

FCC Test Report

Product Name	Bluetooth Headset
Model No.	HSC175
FCC ID	BCE-HSC175

Applicant	GN Audio USA Inc.
Address	900 Chelmsfort St, Tower 2, Floor 8 , Lowell, Massachusetts, 1851 United States

Date of Receipt	Aug. 09, 2022
Issued Date	Sep. 05, 2022
Report No.	2280310R-RFUSBT2V01-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.

This report must not be used to claim product endorsement by TAF or any agency of the government.

The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test Report

Issued Date: Sep. 05, 2022

Report No.: 2280310R-RFUSBT2V01-A



Product Name	Bluetooth Headset
Applicant	GN Audio USA Inc.
Address	900 Chelmsfort St, Tower 2, Floor 8 , Lowell, Massachusetts, 1851 United States
Manufacturer	GN Audio USA Inc.
Model No.	HSC175
FCC ID	BCE-HSC175
EUT Rated Voltage	DC 5V by USB
EUT Test Voltage	DC 5V by USB
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

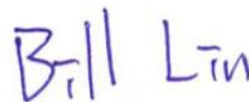
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(Senior Project Specialist / Joanne Lin)

Tested By

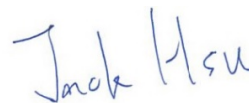
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(Senior Engineer / Bill Lin)

Approved By

:



(Senior Engineer / Jack Hsu)

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Revision History

Report No.	Version	Description	Issued Date
2280310R-RFUSBT2V01-A	V1.0	Initial issue of report.	Sep. 05, 2022

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Bluetooth Headset
Trade Name	Jabra
Model No.	HSC175
FCC ID	BCE-HSC175
Frequency Range	2402-2480MHz
Number of Channels	79CH
Channel Separation	1MHz
Type of Modulation	GFSK(1Mbps) / π / 4DQPSK(2Mbps) / 8DPSK(3Mbps)
Antenna Type	PCB Antenna
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	GN Audio A/S	HSC175	PCB Antenna	3.73 dBi for 2.4 GHz

Note: The antenna of EUT conforms to FCC 15.203.

Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2402 MHz	Channel 20:	2422 MHz	Channel 40:	2442 MHz	Channel 60:	2462 MHz
Channel 01:	2403 MHz	Channel 21:	2423 MHz	Channel 41:	2443 MHz	Channel 61:	2463 MHz
Channel 02:	2404 MHz	Channel 22:	2424 MHz	Channel 42:	2444 MHz	Channel 62:	2464 MHz
Channel 03:	2405 MHz	Channel 23:	2425 MHz	Channel 43:	2445 MHz	Channel 63:	2465 MHz
Channel 04:	2406 MHz	Channel 24:	2426 MHz	Channel 44:	2446 MHz	Channel 64:	2466 MHz
Channel 05:	2407 MHz	Channel 25:	2427 MHz	Channel 45:	2447 MHz	Channel 65:	2467 MHz
Channel 06:	2408 MHz	Channel 26:	2428 MHz	Channel 46:	2448 MHz	Channel 66:	2468 MHz
Channel 07:	2409 MHz	Channel 27:	2429 MHz	Channel 47:	2449 MHz	Channel 67:	2469 MHz
Channel 08:	2410 MHz	Channel 28:	2430 MHz	Channel 48:	2450 MHz	Channel 68:	2470 MHz
Channel 09:	2411 MHz	Channel 29:	2431 MHz	Channel 49:	2451 MHz	Channel 69:	2471 MHz
Channel 10:	2412 MHz	Channel 30:	2432 MHz	Channel 50:	2452 MHz	Channel 70:	2472 MHz
Channel 11:	2413 MHz	Channel 31:	2433 MHz	Channel 51:	2453 MHz	Channel 71:	2473 MHz
Channel 12:	2414 MHz	Channel 32:	2434 MHz	Channel 52:	2454 MHz	Channel 72:	2474 MHz
Channel 13:	2415 MHz	Channel 33:	2435 MHz	Channel 53:	2455 MHz	Channel 73:	2475 MHz
Channel 14:	2416 MHz	Channel 34:	2436 MHz	Channel 54:	2456 MHz	Channel 74:	2476 MHz
Channel 15:	2417 MHz	Channel 35:	2437 MHz	Channel 55:	2457 MHz	Channel 75:	2477 MHz
Channel 16:	2418 MHz	Channel 36:	2438 MHz	Channel 56:	2458 MHz	Channel 76:	2478 MHz
Channel 17:	2419 MHz	Channel 37:	2439 MHz	Channel 57:	2459 MHz	Channel 77:	2479 MHz
Channel 18:	2420 MHz	Channel 38:	2440 MHz	Channel 58:	2460 MHz	Channel 78:	2480 MHz
Channel 19:	2421 MHz	Channel 39:	2441 MHz	Channel 59:	2461 MHz		

Note:

1. The EUT is a Bluetooth Headset with built-in Bluetooth V5.0, V2.1+EDR transceiver, this report for Bluetooth V2.1+EDR.
2. These tests were conducted on a sample for the purpose of demonstrating compliance of 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. DEKRA has evaluated each test mode. Only the worst case (Stereo headsets) is shown in the report.
5. Mono and Stereo headsets are different in the amount of the speaker only. Their Bluetooth chip and antenna is completely the same, while the duo left-hand side only holds additional beads, protection-diodes, and another speaker.
6. The test mode is based on the Bluetooth technology, while testing 1Mbps, 2Mbps and 3Mbps, the worst case is 1Mbps and 3Mbps, and only worse case data is recorded in this report.

Test Mode	Mode 1: Transmit - 1Mbps Mode 2: Transmit - 3Mbps
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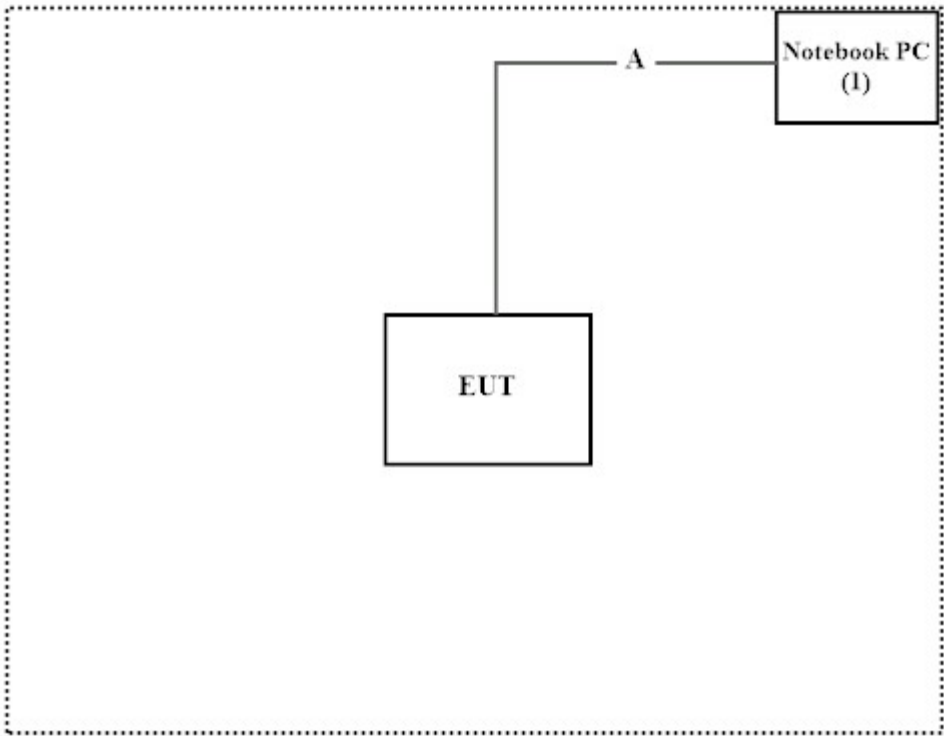
1.2. Tested System Details

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	N/A

Signal Cable Type		Signal cable Description
A	USB Cable	Shielded, 1.7m

1.3. Configuration of Tested System



1.4. EUT Exercise Software

1. Setup the EUT as shown in Section 1.3.
2. Execute software “BlueTest3 Version 3.3.5” 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.

1.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Conducted Emission	Temperature (°C)	10~40 °C	23.4 °C
	Humidity (%RH)	10~90 %	55.2 %
Radiated Emission	Temperature (°C)	10~40 °C	21.3 °C
	Humidity (%RH)	10~90 %	59.6 %
Conductive	Temperature (°C)	10~40 °C	25.5 °C
	Humidity (%RH)	10~90 %	55 %

USA : FCC Registration Number: TW0033

Canada : CAB Identifier Number: TW3023 / Company Number: 26930

Site Description : Accredited by TAF
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd
Address : No. 5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan
Performed Location : No. 26, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan, R.O.C.
Phone number : +886-3-275-7255
Fax number : +886-3-327-8031
Email address : info.tw@dekra.com
Website : <http://www.dekra.com.tw>

1.6. List of Test Equipment

For Conduction measurements /HY-SR01

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due. Date
X	EMI Test Receiver	R&S	ESR7	101601	2022.06.23	2023.06.22
X	Two-Line V-Network	R&S	ENV216	101306	2022.05.23	2023.05.22
X	Two-Line V-Network	R&S	ENV216	101307	2022.07.04	2023.07.03
X	Coaxial Cable	SUHNER	RG400_BNC	RF001	2022.05.24	2023.05.23

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 : E3 210616 dekra V9.

For Conducted measurements /HY-SR02

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due. Date
X	Spectrum Analyzer	R&S	FSV30	103466	2021.12.27	2022.12.26
X	Peak Power Analyzer	KEYSIGHT	8900B	MY51000539	2022.05.27	2023.05.26
X	Power Sensor	KEYSIGHT	N1923A	MY59240002	2022.05.19	2023.05.18
X	Power Sensor	KEYSIGHT	N1923A	MY59240003	2022.05.19	2023.05.18

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 : RF Conducted Test Tools R3 V3.0.1.19.

For Radiated measurements / HY-CB02

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due. Date
	Loop Antenna	AMETEK	HLA6121	56736	2022.05.14	2023.05.13
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2021.08.11	2023.08.10
X	Horn Antenna	RF SPIN	DRH18-E	210503A18ES	2022.06.08	2023.06.07
	Horn Antenna	Com-Power	AH-840	101087	2022.06.16	2023.06.15
X	Pre-Amplifier	SGH	SGH0301-9	20211007-11	2022.02.22	2023.02.21
X	Pre-Amplifier	EMCI	EMC051845SE	980632	2021.09.07	2022.09.06
	Pre-Amplifier	EMCI	EMC05820SE	980361	2021.12.16	2022.12.15
	Pre-Amplifier	EMCI	EMC184045SE	980369	2022.05.12	2023.05.11
	Coaxial Cable	EMCI	EMC102-KM-KM-600	1160314		
	Coaxial Cable	EMCI	EMC102-KM-KM-7000	170242		
X	Filter	MICRO TRONICS	BRM50702	G251	2021.09.16	2022.09.15
	Filter	MICRO TRONICS	BRM50716	G188	2021.09.16	2022.09.15
X	EMI Test Receiver	R&S	ESR3	102793	2021.12.15	2022.12.14
X	Spectrum Analyzer	R&S	FSV3044	101114	2022.02.11	2023.02.10
X	Coaxial Cable	SGH	HA800	GD20110223-2	2022.03.17	2023.03.16
	Coaxial Cable	SGH	HA800	GD20110222-4		
	Coaxial Cable	SGH	SGH18	2021005-2		
	Coaxial Cable	SGH	SGH18	202108-5		

Note:

1. Bi-Log 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 : E3 210616 dekra V9.

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

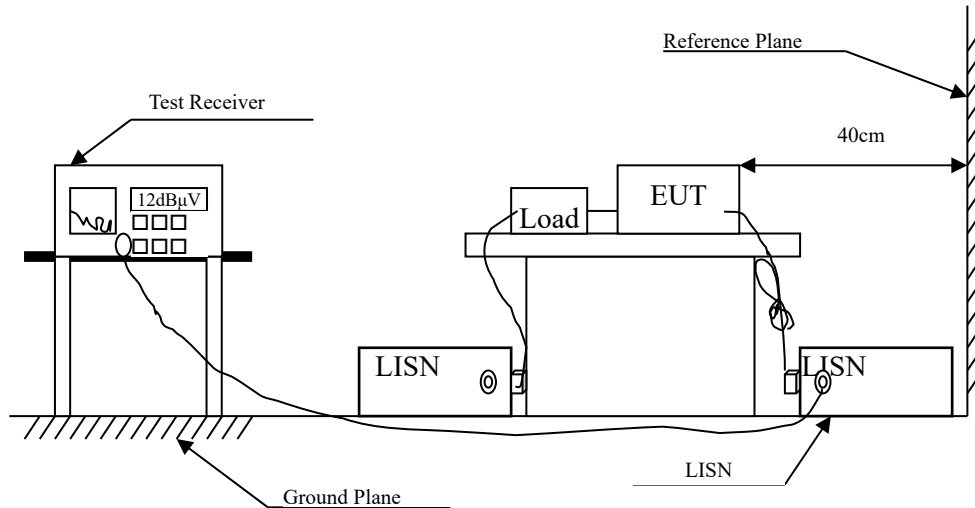
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	Uncertainty	
Conducted Emission	± 3.42 dB	
Peak Power Output	± 0.89 dB	
Radiated Emission	Under 1GHz ± 4.05 dB	Above 1GHz ± 3.73 dB
RF Antenna Conducted Test	± 2.06 dB	
Band Edge	Under 1GHz ± 4.05 dB	Above 1GHz ± 3.73 dB
Channel Number	N/A	
Channel Separation	± 1544.74 Hz	
Dwell Time	± 2.31 ms	
Occupied Bandwidth	± 1544.74 Hz	
Duty Cycle	± 2.31 ms	

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dB μ V) 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

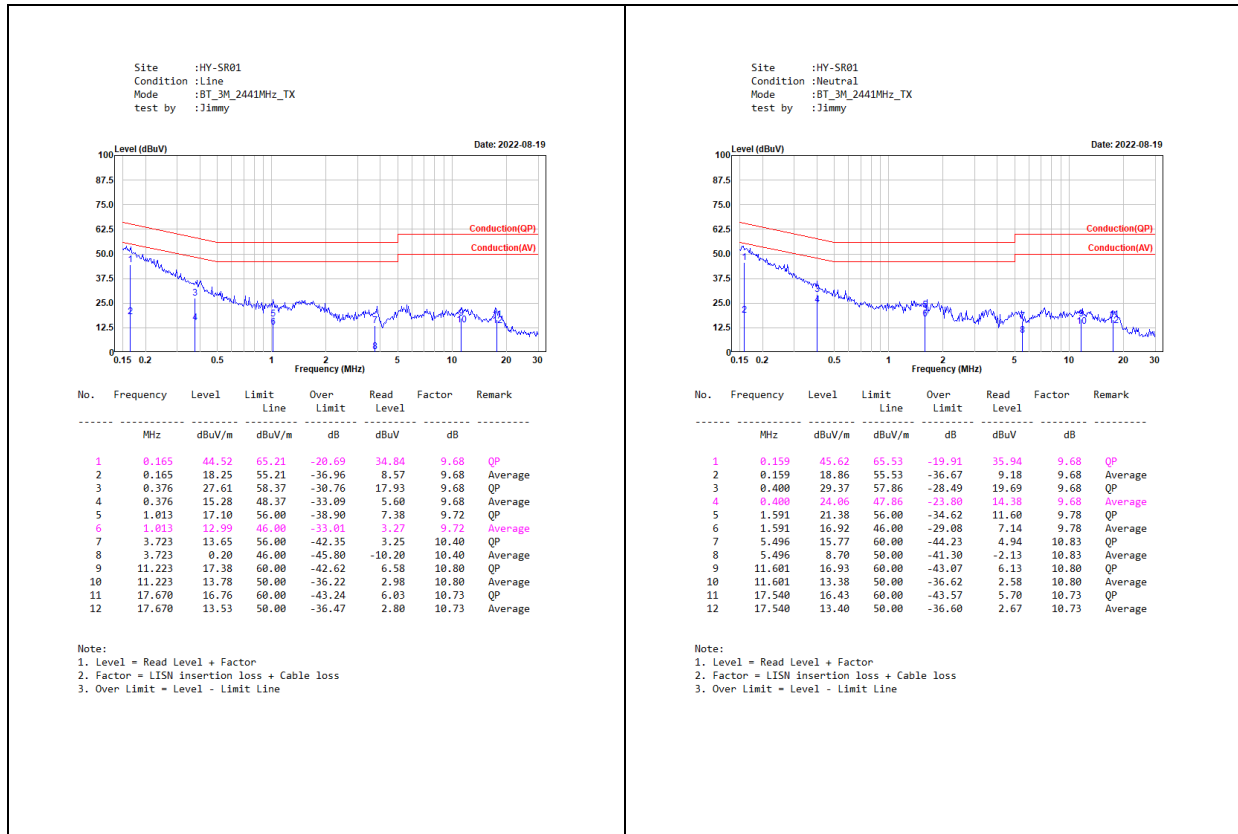
The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling 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.

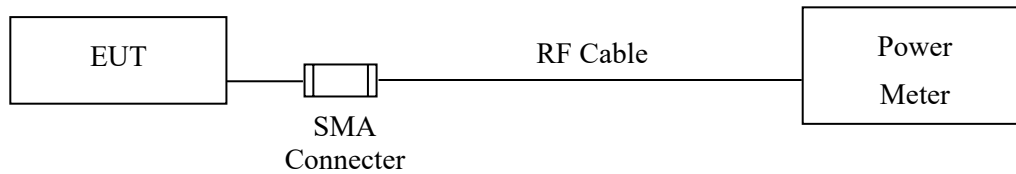
The EUT setup and the test procedure are according to ANSI C63.4, 2014 to comply with the requirements of FCC 47CFR Subpart C.

2.4. Test Result of Conducted Emission



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 FHSS test procedure of KDB 558074 section 9 (b for compliance to FCC 47CFR 15.247 requirements.

3.4. Test Result of Peak Power Output

Product : Bluetooth Headset
Test Item : Peak Power Output
Test Mode : Mode 1: Transmit - 1Mbps
Test Date : 2022/08/12

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
00	2402.00	12.23	1 Watt= 30 dBm	Pass
39	2441.00	12.32	1 Watt= 30 dBm	Pass
78	2480.00	12.24	1 Watt= 30 dBm	Pass

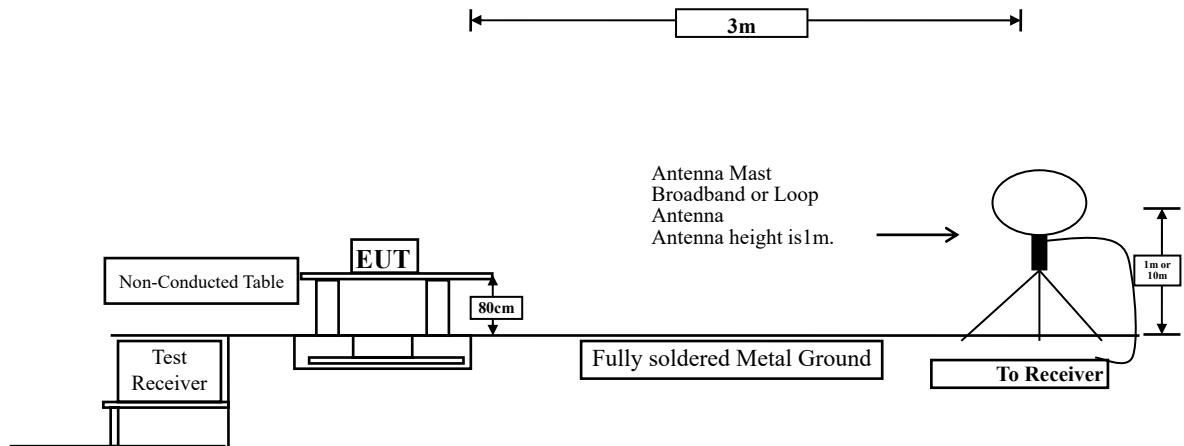
Product : Bluetooth Headset
Test Item : Peak Power Output
Test Mode : Mode 2: Transmit - 3Mbps
Test Date : 2022/08/12

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
00	2402.00	12.42	1 Watt= 30 dBm	Pass
39	2441.00	12.43	1 Watt= 30 dBm	Pass
78	2480.00	12.47	1 Watt= 30 dBm	Pass

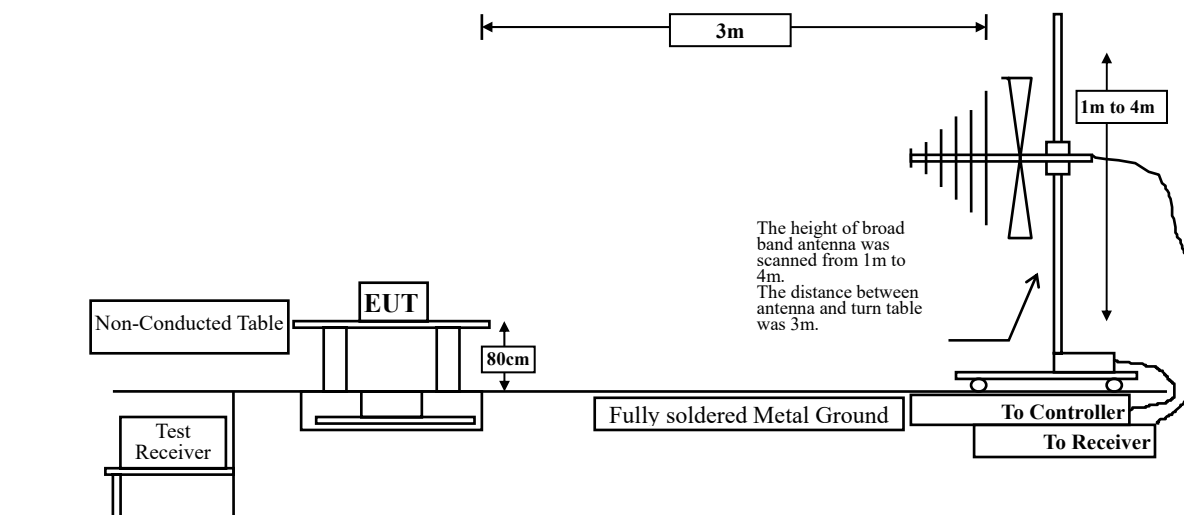
4. Radiated Emission

4.1. Test Setup

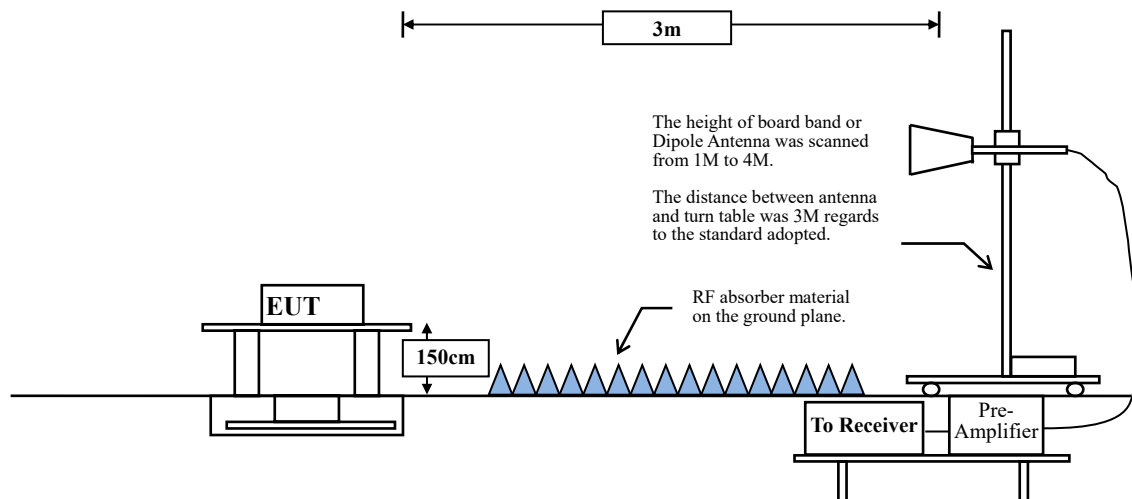
Radiated Emission Under 30MHz



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 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.

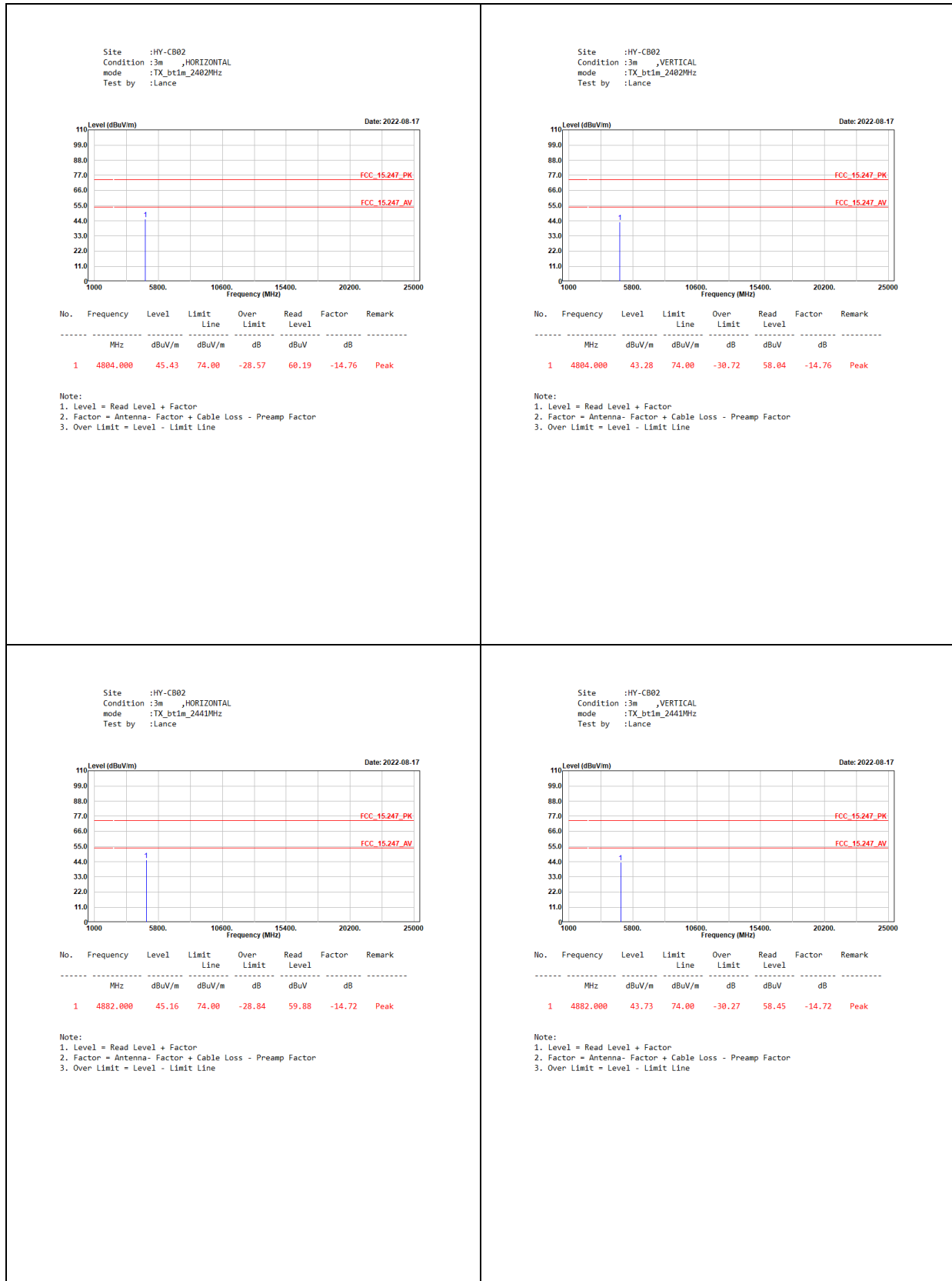
Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

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

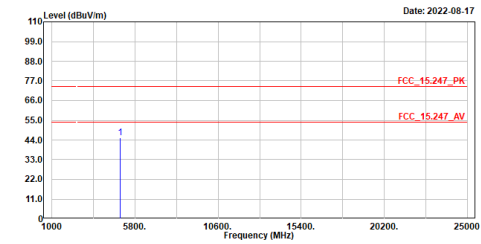
The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the 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.

4.4. Test Result of Radiated Emission



Site :HY-CB02
Condition :3m ,HORIZONTAL
mode :TX_bt1m_2480MHz
Test by :Peter



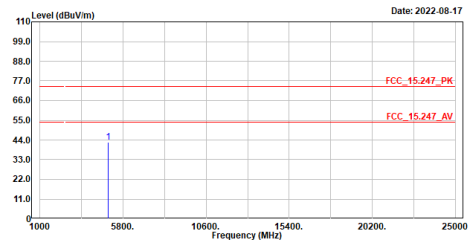
No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	Line	Limit	Level		
			dBuV/m	dB	dBuV	dB	

1	4960.000	45.29	74.00	-28.71	59.88	-14.59	Peak
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Note:

1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

Site :HY-CB02
Condition :3m ,VERTICAL
mode :TX_bt1m_2480MHz
Test by :Peter



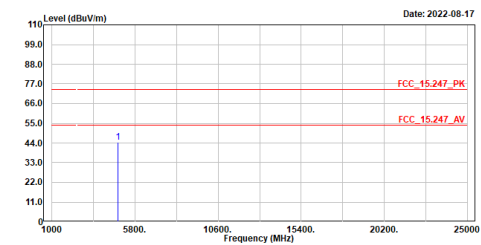
No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	Line	Limit	Level		
			dBuV/m	dB	dBuV	dB	

1	4960.000	42.91	74.00	-31.09	57.50	-14.59	Peak
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Note:

1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

Site :HY-CB02
Condition :3m ,HORIZONTAL
mode :TX_bt3m_2402MHz
Test by :Peter



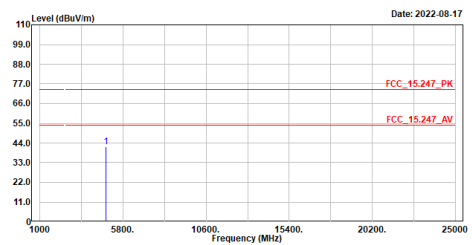
No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	Line	Limit	Level		
			dBuV/m	dB	dBuV	dB	

1	4884.000	44.55	74.00	-29.45	59.31	-14.76	Peak
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Note:

1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

Site :HY-CB02
Condition :3m ,VERTICAL
mode :TX_bt3m_2402MHz
Test by :Peter



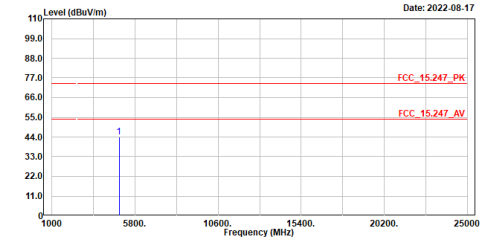
No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	Line	Limit	Level		
			dBuV/m	dB	dBuV	dB	

1	4884.000	42.03	74.00	-31.97	56.79	-14.76	Peak
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Note:

1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

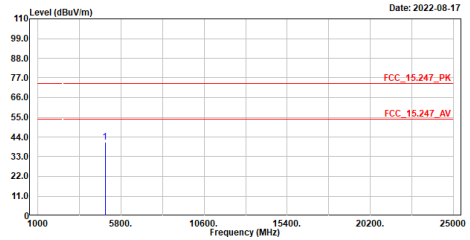
Site :HY-CB02
Condition :3m ,HORIZONTAL
mode :TX_bt3m_2441MHz
Test by :Peter



No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	Line	Limit	Level		
			dBuV/m	dB	dBuV	dB	
1	4882.000	44.03	74.00	-29.97	58.75	-14.72	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

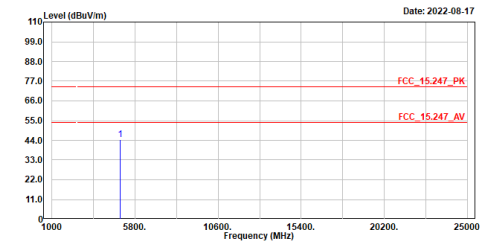
Site :HY-CB02
Condition :3m ,VERTICAL
mode :TX_bt3m_2441MHz
Test by :Peter



No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	Line	Limit	Level		
			dBuV/m	dB	dBuV	dB	
1	4882.000	40.96	74.00	-33.04	55.68	-14.72	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

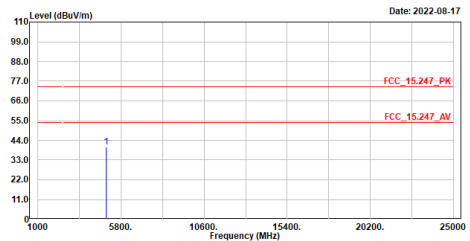
Site :HY-CB02
Condition :3m ,HORIZONTAL
mode :TX_bt3m_2480MHz
Test by :Peter



No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	Line	Limit	Level		
			dBuV/m	dB	dBuV	dB	
1	4960.000	44.38	74.00	-29.62	58.97	-14.59	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

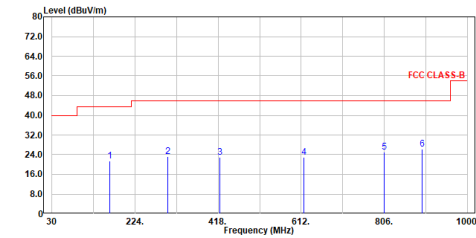
Site :HY-CB02
Condition :3m ,VERTICAL
mode :TX_bt3m_2480MHz
Test by :Peter



No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	Line	Limit	Level		
			dBuV/m	dB	dBuV	dB	
1	4960.000	40.23	74.00	-33.77	54.82	-14.59	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

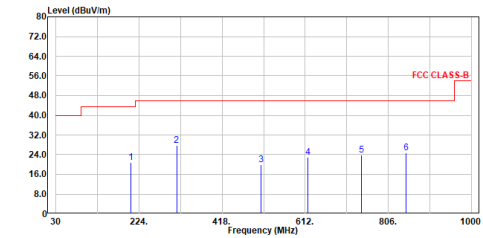
Site :HY-CB02
Condition :3m ,HORIZONTAL
mode :TX_bt3m_2441MHz
Test by :Peter



No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	164.588	21.36	43.50	-22.14	45.49	-24.13	QP
2	301.358	23.27	46.00	-22.73	46.97	-23.70	QP
3	421.395	22.85	46.00	-23.15	43.53	-20.68	QP
4	619.154	22.89	46.00	-23.11	39.03	-16.14	QP
5	805.758	25.03	46.00	-20.97	38.43	-13.40	QP
6	894.755	26.14	46.00	-19.86	38.48	-12.34	QP

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission under 30MHz was not included since the emission levels are very low against the limit.

Site :HY-CB02
Condition :3m ,VERTICAL
mode :TX_bt3m_2441MHz
Test by :Peter

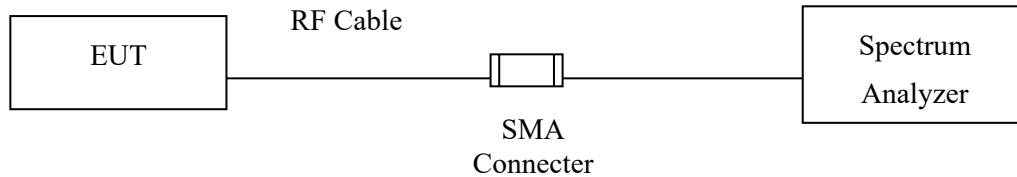


No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	205.449	20.96	43.50	-22.54	48.15	-27.19	QP
2	311.906	27.92	46.00	-18.08	51.23	-23.31	QP
3	508.938	20.07	46.00	-25.93	38.48	-18.41	QP
4	617.699	22.85	46.00	-23.15	39.06	-16.21	QP
5	743.071	23.92	46.00	-22.08	37.90	-13.98	QP
6	847.225	24.63	46.00	-21.37	37.61	-12.98	QP

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission under 30MHz was not included since the emission levels are very low against the limit.

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.

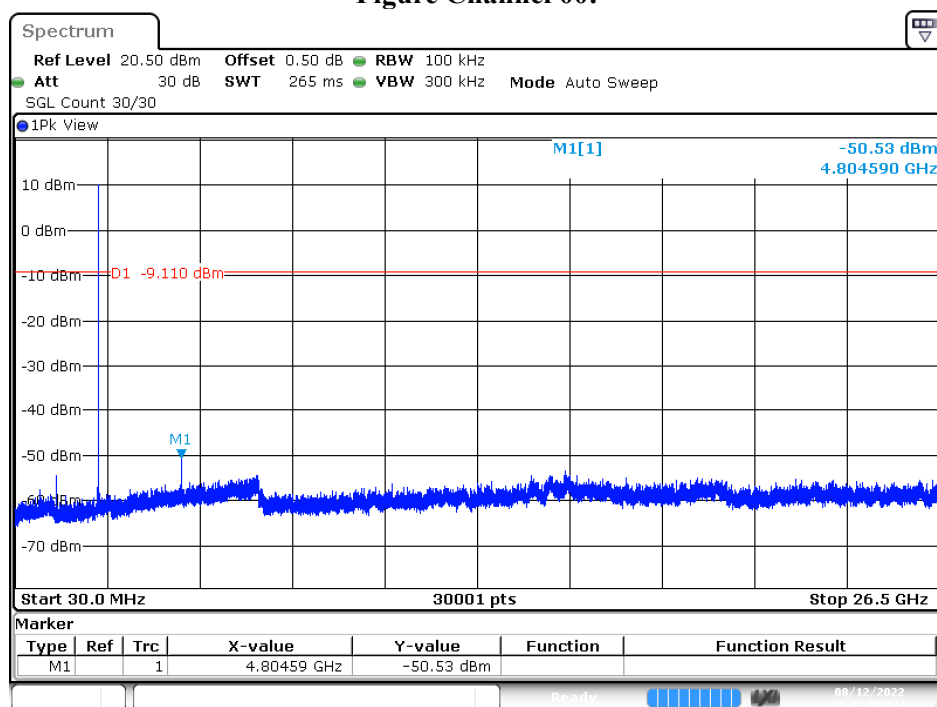
5.3. Test Procedure

Tested according to FHSS test procedure of KDB558074 section 9 b) for compliance to FCC 47CFR 15.247 requirements.

5.4. Test Result of RF Antenna Conducted Test

Product : Bluetooth Headset
 Test Item : RF Antenna Conducted Test
 Test Mode : Mode 1: Transmit - 1Mbps
 Test Date : 2022/08/12

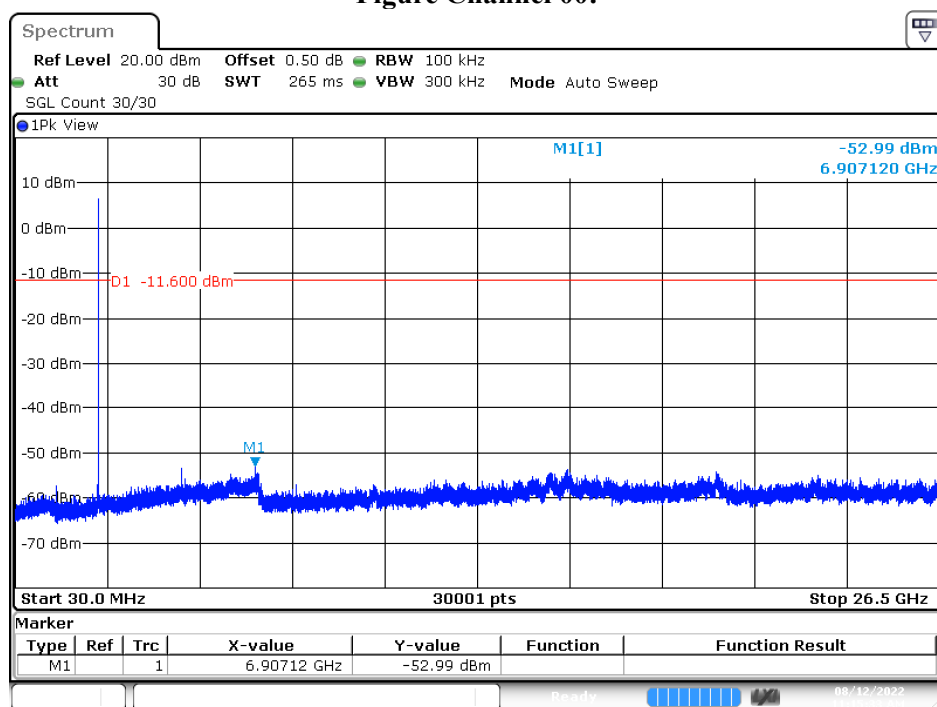
Figure Channel 00:



Date: 12.AUG.2022 10:04:09

Product : Bluetooth Headset
Test Item : RF Antenna Conducted Test
Test Mode : Mode 2: Transmit - 3Mbps
Test Date : 2022/08/12

Figure Channel 00:

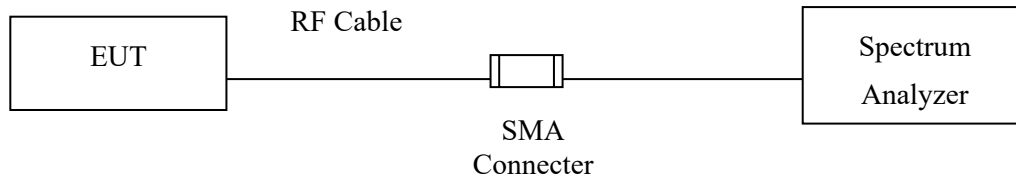


Date: 12.AUG.2022 11:15:33

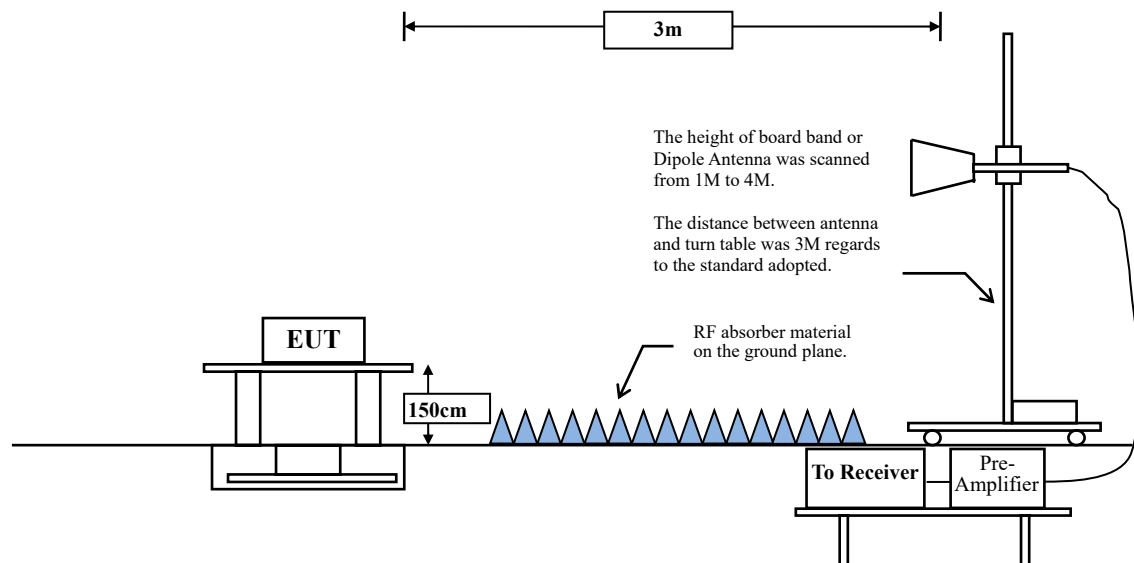
6. Band Edge

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 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.

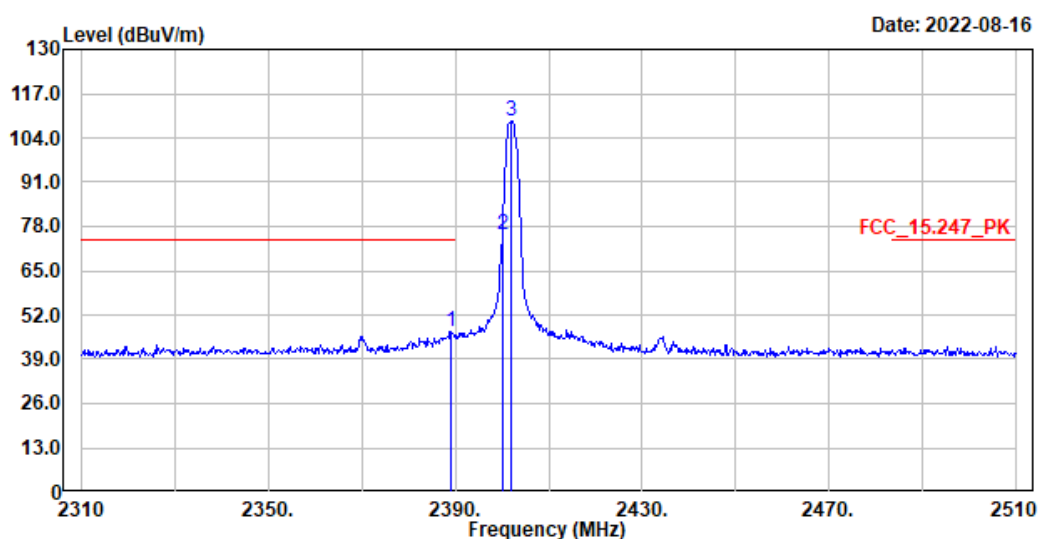
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

6.4. Test Result of Band Edge

Site :HY-CB02
 Condition :3m ,Horizontal
 Mode :TX_bt1m_2402MHz
 TEST BY :Lance



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2389.200	47.31	74.00	-26.69	40.94	6.37	Peak
2	2400.000	75.78	-----	-----	69.41	6.37	Peak
3	2401.800	108.80	-----	-----	102.43	6.37	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

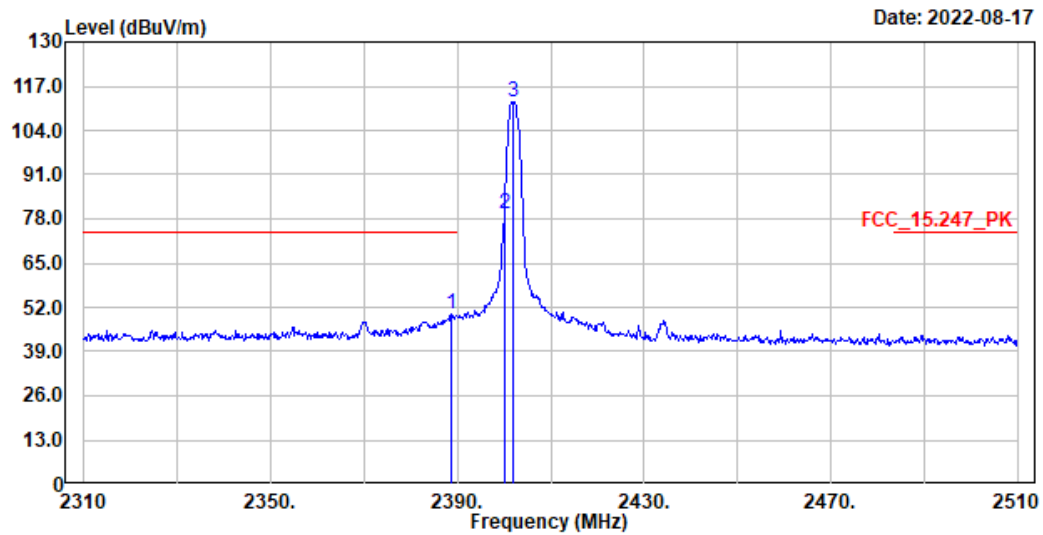
Horizontal Average Detector:

Frequency (MHz)	Peak Measurement (dBuV/m)	Duty Cycle Factor (dB)	Measurement (dBm)	Margin (dB)	Limit (dBm)
2389.2	47.31	-25.036	22.274	-31.726	54.000
2400	75.78	-25.036	50.744	--	--
2401.8	108.8	-25.036	83.764	--	--

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 11.

Site :HY-CB02
 Condition :3m ,Vertical
 Mode :TX_bt1m_2402MHz
 TEST BY :Lance



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2388.600	50.07	74.00	-23.93	43.70	6.37	Peak
2	2400.000	79.55	-----	-----	73.18	6.37	Peak
3	2401.800	112.52	-----	-----	106.15	6.37	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

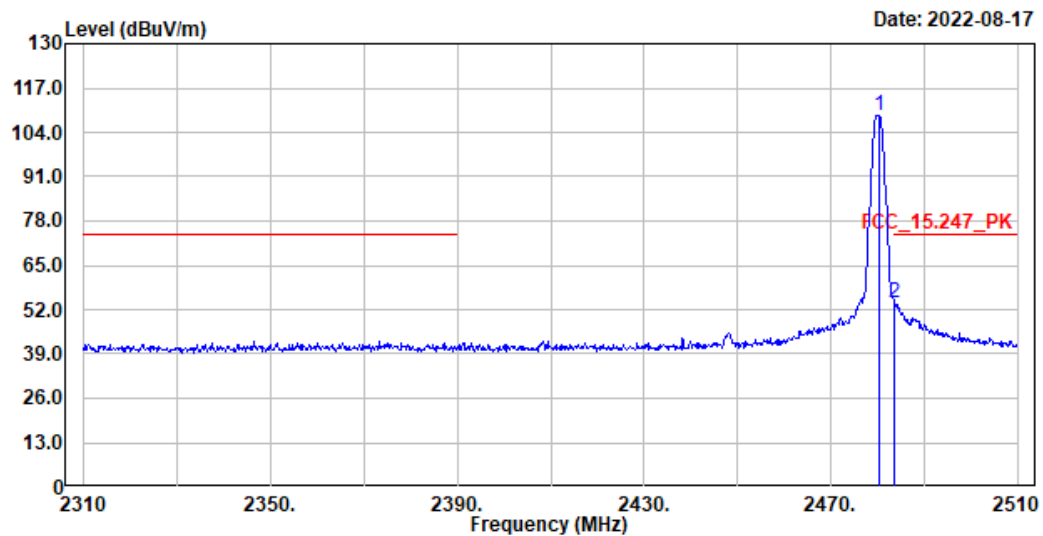
Vertical Average Detector:

Frequency (MHz)	Peak Measurement (dBuV/m)	Duty Cycle Factor (dB)	Measurement (dBm)	Margin (dB)	Limit (dBm)
2388.6	50.07	-25.036	25.034	-28.966	54.000
2400	79.55	-25.036	54.514	--	--
2401.8	112.52	-25.036	87.484	--	--

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 11.

Site :HY-CB02
 Condition :3m ,Horizontal
 Mode :TX_bt1m_2480MHz
 TEST BY :Lance



No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	Limit	Level		
				dB	dBuV	dB	
1	2480.200	108.90	-----	-----	102.56	6.34	Peak
2	2483.600	54.16	74.00	-19.84	47.81	6.35	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

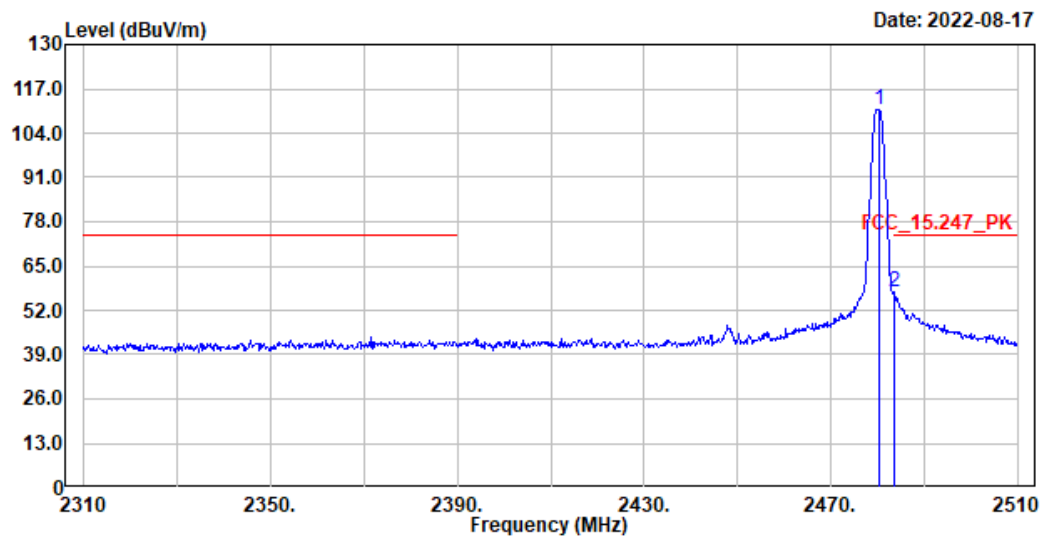
Horizontal Average Detector:

Frequency (MHz)	Peak Measurement (dBuV/m)	Duty Cycle Factor (dB)	Measurement (dBm)	Margin (dB)	Limit (dBm)
2480.2	108.9	-25.036	83.864	--	--
2483.6	54.16	-25.036	29.124	-24.876	54.000

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 11.

Site :HY-CB02
 Condition :3m ,Vertical
 Mode :TX_bt1m_2480MHz
 TEST BY :Lance



No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	Limit	Level	dB	
1	2480.200	110.94	-----	-----	104.60	6.34	Peak
2	2483.600	57.50	74.00	-16.50	51.15	6.35	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

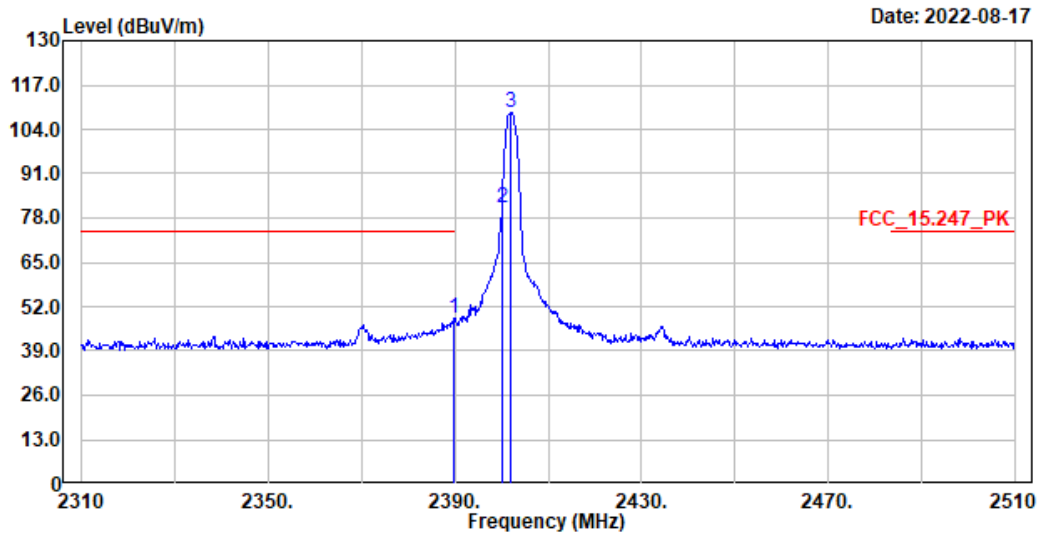
Vertical Average Detector:

Frequency (MHz)	Peak Measurement (dBuV/m)	Duty Cycle Factor (dB)	Measurement (dBm)	Margin (dB)	Limit (dBm)
2480.2	110.94	-25.036	85.904	--	--
2483.6	57.5	-25.036	32.464	-21.536	54.000

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 11.

Site :HY-CB02
 Condition :3m ,Horizontal
 Mode :TX_bt3m_2402MHz
 TEST BY :Lance



No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	Line	Limit	Level		
			dBuV/m	dB	dBuV	dB	
1	2389.800	48.39	74.00	-25.61	42.02	6.37	Peak
2	2400.000	81.02	-----	-----	74.65	6.37	Peak
3	2402.000	109.07	-----	-----	102.70	6.37	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

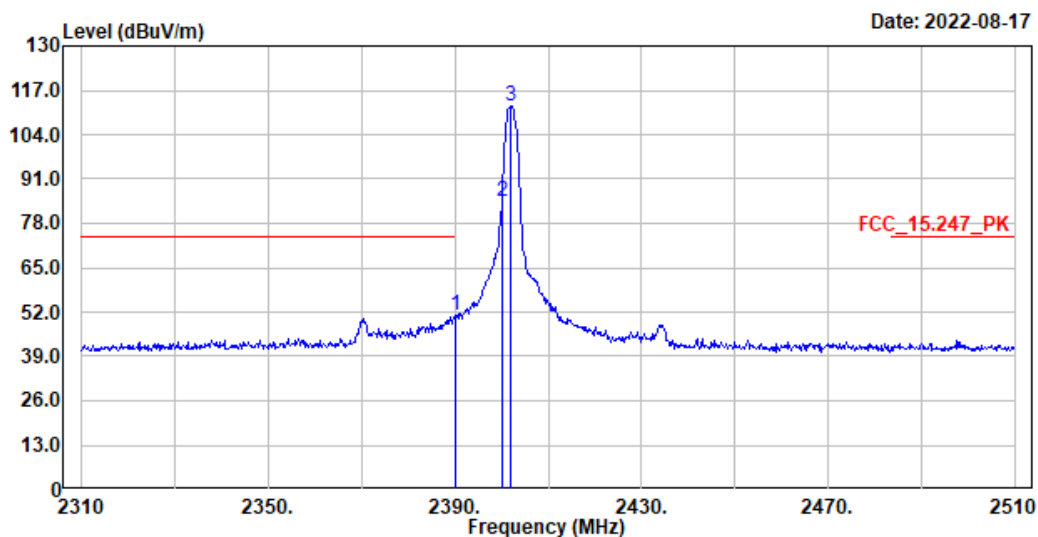
Horizontal Average Detector:

Frequency (MHz)	Peak Measurement (dBuV/m)	Duty Cycle Factor (dB)	Measurement (dBm)	Margin (dB)	Limit (dBm)
2389.8	48.39	-24.731	23.659	-30.341	54.000
2400	81.02	-24.731	56.289	--	--
2402	109.07	-24.731	84.339	--	--

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 11.

Site :HY-CB02
 Condition :3m ,Vertical
 Mode :TX_bt3m_2402MHz
 TEST BY :Lance



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2390.000	51.02	74.00	-22.98	44.65	6.37	Peak
2	2400.000	84.51	-----	-----	78.14	6.37	Peak
3	2402.000	112.36	-----	-----	105.99	6.37	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

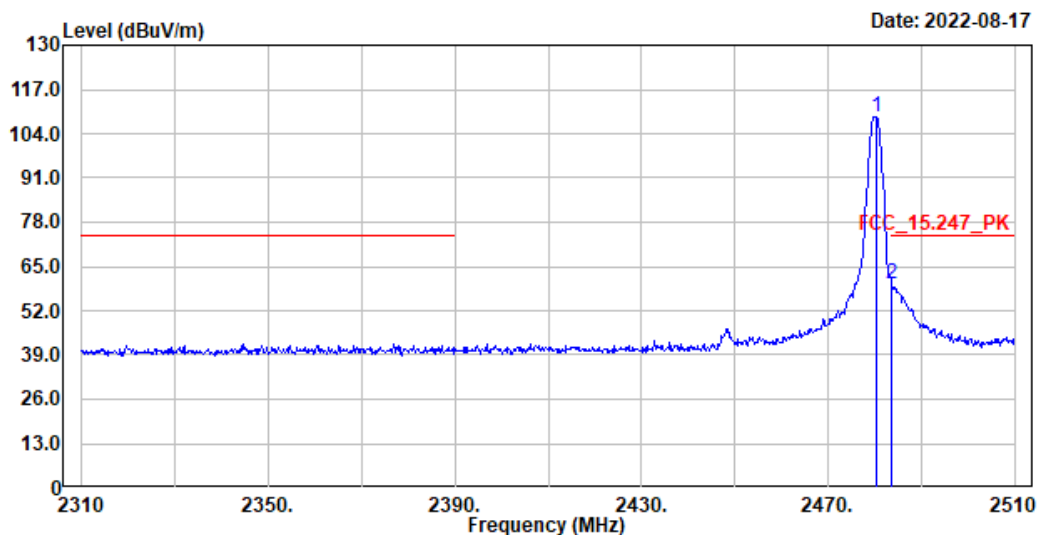
Vertical Average Detector:

Frequency (MHz)	Peak Measurement (dBuV/m)	Duty Cycle Factor (dB)	Measurement (dBm)	Margin (dB)	Limit (dBm)
2390	51.02	-24.731	26.289	-27.711	54.000
2400	84.51	-24.731	59.779	--	--
2402	112.36	-24.731	87.629	--	--

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 11.

Site :HY-CB02
 Condition :3m ,Horizontal
 Mode :TX_bt3m_2480MHz
 TEST BY :Lance



No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	Line	Limit	Level		
			dBuV/m	dB	dBuV	dB	
1	2480.200	108.94	-----	-----	102.60	6.34	Peak
2	2483.600	59.98	74.00	-14.02	53.63	6.35	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line

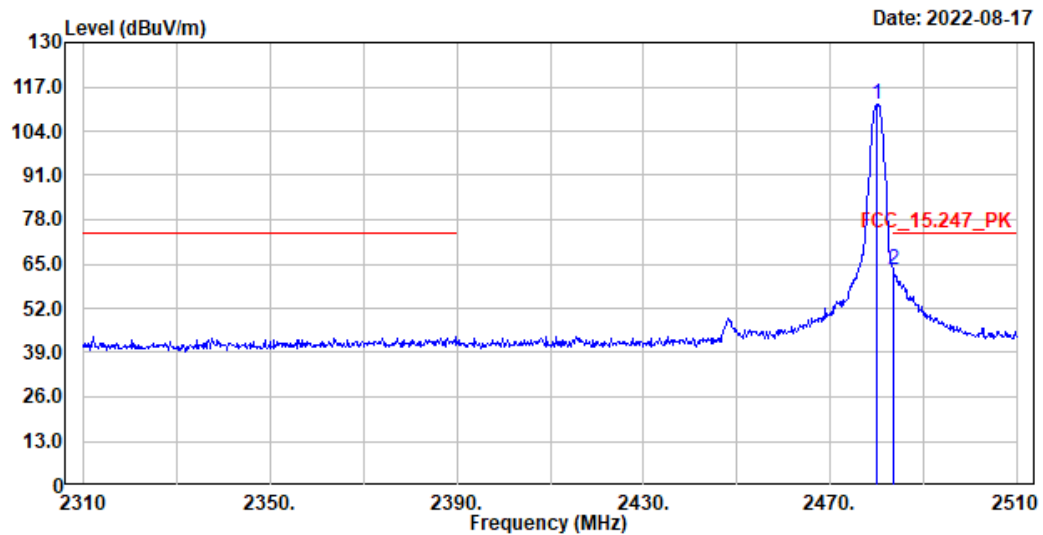
Horizontal Average Detector:

Frequency (MHz)	Peak Measurement (dBuV/m)	Duty Cycle Factor (dB)	Measurement (dBm)	Margin (dB)	Limit (dBm)
2480.2	108.94	-24.731	84.209	--	--
2483.6	59.98	-24.731	35.249	-18.751	54.000

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 11.

Site :HY-CB02
 Condition :3m ,Vertical
 Mode :TX_bt3m_2480MHz
 TEST BY :Lance



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2480.000	111.74	-----	-----	105.40	6.34	Peak
2	2483.600	63.35	74.00	-10.65	57.00	6.35	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit

Vertical Average Detector:

Frequency (MHz)	Peak Measurement (dBuV/m)	Duty Cycle Factor (dB)	Measurement (dBm)	Margin (dB)	Limit (dBm)
2480	111.74	-24.731	87.009	--	--
2483.6	63.35	-24.731	38.619	-15.381	54.000

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 11.

Product : Bluetooth Headset
 Test Item : Band Edge
 Test Mode : Mode 1: Transmit - 1Mbps (Hopping off)
 Test Date : 2022/08/12

Measurement Level	Result
Δ (dB)	
> 20	PASS

Figure Channel 00:

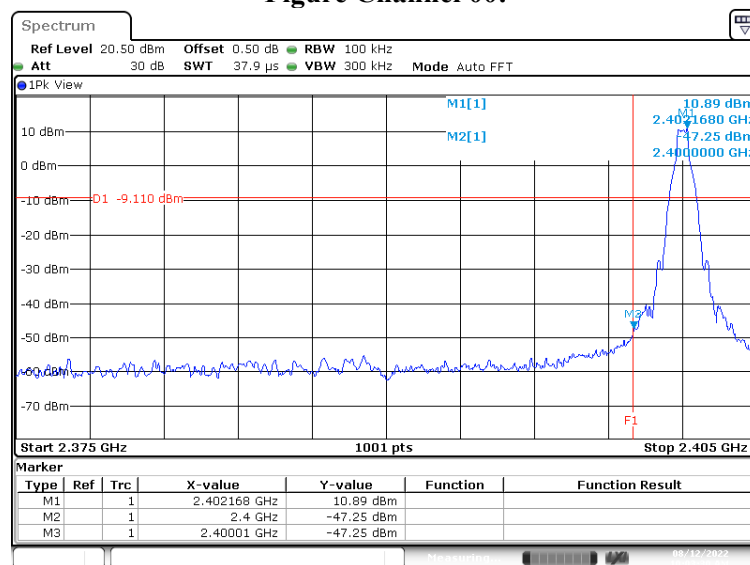
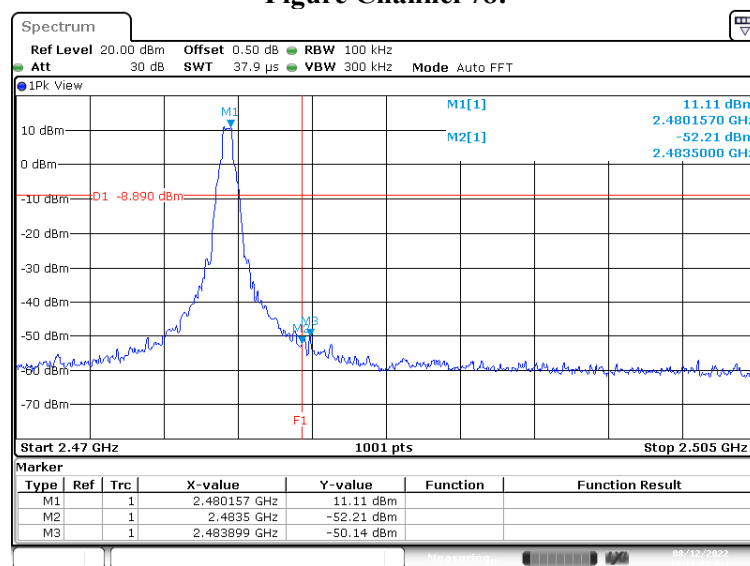


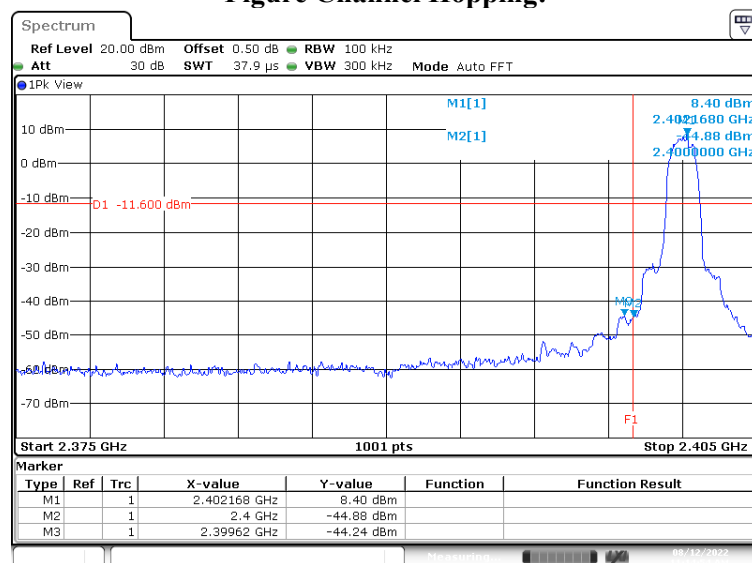
Figure Channel 78:



Product : Bluetooth Headset
 Test Item : Band Edge
 Test Mode : Mode 2: Transmit - 3Mbps (Hopping off)
 Test Date : 2022/08/12

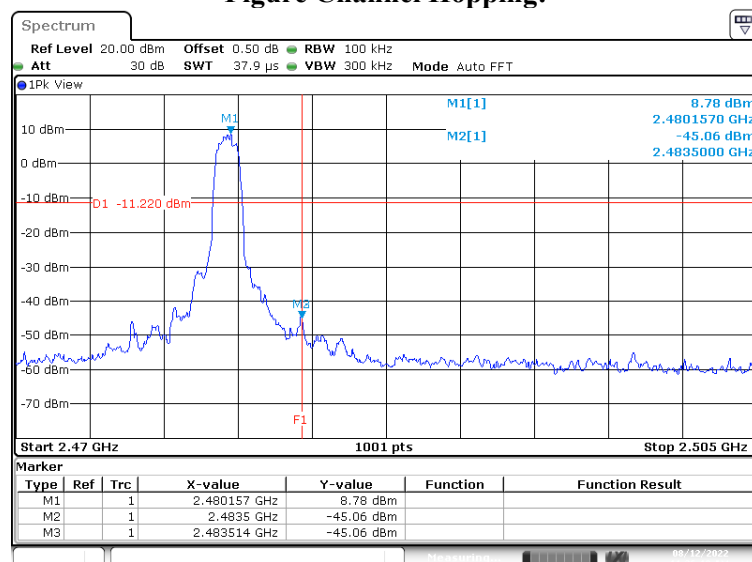
Measurement Level	Result
Δ (dB)	
> 20	PASS

Figure Channel Hopping:



Date: 12.AUG.2022 11:14:54

Figure Channel Hopping:

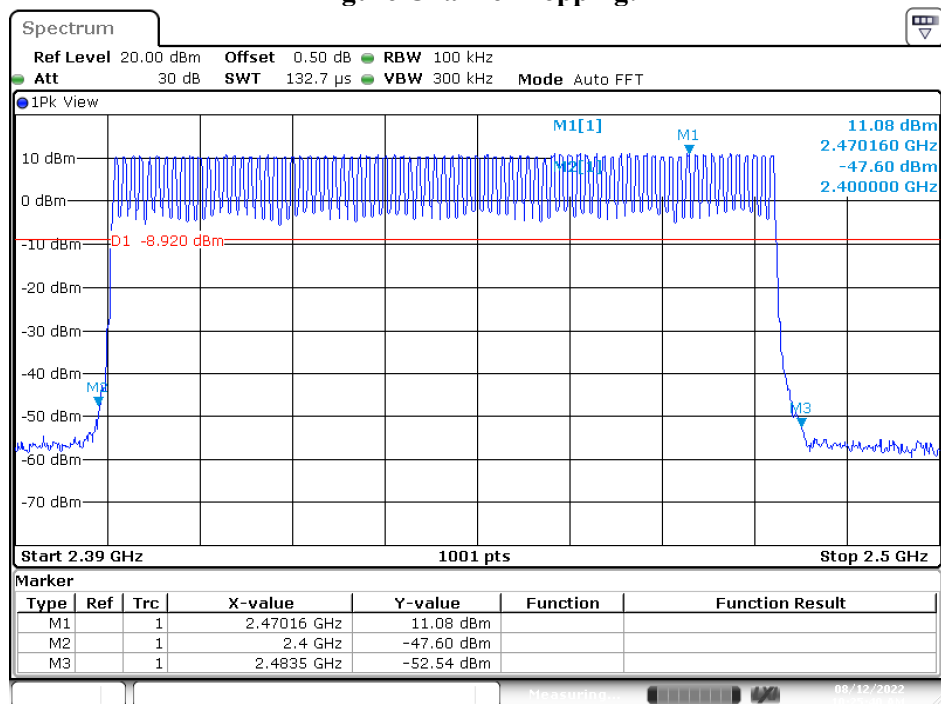


Date: 12.AUG.2022 11:26:10

Product : Bluetooth Headset
Test Item : Band Edge
Test Mode : Mode 1: Transmit - 1Mbps (Hopping on)
Test Date : 2022/08/12

Measurement Level	Result
Δ (dB)	
> 20	PASS

Figure Channel Hopping:

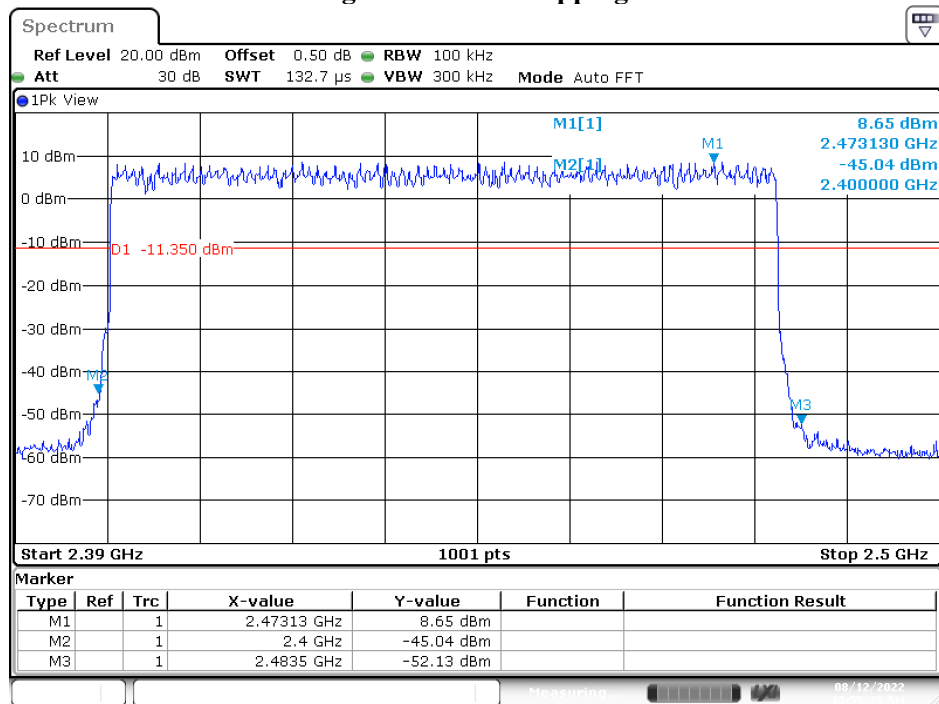


Date: 12.AUG.2022 10:25:41

Product : Bluetooth Headset
 Test Item : Band Edge
 Test Mode : Mode 2: Transmit - 3Mbps (Hopping on)
 Test Date : 2022/08/12

Measurement Level	Result
Δ (dB)	
> 20	PASS

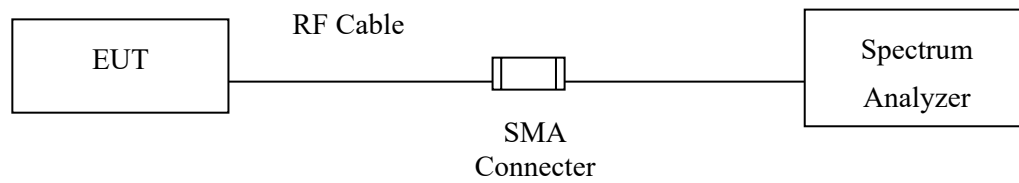
Figure Channel Hopping:



Date: 12.AUG.2022 10:55:36

7. Channel Number

7.1. Test Setup



7.2. Limit

Frequency hopping systems operating in the 2400-2483.5 MHz bands shall use at least 75 hopping frequencies.

7.3. Test Procedure

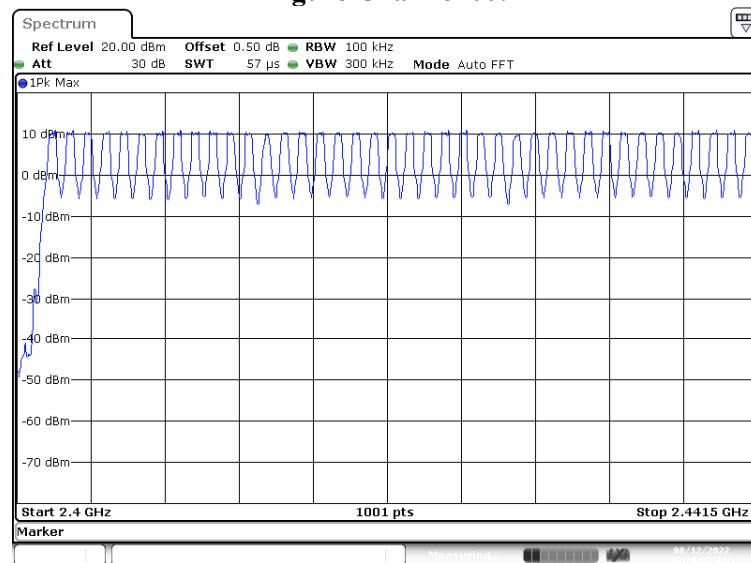
Tested according to FHSS test procedure of KDB558074 section 9 (b for compliance to FCC 47CFR 15.247 requirements.

7.4. Test Result of Channel Number

Product : Bluetooth Headset
 Test Item : Channel Number
 Test Mode : Mode 1: Transmit - 1Mbps
 Test Date : 2022/08/12

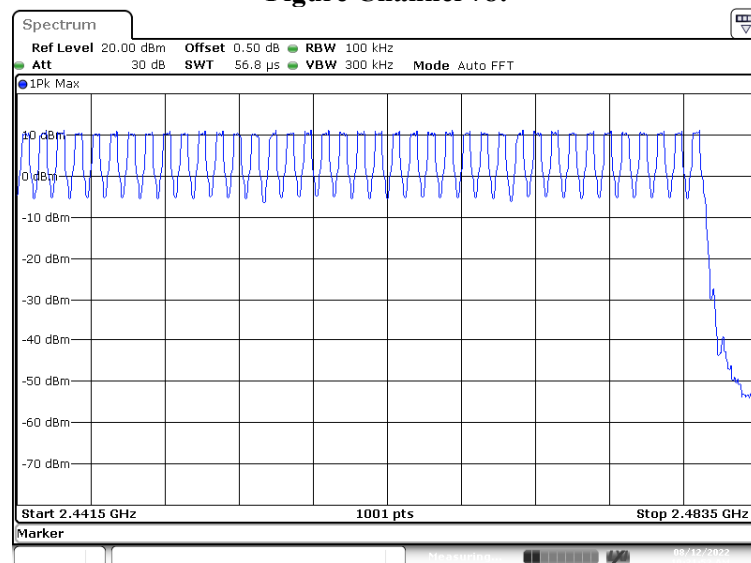
Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

Figure Channel 00:



Date: 12 AUG.2022 10:28:10

Figure Channel 78:

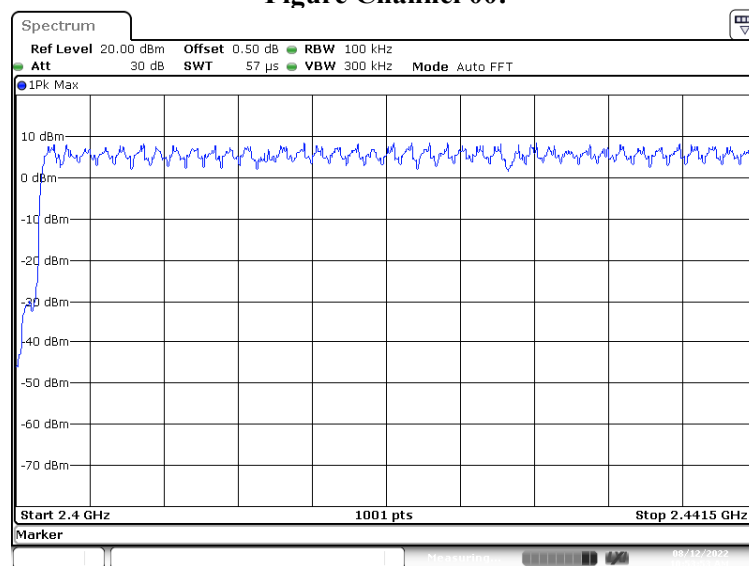


Date: 12 AUG.2022 10:31:52

Product : Bluetooth Headset
 Test Item : Channel Number
 Test Mode : Mode 2: Transmit - 3Mbps
 Test Date : 2022/08/12

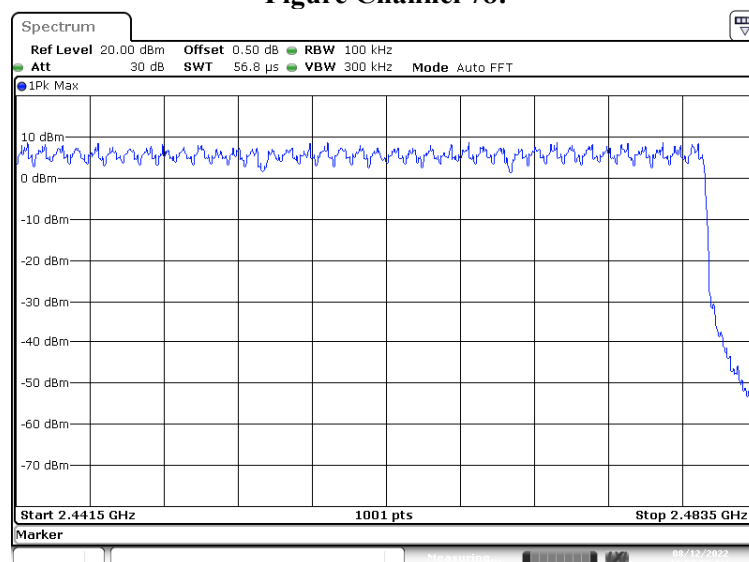
Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

Figure Channel 00:



Date: 12 AUG.2022 10:53:53

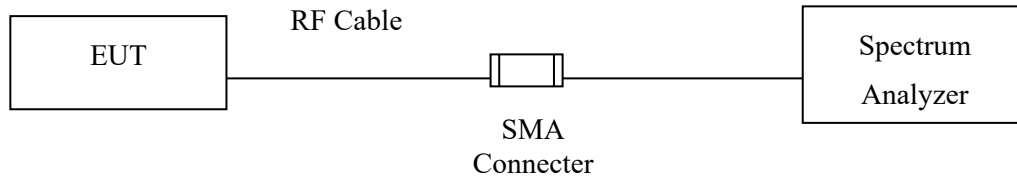
Figure Channel 78:



Date: 12 AUG.2022 10:57:56

8. Channel Separation

8.1. Test Setup



8.2. Limit

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.

8.3. Test Procedure

Tested according to FHSS test procedure of KDB558074 section 9 (b for compliance to FCC 47CFR 15.247 requirements).

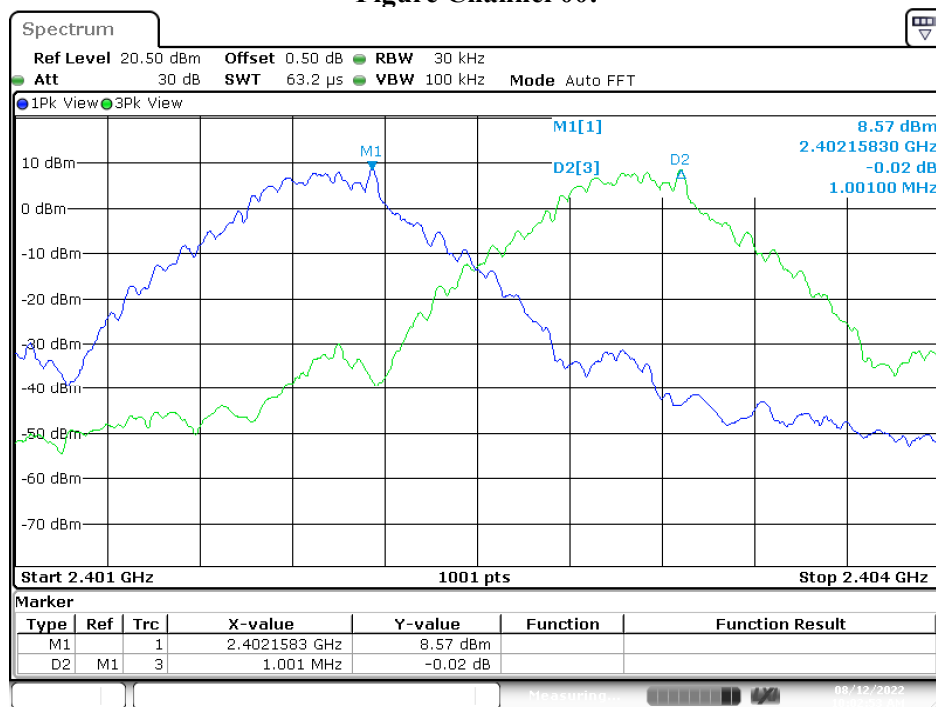
8.4. Test Result of Channel Separation

Product : Bluetooth Headset
 Test Item : Channel Separation
 Test Mode : Mode 1: Transmit - 1Mbps
 Test Date : 2022/08/12

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Limit (kHz)	Limit of (2/3)*20dB Bandwidth (kHz)	Result
00	2402	1001	>25 kHz	631.4	Pass
39	2441	1001	>25 kHz	633.4	Pass
78	2480	1001	>25 kHz	633.4	Pass

NOTE: The 20dB Bandwidth is refer to section 10.

Figure Channel 00:



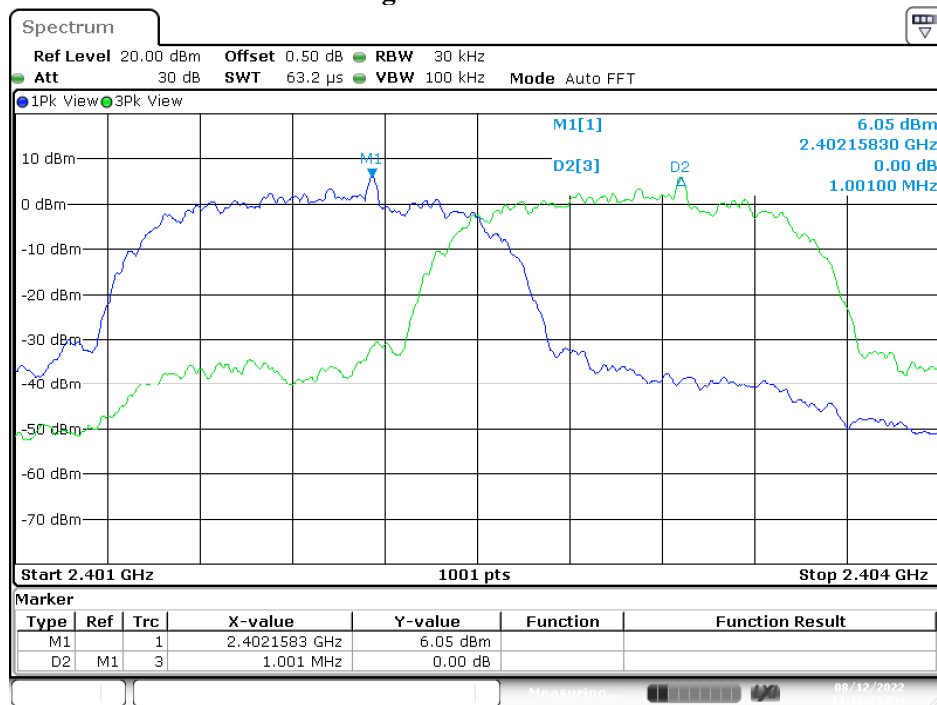
Date: 12.AUG.2022 10:02:53

Product : Bluetooth Headset
 Test Item : Channel Separation
 Test Mode : Mode 2: Transmit - 3Mbps
 Test Date : 2022/08/12

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Limit (kHz)	Limit of (2/3)*20dB Bandwidth (kHz)	Result
00	2402	1001	>25 kHz	864.7	Pass
39	2441	1001	>25 kHz	864.7	Pass
78	2480	1001	>25 kHz	864.7	Pass

NOTE: The 20dB Bandwidth is refer to section 10.

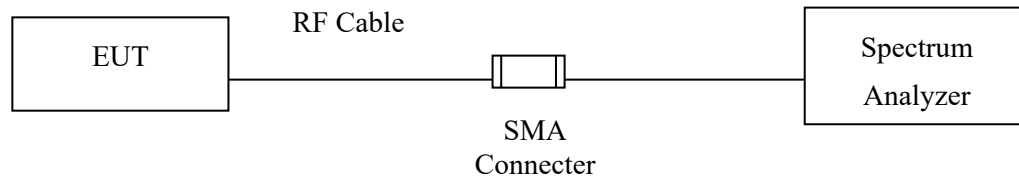
Figure Channel 00:



Date: 12.AUG.2022 11:16:33

9. Dwell Time

9.1. Test Setup



9.2. Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

9.3. Test Procedure

Tested according to FHSS test procedure of KDB558074 section 9 (b for compliance to FCC 47CFR 15.247 requirements.

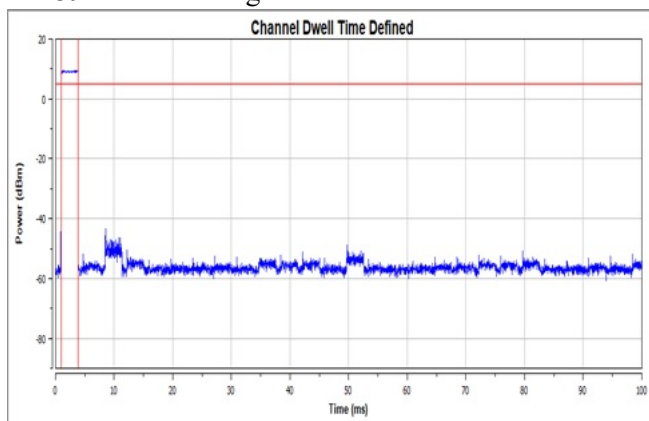
9.4. Test Result of Dwell Time

Product : Bluetooth Headset
 Test Item : Dwell Time
 Test Mode : Mode 1: Transmit - 1Mbps
 Test Date : 2022/08/12

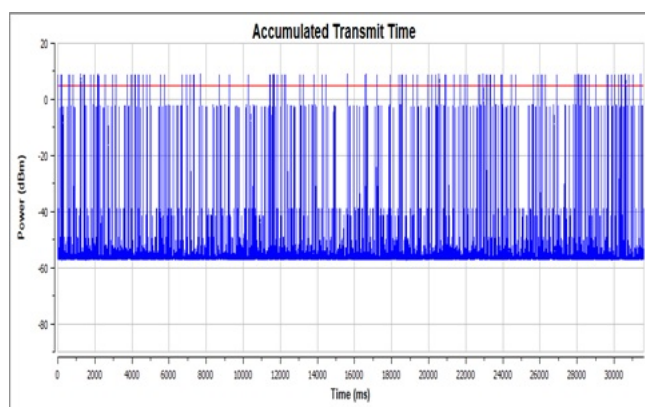
Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Dwell Time (ms)	Limit (ms)	Result
2402	2.880	102	31600	293.760	400	Pass
2441	2.880	104	31600	299.520	400	Pass
2480	2.860	107	31600	306.020	400	Pass

Dwell time = Time slot length(ms)* Hopping of Number

CH 39 Time slot length



CH 39 Hopping of Number

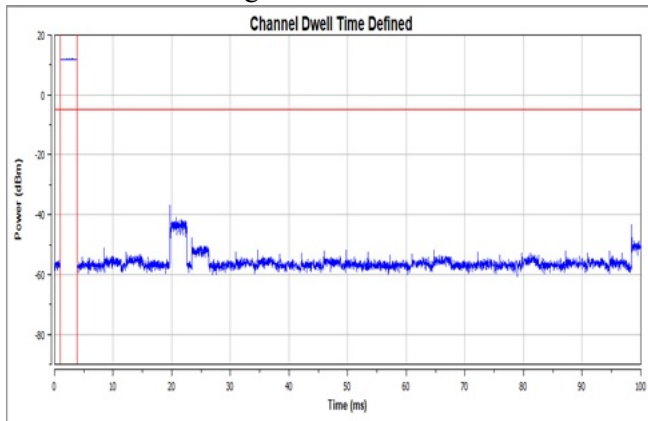


Product : Bluetooth Headset
 Test Item : Dwell Time
 Test Mode : Mode 2: Transmit - 3Mbps
 Test Date : 2022/08/12

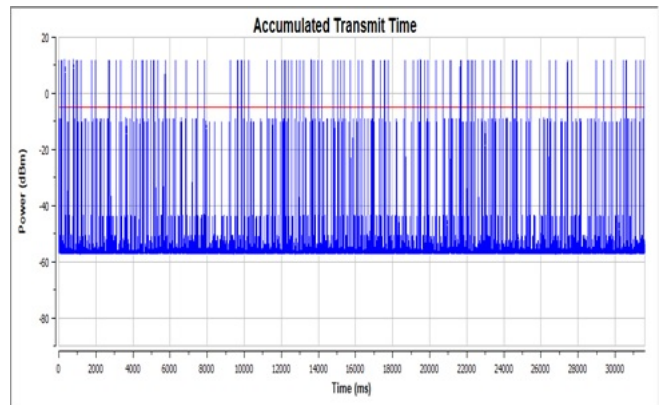
Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Dwell Time (ms)	Limit (ms)	Result
2402	2.880	106	31600	305.280	400	Pass
2441	2.860	111	31600	317.460	400	Pass
2480	2.880	108	31600	311.040	400	Pass

Dwell time = Time slot length(ms)* Hopping of Number

CH 39 Time slot length

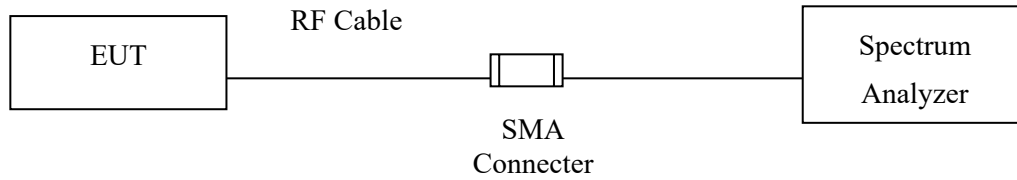


CH 39 Hopping of Number



10. Occupied Bandwidth

10.1. Test Setup



10.2. Limits

N/A

10.3. Test Procedure

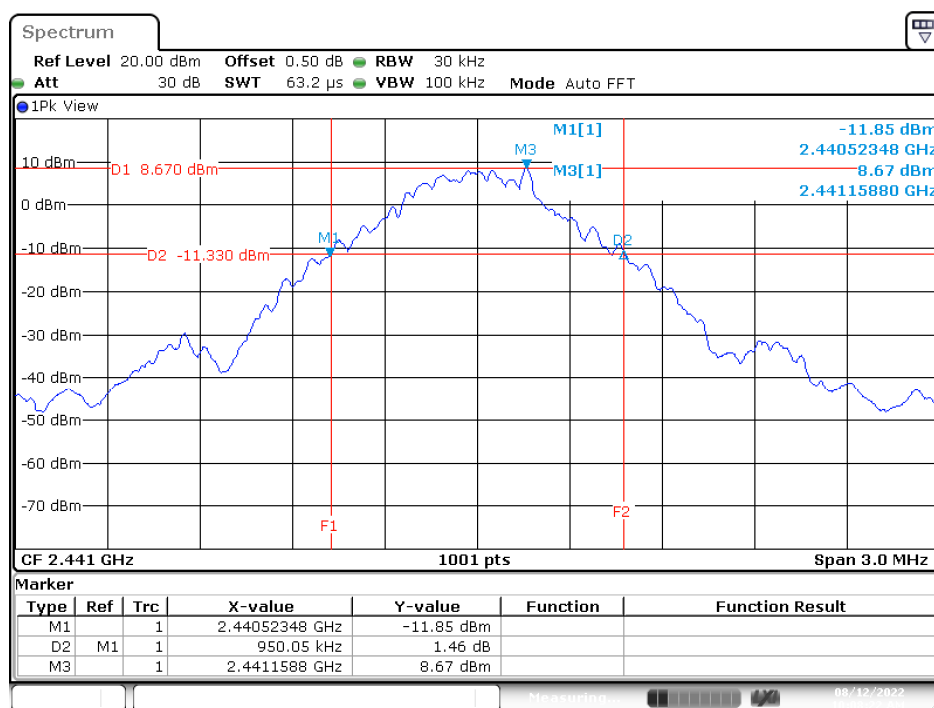
Tested according to FHSS test procedure of KDB558074 section 9 (b for compliance to FCC 47CFR 15.247 requirements.

10.4. Test Result of Occupied Bandwidth

Product : Bluetooth Headset
 Test Item : Occupied Bandwidth Data
 Test Mode : Mode 1: Transmit - 1Mbps
 Test Date : 2022/08/12

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	947	--	NA
39	2441	950	--	NA
78	2480	950	--	NA

Figure Channel 39:

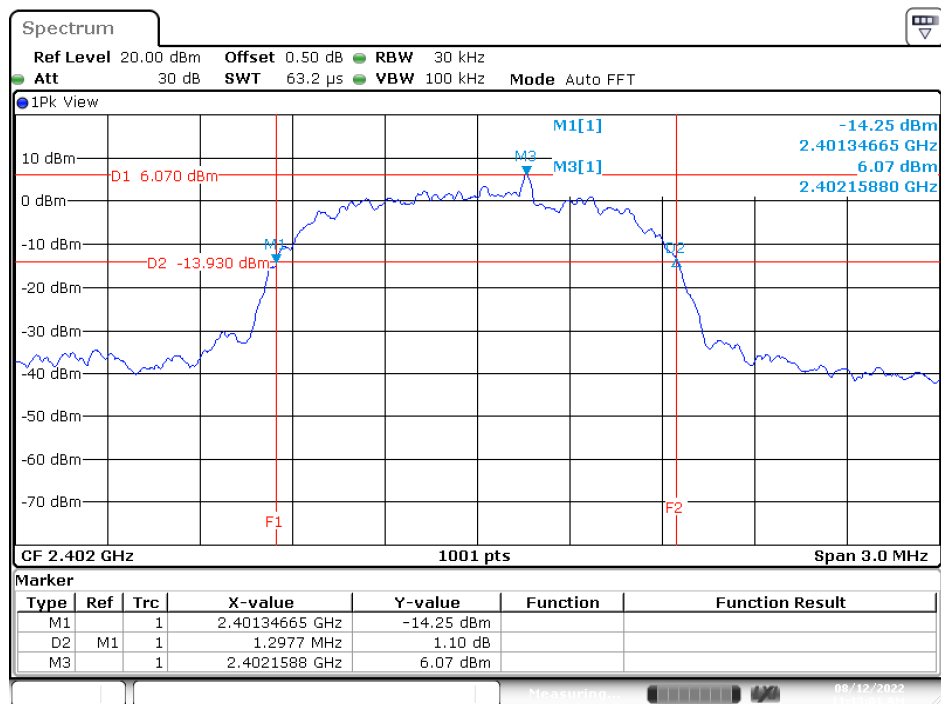


Date: 12.AUG.2022 10:08:23

Product : Bluetooth Headset
 Test Item : Occupied Bandwidth Data
 Test Mode : Mode 2: Transmit - 3Mbps
 Test Date : 2022/08/12

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1297	--	NA
39	2441	1297	--	NA
78	2480	1297	--	NA

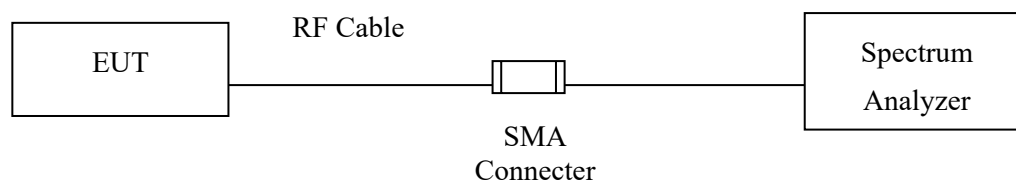
Figure Channel 00:



Date: 12.AUG.2022 11:13:01

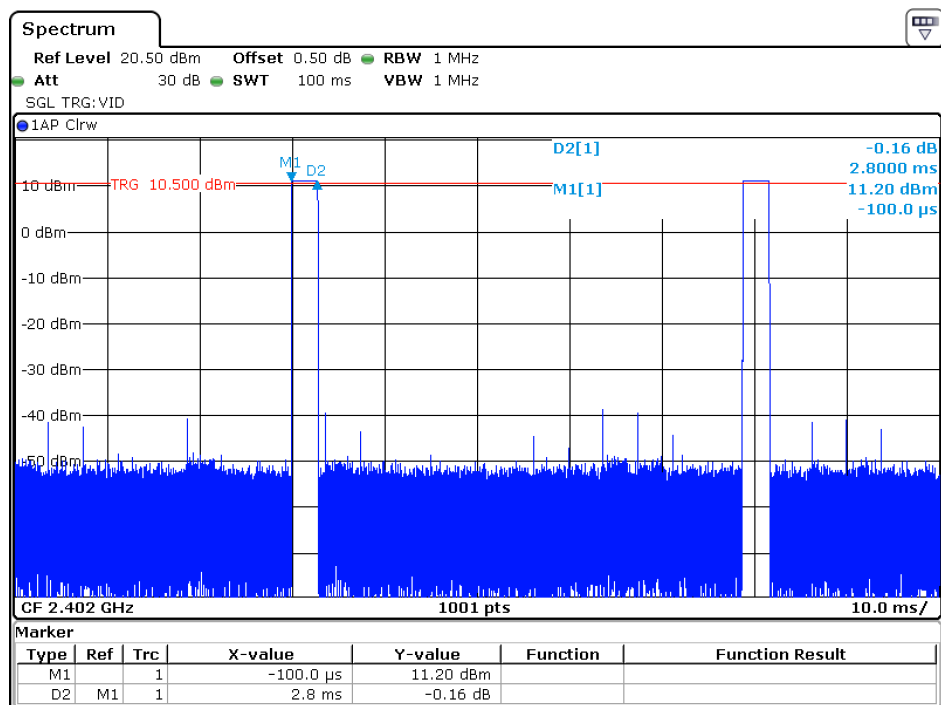
11. Duty Cycle

11.1. Test Setup



11.2. Test Result of Duty Cycle

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



Date: 16.AUG.2022 08:34:48

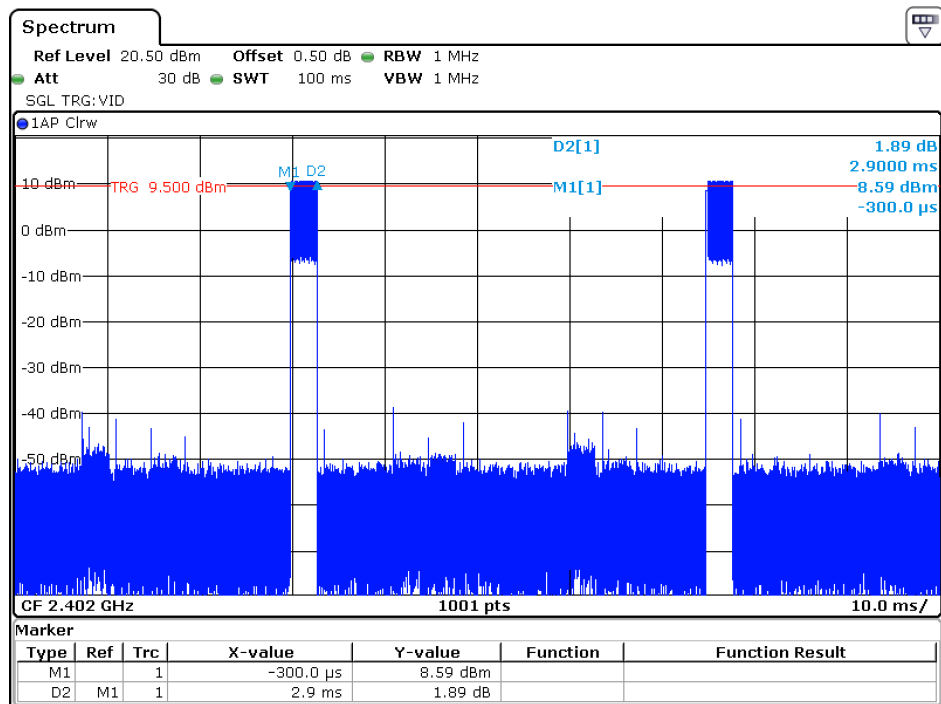
Time on of 100ms = 5.60ms

Duty Cycle = 5.6ms / 100ms = 0.056

Duty Cycle correction factor = 20 LOG 0.056 = -25.036 dB

Duty Cycle correction factor	-25.036 dB
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Product : Bluetooth Headset
 Test Item : Duty Cycle Data
 Test Mode : Mode 2: Transmit - 3Mbps



Date: 16.AUG.2022 08:50:43

Time on of 100ms = 5.80ms

Duty Cycle = 5.8ms / 100ms = 0.058

Duty Cycle correction factor = 20 LOG 0.058 = -24.731 dB

Duty Cycle correction factor	-24.731dB
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