

Washington Laboratories, Ltd.

## TEST REPORT

for the

**RFW-201**

**FCC ID: P9X-RFW201**

**IC ID: 6766A-RFW201**

**REPORT# 16031-01 REV 0**

Prepared for:

**Eaton's Cooper Power Systems**  
**540 Gaither Road, Suite 480**  
**Rockville, Maryland 20850**

Prepared By:

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Gaithersburg, Maryland 20879





Test Report  
for the  
**Eaton's Cooper Power Systems**  
**RFW-201**

FCC ID: P9X-RFW201  
ISED ID: 6766A-RFW201

JUNE 20, 2019

WLL REPORT# 16031-01 REV 0

Prepared by:

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## ABSTRACT

This report has been prepared on behalf of Eaton's Cooper Power Systems to support the attached Application for Equipment Authorization. The test report and application are submitted for a Frequency Hopping Spread Spectrum (FHSS) Transmitter under Part 15.247 and RSS-247 of the FCC Rules and Regulations and Spectrum Management and Telecommunications Policy. This Certification Test Report documents the test configuration and test results for the Eaton's Cooper Power Systems RFW-201.

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ANAB under Testing Certificate AT-1448 as an independent FCC test laboratory. The Eaton's Cooper Power Systems RFW-201 complies with the limits for a Frequency Hopping Spread Spectrum (FHSS) Transmitter device under FCC Part 15.247 and Innovation, Science and Economic Development Canada (ISED) RSS-247.

| Revision History | Description of Change | Date          |
|------------------|-----------------------|---------------|
| Rev 0            | Initial Release       | JUNE 20, 2019 |
| Rev 1            | Comments addressed    | June 25, 2019 |



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# 1 INTRODUCTION

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## 1.1 COMPLIANCE STATEMENT

The Eaton's Cooper Power Systems RFW-201 complies with the limits for a Frequency Hopping Spread Spectrum Transmitter device under FCC Part 15.247 and ISSED Canada RSS-247.

Note that the output power and OBW measurements collected and reported herein are within measurement tolerances compared to the values submitted for the original certification.

## 1.2 TEST SCOPE

Tests for radiated and conducted (at antenna terminal) emissions were performed. All measurements were performed in accordance with FCC Public Notice DA-00-705 "Measurement Guidance for Frequency Hopping Spread Spectrum Systems. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

## 1.3 CONTRACT INFORMATION

|                        |                                                          |
|------------------------|----------------------------------------------------------|
| Customer:              | Eaton's Cooper Power Systems                             |
| Address                | 540 Gaither Road, Suite 480<br>Rockville, Maryland 20850 |
| Purchase Order Number: | 4510999093                                               |
| Quotation Number:      | 71368                                                    |

## 1.4 TEST DATES

Testing was performed on the following date(s): May 2, 2019-May 3, 2019

## 1.5 TEST AND SUPPORT PERSONNEL

|                              |                  |
|------------------------------|------------------|
| Washington Laboratories, LTD | Michael Violette |
| Customer Representative      | Steven Seymour   |



## 1.6 ABBREVIATIONS

|      |                                                                      |
|------|----------------------------------------------------------------------|
| A    | <b>A</b> mpere                                                       |
| ac   | <b>a</b> lternating current                                          |
| AM   | <b>A</b> mplitude Modulation                                         |
| Amps | <b>A</b> mperes                                                      |
| b/s  | <b>b</b> its per second                                              |
| BW   | <b>B</b> and <b>W</b> idth                                           |
| CE   | <b>C</b> onducted <b>E</b> mission                                   |
| cm   | <b>C</b> entimeter                                                   |
| CW   | <b>C</b> ontinuous <b>W</b> ave                                      |
| dB   | <b>d</b> eci <b>B</b> el                                             |
| dc   | <b>d</b> irect current                                               |
| EMI  | <b>E</b> lectro <b>m</b> agnetic Interference                        |
| EUT  | <b>E</b> quipment <b>U</b> nder <b>T</b> est                         |
| FM   | <b>F</b> requency <b>M</b> odulation                                 |
| G    | <b>g</b> iga – prefix for 10 <sup>9</sup> multiplier                 |
| Hz   | <b>H</b> ertz                                                        |
| IF   | <b>I</b> ntermediate <b>F</b> requency                               |
| k    | <b>k</b> ilo – prefix for 10 <sup>3</sup> multiplier                 |
| LISN | <b>L</b> ine <b>I</b> mpedance <b>S</b> tabilization <b>N</b> etwork |
| M    | <b>M</b> ega – prefix for 10 <sup>6</sup> multiplier                 |
| m    | <b>M</b> eter                                                        |
| μ    | <b>m</b> icro – prefix for 10 <sup>-6</sup> multiplier               |
| NB   | <b>N</b> arrow <b>b</b> and                                          |
| QP   | <b>Q</b> uasi- <b>P</b> eak                                          |
| RE   | <b>R</b> adiated <b>E</b> missions                                   |
| RF   | <b>R</b> adio <b>F</b> requency                                      |
| rms  | <b>r</b> oot- <b>m</b> ean- <b>s</b> quare                           |
| SN   | <b>S</b> erial <b>N</b> umber                                        |
| S/A  | <b>S</b> pectrum <b>A</b> nalyzer                                    |
| V    | <b>V</b> olt                                                         |



## 2 EQUIPMENT UNDER TEST

### 2.1 EUT IDENTIFICATION & DESCRIPTION

Table 1: Device Summary

|                                         |                                                                                 |
|-----------------------------------------|---------------------------------------------------------------------------------|
| <b>Item</b>                             | Wireless radio module, or node, designed to be used in water metering products. |
| <b>Manufacturer:</b>                    | Eaton's Cooper Power Systems                                                    |
| <b>FCC ID:</b>                          | P9X-RFW201                                                                      |
| <b>ISED ID:</b>                         | 6766A-RFW201                                                                    |
| <b>Model:</b>                           | RFW-201                                                                         |
| <b>Serial Number of Unit Tested</b>     | N/A                                                                             |
| <b>FCC Rule Parts:</b>                  | §15.247                                                                         |
| <b>ISED Rule Parts:</b>                 | RSS-247                                                                         |
| <b>Frequency Range:</b>                 | 902MHz – 928MHz                                                                 |
| <b>Maximum Output Power:</b>            | 87mW (19.4dBm)                                                                  |
| <b>Reported Output Power from Grant</b> | 0.1W                                                                            |
| <b>Modulation:</b>                      | FSK                                                                             |
| <b>Occupied Bandwidth (99%):</b>        | 308kHz maximum                                                                  |
| <b>Emission Designator:</b>             | 3K08F1D                                                                         |
| <b>Keying:</b>                          | Automatic                                                                       |
| <b>Type of Information:</b>             | Data                                                                            |
| <b>Number of Channels:</b>              | 50                                                                              |
| <b>Power Output Level</b>               | Fixed                                                                           |
| <b>Highest TX Spurious Emission:</b>    | 57.5 uV/m @9272 MHz                                                             |
| <b>Highest RX Spurious Emission:</b>    | 45.4 uV/m @274MHz                                                               |
| <b>Antenna Connector</b>                | hard-wired                                                                      |
| <b>Antenna Type</b>                     | Linx ANT-916-HETH (helical), 2.4 dBi                                            |
| <b>Interface Cables:</b>                | For configuration/maintenance only                                              |
| <b>Maximum Data Rate</b>                | 8192 kSymbols                                                                   |
| <b>Power Source &amp; Voltage:</b>      | Battery 3.6 VDC (button cell)                                                   |

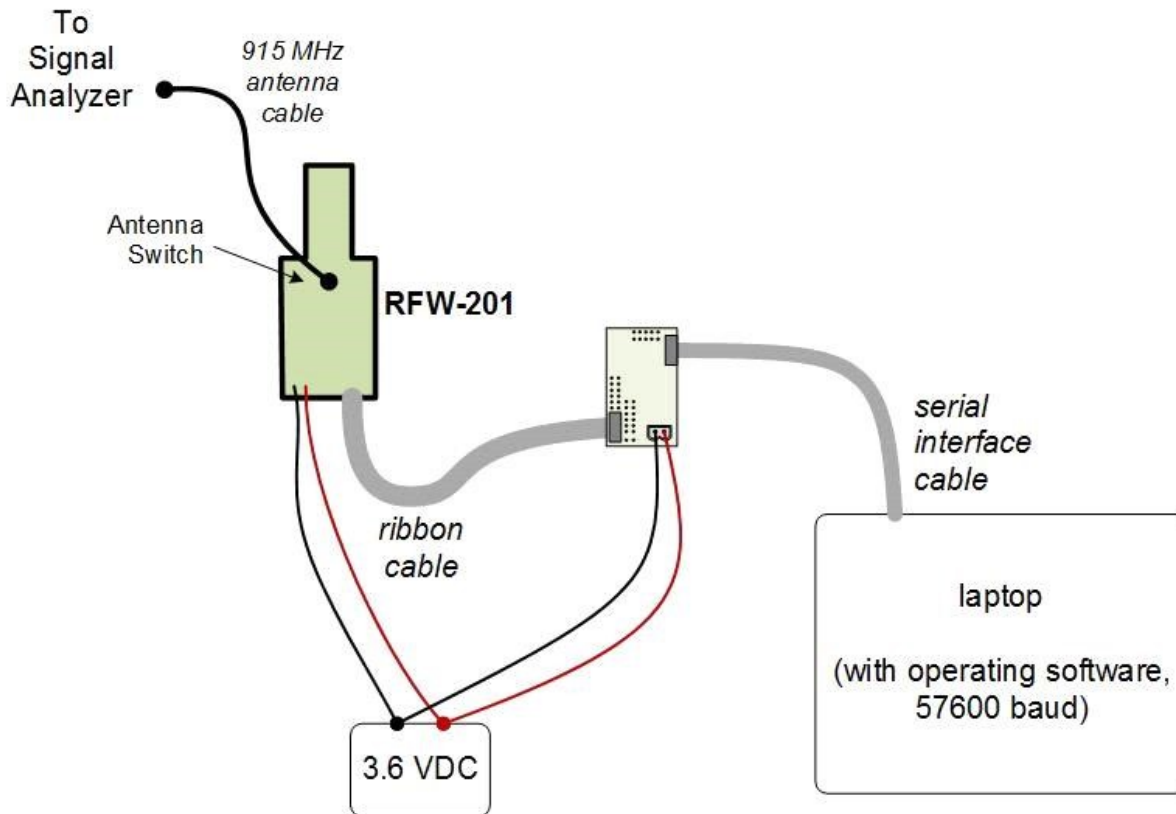
The Eaton's Cooper Power Systems RFW-201 is a wireless radio module, or Node, designed to be used in water metering products.

The Node enables communication of metering data between the meter and a remotely located Gateway or Relay Node device using an RF-mesh network. The RFW-201 contains a 915 MHz radio that operates with a maximum output power of 0.1W.

## 2.2 TEST CONFIGURATION

There are five selectable FHSS, transmission data rates for the RFW-201 which can be set using the operating software –9.6, 19.2, 38.4, 76.8 kb/s.

**Figure 1. Test Configuration**





## **2.3 TESTING ALGORITHM**

The RFW-201 performance was measured by its ability to communicate to the RFW-201 using its operating software was programmed for FHSS operation via ?? Worst cast emission levels are provided in the test results data.

## **2.4 TEST LOCATION**

All measurements herein were performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. The ISED Canada OATS numbers are 3035A-1 and 3035A-2 for Washington Laboratories, Ltd. Site 1 and Site 2, respectively. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ANAB under Testing Certificate AT-1448 as an independent FCC test laboratory.

## **2.5 MEASUREMENTS**

### **2.5.1 References**

ANSI C63.2 (Jan-2016) Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 (Jan 2014) American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

ANSI C63.10 (Jun 2013) American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

ANSI C63.26 (Dec 2015) American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

## **2.6 MEASUREMENT UNCERTAINTY**

All results reported herein relate only to the equipment tested. The basis for uncertainty calculation uses ANSI/NCSL Z540-2-1997 (R2002) with a type B evaluation of the standard uncertainty. Elements contributing to the standard uncertainty are combined using the method described in Equation 1 to arrive at the total standard uncertainty. The standard uncertainty is multiplied by the coverage factor to determine the expanded uncertainty which is generally accepted for use in commercial, industrial, and regulatory applications and when health and safety are concerned (see Equation 2). A coverage factor was selected to yield a 95% confidence in the uncertainty estimation.



## Equation 1: Standard Uncertainty

Where  $u_c$  = standard uncertainty  
 $a, b, c, \dots$  = individual uncertainty elements  
 $Div_{a, b, c}$  = the individual uncertainty element divisor based on the probability distribution

Divisor = 1.732 for rectangular distribution  
 Divisor = 2 for normal distribution  
 Divisor = 1.414 for trapezoid distribution

## Equation 2: Expanded Uncertainty

Where  $U$  = expanded uncertainty  
 $k$  = coverage factor  
 $k \leq 2$  for 95% coverage (ANSI/NCSL Z540-2 Annex G)  
 $u_c$  = standard uncertainty

The measurement uncertainty complies with the maximum allowed uncertainty from CISPR 16-4-2. Measurement uncertainty is not used to adjust the measurements to determine compliance. The expanded uncertainty values for the various scopes in the WLL accreditation are provided in Table 2 below.

**Table 2: Expanded Uncertainty List**

| Scope               | Standard(s)                                       | Expanded Uncertainty |
|---------------------|---------------------------------------------------|----------------------|
| Conducted Emissions | CISPR11, CISPR22, , CISPR32, CISPR14, FCC Part 15 | $\pm 2.63$ dB        |
| Radiated Emissions  | CISPR11, CISPR22, , CISPR32, CISPR14, FCC Part 15 | $\pm 4.55$ dB        |



### 3 TEST EQUIPMENT

Table 3 shows a list of the test equipment used for measurements along with the calibration information

Table 3: Test Equipment List

| Test Name: <b>Bench Conducted/ Radiated Emissions</b> |                           |                           |                 |
|-------------------------------------------------------|---------------------------|---------------------------|-----------------|
| <b>Asset #</b>                                        | <b>Manufacturer/Model</b> | <b>Description</b>        | <b>Cal. Due</b> |
| 00823                                                 | Agilent/EXA 9010A         | Spectrum Analyzer         | 2/20/2020       |
| 00644                                                 | Sunol Sciences/JB1        | Bi-Conilog Antenna        | 01/16/2020      |
| 00522                                                 | HP/8449B                  | Pre-Amplifier             | 04/03/2020      |
| 00276                                                 | Electro-Metrics/BPA-1000  | Pre-Amplifier             | 04/03/2020      |
| 00425                                                 | ARA/DRG-118-A             | Double Ridge Horn Antenna | 01/03/2020      |
| 00849                                                 | AH Systems/SAC-18G-16     | HF Low Loss RF Cable      | 01/18/2020      |



## 4 TEST RESULTS

The Table Below shows the results of testing for compliance with a Frequency Hopping Spread Spectrum device in accordance with FCC Part 15.247 10/2014 and RSS-247 Issue 1. Full test results are shown in subsequent sub-sections.

**Table 4: Test Summary Table**

| Frequency Hopping Spread Spectrum - TX Test Summary         |                    |                                                              |        |
|-------------------------------------------------------------|--------------------|--------------------------------------------------------------|--------|
| FCC Rule Part                                               | IC Rule Part       | Description                                                  | Result |
| 15.247 (a)(1)                                               | RSS-247 [5.1a]     | 20dB Bandwidth                                               |        |
| 15.247 (b)                                                  | RSS-247 [5.4]      | Transmit Output Power                                        |        |
| 15.247 (a)(1)                                               | RSS-247 [5.1]      | Channel Separation                                           |        |
| 15.247 (a)(1)                                               | RSS-247 [5.4]      | Number of Channels                                           |        |
| 15.247 (a)(1)                                               | RSS-247 [5.1]      | Time of Occupancy                                            |        |
| 15.247 (d)                                                  | RSS-247 [5.5]      | Occupied BW / Out-of-Band Emissions (Band Edge @ 20dB below) |        |
| 15.205<br>15.209                                            | RSS-Gen [8.9/8.10] | General Field Strength Limits (Restricted Bands & RE Limits) |        |
| 15.207                                                      | RSS-Gen [8.8]      | AC Conducted Emissions                                       | N/A    |
| Frequency Hopping Spread Spectrum - RX/Digital Test Summary |                    |                                                              |        |
| FCC Rule Part                                               | IC Rule Part       | Description                                                  | Result |
| 15.207                                                      | RSS-Gen            | AC Conducted Emissions                                       | N/A    |
| 15.209                                                      | RSS-Gen            | General Field Strength Limits                                | Pass   |



## 4.1 DUTY CYCLE CORRECTION AND TIME OF OCCUPANCY

In accordance with the FCC Public Notice the spurious radiated emissions measurements may be adjusted if using a duty cycle correction factor if the dwell time per channel of the hopping signal is less than 100 ms.

The duty cycle correction factor is calculated by:  
$$20 \times \text{LOG} (\text{dwell time}/100 \text{ ms})$$

The following figure shows the plot of the dwell time for the transmitter. Based on this plot, the dwell time per hop is 18.69ms. The maximum total dwell time per 100ms is 19ms. This corresponds to a duty cycle correction of 14.6 dB for radiated spurious emissions. However, the duty cycle correction factor was not used in these measurements.

The transmitter shall have a time of occupancy for systems having a 20dB bandwidth greater than 250 kHz of no more than 0.4seconds in any 10 second period.

These tests were conducted with the RF output connected through appropriate attenuators to the input of a spectrum analyzer set to zero span mode. The unit was set to hopping mode with the spectrum analyzer set 0 span.

The time of occupancy in a single hop is 18.69 milli-seconds.

The results are shown in the plots below.

**Table 5: Duty Cycle/Time of Occupancy Results**

| Test                    | Result          | Limit       | Pass/Fail |
|-------------------------|-----------------|-------------|-----------|
| Dwell time per Hop      | 18.69ms         | NA          | NA        |
| On times per 10 seconds | Correction      | NA          | NA        |
| Time of Occupancy       | 0.09774s/10 sec | 0.4s/10 sec | Pass      |



Figure 2: Duty Cycle Plot

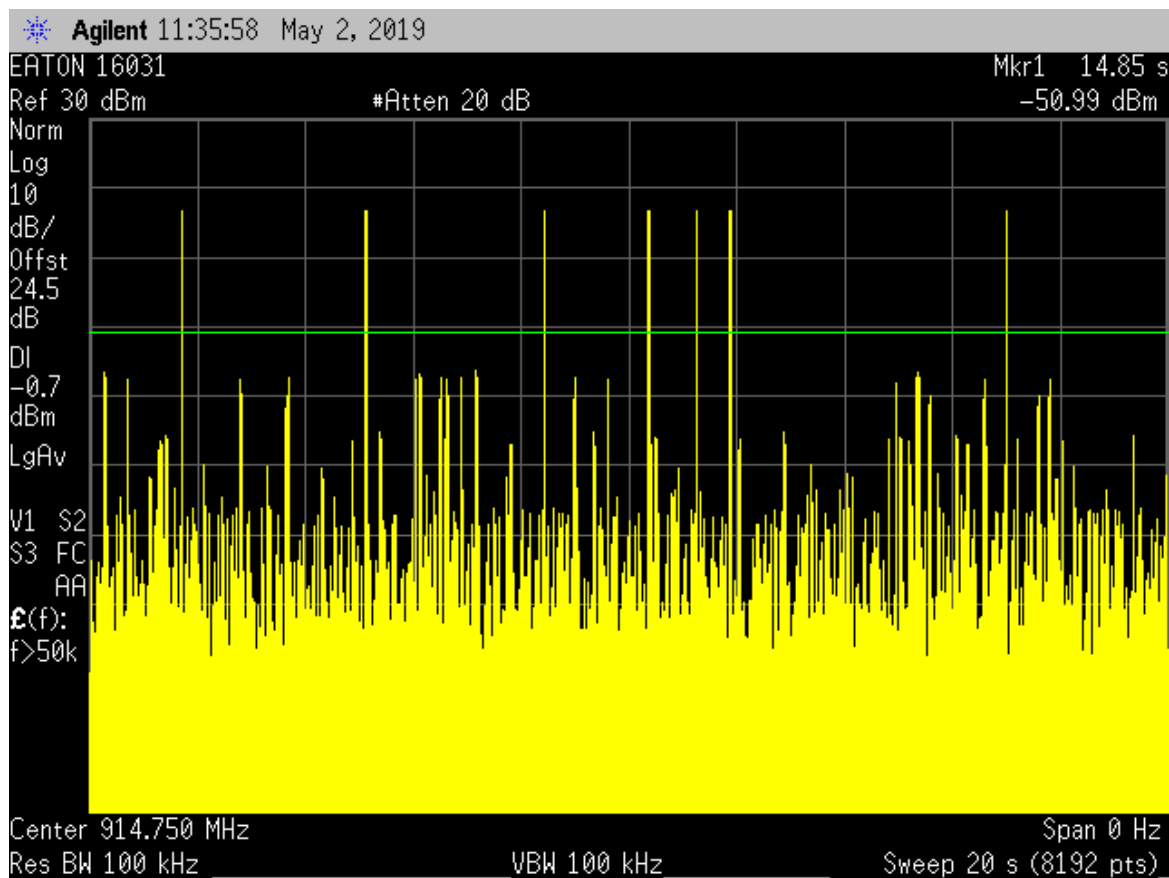
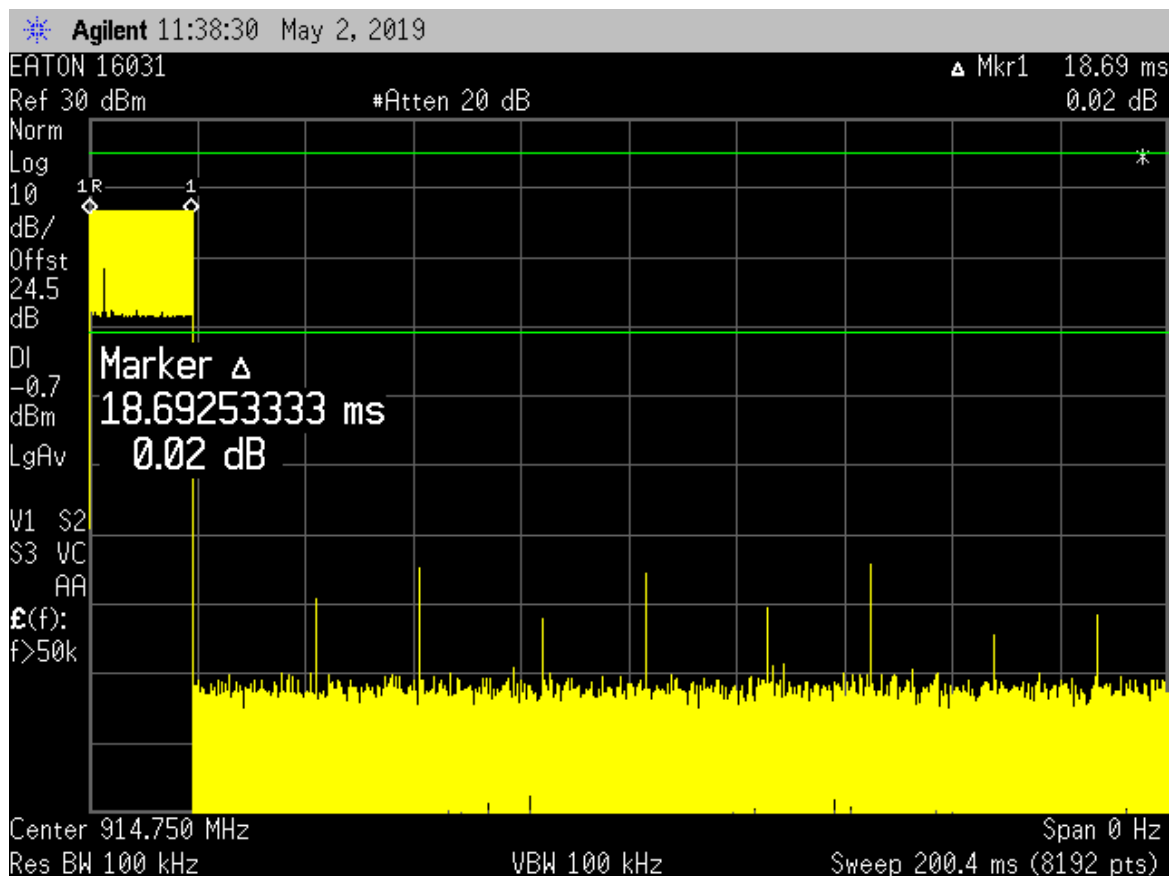




Figure 3: Time of Occupancy





## 4.2 RF POWER OUTPUT: (FCC PART §2.1046)

To measure the output power the hopping sequence was stopped while the frequency dwelled on a low, high and middle channel. The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum Analyzer. The analyzer offset was adjusted to compensate for the attenuator and other losses in the system.

**Table 6: RF Power Output**

| Frequency               | Level (dBm) | Limit (dBm) | Pass/Fail |
|-------------------------|-------------|-------------|-----------|
| Low Channel: 902.75MHz  | 19.2        | 30          | Pass      |
| Mid Channel: 915.75MHz  | 19.3        | 30          | Pass      |
| High Channel: 927.25MHz | 19.4        | 30          | Pass      |



Figure 4: RF Peak Power, Low Channel

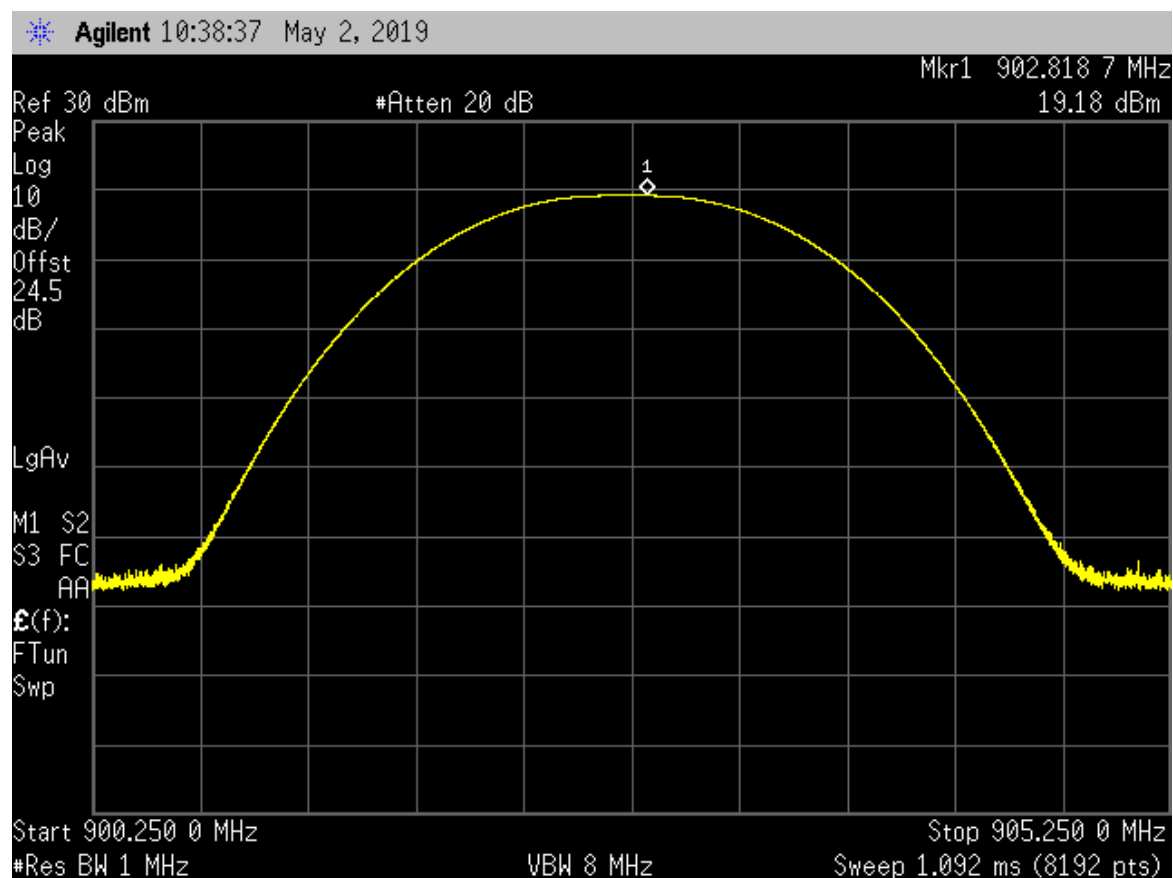




Figure 5: RF Peak Power, Mid Channel

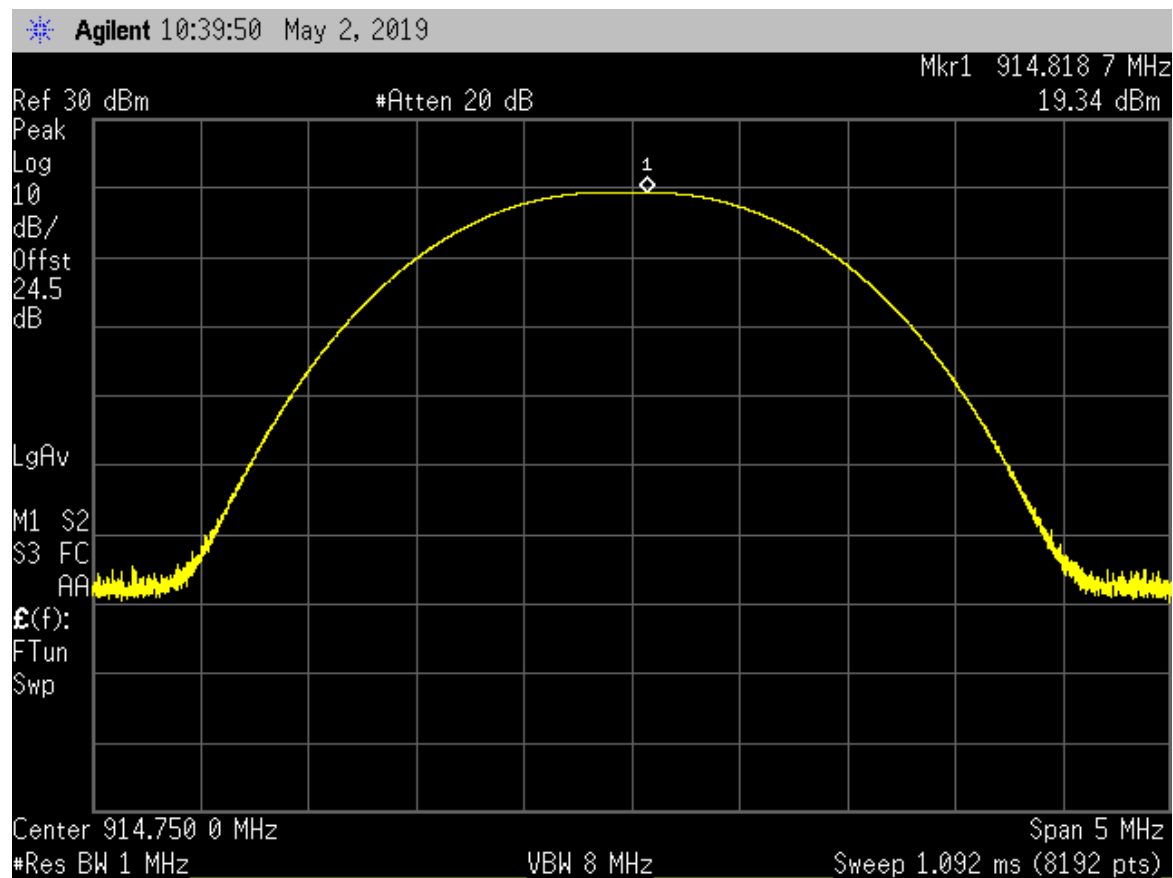
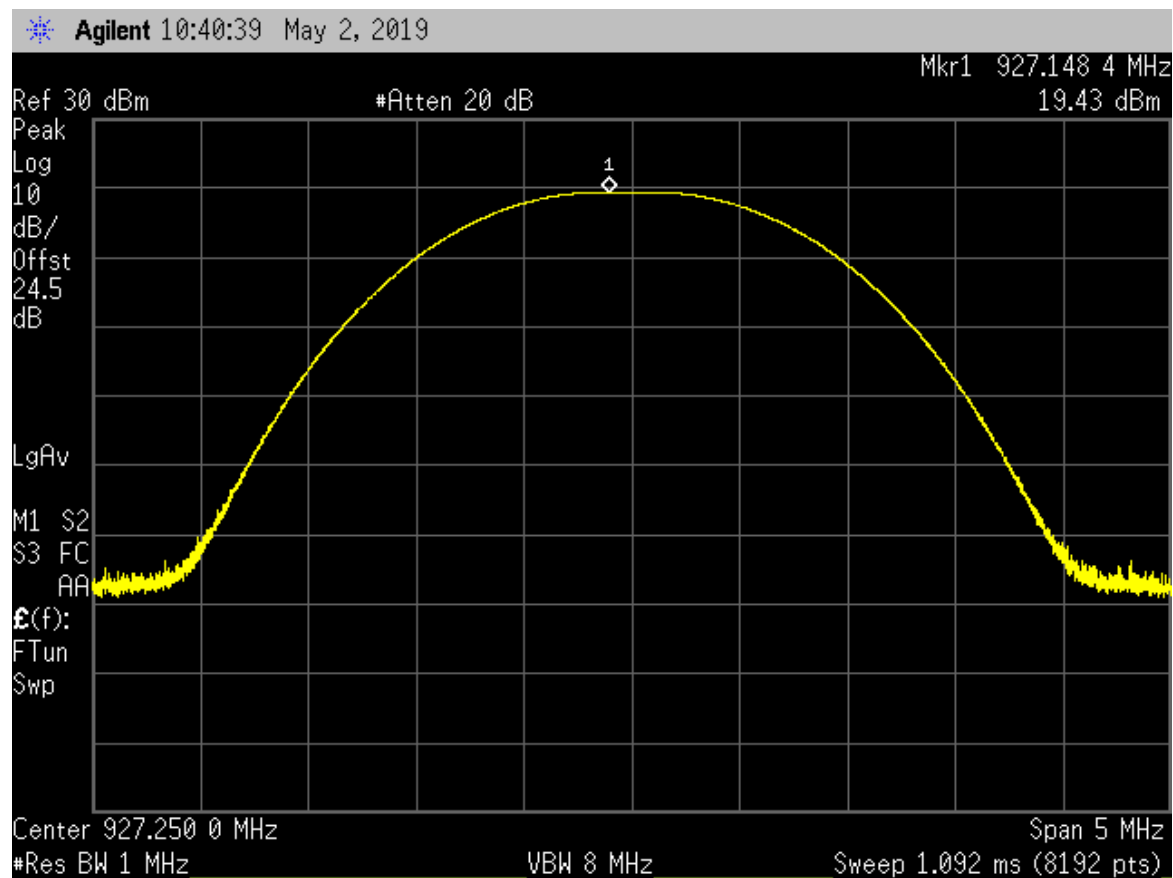




Figure 6: RF Peak Power, High Channel





#### 4.3 OCCUPIED BANDWIDTH: (FCC PART §2.1049)

Occupied bandwidth was performed by coupling the output of the EUT to the input of a spectrum analyzer.

For Frequency Hopping Spread Spectrum Systems, FCC Part 15.247 requires the maximum 20 dB bandwidth not exceed 500 kHz.

At full modulation, the occupied bandwidth was measured as shown.

Table 7 provides a summary of the Occupied Bandwidth Results.

**Table 7: Occupied Bandwidth Results**

| Frequency               | Bandwidth (kHz) | Limit (kHz) | Pass/Fail |
|-------------------------|-----------------|-------------|-----------|
| Low Channel: 902.75MHz  | 289.8           | 500         | Pass      |
| Mid Channel: 914.75MHz  | 308.9           | 500         | Pass      |
| High Channel: 927.25MHz | 293.2           | 500         | Pass      |



Figure 7: Occupied Bandwidth, Low Channel

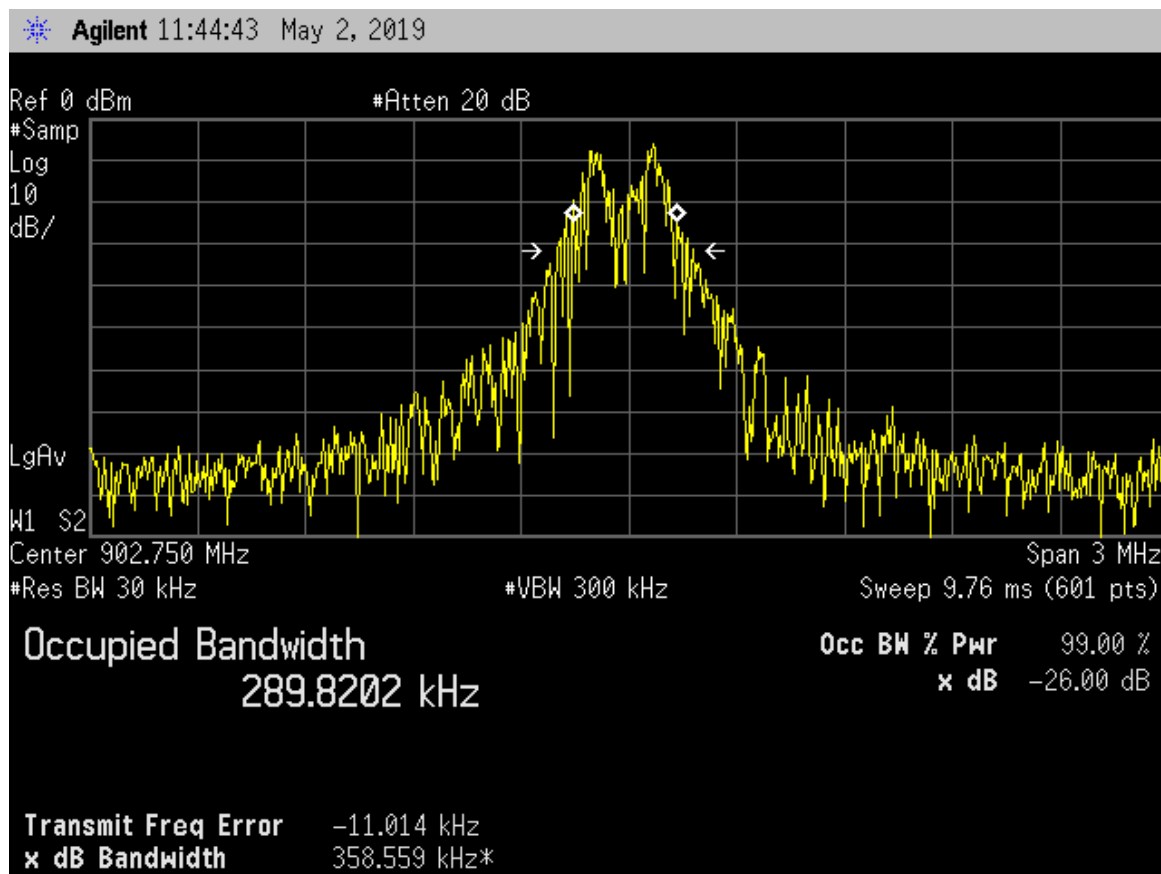




Figure 8: Occupied Bandwidth, Mid Channel

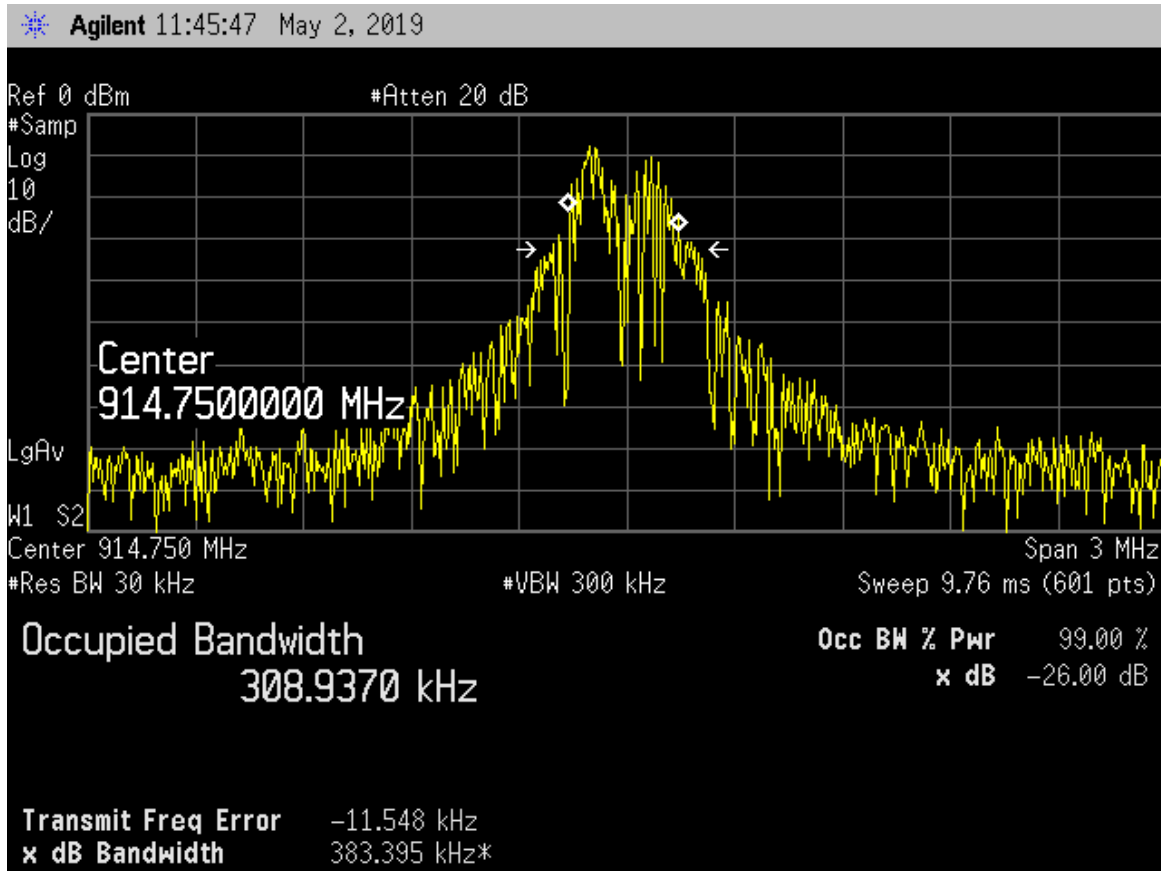
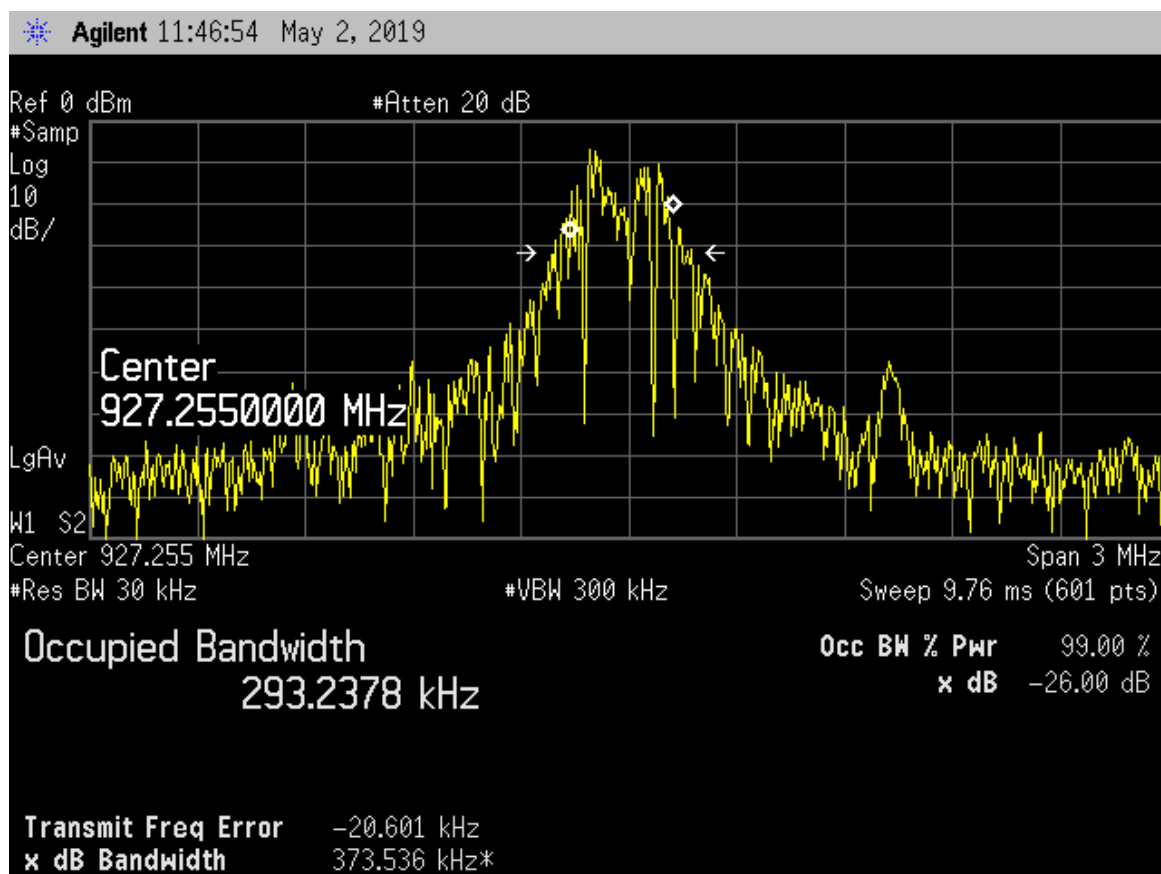




Figure 9: Occupied Bandwidth, High Channel





#### 4.4 CHANNEL SPACING AND NUMBER OF HOP CHANNELS (FCC PART §15247(A)(1))

Per the FCC requirements, frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth, whichever is greater. The maximum 20dB bandwidth measured is 308.9kHz so the channel spacing must be more than 308 kHz.

The following are plots of the channel spacing and number of hopping channels data. The channel spacing was measured to be kHz and the number of channels used is 50.

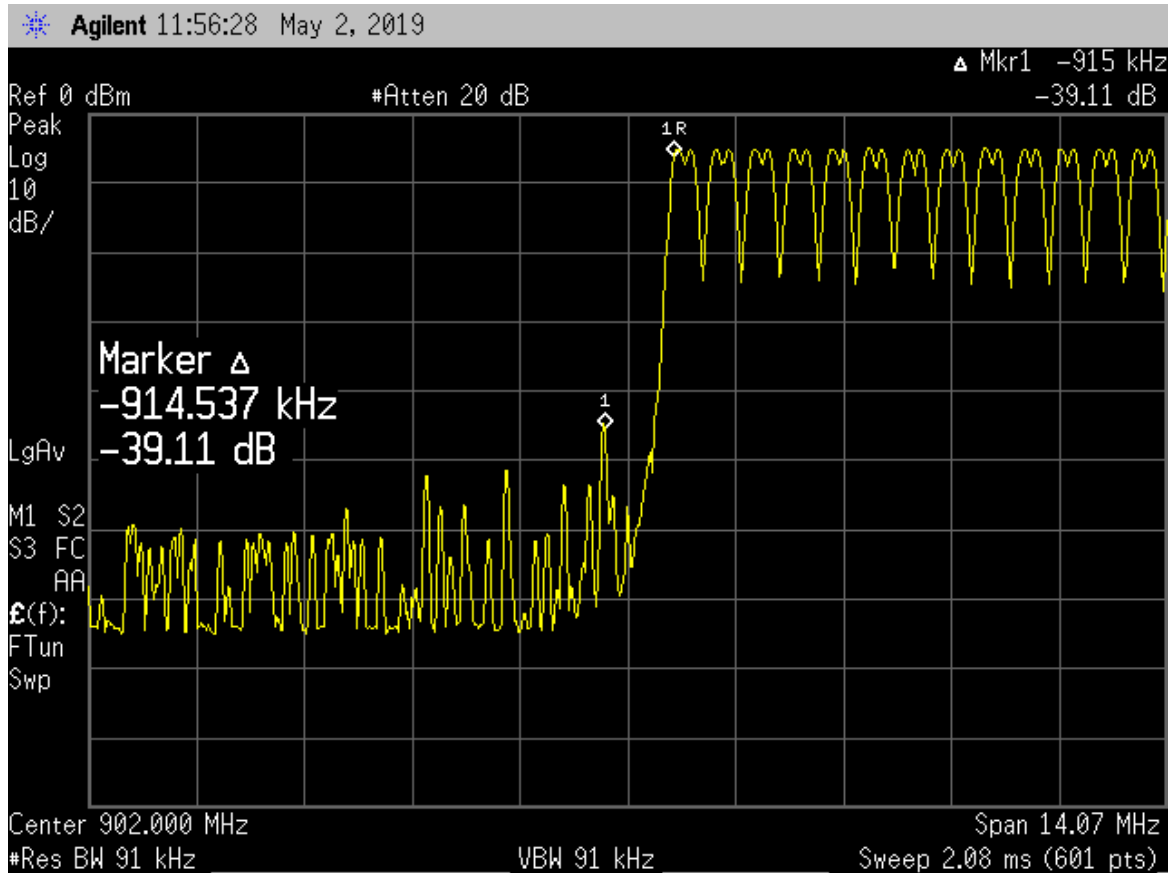
Note: In the following plots, each channel is composed of 2 distinct peaks, typical of the FSK modulation.

**Table 8: Channel Spacing and Number of Channels Results**

| Frequency          | Result      | Limit               | Pass/Fail |
|--------------------|-------------|---------------------|-----------|
| Channel Spacing    | 467 kHz     | 308 kHz Minimum     | Pass      |
| Number of channels | 50 channels | 25 Channels Minimum | Pass      |



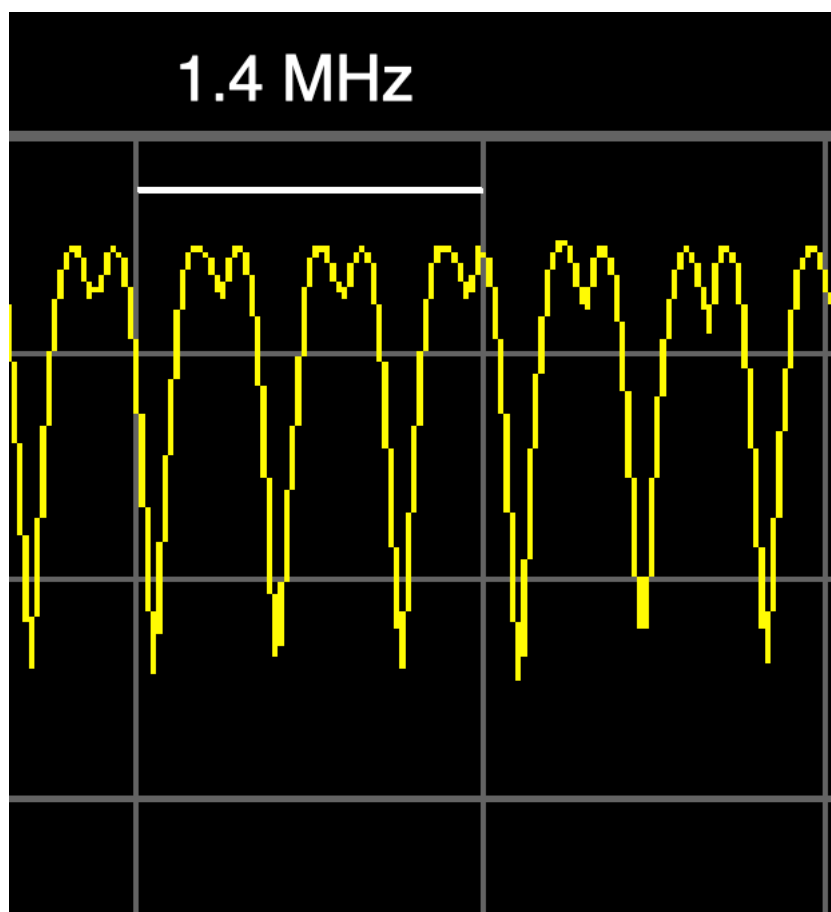
Figure 10: Channel Spacing



There are three channels in each 1.4 MHz segment shown in the figure above. This results in a channel spacing of  $1.4\text{MHz}/3 = 467\text{ kHz}$ .



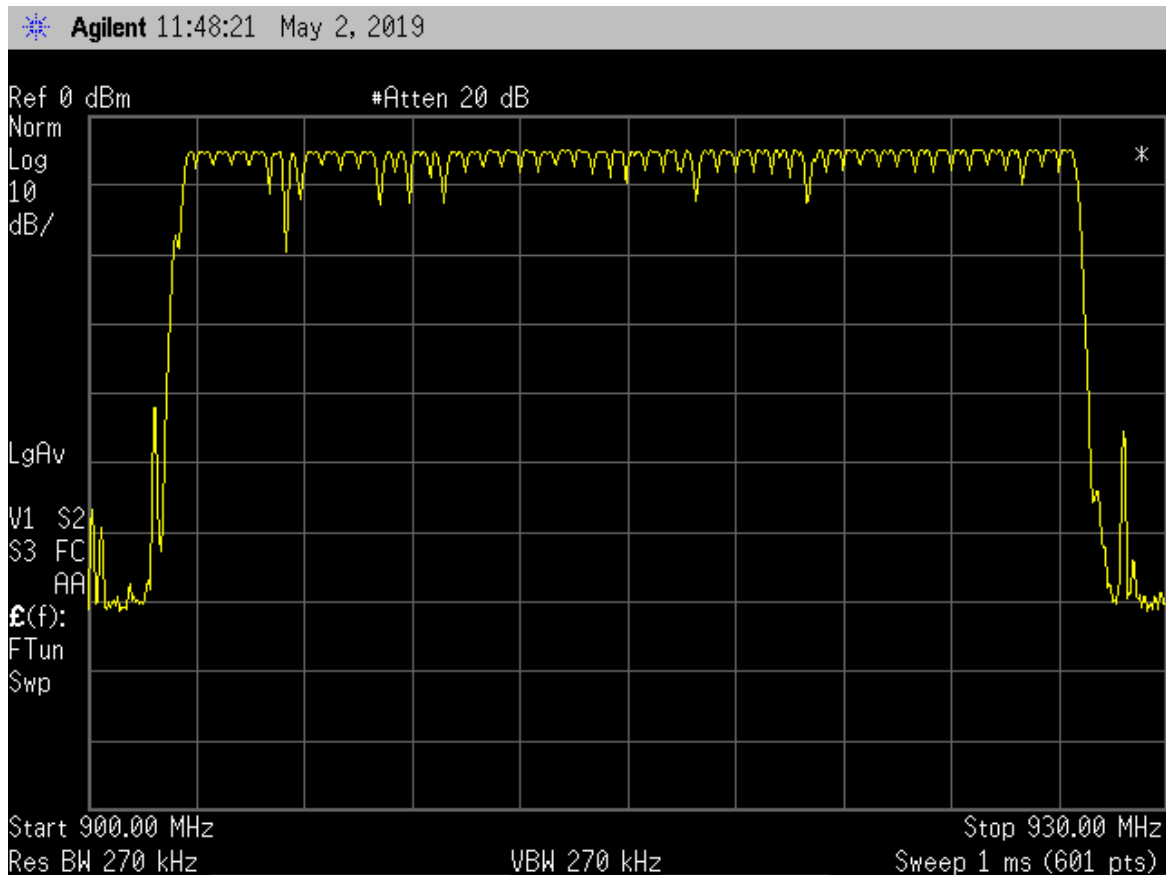
Figure 11: Channel Spacing





**Figure 12: Number of Hopping Channels**

Per the following figure, the number of hopping channels exceeds the minimum of 50.



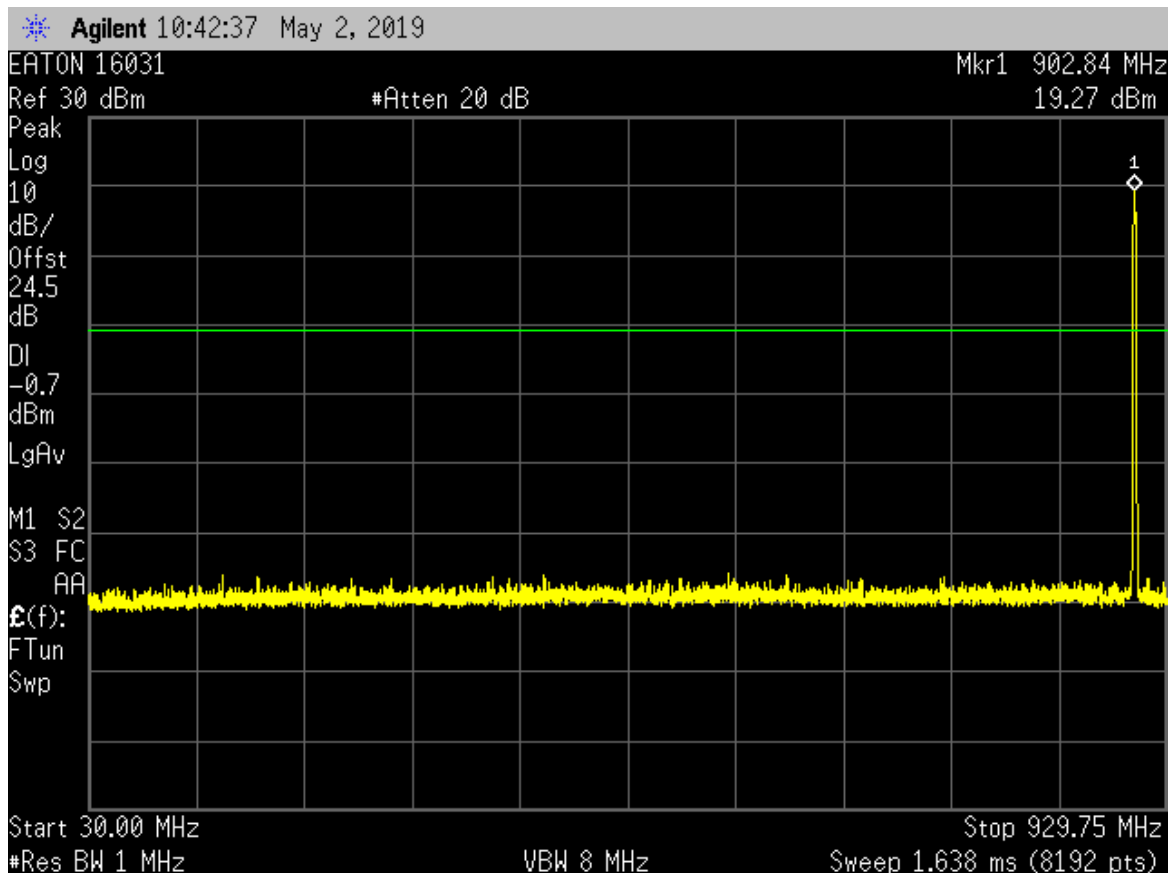


#### 4.5 CONDUCTED SPURIOUS EMISSIONS AT ANTENNA TERMINALS (FCC PART §2.1051)

The EUT must comply with requirements for spurious emissions at antenna terminals. Per §15.247(c) all spurious emissions in any 100 kHz bandwidth outside the frequency band in which the spread spectrum device is operating shall be attenuated 20 dB below the highest power level in a 100 kHz bandwidth within the band containing the highest level of the desired power.

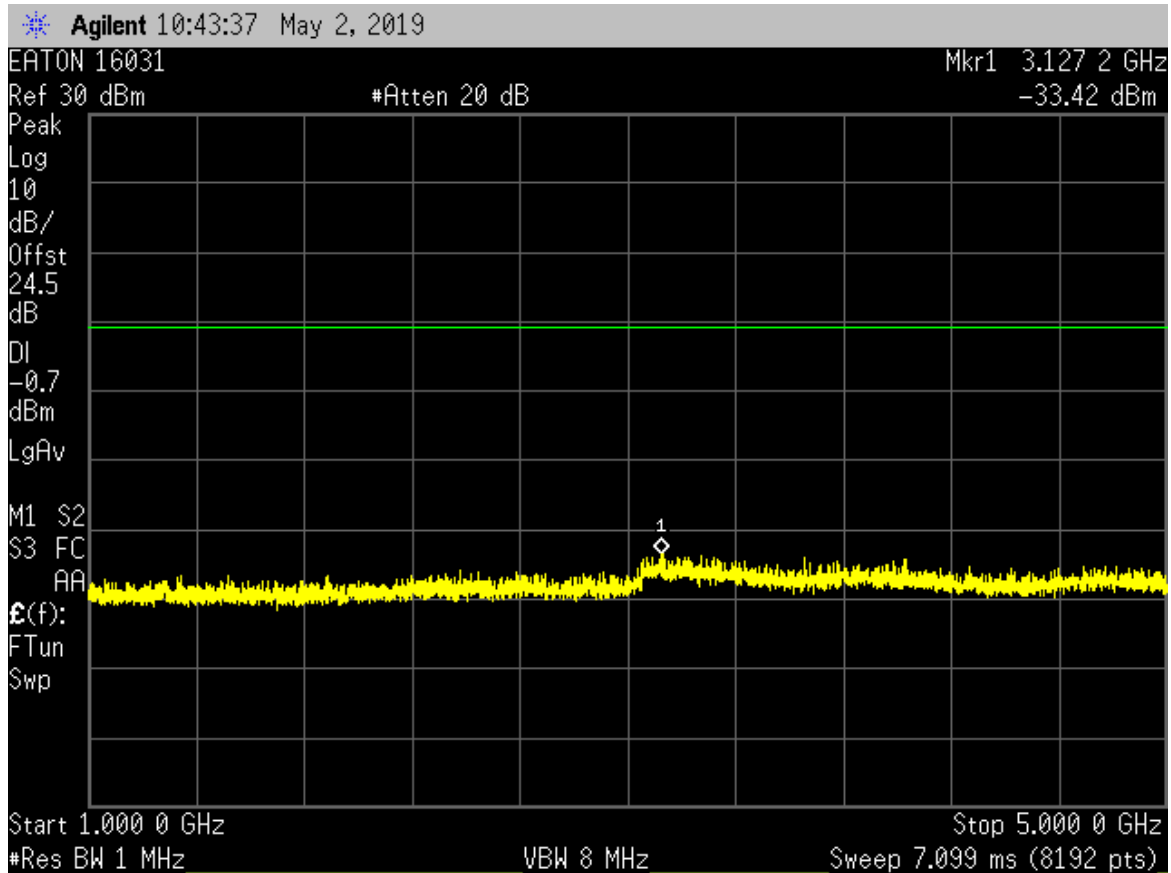
The EUT antenna was removed and the cable was connected directly into a spectrum analyzer through a 10 dB attenuator. An offset was programmed into the spectrum analyzer to compensate for the loss of the external attenuator. The spectrum analyzer resolution bandwidth was set to 100 kHz and the video bandwidth was set to 300 kHz. The amplitude of the EUT carrier frequency was measured to determine the emissions limit (20 dB below the carrier frequency amplitude). The emissions outside of the allocated frequency band were then scanned from 30 MHz up to the tenth harmonic of the carrier. The following are plots of the conducted spurious emissions data.

**Figure 13: Conducted Spurious Emissions, High Power, Low Channel 30 - 1000MHz**



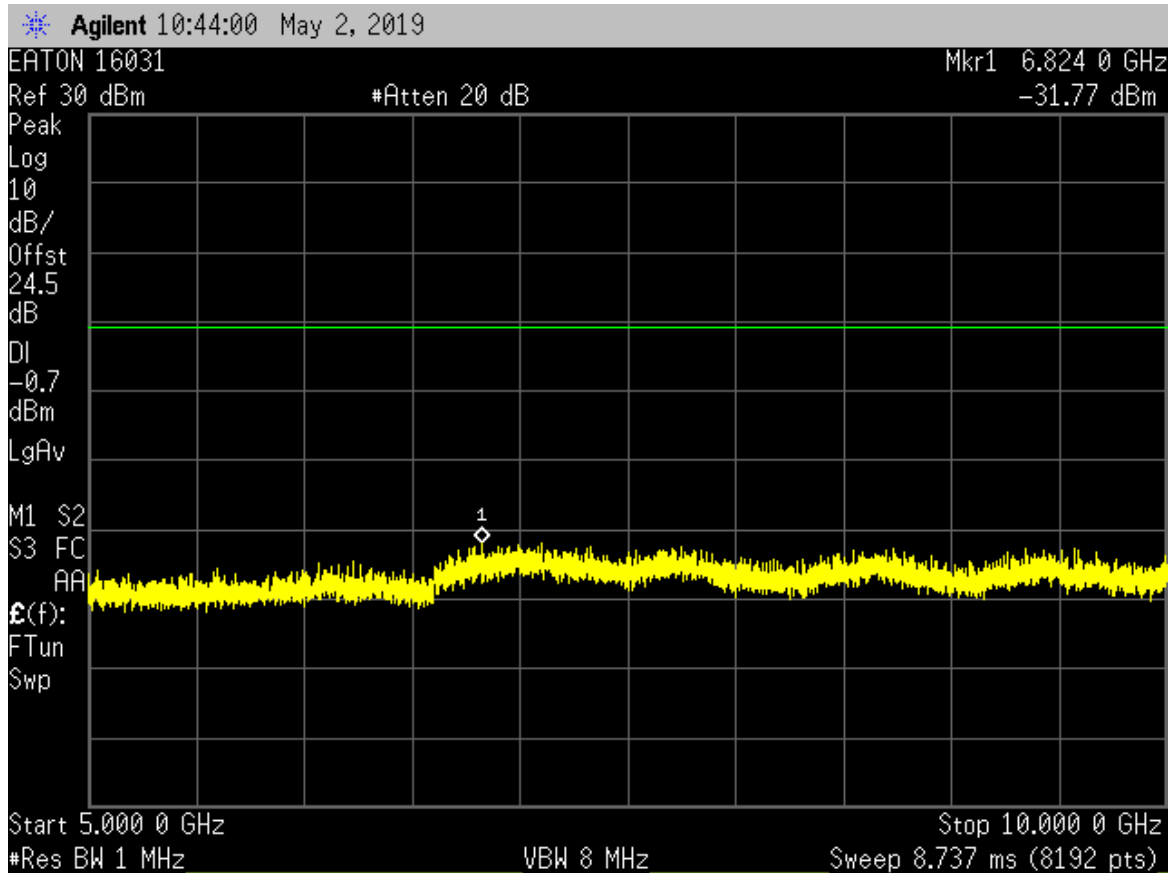


**Figure 14: Conducted Spurious Emissions, High Power, Low Channel 1000 – 5000MHz**



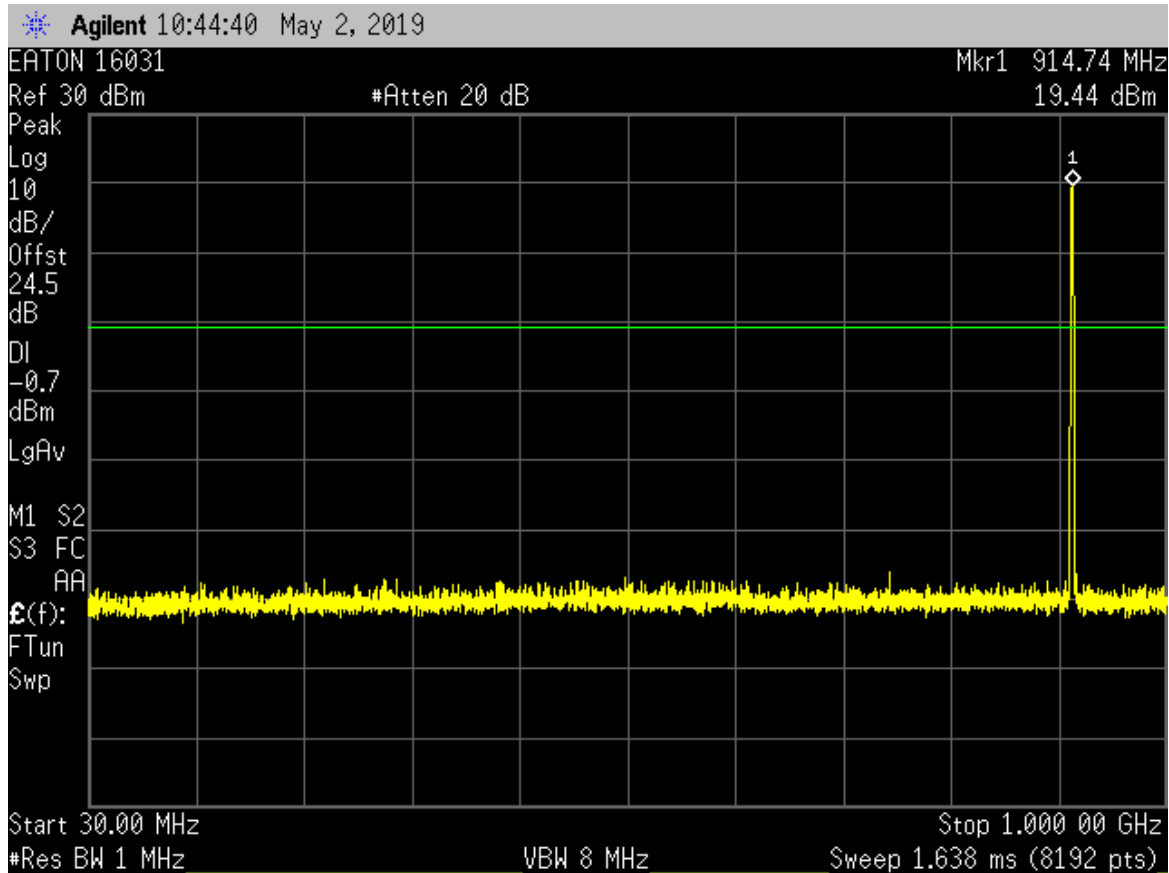


**Figure 15: Conducted Spurious Emissions, High Power, Low Channel 5 – 10 GHz**



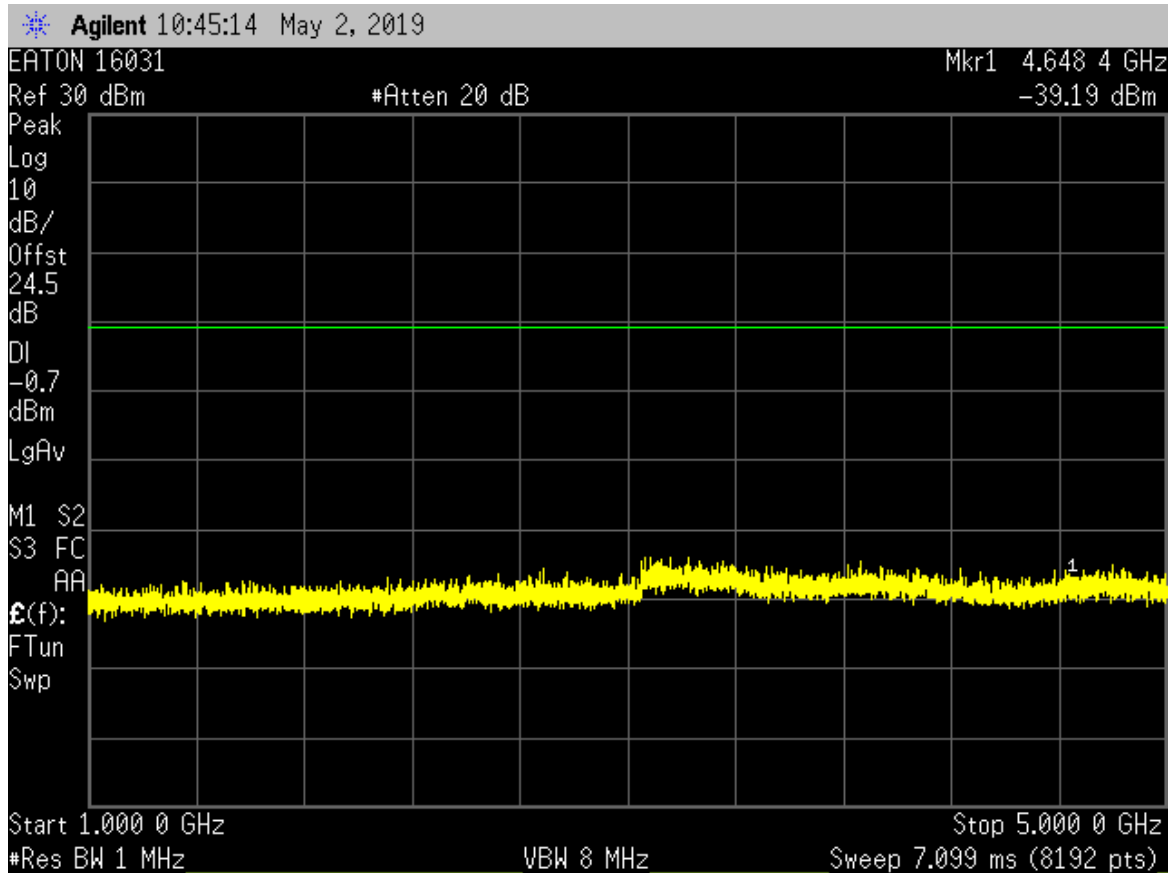


**Figure 16: Conducted Spurious Emissions, High Power, Center Channel 30 - 1000MHz**





**Figure 17: Conducted Spurious Emissions, High Power, Center Channel 1000 – 5000MHz**





**Figure 18: Conducted Spurious Emissions, High Power, Center Channel 5-10 GHz**

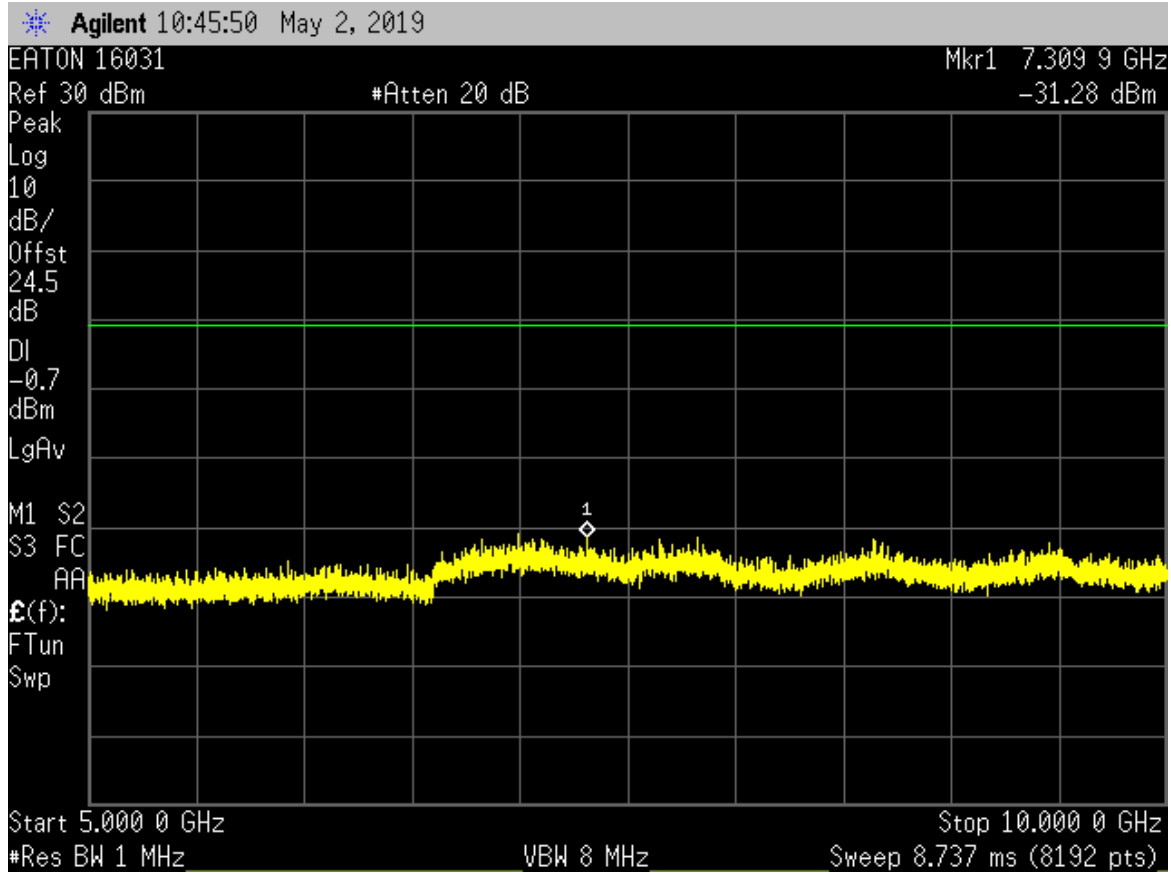




Figure 19: Conducted Spurious Emissions, High Power, High Channel 30 – 1000MHz

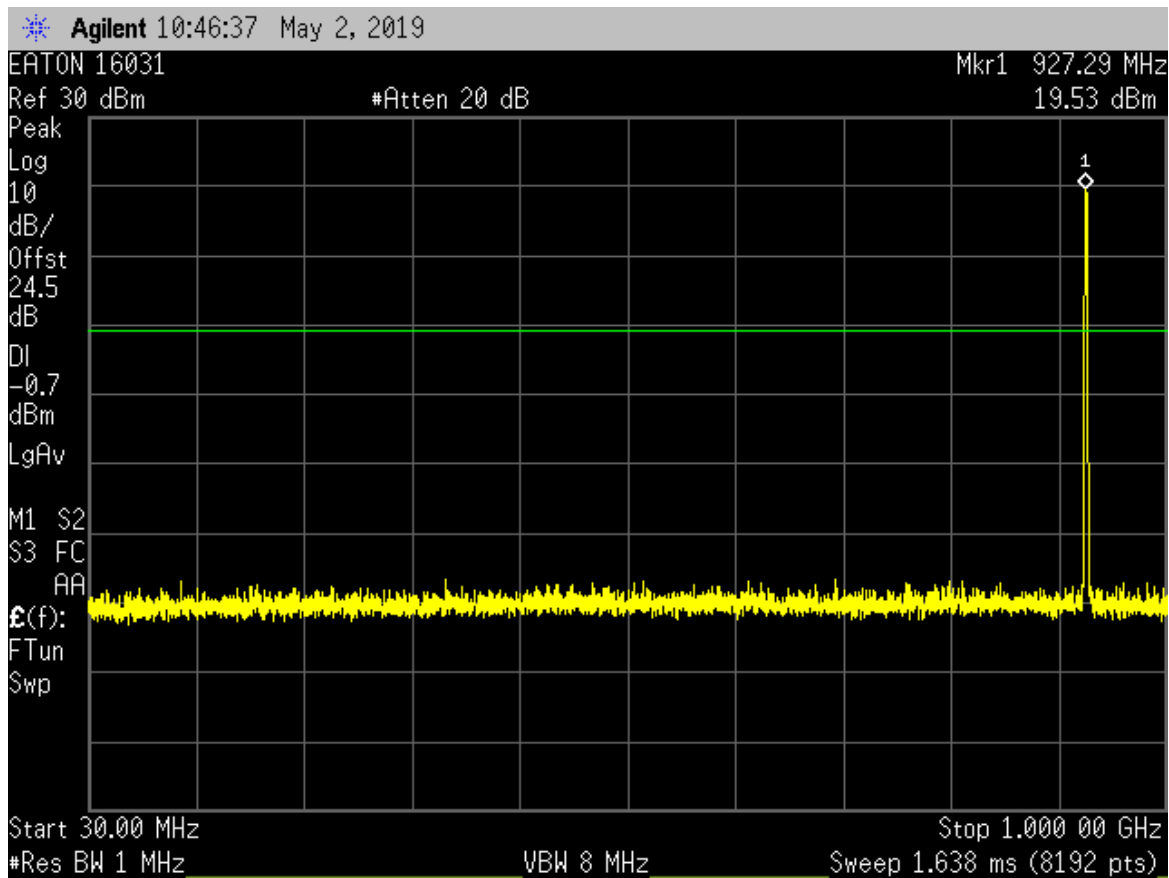
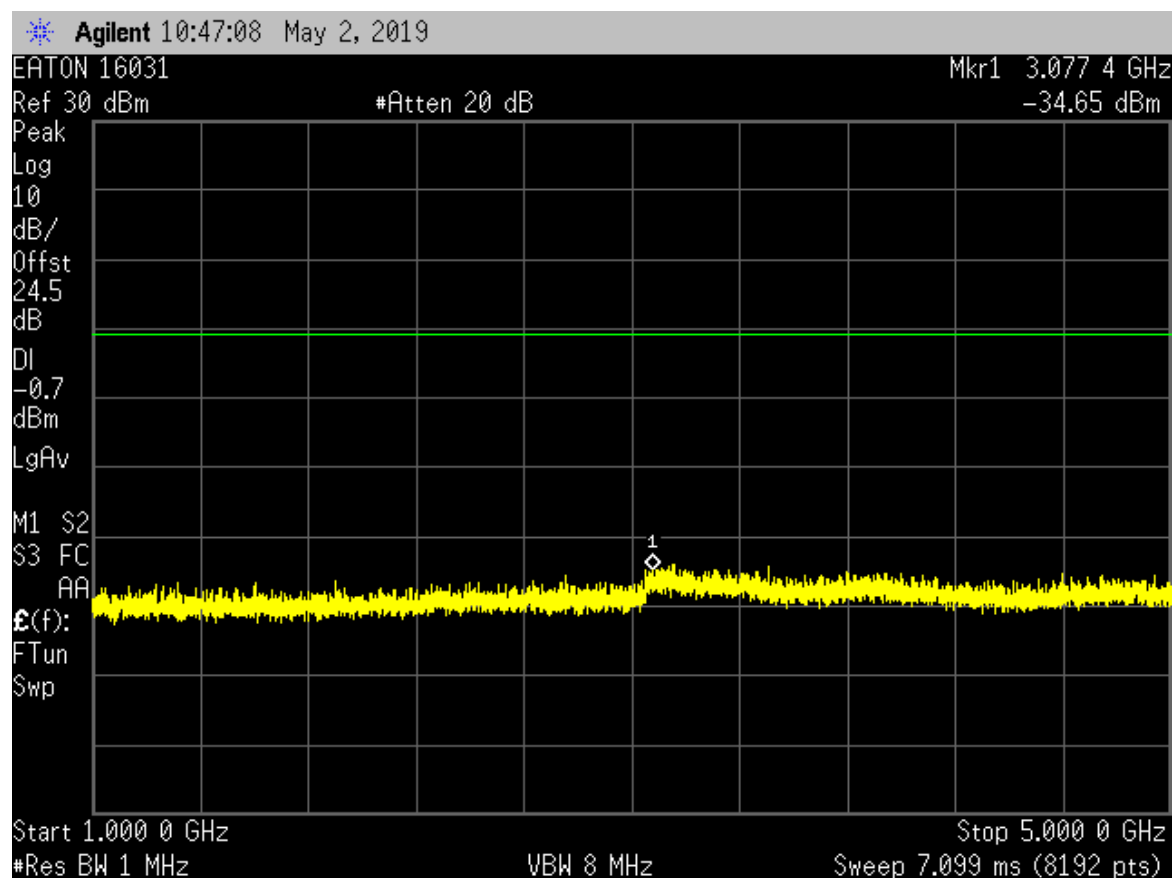


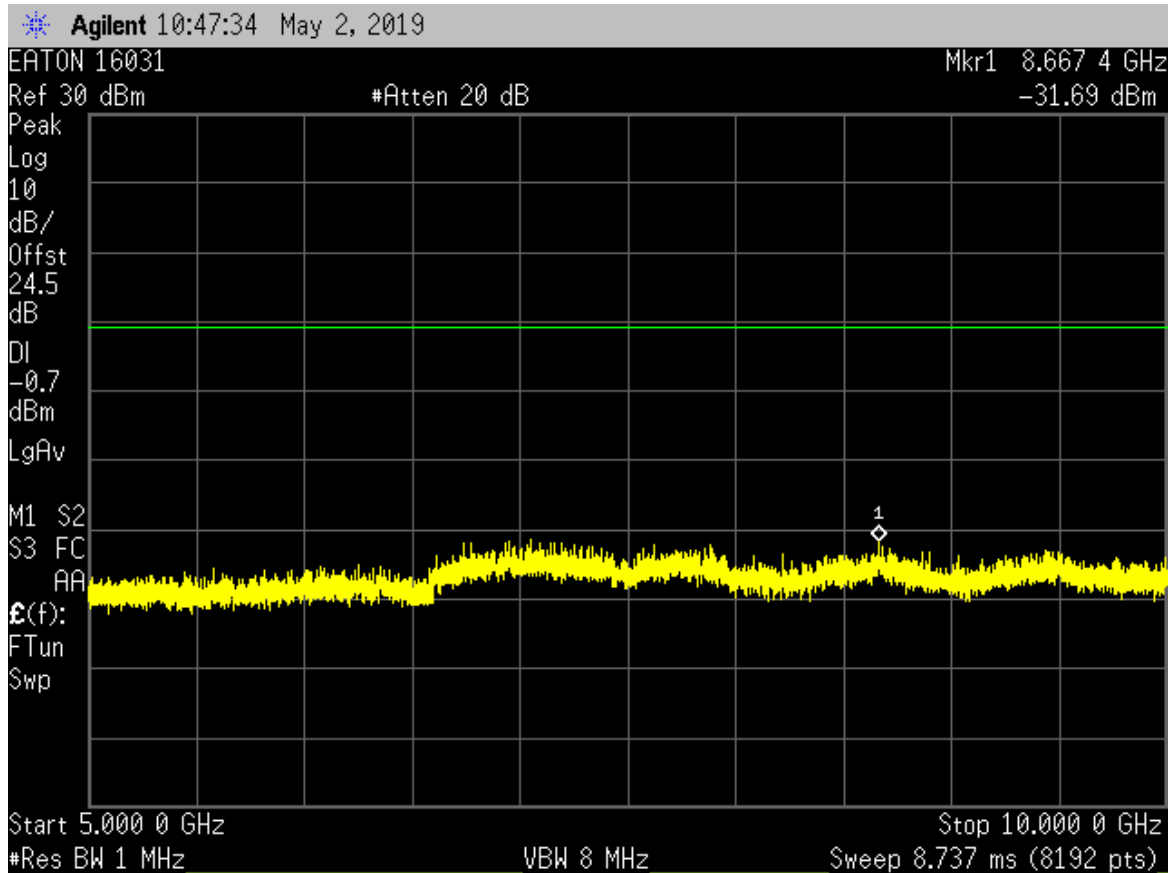


Figure 20: Conducted Spurious Emissions, High Power, High Channel 1000 – 5000MHz





**Figure 21: Conducted Spurious Emissions, High Power, High Channel 5-10GHz**





### Band Edge Compliance

In accordance with FCC Public Notice DA-00-705 close-up plots of the upper and lower channels in hopping mode (worst-case) with respect to the nearest authorized band-edges are provided below. The tests were performed in the same manner as the above conducted spurious emissions tests.

**Figure 22: Lower Band Edge, Hopping Mode**

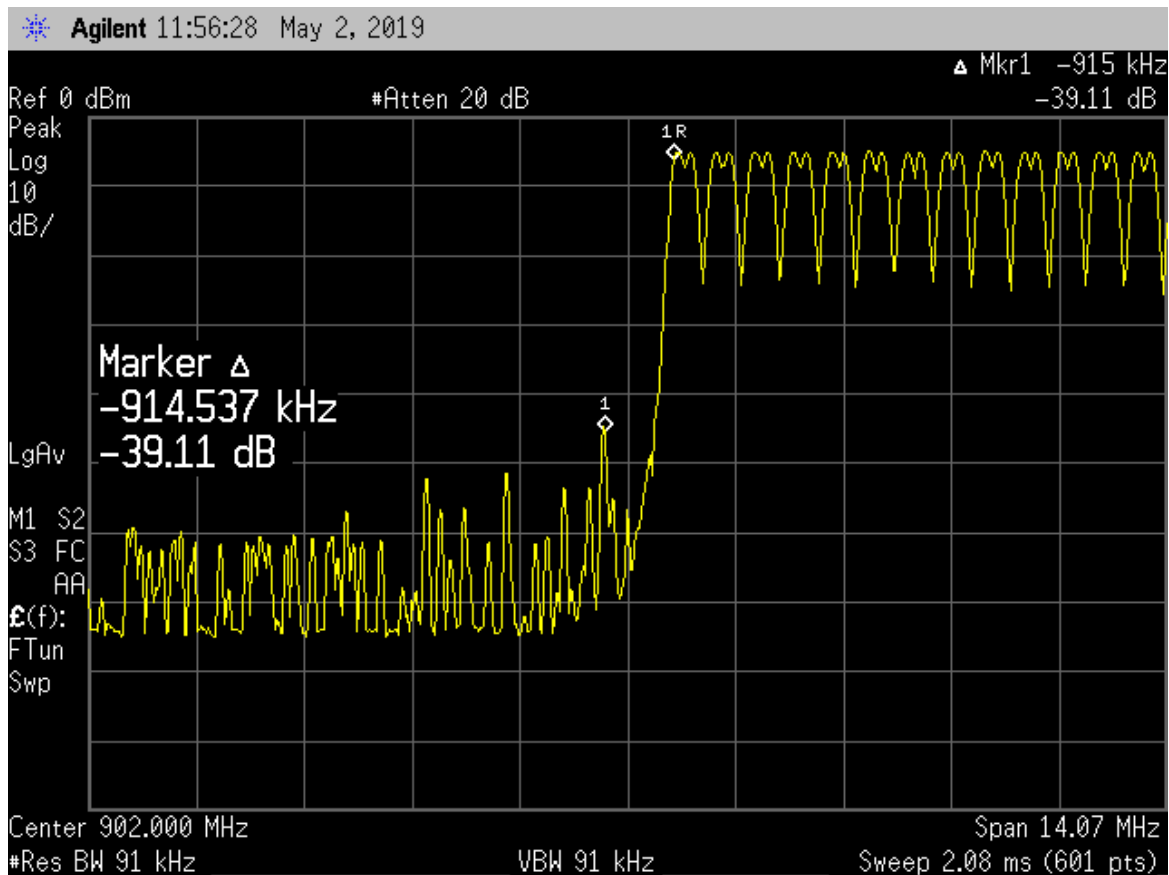
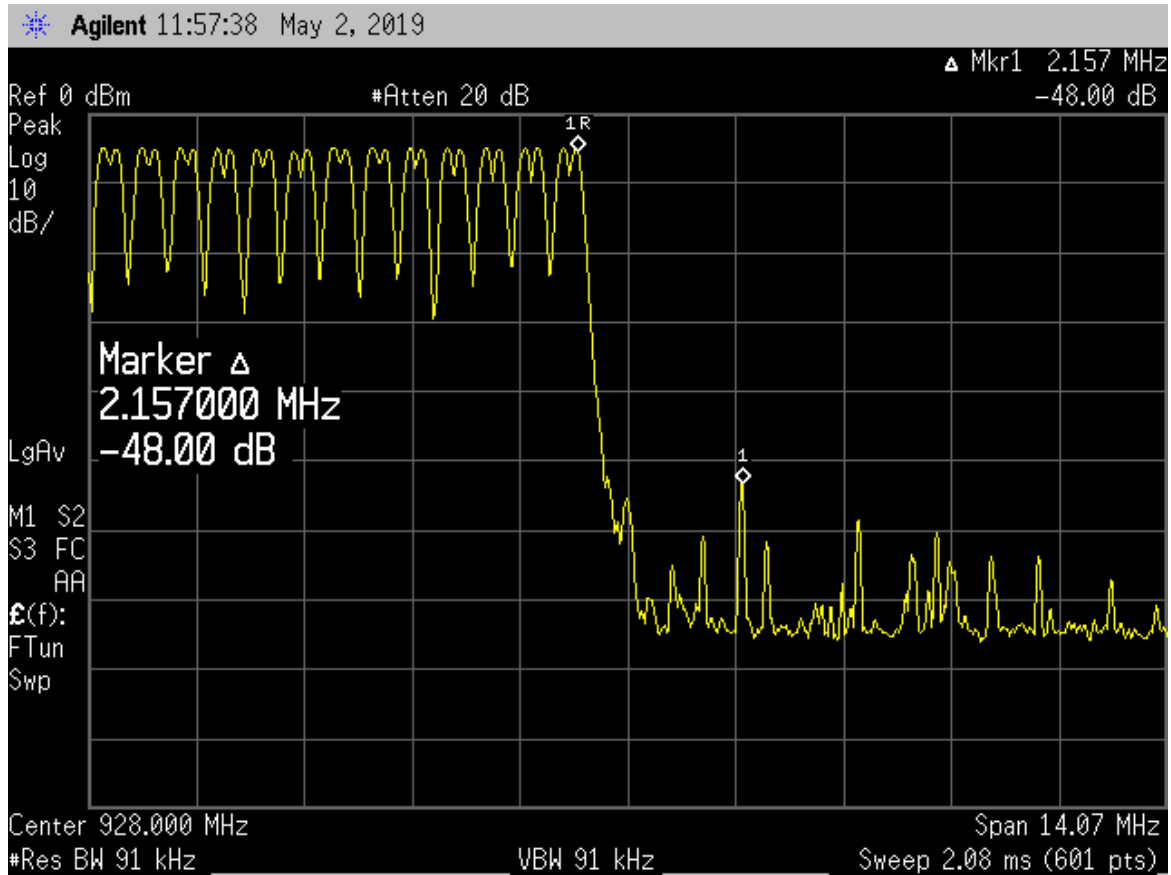




Figure 23: Upper Band Edge, Hopping Mode





#### 4.6 RADIATED SPURIOUS EMISSIONS: (FCC PART §2.1053)

The EUT must comply with the requirements for radiated spurious emissions that fall within the restricted bands. These emissions must meet the limits specified in §15.209 and §15.35(b) for peak measurements. All orthogonals were investigated. These data represent worst-case orientation.

##### 4.6.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions.

The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-2014. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The emissions were measured using the following resolution bandwidths:

**Table 9: Spectrum Analyzer Settings**

| Frequency Range | Resolution Bandwidth | Video Bandwidth            |
|-----------------|----------------------|----------------------------|
| 30MHz-1000 MHz  | 120kHz               | >100 kHz                   |
| >1000 MHz       | 1 MHz                | <10 Hz (Avg.), 1MHz (Peak) |

##### 4.6.2 Requirements

| FCC Compliance Limits |                    |                   |
|-----------------------|--------------------|-------------------|
| Frequency Range       | Limit (distance)   |                   |
|                       | Class A (10 meter) | Class B (3 meter) |
| 30-88 MHz             | 90 $\mu$ V/m       | 100 $\mu$ V/m     |
| 88-216 MHz            | 150 $\mu$ V/m      | 150 $\mu$ V/m     |
| 216-960 MHz           | 210 $\mu$ V/m      | 200 $\mu$ V/m     |
| >960MHz               | 300 $\mu$ V/m      | 500 $\mu$ V/m     |

##### 4.6.3 Test Procedure

The requirements of FCC Part 15 and ICES-003 call for the EUT to be placed on an 80 cm high 1 X 1.5 meters non-conductive motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Bi-conical and log periodic broadband antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The output of the antenna was connected to the input of the spectrum analyzer and the emissions in the frequency range of 30 MHz to 1 GHz were measured. The peripherals were placed on the table in accordance with ANSI



C63.4. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The output from the antenna was connected, via a preamplifier, to the input of the spectrum analyzer. The detector function was set to quasi-peak or peak, as appropriate. Above 1GHz average measurement are recorded. The measurement bandwidth of the spectrum analyzer system was set to at least 120 kHz, with all post-detector filtering no less than 10 times the measurement bandwidth. Frequencies above 1GHz were performed using a measurement bandwidth of 1MHz with a video bandwidth setting of 10 Hz for the average measurement.

#### 4.6.4 Radiated Data Reduction and Reporting

To convert the raw spectrum analyzer radiated data into a form that can be compared with the FCC limits, it is necessary to account for various calibration factors that are supplied with the antennas and other measurement accessories. These factors are included into the antenna factor (AF) column of the table and in the cable factor (CF) column of the table. The AF (in dB/m) and the CF (in dB) is algebraically added to the raw Spectrum Analyzer Voltage in dB $\mu$ V to obtain the Radiated Electric Field in dB $\mu$ V/m. This logarithm amplitude is converted to a linear amplitude, then compared to the FCC limit.

Example:

Spectrum Analyzer Voltage: VdB $\mu$ V

Antenna Correction Factor: AFdB/m

Cable Correction Factor: CFdB

Pre-Amplifier Gain (if applicable): GdB

Electric Field: EdB $\mu$ V/m = V dB $\mu$ V + AFdB/m + CFdB - GdB

To convert to linear units of measure: EdB $\mu$ V/m/20 Inv log



## 4.7 RADIATED EMISSIONS

### 4.7.1 Requirements

| FCC Compliance Limits |                    |                   |
|-----------------------|--------------------|-------------------|
| Frequency Range       | Limit (distance)   |                   |
|                       | Class A (10 meter) | Class B (3 meter) |
| 30-88 MHz             | 90 $\mu$ V/m       | 100 $\mu$ V/m     |
| 88-216 MHz            | 150 $\mu$ V/m      | 150 $\mu$ V/m     |
| 216-960 MHz           | 210 $\mu$ V/m      | 200 $\mu$ V/m     |
| >960MHz               | 300 $\mu$ V/m      | 500 $\mu$ V/m     |

### 4.7.2 Test Procedure

The requirements of FCC Part 15 and ICES-003 call for the EUT to be placed on an 80 cm high 1 X 1.5 meters non-conductive motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Bi-conical and log periodic broadband antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The output of the antenna was connected to the input of the spectrum analyzer and the emissions in the frequency range of 30 MHz to 1 GHz were measured. The peripherals were placed on the table in accordance with ANSI C63.4. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The output from the antenna was connected, via a preamplifier, to the input of the spectrum analyzer. The detector function was set to quasi-peak or peak, as appropriate. Above 1GHz average measurement are recorded. The measurement bandwidth of the spectrum analyzer system was set to at least 120 kHz, with all post-detector filtering no less than 10 times the measurement bandwidth. Frequencies above 1GHz were performed using a measurement bandwidth of 1MHz with a video bandwidth setting of 10 Hz for the average measurement.



#### 4.7.3 Radiated Data Reduction and Reporting

To convert the raw spectrum analyzer radiated data into a form that can be compared with the FCC limits, it is necessary to account for various calibration factors that are supplied with the antennas and other measurement accessories. These factors are included into the antenna factor (AF) column of the table and in the cable factor (CF) column of the table. The AF (in dB/m) and the CF (in dB) is algebraically added to the raw Spectrum Analyzer Voltage in dBμV to obtain the Radiated Electric Field in dBμV/m. This logarithm amplitude is converted to a linear amplitude, then compared to the FCC limit.

Example:

Spectrum Analyzer Voltage: VdBμV

Antenna Correction Factor: AFDdB/m

Cable Correction Factor: CFdB

Pre-Amplifier Gain (if applicable): GdB

Electric Field: EdBμV/m = V dBμV + AFDdB/m + CFdB - GdB

To convert to linear units of measure: EdBμV/m/20 Inv log

**Table 10: Radiated Emission & Receiver Spurious Emissions, Low Frequency (<1GHz)**

| Frequency (MHz) | Polarity H/V | Azimuth (Degree) | Ant. Height (m) | SA Level (dBμV) | Corr Factors (dB) | Corr. Level (uV/m) | Limit (uV/m) | Margin (dB) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
| 241.50          | V            | 0.00             | 41.00           | 41.00           | -12.2             | 27.6               | 200.0        | -17.2       | Peak     |
| 265.80          | V            | 180.00           | 2.00            | 36.70           | -10.9             | 19.4               | 200.0        | -20.3       | Peak     |
| 290.10          | V            | 180.00           | 1.50            | 37.40           | -10.0             | 23.4               | 200.0        | -18.6       | Peak     |
| 339.40          | V            | 90.00            | 1.50            | 38.50           | -8.9              | 30.0               | 200.0        | -16.5       | Peak     |
| 366.00          | V            | 0.00             | 2.00            | 40.70           | -7.9              | 43.8               | 200.0        | -13.2       | Peak     |
| 377.00          | V            | 45.00            | 2.00            | 38.70           | -7.8              | 35.0               | 200.0        | -15.1       | Peak     |
| 242.30          | H            | 180.00           | 1.50            | 41.60           | -12.1             | 29.8               | 200.0        | -16.5       | Peak     |
| 256.40          | H            | 0.00             | 2.00            | 42.50           | -12.2             | 32.7               | 200.0        | -15.7       | Peak     |
| 274.40          | H            | 180.00           | 1.50            | 43.40           | -10.3             | 45.0               | 200.0        | -13.0       | Peak     |
| 342.00          | H            | 90.00            | 1.50            | 36.40           | -8.8              | 23.9               | 200.0        | -18.5       | Peak     |
| 385.60          | H            | 0.00             | 2.00            | 39.50           | -7.8              | 38.7               | 200.0        | -14.3       | Peak     |
| 395.80          | H            | 180.00           | 2.00            | 35.10           | -7.7              | 23.5               | 200.0        | -18.6       | Peak     |



**Table 11: Radiated Emission Test Data, High Frequency Data >1GHz, Low Channel**

|        | Frequency<br>(MHz) | Polarity<br>(H/V) | Azimuth<br>(Degree) | Ant.<br>Height<br>(m) | SA Level<br>(dBuV) | Corr<br>Factors<br>(dB) | Corr.<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Peak or<br>Average |
|--------|--------------------|-------------------|---------------------|-----------------------|--------------------|-------------------------|----------------------------|-------------------|----------------|--------------------|
| 902.75 |                    |                   |                     |                       |                    |                         |                            |                   |                |                    |
|        |                    |                   |                     |                       |                    |                         |                            |                   |                |                    |
|        | 2708.25            | V                 | 0                   | 1.5                   | 30.6               | -0.1                    | 30.5                       | 54.0              | -23.5          | AVG                |
|        | 3611.00            | V                 | 0                   | 1.5                   | 31.0               | 2.1                     | 33.1                       | 54.0              | -20.9          | AVG                |
|        | 4513.75            | V                 | 0                   | 1.5                   | 30.5               | 4.4                     | 34.9                       | 54.0              | -19.1          | AVG                |
|        | 5416.50            | V                 | 90                  | 1.5                   | 29.5               | 7.5                     | 37.0                       | 54.0              | -17.0          | AVG                |
|        | 6319.25            | V                 | 90                  | 1.5                   | 30.2               | 8.2                     | 38.4                       | 54.0              | -15.6          | AVG                |
|        | 7222.00            | V                 | 180                 | 1.5                   | 29.0               | 11.5                    | 40.5                       | 54.0              | -13.5          | AVG                |
|        | 8124.75            | V                 | 0                   | 1.5                   | 29.2               | 11.4                    | 40.6                       | 54.0              | -13.4          | AVG                |
|        | 9027.50            | V                 | 0                   | 1.5                   | 30.1               | 14.1                    | 44.2                       | 54.0              | -9.8           | AVG                |
|        |                    |                   |                     |                       |                    |                         |                            |                   |                |                    |
|        |                    |                   |                     |                       |                    |                         |                            |                   |                |                    |
|        | 2708.25            | H                 | 90                  | 1.5                   | 39.0               | -0.1                    | 38.9                       | 54.0              | -15.1          | AVG                |
|        | 3611.00            | H                 | 180                 | 1.5                   | 31.6               | 2.1                     | 33.7                       | 54.0              | -20.3          | AVG                |
|        | 4513.75            | H                 | 90                  | 1.5                   | 30.2               | 4.4                     | 34.6                       | 54.0              | -19.4          | AVG                |
|        | 5416.50            | H                 | 0                   | 1.5                   | 29.6               | 7.5                     | 37.1                       | 54.0              | -16.9          | AVG                |
|        | 6319.25            | H                 | 90                  | 1.5                   | 30.8               | 8.2                     | 39.0                       | 54.0              | -15.0          | AVG                |
|        | 7222.00            | H                 | 90                  | 1.5                   | 30.3               | 11.5                    | 41.8                       | 54.0              | -12.2          | AVG                |
|        | 8124.75            | H                 | 0                   | 1.5                   | 31.0               | 11.4                    | 42.4                       | 54.0              | -11.6          | AVG                |
|        | 9027.50            | H                 | 180                 | 1.5                   | 30.7               | 14.1                    | 44.8                       | 54.0              | -9.2           | AVG                |



902.75

| Frequency (MHz) | Polarity (H/V) | Azimuth (Degree) | Ant. Height (m) | SA Level (dBuV) | Corr Factors (dB) | Corr. Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Peak or Average |
|-----------------|----------------|------------------|-----------------|-----------------|-------------------|----------------------|----------------|-------------|-----------------|
|                 |                |                  |                 |                 |                   |                      |                |             |                 |
| 1805.50         | V              | 180              | 2.0             | 41.0            | -5.7              | 35.3                 | 74.0           | -38.7       | Peak            |
| 2708.25         | V              | 0                | 1.5             | 45.2            | -0.1              | 45.1                 | 74.0           | -28.9       | Peak            |
| 3611.00         | V              | 180              | 1.5             | 40.0            | 2.1               | 42.1                 | 74.0           | -31.9       | Peak            |
| 4513.75         | V              | 90               | 1.5             | 41.6            | 4.4               | 46.0                 | 74.0           | -28.0       | Peak            |
| 5416.50         | V              | 180              | 1.5             | 39.0            | 7.5               | 46.5                 | 74.0           | -27.5       | Peak            |
| 6319.25         | V              | 90               | 1.5             | 36.0            | 8.2               | 44.2                 | 74.0           | -29.8       | Peak            |
| 7222.00         | V              | 90               | 1.5             | 40.0            | 11.5              | 51.5                 | 74.0           | -22.5       | Peak            |
| 8124.75         | V              | 0                | 1.5             | 40.2            | 11.4              | 51.6                 | 74.0           | -22.4       | Peak            |
| 9027.50         | V              | 90               | 1.5             | 40.4            | 14.1              | 54.5                 | 74.0           | -19.5       | Peak            |
|                 |                |                  |                 |                 |                   |                      |                |             |                 |
| 1805.50         | H              | 180              |                 | 42.0            | -5.7              | 36.3                 | 74.0           | -37.7       | Peak            |
| 2708.25         | H              | 0                | 1.5             | 38.0            | -0.1              | 39.9                 | 74.0           | -36.1       | Peak            |
| 3611.00         | H              | 90               | 1.5             | 40.2            | 2.1               | 42.3                 | 74.0           | -31.7       | Peak            |
| 4513.75         | H              | 180              | 1.5             | 38.0            | 4.4               | 42.4                 | 74.0           | -31.6       | Peak            |
| 5416.50         | H              | 90               | 1.5             | 37.8            | 7.5               | 45.3                 | 74.0           | -28.7       | Peak            |
| 6319.25         | H              | 90               | 1.5             | 39.0            | 8.2               | 47.2                 | 74.0           | -26.8       | Peak            |
| 7222.00         | H              | 0                | 1.5             | 41.5            | 11.5              | 53.0                 | 74.0           | -21.0       | Peak            |
| 8124.75         | H              | 90               | 1.5             | 39.8            | 11.4              | 51.2                 | 74.0           | -22.8       | Peak            |
| 9027.50         | H              | 180              | 1.5             | 40.9            | 14.1              | 55.0                 | 74.0           | -19.0       | Peak            |



**Table 12: Radiated Emission Test Data, High Frequency Data >1GHz, Center Channel**

| Frequency (MHz) | Polarity (H/V) | Azimuth (Degree) | Ant. Height (m) | SA Level (dBuV) | Corr Factors (dB) | Corr. Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Peak or Average |
|-----------------|----------------|------------------|-----------------|-----------------|-------------------|----------------------|----------------|-------------|-----------------|
| 914.75          |                |                  |                 |                 |                   |                      |                |             |                 |
|                 |                |                  |                 |                 |                   |                      |                |             |                 |
|                 |                |                  |                 |                 |                   |                      |                |             |                 |
|                 | V              | 0                | 1.5             | 36.0            | 0.0               | 36.0                 | 54.0           | -18.0       | AVG             |
|                 | V              | 0                | 1.5             | 31.0            | 2.2               | 33.2                 | 54.0           | -20.8       | AVG             |
|                 | V              | 90               | 1.5             | 32.0            | 4.5               | 36.5                 | 54.0           | -17.5       | AVG             |
|                 | V              | 180              | 1.5             | 31.0            | 7.5               | 38.5                 | 54.0           | -15.5       | AVG             |
|                 | V              | 90               | 1.5             | 30.5            | 8.2               | 38.7                 | 54.0           | -15.3       | AVG             |
|                 | V              | 90               | 1.5             | 31.0            | 11.2              | 42.2                 | 54.0           | -11.8       | AVG             |
|                 | V              | 0                | 1.5             | 30.5            | 11.7              | 42.2                 | 54.0           | -11.8       | AVG             |
|                 | V              | 90               | 1.5             | 31.0            | 14.5              | 45.5                 | 54.0           | -8.5        | AVG             |
|                 | V              | 180.0            | 1.5             | 42.3            | 14.5              | 56.8                 | 74.0           | -17.2       | AVG             |
|                 |                |                  |                 |                 |                   |                      |                |             |                 |
|                 |                |                  |                 |                 |                   |                      |                |             |                 |
|                 | H              | 0                | 1.5             | 37.0            | 0.0               | 37.0                 | 54.0           | -17.0       | AVG             |
|                 | H              | 180              | 1.5             | 31.5            | 2.2               | 33.7                 | 54.0           | -20.3       | AVG             |
|                 | H              | 0                | 1.5             | 32.0            | 4.5               | 36.5                 | 54.0           | -17.5       | AVG             |
|                 | H              | 180              | 1.5             | 31.0            | 7.5               | 38.5                 | 54.0           | -15.5       | AVG             |
|                 | H              | 90               | 1.5             | 30.5            | 8.2               | 38.7                 | 54.0           | -15.3       | AVG             |
|                 | H              | 0                | 1.5             | 30.1            | 11.2              | 41.3                 | 54.0           | -12.7       | AVG             |
|                 | H              | 0                | 1.5             | 30.3            | 11.7              | 42.0                 | 54.0           | -12.0       | AVG             |
|                 | H              | 90               | 1.5             | 30.5            | 14.5              | 45.0                 | 54.0           | -9.0        | AVG             |



914.75

| Frequency (MHz) | Polarity (H/V) | Azimuth (Degree) | Ant. Height (m) | SA Level (dBuV) | Corr Factors (dB) | Corr. Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Peak or Average |
|-----------------|----------------|------------------|-----------------|-----------------|-------------------|----------------------|----------------|-------------|-----------------|
|                 |                |                  |                 |                 |                   |                      |                |             |                 |
| 1829.50         | V              | 180              | 1.5             | 45.0            | -5.5              | 39.5                 | 74.0           | -34.5       | Peak            |
| 2744.25         | V              | 0                | 1.5             | 39.5            | 0.0               | 39.5                 | 74.0           | -34.5       | Peak            |
| 3659.00         | V              | 180              | 1.5             | 38.4            | 2.2               | 40.6                 | 74.0           | -33.4       | Peak            |
| 4573.75         | V              | 90               | 1.5             | 38.4            | 4.5               | 42.9                 | 74.0           | -31.1       | Peak            |
| 5488.50         | V              | 90               | 1.5             | 40.0            | 7.5               | 47.5                 | 74.0           | -26.5       | Peak            |
| 6403.25         | V              | 90               | 1.5             | 37.3            | 8.2               | 45.5                 | 74.0           | -28.5       | Peak            |
| 7318.00         | V              | 90               | 1.5             | 43.0            | 11.2              | 54.2                 | 74.0           | -19.8       | Peak            |
| 8232.75         | V              | 180              | 1.5             | 39.0            | 11.7              | 50.7                 | 74.0           | -23.3       | Peak            |
| 9147.50         | V              | 90               | 1.5             | 43.0            | 14.5              | 57.5                 | 74.0           | -16.5       | Peak            |
|                 |                |                  |                 |                 |                   |                      |                |             |                 |
| 1829.50         | H              | 90               |                 | 41.1            | -5.5              | 35.6                 | 74.0           | -38.4       | Peak            |
| 2744.25         | H              | 0                | 1.5             | 39.6            | 0.0               | 39.6                 | 74.0           | -34.4       | Peak            |
| 3659.00         | H              | 90               | 1.5             | 40.0            | 2.2               | 42.2                 | 74.0           | -31.8       | Peak            |
| 4573.75         | H              | 90               | 1.5             | 38.5            | 4.5               | 43.0                 | 74.0           | -31.0       | Peak            |
| 5488.50         | H              | 0                | 1.5             | 38.0            | 7.5               | 45.5                 | 74.0           | -28.5       | Peak            |
| 6403.25         | H              | 90               | 1.5             | 40.2            | 8.2               | 48.4                 | 74.0           | -25.6       | Peak            |
| 7318.00         | H              | 0                | 1.5             | 39.6            | 11.2              | 50.8                 | 74.0           | -23.2       | Peak            |
| 8232.75         | H              | 0                | 1.5             | 40.6            | 11.7              | 52.3                 | 74.0           | -21.7       | Peak            |
| 9147.50         | H              | 90               | 1.5             | 38.8            | 14.5              | 53.3                 | 74.0           | -20.7       | Peak            |



**Table 13: Radiated Emission Test Data, High Frequency Data >1GHz, High Channel**

|        | Frequency<br>(MHz) | Polarity<br>(H/V) | Azimuth<br>(Degree) | Ant.<br>Height<br>(m) | SA Level<br>(dBuV) | Corr<br>Factors<br>(dB) | Corr.<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Peak or<br>Average |
|--------|--------------------|-------------------|---------------------|-----------------------|--------------------|-------------------------|----------------------------|-------------------|----------------|--------------------|
| 927.25 |                    |                   |                     |                       |                    |                         |                            |                   |                |                    |
|        |                    |                   |                     |                       |                    |                         |                            |                   |                |                    |
|        |                    |                   |                     |                       |                    |                         |                            |                   |                |                    |
|        | 2781.75            | V                 | 0                   | 1.5                   | 37.0               | 0.2                     | 37.2                       | 54.0              | -16.8          | AVG                |
|        | 3709.00            | V                 | 90                  | 1.5                   | 34.0               | 2.3                     | 36.3                       | 54.0              | -17.7          | AVG                |
|        | 4636.25            | V                 | 90                  | 1.5                   | 31.0               | 4.8                     | 35.8                       | 54.0              | -18.2          | AVG                |
|        | 5563.50            | V                 | 90                  | 1.5                   | 30.5               | 7.4                     | 37.9                       | 54.0              | -16.1          | AVG                |
|        | 6490.75            | V                 | 90                  | 1.5                   | 29.0               | 8.5                     | 37.5                       | 54.0              | -16.5          | AVG                |
|        | 7418.00            | V                 | 180                 | 1.5                   | 33.0               | 11.1                    | 44.1                       | 54.0              | -9.9           | AVG                |
|        | 8345.25            | V                 | 0                   | 1.5                   | 31.0               | 12.0                    | 43.0                       | 54.0              | -11.0          | AVG                |
|        | 9272.50            | V                 | 180                 | 1.5                   | 29.0               | 15.1                    | 44.1                       | 54.0              | -9.9           | AVG                |
|        |                    |                   |                     |                       |                    |                         |                            |                   |                |                    |
|        |                    |                   |                     |                       |                    |                         |                            |                   |                |                    |
|        | 2781.75            | H                 | 0                   | 1.5                   | 36.0               | 0.2                     | 36.2                       | 54.0              | -17.8          | AVG                |
|        | 3709.00            | H                 | 180                 | 1.5                   | 33.0               | 2.3                     | 35.3                       | 54.0              | -18.7          | AVG                |
|        | 4636.25            | H                 | 90                  | 1.5                   | 31.0               | 4.8                     | 35.8                       | 54.0              | -18.2          | AVG                |
|        | 5563.50            | H                 | 180                 | 1.5                   | 31.0               | 7.4                     | 38.4                       | 54.0              | -15.6          | AVG                |
|        | 6490.75            | H                 | 0                   | 1.5                   | 33.0               | 8.5                     | 41.5                       | 54.0              | -12.5          | AVG                |
|        | 7418.00            | H                 | 0                   | 1.5                   | 32.0               | 11.1                    | 43.1                       | 54.0              | -10.9          | AVG                |
|        | 8345.25            | H                 | 0                   | 1.5                   | 31.0               | 12.0                    | 43.0                       | 54.0              | -11.0          | AVG                |
|        | 9272.50            | H                 | 90                  | 1.5                   | 30.0               | 15.1                    | 45.1                       | 54.0              | -8.9           | AVG                |



927.25

| Frequency (MHz) | Polarity (H/V) | Azimuth (Degree) | Ant. Height (m) | SA Level (dBuV) | Corr Factors (dB) | Corr. Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Peak or Average |
|-----------------|----------------|------------------|-----------------|-----------------|-------------------|----------------------|----------------|-------------|-----------------|
|                 | V              |                  |                 |                 |                   |                      |                |             |                 |
| 1854.50         | V              | 180              |                 | 40.0            | -5.2              | 34.8                 | 74.0           | -39.2       | Peak            |
| 2781.75         | V              | 0                | 1.5             | 41.0            | 0.2               | 41.2                 | 74.0           | -32.8       | Peak            |
| 3709.00         | V              | 90               | 1.5             | 40.2            | 2.3               | 42.5                 | 74.0           | -31.5       | Peak            |
| 4636.25         | V              | 90               | 1.5             | 39.0            | 4.8               | 43.8                 | 74.0           | -30.2       | Peak            |
| 5563.50         | V              | 180              | 1.5             | 40.2            | 7.4               | 47.6                 | 74.0           | -26.4       | Peak            |
| 6490.75         | V              | 0                | 1.5             | 41.0            | 8.5               | 49.5                 | 74.0           | -24.5       | Peak            |
| 7418.00         | V              | 0                | 1.5             | 42.3            | 11.1              | 53.4                 | 74.0           | -20.6       | Peak            |
| 8345.25         | V              | 0                | 1.5             | 41.0            | 12.0              | 53.0                 | 74.0           | -21.0       | Peak            |
| 9272.50         | V              | 180              |                 | 40.2            | 15.1              | 55.3                 | 74.0           | -18.7       | Peak            |
|                 |                |                  |                 |                 |                   |                      |                |             |                 |
| 1854.50         | H              | 90               |                 | 41.0            | -5.2              | 35.8                 | 74.0           | -38.2       | Peak            |
| 2781.75         | H              | 0                | 1.5             | 42.2            | 0.2               | 42.4                 | 74.0           | -31.6       | Peak            |
| 3709.00         | H              | 180              | 1.5             | 39.8            | 2.3               | 42.1                 | 74.0           | -31.9       | Peak            |
| 4636.25         | H              | 0                | 1.5             | 39.0            | 4.8               | 43.8                 | 74.0           | -30.2       | Peak            |
| 5563.50         | H              | 90               | 1.5             | 42.0            | 7.4               | 49.4                 | 74.0           | -24.6       | Peak            |
| 6490.75         | H              | 90               | 1.5             | 43.0            | 8.5               | 51.5                 | 74.0           | -22.5       | Peak            |
| 7418.00         | H              | 0                | 1.5             | 42.0            | 11.1              | 53.1                 | 74.0           | -20.9       | Peak            |
| 8345.25         | H              | 0                | 1.5             | 40.2            | 12.0              | 52.2                 | 74.0           | -21.8       | Peak            |
| 9272.50         | H              | 90               | 1.5             | 41.0            | 15.1              | 56.1                 | 74.0           | -17.9       | Peak            |



#### 4.8 RECEIVER RADIATED SPURIOUS EMISSIONS: (RSS-210 SECT 2.6)

The EUT must comply with the requirements for radiated spurious emissions that fall within the restricted bands. These emissions must meet the limits specified in §15.109 for peak measurements.

##### 4.8.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-2014. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured. The emissions were measured using the following resolution bandwidths:

**Table 14: Spectrum Analyzer Settings**

| Frequency Range | Resolution Bandwidth | Video Bandwidth           |
|-----------------|----------------------|---------------------------|
| 30MHz-1000 MHz  | 120kHz               | >100 kHz                  |
| >1000 MHz       | 1 MHz                | 10 Hz (Avg.), 1MHz (Peak) |

**Table 15: Radiated Emission Test Data, Receiver**

| Frequency (MHz) | Polarity H/V | Azimuth (Degree) | Ant. Height (m) | SA Level (dBuV) | Corr Factors (dB) | Corr. Level (uV/m) | Limit (uV/m) | Margin (dB) | Comments |
|-----------------|--------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------|-------------|----------|
| 241.50          | V            | 0.00             | 41.00           | 41.00           | -12.2             | 27.6               | 200.0        | -17.2       | Peak     |
| 265.80          | V            | 180.00           | 2.00            | 36.70           | -10.9             | 19.4               | 200.0        | -20.3       | Peak     |
| 290.10          | V            | 180.00           | 1.50            | 37.40           | -10.0             | 23.4               | 200.0        | -18.6       | Peak     |
| 339.40          | V            | 90.00            | 1.50            | 38.50           | -8.9              | 30.0               | 200.0        | -16.5       | Peak     |
| 366.00          | V            | 0.00             | 2.00            | 40.70           | -7.9              | 43.8               | 200.0        | -13.2       | Peak     |
| 377.00          | V            | 45.00            | 2.00            | 38.70           | -7.8              | 35.0               | 200.0        | -15.1       | Peak     |
| 242.30          | H            | 180.00           | 1.50            | 41.60           | -12.1             | 29.8               | 200.0        | -16.5       | Peak     |
| 256.40          | H            | 0.00             | 2.00            | 42.50           | -12.2             | 32.7               | 200.0        | -15.7       | Peak     |
| 274.40          | H            | 180.00           | 1.50            | 43.40           | -10.3             | 45.0               | 200.0        | -13.0       | Peak     |
| 342.00          | H            | 90.00            | 1.50            | 36.40           | -8.8              | 23.9               | 200.0        | -18.5       | Peak     |
| 385.60          | H            | 0.00             | 2.00            | 39.50           | -7.8              | 38.7               | 200.0        | -14.3       | Peak     |
| 395.80          | H            | 180.00           | 2.00            | 35.10           | -7.7              | 23.5               | 200.0        | -18.6       | Peak     |