# RF TEST REPORT

**For**

## Huizhou HuoYing Photoelectric Technology Co., Ltd.
## Product Name: Projector
## Test Model(s).: P50

| | | |
|---|---|---|
| **Report Reference No.** | : | **DACE240819004RF002** |
| **FCC ID** | : | **2BLCL-P50** |
| **Applicant's Name** | : | Huizhou HuoYing Photoelectric Technology Co., Ltd. |
| **Address** | : | 2 F, Building 3,8 a, Yuen Fai Road, Chan Kong Street, Chung Kai high-tech development zone, Huizhou, China |
| **Testing Laboratory** | : | 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 |
| **Test Specification Standard** | : | **47 CFR Part 15.247**<br>**C63.10-2013 & KDB 558074 D01 15.247 Meas Guidance v05r02** |
| **Date of Receipt** | : | August 19, 2024 |
| **Date of Test** | : | August 19, 2024 to September 24, 2024 |
| **Data of Issue** | : | September 24, 2024 |
| **Result** | : | **Pass** |

Note: This report shall not be reproduced except in full, without the written approval of Shenzhen DACE Testing Technology Co., Ltd. This document may be altered or revised by Shenzhen DACE Testing Technology Co., Ltd. personnel only, and shall be noted in the revision section of the document. The test results in the report only apply to the tested sample

# Revision History Of Report

| Version | Description | REPORT No. | Issue Date |
|---|---|---|---|
| V1.0 | Original | DACE240819004RF002 | September 24, 2024 |
| | | | |
| | | | |
| | | | |
| | | | |

**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 |

# CONTENTS


1 TEST SUMMARY ..... 5

1.1 TEST STANDARDS ..... 5
1.2 SUMMARY OF TEST RESULT ..... 5

2 GENERAL INFORMATION ..... 6

2.1 CLIENT INFORMATION ..... 6
2.2 DESCRIPTION OF DEVICE (EUT)* ..... 6
2.3 DESCRIPTION OF TEST MODES ..... 7
2.4 DESCRIPTION OF SUPPORT UNITS ..... 7
2.5 EQUIPMENTS USED DURING THE TEST ..... 7
2.6 STATEMENT OF THE MEASUREMENT UNCERTAINTY ..... 9
2.7 IDENTIFICATION OF TESTING LABORATORY ..... 9
2.8 ANNOUNCEMENT ..... 9

3 EVALUATION RESULTS (EVALUATION) ..... 10

3.1 ANTENNA REQUIREMENT ..... 10
3.1.1 Conclusion: ..... 10

4 RADIO SPECTRUM MATTER TEST RESULTS (RF) ..... 11

4.1 CONDUCTED EMISSION AT AC POWER LINE ..... 11
4.1.1 E.U.T. Operation: ..... 11
4.1.2 Test Setup Diagram: ..... 11
4.1.3 Test Data: ..... 12
4.2 OCCUPIED BANDWIDTH ..... 14
4.2.1 E.U.T. Operation: ..... 14
4.2.2 Test Setup Diagram: ..... 14
4.2.3 Test Data: ..... 14
4.3 MAXIMUM CONDUCTED OUTPUT POWER ..... 15
4.3.1 E.U.T. Operation: ..... 15
4.3.2 Test Setup Diagram: ..... 15
4.3.3 Test Data: ..... 16
4.4 POWER SPECTRAL DENSITY ..... 17
4.4.1 E.U.T. Operation: ..... 17
4.4.2 Test Setup Diagram: ..... 17
4.4.3 Test Data: ..... 17
4.5 EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS ..... 18
4.5.1 E.U.T. Operation: ..... 18
4.5.2 Test Setup Diagram: ..... 18
4.5.3 Test Data: ..... 18
4.6 BAND EDGE EMISSIONS (RADIATED) ..... 19
4.6.1 E.U.T. Operation: ..... 19
4.6.2 Test Setup Diagram: ..... 19
4.6.3 Test Data: ..... 20
4.7 EMISSIONS IN FREQUENCY BANDS (BELOW 1GHZ) ..... 22
4.7.1 E.U.T. Operation: ..... 23
4.7.2 Test Setup Diagram: ..... 23
4.7.3 Test Data: ..... 24
4.8 EMISSIONS IN FREQUENCY BANDS (ABOVE 1GHZ) ..... 25
4.8.1 E.U.T. Operation: ..... 26

4.8.2 Test Setup Diagram: ..... 26
4.8.3 Test Data: ..... 27

**5 TEST SETUP PHOTOS ..... 30**
**6 PHOTOS OF THE EUT ..... 30**
**APPENDIX ..... 31**

**1. -6dB Bandwidth ..... 31**
**2. 99% Occupied Bandwidth ..... 33**
**3. Peak Output Power ..... 35**
**4. Power Spectral Density ..... 37**
**5. Bandedge ..... 39**
**6. Spurious Emission ..... 41**

# 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 C63.10-2013 section 6.2 | 47 CFR 15.207(a) | Pass |
| Occupied Bandwidth | ANSI C63.10-2013, section 11.8 | 47 CFR 15.247(a)(2) | Pass |
| Maximum Conducted Output Power | ANSI C63.10-2013, section 11.9.1 | 47 CFR 15.247(b)(3) | Pass |
| Power Spectral Density | ANSI C63.10-2013, section 11.10 | 47 CFR 15.247(e) | Pass |
| Emissions in non-restricted frequency bands | ANSI C63.10-2013 section 11.11 | 47 CFR 15.247(d), 15.209, 15.205 | Pass |
| Band edge emissions (Radiated) | ANSI C63.10-2013 section 6.10 | 47 CFR 15.247(d), 15.209, 15.205 | Pass |
| Emissions in frequency bands (below 1GHz) | ANSI C63.10-2013 section 6.6.4 | 47 CFR 15.247(d), 15.209, 15.205 | Pass |
| Emissions in frequency bands (above 1GHz) | ANSI C63.10-2013 section 6.6.4 | 47 CFR 15.247(d), 15.209, 15.205 | Pass |

Note:1. N/A-- Not applicable to the this test clause.
2. The results of all conduction method tests include cable loss.

# 2 GENERAL INFORMATION

## 2.1 Client Information

**Applicant's Name** : Huizhou HuoYing Photoelectric Technology Co., Ltd.
**Address** : 2 F, Building 3,8 a, Yuen Fai Road, Chan Kong Street, Chung Kai high-tech development zone, Huizhou, China

**Manufacturer** : Huizhou HuoYing Photoelectric Technology Co., Ltd.
**Address** : 2 F, Building 3,8 a, Yuen Fai Road, Chan Kong Street, Chung Kai high-tech development zone, Huizhou, China

## 2.2 Description of Device (EUT)*

| | |
|---|---|
| Product Name: | Projector |
| Model/Type reference: | P50 |
| Series Model: | P50+, H95S, H01, H02, H03, H04, H05, H06, H07, H08, H09, H26, H30, H35, H40, H45, Y01, Y02, Y03, Y04, Y05, Y06, Y07, Y08, Y09, Y26, Y30, Y35, Y40, Y45, HY26, HY30, HY35, HY40, HY45, HY50, HY200, HY350, HY400, HY450, S01, S02, S03, S04, S05, S06, S07, S08,S09, S26, S30,S35, S40, S45,M01, M02, M03, M04, M05, M06, M07, M08, M09, M26, M30, M35, M400, M450 |
| Model difference: | There are many models of the product to meet the needs of different customers, ensuring that each customer's model is not duplicated and avoiding unnecessary disputes. The only difference between models is the model name, everything else is the same (such as PCB, BOM, etc.) |
| Trade Mark: | N/A |
| Power Supply: | AC120V 50/60Hz 55W |
| Operation Frequency: | 2402MHz to 2480MHz |
| Number of Channels: | 40 |
| Modulation Type: | GFSK |
| Antenna Type: | FPC ANT |
| Antenna Gain: | 1.88dBi |
| Hardware Version: | V1.3 |
| Software Version: | V1.0 |

| **Operation Frequency each of channel** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 1 | 2402 MHz | 11 | 2422 MHz | 21 | 2442 MHz | 31 | 2462 MHz |
| 2 | 2404 MHz | 12 | 2424 MHz | 22 | 2444 MHz | 32 | 2464 MHz |
| 3 | 2406 MHz | 13 | 2426 MHz | 23 | 2446 MHz | 33 | 2466 MHz |
| 4 | 2408 MHz | 14 | 2428 MHz | 24 | 2448 MHz | 34 | 2468 MHz |
| 5 | 2410 MHz | 15 | 2430 MHz | 25 | 2450 MHz | 35 | 2470 MHz |
| 6 | 2412 MHz | 16 | 2432 MHz | 26 | 2452 MHz | 36 | 2472 MHz |
| 7 | 2414 MHz | 17 | 2434 MHz | 27 | 2454 MHz | 37 | 2474 MHz |
| 8 | 2416 MHz | 18 | 2436 MHz | 28 | 2456 MHz | 38 | 2476 MHz |
| 9 | 2418 MHz | 19 | 2438 MHz | 29 | 2458 MHz | 39 | 2478 MHz |
| 10 | 2420 MHz | 20 | 2440 MHz | 30 | 2460 MHz | 40 | 2480 MHz |

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) |
|---|---|
| | BLE |
| Lowest channel | 2402MHz |
| Middle channel | 2440MHz |
| Highest channel | 2480MHz |
| Remark:Only the data of the worst mode would be recorded in this report. | |

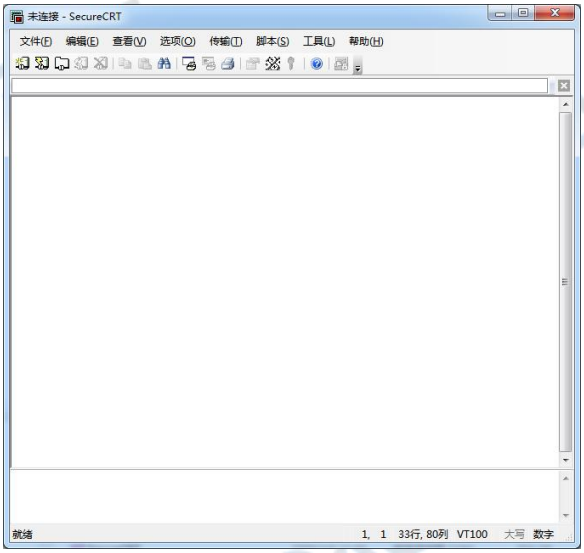
## 2.3 Description of Test Modes

| No | Title | Description |
|---|---|---|
| TM1 | TX mode | Keep the EUT connect to AC power line and works in continuously transmitting mode with GFSK modulation at lowest, middle and highest channel. |

**Description**

☐ Special software is used.
☐ Through engineering command into the engineering mode.
engineering command: *#*#3646633#*#*
☒ Other method:

Special software+test command




## 2.4 Description of Support Units

The EUT was tested as an independent device.

## 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 | / | / | 2024-03-20 | 2025-03-19 |
| Pulse Limiter | SCHWARZ BECK | VTSD 9561-F Pulse | 561-G071 | 2023-12-12 | 2024-12-11 |

| | | | | | |
|---|---|---|---|---|---|
| | | limiter 10dB Attenuation | | | |
| 50ΩCoaxial Switch | Anritsu | MP59B | M20531 | / | / |
| Test Receiver | Rohde & Schwarz | ESPI TEST RECEIVER | 1164.6607K03-102109-MH | 2024-06-12 | 2025-06-11 |
| L.I.S.N | R&S | ESH3-Z5 | 831.5518.52 | 2023-12-12 | 2024-12-11 |
| L.I.S.N | SCHWARZ BECK | NSLK 8126 | 05055 | 2024-06-14 | 2025-06-13 |
| Pulse Limiter | CYBERTEK | EM5010A | / | 2023-09-27 | 2024-09-26 |
| EMI test software | EZ -EMC | EZ | V1.1.42 | / | / |

**Power Spectral Density**
**Emissions in non-restricted frequency bands**
**Occupied Bandwidth**
**Maximum Conducted Output Power**

| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
|---|---|---|---|---|---|
| RF Test Software | TACHOY | RTS-01 | V1.0.0 | / | / |
| RF Sensor Unit | TACHOY | TR1029-2 | 000001 | / | / |
| Signal Generator | Keysight | N5181A | MY48180415 | 2023-11-09 | 2024-11-08 |
| Signal Generator | Keysight | N5182A | MY50143455 | 2023-11-09 | 2024-11-08 |
| Spectrum Analyzer | Keysight | N9020A | MY53420323 | 2023-12-12 | 2024-12-11 |

**Band edge emissions (Radiated)**
**Emissions in frequency bands (below 1GHz)**
**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-7802 | / | / | / |
| Amplifier(18-40G) | COM-POWER | AH-1840 | 10100008-1 | 2022-04-05 | 2025-04-04 |
| Horn antenna | COM-POWER | AH-1840 (18-40G) | 10100008 | 2023-04-05 | 2025-04-04 |
| Loop antenna | ZHINAN | ZN30900C | ZN30900C | 2024-06-14 | 2026-06-13 |
| Cable(LF)#2 | Schwarzbeck | / | / | 2024-02-19 | 2025-02-18 |
| Cable(LF)#1 | Schwarzbeck | / | / | 2024-02-19 | 2025-02-18 |
| Cable(HF)#2 | Schwarzbeck | AK9515E | 96250 | 2024-03-20 | 2025-03-19 |
| Cable(HF)#1 | Schwarzbeck | SYV-50-3-1 | / | 2024-03-20 | 2025-03-19 |
| Power amplifier(LF) | Schwarzbeck | BBV9743 | 9743-151 | 2024-06-12 | 2025-06-11 |
| Power amplifier(HF) | Schwarzbeck | BBV9718 | 9718-282 | 2024-06-12 | 2025-06-11 |
| Spectrum Analyzer | R&S | FSP30 | 1321.3008K40-101729-jR | 2024-06-12 | 2025-06-11 |
| Test Receiver | R&S | ESCI 3 | 1166.5950K03-101431-Jq | 2024-06-13 | 2025-06-12 |
| Horn Antenna | Sunol Sciences | DRH-118 | A091114 | 2023-05-13 | 2025-05-12 |
| Broadband Antenna | Sunol Sciences | JB6 Antenna | A090414 | 2023-05-21 | 2025-05-20 |

## 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, Shiyan, 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, Shiyan, 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.

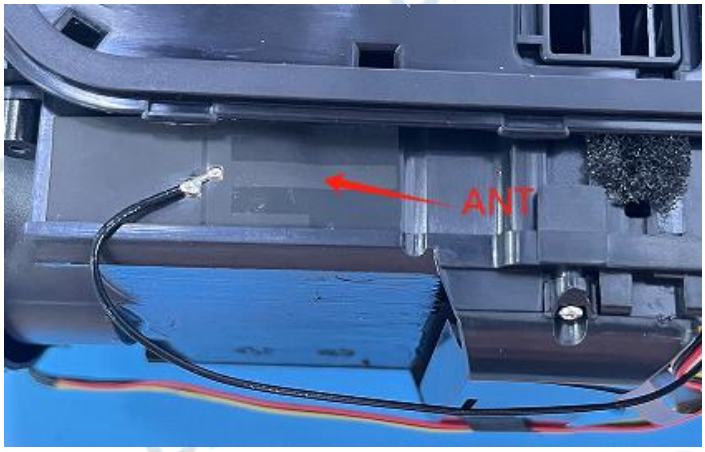
(6) We hereby declare that the laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant(information with "*" provided by applicant). the laboratory is not responsible for the accuracy of the information provided by the client. When the information 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 |

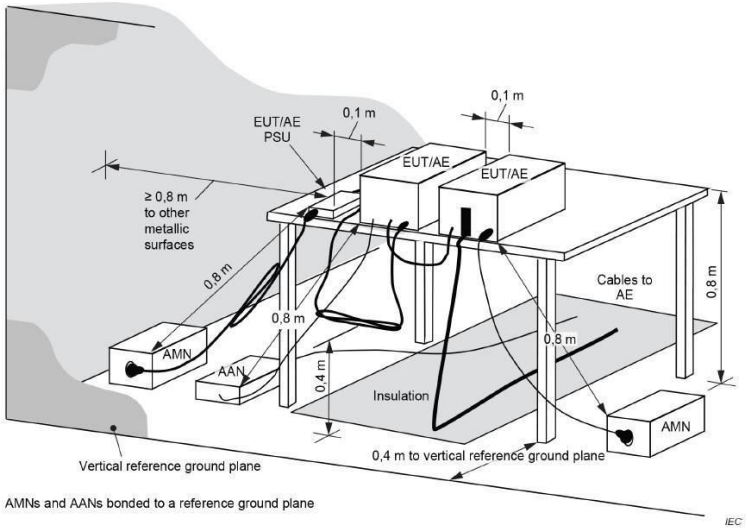
*Decreases with the logarithm of the frequency.

| | |
|---|---|
| Test Method: | ANSI C63.10-2013 section 6.2 |
| Procedure: | Refer to ANSI C63.10-2013 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices |

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

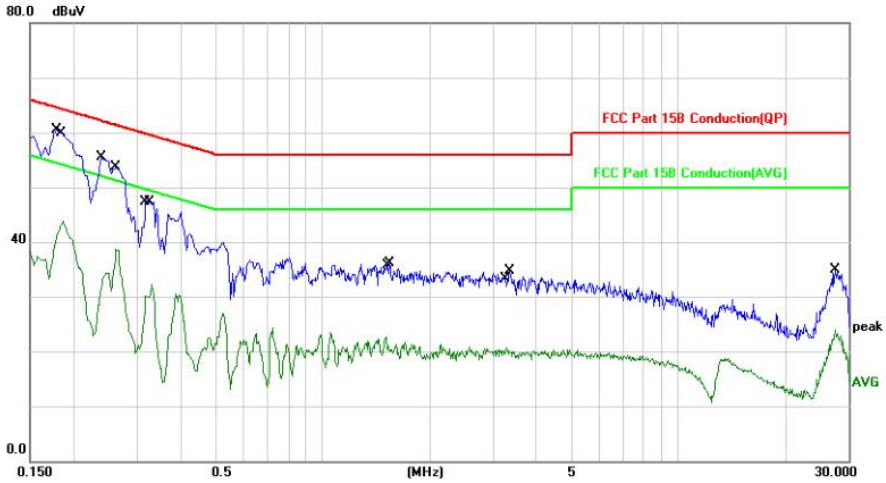
| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 23 °C | Humidity: | 46 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1 | | | | |
| Final test mode: | TM1 | | | | |

### 4.1.2 Test Setup Diagram:



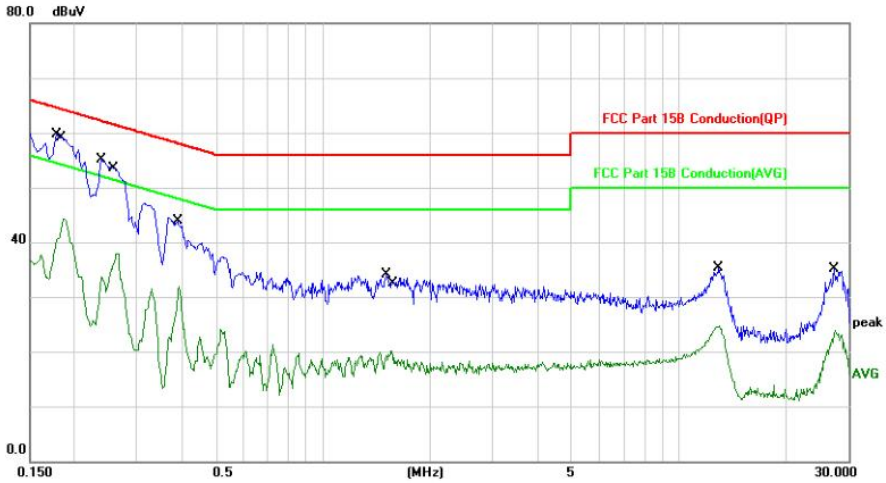
### 4.1.3 Test Data:

TM1 / Line: Line / Band: 2400-2483.5 MHz / BW: 1 / CH: H




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | * | 0.1780 | 50.41 | 10.10 | 60.51 | 64.57 | -4.06 | QP | |
| 2 | | 0.1860 | 33.75 | 10.10 | 43.85 | 54.21 | -10.36 | AVG | |
| 3 | | 0.2380 | 45.33 | 10.09 | 55.42 | 62.16 | -6.74 | QP | |
| 4 | | 0.2620 | 28.51 | 10.09 | 38.60 | 51.36 | -12.76 | AVG | |
| 5 | | 0.3180 | 37.29 | 10.09 | 47.38 | 59.76 | -12.38 | QP | |
| 6 | | 0.3300 | 22.24 | 10.09 | 32.33 | 49.45 | -17.12 | AVG | |
| 7 | | 1.5060 | 12.66 | 10.04 | 22.70 | 46.00 | -23.30 | AVG | |
| 8 | | 1.5380 | 26.09 | 10.04 | 36.13 | 56.00 | -19.87 | QP | |
| 9 | | 3.2900 | 10.53 | 10.10 | 20.63 | 46.00 | -25.37 | AVG | |
| 10 | | 3.3460 | 24.52 | 10.11 | 34.63 | 56.00 | -21.37 | QP | |
| 11 | | 27.4580 | 23.98 | 10.97 | 34.95 | 60.00 | -25.05 | QP | |
| 12 | | 27.4580 | 12.93 | 10.97 | 23.90 | 50.00 | -26.10 | AVG | |

TM1 / Line: Neutral / Band: 2400-2483.5 MHz / BW: 1 / CH: H




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | * | 0.1780 | 49.68 | 10.10 | 59.78 | 64.57 | -4.79 | QP | |
| 2 | | 0.1860 | 34.28 | 10.10 | 44.38 | 54.21 | -9.83 | AVG | |
| 3 | | 0.2380 | 44.94 | 10.09 | 55.03 | 62.16 | -7.13 | QP | |
| 4 | | 0.2620 | 27.86 | 10.09 | 37.95 | 51.36 | -13.41 | AVG | |
| 5 | | 0.3899 | 33.83 | 10.08 | 43.91 | 58.06 | -14.15 | QP | |
| 6 | | 0.3940 | 21.72 | 10.08 | 31.80 | 47.98 | -16.18 | AVG | |
| 7 | | 1.5060 | 24.13 | 10.04 | 34.17 | 56.00 | -21.83 | QP | |
| 8 | | 1.5540 | 10.02 | 10.03 | 20.05 | 46.00 | -25.95 | AVG | |
| 9 | | 12.9420 | 24.97 | 10.41 | 35.38 | 60.00 | -24.62 | QP | |
| 10 | | 13.0140 | 14.28 | 10.41 | 24.69 | 50.00 | -25.31 | AVG | |
| 11 | | 27.3060 | 24.08 | 10.96 | 35.04 | 60.00 | -24.96 | QP | |
| 12 | | 27.4180 | 12.89 | 10.97 | 23.86 | 50.00 | -26.14 | AVG | |

Note:

1.An initial pre-scan was performed on the line and neutral lines with peak detector.

2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.

3.Mesurement Level = Reading level + Correct Factor, Over= Mesurement - Limit

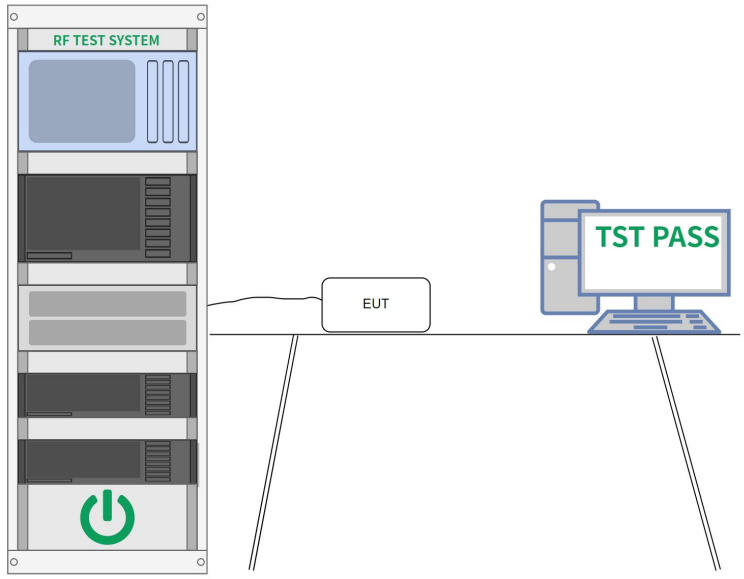
## 4.2 Occupied Bandwidth

| | |
|---|---|
| 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 C63.10-2013, section 11.8 |
| Procedure: | a) Set RBW = 100 kHz.<br>b) Set the VBW >= [3 × RBW].<br>c) Detector = peak.<br>d) Trace mode = max hold.<br>e) Sweep = auto couple.<br>f) Allow the trace to stabilize.<br>g) 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 6 dB relative to the maximum level measured in the fundamental emission. |

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

| | | | | | |
|---|---|---|---|---|---|
| Operating Environment: | | | | | |
| Temperature: | 23 °C | Humidity: | 46 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1 | | | | |
| Final test mode: | TM1 | | | | |

### 4.2.2 Test Setup Diagram:




### 4.2.3 Test Data:

Please Refer to Appendix for Details.

## 4.3 Maximum Conducted Output Power

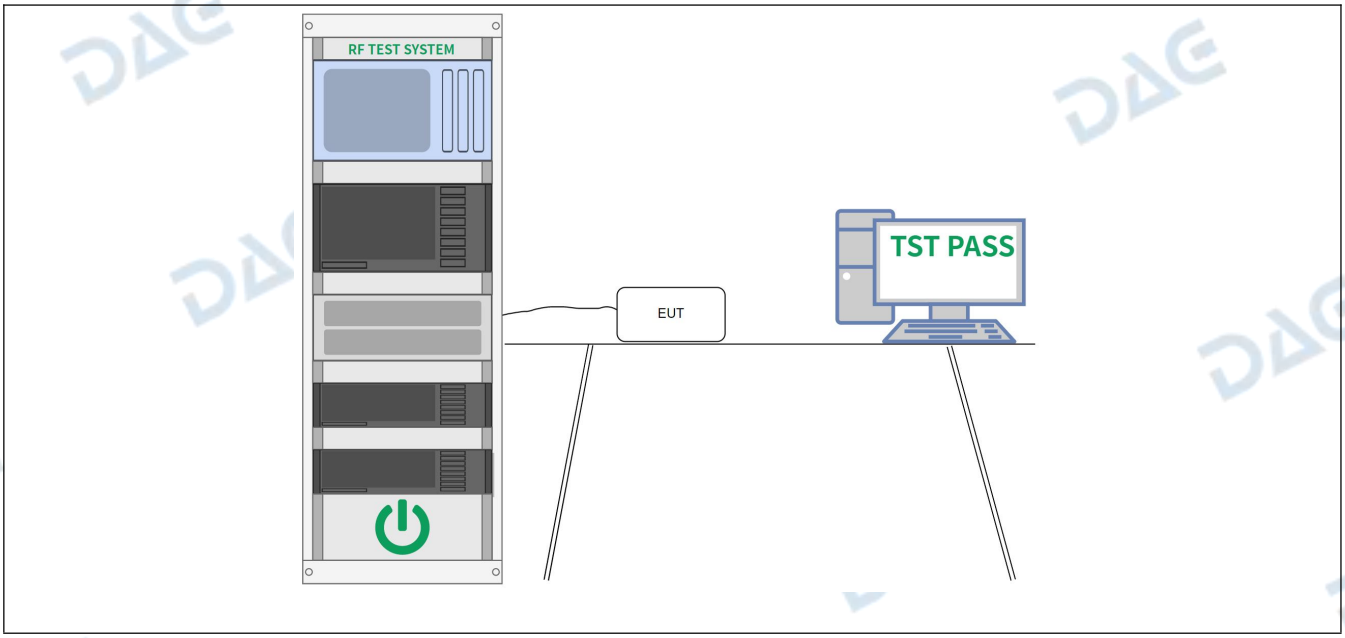
| | |
|---|---|
| Test Requirement: | 47 CFR 15.247(b)(3) |
| Test Limit: | Refer to 47 CFR 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be 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 C63.10-2013, section 11.9.1 |
| Procedure: | ANSI C63.10-2013, 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: | 23 °C | Humidity: | 46 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1 | | | | |
| Final test mode: | TM1 | | | | |

### 4.3.2 Test Setup Diagram:

| |
|---|
| |




### 4.3.3 Test Data:

Please Refer to Appendix for Details.

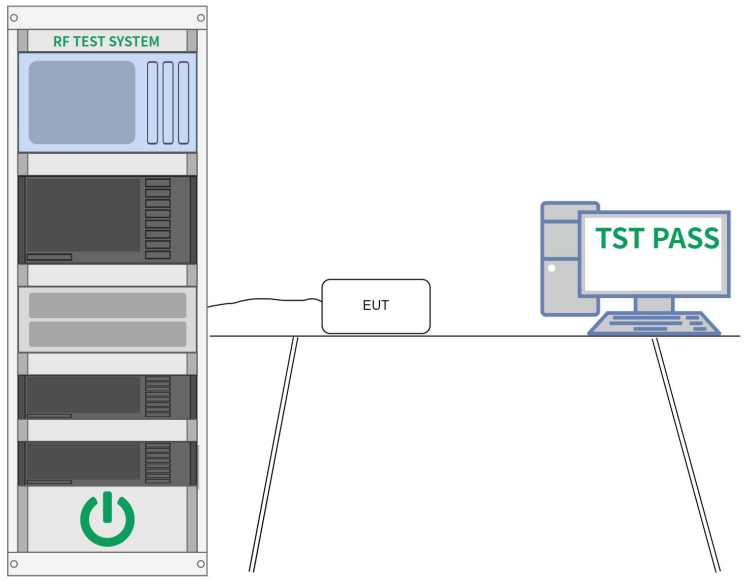
## 4.4 Power Spectral Density

| | |
|---|---|
| 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 C63.10-2013, section 11.10 |
| Procedure: | ANSI C63.10-2013, section 11.10, Maximum power spectral density level in the fundamental emission |

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

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 23 °C | Humidity: | 46 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1 | | | | |
| Final test mode: | TM1 | | | | |

### 4.4.2 Test Setup Diagram:




### 4.4.3 Test Data:

Please Refer to Appendix for Details.

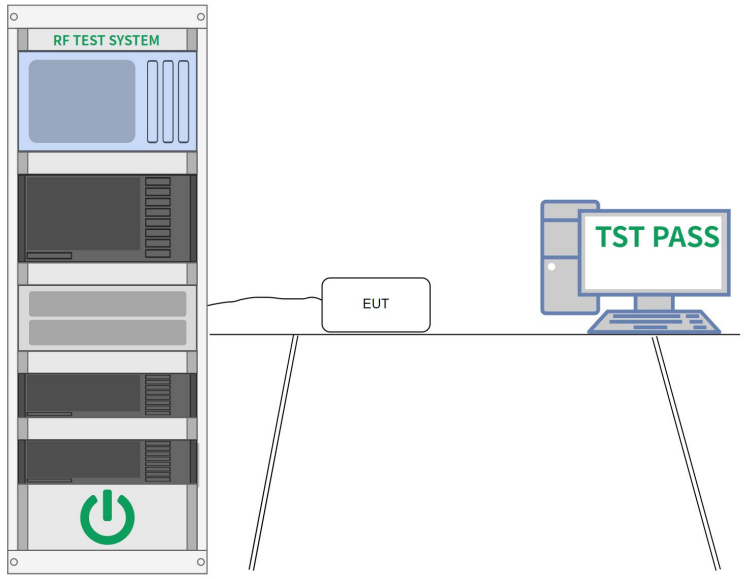
## 4.5 Emissions in non-restricted frequency bands

| | |
|---|---|
| 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 C63.10-2013 section 11.11 |
| Procedure: | ANSI C63.10-2013<br>Section 11.11.1, Section 11.11.2, Section 11.11.3 |

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

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 23 °C | Humidity: | 46 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1 | | | | |
| Final test mode: | TM1 | | | | |

### 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 |

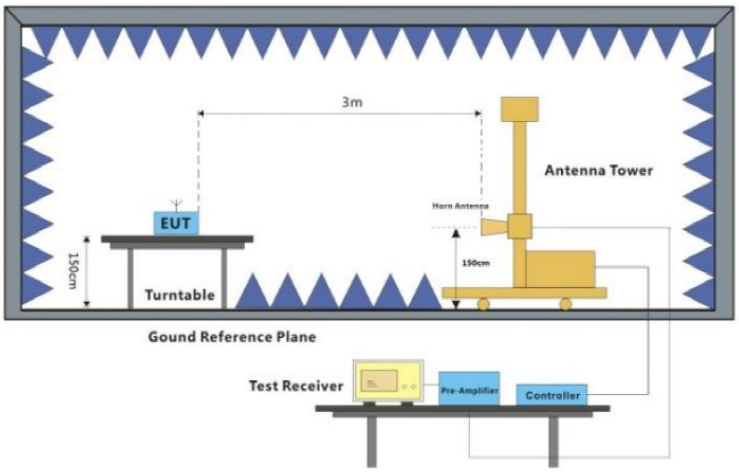
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this 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 C63.10-2013 section 6.10 |
| Procedure: | ANSI C63.10-2013 section 6.10.5.2 |

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

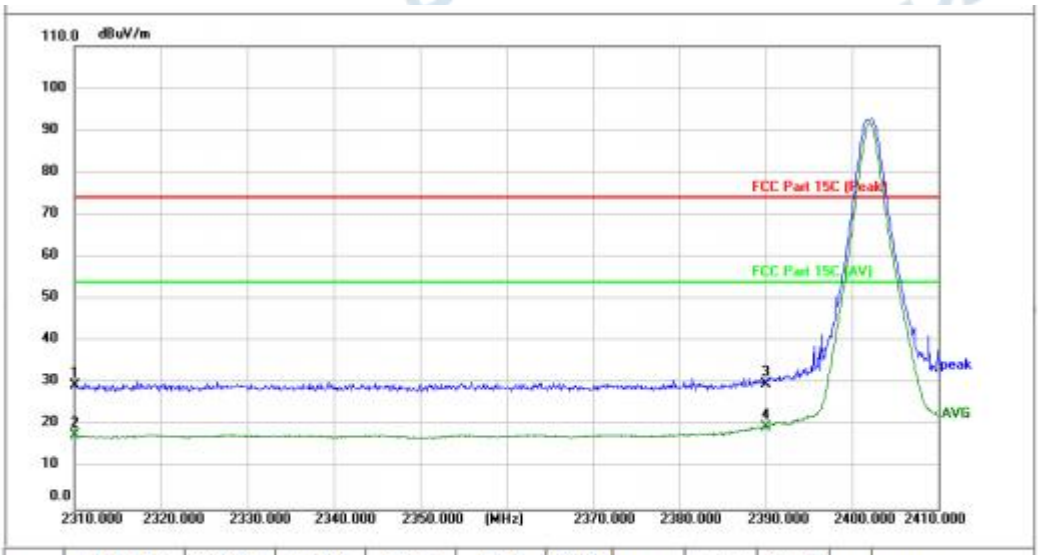
| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 23 °C | Humidity: | 46 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1 | | | | |
| Final test mode: | TM1 | | | | |

### 4.6.2 Test Setup Diagram:



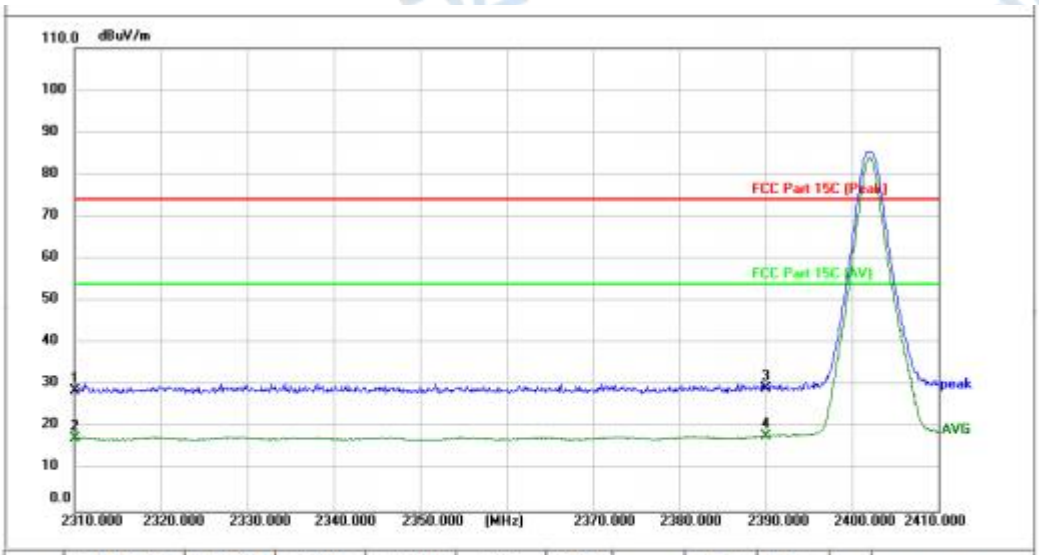
### 4.6.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



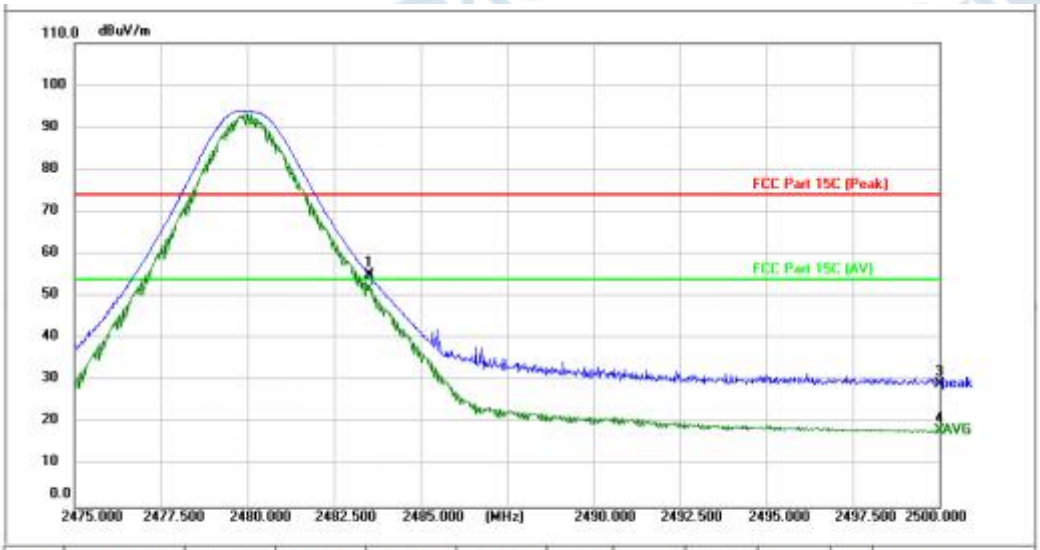

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2310.000 | 36.11 | -6.63 | 29.48 | 74.00 | -44.52 | peak | 150 | | P | |
| 2 | 2310.000 | 24.25 | -6.63 | 17.62 | 54.00 | -36.38 | AVG | 150 | | P | |
| 3 | 2390.000 | 36.29 | -6.42 | 29.87 | 74.00 | -44.13 | peak | 150 | | P | |
| 4 * | 2390.000 | 25.97 | -6.42 | 19.55 | 54.00 | -34.45 | AVG | 150 | | P | |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



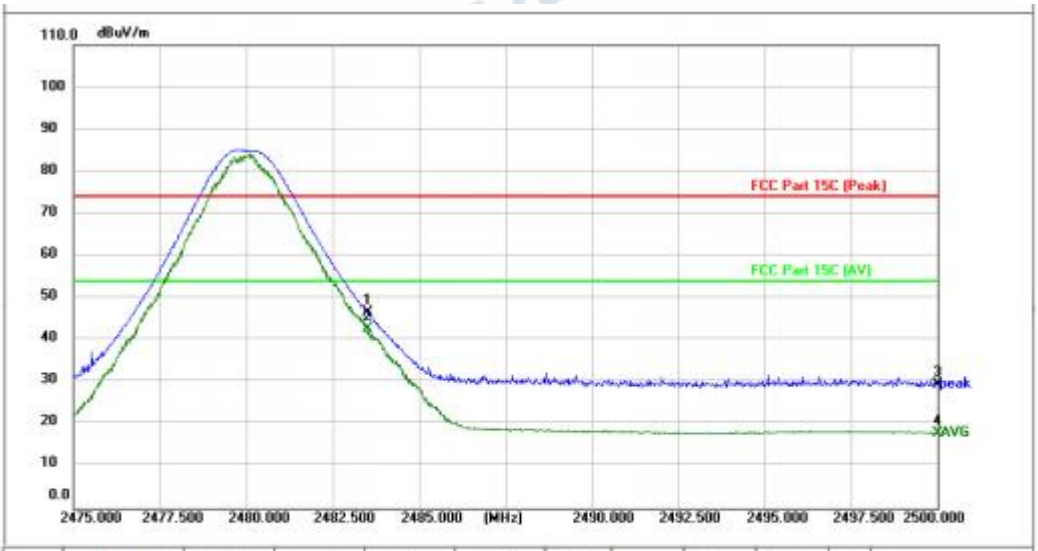

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2310.000 | 35.33 | -6.63 | 28.70 | 74.00 | -45.30 | peak | 150 | | P | |
| 2 | 2310.000 | 24.15 | -6.63 | 17.52 | 54.00 | -36.48 | AVG | 150 | | P | |
| 3 | 2390.000 | 35.83 | -6.42 | 29.41 | 74.00 | -44.59 | peak | 150 | | P | |
| 4 * | 2390.000 | 24.35 | -6.42 | 17.93 | 54.00 | -36.07 | AVG | 150 | | P | |

TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / 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 | 61.27 | -6.17 | 55.10 | 74.00 | -18.90 | peak | 150 | | P | |
| 2 * | 2483.500 | 57.94 | -6.17 | 51.77 | 54.00 | -2.23 | AVG | 150 | | P | |
| 3 | 2500.000 | 35.36 | -6.13 | 29.23 | 74.00 | -44.77 | peak | 150 | | P | |
| 4 | 2500.000 | 24.50 | -6.13 | 18.37 | 54.00 | -35.63 | AVG | 150 | | P | |

TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / 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 | 52.69 | -6.17 | 46.52 | 74.00 | -27.48 | peak | 150 | | P | |
| 2 * | 2483.500 | 48.80 | -6.17 | 42.63 | 54.00 | -11.37 | AVG | 150 | | P | |
| 3 | 2500.000 | 35.72 | -6.13 | 29.59 | 74.00 | -44.41 | peak | 150 | | P | |
| 4 | 2500.000 | 24.13 | -6.13 | 18.00 | 54.00 | -36.00 | AVG | 150 | | P | |

1. Margin = Measurement Level - Limit ; Measurement Level=Test receiver reading + correction factor

2.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)

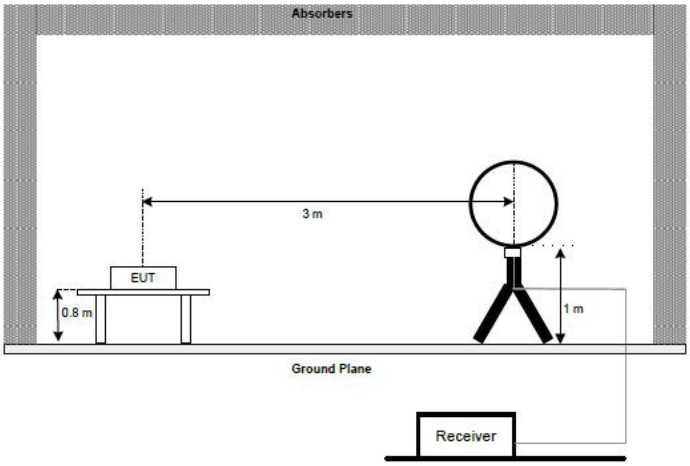
<table>
<tr><td>Test Requirement:</td><td>Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<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 C63.10-2013 section 6.6.4</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.<br>2) The field strength is calculated by adding the Antenna Factor, Cable Factor &</td></tr>
</table>

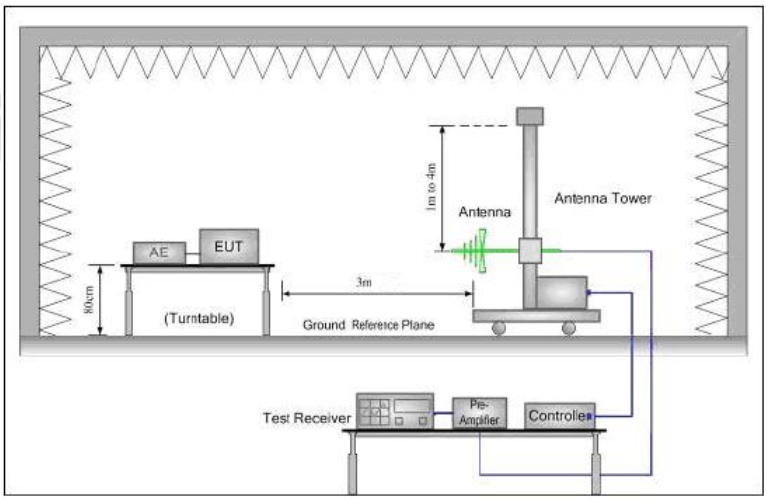
| | |
|---|---|
| | Preamplifier. The basic equation with a sample calculation is as follows:<br>Final Test Level =Receiver Reading + Antenna Factor + Cable Factor ¨C Preamplifier Factor<br>3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above 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: | 23 °C | Humidity: | 46 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1 | | | | |
| Final test mode: | TM1 | | | | |

### 4.7.2 Test Setup Diagram:



### 4.7.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / 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 | 30.2110 | 26.16 | 0.69 | 26.85 | 40.00 | -13.15 | QP | | | P | |
| 2 | 106.3850 | 37.06 | -6.55 | 30.51 | 43.50 | -12.99 | QP | | | P | |
| 3 * | 392.0950 | 44.29 | -3.92 | 40.37 | 46.00 | -5.63 | QP | | | P | |
| 4 | 434.0650 | 40.44 | -2.14 | 38.30 | 46.00 | -7.70 | QP | | | P | |
| 5 | 869.1300 | 30.34 | 4.51 | 34.85 | 46.00 | -11.15 | QP | | | P | |
| 6 | 916.0683 | 27.15 | 5.50 | 32.65 | 46.00 | -13.35 | QP | | | P | |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / 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 | 48.5247 | 41.74 | -11.28 | 30.46 | 40.00 | -9.54 | QP | | | P | |
| 2 * | 106.5200 | 46.94 | -6.53 | 40.41 | 43.50 | -3.09 | QP | | | P | |
| 3 | 130.1133 | 42.01 | -5.42 | 36.59 | 43.50 | -6.91 | QP | | | P | |
| 4 | 394.4873 | 43.78 | -3.86 | 39.92 | 46.00 | -6.08 | QP | | | P | |
| 5 | 529.7645 | 38.30 | -1.01 | 37.29 | 46.00 | -8.71 | QP | | | P | |
| 6 | 935.4840 | 32.81 | 5.77 | 38.58 | 46.00 | -7.42 | QP | | | P | |

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

2.The EMC 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)

| | |
|---|---|
| Test Requirement: | 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.

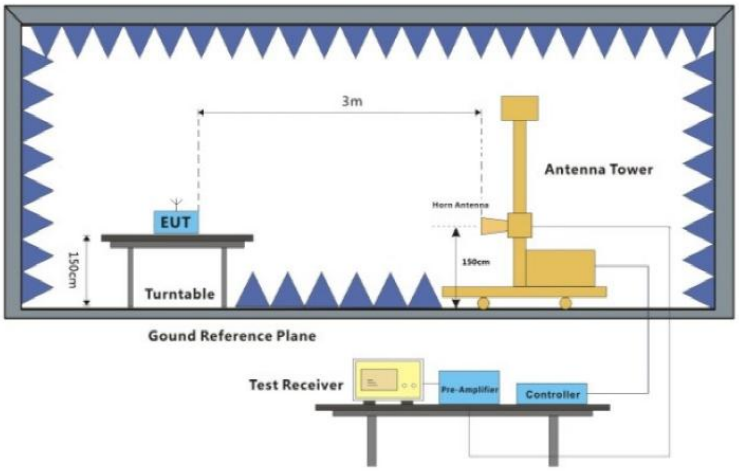
| | |
|---|---|
| Test Method: | ANSI C63.10-2013 section 6.6.4 |
| Procedure: | a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.<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.<br>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:

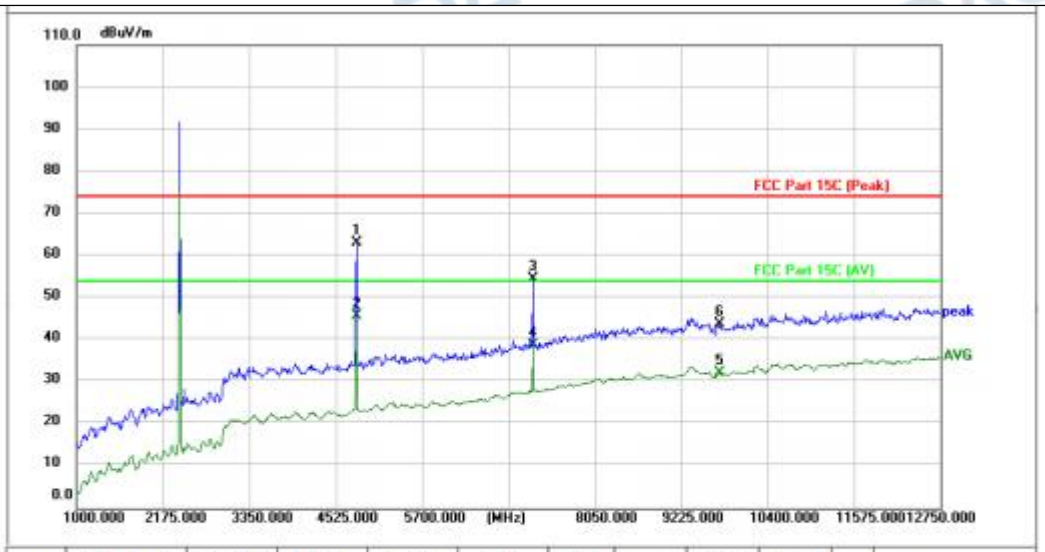
| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 23 °C | Humidity: | 46 % | Atmospheric Pressure: | 101 kPa |
| Pretest mode: | TM1 | | | | |
| Final test mode: | TM1 | | | | |

### 4.8.2 Test Setup Diagram:



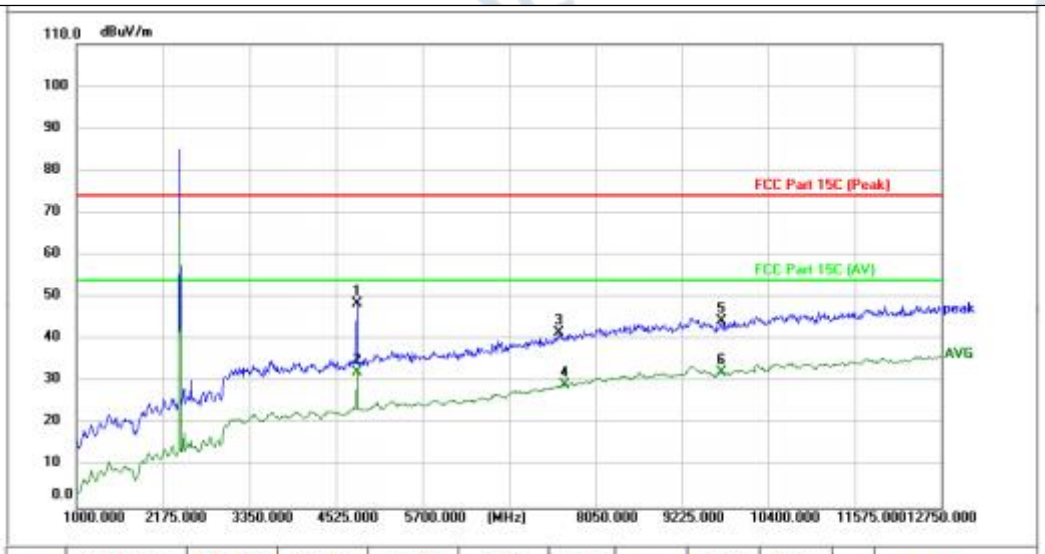
### 4.8.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



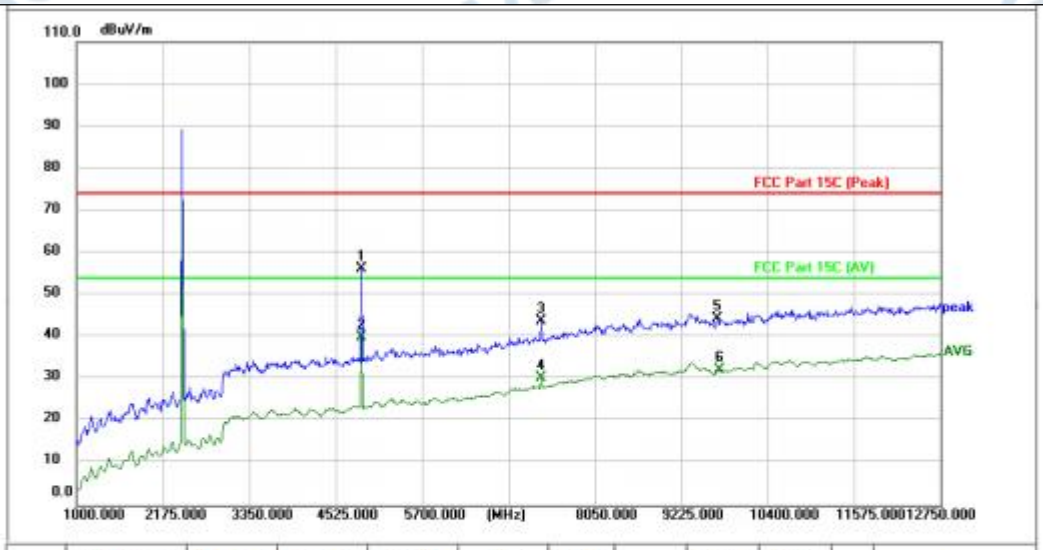

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4807.000 | 63.86 | -0.69 | 63.17 | 74.00 | -10.83 | peak | 150 | | P | |
| 2 * | 4807.000 | 46.49 | -0.69 | 45.80 | 54.00 | -8.20 | AVG | 150 | | P | |
| 3 | 7204.000 | 50.15 | 4.37 | 54.52 | 74.00 | -19.48 | peak | 150 | | P | |
| 4 | 7204.000 | 34.41 | 4.37 | 38.78 | 54.00 | -15.22 | AVG | 150 | | P | |
| 5 | 9742.000 | 24.15 | 8.10 | 32.25 | 54.00 | -21.75 | AVG | 150 | | P | |
| 6 | 9753.750 | 35.64 | 8.09 | 43.73 | 74.00 | -30.27 | peak | 150 | | P | |

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



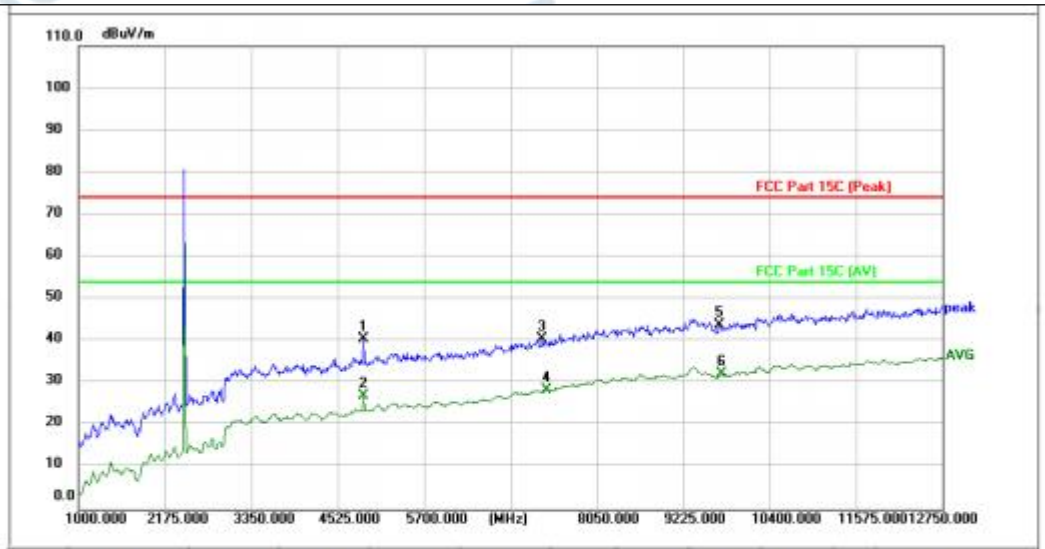

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4807.000 | 49.12 | -0.69 | 48.43 | 74.00 | -25.57 | peak | 150 | | P | |
| 2 | 4807.000 | 33.00 | -0.69 | 32.31 | 54.00 | -21.69 | AVG | 150 | | P | |
| 3 | 7556.500 | 36.68 | 5.09 | 41.77 | 74.00 | -32.23 | peak | 150 | | P | |
| 4 | 7638.750 | 23.95 | 5.39 | 29.34 | 54.00 | -24.66 | AVG | 150 | | P | |
| 5 | 9765.500 | 36.35 | 8.09 | 44.44 | 74.00 | -29.56 | peak | 150 | | P | |
| 6 * | 9765.500 | 24.26 | 8.09 | 32.35 | 54.00 | -21.65 | AVG | 150 | | P | |

TM2 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: M



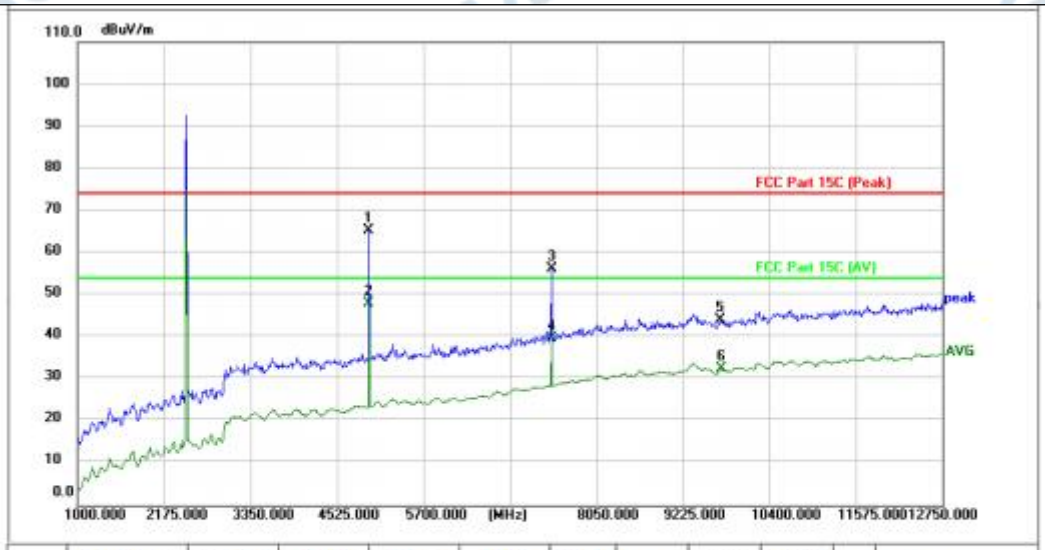

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4877.500 | 56.75 | -0.45 | 56.30 | 74.00 | -17.70 | peak | 150 | | P | |
| 2 * | 4877.500 | 40.48 | -0.45 | 40.03 | 54.00 | -13.97 | AVG | 150 | | P | |
| 3 | 7321.500 | 39.17 | 4.57 | 43.74 | 74.00 | -30.26 | peak | 150 | | P | |
| 4 | 7321.500 | 25.91 | 4.57 | 30.48 | 54.00 | -23.52 | AVG | 150 | | P | |
| 5 | 9718.500 | 36.20 | 8.08 | 44.28 | 74.00 | -29.72 | peak | 150 | | P | |
| 6 | 9753.750 | 24.27 | 8.09 | 32.36 | 54.00 | -21.64 | AVG | 150 | | P | |

TM2 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: M



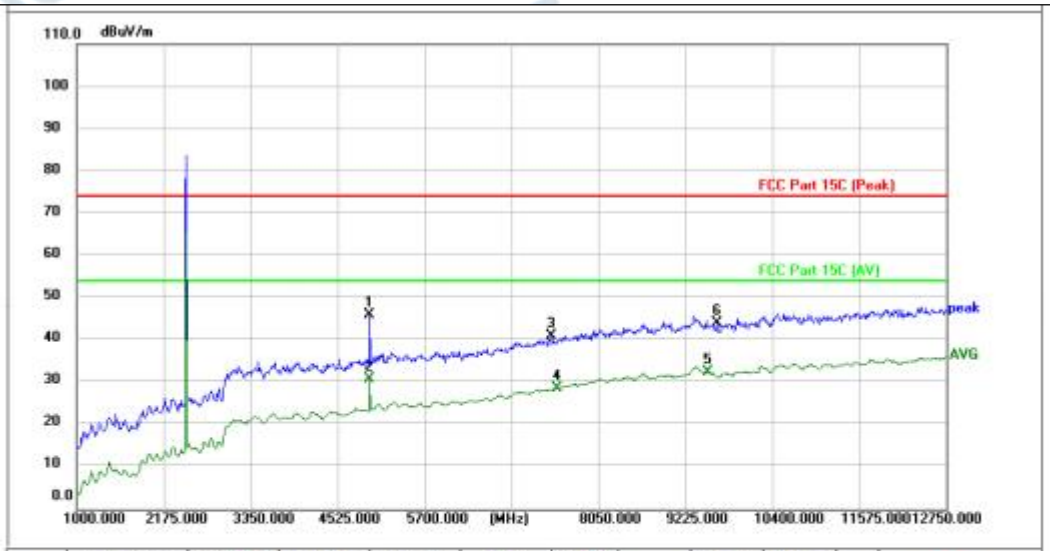

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4877.500 | 41.11 | -0.45 | 40.66 | 74.00 | -33.34 | peak | 150 | | P | |
| 2 | 4877.500 | 27.63 | -0.45 | 27.18 | 54.00 | -26.82 | AVG | 150 | | P | |
| 3 | 7309.750 | 35.94 | 4.55 | 40.49 | 74.00 | -33.51 | peak | 150 | | P | |
| 4 | 7368.500 | 23.81 | 4.66 | 28.47 | 54.00 | -25.53 | AVG | 150 | | P | |
| 5 | 9718.500 | 35.67 | 8.08 | 43.75 | 74.00 | -30.25 | peak | 150 | | P | |
| 6 * | 9753.750 | 24.31 | 8.09 | 32.40 | 54.00 | -21.60 | AVG | 150 | | P | |

TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / 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 | 4959.750 | 65.58 | -0.17 | 65.41 | 74.00 | -8.59 | peak | 150 | | P | |
| 2 * | 4959.750 | 48.27 | -0.17 | 48.10 | 54.00 | -5.90 | AVG | 150 | | P | |
| 3 | 7439.000 | 51.46 | 4.78 | 56.24 | 74.00 | -17.76 | peak | 150 | | P | |
| 4 | 7439.000 | 34.99 | 4.78 | 39.77 | 54.00 | -14.23 | AVG | 150 | | P | |
| 5 | 9730.250 | 35.98 | 8.10 | 44.08 | 74.00 | -29.92 | peak | 150 | | P | |
| 6 | 9753.750 | 24.47 | 8.09 | 32.56 | 54.00 | -21.44 | AVG | 150 | | P | |

TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / 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 | 4959.750 | 46.17 | -0.17 | 46.00 | 74.00 | -28.00 | peak | 150 | | P | |
| 2 | 4959.750 | 31.14 | -0.17 | 30.97 | 54.00 | -23.03 | AVG | 150 | | P | |
| 3 | 7415.500 | 36.26 | 4.74 | 41.00 | 74.00 | -33.00 | peak | 150 | | P | |
| 4 | 7486.000 | 24.00 | 4.86 | 28.86 | 54.00 | -25.14 | AVG | 150 | | P | |
| 5 * | 9530.500 | 24.50 | 8.10 | 32.60 | 54.00 | -21.40 | AVG | 150 | | P | |
| 6 | 9648.000 | 35.91 | 8.10 | 44.01 | 74.00 | -29.99 | peak | 150 | | P | |

Remark: 1.Margin= Level – Limit; Level=Test receiver reading + correction factor

2. 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

Please Refer to DACE240819004RF001 for Details.

# 6 PHOTOS OF THE EUT

Please Refer to DACE240819004RF001 for Details.

# Appendix

## 1. -6dB Bandwidth

| Condition | Antenna | Rate | Frequency (MHz) | -6dB BW(kHz) | limit(kHz) | Result |
|---|---|---|---|---|---|---|
| NVNT | ANT1 | 1Mbps | 2402.00 | 682.83 | 500 | Pass |
| NVNT | ANT1 | 1Mbps | 2440.00 | 685.33 | 500 | Pass |
| NVNT | ANT1 | 1Mbps | 2480.00 | 685.28 | 500 | Pass |

**-6dB_Bandwidth_NVNT_ANT1_1Mbps_2402**

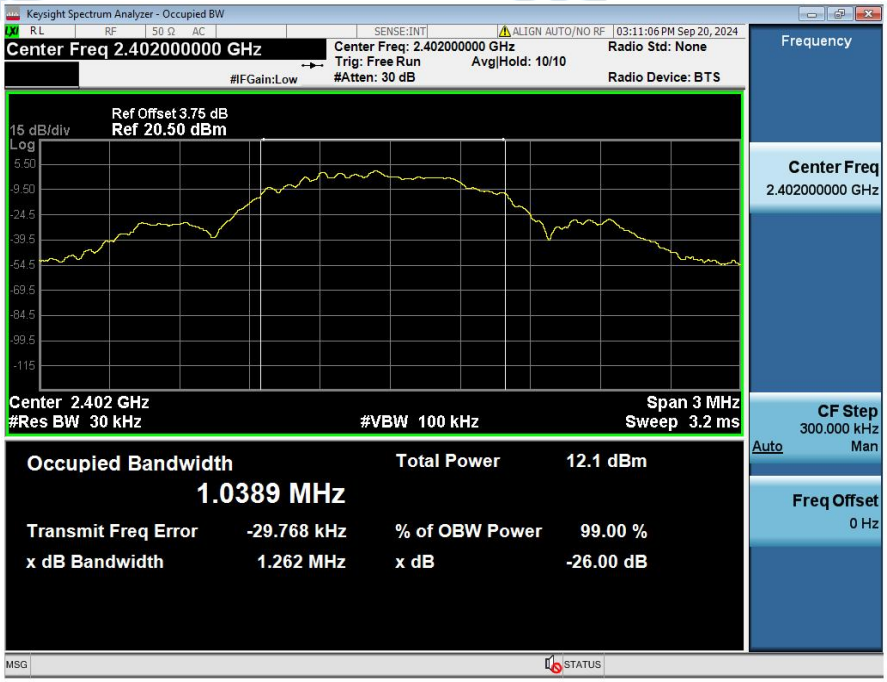
**-6dB_Bandwidth_NVNT_ANT1_1Mbps_2440**

**-6dB_Bandwidth_NVNT_ANT1_1Mbps_2480**

## 2. 99% Occupied Bandwidth

| Condition | Antenna | Rate | Frequency (MHz) | 99%%BW(MHz) |
|---|---|---|---|---|
| NVNT | ANT1 | 1Mbps | 2402.00 | 1.039 |
| NVNT | ANT1 | 1Mbps | 2440.00 | 1.040 |
| NVNT | ANT1 | 1Mbps | 2480.00 | 1.038 |

**99%_Occupied_Bandwidth_NVNT_ANT1_1Mbps_2402**




**99%_Occupied_Bandwidth_NVNT_ANT1_1Mbps_2440**

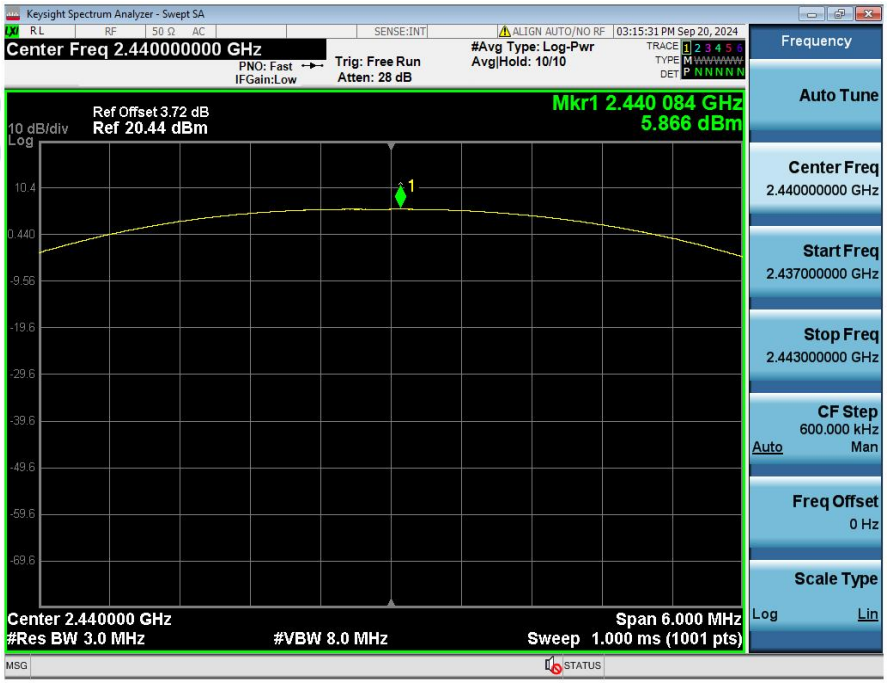
**99%_Occupied_Bandwidth_NVNT_ANT1_1Mbps_2480**

## 3. Peak Output Power

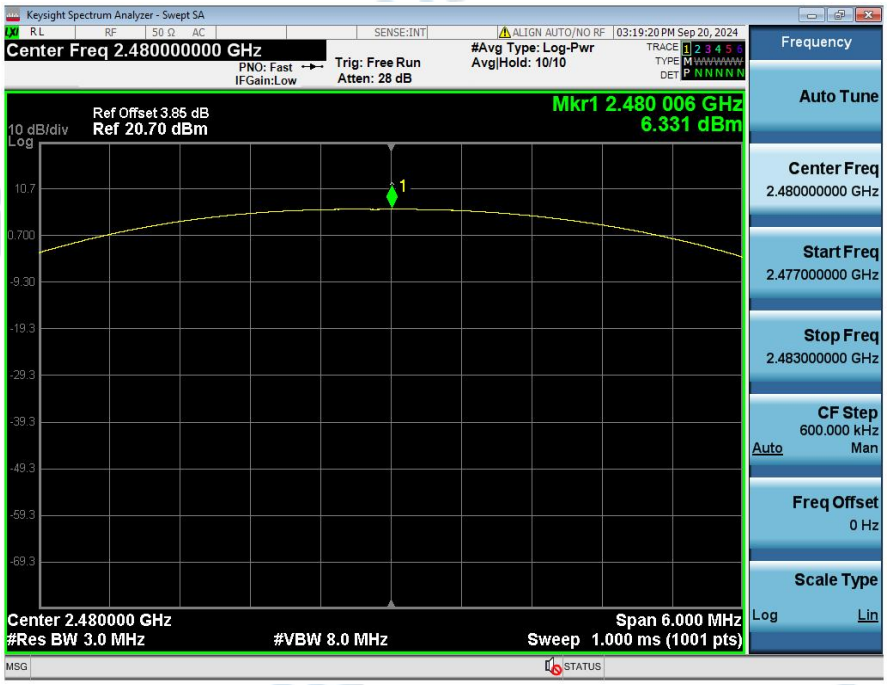
| Condition | Antenna | Rate | Frequency (MHz) | Max. Conducted Power(dBm) | Max. Conducted Power(mW) | Limit(mW) | Result |
|---|---|---|---|---|---|---|---|
| NVNT | ANT1 | 1Mbps | 2402.00 | 5.83 | 3.82 | 1000 | Pass |
| NVNT | ANT1 | 1Mbps | 2440.00 | 5.87 | 3.86 | 1000 | Pass |
| NVNT | ANT1 | 1Mbps | 2480.00 | 6.33 | 4.30 | 1000 | Pass |

**Peak_Output_Power_NVNT_ANT1_1Mbps_2402**

**Peak_Output_Power_NVNT_ANT1_1Mbps_2440**



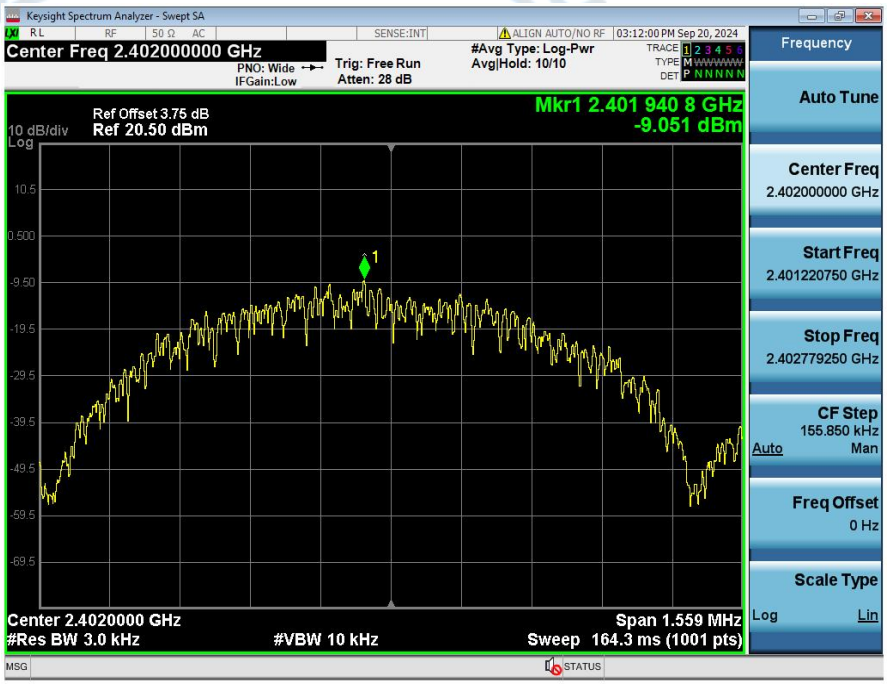
**Peak_Output_Power_NVNT_ANT1_1Mbps_2480**



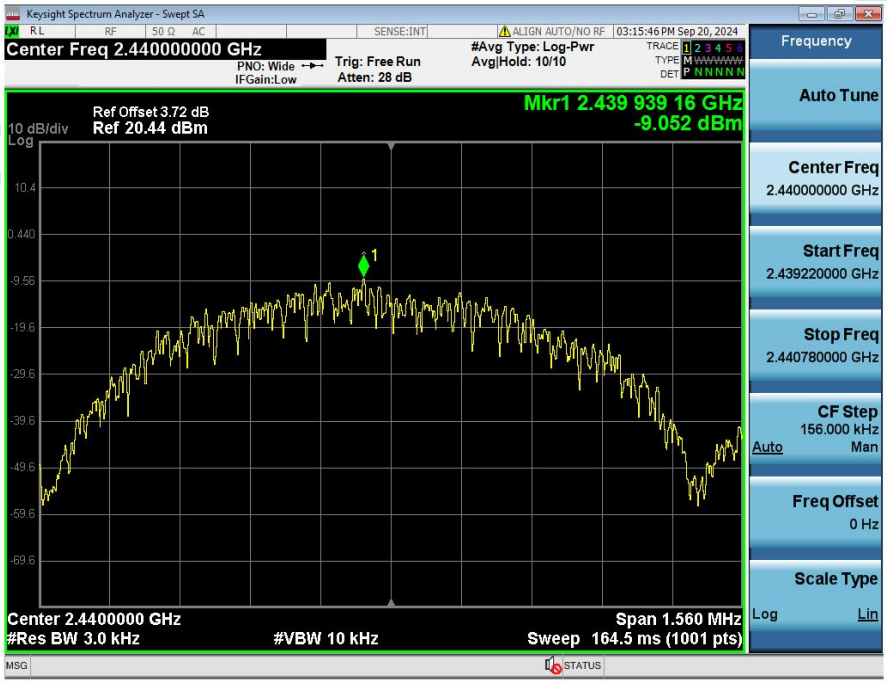
## 4. Power Spectral Density

| Condition | Antenna | Rate | Frequency (MHz) | Power Spectral Density(dBm) | Limit(dBm/3kHz) | Result |
|---|---|---|---|---|---|---|
| NVNT | ANT1 | 1Mbps | 2402.00 | -9.05 | 8 | Pass |
| NVNT | ANT1 | 1Mbps | 2440.00 | -9.05 | 8 | Pass |
| NVNT | ANT1 | 1Mbps | 2480.00 | -8.54 | 8 | Pass |

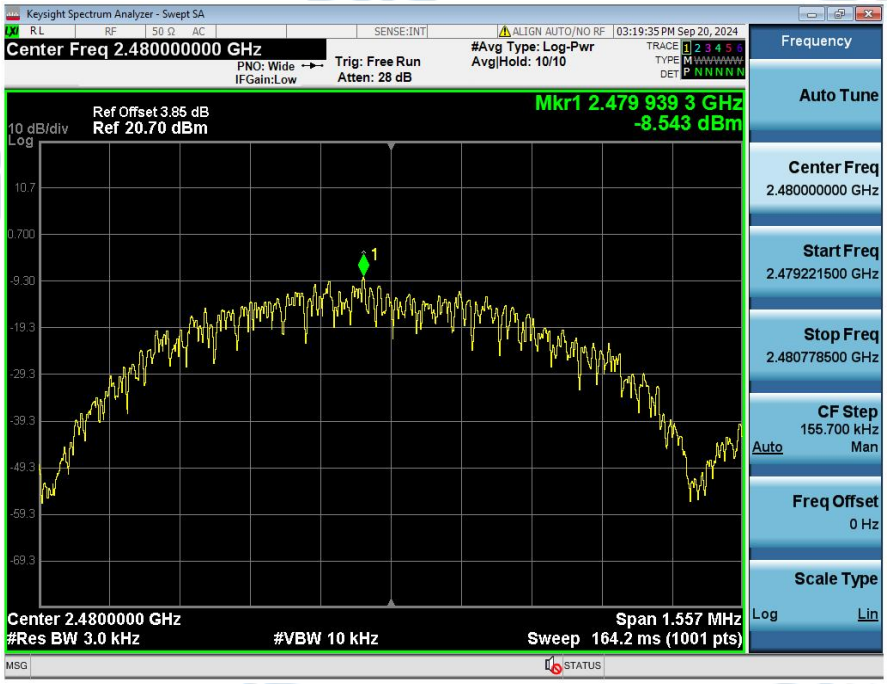
**Power_Spectral_Density_NVNT_ANT1_1Mbps_2402**




**Power_Spectral_Density_NVNT_ANT1_1Mbps_2440**



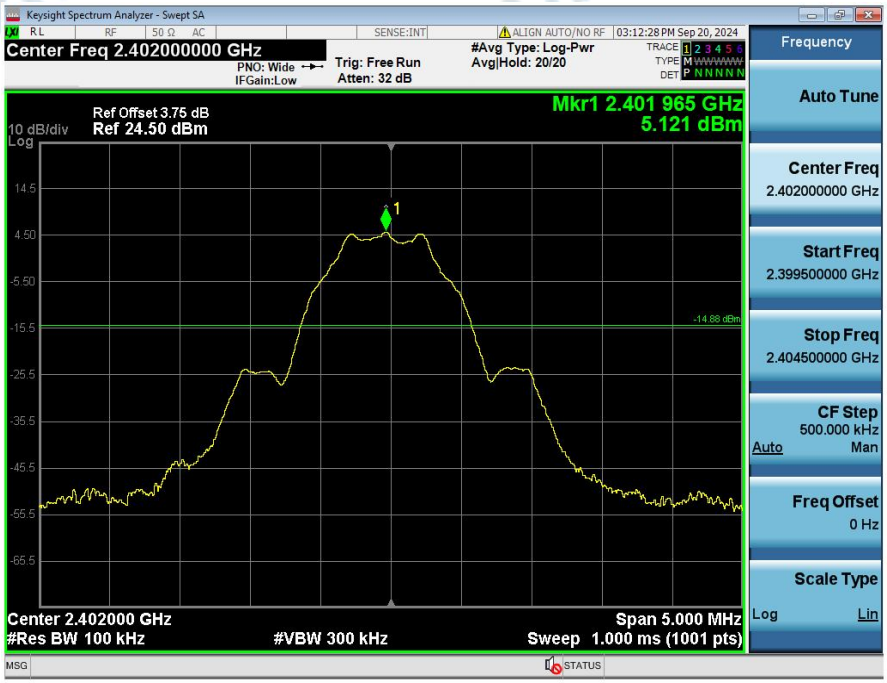
**Power_Spectral_Density_NVNT_ANT1_1Mbps_2480**



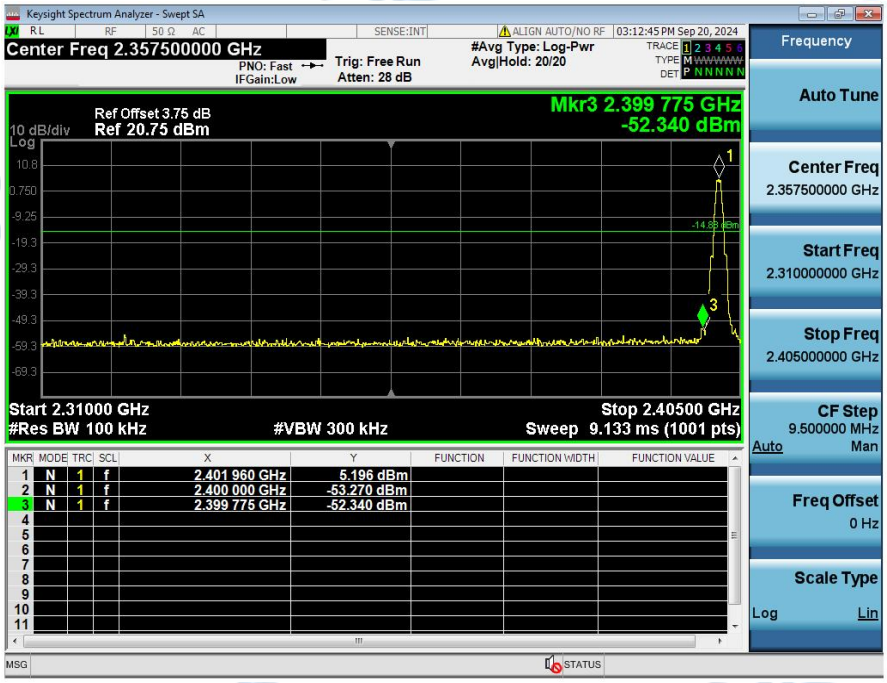
## 5. Bandedge

| Condition | Antenna | Rate | TX_Frequency (MHz) | Max. Mark Frequency (MHz) | Spurious level(dBm) | limit(dBm) | Result |
|---|---|---|---|---|---|---|---|
| NVNT | ANT1 | 1Mbps | 2402.00 | 2399.775 | -52.340 | -14.879 | Pass |
| NVNT | ANT1 | 1Mbps | 2480.00 | 2484.150 | -55.408 | -14.339 | Pass |

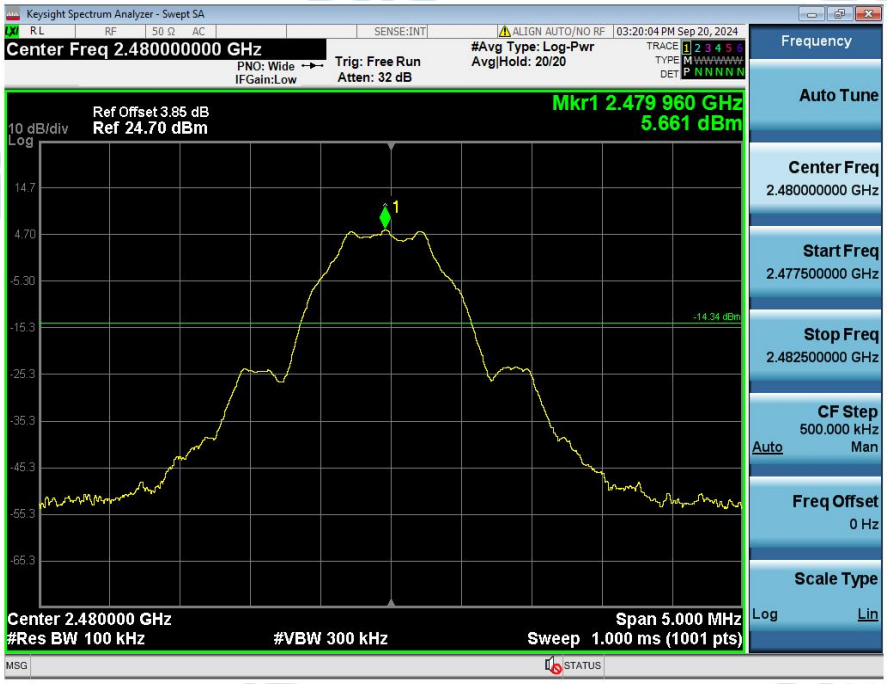
**1_Reference_Level_NVNT_ANT1_1Mbps_2402**



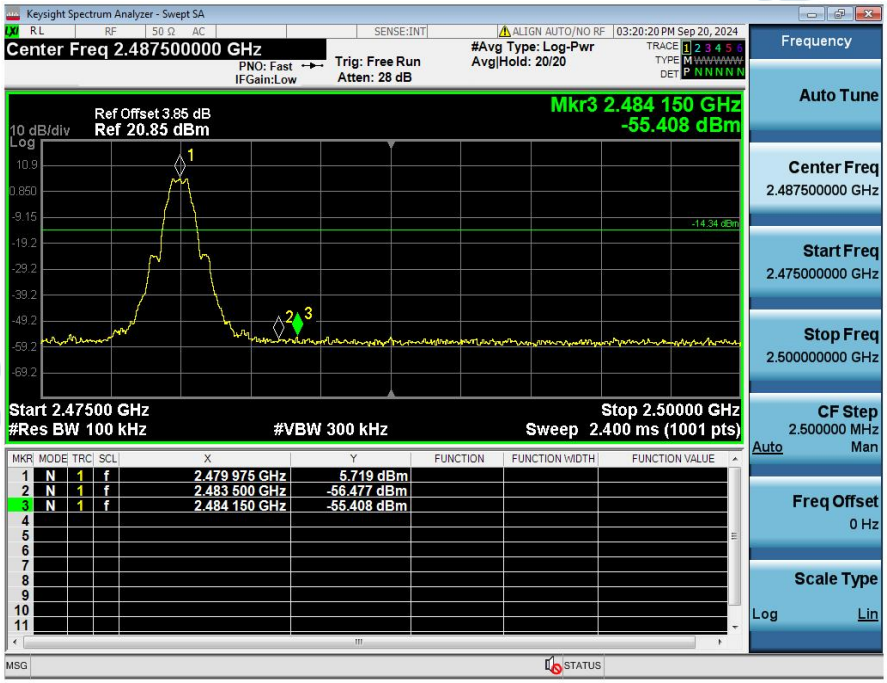

**2_Bandedge_NVNT_ANT1_1Mbps_2402**



**1_Reference_Level_NVNT_ANT1_1Mbps_2480**



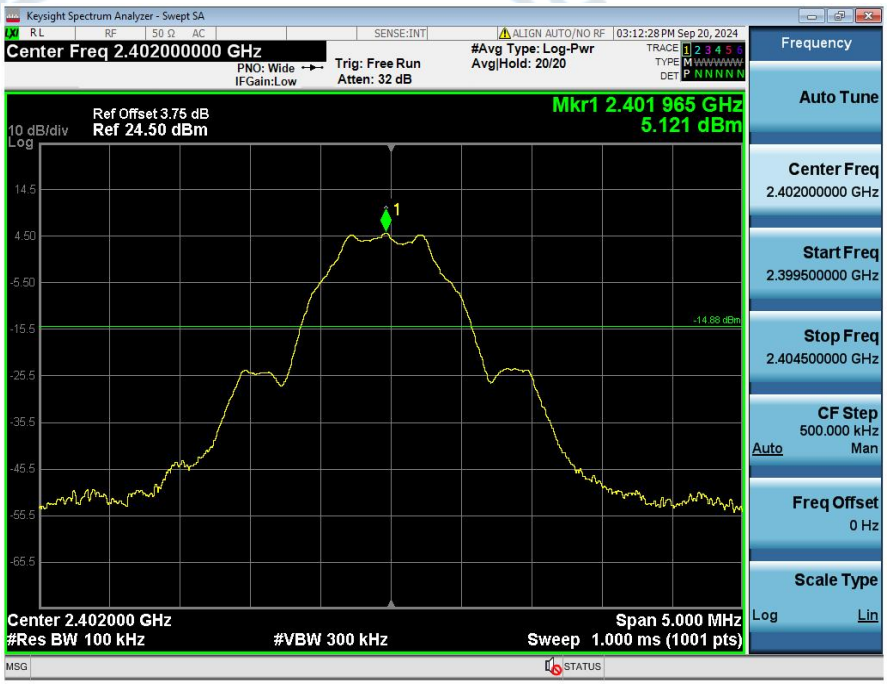

**2_Bandedge_NVNT_ANT1_1Mbps_2480**



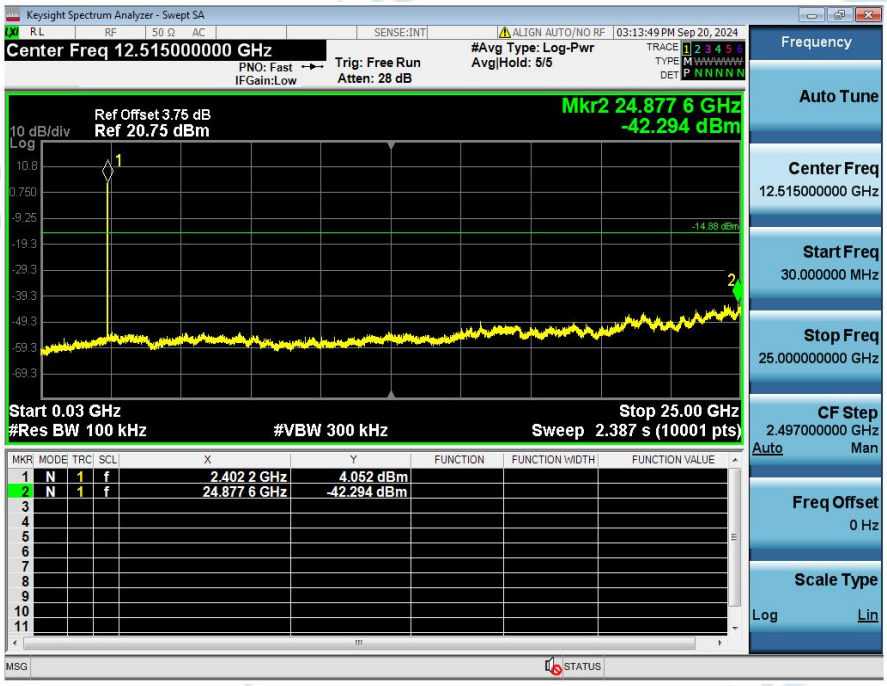
## 6. Spurious Emission

| Condition | Antenna | Rate | TX_Frequency(MHz) | Spurious MAX.Value(dBm) | Limit | Result |
|---|---|---|---|---|---|---|
| NVNT | ANT1 | 1Mbps | 2402.00 | -42.294 | -14.879 | Pass |
| NVNT | ANT1 | 1Mbps | 2440.00 | -42.902 | -14.857 | Pass |
| NVNT | ANT1 | 1Mbps | 2480.00 | -42.662 | -14.339 | Pass |

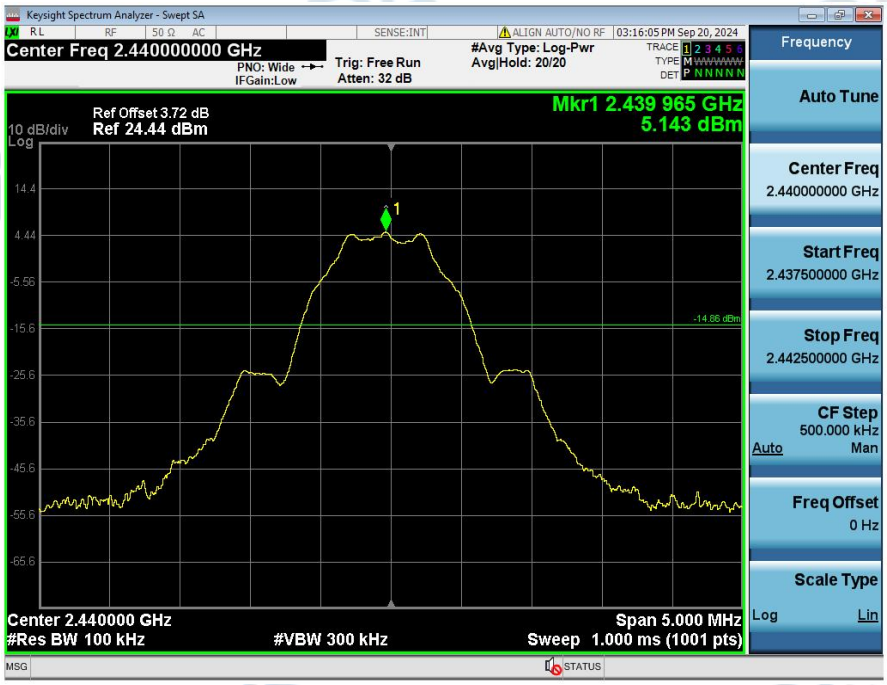
**1_Reference_Level_NVNT_ANT1_1Mbps_2402**



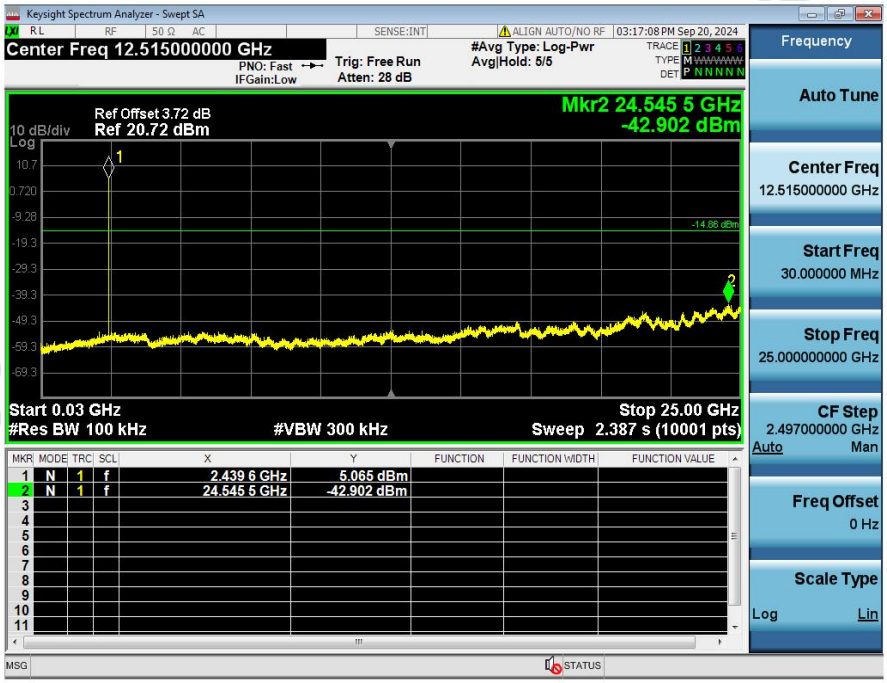

**2_Spurious_Emission_NVNT_ANT1_1Mbps_2402**



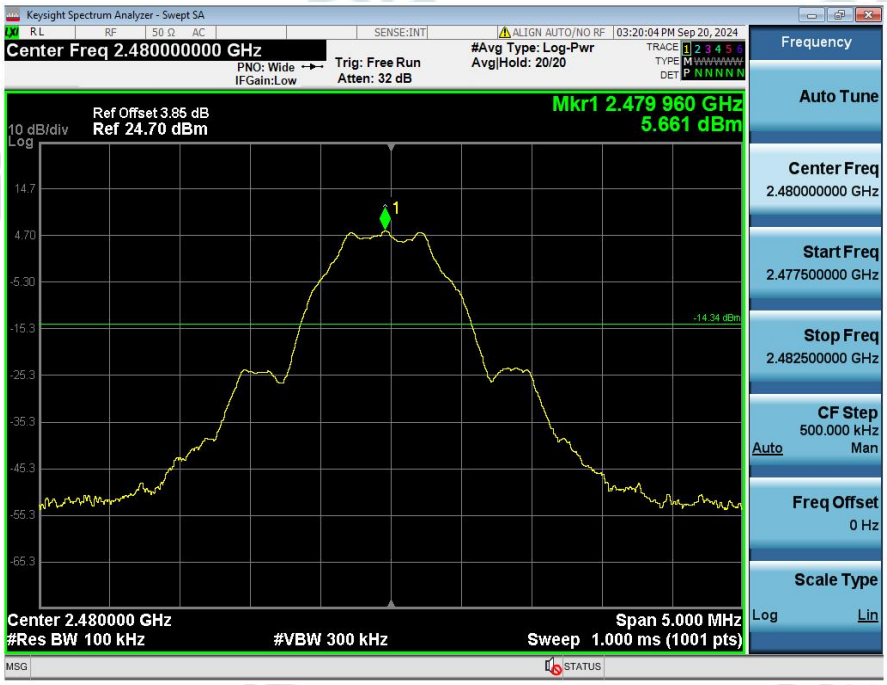
**1_Reference_Level_NVNT_ANT1_1Mbps_2440**



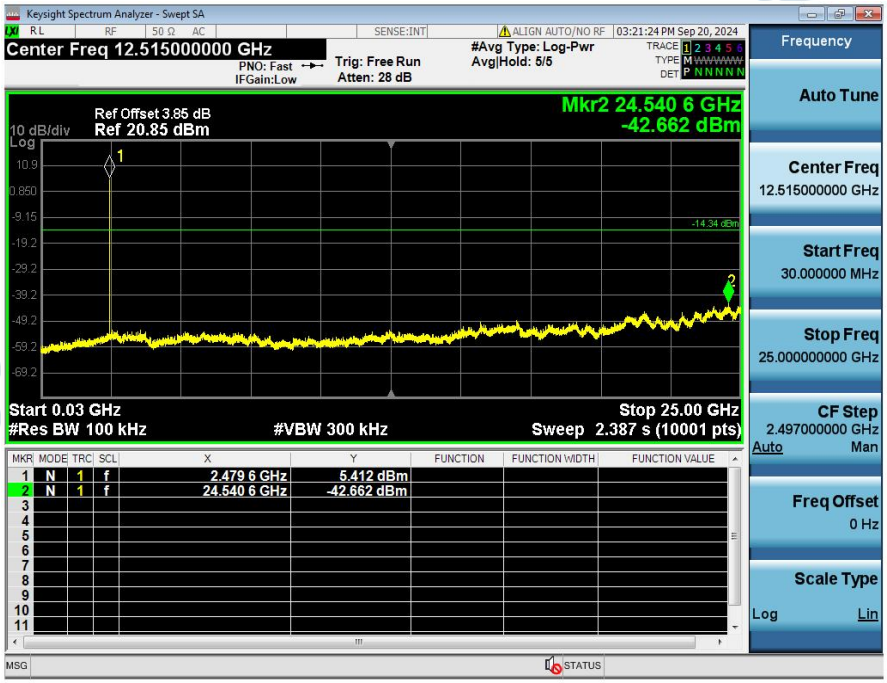

**2_Spurious_Emission_NVNT_ANT1_1Mbps_2440**



**1_Reference_Level_NVNT_ANT1_1Mbps_2480**




**2_Spurious_Emission_NVNT_ANT1_1Mbps_2480**




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