# RF TEST REPORT

**For**

## SHENZHEN LONG SI PU TECHNOLOGY LIMITED
## Product Name: WiFi Wall Switch
## Test Model(s): USCW

| | | |
|---|---|---|
| **Report Reference No.** | : | **DACE250517019RL001** |
| **FCC ID** | : | **2AV9Z-USCW** |
| **Applicant's Name** | : | SHENZHEN LONG SI PU TECHNOLOGY LIMITED |
| **Address** | : | 301, Building J, Haoguan Jiaqi Chuangyuan, Xiaolong Road, Shanghenglang Community, Dalang Street, Longhua District, Shenzhen |
| **Testing Laboratory** | : | Shenzhen DACE Testing Technology Co., Ltd. |
| **Address** | : | 102, Building H1, & 1/F., Building H, Hongfa Science & Technology Park, Tangtou Community, Shiyan Subdistrict, Bao'an District, Shenzhen, Guangdong, China |
| **Test Specification Standard** | : | **47 CFR Part 15.247** |
| **Date of Receipt** | : | May 17, 2025 |
| **Date of Test** | : | May 17, 2025 to May 26, 2025 |
| **Data of Issue** | : | May 26, 2025 |
| **Result** | : | **Pass** |

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CHECK

000005526

# Apply for company information

| | | |
|---|---|---|
| **Applicant's Name** | : | SHENZHEN LONG SI PU TECHNOLOGY LIMITED |
| **Address** | : | 301, Building J, Haoguan Jiaqi Chuangyuan, Xiaolong Road, Shanghenglang Community, Dalang Street, Longhua District, Shenzhen |
| **Product Name** | : | WiFi Wall Switch |
| **Test Model(s)** | : | USCW |
| **Series Model(s)** | : | USCW1, USCW2, USCW3, USCW4 |
| **Test Specification Standard(s)** | : | 47 CFR Part 15.247 |

**NOTE1:**

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

| Compiled by: | Supervised by: | Approved by: |
|---|---|---|
| Keren Huang | Stone Yin | Tom Chen |
| Keren Huang / Test Engineer | Stone Yin / Project Engineer | Tom Chen / Manager |
| May 26, 2025 | May 26, 2025 | May 26, 2025 |

Shenzhen DACE Testing Technology Co., Ltd. APPROVED

# Revision History Of Report

| Version | Description | REPORT No. | Issue Date |
|---|---|---|---|
| V1.0 | Original | DACE250517019RL001 | May 26, 2025 |
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# 1 TEST SUMMARY

## 1.1 Test Standards

The tests were performed according to following standards:

**47 CFR Part 15.247:** Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

## 1.2 Summary of Test Result

| Item | Method | Requirement | Result |
|---|---|---|---|
| Antenna requirement | / | 47 CFR 15.203 | Pass |
| Conducted Emission at AC power line | ANSI C63.10-2020 section 6.2 | 47 CFR 15.207(a) | Pass |
| 6dB Bandwidth | ANSI C63.10-2020, section 11.8<br>KDB 558074 D01 15.247 Meas Guidance v05r02 | 47 CFR 15.247(a)(2) | Pass |
| Maximum Conducted Output Power | ANSI C63.10-2020 section 11.9.1<br>KDB 558074 D01 15.247 Meas Guidance v05r02 | 47 CFR 15.247(b)(3) | Pass |
| Power Spectral Density | ANSI C63.10-2020, section 11.10<br>KDB 558074 D01 15.247 Meas Guidance v05r02 | 47 CFR 15.247(e) | Pass |
| Emissions in non-restricted frequency bands | ANSI C63.10-2020 section 11.11<br>KDB 558074 D01 15.247 Meas Guidance v05r02 | 47 CFR 15.247(d), 15.209, 15.205 | Pass |
| Band edge emissions (Radiated) | ANSI C63.10-2020 section 6.10<br>KDB 558074 D01 15.247 Meas Guidance v05r02 | 47 CFR 15.247(d), 15.209, 15.205 | Pass |
| Emissions in frequency bands (below 1GHz) | ANSI C63.10-2020 section 6.6.4<br>KDB 558074 D01 15.247 Meas Guidance v05r02 | 47 CFR 15.247(d), 15.209, 15.205 | Pass |
| Emissions in frequency bands (above 1GHz) | ANSI C63.10-2020 section 6.6.4<br>KDB 558074 D01 15.247 Meas Guidance v05r02 | 47 CFR 15.247(d), 15.209, 15.205 | Pass |

Note: 1.N/A -this device(EUT) is not applicable to this testing item
2. RF-conducted test results including cable loss.

# 2 GENERAL INFORMATION

## 2.1 Client Information

**Applicant's Name** : SHENZHEN LONG SI PU TECHNOLOGY LIMITED
**Address** : 301, Building J, Haoguan Jiaqi Chuangyuan, Xiaolong Road, Shanghenglang Community, Dalang Street, Longhua District, Shenzhen

**Manufacturer** : SHENZHEN LONG SI PU TECHNOLOGY LIMITED
**Address** : 301, Building J, Haoguan Jiaqi Chuangyuan, Xiaolong Road, Shanghenglang Community, Dalang Street, Longhua District, Shenzhen

## 2.2 Description of Device (EUT)

| | |
|---|---|
| Product Name: | WiFi Wall Switch |
| Sample No.: | Q250516020 |
| Model/Type reference: | USCW |
| Series Model: | USCW1, USCW2, USCW3, USCW4 |
| Model Difference: | There are multiple models of the product, with differences of the appearance and customer requirements for different models in the market, resulting in multiple models. However, the internal circuit boards, PCBs, BOMs, and other electrical structures of these models are the same, and these differences will not affect RF&EMC performance. Therefore, the selected test model is: USCW |
| Trade Mark: | N/A |
| Product Description: | WiFi Wall Switch |
| Test Power: | AC120V 50/60Hz |
| Operation Frequency: | 802.11b/g/n(HT20): 2412MHz to 2462MHz;<br>802.11n(HT40): 2422MHz to 2452MHz |
| Number of Channels: | 802.11b/g/n(HT20): 11 Channels;<br>802.11n(HT40): 7 Channels |
| Modulation Type: | 802.11b: DSSS(CCK, DQPSK, DBPSK);<br>802.11g: OFDM(BPSK, QPSK, 16QAM, 64QAM);<br>802.11n(HT20 and HT40): OFDM (BPSK, QPSK, 16QAM, 64QAM) |
| Antenna Type: | PCB ANTENNA |
| Antenna Gain: | 1.37dBi |
| Hardware Version: | V1.2 |
| Software Version: | Wifi Test Tool1.7 |

**Operation Frequency each of channel:**

| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|---|---|
| 1 | 2412MHz | 4 | 2426MHz | 7 | 2442MHz | 10 | 2457MHz |
| 2 | 2417MHz | 5 | 2432MHz | 8 | 2447MHz | 11 | 2462MHz |
| 3 | 2422MHz | 6 | 2437MHz | 9 | 2452MHz | -- | -- |

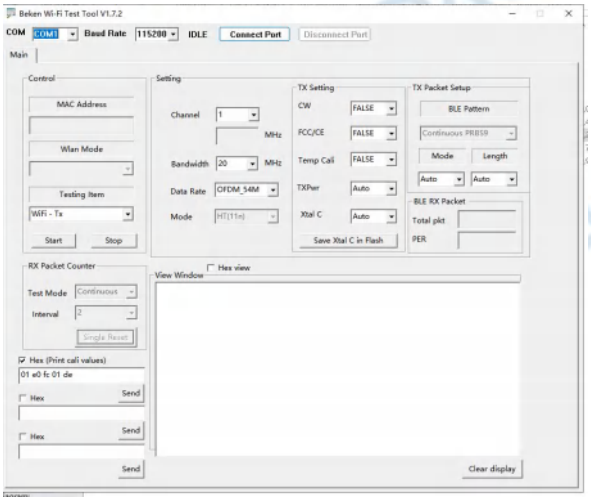
Note: In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Test channel | Frequency (MHz) | |
|---|---|---|
| | 20MHz OBW | 40MHz OBW |
| Lowest channel | 2412MHz | 2422MHz |
| Middle channel | 2437MHz | 2437MHz |
| Highest channel | 2462MHz | 2452MHz |

## 2.3 Description of Test Modes

| No | Title | Description |
|---|---|---|
| TM1 | 802.11b mode | Keep the EUT in 802.11b-11Mbps transmitting mode at lowest, middle and highest channel. |
| TM2 | 802.11g mode | Keep the EUT in 802.11g-54Mbps transmitting mode at lowest, middle and highest channel. |
| TM3 | 802.11n(HT20) mode | Keep the EUT in 802.11n(HT20)-MCS7 transmitting mode at lowest, middle and highest channel. |
| TM4 | 802.11n(HT40) mode | Keep the EUT in 802.11n(HT40)-MCS7 transmitting mode at lowest, middle and highest channel. |

Test software:




After prediction, it was found that the maximum rate power is greater. Therefore, the maximum speed and maximum duty cycle are used for testing.

## 2.4 Description of Support Units

| Title | Manufacturer | Model No. | Serial No. |
|---|---|---|---|
| Tungsten Lamp | / | / | / |

## 2.5 Equipments Used During The Test

| Conducted Emission at AC power line | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No** | **Inventory No** | **Cal Date** | **Cal Due Date** |
| Cable | SCHWARZ BECK | / | / | 2025-04-18 | 2026-04-17 |
| Pulse Limiter | SCHWARZ BECK | VTSD 9561-F Pulse limiter 10dB Attenuation | 561-G071 | 2024-12-06 | 2025-12-05 |
| 50ΩCoaxial Switch | Anritsu | MP59B | M20531 | / | / |
| Test Receiver | Rohde & Schwarz | ESPI TEST RECEIVER | 1164.6607K03 -102109-MH | 2025-04-25 | 2026-04-24 |
| L.I.S.N | R&S | ESH3-Z5 | 831.5518.52 | 2025-04-18 | 2026-04-17 |
| L.I.S.N | SCHWARZ BECK | NSLK 8126 | 05055 | 2025-04-18 | 2026-04-17 |
| Pulse Limiter | CYBERTEK | EM5010A | / | 2024-09-27 | 2025-09-26 |
| EMI test software | EZ -EMC | EZ | V1.1.42 | / | / |

| **6dB Bandwidth**<br>**Maximum Conducted Output Power**<br>**Power Spectral Density**<br>**Emissions in non-restricted frequency bands** | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No** | **Inventory No** | **Cal Date** | **Cal Due Date** |
| RF Test Software | Tachoy Information Technology(shenzhen) Co.,Ltd. | RTS-01 | V1.0.0 | / | / |
| RF Sensor Unit | Tachoy Information Technology(shenzhen) Co.,Ltd. | TR1029-2 | 000001 | / | / |
| Wideband radio communication tester | R&S | CMW500 | 113410 | 2025-04-25 | 2026-04-24 |
| Vector Signal Generator | Keysight | N5181A | MY50143455 | 2024-12-06 | 2025-12-05 |
| Signal Generator | Keysight | N5182A | MY48180415 | 2024-12-06 | 2025-12-05 |
| Spectrum Analyzer | Keysight | N9020A | MY53420323 | 2024-12-06 | 2025-12-05 |

| Band edge emissions (Radiated)<br>Emissions in frequency bands (below 1GHz)<br>Emissions in frequency bands (above 1GHz) | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No** | **Inventory No** | **Cal Date** | **Cal Due Date** |
| EMI Test software | Farad | EZ -EMC | V1.1.42 | / | / |
| Positioning Controller | MF | MF-7802 | / | / | / |
| Amplifier(18-40G) | COM-POWER | AH-1840 | 10100008-1 | 2024-04-26 | 2027-04-25 |
| Horn antenna | COM-POWER | AH-1840 (18-40G) | 10100008 | 2024-04-26 | 2027-04-25 |
| Loop antenna | ZHINAN | ZN30900C | ZN30900C | 2025-04-28 | 2026-04-27 |
| Cable(LF)#2 | Schwarzbeck | / | / | 2024-12-19 | 2025-12-18 |
| Cable(LF)#1 | Schwarzbeck | / | / | 2024-12-19 | 2025-12-18 |
| Cable(HF)#2 | Schwarzbeck | AK9515E | 96250 | 2025-04-25 | 2026-04-24 |
| Cable(HF)#1 | Schwarzbeck | SYV-50-3-1 | / | 2025-04-25 | 2026-04-24 |
| Power amplifier(LF) | Schwarzbeck | BBV9743 | 9743-151 | 2025-04-29 | 2026-04-28 |
| Power amplifier(HF) | Schwarzbeck | BBV9718 | 9718-282 | 2025-04-29 | 2026-04-28 |
| Wideband radio communication tester | R&S | CMW500 | 113410 | 2025-04-25 | 2026-04-24 |
| Spectrum Analyzer | R&S | FSP30 | 1321.3008K40 -101729-jR | 2025-04-18 | 2026-04-17 |
| Test Receiver | R&S | ESCI 3 | 1166.5950K03 -101431-Jq | 2025-04-18 | 2026-04-17 |
| Horn Antenna | Sunol Sciences | DRH-118 | A091114 | 2025-04-21 | 2026-04-20 |
| Broadband Antenna | Sunol Sciences | JB6 Antenna | A090414 | 2024-09-28 | 2026-09-27 |

## 2.6 Statement Of The Measurement Uncertainty

| **Test Item** | **Measurement Uncertainty** |
|---|---|
| Conducted Disturbance (0.15~30MHz) | ±3.41dB |
| Occupied Bandwidth | ±3.63% |
| RF conducted power | ±0.733dB |
| RF power density | ±0.234% |
| Conducted Spurious emissions | ±1.98dB |
| Radiated Emission (Above 1GHz) | ±5.46dB |
| Radiated Emission (Below 1GHz) | ±5.79dB |
| Note: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. | |

## 2.7 Identification of Testing Laboratory

| | |
|---|---|
| Company Name: | Shenzhen DACE Testing Technology Co., Ltd. |
| Address: | 102, Building H1, & 1/F., Building H, Hongfa Science & Technology Park, Tangtou Connunity, Shiyan Subdistrict, Bao'an District, Shenzhen, Guangdong, China |
| Phone Number: | +86-13267178997 |
| Fax Number: | 86-755-29113252 |

Identification of the Responsible Testing Location

| | |
|---|---|
| Company Name: | Shenzhen DACE Testing Technology Co., Ltd. |
| Address: | 102, Building H1, & 1/F., Building H, Hongfa Science & Technology Park, Tangtou Connunity, Shiyan Subdistrict, Bao'an District, Shenzhen, Guangdong, China |
| Phone Number: | +86-13267178997 |
| Fax Number: | 86-755-29113252 |
| FCC Registration Number: | 0032847402 |
| Designation Number: | CN1342 |
| Test Firm Registration Number: | 778666 |
| A2LA Certificate Number: | 6270.01 |

## 2.8 Announcement

(1) The test report reference to the report template version v0.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) This document may not be altered or revised in any way unless done so by DACE and all revisions are duly noted in the revisions section.

(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

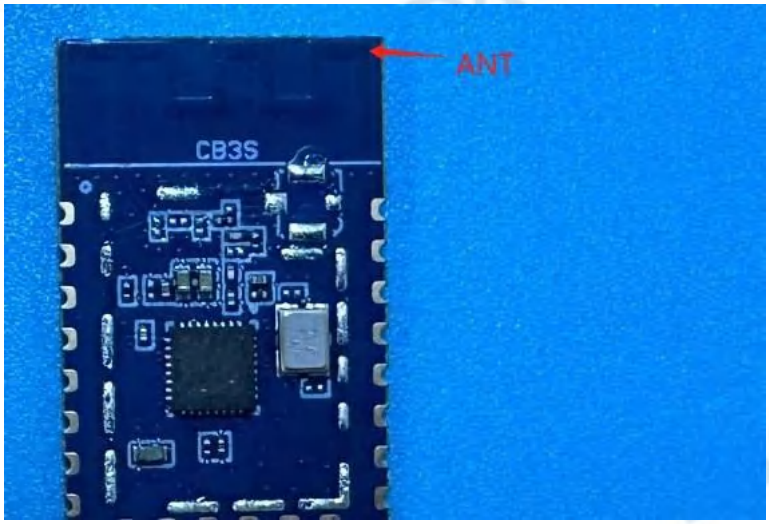
(6) We hereby declare that the laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant. the laboratory is not responsible for the accuracy of the information provided by the client(item 2.2). When the information provided by the customer may affect the effectiveness of the results, the responsibility lies with the customer, and the laboratory does not assume any responsibility.

# 3 Evaluation Results (Evaluation)

## 3.1 Antenna requirement

| | |
|---|---|
| Test Requirement: | Refer to 47 CFR Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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. |

### 3.1.1 Conclusion:



# 4 Radio Spectrum Matter Test Results (RF)

## 4.1 Conducted Emission at AC power line

| | |
|---|---|
| Test Requirement: | Refer to 47 CFR 15.207(a), Except as shown in paragraphs (b)and (c)of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). |
| Test Limit: | |

| Frequency of emission (MHz) | Conducted limit (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

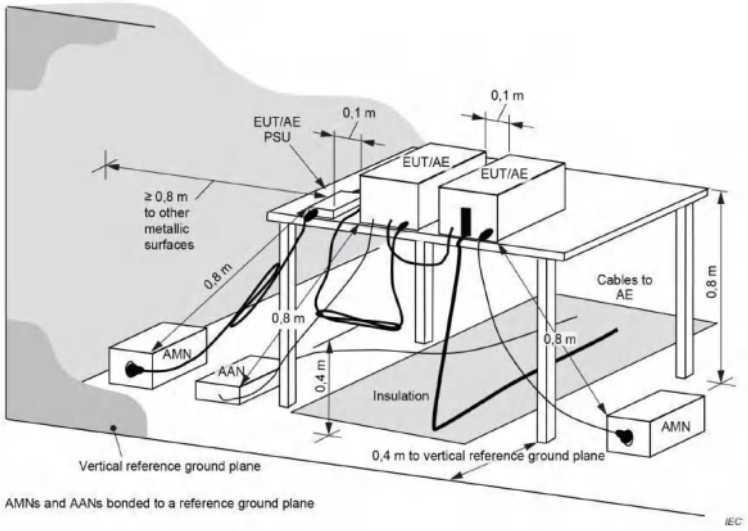
*Decreases with the logarithm of the frequency.

| | |
|---|---|
| Test Method: | ANSI C63.10-2020 section 6.2 |
| Procedure: | Refer to ANSI C63.10-2020 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices |

### 4.1.1 E.U.T. Operation:

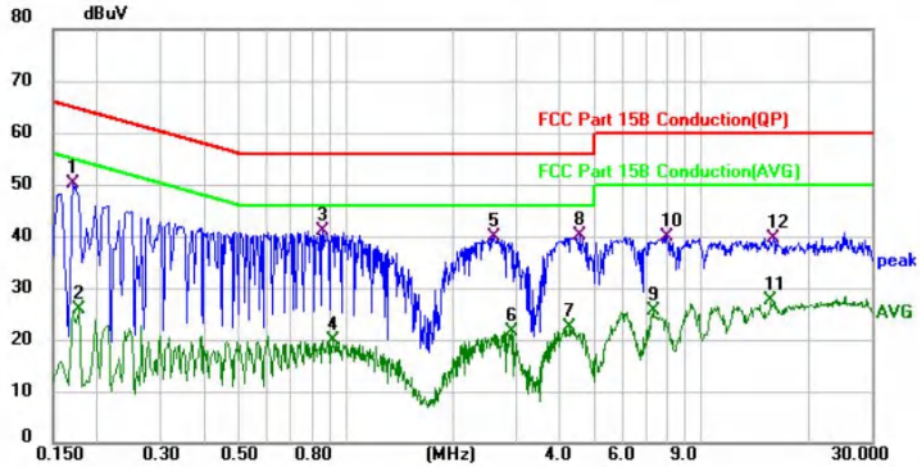
| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 22.5 °C | Humidity: | 48 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1 | | | | |
| Final test mode: | TM1 | | | | |

### 4.1.2 Test Setup Diagram:



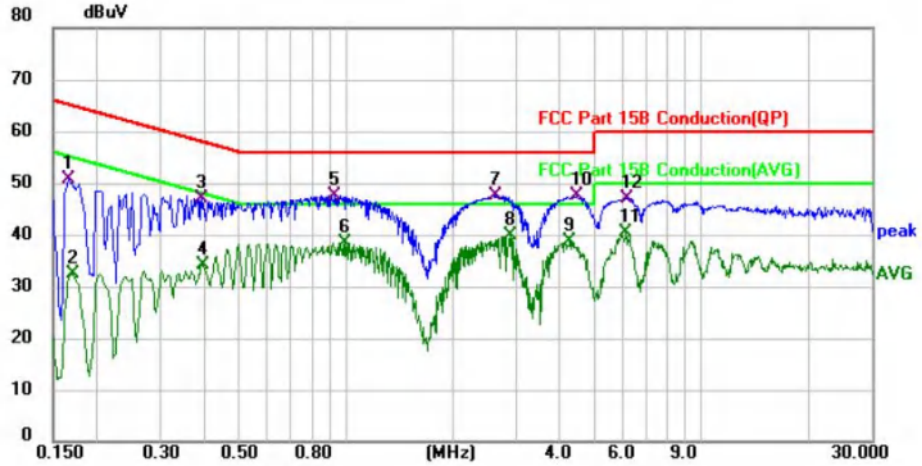
### 4.1.3 Test Data:

TM1 / Line: Line / Band: 2400-2483.5 MHz / BW: 20 / CH: H




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | * | 0.1700 | 39.90 | 10.12 | 50.02 | 64.96 | -14.94 | QP | |
| 2 | | 0.1780 | 15.70 | 10.12 | 25.82 | 54.58 | -28.76 | AVG | |
| 3 | | 0.8580 | 30.92 | 10.10 | 41.02 | 56.00 | -14.98 | QP | |
| 4 | | 0.9220 | 9.83 | 10.10 | 19.93 | 46.00 | -26.07 | AVG | |
| 5 | | 2.6099 | 29.75 | 10.04 | 39.79 | 56.00 | -16.21 | QP | |
| 6 | | 2.9340 | 11.50 | 10.06 | 21.56 | 46.00 | -24.44 | AVG | |
| 7 | | 4.2540 | 12.40 | 10.17 | 22.57 | 46.00 | -23.43 | AVG | |
| 8 | | 4.5380 | 29.94 | 10.17 | 40.11 | 56.00 | -15.89 | QP | |
| 9 | | 7.3220 | 15.35 | 10.23 | 25.58 | 50.00 | -24.42 | AVG | |
| 10 | | 8.0140 | 29.55 | 10.26 | 39.81 | 60.00 | -20.19 | QP | |
| 11 | | 15.7140 | 16.93 | 10.50 | 27.43 | 50.00 | -22.57 | AVG | |
| 12 | | 15.9260 | 29.21 | 10.50 | 39.71 | 60.00 | -20.29 | QP | |

TM1 / Line: Neutral / Band: 2400-2483.5 MHz / BW: 20 / CH: H




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1660 | 40.62 | 10.10 | 50.72 | 65.16 | -14.44 | QP | |
| 2 | | 0.1700 | 22.35 | 10.10 | 32.45 | 54.96 | -22.51 | AVG | |
| 3 | | 0.3899 | 36.87 | 10.08 | 46.95 | 58.07 | -11.12 | QP | |
| 4 | | 0.3940 | 24.18 | 10.08 | 34.26 | 47.98 | -13.72 | AVG | |
| 5 | | 0.9300 | 37.45 | 10.08 | 47.53 | 56.00 | -8.47 | QP | |
| 6 | | 0.9900 | 28.34 | 10.08 | 38.42 | 46.00 | -7.58 | AVG | |
| 7 | | 2.6380 | 37.49 | 10.04 | 47.53 | 56.00 | -8.47 | QP | |
| 8 | * | 2.9020 | 29.84 | 10.06 | 39.90 | 46.00 | -6.10 | AVG | |
| 9 | | 4.2580 | 28.44 | 10.18 | 38.62 | 46.00 | -7.38 | AVG | |
| 10 | | 4.4699 | 37.28 | 10.18 | 47.46 | 56.00 | -8.54 | QP | |
| 11 | | 6.1380 | 30.30 | 10.22 | 40.52 | 50.00 | -9.48 | AVG | |
| 12 | | 6.1740 | 36.86 | 10.22 | 47.08 | 60.00 | -12.92 | QP | |

Remark: 1.Over= Mesurement Level- Limit; Measurement Level=Test receiver reading + correction factor

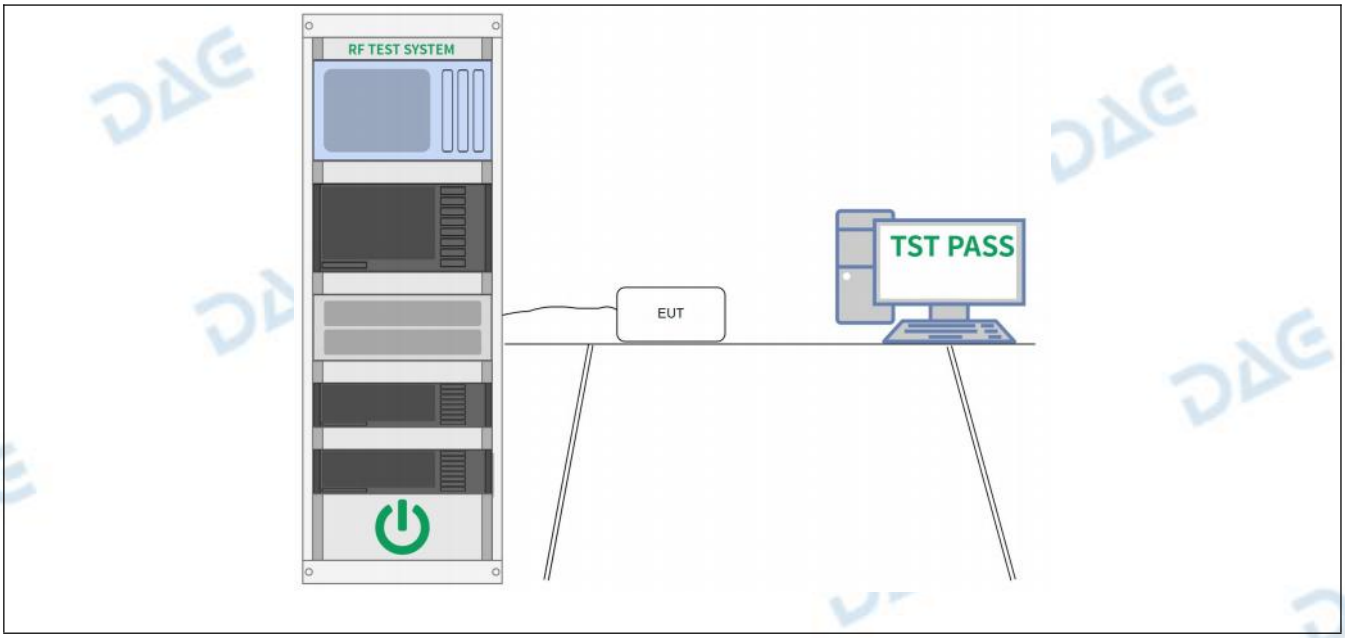
## 4.2 6dB Bandwidth

| | |
|---|---|
| Test Requirement: | 47 CFR 15.247(a)(2) |
| Test Limit: | Refer to 47 CFR 15.247(a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz. |
| Test Method: | ANSI C63.10-2020, section 11.8<br>KDB 558074 D01 15.247 Meas Guidance v05r02 |
| Procedure: | 11.8.1 Option 1<br>The steps for the first option are as follows:<br>a) Set RBW = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz.<br>b) Set the VBW ≥ [3 × RBW].<br>c) Detector = peak.<br>d) Trace mode = max-hold.<br>e) Sweep = No faster than coupled (auto) time.<br>f) Allow the trace to stabilize.<br>g) Measure the maximum width of the emission by placing two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “−6 dB down amplitude”. If a marker is below this “−6 dB down amplitude” value, then it shall be as close as possible to this value.<br><br>11.8.2 Option 2<br>The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz, VBW ≥ 3 × RBW, and peak detector with maximum hold) is implemented by the instrumentation function.<br>When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB. |

### 4.2.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 22.5 °C | Humidity: | 48 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1, TM2, TM3, TM4 | | | | |
| Final test mode: | TM1, TM2, TM3, TM4 | | | | |

### 4.2.2 Test Setup Diagram:




### 4.2.3 Test Data:

Please Refer to Appendix for Details.

## 4.3 Maximum Conducted Output Power

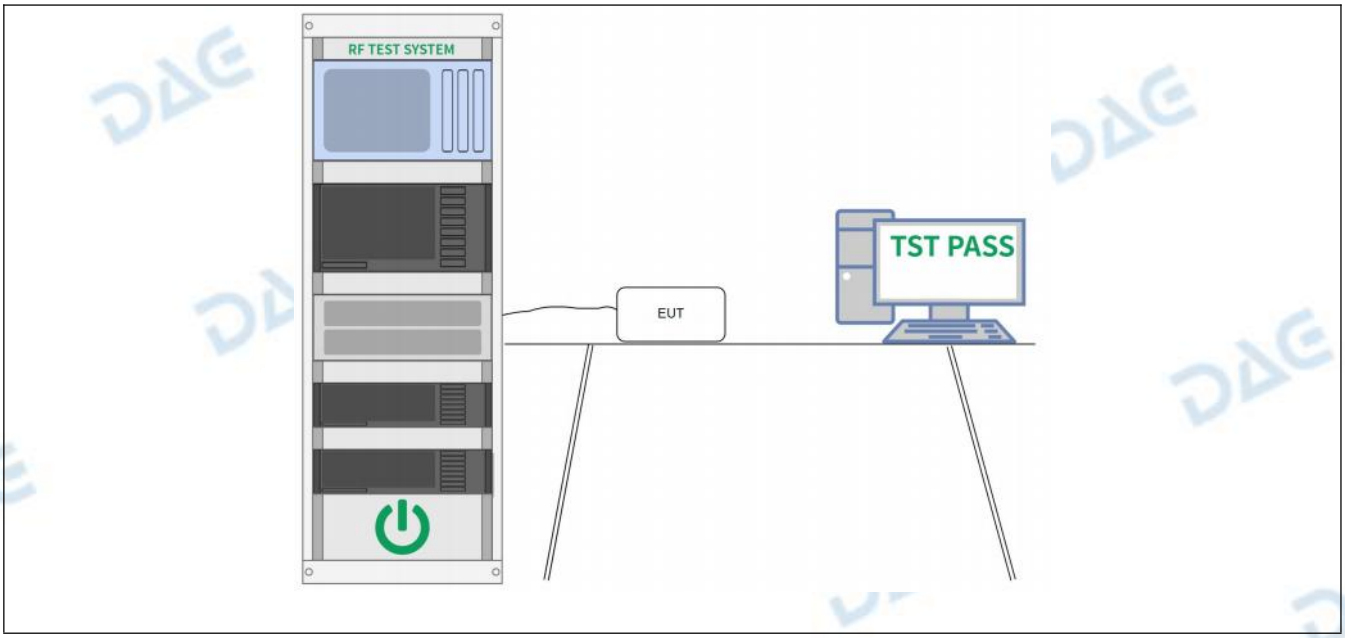
| | |
|---|---|
| Test Requirement: | 47 CFR 15.247(b)(3) |
| Test Limit: | Refer to 47 CFR 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode. |
| Test Method: | ANSI C63.10-2020 section 11.9.1<br>KDB 558074 D01 15.247 Meas Guidance v05r02 |
| Procedure: | ANSI C63.10-2020, section 11.9.1 Maximum peak conducted output power<br>Note:<br>Per ANSI C63.10-2013, if there are two or more antnnas, the conducted powers at Core 0, Core 1,…, Core i were first measured separately, as shown in the section above(this product olny have one antenna). The measured values were then summed in linear power units then converted back to dBm.<br>Per ANSI C63.10-2013 Section 14.4.3.2.3, the directional gain is calculated using the following formula, where GN is the gain of the nth antenna and NANT, the total number of antennas used.<br>For correlated unequal antenna gain<br>Directional gain = 10*log[(10G1/20 + 10G2/20 + … + 10GN/20)2 / NANT] dBi<br>For completely uncorrelated unequal antenna gain<br>Directional gain = 10*log[(10G1/10 + 10G2/10 + … + 10GN/10)/ NANT] dBi<br>Sample Multiple antennas Calculation: Core 0 + Core 1 +…Core i. = MIMO/CDD<br>(i is the number of antennas)<br>(#VALUE! mW + mW) = #VALUE! mW = dBm<br>Sample e.i.r.p. Calculation:<br>e.i.r.p. (dBm) = Conducted Power (dBm) + Ant gain (dBi) |

### 4.3.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 22.5 °C | Humidity: | 48 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1, TM2, TM3, TM4 | | | | |
| Final test mode: | TM1, TM2, TM3, TM4 | | | | |

### 4.3.2 Test Setup Diagram:

| |
|---|
| |




### 4.3.3 Test Data:

Please Refer to Appendix for Details.

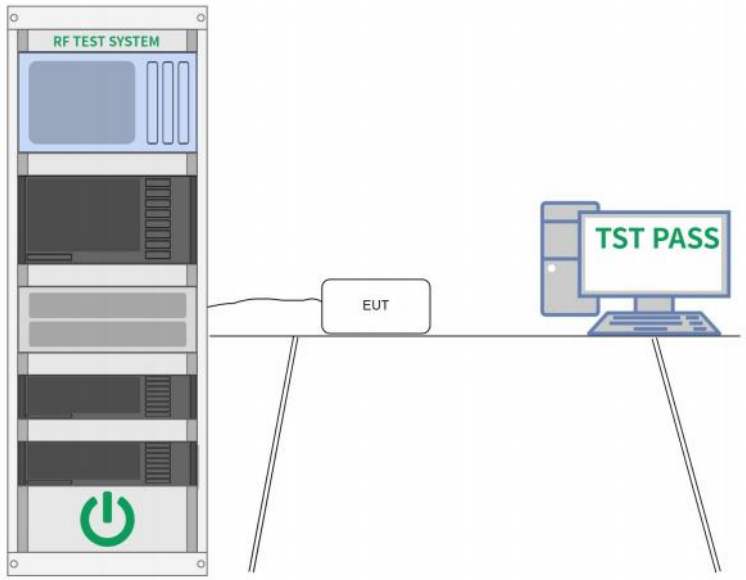
## 4.4 Power Spectral Density

| | |
|---|---|
| Test Requirement: | 47 CFR 15.247(e) |
| Test Limit: | Refer to 47 CFR 15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density. |
| Test Method: | ANSI C63.10-2020, section 11.10<br>KDB 558074 D01 15.247 Meas Guidance v05r02 |
| Procedure: | ANSI C63.10-2020, section 11.10, Maximum power spectral density level in the fundamental emission |

### 4.4.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 22.5 °C | Humidity: | 48 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1, TM2, TM3, TM4 | | | | |
| Final test mode: | TM1, TM2, TM3, TM4 | | | | |

### 4.4.2 Test Setup Diagram:




### 4.4.3 Test Data:

Please Refer to Appendix for Details.

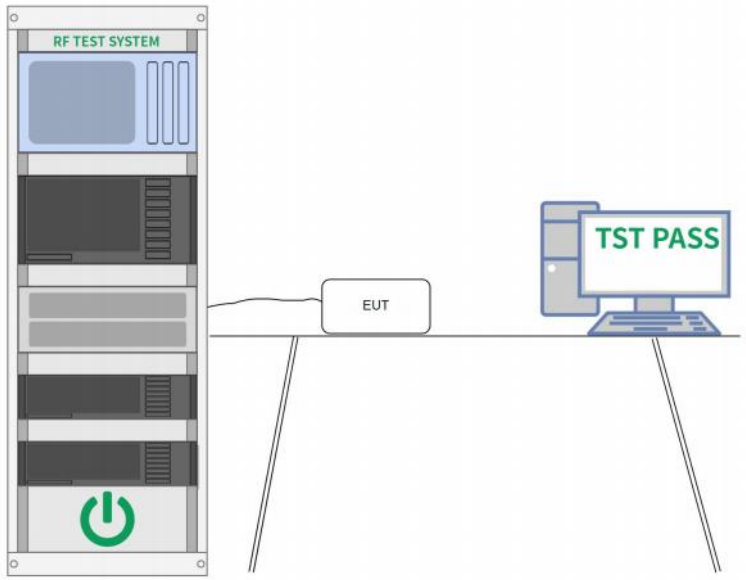
## 4.5 Emissions in non-restricted frequency bands

| | |
|---|---|
| Test Requirement: | 47 CFR 15.247(d), 15.209, 15.205 |
| Test Limit: | Refer to 47 CFR 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. |
| Test Method: | ANSI C63.10-2020 section 11.11<br>KDB 558074 D01 15.247 Meas Guidance v05r02 |
| Procedure: | ANSI C63.10-2020<br>Section 11.11.1, Section 11.11.2, Section 11.11.3 |

### 4.5.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 22.5 °C | Humidity: | 48 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1, TM2, TM3, TM4 | | | | |
| Final test mode: | TM1, TM2, TM3, TM4 | | | | |

### 4.5.2 Test Setup Diagram:




### 4.5.3 Test Data:

Please Refer to Appendix for Details.

## 4.6 Band edge emissions (Radiated)

| | |
|---|---|
| Test Requirement: | Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)). |
| Test Limit: | |

| Frequency (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 |

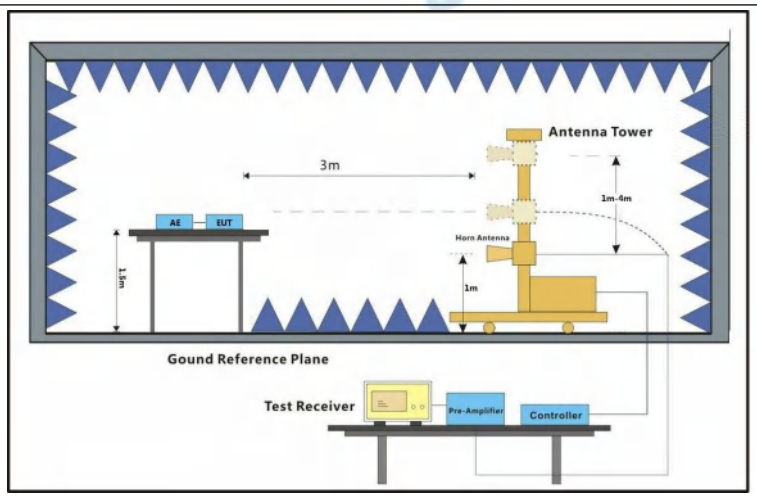
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

| | |
|---|---|
| Test Method: | ANSI C63.10-2020 section 6.10<br>KDB 558074 D01 15.247 Meas Guidance v05r02 |
| Procedure: | ANSI C63.10-2020 section 6.10.5.2 |

### 4.6.1 E.U.T. Operation:

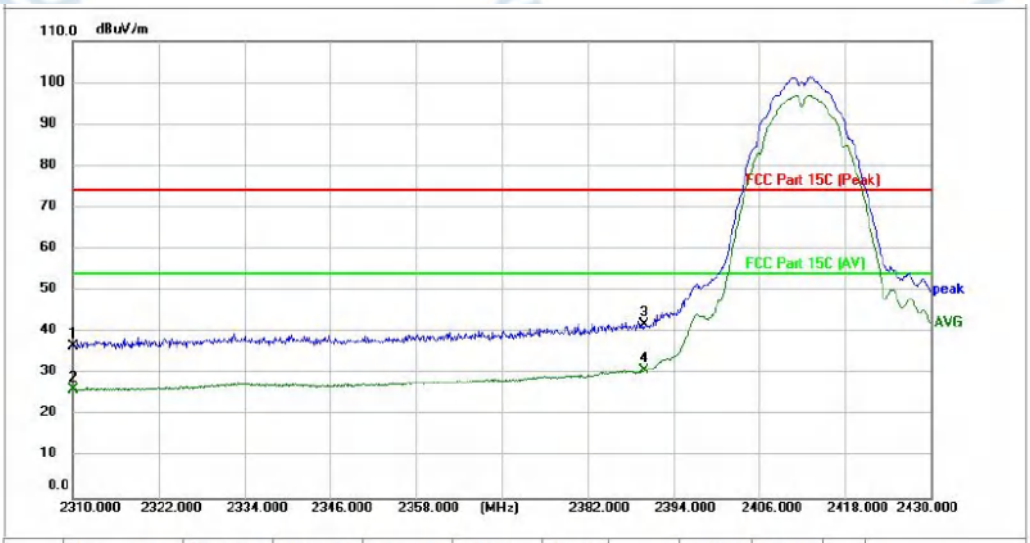
| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 22.5 °C | Humidity: | 48 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1, TM2, TM3, TM4 | | | | |
| Final test mode: | TM1, TM2, TM3, TM4 | | | | |

### 4.6.2 Test Setup Diagram:




### 4.6.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: L

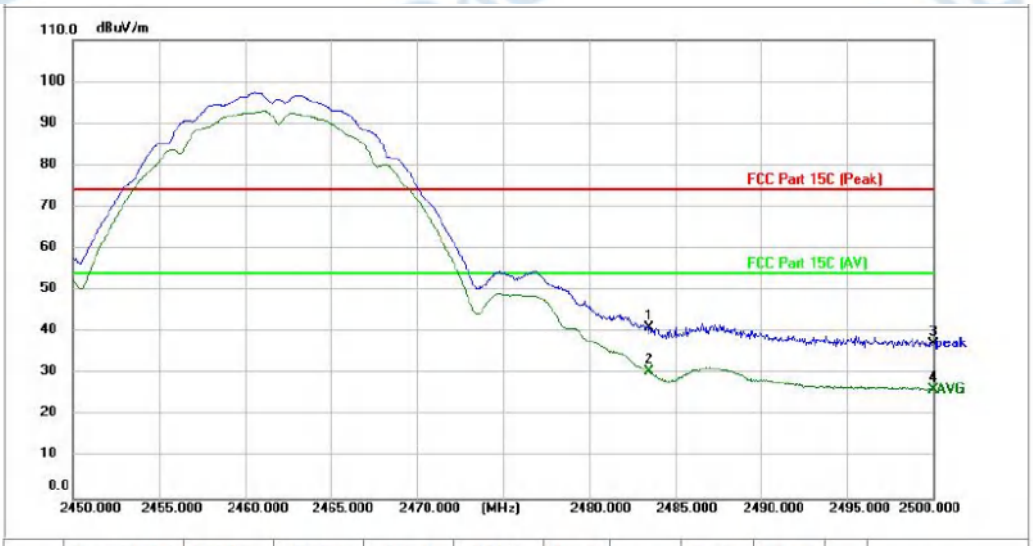



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2310.000 | 40.27 | -3.63 | 36.64 | 74.00 | -37.36 | peak | 149 | | P | |
| 2 | 2310.000 | 29.96 | -3.63 | 26.33 | 54.00 | -27.67 | AVG | 149 | | P | |
| 3 | 2390.000 | 45.49 | -3.42 | 42.07 | 74.00 | -31.93 | peak | 149 | | P | |
| 4 * | 2390.000 | 34.49 | -3.42 | 31.07 | 54.00 | -22.93 | AVG | 149 | | P | |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: L

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2310.000 | 40.94 | -3.63 | 37.31 | 74.00 | -36.69 | peak | 149 | | P | |
| 2 | 2310.000 | 29.30 | -3.63 | 25.67 | 54.00 | -28.33 | AVG | 149 | | P | |
| 3 | 2390.000 | 40.44 | -3.42 | 37.02 | 74.00 | -36.98 | peak | 149 | | P | |
| 4 * | 2390.000 | 29.35 | -3.42 | 25.93 | 54.00 | -28.07 | AVG | 149 | | P | |

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: H

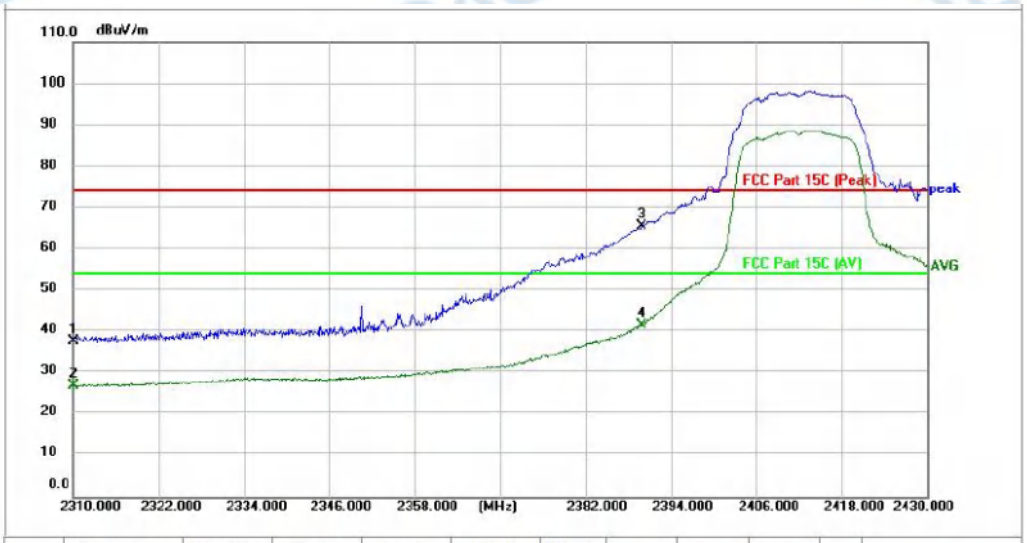



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 44.19 | -3.17 | 41.02 | 74.00 | -32.98 | peak | 149 | | P | |
| 2 * | 2483.500 | 33.74 | -3.17 | 30.57 | 54.00 | -23.43 | AVG | 149 | | P | |
| 3 | 2500.000 | 40.29 | -3.13 | 37.16 | 74.00 | -36.84 | peak | 149 | | P | |
| 4 | 2500.000 | 29.52 | -3.13 | 26.39 | 54.00 | -27.61 | AVG | 149 | | P | |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: H

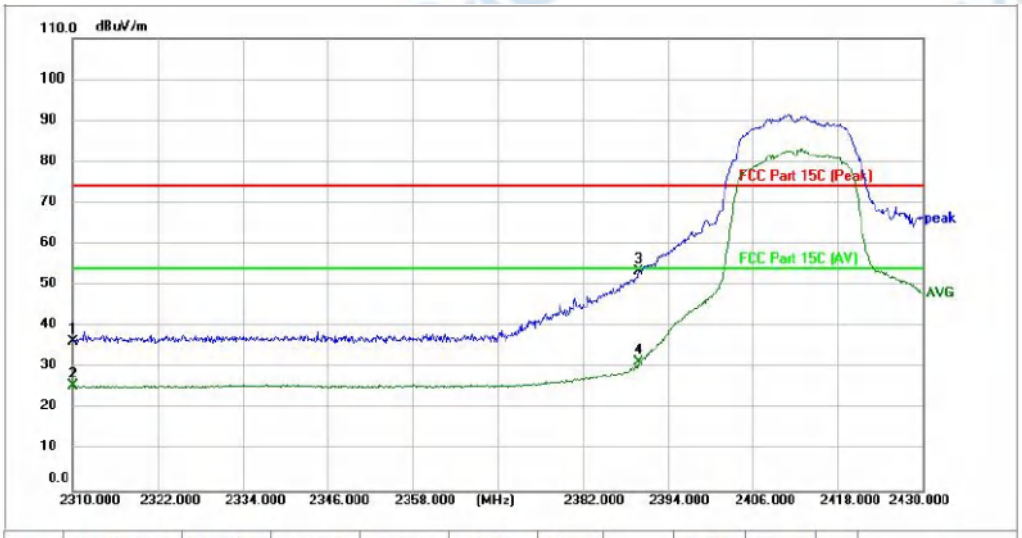
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 41.85 | -3.17 | 38.68 | 74.00 | -35.32 | peak | 149 | | P | |
| 2 * | 2483.500 | 31.51 | -3.17 | 28.34 | 54.00 | -25.66 | AVG | 149 | | P | |
| 3 | 2500.000 | 40.90 | -3.13 | 37.77 | 74.00 | -36.23 | peak | 149 | | P | |
| 4 | 2500.000 | 29.75 | -3.13 | 26.62 | 54.00 | -27.38 | AVG | 149 | | P | |

TM2 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: L



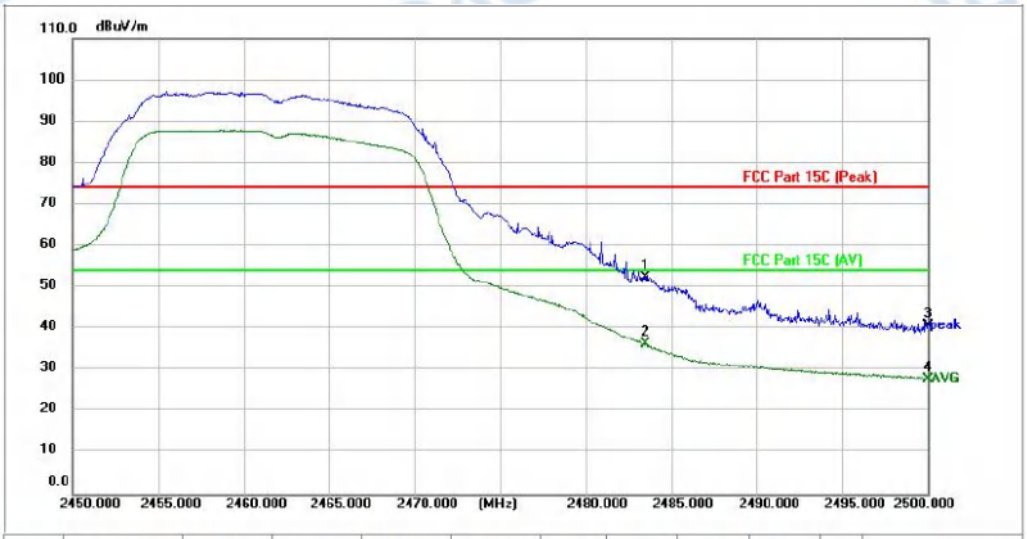

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2310.000 | 41.36 | -3.63 | 37.73 | 74.00 | -36.27 | peak | 149 | | P | |
| 2 | 2310.000 | 30.85 | -3.63 | 27.22 | 54.00 | -26.78 | AVG | 149 | | P | |
| 3 * | 2390.000 | 68.89 | -3.42 | 65.47 | 74.00 | -8.53 | peak | 149 | | P | |
| 4 | 2390.000 | 45.06 | -3.42 | 41.64 | 54.00 | -12.36 | AVG | 149 | | P | |

TM2 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: L




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2310.000 | 40.15 | -3.63 | 36.52 | 74.00 | -37.48 | peak | 149 | | P | |
| 2 | 2310.000 | 29.27 | -3.63 | 25.64 | 54.00 | -28.36 | AVG | 149 | | P | |
| 3 * | 2390.000 | 56.92 | -3.42 | 53.50 | 74.00 | -20.50 | peak | 149 | | P | |
| 4 | 2390.000 | 34.78 | -3.42 | 31.36 | 54.00 | -22.64 | AVG | 149 | | P | |

TM2 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: H




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 55.49 | -3.17 | 52.32 | 74.00 | -21.68 | peak | 149 | | P | |
| 2 * | 2483.500 | 39.69 | -3.17 | 36.52 | 54.00 | -17.48 | AVG | 149 | | P | |
| 3 | 2500.000 | 44.04 | -3.13 | 40.91 | 74.00 | -33.09 | peak | 149 | | P | |
| 4 | 2500.000 | 31.16 | -3.13 | 28.03 | 54.00 | -25.97 | AVG | 149 | | P | |

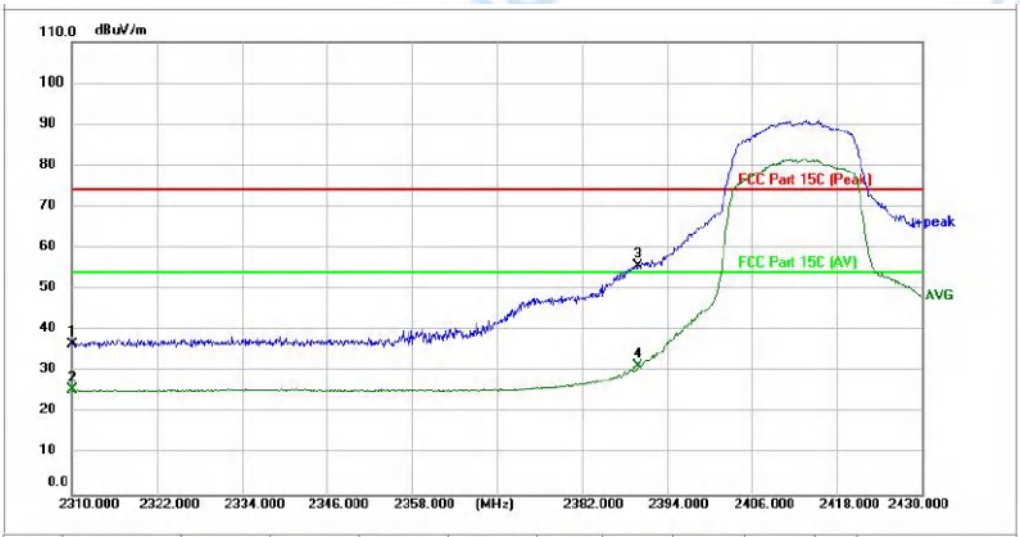
TM2 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: H

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 50.94 | -3.17 | 47.77 | 74.00 | -26.23 | peak | 149 | | P | |
| 2 * | 2483.500 | 35.73 | -3.17 | 32.56 | 54.00 | -21.44 | AVG | 149 | | P | |
| 3 | 2500.000 | 42.59 | -3.13 | 39.46 | 74.00 | -34.54 | peak | 149 | | P | |
| 4 | 2500.000 | 31.00 | -3.13 | 27.87 | 54.00 | -26.13 | AVG | 149 | | P | |

TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: L

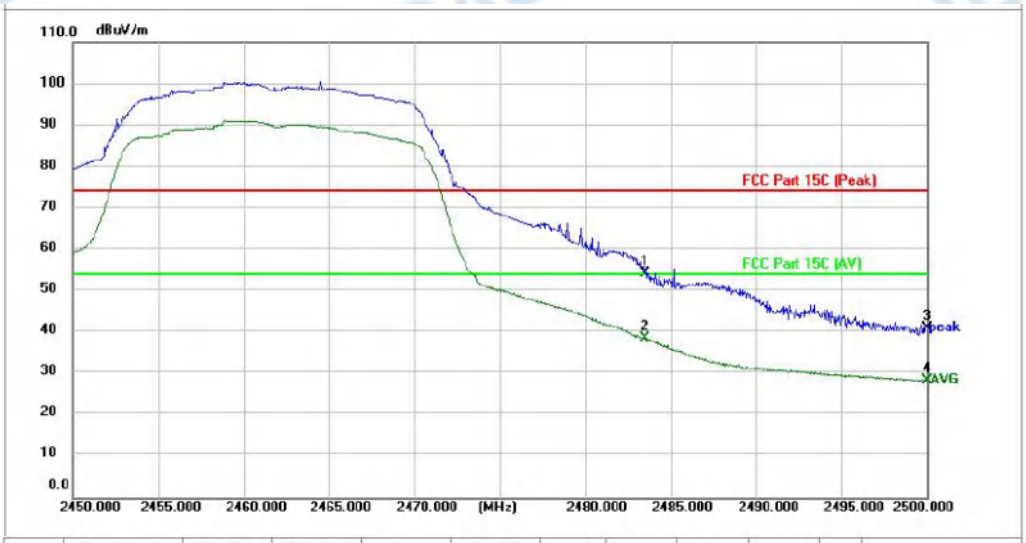
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2310.000 | 41.78 | -3.63 | 38.15 | 74.00 | -35.85 | peak | 149 | | P | |
| 2 | 2310.000 | 30.73 | -3.63 | 27.10 | 54.00 | -26.90 | AVG | 149 | | P | |
| 3 * | 2390.000 | 72.18 | -3.42 | 68.76 | 74.00 | -5.24 | peak | 149 | | P | |
| 4 | 2390.000 | 46.15 | -3.42 | 42.73 | 54.00 | -11.27 | AVG | 149 | | P | |

TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: L




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2310.000 | 40.24 | -3.63 | 36.61 | 74.00 | -37.39 | peak | 149 | | P | |
| 2 | 2310.000 | 29.21 | -3.63 | 25.58 | 54.00 | -28.42 | AVG | 149 | | P | |
| 3 * | 2390.000 | 58.99 | -3.42 | 55.57 | 74.00 | -18.43 | peak | 149 | | P | |
| 4 | 2390.000 | 34.79 | -3.42 | 31.37 | 54.00 | -22.63 | AVG | 149 | | P | |

TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: H

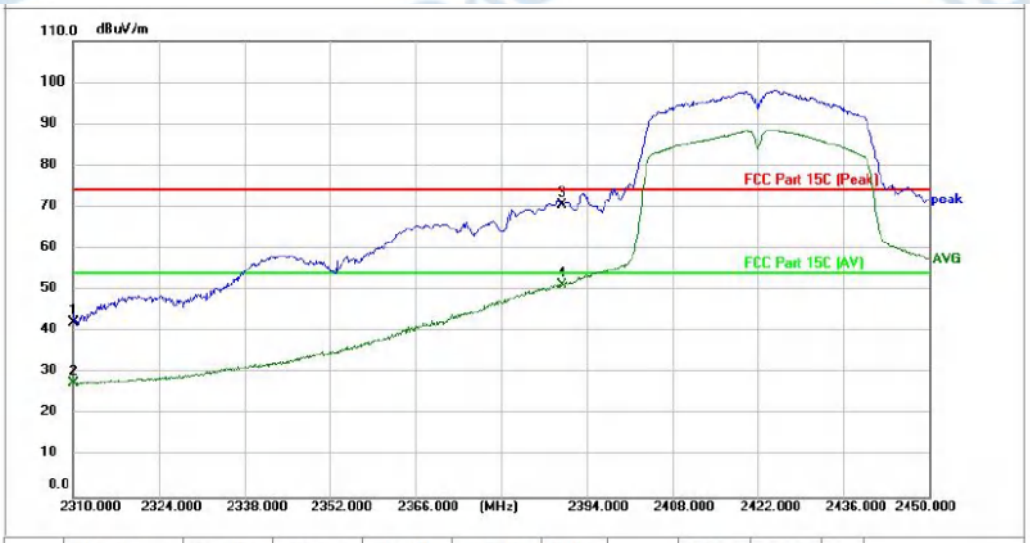



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 57.54 | -3.17 | 54.37 | 74.00 | -19.63 | peak | 149 | | P | |
| 2 * | 2483.500 | 41.93 | -3.17 | 38.76 | 54.00 | -15.24 | AVG | 149 | | P | |
| 3 | 2500.000 | 44.28 | -3.13 | 41.15 | 74.00 | -32.85 | peak | 149 | | P | |
| 4 | 2500.000 | 31.60 | -3.13 | 28.47 | 54.00 | -25.53 | AVG | 149 | | P | |

TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: H

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 52.50 | -3.17 | 49.33 | 74.00 | -24.67 | peak | 149 | | P | |
| 2 * | 2483.500 | 37.55 | -3.17 | 34.38 | 54.00 | -19.62 | AVG | 149 | | P | |
| 3 | 2500.000 | 42.56 | -3.13 | 39.43 | 74.00 | -34.57 | peak | 149 | | P | |
| 4 | 2500.000 | 31.01 | -3.13 | 27.88 | 54.00 | -26.12 | AVG | 149 | | P | |

TM4 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 40 / CH: L




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2310.000 | 45.80 | -3.63 | 42.17 | 74.00 | -31.83 | peak | 150 | | P | |
| 2 | 2310.000 | 31.22 | -3.63 | 27.59 | 54.00 | -26.41 | AVG | 150 | | P | |
| 3 | 2390.000 | 73.85 | -3.42 | 70.43 | 74.00 | -3.57 | peak | 150 | | P | |
| 4 * | 2390.000 | 54.62 | -3.42 | 51.20 | 54.00 | -2.80 | AVG | 150 | | P | |

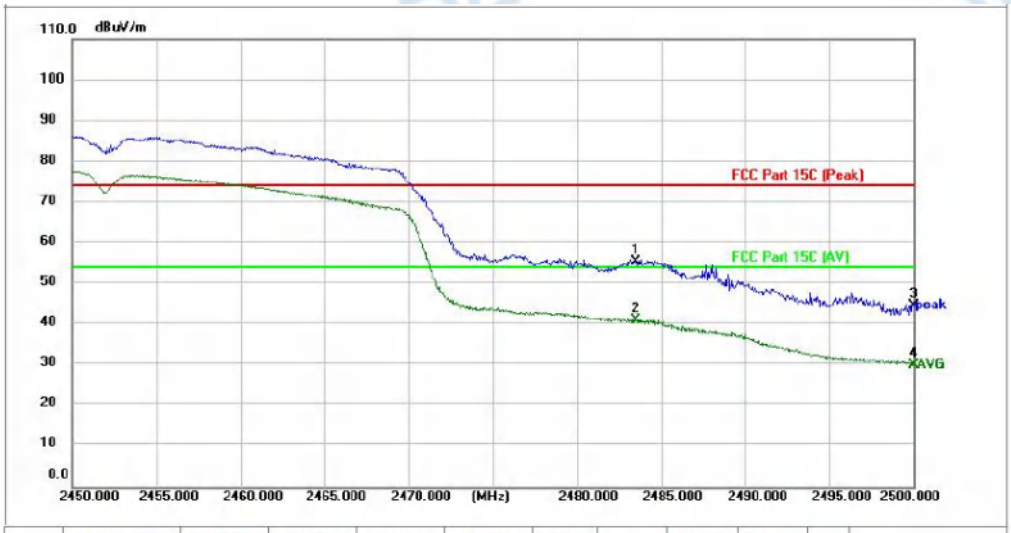
TM4 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 40 / CH: L

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2310.000 | 41.62 | -3.63 | 37.99 | 74.00 | -36.01 | peak | 150 | | P | |
| 2 | 2310.000 | 29.58 | -3.63 | 25.95 | 54.00 | -28.05 | AVG | 150 | | P | |
| 3 | 2390.000 | 61.35 | -3.42 | 57.93 | 74.00 | -16.07 | peak | 150 | | P | |
| 4 * | 2390.000 | 43.19 | -3.42 | 39.77 | 54.00 | -14.23 | AVG | 150 | | P | |

TM4 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 40 / CH: H

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 61.94 | -3.17 | 58.77 | 74.00 | -15.23 | peak | 149 | | P | |
| 2 * | 2483.500 | 48.05 | -3.17 | 44.88 | 54.00 | -9.12 | AVG | 149 | | P | |
| 3 | 2500.000 | 47.97 | -3.13 | 44.84 | 74.00 | -29.16 | peak | 149 | | P | |
| 4 | 2500.000 | 34.75 | -3.13 | 31.62 | 54.00 | -22.38 | AVG | 149 | | P | |

TM4 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 40 / CH: H




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.500 | 58.66 | -3.17 | 55.49 | 74.00 | -18.51 | peak | 149 | | P | |
| 2 * | 2483.500 | 44.22 | -3.17 | 41.05 | 54.00 | -12.95 | AVG | 149 | | P | |
| 3 | 2500.000 | 47.76 | -3.13 | 44.63 | 74.00 | -29.37 | peak | 149 | | P | |
| 4 | 2500.000 | 33.36 | -3.13 | 30.23 | 54.00 | -23.77 | AVG | 149 | | P | |

Remark:Margin=Level - Limit, Level=Test receiver reading + correction factor

The test software will only record the worst test angle and height, and only the worst case will be recorded in the test report.

## 4.7 Emissions in frequency bands (below 1GHz)

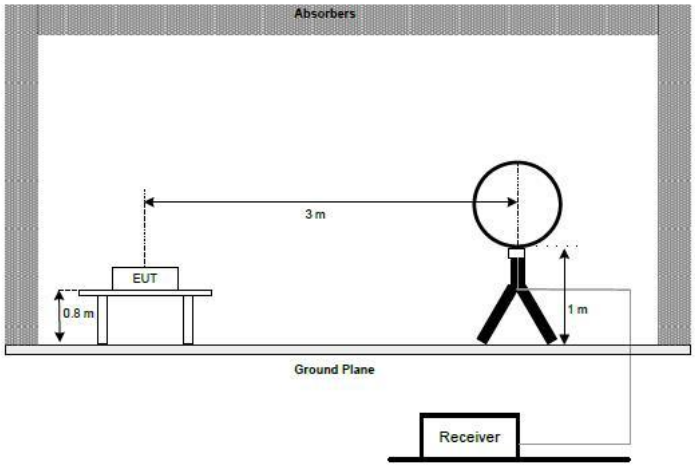
<table>
<tr><td>Test Requirement:</td><td>Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.<br>In the emission table above, the tighter limit applies at the band edges.<br>The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020 section 6.6.4<br>KDB 558074 D01 15.247 Meas Guidance v05r02</td></tr>
<tr><td>Procedure:</td><td>a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.<br>e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.<br>f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.<br>g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.<br>h. Test the EUT in the lowest channel, the middle channel, the Highest channel.<br>i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.<br>j. Repeat above procedures until all frequencies measured was complete.<br>Remark:<br>1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.</td></tr>
</table>

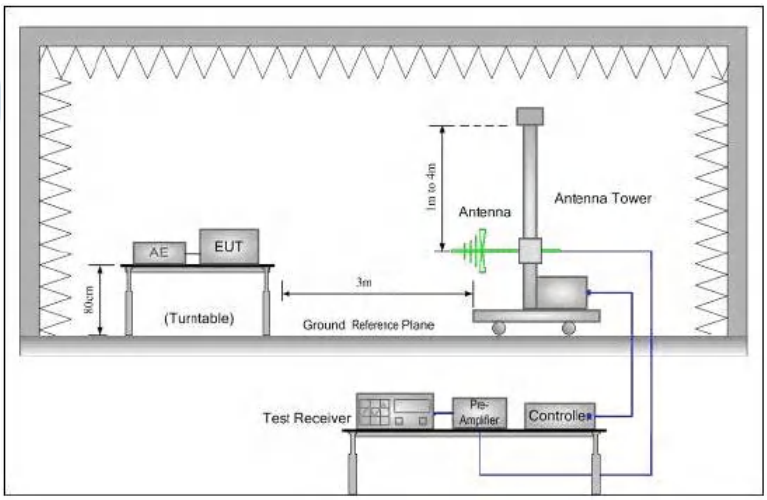
| | |
|---|---|
| | 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:<br>Final Test Level =Receiver Reading + Antenna Factor + Cable Factor ¨C Preamplifier Factor<br>3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. Fundamental frequency is blocked by filter, and only spurious emission is shown. |

### 4.7.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 22.5 °C | Humidity: | 48 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1, TM2, TM3, TM4 | | | | |
| Final test mode: | TM1 | | | | |

### 4.7.2 Test Setup Diagram:



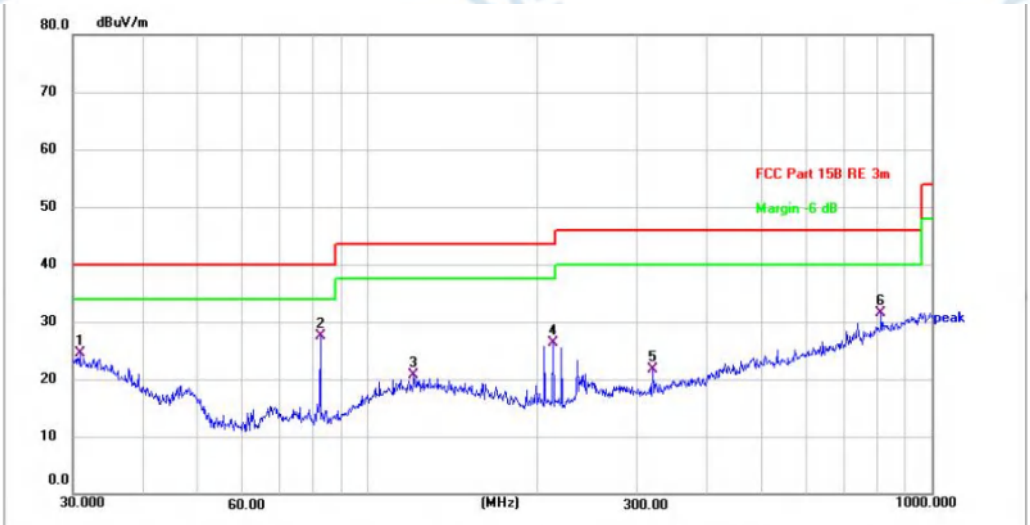




### 4.7.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: H

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 31.2893 | 26.53 | -2.62 | 23.91 | 40.00 | -16.09 | QP | 100 | | P | |
| 2 | 123.6985 | 27.44 | -6.55 | 20.89 | 43.50 | -22.61 | QP | 100 | | P | |
| 3 | 220.6171 | 37.88 | -10.48 | 27.40 | 46.00 | -18.60 | QP | 100 | | P | |
| 4 | 319.9370 | 36.68 | -7.91 | 28.77 | 46.00 | -17.23 | QP | 100 | | P | |
| 5 | 478.8456 | 27.42 | -3.24 | 24.18 | 46.00 | -21.82 | QP | 100 | | P | |
| 6 * | 948.7610 | 26.75 | 4.34 | 31.09 | 46.00 | -14.91 | QP | 100 | | P | |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: H




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 30.8535 | 28.76 | -4.23 | 24.53 | 40.00 | -15.47 | QP | 100 | | P | |
| 2 * | 82.3588 | 40.52 | -12.94 | 27.58 | 40.00 | -12.42 | QP | 100 | | P | |
| 3 | 120.6991 | 27.51 | -6.81 | 20.70 | 43.50 | -22.80 | QP | 100 | | P | |
| 4 | 213.0151 | 36.07 | -9.70 | 26.37 | 43.50 | -17.13 | QP | 100 | | P | |
| 5 | 319.9370 | 29.66 | -7.93 | 21.73 | 46.00 | -24.27 | QP | 100 | | P | |
| 6 | 813.1115 | 28.80 | 2.62 | 31.42 | 46.00 | -14.58 | QP | 100 | | P | |

Remark:Margin=Level - Limit, Level=Test receiver reading + correction factor

The test software will only record the worst test angle and height, and only the worst case will be recorded in the test report.

## 4.8 Emissions in frequency bands (above 1GHz)

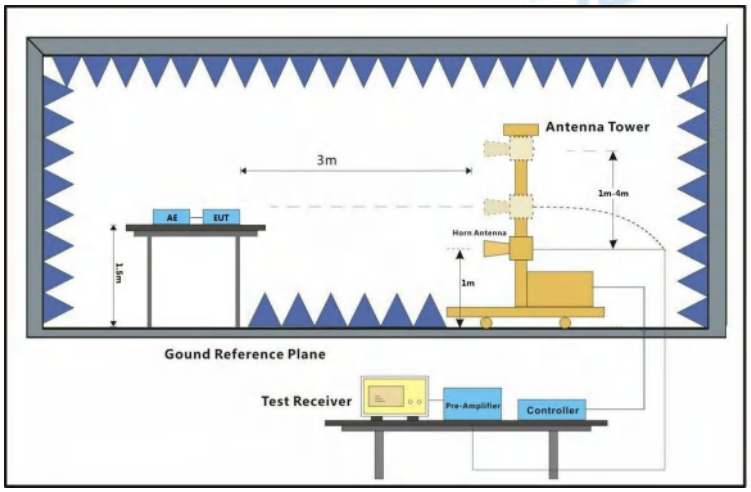
<table>
<tr><td>Test Requirement:</td><td>In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.<br>In the emission table above, the tighter limit applies at the band edges.<br>The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020 section 6.6.4<br>KDB 558074 D01 15.247 Meas Guidance v05r02</td></tr>
<tr><td>Procedure:</td><td>a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.<br>e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.<br>f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.<br>g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.<br>h. Test the EUT in the lowest channel, the middle channel, the Highest channel.<br>i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.<br>j. Repeat above procedures until all frequencies measured was complete.<br>Remark:<br>1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.</td></tr>
</table>

| | |
|---|---|
| | 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:<br>Final Test Level =Receiver Reading + Antenna Factor + Cable Factor ¨C Preamplifier Factor<br>3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. Fundamental frequency is blocked by filter, and only spurious emission is shown. |

### 4.8.1 E.U.T. Operation:

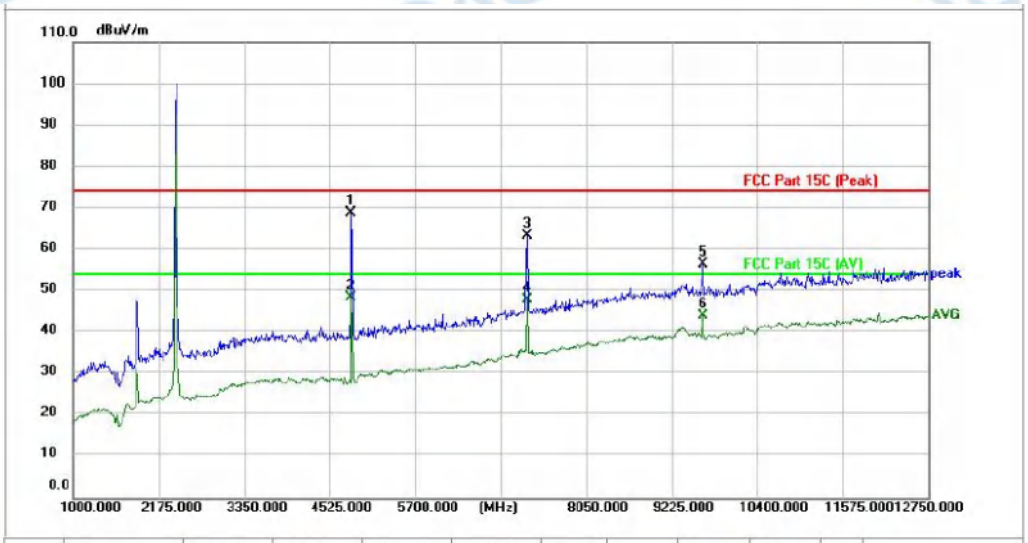
| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 22.5 °C | Humidity: | 48 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1, TM2, TM3, TM4 | | | | |
| Final test mode: | TM1, TM2, TM3, TM4 | | | | |

### 4.8.2 Test Setup Diagram:



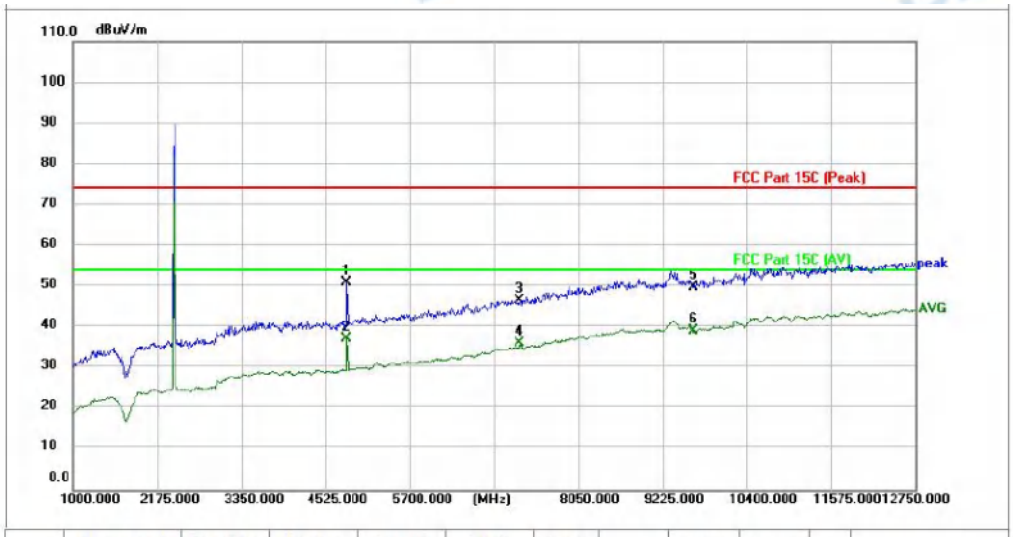

### 4.8.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: L



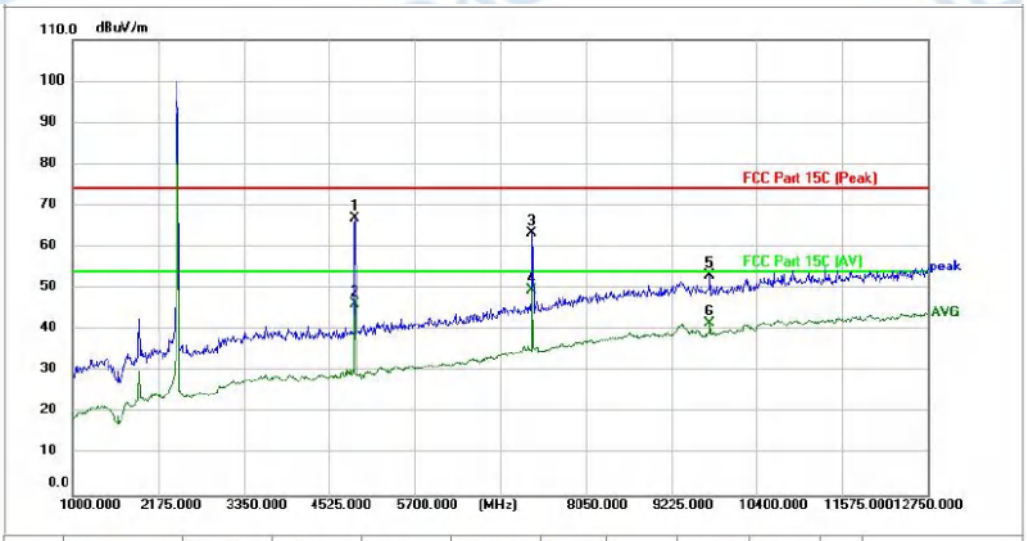

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 * | 4818.750 | 65.43 | 3.35 | 68.78 | 74.00 | -5.22 | peak | 149 | | P | |
| 2 | 4818.750 | 45.10 | 3.35 | 48.45 | 54.00 | -5.55 | AVG | 149 | | P | |
| 3 | 7239.250 | 53.08 | 10.42 | 63.50 | 74.00 | -10.50 | peak | 149 | | P | |
| 4 | 7239.250 | 37.46 | 10.42 | 47.88 | 54.00 | -6.12 | AVG | 149 | | P | |
| 5 | 9648.000 | 41.30 | 15.10 | 56.40 | 74.00 | -17.60 | peak | 149 | | P | |
| 6 | 9648.000 | 28.95 | 15.10 | 44.05 | 54.00 | -9.95 | AVG | 149 | | P | |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: L



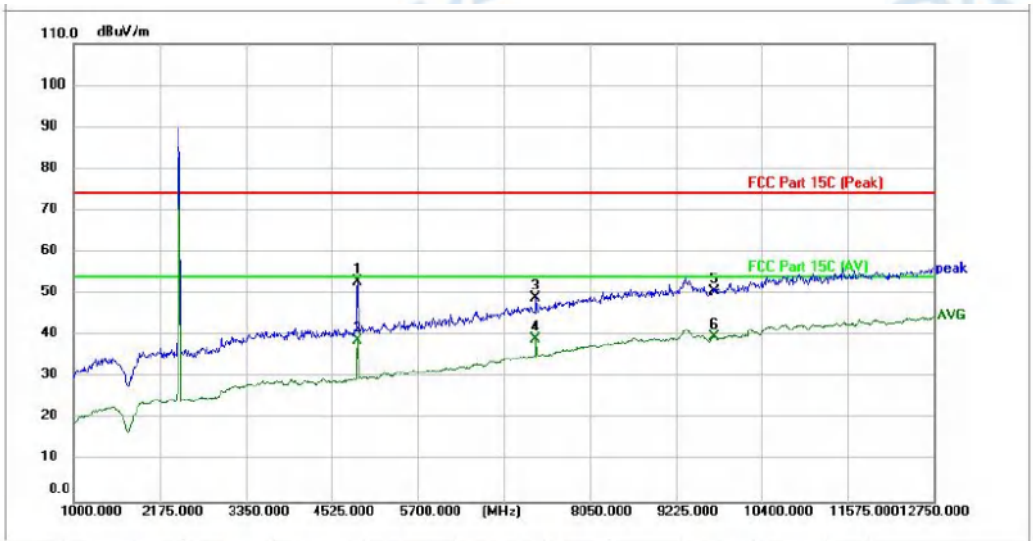

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4818.750 | 47.61 | 3.35 | 50.96 | 74.00 | -23.04 | peak | 149 | | P | |
| 2 | 4818.750 | 33.78 | 3.35 | 37.13 | 54.00 | -16.87 | AVG | 149 | | P | |
| 3 | 7236.000 | 36.33 | 10.42 | 46.75 | 74.00 | -27.25 | peak | 149 | | P | |
| 4 | 7236.000 | 25.77 | 10.42 | 36.19 | 54.00 | -17.81 | AVG | 149 | | P | |
| 5 | 9648.000 | 34.77 | 15.10 | 49.87 | 74.00 | -24.13 | peak | 149 | | P | |
| 6 * | 9648.000 | 24.16 | 15.10 | 39.26 | 54.00 | -14.74 | AVG | 149 | | P | |

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: M



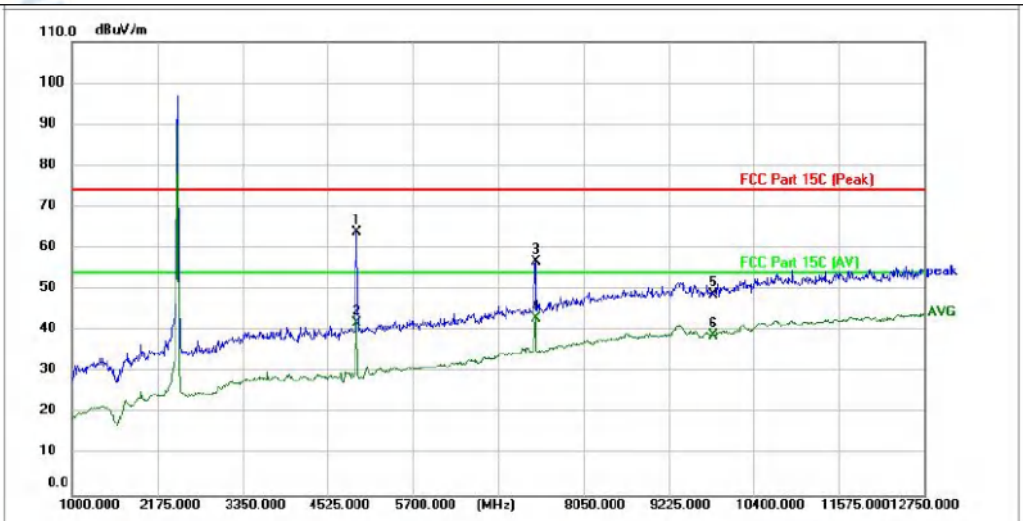

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4877.500 | 63.50 | 3.55 | 67.05 | 74.00 | -6.95 | peak | 149 | | P | |
| 2 | 4877.500 | 42.69 | 3.55 | 46.24 | 54.00 | -7.76 | AVG | 149 | | P | |
| 3 | 7309.750 | 52.79 | 10.55 | 63.34 | 74.00 | -10.66 | peak | 149 | | P | |
| 4 * | 7309.750 | 39.03 | 10.55 | 49.58 | 54.00 | -4.42 | AVG | 149 | | P | |
| 5 | 9753.750 | 38.17 | 15.09 | 53.26 | 74.00 | -20.74 | peak | 149 | | P | |
| 6 | 9753.750 | 26.44 | 15.09 | 41.53 | 54.00 | -12.47 | AVG | 149 | | P | |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: M



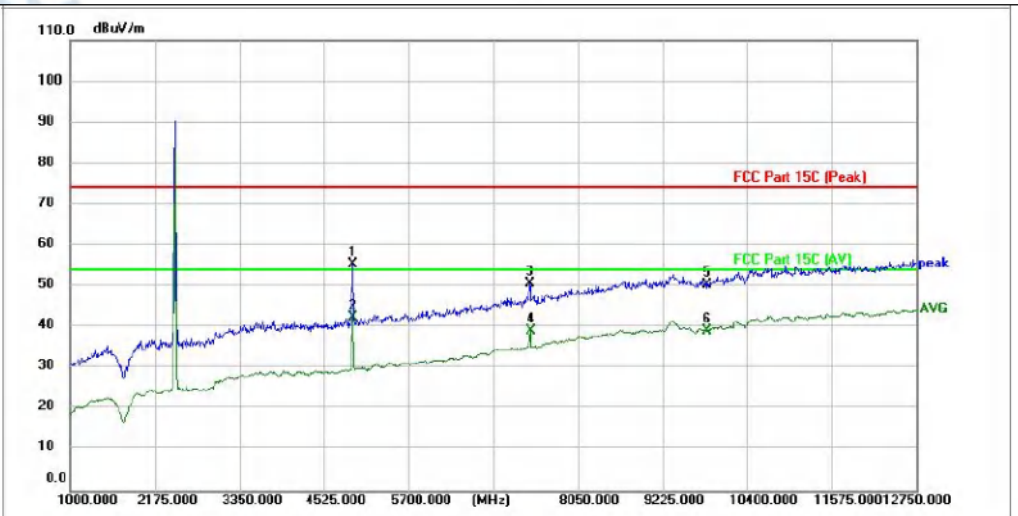

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4877.500 | 49.34 | 3.55 | 52.89 | 74.00 | -21.11 | peak | 149 | | P | |
| 2 | 4877.500 | 35.38 | 3.55 | 38.93 | 54.00 | -15.07 | AVG | 149 | | P | |
| 3 | 7309.750 | 38.65 | 10.55 | 49.20 | 74.00 | -24.80 | peak | 149 | | P | |
| 4 | 7309.750 | 28.64 | 10.55 | 39.19 | 54.00 | -14.81 | AVG | 149 | | P | |
| 5 | 9748.000 | 35.51 | 15.10 | 50.61 | 74.00 | -23.39 | peak | 149 | | P | |
| 6 * | 9748.000 | 24.61 | 15.10 | 39.71 | 54.00 | -14.29 | AVG | 149 | | P | |

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: H




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 * | 4924.500 | 60.27 | 3.70 | 63.97 | 74.00 | -10.03 | peak | 149 | | P | |
| 2 | 4924.500 | 38.29 | 3.70 | 41.99 | 54.00 | -12.01 | AVG | 149 | | P | |
| 3 | 7392.000 | 46.13 | 10.70 | 56.83 | 74.00 | -17.17 | peak | 149 | | P | |
| 4 | 7392.000 | 32.29 | 10.70 | 42.99 | 54.00 | -11.01 | AVG | 149 | | P | |
| 5 | 9848.000 | 33.75 | 15.10 | 48.85 | 74.00 | -25.15 | peak | 149 | | P | |
| 6 | 9848.000 | 23.84 | 15.10 | 38.94 | 54.00 | -15.06 | AVG | 149 | | P | |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: H



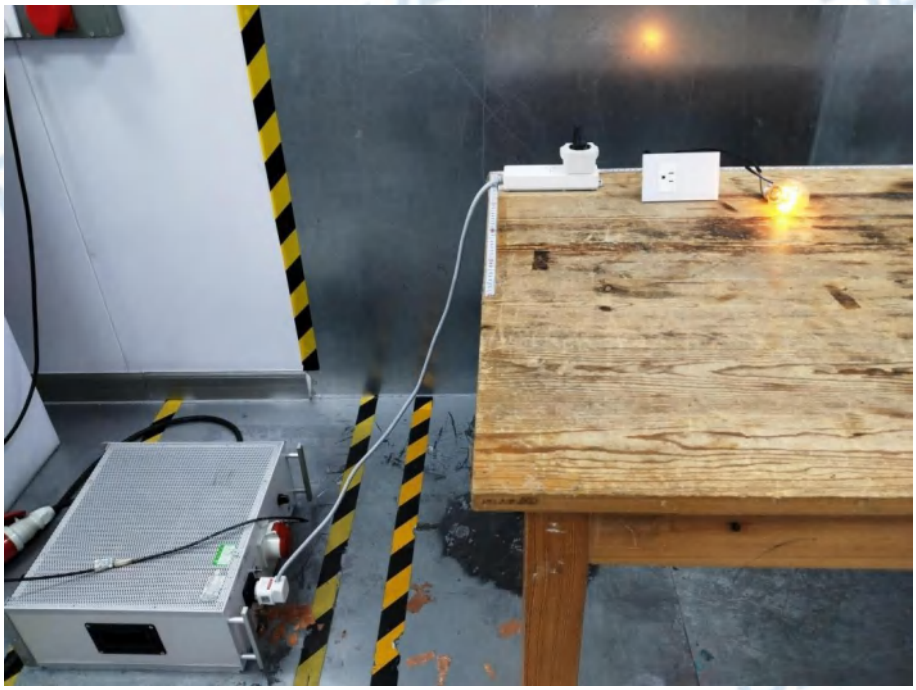

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4924.500 | 51.69 | 3.70 | 55.39 | 74.00 | -18.61 | peak | 149 | | P | |
| 2 * | 4924.500 | 38.83 | 3.70 | 42.53 | 54.00 | -11.47 | AVG | 149 | | P | |
| 3 | 7380.250 | 39.94 | 10.67 | 50.61 | 74.00 | -23.39 | peak | 149 | | P | |
| 4 | 7392.000 | 28.50 | 10.70 | 39.20 | 54.00 | -14.80 | AVG | 149 | | P | |
| 5 | 9848.000 | 35.39 | 15.10 | 50.49 | 74.00 | -23.51 | peak | 149 | | P | |
| 6 | 9848.000 | 24.16 | 15.10 | 39.26 | 54.00 | -14.74 | AVG | 149 | | P | |

Remark:Margin=Level - Limit, Level=Test receiver reading + correction factor

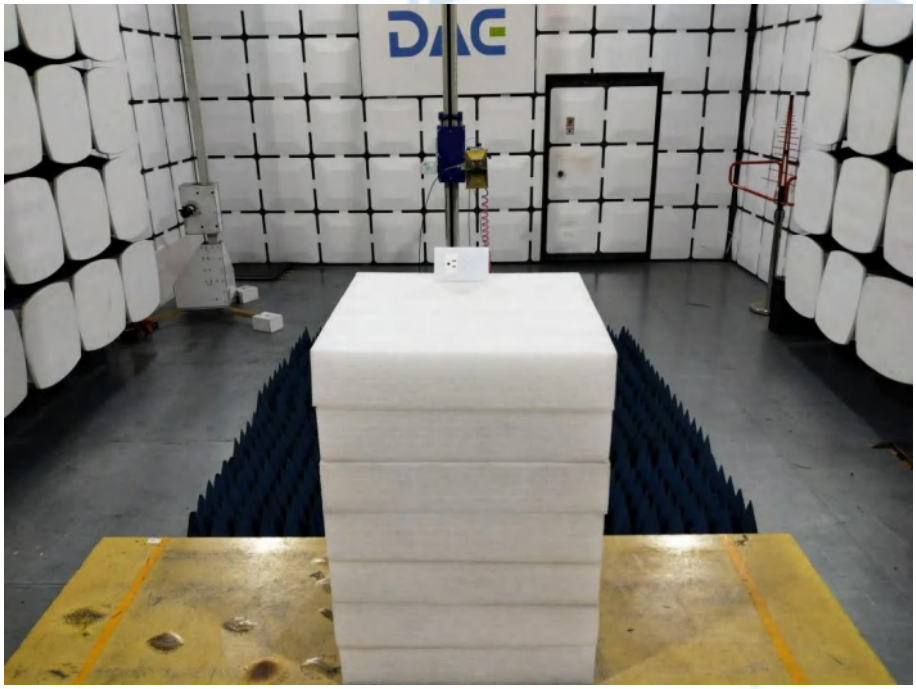
The test software will only record the worst test angle and height, and only the worst case will be recorded in the test report.

# 5 TEST SETUP PHOTOS

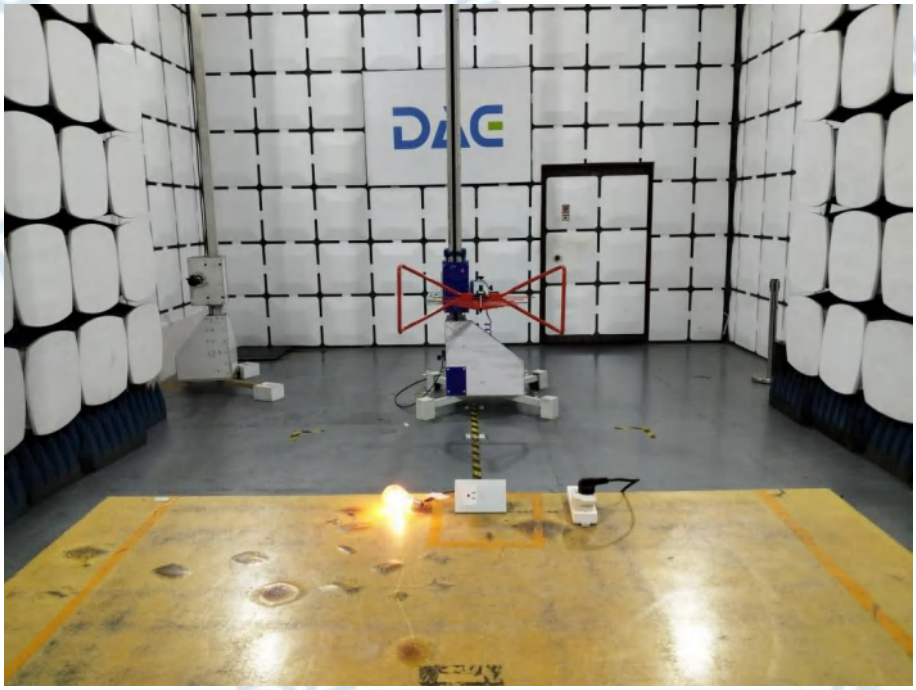
**Conducted Emission at AC power line**



**Band edge emissions (Radiated)**
**Emissions in frequency bands (above 1GHz)**

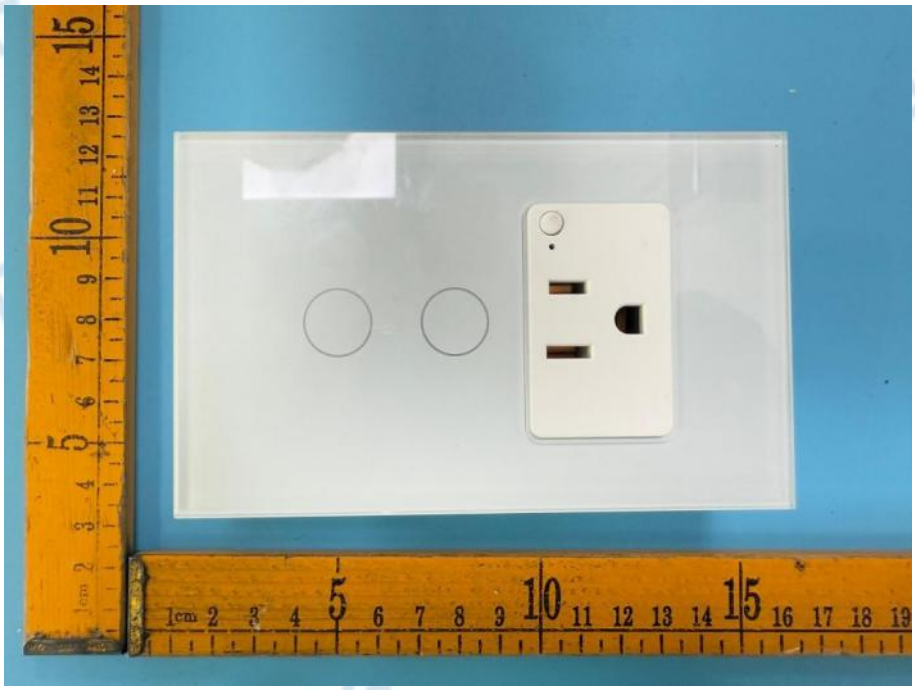


**Emissions in frequency bands (below 1GHz)**

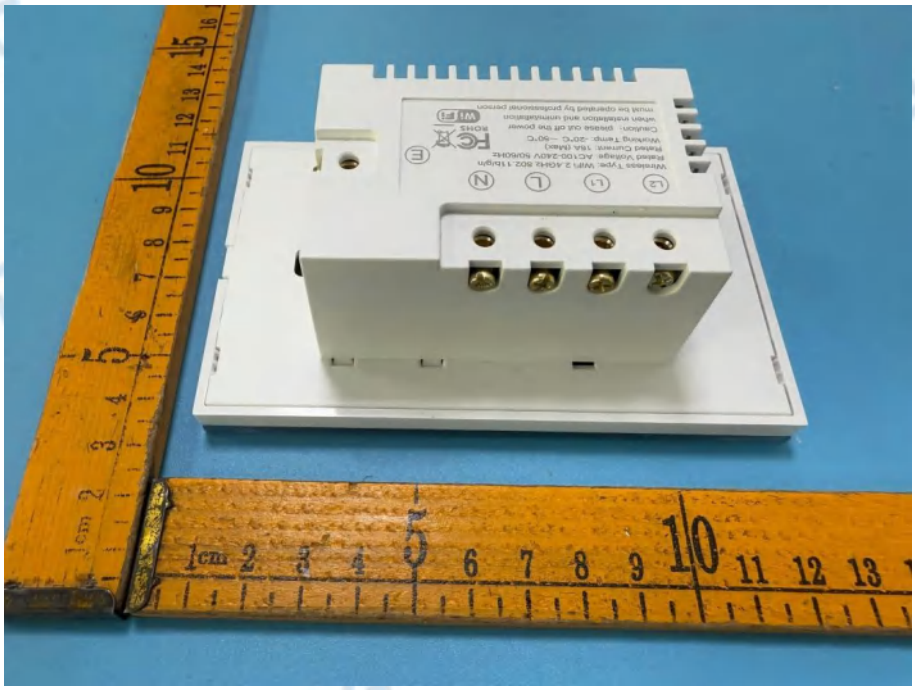


# 6 PHOTOS OF THE EUT

| External |
| --- |
| |

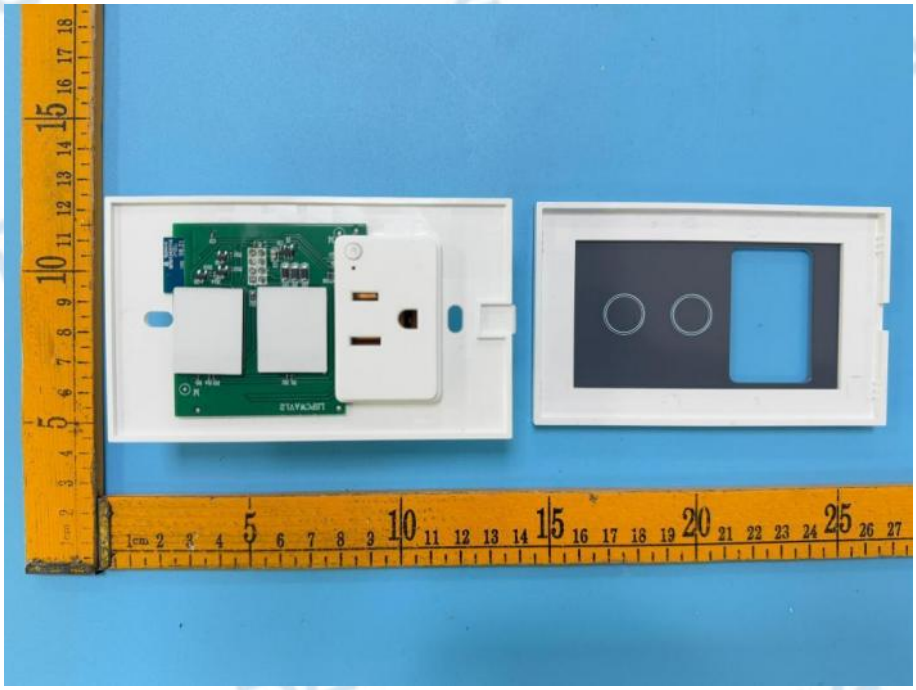


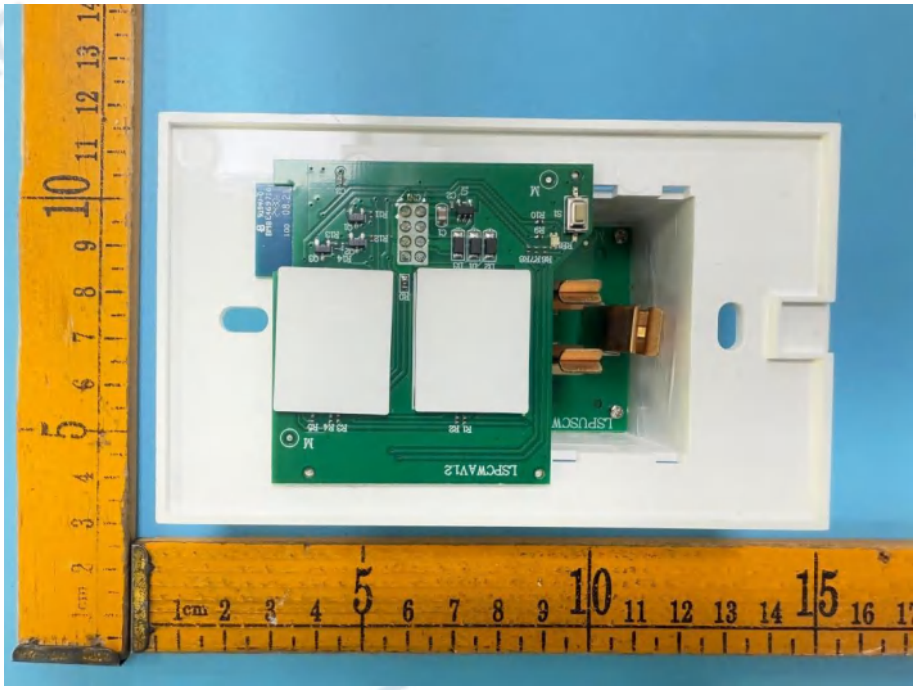
L2
L1
L
N
Wireless Type: WiFi 2.4GHz 802.11b/g/n
Rated Voltage: AC100-240V 50/60Hz
Rated Current: 16A (Max)
Working Temp: -20°C ~50°C
Caution: please cut off the power
when installation and uninstallation
must be operated by professional person
ROHS
WiFi

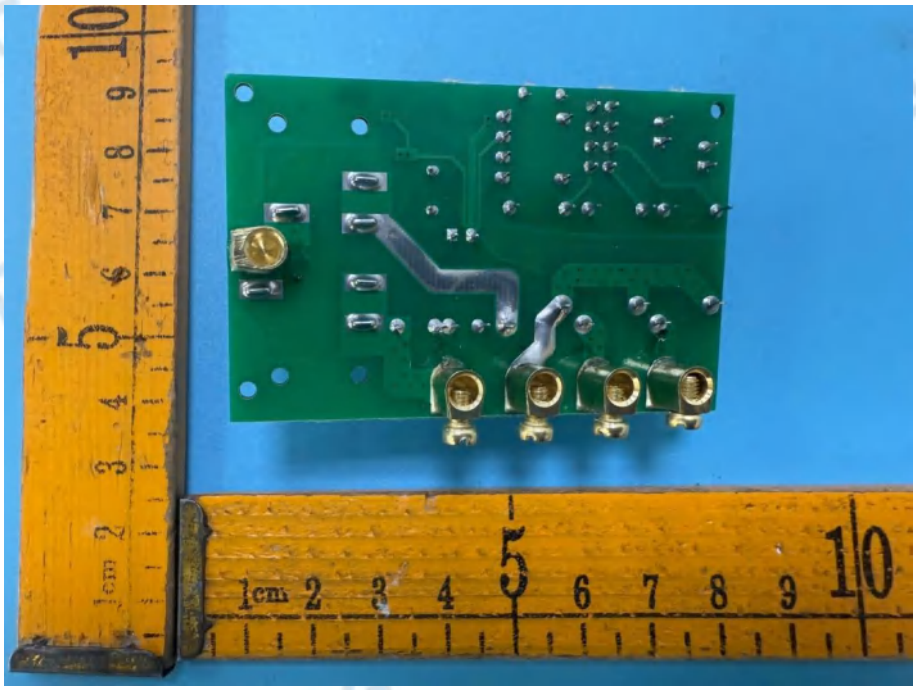

L2
L1
L
N
E
Wireless Type: WiFi 2.4GHz 802.11b/g/n
Rated Voltage: AC100-240V 50/60Hz
Rated Current: 16A (Max)
Working Temp: -20°C ~ +50°C
Caution: please cut off the power
when installation and uninstallation
must be operated by professional person
FC
ROHS
WiFi

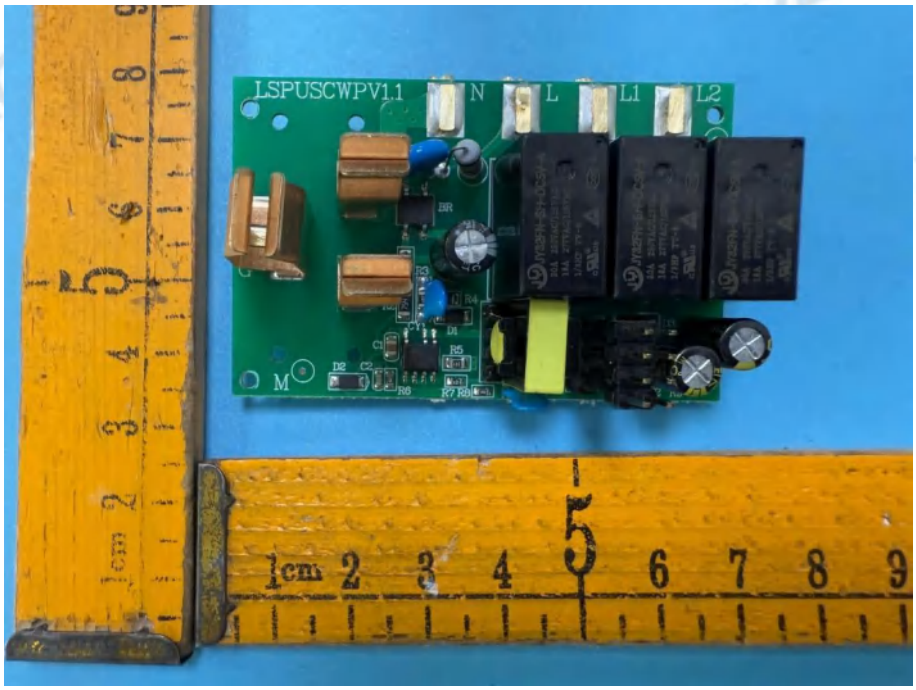
L2
L1
L
N
E
Wireless Type: WiFi 2.4GHz 802.11b/g/n
Rated Voltage: AC100-240V 50/60Hz
Rated Current: 16A (Max)
Working Temp: -20°C ~ +50°C
Caution: please cut off the power
when installation and uninstallation
must be operated by professional person
FC
ROHS
WiFi

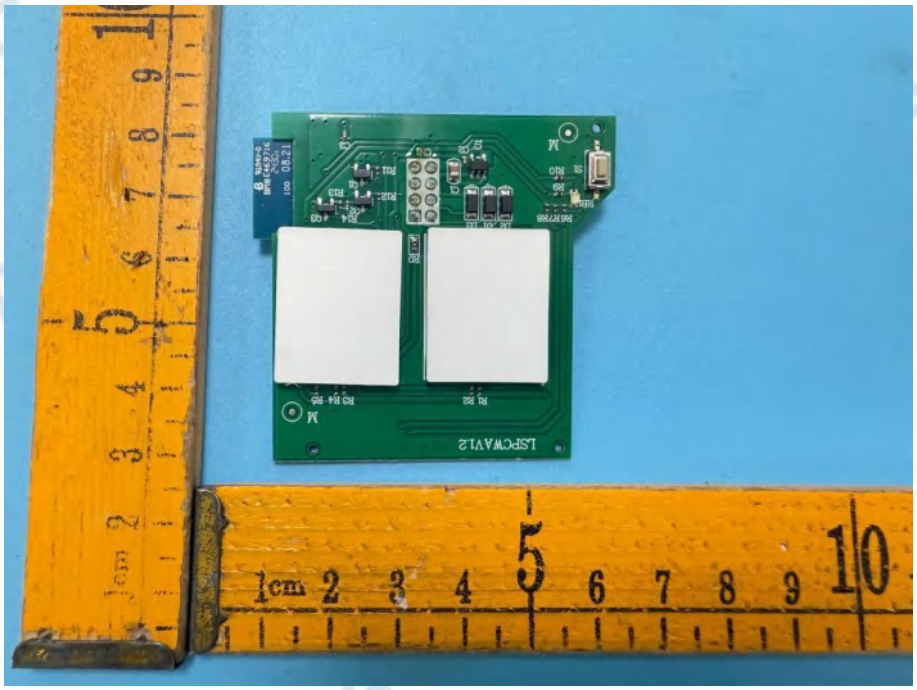
**Internal**

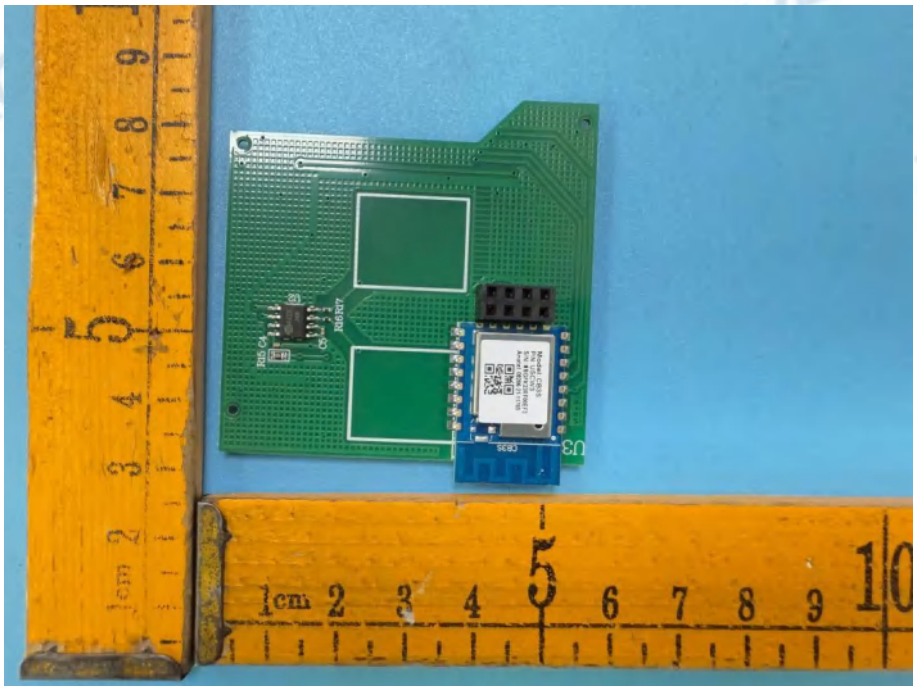


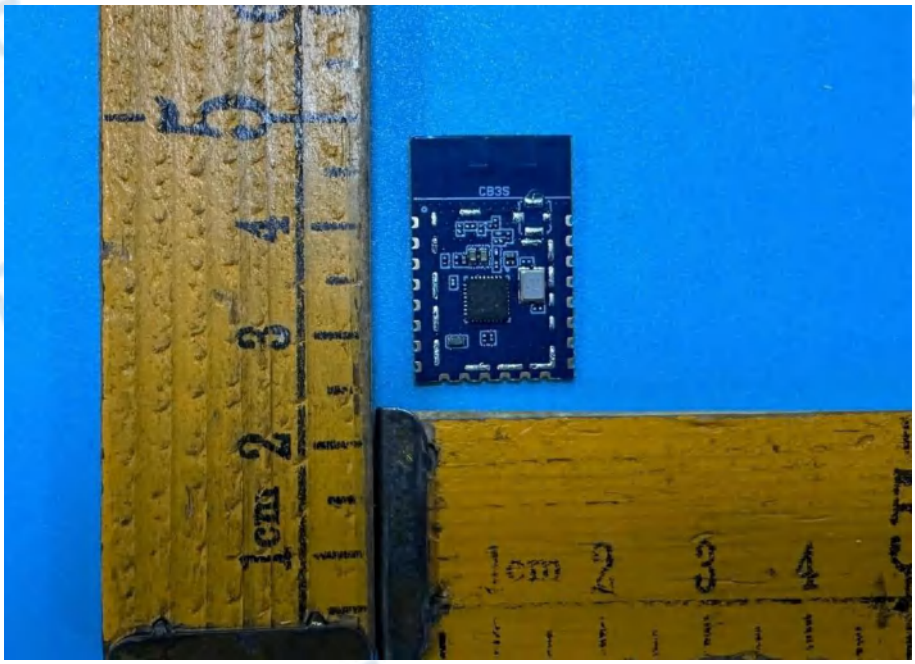


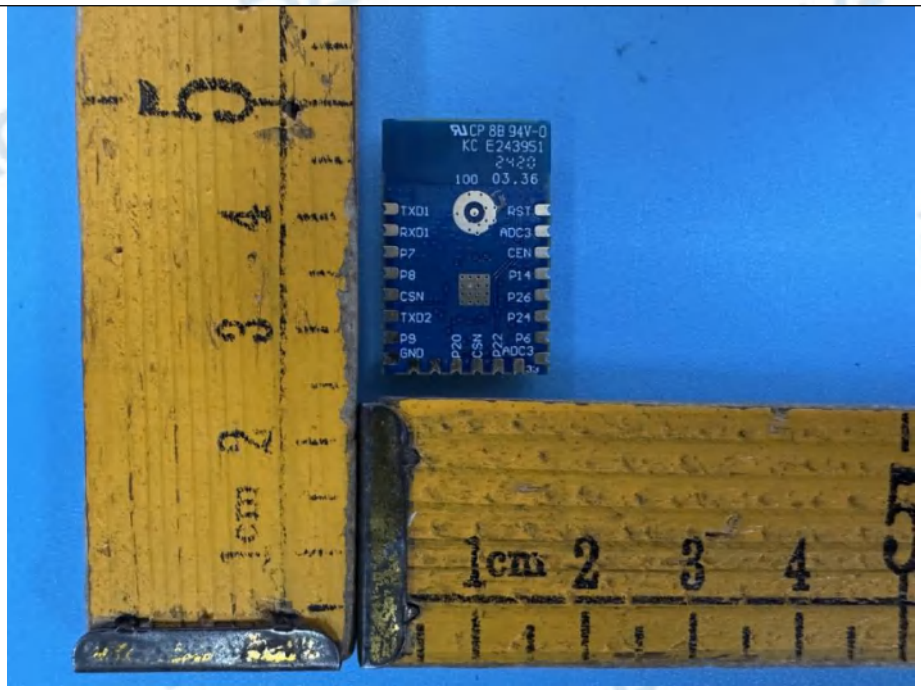


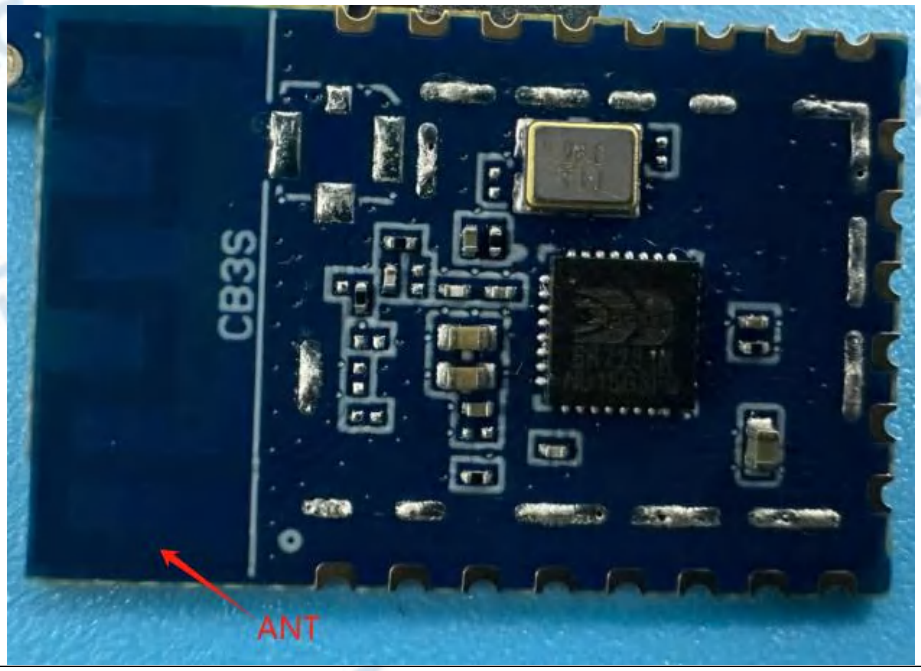

LSPUSCWPV1.1
N
L
L1
L2
M


LSPCWAV1.2
1cm 2 3 4 5 6 7 8 9 10


1cm 2 3 4 5 6 7 8 9 10


CB3S


CP 8B 94V-0
KC E243951
2420
100 03.36
TXD1
RXD1
P7
P8
CSN
TXD2
P9
GND
RST
ADC3
CEN
P14
P26
P24
P6
ADC3


CB3S
ANT

# Appendix

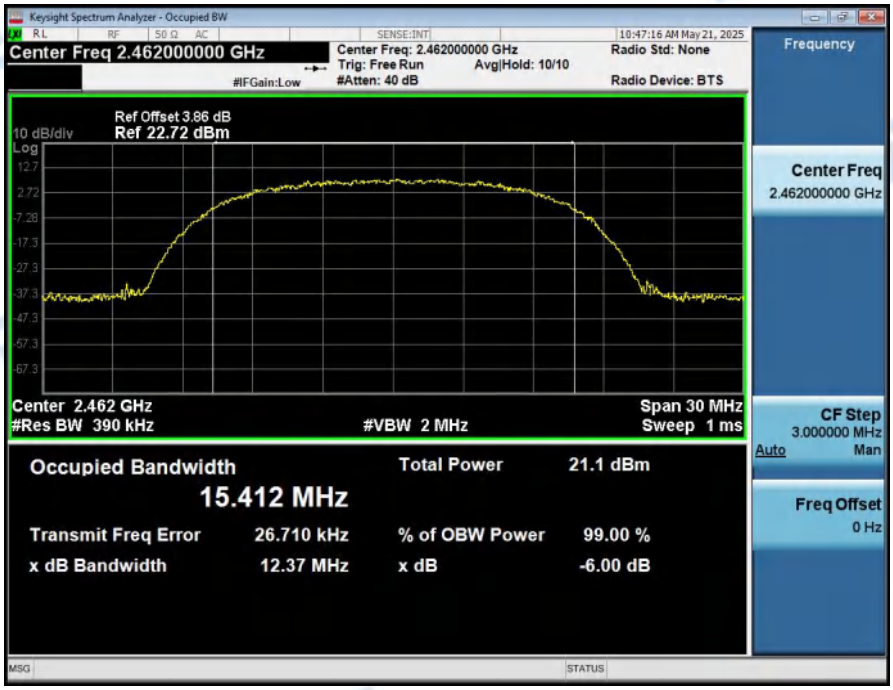
## 1. -6dB Bandwidth

| Condition | Antenna | Modulation | Frequency (MHz) | -6dB BW(MHz) | limit(kHz) | Result |
|---|---|---|---|---|---|---|
| NVNT | ANT1 | 802.11b | 2412.00 | 12.19 | 500 | Pass |
| NVNT | ANT1 | 802.11b | 2437.00 | 12.69 | 500 | Pass |
| NVNT | ANT1 | 802.11b | 2462.00 | 12.37 | 500 | Pass |
| NVNT | ANT1 | 802.11g | 2412.00 | 17.51 | 500 | Pass |
| NVNT | ANT1 | 802.11g | 2437.00 | 17.50 | 500 | Pass |
| NVNT | ANT1 | 802.11g | 2462.00 | 17.48 | 500 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2412.00 | 18.19 | 500 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2437.00 | 18.20 | 500 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2462.00 | 18.18 | 500 | Pass |
| NVNT | ANT1 | 802.11n(HT40) | 2422.00 | 35.89 | 500 | Pass |
| NVNT | ANT1 | 802.11n(HT40) | 2437.00 | 35.94 | 500 | Pass |
| NVNT | ANT1 | 802.11n(HT40) | 2452.00 | 35.85 | 500 | Pass |

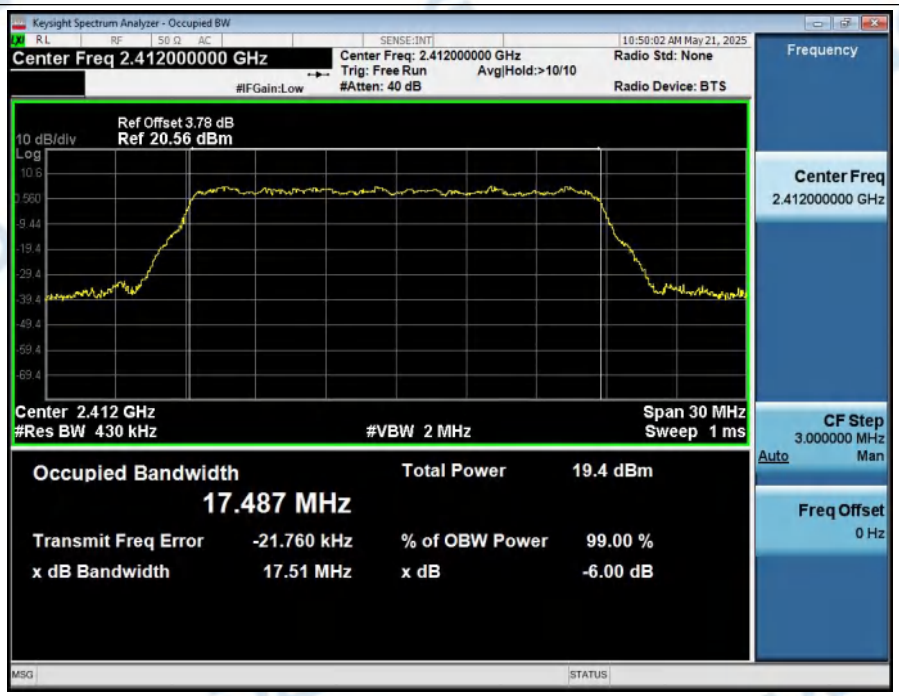
**-6dB_Bandwidth_NVNT_ANT1_802_11b_2412**

**-6dB_Bandwidth_NVNT_ANT1_802_11b_2437**

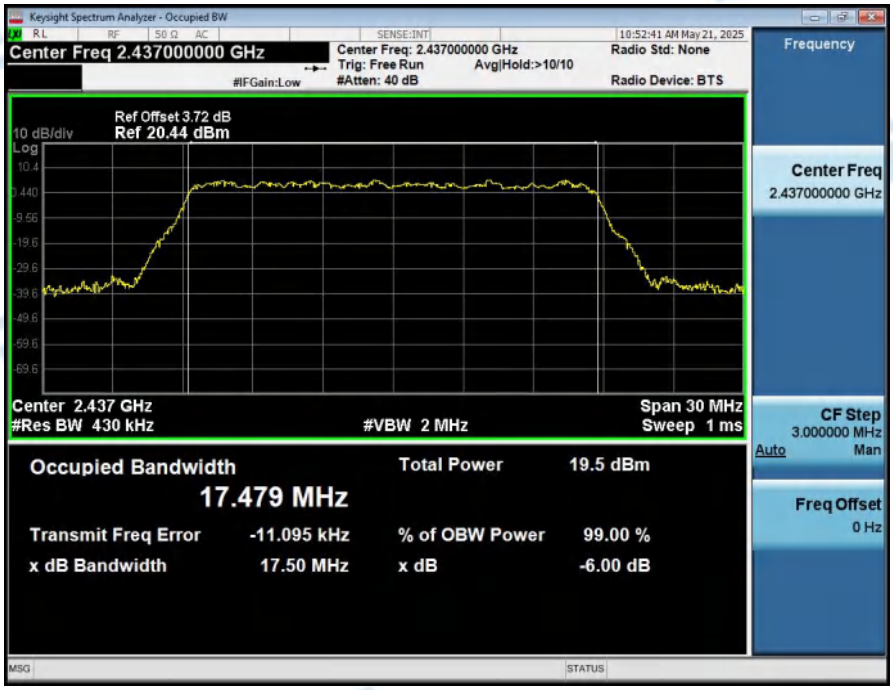
**-6dB_Bandwidth_NVNT_ANT1_802_11b_2462**



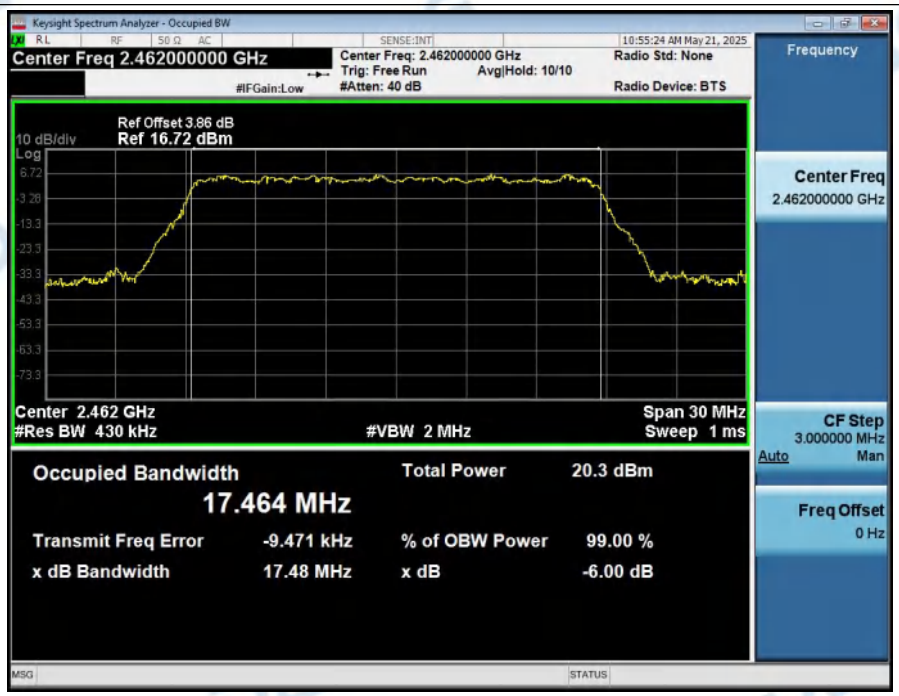
**-6dB_Bandwidth_NVNT_ANT1_802_11g_2412**



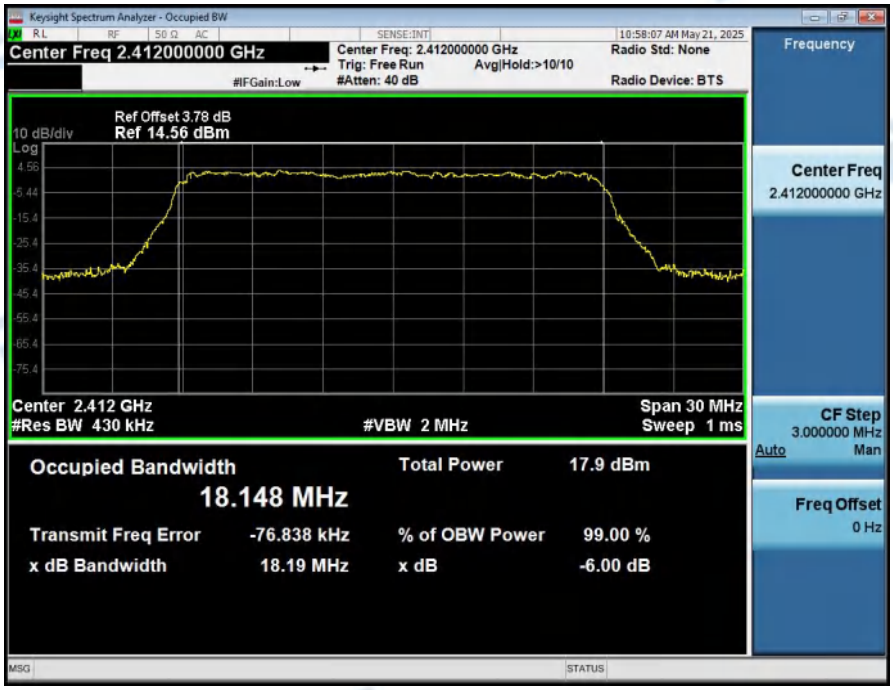

**-6dB_Bandwidth_NVNT_ANT1_802_11g_2437**



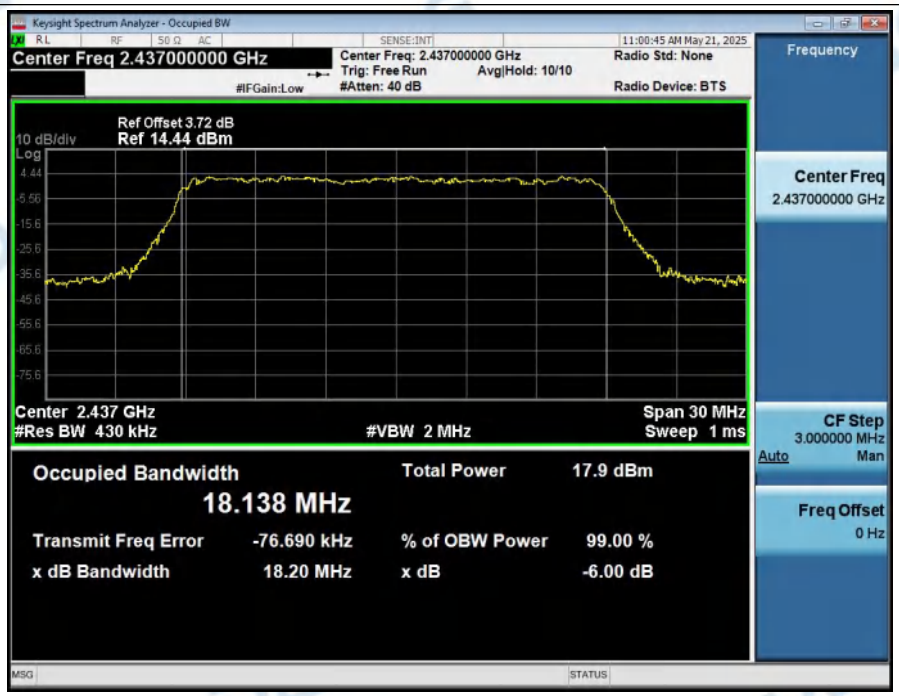
**-6dB_Bandwidth_NVNT_ANT1_802_11g_2462**



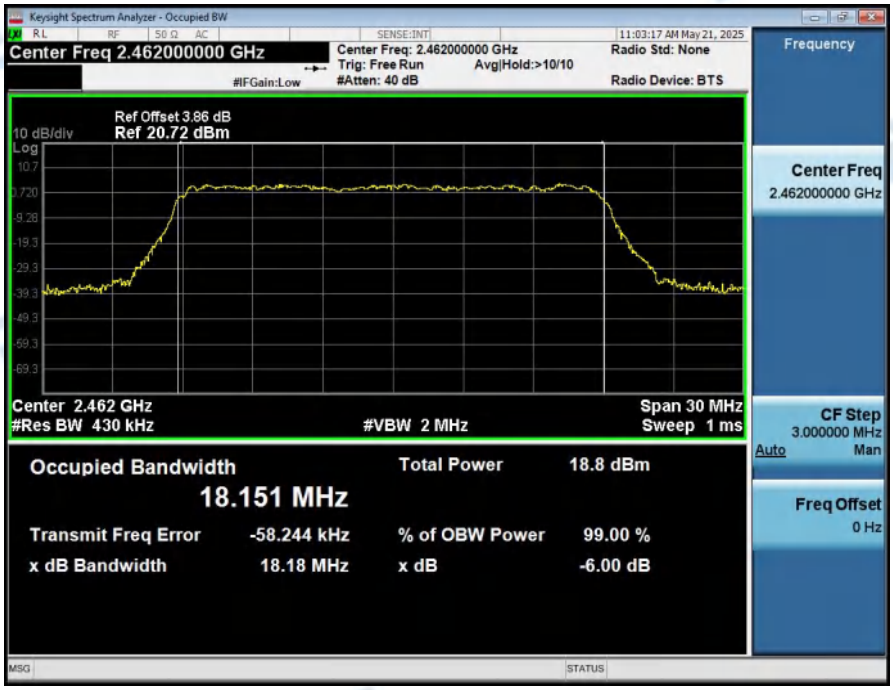

**-6dB_Bandwidth_NVNT_ANT1_802_11n(HT20)_2412**



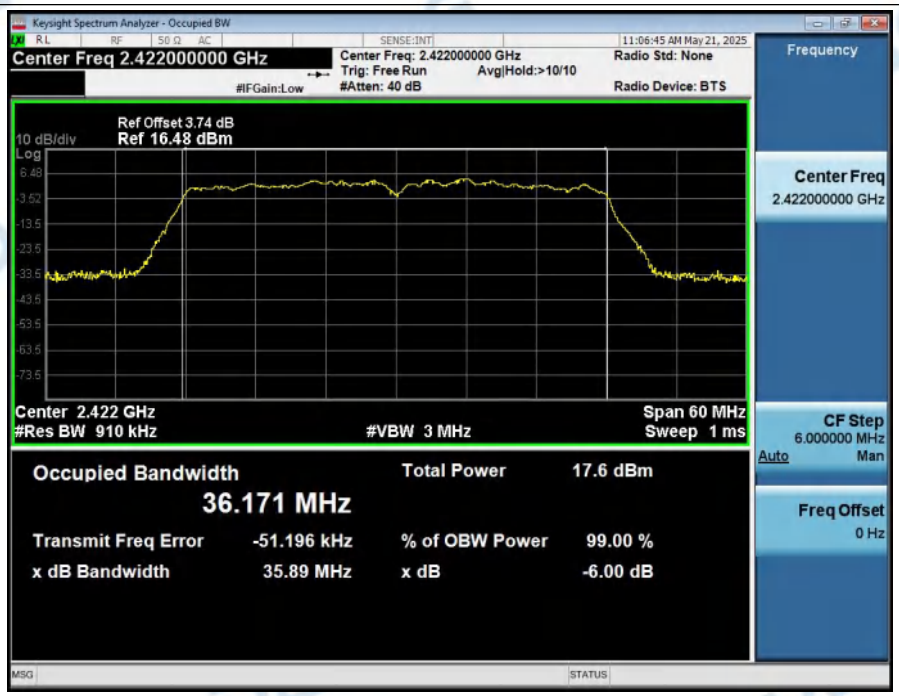
**-6dB_Bandwidth_NVNT_ANT1_802_11n(HT20)_2437**



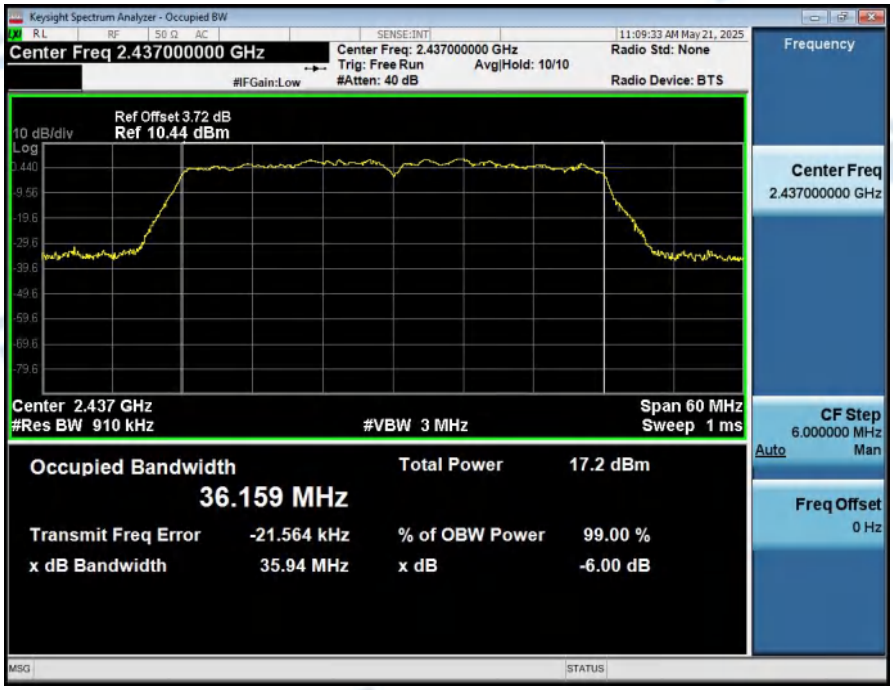

**-6dB_Bandwidth_NVNT_ANT1_802_11n(HT20)_2462**



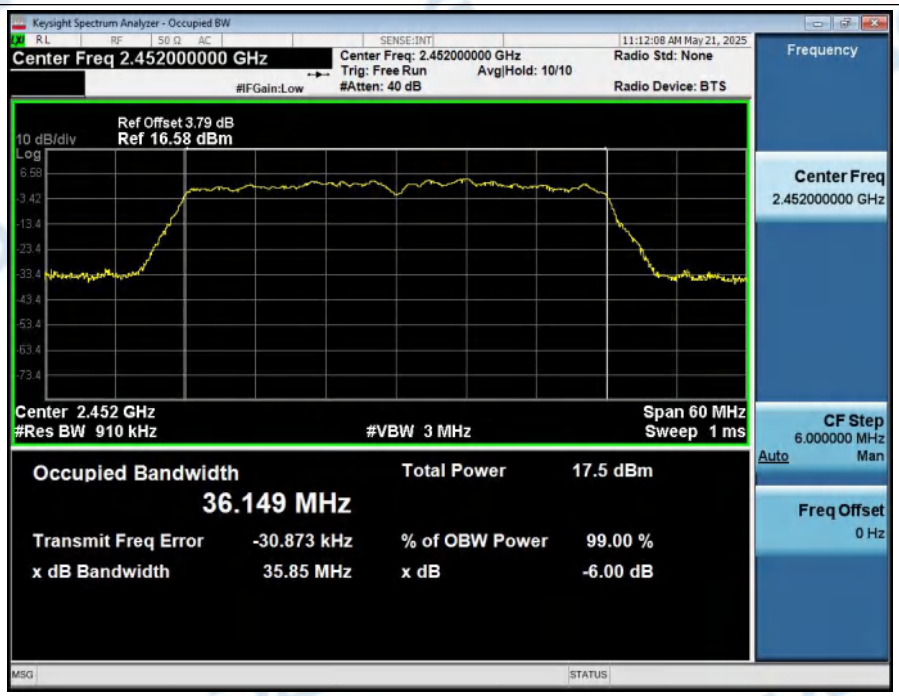
**-6dB_Bandwidth_NVNT_ANT1_802_11n(HT40)_2422**




**-6dB_Bandwidth_NVNT_ANT1_802_11n(HT40)_2437**



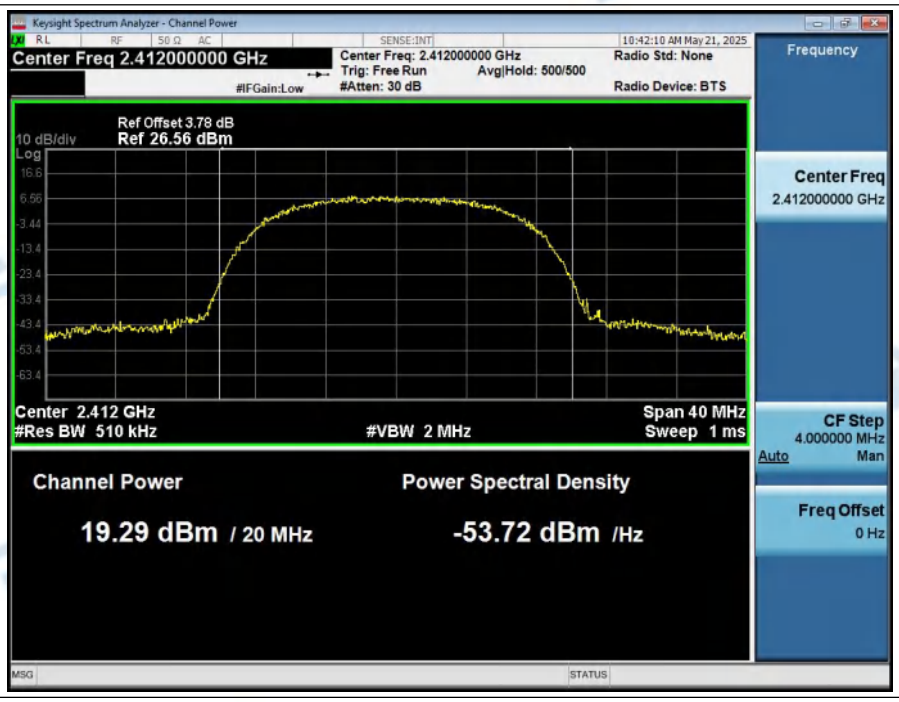
**-6dB_Bandwidth_NVNT_ANT1_802_11n(HT40)_2452**



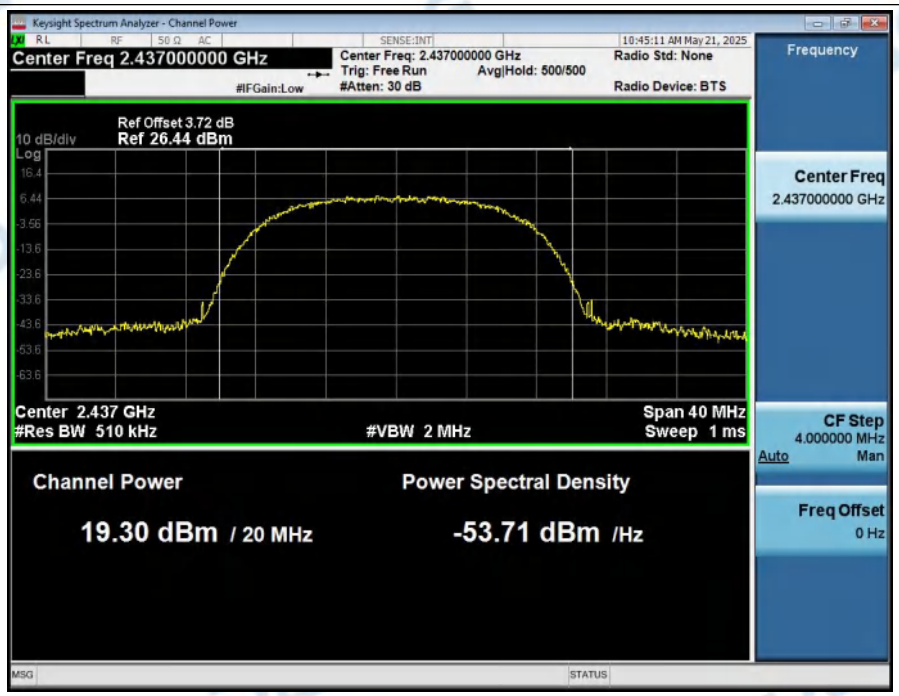
## 2. MAX. Output Power

| Condition | Antenna | Modulation | Frequency (MHz) | Detector | Conducted Power(dBm) | limit(dBm) | Result |
|---|---|---|---|---|---|---|---|
| NVNT | ANT1 | 802.11b | 2412.00 | Peak | 19.29 | 30 | Pass |
| NVNT | ANT1 | 802.11b | 2437.00 | Peak | 19.30 | 30 | Pass |
| NVNT | ANT1 | 802.11b | 2462.00 | Peak | 20.40 | 30 | Pass |
| NVNT | ANT1 | 802.11g | 2412.00 | Peak | 19.14 | 30 | Pass |
| NVNT | ANT1 | 802.11g | 2437.00 | Peak | 18.92 | 30 | Pass |
| NVNT | ANT1 | 802.11g | 2462.00 | Peak | 20.01 | 30 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2412.00 | Peak | 17.63 | 30 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2437.00 | Peak | 17.57 | 30 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2462.00 | Peak | 18.56 | 30 | Pass |
| NVNT | ANT1 | 802.11n(HT40) | 2422.00 | Peak | 16.74 | 30 | Pass |
| NVNT | ANT1 | 802.11n(HT40) | 2437.00 | Peak | 16.35 | 30 | Pass |
| NVNT | ANT1 | 802.11n(HT40) | 2452.00 | Peak | 16.62 | 30 | Pass |

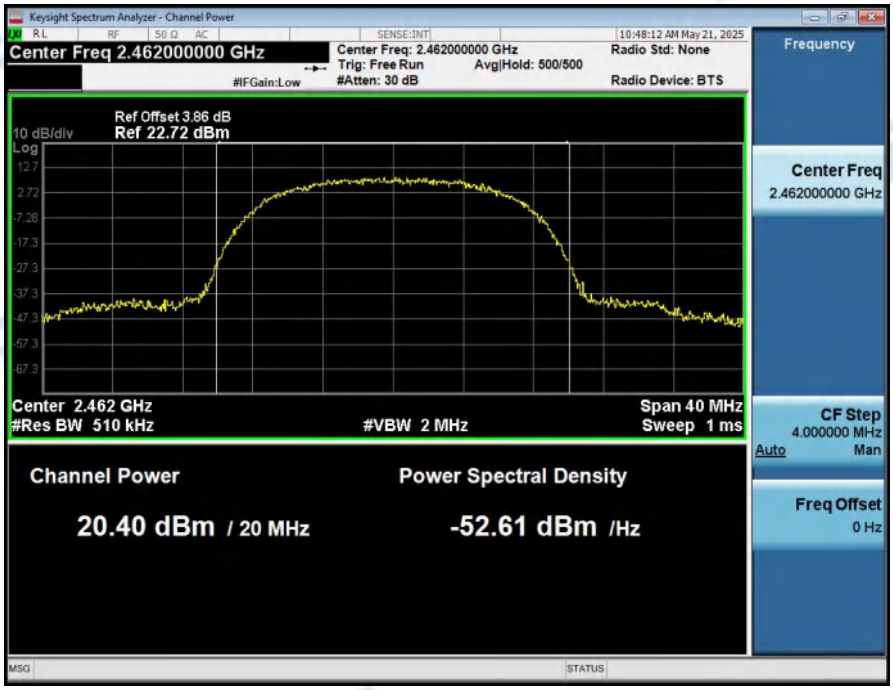
**MAX__Output_Power_NVNT_ANT1_802_11b_2412**



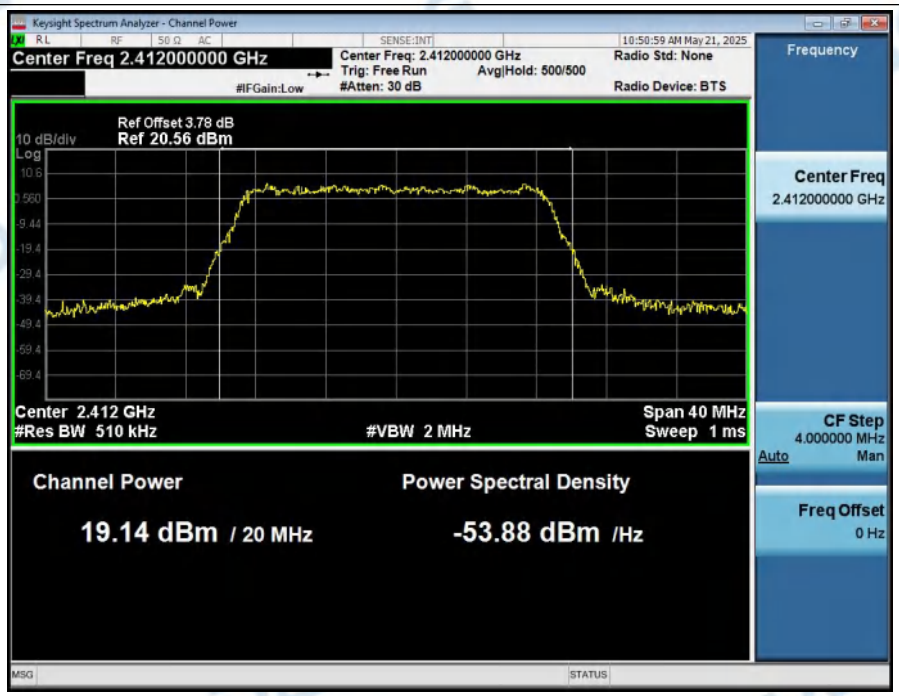
**MAX__Output_Power_NVNT_ANT1_802_11b_2437**



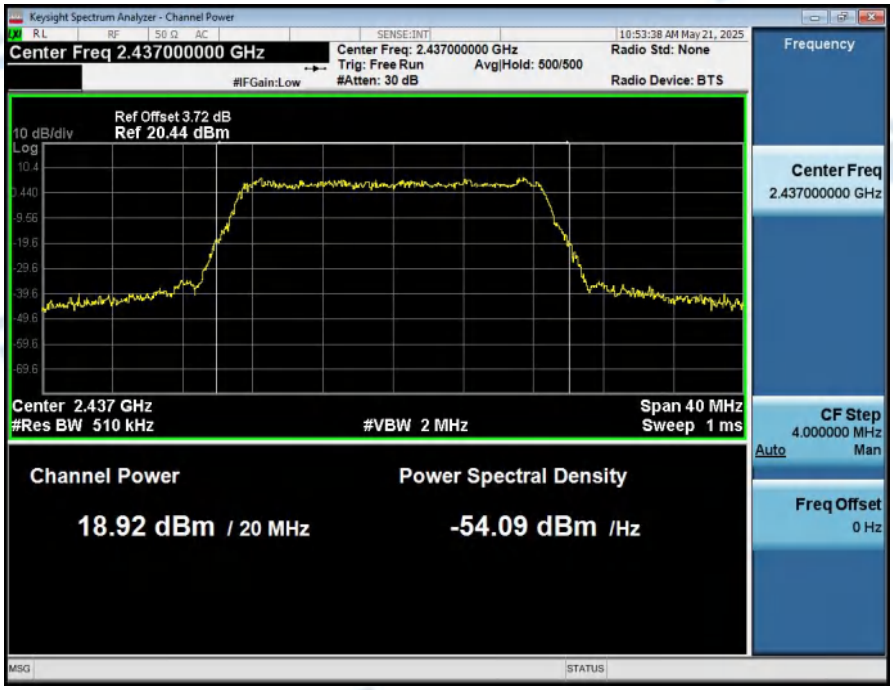

**MAX__Output_Power_NVNT_ANT1_802_11b_2462**



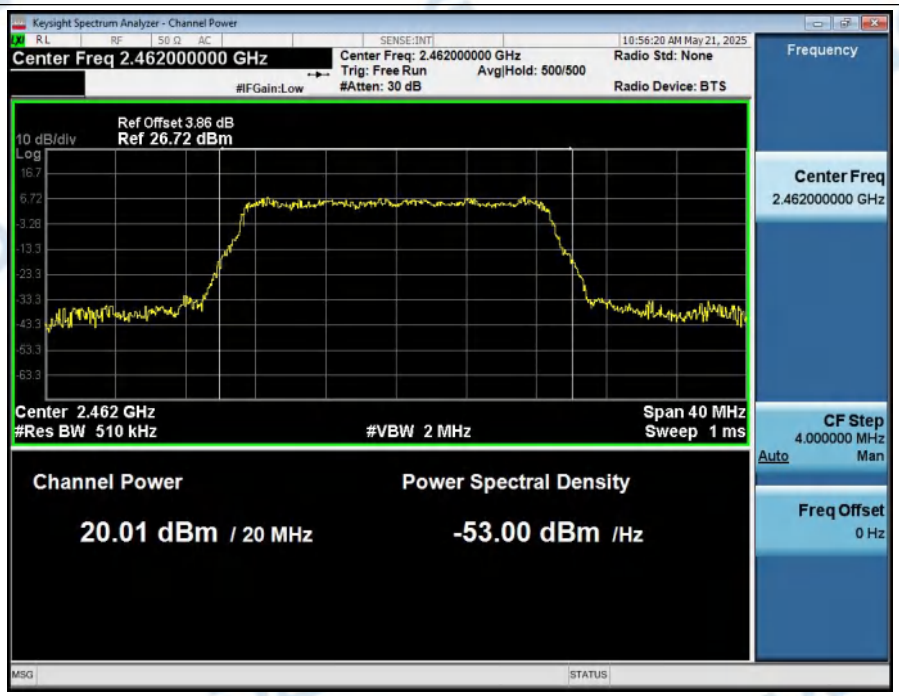
**MAX__Output_Power_NVNT_ANT1_802_11g_2412**



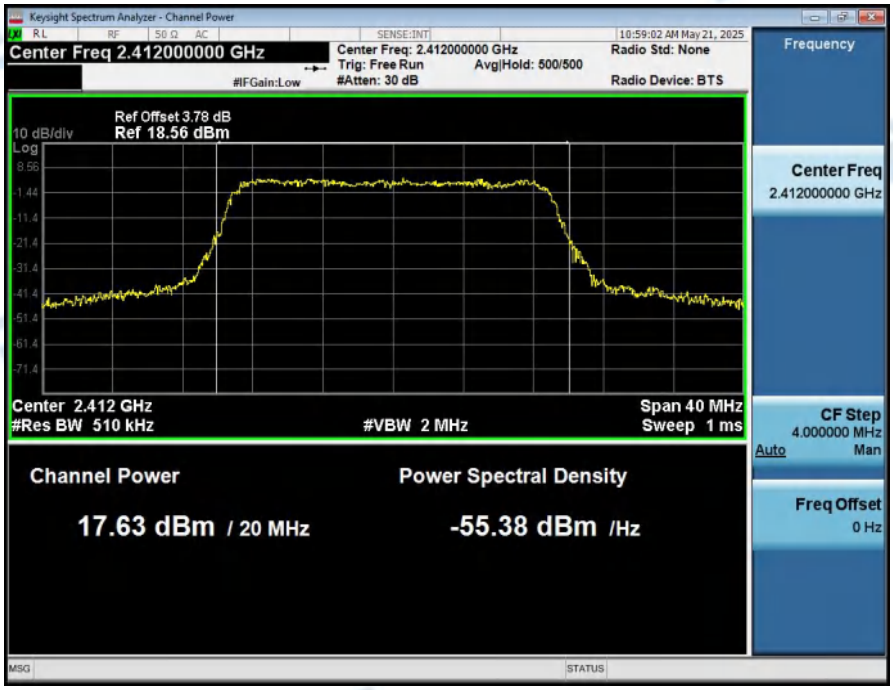

**MAX__Output_Power_NVNT_ANT1_802_11g_2437**



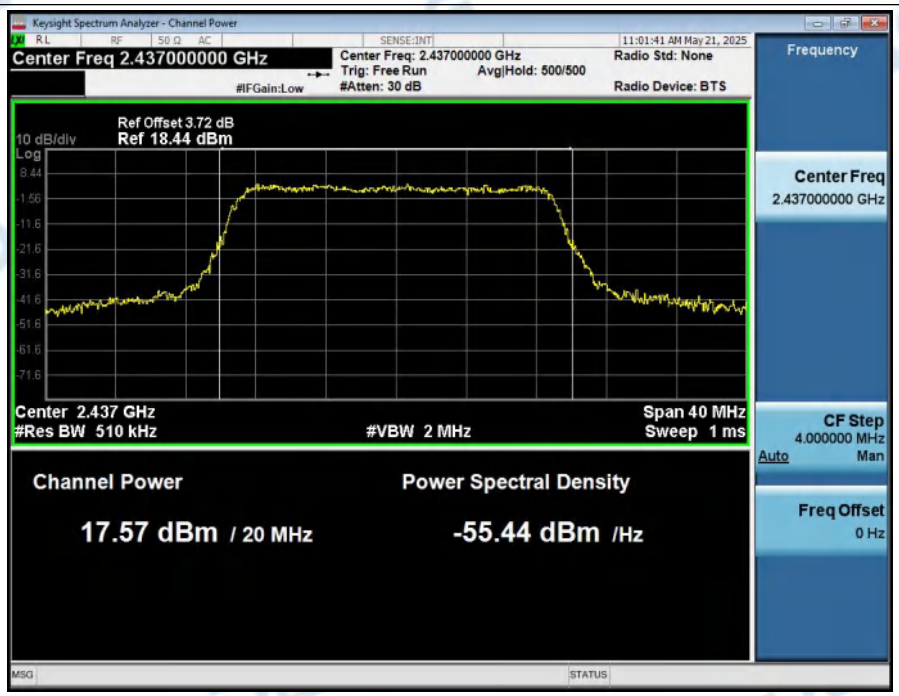
**MAX__Output_Power_NVNT_ANT1_802_11g_2462**



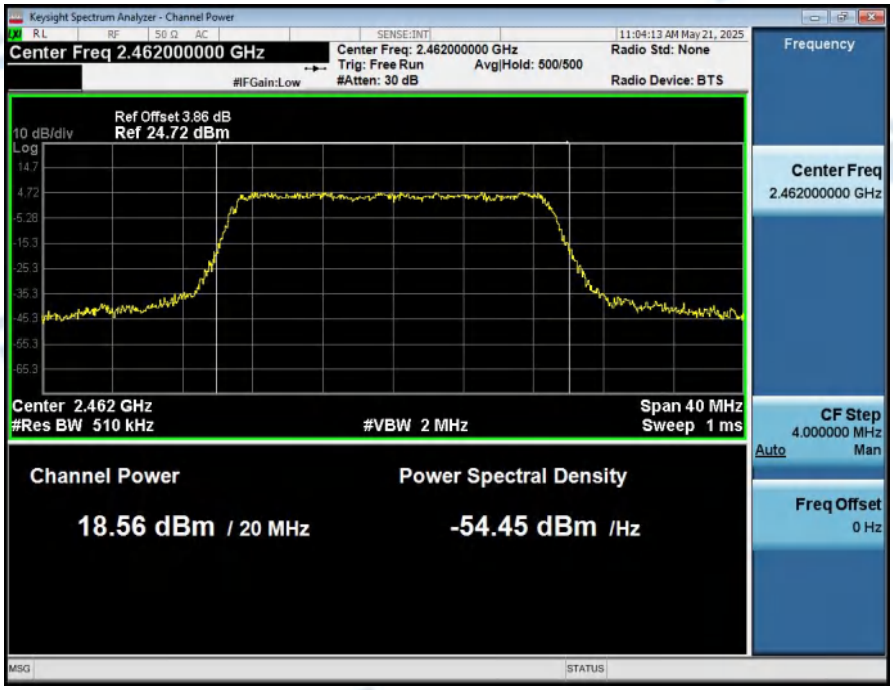

**MAX__Output_Power_NVNT_ANT1_802_11n(HT20)_2412**



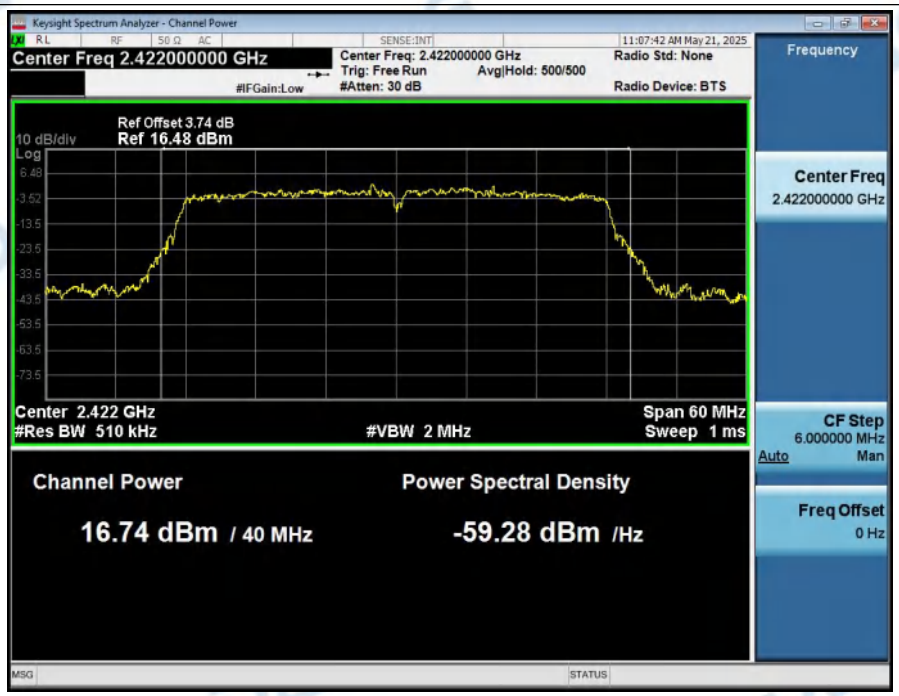
**MAX__Output_Power_NVNT_ANT1_802_11n(HT20)_2437**



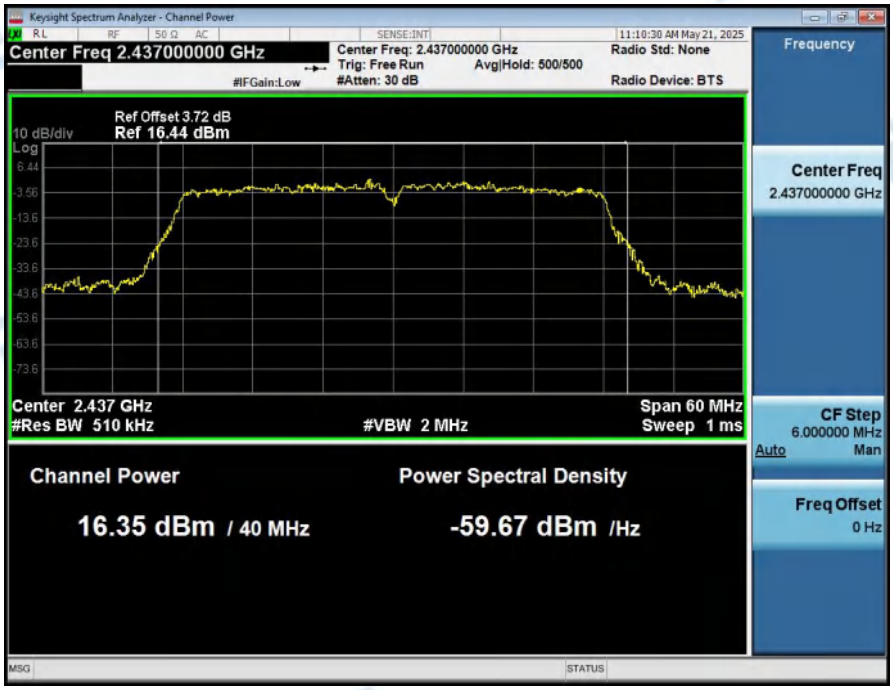

**MAX__Output_Power_NVNT_ANT1_802_11n(HT20)_2462**



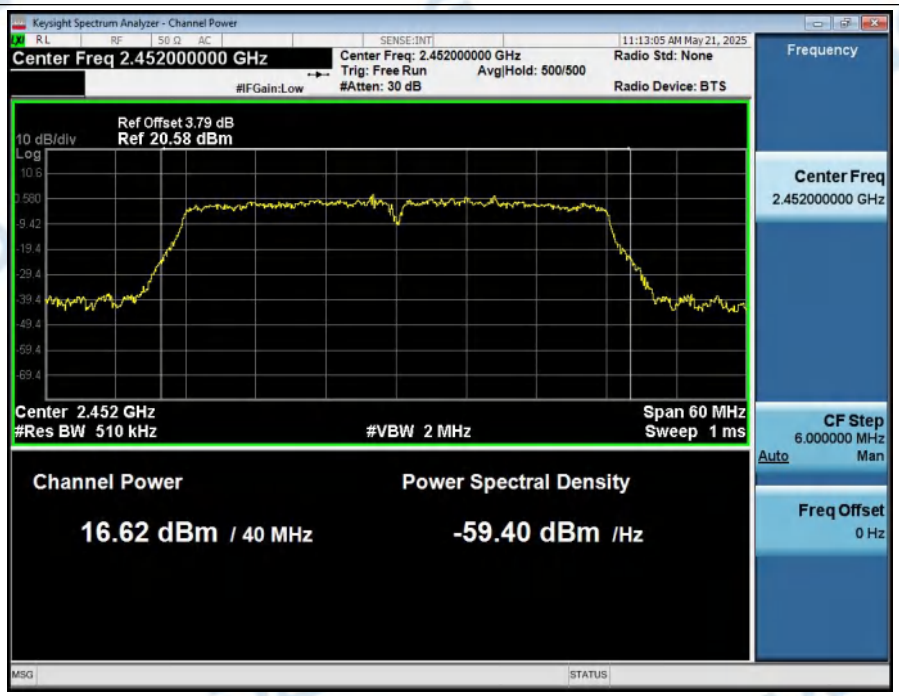
**MAX__Output_Power_NVNT_ANT1_802_11n(HT40)_2422**




**MAX__Output_Power_NVNT_ANT1_802_11n(HT40)_2437**



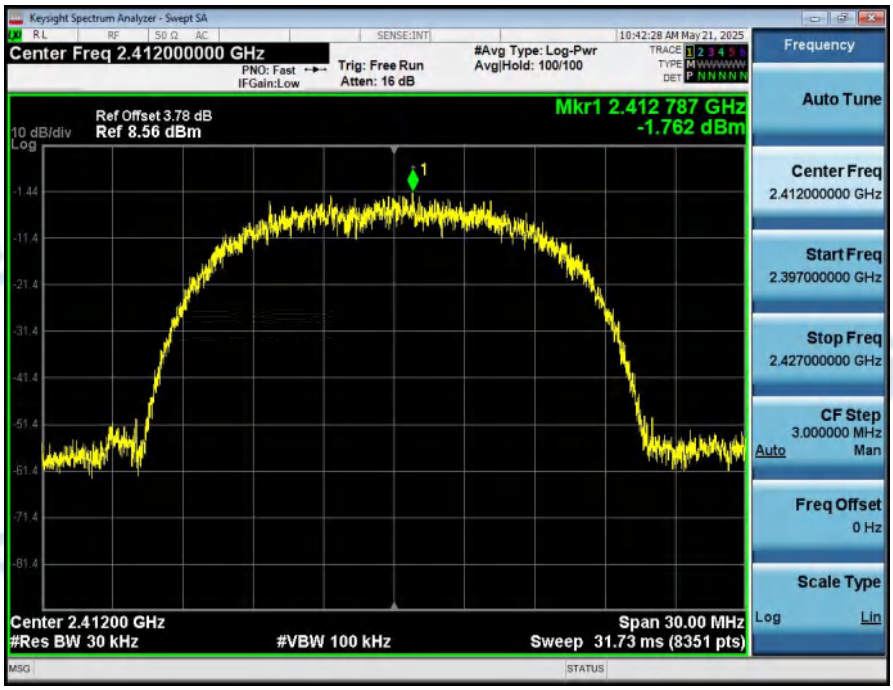
**MAX__Output_Power_NVNT_ANT1_802_11n(HT40)_2452**



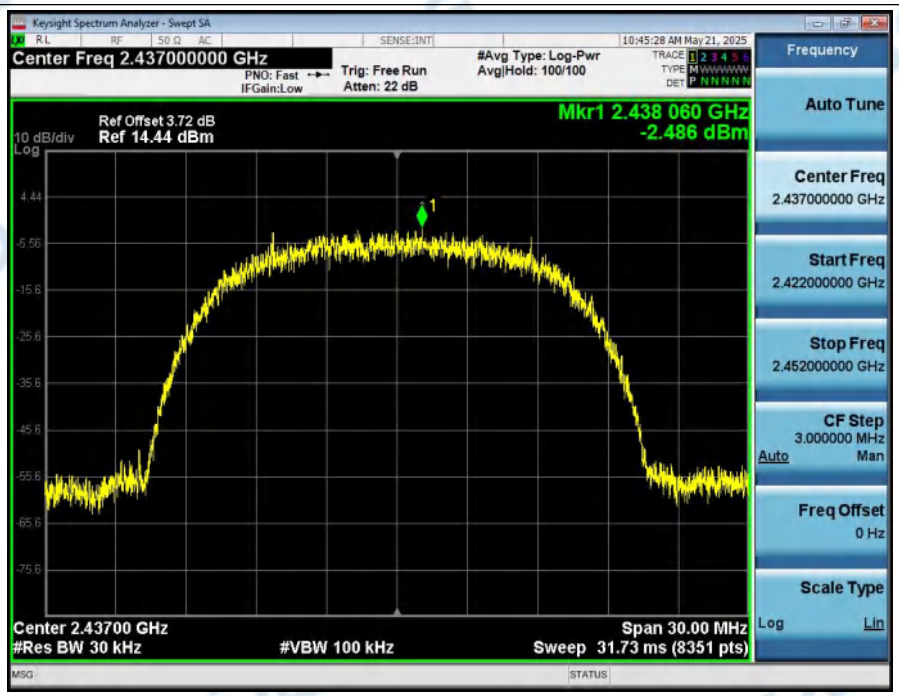
## 3. Power Spectral Density

| Condition | Antenna | Modulation | Frequency (MHz) | SA_PSD (dBm/30kHz) | Limit (dBm/3kHz) | Result |
|---|---|---|---|---|---|---|
| NVNT | ANT1 | 802.11b | 2412.00 | -1.76 | 8.00 | Pass |
| NVNT | ANT1 | 802.11b | 2437.00 | -2.49 | 8.00 | Pass |
| NVNT | ANT1 | 802.11b | 2462.00 | -0.57 | 8.00 | Pass |
| NVNT | ANT1 | 802.11g | 2412.00 | -3.66 | 8.00 | Pass |
| NVNT | ANT1 | 802.11g | 2437.00 | -3.56 | 8.00 | Pass |
| NVNT | ANT1 | 802.11g | 2462.00 | -2.68 | 8.00 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2412.00 | -4.84 | 8.00 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2437.00 | -4.77 | 8.00 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2462.00 | -3.52 | 8.00 | Pass |
| NVNT | ANT1 | 802.11n(HT40) | 2422.00 | -7.80 | 8.00 | Pass |
| NVNT | ANT1 | 802.11n(HT40) | 2437.00 | -7.97 | 8.00 | Pass |
| NVNT | ANT1 | 802.11n(HT40) | 2452.00 | -7.83 | 8.00 | Pass |

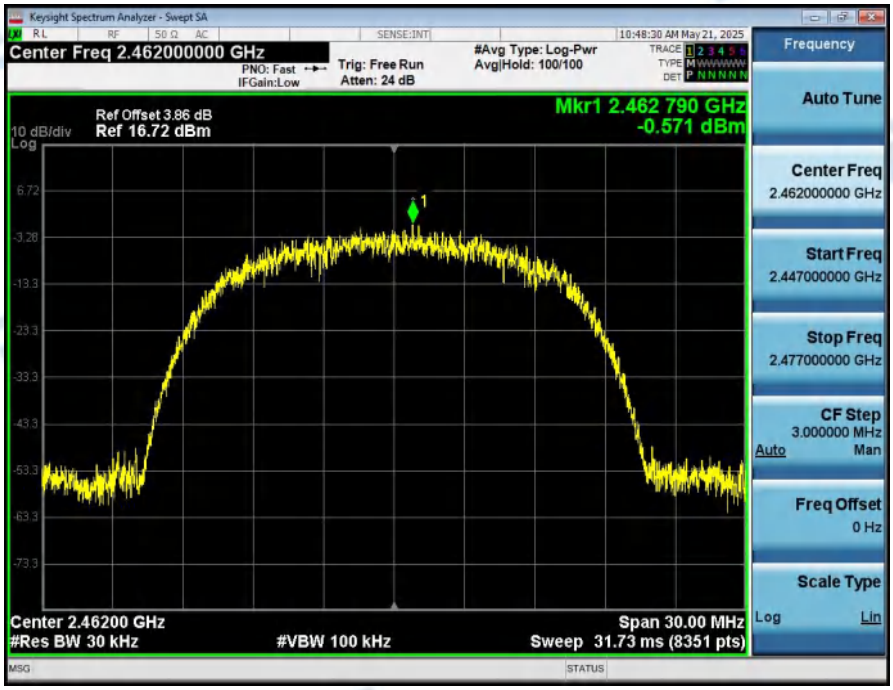
**Power_Spectral_Density_NVNT_ANT1_802_11b_2412**



**Power_Spectral_Density_NVNT_ANT1_802_11b_2437**

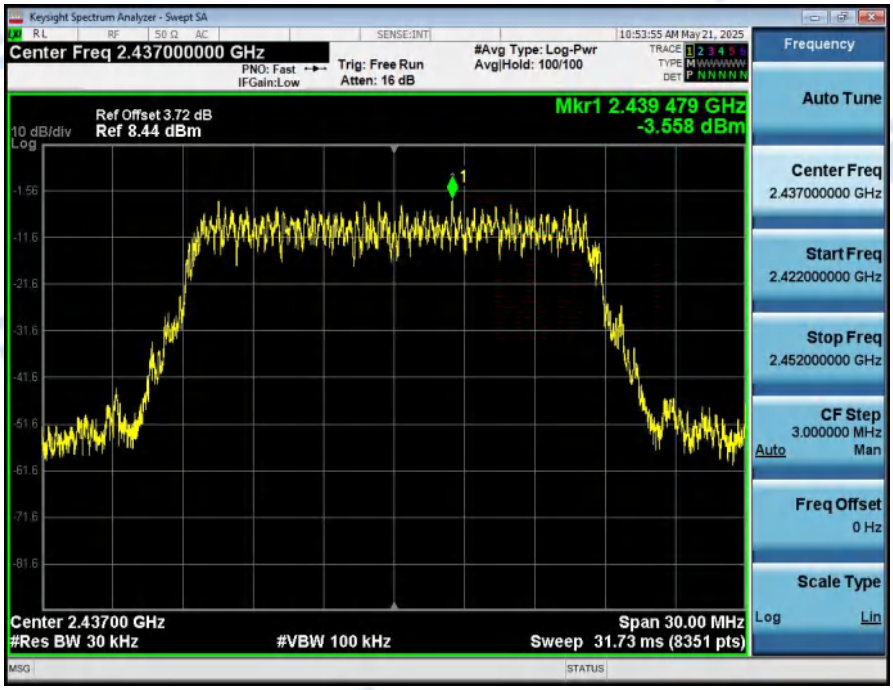



**Power_Spectral_Density_NVNT_ANT1_802_11b_2462**



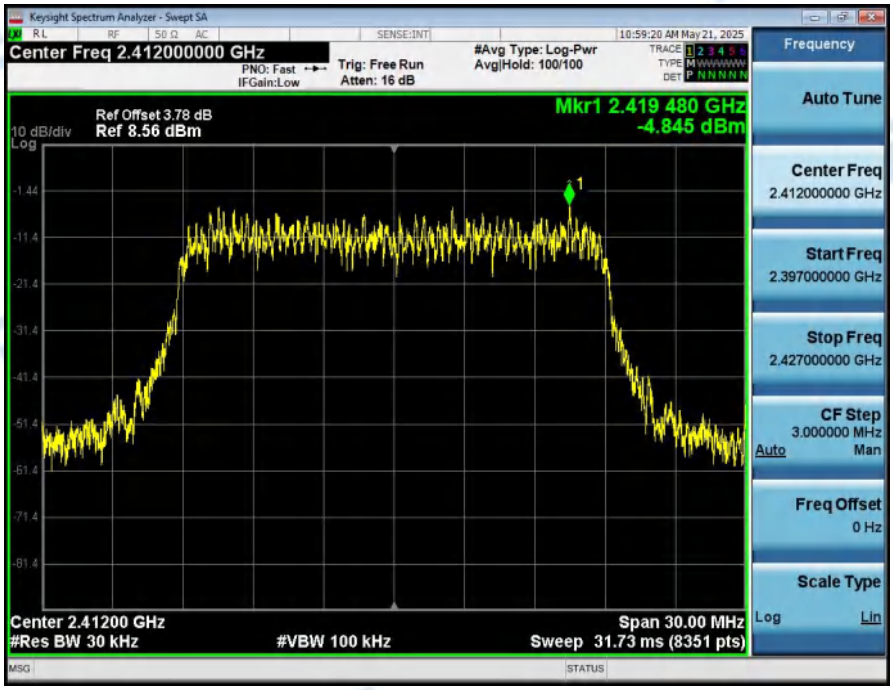
**Power_Spectral_Density_NVNT_ANT1_802_11g_2412**

**Power_Spectral_Density_NVNT_ANT1_802_11g_2437**

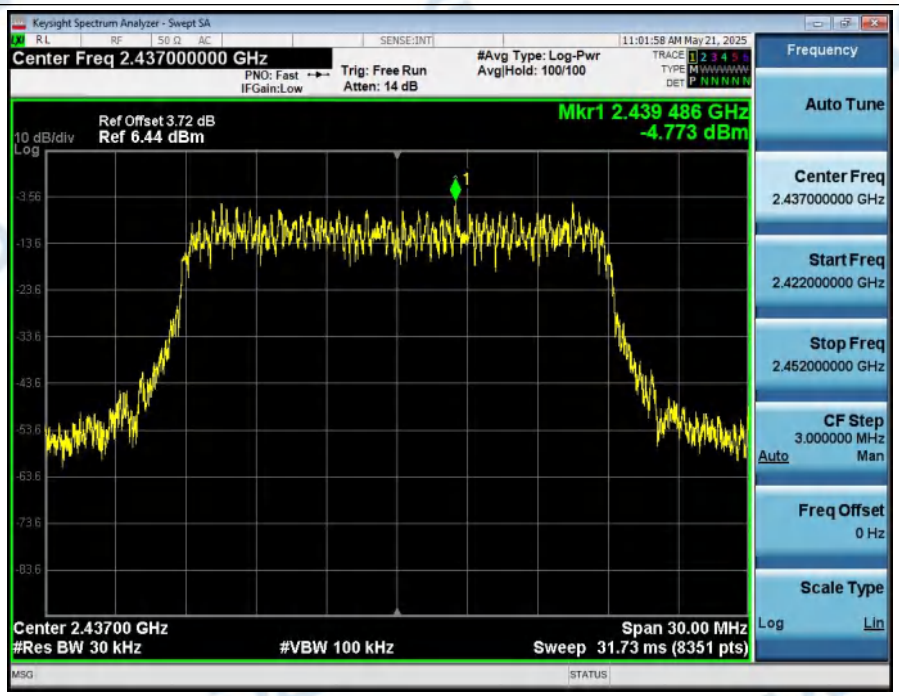


**Power_Spectral_Density_NVNT_ANT1_802_11g_2462**

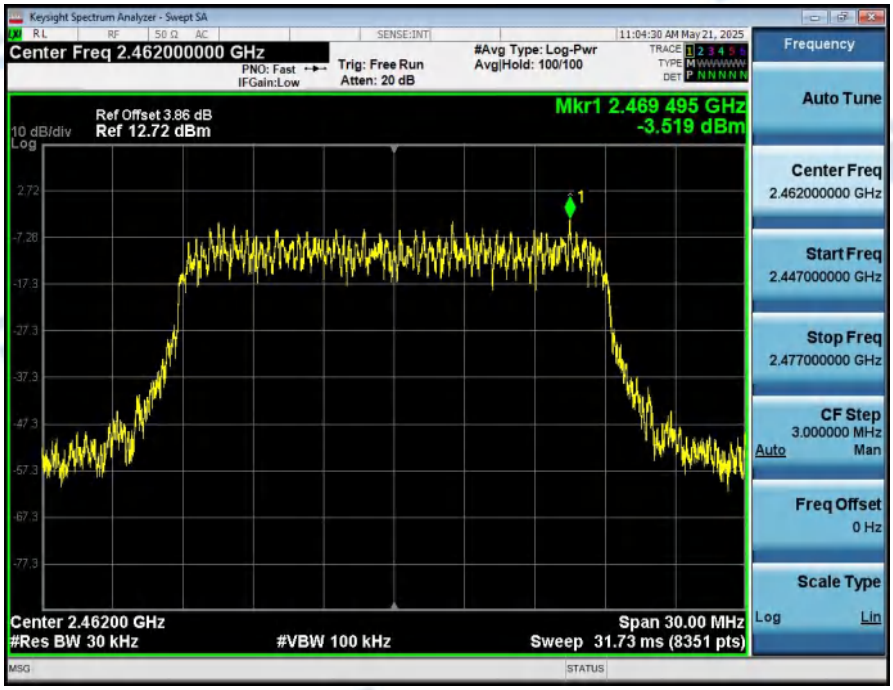
**Power_Spectral_Density_NVNT_ANT1_802_11n(HT20)_2412**



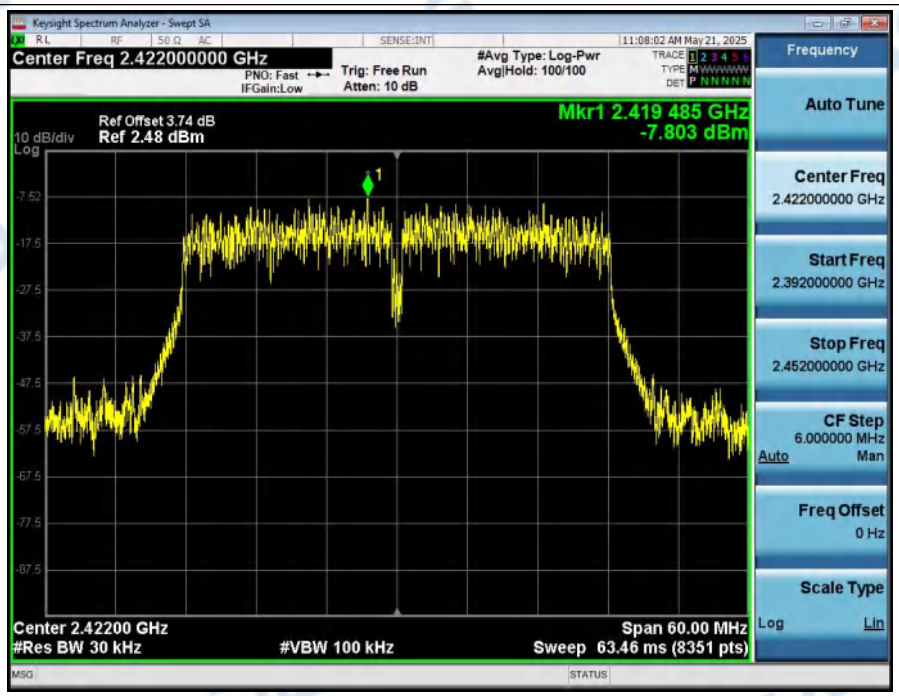
**Power_Spectral_Density_NVNT_ANT1_802_11n(HT20)_2437**




**Power_Spectral_Density_NVNT_ANT1_802_11n(HT20)_2462**

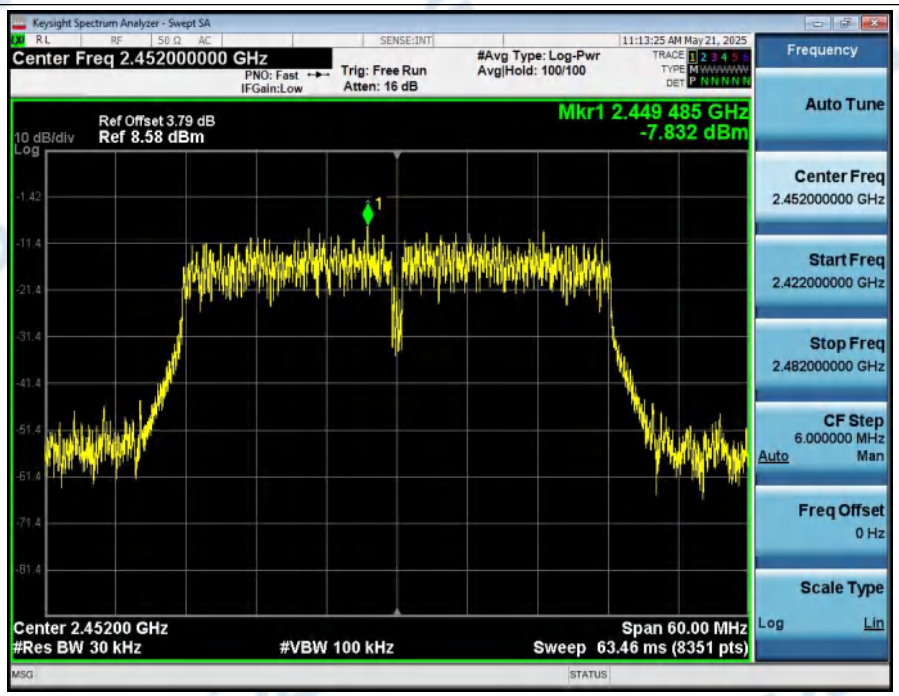


**Power_Spectral_Density_NVNT_ANT1_802_11n(HT40)_2422**




**Power_Spectral_Density_NVNT_ANT1_802_11n(HT40)_2437**

**Power_Spectral_Density_NVNT_ANT1_802_11n(HT40)_2452**

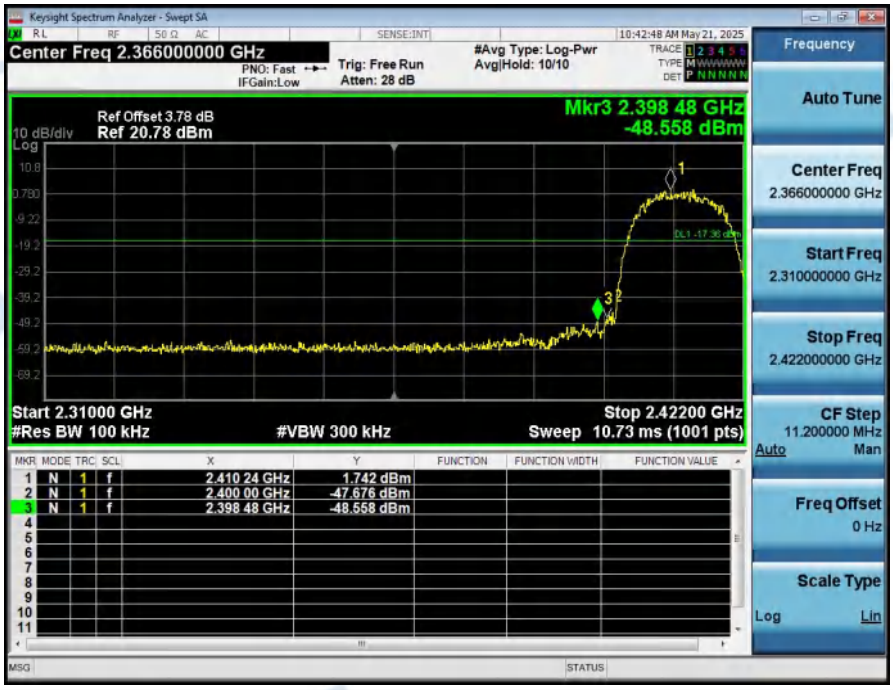


## 4. Bandedge

| Condition | Antenna | Modulation | TX_Frequency (MHz) | Max. Mark_freq(MHz) | Ref_level(dBm) | Spurious level(dBm) | limit(dBm) | Result |
|---|---|---|---|---|---|---|---|---|
| NVNT | ANT1 | 802.11b | 2412.00 | 2398.480 | 2.642 | -48.558 | -17.358 | Pass |
| NVNT | ANT1 | 802.11b | 2462.00 | 2487.808 | 3.797 | -51.697 | -16.203 | Pass |
| NVNT | ANT1 | 802.11g | 2412.00 | 2399.824 | 1.652 | -43.109 | -18.348 | Pass |
| NVNT | ANT1 | 802.11g | 2462.00 | 2483.824 | 2.503 | -48.103 | -17.497 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2412.00 | 2399.936 | 0.700 | -44.646 | -19.300 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2462.00 | 2484.640 | 1.070 | -52.195 | -18.930 | Pass |
| NVNT | ANT1 | 802.11n(HT40) | 2422.00 | 2396.988 | -3.131 | -39.649 | -23.131 | Pass |
| NVNT | ANT1 | 802.11n(HT40) | 2452.00 | 2484.496 | -3.451 | -46.409 | -23.451 | Pass |

**1_Reference_Level_NVNT_ANT1_802_11b_2412**

**2_Bandedge_NVNT_ANT1_802_11b_2412**




**1_Reference_Level_NVNT_ANT1_802_11b_2462**

**2_Bandedge_NVNT_ANT1_802_11b_2462**

**1_Reference_Level_NVNT_ANT1_802_11g_2412**

**2_Bandedge_NVNT_ANT1_802_11g_2412**

**1_Reference_Level_NVNT_ANT1_802_11g_2462**

**2_Bandedge_NVNT_ANT1_802_11g_2462**

**1_Reference_Level_NVNT_ANT1_802_11n(HT20)_2412**

**2_Bandedge_NVNT_ANT1_802_11n(HT20)_2412**

**1_Reference_Level_NVNT_ANT1_802_11n(HT20)_2462**

**2_Bandedge_NVNT_ANT1_802_11n(HT20)_2462**

**1_Reference_Level_NVNT_ANT1_802_11n(HT40)_2422**

**2_Bandedge_NVNT_ANT1_802_11n(HT40)_2422**

**1_Reference_Level_NVNT_ANT1_802_11n(HT40)_2452**

**2_Bandedge_NVNT_ANT1_802_11n(HT40)_2452**

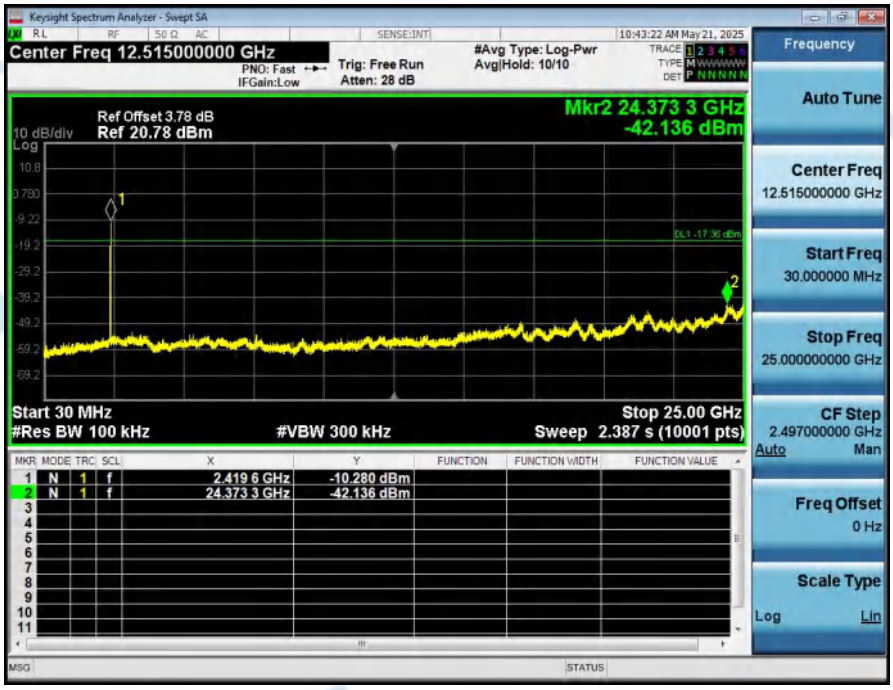
Keysight Spectrum Analyzer - Swept SA
Center Freq 2.466000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 18 dB
#Avg Type: Log-Pwr
Avg|Hold: 10/10
11:13:46 AM May 21, 2025
Ref Offset 3.79 dB
10 dB/div Ref 10.79 dBm
Log
Mkr3 2.484 496 GHz
-46.409 dBm
Start 2.43200 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.50000 GHz
Sweep 6.533 ms (1001 pts)
1 N 1 f 2.454 508 GHz -3.123 dBm
2 N 1 f 2.483 500 GHz -51.249 dBm
3 N 1 f 2.484 496 GHz -46.409 dBm
Frequency
Auto Tune
Center Freq
2.466000000 GHz
Start Freq
2.432000000 GHz
Stop Freq
2.500000000 GHz
CF Step
6.800000 MHz
Auto Man
Freq Offset
0 Hz
Scale Type
Log Lin

## 5. Spurious Emission

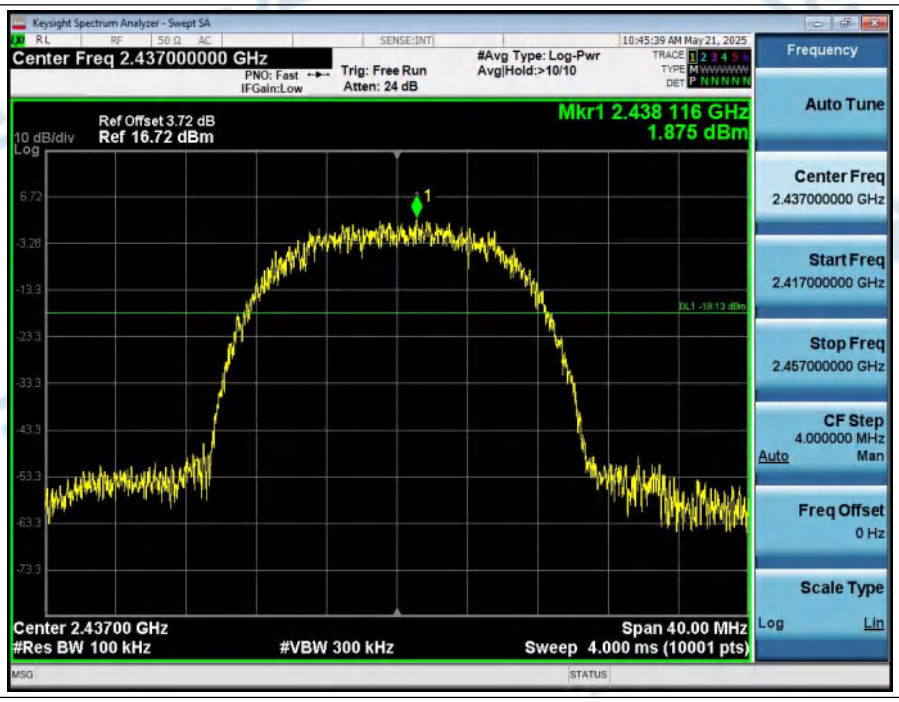
| Condition | Antenna | Modulation | TX_Frequency (MHz) | Max. Mark_freq(MHz) | Ref_level(dBm) | Spurious level(dBm) | limit(dBm) | Result |
|---|---|---|---|---|---|---|---|---|
| NVNT | ANT1 | 802.11b | 2412.00 | 24373.253 | 2.642 | -42.136 | -17.358 | Pass |
| NVNT | ANT1 | 802.11b | 2437.00 | 24947.563 | 1.875 | -46.176 | -18.125 | Pass |
| NVNT | ANT1 | 802.11b | 2462.00 | 24997.503 | 3.797 | -44.263 | -16.203 | Pass |
| NVNT | ANT1 | 802.11g | 2412.00 | 24995.006 | 1.652 | -47.623 | -18.348 | Pass |
| NVNT | ANT1 | 802.11g | 2437.00 | 24950.060 | 1.232 | -48.075 | -18.768 | Pass |
| NVNT | ANT1 | 802.11g | 2462.00 | 24940.072 | 2.503 | -42.384 | -17.497 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2412.00 | 24415.702 | 0.700 | -48.207 | -19.300 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2437.00 | 24992.509 | -0.111 | -48.499 | -20.111 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2462.00 | 24987.515 | 1.070 | -41.998 | -18.930 | Pass |
| NVNT | ANT1 | 802.11n(HT40) | 2422.00 | 24942.569 | -3.131 | -52.052 | -23.131 | Pass |
| NVNT | ANT1 | 802.11n(HT40) | 2437.00 | 24448.163 | -3.434 | -51.222 | -23.434 | Pass |
| NVNT | ANT1 | 802.11n(HT40) | 2452.00 | 24967.539 | -3.451 | -51.511 | -23.451 | Pass |

**1_Reference_Level_NVNT_ANT1_802_11b_2412**

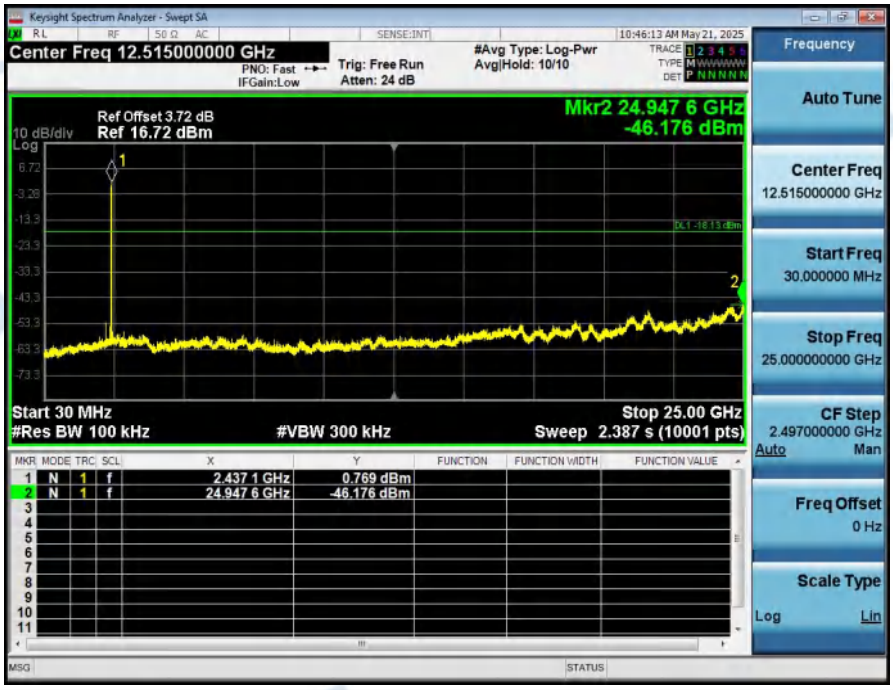
**2_Spurious_Emission_NVNT_ANT1_802_11b_2412**




**1_Reference_Level_NVNT_ANT1_802_11b_2437**

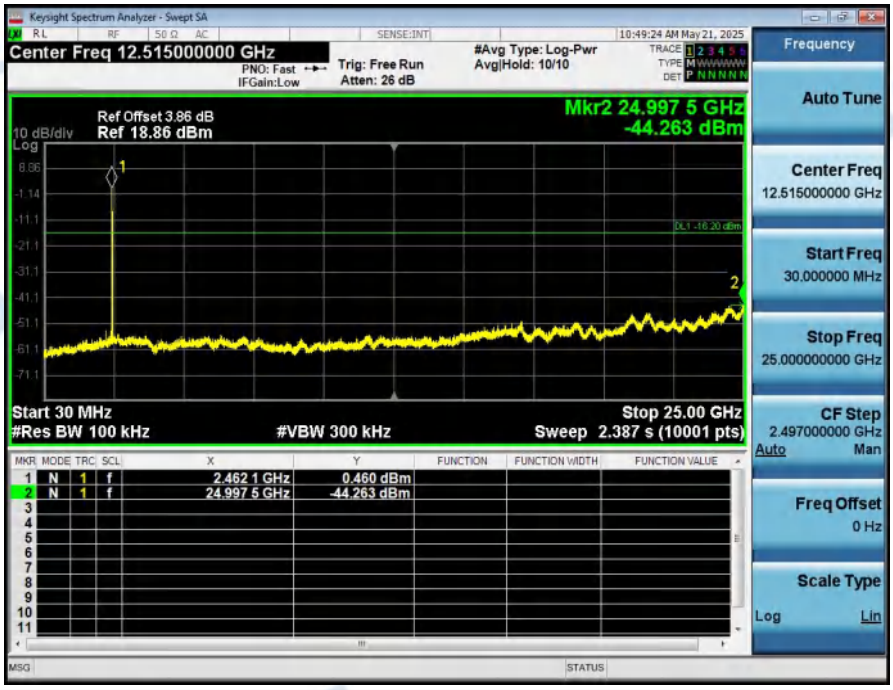



**2_Spurious_Emission_NVNT_ANT1_802_11b_2437**



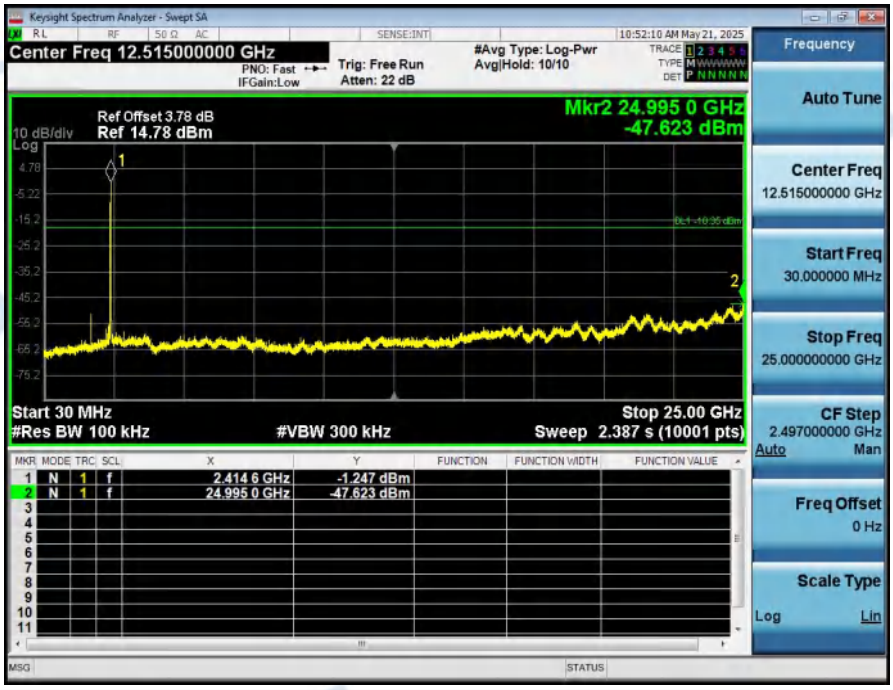

**1_Reference_Level_NVNT_ANT1_802_11b_2462**

**2_Spurious_Emission_NVNT_ANT1_802_11b_2462**



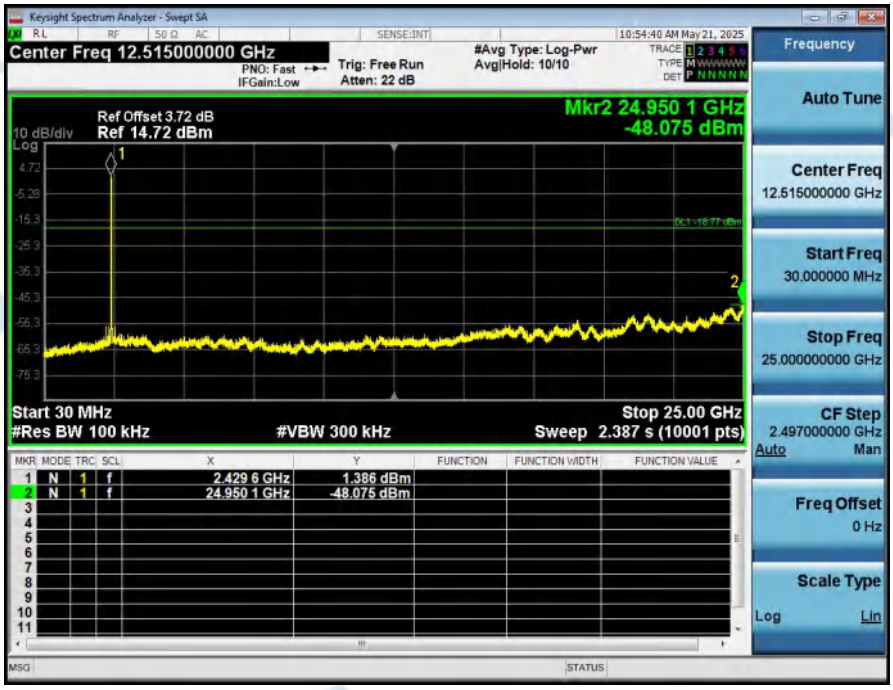

**1_Reference_Level_NVNT_ANT1_802_11g_2412**

**2_Spurious_Emission_NVNT_ANT1_802_11g_2412**



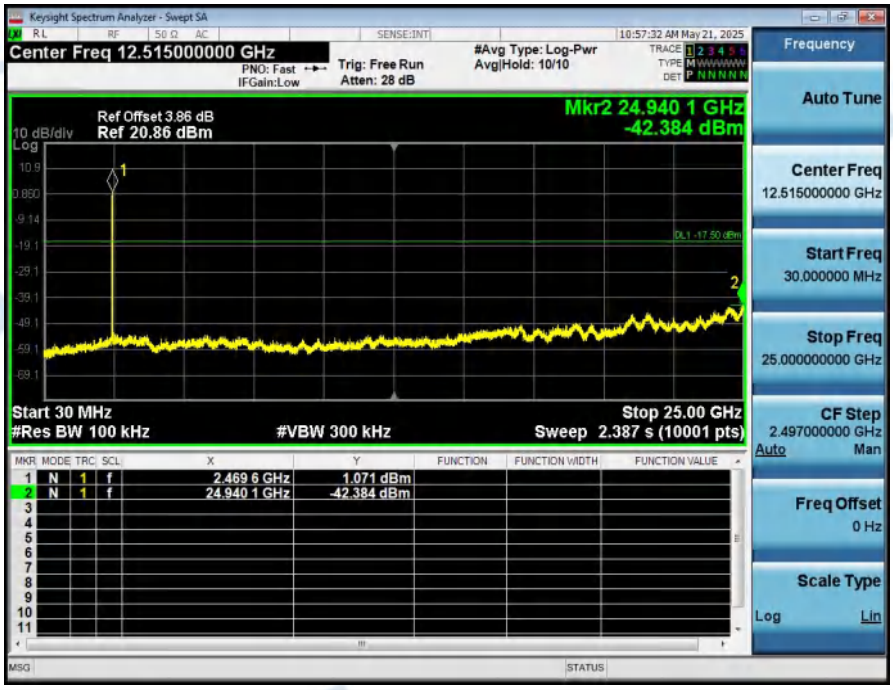

**1_Reference_Level_NVNT_ANT1_802_11g_2437**

**2_Spurious_Emission_NVNT_ANT1_802_11g_2437**



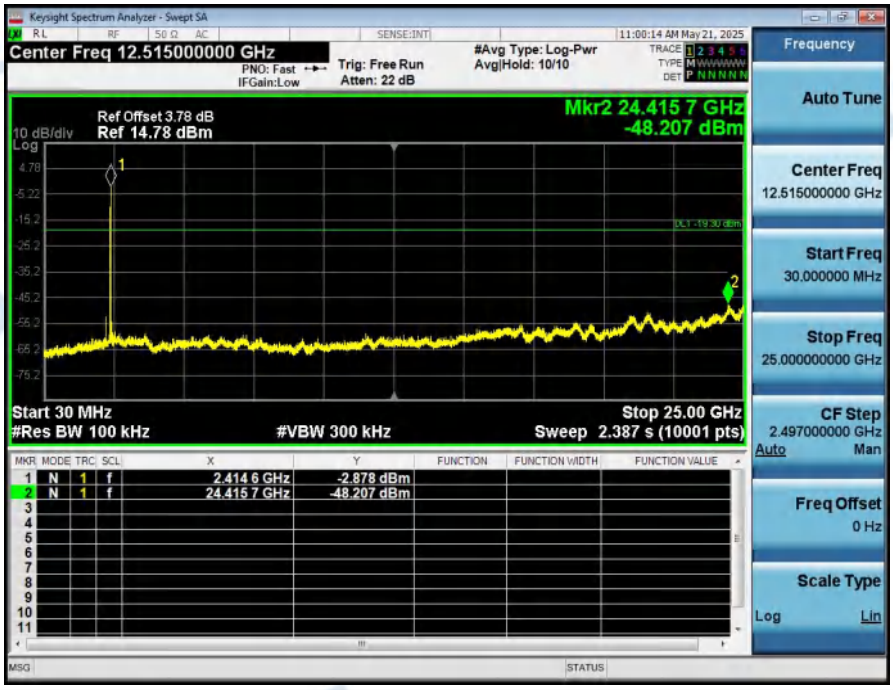

**1_Reference_Level_NVNT_ANT1_802_11g_2462**

**2_Spurious_Emission_NVNT_ANT1_802_11g_2462**

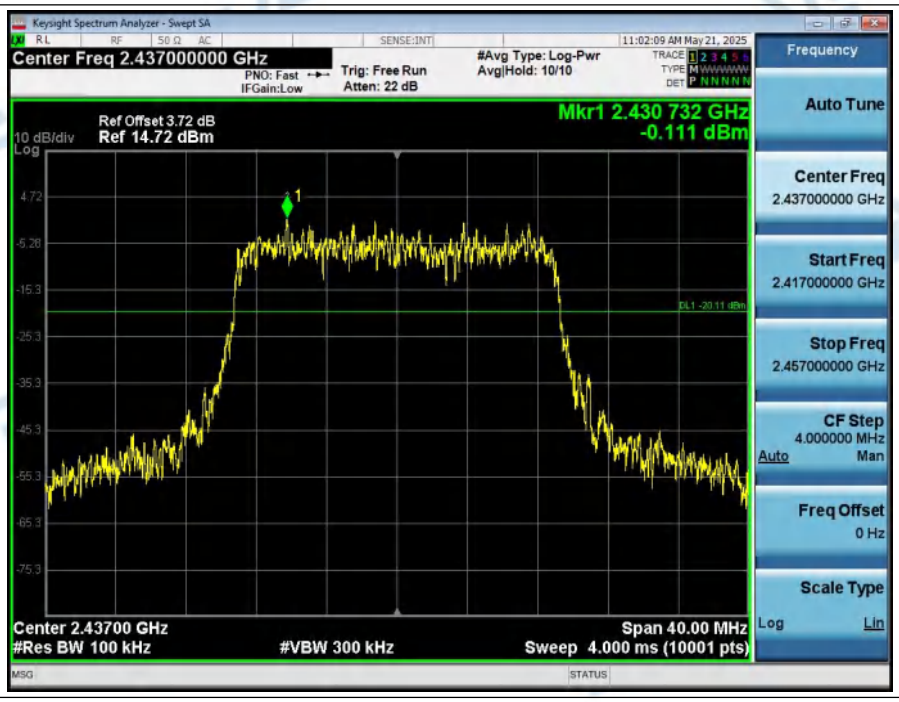



1_Reference_Level_NVNT_ANT1_802_11n(HT20)_2412

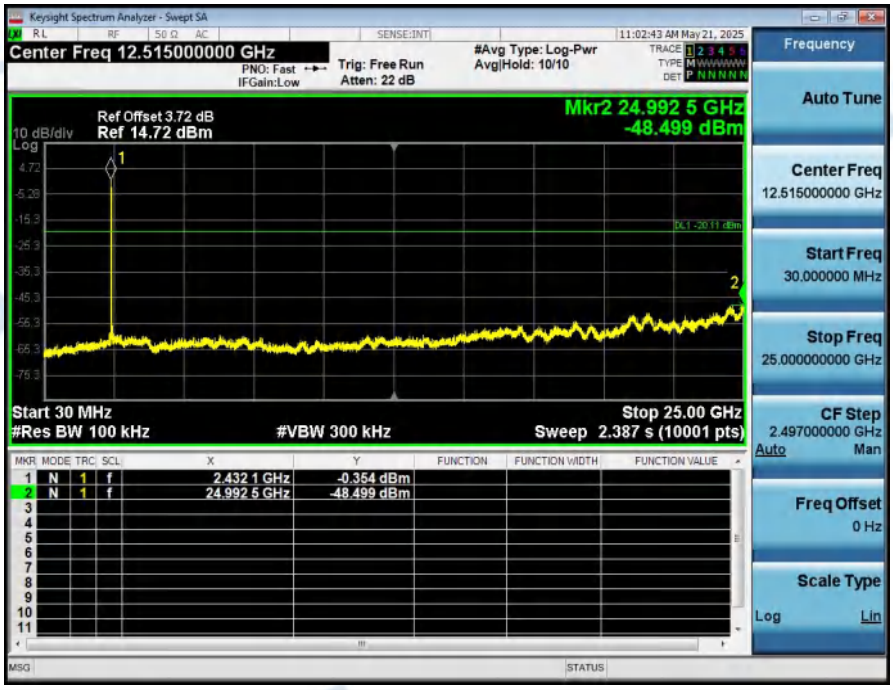
2_Spurious_Emission_NVNT_ANT1_802_11n(HT20)_2412




**1_Reference_Level_NVNT_ANT1_802_11n(HT20)_2437**

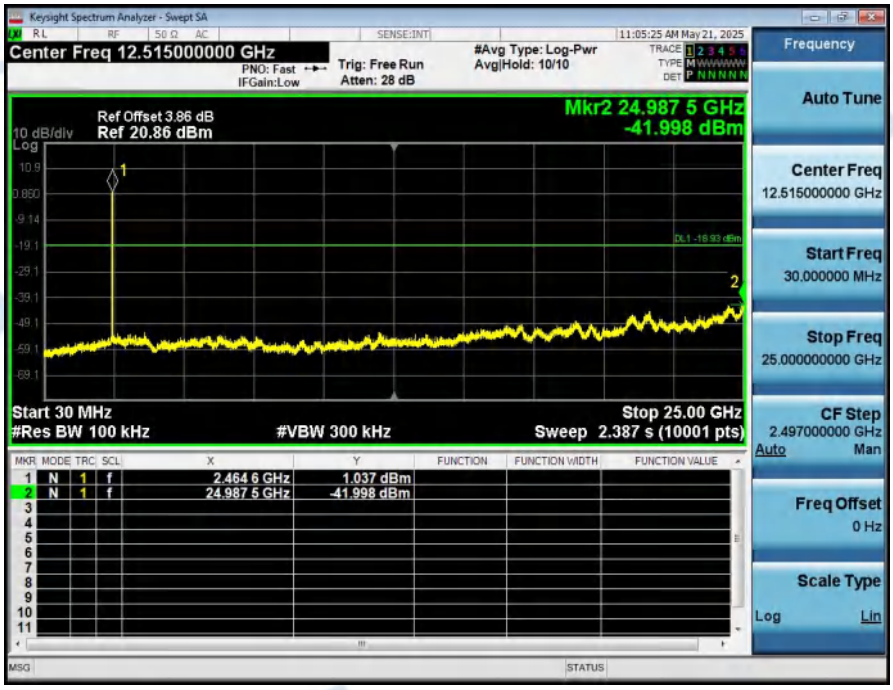



**2_Spurious_Emission_NVNT_ANT1_802_11n(HT20)_2437**



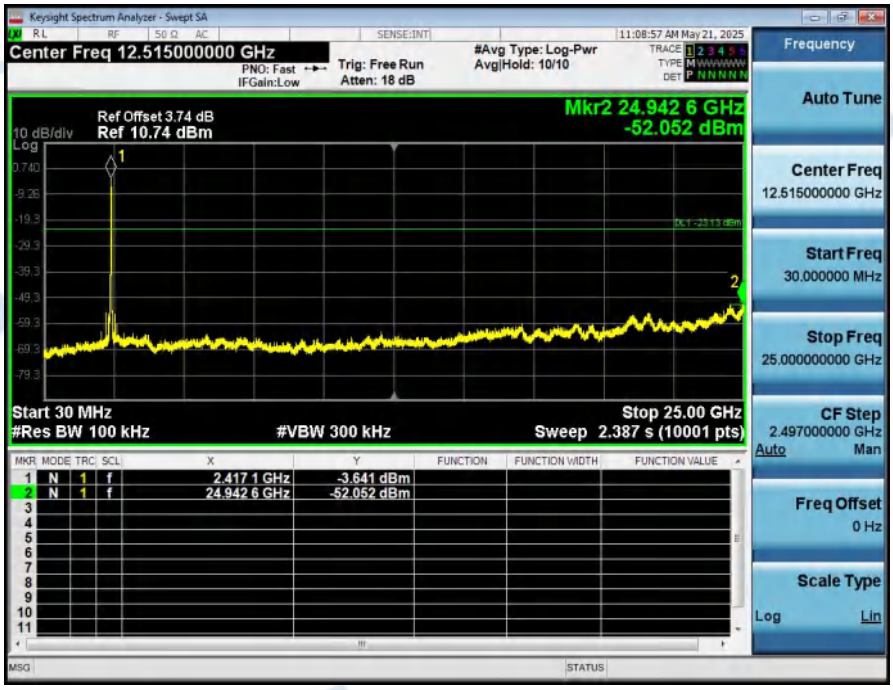

1_Reference_Level_NVNT_ANT1_802_11n(HT20)_2462

2_Spurious_Emission_NVNT_ANT1_802_11n(HT20)_2462

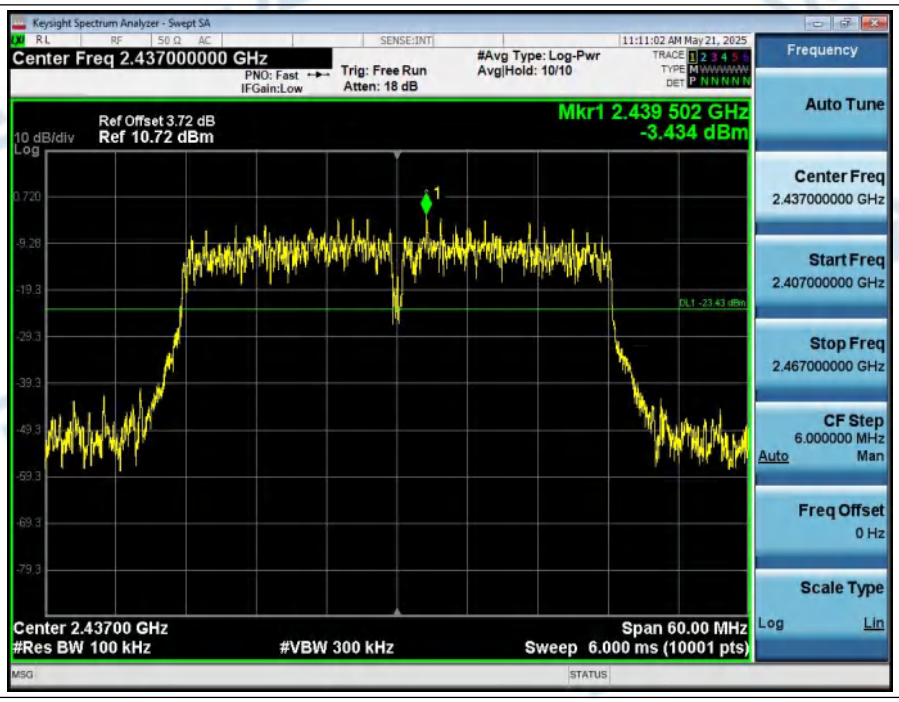



1_Reference_Level_NVNT_ANT1_802_11n(HT40)_2422

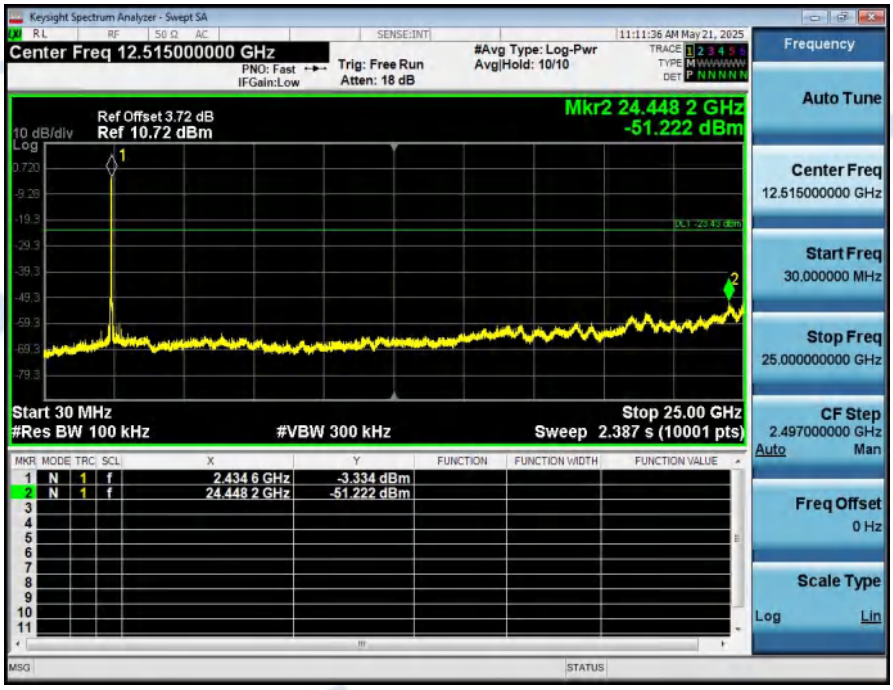
2_Spurious_Emission_NVNT_ANT1_802_11n(HT40)_2422




1_Reference_Level_NVNT_ANT1_802_11n(HT40)_2437

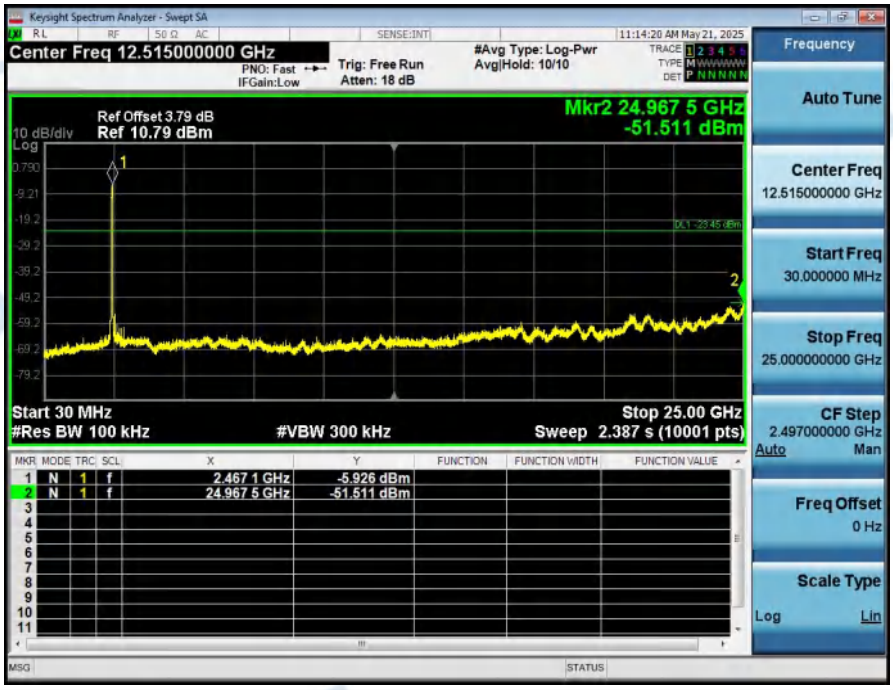



2_Spurious_Emission_NVNT_ANT1_802_11n(HT40)_2437




**1_Reference_Level_NVNT_ANT1_802_11n(HT40)_2452**

**2_Spurious_Emission_NVNT_ANT1_802_11n(HT40)_2452**




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