

FCC Test Report

Product Name	Bluetooth Headset
Model No.	HSC070W
FCC ID.	BCE-HSC070W

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

Date of Receipt	Sep. 25, 2017
Issued Date	Oct. 03, 2017
Report No.	1790338R-RFUSP01V00-A
Report Version	V1.0



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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Test Report

Issued Date: Oct. 03, 2017

Report No.: 1790338R-RFUSP01V00-A



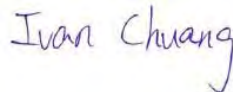
Product Name	Bluetooth Headset
Applicant	GN Audio A/S
Address	Lautrupbjerg 7,DK-2750 Ballerup,Denmark.
Manufacturer	GN Audio A/S
Model No.	HSC070W
FCC ID.	BCE-HSC070W
EUT Rated Voltage	DC 3.8V (Power by Battery) or DC 5V (Power by USB)
EUT Test Voltage	DC 5V (Power by USB)
Trade Name	Jabra
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2016 ANSI C63.4: 2014, ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v04
Test Result	Complied

Documented By :



(Senior Adm. Specialist / Jinn Chen)

Tested By :



(Senior Engineer / Ivan Chuang)

Approved By :



(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Bluetooth Headset
Trade Name	Jabra
Model No.	HSC070W
FCC ID.	BCE-HSC070W
Frequency Range	2402 – 2480MHz
Channel Number	V4.0: 40CH
Type of Modulation	V4.0: GFSK(1Mbps)
Antenna Type	IFA Antenna
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”
USB Cable	Non-shielded, 1.5m

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Jabra	HSC070W	IFA Antenna	-4.64 dBi for 2.4 GHz

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

Center Frequency of Each Channel: (For V4.0)

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 Headset with built-in Bluetooth V4.0 、 V2.1+EDR transceiver, this report for Bluetooth V4.0.
2. These tests were conducted on a sample for the purpose of demonstrating compliance of Bluetooth V4.0 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
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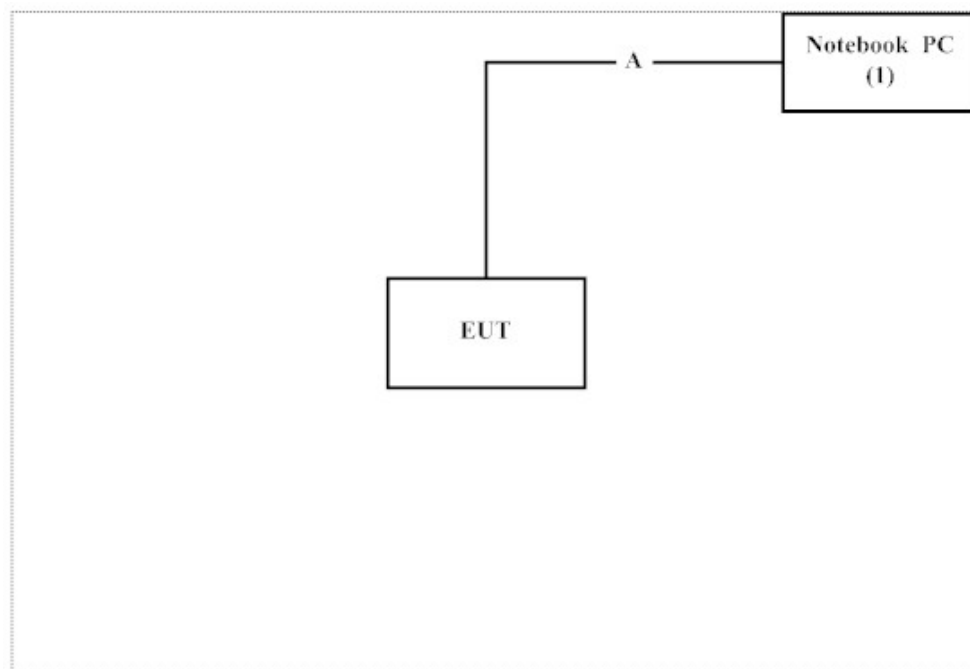
1.3. Tested System Details

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	P62G	416FJC2	N/A

Signal Cable Type		Signal cable Description
A	USB Cable	Non-Shielded, 1.5m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4.
- (2) Execute software “Blue Test 3 v2.6.2” on the Notebook PC.
- (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:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en

Site Description: Accredited by TAF
Accredited Number: 3023

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Site Address: No.159, Sec. 2, Wenhua 1st Rd., Linkou Dist.,
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TEL: 886-2-2602-7968 / FAX : 866-2-2602-3286
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW3023

1.7. List of Test Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	EMI Test Receiver	R&S	ESR7	101601	2017.01.06	2018.01.05
X	Two-Line V-Network	R&S	ENV216	101306	2017.02.16	2018.02.15
X	Two-Line V-Network	R&S	ENV216	101307	2017.03.17	2018.03.16
X	Coaxial Cable	Quietek	RG400_BNC	RF001	2017.05.24	2018.05.23

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 : QuieTek EMI 2.0 V2.1.113

For Conducted measurements /ASR4

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Spectrum Analyzer	R&S	FSV30	103464	2017.01.09	2018.01.08
X	Power Meter	Anritsu	ML2496A	1548003	2016.12.15	2017.12.14
X	Power Sensor	Anritsu	MA2411B	1531024	2016.12.15	2017.12.14
X	Power Sensor	Anritsu	MA2411B	1531025	2016.12.15	2017.12.14
	Bluetooth Tester	R&S	CBT	101238	2017.01.03	2018.01.02

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 : QuieTek Conduction Test System V8.0.110

For Radiated measurements /ACB1

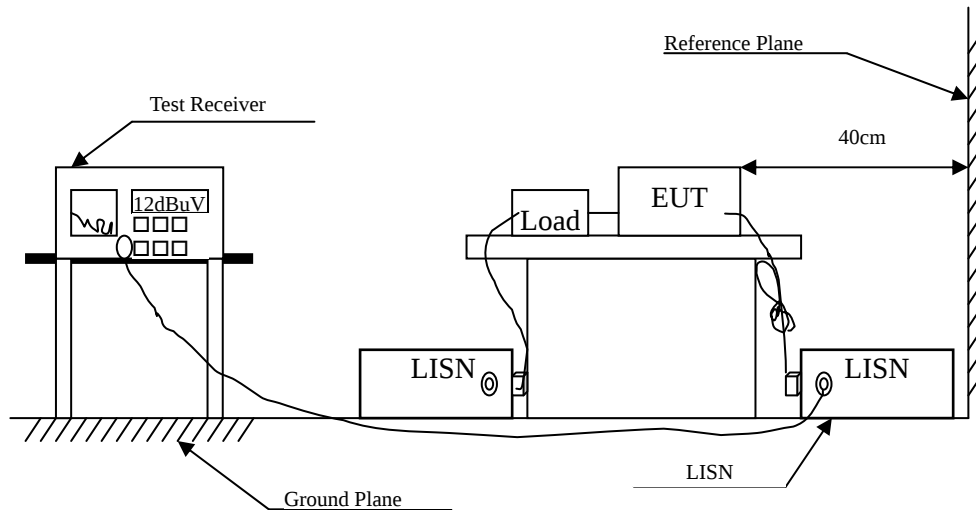
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	TESEQ	HLA6121	37133	2016.03.18	2018.03.17
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-674	2017.02.13	2018.02.12
X	Horn Antenna	ETS-Lindgren	3117	00203800	2016.10.13	2017.10.12
X	Horn Antenna	Com-Power	AH-840	101087	2017.05.24	2018.05.23
X	Pre-Amplifier	EMCI	EMC001330	980316	2017.05.16	2018.05.15
X	Pre-Amplifier	EMCI	EMC051835SE	980311	2017.05.17	2018.05.16
X	Pre-Amplifier	EMCI	EMC05820SE	980310	2017.05.17	2018.05.16
X	Pre-Amplifier	EMCI	EMC184045SE	980314	2017.05.17	2018.05.16
X	Filter	MICRO TRONICS	BRM50702	G249	2017.08.11	2018.08.10
	Filter	MICRO TRONICS	BRM50716	G187	2017.08.16	2018.08.15
X	EMI Test Receiver	R&S	ESR7	101602	2016.12.15	2017.12.14
X	Spectrum Analyzer	R&S	FSV40	101148	2017.01.24	2018.01.23
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2017.05.25	2018.05.24
X	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2017.08.11	2018.08.10

Note:

1. Loop Antenna is calibrated every two year, 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 2.0 V2.1.113

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) 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 investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.4, 2014; tested to DTS test procedure of FCC KDB-558074 for compliance to FCC 47CFR Subpart C requirements.

2.4. Uncertainty

±2.35dB

2.5. Test Result of Conducted Emission

Product : Bluetooth Headset
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmit - BLE (2440MHz)
 Test Date : 2017/09/27

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.151	9.614	40.436	50.050	-15.921	65.971
0.480	9.698	29.831	39.529	-17.042	56.571
0.720	9.710	15.238	24.948	-31.052	56.000
3.500	9.795	24.431	34.226	-21.774	56.000
9.600	9.927	23.606	33.533	-26.467	60.000
21.374	10.080	7.834	17.914	-42.086	60.000
Average					
0.151	9.614	25.490	35.104	-20.867	55.971
0.480	9.698	19.663	29.362	-17.209	46.571
0.720	9.710	6.293	16.003	-29.997	46.000
3.500	9.795	13.037	22.832	-23.168	46.000
9.600	9.927	18.338	28.266	-21.734	50.000
21.374	10.080	1.156	11.236	-38.764	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Bluetooth Headset
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmit - BLE (2440MHz)
 Test Date : 2017/09/27

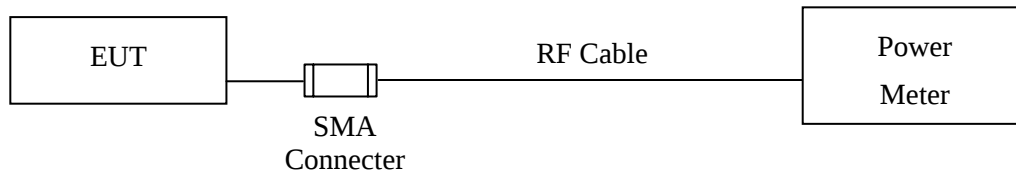
Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
LINE 2					
Quasi-Peak					
0.154	9.611	38.141	47.751	-18.135	65.886
0.490	9.690	23.270	32.960	-23.326	56.286
1.394	9.730	13.946	23.676	-32.324	56.000
3.400	9.794	22.707	32.501	-23.499	56.000
9.651	9.928	15.989	25.917	-34.083	60.000
21.320	10.113	8.960	19.074	-40.926	60.000
Average					
0.154	9.611	19.950	29.560	-26.326	55.886
0.490	9.690	16.163	25.853	-20.433	46.286
1.394	9.730	8.100	17.830	-28.170	46.000
3.400	9.794	12.408	22.202	-23.798	46.000
9.651	9.928	10.049	19.977	-30.023	50.000
21.320	10.113	3.827	13.940	-36.060	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

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 DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using KDB 558074 section 9.1.2 PKPM1 Peak power meter method.

3.4. Uncertainty

± 0.86 dB

3.5. Test Result of Peak Power Output

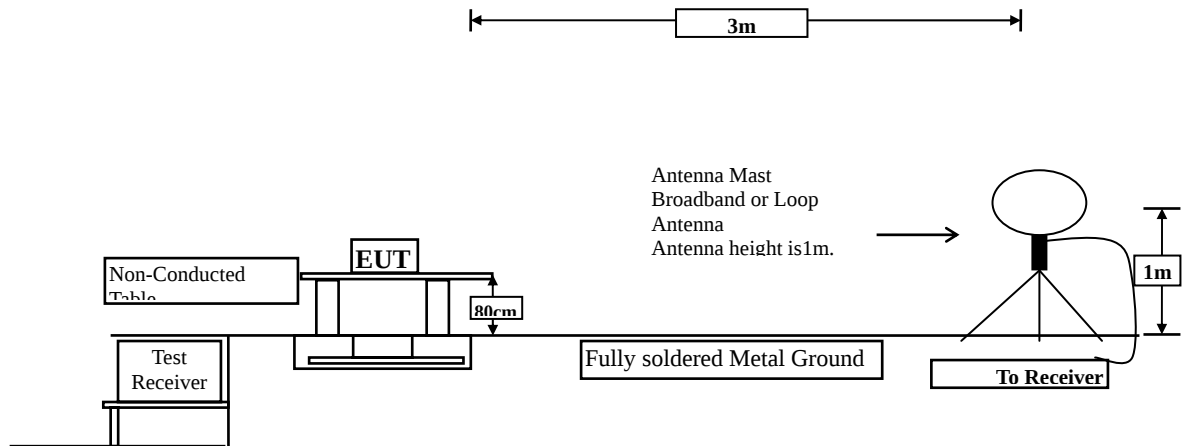
Product : Bluetooth Headset
Test Item : Peak Power Output
Test Mode : Mode 1: Transmit - BLE
Test Date : 2017/09/28

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	7.85	1 Watt= 30 dBm	Pass
Channel 19	2440.00	8.59	1 Watt= 30 dBm	Pass
Channel 39	2480.00	8.98	1 Watt= 30 dBm	Pass

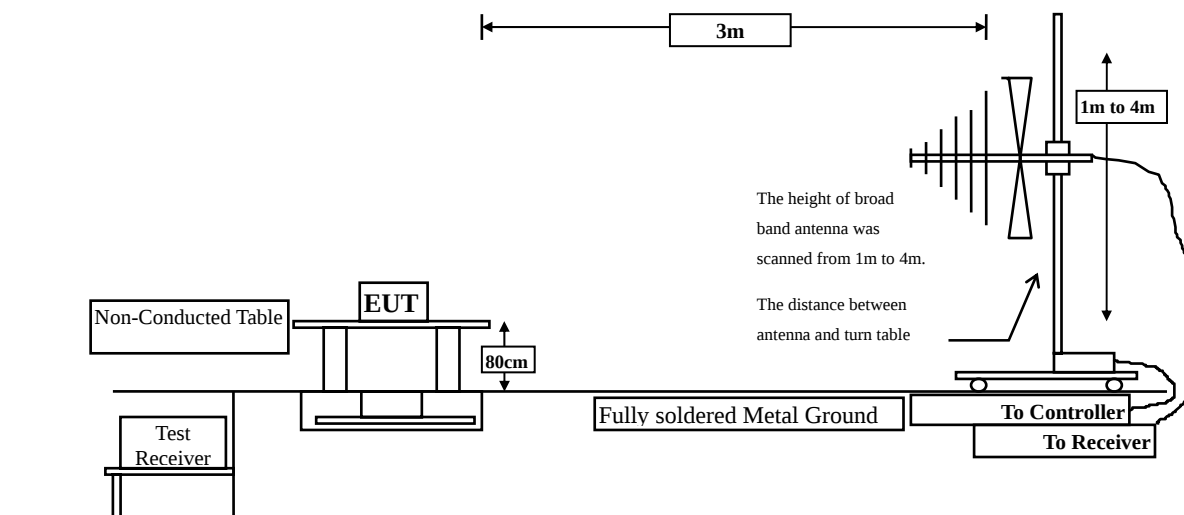
4. Radiated Emission

4.1. Test Setup

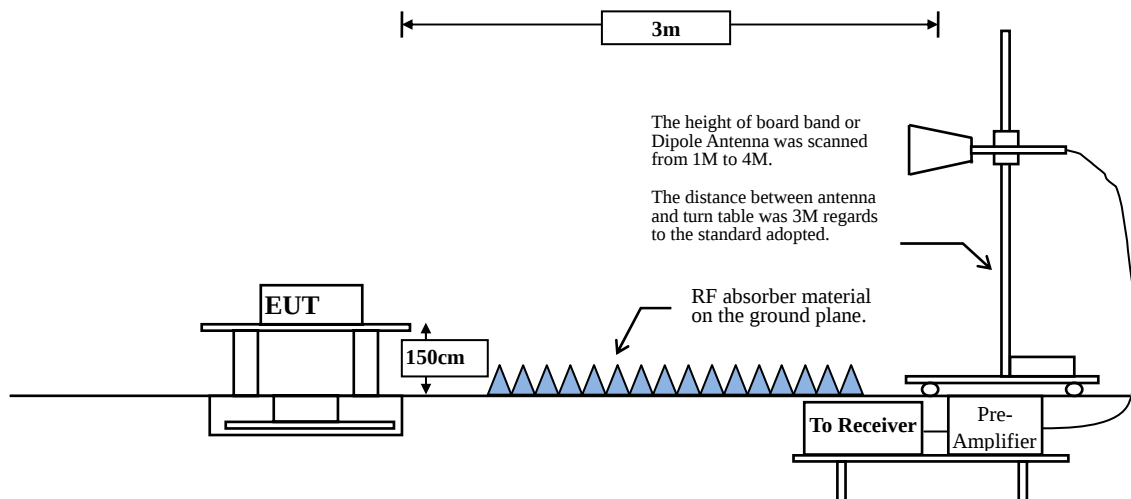
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



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 (dBuV) = 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 DTS test procedure of KDB558074 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 measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to KDB 558074 section 12.2.4. Peak power measurement procedure

RBW = as specified in Table 1.

$VBW \geq 3 \times RBW$.

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 KDB 558074 section 12.2.5. Average power measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle $\geq 98\%$

$VBW \geq 1/T$, 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	63.22	0.3986	2509	3k

Note: Duty Cycle Refer to Section 9

4.4. Uncertainty

Horizontal polarization :

30-300MHz: $\pm 4.08\text{dB}$; 300M-1GHz: $\pm 3.86\text{dB}$; 1-18GHz: $\pm 3.77\text{dB}$; 18-40GHz: $\pm 3.98\text{dB}$

Vertical polarization :

30-300MHz: $\pm 4.81\text{dB}$; 300M-1GHz: $\pm 3.87\text{dB}$; 1-18GHz : $\pm 3.83\text{dB}$; 18-40GHz: $\pm 3.98\text{dB}$

4.5. Test Result of Radiated Emission

Product : Bluetooth Headset
 Test Item : Harmonic Radiated Emission
 Test Mode : Mode 1: Transmit - BLE(2402MHz)
 Test Date : 2017/09/28

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4804.000	-6.114	61.170	55.056	-18.944	74.000
7206.000	-3.112	52.260	49.148	-24.852	74.000
9608.000	-0.801	46.330	45.530	-28.470	74.000
Average					
Detector:					
4804.000	-6.114	57.450	51.336	-2.664	54.000
Vertical					
Peak Detector:					
4804.000	-6.114	58.380	52.266	-21.734	74.000
7206.000	-3.112	50.090	46.978	-27.022	74.000
9608.000	-0.801	46.380	45.580	-28.420	74.000
Average					
Detector:					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement 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 Headset
 Test Item : Harmonic Radiated Emission
 Test Mode : Mode 1: Transmit - BLE (2440MHz)
 Test Date : 2017/09/28

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4880.000	-6.069	61.110	55.041	-18.959	74.000
7320.000	-3.027	52.620	49.593	-24.407	74.000
9760.000	-0.527	46.830	46.302	-27.698	74.000
Average					
Detector:					
4880.000	-6.069	57.410	51.341	-2.659	54.000
Vertical					
Peak Detector:					
4880.000	-6.069	58.500	52.431	-21.569	74.000
7320.000	-3.027	50.750	47.723	-26.277	74.000
9760.000	-0.527	46.390	45.862	-28.138	74.000
Average					
Detector:					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement 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 Headset
 Test Item : Harmonic Radiated Emission
 Test Mode : Mode 1: Transmit - BLE (2480MHz)
 Test Date : 2017/09/28

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4960.000	-6.055	61.570	55.515	-18.485	74.000
7440.000	-2.861	47.220	44.358	-29.642	74.000
9920.000	-0.306	45.970	45.664	-28.336	74.000
Average					
Detector:					
4960.000	-6.055	57.930	51.875	-2.125	54.000
Vertical					
Peak Detector:					
4960.000	-6.055	58.850	52.795	-21.205	74.000
7440.000	-2.861	47.740	44.878	-29.122	74.000
9920.000	-0.306	45.880	45.574	-28.426	74.000
Average					
Detector:					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement 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 Headset
 Test Item : General Radiated Emission
 Test Mode : Mode 1: Transmit - BLE (2440MHz)
 Test Date : 2017/09/28

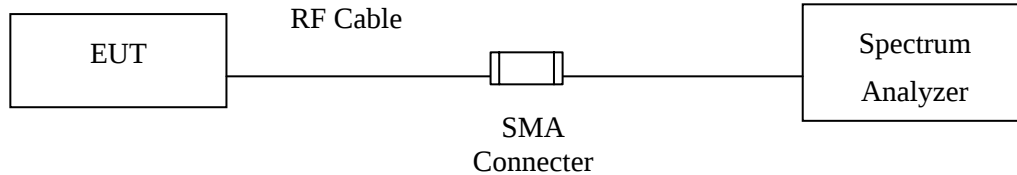
Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
107.319	-14.849	50.694	35.845	-7.655	43.500
263.362	-11.772	37.009	25.237	-20.763	46.000
457.362	-6.727	31.973	25.246	-20.754	46.000
603.565	-4.033	30.382	26.349	-19.651	46.000
739.928	-2.278	30.669	28.391	-17.609	46.000
918.464	-0.121	30.130	30.009	-15.991	46.000
Vertical					
79.203	-15.468	51.652	36.184	-3.816	40.000
360.362	-8.975	34.539	25.564	-20.436	46.000
551.551	-5.202	31.421	26.219	-19.781	46.000
738.522	-2.306	30.539	28.233	-17.767	46.000
843.957	-1.057	30.275	29.218	-16.782	46.000
946.580	0.180	30.878	31.058	-14.942	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement 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 DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

5.4. Uncertainty

±1.23dB

5.5. Test Result of RF Antenna Conducted Test

Product : Bluetooth Headset
Test Item : RF Antenna Conducted Test
Test Mode : Mode 1: Transmit - BLE
Test Date : 2017/09/28

Figure Channel 00:

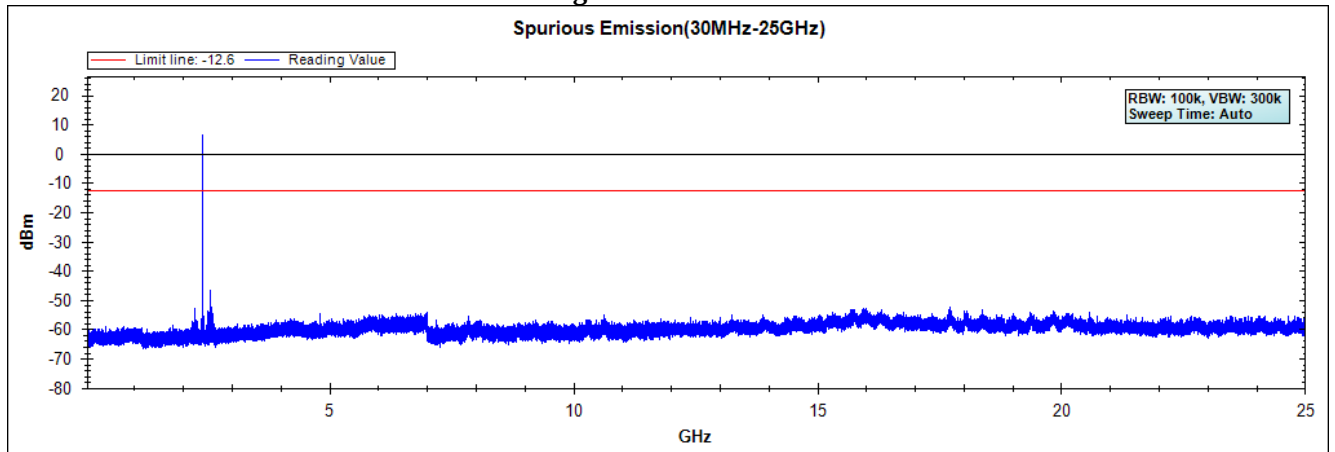


Figure Channel 19:

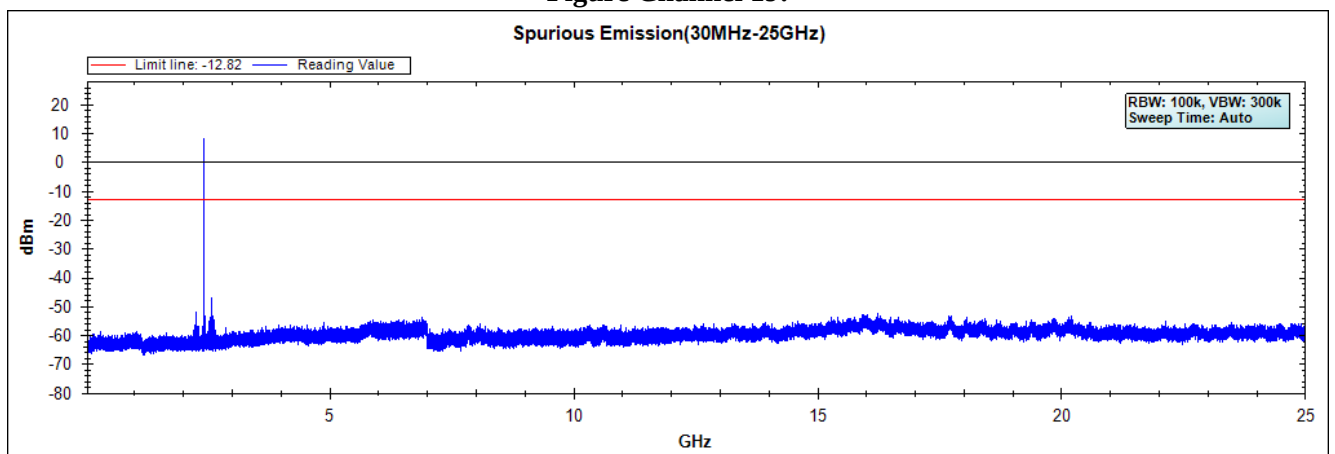
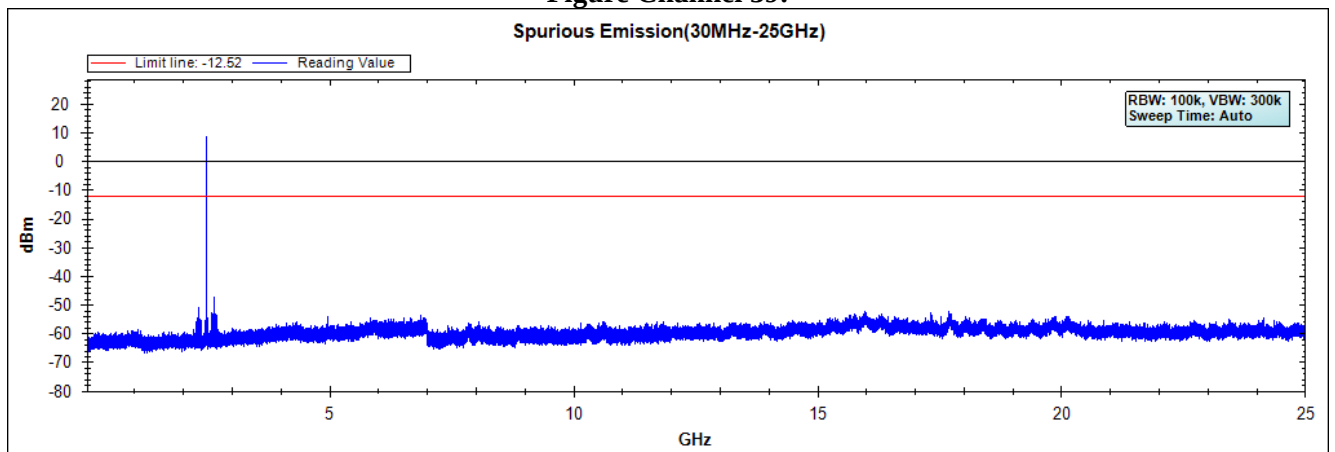


Figure Channel 39:

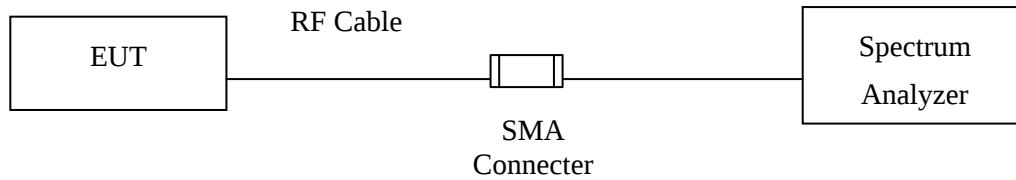


Note: The above test pattern is synthesized by multiple of the frequency range.

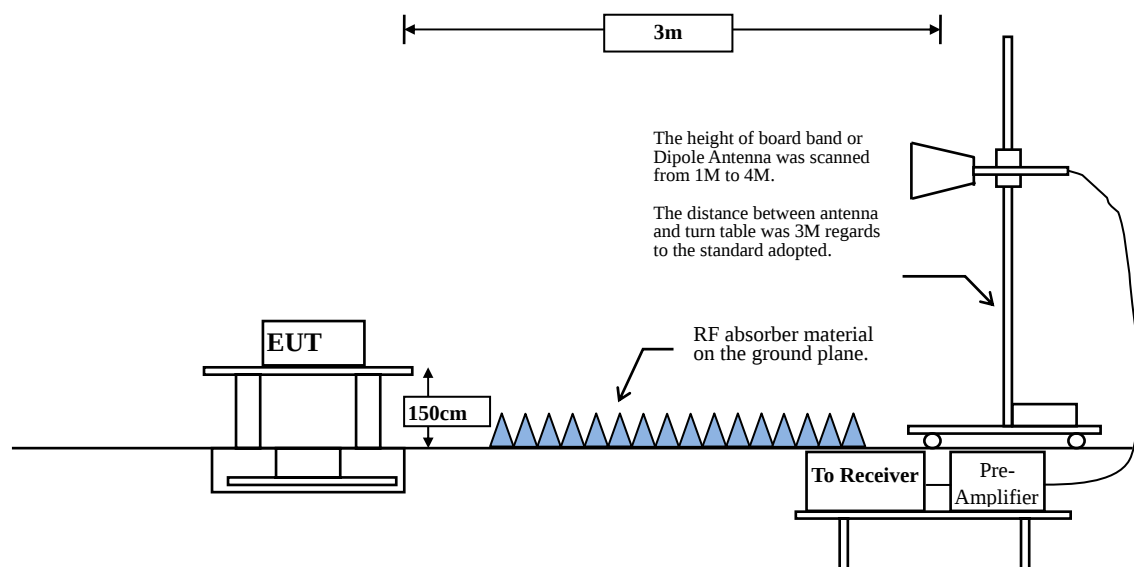
6. Band Edge

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 DTS test procedure of KDB558074 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 KDB 558074 section 12.2.4. Peak power measurement procedure

RBW = as specified in Table 1.

$VBW \geq 3 \times RBW$.

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 KDB 558074 section 12.2.5. Average power measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle $\geq 98\%$

$VBW \geq 1/T$, 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	63.22	0.3986	2509	3k

Note: Duty Cycle Refer to Section 9

6.4. Uncertainty

Conducted: $\pm 1.23\text{dB}$

Radiated:

Horizontal polarization : 1-18GHz: $\pm 3.77\text{dB}$

Vertical polarization : 1-18GHz : $\pm 3.83\text{dB}$

6.5. Test Result of Band Edge

Product : Bluetooth Headset
 Test Item : Band Edge
 Test Mode : Mode 1: Transmit - BLE
 Test Date : 2017/09/29

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2376.232	10.206	34.244	44.450	74.00	54.00	Pass
00 (Peak)	2390.000	10.262	32.413	42.675	74.00	54.00	Pass
00 (Peak)	2400.000	10.304	61.532	71.835	--	--	Pass
00 (Peak)	2402.319	10.312	91.842	102.155	--	--	--
00 (Average)	2375.942	10.205	25.191	35.396	74.00	54.00	Pass
00 (Average)	2390.000	10.262	20.150	30.412	74.00	54.00	Pass
00 (Average)	2400.000	10.304	50.915	61.218	--	--	Pass
00 (Average)	2402.029	10.312	91.005	101.317	--	--	--

Figure Channel 00:

Horizontal (Peak)

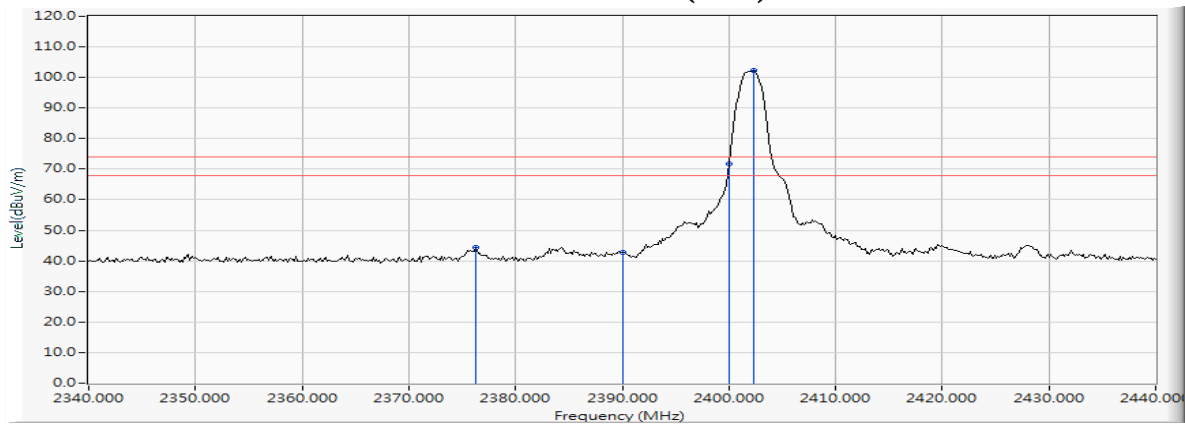
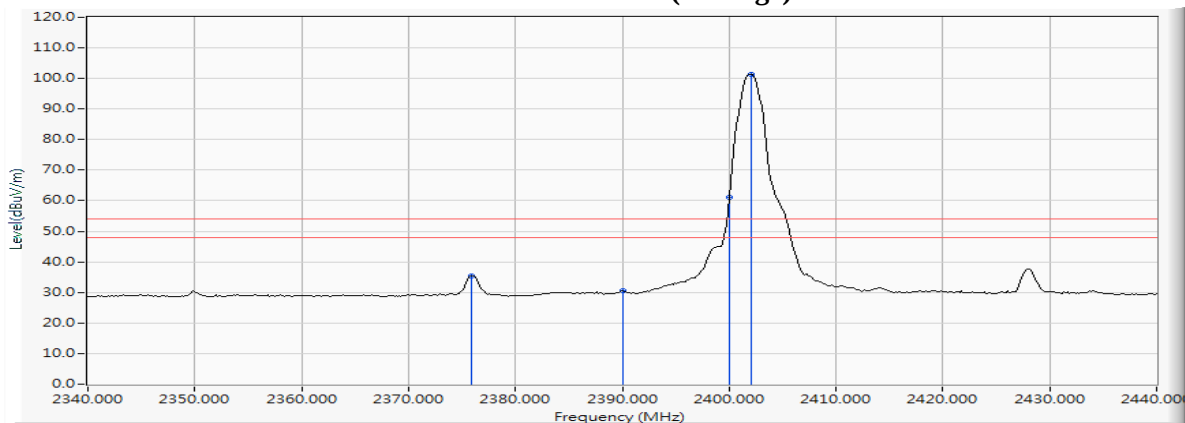


Figure Channel 00:

Horizontal (Average)



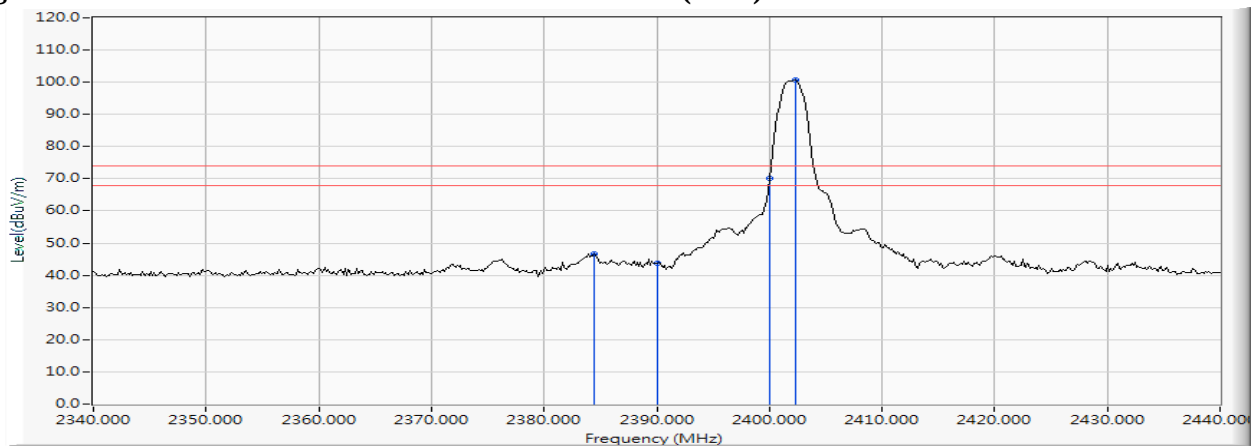
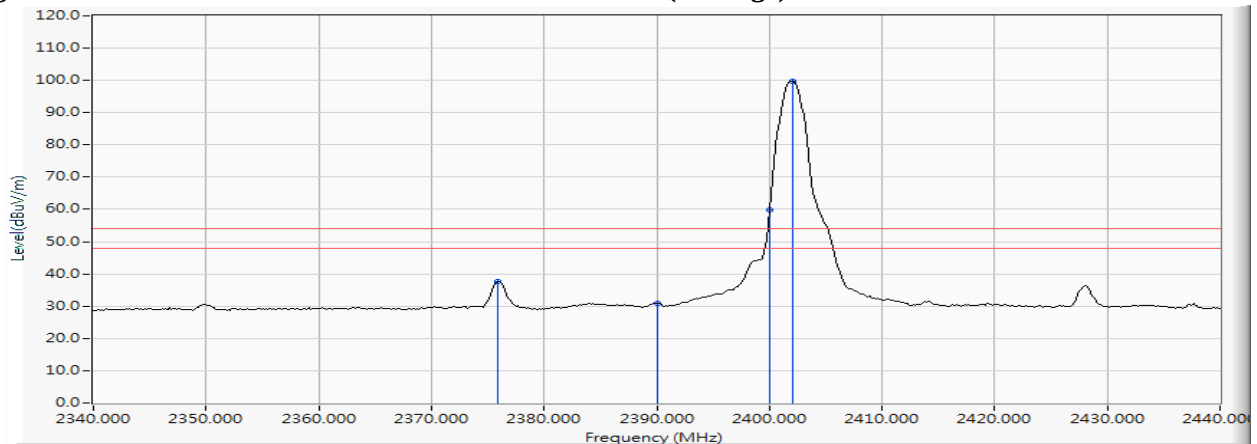
Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Bluetooth Headset
 Test Item : Band Edge
 Test Mode : Mode 1: Transmit - BLE
 Test Date : 2017/09/29

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2384.493	10.239	36.313	46.552	74.00	54.00	Pass
00 (Peak)	2390.000	10.262	33.489	43.751	74.00	54.00	Pass
00 (Peak)	2400.000	10.304	59.795	70.098	--	--	Pass
00 (Peak)	2402.319	10.312	90.273	100.586	--	--	--
00 (Average)	2375.942	10.205	27.335	37.540	74.00	54.00	Pass
00 (Average)	2390.000	10.262	20.472	30.734	74.00	54.00	Pass
00 (Average)	2400.000	10.304	49.434	59.737	--	--	Pass
00 (Average)	2402.029	10.312	89.480	99.792	--	--	--

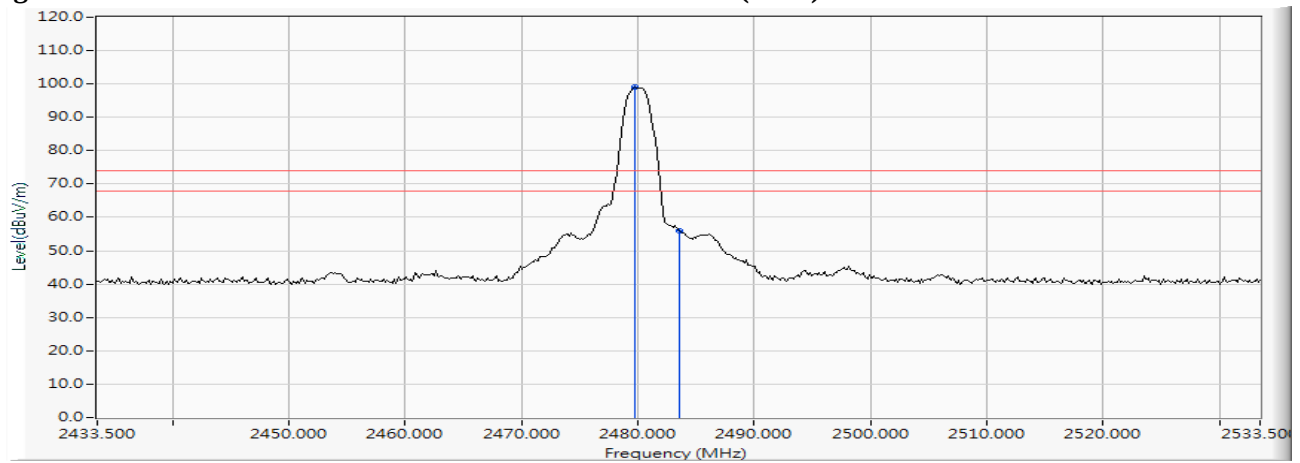
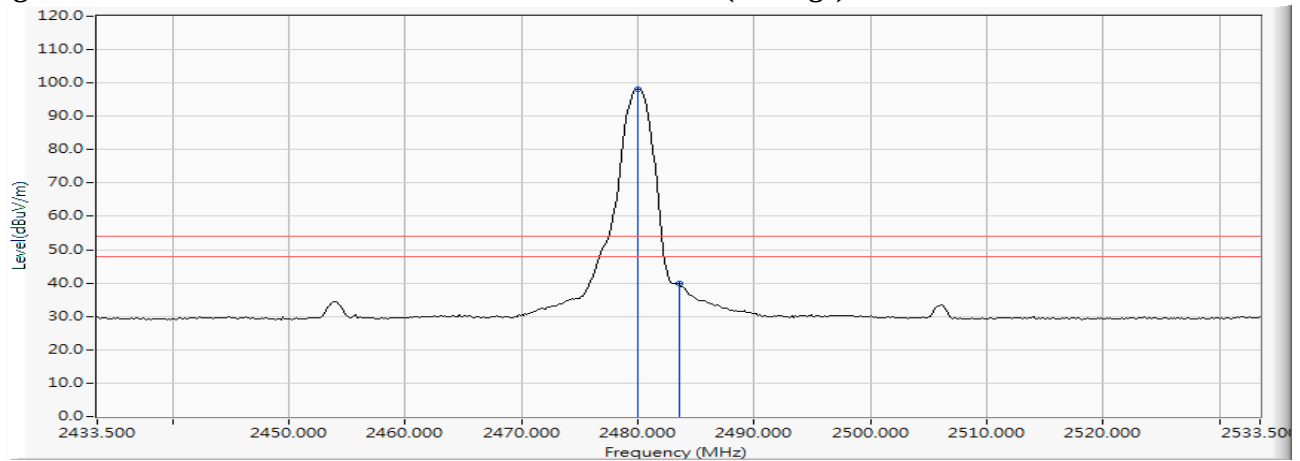
Figure Channel 00: Vertical (Peak)**Figure Channel 00: Vertical (Average)****Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Bluetooth Headset
 Test Item : Band Edge
 Test Mode : Mode 1: Transmit - BLE
 Test Date : 2017/09/29

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
39 (Peak)	2479.732	10.627	88.348	98.975	--	--	--
39 (Peak)	2483.500	10.640	45.183	55.824	74.00	54.00	Pass
39 (Average)	2480.022	10.628	87.530	98.158	--	--	--
39 (Average)	2483.500	10.640	29.095	39.736	74.00	54.00	Pass

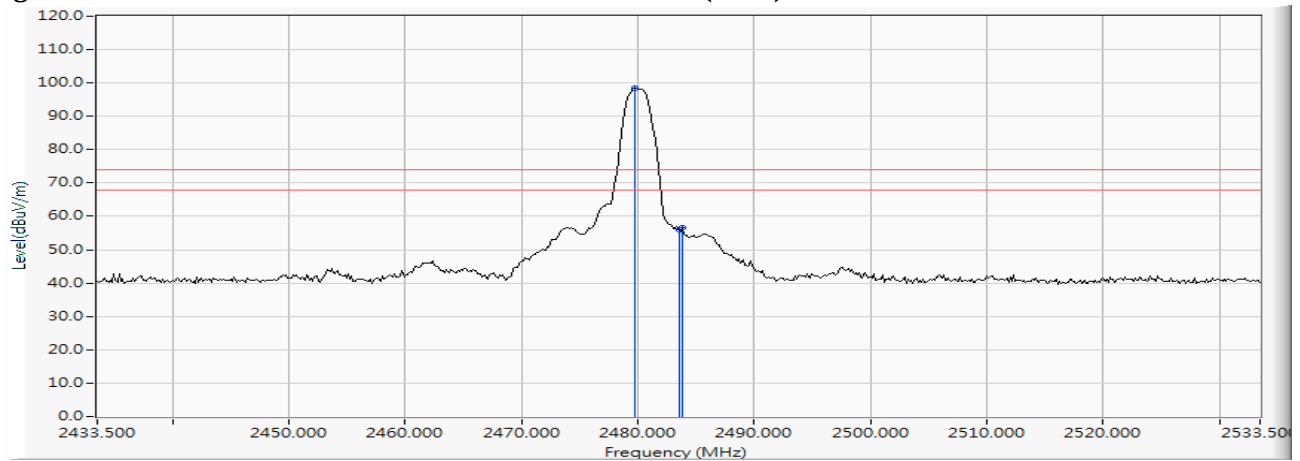
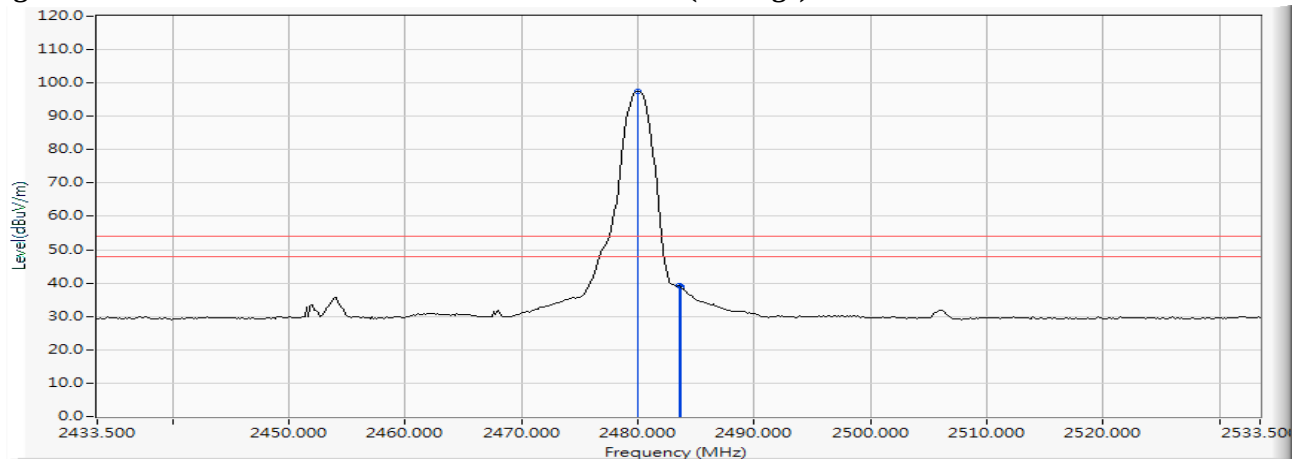
Figure Channel 39:**Horizontal (Peak)****Figure Channel 39:****Horizontal (Average)****Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Bluetooth Headset
 Test Item : Band Edge
 Test Mode : Mode 1: Transmit - BLE
 Test Date : 2017/09/29

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
39 (Peak)	2479.732	10.627	87.767	98.394	--	--	--
39 (Peak)	2483.500	10.640	45.379	56.020	74.00	54.00	Pass
39 (Peak)	2483.790	10.643	46.030	56.672	74.00	54.00	Pass
39 (Average)	2480.022	10.628	86.913	97.541	--	--	--
39 (Average)	2483.500	10.640	28.484	39.125	74.00	54.00	Pass
39 (Average)	2483.645	10.642	28.171	38.813	74.00	54.00	Pass

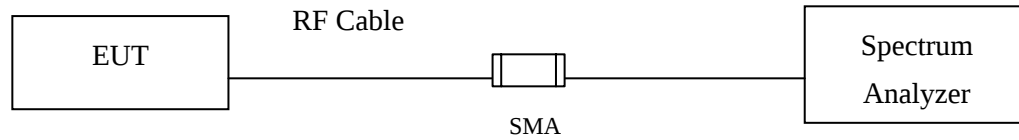
Figure Channel 39:
Vertical (Peak)

Figure Channel 39:
Vertical (Average)


Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

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 DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 1-5% of the emission bandwidth, $VBW \geq 3 \cdot RBW$

7.4. Uncertainty

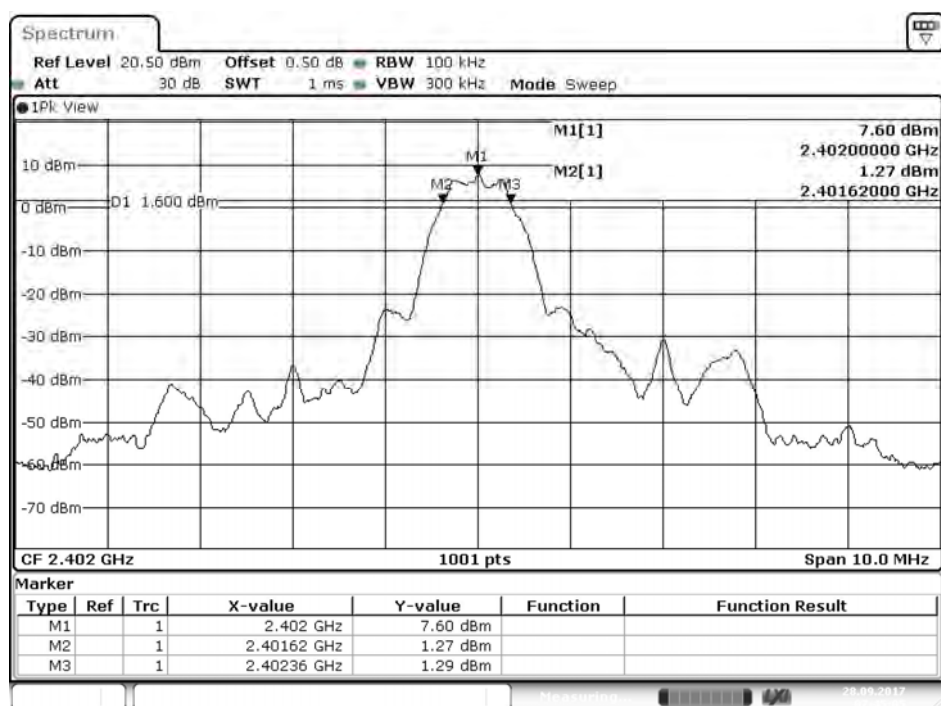
$\pm 279.2\text{Hz}$

7.5. Test Result of 6dB Bandwidth

Product : Bluetooth Headset
 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:

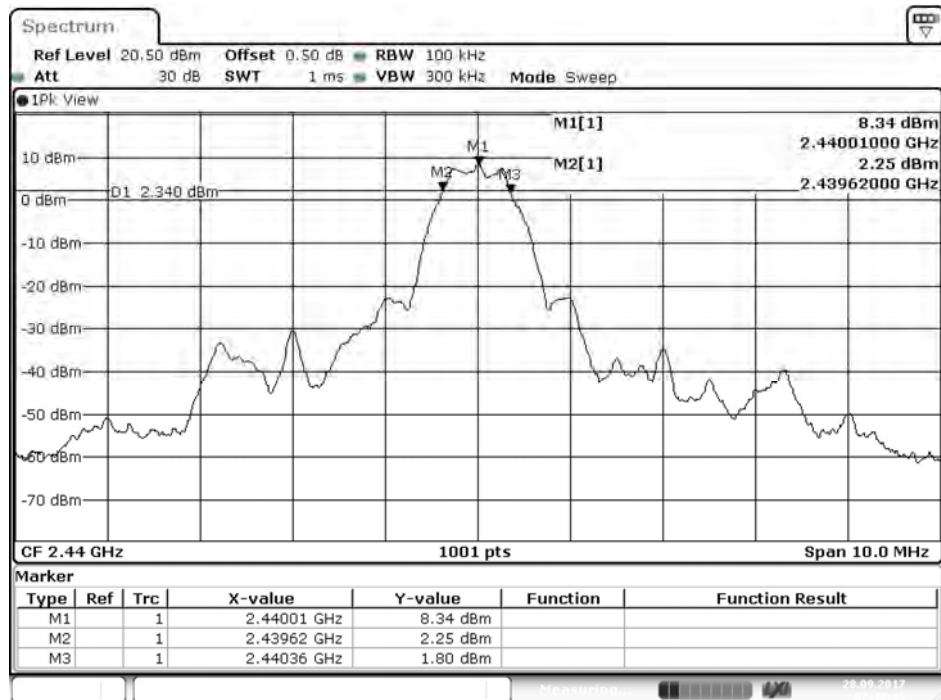


Date: 28.SEP.2017 07:45:04

Product : Bluetooth Headset
 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	740	>500	Pass

Figure Channel 19:

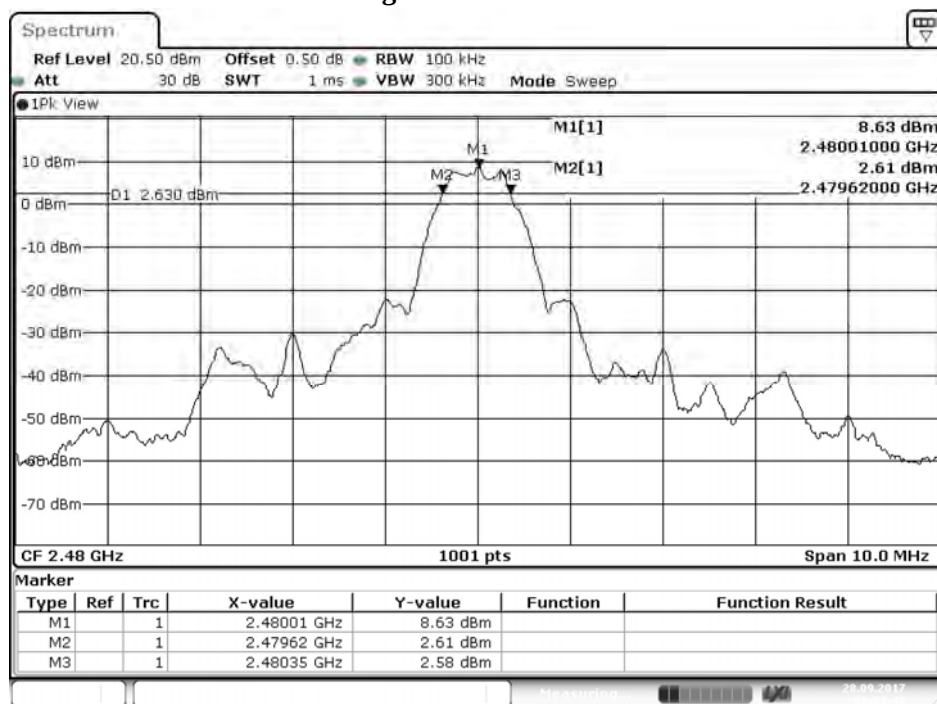


Date: 28.SEP.2017 07:48:46

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

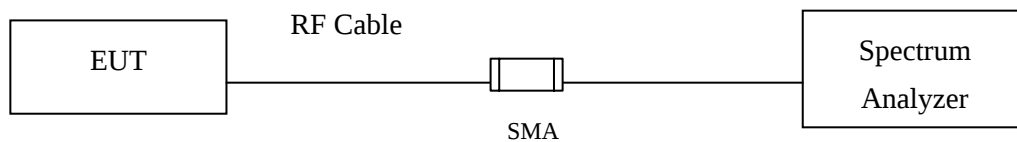
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2480	730	>500	Pass

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 KDB 558074 section 10.2 PKPSD (peak PSD) method.

8.4. Uncertainty

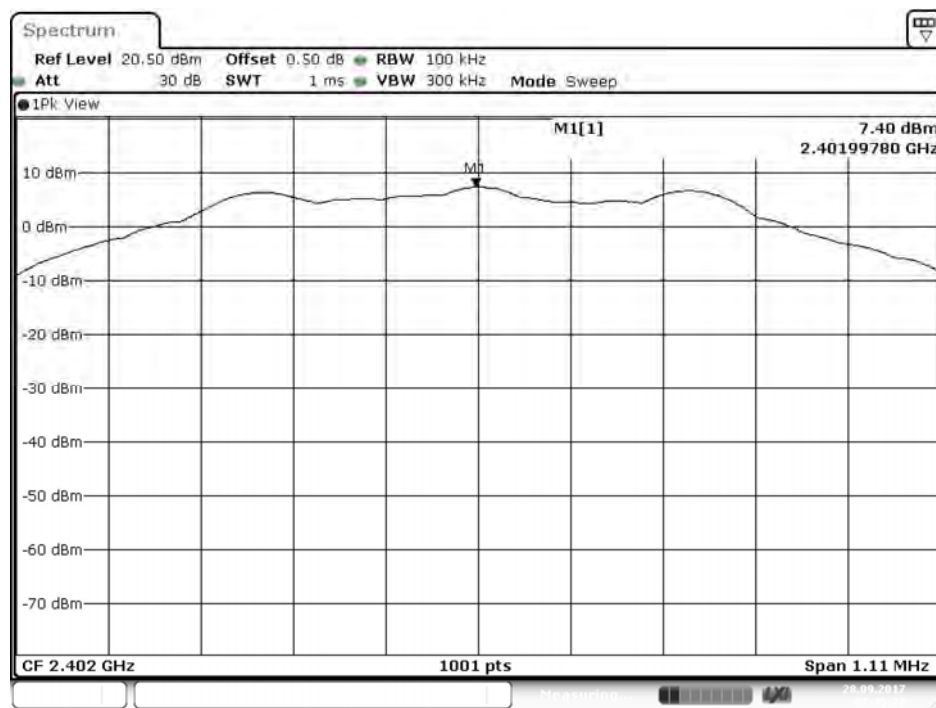
$\pm 1.23\text{dB}$

8.5. Test Result of Power Density

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

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
00	2402	7.40	$\leq 8\text{dBm}$	Pass

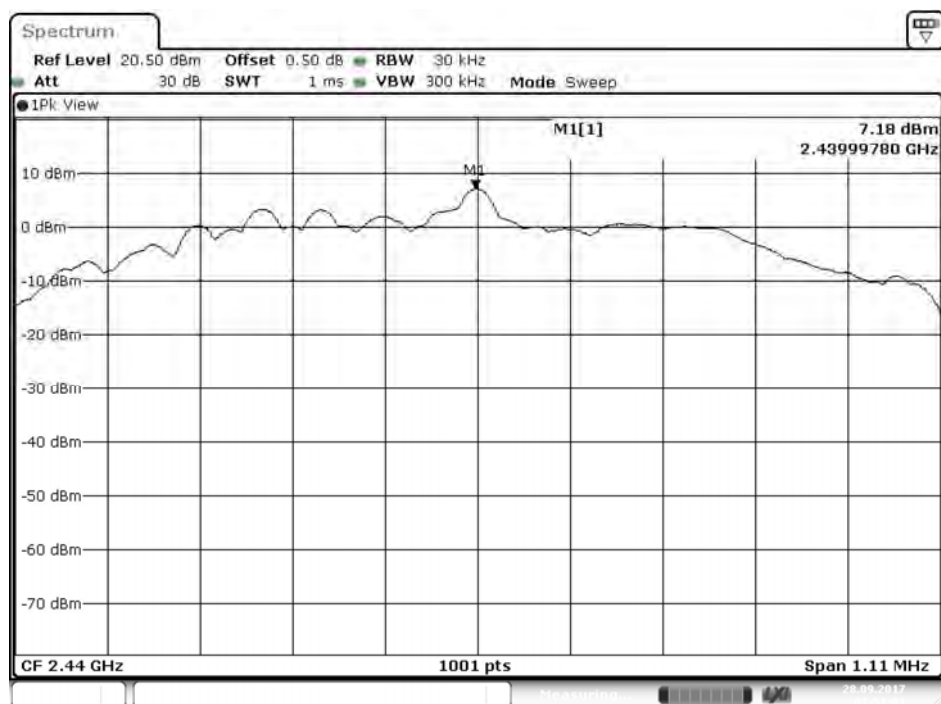
Figure Channel 00:



Product : Bluetooth Headset
 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	7.18	$\leq 8\text{dBm}$	Pass

Figure Channel 19:

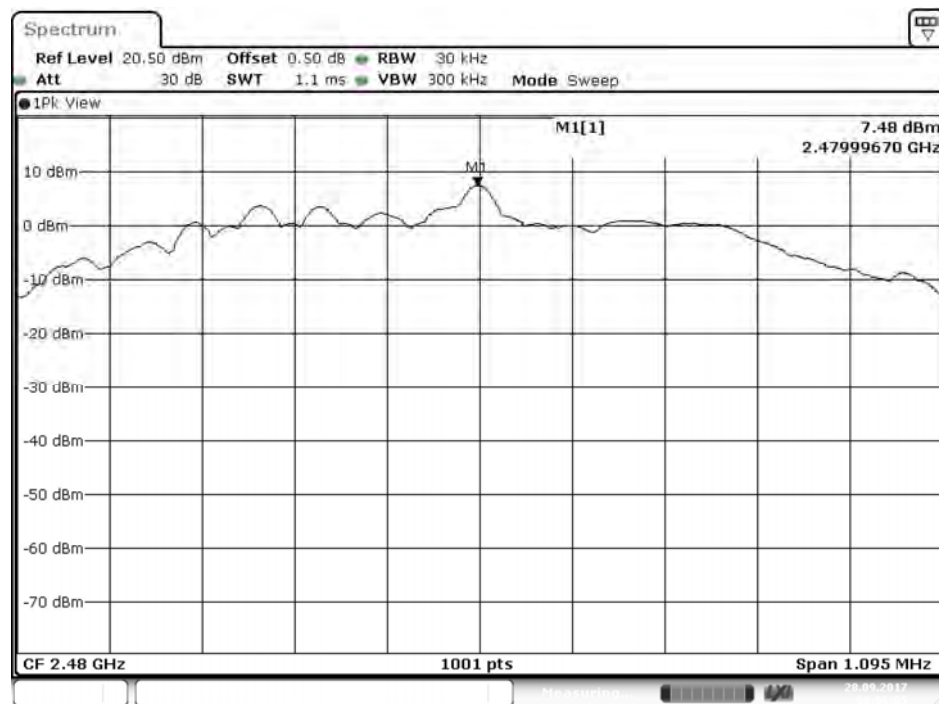


Date: 28.SEP.2017 07:51:02

Product : Bluetooth Headset
 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	7.48	$\leq 8\text{dBm}$	Pass

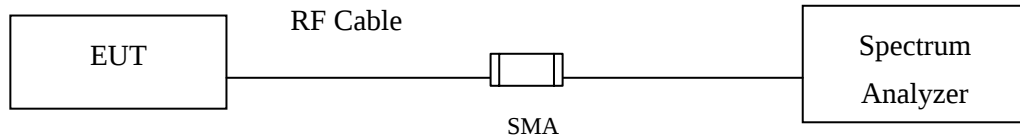
Figure Channel 39:



Date: 28.SEP.2017 08:06:05

9. Duty Cycle

9.1. Test Setup



9.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

9.3. Uncertainty

$\pm 2.31\text{msec}$

9.4. Test Result of Duty Cycle

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

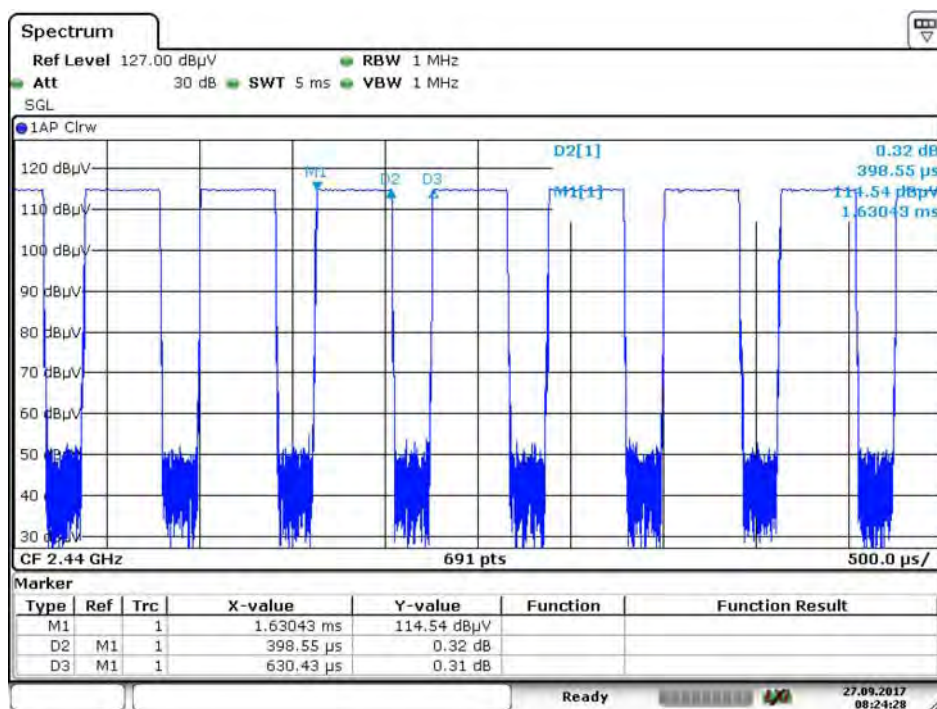
Duty Cycle Formula:

Duty Cycle = $Ton / (Ton + Toff)$

Duty Factor = $10 \text{ Log } (1/\text{Duty Cycle})$

Results:

2.4GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
BLE	0.3986	0.6304	63.22	1.99



Date: 27.SEP.2017 08:24:28

10. EMI Reduction Method During Compliance Testing

No modification was made during testing.