COMPLIANCE WORLDWIDE INC.
TEST REPORT 317-11

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

Kronos, Incorporated
4 Omni Way
Chelmsford, MA. 01824

for the

In Touch 9000 HID Electronic Module
125 kHz

FCC ID: P5W-8609K003
IC: 1416A-8609K003

Report Issued on August 15, 2011

Tested by

Brian F. Breault

Reviewed by

Larry K. Stillings

Table of Contents

Compliance Worldwide, Inc. - 357 Main Street - Sandown, NH 03873
(603) 887 3903 Fax 887 6445
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1. Scope

This test report certifies that the In Touch 9000 HID Electronic Module, 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: Kronos, Incorporated

2.2. Model Number: Tested 8609000-XX3 and this represents Part numbers: 8609000-003, 8609000-053 and 8609000-403

2.3. Serial Number: N/A

2.4. Description of EUT: Passive Tag Transmitter HID 125 kHz

2.5. Power Sources: 120 Volts/60 Hz (In Touch 9000)

2.6. Hardware Revision: N/A

2.7. Software Revision: N/A

2.8. EMC Modifications: None

3. Product Configuration

3.1. Operational Characteristics & Software

The Kronos In Touch 9000 HID Electronic Module transmits a typically modulated signal continuously once power is applied to the unit.

3.2. EUT Cables/Transducers

Manufacturer	Model/Part #	Length (m)	Shield Y/N	Description	From	To
Kronos	N/A	.5	Y	AC Power Cable	---	---

3.3. Support Equipment

Manufacturer	Model	Serial Number	Input Voltage	Frq (Hz)	Description/Function
Kronos	In Touch 9000	1660746			

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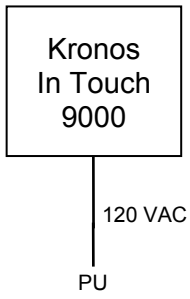
3. Product Configuration (continued)

3.4. Block Diagram



Note: The device under test is contained within the Kronos In Touch 9000

4. Measurements Parameters

4.1. Measurement Equipment Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
EMI Receiver	Hewlett Packard	8546A	3330A00115	10/28/2011
Spectrum Analyzer	Rohde Schwarz	FSV40	100899	05/31/2013
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	7/5/2012
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:	August 1 - 5, 2011
Test Engineer:	Ben Dovidio
Normal Site Temperature (15 - 35°C):	21.0
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.

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4. Measurements Parameters

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.

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.

5.2. Presentation

The test sample was 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 125.7 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.

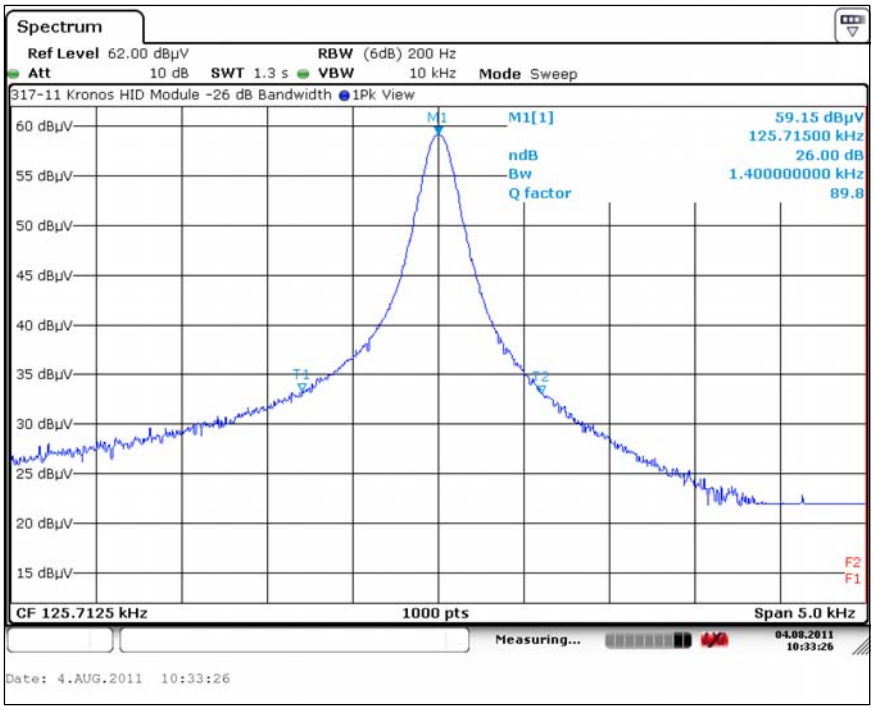
Status: The unit under test employs a permanent, internally mounted antenna.

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 : 9 kHz
Sweep Time : 1.3 Sec

Frequency (kHz)	-26 dB Bandwidth (kHz)
125.72	1.400



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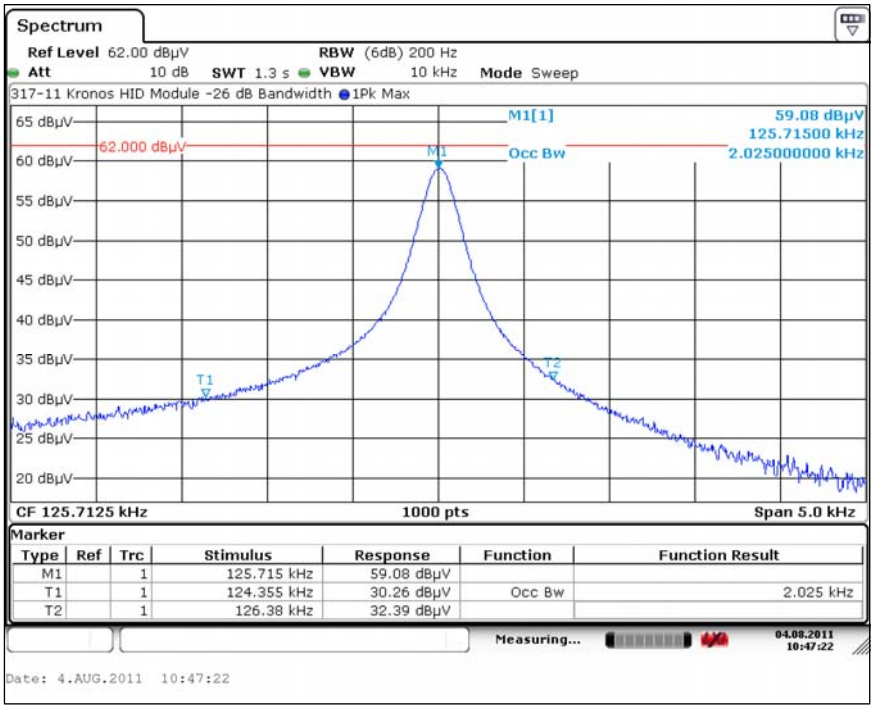
7. Measurement Data (continued)

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)
125.72	2.025



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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	120 VDC	125.526	30
+20 ºC		125.688	30
+50 ºC		125.683	30
+20 ºC	102 VDC	125.526	30
	138 VDC	125.683	30

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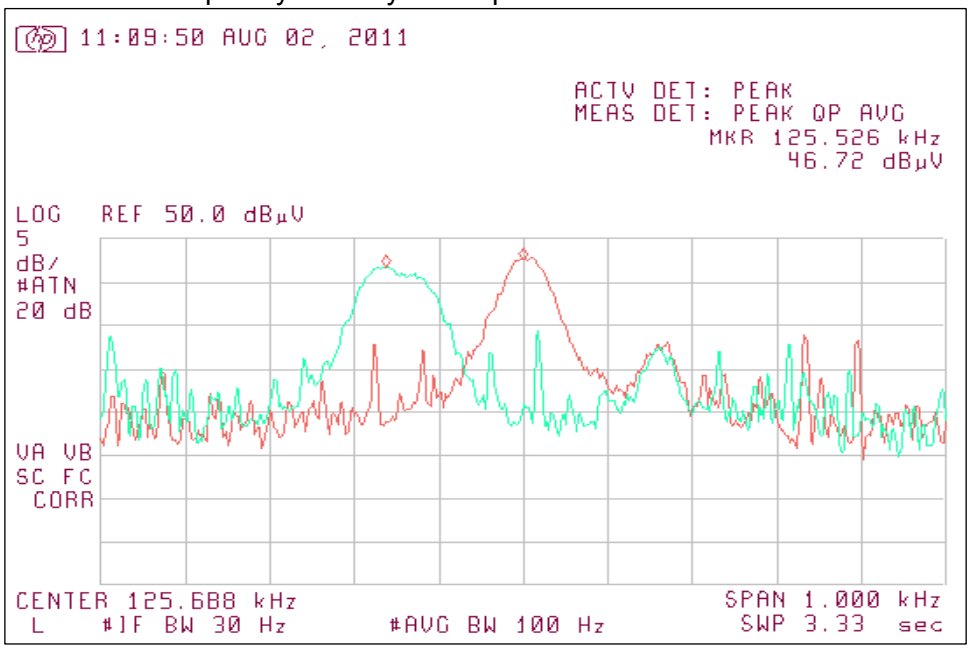
7. Measurement Data (continued)

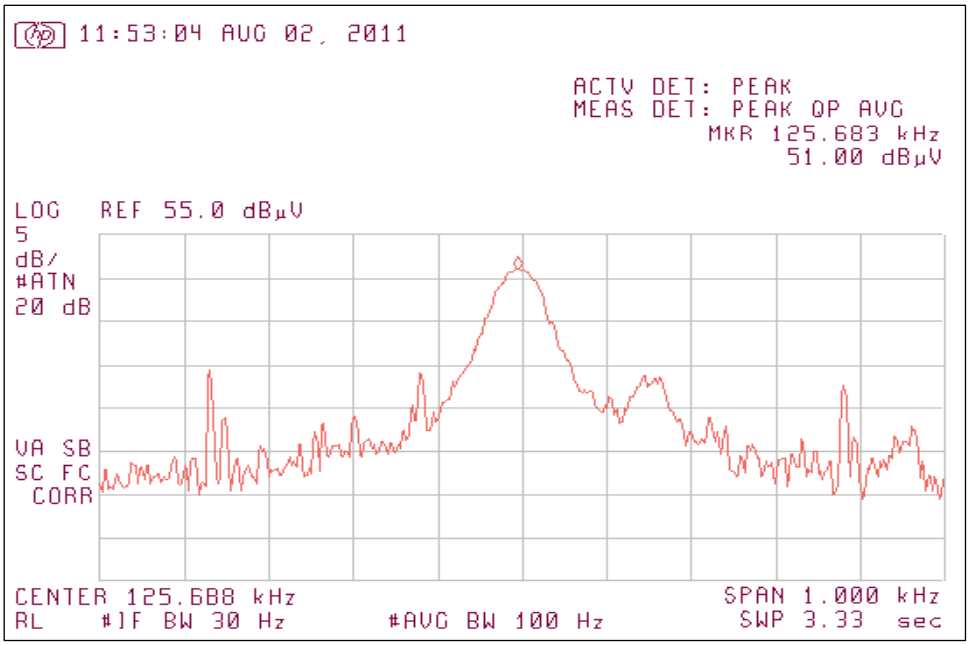
7.4. Transmitter Frequency Stability (RSS-GEN 4.7) (continued)

7.4.1. Transmitter Frequency Stability – Temperature 1 of 2



Green Trace: Ambient, Red Trace: -30ºC

7.4.2. Transmitter Frequency Stability – Temperature 2 of 2



Red Trace: +50ºC

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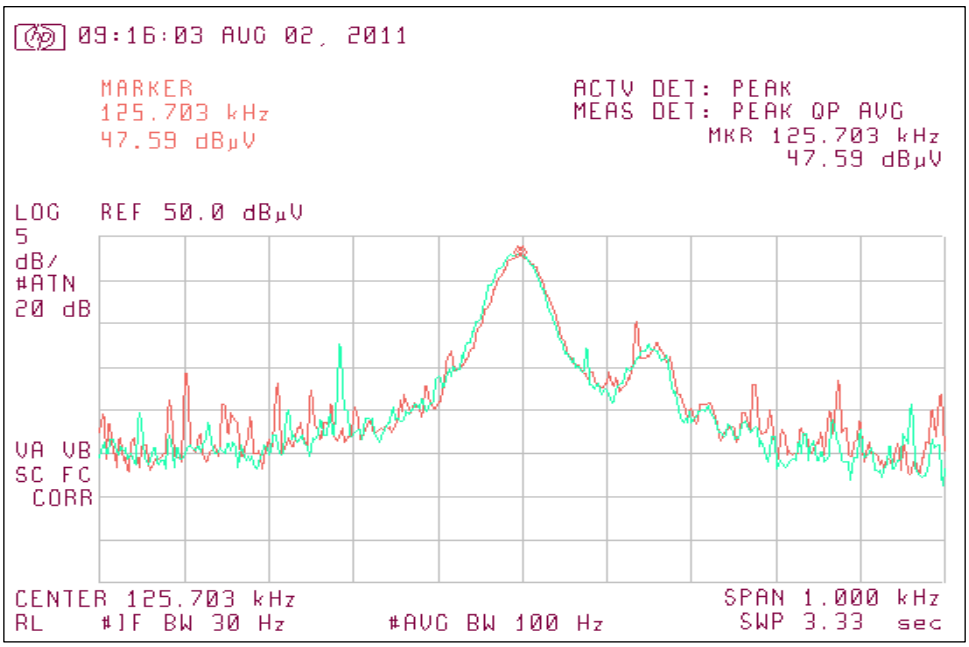
7. Measurement Data (continued)

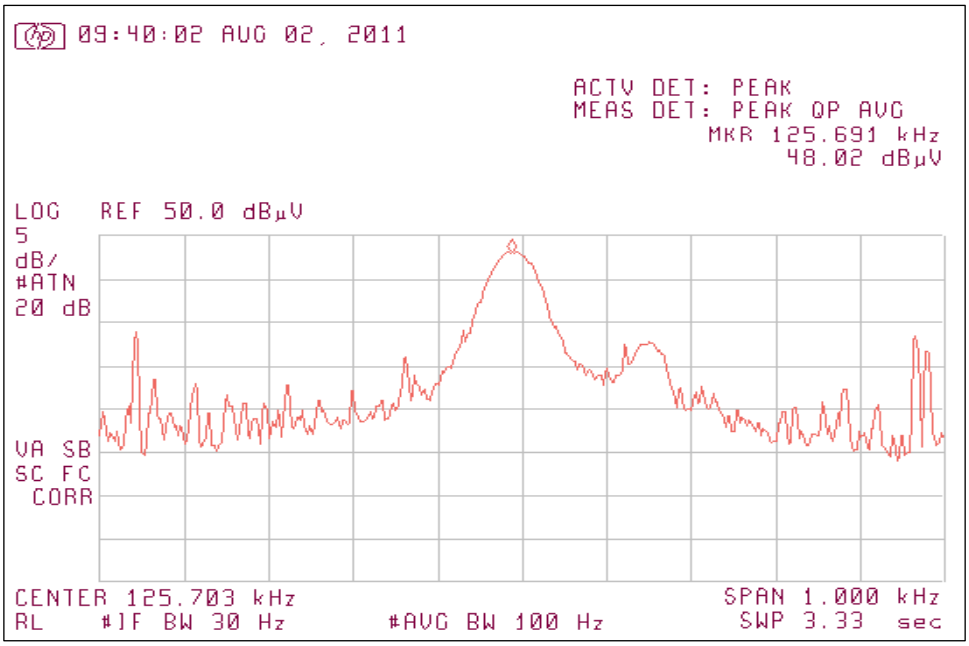
7.4. Transmitter Frequency Stability (RSS-GEN 4.7) (continued)

7.4.1. Transmitter Frequency Stability – Voltage 1 of 1



Green Trace: Ambient, Red Trace: 102 VAC

7.4.2. Transmitter Frequency Stability – Voltage 2 of 2



Red Trace: 138 VAC

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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.

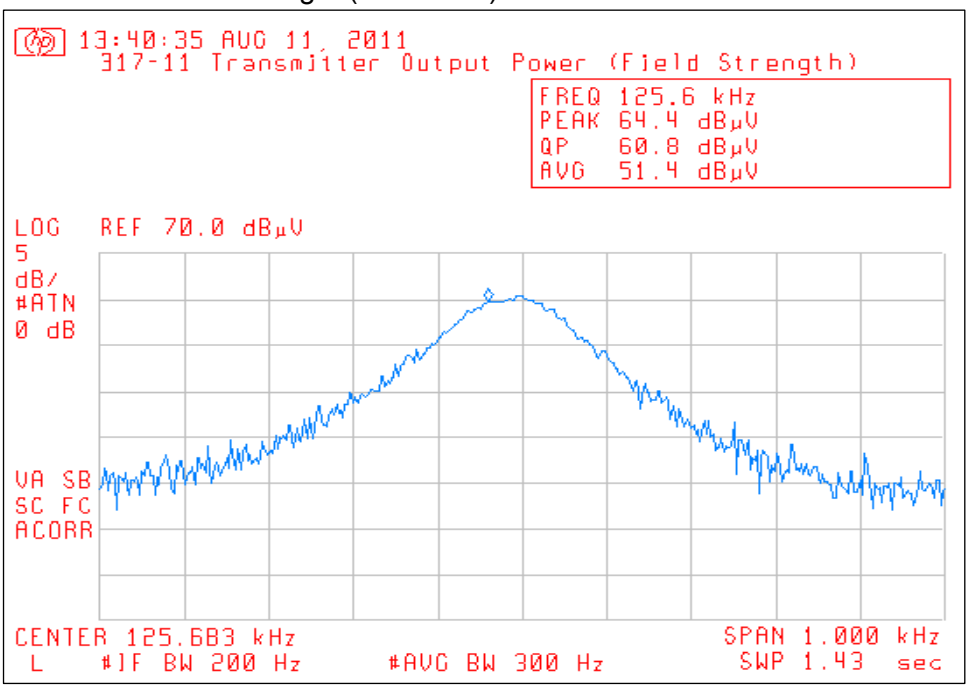
The following formula may be used to convert field strength (FS) in volts/meter to transmitter output power (TP) in watts:

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

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
125.69	10	64.4	60.8	84.75	-23.95	1	0.003183	-24.97

7.5.1. Transmitter Field Strength (10 Meters)



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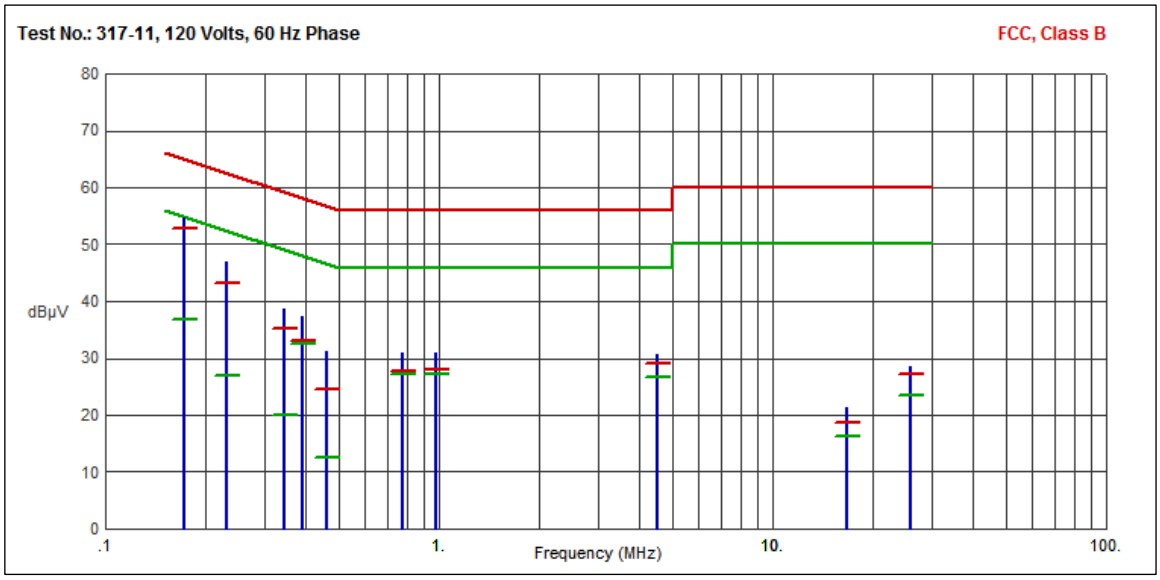
7. Measurement Data (continued)

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
.1732	54.64	52.91	64.81	-11.90	36.90	54.81	-17.91	
.2301	46.96	43.24	62.45	-19.21	26.89	52.45	-25.56	
.3439	38.61	35.28	59.11	-23.83	20.01	49.11	-29.10	
.3911	37.29	33.20	58.04	-24.84	32.50	48.04	-15.54	
.4620	31.17	24.64	56.66	-32.02	12.54	46.66	-34.12	
.7812	30.98	27.72	56.00	-28.28	27.26	46.00	-18.74	
.9764	30.90	28.03	56.00	-27.97	27.22	46.00	-18.78	
4.5048	30.60	29.17	56.00	-26.83	26.62	46.00	-19.38	
16.7818	21.40	18.64	60.00	-41.36	16.20	50.00	-33.80	
25.9564	28.58	27.11	60.00	-32.89	23.35	50.00	-26.65	

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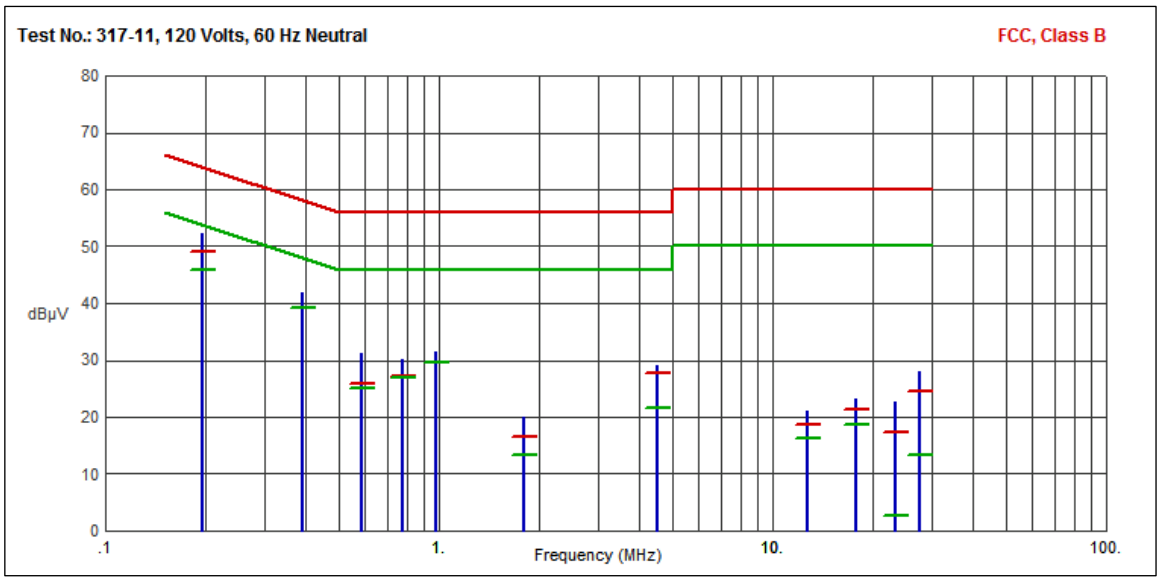
7. Measurement Data (continued)

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
.1963	52.23	49.15	63.77	-14.62	45.93	53.77	-7.84	
.3905	41.86	39.19	58.05	-18.86	39.07	48.05	-8.98	
.5879	31.18	25.85	56.00	-30.15	24.98	46.00	-21.02	
.7819	30.03	27.12	56.00	-28.88	27.02	46.00	-18.98	
.9772	31.57	29.67	56.00	-26.33	29.59	46.00	-16.41	
1.7991	20.12	16.48	56.00	-39.52	13.46	46.00	-32.54	
4.5173	28.98	27.68	56.00	-28.32	21.71	46.00	-24.29	
12.7197	21.18	18.79	60.00	-41.21	16.33	50.00	-33.67	
17.6938	23.22	21.31	60.00	-38.69	18.66	50.00	-31.34	
23.3506	22.57	17.40	60.00	-42.60	2.74	50.00	-47.26	
27.5468	28.13	24.50	60.00	-35.50	13.33	50.00	-36.67	

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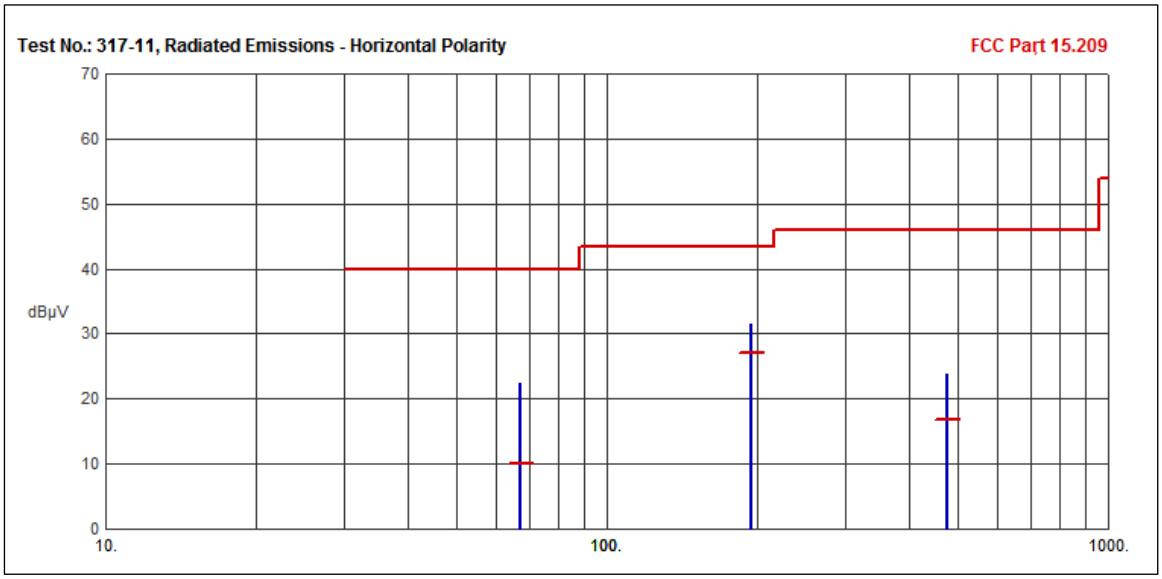
7. Measurement Data (continued)

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

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. Worst Case Horizontal Polarity



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
66.9876	22.50	10.09	40.00	-29.91	N/A	N/A	
194.1074	31.54	26.99	43.50	-16.51	N/A	N/A	
478.1659	23.72	16.90	46.00	-29.10	N/A	N/A	

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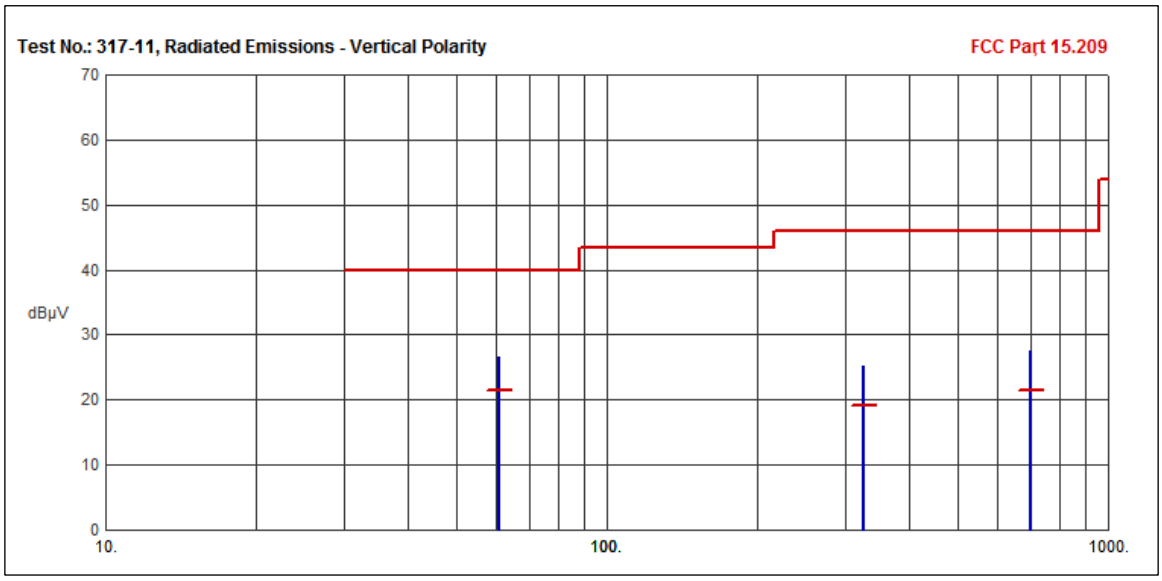
7. Measurement Data (continued)

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

7.7.2. Worst Case Vertical Polarity



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
60.7422	26.58	21.50	40.00	-18.50	N/A	N/A	
325.9238	25.20	19.24	46.00	-26.76	N/A	N/A	
698.2468	27.61	21.41	46.00	-24.59	N/A	N/A	

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7. Measurement Data (continued)

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

Freq. (MHz)	Ant. Pos. [1]	Field Strength (dBµV/m)		Limit (dBµV/m)		Margin (dBµV/m)		Ant. Polarity (H/V)	Antenna Height (cm)	Turntable Position (deg)
		Peak	Avg/QP[2]	Peak	Avg/QP[2]	Peak	Avg/QP[2]			
0.12569	1	55.90	43.30	104.75	84.75	-48.85	-41.45	V	100	90
	2	63.90	50.40	104.75	84.75	-40.85	-34.35	V	100	343
0.25138	1	55.40	44.10	104.75	84.75	-49.35	-40.65	V	100	0
	2	55.90	43.60	104.75	84.75	-48.85	-41.15	V	100	0
0.37707	1	52.80	40.80	104.75	84.75	-51.95	-43.95	V	100	0
	2	52.10	37.70	104.75	84.75	-52.65	-47.05	V	100	0
0.50276	1	49.30	44.70	104.75	84.75	-55.45	-40.05	V	100	0
	2	50.10	44.80	104.75	84.75	-54.65	-39.95	V	100	0
0.62845	1	50.30	43.10	104.75	84.75	-54.45	-41.65	V	100	0
	2	49.70	45.20	104.75	84.75	-55.05	-39.55	V	100	0
0.75414	1	54.10	41.70	104.75	84.75	-50.65	-43.05	V	100	0
	2	45.80	40.20	104.75	84.75	-58.95	-44.55	V	100	0
0.87983	1	44.70	39.40	104.75	84.75	-60.05	-45.35	V	100	0
	2	45.40	40.50	104.75	84.75	-59.35	-44.25	V	100	0
1.00552	1	44.10	38.30	104.75	84.75	-60.65	-46.45	V	100	0
	2	44.00	37.50	104.75	84.75	-60.75	-47.25	V	100	0
1.13121	1	42.10	36.40	104.75	84.75	-62.65	-48.35	V	100	0
	2	42.30	36.50	104.75	84.75	-62.45	-48.25	V	100	0
1.25690	1	46.60	41.90	104.75	84.75	-58.15	-42.85	V	100	0
	2	47.60	44.30	104.75	84.75	-57.15	-40.45	V	100	0

[1] Position 1 = antenna is perpendicular to the DUT, position 2 = antenna is parallel to the DUT.

[2] Measurements below 500 kHz are average measurements. Measurements above 500 kHz are quasi-peak measurements.

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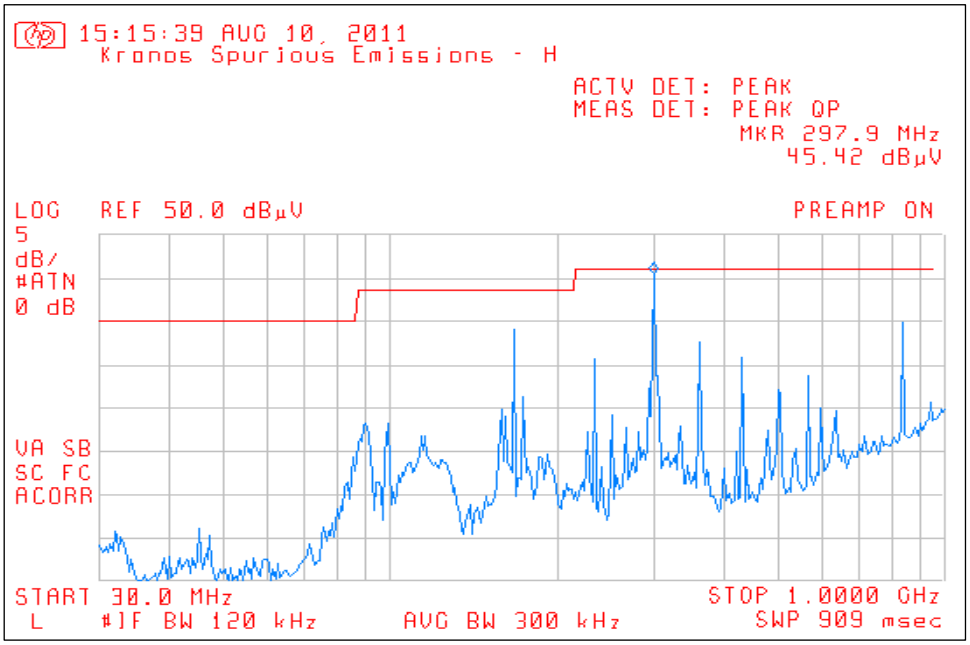
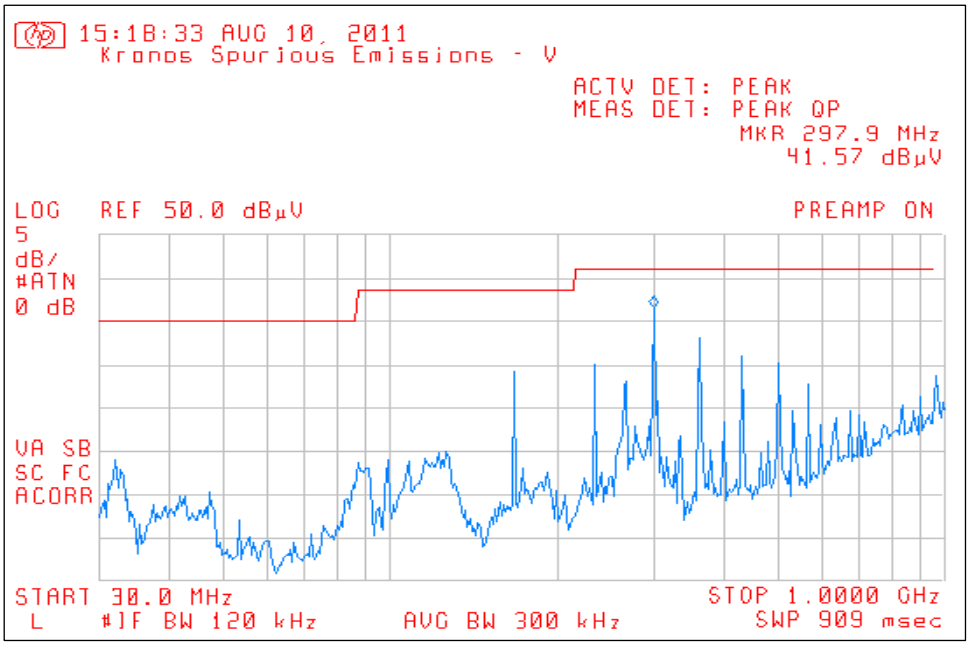
7. Measurement Data (continued)

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

7.9.1. Horizontal Polarity



7.9.2. Vertical Polarity



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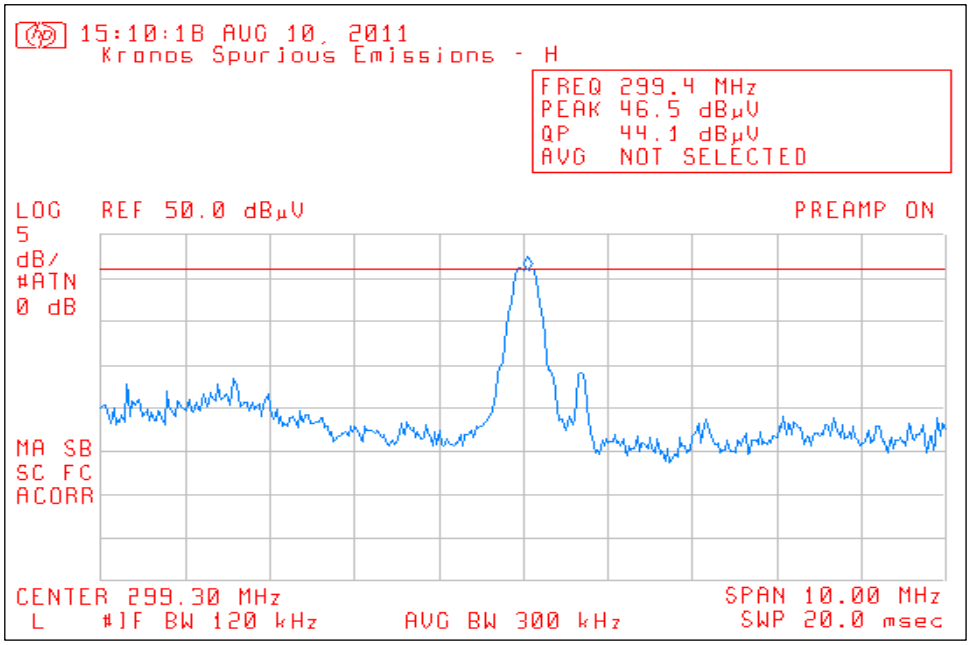
7. Measurement Data (continued)

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

7.9.3. Worst Case – Quasi-Peak



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)
299.40	46.5	44.1	46.00	-1.90

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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		Limit (mW/cm2)	Result
				(mW/cm2)	(W/m2)		
	(1)	(2)	(3)	(4)		(5)	
N/A	20.0	-21.37	1.0	0.0000018	0.0000183	1	Compliant

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

- **PD = Power Density (mW/cm^2)**
- **OP = DUT Peak 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 7.5, column 3 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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