REPORT No.: SZ23090029W01

# TEST REPORT

| | | |
|---|---|---|
| **APPLICANT** | : | NiceRF Wireless Technology LTD. |
| **PRODUCT NAME** | : | LoRa128x-T |
| **MODEL NAME** | : | LoRa128x-T |
| **BRAND NAME** | : | G-NiceRF |
| **FCC ID** | : | 2AD66-LORA128X-T |
| **STANDARD(S)** | : | 47 CFR Part 15 Subpart C |
| **RECEIPT DATE** | : | 2023-09-07 |
| **TEST DATE** | : | 2023-09-11 to 2023-10-12 |
| **ISSUE DATE** | : | 2023-11-02 |

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MORLAB

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# DIRECTORY

| Change History | | |
|---|---|---|
| **Version** | **Date** | **Reason for change** |
| 1.0 | 2023-11-02 | First edition |
| | | |

# 1. Summary of Test Result

| No. | Section | Description | Test Date | Test Engineer | Result | Method Determination /Remark |
|---|---|---|---|---|---|---|
| 1 | 15.203 | Antenna Requirement | N/A | N/A | PASS | No deviation |
| 2 | N/A | Duty Cycle of Test Signal | Sep 11&Oct 11, 2023 | He Yuyang | PASS | No deviation |
| 3 | 15.247(b) | Maximum Peak Conducted Output Power | Sep 11&Oct 11, 2023 | He Yuyang | PASS | No deviation |
| 4 | 15.247(b) | Maximum Average Conducted Output Power | Sep 11&Oct 11, 2023 | He Yuyang | PASS | No deviation |
| 5 | 15.247(a) | Bandwidth | Sep 11&Oct 11, 2023 | He Yuyang | PASS | No deviation |
| 6 | 15.247(d) | Conducted Spurious Emission and Band Edge | Sep 11&Oct 11, 2023 | He Yuyang | PASS | No deviation |
| 7 | 15.247(e) | Power Spectral Density | Sep 11&Oct 11, 2023 | He Yuyang | PASS | No deviation |
| 8 | 15.207 | Conducted Emission | N/A | N/A | N/A Note1 | N/A |
| 9 | 15.247(d) | Restricted Frequency Bands | Oct 10, 2023 | Su Zhan | PASS | No deviation |
| 10 | 15.209, 15.247(d) | Radiated Emission | Oct 10, 2023 | Su Zhan | PASS | No deviation |

**Note 1:** Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

**Note 2:** The tests were performed according to the method of measurements prescribed in ANSIC63.10-2013 and KDB558074 D01 v05r02.

**Note 3:** Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the

"Remark" of the above table.

**Note 4:** When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

## 1.1. Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

• 47 CFR Part 15 Subpart C Radio Frequency Devices

# 1.2. Test Equipment List

### 1.2.1 Conducted Test Equipments

| Equipment Name | Serial No. | Type | Manufacturer | Cal. Date | Due Date |
|---|---|---|---|---|---|
| EXA Signal Analzyer | MY53470836 | N9010A | Agilent | 2023.02.27 | 2024.02.26 |
| RF Cable (30MHz-26GHz) | CB01 | RF01 | Morlab | N/A | N/A |
| Coaxial Cable | CB02 | RF02 | Morlab | N/A | N/A |
| SMA Connector | CN01 | RF03 | HUBER-SUHNER | N/A | N/A |

### 1.2.2 Conducted Emission Test Equipments

| Equipment Name | Serial No. | Type | Manufacturer | Cal. Date | Due Date |
|---|---|---|---|---|---|
| Receiver | MY56400093 | N9038A | KEYSIGHT | 2023.02.09 | 2024.02.08 |
| LISN | 8127449 | NSLK 8127 | Schwarzbeck | 2023.02.21 | 2024.02.20 |
| Pulse Limiter (10dB) | VTSD 9561 F-B #206 | VTSD 9561-F | Schwarzbeck | 2023.06.27 | 2024.06.26 |
| RF Coaxial Cable (DC-100MHz) | BNC | MRE04 | Qualwave | N/A | N/A |

### 1.2.3 List of Software Used

| Description | Manufacturer | Software Version |
|---|---|---|
| Test System | MaiWei | 2.0.0.0 |
| Morlab EMCR | Morlab | V1.2 |
| TS+ -[JS32-CE] | Tonscend | V2.5.0.0 |

### 1.2.4 Radiated Test Equipments

| Equipment Name | Serial No. | Type | Manufacturer | Cal. Date | Due Date |
|---|---|---|---|---|---|
| Receiver | MY54130016 | N9038A | Agilent | 2023.06.21 | 2024.06.20 |
| Test Antenna - Bi-Log | 9163-519 | VULB 9163 | Schwarzbeck | 2022.05.25 | 2025.05.24 |
| Test Antenna - Loop | 1519-022 | FMZB1519 | Schwarzbeck | 2022.02.11 | 2025.02.10 |
| Test Antenna – Horn | 01774 | BBHA 9120D | Schwarzbeck | 2022.07.13 | 2025.07.12 |
| Test Antenna – Horn | BBHA9170 #773 | BBHA9170 | Schwarzbeck | 2022.07.14 | 2025.07.13 |
| Preamplifier (10MHz-6GHz) | 46732 | S10M100L3802 | LUCIX CORP. | 2023.06.27 | 2024.06.26 |
| Preamplifier (2GHz-18GHz) | 61171/61172 | S020180L3203 | LUCIX CORP. | 2023.06.27 | 2024.06.26 |
| Preamplifier (18GHz-40GHz) | DS77209 | DCLNA0118-40C-S | Decentest | 2023.07.04 | 2024.07.03 |
| RF Coaxial Cable (DC-18GHz) | MRE001 | PE330 | Pasternack | 2023.06.27 | 2024.06.26 |
| RF Coaxial Cable (DC-18GHz) | MRE002 | CLU18 | Pasternack | 2023.06.27 | 2024.06.26 |
| RF Coaxial Cable (DC-18GHz) | MRE003 | CLU18 | Pasternack | 2023.06.27 | 2024.06.26 |
| RF Coaxial Cable (DC-40GHz) | 22290045 | QA360-40-KK-0.5 | Qualwave | 2023.06.27 | 2024.06.26 |
| RF Coaxial Cable (DC-40GHz) | 22290046 | QA360-40-KKF-2 | Qualwave | 2023.06.27 | 2024.06.26 |
| RF Coaxial Cable (DC-18GHz) | 22120181 | QA500-18-NN-5 | Qualwave | 2023.06.27 | 2024.06.26 |
| Notch Filter | N/A | WRCG-2400-2483.5-60SS | Wainwright | 2023.06.27 | 2024.06.26 |
| Anechoic Chamber | N/A | 9m*6m*6m | CRT | 2022.05.10 | 2025.05.09 |

## 1.3. Measurement Uncertainty

| Test Items | Uncertainty | Remark |
|---|---|---|
| Peak Output Power | ±2.22dB | Confidence levels of 95% |
| Power Spectral Density | ±2.22dB | Confidence levels of 95% |
| Bandwidth | ±5% | Confidence levels of 95% |
| Conducted Spurious Emission | ±2.77dB | Confidence levels of 95% |
| Restricted Frequency Bands | ±5% | Confidence levels of 95% |
| Radiated Emission | ±2.95dB | Confidence levels of 95% |
| Conducted Emission | ±2.44dB | Confidence levels of 95% |

## 1.4. Testing Laboratory

| | |
|---|---|
| **Laboratory Name** | Shenzhen Morlab Communications Technology Co., Ltd. |
| **Laboratory Address** | FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China |
| **Telephone** | +86 755 36698555 |
| **Facsimile** | +86 755 36698525 |
| **FCC Designation Number** | CN1192 |
| **FCC Test Firm Registration Number** | 226174 |

# 2. General Description

## 2.1. Information of Applicant and Manufacturer

| | |
|---|---|
| **Applicant** | NiceRF Wireless Technology LTD. |
| **Applicant Address** | 309-314, Bldg A,Hongdu business building, Xin'an street, Zone 43, Baoan Dist, Shenzhen 518101, China |
| **Manufacturer** | NiceRF Wireless Technology LTD. |
| **Manufacturer Address** | 309-314, Bldg A,Hongdu business building, Xin'an street, Zone 43, Baoan Dist, Shenzhen 518101, China |

## 2.2. Information of EUT

| | |
|---|---|
| **Product Name:** | LoRa128x-T |
| **Sample No.:** | 3# |
| **Hardware Version:** | V1.0 |
| **Software Version:** | V1.0 |
| **Equipment Type:** | LoRa |
| **Transmitter Bandwidth** | 400kHz, 800kHz, 1600khz |
| **Operating Frequency Range:** | 2401MHz-2476MHz |
| **Antenna Type:** | Rod antenna |
| **Antenna Gain:** | 1.1dBi |

**Note 1:** We use the dedicated software to control the EUT continuous transmission.

**Note 2:** For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

## 2.3. Channel List of EUT

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|
| **1** | **2401** | **3** | **2476** |
| **2** | **2440** | | |

**Note 1:** The black bold channels were selected for test.

## 2.4. Operation and Transmitter Power Level Setting

The EUT was tested while in a continues transmitter/receiver mode under the control of tool which is provided by manufacturer, all the items of transmitter were tested under the power setting as below:

| Modulation | Bandwidth (kHz) | Power Setting |
|---|---|---|
| LoRa | 400 | 7 |
| | 800 | 9 |
| | 1600 | 9 |

## 2.5. Test Configuration of EUT

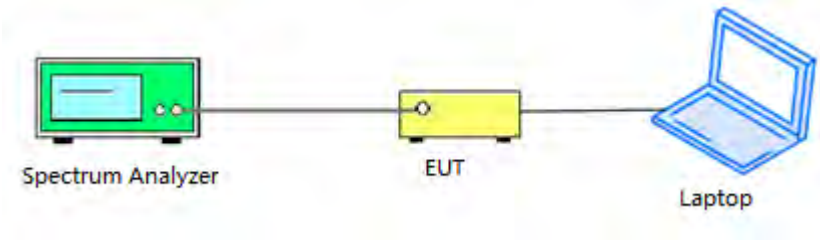
Test mode is used to control the EUT under the maximum power level during test.

## 2.6. Test Conditions

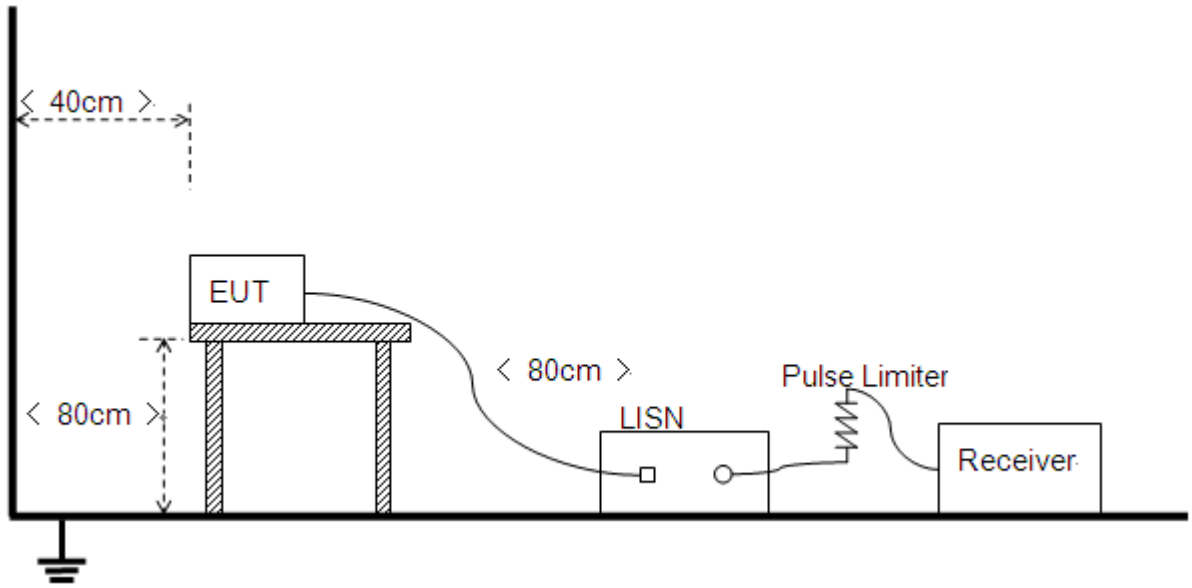
| | |
|---|---|
| **Temperature (°C)** | 15-35 |
| **Relative Humidity (%)** | 30-60 |
| **Atmospheric Pressure (kPa)** | 86-106 |

## 2.7. Test Setup Layout Diagram

### 2.7.1.Conducted Measurement

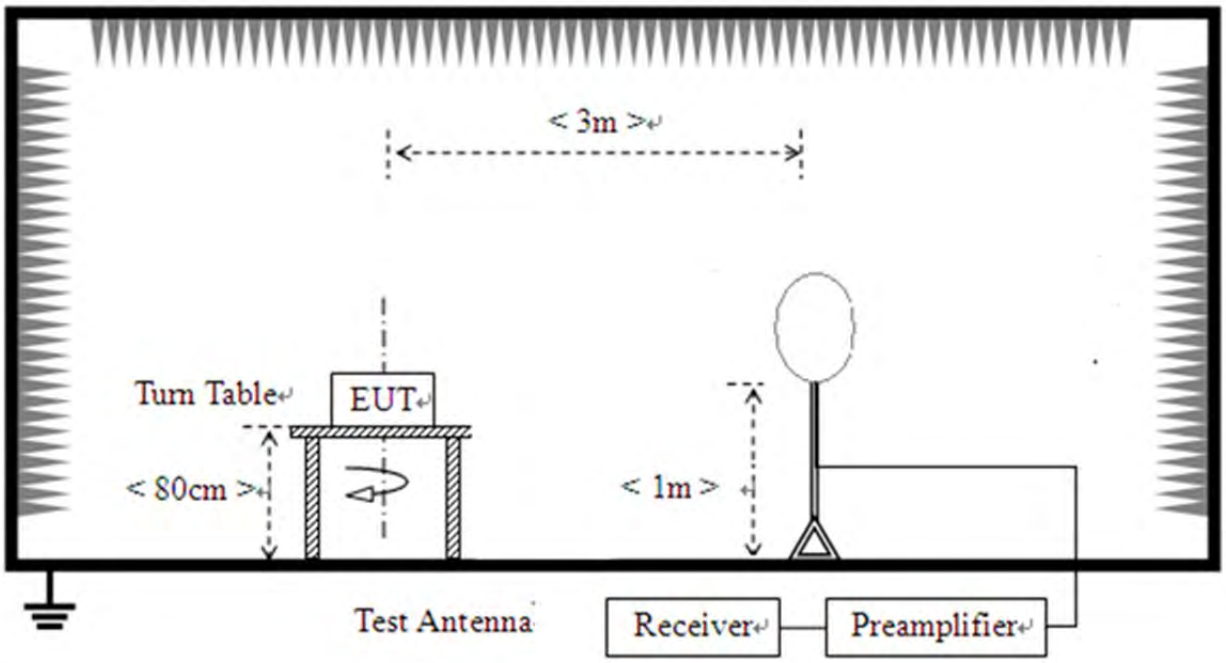



### 2.7.2.Conducted Emission Measurement

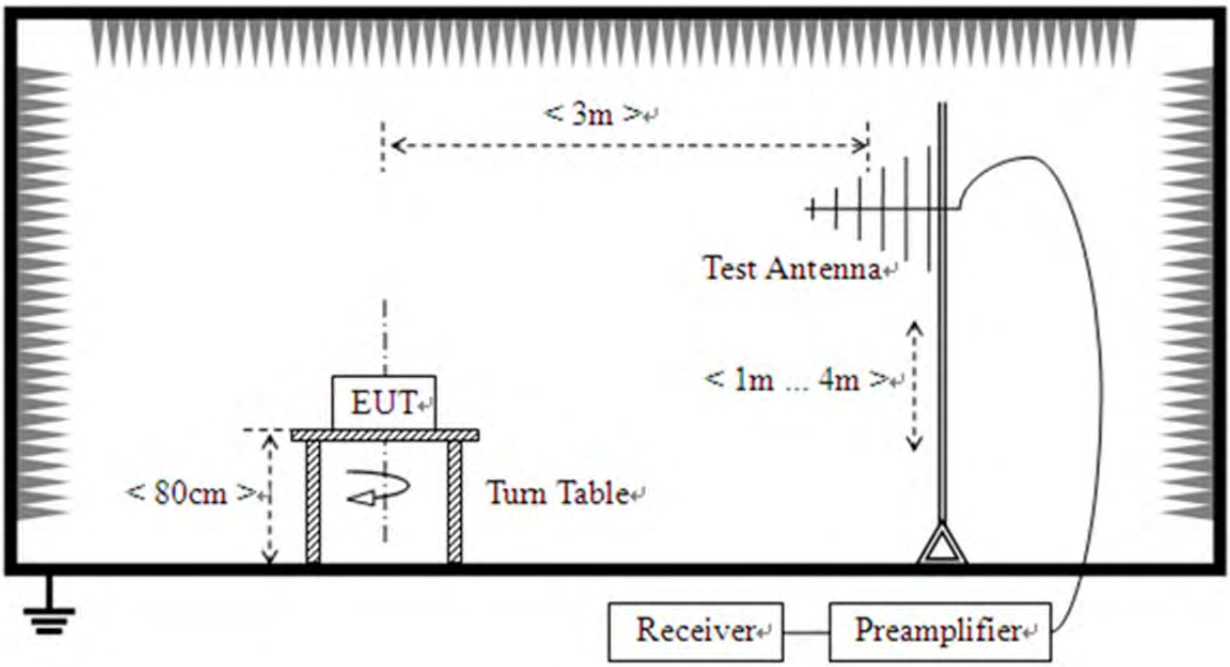


### 2.7.3.Radiation Measurement

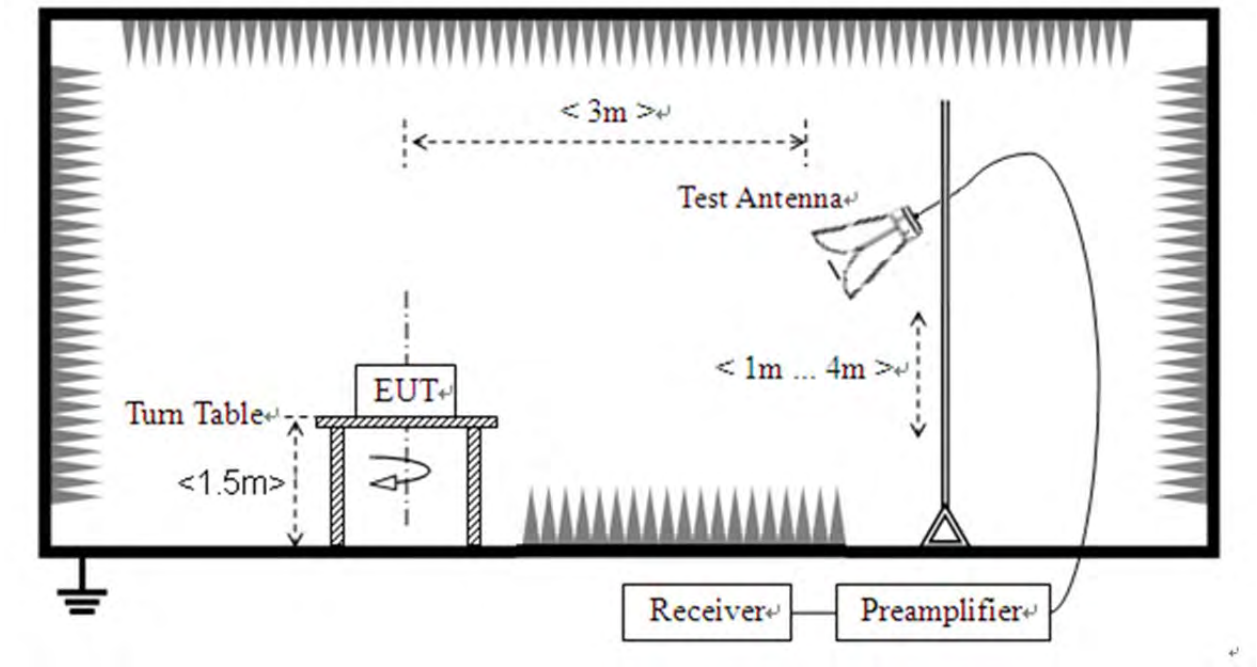
1) For radiated emissions from 9kHz to 30MHz




2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



# 3. Test Results

## 3.1. Antenna Requirement

### 3.1.1. Requirement

According to FCC 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.

### 3.1.2. Test Result

The EUT has an external Rod antenna coupled with the RP-SMA connector. Please refer to the EUT photos.

## 3.2. Duty Cycle of Test Signal

### 3.2.1.Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%).When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration(T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e.,no transmitter OFF-time is to be considered).
When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this sub clause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than ±2%; otherwise, the duty cycle is considered to be non constant.

### 3.2.2.Test Result

Refer to Annex A.1 in this report.

# 3.3. Maximum Peak Conducted Output Power

### 3.3.1.Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed 1 Watt.

### 3.3.2.Test Procedures

KDB 558074 Section 8.3.1 was used in order to prove compliance.

### 3.3.3.Test Setup Layout

Refer to chapter 2.6.1 in this report.

### 3.3.4.Test Result

Refer to Annex A.2 in this report.

# 3.4. Maximum Average Conducted Output Power

### 3.4.1.Requirement

According to FCC section 15.247(b)(3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum average conducted output power of the intentional radiator shall not exceed 1 Watt.

### 3.4.2.Test Procedures

KDB 558074 Section 8.3.2 was used in order to prove compliance.

### 3.4.3.Test Setup Layout

Refer to chapter 2.6.1 in this report.

### 3.4.4.Test Result

Refer to Annex A.3 in this report.

# 3.5.6 dB Bandwidth

### 3.5.1.Requirement

According to FCC section 15.247(a) (2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

### 3.5.1.Test Procedures

The steps for the first option are as follows:
a) Set analyzer center frequency to channel center frequency
b) Set RBW to100kHz
c) Set VBW to 300kHz
d) Detector = peak.
e) Trace mode = max hold
f) Sweep time = auto couple
g) Allow the trace to fully stabilize
h) 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 by6 dB relative to the maximum level measured in the fundamental emission
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. 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.

### 3.5.2.Test Setup Layout

Refer to chapter 2.6.1 in this report.

### 3.5.3.Test Result

Refer to Annex A.4 in this report.

# 3.6. Conducted Spurious Emissions and Band Edge

### 3.6.1.Requirement

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

### 3.6.2.Test Procedures

KDB 558074 Section 8.5 and 8.7 was used in order to prove compliance.

### 3.6.3.Test Setup Layout

Refer to chapter 2.6.1 in this report.

### 3.6.4.Test Result

Refer to Annex A.5 and A.6 in this report.

# 3.7. Power Spectral Density

### 3.7.1.Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm 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.

### 3.7.2.Test Procedures

The measured power spectral density was calculated by the reading of the spectrum analyzer and calibration. Following is the test procedure for PSD test:
a) Set analyzer center frequency to channel center frequency
b) Set span to1.5 times DTS
c) Set RBW to 3kHz
d) Set VBW to 10kHz
e) Detector = peak
f) Sweep time = auto couple
g) Trace mode = max hold
h) Allow trace to fully stabilize
i) Use the peak marker function to determine the maximum amplitude level within the RBW

### 3.7.3.Test Setup Layout

Refer to chapter 2.6.1 in this report.

### 3.7.4.Test Result

Refer to Annex A.7 in this report.

# 3.8. Conducted Emission

### 3.8.1.Requirement

According to FCC section 15.207, 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 within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

| Frequency Range (MHz) | Conducted Limit (dBμV) | |
|---|---|---|
| | Quai-peak | Average |
| 0.15 - 0.50 | 66 to 56 | 56 to 46 |
| 0.50 - 5 | 56 | 46 |
| 5 - 30 | 60 | 50 |

Note:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

### 3.8.2.Test Procedures

The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

### 3.8.3.Test Setup Layout

Refer to chapter 2.6.2 in this report.

### 3.8.4.Test Result

Refer to Annex A.8 in this report.

# 3.9. Restricted Frequency Bands

### 3.9.1.Requirement

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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).

### 3.9.2.Test Procedures

The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.
For the Test Antenna:
Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1GHz, 100 kHz for f < 1GHz
VBW = 3 MHz
Sweep = auto
Detector function = peak/average
Trace = max hold
Allow the trace to stabilize

### 3.9.3.Test Setup Layout

Refer to chapter 2.6.3 in this report.

### 3.9.4.Test Result

Refer to Annex A.8 in this report.

# 3.10. Radiated Emission

### 3.10.1.Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (μV/m) | Measurement Distance (m) |
|---|---|---|
| 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 |

**Note1:** For above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
**Note2:**For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).

### 3.10.2.Test Procedures

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz.The antenna to EUT distance is 3meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 30MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9kHz-90 kHz, 110kHz-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions. For measurements above 1 GHz, keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.

### 3.10.3.Test Setup Layout

Refer to chapter 2.6.3 in this report.

### 3.10.4.Test Result

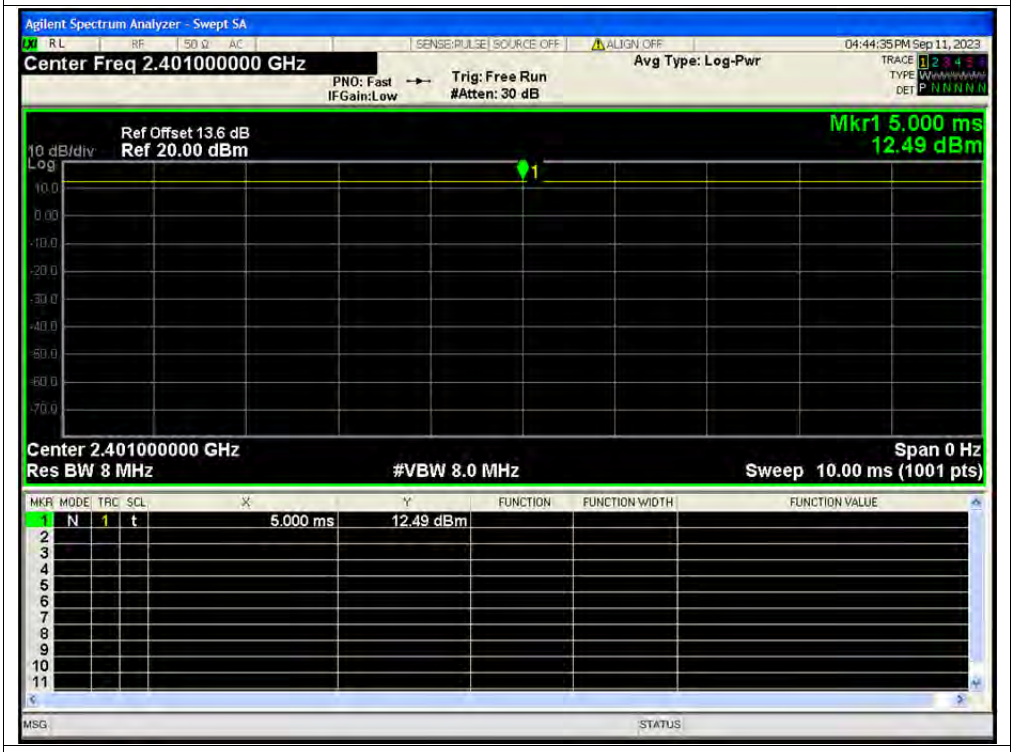
Refer to Annex A.9 in this report.

# Annex A Test Data and Result

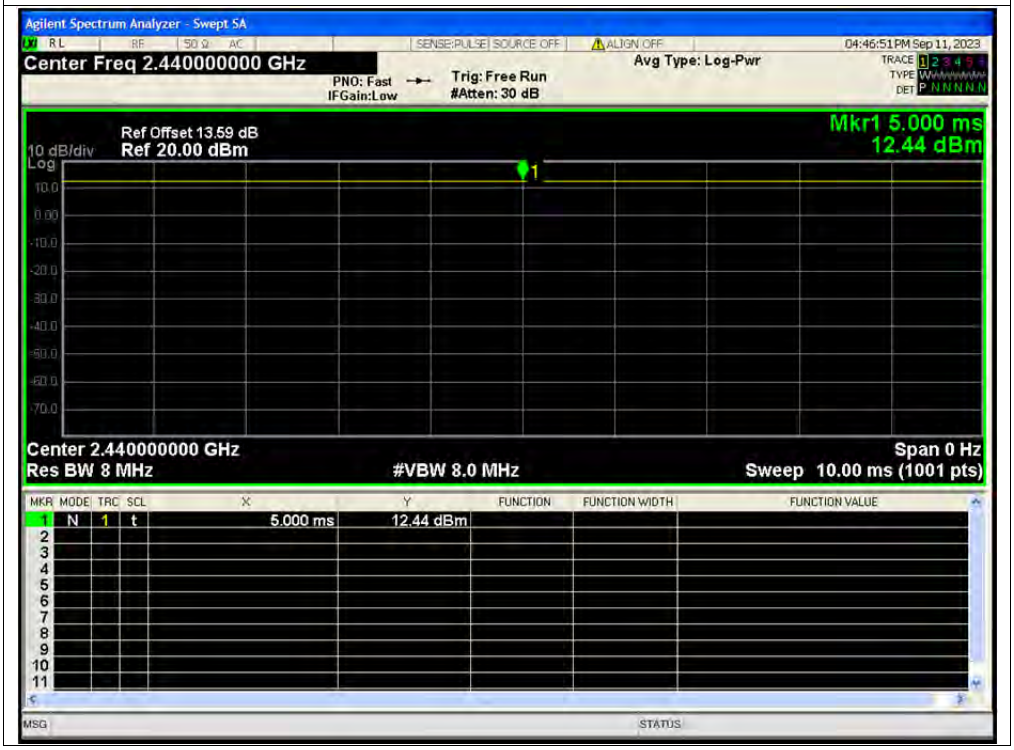
## A.1. Duty Cycle of Test Signal

| Condition | Modulation | Bandwidth (KHz) | Frequency (MHz) | Antenna | Duty Cycle (%) | Correction Factor (dB) | 1/T (kHz) |
|---|---|---|---|---|---|---|---|
| NVNT | LORA | 1600 | 2401 | Ant1 | 100 | 0 | 0 |
| NVNT | LORA | 1600 | 2440 | Ant1 | 100 | 0 | 0 |
| NVNT | LORA | 1600 | 2476 | Ant1 | 100 | 0 | 0 |
| NVNT | LORA | 400 | 2401 | Ant1 | 100 | 0 | 0 |
| NVNT | LORA | 400 | 2440 | Ant1 | 100 | 0 | 0 |
| NVNT | LORA | 400 | 2476 | Ant1 | 100 | 0 | 0 |
| NVNT | LORA | 800 | 2401 | Ant1 | 100 | 0 | 0 |
| NVNT | LORA | 800 | 2440 | Ant1 | 100 | 0 | 0 |
| NVNT | LORA | 800 | 2476 | Ant1 | 100 | 0 | 0 |

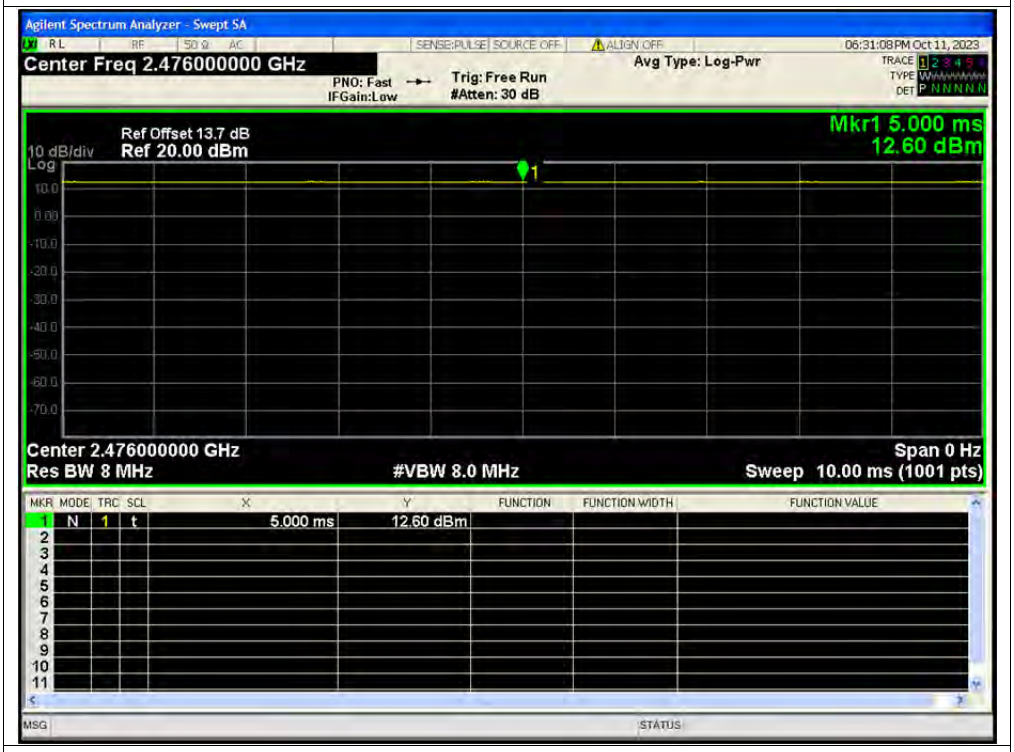
| Test Graphs |
| --- |
| Duty Cycle NVNT LORA_1600KHz 2401MHz Ant1 |



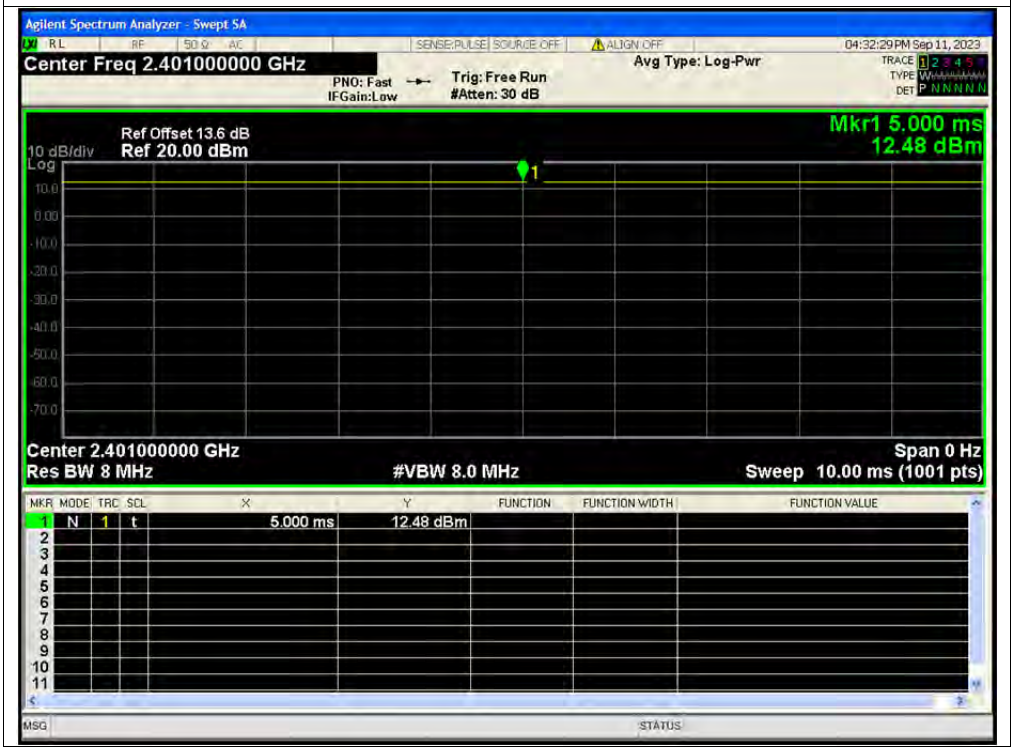

| Duty Cycle NVNT LORA_1600KHz 2440MHz Ant1 |
| --- |



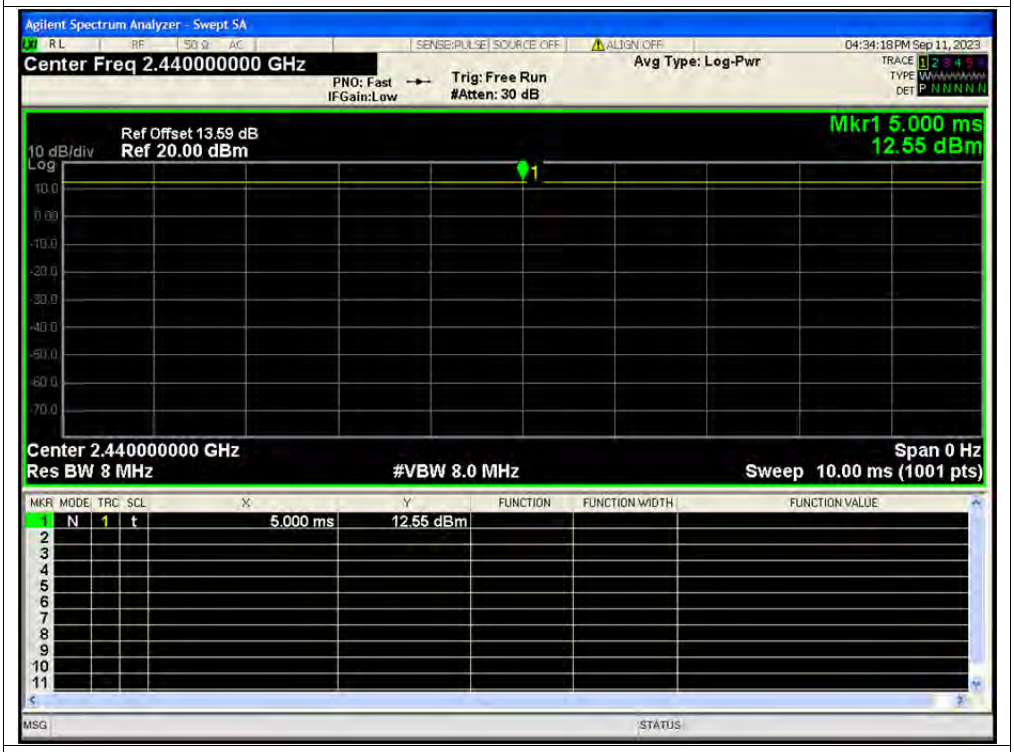
Duty Cycle NVNT LORA_1600KHz 2476MHz Ant1



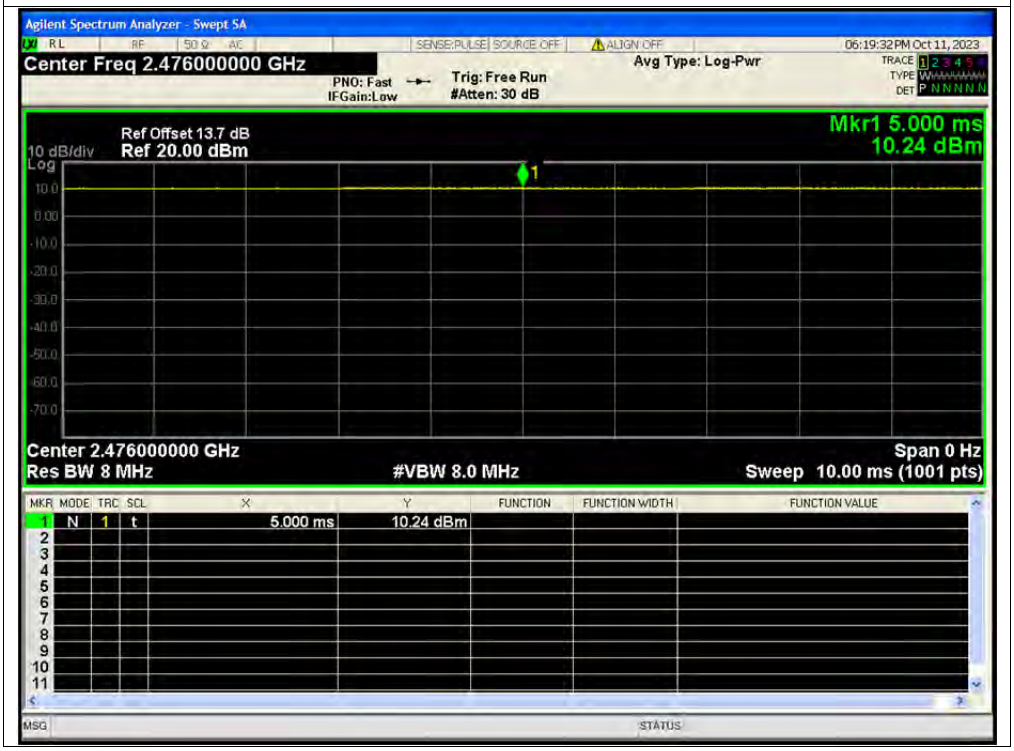

Duty Cycle NVNT LORA_400KHz 2401MHz Ant1



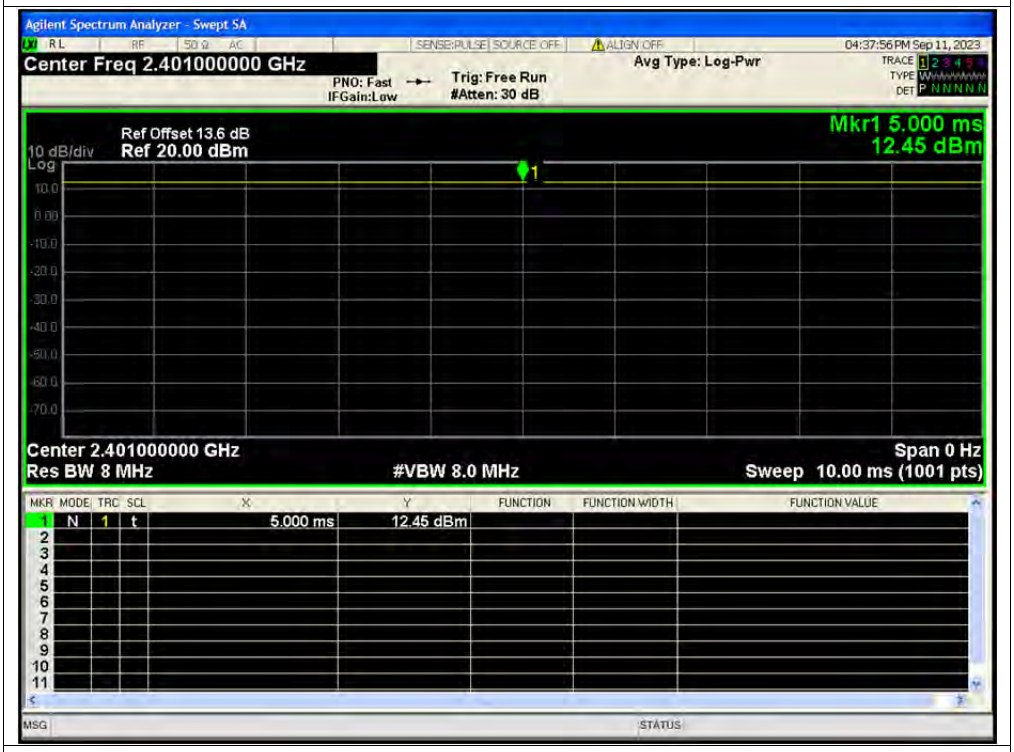
Duty Cycle NVNT LORA_400KHz 2440MHz Ant1



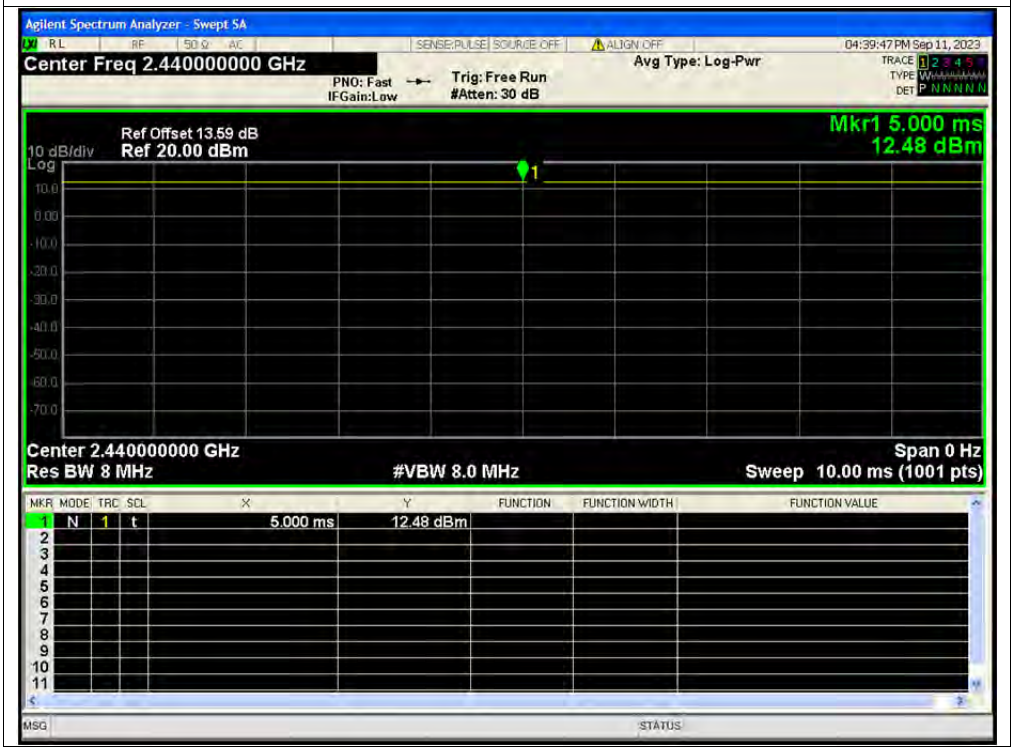

Duty Cycle NVNT LORA_400KHz 2476MHz Ant1



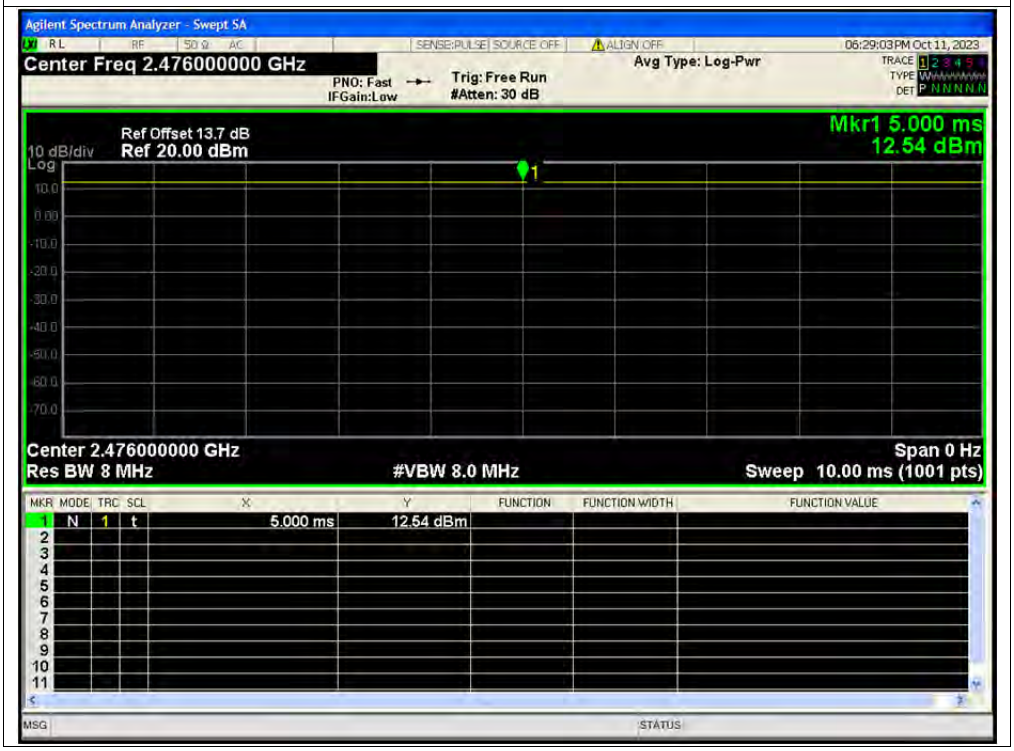
Duty Cycle NVNT LORA_800KHz 2401MHz Ant1




Duty Cycle NVNT LORA_800KHz 2440MHz Ant1



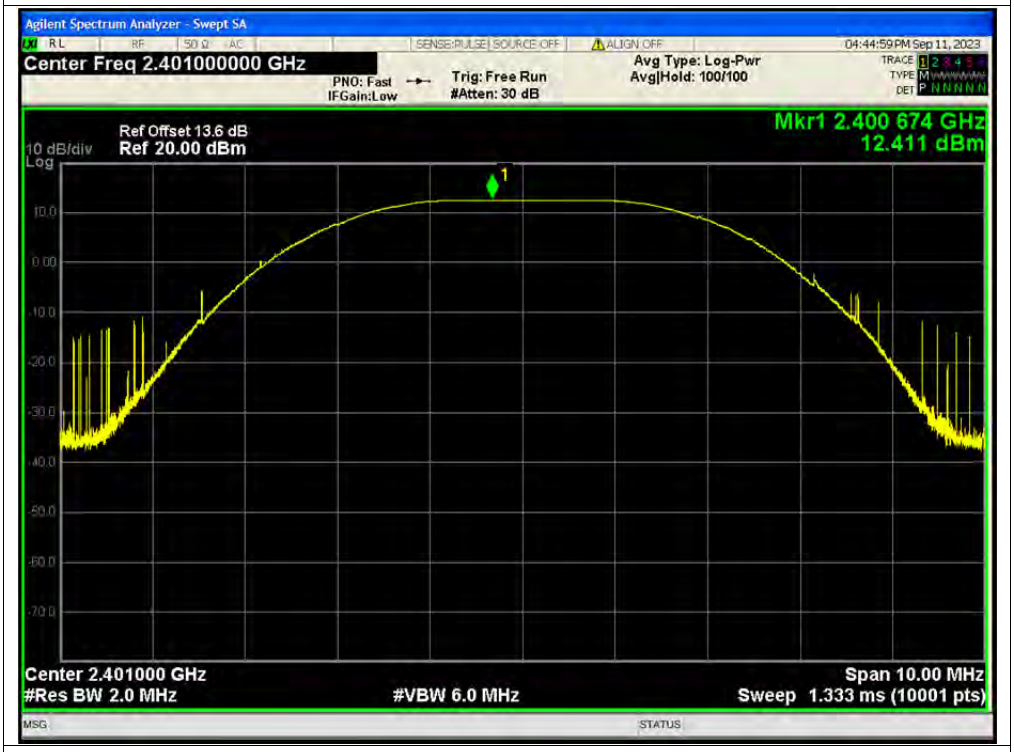
| Duty Cycle NVNT LORA_800KHz 2476MHz Ant1 |
|---|



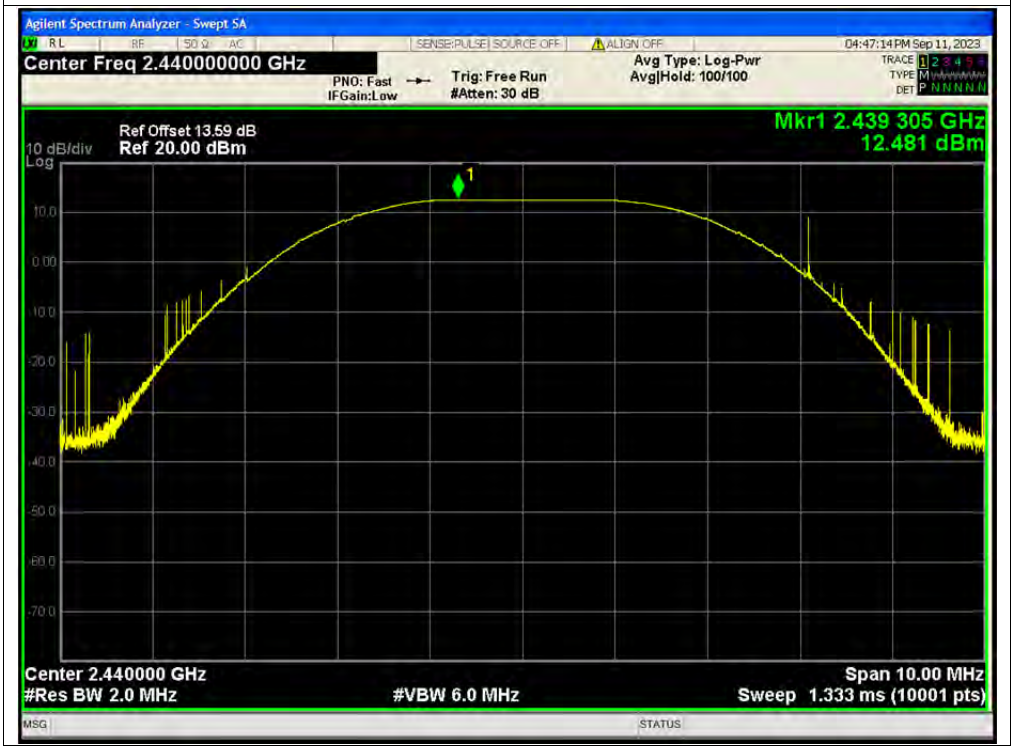
## A.2. Maximum Peak Conducted Output Power

| Condition | Modulation | Bandwidth (KHz) | Frequency (MHz) | Antenna | Power (dBm) | Duty Factor (dB) | Total Power (dBm) | Total Power (W) | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|
| NVNT | LORA | 1600 | 2401 | Ant1 | 12.41 | 0 | 12.41 | 0.01742 | 30 | Pass |
| NVNT | LORA | 1600 | 2440 | Ant1 | 12.48 | 0 | 12.48 | 0.0177 | 30 | Pass |
| NVNT | LORA | 1600 | 2476 | Ant1 | 12.54 | 0 | 12.54 | 0.01795 | 30 | Pass |
| NVNT | LORA | 400 | 2401 | Ant1 | 8.65 | 0 | 8.65 | 0.00733 | 30 | Pass |
| NVNT | LORA | 400 | 2440 | Ant1 | 8.56 | 0 | 8.56 | 0.00718 | 30 | Pass |
| NVNT | LORA | 400 | 2476 | Ant1 | 8.4 | 0 | 8.4 | 0.00692 | 30 | Pass |
| NVNT | LORA | 800 | 2401 | Ant1 | 12.44 | 0 | 12.44 | 0.01754 | 30 | Pass |
| NVNT | LORA | 800 | 2440 | Ant1 | 12.43 | 0 | 12.43 | 0.0175 | 30 | Pass |
| NVNT | LORA | 800 | 2476 | Ant1 | 12.52 | 0 | 12.52 | 0.01786 | 30 | Pass |

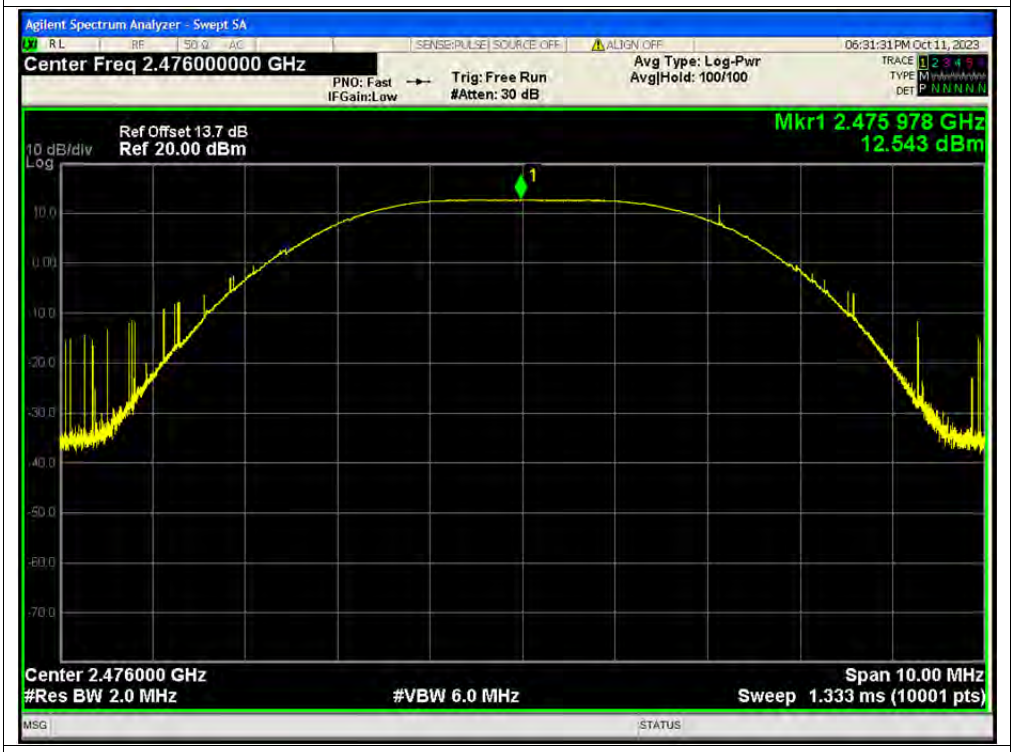
| Test Graphs |
| --- |
| Peak Power NVNT LORA_1600KHz 2401MHz Ant1 |




| Peak Power NVNT LORA_1600KHz 2440MHz Ant1 |
| --- |

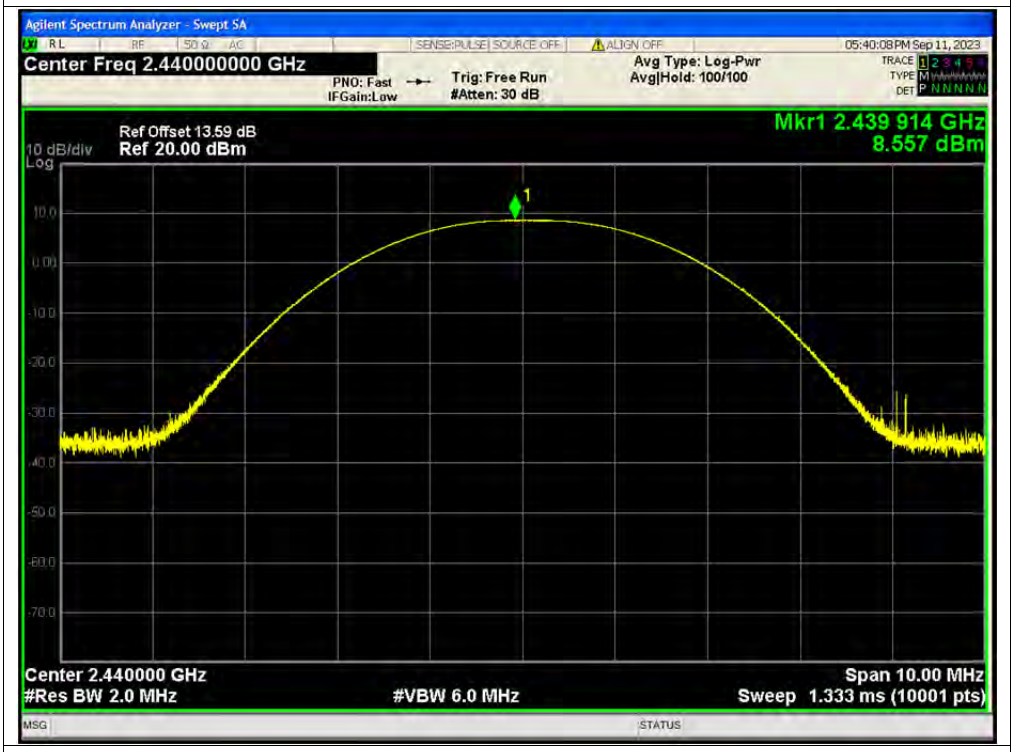


Peak Power NVNT LORA_1600KHz 2476MHz Ant1



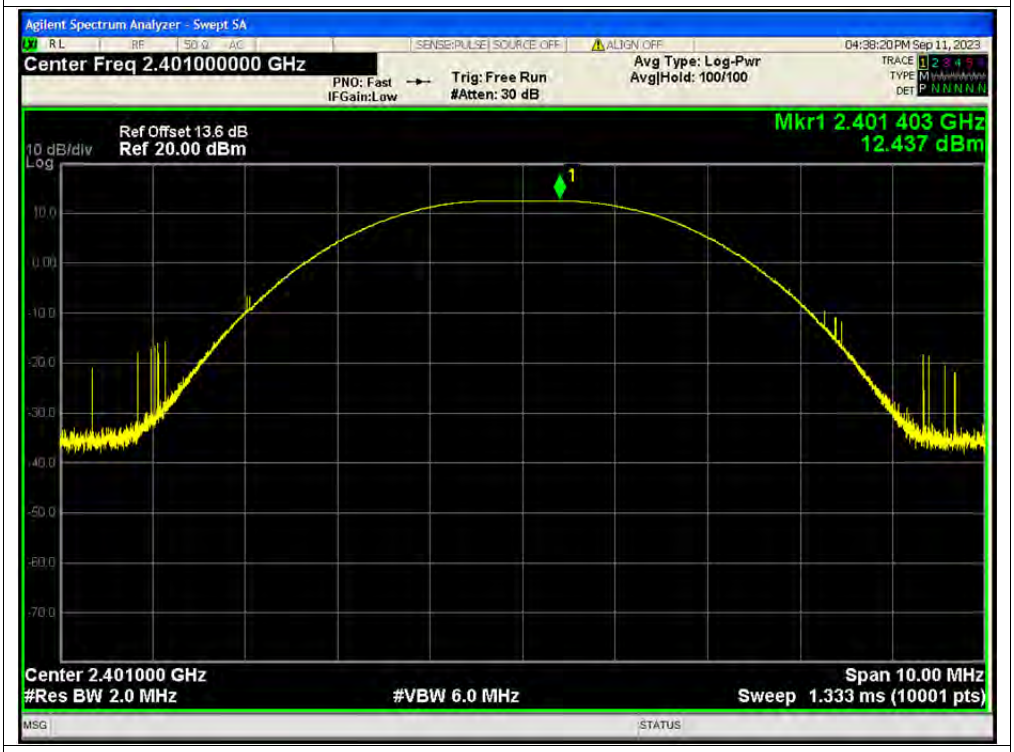

Peak Power NVNT LORA_400KHz 2401MHz Ant1

Peak Power NVNT LORA_400KHz 2440MHz Ant1

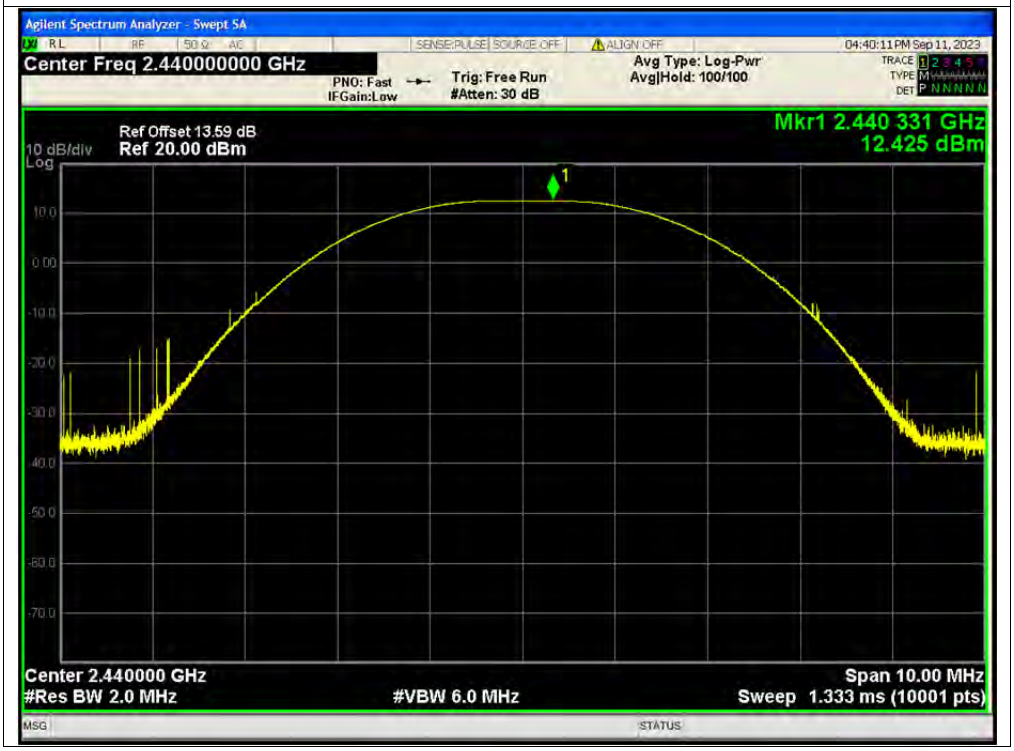


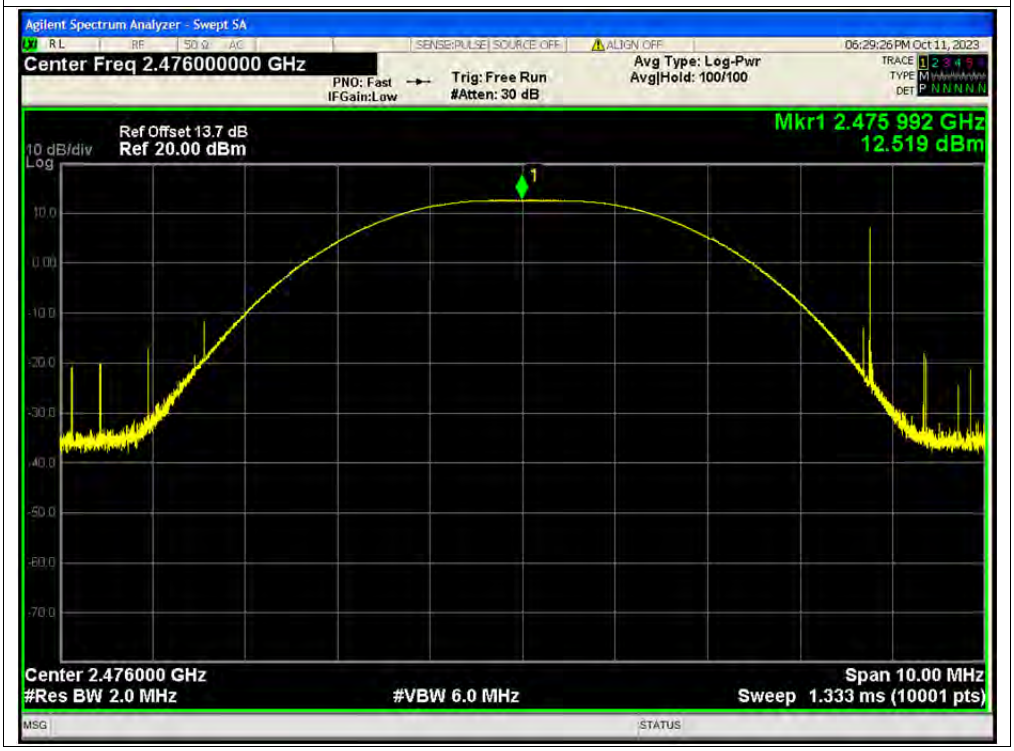

Peak Power NVNT LORA_400KHz 2476MHz Ant1

Peak Power NVNT LORA_800KHz 2401MHz Ant1




Peak Power NVNT LORA_800KHz 2440MHz Ant1

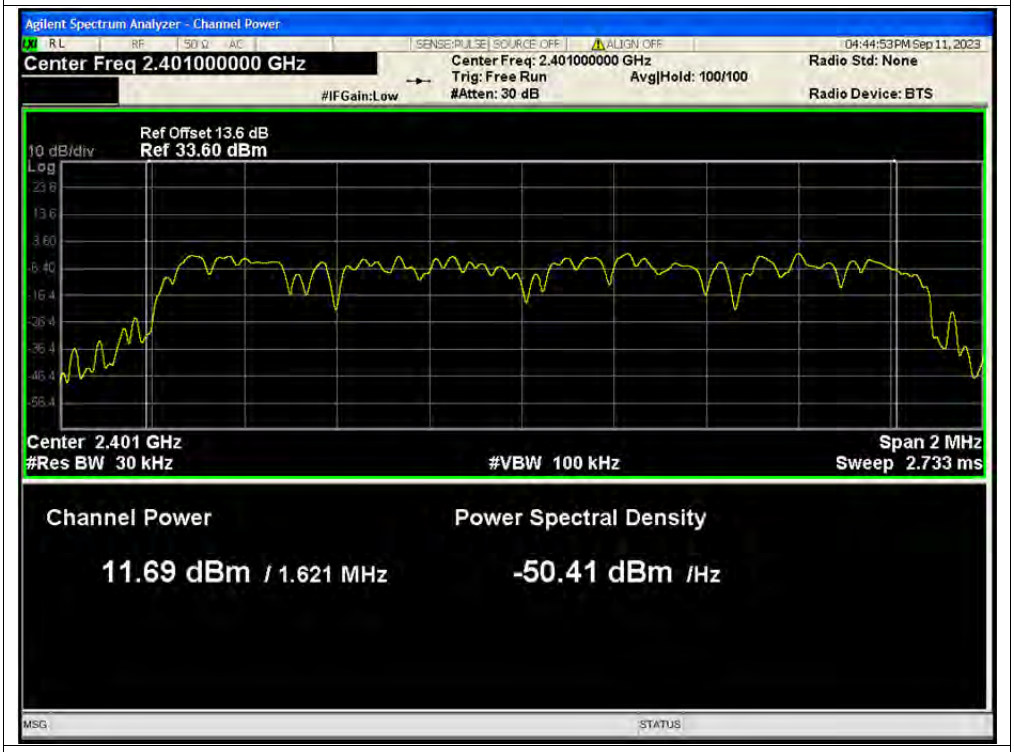


| Peak Power NVNT LORA_800KHz 2476MHz Ant1 |
| --- |
|  |

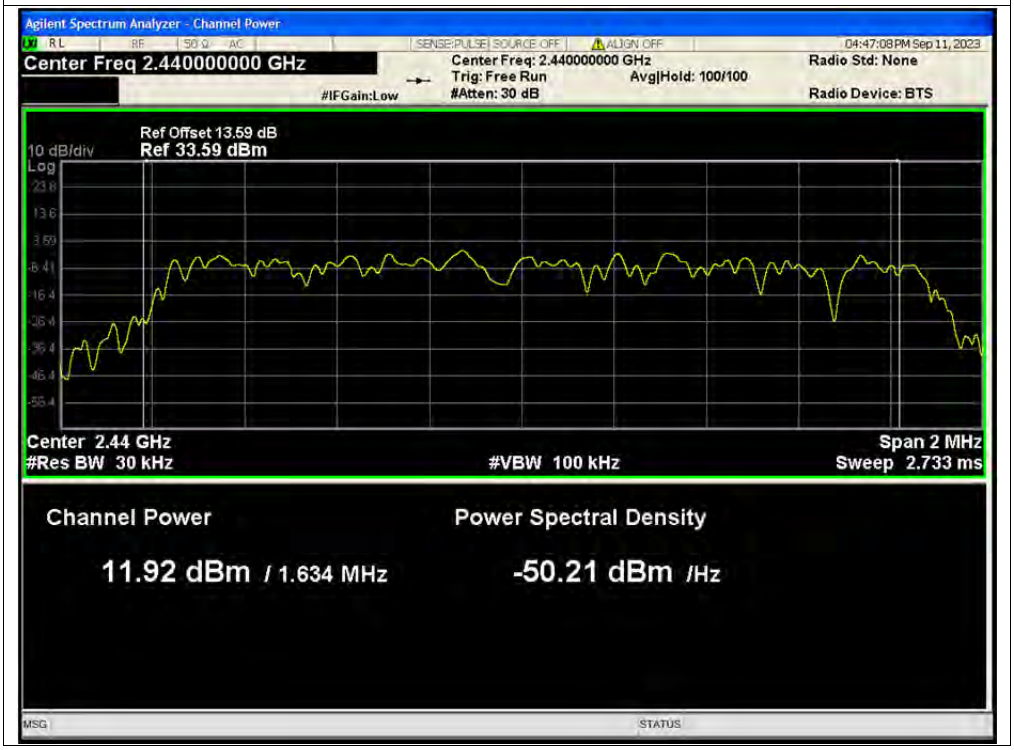
## A.3. Maximum Average Conducted Output Power

| Condition | Modulation | Bandwidth (KHz) | Frequency (MHz) | Antenna | Power (dBm) | Duty Factor (dB) | Total Power (dBm) | Total Power (W) | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|
| NVNT | LORA | 1600 | 2401 | Ant1 | 11.69 | 0 | 11.69 | 0.01476 | 30 | Pass |
| NVNT | LORA | 1600 | 2440 | Ant1 | 11.92 | 0 | 11.92 | 0.01556 | 30 | Pass |
| NVNT | LORA | 1600 | 2476 | Ant1 | 12.17 | 0 | 12.17 | 0.01648 | 30 | Pass |
| NVNT | LORA | 400 | 2401 | Ant1 | 7.92 | 0 | 7.92 | 0.00619 | 30 | Pass |
| NVNT | LORA | 400 | 2440 | Ant1 | 7.85 | 0 | 7.85 | 0.0061 | 30 | Pass |
| NVNT | LORA | 400 | 2476 | Ant1 | 8.03 | 0 | 8.03 | 0.00635 | 30 | Pass |
| NVNT | LORA | 800 | 2401 | Ant1 | 11.65 | 0 | 11.65 | 0.01462 | 30 | Pass |
| NVNT | LORA | 800 | 2440 | Ant1 | 11.56 | 0 | 11.56 | 0.01432 | 30 | Pass |
| NVNT | LORA | 800 | 2476 | Ant1 | 12.08 | 0 | 12.08 | 0.01614 | 30 | Pass |

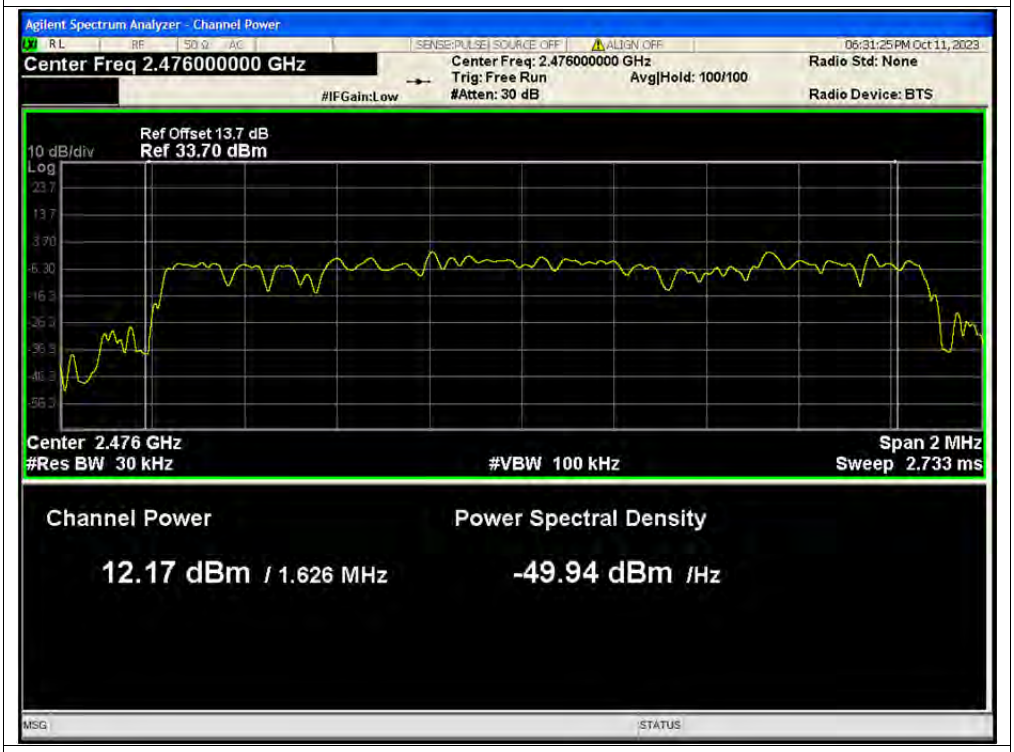
| Test Graphs |
| --- |
| Average Power NVNT LORA_1600KHz 2401MHz Ant1 |



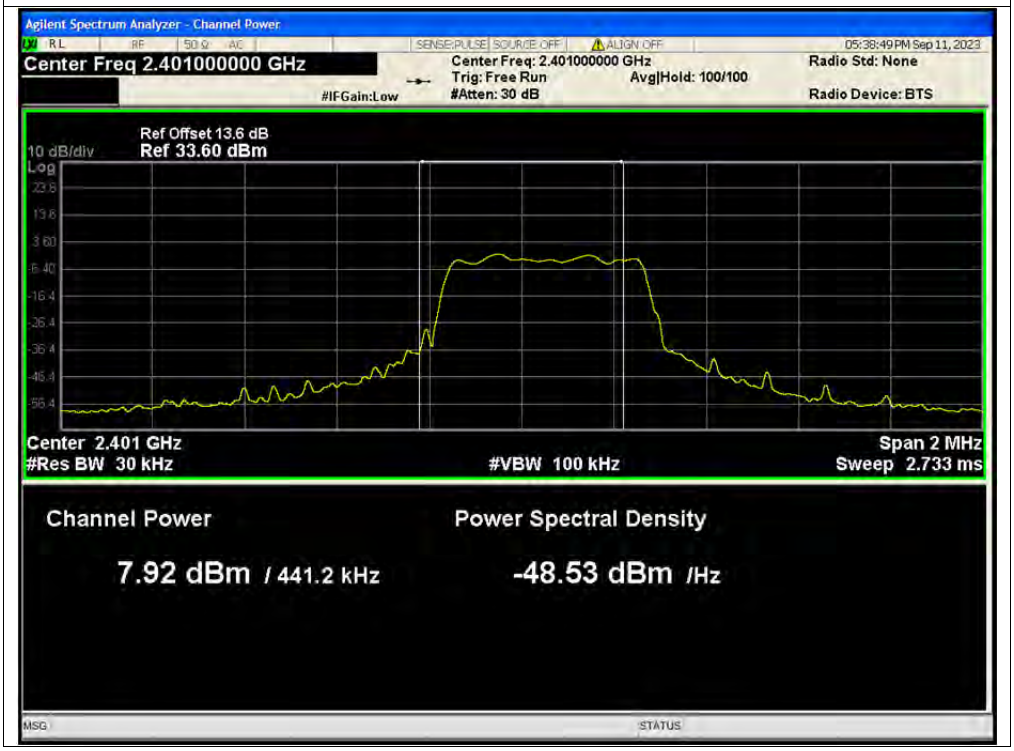

| Average Power NVNT LORA_1600KHz 2440MHz Ant1 |
| --- |



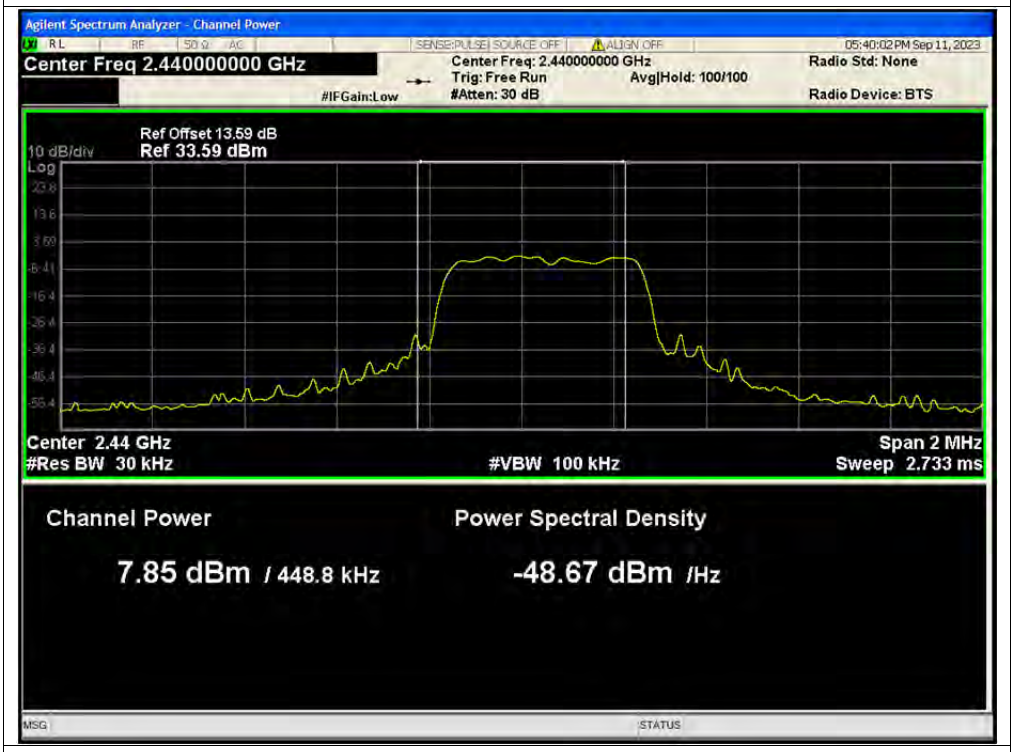
Average Power NVNT LORA_1600KHz 2476MHz Ant1



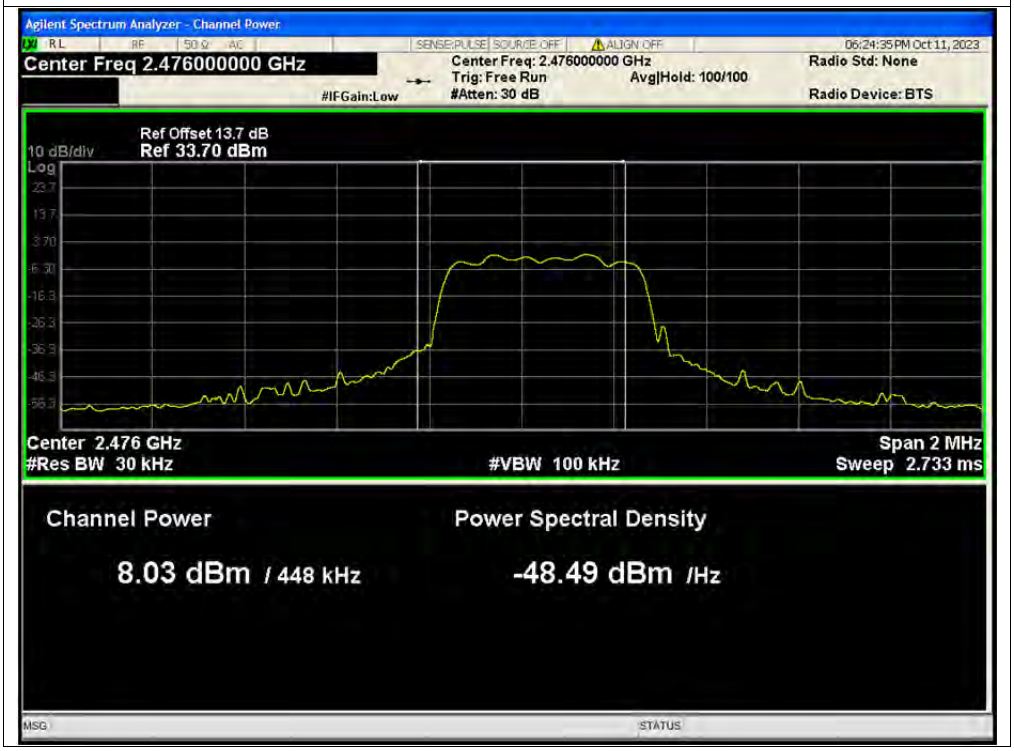

Average Power NVNT LORA_400KHz 2401MHz Ant1



Average Power NVNT LORA_400KHz 2440MHz Ant1

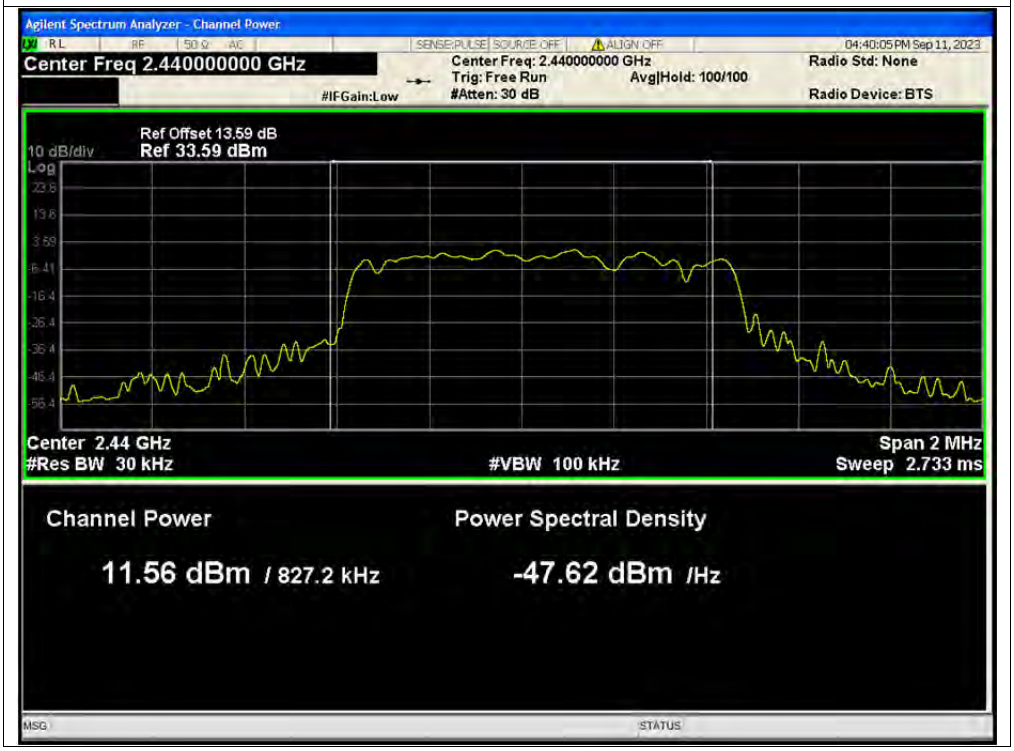


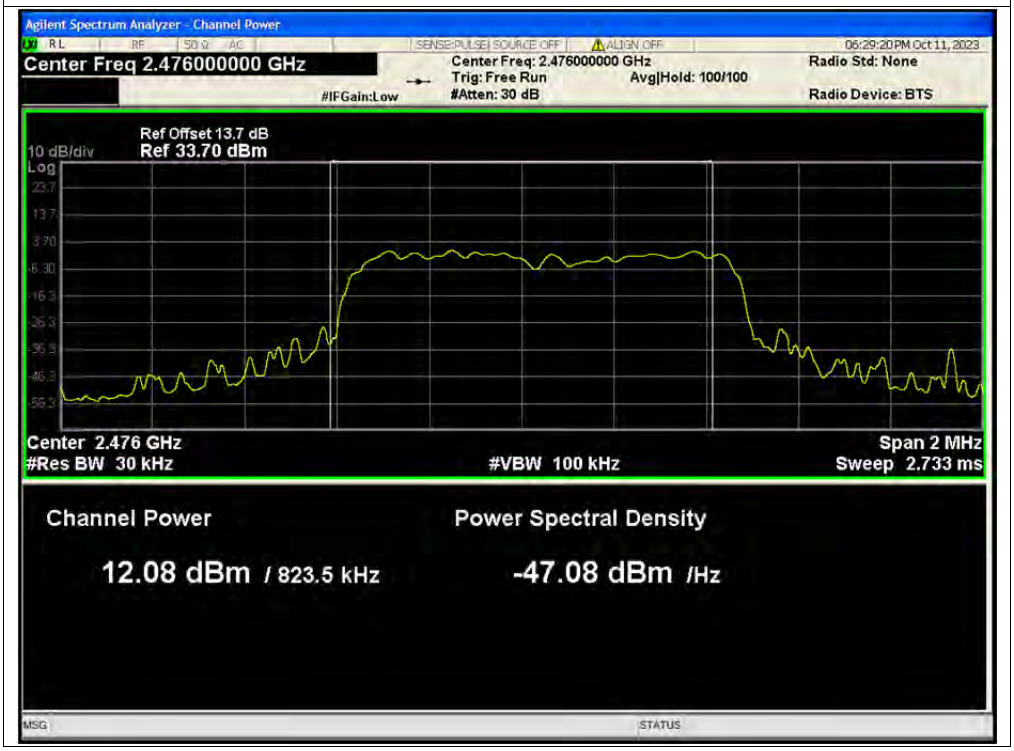

Average Power NVNT LORA_400KHz 2476MHz Ant1



Average Power NVNT LORA_800KHz 2401MHz Ant1


Average Power NVNT LORA_800KHz 2440MHz Ant1

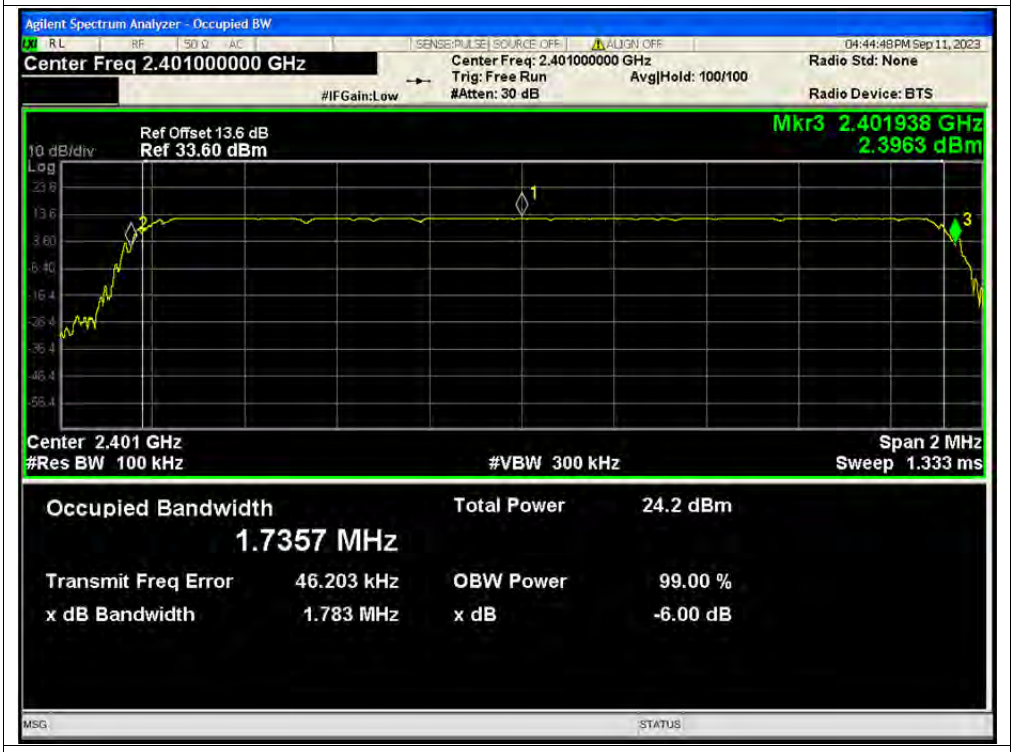


| Average Power NVNT LORA_800KHz 2476MHz Ant1 |
|---|
|  |

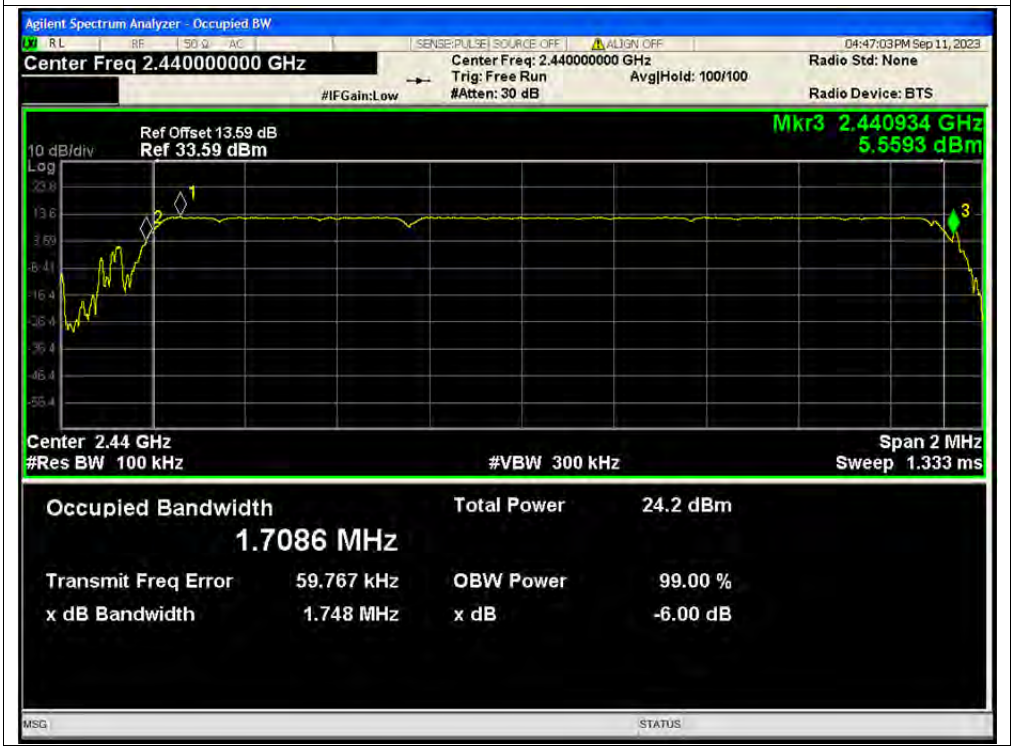
## A.4. 6 dB Bandwidth

| Condition | Modulation | Bandwidth (KHz) | Frequency (MHz) | Antenna | -6 dB Bandwidth (MHz) | Limit -6 dB Bandwidth (MHz) | Verdict |
|---|---|---|---|---|---|---|---|
| NVNT | LORA | 1600 | 2401 | Ant1 | 1.783 | 0.5 | Pass |
| NVNT | LORA | 1600 | 2440 | Ant1 | 1.748 | 0.5 | Pass |
| NVNT | LORA | 1600 | 2476 | Ant1 | 1.744 | 0.5 | Pass |
| NVNT | LORA | 400 | 2401 | Ant1 | 0.533 | 0.5 | Pass |
| NVNT | LORA | 400 | 2440 | Ant1 | 0.53 | 0.5 | Pass |
| NVNT | LORA | 400 | 2476 | Ant1 | 0.538 | 0.5 | Pass |
| NVNT | LORA | 800 | 2401 | Ant1 | 0.935 | 0.5 | Pass |
| NVNT | LORA | 800 | 2440 | Ant1 | 0.955 | 0.5 | Pass |
| NVNT | LORA | 800 | 2476 | Ant1 | 0.946 | 0.5 | Pass |

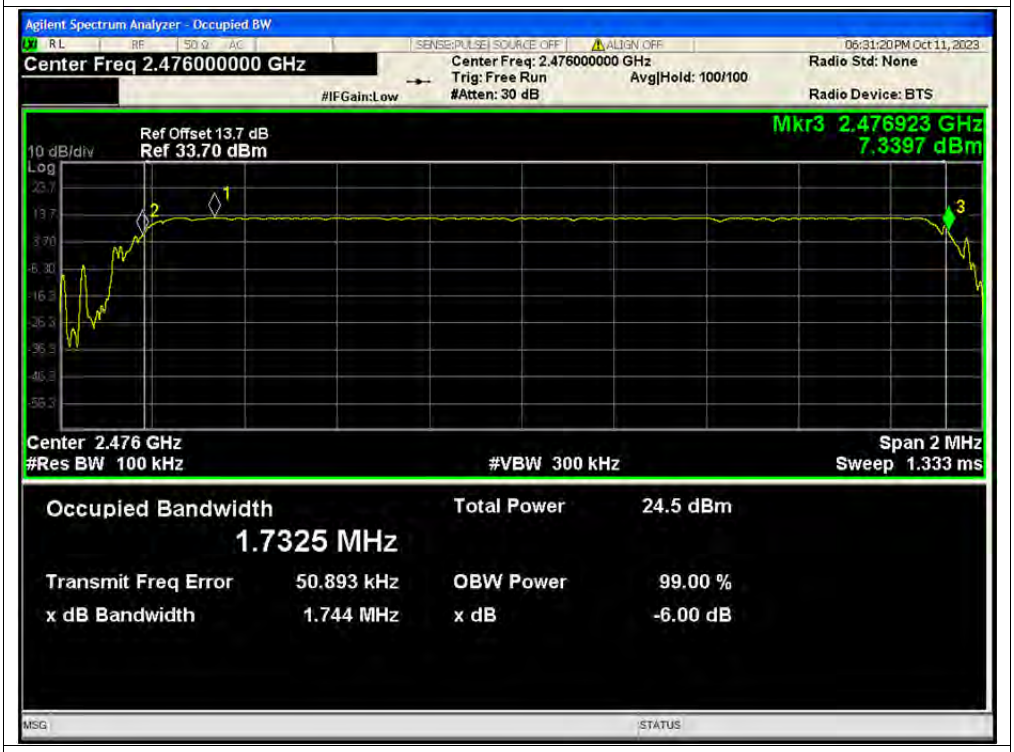
| Test Graphs |
| --- |
| -6dB Bandwidth NVNT LORA_1600KHz 2401MHz Ant1 |




| -6dB Bandwidth NVNT LORA_1600KHz 2440MHz Ant1 |
| --- |

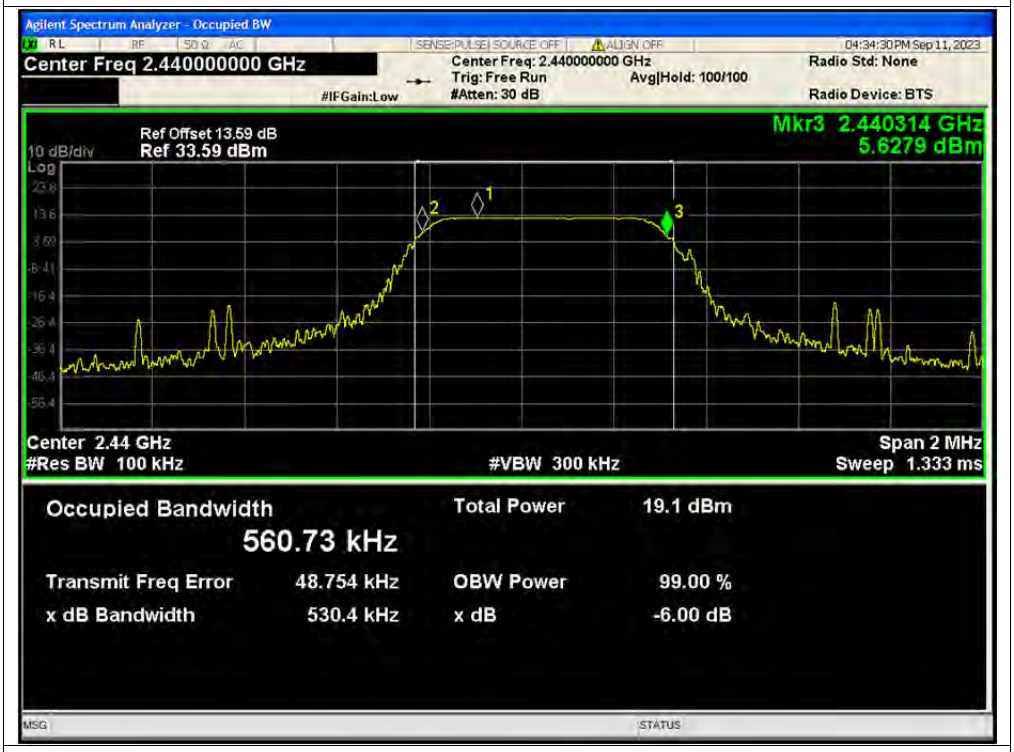


-6dB Bandwidth NVNT LORA_1600KHz 2476MHz Ant1

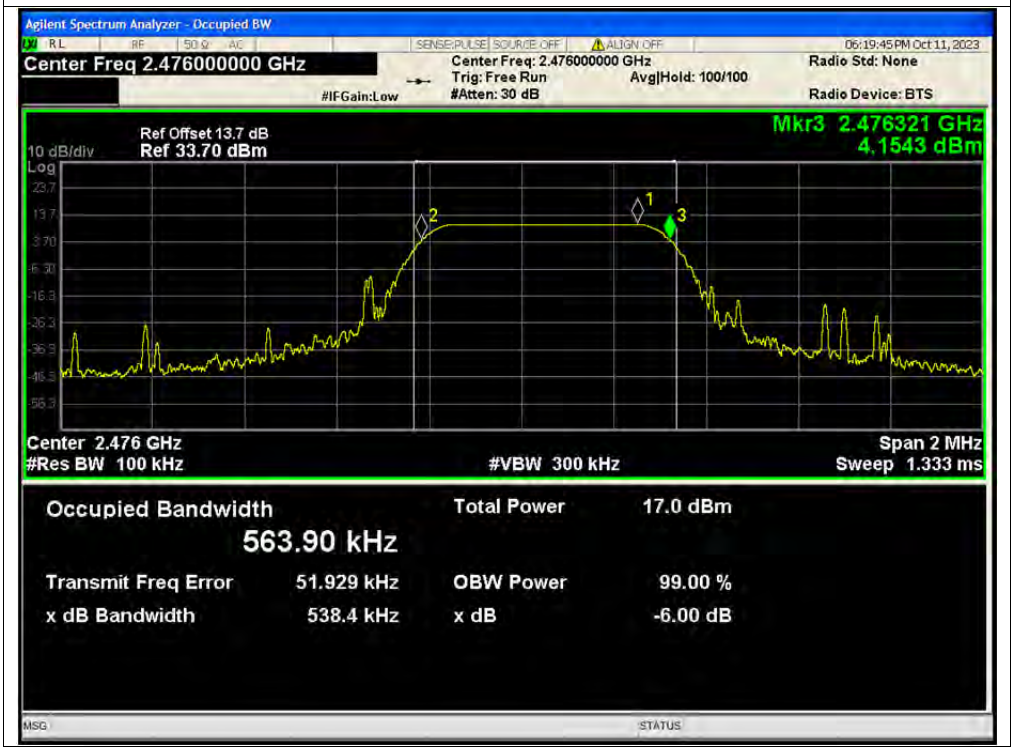



-6dB Bandwidth NVNT LORA_400KHz 2401MHz Ant1

-6dB Bandwidth NVNT LORA_400KHz 2440MHz Ant1



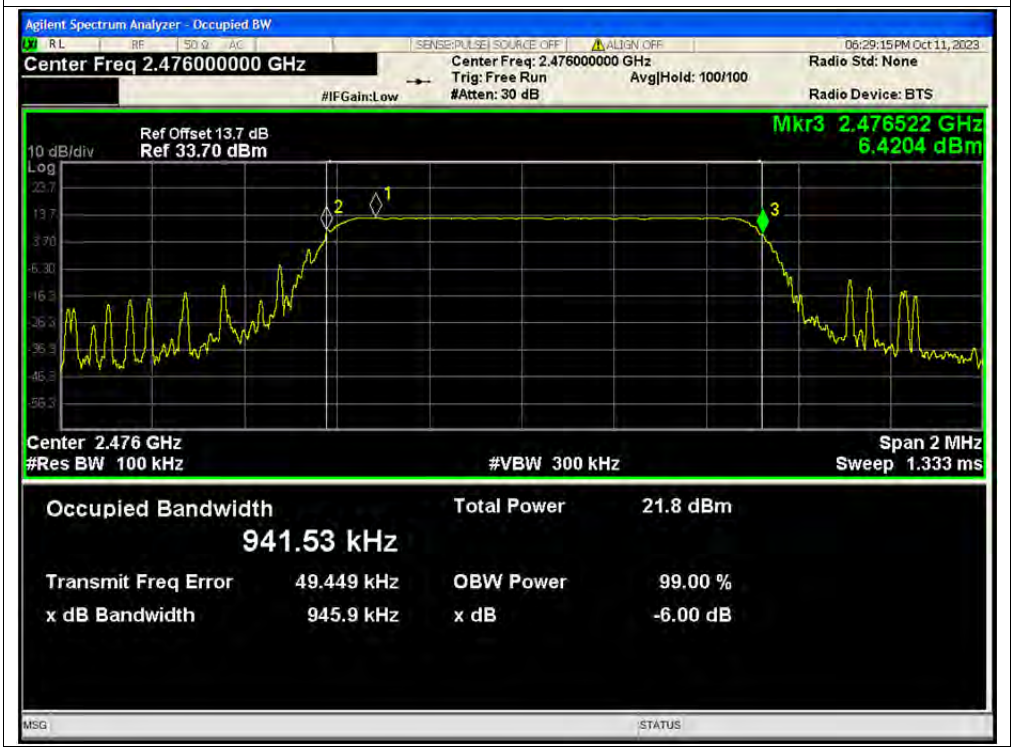

-6dB Bandwidth NVNT LORA_400KHz 2476MHz Ant1



-6dB Bandwidth NVNT LORA_800KHz 2401MHz Ant1


-6dB Bandwidth NVNT LORA_800KHz 2440MHz Ant1

-6dB Bandwidth NVNT LORA_800KHz 2476MHz Ant1



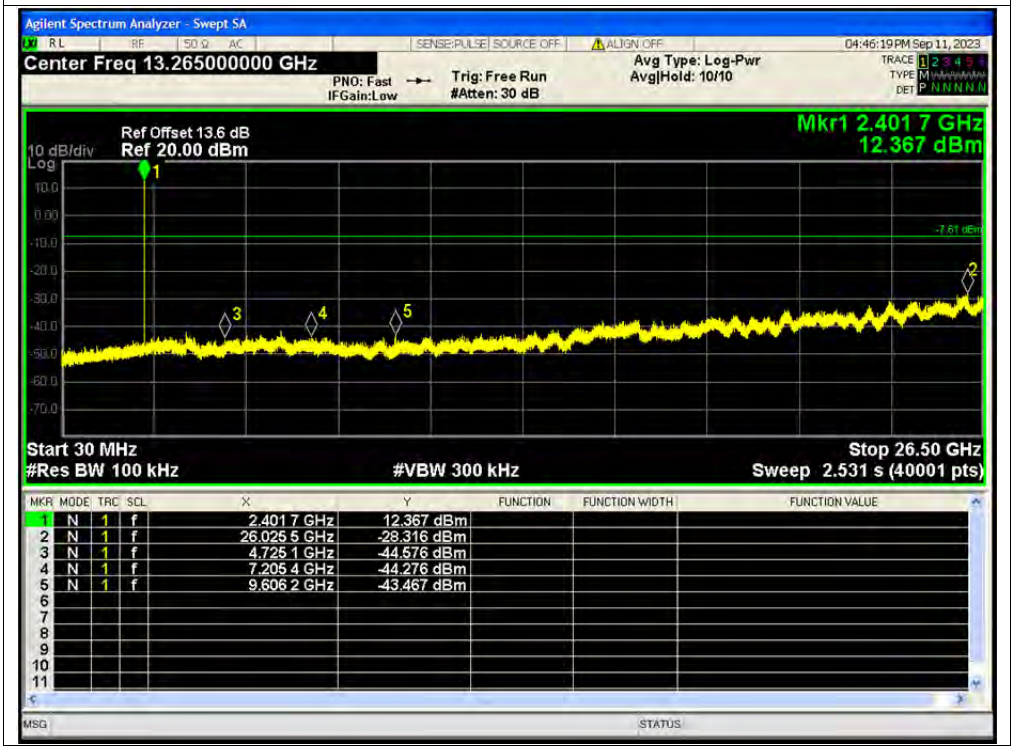
## A.5. Conducted Spurious Emissions

| Condition | Modulation | Bandwidth (KHz) | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|---|---|---|---|---|---|---|---|
| NVNT | LORA | 1600 | 2401 | Ant1 | -40.7 | -20 | Pass |
| NVNT | LORA | 1600 | 2440 | Ant1 | -40.56 | -20 | Pass |
| NVNT | LORA | 1600 | 2476 | Ant1 | -40.85 | -20 | Pass |
| NVNT | LORA | 400 | 2401 | Ant1 | -40.84 | -20 | Pass |
| NVNT | LORA | 400 | 2440 | Ant1 | -39.77 | -20 | Pass |
| NVNT | LORA | 400 | 2476 | Ant1 | -36.52 | -20 | Pass |
| NVNT | LORA | 800 | 2401 | Ant1 | -40.44 | -20 | Pass |
| NVNT | LORA | 800 | 2440 | Ant1 | -41.1 | -20 | Pass |
| NVNT | LORA | 800 | 2476 | Ant1 | -40.02 | -20 | Pass |

Test Graphs

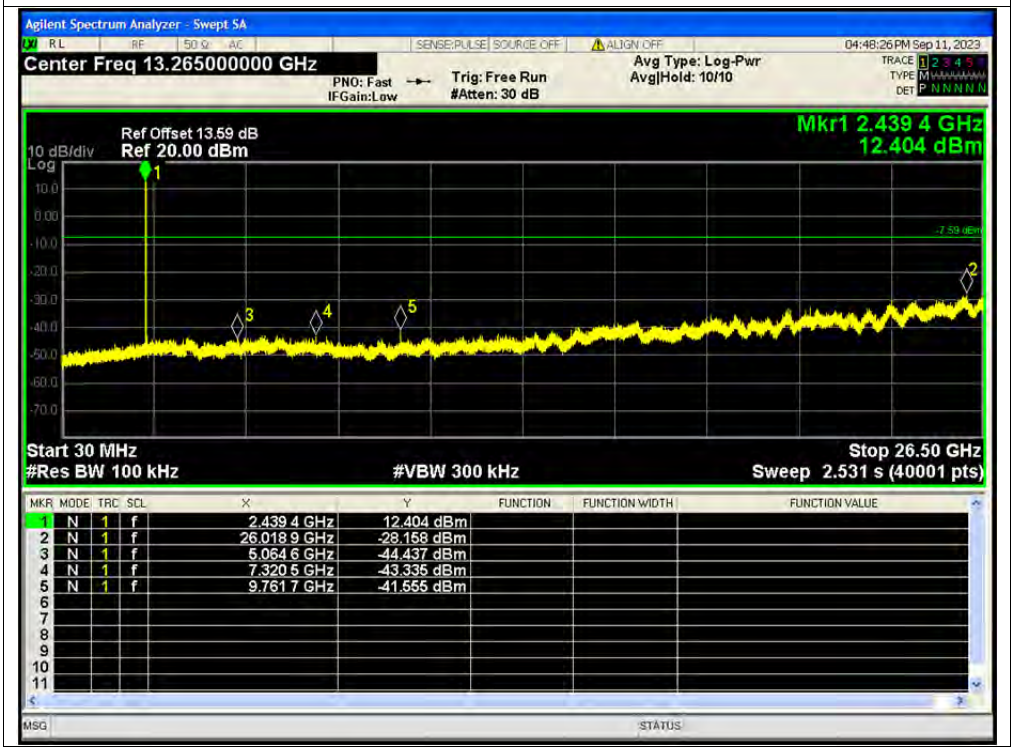
Tx. Spurious NVNT LORA_1600KHz 2401MHz Ant1 Ref


Tx. Spurious NVNT LORA_1600KHz 2401MHz Ant1 Emission



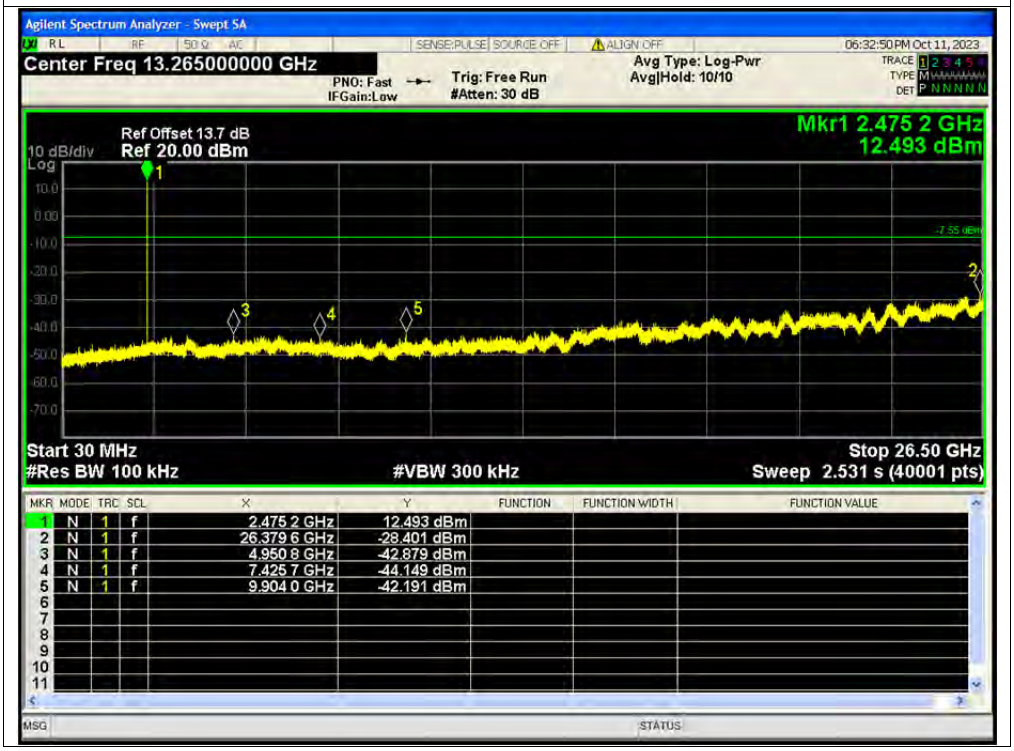
Tx. Spurious NVNT LORA_1600KHz 2440MHz Ant1 Ref


Tx. Spurious NVNT LORA_1600KHz 2440MHz Ant1 Emission



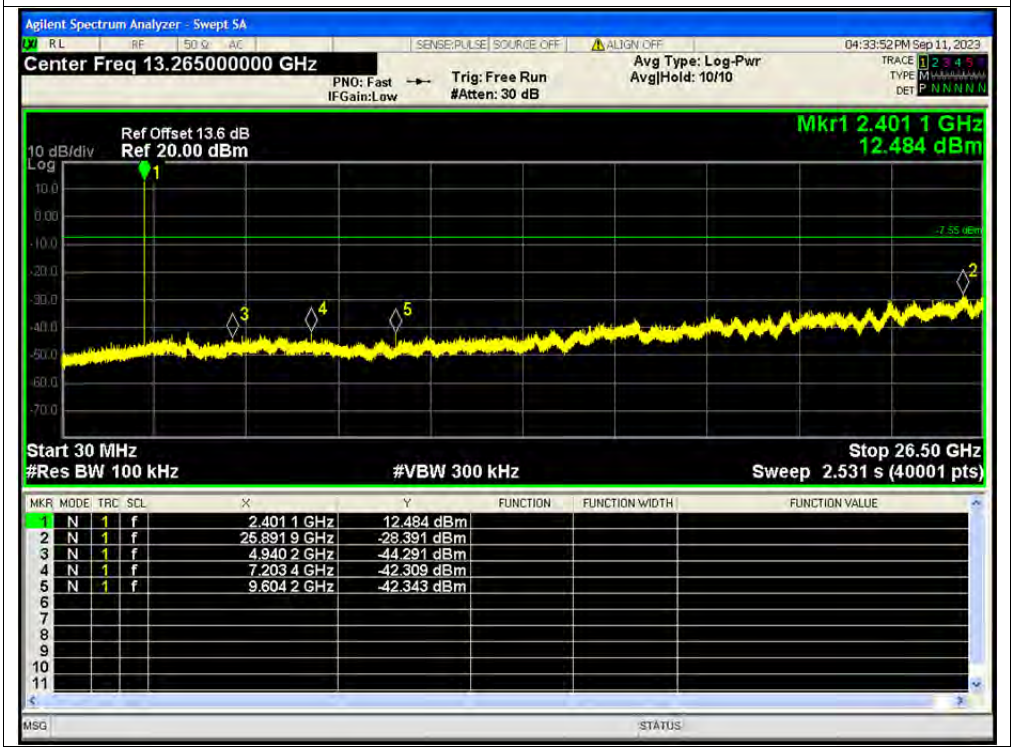
Tx. Spurious NVNT LORA_1600KHz 2476MHz Ant1 Ref


Tx. Spurious NVNT LORA_1600KHz 2476MHz Ant1 Emission

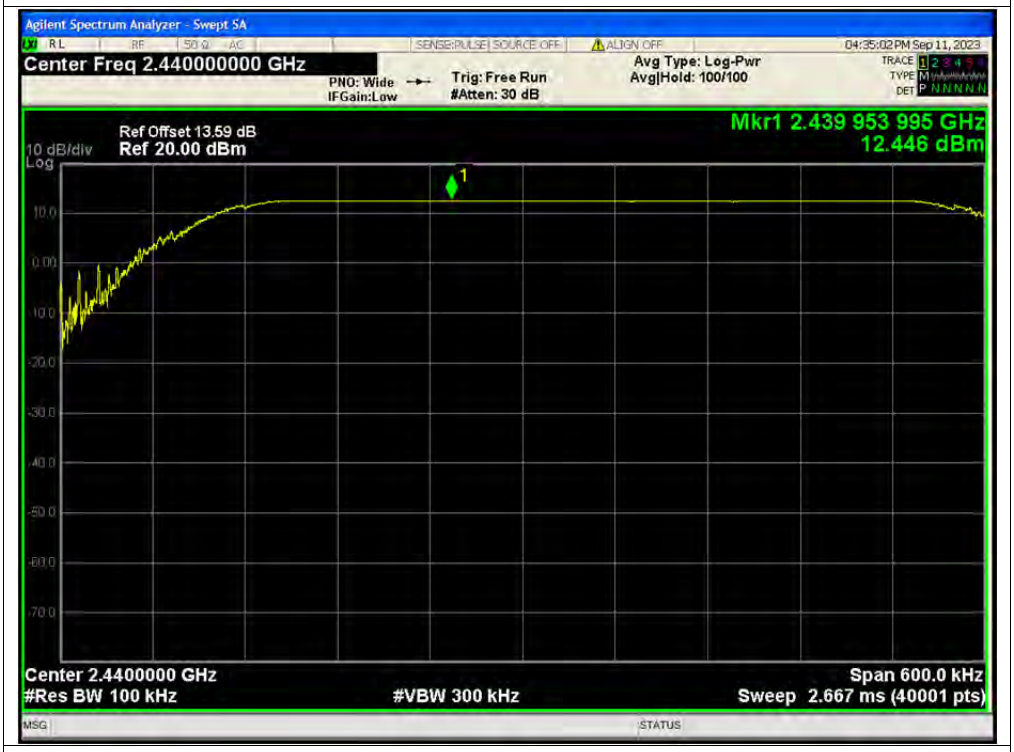


Tx. Spurious NVNT LORA_400KHz 2401MHz Ant1 Ref

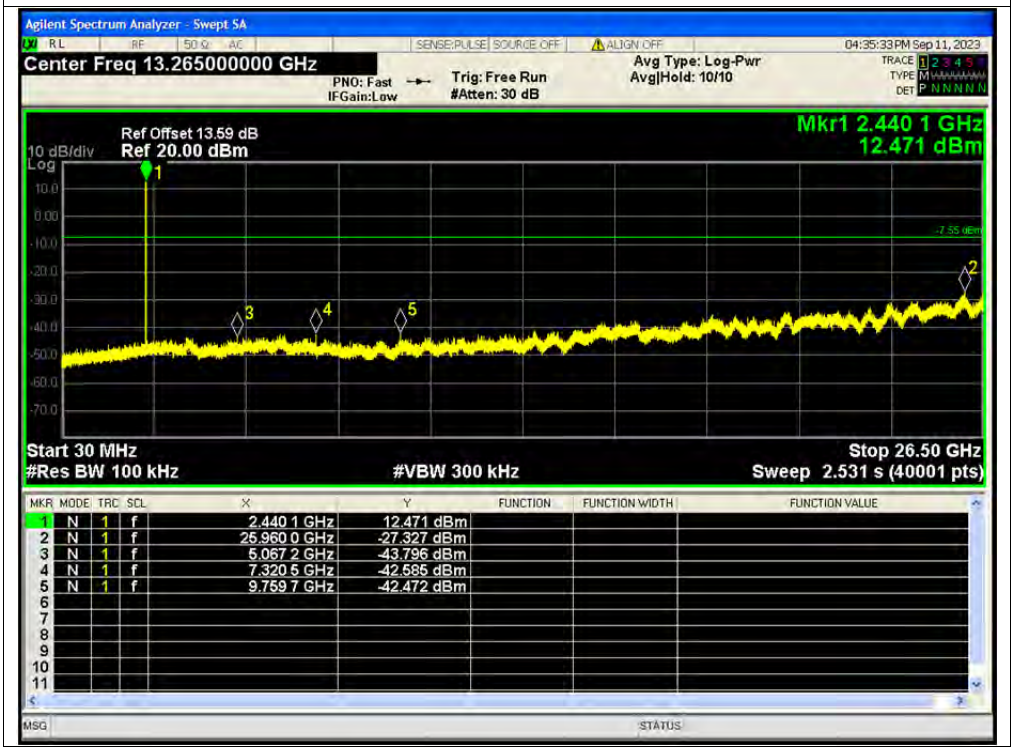

Tx. Spurious NVNT LORA_400KHz 2401MHz Ant1 Emission



Tx. Spurious NVNT LORA_400KHz 2440MHz Ant1 Ref

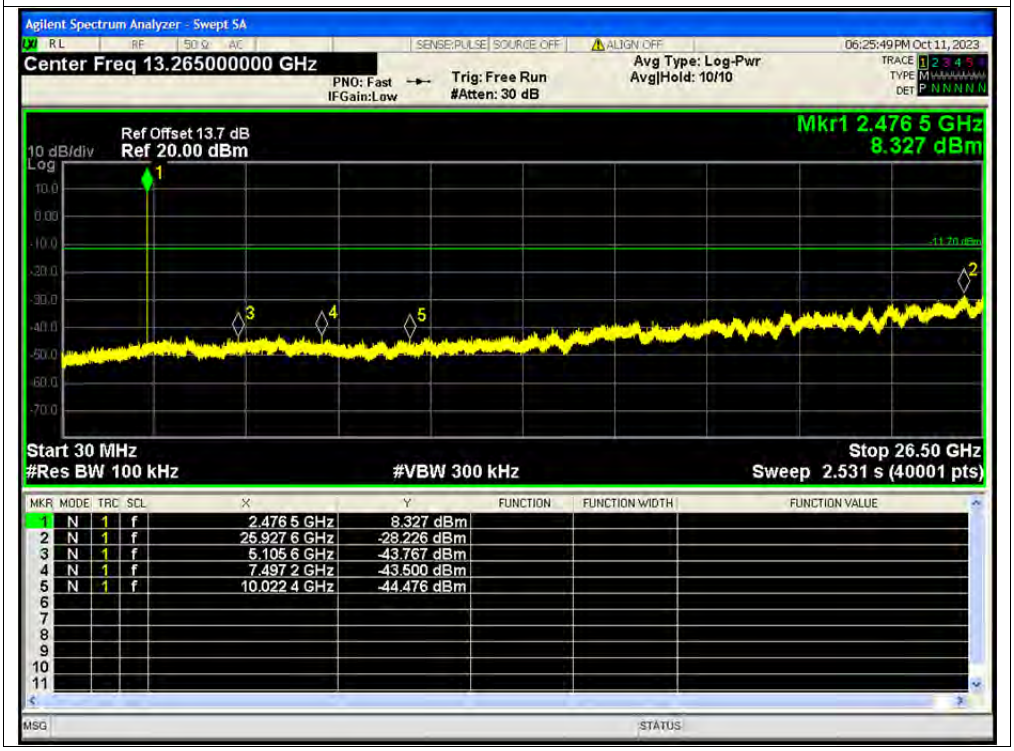



Tx. Spurious NVNT LORA_400KHz 2440MHz Ant1 Emission



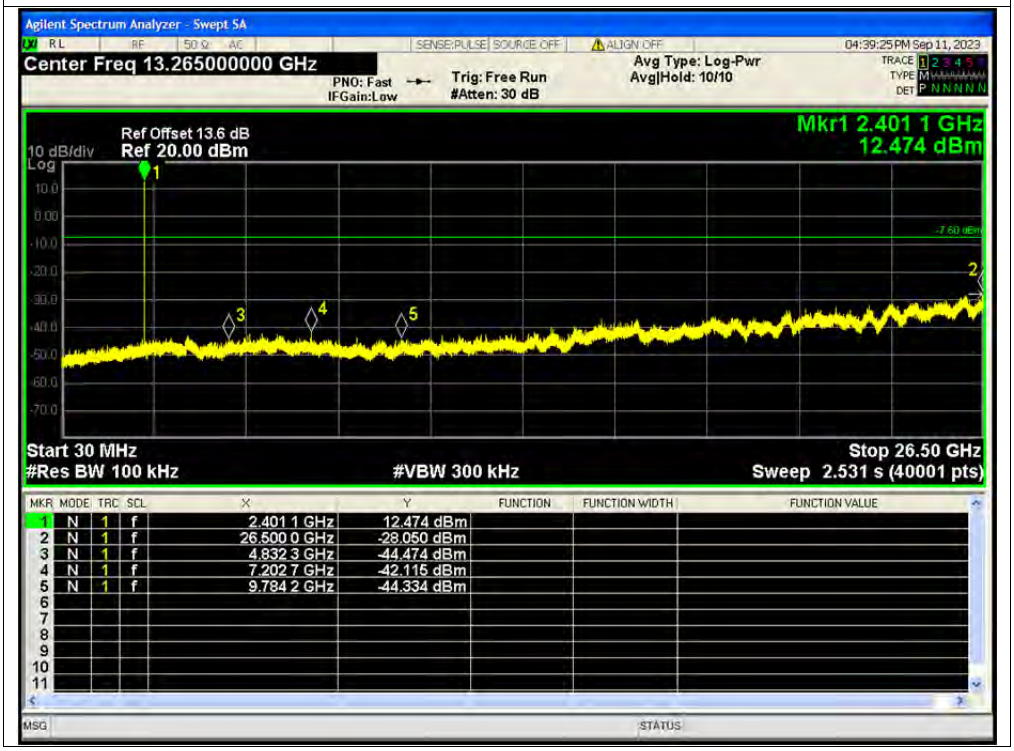
Tx. Spurious NVNT LORA_400KHz 2476MHz Ant1 Ref


Tx. Spurious NVNT LORA_400KHz 2476MHz Ant1 Emission



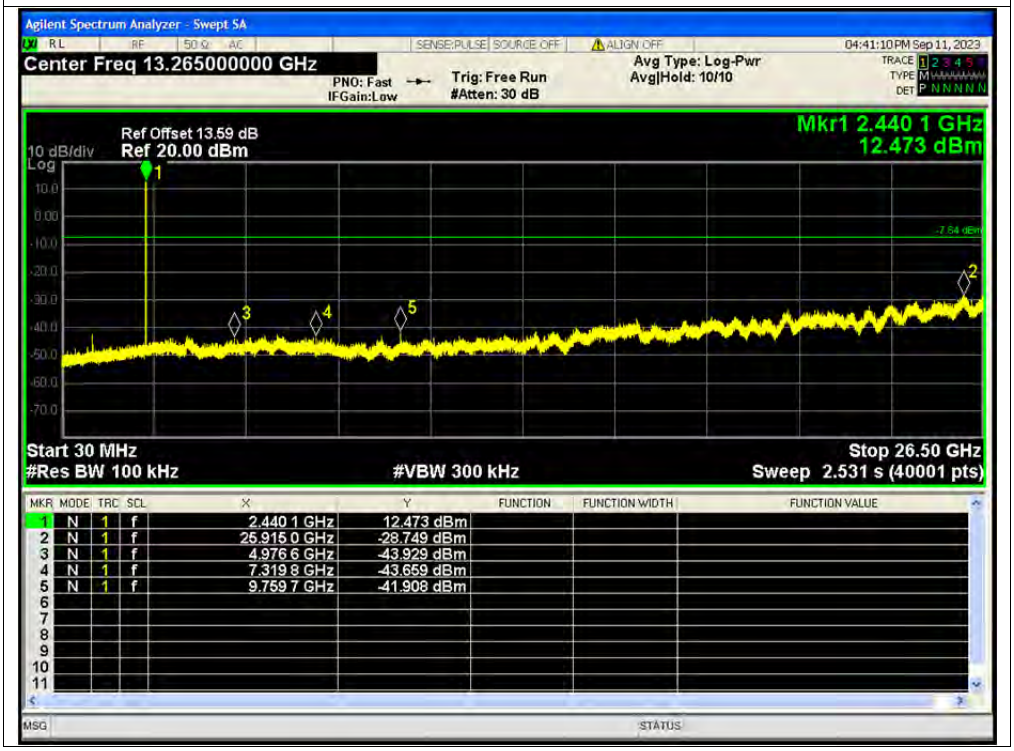
Tx. Spurious NVNT LORA_800KHz 2401MHz Ant1 Ref


Tx. Spurious NVNT LORA_800KHz 2401MHz Ant1 Emission



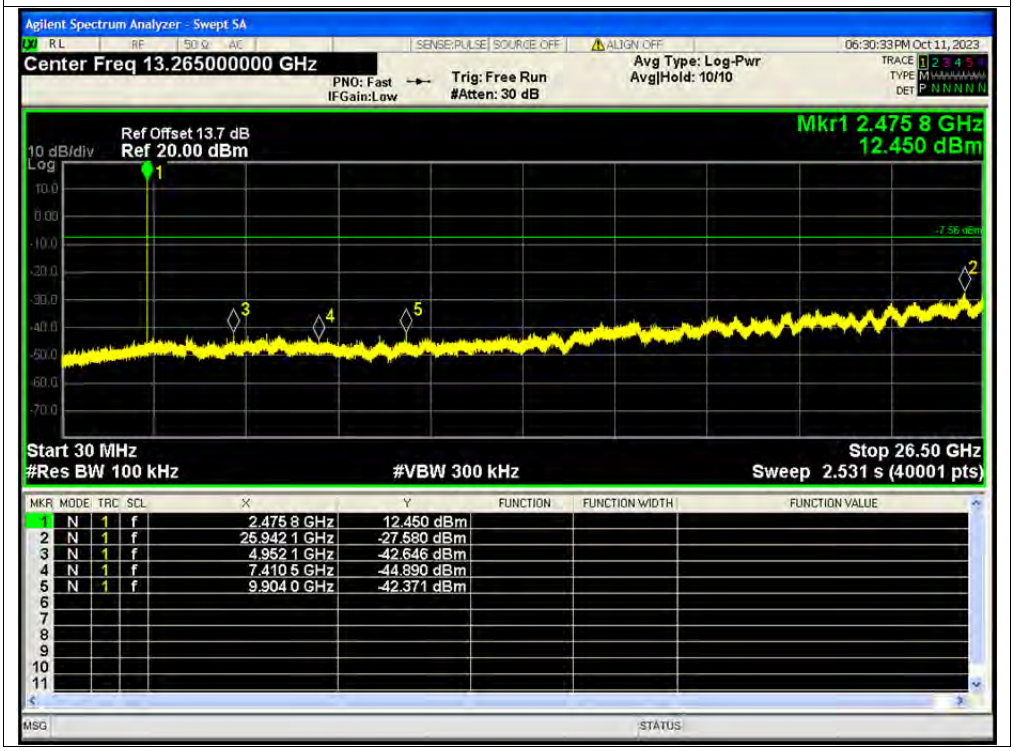
Tx. Spurious NVNT LORA_800KHz 2440MHz Ant1 Ref


Tx. Spurious NVNT LORA_800KHz 2440MHz Ant1 Emission



Tx. Spurious NVNT LORA_800KHz 2476MHz Ant1 Ref


Tx. Spurious NVNT LORA_800KHz 2476MHz Ant1 Emission

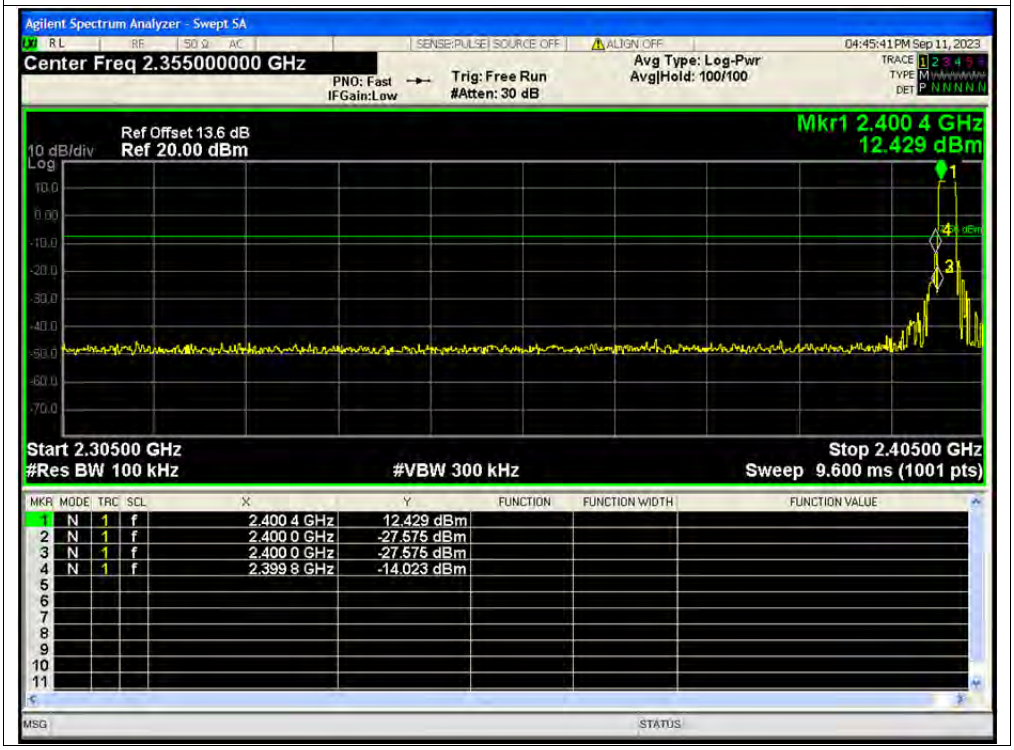


## A.6. Band Edge

| Condition | Modulation | Bandwidth (KHz) | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|---|---|---|---|---|---|---|---|
| NVNT | LORA | 1600 | 2401 | Ant1 | -26.46 | -20 | Pass |
| NVNT | LORA | 1600 | 2476 | Ant1 | -58.4 | -20 | Pass |
| NVNT | LORA | 400 | 2401 | Ant1 | -46.89 | -20 | Pass |
| NVNT | LORA | 400 | 2476 | Ant1 | -54.01 | -20 | Pass |
| NVNT | LORA | 800 | 2401 | Ant1 | -35.83 | -20 | Pass |
| NVNT | LORA | 800 | 2476 | Ant1 | -58.03 | -20 | Pass |

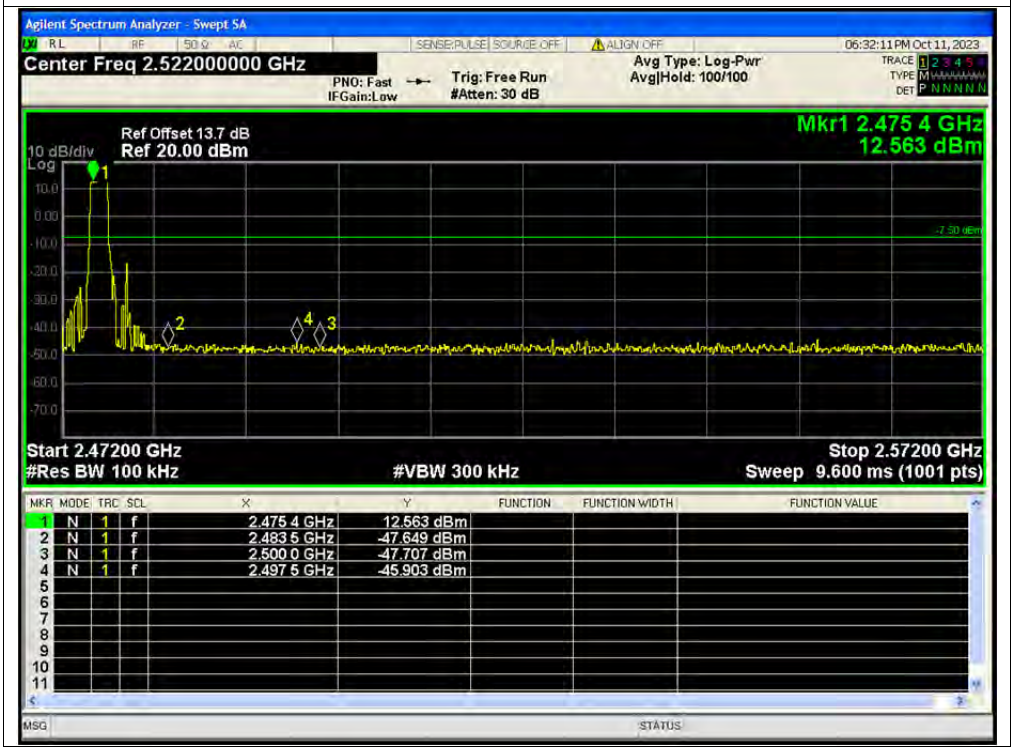
| Test Graphs |
| --- |
| Band Edge NVNT LORA_1600KHz 2401MHz Ant1 Ref |


| Band Edge NVNT LORA_1600KHz 2401MHz Ant1 Emission |
| --- |

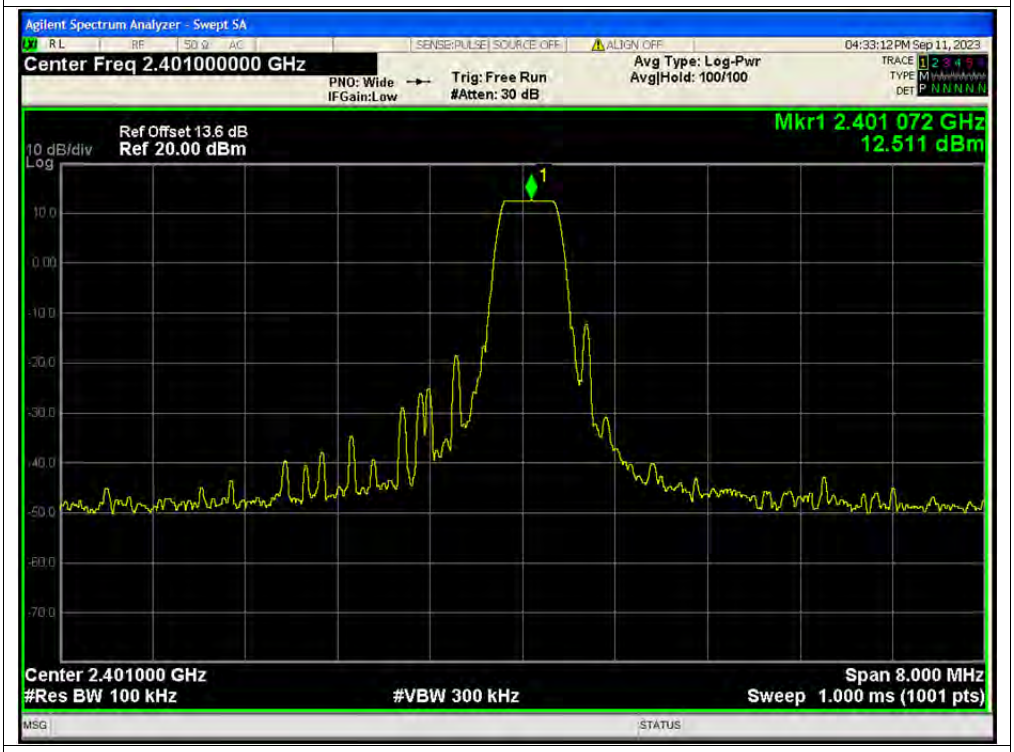


Band Edge NVNT LORA_1600KHz 2476MHz Ant1 Ref

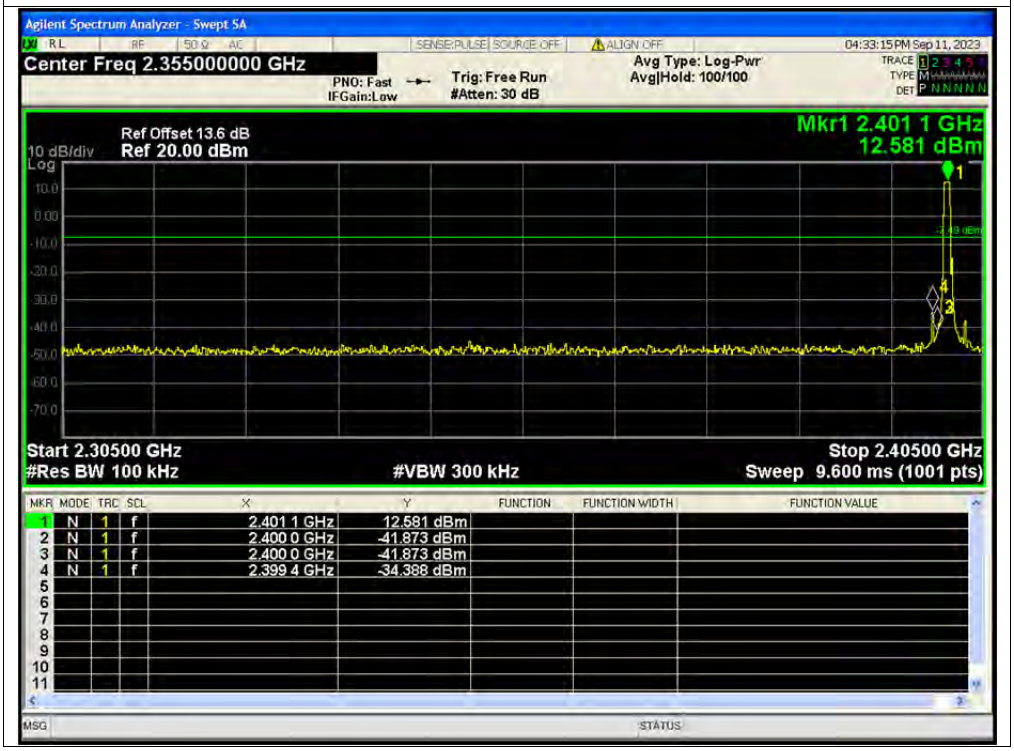

Band Edge NVNT LORA_1600KHz 2476MHz Ant1 Emission



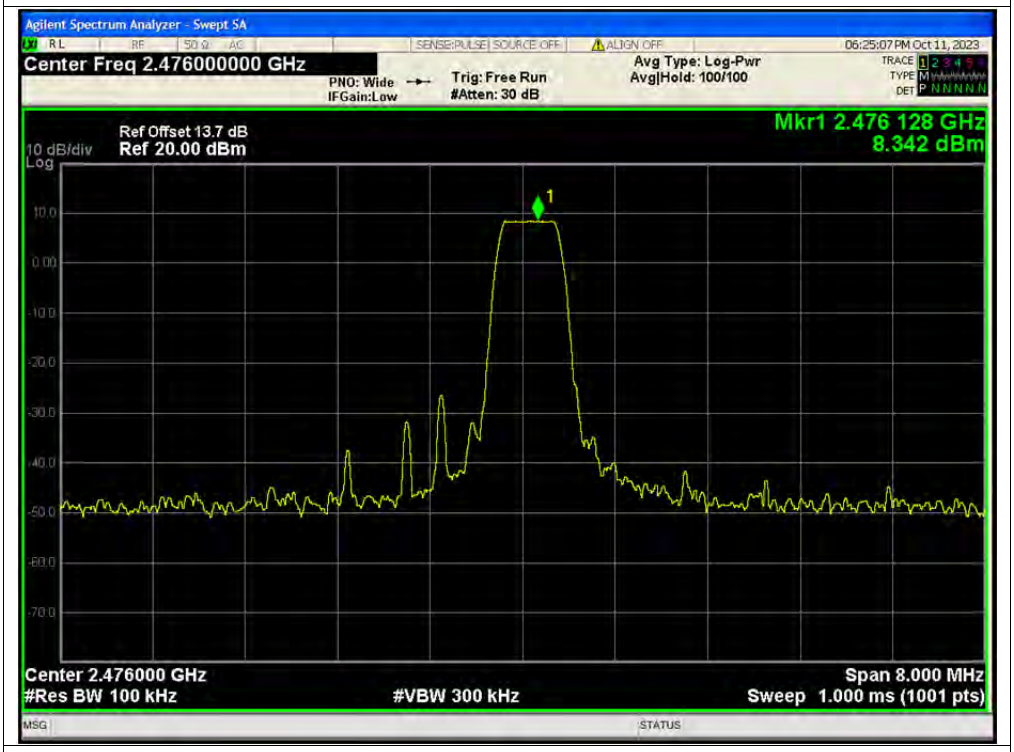
Band Edge NVNT LORA_400KHz 2401MHz Ant1 Ref



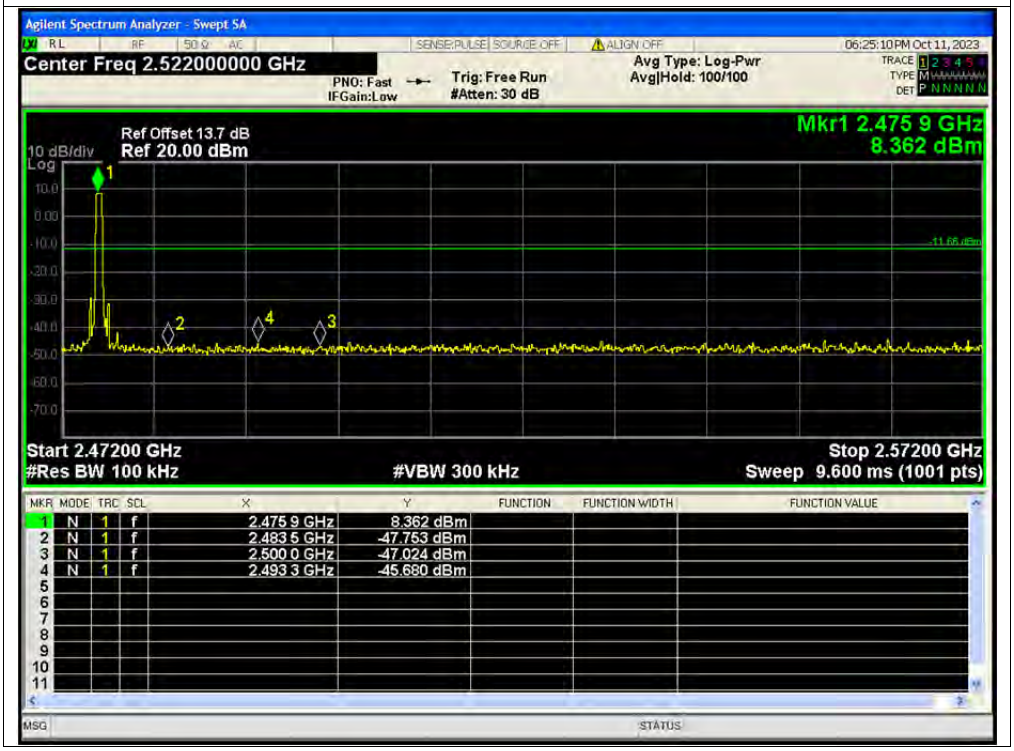

Band Edge NVNT LORA_400KHz 2401MHz Ant1 Emission



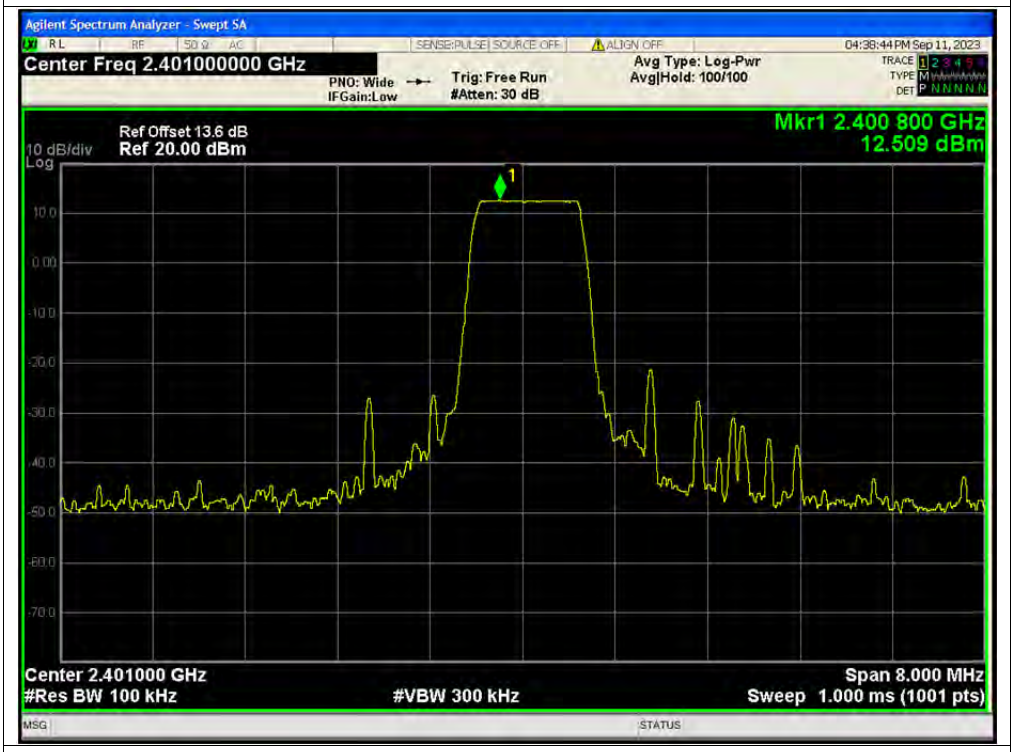
Band Edge NVNT LORA_400KHz 2476MHz Ant1 Ref



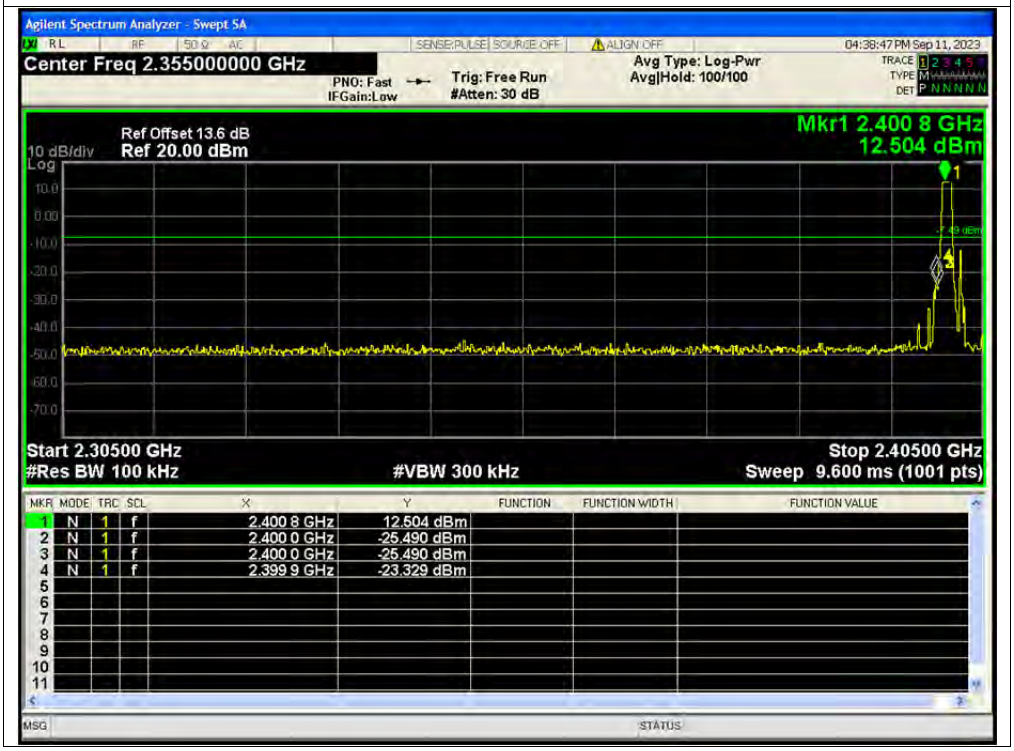

Band Edge NVNT LORA_400KHz 2476MHz Ant1 Emission



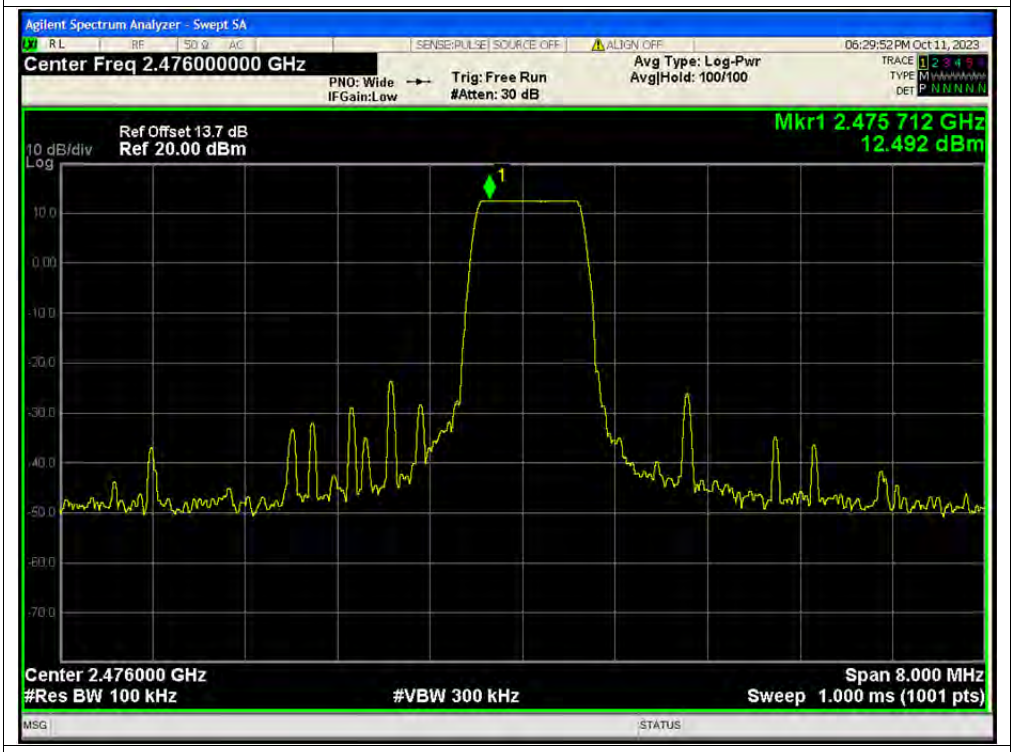
Band Edge NVNT LORA_800KHz 2401MHz Ant1 Ref



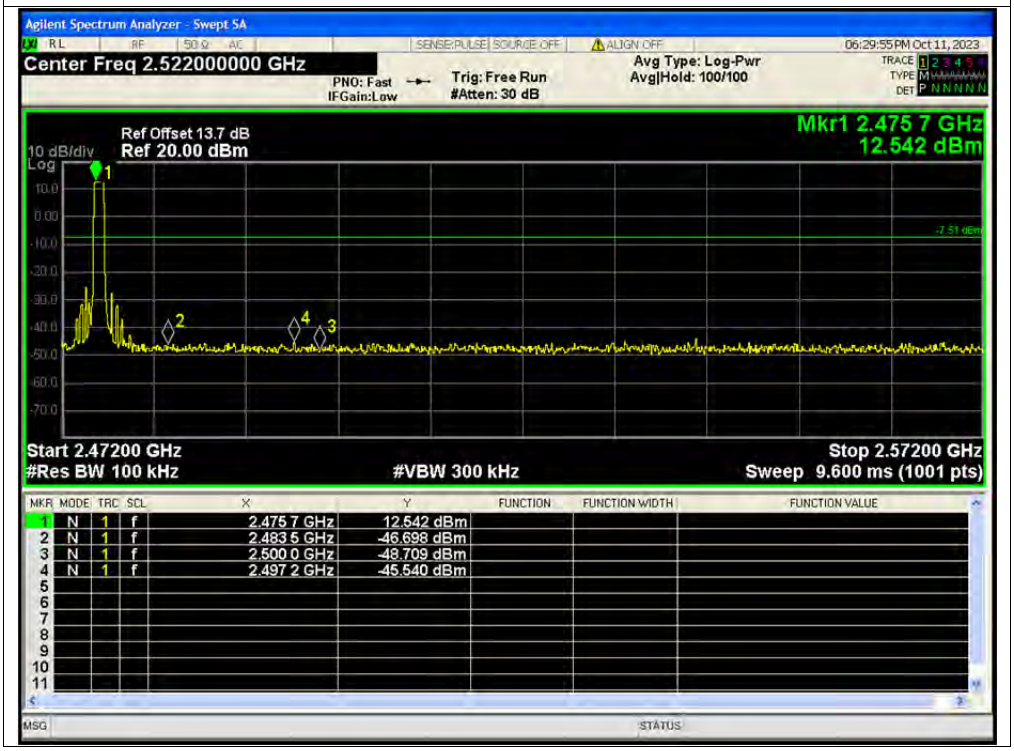

Band Edge NVNT LORA_800KHz 2401MHz Ant1 Emission



Band Edge NVNT LORA_800KHz 2476MHz Ant1 Ref




Band Edge NVNT LORA_800KHz 2476MHz Ant1 Emission



## A.7. Power Spectral Density

| Condition | Modulation | Bandwidth (KHz) | Frequency (MHz) | Antenna | Conducted PSD (dBm/3kHz) | Limit (dBm/3kHz) | Verdict |
|---|---|---|---|---|---|---|---|
| NVNT | LORA | 1600 | 2401 | Ant1 | 0.98 | 8 | Pass |
| NVNT | LORA | 1600 | 2440 | Ant1 | 1.06 | 8 | Pass |
| NVNT | LORA | 1600 | 2476 | Ant1 | 3.86 | 8 | Pass |
| NVNT | LORA | 400 | 2401 | Ant1 | 6.28 | 8 | Pass |
| NVNT | LORA | 400 | 2440 | Ant1 | 6.55 | 8 | Pass |
| NVNT | LORA | 400 | 2476 | Ant1 | 6.26 | 8 | Pass |
| NVNT | LORA | 800 | 2401 | Ant1 | 4.5 | 8 | Pass |
| NVNT | LORA | 800 | 2440 | Ant1 | 5.89 | 8 | Pass |
| NVNT | LORA | 800 | 2476 | Ant1 | 7.8 | 8 | Pass |

| Test Graphs |
| --- |
| PSD NVNT LORA_1600KHz 2401MHz Ant1 |


| PSD NVNT LORA_1600KHz 2440MHz Ant1 |
| --- |

PSD NVNT LORA_1600KHz 2476MHz Ant1


PSD NVNT LORA_400KHz 2401MHz Ant1

PSD NVNT LORA_400KHz 2440MHz Ant1


PSD NVNT LORA_400KHz 2476MHz Ant1

PSD NVNT LORA_800KHz 2401MHz Ant1


PSD NVNT LORA_800KHz 2440MHz Ant1

| PSD NVNT LORA_800KHz 2476MHz Ant1 |
| --- |
|  |

## A.8. Conducted Emission

The test case does not apply this kind of EUT. The LoRa function does not work when the device is connected to the AC power adapter, measurements to demonstrate compliance with the conducted limits are not required for devices which do not contain provisions for operation while connected to the AC power lines.

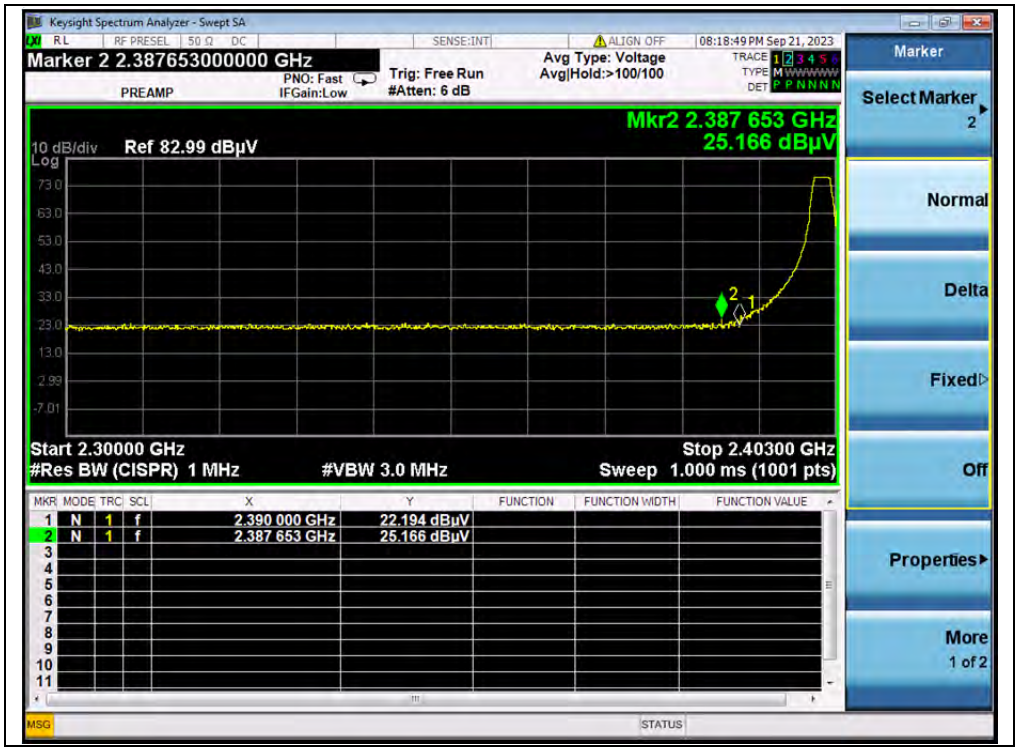
## A.9. Restricted Frequency Bands

The lowest and highest channels are tested to verify the Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] =$U_R$ + $A_T$ + $A_{Factor}$ [dB]; $A_T$ =$L_{Cable\ loss}$ [dB]-$G_{preamp}$ [dB]
$A_T$: Total correction Factor except Antenna
$U_R$: Receiver Reading
$G_{preamp}$: Preamplifier Gain
$A_{Factor}$: Antenna Factor at 3m

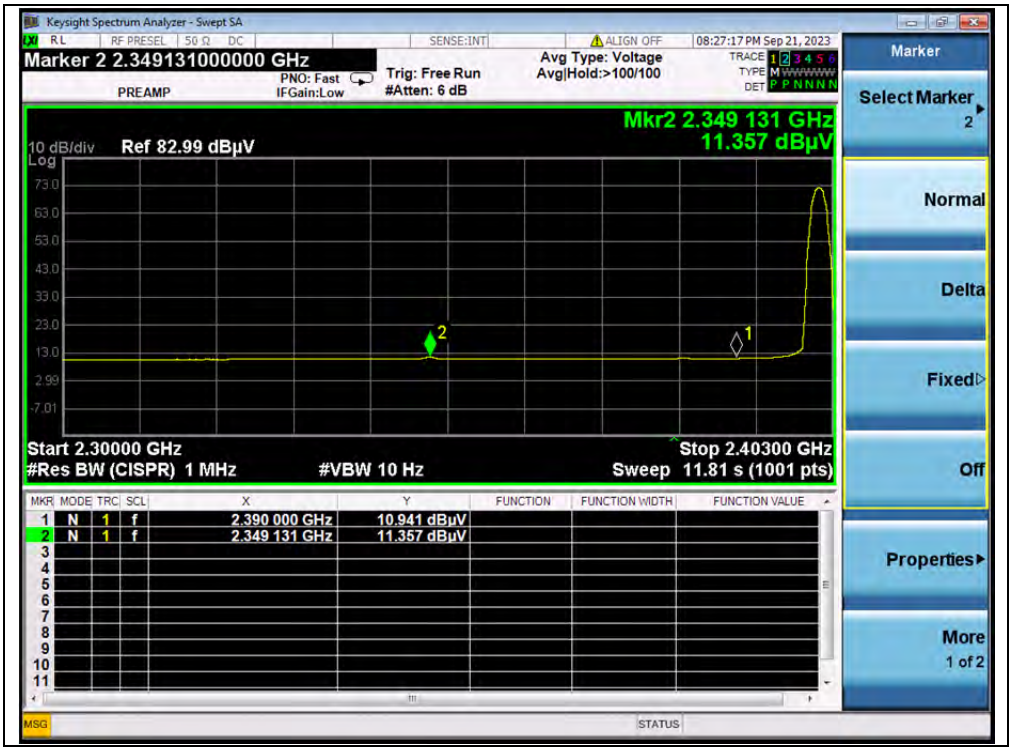
Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

**1600KHz**

| Channel | Frequency (MHz) | Detector PK/ AV | Receiver Reading $U_R$ (dBμV) | $A_T$ (dB) | $A_{Factor}$ (dB@3m) | Max. Emission E (dBμV/m) | Limit (dBμV/m) | Verdict |
|---|---|---|---|---|---|---|---|---|
| 1 | 2387.65 | PK | 25.17 | 6.74 | 27.20 | 59.11 | 74 | PASS |
| 1 | 2349.13 | AV | 11.36 | 6.74 | 27.20 | 45.30 | 54 | PASS |
| 3 | 2483.58 | PK | 36.69 | 6.74 | 27.20 | 70.63 | 74 | PASS |
| 3 | 2483.50 | AV | 10.53 | 6.74 | 27.20 | 44.47 | 54 | PASS |

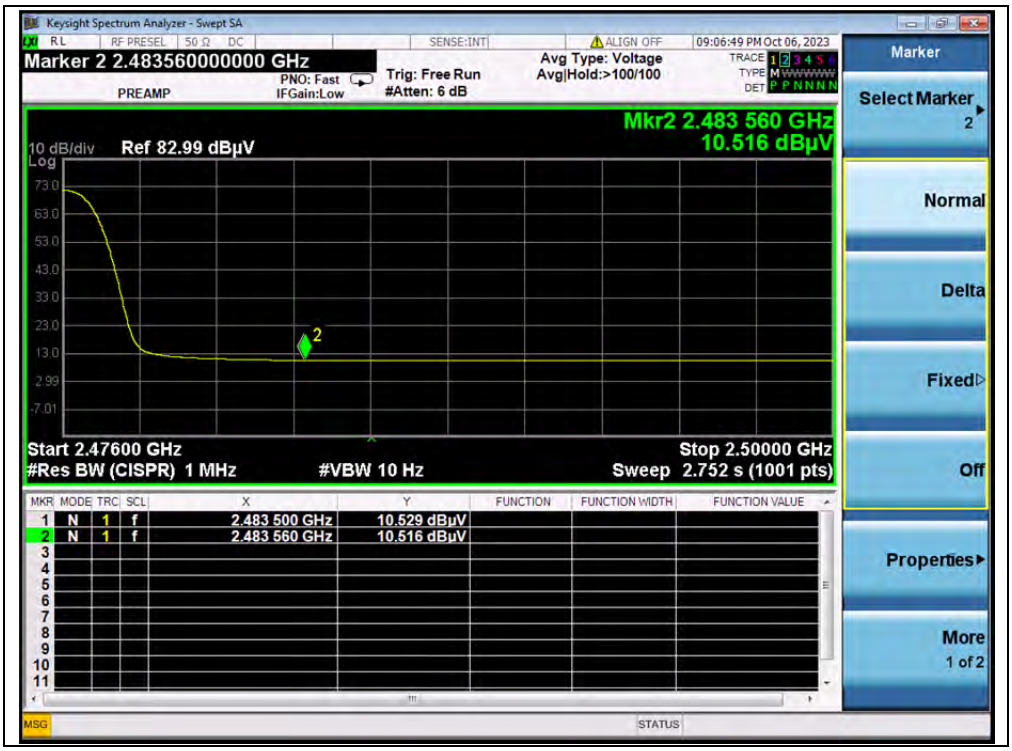



(PEAK, Channel 1)




(AVERAGE, Channel 1)

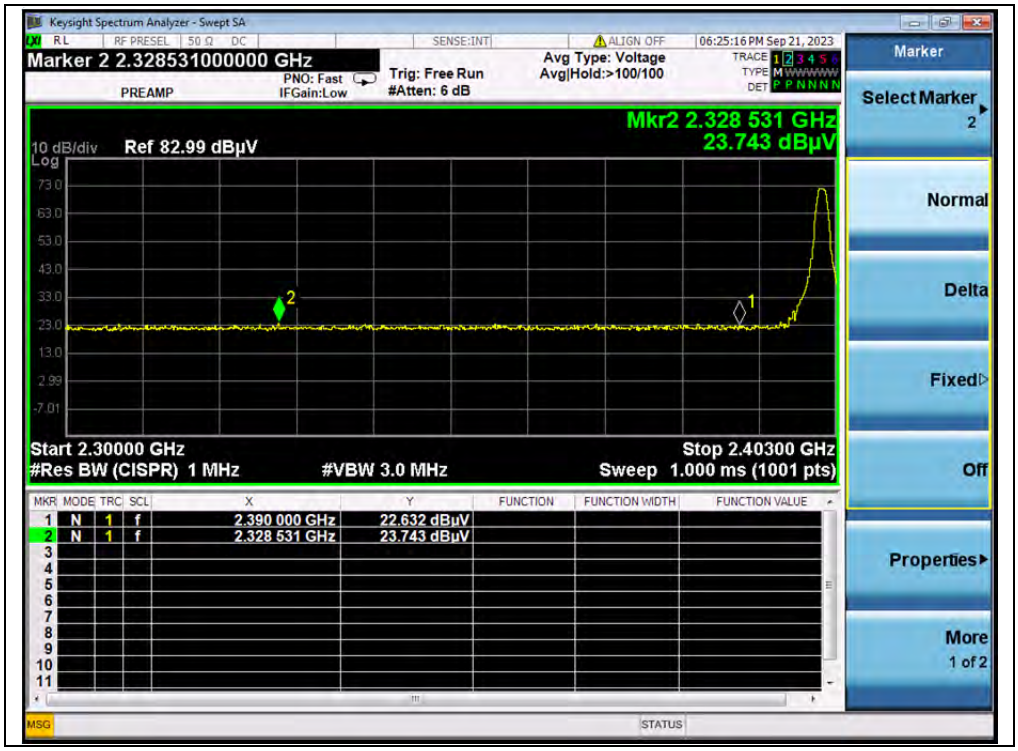

(PEAK, Channel 3)



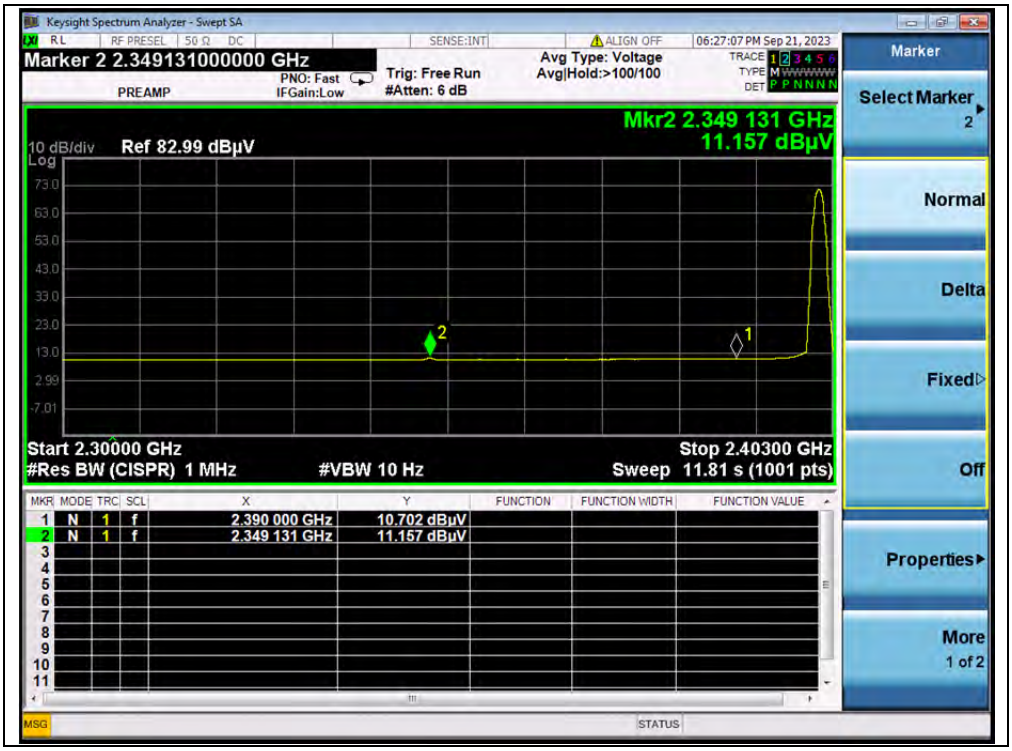

(AVERAGE, Channel 3)

**400KHz**

| Channel | Frequency (MHz) | Detector | Receiver Reading $U_R$ (dBμV) | $A_T$ (dB) | $A_{Factor}$ (dB@3m) | Max. Emission E (dBμV/m) | Limit (dBμV/m) | Verdict |
|---|---|---|---|---|---|---|---|---|
| | | PK/ AV | | | | | | |
| 1 | 2328.53 | PK | 23.74 | 6.74 | 27.20 | 57.68 | 74 | PASS |
| 1 | 2349.13 | AV | 11.16 | 6.74 | 27.20 | 45.10 | 54 | PASS |
| 3 | 2486.70 | PK | 23.87 | 6.74 | 27.20 | 57.81 | 74 | PASS |
| 3 | 2483.50 | AV | 10.40 | 6.74 | 27.20 | 44.34 | 54 | PASS |

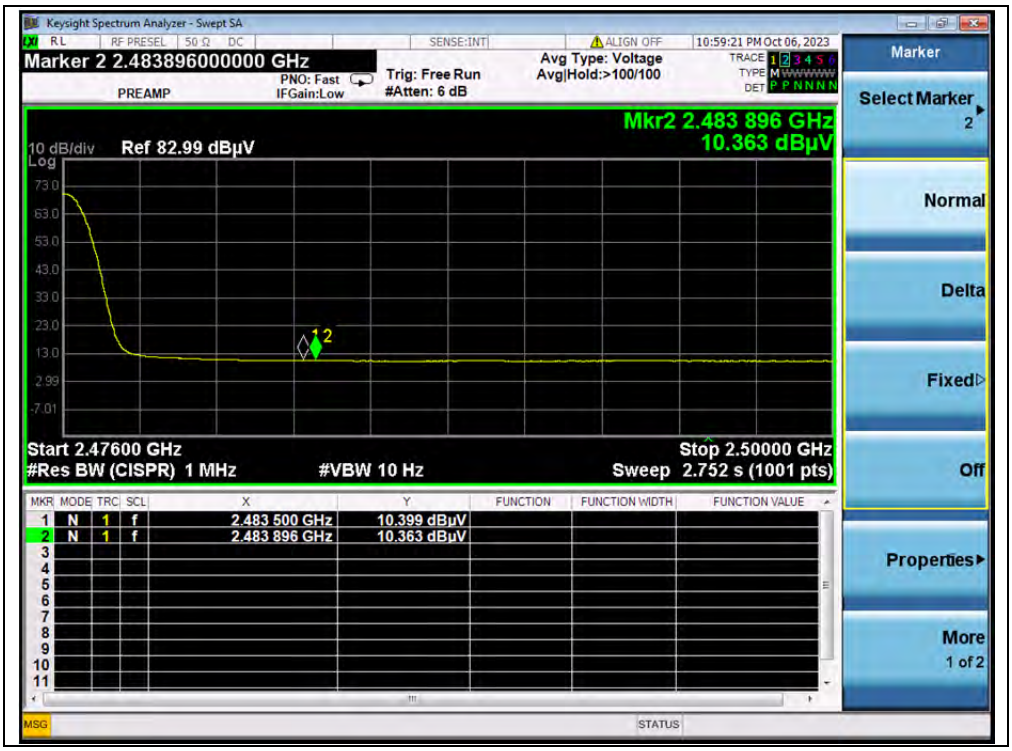



(PEAK, Channel 1)




(AVERAGE, Channel 1)

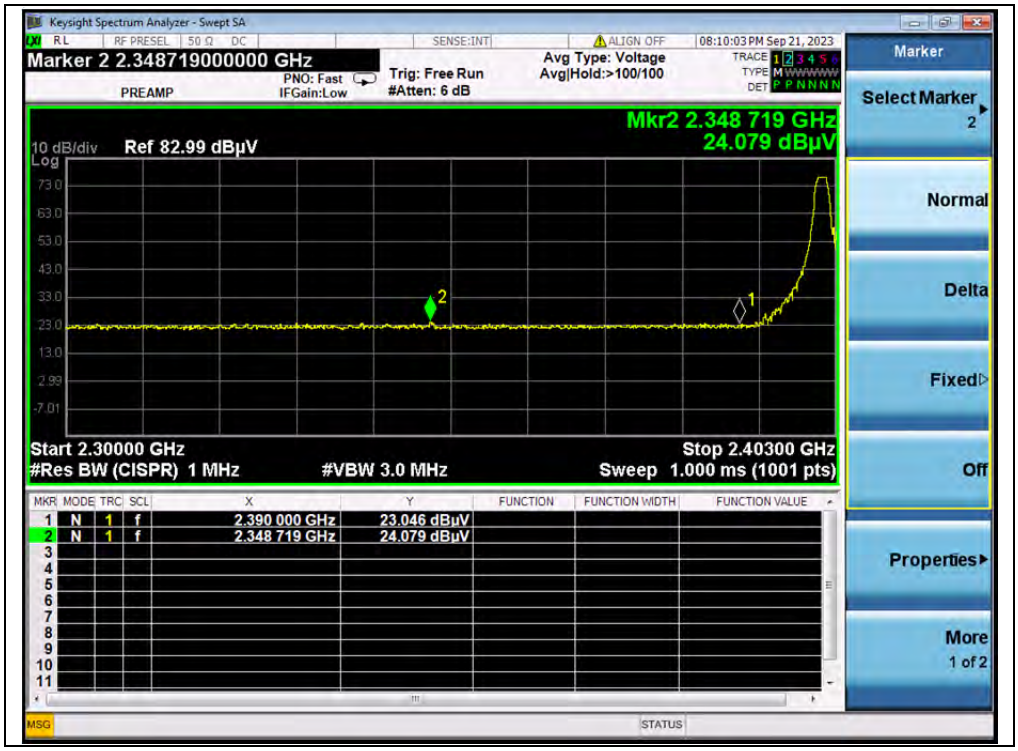

(PEAK, Channel 3)



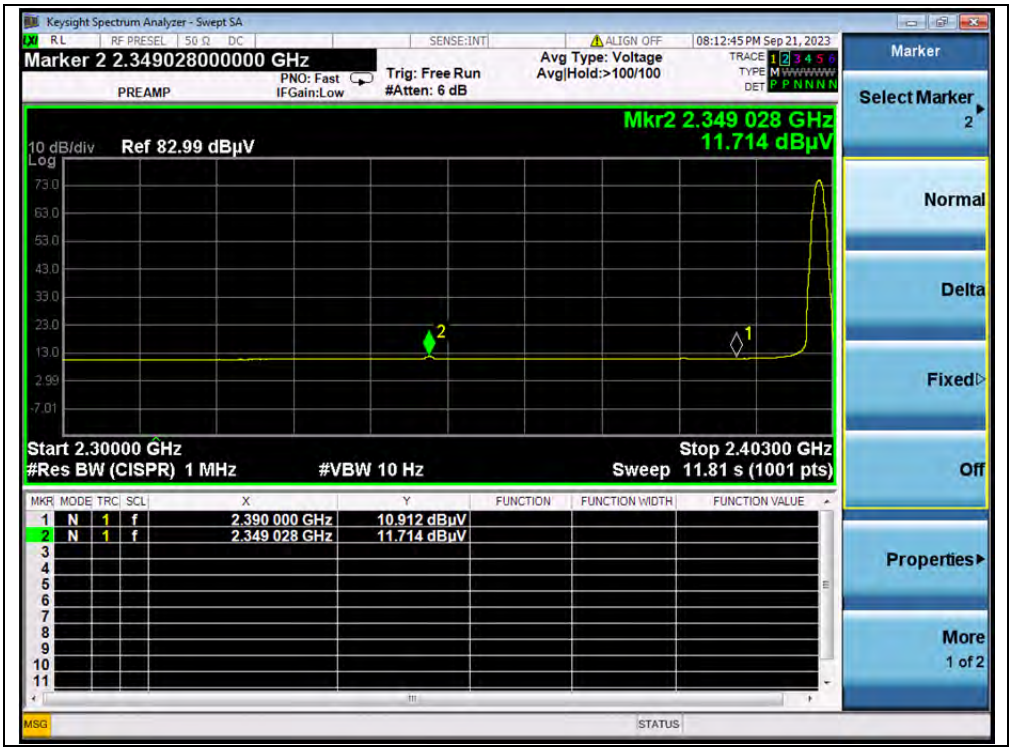

(AVERAGE, Channel 3)

**800KHz**

| Channel | Frequency (MHz) | Detector | Receiver Reading $U_R$ (dBμV) | $A_T$ (dB) | $A_{Factor}$ (dB@3m) | Max. Emission E (dBμV/m) | Limit (dBμV/m) | Verdict |
|---|---|---|---|---|---|---|---|---|
| | | PK/ AV | | | | | | |
| 1 | 2348.72 | PK | 24.08 | 6.74 | 27.20 | 58.02 | 74 | PASS |
| 1 | 2349.03 | AV | 11.72 | 6.74 | 27.20 | 45.66 | 54 | PASS |
| 3 | 2483.63 | PK | 35.96 | 6.74 | 27.20 | 69.90 | 74 | PASS |
| 3 | 2483.58 | AV | 10.47 | 6.74 | 27.20 | 44.41 | 54 | PASS |

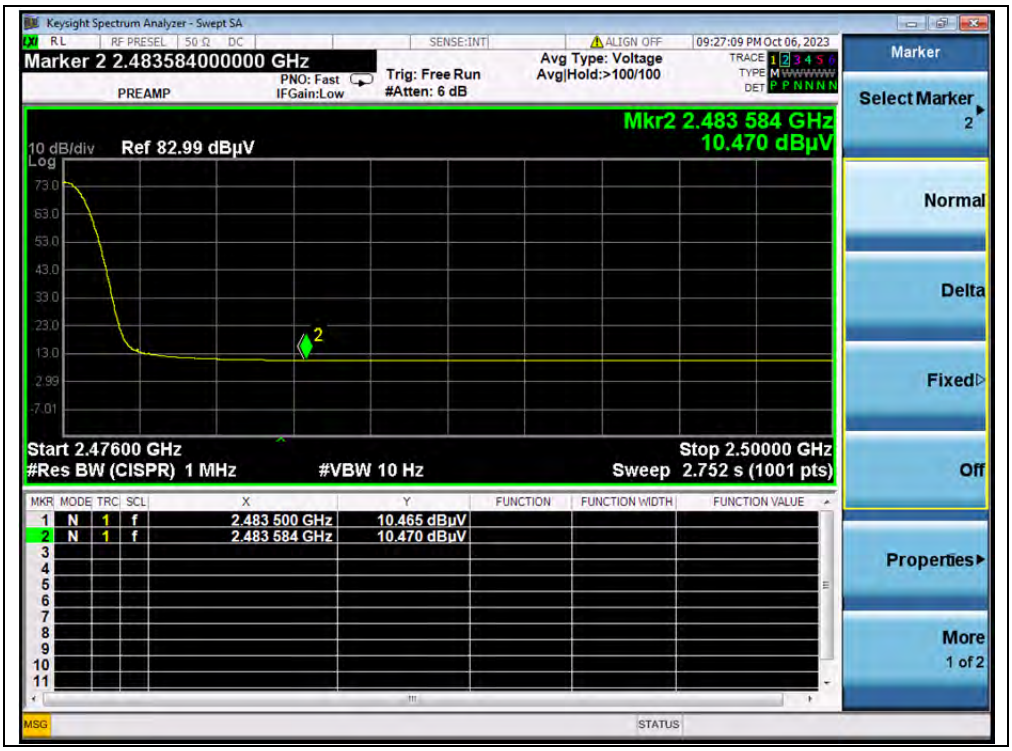



(PEAK, Channel 1)




(AVERAGE, Channel 1)


(PEAK, Channel 3)




(AVERAGE, Channel 3)

## A.10. Radiated Emission

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).

The measurement results are obtained as below:

$E\ [dB\mu V/m] = U_R + A_T + A_{Factor}\ [dB]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$

$A_T$: Total correction Factor except Antenna

$U_R$: Receiver Reading

$G_{preamp}$: Preamplifier Gain

$A_{Factor}$: Antenna Factor at 3m

During the test, the total correction Factor $A_T$ and $A_{Factor}$ were built in test software.

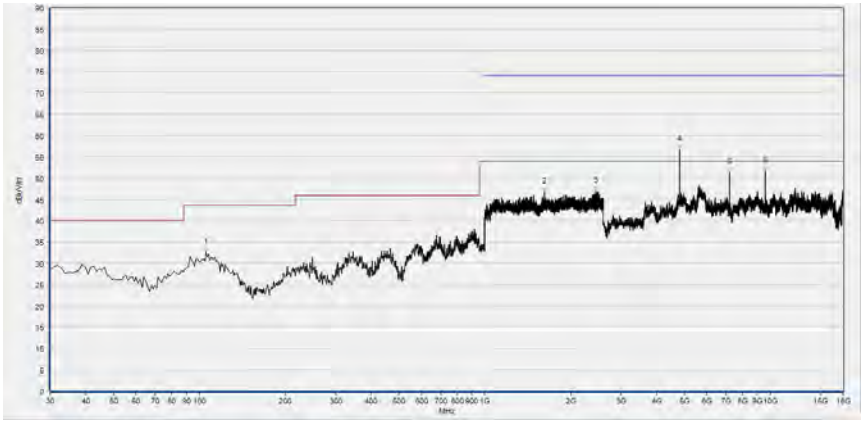
**Note1:** All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

**Note2:** For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

**Note3:** For the frequency, which started from 18GHz to 10th harmonic of the highest frequency, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

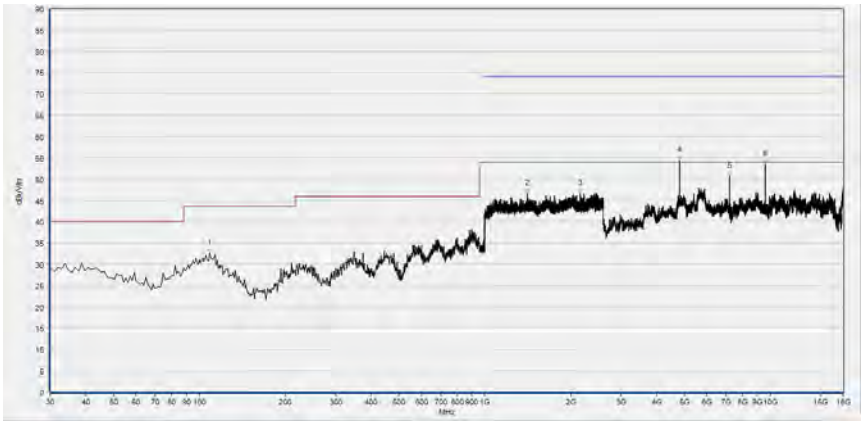
**1600KHz**

Plot for Channel 1



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 105.660 | 32.55 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 1620.267 | 46.77 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 2444.267 | 46.90 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 4802.200 | 56.63 | N/A | 46.61 | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 7201.520 | 51.35 | N/A | 40.41 | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 9600.840 | 51.56 | N/A | 37.67 | 74.00 | N/A | 54.00 | Horizontal | PASS |

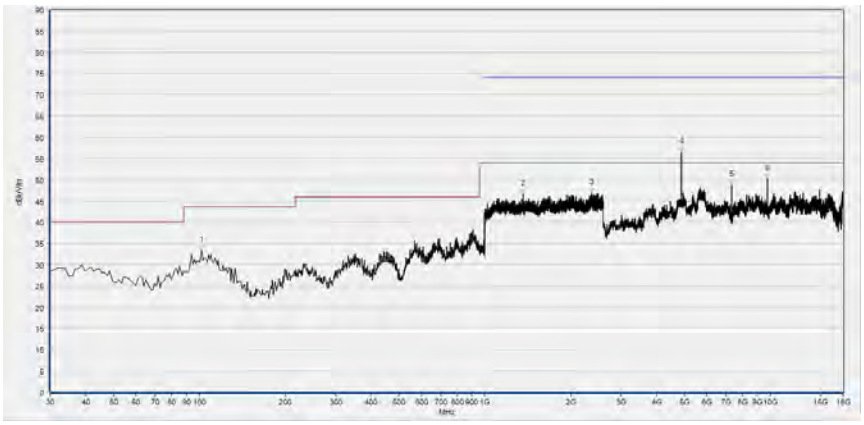
(Antenna Horizontal, 30MHz to 18GHz)



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 108.570 | 32.45 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 1409.600 | 46.53 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 2162.667 | 46.63 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 4802.200 | 54.22 | N/A | 45.12 | 74.00 | N/A | 54.00 | Vertical | PASS |
| 7201.520 | 50.60 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 9607.000 | 53.41 | N/A | 40.21 | 74.00 | N/A | 54.00 | Vertical | PASS |

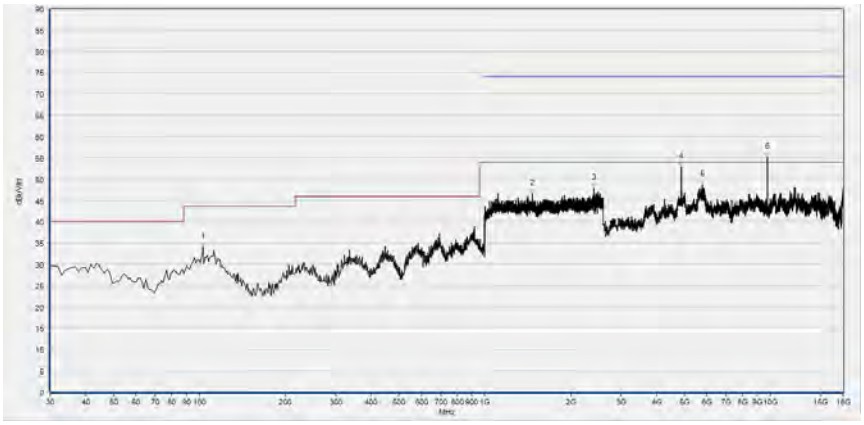
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 2



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 101.780 | 33.29 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 1361.067 | 46.65 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 2362.667 | 46.85 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 4882.280 | 56.46 | N/A | 46.60 | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 7321.640 | 48.74 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 9757.920 | 50.05 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |

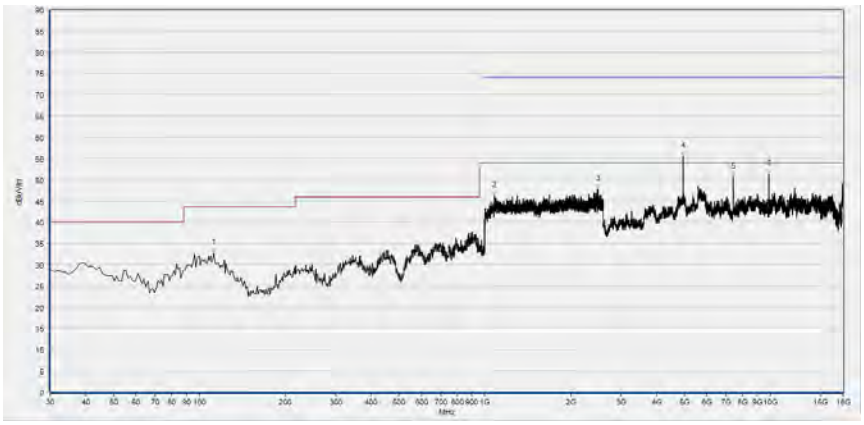
(Antenna Horizontal, 30MHz to 18GHz)



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 102.750 | 34.01 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 1469.333 | 46.65 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 2414.400 | 47.93 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 4879.200 | 52.86 | N/A | 43.21 | 74.00 | N/A | 54.00 | Vertical | PASS |
| 5769.320 | 48.59 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 9761.000 | 55.09 | N/A | 40.36 | 74.00 | N/A | 54.00 | Vertical | PASS |

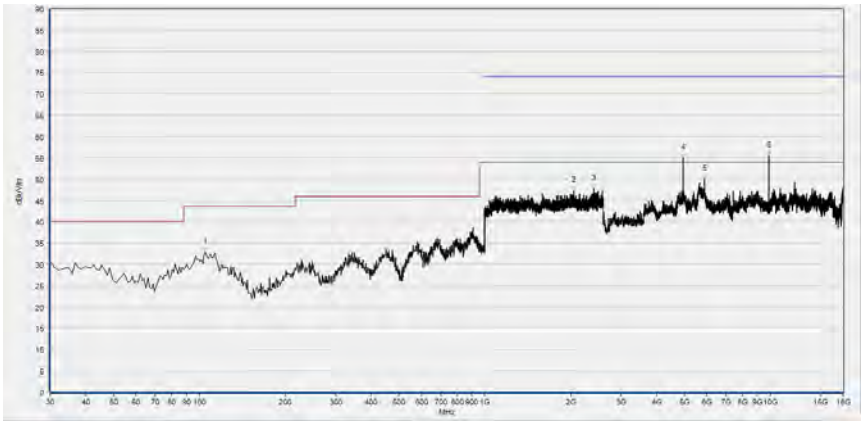
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 3



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 112.450 | 32.71 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 1081.600 | 46.19 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 2497.067 | 47.83 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 4950.040 | 55.45 | N/A | 45.37 | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 7429.440 | 50.67 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 9899.600 | 51.34 | N/A | 40.16 | 74.00 | N/A | 54.00 | Horizontal | PASS |

(Antenna Horizontal, 30MHz to 18GHz)

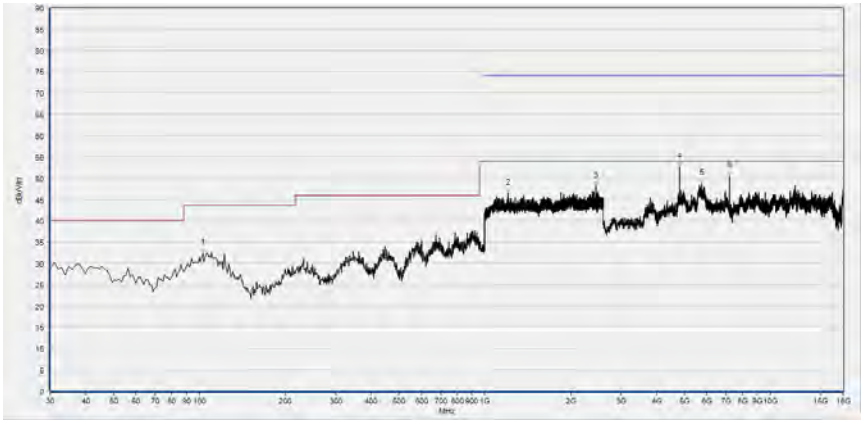


| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 104.690 | 32.87 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 2050.667 | 47.34 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 2409.600 | 47.69 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 4950.040 | 54.89 | N/A | 44.27 | 74.00 | N/A | 54.00 | Vertical | PASS |
| 5883.280 | 50.00 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 9902.680 | 55.48 | N/A | 37.67 | 74.00 | N/A | 54.00 | Vertical | PASS |

(Antenna Vertical, 30MHz to 18GHz)

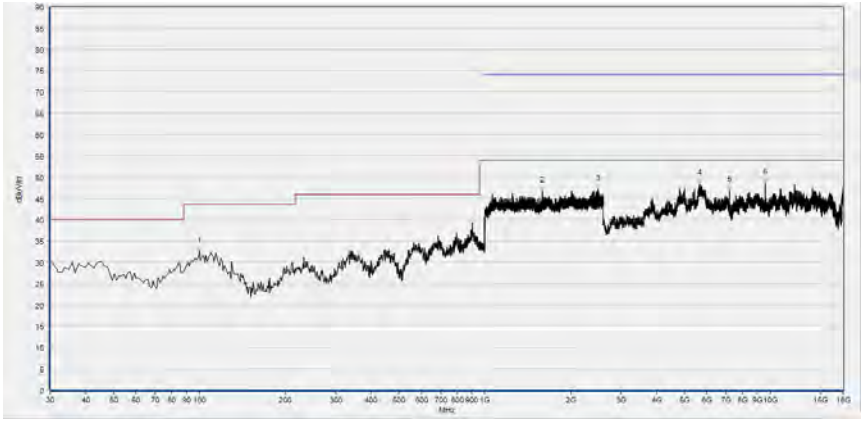
**400KHz**

Plot for Channel 1



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 102.750 | 32.32 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 1204.267 | 46.35 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 2455.467 | 48.03 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 4802.200 | 52.64 | N/A | 49.41 | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 5753.920 | 48.80 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 7201.520 | 50.44 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |

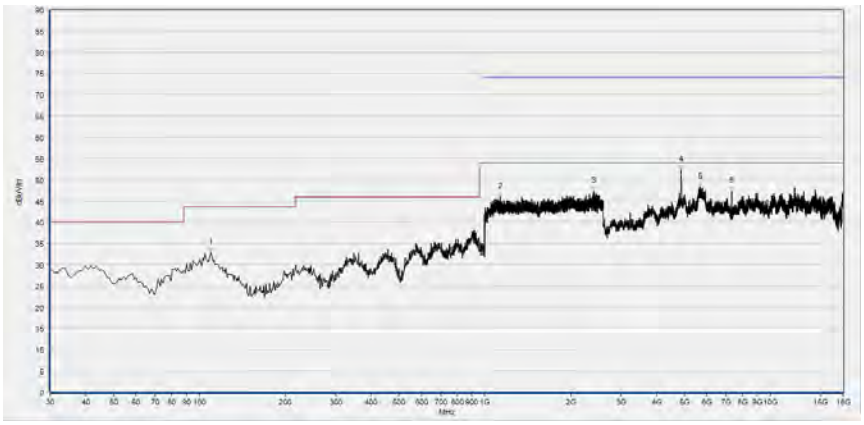
(Antenna Horizontal, 30MHz to 18GHz)



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 99.840 | 32.50 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 1586.667 | 46.74 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 2487.467 | 47.09 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 5652.280 | 48.48 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 7201.520 | 46.94 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 9603.920 | 48.52 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |

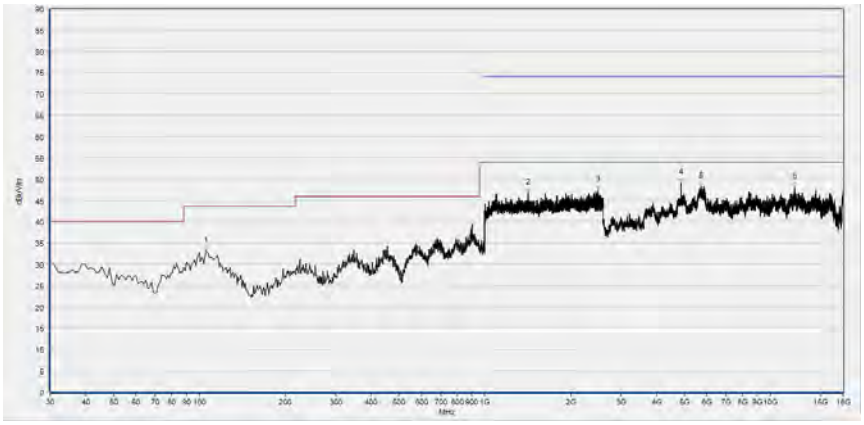
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 2



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 109.540 | 32.80 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 1130.133 | 45.97 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 2411.200 | 47.24 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 4879.200 | 52.29 | N/A | 46.19 | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 5673.840 | 48.19 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 7318.560 | 47.19 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |

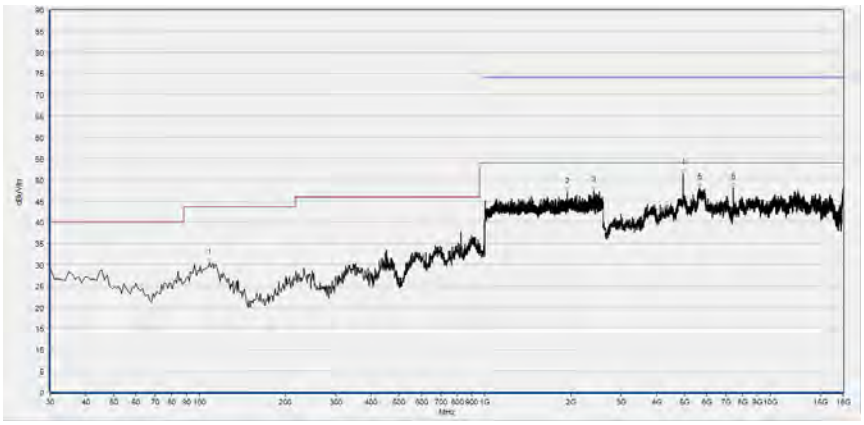
(Antenna Horizontal, 30MHz to 18GHz)



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 105.660 | 33.23 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 1419.200 | 46.73 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 2493.867 | 47.47 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 4879.200 | 49.06 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 5732.360 | 48.34 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 12151.080 | 48.15 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |

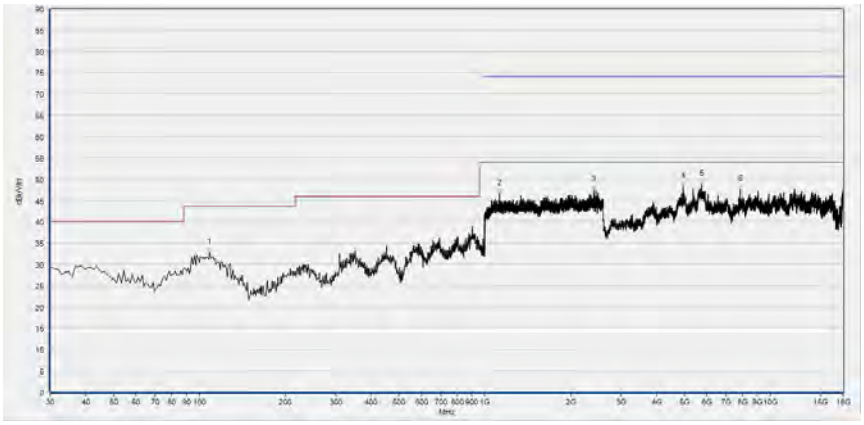
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 3



| Fre. (MHz) | PK (dBµV/m) | QP (dBµV/m) | AV (dBµV/m) | Limit-PK (dBµV/m) | Limit-QP (dBµV/m) | Limit-AV (dBµV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 108.570 | 30.51 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 1944.000 | 47.02 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 2403.200 | 47.35 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 4953.120 | 51.40 | N/A | 46.69 | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 5667.680 | 48.08 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 7426.360 | 48.08 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |

(Antenna Horizontal, 30MHz to 18GHz)

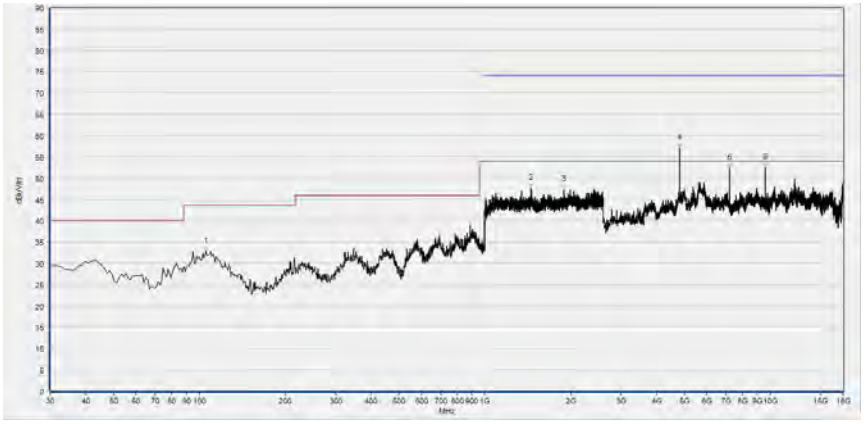


| Fre. (MHz) | PK (dBµV/m) | QP (dBµV/m) | AV (dBµV/m) | Limit-PK (dBµV/m) | Limit-QP (dBµV/m) | Limit-AV (dBµV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 108.570 | 32.69 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 1128.533 | 46.52 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 2403.733 | 47.42 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 4953.120 | 48.20 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 5750.840 | 48.78 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 7863.720 | 47.64 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |

(Antenna Vertical, 30MHz to 18GHz)

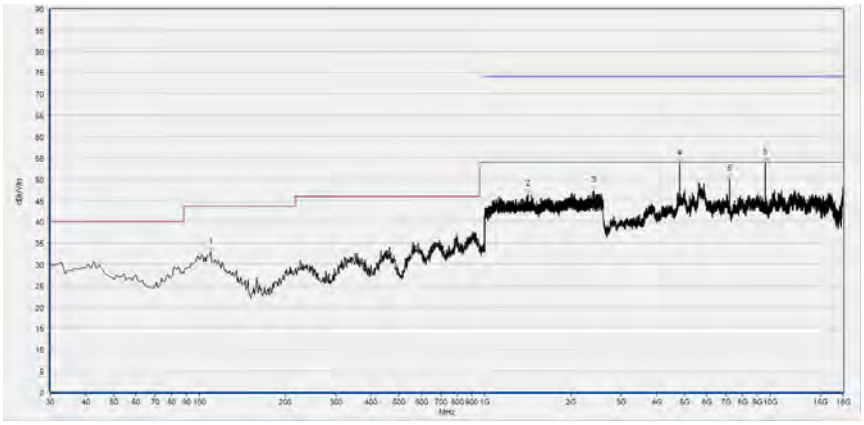
**800KHz**

Plot for Channel 1



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 105.660 | 32.70 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 1448.000 | 47.66 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 1893.867 | 47.30 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 4802.200 | 57.04 | N/A | 52.04 | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 7201.520 | 52.34 | N/A | 44.33 | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 9603.920 | 52.47 | N/A | 41.94 | 74.00 | N/A | 54.00 | Horizontal | PASS |

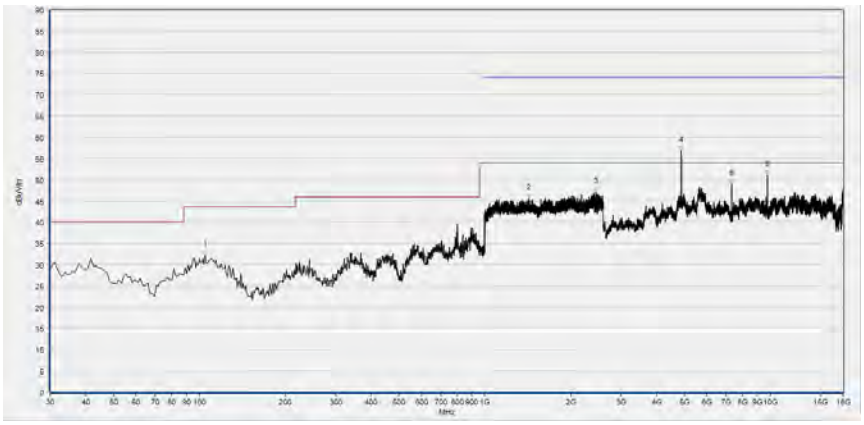
(Antenna Horizontal, 30MHz to 18GHz)



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 109.540 | 32.90 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 1420.800 | 46.50 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 2404.267 | 47.19 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 4802.200 | 53.65 | N/A | 47.31 | 74.00 | N/A | 54.00 | Vertical | PASS |
| 7201.520 | 49.88 | N/A | | 74.00 | N/A | 54.00 | Vertical | PASS |
| 9603.920 | 53.87 | N/A | 43.71 | 74.00 | N/A | 54.00 | Vertical | PASS |

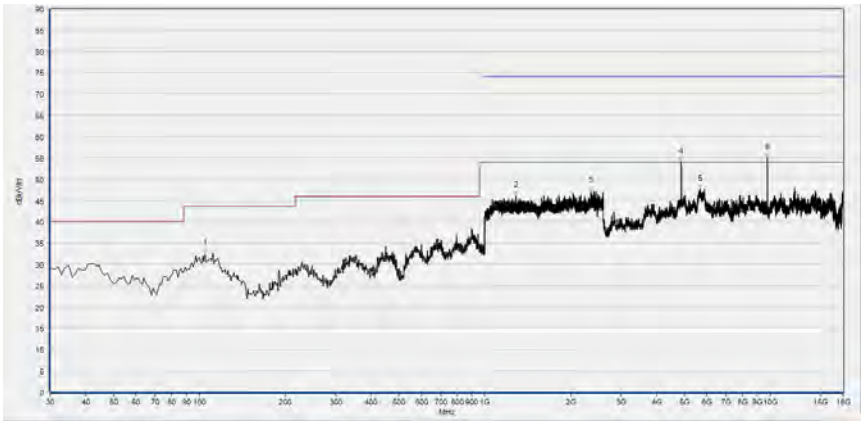
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 2



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 104.690 | 32.26 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 1423.467 | 45.60 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 2451.200 | 47.06 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 4879.200 | 56.79 | N/A | 49.70 | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 7318.560 | 48.98 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 9761.000 | 51.12 | N/A | 41.04 | 74.00 | N/A | 54.00 | Horizontal | PASS |

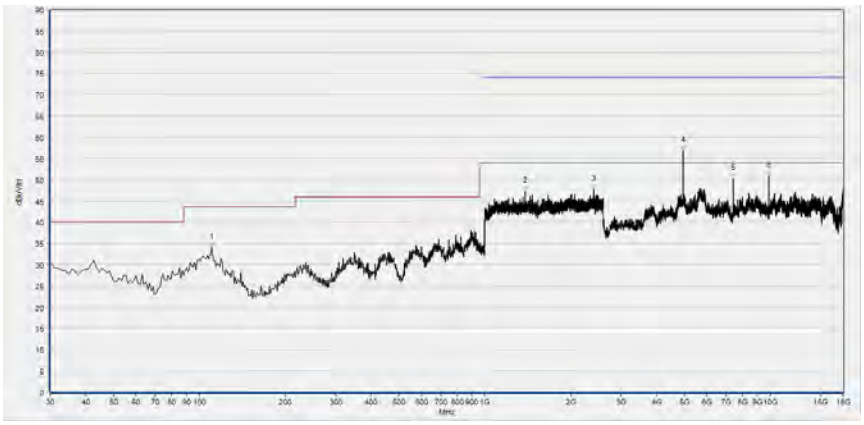
(Antenna Horizontal, 30MHz to 18GHz)



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 104.690 | 32.33 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 1283.200 | 46.01 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 2352.533 | 47.13 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 4879.200 | 53.90 | N/A | 46.73 | 74.00 | N/A | 54.00 | Vertical | PASS |
| 5695.400 | 47.67 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 9757.920 | 54.95 | N/A | 44.82 | 74.00 | N/A | 54.00 | Vertical | PASS |

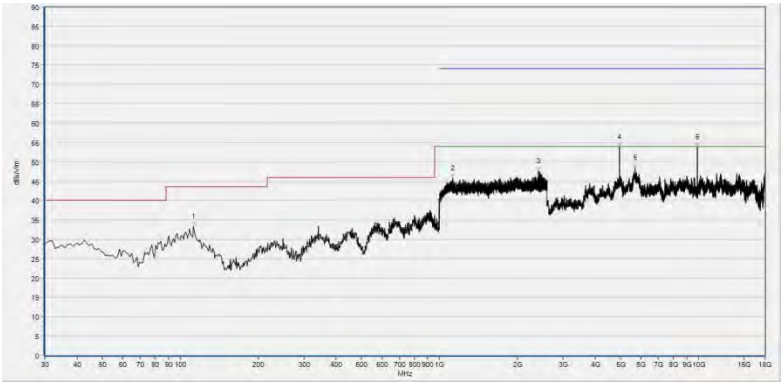
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 3



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 110.510 | 34.10 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 1383.467 | 47.31 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 2409.067 | 47.81 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 4953.120 | 56.73 | N/A | 49.64 | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 7426.360 | 50.31 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 9902.680 | 50.74 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |

(Antenna Horizontal, 30MHz to 18GHz)



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 112.450 | 33.31 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 1128.533 | 45.80 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 2411.200 | 47.53 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 4953.120 | 53.79 | N/A | 48.46 | 74.00 | N/A | 54.00 | Vertical | PASS |
| 5680.000 | 48.42 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 9905.760 | 53.79 | N/A | 43.67 | 74.00 | N/A | 54.00 | Vertical | PASS |

(Antenna Vertical, 30MHz to 18GHz)

END OF REPORT