Project 10680-10

Prepared for:

GPS Industries, LLC
1074 N. Orange Ave.
Sarasota, FL 34236

By

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June 3, 2010

CERTIFICATION
Wireless Test Report
Visage VDU
YEY-VISAGE1-2010

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Applicant: GPS Industries, LLC.

Applicant's Address: 1074 N. Orange Ave

Sarasota, FL 34236

FCC ID: YEY-VISAGE1-2010

IC Number: 8998A-VISAGE1-2010

Project Number: 10680-10

Test Dates: April 13-14, 2010 and May 5,7, and 10, 2010

The **GPS Industries, Visage VDU** was tested to and found to be in compliance with FCC 47 CFR Part 15 and IC RSS-210 issue 7.

NOTE: Pre scans of EUT determined that the operating voltage (12 VDC or 48 VDC) did not affect performance.

The highest emissions generated by the above equipment are listed below:

Parameter	Frequency (MHz)	Level		Limit	Margin (dB)
Transmitter: Mains Conducted	Not applicable, battery powered.				
Transmitter: Radiated Spurious	155.982	38.8 dBµV/m @ 3 m		40 dBµV/m	-1.2
Transmitter: Peak Power @ 3 m	2412	24.82 dBm	303.4 mW	+30 dBm	-5.18
Receiver: Mains Conducted	Not applicable, battery powered.				
Receiver: Radiated Spurious	155.98	38.3 dBuV/m		+40 dBµV/m	-1.7

Occupied Bandwidth (B Mode)		
6 dB	**20 dB**	**26 dB**
10.35 MHz	16.45 MHz	17.75 MHz

I, Jason Anderson, for Professional Testing (EMI), Inc., being familiar with the FCC rules and test procedures have reviewed the test setup, measured data and this report. I believe them to be true and accurate.

Jason Anderson
Director of Testing Services

This report has been reviewed and accepted by GPS Industries, LLC. The undersigned is responsible for ensuring that this device will continue to comply with the FCC and IC rules.

1.0 Introduction

1.1 Scope

This report describes the extent of the Equipment Under Test (EUT) conformance to the Intentional Radiator requirements of the USA and Canada.

1.2 EUT Description

The Visage VDU system contains GPRS, GPS, and Wi-Fi capabilities incorporated into an LCD touch screen. The Visage system consists of the main PCB, GPS antenna PCB, GPRS pluggable module, LCD Panel with touch screen, and speaker. The main circuit board includes all the processors and sensors. The main processor consists of a Marvell PXA310 processor that is running Microsoft Windows CE 6.0. The main processor uses external 32 bit wide DDR memory bus running at 133 MHz. The 32 bit NAND flash memory contains the operating systems, boot loader, and key parameters that are required for PXA310 processor and Visage application. The input/output interfaces consist of the wired connectivity and wireless connectivity. The Wi-Fi device will be co-located with GPRS module: FCC ID QIPTC63I.

1.3 EUT Operation

The EUT was tested while in a continuous transmit mode. The EUT was tuned to a low, middle, and high channel to perform power, occupied bandwidth, power spectral density, and harmonic tests. The EUT was tuned to a middle channel to perform spurious tests. The EUT utilized only transmit mode 802.11b while performing these tests. The EUT continuously transmitted at maximum power. The system tested consisted of the following:

Manufacturer	Model	FCC ID Number	IC Identifier
GPS Industries, LLC	Visage VDU	YEY-VISAGE1-2010	8998A-VISAGE1-2010

The following rules apply to the operation of the EUT:

Guidelines	FCC Rules	IC Rules	
	Part 15	RSS-GEN Issue 1	RSS-210 Issue 7
Transmitter Characteristics	15.247	4.1-4.6, 7	2.2, 2.6-2.7, A2.9, A8, A9
Spurious Radiated Power	15.209	4.2, 4.7, 4.8, 6, 7	2.2, 2.6-2.7, A2.9, A8, A9
Power Line Conducted	15.207	4.2, 4.7, 7.2	
Antenna Requirement	15.203	7.1, 7.1.4	

1.4 Test Site

Measurements were made at the PTI semi-anechoic facility designated Site 45 (FCC 459644, IC 3036B-1) in Austin, Texas. This site is registered with the FCC under Section 2.948 and Industry Canada per RS-212 and is subsequently confirmed by laboratory accreditation (NVLAP). The test site is located at 11400 Burnett Rd., Austin, Texas, 78758 while the main office is located at 1601 N. A.W. Grimes Blvd., Suite B, Round Rock, Texas, 78665. Professional Testing (EMI), Inc. (PTI), follows the guidelines of NIST for all uncertainty calculations, estimates and expressions thereof for EMC testing. The procedure of ANSI C63.4:2003 and FCC Public Notice DA 00-705 were utilized for making all emissions measurements.

1.5 Applicable Documents

The data collected for this report are presented entirely in Appendix B.

Document	Title	Release
ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment.	2009
47 CFR	Part 15 – Radio Frequency Devices Subpart C -Intentional Radiators	
FCC Public Notice DA 00-705	Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems	March 30, 2000
RSS-210	Low-power License-exempt Radio communication Devices (All Frequency Bands): Category I Equipment	Issue 7
RSS-Gen	General Requirements and Information for the Certification of Radio communication Equipment	Issue 2

2.0 Power Line Conducted Emissions

EUT is entirely battery operated from either a 12 VDC or 48 VDC battery pack. This test does not apply.

3.0 Peak Output Power

Peak power measurements were made on selected fundamental transmit frequencies of the EUT for the lowest, most center, and highest transmit frequency.

Tests of the fundamental emissions of the EUT also determined the worse case polarization of the device. The emissions of the device were measured with the EUT in three orthogonal axes.

3.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a motorized turntable, which allows 360-degree rotation. For measurements of the fundamental signal, a measurement antenna was positioned at a distance of 1 meter as measured from the closest point of the EUT. Rotating the EUT maximized the emissions.

A spectrum analyzer with peak detection was used to find the maximum field strength during the variability testing. Resolution bandwidth (RBW) is chosen to encompass the entire 6 dB bandwidth of the fundamental signal, up to 3 times the bandwidth if possible. RBW used is recorded. A calculation was then made to determine the peak power at the antenna terminal. A drawing showing the test setup is given in Appendix A.

3.2 Test Criteria

The maximum peak output power is 1 W for devices operating in the frequency range 2400 2483.5 MHz according to FCC 15.247 and RSS-210.

4.0 Occupied Bandwidth

Occupied bandwidth measurements were performed on the EUT to determine compliance with FCC 15.247(a)(2) and RSS-210.

4.1 Test Procedure

The occupied bandwidth was measured with a spectrum analyzer connected to a double-ridged guide horn while the EUT was operating in continuous transmit mode at the appropriate center frequency. The analyzer center frequency was set to the EUT carrier frequency. Display line and marker delta functions were used to measure the occupied bandwidth of the EUT. However, the 20 or 26 dB bandwidth is referenced to a peak power measurement taken at the entire bandwidth or more for RBW, then using 1% RBW for the 20 or 26 dB bandwidth. Measurements were made at three frequencies. A drawing showing the test setup is given in Appendix A.

4.2 Test Criteria

The minimum 6 dB occupied bandwidth for the EUT is 500 kHz as stated in 15.247(a)(2) and RSS-210. The 20 dB bandwidth must be measured and reported for the FCC and the 26 dB bandwidth must be measured and reported for IC.

5.0 Power Spectral Density

Power spectral density measurements were performed on the EUT to determine compliance with FCC 15.247(d) and RSS-210.

5.1 Test Procedure

The fundamental emission of the EUT is maximized and the spectrum analyzer is tuned to the highest point as measured in max-hold with peak detection. The analyzer is then centered on the maximum peak and set with the following parameters: RBW = 3 kHz, VBW > RBW, span = 300 kHz, and sweep time = 100s. The peak level is obtained after the sweep completes. The test setup is included in Appendix A.

5.2 Test Criteria

According to section FCC 15.247(d) and RSS-210 the maximum power spectral density is +8 dBm in any 3 kHz bandwidth.

6.0 Band Edge Spurious Emissions

Band edge spurious emissions measurements were performed on the EUT to determine compliance to FCC 15.247(c) and RSS-210.

6.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a motorized turntable, which allows 360-degree rotation. For measurements of the fundamental signal, a measurement antenna was positioned at a distance of 1 meter as measured from the closest point of the EUT. Rotating the EUT maximized the emissions.

The spectrum analyzer was set for peak detection using a 100 kHz resolution bandwidth. The span is set wide enough to show the band edge and the edge of the emission of the screen. Measurement is made at the band edge using the marker delta method while transmitting on the channels nearest the band edge to determine if the EUT meets the test criteria. The test setup is included in Appendix A.

6.2 Test Criteria

According to FCC 15.247(c) and RSS-210 the band edge spurious emissions must be 20 dB below the highest peak in the operating band in any 100 kHz bandwidth. If the frequency falls in the restricted bands of 15.205 the maximum permitted average must be below the field strength listed in 15.209.

Alternatively, the band edge spurious emissions will meet criteria if they are attenuated below the limits specified in FCC 15.209 or RSS-210 Table 3.

7.0 Out of Band Spurious Emissions

Out of band spurious/harmonic emissions measurements were performed on the EUT to determine compliance to FCC sections 15.247(c), 15.209 and RSS-210.

7.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a rotating turntable at a distance of 10 meters from the measurement antenna.

For spurious emissions below 1 GHz quasi-peak detection is used with a resolution bandwidth of 120 kHz. All measurements below 1 GHz were normalized to 3 meters using a 20 dB/decade distance extrapolation. The emissions were maximized by rotating the EUT and raising and lowering the measurement antenna from 1-4 meters. The test setup is included in Appendix A.

Spurious/harmonic emissions above 1 GHz peak are measured with average and peak detection with a resolution bandwidth of 1 MHz and measured at a distance of 1 meter. Average detection is used to determine compliance of the EUT if the peak does not meet the average limit. Non-harmonic emissions must satisfy the average limit and the peak limit (20 dB above average). The test setup is included in Appendix A.

Above 1 GHz testing was completed at 3 transmit frequencies to determine compliance.

7.2 Test Criteria

The radiated limits of FCC 15.209 and RSS-210 are shown below. The limits specified are at 3 meters. The limits are quasi-peak for emissions below 1 GHz and average for emissions above 1 GHz. Also above 1 GHz the peak limit is 20 dB above the average limit.

Frequency MHz	Test Distance (Meters)	Field Strength (µV/m)	(dBµV/m)
30 to 88	3	100	40.0
88 to 216	3	150	43.5
216 to 960	3	200	46.0
Above 960	3	500	54.0

8.0 Antenna Requirements

An antenna evaluation was performed on the EUT to determine compliance with FCC sections 15.203, 15.247(b) and RSS-210.

8.1 Evaluation Procedure

The design of the EUT antenna is evaluated for conformance to engineering requirements for gain and to prevent substitution of unapproved antennae. Gain of the antenna is assessed by reviewing the antenna manufacturer's data sheet.

8.2 Evaluation Criteria

The antenna design must meet at least one of the following criteria:

a) Antenna is permanently attached to the unit.
b) Antenna must use a unique type of connector to attach to the EUT.
c) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

Section 15.247(b)(4)(i) states that if the transmitting antenna has a directional gain greater than 6 dBi the power shall be reduced the amount in dB that the directional gain is greater than 6 dBi.

9.0 Modifications

N/A

10.0 Test Equipment

A list of the test equipment utilized to perform the testing is given below. The date of calibration is given for each.

Radiated Test Equipment

Asset #	Manufacturer	Model #	Description	Calibration Due
0275	HP	85650A	Quasi-peak Adapter (high band)	July 8, 2010
1273	HP	85662A	Spectrum Analyzer Display (high band)	NCR
0950	HP	8566B	Spectrum Analyzer (high band)	July 7, 2010
0238	HP	85685A	RF Preselector (high band)	July 16, 2010
0085	HP	85650A	Quasi-peak Adapter (low band)	July 16, 2010
1629	HP	85662A	Spectrum Analyzer Display (low band)	NCR
1145	HP	8568B	Spectrum Analyzer (low band)	July 16, 2010
1035	HP	85685A	RF Preselector (low band)	March 3, 2011
1414	HP	8447D	RF Preamplifier	June 22, 2010
1497	Emco	3108	Biconical Antenna	May 16, 2010
1486	Emco	3147	Log Periodic Dipole Array Antenna	May 16, 2010
C026	none	none	Coaxial Cable (low band)	July 27, 2010
C027	none	none	Coaxial Cable (high band)	July 27, 2010

Microwave Radiated Test Equipment

Asset #	Manufacturer	Model #	Description	Calibration Due
0267	EMCO	3115	Ridge Guide Antenna	October 19, 2010
1529	Miteq	Antenna Mounted	Microwave Preamplifier (preamp 1)	July 17, 2010
0084	HP	8566B	Spectrum Analyzer	April 5, 2011
1273	HP	85662A	Spectrum Analyzer Display	NCR
1530	Miteq	None	Microwave Preamplifier (preamp 2)	July 17, 2010
C030	None	None	Coaxial Cable (MRE band)	July 27, 2010

Asset #	Manufacturer	Model #	Description	Calibration Due
XXXX	Pasternack	LLS	2 sections, total 12ft	NCR
0582	EMCO	3115	Ridge Guide Antenna	October 19, 2010
1594	Miteq	AFS44-00102650	Microwave Preamplifier (preamp 1)	March 2, 2011
1342	Rohde & Schwarz	ESMI	EMI Test Receiver	December 4, 2010
1343	Rohde & Schwarz	ESMI	EMI Test Receiver Display	December 4, 2010

Appendix A Test Setup Diagrams

FIGURE 1: Conducted Emissions Test Setup

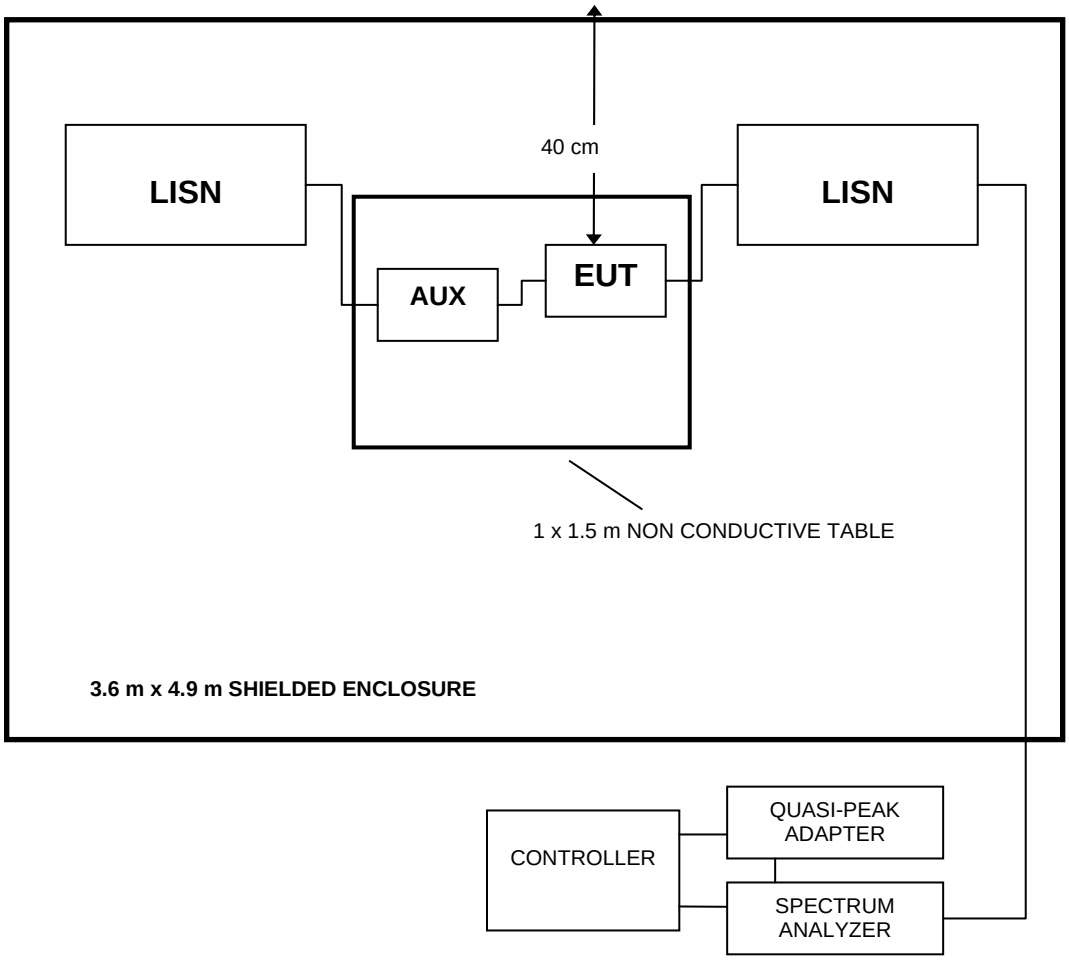
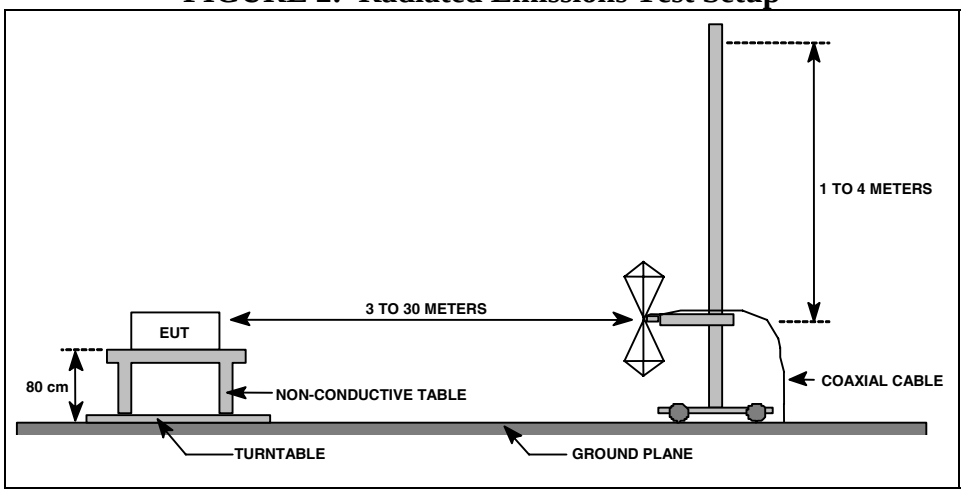


FIGURE 2: Radiated Emissions Test Setup



Appendix B Test Results

Peak Power Data Sheet

PROJECT #	DATE	RULE	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	May 5, 2010	15.247	3m	Horn	1 MHz	1 MHz	Peak

COMMENT	Transmitting B Mode

Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)
2412	131	1	69.3	0.0	28.7	4.0	102.0
2437	135	1	66.4	0.0	28.8	4.0	99.2
2462	128	1	66.4	0.0	28.9	4.0	99.3

COMMENT	Transmitting Carrier Only

Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)
2412	126	1	77.2	0.0	28.7	4.0	109.9
2437	124	1	75	0.0	28.8	4.0	107.8
2462	127	1	75.6	0.0	28.9	4.0	108.5

Calculations

$$P = \frac{(E * d)^2}{30 * G}$$

P=Power in watts, E=measured maximum field strength in V/m, d=distance in meters, G=numeric gain of transmitting antenna

Distance=3 meters
Gain=0 dBi

Calculated Result
B Mode

Frequency (MHz)	Field Strength (dBµV)	E.I.R.P.		Limit (dBm)
		dBm	mW	
2412	102.0	16.92	49.2	30
2437	99.2	14.12	25.8	30
2462	99.3	14.22	26.4	30

Calculated Result
Carrier Only

Frequency (MHz)	Field Strength (dBµV)	E.I.R.P.		Limit (dBm)
		dBm	mW	
2412	109.9	24.82	303.4	30
2437	107.8	22.72	187.1	30
2462	108.5	23.42	219.8	30

NOTE: Used Method 3 of option 2 from "Measurement of Digital Transmission Systems Operating under Section 15.247" dated March 23, 2005.

Computed power by applying a bandwidth correction factor of 10 log (EBW/1 MHz) to the spectral peak of the emission.

10 log (10.35 MHz / 1 MHz) = 10.15

10.15 was added to the measured value to compute real power in mW.

Power Spectral Density

PROJECT #	DATE	RULE	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	May 5, 2010	15.247	3 m	Horn	3 kHz	300 kHz	Peak

COMMENT	Transmitting B Mode

Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)
2412	191	1	44.1	0.0	28.7	4.0	76.8
2437	120	1	48.3	0.0	28.8	4.0	81.1
2462	122	1	44.5	0.0	28.9	4.0	77.4

Calculations

$$P = \frac{(E * d)^2}{30 * G}$$

P=Power in watts, E=measured maximum field strength in V/m, d=distance in meters, G=numeric gain of transmitting antenna

Distance=1 meters
Gain=0 dBi

Calculated Result
B Mode

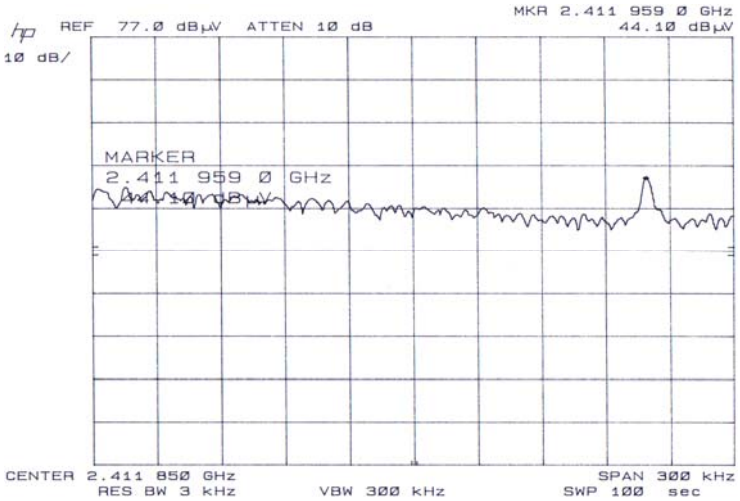
Frequency (MHz)	Field Strength (dBµV / 3 kHz)	E.I.R.P (dBm / 3 kHz)	Limit (dBm / 3 kHz)
2412	76.8	-18.43	8
2437	81.1	-14.13	8
2462	77.4	-17.83	8

Plots of PSD measurements are presented on the following pages.

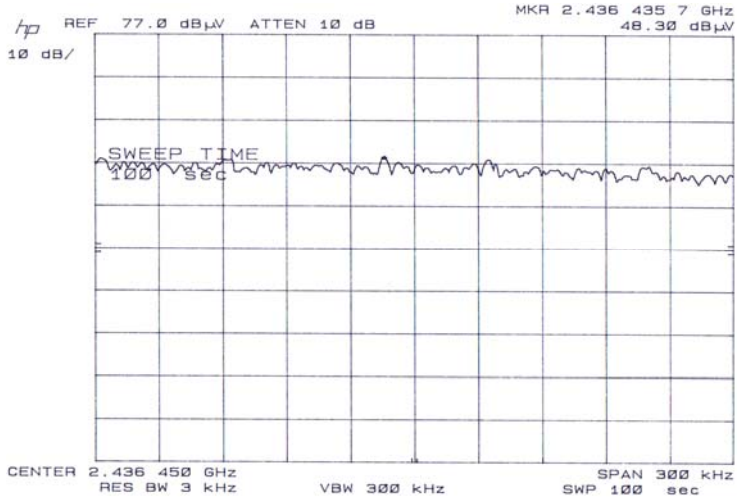
Power Spectral Density Data Sheet

PROJECT #	DATE	RULE	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	May 5, 2010	15.247	3m	Horn	3 kHz	300 kHz	Peak

Low Channel B Mode



Middle Channel B Mode

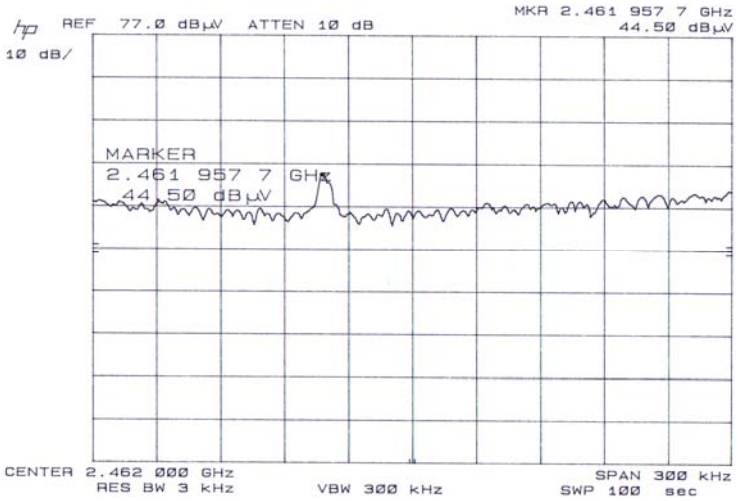


Result = Pass

Power Spectral Density Data Sheet

PROJECT #	DATE	RULE	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	May 5, 2010	15.247	3m	Horn	3 kHz	300 kHz	Peak

High Channel B Mode



Result = Pass

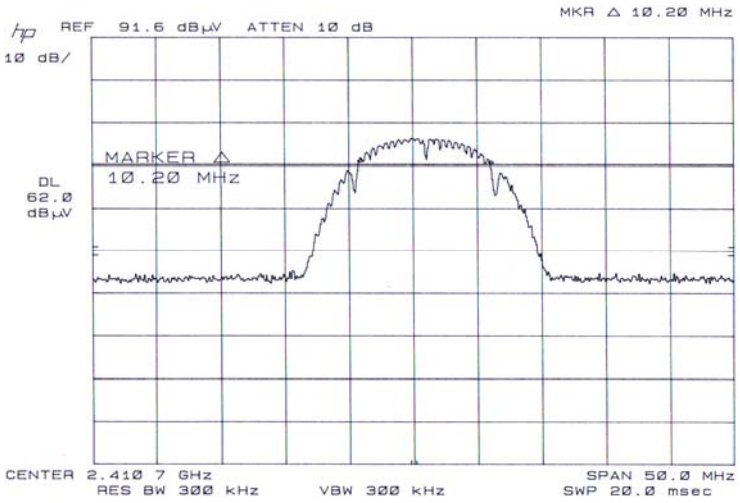
Occupied Bandwidth Data Sheet

PROJECT #	DATE	RULE	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	May 5, 2010	15.247	3m	Horn	300 kHz	300 kHz	Peak

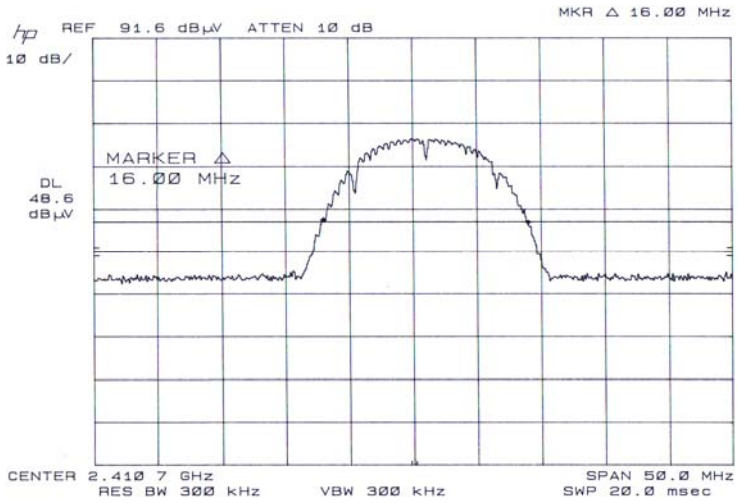
COMMENT	Transmitting 6 dB Bandwidth – 10.20 MHz 20 dB Bandwidth – 16.00 MHz 26 dB Bandwidth – 17.45 MHz

Low Channel B Mode

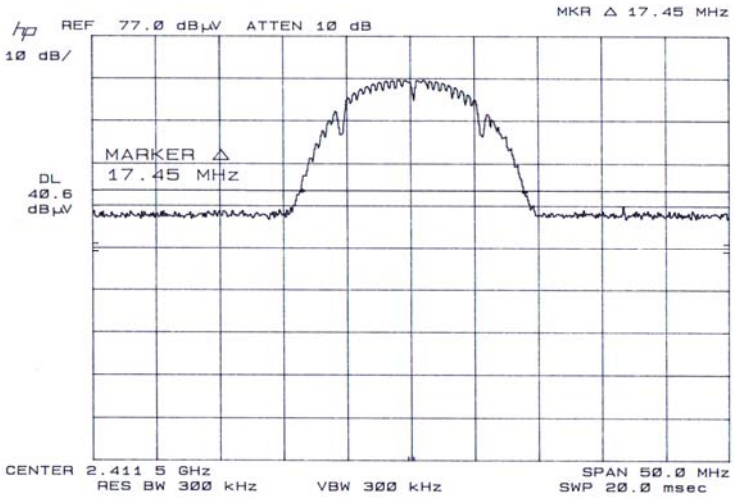
6 dB



20 dB



26 dB



Result = Pass

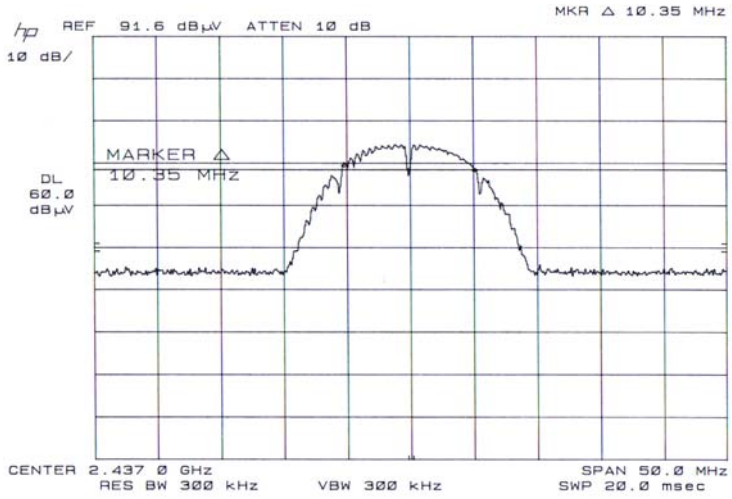
Occupied Bandwidth Data Sheet

PROJECT #	DATE	RULE	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	August 6, 2009	15.247	3m	Horn	300 kHz	300 kHz	Peak

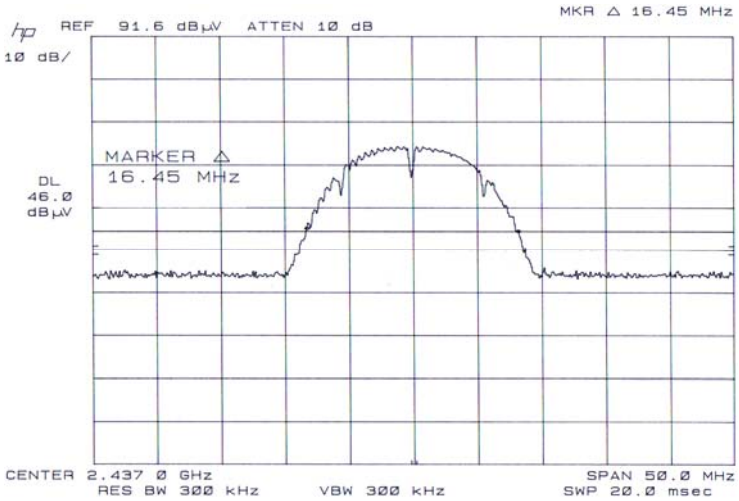
COMMENT	Transmitting 6 dB Bandwidth – 10.35 MHz 20 dB Bandwidth –16.45 MHz 26 dB Bandwidth – 17.75 MHz

Middle Channel B Mode

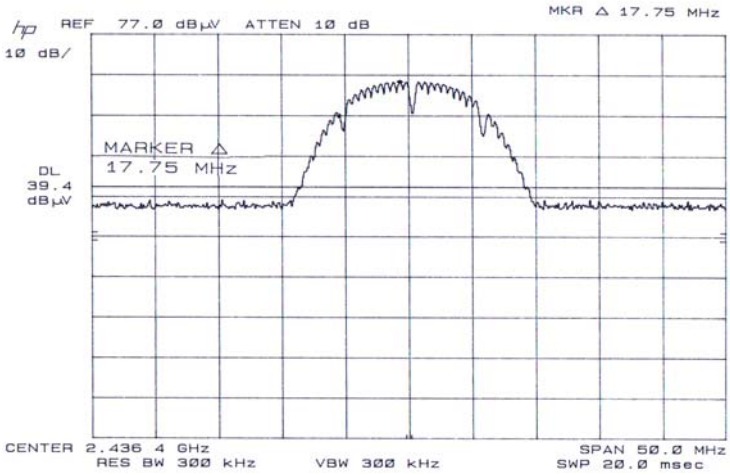
6 dB



20 dB



26 dB



Result = Pass

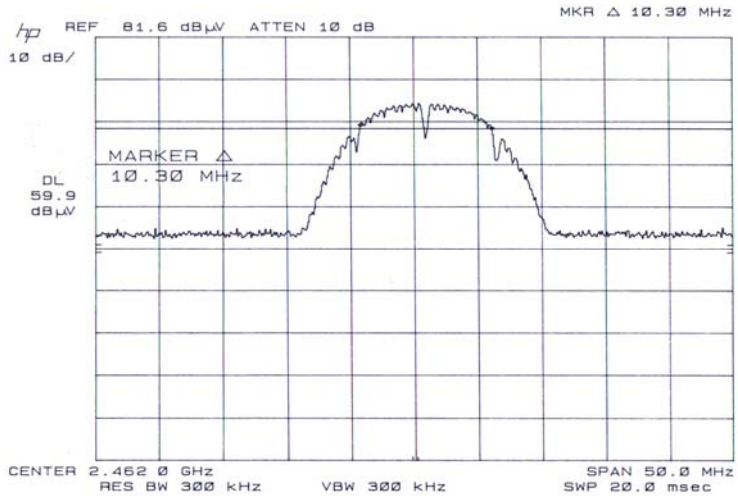
Occupied Bandwidth Data Sheet

PROJECT #	DATE	RULE	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	August 6, 2009	15.247	3m	Horn	300 kHz	300 kHz	Peak

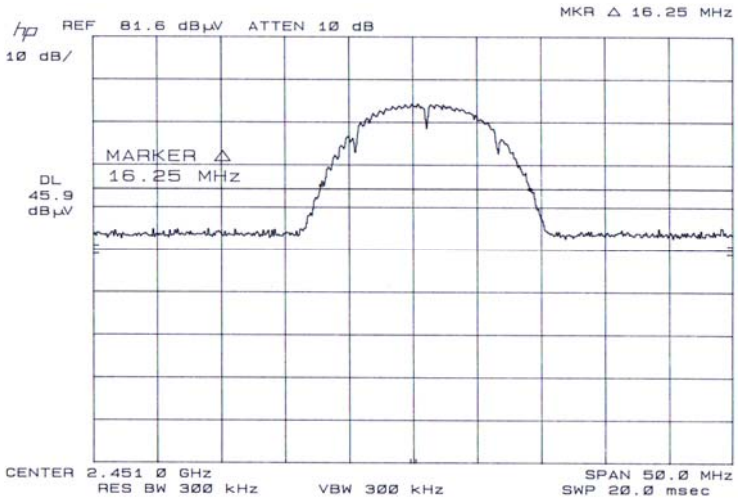
COMMENT	Transmitting 6 dB Bandwidth – 10.30 MHz 20 dB Bandwidth –16.25 MHz 26 dB Bandwidth – 17.55 MHz

High Channel B Mode

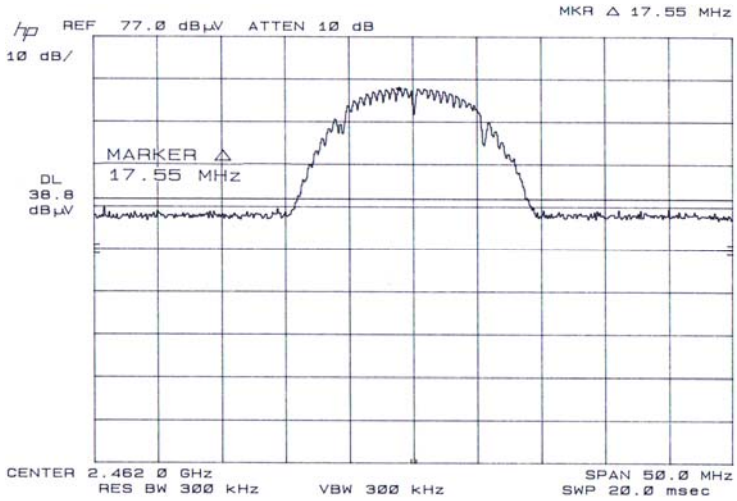
6 dB



20 dB



26 dB



Result = Pass

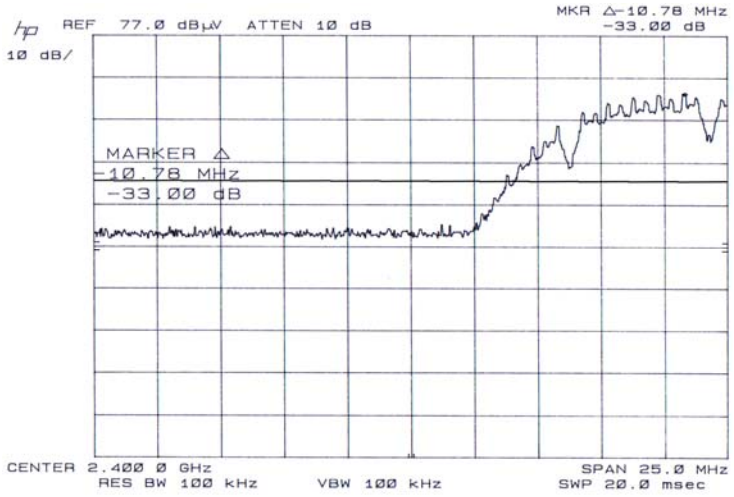
Band Edge Spurious Emissions Data Sheet

PROJECT #	DATE	RULE	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	May 5, 2010	15.247	3m	Horn	100 kHz	100 kHz	Peak

COMMENT	Transmitting B Mode No spurs existed at the band edges by inspection of graphs

Frequency (MHz)	Recorded Level (dB)	Limit (dB) down from fundamental	Margin (dB)	Transmit Mode	Detector Function
2400	-33.00	-20.0	-13.00	B	Peak

Band Edge Low B Mode



Result = Pass

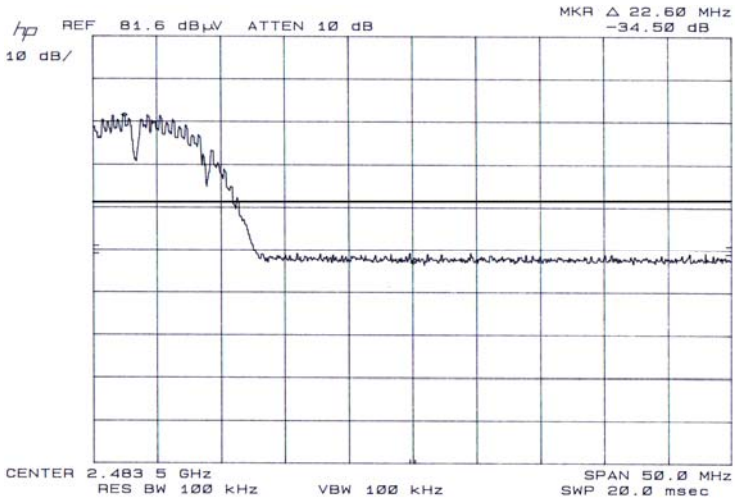
Band Edge Spurious Emissions Data Sheet

PROJECT #	DATE	RULE	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	May 5, 2010	15.247	3m	Horn	100 kHz	100 kHz	Peak

COMMENT	Transmitting No spurs existed at the band edges by inspection of graphs

Frequency (MHz)	Recorded Level (dB)	Limit (dB) down from fundamental	Margin (dB)	Transmit Mode	Detector Function
2483.5	-34.5	-20.0	-14.5	B	Peak

Band Edge High B Mode



Result = Pass

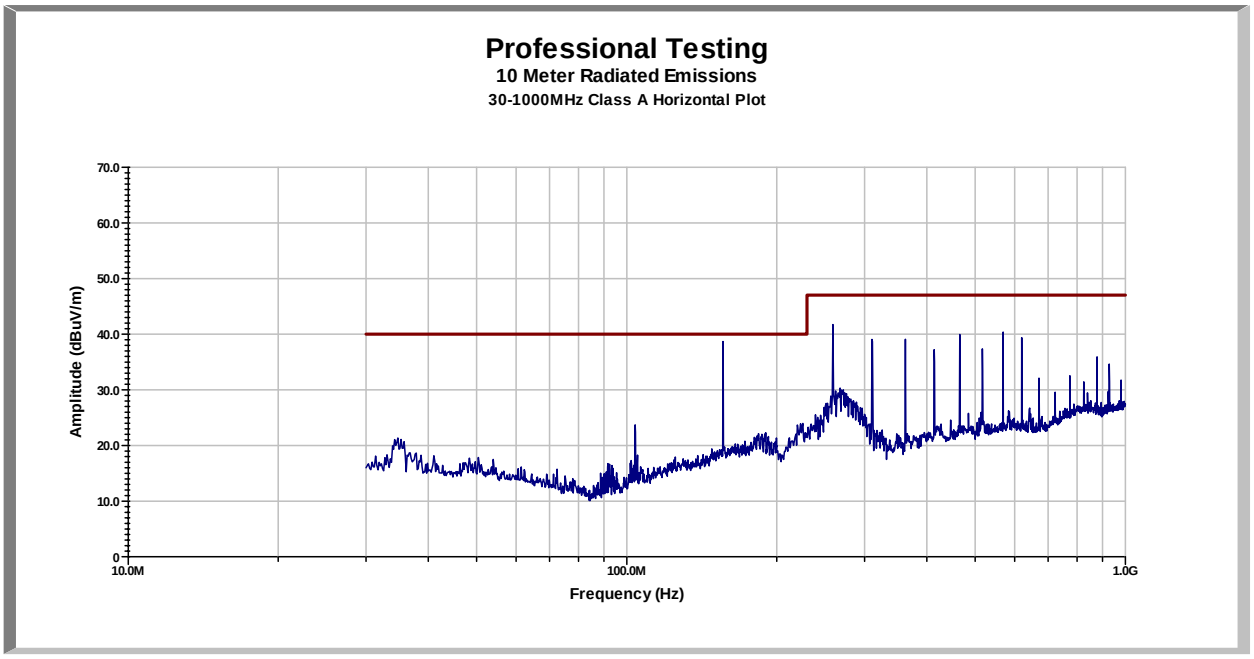
Spurious Radiated Emissions Data Sheet
Emissions 30 MHz … 1 GHz

PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	April 14, 2010	FCC A	10 m	Bicon | Log	CISPR 120 kHz	1 MHz	Quasi Peak

COMMENT	Transmitting B Mode

Horizontal

Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)	Limit (dBµV /m)	Margin (dB)	Detector
155.982	298	4	50.6	25.921	12.3	1.4	38.4	40	-1.6	QP
259.95	252	4	57.9	31.2	12.9	2.3	41.9	47	-5.1	QP
363.94	58	2.5	52.9	31.1	15.1	2.8	39.8	47	-7.2	QP
467.939	324	4	38.8	31.0	18.8	3.3	29.9	47	-17.1	QP
519.918	288	4	41.3	31.1	19.1	3.5	32.8	47	-14.2	QP



Result = Pass

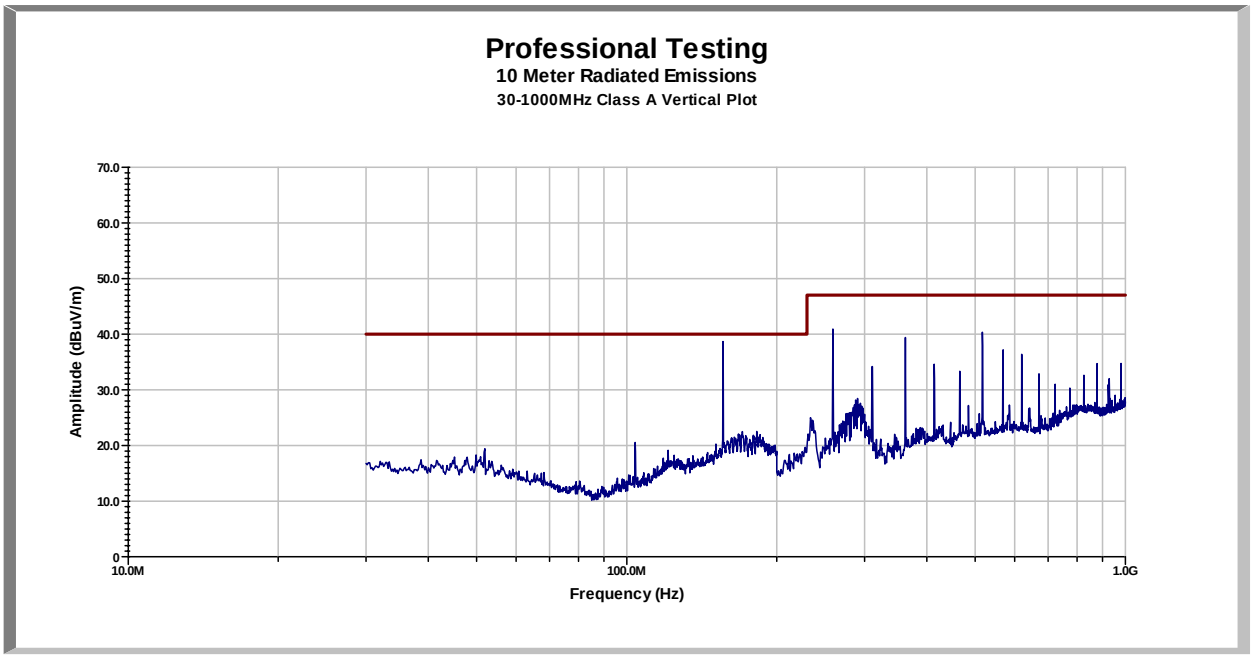
Spurious Radiated Emissions Data Sheet
Emissions 30 MHz … 1 GHz

PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	April 14, 2010	FCC A	10 m	Bicon | Log	CISPR 120 kHz	1 MHz	Quasi Peak

COMMENT	Transmitting B Mode

Vertical

Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)	Limit (dBµV /m)	Margin (dB)	Detector
155.982	289	1	51	25.9	12.3	1.4	38.8	40	-1.2	QP
259.95	173	1	57.1	31.2	12.9	2.3	41.1	47	-5.9	QP
363.94	28	1	50.3	31.1	15.1	2.8	37.2	47	-9.8	QP
467.939	320	3.9	41.7	31.0	18.8	3.3	32.8	47	-14.2	QP
519.928	16	3.4	48.6	31.1	19.1	3.5	40.1	47	-6.9	QP



Result = Pass

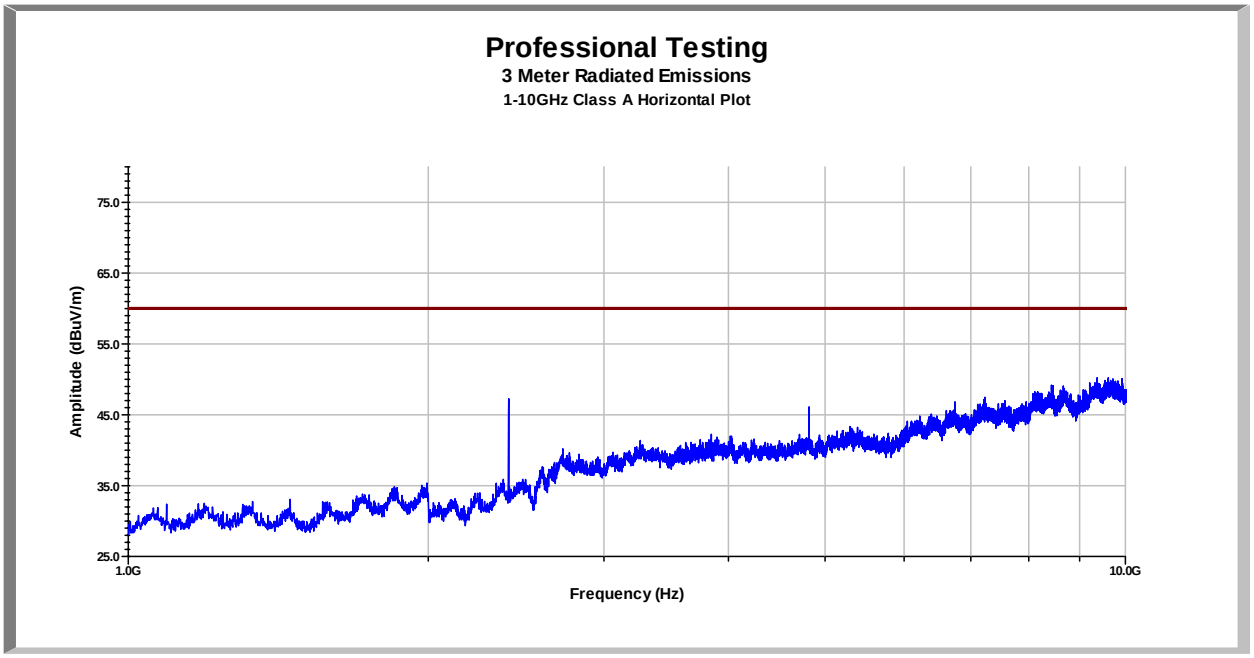
Spurious Radiated Emissions Data Sheet
1 GHz…10 GHz

PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	April 14, 2010	FCC A	3 m	Horn	1 MHz	1 MHz	Average

COMMENT	Transmit Mode B

Horizontal

Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)	Limit (dBµV /m)	Margin (dB)	Detector
4823	121	1	57.1	54.2	32.7	5.3	40.9	60	-19.1	Avg



Result = Pass

Spurious Radiated Emissions Data Sheet

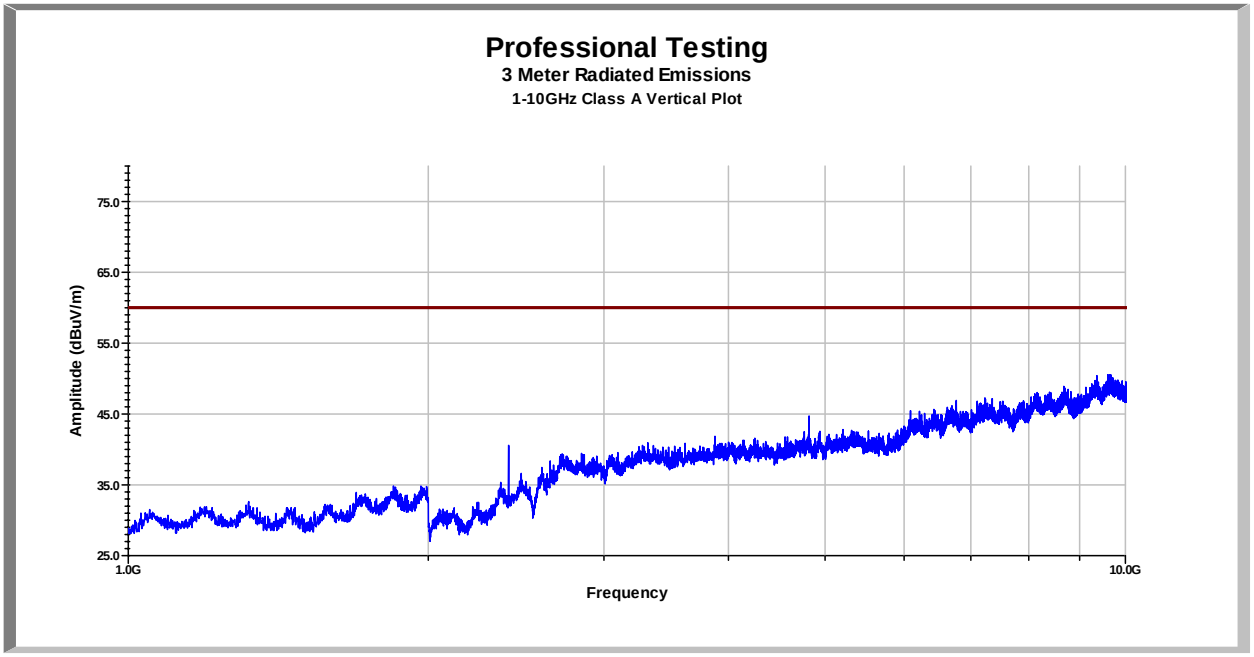
1 GHz…10 GHz

PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	April 14, 2010	FCC A	3 m	Horn	1 MHz	1 MHz	Average

COMMENT	Transmit Mode B

Vertical

Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)	Limit (dBµV /m)	Margin (dB)	Detector
4823	86	1	53.2	54.2	32.7	5.3	37.0	60	-23.0	Avg



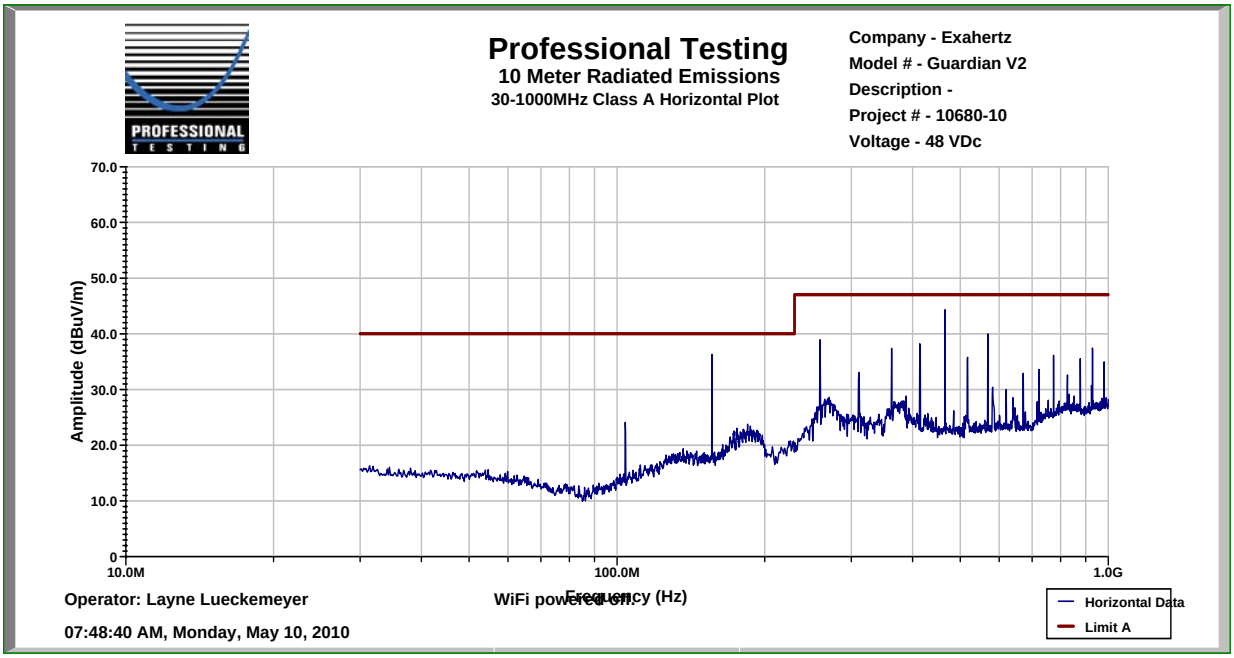
Result = Pass

Spurious Radiated Emissions Data Sheet
Emissions 30 MHz … 1 GHz

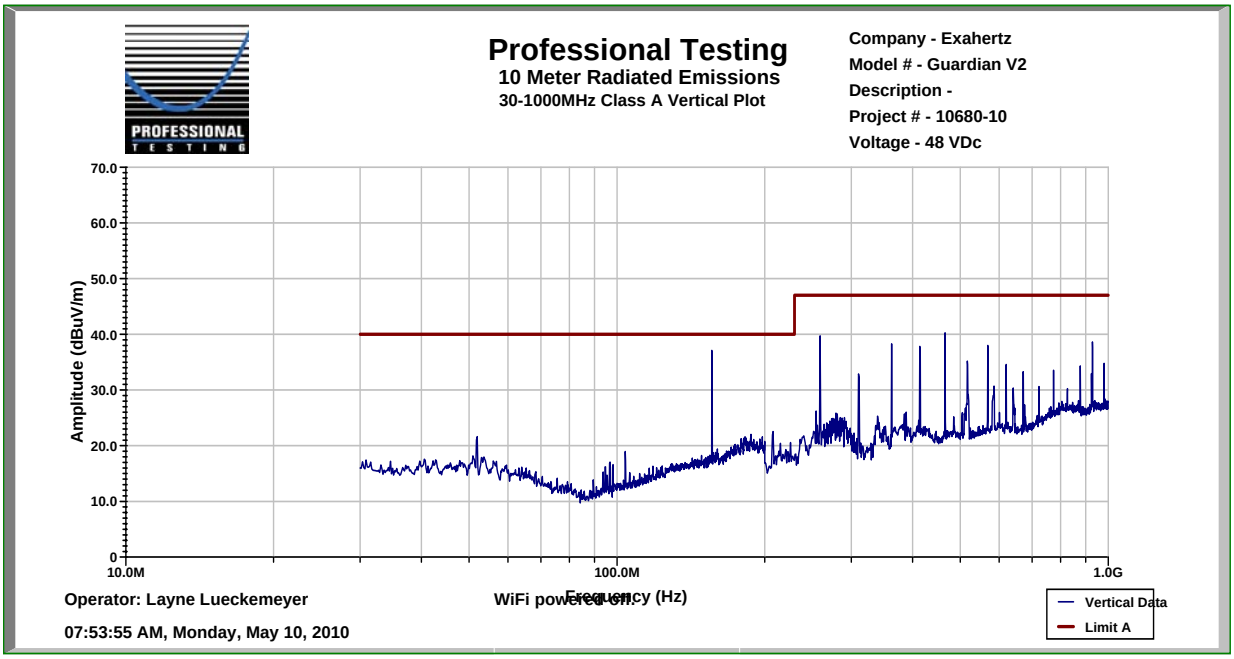
PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	May 10, 2010	FCC A	10 m	Bicon | Log	CISPR 120 kHz	1 MHz	Quasi Peak

COMMENT	WiFi Powered Off **NOTE**: Spurious Radiated Emissions Scans were performed with Wi-Fi unit completely powered off to ensure that no Class A emissions from the Wi-Fi unit were evident. Data was then compared with plots taken with transmitter on and in Receive mode.

Horizontal



Vertical



Spurious/Harmonic Emissions
1 GHz … 25 GHz

PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	May 7, 2010	FCC A	1 m	Horn	1 MHz	1 MHz	Peak

COMMENT	Transmitting Low Channel Harmonics and spurious investigated up to 24.12 GHz.

Horizontal

Frequency (GHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)	Limit (dBµV /m)	Margin (dB)	Detector Function
4.824	Max	1	43.71	41.7	33.5	4.2	39.8	63.5	-23.7	Peak
7.236	noise	floor	31.18	42.5	36.8	5.1	30.6	63.5	-32.9	Peak
9.648	noise	floor	32.63	39.0	38.2	4.7	36.5	63.5	-27.0	Peak
12.06	noise	floor	33.49	35.4	40.3	7.1	45.5	63.5	-18.0	Peak
14.472	noise	floor	37.4	39.7	42.0	7.7	47.4	63.5	-16.1	Peak
16.884	noise	floor	30.04	40.8	41.0	7.6	37.9	63.5	-25.6	Peak
19.296	noise	floor	31.74	43.2	36.6	8.8	33.9	63.5	-29.6	Peak
21.708	noise	floor	29.61	41.8	36.9	9.5	34.2	63.5	-29.3	Peak
24.12	noise	floor	31.31	42.7	37.1	10.3	36.1	63.5	-27.4	Peak

Vertical

Frequency (GHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)	Limit (dBµV /m)	Margin (dB)	Detector Function
4.824	Max	1	38.29	41.7	33.5	4.2	34.4	63.5	-29.1	Peak
7.236	noise	floor	30.77	42.5	36.8	5.1	30.2	63.5	-33.3	Peak
9.648	noise	floor	32.96	39.0	38.2	4.7	36.8	63.5	-26.7	Peak
12.06	noise	floor	34.58	35.4	40.3	7.1	46.6	63.5	-16.9	Peak
14.472	noise	floor	34.33	39.7	42.0	7.7	44.3	63.5	-19.2	Peak
16.884	noise	floor	29.48	40.8	41.0	7.6	37.3	63.5	-26.2	Peak
19.296	noise	floor	30.21	43.2	36.6	8.8	32.4	63.5	-31.1	Peak
21.708	noise	floor	29.5	41.8	36.9	9.5	34.1	63.5	-29.4	Peak
24.12	noise	floor	31.03	42.7	37.1	10.3	35.8	63.5	-27.7	Peak

Result = Pass

Spurious/Harmonic Emissions
1 GHz … 25 GHz

PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	May 7, 2010	FCC A	1 m	Horn	1 MHz	1 MHz	Peak

COMMENT	Transmitting Middle Channel Harmonics and spurious investigated up to 24.37 GHz.

Horizontal

Frequency (GHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)	Limit (dBµV /m)	Margin (dB)	Detector Function
4.874	max	1	41.59	41.7	33.5	4.2	37.7	63.5	-25.8	Peak
7.311	noise	floor	30.77	42.5	36.8	5.1	30.2	63.5	-33.3	Peak
9.748	noise	floor	34.38	39.0	38.2	4.7	38.3	63.5	-25.2	Peak
12.185	noise	floor	33.16	35.5	39.5	5.6	42.7	63.5	-20.8	Peak
14.622	noise	floor	31.18	39.6	41.4	6.1	39.2	63.5	-24.3	Peak
17.059	noise	floor	32.27	42.2	42.7	7.6	40.3	63.5	-23.2	Peak
19.496	noise	floor	33.21	43.7	36.5	8.8	34.8	63.5	-28.7	Peak
21.933	noise	floor	32.88	40.6	36.9	10.4	39.5	63.5	-24.0	Peak
24.37	noise	floor	30.62	42.3	37.2	10.3	35.8	63.5	-27.7	Peak

Vertical

Frequency (GHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)	Limit (dBµV /m)	Margin (dB)	Detector Function
4.874	max	1	39.97	41.7	33.5	4.2	36.1	63.5	-27.4	Peak
7.311	noise	floor	31.41	42.5	36.8	5.1	30.8	63.5	-32.7	Peak
9.748	noise	floor	34.46	39.0	38.2	4.7	38.3	63.5	-25.2	Peak
12.185	noise	floor	32.25	35.5	39.5	5.6	41.8	63.5	-21.7	Peak
14.622	noise	floor	31.31	39.6	41.4	6.1	39.3	63.5	-24.2	Peak
17.059	noise	floor	33.06	42.2	42.7	7.6	41.1	63.5	-22.4	Peak
19.496	noise	floor	31.51	43.7	36.5	8.8	33.1	63.5	-30.4	Peak
21.933	noise	floor	30.39	40.6	36.9	10.4	37.1	63.5	-26.4	Peak
24.37	noise	floor	32.12	42.3	37.2	10.3	37.3	63.5	-26.2	Peak

Result = Pass

Spurious/Harmonic Emissions
1 GHz … 25 GHz

PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	May 7, 2010	FCC A	1 m	Horn	1 MHz	1 MHz	Peak

COMMENT	Transmitting High Channel Harmonics and spurious investigated up to 24.62 GHz.

Horizontal

Frequency (GHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)	Limit (dBµV /m)	Margin (dB)	Detector Function
4.924	max	1	48.52	41.7	33.5	4.2	44.6	63.5	-18.9	Peak
7.386	noise	floor	29.68	42.6	37.3	4.5	28.8	63.5	-34.7	Peak
9.848	noise	floor	33.03	38.9	38.2	5.0	37.3	63.5	-26.2	Peak
12.31	noise	floor	32.91	35.6	39.5	5.6	42.4	63.5	-21.1	Peak
14.772	noise	floor	33.77	39.3	41.1	7.3	42.8	63.5	-20.7	Peak
17.234	noise	floor	32.22	41.4	43.8	8.4	43.0	63.5	-20.5	Peak
19.696	noise	floor	31.21	43.5	36.5	6.8	31.0	63.5	-32.5	Peak
22.158	noise	floor	30.47	40.5	37.0	9.2	36.2	63.5	-27.3	Peak
24.62	noise	floor	31.99	42.1	37.2	9.8	36.8	63.5	-26.7	Peak

Vertical

Frequency (GHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)	Limit (dBµV /m)	Margin (dB)	Detector Function
4.924	max	1	42.05	41.7	33.5	4.2	38.2	63.5	-25.3	Peak
7.386	noise	floor	29.71	42.6	37.3	4.5	28.9	63.5	-34.6	Peak
9.848	noise	floor	35.06	38.9	38.2	5.0	39.3	63.5	-24.2	Peak
12.31	noise	floor	33.24	35.6	39.5	5.6	42.7	63.5	-20.8	Peak
14.772	noise	floor	31.69	39.3	41.1	7.3	40.8	63.5	-22.7	Peak
17.234	noise	floor	32.5	41.4	43.8	8.4	43.3	63.5	-20.2	Peak
19.696	noise	floor	32.45	43.5	36.5	6.8	32.2	63.5	-31.3	Peak
22.158	noise	floor	32.63	40.5	37.0	9.2	38.3	63.5	-25.2	Peak
24.62	noise	floor	30.09	42.1	37.2	9.8	34.9	63.5	-28.6	Peak

Result = Pass

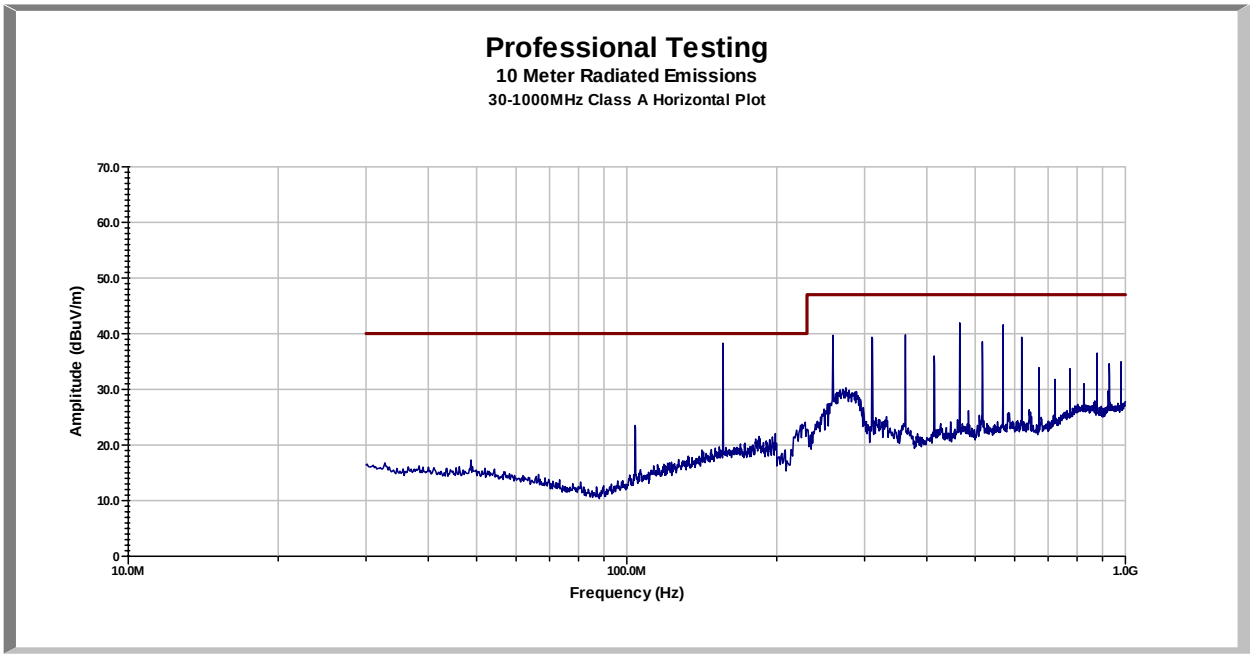
Receiver Radiated Spurious Emissions Data Sheet
30 MHz…1 GHz

PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	April 14, 2010	FCC A	10 m	Bicon | Log	CISPR 120 kHz	1 MHz	Quasi Peak

COMMENT	Receive only mode

Horizontal

Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)	Limit (dBµV /m)	Margin (dB)	Detector
155.98	309	4	50.1	25.921	12.3	1.4	37.9	40	-2.1	QP
259.95	248	4	55.1	31.2	12.9	2.3	39.1	47	-7.9	QP
363.94	58	2.5	52.9	31.1	15.1	2.8	39.8	47	-7.2	QP
467.939	324	4	38.8	31.0	18.8	3.3	29.9	47	-17.1	QP
519.918	288	4	41.3	31.1	19.1	3.5	32.8	47	-14.2	QP



Result = Pass

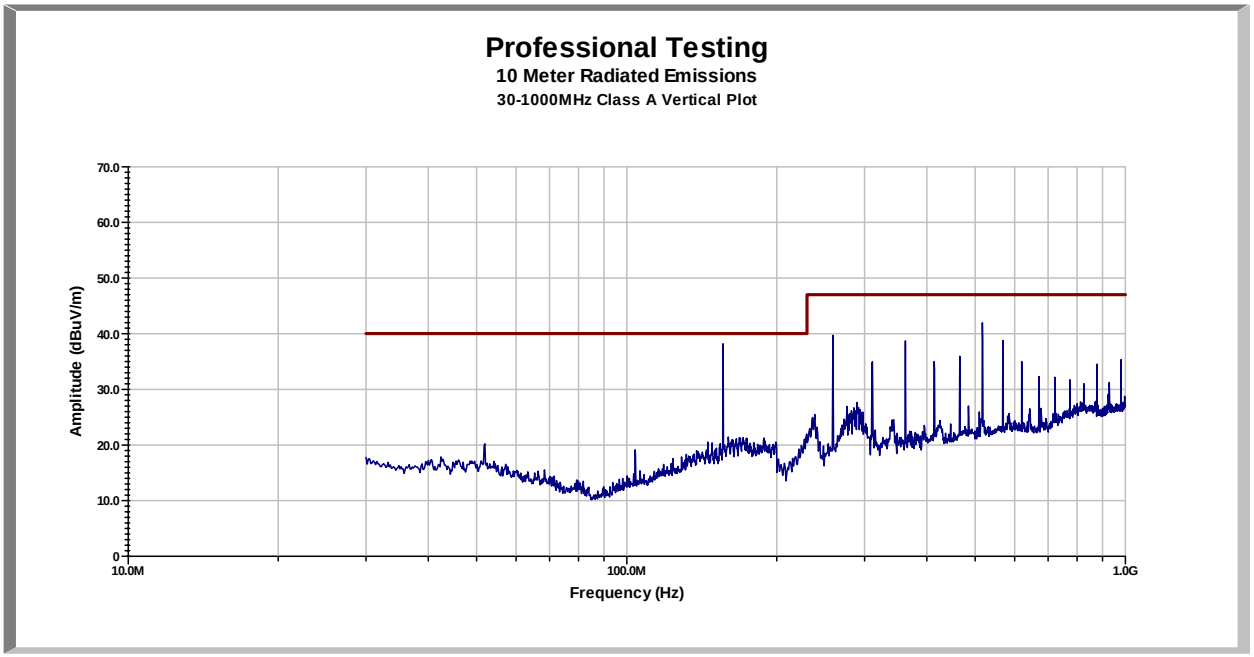
Receiver Radiated Spurious Emissions Data Sheet
30 MHz…1 GHz

PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	April 14, 2010	FCC A	10 m	Bicon | Log	CISPR 120 kHz	1 MHz	Quasi Peak

COMMENT	Receive Mode only

Vertical

Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)	Limit (dBµV /m)	Margin (dB)	Detector
155.98	166	1	50.5	25.9	12.3	1.4	38.3	40	-1.7	QP
259.95	179	1	55.8	31.2	12.9	2.3	39.8	47	-7.2	QP
363.94	28	1	50.3	31.1	15.1	2.8	37.2	47	-9.8	QP
467.939	320	3.9	41.7	31.0	18.8	3.3	32.8	47	-14.2	QP
519.918	14	3.4	49.5	31.1	19.1	3.5	41.0	47	-6.0	QP



Result = Pass

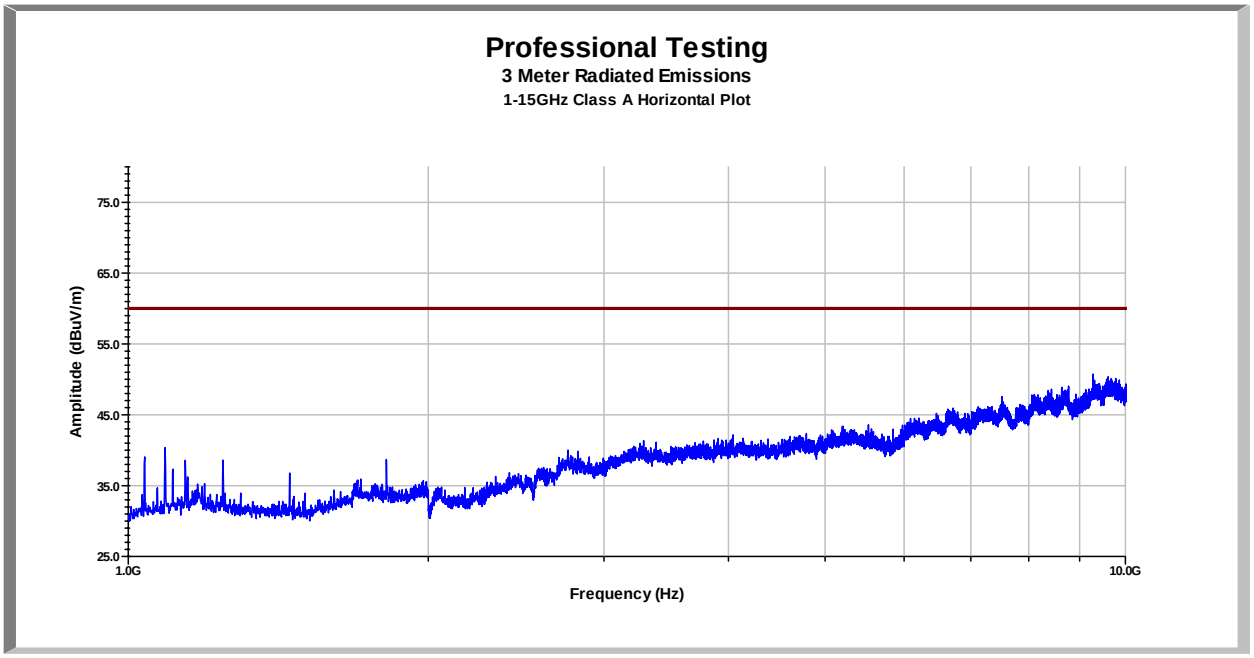
Receiver Radiated Spurious Emissions Data Sheet
1 GHz … 10 GHz

PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	April 14, 2010	FCC A	3 m	Horn	1 MHz	1 MHz	Peak/Avg

COMMENT	Receive Mode only

Horizontal

Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)	Limit (dBµV /m)	Margin (dB)	Detector
1247	72	1	60.3	55.5	24.8	3.2	32.8	60	-27.2	Avg



Result = Pass

Receiver Radiated Spurious Emissions Data Sheet

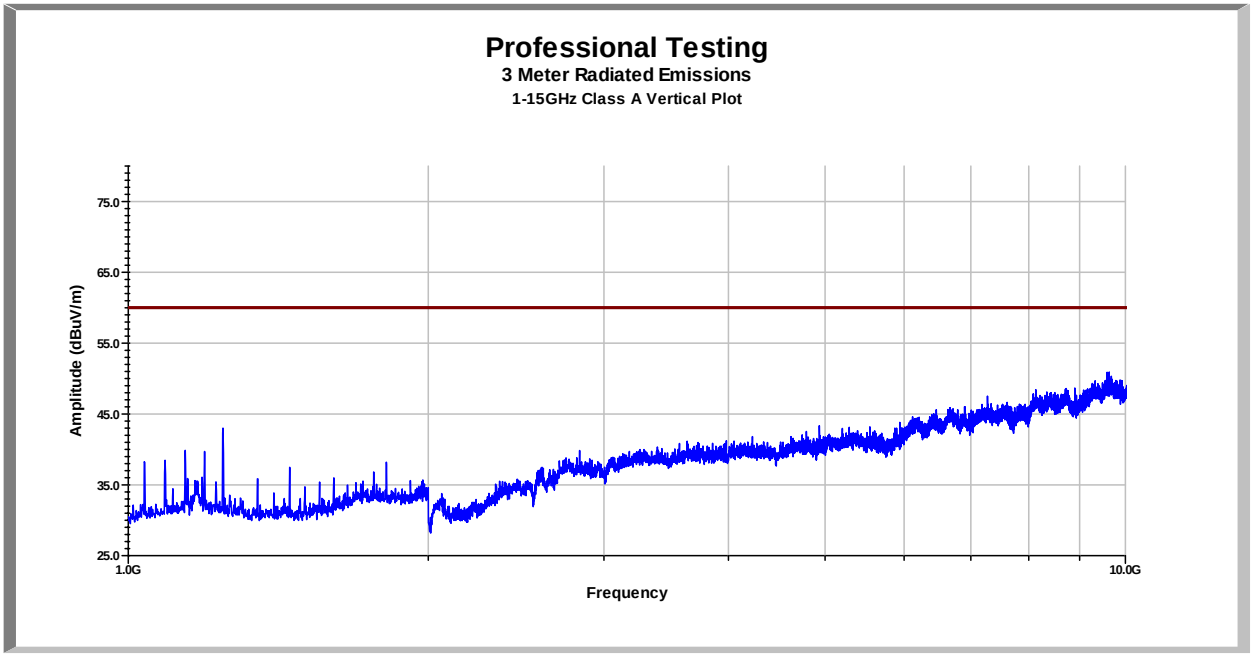
1 GHz … 10 GHz

PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
10680-10	April 14, 2010	FCC A	3 m	Horn	1 MHz	1 MHz	Peak/Avg

COMMENT	Receive Mode only

Vertical

Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dBµV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBµV /m)	Limit (dBµV /m)	Margin (dB)	Detector
1247	48	1	67.2	55.5	24.8	3.2	39.7	60	-20.3	Avg



Result = Pass