



PCTEST ENGINEERING LABORATORY, INC.

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MEASUREMENT REPORT FCC PART 15.247 / IC RSS-210

Applicant Name:
Wireless Seismic, Inc.
361 Centennial Parkway, Suite 230
Louisville, CO 80027

Date of Testing:
02/06/12 - 02/07/12
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
0Y1202030161.YZO

FCC ID:	YZO-00102
APPLICANT:	Wireless Seismic, Inc.

Application Type: Certification

Model(s): RT1000 WRU

EUT Type: Wireless Remote Unit

Max. RF Output Power: 44.978 mW (16.53dBm) 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.

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







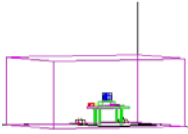
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Test Report S/N: 0Y1202030161.YZO	Test Dates: 02/06/12 - 02/07/12	EUT Type: Wireless Remote Unit		Page 1 of 33

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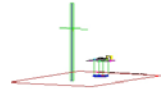
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MEASUREMENT REPORT

FCC Part 15.247

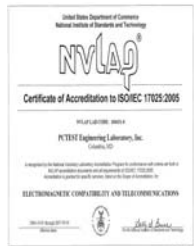
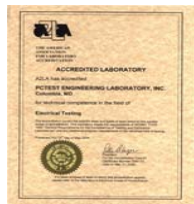


§ 2.1033 General Information



APPLICANT: Wireless Seismic, Inc.
APPLICANT ADDRESS: 361 Centennial Parkway, Suite 230
 Louisville, CO 80027
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: RT1000 WRU
FCC ID: YZO-00102
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: 02/06/12 - 02/07/12
TEST REPORT S/N: 0Y1202030161.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, the Baltimore-Washington Intern't'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.

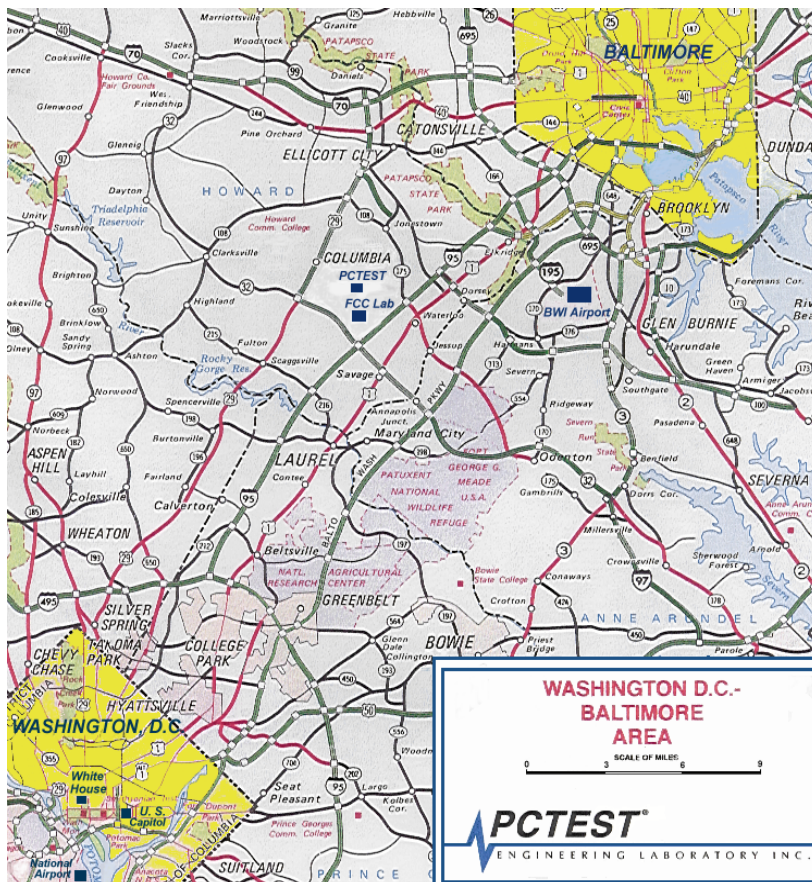




Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Wireless Seismic Wireless Remote Unit FCC ID: YZO-00102**. 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: RT1000 WRU	YZO-00102	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
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 Wireless Remote Unit FCC ID: YZO-00102**.

Deviation from measurement procedure.....None

3.2 Radiated Emissions

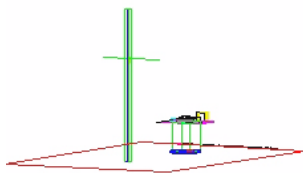


Figure 3-1. 3-Meter Test Site

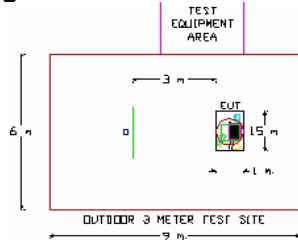


Figure 3-2. Dimensions of Outdoor Test Site

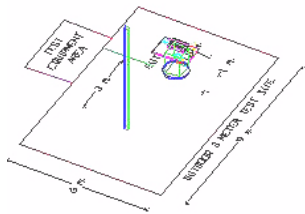


Figure 3-3. Turntable and System Setup

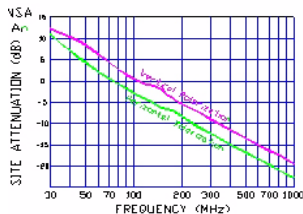


Figure 3-4. Normalized Site Attenuation Curves (H&V)

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 Wireless Remote Unit are professionally installed.

Conclusion:

The **Wireless Seismic Wireless Remote Unit FCC ID: YZO-00102** unit complies with the requirement of §15.203.

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

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
Agilent	N9020A	MXA Signal Analyzer	10/10/2011	Annual	10/10/2012	US46470561
-	BT1	Bluetooth Cable Set	1/15/2012	Annual	1/15/2013	N/A
-	RE1	Radiated Emissions Cable Set	6/7/2011	Annual	6/7/2012	N/A
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	7/22/2011	Annual	7/22/2012	125518
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	ESU26	EMI Test Receiver	4/27/2011	Annual	4/27/2012	100342

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-00102
 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 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	20dB Bandwidth Test Results	
		[kHz]	Pass/Fail
2403	Low	4039	Pass
2439	Mid	4040	Pass
2475	High	4046	Pass

Table 6-2. Conducted 20dB Bandwidth Measurements

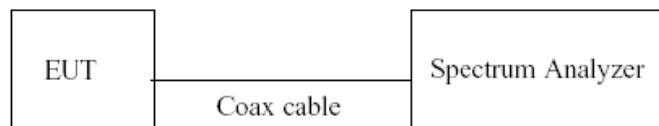
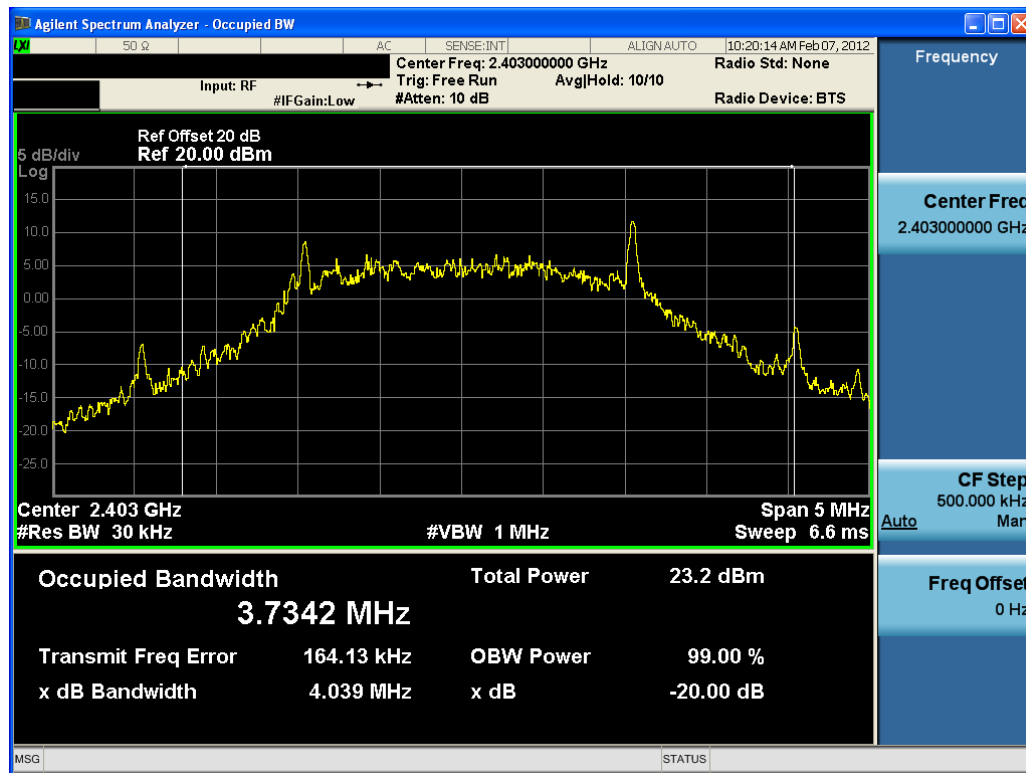
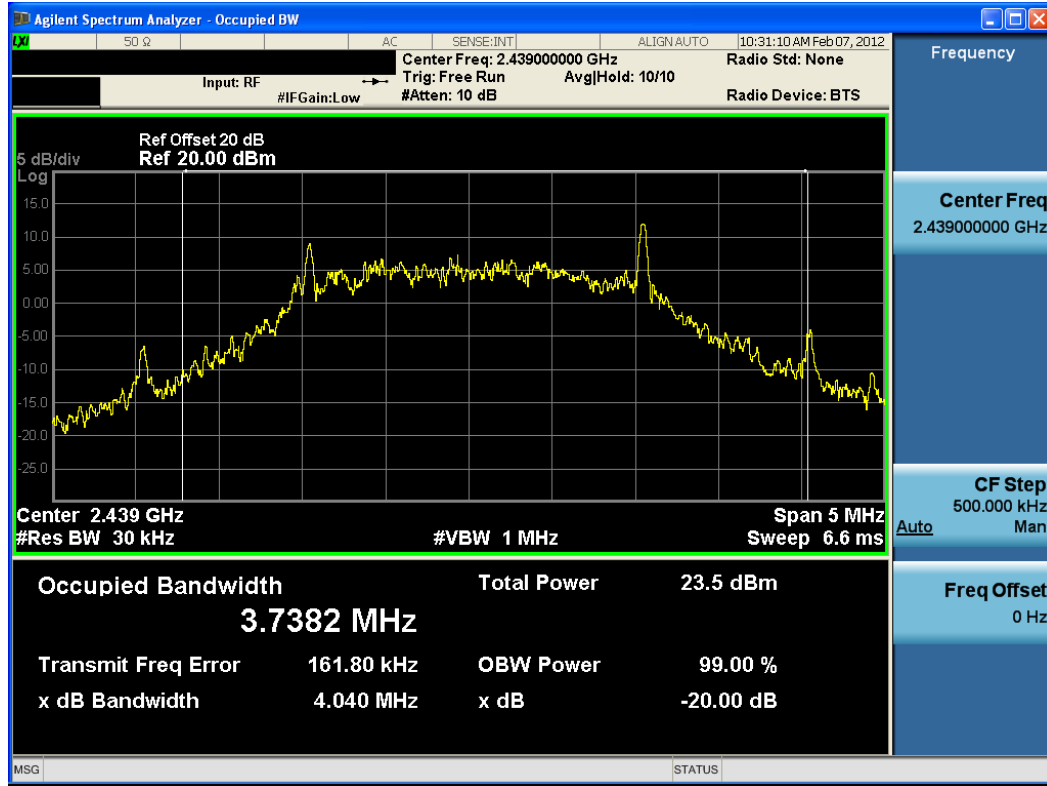


Figure 6-1. Test Instrument & Measurement Setup

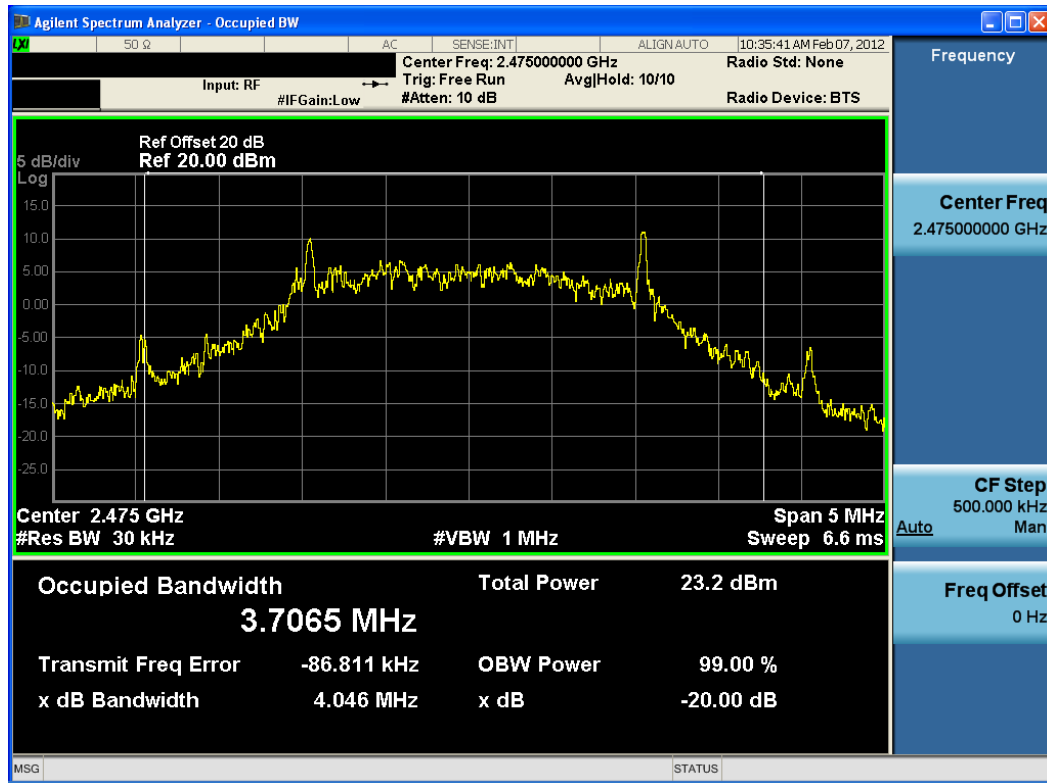


Plot 6-1. 20dB Bandwidth Plot (Low Channel)

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



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

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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	Peak Conducted Power	
		[dBm]	[mW]
2403	Low	15.91	39.021
2439	Mid	16.37	43.371
2475	High	16.53	44.978

Table 6-3. Conducted Output Power Measurements

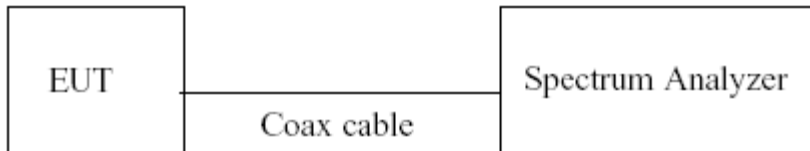
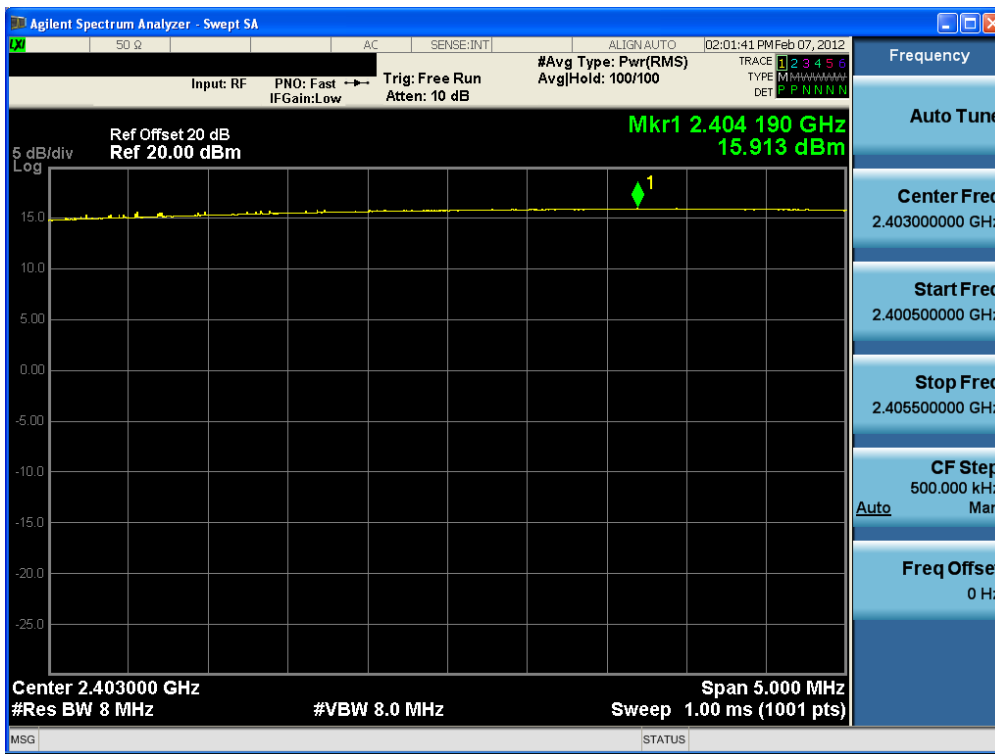
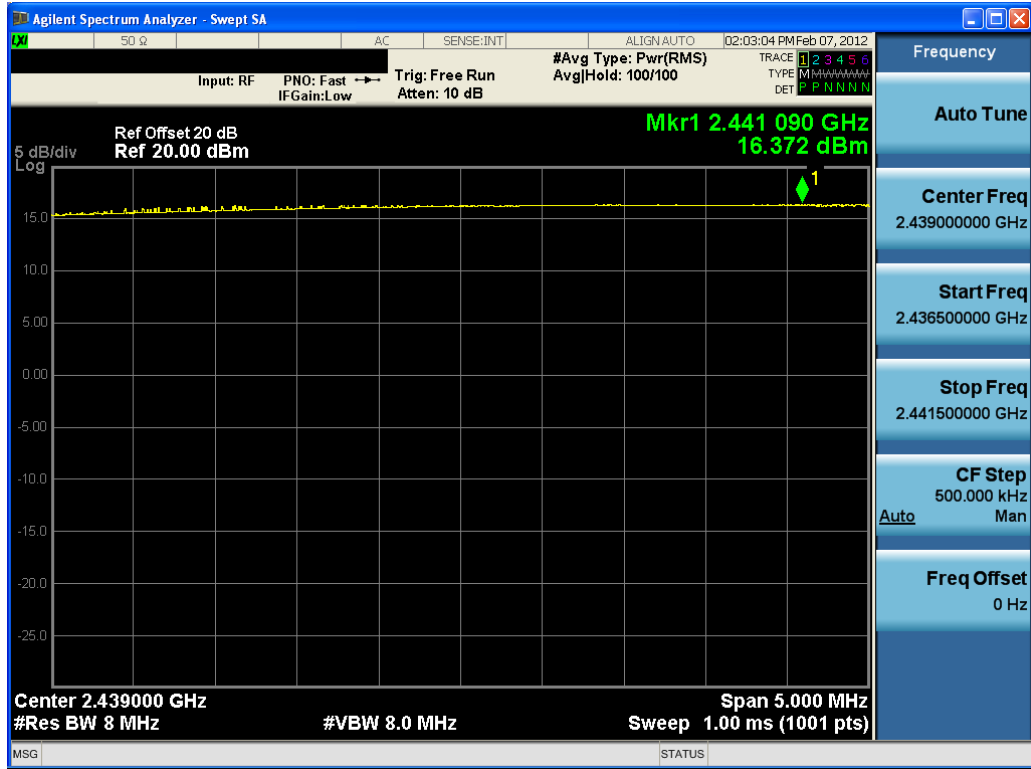


Figure 6-2. Test Instrument & Measurement Setup



Plot 6-4. Peak Conducted Output Power Plot (Low Channel)



FCC ID: YZO-00102		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 6-5. Peak Conducted Output Power Plot (Mid Channel)



Plot 6-6. Peak Conducted Output Power Plot (High Channel)

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6.4 Band Edge Compliance

§15.247 (d); RSS-210 (A8.5)

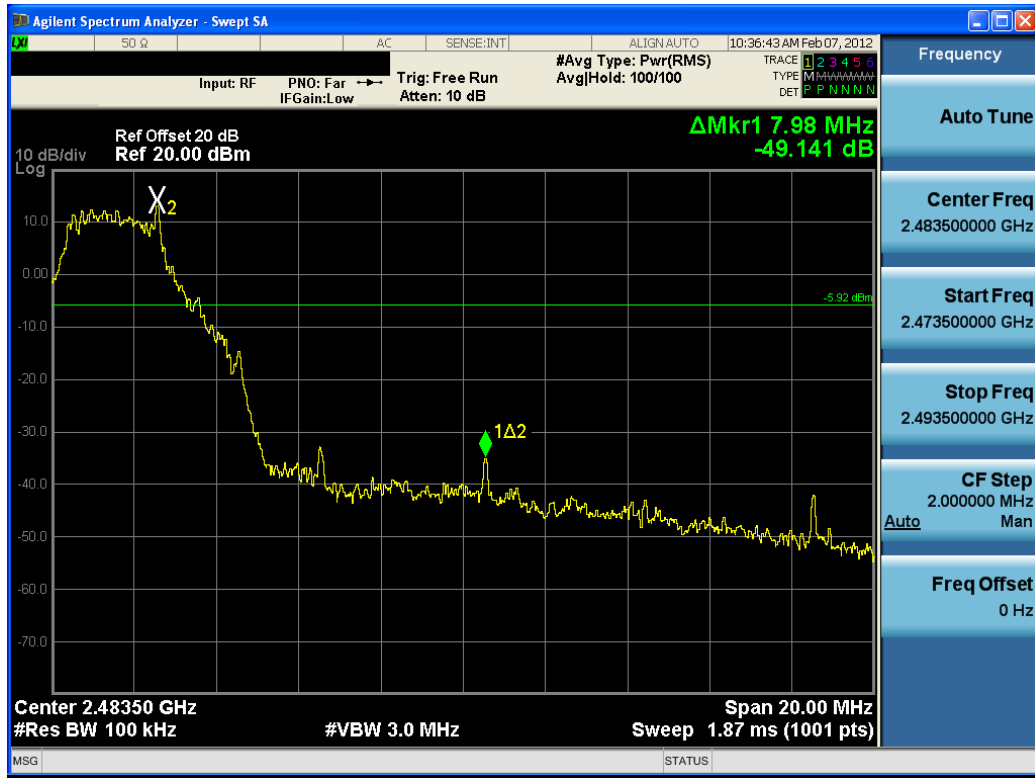
Measurement is taken at the highest point located outside of the emission bandwidth. **The maximum permissible emission level is 20 dBc. Any emission lying outside of the emission bandwidth and in a restricted band is subject to a field strength limit specified in Section 15.209 of the Title 47 CFR.**

Plots of the worst case emissions are shown below.

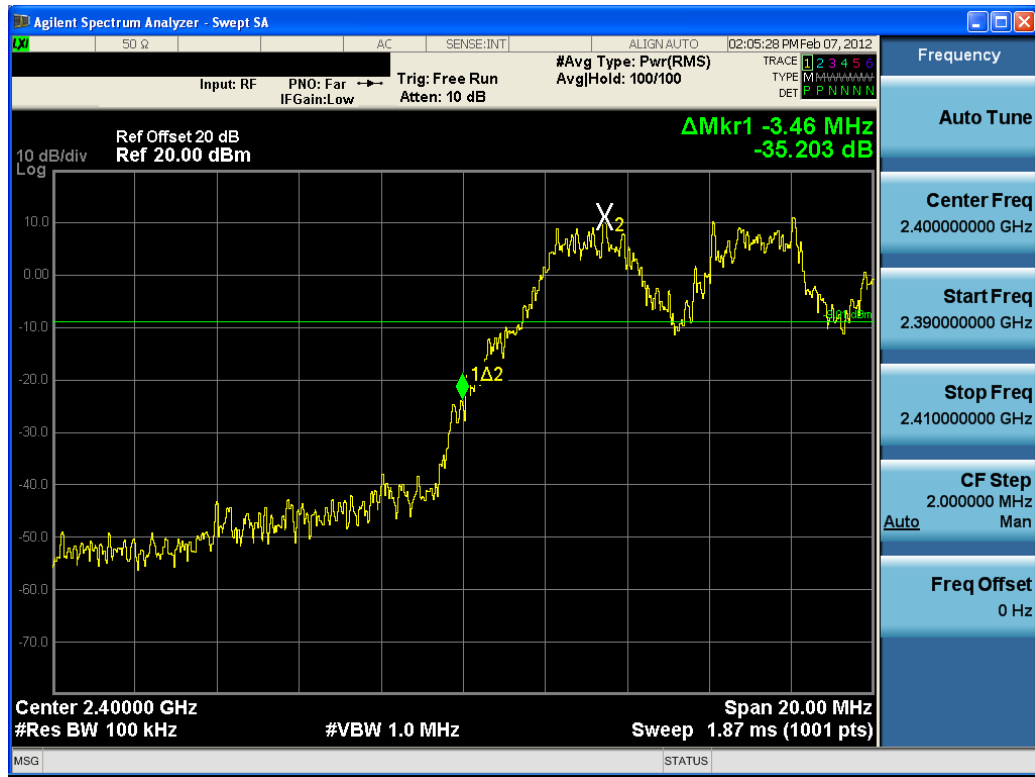


Plot 6-7. Lower Band Edge Plot (Low Channel)

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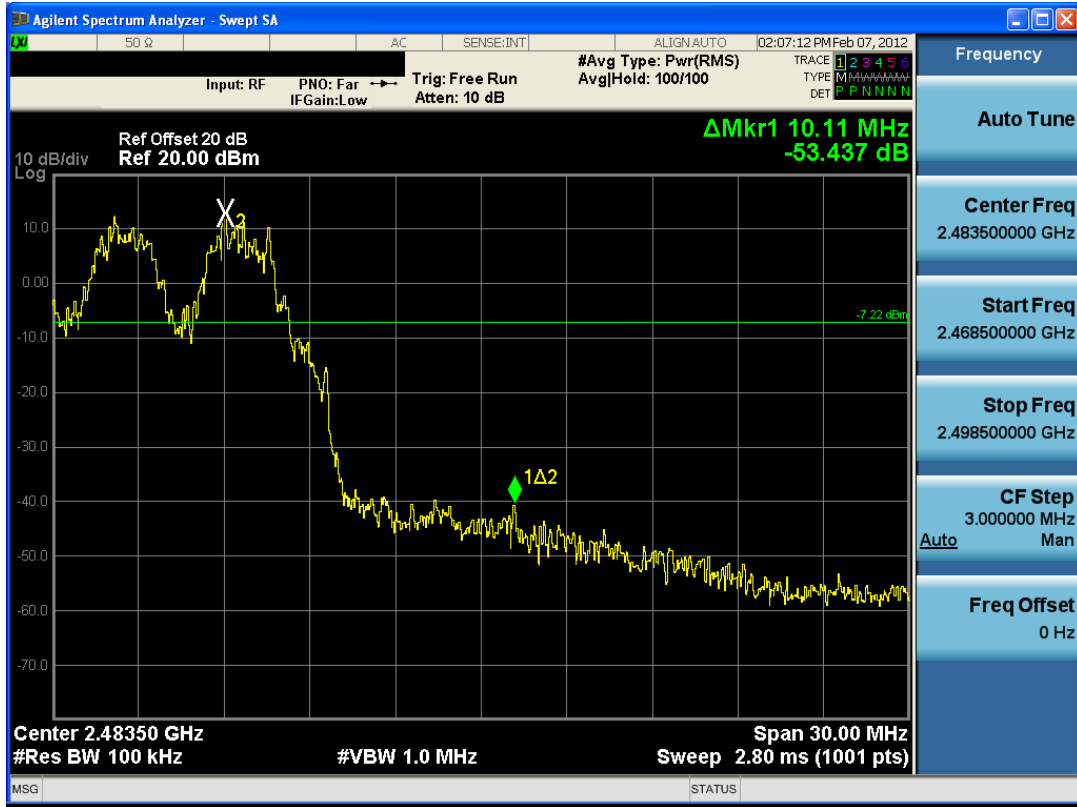


Plot 6-8. Upper Band Edge Plot (High Channel)



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

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

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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	Min. Channel Separation [MHz]
2402	Low	2.693
2441	Mid	2.693
2480	High	2.697

Table 6-4. Minimum Channel Separation



Plot 6-9. Channel Spacing Plot

FCC ID: YZO-00102		FCC Pt. 15.247 TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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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 = 512µs.

- 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 512µs = 12.8ms (total duration of time that one channel transmits within a 6sec time frame)
- Therefore 12.8ms < 400ms; PASS



Data Transmission Mode Calculation:

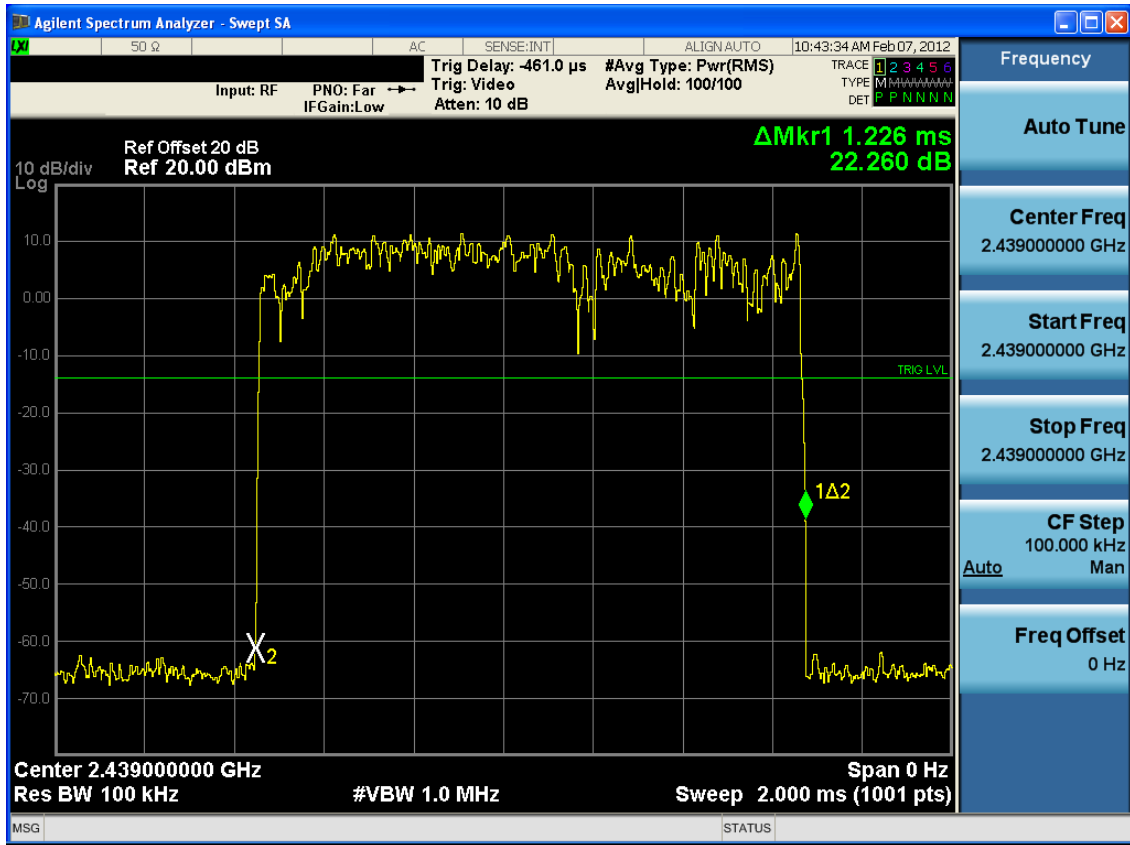
Time of Occupancy for one pulse width = 3.217ms.

- 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 3.217ms = 80.425ms (total duration of time that one channel transmits within a 24.4sec time frame)
- Therefore 80.425ms < 400ms; PASS



Test Mode Selection:

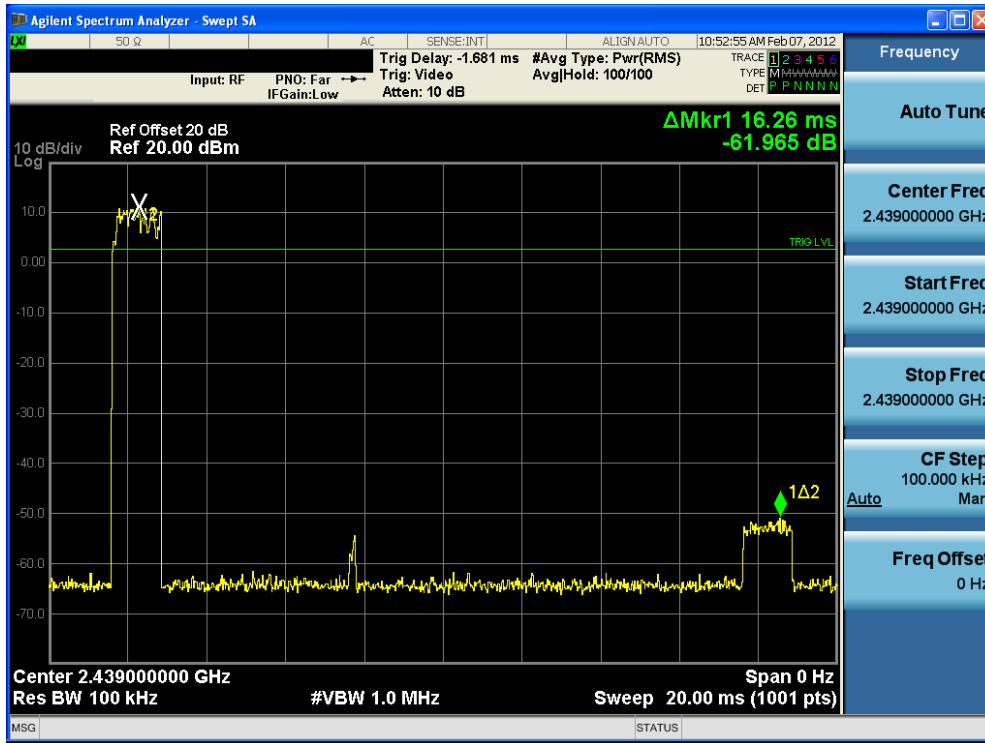
From the calculations above it can be seen that the worst case on time is with the device operating in the Data Transmission Mode. This mode was used during emissions testing and duty cycle correction factor calculation. Additionally, all band edge compliance measurements were made while operating in the Data Transmission Mode 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

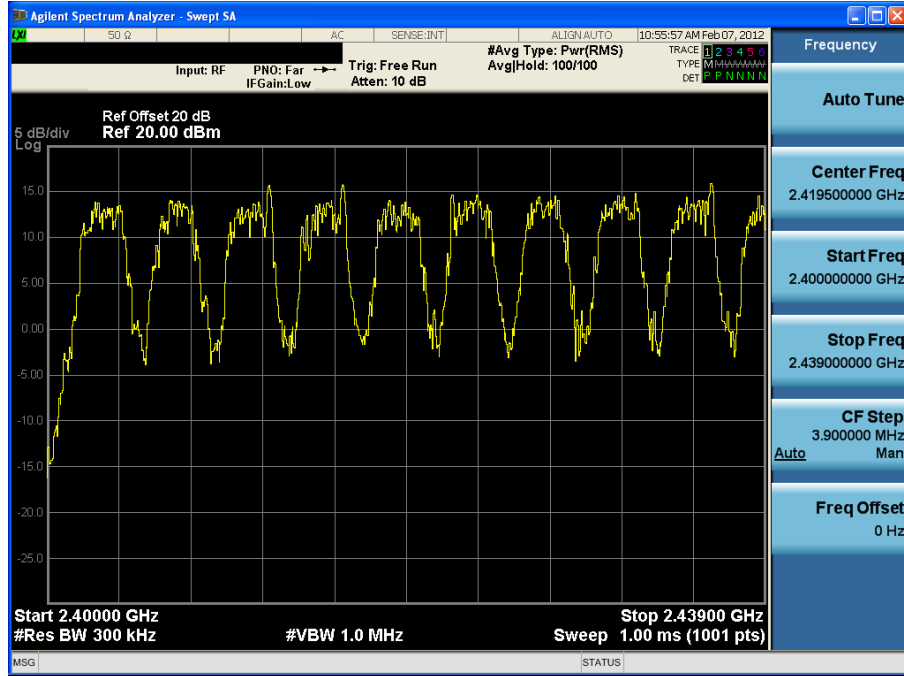
Note:

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 pulse shown in the middle of the plot is a burst transmitted by the BSU which is part of the RT 1000 communication system.

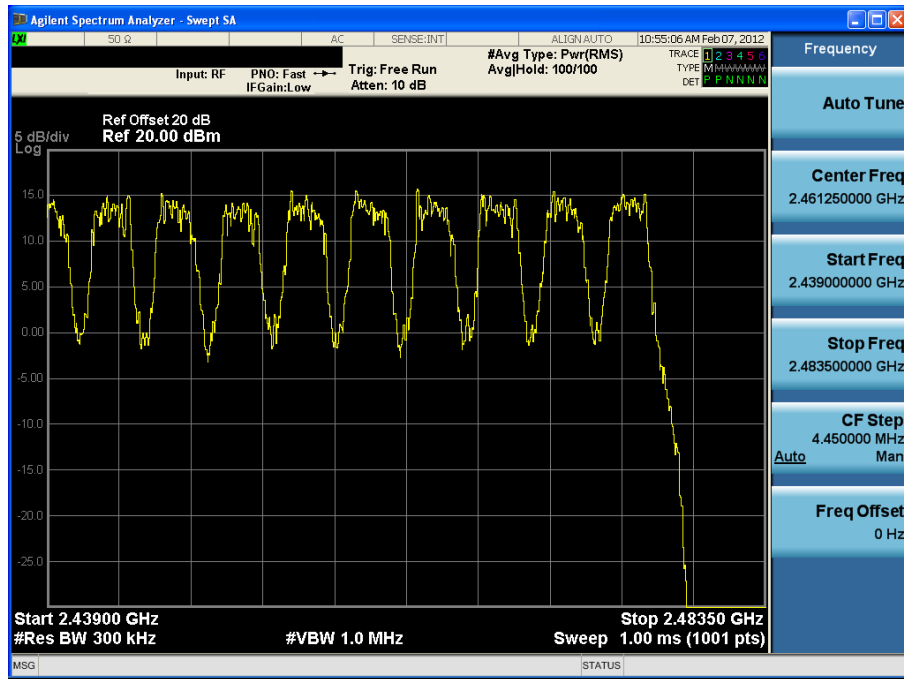
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6.7 Number of Hopping Channels §15.247 (a)(1)(iii); RSS-210 (A8.1 (4))

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



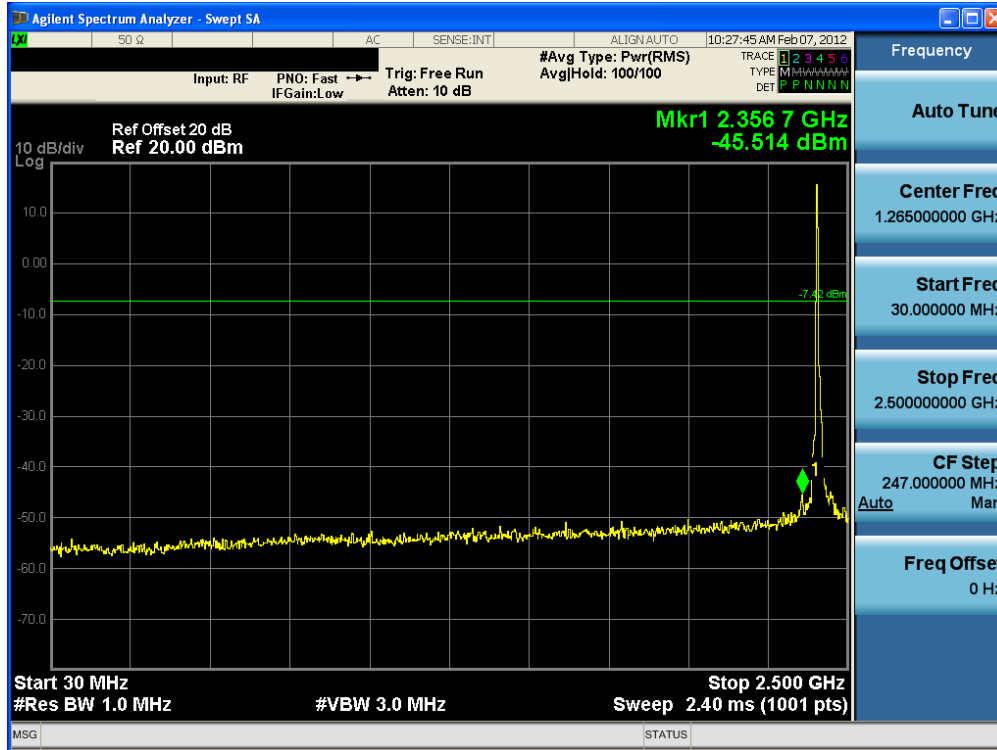
Plot 6-13. High End Spectrum Channel Hopping Plot

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6.8 Conducted Spurious Emissions

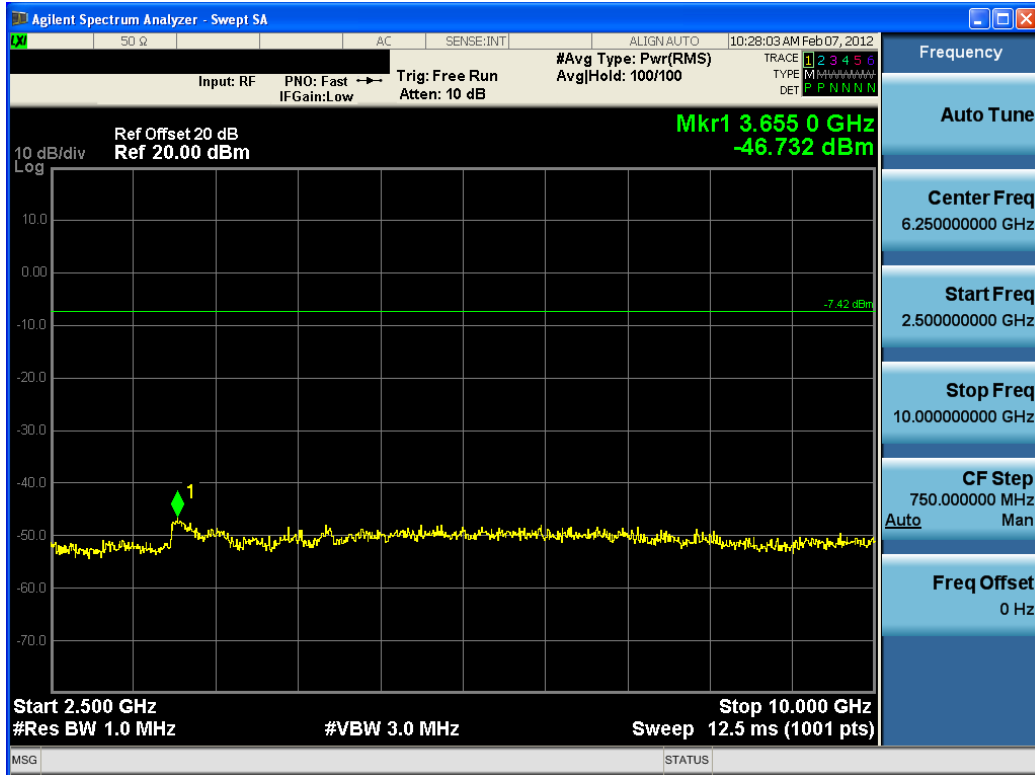
§15.247 (d)

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



Plot 6-14. Conducted Spurious Plot (Low Channel)

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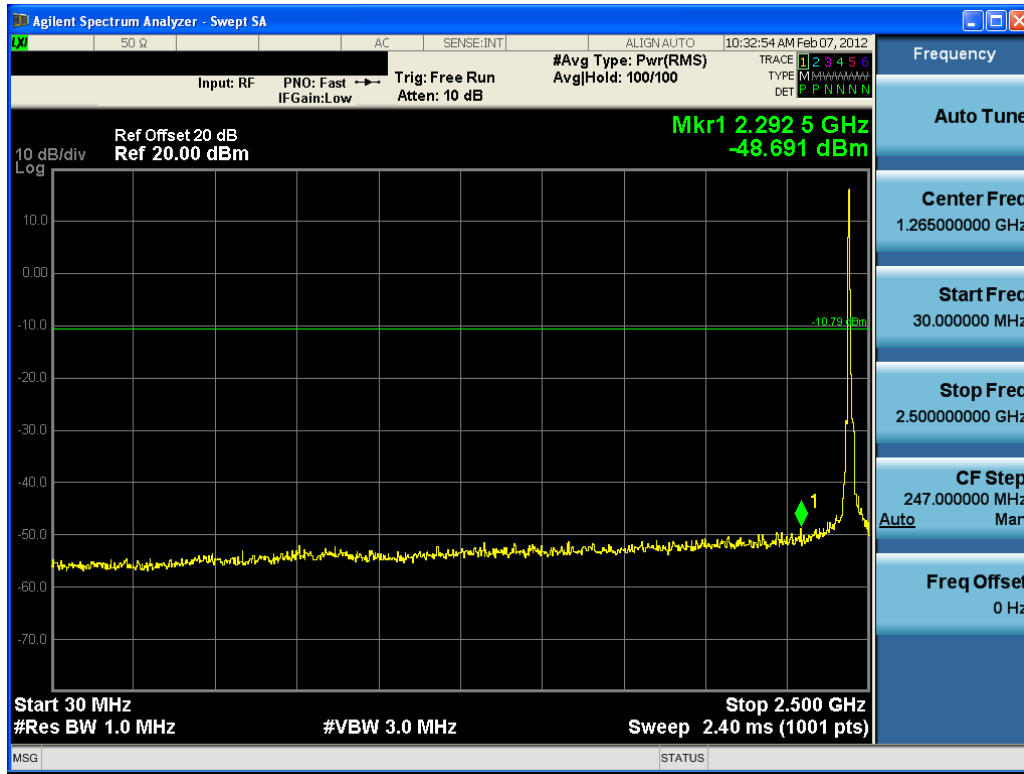


Plot 6-15. Conducted Spurious Plot (Low Channel)

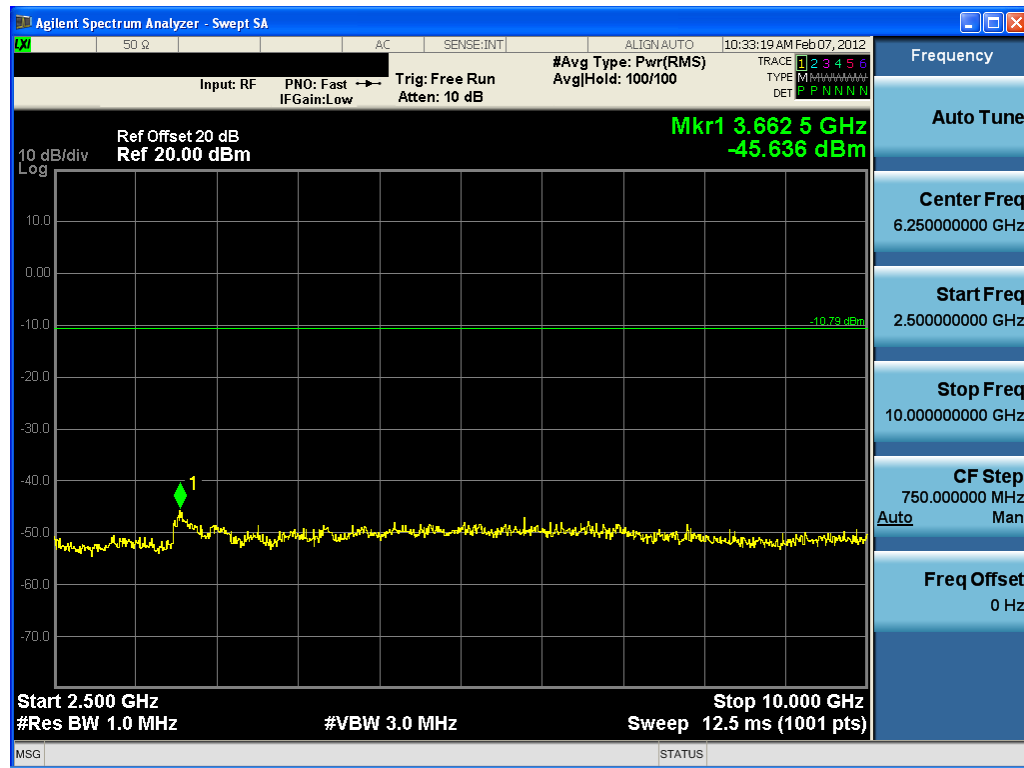


Plot 6-16. Conducted Spurious Plot (Low Channel)

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

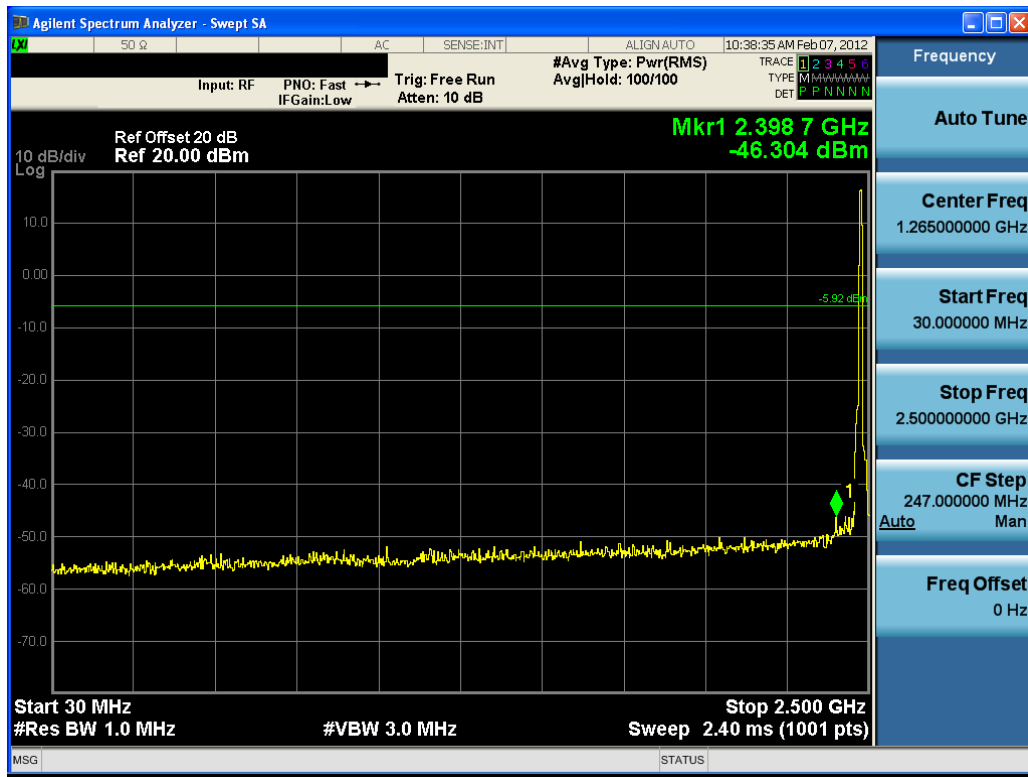


Plot 6-18. Conducted Spurious Plot (Mid Channel)

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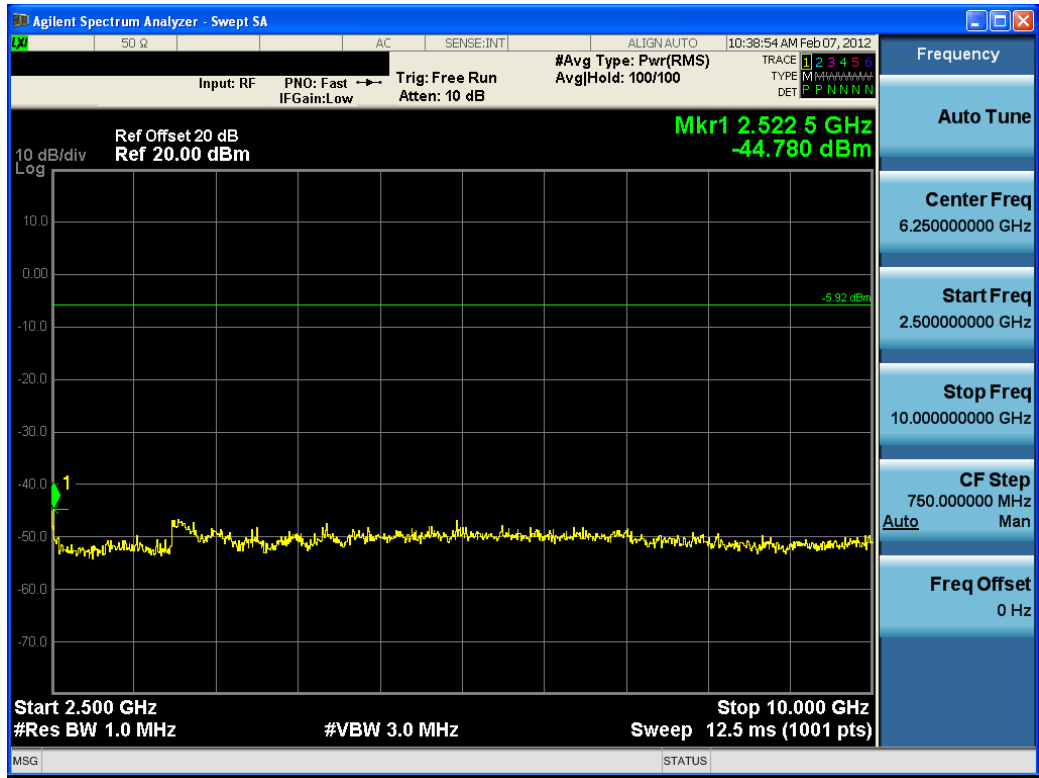


Plot 6-19. Conducted Spurious Plot (Mid Channel)

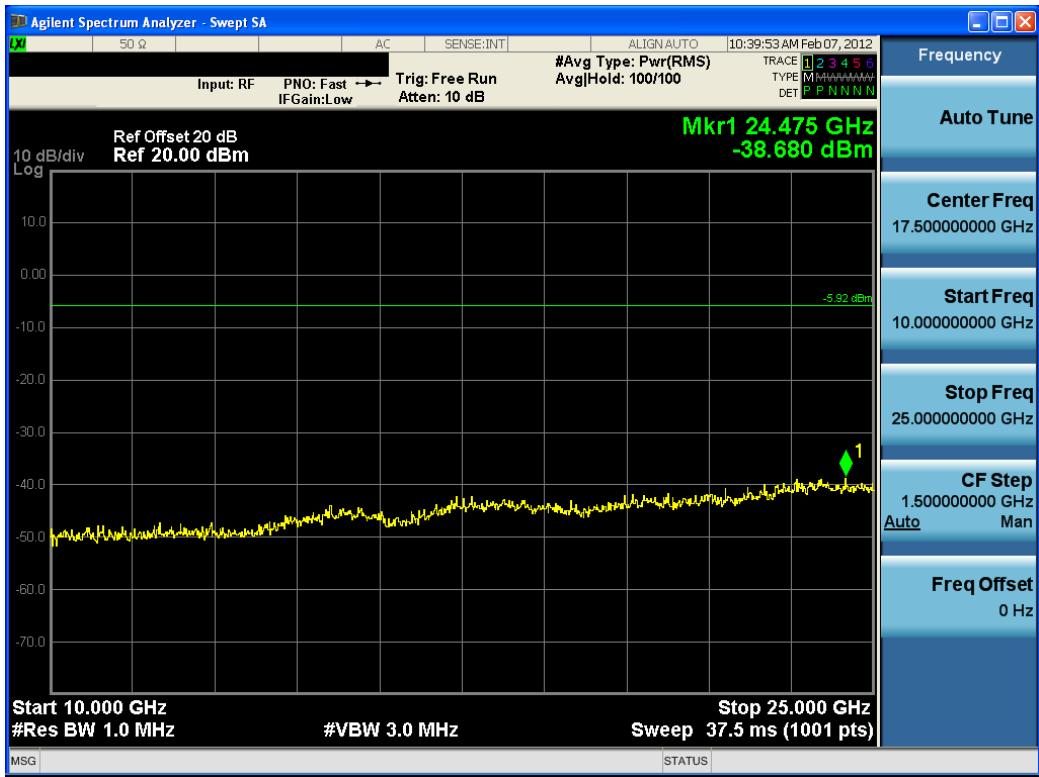


Plot 6-20. Conducted Spurious Plot (High Channel)

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



Plot 6-22. Conducted Spurious Plot (High Channel)

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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, 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 = $\Delta t = 16ms \times 19 \text{ channels} = 304ms$
 - $100ms / \Delta t_{[ms]} = H \rightarrow$ Round up to next highest integer, to account for worst case, $H' = 1$
 - Pulse width = 1.226ms
 - Worst Case Dwell Time = $\tau_{[ms]} \times H' = 1.226ms$
 - Duty Cycle Correction = $20\log(\text{Worst Case Dwell Time}/100ms)_{[dB]} = -38.23dB$

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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: Low

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Duty Cycle Correction [dB]	Field Strength [dBmV/m]	Limit [dBmV/m]	Margin [dB]
4806.00	-103.72	Avg	V	39.63	-38.23	4.68	53.98	-49.30
4806.00	-97.63	Peak	V	39.63	0.00	49.00	73.98	-24.98
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:

- All emissions shown lie in the restricted bands specified in §15.205 and are below the limit shown in Table 6-5.
- Average measurements > 1GHz using RBW = 1MHz and VBW > 1/τ Hz, where τ = pulse width in seconds. Peak measurements > 1GHz using RBW = VBW = 1MHz.
- The device was tested while in the normal upright position. This is the single method of deployment for this device.
- The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
- 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.
- Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
- 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: 2439MHz



Channel: Mid

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Duty Cycle Correction [dB]	Field Strength [dBmV/m]	Limit [dBmV/m]	Margin [dB]
4878.00	-99.23	Avg	V	39.65	-38.23	9.20	53.98	-44.78
4878.00	-95.43	Peak	V	39.65	0.00	51.23	73.98	-22.75
7317.00	-114.39	Avg	V	42.83	-38.23	-2.80	53.98	-56.78
7317.00	-100.80	Peak	V	42.83	0.00	49.02	73.98	-24.96
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:

- All emissions shown lie in the restricted bands specified in §15.205 and are below the limit shown in Table 6-5.
- Average measurements > 1GHz using RBW = 1MHz and VBW > 1/τ Hz, where τ = pulse width in seconds. Peak measurements > 1GHz using RBW = VBW = 1MHz.
- The device was tested while in the normal upright position. This is the single method of deployment for this device.
- The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
- 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.
- Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
- 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: 2475MHz



Channel: High

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Duty Cycle Correction [dB]	Field Strength [dBmV/m]	Limit [dBmV/m]	Margin [dB]
4950.00	-106.50	Avg	V	39.68	-38.23	1.95	53.98	-52.03
4950.00	-100.04	Peak	V	39.68	0.00	46.64	73.98	-27.34
7425.00	-116.21	Avg	V	42.98	-38.23	-4.46	53.98	-58.44
7425.00	-101.38	Peak	V	42.98	0.00	48.60	73.98	-25.38
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:

- All emissions shown lie in the restricted bands specified in §15.205 and are below the limit shown in Table 6-5.
- Average measurements > 1GHz using RBW = 1MHz and VBW = 1/τ Hz, where τ = pulse width in seconds. Peak measurements > 1GHz using RBW = VBW = 1MHz.
- The device was tested while in the normal upright position. This is the single method of deployment for this device.
- The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
- 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.
- Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
- 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: 2475MHz



Channel: High

Frequency [MHz]	Analyzer Level [dBm]	Detector	PoI [H/V]	AFCL [dB]	Duty Cycle Correction [dB]	Field Strength [dBmV/m]	Limit [dBmV/m]	Margin [dB]
* 2483.50	-70.23	Peak	V	36.39	-38.23	34.93	53.98	-19.05
	-70.23	Peak	V	36.39	0.00	73.16	73.98	-0.82
* 2484.50	-71.43	Peak	V	36.40	-38.23	33.74	53.98	-20.24
	-71.43	Peak	V	36.40	0.00	71.97	73.98	-2.01
* 2485.10	-70.10	Peak	V	36.40	-38.23	35.07	53.98	-18.91
	-70.10	Peak	V	36.40	0.00	73.30	73.98	-0.68

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

NOTES:

- All emissions shown lie in the restricted bands specified in §15.205 and are below the limit shown in Table 6-5.
- 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.
- The device was tested while in the normal upright position. This is the single method of deployment for this device.
- The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
- 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.
- Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
- Above 960MHz the limit is 500 μ V/m (54dB μ /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: Low

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Duty Cycle Correction [dB]	Field Strength [dBmV/m]	Limit [dBmV/m]	Margin [dB]
* 2385.9	-44.52	Peak	V	36.39	-38.23	26.65	53.98	-27.33
2385.9	-44.52	Peak	V	36.39	0.00	64.88	73.98	-9.10
* 2387.3	-43.59	Peak	V	36.40	-38.23	27.59	53.98	-26.38
2387.3	-43.59	Peak	V	36.40	0.00	65.82	73.98	-8.15
* 2388.72	-41.91	Peak	V	36.40	0.00	29.28	53.98	-24.70
2388.72	-41.91	Peak	V	36.40	0.00	67.51	73.98	-6.47

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 Wireless Remote Unit FCC ID: YZO-00102** 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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