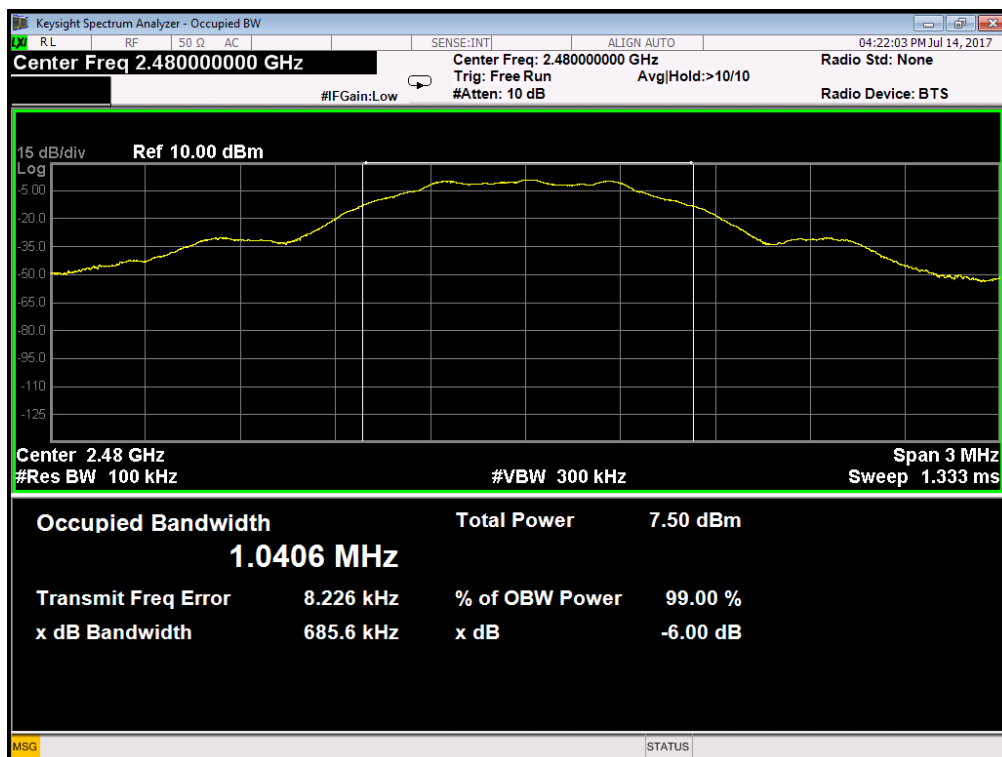
CH0



CH19



CH39

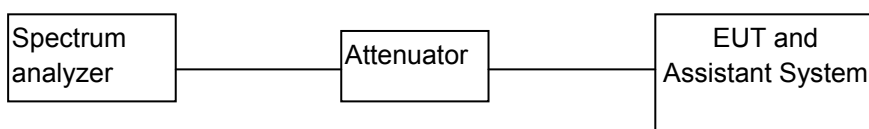


4. Maximum Peak Output Power

4.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2018/05/26	1 Year
2	Attenuator	Mini-Circuits	BW-S10W2	101109	2017/12/18	1 Year
3	RF Cable	Micable	C10-01-01-1	100309	2017/12/18	1 Year

4.2. Block diagram of test setup



4.3. Limits

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz bands: 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.4. Test Procedure

- (1) Configure EUT and assistant system according clause 2.4 and 3.2
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (3) Configure EUT work in test mode as stated in clause 2.4.
- (4) Set the spectrum analyzer as follows:

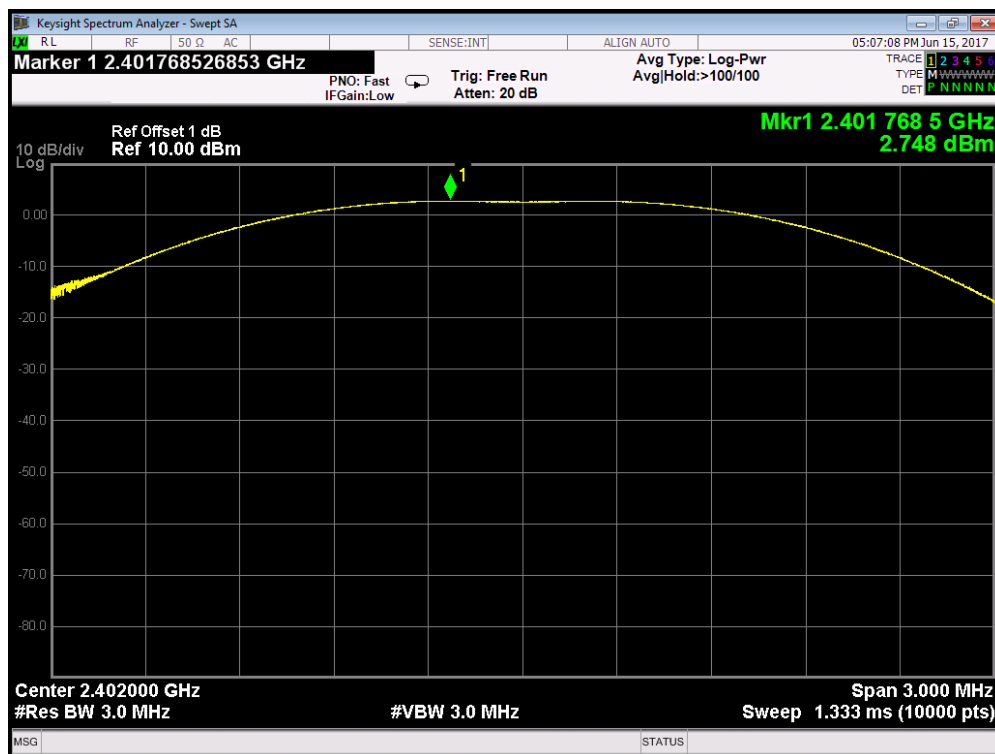
GFSK	RBW:	3MHz
	VBW:	3MHz
Span		>1.5x 20dB bandwidth
Detector Mode:		Peak
Sweep time:		auto
Trace mode		Max hold

4.5. Test Result

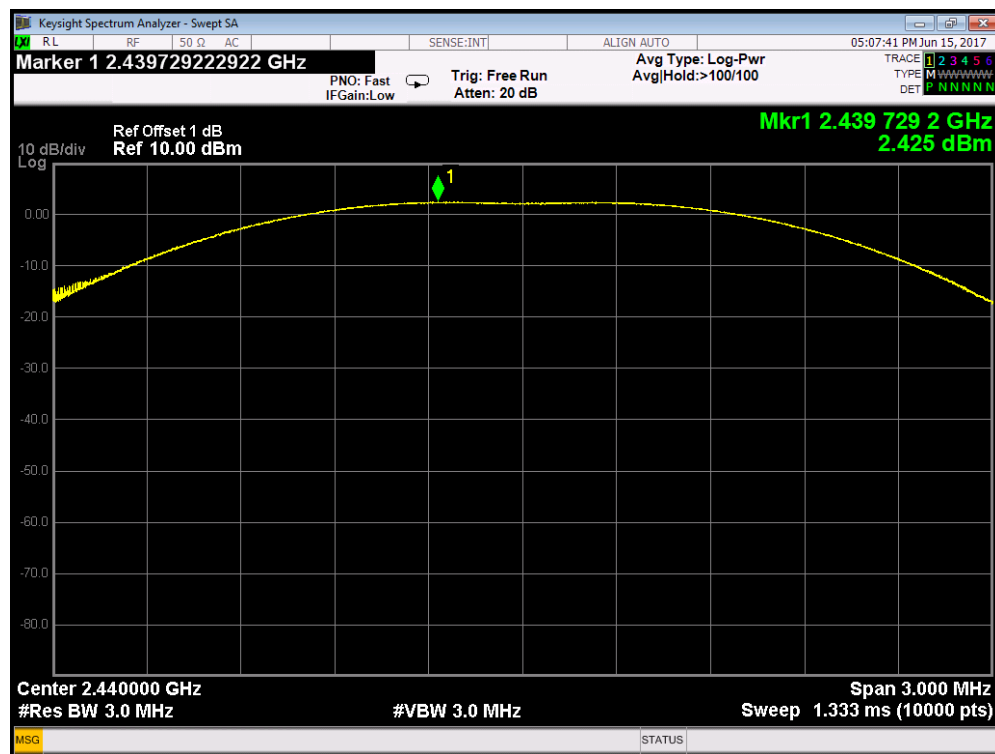
EUT Set Mode	Limit(Peak)	Conclusion	CH	Result(dBm)
				Peak
BLE	30dBm	PASS	CH0	2.75
			CH19	2.43
			CH39	2.55

4.6 Original test data

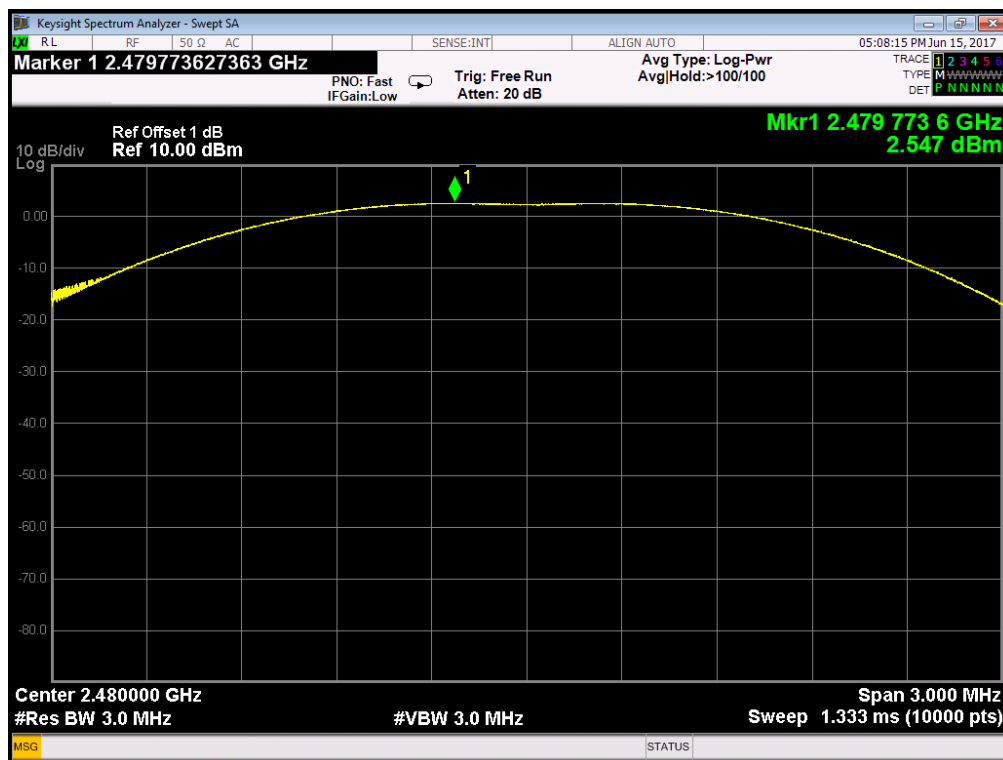
CH0



CH19



CH39

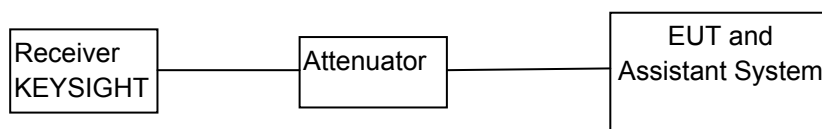


5. Power Spectral Density

5.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2018/05/26	1 Year
2	Attenuator	Mini-Circuits	BW-S10W2	101109	2017/12/18	1 Year
3	RF Cable	Micable	C10-01-01-1	100309	2017/12/18	1 Year

5.2. Block diagram of test setup



5.3. 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 3 kHz band during any time interval of continuous transmission.

5.4. TEST PROCEDURE

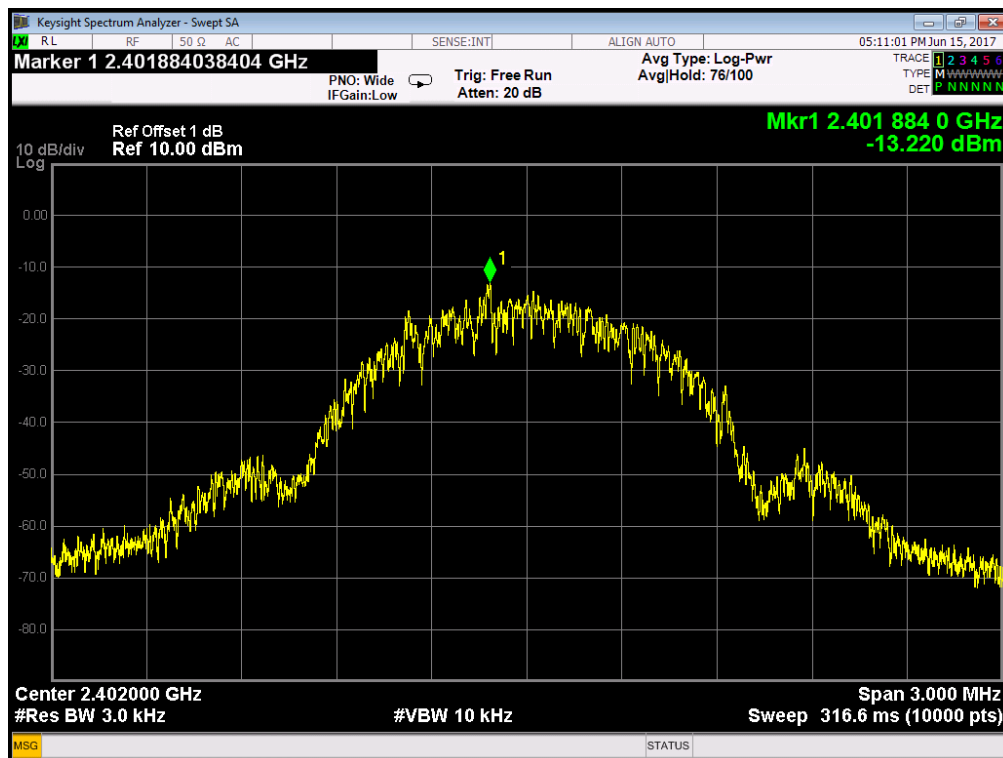
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generatorl.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range
3. According to KDB 558074 D01 DTS Meas Guidance v03, set the RBW = 3 kHz, VBW = 10 kHz, Set the span to 1.5 times the DTS channel bandwidth.
4. Use the peak marker function to determine the maximum power level in any 3 kHz band segment within the fundamental EBW

5.5. Test Result

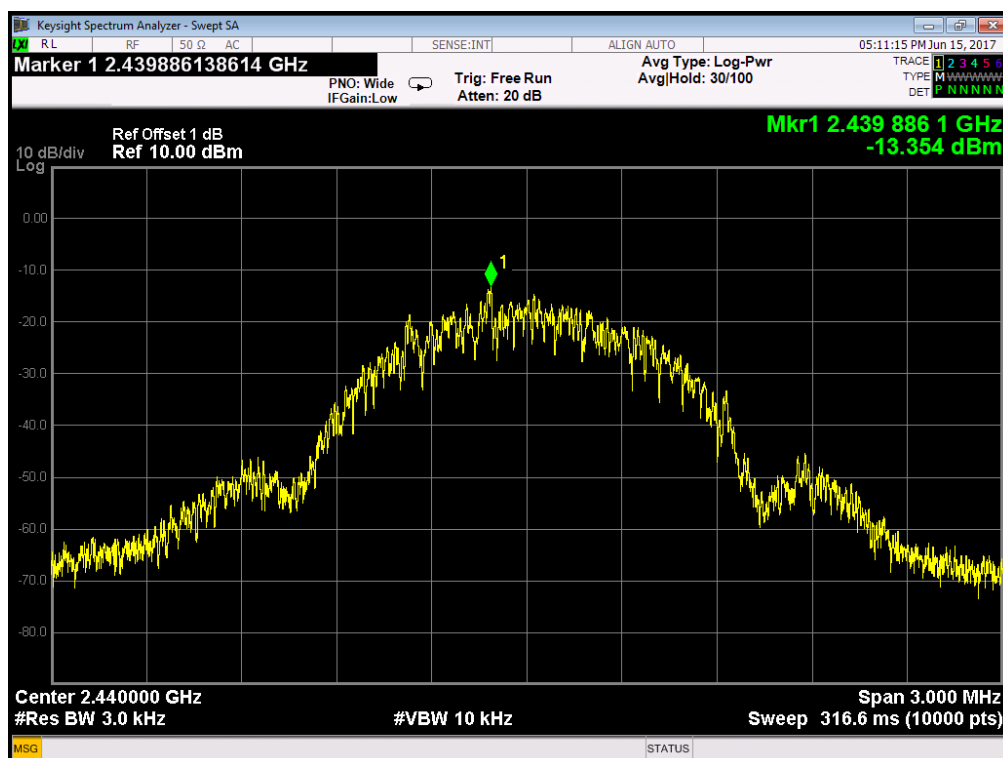
EUT Set Mode	CH or Frequency	Result	Limit: <dBm/3KHz	Conclusion
BLE	CH0	-13.22	8	PASS
	CH19	-13.35	8	PASS
	CH39	-13.13	8	PASS

5.6. Original test data

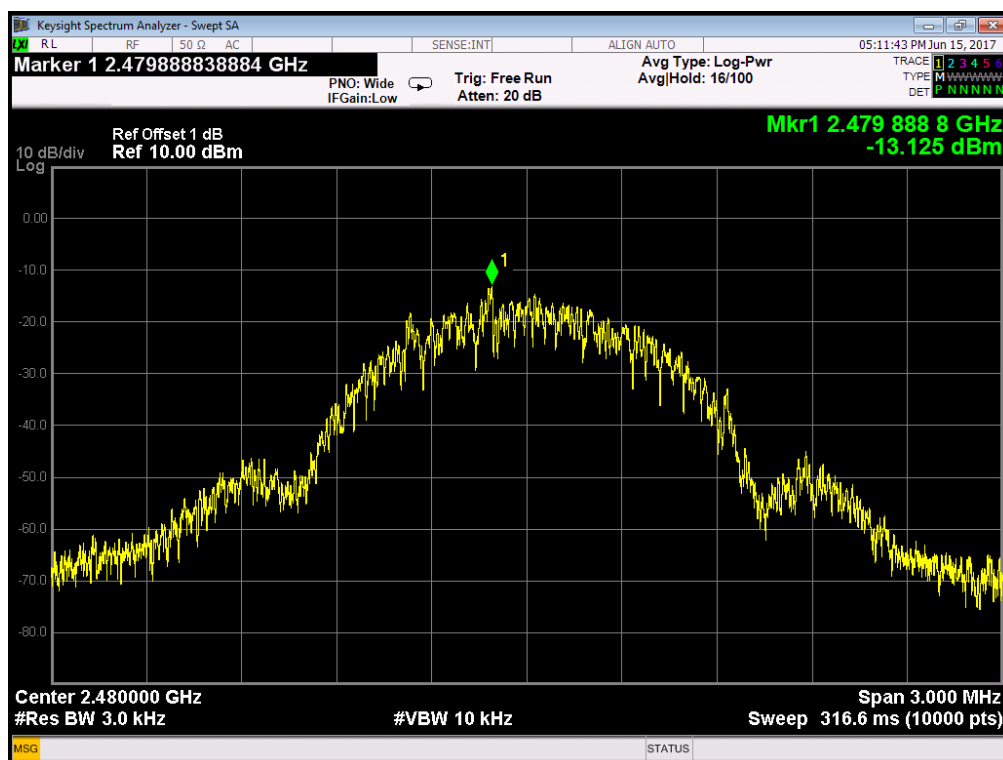
CH0



CH19



CH39



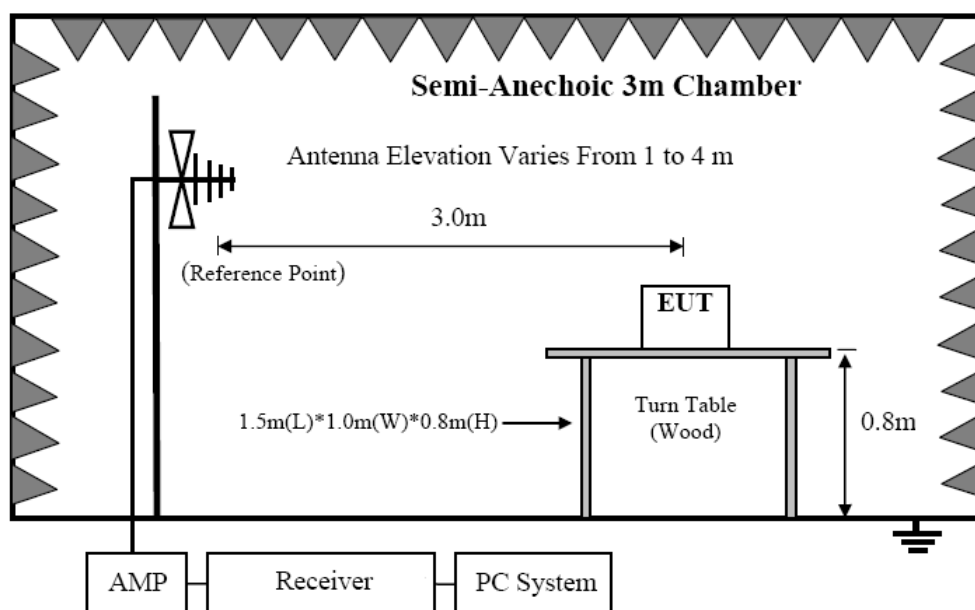
6. Spurious Emissions

6.1. Test equipment

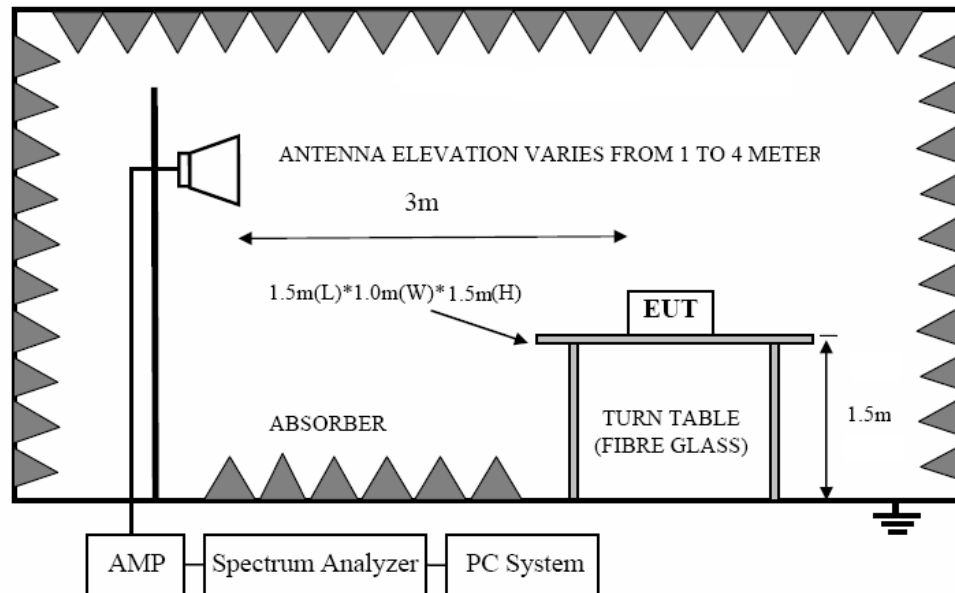
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
1	EMI Test Receiver	R&S	ESU8	100316	2017/12/18	1 Year
2	Spectrum analyzer	R&S	FSU	1166.1660.26	2017/12/18	1 Year
3	Loop antenna	TESEQ	HLA6120	20129	2017/12/18	1 Year
4	Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	2017/12/18	1 Year
5	Double Ridged Horn Antenna	Schwarzbeck	BBHA9120D	9120D 1065	2017/12/18	1 Year
6	Horn Antenna	Schwarzbeck	BBHA 9170	9170 1248	2017/12/18	1 Year
7	Pre-amplifier	A.H.	PAM-1840VH	562	2017/12/18	1 Year
8	Pre-amplifier	R&S	AFS33-18002 650-30-8P-44	SEL0080	2017/12/18	1 Year
9	Pre-Amplifier	HP	8449B	3274A06298	2017/12/18	1 Year
10	RF Cable	R&S	R01	10403	2017/12/18	1 Year
11	RF Cable	R&S	R02	10512	2017/12/18	1 Year

6.2. Block diagram of test setup

In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

6.3. Limit

6.3.1 FCC 15.205 Restricted frequency band

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)

6.3.2 FCC 15.209 Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
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	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

6.3.3 Limit for this EUT

The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10:2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

6.4. TEST PROCEDURE

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Setup EUT and assistant system according clause 2.4 and 8.2
- (3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
 - (a) Change work frequency or channel of device if practicable.
 - (b) Change modulation type of device if practicable.
 - (c) Change power supply range from 85% to 115% of the rated supply voltage
 - (d) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
- (4) Spectrum frequency from 9MHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9KHz to 30MHz and 18GHz to 25GHz, so below final test was performed with frequency range from 30MHz to 18GHz.
- (5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.
- (6) For emissions from 30MHz to 1GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 KHz.
- (7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure, Detector is at PK; RBW is set at 1MHz, VBW is set at 3MHz for Average measure, Detector is at RMS.

6.5. Test result

Below 30M

EUT:	Speaker with bluetooth	Model No.:	Crasher Micro
Temperature:	24°C	Relative Humidity:	55%
Distance:	3m	Test Power:	3.7V by inside the battery
Polarization:	--	Test Result:	Pass
Test Mode:	Keeping TX mode	Test By:	Smile

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

Note:

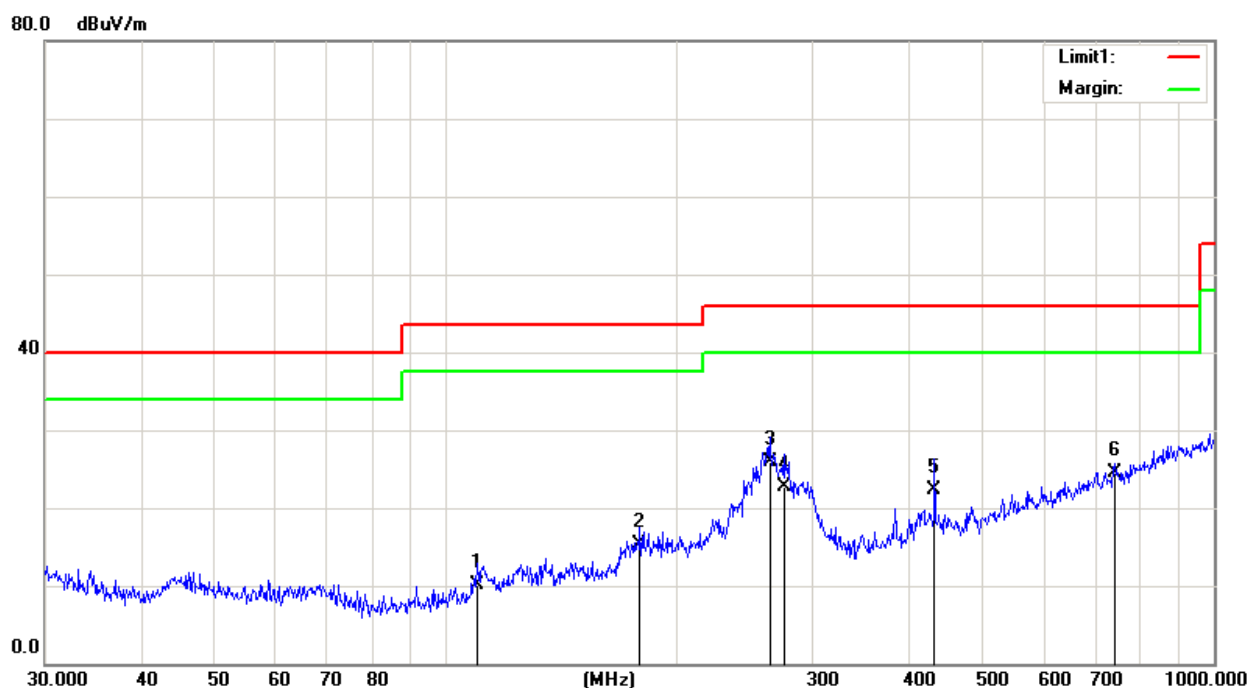
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $20 \log (\text{specific distance}/\text{test distance})$ (dB);

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

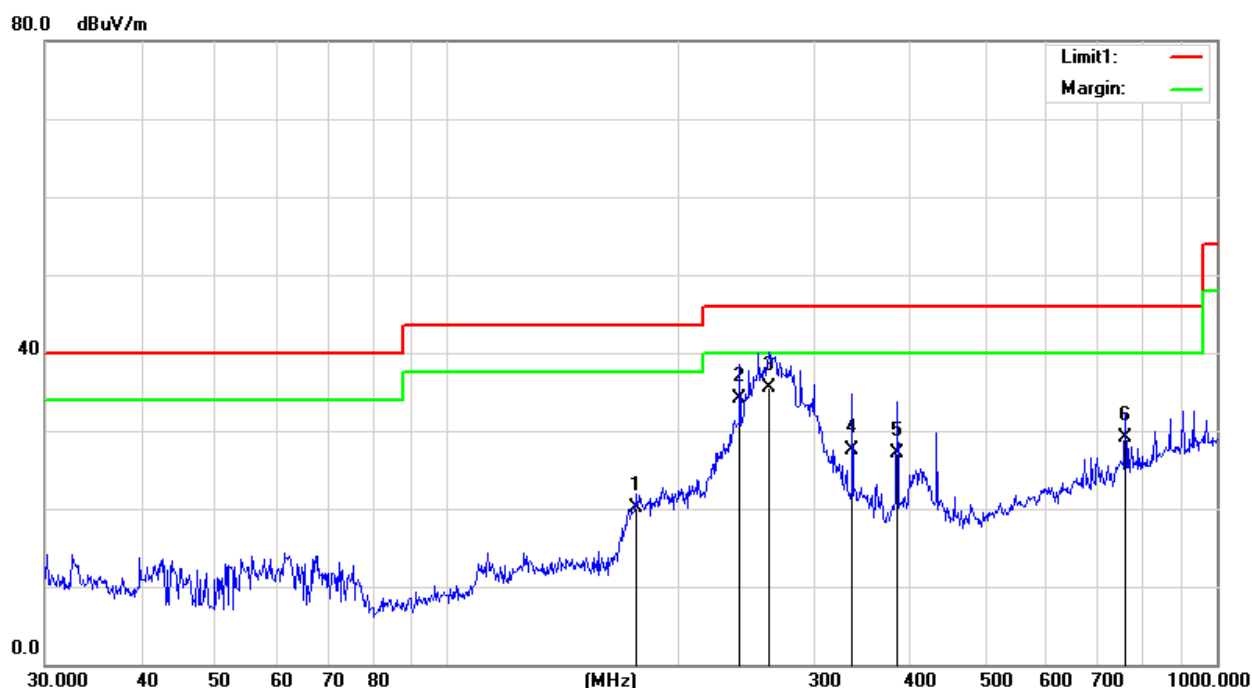
Between 30M – 1000 MHz

EUT:	Speaker with bluetooth	Model No.:	Crasher Micro
Temperature:	24	Relative Humidity:	55%
Distance:	3m	Test Power:	3.7V by inside the battery
Polarization:	Vertical	Test Result:	Pass
Standard:	(RE)FCC PART 15 class B 3m	Test By:	Smile
Test Mode:	Keeping TX Mdoe		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	109.7960	25.03	-14.94	10.09	43.50	-33.41	QP
2	178.7584	27.69	-12.40	15.29	43.50	-28.21	QP
3	263.8190	34.64	-8.71	25.93	46.00	-20.07	QP
4	275.1569	32.71	-9.92	22.79	46.00	-23.21	QP
5	432.5457	30.96	-8.64	22.32	46.00	-23.68	QP
6	742.2586	26.08	-1.66	24.42	46.00	-21.58	QP

EUT:	Speaker with bluetooth	Model No.:	Crasher Micro
Temperature:	24	Relative Humidity:	55%
Distance:	3m	Test Power:	3.7V by inside the battery
Polarization:	Horizontal	Test Result:	Pass
Standard:	(RE)FCC PART 15 class B 3m	Test By:	Smile
Test Mode:	Keeping TX Mdoe		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	175.6516	30.36	-10.23	20.13	43.50	-23.37	QP
2	239.9874	40.69	-6.68	34.01	46.00	-11.99	QP
3	261.9753	41.05	-5.48	35.57	46.00	-10.43	QP
4	336.0350	37.25	-9.75	27.50	46.00	-18.50	QP
5	383.9318	35.05	-7.95	27.10	46.00	-18.90	QP
6	760.7036	30.36	-1.28	29.08	46.00	-16.92	QP

Between 1000M – 25000 MHz

Test Site	: 3m Chamber		
EUT	: Speaker with bluetooth	Tested By	: Smile
Power Supply	: 3.7V by inside the battery	Model Number	: Crasher Micro
Condition	: Temp:24.5'C,Humi:55%, Press:100.1kPa	Test Mode	: Tx mode
Memo	: BLE	Antenna/Distance	: VULB 9163 /3m

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	FCC 15.247	
(MHz)	Reading (dBμV)	PK/QP/AV	Polar (H/V)	Factor (dB)	(dB)	(dB)	(dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low Channel (2402)									
4804	41.54	PK	H	32.3	5.91	31.78	47.97	74	-26.03
4804	32.05	AV	H	32.3	5.91	31.78	38.48	54	-15.52
4804	42.16	PK	V	32.3	5.91	31.78	48.59	74	-25.41
4804	33.48	AV	V	32.3	5.91	31.78	39.91	54	-14.09
7206	42.06	PK	H	36.3	6.34	30.97	53.73	74	-20.27
7206	33.41	AV	H	36.3	6.34	30.97	45.08	54	-8.92
7206	41.97	PK	V	36.3	6.34	30.97	53.64	74	-20.36
7206	33.64	AV	V	36.3	6.34	30.97	45.31	54	-8.69
9608	41.32	PK	H	37.9	8.01	30.86	56.37	74	-17.63
9608	31.55	AV	H	37.9	8.01	30.86	46.60	54	-7.40
9608	41.97	PK	V	37.9	8.01	30.86	57.02	74	-16.98
9608	32.36	AV	V	37.9	8.01	30.86	47.41	54	-6.59
Middle Channel(2440)									
4880	42.75	PK	H	32.6	6.34	31.78	49.91	74	-24.09
4880	33.34	AV	H	32.6	6.34	31.78	40.50	54	-13.50
4880	42.01	PK	V	32.6	6.34	31.78	49.17	74	-24.83
4880	31.58	AV	V	32.6	6.34	31.78	38.74	54	-15.26
7320	40.03	PK	H	36.7	6.72	30.97	52.48	74	-21.52
7320	31.39	AV	H	36.7	6.72	30.97	43.84	54	-10.16
7320	41.52	PK	V	36.7	6.72	30.97	53.97	74	-20.03
7320	31.71	AV	V	36.7	6.72	30.97	44.16	54	-9.84
9760	41.33	PK	H	38.2	8.43	30.86	57.10	74	-16.90
9760	32.54	AV	H	38.2	8.43	30.86	48.31	54	-5.69
9760	39.64	PK	V	38.2	8.43	30.86	55.41	74	-18.59
9760	30.18	AV	V	38.2	8.43	30.86	45.95	54	-8.05

High Channel(2480)									
4960	53.36	PK	H	32.8	6.39	31.78	50.77	74	-23.23
4960	35.22	AV	H	32.8	6.39	31.78	42.63	54	-11.37
4960	45.17	PK	V	32.8	6.39	31.78	52.58	74	-21.42
4960	36.55	AV	V	32.8	6.39	31.78	43.96	54	-10.04
7440	41.87	PK	H	36.8	6.77	30.97	54.47	74	-19.53
7440	33.06	AV	H	36.8	6.77	30.97	45.66	54	-8.34
7440	42.15	PK	V	36.8	6.77	30.97	54.75	74	-19.25
7440	33.09	AV	V	36.8	6.77	30.97	45.69	54	-8.31
9920	40.88	PK	H	38.4	8.48	30.86	56.90	74	-17.10
9920	32.46	AV	H	38.4	8.48	30.86	48.48	54	-5.52
9920	41.24	PK	V	38.4	8.48	30.86	57.26	74	-16.74
9920	32.58	AV	V	38.4	8.48	30.86	58.60	54	-5.40

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss

Radiated band edge:

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	FCC 15.247	
(MHz)	Reading (dBμV)	PK/QP/AV	Polar (H/V)	Factor (dB)	(dB)	(dB)	(dBμV/m)	Limit (dBμV/m)	Margin (dB)
Lowest Channel									
2390	26.34	PK	H	27.8	3.57	0	57.82	74	-16.18
2390	17.42	AV	H	27.8	3.57	0	48.79	54	-5.21
2390	24.05	PK	V	27.8	3.57	0	55.42	74	-18.58
2390	15.87	AV	V	27.8	3.57	0	47.24	54	-6.76
2400	26.03	PK	H	28	3.57	0	57.60	74	-16.40
2400	16.14	AV	H	28	3.57	0	47.71	54	-6.29
2400	25.81	PK	V	28	3.57	0	57.38	74	-16.62
2400	15.14	AV	V	28	3.57	0	46.71	54	-7.29
Highest Channel									
2483.5	25.33	PK	H	28.7	3.72	0	57.75	74	-16.25
2483.5	14.25	AV	H	28.7	3.72	0	46.67	54	-7.33
2483.5	25.34	PK	V	28.7	3.72	0	57.76	74	-16.24
2483.5	13.12	AV	V	28.7	3.72	0	45.54	54	-8.46

Note: 1. Result Level = Read Level + Antenna Factor + Cable Loss- Amplifier Gain

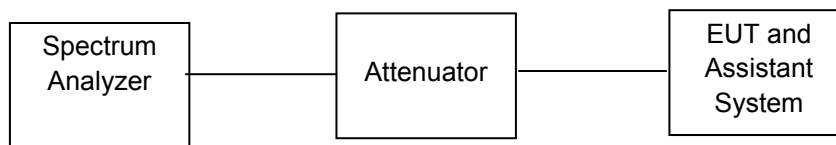
2. After test and evaluation hopping off mode and hopping on mode, will record worst case (hopping off mode) in this report.

7. 100 kHz Bandwidth of Frequency Band Edge

7.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2018/05/26	1 Year
2	Attenuator	Mini-Circuits	BW-S10W2	101109	2017/12/18	1 Year
3	RF Cable	Micable	C10-01-01-1	100309	2017/12/18	1 Year

7.2. Block diagram of test setup



7.3. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB 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 the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

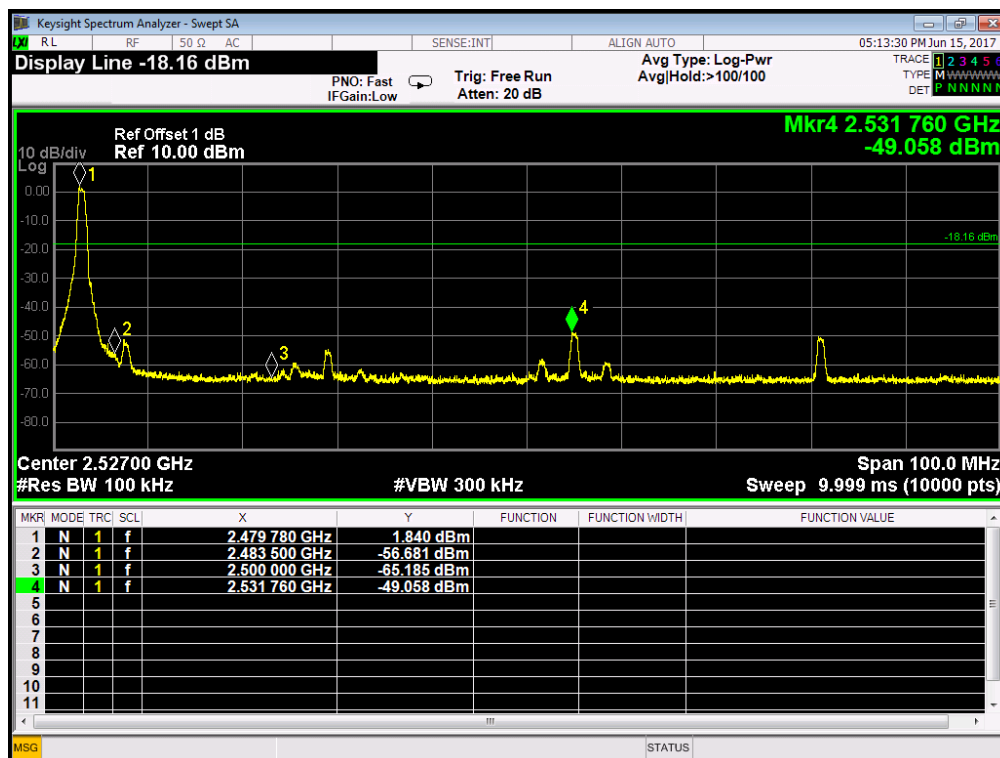
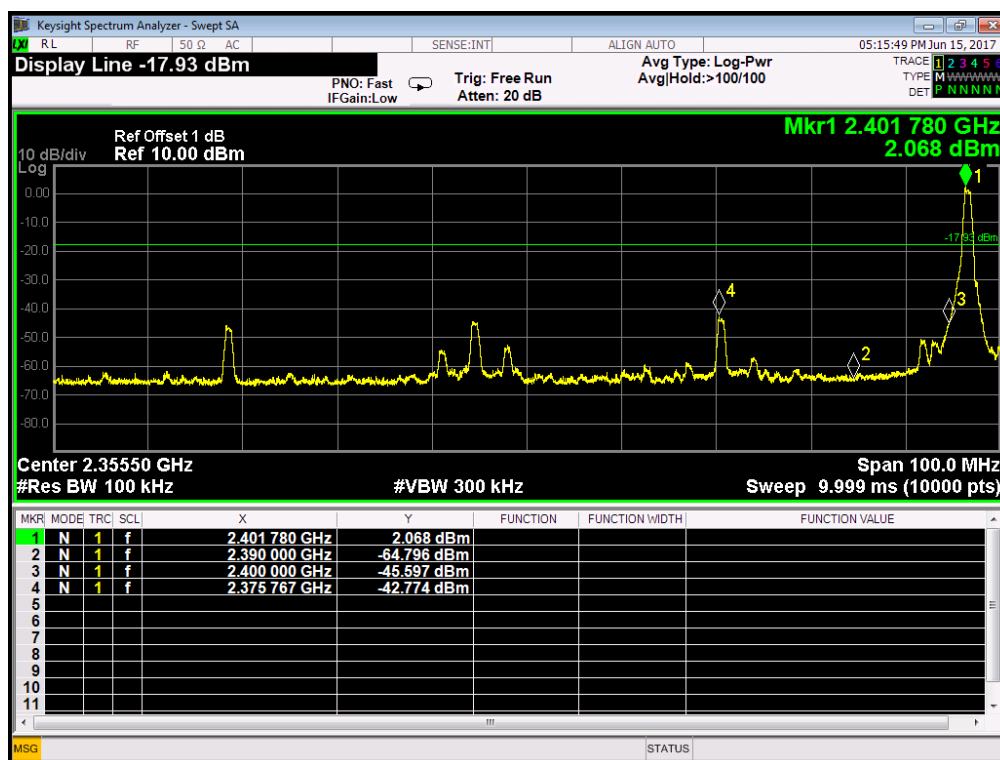
7.4. Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

7.5. Test result

Frequency Band	Delta Peak to band emission (dBc)	>Limit (dBc)	Result
BLE			
2400	47.67	20	Pass
2483.5	58.52	20	Pass

BLE

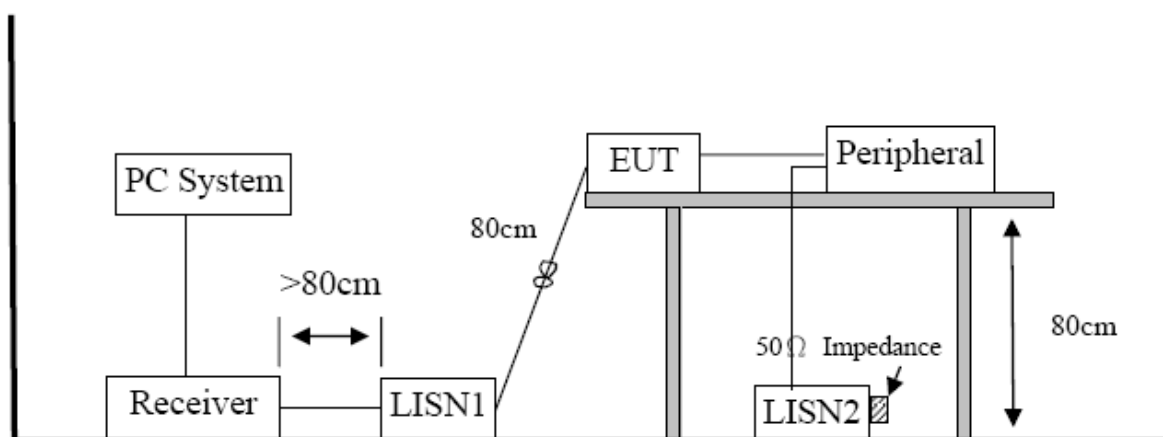


8 Power Line Conducted Emission

8.1 Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
1	Test Receiver	R&S	ESCI	101308	2017/12/18	1 Year
2	LISN 1	AFJ	LS16	16011103219	2017/12/18	1 Year
3	LISN 2	SCHWARZBECK	NSLK 8127	8127-432	2017/12/18	1 Year
4	Pulse Limiter	MTS-systemtechnik	MTS-IMP-136	261115-010-0024	2017/12/18	1 Year
5	CABLE	R&S	EA033	JHW14012068	2017/12/18	1 Year

8.2 Block diagram of test setup



8.3 Power Line Conducted Emission Limits(Class B)

Frequency	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

8.4 Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 KHz.

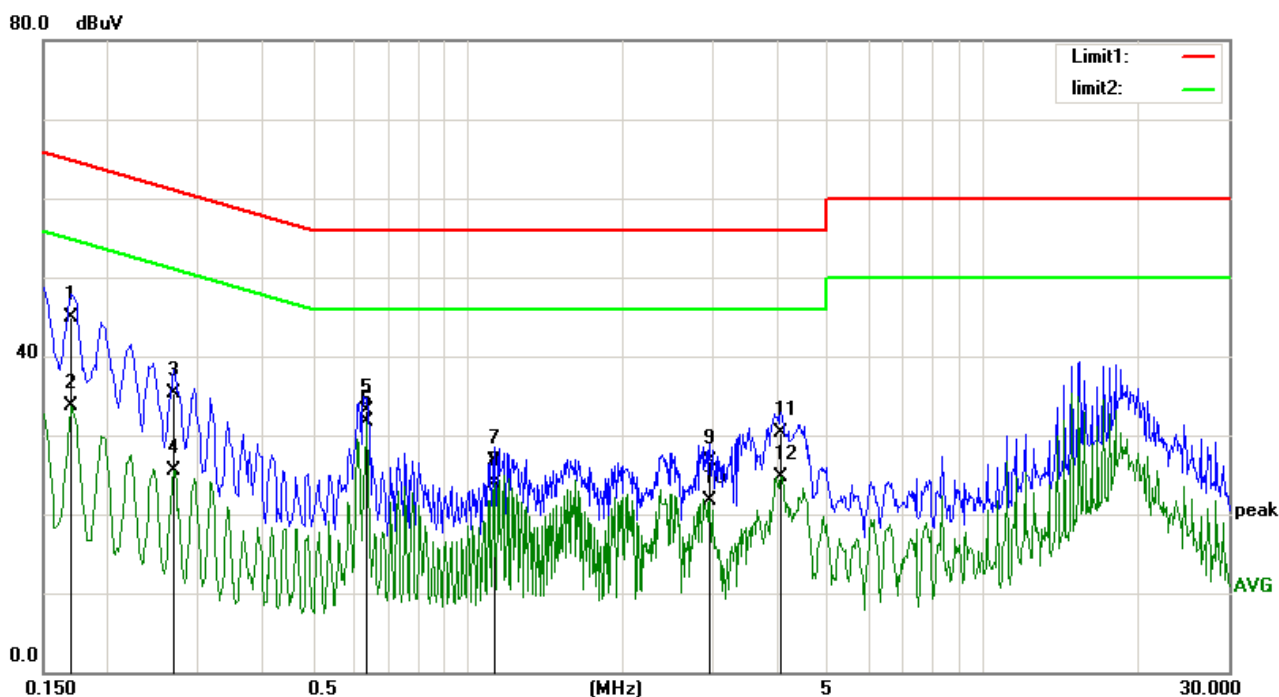
8.5 Test Result

PASS. (See below detailed test result)

Note1: All emissions not reported below are too low against the prescribed limits.

NOTE2: “----” MEANS PEAK DETECTION; “----” MANS AVERAGE DETECTION

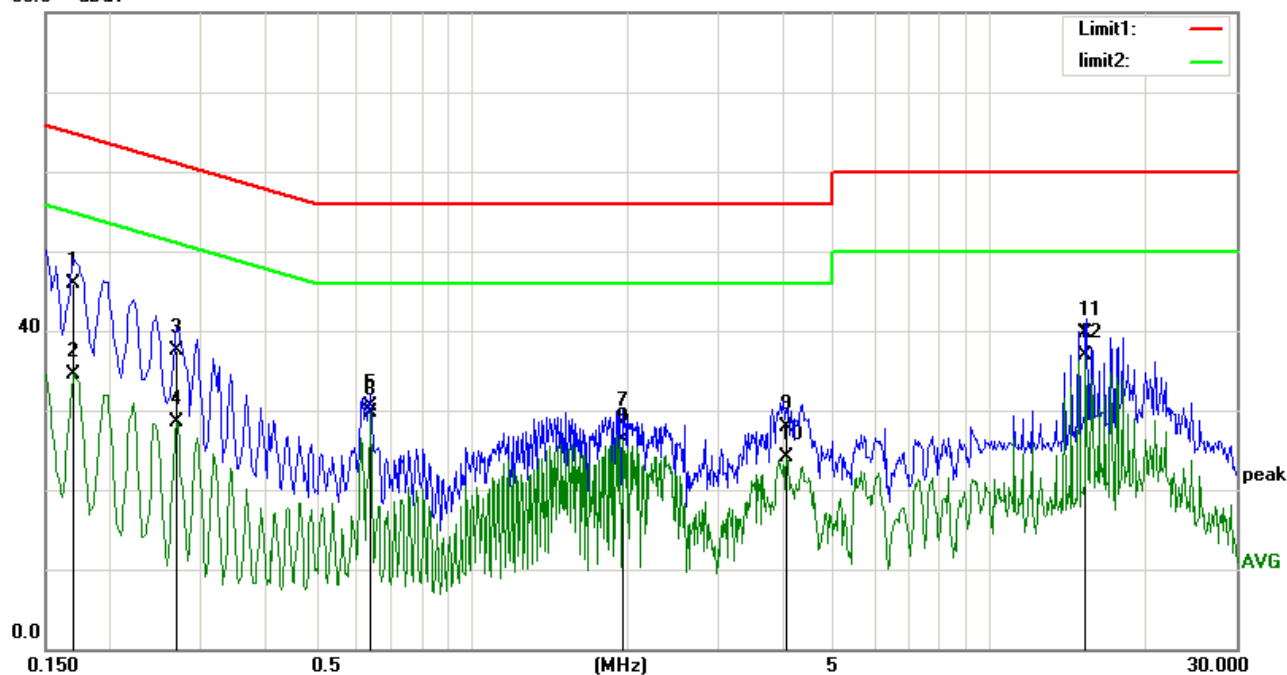
EUT:	Speaker with bluetooth	Model No.:	Crasher Micro
Temperature:	24	Relative Humidity:	55%
Probe:	N	Test Power:	AC 120V
Test Time:	2017-6-16	Test Result:	Pass
Standard:	(CE)FCC PART 15 class B_QP	Test By:	Hale
Test Mode:	TX		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1700	33.64	11.33	44.97	64.96	-19.99	QP
2	0.1700	22.37	11.33	33.70	54.96	-21.26	AVG
3	0.2700	24.71	10.64	35.35	61.12	-25.77	QP
4	0.2700	14.90	10.64	25.54	51.12	-25.58	AVG
5	0.6380	22.96	10.14	33.10	56.00	-22.90	QP
6	0.6380	21.62	10.14	31.76	46.00	-14.24	AVG
7	1.1258	16.55	10.10	26.65	56.00	-29.35	QP
8	1.1258	13.81	10.10	23.91	46.00	-22.09	AVG
9	2.9580	16.52	10.14	26.66	56.00	-29.34	QP
10	2.958	11.61	10.14	21.75	46.00	-24.25	AVG
11	4.057	20.17	10.14	30.31	56.00	-25.69	QP
12	4.057	14.55	10.14	24.69	46.00	-21.31	AVG

EUT:	Speaker with bluetooth	Model No.:	Crasher Micro
Temperature:	24	Relative Humidity:	55%
Probe:	L1	Test Power:	AC 120V
Test Time:	2017-6-16	Test Result:	Pass
Standard:	(CE)FCC PART 15 class B_QP	Test By:	Hale
Test Mode:	TX		

80.0 dBuV



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1700	34.63	11.33	45.96	64.96	-19.00	QP
2	0.1700	23.16	11.33	34.49	54.96	-20.47	AVG
3	0.2700	26.85	10.64	37.49	61.12	-23.63	QP
4	0.2700	17.81	10.64	28.45	51.12	-22.67	AVG
5	0.6380	20.36	10.14	30.50	56.00	-25.50	QP
6	0.6380	19.54	10.14	29.68	46.00	-16.32	AVG
7	1.9538	18.17	10.11	28.28	56.00	-27.72	QP
8	1.9538	16.21	10.11	26.32	46.00	-19.68	AVG
9	4.0579	17.68	10.14	27.82	56.00	-28.18	QP
10	4.057	13.91	10.14	24.05	46.00	-21.95	AVG
11	15.333	29.52	10.17	39.69	60.00	-20.31	QP
12	15.333	26.81	10.17	36.98	50.00	-13.02	AVG

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 built-in undetachable dipole 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 1dBi. The EUT has an internal antenna, the directional gain of antenna is 1 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

END OF REPORT