# RF TEST REPORT

## FCC / ISED

APPLICANT
**Owl Labs Inc.**

MODEL NAME
**MTW405**

FCC ID
**2ALXJ-MTW405**

ISED ID
**22676-MTW405**

REPORT NUMBER
**HA240429-OWL-001-R06-1**

# TEST REPORT

**Date of Issue**
May 21, 2024

**Test Site**
Hyundai C-Tech, Inc. dba HCT America, Inc.
1726 Ringwood Ave, San Jose, CA 95131, USA

| | |
|---|---|
| **Applicant** | Owl Labs Inc. |
| **Applicant Address** | 33-1/2 Union Square Somerville, MA 02143 U.S.A. |
| **FCC ID** | 2ALXJ-MTW405 |
| **ISED ID** | 22676-MTW405 |
| **Model Name** | MTW405 |
| **EUT Type** | 360-Degree Video Conferencing Platform |
| **Modulation Type** | OFDM |
| **FCC Classification** | Unlicensed National Information Infrastructure (NII) |
| **FCC Rule Part(s)** | Part 15.407 |
| **ISED Rule Part(s)** | RSS-247 Issue 3 (August 2023)<br>RSS-Gen Issue 5 Amd 2 (February 2021) |
| **Test Procedure** | ANSI C63.10-2013, KDB 789033 D02 v02r01, KDB 662911 D01 |

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures required. The results of testing in this report apply only to the product which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Hyundai C-Tech, Inc. dba HCT America, Inc. certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

| Tested By | Reviewed By |
|---|---|
| John Park | Yongsoo Park |
| Test Engineer | Technical Manager |



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# REVISION HISTORY

*The revision history for this document is shown in table.*

| TEST REPORT NO. | DATE | DESCRIPTION |
|---|---|---|
| HA240429-OWL-001-R06 | May 13, 2024 | Initial Issue |
| HA240429-OWL-001-R06-1 | May 21, 2024 | Page 6 : Clarify support for each MIMO operation mode<br>Pages 46 – 52, 58 – 59 : Makes it clear that each plot includes all correction factors |
| | | |
| | | |

# TABLE OF CONTENTS





Hyundai C-Tech, Inc. dba HCT America, Inc., 1726 Ringwood Avenue, San Jose, CA 95131, USA. TEL: +1-510-933-8848 FAX: +1-510-933-8849

# 1. GENERAL INFORMATION

## EUT DESCRIPTION

| | |
|---|---|
| **Model** | MTW405 |
| **Product Name** | Meeting Owl 4+ |
| **Serial Number** | Conducted : M4FC1324001C<br>Radiated :M4FV13240003 |
| **Power Supply** | 20 V d.c. (USB type C - External adaptor) |
| **RF Specification** | WIFI 2.4 GHz : 802.11b/g/ n(HT20, HT40)/ ac(VHT20, VHT40)<br>WIFI 5 GHz : 802.11a/n(HT20/40)/ ac(VHT20/40/80)<br>Bluetooth 5.0 LE (1M / BR / EDR) |
| **Transmitter Chain** | WIFI 2.4 GHz / 5 GHz : 2x2 MIMO<br>Bluetooth LE / Bluetooth BR/EDR : SISO |
| **Operating Environment** | Indoor |
| **Operating Temperature** | 5 °C ~ +30 °C |

## RF SPECIFICATION SUBJECT TO THE REPORT

| | | |
|---|---|---|
| **RF Specification** | 802.11a/n(HT20/40)/ ac(VHT20/40/80) | |
| **Transmitter Chain** | 2 x 2 MIMO | |
| **Frequency Range** | U-NII 3 | 20 MHz BW : 5745 MHz – 5825 MHz<br>40 MHz BW : 5755 MHz – 5795 MHz<br>80 MHz BW : 5775 MHz |
| **Max. RF Output Power** | 23.31 dBm (214.48 mW) | |
| **Modulation Type** | OFDM : 802.11a/n/ac | |
| **Antenna Specification [1)]** | ANT1 | Antenna Type : PCB Antenna<br>Antenna Model : CU23001-1<br>Antenna Brand: antenova<br>Peak Gain : 3.8 dBi |
| | ANT2 | Antenna Type : PCB Antenna<br>Antenna Model : CU23002-1<br>Antenna Brand: antenova<br>Peak Gain : 3.2 dBi |
| **Firmware Version [2)]** | 6.4.21.22 | |
| **Hardware Version [2)]** | OWL-900-00027 Rev 5 | |
| **Date(s) of Tests** | April 29, 2024 ~ May 12, 2024 | |

**Note :**
1. Antenna information is based on the document provided.
2. Firmware and Hardware Version are as received by the client.



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## ANTENNA CONFIGURATION

The device employs 2x2 MIMO technologies with possible configurations below.

| Frequency | Configuration | SDM | Beamforming | CDD |
|---|---|---|---|---|
| | | ANT1 + ANT2 | ANT1 + ANT2 | ANT1 + ANT2 |
| 2.4 GHz | 802.11b | - | - | O |
| | 802.11g | - | - | O |
| | 802.11n | O | - | O |
| | 802.11ac | O | O | O |
| 5 GHz | 802.11a | - | - | O |
| | 802.11n | O | - | O |
| | 802.11ac | O | O | O |

The equipment under test supports Cyclic Diversity mode.
CDD mode was picked as worst case for testing even though the device support both CDD and SDM, Beamforming.

## ANTENNA DIRECTIONAL GAIN

| Antenna Type | Type | RF Technology | Frequency | Gain (Ant 1) | Gain (Ant 2) |
|---|---|---|---|---|---|
| PCB | Dipole | 802.11b/g/n | 2.4 GHz | 2.90 dBi | 2.90 dBi |
| PCB | Dipole | 802.11a/n/ac | 5 GHz | 3.80 dBi | 3.20 dBi |

Directional Gain (2.4 GHz : Uncorrelated) = $10 \log[(10^{(2.90/10)}+10^{(2.90/10)}) / 2] = 2.90$ dBi
Directional Gain (5 GHz : Uncorrelated) = $10 \log[(10^{(3.80/10)}+10^{(3.20/10)}) / 2] = 3.51$ dBi

Directional Gain (2.4 GHz : Correlated) = $10 \log[(10^{(2.90/20)}+10^{(2.90/20)})^2 / 2] = 5.91$ dBi
Directional Gain (5 GHz : Correlated) = $10 \log[(10^{(3.80/20)}+10^{(3.20/20)})^2 / 2] = 6.52$ dBi

Beamforming Directional Gain (2.4 GHz) = 2.90 dBi + 10 log(2) = 5.91 dBi
Beamforming Directional Gain (5 GHz) = 3.51 dBi + 10 log(2) = 6.52 dBi



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## OPERATING FREQUENCY CHANNELS

| Band | Frequency (MHz) | Channel | 802.11a | 802.11n HT20 | 802.11ac VHT20 |
|---|---|---|---|---|---|
| U-NII 3 | 5745 | 149 | O | O | O |
| | 5765 | 153 | O | O | O |
| | 5785 | 157 | O | O | O |
| | 5805 | 161 | O | O | O |
| | 5825 | 165 | O | O | O |

| Band | Frequency (MHz) | Channel | 802.11n HT40 | 802.11ac VHT40 |
|---|---|---|---|---|
| U-NII 3 | 5755 | 151 | O | O |
| | 5795 | 159 | O | O |

| Band | Frequency (MHz) | Channel | 802.11ac VHT80 |
|---|---|---|---|
| U-NII 3 | 5775 | 155 | O |

## 2. METHODOLOGY

The measurement procedure described in FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 dated December 14, 2017 entitled "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part15, Subpart E" and ANSI C63.10(Version : 2013) 'the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices' were used in the measurement.

### 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.

### EUT EXERCISE

The EUT was operated in the engineering 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 15.407 under the FCC Rules Part 15 Subpart E. / the RSS-GEN issue 5 amd 2, RSS-247 issue 3.

### GENERAL TEST PROCEDURES

**Conducted Emissions**
The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

**Radiated Emissions**
The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. 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. Also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emission, the relative positions of this hand-held transmitter (EUT) were rotated through three orthogonal axes according to the requirements in Section 8 of ANSI C63.10. (Version: 2013)

### DESCRIPTION OF TEST MODES

The EUT has been tested at 5 GHz WLAN test mode. Qualcomm Radio Control Tool was used to control the channels, power level setting at continuous TX and normal RX mode for each 802.11a/n(HT20/40) /ac(VHT20/40/80).

## 3. 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's, which is traceable to recognized national standards. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).



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# 4. FACILITIES AND ACCREDITATIONS

## FACILITIES

The SAC (Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at 1726 Ringwood Avenue, San Jose, California 95131, USA.
The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

CABID : 25729


Accredited Laboratory

A2LA has accredited

HYUNDAI C-TECH, INC.
DBA HCT AMERICA, INC.
*San Jose, CA*

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 17th day of July 2023.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4201.01
Valid to July 31, 2025

*For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.*

## 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, horn. Spectrum analyzers with pre-selectors and 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."

## 5. ANTENNA REQUIREMENTS

**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."

(1) The antenna of this E.U.T is permanently attached and there is no provision for connection to an external antenna.
(2) The E.U.T Complies with the requirement of §15.203

**According to RSS-Gen Issue 5 Amd 2 (Section 6.8) :**

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

## 6. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of *k* = 2 to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the $U_{CISPR}$ measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

| Parameter | Expanded Uncertainty |
|---|---|
| Output Power, Conducted | ± 0.54 dB |
| Frequency Tolerance | ± 16.78 kHz |
| Occupied Bandwidth | ± 120.66 kHz |
| Unwanted Emissions, Conducted | ± 0.54 dB |
| Radiated Emissions (below 1 GHz) | ± 5.70 dB |
| Radiated Emissions (Above 1 GHz) | ± 5.25 dB |



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# 7. DESCRIPTION OF TESTS

## 7.1. DUTY CYCLE

### TEST SETUP


### TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer.
Measurement is performed in accordance with the section B.2 in KDB 789033 D02 v02r01.

The largest available value of RBW is 8 MHz and VBW is 50 MHz.
The zero-span method of measuring duty cycle shall not be used if T ≤ 6.25 microseconds. (50/6.25 = 8)
The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/*T*.

- RBW = 8 MHz (the largest available value)
- VBW = 8 MHz (≥ RBW)
- SPAN = 0 Hz
- Detector = Peak
- Number of points in sweep > 100
- Trace mode = Clear write
- Measure $T_{total}$ and $T_{on}$
- Calculate Duty Cycle = $T_{on}$/ $T_{total}$ and Duty Cycle Factor = 10*log(1/Duty Cycle)



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## 7.2. 6 dB BANDWIDTH / 26 dB BANDWIDTH / 99 % OCCUPIED BANDWIDTH

**LIMIT**

Emission bandwidth was measured to define the minimum frequency range which the spectrum is integrated for maximum conducted output power measurement.

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

**TEST SETUP**


**TEST PROCEDURE (26 dB Bandwidth)**

Testing was performed according to the section C.1 in KDB 789033 D02 v02r01.
The transmitter output is connected to the spectrum analyzer.

- RBW = Approximately 1 % of the emission bandwidth
- VBW > RBW
- Detector = Peak
- Trace mode = max hold
- Sweep = auto couple
- Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

**TEST PROCEDURE (6 dB Bandwidth)**

Testing was performed according to the procedure C.1 in KDB 789033 D02 v02r01.
The transmitter output is connected to the Spectrum Analyzer.

- RBW = 100 kHz
- VBW ≥ 3*RBW
- Detector = Peak
- Trace mode = Max hold
- Allow the trace to stabilize
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points(upper and lower frequencies) that are attenuated by 6 dB relative to the maximum lever measured in the fundamental emission.



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**TEST PROCEDURE (99% Bandwidth)**

Testing was performed according to the section D in KDB 789033 D02 v02r01.
The transmitter output is connected to the spectrum analyzer.

- RBW = 1% ~ 5% of the occupied bandwidth
- VBW ≒ 3 x RBW
- Detector = Peak
- Trace mode = max hold
- Sweep = auto couple
- Allow the trace to stabilize

**Note:**
1. The bandwidth measurement function from the spectrum analyzer is used to measure X dB bandwidth.
2. 26 dB bandwidth is used to determine the conducted power limits.

### 7.3. OUTPUT POWER

**LIMIT**

| Band | 47 CFR §15.407(a)(3)(i) | RSS-247, 6.2.4.2 |
|---|---|---|
| U-NII 3 | ≤ 1 W (= 30dBm) | ≤ 1 W (= 30dBm) |

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**TEST SETUP**


**TEST PROCEDURE**

Refer to the section E.2.d) in KDB 789033 D02 v02r01
The transmitter output is connected to the Spectrum Analyzer.
Spectrum analyzer’s integrated band power measurement function was used.

- Measure the duty cycle.
- Set span to encompass the 26 dB EBW or 99 % OBW of the signal.
- RBW = 1 MHz
- VBW ≥ 3 MHz
- Number of points in sweep ≥ 2*span/RBW.
- Sweep time = auto.
- Detector = RMS.
- Do not use sweep triggering. Allow the sweep to “free run”.
- Trace average at least 100 traces in power averaging (RMS) mode
- Integrated bandwidth = EBW

Add 10log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times

**<u>Sample Calculation</u>**

- Conducted Output Power (Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor



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## 7.4. POWER SPECTRAL DENSITY

### LIMIT

| Band | 47 CFR §15.407(a)(3)(i) | RSS-247, 6.2.4.2 |
|---|---|---|
| U-NII 3 | ≤ 30 dBm/500 kHz | ≤ 30 dBm/500 kHz |

If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### TEST SETUP


### TEST PROCEDURE

Refer to the section F in KDB 789033 D02 v02r01.

- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- RBW = 510 kHz
- VBW ≥ 3 MHz
- Number of points in sweep ≥ 2*span/RBW.
- Sweep time = auto.
- Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- Do not use sweep triggering. Allow the sweep to “free run”.
- Trace average at least 100 traces in power averaging (RMS) mode
- Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
- If Method SA-2 was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.

**Sample Calculation**

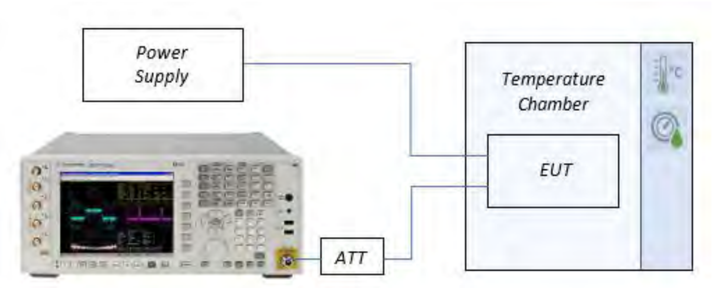
Total PSD (Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

## 7.5. FREQUENCY STABILITY

**LIMIT**

**§15.407(g) / RSS-Gen, 8.8**
Fundamental emissions of the radio devices should be kept within at least the central 80% of its permitted operating frequency band to minimize the possibility of out of band operation.

**TEST SETUP**




**TEST PROCEDURE**

- The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between -30 ℃ and 50 ℃.

- The temperature was incremented by 10 ℃ intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

- The primary supply voltage is varied from 85% to 115% of the nominal value for non-hand carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

- While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.



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## 7.6. UNDESIRABLE EMISSION

### LIMIT

| Frequency Band | 47 CFR § 15.407(b)(4) / RSS-247, 6.2.4.3 |
|---|---|
| U-NII 3 | In accordance with **47 CFR § 15.407(b)(4) / RSS-247, 6.2.4.3**<br>All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. |

### RADIATION EMISSION LIMIT

| FCC : 47 CFR § 15.209 | | |
|---|---|---|
| **Frequency (MHz)** | **Field Strength (uV/m)** | **Measurement Distance (m)** |
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

| ISED : RSS-GEN Section 8.9 | | |
|---|---|---|
| **Frequency (MHz)** | **Field Strength (uV/m)** | **Measurement Distance (m)** |
| 0.009 – 0.490 | 6.37/F(kHz) | 300 |
| 0.490 – 1.705 | 63.7/F(kHz) | 30 |
| 1.705 – 30 | 0.08 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

### RECEIVER RADIATED EMISSION LIMIT

| ISED : RSS-GEN Section 7.3 | | |
|---|---|---|
| **Frequency (MHz)** | **Field Strength (uV/m)** | **Measurement Distance (m)** |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |



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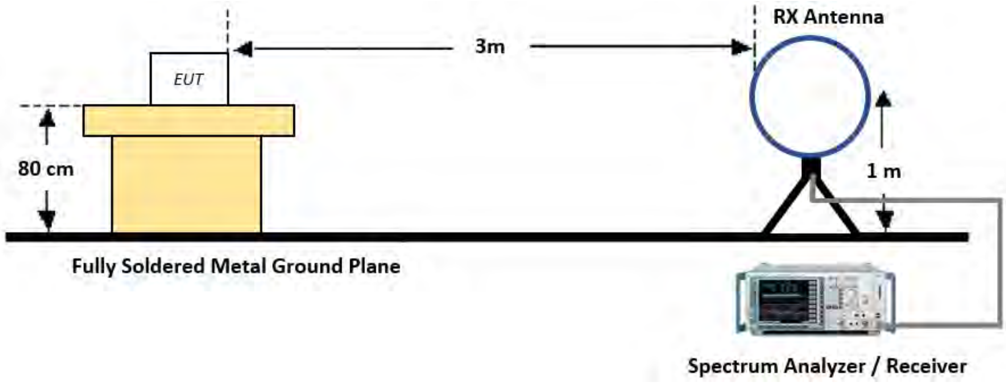
**RESTRICTED BANDS OF OPERATION**

| FCC : 47 CFR § 15.205(a) | | | | |
|---|---|---|---|---|
| **Frequency (MHz)** | **Frequency (MHz)** | **Frequency (MHz)** | **Frequency (MHz)** | **Frequency (MHz)** |
| 0.090 – 0.110 | 12.29 - 12.293 | 149.9 - 150.05 | 1660.0 - 1710.0 | 8025 - 8500 |
| 0.495 - 0.505 | 12.51975 - 12.52025 | 156.52475 - 156.52525 | 1718.8 - 1722.2 | 9000 - 9200 |
| 2.1735 - 2.1905 | 12.57675 - 12.57725 | 156.7 - 156.9 | 2200.0 - 2300.0 | 9300 - 9500 |
| 4.125 - 4.128 | 13.36 - 13.41 | 162.0125 - 167.17 | 2310.0 - 2390.0 | 10600 - 12700 |
| 4.17725 - 4.17775 | 16.42 - 16.423 | 167.72 - 173.2 | 2483.5 - 2500.0 | 13250 - 13400 |
| 4.20725 - 4.20775 | 16.69475 - 16.69525 | 240.0 - 285.0 | 2690.0 - 2900.0 | 14470 - 14500 |
| 6.215 - 6.218 | 16.80425 - 16.80475 | 322.0 - 335.4 | 3260.0 - 3267.0 | 15350 - 16200 |
| 6.26775 - 6.26825 | 25.5 - 25.67 | 399.9 - 410.0 | 3332.0 - 3339.0 | 17700 - 21400 |
| 6.31175 - 6.31225 | 37.5 - 38.25 | 608.0 - 614.0 | 3345.8 - 3358.0 | 22010 - 23120 |
| 8.291 - 8.294 | 73 - 74.6 | 960.0 - 1240.0 | 3600.0 - 4400.0 | 23600 - 24000 |
| 8.362 - 8.366 | 74.8 - 75.2 | 1300.0 - 1427.0 | 4500.0 - 5150.0 | 31200 - 31800 |
| 8.37625 - 8.38675 | 108 - 121.94 | 1435.0 - 1626.5 | 5350.0 - 5460.0 | 36430 - 36500 |
| 8.41425 - 8.41475 | 123 - 138 | 1645.5 - 1646.5 | 7250.0 - 7750.0 | Above 38600 |

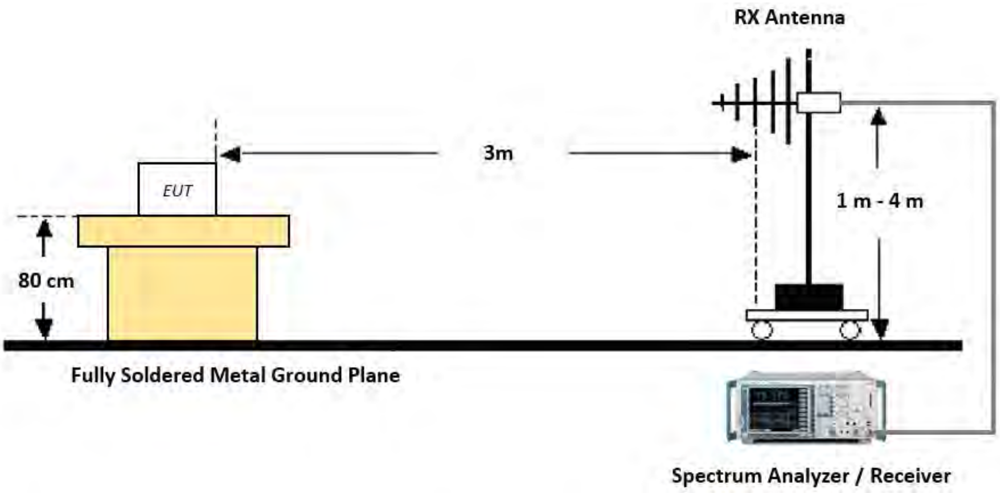
| ISED : RSS-GEN Section 8.10 | | | | |
|---|---|---|---|---|
| **Frequency (MHz)** | **Frequency (MHz)** | **Frequency (MHz)** | **Frequency (MHz)** | **Frequency (MHz)** |
| 0.090 - 0.110 | 8.37625 - 8.38675 | 108 – 138 | 1660 - 1710 | 8025 - 8500 |
| 0.495 - 0.505 | 8.41425 - 8.41475 | 149.9 - 150.05 | 1718.8 - 1722.2 | 9000 - 9200 |
| 2.1735 - 2.1905 | 12.29 - 12.293 | 156.52475 - 156.52525 | 2200 - 2300 | 9300 - 9500 |
| 3.020 - 3.026 | 12.51975 - 12.52025 | 156.7 - 156.9 | 2310 - 2390 | 10600 - 12700 |
| 4.125 - 4.128 | 12.57675 - 12.57725 | 162.0125 - 167.17 | 2483.5 - 2500 | 13250 - 13400 |
| 4.17725 - 4.17775 | 13.36 - 13.41 | 167.72 - 173.2 | 2655 - 2900 | 14470 - 14500 |
| 4.20725 - 4.20775 | 16.42 - 16.423 | 240 - 285 | 3260 - 3267 | 15350 - 16200 |
| 5.677 - 5.683 | 16.69475 - 16.69525 | 322 - 335.4 | 3332 - 3339 | 17700 - 21400 |
| 6.215 - 6.218 | 16.80425 - 16.80475 | 399.9 - 410 | 3345.8 - 3358 | 22010 - 23120 |
| 6.26775 - 6.26825 | 25.5 - 25.67 | 608 - 614 | 3500 - 4400 | 23600 - 24000 |
| 6.31175 - 6.31225 | 37.5 - 38.25 | 960 - 1427 | 4500 - 5150 | 31200 - 31800 |
| 8.291 - 8.294 | 73 - 74.6 | 1435 - 1626.5 | 5350 - 5460 | 36430 - 36500 |
| 8.362 - 8.366 | 74.8 - 75.2 | 1645.5 - 1646.5 | 7250 - 7750 | Above 38600 |

**TEST SETUP**

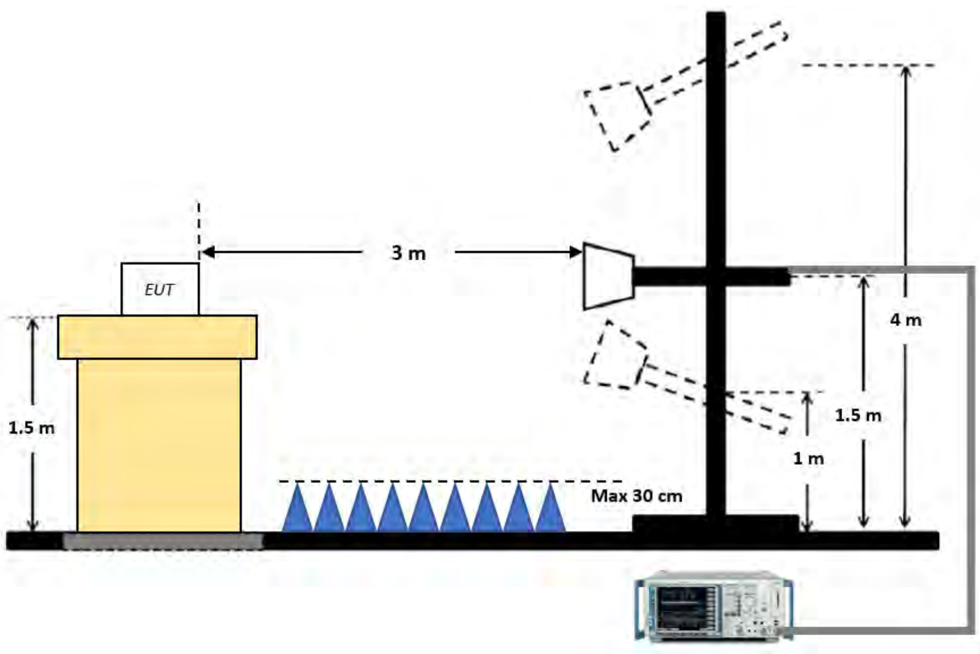
**Below 30 MHz**




**30 MHz - 1 GHz**




**Above 1 GHz**



**TEST PROCEDURE OF RADIATED SPURIOUS EMISSION (BELOW 30 MHz)**

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3m from the EUT
3. The EUT is placed on a turntable, which is 0.8m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor (0.009 MHz – 0.490 MHz) = 40*log(3 m/300 m) = - 80 dB
   Measurement Distance: 3 m
7. Distance Correction Factor (0.490 MHz – 30 MHz) = 40*log(3 m/30 m) = - 40 dB
   Measurement Distance: 3 m
8. Spectrum Setting

   - Frequency Range = 9 kHz ~ 30 MHz
   - Detector = Peak
   - Trace = Max hold
   - RBW = 9 kHz
   - VBW ≥ 3*RBW

9. Total = Reading Value + Antenna Factor (A.F) + Cable Loss (C.L)
10. There is a comparison data both open-field test site and alternative test site – semi-Anechoic chamber according to 414788 D01. And the results are properly calibrated.

**TEST PROCEDURE OF RADIATED SPURIOUS EMISSION (30 MHz – 1 GHz)**

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8 m above ground plane.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. Spectrum Setting

   (1) Measurement Type (Peak):
   - Measured Frequency Range: 30 MHz – 1 GHz
   - Detector = Peak
   - Trace = Max hold
   - RBW = 100 kHz
   - VBW ≥ 3*RBW

   (2) Measurement Type(Quasi-peak):
   - Measured Frequency Range: 30 MHz – 1 GHz
   - Detector = Quasi-Peak
   - RBW = 120 kHz

6. Total = Reading Value + Antenna Factor (A.F) + Cable Loss (C.L)



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**TEST PROCEDURE OF RADIATED SPURIOUS EMISSION (ABOVE 1 GHz)**

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting

(1) Measurement Type(Peak, G.5 in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW ≥ 3 MHz
- Detector = Peak
- Sweep Time = auto
- Trace mode = Max hold
- Allow sweeps to continue until the trace stabilizes.
- Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle.

(2) Measurement Type(Average, G.6.d in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW(Duty cycle ≥ 98 percent) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 percent) = VBW ≥ 1/T, where T is the minimum transmission duration.
- The analyzer is set to linear detector mode.
- Detector = Peak.
- Sweep time = auto.
- Trace mode = Max hold.
- Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of 1/x, where x is the duty cycle.

9. Measurement value only up to 6 maximum emissions noted or would be lesser if no specific emissions from the EUT are recorded (i.e.: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor

10. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency (or 40 GHz whichever comes first)

11. Sample Calculation

(1) Total (Peak) = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G)
(2) Total (Average, Duty ≥ 98%) = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G)
(3) Total (Average, Duty < 98%) = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Duty Cycle Factor



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**TEST PROCEDURE OF RADIATED RESTRICTED BAND EDGE**

1. Radiated test is performed with hopping off (if there is any)
2. The EUT is placed on a turntable, which is 1.5 m above ground plane.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting

(1) Measurement Type(Peak, G.5 in KDB 789033 v02r01):
- RBW = 1 MHz
- VBW ≥ 3 MHz
- Detector = Peak
- Sweep Time = auto
- Trace mode = Max hold
- Allow sweeps to continue until the trace stabilizes.
- Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle.

(2) Measurement Type(Average, G.6.d in KDB 789033 v02r01):
- RBW = 1 MHz
- VBW(Duty cycle ≥ 98 percent) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 percent) = VBW ≥ 1/T, where T is the minimum transmission duration.
- The analyzer is set to linear detector mode.
- Detector = Peak.
- Sweep time = auto.
- Trace mode = Max hold.
- Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of 1/x, where x is the duty cycle.

9. Sample Calculation

(1) Total (Peak) = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)
(2) Total (Average, Duty ≥ 98%) = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G)
(3) Total (Average, Duty < 98%) = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Duty Cycle Factor



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## 7.7. AC POWER LINE CONDUCTED EMISSIONS

**LIMIT**

**47 CFR § 15.207 / RSS-GEN Section 8.8**

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

| Frequency Range (MHz) | Limits (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56* | 56 to 46* |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency.
voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

**TEST SETUP**

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

**TEST PROCEDURE**

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors : Quasi Peak and Average Detector.

According to FCC KDB 174176 D01 Line Conducted FAQ v01r01 :

**Devices Operating Above 30 MHz**

For a device with a permanent or detachable antenna operating above 30 MHz, measurements must be performed with the antenna connected as specified in clause 6.2 of ANSI C63.10-2013.

**Devices Operating Below 30 MHz**

For a device with a permanent or detachable antenna operating at or below 30 MHz, the FCC will accept measurements performed with a suitable dummy load in lieu of the antenna under the following conditions:

(1) Perform the AC power-line conducted tests with the antenna connected to determine compliance with Section 15.207 limits outside the transmitter's fundamental emission band;

(2) Retest with a dummy load in lieu of the antenna to determine compliance with Section 15.207 limits within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network which simulates the antenna in the fundamental frequency band. All measurements must be performed as specified in clause 6.2 of ANSI C63.10-2013.

**Sample Calculation**

Quasi-peak(Final Result) = Reading Value + Correction Factor



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## 8. SUMMARY OF TEST RESULTS

| Test Description | FCC Part Section(s) | ISED Part Section(s) | Test Limit | Test Condition | Test Result |
|---|---|---|---|---|---|
| 26 dB Bandwidth | §15.407 | - | N/A<br>(For power measurement) | Conducted | - |
| 6 dB Bandwidth | §15.407(e) | RSS-247, 6.2.4.2 | ≥ 500 kHz | | PASS |
| Occupied bandwidth | - | RSS-Gen, 6.7 | N/A | | |
| Maximum Conducted Output Power | §15.407(a)(3)(i) | RSS-247, 6.2.4.2 | ≤ 1 W | | PASS |
| Power Spectral Density | §15.407(a)(3)(i) | RSS-247, 6.2.4.2 | ≤ 30 dBm/500 kHz | | PASS |
| Frequency Stability | §15.407(g)<br>§2.1055 | RSS-Gen, 8.11 | Maintained within the band | | PASS |
| AC Power line Conducted Emissions | §15.207<br>§15.407(b)(9) | RSS-Gen, 8.8 | cf. Section 7.7 | | PASS |
| Undesirable Emissions | §15.407(b)(4) | RSS-247, 6.2.4.3 | cf. Section 7.6 | Radiated | PASS |
| Radiated Spurious Emissions | §15.209<br>§15.407(b)(9) | RSS-Gen, 8.9 | cf. Section 7.6 | | PASS |
| Radiated Restricted Band Edge | §15.407(b)(7)<br>§15.205(a) | RSS-Gen, 8.10 | cf. Section 7.6 | | PASS |
| Receiver Spurious Emissions | - | RSS-Gen, 7.3 | cf. Section 7.6 | | PASS |

## WORST CASE CONFIGURATION

### RADIATED TEST

1. EUT Axis

- All X, Y, and Z positions for horizontal / vertical antenna polarization were investigated to find the worst-case position.
- X position was selected for the final evaluation.

2. Operations with all the data rates available were investigated for each different channel BW mode. Lowest datarate was selected as the worst case.

3. Radiated test was performed at the worst case 2 x TX CDD mode

### CONDUCTED TEST

1. AC line conducted emission test was performed at the worst case transmission mode.

## WORST CASE DATA RATE

| Mode | Worst Case Data Rate |
|---|---|
| 802.11a | 6 Mbps |
| 802.11n | MCS0 |
| 802.11ac | MCS0 |

## CHANNEL UNDER TEST

| Mode (U-NII 3) | Bandwidth (MHz) | Low Channel (MHz) | Mid Channel (MHz) | High Channel (MHz) |
|---|---|---|---|---|
| 802.11a | 20 | 5745 | 5785 | 5825 |
| 802.11n | 20 | 5745 | 5785 | 5825 |
| | 40 | 5755 | - | 5795 |
| 802.11ac | 20 | 5745 | 5785 | 5825 |
| | 40 | 5755 | - | 5795 |
| | 80 | 5775 | | |



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## SUMMARY OF OUTPUT POWER

| Bandwidth | Mode | Max Output Power (dBm) | Max Output Power (mW) | Channel Frequency (MHz) |
|---|---|---|---|---|
| 20 MHz | 802.11a | 23.23 | 211.60 | 5745 |
| | 802.11ac VHT20 | 23.31 | 214.48 | 5745 |
| 40 MHz | 802.11ac VHT40 | 23.02 | 200.67 | 5755 |
| 80 MHz | 802.11ac VHT80 | 22.73 | 187.54 | 5775 |

## SUMMARY OF POWER LEVEL SETTING

| U-NII 3 Band (20 MHz) | | Power Level Setting / Chain | | |
|---|---|---|---|---|
| Frequency (MHz) | Channel | 802.11a | 802.11n HT20 | 802.11ac VHT20 |
| 5745 | 149 | 20 | 20 | 20 |
| 5765 | 153 | 20 | 20 | 20 |
| 5785 | 157 | 20 | 20 | 20 |
| 5805 | 161 | 20 | 20 | 20 |
| 5825 | 165 | 20 | 20 | 20 |

| U-NII 3 Band (40 MHz) | | Power Level Setting / Chain | |
|---|---|---|---|
| Frequency (MHz) | Channel | 802.11n HT40 | 802.11ac VHT40 |
| 5755 | 151 | 20 | 20 |
| 5795 | 159 | 20 | 20 |

| U-NII 3 Band (80 MHz) | | Power Level Setting / Chain |
|---|---|---|
| Frequency (MHz) | Channel | 802.11ac VHT80 |
| 5775 | 155 | 20 |



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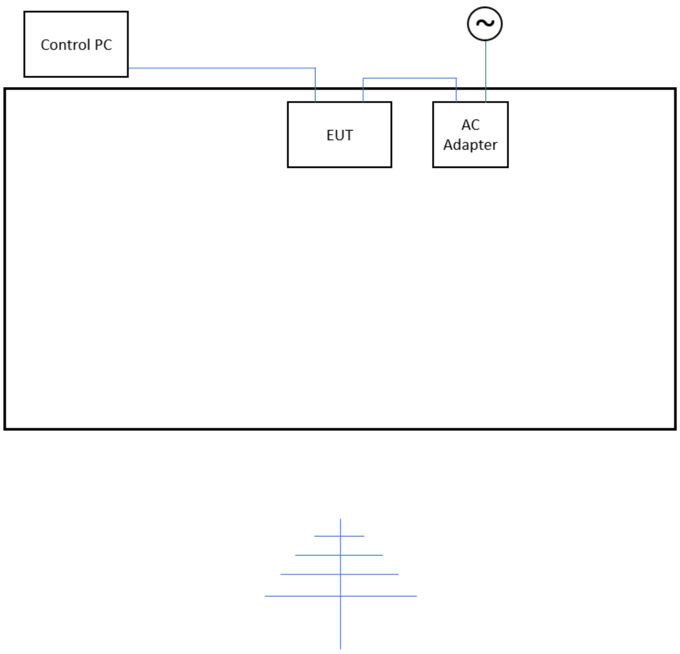
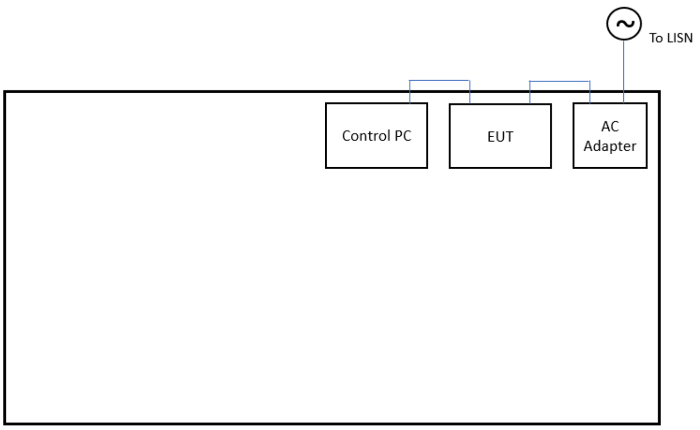
## TEST CONFIGURATION

**Radiated Emission**




**Conducted Emission**




## LIST OF SUPPORT EQUIPMENT

| Equipment Type | Model No. | Serial No. | Manufacturer | Qty | Note |
|---|---|---|---|---|---|
| Power Supply | PA-1650-58 | 165058LT33803287PEA01 | LITEON | 1 | Input : 100-240 V a.c., 50-60 Hz, 1.6 A Output : 20 V d.c., 3.25 A |
| Laptop | 14-dq1038wrn | 5CD04524LL | HP | 1 | For EUT control |

# 9. TEST RESULT

## 9.1 DUTY CYCLE

Duty cycle is 100 % continuous.



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## 9.2 6 dB BANDWIDTH / 26 dB BANDWIDTH / 99% BANDWIDTH

| U-NII 3 Band (20 MHz) | | | 99% Bandwidth (MHz) | | 26 dB Bandwidth (MHz) | |
|---|---|---|---|---|---|---|
| Mode | Frequency (MHz) | Channel | Chain 0 | Chain 1 | Chain 0 | Chain 1 |
| 802.11a | 5745 | 149 | 18.06 | 16.59 | 34.53 | 25.16 |
| | 5785 | 157 | 16.94 | 16.42 | 33.58 | 20.12 |
| | 5825 | 165 | 19.09 | 16.56 | 35.30 | 21.61 |
| 802.11ac VHT20 | 5745 | 149 | 18.31 | 17.70 | 35.40 | 23.24 |
| | 5785 | 157 | 17.84 | 17.59 | 31.16 | 20.86 |
| | 5825 | 165 | 18.33 | 17.66 | 32.29 | 21.73 |

| U-NII 3 Band (20 MHz) | | | 6 dB Bandwidth (MHz) | | |
|---|---|---|---|---|---|
| Mode | Frequency (MHz) | Channel | Chain 0 | Chain 1 | Limit |
| 802.11a | 5745 | 149 | 15.94 | 16.29 | ≥ 0.5 |
| | 5785 | 157 | 16.31 | 15.03 | |
| | 5825 | 165 | 15.68 | 16.32 | |
| 802.11ac VHT20 | 5745 | 149 | 15.67 | 17.63 | ≥ 0.5 |
| | 5785 | 157 | 17.65 | 17.58 | |
| | 5825 | 165 | 16.94 | 14.68 | |

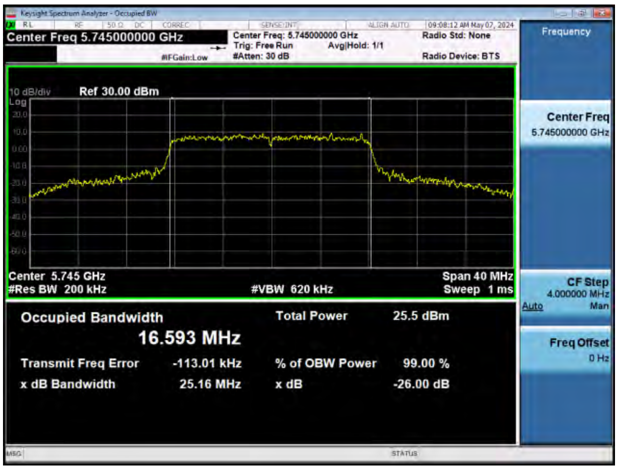
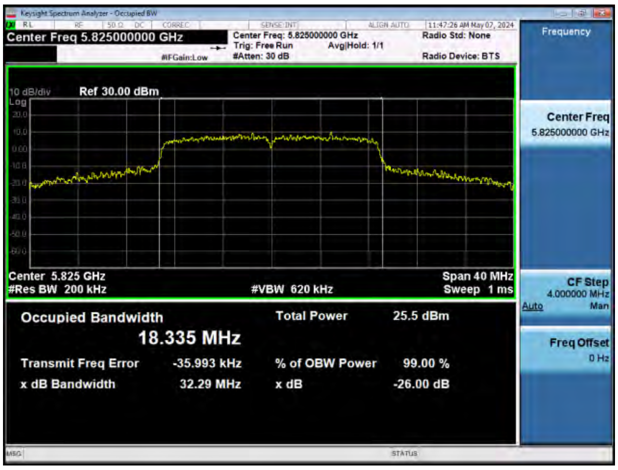
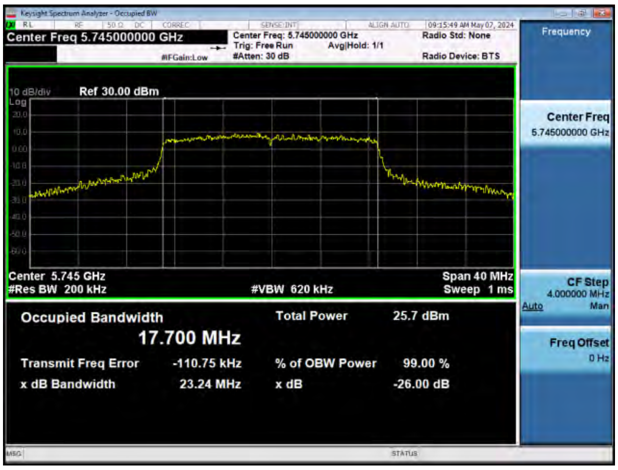
| U-NII 3 Band (40 MHz) | | | 99% Bandwidth (MHz) | | 26 dB Bandwidth (MHz) | |
|---|---|---|---|---|---|---|
| Mode | Frequency (MHz) | Channel | Chain 0 | Chain 1 | Chain 0 | Chain 1 |
| 802.11ac VHT40 | 5755 | 151 | 36.69 | 36.25 | 73.62 | 46.77 |
| | 5795 | 159 | 38.75 | 36.18 | 76.19 | 45.94 |

| U-NII 3 Band (40 MHz) | | | 6 dB Bandwidth (MHz) | | |
|---|---|---|---|---|---|
| Mode | Frequency (MHz) | Channel | Chain 0 | Chain 1 | Limit |
| 802.11ac VHT40 | 5755 | 151 | 36.05 | 36.43 | ≥ 0.5 |
| | 5795 | 159 | 36.05 | 35.86 | |

| U-NII 3 Band (80 MHz) | | | 99% Bandwidth (MHz) | | 26 dB Bandwidth (MHz) | |
|---|---|---|---|---|---|---|
| Mode | Frequency (MHz) | Channel | Chain 0 | Chain 1 | Chain 0 | Chain 1 |
| 802.11ac VHT80 | 5775 | 155 | 76.65 | 75.74 | 149.35 | 99.98 |

| U-NII 3 Band (80 MHz) | | | 6 dB Bandwidth (MHz) | | |
|---|---|---|---|---|---|
| Mode | Frequency (MHz) | Channel | Chain 0 | Chain 1 | Limit |
| 802.11ac VHT80 | 5775 | 155 | 74.90 | 71.59 | ≥ 0.5 |

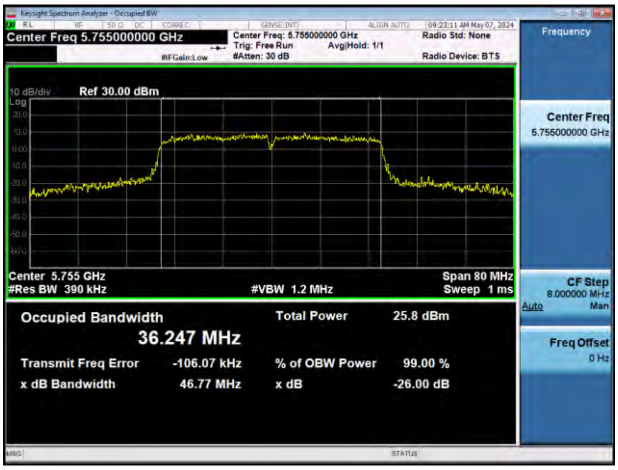
## ▣ TEST PLOTS

<table>
<tr><th colspan="2">26 dB Bandwidth / 99% Bandwidth</th></tr>
<tr><th>802.11a (CH 165 : 5825 MHz) : Chain 0</th><th>802.11a (CH 149 : 5745 MHz) : Chain 1</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><th>802.11ac VHT20 (CH 165 : 5825 MHz) : Chain 0</th><th>802.11ac VHT20 (CH 149 : 5745 MHz) : Chain 1</th></tr>
<tr><td>
</td><td>
</td></tr>
</table>

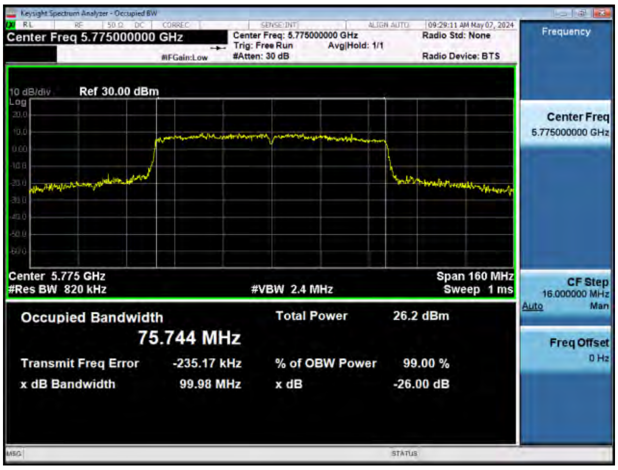
**Note(s) :**
The worst plots are reported for each bandwidth mode.

## ▣ TEST PLOTS

<table>
<tr><th colspan="2">26 dB Bandwidth / 99% Bandwidth</th></tr>
<tr><th>802.11ac VHT40 (CH 159 : 5795 MHz) : Chain 0</th><th>802.11ac VHT40 (CH 151: 5755 MHz) : Chain 1</th></tr>
<tr><td>


</td><td>


</td></tr>
<tr><th>802.11ac VHT80 (CH 155 : 5775 MHz) : Chain 0</th><th>802.11ac VHT80 (CH 155 : 5775 MHz) : Chain 1</th></tr>
<tr><td>


</td><td>


</td></tr>
</table>

**Note(s) :**
The worst plots are reported for each bandwidth mode.



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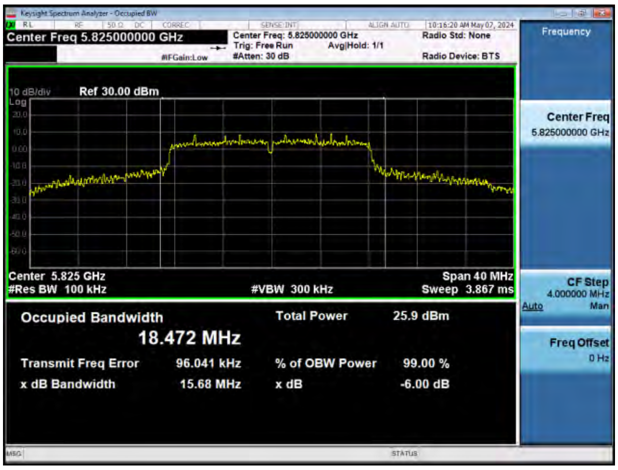
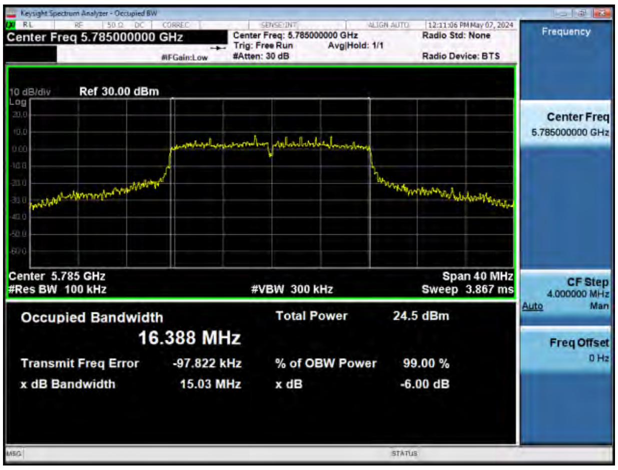
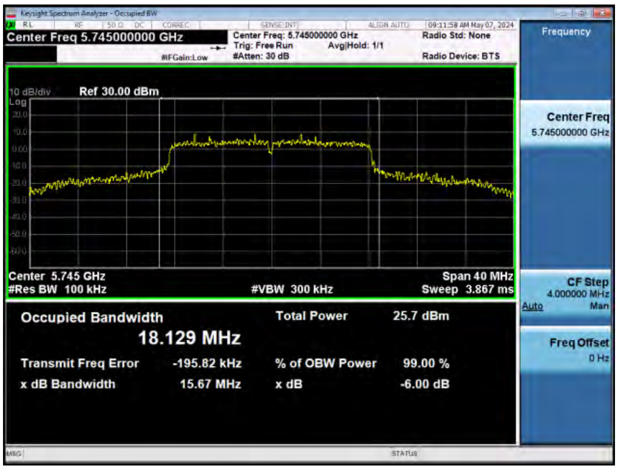
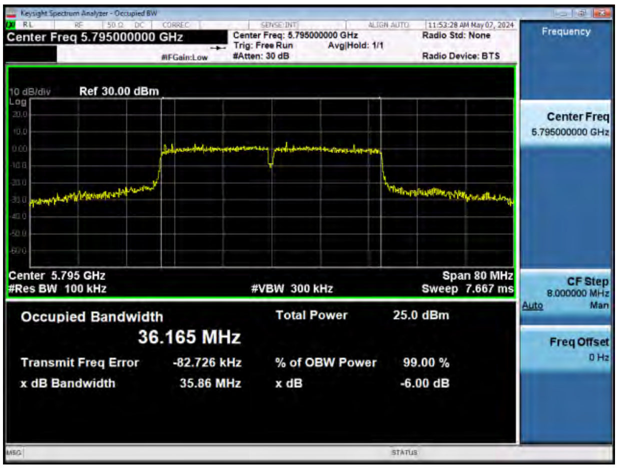
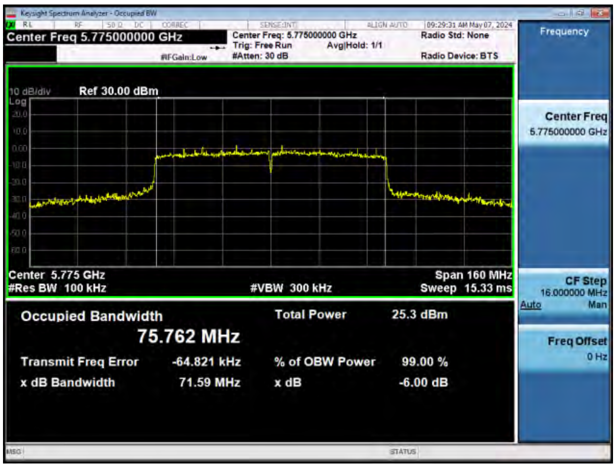
## ▣ TEST PLOTS

<table>
<tr><th colspan="2">6 dB Bandwidth</th></tr>
<tr><th>802.11a (CH 165 : 5825 MHz): Chain 0</th><th>802.11a (CH 157 : 5785 MHz) : Chain 1</th></tr>
<tr><td></td><td></td></tr>
<tr><th>802.11ac VHT20 (CH 149 : 5745 MHz): Chain 0</th><th>802.11ac VHT20 (CH 165 : 5825 MHz) : Chain 1</th></tr>
<tr><td></td><td></td></tr>
</table>

**Note(s) :**

The worst plots are reported for each bandwidth mode.

■ TEST PLOTS (Continued)

| 6 dB Bandwidth | |
| --- | --- |
| 802.11ac VHT40 (CH 151 : 5755 MHz) : Chain 0 | 802.11ac VHT40 (CH 159 : 5795 MHz) : Chain 1 |
|  |  |
| 802.11ac VHT80 (CH 155 : 5775 MHz) : Chain 0 | 802.11ac VHT80 (CH 155 : 5775 MHz) : Chain 1 |
|  |  |

**Note(s) :**
The worst plots are reported for each bandwidth mode.

## 9.3 OUTPUT POWER

| U-NII 3 Band (20 MHz) | | | | Test Result | | | | Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Mode | Frequency (MHz) | Channel | Date Rate | Measured Power (dBm) | | Duty Factor (dB) | Measured Power (dBm) | |
| | | | | Chain 0 | Chain 1 | | Chain 0 + Chain 1 | |
| 802.11a | 5745 | 149 | 6 Mbps | 20.49 | 19.99 | - | 23.26 | 30 |
| | 5785 | 157 | 6 Mbps | 19.34 | 18.66 | - | 22.02 | 30 |
| | 5825 | 165 | 6 Mbps | 19.51 | 18.64 | - | 22.11 | 30 |
| 802.11ac VHT20 | 5745 | 149 | MCS0 | 20.58 | 20.01 | - | 23.31 | 29.48 1) |
| | 5785 | 157 | MCS0 | 19.33 | 18.54 | - | 21.96 | 29.48 1) |
| | 5825 | 165 | MCS0 | 19.46 | 18.56 | - | 22.05 | 29.48 1) |

| U-NII 3 Band (40 MHz) | | | | Test Result | | | | Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Mode | Frequency (MHz) | Channel | Date Rate | Measured Power (dBm) | | Duty Factor (dB) | Measured Power (dBm) | |
| | | | | Chain 0 | Chain 1 | | Chain 0 + Chain 1 | |
| 802.11ac VHT40 | 5755 | 151 | MCS0 | 20.29 | 19.72 | - | 23.02 | 29.48 1) |
| | 5795 | 159 | MCS0 | 19.99 | 18.91 | - | 22.49 | 29.48 1) |

| U-NII 3 Band (80 MHz) | | | | Test Result | | | | Limit (dBm) |
|---|---|---|---|---|---|---|---|---|
| Mode | Frequency (MHz) | Channel | Date Rate | Measured Power (dBm) | | Duty Factor (dB) | Measured Power (dBm) | |
| | | | | Chain 0 | Chain 1 | | Chain 0 + Chain 1 | |
| 802.11ac VHT80 | 5775 | 155 | MCS0 | 20.14 | 19.26 | - | 22.73 | 29.48 1) |

**Note(s) :**

1. In 802.11ac mode, the limit is reduced as follows considering beamforming gain.
   Conducted Power limit = 30 dBm – (6.52 dBi – 6 dBi) = 29.48 dBm
2. Duty factor is not applied since the duty cycle is 100 %.



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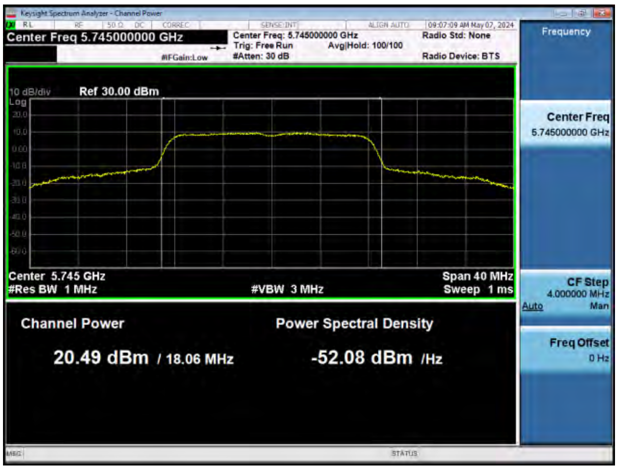
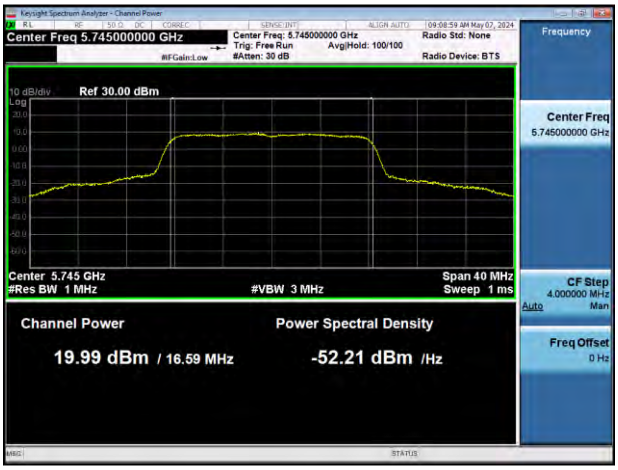
▣ **TEST PLOTS**

## Output Power

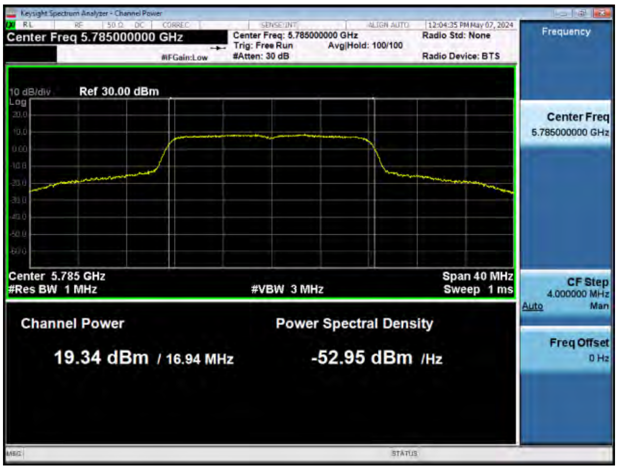
### 802.11a (CH 149 : 5745 MHz) : Chain 0



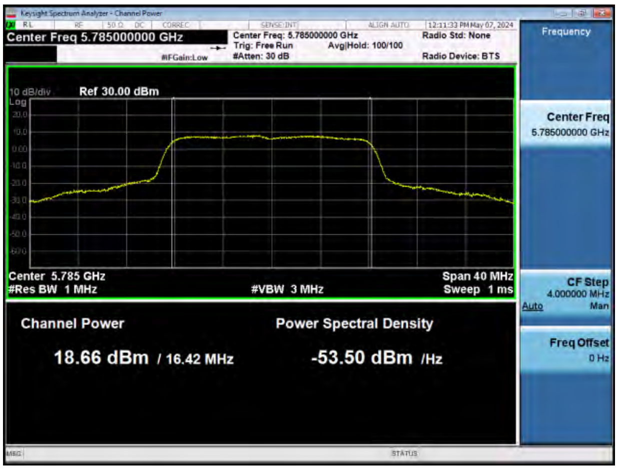

### 802.11a (CH 149 : 5745 MHz) : Chain 1



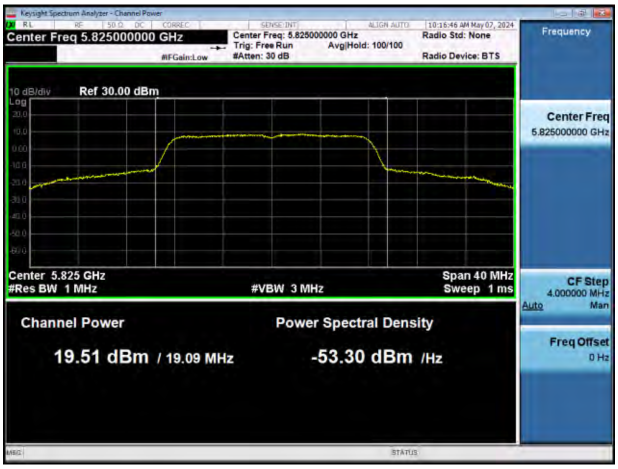

### 802.11a (CH 157 : 5785 MHz) : Chain 0



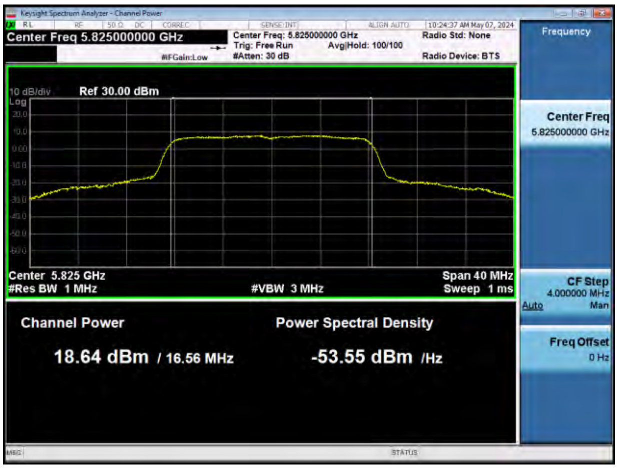

### 802.11a (CH 157 : 5785 MHz) : Chain 1




### 802.11a (CH 165 : 5825 MHz) : Chain 0




### 802.11a (CH 165 : 5825 MHz) : Chain 1



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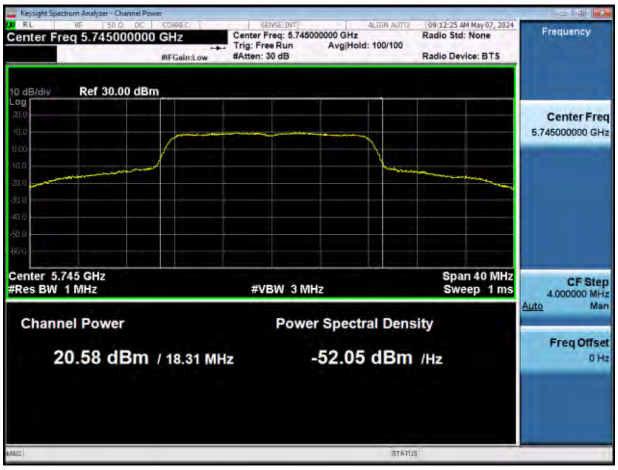
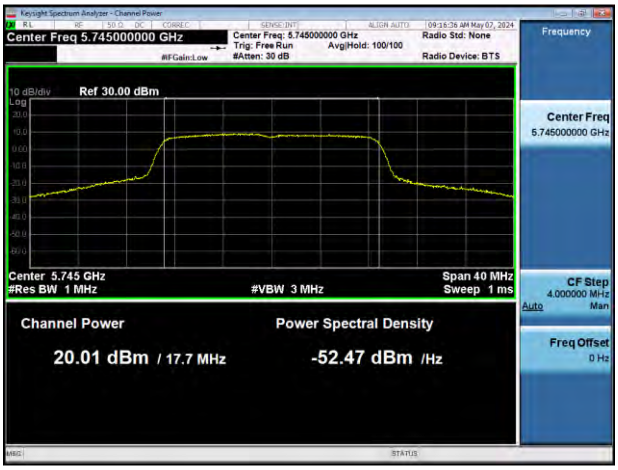
## ▣ TEST PLOTS

### Output Power

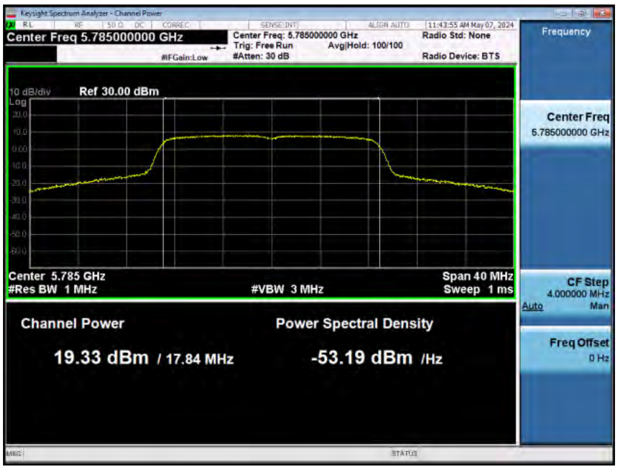
**802.11ac VHT20 (CH 149 : 5745 MHz) : Chain 0**



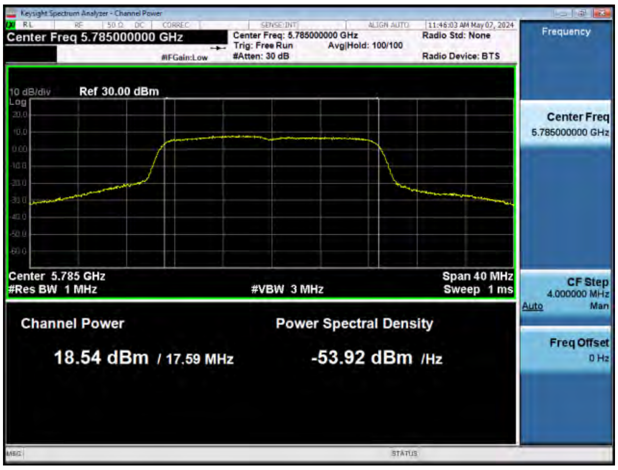

**802.11ac VHT20 (CH 149 : 5745 MHz) : Chain 1**



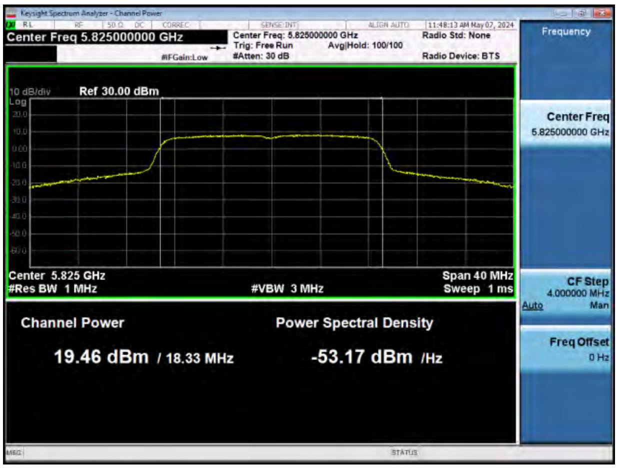

**802.11ac VHT20 (CH 157 : 5785 MHz) : Chain 0**



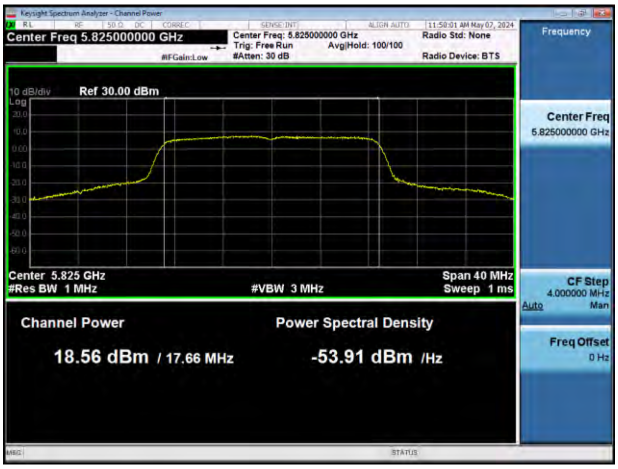

**802.11ac VHT20 (CH 157 : 5785 MHz) : Chain 1**




**802.11ac VHT20 (CH 165 : 5825 MHz) : Chain 0**




**802.11ac VHT20 (CH 165 : 5825 MHz) : Chain 1**



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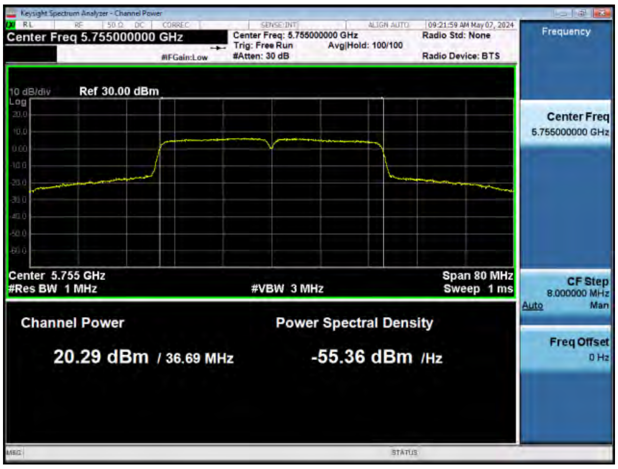
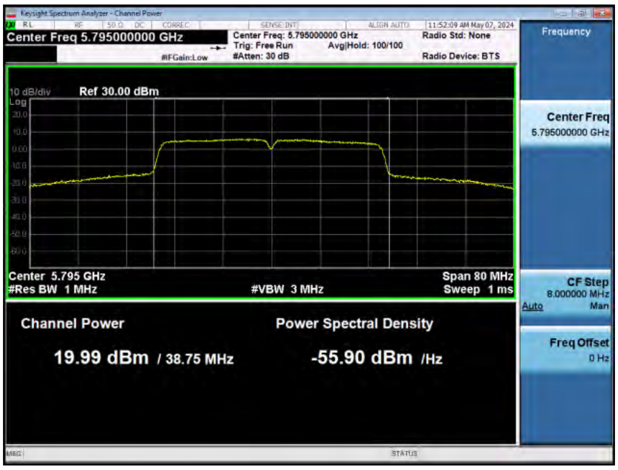
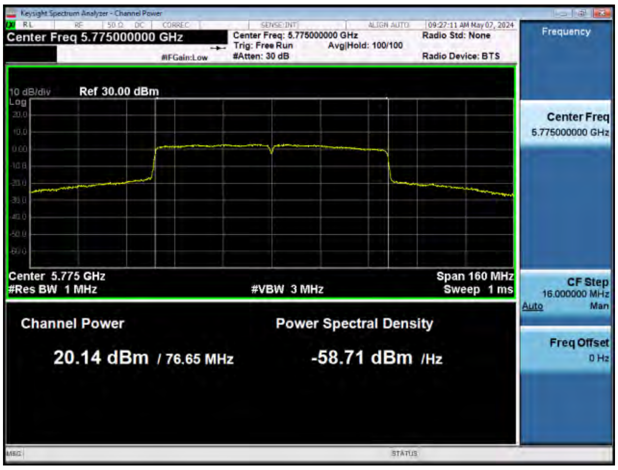
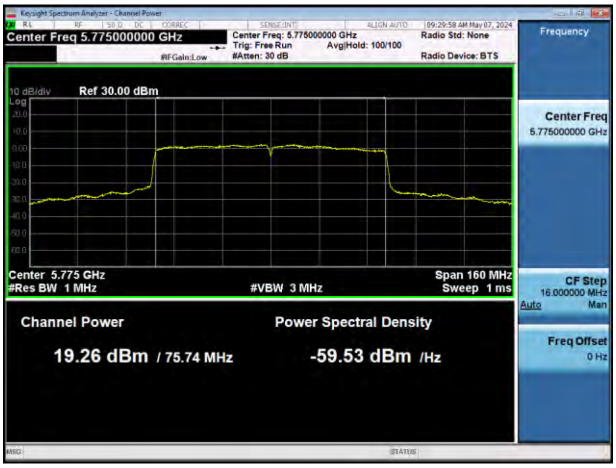
## ▣ TEST PLOTS

<table>
<tr><th colspan="2">Output Power</th></tr>
<tr><th>802.11ac VHT40 (CH 151 : 5755 MHz) : Chain 0</th><th>802.11ac VHT40 (CH 151 : 5755 MHz) : Chain 1</th></tr>
<tr><td>
</td>
<td>
</td></tr>
<tr><th>802.11ac VHT40 (CH 159 : 5795 MHz) : Chain 0</th><th>802.11ac VHT40 (CH 159 : 5795 MHz) : Chain 1</th></tr>
<tr><td>
</td>
<td>
</td></tr>
<tr><th>802.11ac VHT80 (CH 155 : 5775 MHz) : Chain 0</th><th>802.11ac VHT80 (CH 155 : 5775 MHz) : Chain 1</th></tr>
<tr><td>
</td>
<td>
</td></tr>
</table>

## 9.4 POWER SPECTRAL DENSITY

| U-NII 3 Band (20 MHz) | | | | Test Result | | | | Limit (dBm/500kHz) |
|---|---|---|---|---|---|---|---|---|
| Mode | Frequency (MHz) | Channel | Date Rate | Measured PSD (dBm/500kHz) | | Duty Factor (dB) | Total PSD (dBm/500kHz) | |
| | | | | Chain 0 | Chain 1 | | Chain 0 + 1 | |
| 802.11a | 5745 | 149 | 6 Mbps | 7.03 | 6.33 | - | 9.70 | 29.48 1) |
| | 5785 | 157 | 6 Mbps | 5.85 | 5.38 | - | 8.63 | 29.48 1) |
| | 5825 | 165 | 6 Mbps | 5.90 | 5.05 | - | 8.50 | 29.48 1) |
| 802.11ac VHT20 | 5745 | 149 | MCS0 | 7.02 | 6.26 | - | 9.67 | 29.48 1) |
| | 5785 | 157 | MCS0 | 5.41 | 5.13 | - | 8.29 | 29.48 1) |
| | 5825 | 165 | MCS0 | 5.56 | 5.01 | - | 8.30 | 29.48 1) |

| U-NII 3 Band (40 MHz) | | | | Test Result | | | | Limit (dBm/500kHz) |
|---|---|---|---|---|---|---|---|---|
| Mode | Frequency (MHz) | Channel | Date Rate | Measured PSD (dBm/500kHz) | | Duty Factor (dB) | Total PSD (dBm/500kHz) | |
| | | | | Chain 0 | Chain 1 | | Chain 0 + 1 | |
| 802.11ac VHT40 | 5755 | 151 | MCS0 | 3.43 | 2.91 | - | 6.19 | 29.48 1) |
| | 5795 | 159 | MCS0 | 3.08 | 2.24 | - | 5.69 | 29.48 1) |

| U-NII 3 Band (80 MHz) | | | | Test Result | | | | Limit (dBm/500kHz) |
|---|---|---|---|---|---|---|---|---|
| Mode | Frequency (MHz) | Channel | Date Rate | Measured PSD (dBm/500kHz) | | Duty Factor (dB) | Total PSD (dBm/500kHz) | |
| | | | | Chain 0 | Chain 1 | | Chain 0 + 1 | |
| 802.11ac VHT80 | 5775 | 155 | MCS0 | 0.00 | -0.47 | - | 2.78 | 29.48 1) |

**Note :**

1. Conducted PSD limit = 30 dBm/500kHz – (6.52 dBi – 6 dBi) = 29.48 dBm/500kHz
2. Duty factor is not applied since the duty cycle is 100 %.



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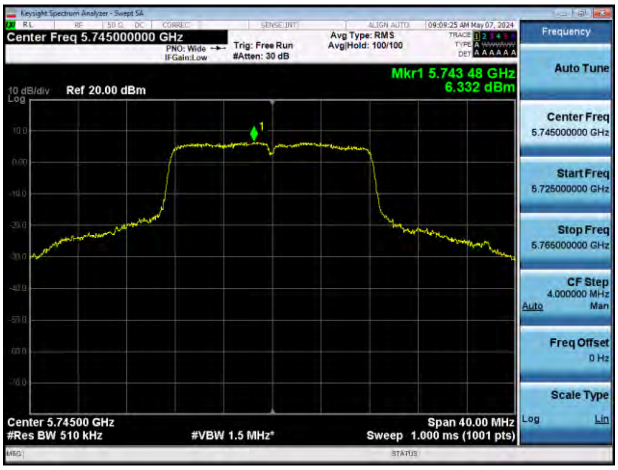
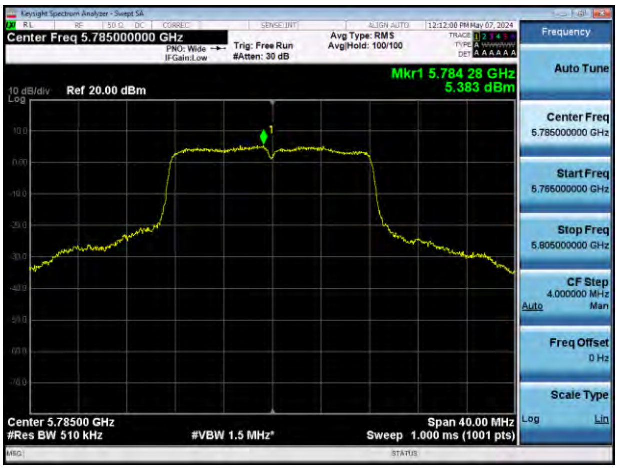
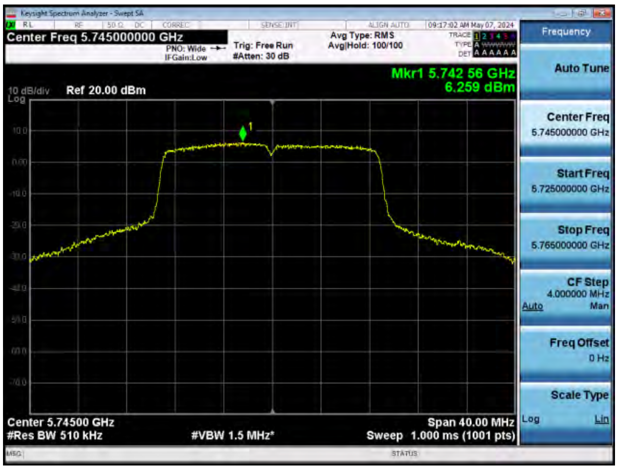
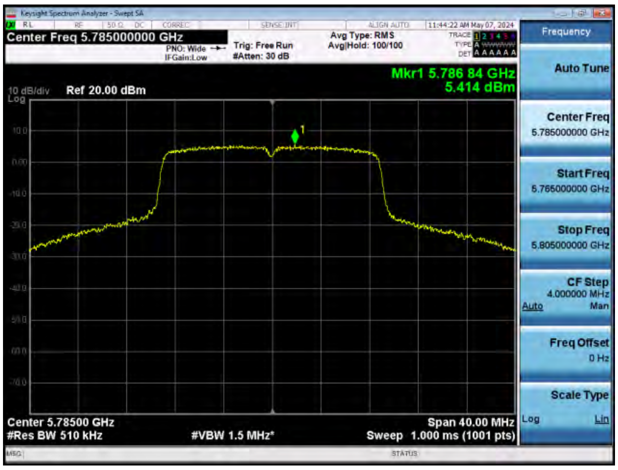
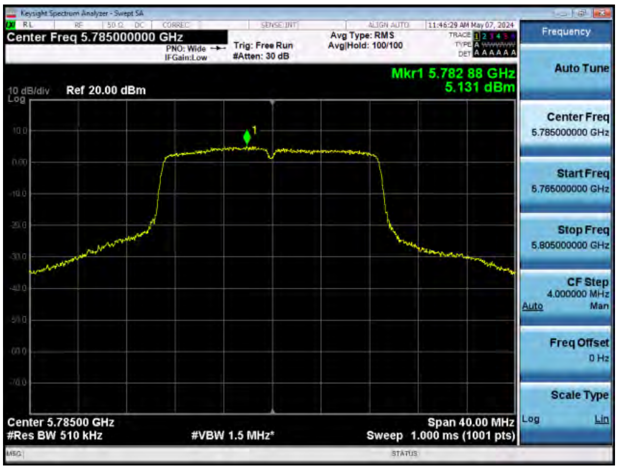
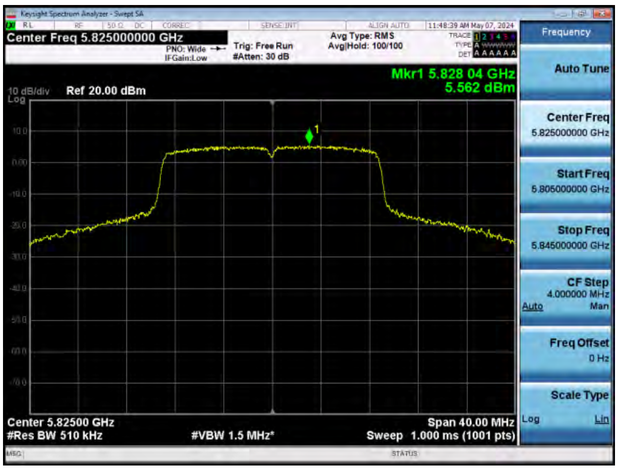
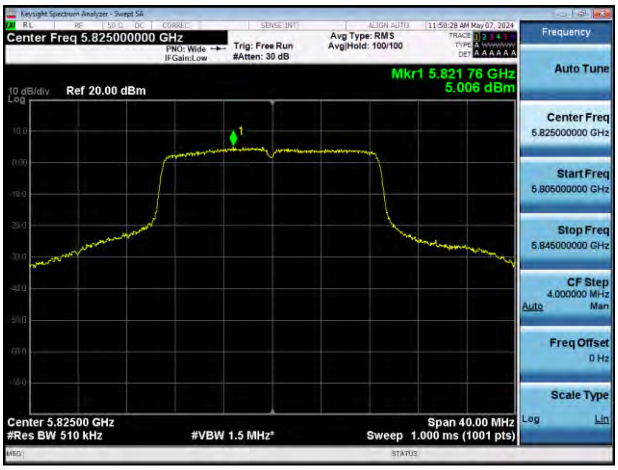
## ▣ TEST PLOTS

| Power Spectral Density | |
|---|---|
| 802.11a (CH 149 : 5745 MHz) : Chain 0 | 802.11a (CH 149 : 5745 MHz) : Chain 1 |
|  |  |
| 802.11a (CH 157 : 5785 MHz) : Chain 0 | 802.11a (CH 157 : 5785 MHz) : Chain 1 |
|  |  |
| 802.11a (CH 165 : 5825 MHz) : Chain 0 | 802.11a (CH 165 : 5825 MHz) : Chain 1 |
|  |  |

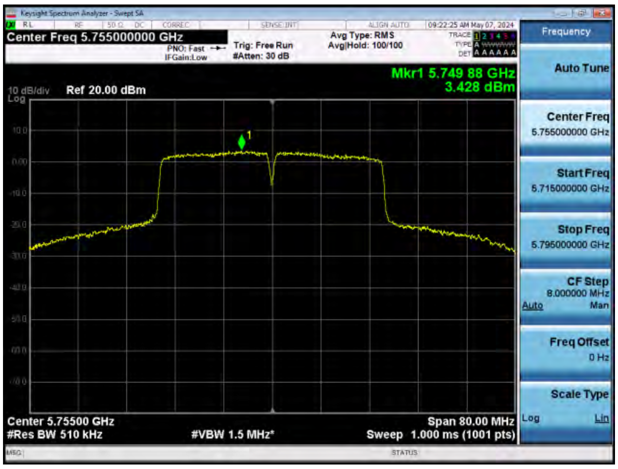
## ▣ TEST PLOTS

| Power Spectral Density | |
|---|---|
| **802.11ac VHT20 (CH 149 : 5745 MHz) : Chain 0** | **802.11ac VHT20 (CH 149 : 5745 MHz) : Chain 1** |
|   |   |
| **802.11ac VHT20 (CH 157 : 5785 MHz) : Chain 0** | **802.11ac VHT20 (CH 157 : 5785 MHz) : Chain 1** |
|   |   |
| **802.11ac VHT20 (CH 165 : 5825 MHz) : Chain 0** | **802.11ac VHT20 (CH 165 : 5825 MHz) : Chain 1** |
|   |   |

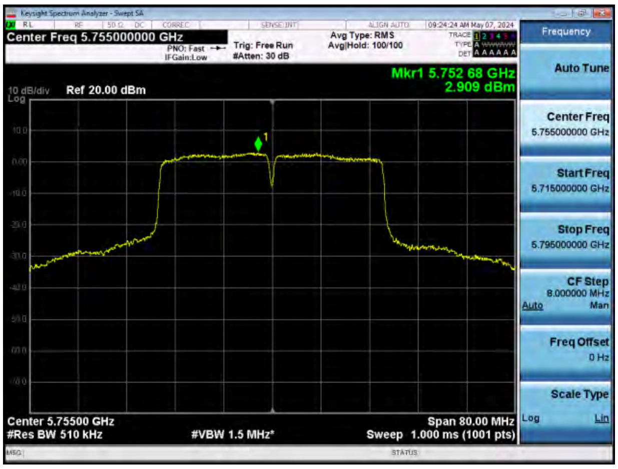
## ▣ TEST PLOTS

### Power Spectral Density

#### 802.11ac VHT40 (CH 151 : 5755 MHz) : Chain 0

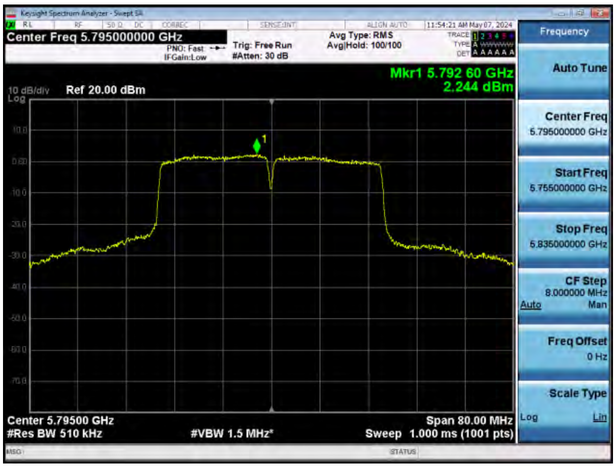



#### 802.11ac VHT40 (CH 151 : 5755 MHz) : Chain 1

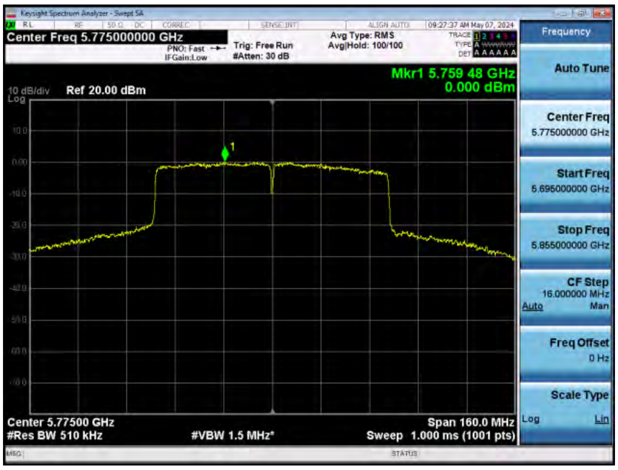



#### 802.11ac VHT40 (CH 159 : 5795 MHz) : Chain 0


#### 802.11ac VHT40 (CH 159 : 5795 MHz) : Chain 1




#### 802.11ac VHT80 (CH 155 : 5775 MHz) : Chain 0




#### 802.11ac VHT80 (CH 155 : 5775 MHz) : Chain 1

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## 9.5 FREQUENCY STABILITY

| | |
|---|---|
| Operating Band : | U-NII Band 3 |
| Operating Frequency : | 5,745,000,000 Hz (CH 149) |
| Reference Voltage : | 20 V d.c. |

| Voltage (%) | Power (V d.c.) | Temp (°C) | Frequency error (ppm) | | | |
|---|---|---|---|---|---|---|
| | | | 0 minutes | 2 minutes | 5 minutes | 10 minutes |
| 100% | 20.0 | +20 (Ref) | -7.71 | -7.78 | -7.76 | -7.72 |
| 100% | | -30 | -0.45 | -0.83 | -1.01 | -1.14 |
| 100% | | -20 | 1.09 | 1.07 | 1.05 | 1.03 |
| 100% | | -10 | 0.83 | 0.89 | 0.92 | 0.94 |
| 100% | | 0 | -1.19 | -1.03 | -0.93 | -0.87 |
| 100% | | +10 | -4.96 | -4.44 | -4.15 | -3.98 |
| 100% | | +30 | -9.09 | -10.36 | -10.79 | -11.14 |
| 100% | | +40 | -14.18 | -14.47 | -25.35 | -18.53 |
| 100% | | +50 | -17.06 | -17.43 | -17.52 | -17.58 |
| 115% | 23.0 | +20 | -7.71 | -7.72 | -7.72 | -7.73 |
| 85% | 17.0 | +20 | -7.73 | -7.73 | -7.74 | -7.75 |

**Note:**
According to the results of the frequency stability test above, the frequency deviation measured are very small. The channels at the band edge should remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore, the Radio frequency should remain in-band during operation over the temperature and voltage range as tested.



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## 9.6 RADIATED SPURIOUS EMISSIONS

**Frequency Range : Below 1 GHz**

| | |
|---|---|
| Test Mode | 802.11a : TX mode |
| Operating Frequency | 5745 MHz (CH 149) |

| Frequency (MHz) | Polarization | Reading (dBuV) | Corr. 1) (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Measurement Type |
|---|---|---|---|---|---|---|---|
| No major peaks found | | | | | | | |

| | |
|---|---|
| Test Mode | 802.11a : TX mode |
| Operating Frequency | 5785 MHz (CH 153) |

| Frequency (MHz) | Polarization | Reading (dBuV) | Corr. 1) (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Measurement Type |
|---|---|---|---|---|---|---|---|
| No major peaks found | | | | | | | |

| | |
|---|---|
| Test Mode | 802.11a : TX mode |
| Operating Frequency | 5825 MHz (CH 165) |

| Frequency (MHz) | Polarization | Reading (dBuV) | Corr. 1) (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Measurement Type |
|---|---|---|---|---|---|---|---|
| No major peaks found | | | | | | | |

**Note(s) :**

1. Correction Factor: Antenna Factor + Cable loss + Preamplifier Gain



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**Frequency Range : Above 1 GHz**

| | |
|---|---|
| Test Mode | 802.11a : TX mode |
| Operating Frequency | 5745 MHz (CH 149) |

| Frequency (MHz) | Polarization | Reading (dBuV) | Corr. 1) (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Measurement Type |
|---|---|---|---|---|---|---|---|
| No major peaks found | | | | | | | |

| | |
|---|---|
| Test Mode | 802.11a : TX mode |
| Operating Frequency | 5785 MHz (CH 153) |

| Frequency (MHz) | Polarization | Reading (dBuV) | Corr. 1) (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Measurement Type |
|---|---|---|---|---|---|---|---|
| No major peaks found | | | | | | | |

| | |
|---|---|
| Test Mode | 802.11a : TX mode |
| Operating Frequency | 5825 MHz (CH 165) |

| Frequency (MHz) | Polarization | Reading (dBuV) | Corr. 1) (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Measurement Type |
|---|---|---|---|---|---|---|---|
| No major peaks found | | | | | | | |

**Note(s) :**

1. Correction Factor: Antenna Factor + Cable loss + Preamplifier Gain
2. AV Level = Measured Power(dBm) + Correction Factor(dB) + Duty Cycle Factor(dB).



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**Frequency Range : Above 1 GHz**

Test Mode 802.11ac VHT20 : TX mode
Operating Frequency 5745 MHz (CH 149)

| Frequency (MHz) | Polarization | Reading (dBuV) | Corr. 1) (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Measurement Type |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No major peaks found | | | | | | | |

Test Mode 802.11ac VHT20 : TX mode
Operating Frequency 5785 MHz (CH 153)

| Frequency (MHz) | Polarization | Reading (dBuV) | Corr. 1) (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Measurement Type |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No major peaks found | | | | | | | |

Test Mode 802.11ac VHT20 : TX mode
Operating Frequency 5825 MHz (CH 165)

| Frequency (MHz) | Polarization | Reading (dBuV) | Corr. 1) (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Measurement Type |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No major peaks found | | | | | | | |

Test Mode 802.11ac VHT40 : TX mode
Operating Frequency 5755 MHz (CH 151)

| Frequency (MHz) | Polarization | Reading (dBuV) | Corr. 1) (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Measurement Type |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No major peaks found | | | | | | | |

Test Mode 802.11ac VHT40 : TX mode
Operating Frequency 5795 MHz (CH 159)

| Frequency (MHz) | Polarization | Reading (dBuV) | Corr. 1) (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Measurement Type |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No major peaks found | | | | | | | |

Test Mode 802.11ac VHT80 : TX mode
Operating Frequency 5775 MHz (CH 155)

| Frequency (MHz) | Polarization | Reading (dBuV) | Corr. 1) (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Measurement Type |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No major peaks found | | | | | | | |

**Note(s) :**
1. Correction Factor: Antenna Factor + Cable loss + Preamplifier Gain
2. AV Level = Measured Power(dBm) + Correction Factor(dB) + Duty Cycle Factor(dB).



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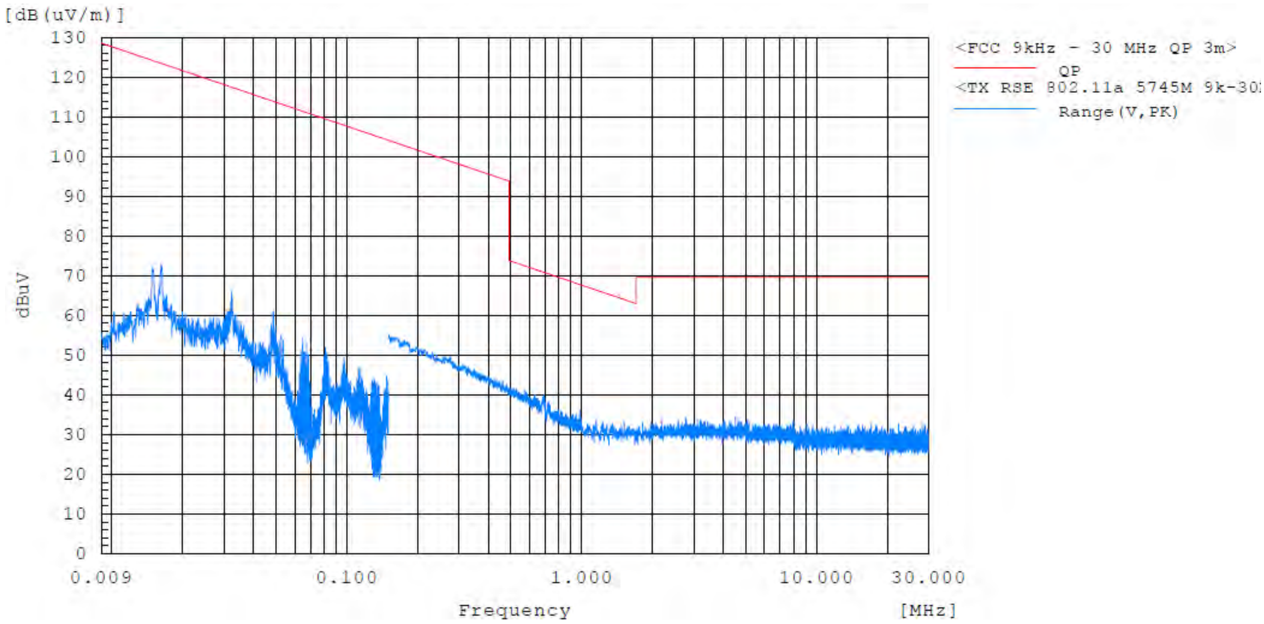
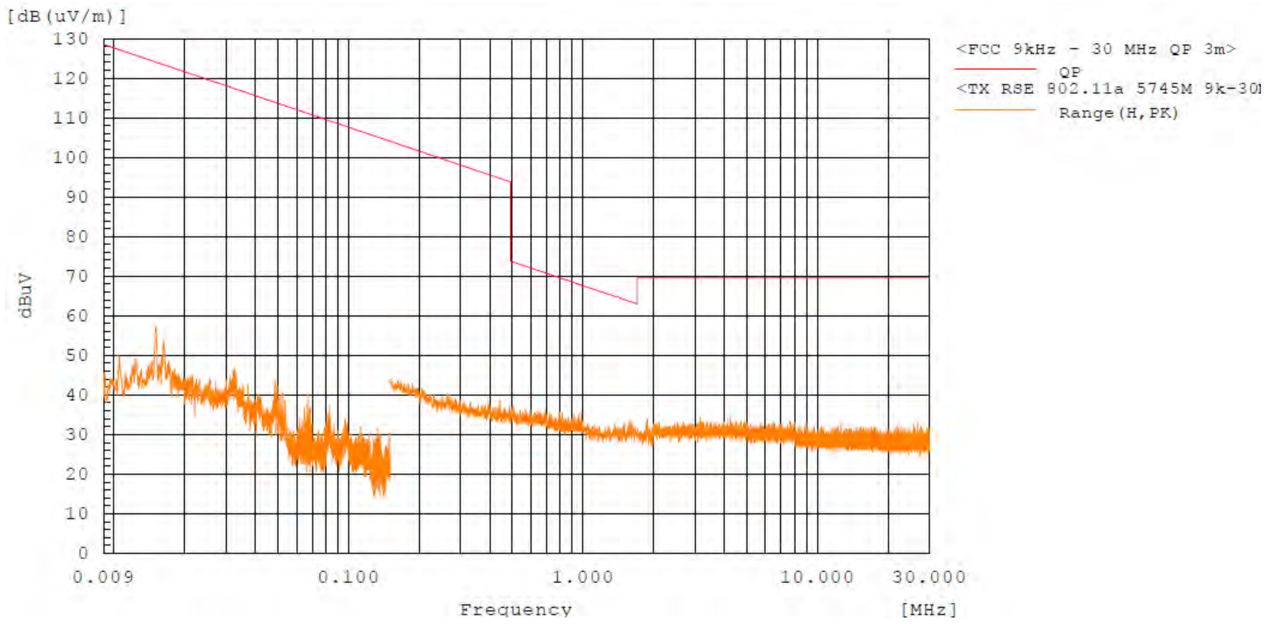
## ▣ TEST PLOTS

**Radiated Spurious Emission 9 kHz – 30 MHz (Antenna Position 90°) : 802.11a (CH 149)**




**Radiated Spurious Emission 9 kHz – 30 MHz (Antenna Position 180°) : 802.11a (CH 149)**

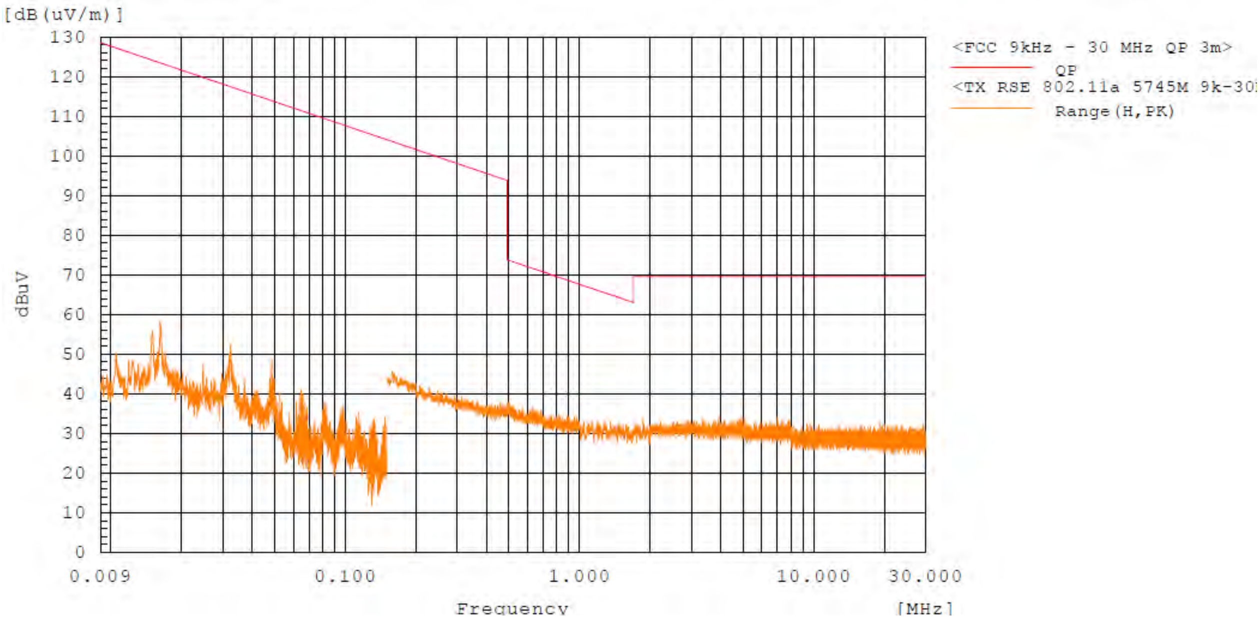



**Note:**

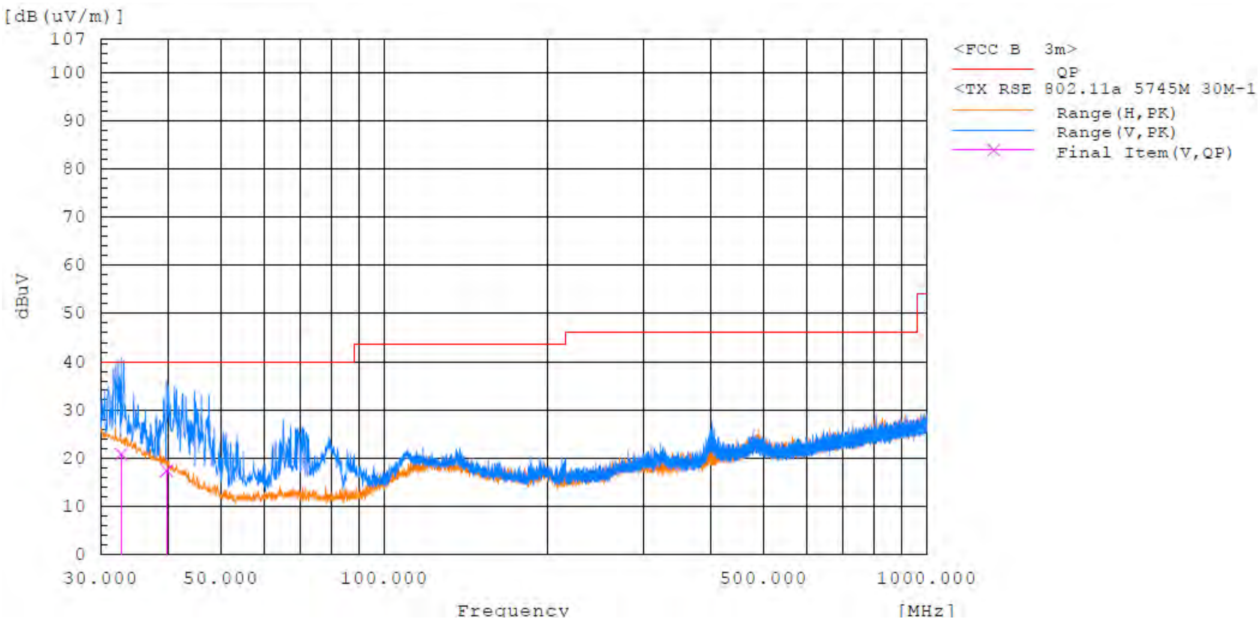
1. There were no major peaks and representative plots are included in this report
2. The plots include all used factor values for cables, antenna, preamplifier, etc.

■ TEST PLOTS (Continued)

**Radiated Spurious Emission 9 kHz – 30 MHz (Antenna Position Bent over) : 802.11a (CH 149)**




**Radiated Spurious Emission 30 MHz – 1 GHz : 802.11a (CH 149)**




**Note:**

1. There were no major peaks and representative plots are included in this report
2. The plots include all used factor values for cables, antenna, preamplifier, etc.



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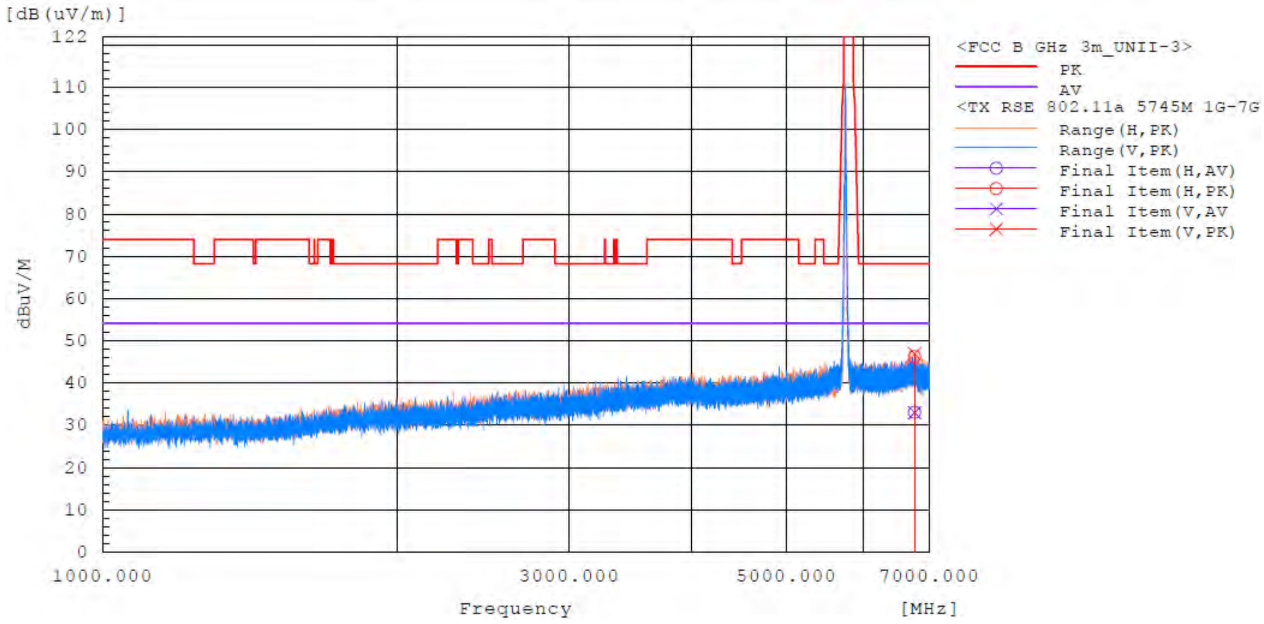
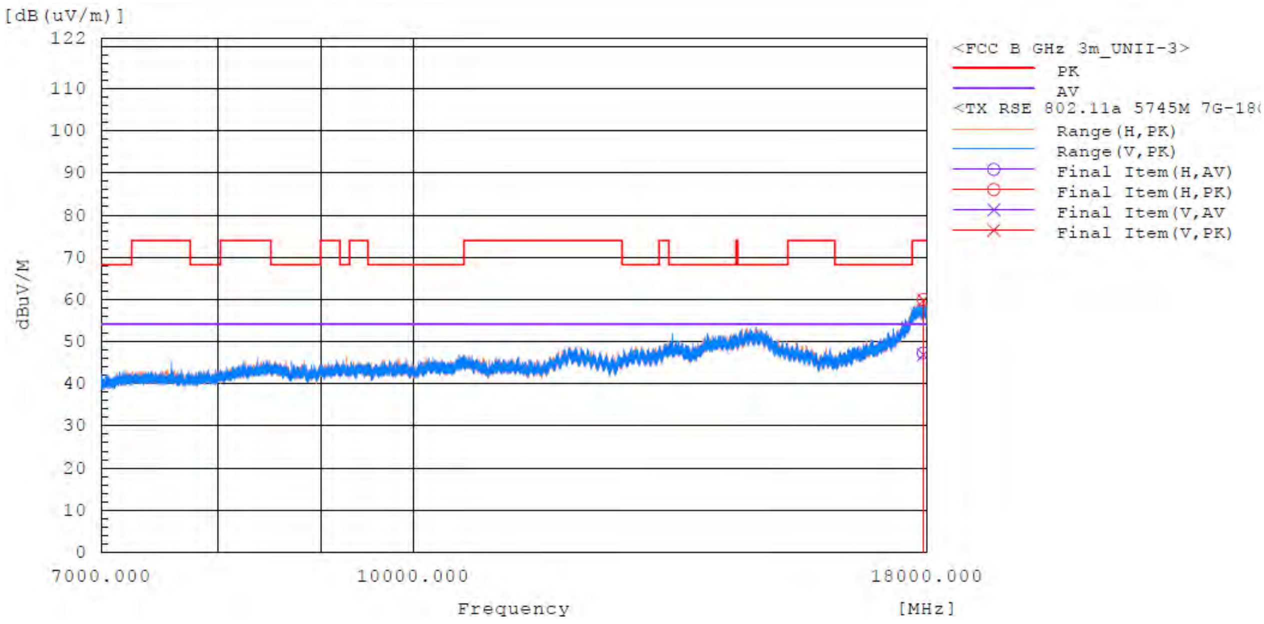
## ▣ TEST PLOTS (Continued)

**Radiated Spurious Emission 1 GHz - 7 GHz : 802.11a (CH 149)**




**Radiated Spurious Emission 7 GHz - 18 GHz : 802.11a (CH 149)**

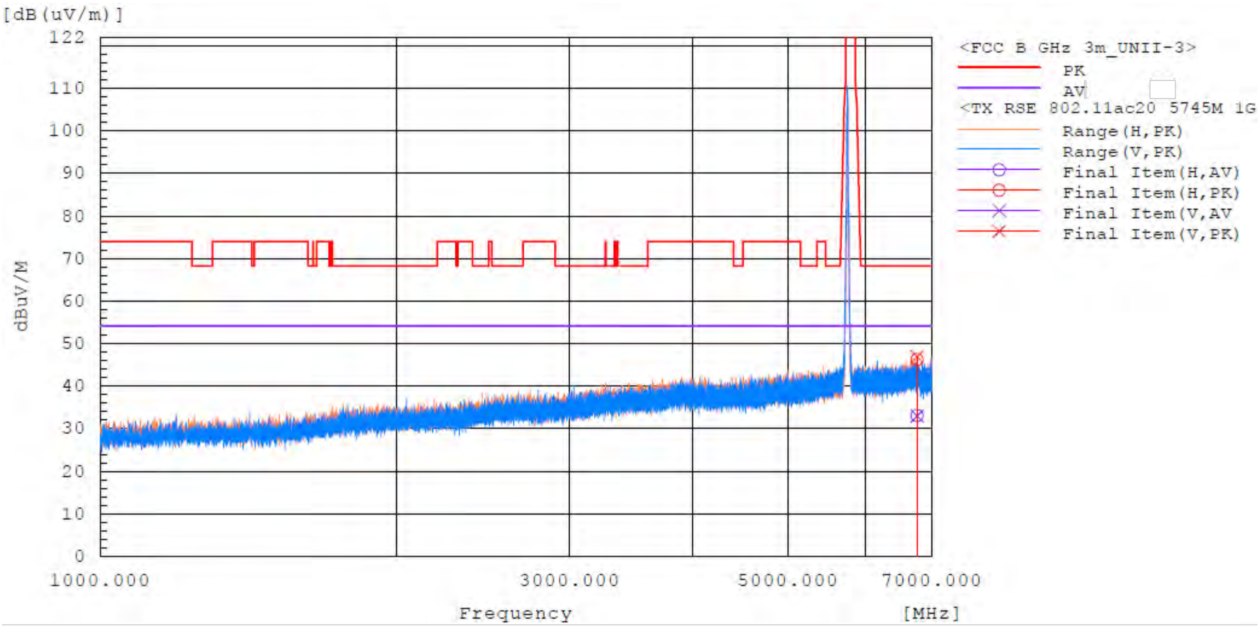



**Note:**

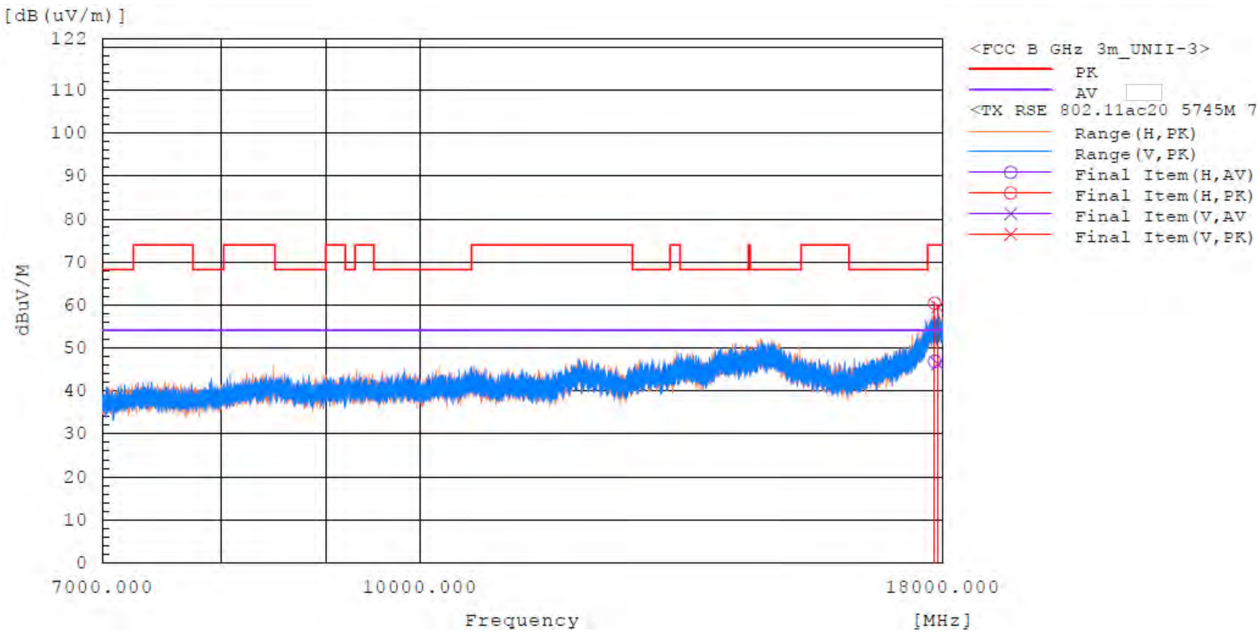
1. There were no major peaks and representative plots are included in this report
2. The plots include all used factor values for cables, antenna, preamplifier, etc.

▣ **TEST PLOTS (Continued)**

**Radiated Spurious Emission 1 GHz - 7 GHz : 802.11ac VHT20 (CH 149)**




**Radiated Spurious Emission 7 GHz - 18 GHz : 802.11ac VHT20 (CH 149)**




**Note:**

1. There were no major peaks and representative plots are included in this report
2. The plots include all used factor values for cables, antenna, preamplifier, etc.



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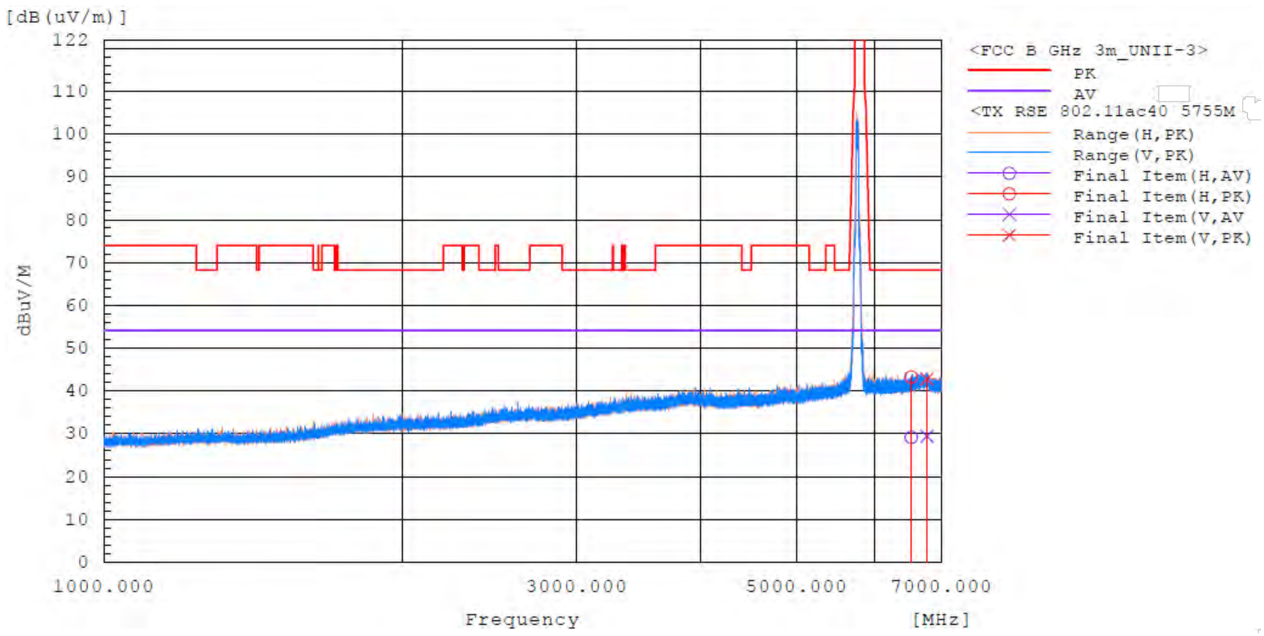
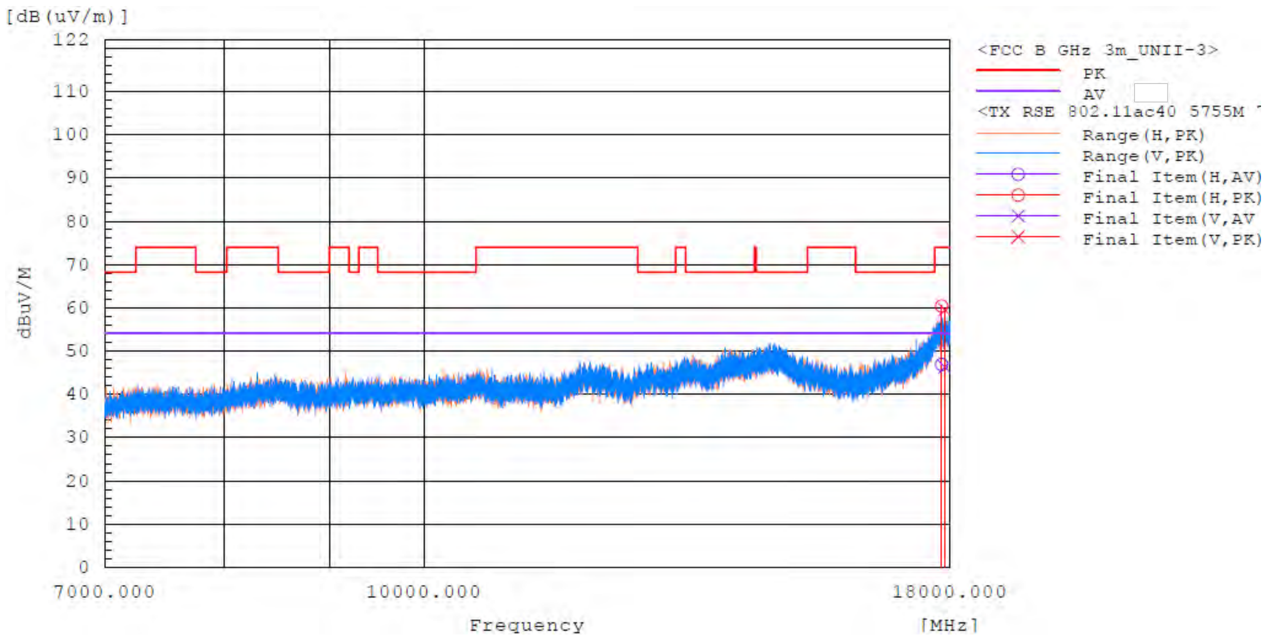
■ TEST PLOTS (Continued)

**Radiated Spurious Emission 1 GHz - 7 GHz : 802.11ac VHT40 (CH 151)**



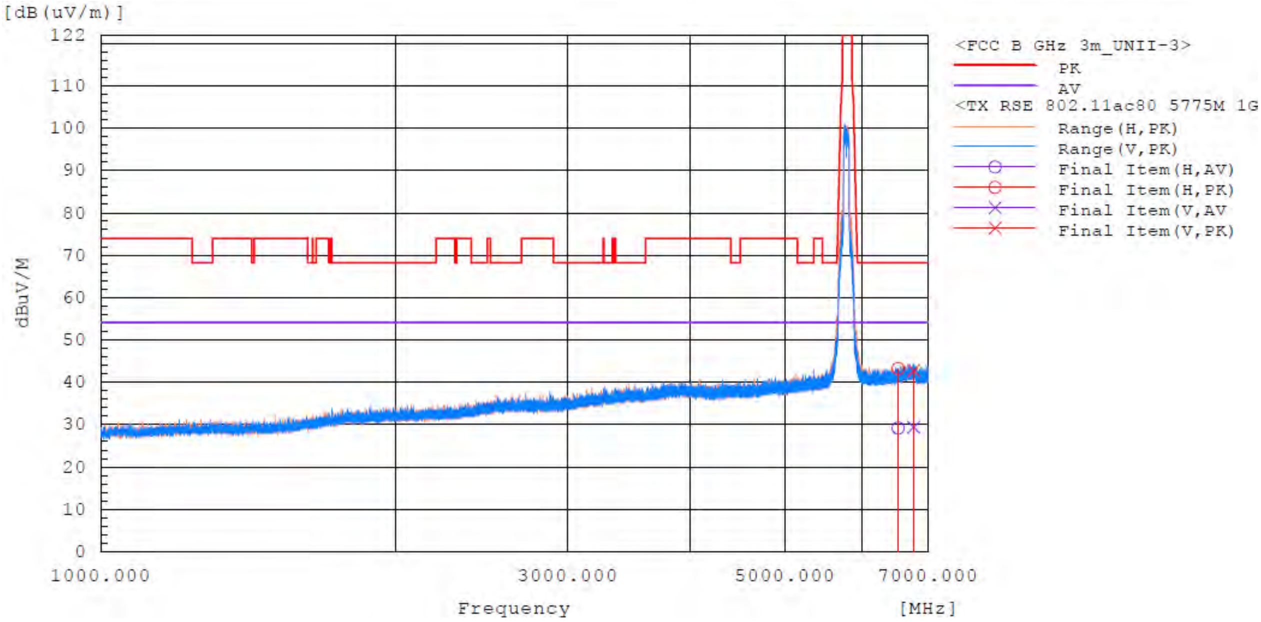
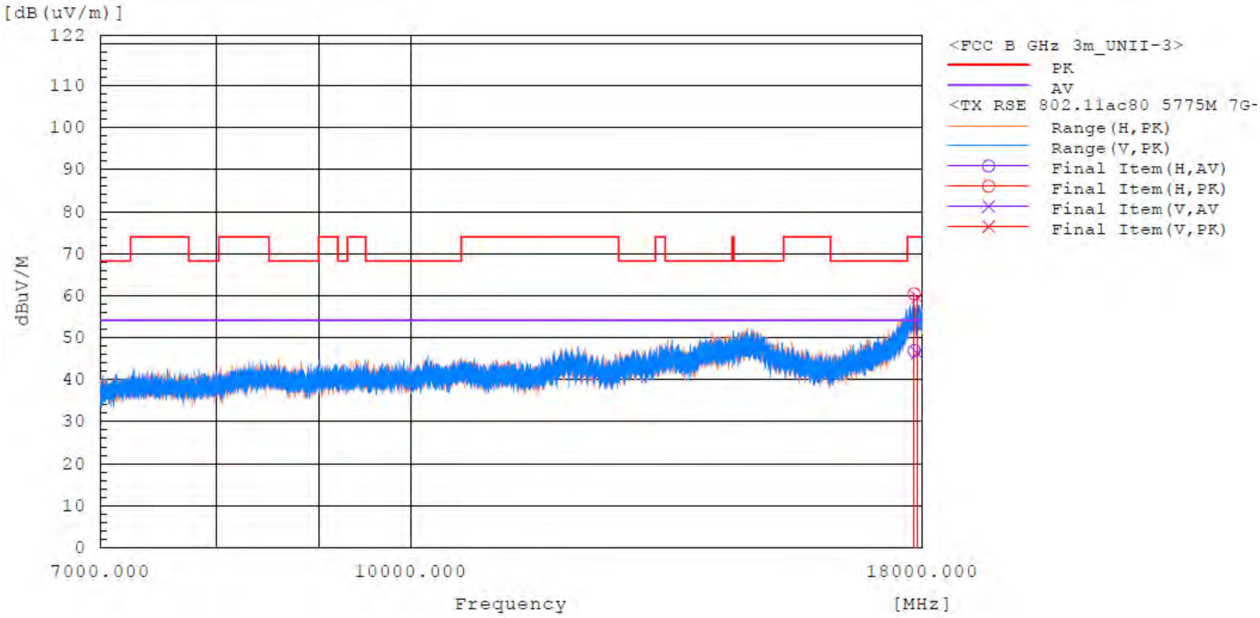

**Radiated Spurious Emission 7 GHz - 18 GHz : 802.11ac VHT40 (CH 151)**




**Note:**

1. There were no major peaks and representative plots are included in this report
2. The plots include all used factor values for cables, antenna, preamplifier, etc.

▣ **TEST PLOTS (Continued)**

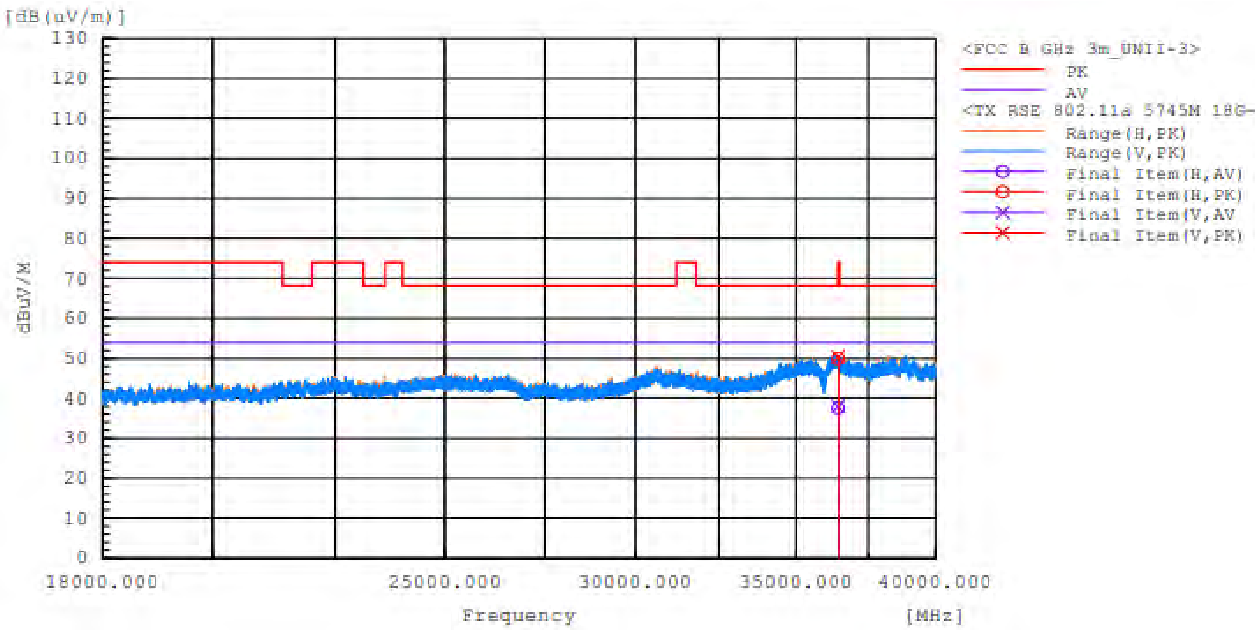
| Radiated Spurious Emission 1 GHz - 7 GHz : 802.11ac VHT80 (CH 155) |
| --- |
|  |
| **Radiated Spurious Emission 7 GHz - 18 GHz : 802.11ac VHT80 (CH 155)** |
|  |

**Note:**

1. There were no major peaks and representative plots are included in this report
2. The plots include all used factor values for cables, antenna, preamplifier, etc.

■ TEST PLOTS (Continued)

**Radiated Spurious Emission 18 GHz - 40 GHz : 802.11a (CH 149)**




**Note:**
1. There were no major peaks and representative plots are included in this report
2. The plots include all used factor values for cables, antenna, preamplifier, etc.

### 9.7 RADIATED RESTRICTED BAND EDGES

Test Mode: 802.11a : TX mode
Operating Frequency: 5745 MHz (CH 149)

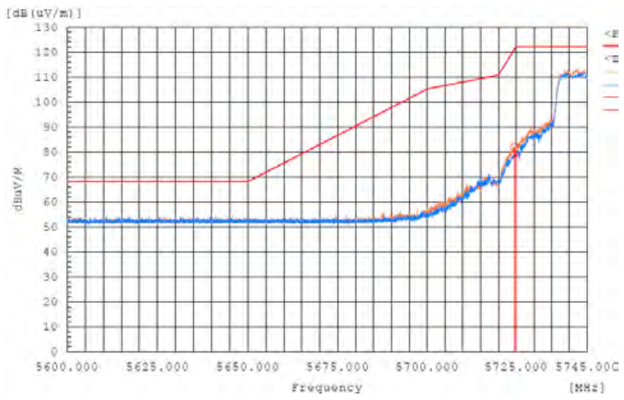
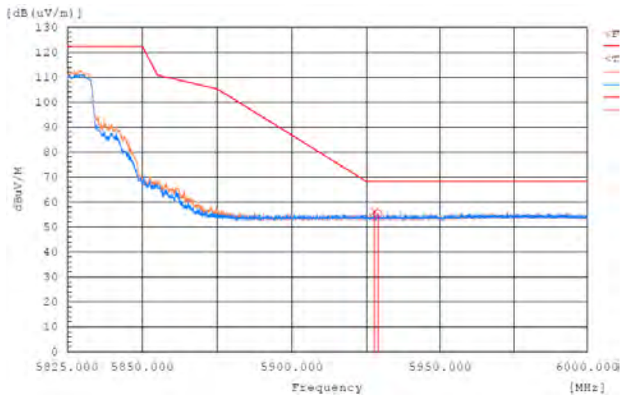
| Frequency (MHz) | Polarization | Reading (dBuV) | Factor (dB) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| | | PK | Corr.[1] | PK | PK | PK |
| 5724.527 | H | 72.5 | 9.3 | 81.8 | 121.1 | 39.3 |
| 5724.998 | V | 69.7 | 9.3 | 79.0 | 122.2 | 43.2 |

Test Mode: 802.11a : TX mode
Operating Frequency: 5825 MHz (CH 165)

| Frequency (MHz) | Polarization | Reading (dBuV) | Factor (dB) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| | | PK | Corr.[1] | PK | PK | PK |
| 5927.663 | V | 46.2 | 10.0 | 56.2 | 68.2 | 12.0 |
| 5928.904 | H | 45.3 | 10.0 | 55.3 | 68.2 | 12.9 |

**Notes:**
1. Correction Factor: Antenna Factor + Cable loss

### ▣ TEST PLOTS

| Radiated Band Edges 802.11a (CH 149) - Low | Radiated Band Edges 802.11a (CH 165) - High |
|---|---|
|   |   |



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Test Mode 802.11ac VHT20 : TX mode

Operating Frequency 5745 MHz (CH 149)

| Frequency (MHz) | Polarization | Reading (dBuV) | Factor (dB) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| | | PK | Corr.[1)] | PK | PK | PK |
| 5724.077 | V | 69.3 | 9.3 | 78.6 | 120.1 | 41.5 |
| 5724.540 | H | 72.7 | 9.3 | 82.0 | 121.2 | 39.2 |

Test Mode 802.11ac VHT20 : TX mode

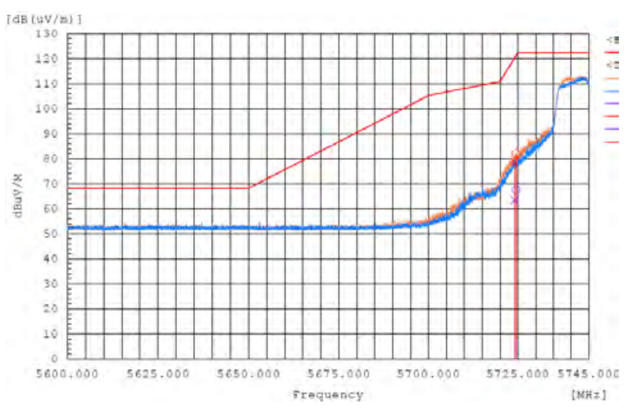
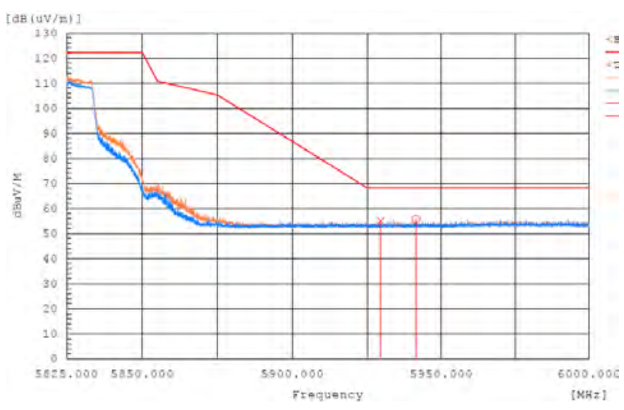
Operating Frequency 5825 MHz (CH 165)

| Frequency (MHz) | Polarization | Reading (dBuV) | Factor (dB) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| | | PK | Corr.[1)] | PK | PK | PK |
| 5929.541 | V | 45.0 | 10.0 | 55.0 | 68.2 | 13.2 |
| 5941.517 | H | 45.6 | 10.1 | 55.7 | 68.2 | 12.5 |

**Notes:**

1. Correction Factor: Antenna Factor + Cable loss

**▣ TEST PLOTS**

| Radiated Band Edges 802.11ac VHT20 (CH 149) - Low | Radiated Band Edges 802.11ac VHT20 (CH 165) - High |
|---|---|
|  |  |



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| Test Mode | 802.11ac VHT40 : TX mode |
|---|---|
| Operating Frequency | 5755 MHz (CH 151) |

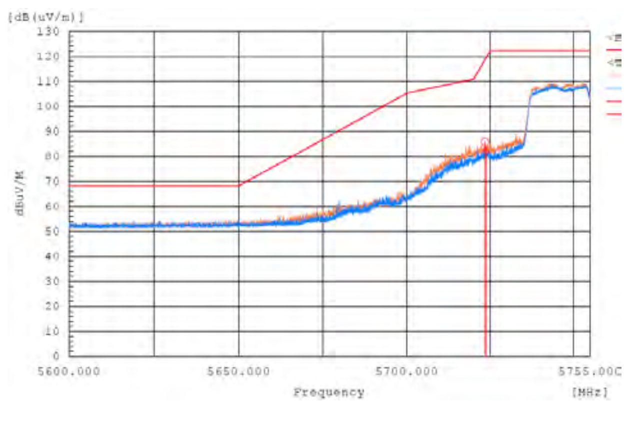
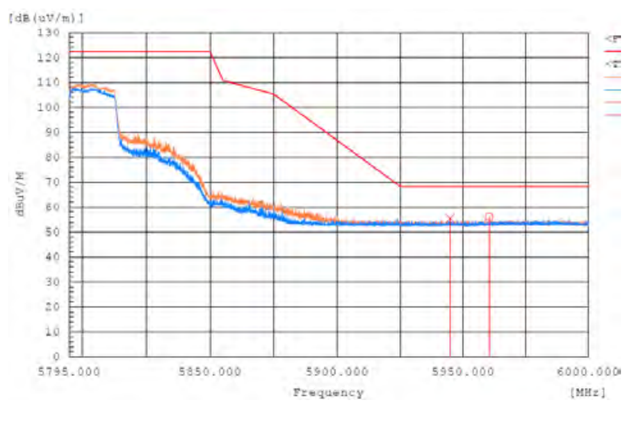
| Frequency (MHz) | Polarization | Reading (dBuV) | Factor (dB) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| | | PK | Corr.[1] | PK | PK | PK |
| 5723.718 | V | 73.8 | 9.3 | 83.1 | 119.3 | 36.2 |
| 5723.376 | H | 76.5 | 9.3 | 85.8 | 118.5 | 32.7 |

| Test Mode | 802.11ac VHT40 : TX mode |
|---|---|
| Operating Frequency | 5795 MHz (CH 159) |

| Frequency (MHz) | Polarization | Reading (dBuV) | Factor (dB) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| | | PK | Corr.[1] | PK | PK | PK |
| 5944.794 | V | 45.5 | 10.1 | 55.6 | 68.2 | 12.6 |
| 5960.378 | H | 46.0 | 10.1 | 56.1 | 68.2 | 12.1 |

**Notes:**
1. Correction Factor: Antenna Factor + Cable loss

### ▣ TEST PLOTS

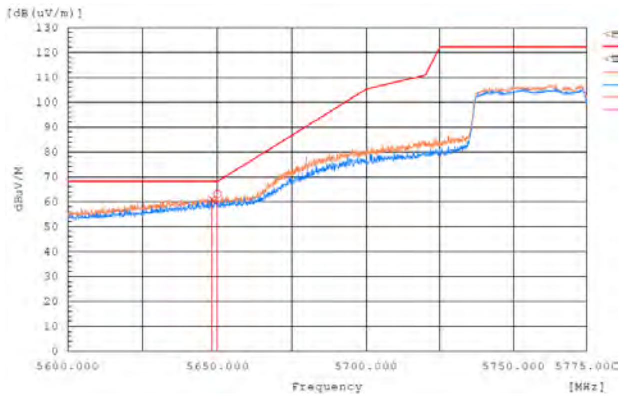
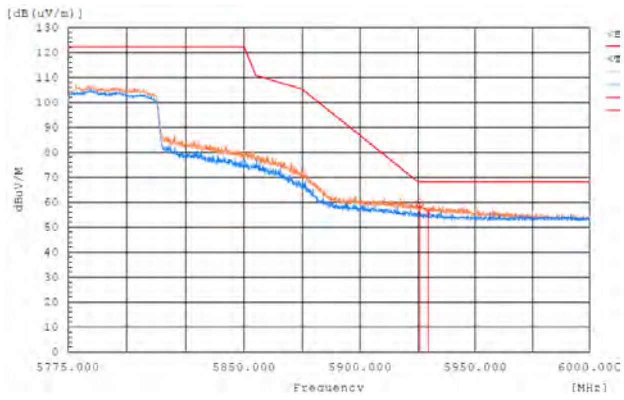
| Radiated Band Edges 802.11ac VHT40 (CH 151) - Low | Radiated Band Edges 802.11ac VHT40 (CH 159) - High |
|---|---|
|  |  |

| | |
|---|---|
| Test Mode | 802.11ac VHT80 : TX mode |
| Operating Frequency | 5775 MHz (CH 155) |

| Frequency (MHz) | Polarization | Reading (dBuV) | Factor (dB) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| | | PK | Corr.[1] | PK | PK | PK |
| 5648.101 | V | 51.7 | 9.2 | 60.9 | 68.2 | 7.3 |
| 5650.000 | H | 53.8 | 9.2 | 63.0 | 68.2 | 5.2 |
| 5925.704 | H | 49.6 | 10.0 | 59.6 | 68.2 | 8.6 |
| 5929.351 | V | 46.2 | 10.0 | 56.2 | 68.2 | 12.0 |

**Notes:**
1. Correction Factor: Antenna Factor + Cable loss

## ▣ TEST PLOTS

| Radiated Band Edges 802.11ac VHT80 (CH 155) – Low | Radiated Band Edges 802.11ac VHT80 (CH 155) – High |
|---|---|
|  |  |



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## 9.8 RECEIVER SPURIOUS EMISSIONS

**Frequency Range : Below 1 GHz**

| | |
|---|---|
| Test Mode | 802.11a : TX mode |
| Operating Frequency | 5745 MHz (CH 149) |

| Frequency (MHz) | Polarization | Reading (dBuV) | Corr. 1) (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Measurement Type |
|---|---|---|---|---|---|---|---|
| No major peaks found | | | | | | | |

**Frequency Range : Above 1 GHz**

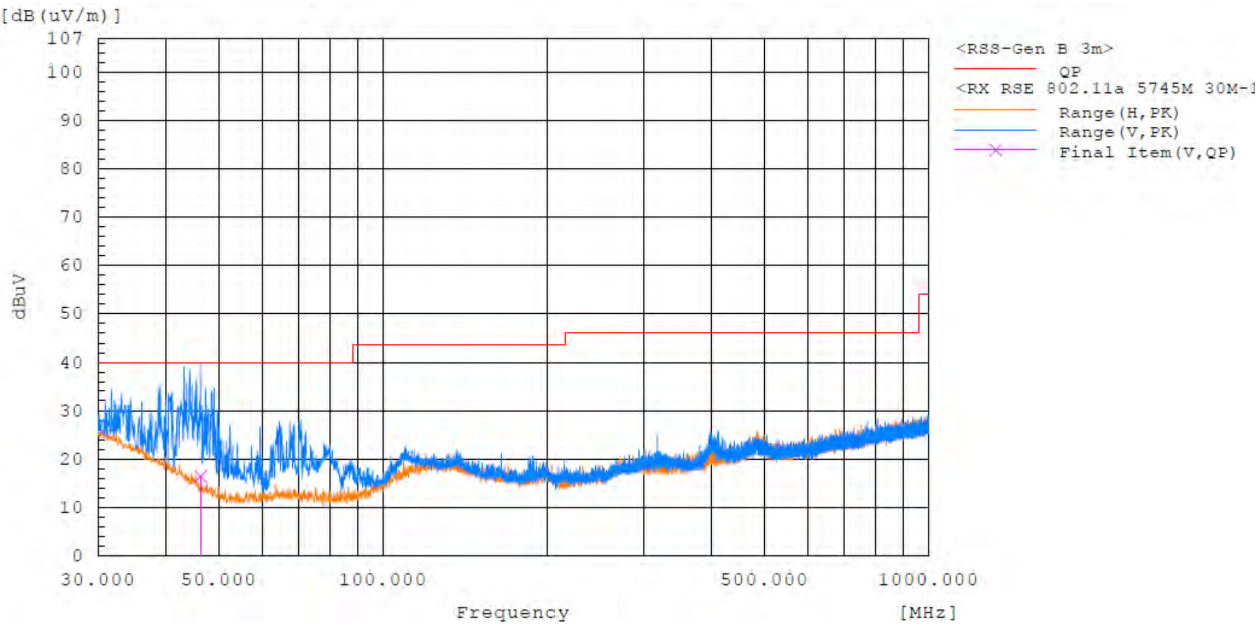
| | |
|---|---|
| Test Mode | 802.11a : TX mode |
| Operating Frequency | 5745 MHz (CH 149) |

| Frequency (MHz) | Polarization | Reading (dBuV) | Corr. 1) (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Measurement Type |
|---|---|---|---|---|---|---|---|
| No major peaks found | | | | | | | |

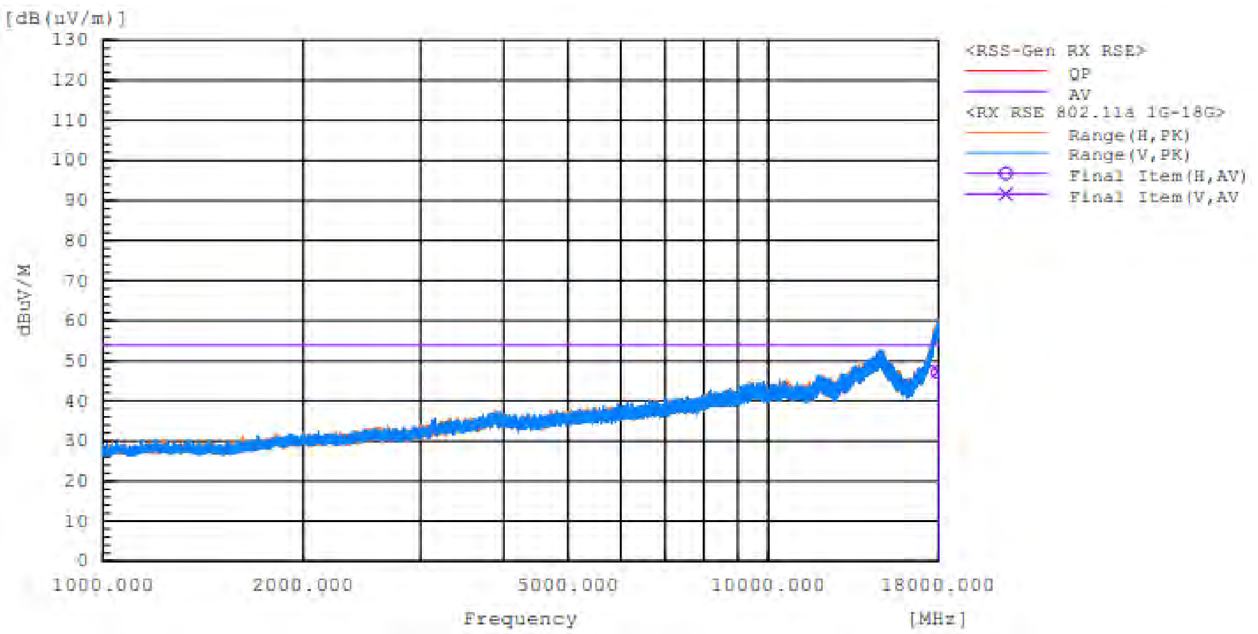
**Note:**
1. Correction Factor: Antenna Factor + Cable loss + Preamplifier

▣ **TEST PLOTS**

| Radiated Receiver Spurious Emission 30 MHz - 1 GHz : 802.11a (CH 149) |
|---|



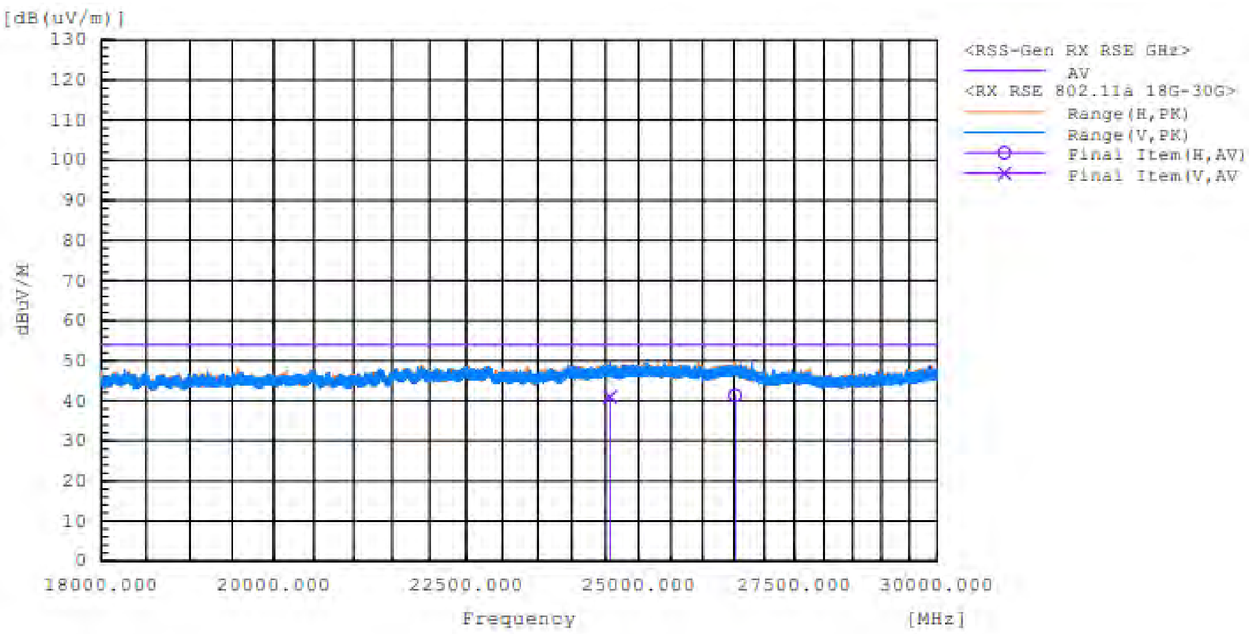

| Radiated Receiver Spurious Emission 1 GHz - 18 GHz : 802.11a (CH 149) |
|---|




**Note:**

1. There were no major peaks and representative plots are included in this report
2. The plots include all used factor values for cables, antenna, preamplifier, etc.

■ TEST PLOTS

| Radiated Receiver Spurious Emission 18 GHz - 30 GHz : 802.11a (CH 149) |
| --- |
|  |



**Note:**
1. There were no major peaks and representative plots are included in this report
2. The plots include all used factor values for cables, antenna, preamplifier, etc.

### 9.9 POWERLINE CONDUCTED EMISSIONS

| Frequency (MHz) | Line | Reading (dBμV) | | Corr. 1) (dB) | Level (dBμV) | | Limit (dBμV) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | QP | CAV | | QP | CAV | QP | CAV | QP | CAV |
| 0.150 | L1 | 33.3 | 19.5 | 10.8 | 44.1 | 30.3 | 66 | 56 | 21.9 | 25.7 |
| 0.463 | L1 | 24.6 | 20.8 | 9.9 | 34.5 | 30.7 | 56.6 | 46.6 | 22.1 | 15.9 |
| 10.885 | L1 | 21.6 | 16.0 | 10.0 | 31.6 | 26.0 | 60 | 50 | 28.4 | 24.0 |

| Frequency (MHz) | Line | Reading (dBμV) | | Corr. 1) (dB) | Level (dBμV) | | Limit (dBμV) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | QP | CAV | | QP | CAV | QP | CAV | QP | CAV |
| 0.155 | N | 34.2 | 20.0 | 10.4 | 44.6 | 30.4 | 65.7 | 55.7 | 21.1 | 25.3 |
| 0.466 | N | 24.3 | 19.8 | 9.9 | 34.2 | 29.7 | 56.6 | 46.6 | 22.4 | 16.9 |
| 10.919 | N | 21.5 | 16.0 | 10.0 | 31.5 | 26.0 | 60 | 50 | 28.5 | 24.0 |

**Note(s)** :
1. Quasi-peak(Final Result) = Reading Value + Correction Factor



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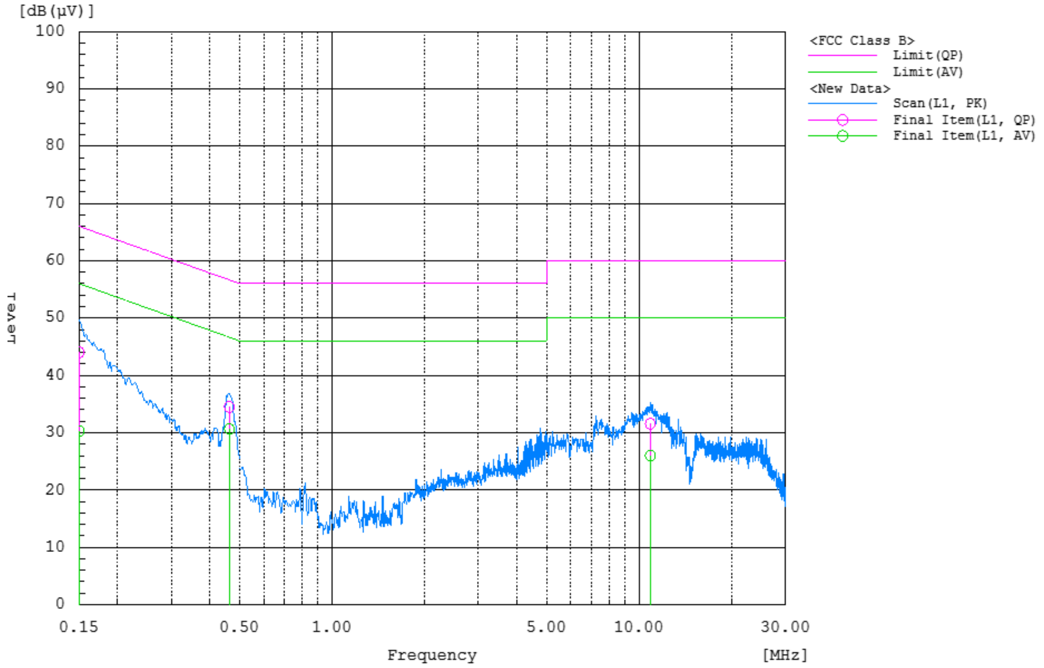
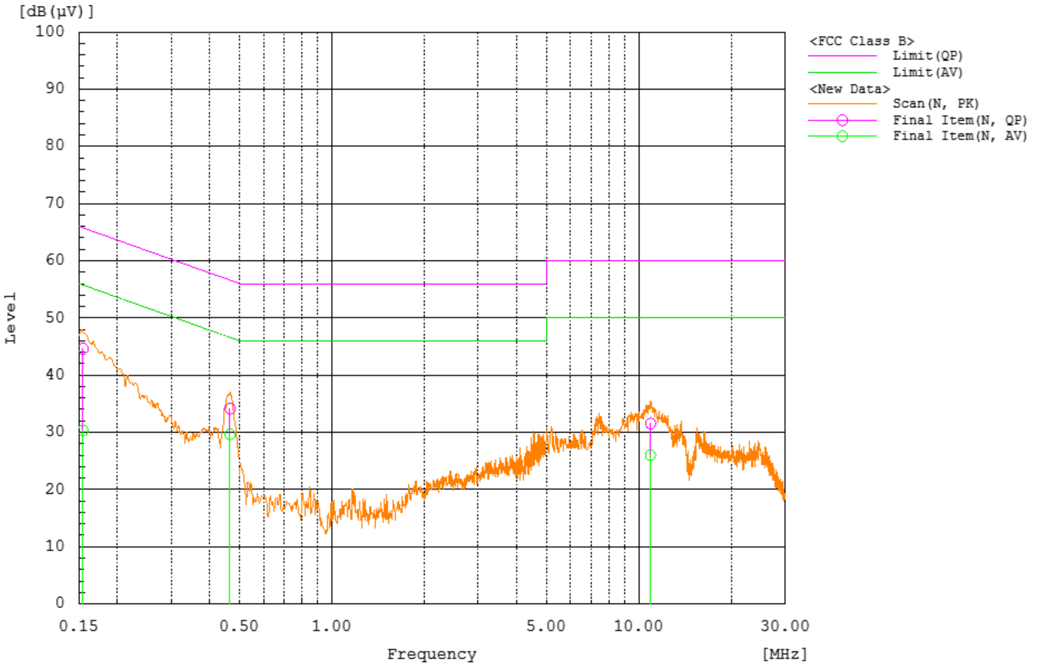
▣ TEST PLOTS

| AC Line Conducted Emission (L1) |
| --- |




| AC Line Conducted Emission (N) |
| --- |



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## 10. LIST OF TEST EQUIPMENT

| No. | Instrument | Model No. | Calibration Due (mm/dd/yy) | Manufacture | Serial No. |
|---|---|---|---|---|---|
| ☒ | Signal Analyzer (20 Hz ~ 40.0 GHz) | ESU40 | 12/01/2024 | Rohde & Schwarz | 100529 |
| ☒ | Signal Analyzer (1 Hz ~ 40.0 GHz) | ESW44 | 10/24/2024 | Rohde & Schwarz | 102015 |
| ☒ | Signal Analyzer (3 Hz ~ 50 GHz) | N9030A | 06/30/2024 | Keysight | MY53311083 |
| ☐ | Attenuator (20 dB, DC ~ 26.5 GHz) | 8493C 20 dB | 02/16/2025 | KEYSIGHT | 89401 |
| ☒ | Attenuator (10 dB, DC ~ 26.5 GHz) | 8493C 10 dB | 09/05/2024 | KEYSIGHT | 89576 |
| ☒ | Loop Antenna (0.009 ~ 30 MHz) | HLA 6121 | 09/12/2025 | TESEQ | 43964 |
| ☒ | BI-LOG Antenna (30 MHz ~ 6 GHz) | JB6 | 03/06/2025 | Sunol | A060916 |
| ☒ | LNA (30 MHz ~ 1GHz) | PAM-103 | 05/03/2025 | Com-Power | 18020254 |
| ☒ | Horn Antenna (1 GHz ~ 18 GHz) | DRH-118 | 01/03/2025 | Sunol | A061616 |
| ☒ | LNA (1 GHz ~ 18 GHz) | PAM-118A | 03/13/2025 | Com-Power | 18040074 |
| ☒ | Horn Antenna (18 GHz ~ 40 GHz) | DRH-1840 | 01/20/2025 | Sunol | 17121 |
| ☒ | LNA (18 GHz ~ 40 GHz) | CBL18405045-01 | 01/05/2025 | CERNEX, Inc. | 27973 |
| ☒ | High Pass Filter | WHKX8-6090-7000-18000-40SS | 11/20/2024 | Wainwright | 23 |
| ☒ | EMI Test Receiver | ESR3 | 12/14/2024 | Rohde & Schwarz | 102363 |
| ☒ | LISN | ENV216 | 10/23/2024 | Rohde & Schwarz | 101550 |
| ☒ | Temperature & Humidity Chamber | SH-641 | 08/01/2024 | ESPEC | 92002929 |
| ☒ | DC Power Supply | E3632A | 06/12/2024 | Agilent | MY40028636 |

**Note(s) :**
1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.



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# APPENDIX A. TEST SETUP PHOTOS

*The setup photos are provided as a separate document.*



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# APPENDIX B. PHOTOGRAPHS OF EUT

## B.1. EXTERNAL PHOTOS

*The external photos are provided as a separate document.*

## B.2. INTERNAL PHOTOS

*The internal photos are provided as a separate document.*



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*END OF TEST REPORT*



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