COMPLIANCE WORLDWIDE INC.
TEST REPORT 478-10

In Accordance with the Requirements of

FCC PART 15.209
INDUSTRY CANADA RSS 210, ISSUE 8, Annex 8

License-exempt Radio Apparatus
(All Frequency Bands): Category I

Issued to

David Clark Company Incorporated
360 Franklin St.
PO Box 15054
Worcester, MA. 01615

for the

Models U9911-BSC, U9920-GPB
U9921-GUV and U9922-G38

FCC ID: Y3J-U9920
IC: 9409A-U9920

Report Issued on February 11, 2011

Tested by

Brian F. Breault

Reviewed by

Larry K. Stillings

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1. Scope

This test report certifies that the David Clark Company models U9911-BSC, U9920-GPB, U9921-GUV and U9922-G38, as tested, meet the FCC Part 15.209, and Industry Canada RSS 210 requirements.

The scope of this test report is limited to the test samples provided by the client, only in as much as those samples represent other production units. If any significant changes are made to the units, the changes shall be evaluated and a retest may be required.

2. Product Details

2.1. Manufacturer: David Clark Company Inc.

2.2. Model Numbers:

U9911-BSC	Controller Belt Station
U9920-GPB	Push Back Gateway
U9921-GUV	Universal Gateway (Part Number 40994G-01)
U9922-G38	3800 Gateway

2.3. Serial Number: P51684-06

2.4. Description of EUT: Universal Gateway (Model U9921-GUV was tested)

2.5. Power Sources:

U9911-BSC U9920-GPB	+3.7 VDC
U9921-GUV U9922-G38	+12 VDC

2.6. Hardware Revision: Rev 5

2.7. Software Revision: N/A

2.8. EMC Modifications: None

3. Product Configuration

3.1. Operational Characteristics & Software

The David Clark Company models listed in section 2.2 were tested using customized firmware. This modification allowed the unit to transmit a typically modulated signal continuously once power was applied to the unit.

3.2. EUT Hardware

Qty	Manufacturer	Model	Serial Number	Input Volts	Frq (Hz)	Description/Function
1	David Clark Company	U9911-BSC	N/A	3.7	VDC	Controller Belt Station
1	David Clark Company	U9920-GPB	N/A	3.7	VDC	Push Back Gateway
1	David Clark Company	U9921-GUV	N/A	12	VDC	Universal Gateway
1	David Clark Company	U9922-G38	N/A	12	VDC	3800 Gateway

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3. Product Configuration (continued)

3.3. EUT Cables/Transducers

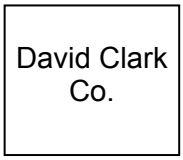
Manufacturer	Model/Part #	Length (m)	Shield Y/N	Description	From	To
David Clark Company	40828G	.5	Y	Power & Signal Cable	Power Supply	U9921-GUV
David Clark Company	C3408	.5	Y	Power & Signal Cable	Power Supply	U9922-G38

3.4. Support Equipment

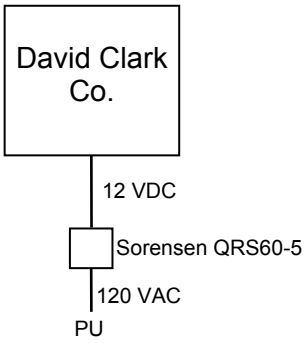
Manufacturer	Model	Serial Number	Input Voltage	Frq (Hz)	Description/Function
Sorensen	QRS60-5	536	120	60	0-60 VDC, .5A Power Supply (for units U9921-GUV and U9922-G38)

3.5. Block Diagrams

3.5.1. Units U9911-BSC, U9920-GPB (internal 3.7 VDC battery)



3.5.2. Units U9921-GUV, U9922-G38



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4. Measurements Parameters

4.1. Measurement Equipment Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
EMI Receiver	Agilent	E7405A	MY4511543	10/22/2011
Spectrum Analyzer	Hewlett Packard	8593E	3829A03887	8/23/2011
Loop Antenna	EMCO	6502	2197	7/21/2012
Bilog Antenna	Com-Power	AC-220	25509	8/30/2011
Horn Antenna	Electro-Metrics	EM-6961	6337	10/19/2012
Horn Antenna	ComPower	AH-840	03075	7/20/2012
LISN	EMCO	3825/2	9109-1860	6/2/2011
DMM / Temperature	Fluke	187	79690058	10/9/2012
Thermal Chamber	Associated Testing Labs	SLHU-1-CRLC	N/A	N/A

4.2. Measurement & Equipment Setup

Test Dates:	Jan 10 - 21, 2011
Test Engineer:	Brian Breault
Normal Site Temperature (15 - 35°C):	24.0
Relative Humidity (20 -75%RH):	33%
Frequency Range:	.009 MHz to 1 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	200 Hz – 9 kHz to 150 kHz 9 kHz – 150 kHz to 30 MHz 120 kHz - 30 MHz to 1 GHz 1 MHz - Above 1 GHz
EMI Receiver Avg Bandwidth:	300 Hz – 9 kHz to 150 kHz 30 kHz – 150 kHz to 30 MHz 300 kHz - 30 MHz to 1 GHz 3 MHz - Above 1 GHz
Detector Function:	Peak, QP, Avg – 150 kHz to 30 MHz Peak, QP - 30 MHz to 1 GHz Peak, Avg - Above 1 GHz Unless otherwise specified.

4.3. Test Procedure

The test measurements contained in this report are based on the requirements detailed in FCC Part 15, Section 15.09: Radiated emission limits; general requirements and RSS-210 Issue 8; License-exempt Radio Apparatus.

The test methods used to generate the data is this test report are in accordance with ANSI C63.4: 2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

When required, the device under test was rotated through three orthogonal axes to determine which attitude produced the highest emission relative to the limit in accordance with ANSI C63.4-2009, section 13.4.1, c). The attitude that produced the highest emission relative to the limit was used for all radiated emission measurements.

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5. Choice of Equipment for Test Suits

5.1. Choice of Model

This test report is based on the test samples supplied by the manufacturer and are reported by the manufacturer to be equivalent to the production units. All four models are supplied with identical transmitters and have been measured for fundamental and harmonic field strength. Of the four units, the U9921-GUV (Part Number 40994G-01) had the highest measured field strength. This unit was selected as the representative unit for all other measurements.

5.2. Presentation

This test samples were tested complete with all required ancillary equipment. Refer to Section 3 of this report for the product equipment configuration.

5.3. Choice of Operating Frequencies

This unit utilizes a single operating frequency at approximately 125 kHz

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6. Measurement Summary

Test Requirement	FCC Reference	IC RSS Reference	Test Report Sect.	Result	Comment
Antenna Requirement	15.203	RSS-GEN §7.1.2	7.1	Compliant	Unit has a permanently mounted internal antenna.
Minimum 26 dB Bandwidth	ANSI C63.4:2009 §13.7	N/A	7.2	Compliant	
99% Power Bandwidth	N/A	RSS-GEN §4.6.1	7.3	Compliant	
Field Strength / Transmitter Output Power	15.209 (a)	RSS-GEN §4.8	7.4	Compliant	
Transmitter Frequency Stability	ANSI C63.4:2009 §13.5 & §13.6	RSS-GEN Section 4.7	7.5	Compliant	
AC Power-line Conducted Emission Measurements	ANSI C63.4:2009 §13.3		7.6	Compliant	Unit is powered by 12 Volts DC
Radiated (Spurious) Emissions Measurements	ANSI C63.4:2009 §13.4		7.7	Compliant	
Radiated (Harmonic) Emissions Measurements	ANSI C63.4:2009 §13.4		7.8	Compliant	
Lower and Upper Band Edge	N/A	N/A	N/A	Compliant	Sections 7.2 and 7.5 provide enough data to prove that the transmitter meets the in-band requirements.
Receiver Spurious Emissions	N/A	RSS-GEN §4.10	7.9	Compliant	
Public Exposure to Radio Frequency Energy Levels	47 CFR 1.1307(b)	RSS-GEN §5.5 RSS-102	7.9	Compliant	

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7. Measurement Data

7.1. Antenna Requirement (Section 15.203, RSS-GEN 7.1.2)

Requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section.

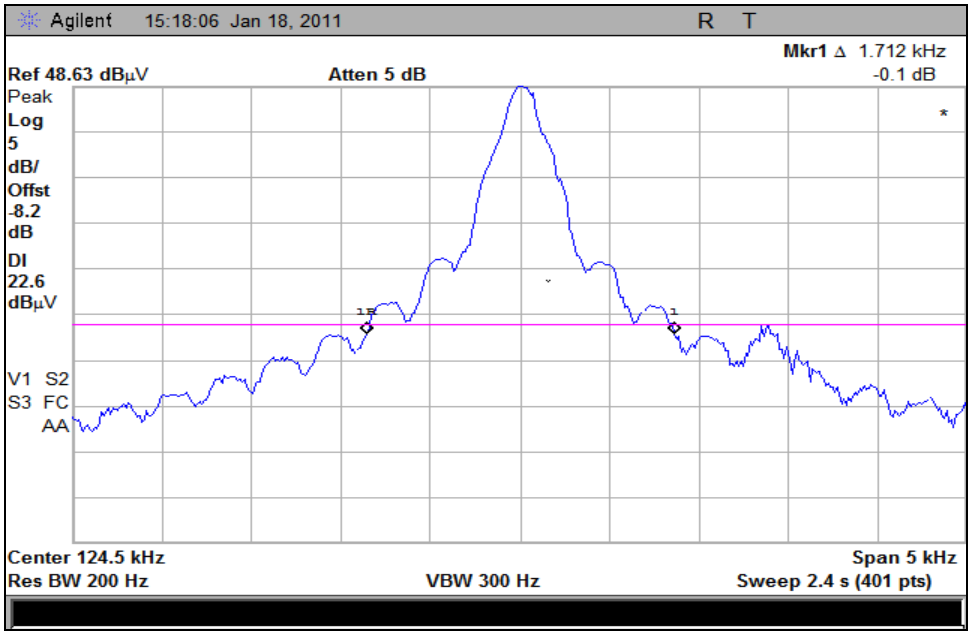
Status: The unit under test employs a permanent, internally mounted antenna.

7.2. Minimum 26 dB Bandwidth (ANSI C63.4, Section 13.7)

Requirement: If no bandwidth requirement is specified by the procuring or regulatory agency, measure the bandwidth at –26 dB with respect to the reference level.

Resolution Bandwidth : 200 Hz
Video Bandwidth : 300 kHz
Sweep Time : 2.4 Sec

Frequency (kHz)	26 dB Bandwidth (kHz)
124.5	1.712



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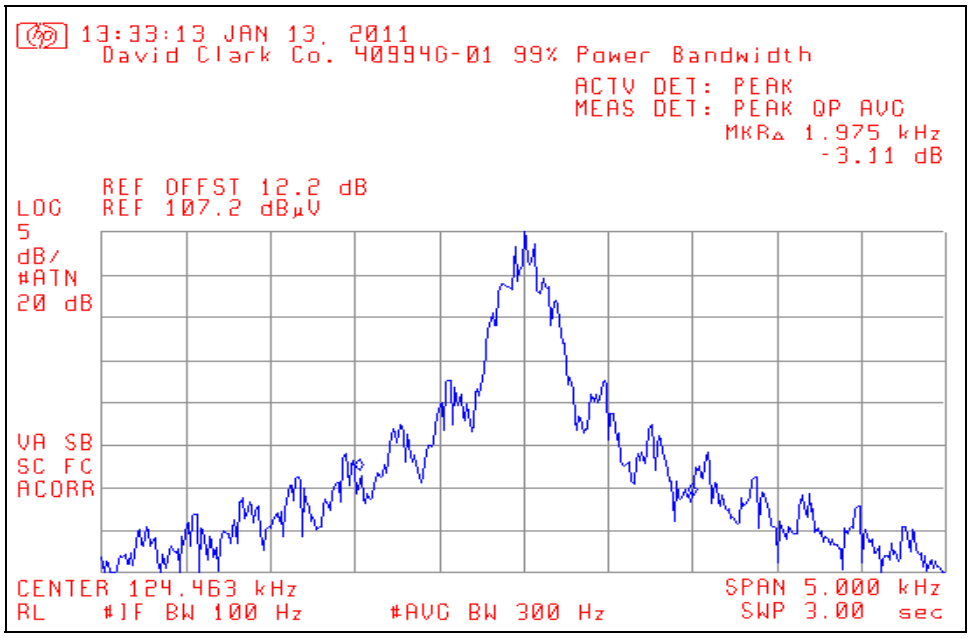
7. Measurement Data (continued)

7.3. 99% Power Bandwidth (Section 15.203, RSS-GEN 7.1.2)

Requirement: When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

Frequency (kHz)	99% Power Bandwidth (kHz)
124.5	1.975



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7. Measurement Data (continued)

7.4. Transmitter Frequency Stability (RSS-GEN 4.7)

Requirement: Frequency stability is a measure of frequency drift due to temperature and supply voltage variations with reference to the frequency measured at an appropriate reference temperature and the rated supply voltage.

With the transmitter installed in an environment test chamber, the unmodulated carrier frequency shall be measured under the conditions specified below. A sufficient stabilization period at each temperature shall be used prior to each frequency measurement. The following temperatures and supply voltage ranges apply, unless specified otherwise in the applicable RSS.

- At temperatures of -30°C, +20°C and +50°C, and the manufacturer's rated supply voltage.
- At a temperature of +20°C and at ±15 percent of the manufacturer's rated supply voltage.

Test Note: The mode of operation for the device under test requires a modulated transmission.

Test Condition		Measured Frequency (kHz)	Analyzer RBW (Hz)
Temp	Voltage		
-30 ºC	12.0 VDC	124.509	30
+20 ºC		124.509	30
+50 ºC		124.509	30
+20 ºC	10.2 VDC	124.509	30
	13.8 VDC	124.509	30

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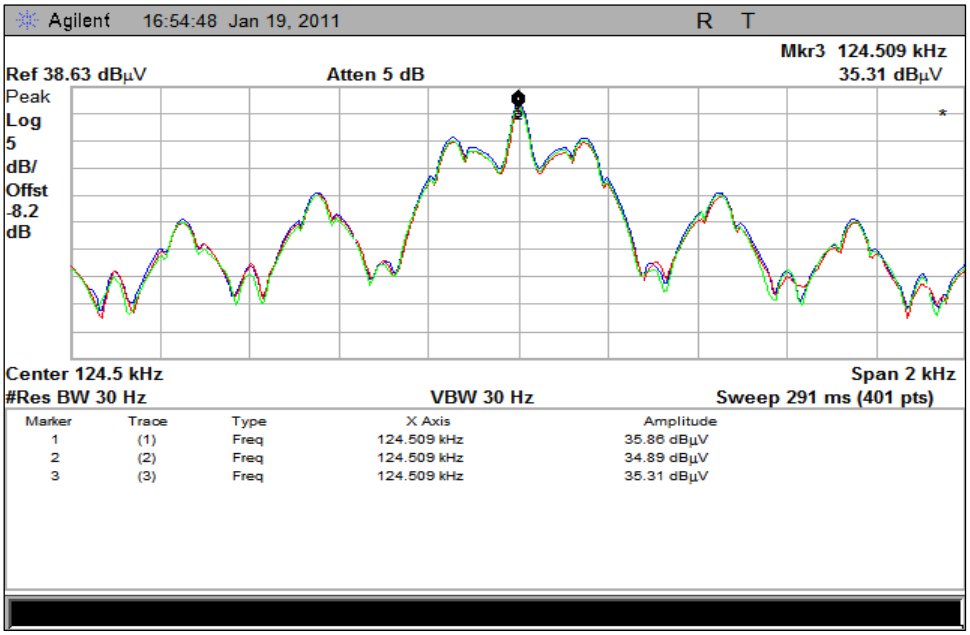
7. Measurement Data (continued)

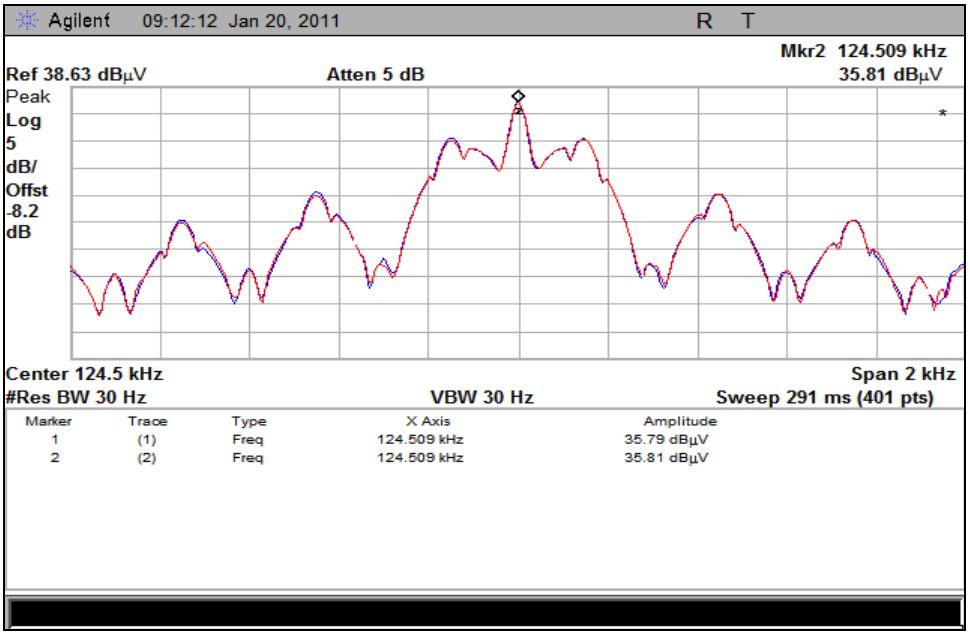
7.4. Transmitter Frequency Stability (RSS-GEN 4.7) (continued)

7.4.1. Transmitter Frequency Stability – Temperature



Marker 1 +20ºC, Marker 2 -30ºC, Marker 3 +50ºC Volts DC

7.4.2. Transmitter Frequency Stability – Voltage



Marker 1 +10.2 VDC, Marker 2 +13.8 VDC

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7. Measurement Data (continued)

7.5. Transmitter Field Strength / Output Power

Requirement: Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the specified field strength level: 84.75 dBµV/m at 10 meters.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

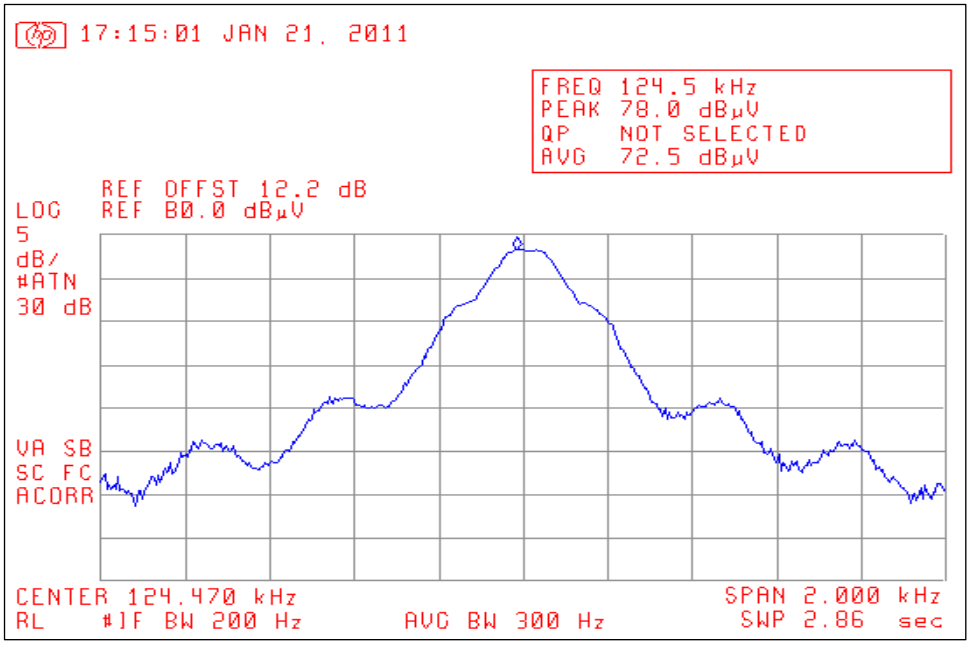
The following formula may be used to convert field strength (FS) in volts/meter to transmitter output power (TP) in watts:

$$TP = (FS \times D)^2 / (30 \times G)$$

TP Transmitter output power (watts)
FS Field strength (volts/meter)
D Distance (meters)
G Antenna numerical gain

Frequency	Meas. Distance	Peak Field Strength	Average Field Strength	Limit @10M	Margin	Ant Gain	Transmit Power	
kHz	Meters	dBµV/m	dBµV/m	dBµV/m	dB	dBi	mW	dBm
125	10	78.0	72.5	84.75	-12.25	1	0.05	-13.27

7.5.1. Transmitter Field Strength (10 Meters)



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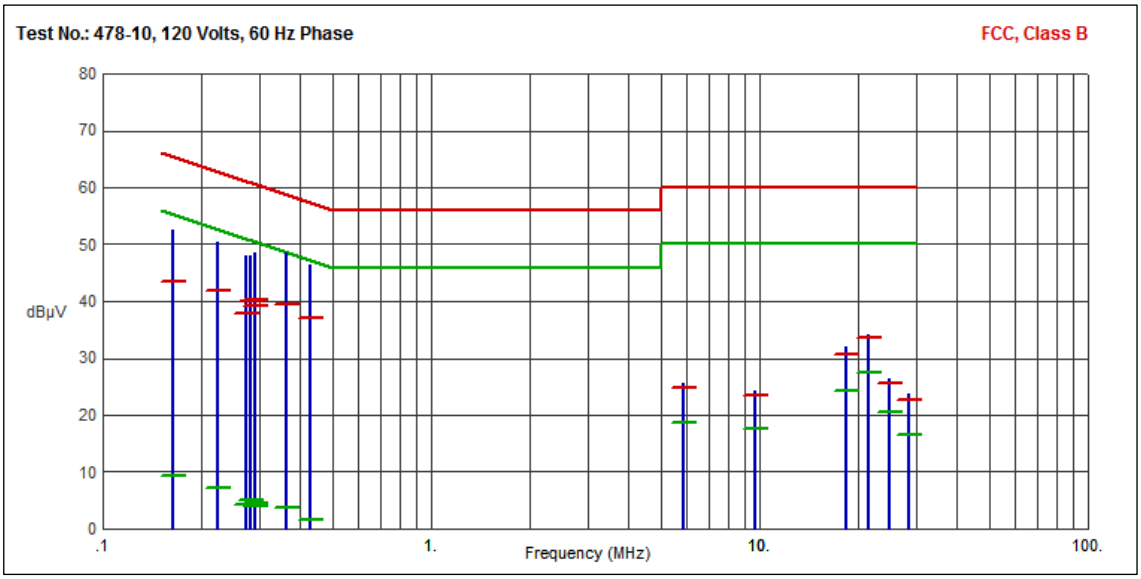
7. Measurement Data (continued)

7.6. AC power-line conducted emissions (ANSI C63.4:2009 §13.3)

Requirement: Record the six highest EUT emissions relative to the limit of each of the current-carrying conductors of the power cords of the equipment that comprise the EUT over the frequency range specified by the procuring or regulatory agency. See ANSI C63.4:2009, Section 10.2.8.1 for full reporting requirements. Diagram or photograph the test setup that was used (see ANSI C63.4:2009, Section 10.2.12).

Test Note: The AC power line of the power supply used to power the device under test was measured for conducted emissions.

7.6.1. 120 Volts, 60 Hz Phase



Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.1634	52.53	43.40	65.29	-21.89	9.32	55.29	-45.97	
.2248	50.36	41.81	62.64	-20.83	7.19	52.64	-45.45	
.2729	48.02	37.76	61.03	-23.27	4.17	51.03	-46.86	
.2814	47.91	40.06	60.77	-20.71	5.17	50.77	-45.60	
.2900	48.52	40.17	60.52	-20.35	4.58	50.52	-45.94	
.2916	48.28	39.09	60.48	-21.39	3.87	50.48	-46.61	
.3627	48.44	39.39	58.67	-19.28	3.85	48.67	-44.82	
.4273	46.51	37.03	57.31	-20.28	1.51	47.31	-45.80	
5.8513	25.49	24.74	60.00	-35.26	18.80	50.00	-31.20	
9.7118	24.24	23.49	60.00	-36.51	17.51	50.00	-32.49	
18.4270	32.05	30.76	60.00	-29.24	24.21	50.00	-25.79	
21.5397	34.08	33.57	60.00	-26.43	27.56	50.00	-22.44	
24.9014	26.33	25.48	60.00	-34.52	20.42	50.00	-29.58	
28.5124	23.72	22.54	60.00	-37.46	16.59	50.00	-33.41	

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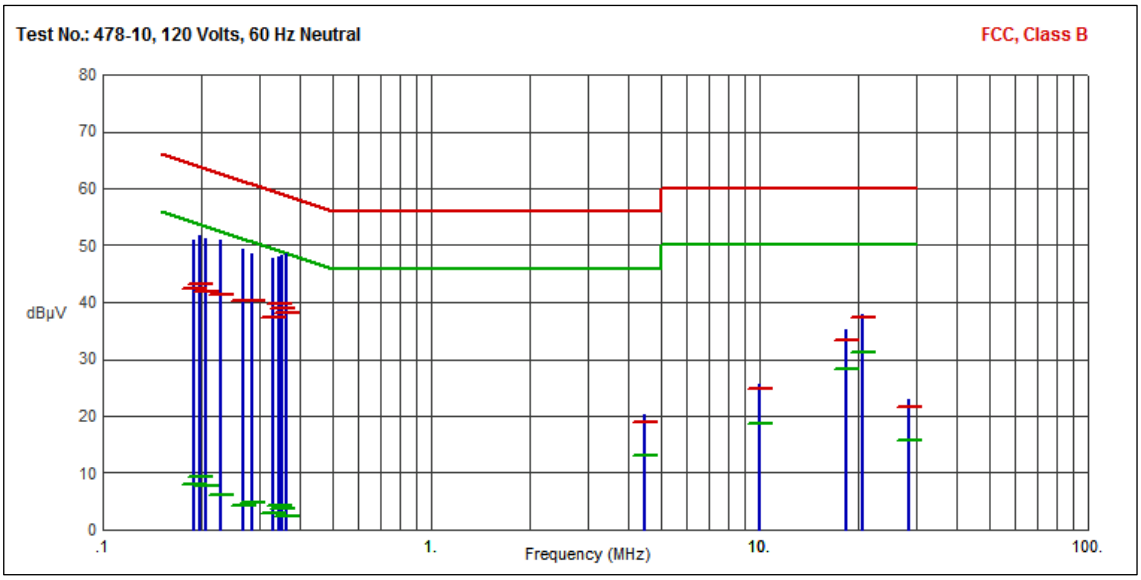
7. Measurement Data (continued)

7.6. AC power-line conducted emissions (ANSI C63.4:2009 §13.3) (continued)

7.6.2. 120 Volts, 60 Hz Neutral



Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.1887	50.85	42.43	64.09	-21.66	8.07	54.09	-46.02	
.1977	51.70	43.13	63.71	-20.58	9.46	53.71	-44.25	
.2064	51.17	41.86	63.35	-21.49	7.81	53.35	-45.54	
.2283	50.86	41.40	62.51	-21.11	6.23	52.51	-46.28	
.2664	49.41	40.25	61.23	-20.98	4.27	51.23	-46.96	
.2852	48.43	40.17	60.66	-20.49	4.85	50.66	-45.81	
.3311	47.69	37.40	59.42	-22.02	2.97	49.42	-46.45	
.3428	48.00	39.63	59.14	-19.51	4.36	49.14	-44.78	
.3521	48.20	38.92	58.91	-19.99	3.76	48.91	-45.15	
.3639	48.64	38.07	58.64	-20.57	2.36	48.64	-46.28	
4.4827	20.33	19.00	56.00	-37.00	13.04	46.00	-32.96	
9.9604	25.68	24.77	60.00	-35.23	18.59	50.00	-31.41	
18.4275	35.13	33.36	60.00	-26.64	28.26	50.00	-21.74	
20.5439	37.95	37.26	60.00	-22.74	31.27	50.00	-18.73	
28.5127	22.91	21.58	60.00	-38.42	15.61	50.00	-34.39	

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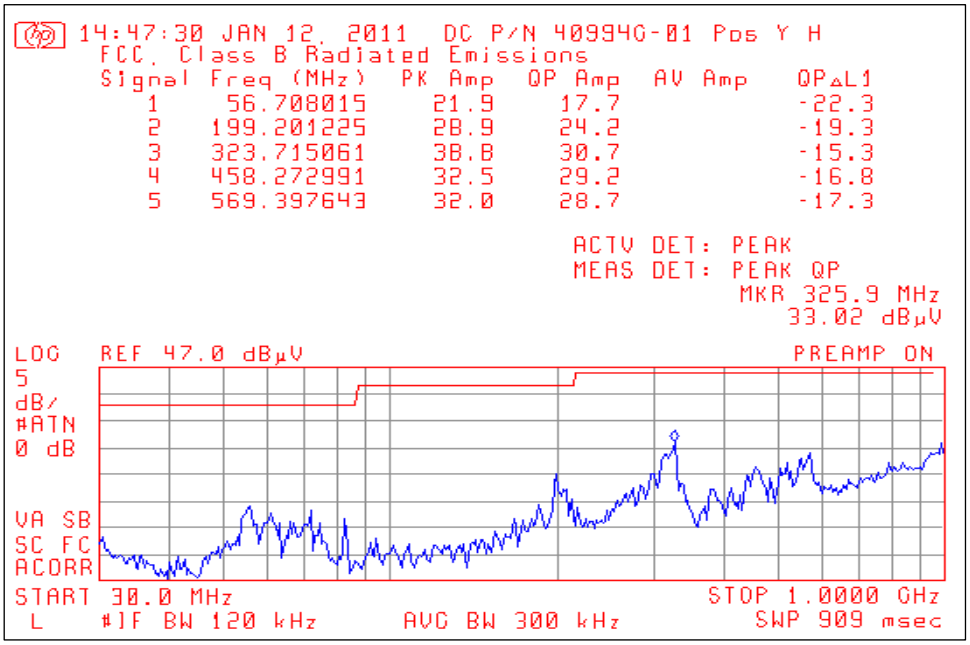
7. Measurement Data (continued)

7.7. Radiated (Spurious) Emissions (ANSI C63.4:2009 §13.4) (continued)

Requirement: On each of the frequencies to which the device is tuned, record the frequency and amplitude of the highest fundamental emission, the frequency and amplitude of the three highest harmonic or spurious emissions relative to the limit, and the frequency and amplitude of the three highest restricted band emissions relative to the limit. See ANSI C63.4:2009, Section 10.2.8.2 for reporting requirements. Diagram or photograph the test setup that was used.

Test Note: Measurements were made with the unit positioned in the Y axis (normal operating position) and Z axis (unit face pointing up) positions. Based on the design of the device, X axis measurements were not performed.

7.7.1. Unit Tested on Y-axis, Antenna is in the Horizontal Polarity



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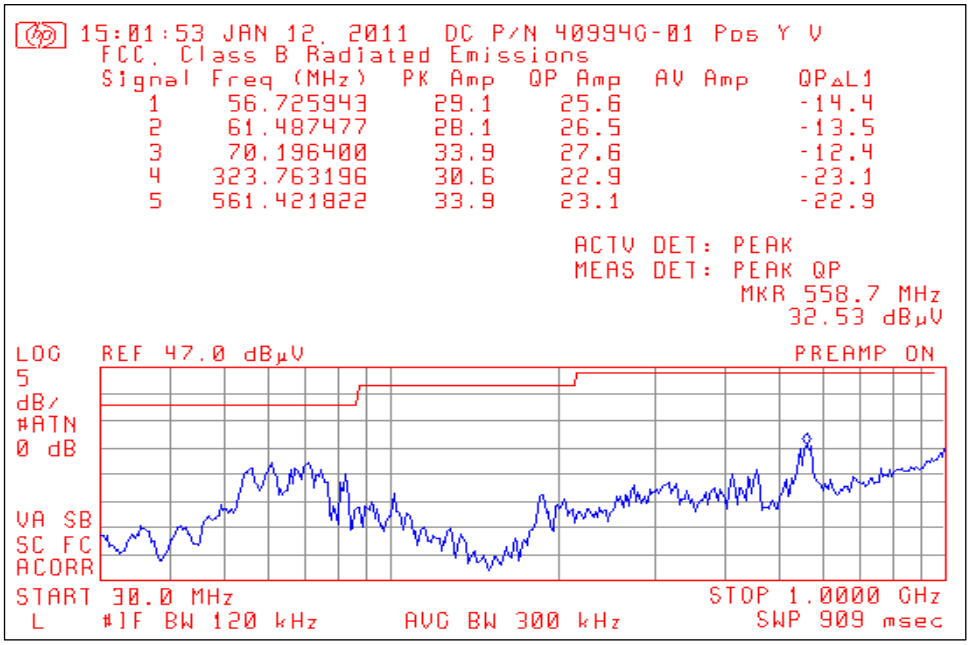
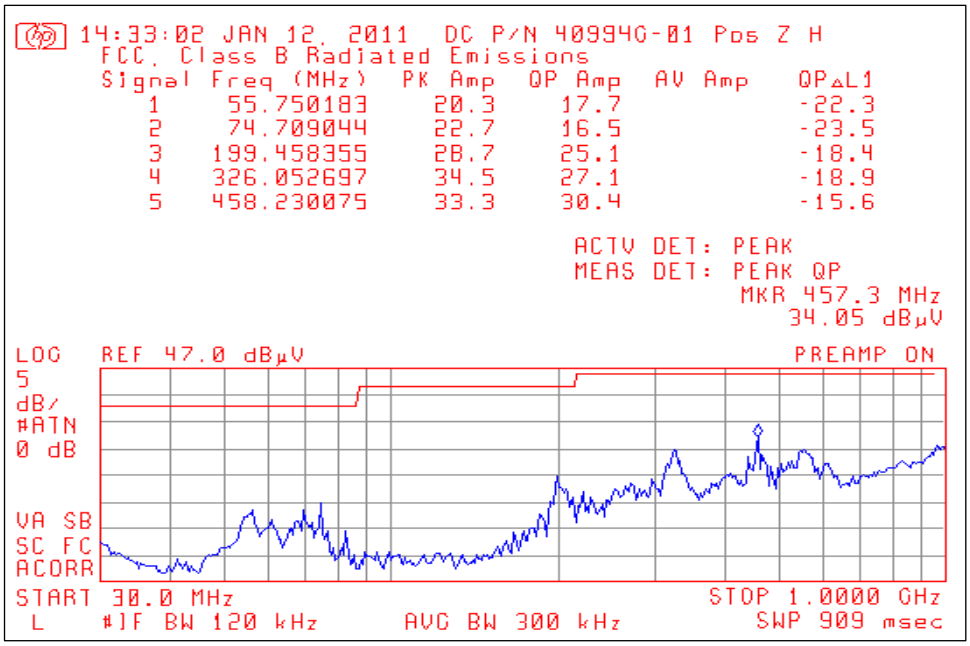
7. Measurement Data (continued)

7.7. Radiated (Spurious) Emissions (ANSI C63.4:2009 §13.4) (continued)

7.7.2. Unit Tested on Y-axis, Antenna is in the Vertical Polarity



7.7.3. Unit Tested on Z-axis, Antenna is in the Horizontal Polarity



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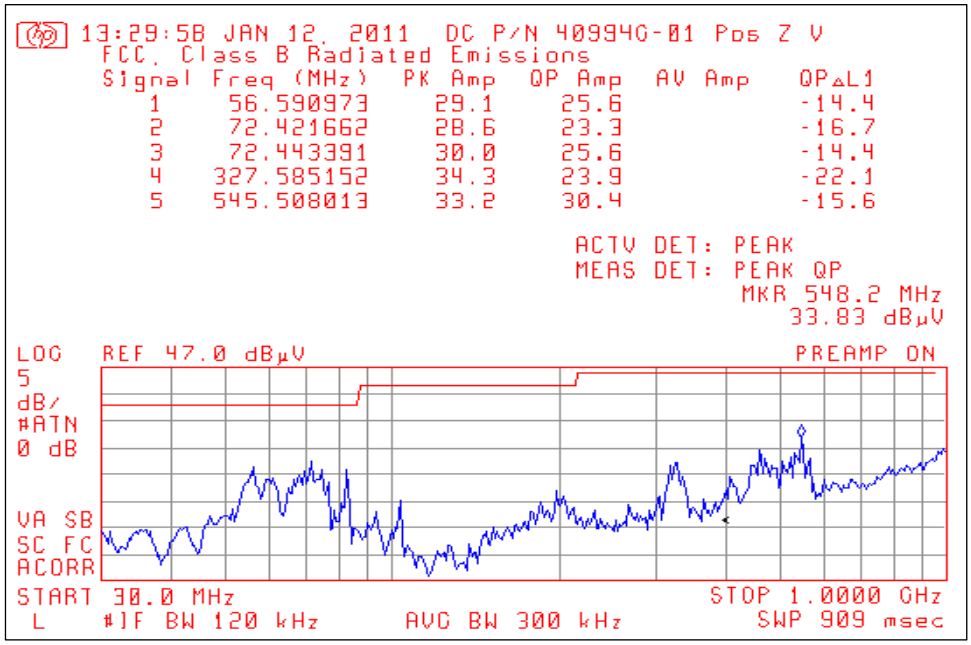
7. Measurement Data (continued)

7.7. Radiated (Spurious) Emissions (ANSI C63.4:2009 §13.4) (continued)

7.7.4. Unit Tested on Z-axis, Antenna is in the Vertical Polarity



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7. Measurement Data (continued)

7.8. Radiated (Harmonic) Emissions (ANSI C63.4:2009 §13.4)

Test Note: The DUT positions are as follows:

- Y Axis – The device under test is positioned front bezel is facing toward the antenna at 0 degrees. This is the normal operating position.
- Z Axis – The device under test front bezel is facing up. The bottom edge of the unit is facing toward the antenna at 0 degrees.

Note: An X axis position was not investigated because it would not represent a real world condition.

Frequency (MHz)	DUT Position	Field Strength (dBµV/m)		Limit (dBµV/m)		Margin (dBµV/m)		Turntable Position (deg)
		Peak	Avg/QP[1]	Peak	Avg/QP[1]	Peak	Avg/QP[1]	
0.250	Y Axis - 1	54.10	42.00	125.66	105.66	-71.56	-63.66	0
	Z Axis - 1	53.10	41.70	125.66	105.66	-72.56	-63.96	0
	Y Axis - 2	55.80	45.20	125.66	105.66	-69.86	-60.46	0
	Z Axis - 2	55.60	44.40	125.66	105.66	-70.06	-61.26	0
0.375	Y Axis - 1	59.20	49.80	125.66	105.66	-66.46	-55.86	274
	Z Axis - 1	56.90	48.10	125.66	105.66	-68.76	-57.56	278
	Y Axis - 2	56.60	46.30	125.66	105.66	-69.06	-59.36	0
	Z Axis - 2	56.00	45.90	125.66	105.66	-69.66	-59.76	184
0.500	Y Axis - 1	49.70	44.30	125.66	105.66	-75.96	-61.36	0
	Z Axis - 1	49.10	43.10	125.66	105.66	-76.56	-62.56	0
	Y Axis - 2	50.70	45.00	125.66	105.66	-74.96	-60.66	0
	Z Axis - 2	49.90	44.80	125.66	105.66	-75.76	-60.86	0
0.625	Y Axis - 1	52.90	47.60	125.66	105.66	-72.76	-58.06	0
	Z Axis - 1	56.00	52.20	125.66	105.66	-69.66	-53.46	0
	Y Axis - 2	50.70	44.30	125.66	105.66	-74.96	-61.36	0
	Z Axis - 2	43.80	34.10	125.66	105.66	-81.86	-71.56	0
0.750	Y Axis - 1	46.80	41.70	125.66	105.66	-78.86	-63.96	0
	Z Axis - 1	52.40	45.70	125.66	105.66	-73.26	-59.96	0
	Y Axis - 2	48.80	41.90	125.66	105.66	-76.86	-63.76	0
	Z Axis - 2	46.60	40.50	125.66	105.66	-79.06	-65.16	0
0.875	Y Axis - 1	46.10	41.50	125.66	105.66	-79.56	-64.16	0
	Z Axis - 1	46.40	41.90	125.66	105.66	-79.26	-63.76	0
	Y Axis - 2	45.50	40.90	125.66	105.66	-80.16	-64.76	0
	Z Axis - 2	48.20	43.40	125.66	105.66	-77.46	-62.26	0
1.000	Y Axis - 1	46.50	41.80	125.66	105.66	-79.16	-63.86	0
	Z Axis - 1	52.20	41.20	125.66	105.66	-73.46	-64.46	0
	Y Axis - 2	46.30	42.60	125.66	105.66	-79.36	-63.06	0
	Z Axis - 2	47.20	37.30	125.66	105.66	-78.46	-68.36	0
1.125	Y Axis - 1	58.40	55.10	125.66	105.66	-67.26	-50.56	0
	Z Axis - 1	63.30	55.40	125.66	105.66	-62.36	-50.26	0
	Y Axis - 2	47.50	41.20	125.66	105.66	-78.16	-64.46	0
	Z Axis - 2	47.70	37.00	125.66	105.66	-77.96	-68.66	0
1.250	Y Axis - 1	57.50	44.70	125.66	105.66	-68.16	-60.96	0
	Z Axis - 1	56.30	48.60	125.66	105.66	-69.36	-57.06	0
	Y Axis - 2	58.10	52.90	125.66	105.66	-67.56	-52.76	0
	Z Axis - 2	57.90	53.80	125.66	105.66	-67.76	-51.86	0

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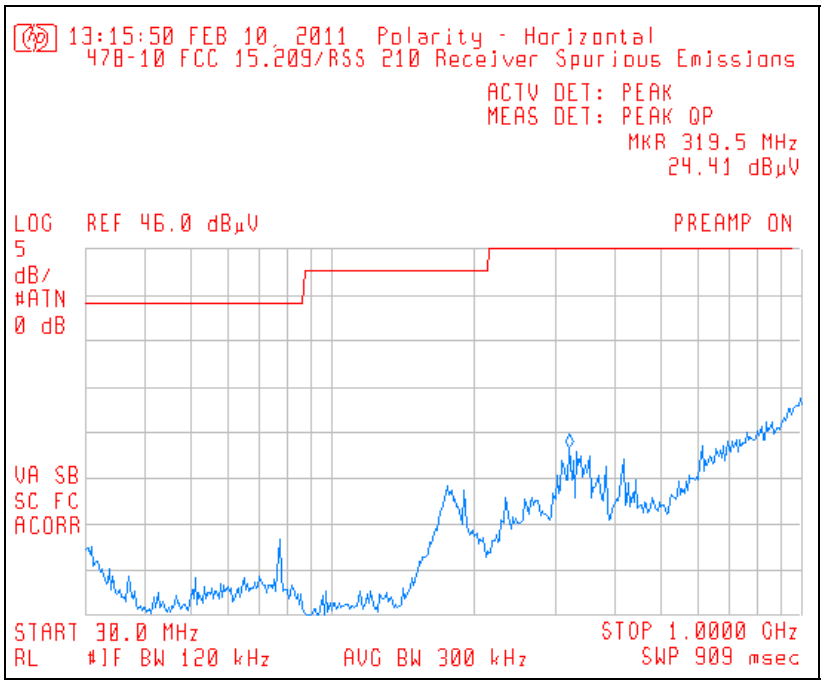
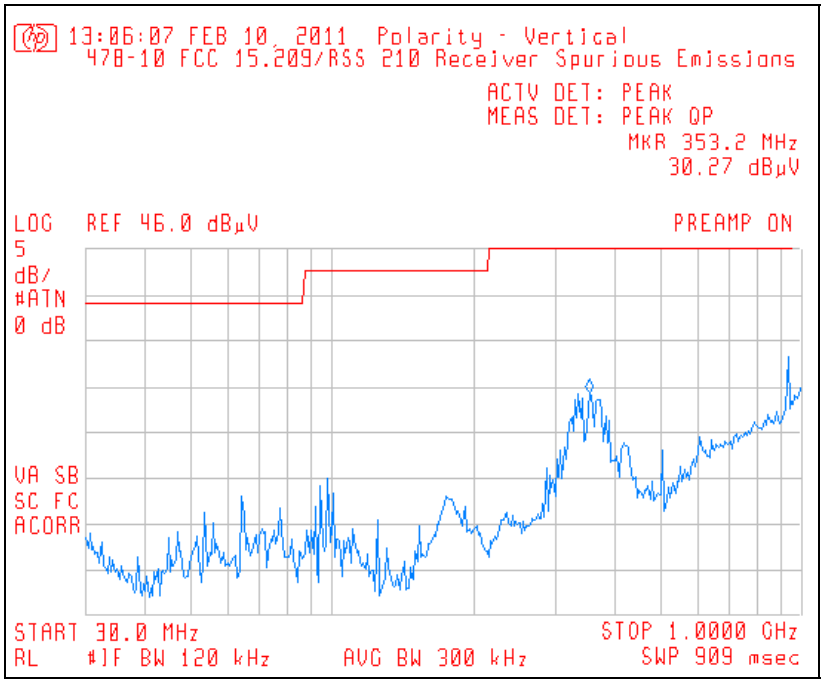
7. Measurement Data (continued)

7.9. Receiver Spurious Emissions (RSS-Gen Section 4-10)

7.9.1. Horizontal Polarity



7.9.2. Vertical Polarity



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7. Measurement Data (continued)

7.10. Public Exposure to Radio Frequency Energy Levels ((47 CFR 1.1307(b) RSS-GEN 5.6, RSS 102

Channel	MPE Distance (cm)	DUT Output Power (dBm)	DUT Antenna Gain (dBi)	Power Density (mW/cm2)	Limit (mW/cm2)	Result
	(1)	(2)	(3)	(4)	(5)	
N/A	20.0	-7.77	1.0	0.0000418	0.0004184	1

$$PD = \frac{OP + AG}{(4 \times \pi \times d^2)}$$

- **PD = Power Density (mW/cm^2)**
- **OP = DUT Output Power (dBm)**
- **AG = DUT Antenna Gain (dBi)**
- **d = MPE Distance (cm)**

1. Reference CFR 2.1093(b): For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.
2. Section 7.4 of this test report.
3. Data supplied by the client. Antenna specification data of worst case antenna used by the DUT.
4. Power density is calculated from field strength measurement and antenna gain.
5. Reference CFR 1.1310, Table 1: Limits for Maximum Permissible Exposure (MPE), Section (B): Limits for General Population/Uncontrolled Exposure.

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8. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with Federal Communications Commission (FCC) and Industry Canada standards. A description of the test sites is on file with the FCC (registration number **96392**) and Industry Canada (file number **IC 3023A-1)**.

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022.

Both sites are designed to test products or systems 1.5 meter W x 1.5 meter L x 2.0 meter H, floor standing or table top.

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