PCTEST ENGINEERING LABORATORY, INC.
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MEASUREMENT REPORT
FCC PART 15.247 / IC RSS-210

Applicant Name:
Wireless Seismic, Inc.
13100 Southwest Freeway, Suite 500
Sugarland, TX 77478
USA

Date of Testing:
April 30, 2012
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
0Y1204300602.YZO

FCC ID:	**YZO-00103**
APPLICANT:	**Wireless Seismic, Inc.**

Application Type:	Certification
Model(s):	10-0017
EUT Type:	Wireless Remote Unit
Max. RF Output Power:	58.21 mW (17.65dBm) Conducted
Frequency Range:	2403 – 2475MHz
FCC Classification:	FCC Part 15 Spread Spectrum Transmitter (DSS)
FCC Rule Part(s):	Part 15 Subpart C (15.247)
IC Specification(s):	RSS-210 Issue 8

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

PCTEST certifies that no party to this application has been subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

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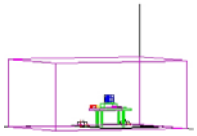
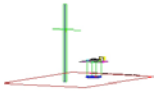


MEASUREMENT REPORT
FCC Part 15.247



§ 2.1033 General Information

APPLICANT:	Wireless Seismic, Inc.
APPLICANT ADDRESS:	13100 Southwest Freeway, Suite 500 Sugarland, TX 77478USA
TEST SITE:	PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS:	7185 Oakland Mills Road, Columbia, MD 21046 USA
FCC RULE PART(S):	Part 15 Subpart C (15.247)
IC SPECIFICATION(S):	RSS-210 Issue 8
BASE MODEL:	10-0017
FCC ID:	YZO-00103
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC CLASSIFICATION:	FCC Part 15 Spread Spectrum Transmitter (DSS)
Method/System:	Frequency Hopping Spread Spectrum (FHSS)
DATE(S) OF TEST:	April 30, 2012
TEST REPORT S/N:	0Y1204300602.YZO

Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21045, U.S.A.

- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC.

- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2 PCTEST Test Location

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity are, the Baltimore-Washington Internt'l (BWI) airport, the city of Baltimore and the Washington, DC area. (*See Figure 1-1*).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The site coordinates are 39° 10'23" N latitude and 76° 49'50" W longitude. The facility is 0.4 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003 on February 15, 2012.

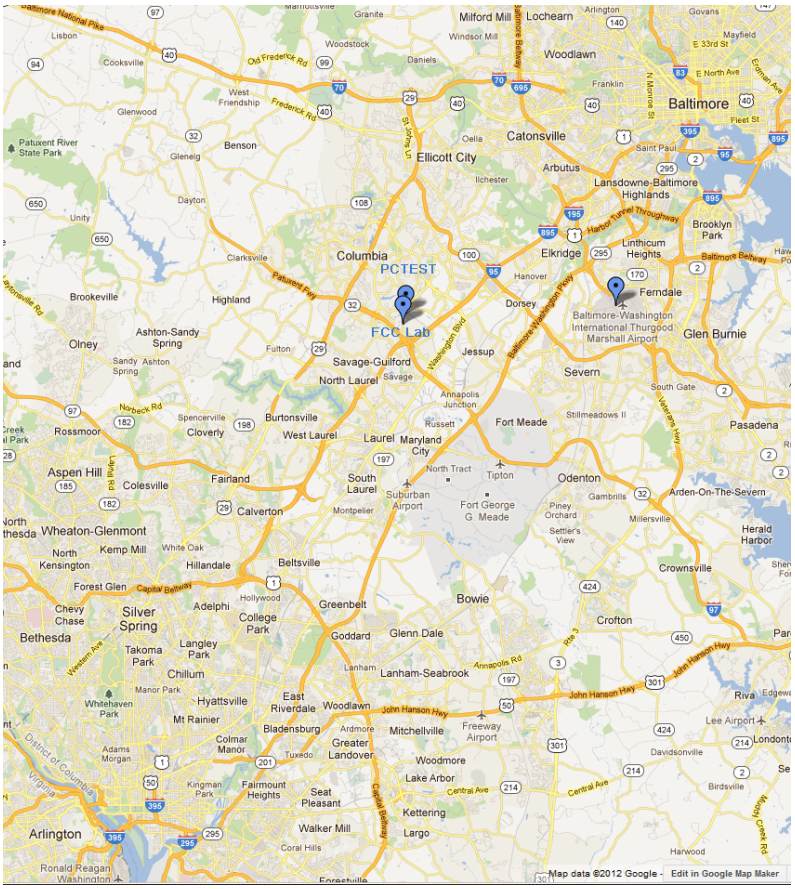


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Wireless Seismic Wireless Remote Unit FCC ID: YZO-00103**. The EUT is part of the RT System 2 for deployment outdoors. The test data contained in this report pertains only to the emissions due to the EUT's transmitter. The EUT contains the R06 Digital Controller. The EUT consisted of the following component(s):

Manufacturer / Base Model	FCC ID	Description
Wireless Seismic / Model: 10-0017	YZO-00103	Wireless Remote Unit
Laird Technologies / OD24M-9	N/A	9dBi Omnidirectional Antenna

Table 2-1. EUT Equipment Description

The EUT may be supplied with the following Omnidirectional antennas. The highest gain antenna (9dBi) was used during testing for worst case conditions.

Manufacturer / Model	Antenna Type	Gain
Laird Technologies / RD2458-5-NM	Rubber Duck Omnidirectional Antenna	2dBi
L-com / HGV-2404U	Omnidirectional Antenna	4dBi
Laird Technologies / OD24M-5	Omnidirectional Antenna	5dBi
Pac Wireless / OD24M-7	Omnidirectional Antenna	7dBi
Comet / SF-245WSPR-R	Omnidirectional Antenna	7.4 dBi
Laird Technologies / OD24M-9	Omnidirectional Antenna	9dBi

Table 2-2. Antenna Information

2.2 Device Capabilities

2.4GHz Frequency Hopping Spread Spectrum Device

2.3 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

2.4 Labeling Requirements

Per 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(b)(2).

Please see attachment for FCC ID label and label location.

3.0 DESCRIPTION OF TEST

3.1 Evaluation Procedure

The measurement procedure described in the *American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz* (ANSI C63.4-2003) and FCC Public Notice DA 00-705 dated March 30, 2000 entitled "*Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems*" were used in the measurement of the **Wireless Seismic Wireless Remote Unit FCC ID: YZO-00103.**

Deviation from measurement procedure…….....None

3.2 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. An ETS Lindgren Model 2188 raised turntable is used for radiated measurement. It is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. A 78cm high PVC support structure is placed on top of the turntable. A ¾" (~1.9cm) sheet of high density polyethylene is used as the table top and is placed on top of the PVC supports to bring the total height of the table to 80cm.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by varying: the mode of operation or resolution, clock or data rate, scrolling H pattern to the EUT and/or support equipment, and changing the polarity of the receive antenna, whichever produced the worst-case emissions. To record the final measurements, the analyzer detector function was set to CISPR quasi-peak mode and the bandwidth of the spectrum analyzer was set to 120kHz for frequencies below 1GHz or 1MHz for frequencies above 1GHz. For average measurements above 1GHz, the analyzer was set to peak detector with a reduced VBW setting (RBW = 1MHz, VBW = 1/T Hz, where T= pulse width).

4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:
"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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."

- The antennas of the Wireless Seismic Wireless Remote Unit are professionally installed**.**

Conclusion:

The **Wireless Seismic Wireless Remote Unit FCC ID: YZO-00103** unit complies with the requirement of §15.203.

Ch.	Frequency (MHz)
Low	2403
:	:
Mid	2439
:	:
High	2475

Table 4-1. Frequency/ Channel Operations

5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	6/7/2011	Annual	6/7/2012	N/A
-	RE2	Radiated Emissions Cable Set (VHF/UHF)	2/13/2012	Annual	2/13/2013	N/A
-	BT2	Bluetooth Cable Set	2/17/2012	Annual	2/17/2013	N/A
Agilent	8447D	Broadband Amplifier	5/8/2012	Annual	5/8/2013	2443A01900
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	7/22/2011	Annual	7/22/2012	125518
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	5/31/2011	Annual	5/31/2012	135427
Mini-Circuits	VHF-3100+	High Pass Filter	1/15/2012	Annual	1/15/2013	30841
Rohde & Schwarz	RS-PR18	1-18 GHz Pre-Amplifier	6/9/2011	Annual	6/9/2012	100071
Rohde & Schwarz	RS-PR26	18-26.5 GHz Pre-Amplifier	6/9/2011	Annual	6/9/2012	100040
Rohde & Schwarz	ESU26	EMI Test Receiver	12/15/2011	Annual	12/15/2012	100342
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/26/2012	Biennial	1/26/2014	A051107

Table 5-1. Annual Test Equipment Calibration Schedule

Note:

The calibration date for the 8447D Broadband Amplifier is after the test date, but it was utilized while still under the previous valid calibration period.

6.0 TEST RESULTS

6.1 Summary

Company Name: Wireless Seismic, Inc.

FCC ID: YZO-00103

Method/System: Frequency Hopping Spread Spectrum (FHSS)

Number of Channels: 19

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MODE (Tx)						
15.247(a)(1)	RSS-210 [A8.1]	20dB Bandwidth	< 1 MHz only if using less than 15 non-overlapping channels	CONDUCTED	PASS	Section 6.2
15.247(b)(1)	RSS-210 [A8.4(2)]	Peak Transmitter Output Power	< 0.125 Watts		PASS	Section 0
15.247(a)(1)	RSS-210 [A8.1(2)]	Channel Separation	> 2/3 of 20 dB BW for systems with Output Power < 125mW		PASS	Section 6.5
15.247(a)(1)(iii)	RSS-210 [A8.1(4)]	Number of Channels	> 15 Channels		PASS	Section 6.7
15.247(a)(1)(iii)	RSS-210 [A8.1(4)]	Time of Occupancy	< 0.4 sec in 7.6 sec period		PASS	Section 6.6
15.247(d)	RSS-210 [A8.5]	Band Edge / Out-of-Band Emissions	Conducted < 20dBc		PASS	Section 0, Section 6.8
15.205 15.209	RSS-210 [A8.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-210 table 3 limits)	RADIATED	PASS	Section 6.9, Section 6.10
RECEIVER MODE (Rx) / DIGITAL DEVICE						
15.109	RSS-Gen [7.2.3.2]	General Field Strength Limits (Restricted Bands and Radiated Emissions Limits)	< FCC 15.109 limits or < RSS-Gen limits [Section 6; Table1]	RADIATED (30MHz-1GHz) (1-25 GHz)	PASS	Part 15B Test Report

Table 6-1. Summary of Test Results

Notes:

1) All modes of operation were investigated. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.

6.2 20dB Bandwidth Measurement

§15.247 (a)(1); RSS-210 (A8.1)

The bandwidth at 20dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies. ***The maximum permissible 20dB bandwidth is 1 MHz, unless more than 15 non-overlapping channels are employed.***

Frequency [MHz]	Channel	20dB Bandwidth Test Results	
		[kHz]	Pass/Fail
2403	Low	4058	Pass
2439	Mid	4042	Pass
2475	High	4062	Pass

Table 6-2. Conducted 20dB Bandwidth Measurements

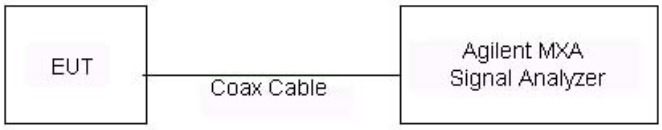
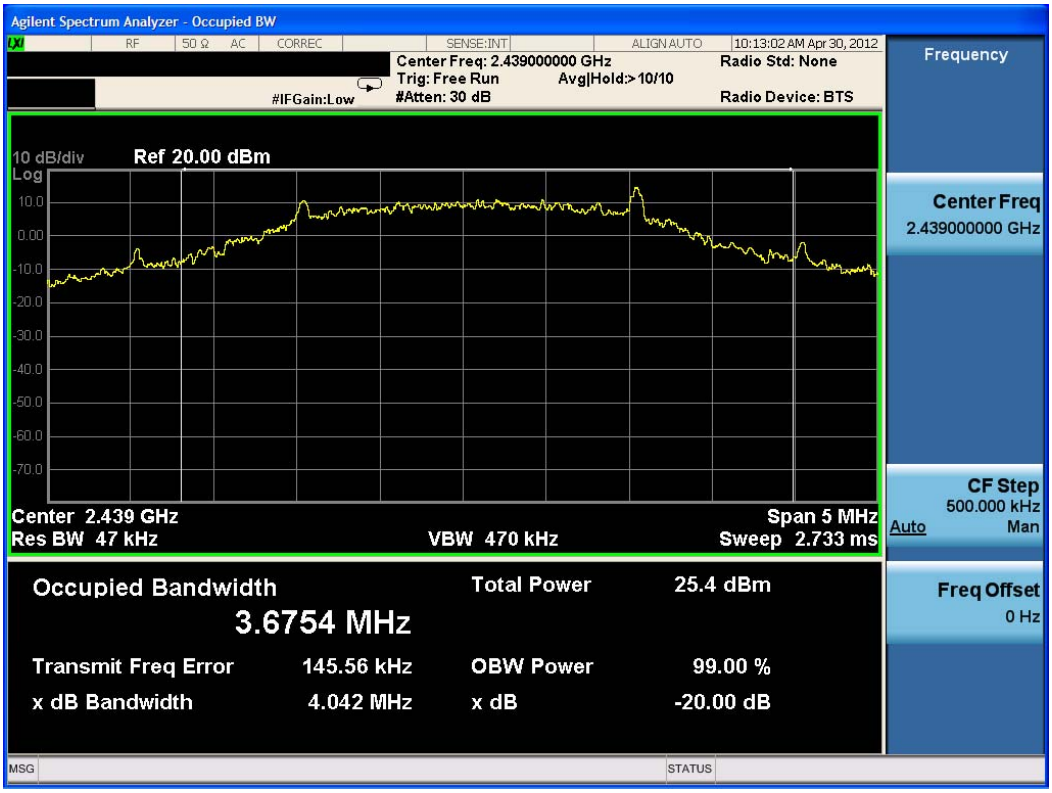


Figure 6-1. Test Instrument & Measurement Setup

Plot 6-1. 20dB Bandwidth Plot (Low Channel)



Plot 6-2. 20dB Bandwidth Plot (Middle Channel)

Plot 6-3. 20dB Bandwidth Plot (High Channel)

6.3 Output Power Measurement

§15.247 (b)(1); RSS-210 (A8.4 (2))

Measurement is made while the EUT is operating in non-hopping transmission mode. The powers shown below are peak powers measured using a spectrum analyzer with the EUT transmitting at maximum power. Peak power measurements are performed in the analyzers' swept spectrum mode using a peak detector with RBW = 8 MHz, VBW = 50 MHz. ***The maximum permissible output power is 0.125 Watts.***

Frequency [MHz]	Channel	Peak Conducted Power	
		[dBm]	[mW]
2403	Low	17.50	56.234
2439	Mid	17.51	56.364
2475	High	17.65	58.210

Table 6-3. Conducted Output Power Measurements

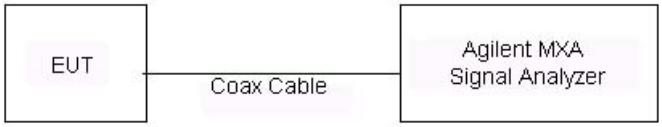
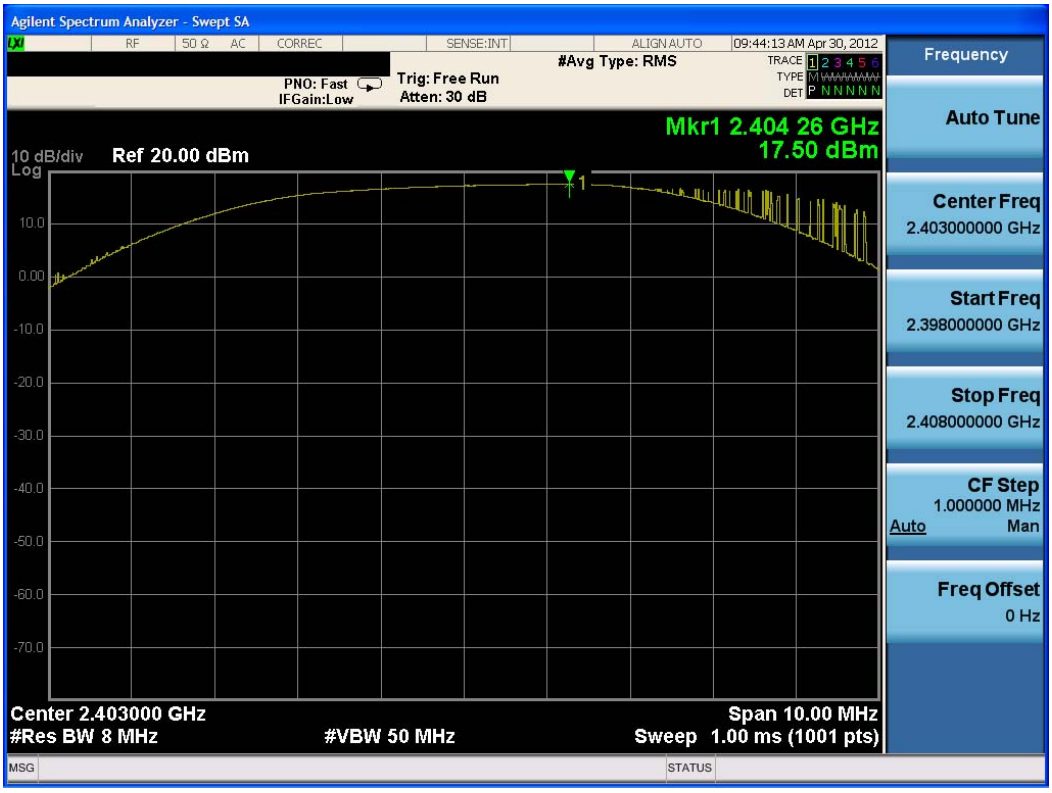


Figure 6-2. Test Instrument & Measurement Setup



Plot 6-4. Conducted Power (Low Channel)

Plot 6-5. Conducted Power (Mid Channel)

Plot 6-6. Conducted Power (High Channel)

6.4 Band Edge Compliance

§15.247 (d); RSS-210 (A8.5)

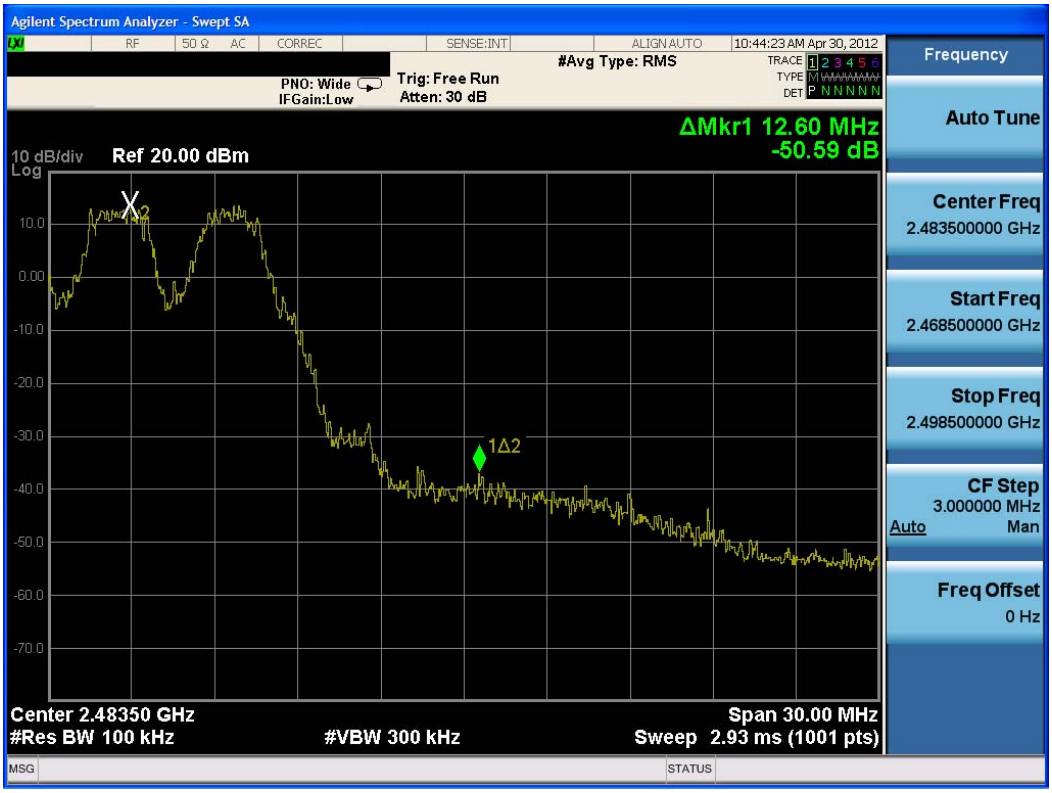
Measurement is taken at the highest point located outside of the emission bandwidth. ***The maximum permissible emission level is 20 dBc. Any emission lying outside of the emission bandwidth and in a restricted band is subject to a field strength limit specified in Section 15.209 of the Title 47 CFR.***

Plots of the worst case emissions are shown below.

Plot 6-7. Lower Band Edge Plot (Low Channel)

Plot 6-8. Upper Band Edge Plot (High Channel)

Plot 6-9. Lower Band Edge Plot, Hopping on (Low Channel)



Plot 6-10. Upper Band Edge Plot, Hopping on (High Channel)

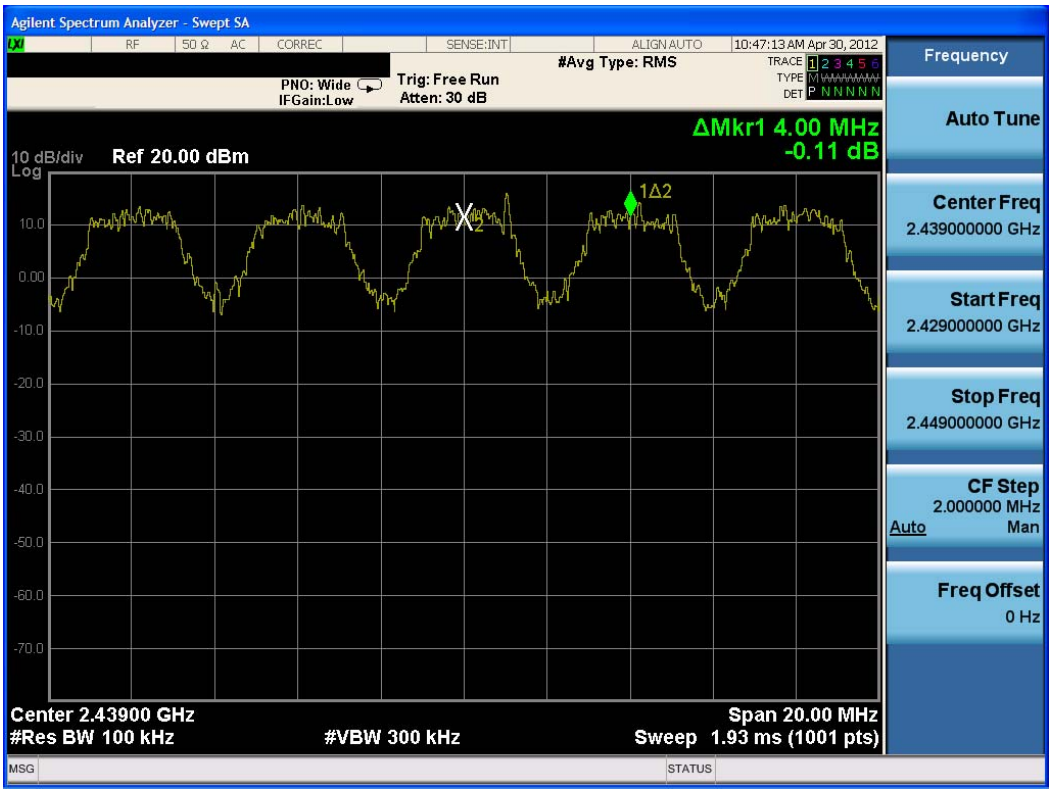
6.5 Carrier Frequency Separation

§15.247 (a)(1); RSS-210 (A8.1 (2))

Measurement is made with EUT operating in hopping mode. ***The minimum permissible channel separation for this system is 2/3 the value of the 20dB BW.*** Result: 4MHz channel separation. PASS.

Frequency [MHz]	Channel	Minimum Channel Separation [MHz]
2403	Low	2.705
2439	Mid	2.695
2475	High	2.708

Table 6-4. Channel Separation Limit



Plot 6-11. Channel Spacing Plot

6.6 Time of Occupancy

§15.247 (a)(1)(iii); RSS-210 (A8.1 (4))

Measurement is made while EUT is operating in hopping mode with the spectrum analyzer set to zero span. ***The maximum permissible time of occupancy is 400 ms within a period of 400ms multiplied by the number of hopping channels employed.***

The EUT uses 19 channels for both beaconing (Announcement Mode) and standard communications (Data Transmission Mode). Both modes use the same hopping pattern and will return to the same channel after 304 ms. Calculations below are included for each mode of operation.

Announcement Mode Calculation:

Time of Occupancy for one total beacon pulse = 206.3 µs

- 400 ms x 19 hopping channels = 7600 ms
- 304 ms = time to return to one channel
- 7600 ms / 304 ms = 25 (number of times one channel transmits within a 7600ms time frame)
- 25 x 206.3 µs = 5.16 ms (total duration of time that one channel transmits within a 7600ms time frame)
- Result: 5.16 ms < 400 ms; PASS

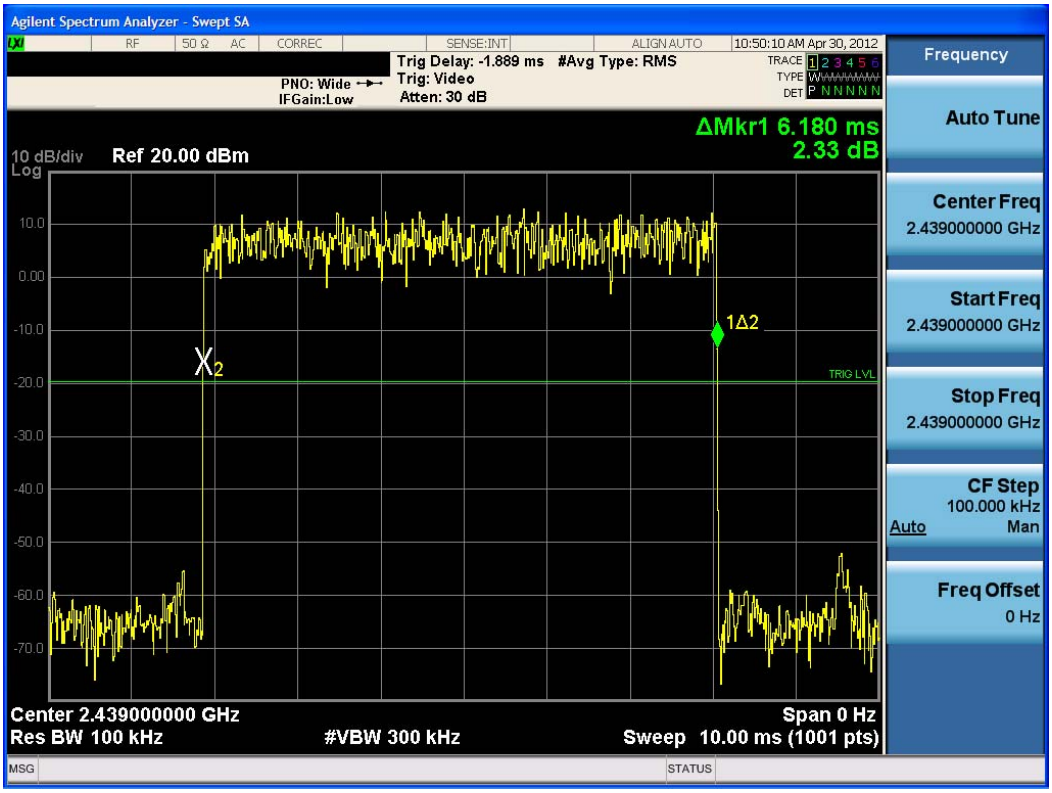
Data Transmission Mode Calculation:

Time of Occupancy for one pulse width = 6.18 ms (worst case occupancy time, see Plot 6-12)

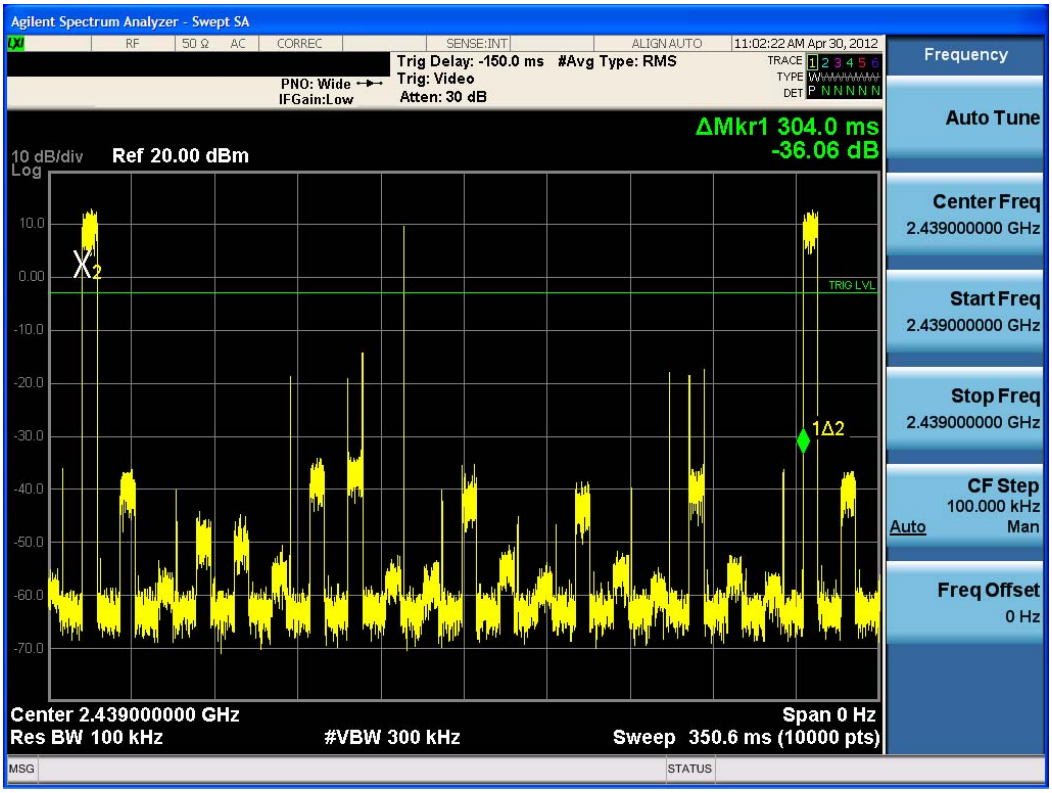
- 400 ms x 19 hopping channels = 7600 ms
- 304 ms = time to return to one channel
- 7600 ms / 304 ms = 25 (number of times one channel transmits within a 7600 ms time frame)
- 25 x 6.18 ms = 154.5 ms (total duration of time that one channel transmits within a 7600 ms time frame)
- Result: 154.5 ms < 400ms; PASS

Test Mode Selection:

From the calculations above it can be seen that the worst case on time is with the device operating in the Data Transmission Mode. This mode was used during emissions testing and duty cycle correction factor calculation. Additionally, all band edge compliance measurements were made while operating in the Data Transmission Mode. There is no change in power between the Data Transmission Mode and the Announcement Mode of operation.



Plot 6-12. Time of Occupancy Plot – Worst Case Data (Transmission Mode)



Plot 6-13. Time Before EUT Returns to Same Channel

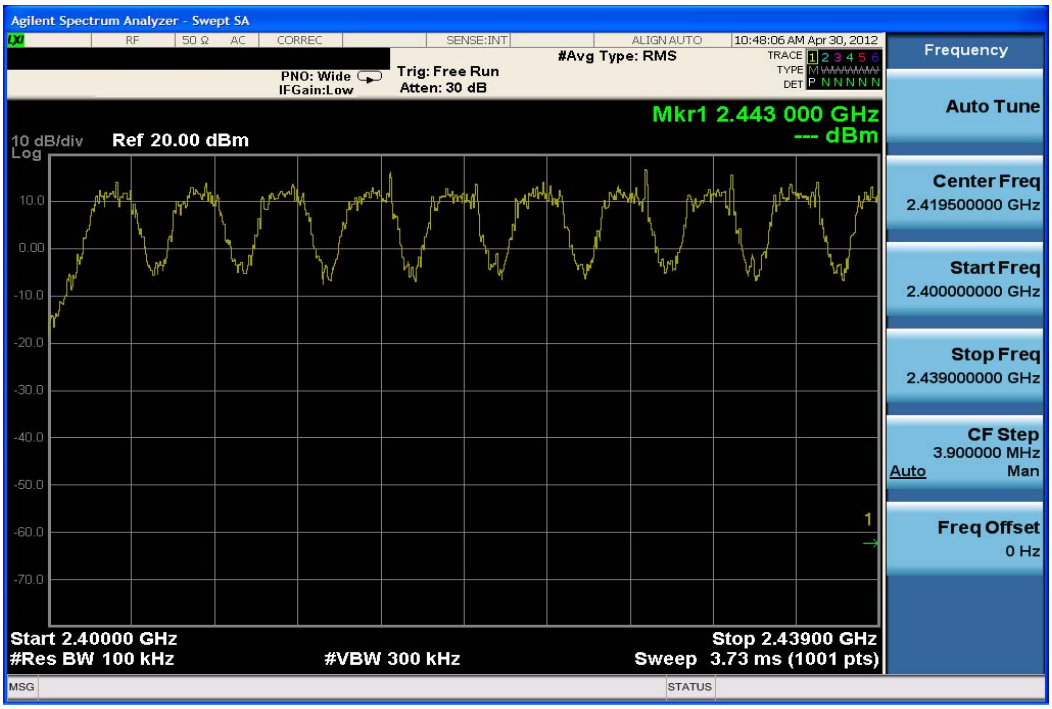
Note:

The Wireless Seismic RT System 2 consists of the Wireless Remote Unit (WRU) and a Line Interface Unit (LIU). Both devices transmit at an interval of 16 ms. Plot 6-13 shows a time differential of 304ms which is the amount of time that elapses between consecutive bursts in the same channel. The pulses shown in the middle of the plot are bursts transmitted by the WRU/LIU which is a normal part of the RT System 2 communication system.

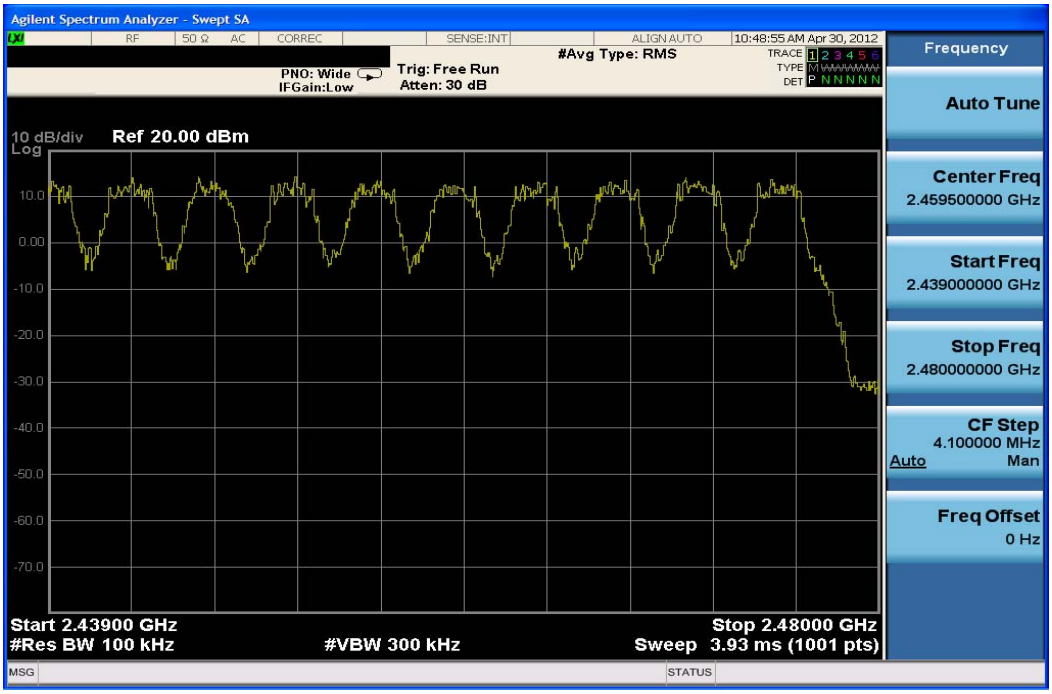
6.7 Number of Hopping Channels

§15.247 (a)(1)(iii); RSS-210 (A8.1 (4))

Measurement is made while EUT is operating in hopping mode. ***This frequency hopping system must employ a minimum of 15 hopping channels.***



Plot 6-14. Low End Spectrum Channel Hopping Plot

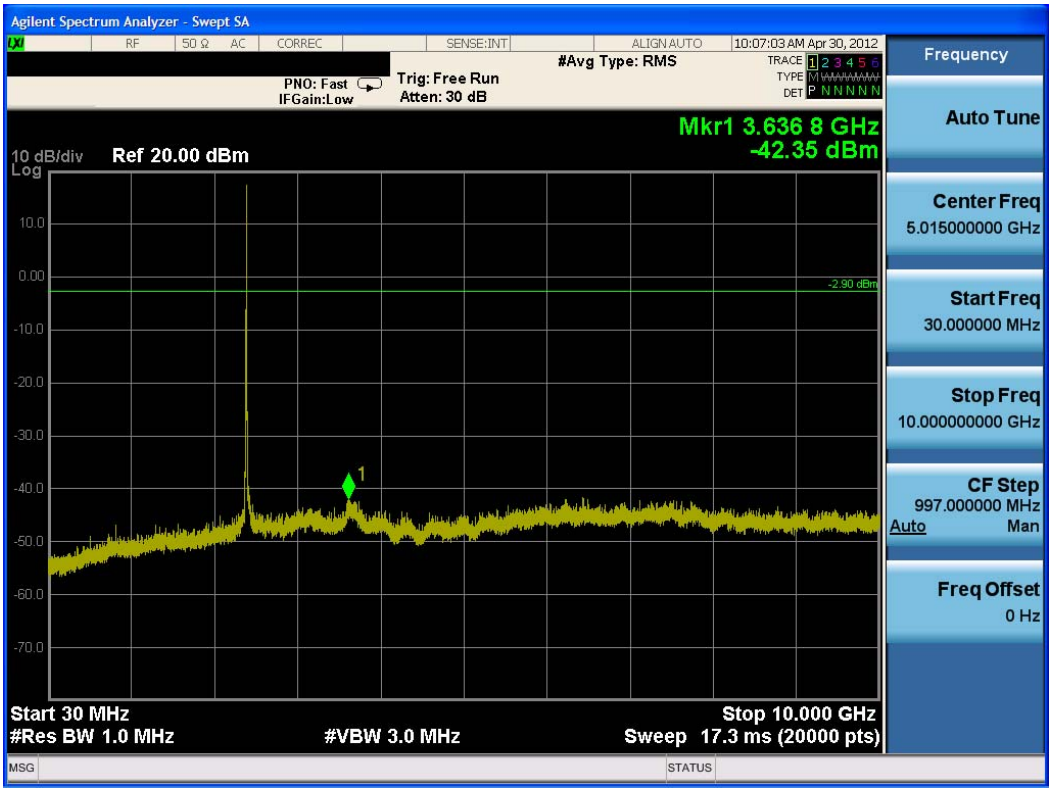


Plot 6-15. High End Spectrum Channel Hopping Plot

6.8 Conducted Spurious Emissions

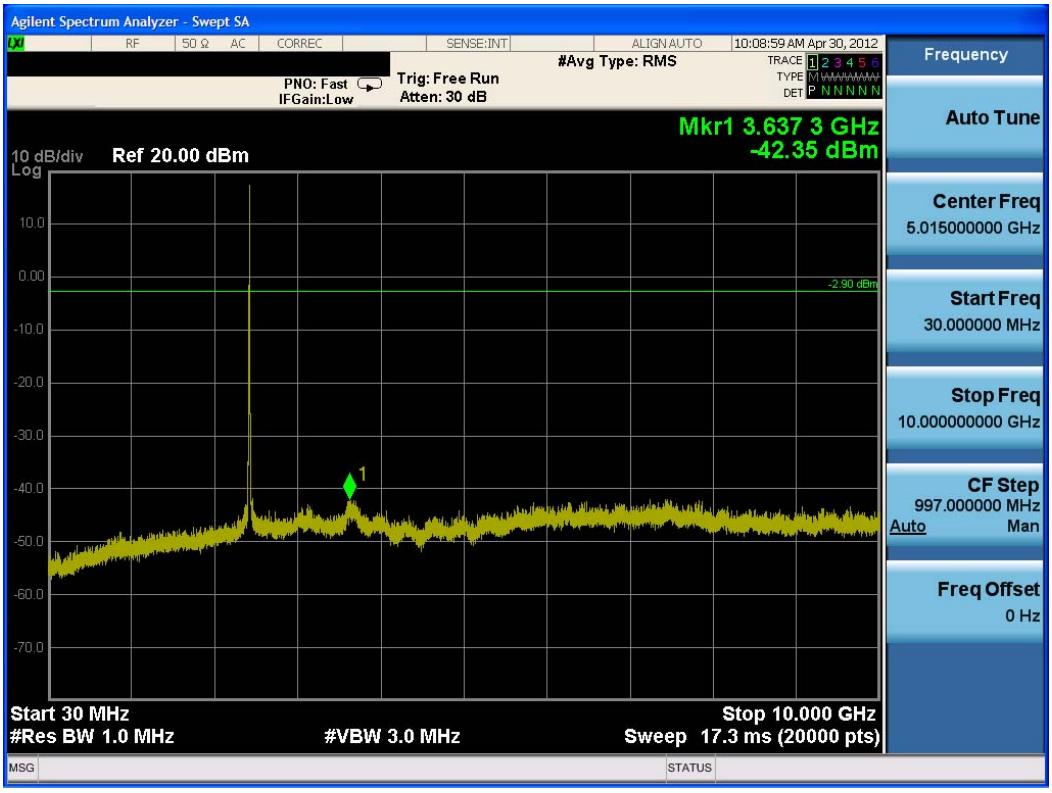
§15.247 (d)

Out of band conducted spurious emissions were investigated for all modes of operation and the worst case emissions are reported below. The display line shown in the following plots denotes the limit at 20dB below the fundamental emission level.

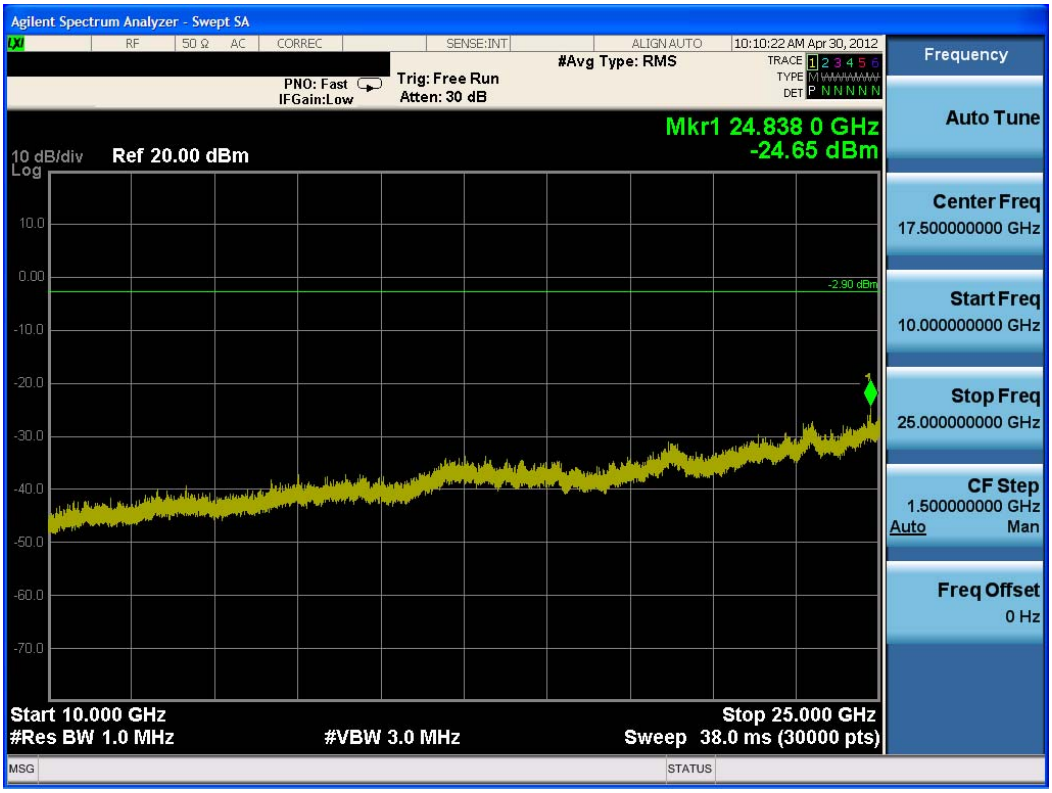


Plot 6-16. Conducted Spurious Plot (Low Channel)

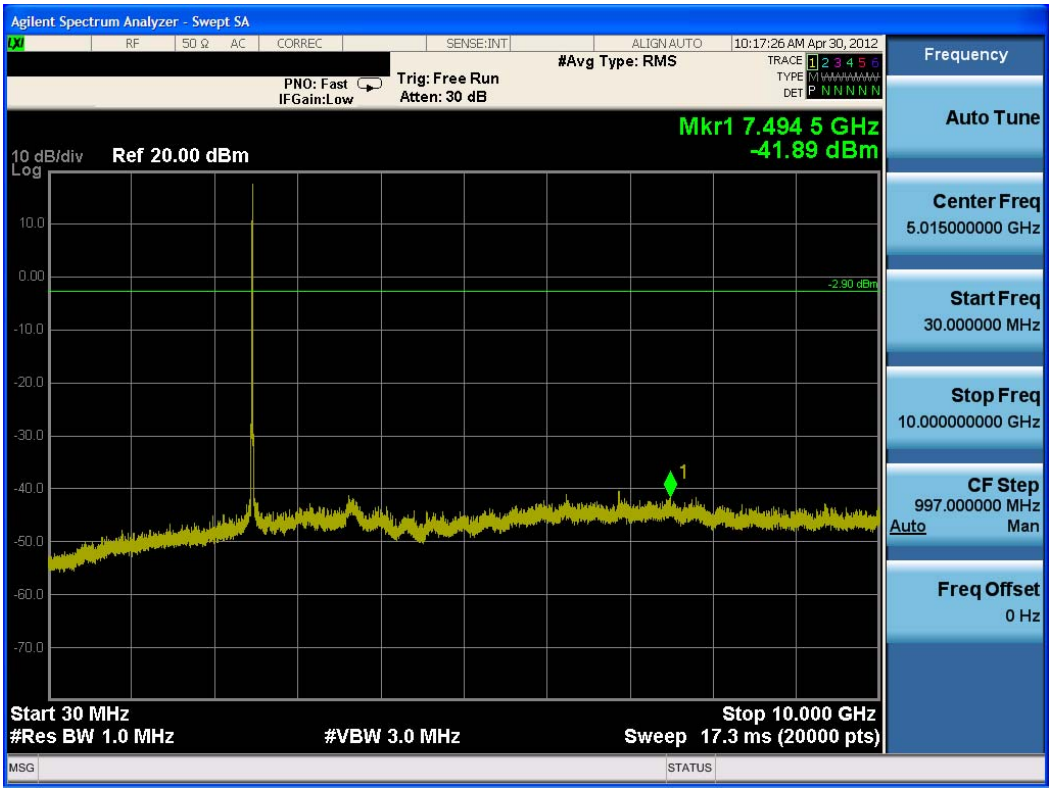
Plot 6-17. Conducted Spurious Plot (Low Channel)



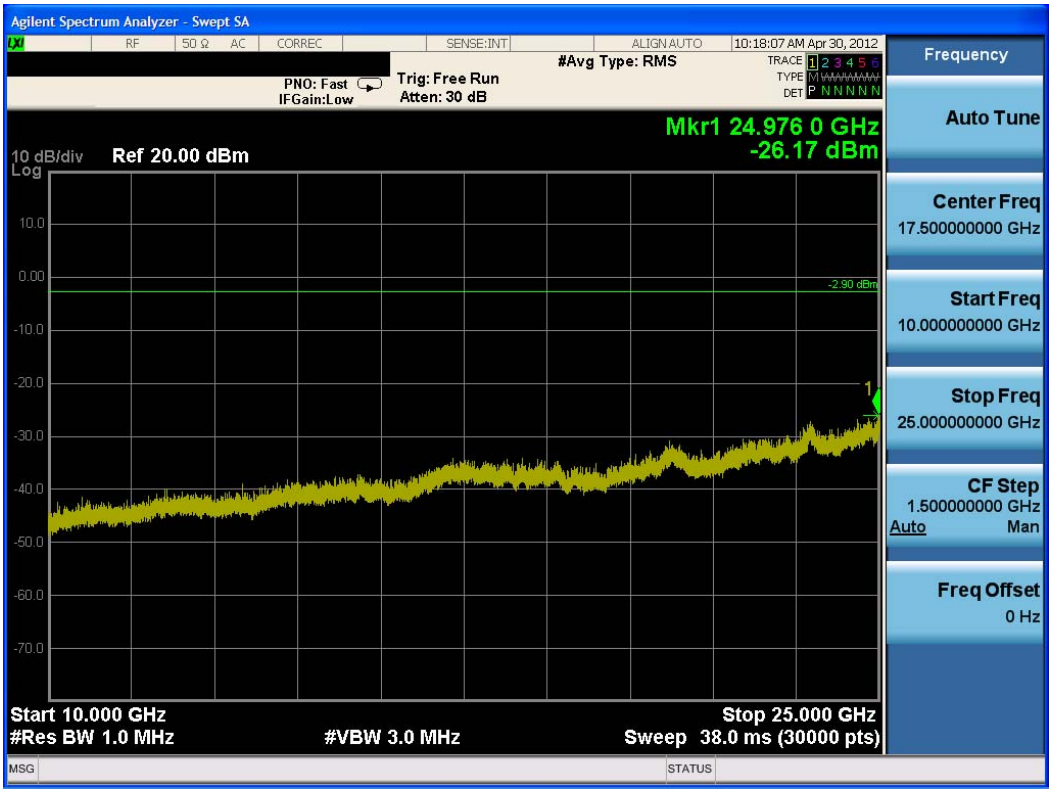
Plot 6-18. Conducted Spurious Plot (Mid Channel)



Plot 6-19. Conducted Spurious Plot (Mid Channel)



Plot 6-20. Conducted Spurious Plot (High Channel)



Plot 6-21. Conducted Spurious Plot (High Channel)

6.9 Radiated Spurious Emission Measurements

§15.205 & §15.209, §15.247 (d); RSS-210 (A8.5)

The EUT was tested from 9kHz and up to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average measurement was used, using RBW = 1MHz, VBW > 1/τ Hz, where τ is the pulse width in seconds, and linearly polarized horn antennas. All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 6-5 per Section 15.209.

Frequency	Field Strength [μV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 6-5. Radiated Limits

Sample Calculation

- Field Strength Level $_{[dB\mu V/m]}$ = Analyzer Level $_{[dBm]}$ + 107 + AFCL $_{[dB]}$ + Duty Cycle Correction $_{[dB]}$

Notes:

- AFCL = Antenna Factor $_{[dB]}$ + Cable Loss $_{[dB]}$
- Duty Cycle Correction Factor Calculation: (Based on worst case – Data Transmission Mode)
  - Time to cycle through all channels = Δt = 16 ms x 19 channels = 304 ms
  - 100ms / $\Delta t_{[ms]}$ = *H* → Round up to next highest integer, to account for worst case, *H' = 1*
  - Pulse width = 6.18 ms
  - Worst Case Dwell Time = $\tau_{[ms]}$ x *H'* = 6.18 ms
  - Duty Cycle Correction = 20log(Worst Case Dwell Time/100ms) $_{[dB]}$ = -24.18 dB

Radiated Spurious Emission Measurements (Cont'd)

§15.205 & §15.209, §15.247 (d); RSS-210 (A8.5)

Measurement Distance: 3 Meters

Operating Frequency: 2403MHz

Channel: Low

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4806.00	-109.41	Avg	V	39.63	-24.18	13.04	53.98	-40.94
4806.00	-98.31	Peak	V	39.63	0.00	48.32	73.98	-25.66
12015.00	-135.00	Avg	V	49.96	0.00	21.96	53.98	-32.02
12015.00	-125.00	Peak	V	49.96	0.00	31.96	73.98	-42.02

Table 6-6. Radiated Measurements

NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 and are below the limit shown in Table 6-5.

2. Average measurements > 1GHz using RBW = 1MHz and VBW > 1/τ Hz, where τ = pulse width in seconds. Peak measurements > 1GHz using RBW = 1MHz and VBW = 3MHz.

3. The device was tested while in the normal upright position. This is the single method of deployment for this device.

4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

7. Above 960MHz the limit is 500 µV/m (54dBµ/m) at 3 meters radiated.

Radiated Spurious Emission Measurements (Cont'd)

§15.205 & §15.209, §15.247 (d); RSS-210 (A8.5)

Measurement Distance: 3 Meters

Operating Frequency: 2439MHz

Channel: Mid

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4878.00	-107.42	Avg	V	39.65	-24.18	15.06	53.98	-38.92
4878.00	-98.72	Peak	V	39.65	0.00	47.94	73.98	-26.04
7317.00	-110.52	Avg	V	42.83	-24.18	15.12	53.98	-38.86
7317.00	-96.82	Peak	V	42.83	0.00	53.00	73.98	-20.98
12195.00	-135.00	Avg	V	50.70	0.00	22.70	53.98	-31.28
12195.00	-125.00	Peak	V	50.70	0.00	32.70	73.98	-41.28

Table 6-7. Radiated Measurements

NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 and are below the limit shown in Table 6-5.

2. Average measurements > 1GHz using RBW = 1MHz and VBW > 1/τ Hz, where τ = pulse width in seconds. Peak measurements > 1GHz using RBW = 1MHz and VBW = 3MHz.

3. The device was tested while in the normal upright position. This is the single method of deployment for this device.

4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

5. The spectrum is measured from 9kHz to the 10^{th} harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

7. Above 960MHz the limit is 500 µV/m (54dBµ/m) at 3 meters radiated.

Radiated Spurious Emission Measurements (Cont'd)

§15.205 & §15.209, §15.247 (d); RSS-210 (A8.5)

Measurement Distance: 3 Meters

Operating Frequency: 2475MHz

Channel: High

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4950.00	-101.32	Avg	V	39.68	-24.18	21.18	53.98	-32.80
4950.00	-96.02	Peak	V	39.68	0.00	50.66	73.98	-23.32
7425.00	-111.10	Avg	V	42.98	-24.18	14.70	53.98	-39.28
7425.00	-97.50	Peak	V	42.98	0.00	52.48	73.98	-21.50
12375.00	-135.00	Avg	V	51.08	0.00	23.08	53.98	-30.90
12375.00	-125.00	Peak	V	51.08	0.00	33.08	73.98	-40.90

Table 6-8. Radiated Measurements

NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 and are below the limit shown in Table 6-5.

2. Average measurements > 1GHz using RBW = 1MHz and VBW = 1/τ Hz, where τ = pulse width in seconds. Peak measurements > 1GHz using RBW = 1MHz and VBW = 3MHz.

3. The device was tested while in the normal upright position. This is the single method of deployment for this device.

4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

7. Above 960MHz the limit is 500 µV/m (54dBµ/m) at 3 meters radiated.

6.10 Radiated Restricted Band Edge Measurements

§15.205 & §15.209, §15.247 (d); RSS-210 (A8.5)

Measurement Distance: 3 Meters

Operating Frequency: 2475MHz

Channel: High

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	2483.50	-81.57	Average	V	36.39	-24.18	37.64	53.98	-16.34
	2483.50	-72.67	Peak	V	36.39	0.00	70.72	73.98	-3.26
*	2484.70	-81.27	Average	V	36.40	-24.18	37.95	53.98	-16.03
	2484.70	-71.97	Peak	V	36.40	0.00	71.43	73.98	-2.55
*	2486.20	-83.37	Average	V	36.41	-24.18	35.86	53.98	-18.12
	2486.20	-71.97	Peak	V	36.41	0.00	71.44	73.98	-2.54

Table 6-9. Radiated Restricted Band Edge Measurements at 3-meters

NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 and are below the limit shown in Table 6-5.

2. All measurements that are preceded by a "*" denote average measurements calculated by adjusting the corresponding peak measurements by the duty cycle correction factor. Peak measurements > 1GHz using RBW = 1MHz and VBW = 3MHz.

3. The device was tested while in the normal upright position. This is the single method of deployment for this device.

4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

7. Above 960MHz the limit is 500 µV/m (54dBµ/m) at 3 meters radiated.

Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 & §15.209, §15.247 (d); RSS-210 (A8.5)

Measurement Distance: 3 Meters

Operating Frequency: 2403MHz

Channel: Low

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	2373.7	-98.19	Average	V	36.39	-24.18	21.02	53.98	-32.96
	2373.7	-82.29	Peak	V	36.39	0.00	61.10	73.98	-12.88
*	2381.7	-97.08	Average	V	36.40	-24.18	22.13	53.98	-31.84
	2381.7	-81.28	Peak	V	36.40	0.00	62.11	73.98	-11.86
*	2388.8	-85.38	Average	V	36.40	-24.18	33.84	53.98	-20.14
	2388.8	-72.38	Peak	V	36.40	0.00	71.02	73.98	-2.96

Table 6-10. Radiated Restricted Band Edge Measurements at 3-meters

NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 and are below the limit shown in Table 6-5.

2. All measurements that are preceded by a "*" denote average measurements calculated by adjusting the corresponding peak measurements by the duty cycle correction factor. Peak measurements > 1GHz using RBW = 1MHz and VBW = 3MHz.

3. The device was tested while in the normal upright position. This is the single method of deployment for this device.

4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.

7. Above 960MHz the limit is 500 µV/m (54dBµ/m) at 3 meters radiated.

7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Wireless Seismic Wireless Remote Unit FCC ID: YZO-00103** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules and RSS-210 of the Industry Canada Rules.