FCC Test Report

Product Name	Bluetooth Speakerphone
Model No.	PHS040Wa
FCC ID.	BCE-PHS040WA

Applicant	GN Audio A/S
Address	Lautrupbjerg 7, 2750 Ballerup, Denmark

Date of Receipt	Dec. 06, 2019
Issued Date	Jan. 31, 2020
Report No.	19C0095R-RFUSP01V00-A
Report Version	V1.0

Testing Laboratory
3023

The test results relate only to the samples tested.
The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
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The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd..

Test Report

Issued Date: Jan. 31, 2020
Report No.: 19C0095R-RFUSP01V00-A

Product Name	Bluetooth Speakerphone
Applicant	GN Audio A/S
Address	Lautrupbjerg 7, 2750 Ballerup, Denmark
Manufacturer	GN Audio A/S
Model No.	PHS040Wa
FCC ID.	BCE-PHS040WA
EUT Rated Voltage	DC 3.8V (By battery) or DC 5V (By USB)
EUT Test Voltage	DC 3.8V (By battery)
Trade Name	Jabra
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By : Genie Chang

(Senior Adm. Specialist / Genie Chang)

Tested By : Jason Tuan

(Engineer / Jason Tuan)

Approved By :

(Director / Vincent Lin)

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Attachment 1: EUT Test Photographs
Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Bluetooth Speakerphone
Trade Name	Jabra
Model No.	PHS040Wa
FCC ID.	BCE-PHS040WA
Frequency Range	2402 – 2480MHz
Channel Number	V4.2: 40CH
Type of Modulation	V4.2:GFSK (1Mbps)
Antenna Type	Inverted F PCB antenna
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”
USB Cable	Brand: Jabra, M/N: PHS040Wa, Shielded, 1m
USB Dongle	Brand: Jabra, M/N: END040W

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Jabra	Speak 710 PHS040W	Inverted F PCB antenna	3.24dBi for 2.4GHz

Note: The antenna of EUT is conforming to FCC 15.203.

Center Frequency of Each Channel: (For V4.2)

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2402 MHz	Channel 01:	2404 MHz	Channel 02:	2406 MHz	Channel 03:	2408 MHz
Channel 04:	2410 MHz	Channel 05:	2412 MHz	Channel 06:	2414 MHz	Channel 07:	2416 MHz
Channel 08:	2418 MHz	Channel 09:	2420 MHz	Channel 10:	2422 MHz	Channel 11:	2424 MHz
Channel 12:	2426 MHz	Channel 13:	2428 MHz	Channel 14:	2430 MHz	Channel 15:	2432 MHz
Channel 16:	2434 MHz	Channel 17:	2436 MHz	Channel 18:	2438 MHz	Channel 19:	2440 MHz
Channel 20:	2442 MHz	Channel 21:	2444 MHz	Channel 22:	2446 MHz	Channel 23:	2448 MHz
Channel 24:	2450 MHz	Channel 25:	2452 MHz	Channel 26:	2454 MHz	Channel 27:	2456 MHz
Channel 28:	2458 MHz	Channel 29:	2460 MHz	Channel 30:	2462 MHz	Channel 31:	2464 MHz
Channel 32:	2466 MHz	Channel 33:	2468 MHz	Channel 34:	2470 MHz	Channel 35:	2472 MHz
Channel 36:	2474 MHz	Channel 37:	2476 MHz	Channel 38:	2478 MHz	Channel 39:	2480 MHz

Note:

1. The EUT is a Bluetooth Speakerphone with a built-in Bluetooth V4.2,V2.1+EDR transceiver, this report for Bluetooth V4.2.
2. These tests were conducted on a sample for the purpose of demonstrating compliance of Bluetooth transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit - BLE Mode 2: Charge

1.2. Operational Description

The EUT is a Bluetooth Speakerphone with built-in 2.4GHz Bluetooth V4.2 transceiver. The number of the channels is 40 in Bluetooth V4.2 mode. This device provides three kinds of transmitting speed and modulation, respectively GFSK(1Mbps) . The antenna is Inverted F PCB Antenna and provides diversity function to improve the receiving function.

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. The transmitter is presented with a continuous data stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its 40 channels.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted.

The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

The EUT is forward-compatible with the impending Bluetooth Low Energy operating mode, which provides a dramatic reduction in the power consumption of the Bluetooth radio and baseband. The primary application for this mode is to provide support for low data rate devices, such as sensors and remote controls.

1.3. Tested System Details

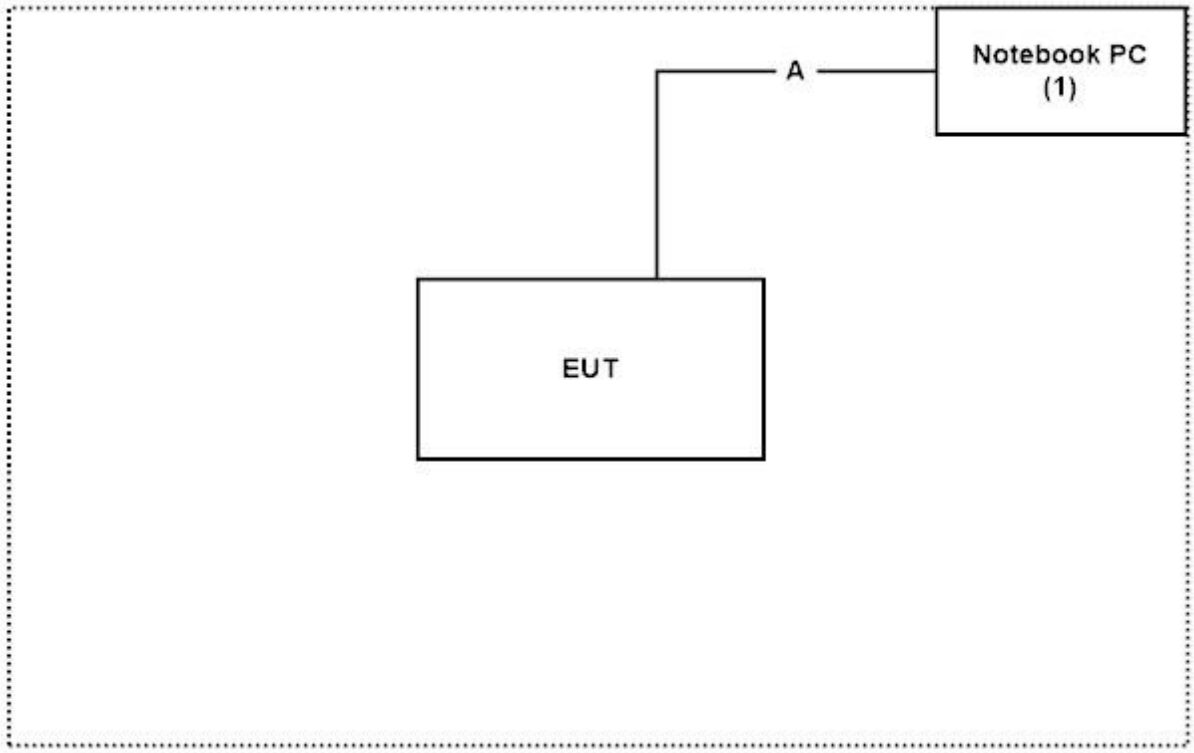
The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	Latitude 5580	GDZN7H2	Non-shielded, 0.8m
2	Adapter	SONY	CAA-0002016-TW	1262-3520.1	N/A

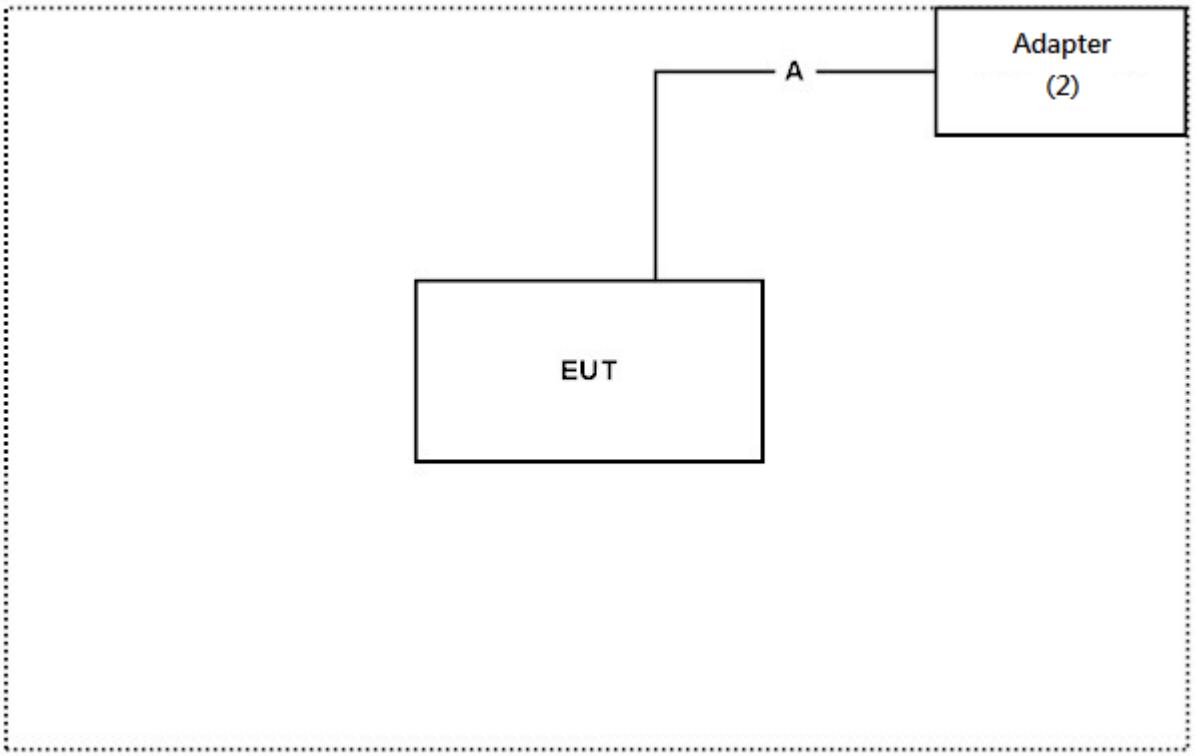
Signal Cable Type		Signal cable Description
A	USB Cable	Shielded, 1m

1.4. Configuration of Tested System

BT mode



Charge mode



1.5. EUT Exercise Software

1. Setup the EUT as shown in Section 1.4.
2. Execute software “Blue test3, Ver.2.6.2” on the EUT.
3. Configure the test mode, the test channel, and the data rate.
4. Press “OK” to start the continuous Transmit.
5. Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Conducted Emission	Temperature (℃)	10~40 ℃	23 ℃
	Humidity (%RH)	10~90 %	66 %
Radiated Emission	Temperature (℃)	10~40 ℃	22.8 ℃
	Humidity (%RH)	10~90 %	61 %
Conductive	Temperature (℃)	10~40 ℃	24.8 ℃
	Humidity (%RH)	10~90 %	52.8 %

USA : FCC Registration Number: TW3023

Canada : IC Registration Number: 4075A

Site Description: Accredited by TAF
Accredited Number: 3023

Test Laboratory: DEKRA Testing and Certification Co., Ltd
Address: No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C.
Phone number: 886-2-8601-3788
Fax number: 886-2-8601-3789
Email address: info.tw@dekra.com
Website: http://www.dekra.com.tw

1.7. List of Test Equipment

For Conducted measurements /CB3/SR8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
	Temperature Chamber	WIT GROUP	TH-1S-B	EQ-201-00146	2019/02/26	2020/02/25
X	Spectrum Analyzer	Agilent	N9010A	MY53470892	2019/09/25	2020/09/24
X	Peak Power Analyzer	Keysight	8990B	MY51000410	2019/07/30	2020/07/29
X	Wideband Power Sensor	Keysight	N1923A	MY56080003	2019/07/30	2020/07/29
X	Wideband Power Sensor	Keysight	N1923A	MY56080004	2019/07/30	2020/07/29
X	EMI Test Receiver	R&S	ESCS 30	100369	2019/11/19	2020/11/18
X	LISN	R&S	ENV216	101105	2019/04/10	2020/04/09
X	LISN	R&S	ESH3-Z5	836679/014	2019/04/10	2020/04/09
X	Coaxial Cable	DEKRA	RG 400	LC018-RG	2019/06/20	2020/06/19

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version :DEKRA Conduction Test SystemV9.0.5.

For Radiated measurements /Site3/CB8

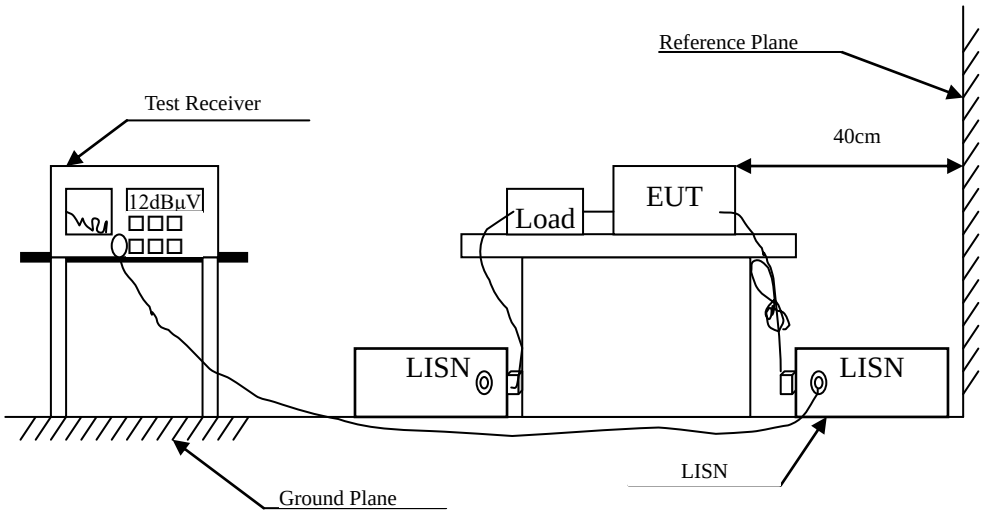
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
X	Spectrum Analyzer	R&S	FSP40	100170	2019/03/11	2020/03/10
X	Loop Antenna	Teseq	HLA6121	37133	2019/10/15	2021/10/14
X	Bilog Antenna	Schaffner Chase	CBL6112B	2794	2019/06/23	2020/06/22
X	Coaxial Cable	DEKRA	L1907-001C	280280.F141.1000D	2019/07/10	2020/07/09
X	Amplifier	EMCI	EMC001330	980254	2019/08/22	2020/08/21
X	Horn Antenna	ETS-LINDGREN	3117	00228113	2019/05/02	2020/05/01
X	Coaxial Cable	DEKRA	L1907-002C	280280.F141.1000D	2019/07/10	2020/07/09
X	Amplifier	EMCI	EMC05820SE	980362	2019/06/26	2020/06/25
X	Amplifier	EMCI	EMC051845SE	SN980632	2019/08/08	2020/08/07
	Horn Antenna	Com-Power	AH-1840	101101	2019/10/31	2020/10/30
	Amplifier + Cable	EMCI	EMC184045SE	980369	2019/04/16	2020/04/15
	Bilog Antenna	Schaffner Chase	CBL6112B	2916	2019/06/23	2020/06/22
	Coaxial Cable	DEKRA	L1907-003C	00100A1B3A120M	2019/07/10	2020/07/09
	Amplifier	EMCI	EMC001330	980255	2019/06/28	2020/06/27
X	Filter	MICRO-TRONICS	BRM50702	G270	2019/08/08	2020/08/07
	Filter	MICRO-TRONICS	BRM50716	G196	2019/08/08	2020/08/07

Note:

1. Loop Antenna is calibrated every two years, the other equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version :QuieTek EMI System V2.1.134.

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBµV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.3. Test Procedure

The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

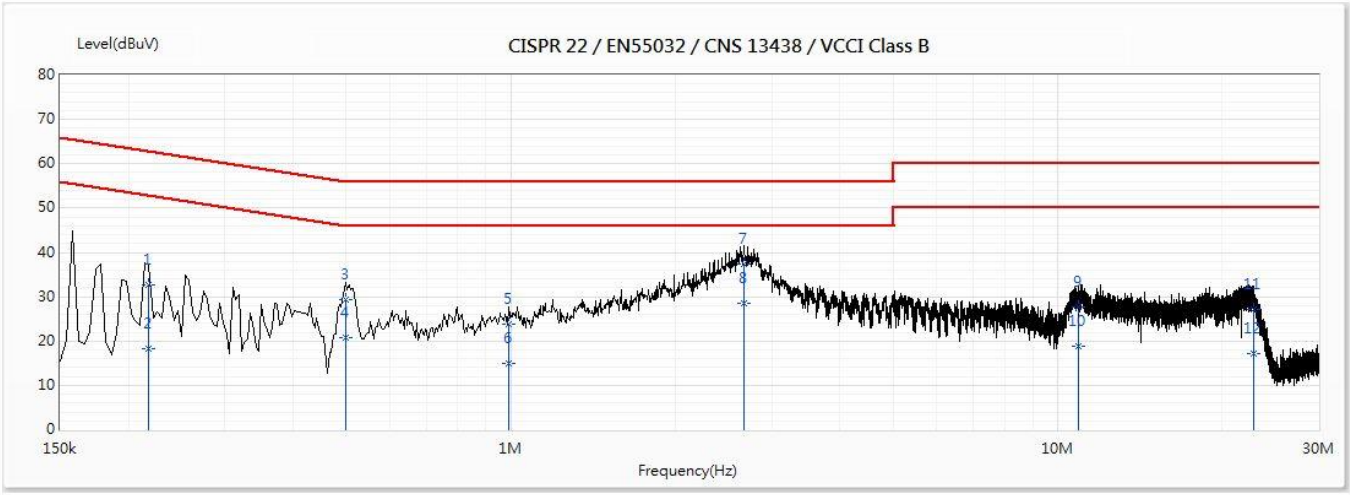
2.4. Uncertainty

± 2.26 dB

2.5. Test Result of Conducted Emission

Product	:	Bluetooth Speakerphone
Test Item	:	Conducted Emission Test
Test date	:	2019/12/18
Test Mode	:	Mode 1: Transmit - BLE (2440MHz)

Line 1



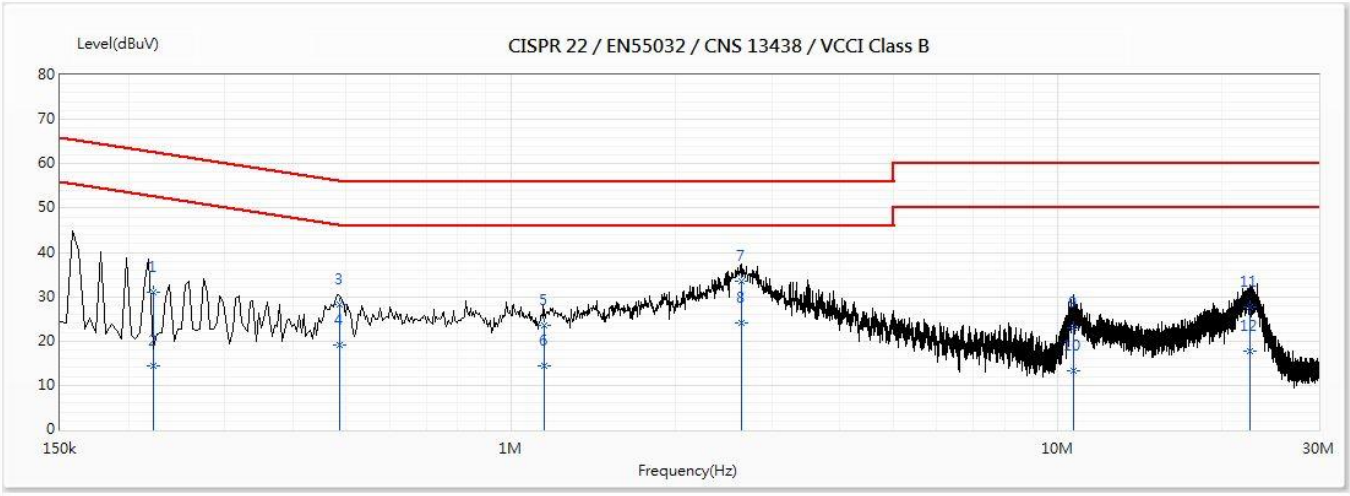
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Cable Loss (dB)	LISN (dB)	Detector Type
1	0.217	32.54	62.93	-30.38	22.85	0.12	9.57	QP
2	0.217	18.21	52.93	-34.72	8.52	0.12	9.57	AV
3	0.499	29.25	56.02	-26.78	19.55	0.13	9.57	QP
4	0.499	20.83	46.02	-25.20	11.13	0.13	9.57	AV
5	0.989	23.75	56.00	-32.25	14.02	0.16	9.57	QP
6	0.989	14.83	46.00	-31.17	5.10	0.16	9.57	AV
7	2.666	37.35	56.00	-18.65	27.55	0.22	9.58	QP
*8	2.666	28.40	46.00	-17.60	18.60	0.22	9.58	AV
9	10.908	27.65	60.00	-32.35	17.61	0.39	9.64	QP
10	10.908	18.89	50.00	-31.11	8.85	0.39	9.64	AV
11	22.812	26.99	60.00	-33.01	16.79	0.55	9.65	QP
12	22.812	17.19	50.00	-32.81	6.99	0.55	9.65	AV

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.

Product	:	Bluetooth Speakerphone
Test Item	:	Conducted Emission Test
Test date	:	2019/12/18
Test Mode	:	Mode 1: Transmit - BLE (2440MHz)

Line 2



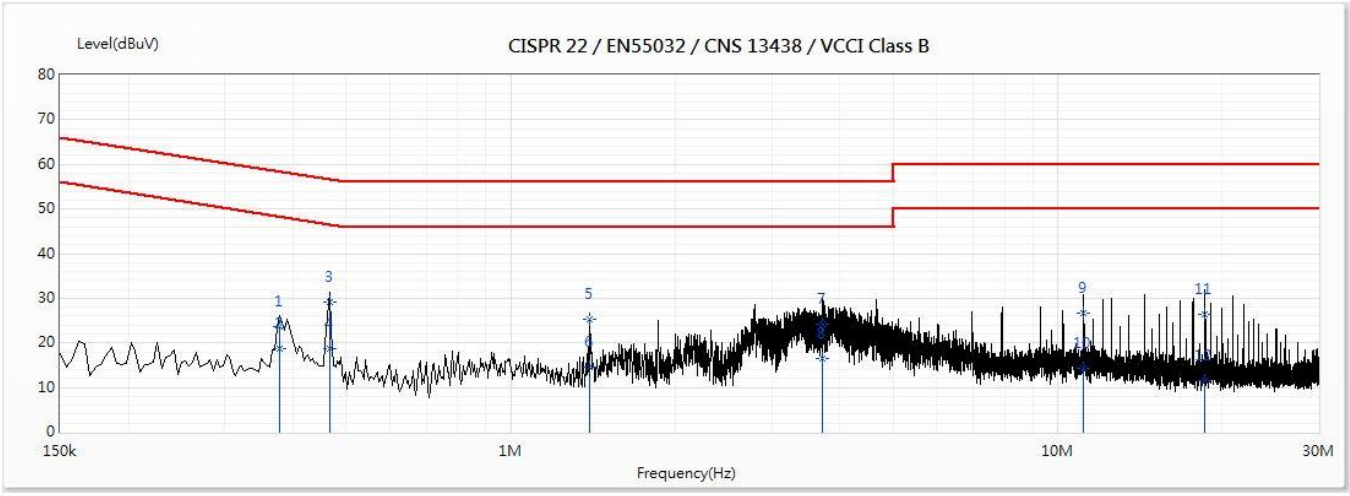
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Cable Loss (dB)	LISN (dB)	Detector Type
1	0.222	31.13	62.74	-31.61	21.41	0.12	9.60	QP
2	0.222	14.46	52.74	-38.28	4.74	0.12	9.60	AV
3	0.487	28.27	56.22	-27.95	18.53	0.13	9.60	QP
4	0.487	19.03	46.22	-27.19	9.30	0.13	9.60	AV
5	1.153	23.40	56.00	-32.60	13.62	0.17	9.61	QP
6	1.153	14.27	46.00	-31.73	4.49	0.17	9.61	AV
7	2.64	33.40	56.00	-22.60	23.56	0.22	9.62	QP
*8	2.64	24.17	46.00	-21.83	14.33	0.22	9.62	AV
9	10.689	23.09	60.00	-36.91	12.99	0.39	9.72	QP
10	10.689	13.20	50.00	-36.80	3.09	0.39	9.72	AV
11	22.436	27.72	60.00	-32.28	17.32	0.54	9.85	QP
12	22.436	17.73	50.00	-32.27	7.33	0.54	9.85	AV

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.

Product	:	Bluetooth Speakerphone
Test Item	:	Conducted Emission Test
Test date	:	2020/01/30
Test Mode	:	Mode 2: Charge

Line 1



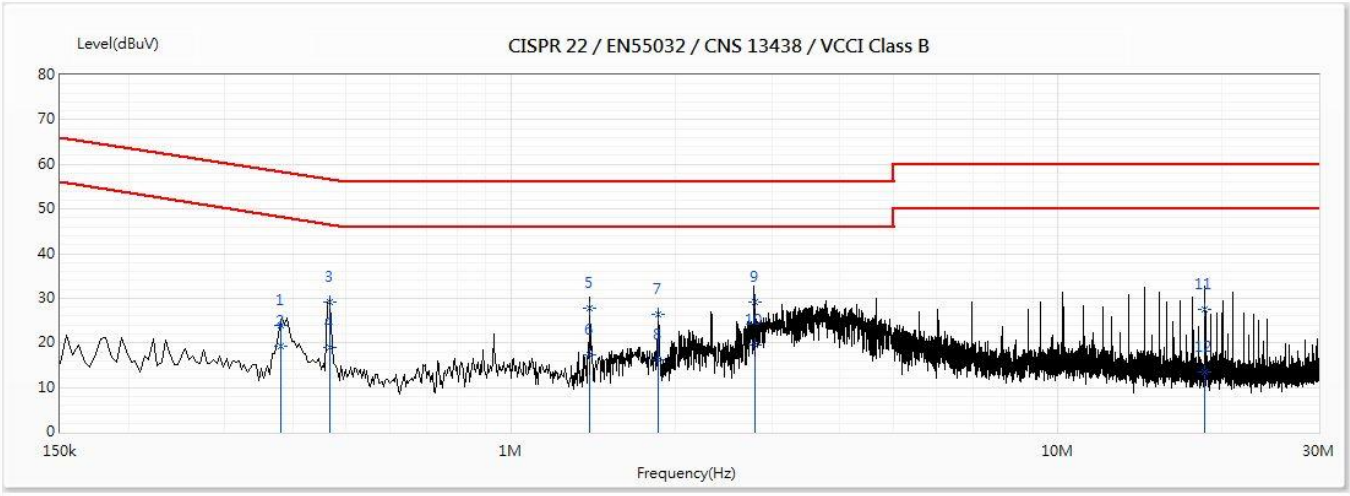
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Cable Loss (dB)	LISN (dB)	Detector Type
1	0.378	23.51	58.32	-34.81	13.81	9.70	QP	1
2	0.378	18.74	48.32	-29.59	9.04	9.70	AV	2
*3	0.466	29.15	56.58	-27.43	19.45	9.70	QP	*3
4	0.466	18.83	46.58	-27.76	9.13	9.70	AV	4
5	1.392	25.16	56.00	-30.84	15.41	9.75	QP	5
6	1.392	14.49	46.00	-31.51	4.74	9.75	AV	6
7	3.712	24.24	56.00	-31.76	14.40	9.84	QP	7
8	3.712	16.61	46.00	-29.39	6.78	9.84	AV	8
9	11.168	26.77	60.00	-33.23	16.73	10.04	QP	9
10	11.168	14.23	50.00	-35.77	4.19	10.04	AV	10
11	18.608	26.48	60.00	-33.52	16.32	10.16	QP	11
12	18.608	11.61	50.00	-38.39	1.45	10.16	AV	12

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.

Product : Bluetooth Speakerphone
Test Item : Conducted Emission Test
Test date : 2020/01/30
Test Mode : Mode 2: Charge

Line 2



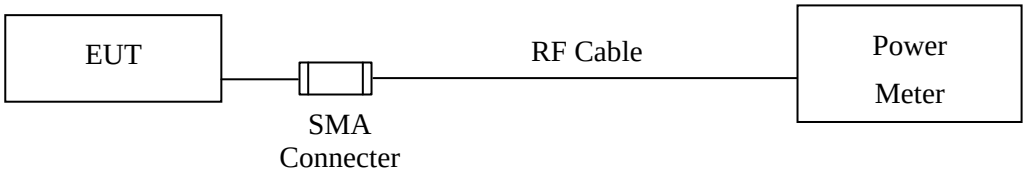
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Cable Loss (dB)	LISN (dB)	Detector Type
1	0.38	23.86	58.27	-34.41	14.13	9.73	QP	1
2	0.38	19.35	48.27	-28.92	9.63	9.73	AV	2
3	0.466	29.23	56.58	-27.35	19.50	9.73	QP	3
4	0.466	18.91	46.58	-27.67	9.18	9.73	AV	4
5	1.396	27.72	56.00	-28.28	17.93	9.79	QP	5
6	1.396	17.24	46.00	-28.76	7.45	9.79	AV	6
7	1.86	26.47	56.00	-29.53	16.66	9.81	QP	7
8	1.86	16.15	46.00	-29.85	6.34	9.81	AV	8
9	2.791	29.10	56.00	-26.90	19.26	9.84	QP	9
*10	2.791	19.54	46.00	-26.46	9.69	9.84	AV	*10
11	18.608	27.50	60.00	-32.50	17.18	10.32	QP	11
12	18.608	13.43	50.00	-36.57	3.11	10.32	AV	12

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.

3. Peak Power Output

3.1. Test Setup



3.2. Limit

The maximum peak power shall be less 1Watt.

3.3. Test Procedure

Tested according to C63.10:2013 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using C63.10:2013 Section 11.9.1.3 PKPM1 Peak power meter method .

3.4. Uncertainty

± 1.19 dB

3.5. Test Result of Peak Power Output

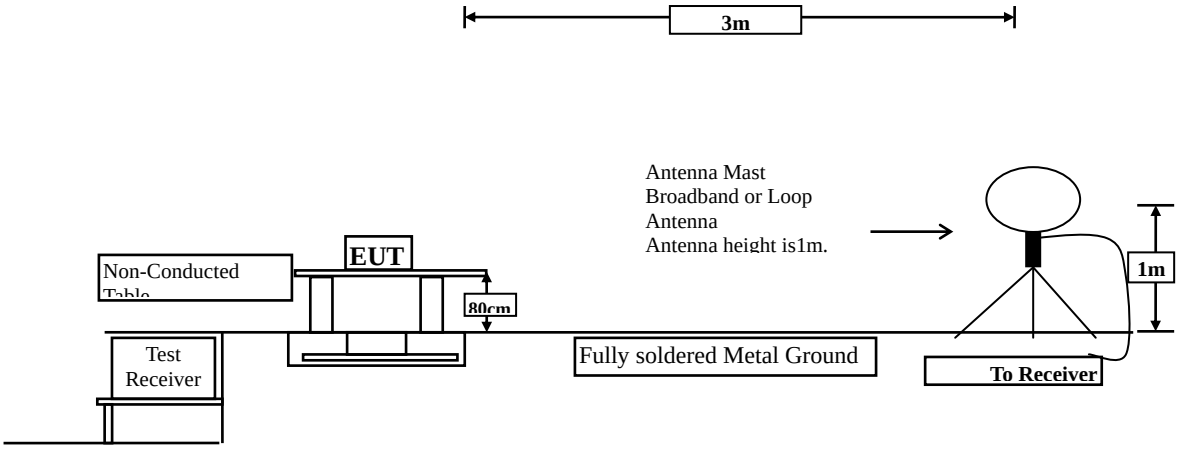
Product : Bluetooth Speakerphone
Test Item : Peak Power Output
Test date : 2019/12/10
Test Mode : Mode 1: Transmit - BLE

Channel No.	Frequency (MHz)	Peak Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	3.06	1 Watt= 30 dBm	Pass
Channel 19	2440.00	4.66	1 Watt= 30 dBm	Pass
Channel 39	2480.00	5.28	1 Watt= 30 dBm	Pass

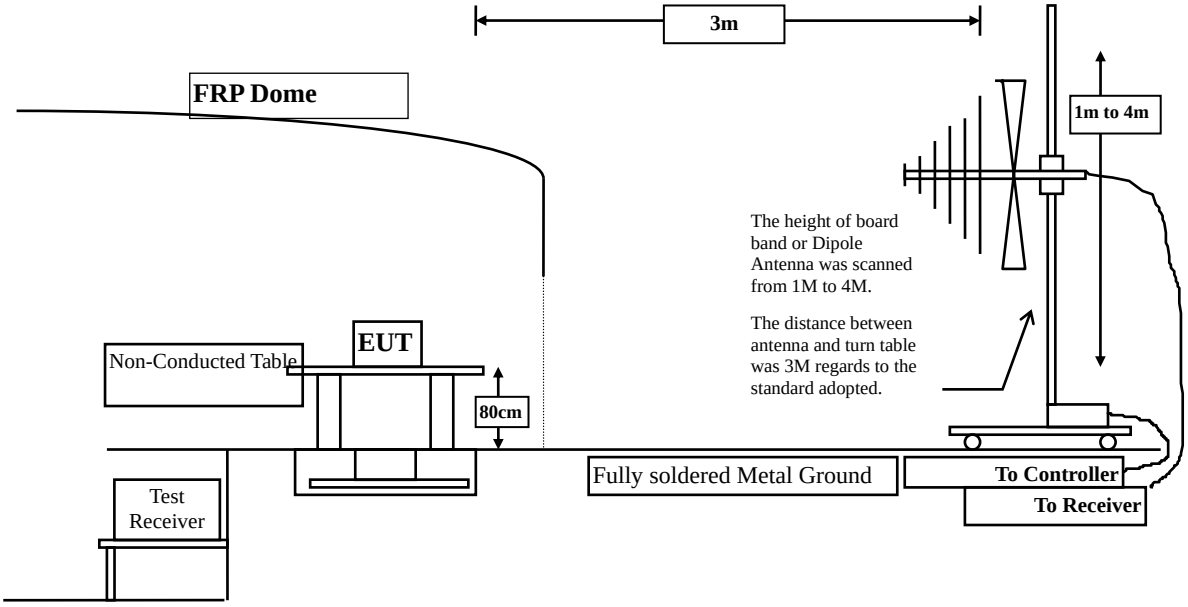
4. Radiated Emission

4.1. Test Setup

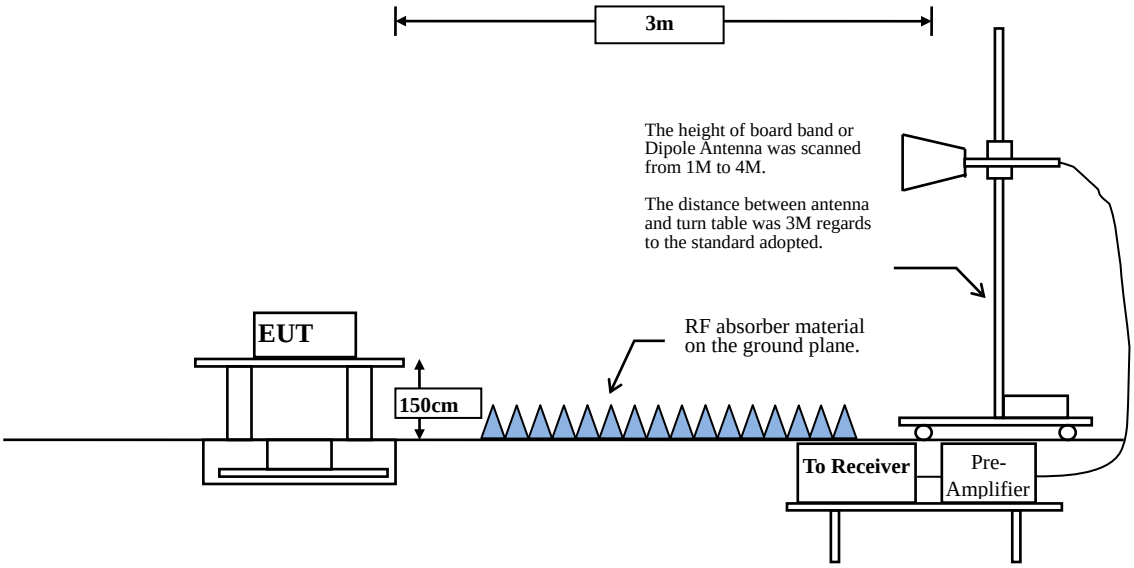
Under 30MHz



Below 1GHz



Above 1GHz


3m
The height of board band or Dipole Antenna was scanned from 1M to 4M.
The distance between antenna and turn table was 3M regards to the standard adopted.
EUT
150cm
RF absorber material on the ground plane.
To Receiver
Pre-Amplifier

4.2. Limits

➢ **General Radiated Emission Limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
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

Remarks: 1. RF Voltage (dBμV) = 20 log RF Voltage (uV)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to C63.10:2013 Section 11.12.1 for compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground,when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to C63.10 Section 11.12.2.4 Peak measurement procedure

RBW = as specified in Table 1.

VBW ≥ 3 x RBW.

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to C63.10 Section 11.12.2.5 Average measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

VBW ≥ 1/T, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
BLE	60.93	0.3971	2518	3000

Note: Duty Cycle Refer to Section 9

4.4. Uncertainty

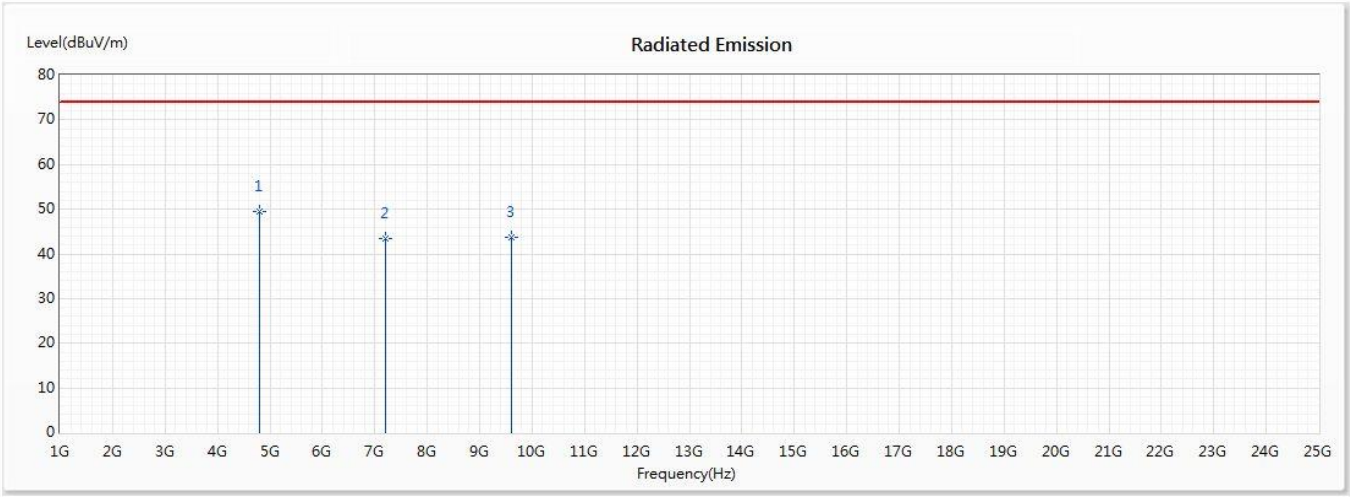
± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

4.5. Test Result of Radiated Emission

Product : Bluetooth Speakerphone
Test Item : Harmonic Radiated Emission
Test date : 2019/12/11
Test Mode : Mode 1: Transmit - BLE(2402MHz)

Horizontal



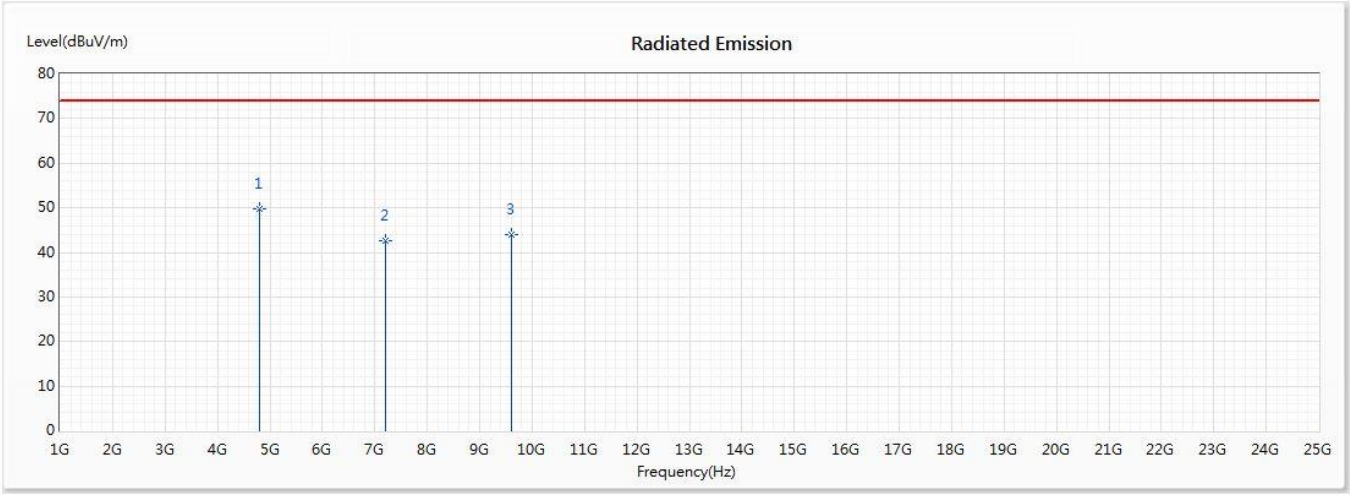
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	4804	49.49	74.00	-24.51	61.64	-12.15	PK
2	7206	43.47	74.00	-30.53	56.61	-13.14	PK
3	9608	43.80	74.00	-30.20	57.22	-13.42	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Bluetooth Speakerphone
Test Item : Harmonic Radiated Emission
Test date : 2019/12/11
Test Mode : Mode 1: Transmit - BLE(2402MHz)

Vertical



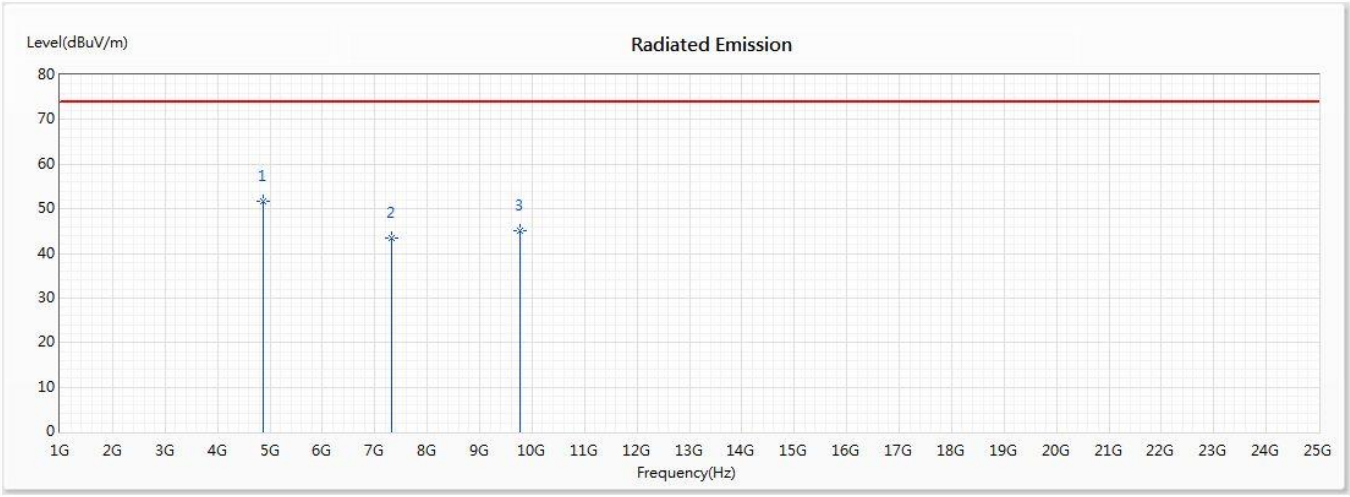
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	4804	49.87	74.00	-24.13	62.02	-12.15	PK
2	7206	42.55	74.00	-31.45	55.69	-13.14	PK
3	9608	43.86	74.00	-30.14	57.28	-13.42	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Bluetooth Speakerphone
Test Item : Harmonic Radiated Emission
Test date : 2019/12/11
Test Mode : Mode 1: Transmit - BLE (2440MHz)

Horizontal



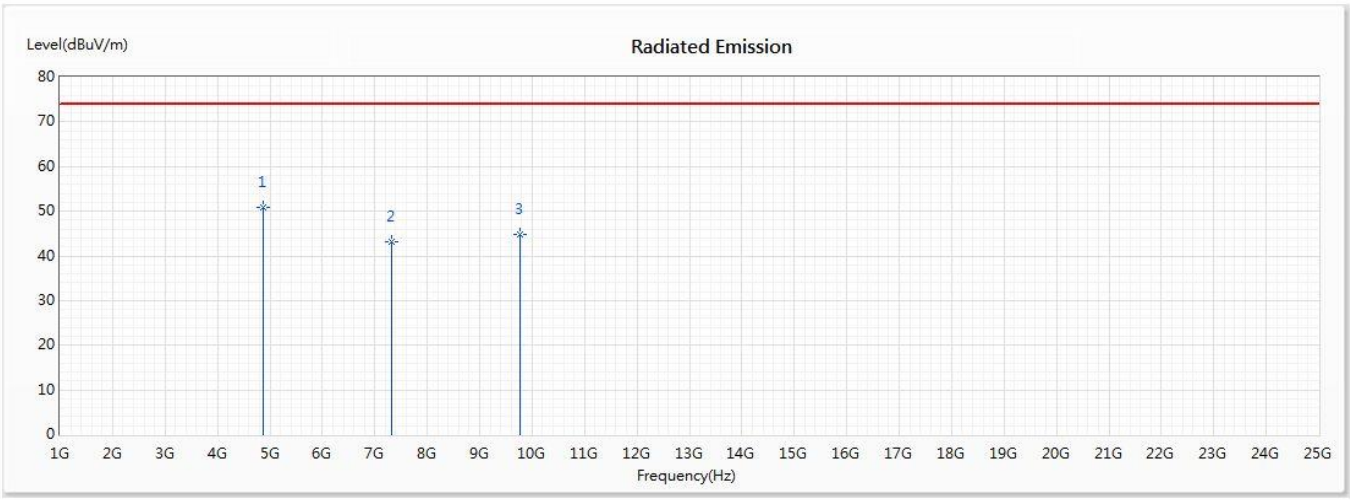
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	4880	51.77	74.00	-22.23	63.37	-11.60	PK
2	7320	43.42	74.00	-30.58	56.97	-13.55	PK
3	9760	45.13	74.00	-28.87	57.61	-12.48	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Bluetooth Speakerphone
Test Item : Harmonic Radiated Emission
Test date : 2019/12/11
Test Mode : Mode 1: Transmit - BLE (2440MHz)

Vertical



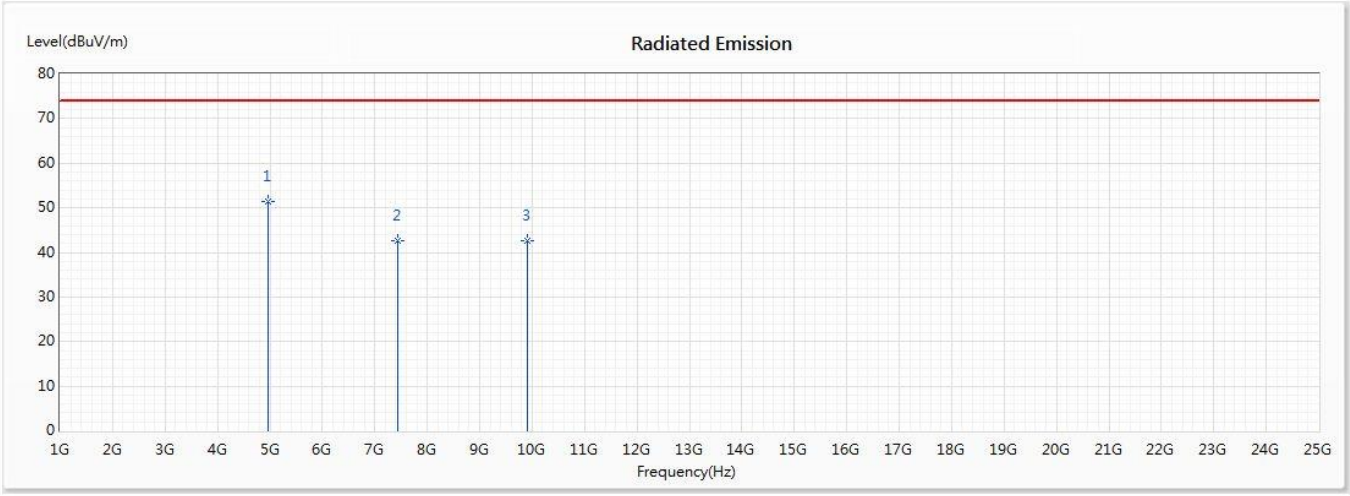
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	4880	50.93	74.00	-23.07	62.53	-11.60	PK
2	7320	43.15	74.00	-30.85	56.70	-13.55	PK
3	9760	44.90	74.00	-29.10	57.38	-12.48	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Bluetooth Speakerphone
Test Item : Harmonic Radiated Emission
Test date : 2019/12/11
Test Mode : Mode 1: Transmit - BLE (2480MHz)

Horizontal



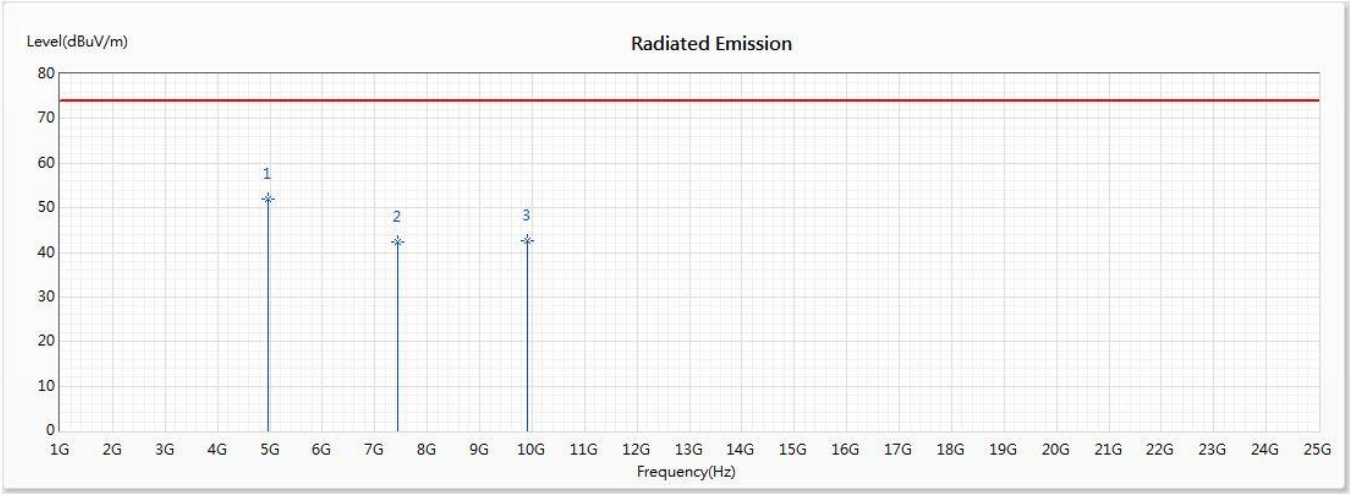
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	4960	51.28	74.00	-22.72	62.17	-10.89	PK
2	7440	42.49	74.00	-31.51	57.11	-14.62	PK
3	9920	42.69	74.00	-31.31	56.92	-14.23	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Bluetooth Speakerphone
Test Item : Harmonic Radiated Emission
Test date : 2019/12/11
Test Mode : Mode 1: Transmit - BLE (2480MHz)

Vertical



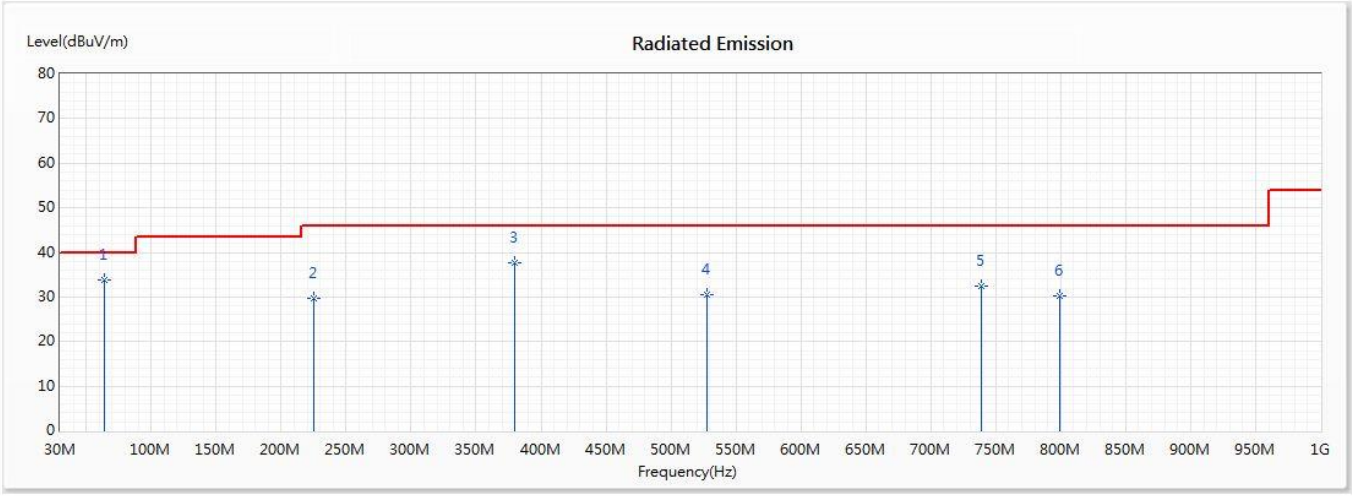
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	4960	51.92	74.00	-22.08	62.81	-10.89	PK
2	7440	42.24	74.00	-31.76	56.86	-14.62	PK
3	9920	42.73	74.00	-31.27	56.96	-14.23	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	Bluetooth Speakerphone
Test Item	:	General Radiated Emission
Test date	:	2019/12/12
Test Mode	:	Mode 1: Transmit - BLE (2440MHz)

Horizontal



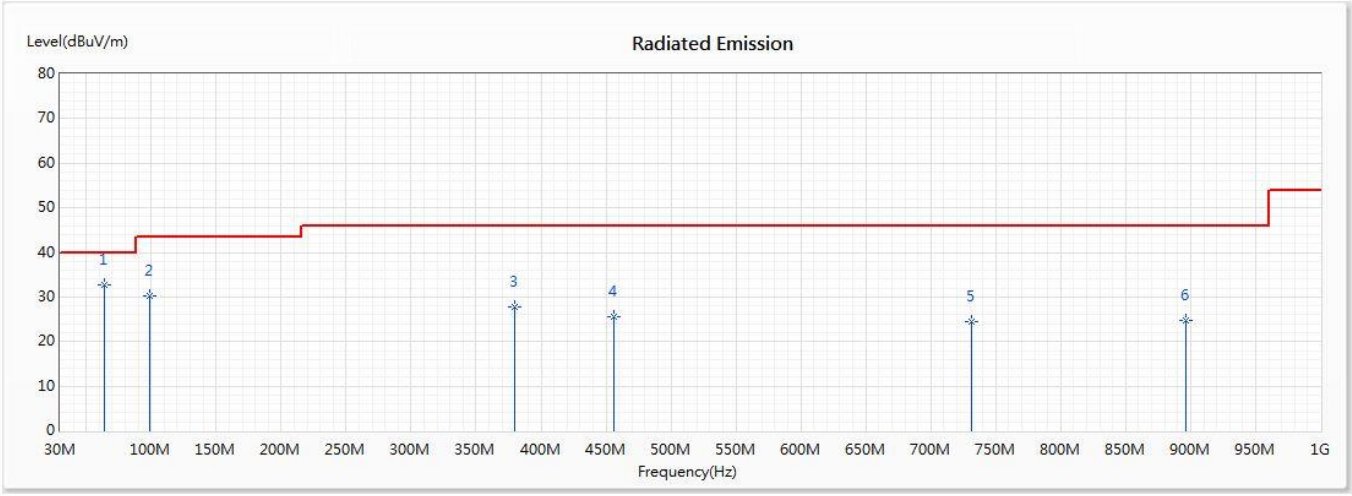
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	63.739	33.95	40.00	-6.05	54.27	-20.32	QP
2	225.406	29.65	46.00	-16.35	47.45	-17.80	QP
3	380.043	37.79	46.00	-8.21	49.81	-12.02	QP
4	527.652	30.48	46.00	-15.52	41.78	-11.30	QP
5	738.522	32.47	46.00	-13.53	38.22	-5.75	QP
6	798.971	30.36	46.00	-15.64	39.27	-8.91	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	Bluetooth Speakerphone
Test Item	:	General Radiated Emission
Test date	:	2019/12/12
Test Mode	:	Mode 1: Transmit - BLE (2440MHz)

Vertical



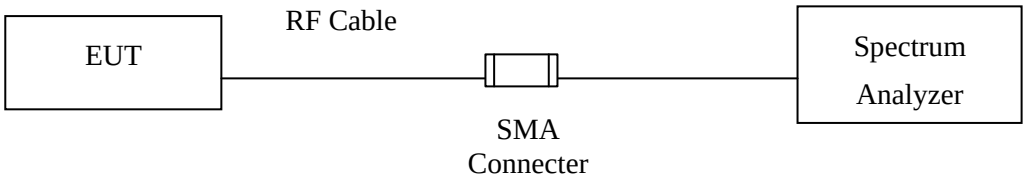
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	63.739	32.80	40.00	-7.20	53.12	-20.32	QP
2	98.884	30.11	43.50	-13.39	46.37	-16.26	QP
3	380.043	27.79	46.00	-18.21	39.81	-12.02	QP
4	455.957	25.48	46.00	-20.52	35.83	-10.35	QP
5	731.493	24.56	46.00	-21.44	31.53	-6.97	QP
6	895.971	24.84	46.00	-21.16	34.41	-9.57	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

5. RF Antenna Conducted Test

5.1. Test Setup



5.2. Limits

According to FCC Section 15.247(d). 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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.3. Test Procedure

The EUT was tested according to C63.10:2013 Section 11.11 for compliance to FCC 47CFR 15.247 requirements.

5.4. Uncertainty

± 1.20dB

5.5. Test Result of RF Antenna Conducted Test

Product : Bluetooth Speakerphone
Test Item : RF Antenna Conducted Test
Test date : 2019/12/09
Test Mode : Mode 1: Transmit - BLE

Figure Channel 00:

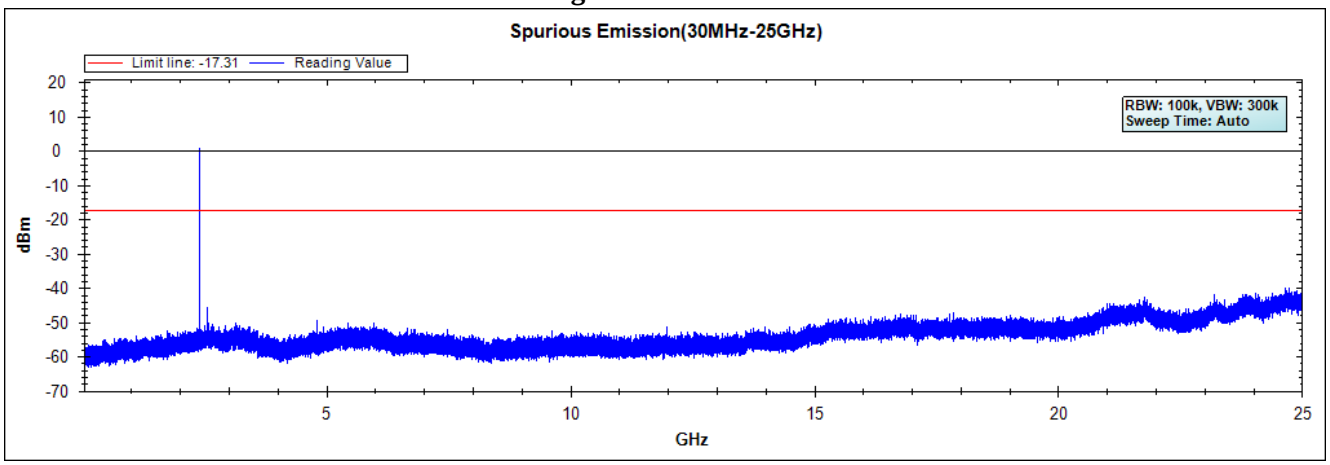


Figure Channel 19:

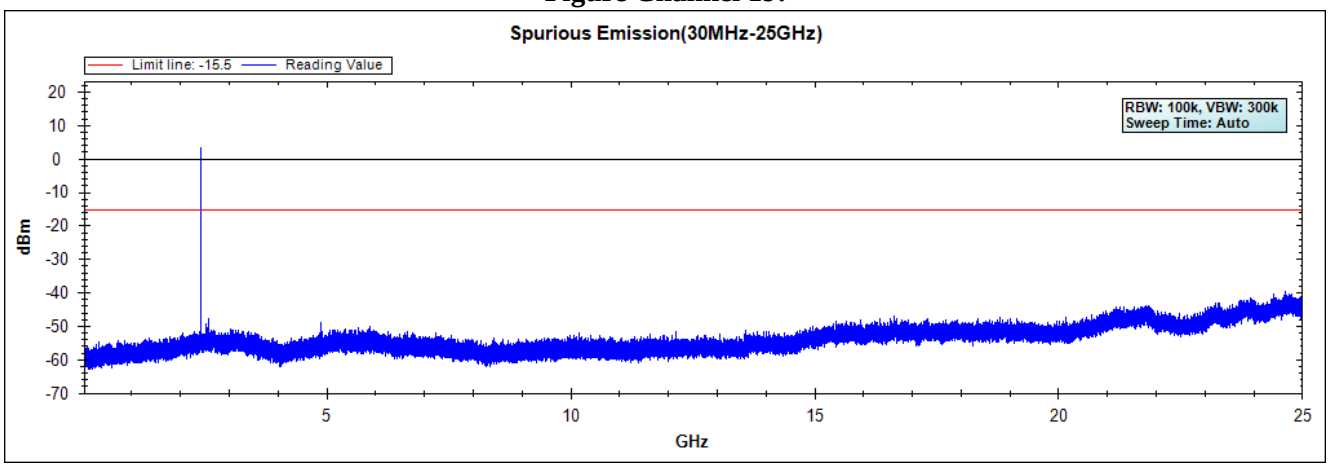
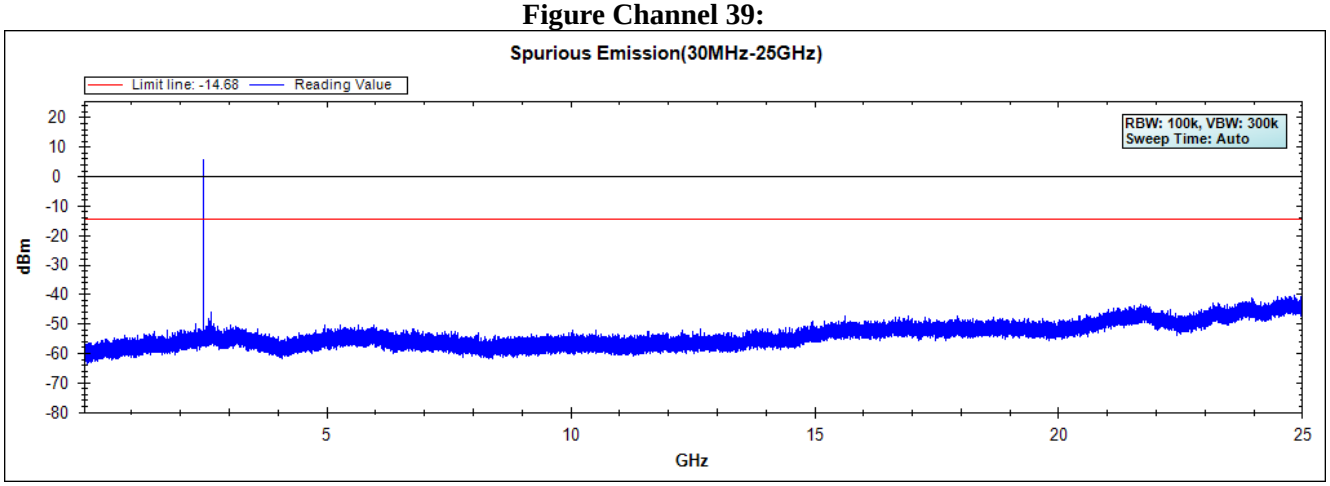


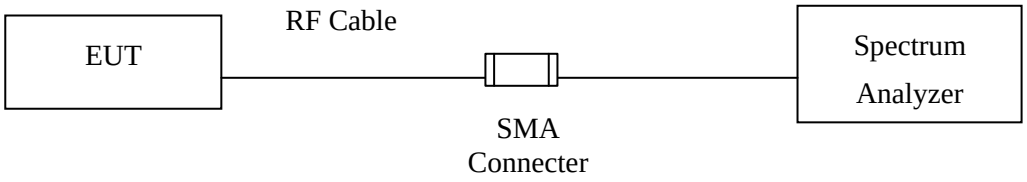
Figure Channel 39:



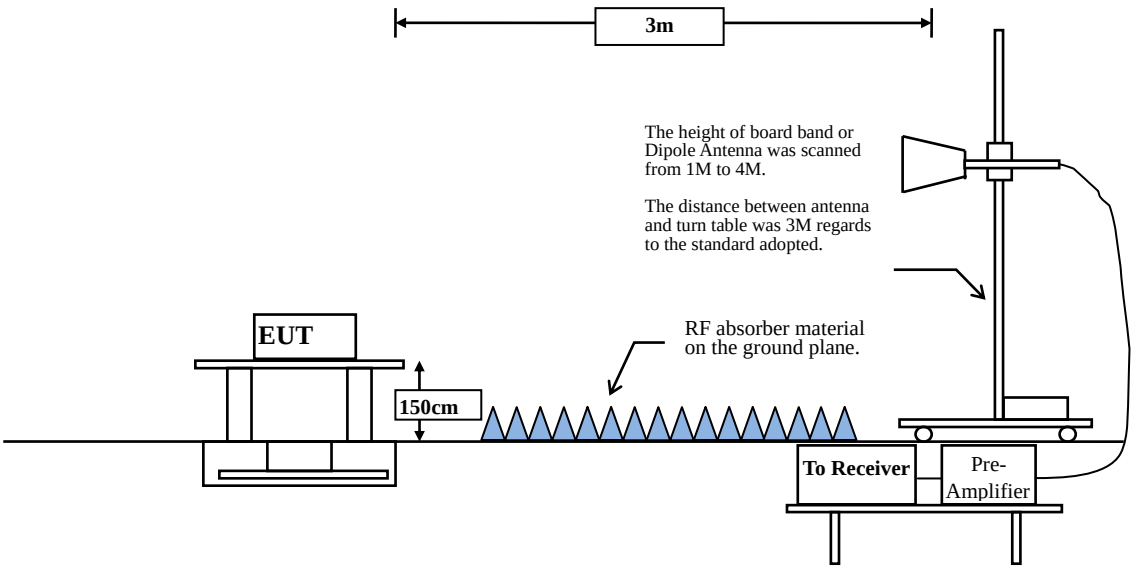
6. Band Edge

6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



6.2. Limit

According to FCC Section 15.247(d). 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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to ANSI C63.10, 2013 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.

RBW and VBW Parameter setting:

According to C63.10 Section 11.12.2.4 Peak measurement procedure

RBW = as specified in Table 1.

VBW ≥ 3 x RBW.

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to C63.10 Section 11.12.2.5 Average measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

VBW ≥ 1/T, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
BLE	60.93	0.3971	2518	3000

Note: Duty Cycle Refer to Section 9

6.4. Uncertainty

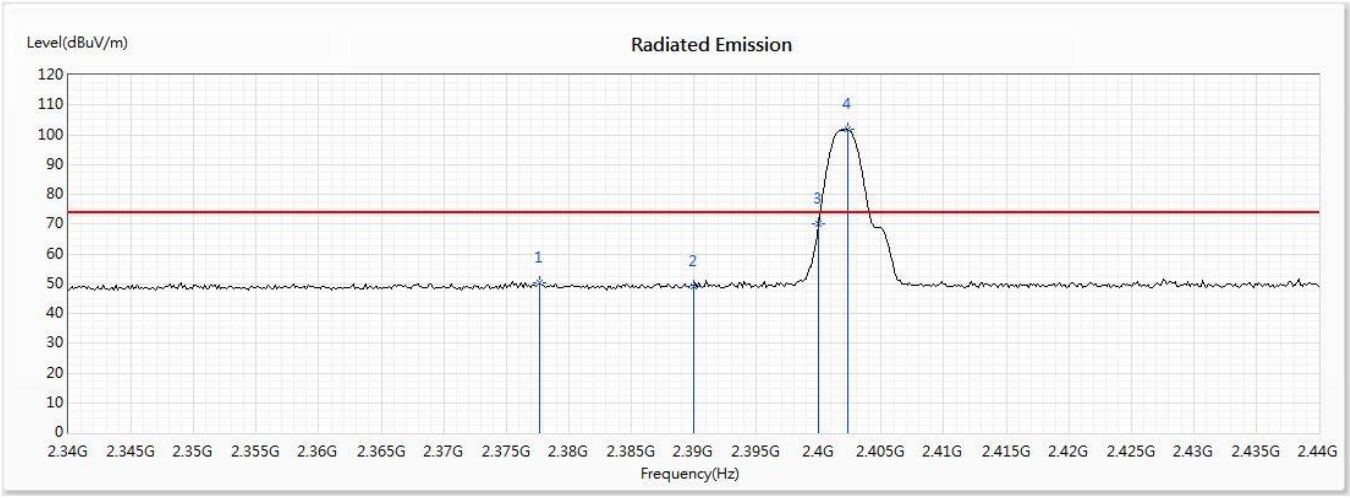
± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

6.5. Test Result of Band Edge

Product : Bluetooth Speakerphone
Test Item : Band Edge
Test date : 2019/12/10
Test Mode : Mode 1: Transmit - BLE (2402MHz)

Horizontal



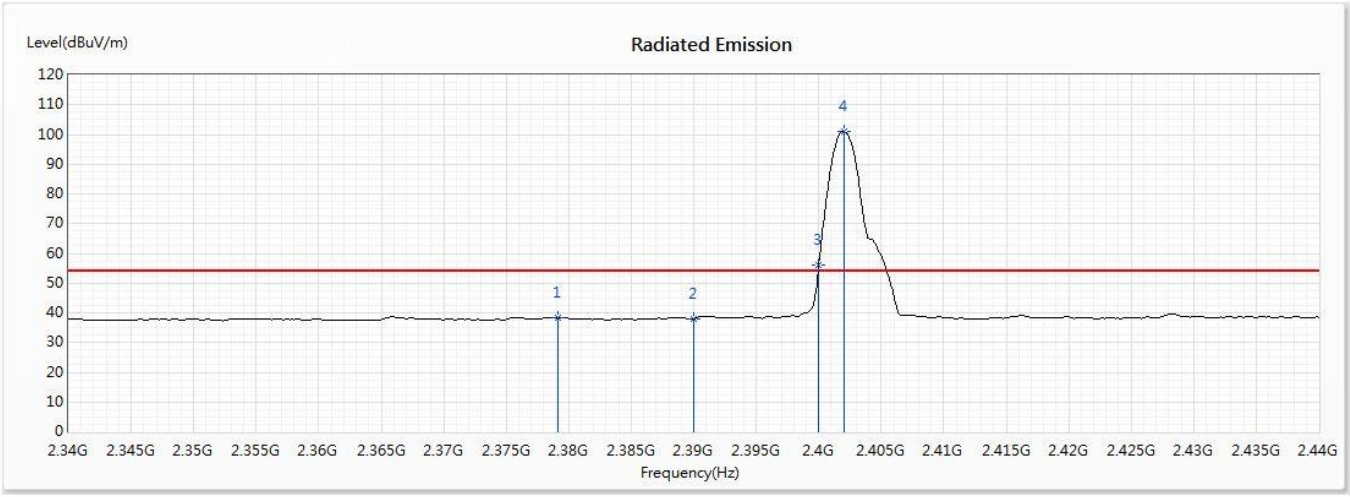
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	2377.681	50.40	74.00	-23.60	37.57	12.83	PK
2	2390	49.14	74.00	-24.86	36.25	12.89	PK
3	2400	70.26	--	--	57.30	12.96	PK
! 4	2402.319	101.76	--	--	88.79	12.97	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Bluetooth Speakerphone
Test Item : Band Edge
Test date : 2019/12/10
Test Mode : Mode 1: Transmit - BLE (2402MHz)

Horizontal



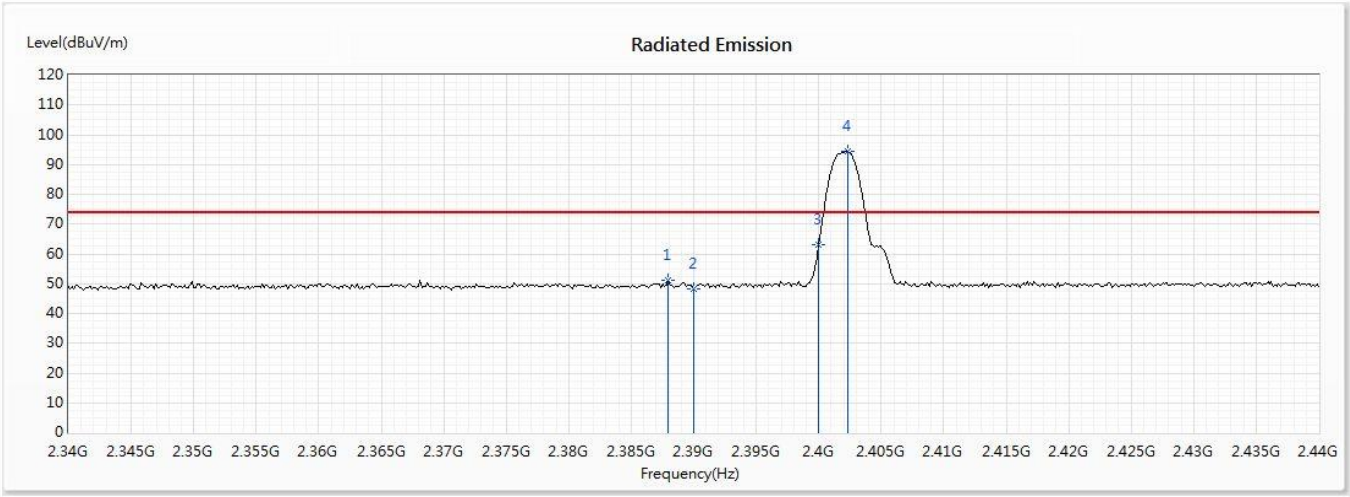
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	2379.13	38.52	54.00	-15.48	25.68	12.84	AV
2	2390	38.03	54.00	-15.97	25.14	12.89	AV
! 3	2400	56.00	--	--	43.04	12.96	AV
! 4	2402.029	100.92	--	--	87.95	12.97	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Bluetooth Speakerphone
Test Item : Band Edge
Test date : 2019/12/10
Test Mode : Mode 1: Transmit - BLE (2402MHz)

Vertical



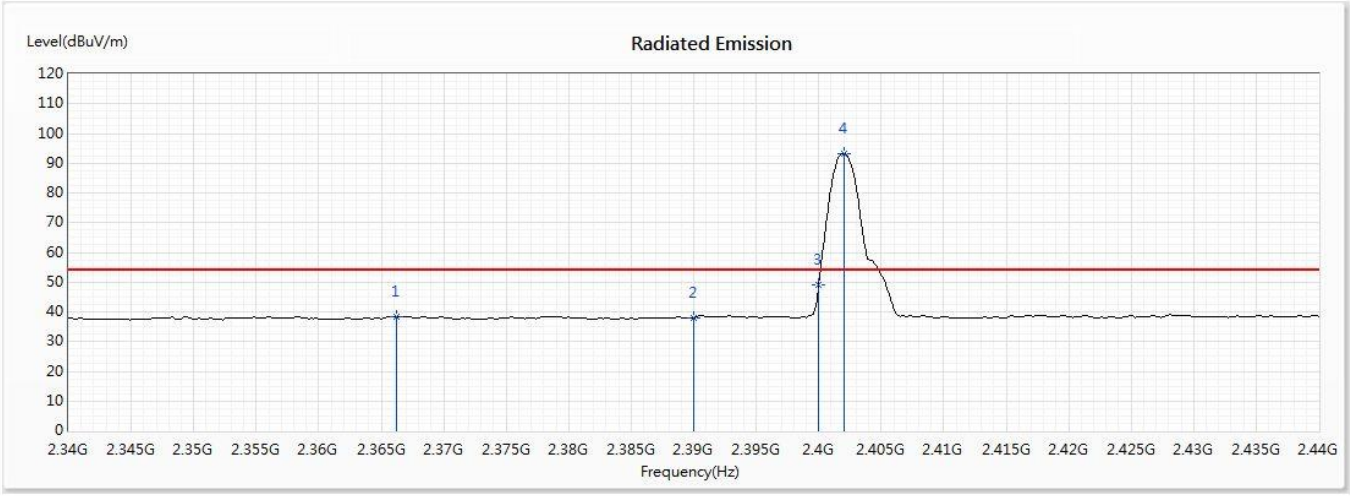
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	2387.971	51.07	74.00	-22.93	38.19	12.88	PK
2	2390	48.29	74.00	-25.71	35.40	12.89	PK
3	2400	63.14	--	--	50.18	12.96	PK
! 4	2402.319	94.25	--	--	81.28	12.97	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : Bluetooth Speakerphone
Test Item : Band Edge
Test date : 2019/12/10
Test Mode : Mode 1: Transmit - BLE (2402MHz)

Vertical



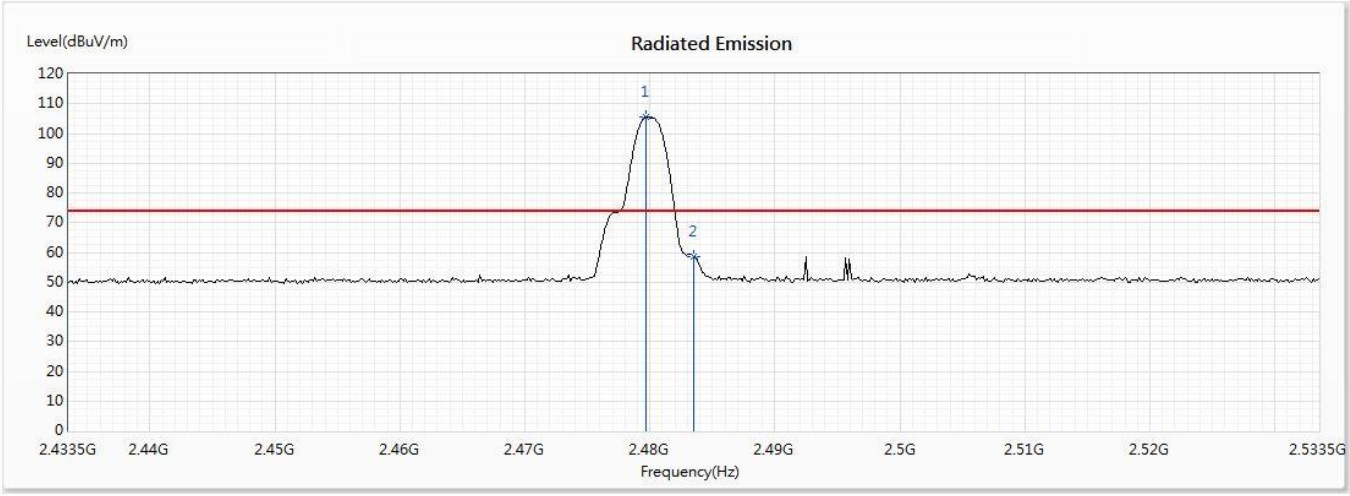
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	2366.232	38.44	54.00	-15.56	25.67	12.77	AV
2	2390	37.89	54.00	-16.11	25.00	12.89	AV
3	2400	49.19	--	--	36.23	12.96	AV
! 4	2402.029	93.36	--	--	80.39	12.97	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	Bluetooth Speakerphone
Test Item	:	Band Edge
Test date	:	2019/12/10
Test Mode	:	Mode 1: Transmit - BLE (2480MHz)

Horizontal



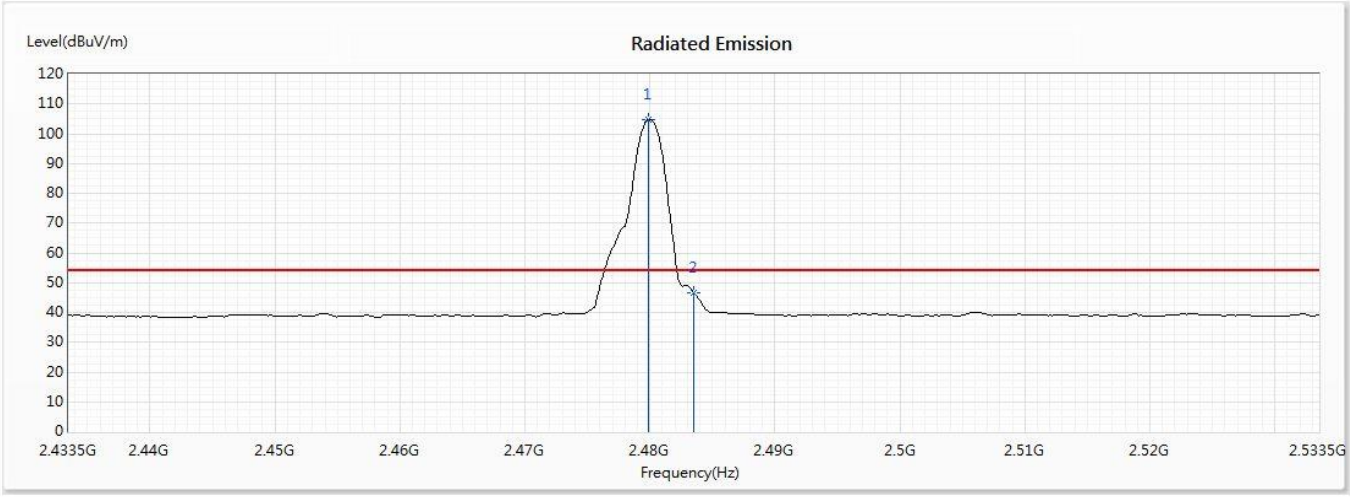
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
! 1	2479.732	105.48	--	--	92.11	13.37	PK
2	2483.5	58.67	74.00	-15.33	45.29	13.38	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	Bluetooth Speakerphone
Test Item	:	Band Edge
Test date	:	2019/12/10
Test Mode	:	Mode 1: Transmit - BLE (2480MHz)

Horizontal



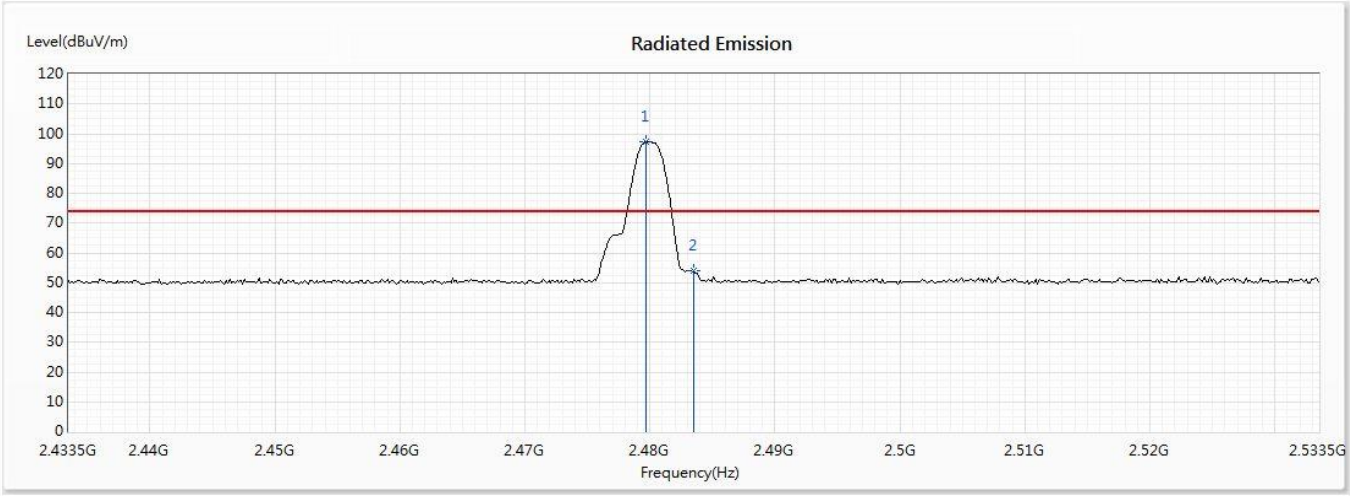
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
! 1	2479.877	104.76	--	--	91.39	13.37	AV
2	2483.5	46.76	54.00	-7.24	33.38	13.38	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	Bluetooth Speakerphone
Test Item	:	Band Edge
Test date	:	2019/12/10
Test Mode	:	Mode 1: Transmit - BLE (2480MHz)

Vertical



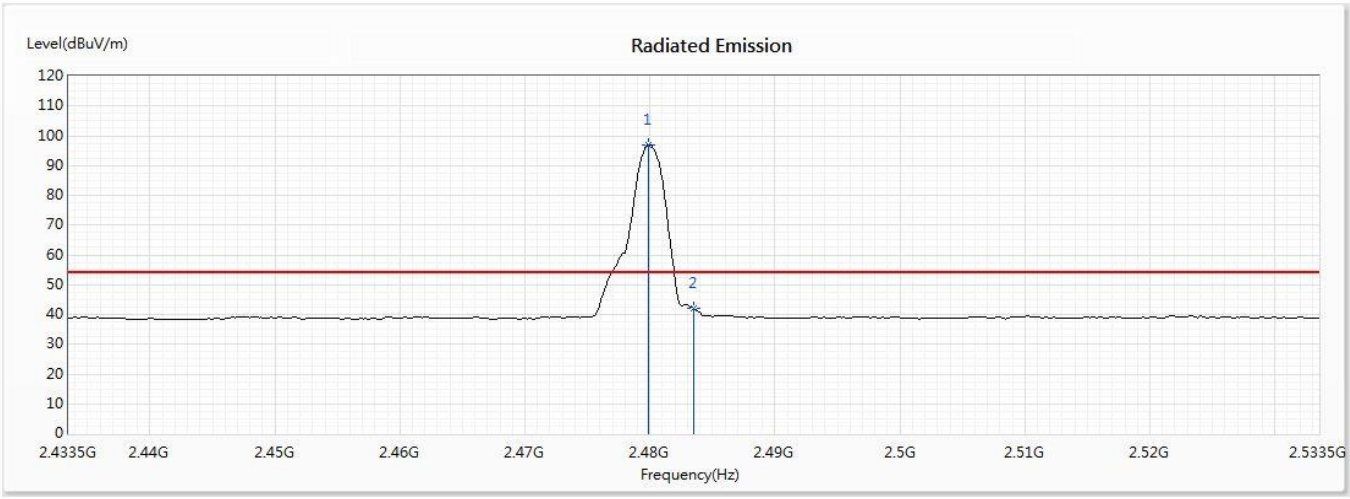
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
! 1	2479.732	97.48	--	--	84.11	13.37	PK
2	2483.5	53.99	74.00	-20.01	40.61	13.38	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	Bluetooth Speakerphone
Test Item	:	Band Edge
Test date	:	2019/12/10
Test Mode	:	Mode 1: Transmit - BLE (2480MHz)

Vertical



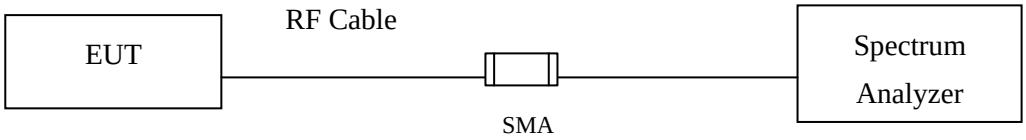
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
! 1	2479.877	96.74	--	--	83.37	13.37	AV
2	2483.5	42.09	54.00	-11.91	28.71	13.38	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

7. 6dB Bandwidth

7.1. Test Setup



7.2. Limits

The minimum bandwidth shall be at least 500 kHz.

7.3. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to ANSI C63.10 Section 11.8 for compliance to FCC 47CFR 15.247 requirements.

7.4. Uncertainty

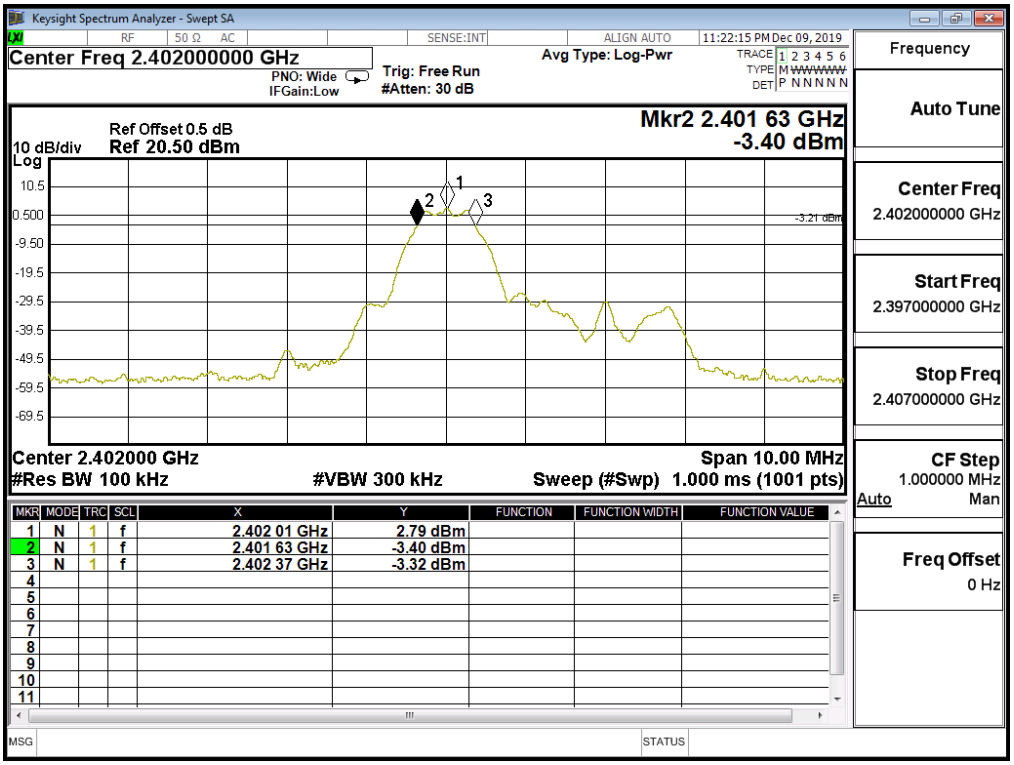
± 283Hz

7.5. Test Result of 6dB Bandwidth

Product : Bluetooth Speakerphone
Test Item : 6dB Bandwidth Data
Test Mode : Mode 1: Transmit - BLE (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	740	>500	Pass

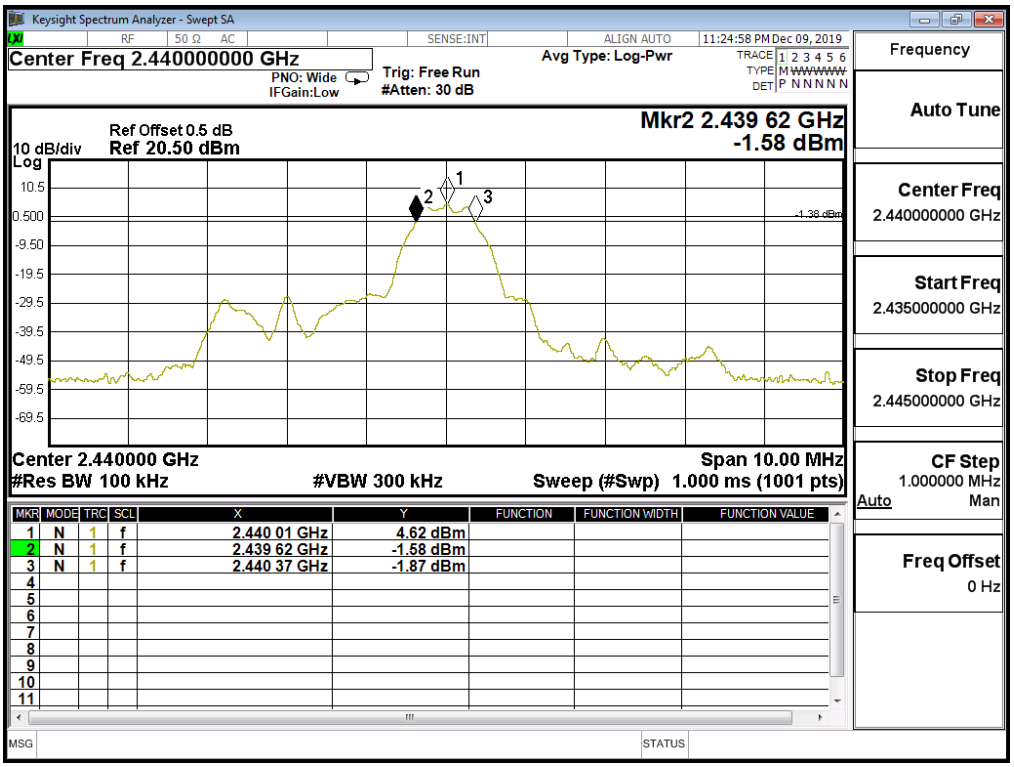
Figure Channel 00:



Product : Bluetooth Speakerphone
Test Item : 6dB Bandwidth Data
Test Mode : Mode 1: Transmit - BLE (2440MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
19	2440	750	>500	Pass

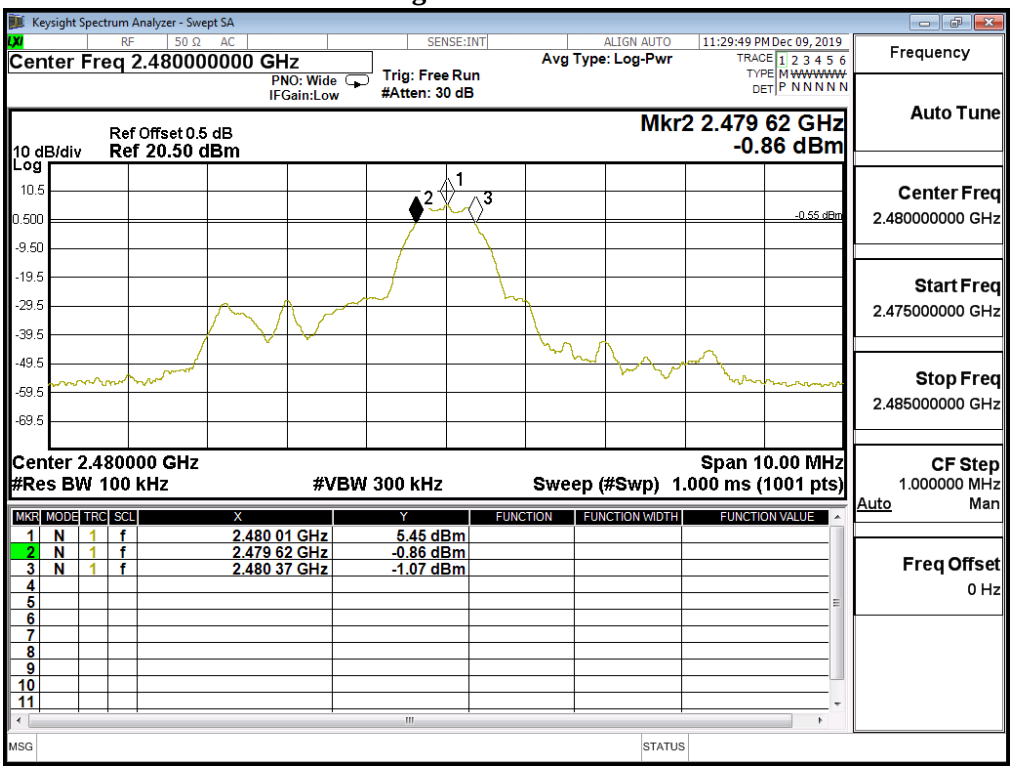
Figure Channel 19:



Product : Bluetooth Speakerphone
Test Item : 6dB Bandwidth Data
Test Mode : Mode 1: Transmit - BLE (2480MHz)

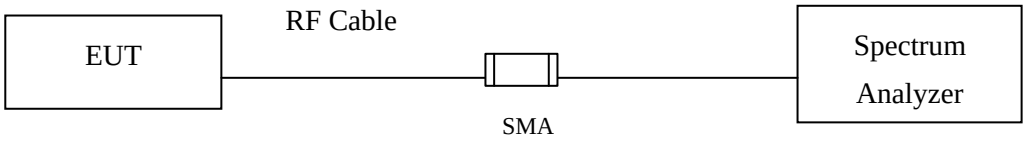
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2480	750	>500	Pass

Figure Channel 39:



8. Power Density

8.1. Test Setup



8.2. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013, the maximum power spectral density using C63.10 Section 11.10.2 Method PKPSD (peak PSD).

8.4. Uncertainty

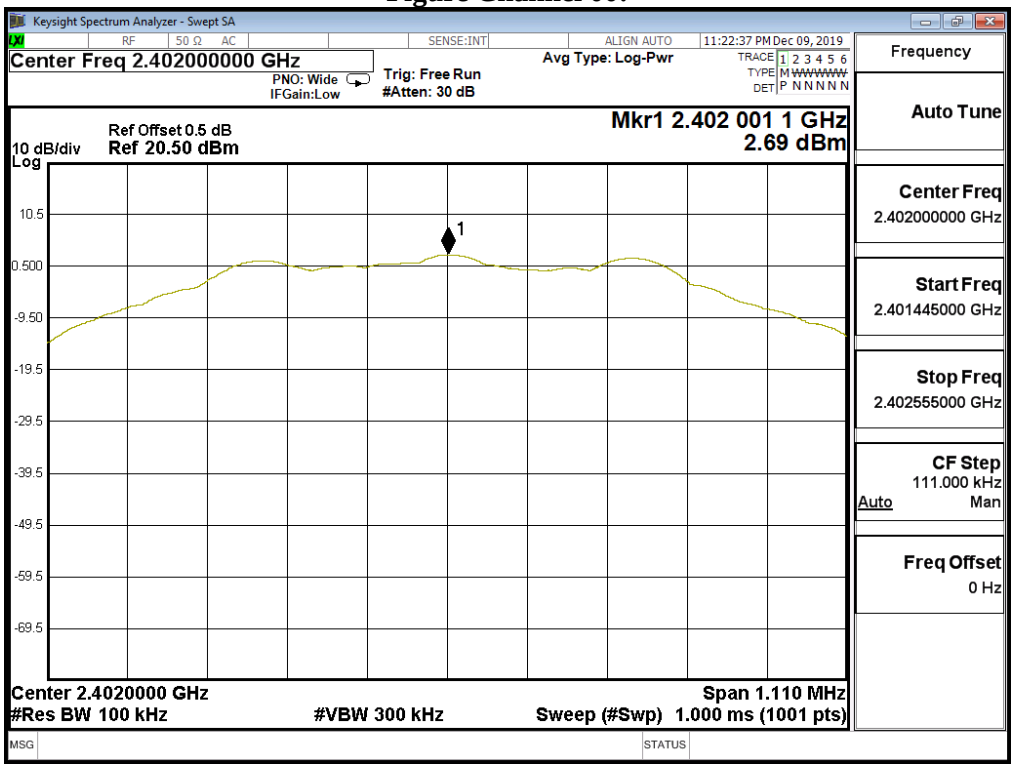
± 1.20 dB

8.5. Test Result of Power Density

Product : Bluetooth Speakerphone
Test Item : Power Density Data
Test Mode : Mode 1: Transmit - BLE (2402MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
00	2402	2.69	≦8dBm	Pass

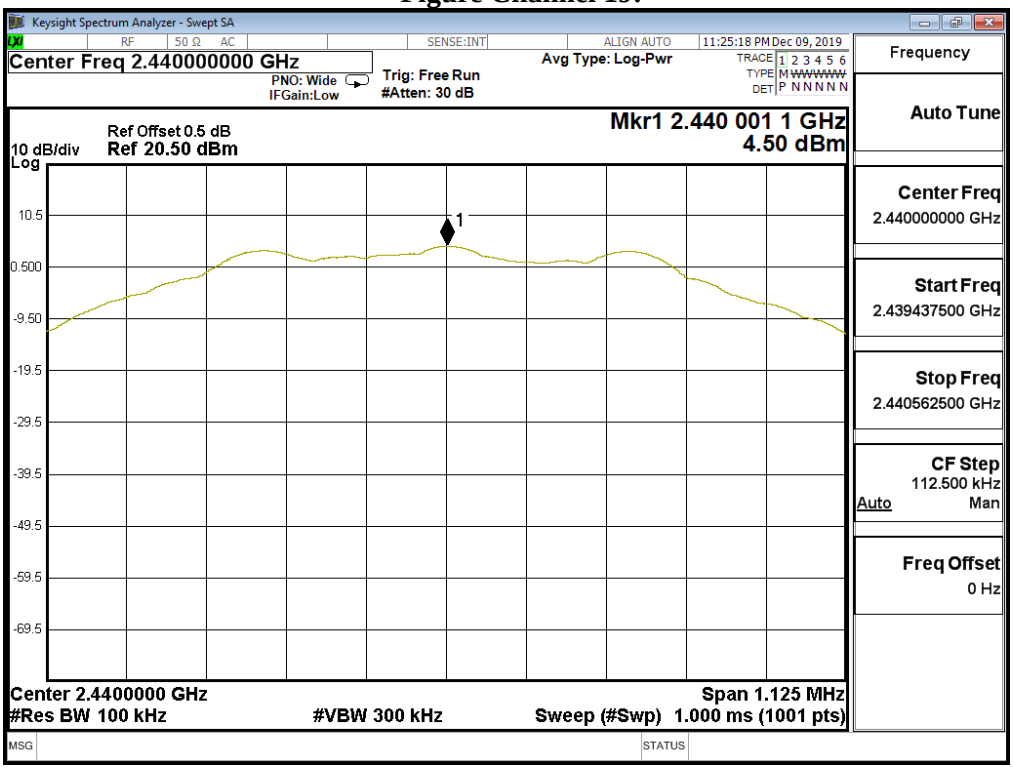
Figure Channel 00:



Product : Bluetooth Speakerphone
Test Item : Power Density Data
Test Mode : Mode 1: Transmit - BLE (2440MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
19	2440	4.50	≦8dBm	Pass

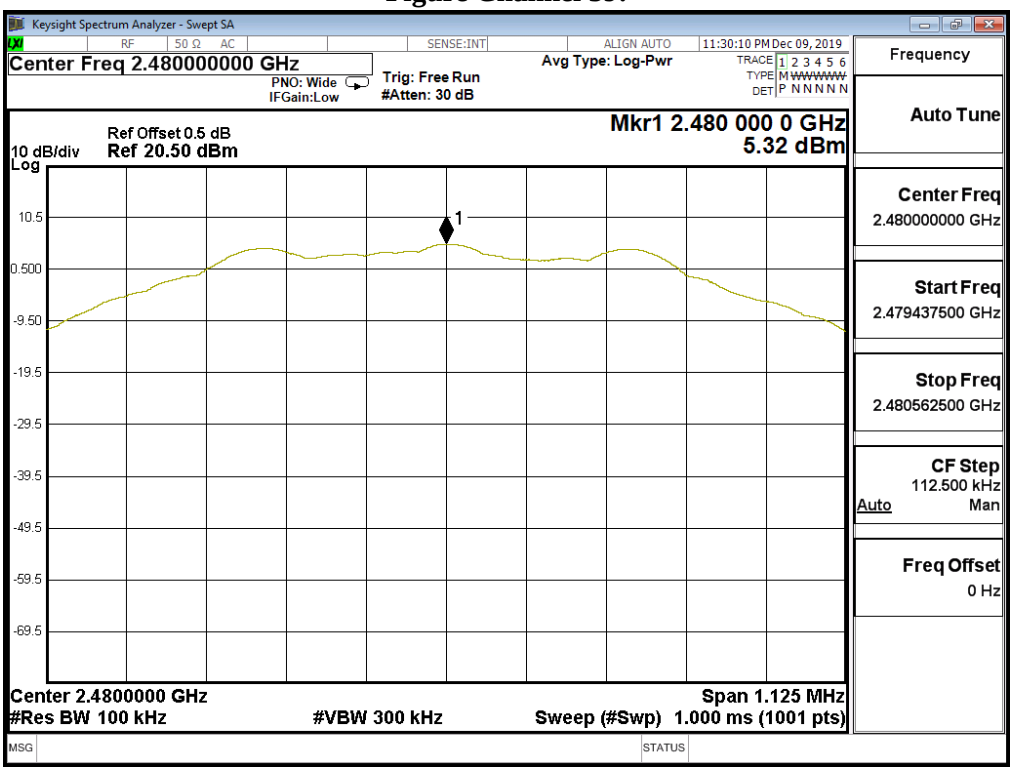
Figure Channel 19:



Product : Bluetooth Speakerphone
Test Item : Power Density Data
Test Mode : Mode 1: Transmit - BLE (2480MHz)

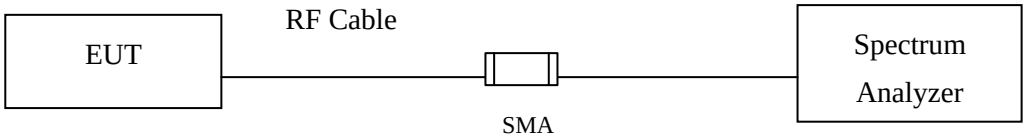
Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
39	2480	5.32	≦8dBm	Pass

Figure Channel 39:



9. Duty Cycle

9.1. Test Setup



9.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to ANSI C63.10 2013 for compliance to FCC 47CFR 15.247 requirements.

9.3. Uncertainty

± 2.31msec

9.4. Test Result of Duty Cycle

Product : Bluetooth Speakerphone
Test Item : Duty Cycle
Test Mode : Mode 1: Transmit - BLE

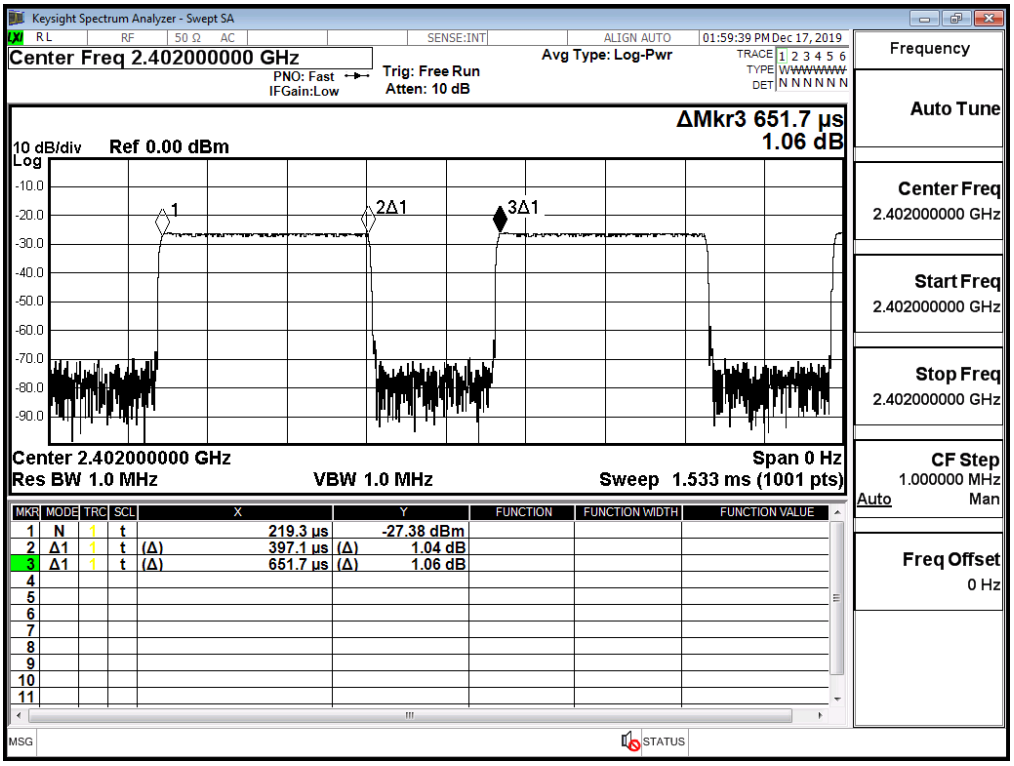
Duty Cycle Formula:

Duty Cycle = Ton / (Ton + Toff)

Duty Factor = 10 Log (1/Duty Cycle)

Results:

2.4GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
BLE	0.3971	0.6517	60.93	2.15



10. EMI Reduction Method During Compliance Testing

No modification was made during testing.