

FCC TEST REPORT(Bluetooth)

for

Soundcast LLC

Bluetooth Speaker

Model Number : VG3

FCC ID: SUD-VGBT03A

Prepared for : Soundcast LLC
Address : 9771 Clairemont Mesa Blvd,
Suite E San Diego, California, United States 92124

Prepared by : Keyway Testing Technology Co., Ltd.
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Report No. : TR17060135-E-001
Date of Test : Jul.3~10, 2017
Date of Report : Jul.11, 2017

Keyway Testing Technology Co., Ltd.

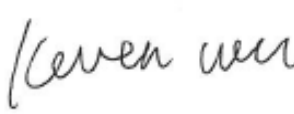


Applicant:	Soundcast LLC	
Address:	9771 Clairemont Mesa Blvd, Suite E San Diego, California, United States 92124	
Manufacturer:	Dongguan Longjoin Electronics Co. Ltd.	
Address:	Shuilang Village, Dalingshan Town, Dongguan City, Guangdong Province, PRC	
E.U.T:	Bluetooth Speaker	
Model Number:	VG3	
Trade Name:	-----	
Date of Receipt:	Jul. 3, 2017	Date of Test: Jul.3~10, 2017
Test Specification:	FCC Part 15, Subpart C Section 15.247: 2017 ANSI C63.10:2013 KDB558074 D01 DTS Meas Guidance v04 RSS-247 Issue 2,2017 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: Jul. 11, 2017	
Tested by:	Reviewed by:	Approved by:
		
Keven Wu/ Engineer	Moore Cai / 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.		

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1. TEST SUMMARY

Test Items	Test Requirement	Result
Conducted Emissions	15.207/ RSS-Gen §8.8	PASS
Radiated Emissions	15.205(a)/15.209 15.247(d) / RSS-Gen §6.13	PASS
20dB Bandwidth	15.247(a)(1) / RSS-247 §5.1(1) &RSS-Gen§6.6	PASS
99% Bandwidth	RSS-247 §5.1(1) &RSS-Gen§6.6	PASS
Frequency Separation	15.247(a)(1) / RSS-247 §5.1(2)	PASS
Maximum Peak Output Power	15.247(b)(1) / RSS-247§5.4(2) &RSS-Gen§6.12	PASS
Number of Hopping Frequency	15.247(a)(1)(iii) / RSS-247 §5.1(4)	PASS
Dwell time	15.247(a)(1)(iii) / RSS-247 §5.1(4)	PASS
Emissions from out of band	15.247(d) / RSS-247 §5.5	PASS
Antenna Requirement	15.203/ 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.:	VG3
Operation Frequency:	2402MHz ~2480MHz
Channel numbers:	79 Channels
Channel spacing	1MHz
Modulation technology:	BT BR(1Mbps): GFSK BT EDR(2Mbps): $\pi/4$ -DQPSK BT EDR(3Mbps): 8-DPSK
Bit Rate of Transmitter	1Mbps/2Mbps/3Mbps
Antenna Type:	PCB Antenna
Antenna gain:	1.0dBi
Power supply:	DC 5V/2A from adapter, DC 3.65V from battery(5700mAh/20.805Wh)

2.3. Difference between Model Numbers

None.

2.4. Independent Operation Modes

2.4.1. EUT work BT mode and Test mode as below:

Pretest Mode	Description
Mode 1	CH00
Mode 2	CH39
Mode 3	CH78
Mode 4	Link Mode

2.5. Test Supporting System

N/A.

2.6. Product Version

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

Note: SW means software, HW means hardware.

2.7. Test Facilities

Lab Qualifications : 944 Shielded Room built by ETS-Lindgren, USA
Date of completion: March 28, 2011

966 Chamber built by ETS-Lindgren, USA
Date of completion: March 28, 2011

Certificated by TUV Rheinland, Germany.
Registration No.: UA 50207153
Date of registration: July 13, 2011

Certificated by UL, USA
Registration No.: 100567-237
Date of registration: September 1, 2011

Certificated by Intertek
Registration No.: 2011-RTL-L1-31
Date of registration: October 11, 2011

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

Name of Firm : Keyway Testing Technology Co., Ltd.

Site Location : Building 1, Baishun Industrial Zone, Zhangmutou
Town, Dongguan, Guangdong, China

2.8. List of Test and Measurement Instruments

2.8.1. For conducted emission at the mains terminals test

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

2.8.2. For radiated emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 08,17	Apr. 08,18
Bilog Antenna	ETS-LINDGREEN	3142D	135452	Apr. 12,17	Apr. 12,18
Spectrum Analyzer	Agilent	E4411B	MY4511304	Apr. 08,17	Apr. 08,18
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	Apr. 09,17	Apr. 09,18
Signal Amplifier	SONOMA	310	187016	Apr. 08,17	Apr. 08,18
Signal Amplifier	Agilent	8449B	3008A00251	Apr. 08,17	Apr. 08,18
RF Cable	IMRO	IMRO-400	966 Cable 1#	N/A	N/A
MULTI-DEVICE Controller	ETS-LINDGREEN	2090	126913	N/A	N/A
Horn Antenna	SCHWARZBECK	BBHA9170	9170-068	Apr. 12,17	Apr. 12,18
Spectrum Analyzer	Agilent	E4408B	MY44211125	Apr. 08,17	Apr. 08,18
High Pass filter	Micro	HPM50111	324216	Apr. 08,17	Apr. 08,18
Constant temperature and humidity box	GF	GTH-800-40-1P	MAA9906-005	Apr. 08,17	Apr. 08,18
Attenuation	MCE	24-10-34	BN9258	Apr. 08,17	Apr. 08,18
Loop Antenna	ARA	PLA-1030/B	1029	Apr. 08,17	Apr. 08,18

3. TEST SET-UP AND OPERATION MODES

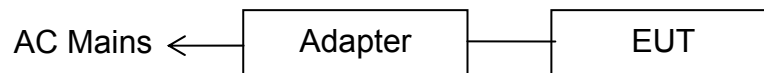
3.1. Principle of Configuration Selection

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

3.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators

Conducted Emission:



Radiated Emission:



(EUT: Bluetooth Speaker)

3.3. Test Operation Mode and Test Software

Final Test Mode	Description
Mode 1	CH00
Mode 2	CH39
Mode 3	CH78
Mode 4	BT Link
Test Software	BlueTest 3

3.4. Special Accessories and Auxiliary Equipment

Adapter:

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

3.5. Test Environment:

Ambient conditions in the test laboratory:

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

4. MAXIMUM PEAK OUTPUT POWER

4.1. Limits

FCC: For frequency hopping systems operating in the 2400-2483.5 MHz, frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

IC: RSS-247§5.4(2)

For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W if the hopset uses less than 75 hopping channels. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

4.2. Test Procedure

For Peak power

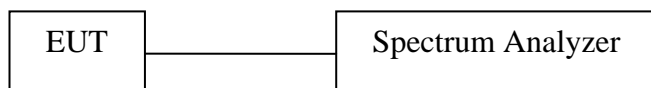
- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below
- b. Spectrum Setting : RBW > the 20 dB bandwidth of the emission being measured
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

For AV power

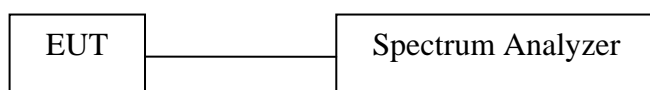
- a. The Transmitter output (antenna port) was connected to the power meter.
- b. Turn on the EUT and power meter and then record the power value.
Repeat above procedures on all channels needed to be tested.

4.3. Test Setup

Peak power:



AV power:

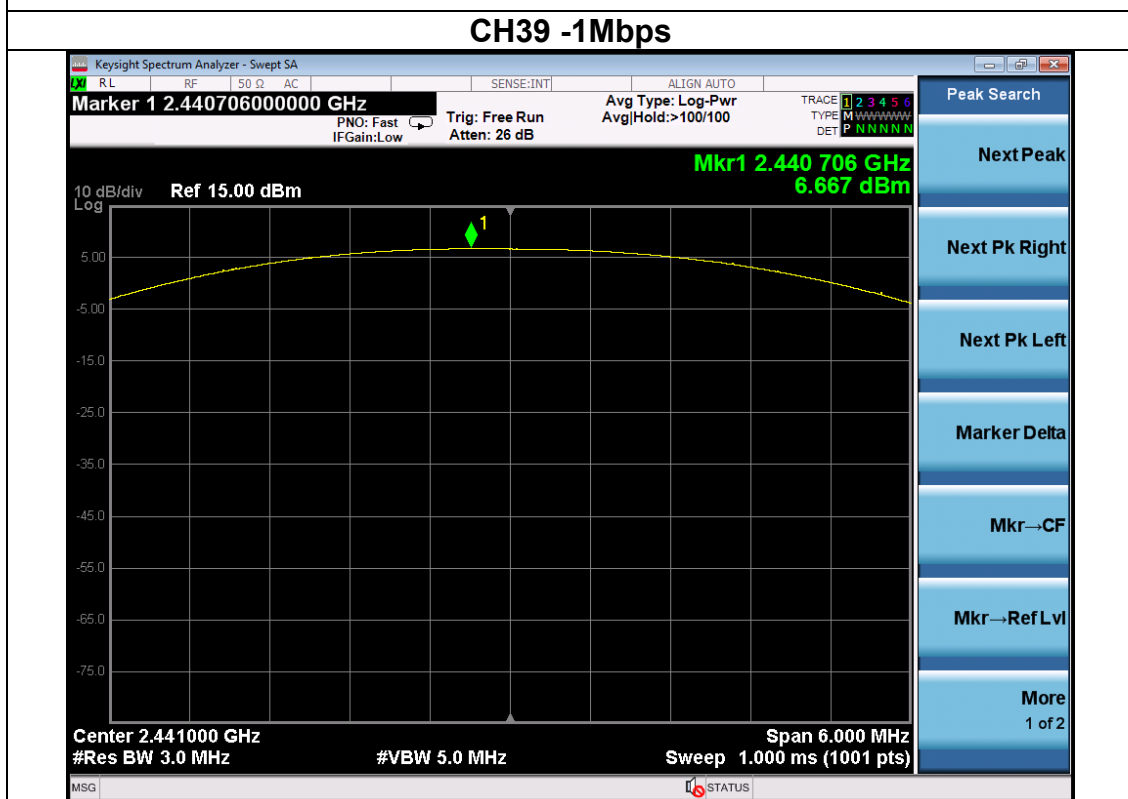
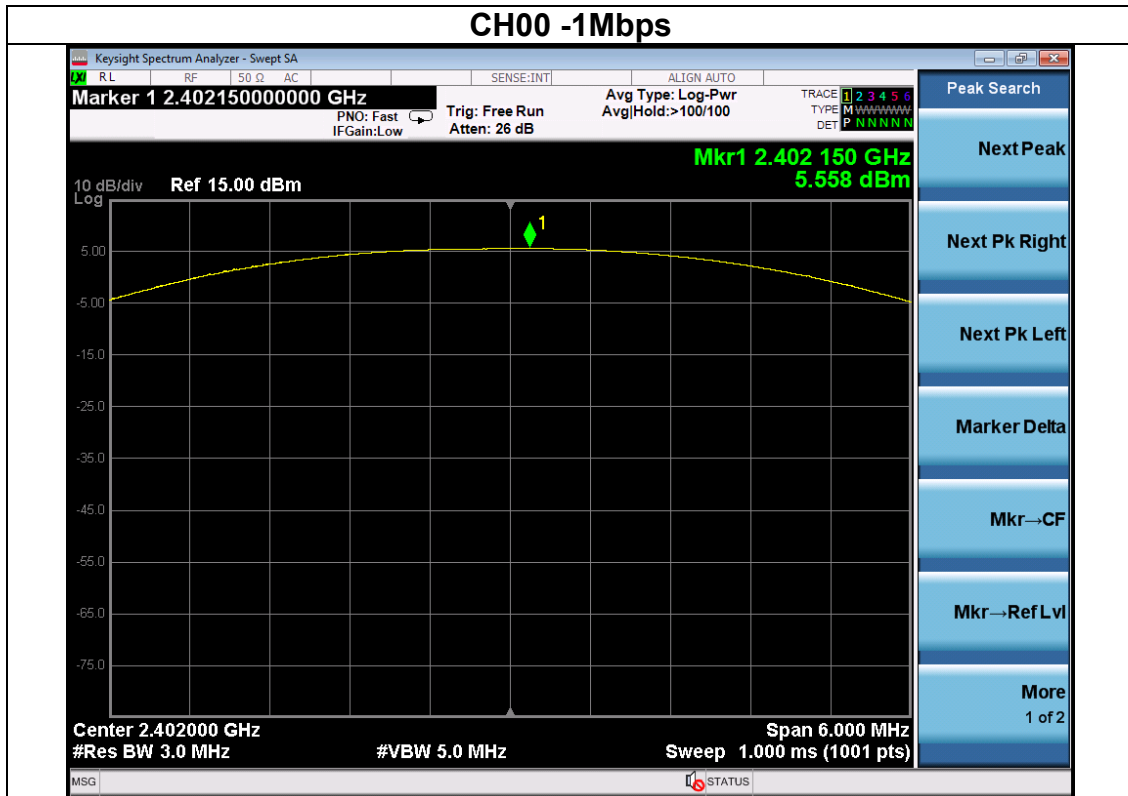


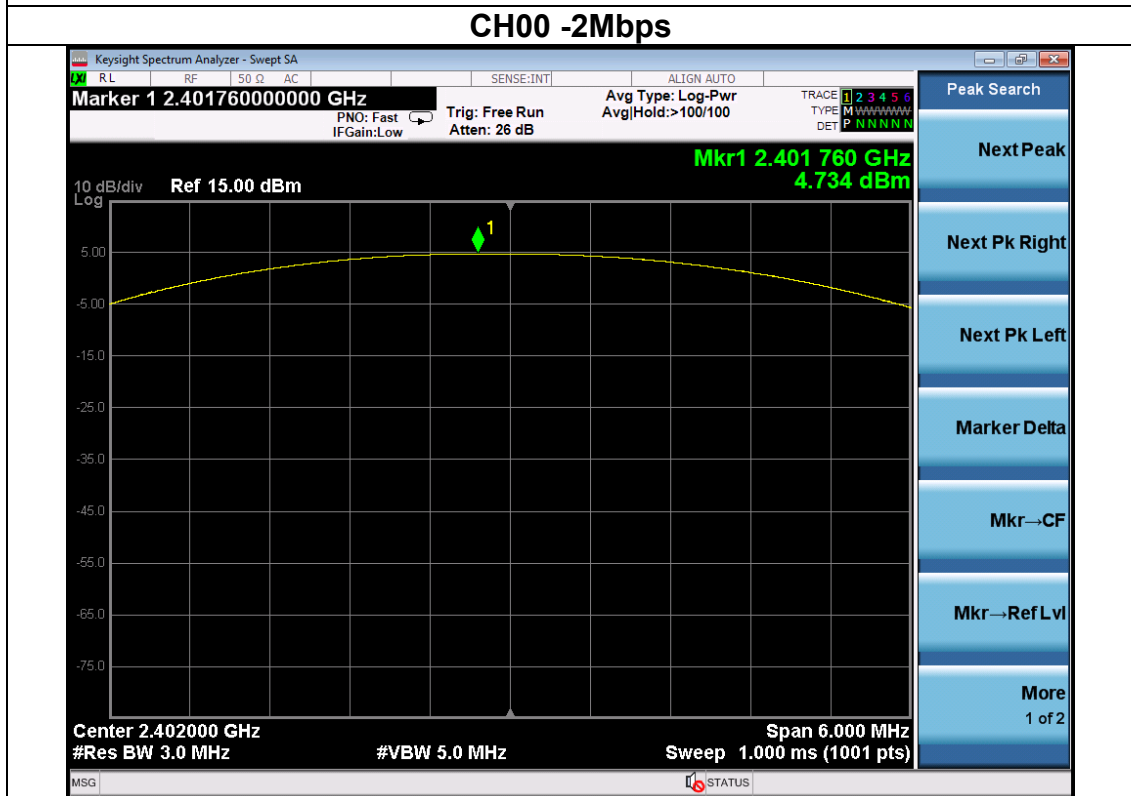
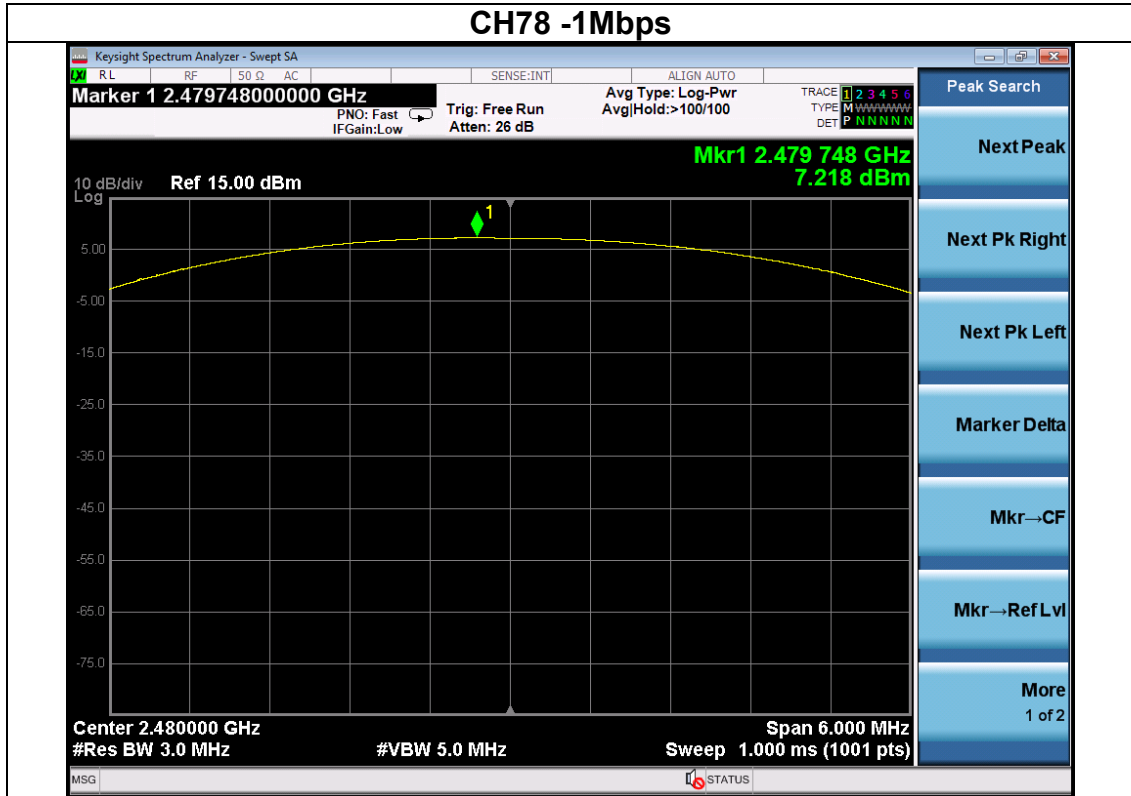
4.4. Test Results

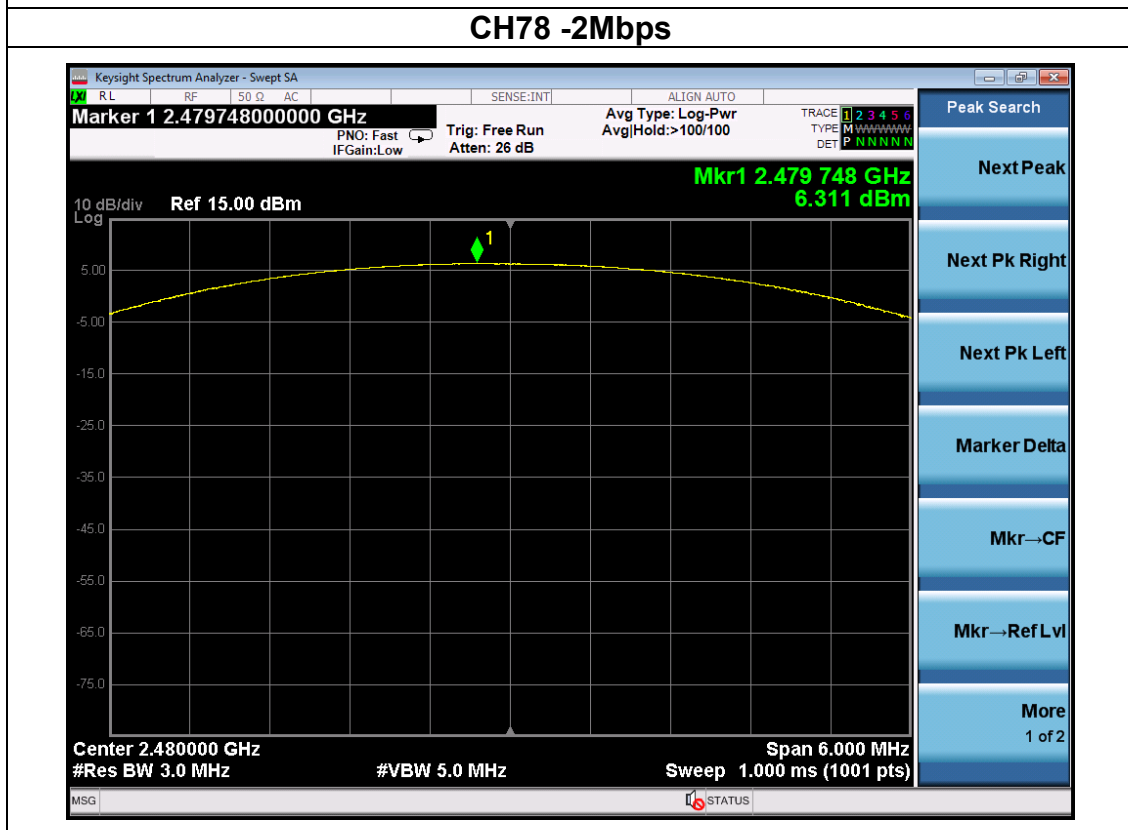
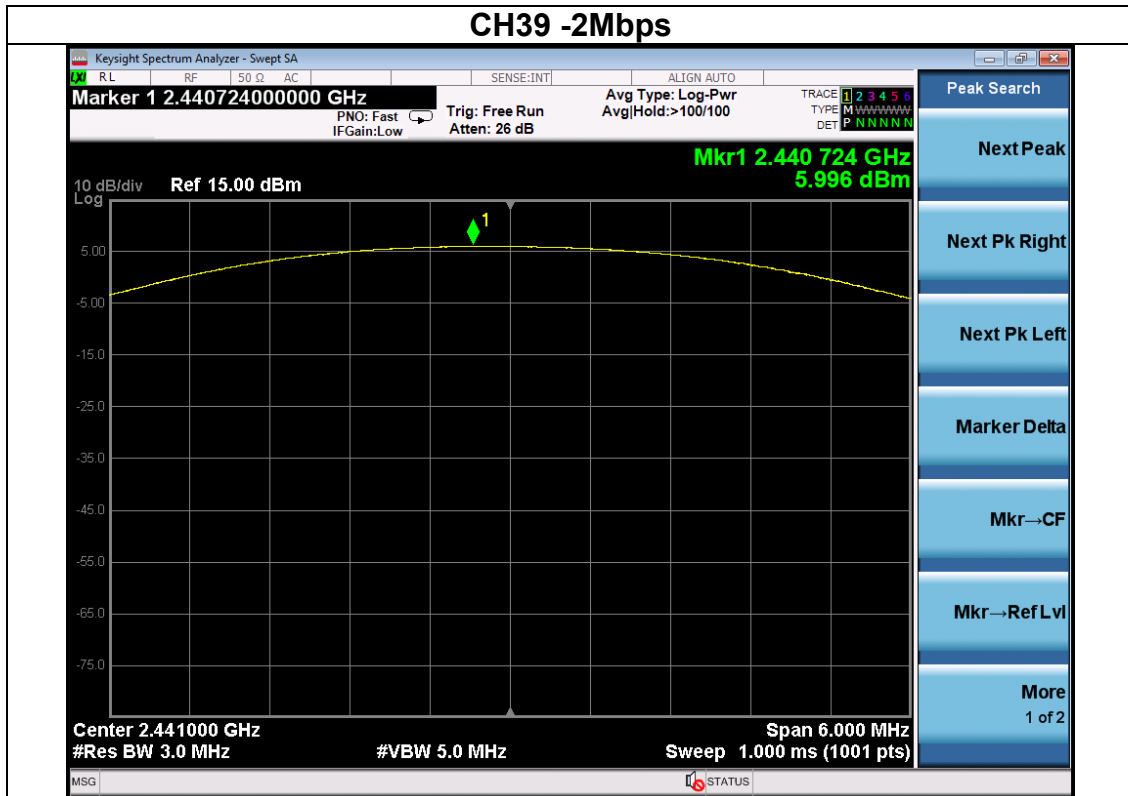
Test data:

	Channel Frequency (MHz)	Peak Output Power dBm	Limit dBm	AV Output Power dBm	EIRP dBm	Limit dBm
GFSK	2402	5.558	30	4.252	5.252	36
	2441	6.667	30	5.357	6.357	36
	2480	7.218	30	5.828	6.828	36
Pi/4DQPSK	2402	4.734	20.96	3.625	4.625	36
	2441	5.996	20.96	4.417	5.417	36
	2480	6.311	20.96	4.923	5.923	36
8-DPSK	2402	4.927	20.96	3.256	4.256	36
	2441	6.192	20.96	4.573	5.573	36
	2480	6.601	20.96	4.282	5.282	36

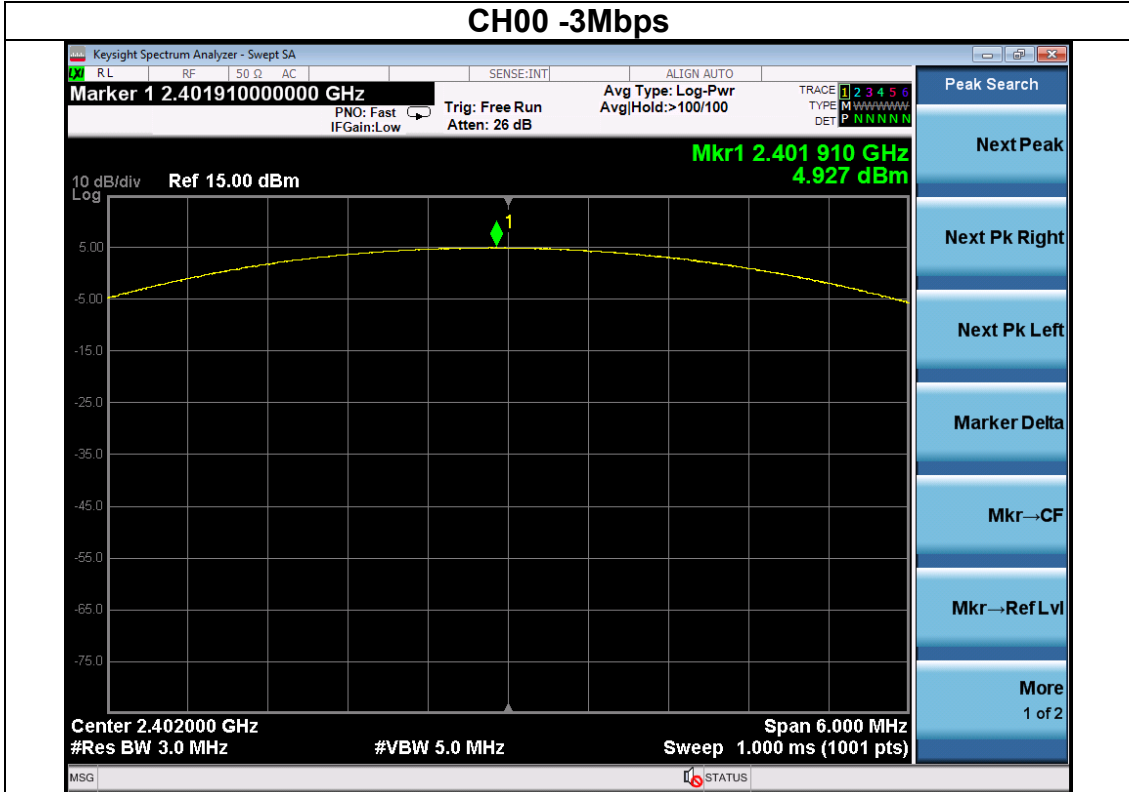
Note: EIRP(dBm)= AV Output Power+Antenna Gain



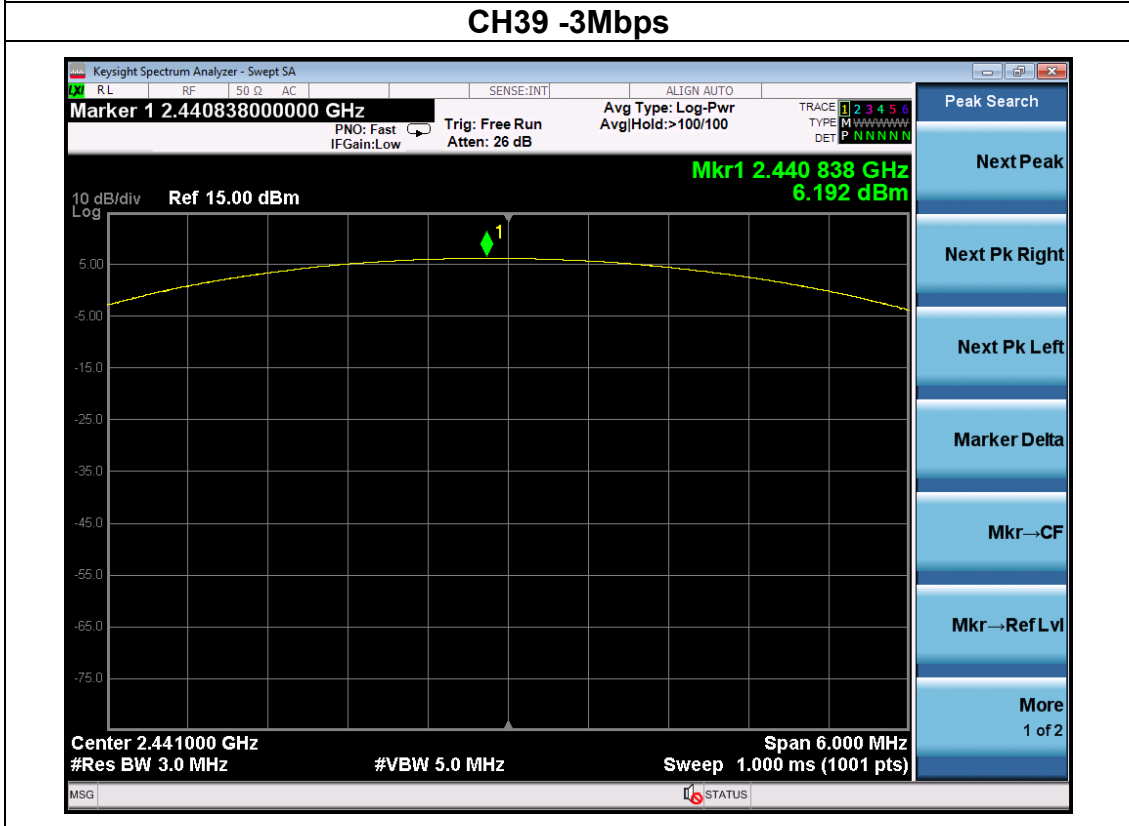


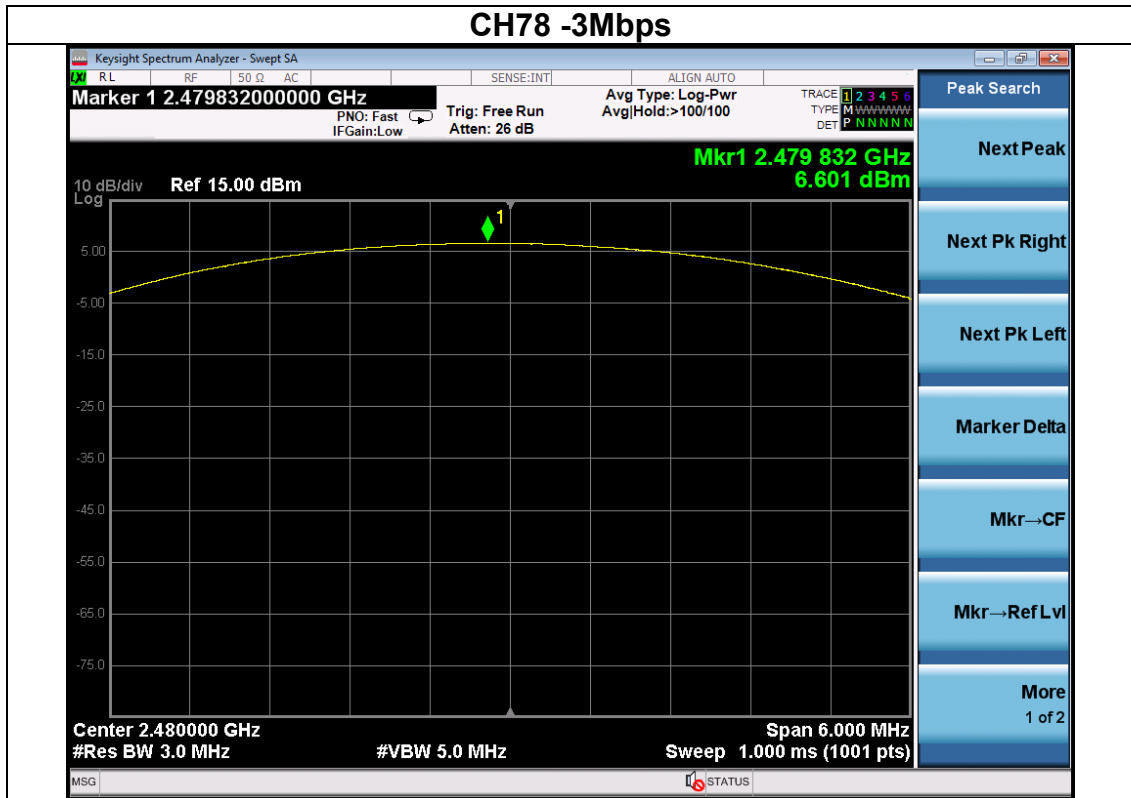


CH00 -3Mbps



CH39 -3Mbps





5. EMISSION TEST RESULTS

5.1. Conducted Emission at the Mains Terminals Test

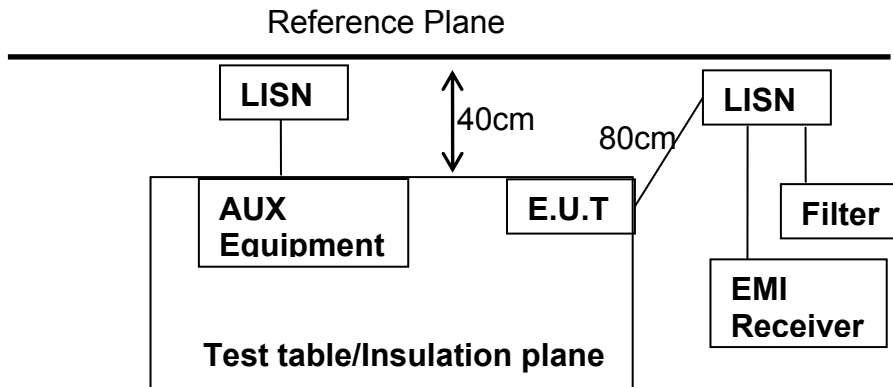
5.1.1. Limit 15.207 limits & RSS-Gen §8.8

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

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

5.1.2. Test Setup

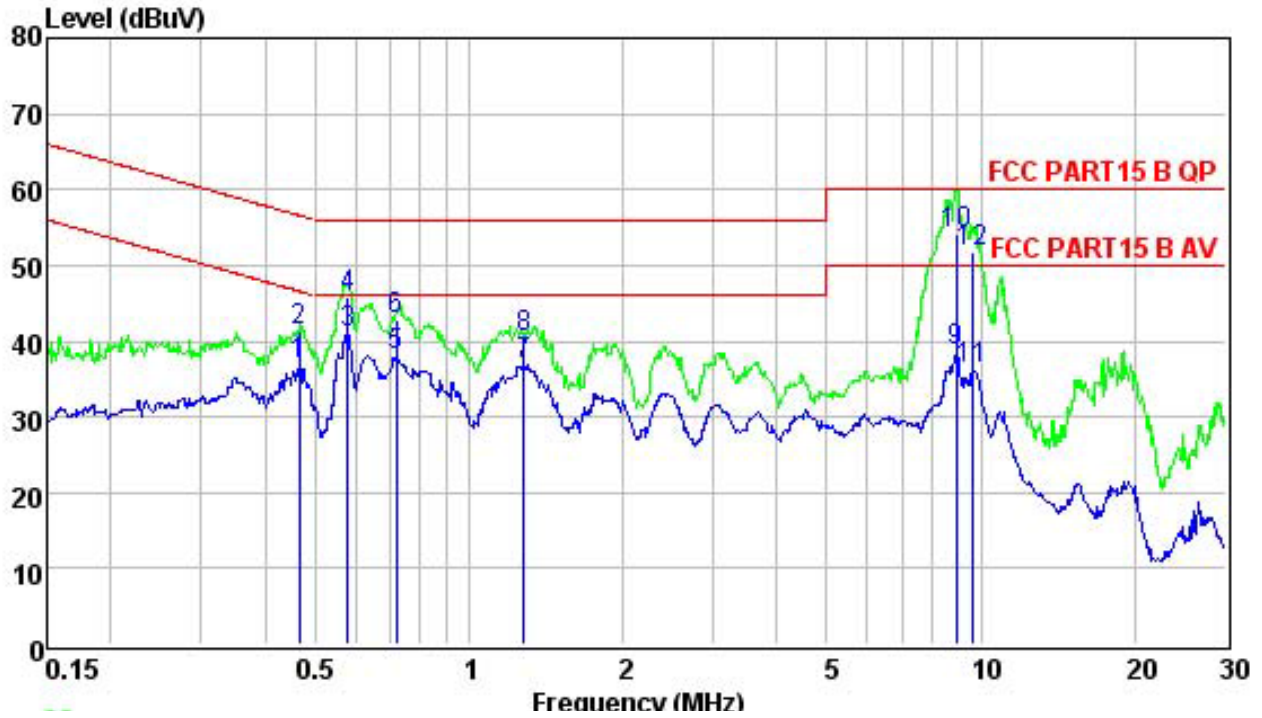
- 1.The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 0.8 m, the excess was folded back and forth parallel to the cable at the center so as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



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

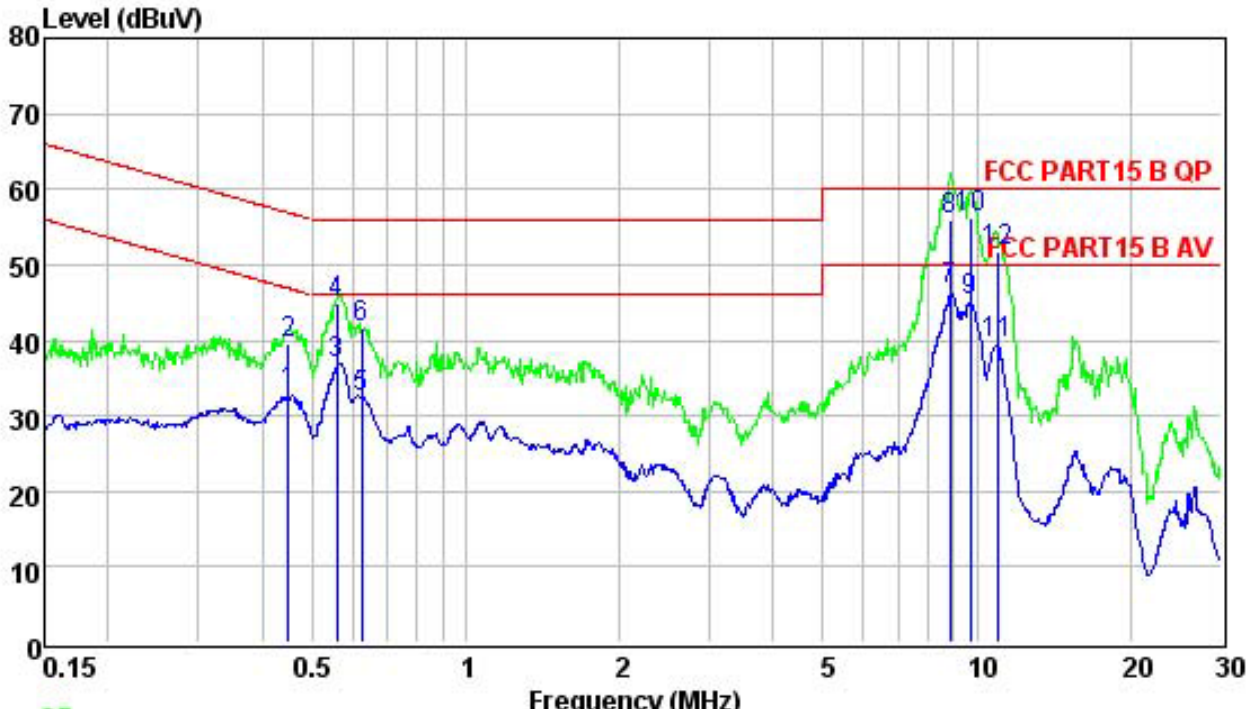
5.1.3. Test Result

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



	Freq	Level	Limit	Over	Remark
	MHz	dBuV	dBuV	dB	
1	0.466	36.98	46.58	-9.60	Average
2	0.466	41.30	56.58	-15.28	QP
3	0.579	40.91	46.00	-5.09	Average
4	0.579	45.90	56.00	-10.10	QP
5	0.720	38.09	46.00	-7.91	Average
6	0.720	42.80	56.00	-13.20	QP
7	1.282	36.92	46.00	-9.08	Average
8	1.282	40.30	56.00	-15.70	QP
9	8.964	38.58	50.00	-11.42	Average
10	8.964	54.20	60.00	-5.80	QP
11	9.654	36.27	50.00	-13.73	Average
12	9.654	51.70	60.00	-8.30	QP

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



	Freq	Level	Limit	Over	Remark
	MHz	dBuV	dBuV	dB	
1	0.449	32.98	46.89	-13.91	Average
2	0.449	39.60	56.89	-17.29	QP
3	0.561	36.87	46.00	-9.13	Average
4	0.561	44.80	56.00	-11.20	QP
5	0.627	32.45	46.00	-13.55	Average
6	0.627	41.60	56.00	-14.40	QP
7	8.869	46.60	50.00	-3.40	Average
8	8.869	55.90	60.00	-4.10	QP
9	9.705	45.28	50.00	-4.72	Average
10	9.705	56.10	60.00	-3.90	QP
11	10.963	39.55	50.00	-10.45	Average
12	10.963	51.70	60.00	-8.30	QP

5.2. Radiated Emission Test

5.2.1. Limit 15.209 limits

Frequency MHZ	Distance Meters	Filed Strengths Limit	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
30~88	3	100	40.0
88~216	3	150	43.5
216~960	3	200	46.0
960~1000	3	500	54.0
Above 1000	3	74.0dB(μV)/m(Peak) 54.0dB(μV)/m(Average)	

5.2.2. Restricted bands of operation

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

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

5.2.3. Test Setup

The EUT was placed on a turn table which was 0.8 m above the ground below 1GHz and 1.5m above 1GHz. 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, the EUT was placed on a turn table which was 1.5 m above the ground, for all test, used peak detector.

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.

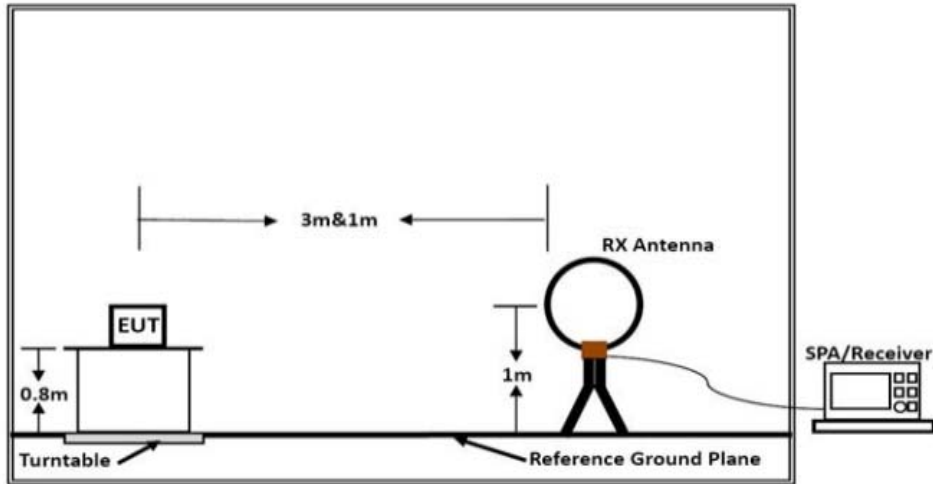
4. For emissions below 1GHz, pretest for all mode, The test data of the worst case condition(s) was reported on the following pages.

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

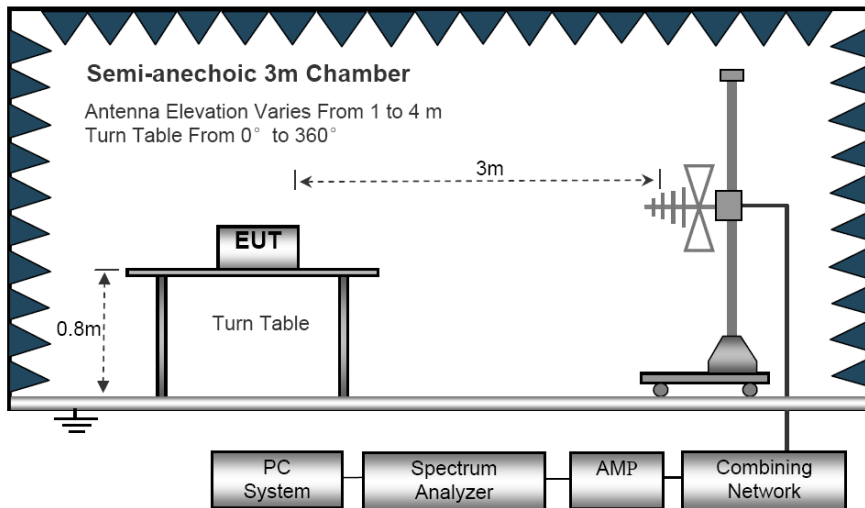
6. We pretest all modulation, The worst modulation was GFSK, the worst data was show in the report.

Radiated Emission Test-Up

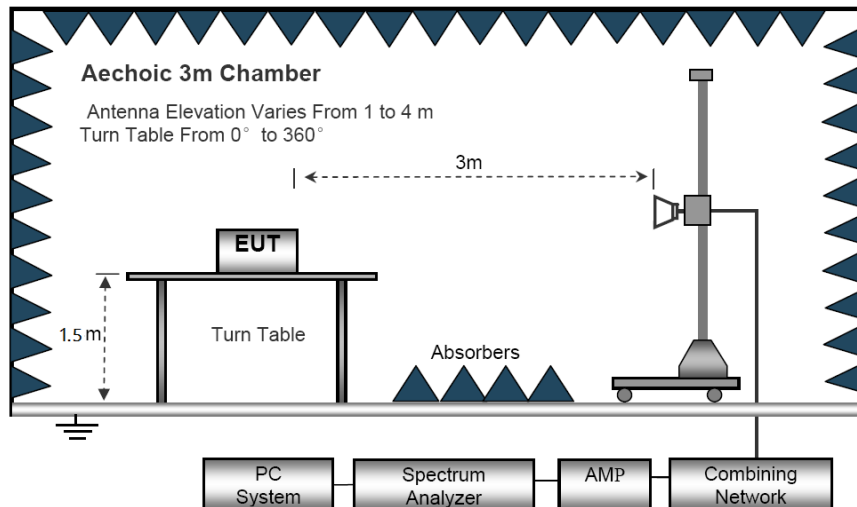
Below 30MHz



30MHz- 1GHz



Above 1GHz



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

Below 30MHz

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

Note:

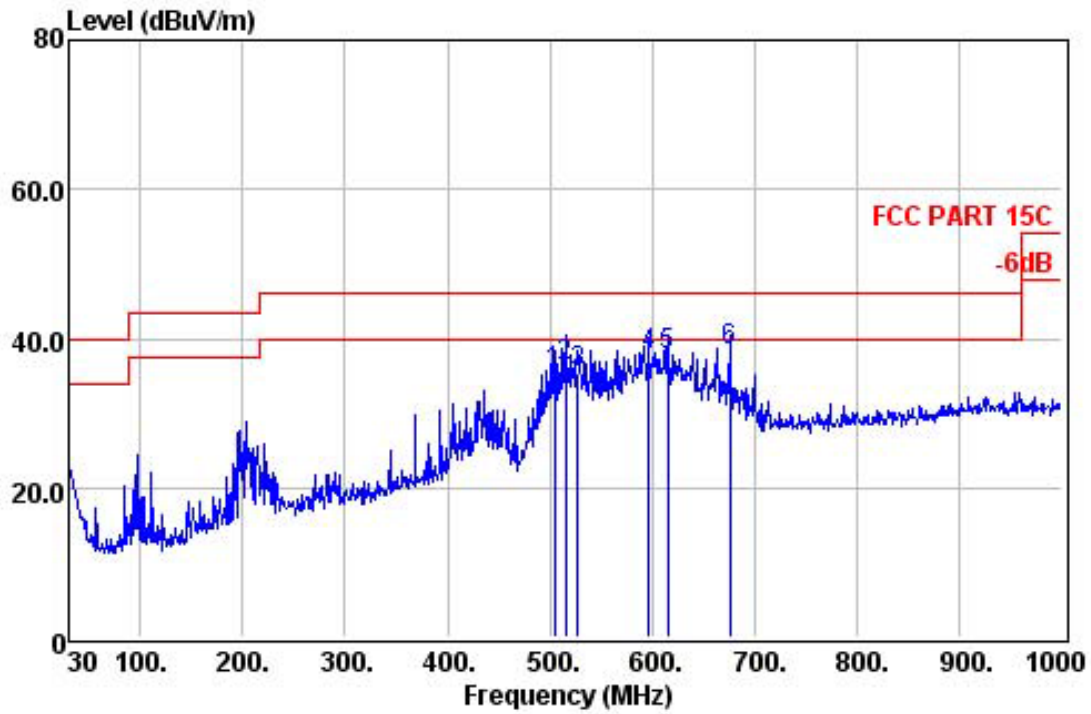
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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

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

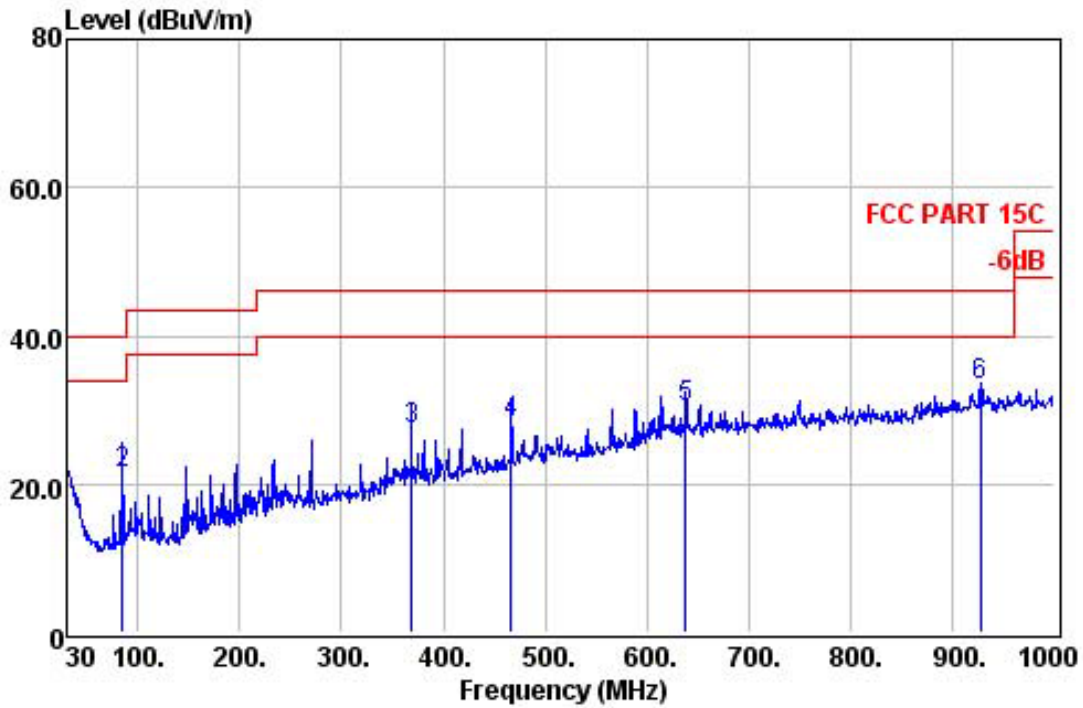
30MHz - 1GHz			
EUT:	Bluetooth Speaker	Model Name :	VG3
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Mode:	TX-GFSK-2480
Test Voltage :	DC 3.65V		

Vertical



	Read Freq	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	504.33	12.33	4.17	18.79	35.29	46.00	-10.71	QP
2	515.97	13.11	4.24	19.02	36.37	46.00	-9.63	QP
3	527.61	11.91	4.32	19.23	35.46	46.00	-10.54	QP
4	596.48	12.62	4.75	20.49	37.86	46.00	-8.14	QP
5	614.91	12.05	4.83	21.02	37.90	46.00	-8.10	QP
6	676.02	11.25	5.08	22.00	38.33	46.00	-7.67	QP

Horizontal



	Read Freq	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	30.00	-1.25	1.20	18.80	18.75	40.00	-21.25	QP
2	85.29	10.86	2.00	8.58	21.44	40.00	-18.56	QP
3	368.53	7.67	3.46	16.15	27.28	46.00	-18.72	QP
4	466.50	6.12	3.99	18.06	28.17	46.00	-17.83	QP
5	638.19	4.06	4.93	21.35	30.34	46.00	-15.66	QP
6	928.22	1.88	6.66	24.69	33.23	46.00	-12.77	QP

NOTE: 1. Absolute Level= Reading Level+Antenna Factor+Cable Loss.
 2. Over Limit= Absolute Level – Limit.
 3. GFSK (CH78 channel) is the worst mode, only worst data is presented in the report.

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

Frequency	Meter Reading	Antenna Factor	Cable loss	Preamp factor	Emission Level	Limits	Margin	Detector Type	Comment
(MHz)	(dBμV)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
TX-2402									
4804	30.17	32.94	11.94	27.49	47.56	54	-6.44	Average	Vertical
4804	40.21	32.94	11.94	27.49	57.60	74	-16.40	peak	Vertical
7206	31.35	25.28	18.04	27.94	46.73	54	-7.27	Average	Vertical
7206	42.11	25.28	18.04	27.94	57.49	74	-16.51	peak	Vertical
4804	30.21	32.94	11.94	27.49	47.60	54	-6.40	Average	Horizontal
4804	39.78	32.94	11.94	27.49	57.17	74	-16.83	peak	Horizontal
7206	29.87	25.28	18.04	27.94	45.25	54	-8.75	Average	Horizontal
7206	40.85	25.28	18.04	27.94	56.23	74	-17.77	peak	Horizontal
TX-2441									
4882	30.12	32.11	12.15	27.53	46.85	54	-7.15	Average	Vertical
4882	40.17	32.11	12.15	27.53	56.90	74	-17.10	peak	Vertical
7323	31.18	24.33	18.09	27.96	45.64	54	-8.36	Average	Vertical
7323	40.76	24.33	18.09	27.96	55.22	74	-18.78	peak	Vertical
4882	31.18	32.11	12.15	27.53	47.91	54	-6.09	Average	Horizontal
4882	40.85	32.11	12.15	27.53	57.58	74	-16.42	peak	Horizontal
7323	30.14	24.33	18.09	27.96	44.60	54	-9.40	Average	Horizontal
7323	40.26	24.33	18.09	27.96	54.72	74	-19.28	peak	Horizontal
TX-2480									
4960	30.51	31.32	12.31	27.58	46.56	54	-7.44	Average	Vertical
4960	40.28	31.32	12.31	27.58	56.33	74	-17.67	peak	Vertical
7440	30.19	24.38	18.16	27.99	44.74	54	-9.26	Average	Vertical
7440	40.62	24.38	18.16	27.99	55.17	74	-18.83	peak	Vertical
4960	30.18	31.32	12.31	27.58	46.23	54	-7.77	Average	Horizontal
4960	41.25	31.32	12.31	27.58	57.30	74	-16.70	peak	Horizontal
7440	31.15	24.38	18.16	27.99	45.70	54	-8.30	Average	Horizontal
7440	41.29	24.38	18.16	27.99	55.84	74	-18.16	peak	Horizontal

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

2.Over Limit= Absolute Level – Limit.

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

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

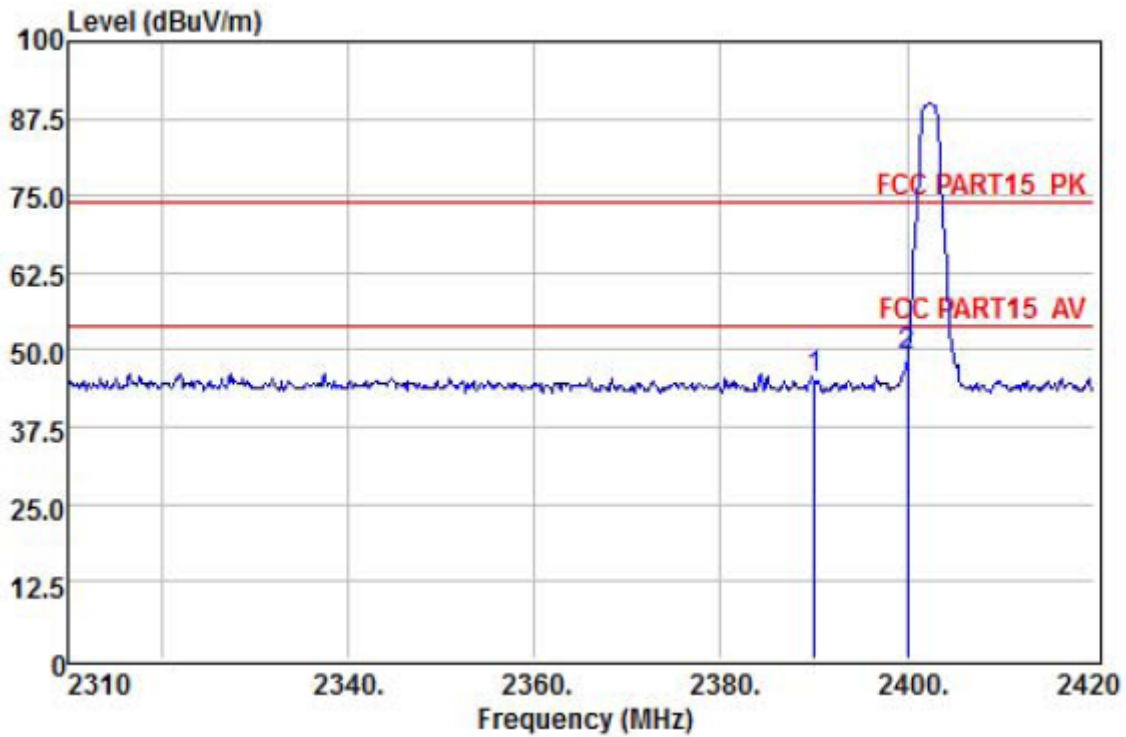
Above 1GHz			
EUT:	Bluetooth Speaker	Model Name :	VG3
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Mode:	TX-8-DPSK
Test Voltage :	DC 3.65V		

Frequency	Meter Reading	Antenna Factor	Cable loss	Preamp factor	Emission Level	Limits	Margin	Detector Type	Comment
(MHz)	(dBµV)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)		
TX-2402									
4804	31.75	32.94	11.94	27.49	49.14	54	-4.86	Average	Vertical
4804	39.51	32.94	11.94	27.49	56.90	74	-17.10	peak	Vertical
7206	30.71	25.28	18.04	27.94	46.09	54	-7.91	Average	Vertical
7206	42.71	25.28	18.04	27.94	58.09	74	-15.91	peak	Vertical
4804	31.41	32.94	11.94	27.49	48.80	54	-5.20	Average	Horizontal
4804	41.28	32.94	11.94	27.49	58.67	74	-15.33	peak	Horizontal
7206	31.56	25.28	18.04	27.94	46.94	54	-7.06	Average	Horizontal
7206	40.82	25.28	18.04	27.94	56.20	74	-17.80	peak	Horizontal
TX-2441									
4882	31.59	32.11	12.15	27.53	48.32	54	-5.68	Average	Vertical
4882	40.61	32.11	12.15	27.53	57.34	74	-16.66	peak	Vertical
7323	32.38	24.33	18.09	27.96	46.84	54	-7.16	Average	Vertical
7323	41.42	24.33	18.09	27.96	55.88	74	-18.12	peak	Vertical
4882	30.51	32.11	12.15	27.53	47.24	54	-6.76	Average	Horizontal
4882	40.17	32.11	12.15	27.53	56.90	74	-17.10	peak	Horizontal
7323	30.68	24.33	18.09	27.96	45.14	54	-8.86	Average	Horizontal
7323	39.42	24.33	18.09	27.96	53.88	74	-20.12	peak	Horizontal
TX-2480									
4960	30.79	31.32	12.31	27.58	46.84	54	-7.16	Average	Vertical
4960	41.38	31.32	12.31	27.58	57.43	74	-16.57	peak	Vertical
7440	31.54	24.38	18.16	27.99	46.09	54	-7.91	Average	Vertical
7440	41.56	24.38	18.16	27.99	56.11	74	-17.89	peak	Vertical
4960	31.25	31.32	12.31	27.58	47.30	54	-6.70	Average	Horizontal
4960	41.26	31.32	12.31	27.58	57.31	74	-16.69	peak	Horizontal
7440	31.95	24.38	18.16	27.99	46.50	54	-7.50	Average	Horizontal
7440	42.67	24.38	18.16	27.99	57.22	74	-16.78	peak	Horizontal
NOTE:1.Absolute Level= ReadingLevel+antenna Factor+cable loss-preamp factor. 2.Over Limit= Absolute Level – Limit. 3.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has not to be reported. 4.EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report (Z orientation)									

For radiated Bandedge test as follows:

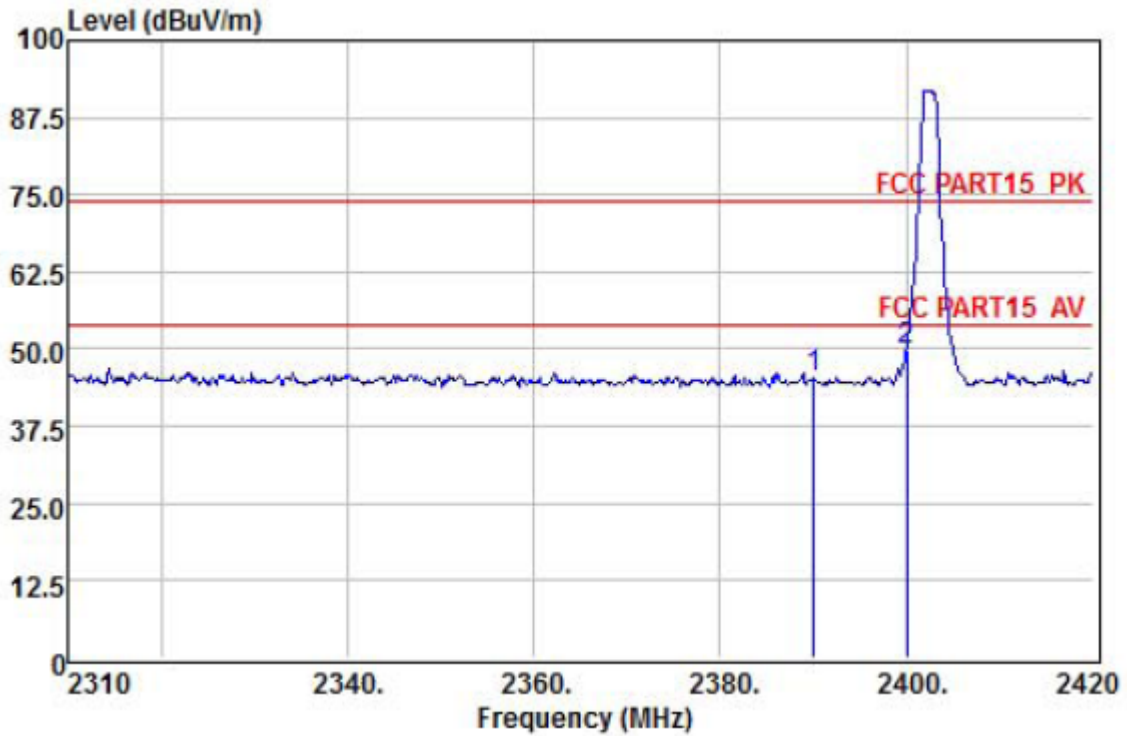
1M bps			
EUT:	Bluetooth Speaker	Model Name :	VG3
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Mode:	TX-2402
Test Voltage :	DC 3.65V		

Vertical



	ReadAntenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.00	39.60	28.72	3.36	26.32	45.36	74.00	-28.64 Peak
2	2400.00	43.26	28.72	3.38	26.32	49.04	74.00	-24.96 Peak

Horizontal

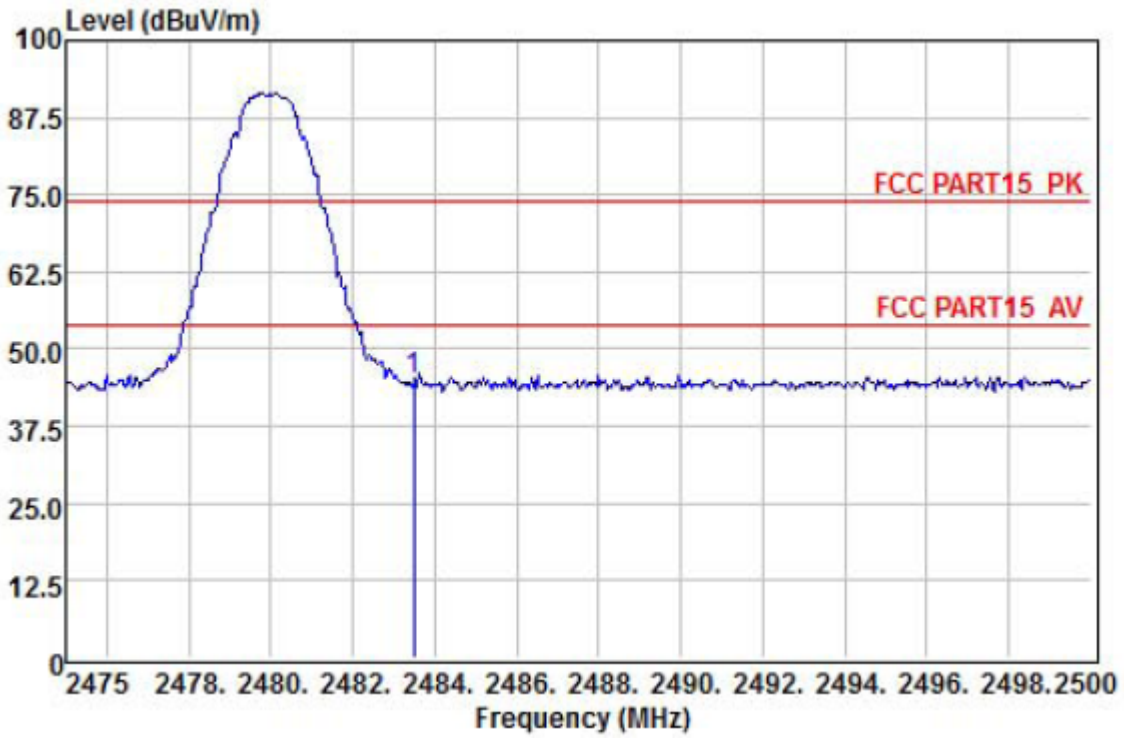


	ReadAntenna	Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.00	39.61	28.72	3.36	26.32	45.37	74.00	-28.63 Peak
2	2400.00	43.88	28.72	3.38	26.32	49.66	74.00	-24.34 Peak

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

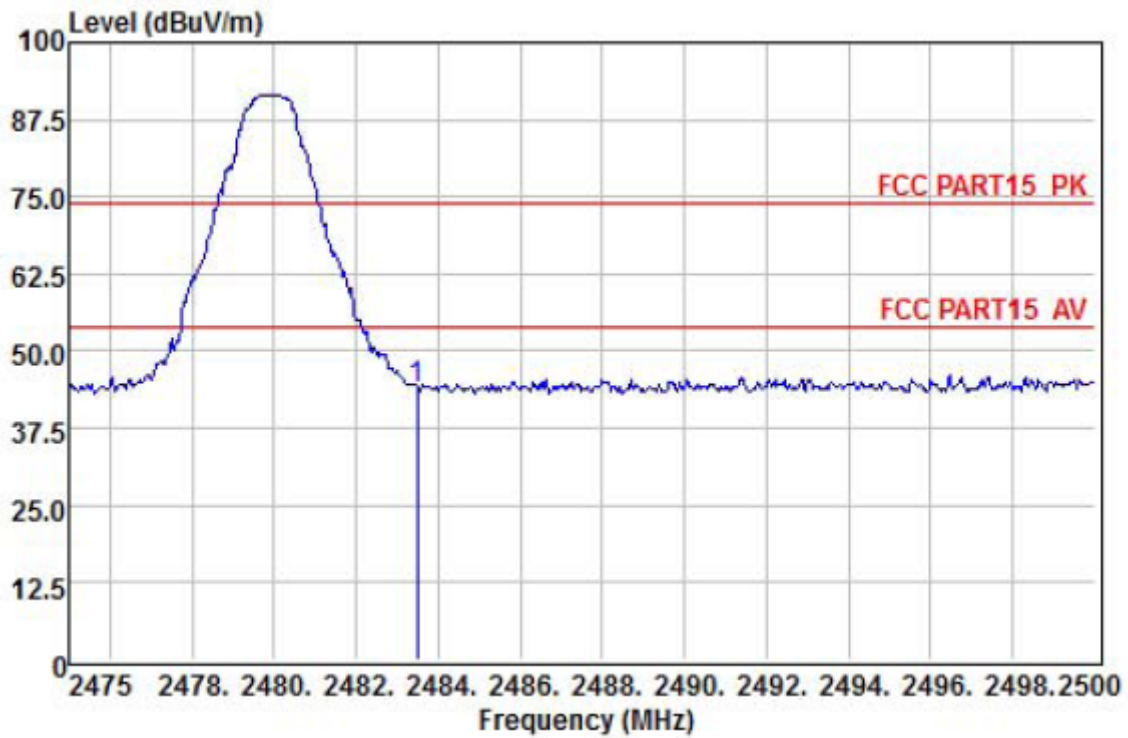
1M bps			
EUT:	Bluetooth Speaker	Model Name :	VG3
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Mode:	TX-2480
Test Voltage :	DC 3.65V		

Vertical



	ReadAntenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.50	38.88	28.79	3.48	26.34	44.81	74.00	-29.19 Peak

Horizontal

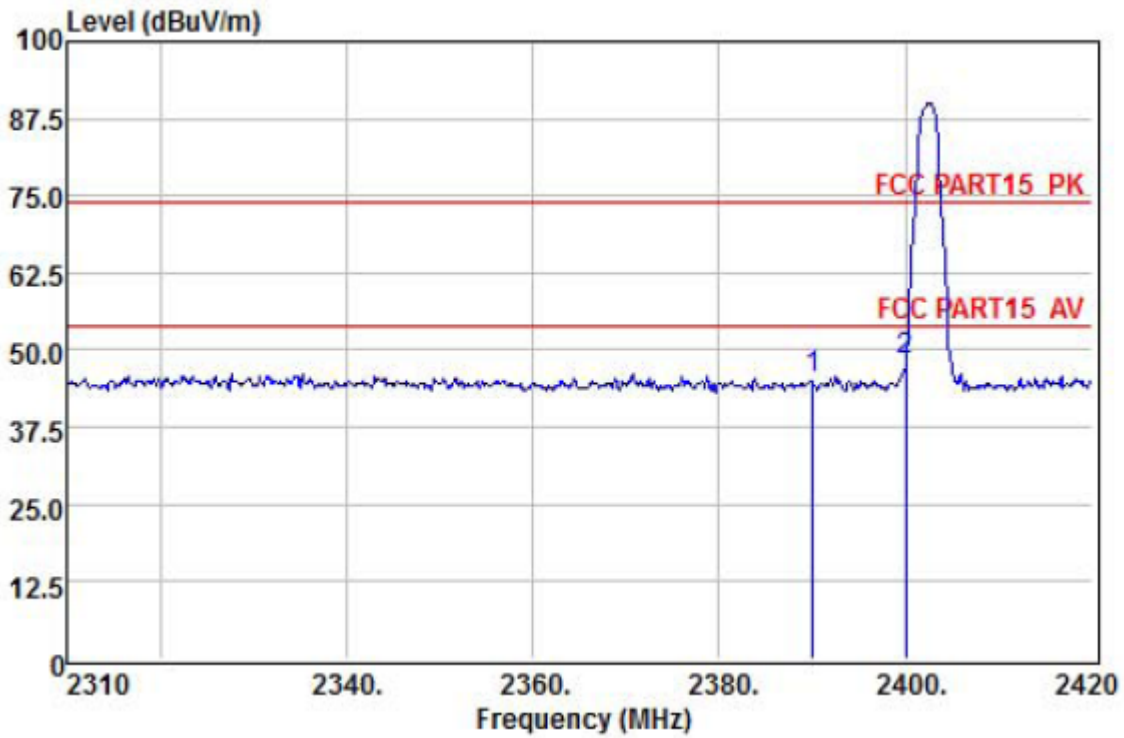


	ReadAntenna	Cable	Preamp		Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit		
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2483.50	37.85	28.79	3.48	26.34	43.78	74.00	-30.22	Peak

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

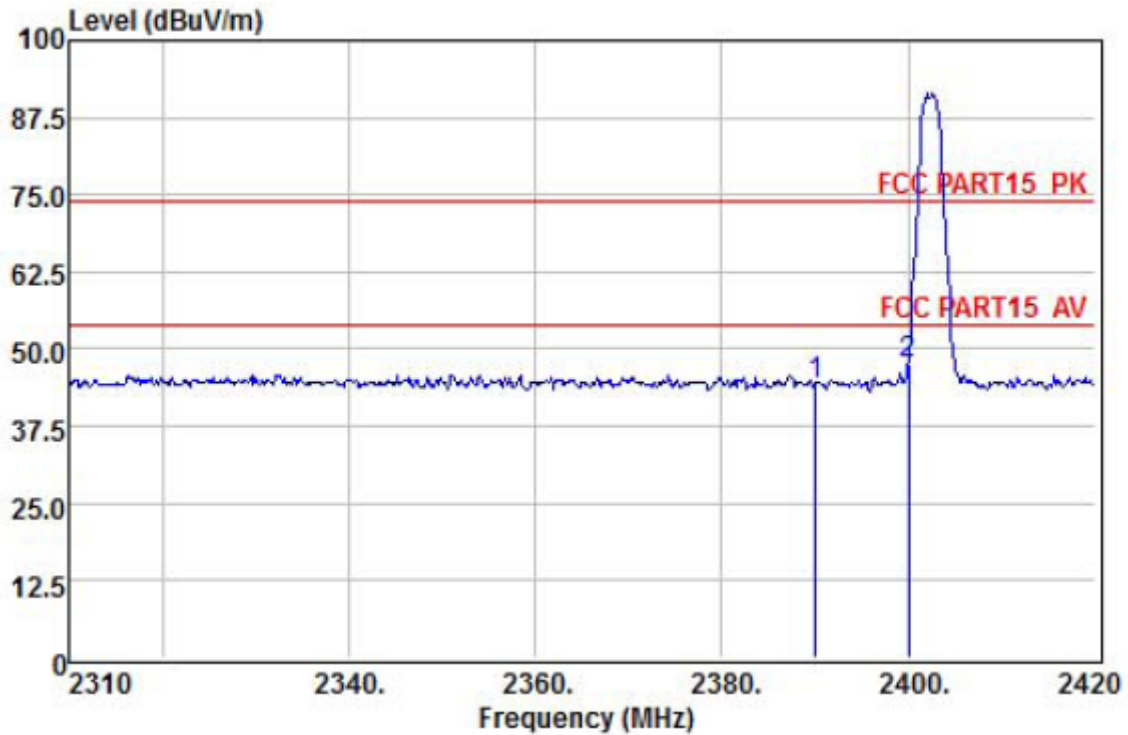
2M bps			
EUT:	Bluetooth Speaker	Model Name :	VG3
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Mode:	TX-2402
Test Voltage :	DC 3.65V		

Vertical



	ReadAntenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.00	39.44	28.72	3.36	26.32	45.20	74.00	-28.80 Peak
2	2400.00	42.45	28.72	3.38	26.32	48.23	74.00	-25.77 Peak

Horizontal



	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.00	38.37	28.72	3.36	26.32	44.13	74.00	-29.87	Peak
2	2400.00	41.85	28.72	3.38	26.32	47.63	74.00	-26.37	Peak

NOTE: 1.Absolute Level= Reading Level+Antenna Factor+Cable Loss-Preamp Factor,

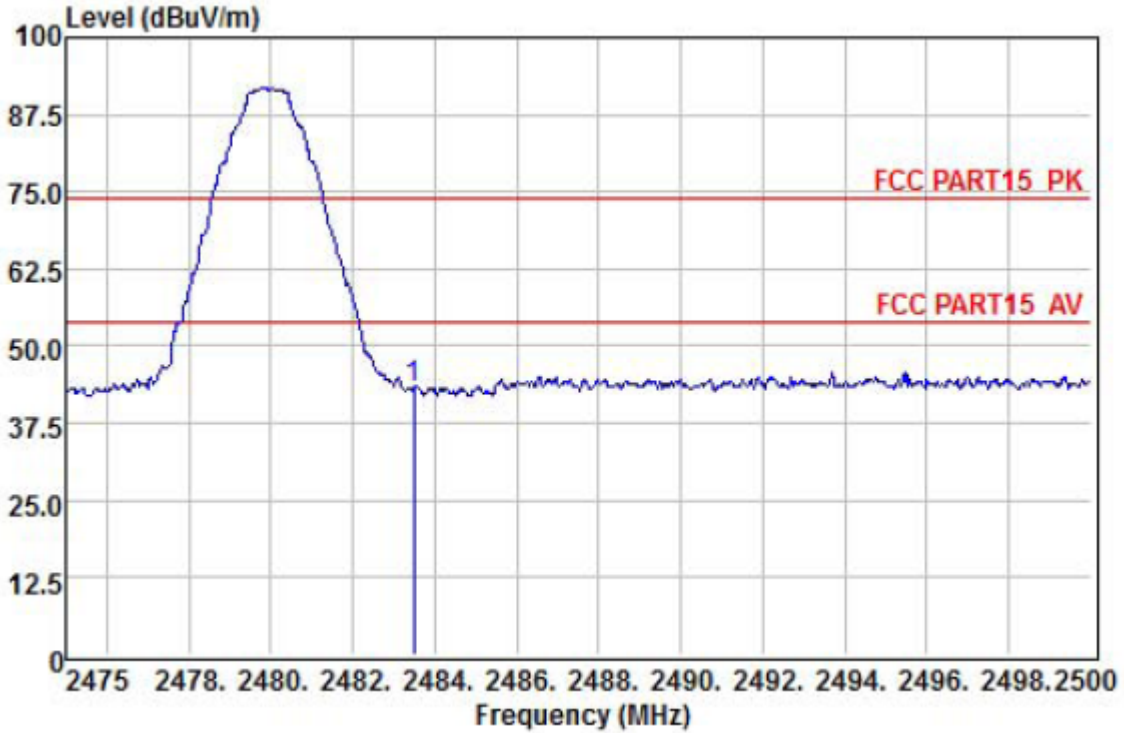
Over Limit= Absolute Level – Limit;

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

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

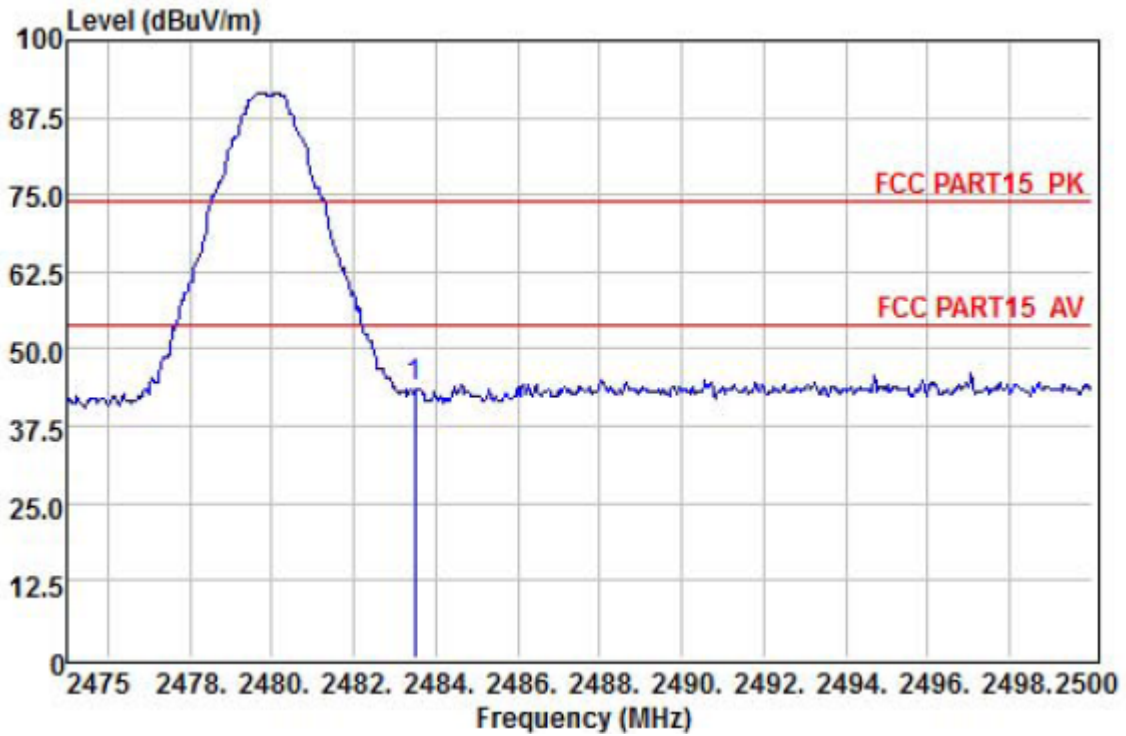
2M bps			
EUT:	Bluetooth Speaker	Model Name :	VG3
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Mode:	TX-2480
Test Voltage :	DC 3.65V		

Vertical



	ReadAntenna	Cable	Preamp		Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit		
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2483.50	37.30	28.79	3.48	26.34	43.23	74.00	-30.77	Peak

Horizontal

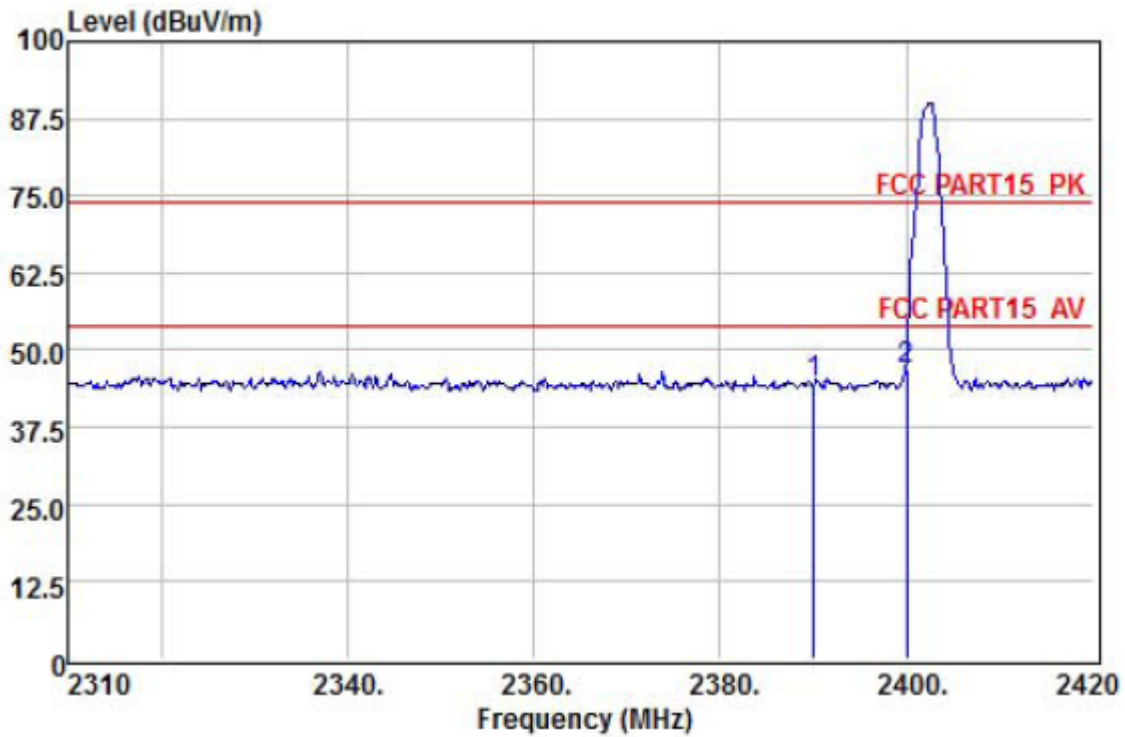


	ReadAntenna	Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.50	37.83	28.79	3.48	26.34	43.76	74.00	-30.24 Peak

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

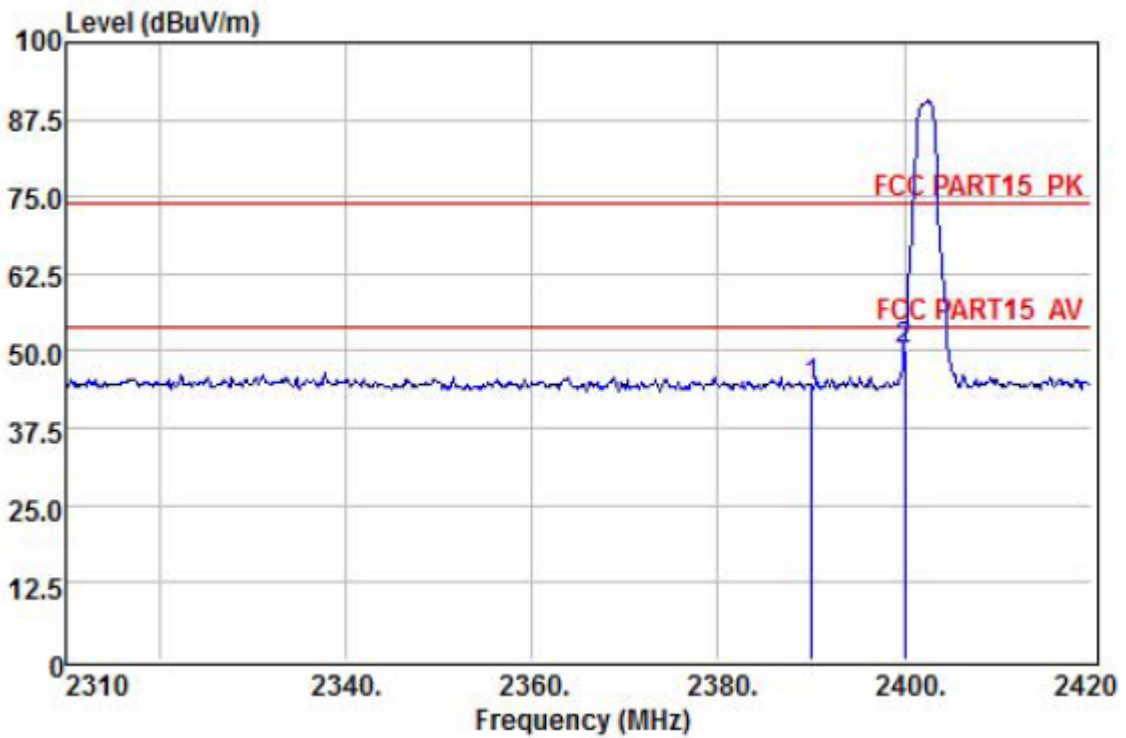
3M bps			
EUT:	Bluetooth Speaker	Model Name :	VG3
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Mode:	TX-2402
Test Voltage :	DC 3.65V		

Vertical



	ReadAntenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.00	38.78	28.72	3.36	26.32	44.54	74.00	-29.46 Peak
2	2400.00	40.90	28.72	3.38	26.32	46.68	74.00	-27.32 Peak

Horizontal

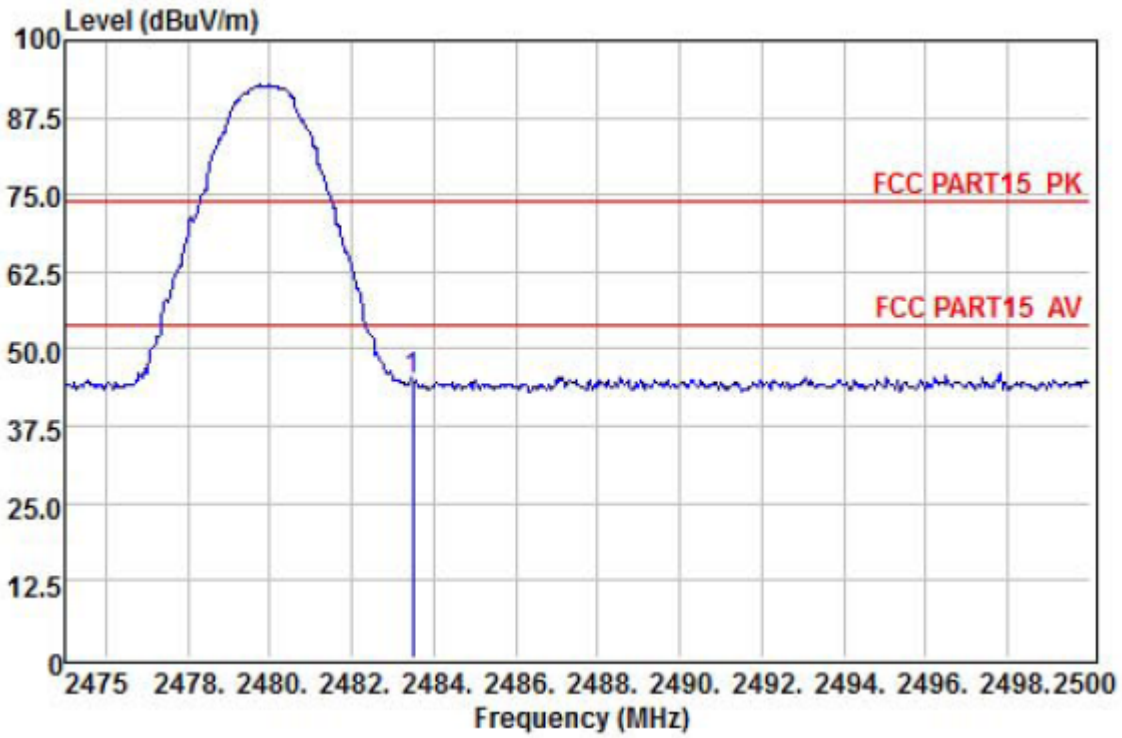


	ReadAntenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.00	38.52	28.72	3.36	26.32	44.28	74.00	-29.72 Peak
2	2400.00	44.38	28.72	3.38	26.32	50.16	74.00	-23.84 Peak

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

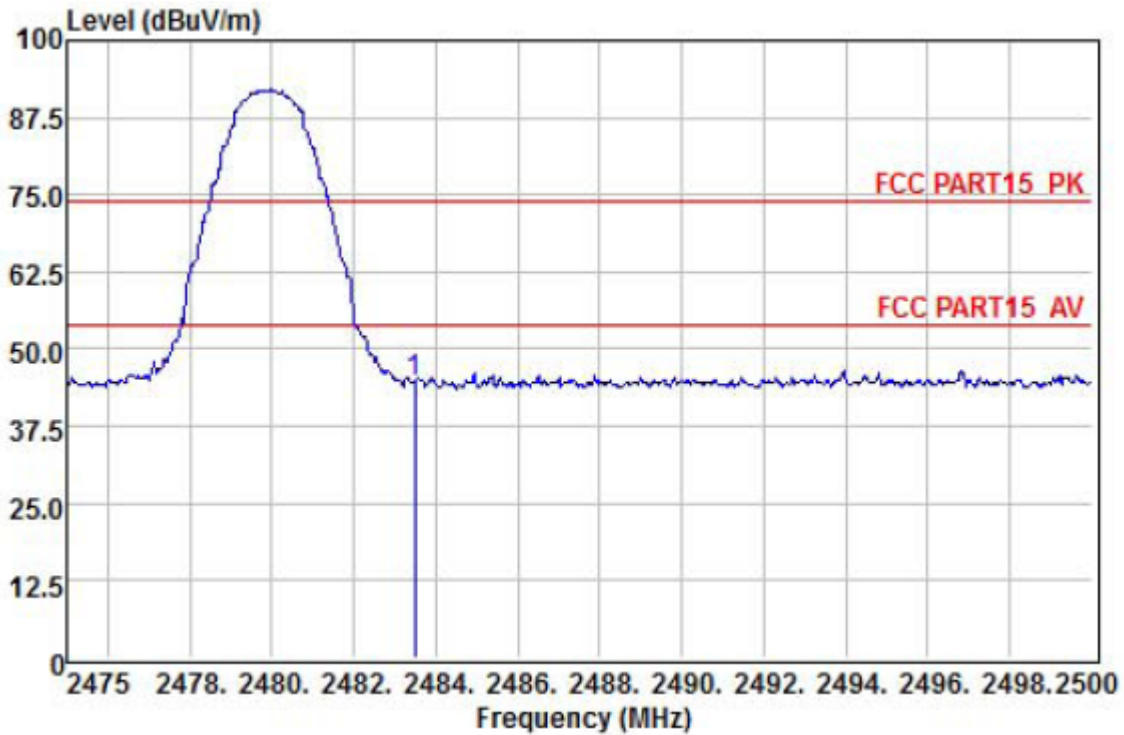
3M bps			
EUT:	Bluetooth Speaker	Model Name :	VG3
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Mode:	TX-2480
Test Voltage :	DC 3.65V		

Vertical



	ReadAntenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.50	38.98	28.79	3.48	26.34	44.91	74.00	-29.09 Peak

Horizontal



	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2483.50	38.81	28.79	3.48	26.34	44.74	74.00 -29.26 Peak

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

Spurious Emission in Restricted Band:(1-25G)

All the modulation modes have been tested and all other emissions more than 20dB below the limit, the worst result was report as below:

Polar (H/V)	Frequency	Meter Reading	Antenna Factor	Cable loss	Preamp factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1Mbps Non-hopping									
Vertical	3262	37.13	30.26	10.68	26.63	51.44	74	-22.56	PK
Horizontal	3262	37.82	30.26	10.68	26.63	52.13	74	-21.87	PK
Vertical	4032	37.28	31.55	10.52	27.02	52.33	74	-21.67	PK
Horizontal	4032	36.63	31.55	10.52	27.02	51.68	74	-22.32	PK
1Mbps hopping									
Vertical	3351	34.76	30.34	10.78	26.67	49.21	74	-24.79	PK
Horizontal	3351	35.83	30.34	10.78	26.67	50.28	74	-23.72	PK
Vertical	4130	37.58	30.69	10.95	27.08	52.14	74	-21.86	PK
Horizontal	4130	36.79	30.69	10.95	27.08	51.35	74	-22.65	PK

6. 20DB OCCUPY BANDWIDTH

6.1. Limits

According to FCC Section 15.247(a)(1)& RSS-247 §5.1(1)&RSS-Gen§6.6, the 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth($10 \cdot \log 1\% = 20\text{dB}$)taking the RF output power

6.2. Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum, during the measurement, the Bluetooth module of the EUT is activated and controlled by the software, and is set to operate under test mode transmitting.

2. Set the spectrum analyzer:

Span: approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel

RBW $\geq 1\%$ of the 20dB bandwidth

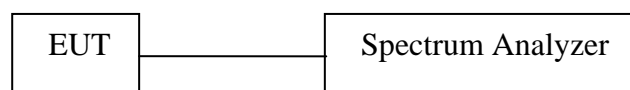
VBW \geq RBW

Sweep=auto

Detector function=peak

Trace=max hold

6.3. Test Setup

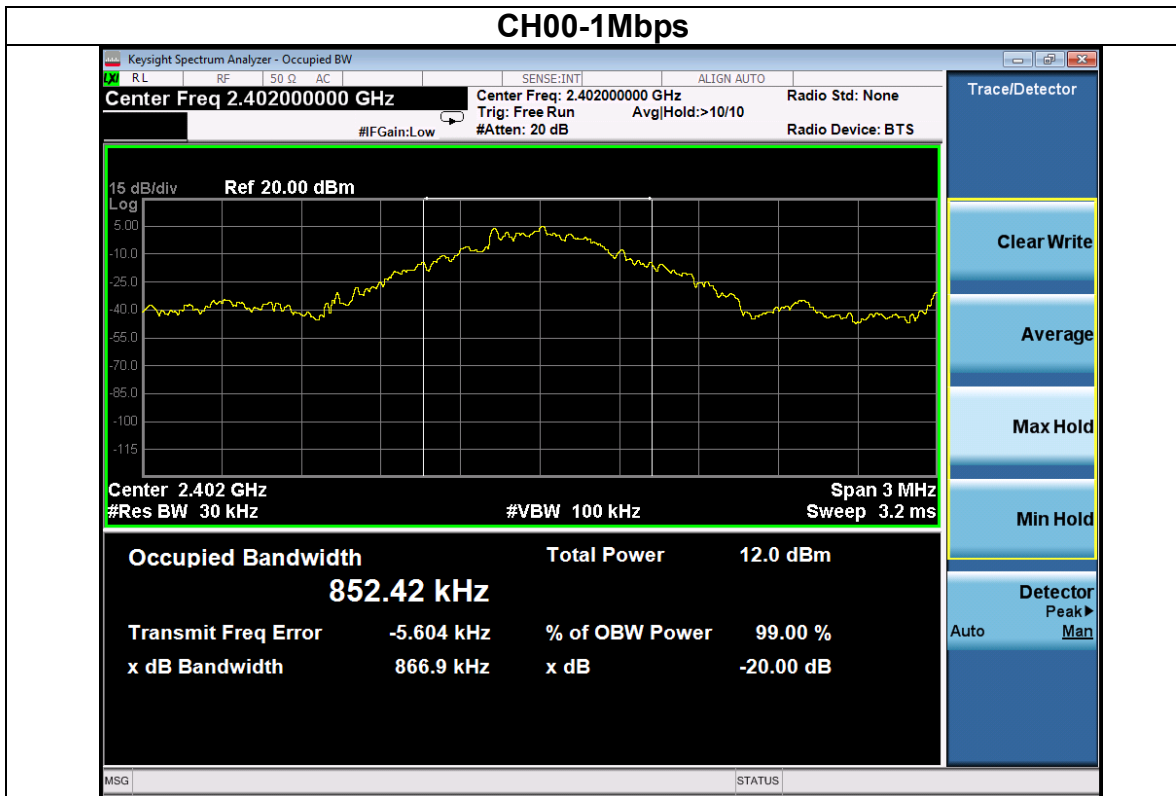


6.4. Test Results

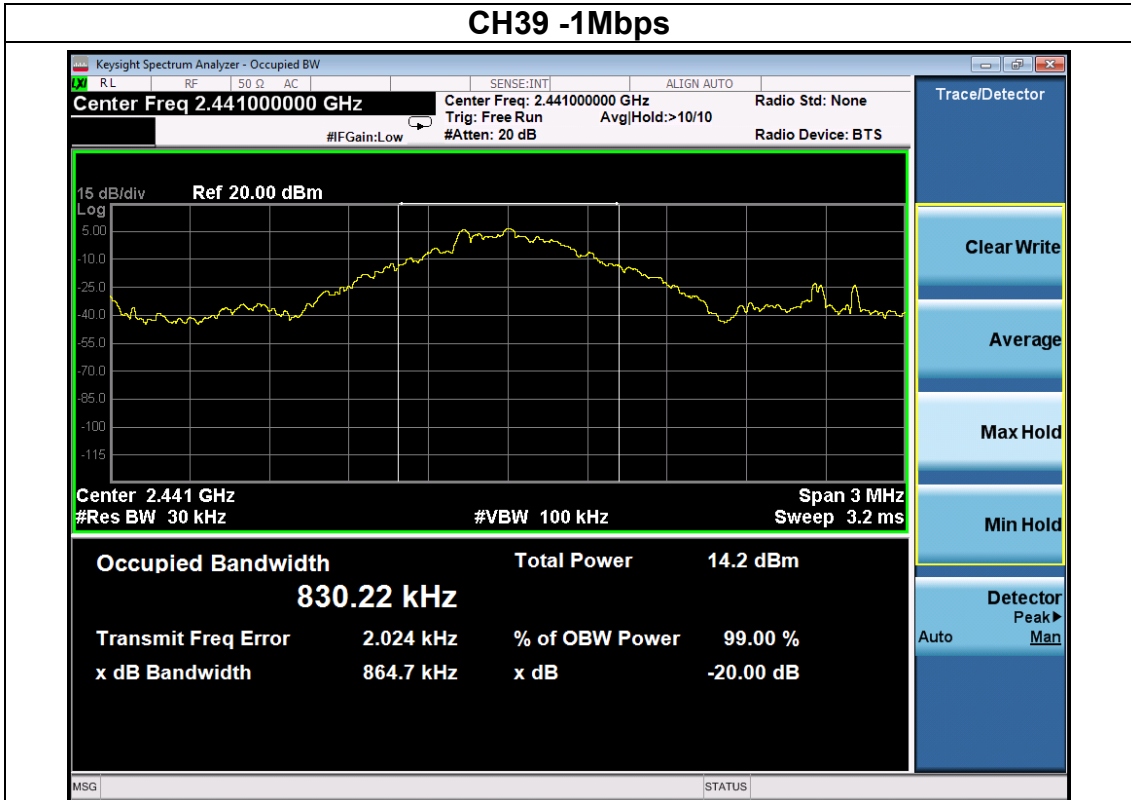
EUT:	Bluetooth Speaker	Model Name :	VG3
Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage :	DC 3.65V
Test Mode :	CH00 / CH39 /C78(1Mbps)		

Frequency	20dB Bandwidth (kHz)	99% Bandwidth (KHz)	Result
2402 MHz	866.9	852.4	PASS
2441 MHz	864.7	830.2	PASS
2480 MHz	849.2	843.9	PASS

Test plot as follows:



CH39 -1Mbps



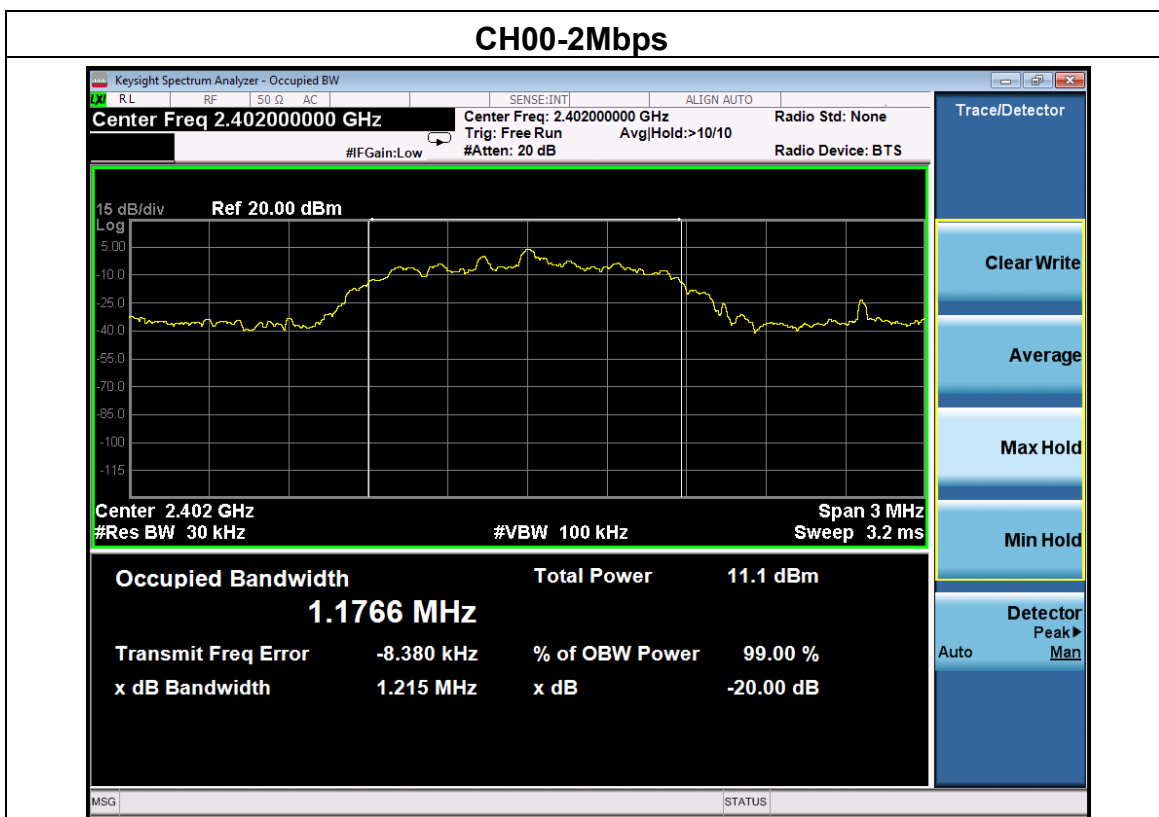
CH78 -1Mbps



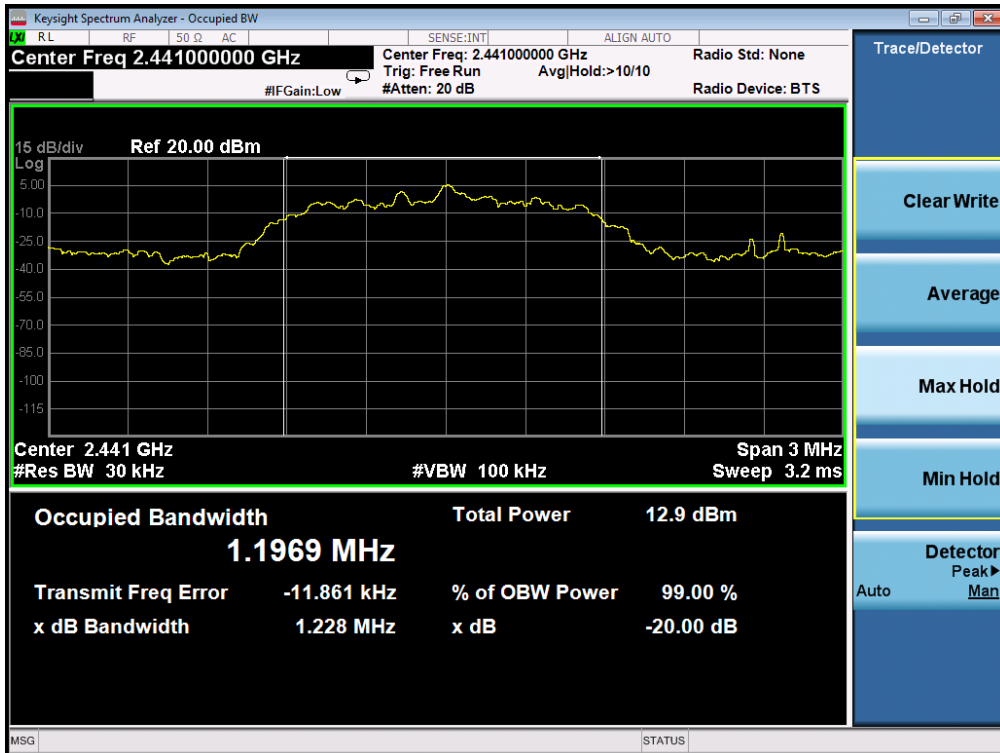
EUT:	Bluetooth Speaker	Model Name :	VG3
Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage :	DC 3.65V
Test Mode :	CH00 / CH39 /C78(2Mbps)		

Frequency	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
2402 MHz	1.215	1.177	PASS
2441 MHz	1.228	1.197	PASS
2480 MHz	1.261	1.172	PASS

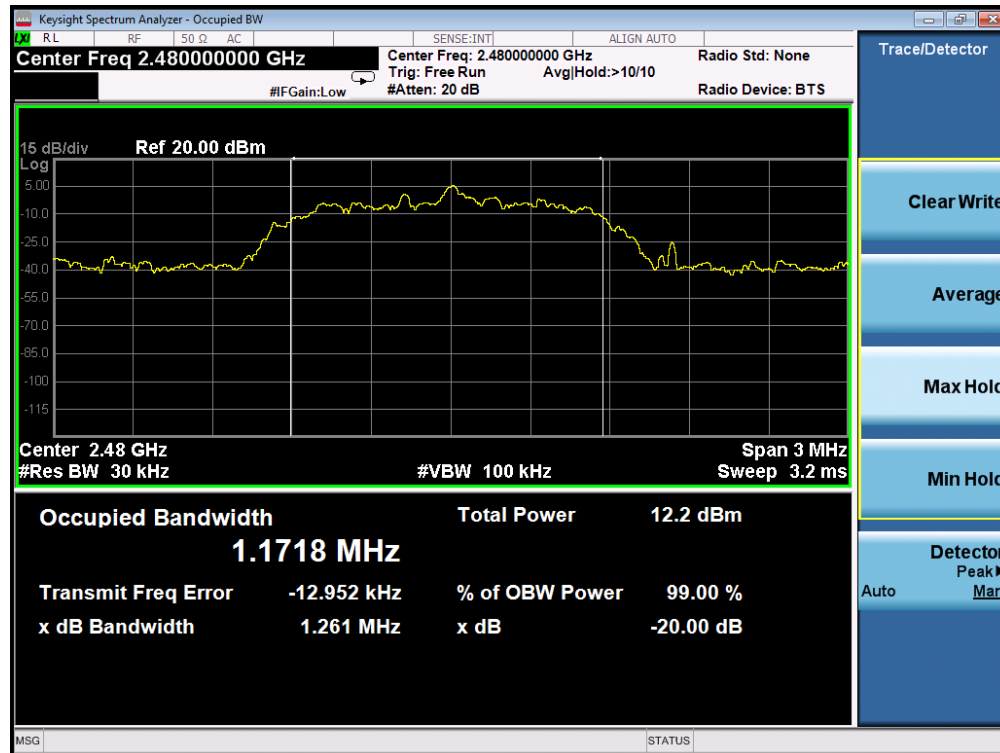
Test plot as follows:



CH39-2Mbps



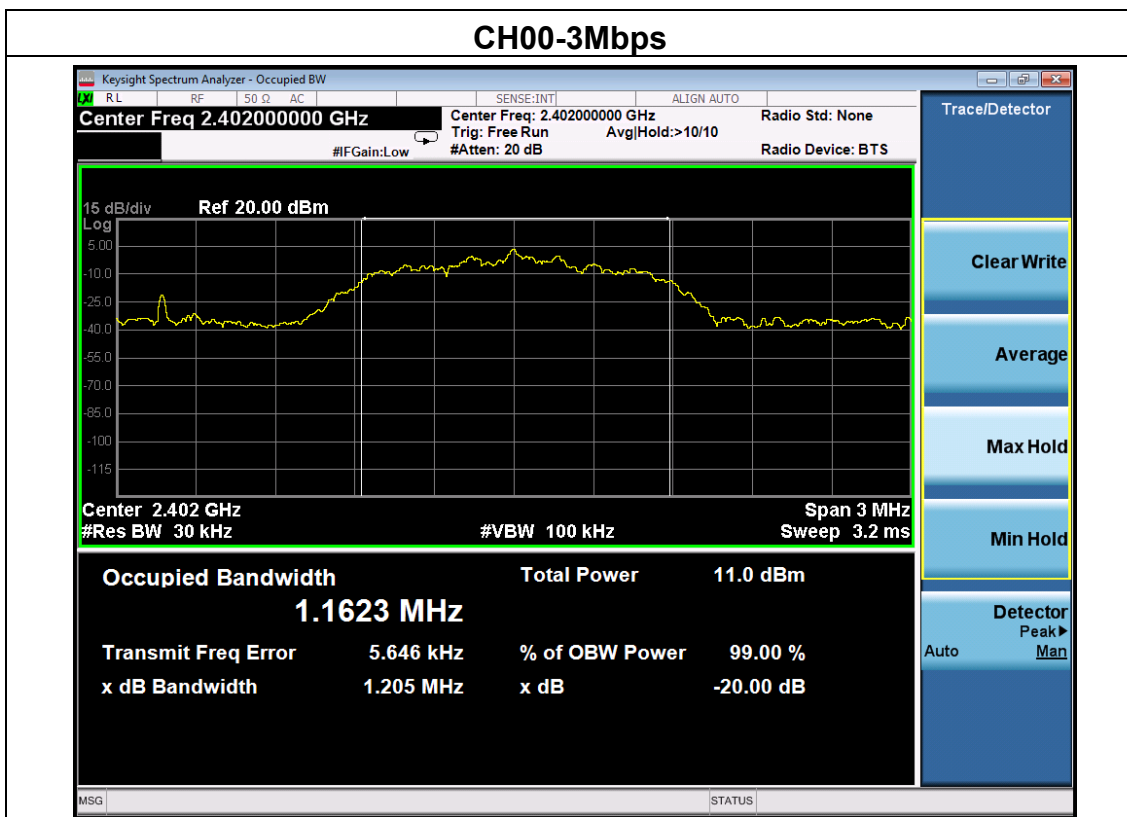
CH78-2Mbps



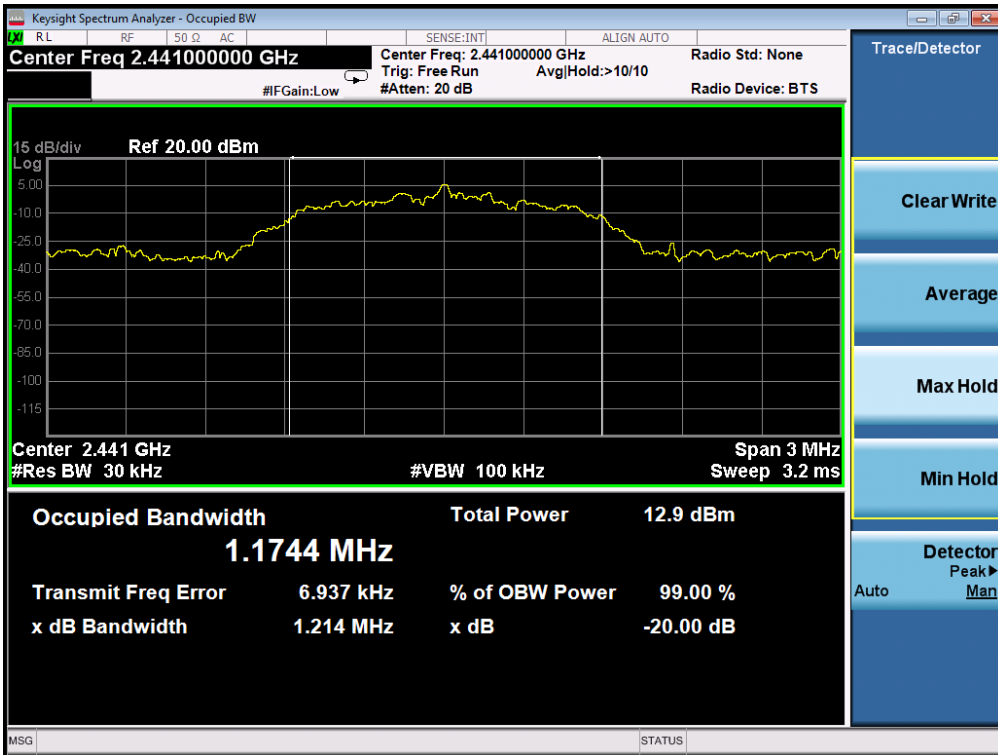
EUT:	Bluetooth Speaker	Model Name :	VG3
Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage :	DC 3.65V
Test Mode :	CH00 / CH39 /CH78(3Mbps)		

Frequency	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
2402 MHz	1.205	1.162	PASS
2441 MHz	1.214	1.174	PASS
2480 MHz	1.252	1.144	PASS

Test plot as follows:



CH39-3Mbps



CH78-3Mbps

