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# Emissions
# Test Report

**EUT Name: Mente Autism**

**Model No.: MEN03**

CFR 47 Part 15.247: 2017

*Prepared for:*

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| | |
|---|---|
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# Revisions

| Revision No. | Date MM/DD/YYYY | Reason for Change | Author |
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Note: Latest revision report will replace all previous reports.

# Statement of Compliance

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|---|---|
| *Manufacturer:* | AAT Medical Ltd,<br>Block LS3, Malta Life Sciences Park,<br>San Gwann Industrial Estate,<br>San Gwann SGN 3000,<br>Malta, Europe |
| *Requester / Applicant:* | Tristan Demanuele |
| *Name of Equipment:* | Mente Autism |
| *Model No.* | MEN03 |
| *Type of Equipment:* | Intentional Radiator |
| *Application of Regulations:* | CFR 47 Part 15.247: 2017 |
| *Test Dates:* | 21 NOV 2017 to 08 DEC 2017 |

*Guidance Documents:*

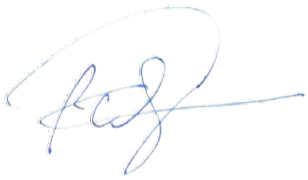
Emissions: ANSI C63.10-2013

*Test Methods:*

Emissions: ANSI C63.10-2013

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in the Executive Summary of this report.

This report must not be used to claim product endorsement by A2LA or any agency of the U.S. Government. This report contains data that are not covered by A2LA accreditation. This report shall not be reproduced except in full, without the written authorization of TUV Rheinland of North America.



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|---|---|---|---|
| Rolly Alegre | | Eddie Mariscal | |
| Test Engineer | December 11, 2017 | A2LA Signatory | December 11, 2017 |

**Testing Cert #3331.02** **US5254** **2932M-1**

# 1 Executive Summary

## *1.1 Scope*

This report is intended to document the status of conformance with the requirements of the CFR 47 Part 15.247: 2017 based on the results of testing performed on 21 NOV 2017 to 08 DEC 2017 on the Mente Autism, Model MEN03 manufactured by AAT Medical Ltd. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

## *1.2 Purpose*

Testing was performed to evaluate the EMC performance of the EUT in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report. The 2412 MHz to 2462 MHz frequency band is covered in this document.

## 1.3 Summary of Test Results

**Table 1:** Summary of Test Results

| Test | Test Method ANSI C63.10: 2013 | Test Parameters (Measured) | Result |
|---|---|---|---|
| Spurious Emission in Transmitted Mode | CFR47 15.209, CFR47 15.247 (d) | Class B | **Complied** |
| Restricted Bands of Operation | CFR47 15.205 | Class B | **Complied** |
| AC Power Conducted Emission | CFR47 15.207 | Class B | **Complied** |
| Occupied Bandwidth | CFR47 15.247 (a1) | See plots | **Complied** |
| Maximum Output Power | CFR47 15.247 (b) | 20.8 dBm (802.11b)<br>23.1 dBm (802.11g)<br>23.1 dBm (HT 20) | **Complied** |
| Peak Power Spectral Density | CFR47 15.247 (e) | < 8 dBm/3kHz | **Complied** |
| Out of Band Emission | CFR47 15.247 (d) | 30 MHz - 26 GHz < 30 dBm/100kHz | **Complied** |
| RF Exposure | CFR47 15.247 (i), 2.1093 | General Population | **N/A** |

Note: This test report covers 2400 MHz to 2483.5 MHz band.

## 1.4 Special Accessories

None

## 1.5 Equipment Modifications

None

# 2 Laboratory Information

## *2.1 Accreditations & Endorsements*

### 2.1.1 US Federal Communications Commission

TUV Rheinland of North America at 1279 Quarry Ln, Pleasanton, CA 94566 is recognized by the commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (US5254). The laboratory scope of accreditation includes: Title 47 CFR Parts 15, 18, and 90. The accreditation is updated every 3 years.

### 2.1.2 NIST / A2LA

TUV Rheinland of North America is accredited by the National Voluntary Laboratory Accreditation Program, which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Guide 17025:1999 and ISO 9002 (Lab Code Testing Cert #3331.02). The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

### 2.1.3 Canada – Industry Canada

TUV Rheinland of North America at the 1279 Quarry Ln, Pleasanton, CA 94566 address is accredited by Industry Canada for performing testing services for the general public on a fee basis. This laboratory test facilities have been fully described in reports submitted to and accepted by Industry Canada (File Number 2932M). This reference number is the indication to the Industry Canada Certification Officers that the site meets the requirements of RSS 212, Issue 1 (Provisional). The accreditation is updated every 3 years.

### 2.1.4 Japan – VCCI

The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America at 1279 Quarry Ln, Pleasanton, CA 94566 has been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0031

VCCI Registration No. for Santa Clara: A-0032

### 2.1.5 Acceptance by Mutual Recognition Arrangement


The United States has an established agreement with specific countries under the Asia Pacific Laboratory Accreditation Corporation (APLAC) Mutual Recognition Arrangement. Under this agreement, all TUV Rheinland at 1279 Quarry Ln, Pleasanton, CA 94566 test results and test reports within the scope of the laboratory NIST / A2LA accreditation will be accepted by each member country.

## *2.2 Test Facilities*

All of the test facilities are located at 1279 Quarry Lane, Pleasanton, California 94566, USA.

### 2.2.1 Emission Test Facility

The Semi-Anechoic chamber and AC Line Conducted measurement facility used to collect the radiated and conducted data has been constructed in accordance with ANSI C63.7:1992. The site has been measured in accordance with and verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2014, at a test distance of 3 and 5 meters. The site is listed with the FCC and accredited by A2LA (Lab Code Testing Cert #3331.02). The 3/5-meter semi-anechoic chamber used to collect the radiated data has been verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2014, at a test distance of 3 meter and 5 meters. A report detailing this site can be obtained from TUV Rheinland of North America.

### 2.2.2 Immunity Test Facility

ESD, EFT, Surge, PQF: These tests are performed in an environmentally controlled room with a 3.7 m x 4.8 m x 3.175 mm thick aluminum floor connected to PE ground.

For ESD testing, tabletop equipment is placed on an insulated mat with a surface resistivity of $10^9$ Ohms/square on a 1.6 m x 0.8 m x 0.8 m high non-conductive table with a 3.175 mm aluminum top (Horizontal Coupling Plane). The HCP is connected to the main ground plane via a low impedance ground strap through two 470-kΩ resistors. The Vertical Coupling Plane consists of an aluminum plate 50 cm x 50 cm x 3.175 mm thick. The VCP is connected to the main ground plane via a low impedance ground strap through two 470-kΩ resistors.

For EFT, Surge, PQF, the HCP and VCP are removed.

RF Field Immunity testing is performed in a 7.3m x 4.3m x 4.1m anechoic chamber.

RF Conducted and Magnetic Field Immunity testing is performed on a 4.8m x 3.7m x 3.175mm thick aluminum ground plane.

All test areas allow a minimum distance of 1 meter from the EUT to walls or conducting objects.

## *2.3 Measurement Uncertainty*

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

*The Combined Standard Uncertainty* is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities; it is equal to the positive square root of the sum of the variances or co-variances of these other quantities, weighted according to how the measurement result varies with changes in these quantities. The term *standard uncertainty* is the result of a measurement expressed as a standard deviation.

### 2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBμV/m) = RAW - AMP + CBL + ACF

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

**Sample radiated emissions calculation @ 30 MHz**

**Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)**

25 dBuV/m + 17.5 dB – 20 dB + 1.0 dB = 23.5 dBuV/m

### 2.3.2 Measurement Uncertainty

| **Per CISPR 16-4-2** | **$U_{lab}$** | **$U_{cispr}$** |
|---|---|---|
| **Radiated Disturbance @ 10 meters** | | |
| 30 – 1,000 MHz | 2.25 dB | 4.51 dB |
| **Radiated Disturbance @ 3 meters** | | |
| 30 – 1,000 MHz | 2.26 dB | 4.52 dB |
| 1 – 6 GHz | 2.12 dB | 4.25 dB |
| 6 – 18 GHz | 2.47 dB | 4.93 dB |
| **Conducted Disturbance @ Mains Terminals** | | |
| 150 kHz – 30 MHz | 1.09 dB | 2.18 dB |
| **Disturbance Power** | | |
| 30 MHz – 300 MHz | 3.92 dB | 4.3 dB |

**Voltech PM6000A**

| | |
|---|---|
| The estimated combined standard uncertainty for harmonic current and flicker measurements is ± 5.0%. | Per CISPR 16-4-2 Methods |

### 2.3.3 Measurement Uncertainty Immunity

| | |
|---|---|
| The estimated combined standard uncertainty for ESD immunity measurements is ± 8.2%. | Per IEC 61000-4-2 |
| The estimated combined standard uncertainty for radiated immunity measurements is ± 4.10 dB. | Per IEC 61000-4-3 |
| The estimated combined standard uncertainty for conducted immunity measurements with CDN is ± 3.66 dB | Per IEC 61000-4-6 |
| The estimated combined standard uncertainty for power frequency magnetic field immunity is ± 2.9%. | Per IEC 61000-4-8 |

**Thermo KeyTek EMC Pro**

| |
|---|
| The estimated combined standard uncertainty for EFT fast transient immunity measurements is ± 2.6%. |
| The estimated combined standard uncertainty for surge immunity measurements is ± 2.6%. |
| The estimated combined standard uncertainty for voltage variation and interruption measurements is ± 1.74%. |

The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by a coverage factor of 2. Compliance criteria are not based on measurement uncertainty.

## 2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005. Equipment calibration records are kept on file at the test facility.

# 3 Product Information

## 3.1 Product Description

Mente Autism is an active medical device intended to read brain activity of patients diagnosed with Autism Spectrum Disorder (ASD) in order to provide a home-based therapeutic means to relax the mind. This is done through reading of the various waveforms of brain activity augmented in a real-time sonified neurofeedback therapy. The therapy is delivered through binaural beat sounds transmitted via earphones that are connected directly to the headband. Mente Autism is targeted for children between the ages of 3 and 12. After initial setup, Mente Autism can be run individually or together with a smartphone or tablet running the Mente Autism software. A medical device capable of operating in the 2.4GHz frequency band. .

## 3.2 Equipment Configuration

A description of the equipment configuration is given in the Test Plan Section. The EUT was tested as called for in the test standard and was configured and operated in a manner consistent with its intended use. The EUT was battery (Alkaline) operated and allowed to reach intended operating conditions. The placement of the EUT system components was guided by the test standard and selected to represent typical installation conditions.

In the case of an EUT that can operate in more than one configuration, preliminary testing was performed to determine the configuration that produced maximum radiation.

The final configuration was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

## 3.3 Operating Mode

A description of the operation mode is given in the Test Plan Section. In the case of an EUT that can operate in more than one state, preliminary testing was performed to determine the operating mode that produced maximum radiation.

The final operating mode was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

## *3.4 Unique Antenna Connector*

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of CFR47 Parts 15.211, 15.213, 15.217, 15.219, or 15.221.

### 3.4.1 Results

The Mente Autism, model MEN03 employs a single antenna and has maximum gain + 1.9 dBi.

## *3.5 Duty Cycle*

### 3.5.1 Results

| Mode | ON Time | Period | Duty Cycle (%) |
|---|---|---|---|
| 802.11b | 0.990 | 1.425 | 69.47% |
| 802.11g | 0.160 | 0.383 | 41.78% |
| 802.11n HT20 | 0.164 | 0.351 | 46.72% |

# 4 Emissions

Testing was performed in accordance with CFR 47 Part 15.247: 2017 . These test methods are listed under the laboratory's A2LA Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Procedures described in section 8 of the standard were used.

## *4.1 Output Power Requirements*

*The maximum output power requirement is the maximum equivalent isotropic radiated power delivering at the transmitting antenna under specified conditions of measurements in the presence of modulation.*

*The maximum output power and harmonics shall not exceed CFR47 Part 15.247 (b):2017*

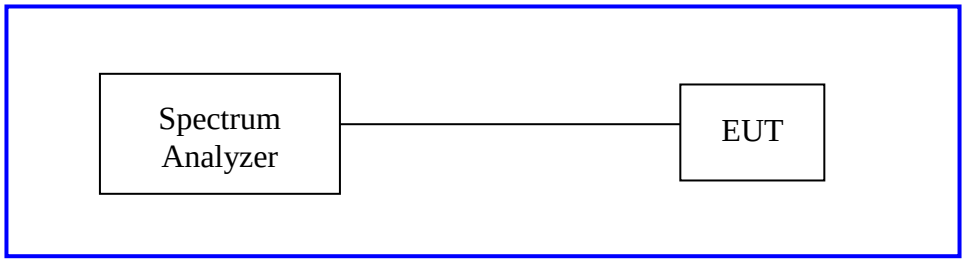
*The maximum transmitted powers are*

*Band 2400-2483.5 MHz: 1 W*

### 4.1.1 Test Method

The ANSI C63.10-2013 conducted method was used to measure the channel power output. The measurements were conducted on 3 channels in each operating range per CFR47 Part 15.247(b): 2017 2400 MHz to 2483.5 MHz

Test Setup:




*The method described in section 9.1.2 of "KDB 558074 – DTS Measurement Guidance v03r05" applies and was used.*

### 4.1.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

**Table 2:** RF Output Power at the Antenna Port – Test Results

| | | | |
|---|---|---|---|
| **Test Conditions:** Conducted Measurement, Normal Temperature | | | |
| **Antenna Type:** Custom Integrated | | **Power Setting:** See test plan | |
| **Max. Directional Gain:** + 1.9 dBi | | | |
| **Signal State:** Modulated | | | |
| **Ambient Temp.:** 22° C | | **Relative Humidity:**35% | |
| **802.11b** | | | |
| **Operating Channel (MHz)** | **Limit [dBm]** | **Max Power [dBm]** | **Margin [dB]** |
| 2412.00 | 30.00 | 19.50 | -10.50 |
| 2437.00 | 30.00 | 20.80 | -9.20 |
| 2462.00 | 30.00 | 19.80 | -10.20 |
| **Note:** All insertion loss and corrections are accounted for in the measurement plots. | | | |
| **802.11g** | | | |
| **Operating Channel (MHz)** | **Limit [dBm]** | **Max Power [dBm]** | **Margin [dB]** |
| 2412.00 | 30.00 | 21.50 | -8.50 |
| 2437.00 | 30.00 | 23.10 | -6.90 |
| 2462.00 | 30.00 | 22.10 | -7.90 |
| **Note:** All insertion loss and corrections are accounted for in the measurement plots. | | | |

**Table 3:** RF Output Power at the Antenna Port – Test Results

| | | | |
|---|---|---|---|
| **Test Conditions:** Conducted Measurement, Normal Temperature | | | |
| **Antenna Type:** Custom Integrated | | **Power Setting:** See test plan | |
| **Max. Directional Gain:** + 1.9 dBi | | | |
| **Signal State:** Modulated | | | |
| **Ambient Temp.:** 22° C | | **Relative Humidity:** 35% | |
| **802.11n** | | | |
| **Operating Channel (MHz)** | **Limit [dBm]** | **Max Power [dBm]** | **Margin [dB]** |
| 2412.00 | 30.00 | 21.70 | -8.30 |
| 2437.00 | 30.00 | 23.10 | -6.90 |
| 2462.00 | 30.00 | 20.90 | -9.10 |
| **Note:** All insertion loss and corrections are accounted for in the measurement plots. | | | |

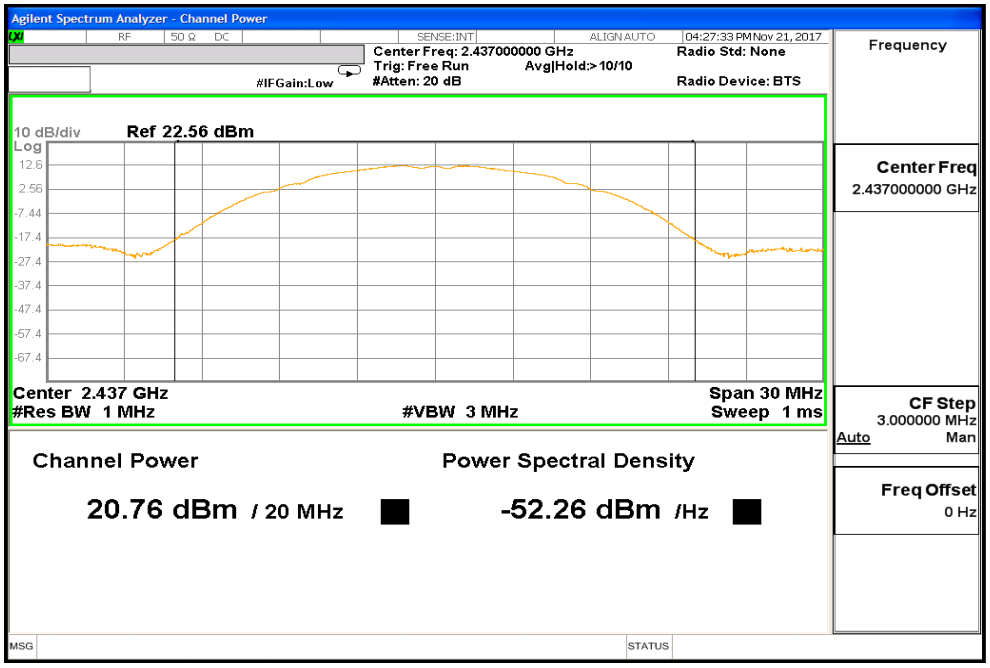



**Figure 1:** Maximum Transmitted Power, 2437 MHz 11b mode

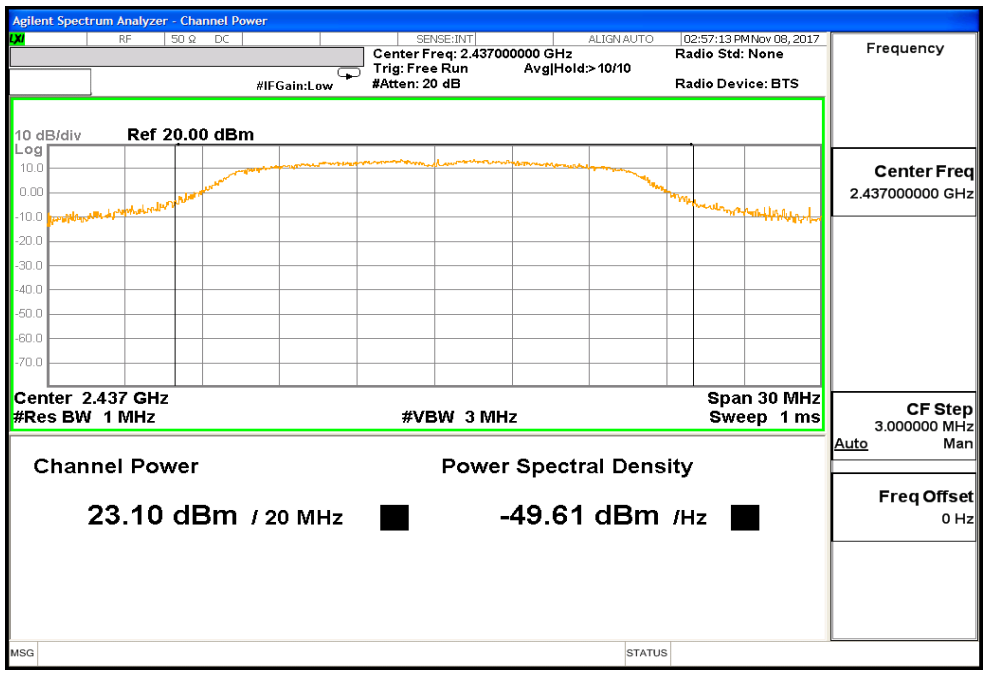



**Figure 2:** Maximum Transmitted Power, 2437 MHz at 11g mode

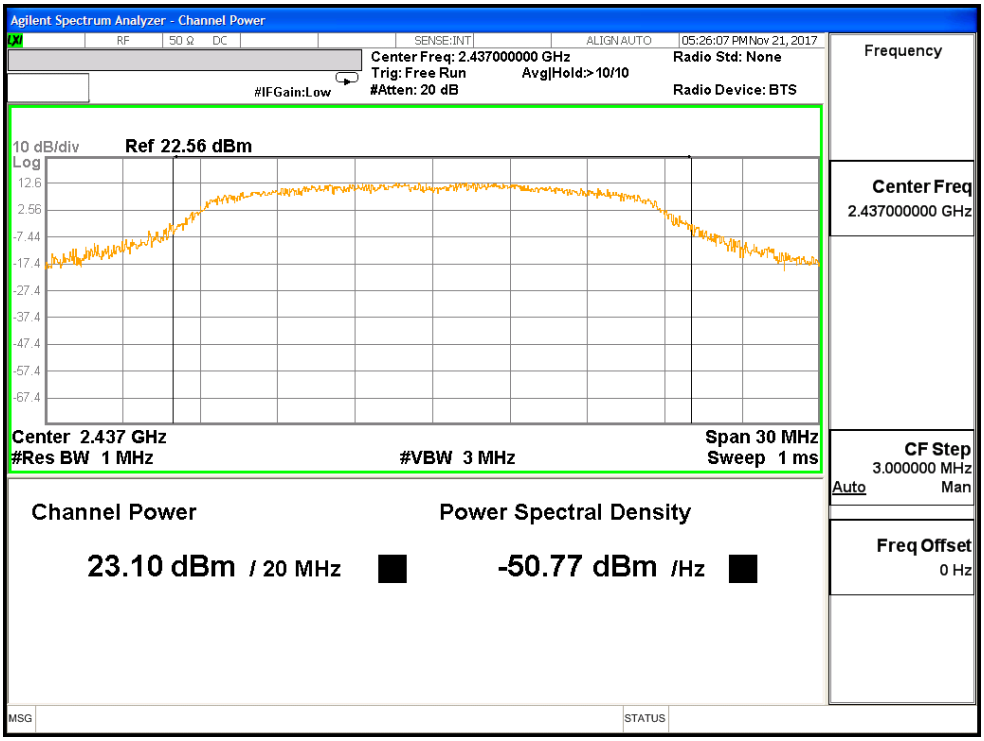



**Figure 3:** Maximum Transmitted Power, 2437 MHz at 11n HT20 mode

## *4.2 Occupied Bandwidth*

*The occupied bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency.*

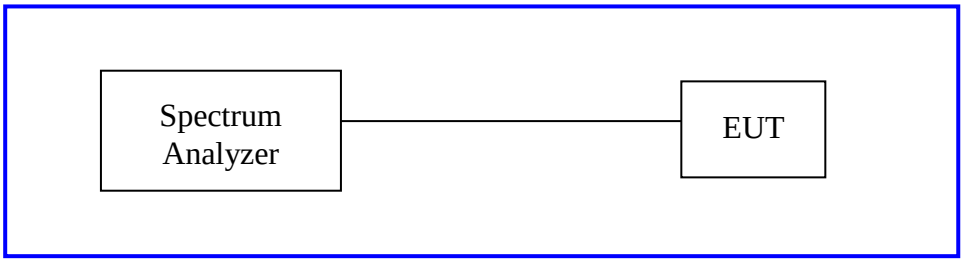
*The 99% bandwidth is the bandwidth in which 99% of the transmitted power occupied.*

*The minimum 6 dB bandwidth shall be at least 500 kHz.*

### 4.2.1 Test Method

The conducted method was used to measure the occupied bandwidth according to ANSI C63.10:2013 Section 11.8. The measurement was performed with modulation per CFR47 15.247(a) (2) 2017. Measurements were performed on 3 channels in each operating frequency range; 2400 MHz to 2483.5 MHz, a 6 dB bandwidth was used.

Test Setup:




### 4.2.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

**Table 4:** Occupied Bandwidth – Test Results

| | | |
|---|---|---|
| **Test Conditions:** Conducted Measurement, Normal Temperature | | |
| **Antenna Type:** Custom Integrated | | **Power Setting:** See test plan |
| **Max. Directional Gain:** + 1.9 dBi | | |
| **Signal State:** Modulated | | |
| **Ambient Temp.:** 22° C | | **Relative Humidity:**35% |
| **802.11b** | | |
| **Frequency (MHz)** | **6dB Bandwidth (MHz)** | **99% Bandwidth (MHz)** |
| 2412 | 9.106 | 13.985 |
| 2437 | 9.109 | 14.023 |
| 2462 | 9.108 | 14.008 |
| **Note:** None | | |
| **802.11g** | | |
| **Frequency (MHz)** | **6dB Bandwidth (MHz)** | **99% Bandwidth (MHz)** |
| 2412 | 15.120 | 16.295 |
| 2437 | 15.110 | 16.375 |
| 2462 | 15.110 | 16.313 |
| **Note:** None | | |

**Table 5:** Occupied Bandwidth – Test Results

| | | |
|---|---|---|
| **Test Conditions:** Conducted Measurement, Normal Temperature | | |
| **Antenna Type:** Custom Integrated | **Power Setting:** See test plan | |
| **Max. Directional Gain:** + 1.9 dBi | | |
| **Signal State:** Modulated | | |
| **Ambient Temp.:** 22° C | **Relative Humidity:**35% | |
| **802.11n** | | |
| **Frequency (MHz)** | **6dB Bandwidth (MHz)** | **99% Bandwidth (MHz)** |
| 2412 | 15.110 | 17.455 |
| 2437 | 15.110 | 17.520 |
| 2462 | 15.110 | 17.448 |
| **Note:** None | | |

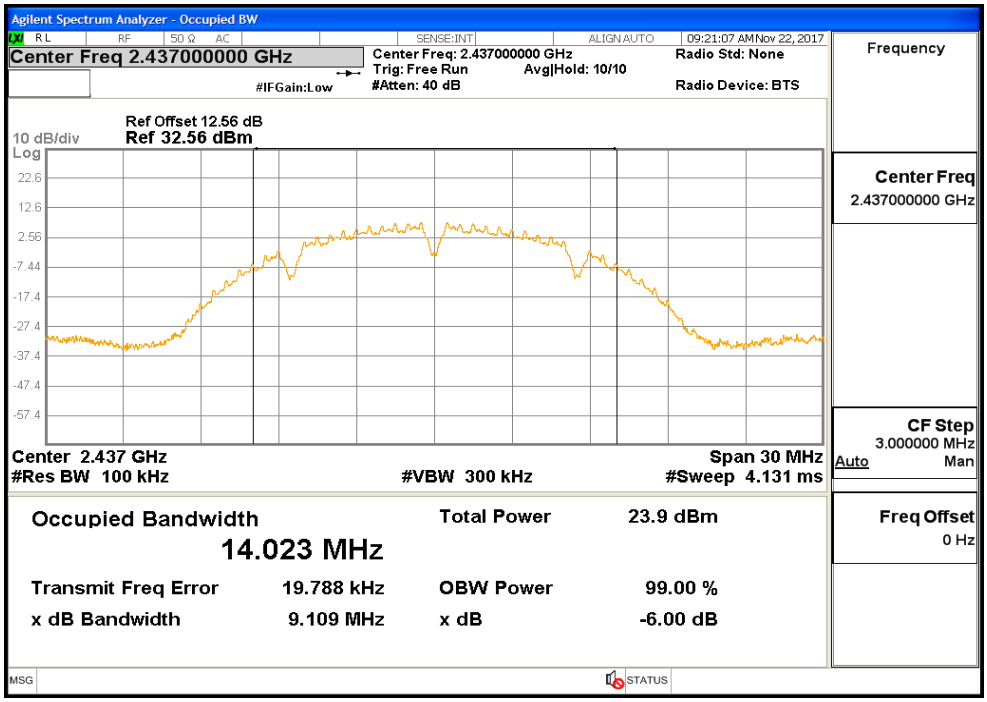



**Figure 4:** 6dB & 99% Occupied Bandwidth, 2437 MHz at 802.11b

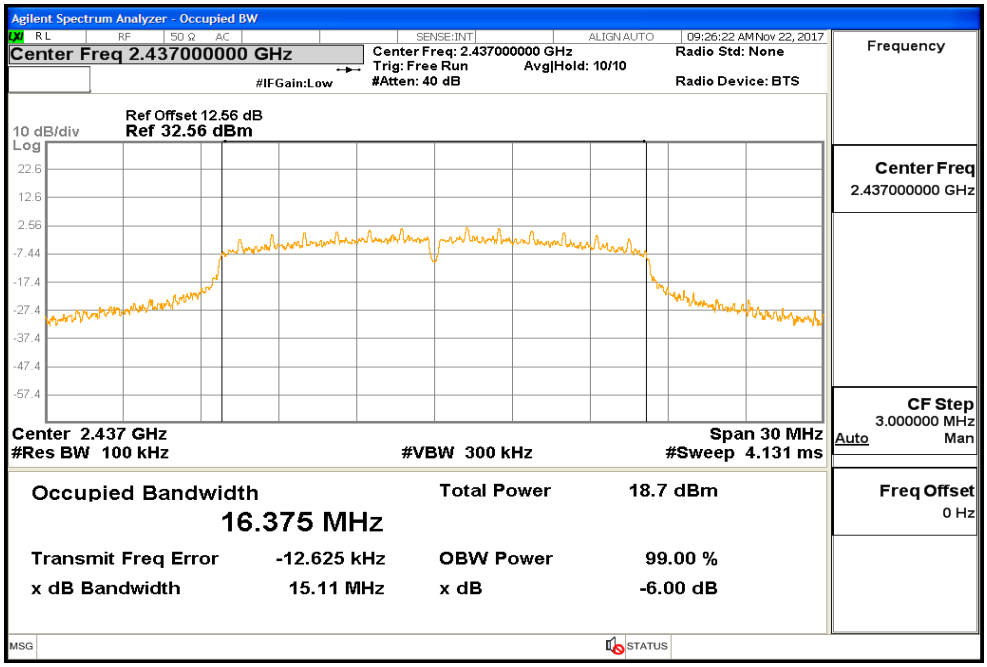



**Figure 5:** 6dB & 99% Occupied Bandwidth, 2437 MHz at 802.11g

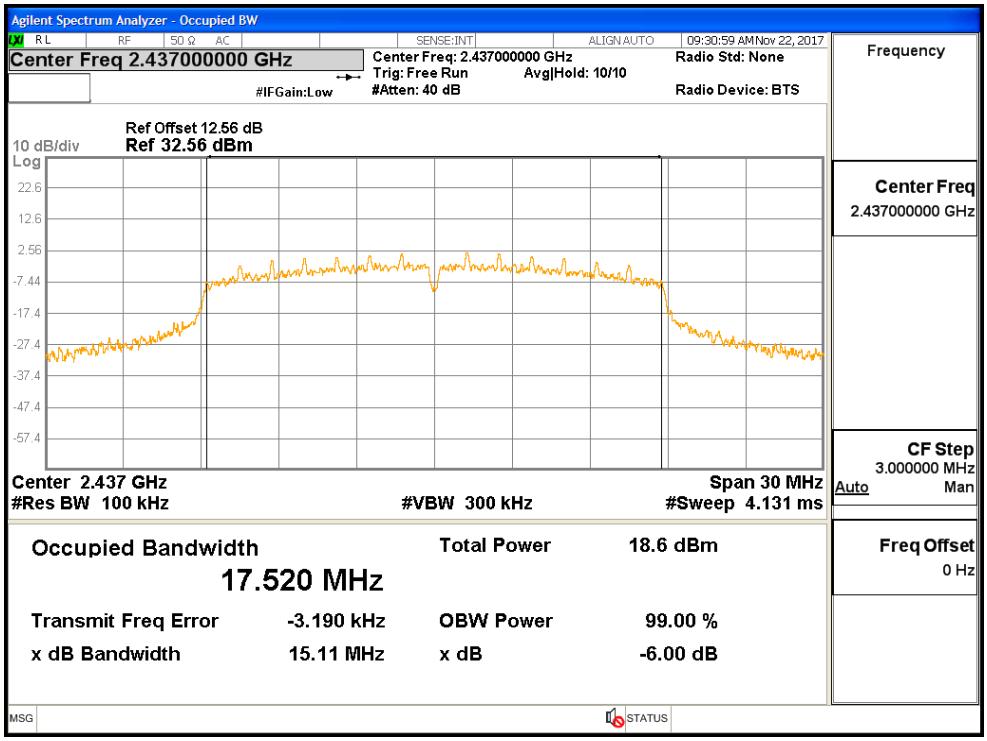



**Figure 6:** 6dB & 99% Occupied Bandwidth, 2437 MHz at HT20

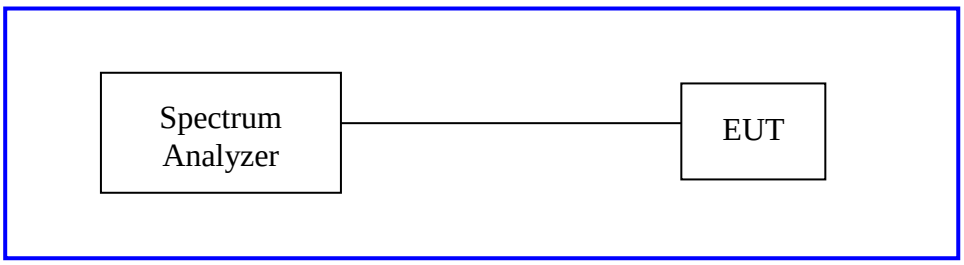
## *4.3 Peak Power Spectral Density*

*According to the CFR47 Part 15.247 (e), the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.*

### 4.3.1 Test Method

The conducted method was used to measure the channel power output per ANSI C63.10-2013 Section 11.10.3. The measurement was performed with modulation per CFR47 Part 15.247 (e).

Test Setup:




### 4.3.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

**Table 6:** Peak Power Spectral Density – Test Results

| | | | |
|---|---|---|---|
| **Test Conditions:** Conducted Measurement, Normal Temperature | | | |
| **Antenna Type:** Custom Integrated | | **Power Setting:** See test plan | |
| **Max. Directional Gain:** + 1.9 dBi | | | |
| **Signal State:** Modulated | | | |
| **Ambient Temp.:** 22° C | | **Relative Humidity:**35% | |
| **802.11b** | | | |
| **Frequency (MHz)** | **Max PPSD [dBm]** | **Limit [dBm]** | **Margin [dB]** |
| 2412 | -7.390 | 8.00 | -15.390 |
| 2437 | -7.387 | 8.00 | -15.387 |
| 2462 | -6.134 | 8.00 | -14.134 |
| **Note:** None | | | |
| **802.11g** | | | |
| **Frequency (MHz)** | **Max PPSD [dBm]** | **Limit [dBm]** | **Margin [dB]** |
| 2412 | -10.489 | 8.00 | -18.489 |
| 2437 | -13.206 | 8.00 | -21.206 |
| 2462 | -11.852 | 8.00 | -19.852 |
| **Note:** None | | | |

**Table 7:** Peak Power Spectral Density – Test Results Continues

| **Test Conditions:** Conducted Measurement, Normal Temperature | | | |
|---|---|---|---|
| **Antenna Type:** | | **Power Setting:** See test plan | |
| **Max. Directional Gain:** + 1.9 dBi | | | |
| **Signal State:** Modulated | | | |
| **Ambient Temp.:** 22° C | | **Relative Humidity:**35% | |
| **802.11n** | | | |
| **Frequency (MHz)** | **Max PPSD [dBm]** | **Limit [dBm]** | **Margin [dB]** |
| 2412 | -12.058 | 8.00 | -20.058 |
| 2437 | -11.728 | 8.00 | -19.728 |
| 2462 | -11.322 | 8.00 | -19.322 |
| **Note:** None | | | |

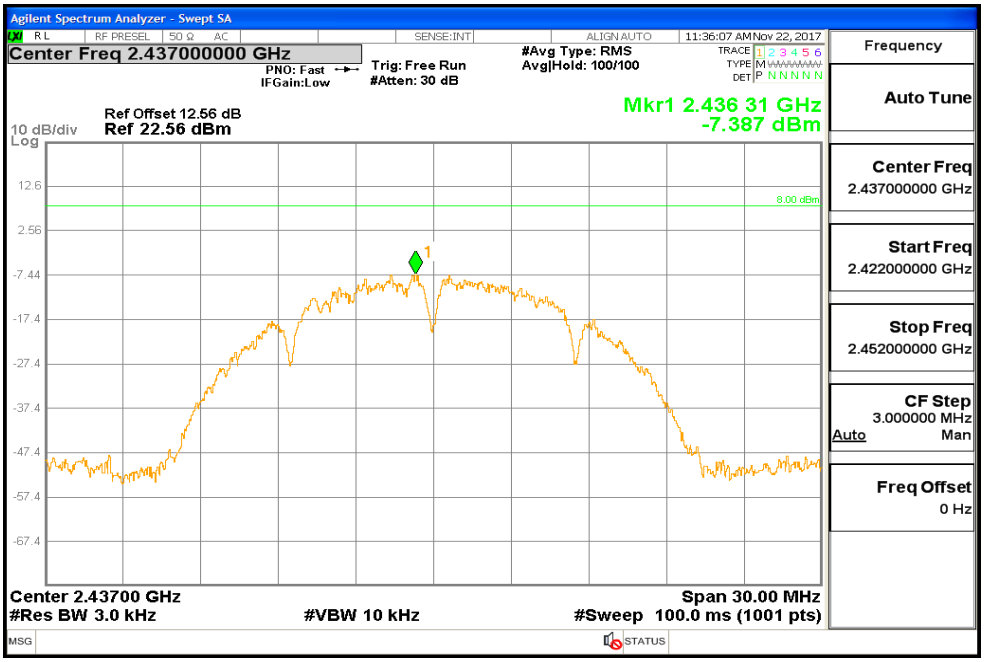



**Figure 7:** Power Spectral Density, 2437 MHz at 802.11b mode

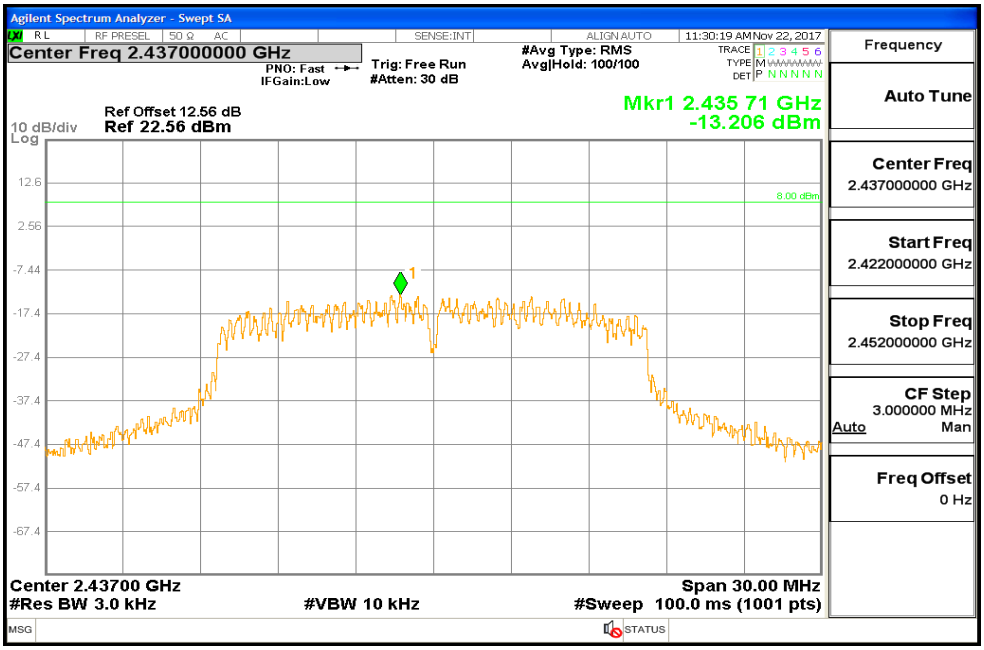



**Figure 8:** Power Spectral Density, 2437 MHz at 802.11g mode

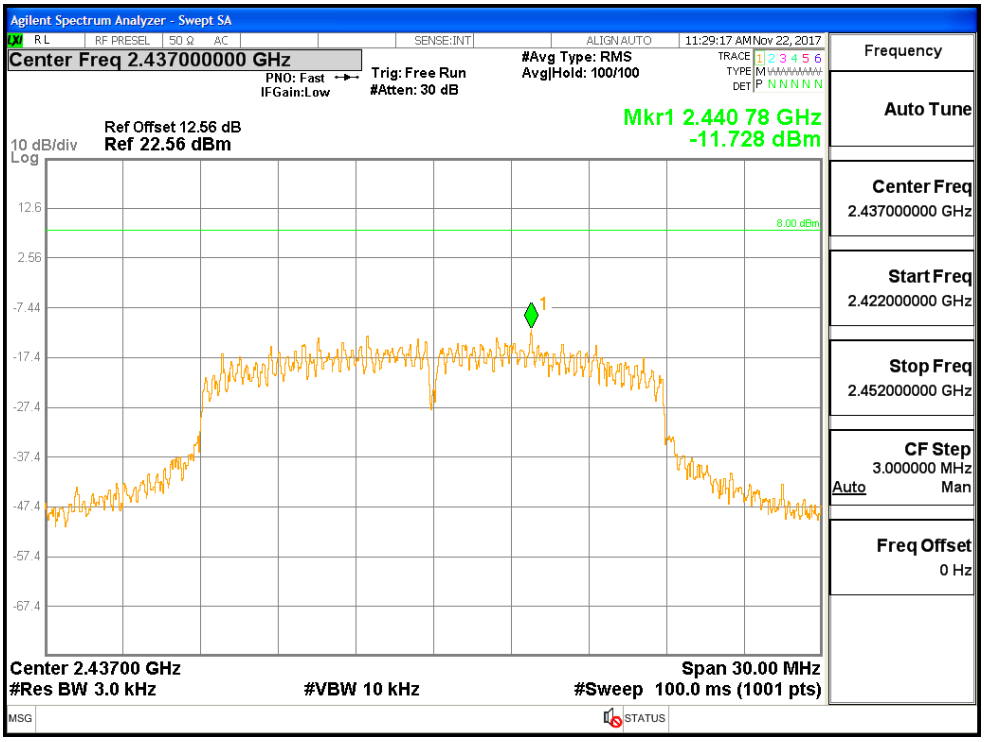



**Figure 9:** Power Spectral Density, 2437 MHz at HT20 mode

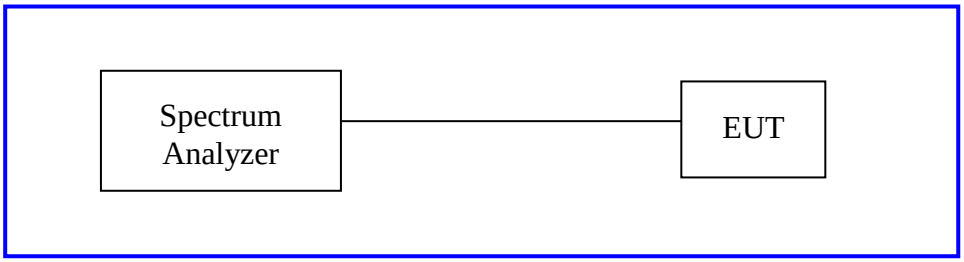
## *4.4 Out of Band Emissions*

*Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmitting mode; per requirement of CFR47 15.205, 15.209, 15.247(d).*

### 4.4.1 Test Method

The conducted method was used to measure the undesirable emission requirement. The measurement was performed with modulation.

Test Setup:



### 4.4.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

**Table 8:** Emissions at the Band-Edge – Test Results

| **Test Conditions:** Conducted Measurement, Normal Temperature | | | | | |
|---|---|---|---|---|---|
| **Antenna Type:** Custom Integrated | | | **Power Setting:** See test plan | | |
| **Max. Directional Gain:** + 1.9 dBi | | | | | |
| **Signal State:** Modulated | | | | | |
| **Ambient Temp.:** 22° C | | | **Relative Humidity:**35% | | |
| **Non-Restricted Frequency Band Emissions** | | | | | |
| **Freq. (MHz)** | **Mode** | **Measured (dBm)** | **Limit (dBm)** | **Plots** | **TX Freq. (MHz)** |
| 2400 | 11b mode | -23.02 | -13.26 | Fig. 13, 14 | Pass |
| 2483.5 | 11b mode | -22.40 | -12.69 | Fig. 15, 16 | Pass |
| 2400 | 11g mode | -26.15 | -16.08 | Fig. 17, 18 | Pass |
| 2483.5 | 11g mode | -25.40 | -15.45 | Fig. 19, 20 | Pass |
| 2400 | 11n HT20 mode | -25.58 | -16.31 | Fig. 21, 22 | Pass |
| 2483.5 | 11n HT20 mode | -27.21 | -16.05 | Fig. 23, 24 | Pass |
| **Note:** 1. The worst case of each data rate is recorded. | | | | | |

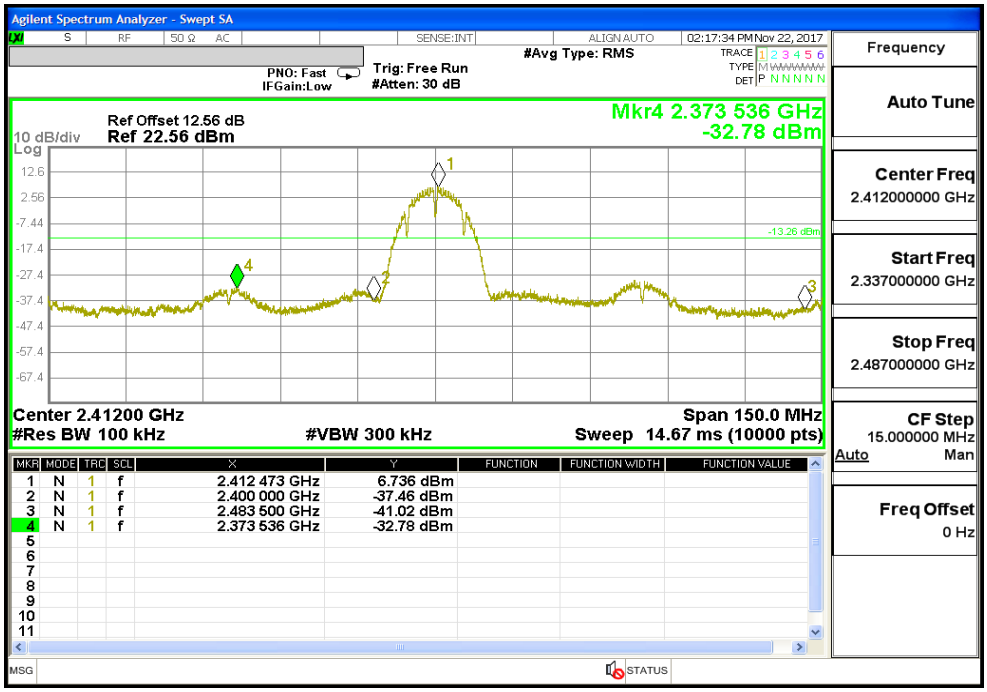



**Figure 10:** Measured Bandedge for 802.11b at 2412 MHz

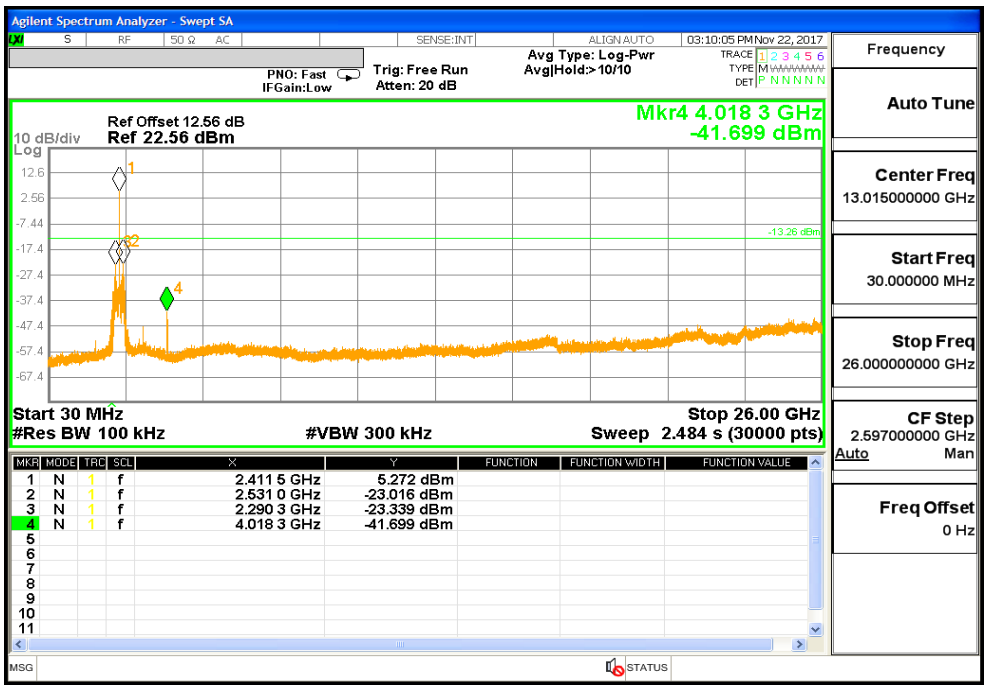



**Figure 11:** Out of Band Emissions for 802.11b at 2412 MHz

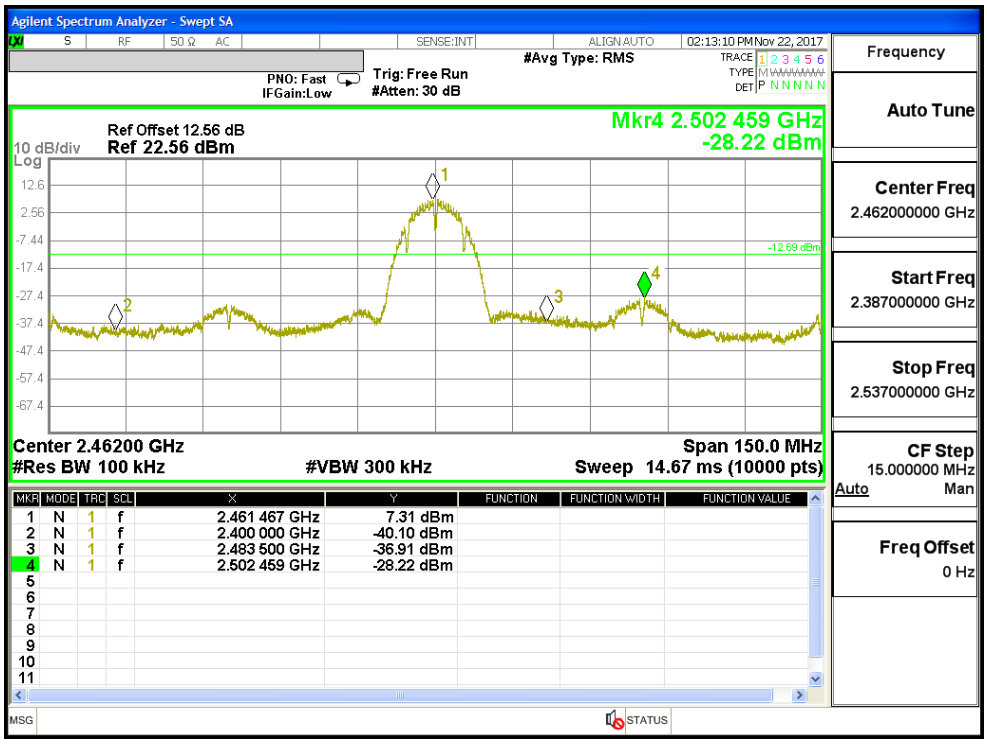



**Figure 12:** Measured Bandedge for 802.11b at 2462 MHz

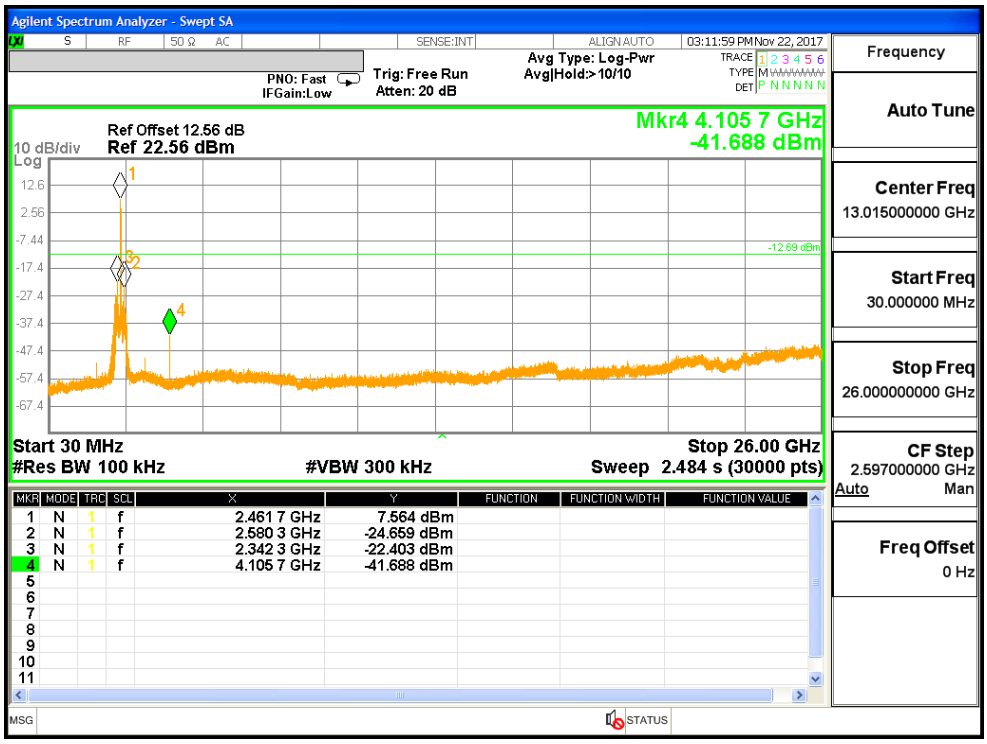



**Figure 13:** Out of Band Emissions for 802.11b at 2462 MHz

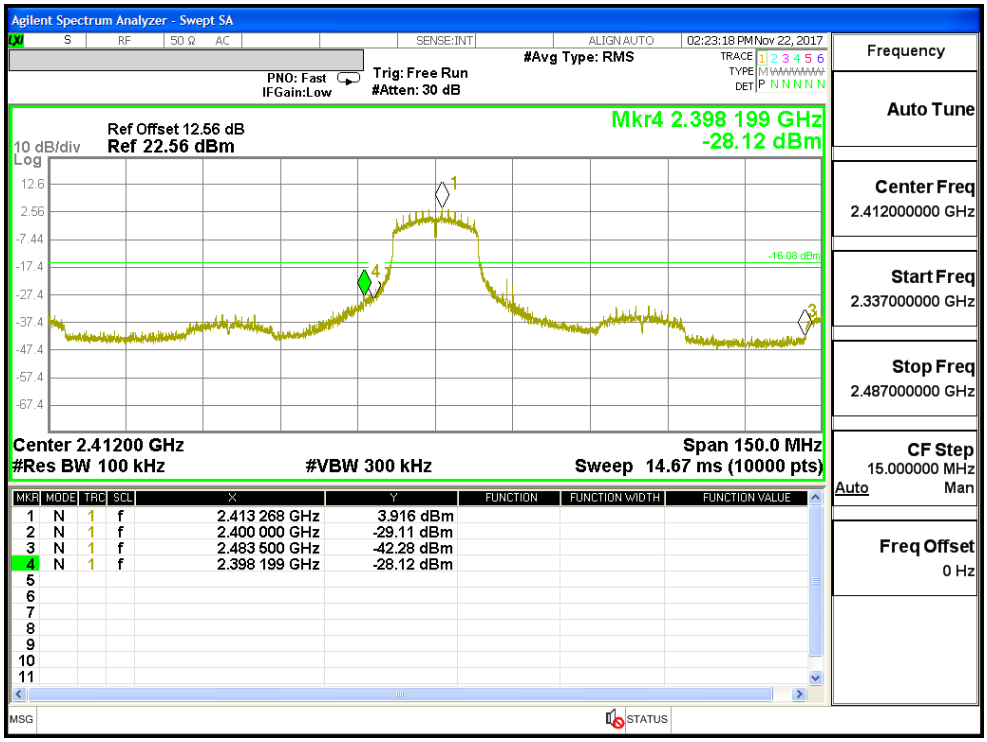



**Figure 14:** Measured Bandedge for 802.11g at 2412 MHz

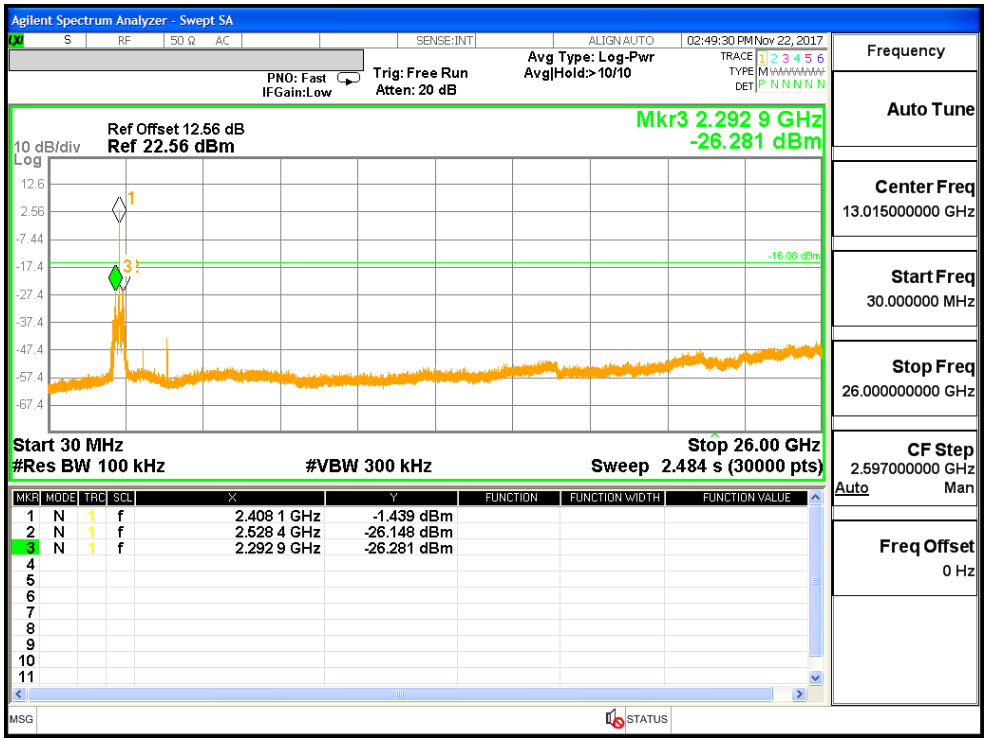



**Figure 15:** Out of Band Emissions for 802.11g at 2412 MHz

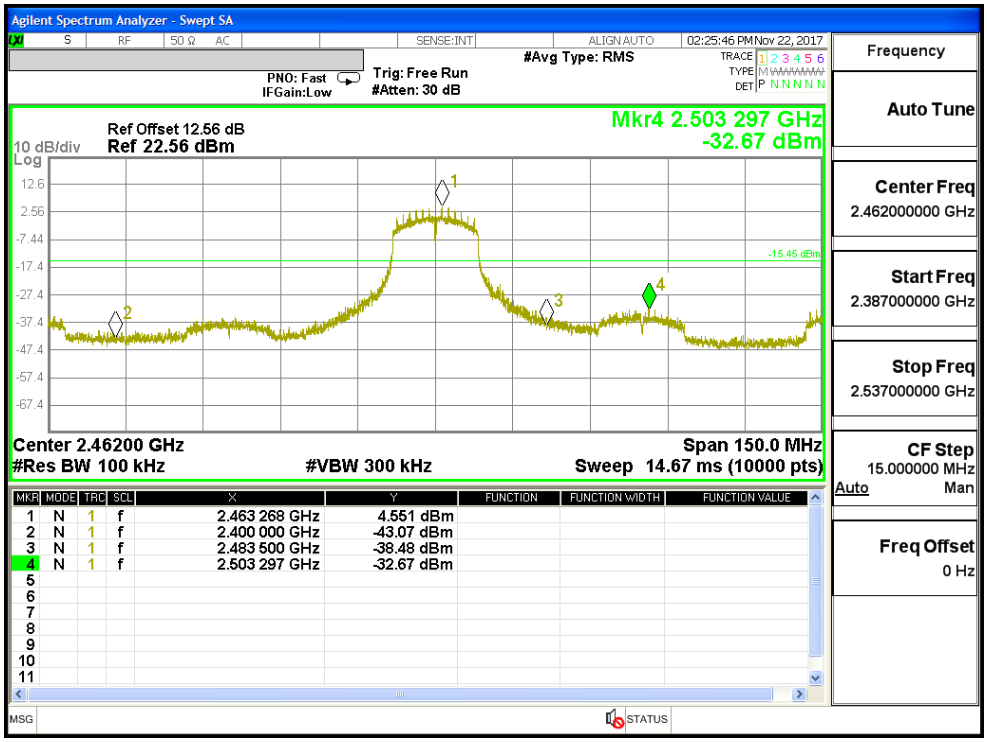



**Figure 16:** Measured Bandedge for 802.11g at 2462 MHz

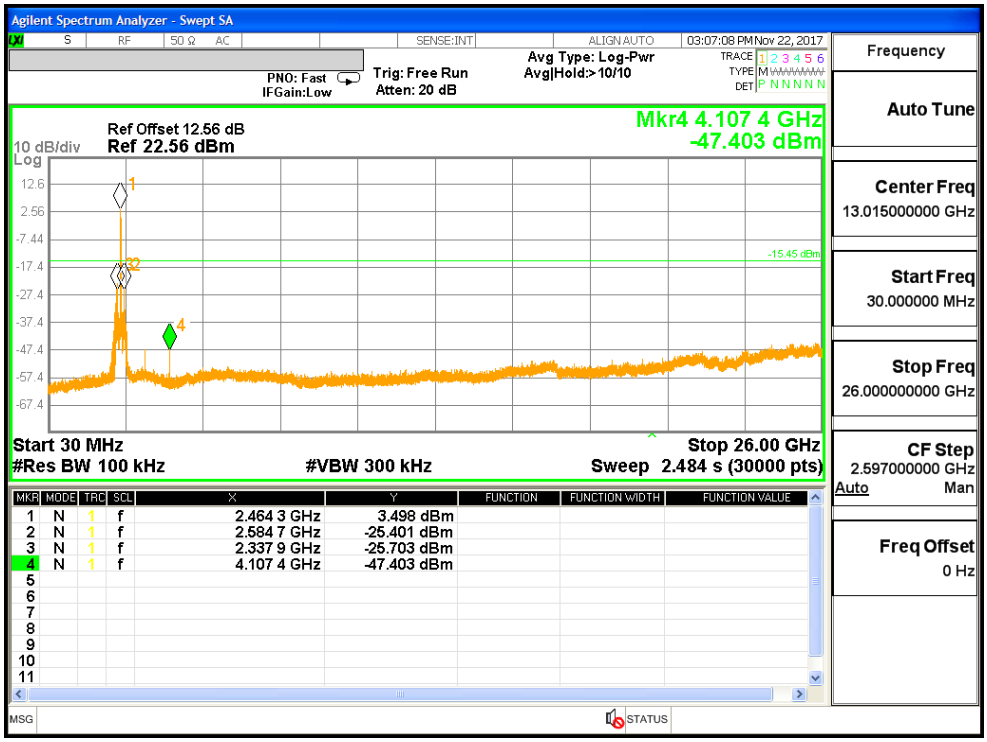



**Figure 17:** Out of Band Emissions for 802.11g at 2462 MHz

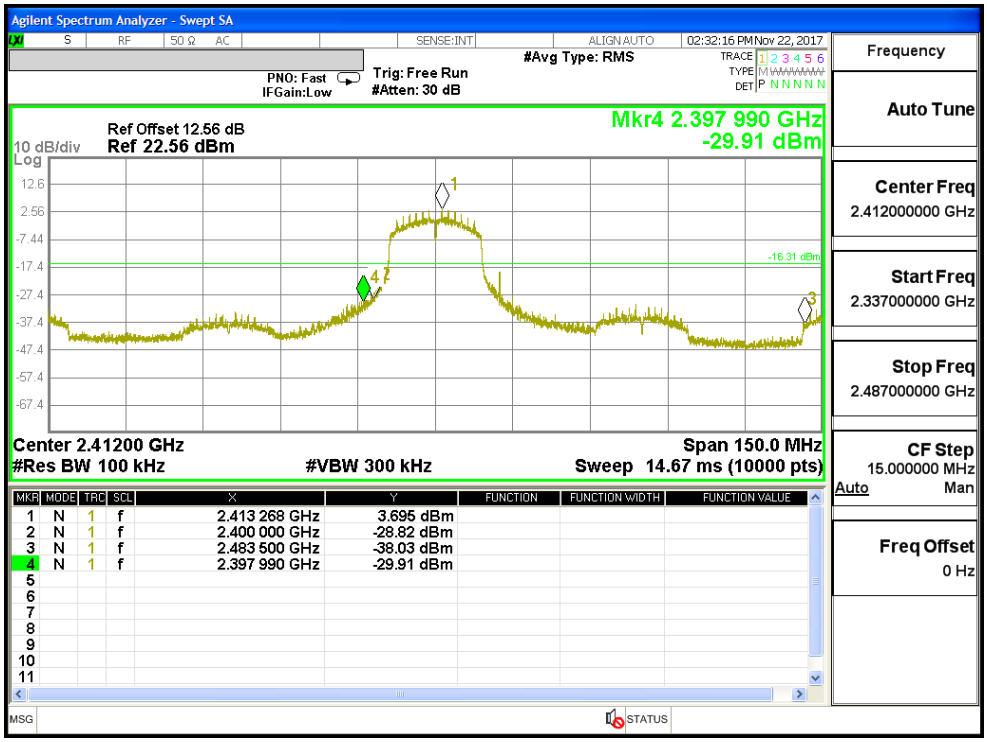



**Figure 18:** Measured Bandedge for HT20 at 2412 MHz

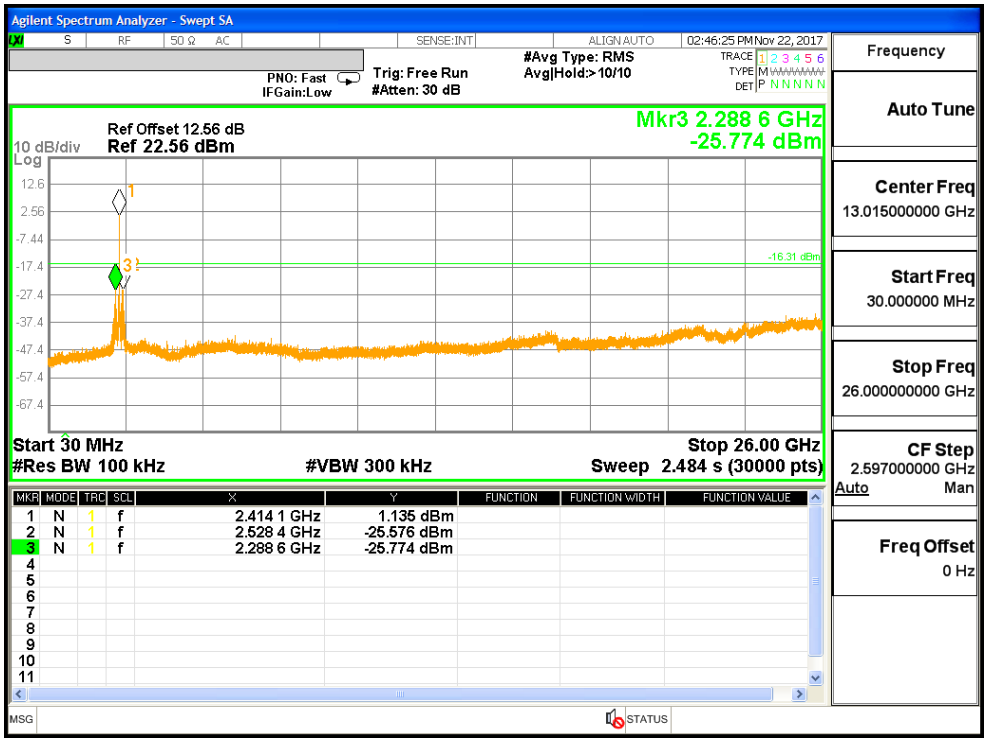



**Figure 19:** Out of Band Emissions for HT20 at 2412 MHz

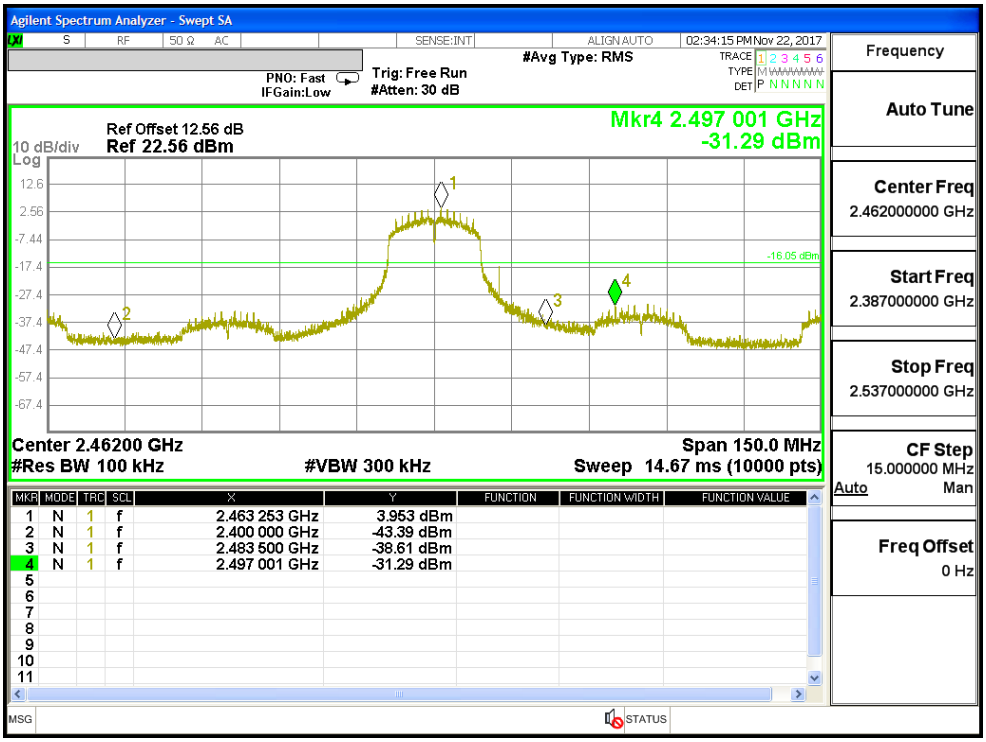



**Figure 20:** Measured Bandedge for HT20-MCS0 at 2462 MHz

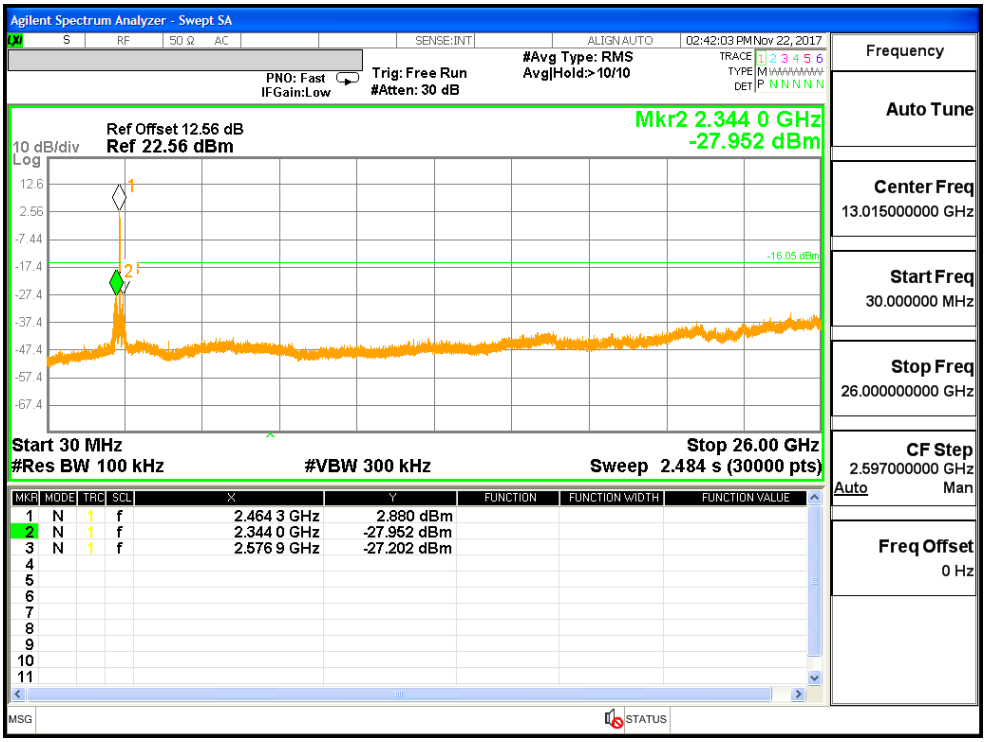



**Figure 21:** Out of Band Emissions for HT20-MCS0 at 2462 MHz

## *4.5 Transmit Spurious Emissions*

*Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmit mode; per requirement of CFR47 15.205, 15.209, 15.247(d).*

### 4.5.1 Test Methodology

#### *4.5.1.1 Preliminary Test*

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

#### *4.5.1.2 Final Test*

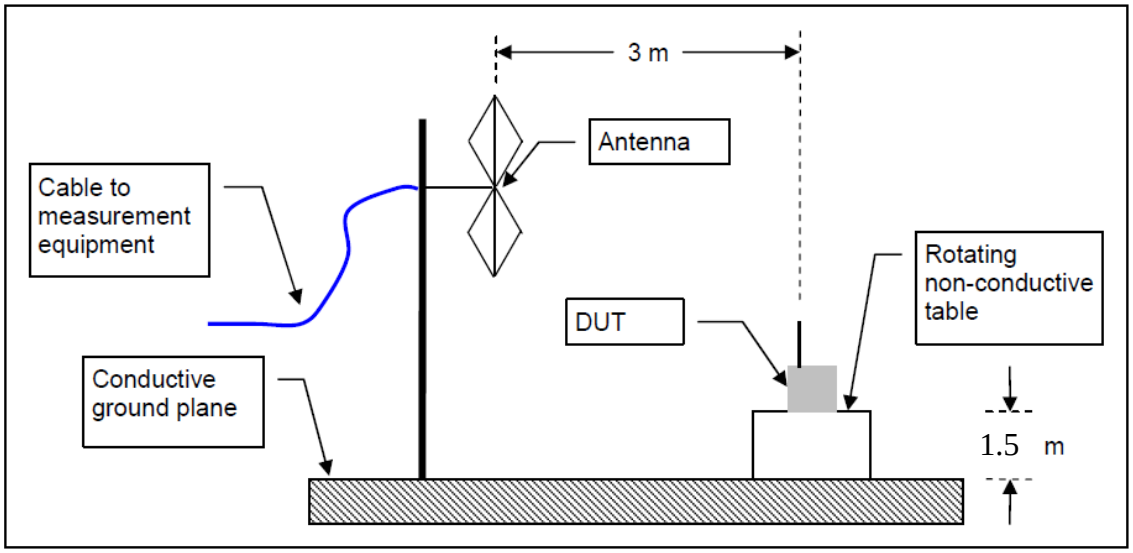
For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

#### *4.5.1.3 Deviations*

None.

**Test Setup:**




### 4.5.2 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209: 2015.

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30.0 | 30 | 30 |
| 30-88 | 100 ** | 3 |
| 88-216 | 150 ** | 3 |
| 216-960 | 200 ** | 3 |
| Above 960 | 500 | 3 |

All harmonics and spurious emission which are outside of the restricted band shall be 20dB below the in-band emission.

### 4.5.3 Test Results

The final measurement data was taken under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and test plan.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

**Table 9:** Transmit Spurious Emission at Band-Edge Requirements

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Test Conditions:** Radiated Measurement | | | | | | | | |
| **Antenna Type:** Custom Integrated | | | | **Power Setting:** See test plan | | | | |
| **Max. Directional Gain:** + 1.9 dBi | | | | | | | | |
| **Signal State:** Modulated | | | | | | | | |
| **Ambient Temp.:** 23° C | | | | **Relative Humidity:**37% | | | | |
| **Band-Edge Results** | | | | | | | | |
| Freq. (MHz) | Level (dBu V/m) | Pol. (H/V) | Limit (dBuV/m) | Margin (dB) | Det. | Table Deg. | Tower (cm) | Note |
| 2389.39 | 52.14 | V | 74 | -21.86 | Pk | 280 | 206 | PLOT 29 |
| 2390.00 | 42.29 | V | 54 | -11.71 | Ave | 280 | 206 | PLOT 30 |
| 2389.52 | 52.52 | H | 74 | -21.48 | Pk | 209 | 326 | PLOT 31 |
| 2390.00 | 40.20 | H | 54 | -13.80 | Ave | 209 | 326 | PLOT 32 |
| 2486.20 | 52.54 | V | 74 | -21.46 | Pk | 106 | 201 | PLOT 33 |
| 2487.31 | 41.96 | V | 54 | -12.04 | Ave | 106 | 201 | PLOT 34 |
| 2487.69 | 53.41 | H | 74 | -20.59 | Pk | 108 | 204 | PLOT 35 |
| 2488.10 | 42.24 | H | 54 | -11.76 | Ave | 108 | 204 | PLOT 36 |
| 2390.00 | 52.00 | V | 74 | -22.00 | Pk | 335 | 351 | PLOT 37 |
| 2390.00 | 43.82 | V | 54 | -10.18 | Ave | 335 | 351 | PLOT 38 |
| 2390.00 | 51.92 | H | 74 | -22.08 | Pk | 344 | 353 | PLOT 39 |
| 2390.00 | 43.58 | H | 54 | -10.42 | Ave | 344 | 353 | PLOT 40 |
| 2483.50 | 52.14 | V | 74 | -21.86 | Pk | 327 | 347 | PLOT 41 |
| 2483.50 | 44.00 | V | 54 | -10.00 | Ave | 327 | 347 | PLOT 42 |
| 2483.50 | 52.54 | H | 74 | -21.46 | Pk | 334 | 345 | PLOT 43 |
| 2483.50 | 43.93 | H | 54 | -10.07 | Ave | 334 | 345 | PLOT 44 |
| 2390.00 | 51.83 | V | 74 | -22.17 | Pk | 116 | 215 | PLOT 45 |
| 2390.00 | 43.53 | V | 54 | -10.47 | Ave | 116 | 215 | PLOT 46 |
| 2390.00 | 52.20 | H | 74 | -21.80 | Pk | 114 | 210 | PLOT 47 |
| 2390.00 | 43.23 | H | 54 | -10.77 | Ave | 114 | 210 | PLOT 48 |

| Band-Edge Results, continue | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Freq. (MHz) | Level (dBuV /m) | Pol. (H/V) | Limit (dBuV/m) | Margin (dB) | Det. | Table Deg. | Tower (cm) | Note |
| 2483.50 | 52.61 | V | 74 | -21.39 | Pk | 125 | 214 | PLOT 49 |
| 2483.50 | 43.54 | V | 54 | -10.46 | Ave | 125 | 214 | PLOT 50 |
| 2483.50 | 52.70 | H | 74 | -21.30 | Pk | 122 | 226 | PLOT 51 |
| 2483.50 | 43.64 | H | 54 | -10.36 | Ave | 122 | 226 | PLOT 52 |

**Note:** 1. The emissions were measured at the adjacent restricted band of the fundamental signal.
2. All the band-edge measurements met the restricted band requirements of CFR47 15.205.

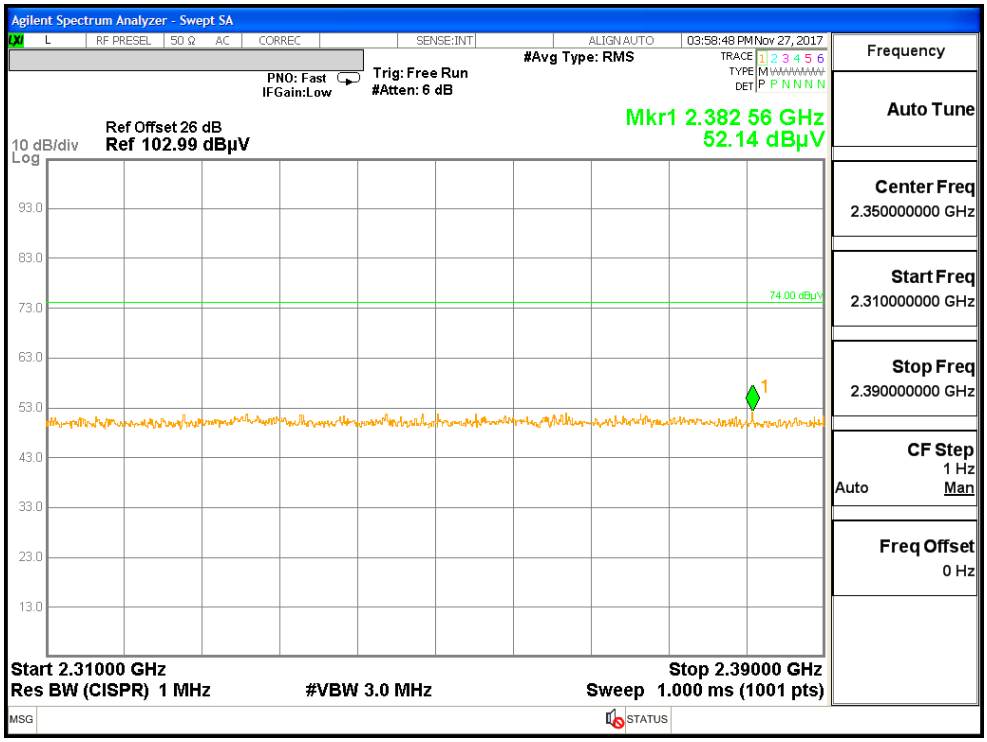



**Figure 22:** Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11b – Vert. (Pk)

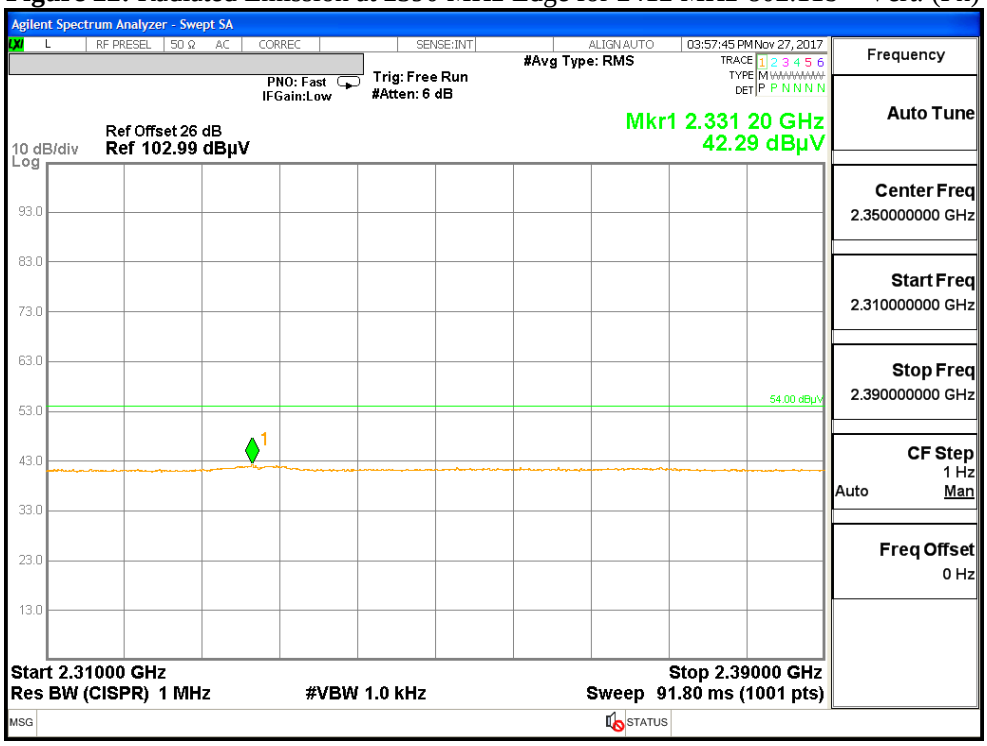



**Figure 23:** Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11b – Vert. (Ave)

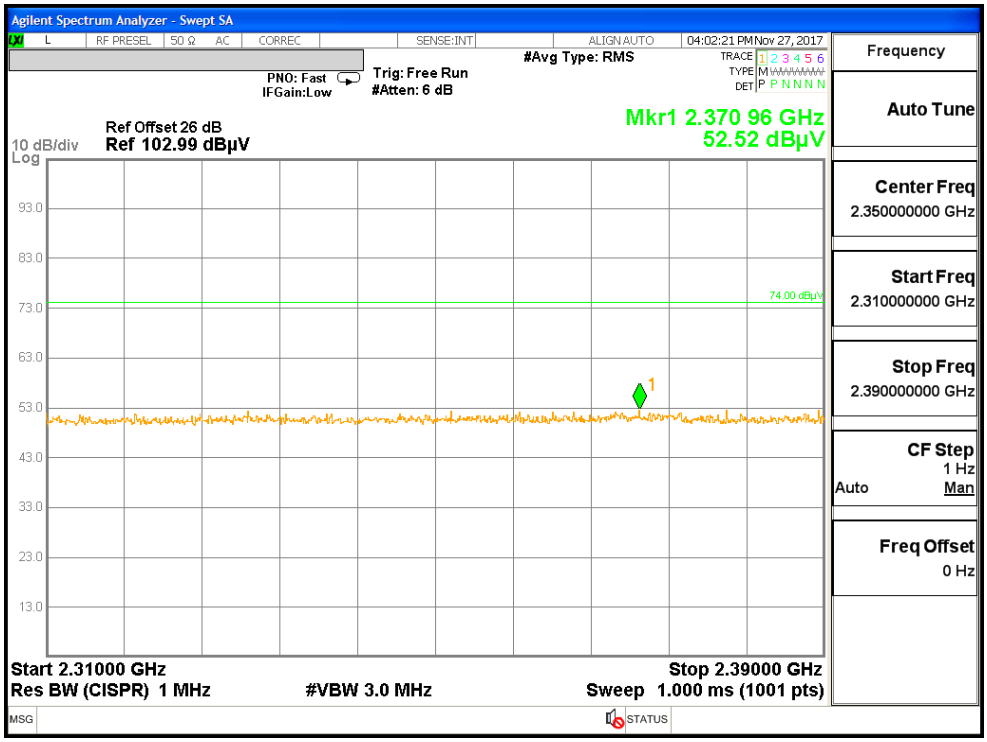



**Figure 24:** Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11b – Horz. (Pk)

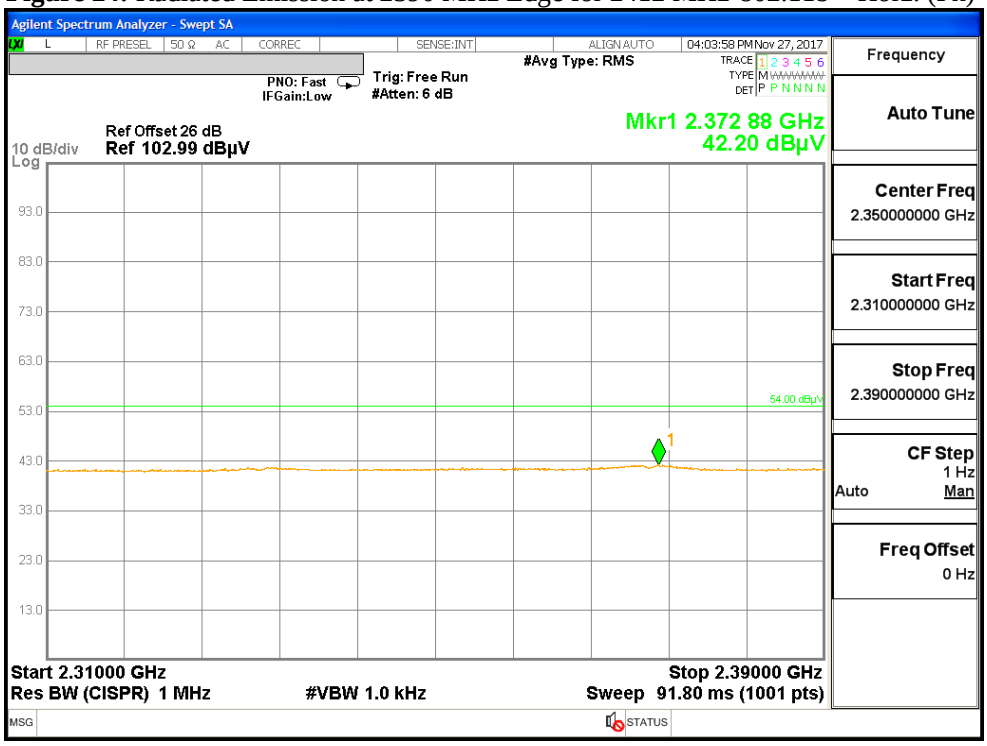



**Figure 25:** Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11b – Horz. (Ave)

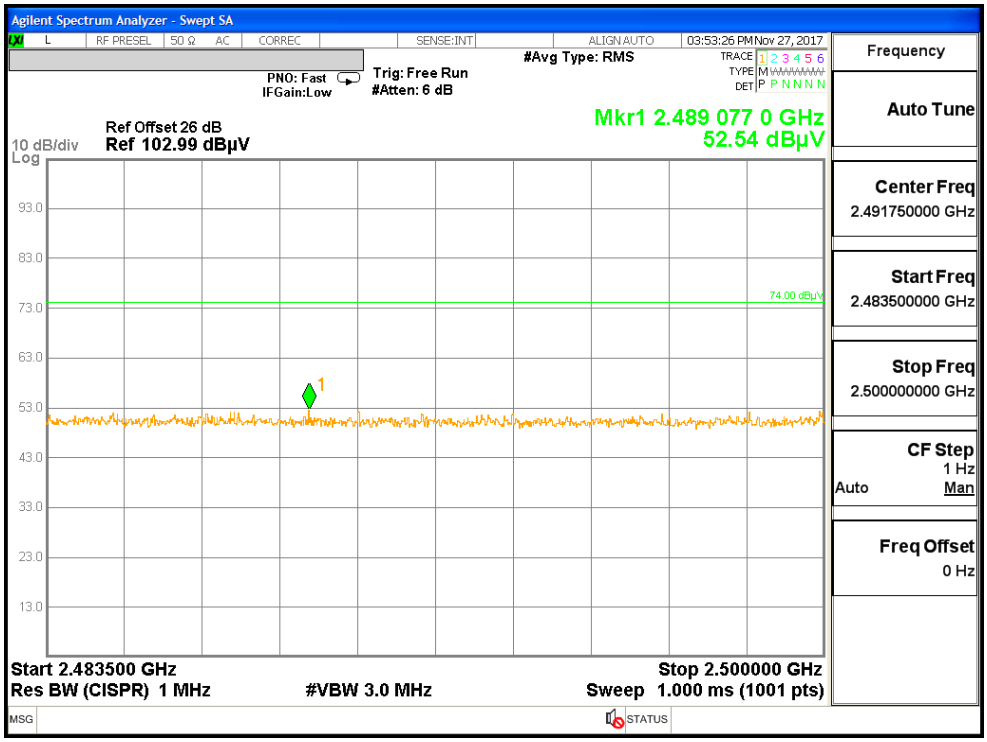



**Figure 26:** Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11b – Vert. (Pk)

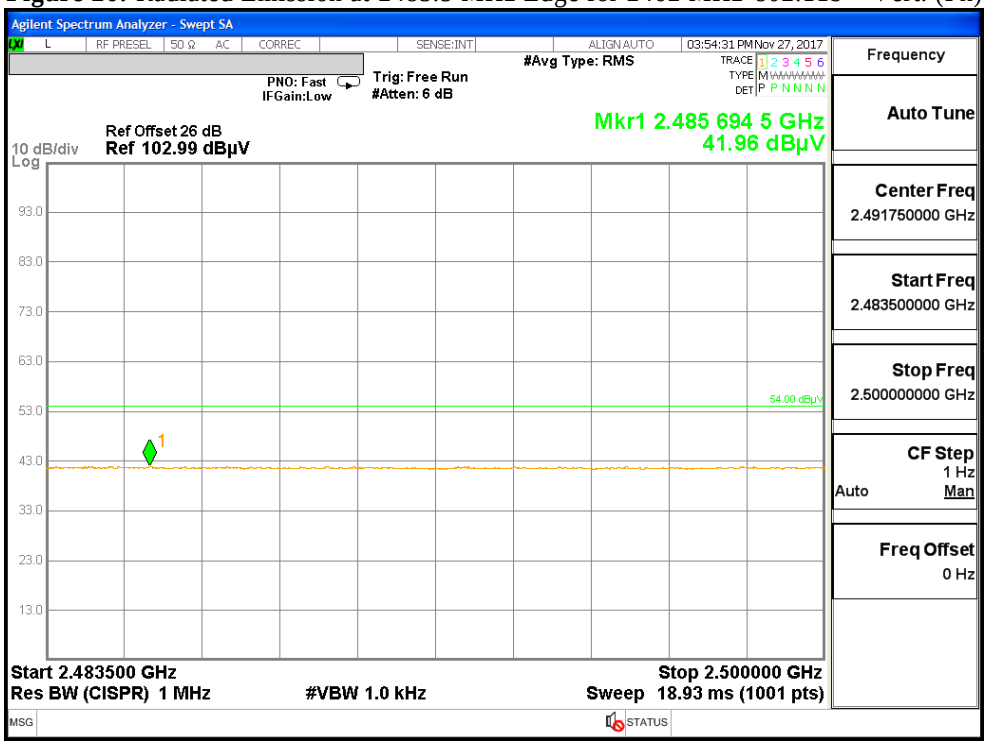



**Figure 27:** Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11b – Vert. (Ave)

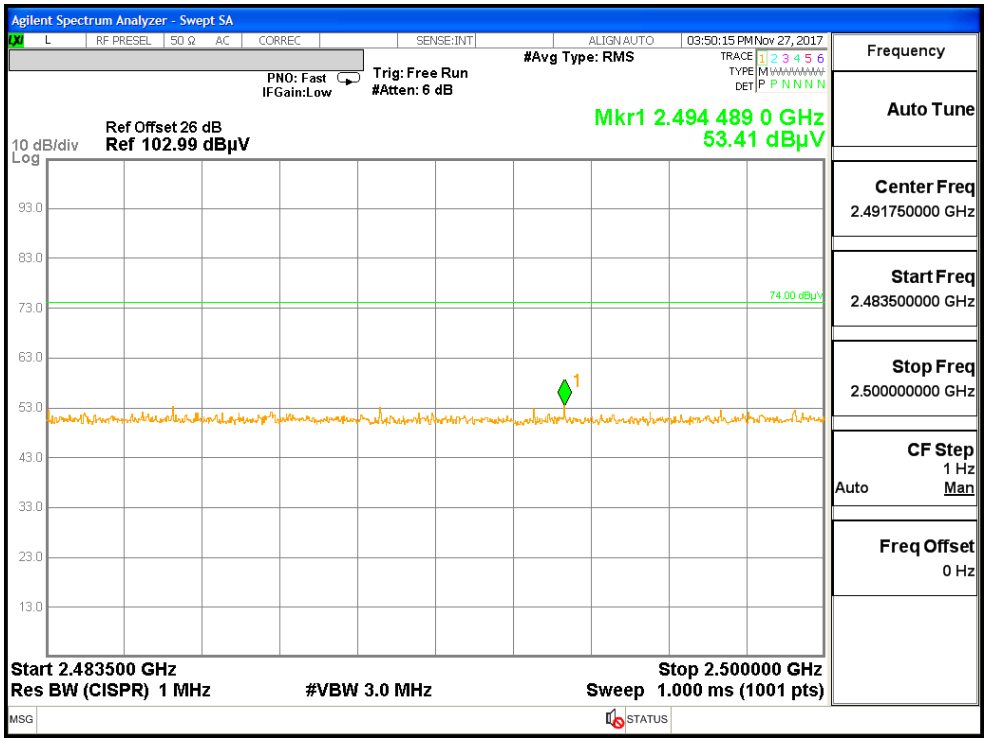



**Figure 28:** Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11b – Horz. (Pk)

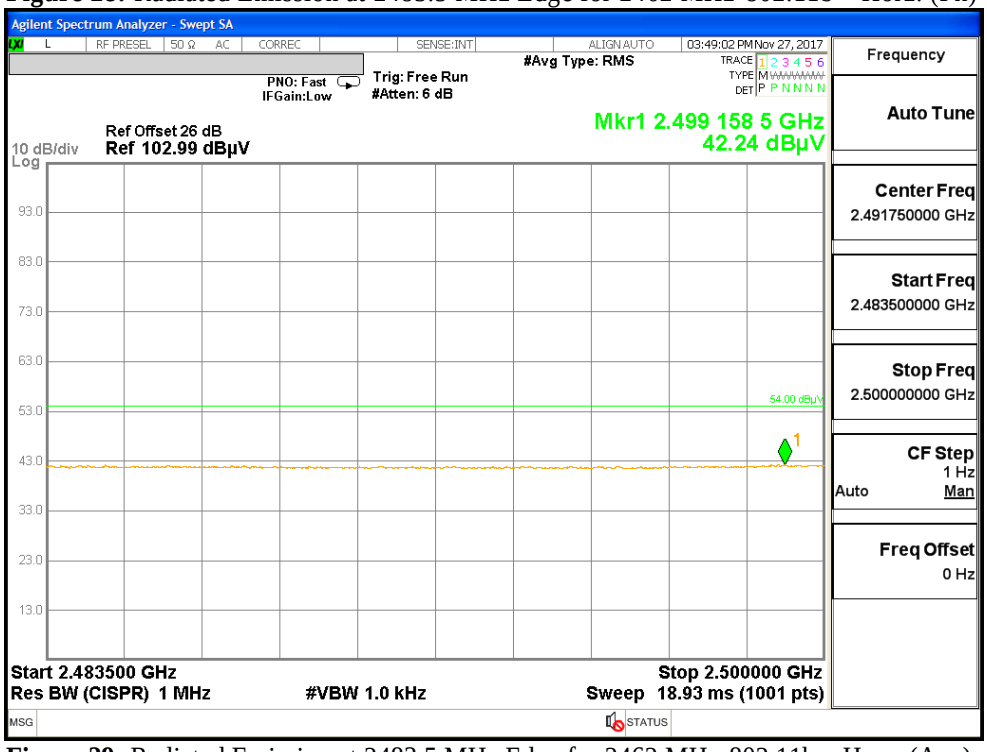



**Figure 29:** Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11b – Horz. (Ave)

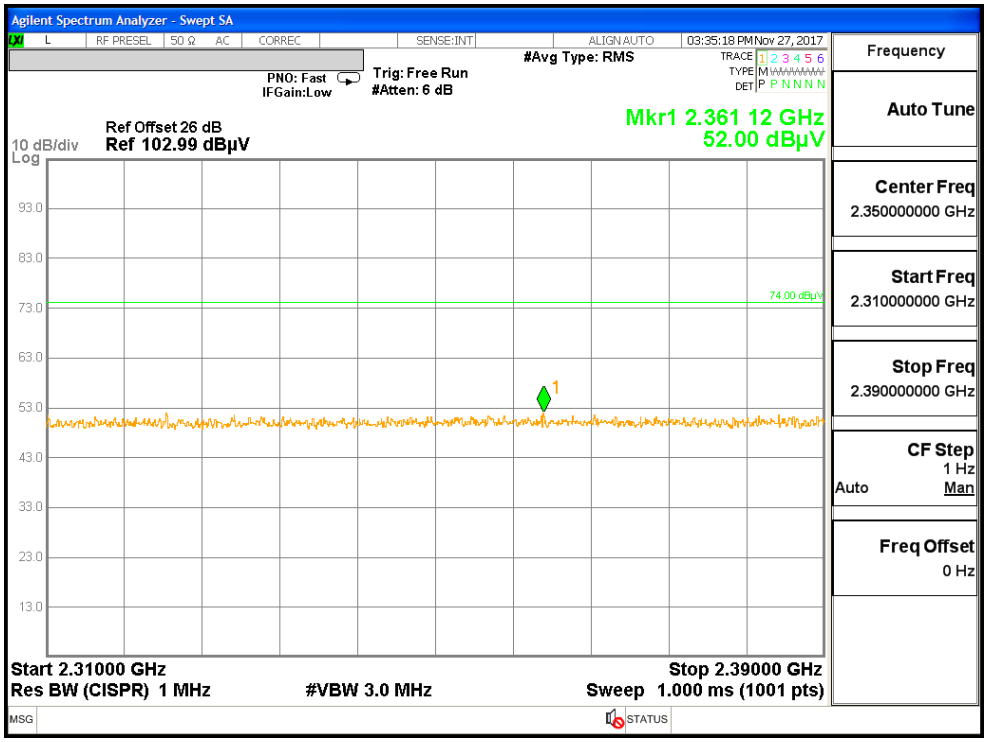



**Figure 30:** Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11g – Vert. (Pk)

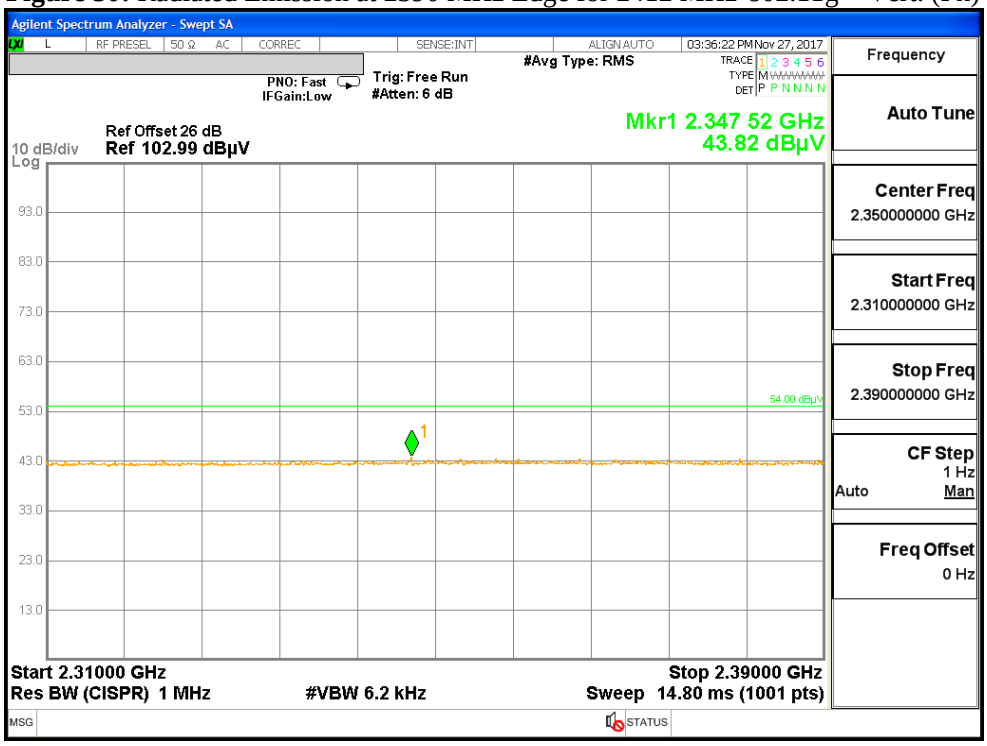



**Figure 31:** Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11g – Vert. (Ave)

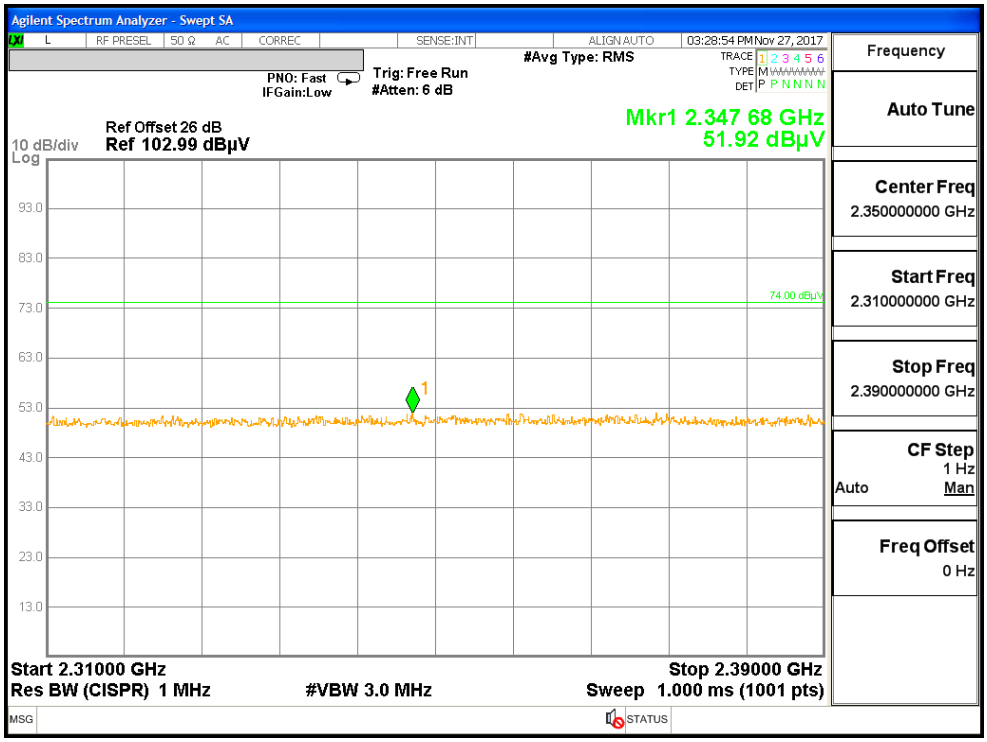



**Figure 32:** Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11g – Horz. (Pk)

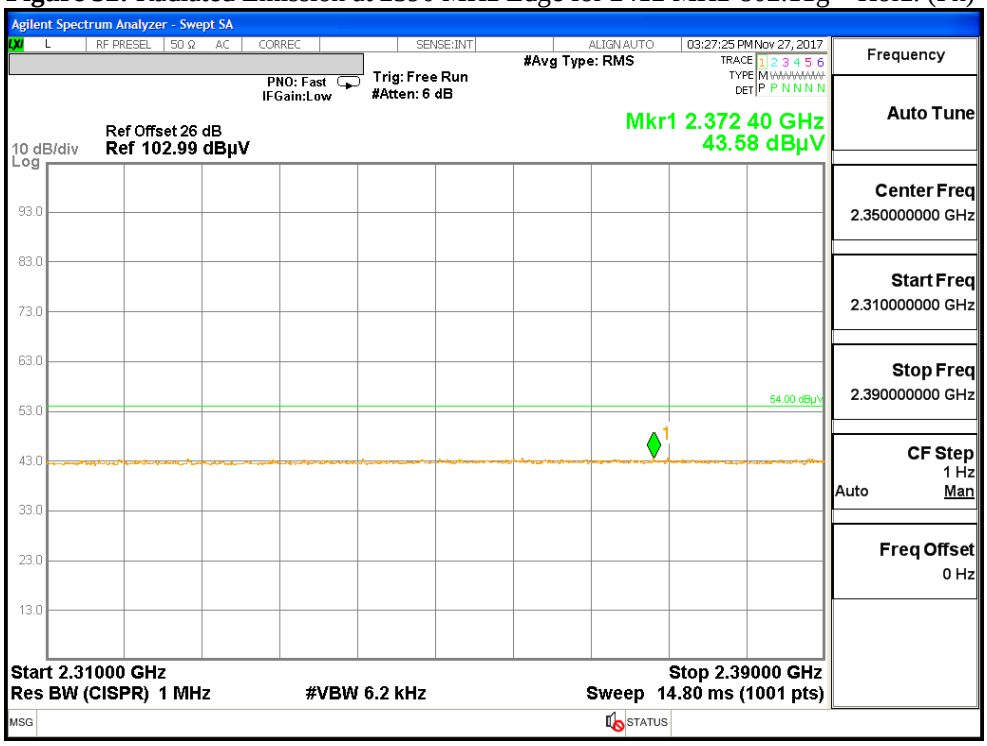



**Figure 33:** Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11g – Horz. (Ave)

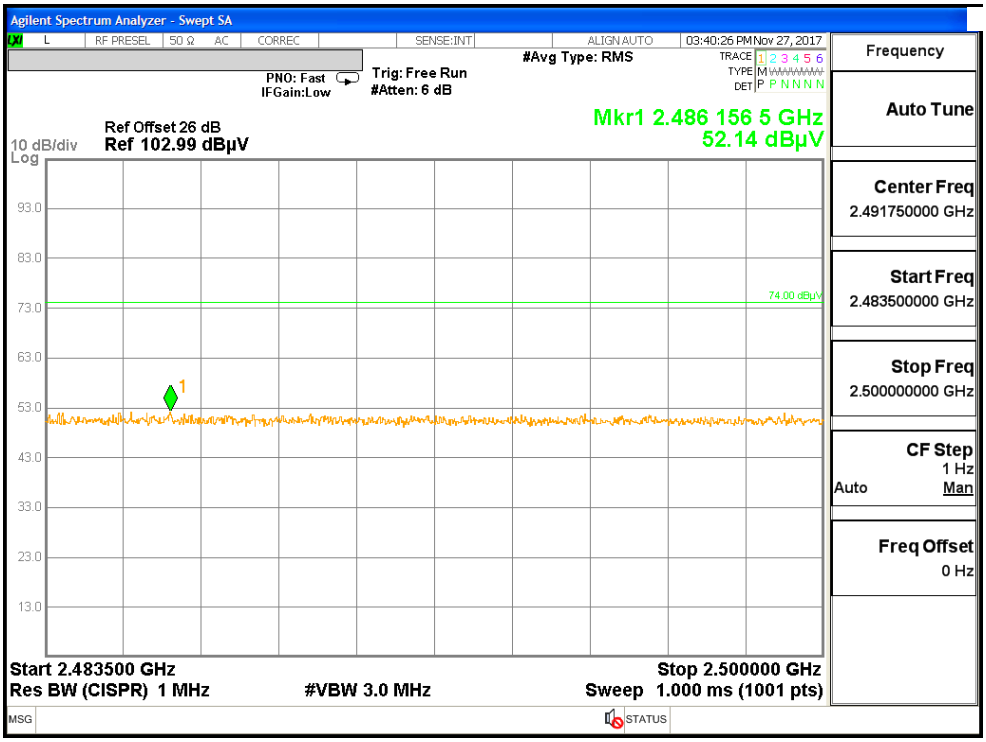



**Figure 34:** Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11g – Vert. (Pk)

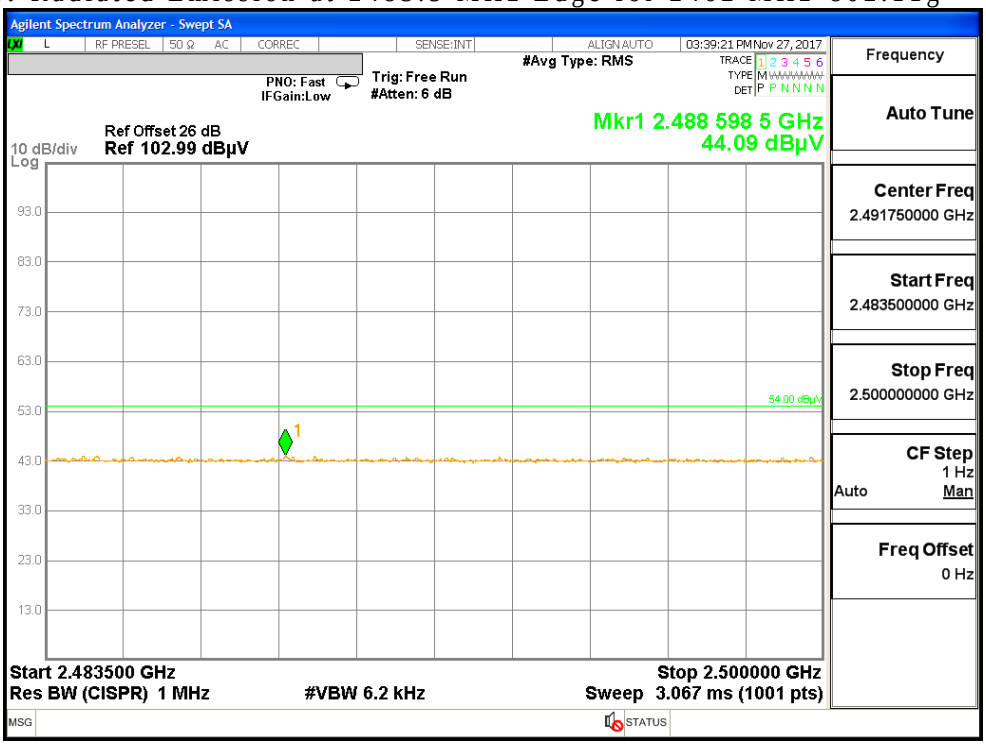



**Figure 35:** Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11g – Vert. (Ave)

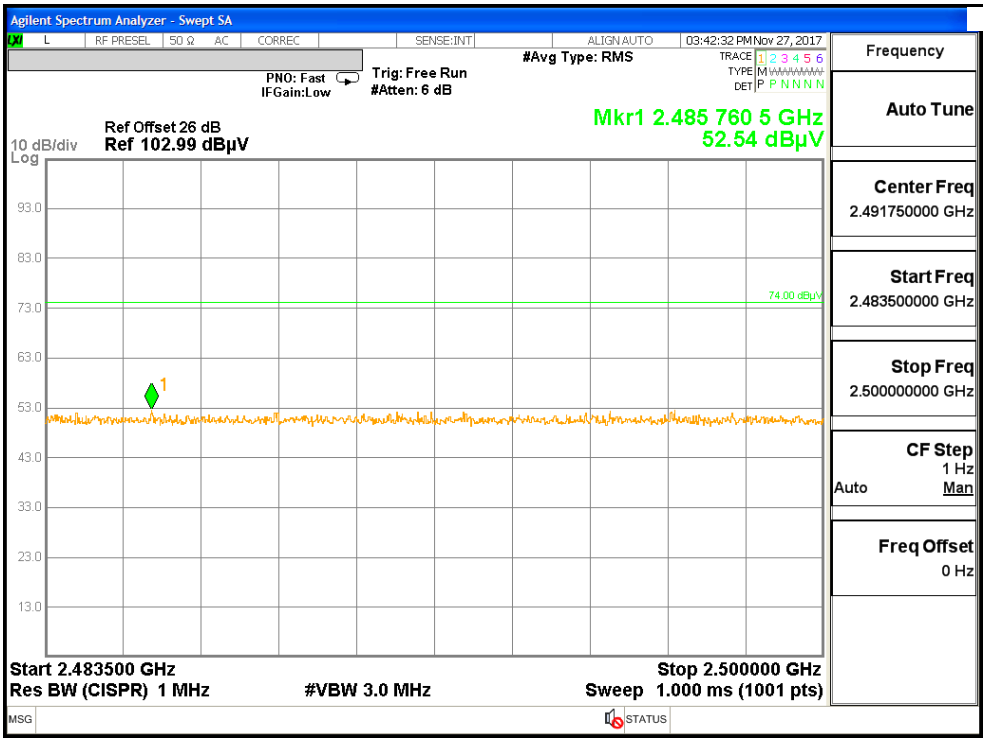



**Figure 36:** Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11g – Horz. (Pk)

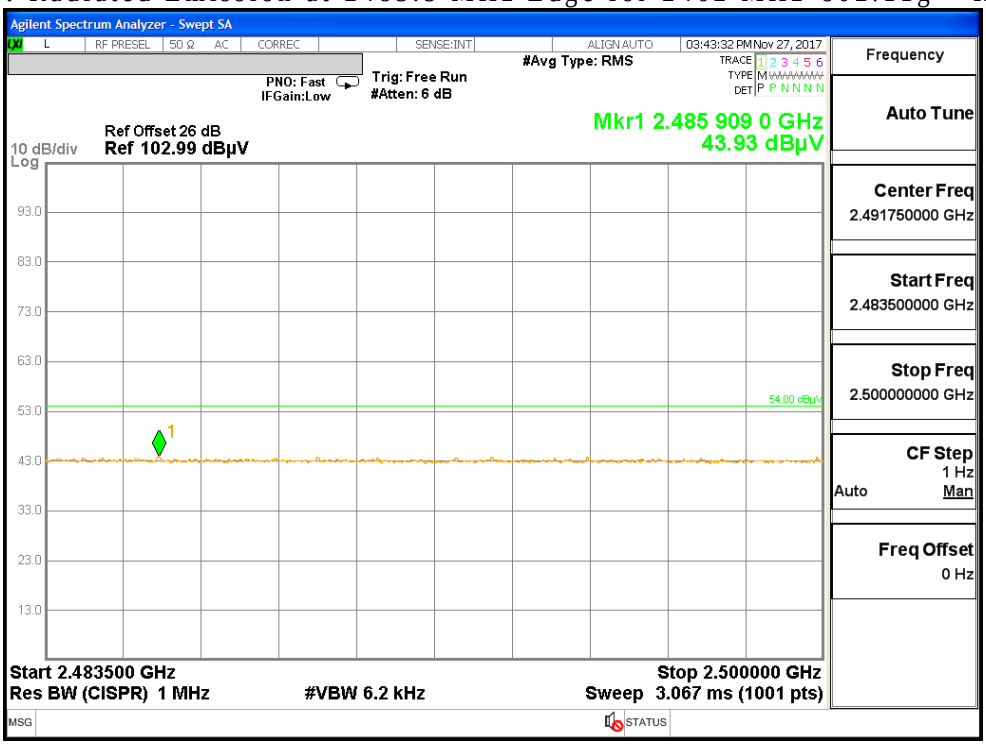



**Figure 37:** Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11g – Horz. (Ave)

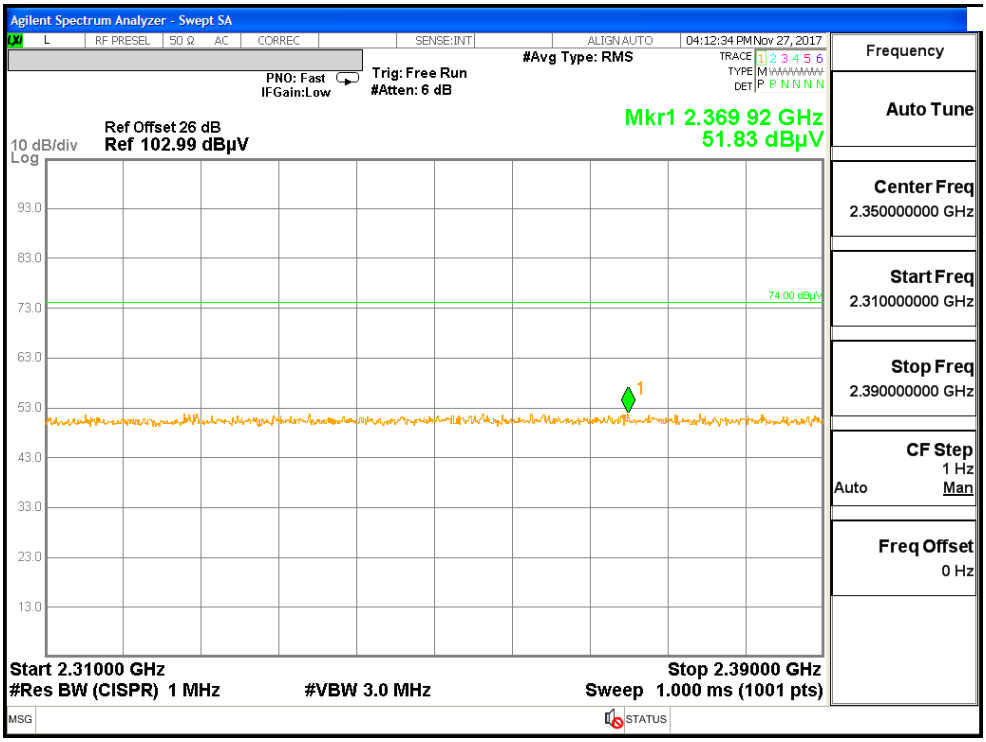



**Figure 38:** Radiated Emission at 2390 MHz Edge for 2412 MHz-HT20 – Vert. (Pk)

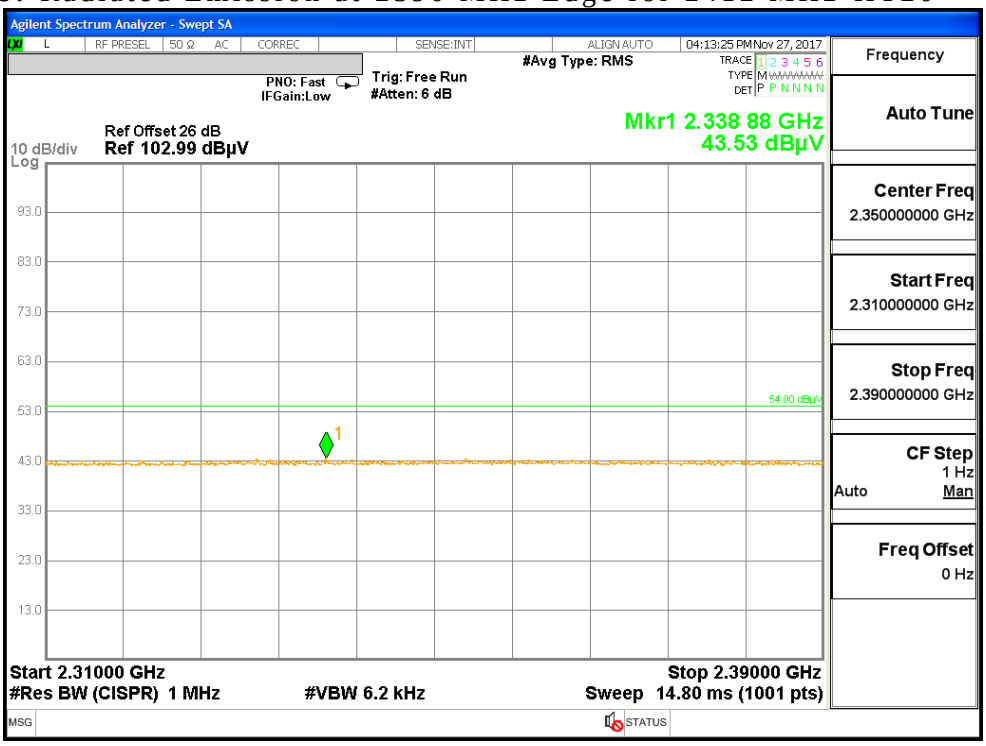



**Figure 39:** Radiated Emission at 2390 MHz Edge for 2412 MHz-HT20 – Vert. (Ave)

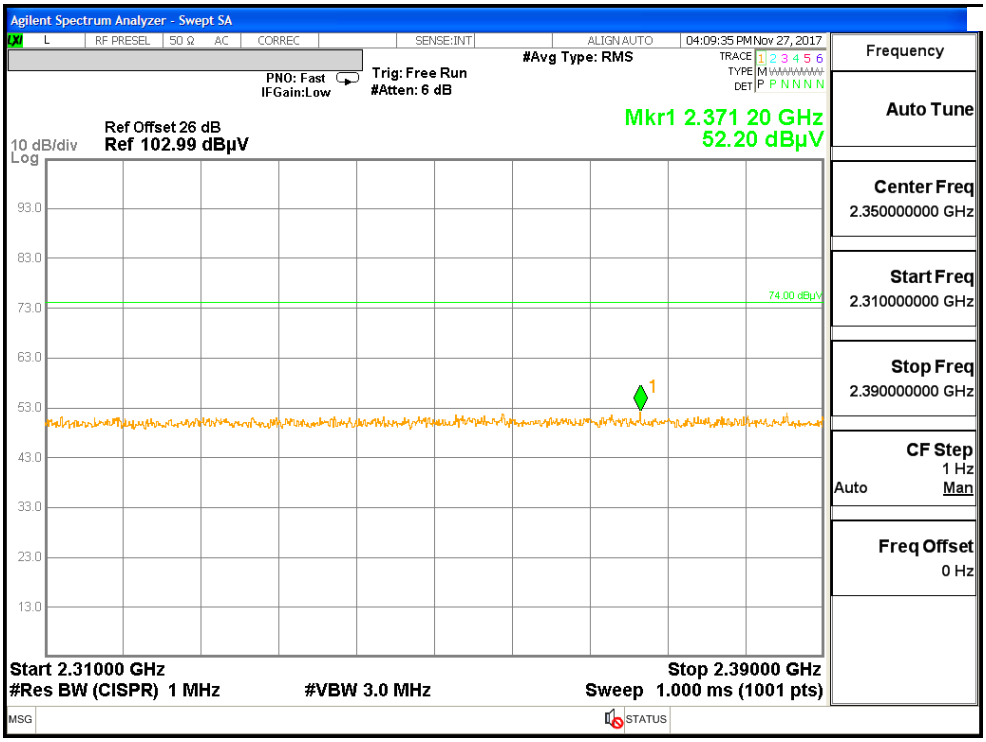



**Figure 40:** Radiated Emission at 2390 MHz Edge for 2412 MHz-HT20 – Horz. (Pk)

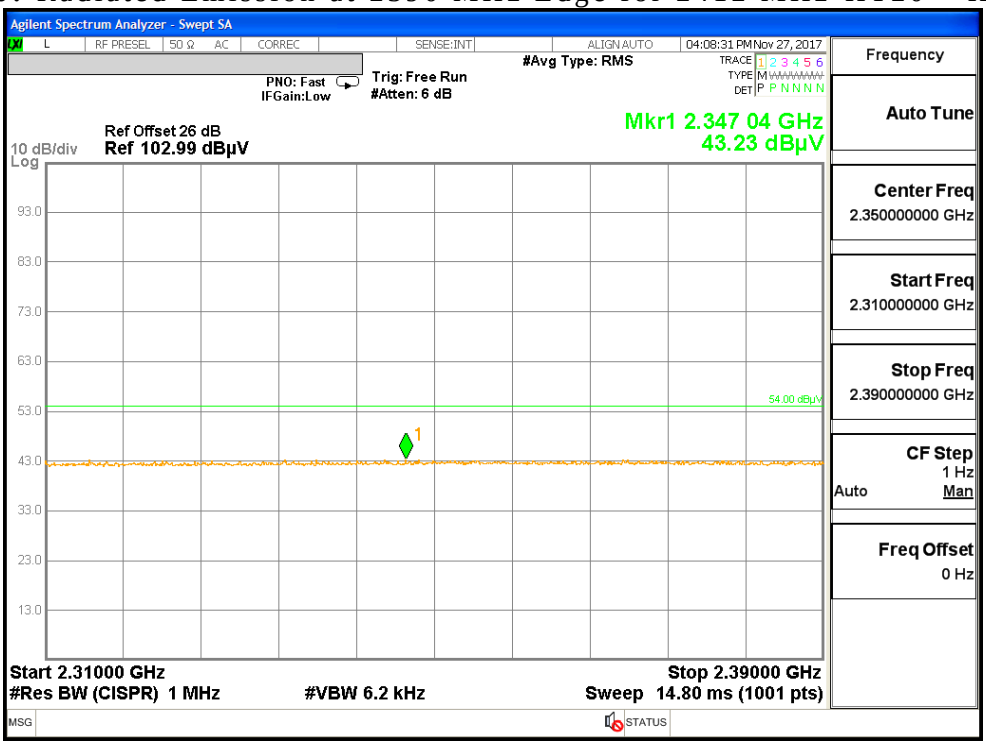



**Figure 41:** Radiated Emission at 2390 MHz Edge for 2412 MHz-HT20 – Horz. (Ave)

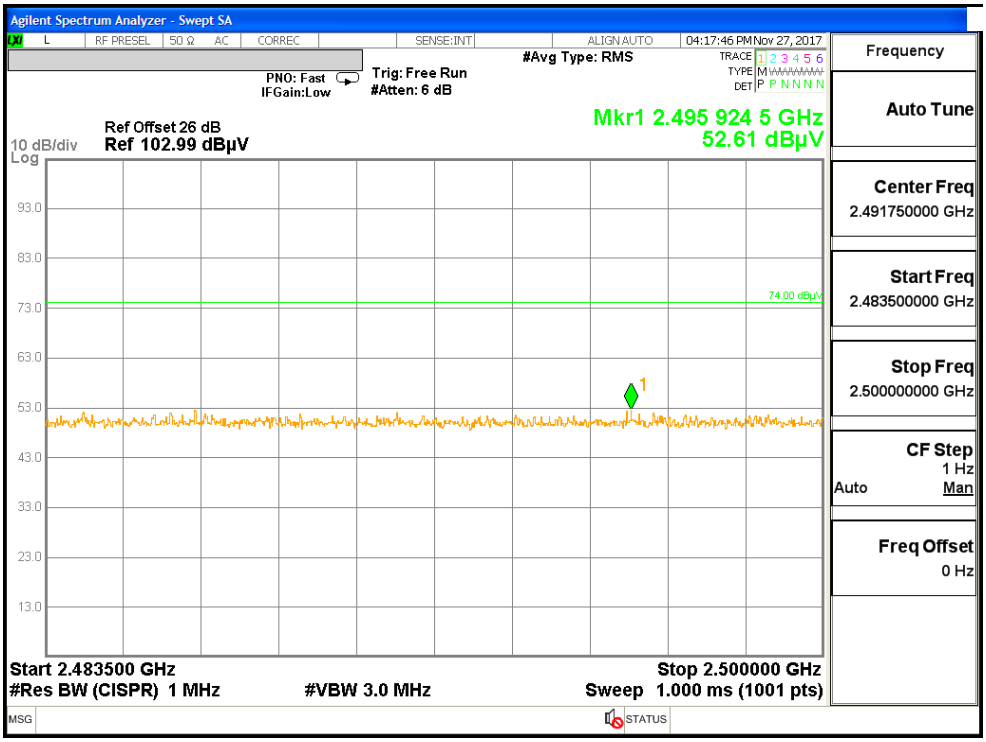



**Figure 42:** Radiated Emission at 2483.5 MHz Edge for 2462 MHz-HT20 – Vert. (Pk)

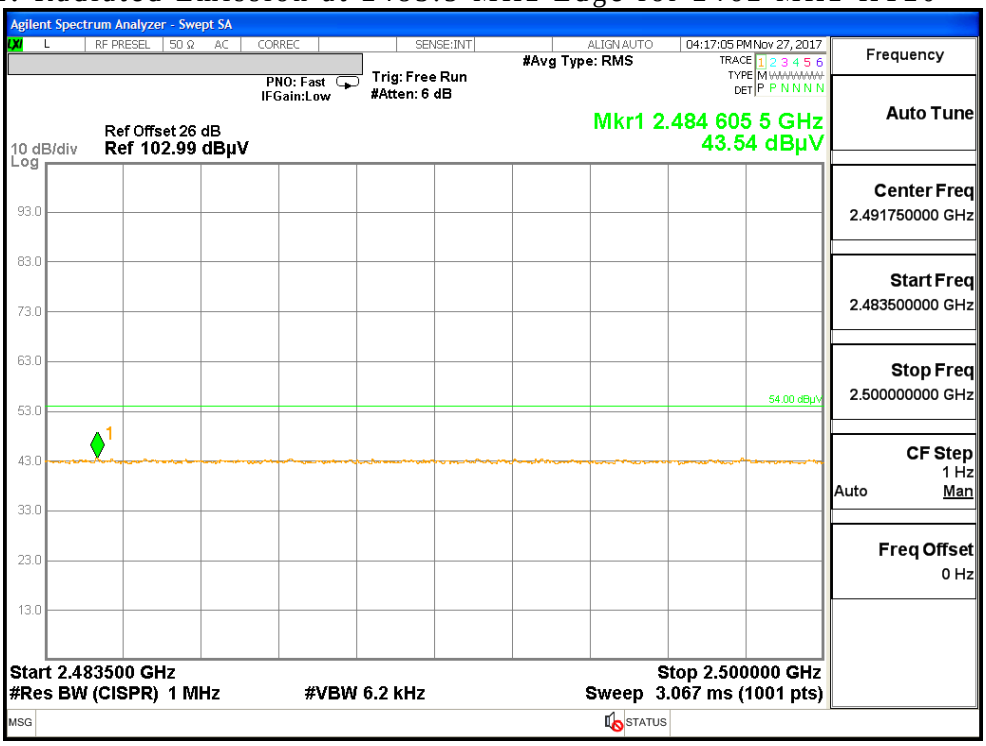



**Figure 43:** Radiated Emission at 2483.5 MHz Edge for 2462 MHz-HT20 – Vert. (Ave)

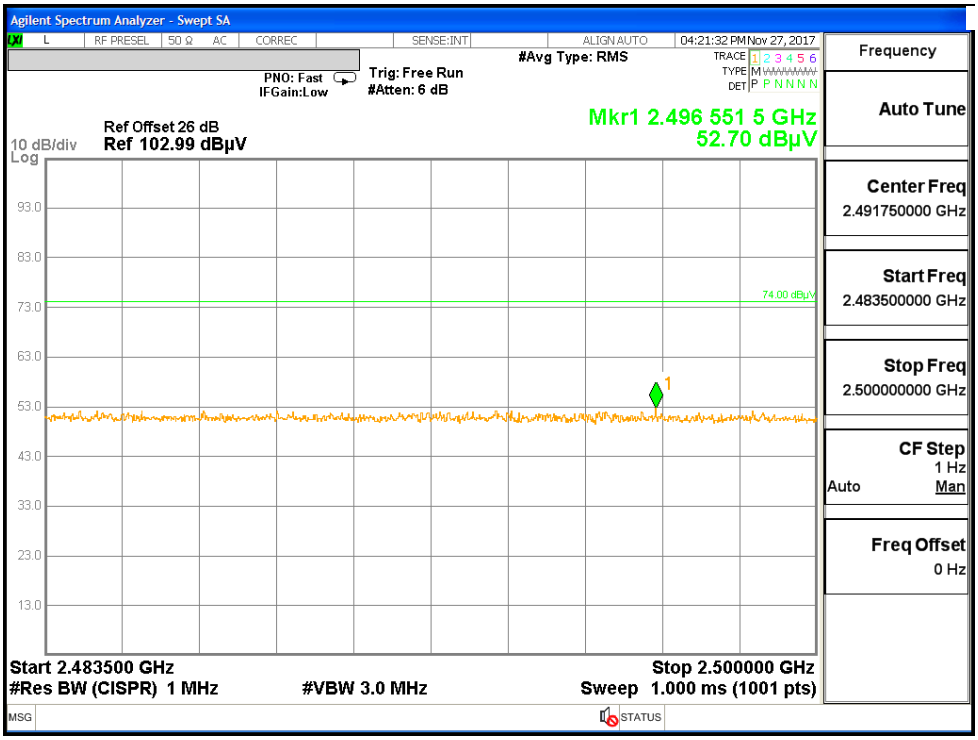



**Figure 44:** Radiated Emission at 2483.5 MHz Edge for 2462 MHz-HT20 – Horz. (Pk)

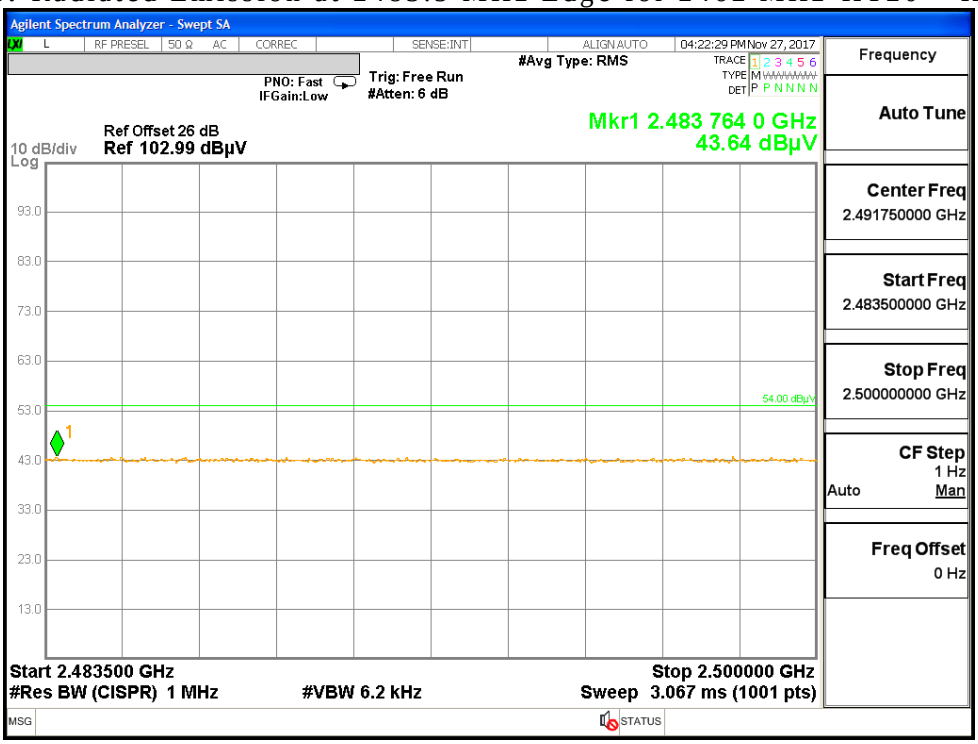


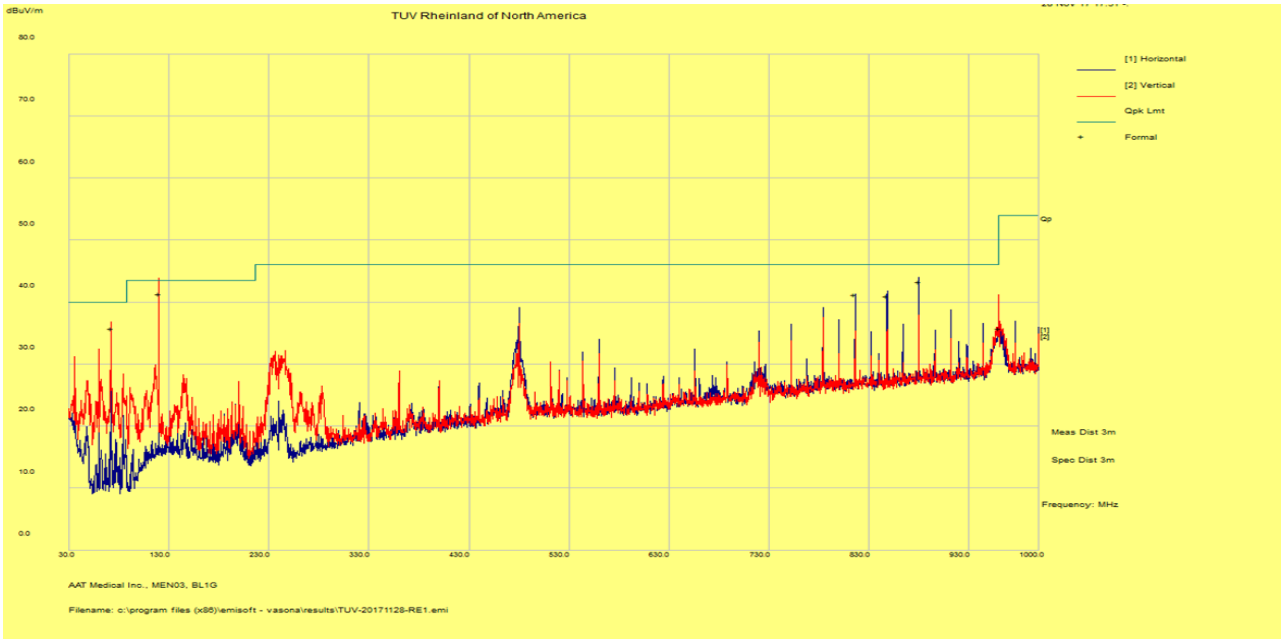

**Figure 45:** Radiated Emission at 2483.5 MHz Edge for 2462 MHz-HT20 – Horz. (Ave)

## SOP 1 Radiated Emissions

| | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 21, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | 802.11b mode | **Line AC / Freq** | 3.7VDC |
| **Standard** | CFR47 Part 15 Subpart C | **RBW / VBW** | 120kHz/300kHz |
| **Dist/Ant Used** | 3m | **Performed by** | Rolly Alegre |

30 MHz – 1 GHz Transmit at 2437 MHz

| Frequency | Raw | Cable Loss | AF | Level | Detector | Polarity | Height | Azimuth | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB | dB | dBuV/m | | H/V | cm | deg | dBuV/m | dB |
| 816.00 | 41.45 | 5.32 | -5.56 | 41.21 | QP | H | 104 | 250 | 46.00 | -4.79 |
| 848.00 | 40.99 | 5.42 | -5.37 | 41.04 | QP | H | 103 | 250 | 46.00 | -4.96 |
| 880.00 | 42.59 | 5.48 | -4.75 | 43.33 | QP | H | 104 | 240 | 46.00 | -2.68 |
| 72.00 | 52.98 | 2.89 | -20.11 | 35.76 | QP | V | 101 | 106 | 40.00 | -4.24 |
| 120.01 | 52.68 | 3.17 | -14.47 | 41.38 | QP | V | 101 | 46 | 43.50 | -2.12 |
| 960.02 | 33.48 | 5.66 | -3.34 | 35.80 | QP | V | 114 | 270 | 54.00 | -18.20 |

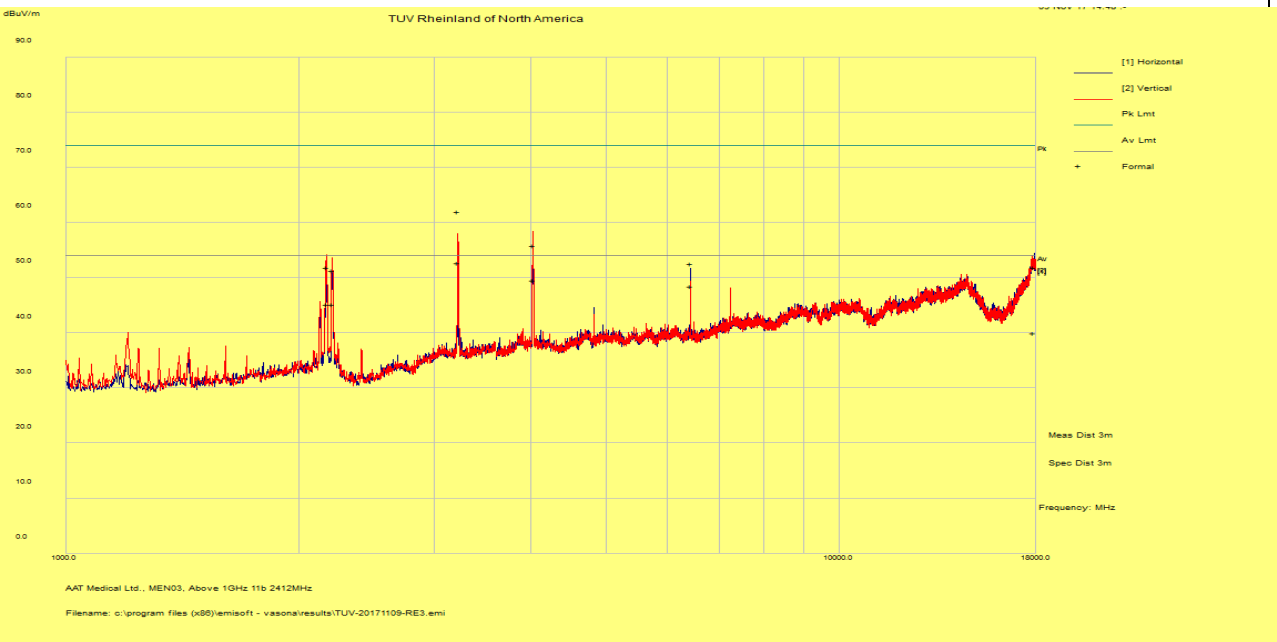



Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on Mid channel of 802.11b mode

| **SOP 1** Radiated Emissions | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 21, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | 802.11b mode | **Line AC / Freq** | 3.7VDC |
| **Standard** | CFR47 Part 15 Subpart C | **RBW / VBW** | 1MHz/3MHz |
| **Dist/Ant Used** | 3m – EMCO3115 / 1m – AHA-840 | **Performed by** | Rolly Alegre |

1 – 18 GHz Transmit at 2412 MHz (Low Channel)



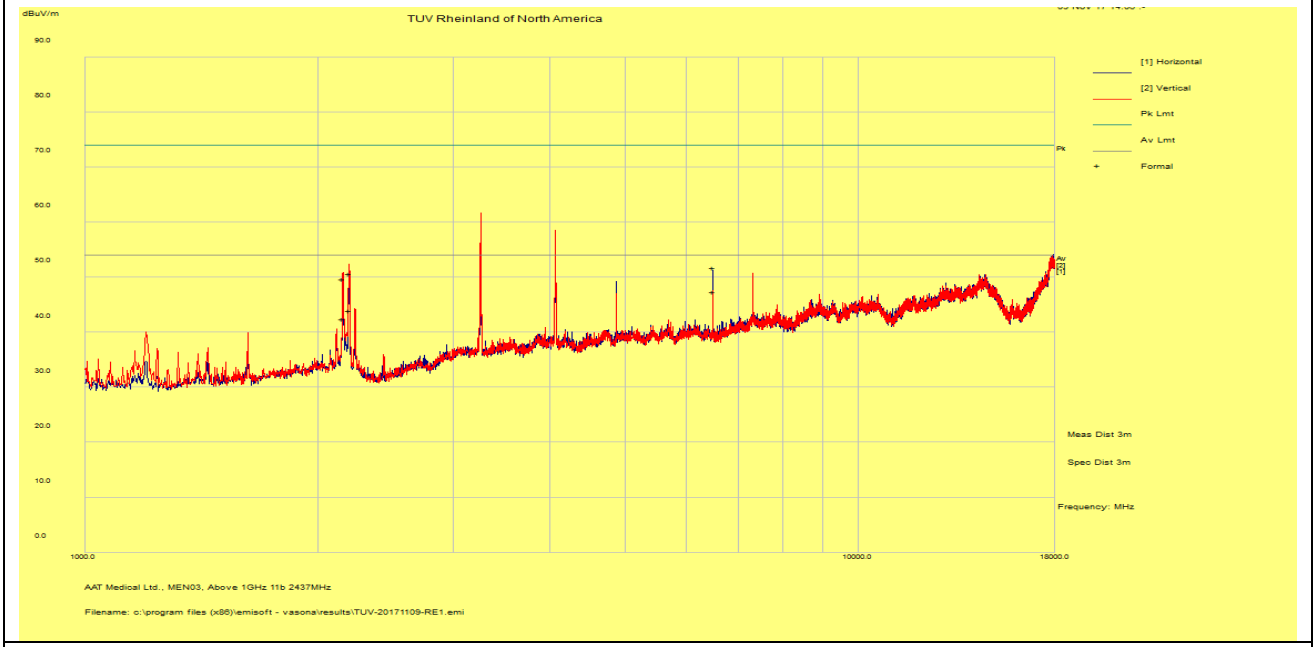

Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: None.

| Frequency | Raw | Cable Loss | AF | Level | Detector | Polarity | Height | Azimuth | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB | dB | dBuV/m | | H/V | cm | deg | dBuV/m | dB |
| 6431.95 | 49.56 | 2.30 | 0.68 | 52.54 | Peak Max | H | 109 | 24 | 74.00 | -21.46 |
| 6431.95 | 45.52 | 2.30 | 0.68 | 48.50 | Average Max | H | 109 | 24 | 54.00 | -5.50 |
| 17898.67 | 32.42 | 4.20 | 15.26 | 51.88 | Peak Max | H | 208 | 168 | 74.00 | -22.12 |
| 17898.67 | 20.51 | 4.20 | 15.26 | 39.97 | Average Max | H | 208 | 168 | 54.00 | -14.03 |
| 2173.54 | 57.21 | 1.20 | -6.49 | 51.92 | Peak Max | V | 134 | 296 | 74.00 | -22.08 |
| 2173.54 | 50.48 | 1.20 | -6.49 | 45.19 | Average Max | V | 134 | 296 | 54.00 | -8.81 |
| 2210.89 | 56.51 | 1.26 | -6.49 | 51.28 | Peak Max | V | 102 | 292 | 74.00 | -22.72 |
| 2210.89 | 50.38 | 1.26 | -6.49 | 45.16 | Average Max | V | 102 | 292 | 54.00 | -8.84 |
| 3216.06 | 64.02 | 1.50 | -3.51 | 62.01 | Peak Max | V | 218 | 246 | 74.00 | -11.99 |
| 3216.06 | 52.64 | 1.50 | -3.51 | 50.63 | Average Max | V | 218 | 246 | 54.00 | -3.37 |
| 4020.92 | 55.59 | 1.78 | -1.57 | 55.81 | Peak Max | V | 141 | 230 | 74.00 | -18.19 |
| 4020.92 | 49.30 | 1.78 | -1.57 | 49.51 | Average Max | V | 141 | 230 | 54.00 | -4.49 |

| **SOP 1** Radiated Emissions | | | Page 3 of 11 |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 21, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | 802.11b mode | **Line AC / Freq** | 3.7VDC |
| **Standard** | CFR47 Part 15 Subpart C | **RBW / VBW** | 1MHz/3MHz |
| **Dist/Ant Used** | 3m – EMCO3115 / 1m – AHA-840 | **Performed by** | Rolly Alegre |

1 – 18 GHz Transmit at 2437 MHz (Mid Channel)



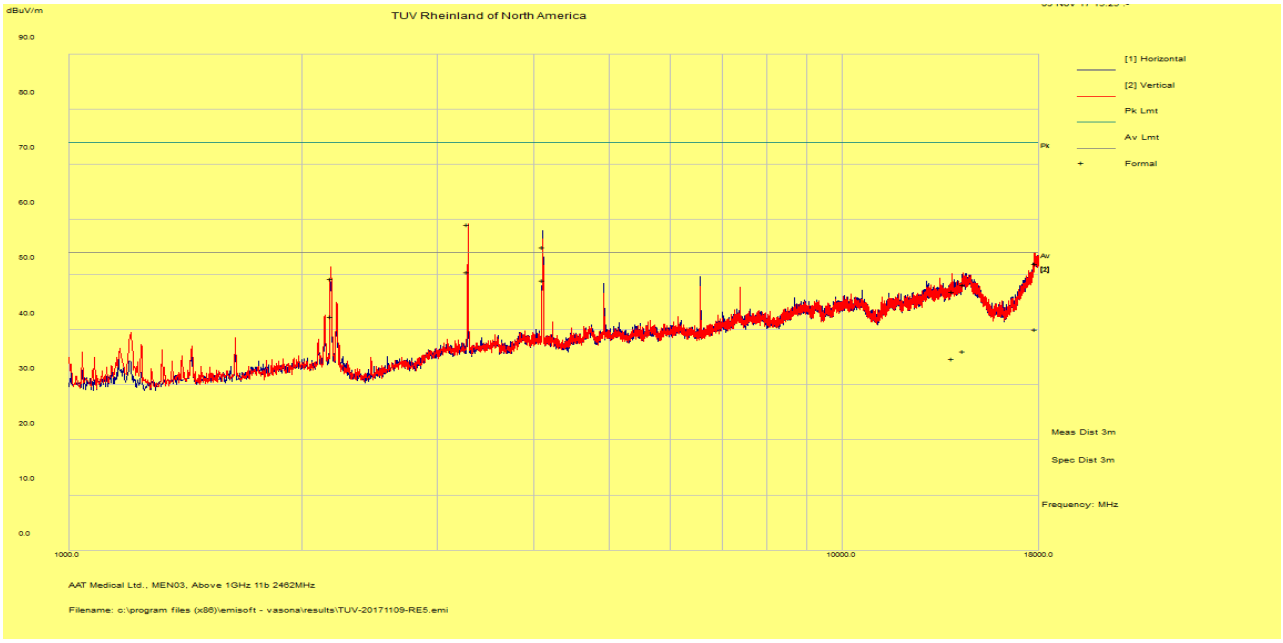

Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: None.

| Frequency | Raw | Cable Loss | AF | Level | Detector | Polarity | Height | Azimuth | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB | dB | dBuV/m | | H/V | cm | deg | dBuV/m | dB |
| 17895.31 | 32.99 | 4.20 | 15.24 | 52.43 | Peak Max | H | 177 | 126 | 74.00 | -21.57 |
| 17895.31 | 20.56 | 4.20 | 15.24 | 40.00 | Average Max | H | 177 | 126 | 54.00 | -14.00 |
| 3249.25 | 60.98 | 1.54 | -3.62 | 58.89 | Peak Max | V | 173 | 190 | 74.00 | -15.11 |
| 3249.25 | 48.91 | 1.54 | -3.62 | 46.83 | Average Max | V | 173 | 190 | 54.00 | -7.17 |
| 4060.60 | 54.99 | 1.74 | -1.67 | 55.06 | Peak Max | V | 244 | 274 | 74.00 | -18.94 |
| 4060.60 | 48.66 | 1.74 | -1.67 | 48.73 | Average Max | V | 244 | 274 | 54.00 | -5.28 |
| 6498.65 | 48.60 | 2.30 | 0.87 | 51.77 | Peak Max | H | 143 | 120 | 74.00 | -22.23 |
| 6498.65 | 44.20 | 2.30 | 0.87 | 47.36 | Average Max | H | 143 | 120 | 54.00 | -6.64 |
| 2158.48 | 54.99 | 1.20 | -6.53 | 49.66 | Peak Max | V | 131 | 310 | 74.00 | -24.34 |
| 2158.48 | 47.69 | 1.20 | -6.53 | 42.36 | Average Max | V | 131 | 310 | 54.00 | -11.64 |
| 2195.84 | 55.78 | 1.23 | -6.43 | 50.58 | Peak Max | V | 131 | 312 | 74.00 | -23.42 |
| 2195.84 | 49.20 | 1.23 | -6.43 | 44.00 | Average Max | V | 131 | 312 | 54.00 | -10.01 |

| **SOP 1** Radiated Emissions | | | Page 4 of 11 |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 21, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | 802.11b mode | **Line AC / Freq** | 3.7VDC |
| **Standard** | CFR47 Part 15 Subpart C | **RBW / VBW** | 1MHz/3MHz |
| **Dist/Ant Used** | 3m – EMCO3115 / 1m – AHA-840 | **Performed by** | Rolly Alegre |

1 – 18 GHz Transmit at 2462 MHz (High Channel)




Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: Other than spectrum noise floor, emission at the limit is the fundamental frequency.

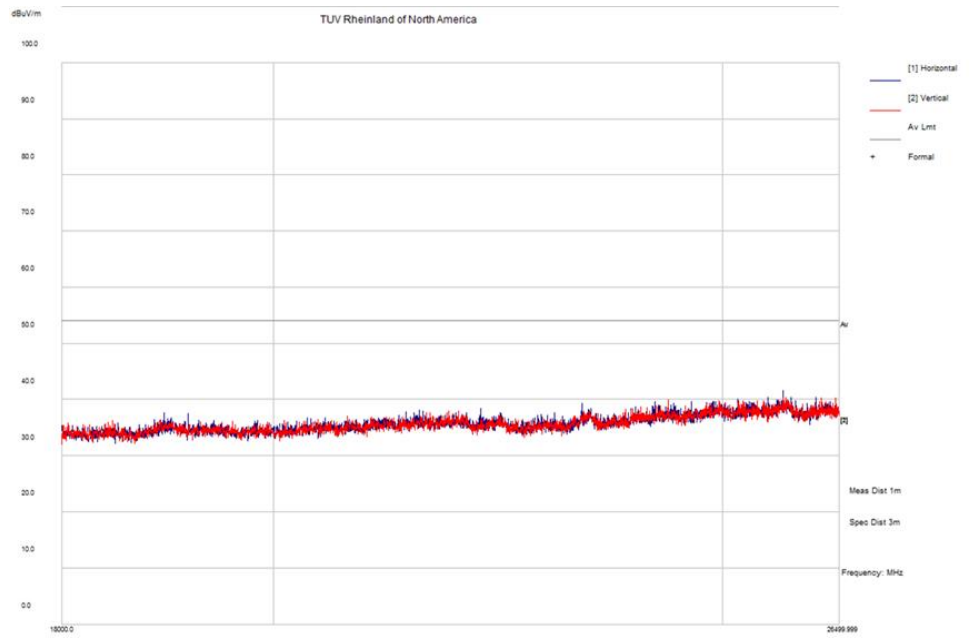
| Frequency | Raw | Cable Loss | AF | Level | Detector | Polarity | Height | Azimuth | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB | dB | dBuV/m | | H/V | cm | deg | dBuV/m | dB |
| 4104.80 | 48.98 | 1.70 | -1.70 | 48.98 | Average Max | H | 161 | 276 | 54.00 | -5.02 |
| 4104.80 | 54.97 | 1.70 | -1.70 | 54.98 | Peak Max | H | 161 | 276 | 74.00 | -19.03 |
| 2181.15 | 47.74 | 1.20 | -6.47 | 42.47 | Average Max | V | 123 | 298 | 54.00 | -11.53 |
| 2181.15 | 54.48 | 1.20 | -6.47 | 49.21 | Peak Max | V | 123 | 298 | 74.00 | -24.79 |
| 3282.60 | 52.54 | 1.60 | -3.64 | 50.50 | Average Max | V | 220 | 0 | 54.00 | -3.50 |
| 3282.60 | 61.10 | 1.60 | -3.64 | 59.06 | Peak Max | V | 220 | 0 | 74.00 | -14.94 |
| 13891.58 | 21.51 | 3.48 | 9.72 | 34.70 | Average Max | V | 238 | 128 | 54.00 | -19.30 |
| 13891.58 | 33.70 | 3.48 | 9.72 | 46.89 | Peak Max | V | 238 | 128 | 74.00 | -27.11 |
| 14370.41 | 21.40 | 3.48 | 11.25 | 36.13 | Average Max | V | 148 | 184 | 54.00 | -17.87 |
| 14370.41 | 33.39 | 3.48 | 11.25 | 48.13 | Peak Max | V | 148 | 184 | 74.00 | -25.87 |
| 17810.52 | 21.32 | 4.24 | 14.51 | 40.08 | Average Max | V | 185 | 198 | 54.00 | -13.92 |
| 17810.52 | 33.20 | 4.24 | 14.51 | 51.95 | Peak Max | V | 185 | 198 | 74.00 | -22.05 |

## **SOP 1** Radiated Emissions

| | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 21, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | 802.11b mode | **Line AC / Freq** | 3.7VDC |
| **Standard** | CFR47 Part 15 Subpart C | **RBW / VBW** | 1MHz/3MHz |
| **Dist/Ant Used** | 3m – EMCO3115 / 1m – AHA-840 | **Performed by** | Rolly Alegre |

18 – 26 GHz Transmit at 2412 MHz (Low Channel)

| Frequency | Raw | Cable Loss | AF | Level | Detector | Polarity | Height | Azimuth | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB | dB | dBuV/m | | H/V | cm | deg | dBuV/m | dB |
| 25280.91 | 39.96 | 8.22 | -5.05 | 43.13 | Pk | V | 150 | 202 | 54.00 | -10.87 |




Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

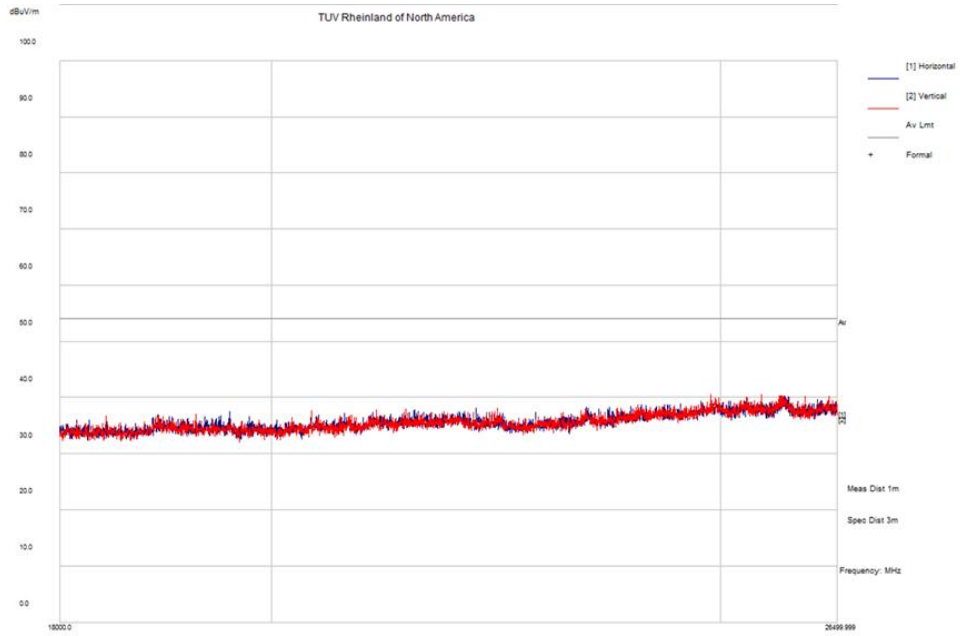
Note: No significant emissions was observed for 802.11b, 802.11g and 802.11n - HT20. **Measured spectrum noise floor**.

## **SOP 1** Radiated Emissions

| | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 21, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | 802.11b mode | **Line AC / Freq** | 3.7VDC |
| **Standard** | CFR47 Part 15 Subpart C | **RBW / VBW** | 1MHz/3MHz |
| **Dist/Ant Used** | 3m – EMCO3115 / 1m – AHA-840 | **Performed by** | Rolly Alegre |

18 – 26 GHz Transmit at 2437 MHz (Mid Channel)

| Frequency | Raw | Cable Loss | AF | Level | Detector | Polarity | Height | Azimuth | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB | dB | dBuV/m | | H/V | cm | deg | dBuV/m | dB |
| 25869.43 | 38.95 | 8.12 | -5.86 | 41.21 | Pk | V | 150 | 188 | 54.00 | -12.79 |




Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

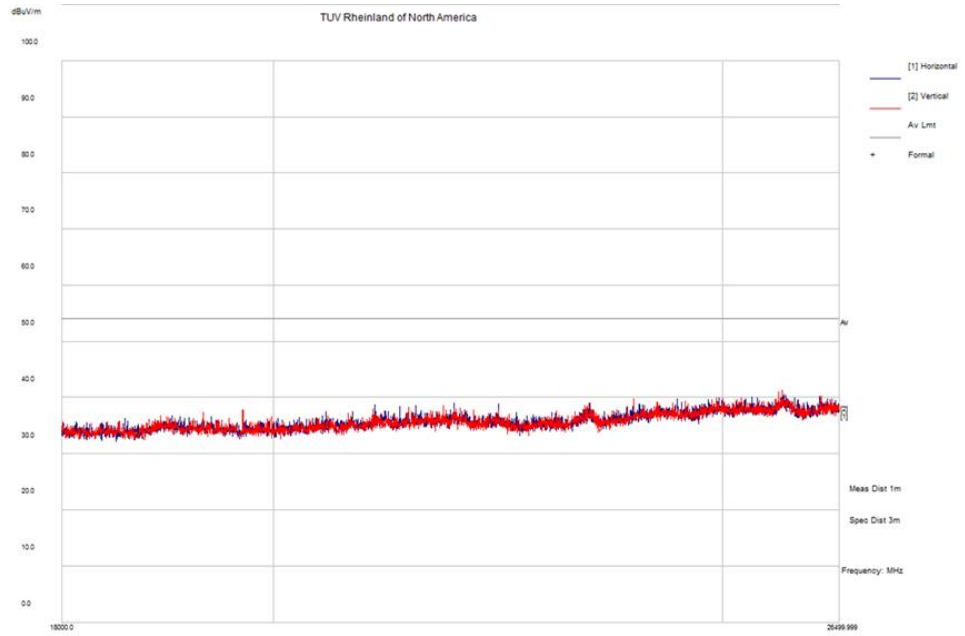
Note: No significant emissions was observed for 802.11b, 802.11g and 802.11n - HT20. **Measured spectrum noise floor**.

## **SOP 1** Radiated Emissions

| | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 21, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | 802.11b mode | **Line AC / Freq** | 3.7VDC |
| **Standard** | CFR47 Part 15 Subpart C | **RBW / VBW** | 1MHz/3MHz |
| **Dist/Ant Used** | 3m – EMCO3115 / 1m – AHA-840 | **Performed by** | Rolly Alegre |

18 – 26 GHz Transmit at 2462 MHz (High Channel)

| Frequency | Raw | Cable Loss | AF | Level | Detector | Polarity | Height | Azimuth | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB | dB | dBuV/m | | H/V | cm | deg | dBuV/m | dB |
| 25163.56 | 38.45 | 8.22 | -5.05 | 41.62 | Pk | V | 150 | 102 | 54.00 | -12.38 |



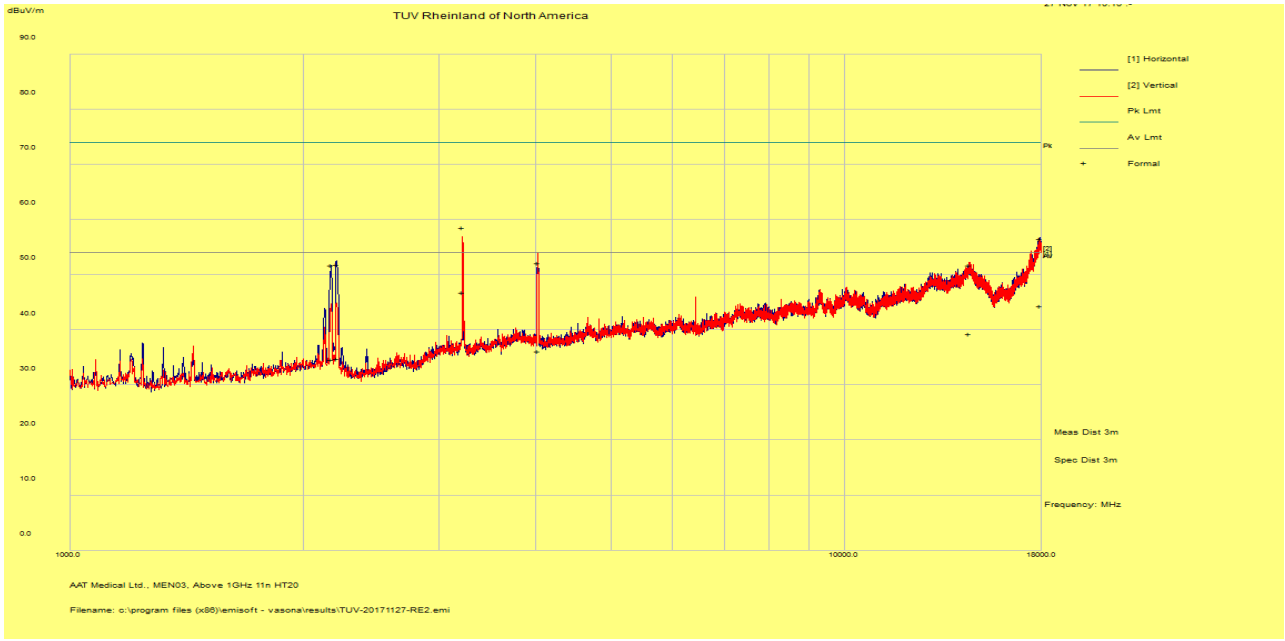

Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: No significant emissions was observed for 802.11b, 802.11g and 802.11n - HT20. **Measured spectrum noise floor**.

## **SOP 1** Radiated Emissions

| | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 22, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | 802.11n HT20 | **Line AC / Freq** | 3.7 VDC |
| **Standard** | CFR47 Part 15 Subpart C | **RBW / VBW** | 1 MHz/ 3 MHz |
| **Dist/Ant Used** | 3m – EMCO3115 / 1m – AHA-840 | **Performed by** | Rolly Alegre |

1 – 18 GHz Transmit at 2412 MHz (Low Channel)



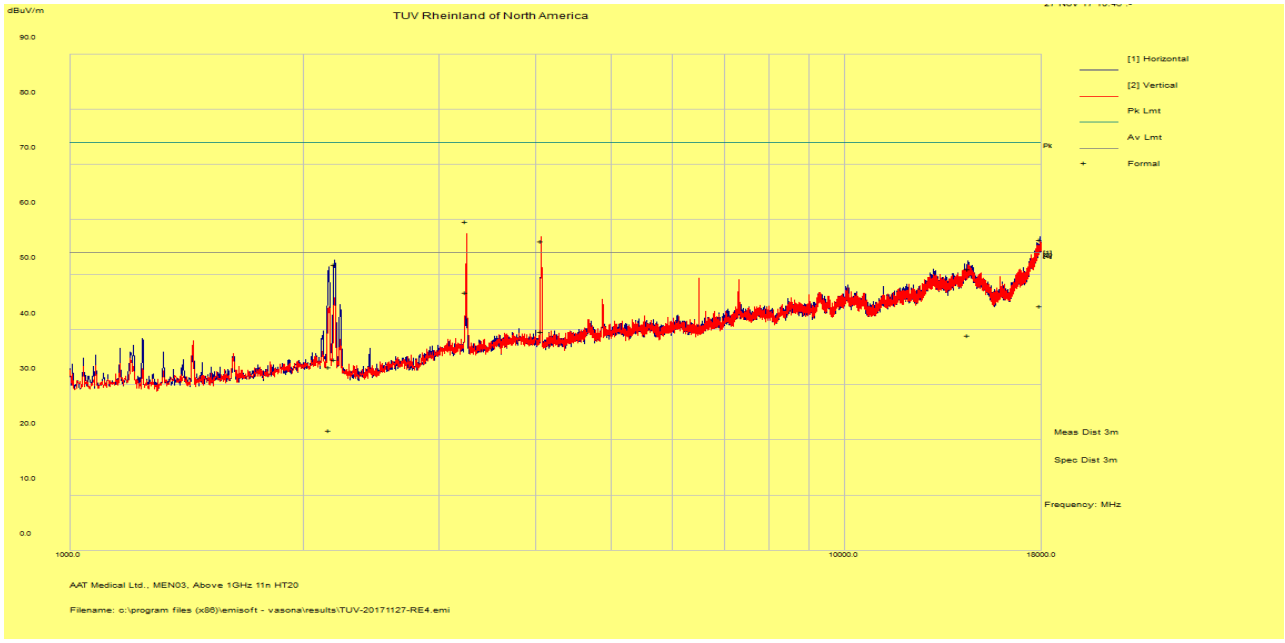

Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: None.

| Frequency | Raw | Cable Loss | AF | Level | Detector | Polarity | Height | Azimuth | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB | dB | dBuV/m | | H/V | cm | deg | dBuV/m | dB |
| 2173.70 | 57.05 | 1.20 | -6.49 | 51.76 | Peak Max | H | 203 | 306 | 74.00 | -22.24 |
| 2173.70 | 39.93 | 1.20 | -6.49 | 34.65 | Average Max | H | 203 | 306 | 54.00 | -19.36 |
| 2209.84 | 57.09 | 1.26 | -6.48 | 51.87 | Peak Max | H | 200 | 306 | 74.00 | -22.13 |
| 2209.84 | 39.99 | 1.26 | -6.48 | 34.77 | Average Max | H | 200 | 306 | 54.00 | -19.23 |
| 3215.98 | 60.63 | 1.50 | -3.51 | 58.62 | Peak Max | H | 104 | 102 | 74.00 | -15.38 |
| 3215.98 | 48.78 | 1.50 | -3.51 | 46.77 | Average Max | H | 104 | 102 | 54.00 | -7.23 |
| 17932.44 | 37.21 | 4.20 | 15.10 | 56.51 | Peak Max | H | 109 | 68 | 74.00 | -17.49 |
| 17932.44 | 25.06 | 4.20 | 15.10 | 44.36 | Average Max | H | 109 | 68 | 54.00 | -9.64 |
| 4020.82 | 51.90 | 1.78 | -1.57 | 52.12 | Peak Max | V | 180 | 70 | 74.00 | -21.88 |
| 4020.82 | 35.86 | 1.78 | -1.57 | 36.07 | Average Max | V | 180 | 70 | 54.00 | -17.93 |
| 14528.30 | 36.50 | 3.60 | 11.69 | 51.79 | Peak Max | V | 130 | 106 | 74.00 | -22.21 |
| 14528.30 | 23.93 | 3.60 | 11.69 | 39.21 | Average Max | V | 130 | 106 | 54.00 | -14.79 |

| **SOP 1** Radiated Emissions | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 22, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | 802.11n HT20 | **Line AC / Freq** | 3.7 VDC |
| **Standard** | CFR47 Part 15 Subpart C | **RBW / VBW** | 1 MHz/ 3 MHz |
| **Dist/Ant Used** | 3m – EMCO3115 / 1m – AHA-840 | **Performed by** | Rolly Alegre |

1 – 18 GHz Transmit at 2437 MHz (Mid Channel)



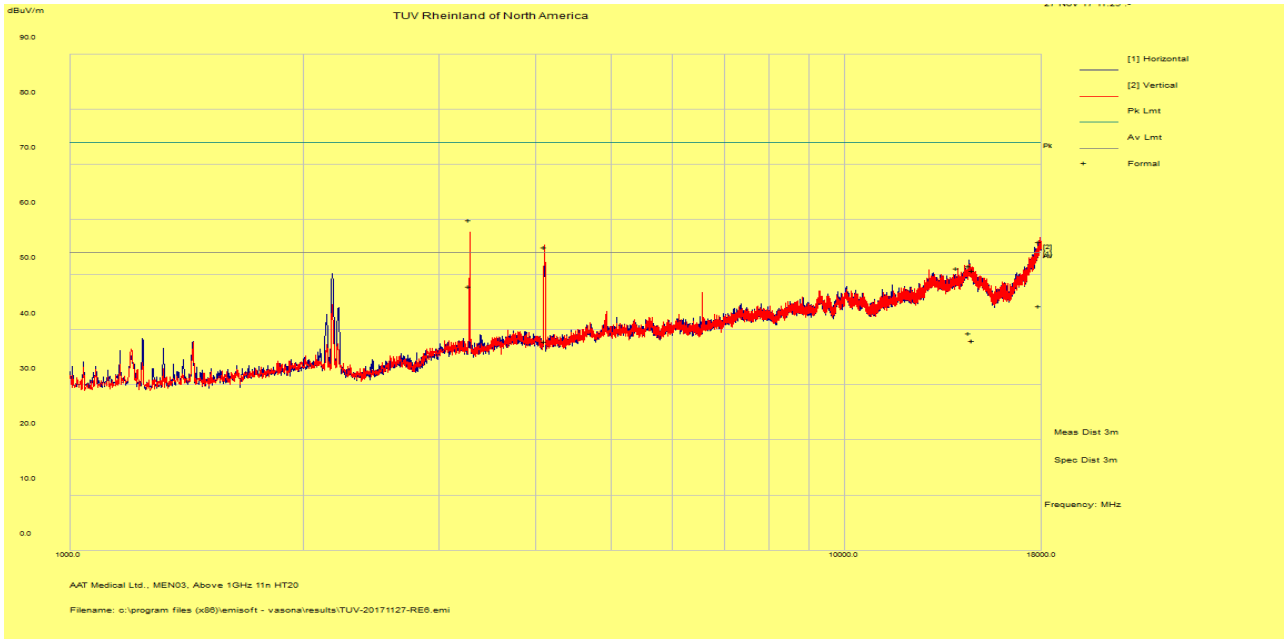

Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: None.

| Frequency | Raw | Cable Loss | AF | Level | Detector | Polarity | Height | Azimuth | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB | dB | dBuV/m | | H/V | cm | deg | dBuV/m | dB |
| 2159.38 | 38.53 | 1.20 | -6.52 | 33.21 | Peak Max | H | 241 | 52 | 74.00 | -40.79 |
| 2159.38 | 27.15 | 1.20 | -6.52 | 21.83 | Average Max | H | 241 | 52 | 54.00 | -32.17 |
| 2195.48 | 57.13 | 1.23 | -6.44 | 51.93 | Peak Max | H | 175 | 314 | 74.00 | -22.07 |
| 2195.48 | 39.87 | 1.23 | -6.44 | 34.67 | Average Max | H | 175 | 314 | 54.00 | -19.33 |
| 14476.88 | 35.88 | 3.49 | 11.62 | 51.00 | Peak Max | H | 105 | 234 | 74.00 | -23.00 |
| 14476.88 | 23.89 | 3.49 | 11.62 | 39.01 | Average Max | H | 105 | 234 | 54.00 | -14.99 |
| 17916.29 | 36.98 | 4.20 | 15.18 | 56.36 | Peak Max | H | 140 | 324 | 74.00 | -17.64 |
| 17916.29 | 24.97 | 4.20 | 15.18 | 44.36 | Average Max | H | 140 | 324 | 54.00 | -9.64 |
| 3249.31 | 61.71 | 1.54 | -3.62 | 59.63 | Peak Max | V | 207 | 278 | 74.00 | -14.37 |
| 3249.31 | 48.93 | 1.54 | -3.62 | 46.85 | Average Max | V | 207 | 278 | 54.00 | -7.16 |
| 4062.86 | 56.09 | 1.73 | -1.67 | 56.15 | Peak Max | V | 242 | 260 | 74.00 | -17.85 |
| 4062.86 | 39.68 | 1.73 | -1.67 | 39.75 | Average Max | V | 242 | 260 | 54.00 | -14.25 |

| **SOP 1** Radiated Emissions | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 22, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | 802.11n HT20 | **Line AC / Freq** | 3.7 VDC |
| **Standard** | CFR47 Part 15 Subpart C | **RBW / VBW** | 1 MHz/ 3 MHz |
| **Dist/Ant Used** | 3m – EMCO3115 / 1m – AHA-840 | **Performed by** | Rolly Alegre |

1 – 18 GHz Transmit at 2462 MHz (High Channel)




Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: No significant emissions was observed.

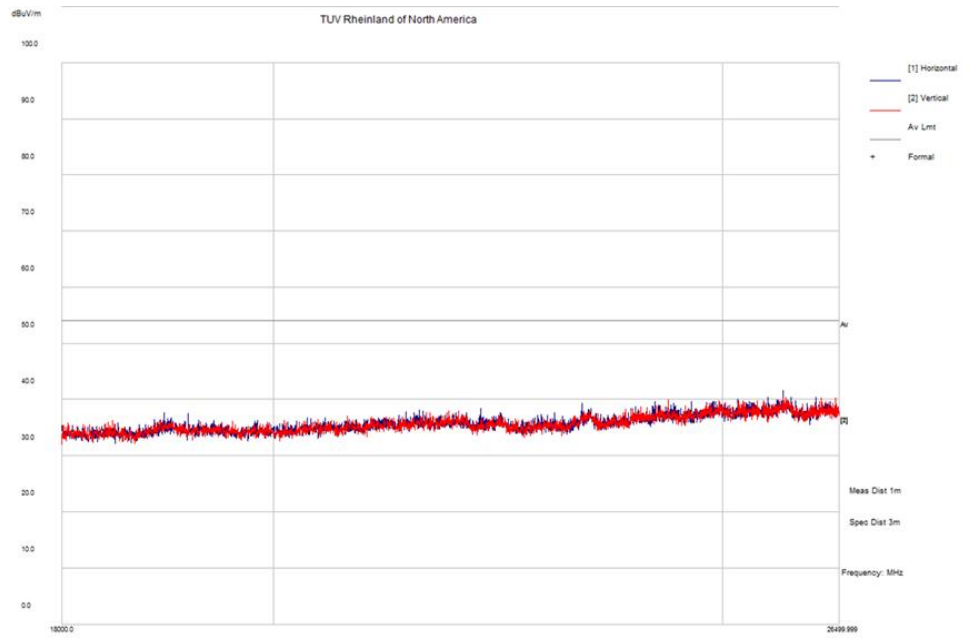
| Frequency | Raw | Cable Loss | AF | Level | Detector | Polarity | Height | Azimuth | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB | dB | dBuV/m | | H/V | cm | deg | dBuV/m | dB |
| 14499.50 | 36.05 | 3.54 | 11.98 | 51.57 | Peak Max | H | 180 | 0 | 74.00 | -22.43 |
| 14499.50 | 23.94 | 3.54 | 11.98 | 39.47 | Average Max | H | 180 | 0 | 54.00 | -14.54 |
| 3282.61 | 61.99 | 1.60 | -3.64 | 59.95 | Peak Max | V | 150 | 280 | 74.00 | -14.05 |
| 3282.61 | 49.96 | 1.60 | -3.64 | 47.92 | Average Max | V | 150 | 280 | 54.00 | -6.08 |
| 4101.26 | 54.99 | 1.70 | -1.70 | 54.98 | Peak Max | V | 208 | 268 | 74.00 | -19.02 |
| 4101.26 | 37.93 | 1.70 | -1.70 | 37.93 | Average Max | V | 208 | 268 | 54.00 | -16.07 |
| 14677.47 | 36.13 | 3.59 | 11.09 | 50.81 | Peak Max | V | 135 | 30 | 74.00 | -23.19 |
| 14677.47 | 23.40 | 3.59 | 11.09 | 38.08 | Average Max | V | 135 | 30 | 54.00 | -15.92 |
| 14677.47 | 23.40 | 3.59 | 11.09 | 38.08 | Average Max | V | 135 | 30 | 54.00 | -15.92 |
| 17907.15 | 36.50 | 4.20 | 15.23 | 55.94 | Peak Max | V | 105 | 18 | 74.00 | -18.06 |
| 17907.15 | 24.94 | 4.20 | 15.23 | 44.37 | Average Max | V | 105 | 18 | 54.00 | -9.63 |
| 14018.21 | 35.98 | 3.40 | 9.84 | 49.22 | Peak Max | V | 147 | 140 | 74.00 | -24.78 |
| 14018.21 | 24.03 | 3.40 | 9.84 | 37.27 | Average Max | V | 147 | 140 | 54.00 | -16.73 |

## **SOP 1** Radiated Emissions

| | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 22, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | 802.11n HT20 | **Line AC / Freq** | 3.7 VDC |
| **Standard** | CFR47 Part 15 Subpart C | **RBW / VBW** | 1 MHz/ 3 MHz |
| **Dist/Ant Used** | 3m – EMCO3115 / 1m – AHA-840 | **Performed by** | Rolly Alegre |

18 – 26 GHz Transmit at 2412 MHz (Low Channel)

| Frequency | Raw | Cable Loss | AF | Level | Detector | Polarity | Height | Azimuth | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB | dB | dBuV/m | | H/V | cm | deg | dBuV/m | dB |
| 25280.91 | 39.96 | 8.22 | -5.05 | 43.13 | Pk | V | 150 | 202 | 54.00 | -10.87 |




Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

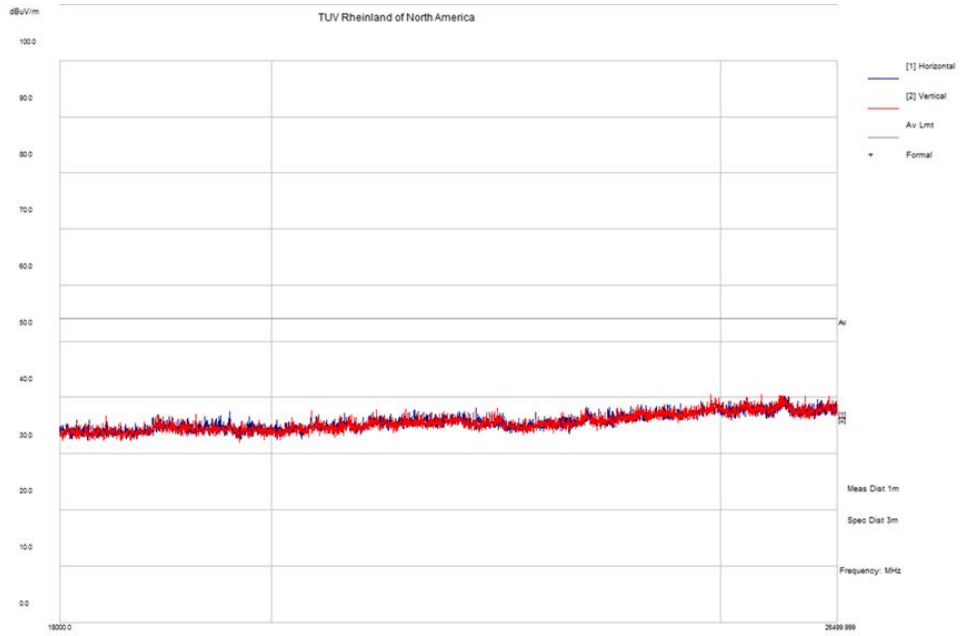
Note: No significant emissions was observed. **Measured spectrum noise floor**.

## **SOP 1** Radiated Emissions

| | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 22, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | 802.11n HT20 | **Line AC / Freq** | 3.7 VDC |
| **Standard** | CFR47 Part 15 Subpart C | **RBW / VBW** | 1 MHz/ 3 MHz |
| **Dist/Ant Used** | 3m – EMCO3115 / 1m – AHA-840 | **Performed by** | Rolly Alegre |

18 – 26 GHz Transmit at 2437 MHz (Mid Channel)

| Frequency | Raw | Cable Loss | AF | Level | Detector | Polarity | Height | Azimuth | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB | dB | dBuV/m | | H/V | cm | deg | dBuV/m | dB |
| 25869.43 | 38.95 | 8.12 | -5.86 | 41.21 | Pk | V | 150 | 188 | 54.00 | -12.79 |




Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

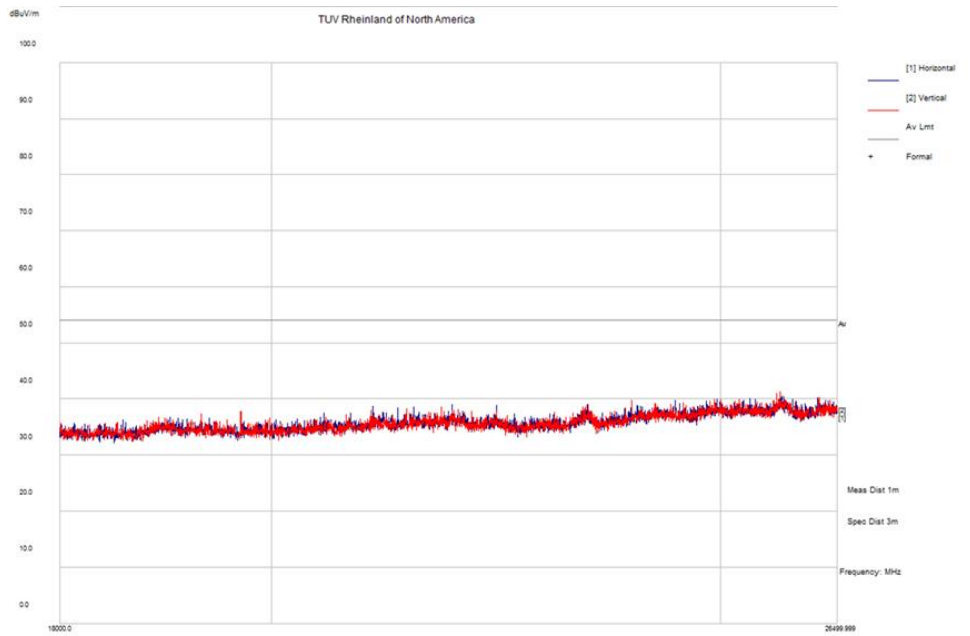
Note: No significant emissions was observed. **Measured spectrum noise floor**.

## **SOP 1** Radiated Emissions

| | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 22, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | 802.11n HT20 | **Line AC / Freq** | 3.7 VDC |
| **Standard** | CFR47 Part 15 Subpart C | **RBW / VBW** | 1 MHz/ 3 MHz |
| **Dist/Ant Used** | 3m – EMCO3115 / 1m – AHA-840 | **Performed by** | Rolly Alegre |

18 – 26 GHz Transmit at 2462 MHz (High Channel)

| Frequency | Raw | Cable Loss | AF | Level | Detector | Polarity | Height | Azimuth | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB | dB | dBuV/m | | H/V | cm | deg | dBuV/m | dB |
| 25163.56 | 38.45 | 8.22 | -5.05 | 41.62 | Pk | V | 150 | 102 | 54.00 | -12.38 |




Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: No significant emissions was observed. **Measured spectrum noise floor**.

## *4.6 AC Conducted Emissions*

Testing was performed in accordance with ANSI C63.4: 2014. These test methods are listed under the laboratory's A2LA Scope of Accreditation.This test measures the levels emanating from the EUT's HOST AC input port, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. The AC conducted emissions of equipment under test shall not exceed the values in CFR47 Part 15.207: 2015.

### 4.6.1 Test Methodology

A test program that controls instrumentation and data logging was used to automate the AC Power Line Conducted emission test procedure. The frequency range of interest was divided into sub-ranges such as to yield a frequency resolution of 9 kHz. Each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a set of 50μH / 50Ω LISNs.

Testing is performed in Lab 5. The setup photographs clearly identify which site was used. The vertical ground plane used in the semi-anechoic chamber is a 2m x 2m solid aluminum frame and panel, and it is bonded to the horizontal ground plane.

In the case of tabletop equipment, the EUT is placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane and 40cm from a vertical ground reference plane. The rear of the EUT was positioned flush with the backside of the table and directly over the LISNs. The power and I/O cables were routed over the edge of the table and bundled approximately 40cm from the ground plane. Support equipment was powered from a separate LISN.

#### *4.6.1.1 Deviations*

There were no deviations from this test methodology.

### 4.6.2 Test Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

**Table 10:** AC Conducted Emissions – Test Results

| **Test Conditions:** Conducted Measurement at Normal Conditions only | | |
|---|---|---|
| **Antenna Type:** Custom Integrated | **Power Level:** See Test Plan | |
| **AC Power:** 110 Vac/60 Hz | **Configuration:** Tabletop | |
| **Ambient Temperature:** 22° C | **Relative Humidity:** 39% RH | |
| **Configuration** | **Frequency Range** | **Test Result** |
| Line 1 (Hot) | 0.15 to 30 MHz | Pass |
| Line 2 (Neutral) | 0.15 to 30 MHz | Pass |

**SOP 2** Conducted Emissions

Page 1 of 4

| | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 24, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | TX mode | **Line AC / Freq** | 110Vac / 60Hz |
| **Standard** | CFR47 Part 15.207 | **RBW / VBW** | 9 kHz / 30 kHz |
| **Lab/LISN** | Lab #5 /Com-Power, Line 1 | **Performed by** | Rolly Alegre |

| Frequency | Raw | Limiter | Ins. Loss | Level | Detector | Line | Limit | Margin | Result |
|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB | dB | dBuV | | Line | dBuV | dB | |
| 0.154 | 37.33 | 9.82 | 0.06 | 47.20 | QP | Live | 65.80 | -18.59 | Pass |
| 0.154 | 17.86 | 9.82 | 0.06 | 27.74 | Ave | Live | 55.80 | -28.06 | Pass |
| 0.180 | 44.09 | 9.83 | 0.05 | 53.97 | QP | Live | 64.49 | -10.52 | Pass |
| 0.180 | 26.45 | 9.83 | 0.05 | 36.33 | Ave | Live | 54.49 | -18.16 | Pass |
| 0.214 | 30.57 | 9.83 | 0.04 | 40.44 | QP | Live | 63.07 | -22.62 | Pass |
| 0.214 | 9.73 | 9.83 | 0.04 | 19.60 | Ave | Live | 53.07 | -33.46 | Pass |
| 0.229 | 34.61 | 9.83 | 0.04 | 44.48 | QP | Live | 62.50 | -18.02 | Pass |
| 0.229 | 16.54 | 9.83 | 0.04 | 26.41 | Ave | Live | 52.50 | -26.09 | Pass |
| 0.337 | 29.69 | 9.83 | 0.03 | 39.56 | QP | Live | 59.28 | -19.72 | Pass |
| 0.337 | 14.21 | 9.83 | 0.03 | 24.07 | Ave | Live | 49.28 | -25.21 | Pass |
| 0.576 | 23.70 | 9.85 | 0.03 | 33.58 | QP | Live | 56.00 | -22.42 | Pass |
| 0.576 | 13.25 | 9.85 | 0.03 | 23.13 | Ave | Live | 46.00 | -22.87 | Pass |

Spec Margin = QP./Ave. - Limit, ± Uncertainty

Combined Standard Uncertainty $u_c(y)$ = ± 1.2 dB Expanded Uncertainty $U = ku_c(y)$ $k$ = 2 for 95% confidence

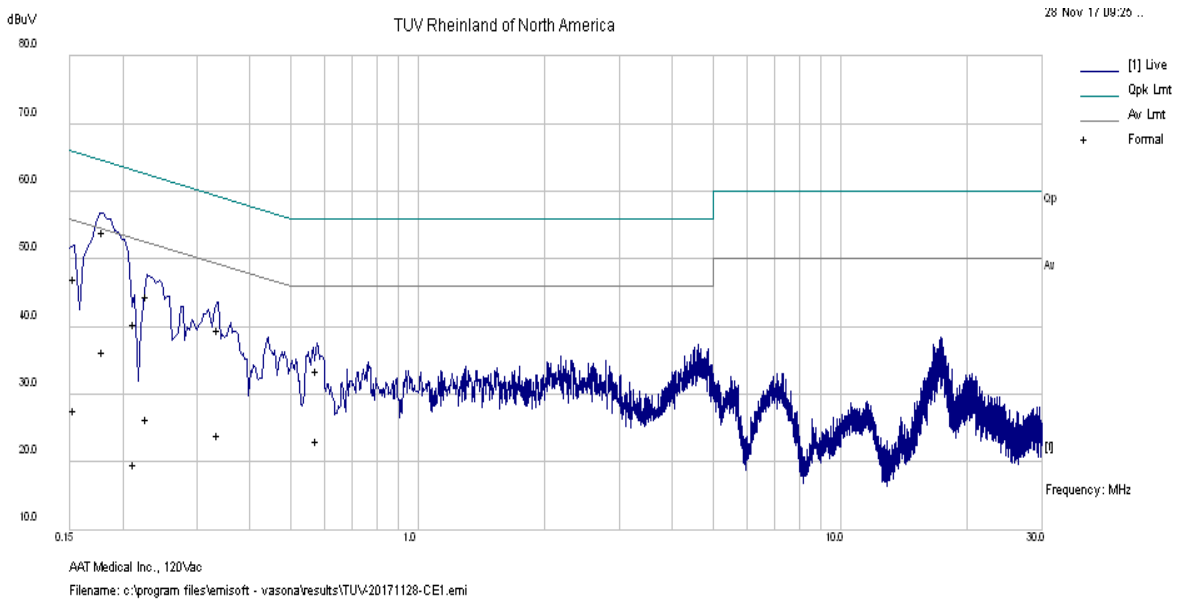
Notes: EUT was setup as table top equipment and transmitted at 2437 MHz in 802.11b at 1 Mbps

## **SOP 2** Conducted Emissions



| | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 24, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | TX mode | **Line AC** | 110Vac / 60Hz |
| **Standard** | CFR47 Part 15.207 | **RBW / VBW** | 9 kHz / 30 kHz |
| **Lab/LISN** | Lab #5 /Com-Power, Line 1 | **Performed by** | Rolly Alegre |

150 kHz to 30 MHz Plot for Line 1 (Hot)




Note: Met FCC Class B limit.

**SOP 2** Conducted Emissions

Page 3 of 4

| | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 24, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | TX mode | **Line AC / Freq** | 110Vac / 60Hz |
| **Standard** | CFR47 Part 15.207 | **RBW / VBW** | 9 kHz / 30 kHz |
| **Lab/LISN** | Lab #5 /Com-Power, Line 2 | **Performed by** | Rolly Alegre |

| Frequency | Raw | Limiter | Ins. Loss | Level | Detector | Line | Limit | Margin | Result |
|---|---|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB | dB | dBuV | | Line | dBuV | dB | |
| 0.150 | 46.27 | 9.82 | 0.06 | 56.15 | QP | Neutral | 66.00 | -9.85 | Pass |
| 0.150 | 26.82 | 9.82 | 0.06 | 36.70 | Ave | Neutral | 56.00 | -19.30 | Pass |
| 0.195 | 38.34 | 9.82 | 0.04 | 48.20 | QP | Neutral | 63.83 | -15.62 | Pass |
| 0.195 | 19.28 | 9.82 | 0.04 | 29.15 | Ave | Neutral | 53.83 | -24.68 | Pass |
| 0.251 | 29.13 | 9.83 | 0.04 | 39.00 | QP | Neutral | 61.73 | -22.73 | Pass |
| 0.251 | 16.88 | 9.83 | 0.04 | 26.75 | Ave | Neutral | 51.73 | -24.98 | Pass |
| 0.487 | 19.18 | 9.84 | 0.03 | 29.05 | QP | Neutral | 56.23 | -27.18 | Pass |
| 0.487 | 9.43 | 9.84 | 0.03 | 19.30 | Ave | Neutral | 46.23 | -26.93 | Pass |
| 2.711 | 20.98 | 9.90 | 0.03 | 30.90 | QP | Neutral | 56.00 | -25.10 | Pass |
| 2.711 | 11.79 | 9.90 | 0.03 | 21.72 | Ave | Neutral | 46.00 | -24.28 | Pass |
| 2.778 | 16.69 | 9.90 | 0.03 | 26.61 | QP | Neutral | 56.00 | -29.39 | Pass |
| 2.778 | 15.62 | 9.90 | 0.03 | 25.55 | Ave | Neutral | 46.00 | -20.45 | Pass |

Spec Margin = QP./Ave. - Limit, ± Uncertainty

Combined Standard Uncertainty $u_c(y)$ = ± 1.2 dB Expanded Uncertainty $U = ku_c(y)$ $k$ = 2 for 95% confidence

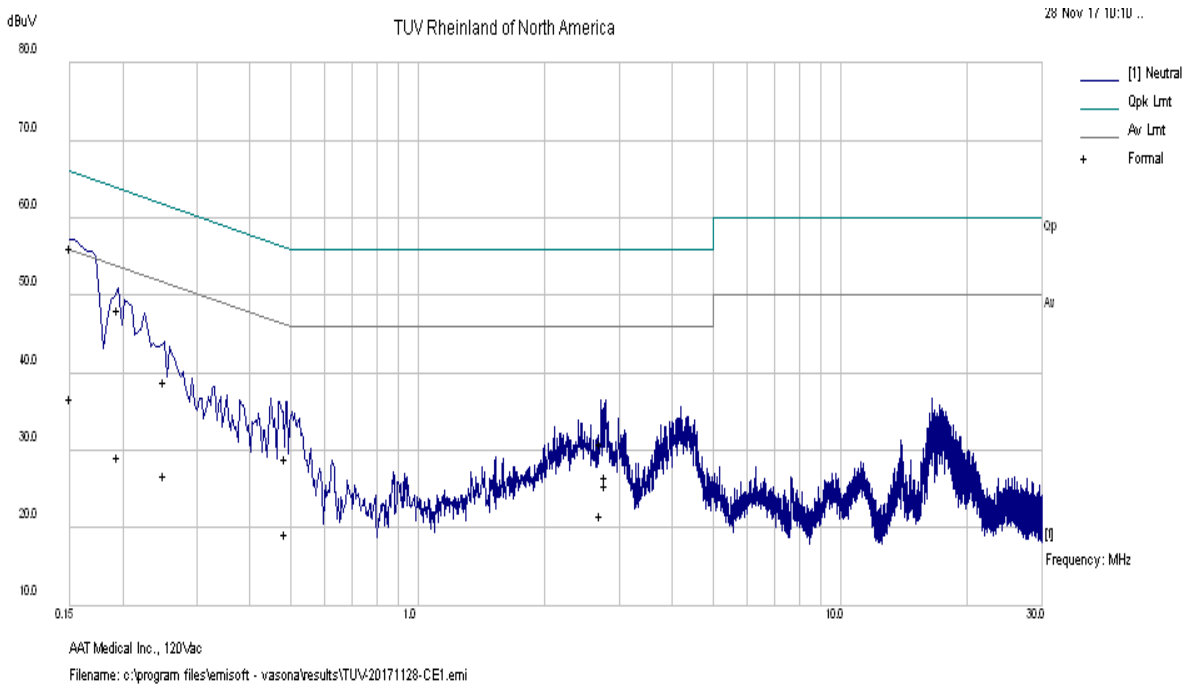
Notes: EUT was setup as table top equipment and transmitted at 2437 MHz in 802.11b at 1 Mbps

## **SOP 2** Conducted Emissions



| | | | |
|---|---|---|---|
| **EUT Name** | Mente Autism | **Date** | November 24, 2017 |
| **EUT Model** | MEN03 | **Temp / Hum in** | 22° C / 40%rh |
| **EUT Serial** | PCB 2 | **Temp / Hum out** | N/A |
| **EUT Config.** | TX mode | **Line AC** | 110Vac / 60Hz |
| **Standard** | CFR47 Part 15.207 | **RBW / VBW** | 9 kHz / 30 kHz |
| **Lab/LISN** | Lab #5 /Com-Power, Line 2 | **Performed by** | Rolly Alegre |

150 kHz to 30 MHz Plot for Line 2 (Neutral)




Note: Met FCC Class B Limit.

## *4.7 Maximum Permissible Exposure*

### 4.7.1 Test Methodology

In this section, we try to prove the safety of radiation harmfulness to the human body for our product. The KDB 447498 D01v06 General RF Exposure Guidance is followed. The Gain of the antenna used in this calculation is declared by the manufacturer, and the maximum average power input to the antenna is measured. Using the general SAR test exclusion guidance in Section 4.3 of KDB 447498 D01v06, we show that the device meets the SAR exclusion threshold found in Appendix A of KDB 447498 D01v06 and the SAR exemption limits found in table 1 of RSS-102 Issue 5.

ISED accepts the KDB 447498 D01v06 Procedure.

### 4.7.2 FCC KDB 447498 D01v06 – General SAR Test Exclusion Guidance

The SAR exclusion threshold conditions are listed:
1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by the following formula:

$$\text{Exclusion Threshold} = [\ P / d\ ] * [\sqrt{f}]$$

Where

P = max power of channel (including tune-up tolerance) in mW
d = min. test separation distance in mm
f = the RF channel transmit frequency in GHz
Power and distance are rounded to the nearest mW and mm before calculation
The result is rounded to one decimal place for comparison

Limits: ≤ 3.0 for 1-g SAR ≤ 7.5 for 10-g extremity SAR

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

### 4.7.3 EUT Operating Condition

The software provided by Manufacturer enabled the EUT to transmit data at lowest, middle and highest channel individually.

### 4.7.4 Classification

The antenna of the product, under normal condition, is less than 20cm away from the body of the user. This device is classified as a **Portable Medical Device**.

### 4.7.5 Test Results

See SAR report for data results.

# 5 Test Equipment List

## *5.1 Equipment List*

| Equipment | Manufacturer | Model # | Serial/Inst # | Last Cal mm/dd/yyyy | Next Cal mm/dd/yyyy |
|---|---|---|---|---|---|
| Bilog Antenna | Sunol Sciences | JB3 | A102606 | 06/15/2016 | 06/15/2018 |
| Horn Ant. (1-18GHz) | EMCO | 3115 | 9710-5301 | 10/08/2017 | 10/08/2018 |
| Antenna (18-40 GHz) | Com-Power | AHA-840 | 105005 | 07/08/2017 | 07/08/2018 |
| Spectrum Analyzer | Agilent | N9030A | MY52350885 | 05/17/2016 | 05/17/2018 |
| EMI Receiver | Rohde & Schwarz | ESU | 100364 | 04/21/2016 | 04/21/2018 |
| Preamplifier | Sonoma Instruments | 310 | 185516 | 01/10/2016 | 01/10/2018 |
| Preamplifier | HP | 8449B | 3008A01014 | 01/20/2016 | 01/20/2018 |
| Notch Filter | Micro-Tronics | BRM50716 | 037 | 07/29/2017 | 07/29/2018 |

# 6 EMC Test Plan

## 6.1 Introduction

This section provides a description of the Equipment Under Test (EUT), configurations, operating conditions, and performance acceptance criteria. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing.

## 6.2 Customer

**Table 11:** Customer Information

| | |
|---|---|
| **Company Name** | AAT Medical Ltd. |
| **Address** | Block LS3, Malta Life Sciences Park,<br>San Gwann Industrial Estate,<br>San Gwann SGN 3000 |
| **City, State, Zip** | Malta, Europe |
| **Country** | Europe |

**Table 12:** Technical Contact Information

| | |
|---|---|
| **Name** | Tristan Demanuele |
| **E-mail** | tristan.demanuele@mentetech.com |
| **Phone** | 0035699833376 |

## 6.3 Equipment Under Test (EUT)

**Table 13:** EUT Specifications

| EUT Specifications | |
|---|---|
| Dimensions | H: 56cm W: 42cm L: 23cm |
| DC Input | Battery (Alkaline) 3.7VDC |
| Environment | Indoor/Outdoor |
| Operating Temperature: | +5 degrees to +40 degrees C |
| Multiple Feeds: | ☐ Yes and how many<br>☒ No |
| 802.11-radio modules | |
| Operating Mode | 802.11b, 802.11g, 802.11n HT20 |
| Transmitter Frequency Band | 2.4 GHz – 2.4835 GHz |
| Max. Rated Power Output | See Channel Planning Table. |
| Power Setting @ Operating Channel | See Channel Planning Table. |
| Antenna Type | Custom Integrated |
| Antenna Gain | + 1.9 dBi |
| Modulation Type | ☐ AM ☐ FM ☒ DSSS ☒ OFDM<br>☐ Other describe: 16QAM and 64 QAM |
| Data Rate | 802.11b:<br>1 Mbps<br>802.11g:<br>6 Mbps<br>802.11n HT20:<br>MCS 0 |
| TX/RX Chain (s) | Single; no beam forming |
| Directional Gain Type | ☒ Uncorrelated ☐ Beam-Forming<br>☐ Other describe: |
| Type of Equipment | ☒ Table Top ☒ Wall-mount ☐ Floor standing cabinet<br>☐ Other: |
| **Note:** None. | |

**Table 14:** Interface Specifications

| Interface Type | Cabled with what type of cable? | Is the cable shielded? | Maximum potential length of the cable? | Metallic (M), Coax (C), Fiber (F), or Not Applicable? |
|---|---|---|---|---|
| USB | USB to Micro B cable | ☒ No | ☒ Metric: 1 m | ☐ N/A |

**Table 15**: Supported Equipment

| Equipment | Manufacturer | Model | Serial | Used for |
|---|---|---|---|---|
| Laptop | Lenovo | E440 | 28302E3C | Setup EUT operating channel |
| **Note:** None. | | | | |

**Table 16:** Description of Sample used for Testing

| Device | Serial | RF Connection | CFR47 Part 15.247 |
|---|---|---|---|
| Mente Autism(MEN03) | PCB 2 | Integrated Antenna | Radiated Emissions |
| | PCB 2 | Integrated Antenna | Radiated Bandedge Emissions, |
| | PCB 1 | Direct Connection | Peak Transmit Power,<br>Peak Power Spectral Density,<br>Occupied Bandwidth,<br>Band-Edge,<br>Out-of-Band Emissions |

**Table 17:** Description of Test Configuration used for Radiated Measurement.

| Device | Antenna | Mode | Setup Photo (X-Axis) | Setup Photo (Y-Axis) | Setup Photo (Z-Axis) |
|---|---|---|---|---|---|
| Mente Autism(MEN03) | Custom Integrated | Transmit | N/A | N/A | Worst Case |
| **Note:** None. | | | | | |

## *6.4 Test Specifications*

**Table 18:** Test Specifications

| Emissions and Immunity | |
|---|---|
| **Standard** | **Requirement** |
| CFR 47 Part 15.247: 2017 | All |

# END OF REPORT