

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-RFUSBLEV01-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



| | |
|---------------------|--|
| 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)

TABLE OF CONTENTS

| | |
|--|-----------|
| 1. General Information..... | 6 |
| 1.1. EUT Description..... | 6 |
| 1.2. Tested System Details..... | 8 |
| 1.3. Configuration of Tested System | 8 |
| 1.4. EUT Exercise Software | 8 |
| 1.5. Test Facility | 9 |
| 1.6. List of Test Equipment..... | 10 |
| 1.7. Uncertainty | 11 |
| 2. Conducted Emission | 12 |
| 2.1. Test Setup | 12 |
| 2.2. Limits..... | 12 |
| 2.3. Test Procedure | 13 |
| 2.4. Test Result of Conducted Emission..... | 14 |
| 3. Peak Power Output..... | 15 |
| 3.1. Test Setup | 15 |
| 3.2. Limit | 15 |
| 3.3. Test Procedure | 15 |
| 3.4. Test Result of Peak Power Output..... | 16 |
| 4. Radiated Emission | 18 |
| 4.1. Test Setup | 18 |
| 4.2. Limits..... | 19 |
| 4.3. Test Procedure | 20 |
| 4.4. Test Result of Radiated Emission | 22 |
| 5. RF Antenna Conducted Test | 26 |
| 5.1. Test Setup | 26 |
| 5.2. Limits..... | 26 |
| 5.3. Test Procedure | 26 |
| 5.4. Test Result of RF Antenna Conducted Test..... | 27 |
| 6. Band Edge | 29 |
| 6.1. Test Setup | 29 |
| 6.2. Limit | 30 |
| 6.3. Test Procedure | 30 |

| | | |
|------------|---|-----------|
| 6.4. | Test Result of Band Edge | 32 |
| 7. | 6dB Bandwidth | 36 |
| 7.1. | Test Setup | 36 |
| 7.2. | Limits..... | 36 |
| 7.3. | Test Procedure | 36 |
| 7.4. | Test Result of 6dB Bandwidth..... | 37 |
| 8. | Power Density..... | 39 |
| 8.1. | Test Setup | 39 |
| 8.2. | Limits..... | 39 |
| 8.3. | Test Procedure | 39 |
| 8.4. | Test Result of Power Density | 40 |
| 9. | Duty Cycle | 42 |
| 9.1. | Test Setup | 42 |
| 9.2. | Test Procedure | 42 |
| 9.3. | Test Result of Duty Cycle..... | 43 |
| 10. | EMI Reduction Method During Compliance Testing | 45 |
| | | |
| | Appendix 1: EUT Test Photographs | |
| | Appendix 2: Product Photos-Please refer to the file: 22B0954R -Product Photos | |

Revision History

| Report No. | Version | Description | Issued Date |
|-----------------------|---------|--------------------------|---------------|
| 22B0954R-RFUSBLEV01-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 V5.1: 40 CH |
| Type of Modulation | Bluetooth V5.1: GFSK(1 Mbps, 2 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 is conforming to FCC 15.203.

Center Frequency of Each Channel:

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

Note:

1. The EUT is a Bluetooth Headset with built-in Bluetooth transceiver, this report for Bluetooth V5.1.
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.

| | | |
|-----------|--------|-----------------------|
| Test Mode | Mode 1 | Transmit - 1 Mbps-BLE |
| | | Transmit - 2 Mbps-BLE |

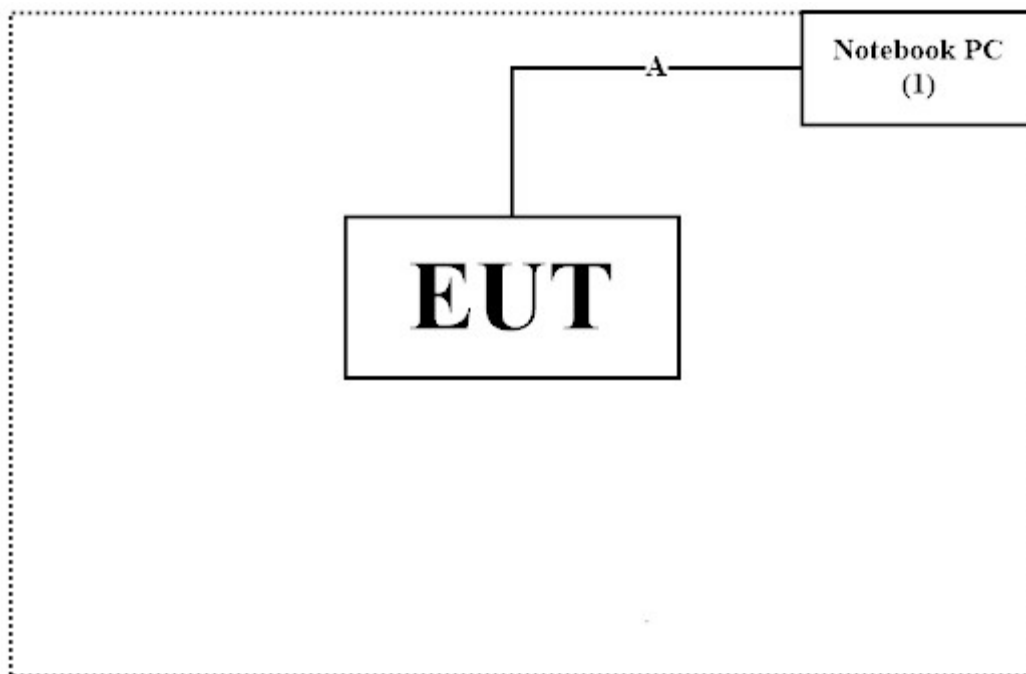
1.2. Tested System Details

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.comWebsite : <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 | 2022/10/03 | 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 | | |
| | Coaxial Cable | EMCI | EMC102-KM-KM-600 | 1160314 | 2022/05/12 | 2023/05/11 |
| | 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 |
| | Coaxial Cable | SGH | SGH18 | 2021005-1 | | |
| | Coaxial Cable | SGH | SGH18 | 202108-4 | | |
| V | Coaxial Cable | SGH | HA800 | GD20110223-1 | 2022/3/18 | 2023/03/17 |
| | 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.

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

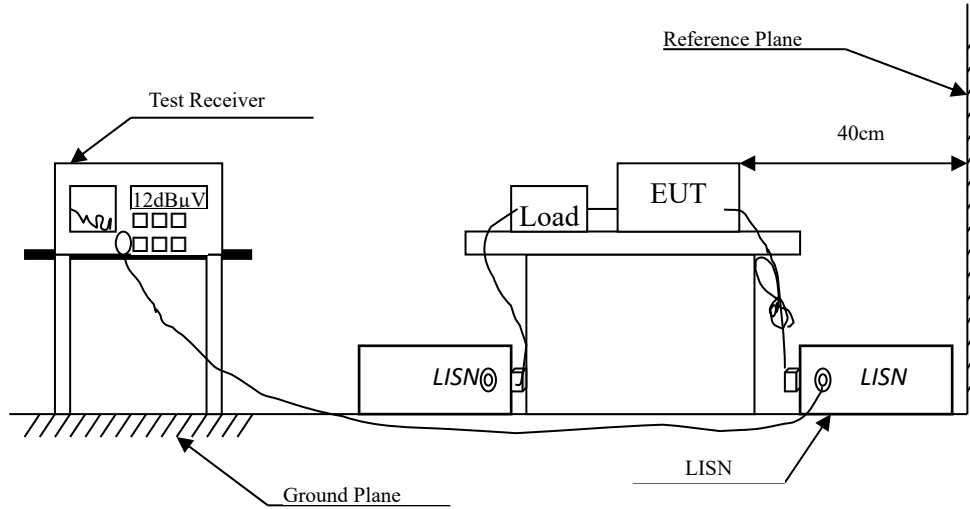
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

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 | ±0.89dB | |
| Radiated Emission | Under 1 GHz ±4.05 dB | Above 1 GHz ±3.73 dB |
| RF Antenna Conducted Test | ±2.06 dB | |
| Band Edge | Under 1 GHz ±4.05 dB | Above 1 GHz ±3.73 dB |
| 6dB Bandwidth | ±1544.74 Hz | |
| Power Density | ±2.06 dB | |
| 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

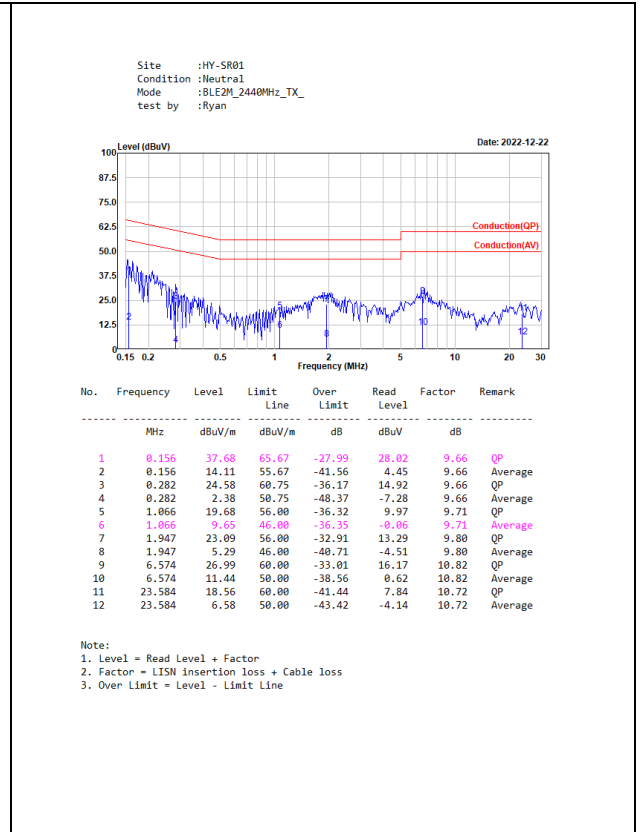
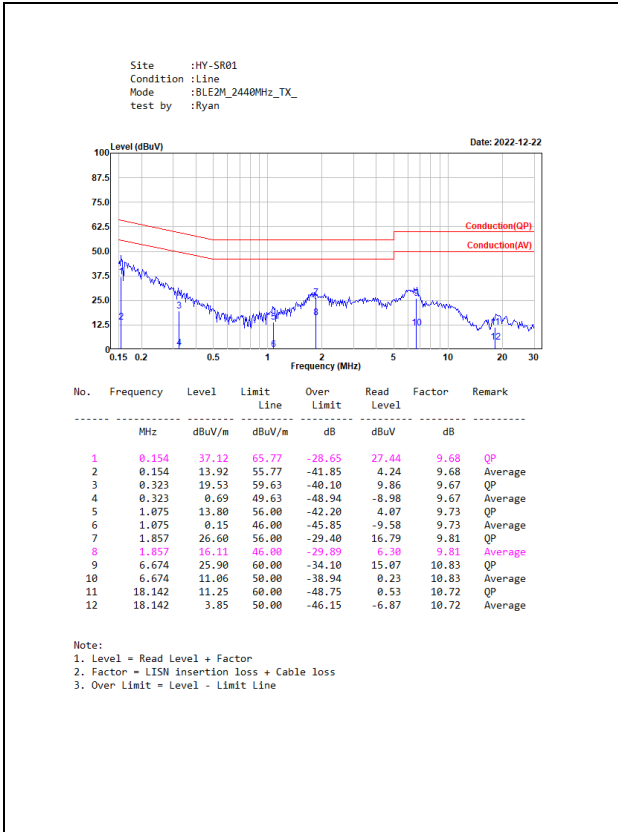
The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling 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 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz.

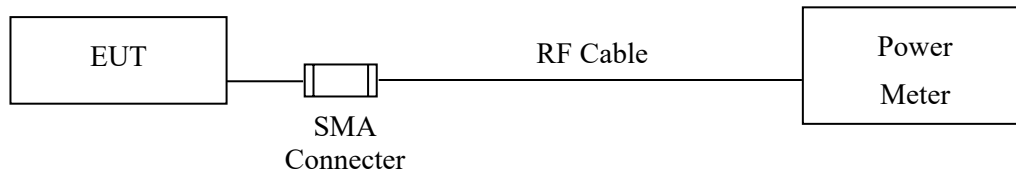
The EUT was setup to ANSI C63.4, 2014; tested to DTS test procedure of FCC KDB-558074 for compliance to FCC 47CFR Subpart C requirements.

2.4. 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

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

3.4. Test Result of Peak Power Output

Product : Bluetooth Headset
Test Item : Peak Power Output
Test Mode : Transmit - 1 Mbps-BLE
Test Date : 2022/12/06

| Channel No. | Frequency (MHz) | Measurement (dBm) | Required Limit | Result |
|-------------|--------------------|----------------------|----------------|--------|
| 00 | 2402 | 7.26 | 1 Watt= 30 dBm | Pass |
| 19 | 2440 | 7.20 | 1 Watt= 30 dBm | Pass |
| 39 | 2480 | 7.16 | 1 Watt= 30 dBm | Pass |

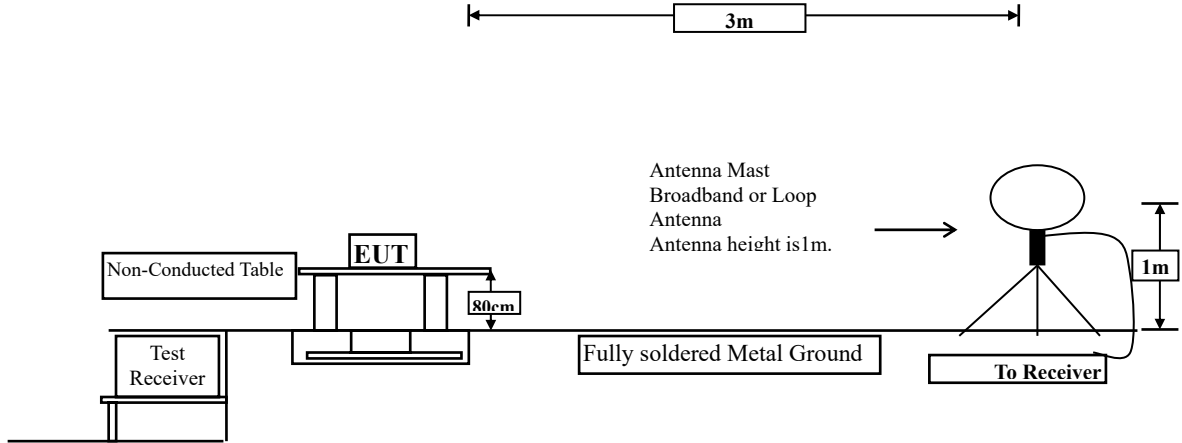
Product : Bluetooth Headset
Test Item : Peak Power Output
Test Mode : Transmit - 2 Mbps-BLE
Test Date : 2022/12/06

| Channel No. | Frequency (MHz) | Measurement (dBm) | Required Limit | Result |
|-------------|--------------------|----------------------|----------------|--------|
| 00 | 2402 | 7.26 | 1 Watt= 30 dBm | Pass |
| 19 | 2440 | 7.20 | 1 Watt= 30 dBm | Pass |
| 39 | 2480 | 7.16 | 1 Watt= 30 dBm | Pass |

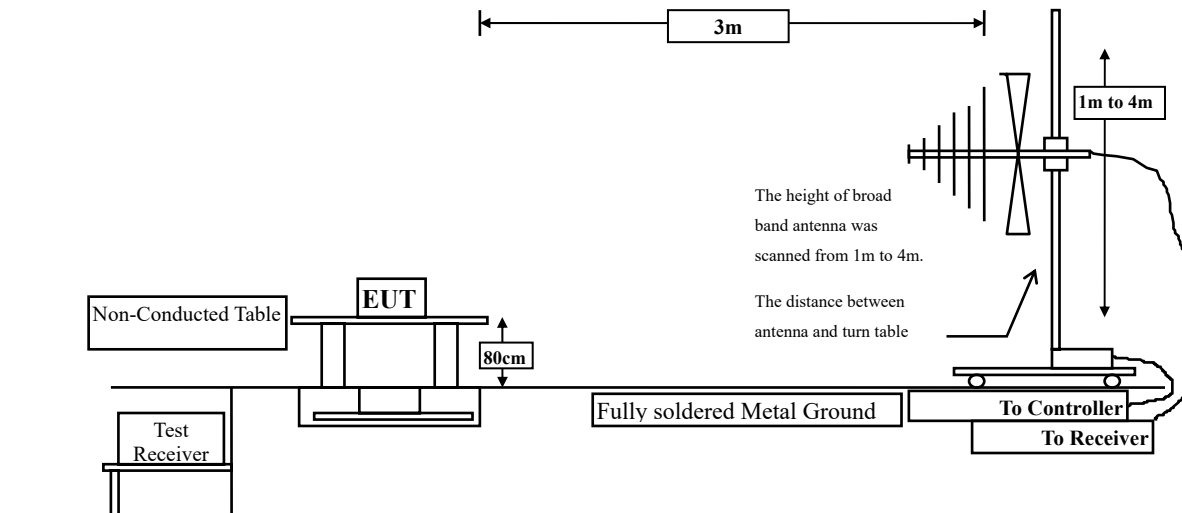
4. Radiated Emission

4.1. Test Setup

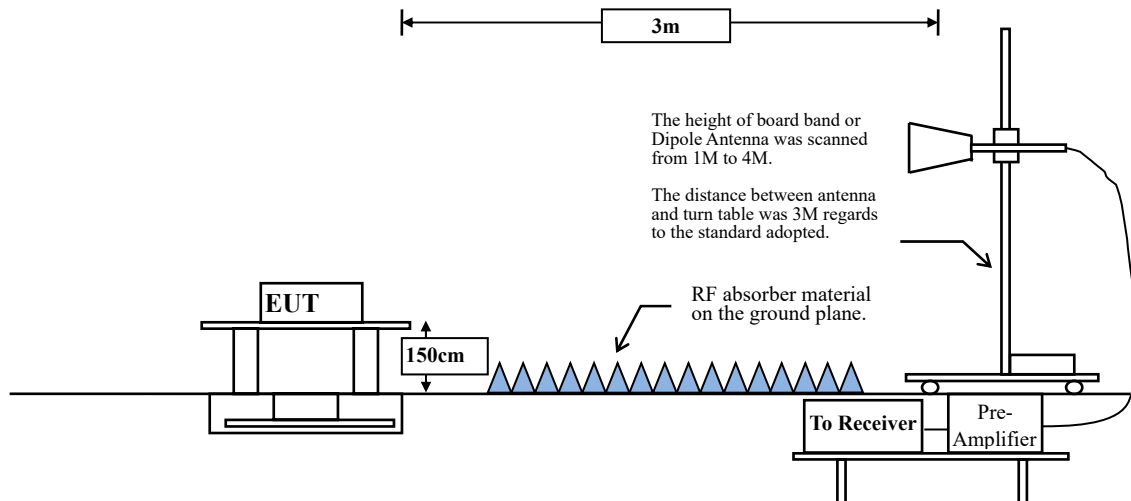
Radiated Emission Under 30 MHz



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

4.3. Test Procedure

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

Measuring the frequency range below 1 GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1 GHz, 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 9 kHz 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 from 9 kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to C63.10 Section 11.12.2.4 Peak measurement procedure.

RBW = as specified in Table 1.

VBW \geq 3 x RBW.

Table 1 —RBW as a function of frequency

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

According to C63.10 Section 11.12.2.5 Average measurement procedure.

RBW = 1 MHz.

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

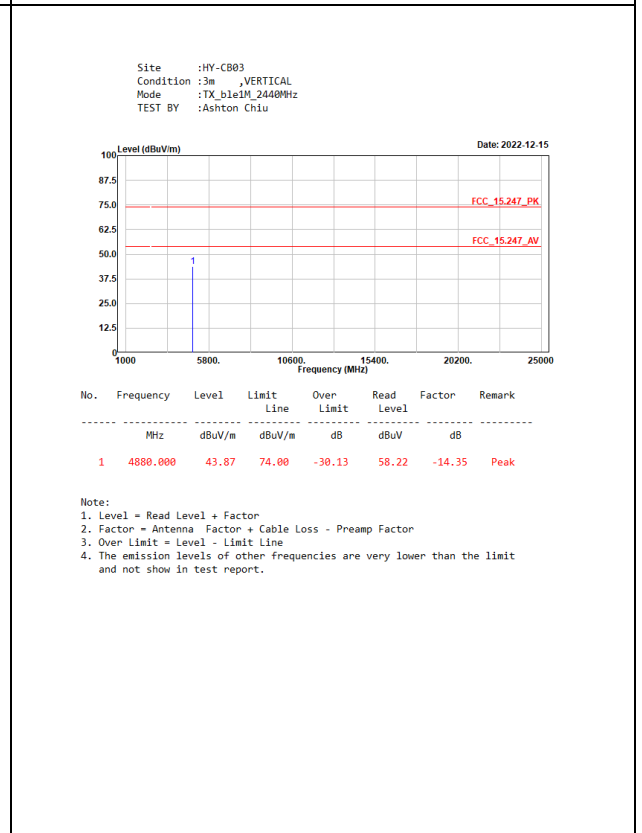
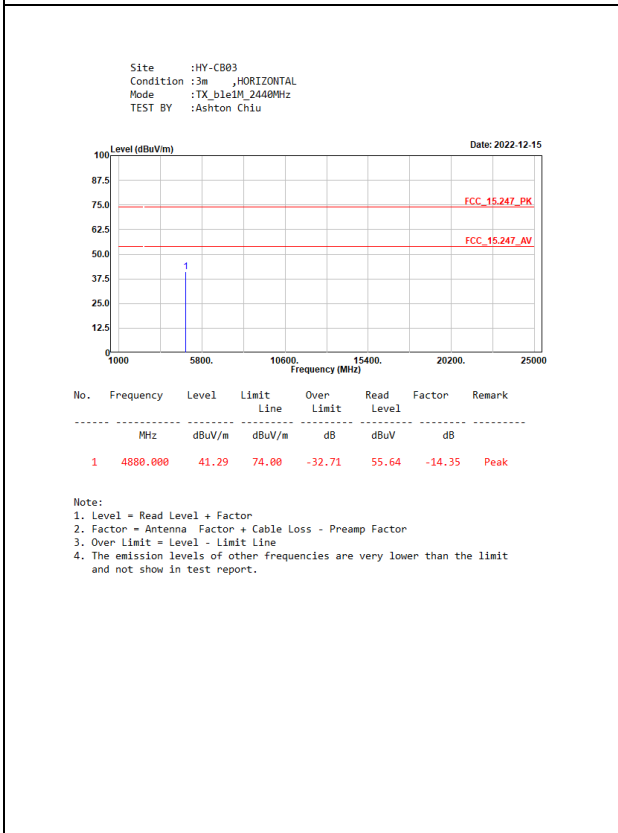
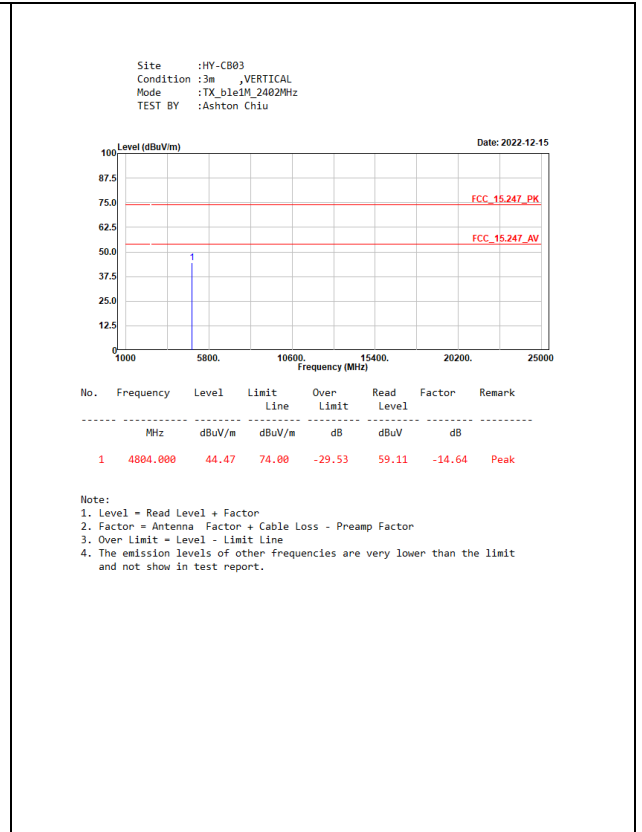
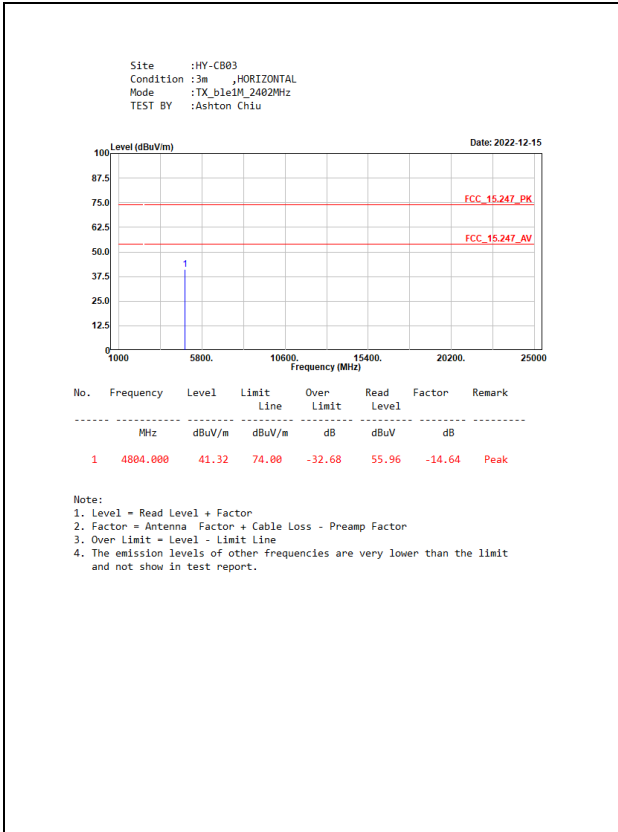
VBW \geq 1/T, when duty cycle < 98 %

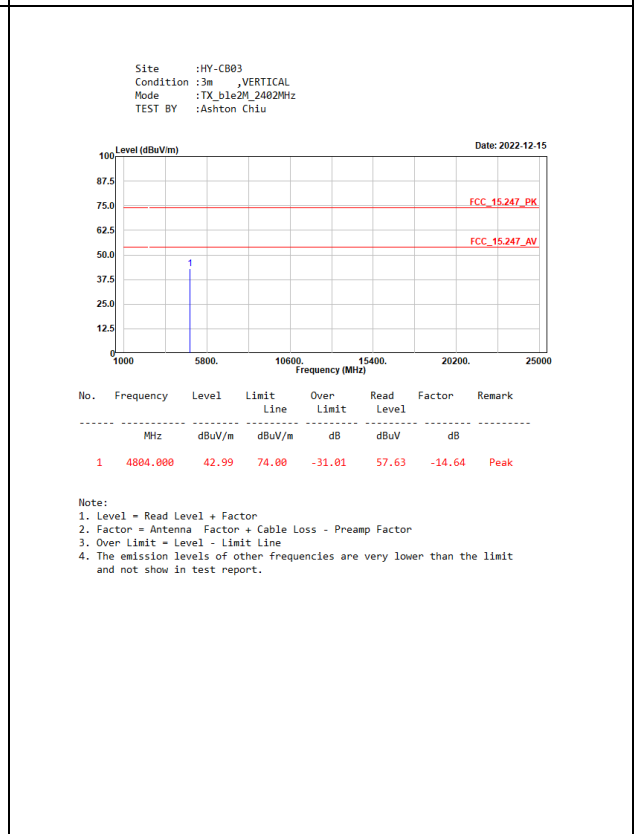
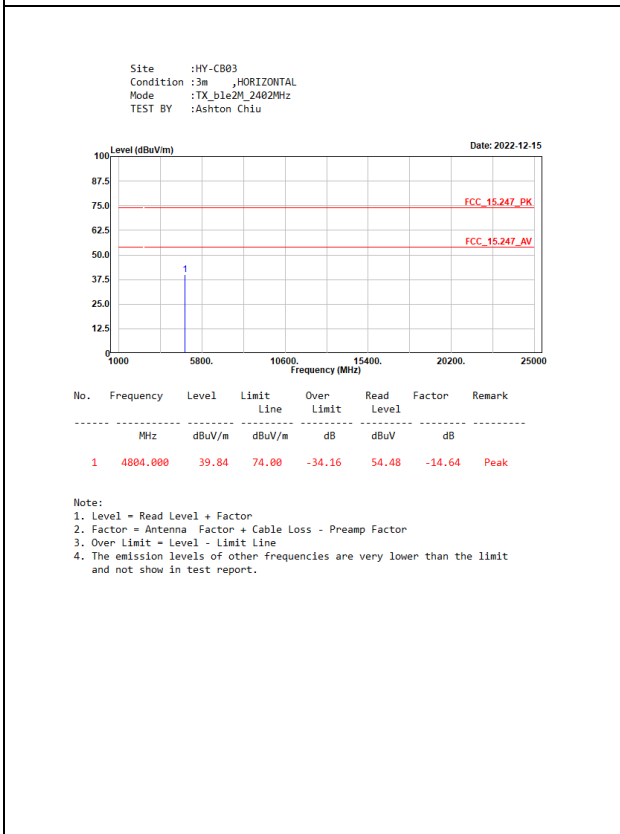
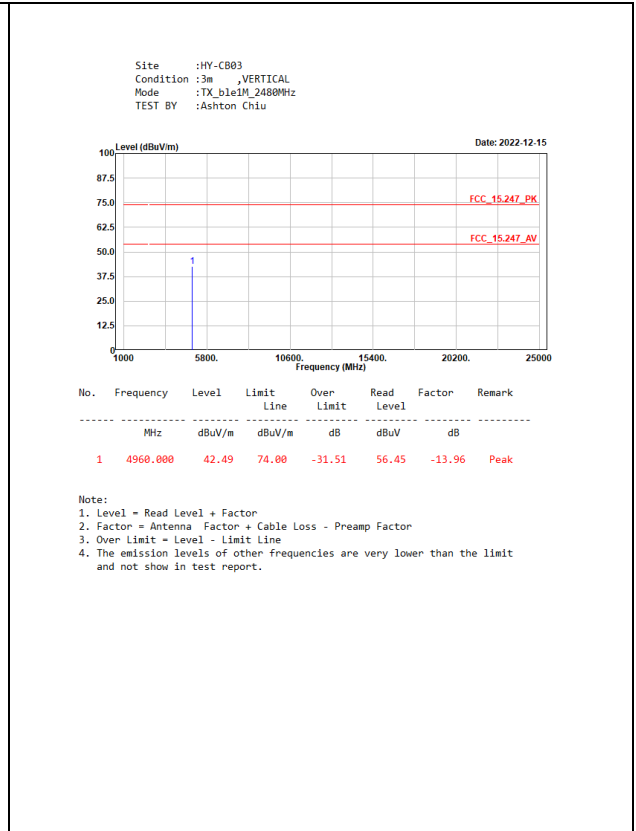
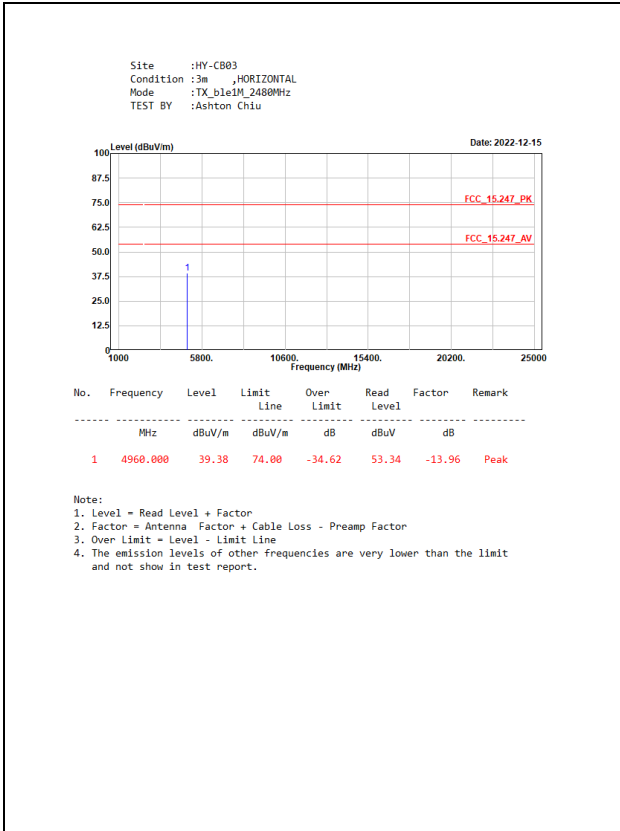
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

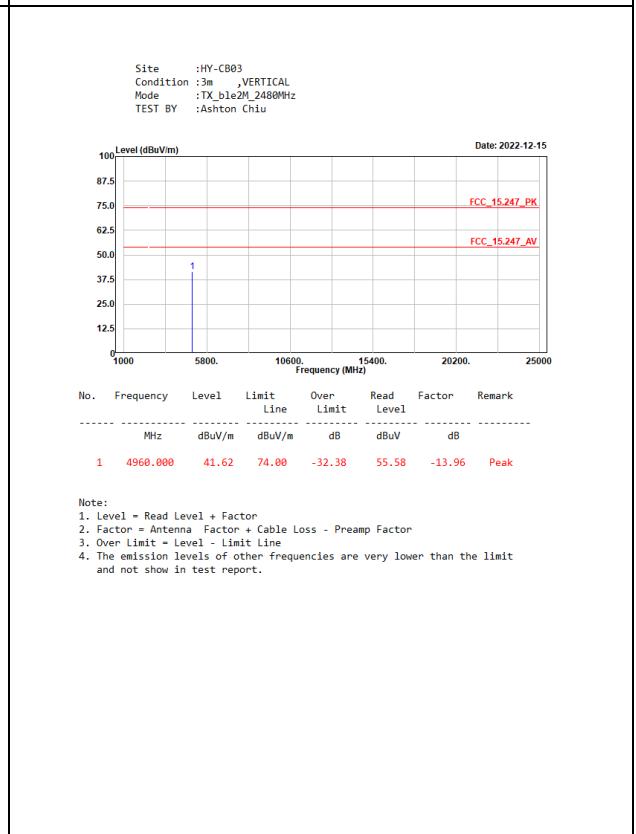
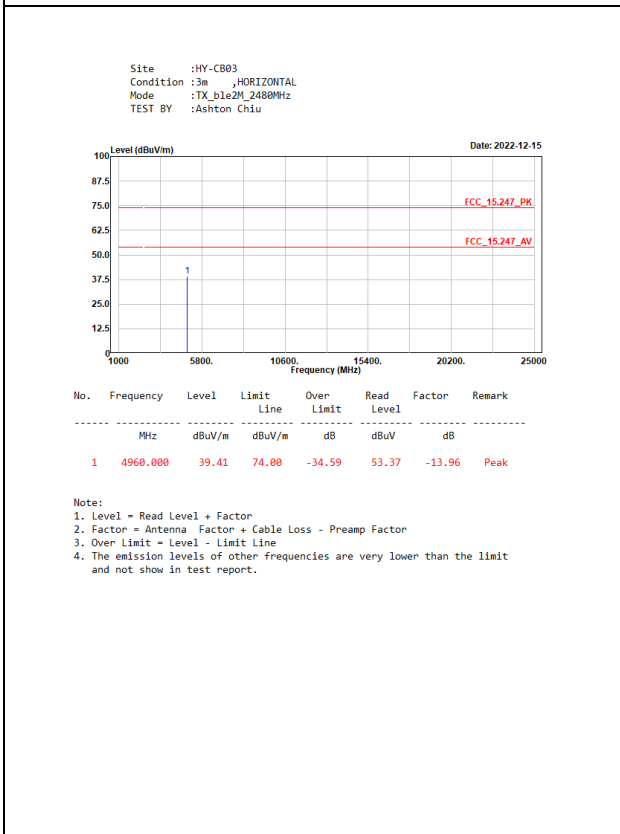
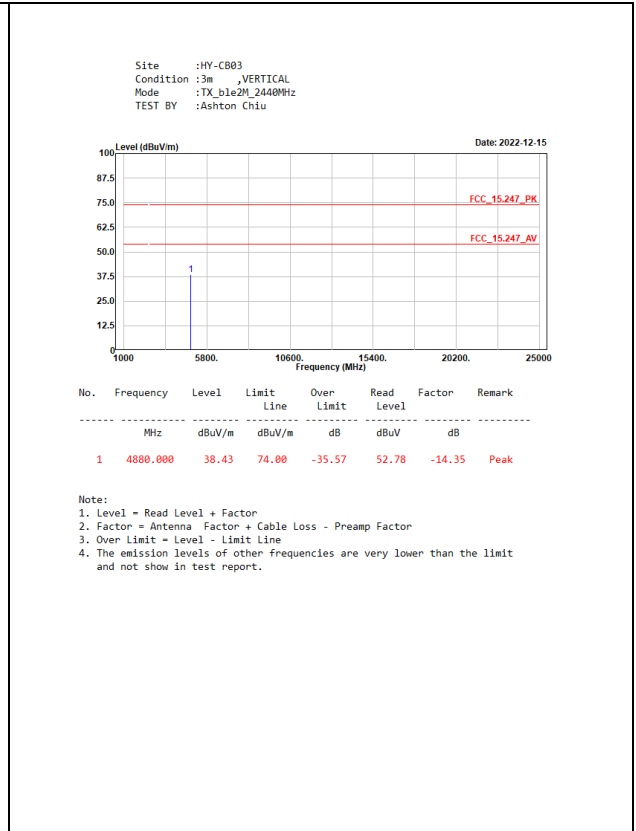
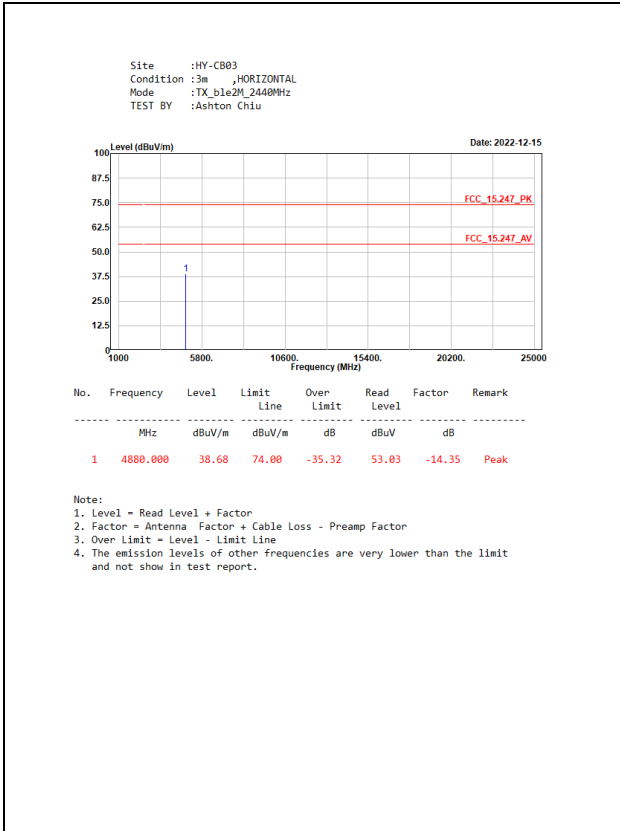
| 2.4GHz band | Duty Cycle (%) | T (ms) | 1/T (Hz) | VBW (Hz) |
|--------------|----------------|--------|----------|----------|
| BLE (1 Mbps) | 84.80 | 2.1200 | 472 | 500 |
| BLE (2 Mbps) | 56.38 | 1.0600 | 943 | 1000 |

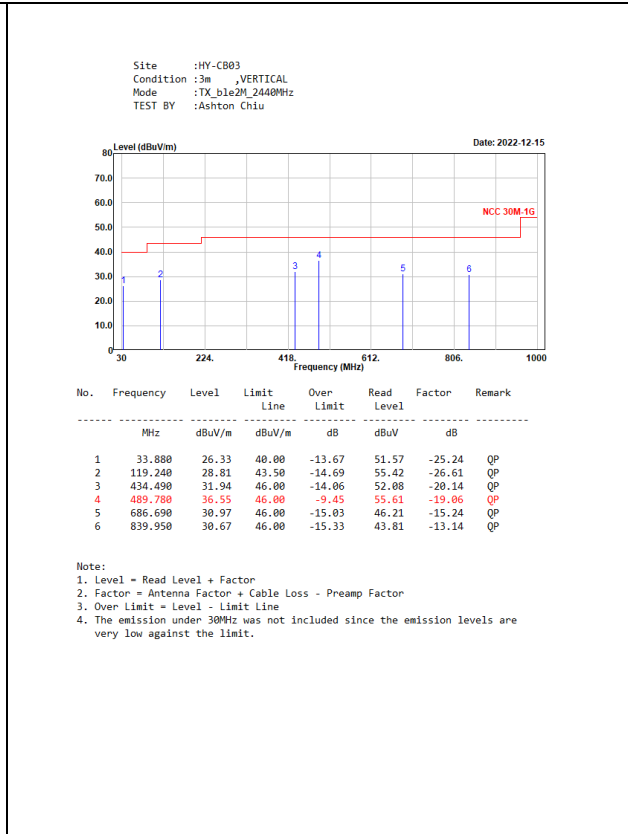
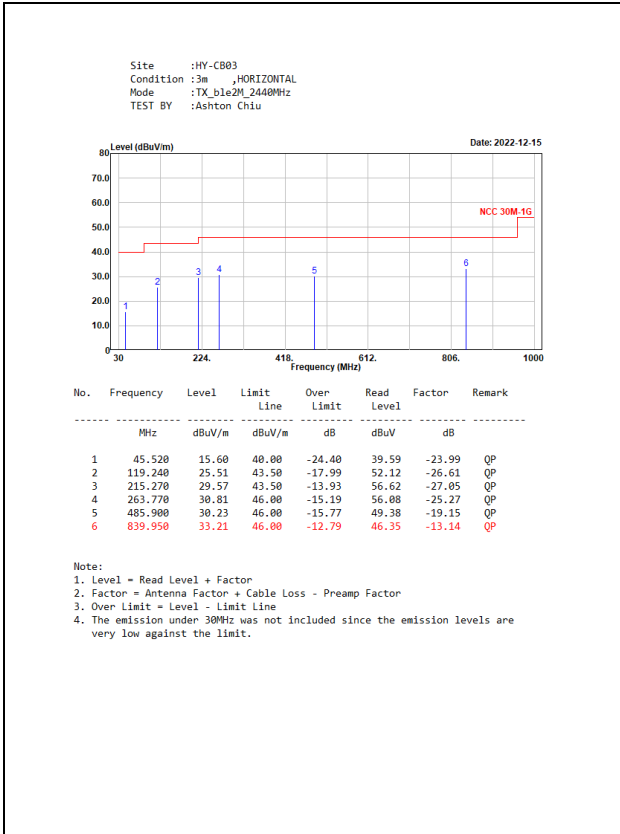
Note: Duty Cycle Refer to Section 9.

4.4. Test Result of Radiated Emission



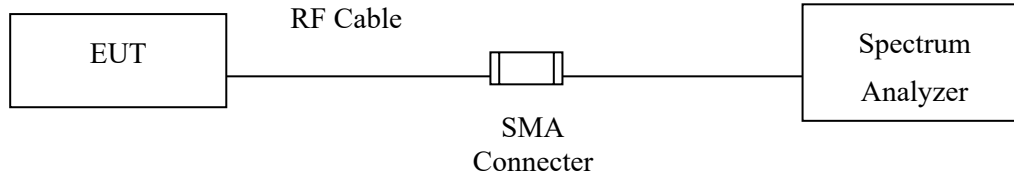






5. RF Antenna Conducted Test

5.1. Test Setup



5.2. Limits

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.3. Test Procedure

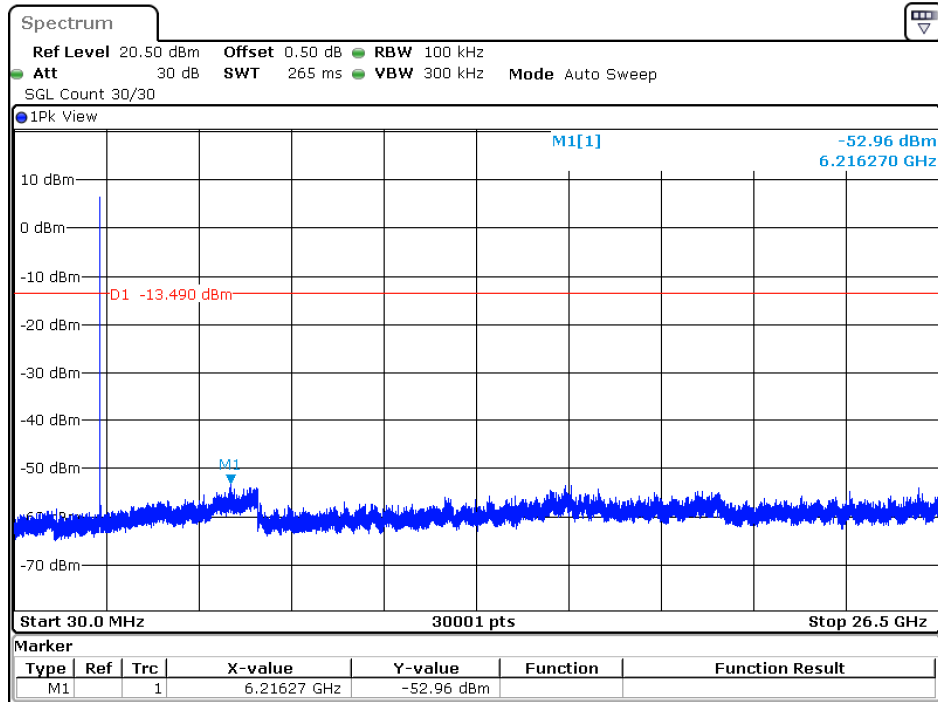
The EUT was tested according to C63.10:2013 Section 11.11 for compliance to FCC 47CFR 15.247 requirements.

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

5.4. Test Result of RF Antenna Conducted Test

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

Figure Channel 39:

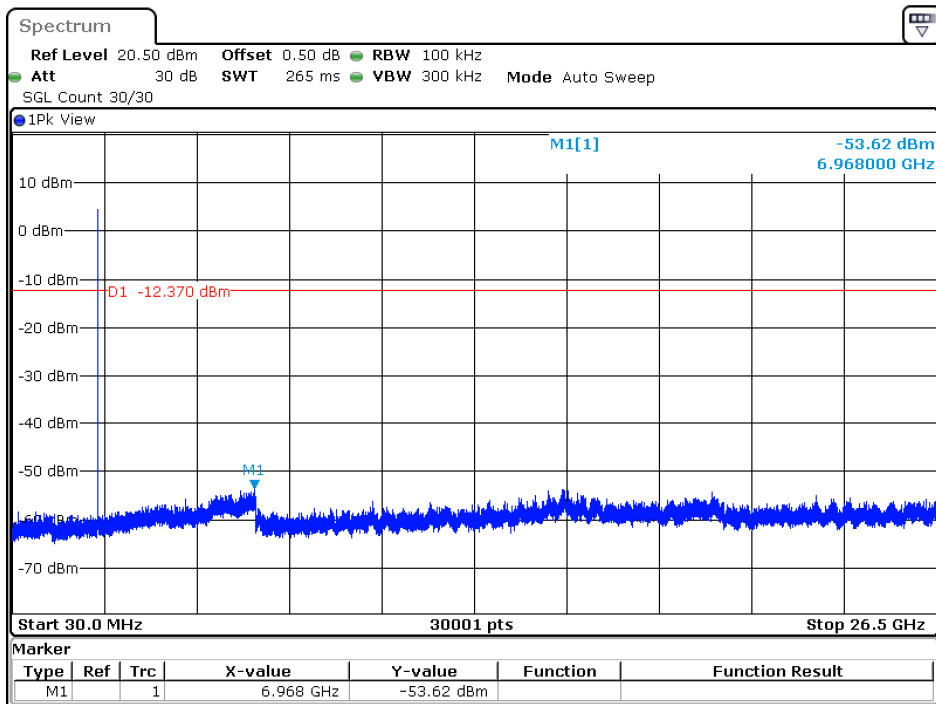


Date: 12.DEC.2022 12:10:12

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 - 2 Mbps-BLE
 Test Date : 2022/12/12

Figure Channel 39:



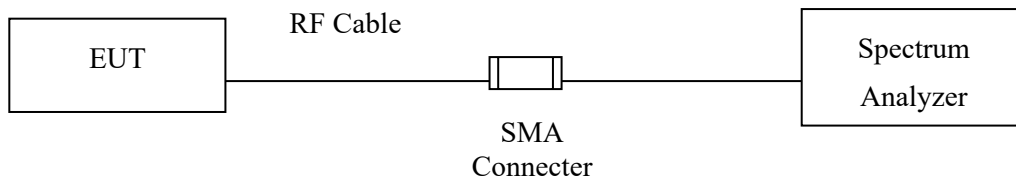
Date: 12.DEC.2022 12:16:30

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

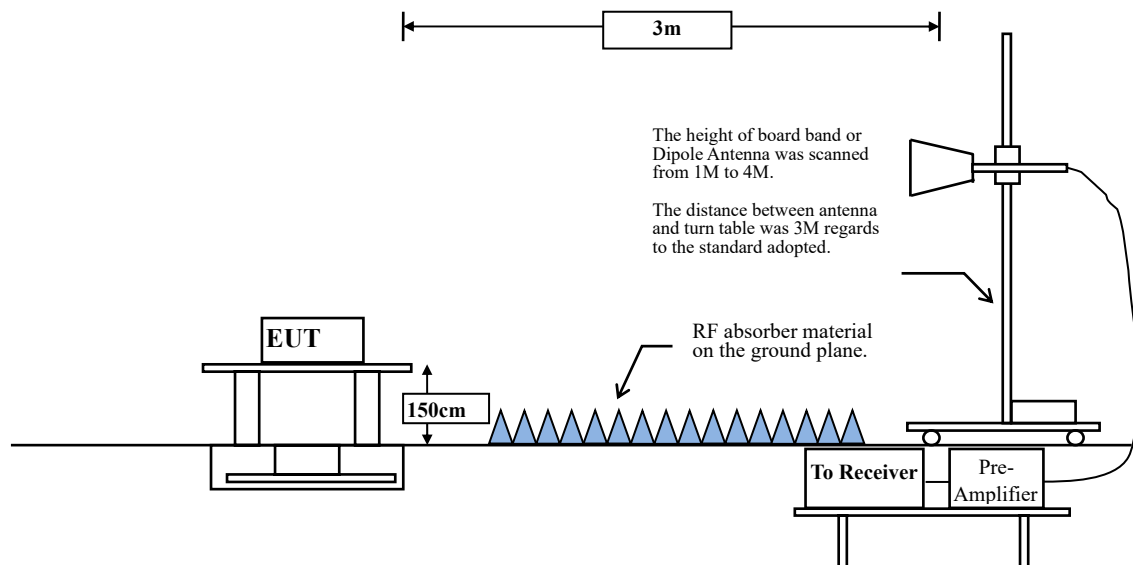
6. Band Edge

6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



6.2. Limit

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.3. Test Procedure

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

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

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

RBW and VBW Parameter setting:

According to C63.10 Section 11.12.2.4 Peak measurement procedure.

RBW = as specified in Table 1.

VBW \geq 3 x RBW.

Table 1 —RBW as a function of frequency

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

According to C63.10 Section 11.12.2.5 Average measurement procedure.

RBW = 1 MHz.

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

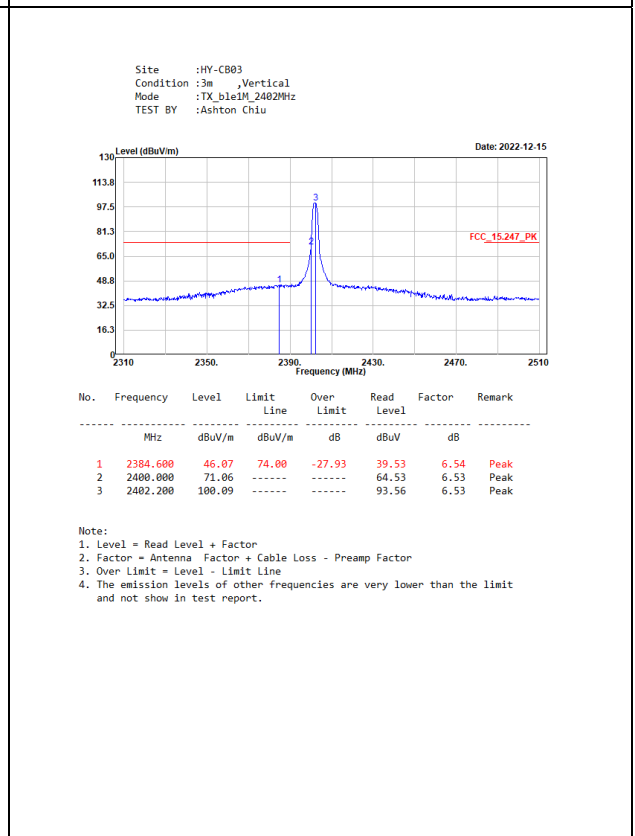
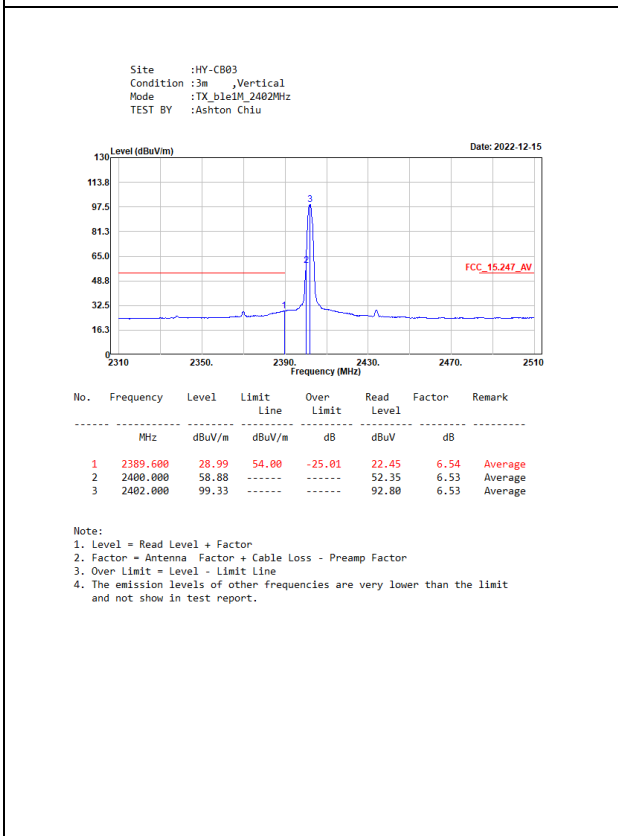
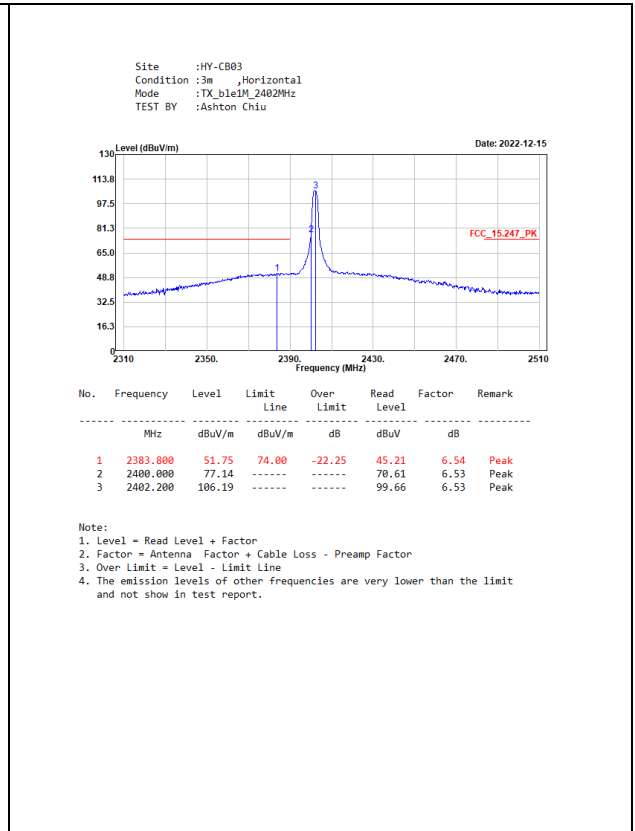
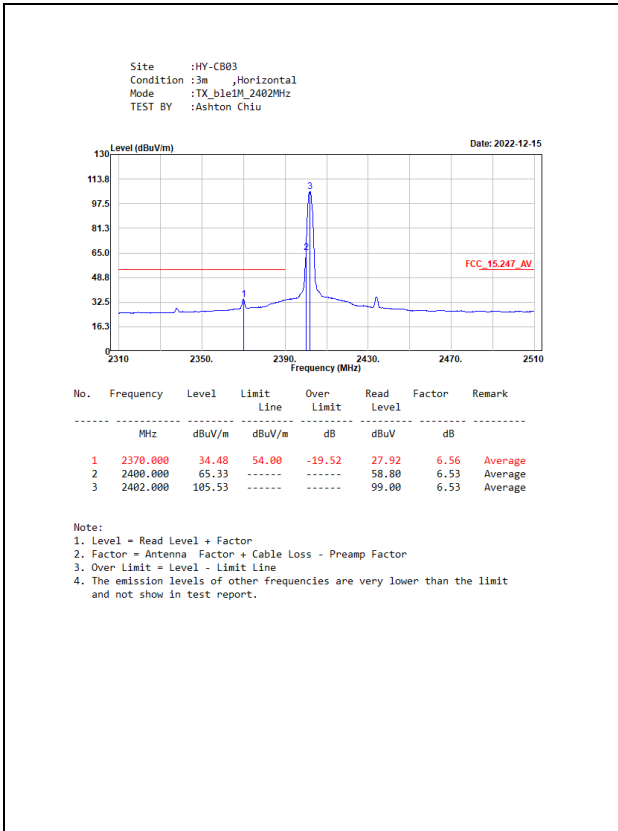
VBW \geq 1/T, when duty cycle < 98 %

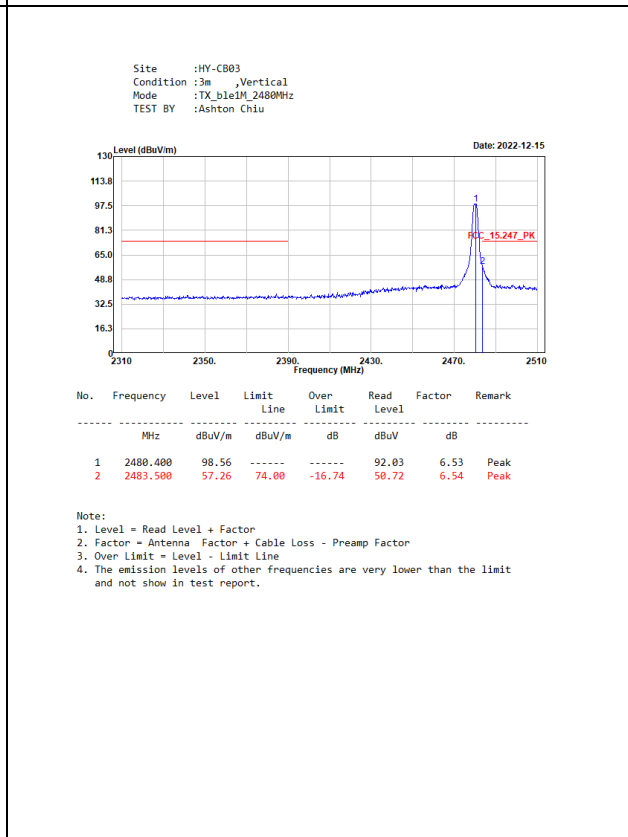
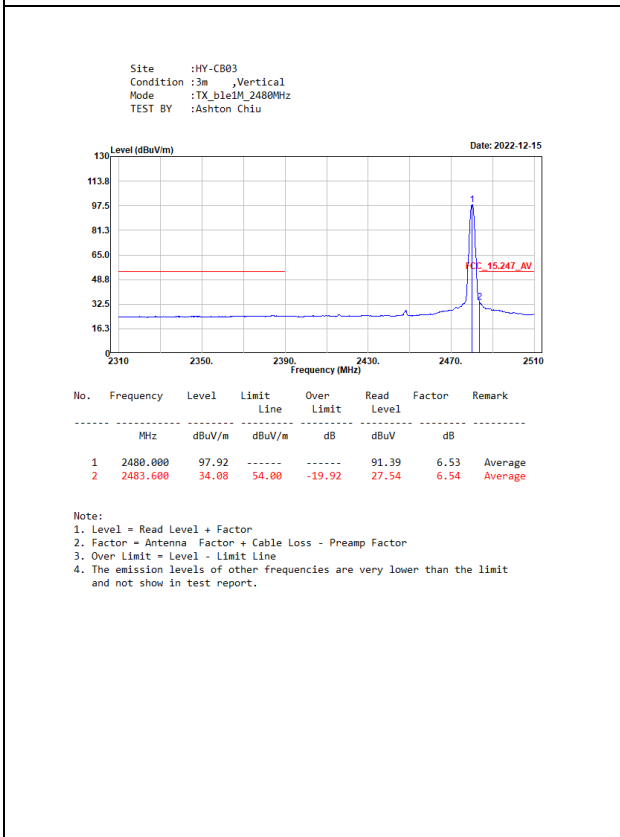
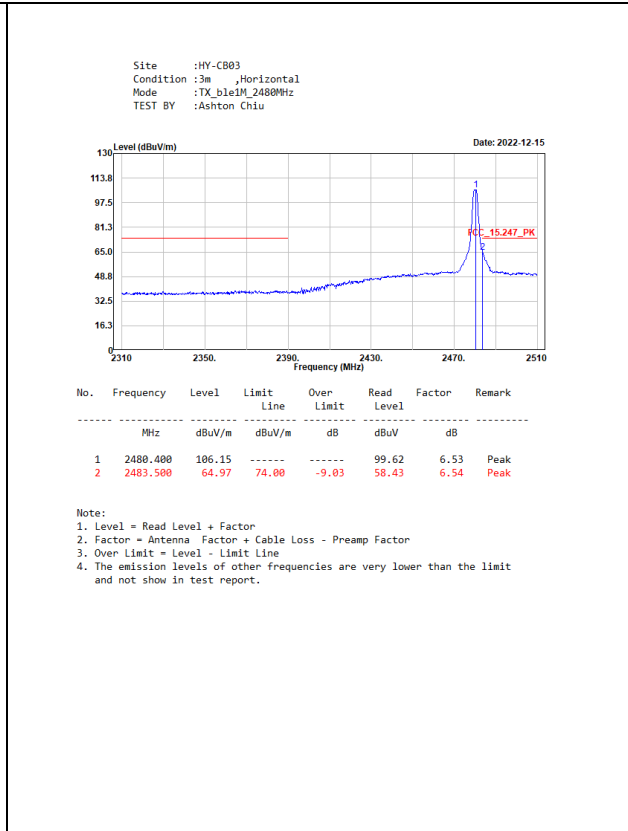
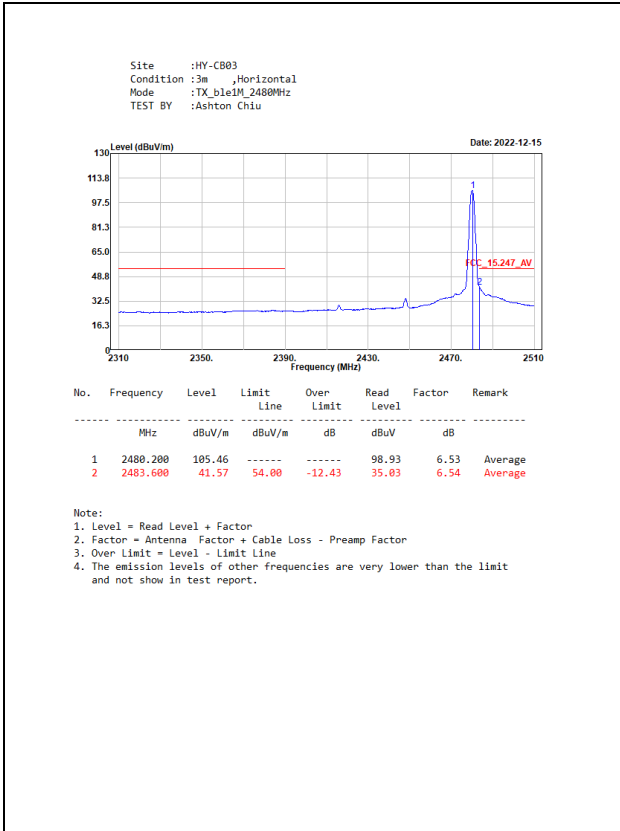
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

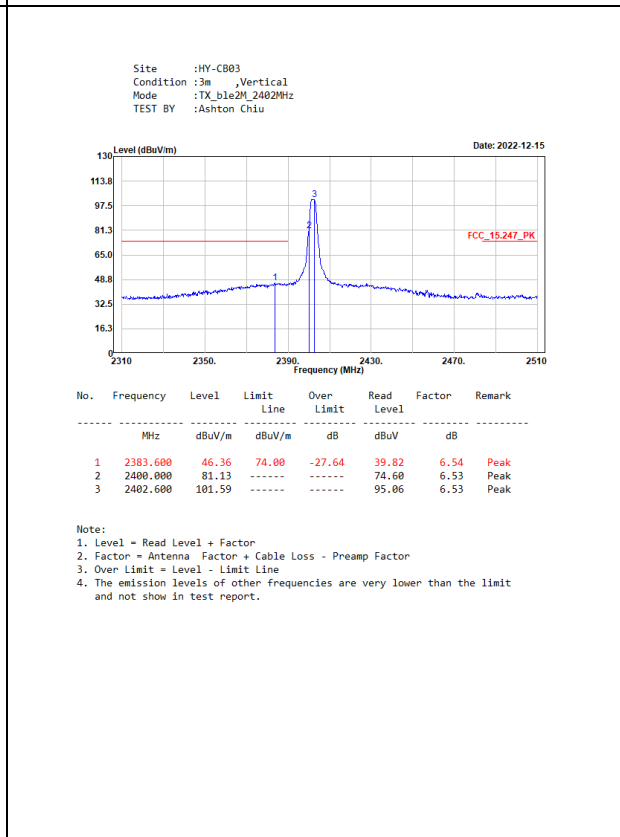
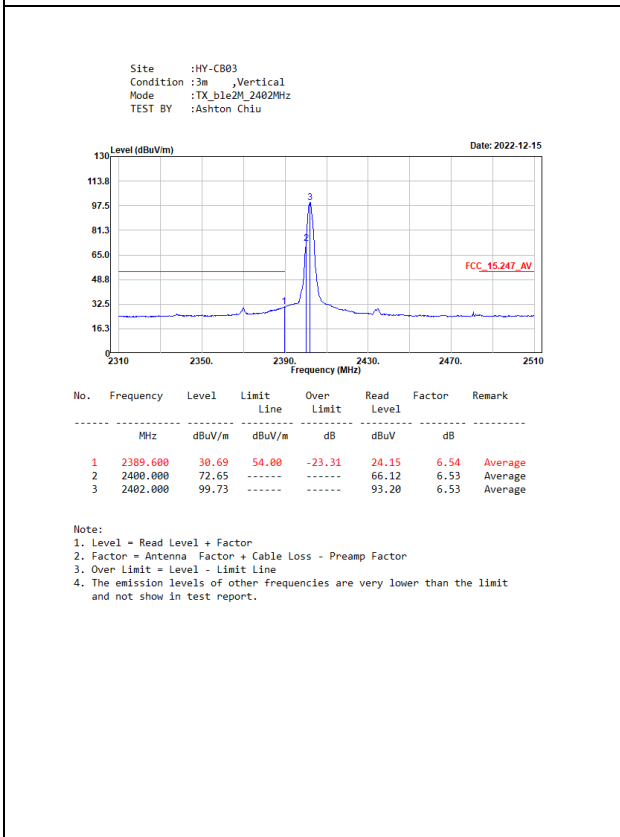
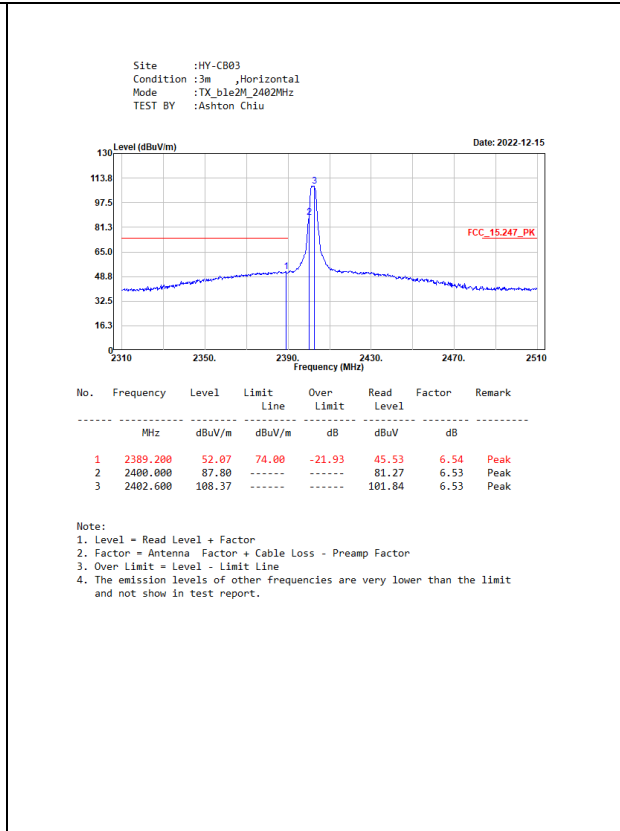
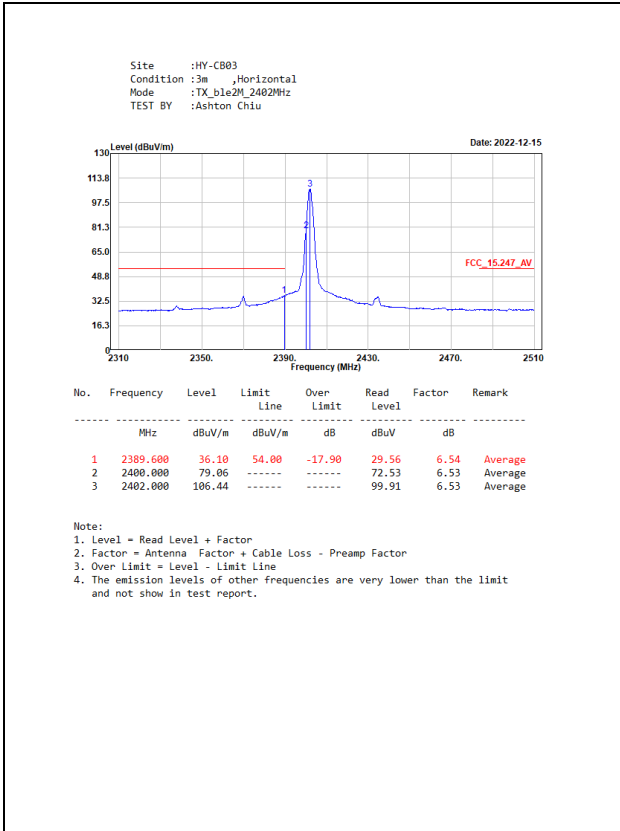
| 2.4GHz band | Duty Cycle (%) | T (ms) | 1/T (Hz) | VBW (Hz) |
|--------------|----------------|--------|----------|----------|
| BLE (1 Mbps) | 84.80 | 2.1200 | 472 | 500 |
| BLE (2 Mbps) | 56.38 | 1.0600 | 943 | 1000 |

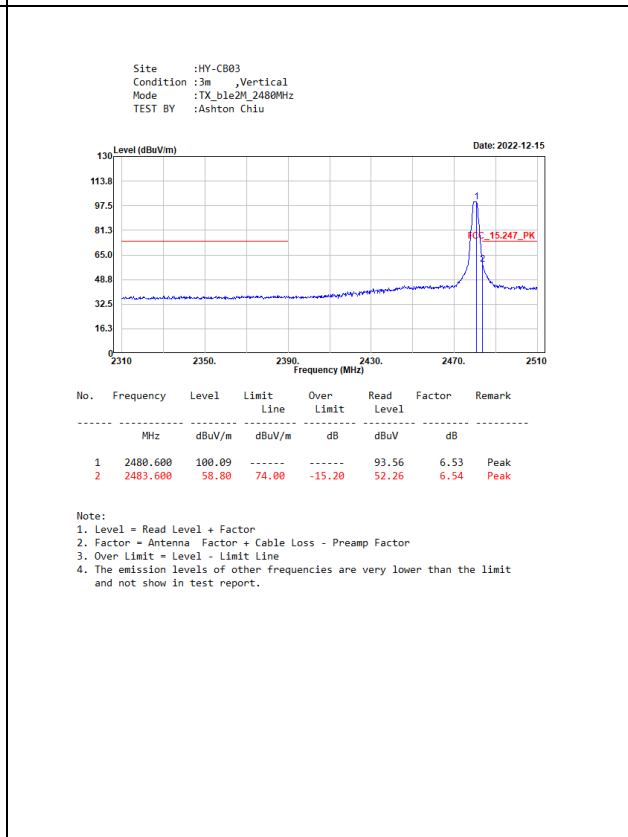
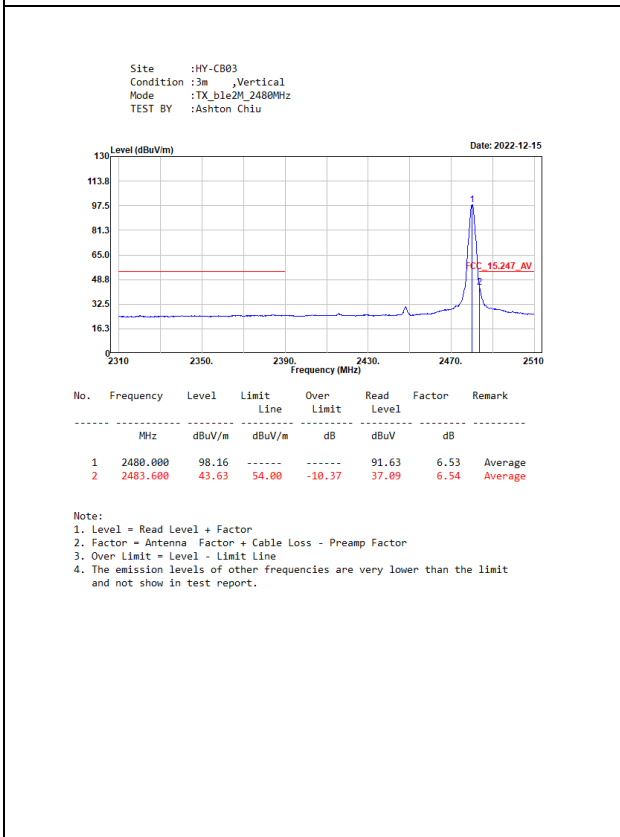
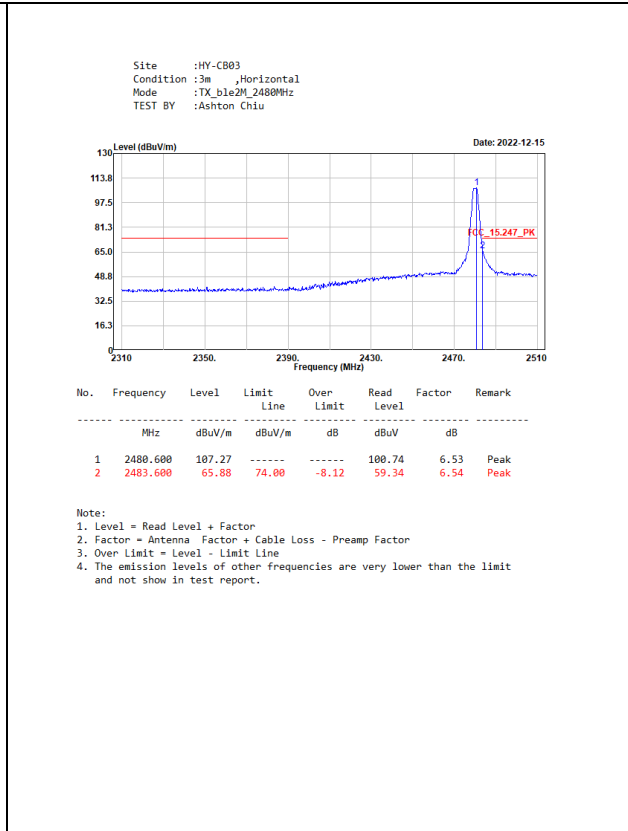
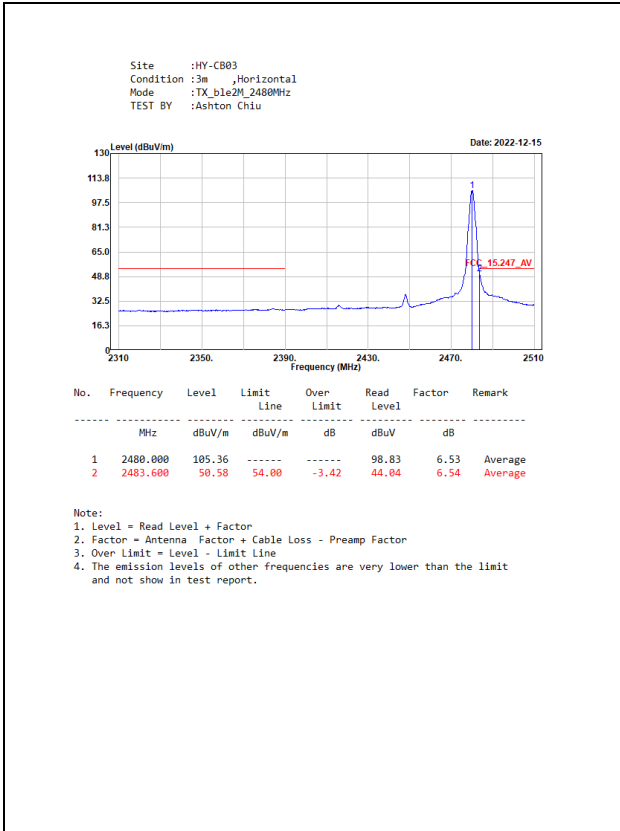
Note: Duty Cycle Refer to Section 9.

6.4. Test Result of Band Edge



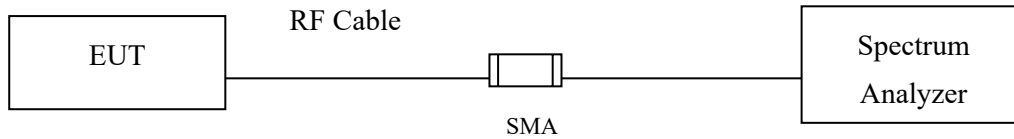






7. 6dB Bandwidth

7.1. Test Setup



7.2. Limits

The minimum bandwidth shall be at least 500 kHz.

7.3. Test Procedure

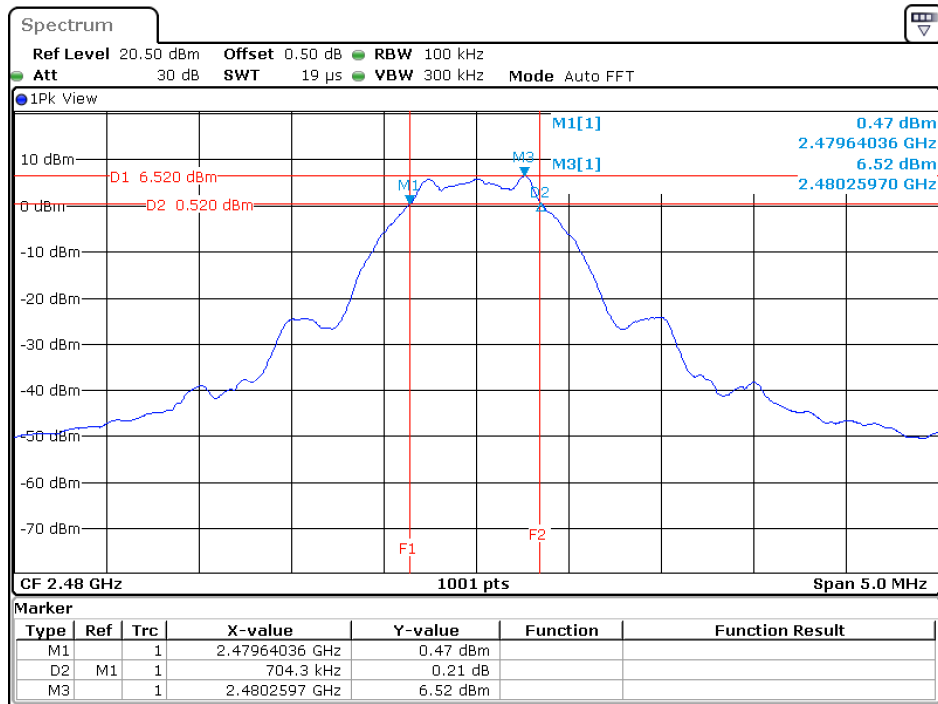
The EUT was setup according to ANSI C63.4, 2014; tested according to ANSI C63.10 Section 11.8 for compliance to FCC 47CFR 15.247 requirements.

7.4. Test Result of 6dB Bandwidth

Product : Bluetooth Headset
 Test Item : 6dB Bandwidth Data
 Test Mode : Transmit - 1 Mbps-BLE
 Test Date : 2022/12/12

| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 00 | 2402 | 709 | >500 | Pass |
| 19 | 2440 | 704 | >500 | Pass |
| 39 | 2480 | 704 | >500 | Pass |

Figure Channel 39:

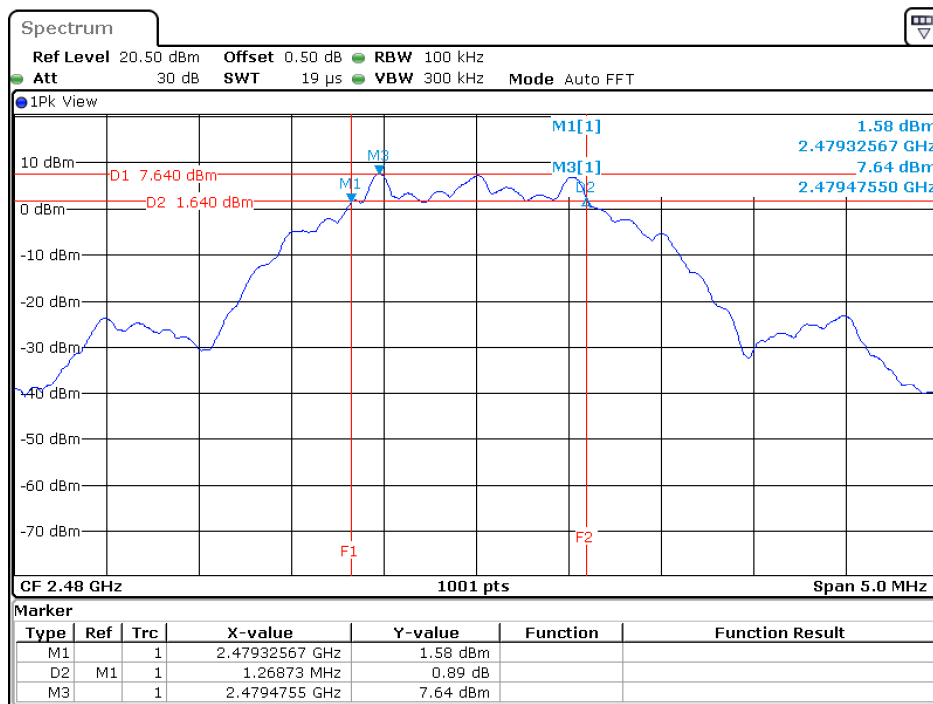


Date: 12.DEC.2022 12:09:14

Product : Bluetooth Headset
 Test Item : 6dB Bandwidth Data
 Test Mode : Transmit - 2 Mbps-BLE
 Test Date : 2022/12/12

| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|-------------|-----------------|-------------------------|----------------------|--------|
| 00 | 2402 | 1268 | >500 | Pass |
| 19 | 2440 | 1268 | >500 | Pass |
| 39 | 2480 | 1268 | >500 | Pass |

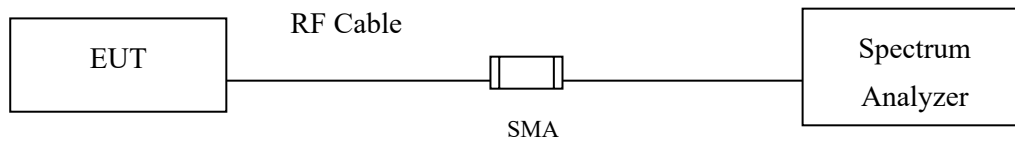
Figure Channel 39:



Date: 12.DEC.2022 12:15:31

8. Power Density

8.1. Test Setup



8.2. Limits

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

8.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

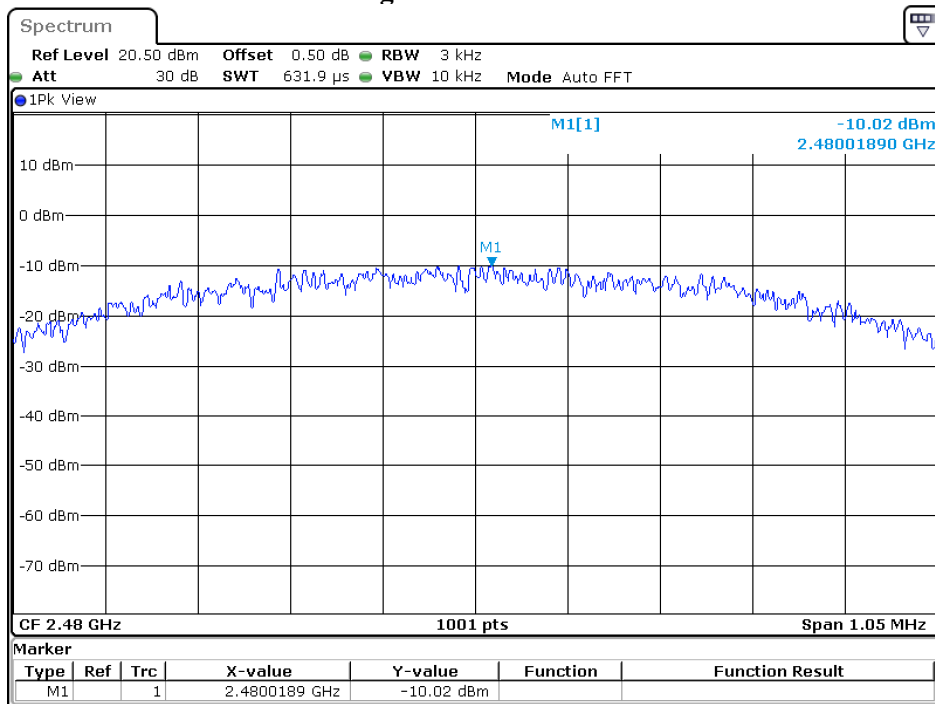
The maximum power spectral density using C63.10 Section 11.10.2 Method PKPSD (peak PSD)

8.4. Test Result of Power Density

Product : Bluetooth Headset
 Test Item : Power Density Data
 Test Mode : Transmit - 1 Mbps-BLE
 Test Date : 2022/12/12

| Channel No. | Frequency (MHz) | Measure Level (dBm) | Limit (dBm) | Result |
|-------------|-----------------|---------------------|-------------|--------|
| 00 | 2402 | -10.32 | ≤ 8dBm | Pass |
| 19 | 2440 | -10.17 | ≤ 8dBm | Pass |
| 39 | 2480 | -10.02 | ≤ 8dBm | Pass |

Figure Channel 39:

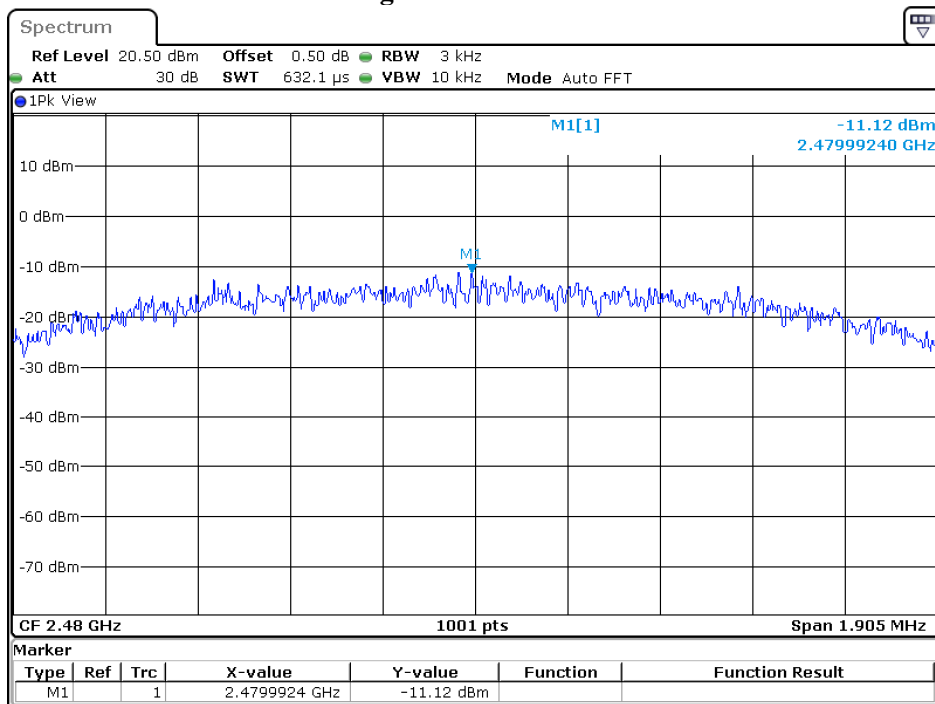


Date: 12.DEC.2022 12:09:24

Product : Bluetooth Headset
 Test Item : Power Density Data
 Test Mode : Transmit - 2 Mbps-BLE
 Test Date : 2022/12/12

| Channel No. | Frequency (MHz) | Measure Level (dBm) | Limit (dBm) | Result |
|-------------|-----------------|---------------------|-------------|--------|
| 00 | 2402 | -11.49 | ≤ 8dBm | Pass |
| 19 | 2440 | -11.17 | ≤ 8dBm | Pass |
| 39 | 2480 | -11.12 | ≤ 8dBm | Pass |

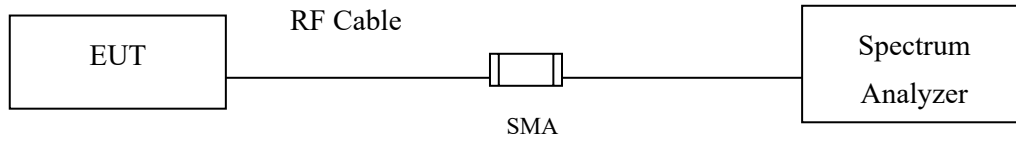
Figure Channel 39:



Date: 12.DEC.2022 12:15:42

9. Duty Cycle

9.1. Test Setup



9.2. Test Procedure

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

9.3. Test Result of Duty Cycle

Product : Bluetooth Headset
Test Item : Duty Cycle
Test Mode : Transmit

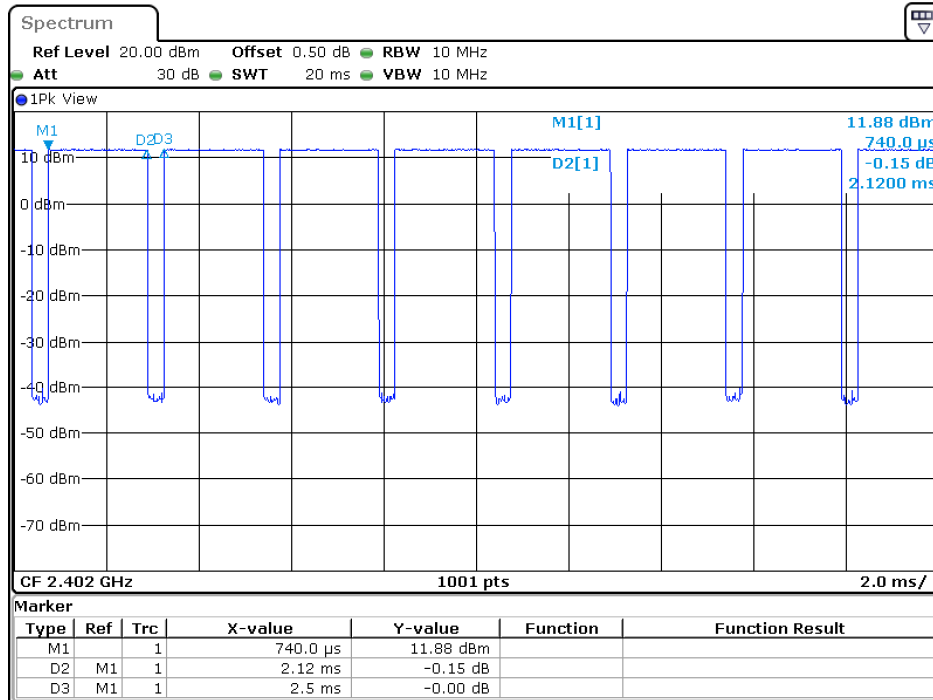
Formula:

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

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

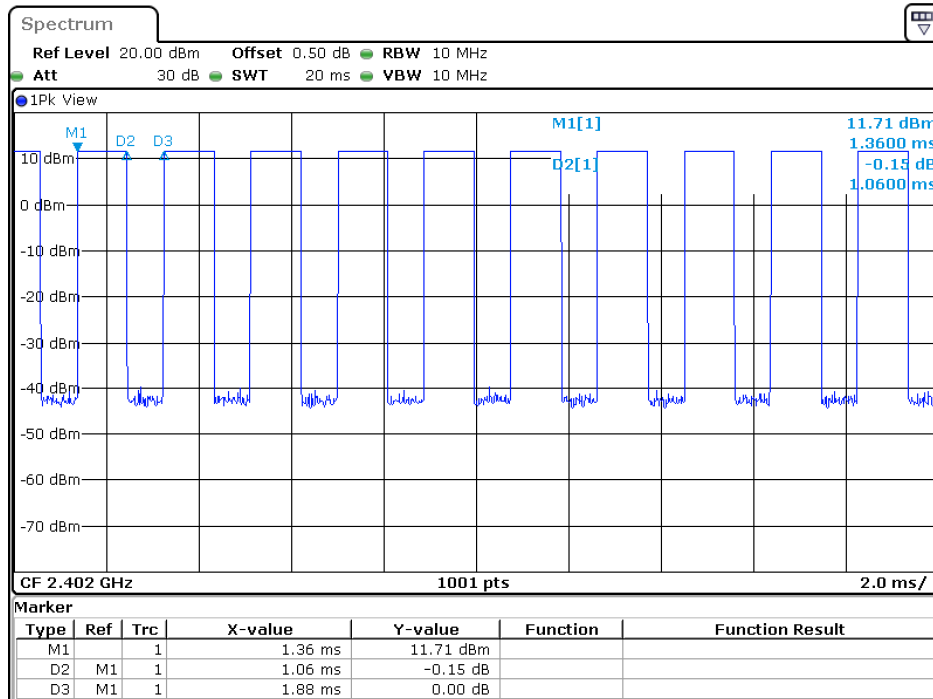
| 2.4GHz Band | Ton (ms) | Ton + Toff (ms) | Duty Cycle (%) | Duty Factor (dB) |
|--------------|-------------|--------------------|-------------------|---------------------|
| BLE (1 Mbps) | 2.1200 | 2.5000 | 84.80 | 0.72 |
| BLE (2 Mbps) | 1.0600 | 1.8800 | 56.38 | 2.49 |

BLE 1M



Date: 5.DEC.2022 14:45:12

BLE 2M



Date: 5.DEC.2022 14:52:28

10. EMI Reduction Method During Compliance Testing

No modification was made during testing.