COMPLIANCE WORLDWIDE INC.
TEST REPORT 318-11

In Accordance with the Requirements of

Federal Communications Commission CFR Title 47 Part 15.225, Subpart C
Industry Canada RSS 210, Issue 8, Annex 2

Low Power License-Exempt Radio Communication Devices
Intentional Radiators

Issued to

Kronos, Incorporated
4 Omni Way
Chelmsford, MA. 01824

for the

In Touch 9000 HID Electronic Module

FCC ID: P5W-8609K005
IC: 1416A-8609K005

Report Issued on August 15, 2011

Tested by

Brian F. Breault

Reviewed by

Larry K. Stillings

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Compliance Worldwide, Inc. - 357 Main Street - Sandown, NH 03873
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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-XX5 and this represents Part numbers: 8609000-005, 8609000-055 and 8609000-405

2.3. Serial Number: N/A

2.4. Description of EUT: Passive Tag Transmitter HID 13.56 MHz

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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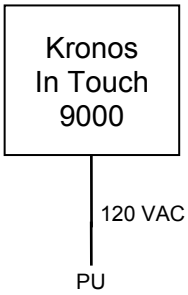
3. Product Configuration (continued)

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 (continued)

4.3. Measurement Procedure

The test measurements contained in this report are based on the requirements detailed in FCC Part 15, Subpart C - Intentional Radiators, notably Section 15.225, Operation within the band 13.110 – 14.010 MHz.

The test methods used to generate the data is this test report are in accordance with ANSI C63.4: 2003, 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.

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 13.56 MHz

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6. Measurement Summary

Test Requirement	FCC Part 15 Reference	RSS Reference	Test Report Section	Result	Comment
Antenna Requirement	15.203	RSS-GEN Section 7.1.2	6.1	Compliant	
Power Line Conducted Emissions	15.207	RSS-GEN Section 7.2.4	6.2	Compliant	Reference ANSI C63.4 Annex H, Paragraph H1(b)
Spurious Radiated Emissions	15.209		6.3	Compliant	
Field Strength of Fundamental	15.225(a)	RSS-210 Section A2.6	6.4	Compliant	
Frequency Tolerance of the Carrier Signal	15.225(e)	RSS-210 Section A6.1.6	6.5	Compliant	
Occupied Bandwidth/ Lower and Upper Band Edges	15.215(c)	N/A	6.6	Compliant	
99% Power Bandwidth	N/A	RSS-GEN Section 4.6.1	6.7	Compliant	
Receiver Spurious Emissions	N/A	RSS-GEN Section 4.10	6.8	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. Power Line Conducted Emissions (15.207)

Requirement: For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

7.2.1. Test Procedure

Test measurements were made in accordance with ANSI C63.4-2003, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz. Specifically, Annex H, paragraph H1(b) regarding the use of a dummy load for a Part 15 transmitter.

7.2.2. Test Limits

Frequency Range (MHz)	Limits (dBµV)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5.0	56	46
5.0 to 30.0	60	50
* Decreases with the logarithm of the frequency.		

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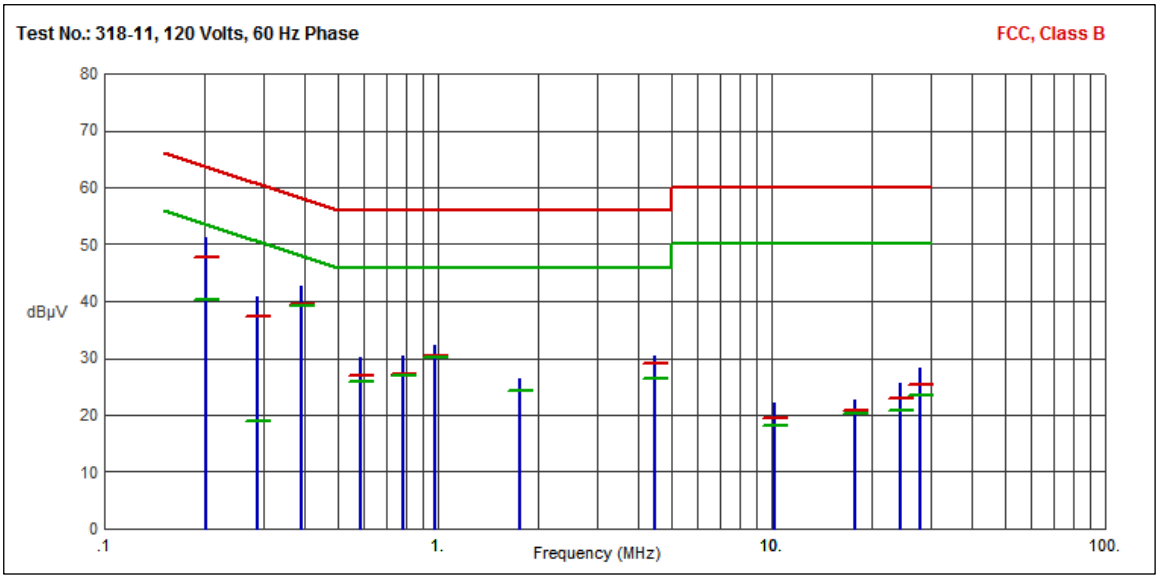
7. Measurement Data (continued)

7.2. Power Line Conducted Emissions (15.207) (continued)

7.2.3. Conducted Emissions Test Data (with antenna attached, measured outside the transmitter's fundamental emissions band)

7.2.3.1. 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
.2007	51.15	47.63	63.58	-15.95	40.16	53.58	-13.42	
.2876	40.92	37.28	60.59	-23.31	19.00	50.59	-31.59	
.3917	42.78	39.41	58.03	-18.62	39.29	48.03	-8.74	
.5862	30.09	26.94	56.00	-29.06	25.78	46.00	-20.22	
.7830	30.41	27.10	56.00	-28.90	26.96	46.00	-19.04	
.9782	32.16	30.31	56.00	-25.69	30.05	46.00	-15.95	
1.7623	26.37	24.35	56.00	-31.65	24.24	46.00	-21.76	
4.4890	30.35	29.06	56.00	-26.94	26.41	46.00	-19.59	
10.1884	22.25	19.35	60.00	-40.65	18.17	50.00	-31.83	
17.6953	22.55	20.92	60.00	-39.08	20.30	50.00	-29.70	
24.2986	25.72	23.04	60.00	-36.96	20.80	50.00	-29.20	
28.0216	28.21	25.21	60.00	-34.79	23.36	50.00	-26.64	

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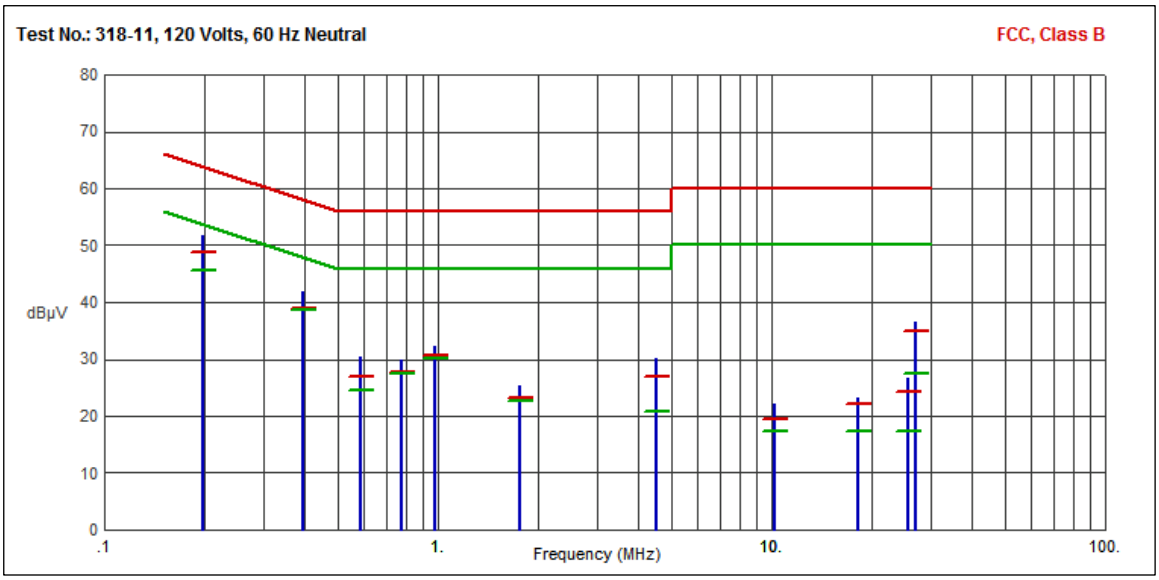
7. Measurement Data (continued)

7.2. Power Line Conducted Emissions (15.207) (continued)

7.2.3. Conducted Emissions Test Data (with antenna attached, measured outside the transmitter's fundamental emissions band) (continued)

7.2.3.2. 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
.1970	51.73	48.73	63.74	-15.01	45.58	53.74	-8.16	
.3926	41.78	38.82	58.01	-19.19	38.64	48.01	-9.37	
.5851	30.43	27.03	56.00	-28.97	24.58	46.00	-21.42	
.7817	29.92	27.65	56.00	-28.35	27.46	46.00	-18.54	
.9777	32.36	30.62	56.00	-25.38	30.10	46.00	-15.90	
1.7597	25.37	23.08	56.00	-32.92	22.69	46.00	-23.31	
4.4973	30.25	26.97	56.00	-29.03	20.77	46.00	-25.23	
10.1746	22.03	19.35	60.00	-40.65	17.29	50.00	-32.71	
18.2430	23.22	22.21	60.00	-37.79	17.31	50.00	-32.69	
25.6552	26.70	24.22	60.00	-35.78	17.22	50.00	-32.78	
27.1204	36.66	35.00	60.00	-25.00	27.56	50.00	-22.44	

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7. Measurement Data (continued)

7.3. Spurious Radiated Emissions (15.209)

Requirement: The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table (Reference FCC 15.209):

Frequency MHz	Distance Meters	Limit dBμV/m (Quasi-Peak)	Limit μV/m
1.705 - 30	30 [10]	29.5 [49.5]	30 [300]
30 - 88	3	40.0	100
88 - 216	3	43.5	150
216 - 960	3	46.0	200
960 - 1000	3	54.0	500
1000 - 40000	3	54.0	500

Note: Extrapolation below 30 MHz is 40 dB/decade

7.3.1. Test Procedure

Test measurements were made in accordance with ANSI C63.4-2003, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

7.3.2. Spurious Radiated Emissions – Below 30 MHz

There were no measurable spurious emissions below 30 MHz.

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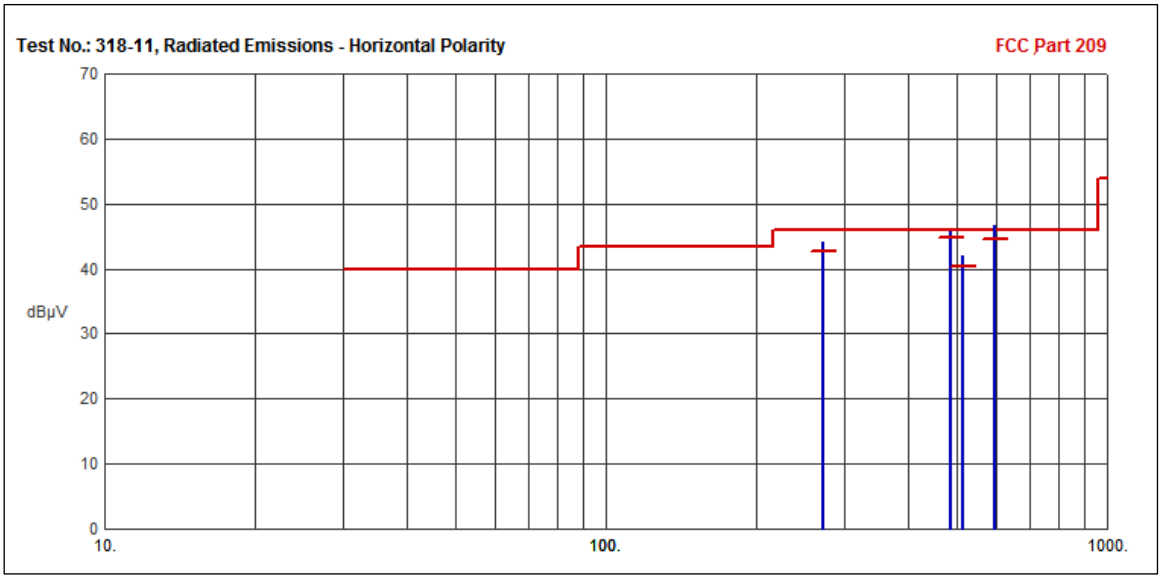
7. Measurement Data (continued)

7.3. Spurious Radiated Emissions (continued)

7.3.3. Spurious Radiated Emissions - 30 MHz to 1 GHz,

7.3.3.1. Horizontal Polarity



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
271.1914	44.04	42.67	46.00	-3.33	N/A	N/A	
488.1535	45.75	44.90	46.00	-1.10	N/A	N/A	
515.2745	41.93	40.28	46.00	-5.72	N/A	N/A	
596.6260	46.75	44.52	46.00	-1.48	N/A	N/A	

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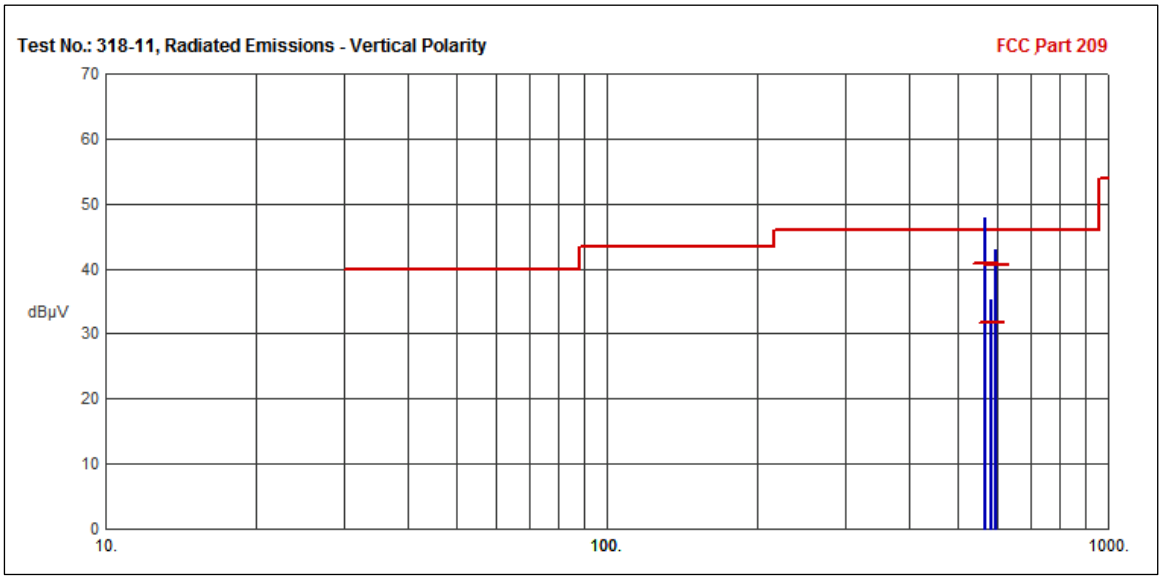
7. Measurement Data (continued)

7.3. Spurious Radiated Emissions (continued)

7.3.3. Radiated Emissions - 30 MHz to 1 GHz,

7.3.3.2. Vertical Polarity



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
569.5265	47.90	40.86	46.00	-5.14	N/A	N/A	
583.0695	35.21	31.74	46.00	-14.26	N/A	N/A	
596.6359	42.86	40.55	46.00	-5.45	N/A	N/A	

7.4. Radiated Emissions Test - Above 1 GHz

There were no measurable radiated emissions that could be attributed to the product transmitter.

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7. Measurement Data (continued)

7.3. Spurious Radiated Emissions (continued)

7.3.4. Harmonic Radiated Emissions

Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Pol (H/V)	Ant Ht (cm)	Table (Deg)	Result
27.12	18.3	13.4	49.5	-36.1	N/A	100	0	Compliant
40.68	33.0	27.1	40.0	-12.9	V	100	0	Compliant
54.24	32.2	25.8	40.0	-14.2	V	213	0	Compliant
67.80	24.0	18.9	40.0	-21.1	V	100	0	Compliant
81.36	26.5	20.6	40.0	-19.4	V	100	0	Compliant
94.92	36.0	33.4	43.5	-10.1	H	100	0	Compliant
108.48	26.6	21.7	43.5	-21.8	V	100	0	Compliant
122.04	43.9	42.4	43.5	-1.1	V	100	154	Compliant
135.60	31.0	25.7	43.5	-17.8	V	100	0	Compliant

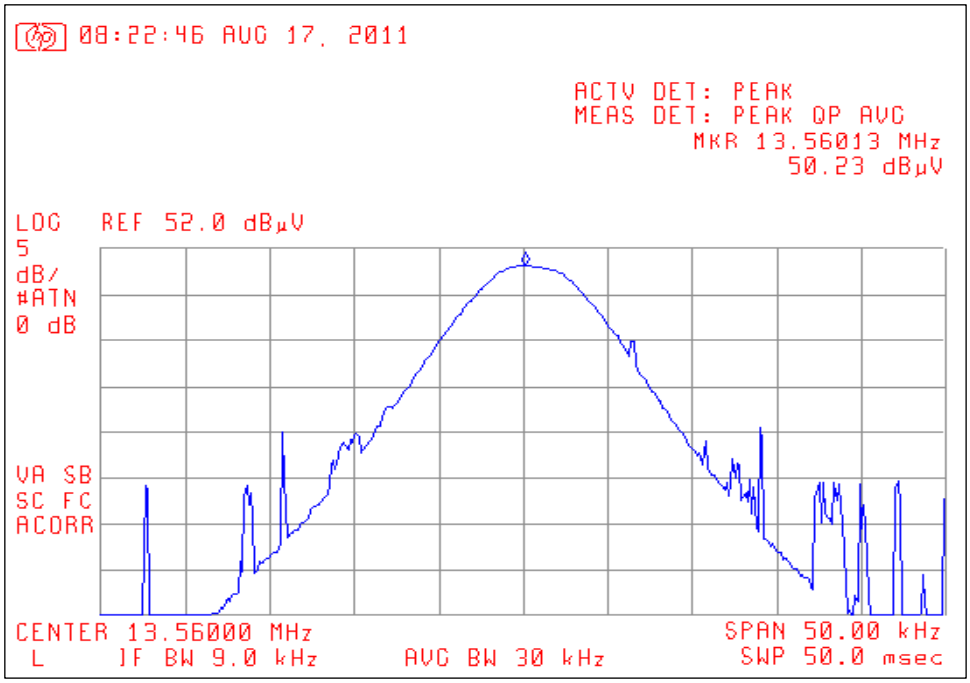
7.4. Field Strength of Fundamental

Requirement: The field strength of any emissions within the band 13.553 - 13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

Freq. (MHz)	Dist. (Meters)	Measurement		Limit[1]		Margin	Power
		µV/m	dBµV/m	µV/m	dBµV/m	(dB)	Watts
13.56	10	324.71	50.23	158,480	103.99	-43.31	0.0000000351

[1] Limit has been extrapolated to 10 meters.

7.4.1. Measurement Plot



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7. Measurement Data (continued)

7.5. Frequency Tolerance of the Carrier Signal

Requirement : The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

7.5.1. Normal Operating Conditions

Ambient Temp (°C)	Normal Voltage	Measured Frequency (MHz)
21.5	120	13.560125

Based on the measured frequency under normal operating conditions, the allowable tolerance of the carrier signal is 13.558637 MHz to 13.561348 MHz.

7.5.2. Temperature Stability (measured at the normal voltage)

Extreme Temp	Measured Frequency	Acceptable Range		Result
°C	MHz	F_{LO}	F_{HI}	
-20	13.56000	13.558769	13.561481	Compliant
+50	13.56001			Compliant

7.5.3. Voltage Stability (measured at ambient temperature)

Extreme Voltage	Measured Frequency	Acceptable Range		Result
VAC	MHz	F_{LO}	F_{HI}	
102	13.56013	13.558769	13.561481	Compliant
138	13.56019			Compliant

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7. Measurement Data (continued)

7.6. Occupied Bandwidth

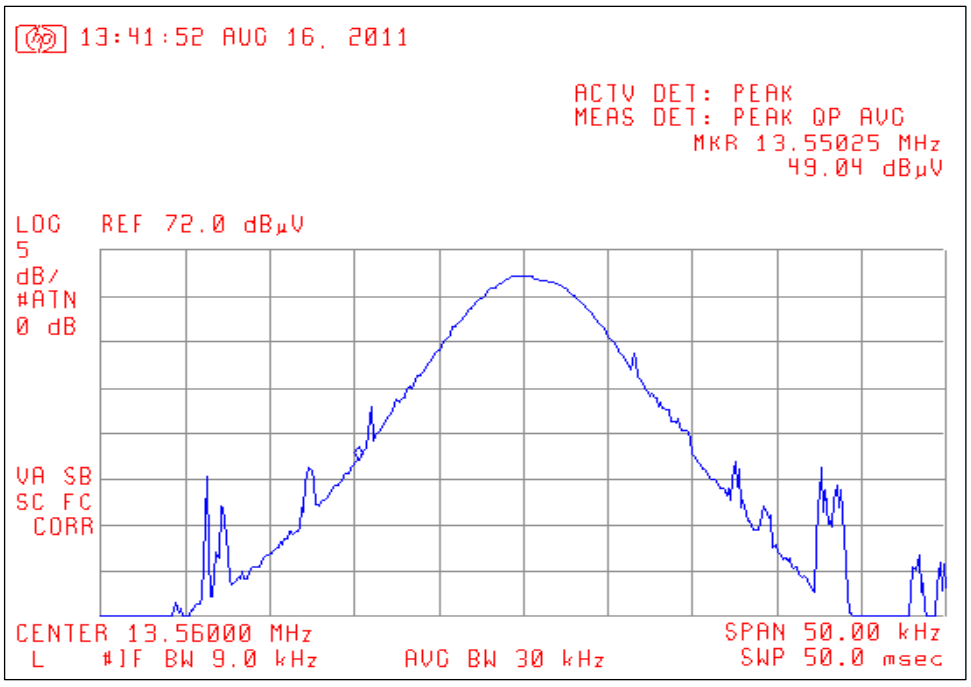
Requirement: Intentional radiators operating under the alternative provisions to the general emission limits, as contained in Sections 15.217 through 15.255 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule.

Frequency Band: F_{MIN} = 13.110 MHz

F_{MAX} = 14.010 MHz

	-20 dB Frequency Measured	Lower & Upper Band Edge	Result
	MHz	MHz	
F_{LO}	13.55025	13.11	Compliant (F_{LO} > F_{MIN})
F_{HI}	13.57025	14.01	Compliant (F_{HI} < F_{Max})

7.6.1. Plot of 20 dB Bandwidth vs. Frequency Band
Lower Band Edge



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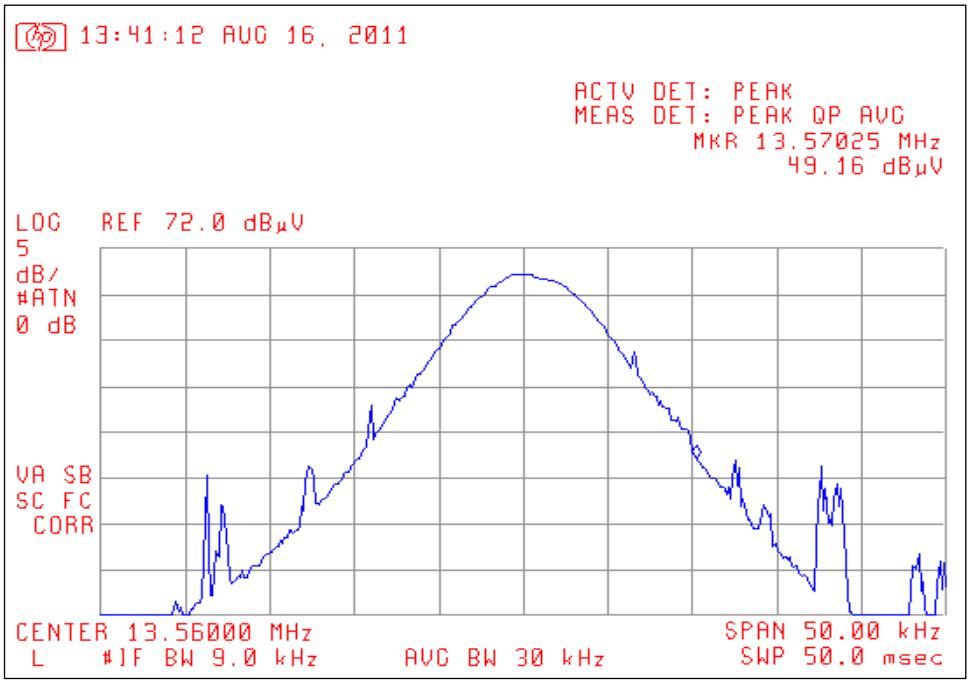
7. Measurement Data (continued)

7.6. Occupied Bandwidth

7.6.1. Plot of 20 dB Bandwidth vs. Frequency Band
Upper Band Edge



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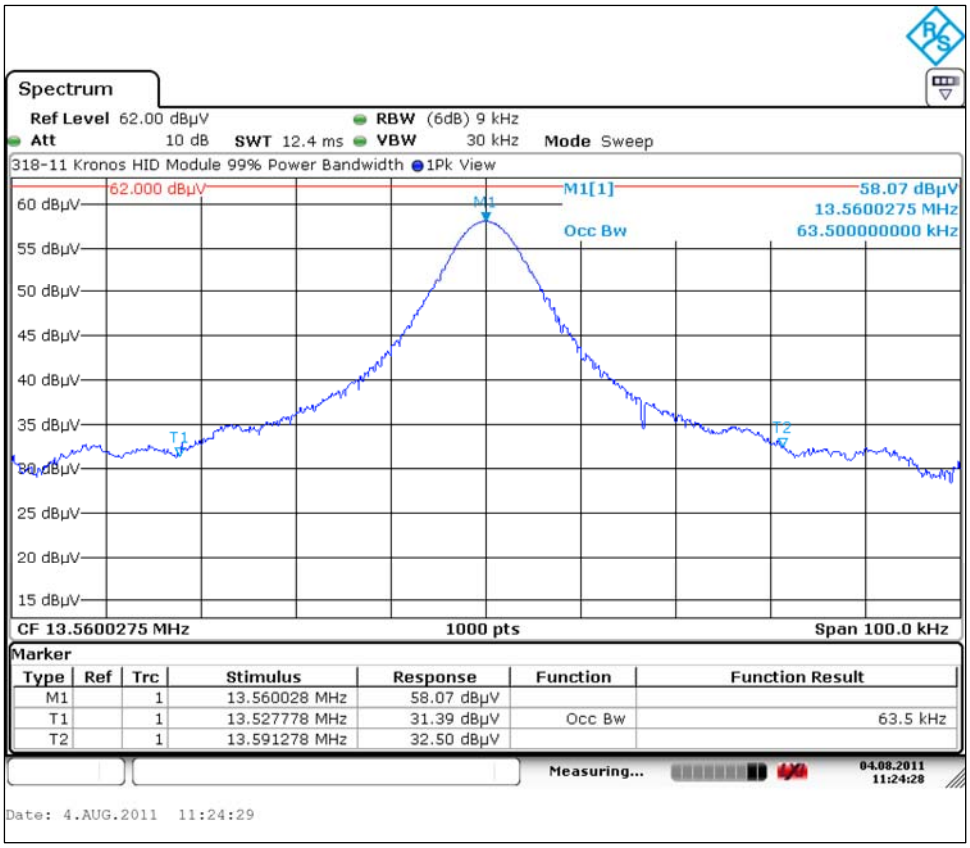
6. Measurement Data (continued)

7.7. 99% Power Bandwidth

7.7.1. Plot of 99% Power Bandwidth

Frequency	99% Power Bandwidth
(MHz)	(kHz)
13.56	63.5



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7. Measurement Data (continued)

7.8 Receiver Spurious Emissions (RSS-GEN Issue 3, Section 4.10)

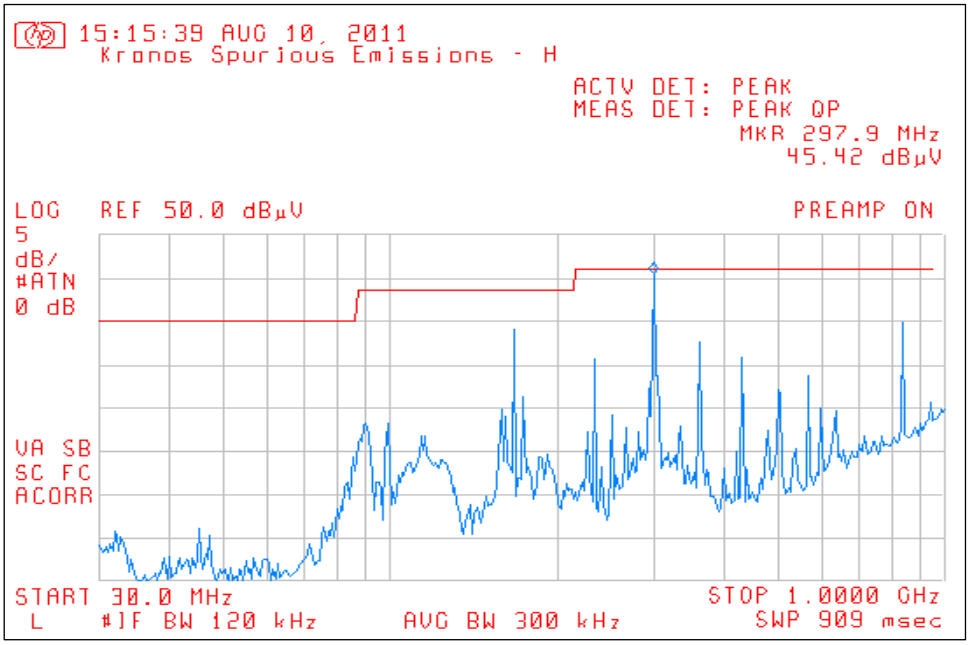
Requirement: The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is higher, to at least 3 times the highest tunable or local oscillator frequency, whichever is higher, without exceeding 40 GHz.

Test Note: In order to perform this test, the transmitter was disabled by internally disconnecting the feed cable to the module. This does not represent a normal operating condition.

7.8.1. 150 kHz to 30 MHz

No measurable signals.

7.8.2. 30 MHz to 1 GHz, Horizontal Polarity



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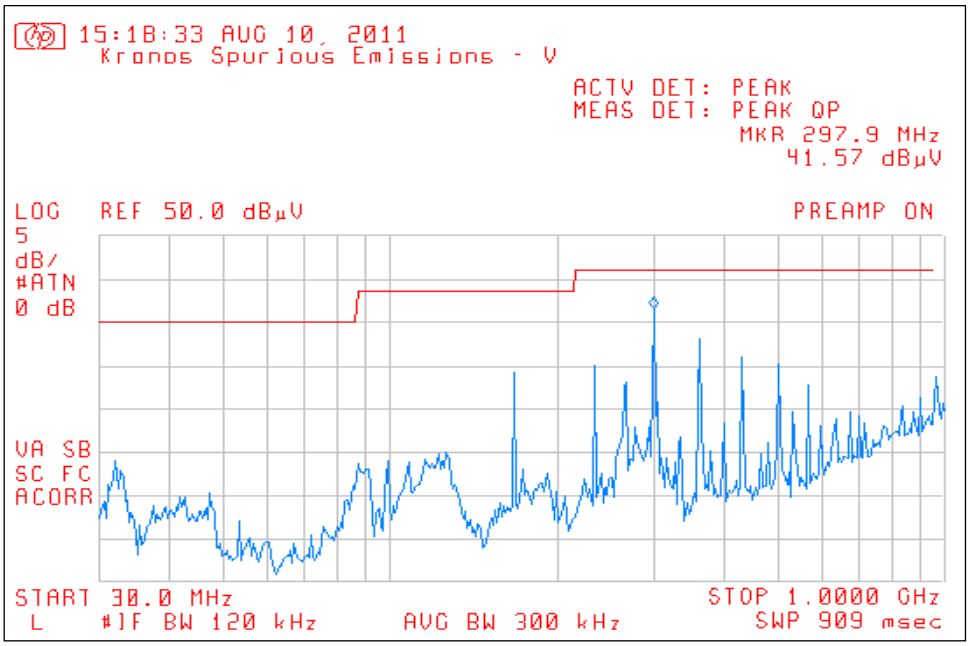
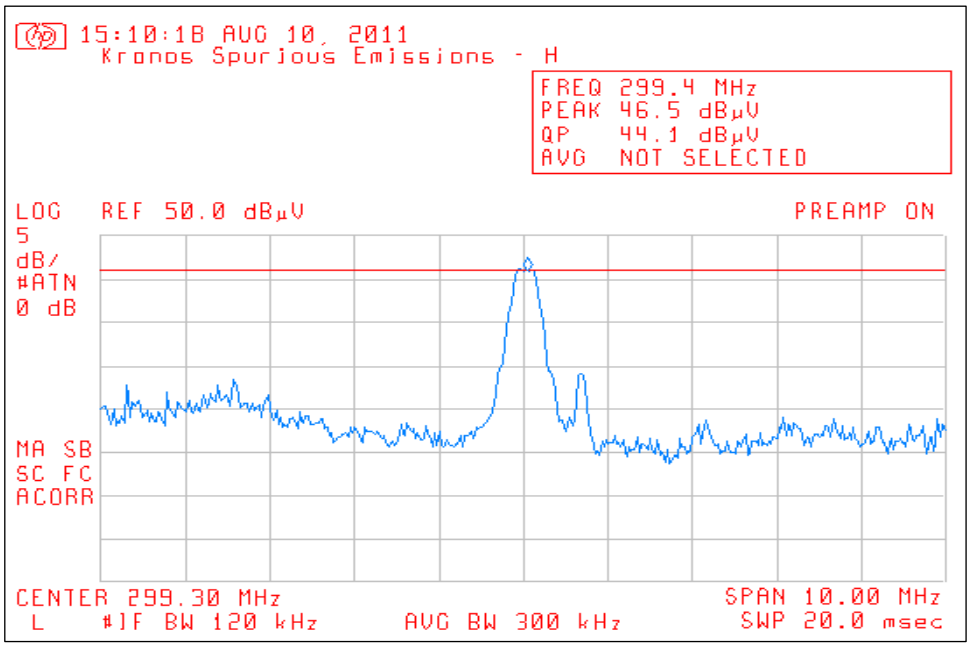
7. Measurement Data (continued)

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

7.8.3. 30 MHz to 1 GHz, Vertical Polarity



7.8.4. 30 MHz to 1 GHz, Worst Case



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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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), Industry Canada, and Voluntary Control Council Interference (VCCI) standards. A description of the test sites is on file with the FCC (registration number 96392), 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 meters W x 1.5 meters L x 2.0 meters H, floor standing or table top.

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