

TEST REPORT

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Project Number: G101454375

Report Issue Date: 1/10/2014

Product Designation: Model: EN1240

Standards: FCC title 47 CFR part 15 subpart C

Tested by:
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Client:
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1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 3.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested Passed the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

2 Test Summary

Section	Test full name	Test date	Result
5	Radiated Emissions – Output power of the Fundamental & Harmonics of the Fundamental - FCC 247(b)(2) (d)/15.205 Covers RSS-210 A8.4(1)	12/16/2013	Pass
		12/17/2013	
6	Tx Band Edge & Restricted Band – FCC 15.247(d)/15.205/209 Covers RSS-210 A8.5/RSS-GEN	12/17/2013	Pass
7	Radiated Emissions – Tx Spurious Emissions (Non Harmonics) - FCC 15.247(d) / FCC 15.209/109 Covers RSS-210 A8.5/RSS-GEN	12/17/2013	Pass
8	Radiated Emissions – Idle/Standby Unintentional Emissions FCC 15.109	12/17/2013	Pass
9	20 dB Bandwidth – FCC 15.247 (a)(1)(i) Covers RSS-210 A8.1(c)	12/17/2013	Pass
10	Carrier Frequency Separation – FCC 15.247 (a)(1) Covers RSS-210 A8.1(b)	01/06/2014	Pass
11	Number of Hopping Frequencies – FCC 15.247 (a)(1)(i) Covers RSS-210 A8.1(c)	01/06/2014	Pass
12	Time of Occupancy (Dwell Time) – FCC 15.247 (a)(1)(i) Covers RSS-210 A8.1(c)	01/06/2014	Pass
13	AC Conducted Emissions – FCC 15.207 Covers RSS-Gen 7.2.4	-----	N/A

Notes:

- 1) The product is internal battery-powered – therefore, ac conducted emissions do not apply.

General Radio Remarks:

Testing was performed in 3 different orthogonal axes to determine the worst-case emissions from the device. The worst-case axis and emissions are shown in this report.

FCC CFR47 Part 15.31: Measurement Standards: In any case where the device is powered off a battery, a fresh battery was used during testing.

FCC CFR Part 15.35: Measurement Detector Functions and Bandwidths: FCC Part 15.35 was utilized when performing measurements within this report.

Whenever possible, the approved test procedures specified in FCC DA 00-705 for FHSS (Frequency Hopping Spread Spectrum) devices was used for testing.

The product tested was configured with an integral antenna – therefore all measurements are radiated field strength measurements. If antenna conducted port tests cannot be performed, radiated field strength measurements may be taken to demonstrate compliance with the various conducted port power requirements of FCC 15.247.

2.1 Test Facility

Intertek Denver's testing facilities are located at 1795 Dogwood St. Suite 200 Louisville, CO 80027. The testing facility is ISO17025:2005 accredited by A2LA, our lab code is 2506.02, our VCCI registration numbers are: R-1643, C-1752 and T-1558, our FCC designation no. US1121 and our IC lab no. 2042N.

Testing contained in this test report may not be covered under the laboratories scope of accreditation. A note will be placed in the specific test section for testing not covered under the laboratories scope.

3 Description of Equipment Under Test

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Activity Sensor	Inovonics Wireless	EN1240	SN: 99514146 SN: 99514116

Receive Date:	12/16/2012
Received Condition:	Good
Type:	Production Samples

Description of Equipment Under Test (provided by client)

The EN1240 activity sensor is designed specifically for residential and senior living environments where a notification of a daily activity is necessary. The EN1240 leverages the latest motion detector technology, including white light and pet immunity, to ensure performance accuracy. Selectable fixed sleep intervals of two, four, or six hours are used to minimize wireless traffic in large installations, while confirming daily resident activity. Check-in messages are sent every 30 minutes to provide effective notification of recent resident activity even when the device is in the fixed sleep cycle.

Product transmit range: 902.4MHz to 927.6 MHz, 25-channels, FHSS

Modulation: FSK

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
(Internal Battery Only) 3VDC CR123A Lithium	unknown	---	---

Operating modes of the EUT: Intentional Tx Testing

No.	Descriptions of EUT Exercising
1	EUT shall be powered by an internal battery, energized as intended & programmed to transmit continuously at one of three channel frequencies, low (902.4MHz), center (914.8MHz) and high (927.6MHz). Product modulation could be enabled or disabled as needed.
2	EUT set up in normal FHSS mode of operation, hopping on all 25 channels.

Operating modes of the EUT: Unintentional Idle/Standby Testing

No.	Descriptions of EUT Exercising
1	EUT shall be powered by an internal battery, energized as intended & programmed to operate in idle/standby mode of operation.

Clock Frequencies of the EUT:

No.	Descriptions of EUT Exercising
1	32.768kHz – micro-controller clock.
2	30.0MHz – radio clock frequency
3	2MHz ~ 3MHz switching regulator for power amplifier (PA) circuit.

3.1 Product Photo:

Product Tested – Model: EN1240



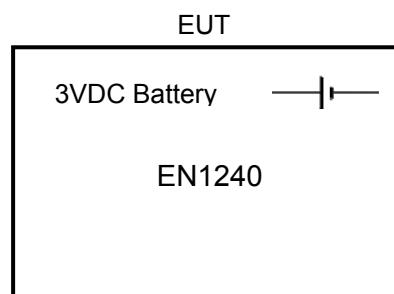
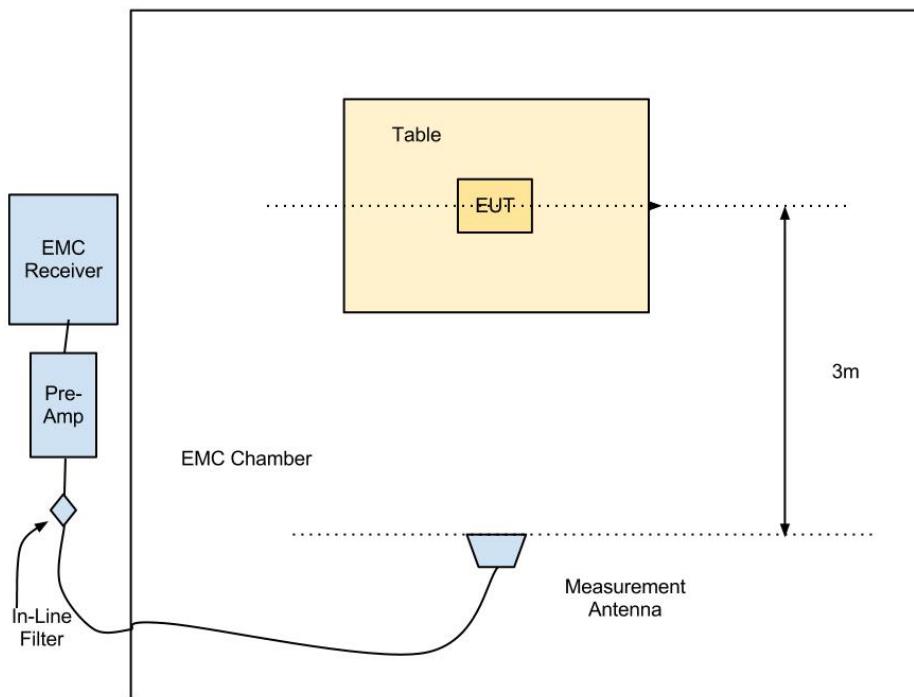
4 System setup including cable interconnection details, support equipment and simplified block diagram

4.1 Method:

The EUT is a stand-alone device powered by an internal battery. No external support cables are necessary for normal operation.

4.2 EUT Block Diagram:

Top View – Radiated Emissions Chamber



4.3 Support Data:

ID	Description/ Function	Shield Type	Length	Connector	Connection	Ferrites
---	---	---	---	---	---	---

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Laptop Computer	Dell	---	---

General notes:

1. Product has no I/O or signal cables.
2. Product did not require any support equipment other than laptop computer to configure Tx settings.

5 Radiated Emissions – Intentional Radiators: Output Power - Fundamental & Harmonics of the Fundamental – FCC 15.247(b)(2)**5.1 Method**

The test methods used comply with ANSI C63.10. Unless otherwise stated no deviations were made from **FCC CFR47 15.247**.

This testing was performed at Intertek Denver, located at 1795 Dogwood St. Suite 200, Louisville, CO 80027.

5.2 Test Equipment Used:

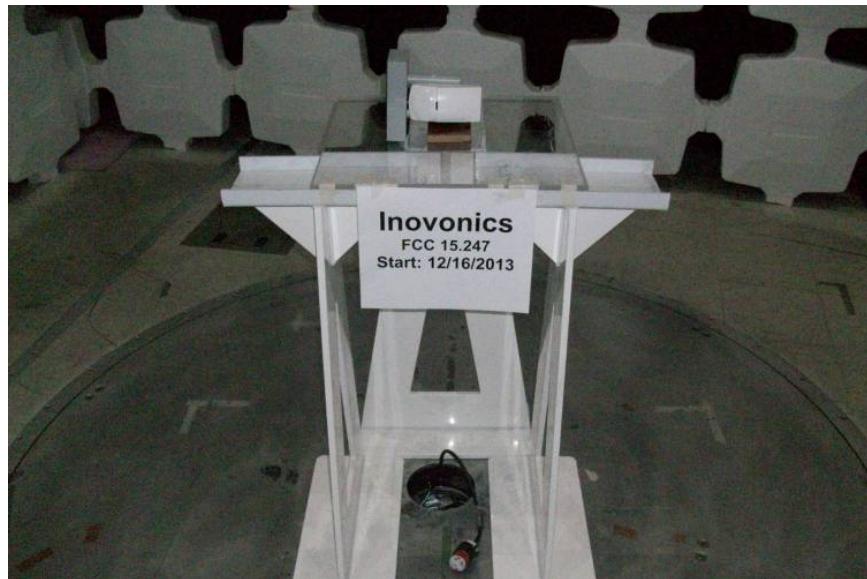
Asset ID	Description	Manufacture	Model	Serial	Cal Date	Cal Due
DEN-073	EMI Receiver	ROHDE & SCHWARZ	ESU 26	100265	01/23/2013	01/23/2014
18912	9 kHz- 1.3GHz Pre Amp	Hewlett-Packard	8447F	3113A05545	06/07/2013	06/07/2014
19937	Bilog Antenna 30MHz - 6GHz	Sunol Sciences	JB6	A050707-2	03/20/2013	03/20/2014
18906	RF Pre-Amp (1-4GHz)	Mini-Circuits Lab	ZHL-42	N052792-2	06/10/2013	06/10/2014
DEN-032	4-18 GHz LNA	NARDA	DBL-0618N615	031	03/07/2013	03/07/2014
18887	Horn Antenna 1-18GHz	EMCO	3115	9205-3886	03/19/2013	03/19/2014
DEN-060	1GHz low Pass Filter	Mini-Circuits	VHF-1300+	3 1022	12/19/2013	12/19/2014
SW-6	Software for Radiated and Conducted emissions.	Intertek	OATS vba	V. 1.0	VBU	VBU

5.3 Results:

The sample tested was found to Comply.

5.4 Setup Photographs:

Test Setup – Tx Fundamental Output & Harmonics of Fundamental (Front View)



(Rear View)



Photo:

Product Test Axis 1



Product Test Axis 2



Product Test Axis 3

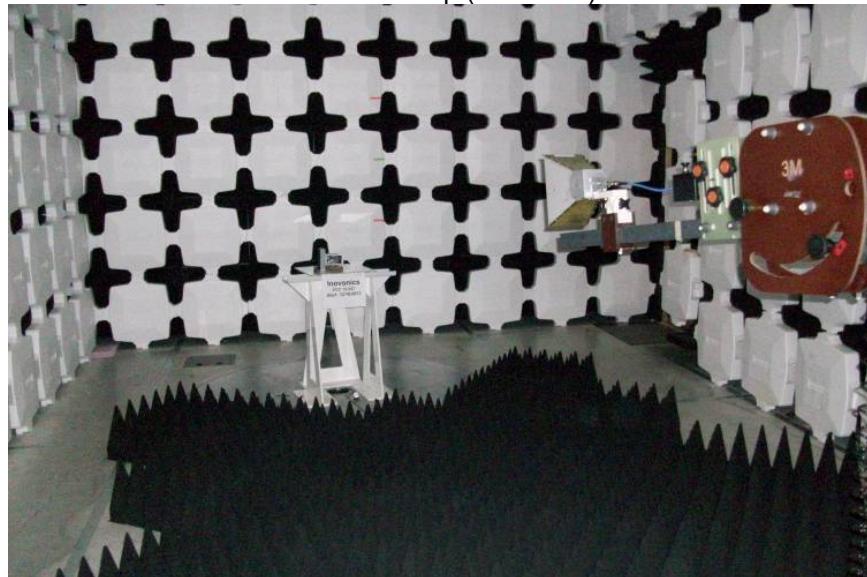


Photo:

Antenna Setup (30-1000 MHz)



Antenna Setup (1-10 GHz)



5.5 Test Data: Fundamental Peak Output Power

Fundamental Peak Output Power
of the TransmitterTest Report #: **G101454375**

Test Area: CC1 Radiated

Temperature: 22.8 °C

Test Method: FCC 15.247 FHSS

Test Date: 16-Dec-2013

Relative Humidity: 23.7 %

EUT Model #: EN1240

EUT Power: 3V Battery

Air Pressure: 82.9 kPa

EUT Serial #: 99514146

Manufacturer: Inovonics Wireless

Level Key

EUT Description: Activity Sensor

Pk – Peak Nb – Narrow Band

Notes Product transmitting continuously – worst-case modulation [Tx power PA = 27)

Qp – QuasiPeak Bb – Broad Band

(3) Test Axes measured; Lowest, Middle and Highest Channels measured

Av - Average

RF Radiated Field Measurements @ 3-meters, Peak detector, 1MHz RBW, 3MHz
VBW

The following Duty Cycle was verified by Intertek: Not applicable for fundamental < 1GHz														
Averaging method for pulsed signals and calculation in accordance to FCC CFR47 Part 15.35 utilized to calculate field strength emissions.														
The testing performed in accordance to FCC CFR47 Part 15.247 and delta limits were calculated as follows:														
Final Corrected Peak Measurement – Duty Cycle Correction Factor* = Final Calculated Emission														
The Final Calculated Emission was then compared to the Limits in CFR47 Part 15.247 and the emission/limit delta was calculated.														
DTCF is calculated as follows $20 \times \log_{10}$ (duty cycle in 100mS).														
Part 15.247 FHSS														
FREQ [MHz]	LEVEL [dBuV/m]	DET Qp Av Pk	CABLE + [dB]	Antenna + [dB/m]	PREAMP - [dB]	FINAL = [dBuV/m]	Duty Cycle CF [dB]	Duty Cycle Corrected FINAL	POL (V/H)	HGT (m)	AZ (DEG)	LIMIT [dBuV/m]	DELTA LIMIT [dB]	RBW (MHz)
Fundamental Measurements – RF Radiated Field [dBuV/m]														
Tx Lowest Channel														
Axis 1 – Product Flat on Table														
902.4000	70.82	Pk	2.10	22.20	0.00	95.11	0.00	95.11	V	1.61	185.0	119.20	- 24.09	1.000
902.4000	80.66	Pk	2.10	22.20	0.00	104.95	0.00	104.95	H	1.58	101.2	119.20	- 14.25	1.000
Axis 2 – Product Vertical														
902.4000	67.16	Pk	2.10	22.20	0.00	91.45	0.00	91.45	H	1.10	197.4	119.20	- 27.75	1.000
902.4000	79.95	Pk	2.10	22.20	0.00	104.24	0.00	104.24	V	1.17	61.7	119.20	- 14.96	1.000
Axis 3 – Product Vertical & Rotated 90 degrees														
902.4000	73.66	Pk	2.10	22.20	0.00	97.95	0.00	97.95	V	1.42	267.2	119.20	- 21.25	1.000
902.4000	82.15	Pk	2.10	22.20	0.00	106.44	0.00	106.44	H	1.00	180.9	119.20	- 12.76	1.000
Tx Mid Channel														
Axis 1 – Product Flat on Table														
914.8000	81.04	Pk	2.11	22.10	0.00	105.26	0.00	105.26	H	1.58	77.1	119.20	- 13.94	1.000
914.8000	71.03	Pk	2.11	22.10	0.00	95.25	0.00	95.25	V	1.36	177.3	119.20	- 23.95	1.000

Axis 2 – Product Vertical														
914.8000	79.50	Pk	2.11	22.10	0.00	103.72	0.00	103.72	V	1.16	70.7	119.20	- 15.48	1.000
914.8000	68.49	Pk	2.11	22.10	0.00	92.71	0.00	92.71	H	1.83	204.6	119.20	- 26.49	1.000
Axis 3 – Product Vertical & Rotated 90 degrees														
914.8000	81.56	Pk	2.11	22.10	0.00	105.78	0.00	105.78	H	1.00	188.4	119.20	- 13.42	1.000
914.8000	72.91	Pk	2.11	22.10	0.00	97.13	0.00	97.13	V	1.38	278.6	119.20	- 22.07	1.000
Tx Highest Channel														
Axis 1 – Product Flat on Table														
927.6000	72.60	Pk	2.13	22.25	0.00	96.97	0.00	96.97	V	1.50	189.4	119.20	- 22.23	1.000
927.6000	79.30	Pk	2.13	22.25	0.00	103.67	0.00	103.67	H	1.56	105.0	119.20	- 15.53	1.000
Axis 2 – Product Vertical														
927.6000	66.99	Pk	2.13	22.25	0.00	91.36	0.00	91.36	H	1.81	196.4	119.20	- 27.84	1.000
927.6000	79.17	Pk	2.13	22.25	0.00	103.54	0.00	103.54	V	1.09	84.0	119.20	- 15.66	1.000
Axis 3 – Product Vertical & Rotated 90 degrees														
927.6000	73.02	Pk	2.13	22.25	0.00	97.39	0.00	97.39	V	1.36	274.0	119.20	- 21.81	1.000
927.6000	81.66	Pk	2.13	22.25	0.00	106.03	0.00	106.03	H	1.00	182.0	119.20	- 13.17	1.000

5.6 Measurement Summary

Worst Case Fundamental Measurement: Lowest Channel 902.40 MHz, 106.44 dBuV/m (-12.76 dB under limit)														
FREQ	LEVEL	DET	CABLE	Antenna	PREAMP	FINAL	Duty Cycle CF	Duty Cycle Corrected	POL	HGT	AZ	LIMIT	DELTA LIMIT	RBW
[MHz]	[dBuV/m]	Qp Av Pk	+ [dB]	+ [dB/m]	- [dB]	= [dBuV/m]	[dB]	FINAL	(V/H)	(m)	(DEG)	[dBuV/m]	[dB]	(MHz)
902.4000	82.15	Pk	2.10	22.20	0.00	106.44	0.00	106.44	H	1.00	180.9	119.20	- 12.76	1.000

- **FCC DA 00-705 FHHS Measurement Guidance: 2000, Section “Peak Output Power” (RBW > 20dB BW, Peak Detector)**
- **Specification: Maximum Peak Conducted Output Power 0.25 W (119.2 dBuV/m @ 3-meters)**
Note: FHSS systems ≥ 25 channels and < 50 channels

Notes:

1. All Fundamental and Harmonics measurements are RF Radiated Field – peak detector measurements - 1MHz RBW, which is greater than the 20dB BW.
2. Fundamental measurements were not adjusted by a duty cycle correction factor - frequencies were less than 1GHz.
3. The device was measured at 3 meters measurement antenna to product test distance.
4. The device was placed on a turntable 80 cm high, it was rotated 360 degrees and the measurement antenna was raised and lowered between 1 and 4 meters to maximize emissions from this device.

Conversion of RF Port Output Power of the Fundamental Limit to Radiated Field Strength Limit

When limits are defined as conducted port power measurements and the product has an integral antenna, radiated field strength tests to demonstrate compliance are acceptable per FCC 15.247(b)(2).

The following equation was used to convert RF Port Power (Watts) limit into a Radiated Field Strength (dBuV/m) limit:

$$P [W] = \frac{(E \cdot d)^2}{30G}$$

Therefore:

$$E [V/m] = \frac{\sqrt{30PG}}{d}$$

Power Limit Fundamental Frequency = 250mW => E = 119.2 dBuV/m

Where:

E = Measured Field Strength in V/m (converted to dBuV/m in test data)

P = 250mW Fundamental Limit

G = Numeric Gain of transmitting antenna over an ideal isotropic radiator = 1 (assumes worst case)

d = EUT-to-Antenna Test Distance = 3-meters

Peak power from Fundamental field strength.

$$P [W] = \frac{(E \cdot d)^2}{30G}$$

Where:

E = Measured Field Strength in V/m (converted to dBuV/m in test data) = 106.44 dBuV/m = 0.21V/m

G = Numeric Gain of transmitting antenna over an ideal isotropic radiator = 1 (assumes worst case)

d = EUT-to-Antenna Test Distance = 3-meters

P = 0.013 W

Limit = 0.25 W

Delta = -0.237W

Test Data: Spurious Harmonics of the Fundamental

Spurious Harmonics of the Transmitter

Test Report #:	G101454375	Test Area:	CC1 Radiated	Temperature:	22.8	°C						
Test Method:	FCC 15.247 FHSS	Test Date:	16-Dec-2013	Relative Humidity:	23.7	%						
EUT Model #:	EN1240	EUT Power:	3V Battery	Air Pressure:	82.9	kPa						
EUT Serial #:	99514146											
Manufacturer:	Inovonics Wireless											
EUT	Activity Sensor											
Description:												
Notes	Product transmitting continuously – worst-case modulation (Tx power PA = 27)											
(3) Test Axes measured; Lowest, Middle and Highest Channels measured												
RF Radiated Field Measurements @ 3-meters, Peak detector, 1MHz RBW, 3MHz VBW												

The following Duty Cycle was verified by Intertek: 20.8%, 13.6dB Duty Cycle Correction Factor

Averaging method for pulsed signals and calculation in accordance to FCC CFR47 Part 15.35 utilized to calculate field strength emissions.

The testing performed in accordance to FCC CFR47 Part 15.247 and delta limits were calculated as follows:

Final Corrected Peak Measurement – Duty Cycle Correction Factor* = Final Calculated Emission

The Final Calculated Emission was then compared to the Limits in CFR47 Part 15.247 and the emission/limit delta was calculated.

DTCF is calculated as follows $20 \times \log_{10}$ (duty cycle in 100ms).

Part 15.247 FHSS

FREQ	LEVEL	DET	CABLE	Antenna	PREAMP	FINAL	Duty Cycle CF	Duty Cycle Corrected	POL	HGT	AZ	LIMIT	DELTA LIMIT	RBW
[MHz]	[dBuV/m]	Qp Av Pk	+ [dB]	+ [dB/m]	- [dB]	= [dBuV/m]	[dB]	FINAL	(V/H)	(m)	(DEG)	[dBuV/m]	[dB]	(MHz)

Fundamental Measurements – RF Radiated Field [dBuV/m]

Measurement using 100kHz RBW (300kHz VBW) to determine limits for the Harmonics of the Fundamental

Tx Lowest Channel

902.4000	81.82	Pk	2.10	22.20	0.00	106.12	0.00	106.12	H	1.00	181.0	---	---	0.100
----------	-------	-----------	------	-------	------	--------	------	--------	---	------	-------	-----	-----	-------

Harmonic Low Channel Limit Outside Restricted Bands: 106.12dB - 20dB = 86.12

Tx Mid Channel

914.8000	81.15	Pk	2.11	22.10	0.00	105.36	0.00	105.36	H	1.00	188.0	---	---	0.100
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Harmonic Mid Channel Limit Outside Restricted Bands: 105.36dB - 20dB = 85.36

Tx Highest Channel

927.6000	81.28	Pk	2.13	22.25	0.00	105.66	0.00	105.66	H	1.00	182.0	---	---	0.100
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Harmonic High Channel Limit Outside Restricted Bands: 105.66dB - 20dB = 85.66

Spurious Harmonics of the Transmitter

(Restricted Band Harmonics highlighted in yellow)

FREQ	LEVEL	DET	CABLE	Antenna	PREAMP	FINAL	Duty Cycle CF	Duty Cycle Corrected	POL	HGT	AZ	LIMIT	DELTA LIMIT	RBW
MHz	dBuV/m	Qp Av Pk	+ [dB]	+ [dB/m]	- [dB]	= [dBuV/m]	[dB]	FINAL dBuV/m	(V/H)	(m)	(DEG)	FCC 15.247 (b)(3) [dBuV/m]	[dB]	(MHz)
Harmonics (Spurious) of the Fundamental Measurements – RF Radiated Field [dBuV/m]														
Tx Lowest Channel														
1804.8385	64.99	Pk	3.02	26.80	37.06	57.75	13.60	44.15	H	1.63	189.1	86.12	- 41.97	1.000
1804.8385	56.75	Pk	3.02	26.80	37.06	49.51	13.60	35.91	V	1.28	113.9	86.12	- 50.21	1.000
2707.2577	55.74	Pk	3.76	28.97	37.47	51.00	13.60	37.40	H	1.54	186.6	54.00	- 16.60	1.000
2707.2577	51.81	Pk	3.76	28.97	37.47	47.07	13.60	33.47	V	1.50	187.5	54.00	- 20.53	1.000
3609.6769	52.99	Pk	4.42	31.57	37.89	51.09	13.60	37.49	H	1.49	93.2	54.00	- 16.51	1.000
3609.6769	51.23	Pk	4.42	31.57	37.89	49.33	13.60	35.73	V	1.26	173.7	54.00	- 18.27	1.000
4512.0000	44.77	Pk	4.99	32.52	35.08	47.20	13.60	33.60	H	1.57	347.3	54.00	- 20.40	1.000
4512.0321	43.41	Pk	4.99	32.52	35.08	45.84	13.60	32.24	V	1.37	27.1	54.00	- 21.76	1.000
5414.4321	49.52	Pk	5.48	34.24	43.30	45.94	13.60	32.34	H	1.48	8.7	54.00	- 21.66	1.000
5414.4321	49.00	Pk	5.48	34.24	43.30	45.42	13.60	31.82	V	1.37	30.4	54.00	- 22.18	1.000
6316.8321	52.15	Pk	5.95	34.92	46.14	46.88	13.60	33.28	H	1.39	199.3	86.12	- 52.84	1.000
6316.8321	50.06	Pk	5.95	34.92	46.14	44.79	13.60	31.19	V	1.16	19.1	86.12	- 54.93	1.000
7219.2321	54.24	Pk	6.41	36.09	47.43	49.32	13.60	35.72	H	1.39	202.6	86.12	- 50.40	1.000
7219.2321	52.08	Pk	6.41	36.09	47.43	47.16	13.60	33.56	V	1.42	32.1	86.12	- 52.56	1.000
8121.6321	48.87	Pk	6.89	37.05	46.42	46.39	13.60	32.79	H	1.39	202.6	54.00	- 21.21	1.000
8121.6321	49.47	Pk	6.89	37.05	46.42	46.99	13.60	33.39	V	1.46	169.4	54.00	- 20.61	1.000
9024.0321	50.00	Pk	7.34	38.37	47.38	48.33	13.60	34.73	H	1.39	181.3	54.00	- 19.27	1.000
9024.0321	48.84	Pk	7.34	38.37	47.38	47.17	13.60	33.57	V	1.46	169.4	54.00	- 20.43	1.000
Tx Mid Channel														
1829.6321	65.29	Pk	3.04	26.95	37.08	58.20	13.60	44.60	H	1.57	178.5	85.36	- 40.76	1.000
1829.6321	58.16	Pk	3.04	26.95	37.08	51.07	13.60	37.47	V	1.53	235.5	85.36	- 47.89	1.000
2744.4481	56.26	Pk	3.79	28.98	37.46	51.57	13.60	37.97	H	1.58	198.4	54.00	- 16.03	1.000
2744.4481	52.26	Pk	3.79	28.98	37.46	47.57	13.60	33.97	V	1.29	29.5	54.00	- 20.03	1.000
3659.2641	54.68	Pk	4.45	31.89	37.89	53.12	13.60	39.52	H	1.52	61.2	54.00	- 14.48	1.000
3659.2641	50.69	Pk	4.45	31.89	37.89	49.13	13.60	35.53	V	1.45	122.9	54.00	- 18.47	1.000
4574.0000	45.40	Pk	5.03	32.56	35.87	47.12	13.60	33.52	H	1.54	0.0	54.00	- 20.48	1.000
4574.0000	43.33	Pk	5.03	32.56	35.87	45.05	13.60	31.45	V	1.28	62.1	54.00	- 22.55	1.000
5488.8000	49.65	Pk	5.52	34.35	43.52	45.99	13.60	32.39	H	1.07	11.5	85.36	- 52.97	1.000
5488.8000	48.73	Pk	5.52	34.35	43.52	45.07	13.60	31.47	V	1.28	33.4	85.36	- 53.89	1.000
6403.6000	54.34	Pk	5.99	34.80	46.48	48.66	13.60	35.06	H	1.07	75.0	85.36	- 50.30	1.000
6403.6000	52.24	Pk	5.99	34.80	46.48	46.56	13.60	32.96	V	1.36	124.6	85.36	- 52.40	1.000
7318.4000	52.35	Pk	6.47	36.53	47.32	48.03	13.60	34.43	H	1.35	135.3	54.00	- 19.57	1.000
7318.4000	51.28	Pk	6.47	36.53	47.32	46.96	13.60	33.36	V	1.20	37.2	54.00	- 20.64	1.000
8233.2000	48.73	Pk	6.95	37.13	46.52	46.28	13.60	32.68	H	1.31	135.3	54.00	- 21.32	1.000
8233.2000	47.79	Pk	6.95	37.13	46.52	45.34	13.60	31.74	V	1.10	21.2	54.00	- 22.26	1.000
9148.0000	47.33	Pk	7.40	38.39	47.44	45.67	13.60	32.07	H	1.31	135.3	54.00	- 21.93	1.000

FREQ MHz	LEVEL dBuV/m	DET Qp Av Pk	CABLE + [dB]	Antenna + [dB/m]	PREAMP - [dB]	FINAL [dBuV/m]	Duty Cycle CF [dB]	Duty Cycle Corrected FINAL dBuV/m (V/H)	POL (m)	HGT (DEG)	AZ	LIMIT [dBuV/m]	DELTA LIMIT [dB]	RBW (MHz)
9148.0000	49.15	Pk	7.40	38.39	47.44	47.49	13.60	33.89	V	1.00	20.8	54.00	- 20.11	1.000
Tx Highest Channel														
1855.2321	64.30	Pk	3.07	27.09	37.09	57.37	13.60	43.77	H	1.52	193.5	85.66	- 41.89	1.000
1855.2321	59.36	Pk	3.07	27.09	37.09	52.43	13.60	38.83	V	1.43	260.3	85.66	- 46.83	1.000
2782.8481	56.05	Pk	3.82	29.00	37.51	51.36	13.60	37.76	H	1.56	190.7	54.00	- 16.24	1.000
2782.8481	52.10	Pk	3.82	29.00	37.51	47.41	13.60	33.81	V	1.38	76.3	54.00	- 20.19	1.000
3710.4641	54.66	Pk	4.48	32.22	37.80	53.56	13.60	39.96	H	1.54	66.8	54.00	- 14.04	1.000
3710.4641	51.43	Pk	4.48	32.22	37.80	50.33	13.60	36.73	V	1.50	83.3	54.00	- 17.27	1.000
4638.0000	45.98	Pk	5.07	32.63	36.58	47.10	13.60	33.50	H	1.52	0.0	54.00	- 20.50	1.000
4638.0000	44.69	Pk	5.07	32.63	36.58	45.81	13.60	32.21	V	1.42	32.0	54.00	- 21.79	1.000
5565.6000	49.86	Pk	5.56	34.28	43.73	45.97	13.60	32.37	H	1.24	75.4	85.66	- 53.29	1.000
5565.6000	48.78	Pk	5.56	34.28	43.73	44.89	13.60	31.29	V	1.42	32.5	85.66	- 54.37	1.000
6493.2000	55.70	Pk	6.04	34.78	46.77	49.75	13.60	36.15	H	1.32	102.9	85.66	- 49.51	1.000
6493.2000	52.46	Pk	6.04	34.78	46.77	46.51	13.60	32.91	V	1.56	61.3	85.66	- 52.75	1.000
7420.8000	53.83	Pk	6.52	36.68	47.17	49.86	13.60	36.26	H	1.37	54.9	54.00	- 17.74	1.000
7420.8000	51.41	Pk	6.52	36.68	47.17	47.44	13.60	33.84	V	1.30	32.3	54.00	- 20.16	1.000
8348.4000	48.70	Pk	7.01	37.31	46.63	46.38	13.60	32.78	H	1.37	54.9	54.00	- 21.22	1.000
8348.4000	46.22	Pk	7.01	37.31	46.63	43.90	13.60	30.30	V	1.20	10.5	54.00	- 23.70	1.000
9276.0000	41.92	Pk	7.46	38.50	47.51	48.71	13.60	35.11	V	1.20	10.5	85.66	- 58.89	1.000
9276.0000	50.26	Pk	7.46	38.50	47.51	48.71	13.60	35.11	V	1.20	10.5	85.66	- 50.55	1.000

Example calculation for Intentional Radiated Emissions:

Measured Level (dB μ V)	+	Transducer, Cable Loss Pre- Amplifier (dB)	=	Corrected Reading (dB μ V/m)	-	Duty Cycle Correction (dB μ V/m)	=	FINAL Measurement (dB μ V/m)	-	Specification Limit (dB μ V/m)	=	Delta from Specification Limit	
24.0		14.9		38.9		10.0		28.9		40.0			-11.1

5.7 Measurement Summary:

Worst Case Harmonic Measurement – Restricted Band: High Channel: 3710.46 MHz, 39.96 dBuV/m (-14.04 dB below limit)														
Worst Case Harmonic Measurement – Out of Restricted Band: 1829.63 MHz, 44.60 dBuV/m (-40.76 dB below limit)														
FREQ	LEVEL	DET	CABLE	Antenna	PREAMP	FINAL	Duty Cycle CF	Duty Cycle Corrected	POL	HGT	AZ	LIMIT	DELTA LIMIT	RBW
MHz	dBm	Qp Av Pk	+ [dB]	+ [dB/m]	- [dB]	= [dBm]	[dB]	FINAL	(V/H)	(m)	(DEG)	FCC 15.247 (b)(3) [dBm]	[dB]	(MHz)
3710.4641	54.66	Pk	4.48	32.22	37.80	53.56	13.60	39.96	H	1.54	66.8	54.00	- 14.04	1.000
1829.6321	65.29	Pk	3.04	26.95	37.08	58.20	13.60	44.60	H	1.57	178.5	85.36	- 40.76	1.000

- **FCC DA 00-705: 2000, Section “Spurious Radiated Emissions” (RBW 1MHz for frequencies > 1GHz, Peak Detector)**
- **Specification: Maximum Peak Radiated Spurious Emissions:**
- **FCC 15.209(a) (Restricted Band, QP ≤ 1GHz, Average > 1GHz)**
- **FCC 15.247(d) (Outside Restricted Band, 20dBc Peak/Average)**

Notes:

1. All Fundamental and Harmonics measurements are RF Radiated Field – peak detector measurements - 1MHz RBW.
2. Measurements above 1GHz were adjusted by the allowed duty cycle correction factor per FCC 15.35/ IC RSS-GEN, Section 4.5.
3. The device was measured at 3 meters measurement antenna to product test distance.
4. The device was placed on a turntable 80 cm high, it was rotated 360 degrees and the measurement antenna was raised and lowered between 1 and 4 meters to maximize emissions from this device.

Duty Cycle Correction Factor

DCCF is calculated as follows $20 \cdot \log_{10}(\text{duty cycle in } 100\text{mS})$ and is “not to exceed 20dB”.

The plots in section 12 (Dwell Time) show that the max duty cycle is 20.8 mS per 100mS period, yielding a 13.56dB duty-cycle correction factor.

6 Tx Band Edge & Restricted Band – FCC 15.247(d)/15.205(a)/15.209(a)**6.1 Method**

Unless otherwise stated no deviations were made from ANSI C63.10 and FCC public notice DA 00-705.

This testing was performed at Intertek Denver, located at 1795 Dogwood St., Suite 200, Louisville, CO 80027.

6.2 Test Equipment Used:

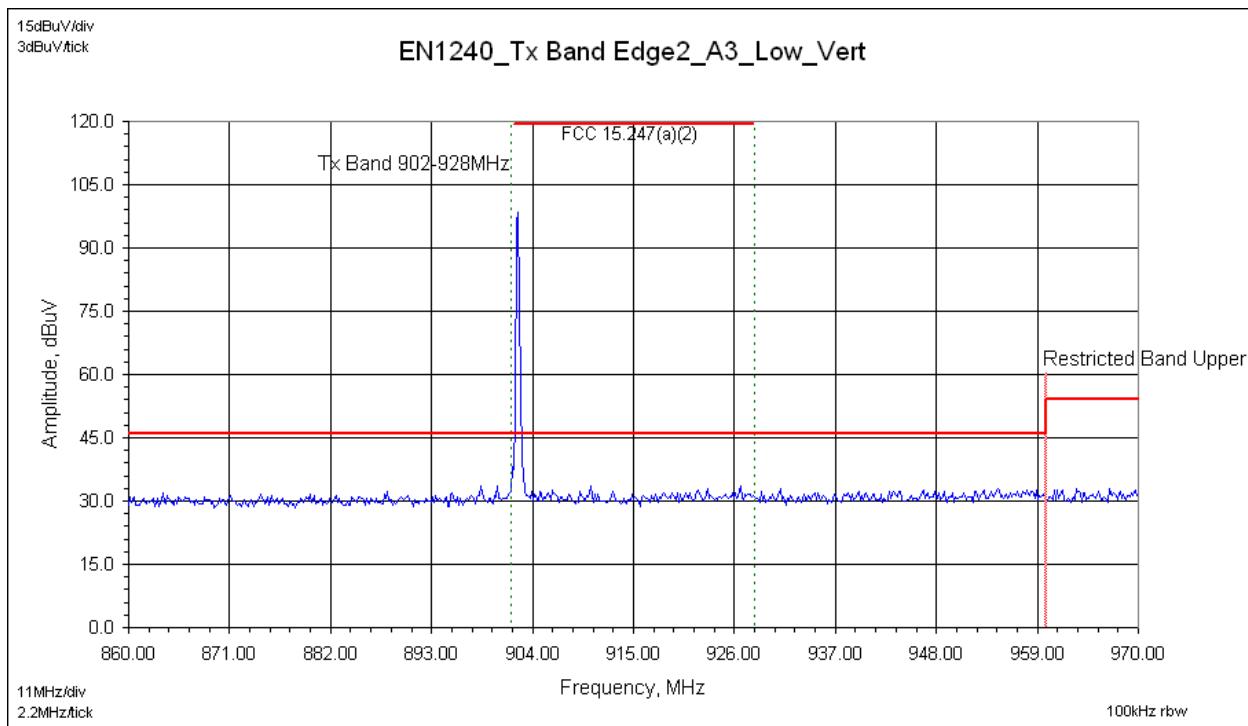
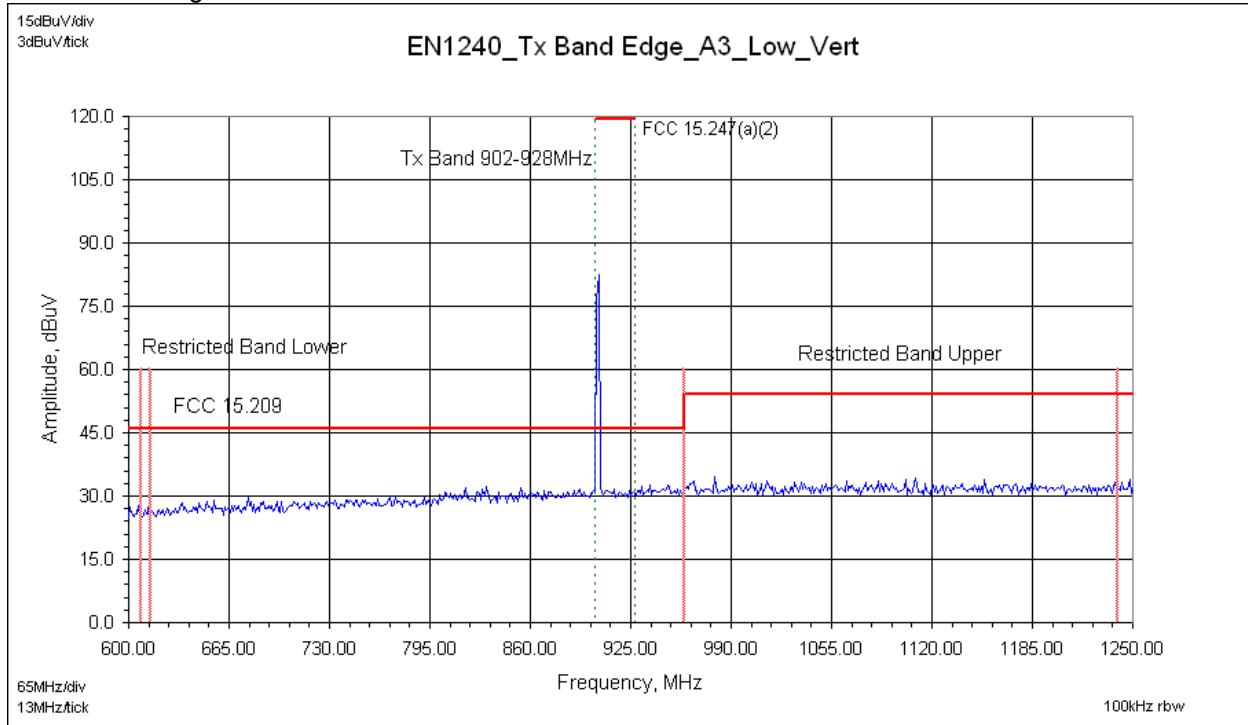
<u>Asset ID</u>	<u>Description</u>	<u>Manufacture</u>	<u>Model</u>	<u>Serial</u>	<u>Cal Date</u>	<u>Cal Due</u>
DEN-073	EMI Receiver	ROHDE & SCHWARZ	ESU 26	100265	01/23/2013	01/23/2014
18912	9 kHz- 1.3GHz Pre Amp	Hewlett-Packard	8447F	3113A05545	06/07/2013	06/07/2014
19937	Bilog Antenna 30MHz - 6GHz	Sunol Sciences	JB6	A050707-2	03/20/2013	03/20/2014
SW-6	Software for Radiated and Conducted emissions.	Intertek	OATS vba	V. 1.0	VBU	VBU

6.3 Results:

The sample tested was found to Comply.

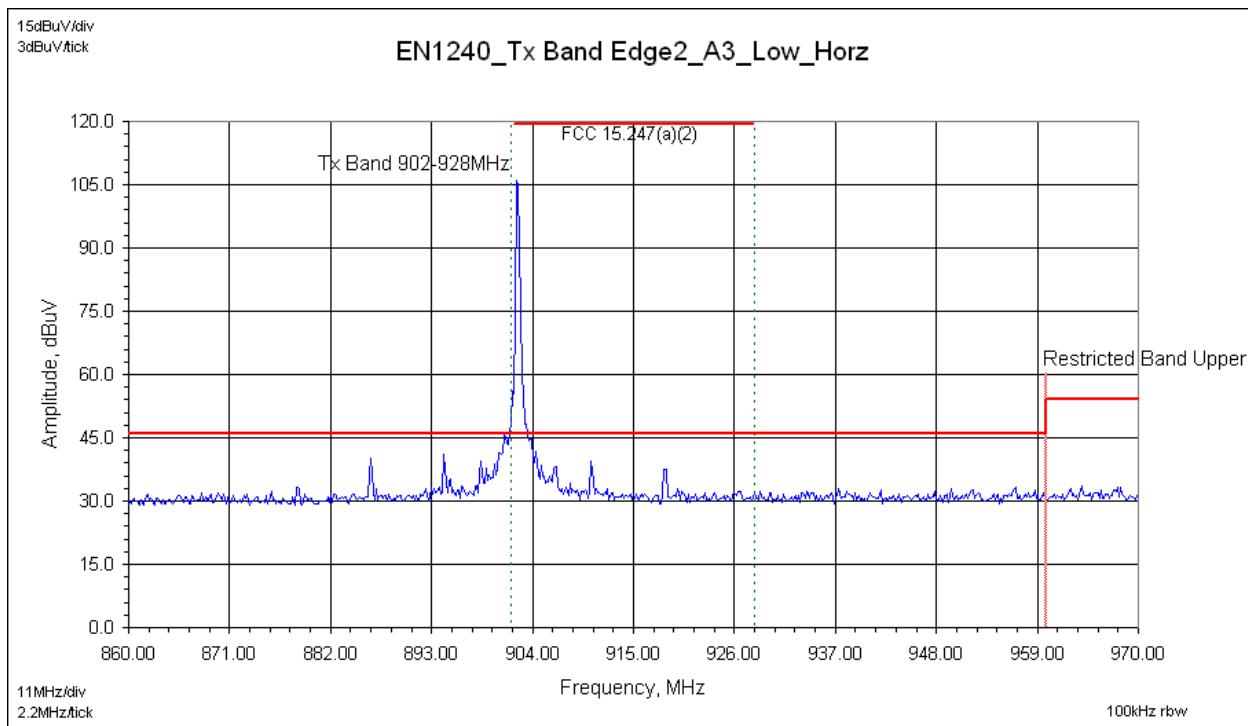
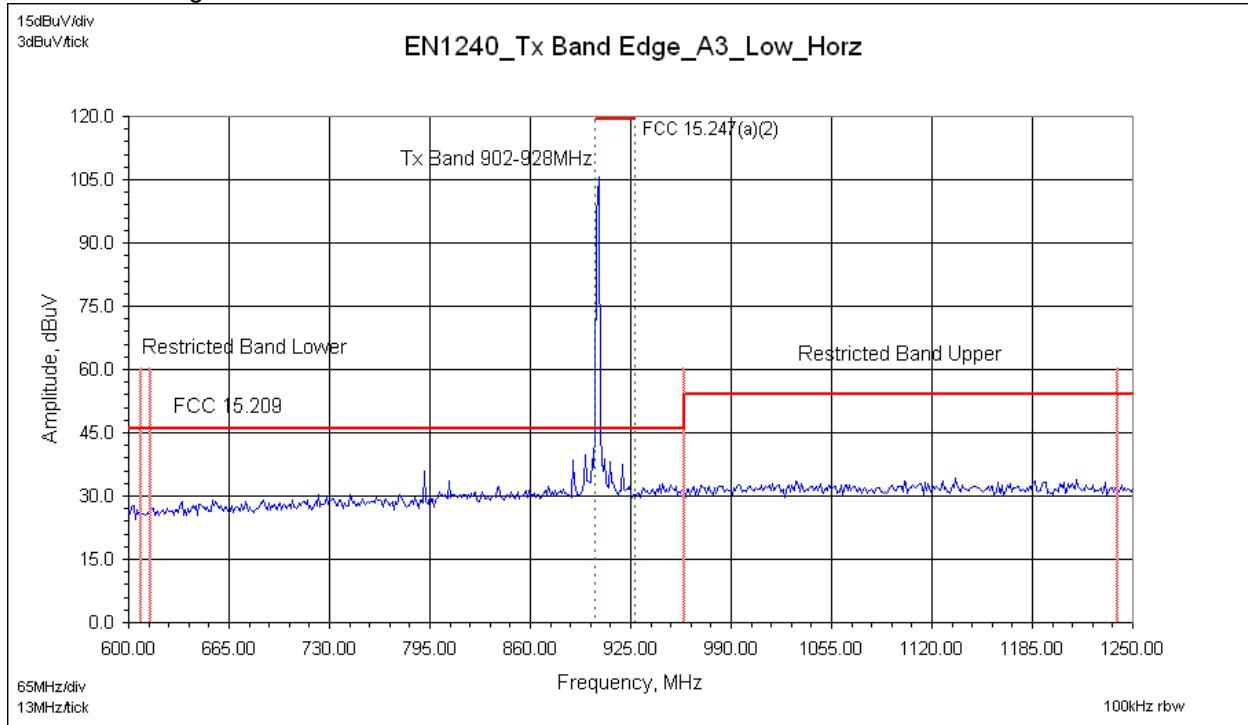
6.4 Plots: Restricted Band & Band Edge FCC 15.205/209

Lower Band Edges



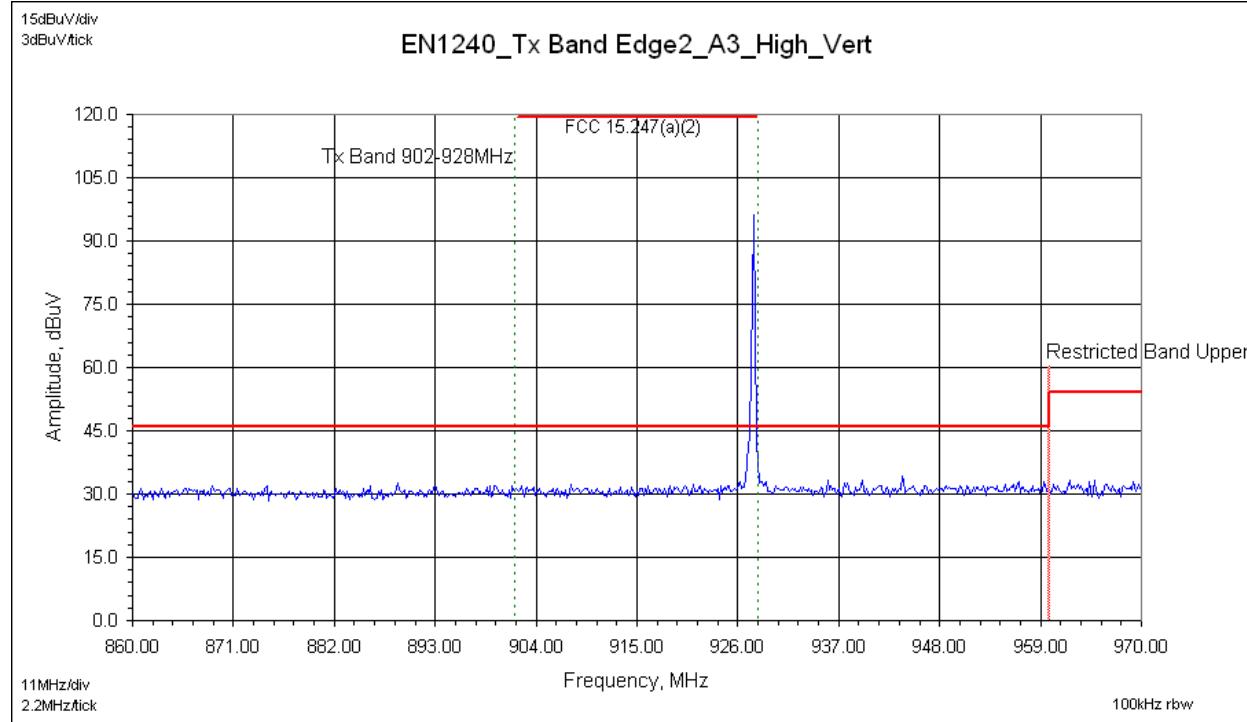
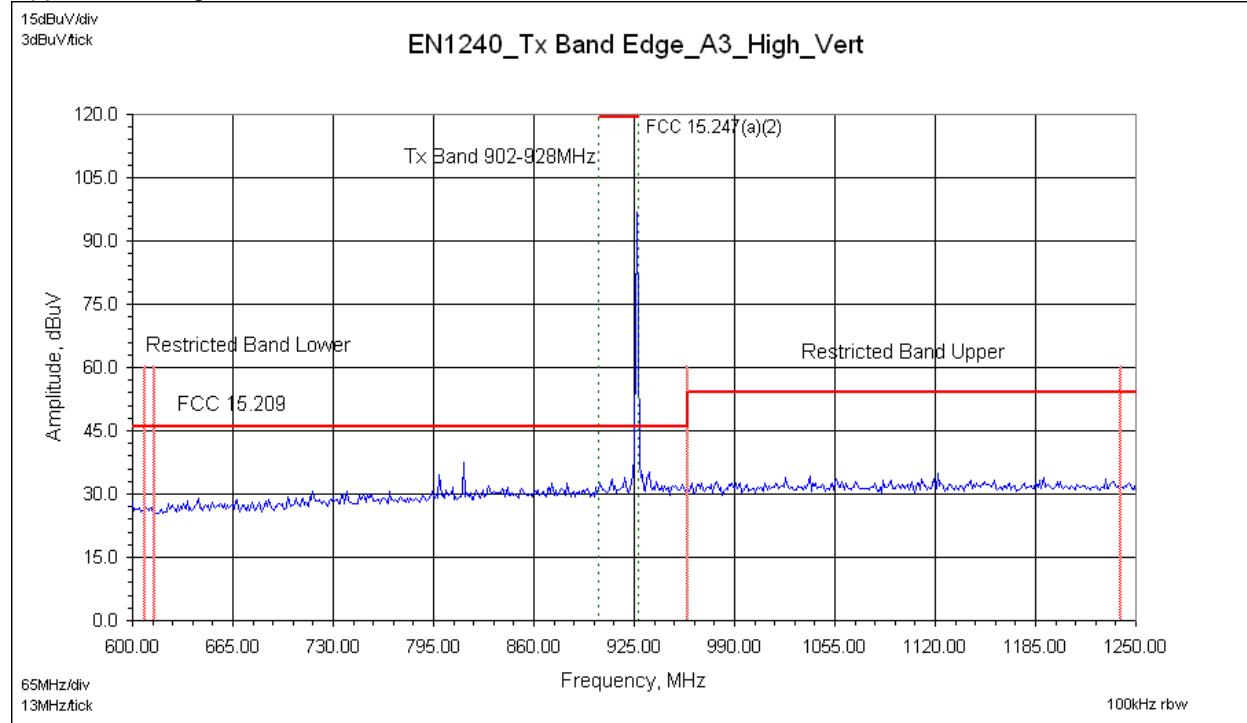
6.5 Plots: Restricted Band Edge FCC 15.205/209

Lower Band Edges



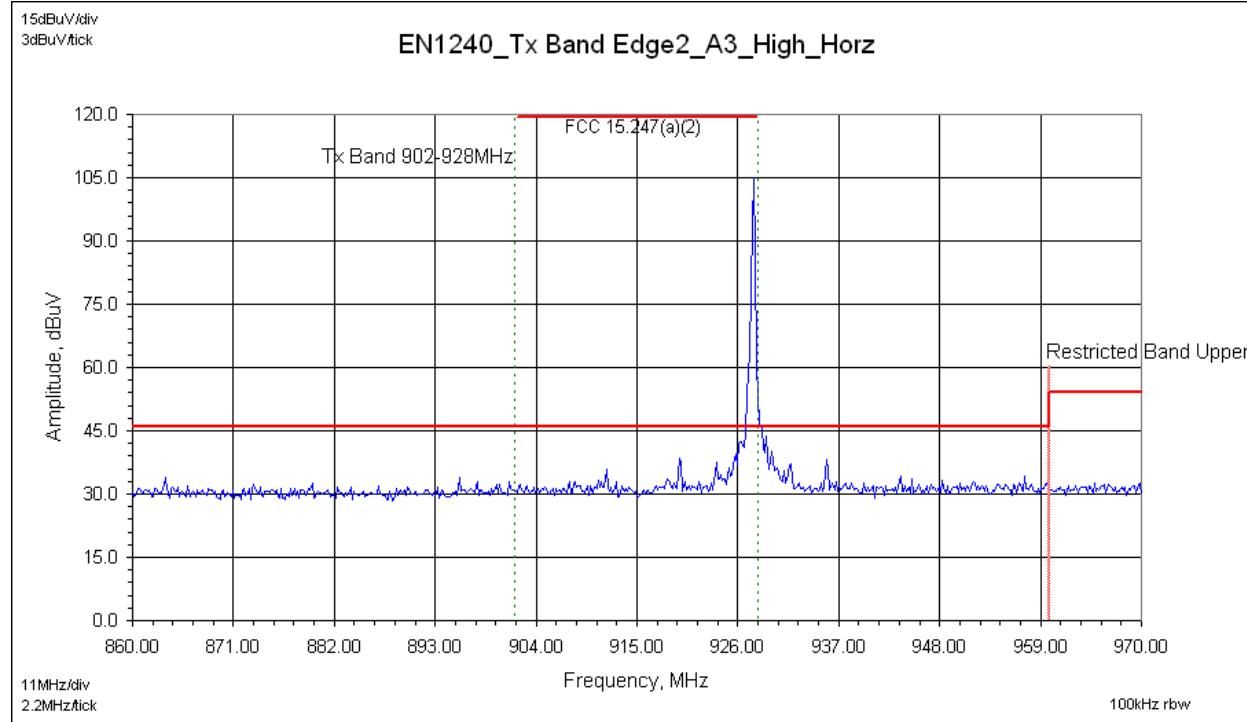
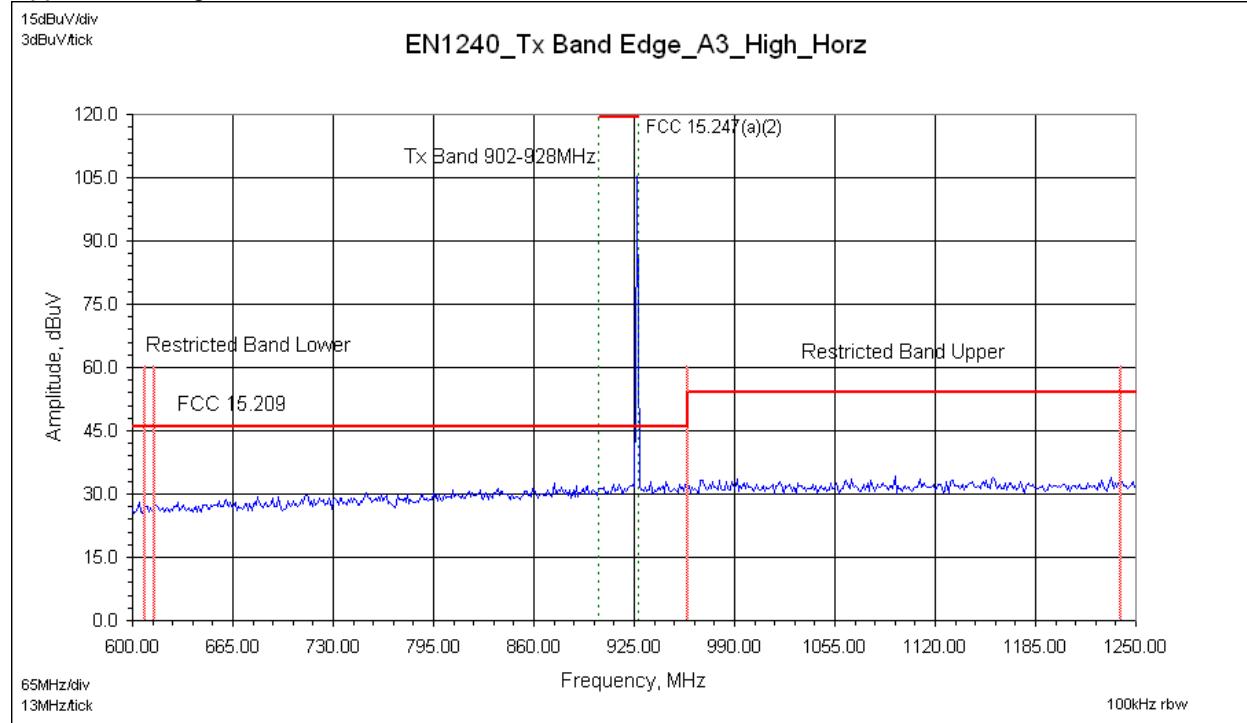
6.6 Plots: Restricted Band Edge FCC 15.205/209

Upper Band Edges



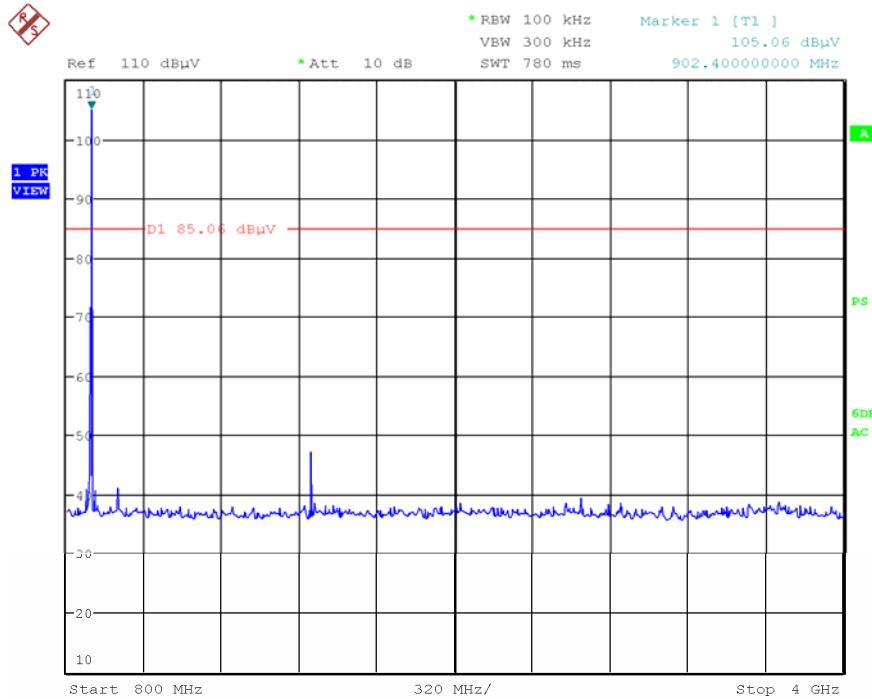
6.7 Plots: Restricted Band Edge FCC 15.205/209

Upper Band Edges

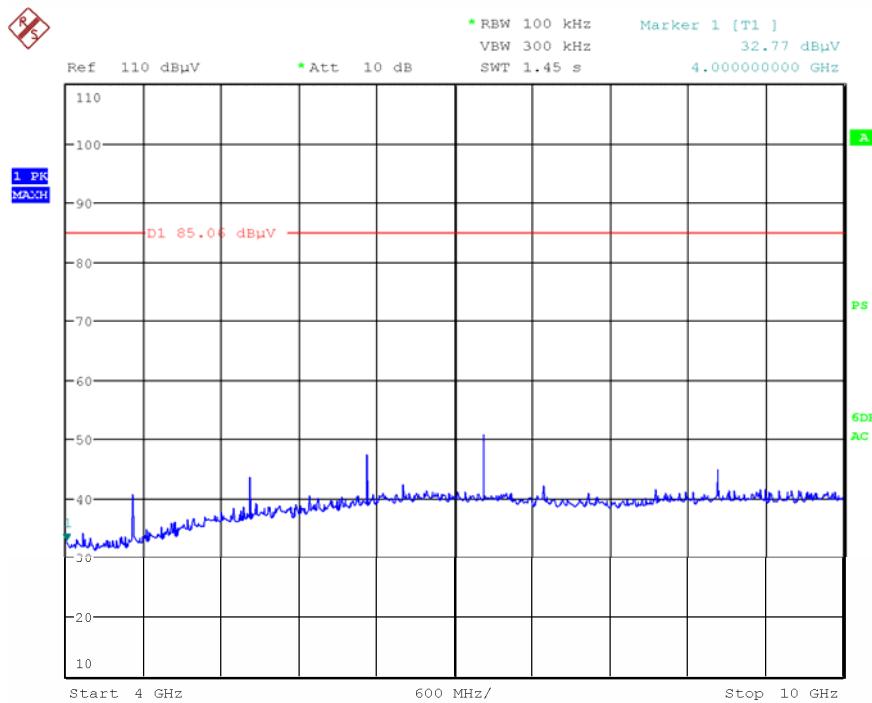


6.8 Plots: 20dBc - FCC 15.247(d)

Low Channel



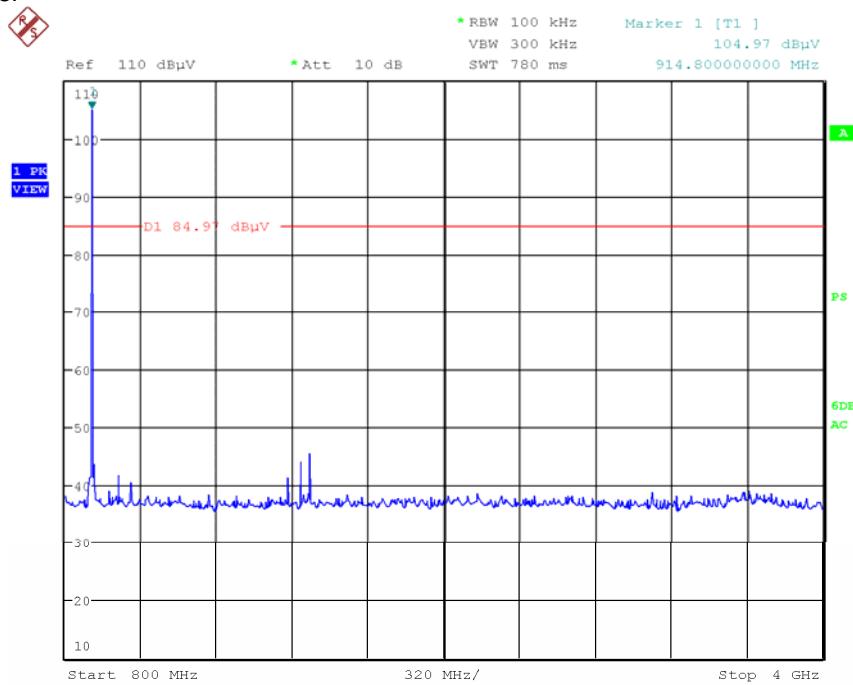
Date: 17.DEC.2013 14:43:21



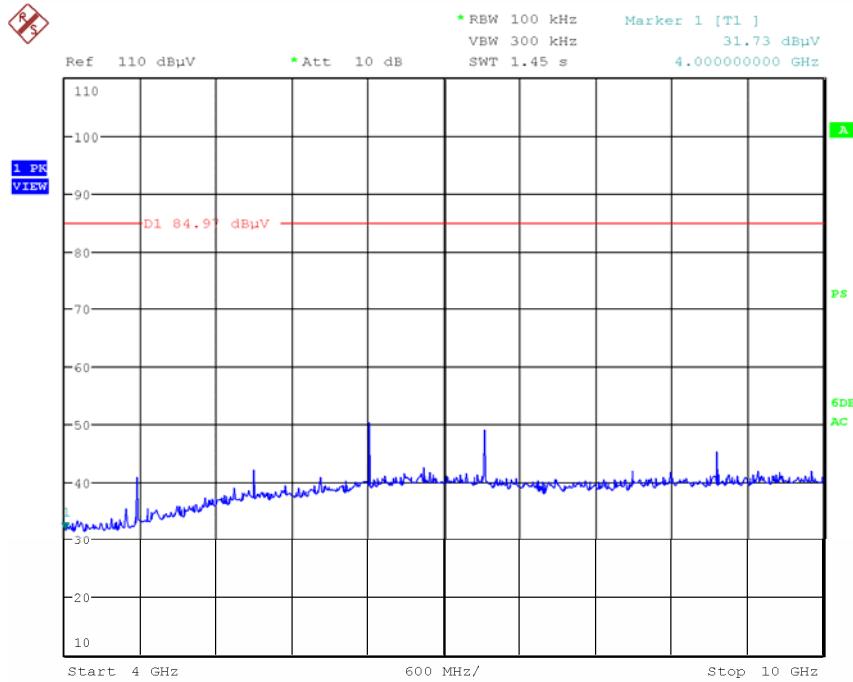
Date: 17.DEC.2013 15:05:38

6.9 Plots: 20dBc - FCC 15.247(d)

Mid Channel



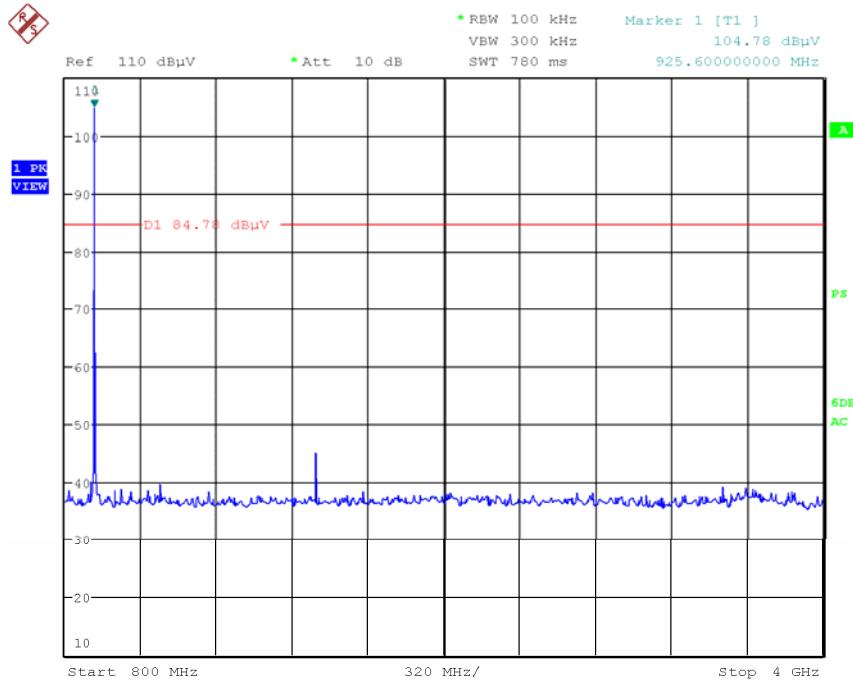
Date: 17.DEC.2013 14:49:50



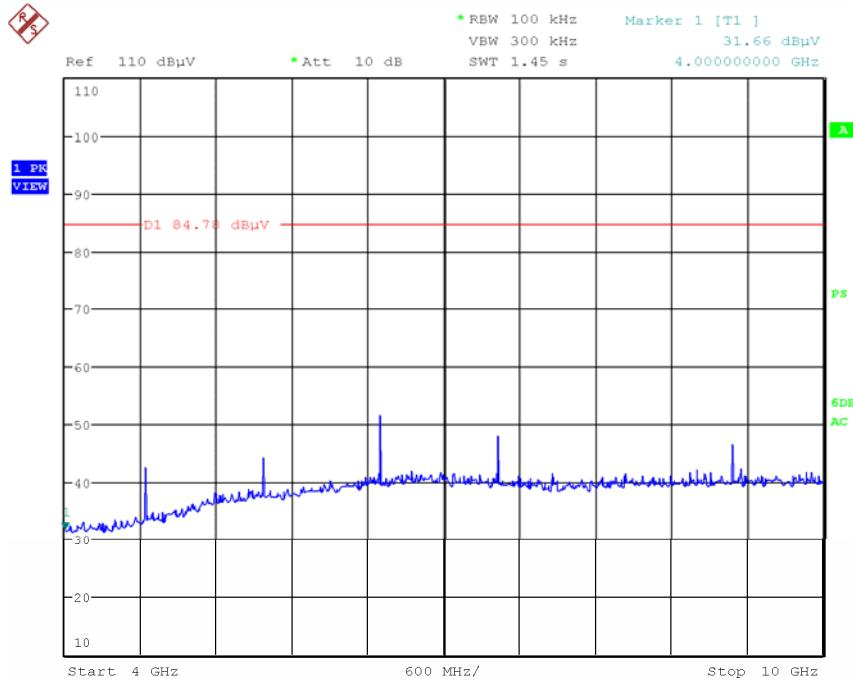
Date: 17.DEC.2013 15:03:18

6.10 Plots: 20dBc - FCC 15.247(d)

High Channel



Date: 17.DEC.2013 14:56:27



Date: 17.DEC.2013 14:59:04

6.11 Measurement Summary:

- All Tx Spurious signals within the FCC Restricted Bands were verified to be below the limits for FCC 15.205/209.
- All Tx Spurious signals up to 10GHz were > 20dBc.

Notes:

- 1) The device was measured at 3 meters measurement antenna to product test distance.
- 2) The device was placed on a turntable 80 cm high, it was rotated 360 degrees and the measurement antenna was raised and lowered between 1 and 4 meters to maximize emissions from this device.

7 Radiated Emissions Tx Spurious (Non Harmonics)

7.1 Method

Unless otherwise stated no deviations were made from ANSI C63.10 and FCC public notice DA 00-705.

This testing was performed at Intertek Denver, located at 1795 Dogwood St., Suite 200, Louisville, CO 80027.

7.2 Test Equipment Used:

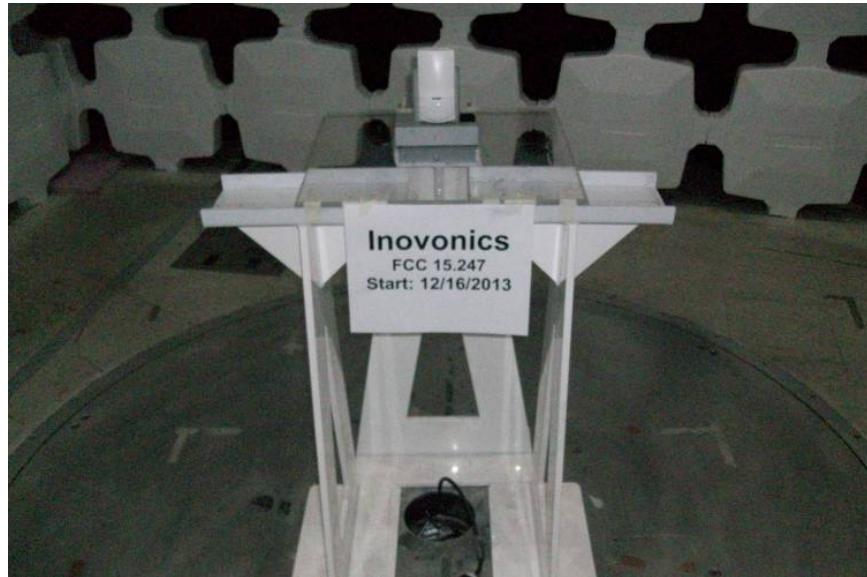
<u>Asset ID</u>	<u>Description</u>	<u>Manufacture</u>	<u>Model</u>	<u>Serial</u>	<u>Cal Date</u>	<u>Cal Due</u>
DEN-073	EMI Receiver	ROHDE & SCHWARZ	ESU 26	100265	01/23/2013	01/23/2014
18912	9 kHz- 1.3GHz Pre Amp	Hewlett-Packard	8447F	3113A05545	06/07/2013	06/07/2014
19937	Bilog Antenna 30MHz - 6GHz	Sunol Sciences	JB6	A050707-2	03/20/2013	03/20/2014
18906	RF Pre-Amp (1-4GHz)	Mini-Circuits Lab	ZHL-42	N052792-2	06/10/2013	06/10/2014
DEN-032	4-18 GHz LNA	NARDA	DBL-0618N615	031	03/07/2013	03/07/2014
18887	Horn Antenna 1-18GHz	EMCO	3115	9205-3886	03/19/2013	03/19/2014
SW-6	Software for Radiated and Conducted emissions.	Intertek	OATS vba	V. 1.0	VBU	VBU

7.3 Results:

The sample tested was found to Comply.

7.4 Setup Photographs:

Front



Rear

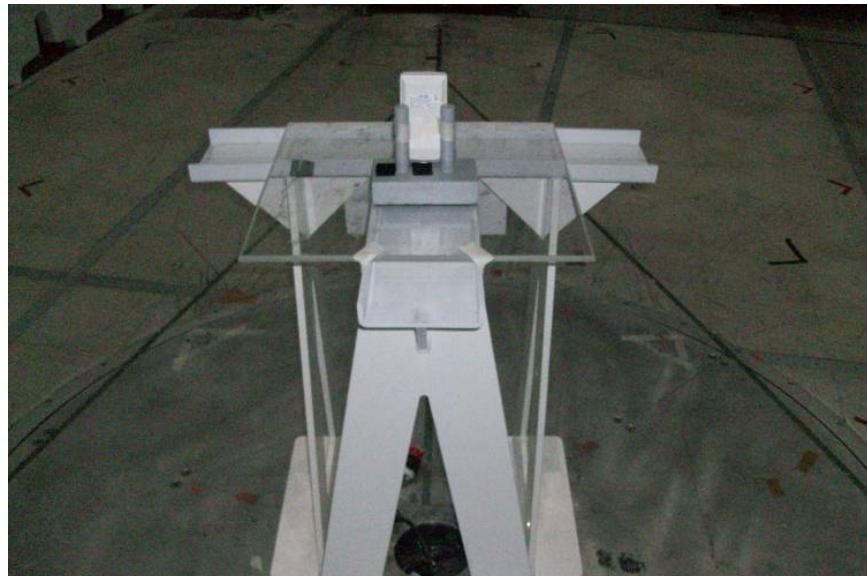
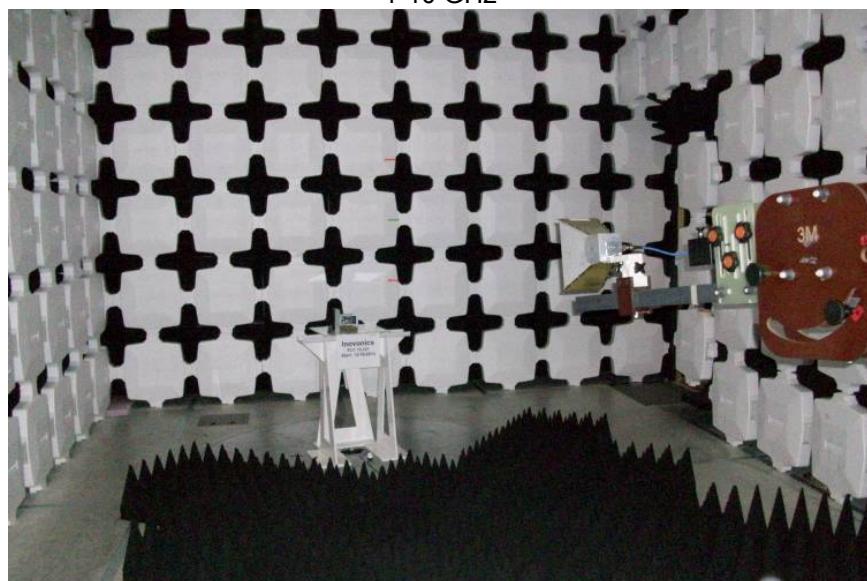


Photo:

30-1000 MHz



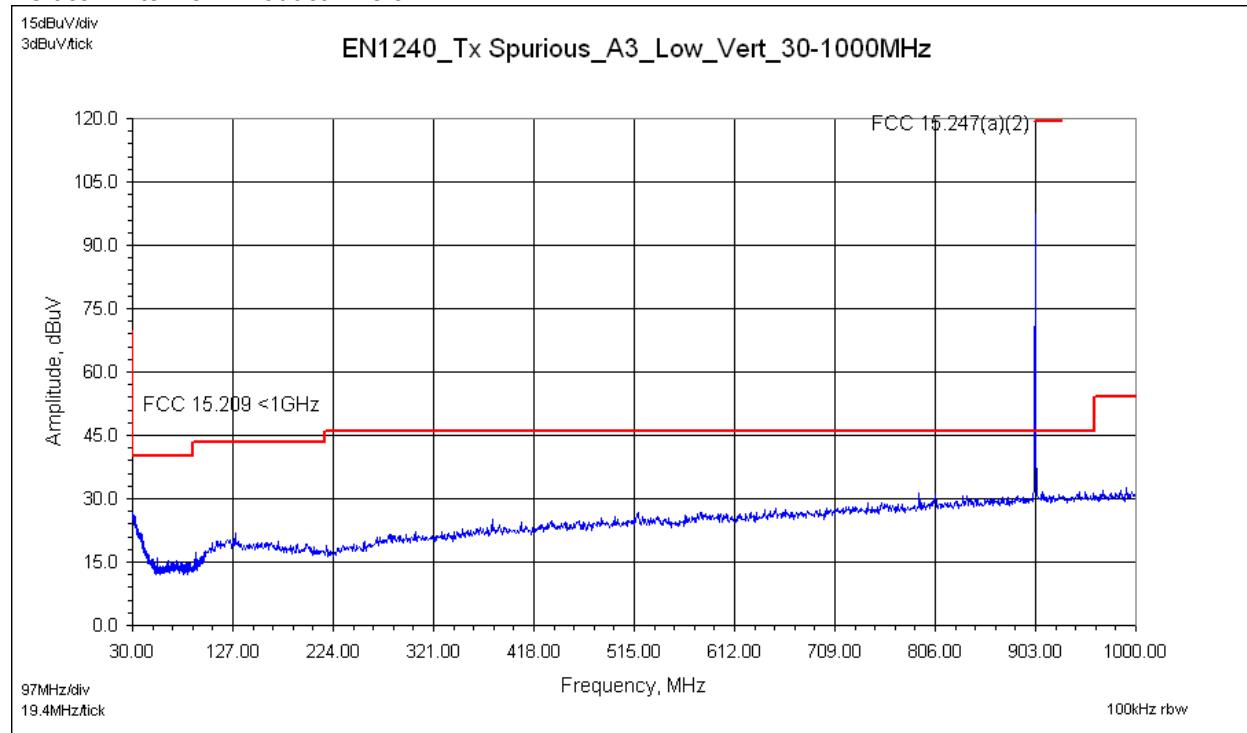
1-10 GHz



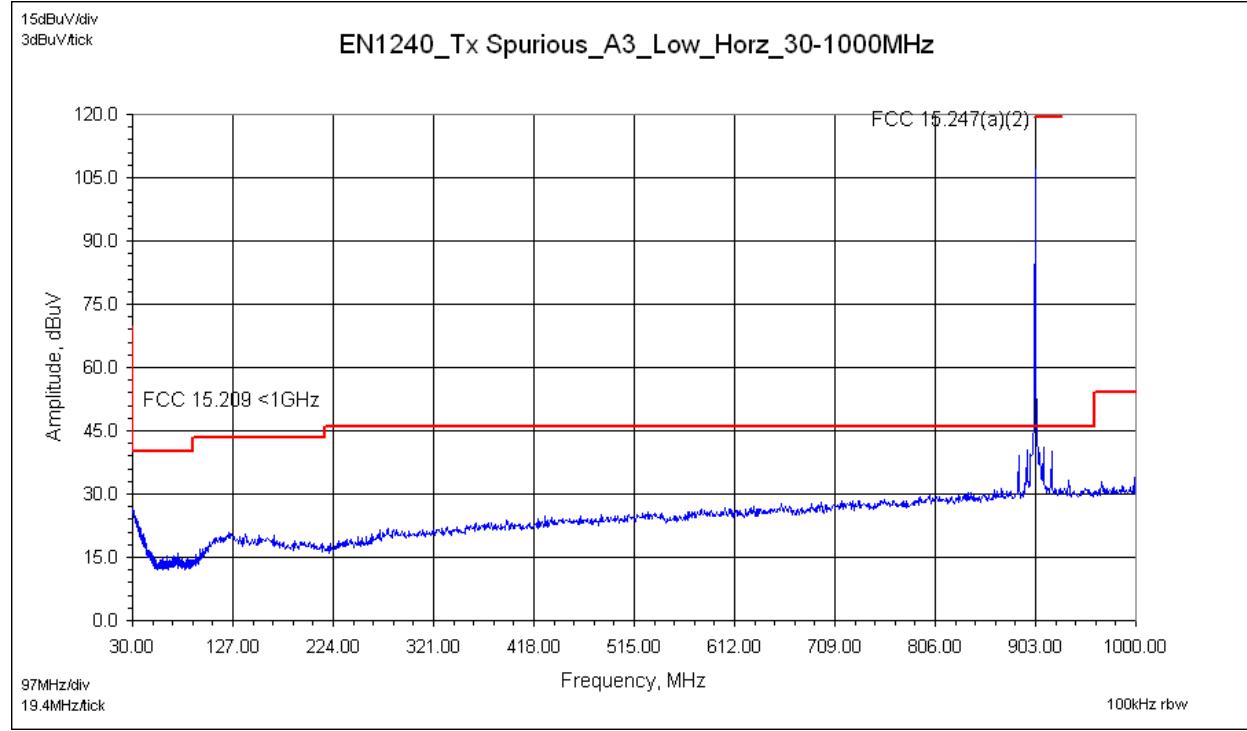
7.5 Pre-scan Plots: Low Channel – Axis 3

30MHz to 1000MHz

Vertical Antenna – Product Axis 3



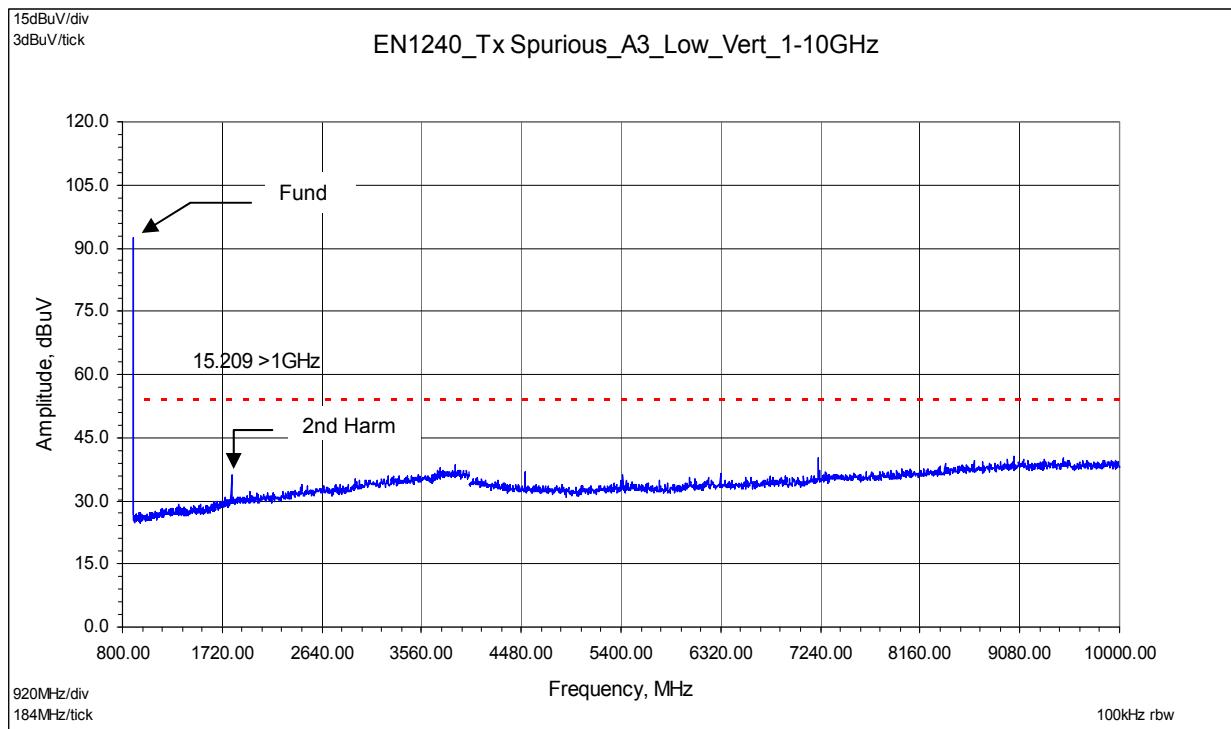
Horizontal Antenna – Product Axis 3



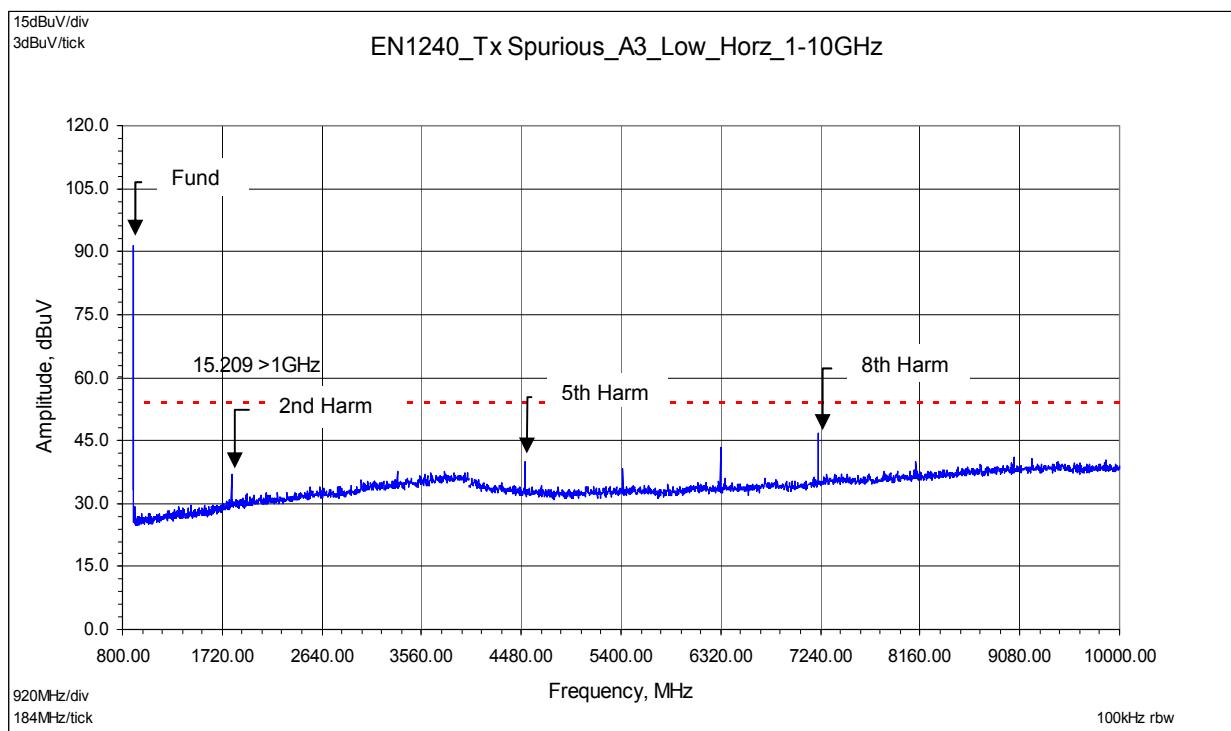
7.6 Pre-scan Plots: Low Channel – Axis 3

1GHz to 10GHz

Vertical Antenna – Product Axis 3



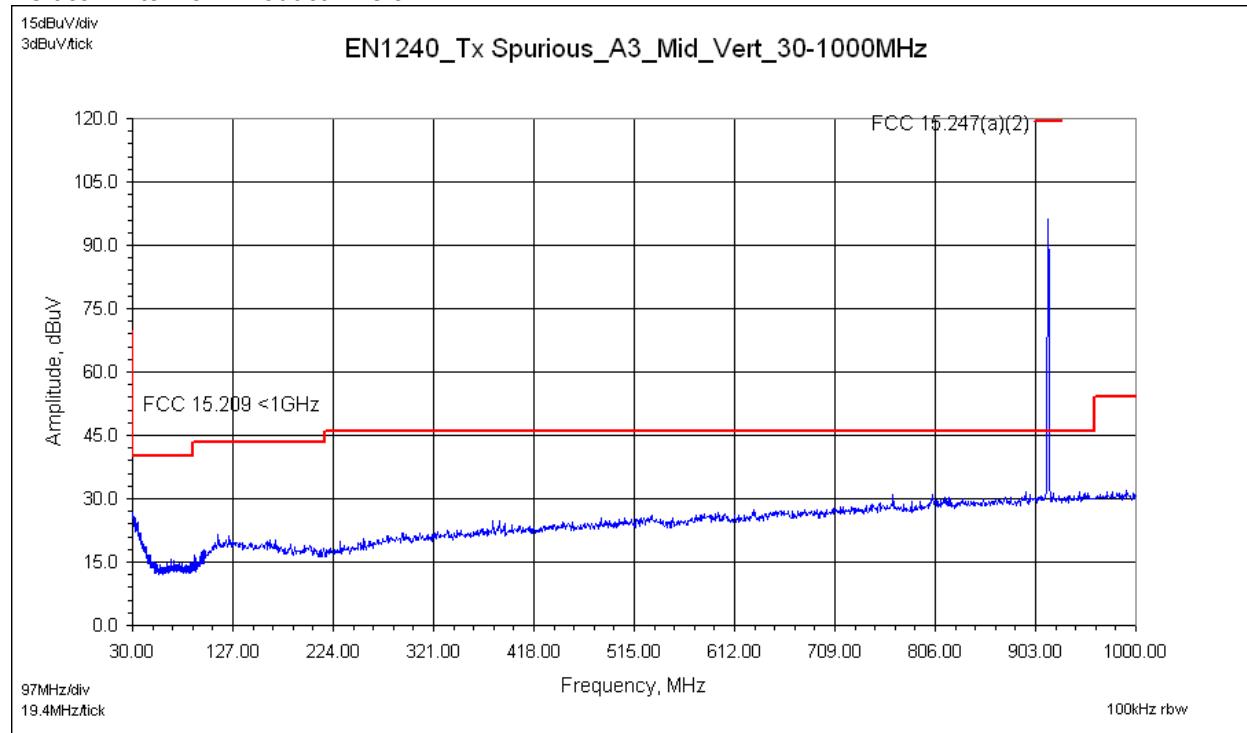
Horizontal Antenna – Product Axis 3



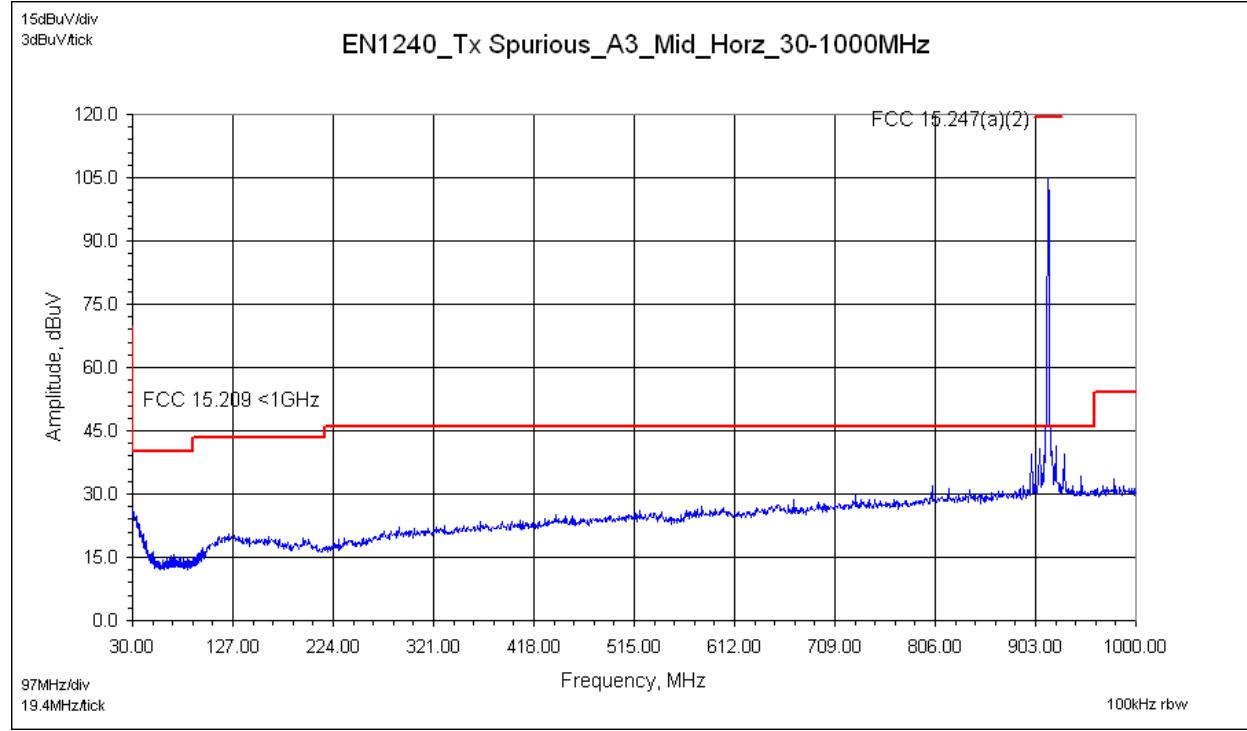
7.7 Pre-scan Plots: Mid Channel – Axis 3

30MHz to 1000MHz

Vertical Antenna – Product Axis 3



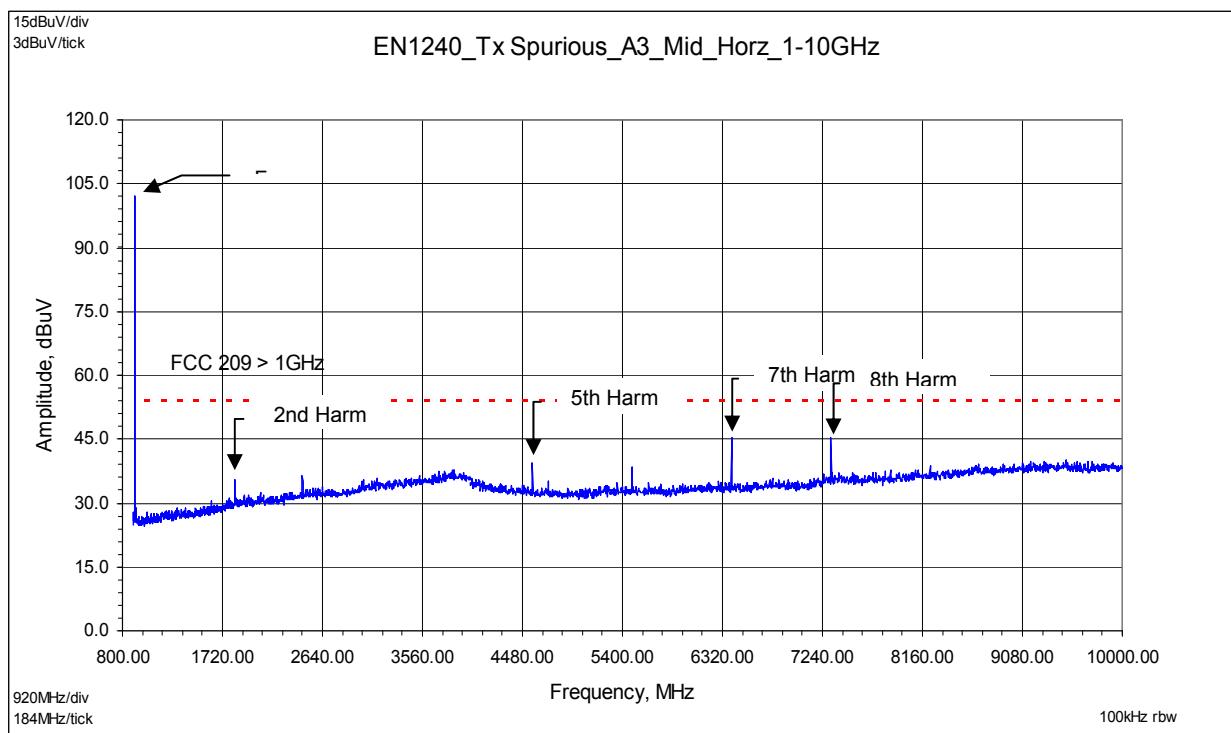
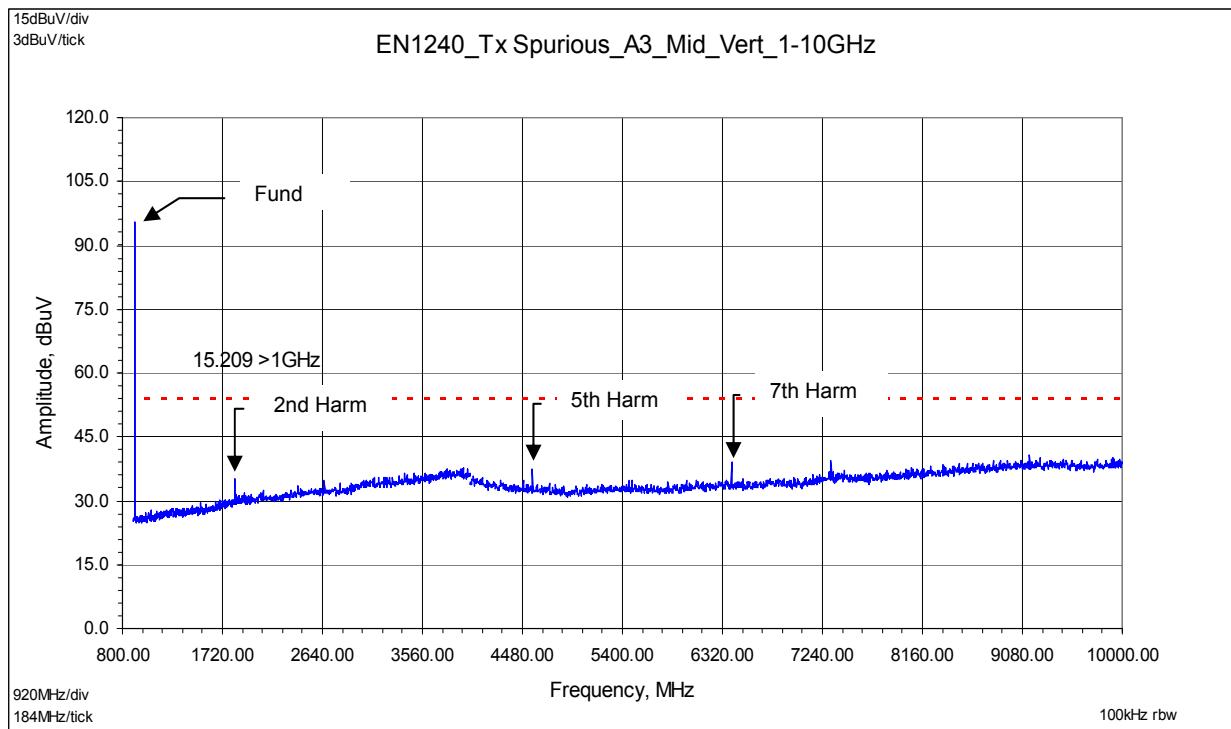
Horizontal Antenna – Product Axis 3



7.8 Pre-scan Plots: Mid Channel – Axis 3

1GHz to 10GHz

Vertical Antenna – Product Axis 3

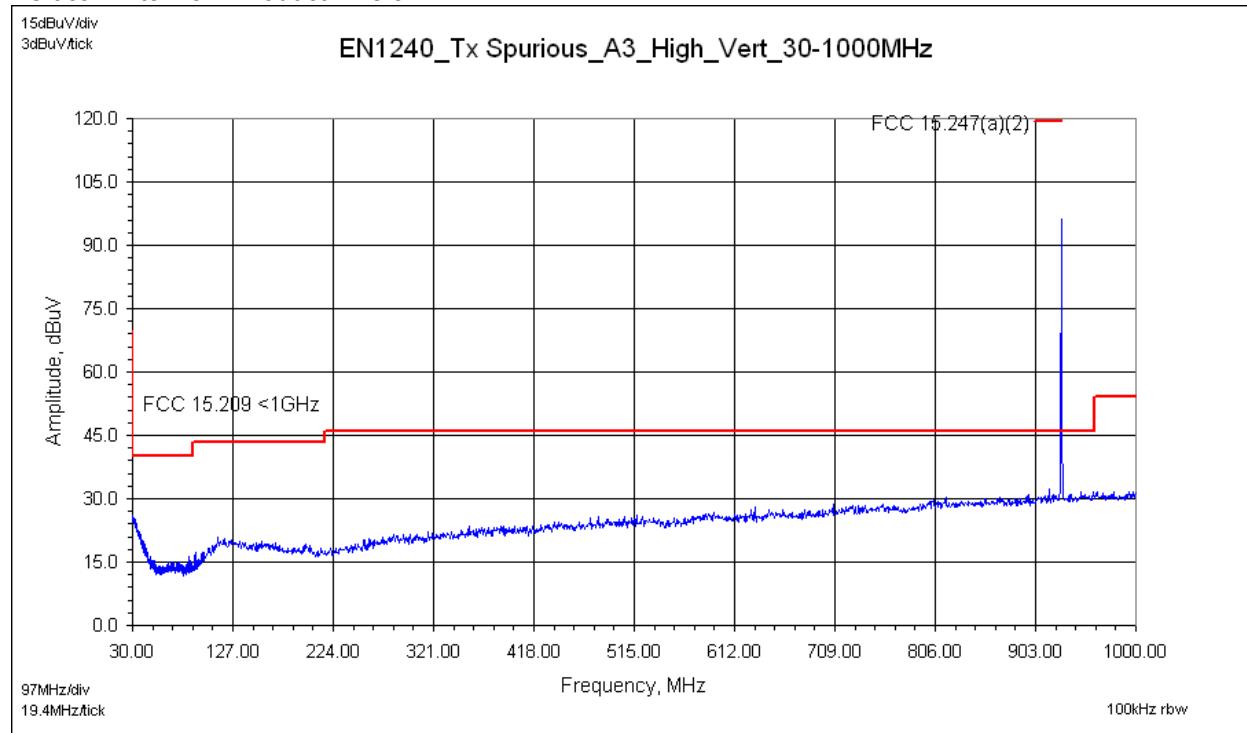


Horizontal Antenna – Product Axis 3

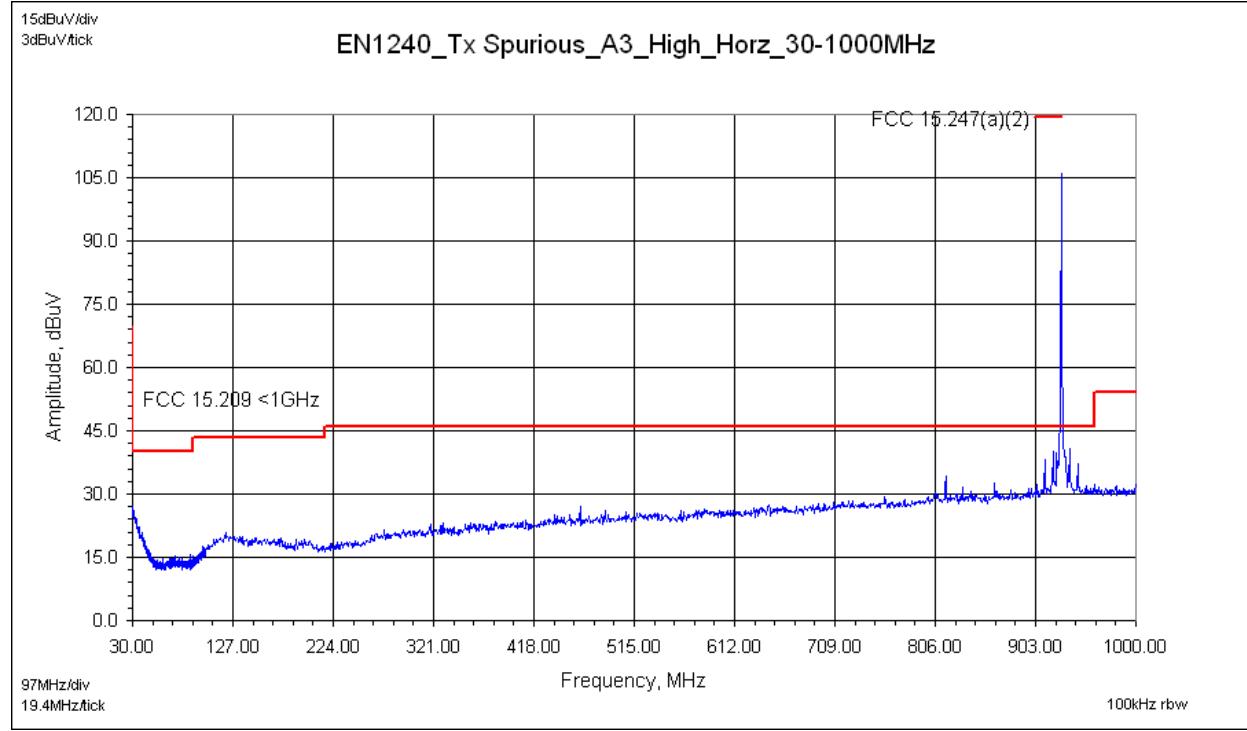
7.9 Pre-scan Plots: High Channel – Axis 3

30MHz to 1000MHz

Vertical Antenna – Product Axis 3



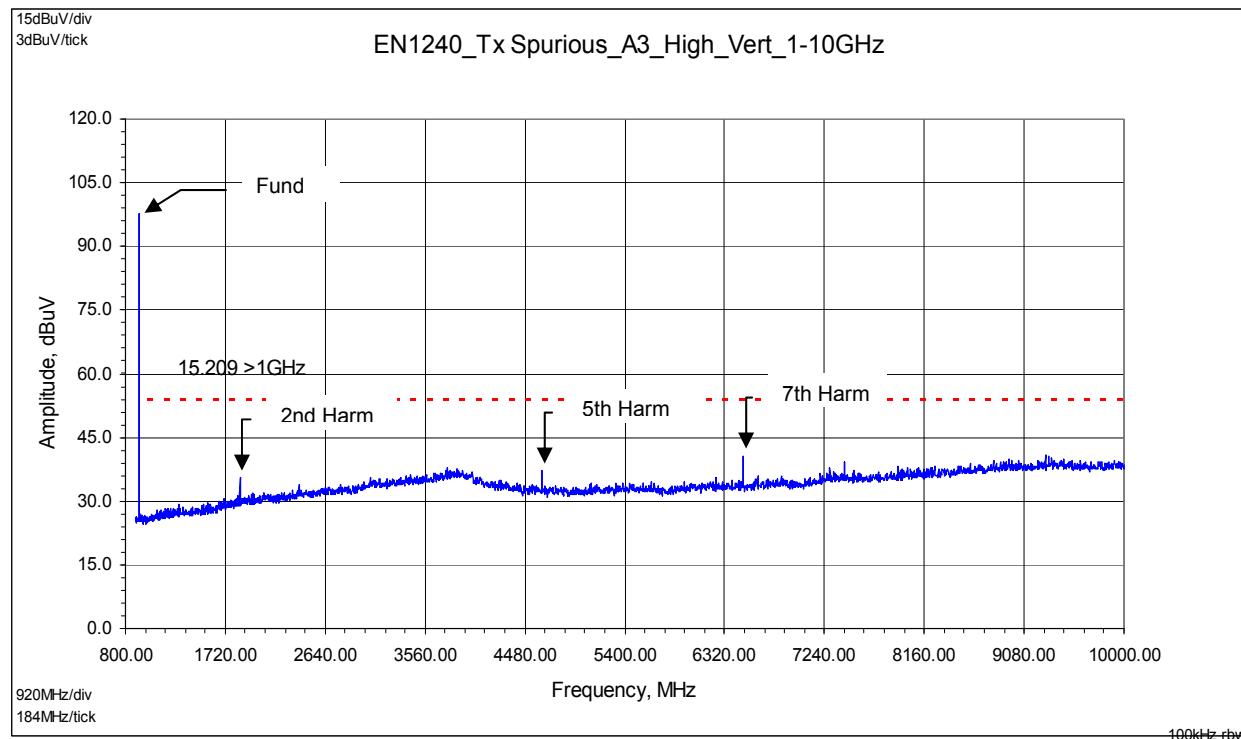
Horizontal Antenna – Product Axis 3



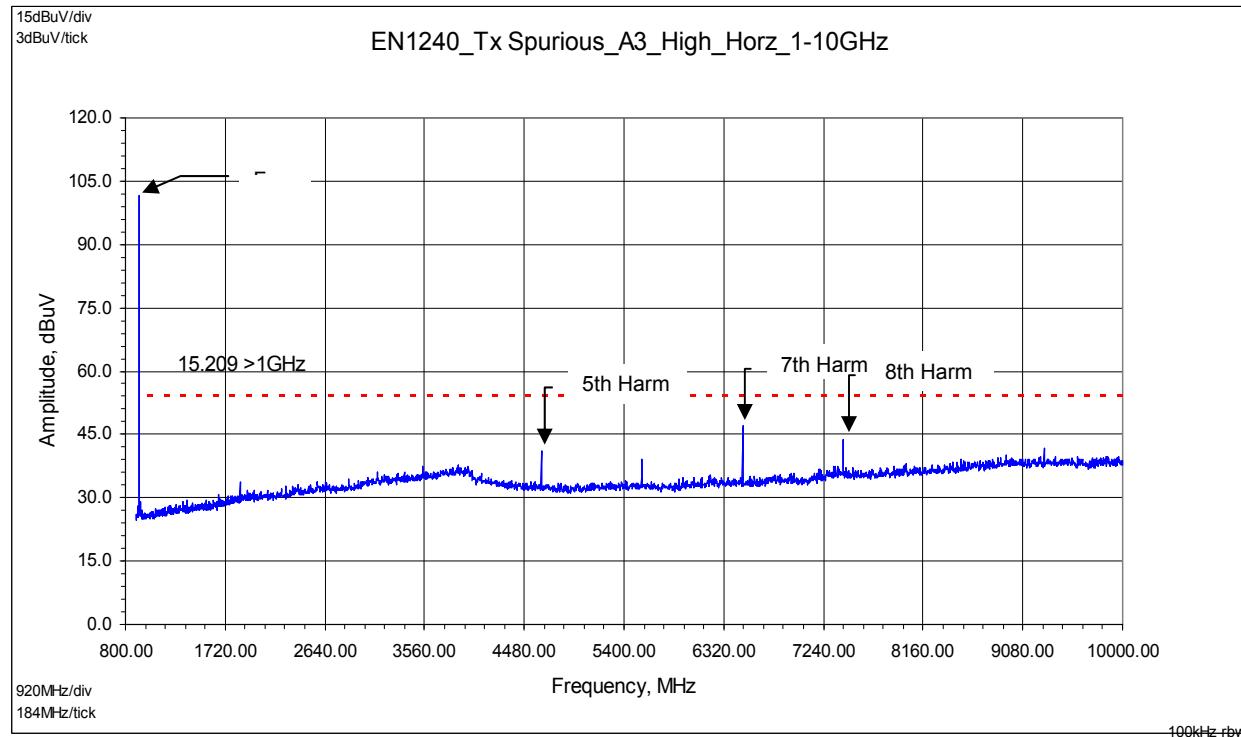
7.10 Pre-scan Plots: High Channel – Axis 3

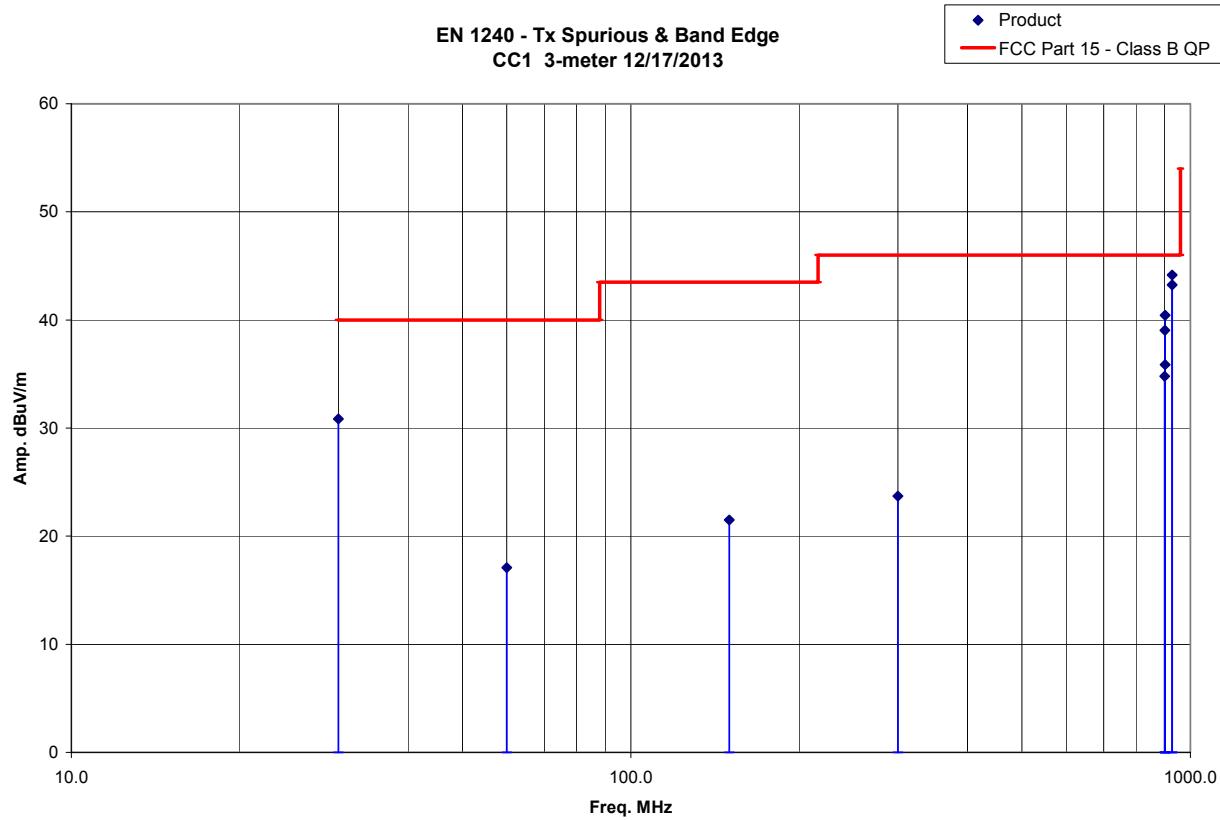
1GHz to 10GHz

Vertical Antenna – Product Axis 3



Horizontal Antenna – Product Axis 3



7.11 Final Measurement Plots:

7.12 Data:

Radiated Electromagnetic Emissions

Test Report #:	G101454375	Test Area:	CC1 Radiated	Temperature:	23.1	°C
Test Method:	FCC 15.209	Test Date:	12/17/2013	Relative Humidity:	21.9	%
EUT Model #:	EN 1240	EUT Power:	3VDC Battery	Air Pressure:	83.7	kP a

EUT Serial #: 99514079

Manufacturer:	Inovonics Wireless	Level Key
EUT Description:	Activity Sensor	Pk – Peak
Notes	Product configured in Tx Mode of operation – modulated.	Qp – Quasi Peak
	Tx Spurious measurements – other than Harmonics of the Fundamental	Av - Average

Includes Tx Band Edge measurements

Freq	Level	Det	Cable	Ant	Preamp	Atten	Final	Pol	Hgt	Az	Delta1	Delta2	RBW
MHz	dBuV	Qp Av Pk									FCC 15.209	N/A	(MHz)
Measurements: Tx Spurious - 30MHz to 1000MHz													
30.0000	9.14	Qp	0.40	21.30	0.00	0.00	30.84	V	1.00	219.6	- 9.16	N/A	0.120
60.0000	8.62	Qp	0.77	7.70	0.00	0.00	17.09	V	1.00	97.0	- 22.91	N/A	0.120
150.0000	8.29	Qp	0.82	12.40	0.00	0.00	21.51	V	1.00	0.0	- 22.01	N/A	0.120
300.0000	9.13	Qp	1.19	13.40	0.00	0.00	23.71	V	1.00	165.1	- 22.31	N/A	0.120
899.7300	11.20	Qp	2.09	21.50	0.00	0.00	34.79	V	1.23	140.6	- 11.23	N/A	0.120
Measurements: Tx Spurious – Tx Band Edge													
901.0000	15.45	Qp	2.10	21.50	0.00	0.00	39.05	V	1.75	208.7	- 6.97	N/A	0.120
901.8000	43.97	Qp	2.10	22.18	27.82	0.00	40.43	V	1.42	32.0	- 5.59	N/A	0.120
901.8000	39.41	Qp	2.10	22.17	27.82	0.00	35.86	H	1.21	14.7	- 10.16	N/A	0.120
928.2000	46.65	Qp	2.13	22.24	27.76	0.00	43.26	V	1.23	6.1	- 2.76	N/A	0.120
928.0000	47.55	Qp	2.13	22.24	27.76	0.00	44.16	H	1.21	14.7	- 1.86	N/A	0.120
No measurements taken above 1GHz – no significant signals (other than harmonics of the fundamental) – refer to pre-scan plots													

Example calculation for Unintentional Radiated Emissions:

Measured Level	+	Transducer, Cable Loss & Amplifier corrections	=	Corrected Reading	Specification Limit	-	Corrected Reading	=	Delta Specification
			(dB)	(dB μ V/m)	(dB μ V/m)				
14.0			14.9	28.9	40.0		28.9		-11.1

Notes:

1. Quasi-peak detector measurements up to 1GHz: 120kHz RBW, 300kHz VBW.
2. Average detector measurements above 1 GHz: 1MHz RBW, 10Hz VBW..
3. All measurements are field strength measurements taken at 3-meter product-to-antenna.
4. The device was placed on a turntable 80 cm high, it was rotated 360 degrees and the measurement antenna was raised and lowered between 1 and 4 meters to maximize emissions from this device.

Deviations, Additions, or Exclusions: None

8 Radiated Unintentional Emissions - Idle/Standby Mode of Operation**8.1 Method**

Unless otherwise stated no deviations were made from ANSI C63.10 and FCC public notice DA 00-705.

This testing was performed at Intertek Denver, located at 1795 Dogwood St., Suite 200, Louisville, CO 80027.

8.2 Test Equipment Used:

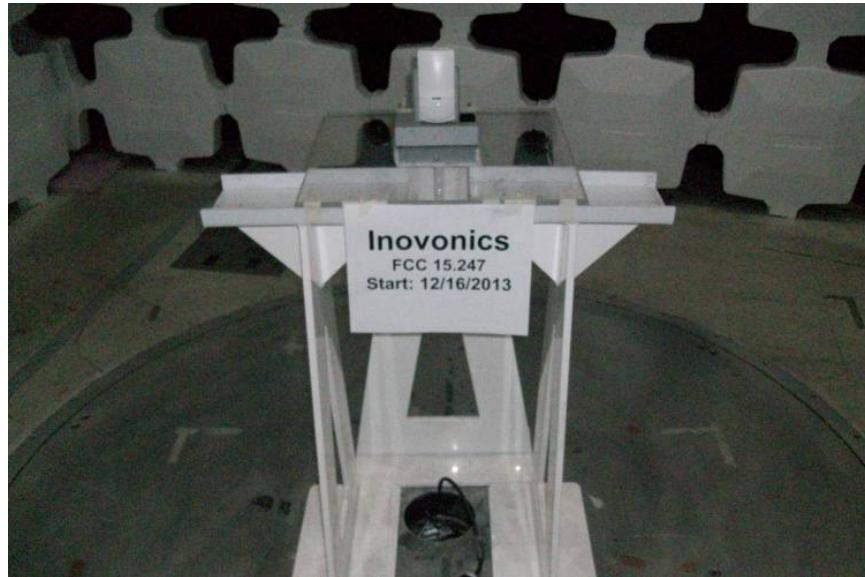
Asset ID	Description	Manufacture	Model	Serial	Cal Date	Cal Due
DEN-073	EMI Receiver	ROHDE & SCHWARZ	ESU 26	100265	01/23/2013	01/23/2014
18912	9 kHz- 1.3GHz Pre Amp	Hewlett-Packard	8447F	3113A05545	06/07/2013	06/07/2014
19937	Bilog Antenna 30MHz - 6GHz	Sunol Sciences	JB6	A050707-2	03/20/2013	03/20/2014
18906	RF Pre-Amp (1-4GHz)	Mini-Circuits Lab	ZHL-42	N052792-2	06/10/2013	06/10/2014
DEN-032	4-18 GHz LNA	NARDA	DBL-0618N615	031	03/07/2013	03/07/2014
18887	Horn Antenna 1-18GHz	EMCO	3115	9205-3886	03/19/2013	03/19/2014
SW-6	Software for Radiated and Conducted emissions.	Intertek	OATS vba	V. 1.0	VBU	VBU

8.3 Results:

The sample tested was found to Comply.

8.4 Setup Photographs:

Front



Rear

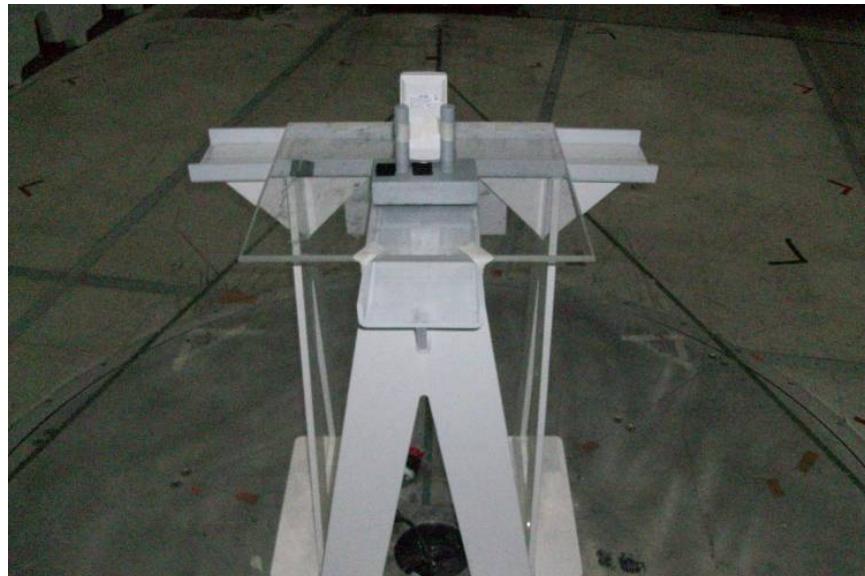
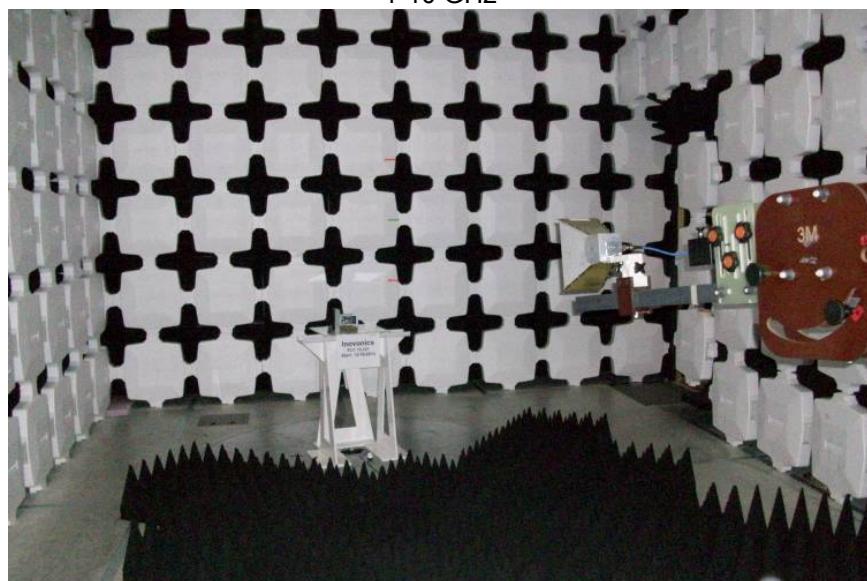


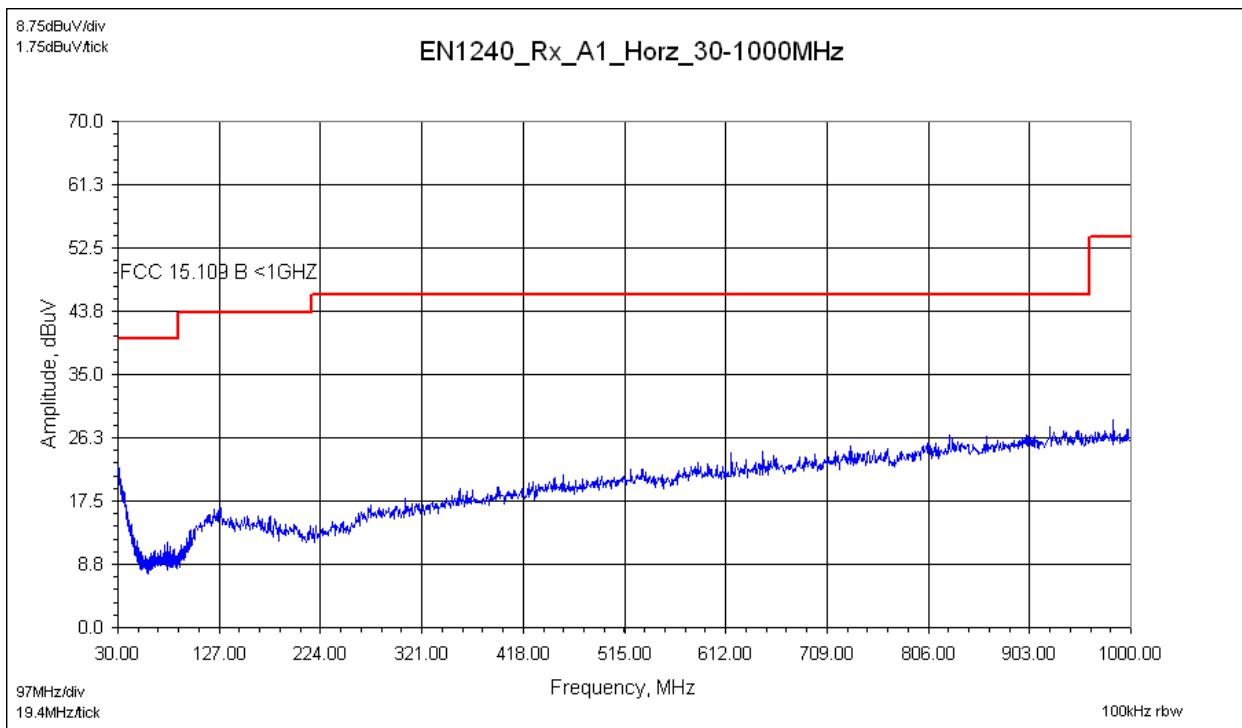
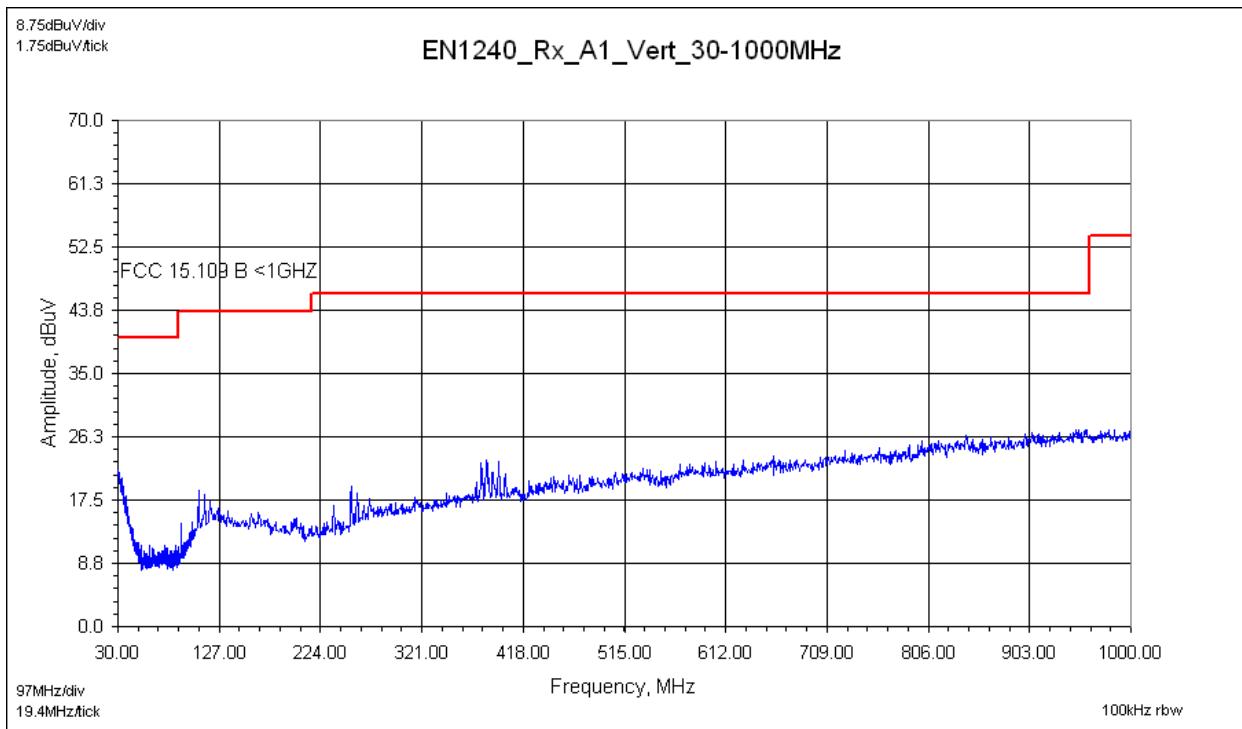
Photo:

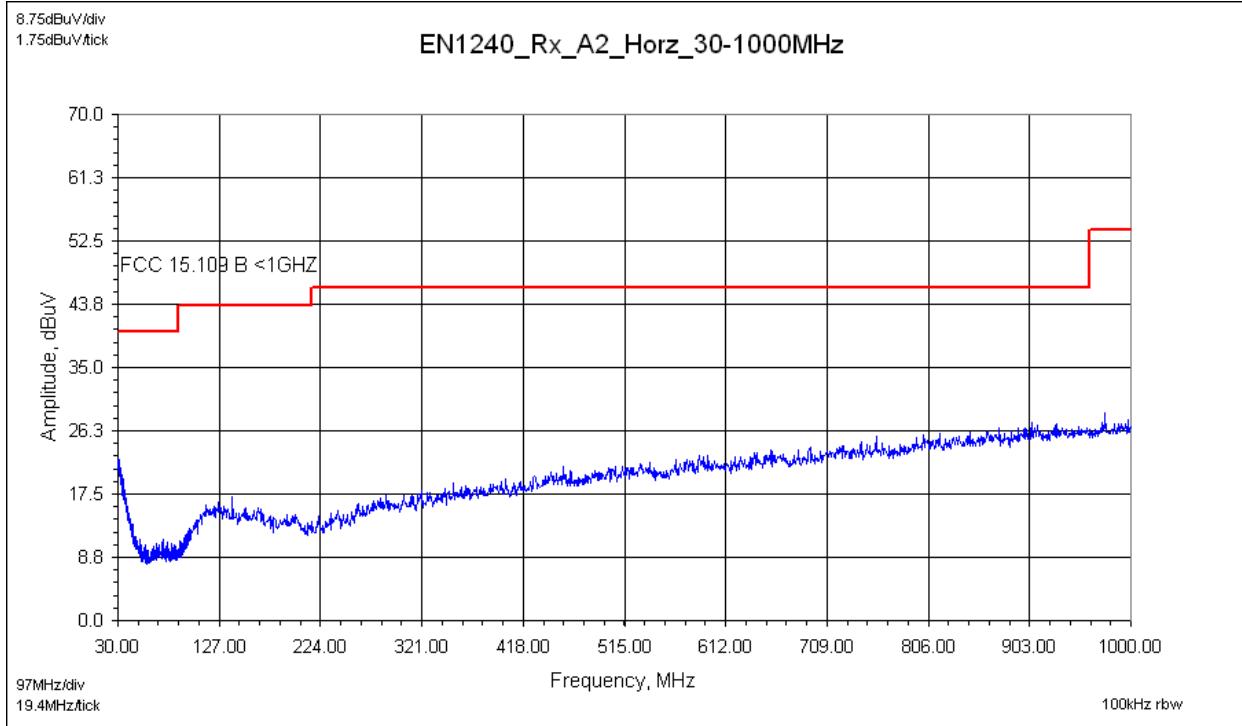
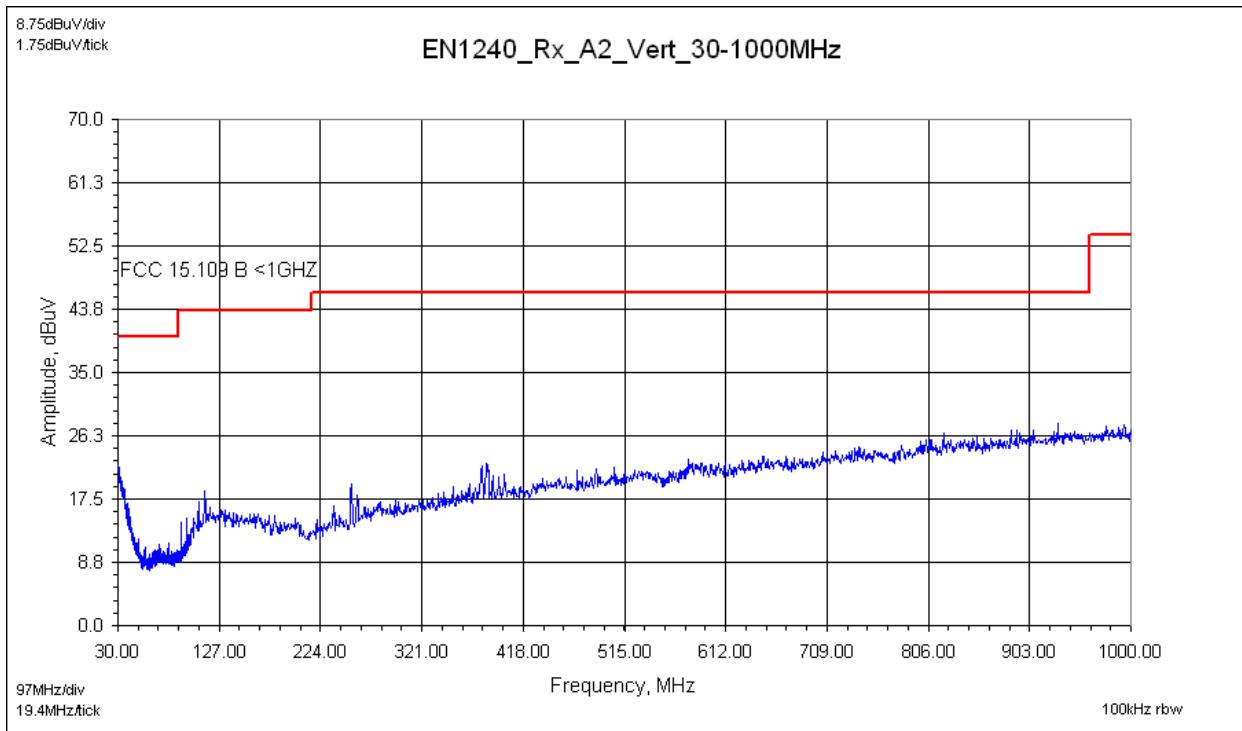
30-1000 MHz

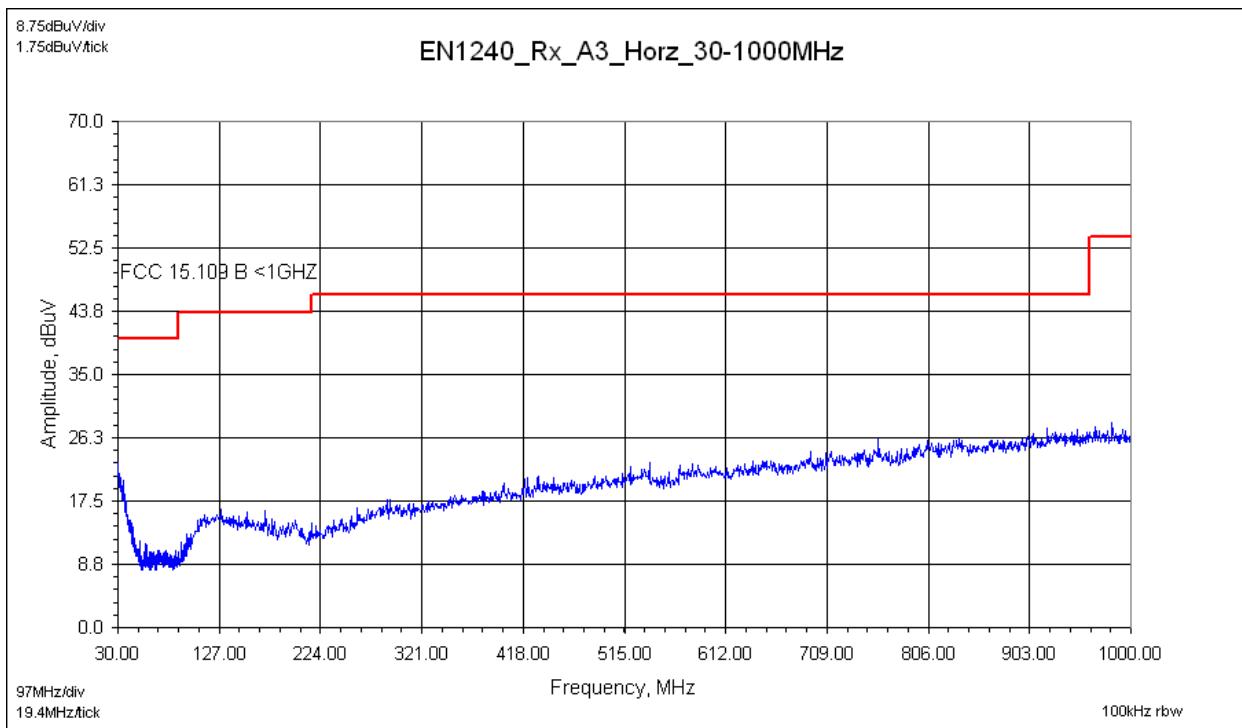
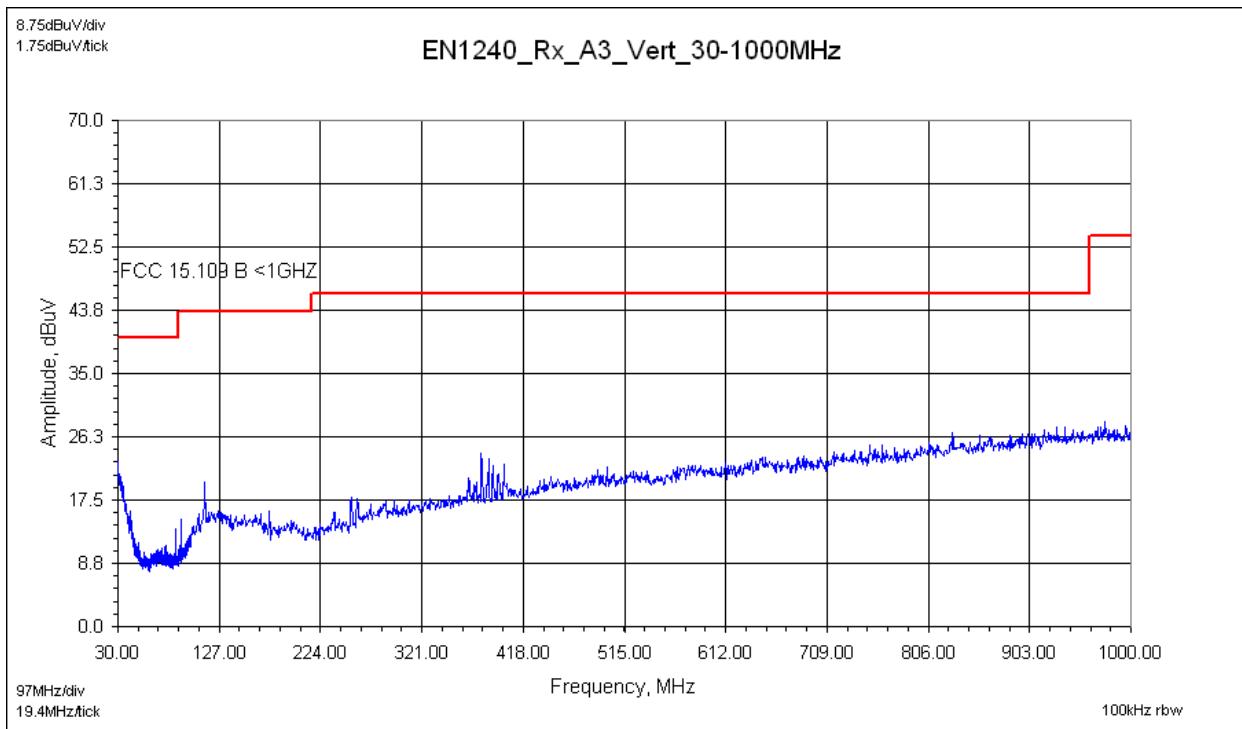


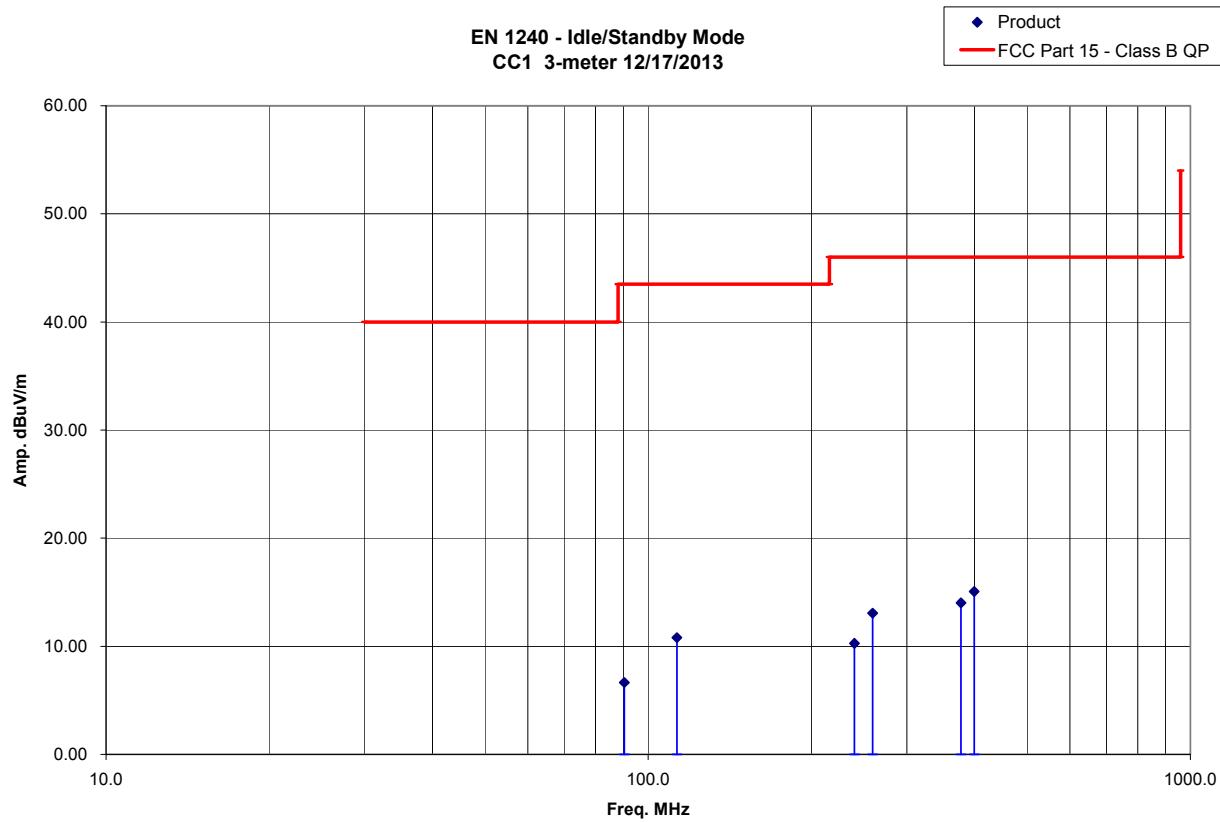
1-10 GHz



8.5 Pre-scan Plots:

8.6 Pre-scan Plots:

8.7 Pre-scan Plots:

8.8 Final Measurement Plots

8.9 Data:

Unintentional Radiated Electromagnetic Emissions

Test Report #: **G101454375** Test Area: CC1 Radiated Temperature: 23.1 °C
 Test Method: FCC 15.109 Test Date: 12/17/2013 Relative Humidity: 21.9 %
 EUT Model #: EN 1240 EUT Power: 3VDC Battery Air Pressure: 83.7 kPa
 EUT Serial #: 99514079

Manufacturer: Inovonics Wireless	Level Key
EUT Description: Activity Sensor	Pk – Peak
Notes: Product configured in idle/standby mode of operation	Qp – Quasi Peak
Note: The product does not incorporate an Rx receive mode	Av - Average

Freq	Level	Det	Cable	Ant	Preamp	Atten	Final	Pol	Hgt	Az	Delta1	Delta2	RBW
MHz	dBuV	Qp Av Pk									FCC 15.109		(MHz)
Measurements: 30MHz to 1000MHz													
90.3526	25.75	Qp	0.77	8.23	28.10	0.00	6.65	H	1.94	110.4	- 36.85	NA	0.120
113.0000	25.05	Qp	0.77	13.00	28.02	0.00	10.80	H	2.29	144.4	- 32.70	NA	0.120
240.0641	25.05	Qp	1.04	11.60	27.41	0.00	10.28	H	2.18	275.5	- 35.72	NA	0.120
259.3750	27.11	Qp	1.09	12.21	27.34	0.00	13.07	H	1.86	45.8	- 32.93	NA	0.120
377.6442	25.11	Qp	1.33	15.30	27.73	0.00	14.02	H	1.46	221.4	- 31.98	NA	0.120
399.2788	25.88	Qp	1.37	15.70	27.88	0.00	15.07	H	1.37	30.9	- 30.93	NA	0.120

Example calculation:

Measure d Level	+	Cable Loss	+	Antenna Factor	-	Pre-Amp	+	Atten	=	Final Correcte d Reading	Specificatio n Limit	-	Final Correcte d Reading	=	Delta Specificatio n
(dB μ V)		(dB)		(dB)		(dB)		(dB)		(dB μ V/m)	(dB μ V/m)		(dB μ V/m)		
20.0	+	3.0	+	5.0	-	10.0	+	0.0	=	18.0	40.0	-	18.0	=	- 22.0

Notes:

1. Quasi-peak detector measurements \leq 1GHz: 120kHz RBW, 300kHz VBW.
2. Average detector measurements $>$ 1 GHz: 1MHz RBW, 10Hz VBW..
3. All measurements are field strength measurements taken at 3-meter product-to-antenna.
4. The device was placed on a turntable 80 cm high, it was rotated 360 degrees and the measurement antenna was raised and lowered between 1 and 4 meters to maximize emissions from this device.

Deviations, Additions, or Exclusions: None

9 20 dB Bandwidth – FCC 15.247 (a)(1)(i)**9.1 Method**

Unless otherwise stated no deviations were made from ANSI C63.10 and FCC public notice DA 00-705.

This testing was performed at Intertek Denver, located at 1795 Dogwood St., Suite 200, Louisville, CO 80027.

9.2 Test Equipment Used:

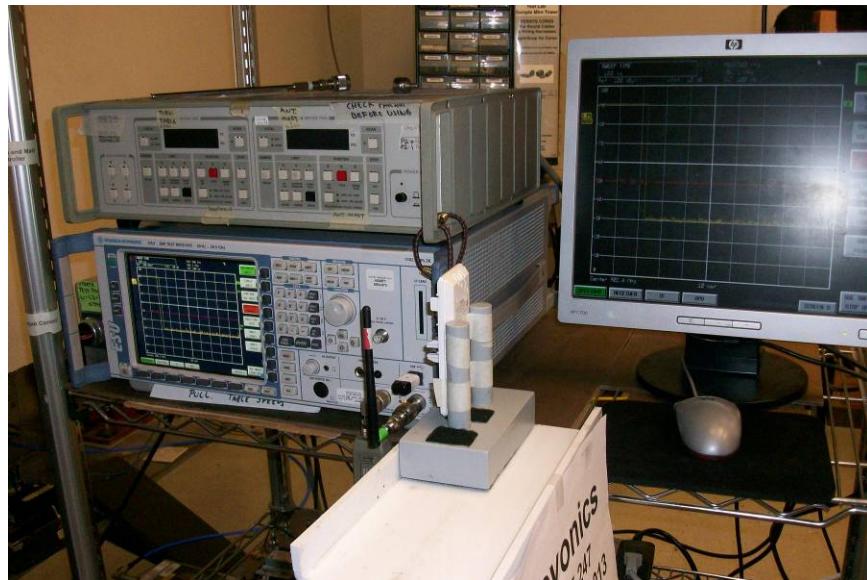
<u>Asset ID:</u>	<u>Description:</u>	<u>Manufacturer:</u>	<u>Model:</u>	<u>Serial:</u>	<u>Cal Date</u>	<u>Cal Due</u>
DEN-073	EMI Receiver	ROHDE & SCHWARZ	ESU 26	100265	01/23/2013	01/23/2014
EMC-xx	Whip antenna	xxx	xxx	xxx	VBU	VBU

9.3 Results:

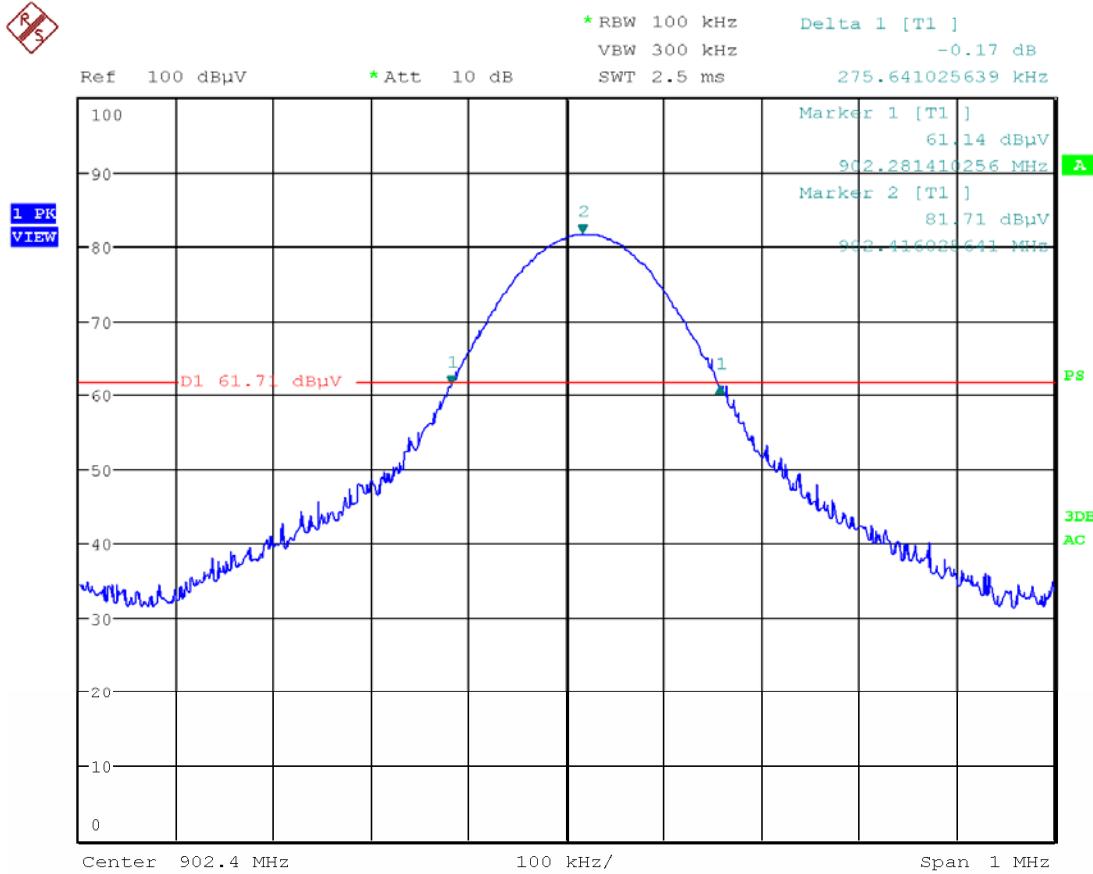
The sample tested was found to Comply.

9.4 Setup Photographs:

Test Setup – 20dB Bandwidth



9.5 Plots: Low Channel

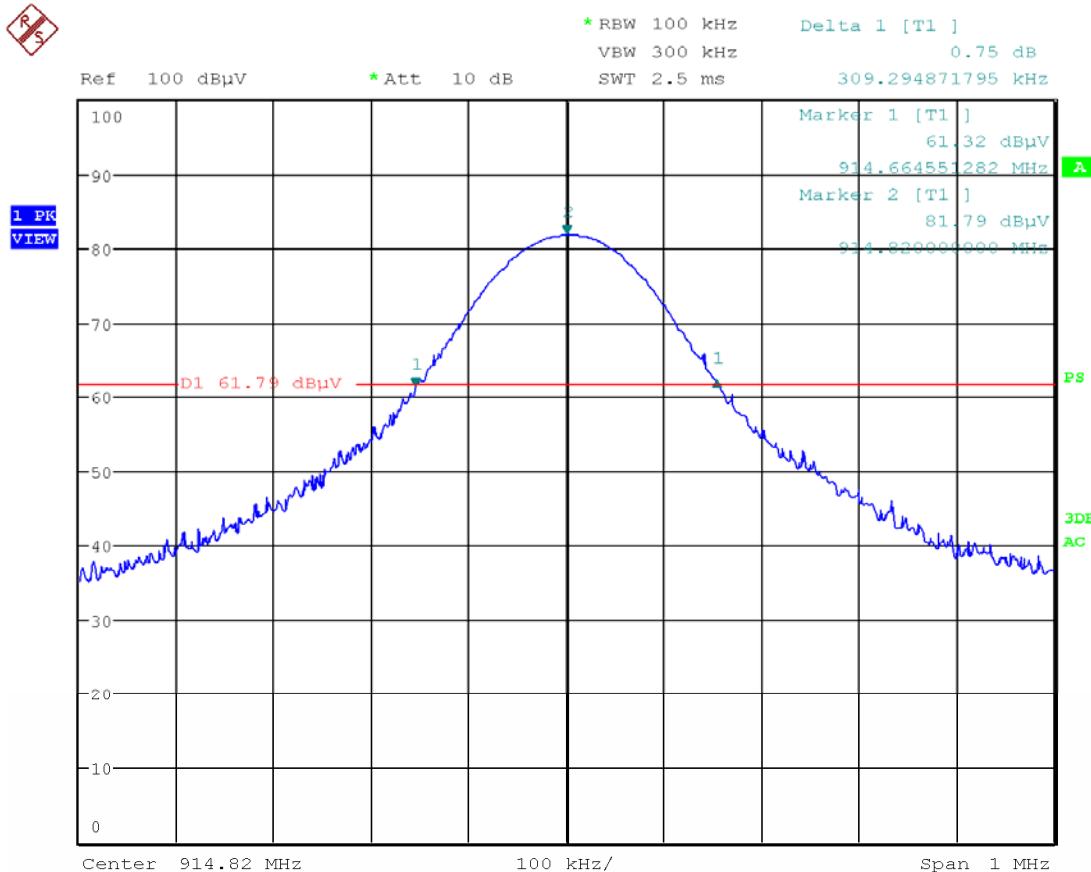


Date: 17.DEC.2013 17:14:07

Requirement: For products with ≥ 25 hopping channels, the minimum allowed 20dB Bandwidth is 250 kHz. The maximum allowed 20dB Bandwidth is 500 kHz.

Test Result: The minimum 20dB Bandwidth was found to be 275.64 kHz: Lowest Channel

9.6 Plots: Mid Channel

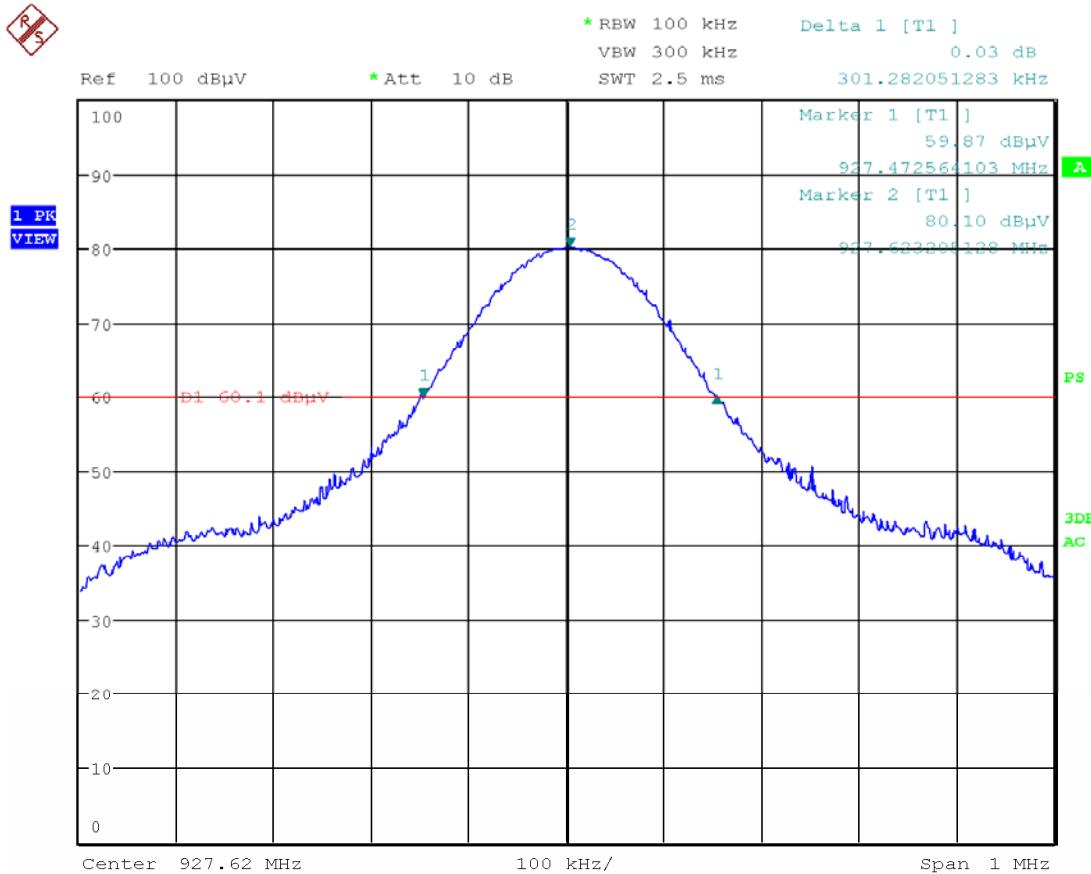


Date: 17.DEC.2013 17:01:25

Requirement: For products with ≥ 25 hopping channels, the minimum allowed 20dB Bandwidth is 250 kHz. The maximum allowed 20dB Bandwidth is 500 kHz.

Test Result: The minimum 20dB Bandwidth was found to be 309.29 kHz: Mid Channel

9.7 Plots High Channel



Date: 17.DEC.2013 17:07:21

Requirement: For products with ≥ 25 hopping channels, the minimum allowed 20dB Bandwidth is 250 kHz. The maximum allowed 20dB Bandwidth is 500 kHz.

Test Result: The minimum 20dB Bandwidth was found to be 301.28 kHz: Highest Channel

9.8 Measurement Summary:

The minimum 20dB Bandwidth (worst-case margin) was found to be 275.64 kHz: Lowest Channel

Notes: None

10 Carrier Frequency Separation – FCC 15.247 (a)(1)**10.1 Method**

Unless otherwise stated no deviations were made from ANSI C63.10 and FCC public notice DA 00-705.

This testing was performed at Intertek Denver, located at 1795 Dogwood St., Suite 200, Louisville, CO 80027.

10.2 Test Equipment Used:

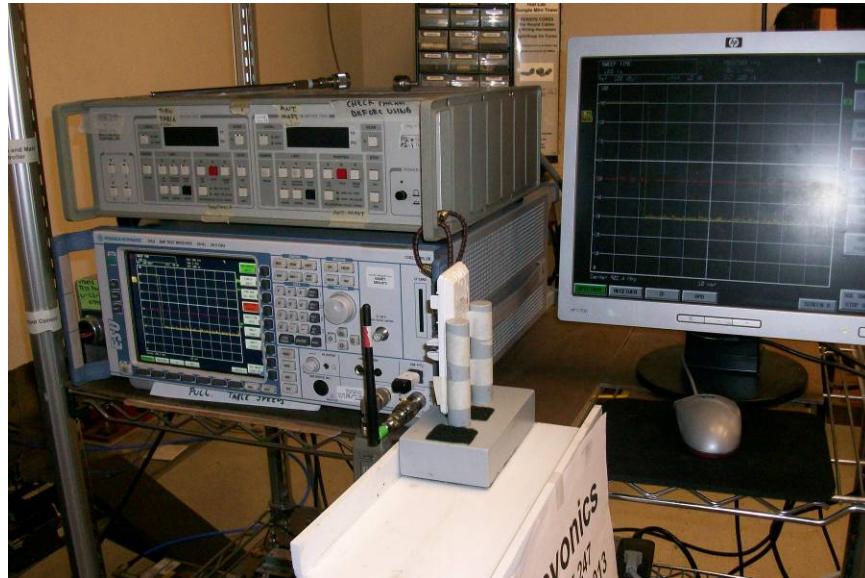
<u>Asset ID:</u>	<u>Description:</u>	<u>Manufacturer:</u>	<u>Model:</u>	<u>Serial:</u>	<u>Cal Date</u>	<u>Cal Due</u>
DEN-073	EMI Receiver	ROHDE & SCHWARZ	ESU 26	100265	01/23/2013	01/23/2014
EMC-xx	Whip antenna	xxx	xxx	xxx	VBU	VBU

10.3 Results:

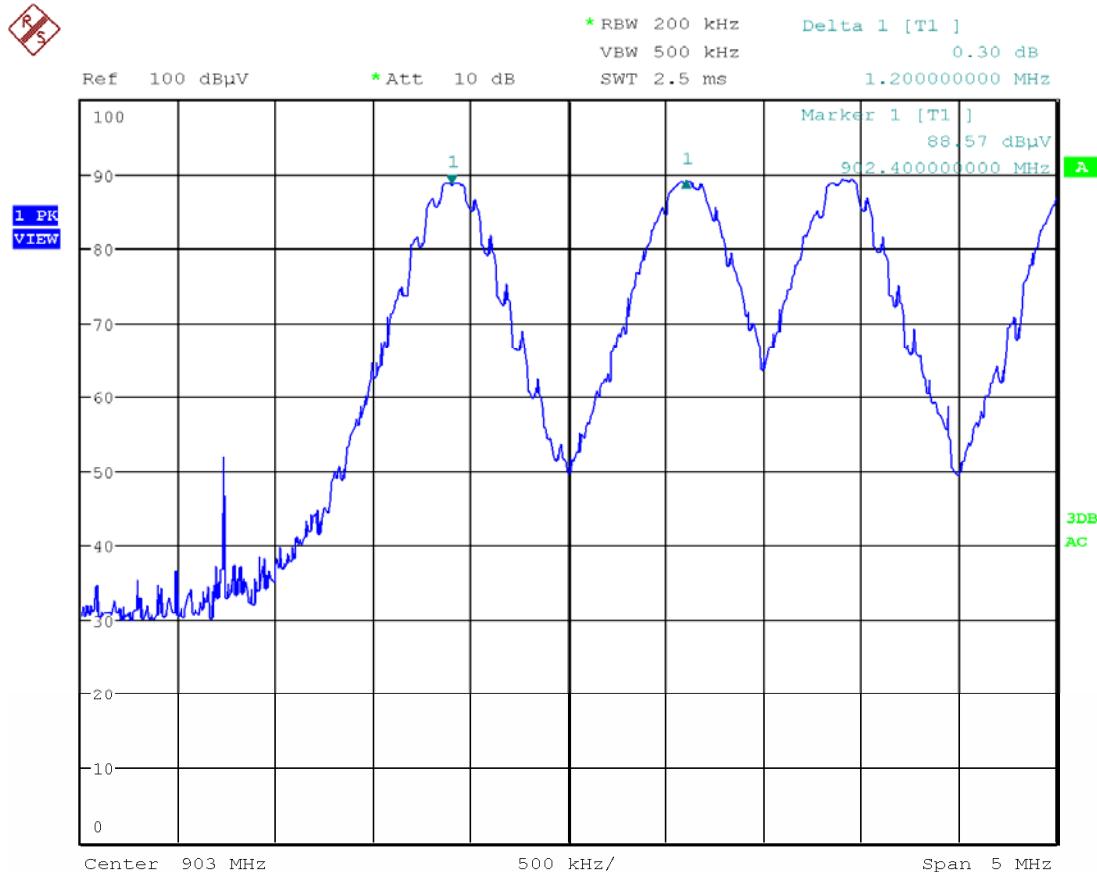
The sample tested was found to Comply.

10.4 Setup Photographs:

Test Setup – Carrier Frequency Separation



10.5 Plots: Maximum Carrier Frequency Separation

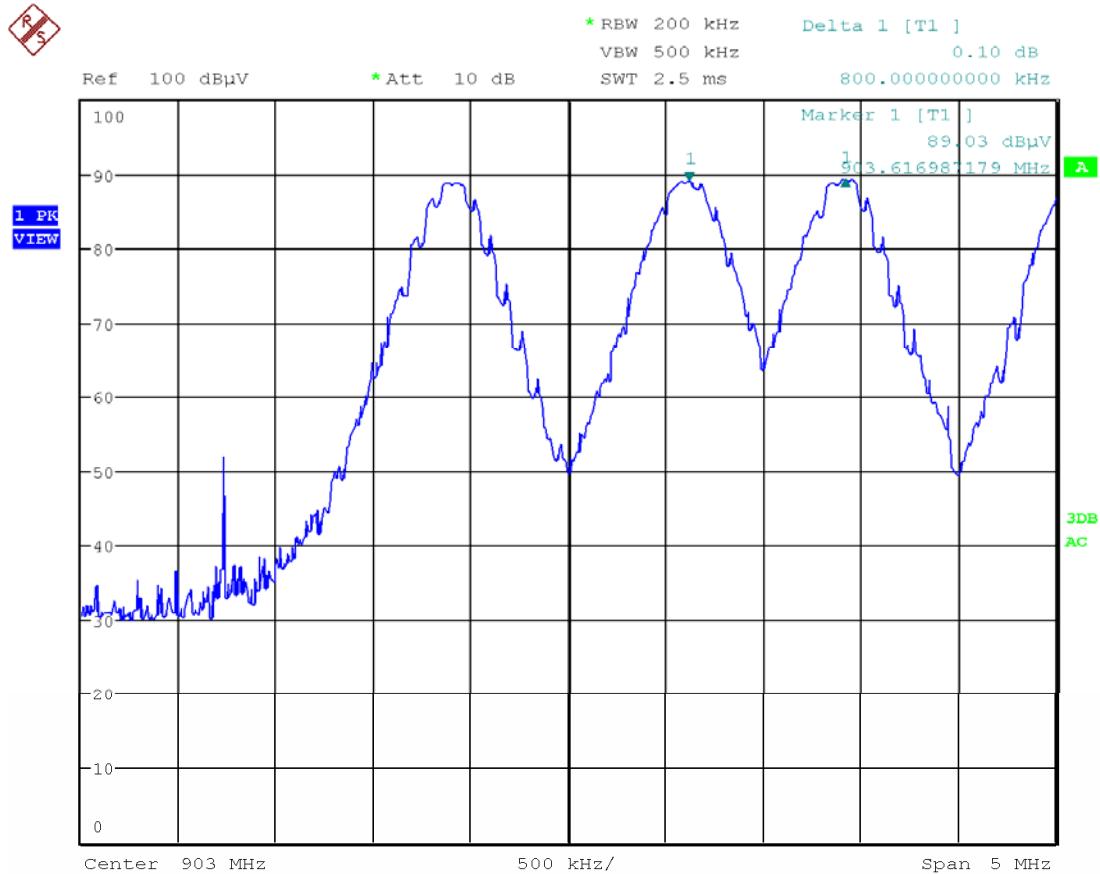


Date: 6.JAN.2014 19:36:46

Requirement: The minimum hopping channel carrier frequency separation is the greater of the 20dB Bandwidth and 25 kHz.

Test Result: The 20dB Bandwidth was found to be 275.64 kHz. The minimum hopping channel frequency separation was found to be 1.2 MHz, which is greater than 275.64 kHz.

10.6 Plots: Minimum Carrier Frequency Separation (Worst-Case)



Date: 6.JAN.2014 19:37:44

Requirement: The minimum hopping channel carrier frequency separation is the greater of the 20dB Bandwidth and 25 kHz.

Test Result: The 20dB Bandwidth was found to be 275.64 kHz. The minimum hopping channel frequency separation was found to be 800 kHz, which is greater than 275.64 kHz.

10.7 Measurement Summary:

The minimum (worst-case) hopping channel frequency separation was found to be 800 kHz, which is greater than the the measured 20dB Bandwidth.

11 Number of Hopping Frequencies – FCC 15.247 (a)(1)(i)**11.1 Method**

Unless otherwise stated no deviations were made from ANSI C63.10 and FCC public notice DA 00-705.

This testing was performed at Intertek Denver, located at 1795 Dogwood St., Suite 200, Louisville, CO 80027.

11.2 Test Equipment Used:

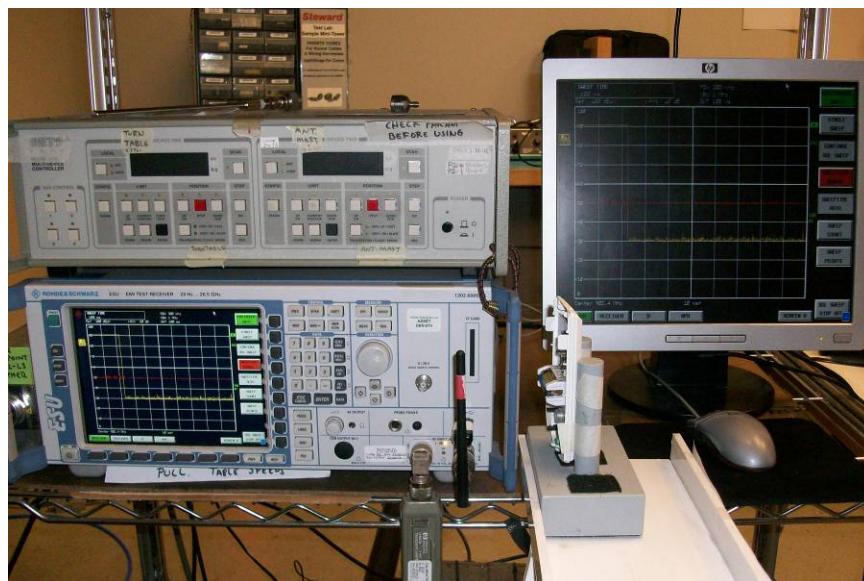
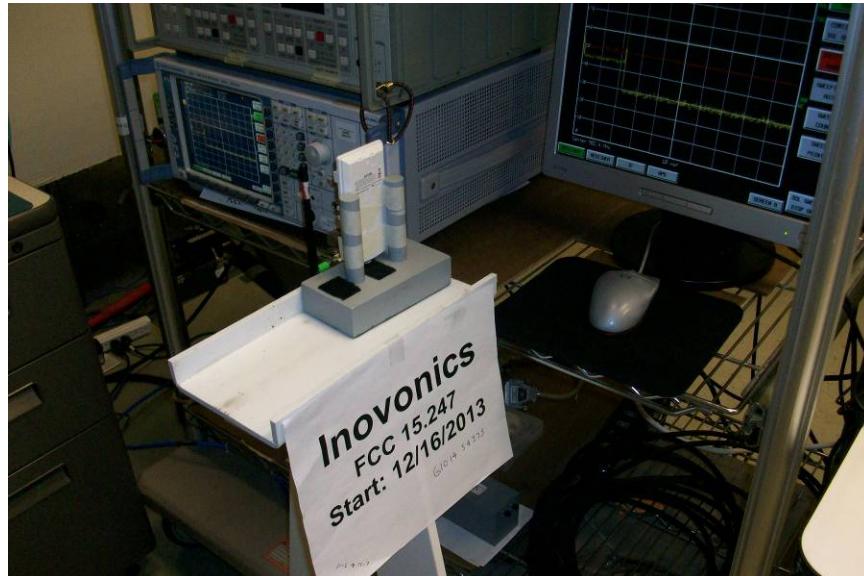
<u>Asset ID:</u>	<u>Description:</u>	<u>Manufacturer:</u>	<u>Model:</u>	<u>Serial:</u>	<u>Cal Date</u>	<u>Cal Due</u>
DEN-073	EMI Receiver	ROHDE & SCHWARZ	ESU 26	100265	01/23/2013	01/23/2014
EMC-xx	Whip antenna	xxx	xxx	xxx	VBU	VBU

11.3 Results:

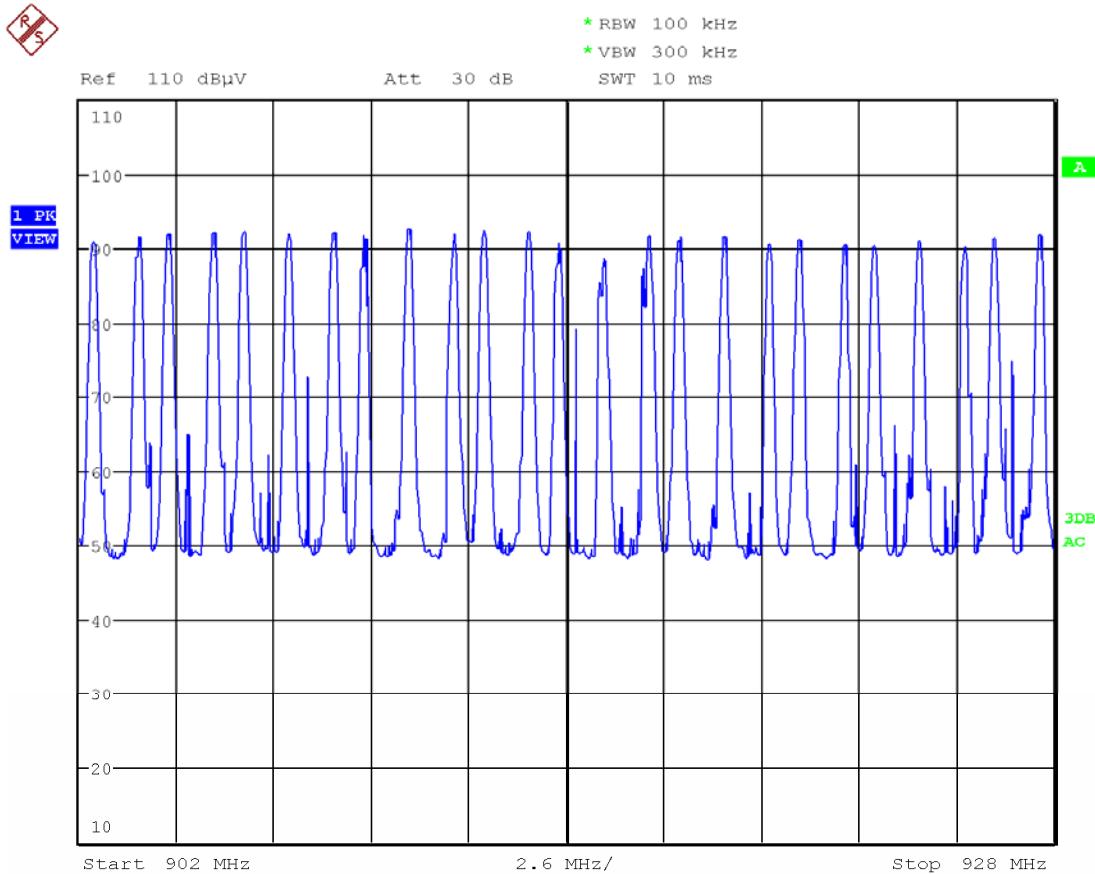
The sample tested was found to Comply.

11.4 Setup Photographs:

Test Setup – Tx Number of Hopping Frequencies

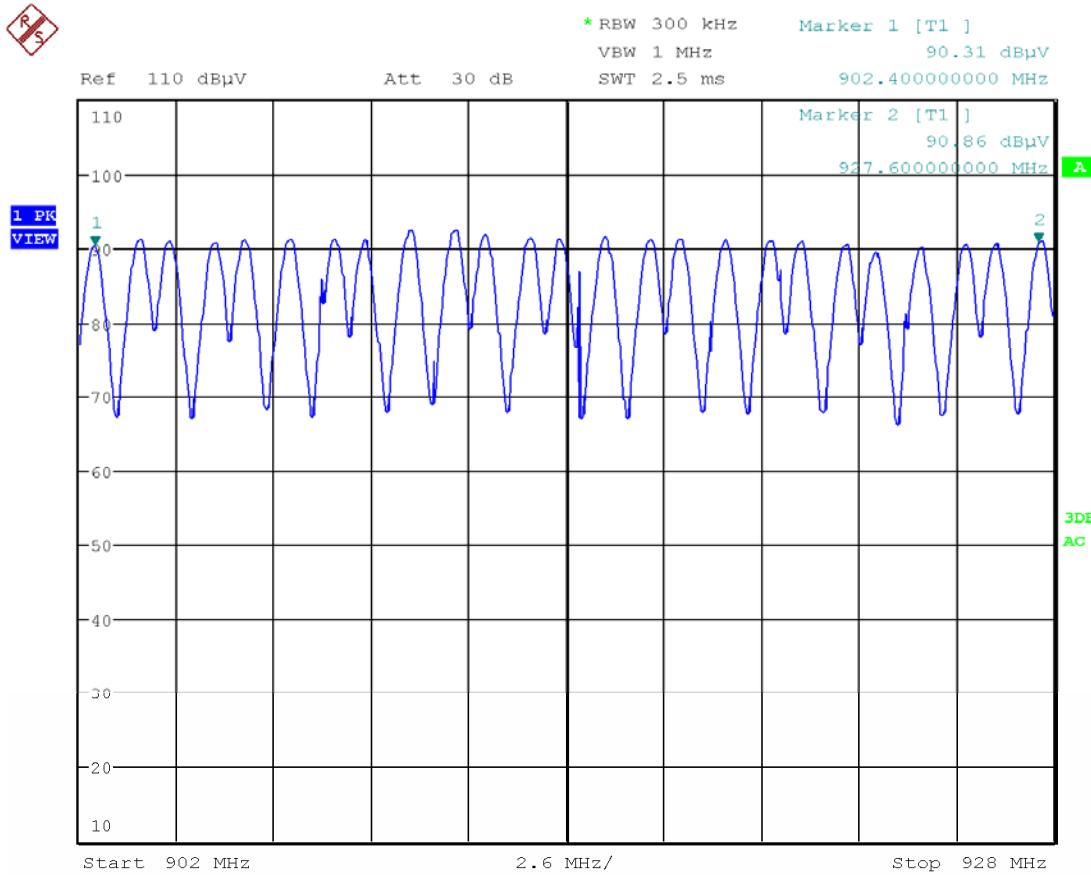


11.5 Plots: RBW 100kHz



Date: 6.JAN.2014 18:50:46

11.6 Plots: RBW 300kHz



Date: 6.JAN.2014 19:00:03

Requirement: Systems where the 20dB Bandwidth is greater than 250 kHz (measured 20dB BW = 275.64 kHz) require the usage of at least 25 hopping frequencies.

11.7 Measurement Summary:

Test Result: This device was verified to use a minimum of 25 hopping frequencies.

12 Time of Occupancy (Dwell Time) – FCC 15.247 (a)(1)(i)**12.1 Method**

Unless otherwise stated no deviations were made from ANSI C63.10 and FCC public notice DA 00-705.

This testing was performed at Intertek Denver, located at 1795 Dogwood St., Suite 200, Louisville, CO 80027.

12.2 Test Equipment Used:

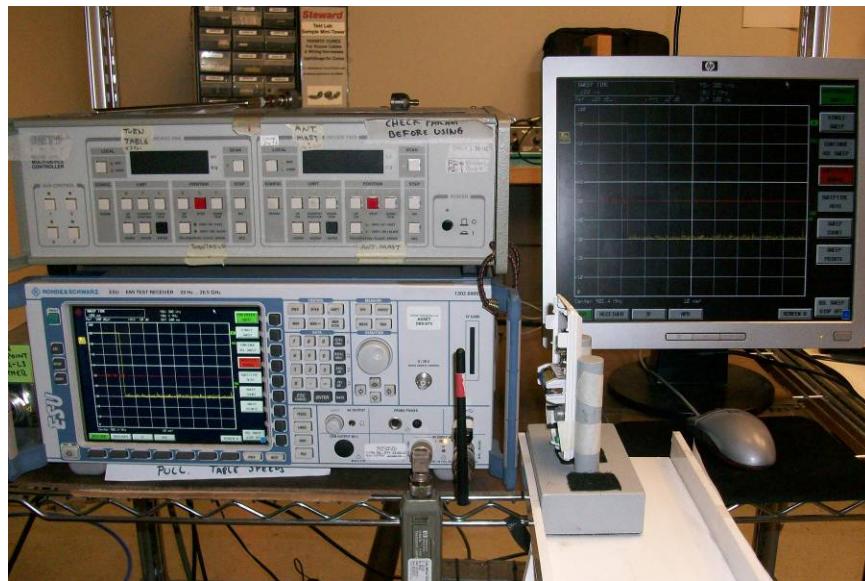
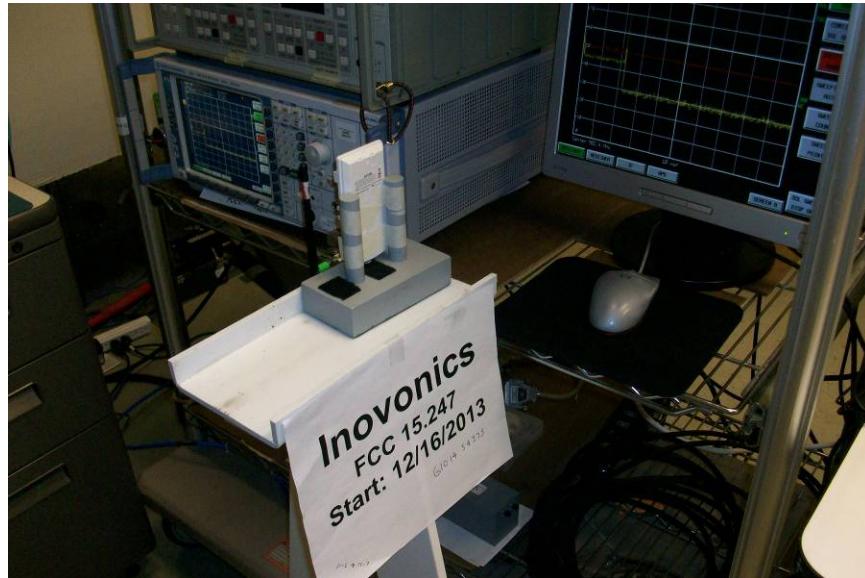
<u>Asset ID:</u>	<u>Description:</u>	<u>Manufacturer:</u>	<u>Model:</u>	<u>Serial:</u>	<u>Cal Date</u>	<u>Cal Due</u>
DEN-073	EMI Receiver	ROHDE & SCHWARZ	ESU 26	100265	01/23/2013	01/23/2014
EMC-xx	Whip antenna	xxx	xxx	xxx	VBU	VBU

12.3 Results:

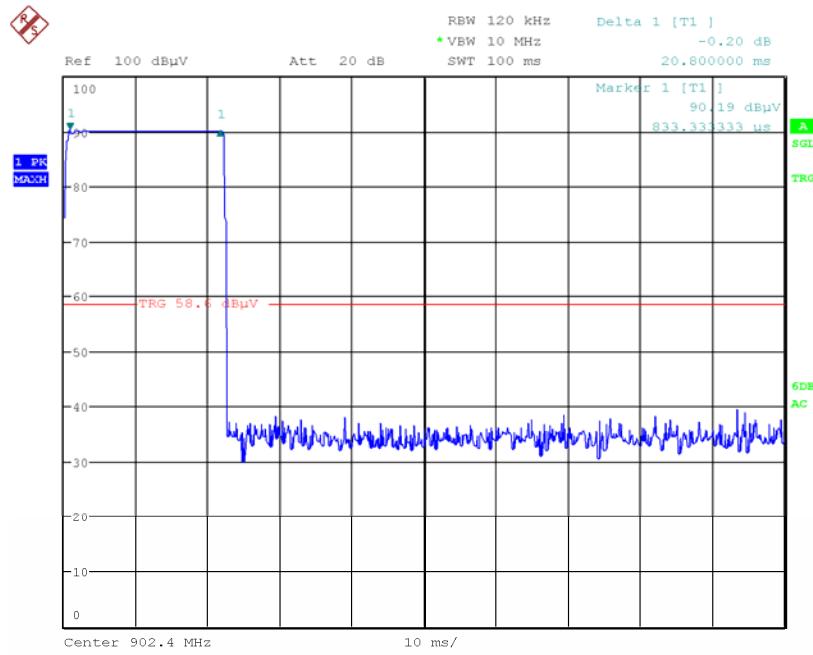
The sample tested was found to Comply.

12.4 Setup Photographs:

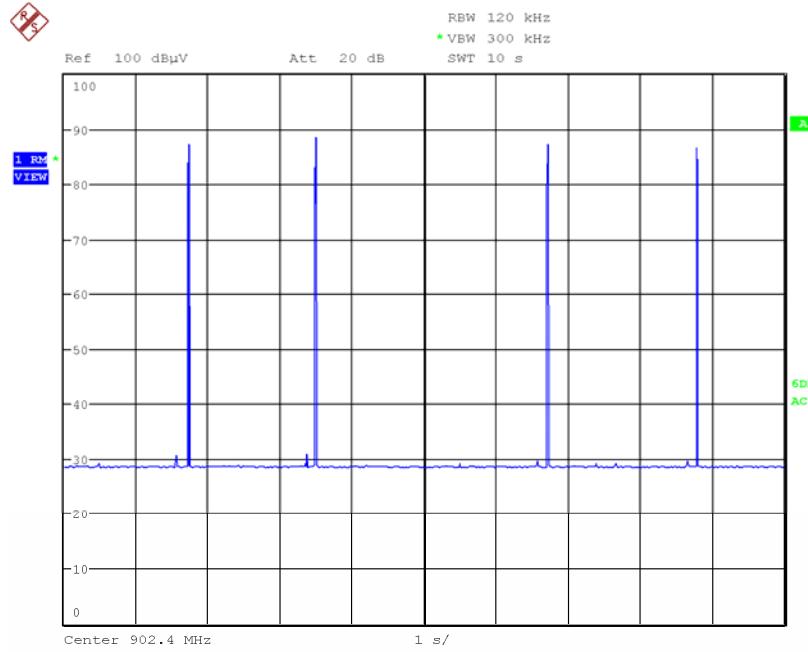
Test Setup – Time of Occupancy (Dwell Time)



12.5 Plots: Low Channel



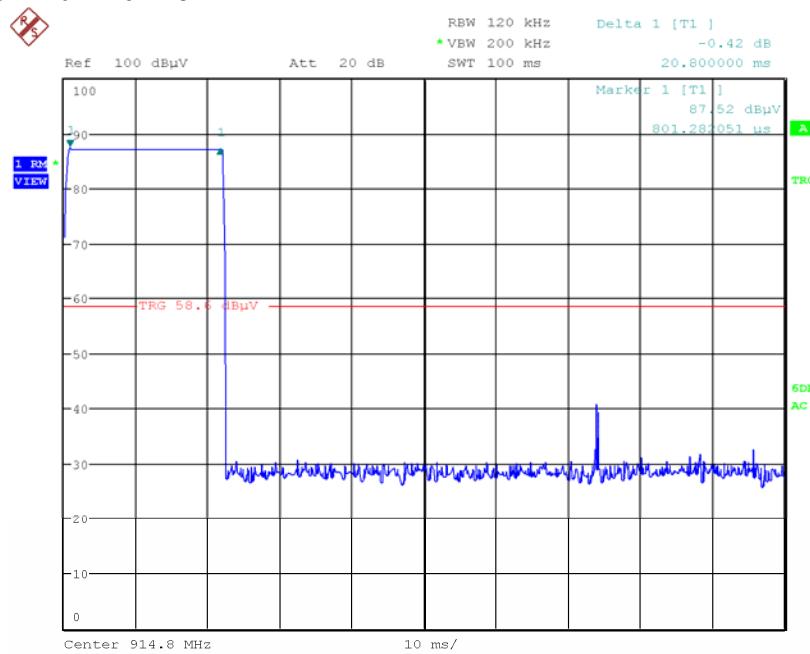
Date: 10.JAN.2014 10:43:33



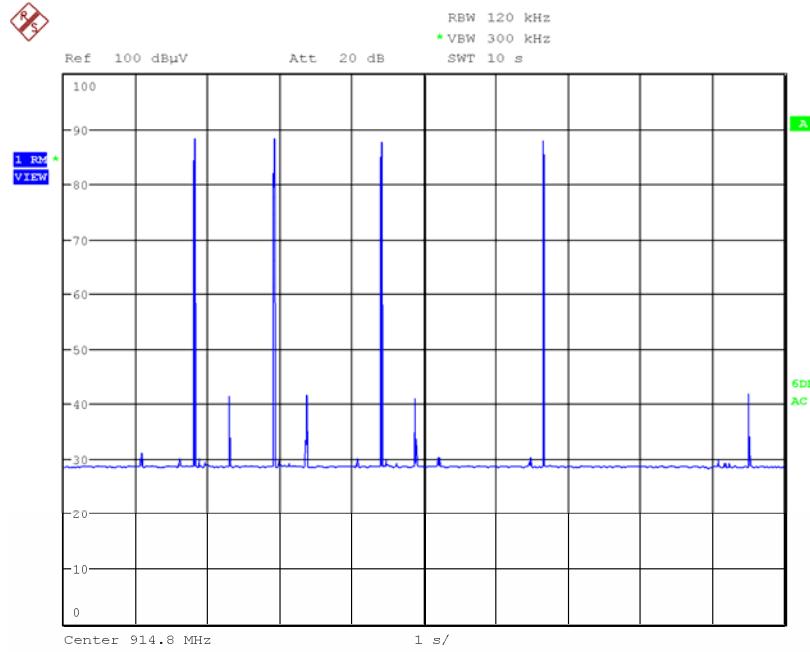
Date: 10.JAN.2014 12:00:55

Note: Requirement: The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. This device was found to occupy the frequency for 0.0832 seconds (0.0208 sec x 4).

12.6 Plots: Mid Channel



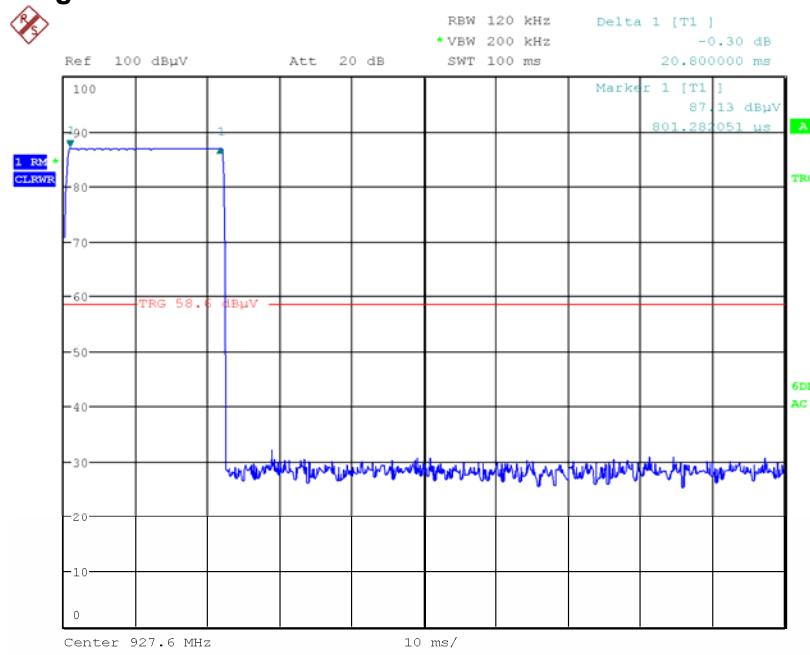
Date: 10.JAN.2014 11:04:49



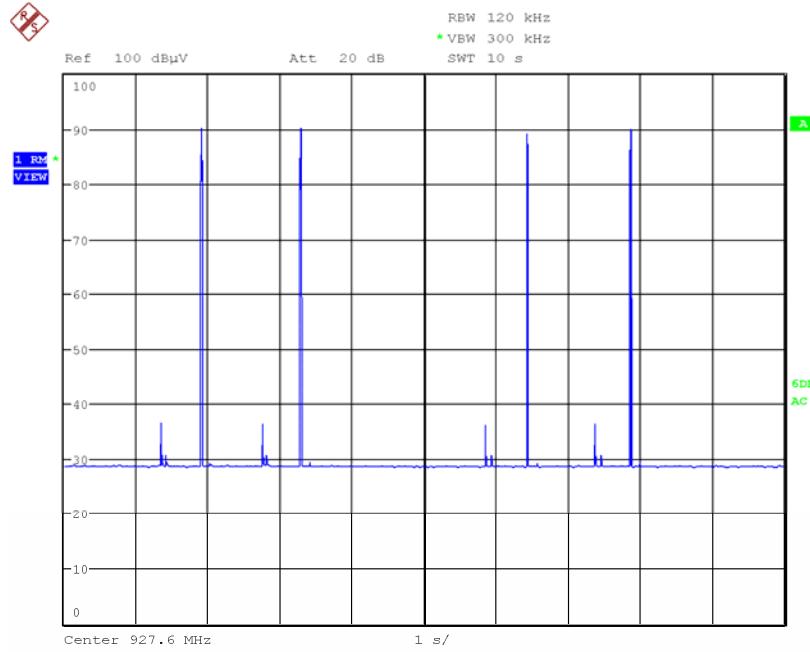
Date: 10.JAN.2014 12:01:36

Note: Requirement: The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. This device was found to occupy the frequency for 0.0832 seconds (0.0208 sec x 4).

12.7 Plots: High Channel



Date: 10.JAN.2014 11:05:29



Date: 10.JAN.2014 12:03:53

Note: Requirement: The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. This device was found to occupy the frequency for 0.0832 seconds (0.0208 sec x 4).

13 AC Mains Conducted Emissions – Not required, device is battery powered.**14 Measurement Uncertainty**

The measured value related to the corresponding limit will be used to decide whether the equipment meets the requirements.

The measurement uncertainty figures were calculated and correspond to a coverage factor of $k = 2$, providing a confidence level of respectively 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian).

Measurement uncertainty Table

Parameter	Uncertainty \pm	Notes
Radiated emissions, 10kHz to 30 MHz	3.4 dB	
Radiated emissions, 30 to 200 MHz HP	2.2 dB	
Radiated emissions, 30 to 200 MHz VP	3.8 dB	
Radiated emissions, 200 to 1000 MHz HP	2.8 dB	
Radiated emissions, 200 to 1000 MHz VP	2.7 dB	
Radiated emissions, 1 to 18 GHz	5.2 dB	
Conducted port emissions 10kHz to 1000 MHz	1.0 dB	
Conducted port emissions 1 – 26.5 GHz	1.6 dB	
AC mains Conducted emissions, 9kHz to 30 MHz	3.14 dB	

15 Appendix A: Product Modifications - Not Required

- No product modifications were required to pass the testing in this report.

16 Revision History

Revision Level	Date	Report Number	Notes
0	1/10/2014	101454375DEN-001	Original