# TEST REPORT

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Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC2001-0007(1)
2. Customer
   - Name : LG Electronics USA, Inc.
   - Address : 1000 Sylvan Ave. Englewood Cliffs, New Jersey, United States 07632
3. Use of Report : FCC Original Grant
4. Product Name / Model Name : Mobile Phone / OA2001
   FCC ID : ZNFOA2001
5. Test Method Used : KDB558074 D01v05r02, ANSI C63.10-2013
   Test Specification : FCC Part 15.247
6. Date of Test : 2019.11.25 ~ 2020.01.16
7. Testing Environment : See appended test report.
8. Test Result : Refer to the attached test result.

| | | |
|---|---|---|
| Affirmation | Tested by<br>Name : JaeJin Lee (Signature) | Reviewed by<br>Name : Guenki Son (Signature) |

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

**2020 . 01 . 28.**

**DT&C Co., Ltd.**

**If this report is required to confirmation of authenticity, please contact to report@dtnc.net**

# Test Report Version

| Test Report No. | Date | Description | Tested by | Reviewed by |
|---|---|---|---|---|
| DRTFCC2001-0007 | Jan. 17, 2020 | Initial issue | JungWoo Kim | Guenki Son |
| DRTFCC2001-0007(1) | Jan. 28, 2020 | Update the section 8.5 | JaeJin Lee | Guenki Son |
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# Table of Contents


1. EUT DESCRIPTION ..... 4
2. INFORMATION ABOUT TESTING ..... 5
2.1 Test mode ..... 5
2.2 Auxiliary equipment ..... 5
2.3 Tested environment ..... 6
2.4 EMI suppression Device(s) / Modifications ..... 6
2.5 Measurement Uncertainty ..... 6
3. SUMMARY OF TESTS ..... 7
4. TEST METHODOLOGY ..... 8
4.1 EUT configuration ..... 8
4.2 EUT exercise ..... 8
4.3 General test procedures ..... 8
4.4 Description of test modes ..... 8
5. INSTRUMENT CALIBRATION ..... 9
6. FACILITIES AND ACCREDITATIONS ..... 9
6.1 Facilities ..... 9
6.2 Equipment ..... 9
7. ANTENNA REQUIREMENTS ..... 9
8. TEST RESULT ..... 10
8.1 6dB bandwidth ..... 10
8.2 Maximum peak conducted output power ..... 20
8.3 Maximum power spectral density ..... 22
8.4 Out of band emissions at the band edge / conducted spurious emissions ..... 32
8.5 Radiated spurious emissions ..... 77
8.6 Power-line conducted emissions ..... 89
9. LIST OF TEST EQUIPMENT ..... 92
APPENDIX I ..... 94
APPENDIX I ..... 98

# 1. EUT DESCRIPTION

| | |
|---|---|
| **FCC Equipment Class** | Digital Transmission System(DTS) |
| **Product** | Mobile Phone |
| **Model Name** | OA2001 |
| **Add Model Name** | KA2004 |
| **Power Supply** | DC 3.87 V |
| **Frequency Range** | ▪ 802.11b/g/n/ac(20 MHz) : 2412 MHz ~ 2472 MHz |
| **Max. RF Output Power** | 2.4GHz Band<br>▪ 802.11ax (HE20) : 24.56 dBm |
| **Modulation Type** | ▪ 802.11ax: OFDM, OFDMA |
| **Antenna Specification** | **Antenna type**: PIFA antenna<br>**Antenna gain:** Refer to the clause 7 in test report. |

## Transmitting configuration of EUT

| **Mode** | **SISO** | | **MIMO(CDD)** | **MIMO(SDM)** |
|---|---|---|---|---|
| | **Ant 1** | **Ant 2** | **Ant 1 & 2** | **Ant 1 & 2** |
| | **Data rate** | | | |
| 802.11ax(HE20) | MCS 0 ~ 11(1SS) | MCS 0 ~ 11(1SS) | MCS 0 ~ 11(1SS) | MCS 0 ~ 11(2SS) |

Note1: SDM = Spatial Diversity Multiplexing, CDD = Cycle Delay Diversity, SS = Spatial Streams

Note2: This device supports WLAN DBS(dual-band simultaneous) transmission operation, which allows for two SISO channels to operate independent of one another in the 2.4GHz and 5GHz bands simultaneously on each antenna. (Ant 1: 2.4GHz band transmitting & ANT 2: 5GHz band transmitting , Ant 1 : 2.4G/5G bands transmitting & Ant 2 : 2.4G/5G bands transmitting), And the test results for WLAN DBS were included in UNII test report of this device.

# 2. INFORMATION ABOUT TESTING

## 2.1 Test mode

| Test mode | Worst case data rate | Tested Frequency (MHz) | | | |
|---|---|---|---|---|---|
| **TM 1** | 802.11ax(HE20)<br>MCS 0<br>(CDD Multiple transmitting) | 2412 | 2437 | 2462 | 2472 |
| **TM 2** | 802.11ax(HE20)<br>MCS 0<br>(SDM Multiple transmitting) | 2412 | 2437 | 2462 | 2472 |

Note1: The worst case data rate was determined according to the power measurements.

Note2: We have done all TX test cases and attached the MIMO test result of 802.11ax mode since MIMO is the worst case.

Note3: The power measurement results for all modes and data rate were reported.

## 2.2 Auxiliary equipment

| Equipment | Model No. | Serial No. | Manufacturer | Note |
|---|---|---|---|---|
| - | - | - | - | - |
| - | - | - | - | - |

## 2.3 Tested environment

| | | |
|---|---|---|
| **Temperature** | : | 22 ºC ~ 24 ºC |
| **Relative humidity content** | : | 37 % ~ 42 % |
| **Details of power supply** | : | DC 3.87 V |

## 2.4 EMI suppression Device(s) / Modifications

EMI suppression device(s) added and/or modifications made during testing
→ None

## 2.5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C63.4-2014 and ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of *k* = 2 to indicate a 95 % level of confidence.

| Test items | Measurement uncertainty |
|---|---|
| Transmitter Output Power | 0.7 dB (The confidence level is about 95 %, k = 2) |
| Conducted spurious emission | 0.9 dB (The confidence level is about 95 %, k = 2) |
| AC conducted emission | 2.4 dB (The confidence level is about 95 %, k = 2) |
| Radiated spurious emission (1 GHz Below) | 5.1 dB (The confidence level is about 95 %, k = 2) |
| Radiated spurious emission (1 GHz ~ 18 GHz) | 5.4 dB (The confidence level is about 95 %, k = 2) |
| Radiated spurious emission (18 GHz Above) | 5.3 dB (The confidence level is about 95 %, k = 2) |

# 3. SUMMARY OF TESTS

| FCC Part Section(s) | Parameter | Limit | Test Condition | Status Note 1 |
|---|---|---|---|---|
| 15.247(a) | 6 dB Bandwidth | > 500 kHz | Conducted | C |
| 15.247(b) | Transmitter Output Power | < 1 Watt | | C |
| 15.247(d) | Out of Band Emissions / Band Edge | 20 dBc in any 100 kHz BW | | C |
| 15.247(e) | Transmitter Power Spectral Density | < 8 dBm/3 kHz | | C |
| 15.247(d)<br>15.205<br>15.209 | General Field Strength Limits (Restricted Bands and Radiated Emission Limits) | FCC 15.209 limits | Radiated | C Note 3, 4 |
| 15.207 | AC Line Conducted Emissions | FCC 15.207 limits | AC Line Conducted | C |
| 15.203 | Antenna Requirements | FCC 15.203 | - | C |

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable
Note 2: For radiated emission tests below 30 MHz were performed on semi-anechoic chamber which is correlated with OATS.
Note 3: This test item was performed in each axis and the worst case data was reported.
Note 4: This device supports wireless charging & Can use Dual Screen.
So per KDB648474 D03v01r0, the radiated test items were performed all not charging, charging and Dual Screen conditions, the handset is placed on the representative charging pad under normal conditions and in a simulated call configuration.

# 4. TEST METHODOLOGY

The measurement procedures described in the ANSI C63.10-2013 and the guidance provided in KDB558074 D01v05r02 were used in measurement of the EUT.

The EUT was tested per the guidance of KDB558074 D01v05r02. And ANSI C63.10-2013 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing.

## 4.1 EUT configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

## 4.2 EUT exercise

The EUT was operated in the test mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

## 4.3 General test procedures

### Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB558074 D01v05r02.

So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10-2013.

The EUT is placed on the wooden table, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and Average detector

### Radiated Emissions

Basically the radiated tests were performed with KDB558074 D01v05r02. But some requirements and procedures like test site requirements, EUT setup and maximizing procedure were fulfilled with the requirements in Section 5 and 6 of the ANSI C63.10 as stated on section 12.1 of the KDB558074 D01v05r02.

The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the highest emission, the relative positions of the EUT were rotated through three orthogonal axes.

## 4.4 Description of test modes

The EUT has been tested with all modes of operating conditions to determine the worst case emission characteristics.

A test program is used to control the EUT for staying in continuous transmitting mode.

# 5. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

# 6. FACILITIES AND ACCREDITATIONS

## 6.1 Facilities

| **DT&C Co., Ltd.** | | |
|---|---|---|
| The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042.<br>The test site complies with the requirements of § 2.948 according to ANSI C63.4-2014.<br><br>**- FCC MRA Accredited Test Firm No. : KR0034** | | |
| www.dtnc.net | | |
| Telephone | : | + 82-31-321-2664 |
| FAX | : | + 82-31-321-1664 |

## 6.2 Equipment

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, loop, horn. Spectrum analyzers with pre-selectors and peak, quasi-peak detectors are used to perform radiated measurements.
Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

# 7. ANTENNA REQUIREMENTS

## 7.1 According to FCC 47 CFR §15.203

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

**The antenna is attached on the device by means of unique coupling method (Spring Tension).**
**Therefore this E.U.T Complies with the requirement of §15.203**

## 7.2 Directional antenna gain:

| Bands | SISO | | MIMO (CDD) Note 1. | MIMO (SDM) Note 2 |
|---|---|---|---|---|
| | ANT 1 [dBi] | ANT 2 [dBi] | Directional Gain [dBi] | Directional Gain [dBi] |
| 2.4 GHz | -1.95 | -6.08 | -0.76 | -3.54 |

**Note 1. Directional gain (Correlated signal with unequal antenna gain and equal transmit power)**

$$10 \log [ ( 10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20} )^2 / N_{ANT} ] \text{ dBi}$$

**Note 2. Directional gain (Completely uncorrelated signal with unequal antenna gain and equal transmit power)**

$$10 \log [ ( 10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10} ) / N_{ANT} ] \text{ dBi}$$

# 8. TEST RESULT

## 8.1 6dB bandwidth

### ▣ Test Requirements and limit, §15.247(a)

The bandwidth at 6 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

**The minimum permissible 6 dB bandwidth is 500 kHz.**

### ▣ Test Configuration:

Refer to the APPENDIX I.

### ▣ Test Procedure:

- **KDB558074 D01v05r02 - Section 8.2**
- **ANSI C63.10-2013 – Section 11.8.2**

**Option 2**

1. Set resolution bandwidth (RBW) = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = **Peak**.
4. Trace mode = **Max hold**.
5. Sweep = **Auto couple**.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level in the fundamental emission.

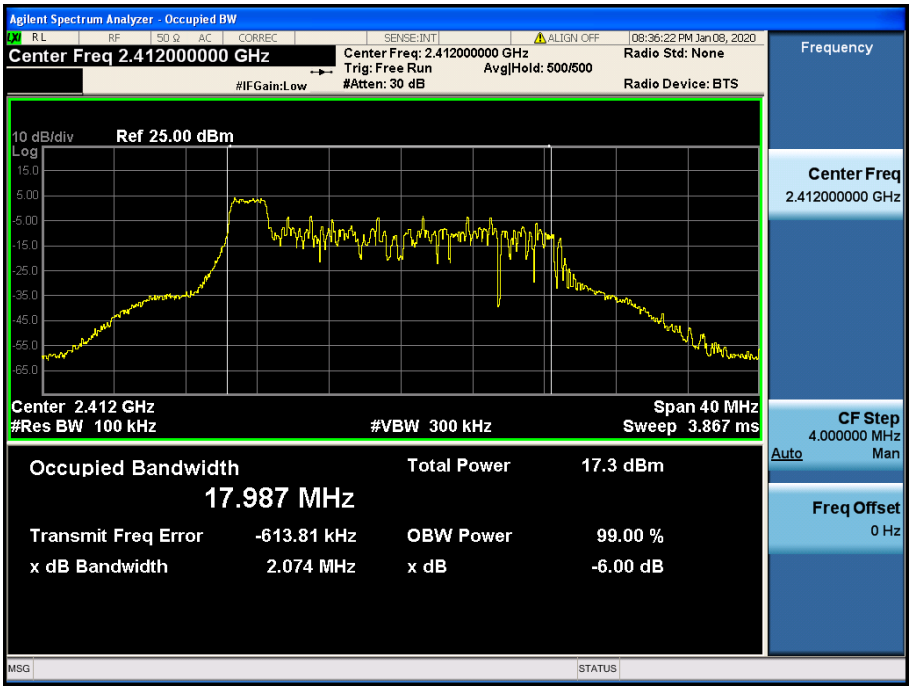
## ▣ Test Results: Comply

| ANT | Tones | RU Index | Test Results[MHz] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | TM 1 | | | | TM 2 | | | |
| | | | 2412 | 2437 | 2462 | 2472 | 2412 | 2437 | 2462 | 2472 |
| ANT 1 | 26 | 0 | **2.07** | **2.05** | **2.10** | **2.08** | **2.11** | **2.03** | **2.07** | **2.10** |
| | | 4 | 2.59 | 2.65 | 2.62 | 2.67 | 2.72 | 2.68 | 2.66 | 2.69 |
| | | 8 | 2.11 | 2.14 | 2.06 | 2.10 | 2.11 | 2.12 | 2.13 | 2.08 |
| | 242 | 61 | 19.11 | 18.55 | 18.26 | 18.76 | 19.12 | 19.08 | 18.89 | 18.76 |
| | SU | | 18.78 | 18.95 | 18.10 | 18.78 | 18.79 | 17.13 | 17.85 | 18.89 |
| ANT 2 | 26 | 0 | 2.14 | 2.08 | 2.10 | 2.05 | 2.06 | 2.10 | 2.12 | 2.12 |
| | | 4 | 2.62 | 2.68 | 2.62 | 2.66 | 2.73 | 2.71 | 2.71 | 2.71 |
| | | 8 | **2.10** | **2.07** | **2.09** | **2.01** | **2.09** | **2.12** | **2.05** | **2.05** |
| | 242 | 61 | 18.77 | 18.86 | 18.33 | 17.89 | 18.85 | 18.99 | 18.97 | 18.47 |
| | SU | | 18.90 | 18.89 | 17.48 | 18.63 | 17.88 | 17.78 | 17.10 | 18.93 |

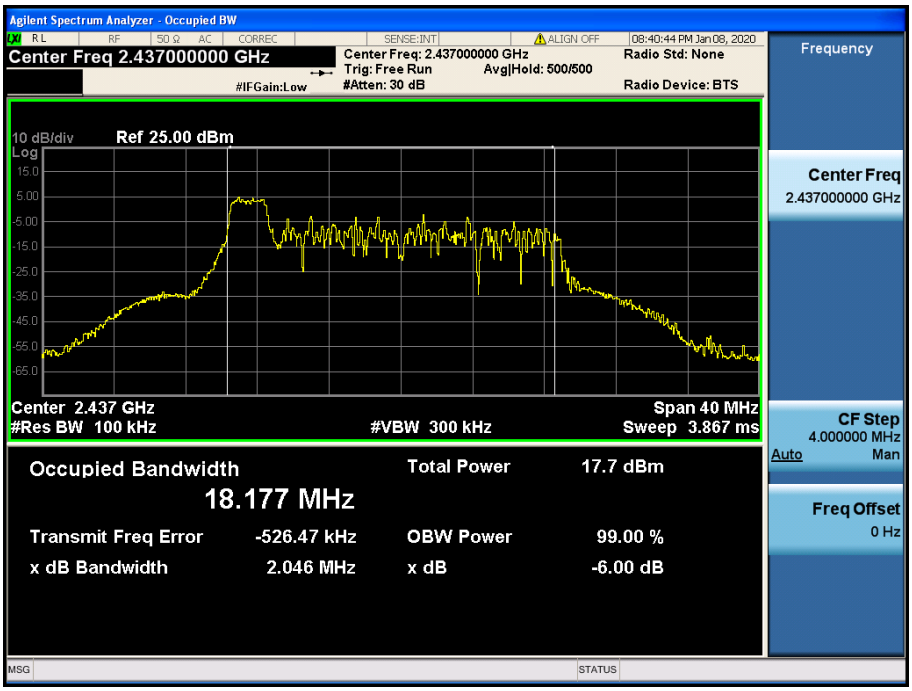
## ▣ RESULT PLOTS

**- This test item was performed in each axis and the worst case data was reported.**

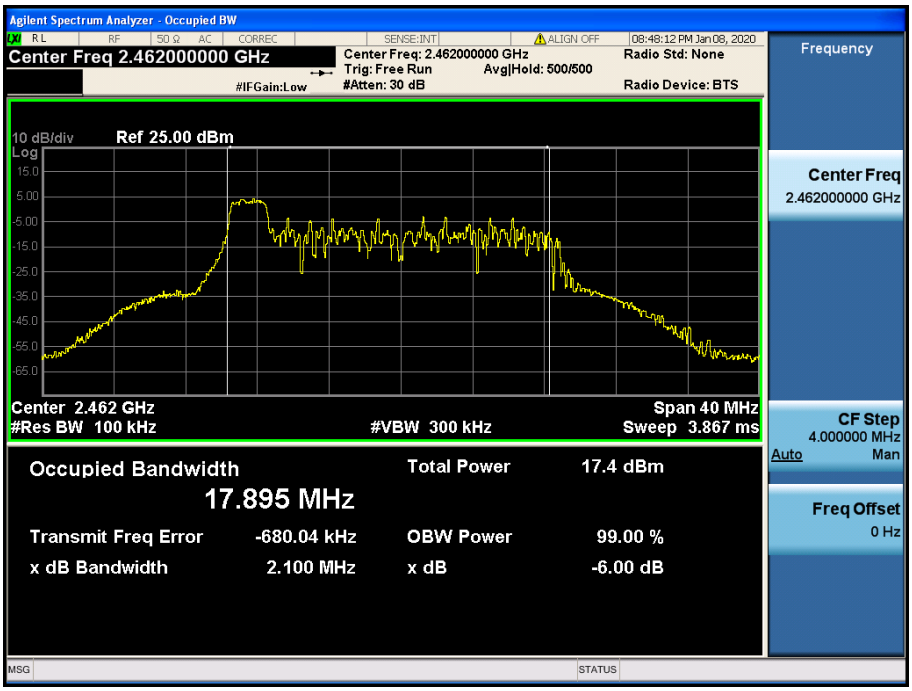
**6 dB Bandwidth** TM 1 & ANT 1 & 26Tone & RU 0 & 2412



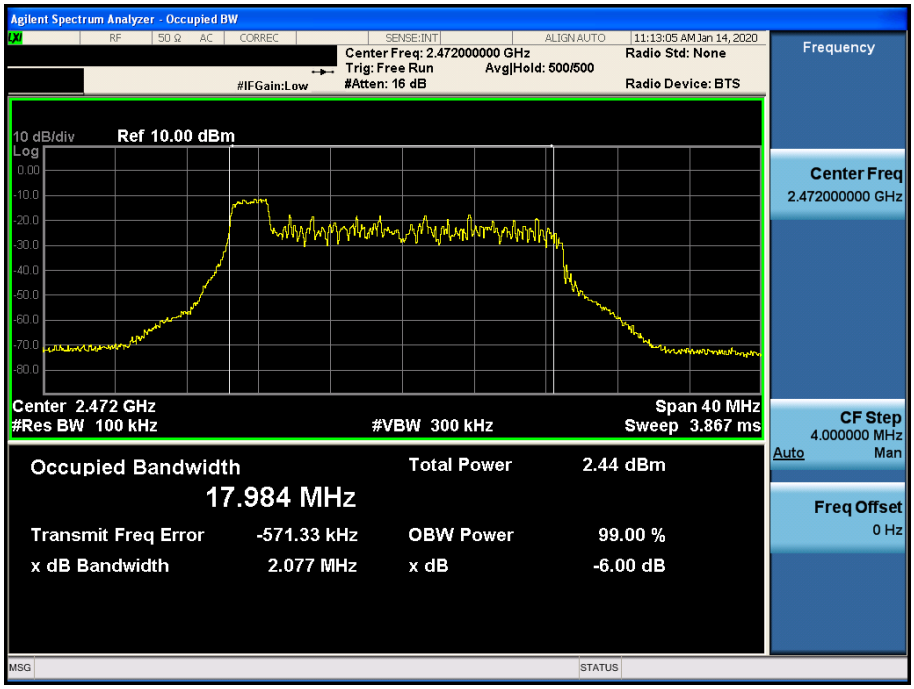

**6 dB Bandwidth** TM 1 & ANT 1 & 26Tone & RU 0 & 2437



**6 dB Bandwidth** TM 1 & ANT 1 & 26Tone & RU 0 & 2462

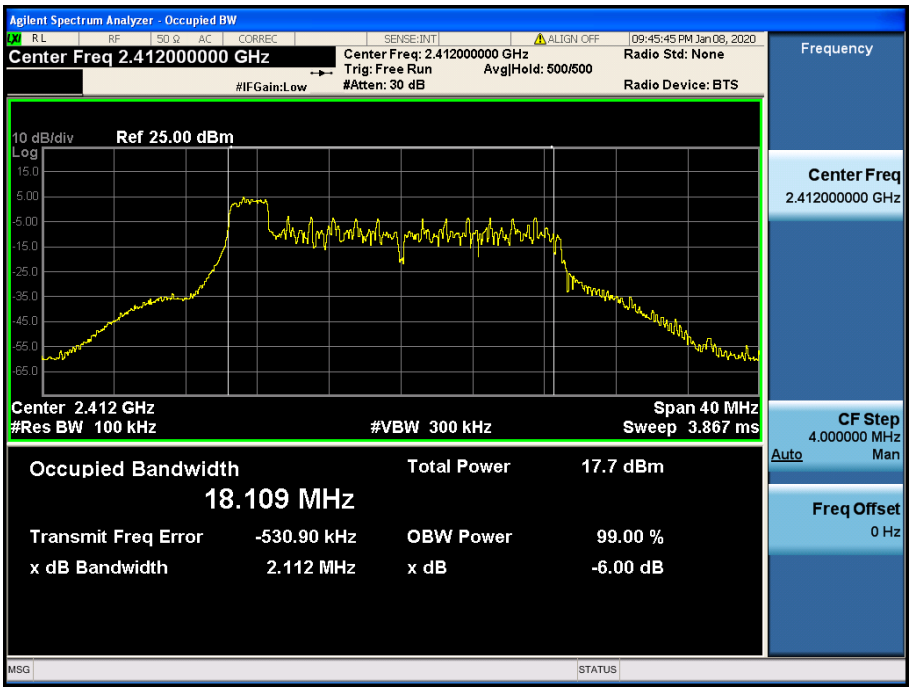



**6 dB Bandwidth** TM 1 & ANT 1 & 26Tone & RU 0 & 2472



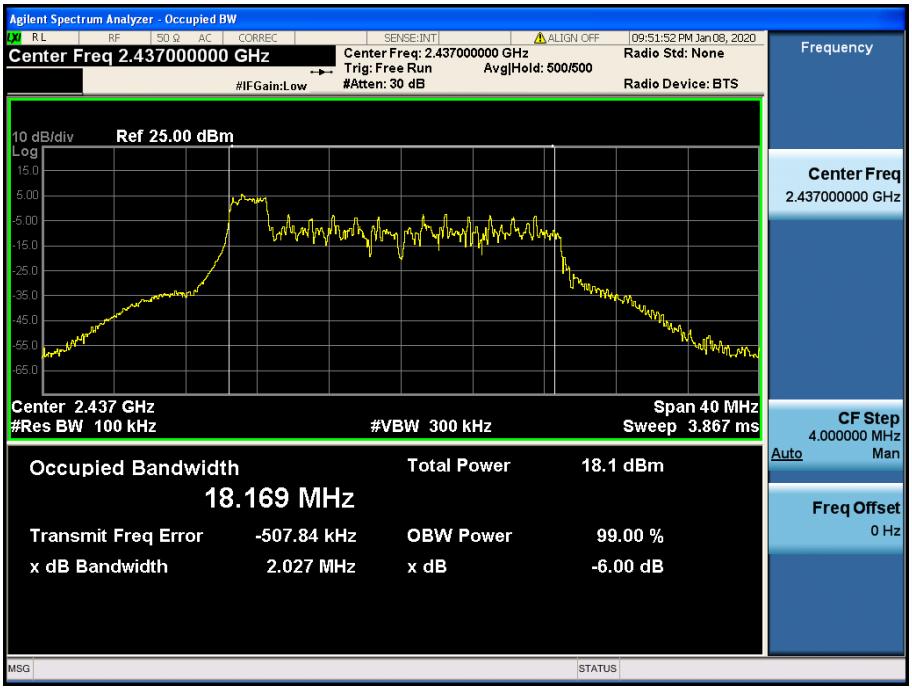
## 6 dB Bandwidth

TM 2 & ANT 1 & 26Tone & RU 0 & 2412

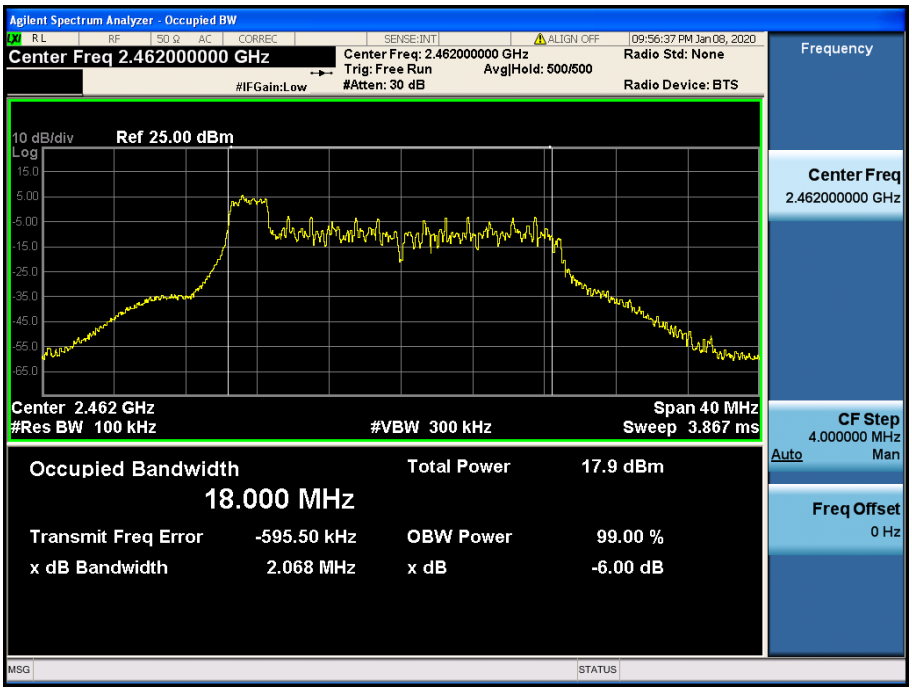



## 6 dB Bandwidth

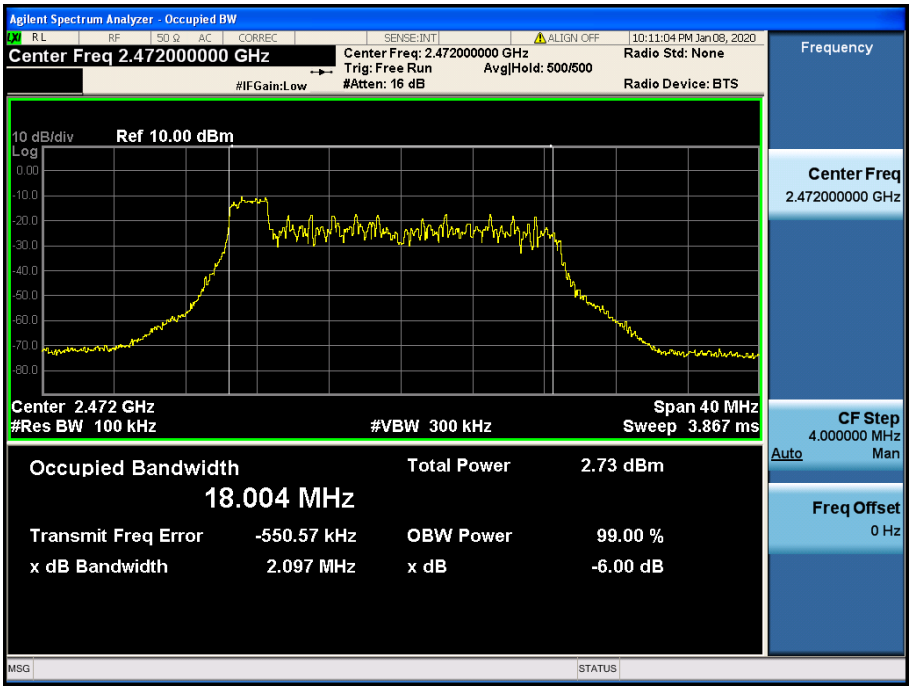
TM 2 & ANT 1 & 26Tone & RU 0 & 2437



**6 dB Bandwidth** TM 2 & ANT 1 & 26Tone & RU 0 & 2462

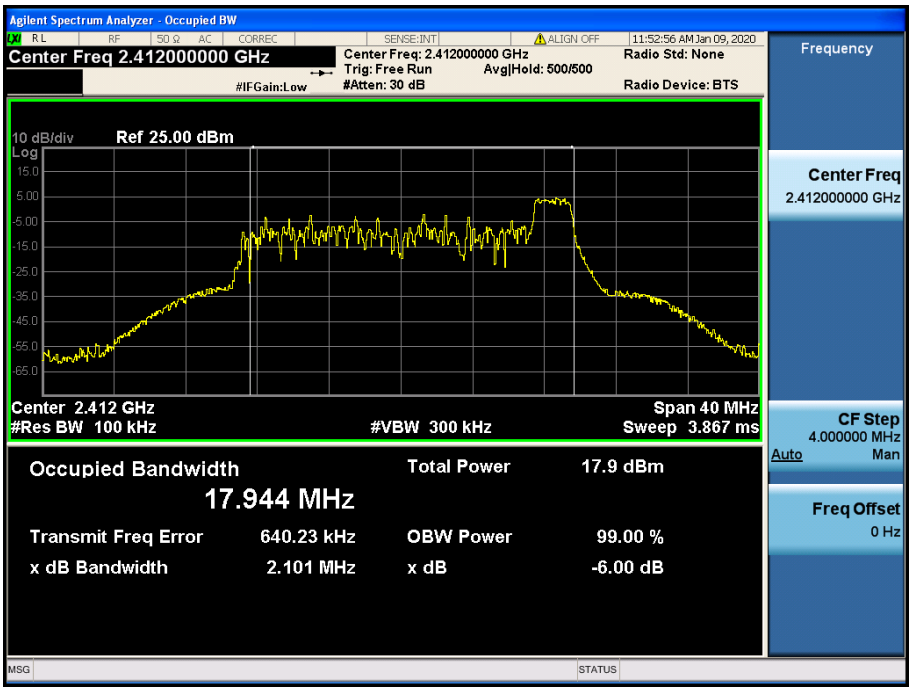



**6 dB Bandwidth** TM 2 & ANT 1 & 26Tone & RU 0 & 2472



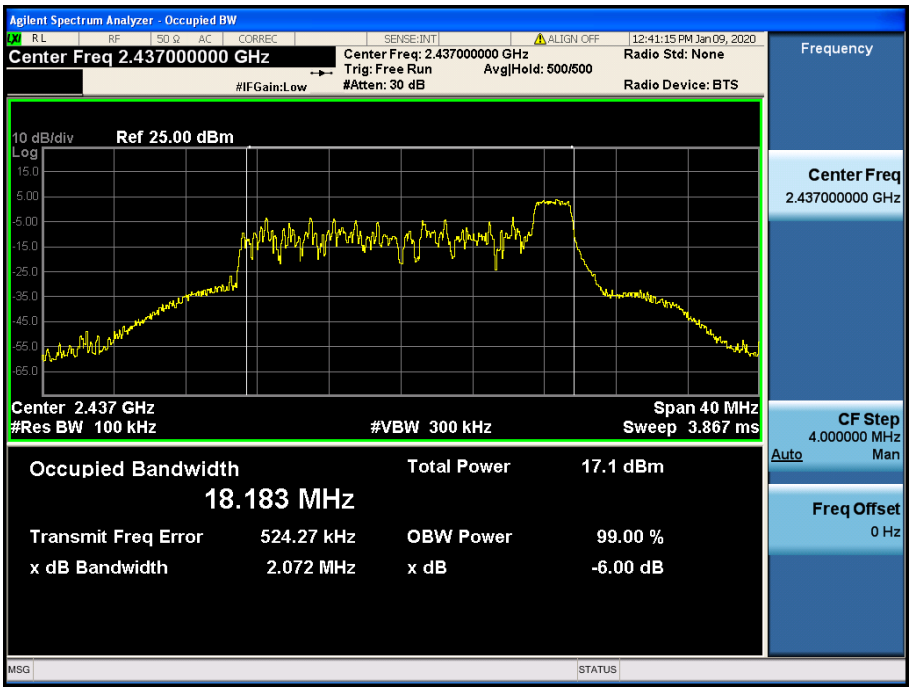
## 6 dB Bandwidth

TM 1 & ANT 2 & 26Tone & RU 0 & 2412



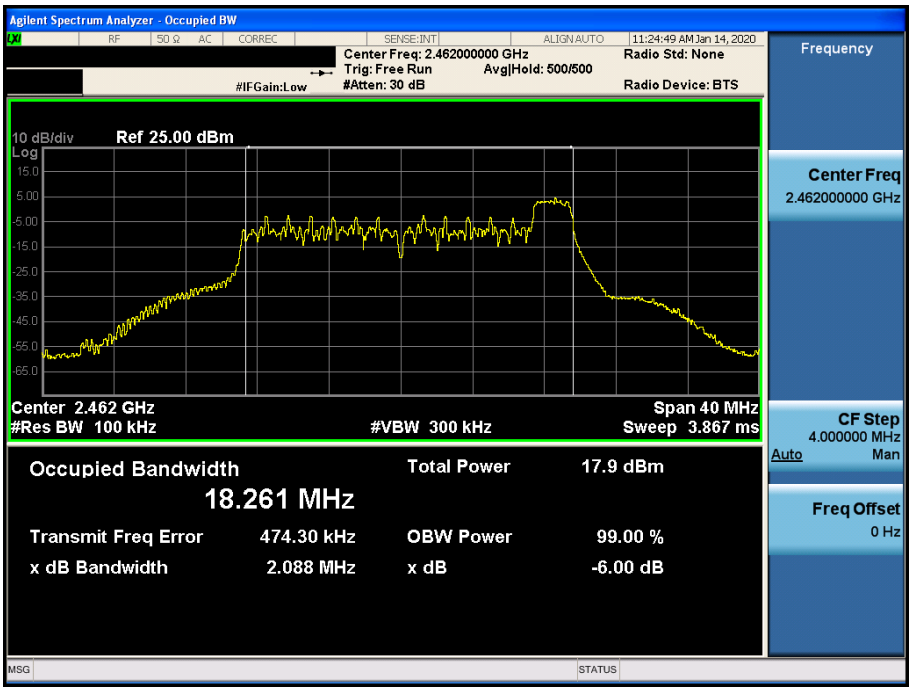

## 6 dB Bandwidth

TM 1 & ANT 2 & 26Tone & RU 0 & 2437



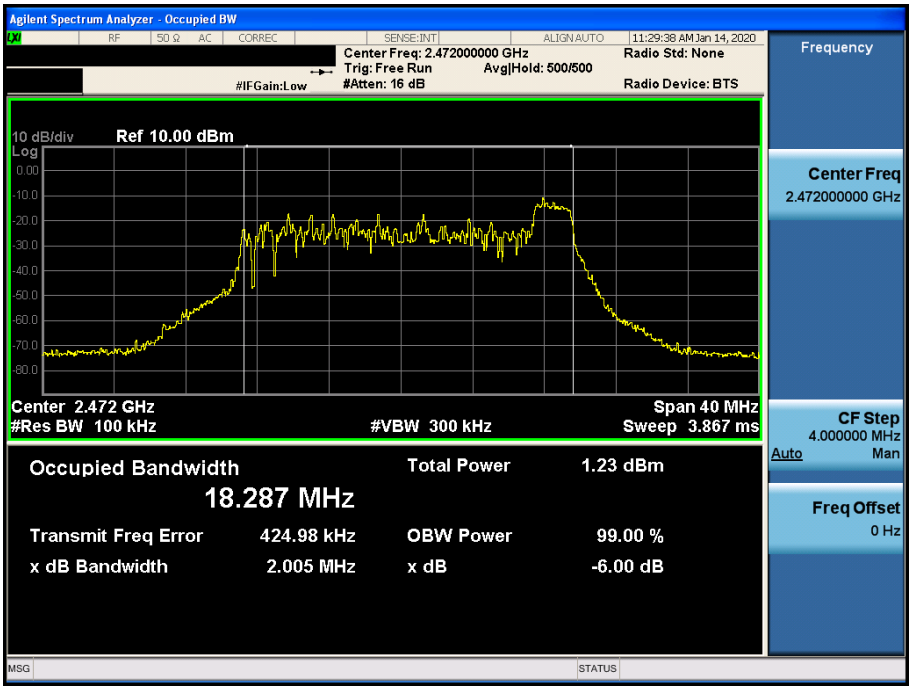
## 6 dB Bandwidth

TM 1 & ANT 2 & 26Tone & RU 0 & 2462

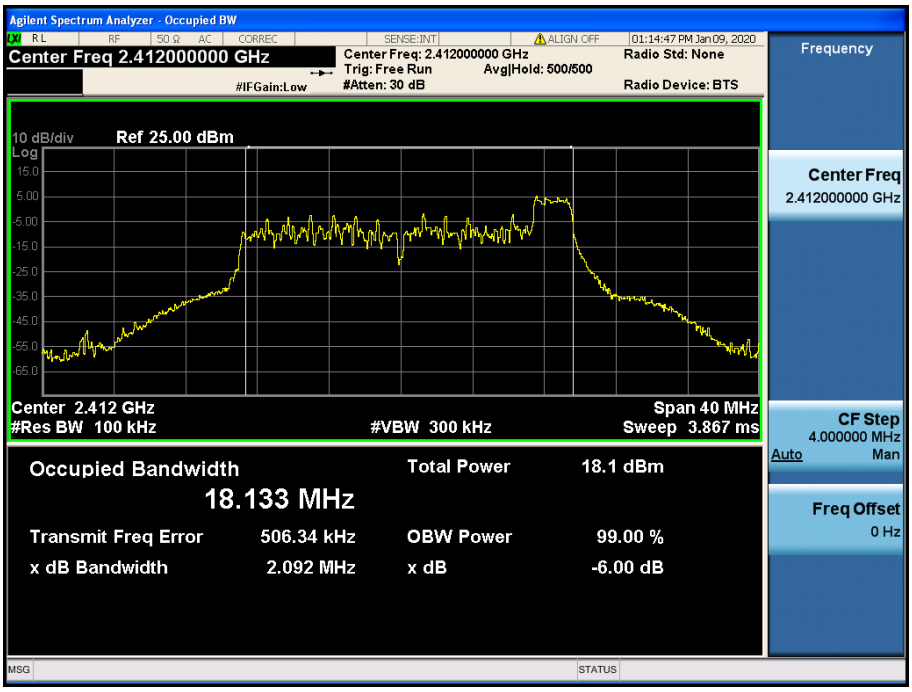



## 6 dB Bandwidth

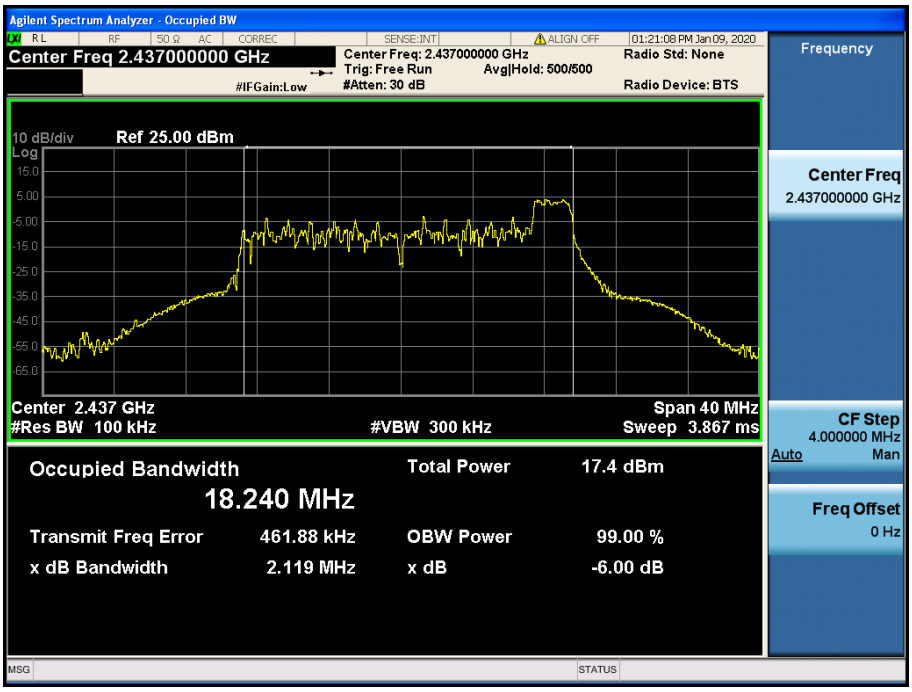
TM 1 & ANT 2 & 26Tone & RU 0 & 2472



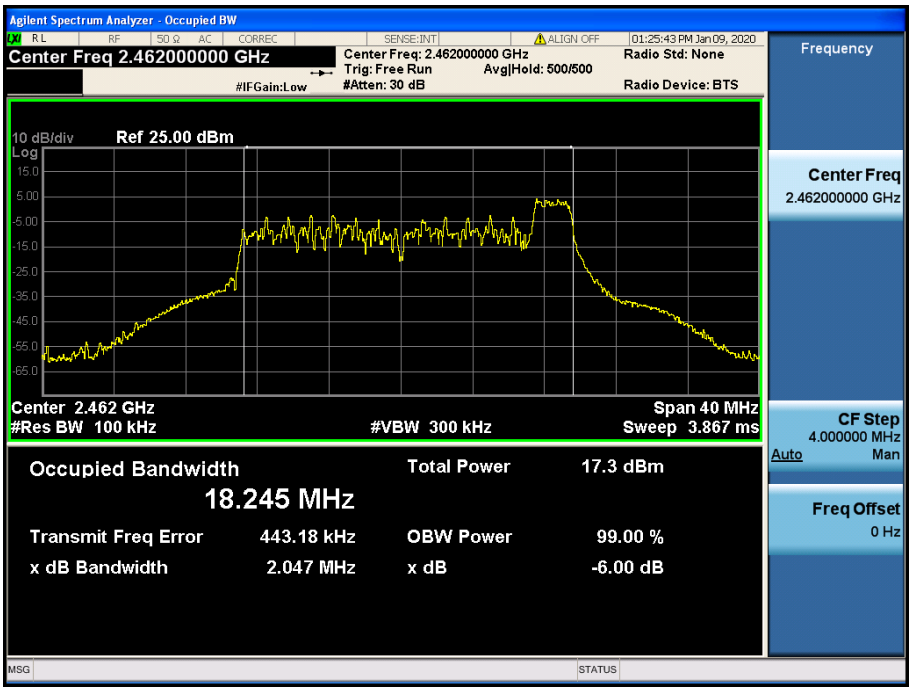
**6 dB Bandwidth** TM 2 & ANT 2 & 26Tone & RU 0 & 2412



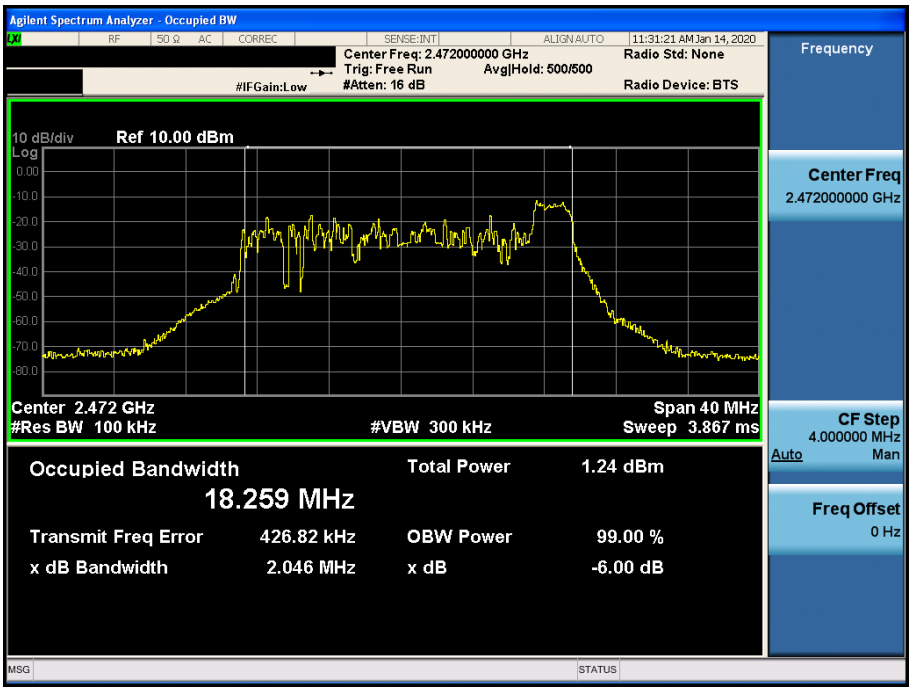

**6 dB Bandwidth** TM 2 & ANT 2 & 26Tone & RU 0 & 2437



**6 dB Bandwidth** TM 2 & ANT 2 & 26Tone & RU 0 & 2462




**6 dB Bandwidth** TM 2 & ANT 2 & 26Tone & RU 0 & 2472

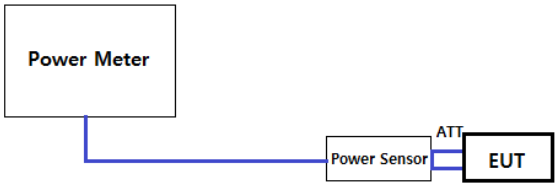


## 8.2 Maximum peak conducted output power

### ▣ Test Requirements and limit, §15.247(b)

The maximum permissible conducted output power is **1 Watt**.

### ▣ Test Configuration




### ▣ Test Procedure

1. **PKPM1 Peak power meter method of KDB558074 D01v05r02**

   The maximum conducted output powers were measured using a broadband peak RF power meter which has greater video bandwidth than DUT's DTS bandwidth and utilize a fast-responding diode detector.

2. **Method AVGPM-G (Measurement using a gated RF average power meter) of KDB558074 D01v05r02**

   The average conducted output powers were measured using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

   Note: The measure-and-sum technique is used for test mode with multiple transmitting.

## ▣ Test Results: Comply

| ANT | Tones | RU Index | Det. | Maximum Peak Conducted Output Power (dBm) for 802.11ax | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Freq.(MHz) / Data Rate [Mbps] | | | | | | | |
| | | | | TM 1 (CDD) | | | | TM 2 (SDM) | | | |
| | | | | 2412 | 2437 | 2462 | 2472 | 2412 | 2437 | 2462 | 2472 |
| ANT 1 | 26 | 0 | PK | 18.86 | 19.44 | 18.89 | 4.75 | 18.78 | 19.24 | 18.86 | 3.96 |
| | | | AV | 8.17 | 8.68 | 8.31 | -6.71 | 8.15 | 8.68 | 8.28 | -6.22 |
| | | 4 | PK | 18.81 | 19.18 | 18.83 | 3.00 | 18.75 | 18.99 | 18.86 | 3.63 |
| | | | AV | 8.14 | 8.74 | 8.29 | -5.51 | 8.18 | 8.61 | 8.14 | -5.24 |
| | | 8 | PK | 18.79 | 19.18 | 18.85 | 2.72 | 18.81 | 19.13 | 18.81 | 1.72 |
| | | | AV | 8.33 | 8.42 | 8.07 | -7.34 | 8.37 | 8.35 | 8.03 | -6.58 |
| | 52 | 37 | PK | 18.82 | 19.26 | 18.80 | 2.46 | 18.82 | 19.16 | 18.92 | 1.58 |
| | | | AV | 8.24 | 8.83 | 8.39 | -6.33 | 8.18 | 8.70 | 8.43 | -6.06 |
| | | 38 | PK | 18.80 | 19.19 | 18.84 | 2.87 | 18.81 | 19.14 | 18.84 | 2.64 |
| | | | AV | 8.35 | 8.90 | 8.51 | -5.42 | 8.35 | 8.98 | 8.61 | -5.38 |
| | | 40 | PK | 18.80 | 19.17 | 18.85 | 2.02 | 18.78 | 19.12 | 18.72 | 2.35 |
| | | | AV | 8.42 | 8.53 | 8.21 | -6.52 | 8.35 | 8.57 | 8.08 | -6.27 |
| | 106 | 53 | PK | 17.43 | 19.22 | 18.91 | 2.67 | 18.05 | 18.70 | 18.27 | 2.43 |
| | | | AV | 8.38 | 8.93 | 8.55 | -5.83 | 8.18 | 8.72 | 8.37 | -6.08 |
| | | 54 | PK | 17.43 | 19.19 | 18.79 | 2.37 | 17.56 | 18.03 | 17.66 | 2.31 |
| | | | AV | 8.51 | 8.74 | 8.40 | -5.89 | 8.29 | 8.59 | 8.20 | -6.25 |
| | 242 | 61 | PK | 18.50 | 19.18 | 18.82 | 2.34 | 17.51 | 17.99 | 17.83 | 2.55 |
| | | | AV | 8.52 | 8.97 | 8.57 | -5.55 | 8.42 | 8.88 | 8.47 | -6.33 |
| | SU | | PK | 21.87 | 22.02 | 21.67 | 3.55 | 21.52 | 21.34 | 21.46 | 3.37 |
| | | | AV | 12.24 | 12.34 | 11.28 | -6.74 | 12.20 | 12.02 | 11.84 | -6.84 |
| ANT 2 | 26 | 0 | PK | 19.53 | 18.91 | 19.23 | 2.74 | 19.45 | 18.72 | 19.37 | 2.67 |
| | | | AV | 8.64 | 8.31 | 8.99 | -6.16 | 8.67 | 8.28 | 8.84 | -5.83 |
| | | 4 | PK | 19.50 | 18.75 | 19.12 | 2.38 | 19.49 | 18.76 | 19.06 | 2.61 |
| | | | AV | 9.42 | 8.24 | 9.41 | -5.36 | 9.62 | 8.25 | 9.31 | -5.07 |
| | | 8 | PK | 19.52 | 18.77 | 19.12 | 3.11 | 19.48 | 18.73 | 19.04 | 2.72 |
| | | | AV | 9.23 | 8.53 | 8.11 | -8.12 | 8.99 | 8.28 | 8.12 | -7.70 |
| | 52 | 37 | PK | 19.42 | 18.85 | 19.11 | 2.11 | 19.49 | 18.72 | 19.01 | 2.26 |
| | | | AV | 9.01 | 8.44 | 9.21 | -5.57 | 9.04 | 8.38 | 9.10 | -5.93 |
| | | 38 | PK | 19.41 | 18.78 | 19.44 | 3.18 | 19.48 | 18.73 | 19.02 | 2.87 |
| | | | AV | 9.45 | 8.39 | 9.56 | -5.11 | 9.39 | 8.17 | 9.21 | -5.53 |
| | | 40 | PK | 19.48 | 18.77 | 19.14 | 2.34 | 19.47 | 18.70 | 19.01 | 1.49 |
| | | | AV | 9.28 | 8.51 | 8.43 | -7.43 | 9.15 | 9.20 | 8.08 | -7.10 |
| | 106 | 53 | PK | 19.64 | 18.82 | 19.11 | 3.24 | 19.38 | 18.37 | 18.92 | 1.61 |
| | | | AV | 9.28 | 8.58 | 9.58 | -5.26 | 9.27 | 8.32 | 9.20 | -6.56 |
| | | 54 | PK | 19.56 | 18.77 | 18.83 | 1.77 | 18.32 | 17.97 | 18.32 | 1.36 |
| | | | AV | 9.46 | 8.48 | 8.83 | -6.55 | 9.40 | 8.35 | 8.58 | -6.84 |
| | 242 | 61 | PK | 19.46 | 18.67 | 19.13 | 2.68 | 19.09 | 18.14 | 18.91 | 2.84 |
| | | | AV | 9.48 | 8.56 | 9.34 | -5.57 | 9.46 | 8.43 | 9.08 | -6.23 |
| | SU | | PK | 21.21 | 20.84 | 20.79 | 4.81 | 20.92 | 20.27 | 21.13 | 2.67 |
| | | | AV | 12.76 | 12.04 | 11.59 | -6.75 | 12.74 | 11.57 | 12.04 | -7.67 |
| Sum (ANT 1+2) | 26 | 0 | PK | 22.22 | 22.20 | 22.07 | 6.87 | 22.14 | 22.00 | 22.13 | 6.37 |
| | | 4 | PK | 22.18 | 21.98 | 21.99 | 5.71 | 22.15 | 21.89 | 21.97 | 6.16 |
| | | 8 | PK | 22.18 | 21.99 | 22.00 | 5.93 | 22.17 | 21.94 | 21.93 | 5.26 |
| | 52 | 37 | PK | 22.14 | 22.07 | 21.97 | 5.30 | 22.18 | 21.96 | 21.98 | 4.94 |
| | | 38 | PK | 22.12 | 22.00 | 22.16 | 6.04 | 22.17 | 21.95 | 21.94 | 5.77 |
| | | 40 | PK | 22.16 | 21.98 | 22.01 | 5.19 | 22.15 | 21.93 | 21.88 | 4.95 |
| | 106 | 53 | PK | 21.69 | 22.04 | 22.02 | 5.97 | 21.78 | 21.55 | 21.62 | 5.05 |
| | | 54 | PK | 21.63 | 22.00 | 21.82 | 5.09 | 20.97 | 21.01 | 21.01 | 4.87 |
| | 242 | 61 | PK | 22.01 | 21.94 | 21.99 | 5.52 | 21.38 | 21.07 | 21.41 | 5.71 |
| | SU | | PK | 24.56 | 24.48 | 24.26 | 7.24 | 24.24 | 23.85 | 24.31 | 6.04 |

**Note : Worst case for SU is MCS 5.**

## 8.3 Maximum power spectral density

### ▣ Test requirements and limit, §15.247(e)

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.

### ▣ Test Configuration:

Refer to the APPENDIX I.

### ▣ Test Procedure

- **KDB558074 D01v05r02 - Section 8.4**
- **ANSI C63.10-2013 – Section 11.10.2**

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to **1.5 times** the DTS bandwidth.
3. Set the RBW to : **3 kHz** ≤ RBW ≤ **100 kHz**
4. Set the VBW ≥ **3 x RBW**
5. Detector = **Peak**
6. Sweep time = **Auto couple**
7. Trace mode = **Max hold.**
8. Allow trace to fully stabilize.
9. Use the **peak marker function** to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

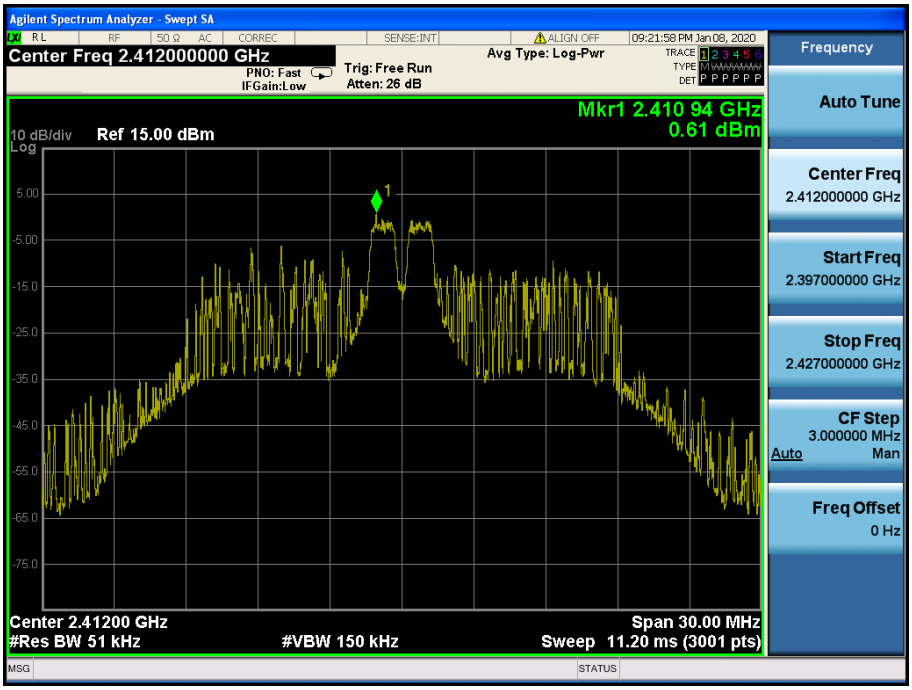
## ▣ Test Results: Comply

| ANT | Tones | RU Index | Power Spectral Density (dBm) for *802.11ax* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | TM 1 (CDD) | | | | TM 2 (SDM) | | | |
| | | | 2412 | 2437 | 2462 | 2472 | 2412 | 2437 | 2462 | 2472 |
| ANT 1 | 26 | 0 | 0.08 | 0.85 | 0.16 | -15.29 | **0.91** | **2.38** | **1.44** | **-13.11** |
| | | 4 | **0.61** | **1.08** | **1.41** | **-13.03** | 0.61 | 0.97 | 0.57 | -13.11 |
| | | 8 | -0.05 | 0.17 | -0.30 | -15.22 | 1.59 | 2.32 | 1.91 | -12.47 |
| | 52 | 37 | -2.69 | -1.71 | -2.56 | -17.62 | -2.28 | -1.61 | -0.20 | -15.19 |
| | | 38 | -2.61 | -1.52 | -0.94 | -16.15 | 0.77 | 1.10 | 0.52 | -13.53 |
| | | 40 | -1.78 | -2.02 | -1.61 | -16.91 | -0.42 | -1.32 | -0.43 | -15.97 |
| | 106 | 53 | -4.98 | -4.85 | -4.74 | -19.30 | -2.67 | -2.28 | -2.83 | -16.88 |
| | | 54 | -5.08 | -3.66 | -5.05 | -19.20 | -2.13 | -2.59 | -3.44 | -16.42 |
| | 242 | 61 | -12.17 | -11.82 | -12.78 | -31.41 | -16.28 | -15.76 | -16.00 | -31.43 |
| | SU | | -11.81 | -11.56 | -12.13 | -31.25 | -11.85 | -11.13 | -12.54 | -31.34 |
| ANT 2 | 26 | 0 | **0.88** | **0.36** | **1.06** | **-13.85** | 1.23 | 0.75 | 1.26 | -14.16 |
| | | 4 | 0.95 | 0.74 | 0.69 | -13.32 | **3.18** | **1.81** | **2.81** | **-11.93** |
| | | 8 | 0.58 | 0.18 | -0.31 | -16.32 | 1.80 | 0.27 | -0.21 | -16.68 |
| | 52 | 37 | -1.79 | -2.80 | -1.61 | -17.17 | -1.05 | -1.75 | -0.03 | -15.09 |
| | | 38 | -0.90 | -2.40 | -1.20 | -16.42 | -0.26 | -1.67 | -0.51 | -15.37 |
| | | 40 | -1.79 | -2.53 | -2.13 | -18.79 | -0.26 | -1.25 | -0.97 | -16.98 |
| | 106 | 53 | -4.08 | -5.07 | -4.07 | -18.82 | -3.00 | -4.51 | -3.88 | -17.79 |
| | | 54 | -4.87 | -5.02 | -4.38 | -19.66 | -2.48 | -3.86 | -3.30 | -18.78 |
| | 242 | 61 | -10.68 | -12.44 | -11.96 | -32.23 | -14.74 | -16.48 | -15.06 | -29.71 |
| | SU | | -11.27 | -12.19 | -12.67 | -31.35 | -10.67 | -12.96 | -12.53 | -31.14 |
| **Sum (ANT 1+2)** | **26** | **0** | 3.51 | 3.62 | 3.64 | -11.50 | 4.08 | 4.65 | 4.36 | -10.59 |
| | | **4** | 3.79 | 3.92 | 4.08 | -10.16 | 5.09 | 4.42 | 4.84 | -9.47 |
| | | **8** | 3.29 | 3.19 | 2.71 | -12.72 | 4.71 | 4.43 | 3.99 | -11.07 |
| | **106** | **37** | 0.79 | 0.79 | 0.95 | -14.38 | 1.39 | 1.33 | 2.90 | -12.13 |
| | | **38** | 1.34 | 1.07 | 1.94 | -13.27 | 3.30 | 2.94 | 3.05 | -11.34 |
| | | **40** | 1.23 | 0.74 | 1.15 | -14.74 | 2.67 | 1.73 | 2.32 | -13.44 |
| | **106** | **53** | -1.50 | -1.95 | -1.38 | -16.04 | 0.18 | -0.24 | -0.31 | -14.30 |
| | | **54** | -1.96 | -1.28 | -1.69 | -16.41 | 0.71 | -0.17 | -0.36 | -14.43 |
| | **242** | **61** | -8.35 | -9.11 | -9.34 | -28.79 | -12.43 | -13.09 | -12.49 | -27.48 |
| | **SU** | | -8.52 | -8.85 | -9.38 | -28.29 | -8.21 | -8.94 | -9.52 | -28.23 |

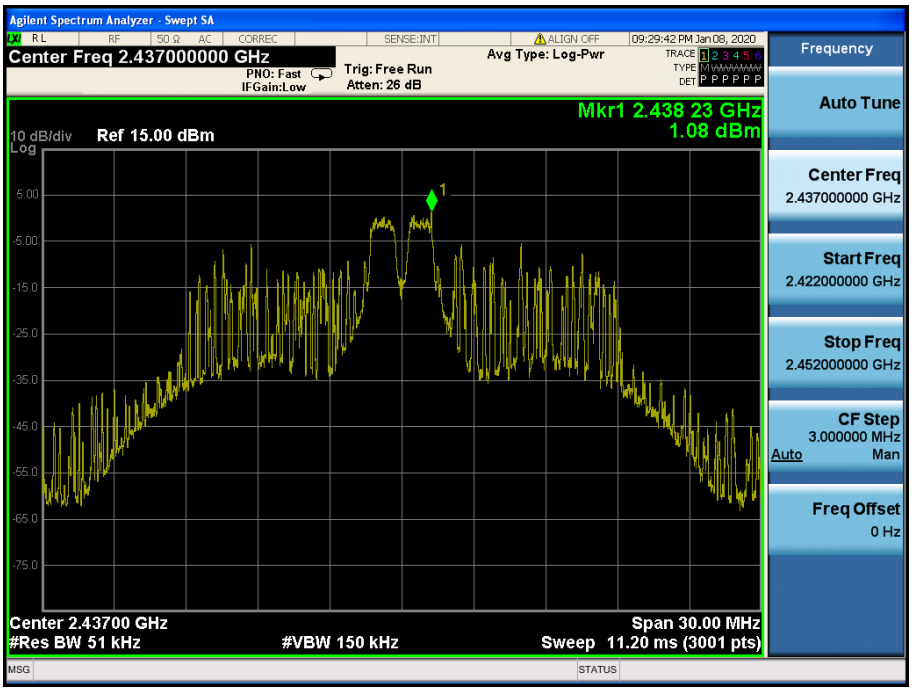
## ▣ RESULT PLOTS

**- This test item was performed in each axis and the worst case data was reported.**

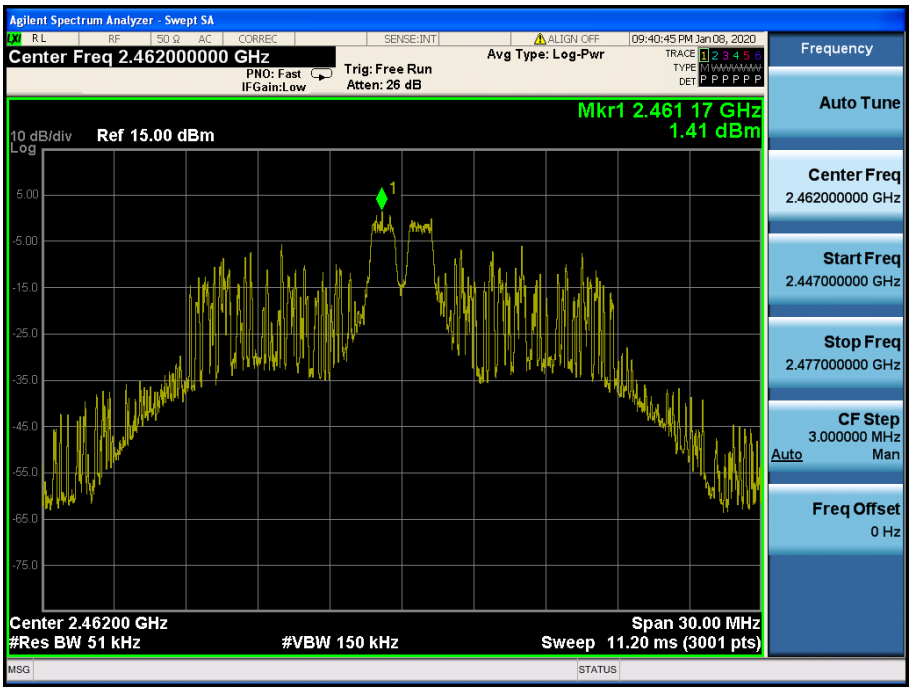
**Maximum PPSD** TM 1 & ANT 1 & 26Tone & RU 4 & 2412



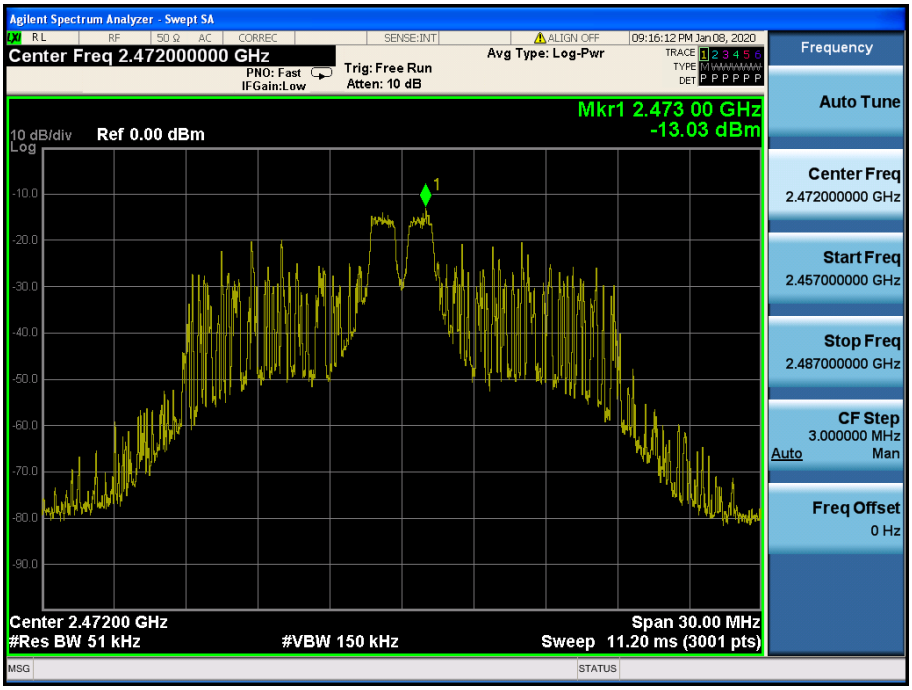

**Maximum PPSD** TM 1 & ANT 1 & 26Tone & RU 4 & 2437



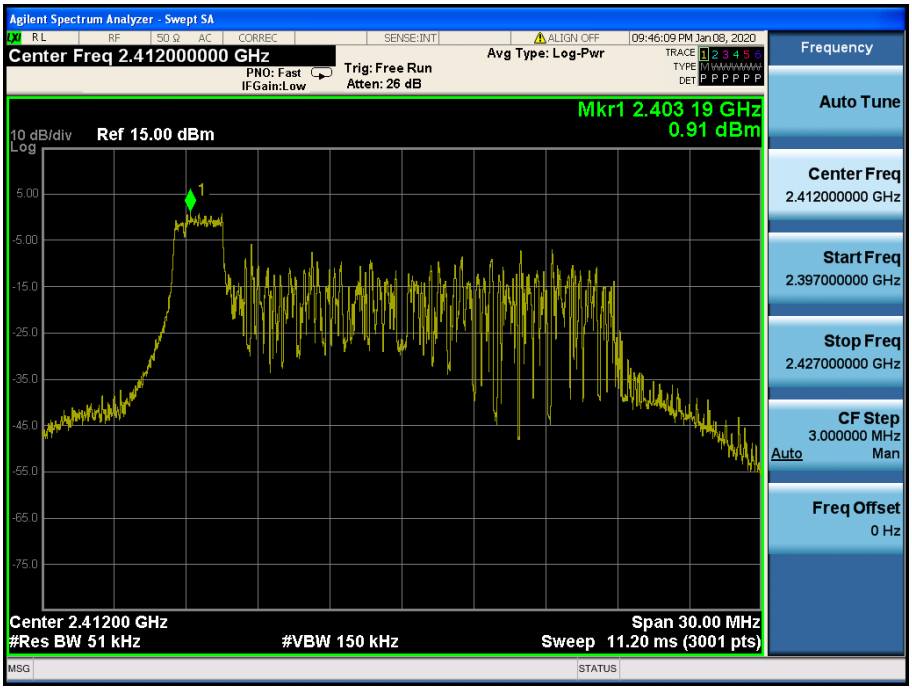
**Maximum PPSD** TM 1 & ANT 1 & 26Tone & RU 4 & 2462



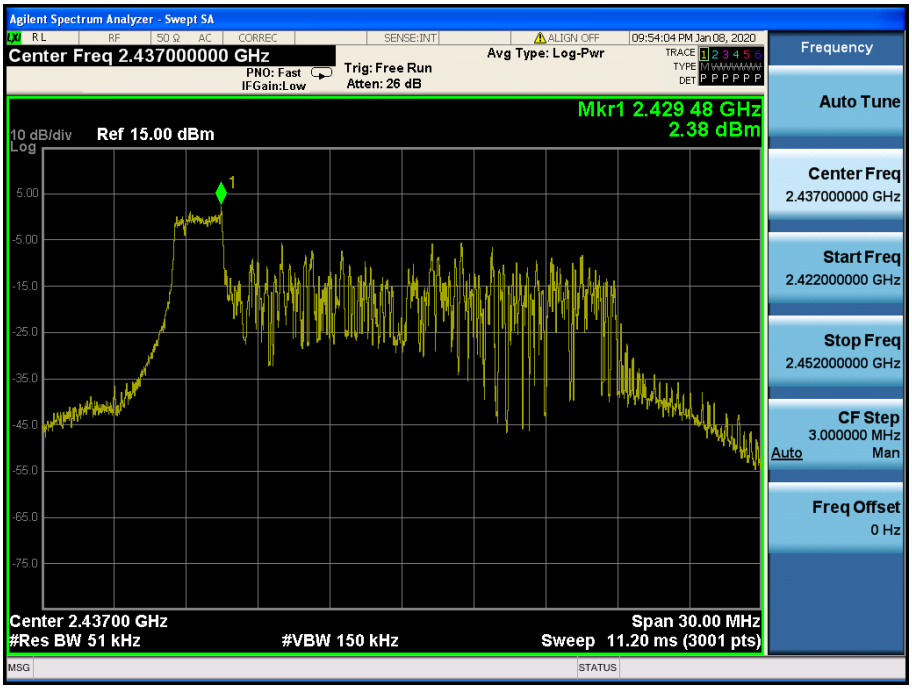

**Maximum PPSD** TM 1 & ANT 1 & 26Tone & RU 4 & 2472



**Maximum PPSD** TM 2 & ANT 1 & 26Tone & RU 0 & 2412

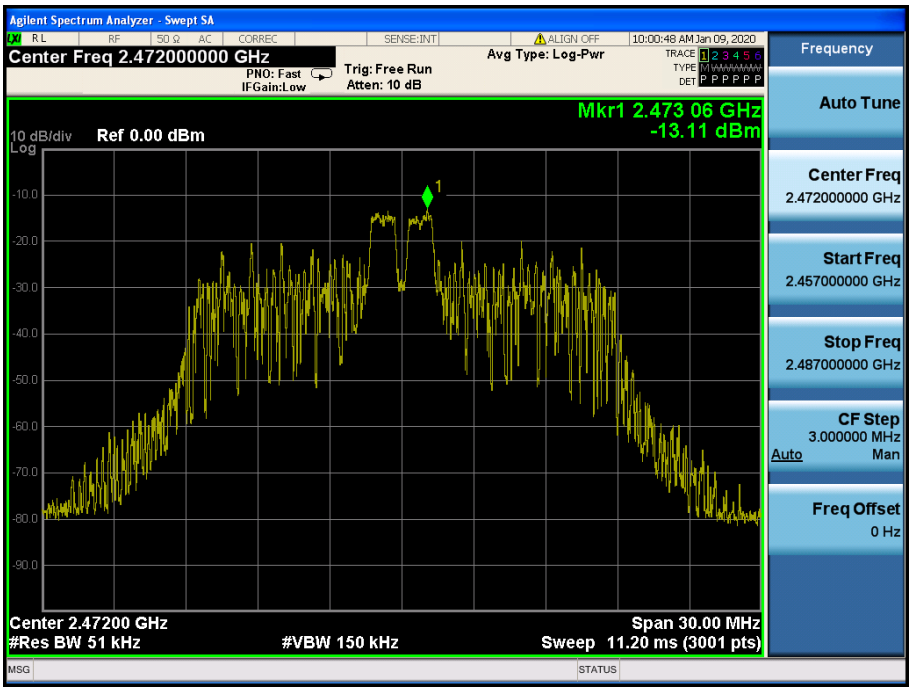



**Maximum PPSD** TM 2 & ANT 1 & 26Tone & RU 0 & 2437

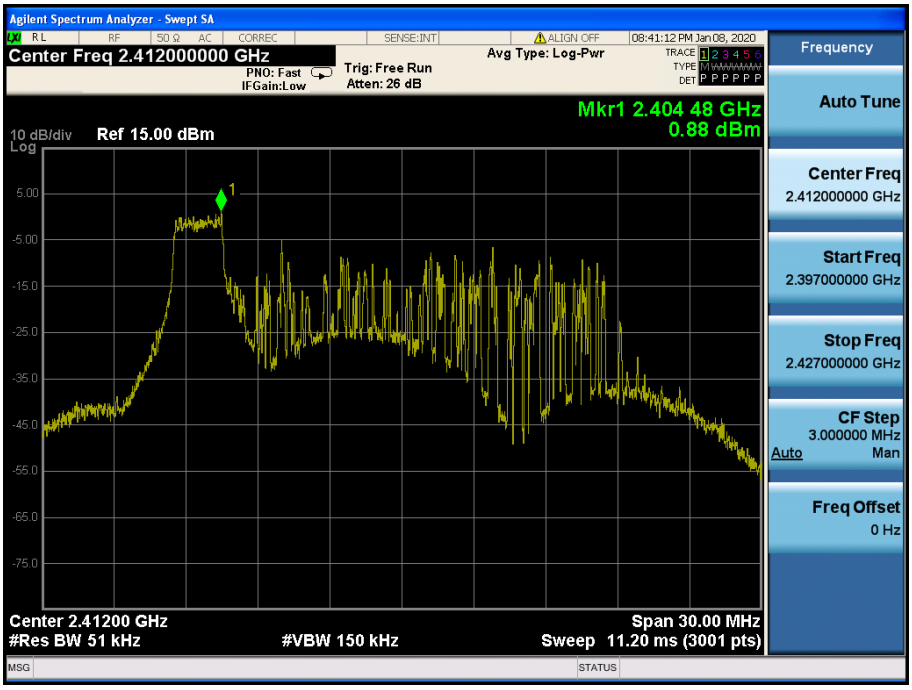


**Maximum PPSD** TM 2 & ANT 1 & 26Tone & RU 0 & 2462

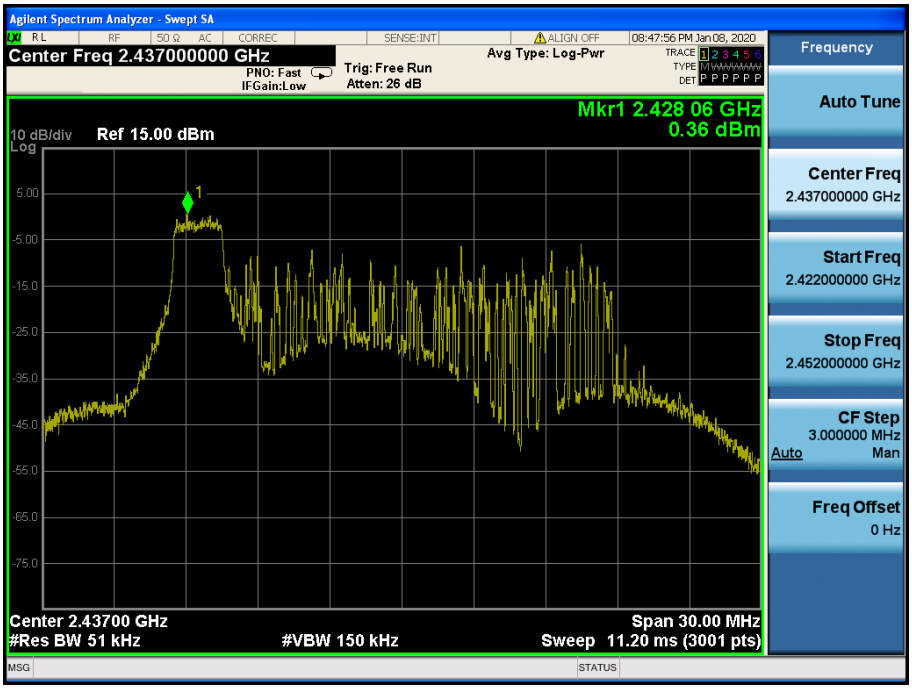
**Maximum PPSD** TM 2 & ANT 1 & 26Tone & RU 0 & 2472



**Maximum PPSD** TM 1 & ANT 2 & 26Tone & RU 0 & 2412

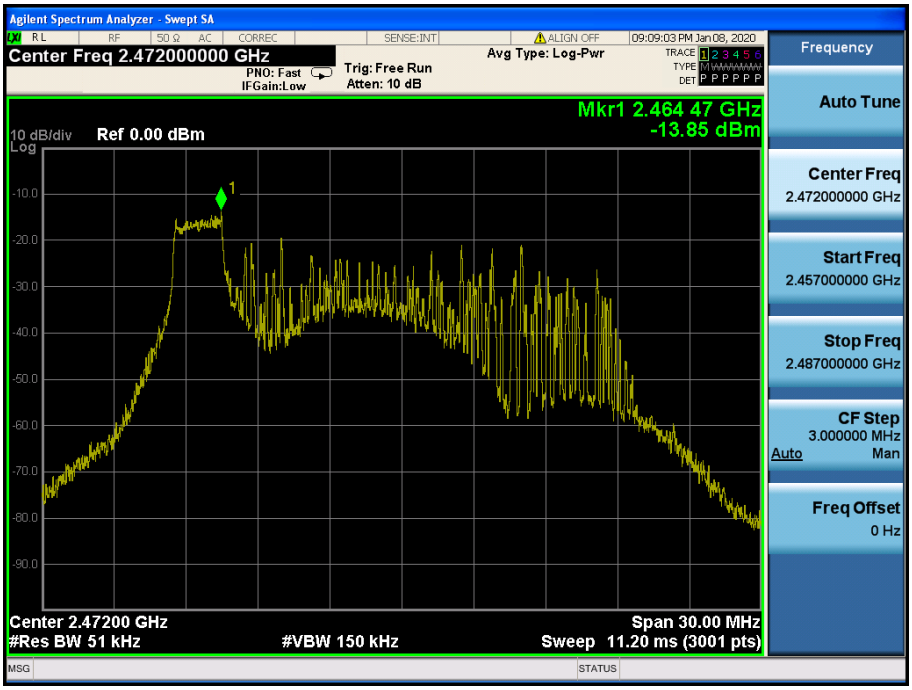



**Maximum PPSD** TM 1 & ANT 2 & 26Tone & RU 0 & 2437

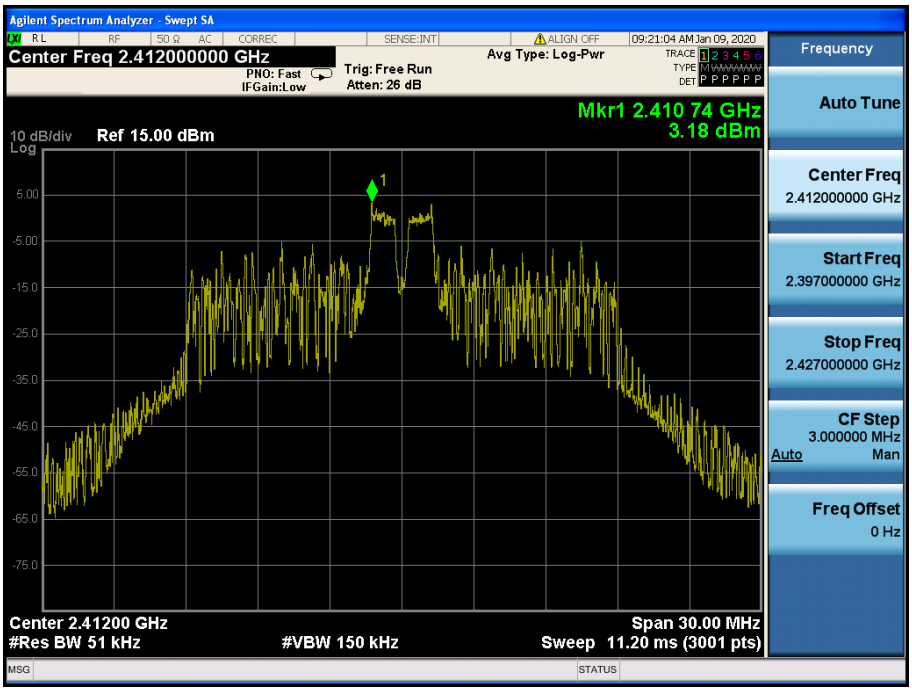


**Maximum PPSD** TM 1 & ANT 2 & 26Tone & RU 0 & 2462

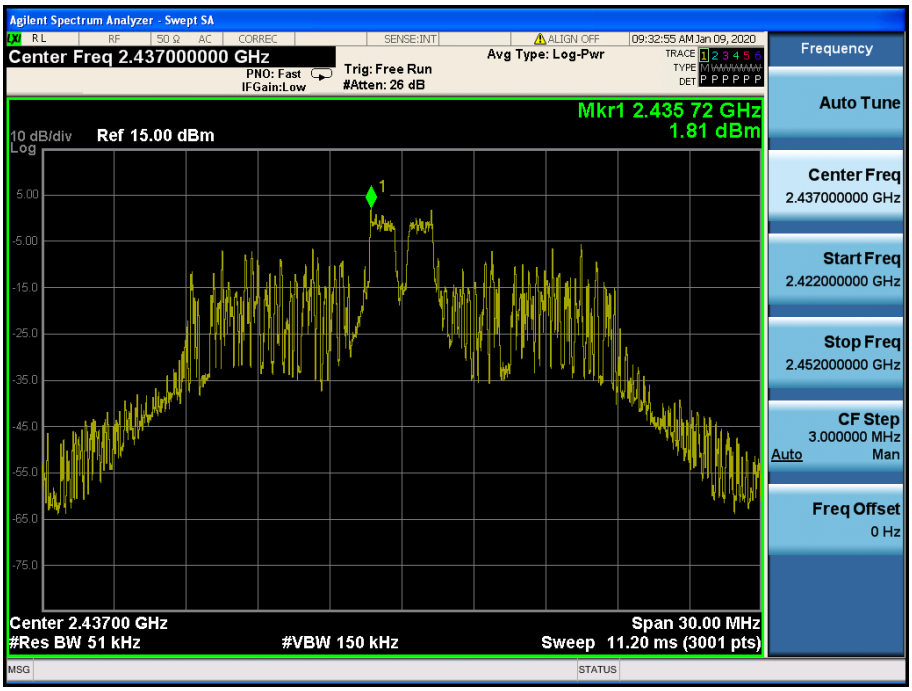
**Maximum PPSD** TM 1 & ANT 2 & 26Tone & RU 0 & 2472



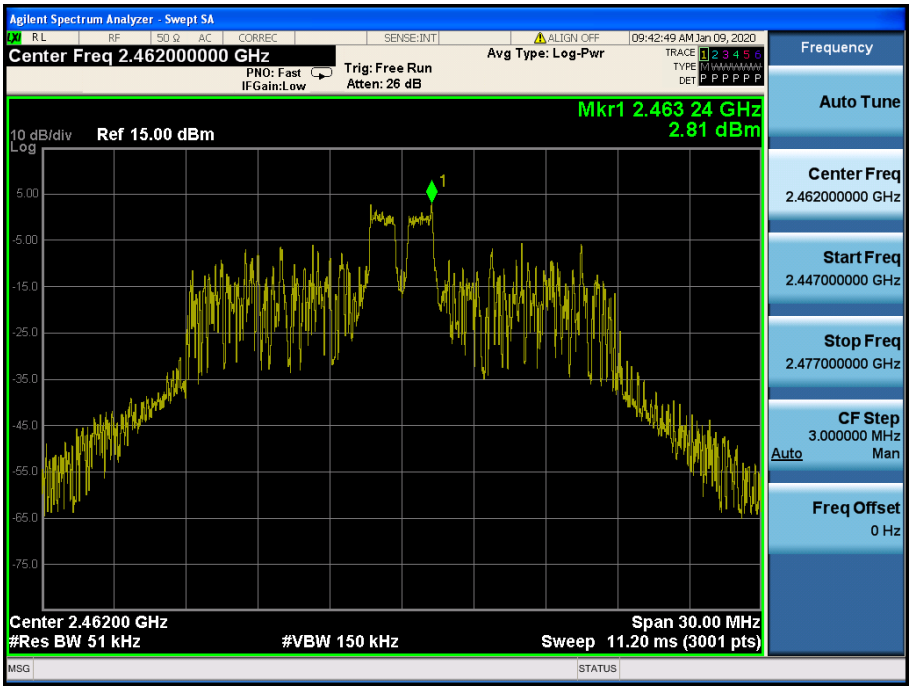
**Maximum PPSD** TM 2 & ANT 2 & 26Tone & RU 4 & 2412



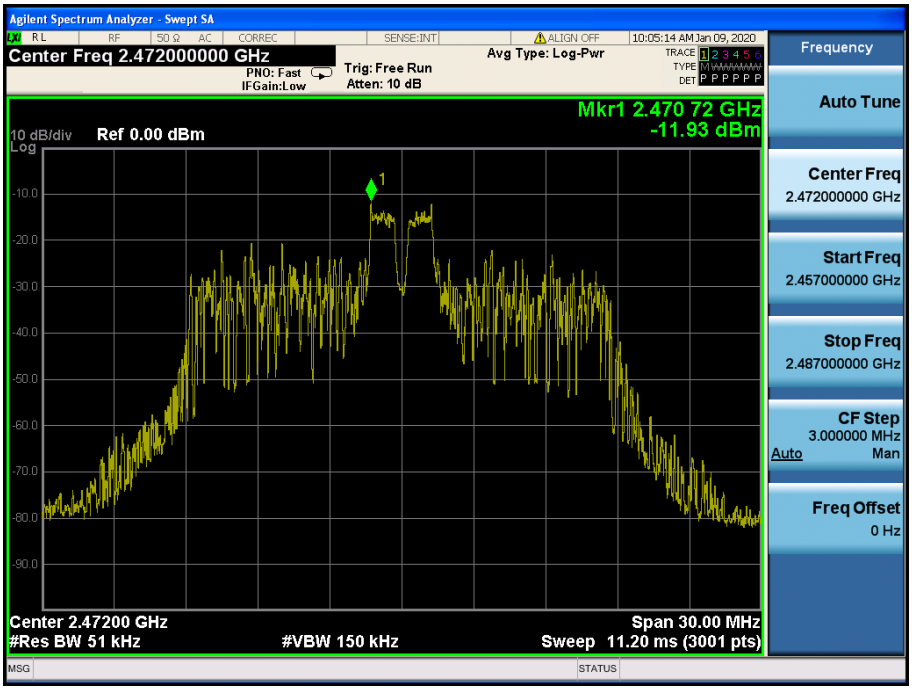

**Maximum PPSD** TM 2 & ANT 2 & 26Tone & RU 4 & 2437



**Maximum PPSD** TM 2 & ANT 2 & 26Tone & RU 4 & 2462




**Maximum PPSD** TM 2 & ANT 2 & 26Tone & RU 4 & 2472



## 8.4 Out of band emissions at the band edge / conducted spurious emissions

### ▣ Test requirements and limit, §15.247(d)

**§15.247(d)** specifies that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:
If **the peak output power procedure** is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated **by at least 20 dB** relative to the maximum measured in-band peak PSD level.
If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in band average PSD level.
In either case, attenuation to levels below the general emission limits specified in **§15.209(a)** is not required.

### ▣ Test Configuration:

Refer to the APPENDIX I.

### ▣ Test Procedure

- **KDB558074 D01v05r02 - Section 8.5**
- **ANSI C63.10-2013 – Section 11.11**

**Reference level measurement**

1. Set instrument center frequency to DTS channel center frequency.
2. Set the span to ≥ 1.5 times the DTS bandwidth.
3. Set the RBW = **100 kHz.**
4. Set the VBW ≥ **3 x RBW.**
5. Detector = **Peak.**
6. Sweep time = **Auto couple.**
7. Trace mode = **Max hold.**
8. **Allow trace to fully stabilize.**
9. Use the peak marker function to determine the maximum PSD level.

**Emission level measurement**

1. Set the center frequency and span to encompass frequency range to be measured.
2. Set the RBW = **100 kHz. (Actual 1 MHz , See below note)**
3. Set the VBW ≥ **3 x RBW. (Actual 3 MHz, See below note)**
4. Detector = **Peak**.
5. Ensure that the number of measurement points ≥ Span / RBW.
6. Sweep time = **Auto couple.**
7. Trace mode = **Max hold.**
8. **Allow the trace to stabilize.** (this may take some time, depending on the extent of the span)
9. Use the peak marker function to determine the maximum amplitude level.

**Note:** The conducted spurious emission was tested with below settings.
**Frequency range: 9 kHz ~ 30 MHz**
RBW = 100 kHz, VBW = 300 kHz, Sweep time = Auto, Detector = Peak, Trace = Max hold, Sweep points: 40001
**Frequency range: 30 MHz ~ 10 GHz, 10 GHz ~ 25 GHz**
RBW = 1 MHz, VBW = 3 MHz, Sweep time = Auto, Detector = Peak, Trace = Max hold, Sweep points: 40001

**LIMIT LINE = 20 dB below of the reference level of above measurement procedure Step 2. (RBW = 100 kHz, VBW = 300 kHz)**

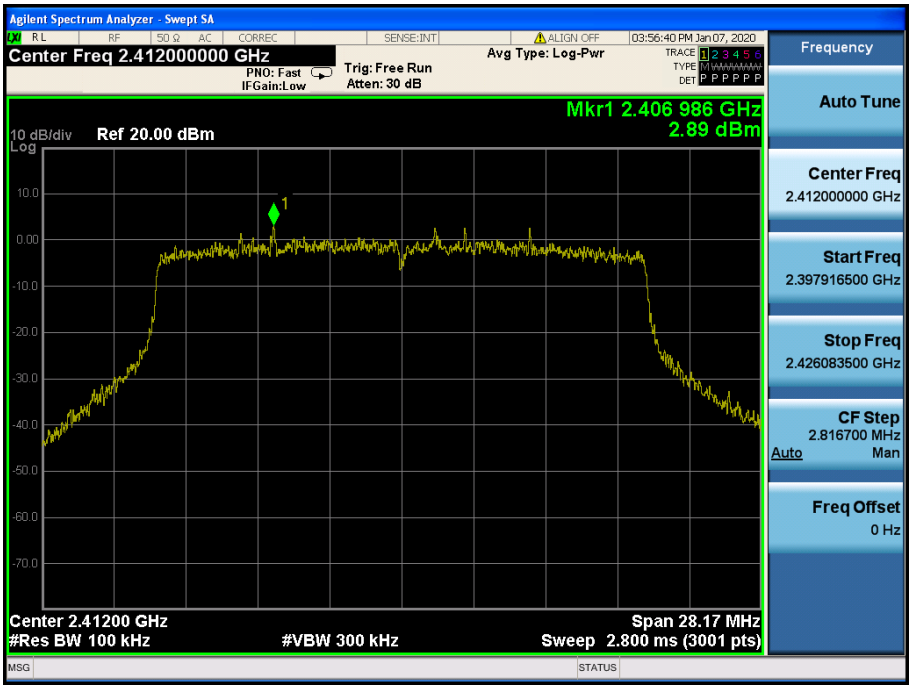
If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 kHz, VBW = 300 kHz, SPAN = 100 MHz and BINS = 2001 to get accurate emission level within 100 kHz BW.

## ▣ RESULT PLOTS

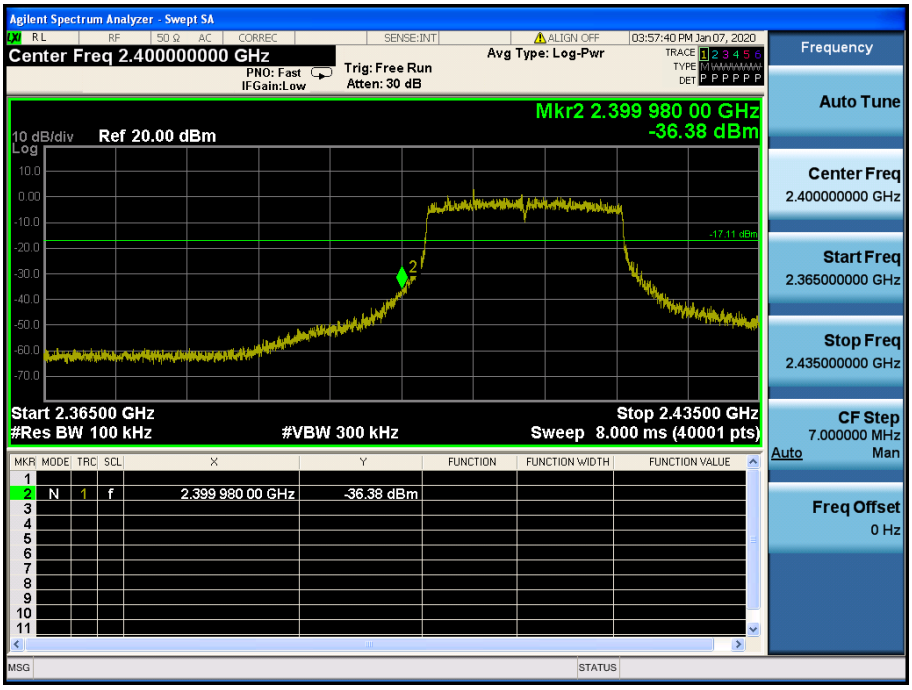
**- This test item was tested on all items, and only the highest max power case data was reported.**

**TM 1 & ANT 1 & SU & 2412**

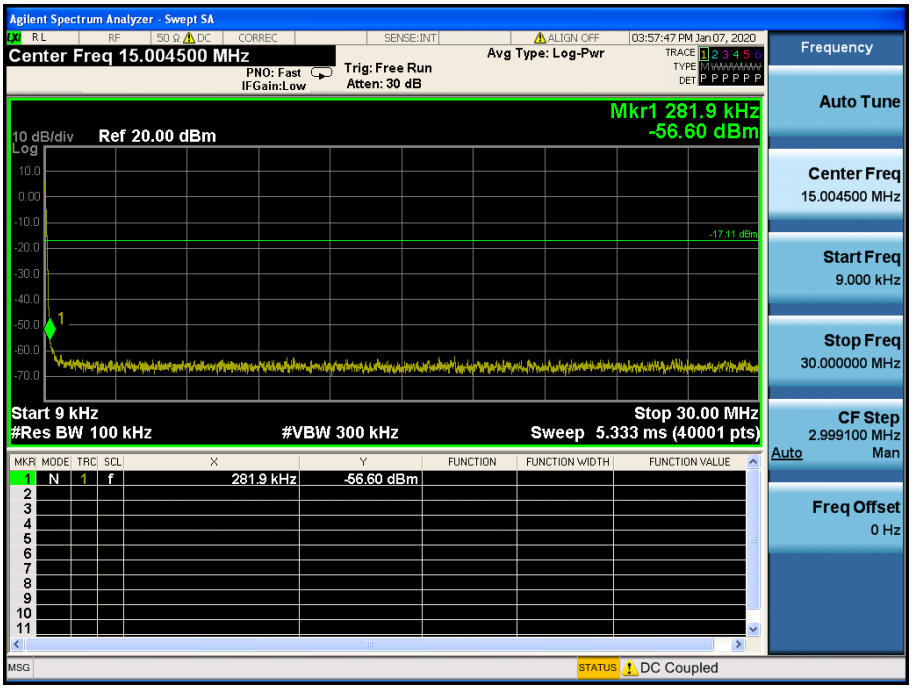
**Reference**

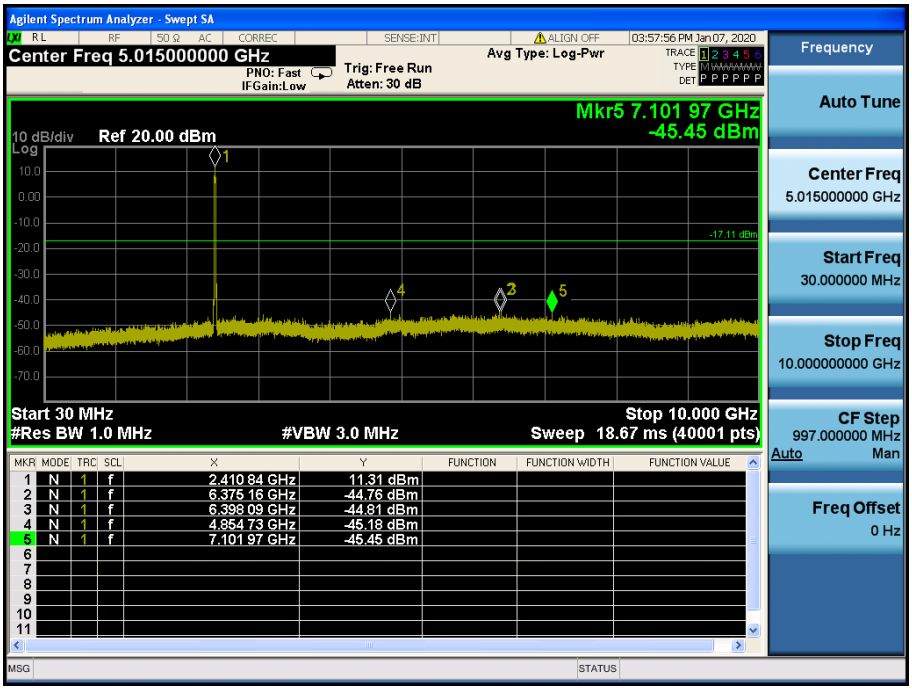



**Low Band-edge**

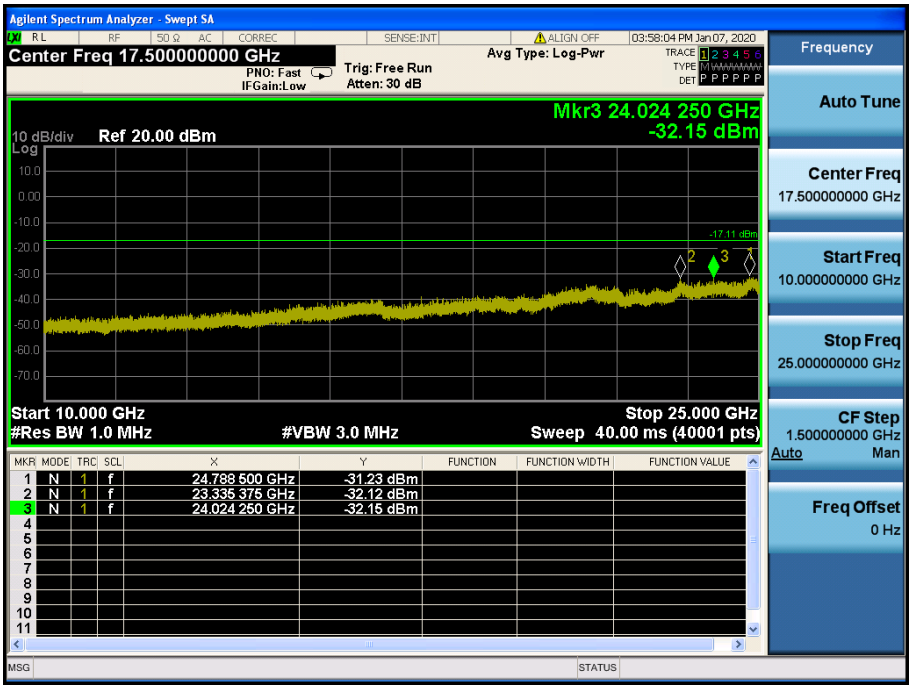


## Conducted Spurious Emissions



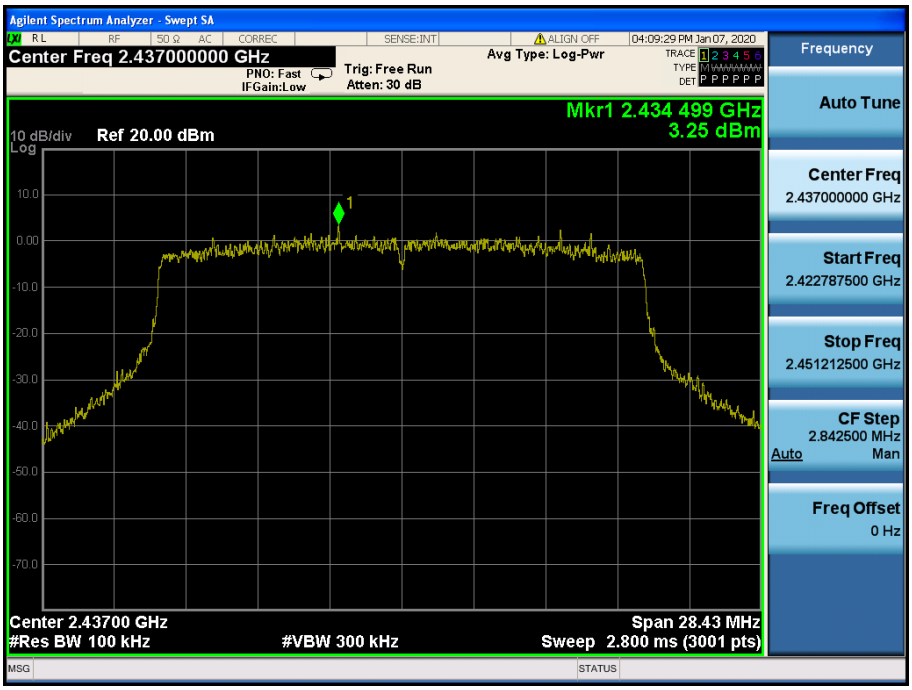



## Conducted Spurious Emissions

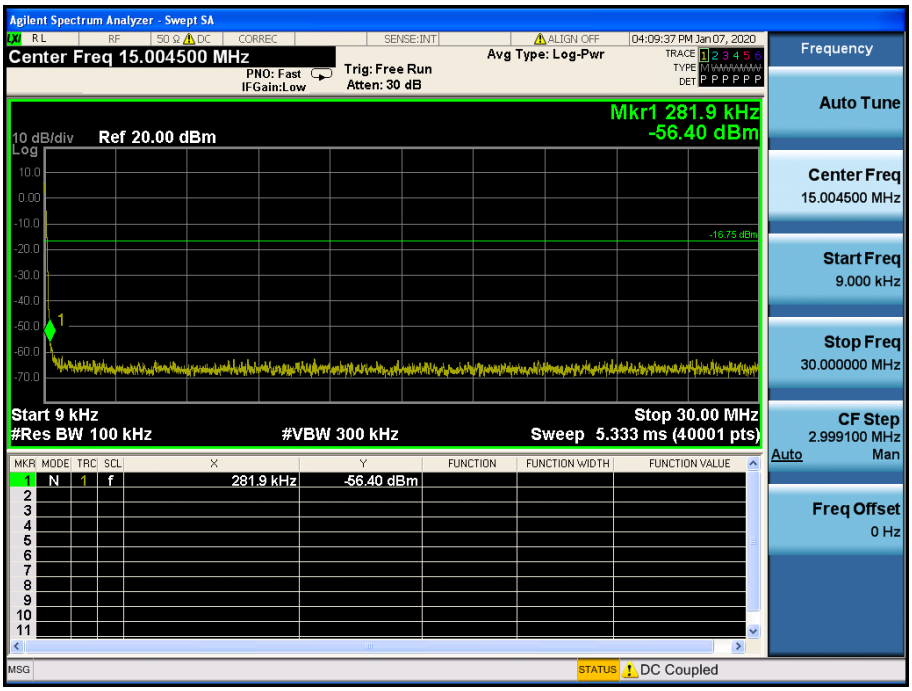


## TM 1 & ANT 1 & SU & 2437

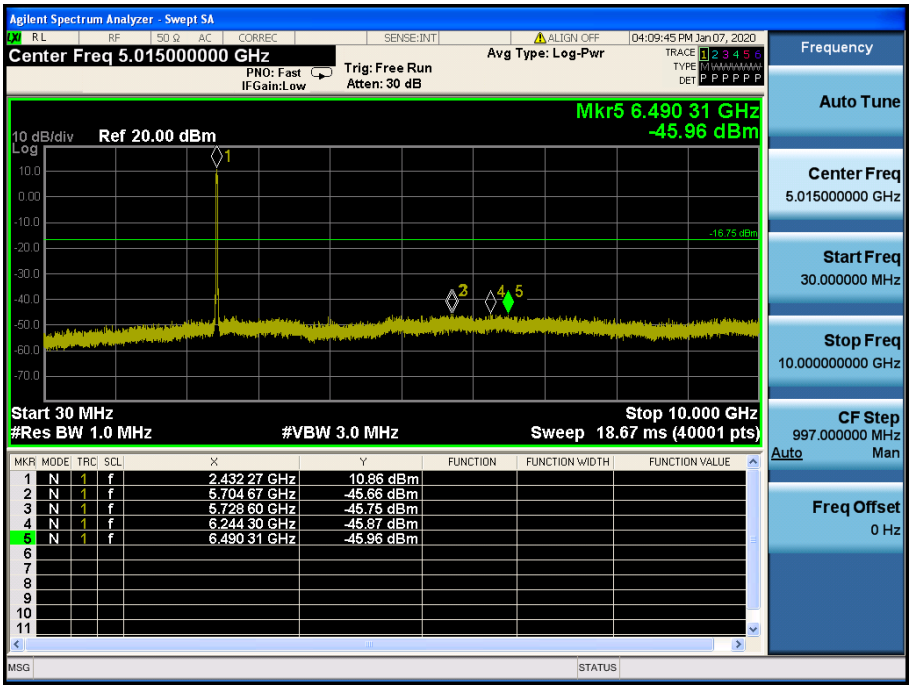
### Reference

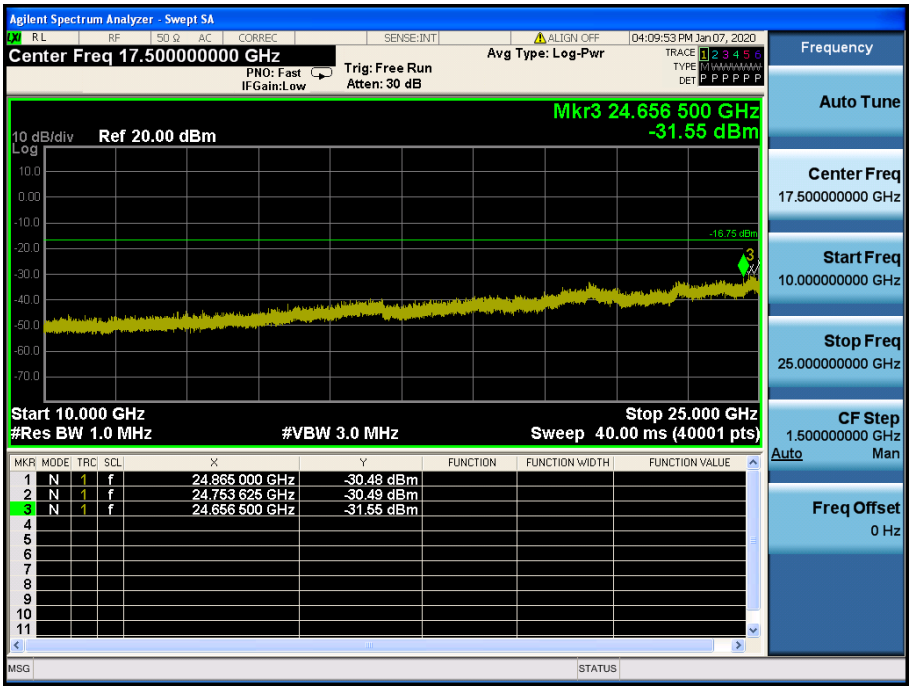



### Conducted Spurious Emissions



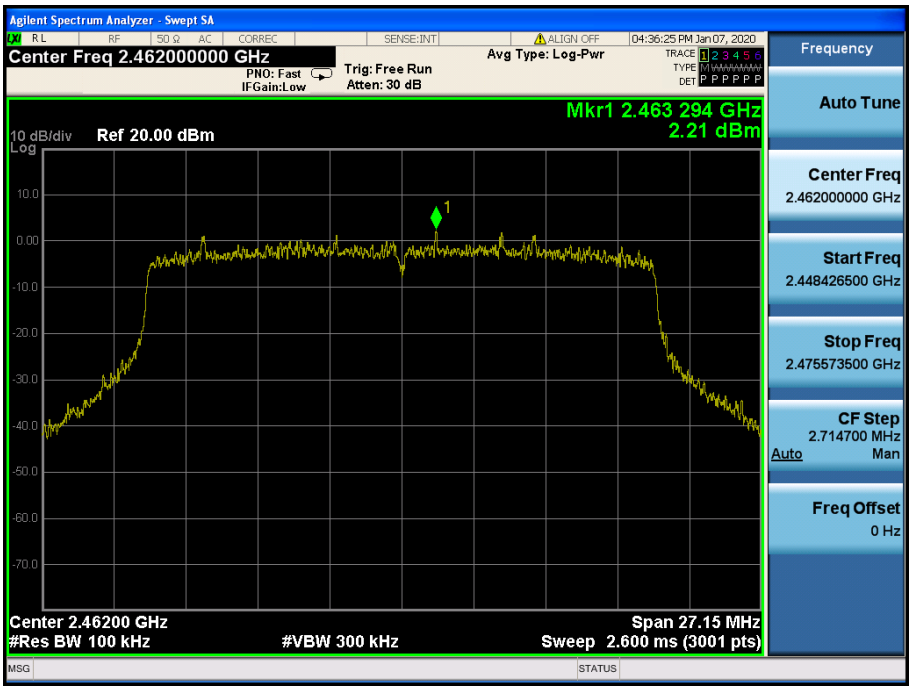
## Conducted Spurious Emissions



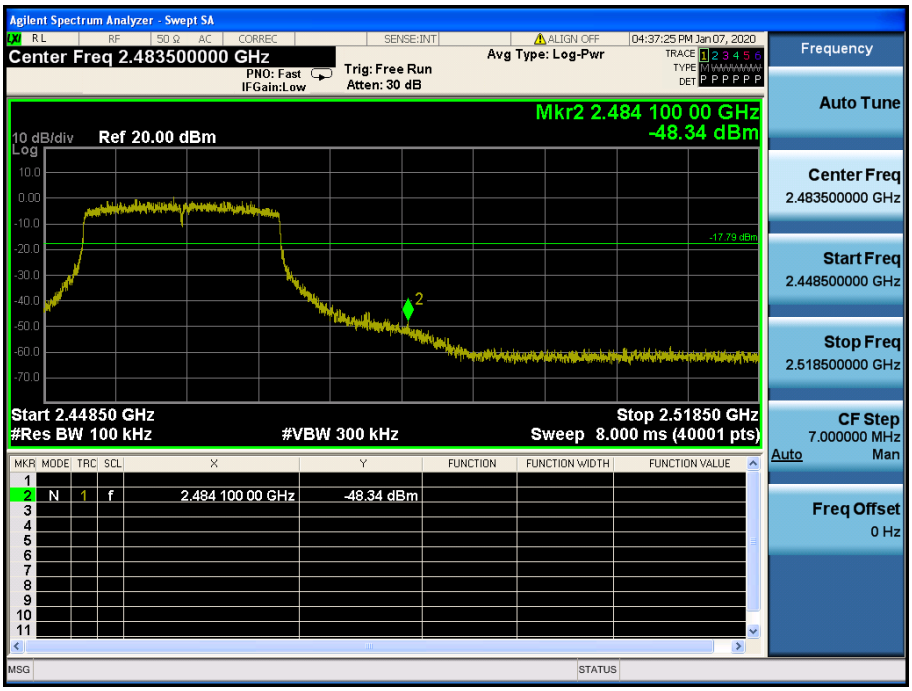



## TM 1 & ANT 1 & SU & 2462

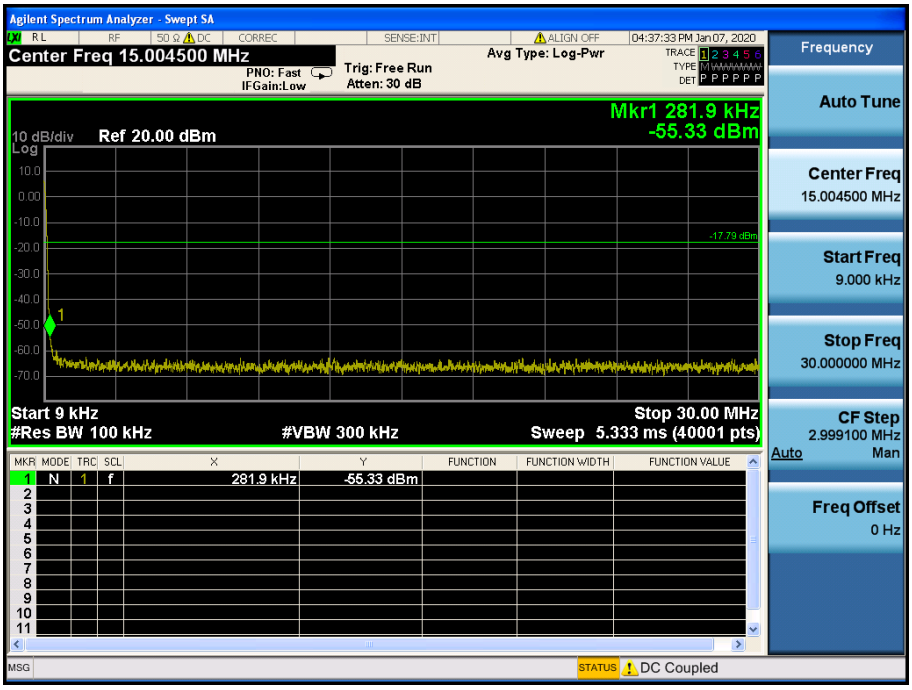
### Reference

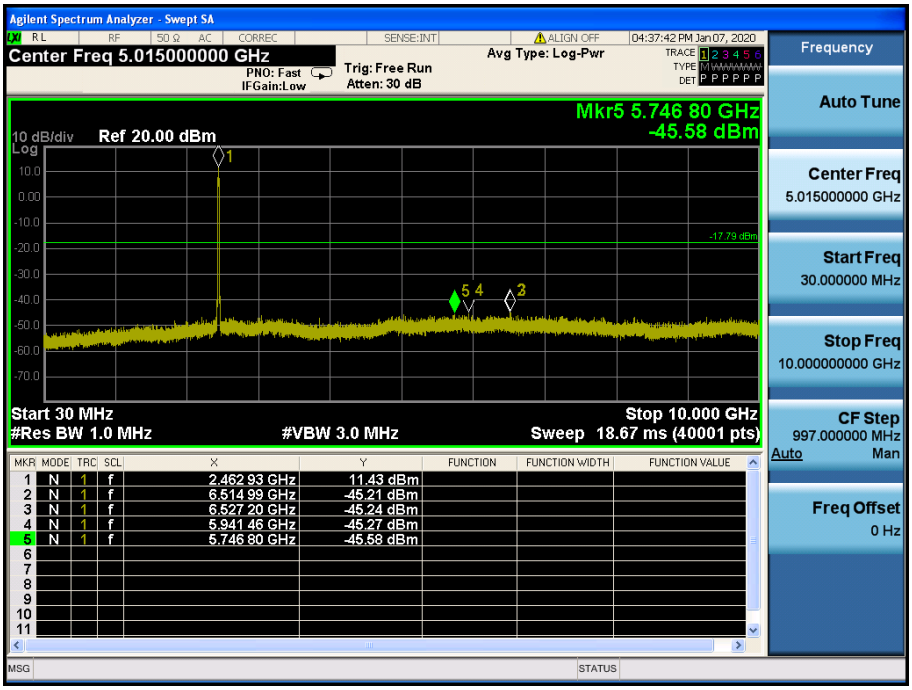



### High Band-edge

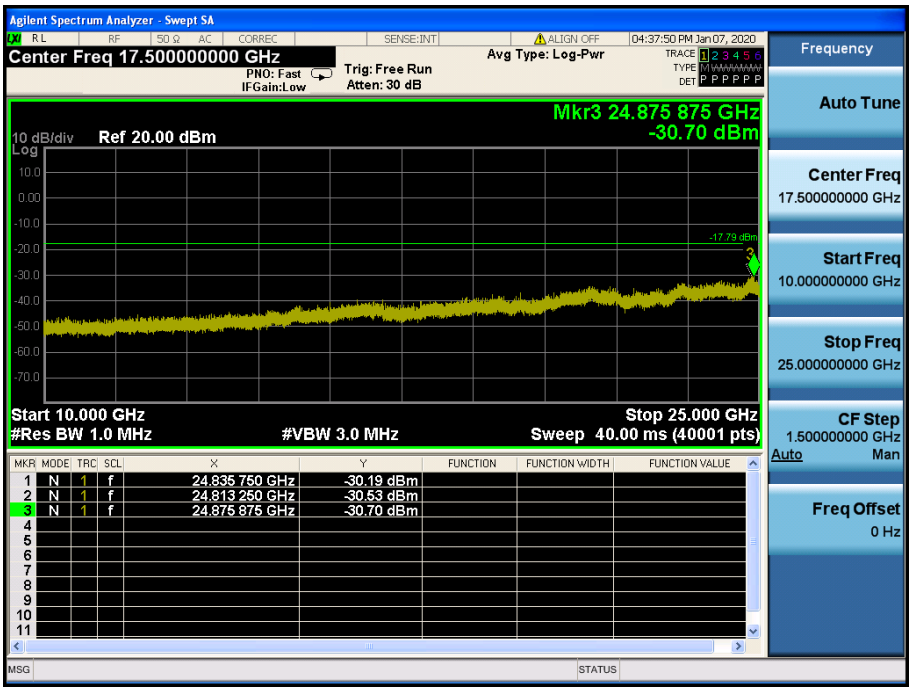


## Conducted Spurious Emissions



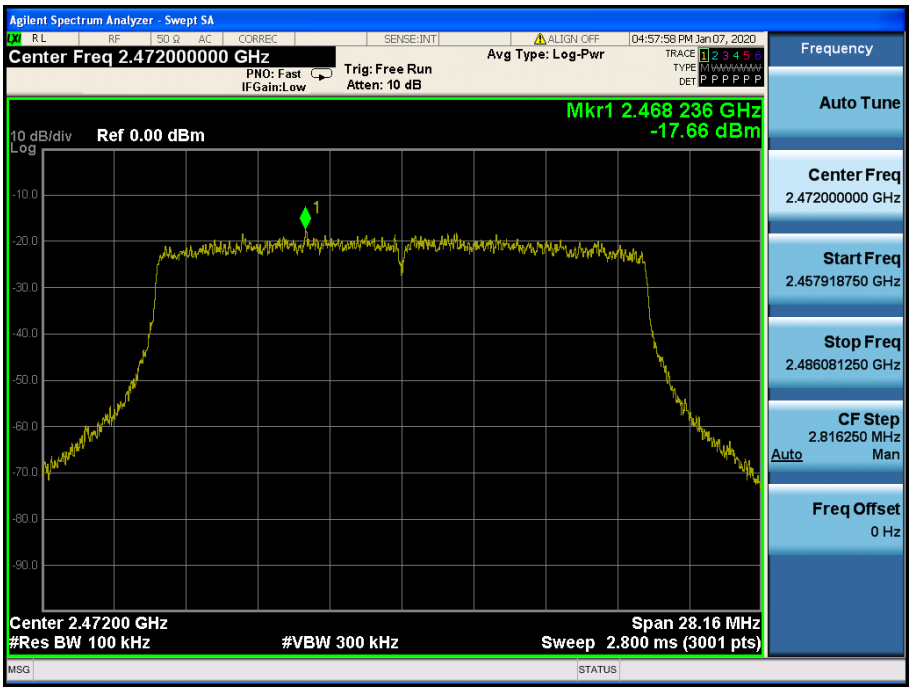



## Conducted Spurious Emissions

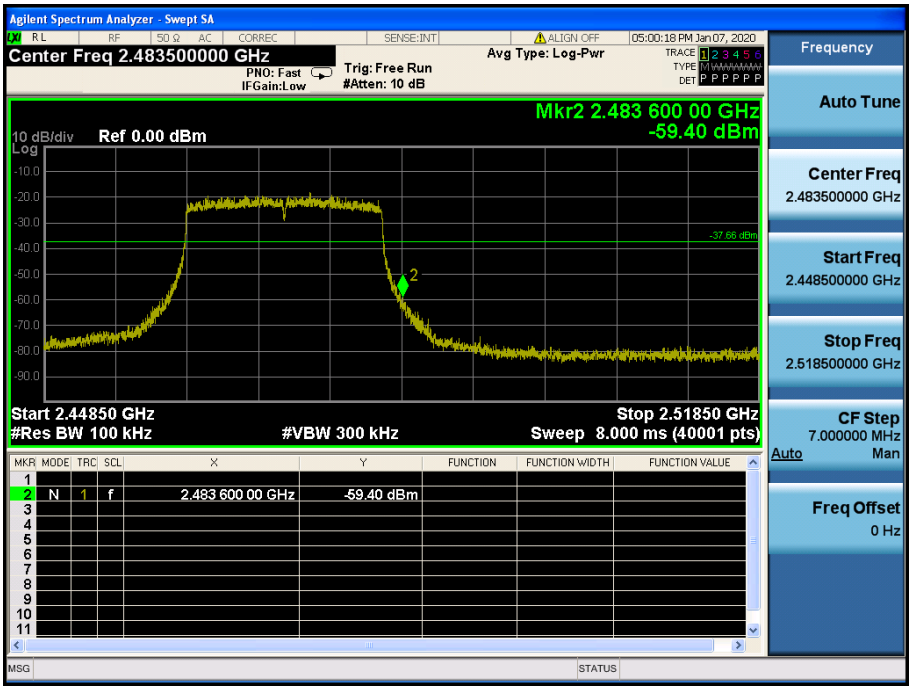


## TM 1 & ANT 1 & SU & 2472

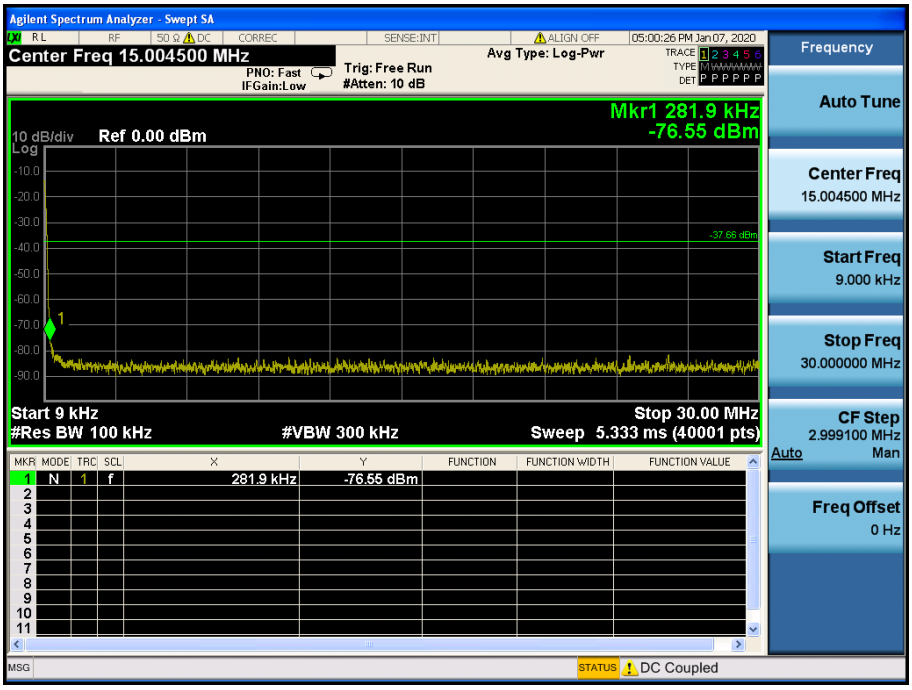
### Reference

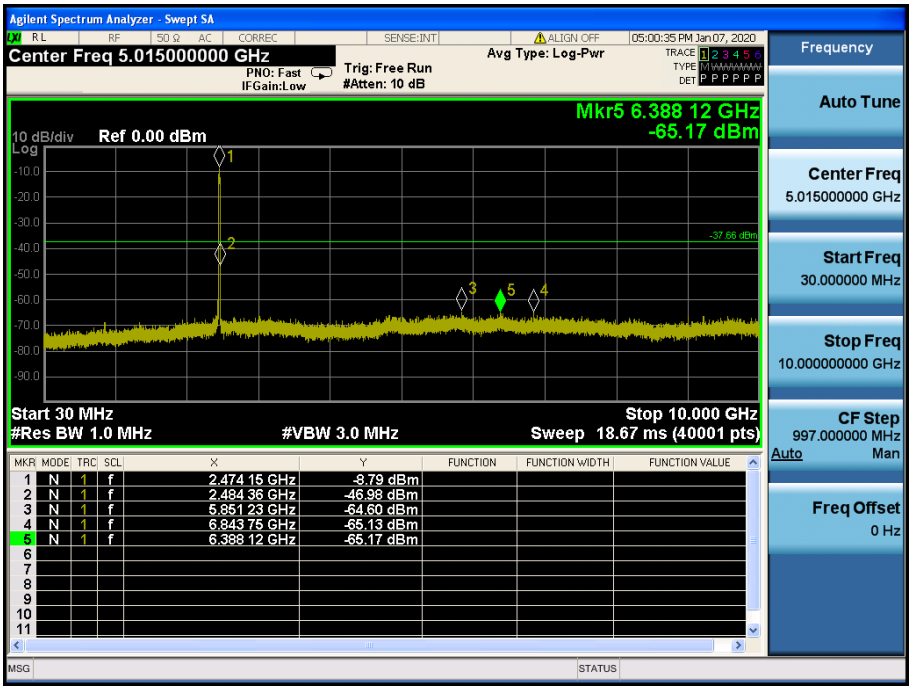



### High Band-edge

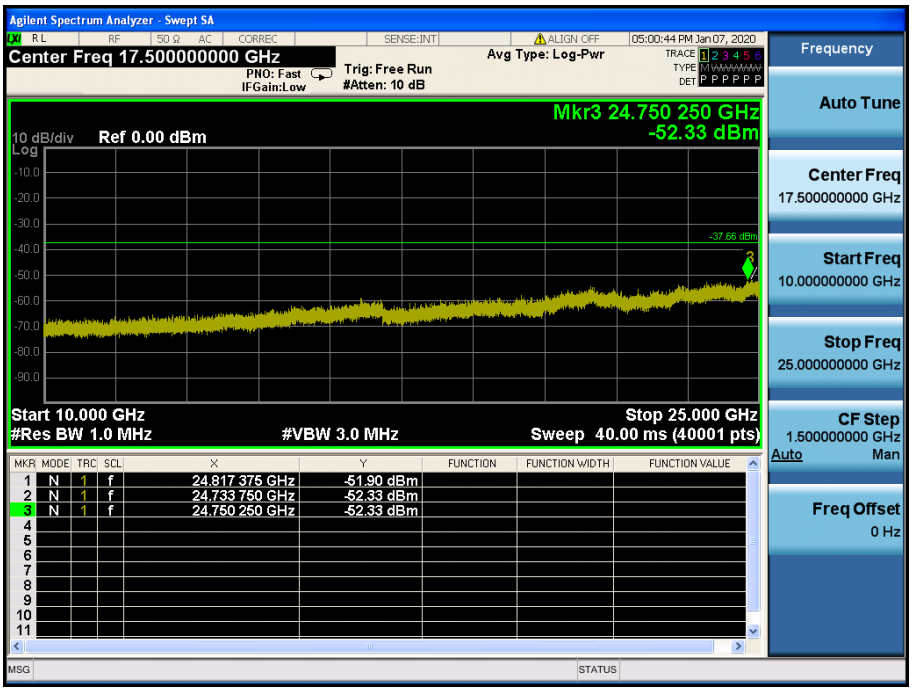


## Conducted Spurious Emissions



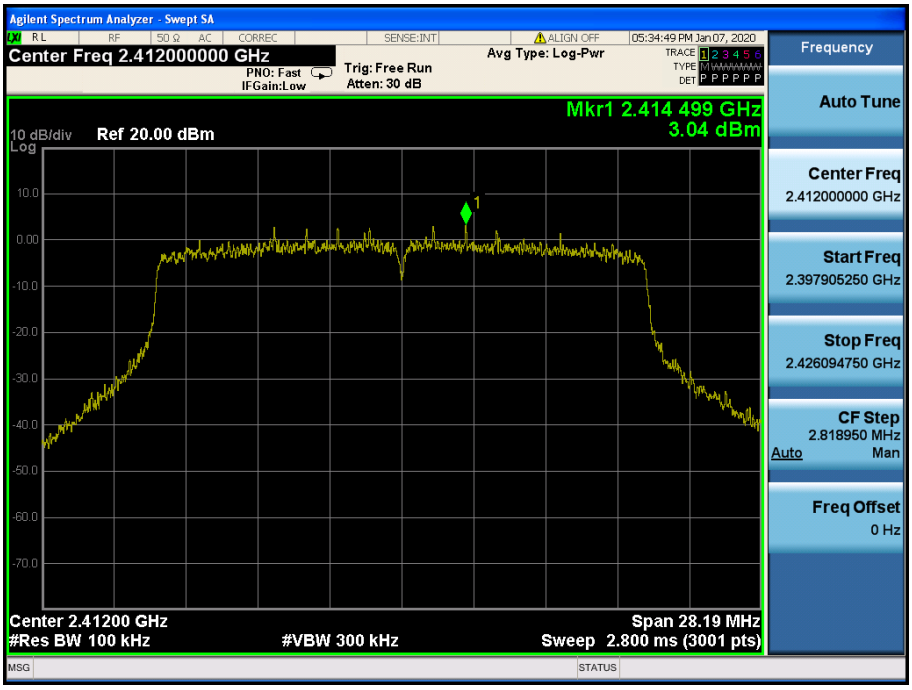



## Conducted Spurious Emissions

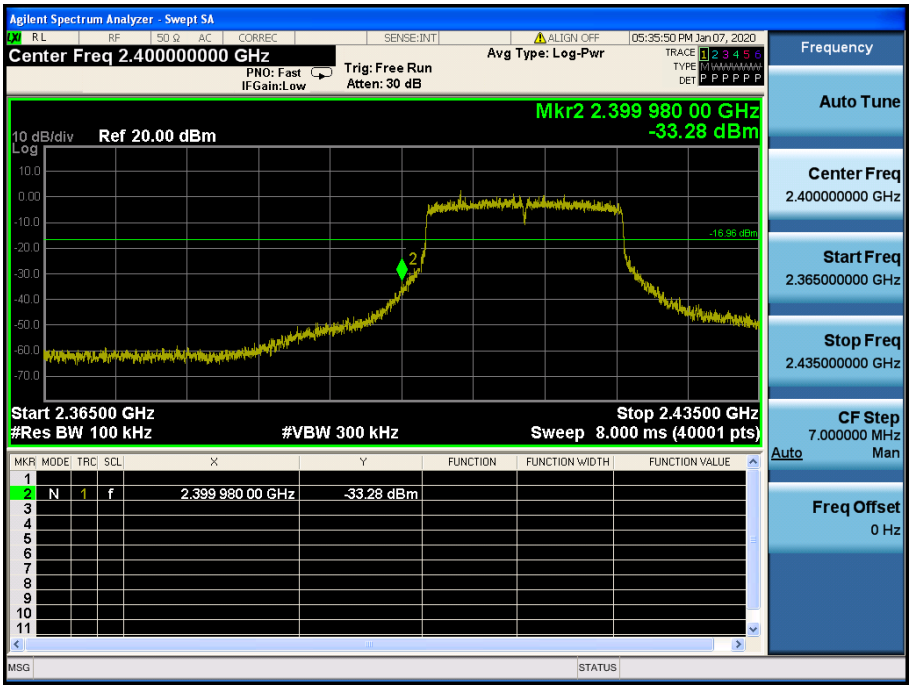


## TM 2 & ANT 1 & SU & 2412

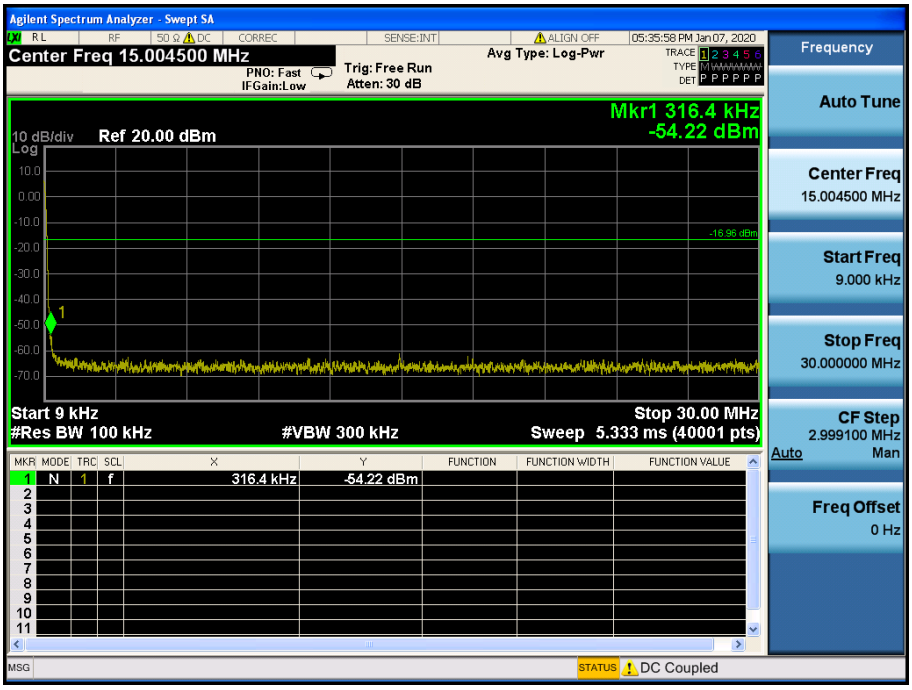
### Reference

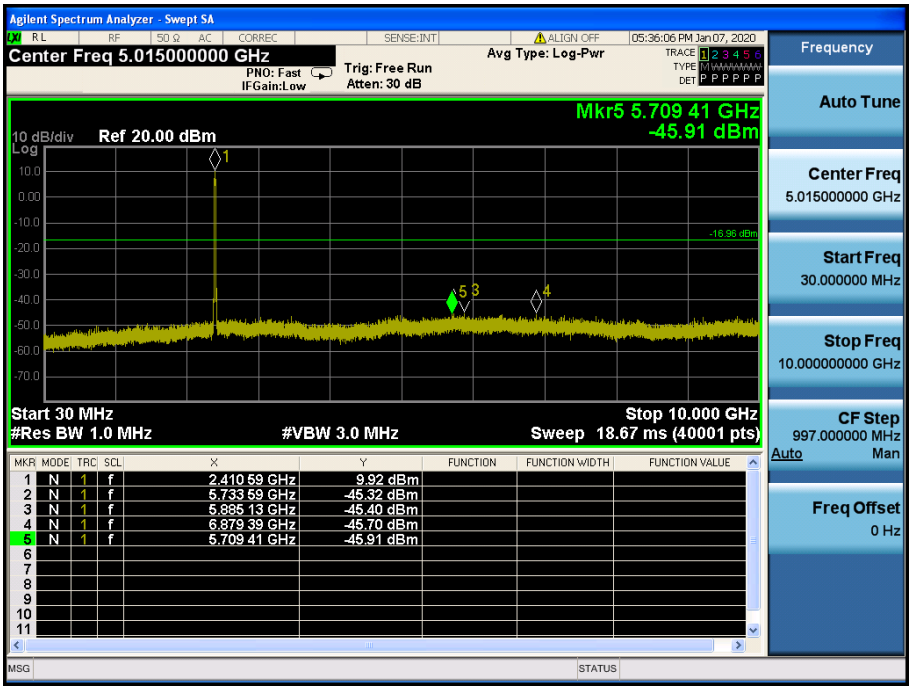



### Low Band-edge

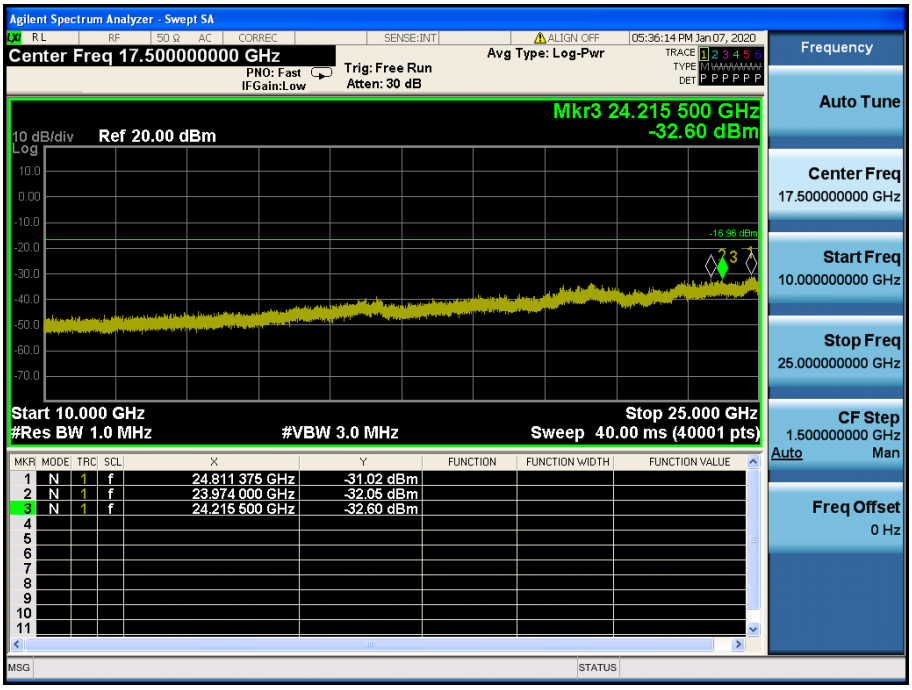


## Conducted Spurious Emissions



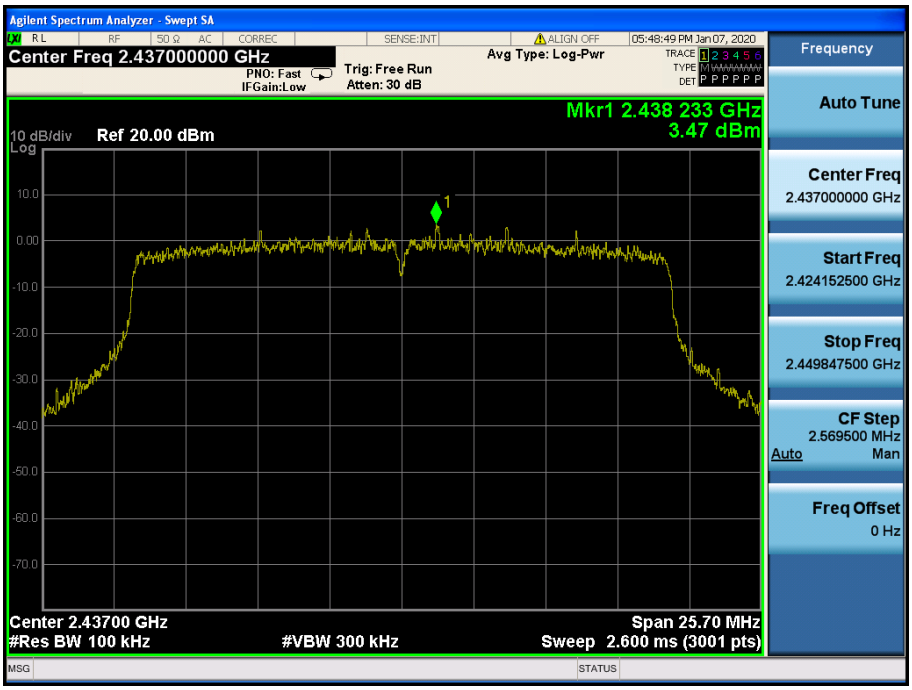



## Conducted Spurious Emissions

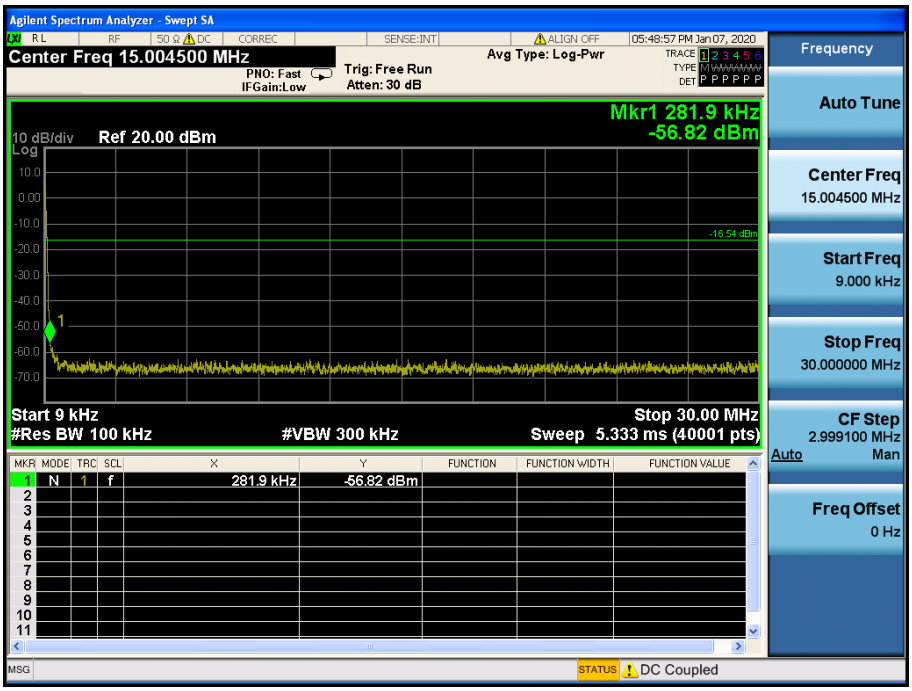


## TM 2 & ANT 1 & SU & 2437

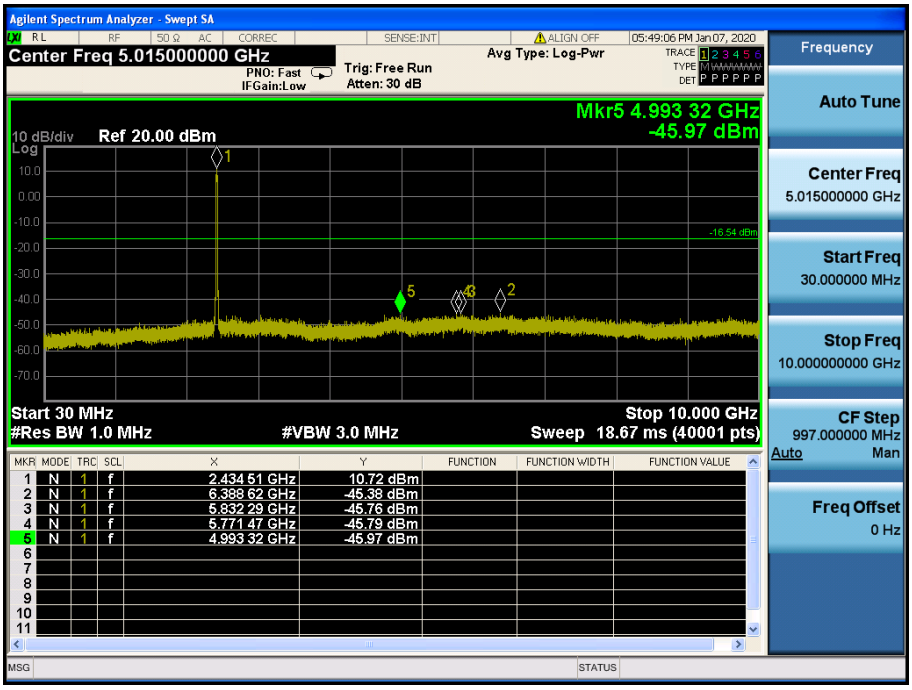
### Reference

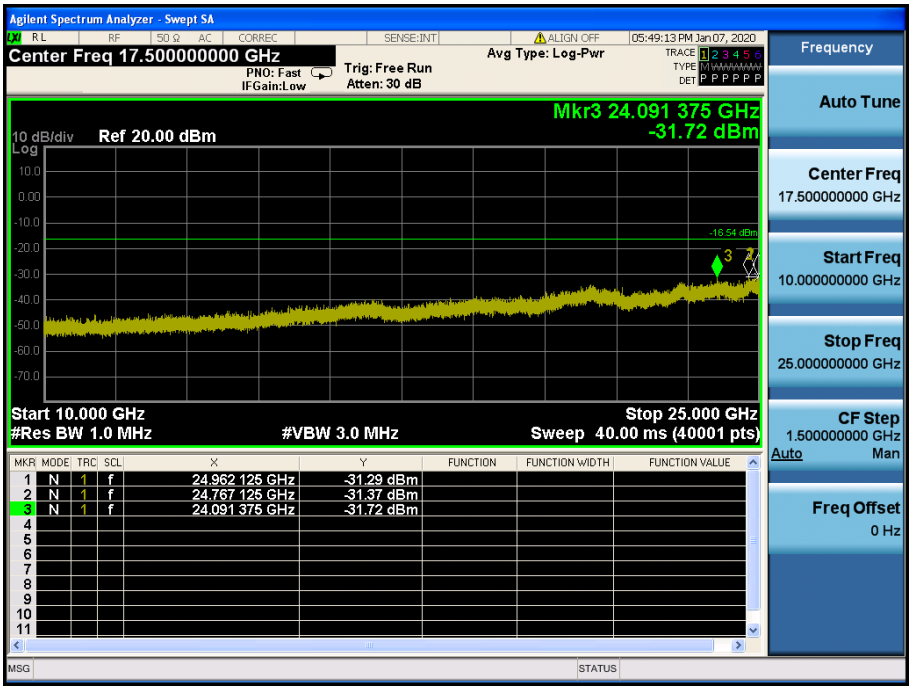



### Conducted Spurious Emissions



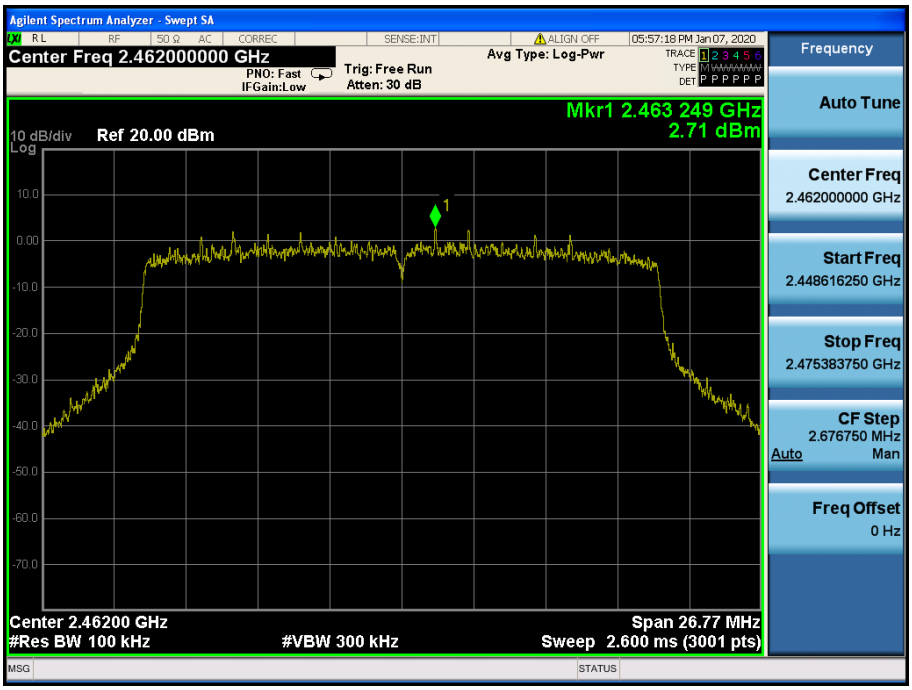
## Conducted Spurious Emissions



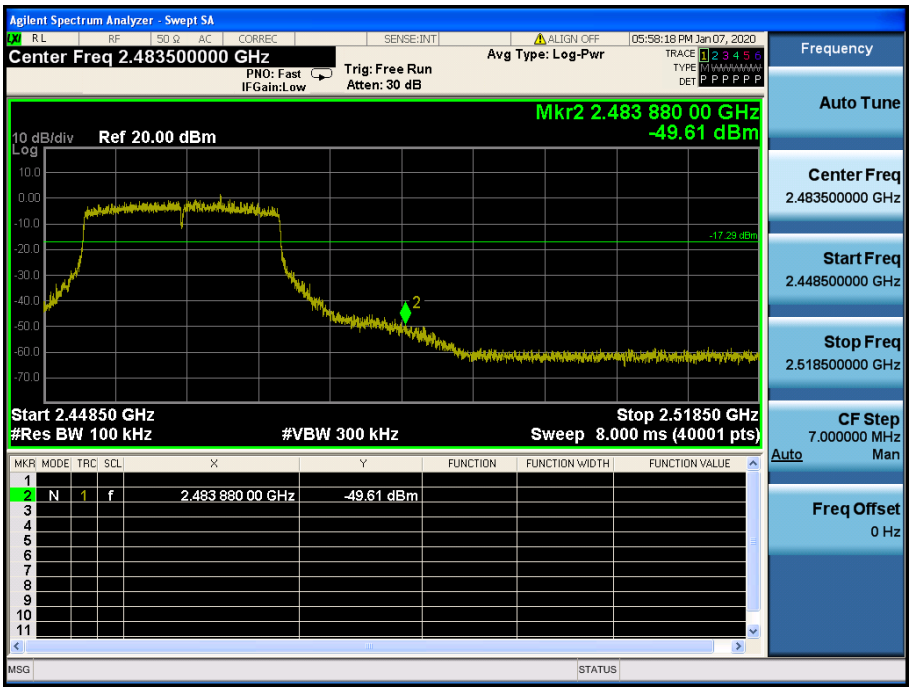



## TM 2 & ANT 1 & SU & 2462

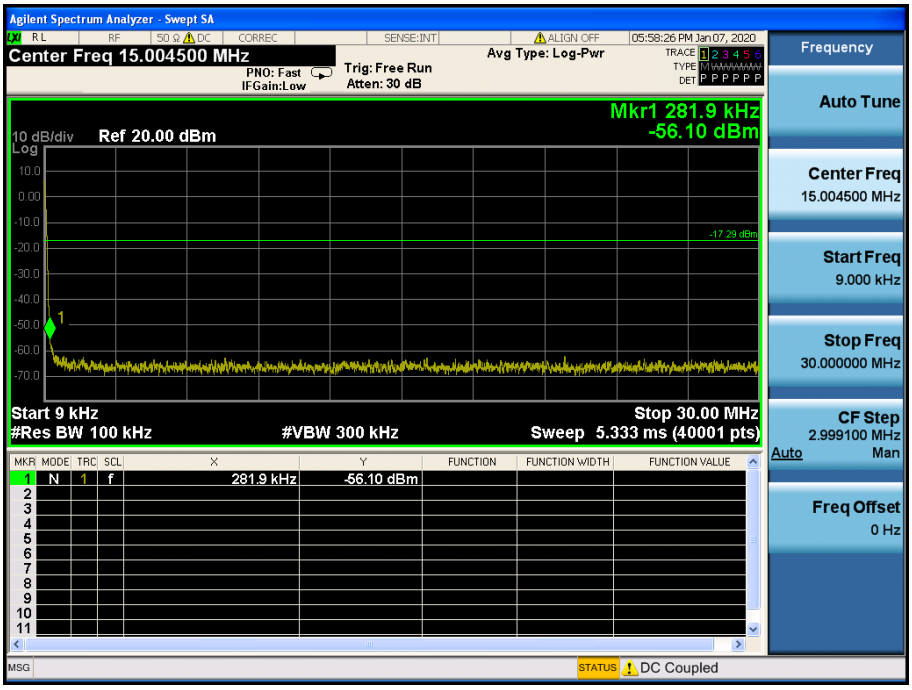
### Reference

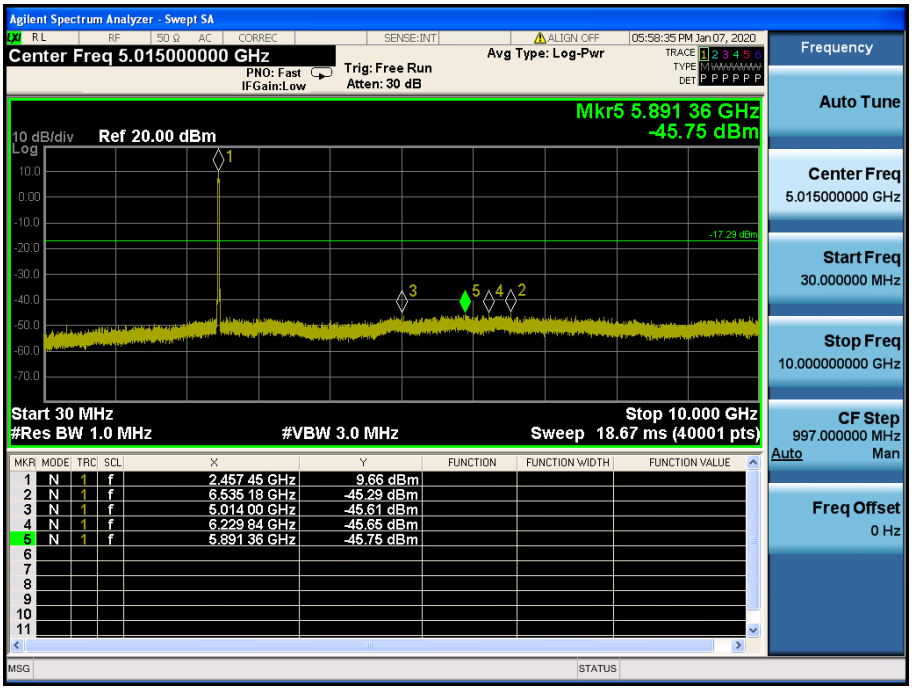



### High Band-edge

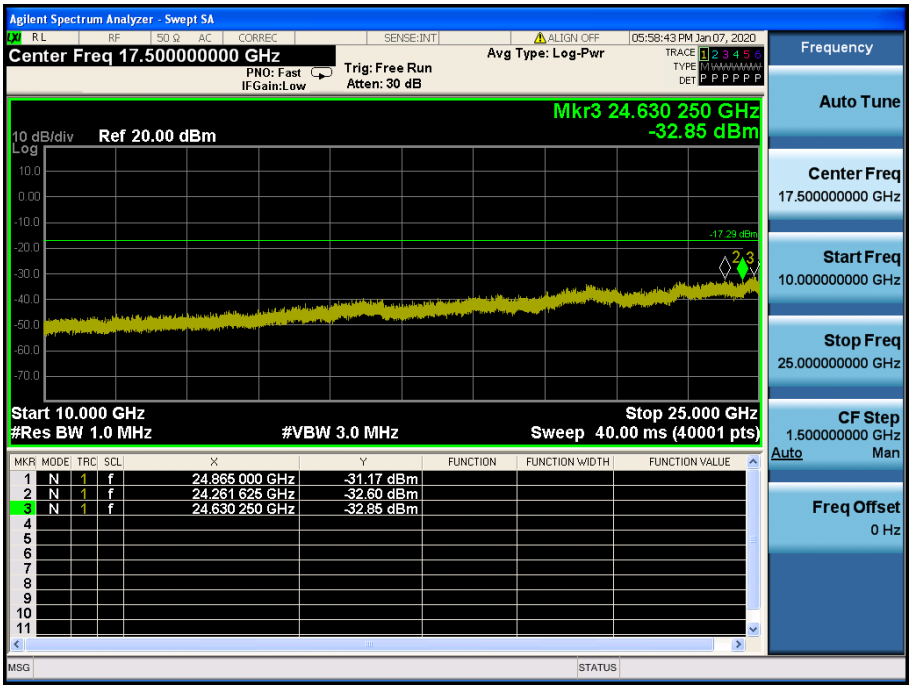


## Conducted Spurious Emissions



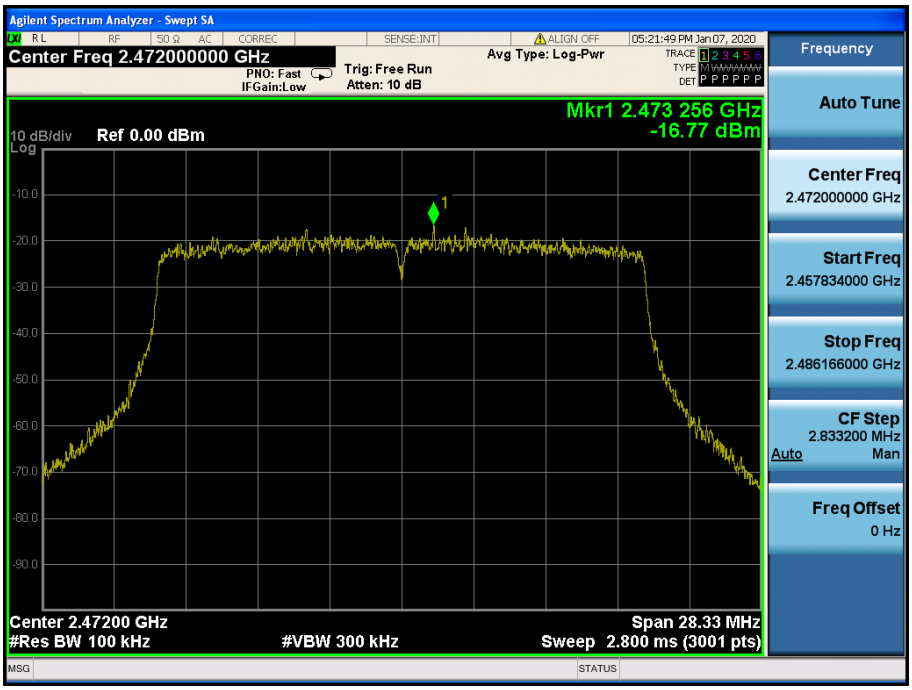



## Conducted Spurious Emissions

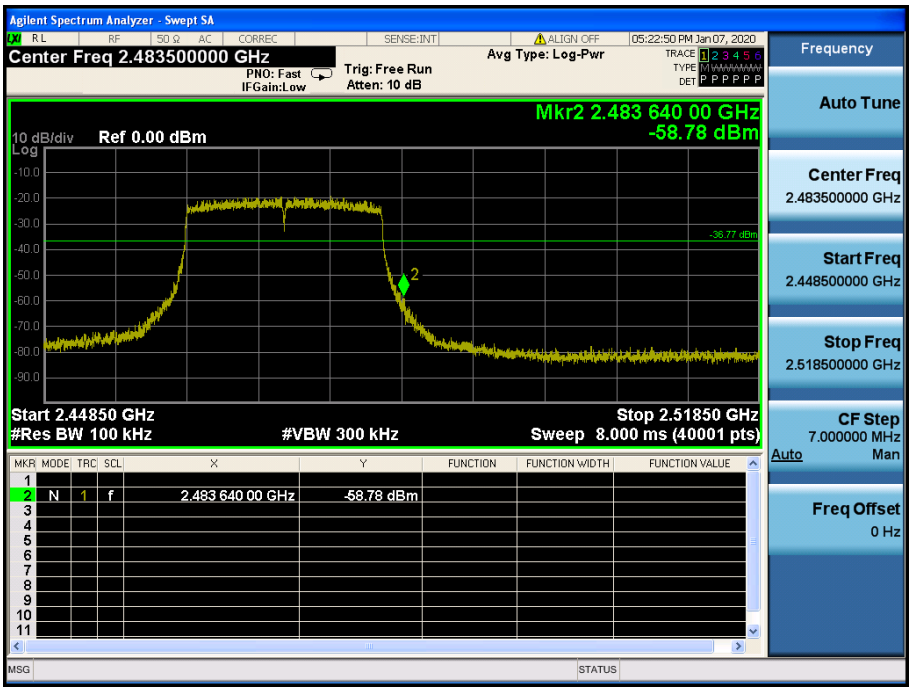


## TM 2 & ANT 1 & SU & 2472

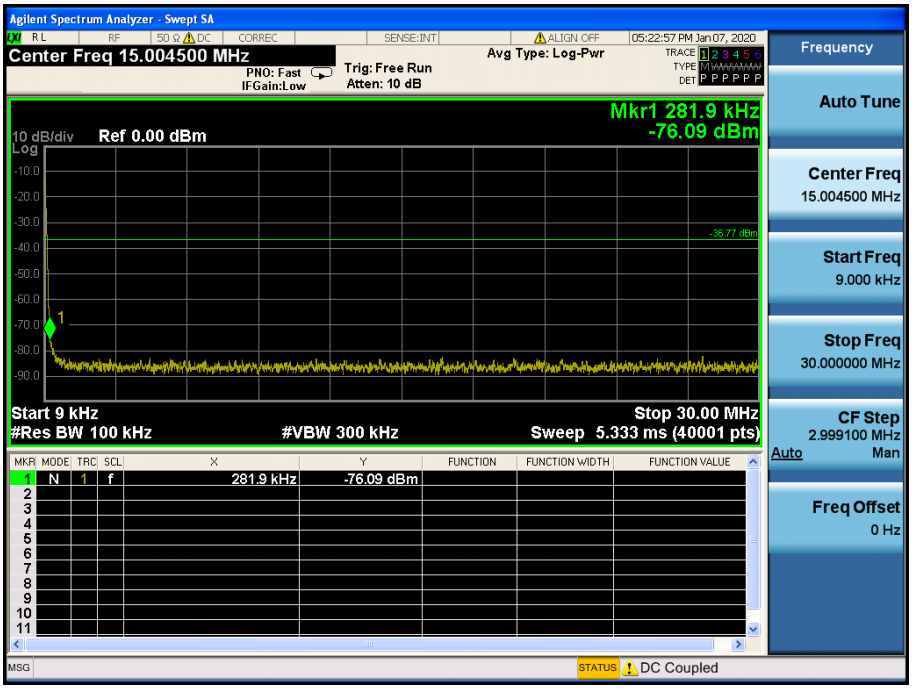
### Reference

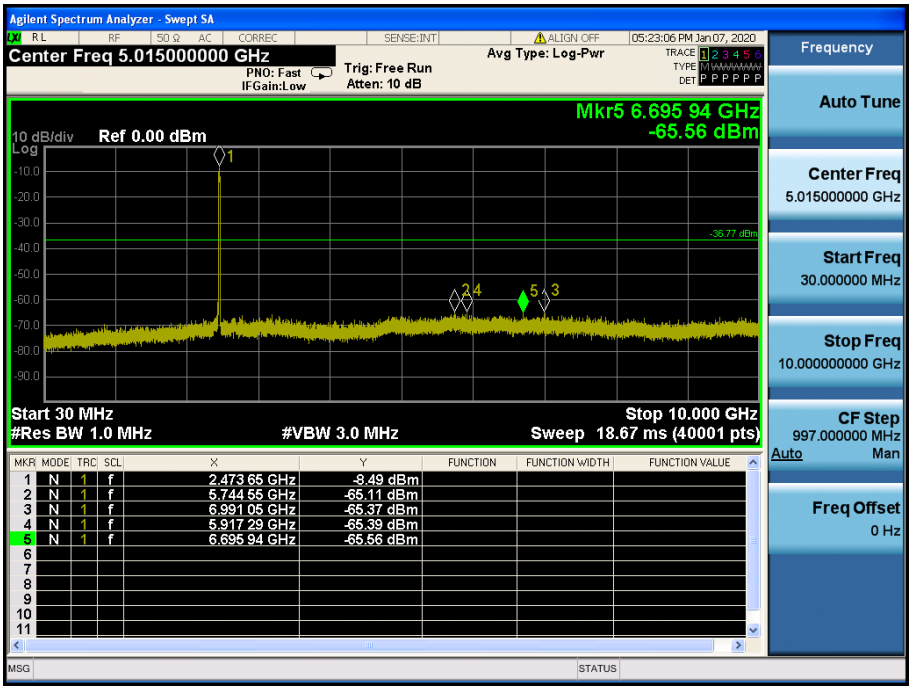



### High Band-edge

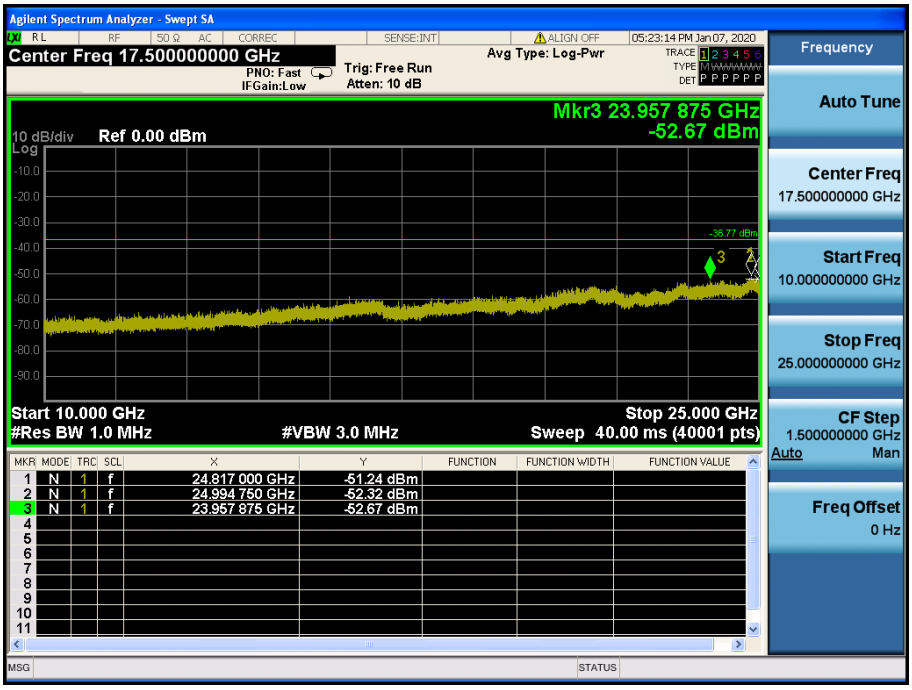


## Conducted Spurious Emissions



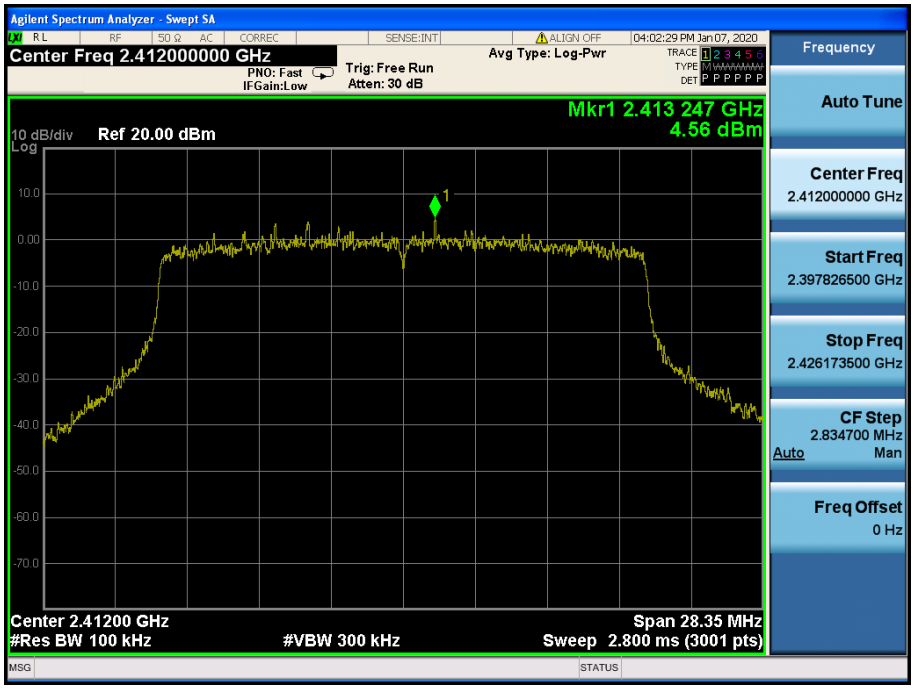



## Conducted Spurious Emissions

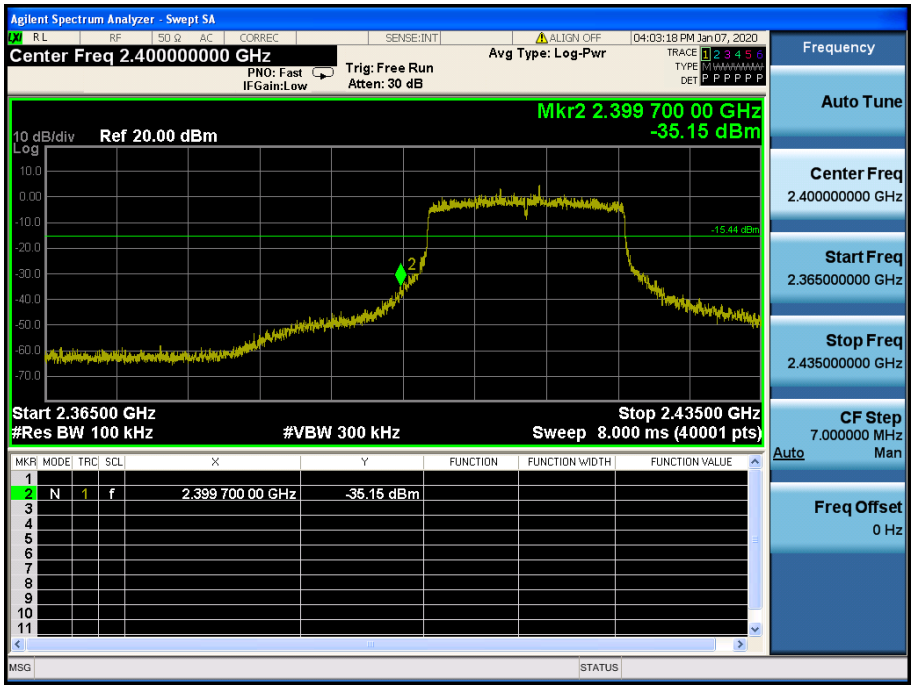


## TM 1 & ANT 2 & SU & 2412

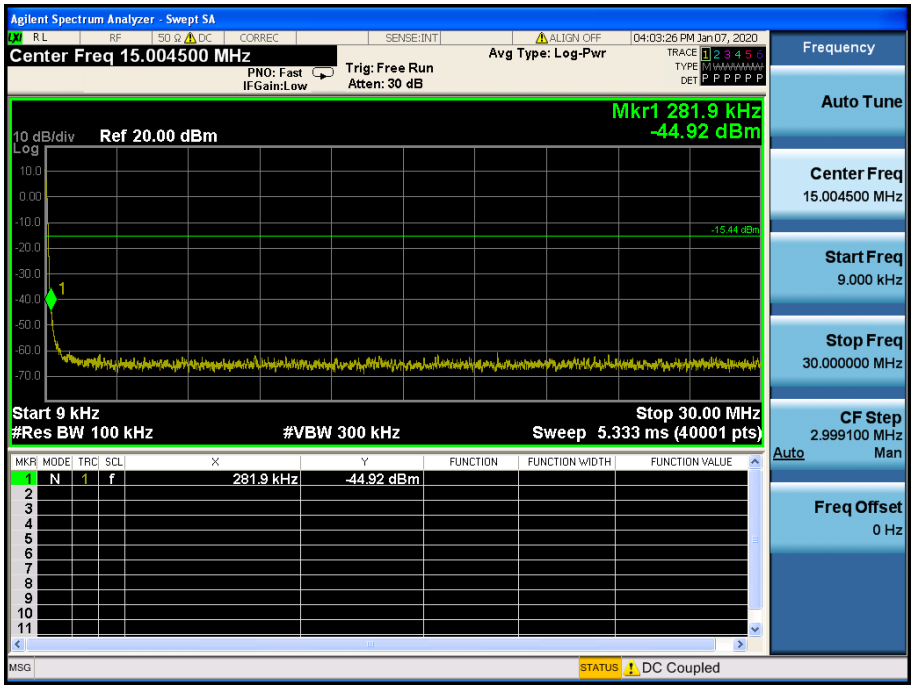
### Reference

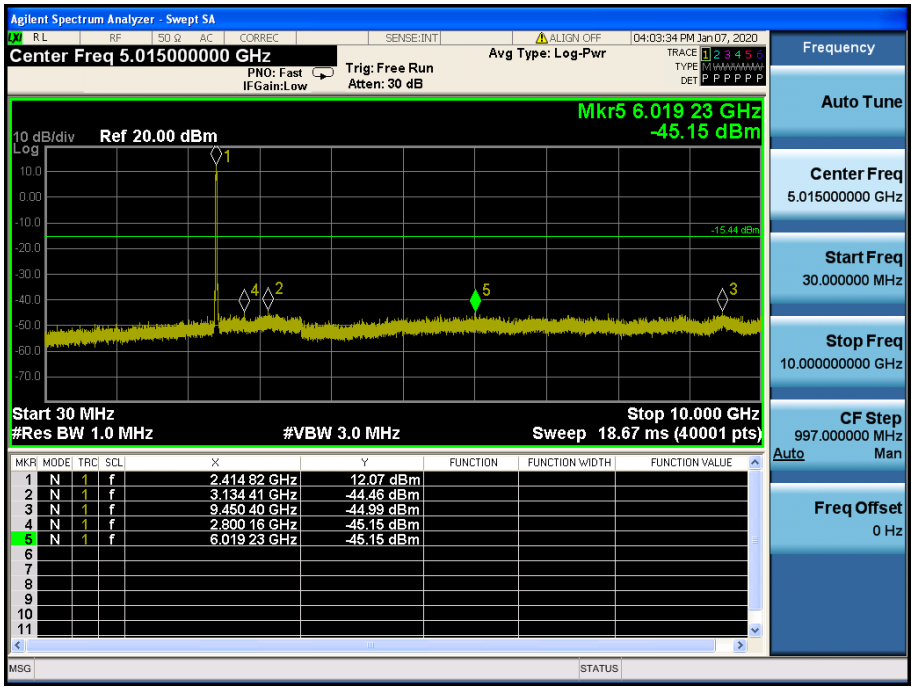



### Low Band-edge

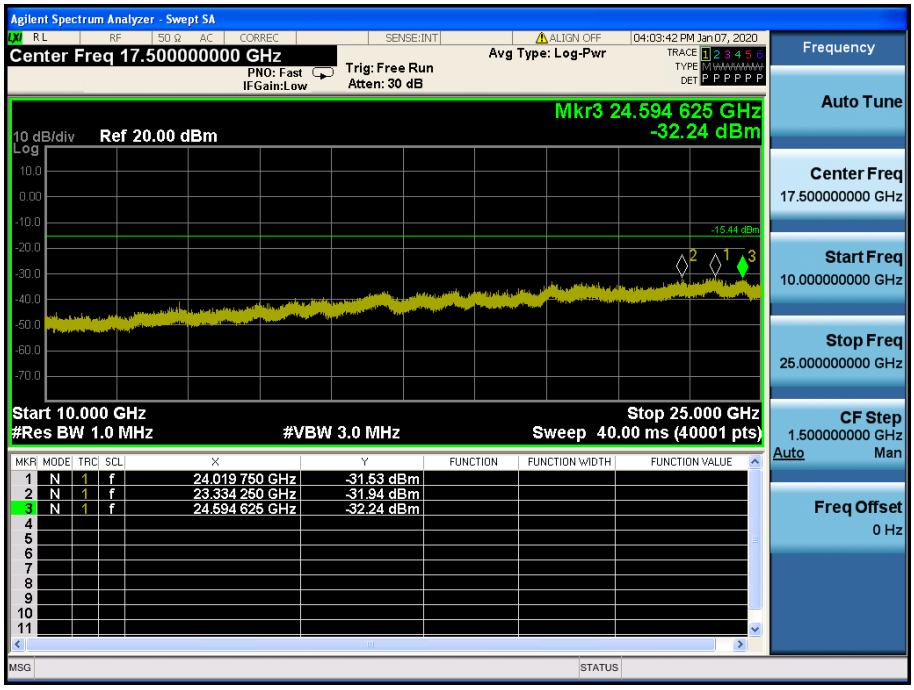


## Conducted Spurious Emissions



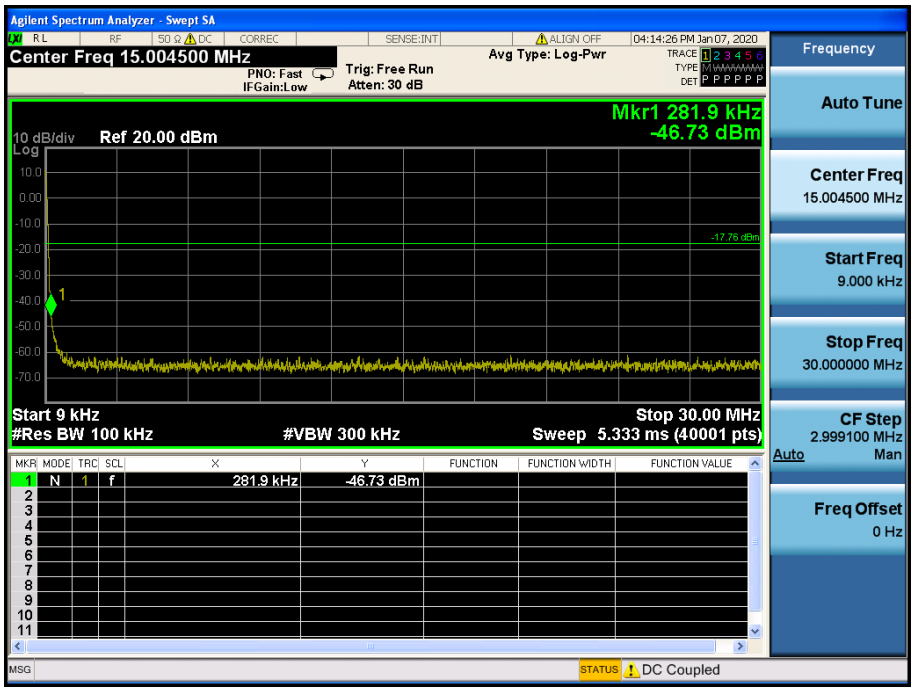
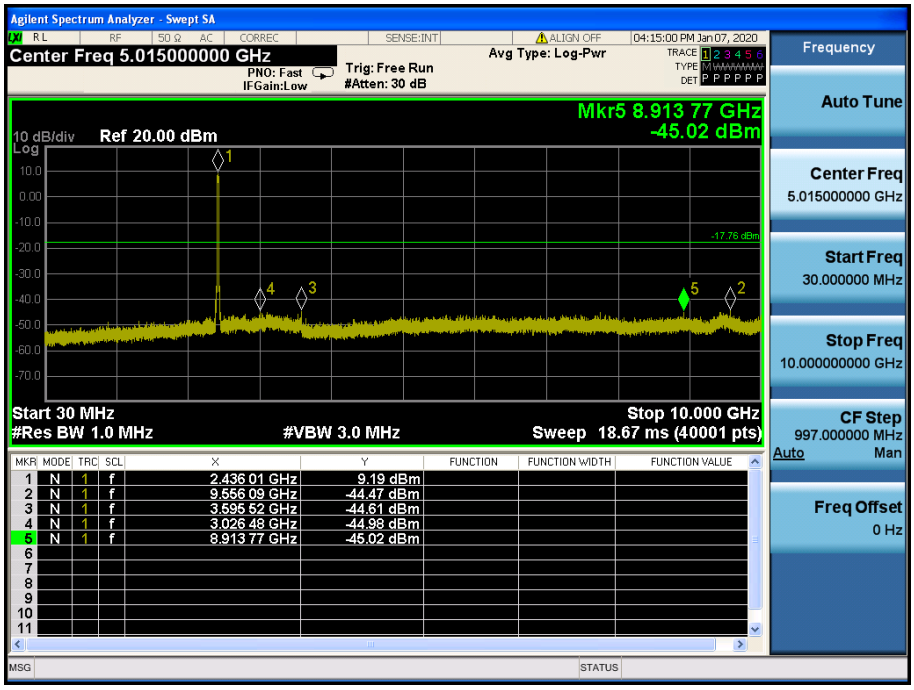
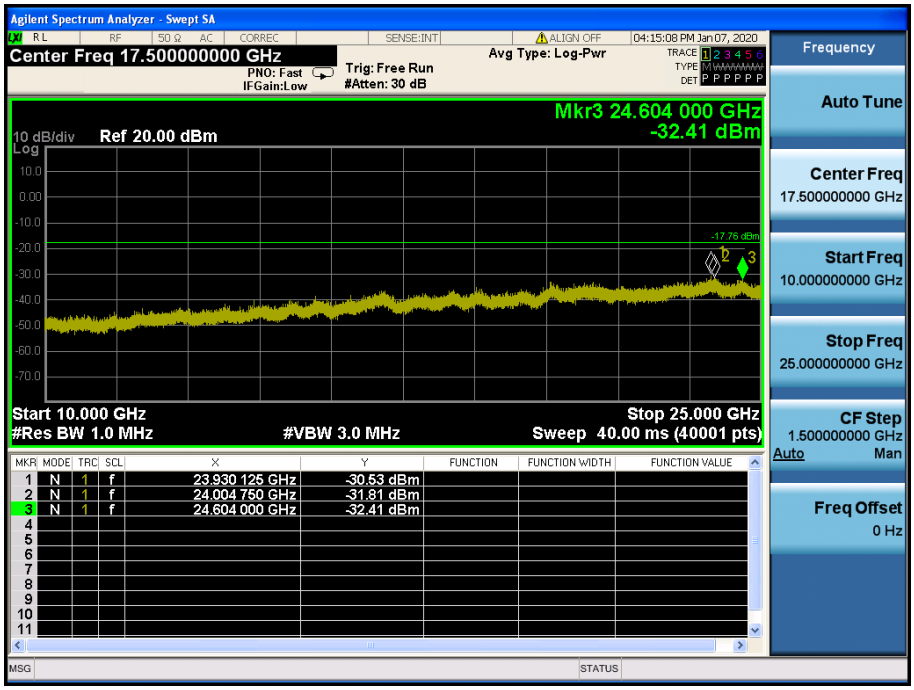
## Conducted Spurious Emissions



## TM 1 & ANT 2 & 2437

### Reference

### Conducted Spurious Emissions



## Conducted Spurious Emissions