Test Report

Product Name	Bluetooth Headset
Model No.	HSC190W
FCC ID	BCE-HSC190W

Applicant	GN Audio USA Inc.
Address	900 Chelmsfort St, Tower 2, Floor 8 , Lowell, Massachusetts, 01851 United States

Date of Receipt	Nov. 28, 2022
Issued Date	Feb. 03, 2023
Report No.	22B0954R-RFUSBT2V01-A
Report Version	V1.0

Testing Laboratory
3023

Test Report

Product Name	Bluetooth Headset
Applicant	GN Audio USA Inc.
Address	900 Chelmsfort St, Tower 2, Floor 8 , Lowell, Massachusetts, 01851 United States
Manufacturer	GN Audio A/S
Model No.	HSC190W
FCC ID	BCE-HSC190W
EUT Rated Voltage	DC 5V by USB or DC 3.8V by Battery
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 : April Chen

(Senior Project Specialist / April Chen)

Tested By : Bill Lin

(Senior Engineer / Bill Lin)

Approved By : Alan Chen

(Senior Engineer / Alan Chen)

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Revision History

Report No.	Version	Description	Issued Date
22B0954R-RFUSBT2V01-A	V1.0	Initial issue of report.	Feb. 03, 2023

1. General Information

1.1. EUT Description

Product Name	Bluetooth Headset
Trade Name	Jabra
Model No.	HSC190W
FCC ID	BCE-HSC190W
Frequency Range	2402 – 2480 MHz
Channel Number	Bluetooth V2.1+EDR: 79
Type of Modulation	Bluetooth V2.1+EDR: GFSK(1 Mbps) / π /4DQPSK(2 Mbps) / 8DPSK(3 Mbps)
Antenna Type	PIFA
Channel Control	Auto
Antenna Gain	Refer to the Antenna List
Type C to Type C Cable	Shielded, 1.2m
Type C to USB Cable	Shielded, 1.2m
Bluetooth USB Dongle	MFR: GN Audio A/S, M/N: END050W, FCC ID: BCE-END050W
Bluetooth USB Dongle	MFR: GN Audio A/S, M/N: END060W, FCC ID: BCE-END060W
Wireless charger	MFR: GN Audio A/S, M/N: 5190004, FCC ID: BCE-5190004
Wireless charger	MFR: GN Audio A/S, M/N: WH-WI-022, FCC ID: BCE-WH-WI-022

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	GN Audio A/S	Jabra Evolve2 65 Flex	PIFA	2.66 dBi for 2400 MHz

Note: The antenna of EUT conforms to FCC 15.203.

Center Frequency of Each Channel:

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

Note:

1. The EUT is a Bluetooth Headset with built-in Bluetooth transceiver, this report for Bluetooth V2.1+EDR.
2. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
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 is shown in the report.
5. 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.
6. The test mode is based on the Bluetooth technology, while testing 1 Mbps, 2 Mbps and 3 Mbps, the worst case is 1Mbps and 3Mbps, and only worse case data is recorded in this report.

Test Mode	Mode 1	Transmit - 1 Mbps
		Transmit - 3 Mbps

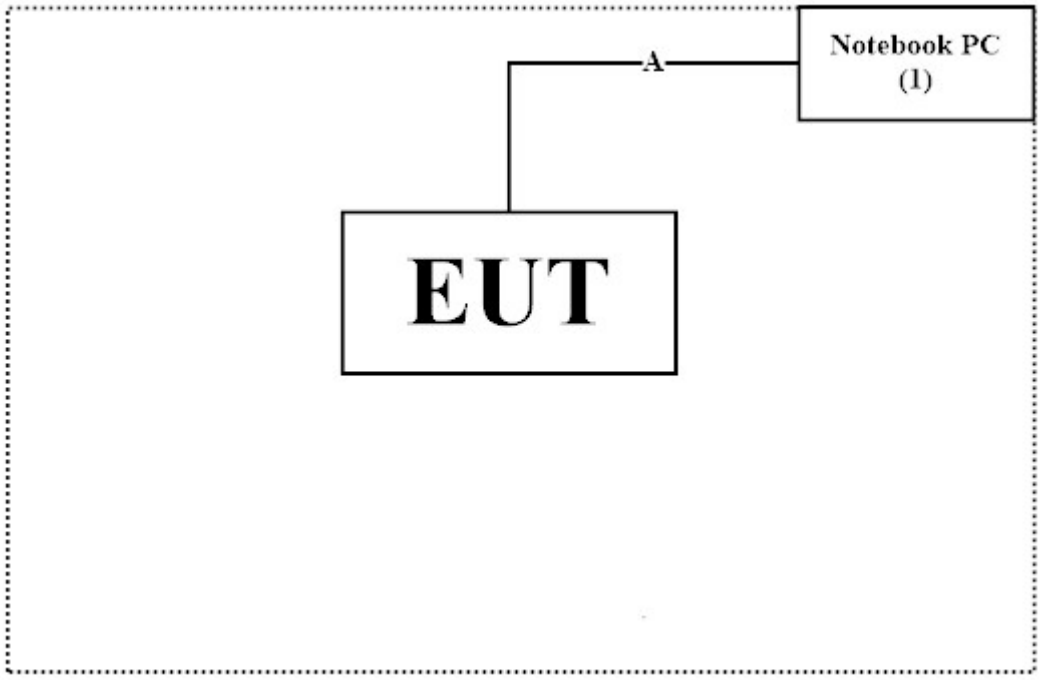
1.2. Tested System Details

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

Cable Type		Cable Description
A	Type C to USB Cable	Non-Shielded, 1.2m

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 Ver.3.3.5’ on the Notebook PC.
3. Configure the test mode, the test channel, and the data rate.
4. 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	20.2 °C
	Humidity (%RH)	10~90 %	65.8 %
Conductive	Temperature (°C)	10~40 °C	22.0 °C
	Humidity (%RH)	10~90 %	55.0 %

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
V	EMI Test Receiver	R&S	ESR7	101601	2022/06/23	2023/06/22
V	Two-Line V-Network	R&S	ENV216	101306	2022/05/23	2023/05/22
V	Two-Line V-Network	R&S	ENV216	101307	2022/05/04	2023/05/03
V	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 "V" 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
V	Spectrum Analyzer	R&S	FSV40	101149	2022/12/06	2023/03/24
V	Peak Power Analyzer	KEYSIGHT	8990B	MY51000410	2022/08/06	2023/08/05
V	Wideband Power Sensor	KEYSIGHT	N1923A	MY56080003	2022/08/05	2023/08/04
V	Wideband Power Sensor	KEYSIGHT	N1923A	MY56080004	2022/08/05	2023/08/04

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "V" are used to measure the final test results.
3. Test Software Version : RF Conducted Test Tools R3 V3.0.1.14.

For Radiated Measurements /HY-CB03

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
	Loop Antenna	AMETEK	HLA6121	49611	2022/03/18	2023/03/17
V	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2021/08/11	2023/08/10
V	Horn Antenna	RF SPIN	DRH18-E	210503A18ES	2022/06/08	2023/06/07
V	Horn Antenna	Com-Power	AH-840	101100	2021/10/04	2023/10/03
V	Pre-Amplifier	SGH	0301-9	20211007-11	2022/02/22	2023/02/21
V	Pre-Amplifier	SGH	PRAMP118	20200701	2022/07/28	2023/07/27
V	Pre-Amplifier	EMCI	EMC05820SE	980310	2022/07/28	2023/07/27
	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		
V	Filter	MICRO TRONICS	BRM50702	G269	2022/07/31	2023/07/30
	Filter	MICRO TRONICS	BRM50716	G196	2022/07/27	2023/07/26
V	EMI Test Receiver	R&S	ESR	102793	2022/12/05	2023/12/04
V	Spectrum Analyzer	R&S	FSV3044	101114	2022/02/11	2023/02/10
V	Coaxial Cable	SGH	SGH18	2021005-1	2022/3/18	2023/03/17
	Coaxial Cable	SGH	SGH18	202108-4		
	Coaxial Cable	SGH	HA800	GD20110223-1		
	Coaxial Cable	SGH	HA800	GD20110222-3		

Note:

1. Bi-Log Antenna and Horn Antenna(AH-840) is calibrated every two years, the other equipments are calibrated every one year.
2. The test instruments marked with "V" are used to measure the final test results.
3. Test Software Version : E3 210616 dekra V9.

4.

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

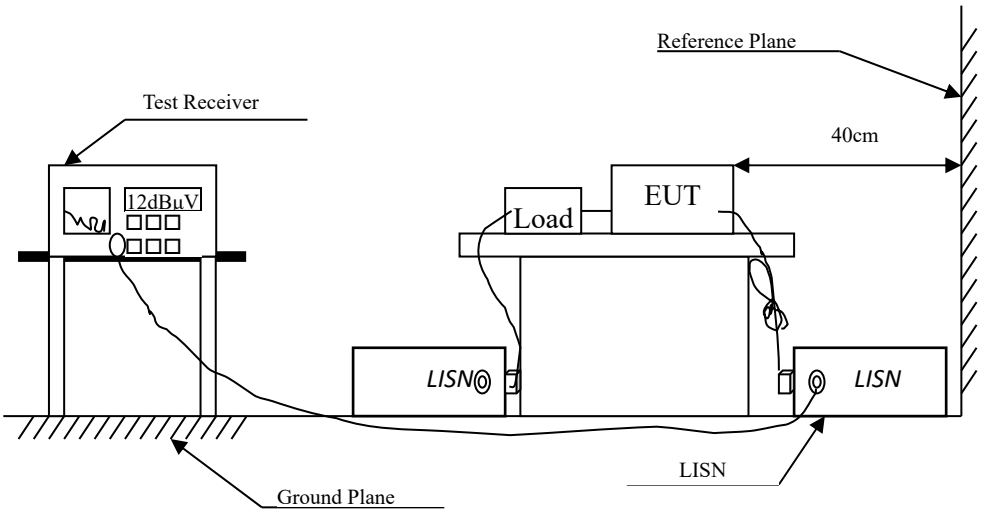
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

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 1 GHz ±4.05 dB	Under 1 GHz ±4.05 dB
RF Antenna Conducted Test	±2.06 dB	
Band Edge	Under 1 GHz ±4.05 dB	Under 1 GHz ±4.05 dB
Channel Number	±1544.74 Hz	
Channel Separation	N/A	
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 (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.)

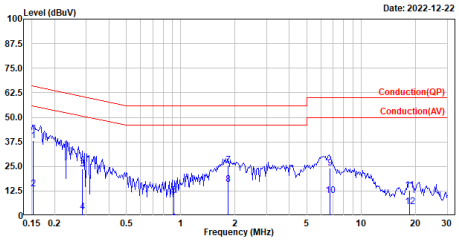
Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

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

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

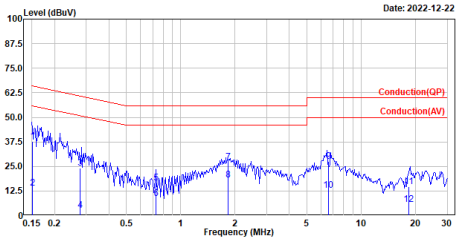
Site :HY-SR01
Condition :Line
Mode :BT3M_2441MHz_TX_
test by :Ryan



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	0.153	37.98	65.86	-27.88	28.30	9.68	QP
2	0.153	13.77	55.86	-42.09	4.09	9.68	Average
3	0.287	23.62	60.62	-37.00	13.95	9.67	QP
4	0.287	1.80	50.62	-48.82	-7.87	9.67	Average
5	0.917	10.15	56.00	-45.85	0.43	9.72	QP
6	0.917	-3.93	46.00	-49.93	-13.65	9.72	Average
7	1.824	25.84	56.00	-30.16	16.04	9.80	QP
8	1.824	15.78	46.00	-30.22	5.98	9.80	Average
9	6.732	24.10	60.00	-35.90	13.27	10.83	QP
10	6.732	10.33	50.00	-39.67	-0.50	10.83	Average
11	18.522	12.86	60.00	-47.14	2.15	10.71	QP
12	18.522	4.46	50.00	-45.54	-6.25	10.71	Average

Note:
1. Level = Read Level + Factor
2. Factor = LISN insertion loss + Cable loss
3. Over Limit = Level - Limit Line

Site :HY-SR01
Condition :Neutral
Mode :BT3M_2441MHz_TX_
test by :Ryan

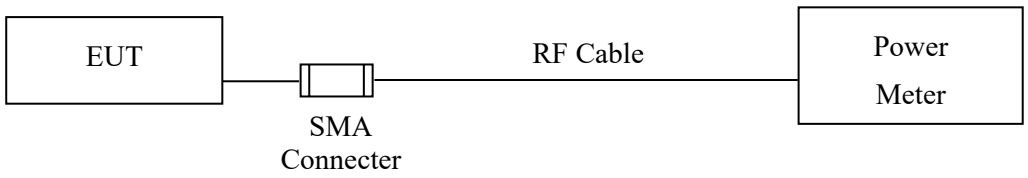


No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	0.151	37.92	65.94	-28.02	28.26	9.66	QP
2	0.151	13.86	55.94	-42.08	4.20	9.66	Average
3	0.277	24.08	60.90	-36.82	14.42	9.66	QP
4	0.277	2.65	50.90	-48.25	-7.01	9.66	Average
5	0.733	16.76	56.00	-39.24	7.08	9.68	QP
6	0.733	8.61	46.00	-37.39	-1.07	9.68	Average
7	1.827	27.28	56.00	-28.72	17.50	9.78	QP
8	1.827	18.28	46.00	-27.72	8.50	9.78	Average
9	6.563	27.44	60.00	-32.56	16.62	10.82	QP
10	6.563	12.70	50.00	-37.30	1.88	10.82	Average
11	18.265	14.85	60.00	-45.15	4.05	10.80	QP
12	18.265	5.50	50.00	-44.50	-5.30	10.80	Average

Note:
1. Level = Read Level + Factor
2. Factor = LISN insertion loss + Cable loss
3. Over Limit = Level - Limit Line

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 : Transmit - 1 Mbps
Test Date : 2022/12/06

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
00	2402	12.32	1 Watt= 30 dBm	Pass
39	2441	12.20	1 Watt= 30 dBm	Pass
78	2480	12.32	1 Watt= 30 dBm	Pass

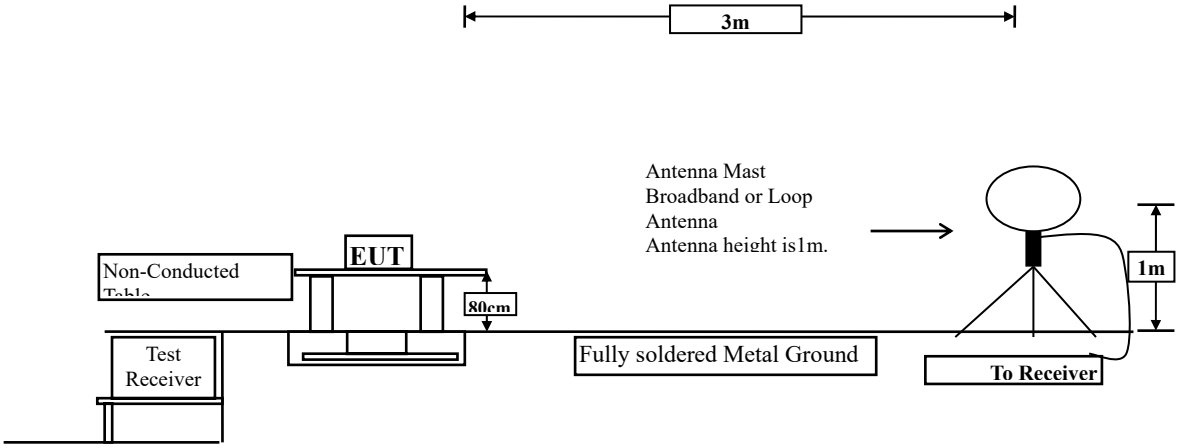
Product : Bluetooth Headset
Test Item : Peak Power Output
Test Mode : Transmit - 3 Mbps
Test Date : 2022/12/06

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
00	2402	12.15	1 Watt= 30 dBm	Pass
39	2441	12.32	1 Watt= 30 dBm	Pass
78	2480	12.46	1 Watt= 30 dBm	Pass

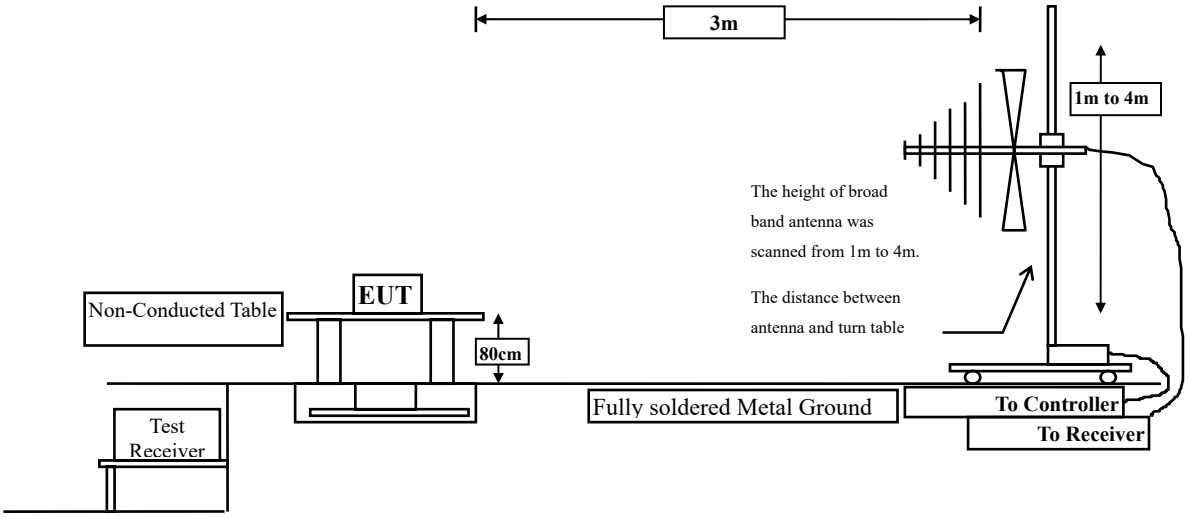
4. Radiated Emission

4.1. Test Setup

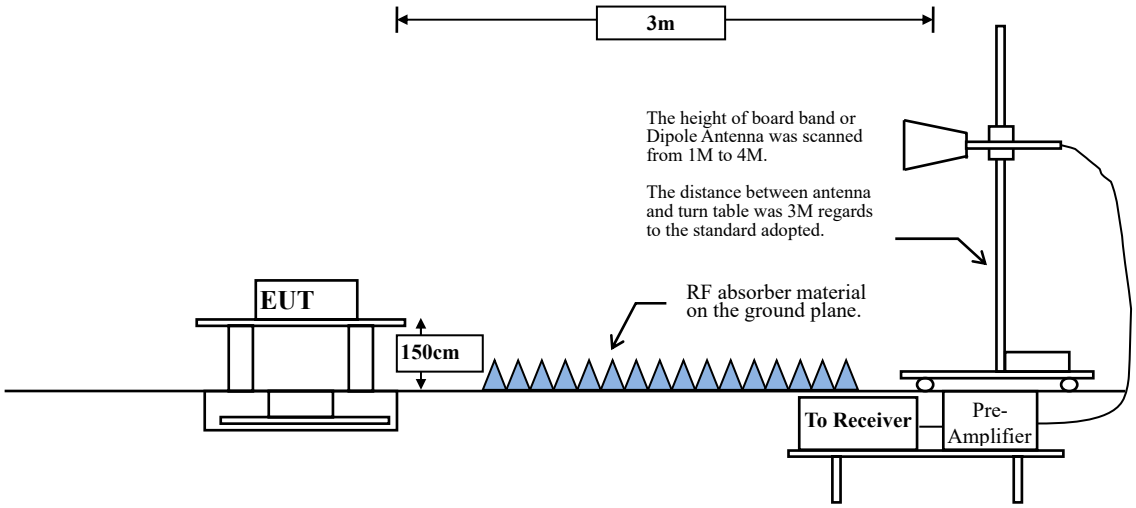
Radiated Emission Under 30 MHz



Radiated Emission Below 1 GHz



Radiated Emission Above 1 GHz



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 compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1 GHz, 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 30 MHz setting on the field strength meter is 9kHz and
30 MHz~1 GHz is 120 kHz and above 1 GHz is 1 MHz.

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

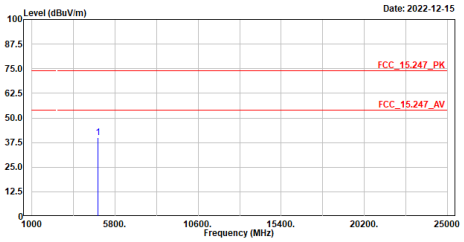
The measurement is divided into the Preliminary Measurement and the Final Measurement.

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 form 9 kHz - 10th Harmonic of fundamental was investigated.

4.4. Test Result of Radiated Emission

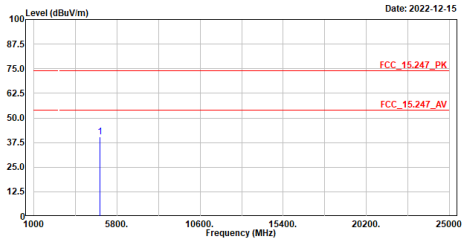
Site :HY-CB03
Condition :3m ,HORIZONTAL
Mode :TX_bt1M_2402MHz
TEST BY :Ashton Chiu



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4804.000	40.14	74.00	-33.86	54.78	-14.64	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

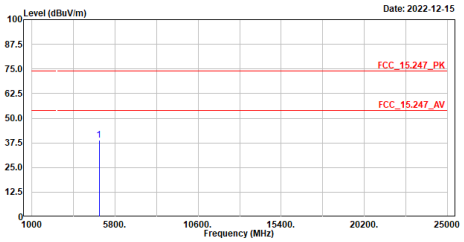
Site :HY-CB03
Condition :3m ,VERTICAL
Mode :TX_bt1M_2402MHz
TEST BY :Ashton Chiu



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4804.000	40.55	74.00	-33.45	55.19	-14.64	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

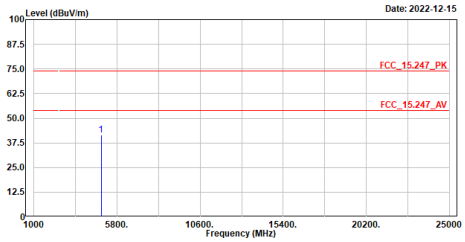
Site :HY-CB03
Condition :3m ,HORIZONTAL
Mode :TX_bt1M_2441MHz
TEST BY :Ashton Chiu



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4882.000	38.84	74.00	-35.16	53.18	-14.34	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

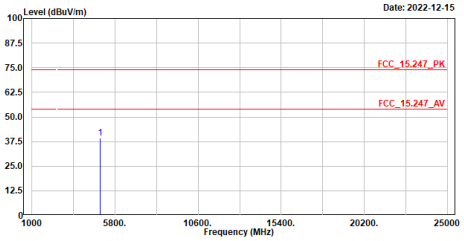
Site :HY-CB03
Condition :3m ,VERTICAL
Mode :TX_bt1M_2441MHz
TEST BY :Ashton Chiu



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4882.000	41.32	74.00	-32.68	55.66	-14.34	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

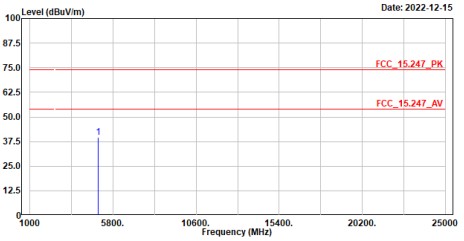
Site :HY-CB03
Condition :3m ,HORIZONTAL
Mode :TX_bt1M_2480MHz
TEST BY :Ashton Chiu



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4960.000	39.18	74.00	-34.82	53.14	-13.96	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

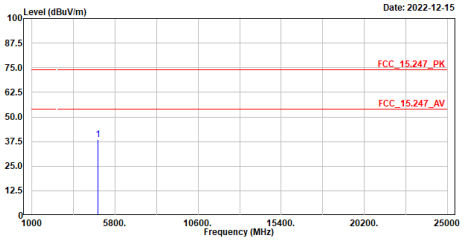
Site :HY-CB03
Condition :3m ,VERTICAL
Mode :TX_bt1M_2480MHz
TEST BY :Ashton Chiu



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4960.000	39.47	74.00	-34.53	53.43	-13.96	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

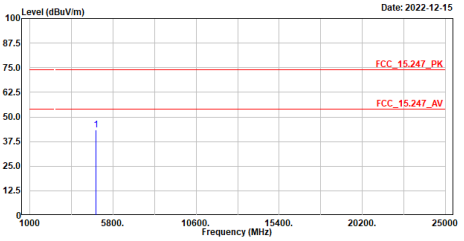
Site :HY-CB03
Condition :3m ,HORIZONTAL
Mode :TX_bt3M_2402MHz
TEST BY :Ashton Chiu



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4804.000	38.53	74.00	-35.47	53.17	-14.64	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

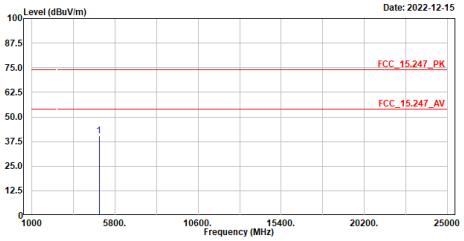
Site :HY-CB03
Condition :3m ,VERTICAL
Mode :TX_bt3M_2402MHz
TEST BY :Ashton Chiu



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4804.000	43.34	74.00	-30.66	57.98	-14.64	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

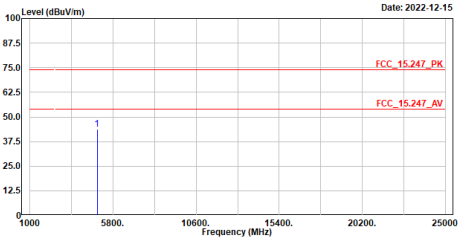
Site :HY-CB03
Condition :3m ,HORIZONTAL
Mode :TX_bt3M_2441MHz
TEST BY :Ashton Chiu



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4882.000	40.37	74.00	-33.63	54.71	-14.34	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

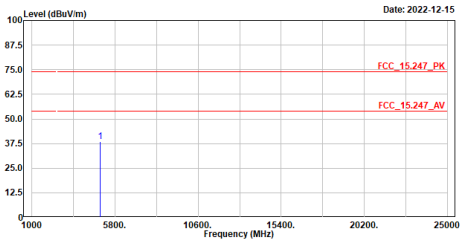
Site :HY-CB03
Condition :3m ,VERTICAL
Mode :TX_bt3M_2441MHz
TEST BY :Ashton Chiu



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4882.000	43.67	74.00	-30.33	58.01	-14.34	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

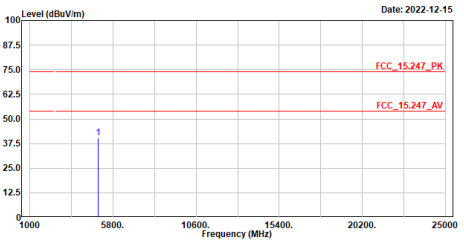
Site :HY-CB03
Condition :3m ,HORIZONTAL
Mode :TX_bt3M_2480MHz
TEST BY :Ashton Chiu



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4960.000	38.65	74.00	-35.35	52.61	-13.96	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

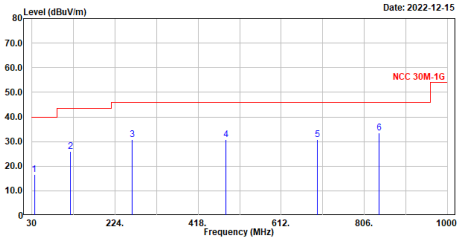
Site :HY-CB03
Condition :3m ,VERTICAL
Mode :TX_bt3M_2480MHz
TEST BY :Ashton Chiu



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4960.000	40.46	74.00	-33.54	54.42	-13.96	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

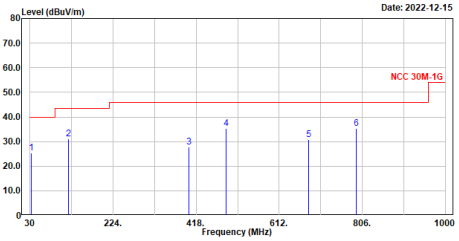
Site :HY-CB03
Condition :3m ,HORIZONTAL
Mode :TX_bt3M_2441MHz
TEST BY :Ashton Chiu



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	35.820	16.58	40.00	-23.42	41.68	-25.10	QP
2	119.240	26.05	43.50	-17.45	52.66	-26.61	QP
3	263.770	30.73	46.00	-15.27	56.00	-25.27	QP
4	482.990	30.93	46.00	-15.07	50.15	-19.22	QP
5	696.390	30.67	46.00	-15.33	45.75	-15.08	QP
6	839.950	33.54	46.00	-12.46	46.68	-13.14	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-CB03
Condition :3m ,VERTICAL
Mode :TX_bt3M_2441MHz
TEST BY :Ashton Chiu

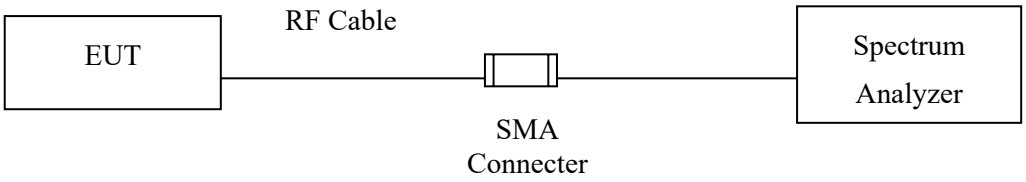


No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	33.880	25.46	40.00	-14.54	50.70	-25.24	QP
2	119.240	31.05	43.50	-12.45	57.66	-26.61	QP
3	401.510	27.92	46.00	-18.08	49.10	-21.18	QP
4	487.840	35.42	46.00	-10.58	54.52	-19.10	QP
5	680.870	30.94	46.00	-15.06	46.48	-15.54	QP
6	792.420	35.30	46.00	-10.70	48.84	-13.54	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.

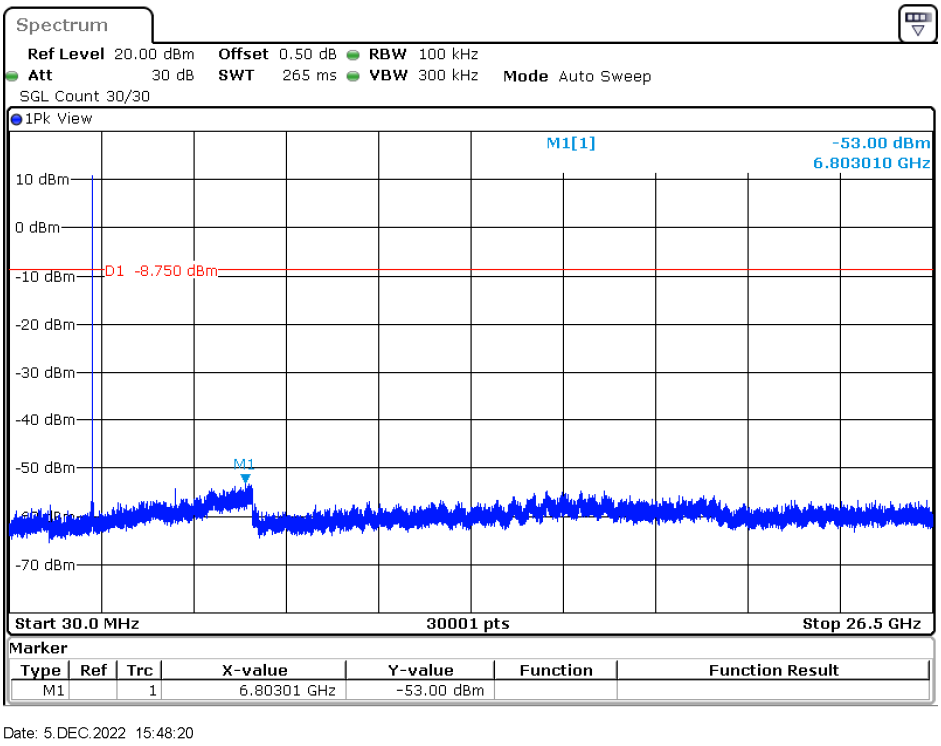
5.3. Test Procedure

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	:	Transmit - 1 Mbps
Test Date	:	2022/12/05

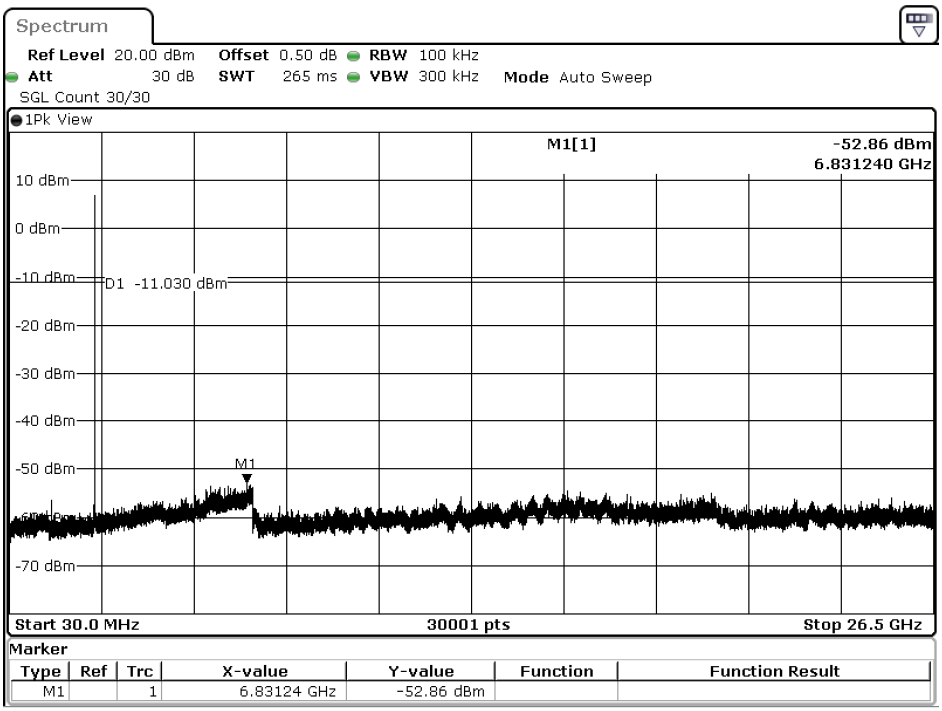
Figure Channel 00:



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

Product	:	Bluetooth Headset
Test Item	:	RF Antenna Conducted Test
Test Mode	:	Transmit - 3 Mbps
Test Date	:	2022/12/05

Figure Channel 00:

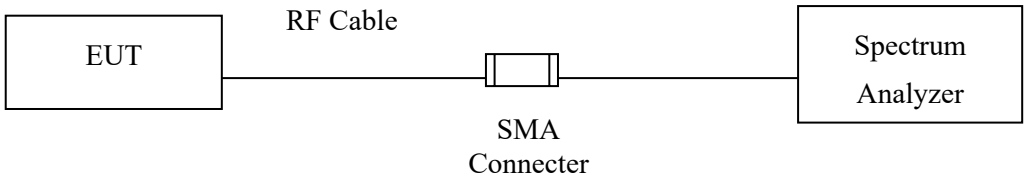


Note: The above test pattern is synthesized by multiple of the frequency range.

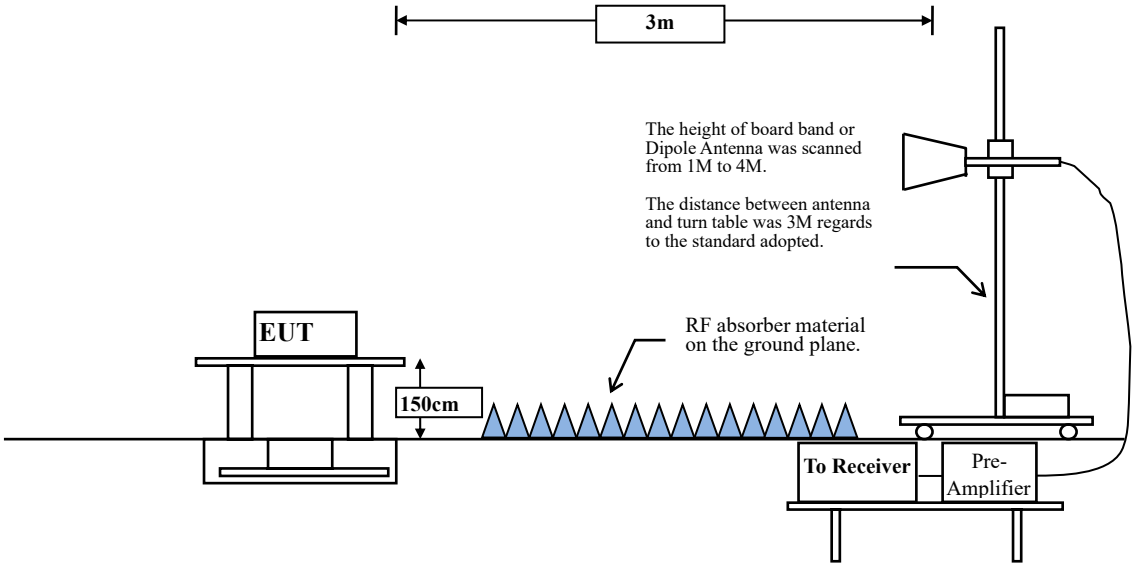
6. Band Edge

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 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.

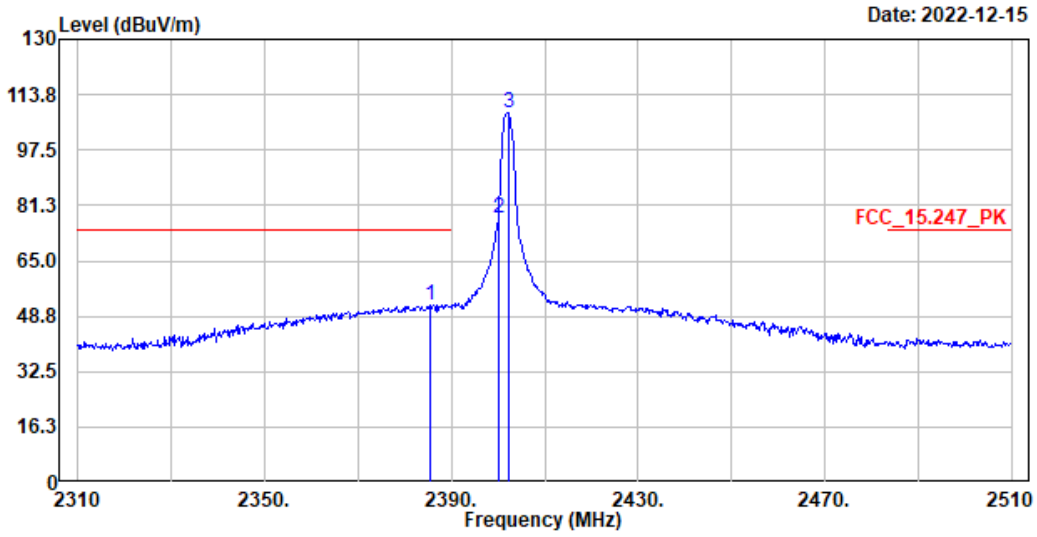
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

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

6.4. Test Result of Band Edge

```
Site       :HY-CB03
Condition  :3m    ,Horizontal
Mode       :TX_bt1M_2402MHz
TEST BY    :Ashton Chiu
```



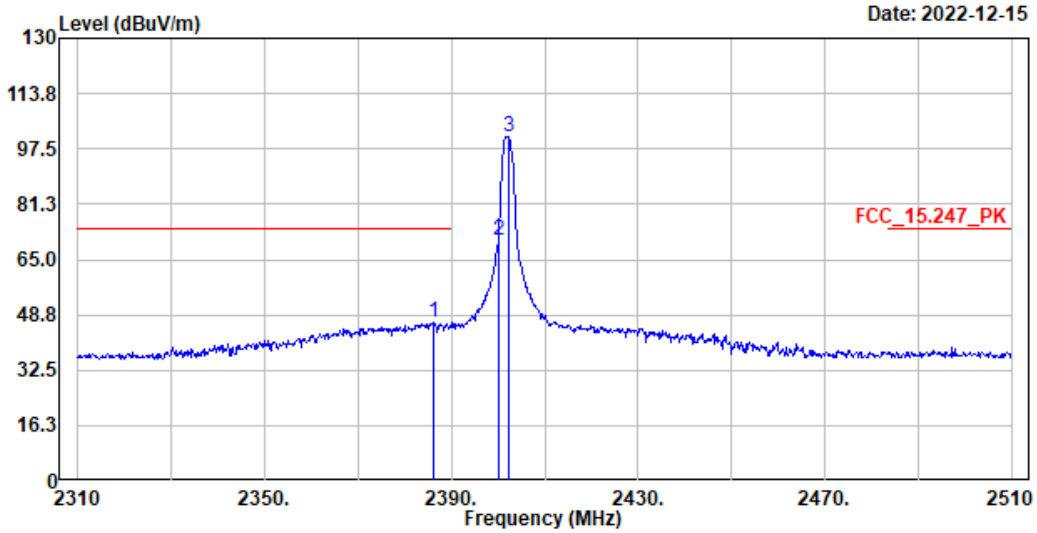
No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2385.400	52.05	74.00	-21.95	45.51	6.54	Peak
2	2400.000	77.29	------	------	70.76	6.53	Peak
3	2402.200	108.24	------	------	101.71	6.53	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

Horizontal -Average Detector:

Frequency (MHz)	Peak Measurement (dBµV/m)	Duty Cycle Factor (dB)	Measurement Level (dBµV/m)	Margin (dB)	Limit (dBµV/m)
2385.4	52.05	-24.734	27.316	-26.684	54.000
2400	77.29	-24.734	52.556	--	--
2402.2	108.24	-24.734	83.506	--	--

Site :HY-CB03
Condition :3m ,Vertical
Mode :TX_bt1M_2402MHz
TEST BY :Ashton Chiu



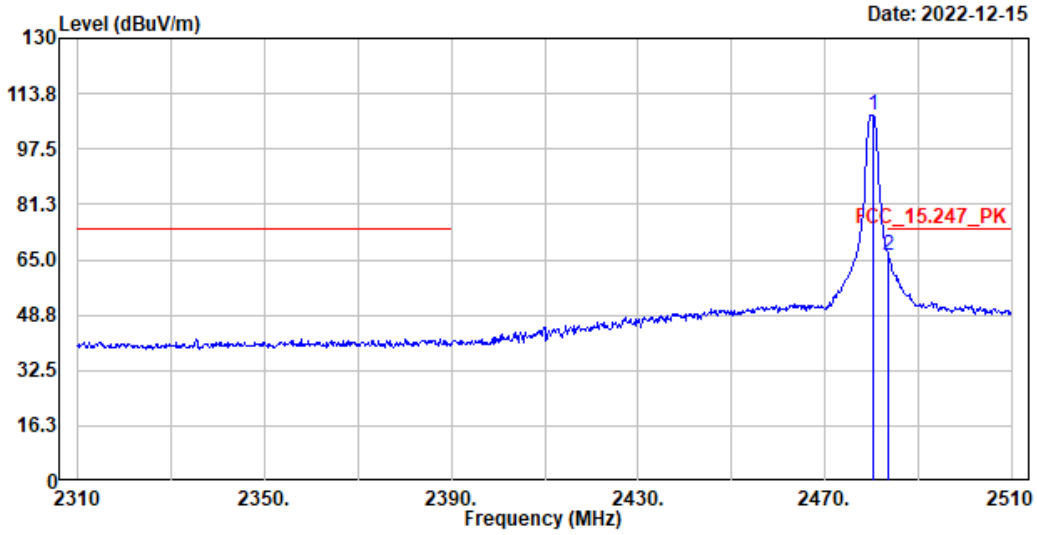
No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2386.200	46.75	74.00	-27.25	40.20	6.55	Peak
2	2400.000	70.59	------	------	64.06	6.53	Peak
3	2402.200	101.27	------	------	94.74	6.53	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

Vertical -Average Detector:

Frequency (MHz)	Peak Measurement (dBμV/m)	Duty Cycle Factor (dB)	Measurement Level (dBμV/m)	Margin (dB)	Limit (dBμV/m)
2386.2	46.75	-24.734	22.016	-31.984	54.000
2400	70.59	-24.734	45.856	--	--
2402.2	101.27	-24.734	76.536	--	--

```
Site       :HY-CB03
Condition  :3m    ,Horizontal
Mode       :TX_bt1M_2480MHz
TEST BY    :Ashton Chiu
```



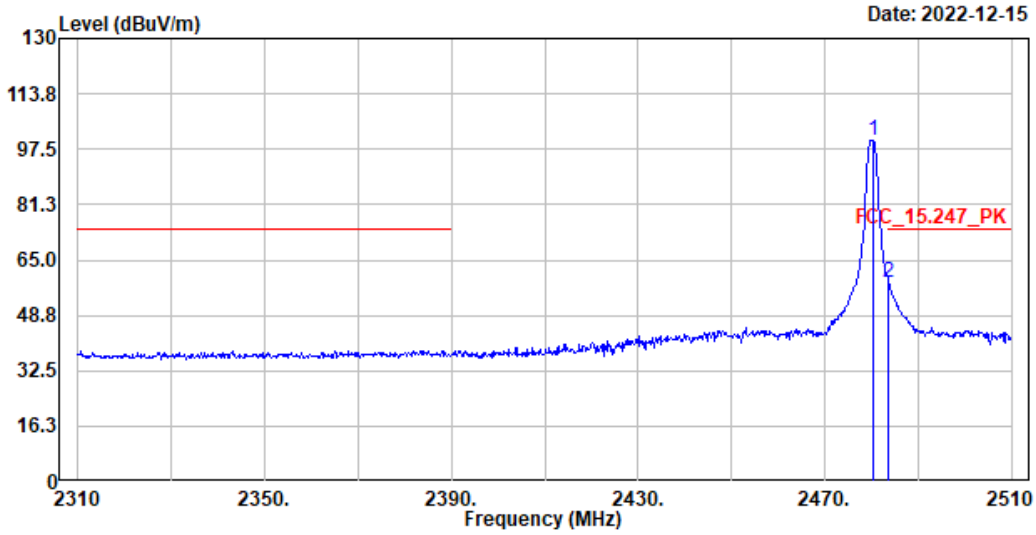
No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2480.200	107.34	------	------	100.81	6.53	Peak
2	2483.600	66.08	74.00	-7.92	59.54	6.54	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

Horizontal -Average Detector:

Frequency (MHz)	Peak Measurement (dBµV/m)	Duty Cycle Factor (dB)	Measurement Level (dBµV/m)	Margin (dB)	Limit (dBµV/m)
2480.2	107.34	-24.734	82.606	--	--
2483.6	66.08	-24.734	41.346	-12.654	54.000

```
Site       :HY-CB03
Condition  :3m    ,Vertical
Mode       :TX_bt1M_2480MHz
TEST BY    :Ashton Chiu
```



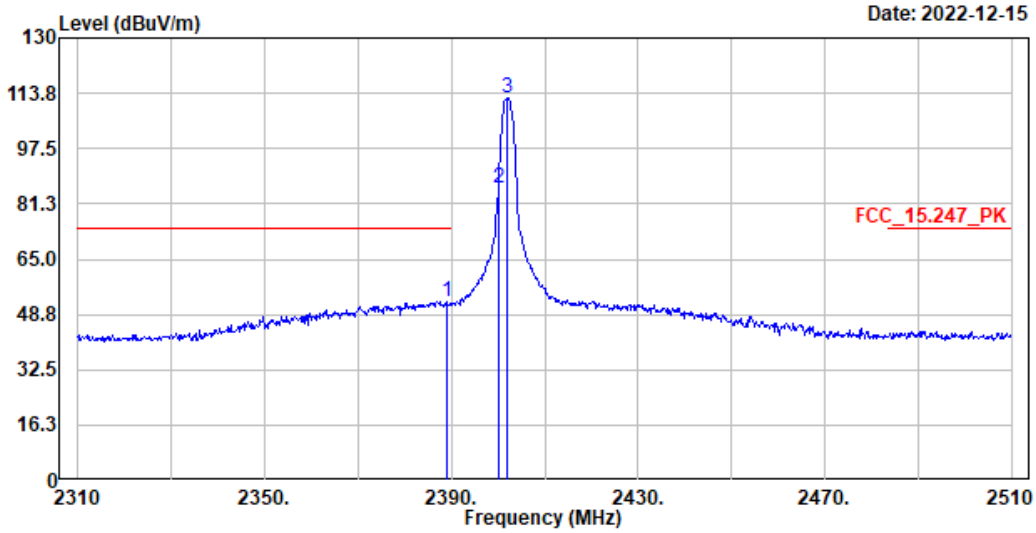
No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2480.200	99.94	------	------	93.41	6.53	Peak
2	2483.600	58.50	74.00	-15.50	51.96	6.54	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

Vertical -Average Detector:

Frequency (MHz)	Peak Measurement (dBµV/m)	Duty Cycle Factor (dB)	Measurement Level (dBµV/m)	Margin (dB)	Limit (dBµV/m)
2480.2	99.94	-24.734	75.206	--	--
2483.6	58.5	-24.734	33.766	-20.234	54.000

Site :HY-CB03
Condition :3m ,Horizontal
Mode :TX_bt3M_2402MHz
TEST BY :Ashton Chiu



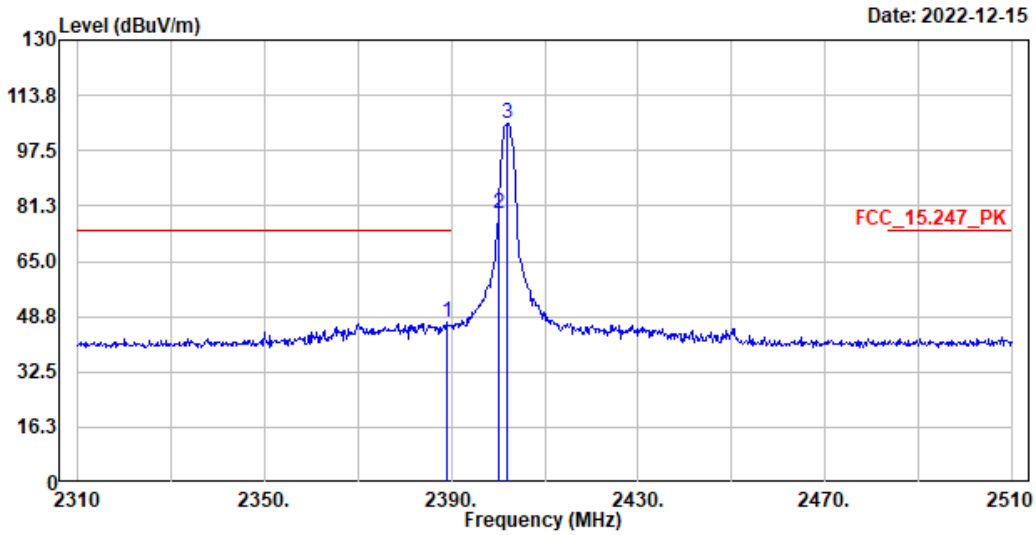
No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2389.000	52.37	74.00	-21.63	45.83	6.54	Peak
2	2400.000	85.74	------	------	79.21	6.53	Peak
3	2402.000	112.53	------	------	106.00	6.53	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

Horizontal -Average Detector:

Frequency (MHz)	Peak Measurement (dBμV/m)	Duty Cycle Factor (dB)	Measurement Level (dBμV/m)	Margin (dB)	Limit (dBμV/m)
2389	52.37	-24.734	27.636	-26.364	54.000
2400	85.74	-24.734	61.006	--	--
2402	112.53	-24.734	87.796	--	--

```
Site       :HY-CB03
Condition  :3m    ,Vertical
Mode       :TX_bt3M_2402MHz
TEST BY    :Ashton Chiu
```



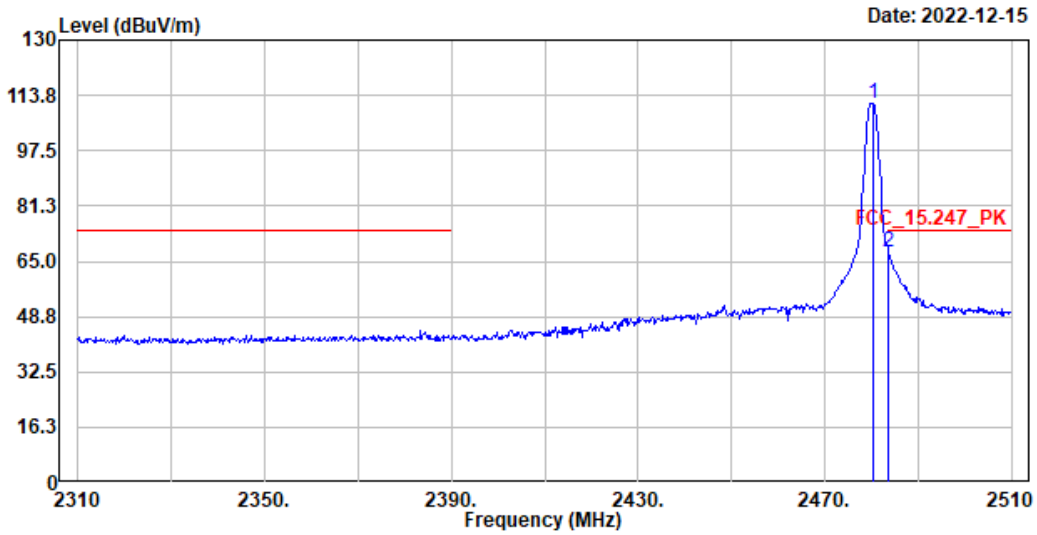
No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2389.000	46.97	74.00	-27.03	40.43	6.54	Peak
2	2400.000	78.88	------	------	72.35	6.53	Peak
3	2402.000	105.43	------	------	98.90	6.53	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

Vertical -Average Detector:

Frequency (MHz)	Peak Measurement (dBµV/m)	Duty Cycle Factor (dB)	Measurement Level (dBµV/m)	Margin (dB)	Limit (dBµV/m)
2389	46.97	-24.734	22.236	-31.764	54.000
2400	78.88	-24.734	54.146	--	--
2402	105.43	-24.734	80.696	--	--

Site :HY-CB03
Condition :3m ,Horizontal
Mode :TX_bt3M_2480MHz
TEST BY :Ashton Chiu



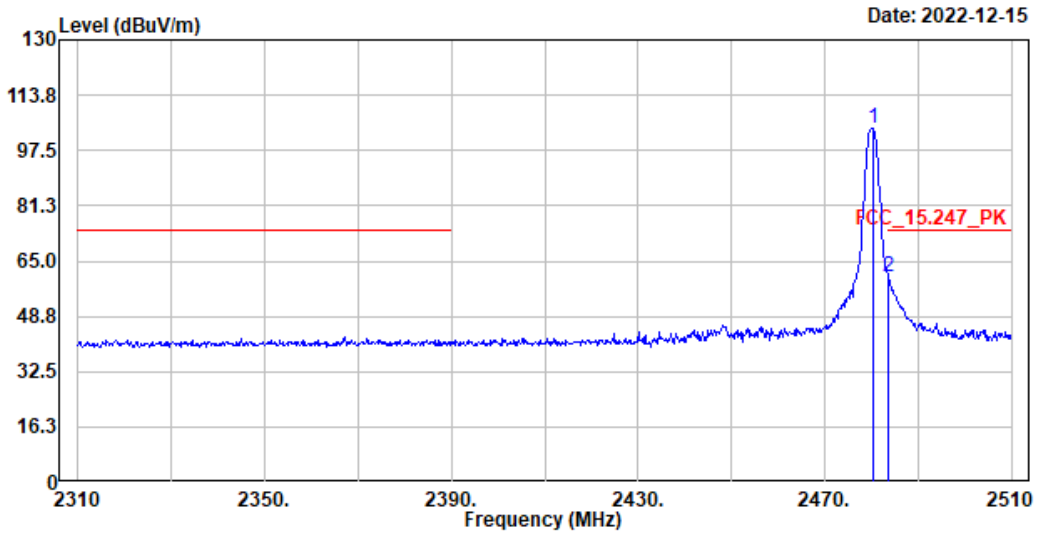
No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2480.200	111.52	------	------	104.99	6.53	Peak
2	2483.600	67.69	74.00	-6.31	61.15	6.54	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

Horizontal -Average Detector:

Frequency (MHz)	Peak Measurement (dBµV/m)	Duty Cycle Factor (dB)	Measurement Level (dBµV/m)	Margin (dB)	Limit (dBµV/m)
2480.2	111.52	-24.734	86.786	--	--
2483.6	67.69	-24.734	42.956	-11.044	54.000

Site :HY-CB03
Condition :3m ,Vertical
Mode :TX_bt3M_2480MHz
TEST BY :Ashton Chiu



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2480.200	103.95	------	------	97.42	6.53	Peak
2	2483.600	60.56	74.00	-13.44	54.02	6.54	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

Vertical -Average Detector:

Frequency (MHz)	Peak Measurement (dBµV/m)	Duty Cycle Factor (dB)	Measurement Level (dBµV/m)	Margin (dB)	Limit (dBµV/m)
2480.2	103.95	-24.734	79.216	--	--
2483.6	60.56	-24.734	35.826	-18.174	54.000

Product : Bluetooth Headset
Test Item : Band Edge
Test Mode : Transmit - 1 Mbps(Hopping off)
Test Date : 2022/12/05

Measurement Level Δ (dB)	Result
> 20	PASS

Figure Channel 00:

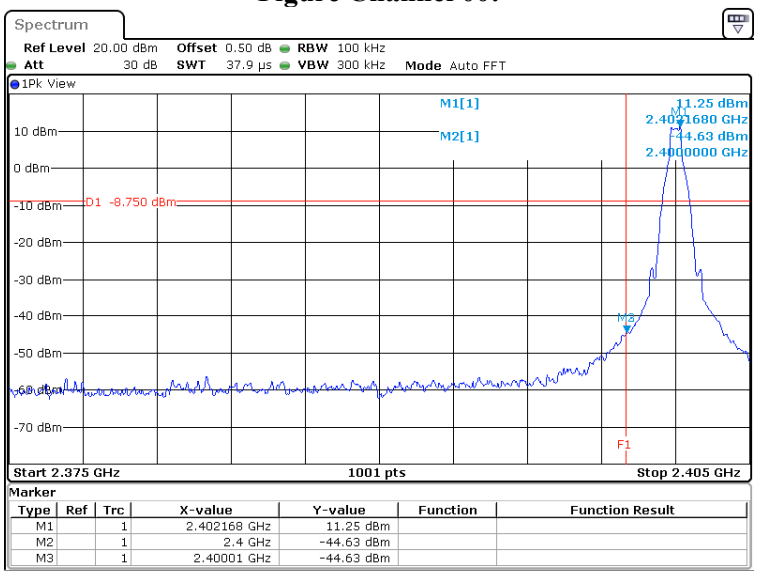
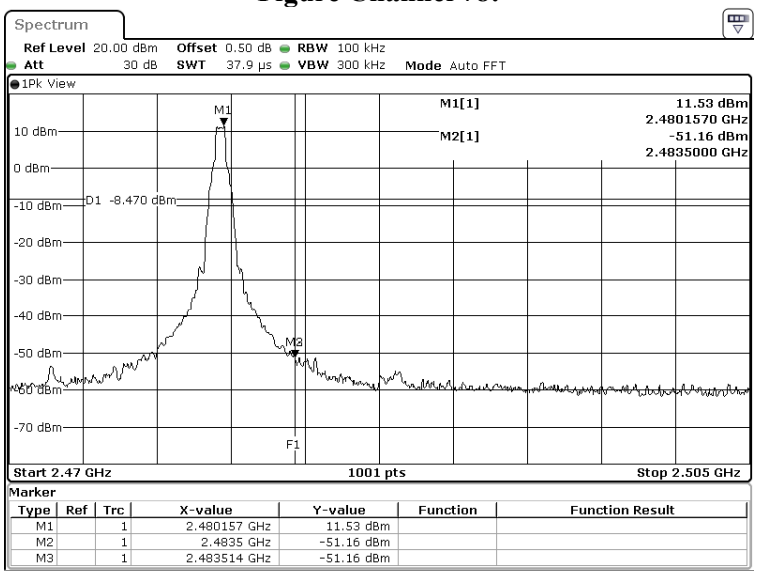


Figure Channel 78:



Product : Bluetooth Headset
Test Item : Band Edge
Test Mode : Transmit - 3 Mbps (Hopping off)
Test Date : 2022/12/05

Measurement Level Δ (dB)	Result
> 20	PASS

Figure Channel 00:

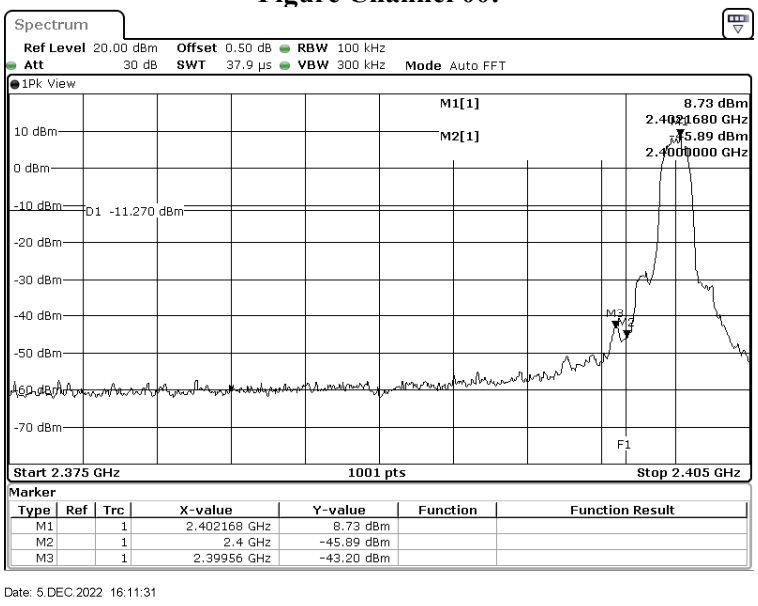
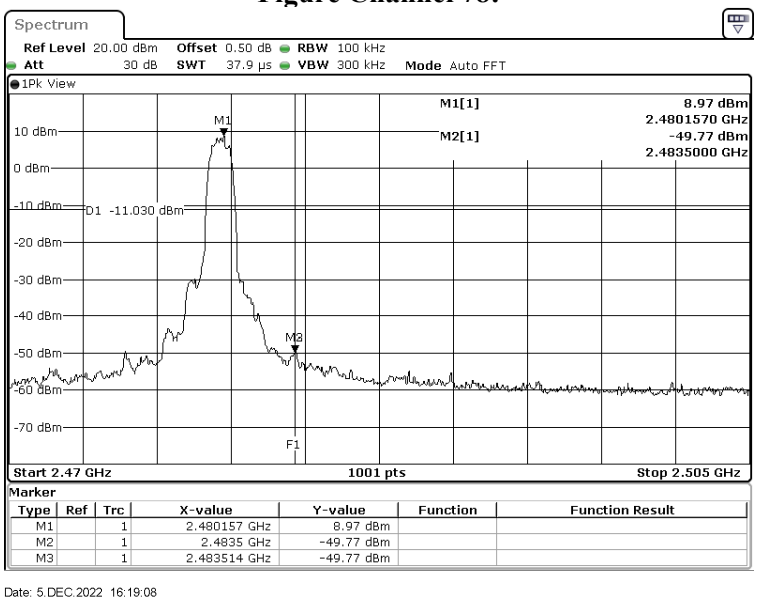


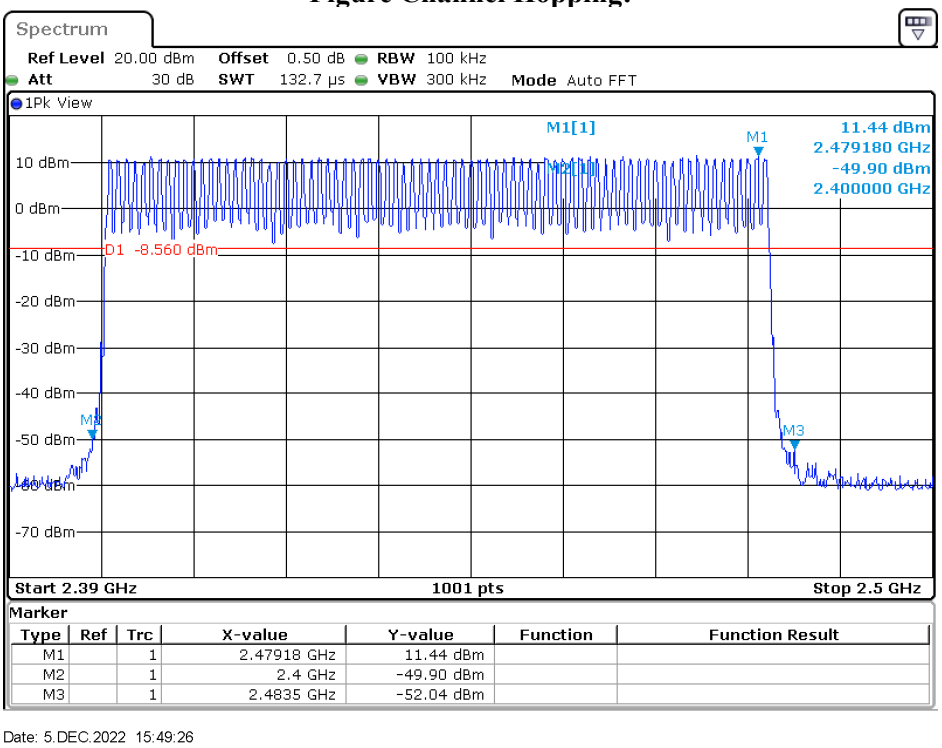
Figure Channel 78:



Product : Bluetooth Headset
Test Item : Band Edge
Test Mode : Transmit - 1 Mbps(Hopping on)
Test Date : 2022/12/05

Measurement Level Δ (dB)	Result
> 20	PASS

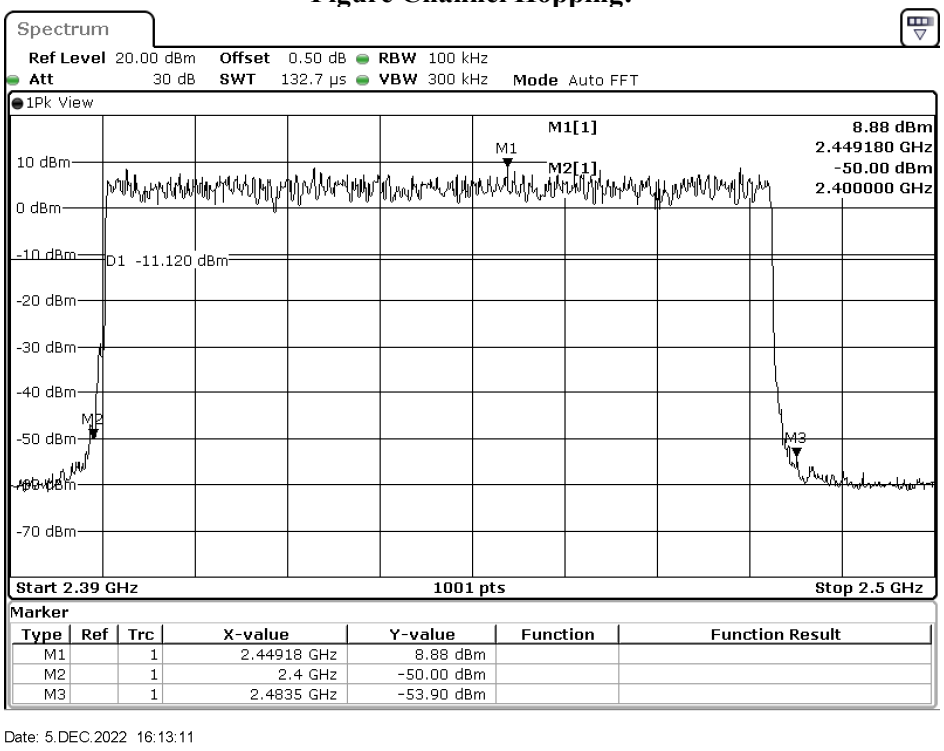
Figure Channel Hopping:



Product : Bluetooth Headset
Test Item : Band Edge
Test Mode : Transmit - 3 Mbps (Hopping on)
Test Date : 2022/12/05

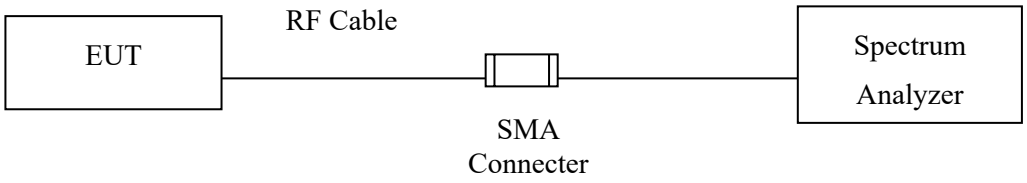
Measurement Level Δ (dB)	Result
> 20	PASS

Figure Channel Hopping:



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

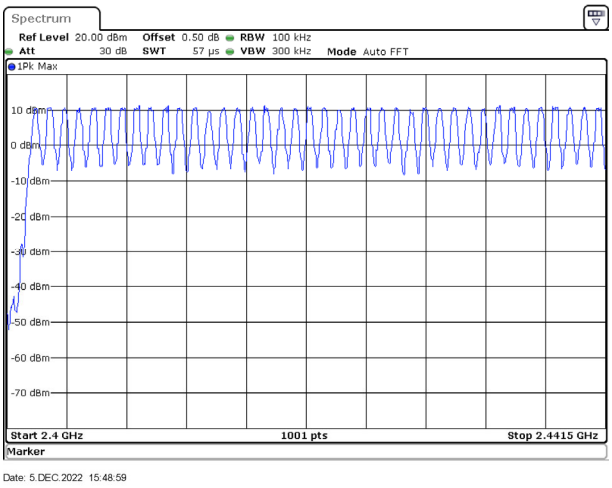
Tested according to FHSS test procedure of KDB558074 section 9 (b for compliance to FCC 47CFR 15.247 requirements.

7.4. Test Result of Channel Number

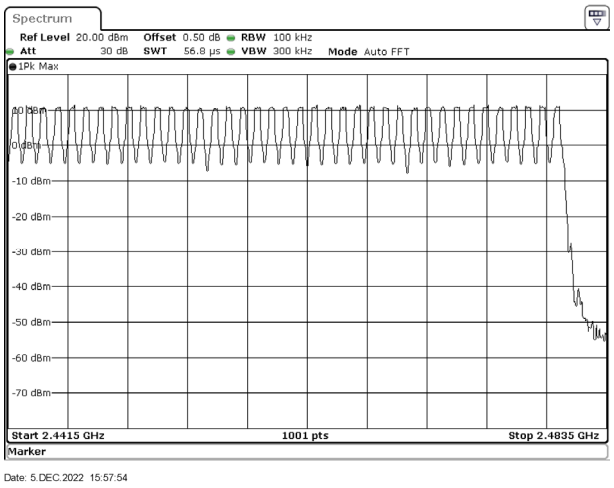
Product : Bluetooth Headset
Test Item : Channel Number
Test Mode : Transmit - 1 Mbps
Test Date : 2022/12/05

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

2402 MHz



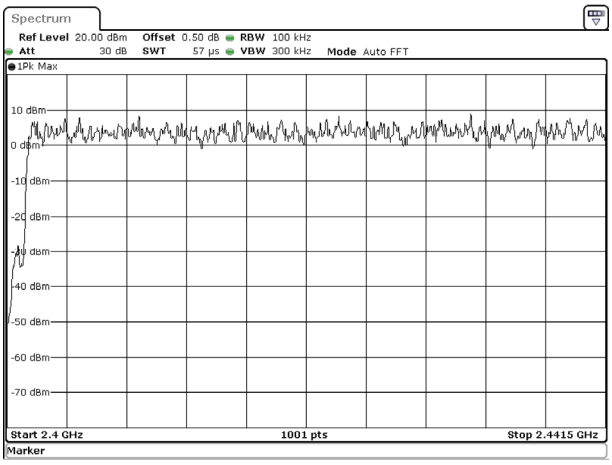
2480 MHz



Product : Bluetooth Headset
Test Item : Channel Number
Test Mode : Transmit - 3 Mbps
Test Date : 2022/12/05

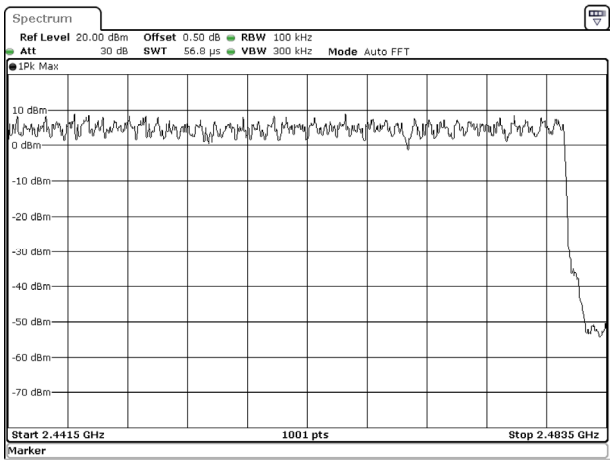
Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

2402 MHz



Date: 5.DEC.2022 16:12:51

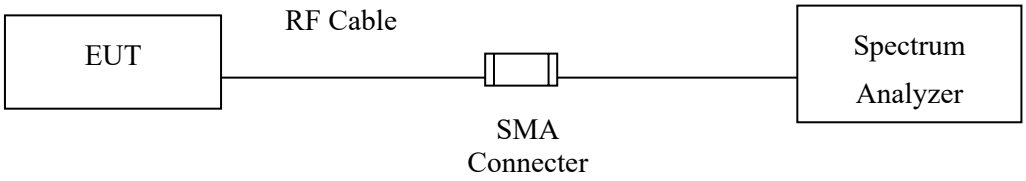
2480 MHz



Date: 5.DEC.2022 16:20:24

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.

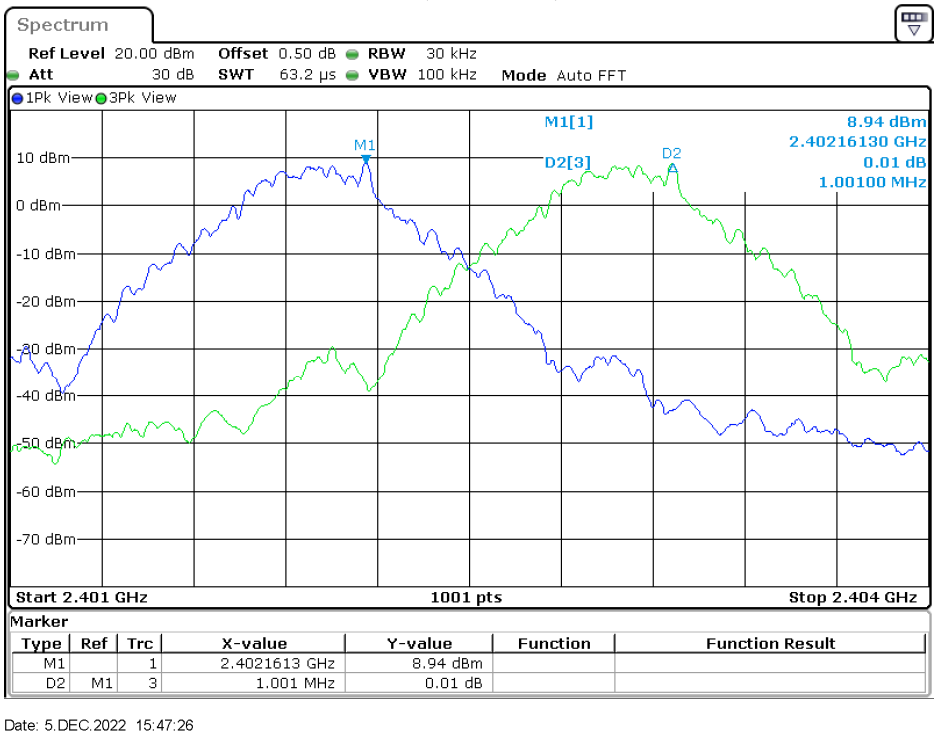
8.4. Test Result of Channel Separation

Product : Bluetooth Headset
Test Item : Channel Separation
Test Mode : Transmit - 1 Mbps
Test Date : 2022/12/05

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

Channel 00 (2402 MHz)

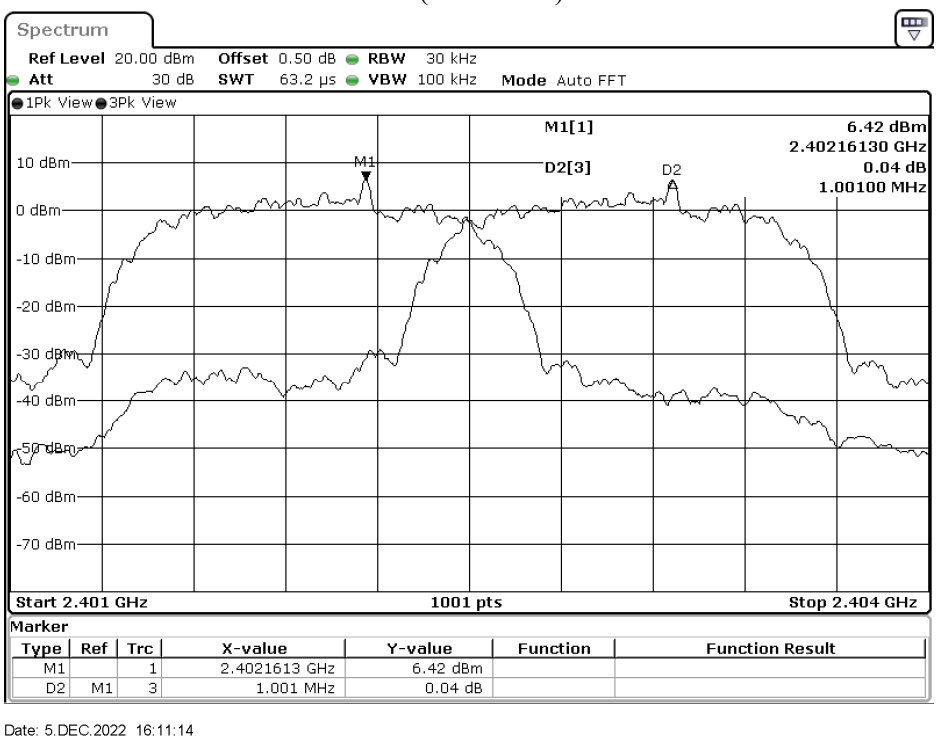


Product : Bluetooth Headset
Test Item : Channel Separation
Test Mode : Transmit - 3 Mbps
Test Date : 2022/12/05

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

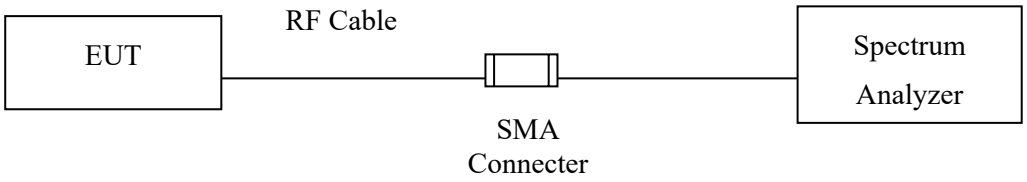
Note: The 20dB Bandwidth is refer to section 10.

Channel 00 (2402 MHz)



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

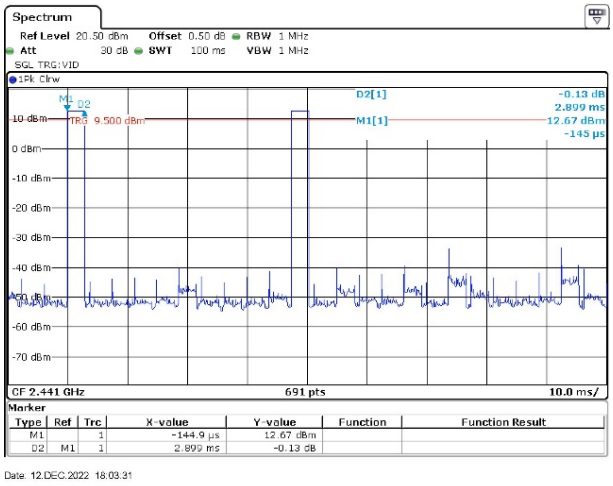
Product	:	Bluetooth Headset
Test Item	:	Dwell Time
Test Mode	:	Transmit - 1 Mbps (Channel 00,39,78)
Test Date	:	2022/12/12

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Dwell Time (ms)	Limit (ms)	Result
2402	2.899	111	31600	321.789	400	Pass
2441	2.899	111	31600	321.789	400	Pass
2480	2.899	111	31600	321.789	400	Pass

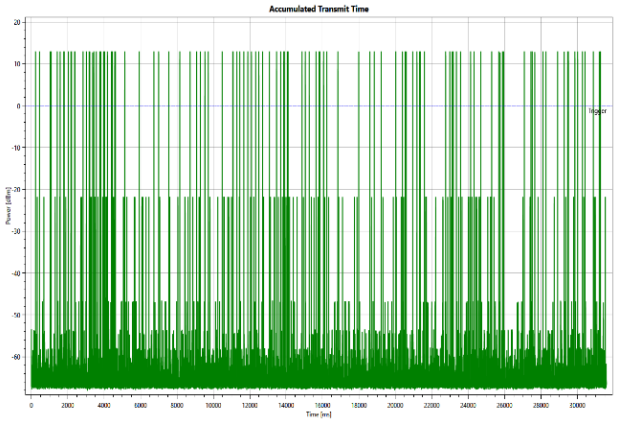
Dwell time = Time slot length (ms)*Hopping of Number

Hopping of Number is S.A software calculated value.

CH 39 Time slot length



Hopping of Number



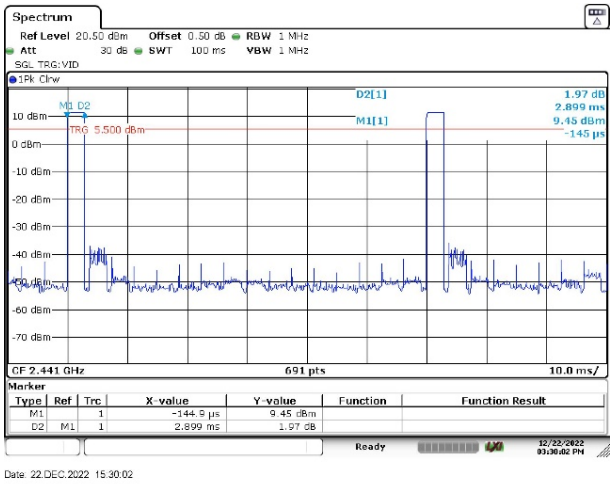
Product : Bluetooth Headset
Test Item : Dwell Time
Test Mode : Transmit - 3 Mbps (Channel 00,39,78)
Test Date : 2022/12/12

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Dwell Time (ms)	Limit (ms)	Result
2402	2.899	108	31600	313.092	400	Pass
2441	2.899	108	31600	313.092	400	Pass
2480	2.899	108	31600	313.092	400	Pass

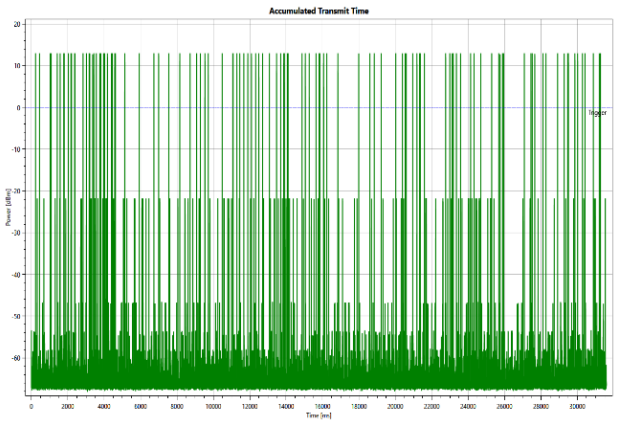
Dwell time = Time slot length (ms)*Hopping of Number

Hopping of Number is S.A software calculated value.

CH 39 Time slot length

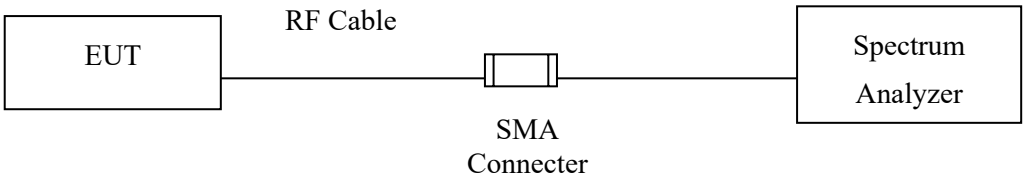


Hopping of Number



10. Occupied Bandwidth

10.1. Test Setup



10.2. Limits

N/A

10.3. Test Procedure

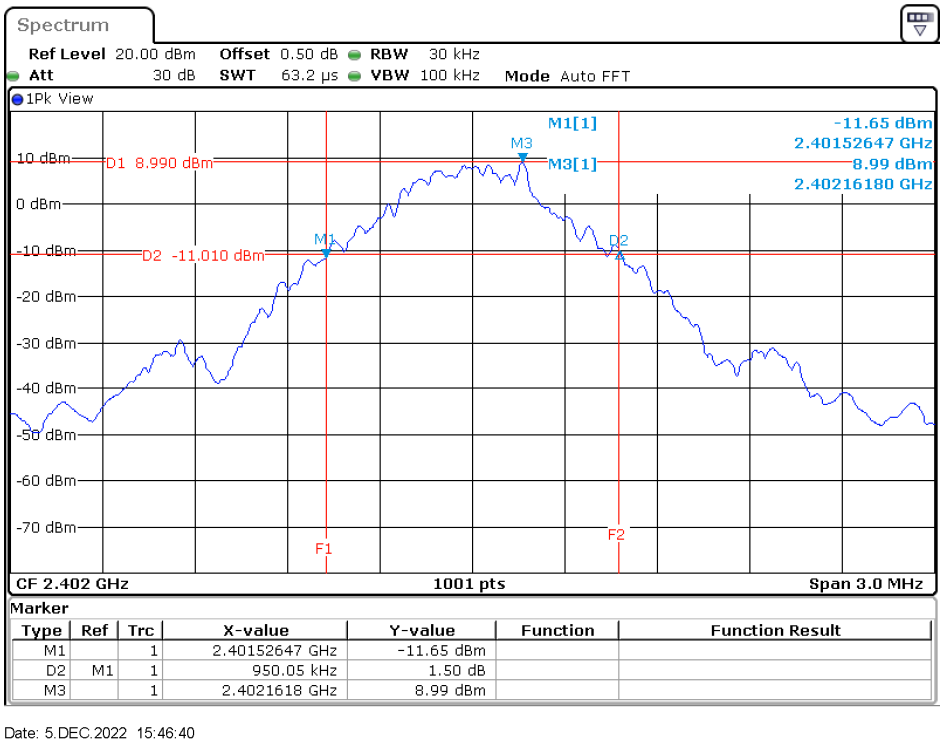
Tested according to FHSS test procedure of KDB558074 section 9 (b for compliance to FCC 47CFR 15.247 requirements.

10.4. Test Result of Occupied Bandwidth

Product : Bluetooth Headset
Test Item : Occupied Bandwidth Data
Test Mode : Transmit - 1 Mbps
Test Date : 2022/12/05

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

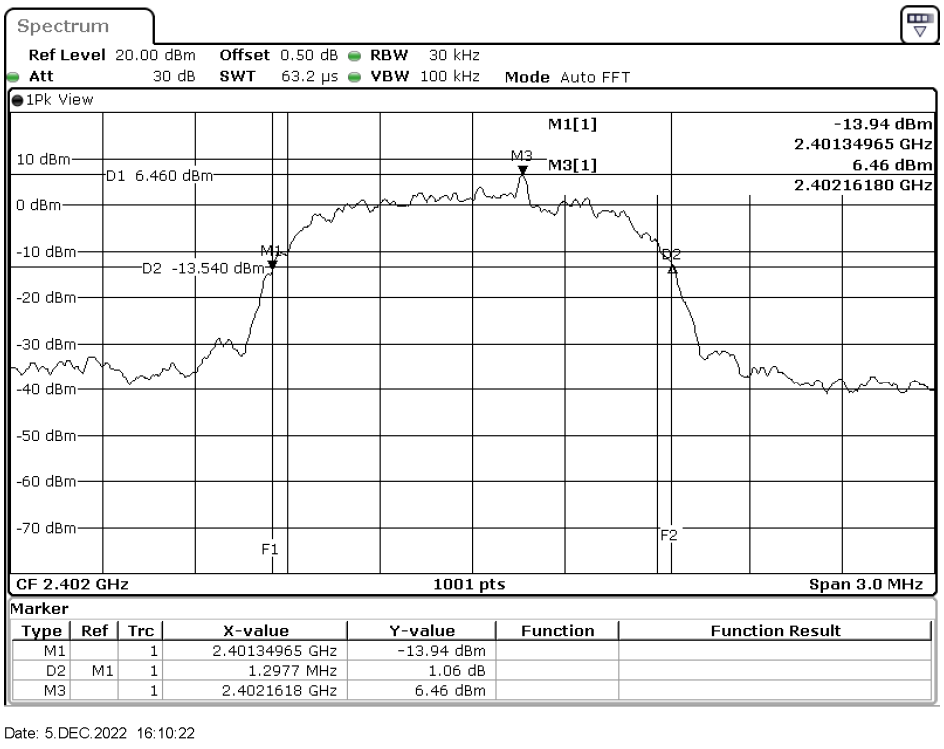
Figure Channel 00:



Product : Bluetooth Headset
Test Item : Occupied Bandwidth Data
Test Mode : Transmit - 3 Mbps
Test Date : 2022/12/05

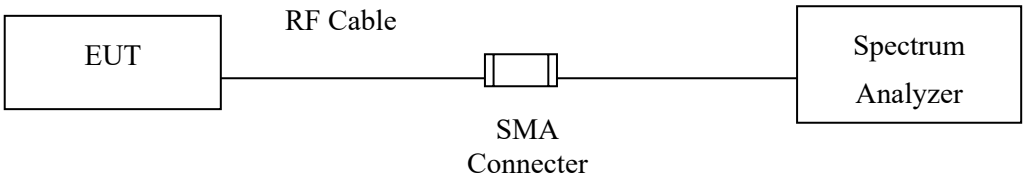
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1297	--	NA
39	2441	1297	--	NA
78	2480	1297	--	NA

Figure Channel 00:



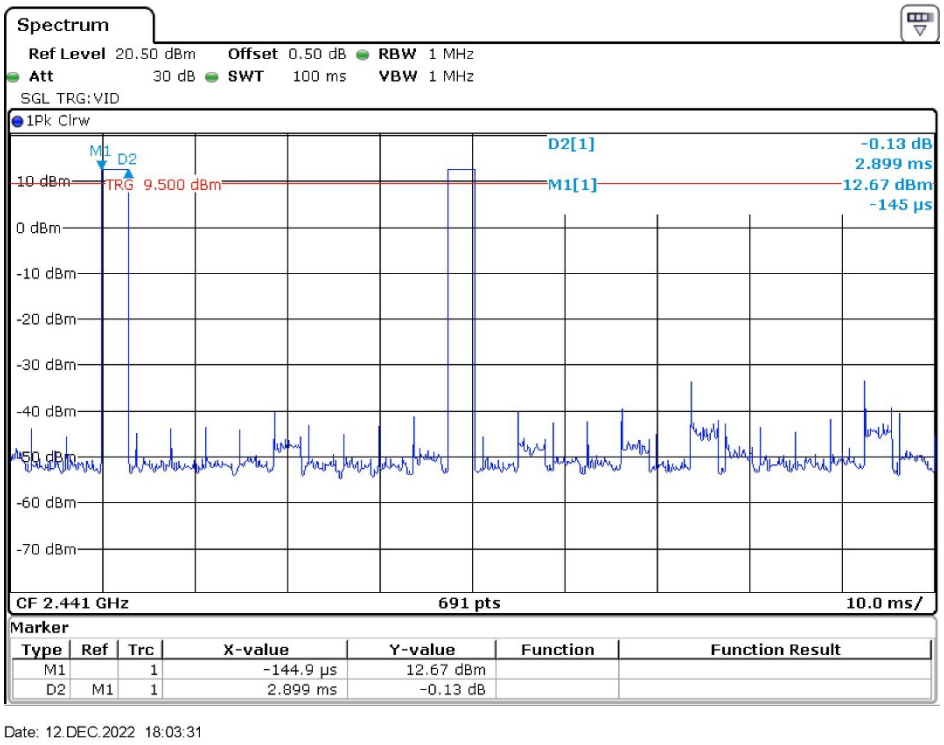
11. Duty Cycle

11.1. Test Setup



11.2. Test Result of Duty Cycle

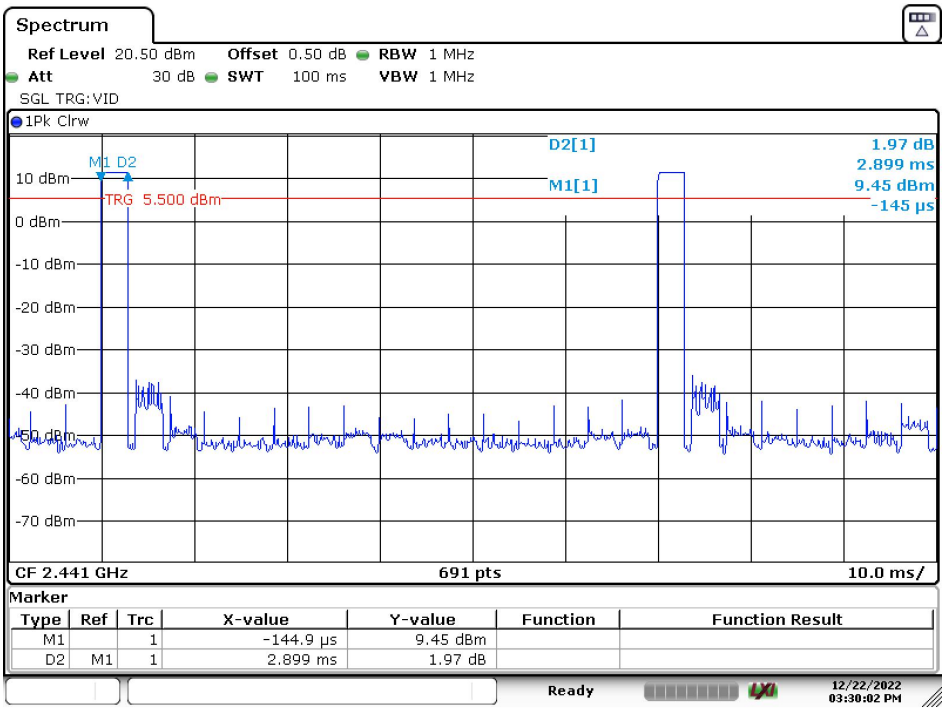
Product : Bluetooth Headset
Test Item : Duty Cycle Data
Test Mode : Transmit - 1 Mbps



Time on of 100ms= 5.798 ms
Duty Cycle= 5.798 ms / 100ms = 0.05798
Duty Cycle correction factor= 20 LOG 0.05798 = -24.734 dB

Duty Cycle correction factor	**-24.734**	**dB**

Product : Bluetooth Headset
Test Item : Duty Cycle Data
Test Mode : Transmit - 3 Mbps



Date: 22.DEC.2022 15:30:02

Time on of 100ms= 5.798 ms
Duty Cycle= 5.798 ms / 100ms = 0.05798
Duty Cycle correction factor= 20 LOG 0.05798 = -24.734 dB

Duty Cycle correction factor	**-24.734**	**dB**

12. EMI Reduction Method During Compliance Testing

No modification was made during testing.