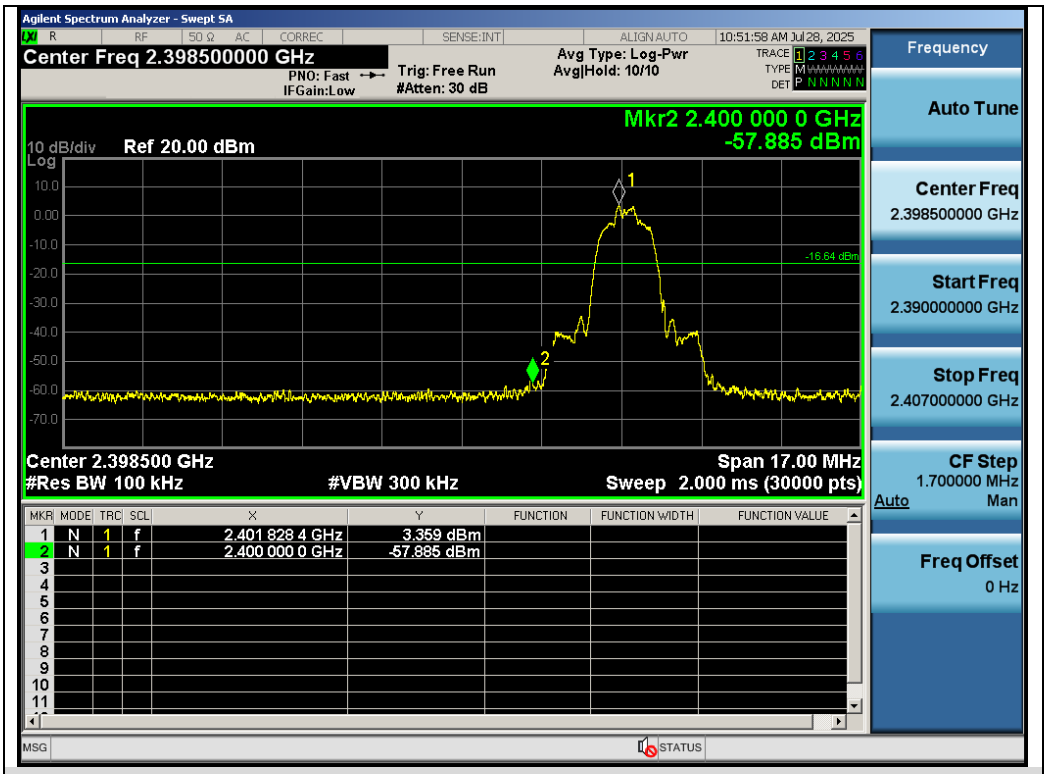
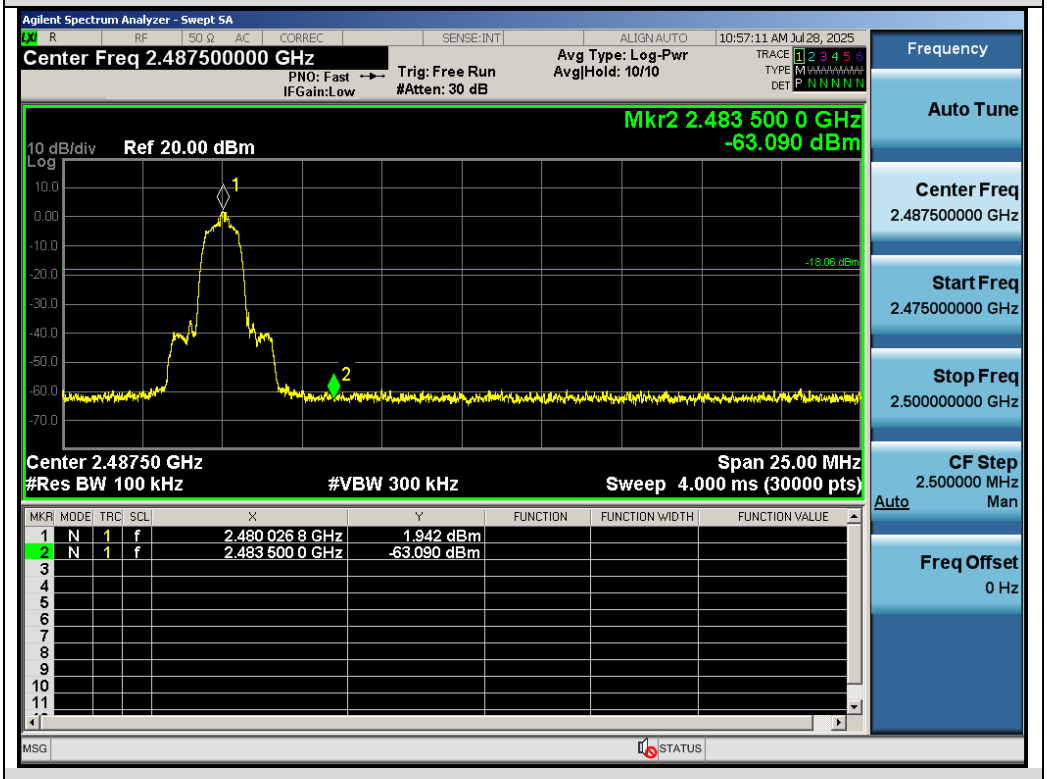
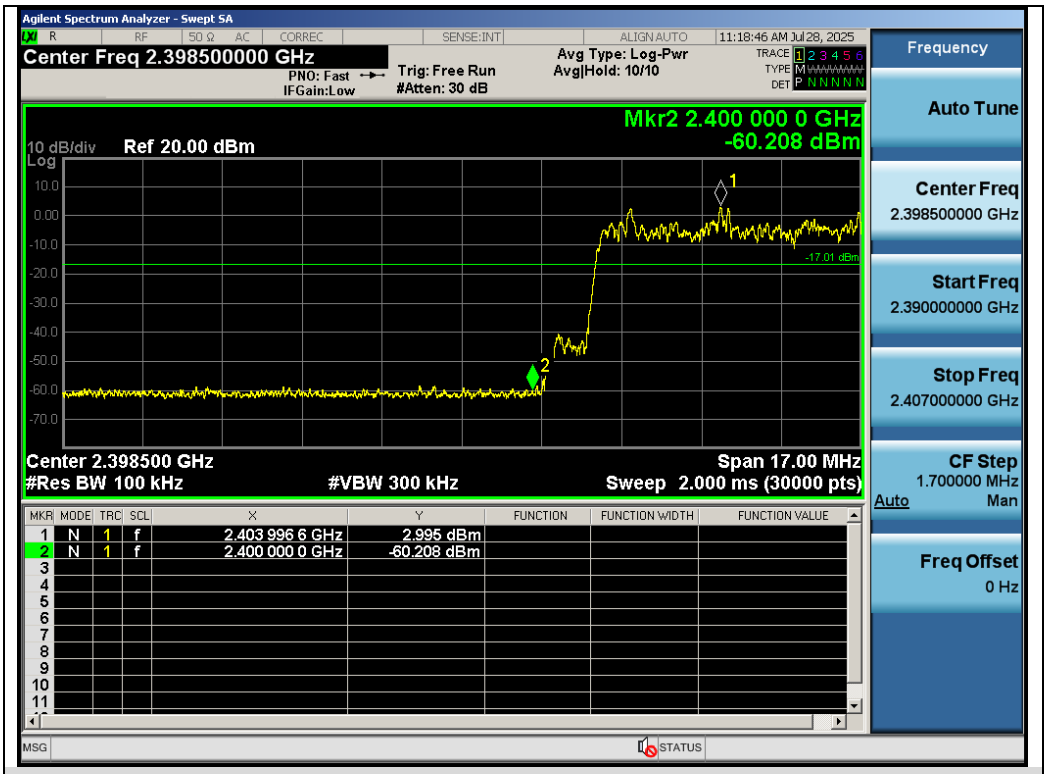


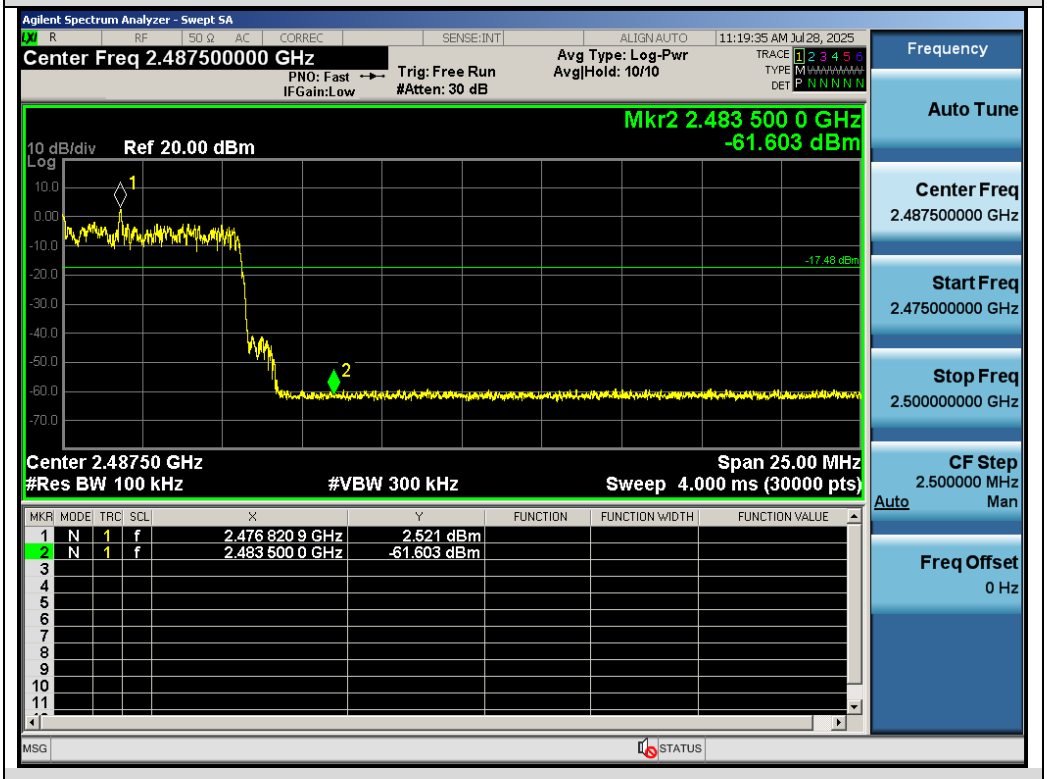

Test_Graph_EDR_ANT1_2402_2Mbps_Lower Band Edge Emissions



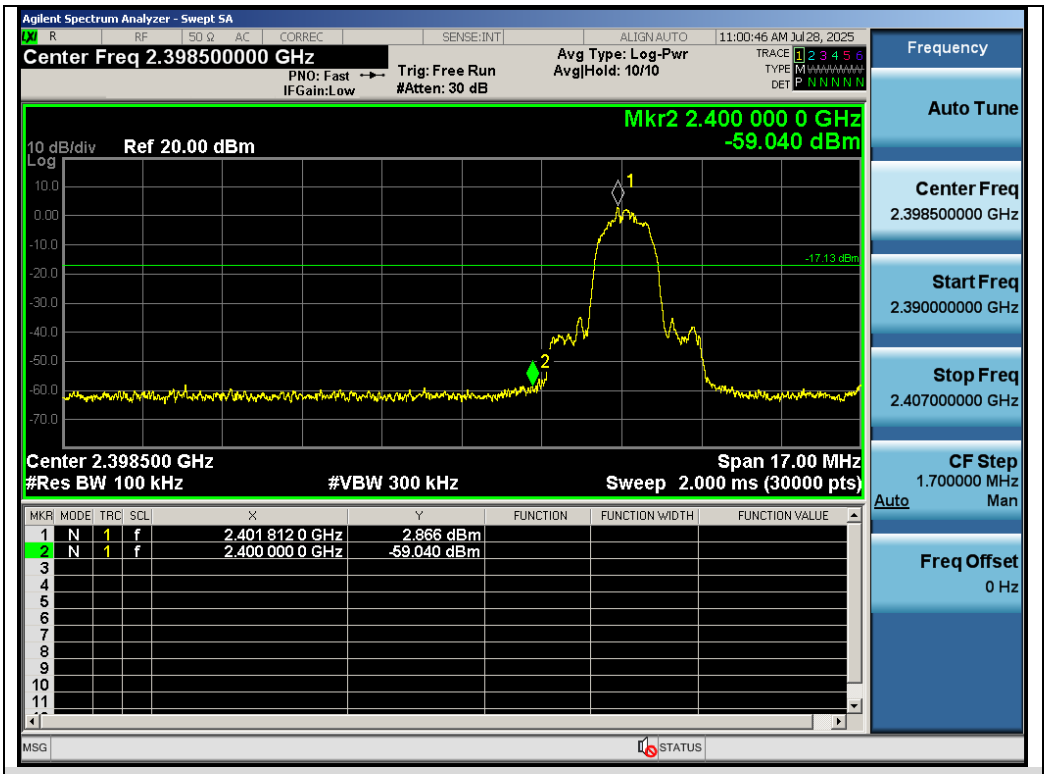

Test_Graph_EDR_ANT1_2480_2Mbps_Higher Band Edge Emissions



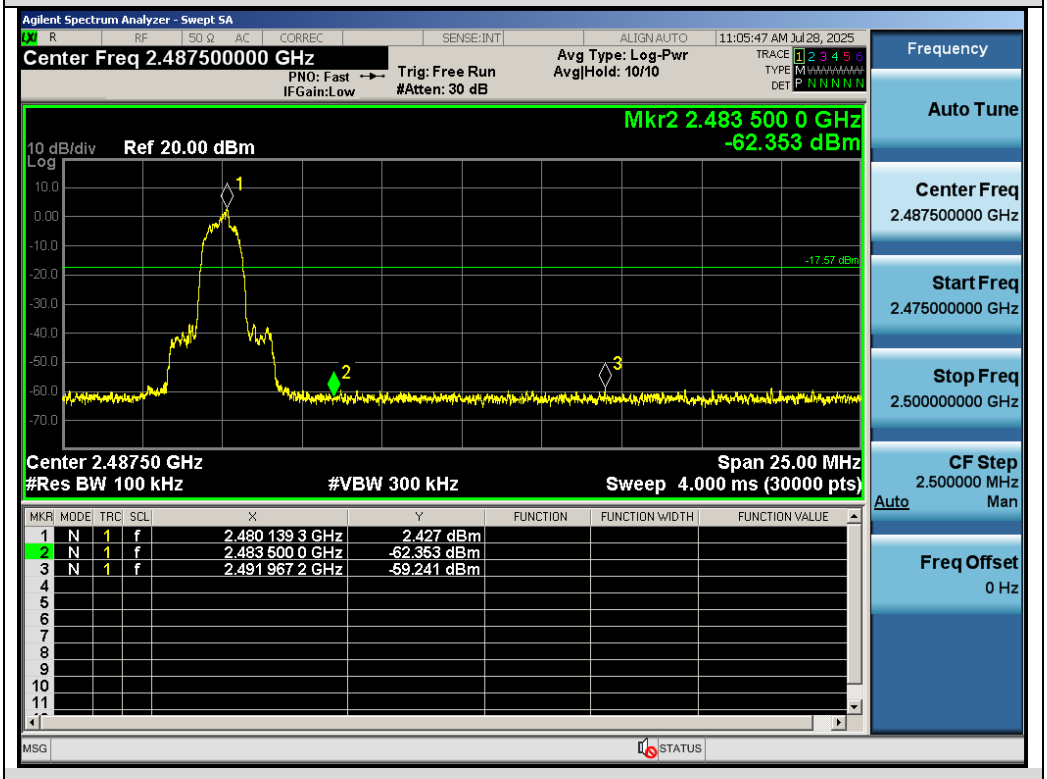

Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Lower Band Edge Emissions



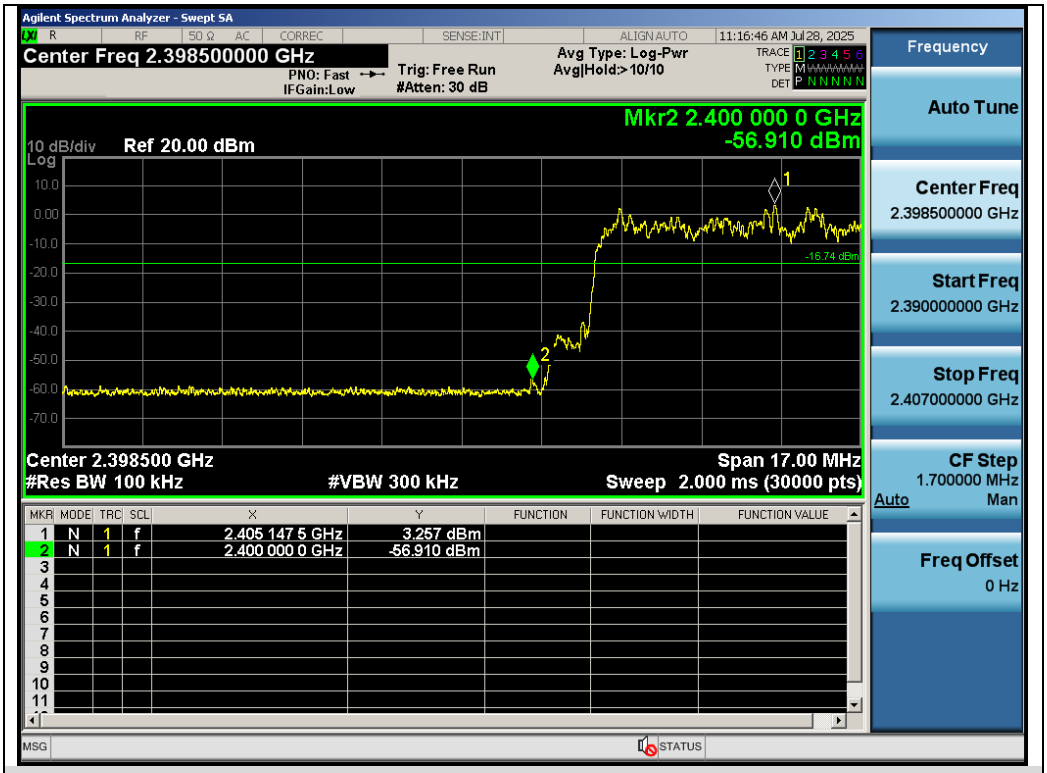

Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Higher Band Edge Emissions



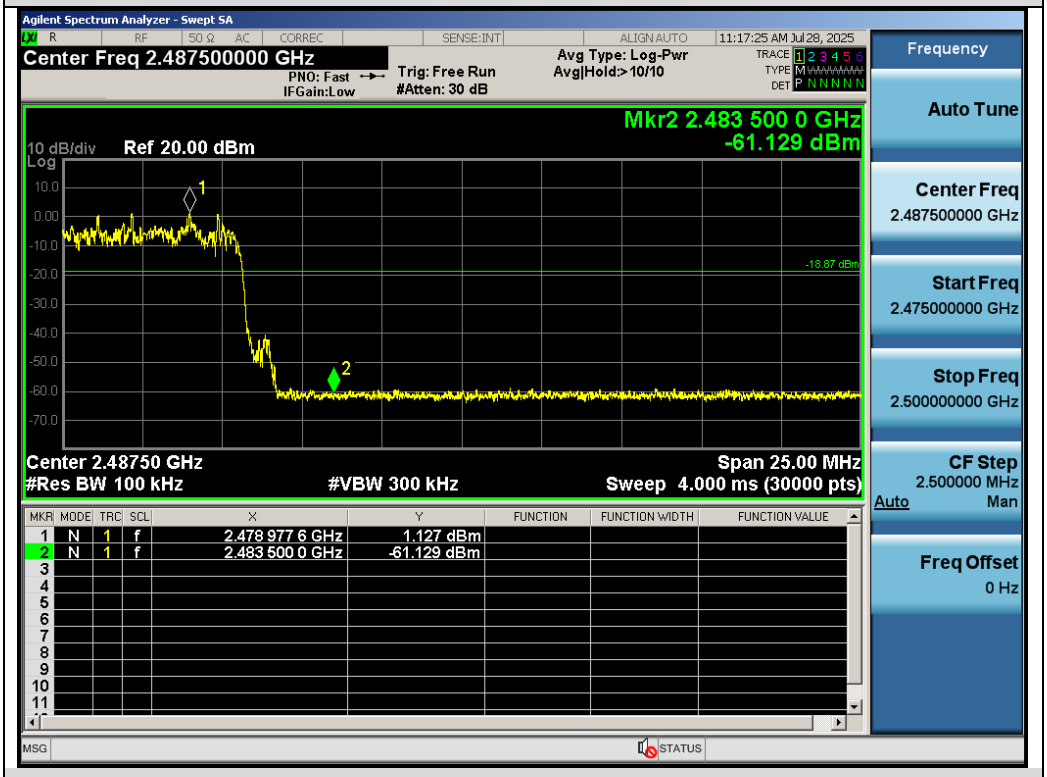

Test_Graph_EDR_ANT1_2402_3Mbps_Lower Band Edge Emissions




Test_Graph_EDR_ANT1_2480_3Mbps_Higher Band Edge Emissions




Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Lower Band Edge Emissions




Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Higher Band Edge Emissions

# 9. Radiated Spurious Emission

## 9.1 Measurement Limit

- 15.209 Limit in the below table has to be followed

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(kHz) | 300 |
| 0.490~1.705 | 24000/F(kHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

## 9.2 Measurement Procedure

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.

8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter | Setting |
|---|---|
| Start ~Stop Frequency | 9KHz~150KHz/RB 200Hz for QP |
| Start ~Stop Frequency | 150KHz~30MHz/RB 9KHz for QP |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120KHz for QP |
| Start ~Stop Frequency | 1GHz~26.5GHz<br>1MHz/3MHz for Peak, 1MHz/3MHz for Average |

| Receiver Parameter | Setting |
|---|---|
| Start ~Stop Frequency | 9KHz~150KHz/RB 200Hz for QP |
| Start ~Stop Frequency | 150KHz~30MHz/RB 9KHz for QP |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120KHz for QP |

- **Quasi-Peak Measurements below 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as shown in the table above
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

- **Peak Measurements above 1GHz**

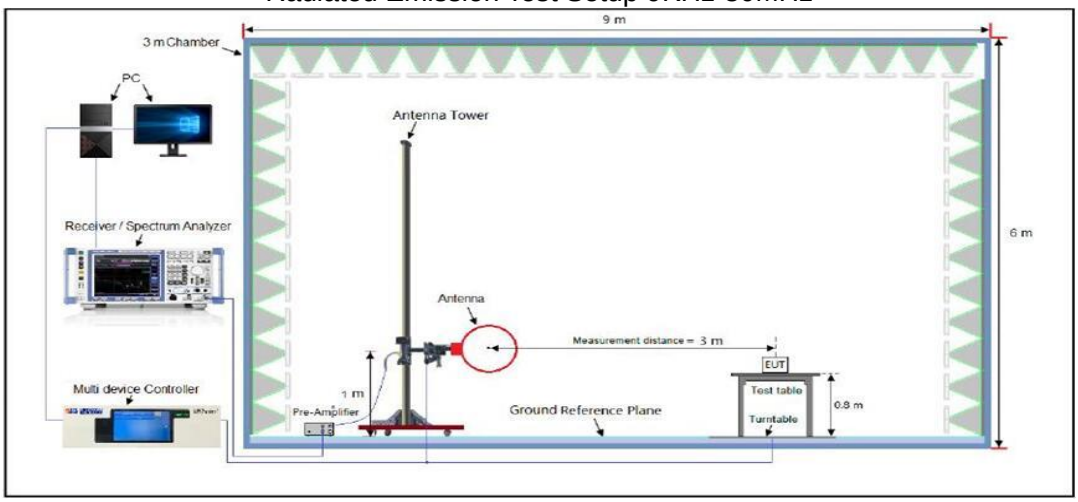
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

- **Average Measurements above 1GHz**

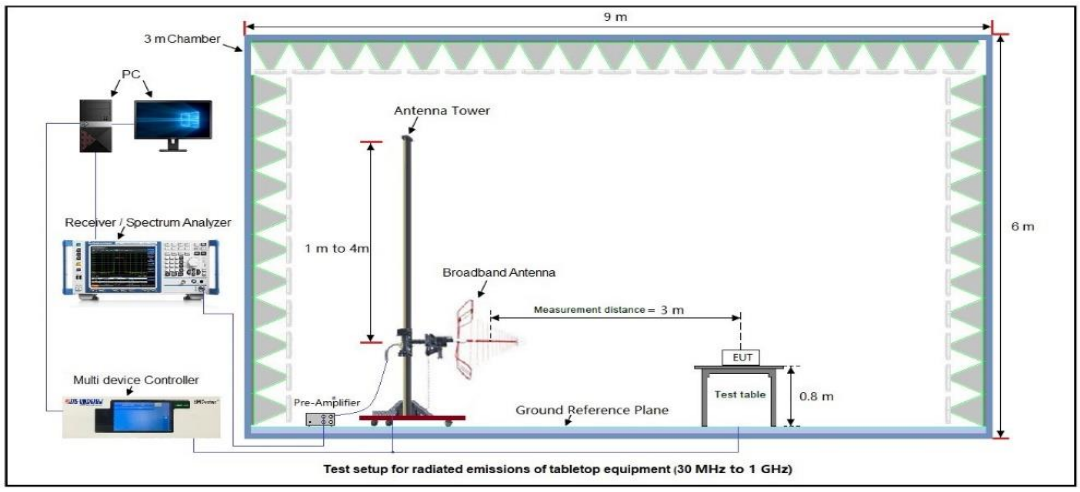
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ [3 × RBW]
4. Detector = Power averaging (rms)
5. Averaging type = power (i.e., rms)
6. Sweep time = auto
7. Perform a trace average of at least 100 traces.
8. The applicable correction factor is [10*log (1 / D)], where D is the duty cycle. The factor had been edited in the “Input Correction” of the Spectrum Analyzer.

## 9.3 Measurement Setup (Block Diagram of Configuration)

Radiated Emission Test Setup 9KHz-30MHz

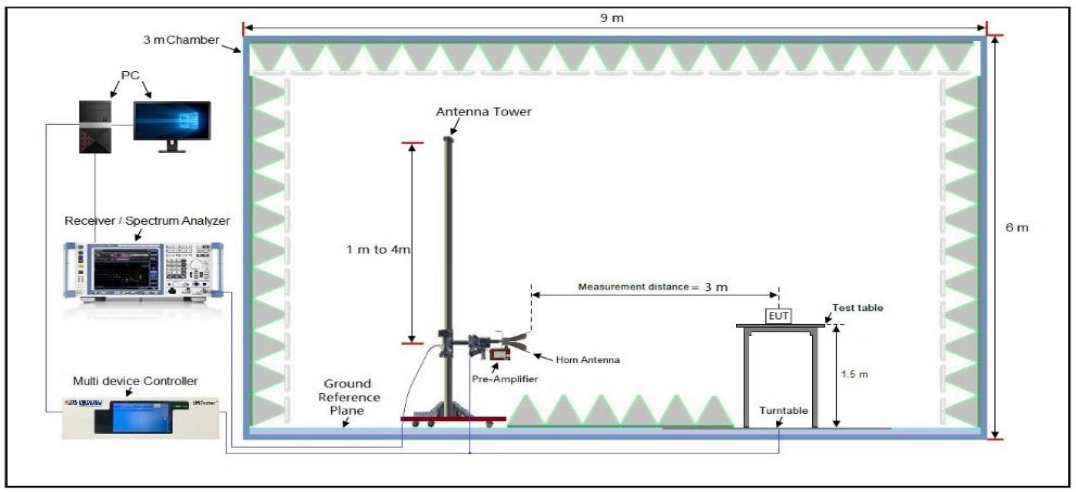



Radiated Emission Test Setup 30MHz-1000MHz




Test setup for radiated emissions of tabletop equipment (30 MHz to 1 GHz)

Radiated Emission Test Setup Above 1000MHz

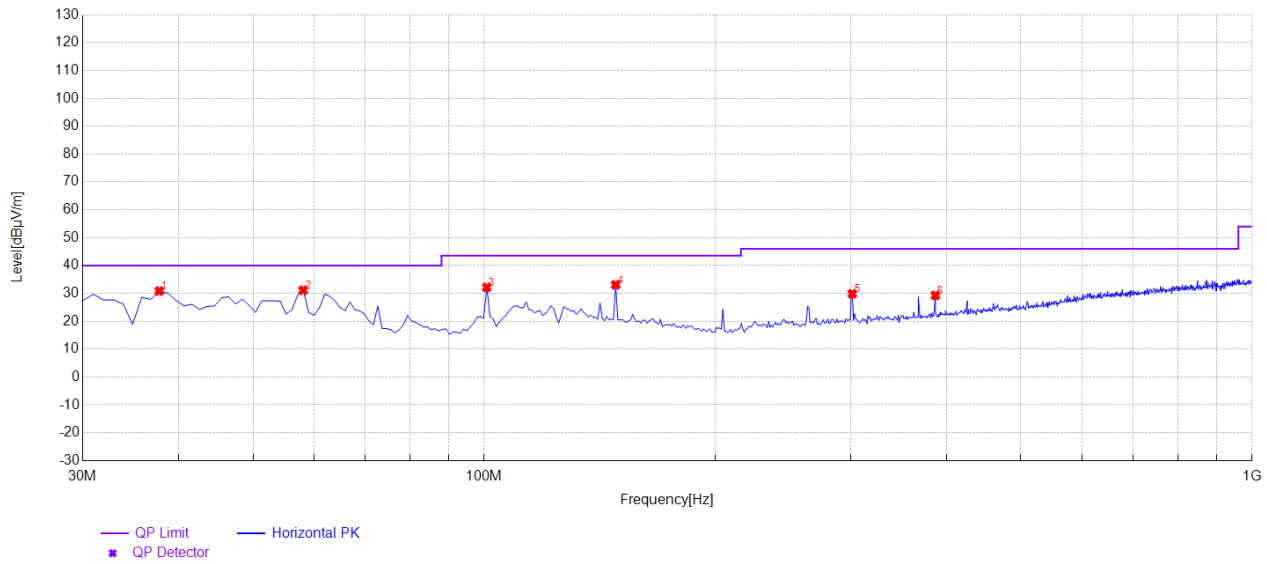


### 9.4 Measurement Result

**Radiated Emission Below 30MHz**

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

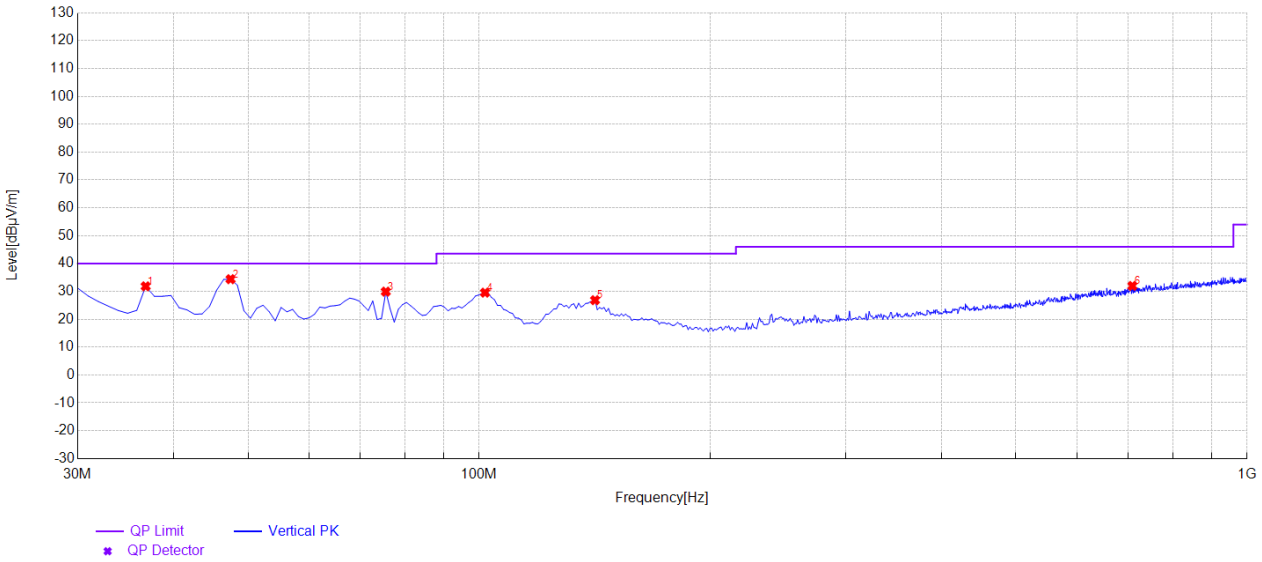
| Radiated Emission Test Results at 30MHz-1GHz | | | |
|---|---|---|---|
| **EUT Name** | TWS Bluetooth Earphone | **Model Name** | FI-TODPLTW |
| **Temperature** | 22.4℃ | **Relative Humidity** | 56.3% |
| **Pressure** | 960hPa | **Test Voltage** | DC 3.85V by battery |
| **Test Mode** | Mode 1 | **Antenna Polarity** | Horizontal |




**Final Data List**

| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 37.76 | 30.83 | 14.39 | 40.00 | 9.17 | 100 | 90 | Horizontal |
| 2 | 58.13 | 31.11 | 13.73 | 40.00 | 8.89 | 100 | 190 | Horizontal |
| 3 | 100.81 | 32.16 | 11.77 | 43.50 | 11.34 | 100 | 200 | Horizontal |
| 4 | 148.34 | 33.08 | 15.46 | 43.50 | 10.42 | 100 | 140 | Horizontal |
| 5 | 301.6 | 29.84 | 16.10 | 46.00 | 16.16 | 100 | 100 | Horizontal |
| 6 | 386.96 | 29.27 | 18.37 | 46.00 | 16.73 | 100 | 130 | Horizontal |

| Radiated Emission Test Results at 30MHz-1GHz | | | |
|---|---|---|---|
| **EUT Name** | TWS Bluetooth Earphone | **Model Name** | FI-TODPLTW |
| **Temperature** | 22.4℃ | **Relative Humidity** | 56.3% |
| **Pressure** | 960hPa | **Test Voltage** | DC 3.85V by battery |
| **Test Mode** | Mode 1 | **Antenna Polarity** | Vertical |




**Final Data List**

| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|
| 1 | 36.79 | 31.81 | 14.35 | 40.00 | 8.19 | 100 | 120 | Vertical |
| 2 | 47.46 | 34.37 | 14.37 | 40.00 | 5.63 | 100 | 90 | Vertical |
| 3 | 75.59 | 29.90 | 11.19 | 40.00 | 10.10 | 100 | 150 | Vertical |
| 4 | 101.78 | 29.53 | 11.89 | 43.50 | 13.97 | 100 | 160 | Vertical |
| 5 | 141.55 | 26.83 | 15.11 | 43.50 | 16.67 | 100 | 100 | Vertical |
| 6 | 709 | 31.96 | 25.48 | 46.00 | 14.04 | 100 | 140 | Vertical |

**RESULT: Pass**

**Note:**

1. Factor=Antenna Factor + Cable loss - Pre-amplifier, Margin=Measurement-Limit.
2. All test modes had been pre-tested. The mode 1 is the worst case and recorded in the report.

**Radiated Emissions Test Results Above 1GHz-Left earphone**

| | | | |
|---|---|---|---|
| **EUT Name** | TWS Bluetooth Earphone | **Model Name** | FI-TODPLTW |
| **Temperature** | 22.4℃ | **Relative Humidity** | 56.3% |
| **Pressure** | 960hPa | **Test Voltage** | DC 3.85V by battery |
| **Test Mode** | Mode 1 | **Antenna Polarity** | Horizontal |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4804.000 | 46.10 | 0.08 | 46.18 | 74 | -27.82 | peak |
| 4804.000 | 37.91 | 0.08 | 37.99 | 54 | -16.01 | AVG |
| 7206.000 | 41.79 | 2.21 | 44.00 | 74 | -30.00 | peak |
| 7206.000 | 32.80 | 2.21 | 35.01 | 54 | -18.99 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| | | | |
|---|---|---|---|
| **EUT Name** | TWS Bluetooth Earphone | **Model Name** | FI-TODPLTW |
| **Temperature** | 22.4℃ | **Relative Humidity** | 56.3% |
| **Pressure** | 960hPa | **Test Voltage** | DC 3.85V by battery |
| **Test Mode** | Mode 1 | **Antenna Polarity** | Vertical |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4804.000 | 46.40 | 0.08 | 46.48 | 74 | -27.52 | peak |
| 4804.000 | 37.03 | 0.08 | 37.11 | 54 | -16.89 | AVG |
| 7206.000 | 41.49 | 2.21 | 43.70 | 74 | -30.30 | peak |
| 7206.000 | 32.30 | 2.21 | 34.51 | 54 | -19.49 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**RESULT: PASS**

**Radiated Emissions Test Results for Above 1GHz-Left earphone**

| | | | |
|---|---|---|---|
| **EUT Name** | TWS Bluetooth Earphone | **Model Name** | FI-TODPLTW |
| **Temperature** | 22.4℃ | **Relative Humidity** | 56.3% |
| **Pressure** | 960hPa | **Test Voltage** | DC 3.85V by battery |
| **Test Mode** | Mode 2 | **Antenna Polarity** | Horizontal |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4882.000 | 46.34 | 0.08 | 46.42 | 74 | -27.58 | peak |
| 4882.000 | 37.10 | 0.08 | 37.18 | 54 | -16.82 | AVG |
| 7323.000 | 41.97 | 2.21 | 44.18 | 74 | -29.82 | peak |
| 7323.000 | 32.36 | 2.21 | 34.57 | 54 | -19.43 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| | | | |
|---|---|---|---|
| **EUT Name** | TWS Bluetooth Earphone | **Model Name** | FI-TODPLTW |
| **Temperature** | 22.4℃ | **Relative Humidity** | 56.3% |
| **Pressure** | 960hPa | **Test Voltage** | DC 3.85V by battery |
| **Test Mode** | Mode 2 | **Antenna Polarity** | Vertical |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4882.000 | 46.05 | 0.08 | 46.13 | 74 | -27.87 | peak |
| 4882.000 | 37.07 | 0.08 | 37.15 | 54 | -16.85 | AVG |
| 7323.000 | 41.85 | 2.21 | 44.06 | 74 | -29.94 | peak |
| 7323.000 | 32.22 | 2.21 | 34.43 | 54 | -19.57 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**RESULT: PASS**

**Radiated Emissions Test Results for Above 1GHz**

| **EUT Name** | TWS Bluetooth Earphone | **Model Name** | FI-TODPLTW |
|---|---|---|---|
| **Temperature** | 22.4℃ | **Relative Humidity** | 56.3% |
| **Pressure** | 960hPa | **Test Voltage** | DC 3.85V by battery |
| **Test Mode** | Mode 3 | **Antenna Polarity** | Horizontal |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4960.000 | 46.87 | 0.08 | 46.95 | 74 | -27.05 | peak |
| 4960.000 | 37.11 | 0.08 | 37.19 | 54 | -16.81 | AVG |
| 7440.000 | 41.15 | 2.21 | 43.36 | 74 | -30.64 | peak |
| 7440.000 | 32.53 | 2.21 | 34.74 | 54 | -19.26 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| **EUT Name** | TWS Bluetooth Earphone | **Model Name** | FI-TODPLTW |
|---|---|---|---|
| **Temperature** | 22.4℃ | **Relative Humidity** | 56.3% |
| **Pressure** | 960hPa | **Test Voltage** | DC 3.85V by battery |
| **Test Mode** | Mode 3 | **Antenna Polarity** | Vertical |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4960.000 | 46.86 | 0.08 | 46.94 | 74 | -27.06 | peak |
| 4960.000 | 37.09 | 0.08 | 37.17 | 54 | -16.83 | AVG |
| 7440.000 | 41.35 | 2.21 | 43.56 | 74 | -30.44 | peak |
| 7440.000 | 32.95 | 2.21 | 35.16 | 54 | -18.84 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**RESULT: PASS**

**Note:**

1. The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.
2. Factor = Antenna Factor + Cable loss – Pre-amplifier gain, Margin =Emission Level-Limit.
3. The “Factor” value can be calculated automatically by software of measurement system.
4. All mode rates are tested and evaluated, GFSK modulated DH5 mode is the worst case and documented in the report.

**Radiated Emissions Test Results Above 1GHz-Right earphone**

| | | | |
|---|---|---|---|
| **EUT Name** | TWS Bluetooth Earphone | **Model Name** | FI-TODPLTW |
| **Temperature** | 22.4℃ | **Relative Humidity** | 56.3% |
| **Pressure** | 960hPa | **Test Voltage** | DC 3.85V by battery |
| **Test Mode** | Mode 1 | **Antenna Polarity** | Horizontal |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4804.000 | 46.29 | 0.08 | 46.37 | 74 | -27.63 | peak |
| 4804.000 | 37.07 | 0.08 | 37.15 | 54 | -16.85 | AVG |
| 7206.000 | 41.64 | 2.21 | 43.85 | 74 | -30.15 | peak |
| 7206.000 | 32.82 | 2.21 | 35.03 | 54 | -18.97 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| | | | |
|---|---|---|---|
| **EUT Name** | TWS Bluetooth Earphone | **Model Name** | FI-TODPLTW |
| **Temperature** | 22.4℃ | **Relative Humidity** | 56.3% |
| **Pressure** | 960hPa | **Test Voltage** | DC 3.85V by battery |
| **Test Mode** | Mode 1 | **Antenna Polarity** | Vertical |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4804.000 | 46.21 | 0.08 | 46.29 | 74 | -27.71 | peak |
| 4804.000 | 37.65 | 0.08 | 37.73 | 54 | -16.27 | AVG |
| 7206.000 | 41.12 | 2.21 | 43.33 | 74 | -30.67 | peak |
| 7206.000 | 32.56 | 2.21 | 34.77 | 54 | -19.23 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**RESULT: PASS**

**Radiated Emissions Test Results for Above 1GHz-Right earphone**

| | | | |
|---|---|---|---|
| **EUT Name** | TWS Bluetooth Earphone | **Model Name** | FI-TODPLTW |
| **Temperature** | 22.4℃ | **Relative Humidity** | 56.3% |
| **Pressure** | 960hPa | **Test Voltage** | DC 3.85V by battery |
| **Test Mode** | Mode 2 | **Antenna Polarity** | Horizontal |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4882.000 | 46.41 | 0.08 | 46.49 | 74 | -27.51 | peak |
| 4882.000 | 37.12 | 0.08 | 37.20 | 54 | -16.80 | AVG |
| 7323.000 | 41.29 | 2.21 | 43.50 | 74 | -30.50 | peak |
| 7323.000 | 32.99 | 2.21 | 35.20 | 54 | -18.80 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| | | | |
|---|---|---|---|
| **EUT Name** | TWS Bluetooth Earphone | **Model Name** | FI-TODPLTW |
| **Temperature** | 22.4℃ | **Relative Humidity** | 56.3% |
| **Pressure** | 960hPa | **Test Voltage** | DC 3.85V by battery |
| **Test Mode** | Mode 2 | **Antenna Polarity** | Vertical |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4882.000 | 46.10 | 0.08 | 46.18 | 74 | -27.82 | peak |
| 4882.000 | 37.42 | 0.08 | 37.50 | 54 | -16.50 | AVG |
| 7323.000 | 41.84 | 2.21 | 44.05 | 74 | -29.95 | peak |
| 7323.000 | 32.33 | 2.21 | 34.54 | 54 | -19.46 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**RESULT: PASS**

**Radiated Emissions Test Results for Above 1GHz-Right earphone**

| | | | |
|---|---|---|---|
| **EUT Name** | TWS Bluetooth Earphone | **Model Name** | FI-TODPLTW |
| **Temperature** | 22.4℃ | **Relative Humidity** | 56.3% |
| **Pressure** | 960hPa | **Test Voltage** | DC 3.85V by battery |
| **Test Mode** | Mode 3 | **Antenna Polarity** | Horizontal |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4960.000 | 46.31 | 0.08 | 46.39 | 74 | -27.61 | peak |
| 4960.000 | 37.30 | 0.08 | 37.38 | 54 | -16.62 | AVG |
| 7440.000 | 41.94 | 2.21 | 44.15 | 74 | -29.85 | peak |
| 7440.000 | 32.08 | 2.21 | 34.29 | 54 | -19.71 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| | | | |
|---|---|---|---|
| **EUT Name** | TWS Bluetooth Earphone | **Model Name** | FI-TODPLTW |
| **Temperature** | 22.4℃ | **Relative Humidity** | 56.3% |
| **Pressure** | 960hPa | **Test Voltage** | DC 3.85V by battery |
| **Test Mode** | Mode 3 | **Antenna Polarity** | Vertical |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4960.000 | 46.01 | 0.08 | 46.09 | 74 | -27.91 | peak |
| 4960.000 | 37.96 | 0.08 | 38.04 | 54 | -15.96 | AVG |
| 7440.000 | 41.40 | 2.21 | 43.61 | 74 | -30.39 | peak |
| 7440.000 | 32.21 | 2.21 | 34.42 | 54 | -19.58 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**RESULT: PASS**

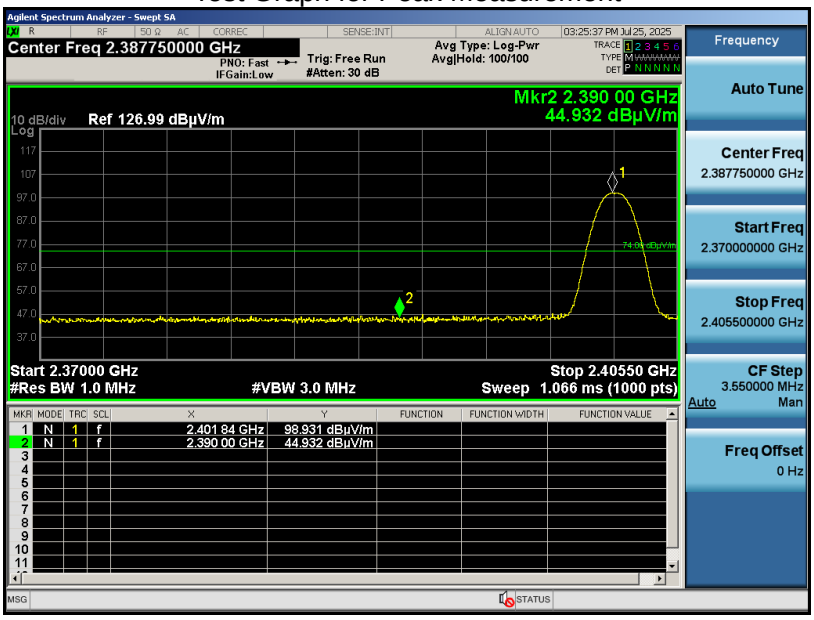
**Note:**

5. The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.
6. Factor = Antenna Factor + Cable loss – Pre-amplifier gain, Margin =Emission Level-Limit.
7. The “Factor” value can be calculated automatically by software of measurement system.
8. All mode rates are tested and evaluated, GFSK modulated DH5 mode is the worst case and documented in the report.

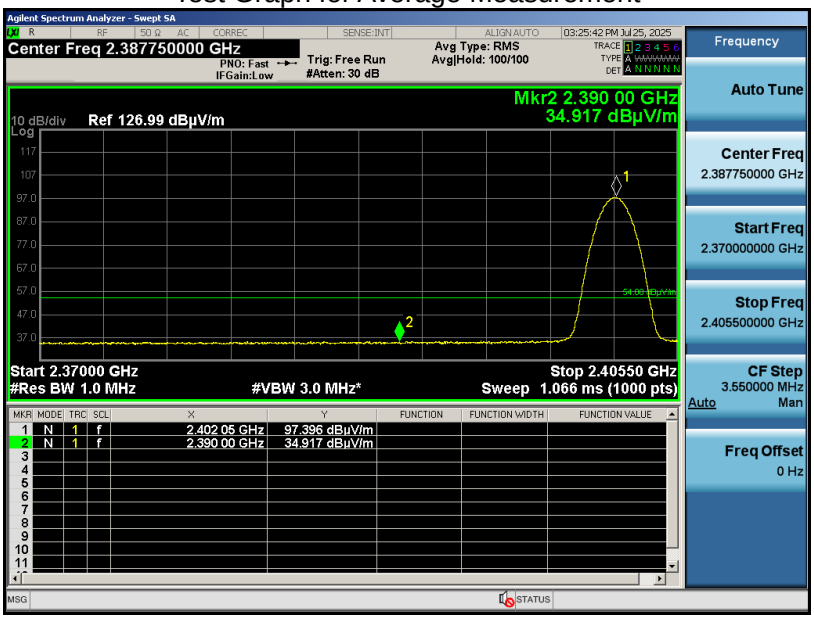
## Band Edge Emission Test Results for Restricted Bands-Left earphone

| EUT Name | TWS Bluetooth Earphone | Model Name | FI-TODPLTW |
|---|---|---|---|
| Temperature | 25℃ | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | DC 3.85V by battery |
| Test Mode | Mode 1 | Antenna Polarity | Horizontal |

Test Graph for Peak Measurement




Test Graph for Average Measurement

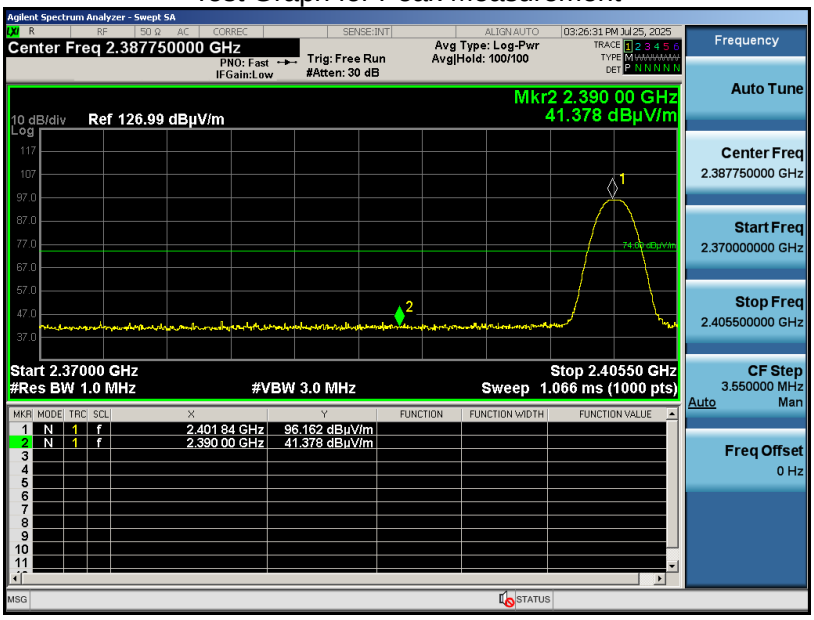



**RESULT: PASS**

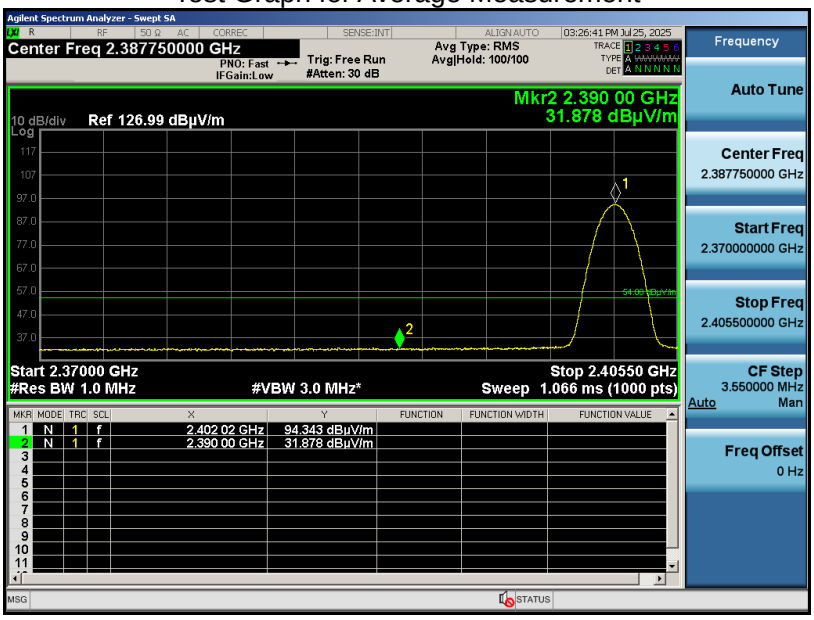
## Band Edge Emission Test Results for Restricted Bands-Left earphone

| EUT Name | TWS Bluetooth Earphone | Model Name | FI-TODPLTW |
|---|---|---|---|
| Temperature | 25℃ | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | DC 3.85V by battery |
| Test Mode | Mode 1 | Antenna Polarity | Vertical |

Test Graph for Peak Measurement




Test Graph for Average Measurement

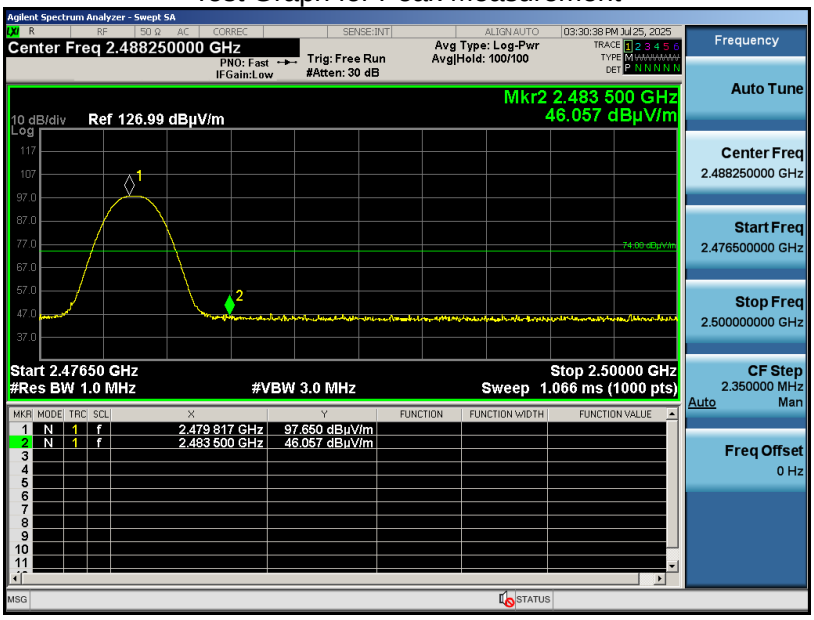



**RESULT: PASS**

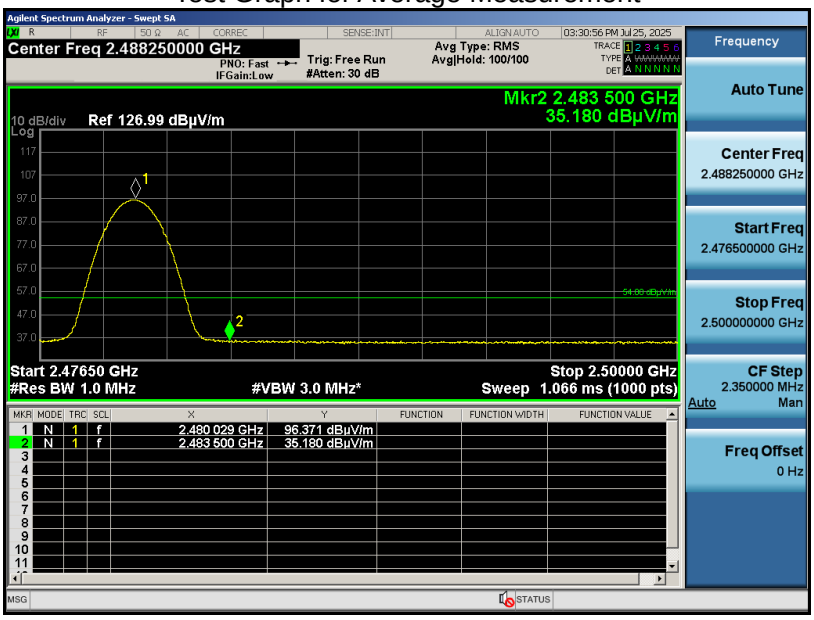
## Band Edge Emission Test Results for Restricted Bands-Left earphone

| EUT Name | TWS Bluetooth Earphone | Model Name | FI-TODPLTW |
|---|---|---|---|
| Temperature | 25℃ | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | DC 3.85V by battery |
| Test Mode | Mode 3 | Antenna Polarity | Horizontal |

Test Graph for Peak Measurement




Test Graph for Average Measurement

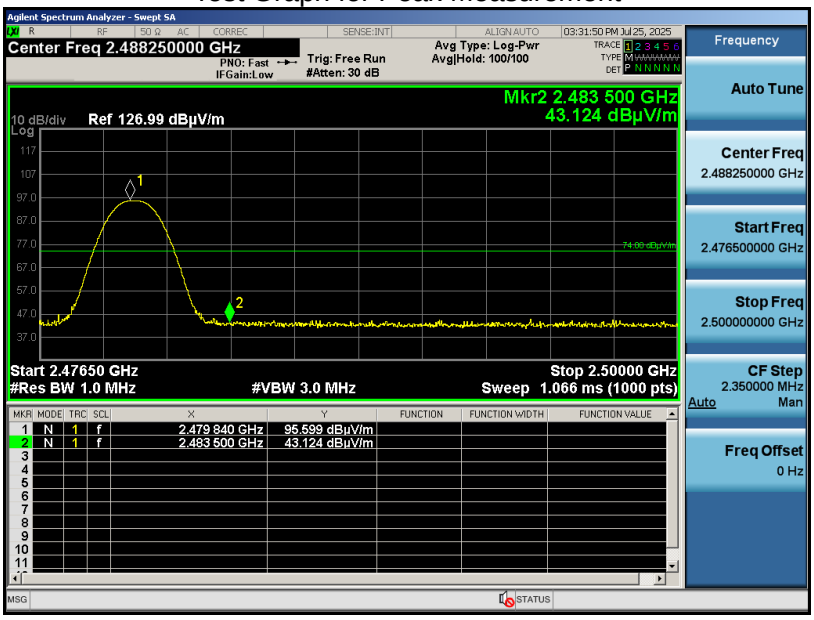



**RESULT: PASS**

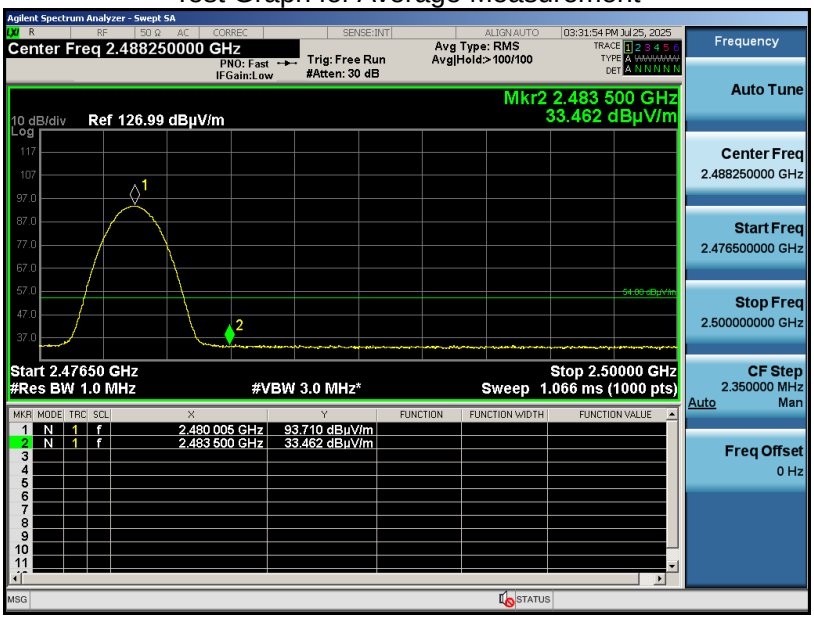
**Band Edge Emission Test Results for Restricted Bands-Left earphone**

| EUT Name | TWS Bluetooth Earphone | Model Name | FI-TODPLTW |
|---|---|---|---|
| Temperature | 25℃ | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | DC 3.85V by battery |
| Test Mode | Mode 3 | Antenna Polarity | Vertical |

Test Graph for Peak Measurement




Test Graph for Average Measurement




**RESULT: PASS**

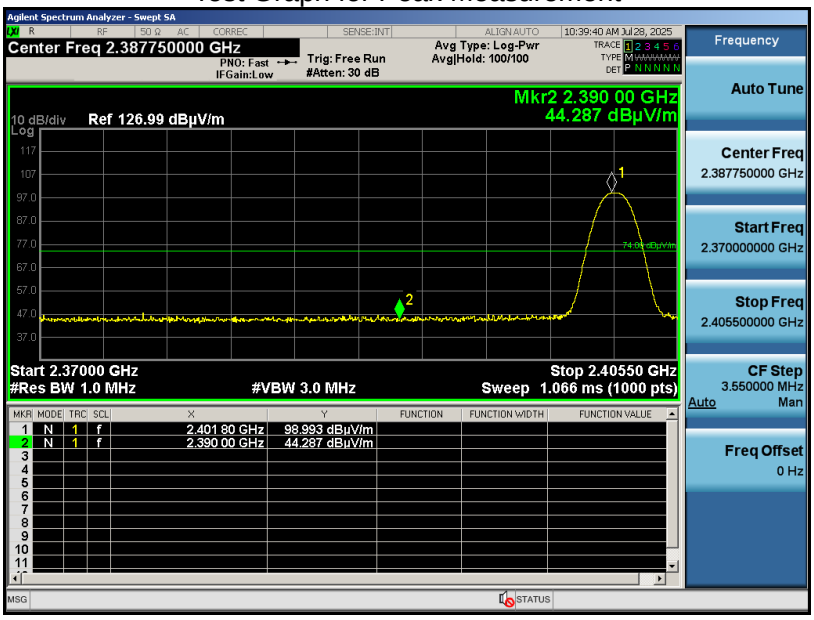
Note: 1. The factor had been edited in the “Input Correction” of the Spectrum Analyzer.

2. All mode rates are tested and evaluated, GFSK modulated DH5 mode is the worst case and documented in the report.

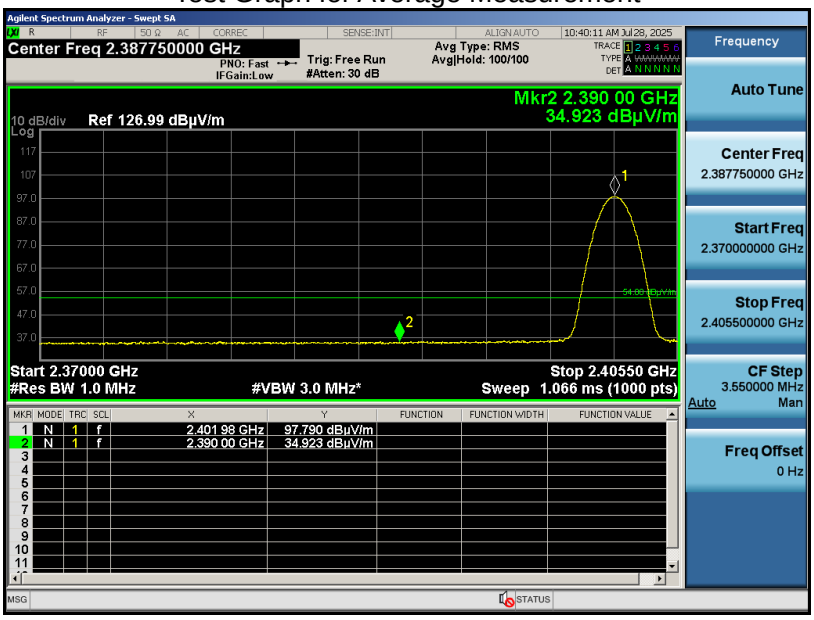
## Band Edge Emission Test Results for Restricted Bands-Right earphone

| EUT Name | TWS Bluetooth Earphone | Model Name | FI-TODPLTW |
|---|---|---|---|
| Temperature | 25℃ | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | DC 3.85V by battery |
| Test Mode | Mode 1 | Antenna Polarity | Horizontal |

Test Graph for Peak Measurement




Test Graph for Average Measurement

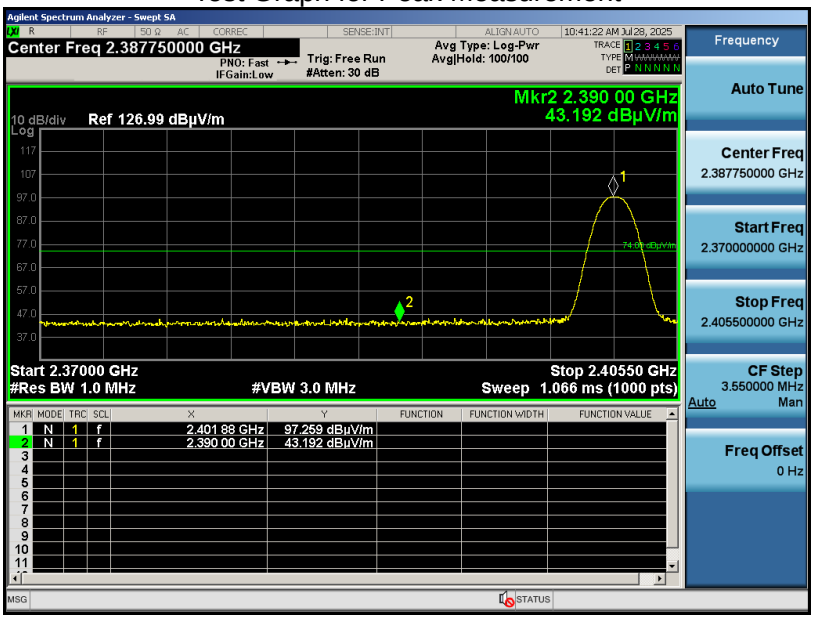



**RESULT: PASS**

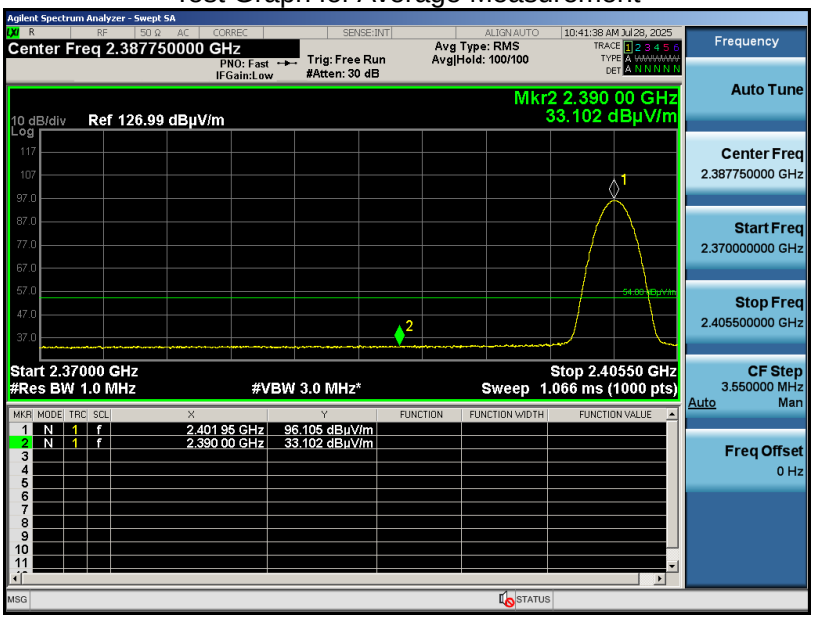
## Band Edge Emission Test Results for Restricted Bands-Right earphone

| EUT Name | TWS Bluetooth Earphone | Model Name | FI-TODPLTW |
|---|---|---|---|
| Temperature | 25℃ | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | Mode 1 | Antenna Polarity | Vertical |

Test Graph for Peak Measurement




Test Graph for Average Measurement

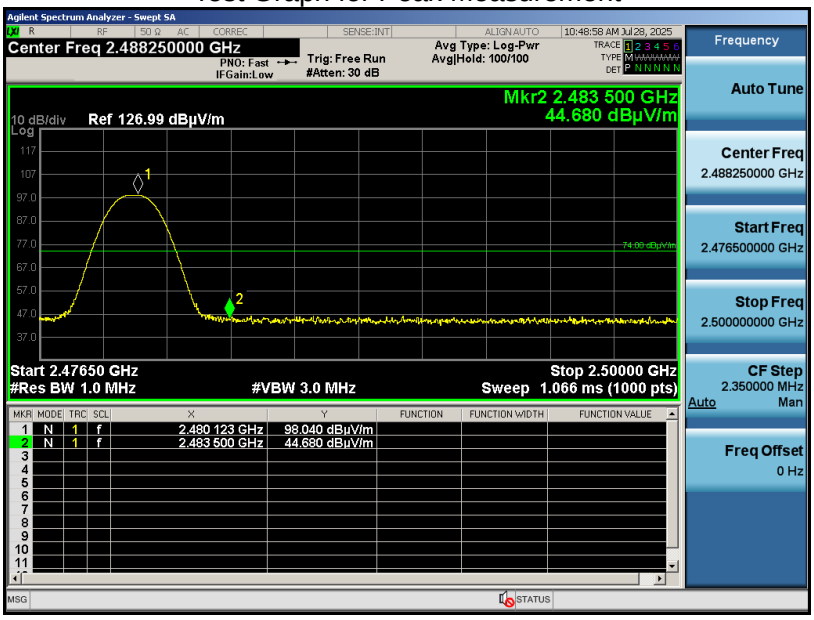



**RESULT: PASS**

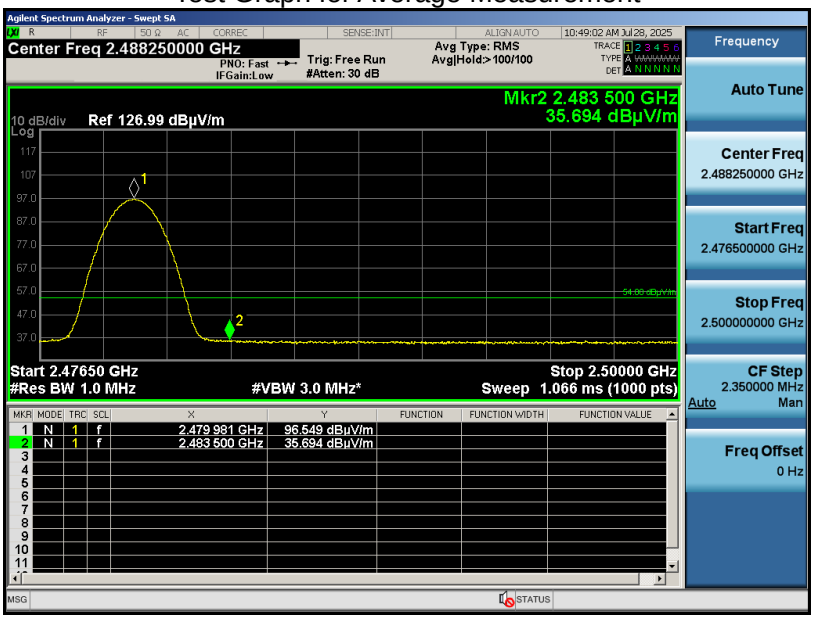
**Band Edge Emission Test Results for Restricted Bands-Right earphone**

| EUT Name | TWS Bluetooth Earphone | Model Name | FI-TODPLTW |
|---|---|---|---|
| Temperature | 25℃ | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | DC 3.85V by battery |
| Test Mode | Mode 3 | Antenna Polarity | Horizontal |

Test Graph for Peak Measurement




Test Graph for Average Measurement

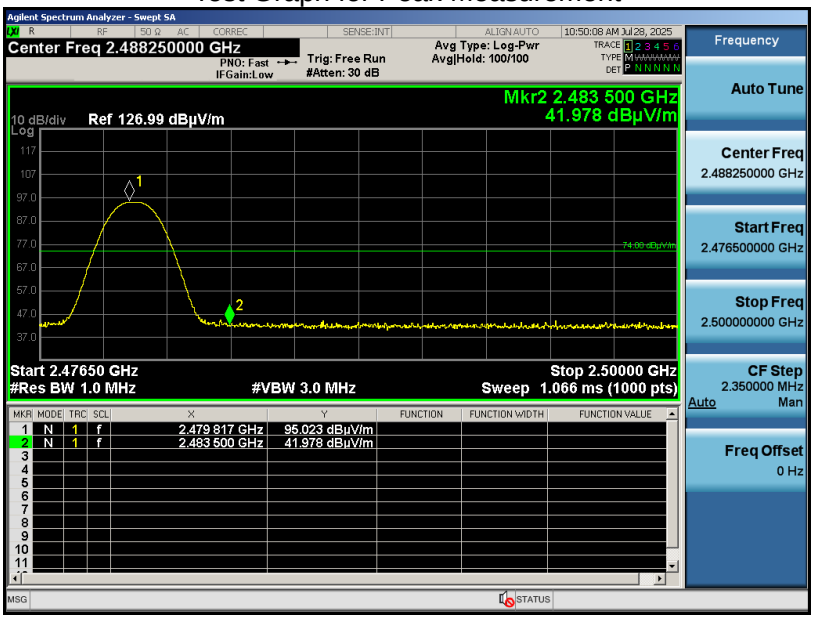



**RESULT: PASS**

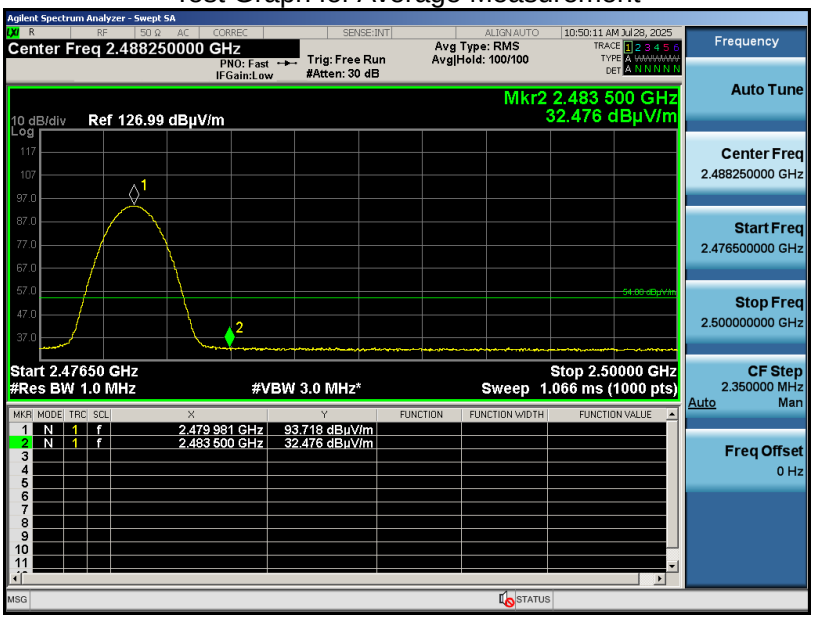
**Band Edge Emission Test Results for Restricted Bands-Right earphone**

| EUT Name | TWS Bluetooth Earphone | Model Name | FI-TODPLTW |
|---|---|---|---|
| Temperature | 25℃ | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | DC 3.85V by battery |
| Test Mode | Mode 3 | Antenna Polarity | Vertical |

Test Graph for Peak Measurement




Test Graph for Average Measurement




**RESULT: PASS**

Note: 1. The factor had been edited in the “Input Correction” of the Spectrum Analyzer.

2. All mode rates are tested and evaluated, GFSK modulated DH5 mode is the worst case and documented in the report.

# 10. Number of Hopping Frequency Measurement

## 10.1 Provisions Applicable

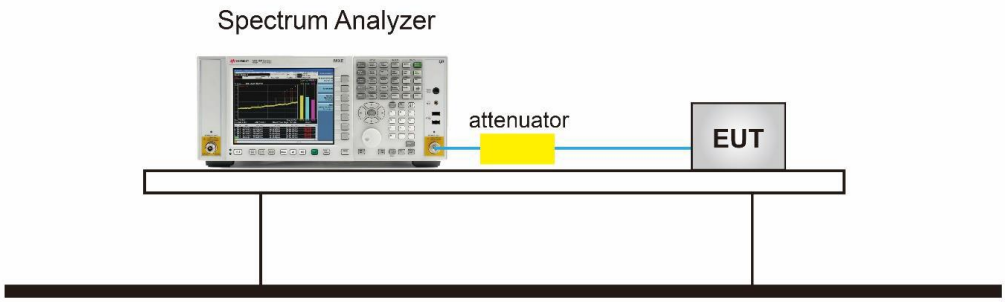
This frequency hopping system must employ a minimum of 15 hopping channels.

## 10.2 Measurement Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span = The frequency band of operation. Depending on the number of channels the device
2. supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
3. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
4. VBW ⩾ RBW
5. Sweep time = Auto couple
6. Detector = Peak
7. Trace mode = Max hold
8. Allow the trace to stabilize

## 10.3 Measurement Setup (Block Diagram of Configuration)

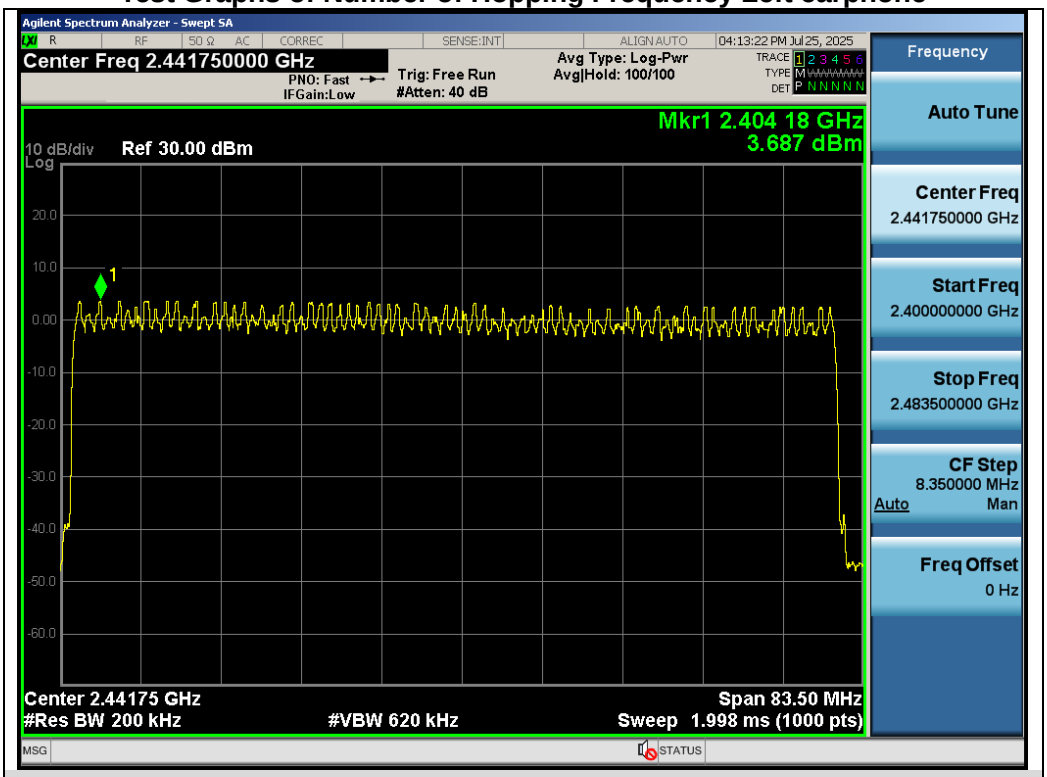



## 10.4 Measurement Result

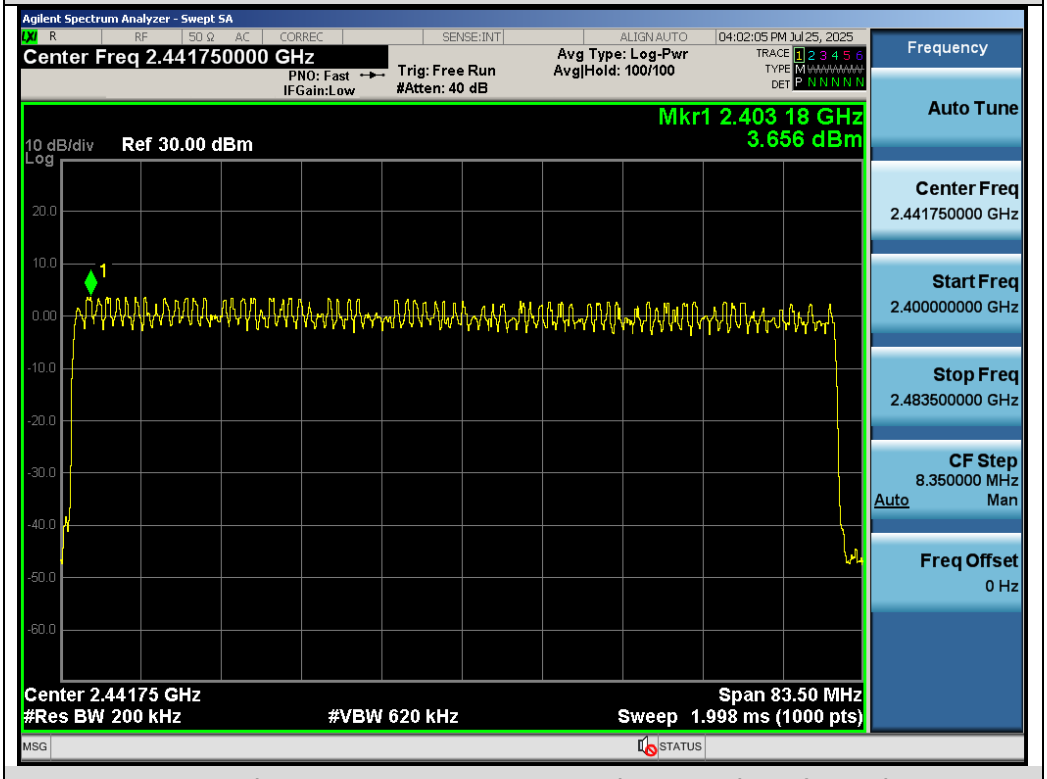
| Test Data of Number of Hopping Frequency-Left earphone | | | |
|---|---|---|---|
| Test Mode | Number of Hopping Frequency | Limits | Pass or Fail |
| GFSK Hopping | 79 | >=15 | Pass |
| π /4-DQPSK Hopping | 79 | >=15 | Pass |
| 8DPSK Hopping | 79 | >=15 | Pass |

| Test Data of Number of Hopping Frequency-Right earphone | | | |
|---|---|---|---|
| Test Mode | Number of Hopping Frequency | Limits | Pass or Fail |
| GFSK Hopping | 79 | >=15 | Pass |
| π /4-DQPSK Hopping | 79 | >=15 | Pass |
| 8DPSK Hopping | 79 | >=15 | Pass |

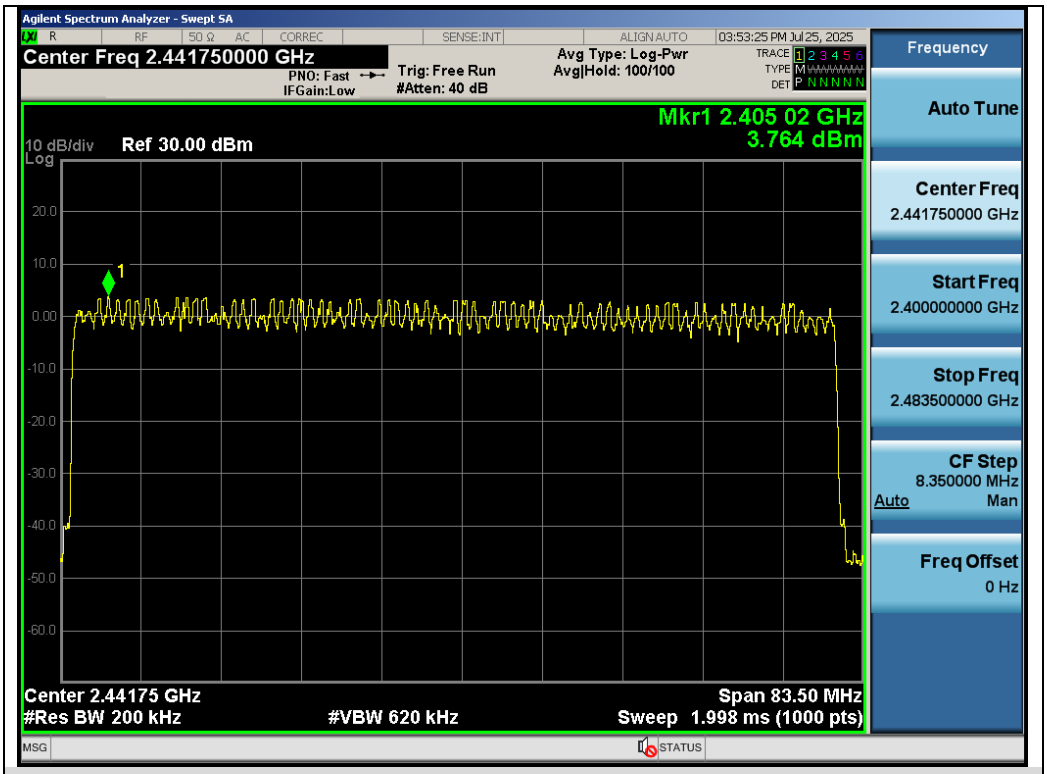
## Test Graphs of Number of Hopping Frequency Left earphone




Test_Graph_BR_HOP_ANT1_NA_1Mbps_Number of Hopping

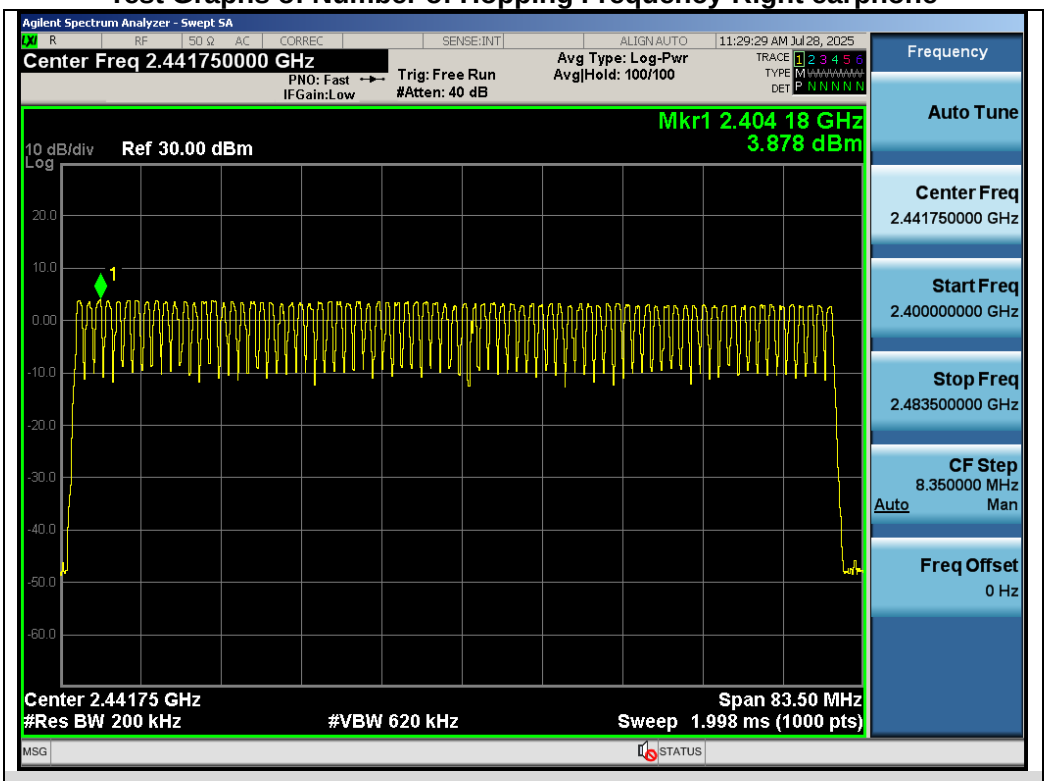



Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Number of Hopping

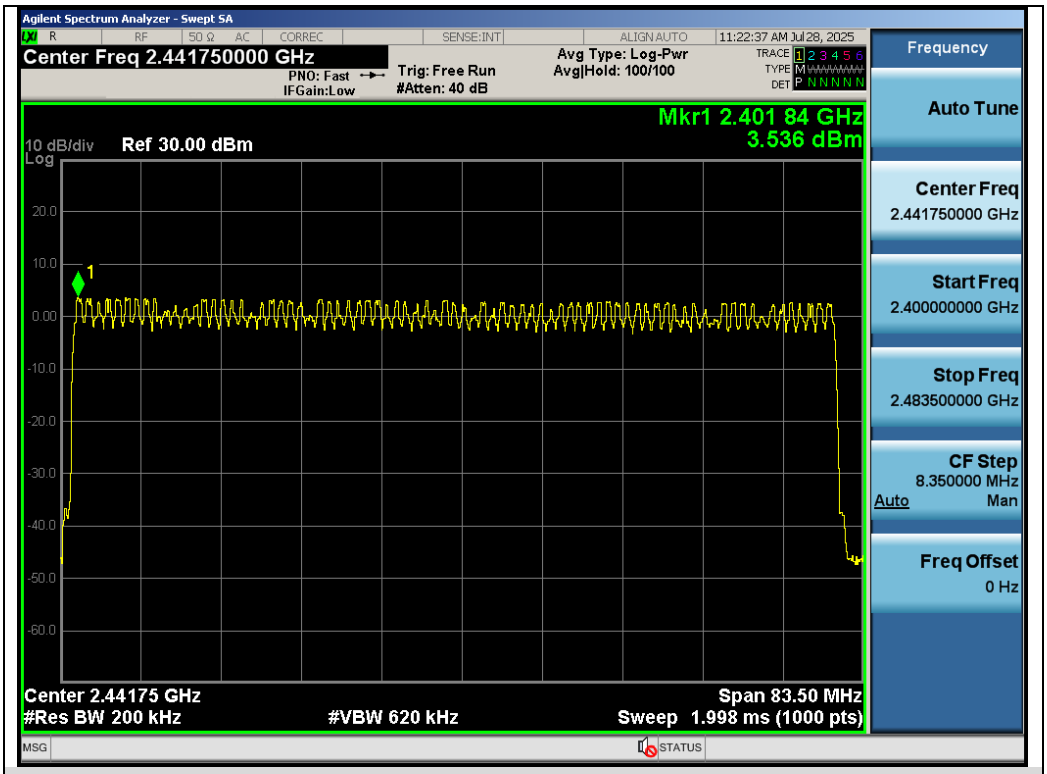



Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Number of Hopping

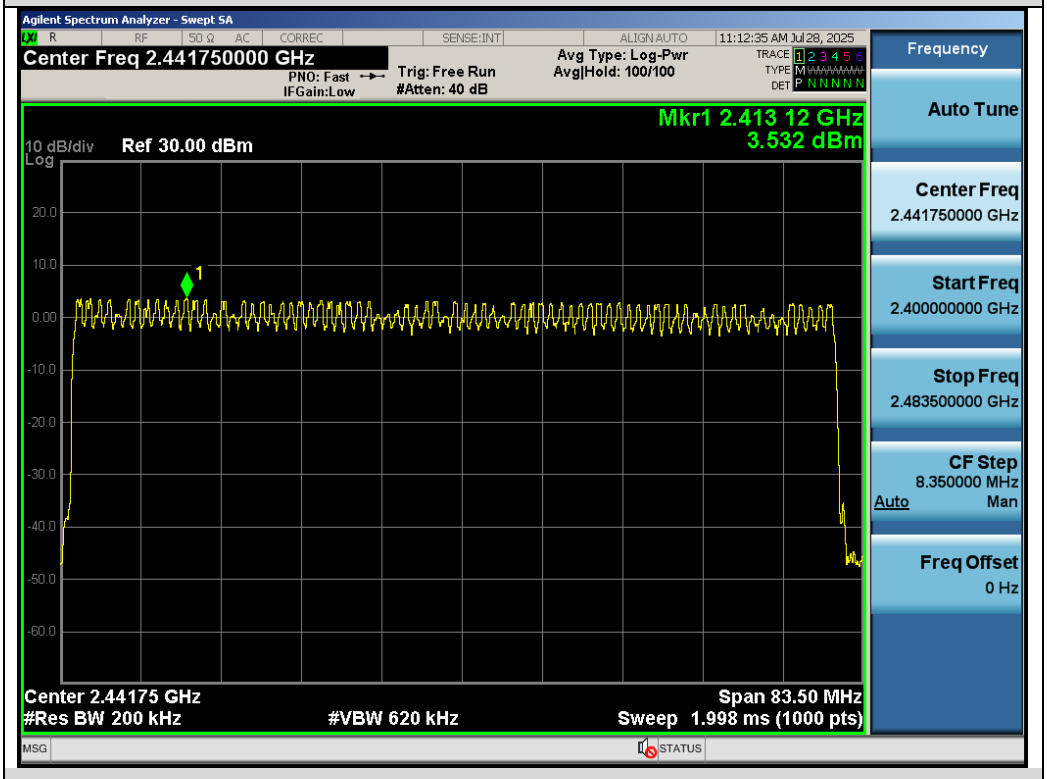
**Test Graphs of Number of Hopping Frequency-Right earphone**




Test_Graph_BR_HOP_ANT1_NA_1Mbps_Number of Hopping




Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Number of Hopping




Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Number of Hopping

# 11. Time of Occupancy (Dwell Time) Measurement

## 11.1 Provisions Applicable

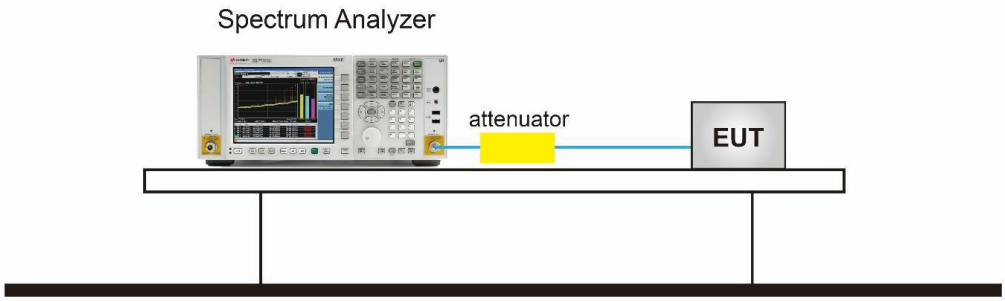
The maximum permissible time of occupancy is 400ms within a period of 400ms multiplied by the number of hopping channels employed.

## 11.2 Measurement Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span = Zero span, centered on a hopping channel.
2. RBW shall be ⩽ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
3. VBW ⩾ RBW
4. Sweep time = As necessary to capture the entire dwell time per hopping channel
5. Detector = Peak
6. Trace mode = Free Run
7. Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time. An oscilloscope may be used instead of a spectrum analyzer. The EUT shall show compliance with the appropriate regulatory limit for the number of hopping channels. A plot of the data shall be included in the test report.

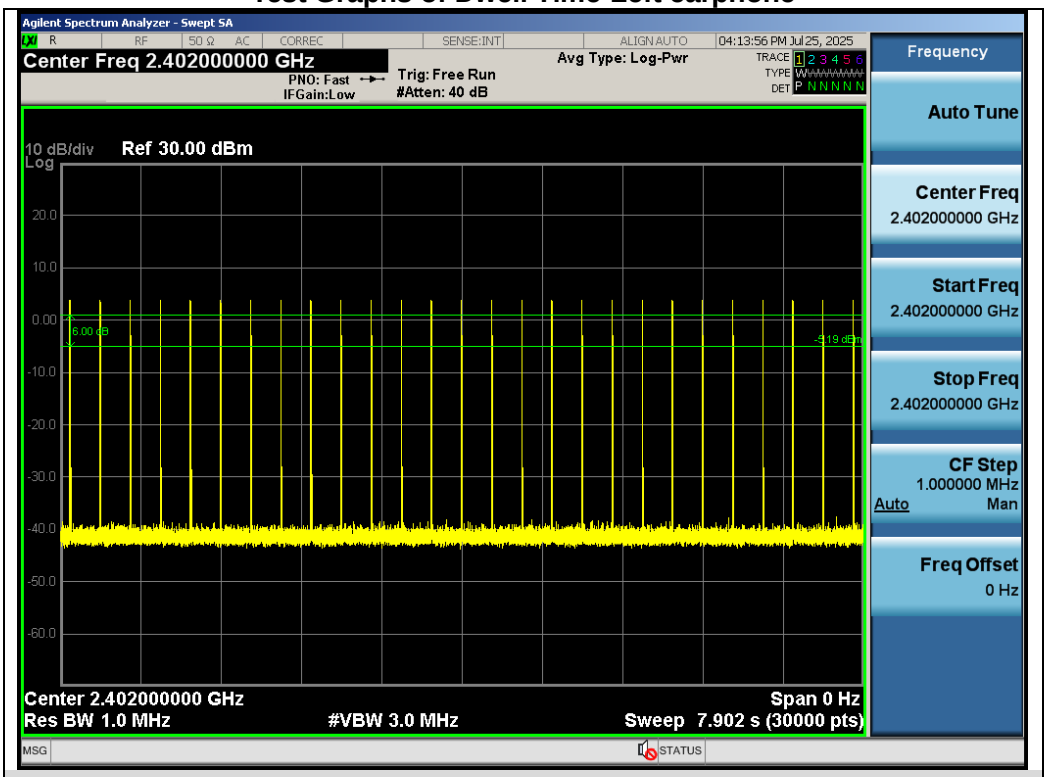
## 11.3 Measurement Setup (Block Diagram of Configuration)



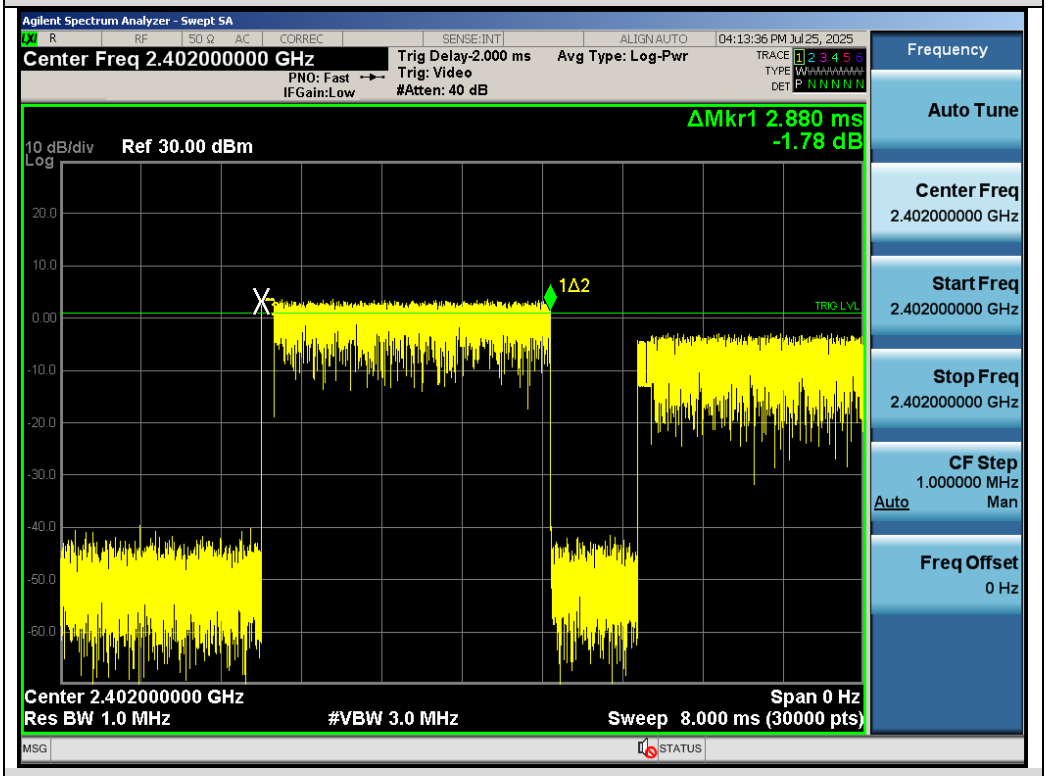

## 11.4 Measurement Result

| Test Data of Dwell Time-Left earphone | | | | | |
|---|---|---|---|---|---|
| Channel | Time of Pulse for DH5 (ms) | Number of hops in the period specified in the requirements | Dwell Time (ms) | Limit (ms) | Pass or Fail |
| 2402 | 2.880 | 27.0*4 | 311.040 | 400 | Pass |
| 2441 | 2.880 | 27.0*4 | 311.040 | 400 | Pass |
| 2480 | 2.880 | 26.0*4 | 299.520 | 400 | Pass |

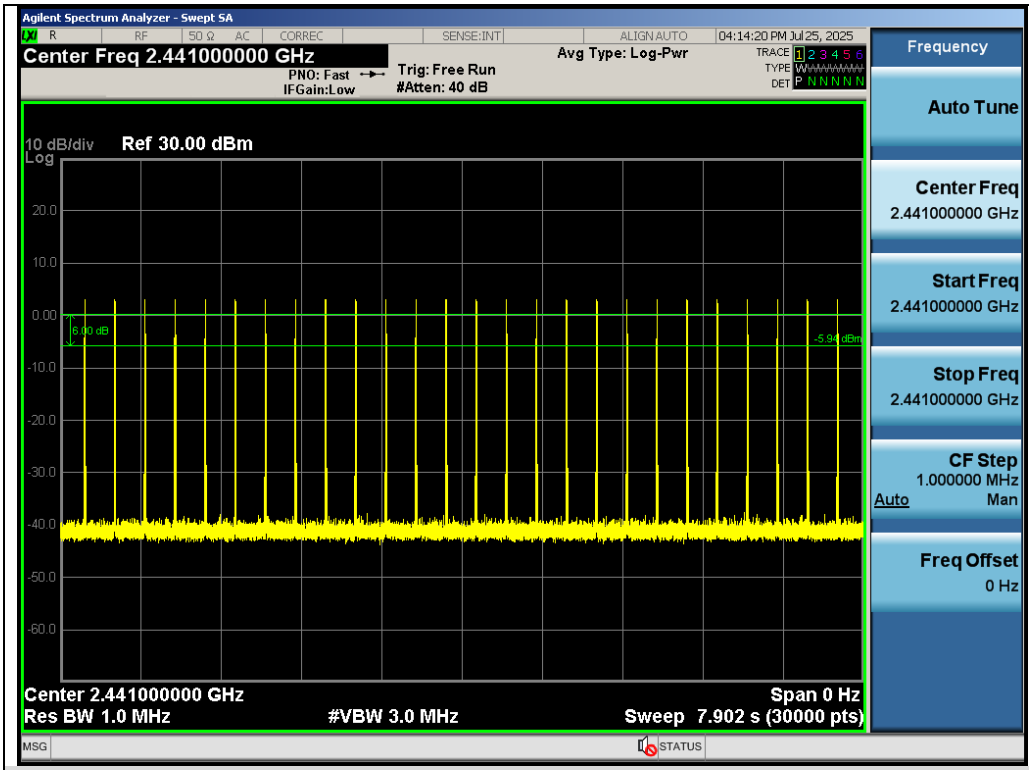
## Test Graphs of Dwell Time-Left earphone



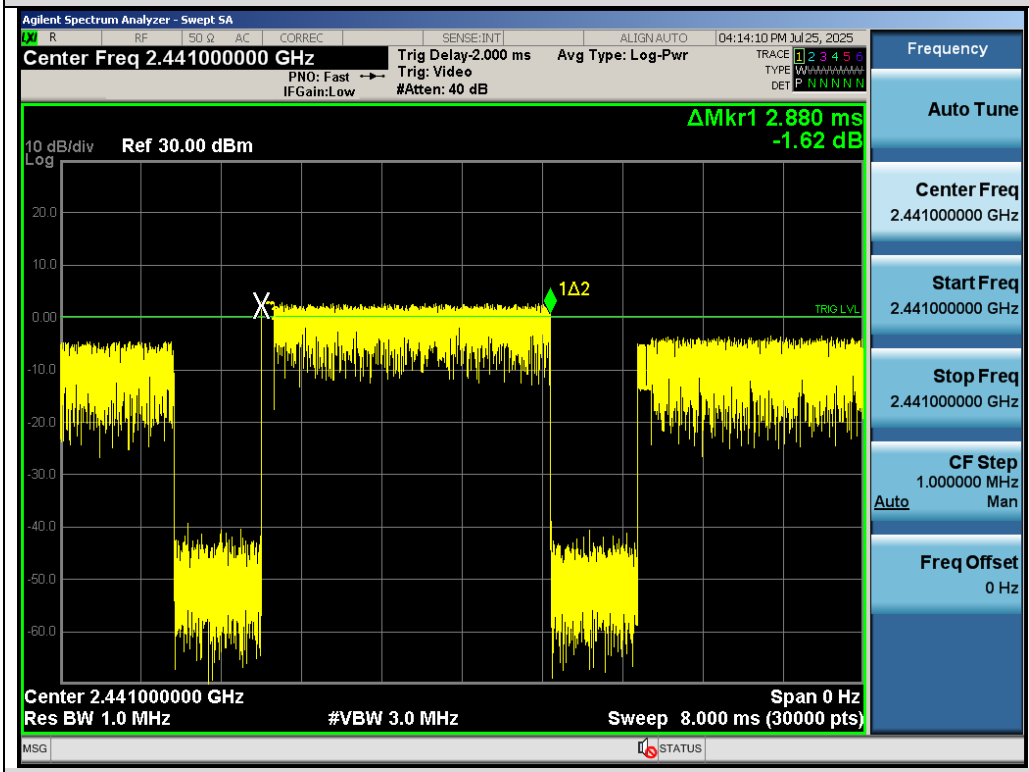

Test_Graph_BR_HOP_ANT1_NA_1Mbps_2402_Number of Busrt



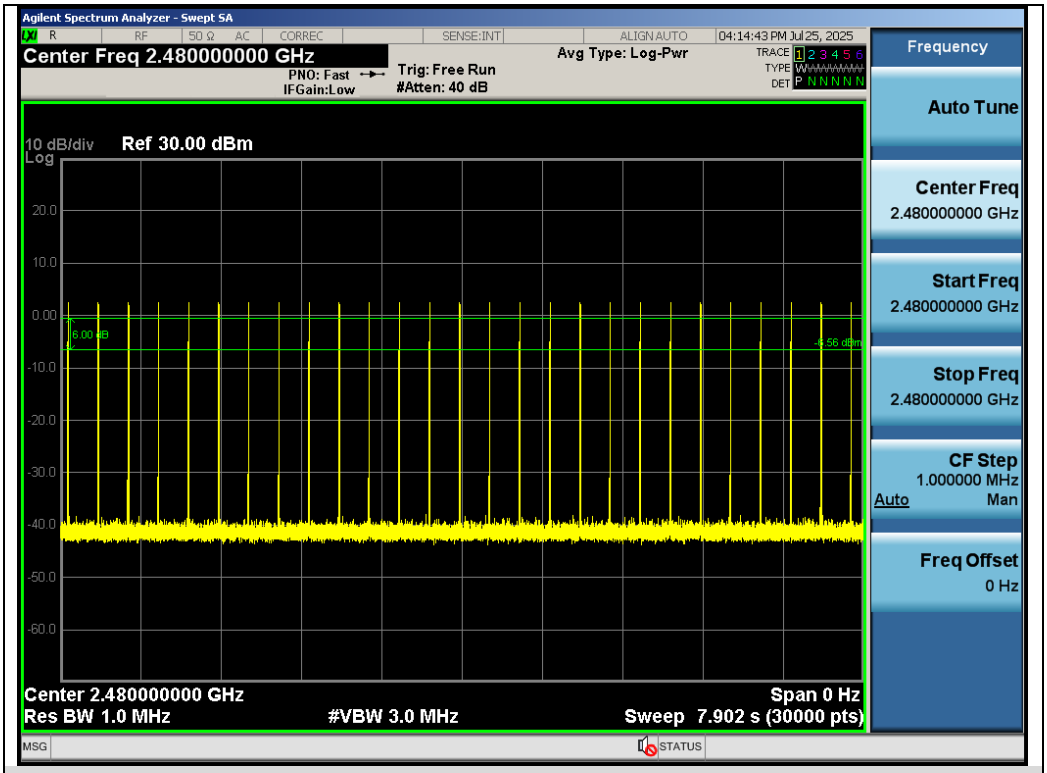

Test_Graph_BR_HOP_ANT1_NA_1Mbps_2402_Time per Burst



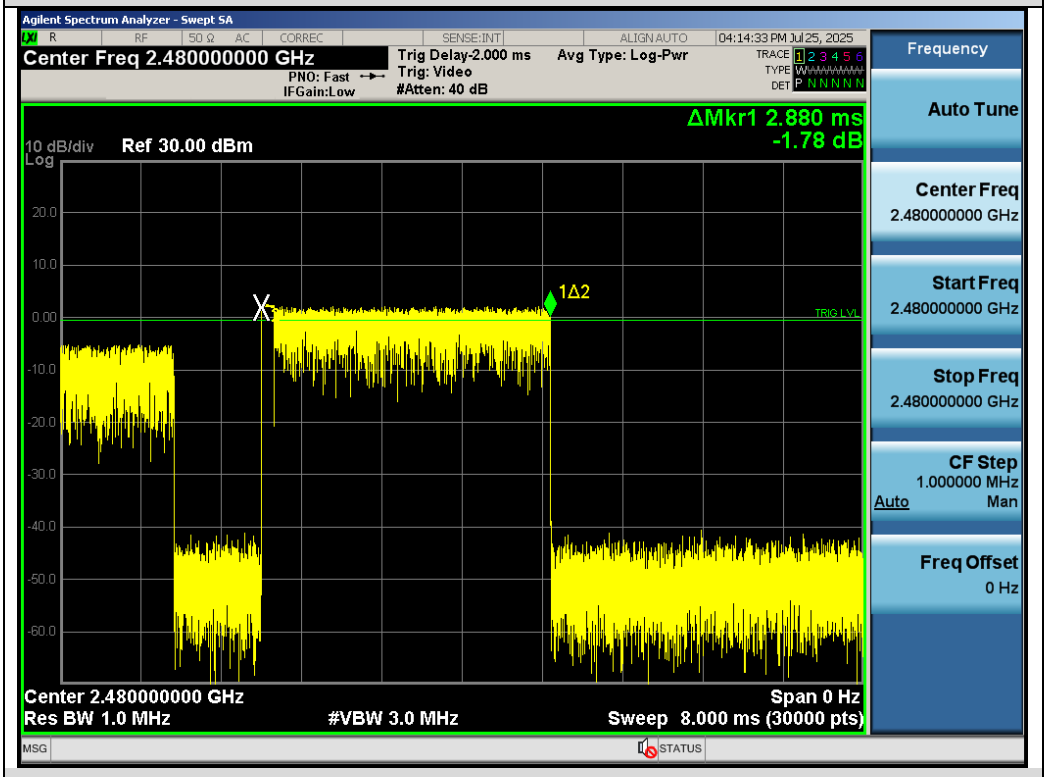

Test_Graph_BR_HOP_ANT1_NA_1Mbps_2441_Number of Busrt




Test_Graph_BR_HOP_ANT1_NA_1Mbps_2441_Time per Burst




Test_Graph_BR_HOP_ANT1_NA_1Mbps_2480_Number of Busrt

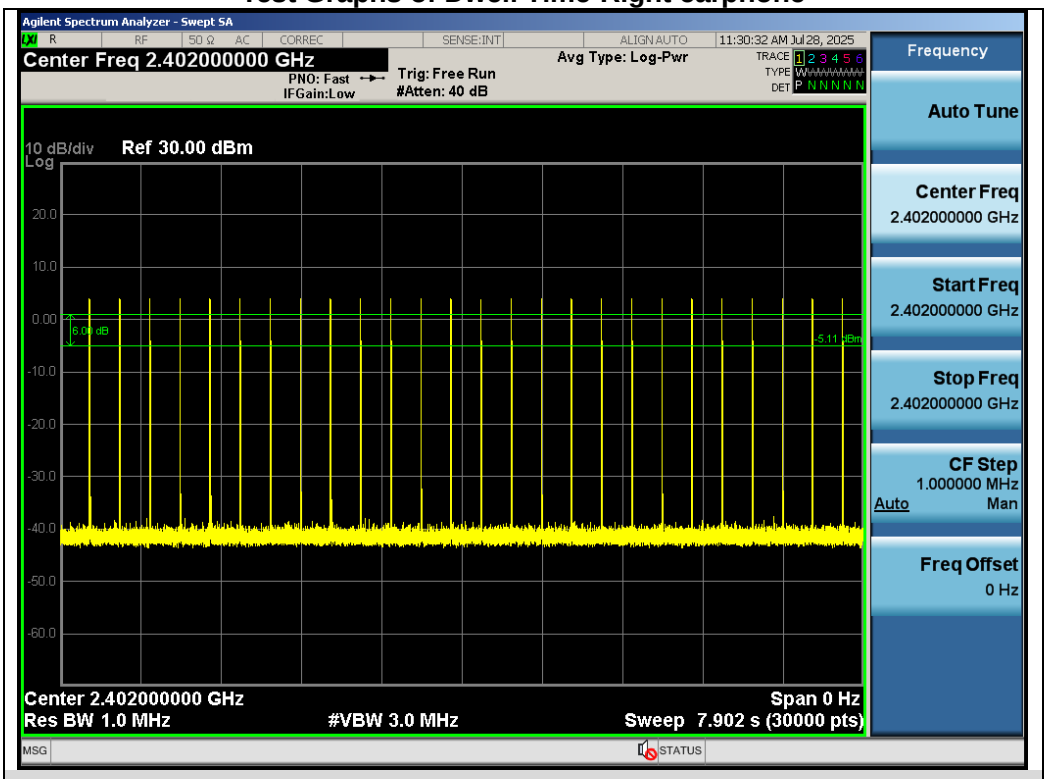



Test_Graph_BR_HOP_ANT1_NA_1Mbps_2480_Time per Burst

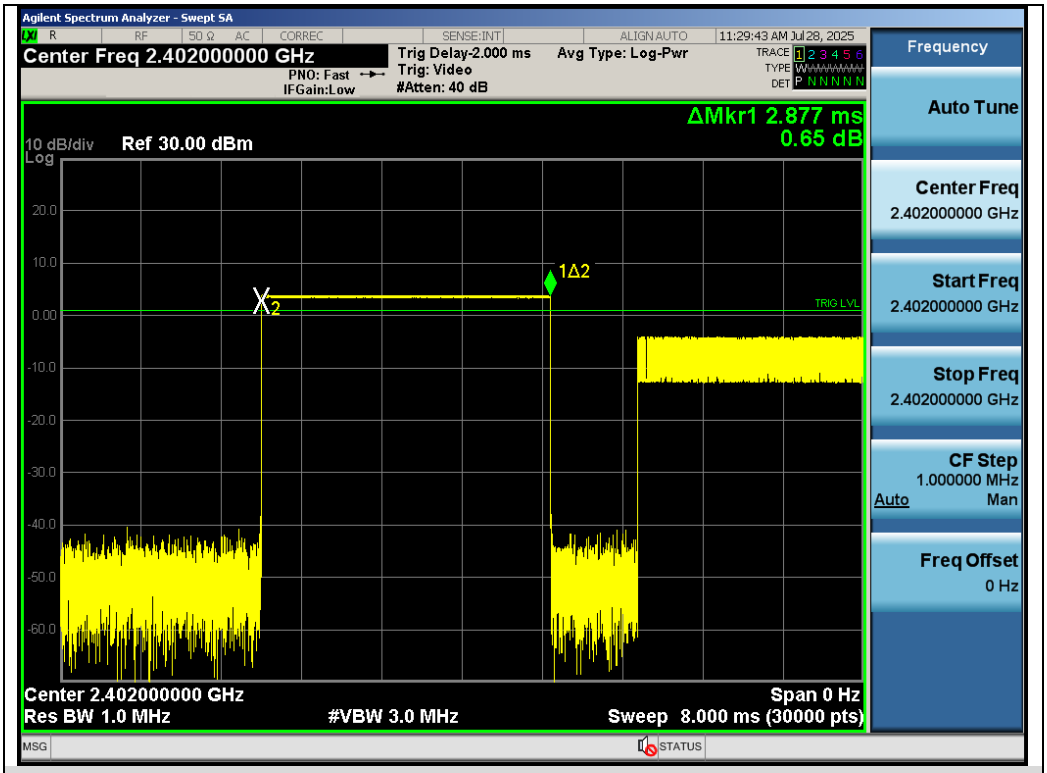
Note: All mode rates are tested and evaluated, GFSK modulated DH5 mode is the worst case and documented in the report.

| Test Data of Dwell Time-Right earphone | | | | | |
|---|---|---|---|---|---|
| Channel | Time of Pulse for DH5 (ms) | Number of hops in the period specified in the requirements | Dwell Time (ms) | Limit (ms) | Pass or Fail |
| 2402 | 2.880 | 27.0*4 | 311.040 | 400 | Pass |
| 2441 | 2.880 | 26.0*4 | 299.520 | 400 | Pass |
| 2480 | 2.880 | 26.0*4 | 299.520 | 400 | Pass |

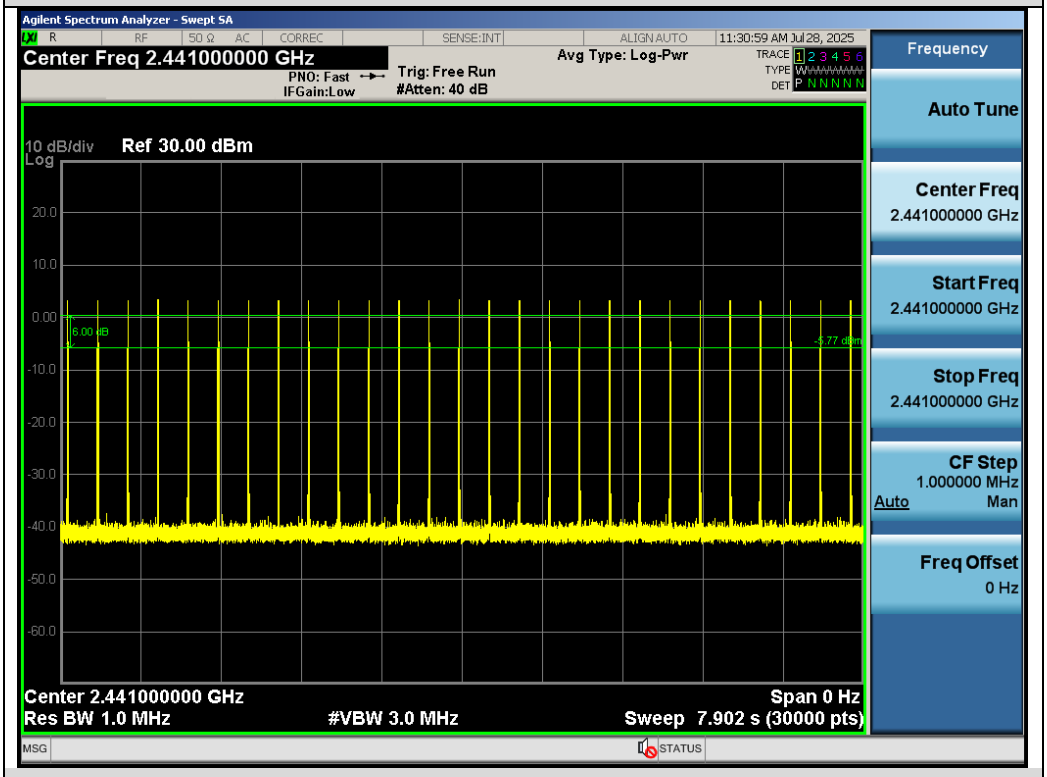
**Test Graphs of Dwell Time-Right earphone**



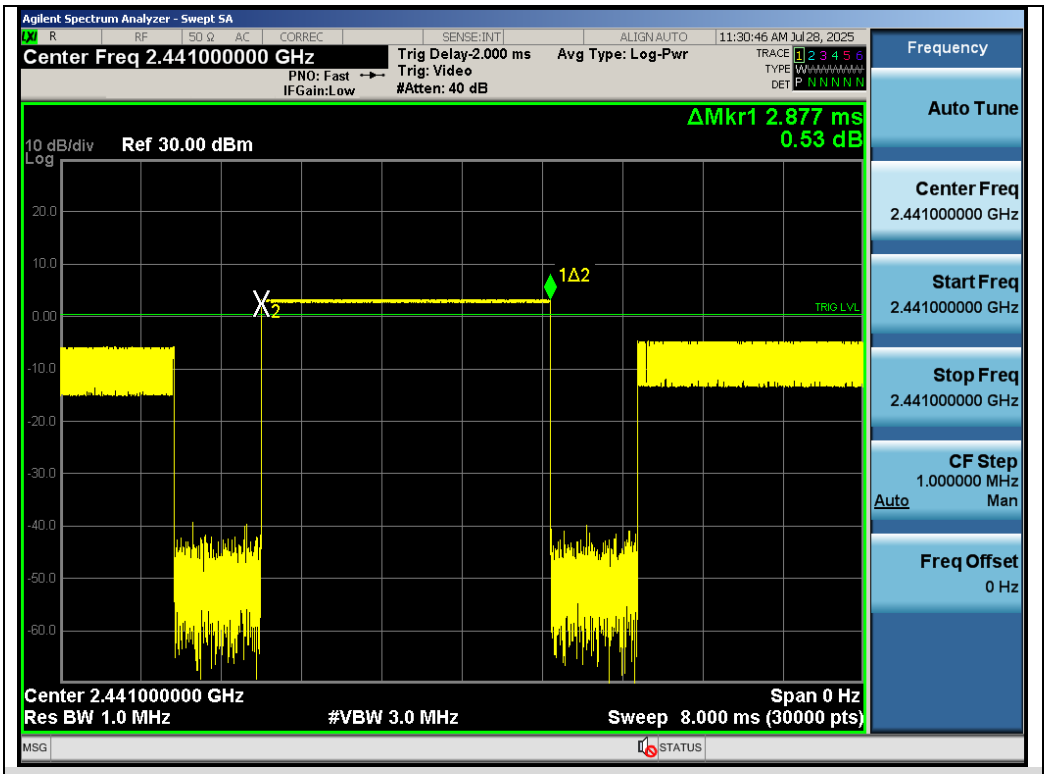

Test_Graph_BR_HOP_ANT1_NA_1Mbps_2402_Number of Busrt



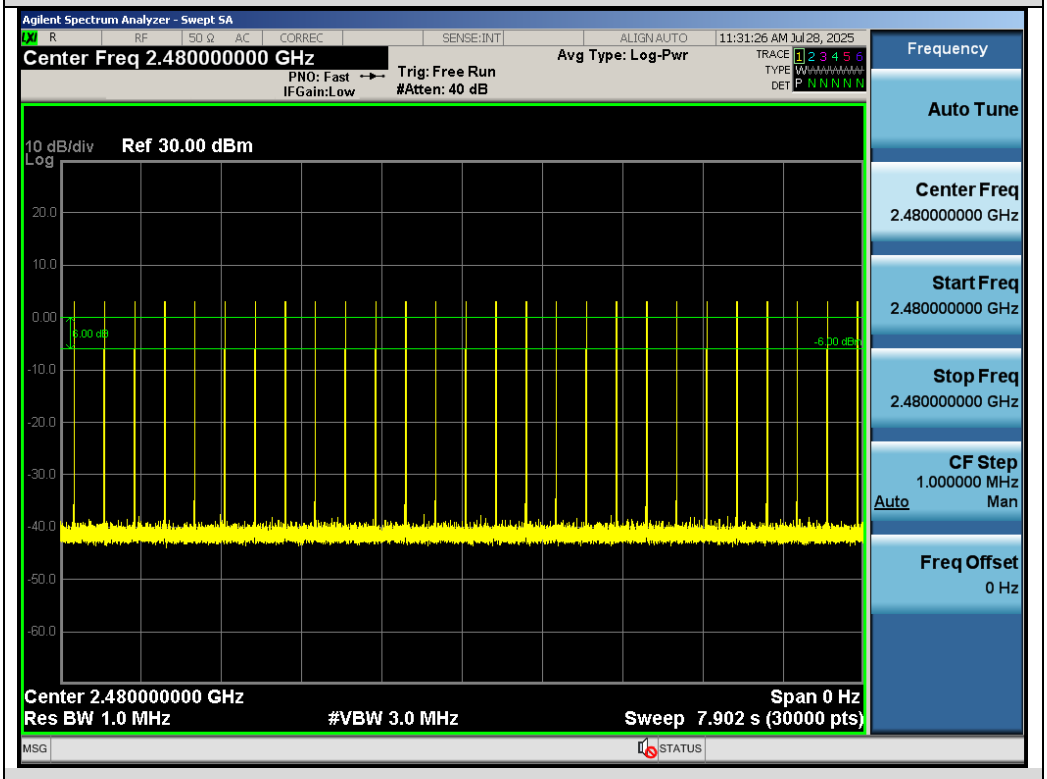

Test_Graph_BR_HOP_ANT1_NA_1Mbps_2402_Time per Burst



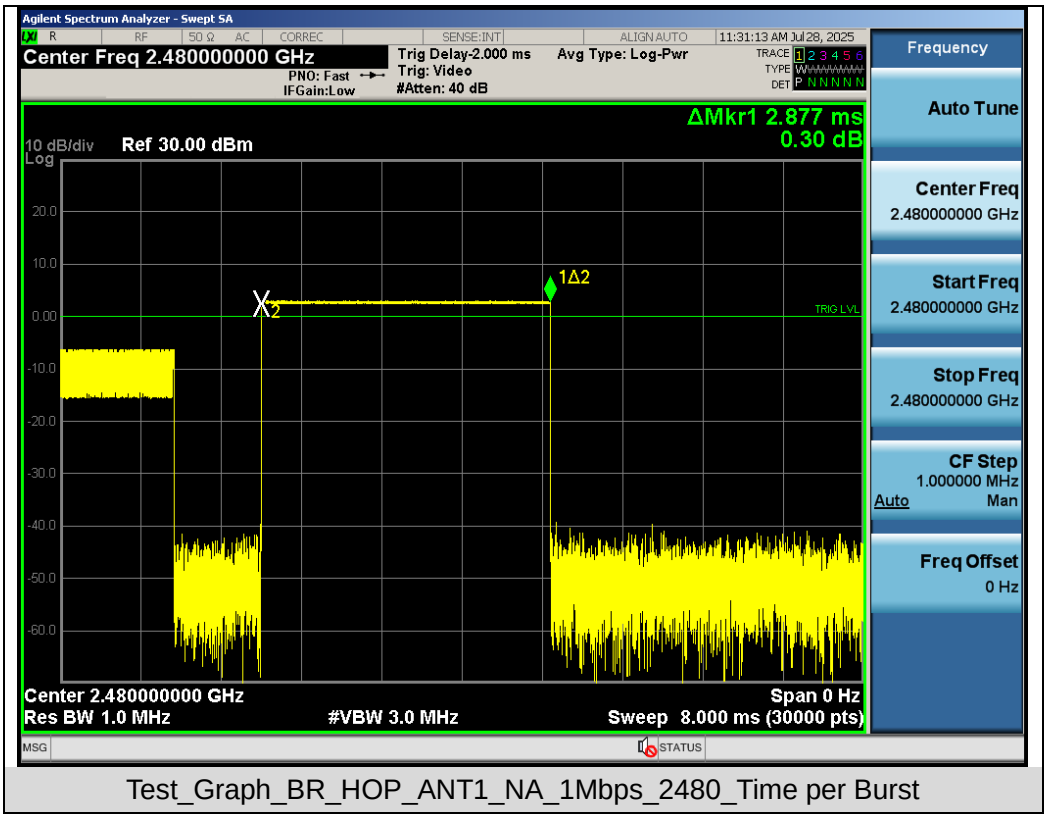

Test_Graph_BR_HOP_ANT1_NA_1Mbps_2441_Number of Busrt




Test_Graph_BR_HOP_ANT1_NA_1Mbps_2441_Time per Burst




Test_Graph_BR_HOP_ANT1_NA_1Mbps_2480_Number of Busrt




Test_Graph_BR_HOP_ANT1_NA_1Mbps_2480_Time per Burst

Note: All mode rates are tested and evaluated, GFSK modulated DH5 mode is the worst case and documented in the report.

# 12. Frequency Separation Measurement

## 12.1 Provisions Applicable

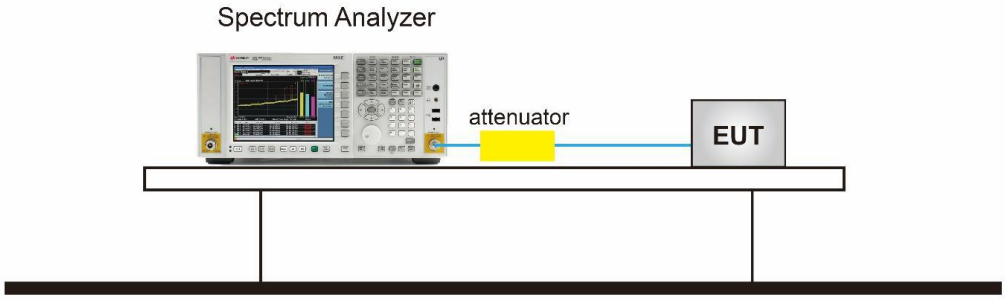
When the power is less than 0.125W: The minimum permissible channel separation for this system is 2/3 the value of the 20dB BW.
When the power is less than 1W: The minimum permissible channel separation for this system is 20dB BW.

## 12.2 Measurement Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: Wide enough to capture the peaks of two adjacent channels.
2. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
3. Video (or average) bandwidth (VBW) ⩾ RBW.
4. Sweep: Auto.
5. Detector function: Peak.
6. Trace: Max hold. g) Allow the trace to stabilize.
7. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

## 12.3 Measurement Setup (Block Diagram of Configuration)

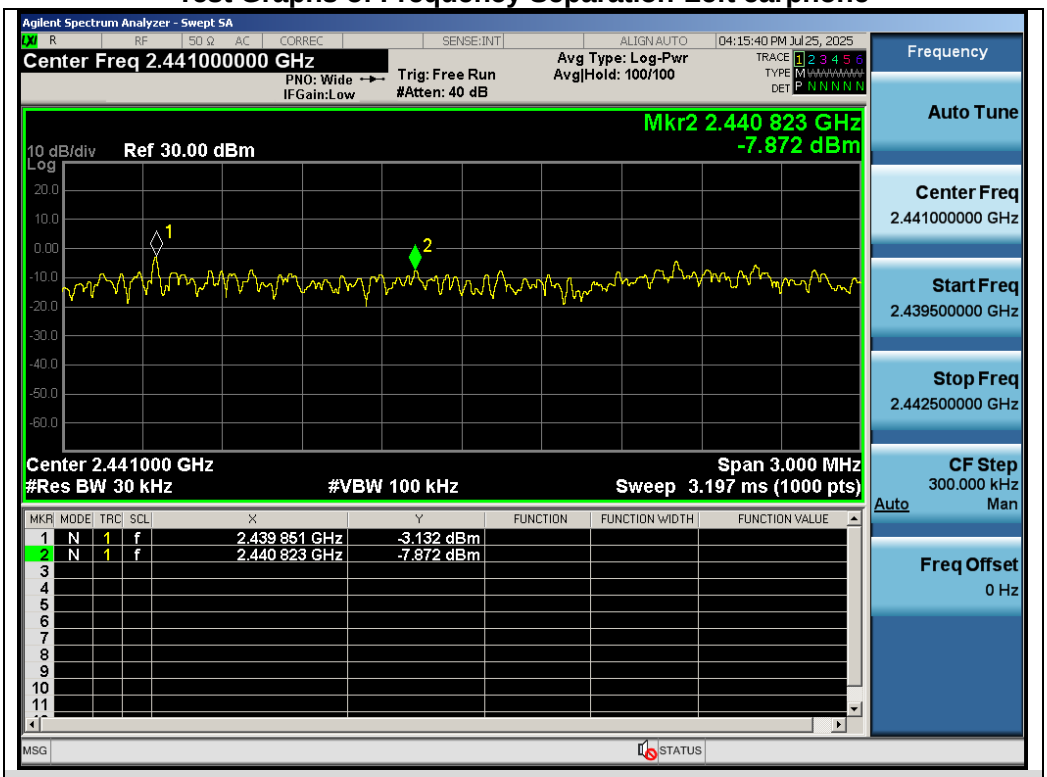



## 12.4 Measurement Result

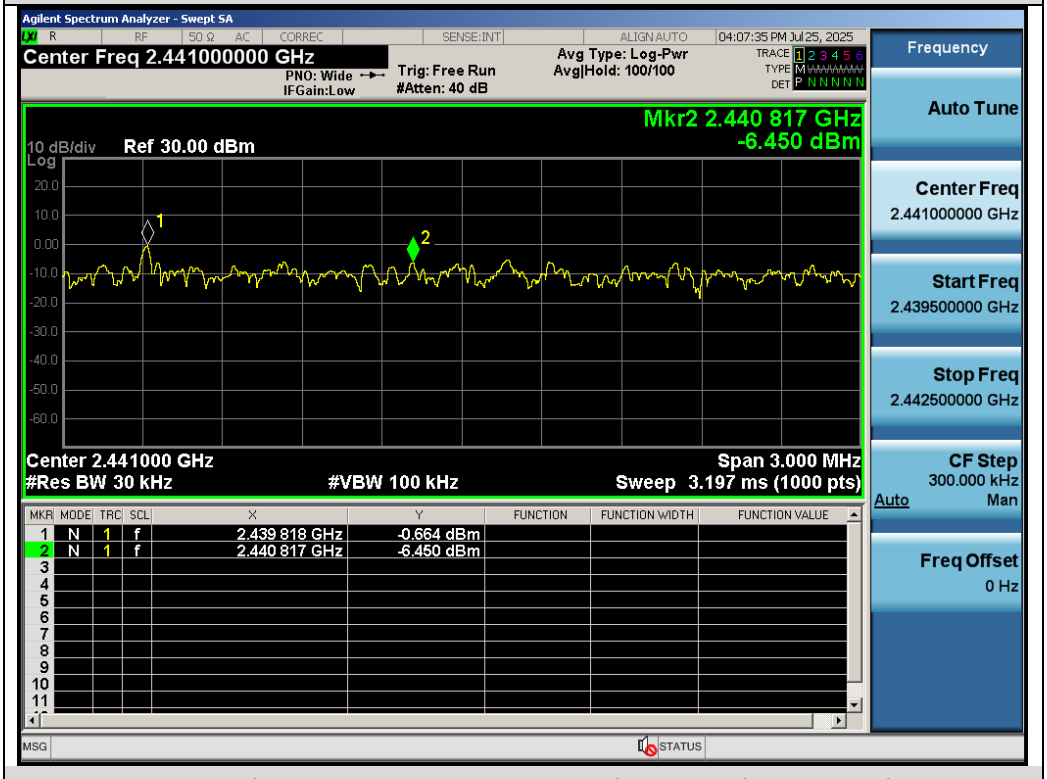
| Test Data of Frequency Separation-Left earphone | | | |
|---|---|---|---|
| Test Mode | Channel Separation (MHz) | Limits (MHz) | Pass or Fail |
| GFSK Hopping | 0.972 | ≥0.643 | Pass |
| π /4-DQPSK Hopping | 0.999 | ≥0.644 | Pass |
| 8DPSK Hopping | 0.975 | ≥0.643 | Pass |

| Test Data of Frequency Separation-Right earphone | | | |
|---|---|---|---|
| Test Mode | Channel Separation (MHz) | Limits (MHz) | Pass or Fail |
| GFSK Hopping | 0.978 | ≥0.643 | Pass |
| π /4-DQPSK Hopping | 1.024 | ≥0.645 | Pass |
| 8DPSK Hopping | 1.023 | ≥0.644 | Pass |

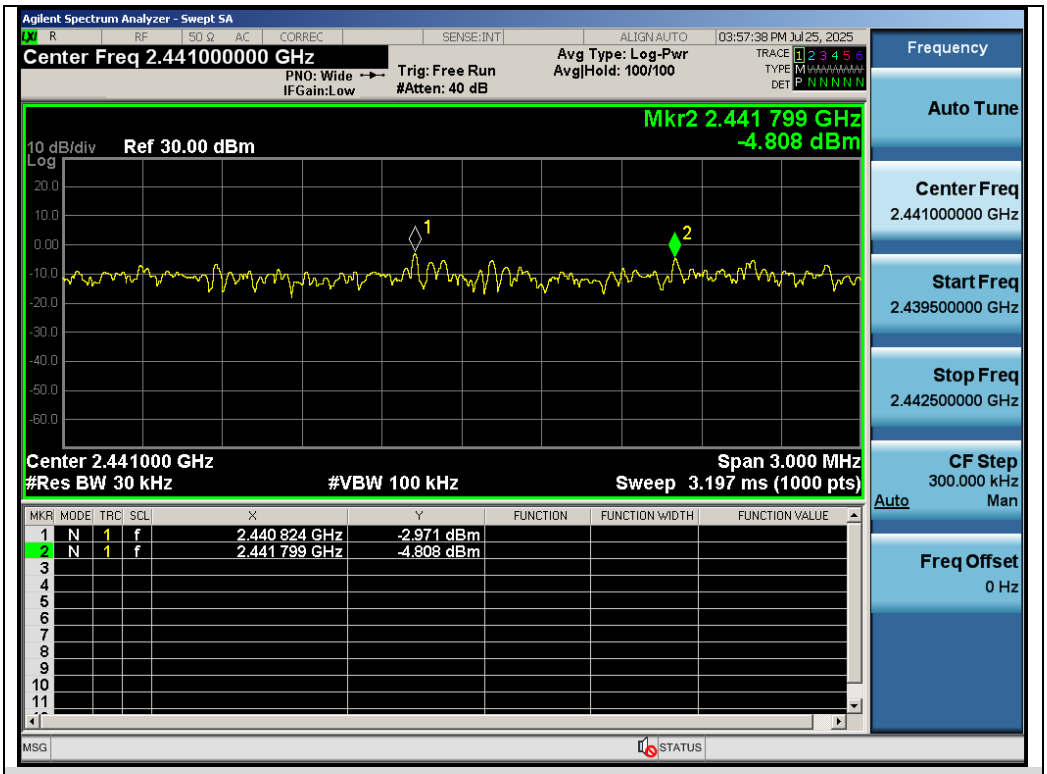
## Test Graphs of Frequency Separation-Left earphone




Test_Graph_BR_HOP_ANT1_NA_1Mbps_Hopping Separation



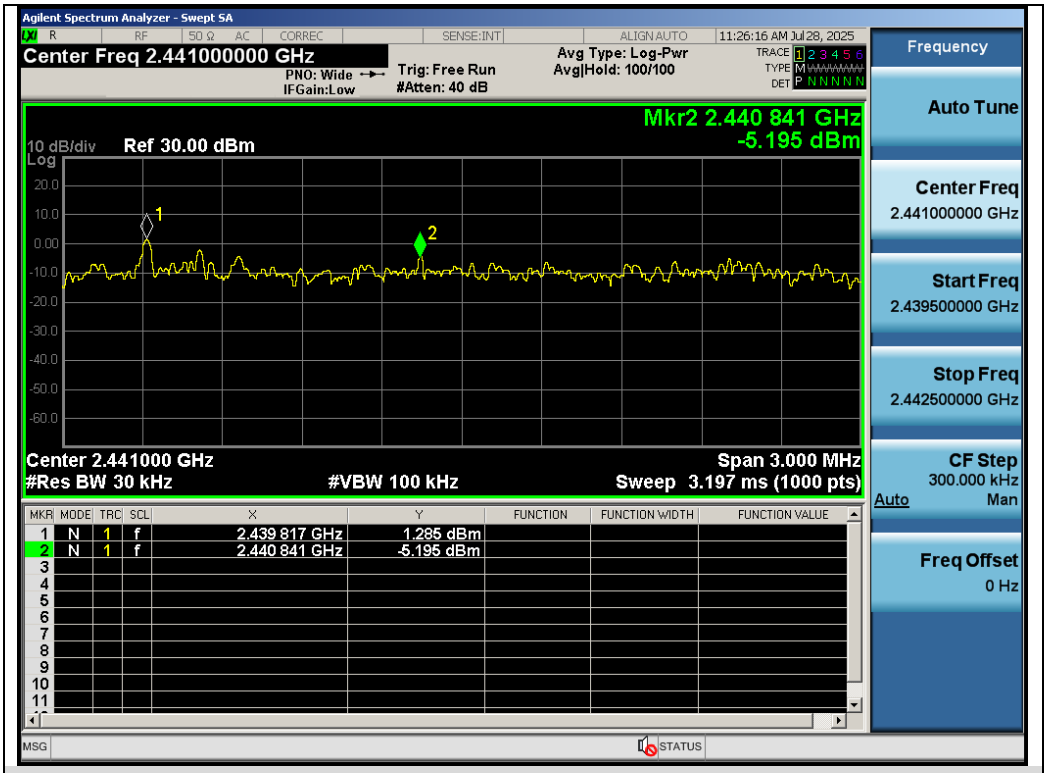

Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Hopping Separation



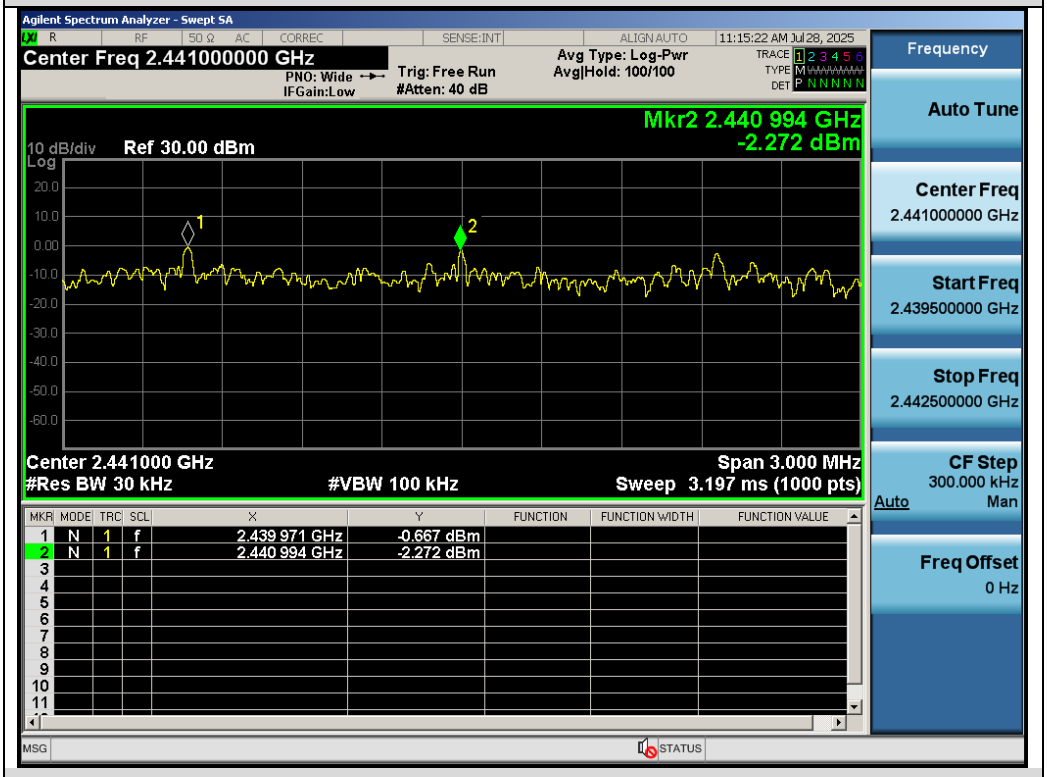

Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Hopping Separation

**Test Graphs of Frequency Separation-Right earphone**


Test_Graph_BR_HOP_ANT1_NA_1Mbps_Hopping Separation




Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Hopping Separation




Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Hopping Separation

# 13. AC Power Line Conducted Emission Test

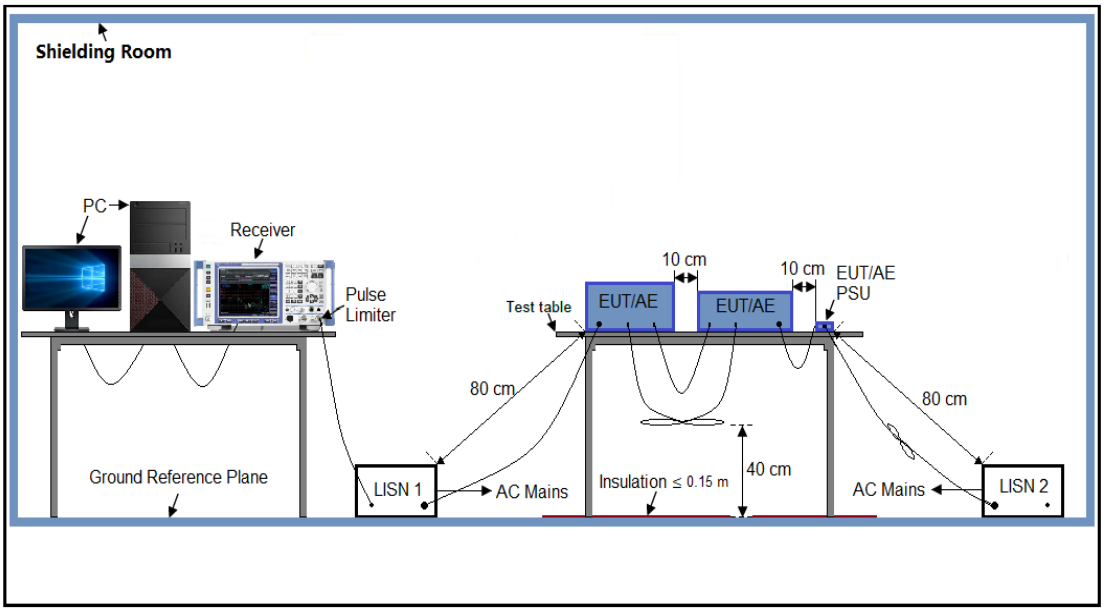
## 13.1 Measurement Limit

| Frequency | Maximum RF Line Voltage | |
|---|---|---|
| | Q.P. (dBμV) | Average (dBμV) |
| 150kHz~500kHz | 66-56 | 56-46 |
| 500kHz~5MHz | 56 | 46 |
| 5MHz~30MHz | 60 | 50 |

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

## 13.2 Measurement Setup (Block Diagram of Configuration)



### 13.3 Preliminary Procedure of Line Conducted Emission Test

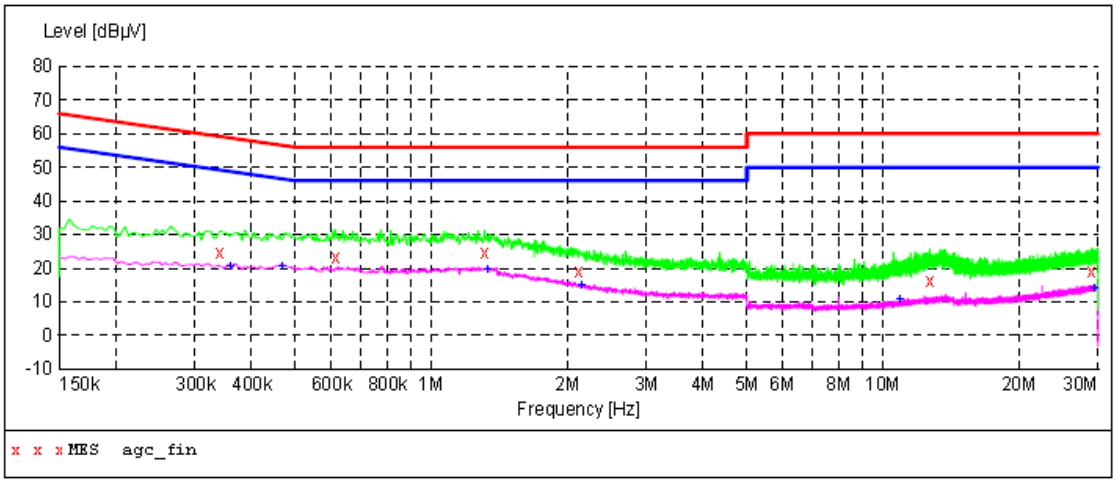
1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipment received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC 5V power from adapter which received AC120V/60Hz power from a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side).
7. Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
8. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
9. During the above scans, the emissions were maximized by cable manipulation.
10. The test mode(s) were scanned during the preliminary test.
11. Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

### 13.4 Final Procedure of Line Conducted Emission Test

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
3. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
4. The test data of the worst case condition(s) was reported on the Summary Data page.
5. A conducted emission is calculated by the following equation:
   - Measurement Level (dBμV) = Receiver reading (dBμV) + Transd (dB)
   - Transd (dB)= AMN Factor(dB)+Cable Loss(dB)+Attenuation(dB)
   - Margin= Limit-Level

### 13.5 Measurement Result

| AC Power Line Conducted Emission Test | | | |
|---|---|---|---|
| Test Mode | Mode 1 | LISN Line | Hot Side |




***MEASUREMENT RESULT: "agc_fin"***

2025/7/16 10:56

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.342000 | 24.40 | 10.3 | 59 | 34.8 | QP | L1 |
| 0.614000 | 23.20 | 10.3 | 56 | 32.8 | QP | L1 |
| 1.314000 | 24.80 | 10.4 | 56 | 31.2 | QP | L1 |
| 2.126000 | 19.10 | 10.5 | 56 | 36.9 | QP | L1 |
| 12.714000 | 16.40 | 12.8 | 60 | 43.6 | QP | L1 |
| 29.010000 | 19.00 | 17.8 | 60 | 41.0 | QP | L1 |

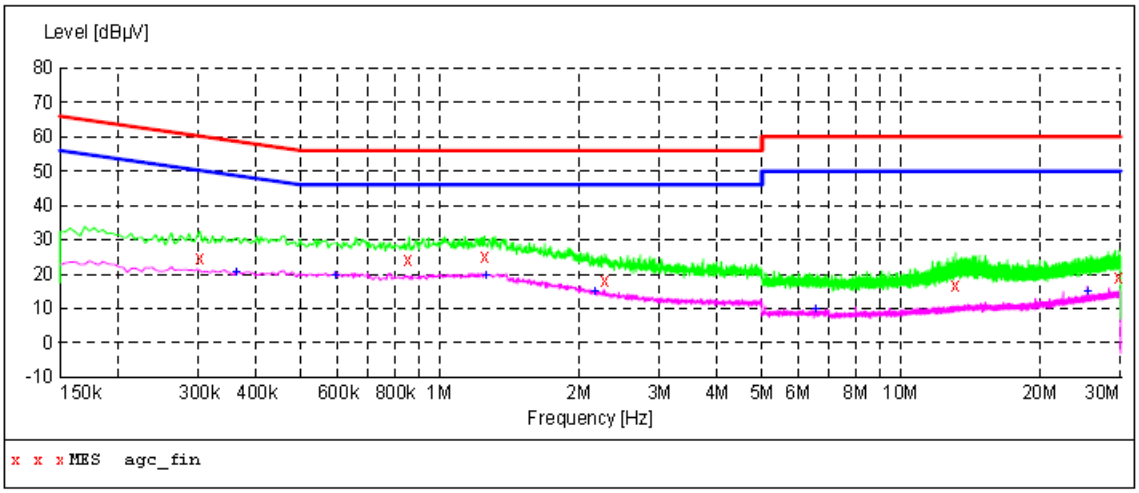
***MEASUREMENT RESULT: "agc_fin2"***

2025/7/16 10:56

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.358000 | 20.50 | 10.3 | 49 | 28.3 | AV | L1 |
| 0.466000 | 20.40 | 10.3 | 47 | 26.2 | AV | L1 |
| 1.334000 | 19.70 | 10.4 | 46 | 26.3 | AV | L1 |
| 2.150000 | 14.70 | 10.5 | 46 | 31.3 | AV | L1 |
| 10.890000 | 10.70 | 12.4 | 50 | 39.3 | AV | L1 |
| 29.322000 | 14.10 | 17.9 | 50 | 35.9 | AV | L1 |

**RESULT: PASS**

| AC Power Line Conducted Emission Test | | | |
|---|---|---|---|
| Test Mode | Mode 1 | LISN Line | Neutral Side |




***MEASUREMENT RESULT: "agc_fin"***

2025/7/16 11:00

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.302000 | 24.80 | 10.3 | 60 | 35.4 | QP | N |
| 0.858000 | 24.00 | 10.4 | 56 | 32.0 | QP | N |
| 1.250000 | 24.90 | 10.4 | 56 | 31.1 | QP | N |
| 2.286000 | 18.20 | 10.5 | 56 | 37.8 | QP | N |
| 13.150000 | 16.50 | 12.9 | 60 | 43.5 | QP | N |
| 29.714000 | 19.10 | 18.0 | 60 | 40.9 | QP | N |

***MEASUREMENT RESULT: "agc_fin2"***

2025/7/16 11:00

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line |
|---|---|---|---|---|---|---|
| 0.362000 | 20.50 | 10.3 | 49 | 28.2 | AV | N |
| 0.594000 | 19.70 | 10.3 | 46 | 26.3 | AV | N |
| 1.258000 | 19.70 | 10.4 | 46 | 26.3 | AV | N |
| 2.178000 | 14.90 | 10.5 | 46 | 31.1 | AV | N |
| 6.534000 | 9.90 | 11.2 | 50 | 40.1 | AV | N |
| 25.406000 | 14.70 | 16.7 | 50 | 35.3 | AV | N |

**RESULT: PASS**

## Appendix I: Photographs of Test Setup

Refer to the Report No.: AGC12383250701AP02

## Appendix II: Photographs of Test EUT

Refer to the Report No.: AGC12383250701AP03

# Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the “Company”) solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the “Clients”).
2. Any report issued by Company as a result of this application for testing services (the “Report”) shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
7. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

**-----End of Report-----**