PCTEST ENGINEERING LABORATORY, INC.
6660-B Dobbin Road, Columbia, MD 21045 USA
Tel. 410.290.6652 / Fax 410.290.6654
http://www.pctestlab.com

MEASUREMENT REPORT
FCC PART 15.247 / IC RSS-210

Applicant Name:
Wireless Seismic, Inc.
13100 Southwest Freeway, Suite 150
Sugerland, TX
USA

Date of Testing:
September 6 - 7, 2011
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
0Y11051600870.YZO

FCC ID:	**YZO-00401**
APPLICANT:	**Wireless Seismic, Inc.**

Application Type:	Certification
Model(s):	RT 1000
EUT Type:	Base Station Unit
Max. RF Output Power:	61.09 mW (17.86dBm) Conducted
Frequency Range:	2403 – 2478MHz
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.

Grant Conditions: Power output listed is conducted.

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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TABLE OF CONTENTS

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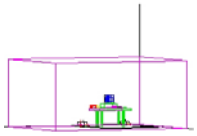
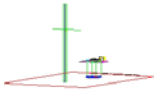


MEASUREMENT REPORT
FCC Part 15.247



§ 2.1033 General Information

APPLICANT:	Wireless Seismic, Inc.
APPLICANT ADDRESS:	13100 Southwest Freeway, Suite 150 Sugerland, TXUSA
TEST SITE:	PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS:	6660-B Dobbin Road, Columbia, MD 21045 USA
FCC RULE PART(S):	Part 15 Subpart C (15.247)
IC SPECIFICATION(S):	RSS-210 Issue 8
BASE MODEL:	RT 1000
FCC ID:	YZO-00401
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:	September 6 - 7, 2011
TEST REPORT S/N:	0Y11051600870.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 and Industry Canada (2451A-1).
- 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 and Industry Canada Rules.
- 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 and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451A-1) test laboratory with the site description on file at Industry Canada.
- 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.

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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 in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. 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 January 28, 2009.

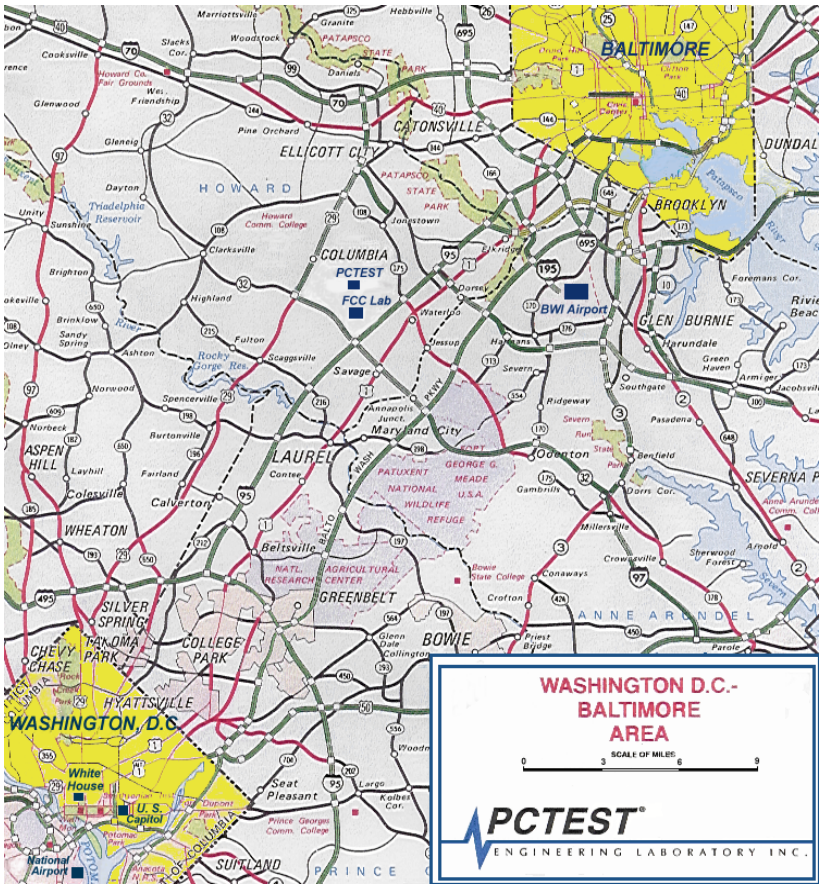

Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Wireless Seismic Base Station Unit FCC ID: YZO-00401**. The test data contained in this report pertains only to the emissions due to the EUT's transmitter.

The EUT consisted of the following component(s):

Manufacturer / Base Model	FCC ID	Description
Wireless Seismic / Model: RT 1000	YZO-00401	Base Station 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
Laird Technologies / OD24M-5	Omnidirectional Antenna	5dBi
Pac Wireless / OD24M-7	Omnidirectional Antenna	7dBi
Laird Technologies / OD24M-9	Omnidirectional Antenna	9dBi

Table 2-2. Antenna Information

2.2 EMI Suppression Device(s)/Modifications

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

2.3 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.

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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 Base Station Unit FCC ID: YZO-00401.**

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

3.2 Radiated Emissions

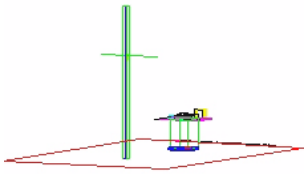

Figure 3-1. 3-Meter Test Site

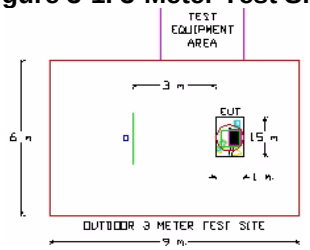

Figure 3-2. Dimensions of Outdoor Test Site

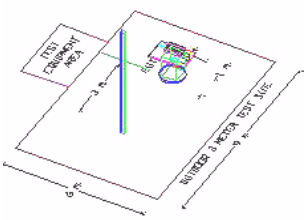

Figure 3-3. Turntable and System Setup

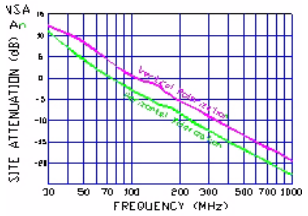

Figure 3-4. Normalized Site Attenuation Curves (H&V)

Preliminary measurements were made indoors at 1-meter using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, and turntable azimuth with respect to the antenna was noted for each frequency found. The spectrum was scanned from 30 to 200 MHz using a bi-conical antenna and from 200 to 1000 MHz using a log-spiral antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3-meter test range using Roberts™ Dipole antennas or horn antennas (*see Figure 3-1*). The test equipment was placed on a wooden and plastic bench situated on a 1.5m x 2m area adjacent to the measurement area (*see Figure 3-2*). 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 detector function was set to CISPR quasi-peak mode and the bandwidth of the spectrum analyzer was set to 100kHz for frequencies below 1GHz or 1MHz for frequencies above 1GHz. Above 1GHz the detector function was set to average mode (RBW = 1MHz, VBW = 10Hz).

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table (*see Figure 3-3*). The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated 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 exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in the test setup photographs. Each EME reported was calibrated using the Agilent E8257D (250kHz – 20GHz) PSG Signal Generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 3-4.

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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 Base Station Unit are professionally installed**.**

Conclusion:

The **Wireless Seismic Base Station Unit FCC ID: YZO-00401** unit complies with the requirement of §15.203.

Ch.	Frequency (MHz)
03	2403
:	:
41	2441
:	:
78	2478

Table 4-1. Frequency/ Channel Operations

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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
-	No.165	(30MHz - 1000MHz) RG58 Coax Cable	N/A		N/A	N/A
-	No.166	(1000-26500MHz) Microwave RF Cable	N/A		N/A	N/A
-	No.167	(100kHz - 100MHz) RG58 Coax Cable	N/A		N/A	N/A
Agilent	8447D	Broadband Amplifier	3/17/2011	Annual	3/17/2012	1937A03348
Agilent	8447D	Broadband Amplifier	3/17/2011	Annual	3/17/2012	2443A01900
Agilent	8449B	(1-26.5GHz) Pre-Amplifier	2/8/2011	Annual	2/8/2012	3008A00985
Agilent	85650A	Quasi-Peak Adapter	4/7/2011	Annual	4/7/2012	3303A01872
Agilent	85650A	Quasi-Peak Adapter	4/7/2011	Annual	4/7/2012	2043A00301
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	4/7/2011	Annual	4/7/2012	2618A02866
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	4/7/2011	Annual	4/7/2012	2542A11898
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	4/7/2011	Annual	4/7/2012	3638A08713
Agilent	E4407B	ESA Spectrum Analyzer	4/5/2011	Annual	4/5/2012	US39210313
Agilent	E4448A	PSA (3Hz-50GHz) Spectrum Analyzer	11/30/2010	Annual	11/30/2011	US42510244
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/8/2011	Annual	4/8/2012	MY45470194
Agilent	N9020A	MXA Signal Analyzer	10/8/2010	Annual	10/8/2011	US46470561
Agilent	N9038A	MXE EMI Receiver	8/5/2011	Annual	8/5/2012	MY51210133
Anritsu	ML2495A	Power Meter	10/13/2010	Annual	10/13/2011	941001
Anritsu	MA2411B	Pulse Sensor	N/A		N/A	1027293
Emco	3115	Horn Antenna (1-18GHz)	10/14/2009	Biennial	10/14/2011	9704-5182
Emco	3115	Horn Antenna (1-18GHz)	4/8/2010	Biennial	4/8/2012	9205-3874
Emco	3116	Horn Antenna (18 - 40GHz)	10/9/2008	Triennial	10/9/2011	9203-2178
Emco	3816/2	LISN	11/5/2010	Biennial	11/5/2012	9707-1077
Emco	3816/2	LISN	11/3/2010	Biennial	11/3/2012	9707-1079
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/11/2010	Annual	10/11/2011	1833460
Gigatronics	8651A	Universal Power Meter	10/11/2010	Annual	10/11/2011	8650319
MiniCircuits	VHF-3100+	High Pass Filter	N/A		N/A	30721
Sunol	DRH-118	Horn Antenna (1 - 18GHz)	7/5/2011	Biennial	7/5/2013	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	10/17/2009	Biennial	10/17/2011	A051107

Table 5-1. Annual Test Equipment Calibration Schedule

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6.0 TEST RESULTS

6.1 Summary

Company Name: Wireless Seismic, Inc.

FCC ID: YZO-00401

Method/System: Frequency Hopping Spread Spectrum (FHSS)

Number of Channels: 76

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 6.3
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 31.6 sec period		PASS	Section 6.6
15.247(d)	RSS-210 [A8.5]	Band Edge / Out-of-Band Emissions	Conducted < 20dBc		PASS	Section 6.4, 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

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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 No.	20dB Bandwidth Test Results	
		[kHz]	Pass/Fail
2403	3	1065	Pass
2441	41	1065	Pass
2478	78	1060	Pass

Table 6-2. Conducted 20dB Bandwidth Measurements

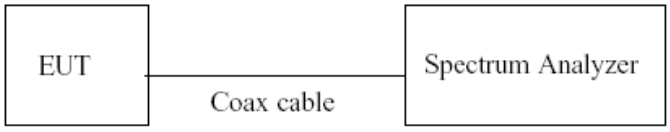

Figure 6-1. Test Instrument & Measurement Setup

Plot 6-1. 20dB Bandwidth Plot (Ch. 03)

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Plot 6-2. 20dB Bandwidth Plot (Ch. 41)

Plot 6-3. 20dB Bandwidth Plot (Ch. 78)

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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. ***The maximum permissible output power is 0.125 Watts.***

Frequency [MHz]	Channel No.	Peak Conducted Power	
		[dBm]	[mW]
2403	3	17.86	61.094
2441	41	17.42	55.208
2478	78	16.87	48.641

Table 6-3. Conducted Output Power Measurements

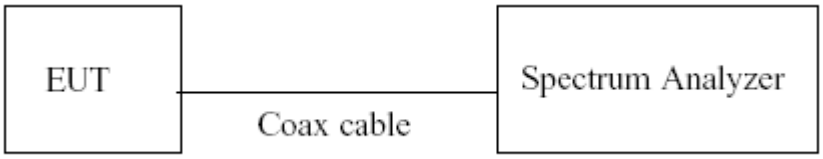
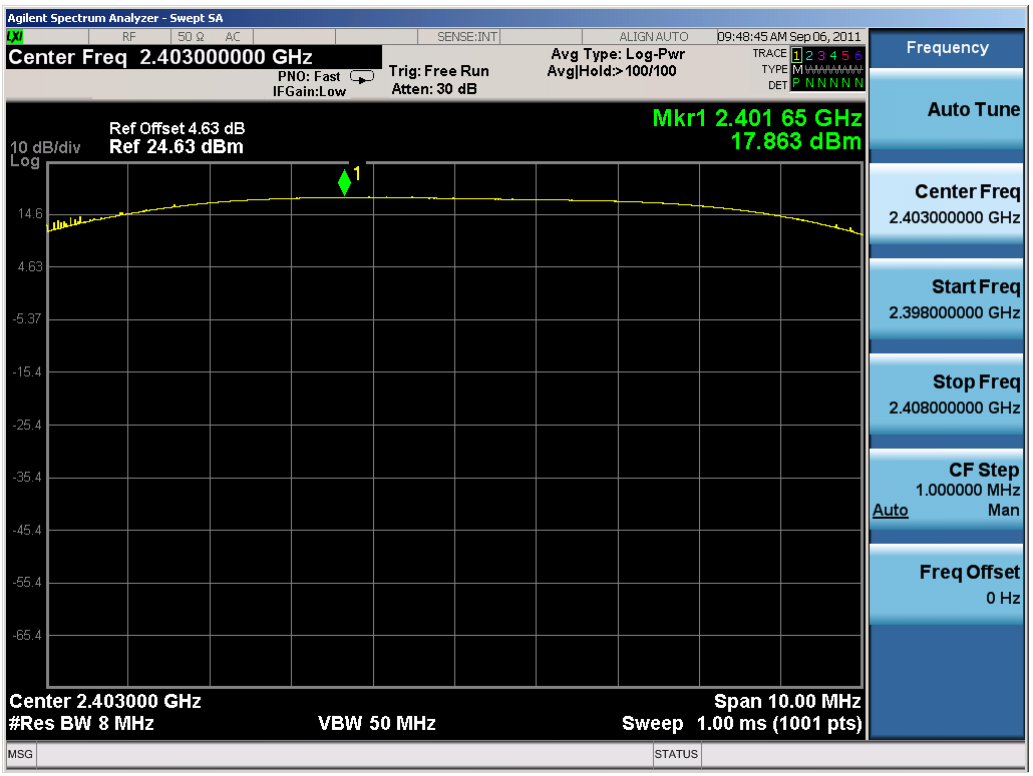


Figure 6-2. Test Instrument & Measurement Setup



Plot 6-4. Peak Conducted Output Power Plot (Ch. 03)

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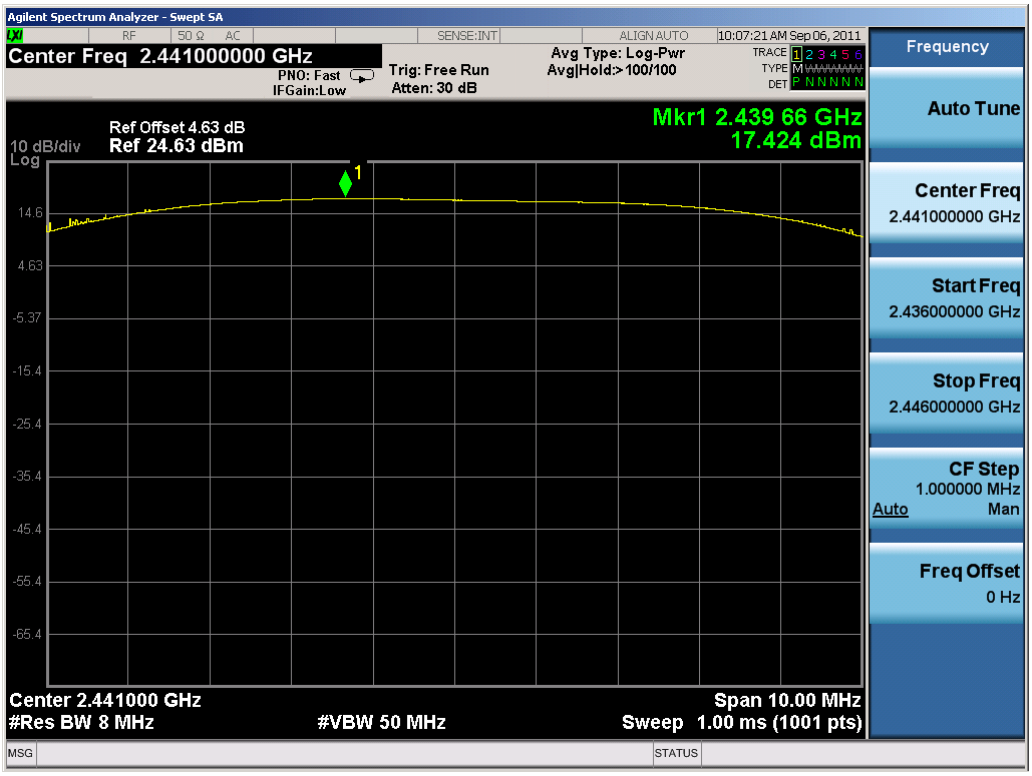
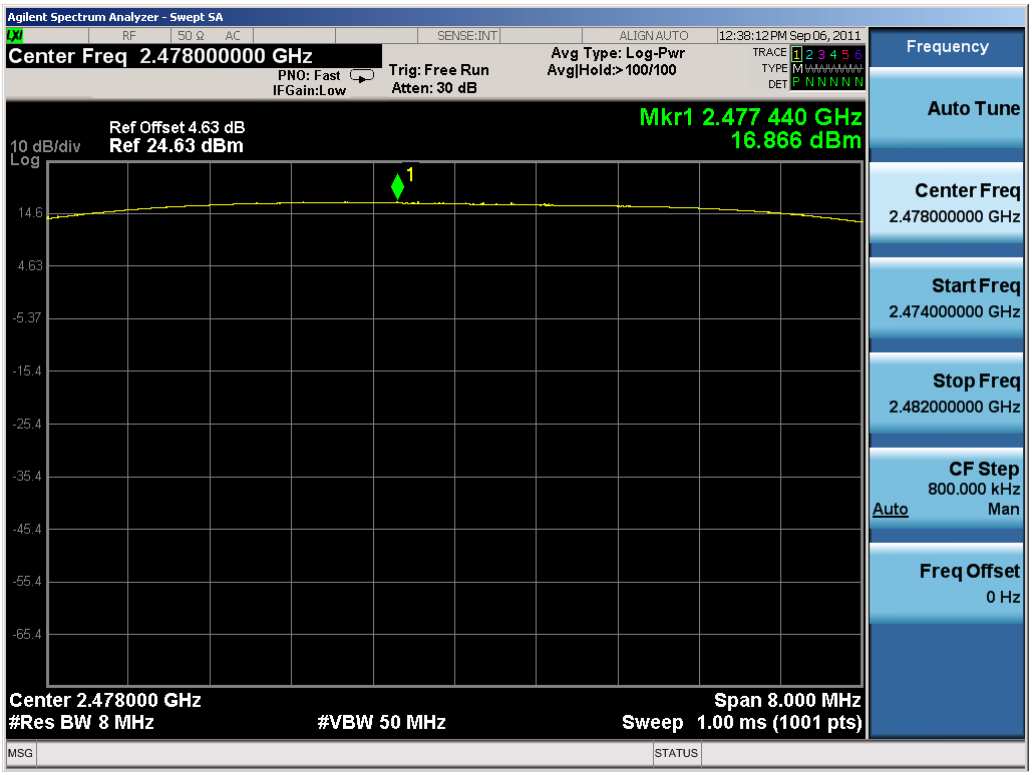


Plot 6-5. Peak Conducted Output Power Plot (Ch. 41)



Plot 6-6. Peak Conducted Output Power Plot (Ch. 78)

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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 (Ch. 03)

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Plot 6-8. Upper Band Edge Plot (Ch. 78)

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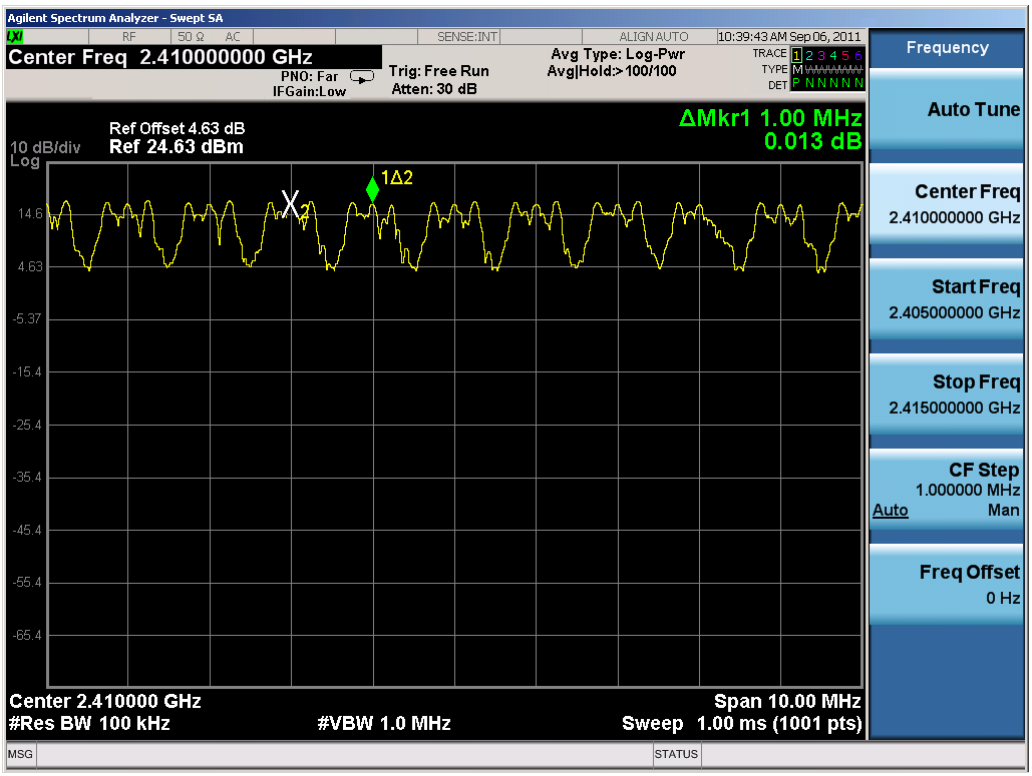
6.5 Carrier Frequency Separation

§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.***

Frequency [MHz]	Channel No.	Min. Channel Separation [MHz]
2403	3	0.710
2441	41	0.710
2478	78	0.707

Table 6-4. Minimum Channel Separation



Plot 6-9. Channel Spacing Plot

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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.***

This device includes two modes of transmissions. The first mode is the Announcement Mode which uses 15 channels (beacon channels) and the second mode is the Data Transmission Mode which uses 61 channels. The following calculations include both modes of operation.

Announcement Mode Calculation:

Time of Occupancy for one total beacon pulse = 490µs.

- 400ms x 15 hopping channels = 6sec
- 16ms x 15 hopping channels = 240ms (time to return to one channel)
- 6sec / 240ms = 25 (number of times one channel transmits within a 6sec time frame)
- 25 x 490µs = 12.25ms (total duration of time that one channel transmits within a 6sec time frame)
- Therefore 12.25ms < 400ms; PASS

Data Transmission Mode Calculation:

Time of Occupancy for one pulse width = 490µs.

- 400ms x 61 hopping channels = 24.4sec
- 16ms x 61 hopping channels = 976ms (time to return to one channel)
- 24.4sec / 976ms = 25 (number of times one channel transmits within a 24.4sec time frame)
- 25 x 490µs = 12.25ms (total duration of time that one channel transmits within a 24.4sec time frame)
- Therefore 12.25ms < 400ms; PASS

Test Mode Selection:

From the calculations above it can be seen that both pulse widths are the same for the BSU. This is due to that fact that the BSU is in a constant "Data receiving mode" from the WRU (separate authorization). The Data Transmissions 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 as this mode utilizes the outer most channels on both sides of the band thus being worst case. There is no change in power between the Data Transmission Mode and the Announcement Mode of operation.

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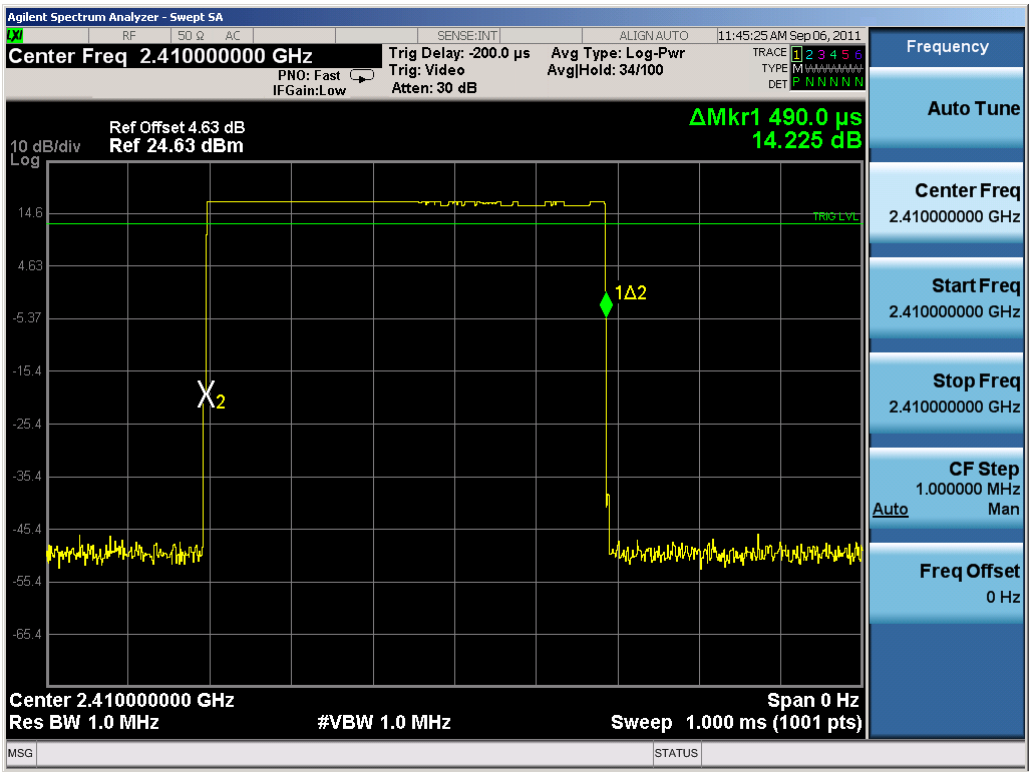

Plot 6-10. Time of Occupancy Plot – Worst Case Data Transmission Mode

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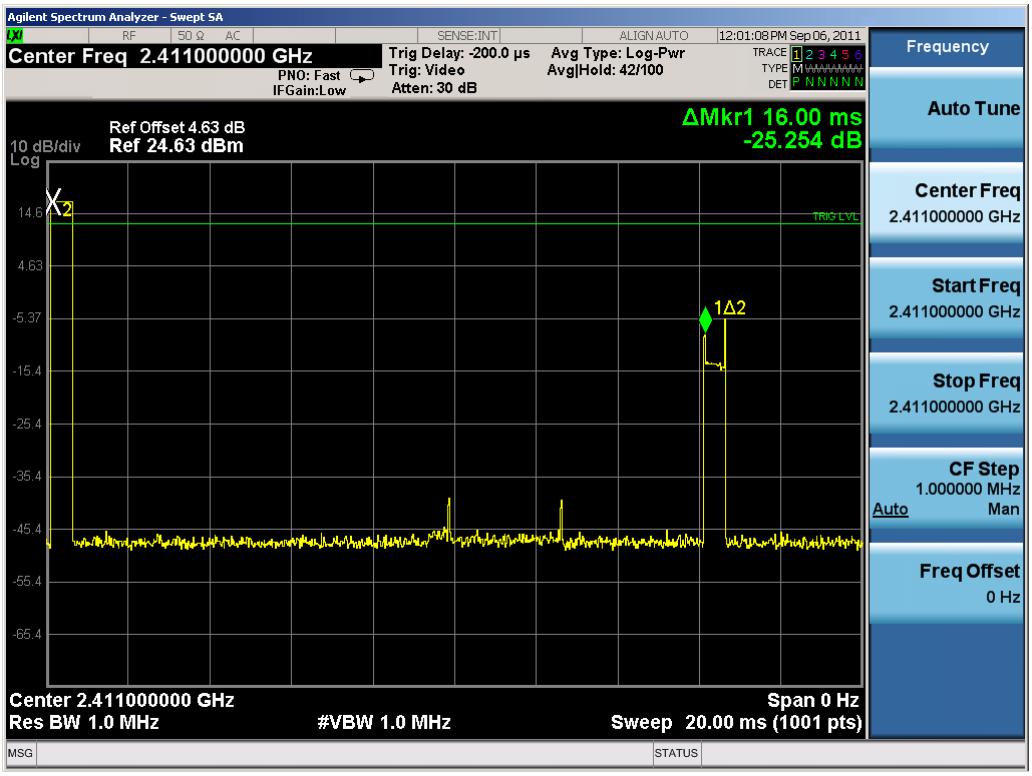

Plot 6-11. Time Before EUT Returns to Same Channel

Note:

The Wireless Seismic RT 1000 system consists of the Wireless Remote Unit (WRU) and a Base Station Unit (BSU). Both devices transmit at an interval of 16ms. Plot 6-11 shows a time differential of 16ms which is the amount of time that elapses between consecutive bursts of information from the WRU unit. The low amplitude pulses shown in the middle of the plot is a burst transmitted by the WRU which is part of the RT 1000 communication system.

The BSU uses 61 total hopping channels. In the initial beaconing state only 15 of the standard 61 frequencies are used to establish the link. There is no RF power difference between the 15 channels used during the beacon stage vs using all 61 channels during the data transmission phase.

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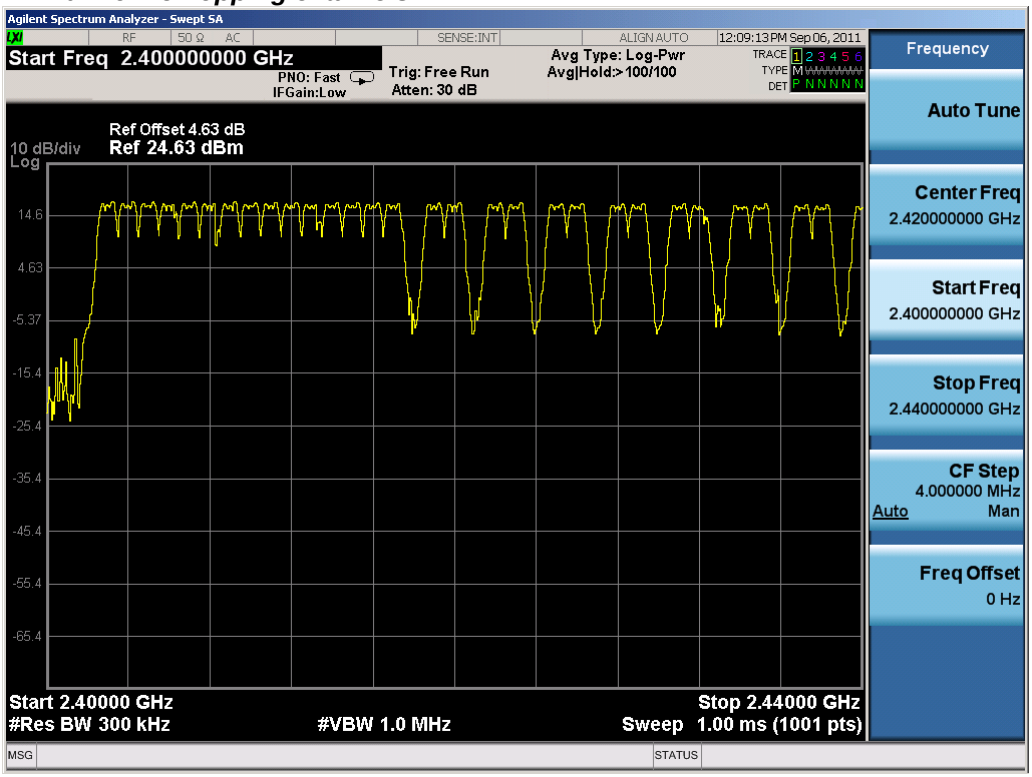
6.7 Number of Hopping Channels

§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 6-12. Low End Spectrum Channel Hopping Plot

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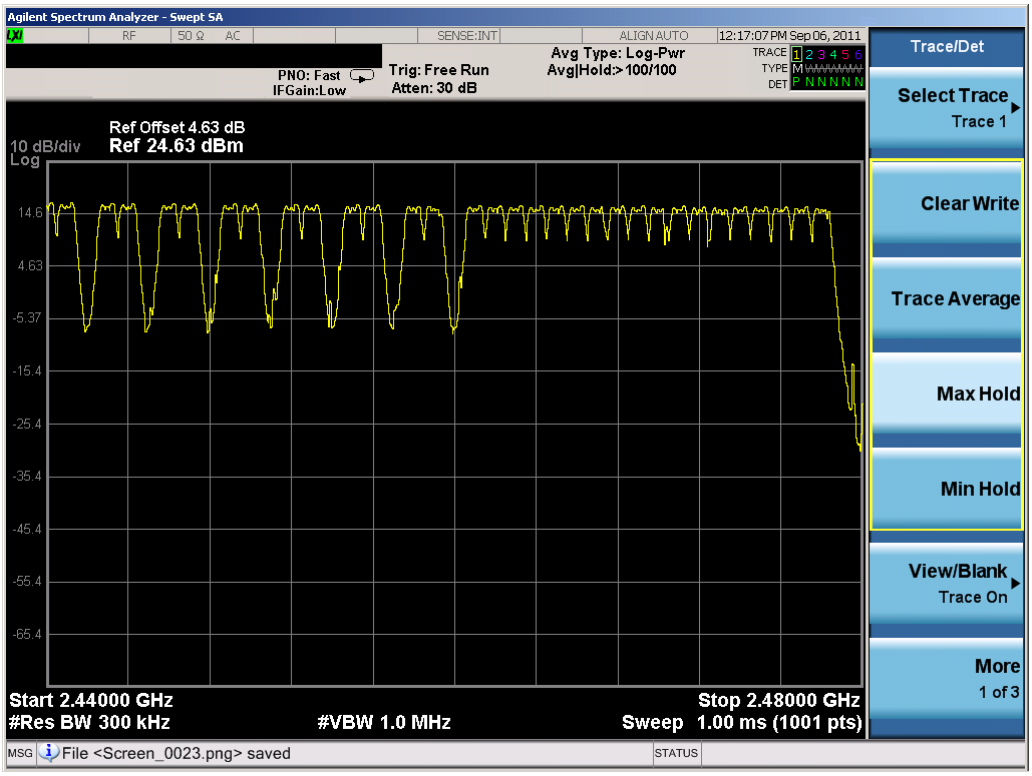

Plot 6-13. High End Spectrum Channel Hopping Plot

The plots shown above indicate the 61 channels used for the data transmission mode. The 15 beacon channels used only during the Announcement Mode are shown as the inner-blank channels in the plots.

6.8 Conducted Spurious Emissions

§15.247 (d)

The display line shown in the following plots denotes the limit at 20dB below the fundamental emission level measured in a 100kHz bandwidth.

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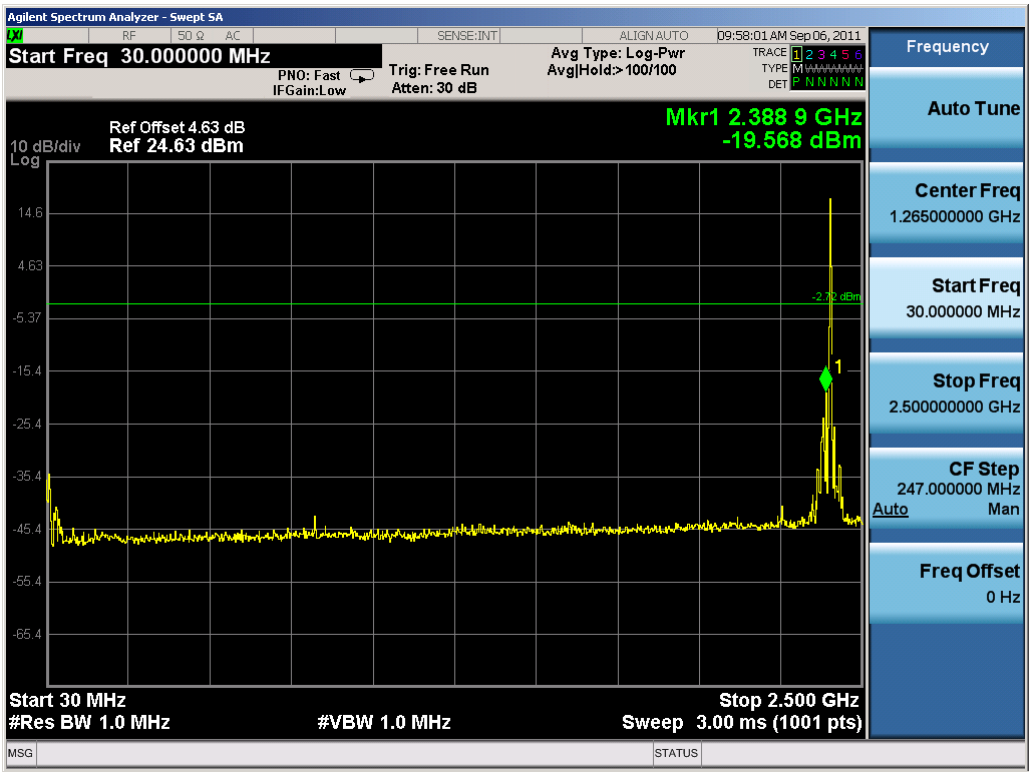
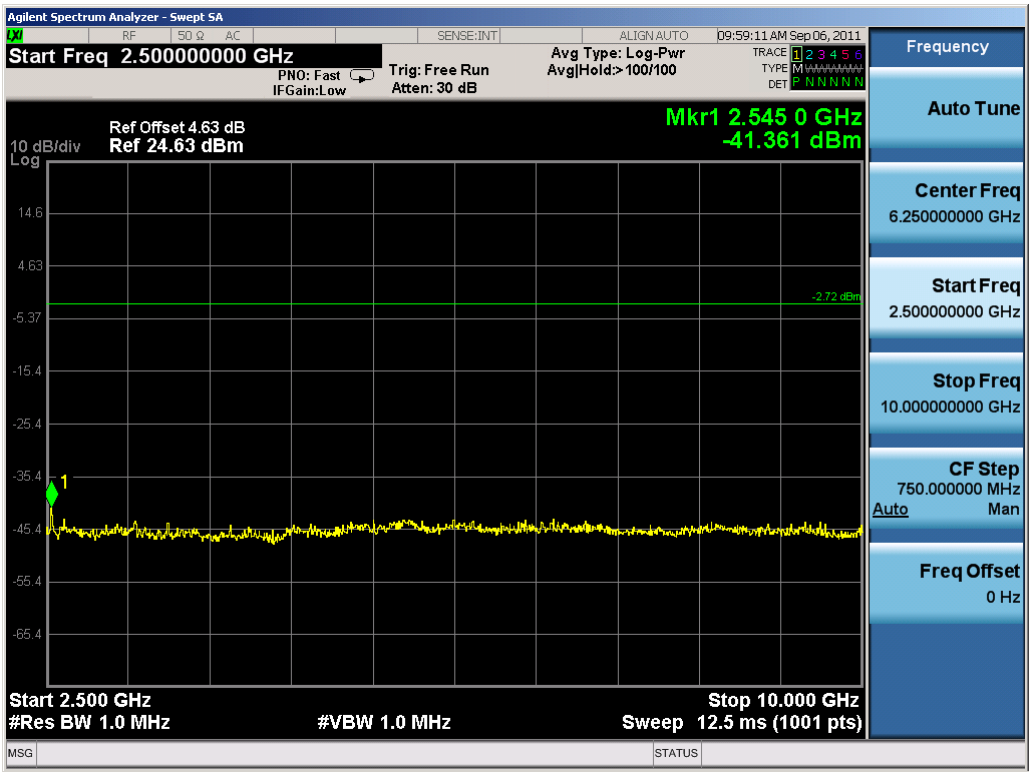


Plot 6-14. Conducted Spurious Plot (Ch. 03)



Plot 6-15. Conducted Spurious Plot (Ch. 03)

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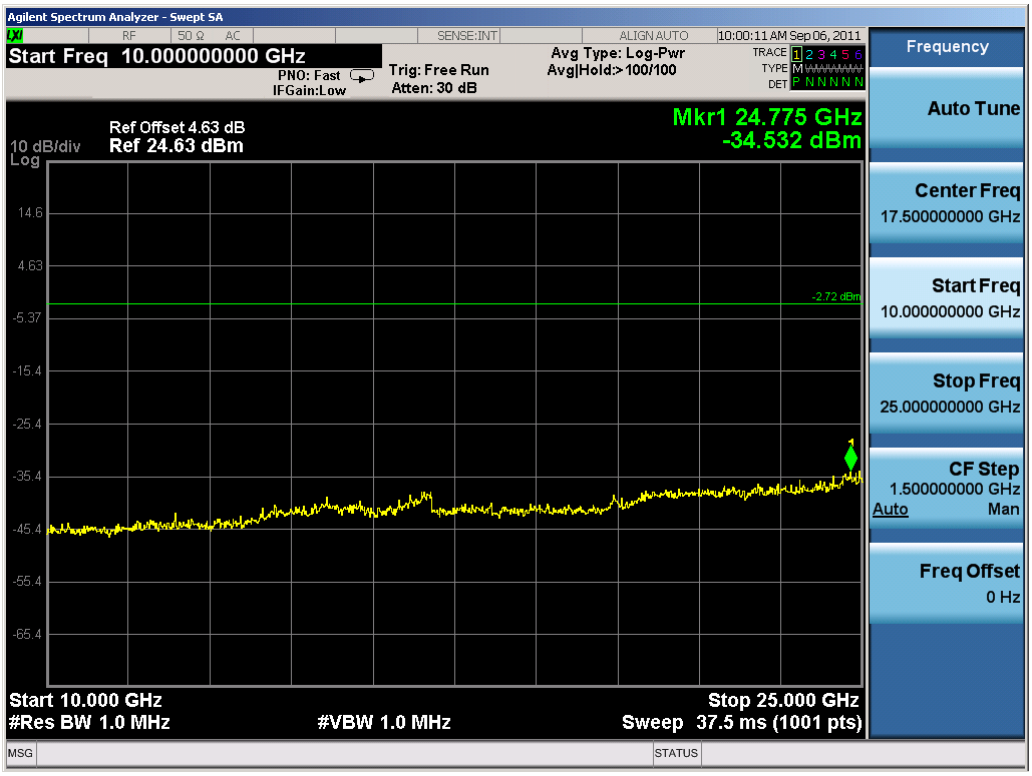
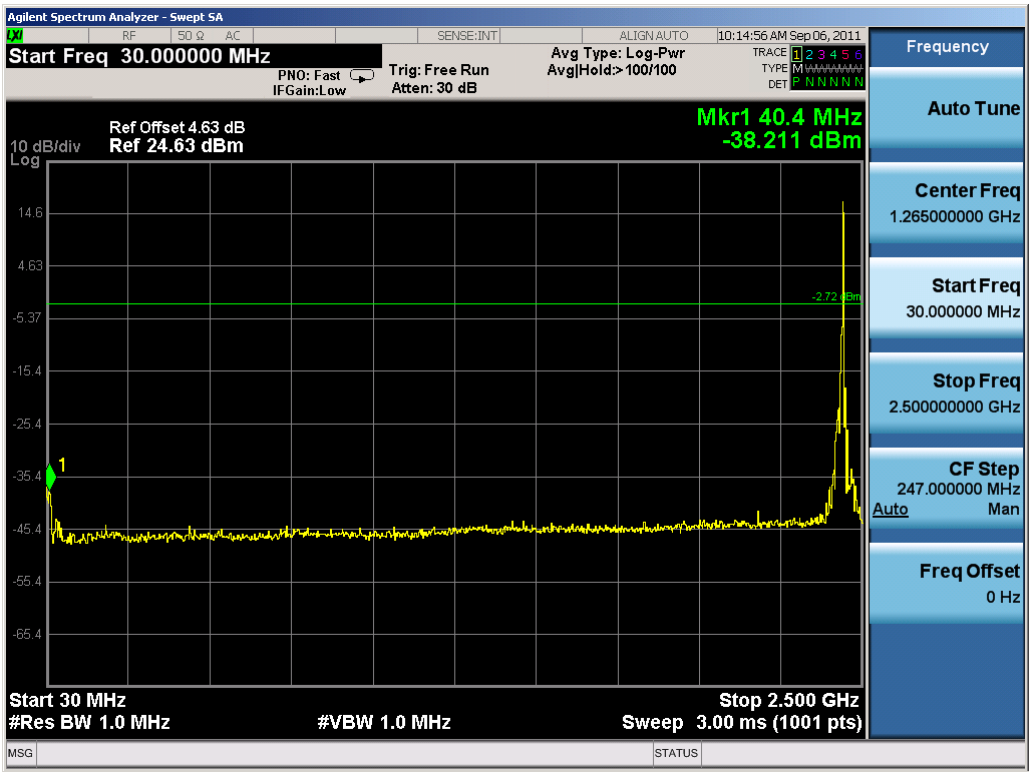


Plot 6-16. Conducted Spurious Plot (Ch. 03)



Plot 6-17. Conducted Spurious Plot (Ch. 41)

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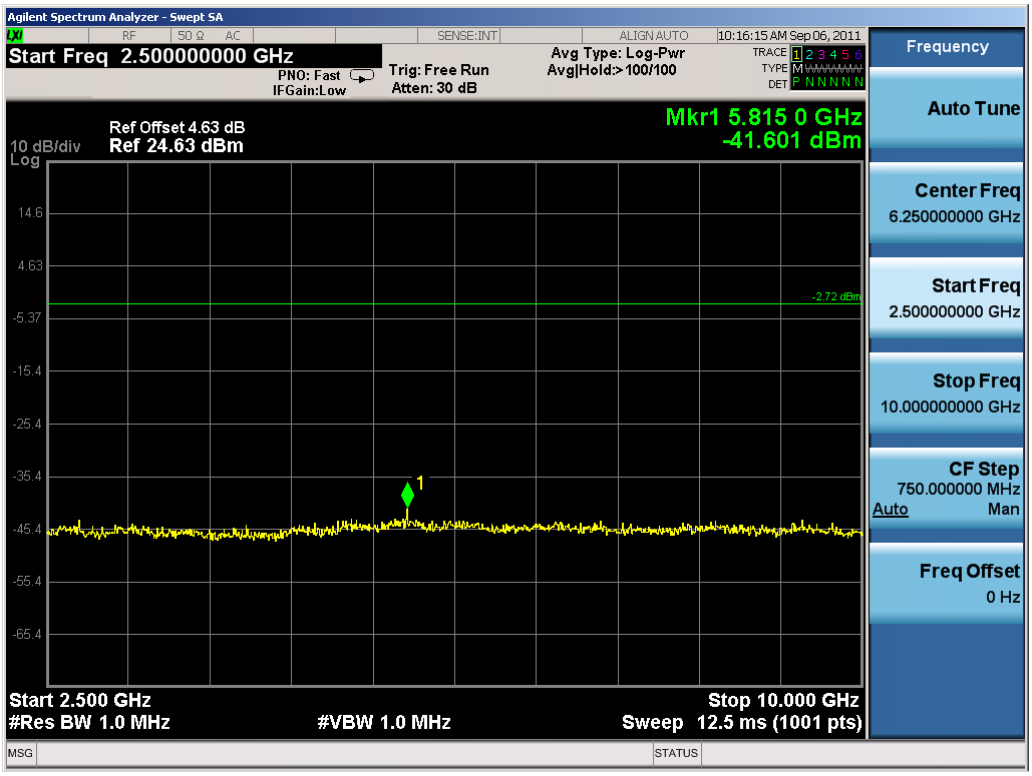

Plot 6-18. Conducted Spurious Plot (Ch. 41)

Plot 6-19. Conducted Spurious Plot (Ch. 41)

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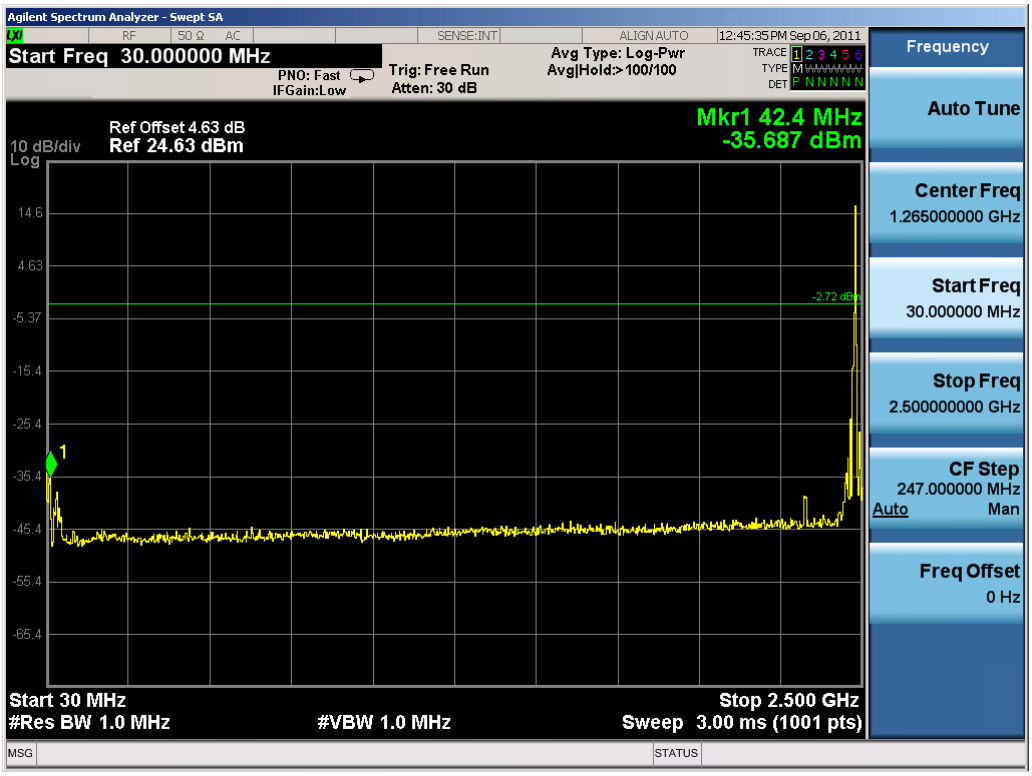
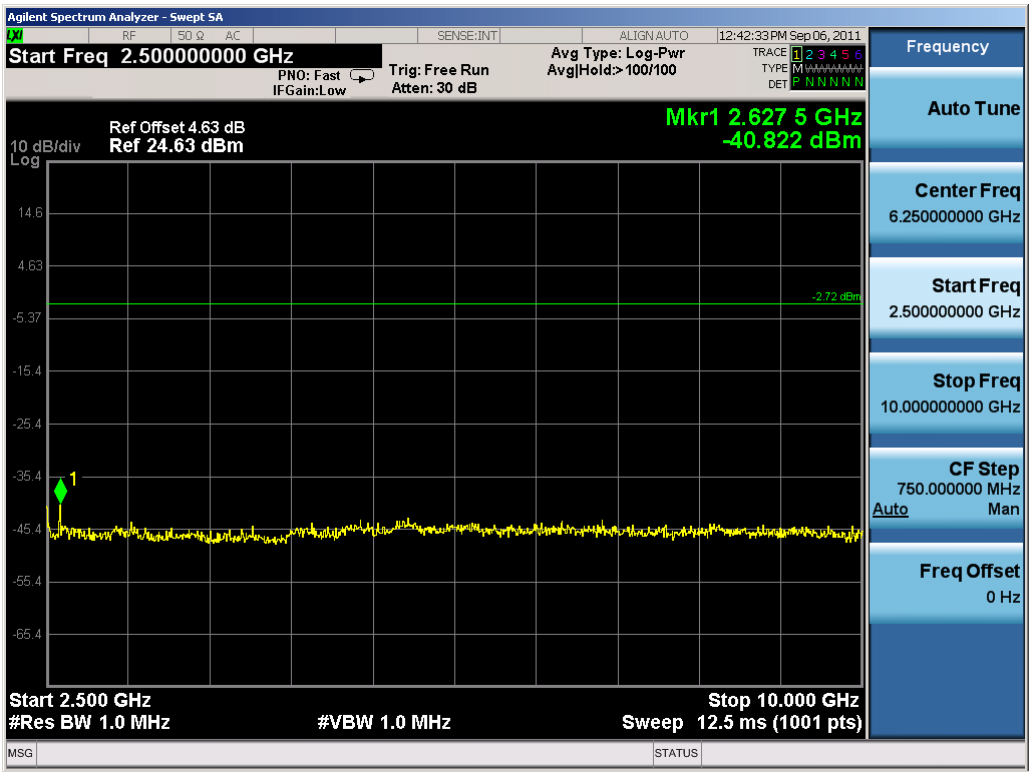


Plot 6-20. Conducted Spurious Plot (Ch. 78)



Plot 6-21. Conducted Spurious Plot (Ch. 78)

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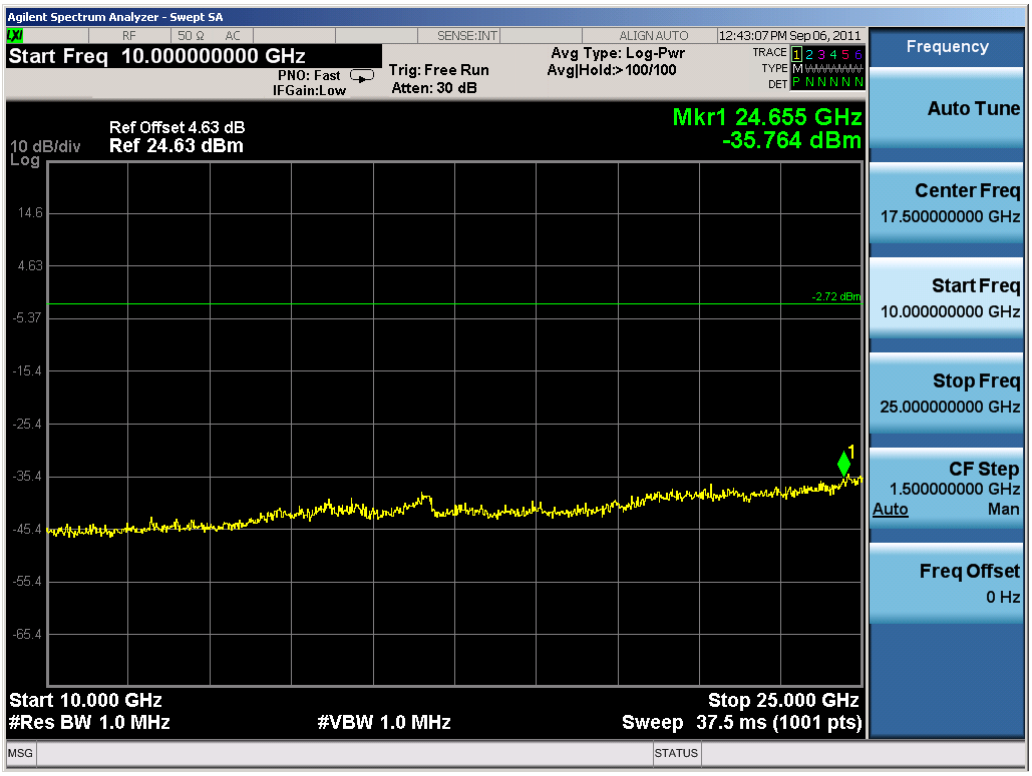

Plot 6-22. Conducted Spurious Plot (Ch. 78)

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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 (3kHz used), 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 = 16ms x 61 channels = 976ms
  - 100ms / $\Delta t_{[ms]}$ = *H* → Round up to next highest integer, to account for worst case, *H' = 4*
  - Pulse width = 490μs
  - Worst Case Dwell Time = $\tau_{[ms]}$ x *H'* = 1.96ms
  - Duty Cycle Correction = 20log(Worst Case Dwell Time/100ms) $_{[dB]}$ = -34.155dB

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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: 03

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	-110.68	Avg	H	43.52	-34.15	5.68	53.98	-48.30
4806.00	-103.98	Peak	H	43.52	0.00	46.54	73.98	-27.44
7209.00	-110.50	Avg	H	50.81	0.00	13.16	53.98	-40.82
7209.00	-101.00	Peak	H	50.81	0.00	56.81	73.98	-17.17
12015.00	-135.00	Avg	H	63.40	0.00	35.40	53.98	-18.58
12015.00	-125.00	Peak	H	63.40	0.00	45.40	73.98	-28.58

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 = VBW = 1MHz.

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.

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Radiated Spurious Emission Measurements (Cont'd)

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

Measurement Distance: 3 Meters

Operating Frequency: 2441MHz

Channel: 41

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Duty Cycle Correction [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4882.00	-114.25	Avg	H	43.69	-34.15	2.28	53.98	-51.70
4882.00	-109.75	Peak	H	43.69	0.00	40.94	73.98	-33.04
7323.00	-114.39	Avg	H	50.91	-34.15	9.37	53.98	-44.61
7323.00	-108.89	Peak	H	50.91	0.00	49.02	73.98	-24.96
12205.00	-135.00	Avg	H	63.64	0.00	35.64	53.98	-18.34
12205.00	-125.00	Peak	H	63.64	0.00	45.64	73.98	-28.34

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 = VBW = 1MHz.

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.

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Radiated Spurious Emission Measurements (Cont'd)

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

Measurement Distance: 3 Meters

Operating Frequency: 2478MHz

Channel: 78

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Duty Cycle Correction [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4956.00	-109.03	Avg	H	43.86	-34.15	7.68	53.98	-46.30
4956.00	-100.03	Peak	H	43.86	0.00	50.84	73.98	-23.14
7434.00	-108.87	Avg	H	50.94	-34.15	14.92	53.98	-39.06
7434.00	-101.37	Peak	H	50.94	0.00	56.57	73.98	-17.41
12390.00	-135.00	Avg	H	63.87	0.00	35.87	53.98	-18.11
12390.00	-125.00	Peak	H	63.87	0.00	45.87	73.98	-28.11

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 = VBW = 1MHz.

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.

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6.10 Radiated Restricted Band Edge Measurements

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

Measurement Distance: 3 Meters

Operating Frequency: 2478MHz

Channel: 78

	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	-71.47	Peak	H	34.31	-34.15	35.69	53.98	-18.29
	2483.50	-71.47	Peak	H	34.31	0.00	69.84	73.98	-4.14
*	2484.00	-74.78	Peak	H	34.31	-34.15	32.38	53.98	-21.60
	2484.00	-74.78	Peak	H	34.31	0.00	66.53	73.98	-7.45
*	2484.47	-77.34	Peak	H	34.31	-34.15	29.82	53.98	-24.16
	2484.47	-77.34	Peak	H	34.31	0.00	63.97	73.98	-10.00

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 = VBW = 1MHz.

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.

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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: 03

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Duty Cycle Correction [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	2381.80	-79.78	Peak	H	33.87	-34.15	26.94	53.98	-27.04
	2381.80	-79.78	Peak	H	33.87	0.00	61.09	73.98	-12.89
*	2385.10	-77.32	Peak	H	33.88	-34.15	29.40	53.98	-24.58
	2385.10	-77.32	Peak	H	33.88	0.00	63.55	73.98	-10.43
*	2389.40	-73.47	Peak	H	33.88	-34.15	33.25	53.98	-20.73
	2389.40	-73.47	Peak	H	33.88	0.00	67.41	73.98	-6.57

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 = VBW = 1MHz.

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.

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7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Wireless Seismic Base Station Unit FCC ID: YZO-00401** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules and RSS-210 of the Industry Canada Rules.

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