# FCC Test Report

Report No.: AGC00970240501FR03

| | | |
|---|---|---|
| **FCC ID** | : | 2BGL3-EM16 |
| **APPLICATION PURPOSE** | : | Original Equipment |
| **PRODUCT DESIGNATION** | : | Smart Energy Monitor |
| **BRAND NAME** | : | Refoss, Meross, Flysocks |
| **MODEL NAME** | : | EM16, EM02, EM04, EM06, EM08, EM10, EM12, EM14, EM18, EM20 |
| **APPLICANT** | : | FLEXBEE HK LIMITED |
| **DATE OF ISSUE** | : | Aug. 01, 2024 |
| **STANDARD(S)** | : | FCC Part 15 Subpart C §15.247 |
| **REPORT VERSION** | : | V1.0 |

Attestation of Global Compliance (Shenzhen) Co., Ltd

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## Report Revise Record

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|---|---|---|---|---|
| V1.0 | / | Aug. 01, 2024 | Valid | Initial Release |

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## 1. General Information

| | |
|---|---|
| Applicant | FLEXBEE HK LIMITED |
| Address | 19H MAXGRAND PLAZA, NO.3 TAI YAU STREET, SAN PO KONG KL, HK. |
| Manufacturer | FLEXBEE HK LIMITED |
| Address | 19H MAXGRAND PLAZA, NO.3 TAI YAU STREET, SAN PO KONG KL, HK. |
| Factory | N/A |
| Address | N/A |
| Product Designation | Smart Energy Monitor |
| Brand Name | Refoss, Meross, Flysocks |
| Test Model | EM16 |
| Series Model(s) | EM02, EM04, EM06, EM08, EM10, EM12, EM14, EM18, EM20 |
| Difference Description | All the same except for the model name. |
| Date of receipt of test item | Jul. 17, 2024 |
| Date of Test | Jul. 17, 2024 – Aug. 01, 2024 |
| Deviation from Standard | No any deviation from the test method |
| Condition of Test Sample | Normal |
| Test Result | Pass |
| Test Report Form No | AGCER-FCC-2.4GWLAN-V1 |

Note: The test results of this report relate only to the tested sample identified in this report.

| | | |
|---|---|---|
| Prepared By | Cici Li<br>(Project Engineer) | Aug. 01, 2024 |
| Reviewed By | Calvin Liu<br>(Reviewer) | Aug. 01, 2024 |
| Approved By | Max Zhang<br>Authorized Officer | Aug. 01, 2024 |

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# 2. Product Information

## 2.1 Product Technical Description

| | |
|---|---|
| Equipment Type | WLAN 2.4G |
| Frequency Band | 2400MHz ~ 2483.5MHz |
| Operation Frequency | 2412MHz ~ 2462MHz |
| Output Power (Average) | IEEE 802.11b:16.41dBm; IEEE 802.11g:13.76dBm;<br>IEEE 802.11n(HT20):12.28dBm; IEEE 802.11n(HT40):11.49dBm |
| Output Power (Peak) | IEEE 802.11b:19.07dBm; IEEE 802.11g:21.30dBm;<br>IEEE 802.11n(HT20):19.91dBm; IEEE 802.11n(HT40):19.23dBm |
| Modulation | 802.11b:(DQPSK, DBPSK, CCK) DSSS<br>802.11g/n:(64-QAM,16-QAM, QPSK, BPSK) OFDM |
| Data Rate | 802.11b:1/2/5.5/11Mbps<br>802.11g: 6/9/12/18/24/36/48/54Mbps<br>802.11n: up to 300Mbps |
| Number of channels | 11 |
| Hardware Version | V1.8 |
| Software Version | V3.1.5 |
| Antenna Designation | External Antenna |
| Antenna Gain | 3dBi |
| Power Supply | 100-240V, 50/60Hz |

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## 2.2 Table of Carrier Frequency

**For 2412-2462MHz:**

**11 channels are provided for 802.11b/g/n(HT20):**

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 01 | 2412 MHz | 02 | 2417 MHz | 03 | 2422 MHz |
| 04 | 2427 MHz | 05 | 2432 MHz | 06 | 2437 MHz |
| 07 | 2442 MHz | 08 | 2447 MHz | 09 | 2452 MHz |
| 10 | 2457 MHz | 11 | 2462 MHz | | |

**7 channels are provided for 802.11n(HT40):**

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 01 | -- | 02 | -- | 03 | 2422 MHz |
| 04 | 2427 MHz | 05 | 2432 MHz | 06 | 2437 MHz |
| 07 | 2442 MHz | 08 | 2447 MHz | 09 | 2452 MHz |
| 10 | -- | 11 | -- | | |

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### 2.3 IEEE 802.11n Modulation Scheme

| MCS Index | Nss | Modulation | R | $N_{BPSC}$ | $N_{CBPS}$ | | $N_{DBPS}$ | | Data Rate(Mbps) 800nsGI | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 20MHz | 40MHz | 20MHz | 40MHz | 20MHz | 40MHz |
| 0 | 1 | BPSK | 1/2 | 1 | 52 | 108 | 26 | 54 | 6.5 | 13.5 |
| 1 | 1 | QPSK | 1/2 | 2 | 104 | 216 | 52 | 108 | 13.0 | 27.0 |
| 2 | 1 | QPSK | 3/4 | 2 | 104 | 216 | 78 | 162 | 19.5 | 40.5 |
| 3 | 1 | 16-QAM | 1/2 | 4 | 208 | 432 | 104 | 216 | 26.0 | 54.0 |
| 4 | 1 | 16-QAM | 3/4 | 4 | 208 | 432 | 156 | 324 | 39.0 | 81.0 |
| 5 | 1 | 64-QAM | 2/3 | 6 | 312 | 648 | 208 | 432 | 52.0 | 108.0 |
| 6 | 1 | 64-QAM | 3/4 | 6 | 312 | 648 | 234 | 489 | 58.5 | 121.5 |
| 7 | 1 | 64-QAM | 5/6 | 6 | 312 | 648 | 260 | 540 | 65.0 | 135.0 |

| Symbol | Explanation |
|---|---|
| NSS | Number of spatial streams |
| R | Code rate |
| NBPSC | Number of coded bits per single carrier |
| NCBPS | Number of coded bits per symbol |
| NDBPS | Number of data bits per symbol |
| GI | Guard interval |

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### 2.4 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: 2BGL3-EM16, filing to comply with Part 2, Part 15 of the Federal Communication Commission rules.

### 2.5 Test Methodology

The tests were performed according to following standards:

| No. | Identity | Document Title |
|---|---|---|
| 1 | FCC 47 CFR Part 2 | Frequency allocations and radio treaty matters; general rules and regulations |
| 2 | FCC 47 CFR Part 15 | Radio Frequency Devices |
| 3 | ANSI C63.10-2013 | American National Standard for Testing Unlicensed Wireless Devices |

### 2.6 Special Accessories

Refer to section 4.4.

### 2.7 Equipment Modifications

Not available for this EUT intended for grant.

### 2.8 Antenna Requirement

| **Standard Requirement** |
|---|
| 15.203 requirement:<br>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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.<br>15.247(b) (4) requirement:<br>The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi |
| **EUT Antenna:** |
| The antenna is detachable antenna but uses a unique connector. It complies with the standard requirement. The gain of the antenna is 3dBi. |

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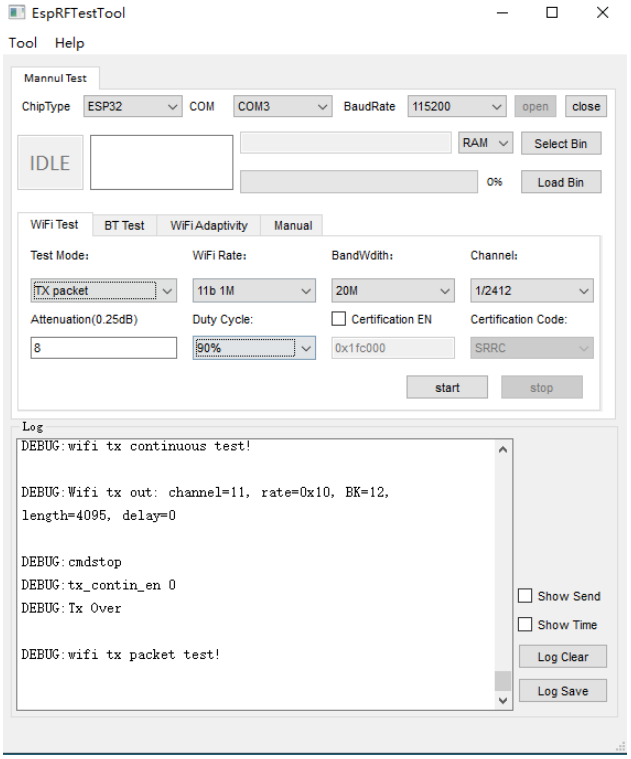
## 2.9 Description of Test Software

**<u>For IEEE 802.11 mode:</u>**

The test utility software used during testing was “EspRFTestTool”, and the version was “V2.8”.

Software Setting Diagram




| Test Mode | Channel | Power Index |
|---|---|---|
| 802.11b | L/M/H | 8 |
| 802.11g | L/M/H | 8 |
| 802.11n-HT20 | L/M/H | 12 |
| 802.11n-HT40 | L/M/H | 12 |

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# 3. Test Environment

## 3.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

## 3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

**CNAS-Lab Code: L5488**

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories).

**A2LA-Lab Cert. No.: 5054.02**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

**FCC-Registration No.: 975832**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

**IC-Registration No.: 24842 (CAB identifier: CN0063)**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

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### 3.3 Environmental Conditions

| | Normal Conditions |
|---|---|
| Temperature range (℃) | 15 - 35 |
| Relative humidity range | 20 % - 75 % |
| Pressure range (kPa) | 86 - 106 |

### 3.4 Measurement Uncertainty

The reported uncertainty of measurement y±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

| Item | Measurement Uncertainty |
|---|---|
| Uncertainty of Conducted Emission for AC Port | $U_c$ = ±2.9 dB |
| Uncertainty of Radiated Emission below 1GHz | $U_c$ = ±3.9 dB |
| Uncertainty of Radiated Emission above 1GHz | $U_c$ = ±4.9 dB |
| Uncertainty of total RF power, conducted | $U_c$ = ±0.8 dB |
| Uncertainty of RF power density, conducted | $U_c$ = ±2.6 dB |
| Uncertainty of spurious emissions, conducted | $U_c$ = ±2 % |
| Uncertainty of Occupied Channel Bandwidth | $U_c$ = ±2 % |

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### 3.5 List of Equipment Used

| ● RF Conducted Test System | | | | | | | |
|---|---|---|---|---|---|---|---|
| Used | Equipment No. | Test Equipment | Manufacturer | Model No. | Serial No. | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
| ☒ | AGC-ER-E036 | Spectrum Analyzer | Agilent | N9020A | MY49100060 | 2024-05-24 | 2025-05-23 |
| ☒ | AGC-ER-E062 | Power Sensor | Agilent | U2021XA | MY54110007 | 2024-02-01 | 2025-01-31 |
| ☒ | AGC-ER-E063 | Power Sensor | Agilent | U2021XA | MY54110009 | 2024-02-01 | 2025-01-31 |
| ☒ | AGC-ER-A001 | 6dB Attenuator | Eeatsheep | LM-XX-6-5W | N/A | 2023-09-21 | 2025-09-20 |
| ☒ | AGC-ER-E083 | Signal Generator | Agilent | E4421B | US39340815 | 2024-05-23 | 2025-05-22 |
| ☒ | N/A | RF Connection Cable | N/A | 1# | N/A | Each time | N/A |
| ☒ | N/A | RF Connection Cable | N/A | 2# | N/A | Each time | N/A |

| ● Radiated Spurious Emission | | | | | | | |
|---|---|---|---|---|---|---|---|
| Used | Equipment No. | Test Equipment | Manufacturer | Model No. | Serial No. | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
| ☐ | AGC-EM-E046 | EMI Test Receiver | R&S | ESCI | 10096 | 2024-02-01 | 2025-01-31 |
| ☒ | AGC-EM-E116 | EMI Test Receiver | R&S | ESCI | 100034 | 2024-05-24 | 2025-05-23 |
| ☒ | AGC-EM-E061 | Spectrum Analyzer | Agilent | N9010A | MY53470504 | 2024-05-28 | 2025-05-27 |
| ☒ | AGC-EM-E086 | Loop Antenna | ZHINAN | ZN30900C | 18051 | 2024-03-05 | 2026-03-04 |
| ☒ | AGC-EM-E001 | Wideband Antenna | SCHWARZBECK | VULB9168 | D69250 | 2023-05-11 | 2025-05-10 |
| ☒ | AGC-EM-E029 | Broadband Ridged Horn Antenna | ETS | 3117 | 00034609 | 2024-03-31 | 2025-03-30 |
| ☒ | AGC-EM-E082 | Horn Antenna | SCHWARZBECK | BBHA 9170 | #768 | 2023-09-24 | 2025-09-23 |
| ☒ | AGC-EM-E146 | Pre-amplifier | ETS | 3117-PA | 00246148 | 2022-08-04 | 2024-08-03 |
| ☒ | AGC-EM-A119 | 2.4G Filter | SongYi | N/A | N/A | 2024-05-23 | 2025-05-22 |
| ☒ | AGC-EM-A138 | 6dB Attenuator | Eeatsheep | LM-XX-6-5W | N/A | 2023-06-09 | 2025-06-08 |
| ☐ | AGC-EM-A139 | 6dB Attenuator | Eeatsheep | LM-XX-6-5W | N/A | 2023-06-09 | 2025-06-08 |

| ● AC Power Line Conducted Emission | | | | | | | |
|---|---|---|---|---|---|---|---|
| Used | Equipment No. | Test Equipment | Manufacturer | Model No. | Serial No. | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
| ☒ | AGC-EM-E045 | EMI Test Receiver | R&S | ESPI | 101206 | 2024-05-28 | 2025-05-27 |
| ☒ | AGC-EM-A130 | 6dB Attenuator | Eeatsheep | LM-XX-6-5W | DC-6GZ | 2023-06-09 | 2025-06-08 |
| ☒ | AGC-EM-E023 | AMN | R&S | 100086 | ESH2-Z5 | 2024-05-28 | 2025-05-27 |

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| ● Test Software | | | | | |
|---|---|---|---|---|---|
| Used | Equipment No. | Test Equipment | Manufacturer | Model No. | Version Information |
| ☒ | AGC-EM-S001 | CE Test System | R&S | ES-K1 | V1.71 |
| ☒ | AGC-EM-S003 | RE Test System | FARA | EZ-EMC | VRA-03A |
| ☒ | AGC-ER-S012 | BT/WIFI Test System | Tonscend | JS1120-2 | 2.6 |
| ☒ | AGC-EM-S011 | RSE Test System | Tonscend | TS+-Ver2.1(JS36-RSE) | 4.0.0.0 |

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# 4.System Test Configuration

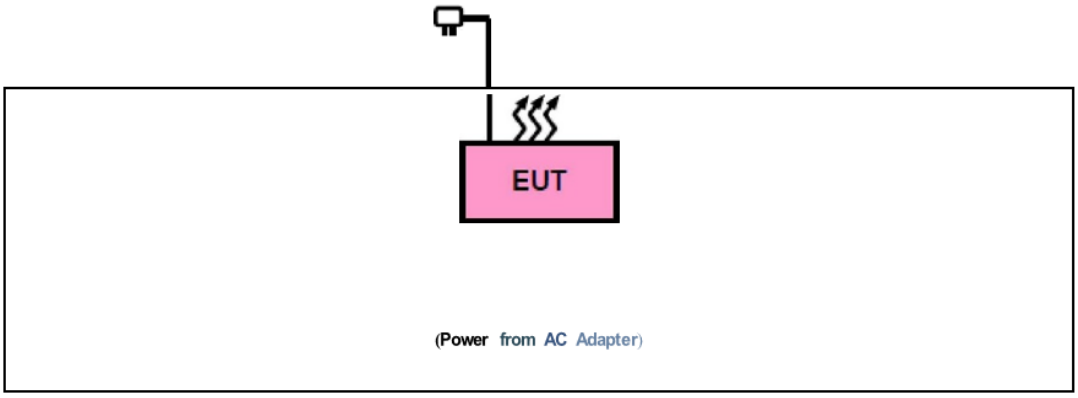
## 4.1 EUT Configuration

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

## 4.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

## 4.3 Configuration of Tested System




## 4.4 Equipment Used in Tested System

The following peripheral devices and interface cables were connected during the measurement:

☒ Test Accessories Come From The Laboratory

| No. | Equipment | Manufacturer | Model No. | Specification Information | Cable |
|---|---|---|---|---|---|
| 1 | Control Box | -- | USB-TTL | -- | -- |

☐ Test Accessories Come From The Manufacturer

| No. | Equipment | Manufacturer | Model No. | Specification Information | Cable |
|---|---|---|---|---|---|
| 1 | -- | -- | -- | -- | -- |

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### 4.5 Summary of Test Results

| Item | FCC Rules | Description of Test | Result |
|---|---|---|---|
| 1 | §15.203&15.247(b)(4) | Antenna Equipment | Pass |
| 2 | §15.247 (b)(1) | RF Output Power | Pass |
| 3 | §15.247 (a)(1) | 6 dB Bandwidth | Pass |
| 4 | §15.247 (e) | Power Spectral Density | Pass |
| 5 | §15.247 (d) | Conducted Band Edge and Out-of-Band Emissions | Pass |
| 6 | §15.247 (d)&15.209 | Radiated Spurious Emission | Pass |
| 7 | §15.207 | AC Power Line Conducted Emission | Pass |

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## 5. Description of Test Modes

| Summary table of Test Cases | |
|---|---|
| Test Item | Data Rate / Modulation |
| | 2.4G WLAN – 802.11b/g/n (DSSS/OFDM) |
| Radiated & Conducted Test Cases | Mode 1: 802.11b_TX CH01_2412 MHz_1 Mbps(AC powered)<br>Mode 2: 802.11b_TX CH06_2437 MHz_1 Mbps(AC powered)<br>Mode 3: 802.11b_TX CH11_2462 MHz_1 Mbps(AC powered)<br>Mode 4: 802.11g_TX CH01_2412 MHz_6 Mbps(AC powered)<br>Mode 5: 802.11g_TX CH06_2437 MHz_6 Mbps(AC powered)<br>Mode 6: 802.11g_TX CH11_2462 MHz_6 Mbps (AC powered)<br>Mode 7: 802.11n-HT20_TX CH01_2412 MHz_MCS0 Mbps(AC powered)<br>Mode 8: 802.11n-HT20_TX CH06_2437 MHz_ MCS0 Mbps(AC powered)<br>Mode 9: 802.11n-HT20_TX CH11_2462 MHz_ MCS0 Mbps(AC powered)<br>Mode 10: 802.11n-HT40_TX CH03_2422 MHz_MCS0 Mbps(AC powered)<br>Mode 11: 802.11n-HT40_TX CH06_2437 MHz_ MCS0 Mbps(AC powered)<br>Mode 12: 802.11n-HT40_TX CH09_2452 MHz_ MCS0 Mbps(AC powered) |
| AC Conducted Emission | Mode 1: 2.4G WLAN Link + AC powered |

Note:
1. Only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

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## 6. Duty Cycle Measurement

2.4GHz WLAN (DTS) operation is possible in 20MHz, and 40MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = Average. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

| Operating mode | Data rates (Mbps) | Duty Cycle (%) | Duty Cycle Factor (dB) |
|---|---|---|---|
| IEEE 802.11b | 1 | 90.25 | 0.45 |
| IEEE 802.11g | 6 | 90.48 | 0.43 |
| IEEE 802.11n-HT20 | MCS0 | 90.43 | 0.44 |
| IEEE 802.11n-HT40 | MCS0 | 100 | / |

Remark:

1. Duty Cycle factor = 10 * log (1/ Duty cycle)
2. The duty cycle of each frequency band mode reflects the determination requirements of the Middle channel measurement value.

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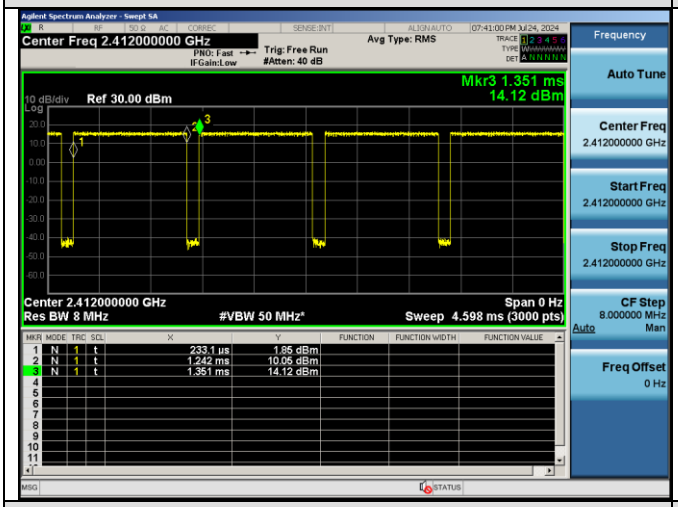
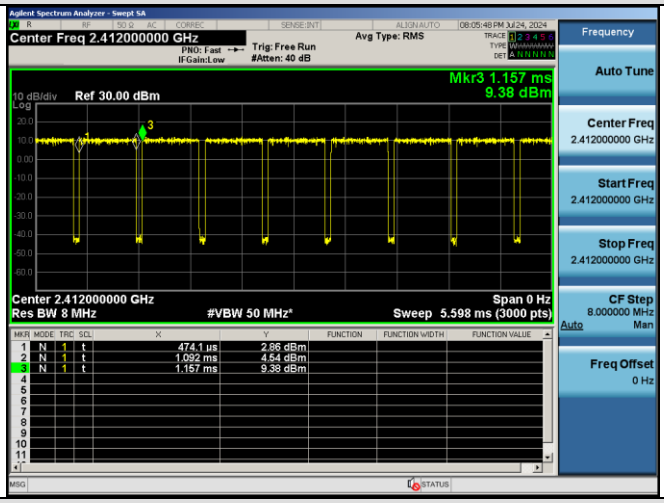
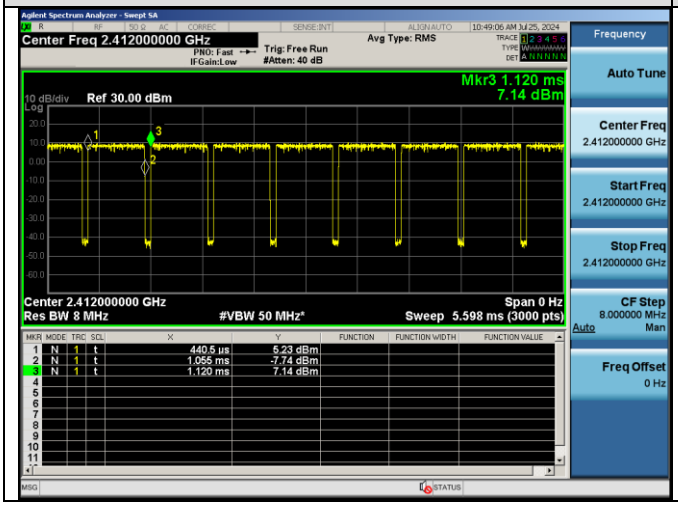
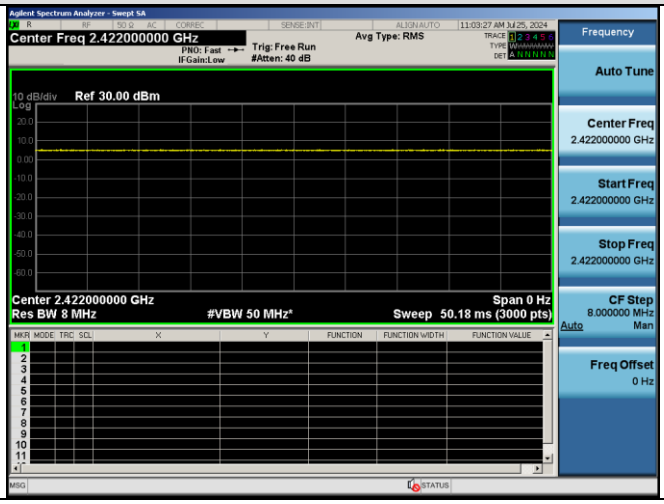
The test plots as follows:

| IEEE 802.11b | IEEE 802.11g |
|---|---|
|  |  |
| IEEE 802.11n-HT20 | IEEE 802.11n-HT40 |
|  |  |

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# 7. RF Output Power Measurement

## 7.1 Provisions Applicable

For DTSs employing digital modulation techniques operating in the bands 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W.

## 7.2 Measurement Procedure

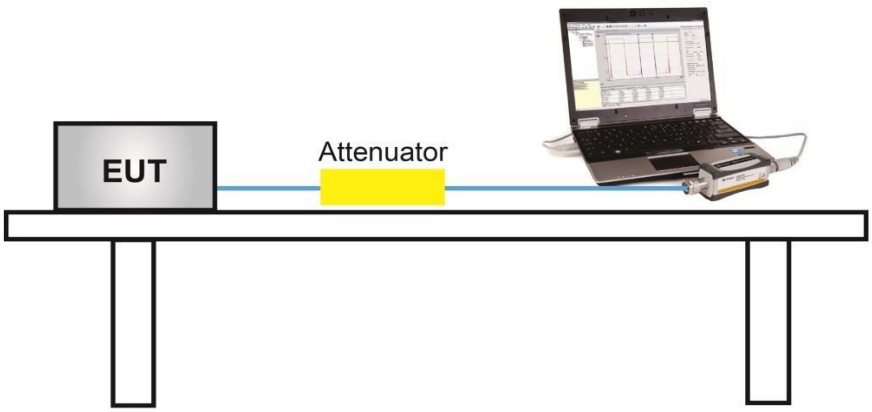
☒Method PM is Measurement using an RF Peak power meter. The procedure for this method is as follows:

1. The testing follows the ANSI C63.10 Section 11.9.1.3
2. The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

☒Method PM is Measurement using an RF average power meter. The procedure for this method is as follows:

1. The testing follows the ANSI C63.10 Section 11.9.2.3
2. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:
3. The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
4. At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
5. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
6. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
7. Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
8. Adjust the measurement in dBm by adding [10 log (1 / D)], where D is the duty cycle {e.g., [10 log (1 / 0.25)], if the duty cycle is 25%}.
9. Record the test results in the report.

## 7.3 Measurement Setup (Block Diagram of Configuration)

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### 7.4 Measurement Result

| Test Data of Conducted Output Power | | | | | |
|---|---|---|---|---|---|
| Test Mode | Test Frequency (MHz) | Average Power (dBm) | Peak Power (dBm) | Limits (dBm) | Pass or Fail |
| 802.11b | 2412 | 16.41 | 19.07 | ≤30 | Pass |
| | 2437 | 15.62 | 18.50 | ≤30 | Pass |
| | 2462 | 15.36 | 18.10 | ≤30 | Pass |
| 802.11g | 2412 | 13.76 | 21.30 | ≤30 | Pass |
| | 2437 | 13.44 | 21.03 | ≤30 | Pass |
| | 2462 | 13.19 | 20.77 | ≤30 | Pass |
| 802.11n20 | 2412 | 12.28 | 19.91 | ≤30 | Pass |
| | 2437 | 12.22 | 19.87 | ≤30 | Pass |
| | 2462 | 11.86 | 19.50 | ≤30 | Pass |
| 802.11n40 | 2422 | 11.49 | 19.23 | ≤30 | Pass |
| | 2437 | 11.32 | 19.04 | ≤30 | Pass |
| | 2452 | 11.12 | 18.85 | ≤30 | Pass |

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# 8. 6dB Bandwidth Measurement

## 8.1 Provisions Applicable

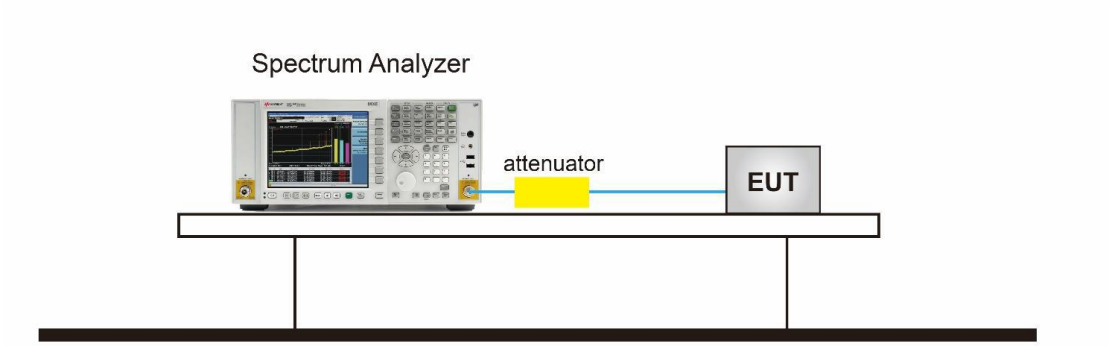
The minimum 6dB bandwidth shall be 500 kHz.

## 8.2 Measurement Procedure

The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).

1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. For 6dB Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement.
4. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the OBW and set the Video bandwidth (VBW) ≥ 3 * RBW.
5. Detector = peak
6. Trace mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize.
9. Measure and record the results in the test report.

## 8.3 Measurement Setup (Block Diagram of Configuration)

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### 8.4 Measurement Result

| Test Data of Occupied Bandwidth and DTS Bandwidth | | | | | |
|---|---|---|---|---|---|
| Test Mode | Test Frequency (MHz) | 99% Occupied Bandwidth (MHz) | DTS Bandwidth (MHz) | DTS Bandwidth Limits (MHz) | Pass or Fail |
| 802.11b | 2412 | 13.431 | 9.600 | ⩾0.5 | Pass |
| | 2437 | 13.348 | 10.059 | ⩾0.5 | Pass |
| | 2462 | 13.296 | 9.601 | ⩾0.5 | Pass |
| 802.11g | 2412 | 16.837 | 16.375 | ⩾0.5 | Pass |
| | 2437 | 16.839 | 16.376 | ⩾0.5 | Pass |
| | 2462 | 16.831 | 16.378 | ⩾0.5 | Pass |
| 802.11n20 | 2412 | 17.948 | 17.586 | ⩾0.5 | Pass |
| | 2437 | 17.952 | 17.588 | ⩾0.5 | Pass |
| | 2462 | 17.947 | 17.584 | ⩾0.5 | Pass |
| 802.11n40 | 2422 | 34.505 | 33.536 | ⩾0.5 | Pass |
| | 2437 | 34.515 | 33.378 | ⩾0.5 | Pass |
| | 2452 | 34.494 | 33.371 | ⩾0.5 | Pass |

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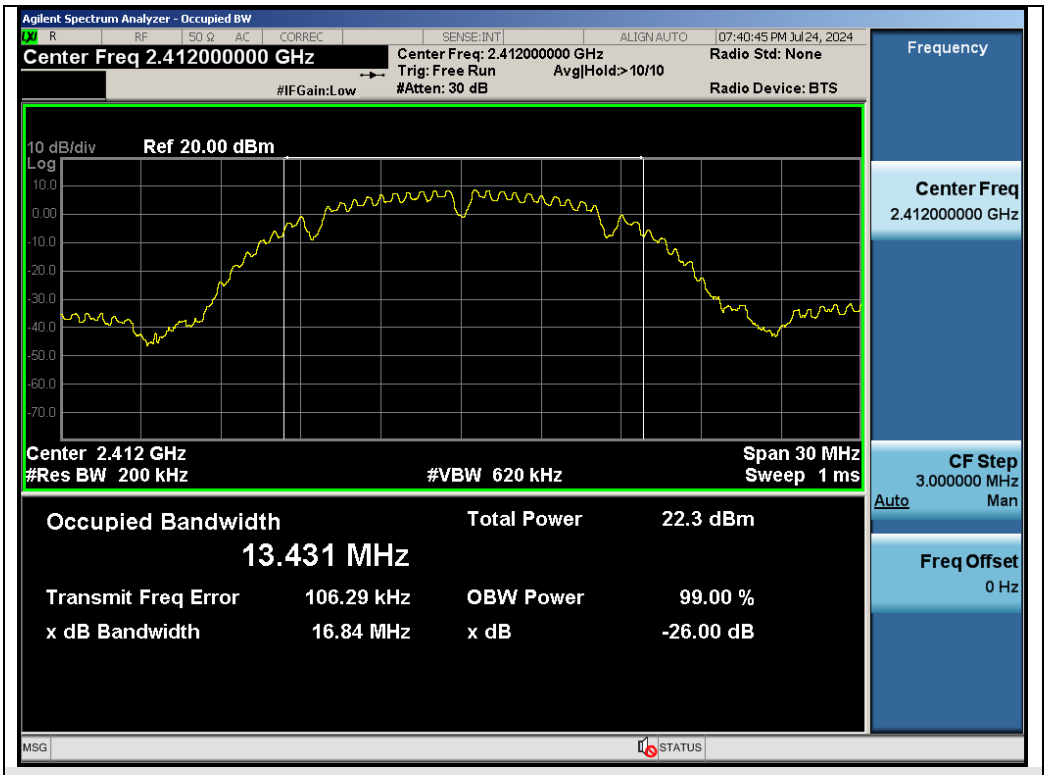
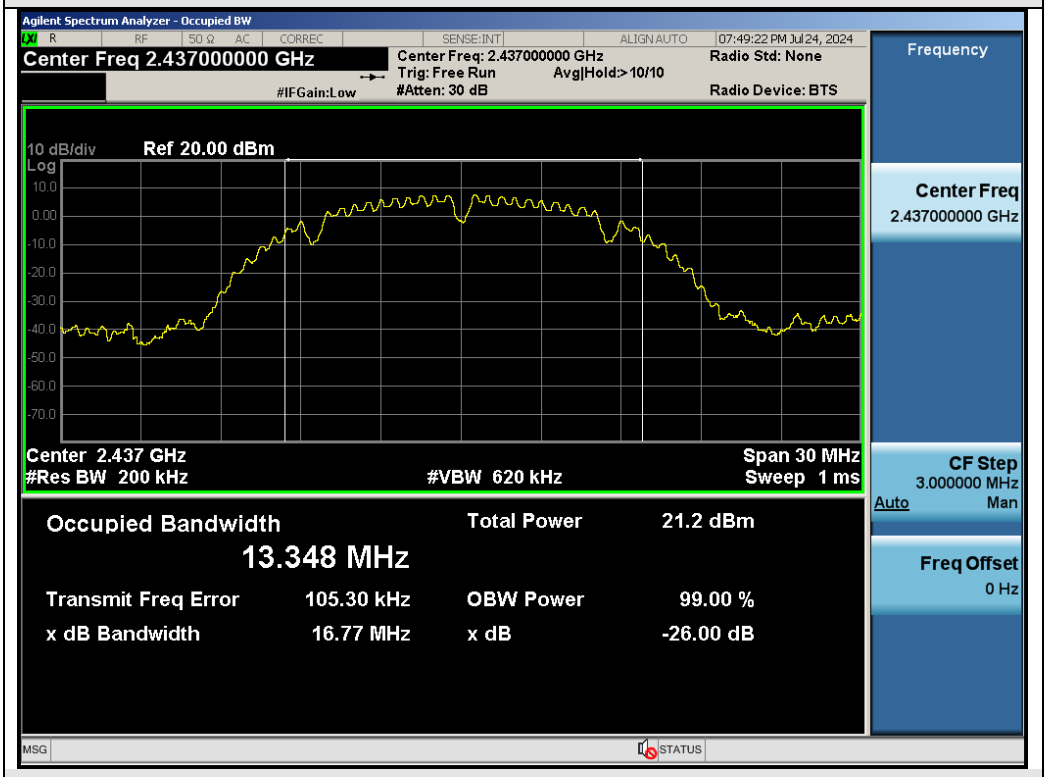
## Test Graphs of Occupied Bandwidth




Test_Graph_802.11b_ANT1_2412_1Mbps_OBW




Test_Graph_802.11b_ANT1_2437_1Mbps_OBW

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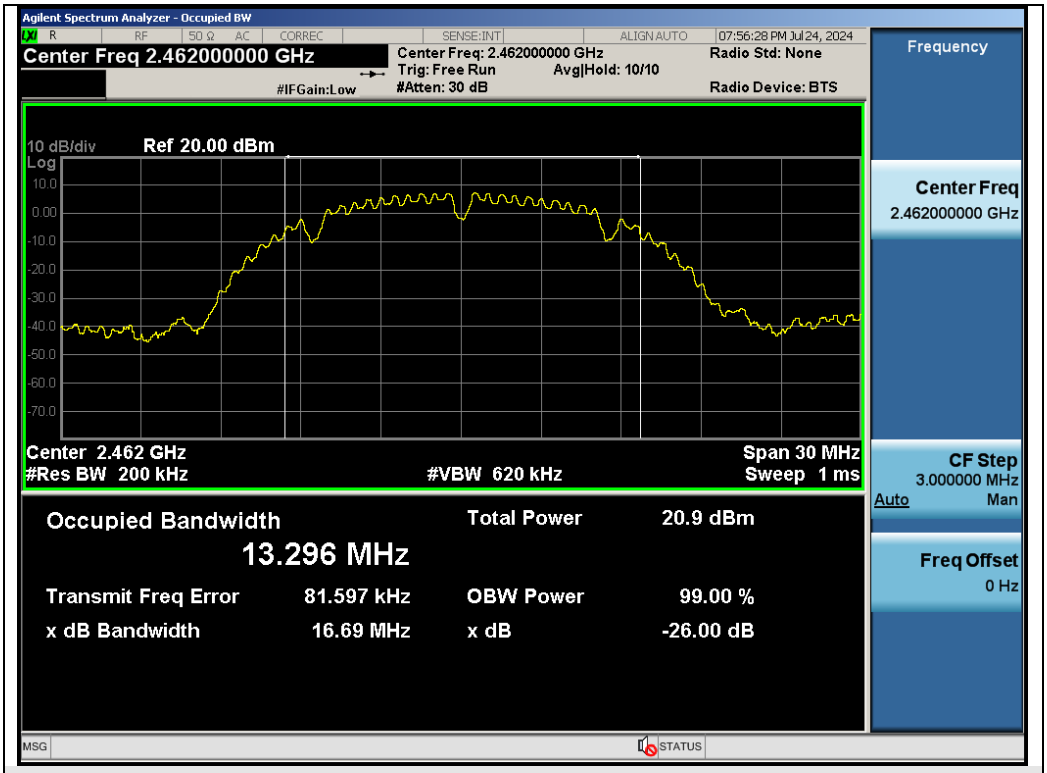


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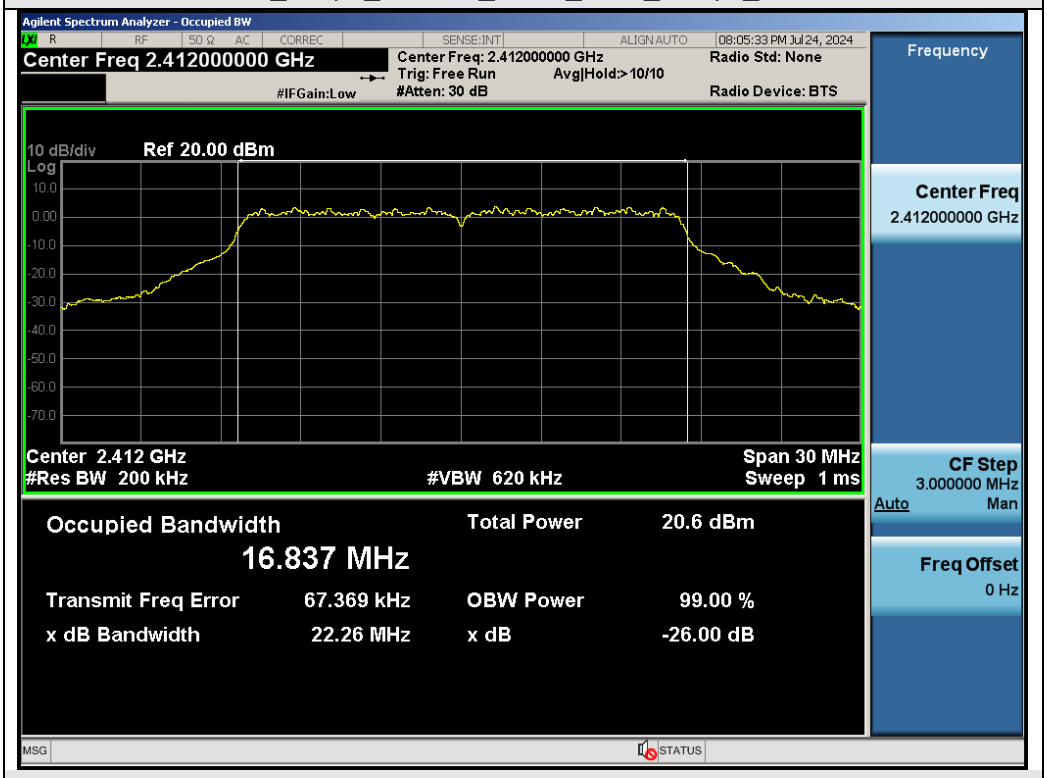


Test_Graph_802.11g_ANT1_2412_6Mbps_OBW

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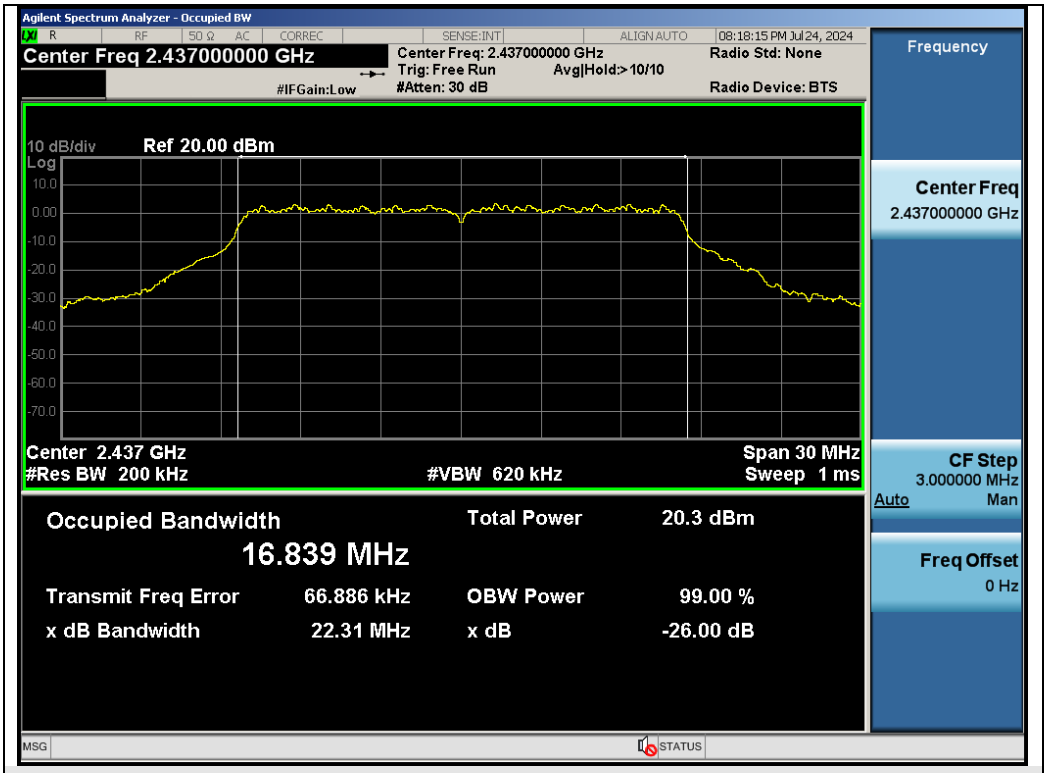


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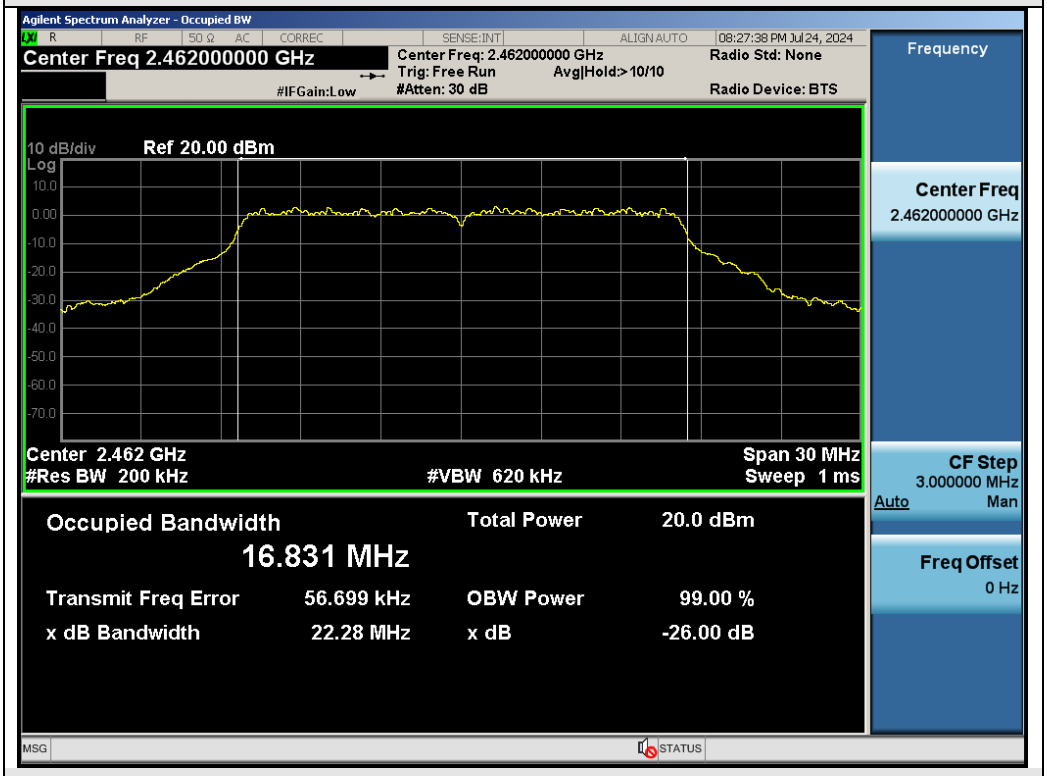


Test_Graph_802.11g_ANT1_2462_6Mbps_OBW

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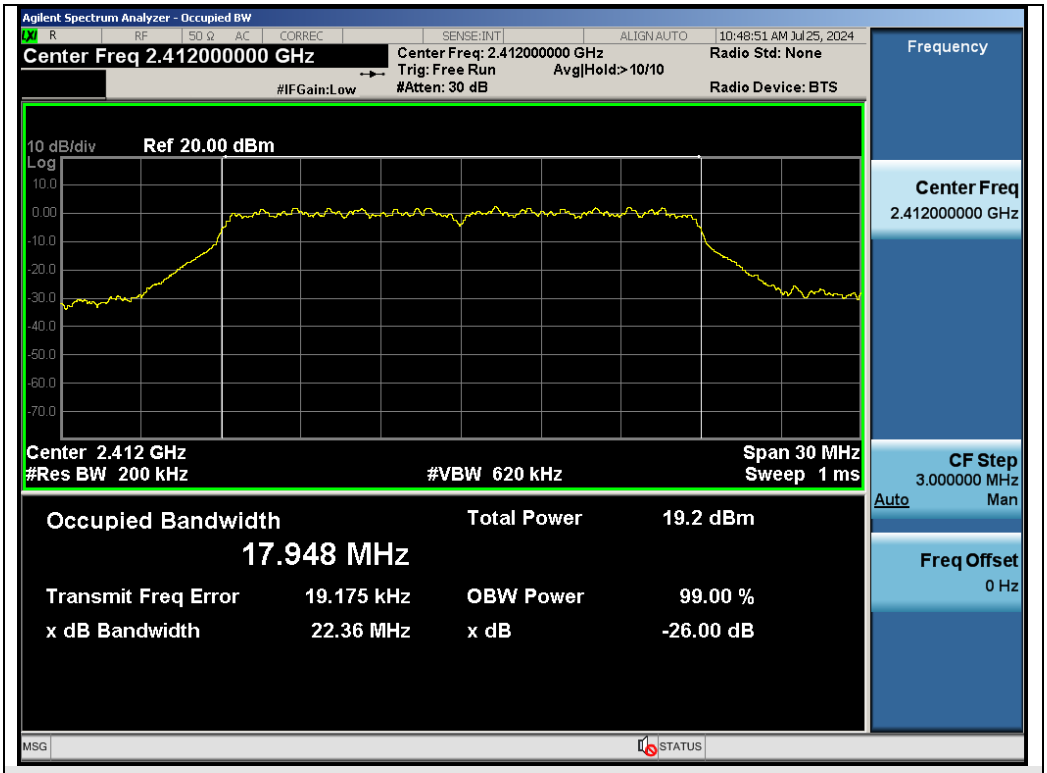
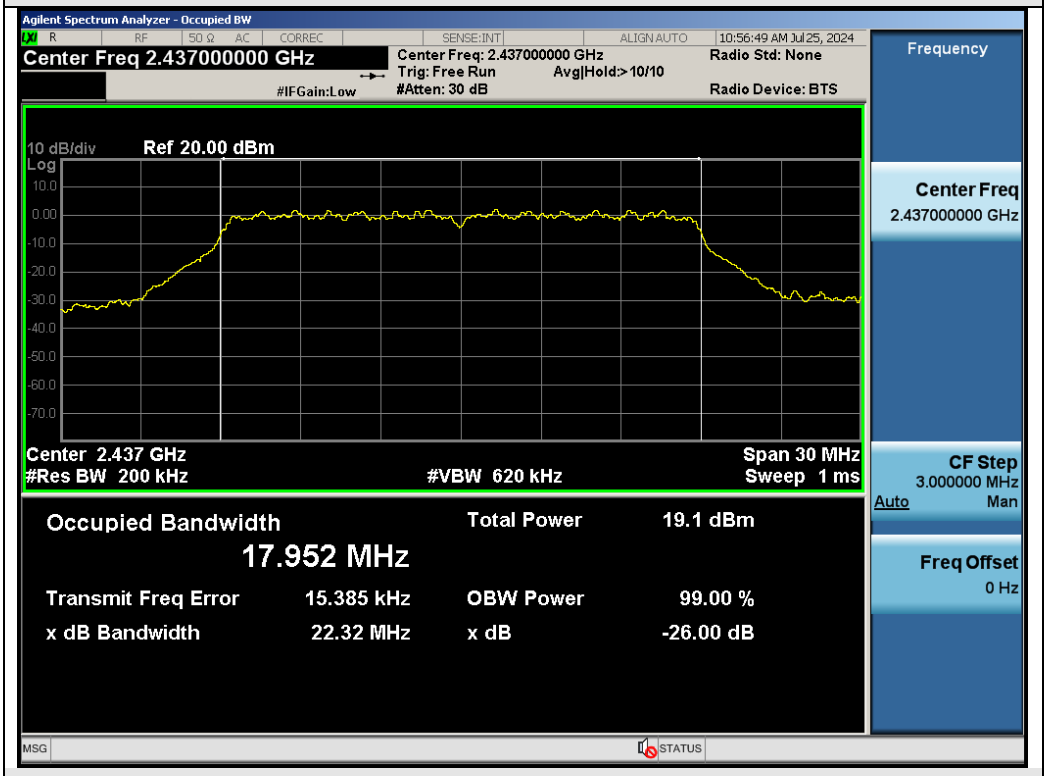



Test_Graph_802.11n20_ANT1_2412_MCS0_OBW




Test_Graph_802.11n20_ANT1_2437_MCS0_OBW

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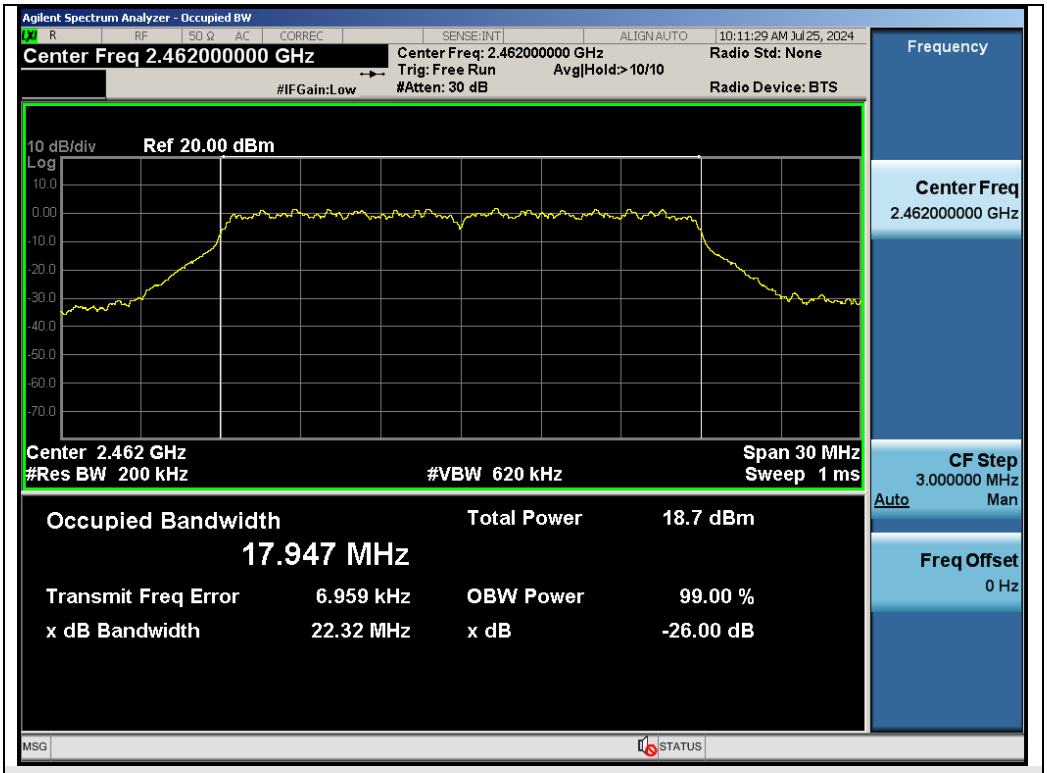


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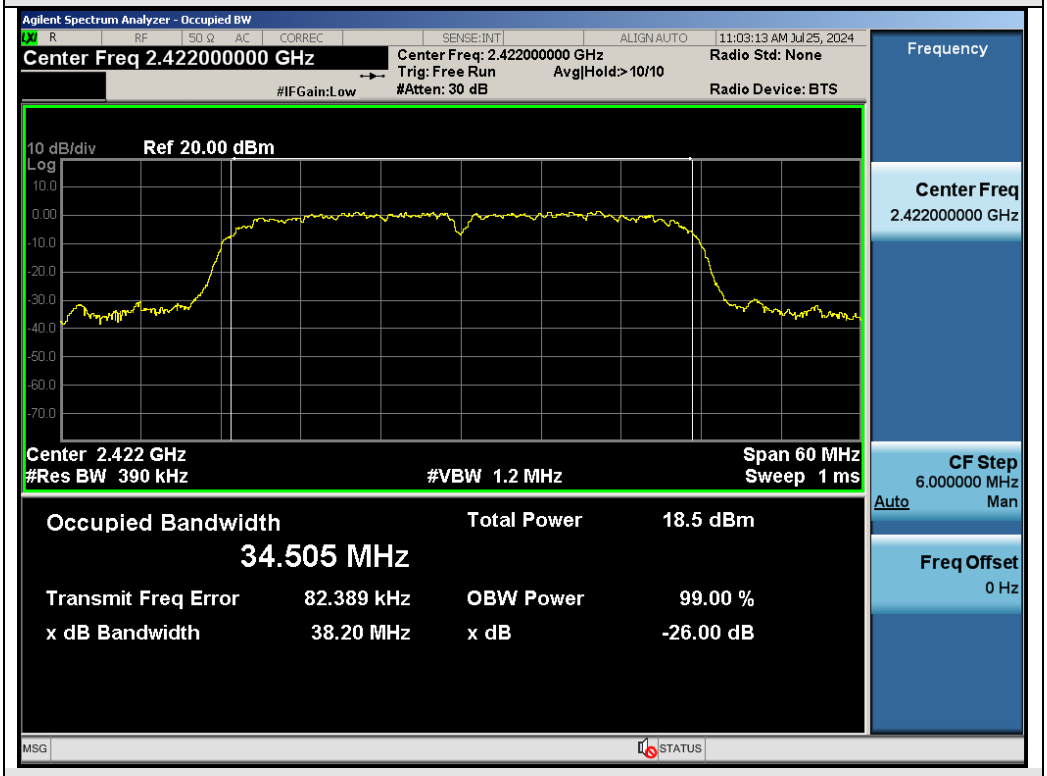


Test_Graph_802.11n40_ANT1_2422_MCS0_OBW

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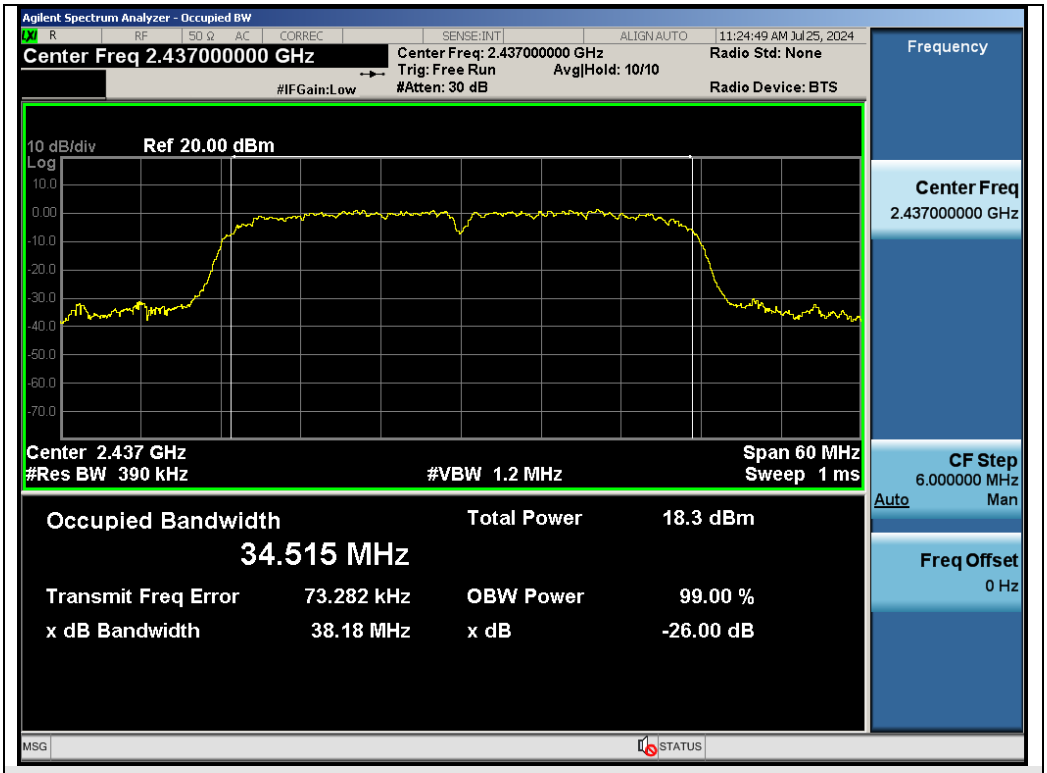
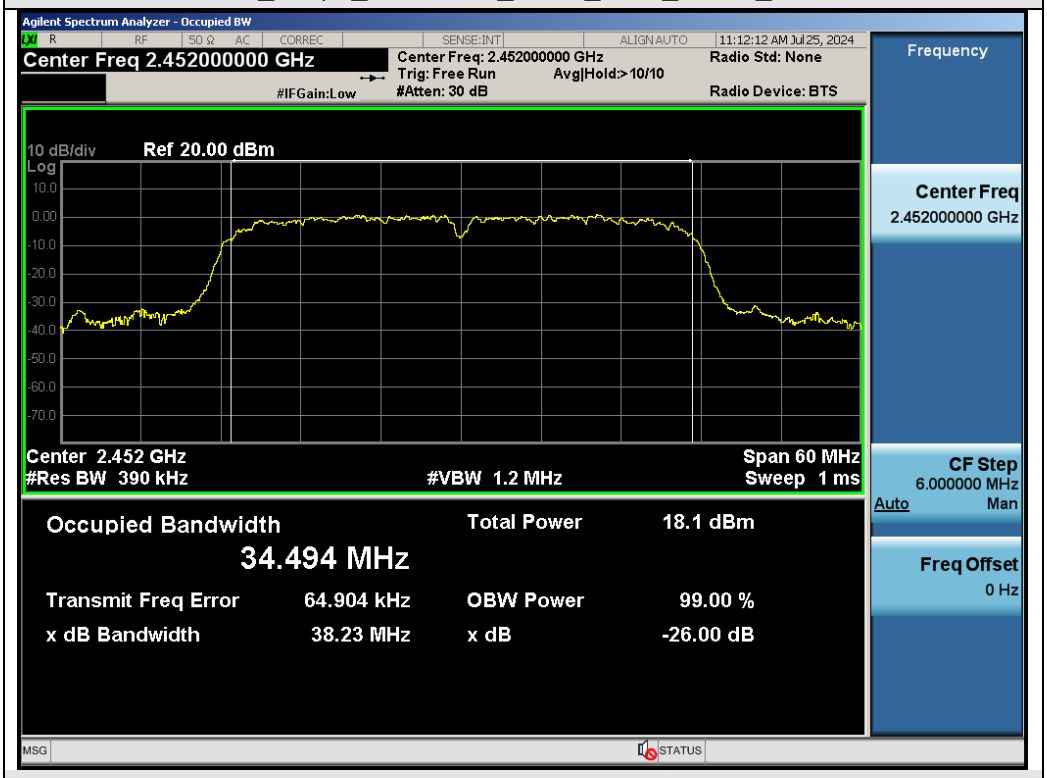



Test_Graph_802.11n40_ANT1_2437_MCS0_OBW




Test_Graph_802.11n40_ANT1_2452_MCS0_OBW

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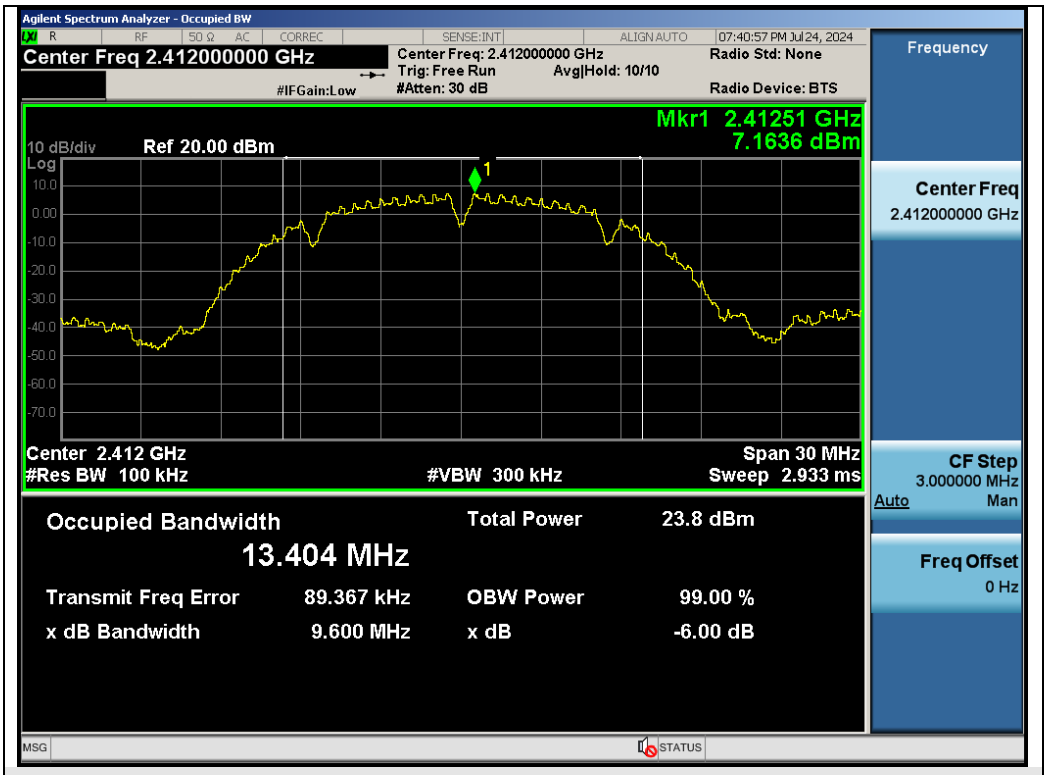
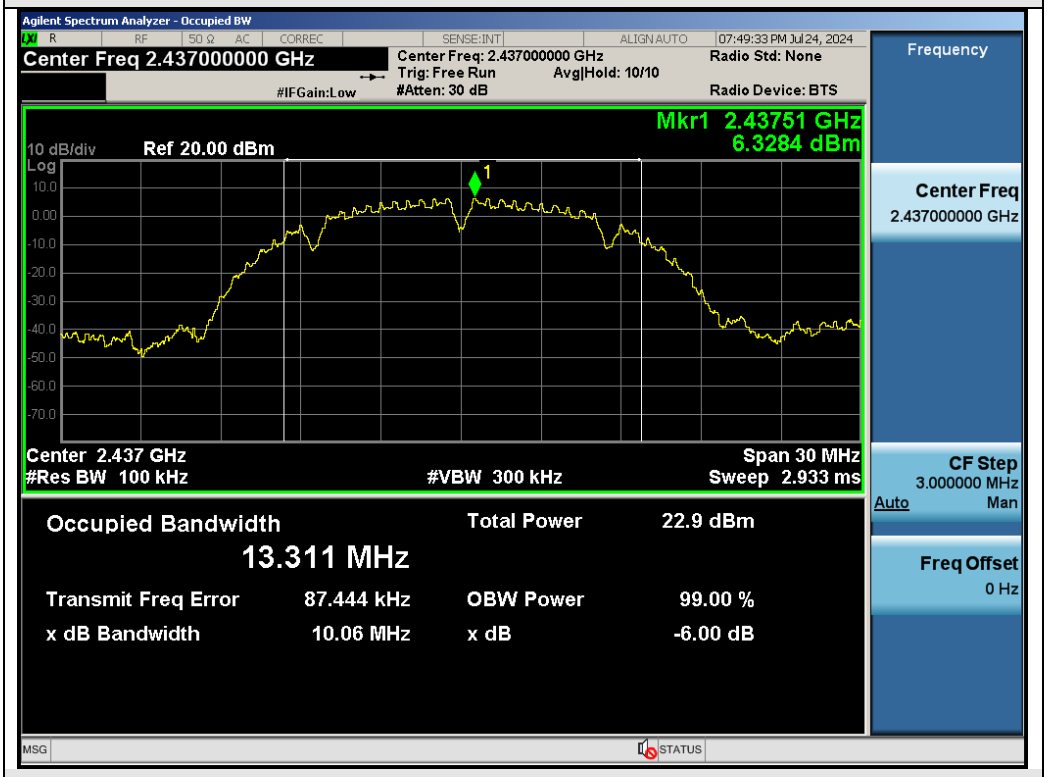
## Test Graphs of DTS Bandwidth




Test_Graph_802.11b_ANT1_2412_1Mbps_DTSBW




Test_Graph_802.11b_ANT1_2437_1Mbps_DTSBW

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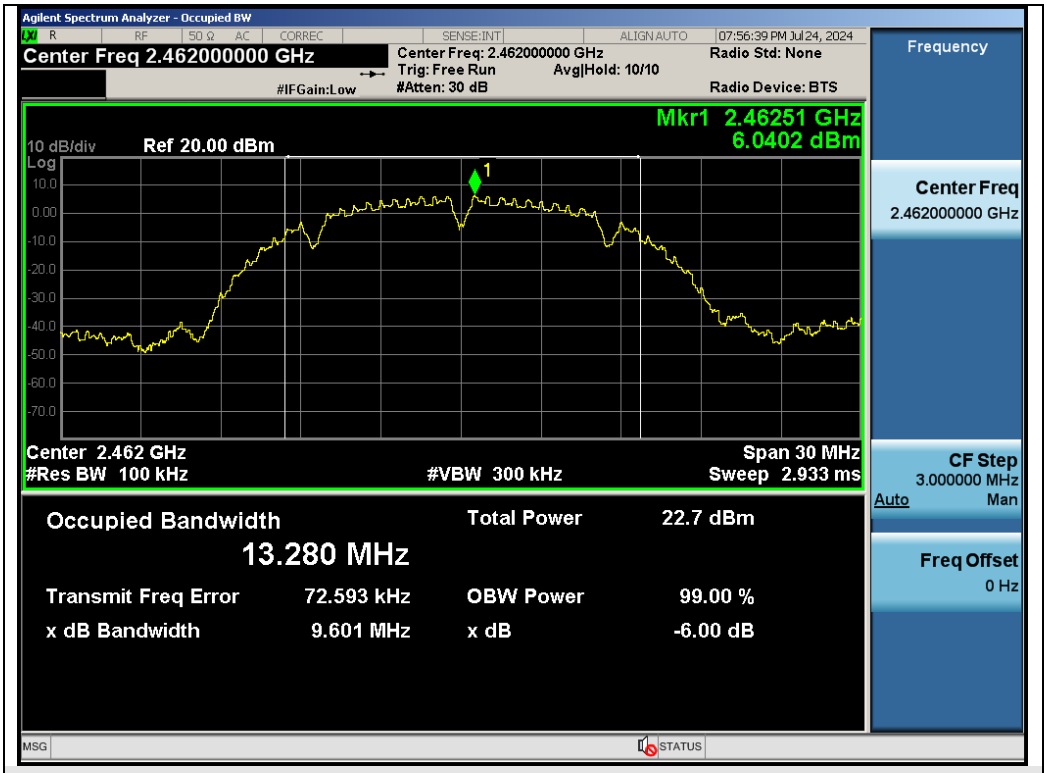
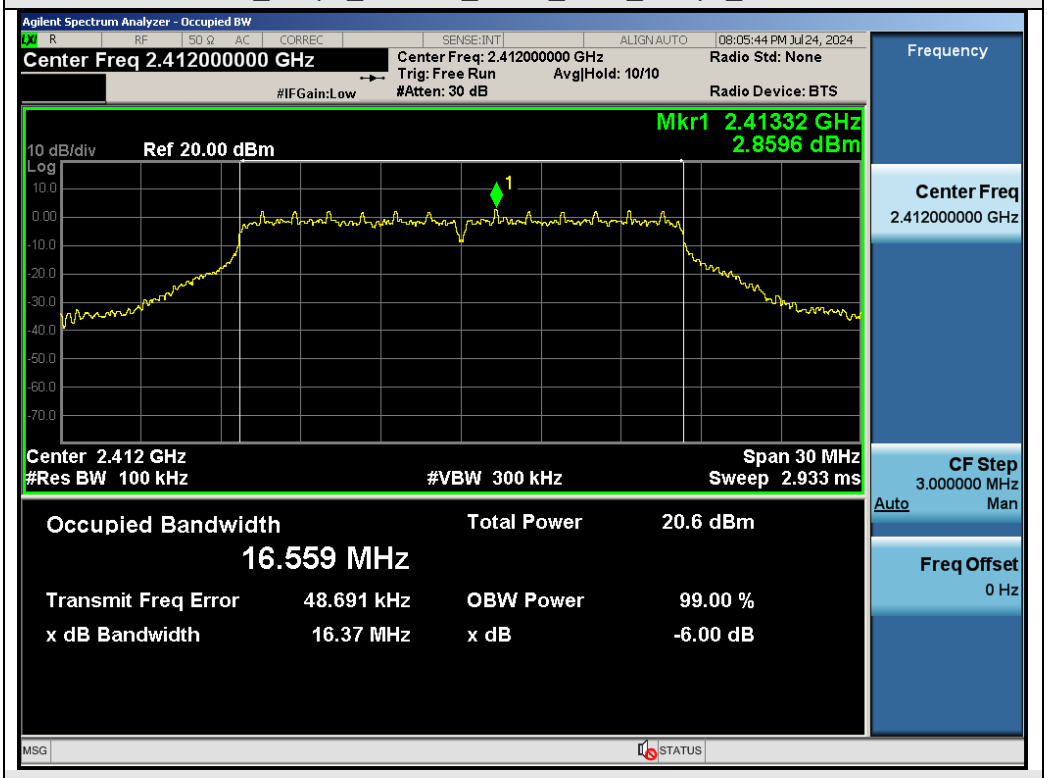



Test_Graph_802.11b_ANT1_2462_1Mbps_DTSBW




Test_Graph_802.11g_ANT1_2412_6Mbps_DTSBW

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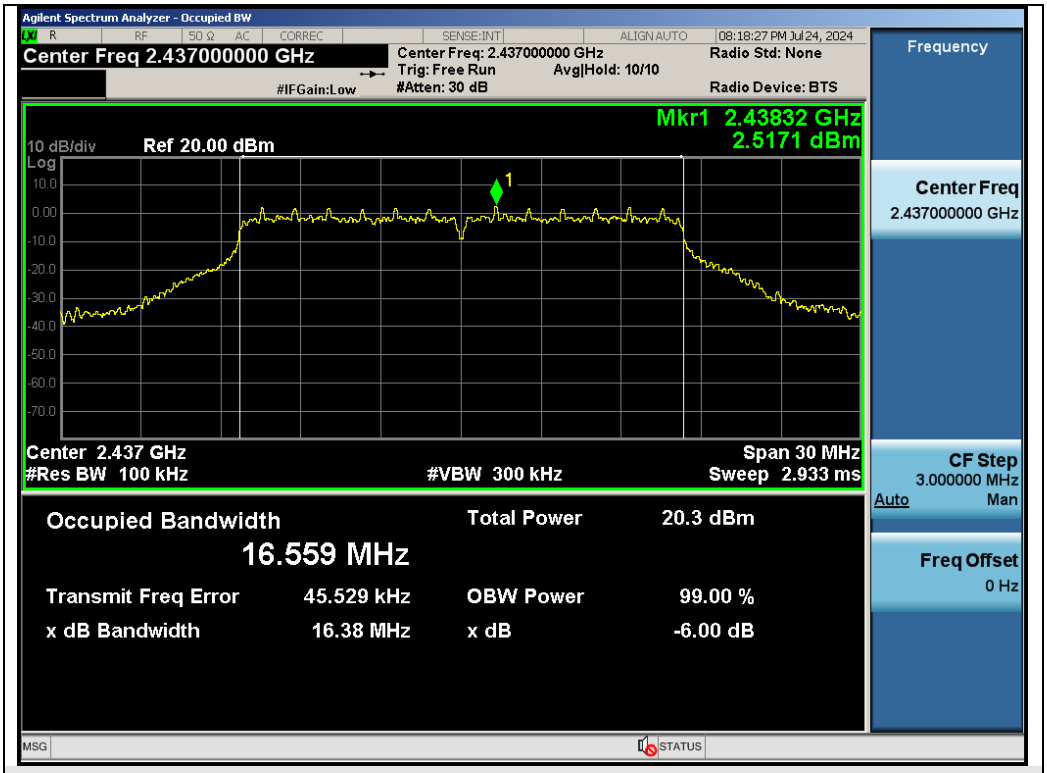
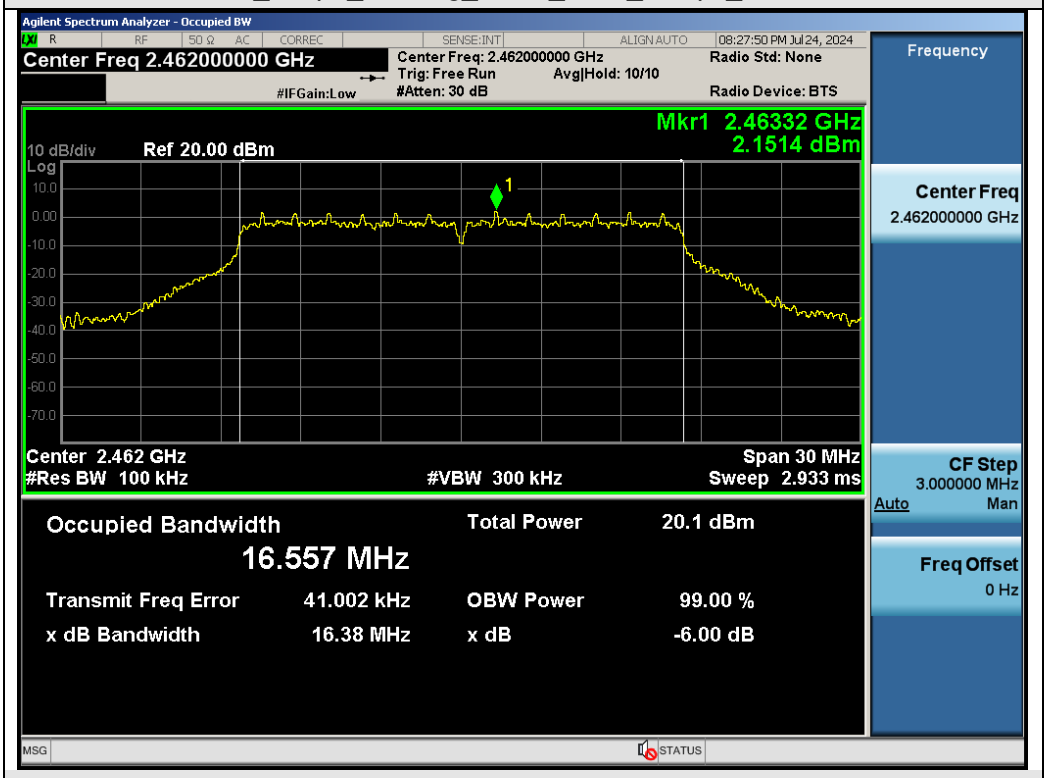



Test_Graph_802.11g_ANT1_2437_6Mbps_DTSBW




Test_Graph_802.11g_ANT1_2462_6Mbps_DTSBW

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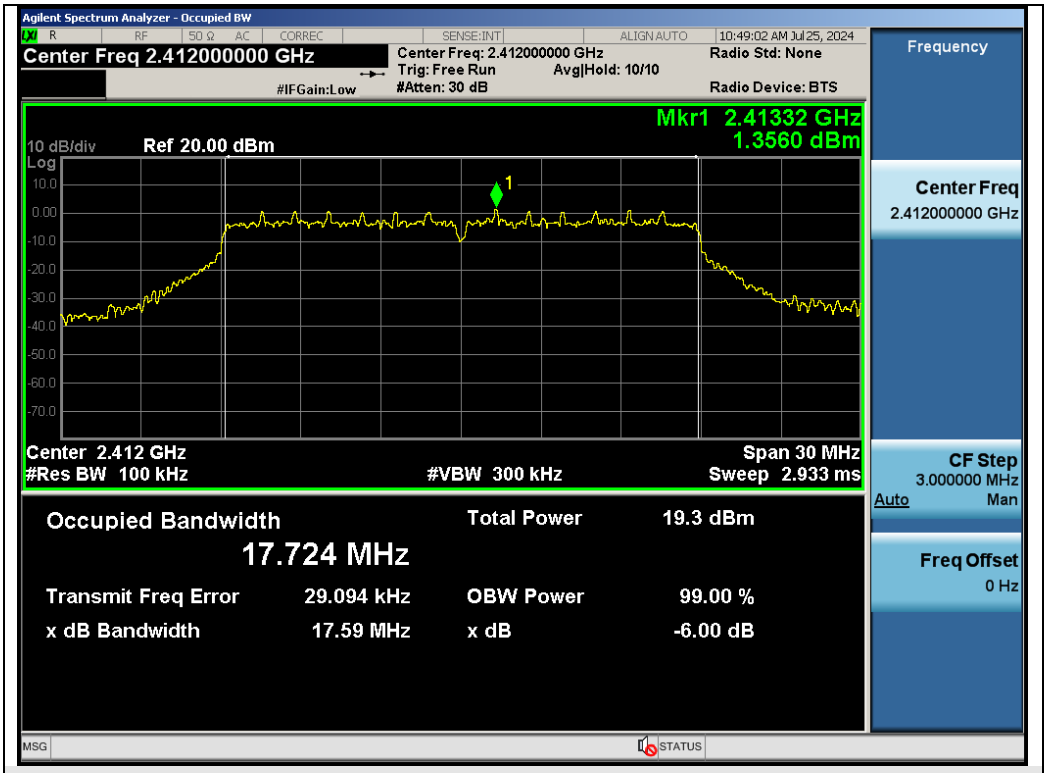
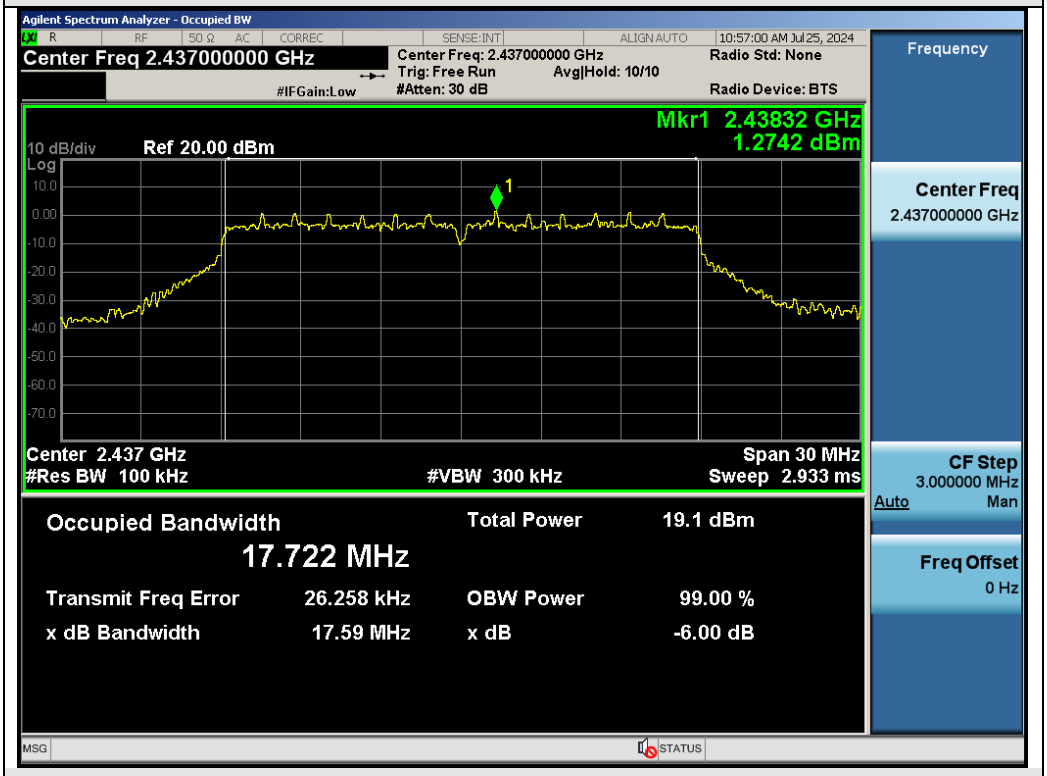



Test_Graph_802.11n20_ANT1_2412_MCS0_DTSBW




Test_Graph_802.11n20_ANT1_2437_MCS0_DTSBW

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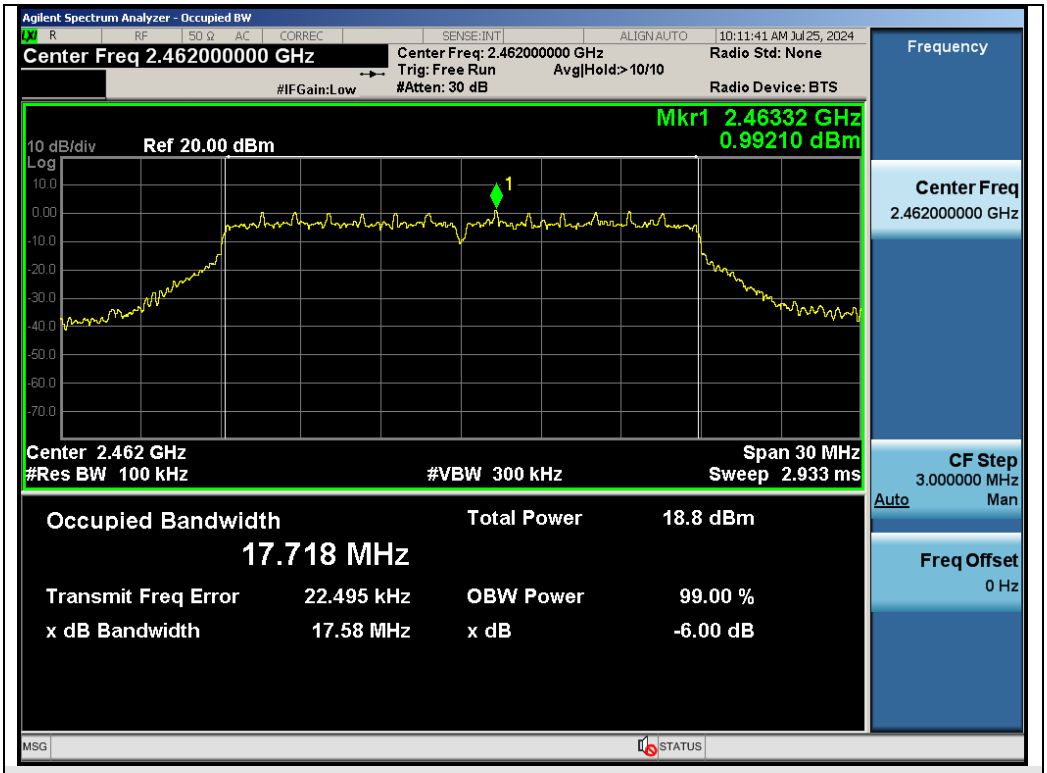
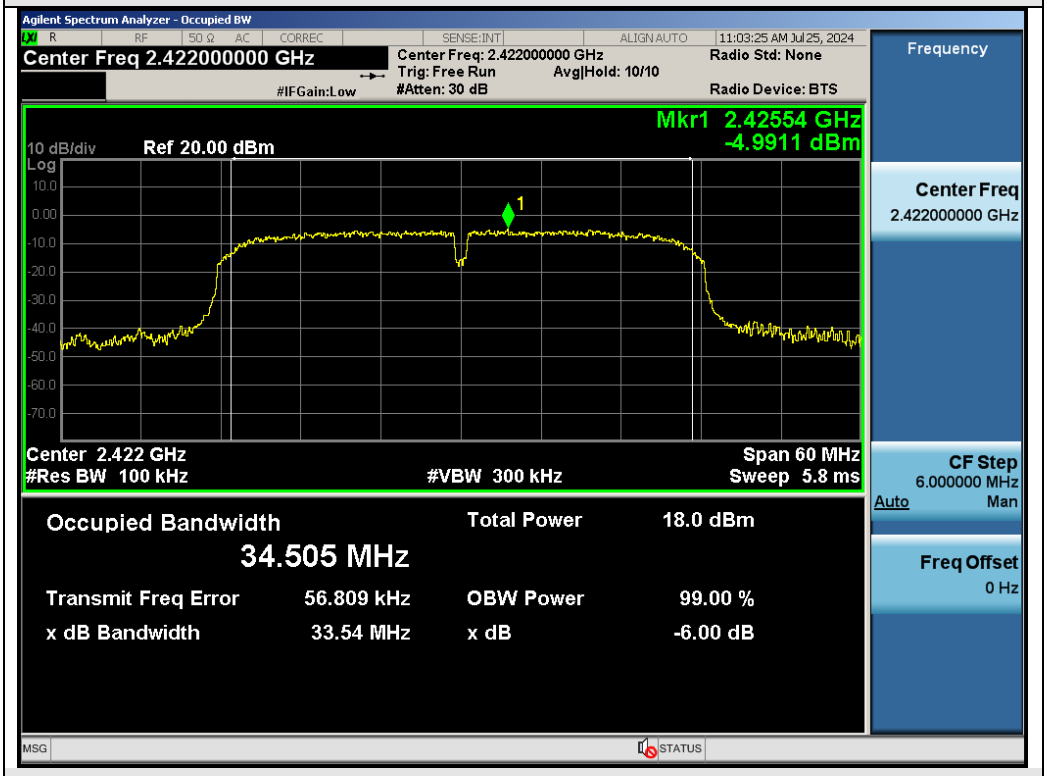



Test_Graph_802.11n20_ANT1_2462_MCS0_DTSBW




Test_Graph_802.11n40_ANT1_2422_MCS0_DTSBW

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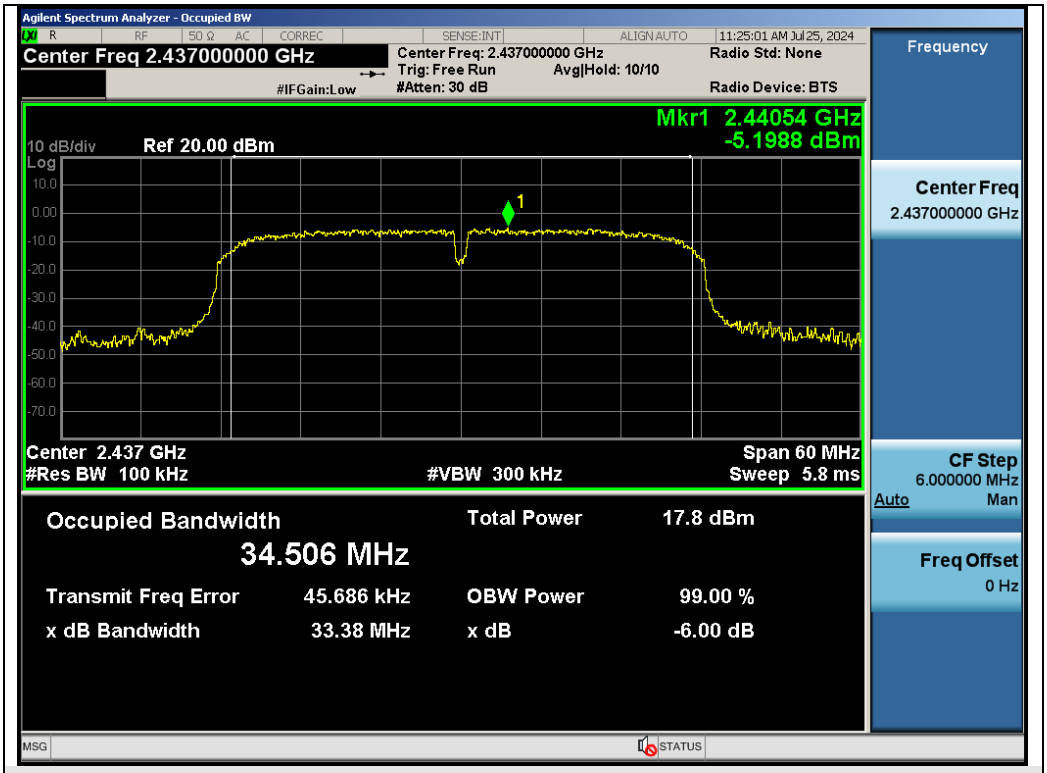
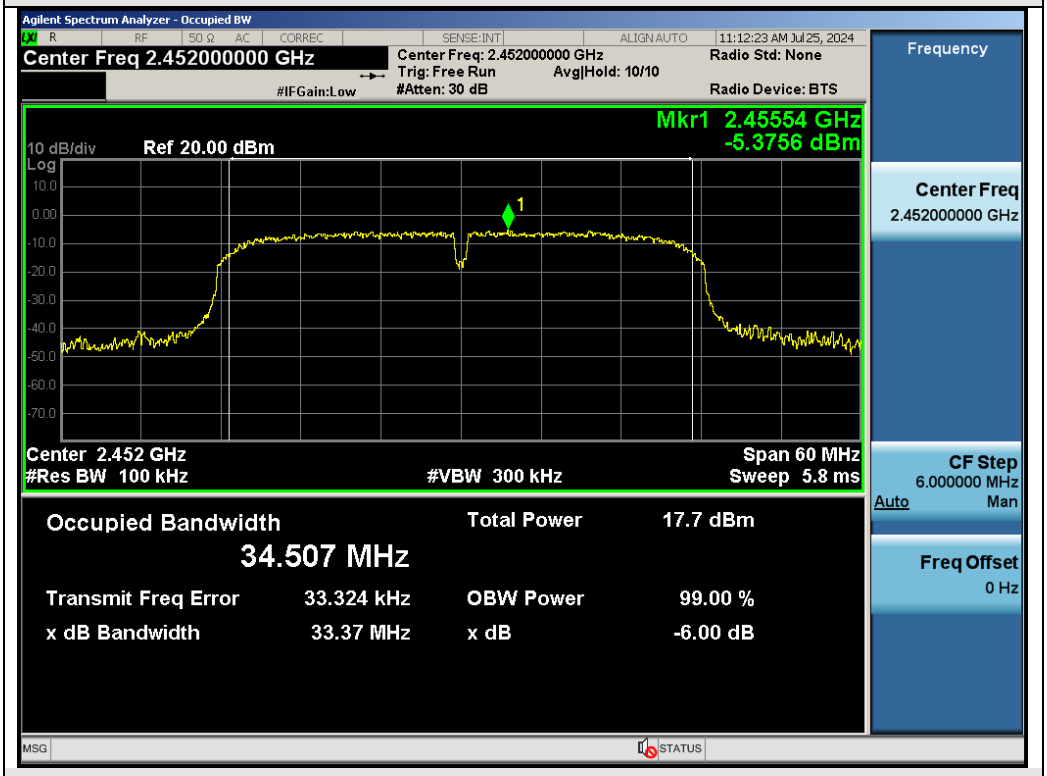



Test_Graph_802.11n40_ANT1_2437_MCS0_DTSBW




Test_Graph_802.11n40_ANT1_2452_MCS0_DTSBW

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# 9. Power Spectral Density Measurement

## 9.1 Provisions Applicable

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

## 9.2 Measurement Procedure

☒For Peak power spectral density test:

1. The testing follows the ANSI C63.10 Section 11.10.2 Method PKPSD.
2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
3. Set the RBW = 20 kHz.
4. Set the VBW ≥ [3 × RBW].
5. Set the Span ≥ [1.5 × DTS bandwidth].
6. Sweep time=Auto couple.
7. Detector function=Peak.
8. Trace Mode=Max hold.
9. When the measurement bandwidth of Maximum PSD is specified in 3 kHz, add a constant factor 10*log(3kHz/20kHz) = -8.23 dB to the measured result.
10. Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission.
11. The indicated level is the peak output power, after any corrections for external attenuators and cables.

☐For Average power spectral density test:

1. The testing follows the ANSI C63.10 Section 11.10.5 Method AVPSD.
2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
3. Set Span to at least 1.5 times the OBW.
4. Set RBW to:3 kHz ≤ RBW ≤ 100 kHz.
5. Set VBW≥[3×RBW].
6. Sweep Time=Auto couple.
7. Detector function=RMS (i.e., power averaging).
8. Trace average at least 100 traces in power averaging (rms) mode.
9. When the measurement bandwidth of Maximum PSD is specified in 3 kHz, add a constant factor 10*log(3kHz/20kHz) = -8.23 dB to the measured result.
10. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
11. Add [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is 25%.
12. Record the test results in the report.

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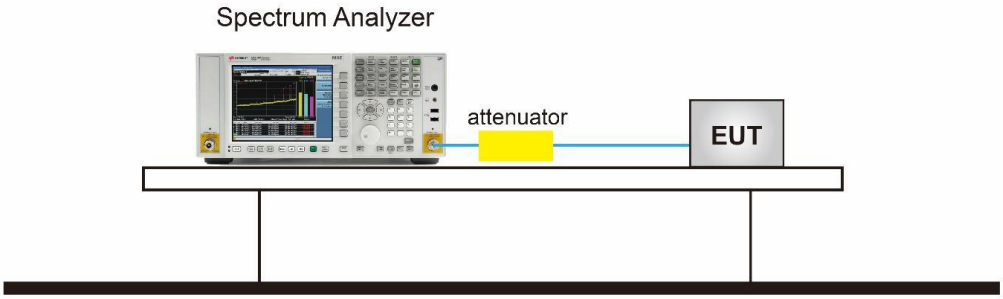
### 9.3 Measurement Setup (Block Diagram of Configuration)




### 9.4 Measurement Result

| Test Data of Conducted Output Power Spectral Density | | | | | |
|---|---|---|---|---|---|
| Test Mode | Test Frequency (MHz) | Power Spectral density (dBm/20kHz) | Power Spectral density (dBm/3kHz) | Limit (dBm/3kHz) | Pass or Fail |
| 802.11b | 2412 | 1.966 | -6.273 | ≤8 | Pass |
| | 2437 | 1.422 | -6.817 | ≤8 | Pass |
| | 2462 | 0.662 | -7.577 | ≤8 | Pass |
| 802.11g | 2412 | -3.752 | -11.991 | ≤8 | Pass |
| | 2437 | -4.050 | -12.289 | ≤8 | Pass |
| | 2462 | -4.308 | -12.547 | ≤8 | Pass |
| 802.11n20 | 2412 | -5.108 | -13.347 | ≤8 | Pass |
| | 2437 | -5.141 | -13.38 | ≤8 | Pass |
| | 2462 | -5.481 | -13.72 | ≤8 | Pass |
| 802.11n40 | 2422 | -8.721 | -16.96 | ≤8 | Pass |
| | 2437 | -9.996 | -18.235 | ≤8 | Pass |
| | 2452 | -10.268 | -18.507 | ≤8 | Pass |

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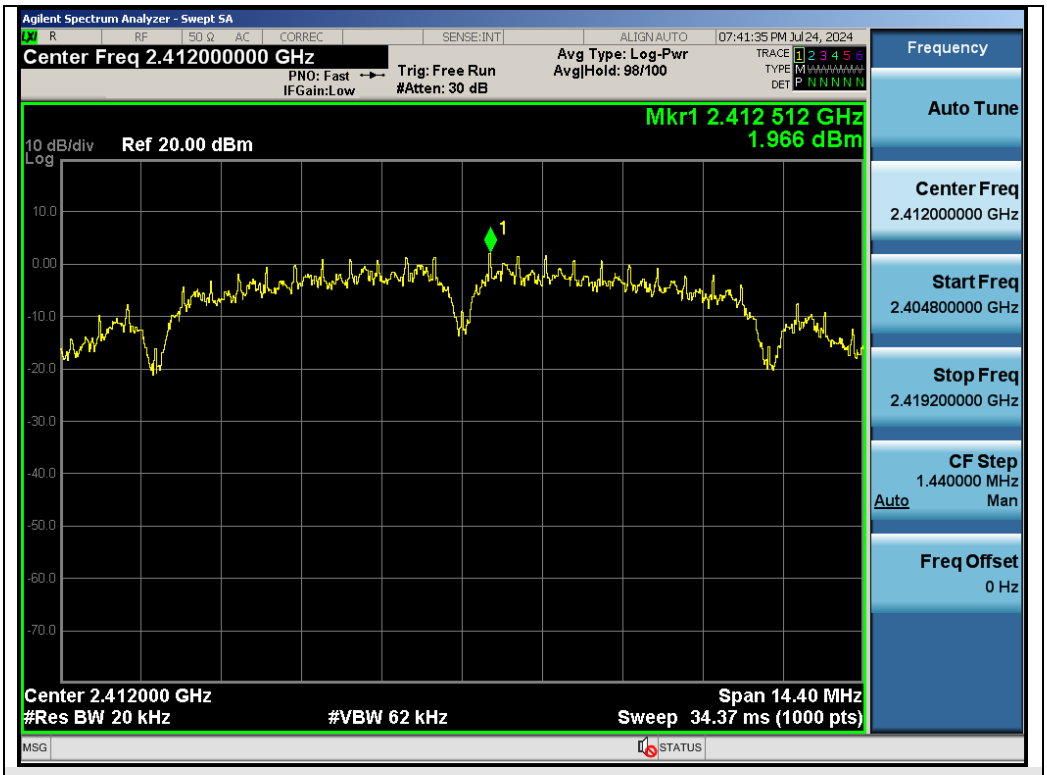
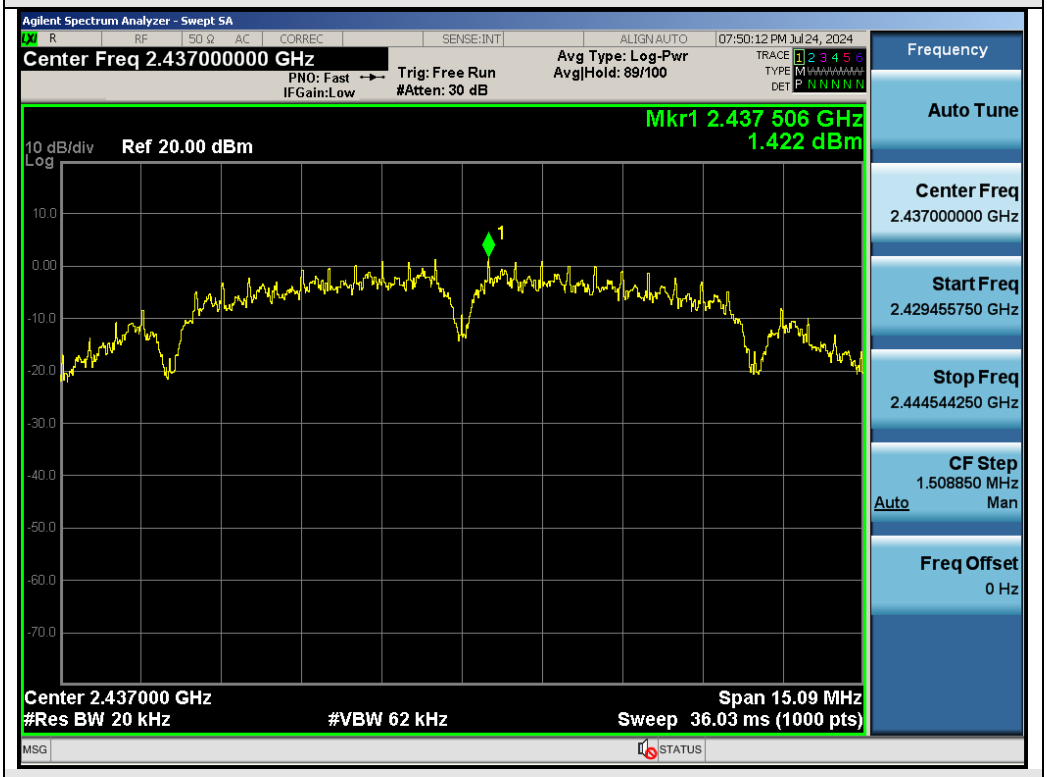
## Test Graphs of Conducted Output Power Spectral Density




Test_Graph_802.11b_ANT1_2412_1Mbps_PSD




Test_Graph_802.11b_ANT1_2437_1Mbps_PSD

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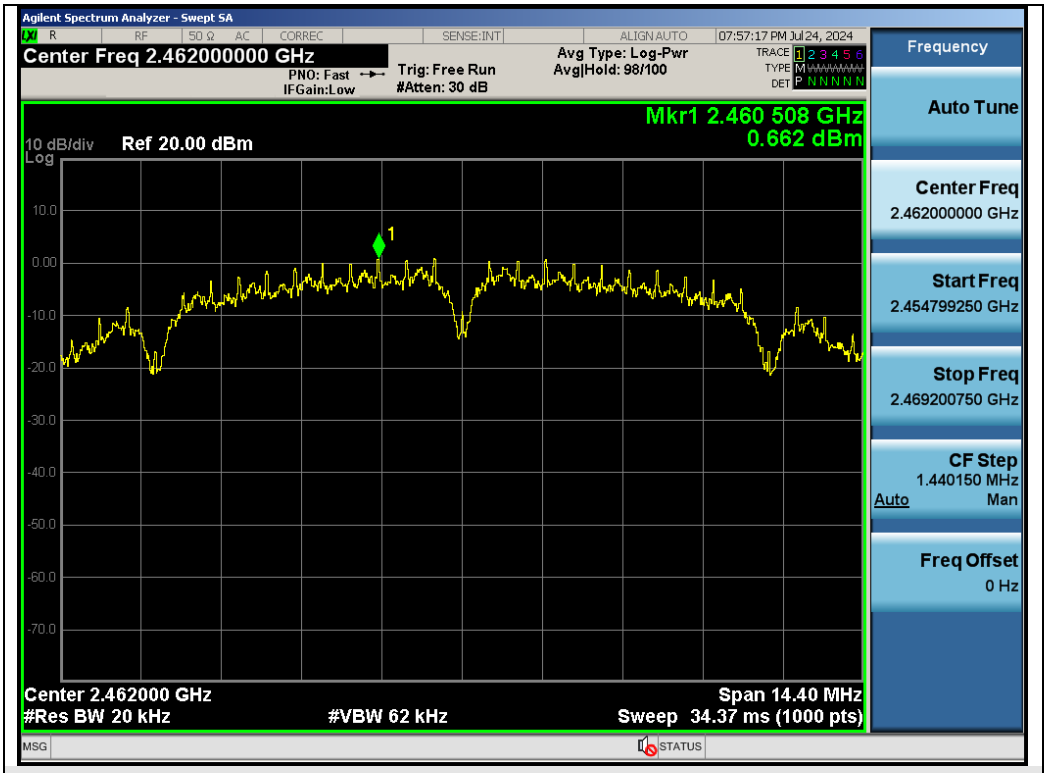
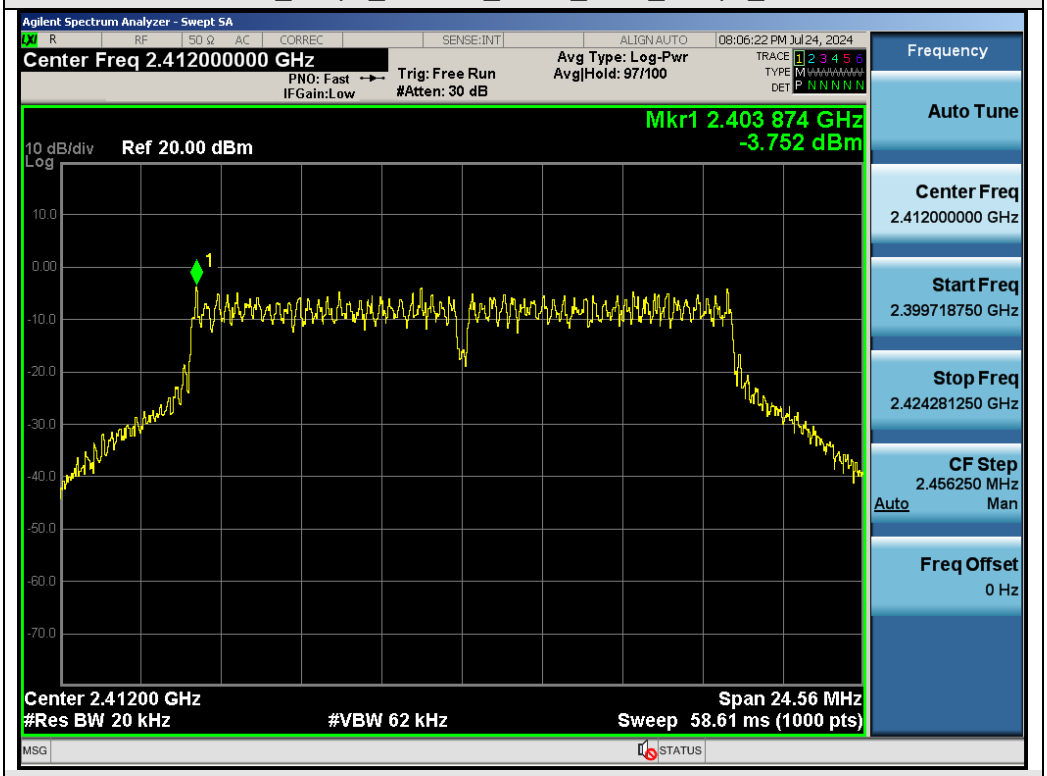



Test_Graph_802.11b_ANT1_2462_1Mbps_PSD




Test_Graph_802.11g_ANT1_2412_6Mbps_PSD

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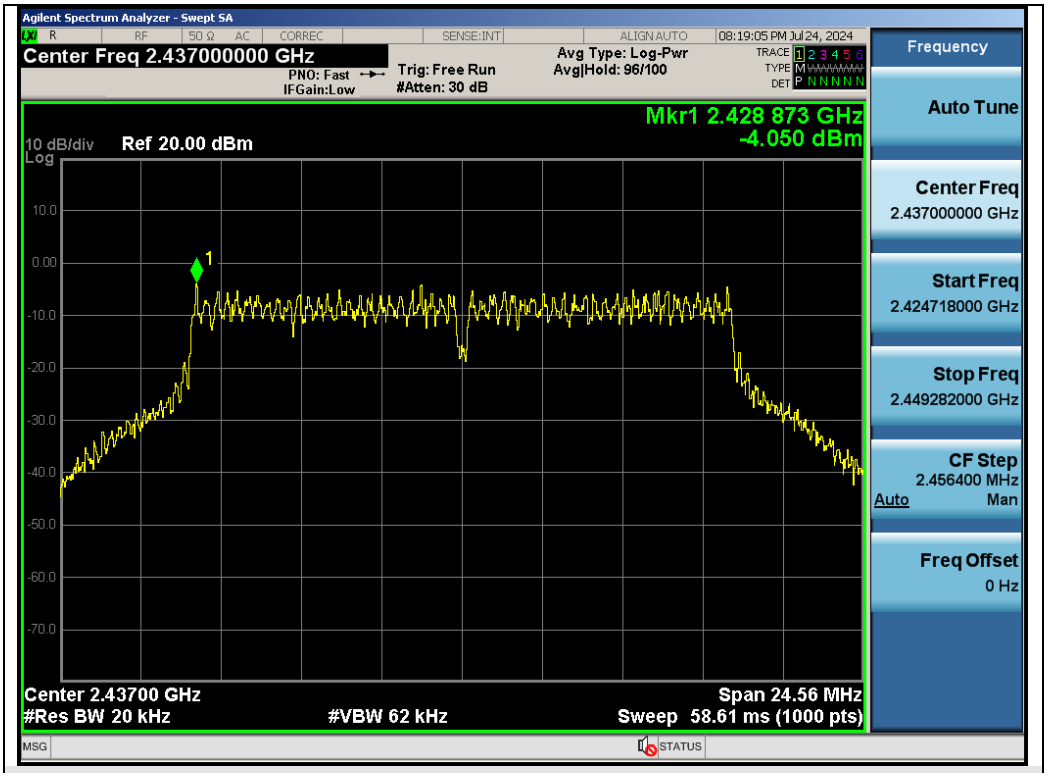


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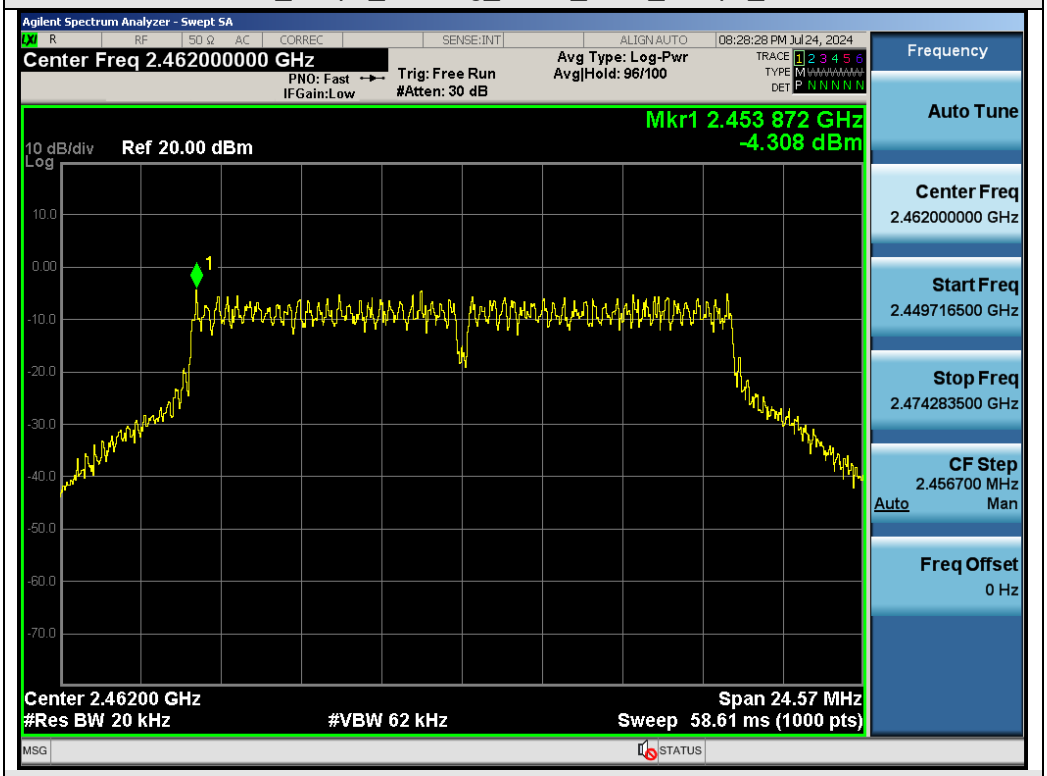


Test_Graph_802.11g_ANT1_2462_6Mbps_PSD

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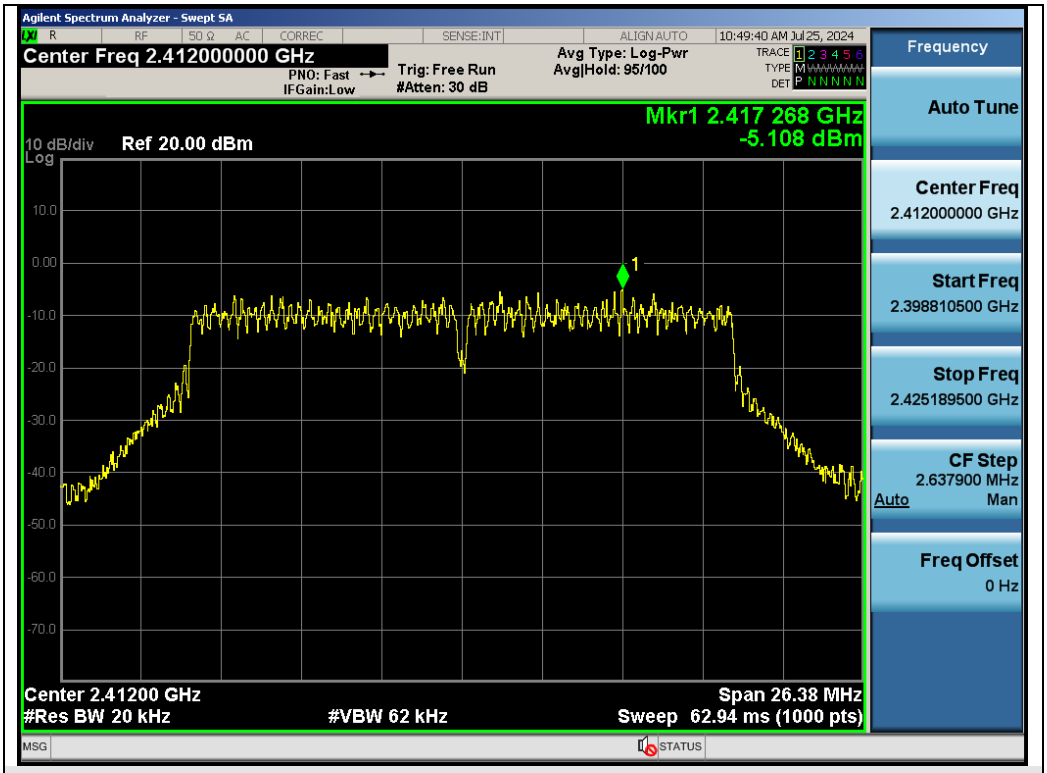


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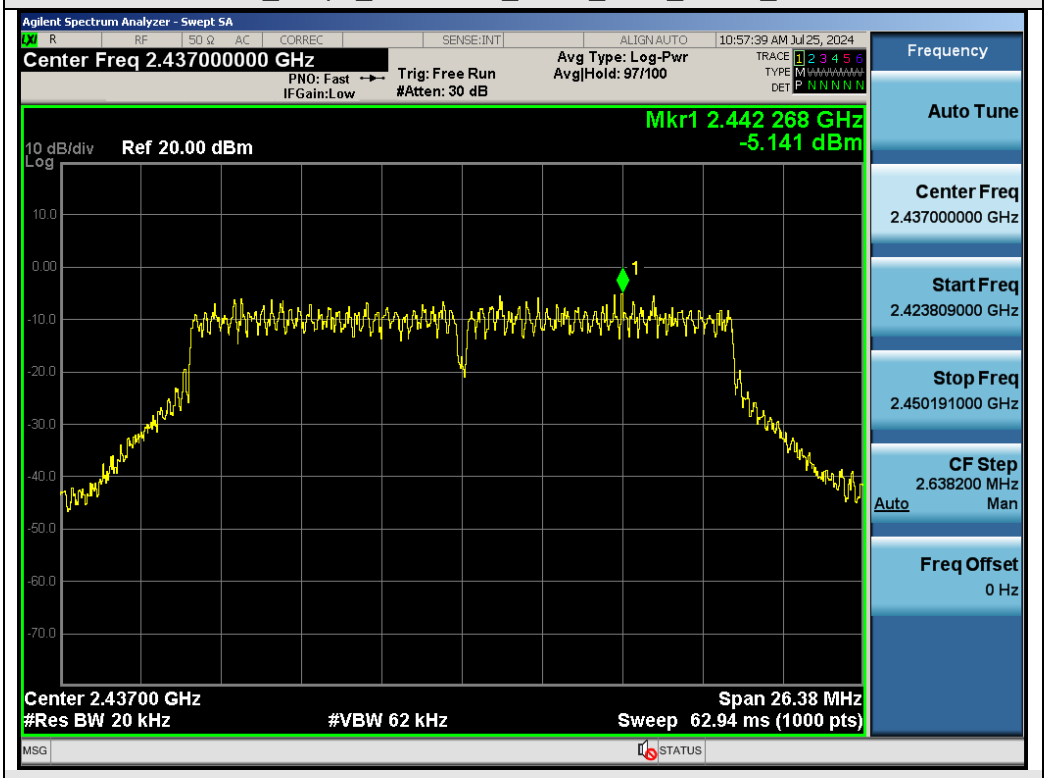


Test_Graph_802.11n20_ANT1_2437_MCS0_PSD

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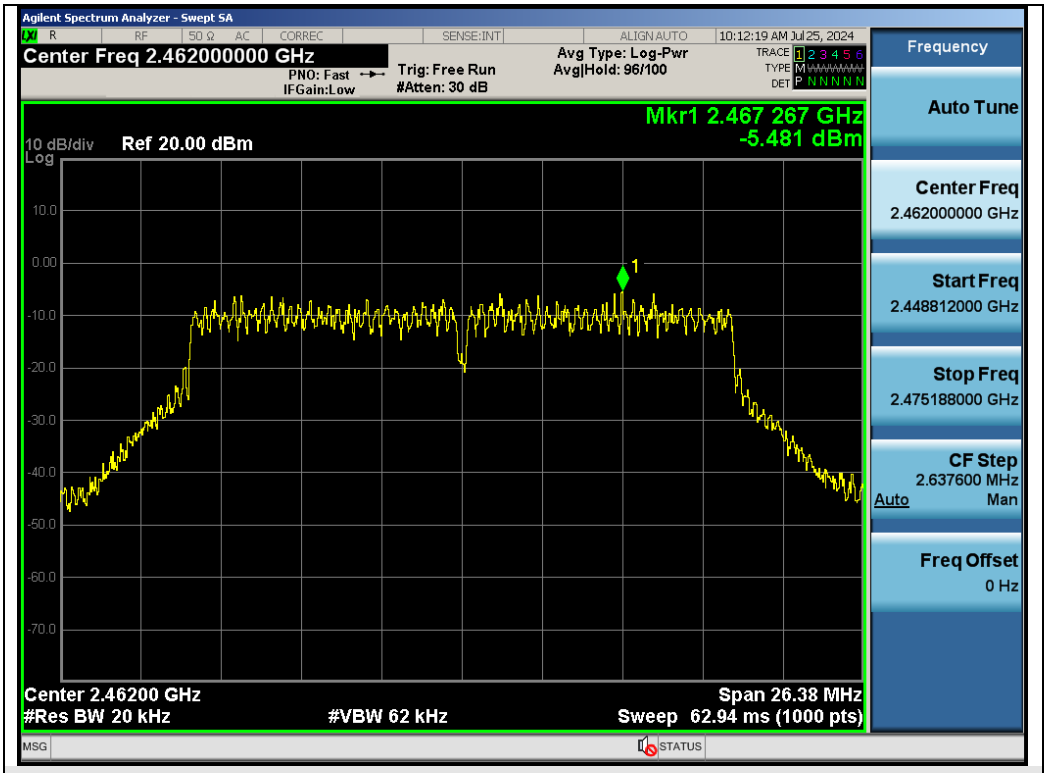


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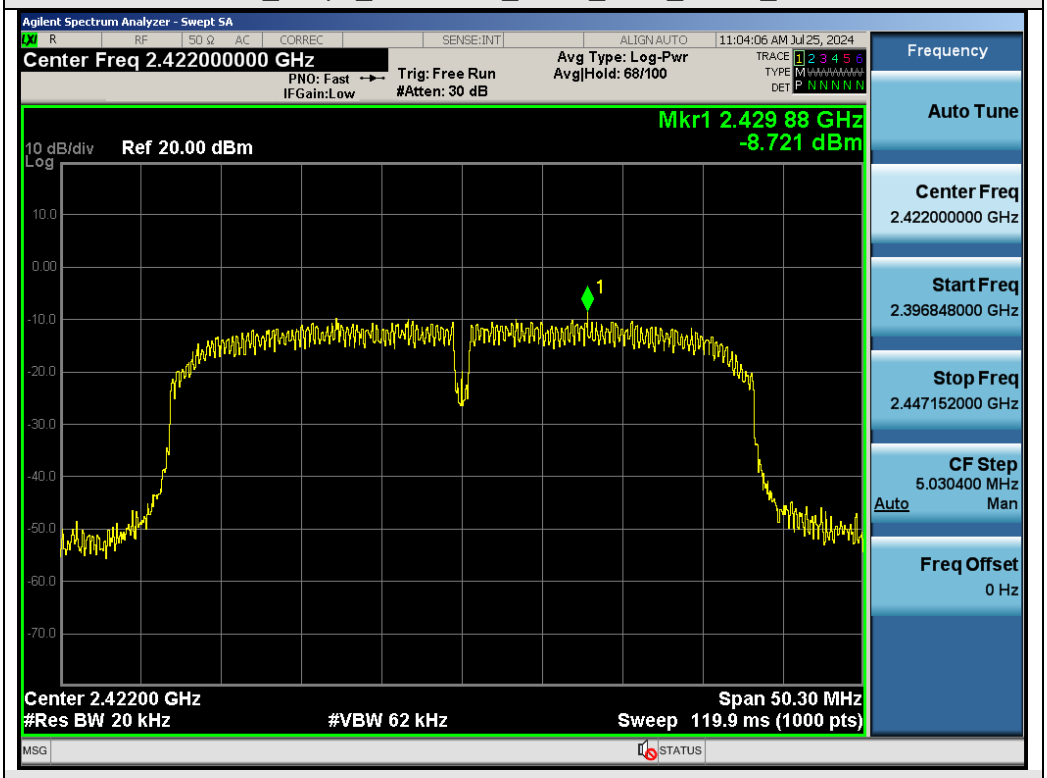


Test_Graph_802.11n40_ANT1_2422_MCS0_PSD

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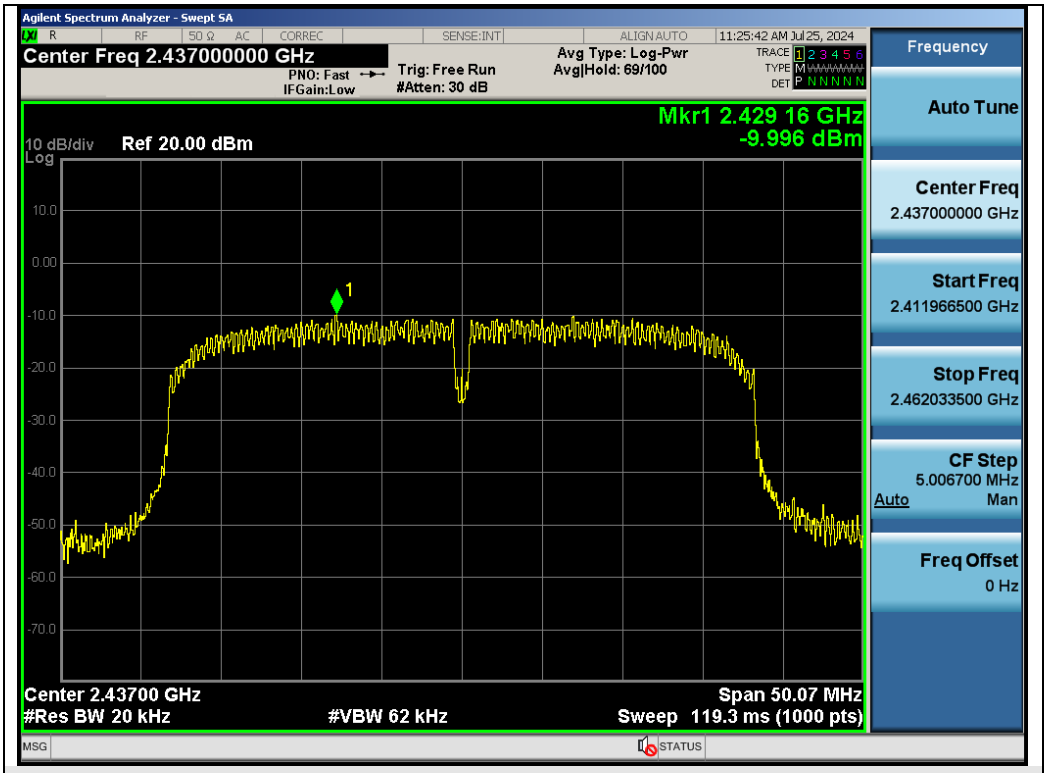


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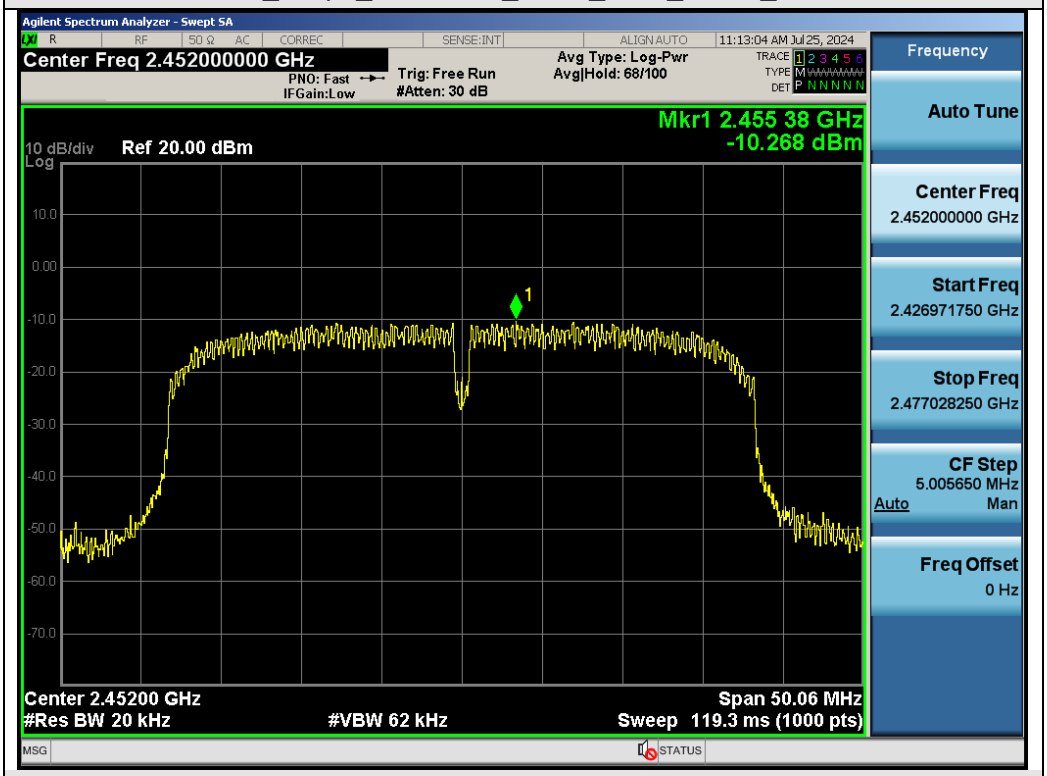


Test_Graph_802.11n40_ANT1_2452_MCS0_PSD

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# 10. Conducted Band Edge and Out-of-Band Emissions

## 10.1 Provisions Applicable

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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.

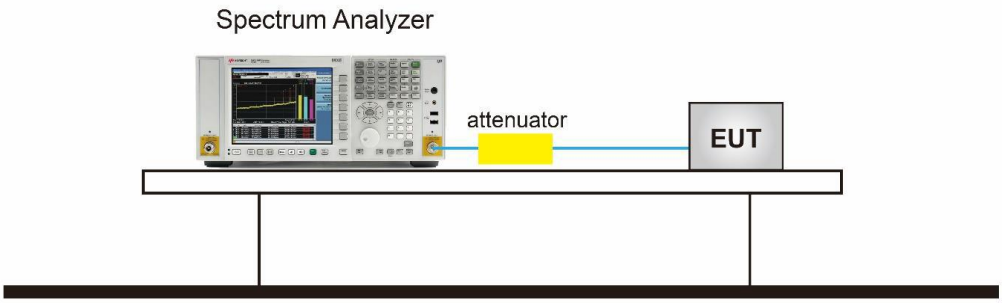
## 10.2 Measurement Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Use the following spectrum analyzer settings:

- Step 1: Measurement Procedure In-Band Reference Level
  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.
  10. Note that the channel found to contain the maximum PSD level can be used to establish the reference level.
  11. For reference level values, please refer to DTS bandwidth test.
- Step 2: Measurement Procedure Out of Band Emission
  1. Set RBW = 100 kHz.
  2. Set VBW ≥ 300 kHz.
  3. Detector = peak.
  4. Sweep = auto couple.
  5. Trace Mode = max hold.
  6. Allow trace to fully stabilize.
  7. Use the peak marker function to determine the maximum amplitude level.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

## 10.3 Measurement Setup (Block Diagram of Configuration)

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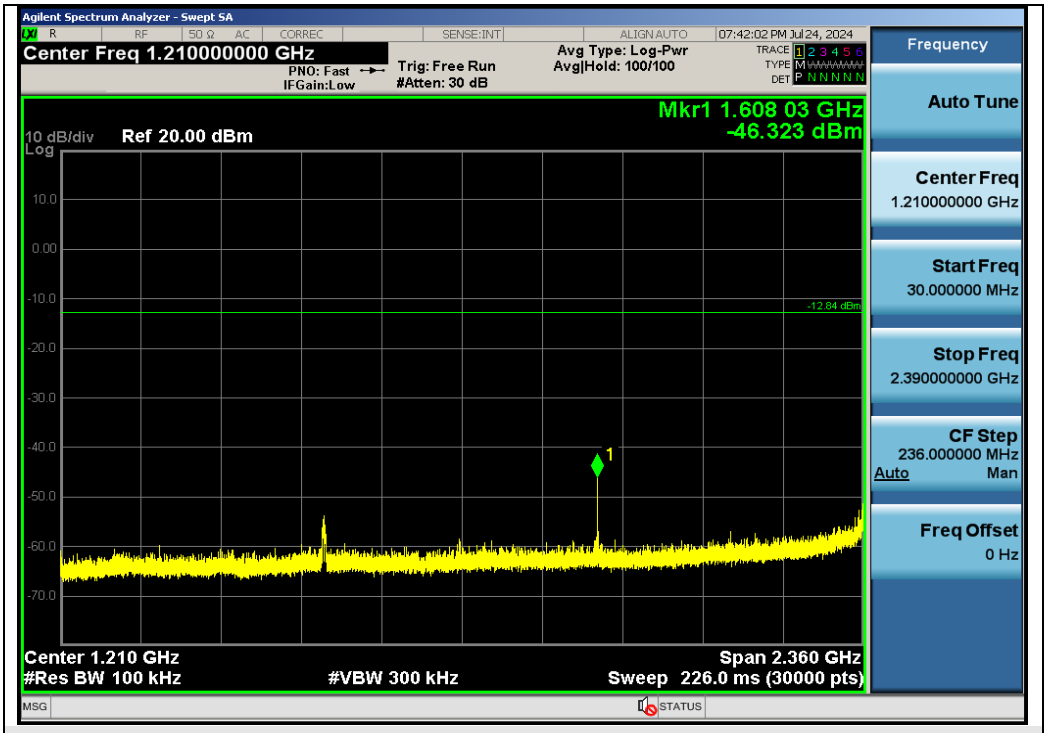
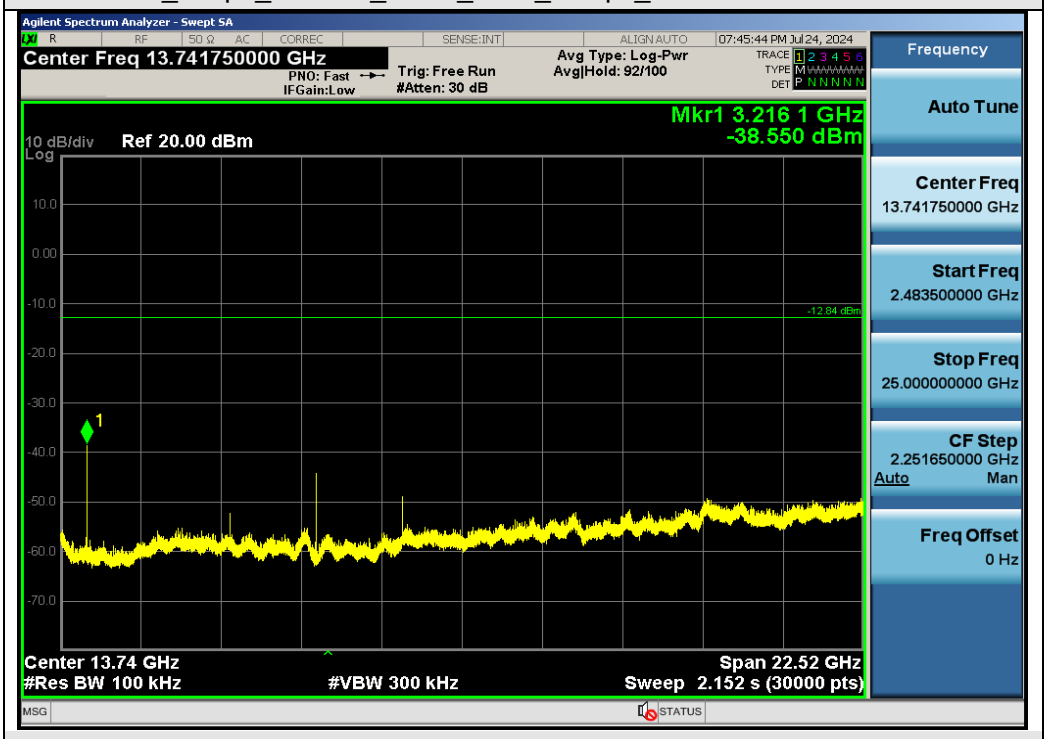
## 10.4 Measurement Result

### Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands




Test_Graph_802.11b_ANT1_2412_1Mbps_Lower Band Emissions




Test_Graph_802.11b_ANT1_2412_1Mbps_Higher Band Emissions

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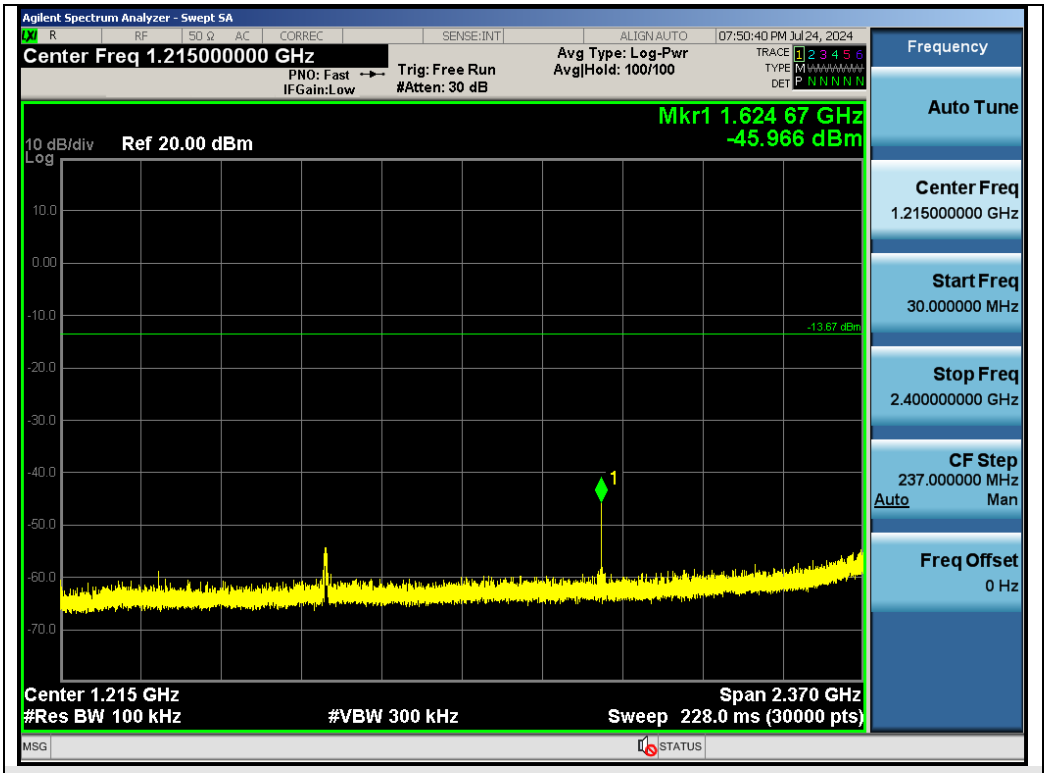
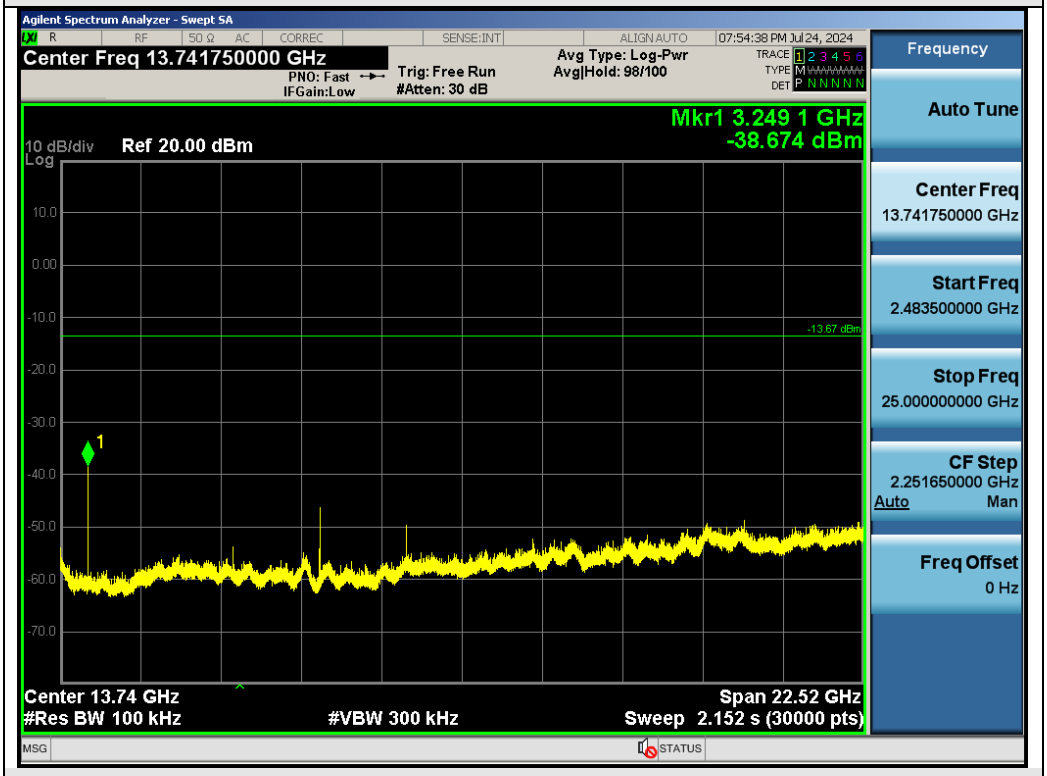



Test_Graph_802.11b_ANT1_2437_1Mbps_Lower Band Emissions




Test_Graph_802.11b_ANT1_2437_1Mbps_Higher Band Emissions

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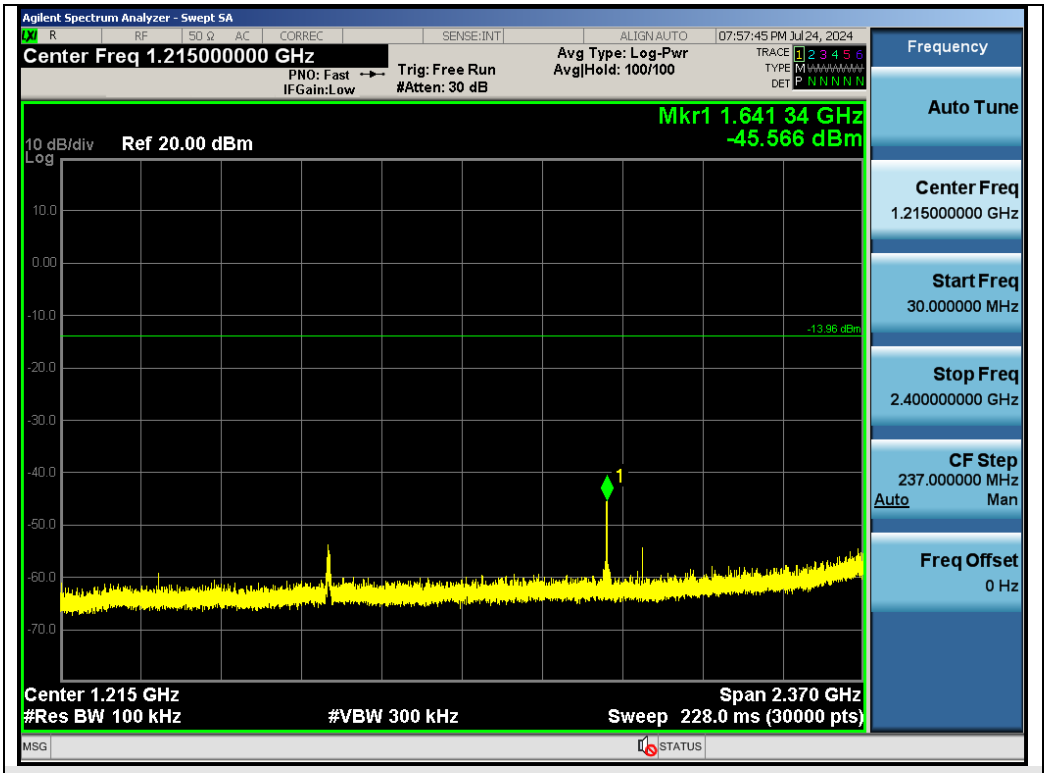
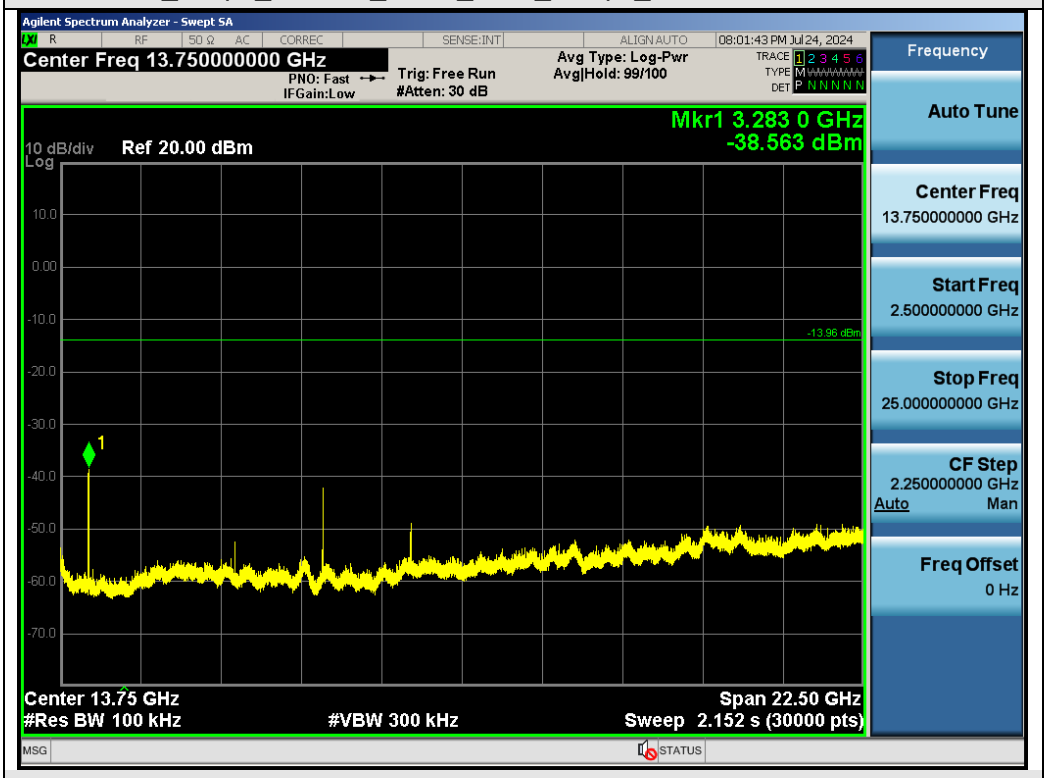



Test_Graph_802.11b_ANT1_2462_1Mbps_Lower Band Emissions




Test_Graph_802.11b_ANT1_2462_1Mbps_Higher Band Emissions

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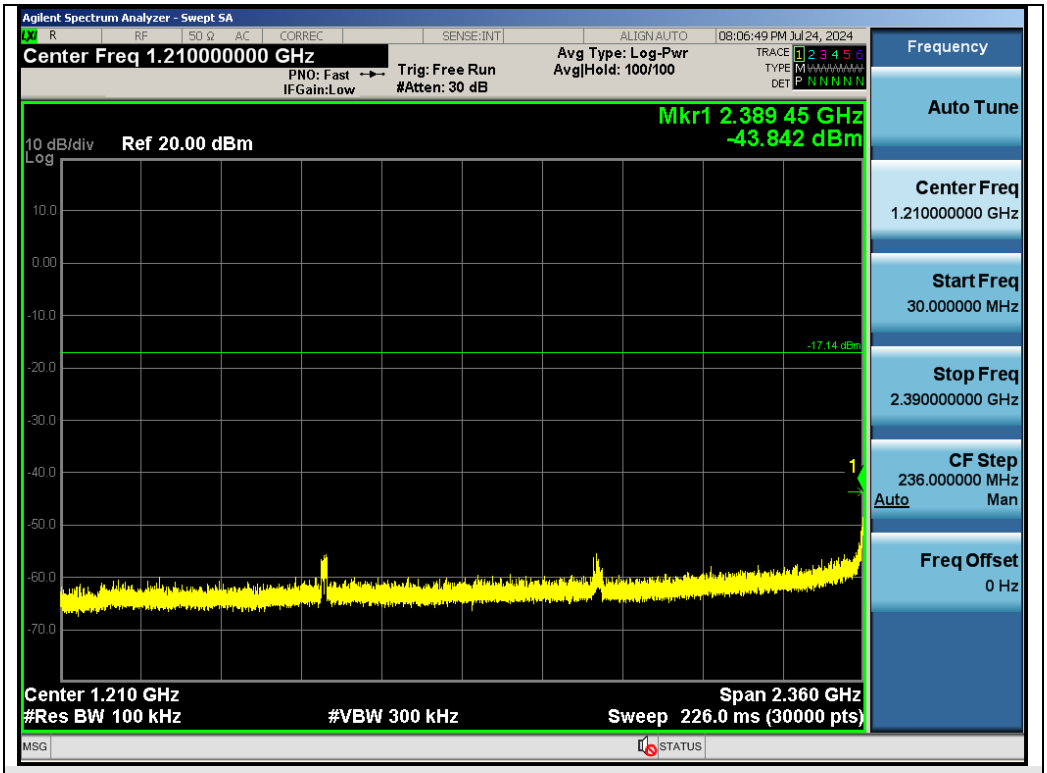
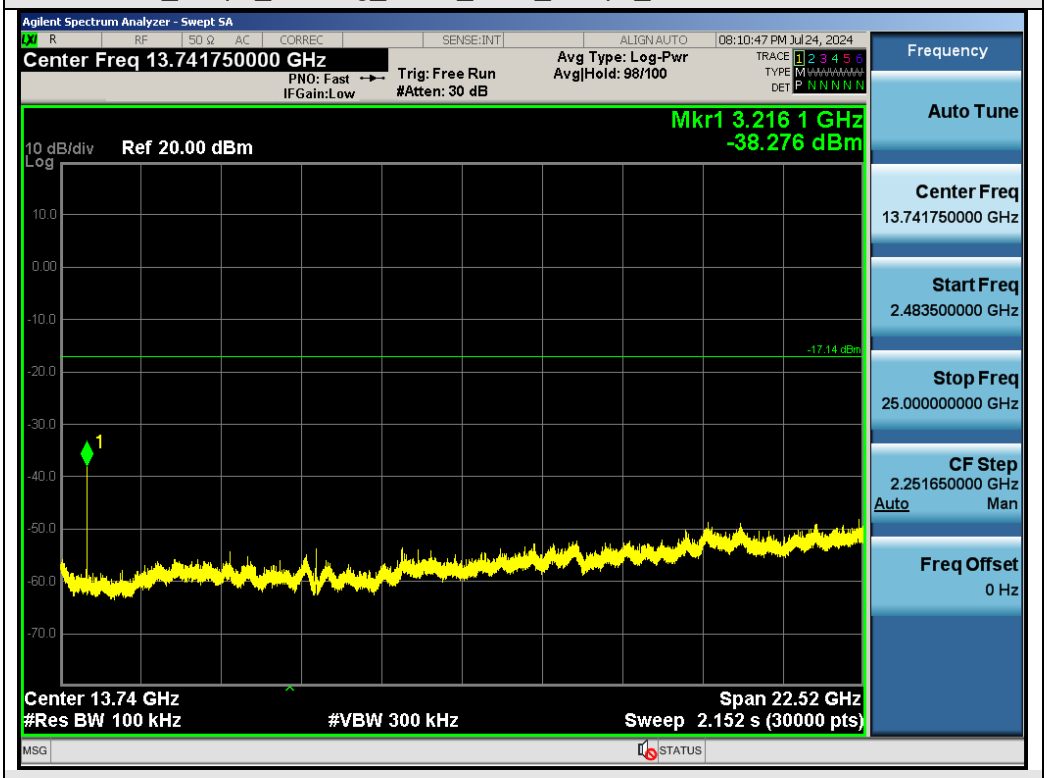



Test_Graph_802.11g_ANT1_2412_6Mbps_Lower Band Emissions




Test_Graph_802.11g_ANT1_2412_6Mbps_Higher Band Emissions

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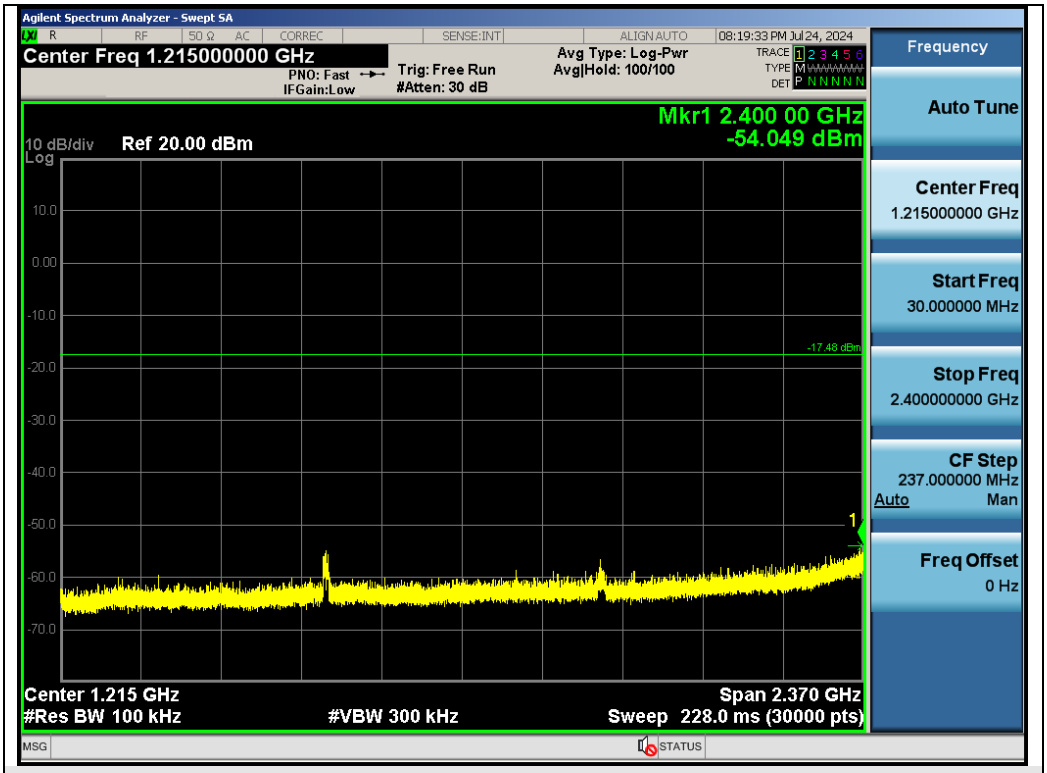
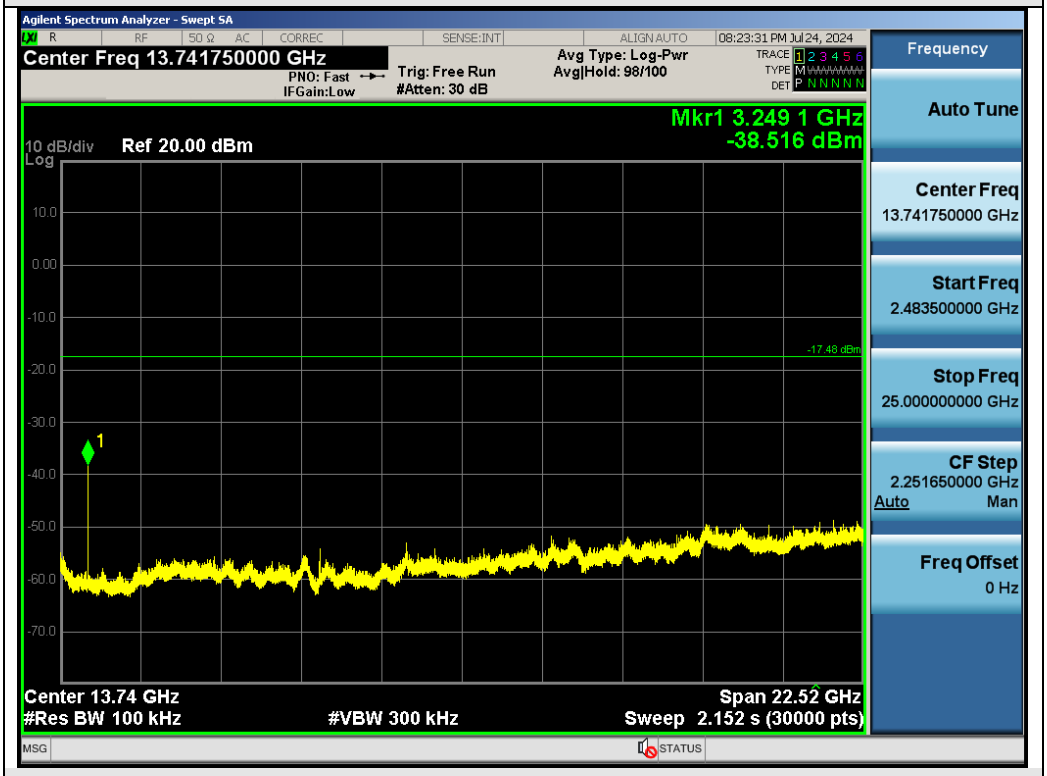



Test_Graph_802.11g_ANT1_2437_6Mbps_Lower Band Emissions




Test_Graph_802.11g_ANT1_2437_6Mbps_Higher Band Emissions

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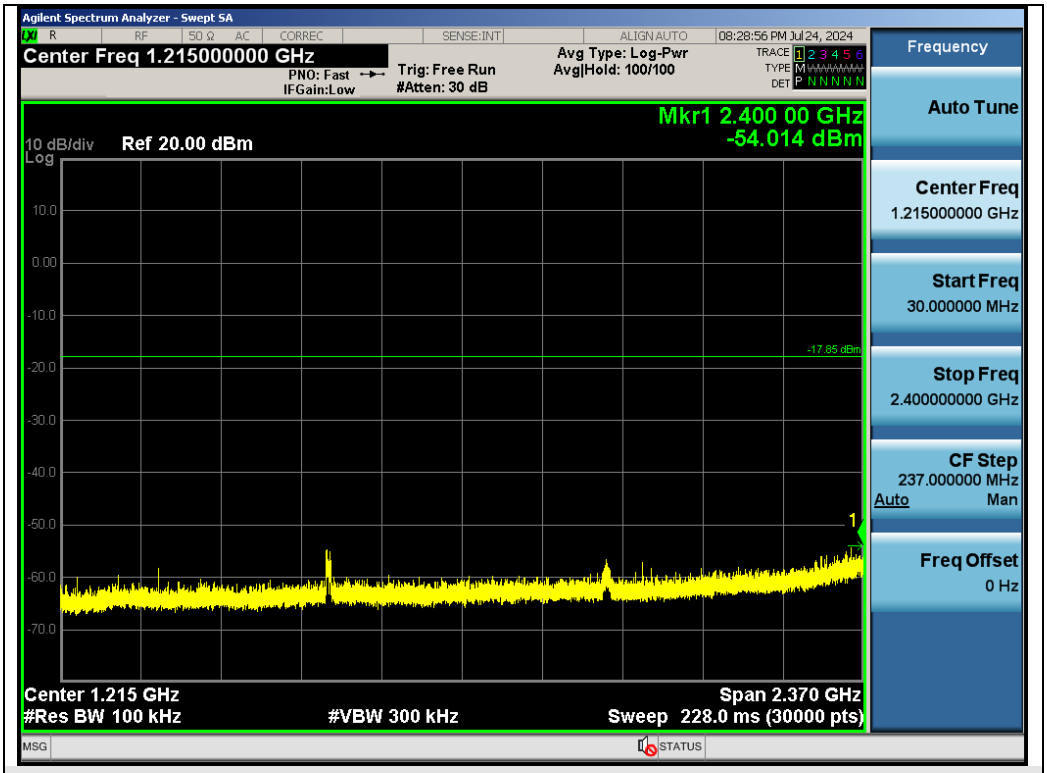


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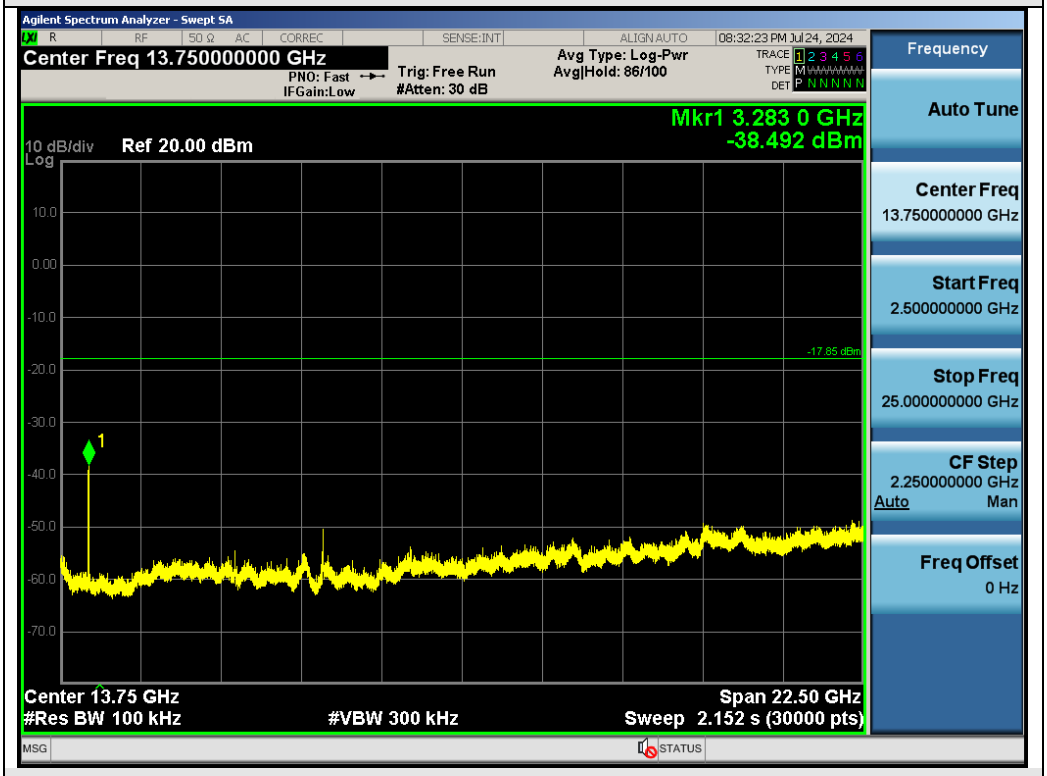


Test_Graph_802.11g_ANT1_2462_6Mbps_Higher Band Emissions

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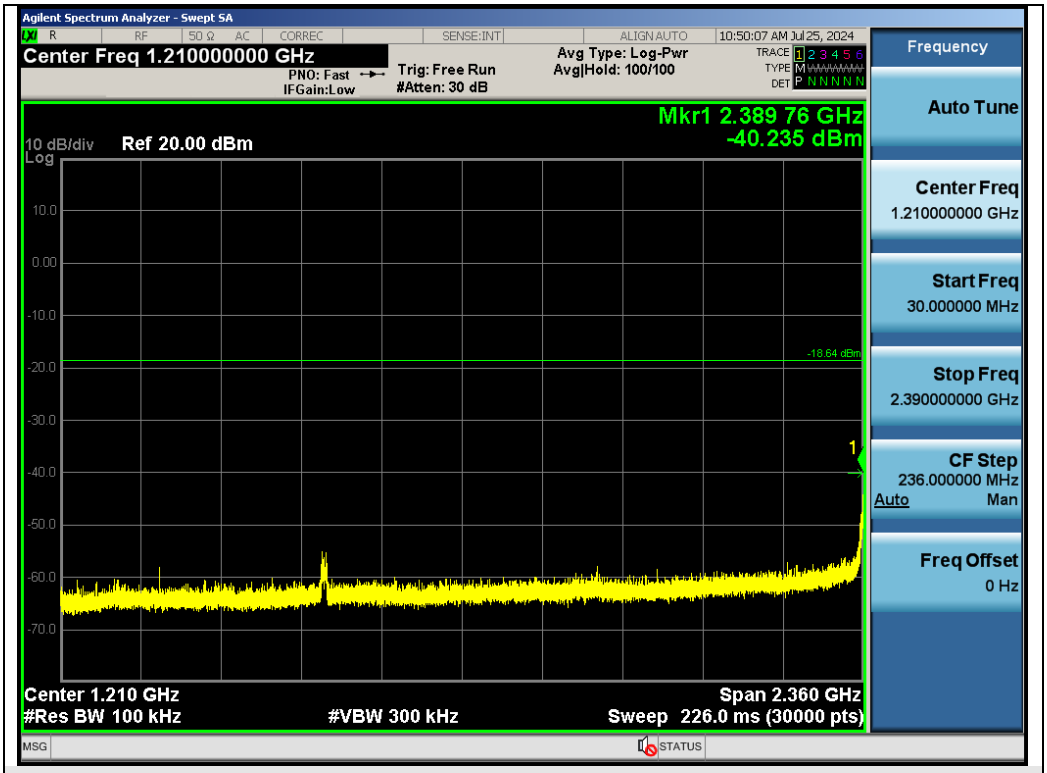
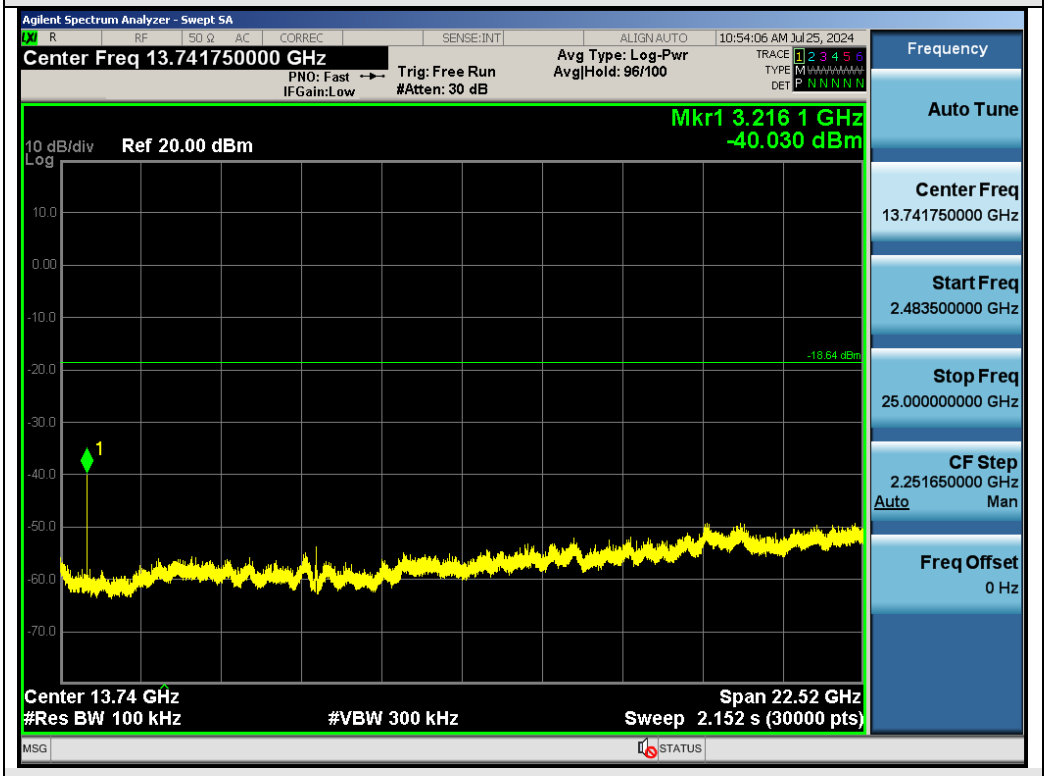



Test_Graph_802.11n20_ANT1_2412_MCS0_Lower Band Emissions




Test_Graph_802.11n20_ANT1_2412_MCS0_Higher Band Emissions

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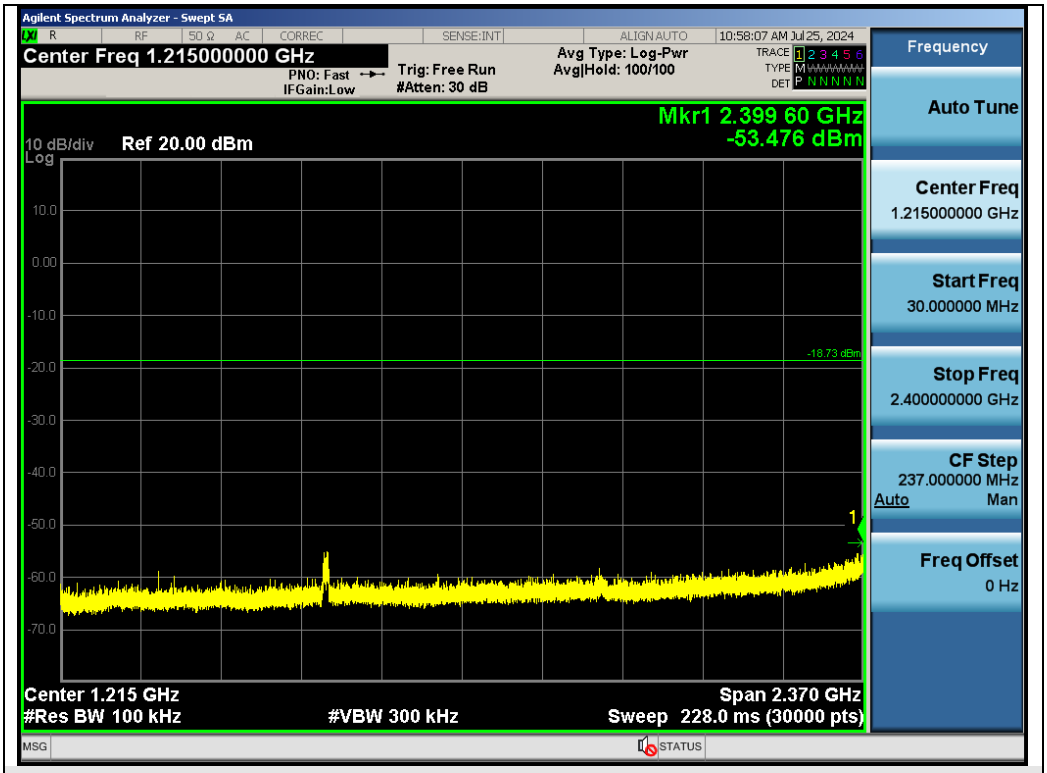
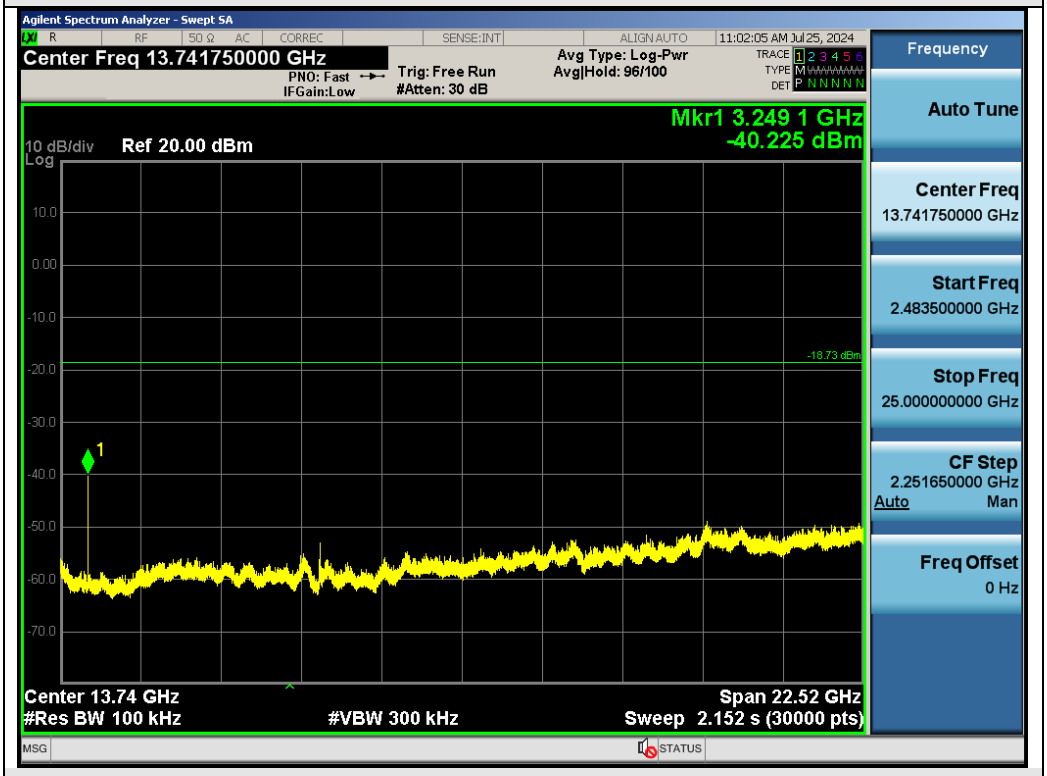



Test_Graph_802.11n20_ANT1_2437_MCS0_Lower Band Emissions




Test_Graph_802.11n20_ANT1_2437_MCS0_Higher Band Emissions

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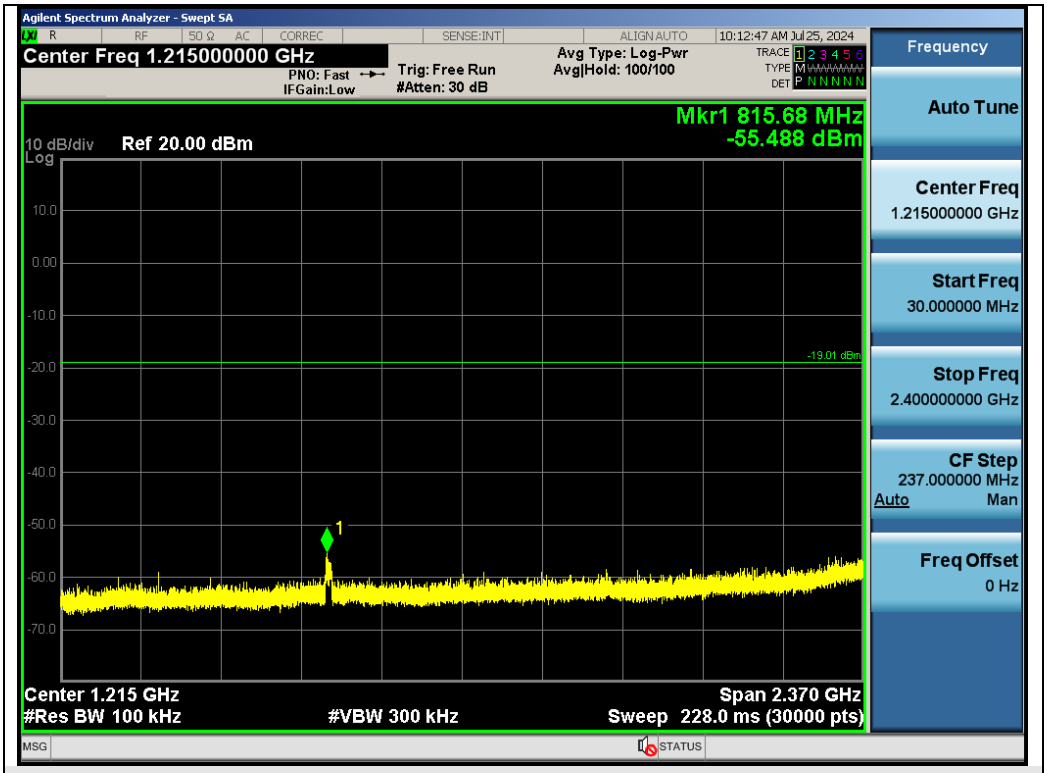
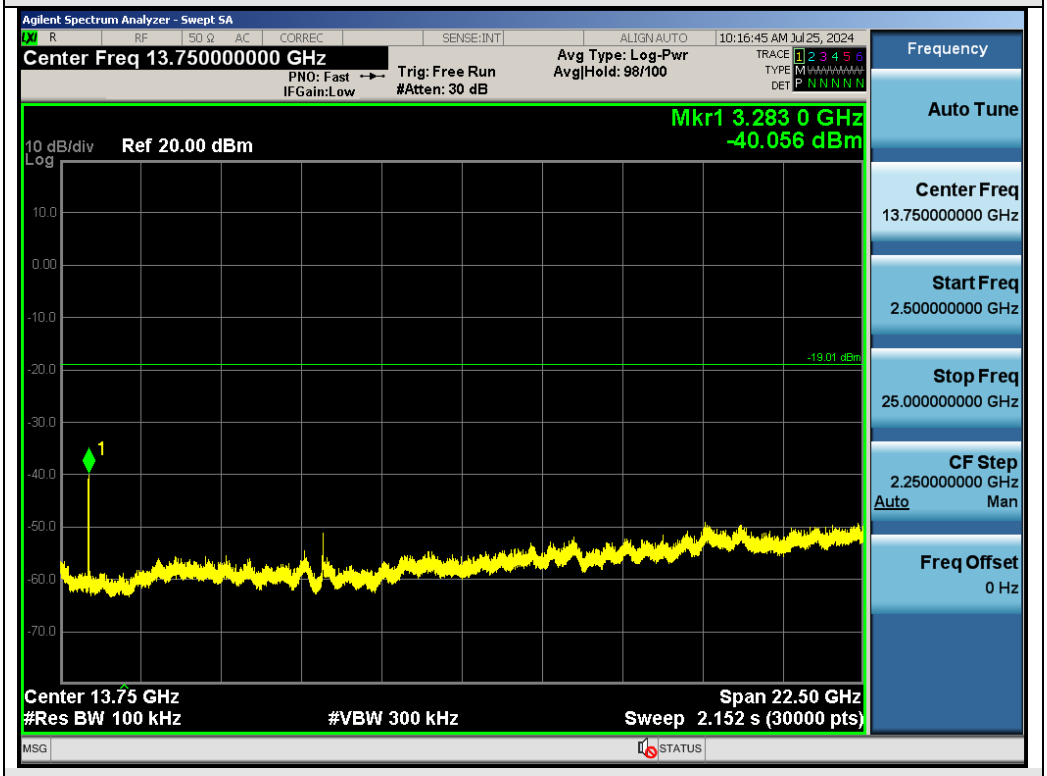



Test_Graph_802.11n20_ANT1_2462_MCS0_Lower Band Emissions




Test_Graph_802.11n20_ANT1_2462_MCS0_Higher Band Emissions

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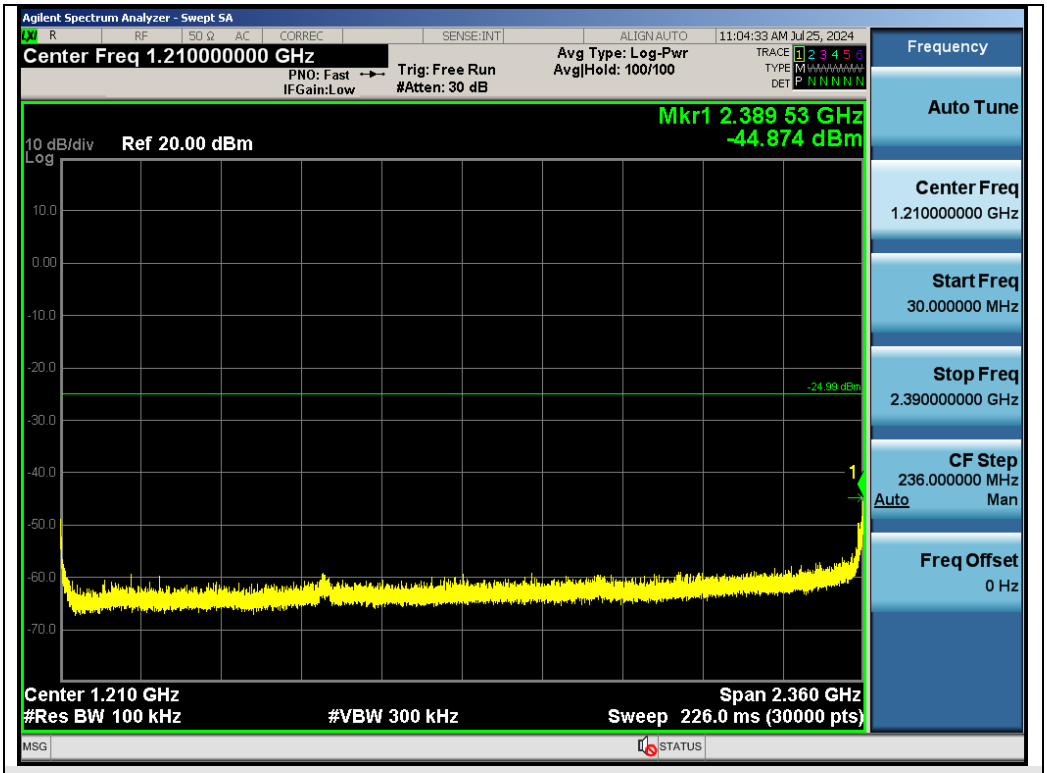
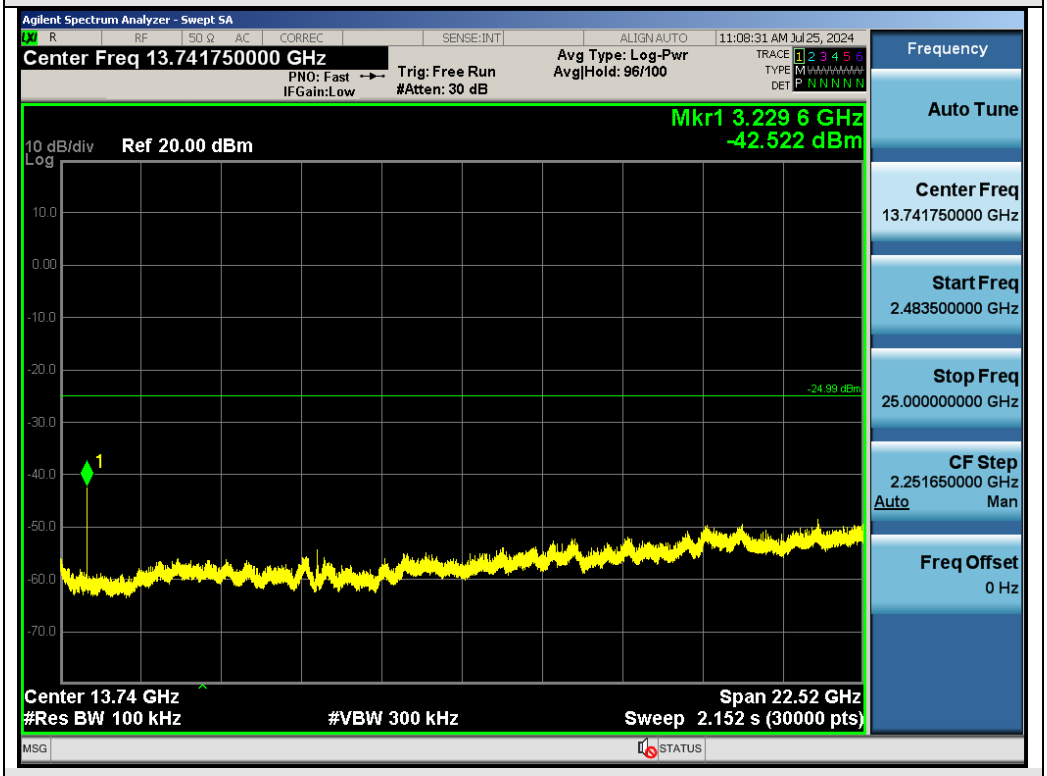



Test_Graph_802.11n40_ANT1_2422_MCS0_Lower Band Emissions




Test_Graph_802.11n40_ANT1_2422_MCS0_Higher Band Emissions

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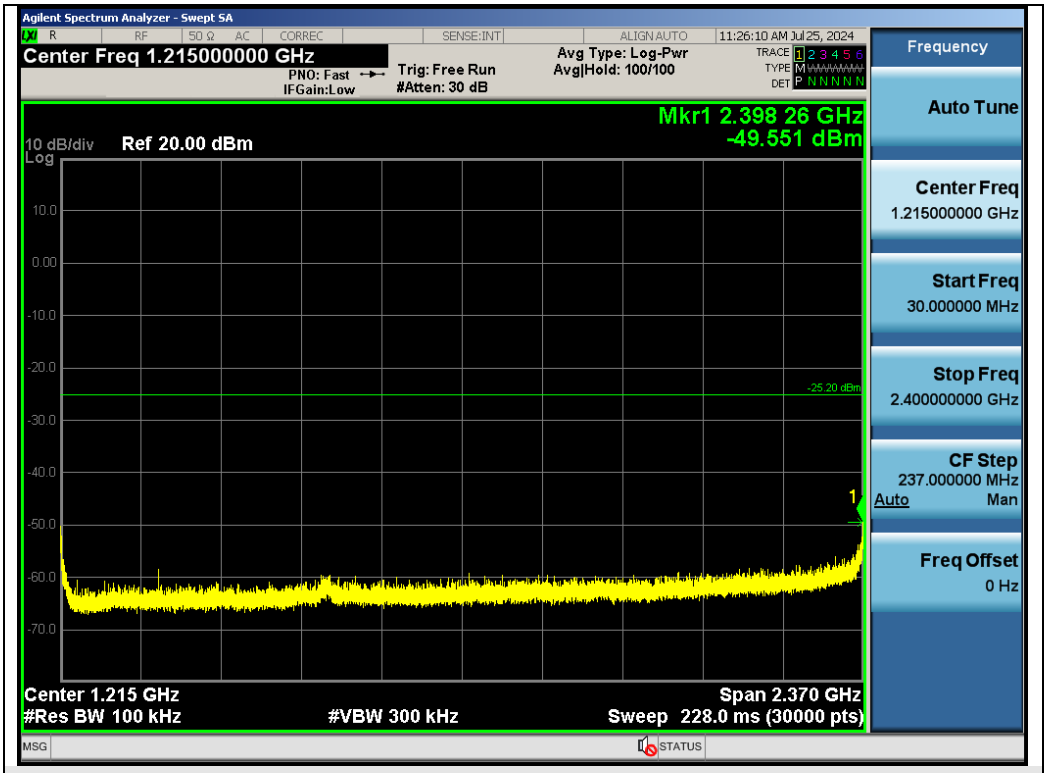
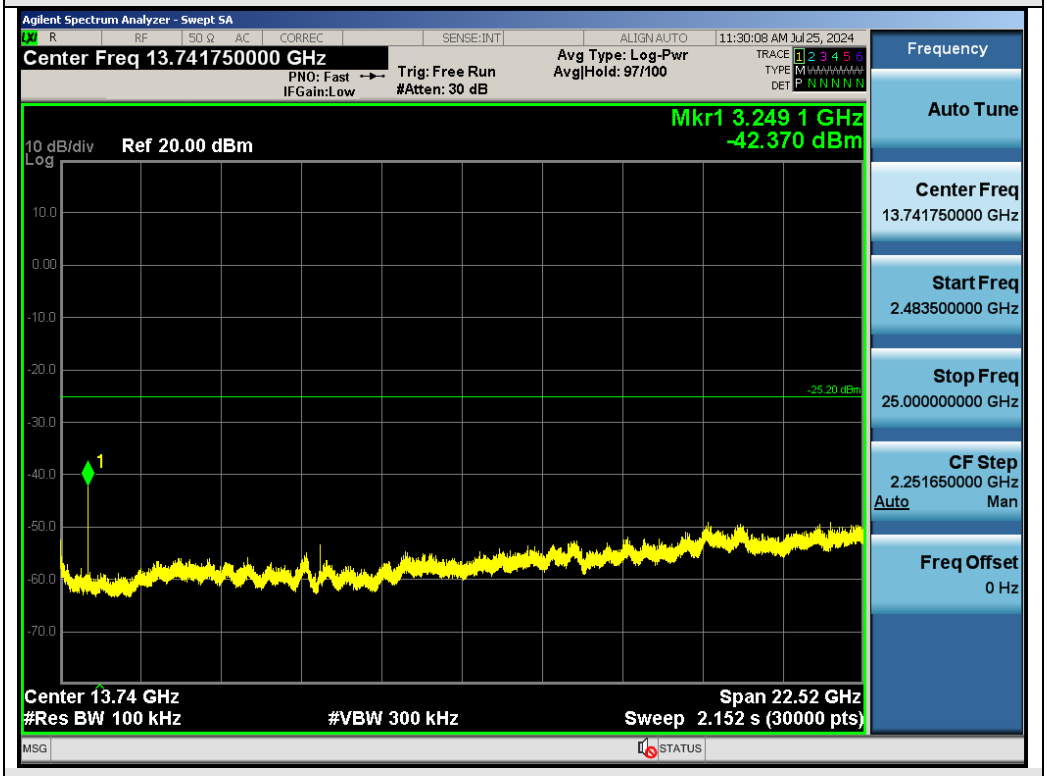



Test_Graph_802.11n40_ANT1_2437_MCS0_Lower Band Emissions




Test_Graph_802.11n40_ANT1_2437_MCS0_Higher Band Emissions

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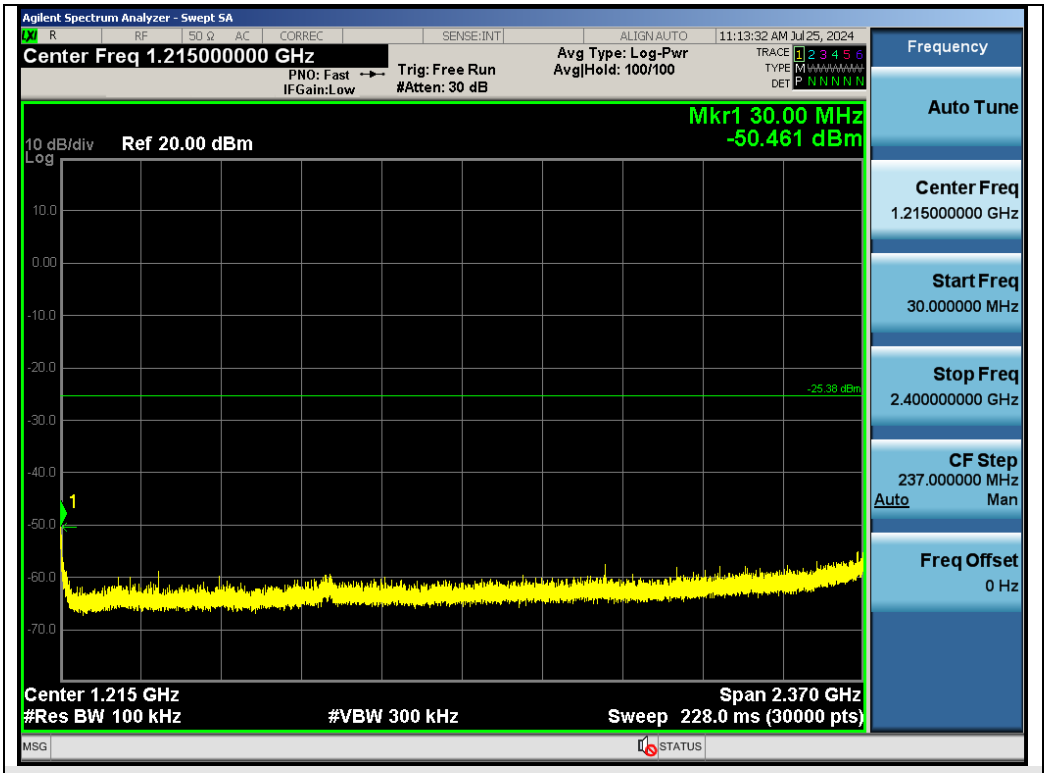
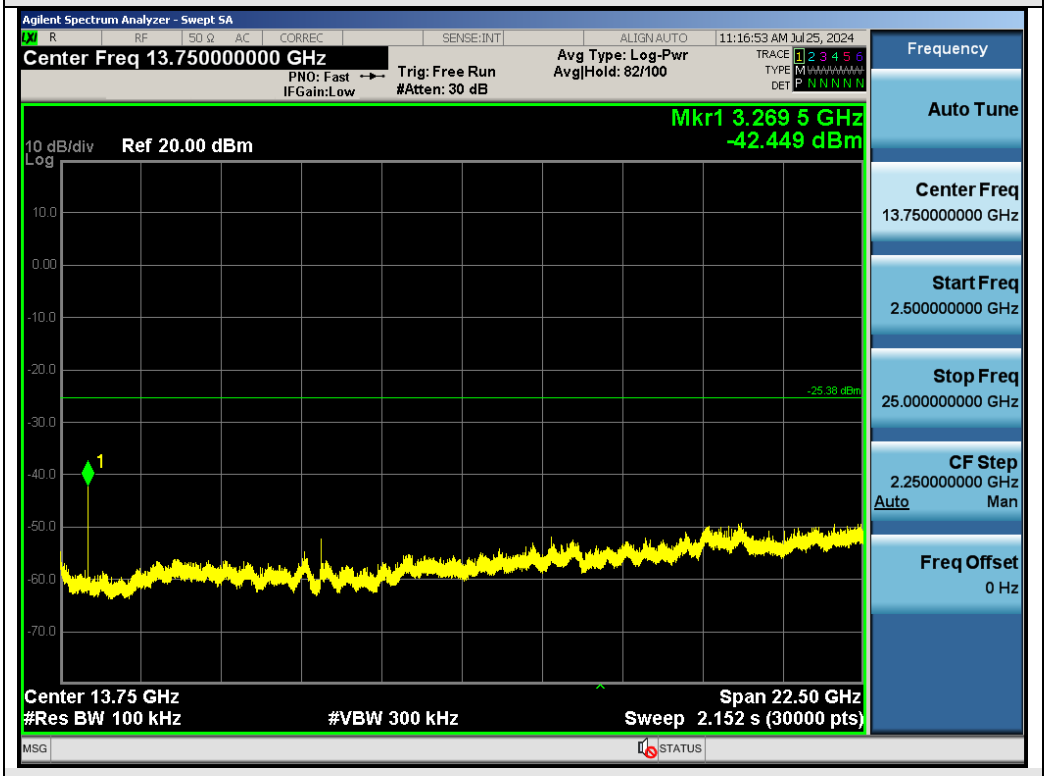



Test_Graph_802.11n40_ANT1_2452_MCS0_Lower Band Emissions




Test_Graph_802.11n40_ANT1_2452_MCS0_Higher Band Emissions

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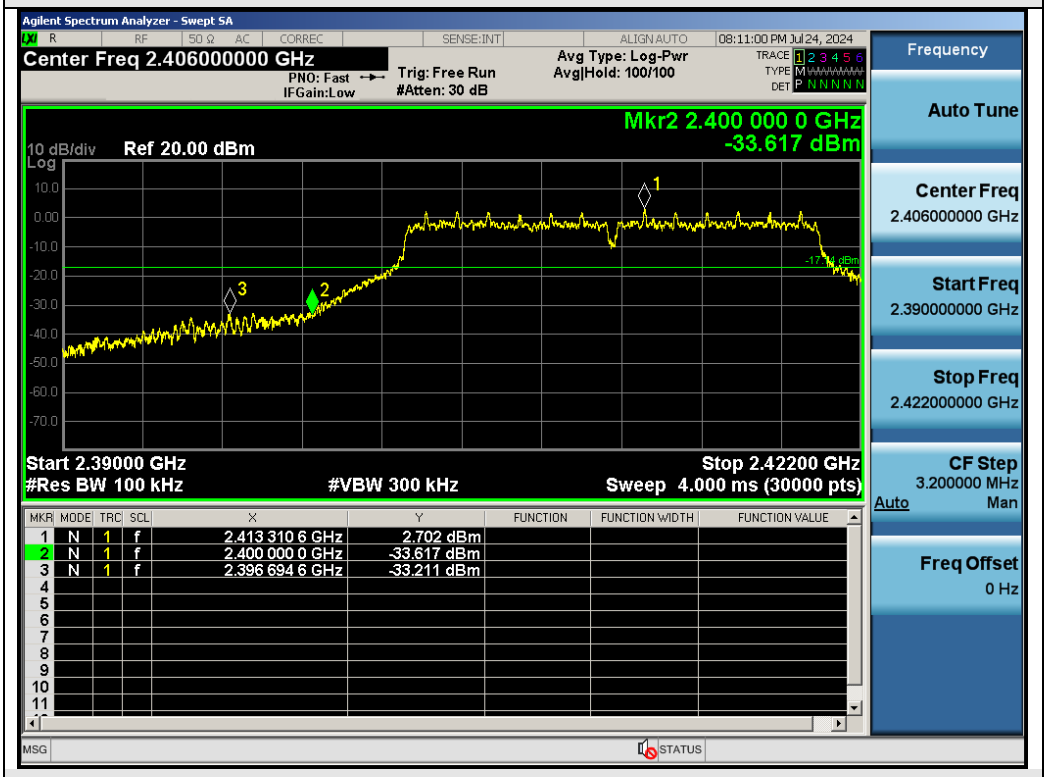
## Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands

Test_Graph_802.11b_ANT1_2412_1Mbps_Lower Band Edge Emissions




Test_Graph_802.11g_ANT1_2412_6Mbps_Lower Band Edge Emissions

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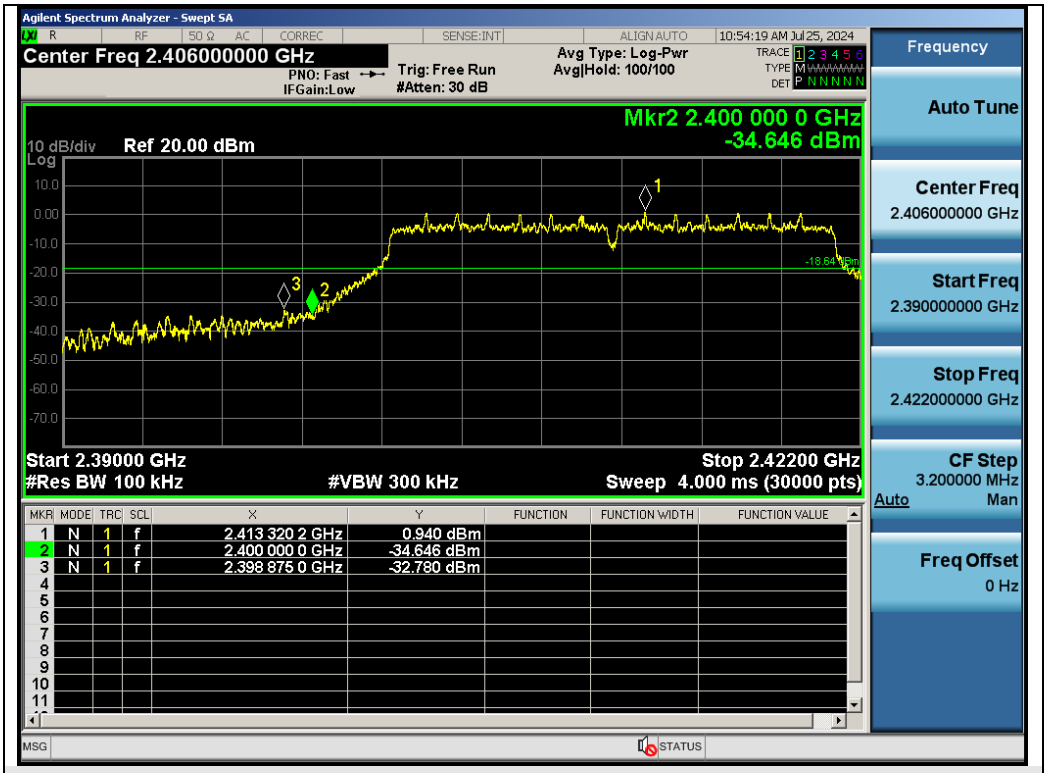
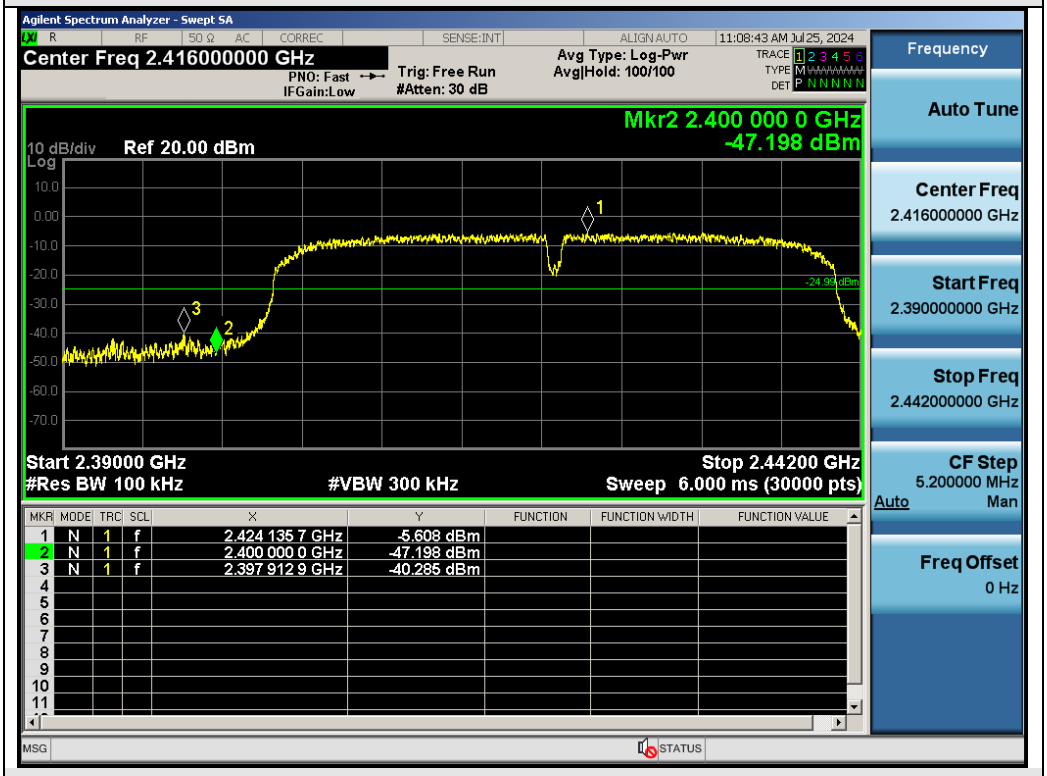



Test_Graph_802.11n20_ANT1_2412_MCS0_Lower Band Edge Emissions




Test_Graph_802.11n40_ANT1_2422_MCS0_Lower Band Edge Emissions

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# 11. Radiated Spurious Emission

## 11.1 Measurement Limits

15.209(a) Limit in the below table has to be followed

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(kHz) | 300 |
| 0.490~1.705 | 24000/F(kHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

## 11.2 Measurement Procedure

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

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As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.

8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

◆ The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter | Setting |
|---|---|
| Start ~Stop Frequency | 9kHz~150KHz/RB 200Hz for QP |
| Start ~Stop Frequency | 150kHz~30MHz/RB 9kHz for QP |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120kHz for QP |
| Start ~Stop Frequency | 1GHz~26.5GHz<br>1MHz/3MHz for Peak, 1MHz/3MHz for Average |

| Receiver Parameter | Setting |
|---|---|
| Start ~Stop Frequency | 9kHz~150KHz/RB 200Hz for QP |
| Start ~Stop Frequency | 150kHz~30MHz/RB 9kHz for QP |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120kHz for QP |

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- **Quasi-Peak Measurements below 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as shown in the table above
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

- **Peak Measurements above 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

- **Average Measurements above 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ [3 × RBW]
4. Detector = Power averaging (rms)
5. Averaging type = power (i.e., rms)
6. Sweep time = auto
7. Perform a trace average of at least 100 traces.
8. The applicable correction factor is [10*log (1 / D)], where D is the duty cycle. The factor had been edited in the “Input Correction” of the Spectrum Analyzer.

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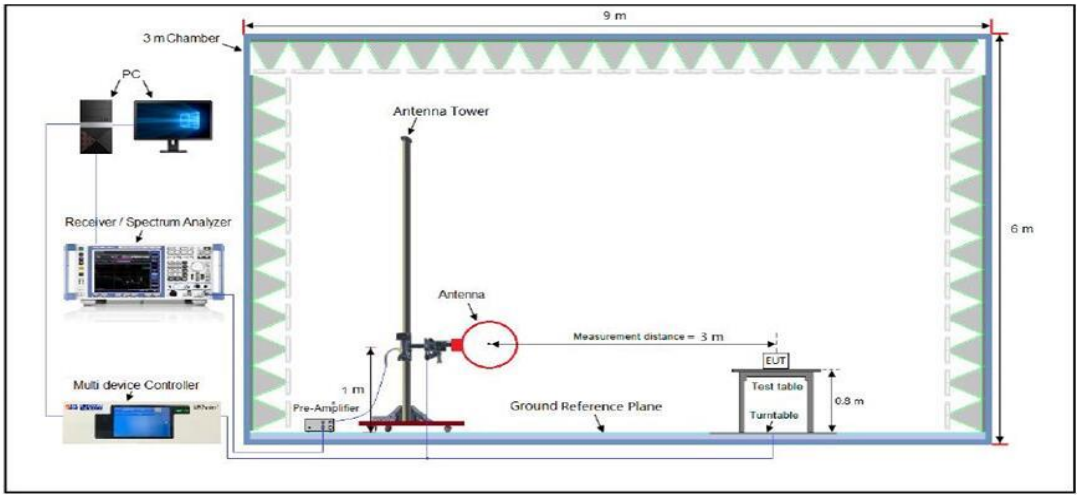
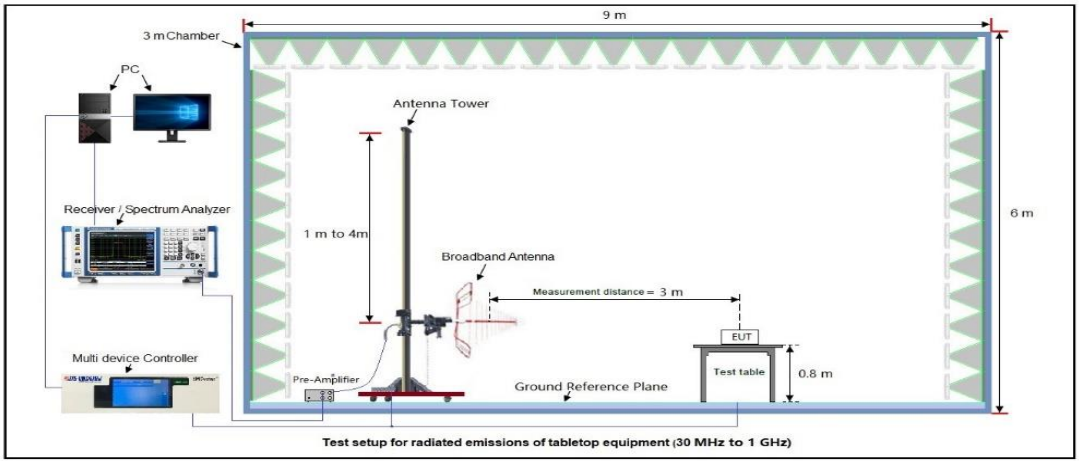
## 11.3 Measurement Setup (Block Diagram of Configuration)

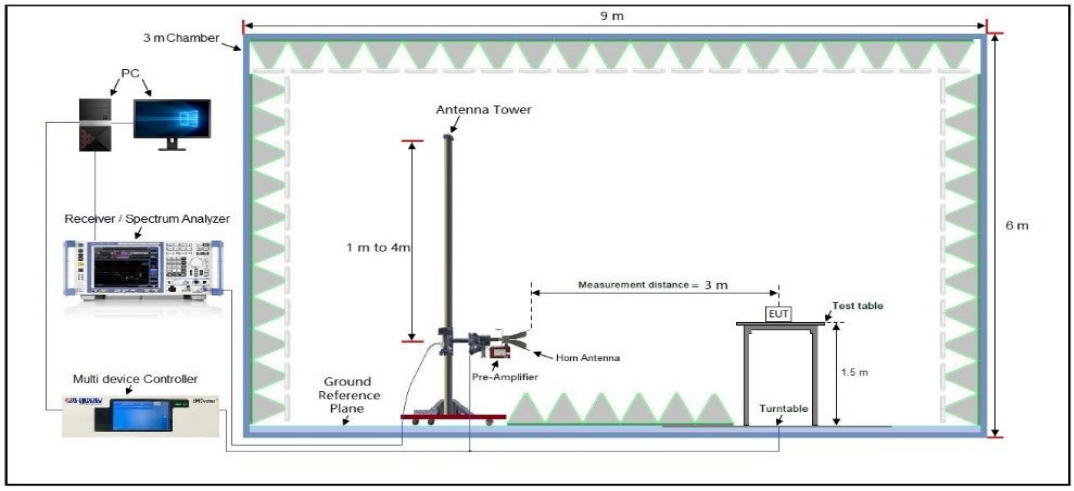
Radiated Emission Test Setup 9kHz-30MHz




Radiated Emission Test Setup 30MHz-1000MHz




Radiated Emission Test Setup Above 1000MHz

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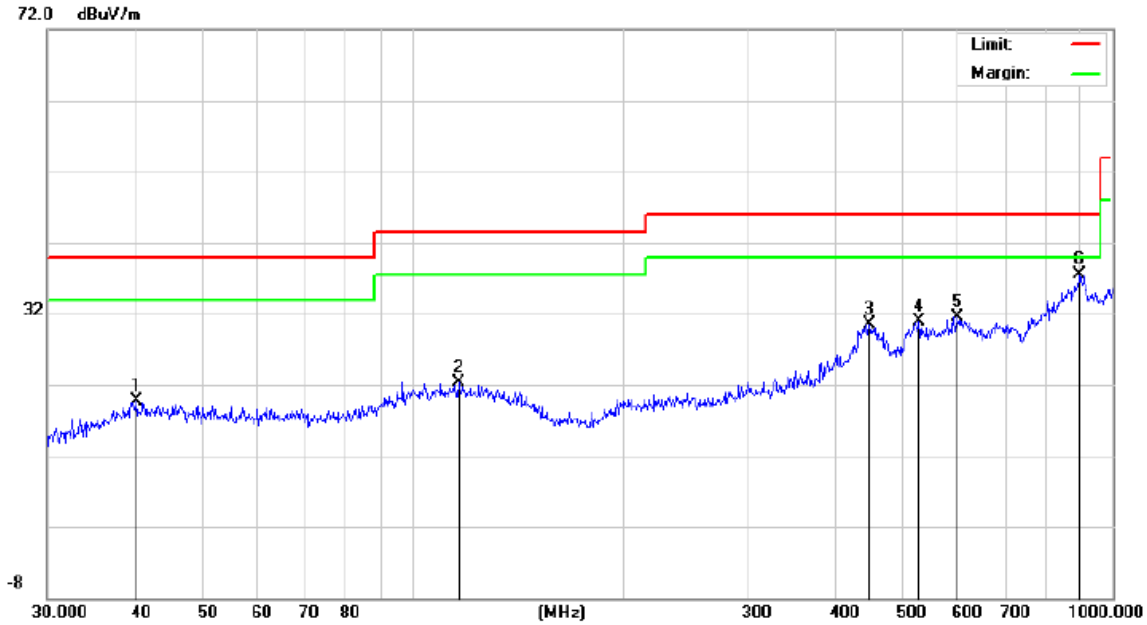
### 11.4 Measurement Result

**Radiated Emission at 9kHz-30MHz**

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

| Radiated Emission Test Results at 30MHz-1GHz | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 22.8℃ | **Relative Humidity** | 58.3% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 1 | **Antenna Polarity** | Horizontal |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 40.1347 | 5.75 | 13.89 | 19.64 | 40.00 | -20.36 | peak |
| 2 | | 116.1321 | 5.97 | 16.36 | 22.33 | 43.50 | -21.17 | peak |
| 3 | | 447.9822 | 5.59 | 24.82 | 30.41 | 46.00 | -15.59 | peak |
| 4 | | 528.2458 | 6.22 | 24.66 | 30.88 | 46.00 | -15.12 | peak |
| 5 | | 599.3212 | 6.46 | 25.07 | 31.53 | 46.00 | -14.47 | peak |
| 6 | * | 896.9965 | 6.04 | 31.42 | 37.46 | 46.00 | -8.54 | peak |

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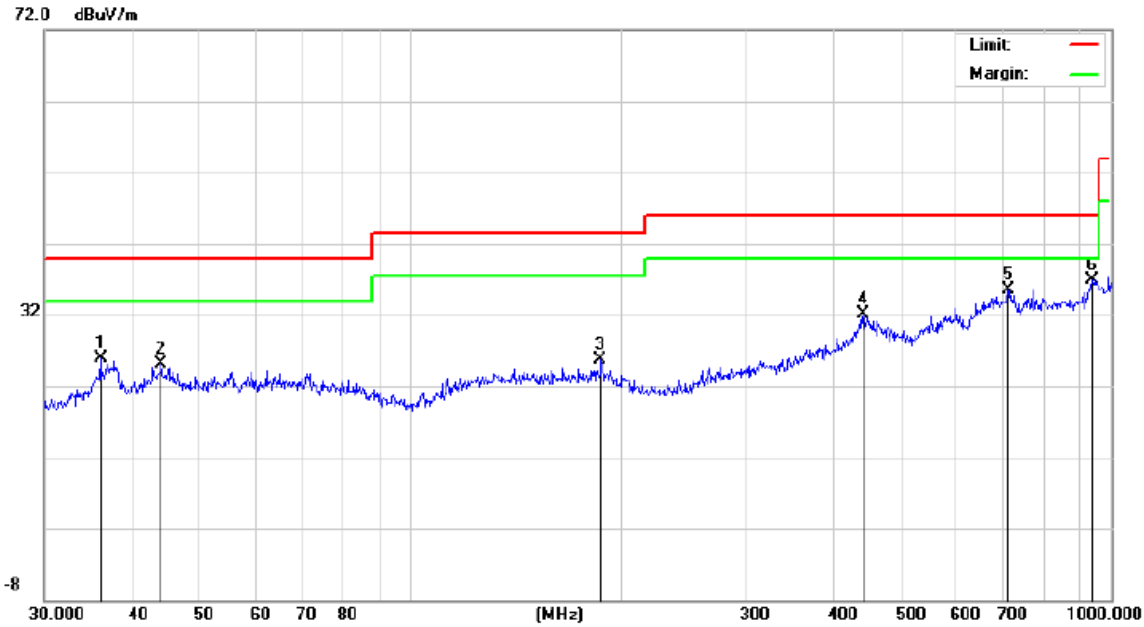
| Radiated Emission Test Results at 30MHz-1GHz | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 22.8℃ | **Relative Humidity** | 58.3% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 1 | **Antenna Polarity** | Vertical |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 36.0007 | 10.23 | 15.58 | 25.81 | 40.00 | -14.19 | peak |
| 2 | | 43.9658 | 8.21 | 16.94 | 25.15 | 40.00 | -14.85 | peak |
| 3 | | 186.4408 | 7.30 | 18.31 | 25.61 | 43.50 | -17.89 | peak |
| 4 | | 441.7425 | 6.01 | 26.02 | 32.03 | 46.00 | -13.97 | peak |
| 5 | | 711.6734 | 7.01 | 28.51 | 35.52 | 46.00 | -10.48 | peak |
| 6 | * | 938.8325 | 6.05 | 30.84 | 36.89 | 46.00 | -9.11 | peak |

**RESULT: Pass**

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

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## Radiated Emissions Test Results above 1 GHz

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 22.8℃ | **Relative Humidity** | 58.3% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 1 | **Antenna Polarity** | Horizontal |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4824.000 | 47.65 | 0.08 | 47.73 | 74 | -26.27 | peak |
| 4824.000 | 38.45 | 0.08 | 38.53 | 54 | -15.47 | AVG |
| 7236.000 | 42.24 | 2.21 | 44.45 | 74 | -29.55 | peak |
| 7236.000 | 31.69 | 2.21 | 33.9 | 54 | -20.1 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 22.8℃ | **Relative Humidity** | 58.3% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 1 | **Antenna Polarity** | Vertical |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4824.000 | 47.85 | 0.08 | 47.93 | 74 | -26.07 | peak |
| 4824.000 | 37.95 | 0.08 | 38.03 | 54 | -15.97 | AVG |
| 7236.000 | 42.16 | 2.21 | 44.37 | 74 | -29.63 | peak |
| 7236.000 | 32.35 | 2.21 | 34.56 | 54 | -19.44 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**RESULT: Pass**

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## Radiated Emissions Test Results above 1GHz

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 22.8℃ | **Relative Humidity** | 58.3% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 2 | **Antenna Polarity** | Horizontal |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4874.000 | 48.65 | 0.14 | 48.79 | 74 | -25.21 | peak |
| 4874.000 | 37.42 | 0.14 | 37.56 | 54 | -16.44 | AVG |
| 7311.000 | 42.19 | 2.36 | 44.55 | 74 | -29.45 | peak |
| 7311.000 | 32.68 | 2.36 | 35.04 | 54 | -18.96 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 22.8℃ | **Relative Humidity** | 58.3% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 2 | **Antenna Polarity** | Vertical |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4874.000 | 46.38 | 0.14 | 46.52 | 74 | -27.48 | peak |
| 4874.000 | 38.42 | 0.14 | 38.56 | 54 | -15.44 | AVG |
| 7311.000 | 41.25 | 2.36 | 43.61 | 74 | -30.39 | peak |
| 7311.000 | 32.35 | 2.36 | 34.71 | 54 | -19.29 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**RESULT: Pass**

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**Radiated Emissions Test Results above 1GHz**

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 22.8℃ | **Relative Humidity** | 58.3% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 3 | **Antenna Polarity** | Horizontal |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4924.000 | 47.65 | 0.22 | 47.87 | 74 | -26.13 | peak |
| 4924.000 | 38.52 | 0.22 | 38.74 | 54 | -15.26 | AVG |
| 7386.000 | 42.16 | 2.64 | 44.8 | 74 | -29.2 | peak |
| 7386.000 | 32.34 | 2.64 | 34.98 | 54 | -19.02 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 22.8℃ | **Relative Humidity** | 58.3% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 3 | **Antenna Polarity** | Vertical |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Value Type |
|---|---|---|---|---|---|---|
| 4924.000 | 48.65 | 0.22 | 48.87 | 74 | -25.13 | peak |
| 4924.000 | 37.53 | 0.22 | 37.75 | 54 | -16.25 | AVG |
| 7386.000 | 42.19 | 2.64 | 44.83 | 74 | -29.17 | peak |
| 7386.000 | 32.48 | 2.64 | 35.12 | 54 | -18.88 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**RESULT: Pass**

**Note:**

1. The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.
2. Factor = Antenna Factor + Cable loss – Pre-amplifier gain, Margin =Emission Level-Limit.
3. The "Factor" value can be calculated automatically by software of measurement system.

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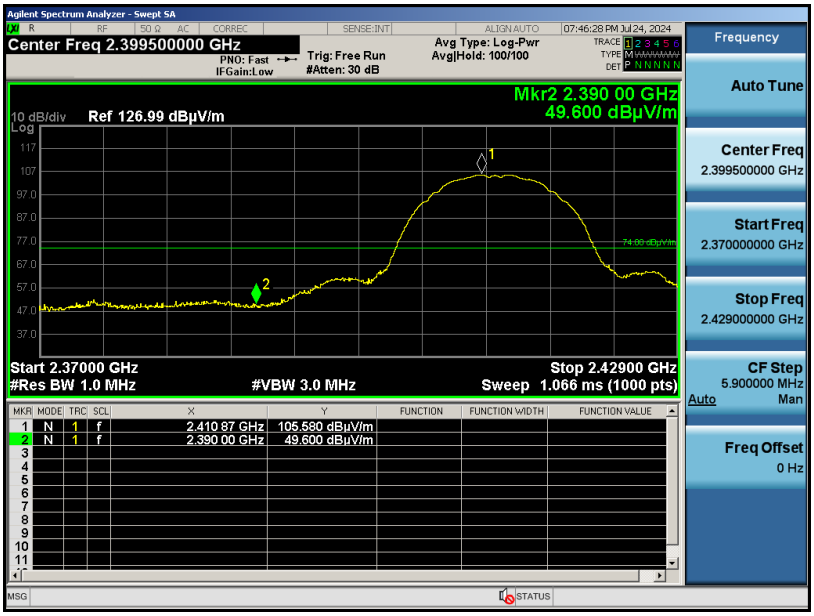
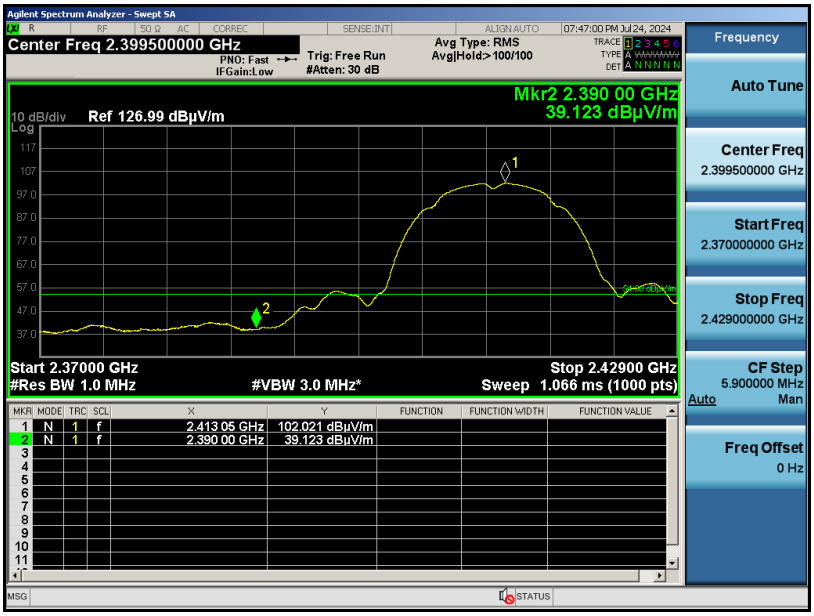
## Band Edge Emission Test Results for Restricted Bands

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 25°C | **Relative Humidity** | 55.4% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 1 | **Antenna Polarity** | Horizontal |

Test Graph for Peak Measurement




Test Graph for Average Measurement




**RESULT: Pass**

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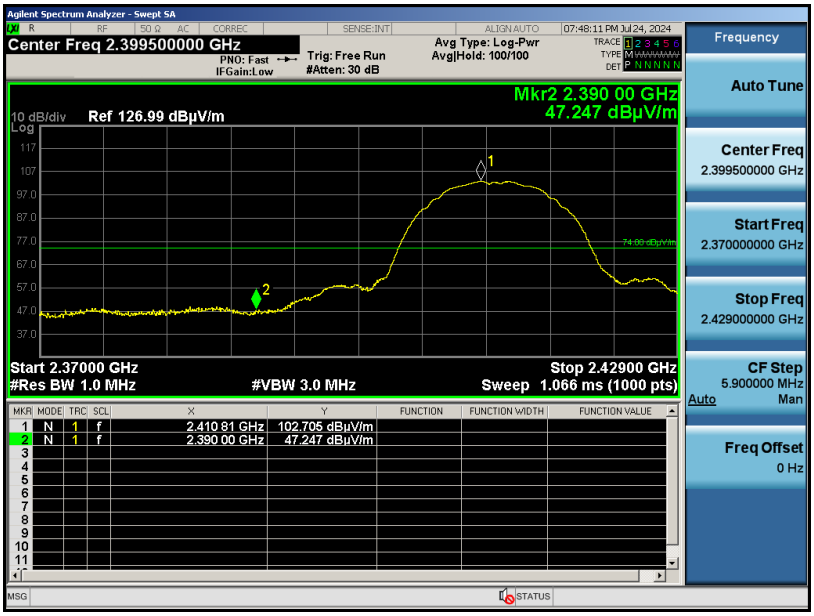
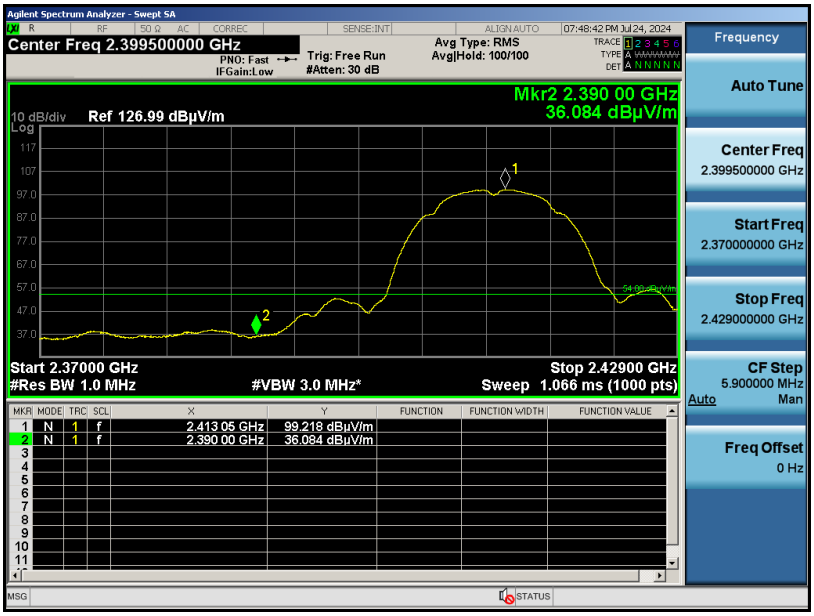
## Band Edge Emission Test Results for Restricted Bands

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 25°C | **Relative Humidity** | 55.4% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 1 | **Antenna Polarity** | Vertical |

Test Graph for Peak Measurement




Test Graph for Average Measurement




**RESULT: Pass**

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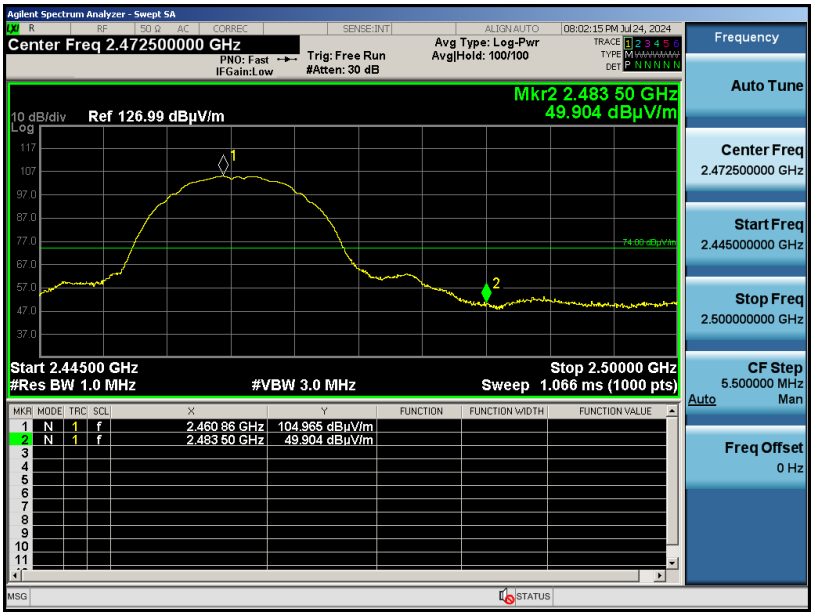
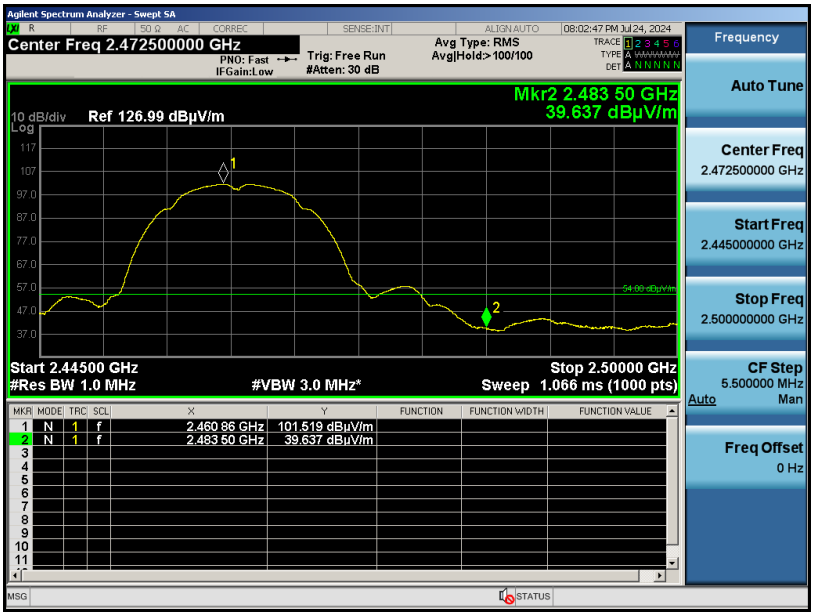
## Band Edge Emission Test Results for Restricted Bands

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 25°C | **Relative Humidity** | 55.4% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 3 | **Antenna Polarity** | Horizontal |

Test Graph for Peak Measurement




Test Graph for Average Measurement




**RESULT: Pass**

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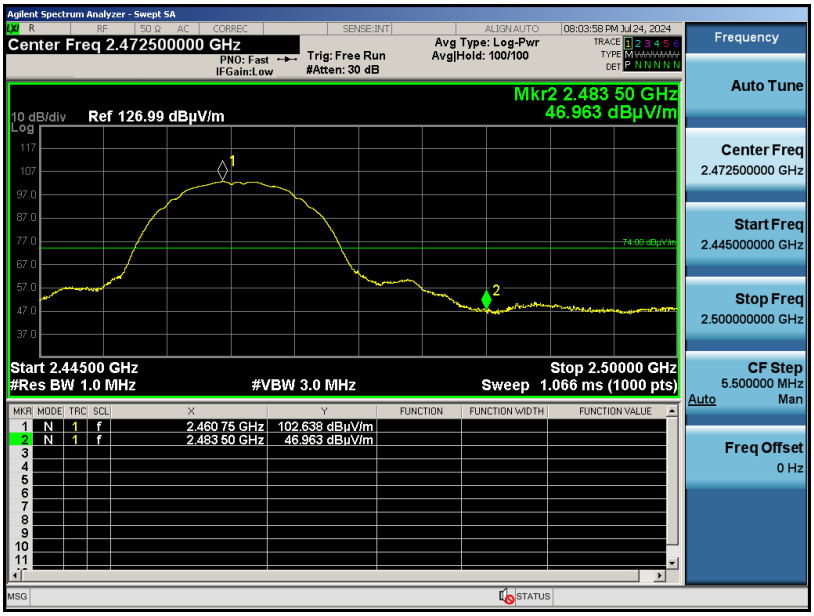
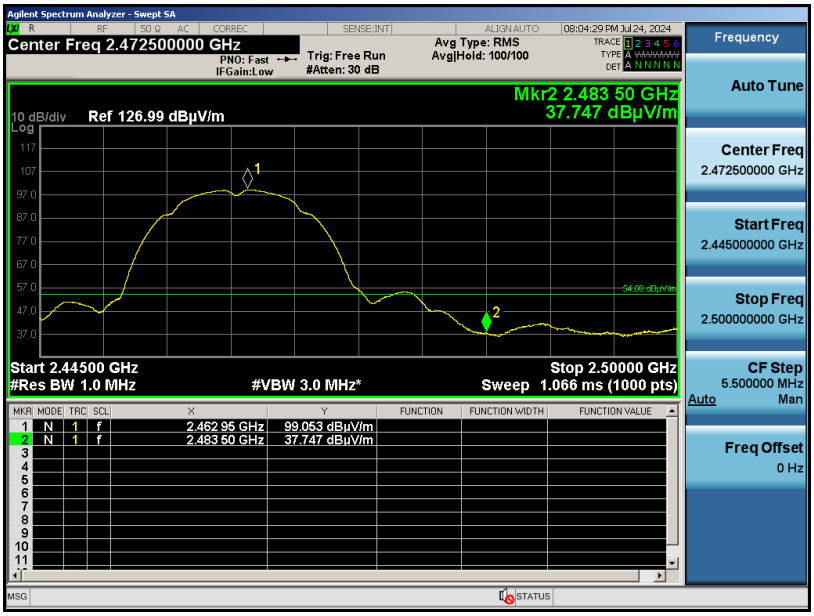
## Band Edge Emission Test Results for Restricted Bands

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 25°C | **Relative Humidity** | 55.4% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 3 | **Antenna Polarity** | Vertical |

Test Graph for Peak Measurement




Test Graph for Average Measurement




**RESULT: Pass**

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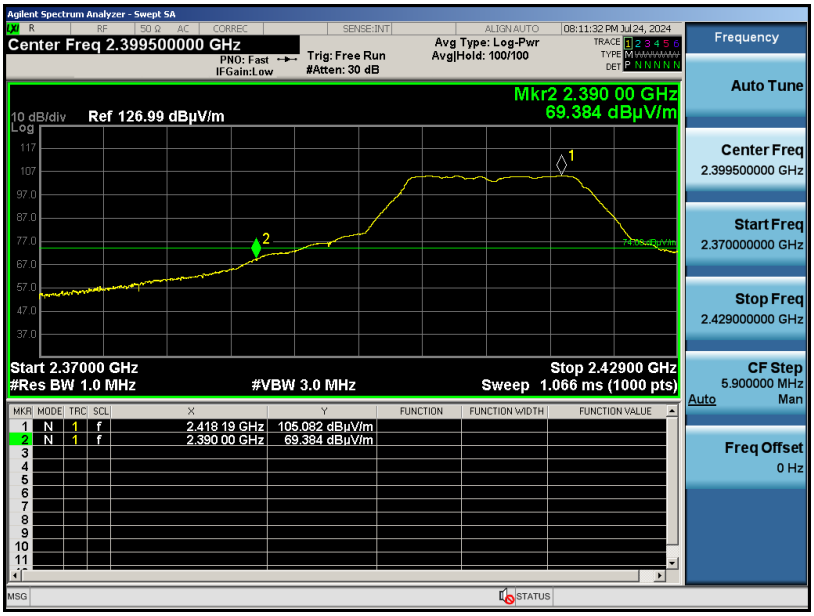
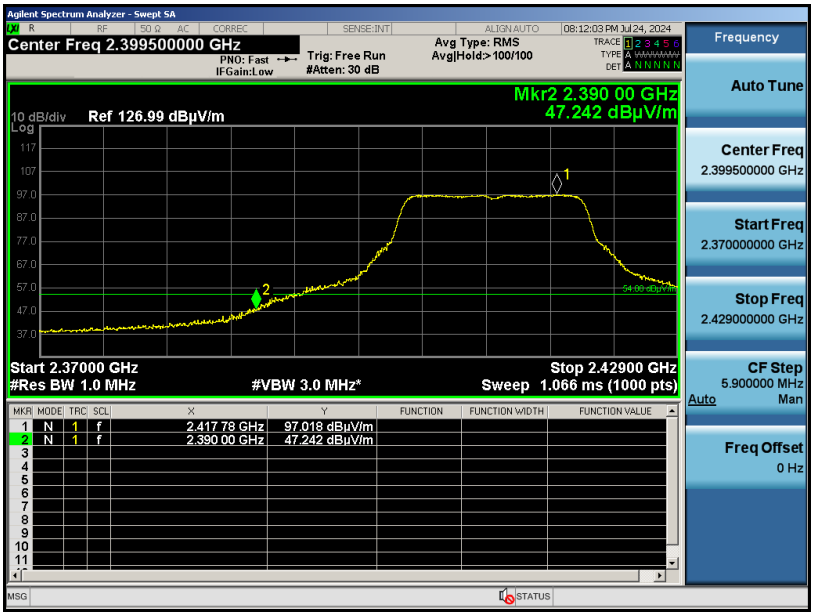
## Band Edge Emission Test Results for Restricted Bands

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 25°C | **Relative Humidity** | 55.4% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 4 | **Antenna Polarity** | Horizontal |

Test Graph for Peak Measurement




Test Graph for Average Measurement




**RESULT: Pass**

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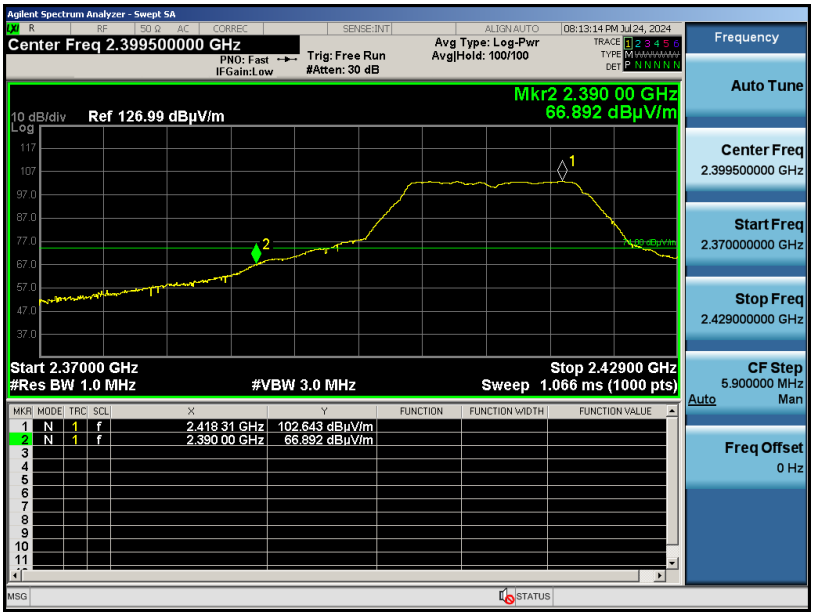
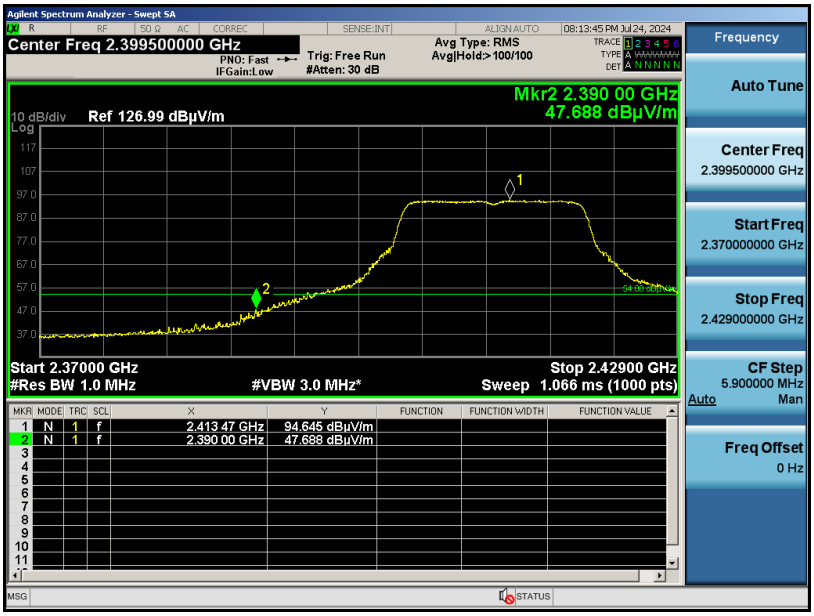
## Band Edge Emission Test Results for Restricted Bands

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 25°C | **Relative Humidity** | 55.4% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 4 | **Antenna Polarity** | Vertical |

Test Graph for Peak Measurement




Test Graph for Average Measurement




**RESULT: Pass**

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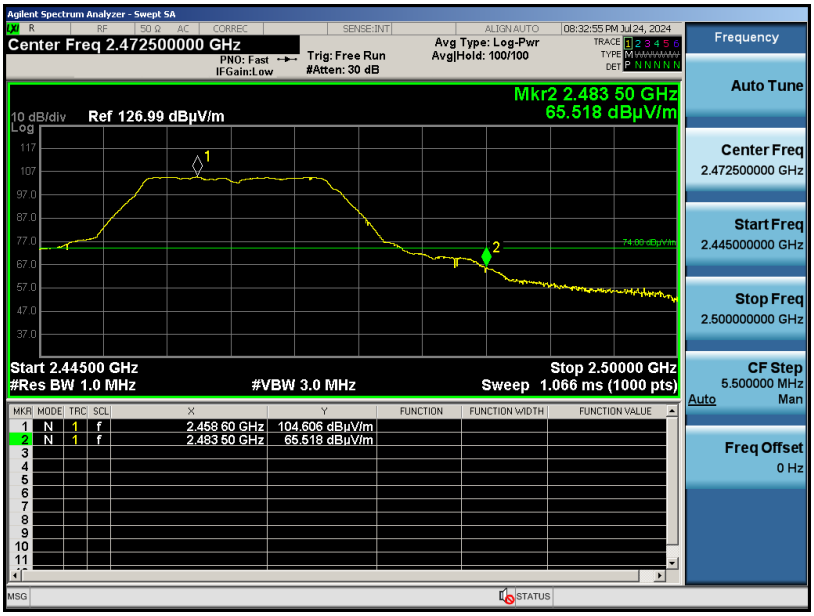
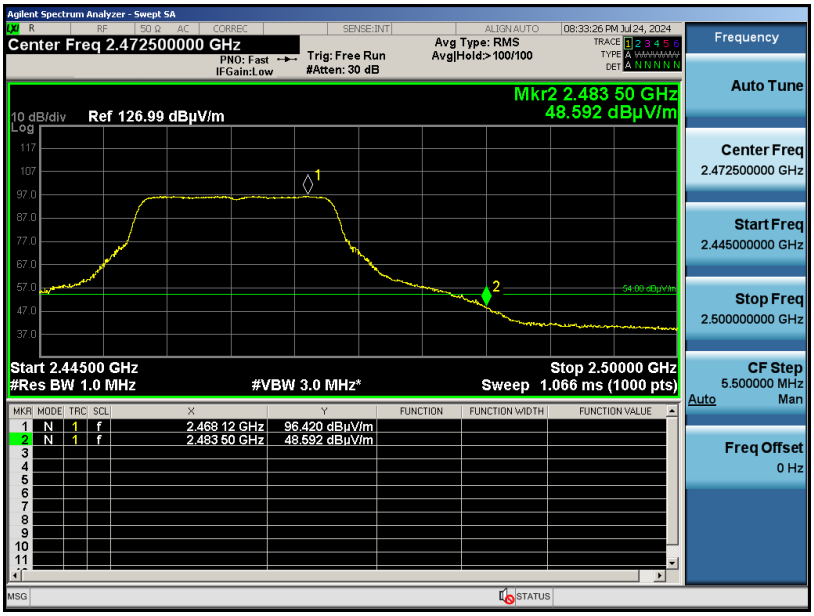
## Band Edge Emission Test Results for Restricted Bands

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 25°C | **Relative Humidity** | 55.4% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 6 | **Antenna Polarity** | Horizontal |

Test Graph for Peak Measurement




Test Graph for Average Measurement




**RESULT: Pass**

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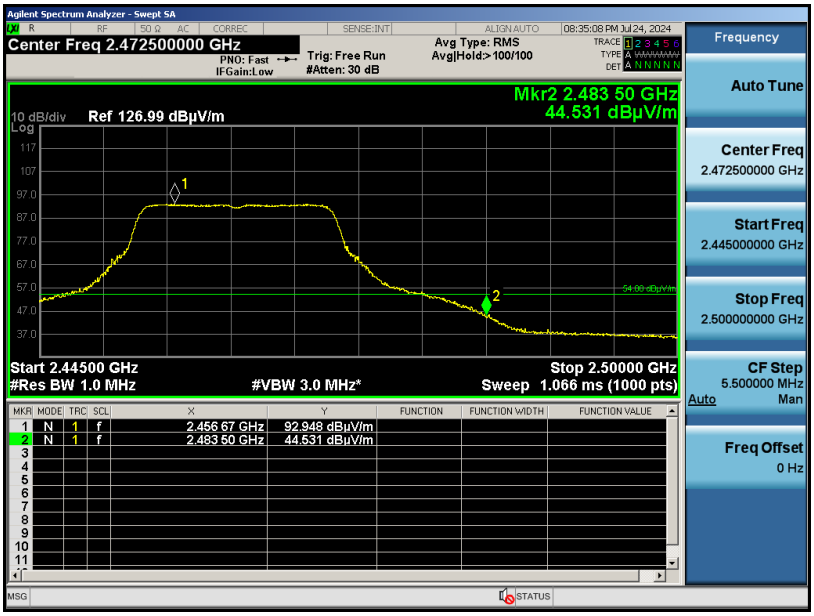
## Band Edge Emission Test Results for Restricted Bands

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 25°C | **Relative Humidity** | 55.4% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 6 | **Antenna Polarity** | Vertical |

Test Graph for Peak Measurement

Test Graph for Average Measurement




**RESULT: Pass**

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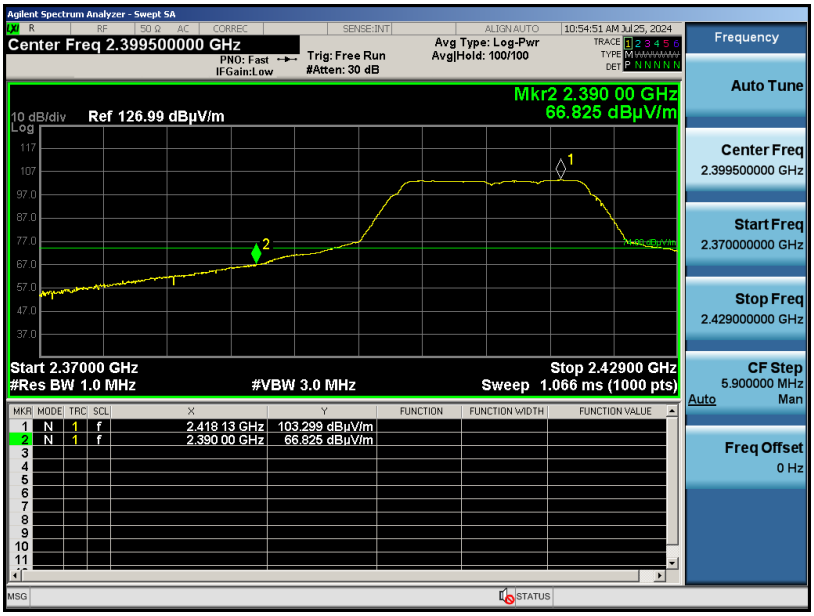
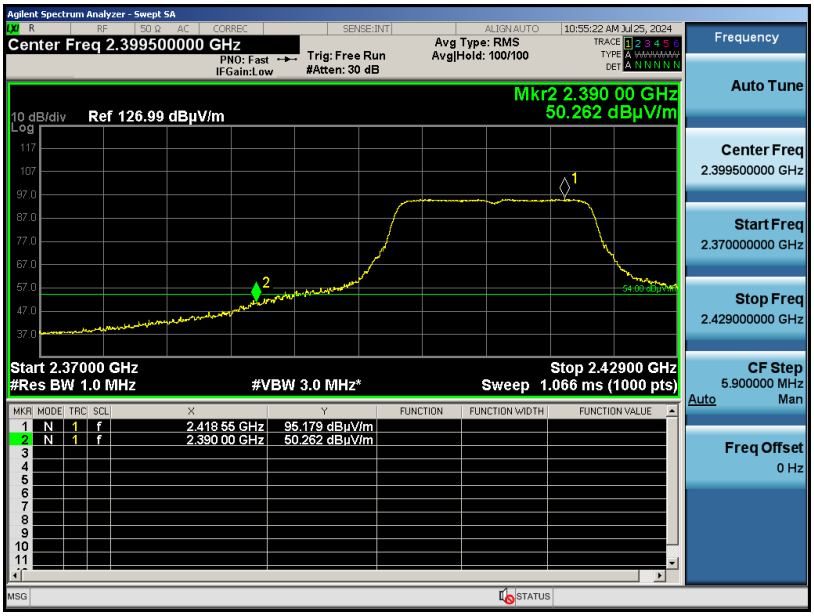
## Band Edge Emission Test Results for Restricted Bands

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 25°C | **Relative Humidity** | 55.4% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 7 | **Antenna Polarity** | Horizontal |

Test Graph for Peak Measurement




Test Graph for Average Measurement




**RESULT: Pass**

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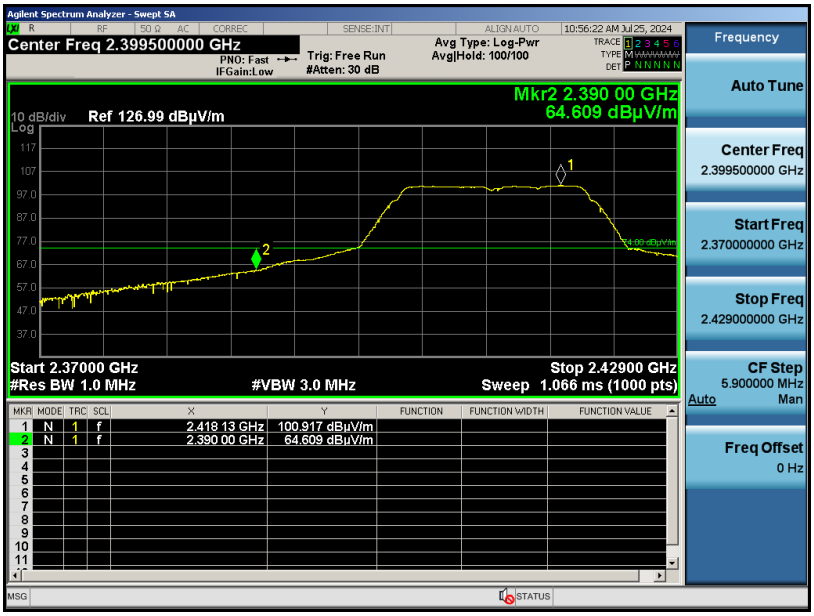
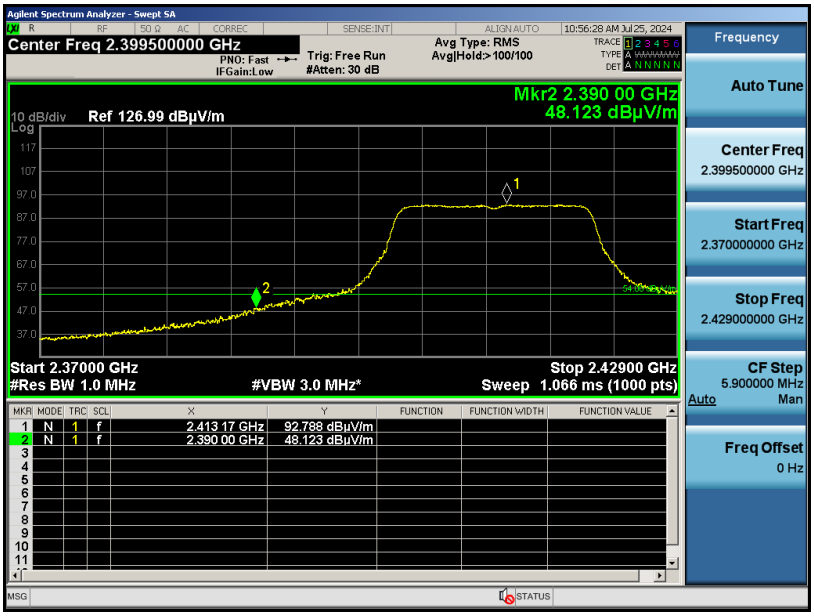
## Band Edge Emission Test Results for Restricted Bands

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 25°C | **Relative Humidity** | 55.4% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 7 | **Antenna Polarity** | Vertical |

Test Graph for Peak Measurement




Test Graph for Average Measurement




**RESULT: Pass**

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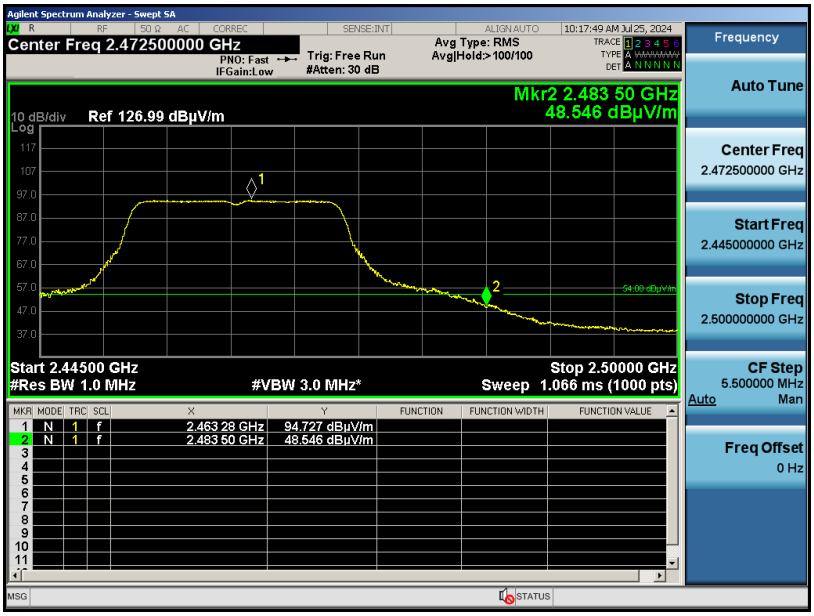
## Band Edge Emission Test Results for Restricted Bands

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 25°C | **Relative Humidity** | 55.4% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 9 | **Antenna Polarity** | Horizontal |

Test Graph for Peak Measurement

Test Graph for Average Measurement




**RESULT: Pass**

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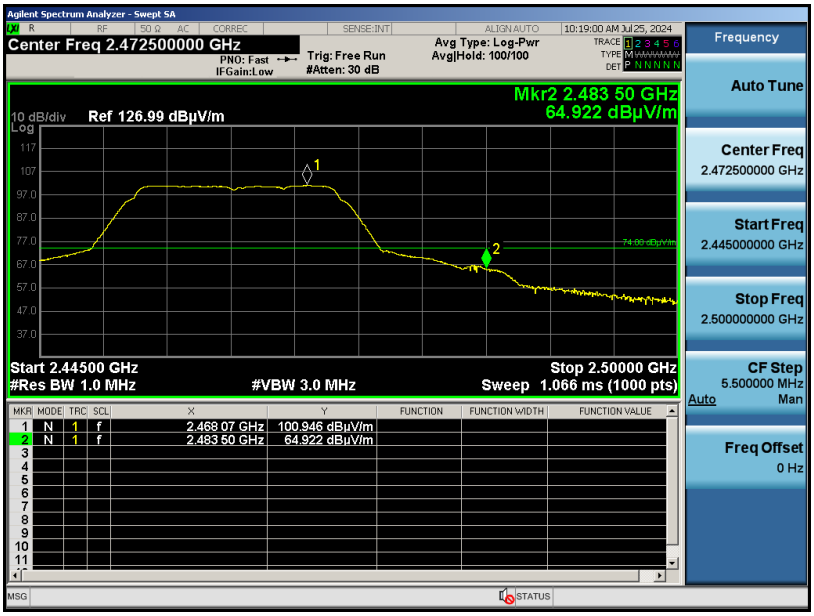
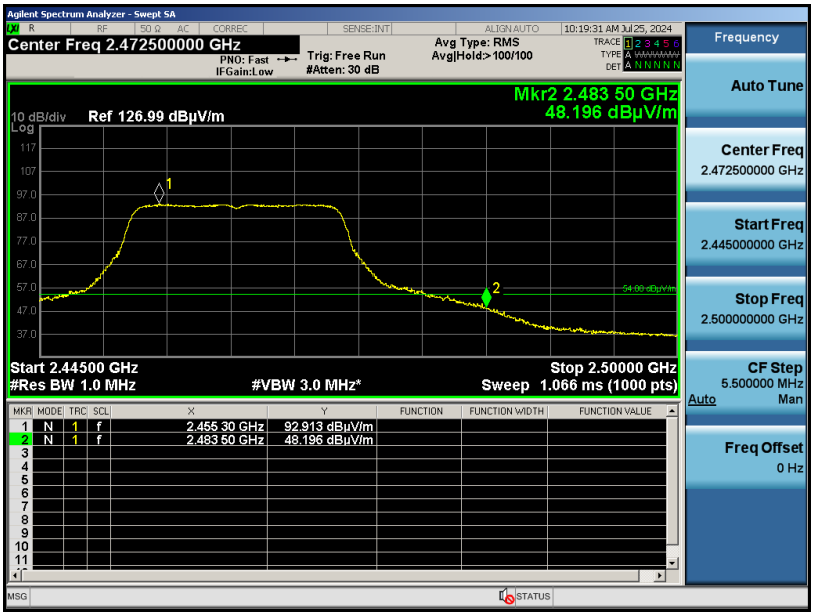
## Band Edge Emission Test Results for Restricted Bands

| | | | |
|---|---|---|---|
| **EUT Name** | Smart Energy Monitor | **Model Name** | EM16 |
| **Temperature** | 25°C | **Relative Humidity** | 55.4% |
| **Pressure** | 960hPa | **Test Voltage** | Normal Voltage |
| **Test Mode** | Mode 9 | **Antenna Polarity** | Vertical |

Test Graph for Peak Measurement




Test Graph for Average Measurement




**RESULT: Pass**

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