



## MEASUREMENT AND TEST REPORT

### VERSION 1.00

**Report Prepared for:** Exegin Technologies Limited  
401 – 2071 Kingsway Avenue  
Port Coquitlam BC,  
V3C 6N2  
Canada

**Equipment Under Test (EUT):** Model: Q51, Q52, Q53, Q70, Q71

**FCC ID:** VD4Q53R6  
**IC Certification number:** 7162A-Q53R6

**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  
**Industry Canada OATS registration number:** 9578B-1

## Revision History

Version	Date	Author	Comment
1.0	31/07/2013	A. Horel	Original Release
1.01	12/08/2013	A. Horel	<ul style="list-style-type: none"><li>• Heading model numbers updated</li><li>• P1. Model numbers updated</li><li>• P6, 25, 27 standard reference updated</li><li>• P7. Model numbers updated</li><li>• P31. Updated to reflect antennas used for testing</li></ul>

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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 FCC Subpart B 15.109	RSS 210 Issue 8 2.5, A8.5 RSS Gen Issue 3 Section 4.10 and section 6 for RX ICES-003 Issue 4	Complies	
Power line Conducted Emission	FCC Subpart C 15.207 (a) FCC Subpart B 15.107	RSS-Gen Issue 3 7.2.4 Ices-003 Issue 4	Complies	

### 2.1 ENVIRONMENTAL CONDITIONS

Description	Reading
Test Dates: 10 <sup>th</sup> July 2013 – 31 <sup>th</sup> July 2013	
Indoor Temperature	20°C - 26°C
Indoor Humidity	40% - 55%
Outdoor Temperature	21°C -31°C
Outdoor Humidity	36% - 70%

## 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 (2003), 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>	Q51, Q52, Q53, Q70, Q71
<b>Function</b>	Zigbee gateway bridge
<b>Power Supply Input</b>	External DC supply 5V; PoE (Power over Ethernet)
<b>Power Output</b>	2.4dBm (2.4GHz band); 9.6 dBm (915 MHz band)
<b>Antenna Gain/Type</b>	2.4GHz: One-quarter wavelength dipole, 2 dBi 915MHz: One-half Wave dipole, 2 dBi
<b>Channel Spacing</b>	5 MHz (2.4 GHz band); 2 MHz (915 MHz band)
<b>Frequency Range</b>	2405 MHz-2480 MHz; 906 MHz-924 MHz
<b>Modulation</b>	OQPSK (2.4 GHz band); BPSK (915 MHz band)

#### 3.1 AUXILIARY EQUIPMENT

Equipment	Description
Laptop	HP EliteBook 2170p
Power Supply (PS1)	HP PPP009L-E WBGST0A1R3E066 (18.5V, 3.5A)
Power Supply (PS2)	Cisco Systems Inc, CP-PWR-INJ (SN: RCH13149J59) (48V, 0.4A)
Power Supply (PS3)	USB Adaptor V-Infinity EMSA050100-138-SZ (5V, 1A)

#### 3.2 ENGINEERING CHANGES TO PRODUCTION UNIT

N/A

## 4 RF PEAK POWER OUTPUT

Test Name	Reference Specification	Result	Notes
RF Peak Power Output	15.247(b)(3) 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  $\geq 3 \times$  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 (2.4GHz TRANSMITTER)

Channel	Tuned Frequency (GHz)	Peak Power (dBm)	CF (dB)	Corrected (dBm)	Limit (dBm)
Low (11)	2.405	-17.6	+20	2.4	30
Mid (18)	2.440	-17.7	+20	2.3	30
High (26)	2.480	-18.9	+20	1.1	30

### 4.3 PLOT(s) (2.4GHz TRANSMITTER)

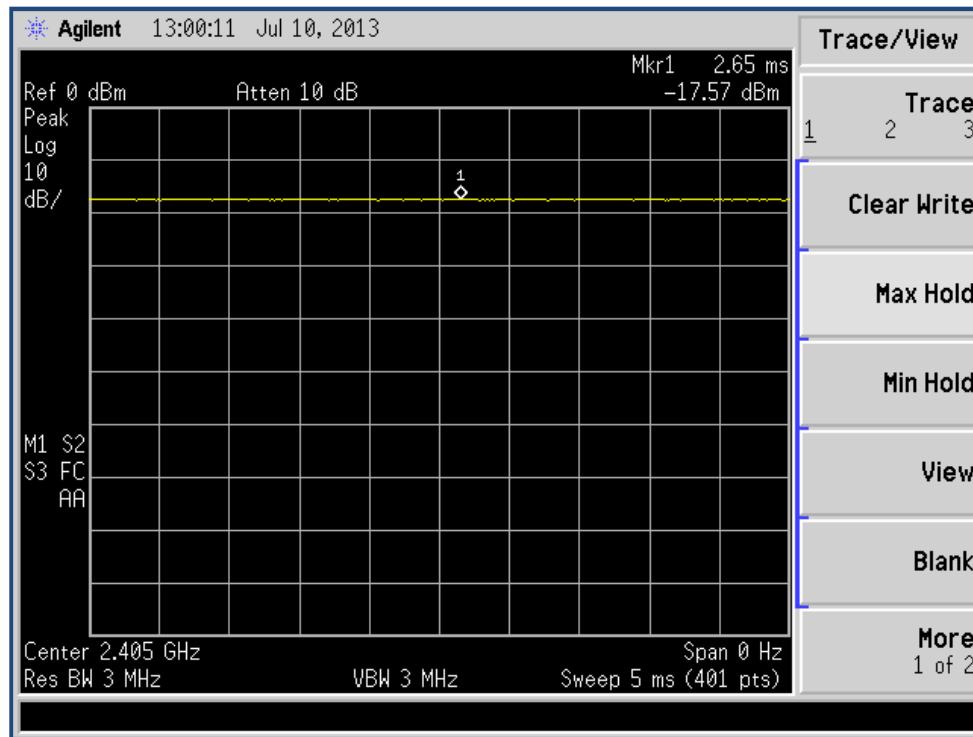


FIGURE 1 - PEAK OUTPUT POWER, LOW CHANNEL (2.4G TRANSMITTER)

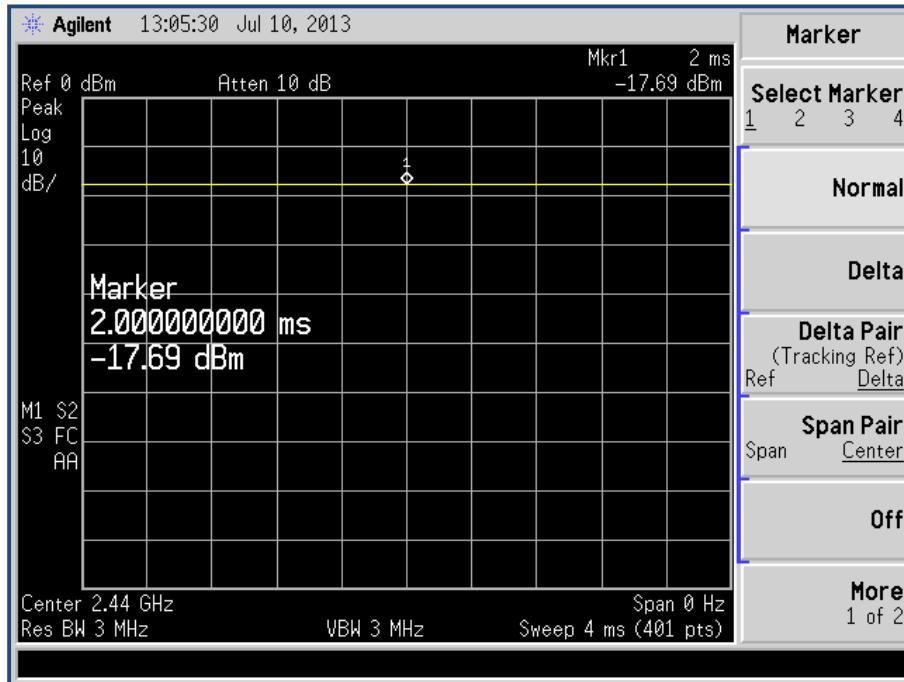


FIGURE 2 - PEAK POWER, MID CHANNEL (2.4G TRANSMITTER)

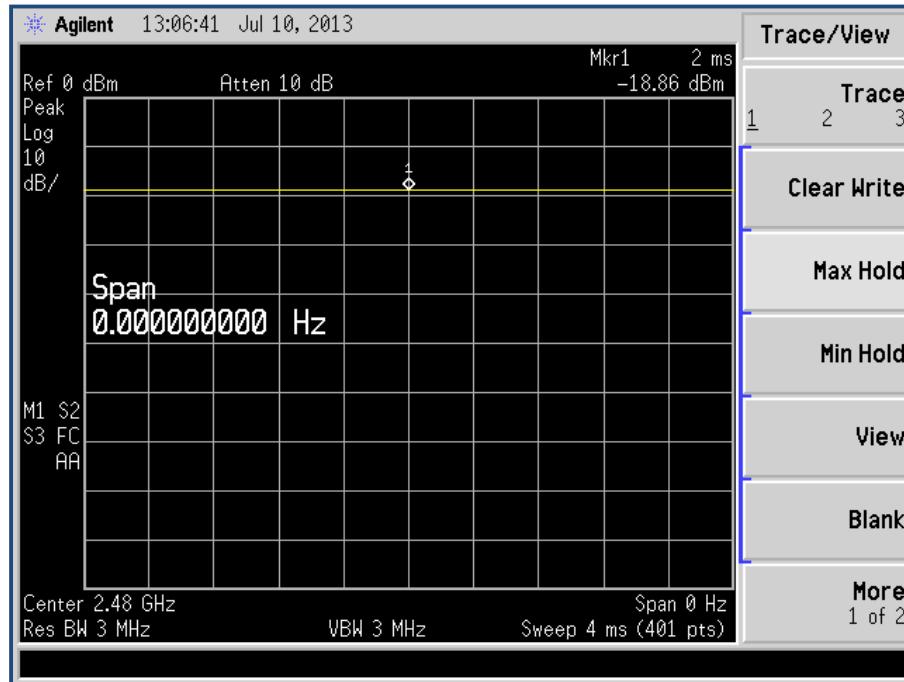


FIGURE 3 - PEAK POWER, HIGH CHANNEL (2.4G TRANSMITTER)

## 4.4 DATA (915 MHZ TRANSMITTER)

Channel	Tuned Frequency (MHz)	Peak Power (dBm)	CF (dB)	Corrected (dBm)	Limit (dBm)
Low (1)	906	9.6	0	9.6	30
Mid (5)	914	9.6	0	9.6	30
High (10)	924	9.6	0	9.6	30

## 4.5 PLOT(s) (915 MHZ TRANSMITTER)

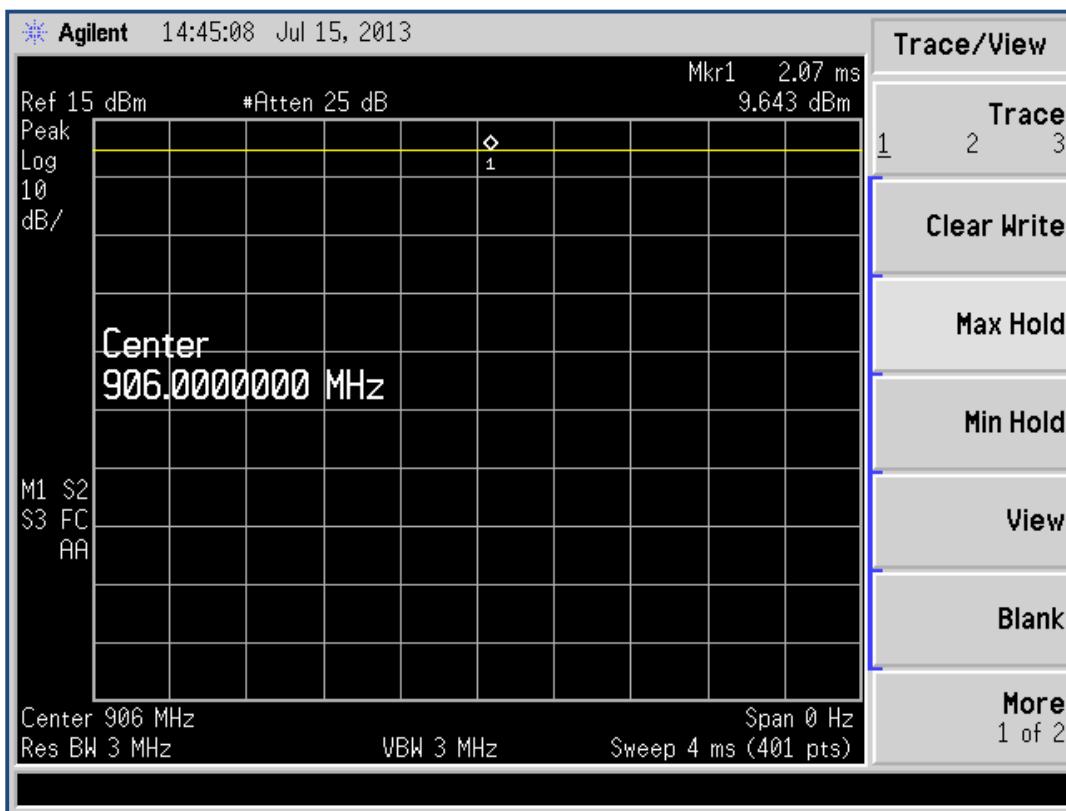


FIGURE 4 - PEAK OUTPUT POWER, LOW CHANNEL (915 MHZ TRANSMITTER)

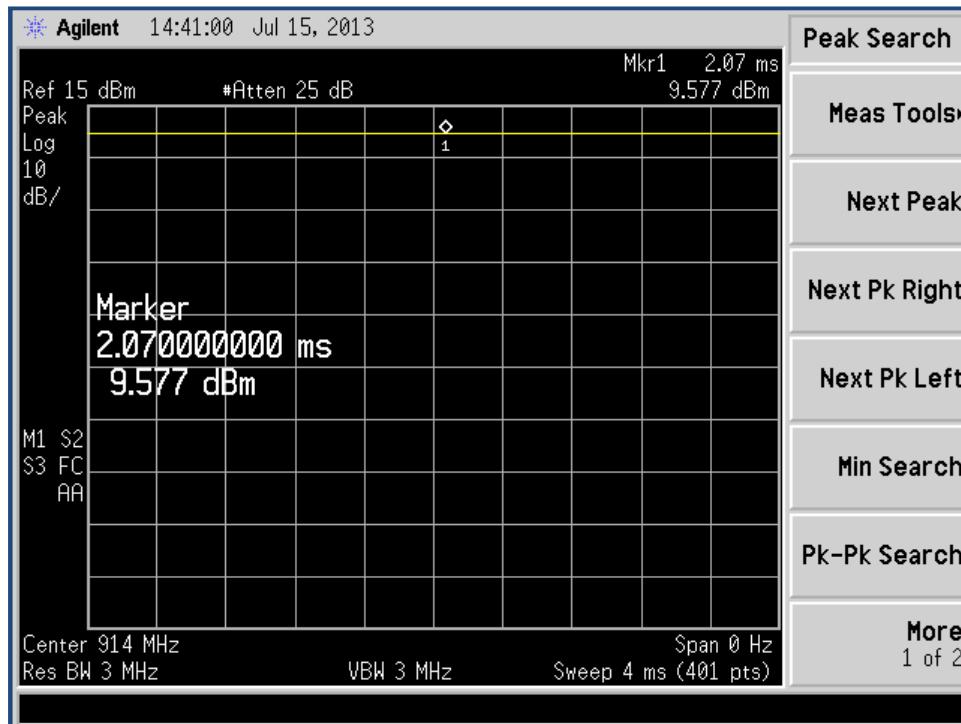


FIGURE 5 - PEAK POWER, MID CHANNEL (915 MHZ TRANSMITTER)

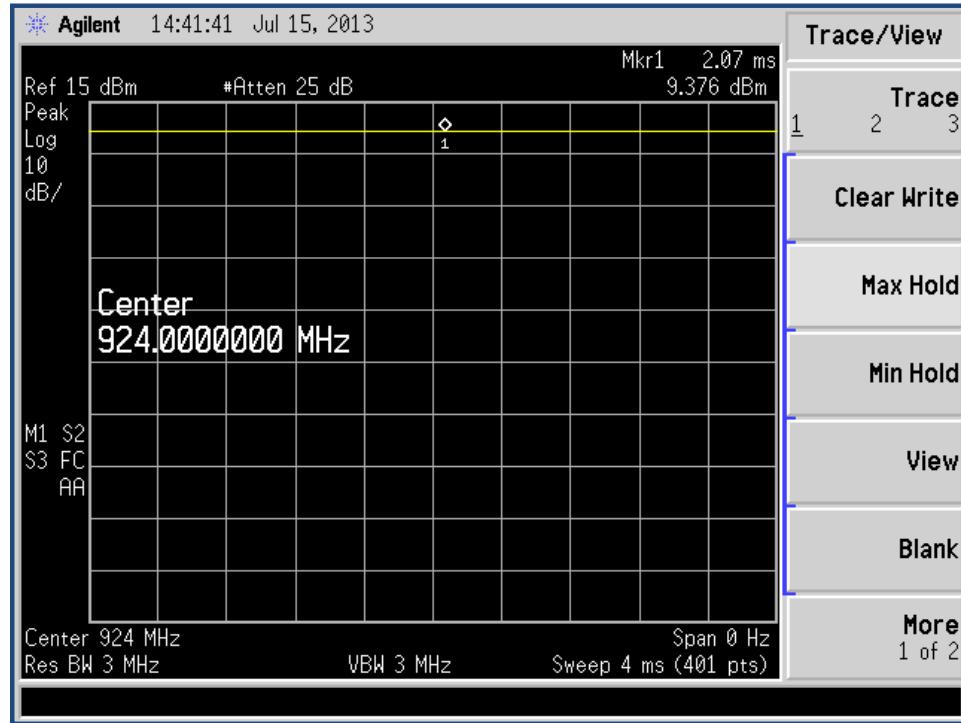


FIGURE 6 - PEAK POWER, HIGH CHANNEL (915 MHZ TRANSMITTER)

## 5 OCCUPIED BANDWIDTH

Test Description	Reference Specification	Result	Notes
Occupied Bandwidth 6dB and 20dB	15.247(a) A8.2(a) 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 x 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 (2.4G TRANSMITTER)

Channel	Frequency (GHz)	20dB Bandwidth (MHz)	6dB Bandwidth (MHz)
Low (11)	2.405	2.34	1.27
Mid (18)	2.440	2.38	1.27
High (26)	2.480	2.44	1.47

### 5.3 PLOTS (2.4G TRANSMITTER)

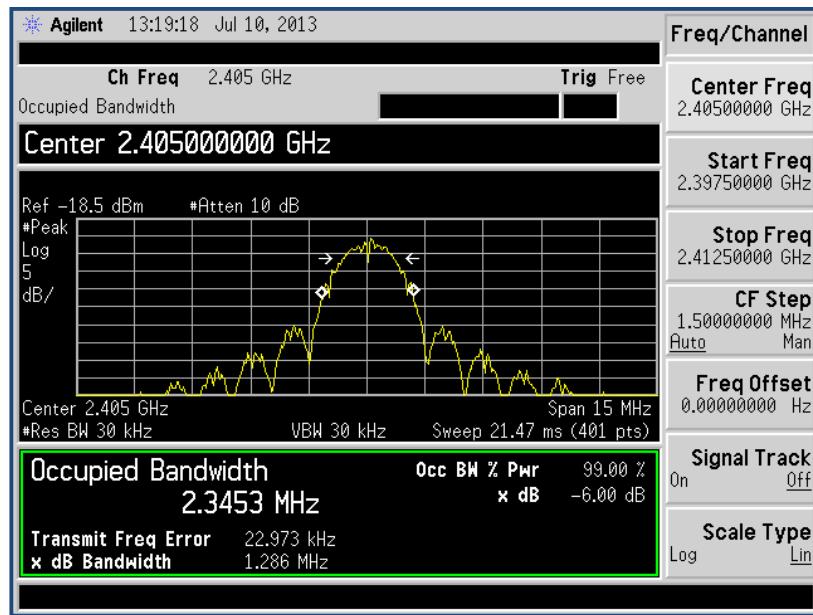


FIGURE 7 - LOW CHANNEL OCCUPIED BANDWIDTH (2.4G TRANSMITTER)

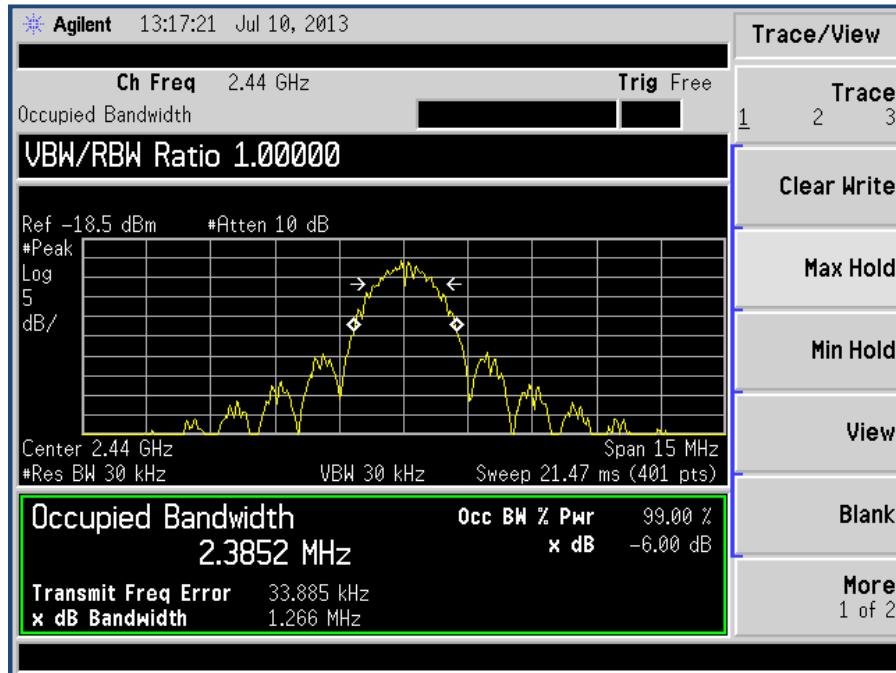


FIGURE 8 – MID CHANNEL OCCUPIED BANDWIDTH (2.4G TRANSMITTER)

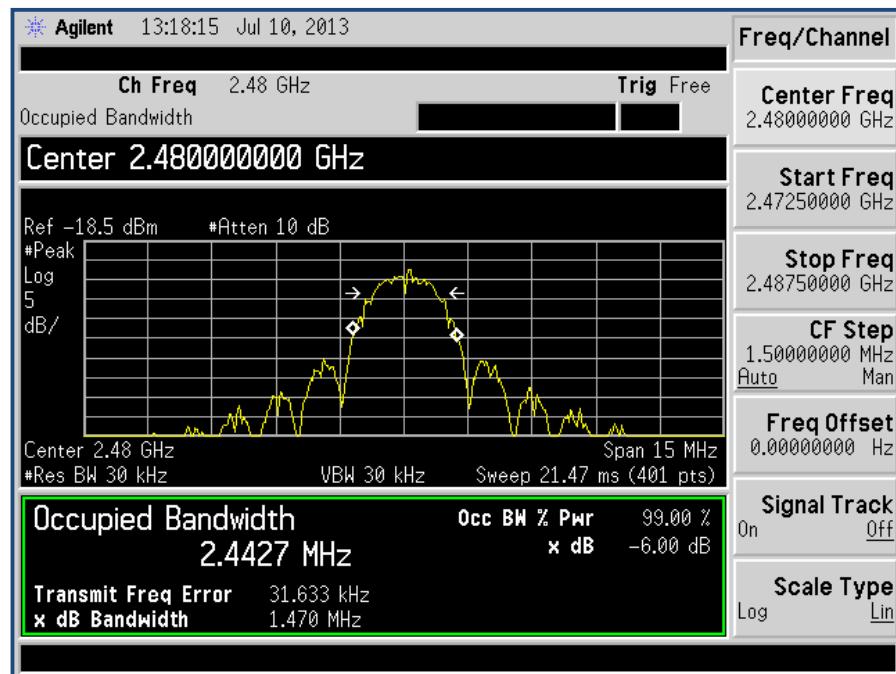


FIGURE 9 - HIGH CHANNEL OCCUPIED BANDWIDTH (2.4G TRANSMITTER)

## 5.4 DATA (915 MHZ TRANSMITTER)

Channel	Frequency (MHz)	20dB Bandwidth (KHz)	6dB Bandwidth (KHz)
Low (1)	906	935	605
Mid (5)	914	920	595
High (10)	924	920	600

## 5.5 PLOTS (915 MHZ TRANSMITTER) 20DB BANDWIDTH

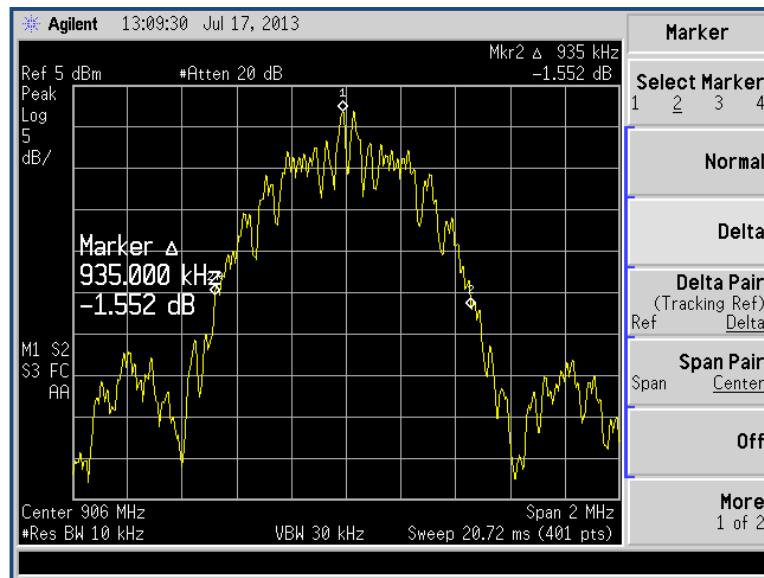


FIGURE 10 - LOW CHANNEL OCCUPIED BANDWIDTH (915 MHZ TRANSMITTER)



FIGURE 11 – MID CHANNEL OCCUPIED BANDWIDTH (915 MHZ TRANSMITTER)

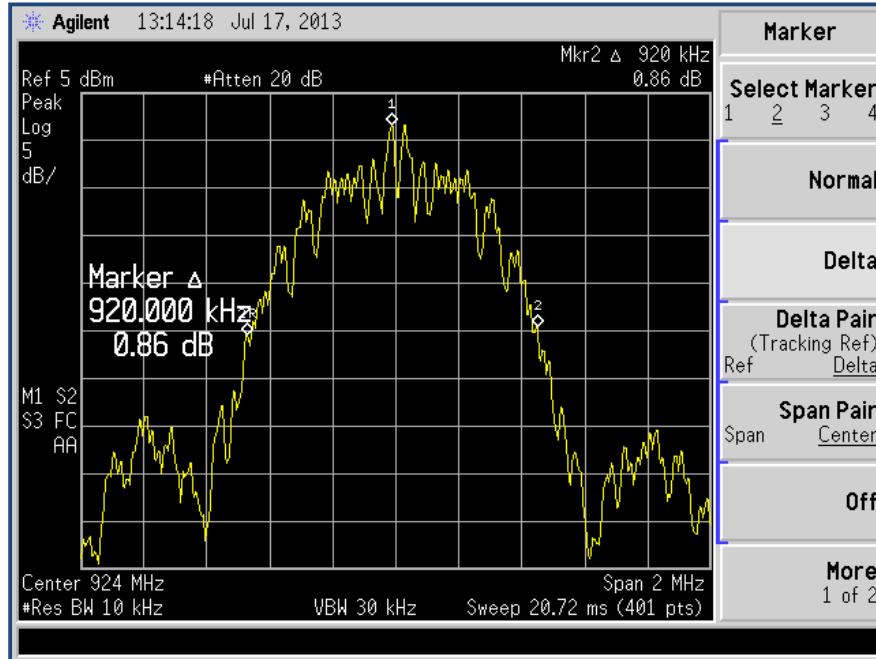


FIGURE 12 - HIGH CHANNEL OCCUPIED BANDWIDTH (915 MHZ TRANSMITTER)

## 5.6 PLOTS (915 MHz TRANSMITTER) 6dB BANDWIDTH

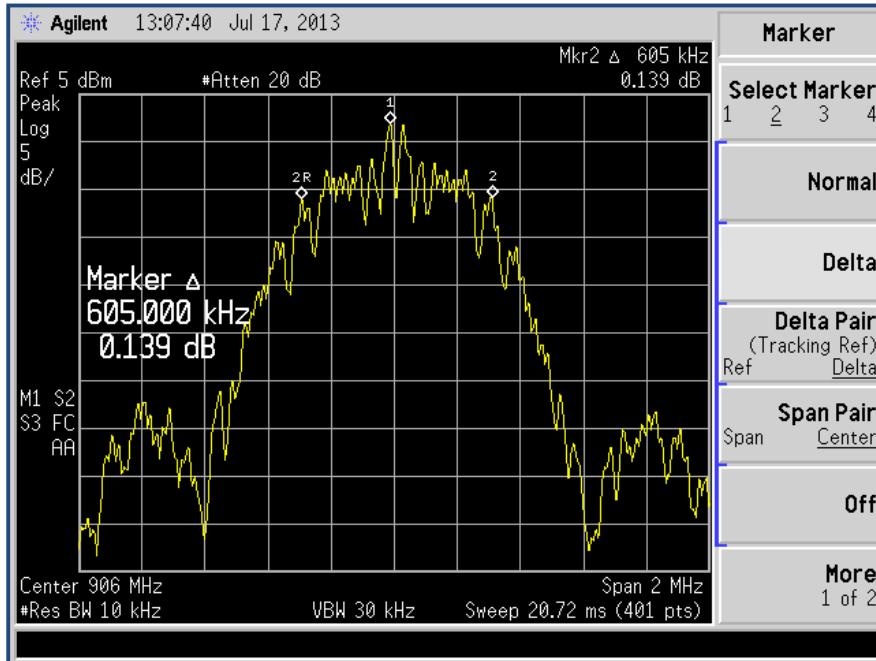


FIGURE 13 - LOW CHANNEL OCCUPIED BANDWIDTH (915 MHZ TRANSMITTER)

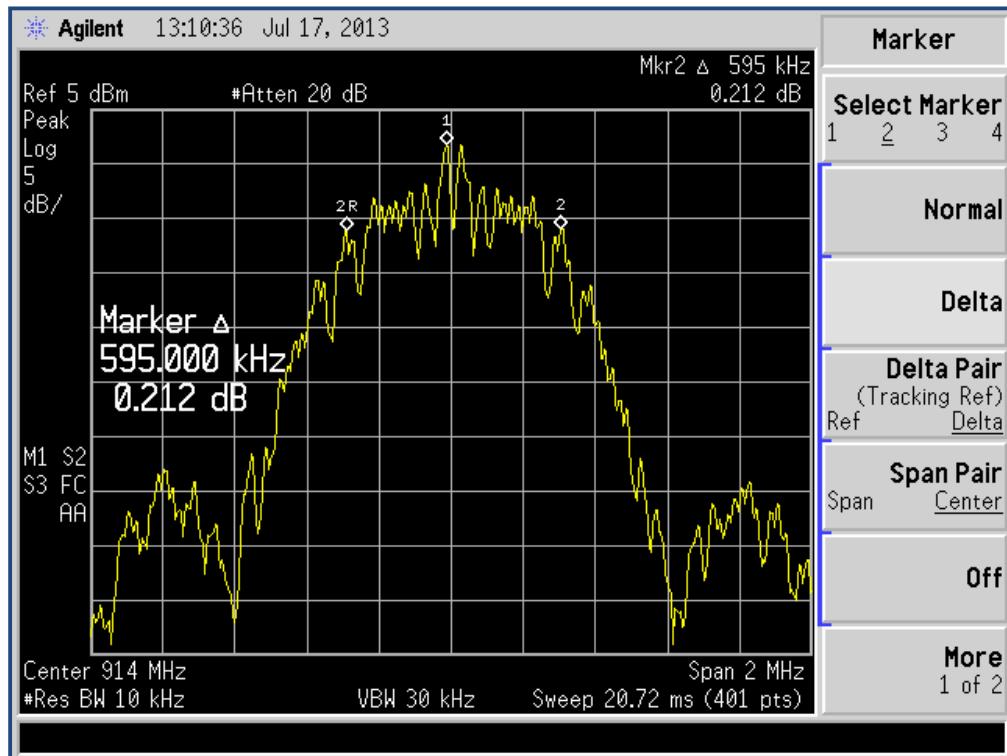


FIGURE 14 – MID CHANNEL OCCUPIED BANDWIDTH (915 MHZ TRANSMITTER)

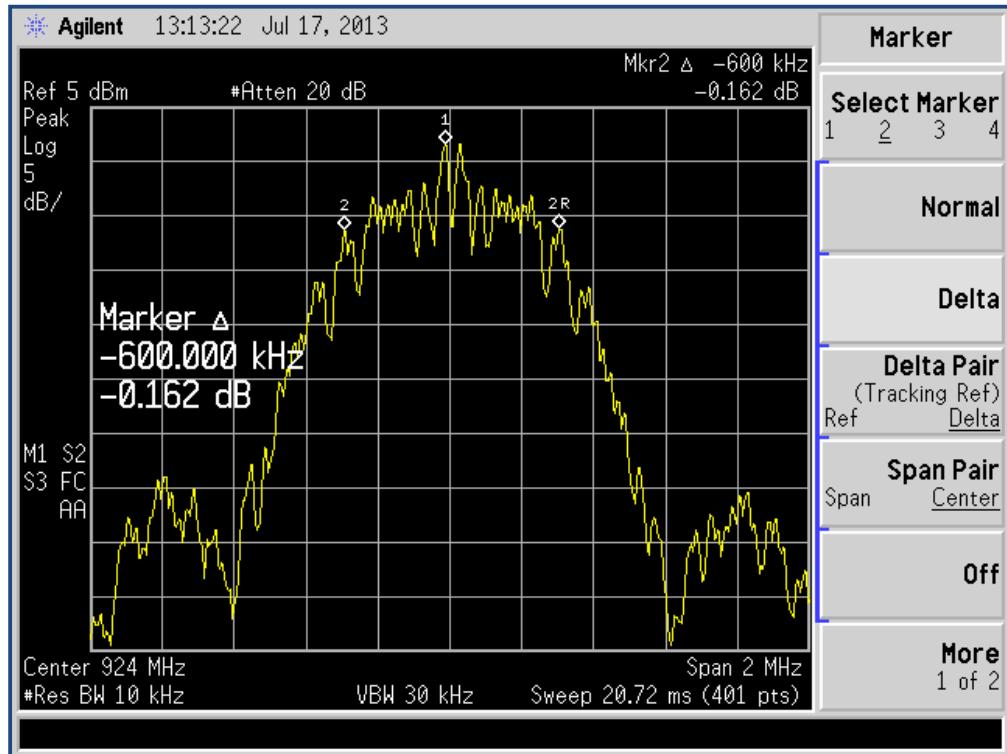


FIGURE 15 - HIGH CHANNEL OCCUPIED BANDWIDTH (915 MHZ TRANSMITTER)

## 6 POWER SPECTRAL DENSITY

Test Description	Reference Specification	Result	Notes
Power Spectral Density	15.247(e) A8.2 (b)	Complies	maximum measured power spectral density:

### 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  $\geq$  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 (2.4G TRANSMITTER)

Channel	Frequency (GHz)	Pk Power (dBm)	CF (dB)	BWCF	PSD (dBm)
Low (11)	2.405	-20.4	20	-15.2	-15.6
Mid (18)	2.440	-20.7	20	-15.2	-15.9
High (26)	2.480	-22.5	20	-15.2	-17.7

Note: All final reported values are corrected values

### 6.4 PLOTS (2.4G TRANSMITTER)

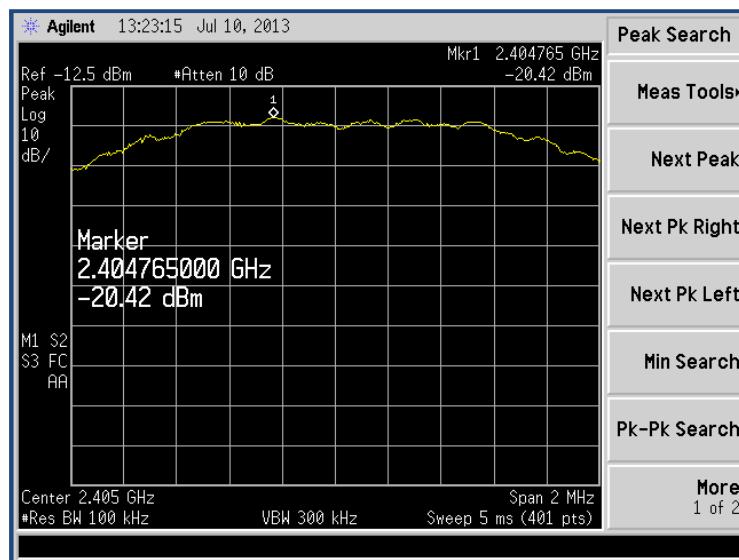


FIGURE 16 – PEAK POWER (LOW CHANNEL) (2.4G TRANSMITTER)

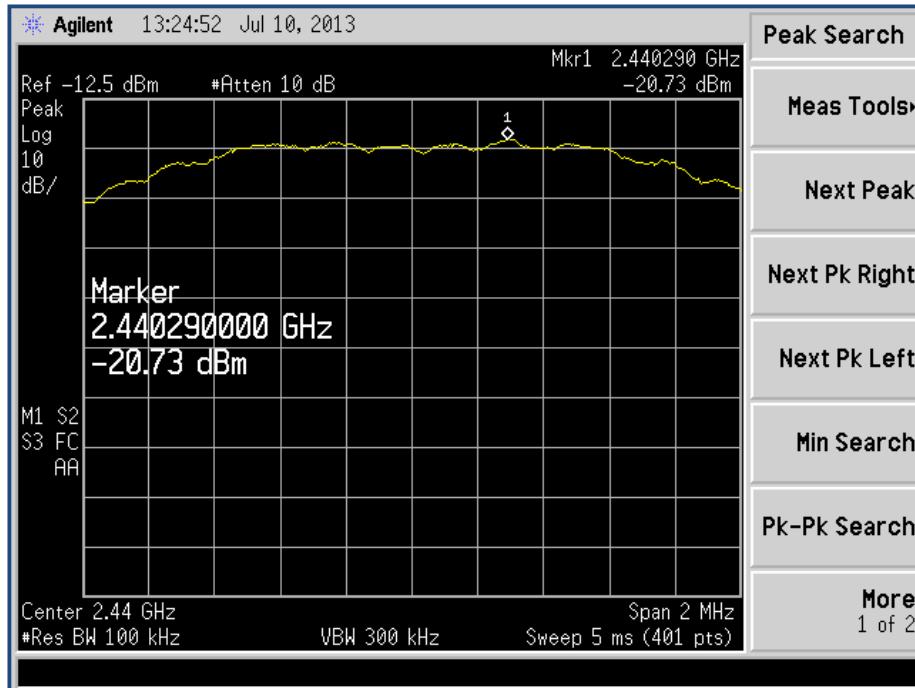


FIGURE 17 - PEAK POWER (MID CHANNEL) (2.4G TRANSMITTER)

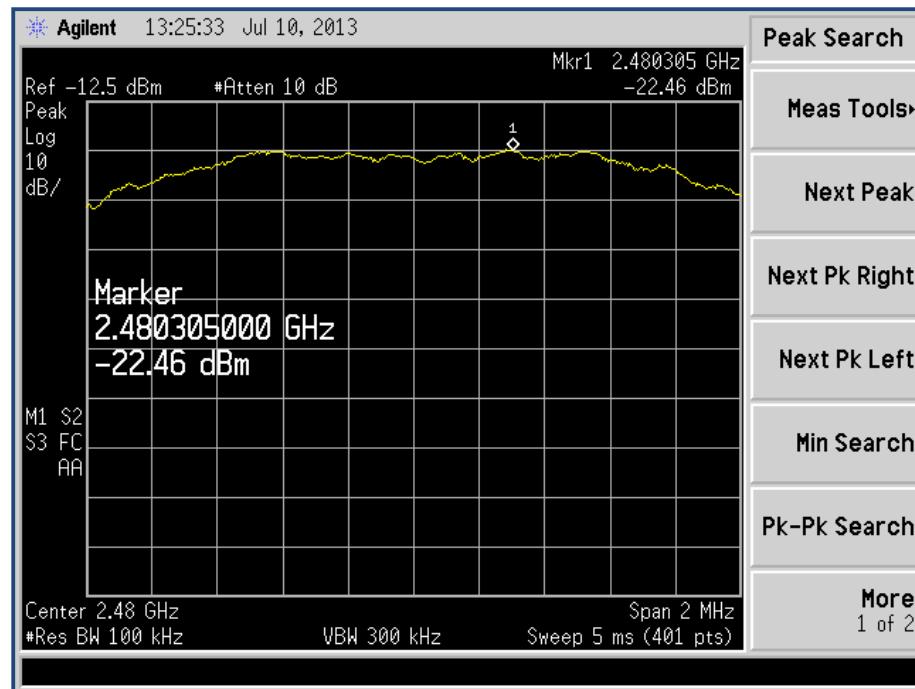


FIGURE 18 - PEAK POWER (HIGH CHANNEL) (2.4G TRANSMITTER)

## 6.5 DATA (915MHZ TRANSMITTER)

Channel	Frequency (MHz)	Pk Power (dBm)	BWCF	PSD (dBm)
Low (1)	906	9.5	-15.2	-5.7
Mid (5)	914	9.3	-15.2	-5.9
High (10)	924	9.1	-15.2	-6.1

Note: All final reported values are corrected values

## 6.6 PLOTS (915MHz TRANSMITTER)

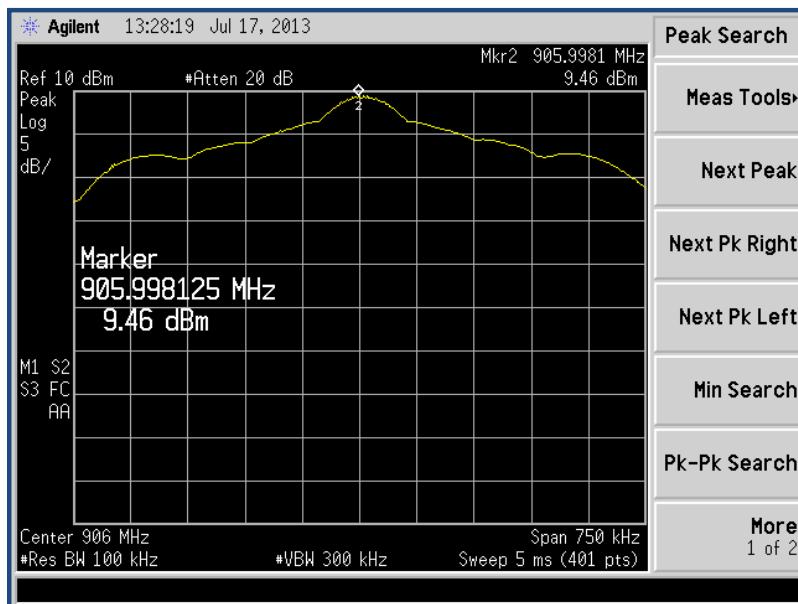


FIGURE 19 – PEAK POWER (LOW CHANNEL) (915MHZ TRANSMITTER)

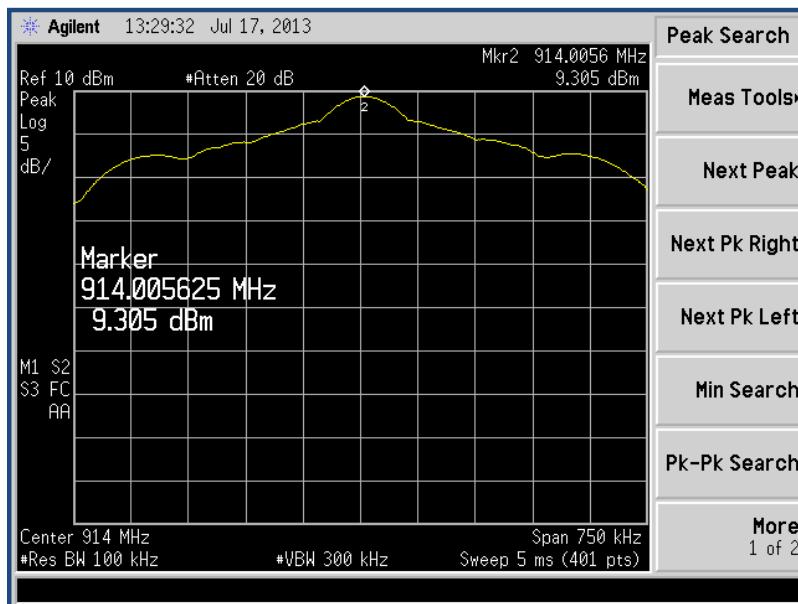


FIGURE 20 - PEAK POWER (MID CHANNEL) (915MHZ TRANSMITTER)

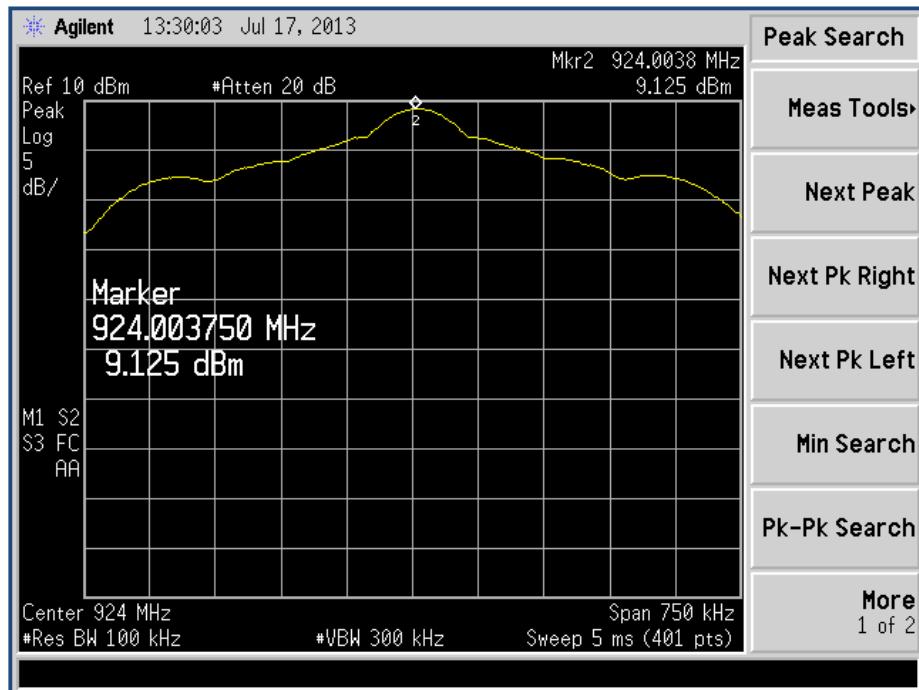


FIGURE 21 - PEAK POWER (HIGH CHANNEL) (915MHZ TRANSMITTER)

## 7 CONDUCTED SPURIOUS EMISSIONS

Test Description	Reference Specification	Result	Notes
Conducted Spurious Emissions	15.247(c) 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 (2.4G TRANSMITTER)

Channel	Fundamental (dB)	Harmonic 2 (dB)	Harmonic 4 (dB)	Limit (dBc)	Margin (dB)	Result
Low (11)	-12.59	<b>-70.23</b>	-	20	37	Complies
Mid (18)	-10.45	-69.80	-73.06	20	39	Complies
High (26)	-10.71	-72.35	-74.04	20	41	Complies

Note: worst case harmonic: **-57 dBc**

### 7.4 NOTES

- 3 x 3dB SMA Attenuators used throughout test

## 7.5 PLOTS (2.4G TRANSMITTER)

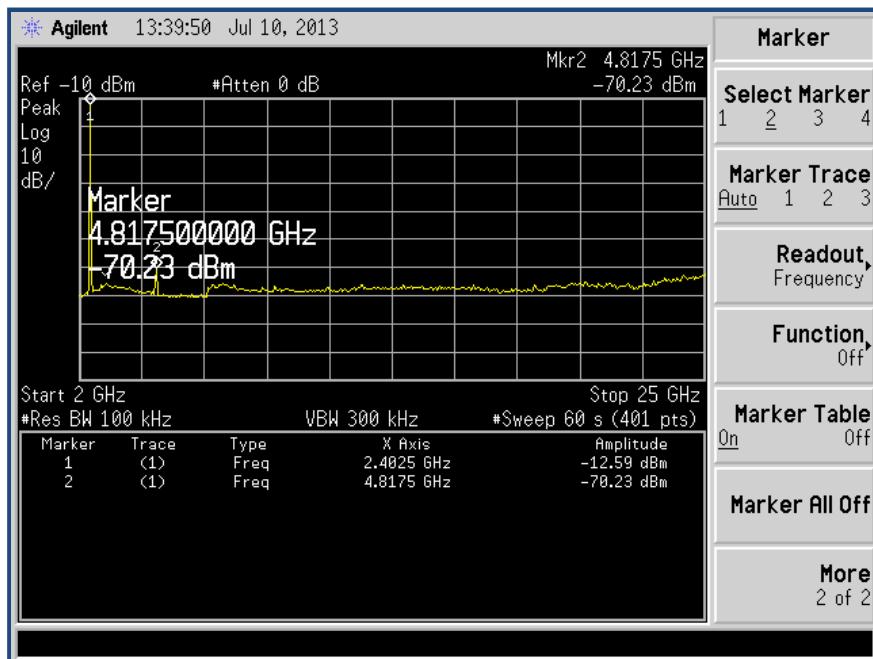


FIGURE 22 – LOW CHANNEL SPURIOUS, 2-25GHZ (2.4G TRANSMITTER)

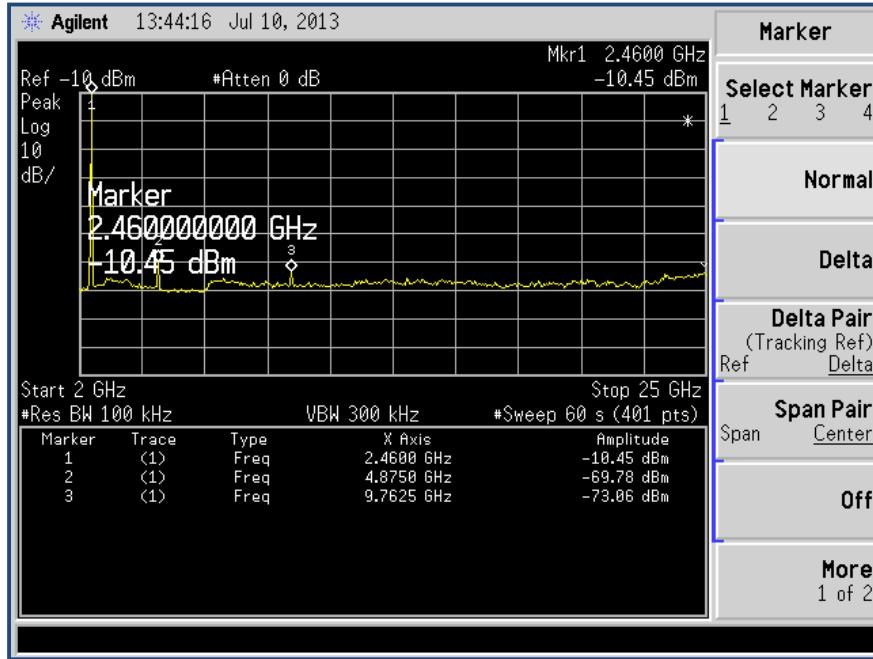


FIGURE 23 - MID CHANNEL SPURIOUS 2-25GHZ (2.4G TRANSMITTER)

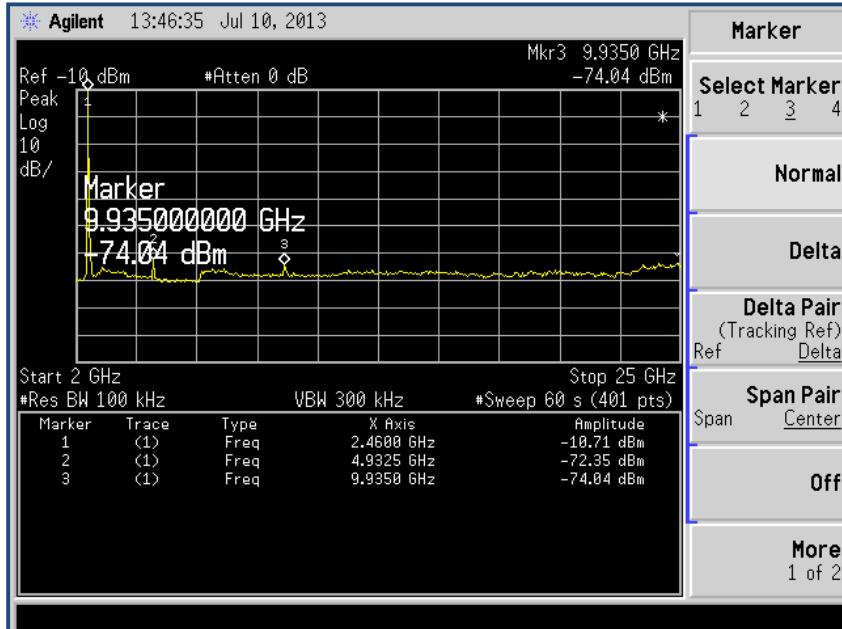


FIGURE 24 - HIGH CHANNEL SPURIOUS 2-25GHZ (2.4G TRANSMITTER)

## 7.6 DATA (915MHz TRANSMITTER)

Channel	Fund. (dBm)	Harmonic 2 (dBm)	Harmonic 3 (dBm)	Harmonic4 (dBm)	Limit (dBc)	Margin (dB)	Result
Low (1)	9.2	-49.0	-46.2	-40.6	20	29.8	Complies
Mid (5)	9.3	-50.4	-46.6	-40.6	20	29.9	Complies
High (10)	9.2	-51.8	-46.2	<b>-40.3</b>	20	29.5	Complies

Note: worst case harmonic: -49.5 dBc

## 7.7 PLOTS (915MHz TRANSMITTER)

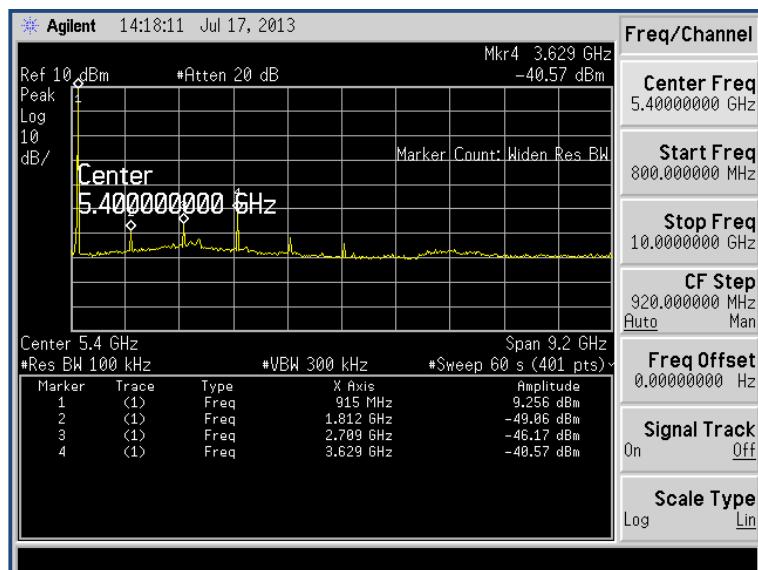


FIGURE 25 – LOW CHANNEL SUPRIOS, 2-10GHZ (915MHz TRANSMITTER)

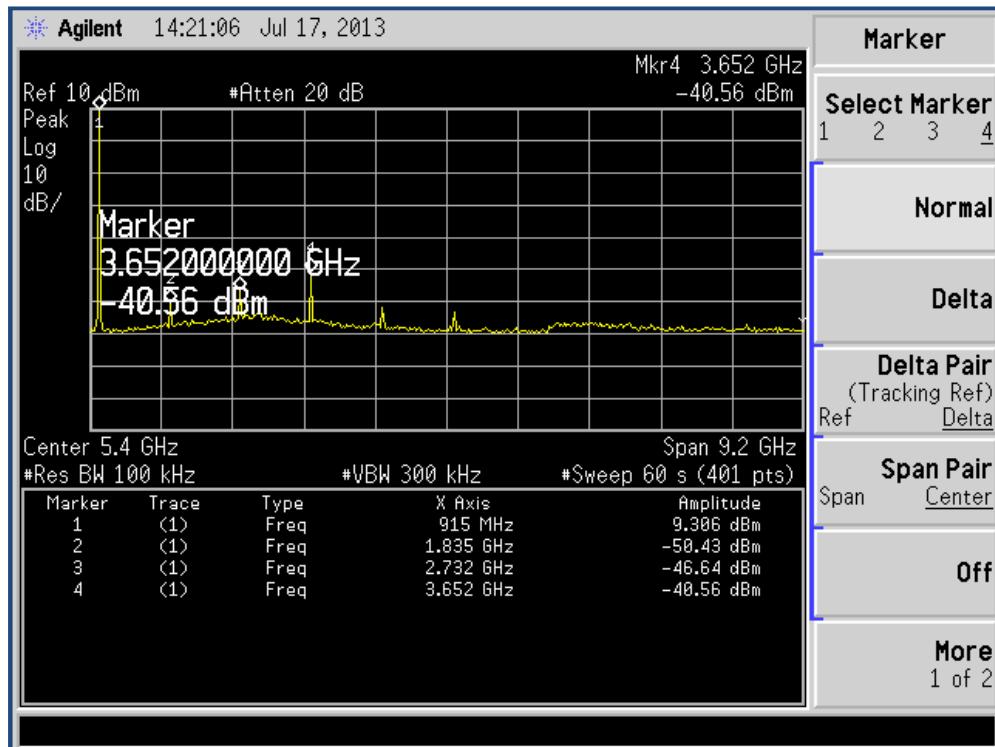


FIGURE 26 - MID CHANNEL SPURIOUS 2-10GHZ (915MHZ TRANSMITTER)

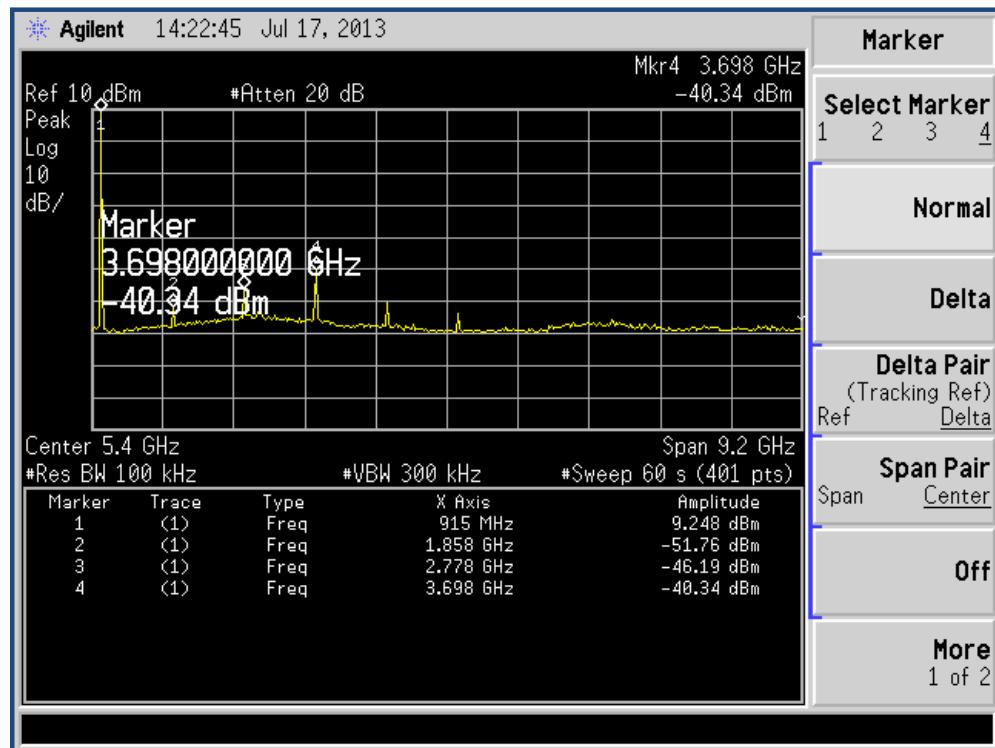


FIGURE 27 - HIGH CHANNEL SPURIOUS 2-10GHZ (915MHZ TRANSMITTER)

## 8 CONDUCTED SPURIOUS EMISSIONS BANDEDGE

Test Description	Reference Specification	Limit	Result	Notes
Band Edge Compliance	15.247(d) A8.1	>20dBc, 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 (2.4G TRANSMITTER)

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 101.9 dBuV/m.

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	101.9	59.1	42.8	>20dBc, 74 dBuV/m pk	31.2	Complies
2483.9	101.8	35.5	66.3	>20dBc, 74 dBuV/m pk	7.7	Complies

### 8.4 NOTES

N/A

## 8.5 PLOTS (2.4G TRANSMITTER)

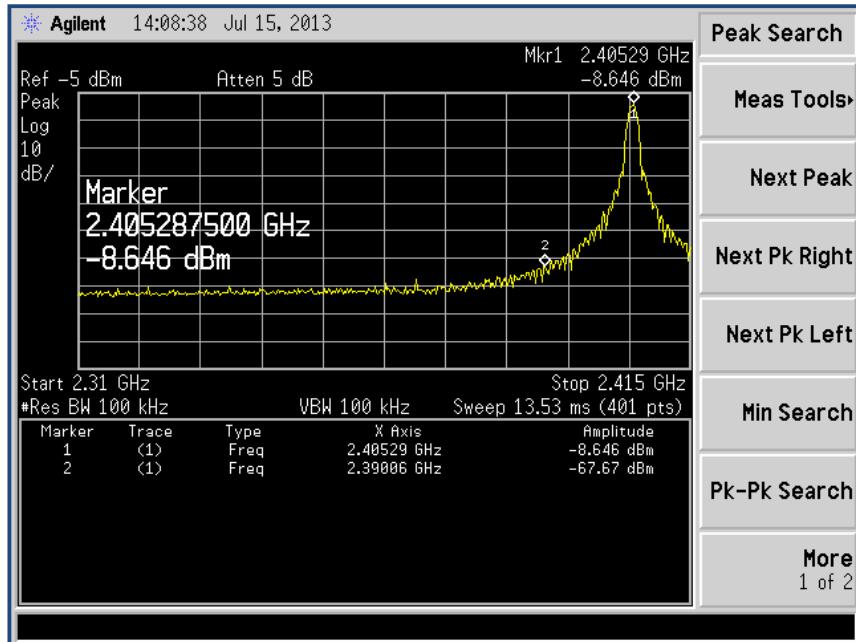


FIGURE 28 – CONDUCTED BAND EDGE (2310-2390) (2.4G TRANSMITTER)

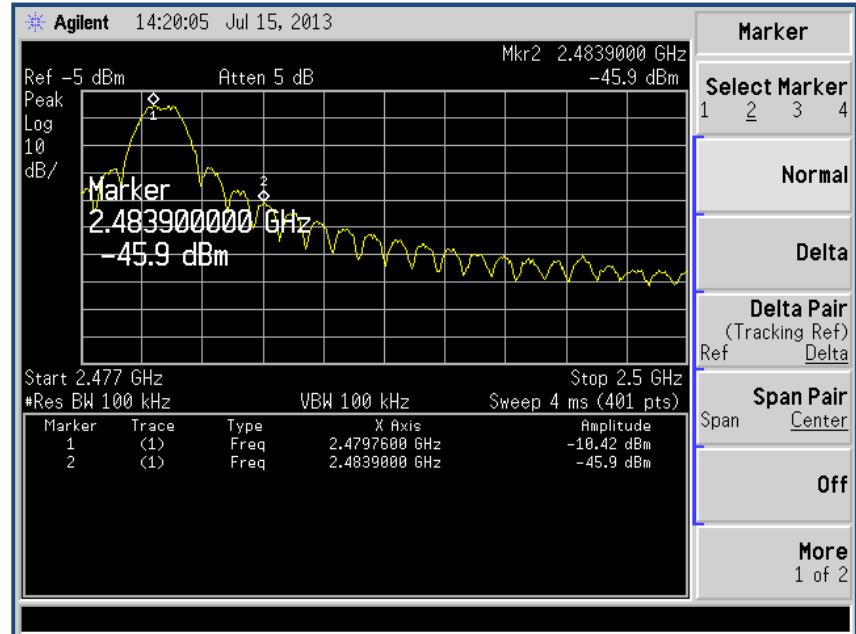


FIGURE 29 – CONDUCTED UPPER BANDEDGE (2477 - 2500) (2.4G TRANSMITTER)

## 8.6 DATA (915MHZ TRANSMITTER)

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 92.7 dBuV/m.

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
960.9	92.7	69.6	23.1	>20dBc, 74 dBuV/m pk	50.9	Complies

## 8.7 NOTES

N/A

## 8.8 PLOTS (915MHZ TRANSMITTER)

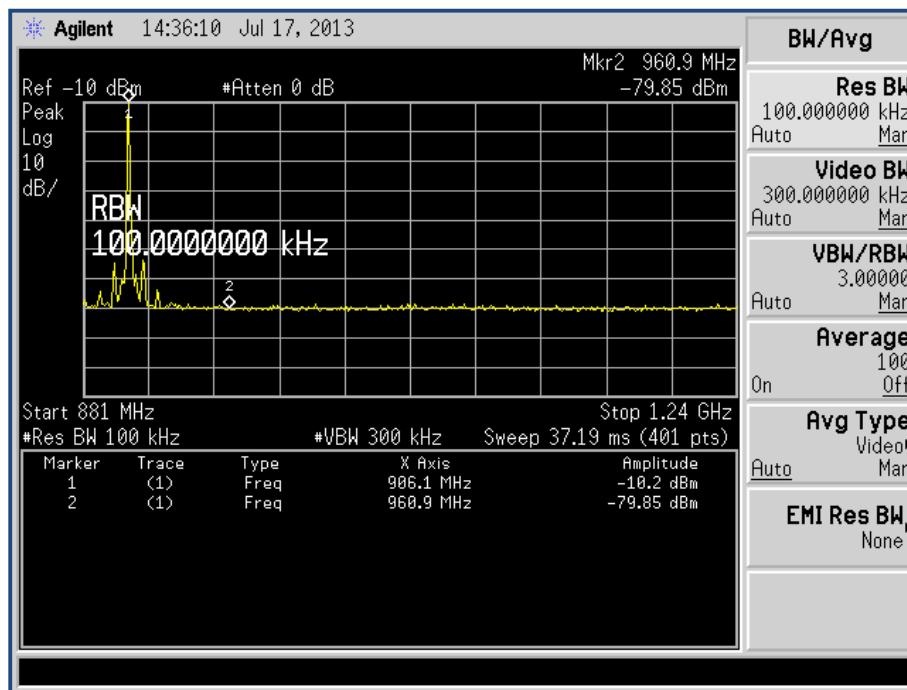


FIGURE 30 – CONDUCTED BAND EDGE (915MHZ TRANSMITTER)

## 9 RADIATED SPURIOUS EMISSIONS BAND EDGE

### 9.1 TEST PROCEDURE

The EUT is placed on a non-conducive 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 15.209(a) 15.205(a) RSS 210 Issue 8 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 31 - RESTRICTED BANDS

### 9.3 DATA BOTH TRANSMITTERS

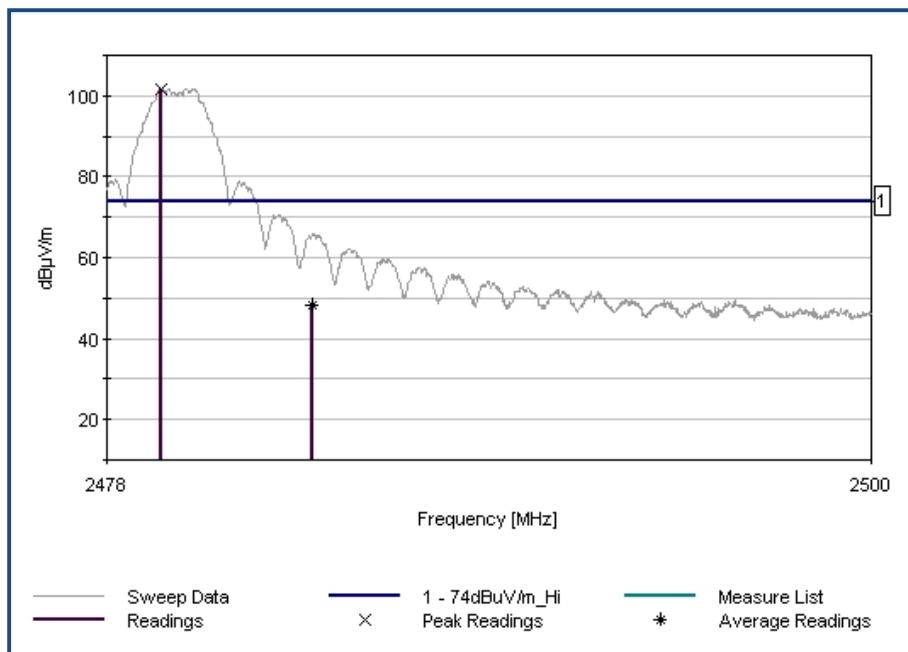


FIGURE 32 - UPPER BAND EDGE – HI CHANNEL

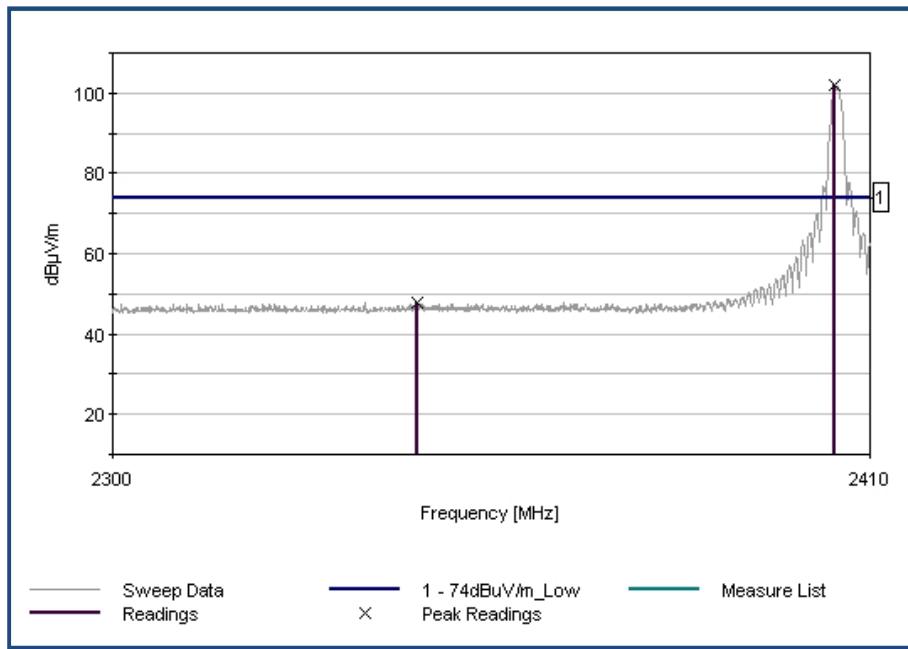


FIGURE 33 - LOWER BAND EDGE - LOW CHANNEL

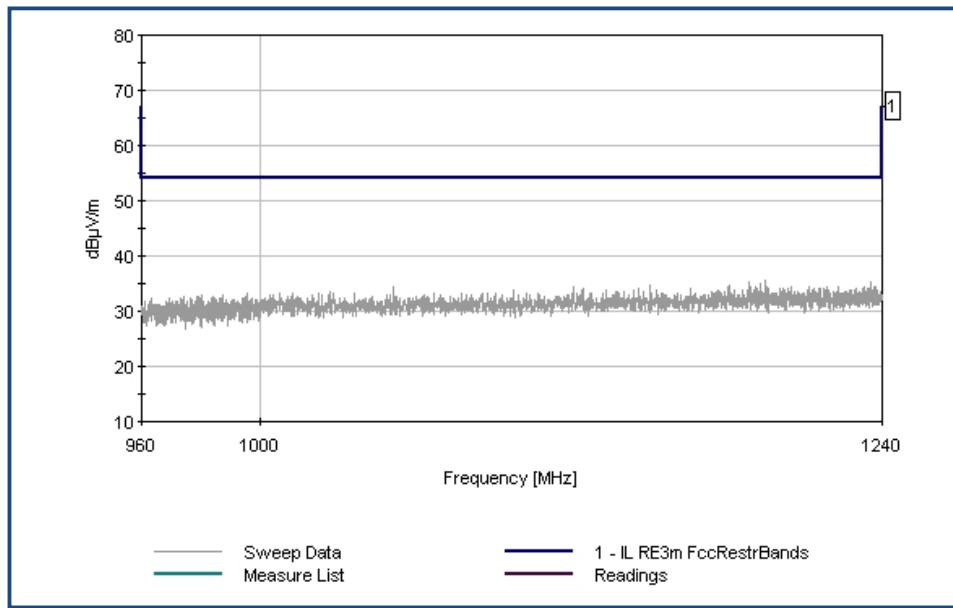


FIGURE 34 - BAND EDGE (960-1240 MHZ)

## 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. 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 10<sup>th</sup> harmonic of the highest fundamental frequency. Where applicable, a hybrid antenna, horn antenna and loop antenna were used to cover the relevant frequency bands. 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:

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

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) 15.205(a) 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	264.189 (QP)	27.6	42.1	46.0	-3.9	Horiz	124
2	396.285 (QP)	22.1	40.0	46.0	-6.0	Horiz	208
3	132.070	24.5	34.7	43.5	-8.8	Horiz	142
4	660.483(QP)	17.1	41.4	46.0	-4.6	Vert	139
5	396.307 (QP)	22.9	40.8	46.0	-5.2	Vert	118
6	162.989	27.1	37.5	43.5	-6.0	Vert	102

### 10.4 EMISSIONS PLOT

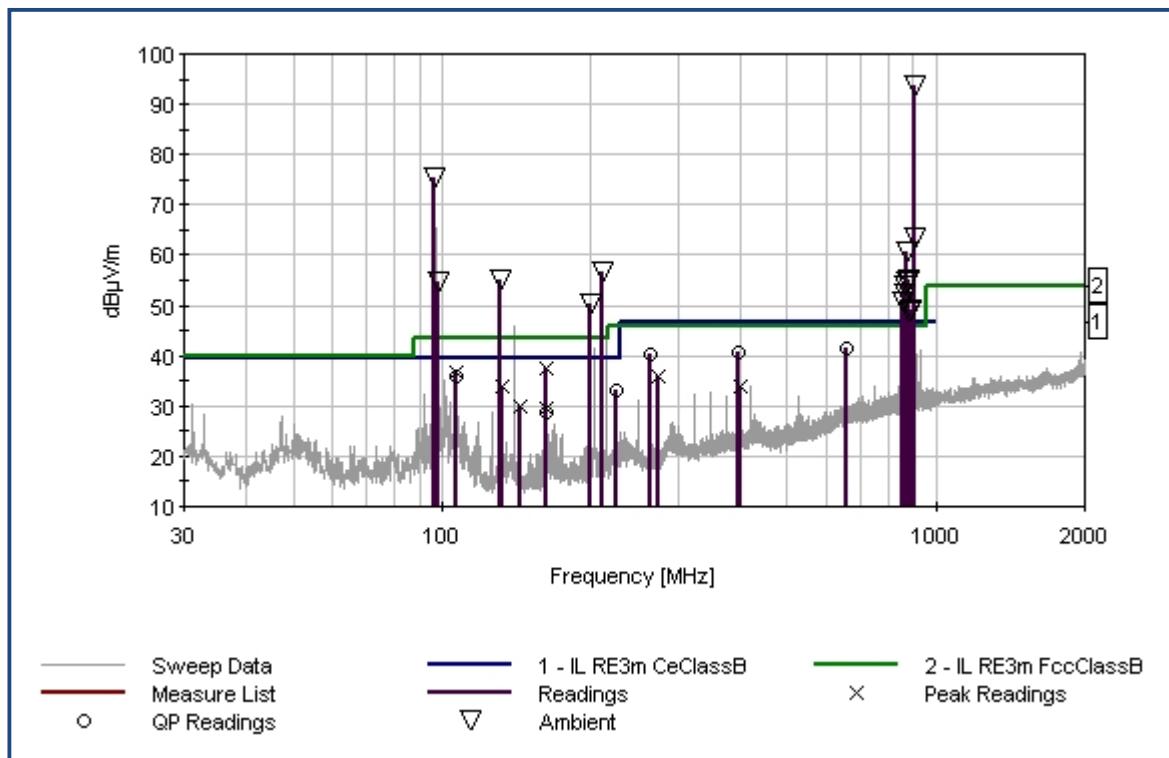


FIGURE 35 - SPURIOUS EMISSIONS PLOT (VERTICAL)

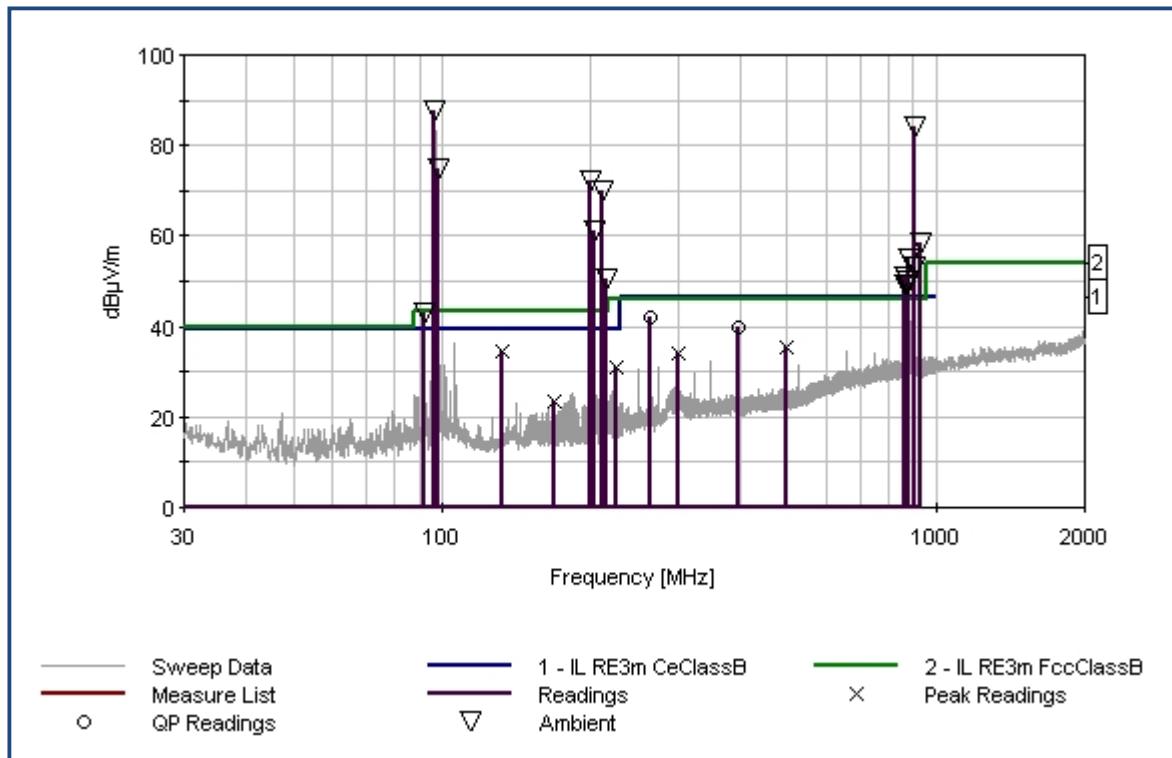


FIGURE 36 - SPURIOUS EMISSIONS PLOT (HORIZONTAL)

## 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

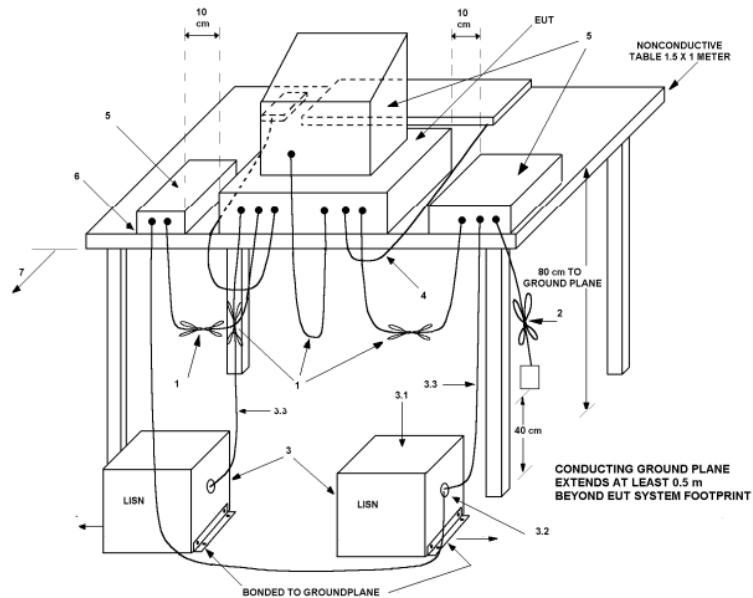


TABLE 1 - TEST ARRANGEMENT FOR CONDUCTED EMISSIONS OF TABLETOP EQUIPMENT

## 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

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**TABLE 2 – CONDUCTED EMISSION LIMITS**

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### 11.3 NOTES

- During test both transmitters were operational

#### 11.4 RESULTS PLOT 120V (PS1)

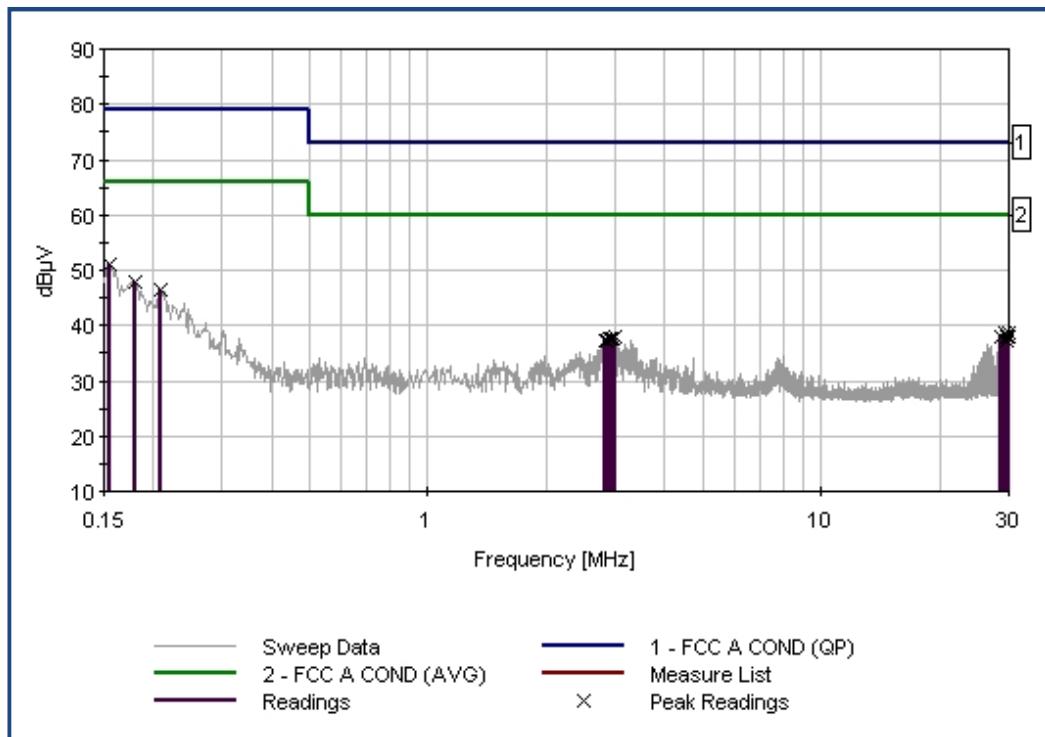


FIGURE 37 - CONDUCTED EMISSIONS PLOT – LINE 120V (PS1)

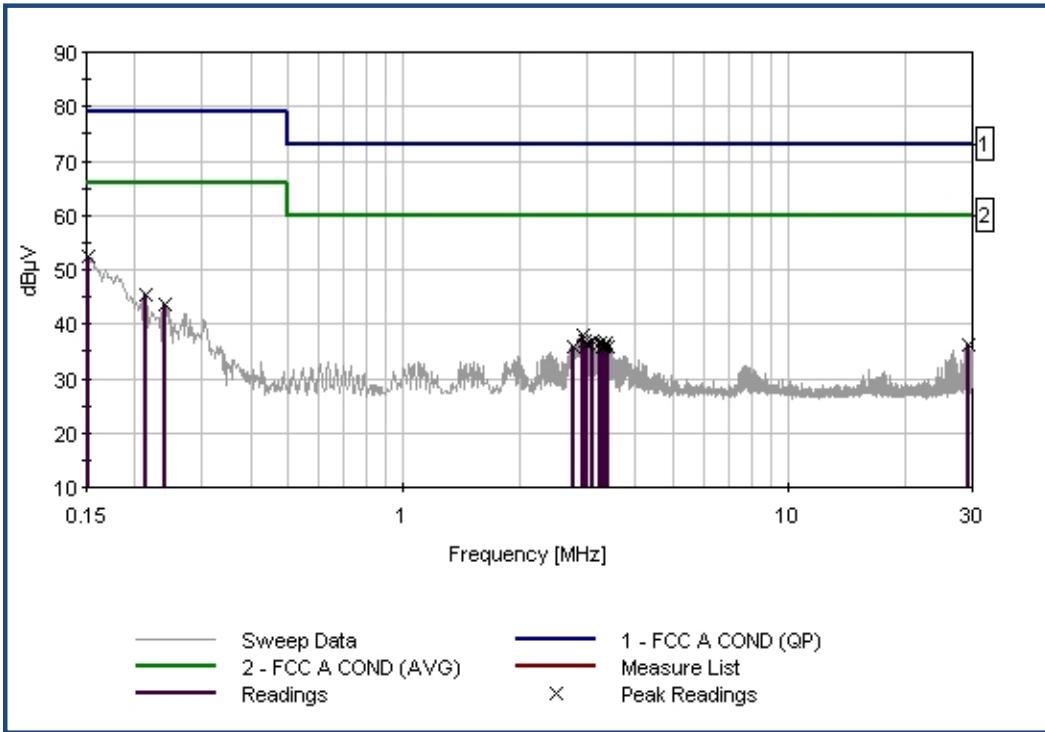


FIGURE 38 - CONDUCTED EMISSIONS PLOT – NEUTRAL 120V (PS1)

## 11.5 MEASUREMENT DATA, LINE 120V (PS1)

No.	Freq (KHz)	Rdng (dBuV)	Corrected (dBuV)	Spec (dBuV)	Margin (dB)	Polarity
1	155.454	41.1	51.2	79.0	-27.8	Line
2	180.906	37.6	47.7	79.0	-31.3	Line
3	209.995	36.2	46.3	79.0	-32.7	Line
4	29.906M	28.1	38.7	73.0	-34.3	Line
5	29.233M	27.9	38.5	73.0	-34.5	Line
6	2.982M	28.0	38.1	73.0	-34.9	Line

## 11.6 MEASUREMENT DATA, NEUTRAL 120V (PS1)

No.	Freq (KHz)	Rdng (dBuV)	Corrected (dBuV)	Spec (dBuV)	Margin (dB)	Polarity
1	151.818	42.3	52.4	79.0	-26.6	Neutral
2	213.631	35.2	45.3	79.0	-33.7	Neutral
3	2.912M	27.8	37.9	73.0	-35.1	Neutral
4	240.901	33.5	43.6	79.0	-35.4	Neutral
5	2.972M	26.8	36.9	73.0	-36.1	Neutral
6	3.093M	26.8	36.9	73.0	-36.1	Neutral

## 11.7 RESULTS PLOT 120V (PS2)

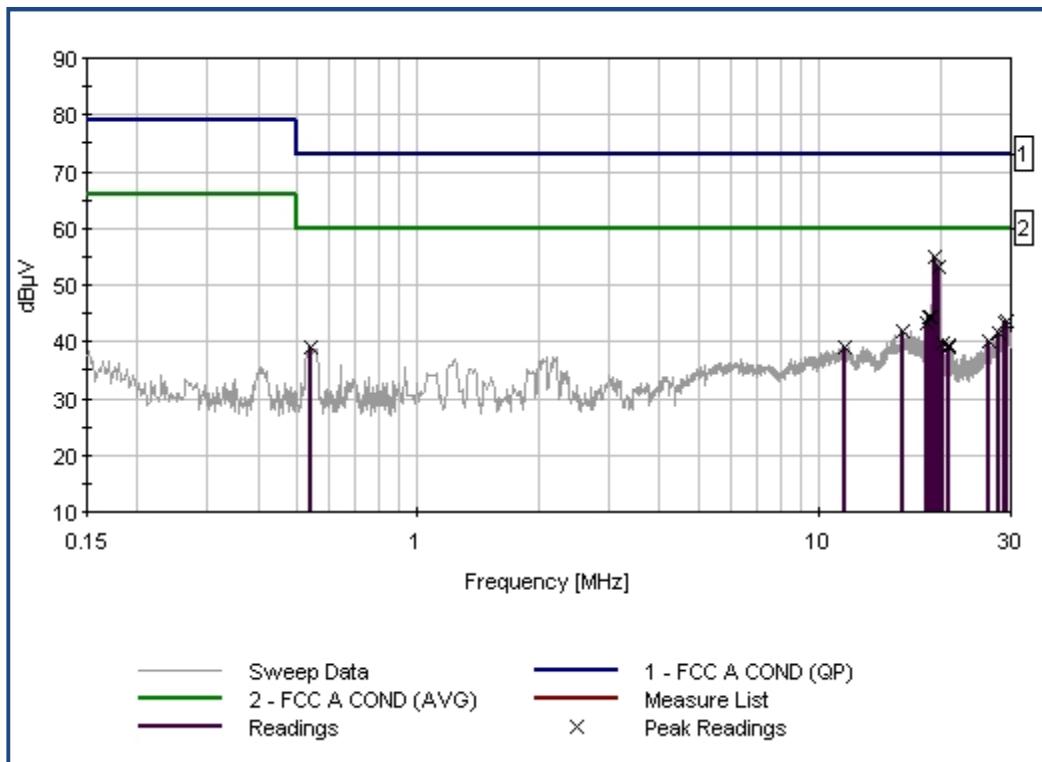


FIGURE 39 - CONDUCTED EMISSIONS PLOT – LINE 120V (PS2)

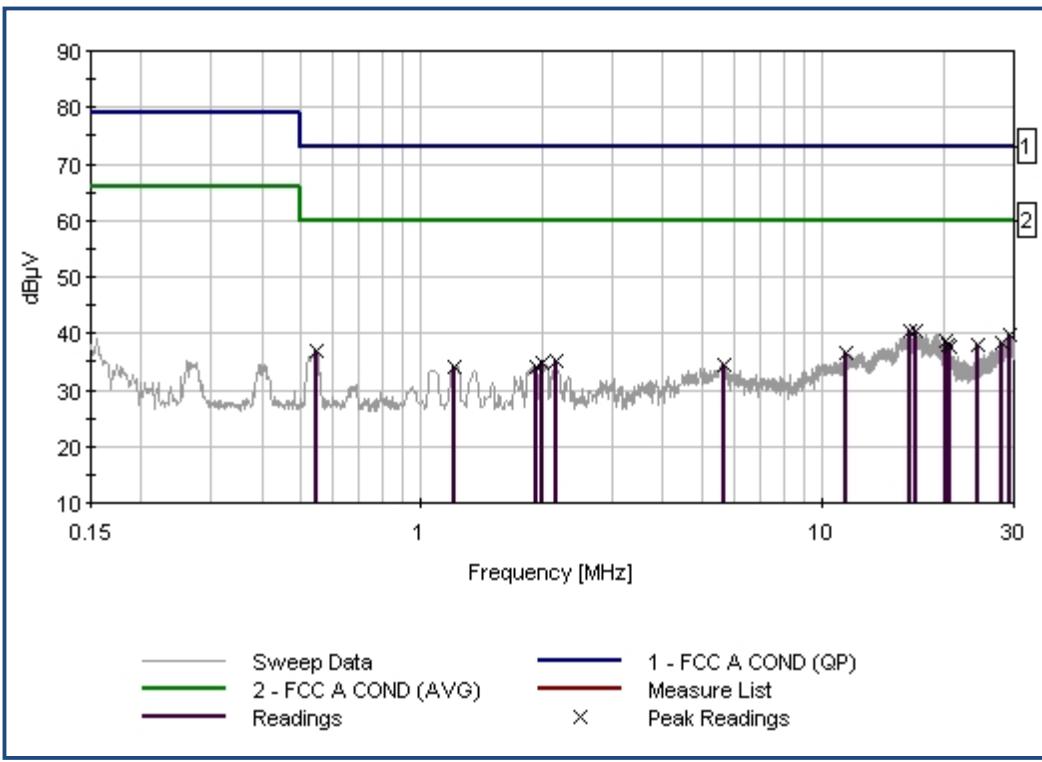


FIGURE 40 - CONDUCTED EMISSIONS PLOT – NEUTRAL 120V (PS2)

### 11.8 MEASUREMENT DATA, LINE 120V (PS2)

No.	Freq (MHz)	Rdng (dBuV)	Corrected (dBuV)	Spec (dBuV)	Margin (dB)	Polarity
1	19.299M	44.9	55.0	73.0	-18.0	Line
2	19.961M	43.2	53.3	73.0	-19.7	Line
3	18.705M	34.4	44.5	73.0	-28.5	Line
4	18.906M	34.1	44.2	73.0	-28.8	Line
5	29.228M	33.1	43.7	73.0	-29.3	Line
6	18.613M	33.0	43.1	73.0	-29.9	Line

### 11.9 MEASUREMENT DATA, NEUTRAL 120V (PS2)

No.	Freq (MHz)	Rdng (dBuV)	Corrected (dBuV)	Spec (dBuV)	Margin (dB)	Polarity
1	17.087M	30.4	40.5	73.0	-32.5	Neutral
2	16.546M	30.2	40.3	73.0	-32.7	Neutral
3	29.233M	29.1	39.7	73.0	-33.3	Neutral
4	20.331M	28.0	38.5	73.0	-34.5	Neutral
5	27.950M	27.7	38.3	73.0	-34.7	Neutral
6	20.561M	27.5	38.0	73.0	-35.0	Neutral

### 11.10 RESULTS PLOT 120V (PS3)

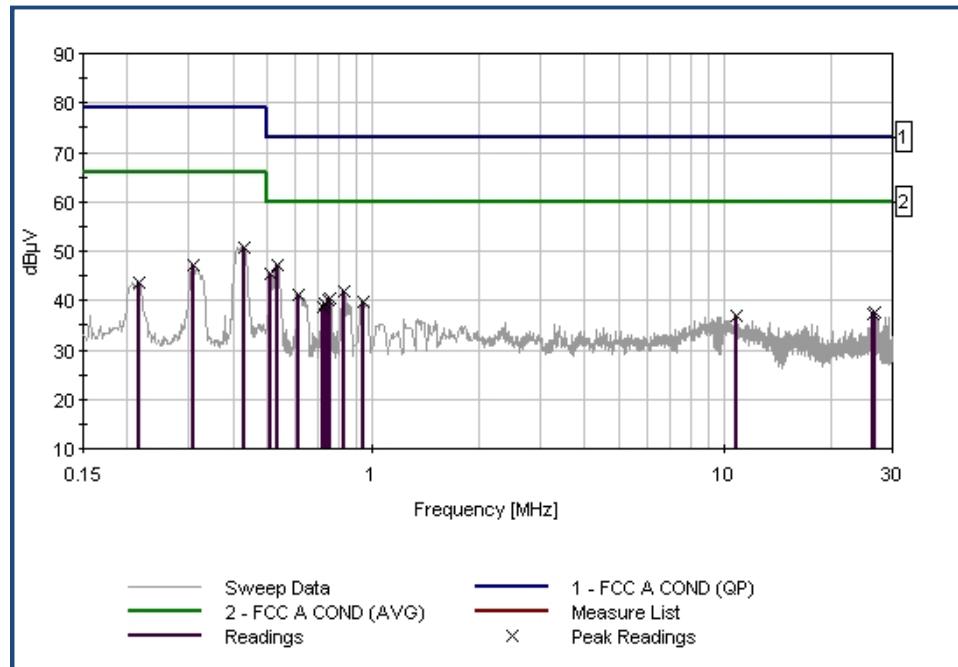


FIGURE 41 - CONDUCTED EMISSIONS PLOT – LINE 120V (PS3)

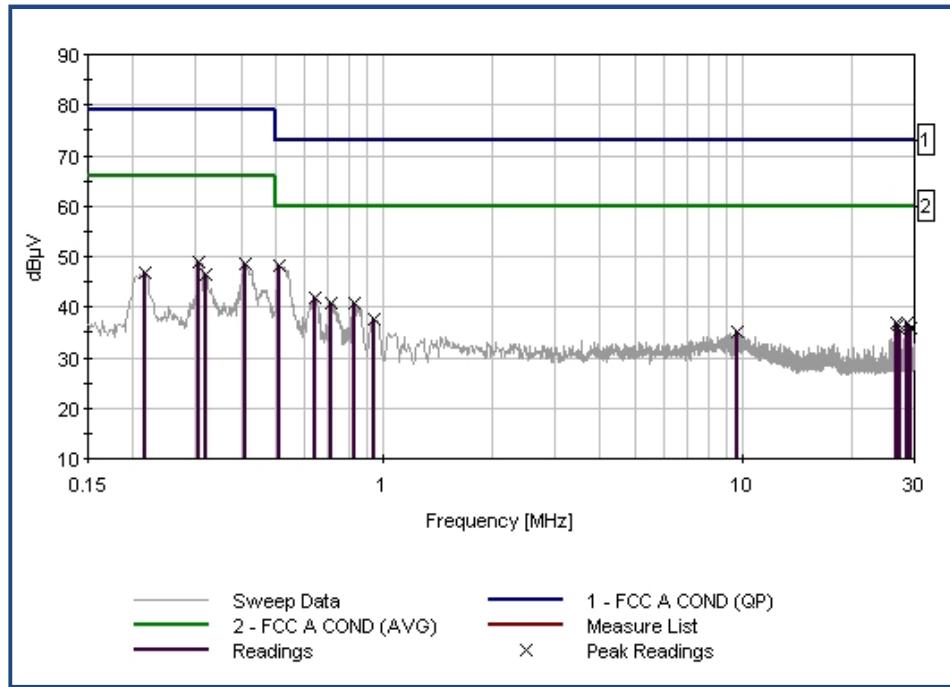


FIGURE 42 - CONDUCTED EMISSIONS PLOT – NEUTRAL 120V (PS3)

## 11.11 MEASUREMENT DATA, LINE 120V (PS3)

No.	Freq (KHz)	Rdng (dBuV)	Corrected (dBuV)	Spec (dBuV)	Margin (dB)	Polarity
1	537.237	37.0	47.1	73.0	-25.9	Line
2	509.967	35.4	45.5	73.0	-27.5	Line
3	431.792	40.7	50.8	79.0	-28.2	Line
4	826.301	31.6	41.7	73.0	-31.3	Line
5	617.230	31.2	41.3	73.0	-31.7	Line
6	308.167	37.1	47.2	79.0	-31.8	Line

## 11.12 MEASUREMENT DATA, NEUTRAL 120V (PS3)

No.	Freq (MHz)	Rdng (dBuV)	Corrected (dBuV)	Spec (dBuV)	Margin (dB)	Polarity
1	511.785k	38.1	48.2	73.0	-24.8	Neutral
2	306.349k	38.9	49.0	79.0	-30.0	Neutral
3	413.612k	38.4	48.5	79.0	-30.5	Neutral
4	642.682k	31.7	41.8	73.0	-31.2	Neutral
5	715.402k	30.8	40.9	73.0	-32.1	Neutral
6	217.267k	36.7	46.8	79.0	-32.2	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	31/10/2013
Com-Power	Loop Antenna	AL-130	ICS100	15/1/2014
Electro Metrics	Hybrid Antenna	EM-3141	9902-1141	07/12/2014
HP	RF Amplifier	11975A	2738A01196	01/03/2014
AH Systems	Horn Antenna	SAS-571	1242	18/11/2013
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 RADIATED EMISSIONS TEST SETUP

