



## MEASUREMENT REPORT

### FCC PART 15.247 / Bluetooth-EDR

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**FCC ID:** Z9G-EDF144

**Applicant:** Edifier International Limited

**Application Type:** Certification

**Product:** True Wireless Gaming Earbuds with Active Noise Cancellation

**Model No.:** EDF700012

**Brand Name:** EDIFIER, HECATE

**FCC Classification:** FCC Part 15 Spread Spectrum Transmitter (DSS)

**FCC Rule Part(s):** Part 15 Subpart C (Section 15.247)

**Test Procedure(s):** ANSI C63.10-2013

**Test Date:** April 20 ~ 30, 2021

**Reviewed By:**

Vincent Yu

**Approved By:**

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Shenzhen) Co., Ltd.

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### Revision History

| Report No.    | Version | Description    | Issue Date | Note  |
|---------------|---------|----------------|------------|-------|
| 2104RSU061-U1 | Rev. 01 | Initial Report | 05-12-2021 | Valid |
|               |         |                |            |       |

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### 1.1. Applicant

P.O. Box 6264 General Post Office Hong Kong

Dongguan Edifier Esports Technology Co., Ltd

5th floor, Office Building in the 1st district, No. 2, East Industry Road, Songshan Lake Science & Technology Industrial Park, Dongguan, 523808, CHINA

|                                          |                                                                                                 |              |              |
|------------------------------------------|-------------------------------------------------------------------------------------------------|--------------|--------------|
| <input type="checkbox"/>                 | <b>Test Site – MRT Suzhou Laboratory</b>                                                        |              |              |
|                                          | <b>Laboratory Location (Suzhou - Wuzhong)</b>                                                   |              |              |
|                                          | D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China              |              |              |
|                                          | <b>Laboratory Location (Suzhou - SIP)</b>                                                       |              |              |
|                                          | 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China    |              |              |
|                                          | <b>Laboratory Accreditations</b>                                                                |              |              |
| A2LA: 3628.01                            |                                                                                                 | CNAS: L10551 |              |
| FCC: CN1166                              |                                                                                                 | ISED: CN0001 |              |
| VCCI: R-20025, G-20034, C-20020, T-20020 |                                                                                                 |              |              |
| <input checked="" type="checkbox"/>      | <b>Test Site – MRT Shenzhen Laboratory</b>                                                      |              |              |
|                                          | <b>Laboratory Location (Shenzhen)</b>                                                           |              |              |
|                                          | 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China |              |              |
|                                          | <b>Laboratory Accreditations</b>                                                                |              |              |
|                                          | A2LA: 3628.02                                                                                   |              | CNAS: L10551 |
|                                          | FCC: CN1284                                                                                     |              | ISED: CN0105 |
| <input type="checkbox"/>                 | <b>Test Site – MRT Taiwan Laboratory</b>                                                        |              |              |
|                                          | <b>Laboratory Location (Taiwan)</b>                                                             |              |              |
|                                          | No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)                        |              |              |
|                                          | <b>Laboratory Accreditations</b>                                                                |              |              |
|                                          | TAF: L3261-190725                                                                               |              |              |
| FCC: 291082, TW3261                      |                                                                                                 | ISED: TW3261 |              |

## 2. PRODUCT INFORMATION

### 2.1. Equipment Description

|                       |                                                                             |
|-----------------------|-----------------------------------------------------------------------------|
| Product Name          | True Wireless Gaming Earbuds with Active Noise Cancellation                 |
| Model No.             | EDF700012                                                                   |
| Test Device No.       | Conducted Sample: 2021EDF144Sample#1<br>Radiated Sample: 2021EDF144Sample#2 |
| Bluetooth Version     | v5.0 Dual mode                                                              |
| Rated Input           | 5VDC 200mA (Earbuds)<br>5VDC 1A (Charging Case)                             |
| Operating Temperature | 0 ~ 45°C                                                                    |

### 2.2. Product Specification Subjective to this Report

|                     |                                                 |
|---------------------|-------------------------------------------------|
| Operating Frequency | 2402~2480MHz                                    |
| Channel Number      | 79                                              |
| Type of modulation  | GFSK, Pi/4 DQPSK, 8DPSK                         |
| Data Rate           | 1Mbps (GFSK), 2Mbps (Pi/4 DQPSK), 3Mbps (8DPSK) |
| Antenna Type        | FPC Antenna                                     |
| Antenna Gain        | Left Earbud: -1.2dBi<br>Right Earbud: -2.8dBi   |

Note 1: All information is provided by the manufacturer.

Note 2: For other features of this EUT, test report will be issued separately.

- 15.247(g): In accordance with the Bluetooth Industry Standard, the system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) system.
- 15.247(h): In accordance with the Bluetooth Industry Standard, the system does not coordinate its channels selection/ hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

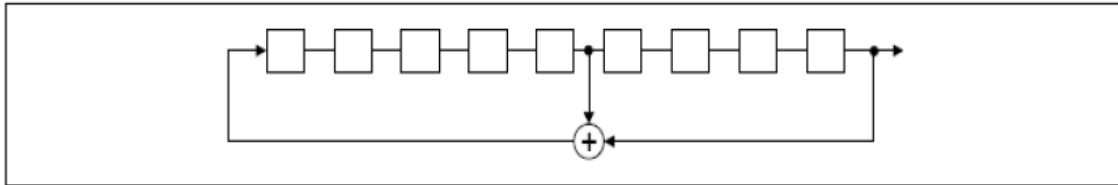
### 2.3. Working Frequencies

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

## 2.4. Pseudorandom Frequency Hopping Sequence

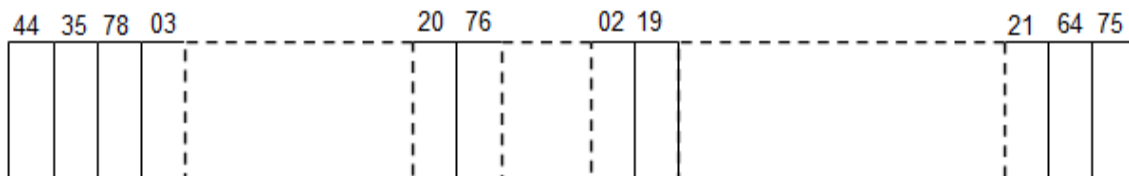
The pseudorandom sequence may be generated in a nine-stage shift register whose 5<sup>th</sup> and 9<sup>th</sup> stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES, i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence:  $2^9 - 1 = 511$  bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their Corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

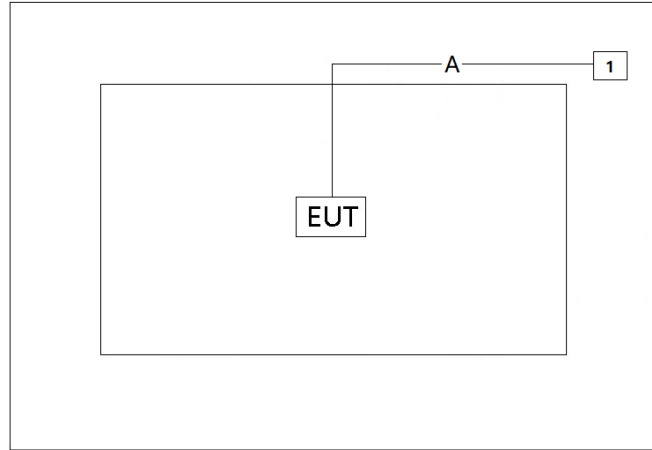
## 2.5. Test Mode

| Test Mode                |
|--------------------------|
| Mode 1: Transmit by DH5  |
| Mode 2: Transmit by 2DH5 |
| Mode 3: Transmit by 3DH5 |

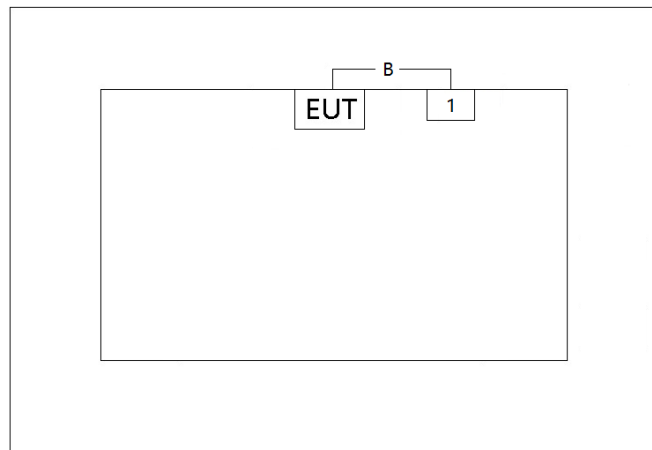
## 2.6. Description of Test Configuration

The ANSI C63.10: 2013 was used to reference the appropriate EUT setup for testing.

### Radiated Emission Measurement



### AC Conducted Emission Measurement



| Cable Type |           | Cable Description   |
|------------|-----------|---------------------|
| A          | USB Cable | Non-Shielded, > 5 m |
| B          | USB Cable | Non-Shielded, 1.8 m |

## 2.7. Test System Details

| Product    | Manufacturer | Model No.       |
|------------|--------------|-----------------|
| 1 Notebook | HP           | EliteBook 735G5 |

## 2.8. Test Software

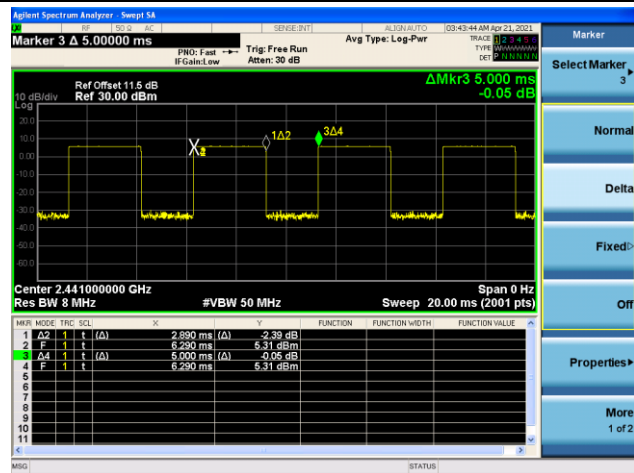
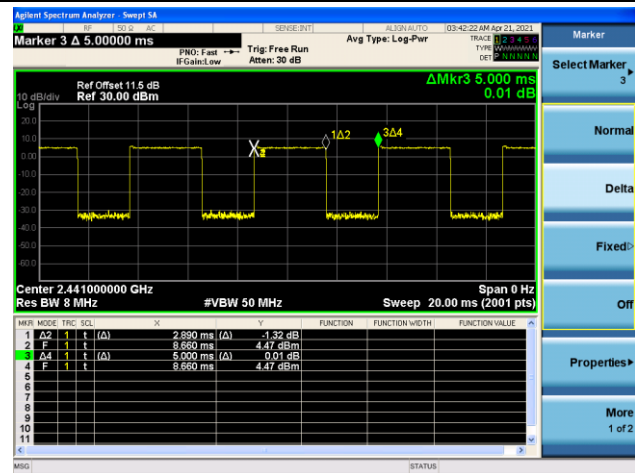
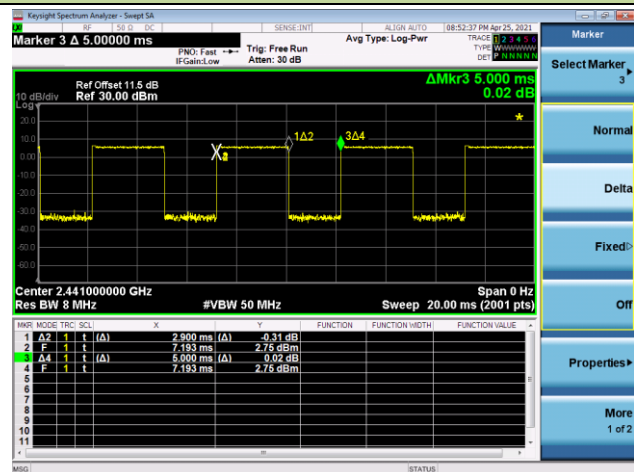
The test utility software used during testing was “BQB”, and RF power setting values of the software refer to operation description.

## 2.9. Test Environment Condition

|                     |             |
|---------------------|-------------|
| Ambient Temperature | 15 ~ 35 °C  |
| Relative Humidity   | 20 ~ 75 %RH |

## 2.10. Duty Cycle

The maximum achievable duty cycle was determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

| Test Mode                                                                           | Duty Cycle                                                                           |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Left Earbud                                                                         |                                                                                      |
| DH5                                                                                 | 57.80%                                                                               |
| 2DH5                                                                                | 57.80%                                                                               |
| 3DH5                                                                                | 58.00%                                                                               |
| Test Plot (T = Transmission Duration)                                               |                                                                                      |
| DH5 (T = 2.890ms)                                                                   | 2DH5 (T = 2.890ms)                                                                   |
|  |  |
| 3DH5 (T = 2.900ms)                                                                  |                                                                                      |
|  |                                                                                      |

| Test Mode                             | Duty Cycle         |
|---------------------------------------|--------------------|
| Right Earbud                          |                    |
| DH5                                   | 57.60%             |
| 2DH5                                  | 57.60%             |
| 3DH5                                  | 57.80%             |
| Test Plot (T = Transmission Duration) |                    |
| DH5 (T = 2.880ms)                     | 2DH5 (T = 2.880ms) |
|                                       |                    |
| 3DH5 (T = 2.890ms)                    |                    |
|                                       |                    |

### 3. ANTENNA REQUIREMENTS

#### **Excerpt from §15.203 of the FCC Rules/Regulations:**

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- The antenna of the device is **permanently attached**.
- There are no provisions for connection to an external antenna.

#### **Conclusion:**

The unit complies with the requirement of §15.203.

#### 4. TEST EQUIPMENT CALIBRATION DATE

##### Conducted Emission (NS-SR2)

| Instrument                 | Manufacturer | Type No. | Asset No.   | Cali. Interval | Cali. Due Date |
|----------------------------|--------------|----------|-------------|----------------|----------------|
| EMI Test Receiver          | R&S          | ESL3     | MRTSUE06576 | 1 year         | 2021/07/09     |
| ENV216-LV-NETZNACHB        | R&S          | ENV216   | MRTSUE06577 | 1 year         | 2021/07/09     |
| ENV216-LV-NETZNACHB        | R&S          | ENV216   | MRTSUE06578 | 1 year         | 2021/07/09     |
| Temperature/Humidity Meter | deli         | NO.8813  | MRTSUE06587 | 1 year         | 2021/07/08     |
| Shielding Anechoic Chamber | BOOMWAVE     | SR2      | MRTSUE06551 | 5 year         | 2024/06/04     |

##### Radiated Emission (NS-AC1)

| Instrument                     | Manufacturer | Type No.  | Asset No.   | Cali. Interval | Cal. Due Date |
|--------------------------------|--------------|-----------|-------------|----------------|---------------|
| EMI Test Receiver              | R&S          | ESR3      | MRTSUE06575 | 1 year         | 2021/07/09    |
| EXA Signal Analyzer            | Keysight     | N9010A    | MRTSUE06195 | 1 year         | 2022/03/17    |
| Loop Antenna                   | Schwarzbeck  | FMZB 1519 | MRTSUE06025 | 1 year         | 2021/11/08    |
| Horn Antenna                   | Schwarzbeck  | BBHA 9170 | MRTSUE06292 | 1 year         | 2021/10/24    |
| Broad-Band Horn Antenna        | Schwarzbeck  | 9120D     | MRTSUE06572 | 1 year         | 2021/07/03    |
| Bilog Period Antenna           | Schwarzbeck  | VULB 9162 | MRTSUE06573 | 1 year         | 2021/07/03    |
| Preamplifier                   | Schwarzbeck  | BBV 9721  | MRTSUE06121 | 1 year         | 2021/06/11    |
| Broadband Coaxial Preamplifier | Schwarzbeck  | BBV 9718  | MRTSUE06574 | 1 year         | 2021/07/13    |
| Anechoic Chamber               | BOOMWAVE     | AC1       | MRTSUE06496 | 1 year         | 2021/07/25    |
| Temperature/Humidity Meter     | deli         | NO.8813   | MRTSUE06588 | 1 year         | 2021/07/08    |

##### Conducted Test Equipment (NS-TR2)

| Instrument                  | Manufacturer | Type No. | Asset No.   | Cali. Interval | Cali. Due Date |
|-----------------------------|--------------|----------|-------------|----------------|----------------|
| electronic hygrothermograph | deli         | No.8813  | MRTSUE06783 | 1 year         | 2021/05/13     |
| USB wideband power sensor   | Keysight     | U2021XA  | MRTSUE06581 | 1 year         | 2021/08/20     |
| 10dB Attenuator             | MVE          | 10dB     | N/A         | 1 year         | 2021/08/20     |
| EXA Signal Analyzer         | Keysight     | N9010A   | MRTSUE06195 | 1 year         | 2022/03/17     |
| EXA Signal Analyzer         | Keysight     | N9020A   | MRTSUE10065 | 1 year         | 2022/03/17     |

| Software     | Version | Function          |
|--------------|---------|-------------------|
| EMI Software | V3      | EMI Test Software |

## 5. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

|                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AC Conducted Emission Measurement</b>                                                                                                                                                                                                 |
| Measurement Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>9kHz~150kHz: 3.74dB<br>150kHz~30MHz: 3.44dB                                                                                                                  |
| <b>Radiated Emission Measurement</b>                                                                                                                                                                                                     |
| Measurement Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>Horizontal: 30MHz~300MHz: 5.04dB<br>300MHz~1GHz: 4.95dB<br>1GHz~40GHz: 6.40dB<br>Vertical: 30MHz~300MHz: 5.24dB<br>300MHz~1GHz: 6.03dB<br>1GHz~40GHz: 6.40dB |
| <b>Spurious Emissions, Conducted</b>                                                                                                                                                                                                     |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>0.78dB                                                                                                                                                         |
| <b>Output Power</b>                                                                                                                                                                                                                      |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>1.13dB                                                                                                                                                         |
| <b>Occupied Bandwidth</b>                                                                                                                                                                                                                |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>0.28%                                                                                                                                                          |

## 6. TEST RESULT

### 6.1. Summary

| FCC Part Section(s) | Test Description                                                   | Test Limit                                                                     | Test Condition | Test Result | Reference                   |
|---------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------|-------------|-----------------------------|
| 15.247(a)(1)        | 20dB Bandwidth                                                     | N/A                                                                            | Conducted      | Pass        | Section 6.2                 |
| 15.247(b)(1)        | Peak Transmitter Output Power                                      | <1 Watt if > 75 non-overlapping channels used                                  |                | Pass        | Section 6.3                 |
| 15.24207(a)(1)      | Channel Separation                                                 | > 2/3 of 20 dB BW for systems with Output Power < 125mW                        |                | Pass        | Section 6.4                 |
| 15.247(a)(1)(iii)   | Number of Channels                                                 | > 15 Channels                                                                  |                | Pass        | Section 6.5                 |
| 15.247(a)(1)(iii)   | Time of Occupancy                                                  | < 0.4 sec in 31.6 sec period                                                   |                | Pass        | Section 6.6                 |
| 15.247(d)           | Band Edge / Out-of-Band Emissions                                  | Conducted $\geq$ 20dBc                                                         |                | Pass        | Section 6.7<br>Section 6.8  |
| 15.205, 15.209      | General Field Strength<br>(Restricted Bands and Radiated Emission) | Emissions in restricted bands must meet the radiated limits detailed in 15.209 | Radiated       | Pass        | Section 6.9<br>Section 6.10 |
| 15.207              | AC Conducted Emissions<br>150kHz - 30MHz                           | < FCC 15.207 limits                                                            | Line Conducted | Pass        | Section 6.11                |

**Notes:** The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.

## 6.2. 20dB Bandwidth Measurement

### 6.2.1. Test Limit

N/A

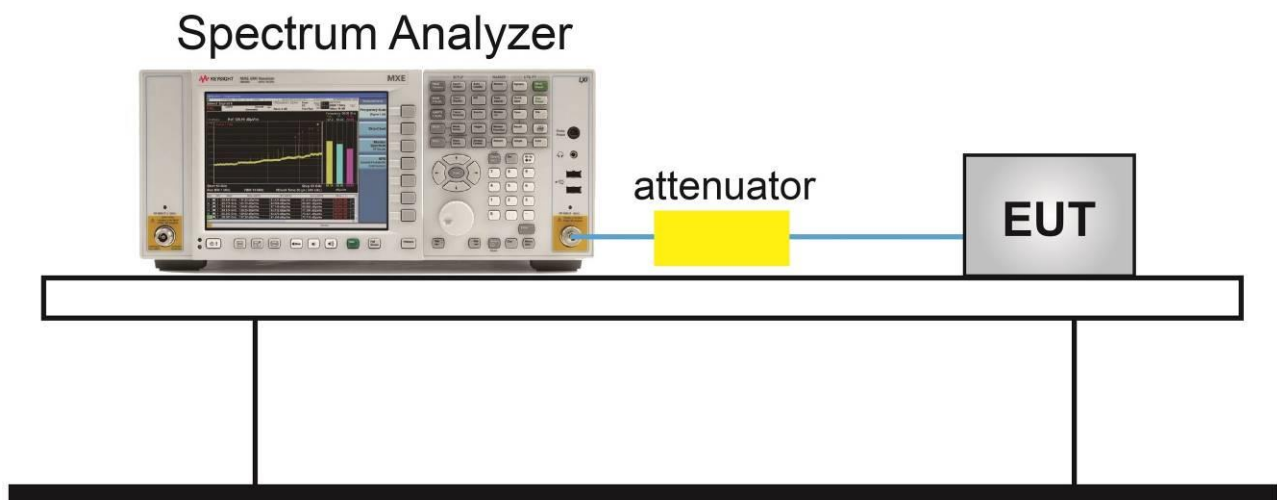
### 6.2.2. Test Procedure Used

ANSI C63.10-2013 - Section 6.9.2

### 6.2.3. Test Setting

1. Set RBW  $\geq 1\%$  to 5% of the OBW
2. VBW = Approximately three times RBW
3. Span = Approximately 2 to 5 times the OBW, centered on a hopping channel
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace to stabilize
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

### 6.2.4. Test Setup



### 6.2.5. Test Result

|           |                       |               |           |
|-----------|-----------------------|---------------|-----------|
| Test Site | NS-TR2                | Test Engineer | Flay Yang |
| Test Date | 2021/04/21~2021/04/25 |               |           |

| Test Mode    | Channel No. | Frequency<br>(MHz) | 20dB Bandwidth<br>(kHz) |
|--------------|-------------|--------------------|-------------------------|
| Left Earbud  |             |                    |                         |
| DH5          | 00          | 2402               | 1053.0                  |
| DH5          | 39          | 2441               | 1244.0                  |
| DH5          | 78          | 2480               | 1051.0                  |
| 2DH5         | 00          | 2402               | 1272.0                  |
| 2DH5         | 39          | 2441               | 1200.0                  |
| 2DH5         | 78          | 2480               | 1195.0                  |
| 3DH5         | 00          | 2402               | 1265.0                  |
| 3DH5         | 39          | 2441               | 1244.0                  |
| 3DH5         | 78          | 2480               | 1203.0                  |
| Right Earbud |             |                    |                         |
| DH5          | 00          | 2402               | 1060.0                  |
| DH5          | 39          | 2441               | 1056.0                  |
| DH5          | 78          | 2480               | 1056.0                  |
| 2DH5         | 00          | 2402               | 1211.0                  |
| 2DH5         | 39          | 2441               | 1201.0                  |
| 2DH5         | 78          | 2480               | 1199.0                  |
| 3DH5         | 00          | 2402               | 1254.0                  |
| 3DH5         | 39          | 2441               | 1238.0                  |
| 3DH5         | 78          | 2480               | 1244.0                  |

## DH5 20dB Bandwidth - Left Earbud

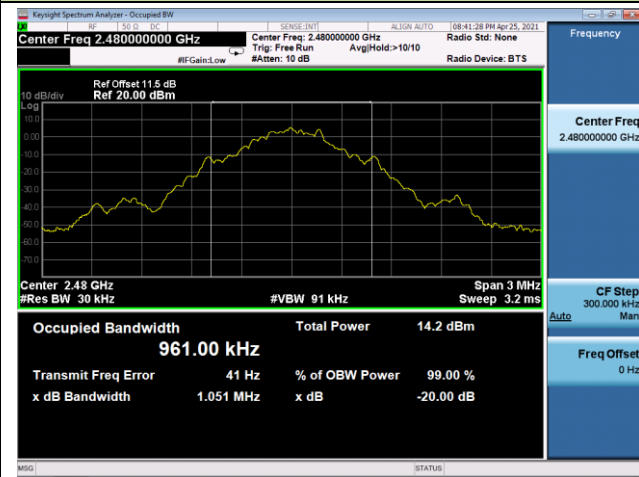
### Channel 00 (2402MHz)



### Channel 39 (2441MHz)

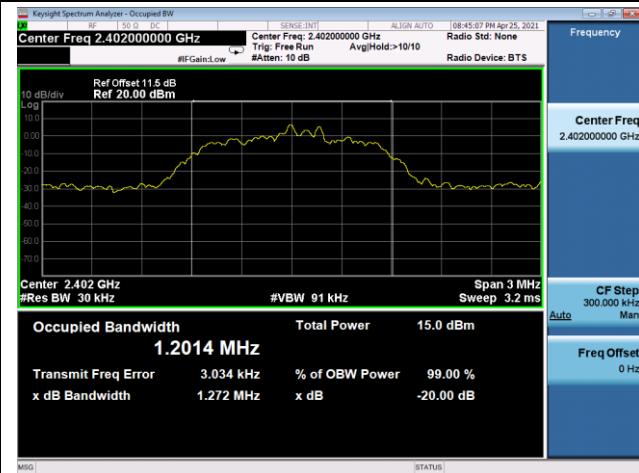


### Channel 78 (2480MHz)



## 2DH5 20dB Bandwidth - Left Earbud

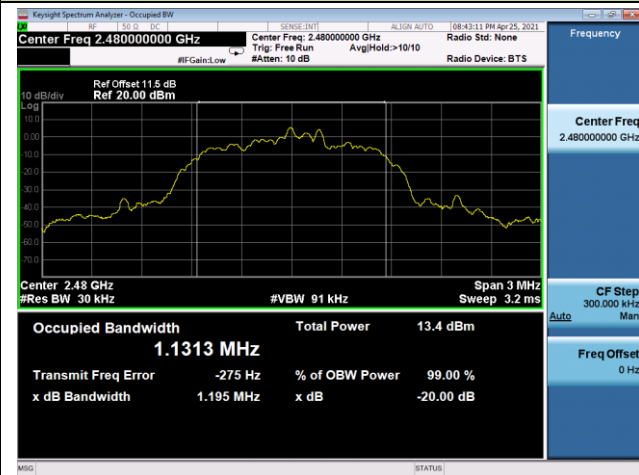
## Channel 00 (2402MHz)



## Channel 39 (2441MHz)

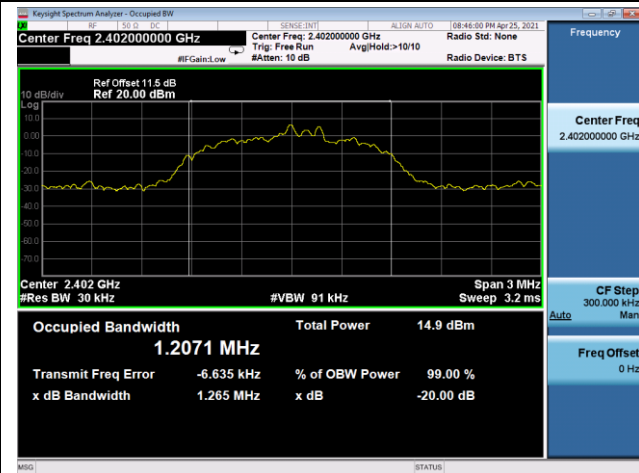


## Channel 78 (2480MHz)

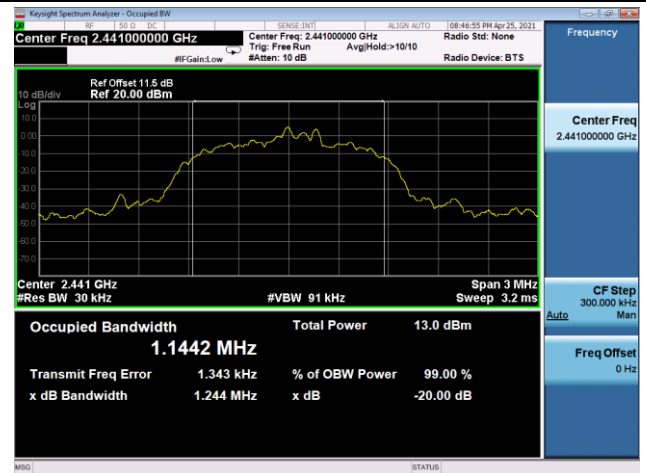


### 3DH5 20dB Bandwidth - Left Earbud

#### Channel 00 (2402MHz)



#### Channel 39 (2441MHz)

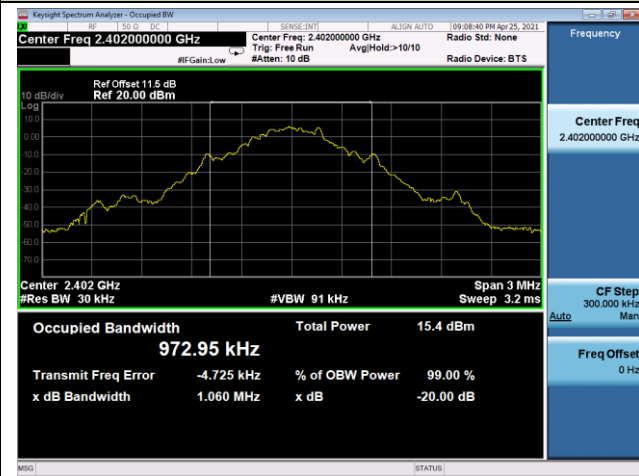


#### Channel 78 (2480MHz)

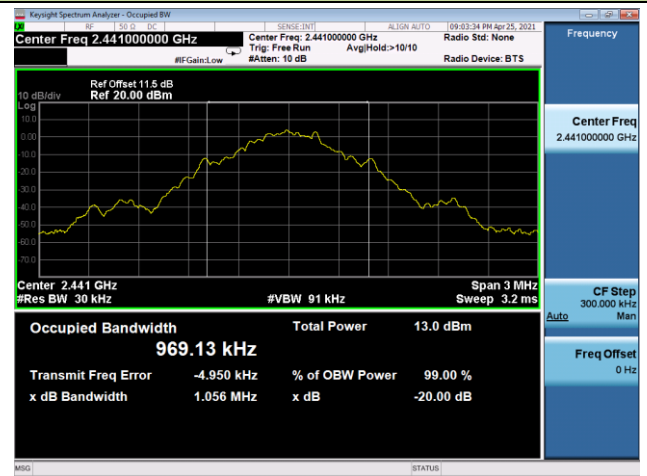


## DH5 20dB Bandwidth - Right Earbud

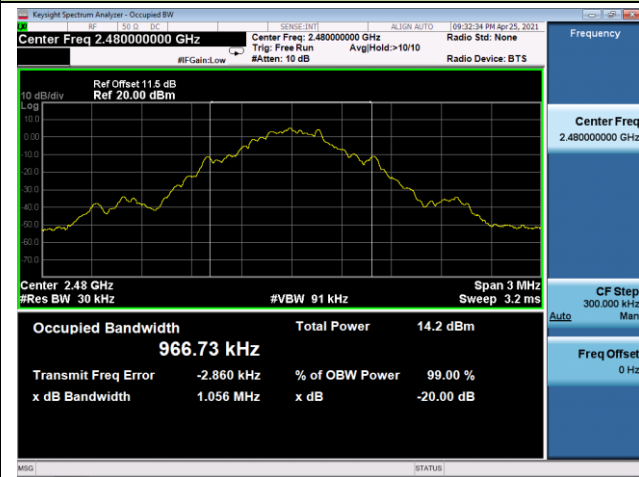
### Channel 00 (2402MHz)



### Channel 39 (2441MHz)



### Channel 78 (2480MHz)



## 2DH5 20dB Bandwidth - Right Earbud

## Channel 00 (2402MHz)



## Channel 39 (2441MHz)



## Channel 78 (2480MHz)



### 3DH5 20dB Bandwidth - Right Earbud

#### Channel 00 (2402MHz)



#### Channel 39 (2441MHz)



#### Channel 78 (2480MHz)



### 6.3. Output Power Measurement

#### 6.3.1. Test Limit

The maximum out power permissible output power is 1 Watt for all frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

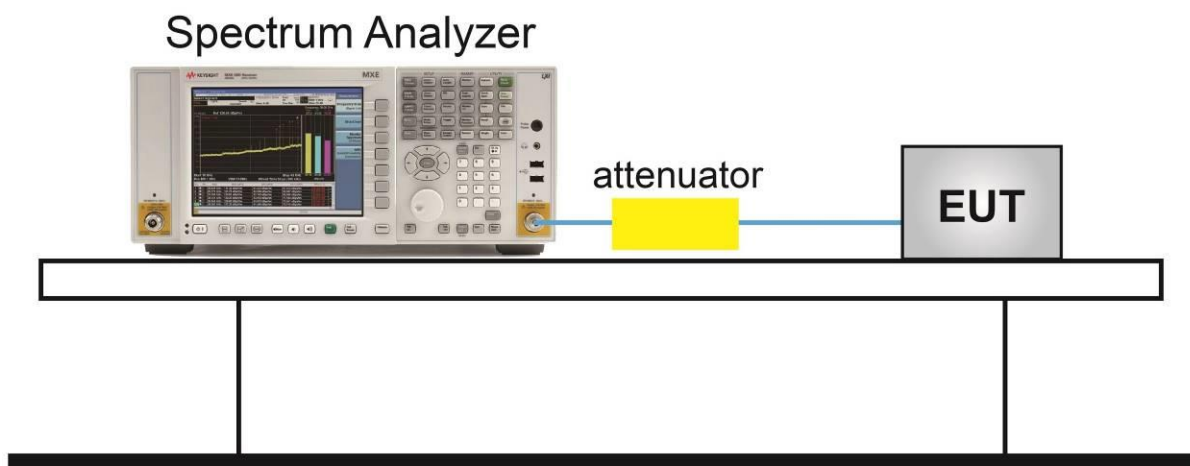
#### 6.3.2. Test Procedure Used

ANSI C63.10-2013 - Section 7.8.5

#### 6.3.3. Test Setting

1. Set RBW  $\geq$  the 20 dB bandwidth of the emission being measured.
2. VBW  $\geq$  RBW
3. Span = approximately five times the 20dB bandwidth, centered on a hopping channel
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (don't forget added the external attenuation and cable loss)

#### 6.3.4. Test Setup



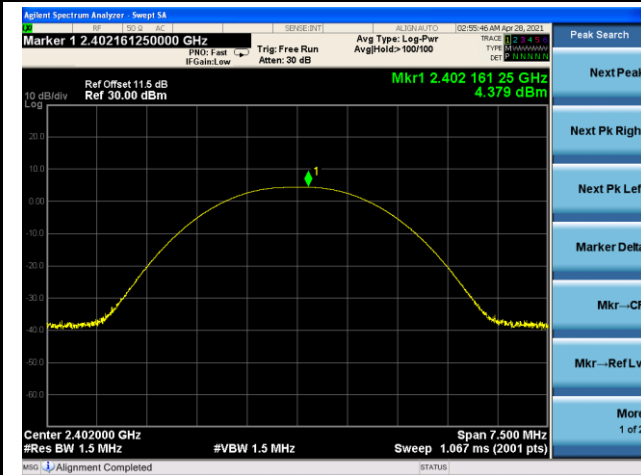
### 6.3.5. Test Result

|           |                       |               |           |
|-----------|-----------------------|---------------|-----------|
| Test Site | NS-TR2                | Test Engineer | Flay Yang |
| Test Date | 2021/04/20~2021/04/28 |               |           |

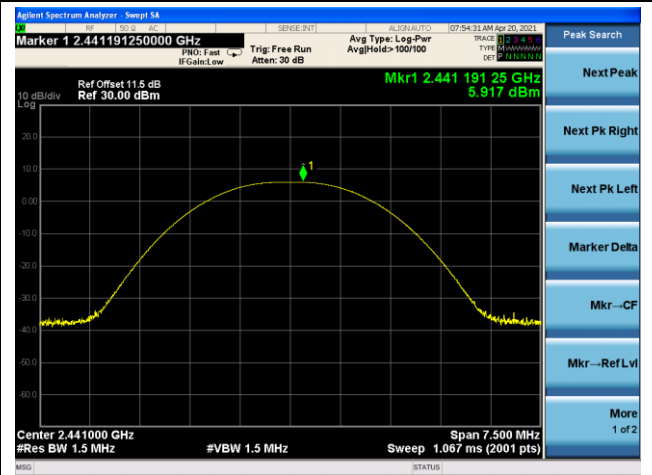
| Test Mode    | Channel No. | Frequency (MHz) | Peak Power (dBm) | Power Limit (dBm) |
|--------------|-------------|-----------------|------------------|-------------------|
| Left Earbud  |             |                 |                  |                   |
| DH5          | 00          | 2402            | 4.38             | $\leq 20.97$      |
| DH5          | 39          | 2441            | 5.92             | $\leq 20.97$      |
| DH5          | 78          | 2480            | 6.57             | $\leq 20.97$      |
| 2DH5         | 00          | 2402            | 4.33             | $\leq 20.97$      |
| 2DH5         | 39          | 2441            | 5.97             | $\leq 20.97$      |
| 2DH5         | 78          | 2480            | 6.60             | $\leq 20.97$      |
| 3DH5         | 00          | 2402            | 4.32             | $\leq 20.97$      |
| 3DH5         | 39          | 2441            | 5.92             | $\leq 20.97$      |
| 3DH5         | 78          | 2480            | 6.53             | $\leq 20.97$      |
| Right Earbud |             |                 |                  |                   |
| DH5          | 00          | 2402            | 3.53             | $\leq 20.97$      |
| DH5          | 39          | 2441            | 5.24             | $\leq 20.97$      |
| DH5          | 78          | 2480            | 6.45             | $\leq 20.97$      |
| 2DH5         | 00          | 2402            | 3.48             | $\leq 20.97$      |
| 2DH5         | 39          | 2441            | 5.24             | $\leq 20.97$      |
| 2DH5         | 78          | 2480            | 6.45             | $\leq 20.97$      |
| 3DH5         | 00          | 2402            | 3.50             | $\leq 20.97$      |
| 3DH5         | 39          | 2441            | 5.25             | $\leq 20.97$      |
| 3DH5         | 78          | 2480            | 6.45             | $\leq 20.97$      |

## DH5 Output Power - Left Earbud

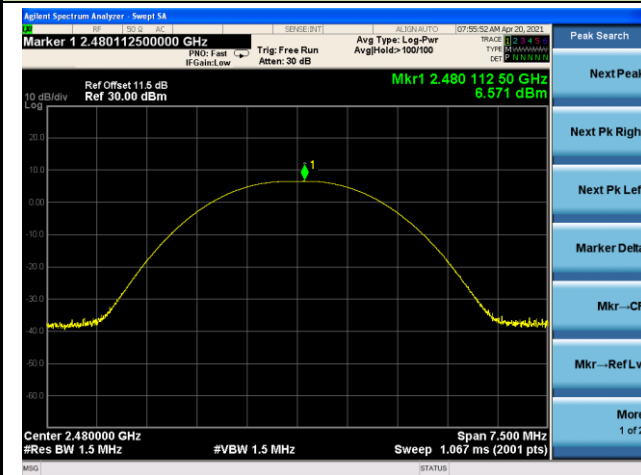
### Channel 00 (2402MHz)



### Channel 39 (2441MHz)

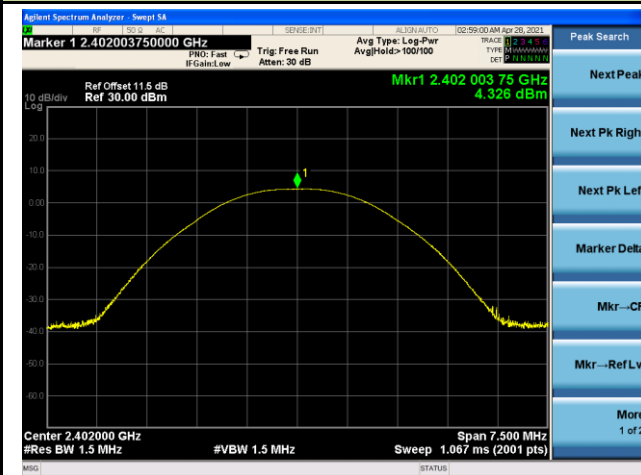


### Channel 78 (2480MHz)

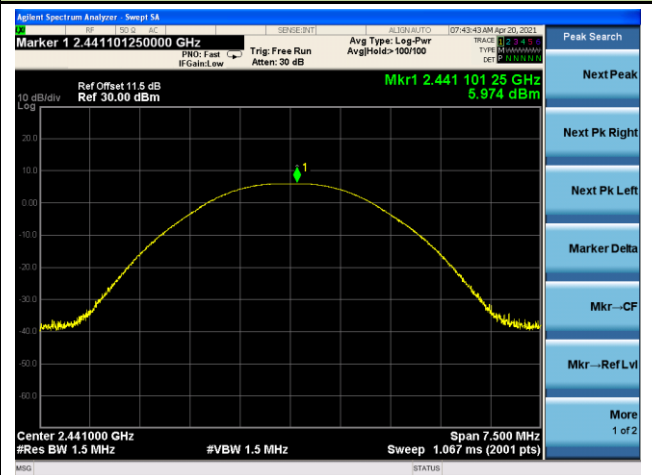


## 2DH5 Output Power - Left Earbud

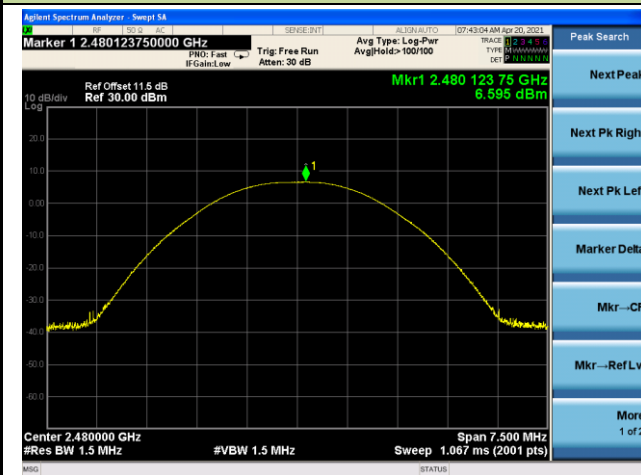
## Channel 00 (2402MHz)



## Channel 39 (2441MHz)

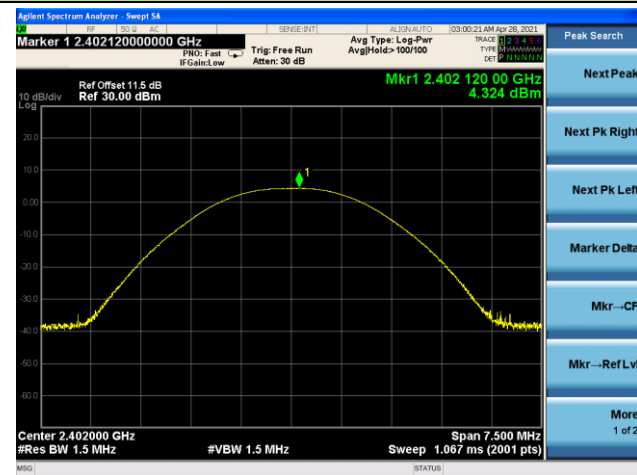


## Channel 78 (2480MHz)

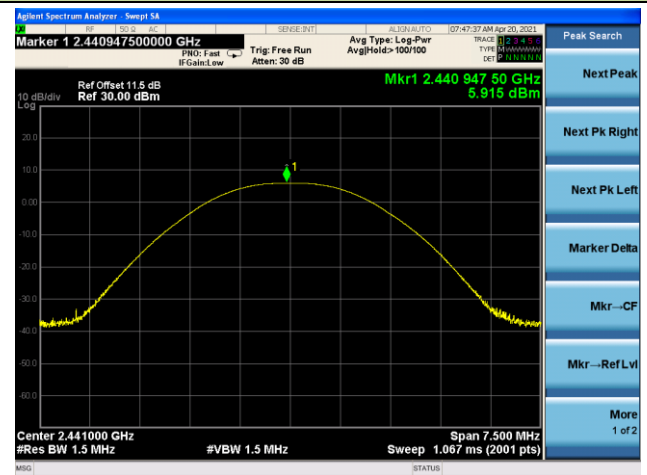


### 3DH5 Output Power - Left Earbud

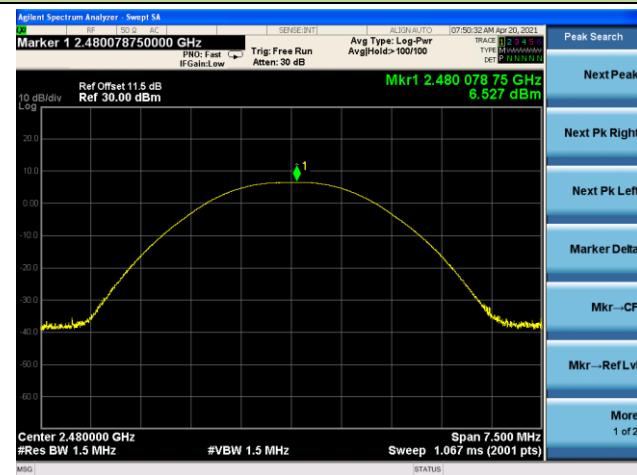
#### Channel 00 (2402MHz)



#### Channel 39 (2441MHz)

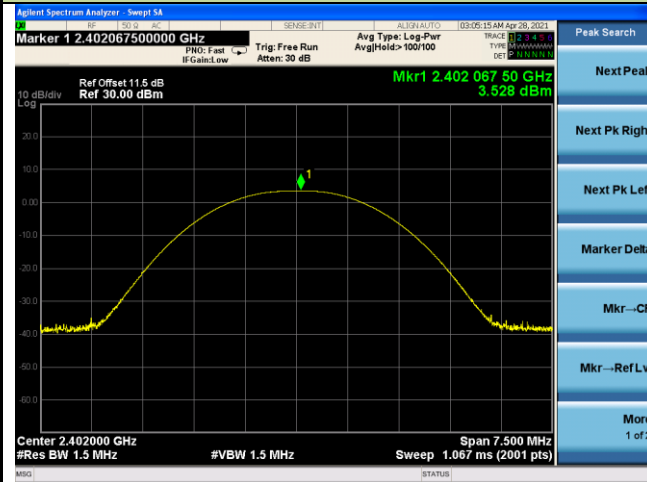


#### Channel 78 (2480MHz)

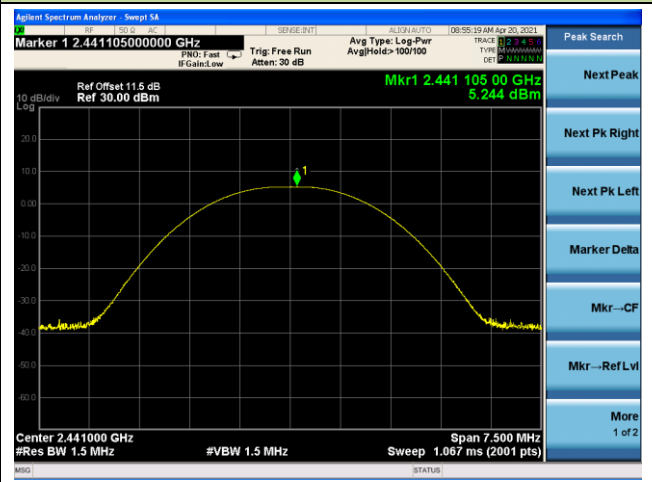


## DH5 Output Power - Right Earbud

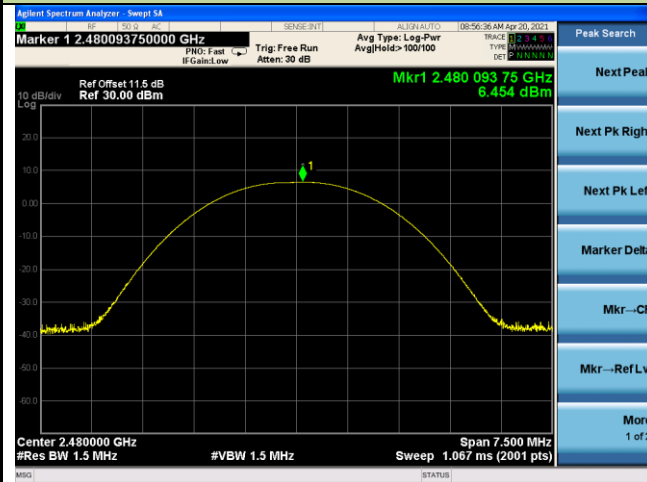
### Channel 00 (2402MHz)



### Channel 39 (2441MHz)

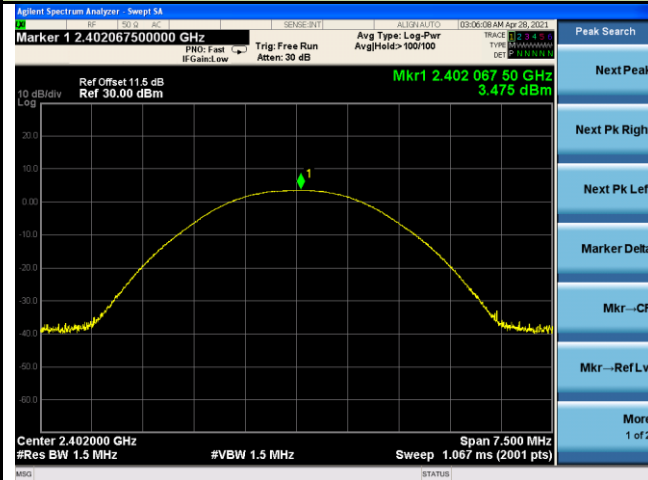


### Channel 78 (2480MHz)

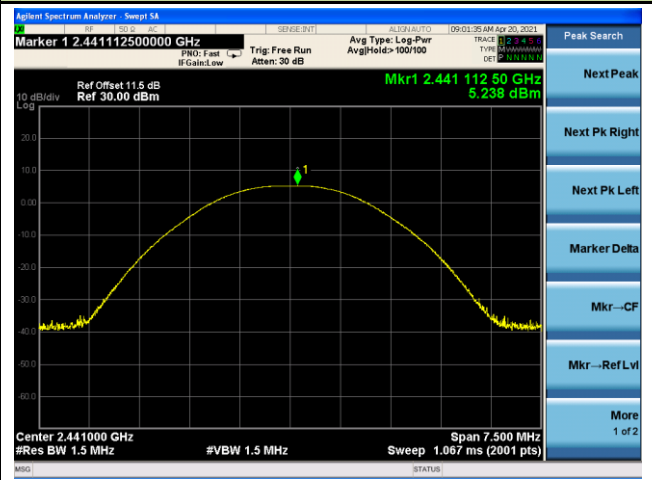


## 2DH5 Output Power - Right Earbud

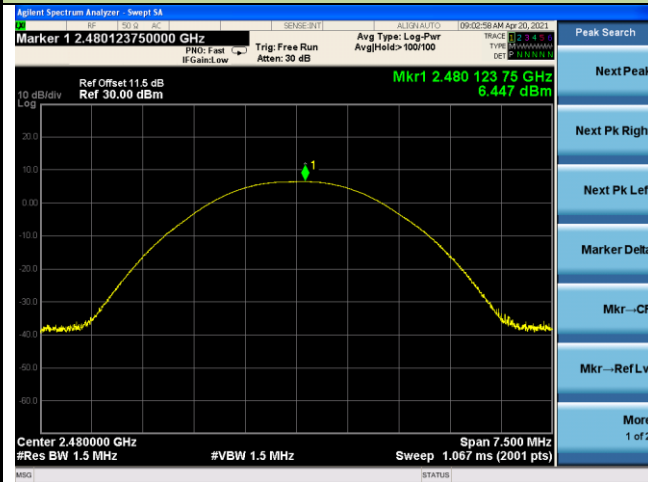
### Channel 00 (2402MHz)



### Channel 39 (2441MHz)

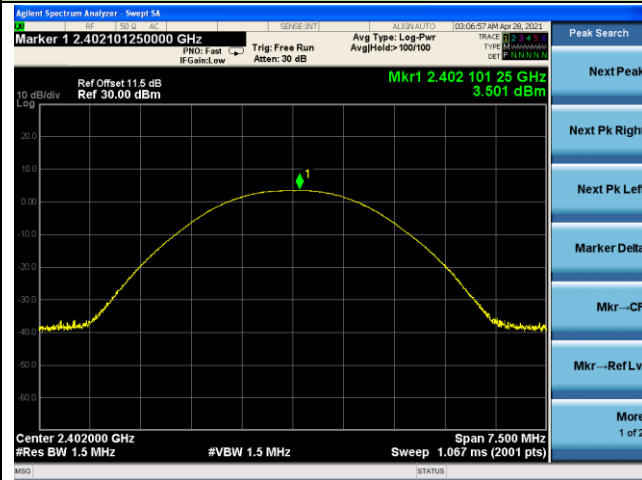


### Channel 78 (2480MHz)

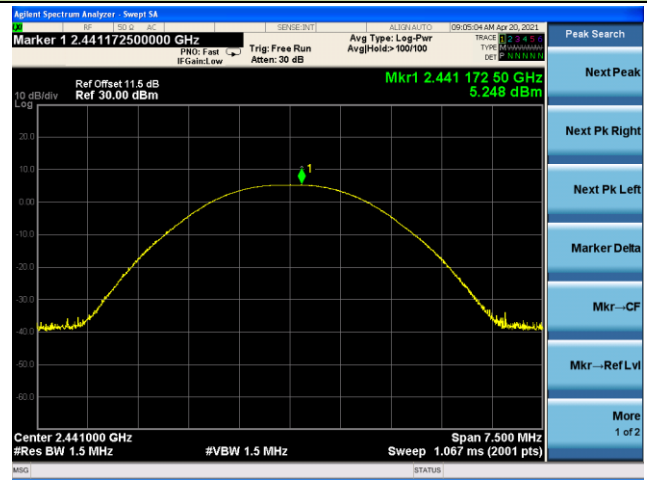


### 3DH5 Output Power - Right Earbud

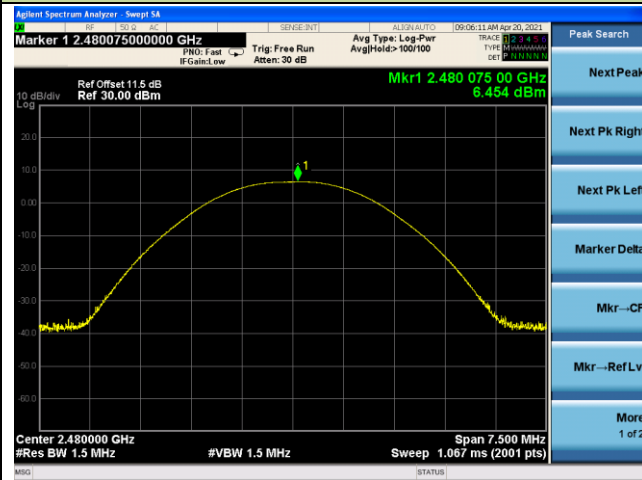
#### Channel 00 (2402MHz)



#### Channel 39 (2441MHz)



#### Channel 78 (2480MHz)



## 6.4. Carrier Frequency Separation Measurement

### 6.4.1. Test Limit

The minimum permissible channel separation for this system is  $\frac{2}{3}$  the value of the 20dB BW.

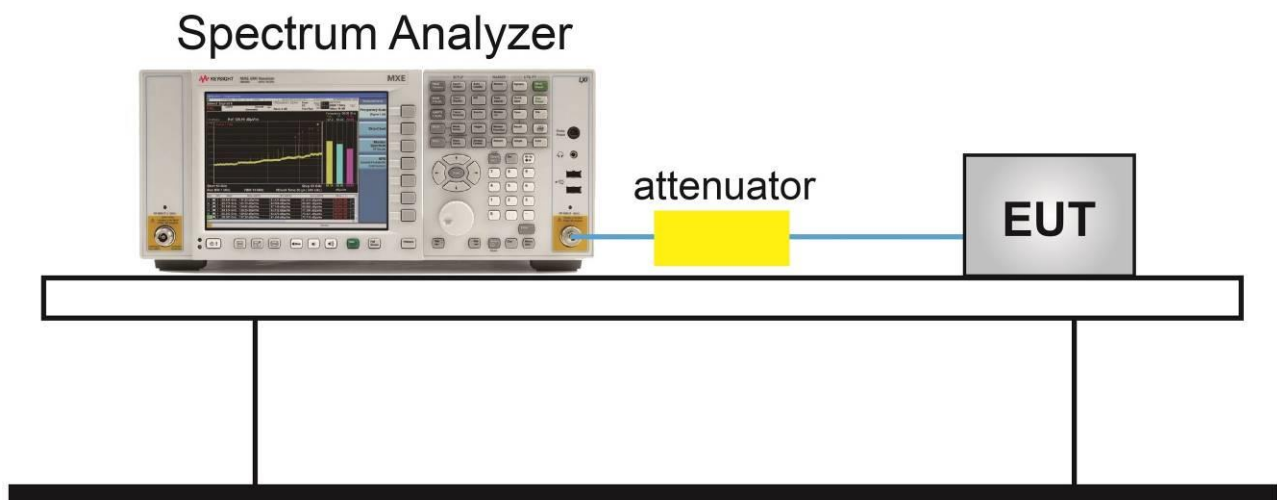
### 6.4.2. Test Procedure Used

ANSI C63.10-2013 - Section 7.8.2

### 6.4.3. Test Setting

1. Span = Wide enough to capture the peaks of two adjacent channels.
2. 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. VBW  $\geq$  RBW
4. Sweep time = Auto couple
5. Detector = Peak
6. Trace mode = Max hold
7. Allowed the trace to stabilize
8. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

### 6.4.4. Test Setup



#### 6.4.5. Test Result

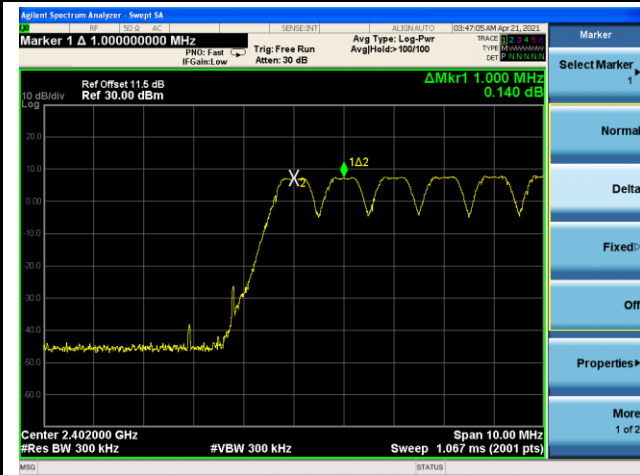
|           |                       |               |           |
|-----------|-----------------------|---------------|-----------|
| Test Site | NS-TR2                | Test Engineer | Flay Yang |
| Test Date | 2021/04/21~2021/04/22 |               |           |

| Test Mode    | Channel No. | Frequency (MHz) | Carrier Frequency Separation (kHz) | Limit (kHz)  | Result |
|--------------|-------------|-----------------|------------------------------------|--------------|--------|
| Left Earbud  |             |                 |                                    |              |        |
| DH5          | 00          | 2402            | 1000                               | $\geq 702.0$ | Pass   |
| DH5          | 39          | 2441            | 1000                               | $\geq 829.3$ | Pass   |
| DH5          | 78          | 2480            | 1000                               | $\geq 700.7$ | Pass   |
| 2DH5         | 00          | 2402            | 1000                               | $\geq 848.0$ | Pass   |
| 2DH5         | 39          | 2441            | 1000                               | $\geq 800.0$ | Pass   |
| 2DH5         | 78          | 2480            | 1000                               | $\geq 796.7$ | Pass   |
| 3DH5         | 00          | 2402            | 1000                               | $\geq 843.3$ | Pass   |
| 3DH5         | 39          | 2441            | 1000                               | $\geq 829.3$ | Pass   |
| 3DH5         | 78          | 2480            | 1000                               | $\geq 802.0$ | Pass   |
| Right Earbud |             |                 |                                    |              |        |
| DH5          | 00          | 2402            | 1000                               | $\geq 706.7$ | Pass   |
| DH5          | 39          | 2441            | 1000                               | $\geq 704.0$ | Pass   |
| DH5          | 78          | 2480            | 1000                               | $\geq 704.0$ | Pass   |
| 2DH5         | 00          | 2402            | 1000                               | $\geq 807.3$ | Pass   |
| 2DH5         | 39          | 2441            | 1000                               | $\geq 800.7$ | Pass   |
| 2DH5         | 78          | 2480            | 1000                               | $\geq 799.3$ | Pass   |
| 3DH5         | 00          | 2402            | 1000                               | $\geq 836.0$ | Pass   |
| 3DH5         | 39          | 2441            | 1000                               | $\geq 825.3$ | Pass   |
| 3DH5         | 78          | 2480            | 1000                               | $\geq 829.3$ | Pass   |

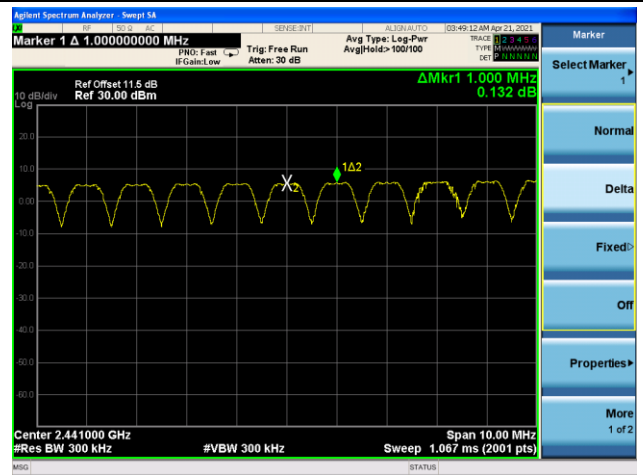
Note: The Limit is 2/3 the value of the 20dB BW.

## DH5 Carrier Frequency Separation - Left Earbud

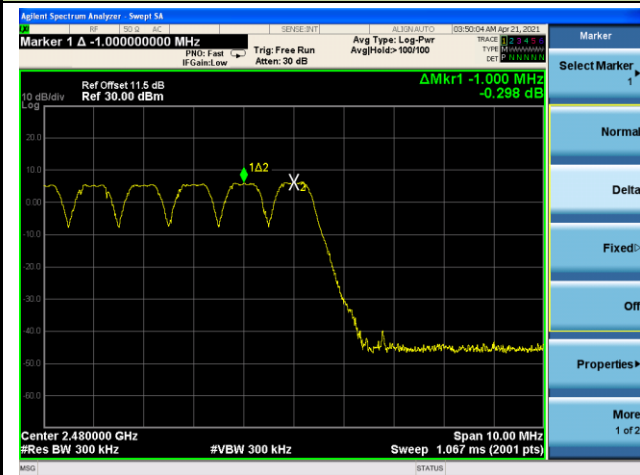
### Channel 00 (2402MHz)



### Channel 39 (2441MHz)



### Channel 78 (2480MHz)



## 2DH5 Carrier Frequency Separation - Left Earbud

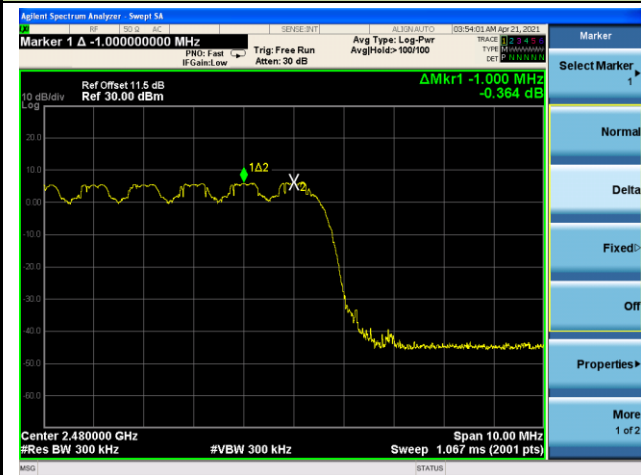
### Channel 00 (2402MHz)



### Channel 39 (2441MHz)



### Channel 78 (2480MHz)

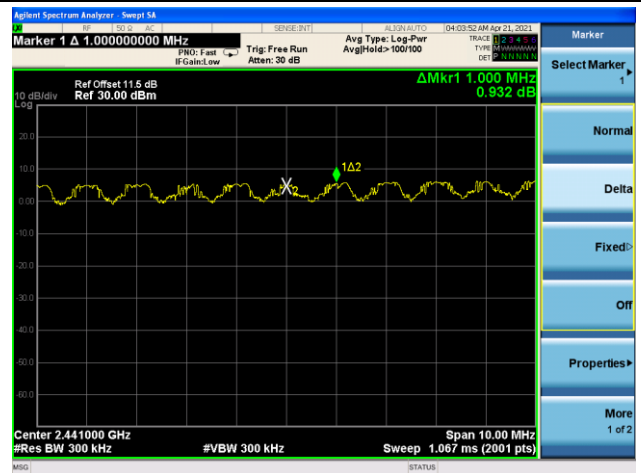


### 3DH5 Carrier Frequency Separation - Left Earbud

#### Channel 00 (2402MHz)



#### Channel 39 (2441MHz)

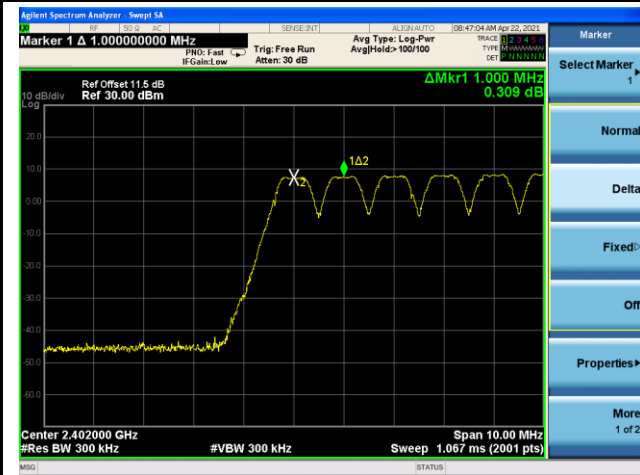


#### Channel 78 (2480MHz)

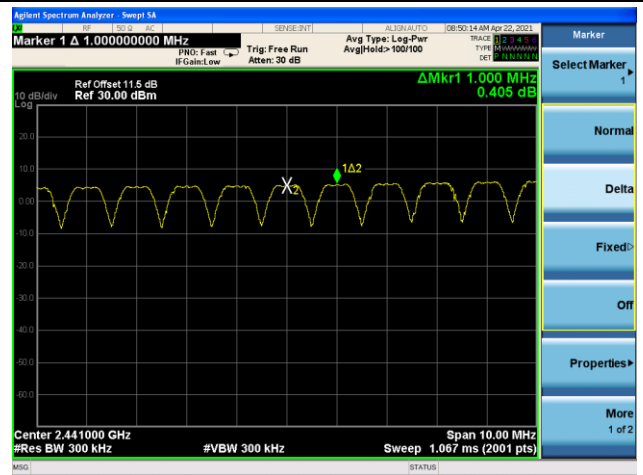


## DH5 Carrier Frequency Separation - Right Earbud

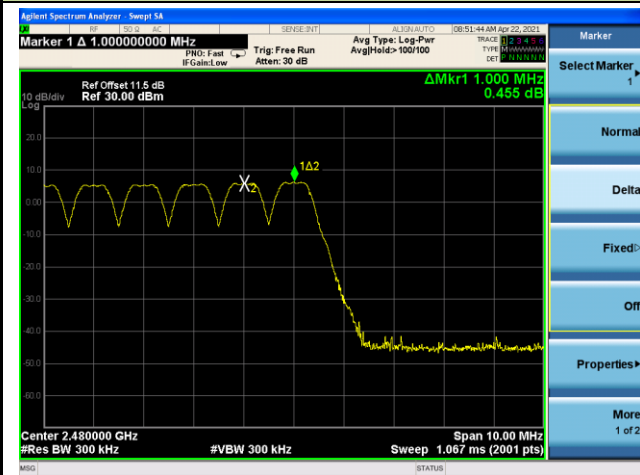
### Channel 00 (2402MHz)



### Channel 39 (2441MHz)



### Channel 78 (2480MHz)



## 2DH5 Carrier Frequency Separation - Right Earbud

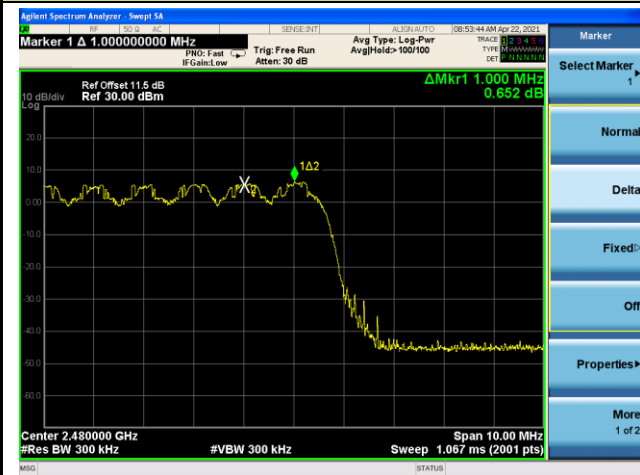
### Channel 00 (2402MHz)



### Channel 39 (2441MHz)

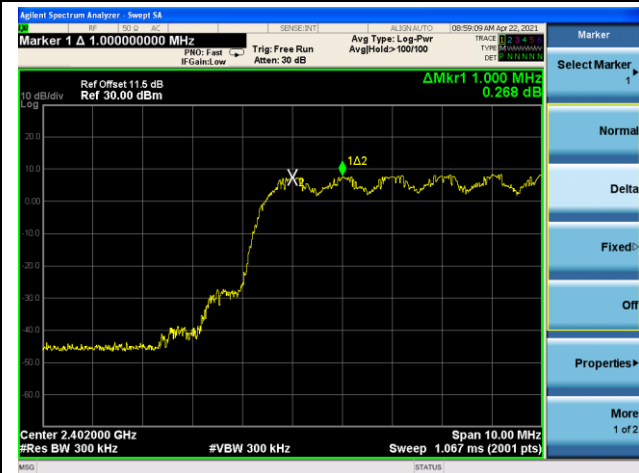


### Channel 78 (2480MHz)

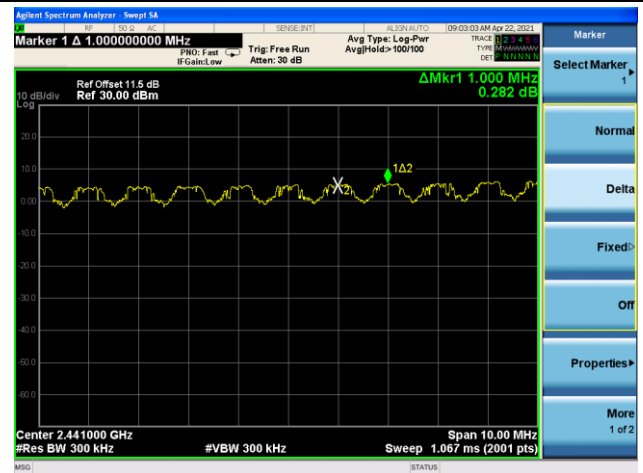


### 3DH5 Carrier Frequency Separation - Right Earbud

Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



## 6.5. Number of Hopping Channels Measurement

### 6.5.1. Test Limit

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

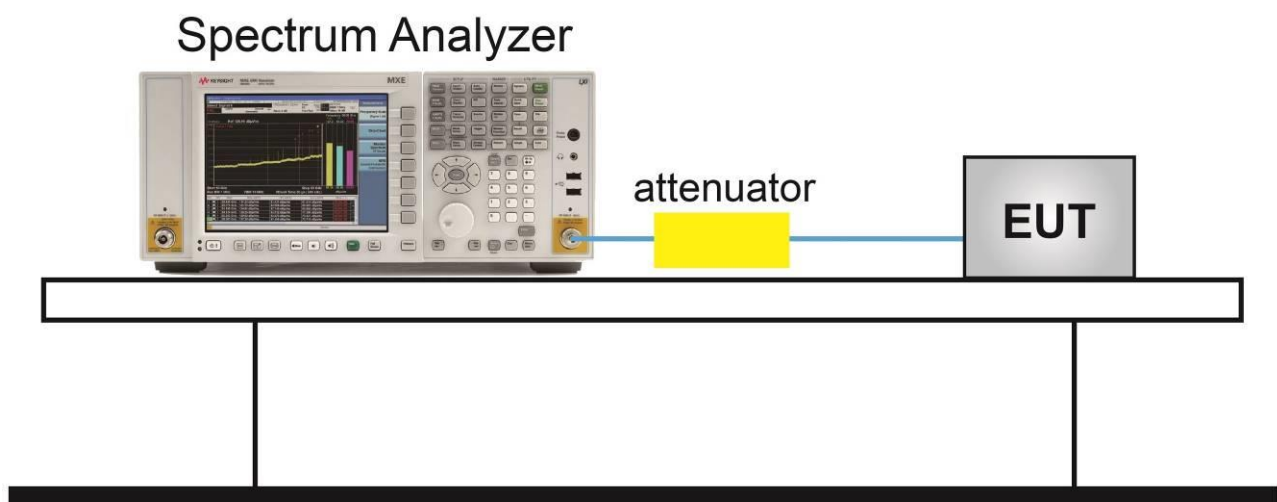
### 6.5.2. Test Procedure Used

ANSI C63.10-2013 - Section 7.8.3

### 6.5.3. Test Setting

1. Span = The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
2. 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.
3. VBW  $\geq$  RBW
4. Sweep time = Auto couple
5. Detector = Peak
6. Trace mode = Max hold
7. Allow the trace to stabilize

### 6.5.4. Test Setup



### 6.5.5. Test Result

|           |                       |               |           |
|-----------|-----------------------|---------------|-----------|
| Test Site | NS-TR2                | Test Engineer | Flay Yang |
| Test Date | 2021/04/21~2021/04/22 |               |           |

| Test Mode<br>(Hopping) | Channel Numbers | Frequency<br>(MHz) | Limit<br>(Hopping Channels) | Result |
|------------------------|-----------------|--------------------|-----------------------------|--------|
| Left Earbud            |                 |                    |                             |        |
| DH5                    | 79              | 2402 ~ 2480        | $\geq 15$                   | Pass   |
| 2DH5                   | 79              | 2402 ~ 2480        | $\geq 15$                   | Pass   |
| 3DH5                   | 79              | 2402 ~ 2480        | $\geq 15$                   | Pass   |
| Right Earbud           |                 |                    |                             |        |
| DH5                    | 79              | 2402 ~ 2480        | $\geq 15$                   | Pass   |
| 2DH5                   | 79              | 2402 ~ 2480        | $\geq 15$                   | Pass   |
| 3DH5                   | 79              | 2402 ~ 2480        | $\geq 15$                   | Pass   |