



# MEASUREMENT AND TEST REPORT



VERSION 1.0

**Report Prepared for:** Exegin Technologies Limited  
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Canada

**Equipment Under Test (EUT):** Q58-3  
**FCC ID:** VD458Q3  
**IC Certification number:** 7163A-58Q3

**FCC Rule Part(s):** Part 15B, 15C  
**Industry Canada Rule Part(s)** RSS-210

**Tested by:** Island Compliance Services Inc.  
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Note: This test report has been prepared for the Applicant and device described herein. It may not be duplicated or used in part without prior written consent from Island Compliance Services Inc.

**FCC OATS registration number:** 386117  
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## Revision History

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|         |               |          |                  |
|         |               |          |                  |

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## 2 SUMMARY OF TEST RESULTS

The equipment under test was found to comply with the test standards and criteria outlined herein.

| Test Description                        | Reference Specification FCC                          | Reference Specification Industry Canada  | Result   | Comment |
|---|--|--|----------|---------|
| RF Peak Power Output                    | FCC Subpart C 15.247(b) (3)                          | RSS 210 Issue 8 A8.4(4)  | Complies |         |
| Occupied Bandwidth 6dB Bandwidth        | FCC Subpart C 15.247 (a) (2)                         | RSS 210 Issue 8 A8.2(a)  | Complies |         |
| Occupied Bandwidth 20dB Bandwidth       | N/A  | RSS-Gen Issue 3 4.6.1  | Complies |         |
| Power Spectral Density                  | FCC Subpart C 15.247(e)                              | RSS 210 Issue 8 A8.2(b)  | Complies |         |
| Conducted Spurious Emissions            | FCC Subpart C 15.247(d)                              | RSS 210 Issue 8 A8.5   | Complies |         |
| Conducted Spurious Emissions Band Edge  | FCC Subpart C 15.247(d)                              | RSS 210 Issue 8 A8.5   | Complies |         |
| Radiated Spurious Emissions Band Edge   | FCC Subpart C 15.209(a) 15.205(a)                    | RSS 210 Issue 8 2.5, A8.5  | Complies |         |
| Radiated Spurious Emissions (TX and RX) | FCC Subpart C 15.247, 15.205<br>FCC Subpart B 15.109 | RSS 210 Issue 8 2.5, A8.5<br>RSS Gen Issue 3 Section 4.10 and section 6 for RX<br>ICES-003 Issue 4 | Complies |         |
| Power line Conducted Emission           | FCC Subpart C 15.207 (a)<br>FCC Subpart B 15.107     | RSS-Gen Issue 3 7.2.4<br>Ices-003 Issue 4  | Complies |         |

### 2.1 ENVIRONMENTAL CONDITIONS

| Description                     | Reading     |
|---------------------------------|-------------|
| Test Dates: 20/12/2013-9/1/2014 |             |
| Indoor Temperature              | 18°C - 22°C |
| Indoor Humidity                 | 40% - 55%   |
| Outdoor Temperature             | 0°C -10°C   |
| Outdoor Humidity                | 40% - 85%   |

## 2.2 STANDARD TEST CONDITIONS AND ENGINEERING PRACTICES

Except as noted herein, the following conditions and procedures were observed during the testing:

CFR 47, FCC rules Part 15 subpart C, ANSI C63.4 (2009), DTS procedures KDB 558074, IC standards RSS-GEN and RSS0210. ANSI C63.4-2003 or later, was used for all test procedures as required by RSS-Gen I3 2010, Section 4.1. Deviations, modification or clarifications (if any) to above mentioned documents are described herein.

Measurement results, unless otherwise noted, are worst-case measurements.

### 3 GENERAL EQUIPMENT SPECIFICATIONS

| Item                      | Description   |
|---------------------------|---|
| <b>Manufacturer</b>       | Exegin Technologies Limited   |
| <b>Applicant</b>          | Exegin Technologies Limited   |
| <b>Model Number(s)</b>    | Q58-3   |
| <b>Function</b>           | Zigbee interface module   |
| <b>Power Supply Input</b> | 3.3 VDC   |
| <b>Power Output</b>       | Transmitter 1: 22.3 dBm (cond.)<br>Transmitter 2: 22.3 dBm (cond.)        |
| <b>Antenna Gain/Type</b>  | TE Connectivity.P/N 2118059-1<br>2300–3800 MHz Single Band Antenna, 4 dBi |
| <b>Channel Spacing</b>    | Transmitter 1: 5 MHz<br>Transmitter 2: 5 MHz                              |
| <b>Frequency Range</b>    | Transmitter 1: 2405 MHz-2480 MHz<br>Transmitter 2: 2405 MHz-2480 MHz      |
| <b>Modulation</b>         | Transmitter 1: OQPSK<br>Transmitter 2: OQPSK                              |

#### 3.1 AUXILIARY EQUIPMENT

| Equipment         | Description                              |
|-------------------|--|
| Laptop            | HP EliteBook 2170p                       |
| Development board | Intel Clanton/Quark development platform |
|                   |  |
|                   |  |

#### 3.2 NOTES

The RF module contains two identical 2.4 GHz transmitter implementations. RF conducted measurements were undertaken on one transmitter only and radiated measurements were made on both transmitters, as per guidance from the TCB.

#### 3.3 MODIFICATIONS REQUIRED

Transmit power on the highest channel (26) was reduced to '-10' (firmware setting) to bring radiated upper band edge measurements within limits. All other measurements were made at full power ('+3' firmware setting) unless otherwise stated. The power settings are restricted in firmware to constrain the end user to those which conform to limits.

## 4 RF PEAK POWER OUTPUT

| Test Name            | Reference Specification  | Result   | Notes |
|----------------------|--------------------------|----------|-------|
| RF Peak Power Output | 15.247(b)(3)<br>A8.4 (4) | Complies |       |

### 4.1 TEST METHOD

RSS-Gen Issue 3 4.8 and FCC Publication 558074, Section 15.247(b) – 2. Set the RBW  $\geq$  EBW. Set VBW  $\geq$  3 x RBW. Set span = zero. Sweep time = auto couple. Detector = peak. Trace mode = max hold. Allow trace to fully stabilize. Use peak marker function to determine the peak amplitude level within the fundamental emission.

### 4.2 DATA

| Channel   | Tuned Frequency (GHz) | Peak Power (dBm) | CF (dB) | Corrected (dBm) | Limit (dBm) |
|-----------|-----------------------|------------------|---------|-----------------|-------------|
| Low (11)  | 2.405                 | 12.3             | +10     | 22.3            | 30          |
| Mid (18)  | 2.440                 | 12.2             | +10     | 22.2            | 30          |
| High (26) | 2.480                 | -11.3            | +0      | -11.3           | 30          |

### 4.3 PLOT(S)

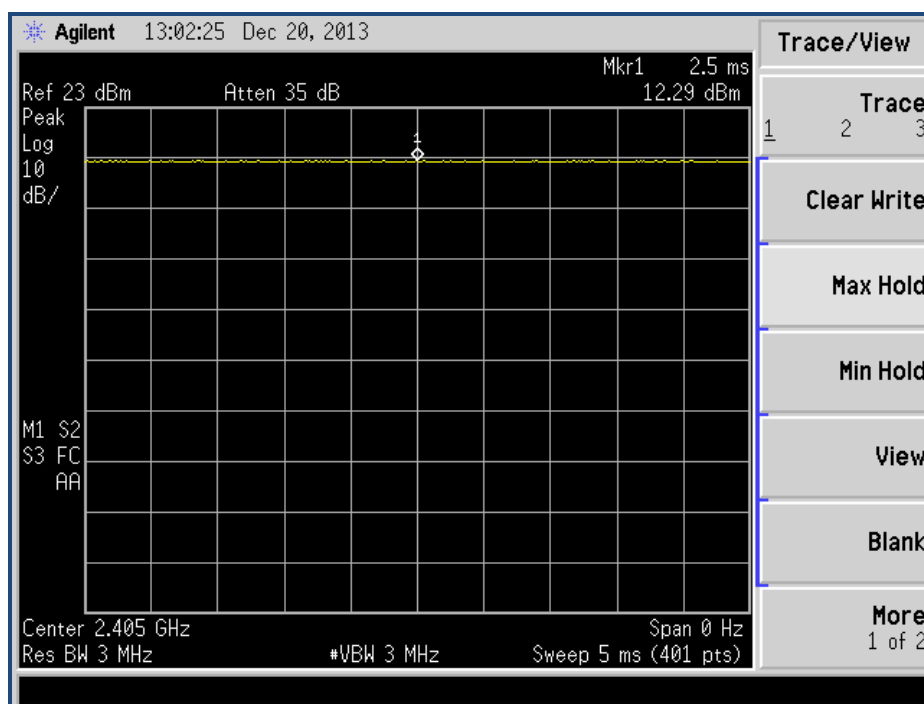


FIGURE 1 - PEAK OUTPUT POWER, LOW CHANNEL



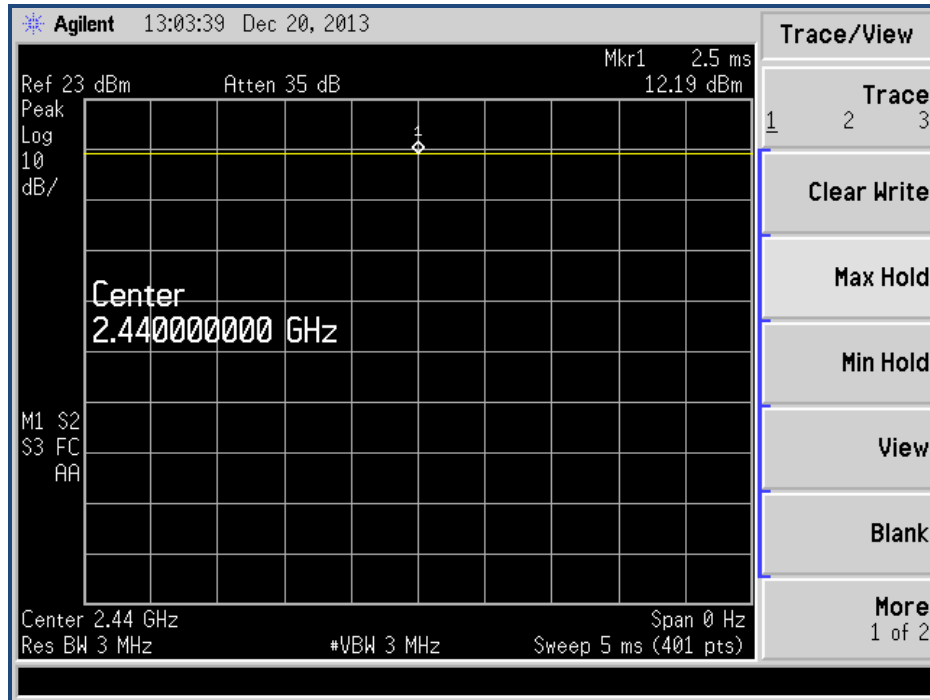


FIGURE 2 - PEAK POWER, MID CHANNEL

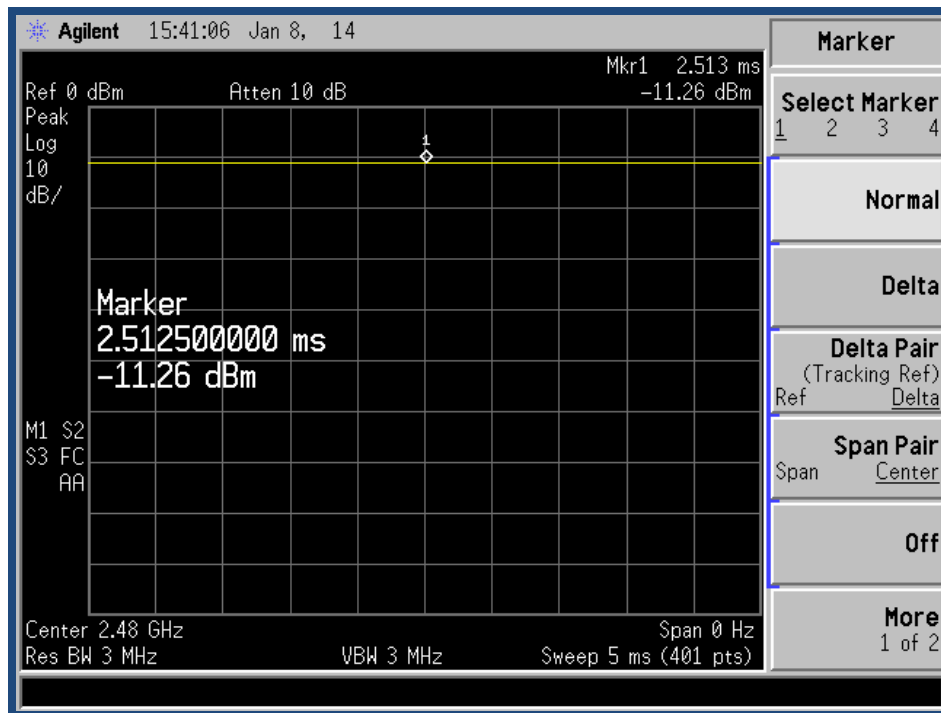


FIGURE 3 - PEAK POWER, HIGH CHANNEL

## 5 OCCUPIED BANDWIDTH

| Test Description                   | Reference Specification       | Result   | Notes |
|------------------------------------|-------------------------------|----------|-------|
| Occupied Bandwidth<br>6dB and 20dB | 15.247(a)<br>A8.2(a)<br>4.6.1 | Complies |       |

### 5.1 TEST METHOD

RSS-Gen Issue 4.6.1 and FCC Publication 558074, Section 15.247(a) (2) – Emission Bandwidth (EBW) -  
 Method: Set RBW=1-5% of the emission bandwidth (EBW), VBW= $\geq 3 \times$  RBW, Detector=Peak, Trace mode=max hold, Sweep=auto couple, allow trace to stabilize. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB to the maximum level measured in the fundamental emission. Compare the resultant bandwidth with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is 1-5%.

Test performed with modulation ON and 100% duty cycle, at maximum power.

### 5.2 DATA

| Channel   | Frequency (GHz) | 20dB<br>Bandwidth<br>(MHz) | 6dB<br>Bandwidth<br>(MHz) |
|-----------|-----------------|----------------------------|---------------------------|
| Low (11)  | 2.405           | 2.42                       | 1.57                      |
| Mid (18)  | 2.440           | 2.42                       | 1.53                      |
| High (26) | 2.480           | 2.51                       | 1.57                      |

### 5.3 PLOTS

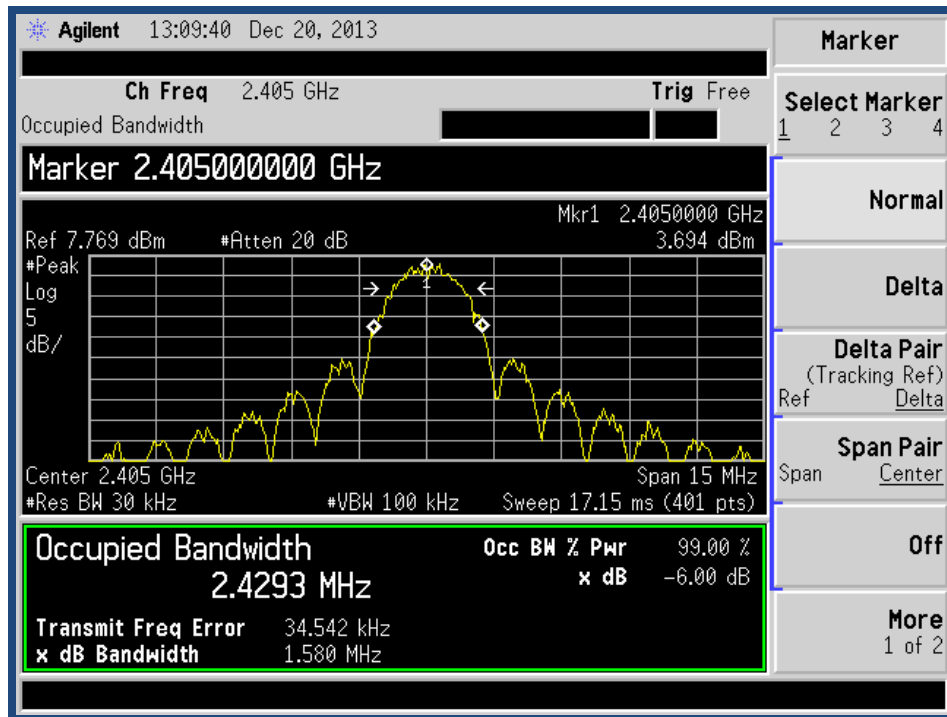


FIGURE 4 - LOW CHANNEL OCCUPIED BANDWIDTH

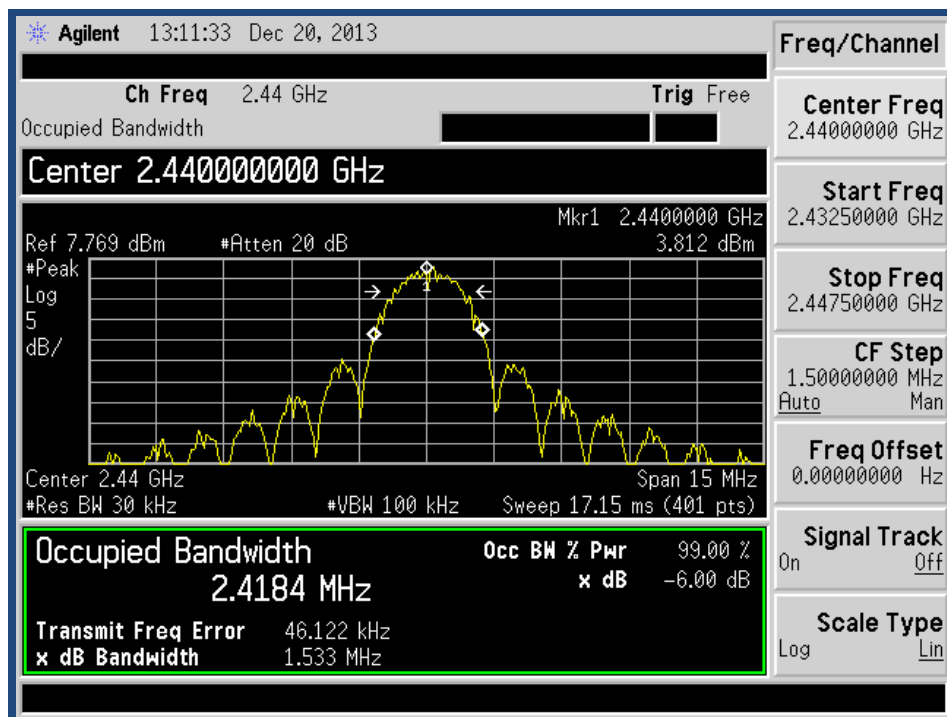


FIGURE 5 – MID CHANNEL OCCUPIED BANDWIDTH

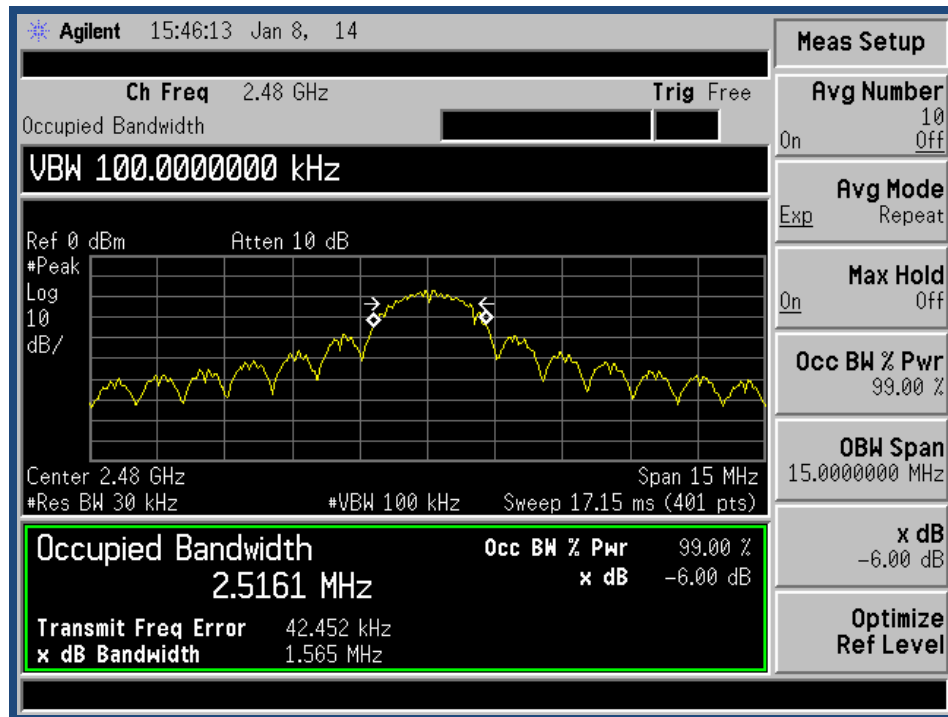


FIGURE 6 - HIGH CHANNEL OCCUPIED BANDWIDTH

## 6 POWER SPECTRAL DENSITY

| Test Description       | Reference Specification | Result   | Notes  |
|------------------------|-------------------------|----------|--|
| Power Spectral Density | 15.247(e)<br>A8.2 (b)   | Complies | maximum measured power spectral density: -18.3 dBm |

### 6.1 TEST METHOD

RSS-210 Issue 8 and FCC Publication 558074, Section 15.247(e) - Maximum Power Spectral Density Level in the Fundamental Emission (PSD) – Method: RBW = 100 kHz, VBW ≥ 300 kHz, Span=5-30 % greater than the EBW, Detector= peak, Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize. The peak marker function is used to determine the maximum power level in any 100 kHz band segment within the fundamental EBW. The observed power level is scaled to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where  $BWCF = 10\log(3\text{ kHz}/100\text{kHz}) = -15.2\text{ dB}$ .

### 6.2 LIMITS

15.247(e) specifies a conducted power spectral density (PSD) limit of 8 dBm in any 3 kHz band segment within the fundamental EBW during any time interval of continuous transmission.

### 6.3 DATA

| Channel   | Frequency (GHz) | Pk Power (dBm) | CF (dB) | BWCF  | PSD (dBm) |
|-----------|-----------------|----------------|---------|-------|-----------|
| Low (11)  | 2.405           | -3.1           | 0       | -15.2 | -18.3     |
| Mid (18)  | 2.440           | -3.1           | 0       | -15.2 | -18.3     |
| High (26) | 2.480           | -13.6          | 0       | -15.2 | -28.8     |

Note: All final reported values are corrected values

### 6.4 PLOTS

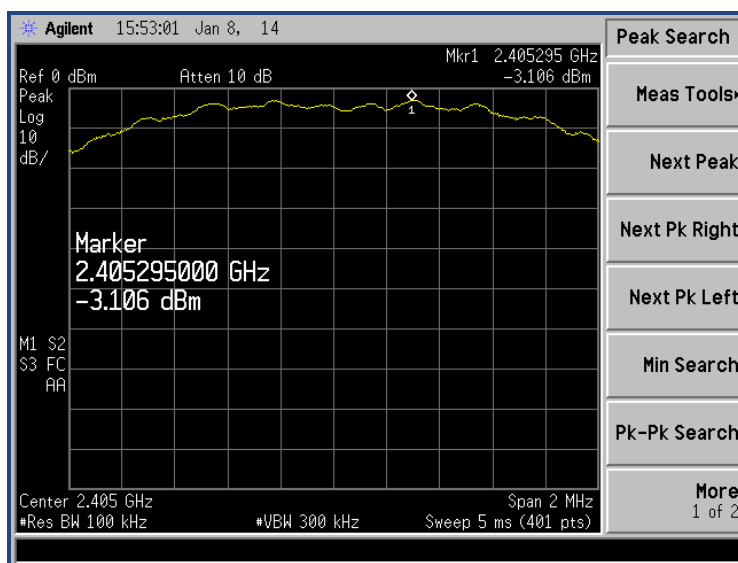


FIGURE 7 – PEAK POWER (LOW CHANNEL)

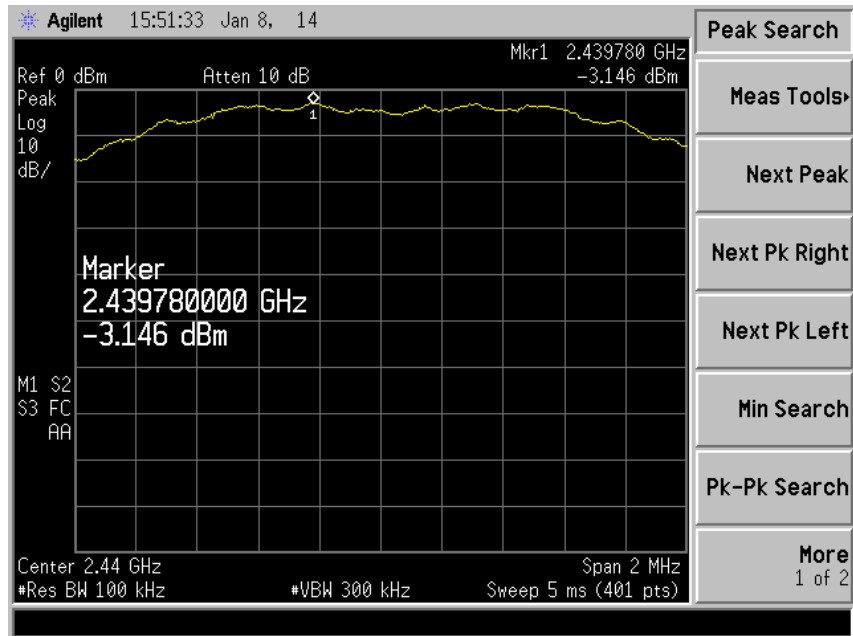


FIGURE 8 - PEAK POWER (MID CHANNEL)

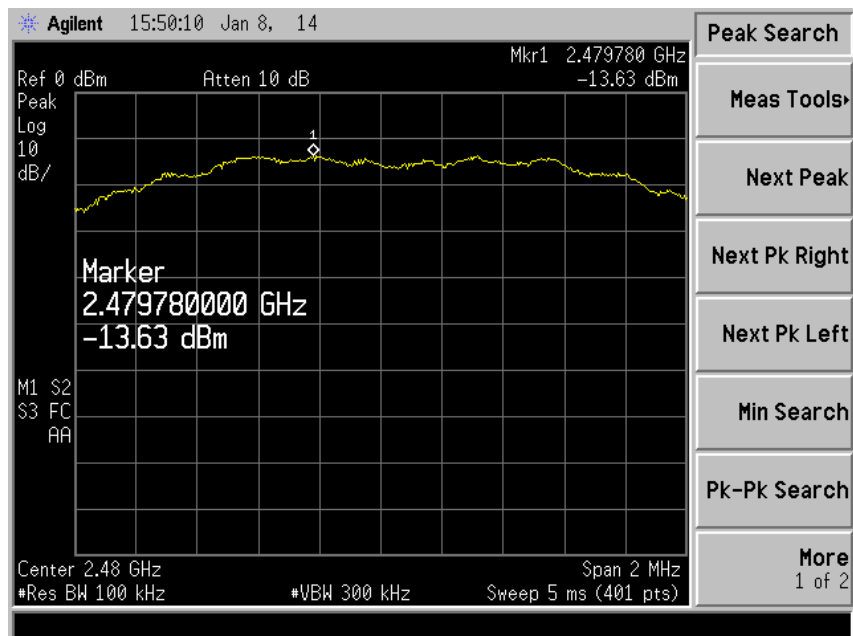


FIGURE 9 - PEAK POWER (HIGH CHANNEL)

## 7 CONDUCTED SPURIOUS EMISSIONS

| Test Description             | Reference Specification | Result   | Notes |
|------------------------------|-------------------------|----------|-------|
| Conducted Spurious Emissions | 15.247(c)<br>A8.5       | Complies |       |

### 7.1 TEST METHOD

RF conducted as per FCC Publication 558074. RSS-210 Issue 8 A8.5.

### 7.2 LIMITS

15.247(c) In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(1) (see 15.205(c)).

### 7.3 DATA

|           |            | Harmonics (dBc) |             |      |      |             |             |          |
|-----------|------------|-----------------|-------------|------|------|-------------|-------------|----------|
| Channel   | Fund (dBm) | 2nd             | 3rd         | 4th  | 5th  | Limit (dBc) | Margin (dB) | Result   |
| Low (11)  | -10.1      | 56.1            | 46.8        | 53.5 | -    | 20          | 26.8        | Complies |
| Mid (18)  | -8.4       | -               | <b>45.6</b> | 53.1 | 54.4 | 20          | 25.6        | Complies |
| High (26) | -16.6      | 47.8            | 50.9        | -    | -    | 20          | 27.8        | Complies |

**Note: worst case harmonic: 45.6 dBc**

### 7.4 NOTES

N/A

## 7.5 PLOTS

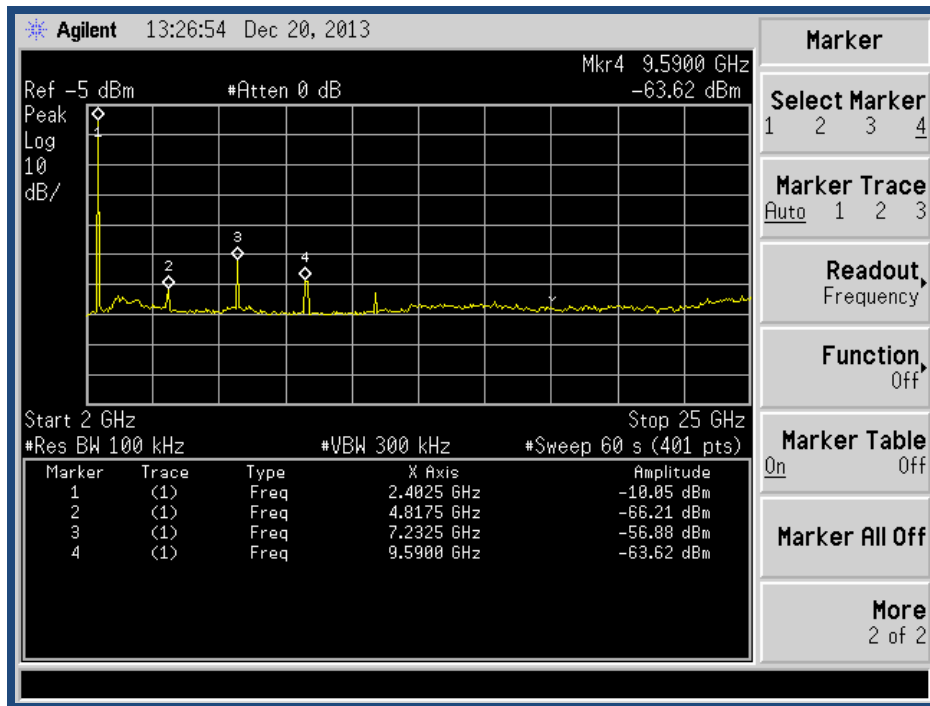


FIGURE 10 – LOW CHANNEL SUPRIIOUS, 2-25GHZ

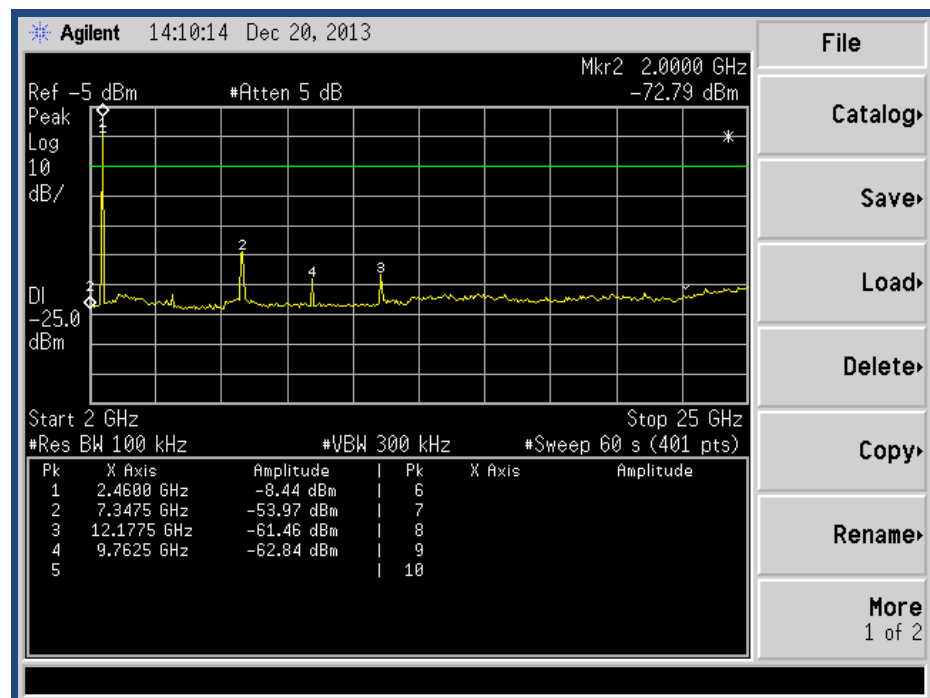


FIGURE 11 - MID CHANNEL SPURIOUS 2-25GHZ



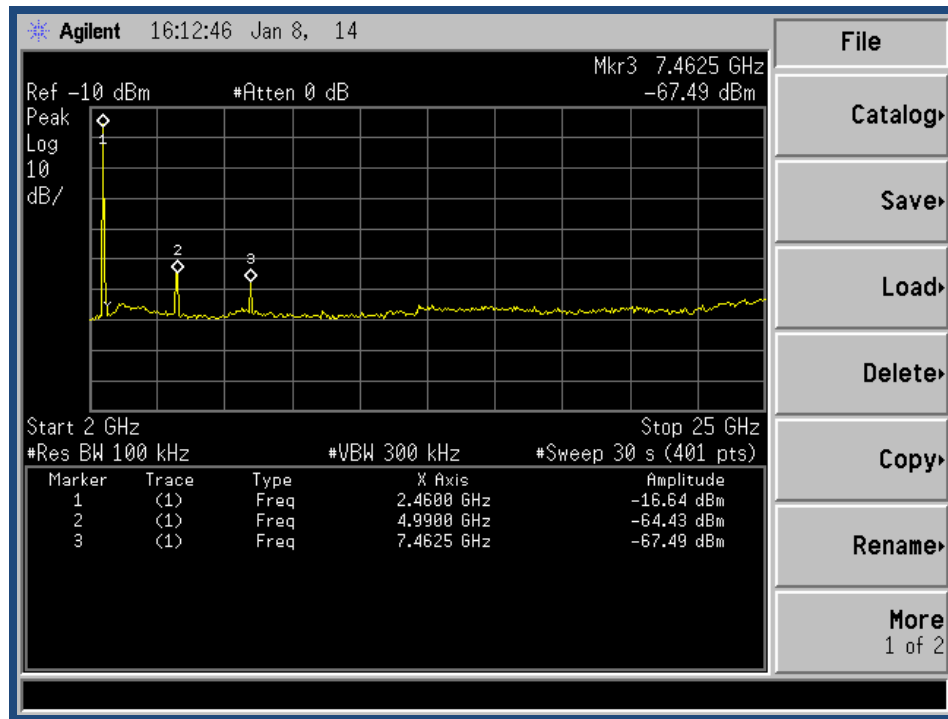


FIGURE 12 - HIGH CHANNEL SPURIOUS 2-25GHZ

## 8 CONDUCTED SPURIOUS EMISSIONS BANDEGE

| Test Description     | Reference Specification | Limit                  | Result   | Notes |
|----------------------|-------------------------|------------------------|----------|-------|
| Band Edge Compliance | 15.247(d)<br>A8.1       | >20dBc,<br>74dBuV/m pk | Complies |       |

### 8.1 TEST METHOD

Using the marker-delta method an in-band field strength measurement of the fundamental emission using the RBW and detector function required by C63.4 and FCC Rules for the frequency being measured was undertaken. A spectrum analyzer span was chosen that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. The delta measurement is then subtracted from the field strengths measured. The resultant field strengths (CISPR QP, average, or peak, as appropriate) are then used to determine band-edge compliance as required by Section 15.205.

### 8.2 LIMITS

15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

### 8.3 DATA (TRANSMITTER 0)

An in-band field strength measurement taken at 3m, with RBW = 1MHz, VBW = 1MHz and in peak detection mode resulted in a corrected peak fundamental measurement of 117.3 dBuV/m at 2405 MHz and 101.5 dBuV/m at 2480 MHz.

Using the marker-delta method, band edge emissions were well below the 74dBuV/m peak limits for restricted bands.

| Spurious Emission Frequency (MHz) | Pk Fundamental Radiated Ampl. (dBuV) | Band Edge Emission Level (dBc) | Band Edge Corrected Value (dBuV/m) | Limit                      | Margin (dB) | Result   |
|-----------------------------------|--------------------------------------|--------------------------------|------------------------------------|----------------------------|-------------|----------|
| 2390                              | 117.3                                | 56.5                           | 60.8                               | >20dBc,<br>74 dBuV/m<br>pk | 13.5        | Complies |
| 2483.9                            | 101.5                                | 36.2                           | 65.3                               | >20dBc,<br>74 dBuV/m<br>pk | 8.7         | Complies |

### 8.4 NOTES

N/A

## 8.5 PLOTS

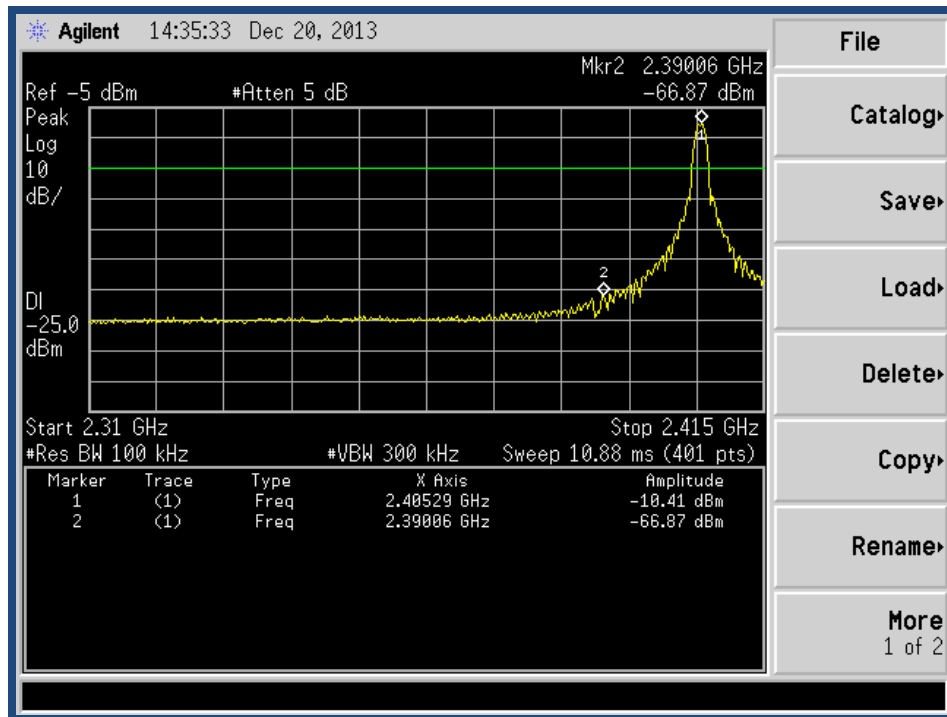


FIGURE 13 – CONDUCTED BAND EDGE (2310-2390)

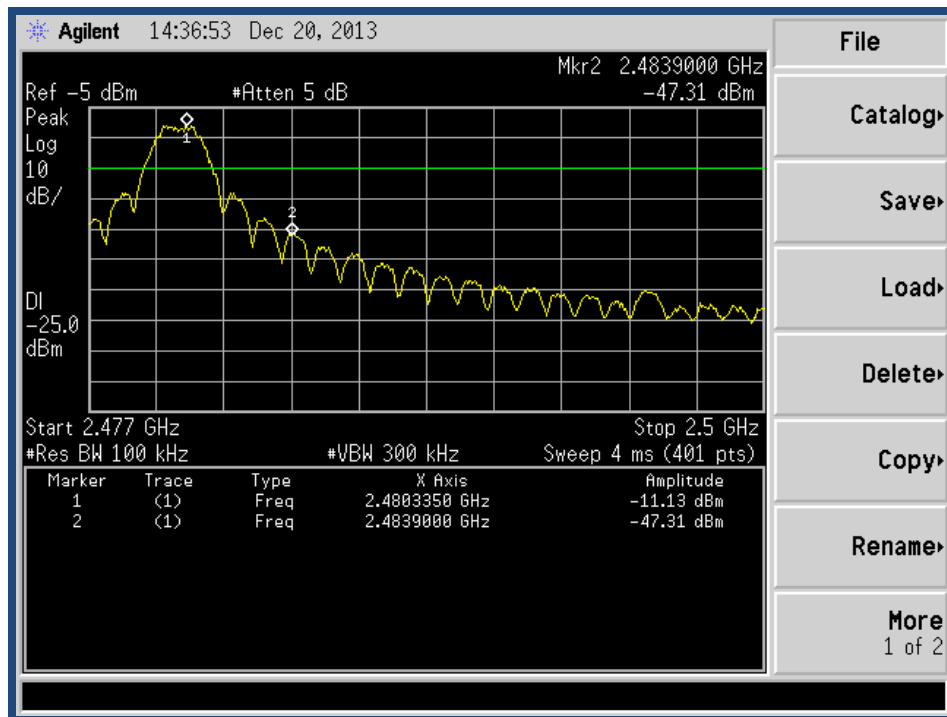


FIGURE 14 – CONDUCTED UPPER BANDEDGE (2477 - 2500)

## 8.6 DATA (TRANSMITTER 1)

An in-band field strength measurement taken at 3m, with RBW = 1MHz, VBW = 1MHz and in peak detection mode resulted in a corrected peak fundamental measurement of 118.8 dBuV/m at 2405 MHz and 107.5 dBuV/m at 2480 MHz.

Band edge emissions were well below the 74dBuV/m peak limits for restricted bands.

| Spurious Emission Frequency (MHz) | Pk Fundamental Radiated Ampl. (dBuV) | Band Edge Emission Level (dBc) | Band Edge Corrected Value (dBuV/m) | Limit                      | Margin (dB) | Result   |
|-----------------------------------|--------------------------------------|--------------------------------|------------------------------------|----------------------------|-------------|----------|
| 2390                              | 118.8                                | 56.5                           | 62.3                               | >20dBc,<br>74 dBuV/m<br>pk | 11.7        | Complies |
| 2483.9                            | 107.5                                | 36.2                           | 71.3                               | >20dBc,<br>74 dBuV/m<br>pk | 2.7         | Complies |

## 8.7 NOTES

N/A

## 9 RADIATED SPURIOUS EMISSIONS BAND EDGE

### 9.1 TEST PROCEDURE

The EUT is placed on a non-conductive turntable on the 3m OATS. An in-band field strength measurement of the fundamental emissions using RBW and detector function for the frequency being measured. Repeated with average detector. Spectrum analyzer span is chosen that encompasses both the peak and the fundamental emissions and the band edge emissions under investigation. Analyzer is set, RBW to 1% of total span (never less than 30kHz) with a video bandwidth equal to or greater than the RBW. Peak levels of the fundamental emissions and the relevant band edge emissions are recorded. Stored trace is observed and amplitude delta between the peak of fundamental and band edge emissions are measured. Delta is subtracted from field strengths, these measurements are used to determine compliance.

### 9.2 SUMMARY OF TEST RESULTS

| Test Description                      | Reference Specification   | Result   | Notes |
|---------------------------------------|---|----------|-------|
| Radiated Spurious Emissions Band Edge | FCC Subpart C<br>15.209(a)<br>15.205(a)<br>RSS 210 Issue 8<br>2.5, A8.5 | Complies |       |

#### 9.2.1 SUMMARY OF 15.205 LIMITS

| MHz                      | MHz                 | MHz           | GHz              |
|--------------------------|---------------------|---------------|------------------|
| 0.090–0.110              | 16.42–16.423        | 399.9–410     | 4.5–5.15         |
| <sup>1</sup> 0.495–0.505 | 16.69475–16.69525   | 608–614       | 5.35–5.46        |
| 2.1735–2.1905            | 16.80425–16.80475   | 960–1240      | 7.25–7.75        |
| 4.125–4.128              | 25.5–25.67          | 1300–1427     | 8.025–8.5        |
| 4.17725–4.17775          | 37.5–38.25          | 1435–1626.5   | 9.0–9.2          |
| 4.20725–4.20775          | 73–74.6             | 1645.5–1646.5 | 9.3–9.5          |
| 6.215–6.218              | 74.8–75.2           | 1660–1710     | 10.6–12.7        |
| 6.26775–6.26825          | 108–121.94          | 1718.8–1722.2 | 13.25–13.4       |
| 6.31175–6.31225          | 123–138             | 2200–2300     | 14.47–14.5       |
| 8.291–8.294              | 149.9–150.05        | 2310–2390     | 15.35–16.2       |
| 8.362–8.366              | 156.52475–156.52525 | 2483.5–2500   | 17.7–21.4        |
| 8.37625–8.38675          | 156.7–156.9         | 2690–2900     | 22.01–23.12      |
| 8.41425–8.41475          | 162.0125–167.17     | 3260–3267     | 23.6–24.0        |
| 12.29–12.293             | 167.72–173.2        | 3332–3339     | 31.2–31.8        |
| 12.51975–12.52025        | 240–285             | 3345.8–3358   | 36.43–36.5       |
| 12.57675–12.57725        | 322–335.4           | 3600–4400     | ( <sup>2</sup> ) |
| 13.36–13.41              |                     |               |                  |

FIGURE 15 - RESTRICTED BANDS

#### 9.2.2 NOTES

For low channel measurements, both transmitters were enabled and set to full power.

## Data (Transmitter 0)

| Spurious Emission Frequency (MHz) | Reading (dBuV) | Corrected (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Result   |
|-----------------------------------|----------------|--------------------|----------------|-------------|----------|
| 2405 (Fund)                       | 115.2          | 121.2              | -              | -           | Complies |
| 2390.0 (pk)                       | 57.7           | 63.7               | 74             | 10.3        | Complies |
| 2390.0 (avg)                      | 44.4           | 50.4               | 54             | 3.6         | Complies |
| 2480 (Fund)                       | 95.2           | 101.5              | -              | -           | Complies |
| 2484.0 (pk)                       | 59.7           | 66.0               | 74             | 8.0         | Complies |
| 2484.0 (avg)                      | 46.6           | 52.9               | 54             | 1.1         | Complies |

## 9.3 DATA (TRANSMITTER 1)

| Spurious Emission Frequency (MHz) | Reading (dBuV) | Corrected (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Result   |
|-----------------------------------|----------------|--------------------|----------------|-------------|----------|
| 2405 (Fund)                       | 115.2          | 121.2              | -              | -           | Complies |
| 2390.0 (pk)                       | 57.7           | 63.7               | 74             | 10.3        | Complies |
| 2390.0 (avg)                      | 44.4           | 50.4               | 54             | 3.6         | Complies |
| 2480 (Fund)                       | 101.2          | 107.5              | -              | -           | Complies |
| 2484.0 (pk)                       | 64.1           | 70.4               | 74             | 3.4         | Complies |
| 2484.0 (avg)                      | 44.6           | 50.9               | 54             | 3.1         | Complies |

#### 9.4 PLOTS TRANSMITTER 0

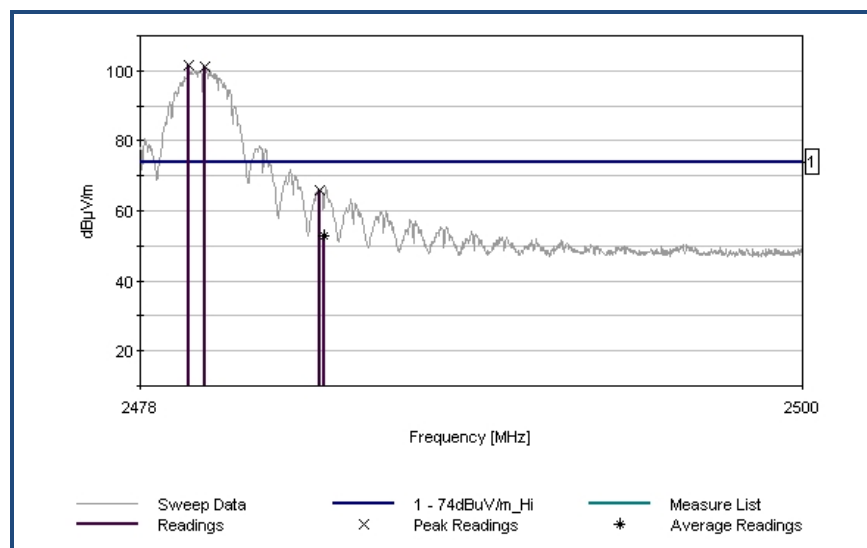


FIGURE 16 - UPPER BAND EDGE - HI CHANNEL

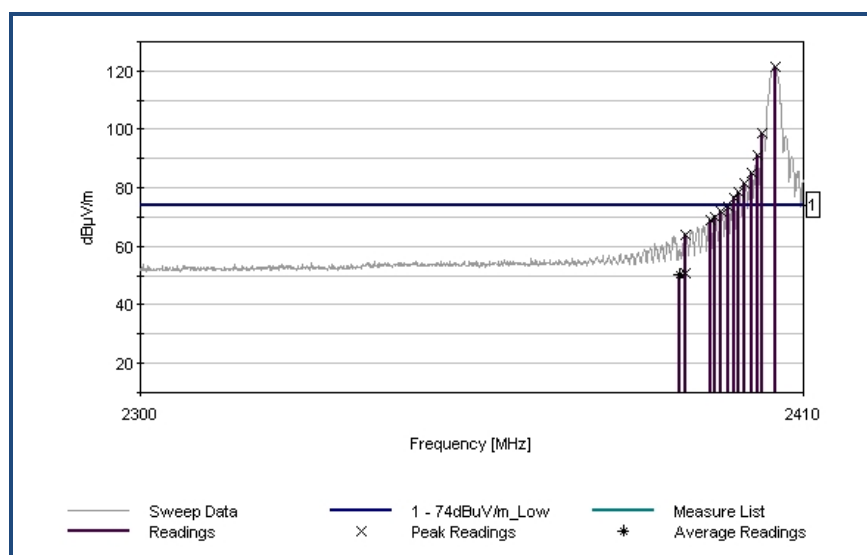


FIGURE 17 - LOWER BAND EDGE - LOW CHANNEL

## 9.5 PLOTS TRANSMITTER 1

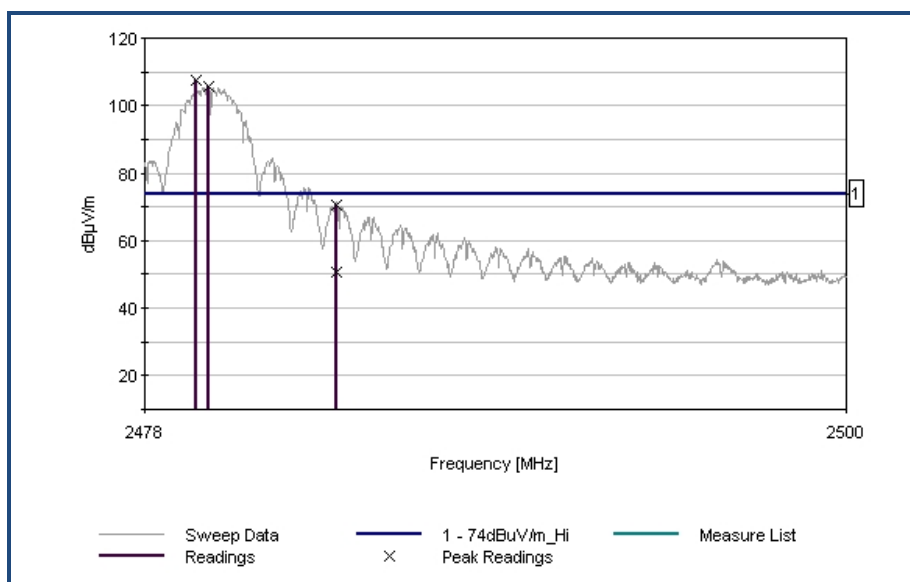


FIGURE 18 - UPPER BAND EDGE - HI CHANNEL

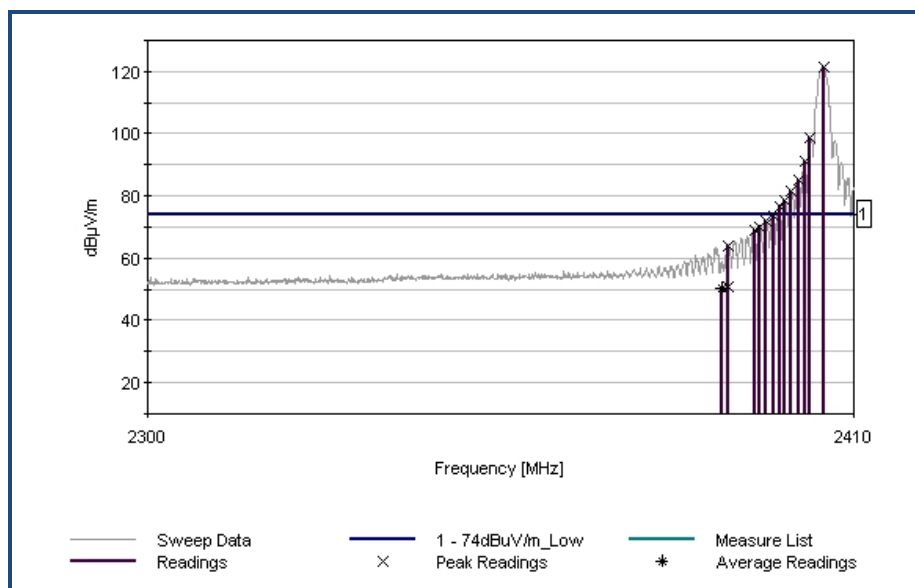


FIGURE 19 - LOWER BAND EDGE - LOW CHANNEL



## 10 RADIATED SPURIOUS EMISSIONS

### 10.1 TEST PROCEDURE

The EUT is placed on a non-conductive turntable on the 3m OATS. Exploratory measurements are made using a suitable antenna positioned within 1m of the EUT. The EUT antenna was manipulated through typical positions during exploratory testing to maximize emission levels. Maximizing procedure was performed on the six (6) highest emissions readings between the lowest RF frequency generated on the device (without going below 9 kHz) and the 10th harmonic of the highest fundamental frequency. Where applicable, a hybrid antenna, horn antenna and loop antenna were used to cover the relevant frequency bands. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

Notable emissions are maximized and final measurements are taken if the initial results are within 20 dB of the permissible limit. The EUT is placed at nonconductive plate at the turntable center. For each suspected frequency, the turntable is rotated 360 degrees and antenna is scanned from 1 to 4 m. This is repeated for both horizontal and vertical receive antenna polarizations. The emissions less than 20 dB below the permissible value are reported.

The measurement results are obtained as described below:

$$E [\mu V/m] = URX + ATOT$$

Where URX is receiver reading and ATOT is total correction factor including cable loss, antenna factor and preamplifier gain (ATOT = LCABLES + AF - GPREAMP).

### 10.2 SUMMARY OF TEST RESULTS

| Test Description            | Reference Specification        | Result   | Notes |
|-----------------------------|--------------------------------|----------|-------|
| Radiated Spurious Emissions | 15.209(a)<br>15.205(a)<br>A8.5 | Complies |       |

Emissions were investigated from the lowest present clock frequency, to the 10<sup>th</sup> harmonic of the highest present clock frequency (up to 25 GHz). No other emissions were observed within 20 dB of the limits.

#### 10.2.1 SUMMARY OF 15.205 LIMITS

See Figure 15 above.

### 10.3 DATA

| No. | Freq (MHz) | Rdng (dBuV) | Corrected (dBuV/m) | Spec (dBuV/m) | Margin (dB) | Polarity | Antenna Height (cm) |
|-----|------------|-------------|--------------------|---------------|-------------|----------|---------------------|
| 1   | 396.305M   | 22.9        | 40.8 (QP)          | 46.0          | -5.2        | V        | 102                 |
| 2   | 250.000M   | 24.0        | 37.7               | 46.0          | -8.3        | H        | 165                 |
| 3   | 194.577M   | 23.2        | 34.6 (QP)          | 43.5          | -8.9        | H        | 301                 |
| 4   | 72.710M    | 22.5        | 31.0               | 40.0          | -9.0        | H        | 125                 |
| 5   | 275.018M   | 20.6        | 35.7               | 46            | -10.3       | H        | 103                 |
| 6   | 168.780M   | 16.7        | 27.3               | 43.5          | -16.2       | H        | 109                 |
| 7   | 264.0      | Ambient     | From aux equipment |               |             |          |                     |

### 10.4 EMISSIONS PLOT

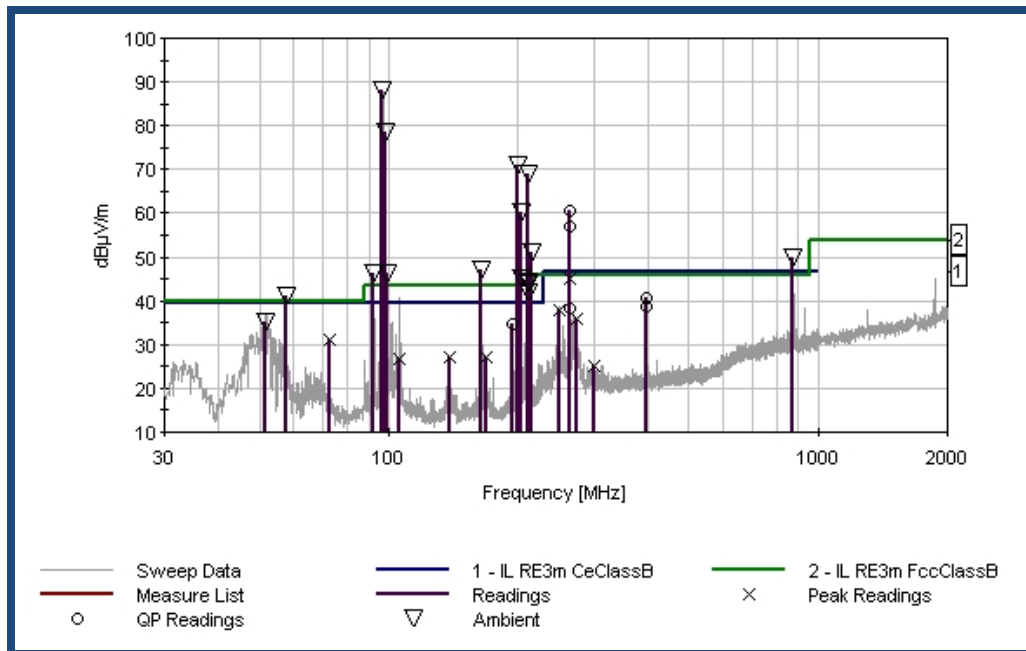


FIGURE 20 - SPURIOUS EMISSIONS PLOT

## 11 POWER LINE CONDUCTED EMISSIONS

### 11.1 TEST METHOD

For the duration of the conducted emissions test, the power cord of the EUT was connected to the main power outlet of the LISN. The LISN in turn is connected to an AC power source. Exploratory tests of the EUT are performed by varying modes and cable positioning. Maximizing procedures are performed on the highest emission readings from the EUT.

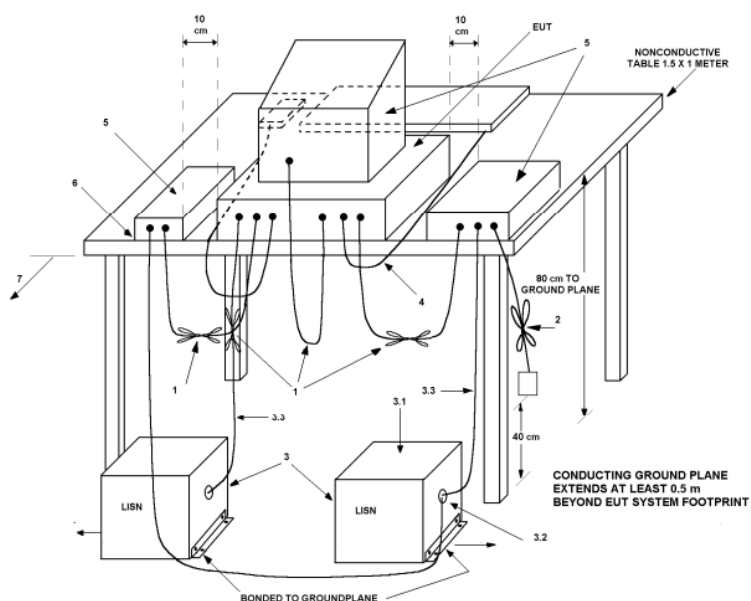


TABLE 1 - TEST ARRANGEMENT FOR CONDUCTED EMISSIONS OF TABLETOP EQUIPMENT

### 11.2 LIMITS AS PER 15.207

| Frequency of emission (MHz) | Conducted Limit (dBuV) |         |
|-----------------------------|------------------------|---------|
|                             | Quasi-Peak             | Average |
| <b>0.15-0.5</b>             | 66-56*                 | 56-46*  |
| <b>0.5-5</b>                | 56                     | 46      |
| <b>5-30</b>                 | 60                     | 50      |

TABLE 2 – CONDUCTED EMISSION LIMITS

### 11.3 NOTES

During test both transmitters were operational

#### 11.4 RESULTS PLOT 120V

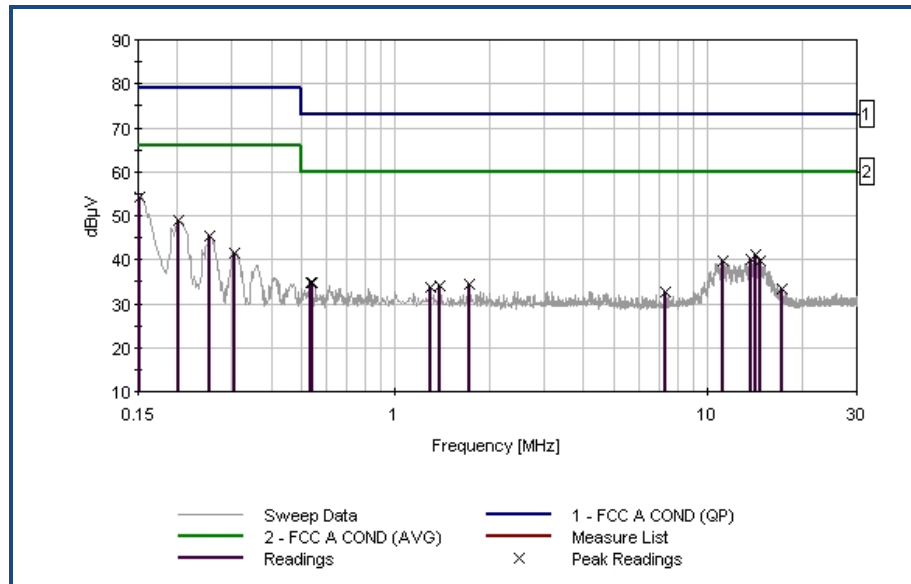


FIGURE 21 - CONDUCTED EMISSIONS PLOT – LINE

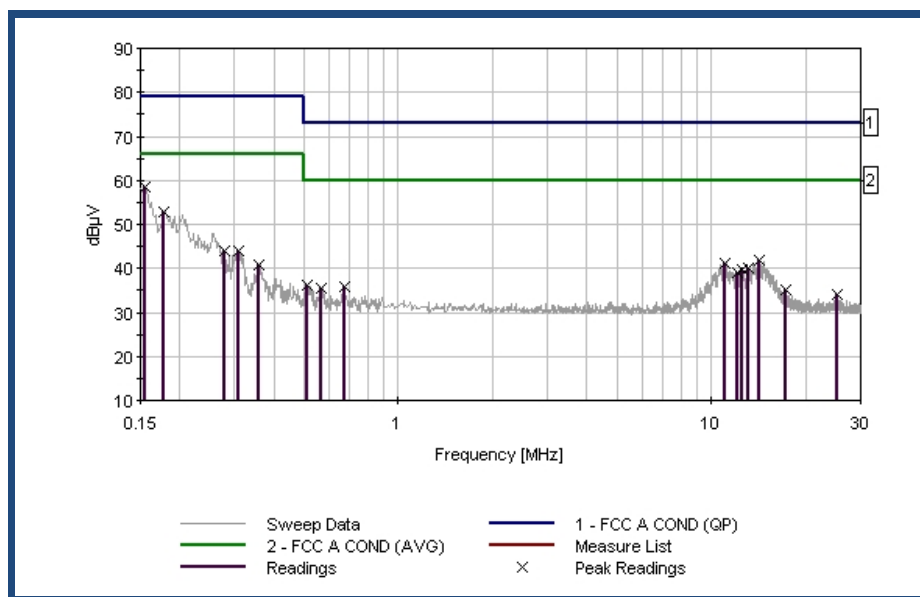


FIGURE 22 - CONDUCTED EMISSIONS PLOT – NEUTRAL

### 11.5 MEASUREMENT DATA, LINE

| No. | Freq (Hz) | Rdng (dBuV) | Corrected (dBuV) | Spec (dBuV) | Margin (dB) | Polarity |
|-----|-----------|-------------|------------------|-------------|-------------|----------|
| 1   | 151.818k  | 44.1        | 54.2             | 79.0        | -24.8       | Line     |
| 2   | 202.722k  | 38.7        | 48.8             | 79.0        | -30.2       | Line     |
| 3   | 14.291M   | 31.0        | 41.1             | 73.0        | -31.9       | Line     |
| 4   | 13.779M   | 29.9        | 40.0             | 73.0        | -33.0       | Line     |
| 5   | 11.183M   | 29.8        | 39.9             | 73.0        | -33.1       | Line     |
| 6   | 14.762M   | 29.5        | 39.6             | 73.0        | -33.4       | Line     |

### 11.6 MEASUREMENT DATA, NEUTRAL

| No. | Freq (Hz) | Rdng (dBuV) | Corrected (dBuV) | Spec (dBuV) | Margin (dB) | Polarity |
|-----|-----------|-------------|------------------|-------------|-------------|----------|
| 1   | 155.454k  | 48.3        | 58.4             | 79.0        | -20.6       | Neutral  |
| 2   | 179.088k  | 42.7        | 52.8             | 79.0        | -26.2       | Neutral  |
| 3   | 14.200M   | 31.6        | 41.7             | 73.0        | -31.3       | Neutral  |
| 4   | 11.103M   | 31.0        | 41.1             | 73.0        | -31.9       | Neutral  |
| 5   | 13.128M   | 29.9        | 40.0             | 73.0        | -33.0       | Neutral  |
| 6   | 12.616M   | 29.5        | 39.6             | 73.0        | -33.4       | Neutral  |

## 12 TEST EQUIPMENT

All applicable test equipment will be calibrated in accordance with ANSI Standard NCSL Z540-1 or other NIST traceable calibration standard. Equipment is calibrated on a 2 year cycle or according to the manufacturer's recommendations.

| Manufacturer    | Description                          | Model   | Serial Number | Cal/Char Due Date D/M/Y |
|-----------------|--------------------------------------|---------|---------------|-------------------------|
| Agilent         | Spectrum Analyzer                    | E4407B  | US4142960     | 10/10/2014              |
| Electro Metrics | Line Impedance Stabilization Network | EM-7823 | 115037        | 31/10/2014              |
| Com-Power       | Loop Antenna                         | AL-130  | ICS100        | 15/1/2014               |
| Electro Metrics | Hybrid Antenna                       | EM-3141 | 9902-1141     | 07/12/2014              |
| HP              | RF Amplifier                         | 8449B   | N/A           | 19/9/2015               |
| AH Systems      | Horn Antenna                         | SAS-571 | 1242          | 14/12/2014              |
| Amawima         | Horn Antenna                         | ANT-K   | 002009        | 7/2/2014                |

## 13 TEST DIAGRAMS

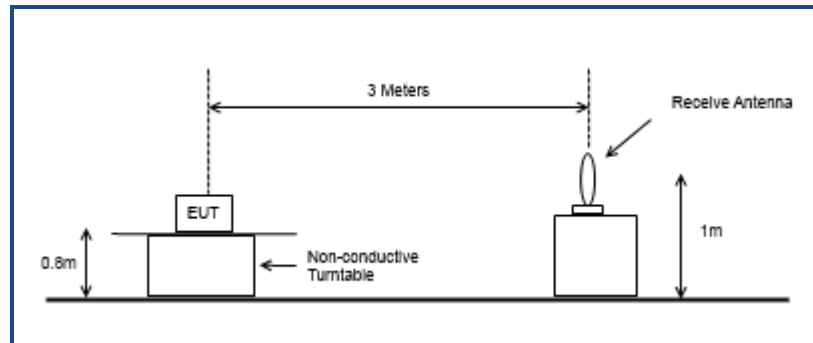
### 13.1 CONDUCTED RF TEST SETUP



### 13.2 POWER LINE CONDUCTED EMISSIONS TEST SETUP



### 13.3 LOW FREQUENCY EMISSIONS TEST SETUP (9 KHz – 30 MHz)



### 13.4 RADIATED EMISSIONS TEST SETUP

