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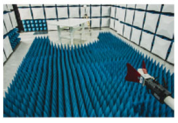

# MEASUREMENT REPORT
## FCC PART 15.407 UNII 802.11a/n/ac

**Applicant Name:**
Sirius XM Radio Inc.
1500 Eckington Place, NE
Washington, DC 20002
United States
Attn: Beejay Jolayemi

**Date of Testing:**
11/04 - 11/21/2019
**Test Site/Location:**
PCTEST Lab. Columbia, MD, USA
**Test Report Serial No.:**
1M1911040180-02.RS2

| | |
|---|---|
| **FCC ID:** | **RS2LBEE5HY1MW** |
| **APPLICANT:** | **Sirius XM Radio Inc.** |

| | |
|---|---|
| **Application Type:** | Class II Permissive Change |
| **Model:** | LBEE5HY1MW |
| **EUT Type:** | BT/WiFi Module |
| **Frequency Range:** | 5180 – 5825MHz |
| **FCC Classification:** | Unlicensed National Information Infrastructure (UNII) |
| **FCC Rule Part(s):** | Part 15 Subpart E (15.407) |
| **Test Procedure(s):** | ANSI C63.10-2013, KDB 789033 D02 v02r01 |
| **Class II Permissive Change:** | Please see FCC change document |
| **Original Grant Date:** | 12/23/2019 |

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013 and KDB 789033 D02 v02r01. Test results reported herein relate only to the item(s) tested.

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.

Randy Ortanez
President

ACCREDITED
TESTING CERT#2041.01



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# TABLE OF CONTENTS


1.0 INTRODUCTION ..... 3
- 1.1 Scope ..... 3
- 1.2 PCTEST Test Location ..... 3
- 1.3 Test Facility / Accreditations ..... 3

2.0 PRODUCT INFORMATION ..... 4
- 2.1 Equipment Description ..... 4
- 2.2 Device Capabilities ..... 4
- 2.3 Test Configuration ..... 4
- 2.4 EMI Suppression Device(s)/Modifications ..... 4

3.0 DESCRIPTION OF TESTS ..... 5
- 3.1 Evaluation Procedure ..... 5
- 3.2 AC Line Conducted Emissions ..... 5
- 3.3 Radiated Emissions ..... 6
- 3.4 Environmental Conditions ..... 6

4.0 ANTENNA REQUIREMENTS ..... 7

5.0 MEASUREMENT UNCERTAINTY ..... 8

6.0 TEST EQUIPMENT CALIBRATION DATA ..... 9

7.0 TEST RESULTS ..... 10
- 7.1 Summary ..... 10
- 7.2 UNII Output Power Measurement – 802.11a/n/ac ..... 11
- 7.3 Radiated Spurious Emission Measurements – Above 1GHz ..... 14
- 7.4 Radiated Spurious Emissions Measurements – Below 1GHz ..... 27
- 7.5 Line-Conducted Test Data ..... 31

8.0 CONCLUSION ..... 37





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# 1.0 INTRODUCTION

## 1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

## 1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

## 1.3 Test Facility / Accreditations

**Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.**

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.

- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).

- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.




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# 2.0 PRODUCT INFORMATION

## 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Sirius XM BT/WiFi Module FCC ID: RS2LBEE5HY1MW**. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter.

The EUT is integrated into a host device certified under FCC ID: RS2SXWB1.

**Test Device Serial No.:** 89337

## 2.2 Device Capabilities

This device contains the following capabilities:

2.4GHz WiFi, 5GHz UNII, Bluetooth, Bluetooth LE

| Band 1 | | Band 2A | | Band 2C | | Band 3 | |
|---|---|---|---|---|---|---|---|
| **Ch.** | **Frequency (MHz)** | **Ch.** | **Frequency (MHz)** | **Ch.** | **Frequency (MHz)** | **Ch.** | **Frequency (MHz)** |
| 36 | 5180 | 52 | 5260 | 100 | 5500 | 149 | 5745 |
| : | : | : | : | : | : | : | : |
| 42 | 5210 | 56 | 5280 | 116 | | 157 | 5785 |
| : | : | : | : | : | : | : | : |
| 48 | 5240 | 64 | 5320 | 140 | 5700 | 165 | 5825 |

**Table 2-1. 802.11a (20MHz) Frequency / Channel Operations**

## 2.3 Test Configuration

The EUT was tested per the guidance of KDB 789033 D02 v02r01. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups, 3.3 for radiated emissions test setups, and 7.2 for antenna port conducted emissions test setups.

## 2.4 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.



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# 3.0 DESCRIPTION OF TESTS

## 3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 789033 D02 v02r01 were used in the measurement of the EUT**.**

**Deviation from measurement procedure……..…….....None**

## 3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (100dB Minimum Insertion Loss, 14kHz – 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 7.5. Automated test software was used to perform the AC line conducted emissions testing.



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## 3.3 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. An 80cm tall test table made of Styrodur is placed on top of the turn table. For measurements above 1GHz, an additional Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33 depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 474788 D01.

## 3.4 Environmental Conditions

The temperature is controlled within range of 15ºC to 35ºC. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).



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# 4.0 ANTENNA REQUIREMENTS

**Excerpt from §15.203 of the FCC Rules/Regulations:**
"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antennas of the EUT are **permanently attached.**
- There are no provisions for connection to an external antenna.

**Conclusion:**

The EUT complies with the requirement of §15.203.



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# 5.0 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 uncertainty shown below 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.

| Contribution | Expanded Uncertainty (±dB) |
|---|---|
| Conducted Bench Top Measurements | 1.13 |
| Line Conducted Disturbance | 3.09 |
| Radiated Disturbance (<1GHz) | 4.98 |
| Radiated Disturbance (>1GHz) | 5.07 |
| Radiated Disturbance (>18GHz) | 5.09 |



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# 6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

| Manufacturer | Model | Description | Cal Date | Cal Interval | Cal Due | Serial Number |
|---|---|---|---|---|---|---|
| Keysight | N9030A | PXA Signal Analyzer (26.5GHz) | 9/13/2019 | Annual | 9/13/2020 | MY54490576 |
| Emco | 3115 | Horn Antenna (1-18GHz) | 3/28/2018 | Biennial | 3/28/2020 | 9704-5182 |
| Rohde & Schwarz | ESU26 | EMI Test Receiver (26.5GHz) | 6/5/2019 | Annual | 6/5/2020 | 100342 |
| Rohde & Schwarz | SFUNIT-Rx | Shielded Filter Unit | 7/11/2019 | Annual | 7/11/2020 | 102134 |
| Sunol | JB5 | Bi-Log Antenna (30M - 5GHz) | 4/19/2018 | Biennial | 4/19/2020 | A051107 |
| Agilent | N9038A | MXE EMI Receiver | 7/17/2019 | Annual | 7/17/2020 | MY51210133 |
| ETS-Lindgren | 3816/2NM | Line Impedance Stabilization Network | 6/18/2018 | Biennial | 6/18/2020 | 114451 |

**Table 6-1. Annual Test Equipment Calibration Schedule**

**Note:**

For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.




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# 7.0 TEST RESULTS

## 7.1 Summary

Company Name: Sirius XM Radio Inc.
FCC ID: RS2LBEE5HY1MW
FCC Classification: Unlicensed National Information Infrastructure (UNII)

| FCC Part Section(s) | Test Description | Test Limit | Test Condition | Test Result | Reference |
|---|---|---|---|---|---|
| 15.407 (a.1.iv), (a.2), (a.3) | Maximum Conducted Output Power | Maximum conducted powers must meet the limits detailed in 15.407 (a) | CONDUCTED | PASS | Section 7.2 |
| 15.407(b.1), (2), (3), (4) | Undesirable Emissions | Undesirable emissions must meet the limits detailed in 15.407(b) | RADIATED | PASS | Section 7.3 |
| 15.205, 15.407(b.1), (4), (5), (6) | General Field Strength Limits (Restricted Bands and Radiated Emission Limits) | Emissions in restricted bands must meet the radiated limits detailed in 15.209 | | PASS | Section 7.3, 7.4 |
| 15.407 | AC Conducted Emissions 150kHz – 30MHz | < FCC 15.207 limits | LINE CONDUCTED | PASS | Section 7.5 |

**Table 7-1. Summary of Test Results**

**Notes:**

1) All channels, modes, and modulations/data rates were investigated among all UNII bands. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.
4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "UNII Automation," Version 4.7.
5) For radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "Chamber Automation," Version 1.3.1.



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## 7.2 UNII Output Power Measurement – 802.11a/n/ac

**§15.407(a.1.iv) §15.407(a.2) §15.407(a.3);**

### Test Overview and Limits

A transmitter antenna terminal of the EUT is connected to the input of an RF pulse power sensor. Measurement is made using a broadband average power meter while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies.

***In the 5.15 – 5.25GHz band, the maximum permissible conducted output power is 250mW (23.98dBm). The maximum e.i.r.p. shall not exceed the lesser of 200 mW or 10 + 10 log10B, dBm.***

***In the 5.25 – 5.35GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) or 11 dBm + 10log$_{10}$(26dB BW) = 11 dBm + 10log$_{10}$(20.89) = 24.20dBm. The maximum e.i.r.p. shall not exceed the lesser of 1.0 W or 17 + 10 log10B, dBm.***

***In the 5.47 – 5.725GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) or 11 dBm + 10log$_{10}$(26dB BW) = 11 dBm + 10log$_{10}$(20.98) = 24.22dBm. The maximum e.i.r.p. shall not exceed the lesser of 1.0 W or 17 + 10 log10B, dBm.***

***In the 5.725 – 5.850GHz band, the maximum permissible conducted output power is 1W (30dBm). The maximum e.i.r.p. is 36 dBm.***

### Test Procedure Used

ANSI C63.10-2013 – Section 12.3.3.2 Method PM-G
KDB 789033 D02 v02r01 – Section E)3)b) Method PM-G

### Test Settings

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

**Figure 7-1. Test Instrument & Measurement Setup**

### Test Notes

The conducted powers were measured for the purpose of ensuring that the powers are equivalent to the powers of the original certified module (FCC ID: VPYLBEE5HY1MW).




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| 5GHz (20MHz Bandwidth) | Freq [MHz] | Channel | Detector | IEEE Transmission Mode | | | Conducted Power Limit [dBm] | Conducted Power Margin [dB] |
|---|---|---|---|---|---|---|---|---|
| | | | | 802.11a | 802.11n | 802.11ac | | |
| | 5180 | 36 | AVG | 11.91 | 11.40 | 11.42 | 23.98 | -12.07 |
| | 5200 | 40 | AVG | 11.93 | 11.54 | 11.54 | 23.98 | -12.05 |
| | 5240 | 48 | AVG | 14.54 | 12.82 | 14.31 | 23.98 | -9.44 |
| | 5260 | 52 | AVG | 14.69 | 14.15 | 14.28 | 23.98 | -9.29 |
| | 5280 | 56 | AVG | 12.03 | 14.33 | 14.40 | 23.98 | -9.58 |
| | 5320 | 64 | AVG | 12.14 | 11.73 | 11.81 | 23.98 | -11.84 |
| | 5500 | 100 | AVG | 11.73 | 11.24 | 11.26 | 23.98 | -12.25 |
| | 5600 | 120 | AVG | 14.39 | 11.78 | 14.29 | 23.98 | -9.59 |
| | 5720 | 144 | AVG | 11.85 | 11.52 | 11.50 | 23.98 | -12.13 |
| | 5745 | 149 | AVG | 11.68 | 11.21 | 10.98 | 30.00 | -18.32 |
| | 5785 | 157 | AVG | 14.01 | 13.41 | 13.53 | 30.00 | -15.99 |
| | 5825 | 165 | AVG | 11.33 | 10.90 | 10.71 | 30.00 | -18.67 |

**Table 7-2. 20MHz BW (UNII) Maximum Conducted Output Power**

| 5GHz (40MHz Bandwidth) | Freq [MHz] | Channel | Detector | IEEE Transmission Mode | | Conducted Power Limit [dBm] | Conducted Power Margin [dB] |
|---|---|---|---|---|---|---|---|
| | | | | 802.11n | 802.11ac | | |
| | 5190 | 38 | AVG | 9.29 | 9.38 | 23.98 | -14.60 |
| | 5230 | 46 | AVG | 13.59 | 13.47 | 23.98 | -10.39 |
| | 5270 | 54 | AVG | 13.41 | 13.58 | 23.98 | -10.40 |
| | 5310 | 62 | AVG | 9.51 | 9.61 | 23.98 | -14.37 |
| | 5510 | 102 | AVG | 9.29 | 9.35 | 23.98 | -14.63 |
| | 5630 | 126 | AVG | 14.20 | 14.38 | 23.98 | -9.60 |
| | 5710 | 142 | AVG | 9.62 | 9.47 | 23.98 | -14.36 |
| | 5755 | 151 | AVG | 9.03 | 9.11 | 30.00 | -20.89 |
| | 5795 | 159 | AVG | 9.13 | 9.24 | 30.00 | -20.76 |

**Table 7-5. 40MHz BW (UNII) Maximum Conducted Output Power**



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| 5GHz (80MHz Bandwidth) | Freq [MHz] | Channel | Detector | IEEE Transmission Mode | Conducted Power Limit [dBm] | Conducted Power Margin [dB] |
|---|---|---|---|---|---|---|
| | | | | 802.11ac | | |
| | 5210 | 42 | AVG | 9.19 | 23.98 | -14.79 |
| | 5290 | 58 | AVG | 9.41 | 23.98 | -14.57 |
| | 5530 | 106 | AVG | 9.17 | 23.98 | -14.81 |
| | 5610 | 122 | AVG | 9.38 | 23.98 | -14.60 |
| | 5690 | 138 | AVG | 9.58 | 23.98 | -14.40 |
| | 5775 | 155 | AVG | 8.97 | 30.00 | -21.03 |

**Table 7-6. 80MHz BW (UNII) Maximum Conducted Output Power**




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## 7.3 Radiated Spurious Emission Measurements – Above 1GHz

**§15.407(b) §15.205 §15.209**

### Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies. All channels, modes (e.g. 802.11a, 802.11n (20MHz BW), 802.11n (40MHz BW), and 802.11ac (80MHz)), and modulations/data rates were investigated among all UNII bands. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

***For transmitters operating in the 5.15-5.25 GHz and 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of −27 dBm/MHz.***

***For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of −27 dBm/MHz.***

***For transmitters operating in the 5.725-5.85 GHz band: 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.***

***All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 7-3 per Section 15.209.***

| Frequency | Field Strength [μV/m] | Measured Distance [Meters] |
|---|---|---|
| Above 960.0 MHz | 500 | 3 |

**Table 7-3. Radiated Limits**

### Test Procedures Used

ANSI C63.10-2013 – Sections 12.7.7.2, 12.7.6, 12.7.5
KDB 789033 D02 v02r01 – Section G

### Test Settings

#### Average Measurements above 1GHz (Method AD)

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be ≥ 2 x span/RBW)
6. Averaging type = power (RMS)
7. Sweep time = auto couple
8. Trace was averaged over 100 sweeps



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**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

**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 = 120kHz
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

**Test Setup**

The EUT and measurement equipment were set up as shown in the diagram below.

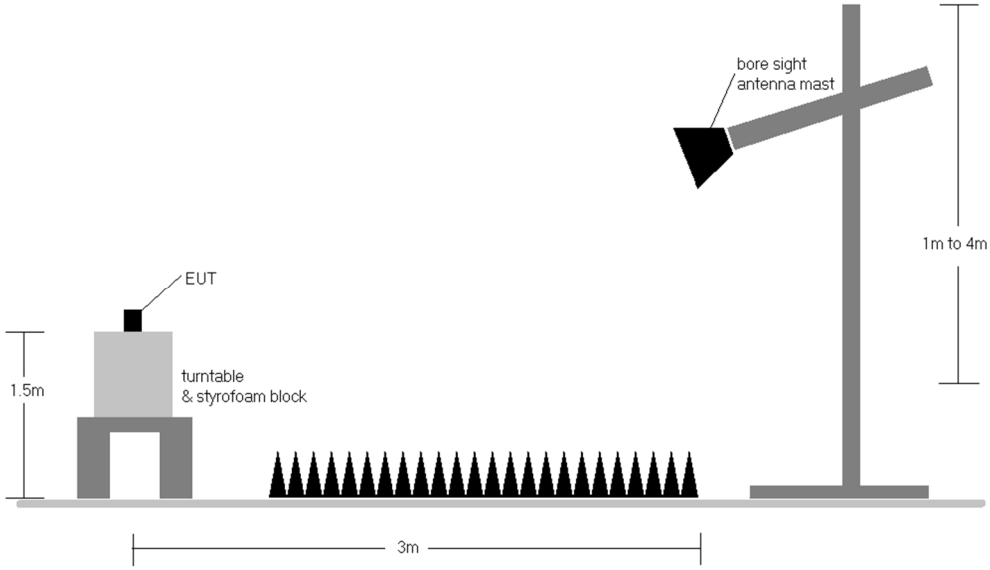


**Figure 7-2. Test Instrument & Measurement Setup**


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## Test Notes

1. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 are below the limit shown in Table 7-3.
2. All spurious emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-3. All spurious emissions that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. This unit was tested while powered by a 12V DC power source (battery).
5. The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
6. Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
7. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. Any emissions found to be within 20dB of the limit are fully investigated and the results are shown in this section.
8. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

## Sample Calculations

### Determining Spurious Emissions Levels

- Field Strength Level $_{[dB\mu V/m]}$ = Analyzer Level $_{[dBm]}$ + 107 + AFCL $_{[dB/m]}$
- AFCL $_{[dB/m]}$ = Antenna Factor $_{[dB/m]}$ + Cable Loss $_{[dB]}$
- Margin $_{[dB]}$ = Field Strength Level $_{[dB\mu V/m]}$ – Limit $_{[dB\mu V/m]}$

### Radiated Band Edge Measurement Offset

- The amplitude offset shown in the radiated restricted band edge plots was calculated using the formula: Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain



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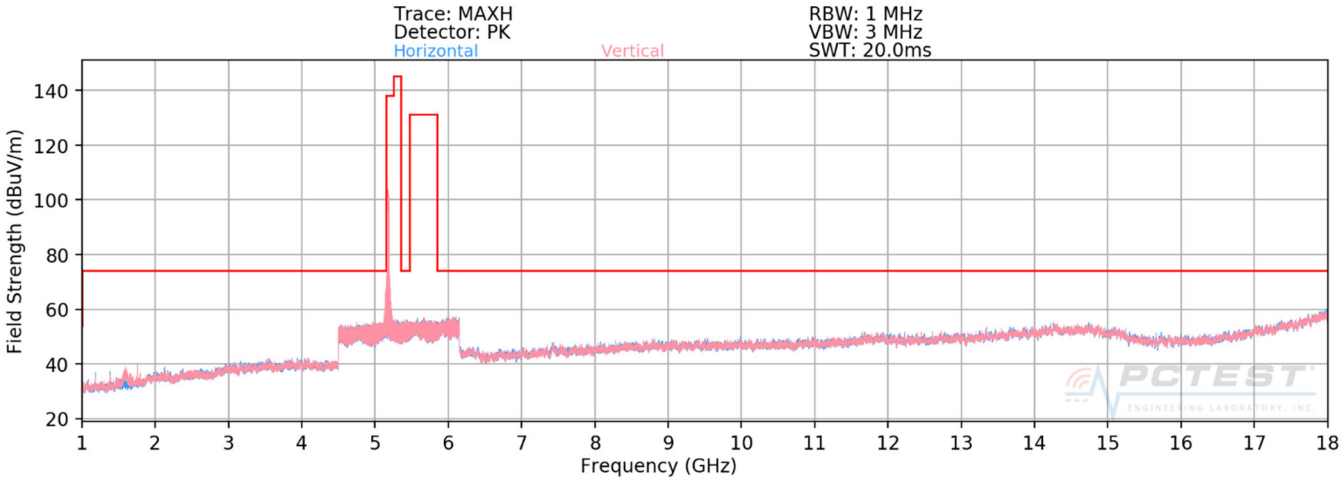
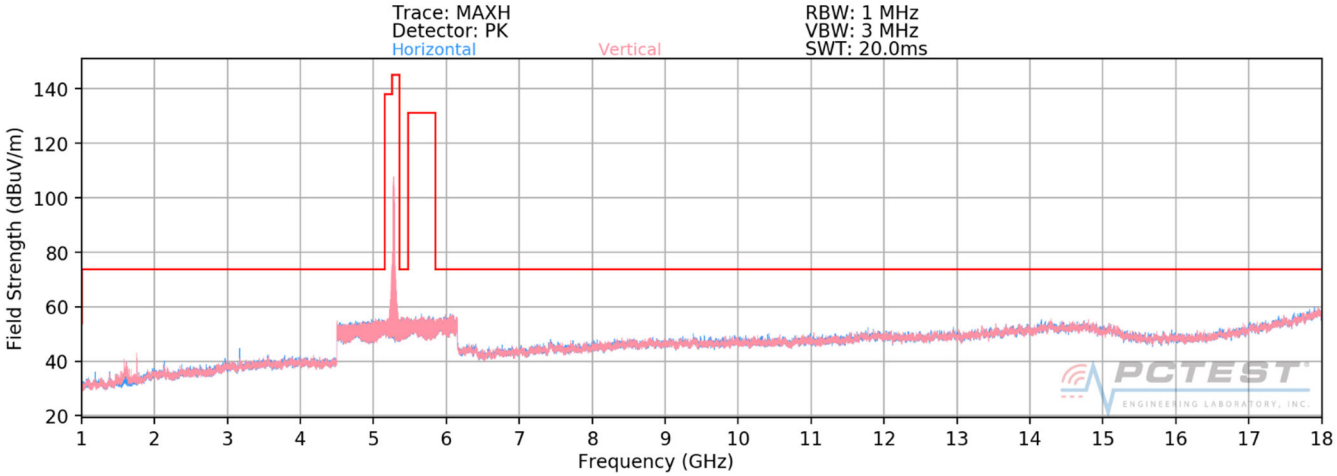
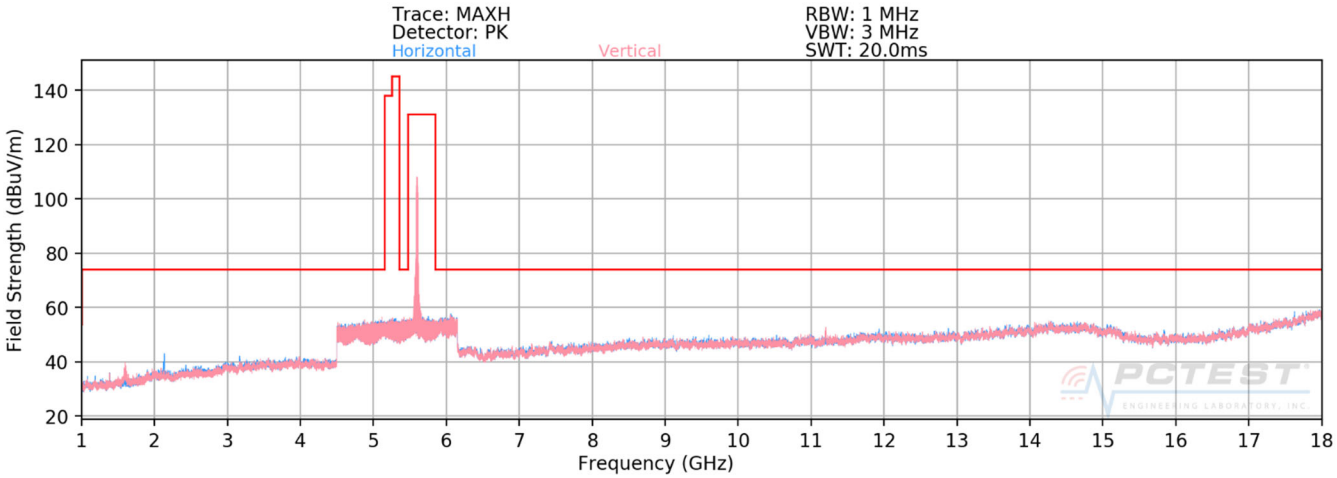
## Radiated Spurious Emission Measurements




**Plot 7-1. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40)**




**Plot 7-2. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56)**




**Plot 7-3. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 120**

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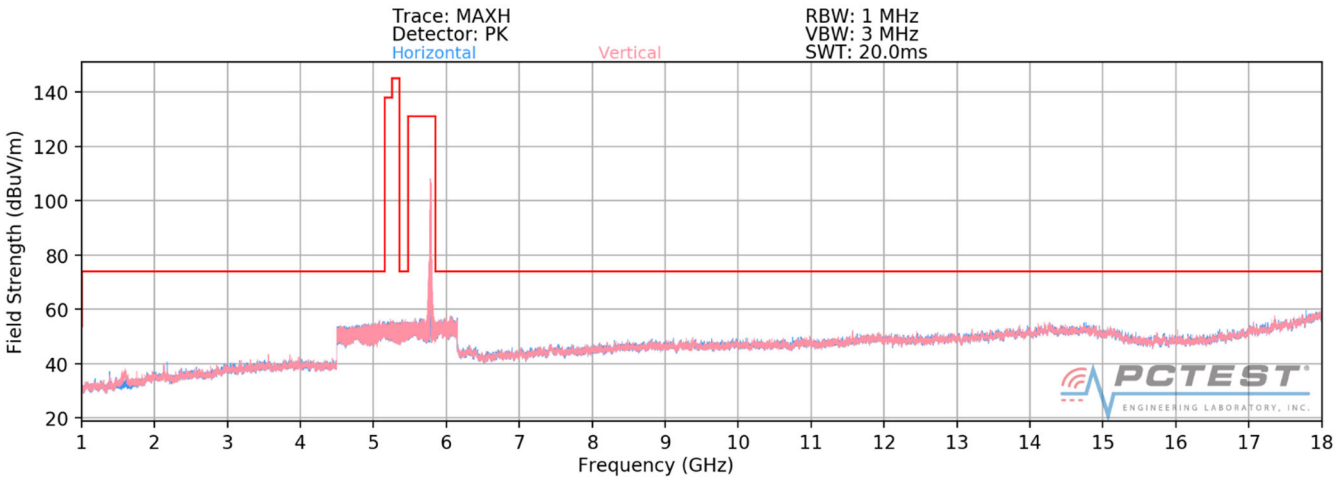


**Plot 7-4. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157)**




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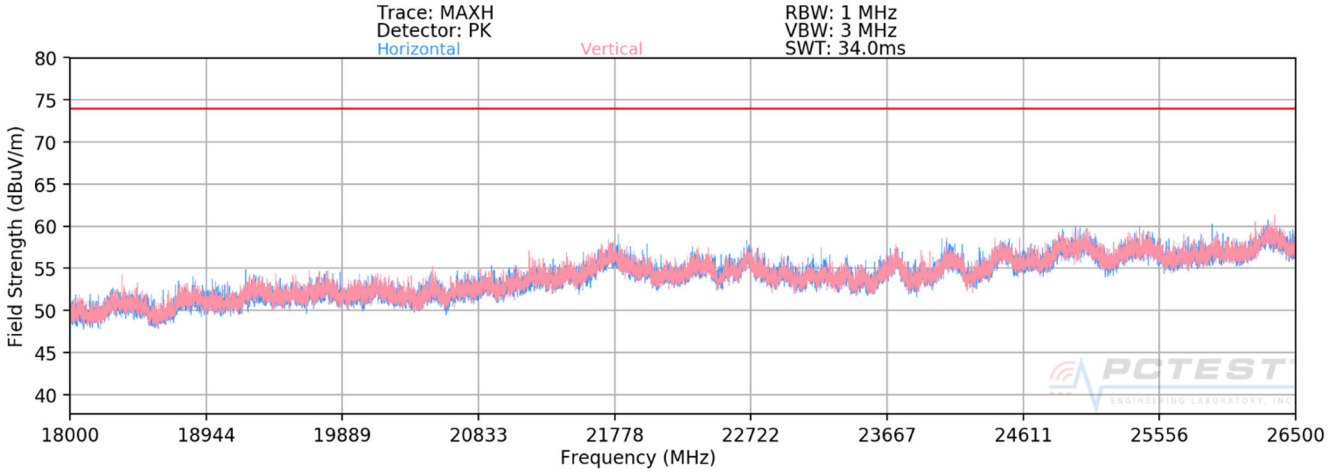
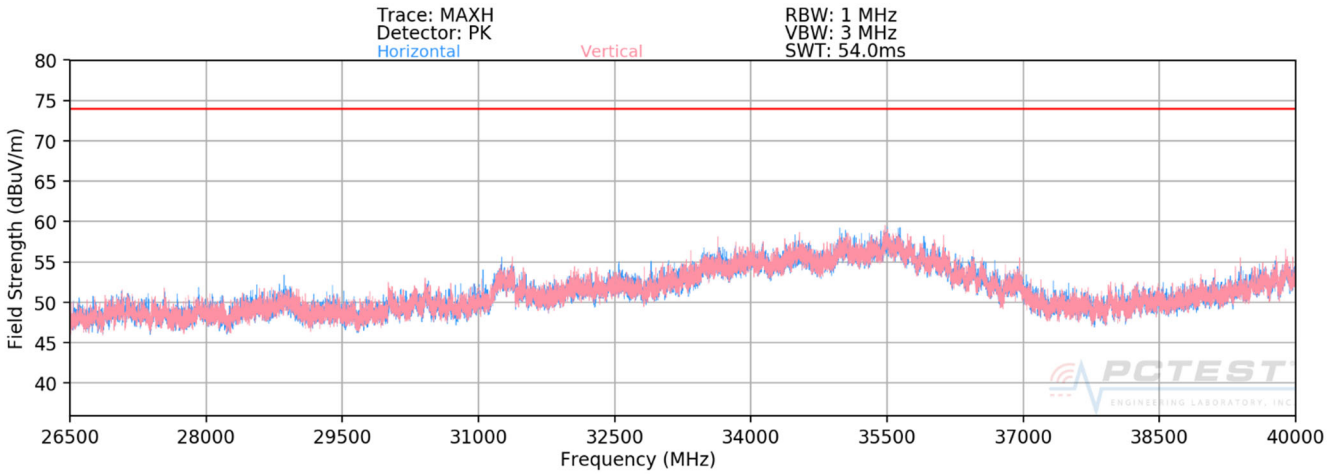
## Radiated Spurious Emissions Measurements (Above 18GHz)




**Plot 7-5. Radiated Spurious Plot 18GHz - 26.5GHz (802.11a)**




**Plot 7-6. Radiated Spurious Plot 26.5GHz - 40GHz (802.11a)**

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## Radiated Spurious Emission Measurements

**§15.407(b) §15.205 & §15.209;**

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5180MHz
Channel: 36

| | Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| | 10360.00 | Peak | V | 121 | 170 | -69.07 | 11.61 | 49.54 | 68.20 | -18.66 |
| * | 15540.00 | Average | V | - | - | -81.89 | 13.79 | 38.90 | 53.98 | -15.08 |
| * | 15540.00 | Peak | V | - | - | -69.83 | 13.79 | 50.96 | 73.98 | -23.02 |

**Table 7-4. Radiated Measurements ANT1**

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5200MHz
Channel: 40

| | Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| | 10400.00 | Peak | V | 118 | 192 | -69.08 | 11.62 | 49.54 | 68.20 | -18.66 |
| * | 15600.00 | Average | V | - | - | -81.95 | 12.99 | 38.04 | 53.98 | -15.94 |
| * | 15600.00 | Peak | V | - | - | -69.79 | 12.99 | 50.20 | 73.98 | -23.78 |

**Table 7-5. Radiated Measurements ANT1**




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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5240MHz
Channel: 48

| | Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| | 10480.00 | Peak | V | 131 | 207 | -68.28 | 11.91 | 50.63 | 68.20 | -17.57 |
| * | 15720.00 | Average | V | - | - | -81.73 | 14.48 | 39.75 | 53.98 | -14.23 |
| * | 15720.00 | Peak | V | - | - | -69.57 | 14.48 | 51.91 | 73.98 | -22.07 |

**Table 7-6. Radiated Measurements ANT1**

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5260MHz
Channel: 52

| | Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| | 10520.00 | Peak | V | 219 | 5 | -66.18 | 11.17 | 51.99 | 68.20 | -16.21 |
| * | 15780.00 | Average | V | - | - | -81.92 | 13.34 | 38.42 | 53.98 | -15.55 |
| * | 15780.00 | Peak | V | - | - | -69.85 | 13.34 | 50.49 | 73.98 | -23.48 |

**Table 7-7. Radiated Measurements ANT1**


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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5280MHz
Channel: 56

| | Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| | 10560.00 | Peak | V | 161 | 142 | -67.78 | 11.69 | 50.91 | 68.20 | -17.29 |
| * | 15840.00 | Average | V | - | - | -81.71 | 15.07 | 40.36 | 53.98 | -13.62 |
| * | 15840.00 | Peak | V | - | - | -69.93 | 15.07 | 52.14 | 73.98 | -21.84 |

**Table 7-8. Radiated Measurements ANT1**

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5320MHz
Channel: 64

| | Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| * | 10640.00 | Average | V | 150 | 139 | -80.61 | 12.99 | 39.38 | 53.98 | -14.60 |
| * | 10640.00 | Peak | V | 150 | 139 | -67.67 | 12.99 | 52.32 | 73.98 | -21.66 |
| * | 15960.00 | Average | V | - | - | -82.22 | 13.86 | 38.64 | 53.98 | -15.34 |
| * | 15960.00 | Peak | V | - | - | -69.74 | 13.86 | 51.12 | 73.98 | -22.86 |

**Table 7-9. Radiated Measurements ANT1**


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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5500MHz
Channel: 100

| | Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| * | 11000.00 | Average | V | 130 | 140 | -79.04 | 12.34 | 40.30 | 53.98 | -13.68 |
| * | 11000.00 | Peak | V | 130 | 140 | -65.58 | 12.34 | 53.76 | 73.98 | -20.22 |
| | 16500.00 | Peak | V | - | - | -70.18 | 15.07 | 51.89 | 68.20 | -16.31 |

**Table 7-10. Radiated Measurements ANT1**

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5745MHz
Channel: 149

| | Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| * | 11490.00 | Average | V | 159 | 164 | -78.99 | 13.90 | 41.91 | 53.98 | -12.07 |
| * | 11490.00 | Peak | V | 159 | 164 | -66.09 | 13.90 | 54.81 | 73.98 | -19.17 |
| | 17235.00 | Peak | V | - | - | -69.15 | 17.99 | 55.84 | 68.20 | -12.36 |

**Table 7-11. Radiated Measurements ANT1**



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Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5785MHz
Channel: 157

| | Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| * | 11570.00 | Average | V | 147 | 164 | -76.07 | 12.91 | 43.84 | 53.98 | -10.14 |
| * | 11570.00 | Peak | V | 147 | 164 | -63.04 | 12.91 | 56.87 | 73.98 | -17.11 |
| | 17355.00 | Peak | V | 143 | 169 | -67.98 | 18.74 | 57.76 | 68.20 | -10.44 |

**Table 7-12. Radiated Measurements ANT1**

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5825MHz
Channel: 165

| | Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| * | 11650.00 | Average | V | 141 | 163 | -79.25 | 13.29 | 41.04 | 53.98 | -12.94 |
| * | 11650.00 | Peak | V | 141 | 163 | -66.64 | 13.29 | 53.65 | 73.98 | -20.33 |
| | 17475.00 | Peak | V | - | - | -69.45 | 19.70 | 57.25 | 68.20 | -10.95 |

**Table 7-13. Radiated Measurements ANT1**


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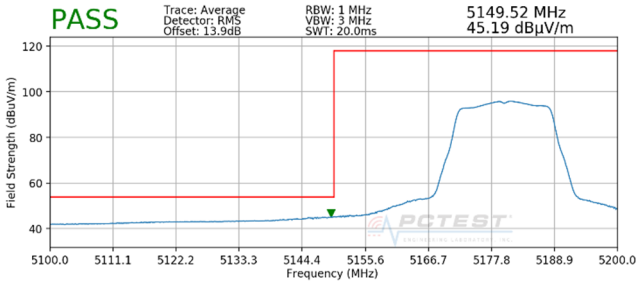
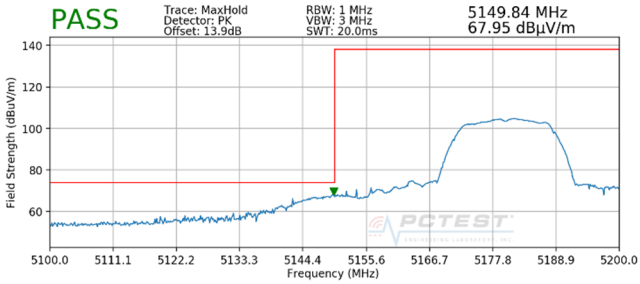
## Radiated Band Edge Measurements (20MHz BW)

**§15.407(b.1)(b.2) §15.205 §15.209**

| | |
|---|---|
| Worst Case Mode: | 802.11a |
| Worst Case Transfer Rate: | 6Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5180MHz |
| Channel: | 36 |

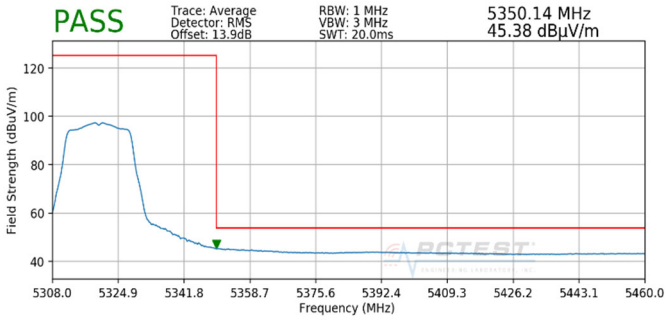



**Plot 7-7. Radiated Lower Band Edge Plot (Average – UNII Band 1)**

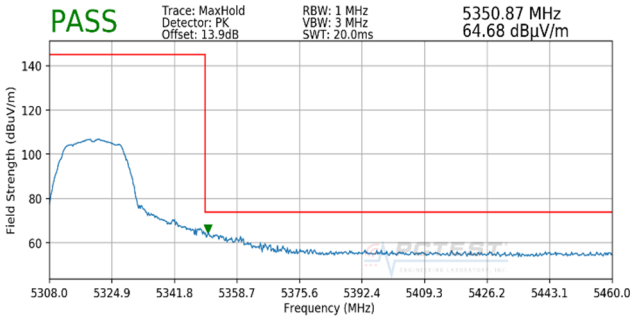



**Plot 7-8. Radiated Lower Band Edge Plot (Peak – UNII Band 1)**

| | |
|---|---|
| Worst Case Mode: | 802.11a |
| Worst Case Transfer Rate: | 6Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5320MHz |
| Channel: | 64 |




**Plot 7-33. Radiated Lower Band Edge Plot (Average – UNII Band 2A)**




**Plot 7-34. Radiated Lower Band Edge Plot (Peak – UNII Band 2A)**

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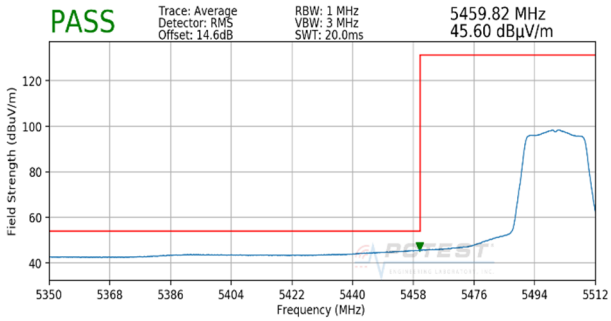
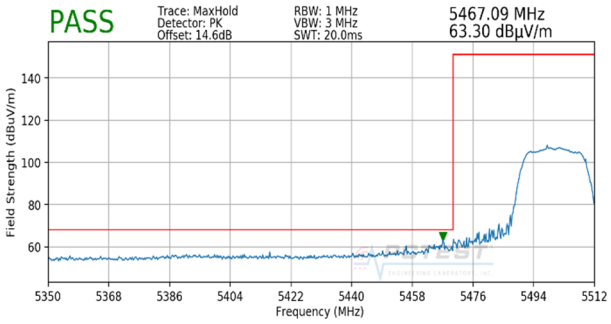
| | |
|---|---|
| Worst Case Mode: | 802.11n |
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5500MHz |
| Channel: | 100 |

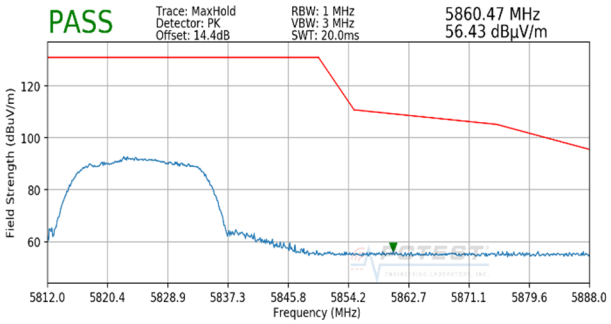



**Plot 7-35. Radiated Lower Band Edge Plot (Average – UNII Band 2C)**




**Plot 7-36. Radiated Lower Band Edge Plot (Peak – UNII Band 2C)**

| | |
|---|---|
| Worst Case Mode: | 802.11n |
| Worst Case Transfer Rate: | MSC0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5825MHz |
| Channel: | 165 |




**Plot 7-9. Radiated Upper Band Edge Plot (Peak – UNII Band 3)**

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## 7.4 Radiated Spurious Emissions Measurements – Below 1GHz
**§15.209**

### Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

***All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 7-14 per Section 15.209.***

| Frequency | Field Strength [µV/m] | Measured Distance [Meters] |
|---|---|---|
| 0.009 – 0.490 MHz | 2400/F (kHz) | 300 |
| 0.490 – 1.705 MHz | 24000/F (kHz) | 30 |
| 1.705 – 30.00 MHz | 30 | 30 |
| 30.00 – 88.00 MHz | 100 | 3 |
| 88.00 – 216.0 MHz | 150 | 3 |
| 216.0 – 960.0 MHz | 200 | 3 |
| Above 960.0 MHz | 500 | 3 |

**Table 7-14. Radiated Limits**

### Test Procedures Used

ANSI C63.10-2013

### Test Settings

#### Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 120kHz (for emissions from 30MHz – 1GHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize



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## Test Setup

The EUT and measurement equipment were set up as shown in the diagrams below.

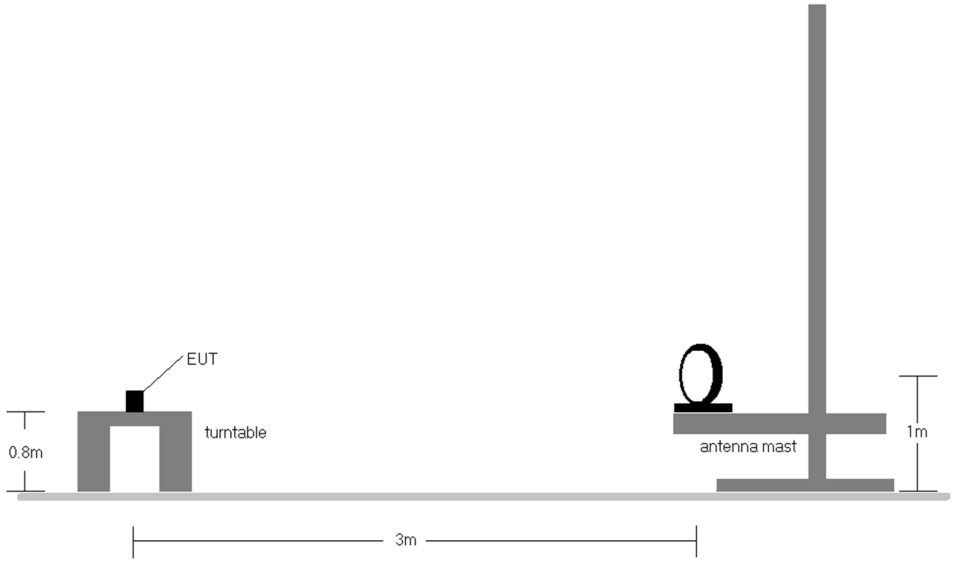


**Figure 7-3. Radiated Test Setup < 30MHz**

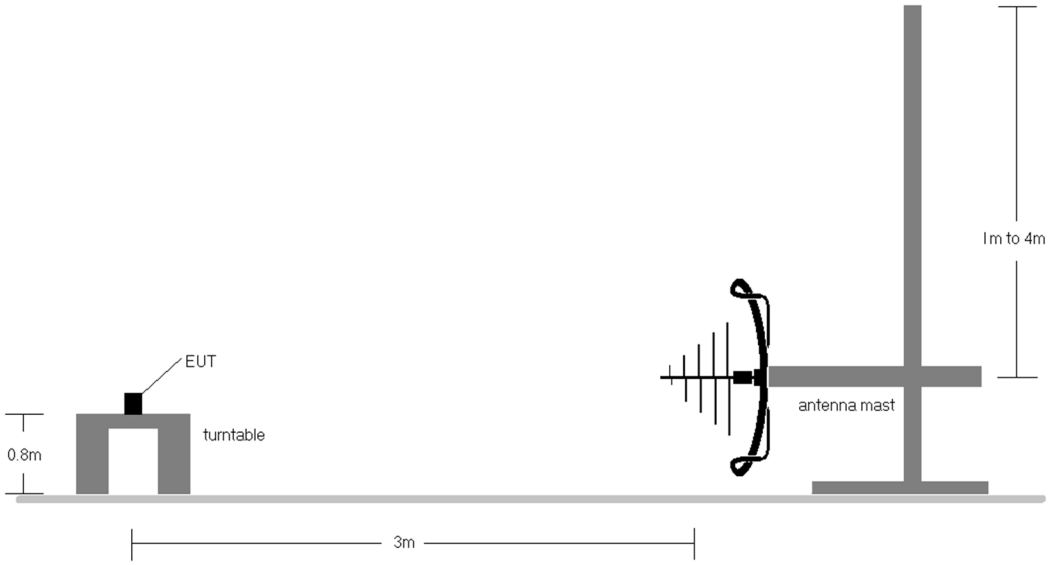


**Figure 7-4. Radiated Test Setup < 1GHz**




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## Test Notes

1. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-14.
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
3. This unit was tested while powered by a 12V DC power source (battery).
4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
5. Emissions were measured at a 3 meter test distance.
6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
7. No spurious emissions were detected within 20dB of the limit below 30MHz.
8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
9. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. There were no emissions detected in the 30MHz – 1GHz frequency range, as shown in the subsequent plots.



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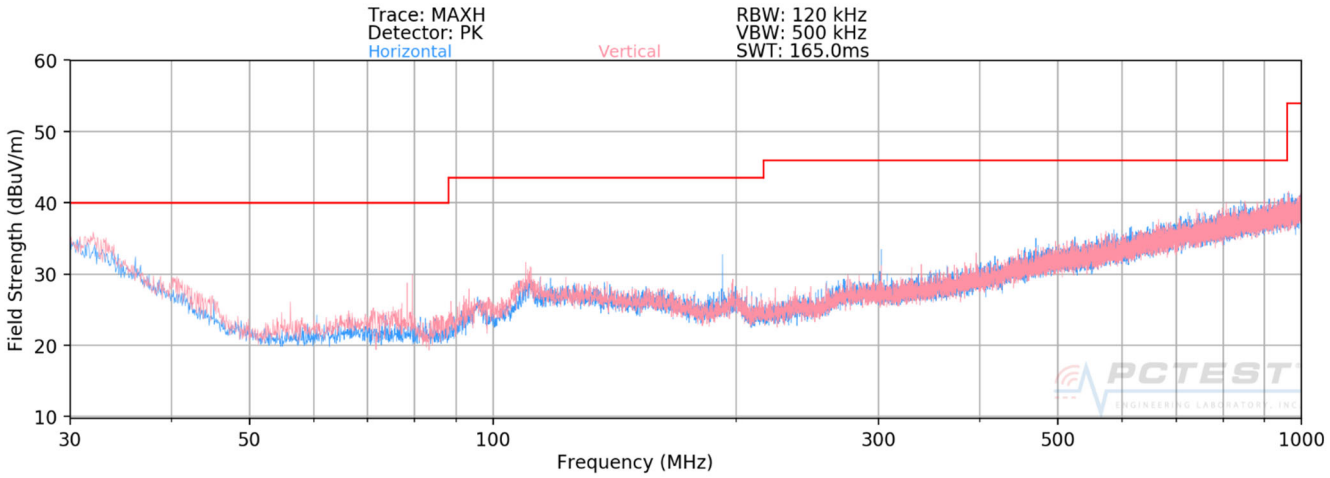
## Radiated Spurious Emissions Measurements (Below 1GHz)
**§15.209**




**Plot 7-10. Radiated Spurious Plot below 1GHz (802.11a – U3 Ch. 157)**

| Frequency [MHz] | Detector | Ant. Pol. [H/V] | EUT Pol. [X/Y/Z] | Analyzer Level [dBm] | AFCL [dB/m] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|
| 56.54 | Quasi-Peak | V | X | -96.51 | 13.59 | 24.08 | 40.00 | -15.92 |
| 89.40 | Quasi-Peak | V | X | -89.82 | 14.60 | 31.78 | 43.52 | -11.74 |
| 118.23 | Quasi-Peak | H | X | -94.32 | 20.51 | 33.19 | 43.52 | -10.33 |
| 192.09 | Quasi-Peak | H | X | -92.78 | 18.73 | 32.95 | 43.52 | -10.57 |
| 302.11 | Quasi-Peak | H | X | -94.68 | 21.26 | 33.58 | 46.02 | -12.44 |

**Table 7-15. Radiated Spurious Measurements**



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## 7.5 Line-Conducted Test Data
**§15.407**

**Test Overview and Limit**

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.

***All conducted emissions must not exceed the limits shown in the table below, per Section 15.207.***

| Frequency of emission (MHz) | Conducted Limit (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 – 0.5 | 66 to 56* | 56 to 46* |
| 0.5 – 5 | 56 | 46 |
| 5 – 30 | 60 | 50 |

**Table 7-16. Conducted Limits**

*Decreases with the logarithm of the frequency.

**Test Procedures Used**

ANSI C63.10-2013, Section 6.2

**Test Settings**

**Quasi-Peak Field Strength Measurements**

1. Analyzer center frequency was set to the frequency of the spurious emission of interest
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

**Average Field Strength Measurements**

1. Analyzer center frequency was set to the frequency of the spurious emission of interest
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = RMS
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize


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## Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

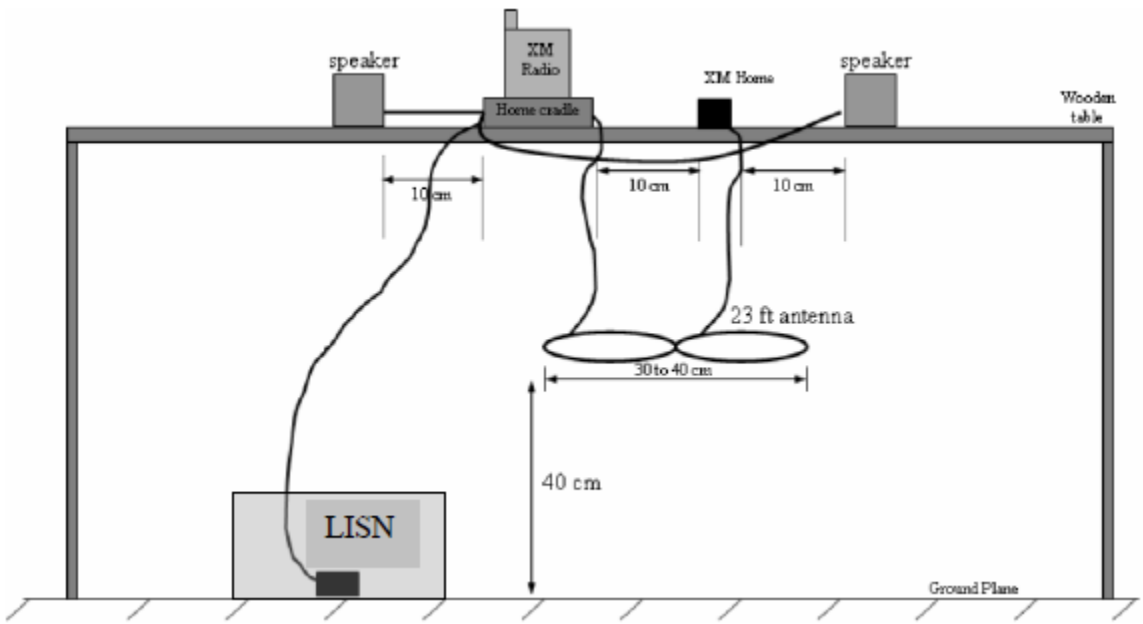


**Figure 7-5. Test Instrument & Measurement Setup**

## Test Notes

1. All modes of operation were investigated and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
2. The limit for an intentional radiator from 150kHz to 30MHz are specified in 15.207.
3. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
4. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Corr. (dB)
5. Margin (dB) = QP/AV Limit (dBμV) - QP/AV Level (dBμV)
6. Traces shown in plot are made using a peak detector.
7. Deviations to the Specifications: None.



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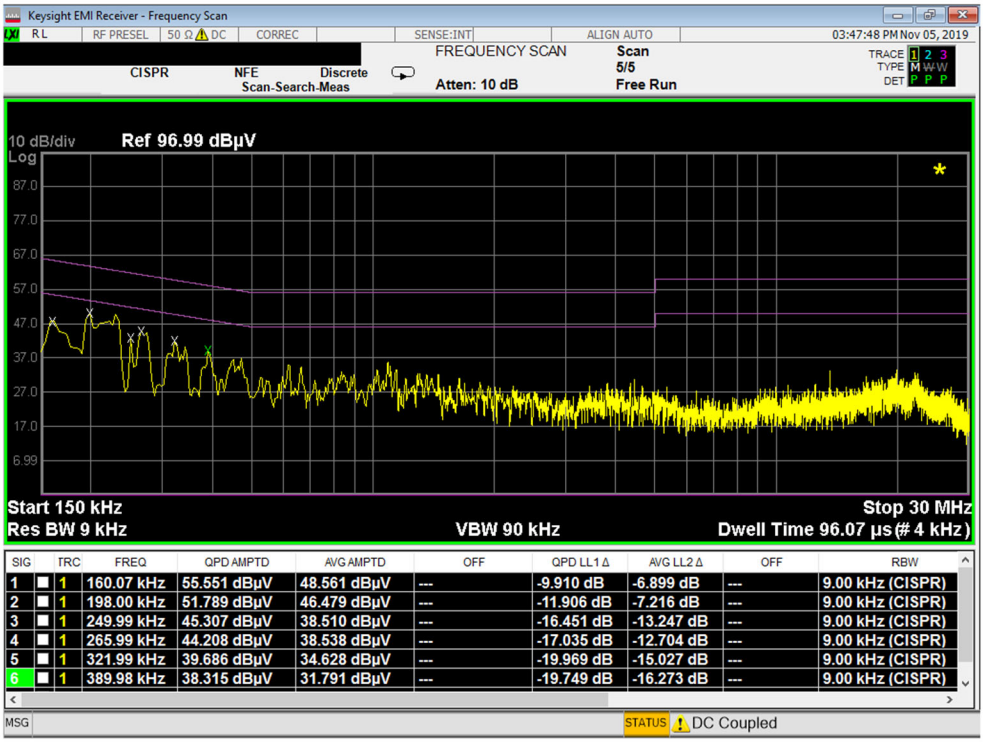
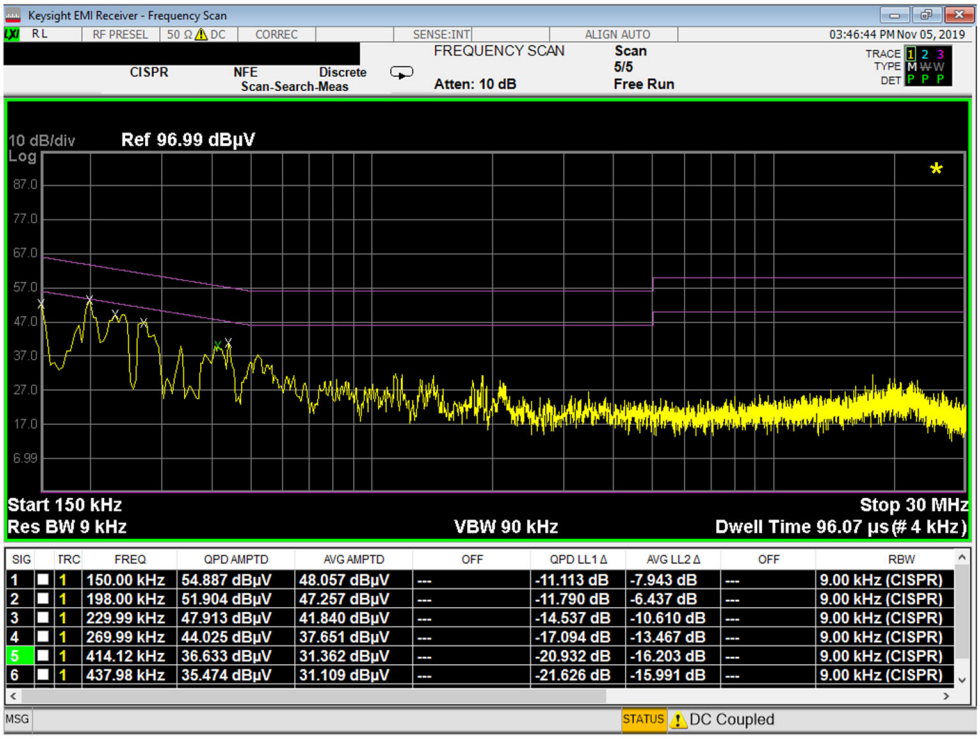



| SIG | TRC | FREQ | QPD AMPTD | AVG AMPTD | OFF | QPD LL1 Δ | AVG LL2 Δ | OFF | RBW |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 160.07 kHz | 55.551 dBµV | 48.561 dBµV | --- | -9.910 dB | -6.899 dB | --- | 9.00 kHz (CISPR) |
| 2 | 1 | 198.00 kHz | 51.789 dBµV | 46.479 dBµV | --- | -11.906 dB | -7.216 dB | --- | 9.00 kHz (CISPR) |
| 3 | 1 | 249.99 kHz | 45.307 dBµV | 38.510 dBµV | --- | -16.451 dB | -13.247 dB | --- | 9.00 kHz (CISPR) |
| 4 | 1 | 265.99 kHz | 44.208 dBµV | 38.538 dBµV | --- | -17.035 dB | -12.704 dB | --- | 9.00 kHz (CISPR) |
| 5 | 1 | 321.99 kHz | 39.686 dBµV | 34.628 dBµV | --- | -19.969 dB | -15.027 dB | --- | 9.00 kHz (CISPR) |
| 6 | 1 | 389.98 kHz | 38.315 dBµV | 31.791 dBµV | --- | -19.749 dB | -16.273 dB | --- | 9.00 kHz (CISPR) |

**Plot 7-11. Line Conducted Plot with 802.11a UNII Band 1 (L1)**




| SIG | TRC | FREQ | QPD AMPTD | AVG AMPTD | OFF | QPD LL1 Δ | AVG LL2 Δ | OFF | RBW |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 150.00 kHz | 54.887 dBµV | 48.057 dBµV | --- | -11.113 dB | -7.943 dB | --- | 9.00 kHz (CISPR) |
| 2 | 1 | 198.00 kHz | 51.904 dBµV | 47.257 dBµV | --- | -11.790 dB | -6.437 dB | --- | 9.00 kHz (CISPR) |
| 3 | 1 | 229.99 kHz | 47.913 dBµV | 41.840 dBµV | --- | -14.537 dB | -10.610 dB | --- | 9.00 kHz (CISPR) |
| 4 | 1 | 269.99 kHz | 44.025 dBµV | 37.651 dBµV | --- | -17.094 dB | -13.467 dB | --- | 9.00 kHz (CISPR) |
| 5 | 1 | 414.12 kHz | 36.633 dBµV | 31.362 dBµV | --- | -20.932 dB | -16.203 dB | --- | 9.00 kHz (CISPR) |
| 6 | 1 | 437.98 kHz | 35.474 dBµV | 31.109 dBµV | --- | -21.626 dB | -15.991 dB | --- | 9.00 kHz (CISPR) |

**Plot 7-12. Line Conducted Plot with 802.11a UNII Band 1 (N)**



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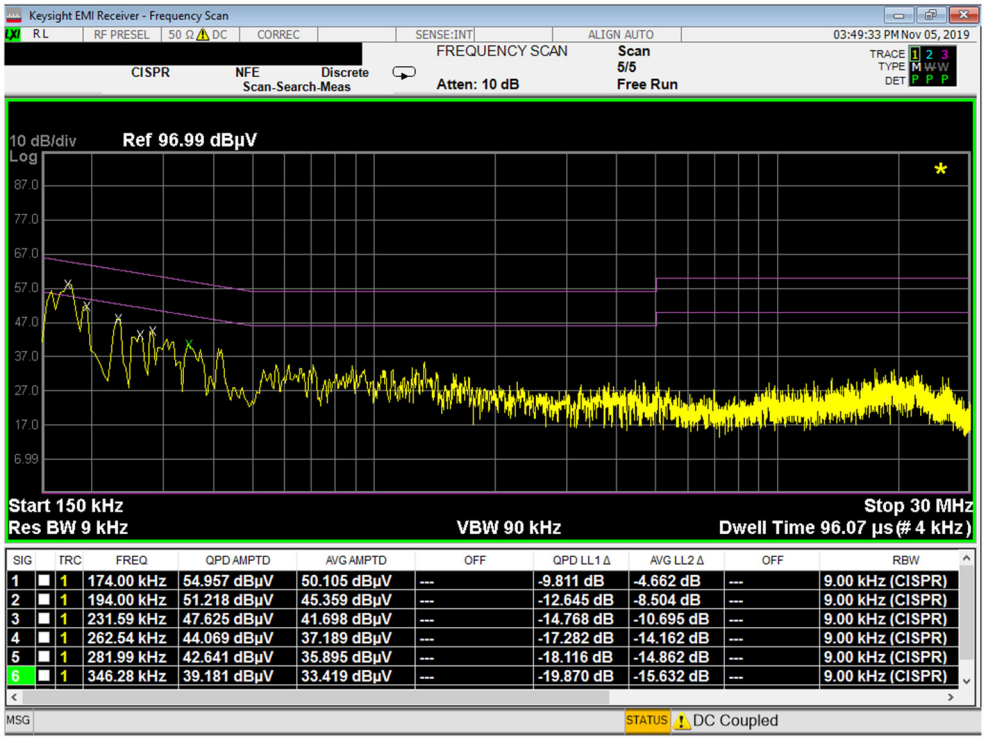
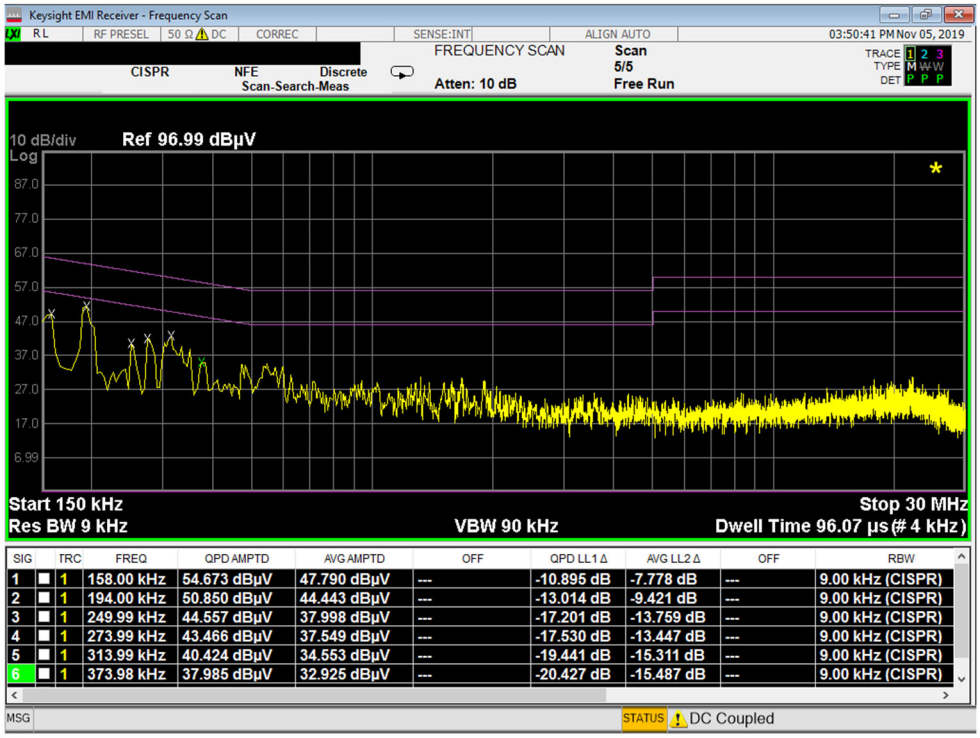



| SIG | TRC | FREQ | QPD AMPTD | AVG AMPTD | OFF | QPD LL1 Δ | AVG LL2 Δ | OFF | RBW |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 174.00 kHz | 54.957 dBµV | 50.105 dBµV | --- | -9.811 dB | -4.662 dB | --- | 9.00 kHz (CISPR) |
| 2 | 1 | 194.00 kHz | 51.218 dBµV | 45.359 dBµV | --- | -12.645 dB | -8.504 dB | --- | 9.00 kHz (CISPR) |
| 3 | 1 | 231.59 kHz | 47.625 dBµV | 41.698 dBµV | --- | -14.768 dB | -10.695 dB | --- | 9.00 kHz (CISPR) |
| 4 | 1 | 262.54 kHz | 44.069 dBµV | 37.189 dBµV | --- | -17.282 dB | -14.162 dB | --- | 9.00 kHz (CISPR) |
| 5 | 1 | 281.99 kHz | 42.641 dBµV | 35.895 dBµV | --- | -18.116 dB | -14.862 dB | --- | 9.00 kHz (CISPR) |
| 6 | 1 | 346.28 kHz | 39.181 dBµV | 33.419 dBµV | --- | -19.870 dB | -15.632 dB | --- | 9.00 kHz (CISPR) |

**Plot 7-13. Line Conducted Plot with 802.11a UNII Band 2A (L1)**




| SIG | TRC | FREQ | QPD AMPTD | AVG AMPTD | OFF | QPD LL1 Δ | AVG LL2 Δ | OFF | RBW |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 158.00 kHz | 54.673 dBµV | 47.790 dBµV | --- | -10.895 dB | -7.778 dB | --- | 9.00 kHz (CISPR) |
| 2 | 1 | 194.00 kHz | 50.850 dBµV | 44.443 dBµV | --- | -13.014 dB | -9.421 dB | --- | 9.00 kHz (CISPR) |
| 3 | 1 | 249.99 kHz | 44.557 dBµV | 37.998 dBµV | --- | -17.201 dB | -13.759 dB | --- | 9.00 kHz (CISPR) |
| 4 | 1 | 273.99 kHz | 43.466 dBµV | 37.549 dBµV | --- | -17.530 dB | -13.447 dB | --- | 9.00 kHz (CISPR) |
| 5 | 1 | 313.99 kHz | 40.424 dBµV | 34.553 dBµV | --- | -19.441 dB | -15.311 dB | --- | 9.00 kHz (CISPR) |
| 6 | 1 | 373.98 kHz | 37.985 dBµV | 32.925 dBµV | --- | -20.427 dB | -15.487 dB | --- | 9.00 kHz (CISPR) |

**Plot 7-14. Line Conducted Plot with 802.11a UNII Band 2A (N)**



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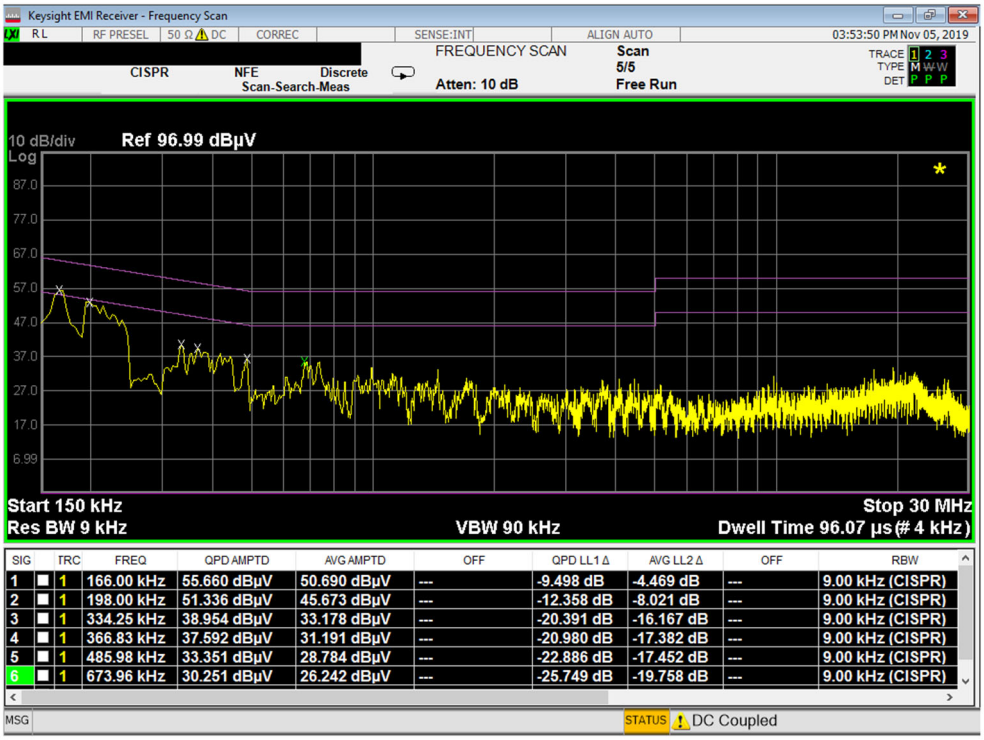
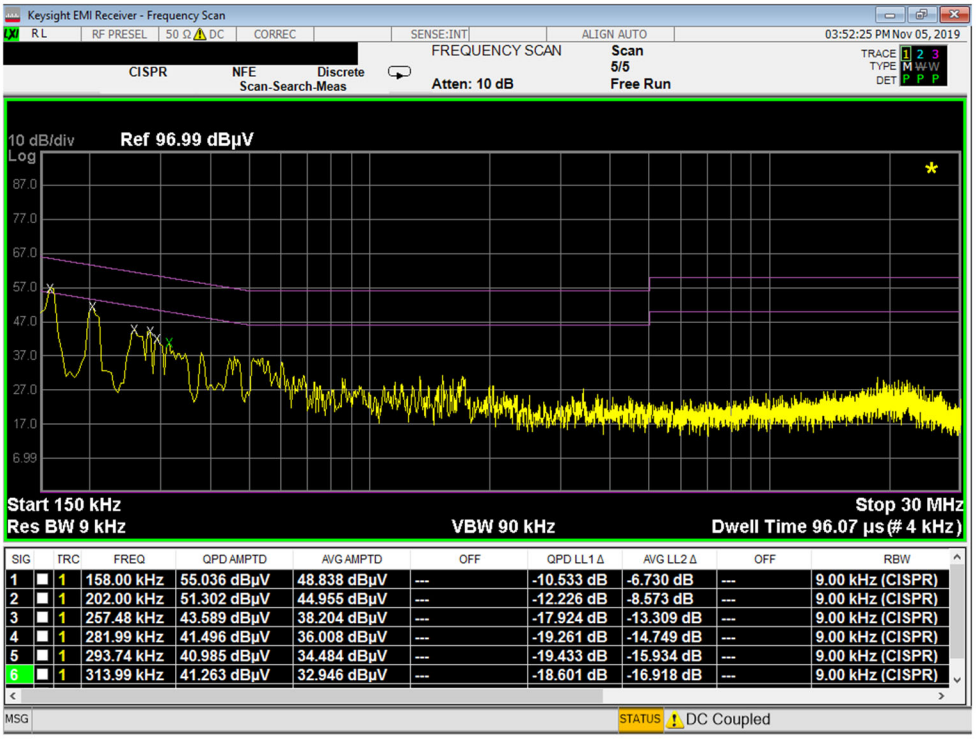



| SIG | TRC | FREQ | QPD AMPTD | AVG AMPTD | OFF | QPD LL1 Δ | AVG LL2 Δ | OFF | RBW |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 166.00 kHz | 55.660 dBµV | 50.690 dBµV | --- | -9.498 dB | -4.469 dB | --- | 9.00 kHz (CISPR) |
| 2 | 1 | 198.00 kHz | 51.336 dBµV | 45.673 dBµV | --- | -12.358 dB | -8.021 dB | --- | 9.00 kHz (CISPR) |
| 3 | 1 | 334.25 kHz | 38.954 dBµV | 33.178 dBµV | --- | -20.391 dB | -16.167 dB | --- | 9.00 kHz (CISPR) |
| 4 | 1 | 366.83 kHz | 37.592 dBµV | 31.191 dBµV | --- | -20.980 dB | -17.382 dB | --- | 9.00 kHz (CISPR) |
| 5 | 1 | 485.98 kHz | 33.351 dBµV | 28.784 dBµV | --- | -22.886 dB | -17.452 dB | --- | 9.00 kHz (CISPR) |
| 6 | 1 | 673.96 kHz | 30.251 dBµV | 26.242 dBµV | --- | -25.749 dB | -19.758 dB | --- | 9.00 kHz (CISPR) |

**Plot 7-15. Line Conducted Plot with 802.11a UNII Band 2C (L1)**




| SIG | TRC | FREQ | QPD AMPTD | AVG AMPTD | OFF | QPD LL1 Δ | AVG LL2 Δ | OFF | RBW |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 158.00 kHz | 55.036 dBµV | 48.838 dBµV | --- | -10.533 dB | -6.730 dB | --- | 9.00 kHz (CISPR) |
| 2 | 1 | 202.00 kHz | 51.302 dBµV | 44.955 dBµV | --- | -12.226 dB | -8.573 dB | --- | 9.00 kHz (CISPR) |
| 3 | 1 | 257.48 kHz | 43.589 dBµV | 38.204 dBµV | --- | -17.924 dB | -13.309 dB | --- | 9.00 kHz (CISPR) |
| 4 | 1 | 281.99 kHz | 41.496 dBµV | 36.008 dBµV | --- | -19.261 dB | -14.749 dB | --- | 9.00 kHz (CISPR) |
| 5 | 1 | 293.74 kHz | 40.985 dBµV | 34.484 dBµV | --- | -19.433 dB | -15.934 dB | --- | 9.00 kHz (CISPR) |
| 6 | 1 | 313.99 kHz | 41.263 dBµV | 32.946 dBµV | --- | -18.601 dB | -16.918 dB | --- | 9.00 kHz (CISPR) |

**Plot 7-16. Line Conducted Plot with 802.11a UNII Band 2C (N)**



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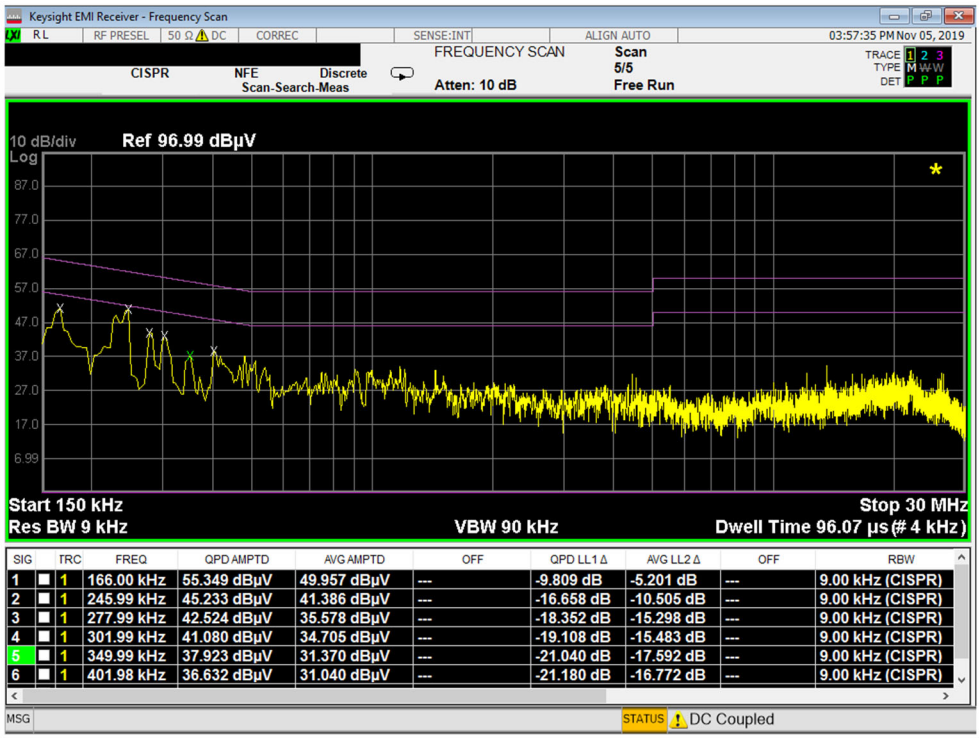
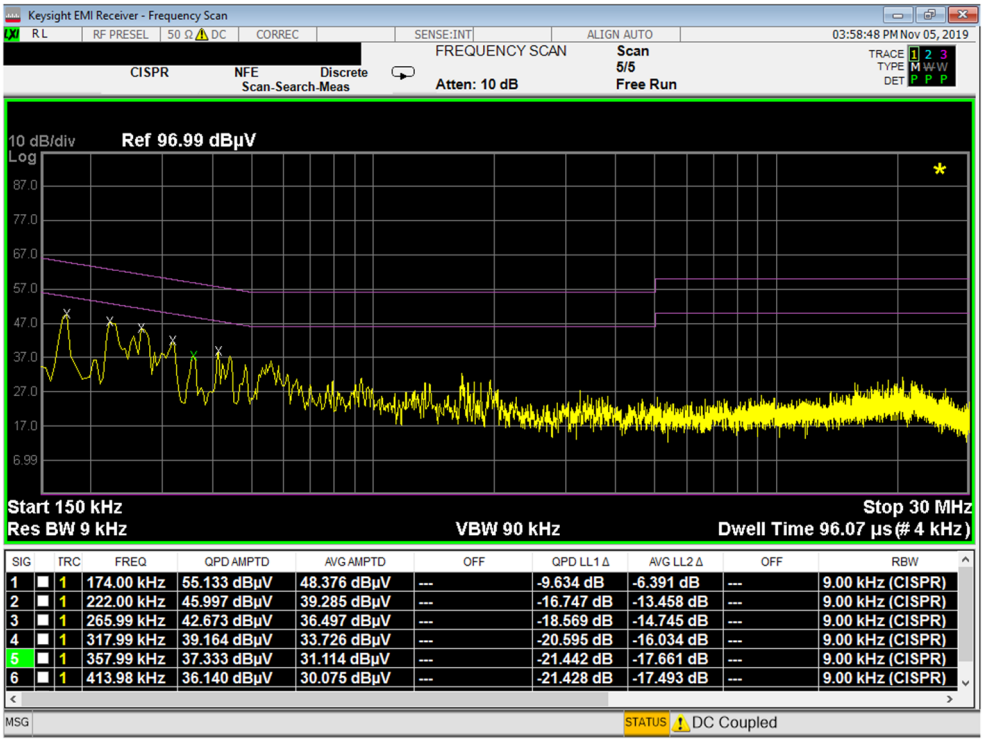



| SIG | TRC | FREQ | QPD AMPTD | AVG AMPTD | OFF | QPD LL1 Δ | AVG LL2 Δ | OFF | RBW |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 166.00 kHz | 55.349 dBµV | 49.957 dBµV | --- | -9.809 dB | -5.201 dB | --- | 9.00 kHz (CISPR) |
| 2 | 1 | 245.99 kHz | 45.233 dBµV | 41.386 dBµV | --- | -16.658 dB | -10.505 dB | --- | 9.00 kHz (CISPR) |
| 3 | 1 | 277.99 kHz | 42.524 dBµV | 35.578 dBµV | --- | -18.352 dB | -15.298 dB | --- | 9.00 kHz (CISPR) |
| 4 | 1 | 301.99 kHz | 41.080 dBµV | 34.705 dBµV | --- | -19.108 dB | -15.483 dB | --- | 9.00 kHz (CISPR) |
| 5 | 1 | 349.99 kHz | 37.923 dBµV | 31.370 dBµV | --- | -21.040 dB | -17.592 dB | --- | 9.00 kHz (CISPR) |
| 6 | 1 | 401.98 kHz | 36.632 dBµV | 31.040 dBµV | --- | -21.180 dB | -16.772 dB | --- | 9.00 kHz (CISPR) |

**Plot 7-17. Line Conducted Plot with 802.11a UNII Band 3 (L1)**




| SIG | TRC | FREQ | QPD AMPTD | AVG AMPTD | OFF | QPD LL1 Δ | AVG LL2 Δ | OFF | RBW |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 174.00 kHz | 55.133 dBµV | 48.376 dBµV | --- | -9.634 dB | -6.391 dB | --- | 9.00 kHz (CISPR) |
| 2 | 1 | 222.00 kHz | 45.997 dBµV | 39.285 dBµV | --- | -16.747 dB | -13.458 dB | --- | 9.00 kHz (CISPR) |
| 3 | 1 | 265.99 kHz | 42.673 dBµV | 36.497 dBµV | --- | -18.569 dB | -14.745 dB | --- | 9.00 kHz (CISPR) |
| 4 | 1 | 317.99 kHz | 39.164 dBµV | 33.726 dBµV | --- | -20.595 dB | -16.034 dB | --- | 9.00 kHz (CISPR) |
| 5 | 1 | 357.99 kHz | 37.333 dBµV | 31.114 dBµV | --- | -21.442 dB | -17.661 dB | --- | 9.00 kHz (CISPR) |
| 6 | 1 | 413.98 kHz | 36.140 dBµV | 30.075 dBµV | --- | -21.428 dB | -17.493 dB | --- | 9.00 kHz (CISPR) |

**Plot 7-18. Line Conducted Plot with 802.11a UNII Band 3 (N)**



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# 8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Sirius XM BT/WiFi Module FCC ID: RS2LBEE5HY1MW** is in compliance with Part 15 Subpart E (15.407) of the FCC Rules.



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