



# MEASUREMENT REPORT

## FCC PART 15.247 Bluetooth

Report No.: S20250723677201

Issue Date: 2025-12-24

**Applicant:** Alps Alpine North America, Inc.  
**Address:** 1500 Atlantic Blvd, Auburn Hills Michigan, United States 48326  
**FCC ID:** 2ACH3UTEM701  
**Product:** Marine Radio with Bluetooth  
**Model No.:** UTE-M701  
**FCC Classification:** FCC Part 15 Spread Spectrum Transmitter (DSS)  
**FCC Rule Part(s):** Part 15 Subpart C (15.247)  
**Test Procedure(s):** ANSI C63.10-2020, KDB 558074 D01v05r02  
**Result:** Pass  
**Item Receipt Date:** Aug. 14, 2025  
**Test Date:** Aug. 15, ~ Aug. 25, 2025



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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 C63.10-2020. 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 Fangguang Inspection & Testing Co., Ltd. Wuxi Branch.

The test report must not be used by the client to claim product certifications, approval, or endorsement by NVLAP, NIST or any agency of U.S. Government.

### Revision History

| Report No.      | Version | Description | Issue Date |
|-----------------|---------|-------------|------------|
| S20250723677201 | Rev. 01 | /           | 2025-12-24 |

## CONTENTS

| Description                                                            | Page |
|------------------------------------------------------------------------|------|
| § 2.1033 General Information.....                                      | 6    |
| 1. INTRODUCTION.....                                                   | 7    |
| 1.1. Scope.....                                                        | 7    |
| 1.2. FANGGUANG Test Location .....                                     | 7    |
| 2. PRODUCT INFORMATION.....                                            | 8    |
| 2.1. Equipment Description .....                                       | 8    |
| 2.2. Product Specification Subjective to this Standard.....            | 8    |
| 2.3. Operation Frequency / Channel List .....                          | 10   |
| 2.4. Pseudorandom Frequency Hopping Sequence.....                      | 11   |
| 2.5. Device Capabilities .....                                         | 11   |
| 2.6. Description of Test Software .....                                | 17   |
| 2.7. Test Configuration.....                                           | 17   |
| 2.8. EMI Suppression Device(s)/Modifications .....                     | 18   |
| 2.9. EUT Photo .....                                                   | 18   |
| 2.10. Labeling Requirements .....                                      | 18   |
| 2.11. Calculation with all conversion and correction factors used..... | 18   |
| 3. DESCRIPTION of TEST .....                                           | 19   |
| 3.1. Evaluation Procedure.....                                         | 19   |
| 3.2. AC Line Conducted Emissions .....                                 | 19   |
| 3.3. Radiated Emissions .....                                          | 20   |
| 4. ANTENNA REQUIREMENTS .....                                          | 21   |
| 5. TEST EQUIPMENT CALIBRATION DATE .....                               | 22   |
| 6. MEASUREMENT UNCERTAINTY.....                                        | 24   |
| 7. TEST RESULT .....                                                   | 25   |
| 7.1. Summary .....                                                     | 25   |
| 7.2. 20dB Bandwidth Measurement.....                                   | 26   |
| 7.2.1. Test Limit .....                                                | 26   |
| 7.2.2. Test Procedure used.....                                        | 26   |
| 7.2.3. Test Setting.....                                               | 26   |
| 7.2.4. Test Setup.....                                                 | 26   |
| 7.2.5. Test Result .....                                               | 27   |
| 7.3. Output Power Measurement.....                                     | 37   |
| 7.3.1. Test Limit .....                                                | 37   |
| 7.3.2. Test Procedure Used .....                                       | 37   |
| 7.3.3. Test Setting.....                                               | 37   |
| 7.3.4. Test Setup.....                                                 | 38   |

|        |                                                 |    |
|--------|-------------------------------------------------|----|
| 7.3.5. | Test Result .....                               | 39 |
| 7.4.   | Carrier Frequency Separation Measurement .....  | 44 |
| 7.4.1. | Test Limit .....                                | 44 |
| 7.4.2. | Test Procedure Used .....                       | 44 |
| 7.4.3. | Test Setting .....                              | 44 |
| 7.4.4. | Test Setup .....                                | 45 |
| 7.4.5. | Test Result .....                               | 46 |
| 7.5.   | Number of Hopping Channels Measurement .....    | 48 |
| 7.5.1. | Test Limit .....                                | 48 |
| 7.5.2. | Test Procedure Used .....                       | 48 |
| 7.5.3. | Test Settting .....                             | 48 |
| 7.5.4. | Test Setup .....                                | 48 |
| 7.5.5. | Test Result .....                               | 49 |
| 7.6.   | Time of Occupancy Measurement .....             | 51 |
| 7.6.1. | Test Limit .....                                | 51 |
| 7.6.2. | Test Procedure Used .....                       | 51 |
| 7.6.3. | Test Settting .....                             | 51 |
| 7.6.4. | Test Setup .....                                | 52 |
| 7.6.5. | Test Result .....                               | 53 |
| 7.7.   | Band-edge Compliance Measurement .....          | 58 |
| 7.7.1. | Test Limit .....                                | 58 |
| 7.7.2. | Test Procedure Used .....                       | 58 |
| 7.7.3. | Test Setting .....                              | 58 |
| 7.7.4. | Test Setup .....                                | 59 |
| 7.7.5. | Test Result .....                               | 60 |
| 7.8.   | Conducted Spurious Emissions Measurement .....  | 67 |
| 7.8.1. | Test Limit .....                                | 67 |
| 7.8.2. | Test Procedure Used .....                       | 67 |
| 7.8.3. | Test Setting .....                              | 67 |
| 7.8.4. | Test Setup .....                                | 68 |
| 7.8.5. | Test Result .....                               | 69 |
| 7.9.   | Radiated Spurious Emission Measurement .....    | 84 |
| 7.9.1. | Test Limit .....                                | 84 |
| 7.9.2. | Test Procedure Used .....                       | 84 |
| 7.9.3. | Test Setting .....                              | 85 |
| 7.9.4. | Test Setup .....                                | 87 |
| 7.9.5. | Test Result .....                               | 88 |
| 7.10.  | Radiated Restricted Band Edge Measurement ..... | 97 |

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|         |                                          |     |
|---------|------------------------------------------|-----|
| 7.10.1. | Test Procedure Used .....                | 98  |
| 7.10.2. | Test Setting.....                        | 98  |
| 7.10.3. | Test Setup.....                          | 99  |
| 7.10.4. | Test Result .....                        | 100 |
| 7.11.   | AC Conducted Emissions Measurement ..... | 116 |
| 7.11.1. | Test Limit .....                         | 116 |
| 7.11.2. | Test Setup.....                          | 116 |
| 7.11.3. | Test Result .....                        | 116 |
| 8.      | CONCLUSION.....                          | 117 |

## §2.1033 General Information

|                                |                                                                                                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Applicant:</b>              | Alps Alpine North America, Inc.                                                                                                                         |
| <b>Applicant Address:</b>      | 1500 Atlantic Blvd, Auburn Hills Michigan, United States 48326                                                                                          |
| <b>Manufacturer:</b>           | Huizhou Foryou General Electronics Co., Ltd.                                                                                                            |
| <b>Manufacturer Address:</b>   | No.2 District A, Foryou Industry Park, No. 1 North Shangxia Road, Dongjiang Hi tech Industry Park, 516005 Huizhou city, Guangdong Province, China(PROC) |
| <b>Factory:</b>                | Huizhou Foryou General Electronics Co., Ltd.                                                                                                            |
| <b>Factory Address:</b>        | No.2 District A, Foryou Industry Park, No. 1 North Shangxia Road, Dongjiang Hi tech Industry Park, 516005 Huizhou city, Guangdong Province, China(PROC) |
| <b>Test Site:</b>              | Fangguang Inspection & Testing Co., Ltd.                                                                                                                |
| <b>LAB ID:</b>                 | CN5037                                                                                                                                                  |
| <b>Test Site Address:</b>      | No.8 Ningyun Rd., Xinwu District Wuxi, Jiangsu 214000 China                                                                                             |
| <b>FCC Rule Part(s):</b>       | Part 15 Subpart C (15.247)                                                                                                                              |
| <b>FCC ID:</b>                 | 2ACH3UTEM701                                                                                                                                            |
| <b>Test Device Serial No.:</b> | S/N.: S202507236772-1-1<br><input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering  |
| <b>FCC Classification:</b>     | FCC Part 15 Spread Spectrum Transmitter (DSS)                                                                                                           |

## **1. INTRODUCTION**

### **1.1. Scope**

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

### **1.2. FANGGUANG Test Location**

These measurement tests were performed at the Fangguang Inspection and testing Co.,LTD located at No.8 Ningyun Rd., Xinwu District Wuxi, Jiangsu 214000 China. The detailed description of the measurement facility was found to be in compliance with the requirements of ANSI C63.10-2020.

## 2. PRODUCT INFORMATION

### 2.1. Equipment Description

|                      |                                                                                                          |
|----------------------|----------------------------------------------------------------------------------------------------------|
| Product Name:        | Marine Radio with Bluetooth                                                                              |
| Model Name:          | UTE-M701                                                                                                 |
| Trade Mark:          | Alpine                                                                                                   |
| Input Voltage Range: | DC 12V                                                                                                   |
| Software Version:    | HMS210A_MPEG V1.15                                                                                       |
| Hardware Version:    | V03                                                                                                      |
| Bluetooth Version:   | 5.2                                                                                                      |
| Note:                | This information is provided by the Customer and its authenticity is the responsibility of the Customer. |

### 2.2. Product Specification Subjective to this Standard

|                      |                                                     |
|----------------------|-----------------------------------------------------|
| Operating Frequency: | 2402~2480MHz                                        |
| Channel Number:      | 79                                                  |
| Channel Spacing      | 1 MHz                                               |
| Type of modulation:  | GFSK, $\pi/4$ DQPSK, 8DPSK                          |
| Data Rate:           | 1Mbps (GFSK), 2Mbps ( $\pi/4$ DQPSK), 3Mbps (8DPSK) |
| Antenna Type:        | PCB Antenna                                         |
| Antenna Gain:        | 0dBi                                                |

Note: The maximum Antenna Gain was declared by the manufacturer.

The equipment under test (EUT) is the **Marine Radio with Bluetooth**. The test data contained in this report pertains only to the emissions due to the EUT's Bluetooth transmitter.

- 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.
- 15.247(h): The EUT employs Adaptive Frequency Hopping (AFH) which identifies sources of interference namely devices operating in 802.11 WLAN and excludes them from the list of available channels. The process of re-mapping reduces the number of test channels from 79 channels to a minimum number of 20 channels.

### 2.3. Operation Frequency / Channel List

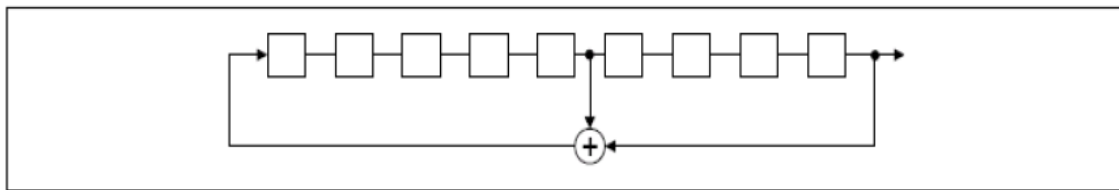
| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|---------|-----------|
| 00      | 2402 MHz  | 01      | 2403 MHz  | 02      | 2404 MHz  |
| 03      | 2405 MHz  | 04      | 2406 MHz  | 05      | 2407 MHz  |
| 06      | 2408 MHz  | 07      | 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  | -       | -         | -       | -         |

EUT was tested with Channel 0, 39 and 78.

## 2.4. Pseudorandom Frequency Hopping Sequence

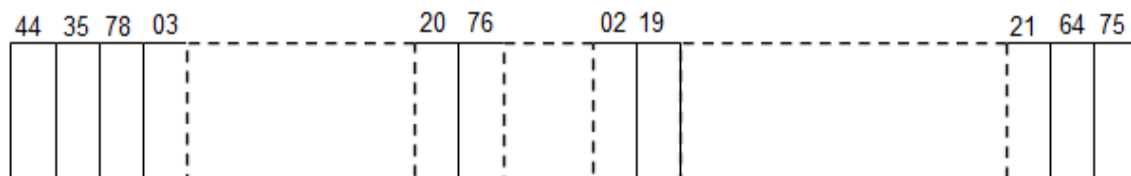
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized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

This device contains the following capabilities:Bluetooth (5.2)

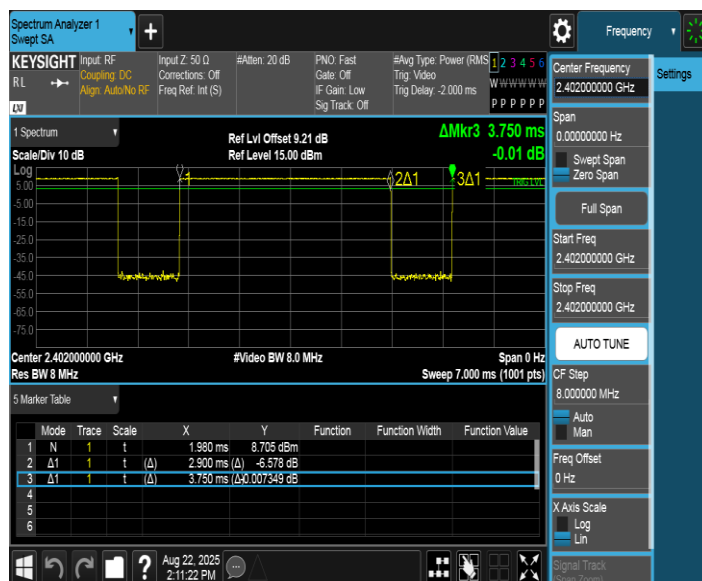
**Note:** The maximum achievable duty cycle was determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 8MHz. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater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

| Test Mode | Antenna | Channel | ON Time [ms] | Period [ms] | Duty Cycle [%] |
|-----------|---------|---------|--------------|-------------|----------------|
| DH5       | Ant1    | 2402    | 2.90         | 3.75        | 77.33          |
|           |         | 2441    | 2.90         | 3.75        | 77.33          |
|           |         | 2480    | 2.90         | 3.76        | 77.13          |
| 2DH5      | Ant1    | 2402    | 2.89         | 3.74        | 77.27          |
|           |         | 2441    | 2.89         | 3.75        | 77.07          |
|           |         | 2480    | 2.89         | 3.75        | 77.07          |

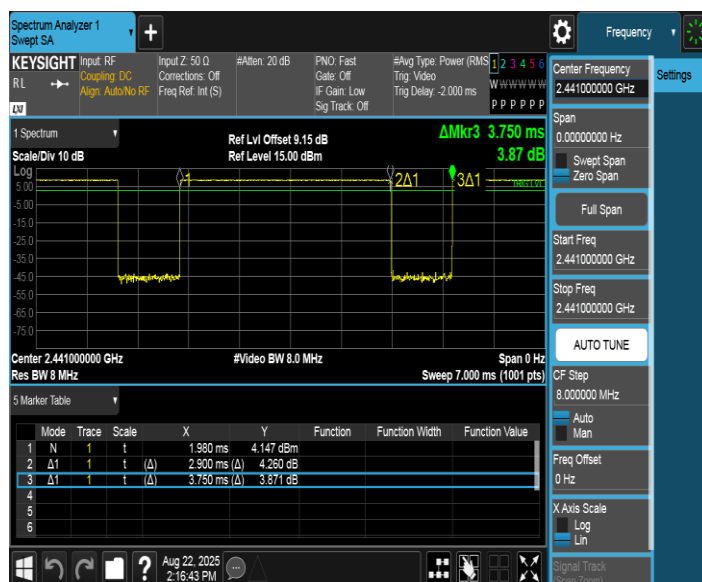
|      |      |      |      |      |       |
|------|------|------|------|------|-------|
| 3DH5 | Ant1 | 2402 | 2.89 | 3.75 | 77.07 |
|      |      | 2441 | 2.89 | 3.75 | 77.07 |
|      |      | 2480 | 2.89 | 3.75 | 77.07 |

## Test Graphs

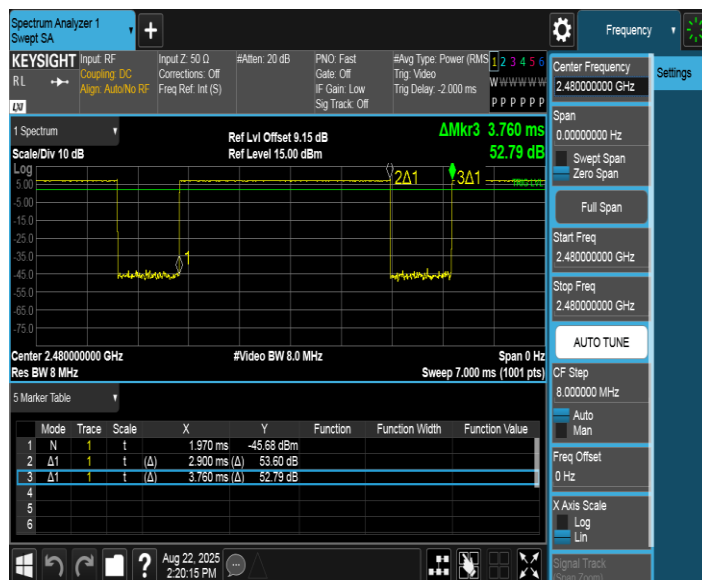
DH5\_Ant1\_2402



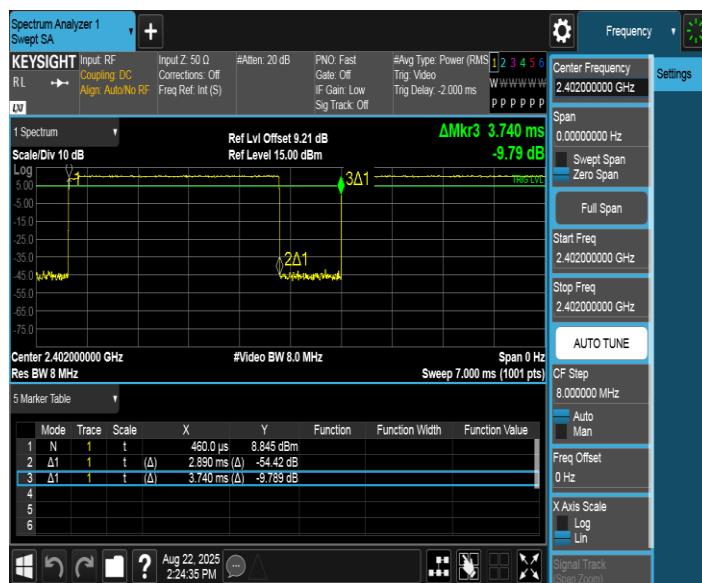
DH5\_Ant1\_2441



DH5\_Ant1\_2480



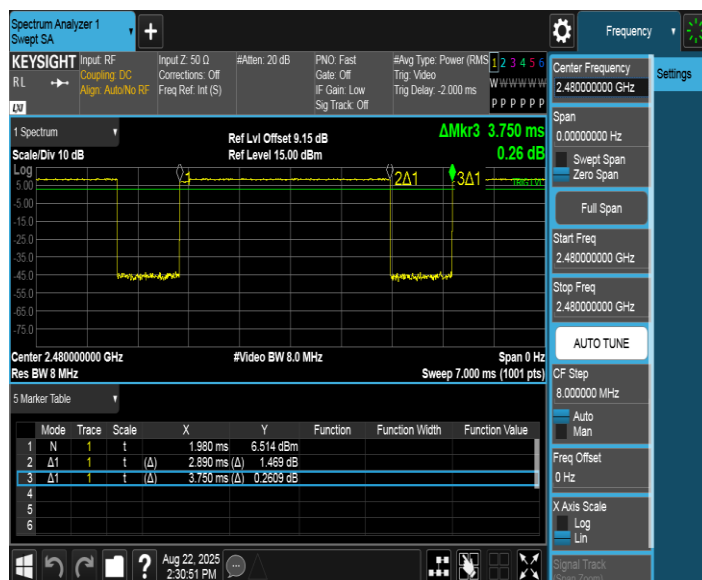
2DH5\_Ant1\_2402



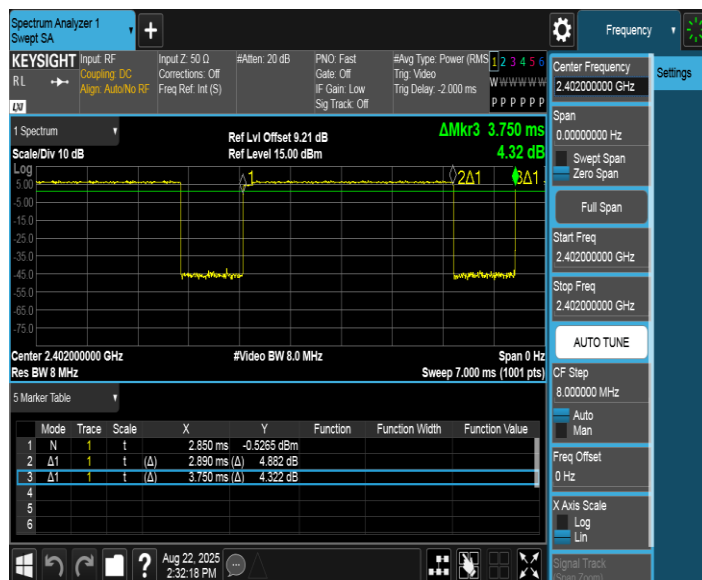
2DH5\_Ant1\_2441



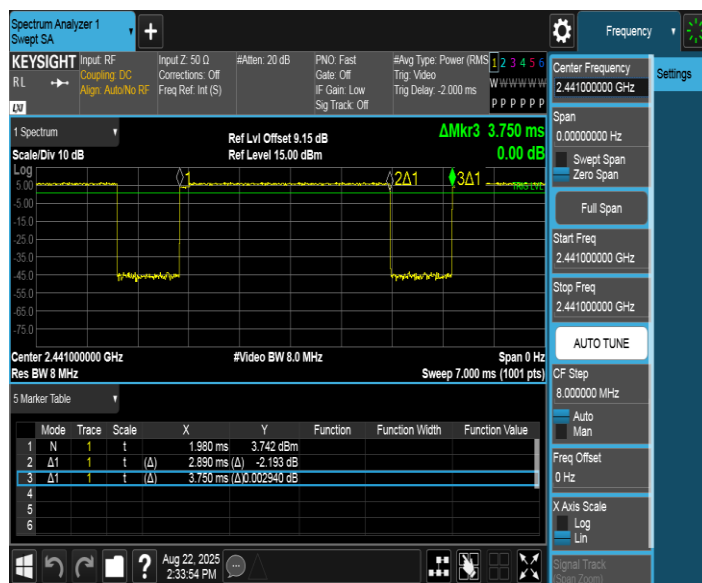
2DH5\_Ant1\_2480



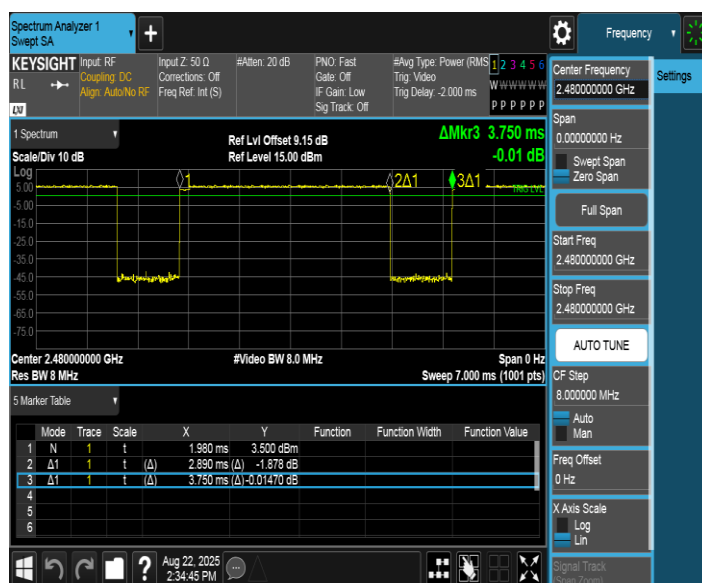
3DH5\_Ant1\_2402



3DH5\_Ant1\_2441



3DH5\_Ant1\_2480



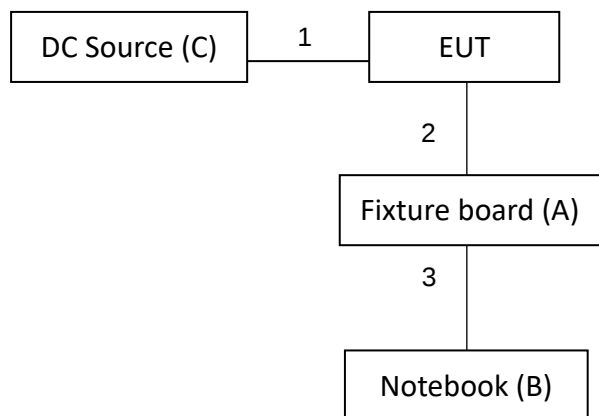
## 2.6. Description of Test Software

The test utility software used during testing was “SecureCRT.exe”, and the test software power level sets as follow:

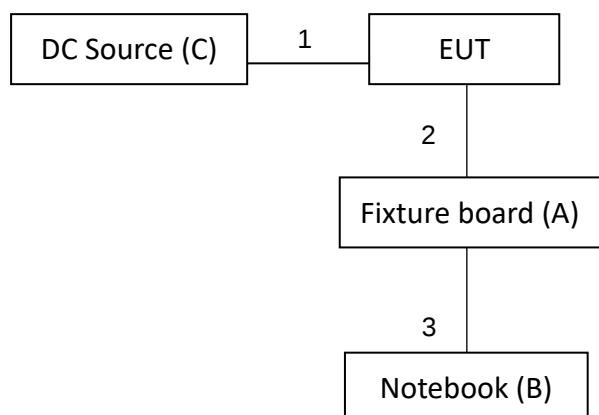
| Software      | Test level                           |
|---------------|--------------------------------------|
| SecureCRT.exe | DH5: 14<br>2DH5: 13<br>3DH5: Default |

## 2.7. Test Configuration

For 20dB Bandwidth& Carrier Frequencies Separated & Hopping Channel Number & Dwell Time &Conducted band edges and Spurious Emission & Duty Cycle & Maximum Peak Output Power:



For Radiated Spurious Emission&Restricted bands of operation:



## 2.8. EMI Suppression Device(s)/Modifications

| No. | Name of equipment | Manufacturer | Model        | Serial number |
|-----|-------------------|--------------|--------------|---------------|
| A   | Fixture board     | /            | /            | /             |
| B   | Notebook          | DELL         | Latitude3300 | 2C6CFW2       |
| C   | DC Source         | LW           | PS-305D      | 230602731     |

| No. | Cable Type   | Qty. | Shielded Type | Ferrite Core(Qty.) | Length |
|-----|--------------|------|---------------|--------------------|--------|
| 1   | DC cable     | 1    | No            | 0                  | 1.0m   |
| 2   | Serial cable | 1    | No            | 0                  | 0.4m   |
| 3   | USB cable    | 1    | No            | 0                  | 1.5m   |

Note: (1) The notebook is just used to produce fixed frequency transmitting.

## 2.9. EUT Photo

The EUT external photo, internal photo and test setup photo, please refer to the plots in the S202507236772-A1/A2/A3.

## 2.10. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase.

However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

## 2.11. Calculation with all conversion and correction factors used

For AC Line Conducted Emissions Test:

Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

For Radiated Emissions Below 1GHz Test:

Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

For Radiated Emissions Above 1GHz Test:

Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB).

### 3. DESCRIPTION of TEST

#### 3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2020), and the “Filing were used in the measurement of the EUT.

**Deviation from measurement procedure.....None**

#### 3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 9'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions were used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2020.

### 3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. The turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beamwidth of horn antenna, the horn antenna should be always directed to the EUT when rising height.

## 4. 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.”

- Use a unique coupling to the intentional radiator.

## 5. TEST EQUIPMENT CALIBRATION DATE

### Conducted Emissions

| Instrument         | Manufacturer | Type No. | Asset No.       | Cali. Interval | Cali. Due Date |
|--------------------|--------------|----------|-----------------|----------------|----------------|
| EMI Test Receiver  | R&S          | ESR3     | FWXGJC-2016-181 | 1 year         | 2026/07/08     |
| Two-Line V-Network | R&S          | ENV216   | FWXGJC-2016-182 | 1 year         | 2026/07/09     |
| Thermohygrometer   | Yuhuaze      | HTC-1    | FWXDA-2016-385  | 1 year         | 2026/08/24     |

### Radiated Emission

| Instrument             | Manufacturer | Type No.        | Asset No.          | Cali. Interval | Cali. Due Date |
|------------------------|--------------|-----------------|--------------------|----------------|----------------|
| Loop Antenna           | Schwarzbeck  | FMZB 1519B      | FWXGJC-2018-015    | 1 year         | 2026/06/21     |
| Bi-Log Antenna         | R&S          | VULB 9168       | FWXGJC-2024-055    | 1 year         | 2026/06/21     |
| Broadband Horn Antenna | R&S          | HF907           | FWXGJC-2016-267-07 | 1 year         | 2026/06/21     |
| Broadband Horn Antenna | Schwarzbeck  | BBHA9170        | FWXGJC-2018-016    | 1 year         | 2026/06/21     |
| EMI Receiver           | R&S          | ESR26           | FWXGJC-2016-267-01 | 1 year         | 2026/07/16     |
| Pre-Amplifier          | Tonscend     | TAP0118048      | FWXGJC-2024-056    | 1 year         | 2026/06/21     |
| Pre-Amplifier          | R&S          | EMC184055<br>SE | FWXGJC-2018-018    | 1 year         | 2026/06/21     |
| Hygrothermograph       | Mittel       | HTC-1           | FWXDA-2016-387     | 1 year         | 2026/08/24     |
| Anechoic Chamber       | SAEMC        | FSAC318         | FGZZ-2024-035      | 3 year         | 2027/06/02     |

### Conducted Test Equipment

| Instrument          | Manufacturer | Type No. | Asset No.       | Cali. Interval | Cali. Due Date |
|---------------------|--------------|----------|-----------------|----------------|----------------|
| EXA Signal Analyzer | Keysight     | N9010B   | FWXGJC-2018-010 | 1 year         | 2026/07/16     |
| RF Control Unit     | Toncend      | JS0806-2 | FWXGJC-2018-013 | 1 year         | 2026/07/21     |
| Thermohygrometer    | Yuhuaze      | HTC-1    | FWXDA-2016-385  | 1 year         | 2026/08/24     |

### Auxiliary Equipment

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Due Date |
|------------|--------------|----------|-----------|----------------|
| Filter     | Toncend      | ZBSF6    | 07247867  | 2026/07/16     |
| Filter     | Toncend      | ZHPF6    | 07233297  | 2026/07/16     |
| Attenuator | Toncend      | 10dB     | /         | 2026/07/16     |
| RF Cable   | Toncend      | T-1      | /         | 2026/07/16     |

## Test Software

| Test Software    | Manufacturer | Version | Asset No.      | Function |
|------------------|--------------|---------|----------------|----------|
| JS32             | Tonscend     | V5.0.0  | FWXWA-2019-004 | RE       |
| RF Test Software | Tonscend     | 3.3.10  | /              | /        |

## 6. 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>                                                                                |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>2.68dB                                        |
| <b>Radiated Emission Measurement (9kHz - 30MHz)</b>                                                                     |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>3.06dB                                        |
| <b>Radiated Emission Measurement (30MHz -1GHz)</b>                                                                      |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>4.01dB                                        |
| <b>Radiated Emission Measurement (1-18GHz)</b>                                                                          |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>4.97dB                                        |
| <b>Radiated Emission Measurement (18-40GHz)</b>                                                                         |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>5.32dB                                        |
| <b>Spurious Emissions, Conducted</b>                                                                                    |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>30MHz-1GHz: 1.00 dB<br>1GHz-12.75GHz: 1.30 dB |
| <b>Output Power</b>                                                                                                     |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>0.60dB                                        |
| <b>Power Spectrum Density</b>                                                                                           |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>0.80dB                                        |
| <b>Occupied Bandwidth</b>                                                                                               |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>0.20MHz                                       |
| <b>Frequency Stability</b>                                                                                              |
| Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ):<br>$0.1 \times 10^{-6}$ MHz                      |

## 7. TEST RESULT

### 7.1. 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 7.2                 |
| 15.247(b)(1)        | Peak Transmitter Output Power                                                    | <0.125 Watt if > 75 non- overlapping channels used                             |                | PASS        | Section 7.3                 |
| 15.247(a)(1)        | Channel Separation                                                               | > 2/3 of 20 dB BW for systems with Output Power < 125mW                        |                | PASS        | Section 7.4                 |
| 15.247(a)(1)(i ii)  | Number of Channels                                                               | > 15 Channels                                                                  |                | PASS        | Section 7.5                 |
| 15.247(a)(1)(i ii)  | Time of Occupancy                                                                | < 0.4 sec in 31.6 sec period                                                   |                | PASS        | Section 7.6                 |
| 15.247(d)           | Band Edge / out-of-Band Emissions                                                | Conducted $\geq$ 20dBc                                                         |                | PASS        | Section 7.7<br>Section 7.8  |
| 15.205, 15.209      | General Field Strength Limits<br>(Restricted Bands and Radiated Emission Limits) | Emissions in restricted bands must meet the radiated limits detailed in 15.209 | Radiated       | PASS        | Section 7.9<br>Section 7.10 |
| 15.207              | AC Conducted Emissions<br>150kHz - 30MHz                                         | < FCC 15.207 limits                                                            | Line Conducted | N/A         | Section 7.11                |

#### Notes:

- 1) 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.
- 2) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

## 7.2. 20dB Bandwidth Measurement

### 7.2.1.Test Limit

N/A

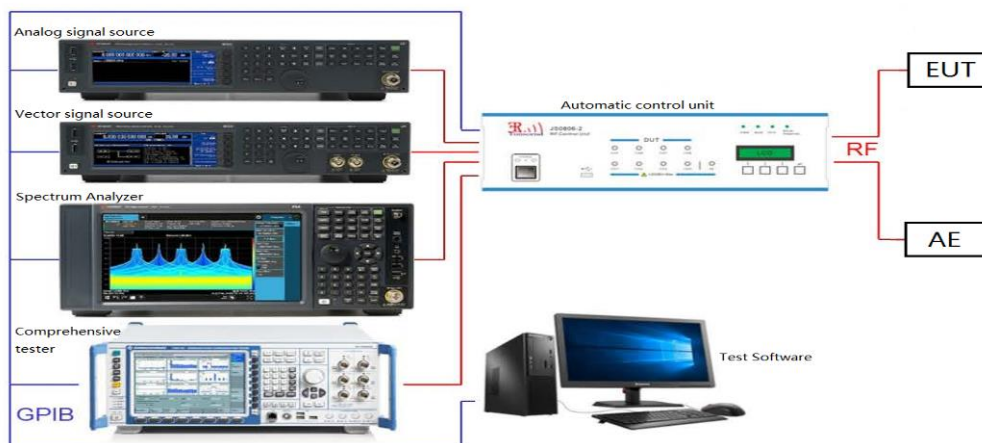
### 7.2.2.Test Procedure used

ANSI C63.10-2020 - Section 6.9.2

### 7.2.3.Test Setting

1. Set RBW  $\geq 1\%$  to 5% of the 20dB bandwidth
2. VBW = approximately three times RBW
3. Span = approximately 2 to 5 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
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.

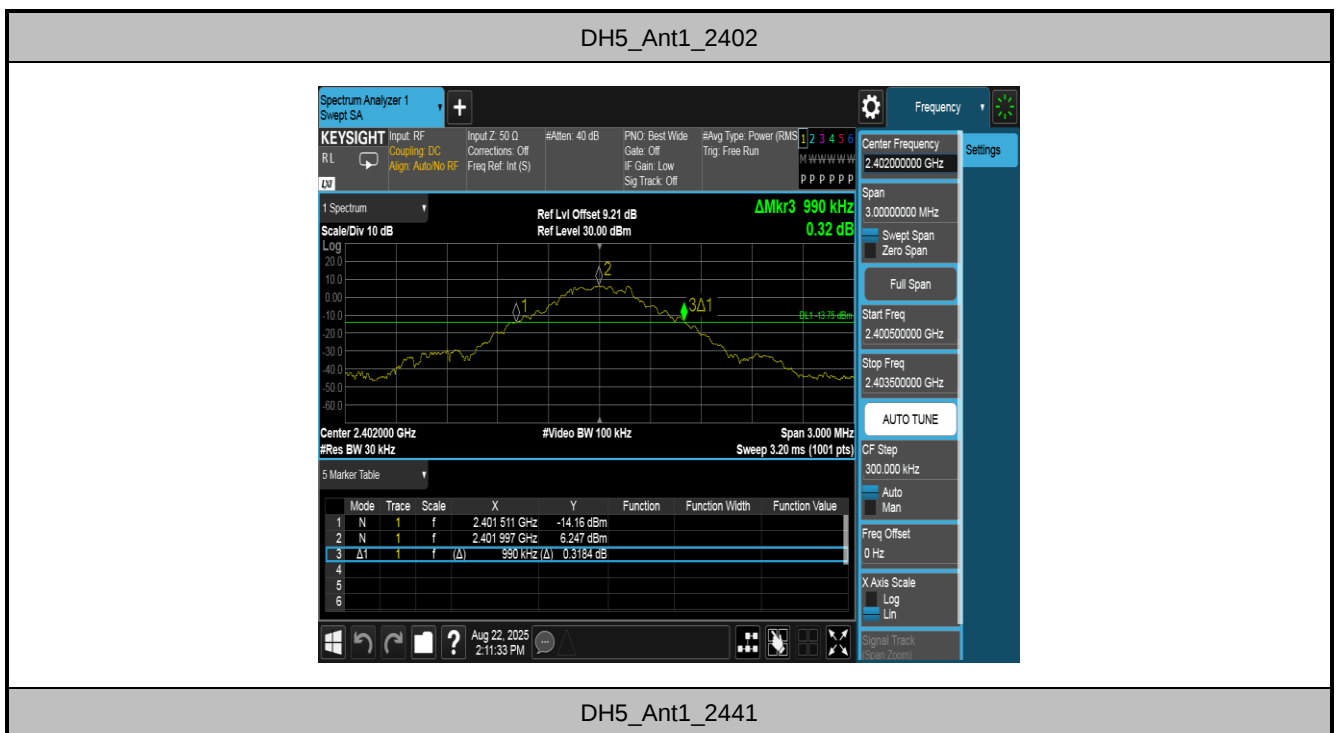
### 7.2.4.Test Setup



## 7.2.5.Test Result

| Test Mode | Antenna | Channel | 20db EBW[MHz] | FL[MHz]  | FH[MHz]  | 99% BW (MHz) | Verdict |
|-----------|---------|---------|---------------|----------|----------|--------------|---------|
| DH5       | Ant1    | 2402    | 0.990         | 2401.511 | 2402.501 | 0.87314      | PASS    |
|           |         | 2441    | 1.029         | 2440.469 | 2441.498 | 0.87129      | PASS    |
|           |         | 2480    | 1.023         | 2479.478 | 2480.501 | 0.89198      | PASS    |
| 2DH5      | Ant1    | 2402    | 1.356         | 2401.328 | 2402.684 | 1.2237       | PASS    |
|           |         | 2441    | 1.362         | 2440.325 | 2441.687 | 1.2218       | PASS    |
|           |         | 2480    | 1.347         | 2479.322 | 2480.669 | 1.2090       | PASS    |
| 3DH5      | Ant1    | 2402    | 1.317         | 2401.343 | 2402.660 | 1.1953       | PASS    |
|           |         | 2441    | 1.317         | 2440.343 | 2441.660 | 1.1953       | PASS    |
|           |         | 2480    | 1.320         | 2479.340 | 2480.660 | 1.2082       | PASS    |

## Test Graphs Of 20dB Emission Bandwidth





DH5\_Ant1\_2480



2DH5\_Ant1\_2402



2DH5\_Ant1\_2441



2DH5\_Ant1\_2480