LS RESEARCH, LLC
WIRELESS PRODUCT DEVELOPMENT
ACCREDITED
Testing Cert. 1255.01
W66 N220 Commerce Court ● Cedarburg, WI 53012 ● USA
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www.lsr.com

TEST REPORT # 311232
LSR Job #: C-1316

Compliance Testing of:
ZPTX

Test Date(s):
November 10, 15, 23, 2011

Prepared For:
Vigil Health Solutions
Attn: Jason Cai
2102-4464 Markham St.
Victoria, BC, Canada V8Z 7X

In accordance with:
Federal Communications Commission (FCC)
Part 15, Subpart C, Section 15.247
Industry Canada (IC) RSS 210 Annex 8
Digital Modulation Transmitters (DTS) Operating in the
Frequency Band 2400 MHz – 2483.5 MHz

This Test Report is issued under the Authority of:

Signature: Thomas T. Smith Date: 12/28/2011

Test Report Reviewed by:

Signature: Thomas T. Smith Date: 12/28/2011

Tested by: Peter Feilen, EMC Engineer

Signature: Peter Feilen

Date: November 23, 2011

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EXHIBIT 1. INTRODUCTION

1.1 SCOPE

References:	FCC Part 15, Subpart C, Section 15.247 and 15.209 FCC Part 2, Section 2.1043 paragraph (b)1. RSS GEN and RSS 210 Annex 8
Title:	FCC : Telecommunication – Code of Federal Regulations, CFR 47, Part 15. IC : Low-power License-exempt Radio-communication Devices (All Frequency Bands): Category I Equipment
Purpose of Test:	To gain FCC and IC Certification Authorization for Low-Power License-Exempt Transmitters.
Test Procedures:	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 – American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
Environmental Classification:	• Commercial, Industrial or Business • Residential

1.2 NORMATIVE REFERENCES

Publication	Title
47 CFR, Parts 0-15 (FCC)	Code of Federal Regulations - Telecommunications
RSS 210	Low-power License-exempt Radio-communication Devices (All Frequency Bands): Category I Equipment
ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
CISPR 16-1-1	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus.
CISPR 16-2-1	Specification for radio disturbance and immunity measuring apparatus and methods. Part 201: Conducted disturbance measurement.
FCC Public Notice DA 00-1407	Part 15 Unlicensed Modular Transmitter Approval
FCC ET Docket No. 99-231	Amendment to FCC Part 15 of the Commission's Rules Regarding Spread Spectrum Devices.
FCC Procedures	Measurement of Digital Transmission Systems operating under Section 15.247.

1.3 LS Research, LLC TEST FACILITY

LS Research, LLC is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025, 2005 "General Requirements for the Competence of Calibration and Testing Laboratories".

LS Research, LLC's scope of accreditation includes all test methods listed herein, unless otherwise noted. A copy of the accreditation may be accessed on our web site: www.lsr.com. Accreditation status can be verified at A2LA's web site: www.a2la2.net.

1.4 LOCATION OF TESTING

All testing was performed at LS Research, LLC, W66 N220 Commerce Court, Cedarburg, Wisconsin, 53012 USA, utilizing the facilities listed below, unless otherwise noted.

List of Facilities Located at LS Research, LLC:

- Compact Chamber
- Semi-Anechoic Chamber
- Open Area Test Site (OATS)

1.5 TEST EQUIPMENT UTILIZED

A complete list of equipment utilized in testing is provided in Appendix A of this test report. Calibration dates are indicated in Appendix A. All test equipment is calibrated in accordance with A2LA standards.

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1 CLIENT INFORMATION

Manufacturer Name:	**Vigil Health Solutions**
Address:	**2102-4464 Markham St., Victoria, BC, Canada V8Z 7X**
Contact Name:	**Jason Cai**

2.2 EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information has been supplied by the applicant.

Product Name:	Mini Pendant Transmitter
Model Number:	ZPTX
Serial Number:	Engineering Sample

2.3 ASSOCIATED ANTENNA DESCRIPTION

ZPTX utilizes a meandering PCB antenna.

2.4 EUT'S TECHNICAL SPECIFICATIONS

Additional Information:

EUT Frequency Range (in MHz)	2405-2480 MHz
Maximum EIRP in Watts	0.0033 W
Minimum EIRP in Watts	0.0028 W
Maximum Conducted Output Power (in dBm)	5.2 dBm
Minimum Conducted Output Power (in dBm)	4.5 dBm
Occupied Bandwidth (99% BW)	2.38 MHz
Type of Modulation	OQPSK
Emission Designator	2M38G7D
Transmitter Spurious (worst case) at 3 meters	50.4 dBuV/m @ 4810 MHz
Receiver Spurious (worst case) at 3 meters	51.7 dBuV/m @ 4890 MHz
Frequency Tolerance %, Hz, ppm	Better than 100 ppm
Transceiver Model # (if applicable)	CC2530
Receiver Bandwidth (MHz)	2 MHz
Receiver Sensitivity (dBm)	-97 dBm
Antenna Information	
Detachable/non-detachable	Non-detachable
Type	Meandering PCB
Gain (in dBi)	0 dBi
EUT will be operated under FCC Rule Part(s)	15.247
EUT will be operated under RSS Rule Part(s)	RSS-210
Modular Filing	☐ Yes ☒ No
Portable or Mobile?	Portable

RF Technical Information:

Type of Evaluation (check one)		SAR Evaluation: Device Used in the Vicinity of the Human Head
		SAR Evaluation: Body-worn Device
	X	RF Evaluation

Procedure for Portable RF Exposure from KDB 447498:

$$Output\ Power \leq \frac{60}{f\ (GHz)}(mW)$$

$$3.31\ mW \leq 24.95\ mW$$

Note: Since the peak output power of 3.31 mW is below the low threshold of 24.95 mW this device does not need SAR evaluation

2.5 PRODUCT DESCRIPTION

The ZPTX is part of the Vigil® Vitality Care System, the newest innovation in nurse call and emergency call systems bringing the benefits of wireless and hardwired architecture together on one platform. The Vitality Care System supports active living for residents by providing them with a small, lightweight, fully supervised pendant that offers them the freedom and independence to move through the community and still be able to call for help if needed. The attractive design of the pendant allows residents to carry them without feeling encumbered or stigmatized. The advanced technology also enables longer battery life while still allowing you to change batteries instead of replacing the entire device.

The Vitality Care System was designed to allow for scalability for small to large communities without additional costly infrastructure. The open architecture allows for continued future innovation and additions to your system such as pull stations, call stations, motion sensors, bed monitoring, smoke detector monitoring, perimeter monitoring and wander management.

The ZRX is a small and lightweight pendant, acting as a user interface as a paging device. The device is powered by a 3V coin cell battery.

EXHIBIT 3. EUT OPERATING CONDITIONS & CONFIGURATIONS DURING TESTS

3.1 CLIMATE TEST CONDITIONS

Temperature:	20-26 ˚C
Humidity:	32-41% R.H.

3.2 APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC and IC Paragraph	Test Requirements	Compliance (yes/no)
FCC : 15.247(a)(2) IC : RSS 210 A8.2(a)	6 dB Bandwidth of a Digital Modulation System	Yes
IC : RSS GEN section 4.6.1	20 dB Bandwidth	Yes
FCC : 15.247(b) & 1.1310 IC : RSS 210 A8.4	Maximum Output Power	Yes
FCC : 15.247(i), 1.1307, 1.1310, 2.1091 & 2.1093 IC : RSS 102	RF Exposure Limit	Yes
FCC :15.247(c) IC : RSS 210 A8.5	RF Conducted Spurious Emissions at the Transmitter Antenna Terminal	Yes
FCC : 15.247(d) IC : RSS 210 A8.2(b)	Transmitted Power Spectral Density of a Digital Modulation System	Yes
FCC : 15.247(c), 15.209 & 15.205 IC : RSS 210 A8.2(b), section 2.2, 2.6 and 2.7	Transmitter Radiated Emissions	Yes
The digital circuit portion of the EUT has been tested and verified to comply with FCC Part 15, Subpart B, Class B Digital Devices (RSS GEN and RSS 210 of IC) and the associated Radio Receiver has also been tested and found to comply with Part 15, Subpart B – Radio Receivers (RSS GEN and RSS 210 of IC). The Receiver Test Report is available upon request.		

3.3 MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

☒ **None** ☐ **Yes (explain below)**

3.4 DEVIATIONS & EXCLUSIONS FROM TEST SPECIFICATIONS

☒ **None** ☐ **Yes (explain below)**

EXHIBIT 4. DECLARATION OF CONFORMITY

The EUT was found to MEET the requirements as described within the specification of FCC Title 47, CFR Part 15.247, and Industry Canada RSS-210, Issue 8 (2010), Section Annex 8 (section 8.2) for a Digital Spread Spectrum (DTS) Transmitter.

If some emissions are seen to be within 3 dB of their respective limits:
As these levels are within the tolerances of the test equipment and site employed, there is a possibility that this unit, or a similar unit selected out of production may not meet the required limit specification if tested by another agency.

LS Research, LLC certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specifications. The results in this Test Report apply only to the item(s) tested on the above-specified dates. Any modifications made to the EUT subsequent to the indicated test date(s) will invalidate the data herein, and void this certification.

EXHIBIT 5. RADIATED EMISSIONS TEST

5.1 Test Setup

The test setup was assembled in accordance with Title 47, CFR FCC Part 15, RSS GEN and ANSI C63.4. The EUT was placed on an 80cm high non-conductive pedestal, centered on a flush mounted 2-meter diameter turntable inside a 3 meter Semi-Anechoic, FCC listed Chamber. The EUT was operated in and final testing was performed using continuous transmit modulated mode. The unit has the capability to operate on 16 channels. Power is supplied by 2-AA batteries for test purposes. During normal operation, a coin cell battery would be used, however,

The applicable limits apply at a 3 meter distance. Measurements above 4 GHz were performed at a 1.0 meter separation distance. The calculations to determine these limits are detailed in the following pages. Please refer to Appendix A for a complete list of test equipment. The test sample was operated on one of three (3) standard channels: low (2405 MHz), middle (2445 MHz) and high (2480 MHz) to comply with FCC Part 15.31(m). The channels and operating modes were pre-programmed, and three separate units were made, programmed to one channel each.

5.2 Test Procedure

Radiated RF measurements were performed on the EUT in a 3 meter Semi-Anechoic, FCC listed Chamber. The frequency range from 30 MHz to 25000 MHz was scanned and investigated. The radiated RF emission levels were manually noted at the various fixed degree settings of azimuth on the turntable and antenna height. The EUT was placed on a non-conductive pedestal in the 3 meter Semi-Anechoic Chamber, with the antenna mast placed such that the antenna was 3 meters from the EUT. A Biconical Antenna was used to measure emissions from 30 MHz to 300 MHz, and a Log Periodic Antenna was used to measure emissions from 300 MHz to 1000 MHz. A Double-Ridged Waveguide Horn Antenna was used from 1 GHz to 18 GHz. The maximum radiated RF emissions were found by raising and lowering the antenna between 1 and 4 meters in height, using both horizontal and vertical antenna polarities. From 18 GHz to 25 GHz, the EUT was measured using a standard gain Horn Antenna and pre-amplifier.

The battery voltage was checked frequently, and the batteries were replaced as necessary.

The EUT was rotated along three orthogonal axes during the investigations to find the highest emission levels.

5.3 Test Equipment Utilized

A list of the test equipment and antennas utilized for the Radiated Emissions test can be found in Appendix A. This list includes calibration information and equipment descriptions. All equipment is calibrated and used according to the operation manuals supplied by the manufacturers. All calibrations of the antennas used were performed at an N.I.S.T. traceable site. In addition, the Connecting Cables were measured for losses using a calibrated Signal Generator and an Agilent E4445A/N9039A EMI System. The resulting correction factors and the cable loss factors from these calibrations were entered into the EMI Receiver database. As a result, the data taken from the EMI Receiver accounts for the antenna correction factor as well as cable loss or other corrections, and can therefore be entered into the database as a corrected meter reading. The EMI Receiver was operated with a resolution bandwidth of 120 kHz for measurements below 1 GHz (video bandwidth of 300 kHz), and a bandwidth of 1 MHz for measurements above 1 GHz (video bandwidth of 1 MHz for peak measurements, 10Hz for average measurements). From 4 GHz to 18 GHz, an Agilent E4446A Spectrum Analyzer and an EMCO Horn Antenna with preamp were used. From 18 GHz to 25 GHz, the Agilent E4446A Spectrum Analyzer as well as a standard gain horn, and preamp were used.

Test Equipment List

Please see Appendix A

5.4 Test Results

The EUT was found to **MEET** the Radiated Emissions requirements of Title 47 CFR, FCC Part 15.247 and Canada RSS-210, Issue 8 (2010), Annex 8 for a DTS transmitter. The frequencies with significant RF signal strength were recorded and plotted as shown in the Data Charts and Graphs.

5.5 CALCULATION OF RADIATED EMISSIONS LIMITS

The maximum peak output power of an intentional radiator in the 2400-2483.5 MHz band, as specified in Title 47 CFR 15.247 (b)(3) and RSS 210 A8.4 is 1 Watt. The harmonic and spurious RF emissions, as measured in any 100 kHz bandwidth, as specified in 15.247 (d) and RSS 210 A8.2(b), shall be at least 20 dB below the measured power of the desired signal, and must also meet the requirements described in 15.205(c) for FCC and section 2.2,2.6 and 2.7 of RSS 210 for IC.

The following table depicts the general radiated emission limits above 30 MHz. These limits are obtained from Title 47 CFR, Part 15.209, for radiated emissions measurements. These limits were applied to any signals found in the 15.205 restricted bands. The mentioned limits correspond to those limits listed in RSS 210 section 2.7.

Frequency (MHz)	3 m Limit μV/m	3 m Limit (dBμV/m)	1 m Limit (dBμV/m)
30-88	100	40.0	-
88-216	150	43.5	-
216-960	200	46.0	-
> 960	500	54.0	63.5

Sample conversion from field strength μV/m to dBμV/m:
$dB\mu V/m = 20 \log_{10} (100)$
= 40 dBμV/m (from 30-88 MHz)

For measurements made at 1.0 meter, a 9.5 dB correction has been invoked.

> 960 MHz
500μV/m or 54.0 dB/μV/m at 3 meters
54.0 + 9.5 = 63.5 dB/μV/m at 1 meter

Sample Calculation using correction factors from the device
Raw Receiver Data + Antenna Factor + Cable Factor + = Reported Value
Generic example of reported data at 298 MHz:
Reported Measurement data = 2.75 (raw receiver measurement) + 21.0 (antenna factor) + 1.55 (cable factor) = 25.32 dBμV

5.6 RADIATED EMISSIONS TEST DATA CHART

3 Meter Measurements of Electromagnetic Radiated Emissions
Test Standard: 47CFR, Part 15.205 and 15.247(DTS)
RSS 210 A8, sections 2.2,2.6 and 2.7
Frequency Range Inspected: 30 MHz to 25000 MHz

Manufacturer:	Vigil Health Solutions						
Date(s) of Test:	November 10, 15, 2011						
Test Engineer(s):	Peter Feilen						
Voltage:	3.0 VDC						
Operation Mode:	continuous modulated transmit						
Environmental Conditions in the Lab:	Temperature: 20 – 25° C Relative Humidity: 30 – 60 %						
EUT Power:		Single Phase ___VAC		3 Phase ___VAC			
		Battery		Other:			
EUT Placement:		80cm non-conductive table		10cm Spacers			
EUT Test Location:		3 Meter Semi-Anechoic FCC Listed Chamber		3/10m OATS			
Measurements:		Pre-Compliance		Preliminary		Final	
Detectors Used:	X	Peak	X	Quasi-Peak	X	Average	

The following table depicts the level of significant spurious radiated RF emissions found:

Frequency (MHz)	Height (m)	Azimuth (degree)	Quasi Peak Reading (dBµV/m)	Quasi Peak Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
64.0	2.61	214	13.86	40.0	26.1	H	V
299.3	1.00	0	25.32	46.0	20.7	H	V
298.2	1.00	0	23.87	46.0	22.1	V	V
998.0	1.00	0	30.22	54.0	23.8	H	V
999.3	1.00	0	29.56	54.0	24.4	V	V
997.8	1.00	0	29.45	54.0	24.6	V	F
983.5	1.00	0	30.17	54.0	23.8	H	F
200.3	1.00	0	25.21	43.5	18.3	H	F
297.7	1.00	0	23.69	46.0	22.3	V	S
999.4	1.00	0	30.36	54.0	23.6	H	S
997.2	1.00	0	29.27	54.0	24.7	V	S

RADIATED EMISSIONS DATA CHART *(continued)*

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Channel 11:

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Avg Reading (dBµV/m)	Avg Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
4810	1.00	346	61.3	59.6	63.5	3.9	Horizontal	Flat
12025				Note 3	63.5	-		
19240				Note 3	63.5	-		

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Channel 19:

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Avg Reading (dBµV/m)	Avg Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
4890	1.13	125	60.3	58.9	63.5	4.6	Vertical	Side
7335	1.03	41	66.5	58.2	63.5	5.3	Horizontal	Side
12225	1.00	306	58.7	48.3	63.5	15.2	Vertical	Side
19560				Note 3	63.5	-		

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Channel 26:

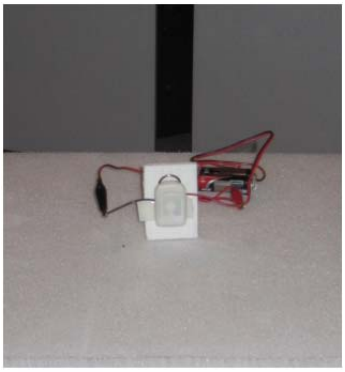
Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Avg Reading (dBµV/m)	Avg Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
4960	1.19	15	60.9	59.3	63.5	4.2	Horizontal	Vertical
7440	1.1	49	61.4	51.1	63.5	12.4	Horizontal	Side
12400	1.11	163	52.2	40.8	63.5	22.7	Horizontal	Flat
19840				Note 3	63.5	-		
22320				Note 3	63.5	-		

Notes:

1) A Quasi-Peak Detector was used in measurements below 1 GHz, and a Peak as well as an Average Detector was used in measurements above 1 GHz. The peak detector was used to ensure the peak emissions did not exceed 20 dB above the limits.
2) Measurements above 4 GHz were made at 1 meters of separation from the EUT
3) Measurement at receiver system noise floor.

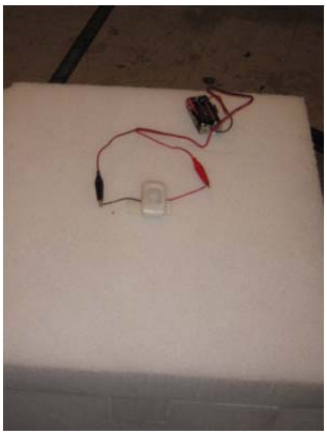
5.7 Test Setup Photo(s) – Radiated Emissions Test

Vertical Orientation



Side Orientation

Horizontal Orientation

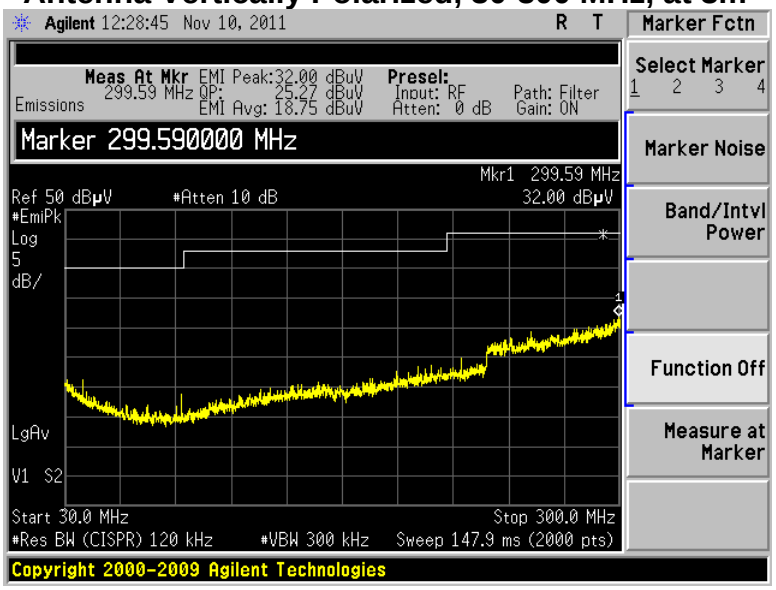


5.8 Screen Captures - Radiated Emissions Test

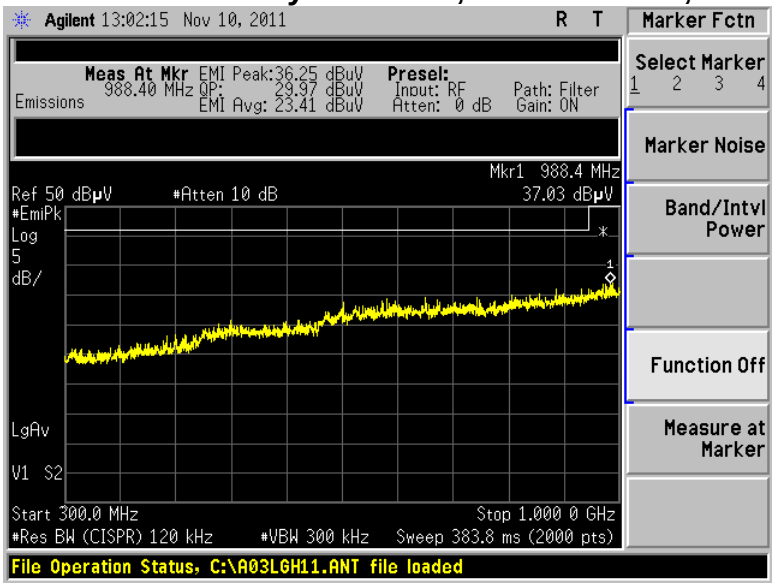
These screen captures represent Peak Emissions. For radiated emission measurements, a Quasi-Peak detector function is utilized when measuring frequencies below 1 GHz, and a 10 Hz video-averaged trace is utilized when measuring frequencies above 1 GHz.

The signature scans shown here are from worst-case emissions, as measured on channels 11, 19, or 26, with the sense antenna both in vertical and horizontal polarity for worst case presentations.

Antenna Vertically Polarized, 30-300 MHz, at 3m

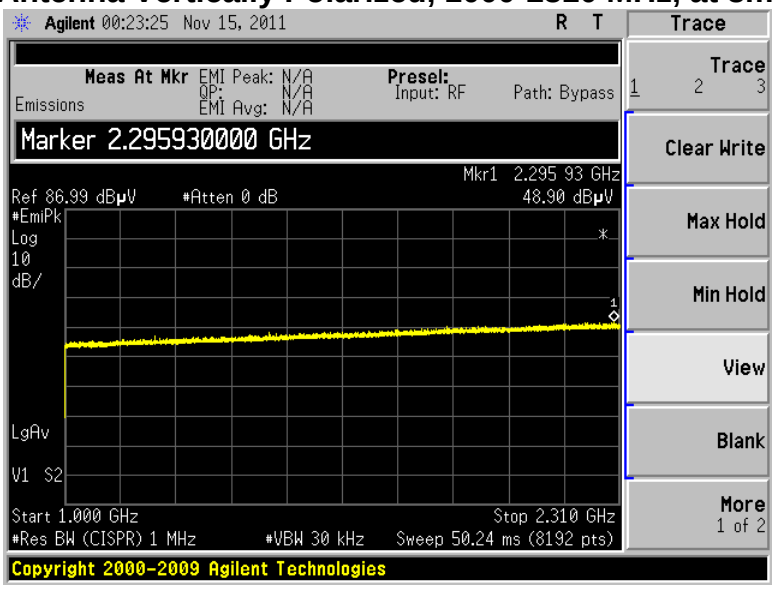


Antenna Horizontally Polarized, 300-1000 MHz, at 3m



Screen Captures - Radiated Emissions Testing *(continued)*

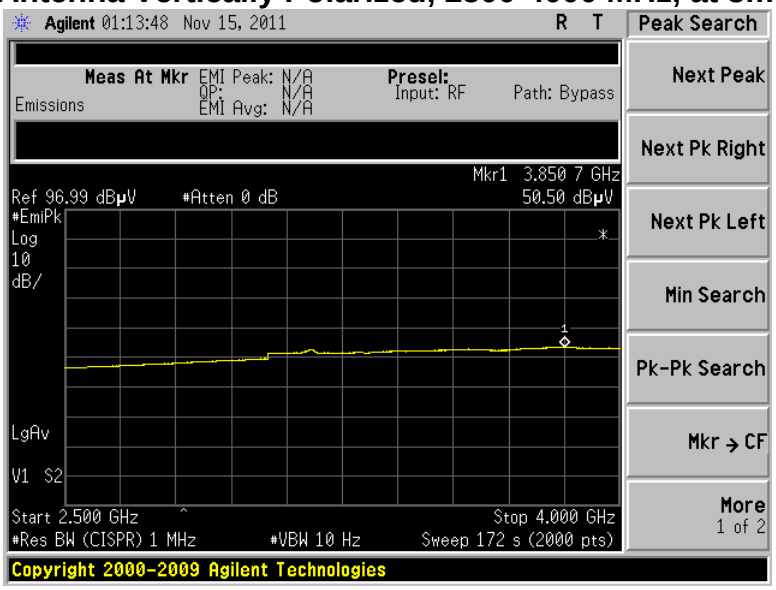
Antenna Vertically Polarized, 1000-2310 MHz, at 3m



2310-2390 MHz, 2390-2400 MHz is represented in Section 8, Bandedge Measurements

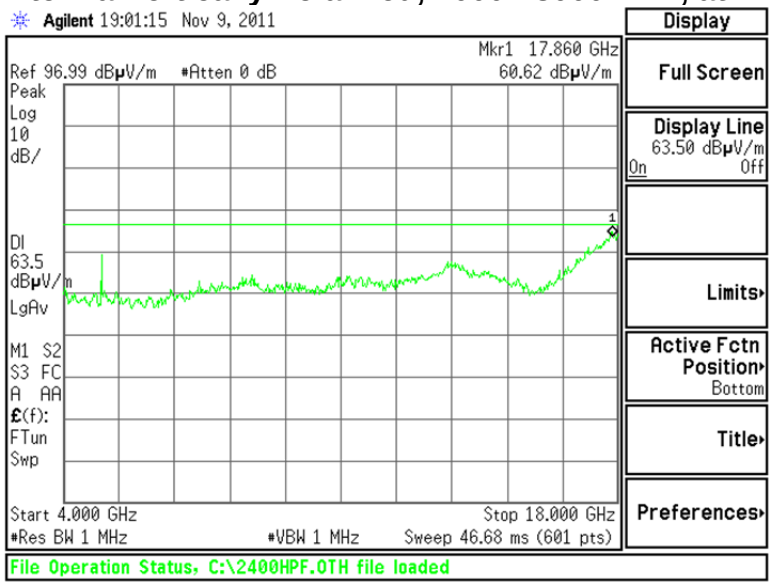
2483.5-2500 MHz is represented in Section 8, Bandedge Measurements

Antenna Vertically Polarized, 2500-4000 MHz, at 3m

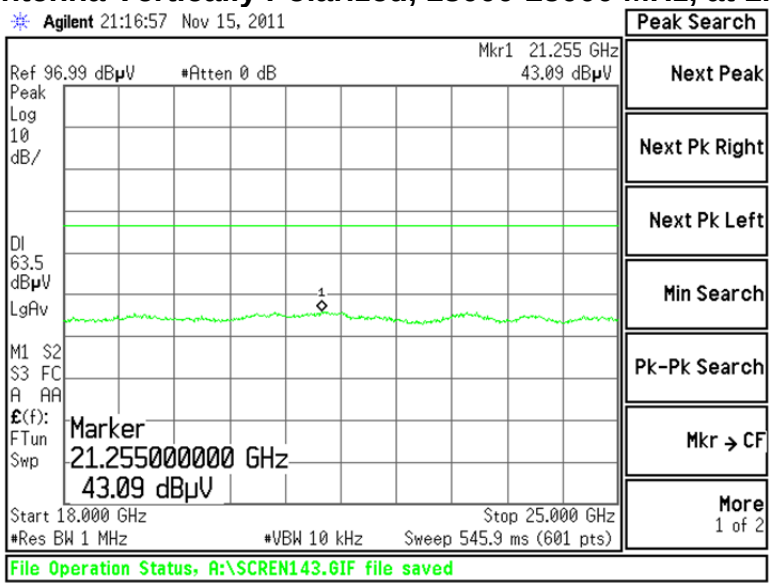


Screen Captures - Radiated Emissions Testing *(continued)*

Antenna Vertically Polarized, 4000-18000 MHz, at 1m



Antenna Vertically Polarized, 18000-25000 MHz, at 1m



5.9 Receive Mode Testing

Per the requirements of RSS-210, the EUT was placed in continuous receive mode and the radiated spurious emissions were measured and compared to the limits stated in RSS-Gen Section 4.10.

The test setup, procedure, and equipment utilized were identical to that described in sections 5.1, 5.2, and 5.3 of this document.

Measurement data and screen captures from the receive tests are presented below:

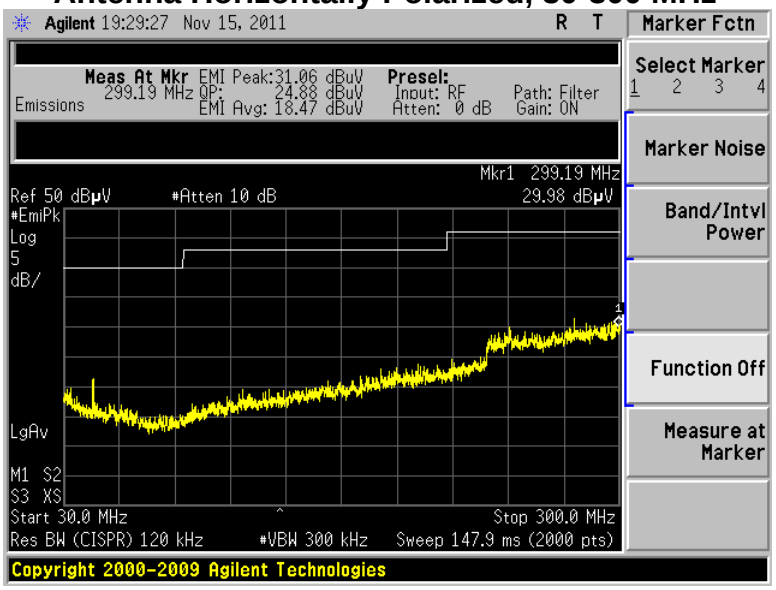
Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBuV/m)	Quasi-Peak Reading (dBuV/m)	Average Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation	RX channel
4890.0	1.00	327	60.7	N/A	59.4	63.5	4.1	H	FLAT	19
4890.0	1.05	239	62.2	N/A	61.2	63.5	2.3	V	FLAT	19
4890.0	1.25	11	62	N/A	60.9	63.5	2.6	H	V	19
4890.0	1.12	22	59.7	N/A	58.6	63.5	4.9	V	V	19
4890.0	1.25	81	59.2	N/A	57.7	63.5	5.8	H	SIDE	19
4890.0	1.44	9	54.8	N/A	52.3	63.5	11.2	V	SIDE	19
4960.0	1.32	239	59.5	N/A	58.1	63.5	5.4	V	FLAT	26
4810.0	1.30	9	56.3	N/A	53.5	63.5	10.0	V	FLAT	11
4810.0	1.08	21	59.3	N/A	57.5	63.5	6.0	V	V	11
4810.0	1.24	0	60.5	N/A	58.4	63.5	5.1	H	V	11
867.6	1.00	0	33.4	27.9	21.9	46.0	18.1	H	V	19
867.4	1.00	0	33.0	28.5	21.4	46.0	17.5	H	SIDE	19
299.2	1.00	0	31.1	24.9	18.5	46.0	21.1	H	V	19

Screen Captures - Radiated Emissions Testing – Receive Mode

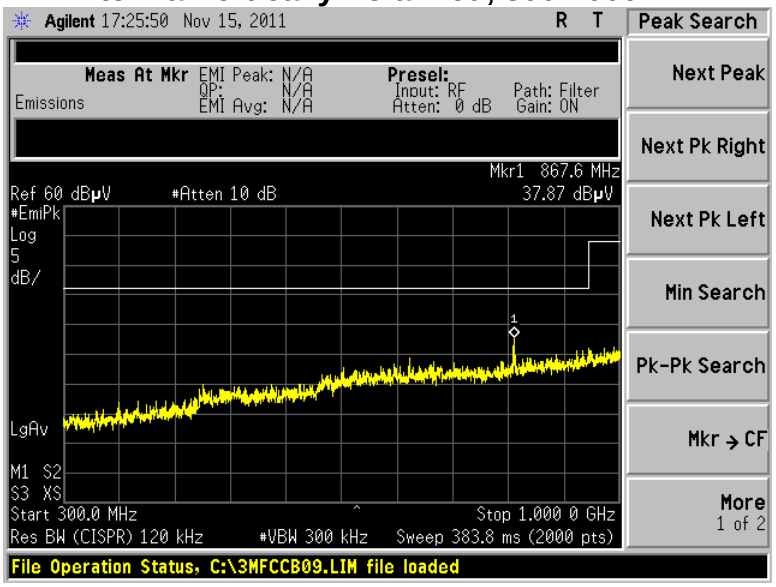
These screen captures represent Peak Emissions. For radiated emission measurements, a Quasi-Peak detector function is utilized when measuring frequencies below 1 GHz, and an Average detector function is utilized when measuring frequencies above 1 GHz.

The signature scans shown here are from worst-case emissions, as measured on channels 11, 19 and 26, with the sense antenna both in vertical and horizontal polarity for worst case presentations.

Antenna Horizontally Polarized, 30-300 MHz

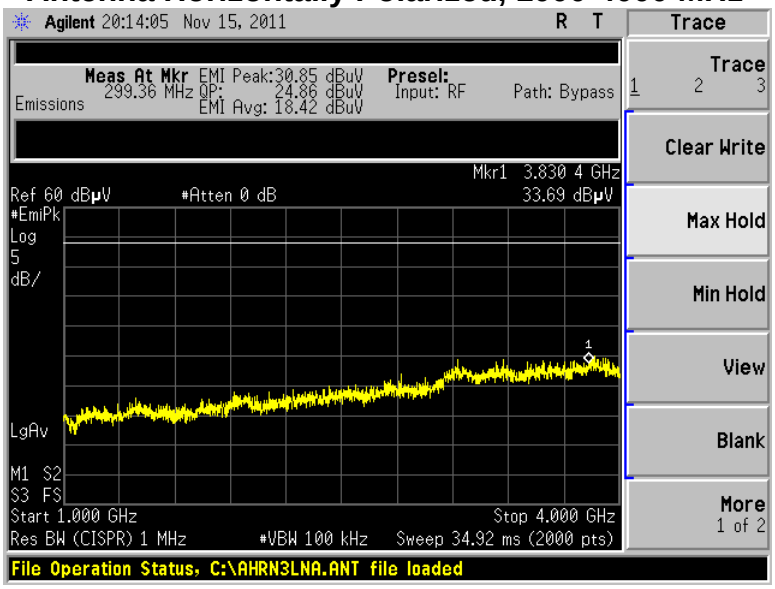


Antenna Vertically Polarized, 300-1000 MHz

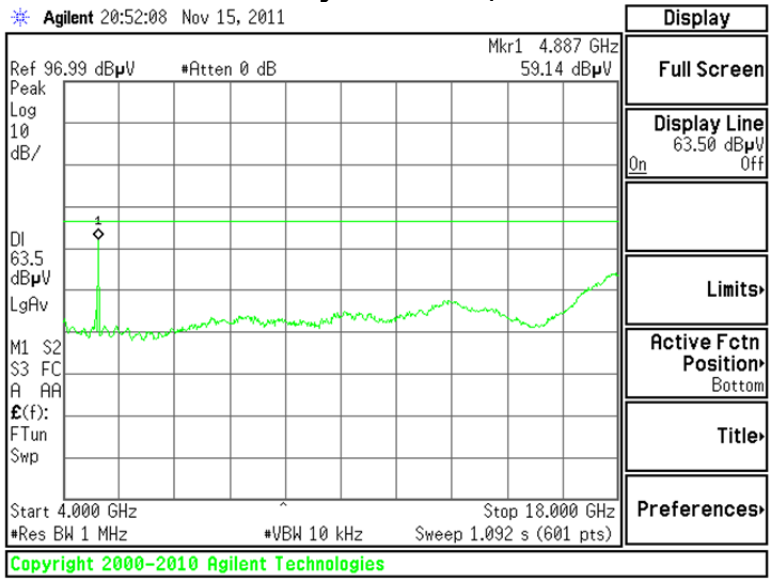


Screen Captures - Radiated Emissions Testing – Receive Mode **(continued)**

Antenna Horizontally Polarized, 1000-4000 MHz



Antenna Horizontally Polarized, 4000-18000 MHz



Screen Captures - Radiated Emissions Testing – Receive Mode *(continued)*

Antenna Horizontally Polarized, 18000-25000 MHz

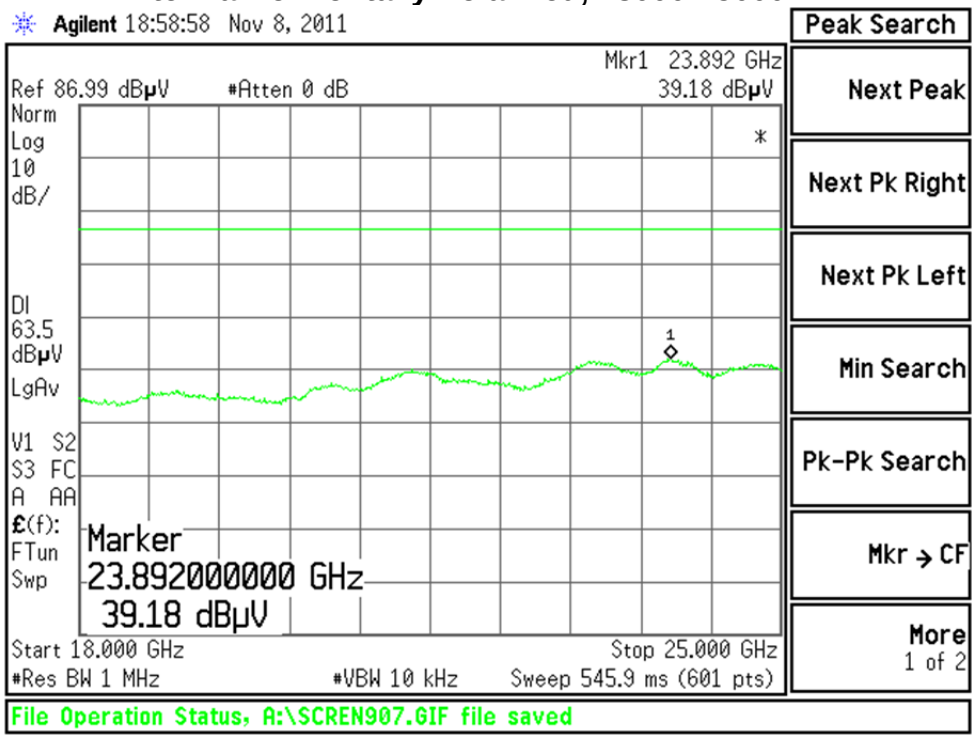


EXHIBIT 6. OCCUPIED BANDWIDTH:

6.1 Limits

For a Digital Modulation System, the 6 dB bandwidth shall be at least 500 kHz.

6.2 Method of Measurements

Refer to ANSI C63.4 and FCC Procedures for Digital Transmission Systems operating under 15.247.

The transmitter output was connected to the Spectrum Analyzer. The bandwidth of the fundamental frequency was measured with the Spectrum Analyzer using 30 kHz RBW and VBW=300 kHz, span=3 MHz.

The bandwidth requirement found in FCC Part 15.247(a)(2) and RSS 210 A8.2(a) requires a minimum -6dBc occupied bandwidth of 500 kHz. In addition, Industry Canada (IC RSS GEN 4.6.1) requires the measurement of the -20dBc occupied bandwidth. For this portion of the tests, a direct measurement of the transmitted signal was performed at the antenna port of the EUT, via a cable connection to the Agilent E4446A spectrum analyzer. The loss from the cable was accounted for by a correction factor loaded on the spectrum analyzer hard drive, thereby allowing direct measurements, without the need for any further corrections. An Agilent model E4446A spectrum analyzer was used with the resolution bandwidth set to 100 kHz for this portion of the tests. The EUT was configured to run in a continuous transmit mode, while being supplied with typical data as a modulation source. The spectrum analyzer was used in peak-hold mode while measurements were made, as presented in the chart below.

From this data, the closest measurement (6 dB bandwidth) when compared to the specified limit, is 1520 kHz, which is above the minimum of 500 kHz.

6.3 Test Equipment List

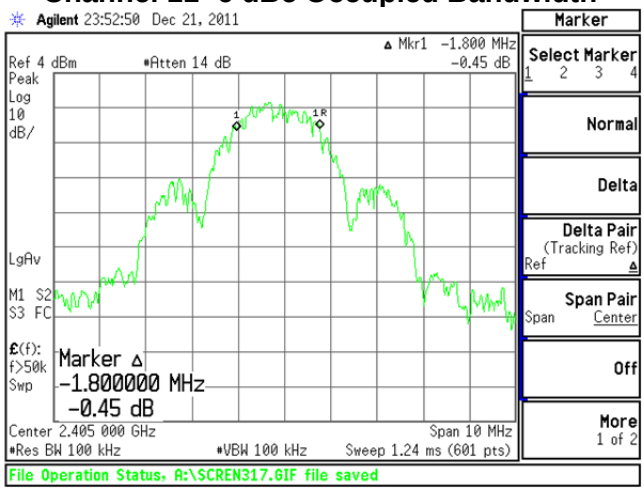
Please see Appendix A

6.4 Test Data

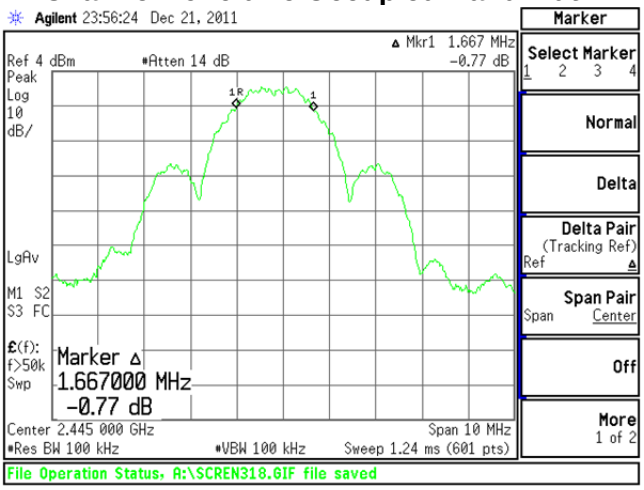
Channel	Center Frequency (MHz)	Measured -6 dBc Occ. BW (kHz)	Minimum -6 dBc Limit (kHz)	Measured -20 dBc Occ.Bw (kHz)
11	2405	1800	500	2750
19	2445	1667	500	2560
26	2480	1817	500	2740

6.5 Screen Captures - OCCUPIED BANDWIDTH

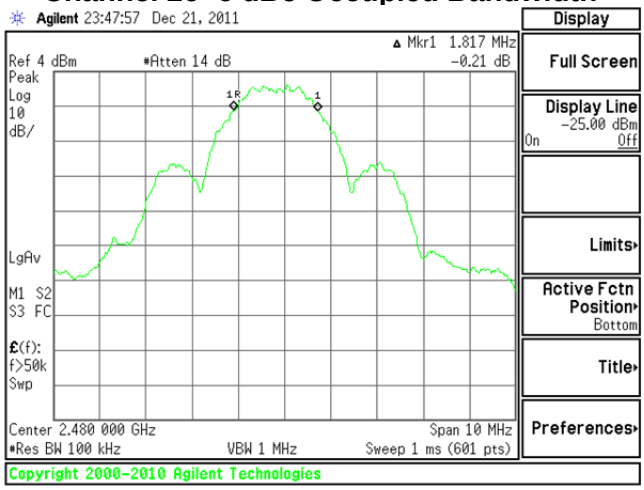
Channel 11 -6 dBc Occupied Bandwidth



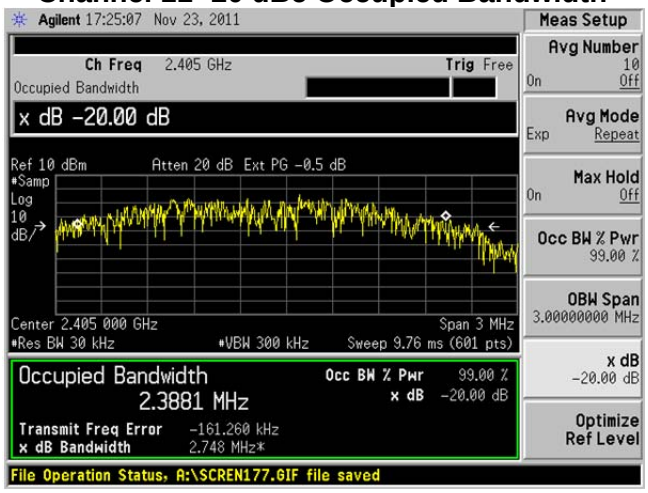
Channel 19 -6 dBc Occupied Bandwidth



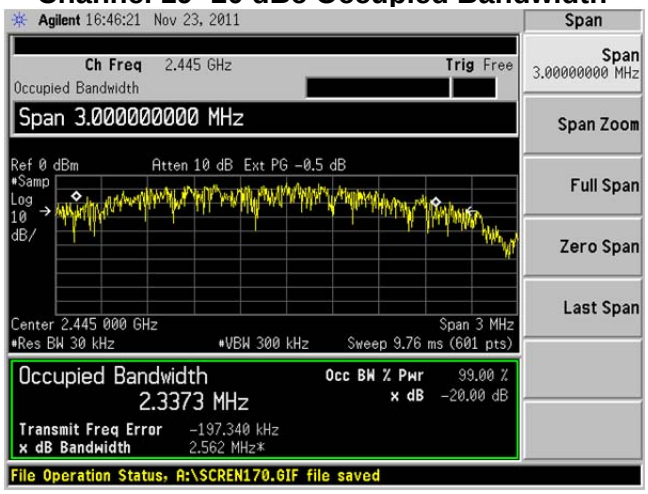
Channel 26 -6 dBc Occupied Bandwidth



Channel 11 -20 dBc Occupied Bandwidth



Channel 19 -20 dBc Occupied Bandwidth



Channel 26 -20 dBc Occupied Bandwidth

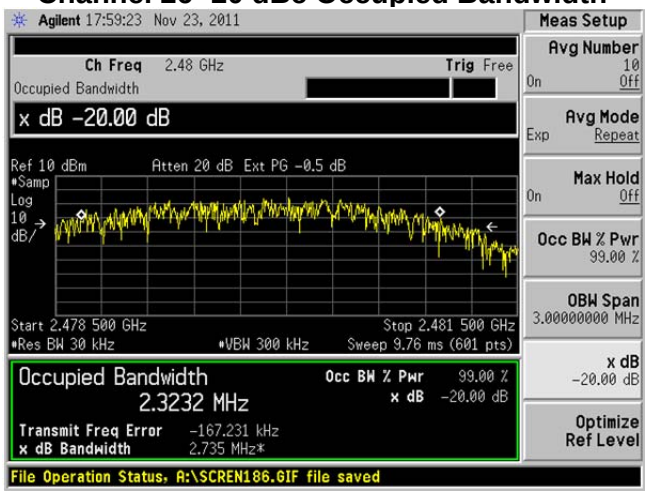


Exhibit 7. Bandedge

7.1 Method of Measurements

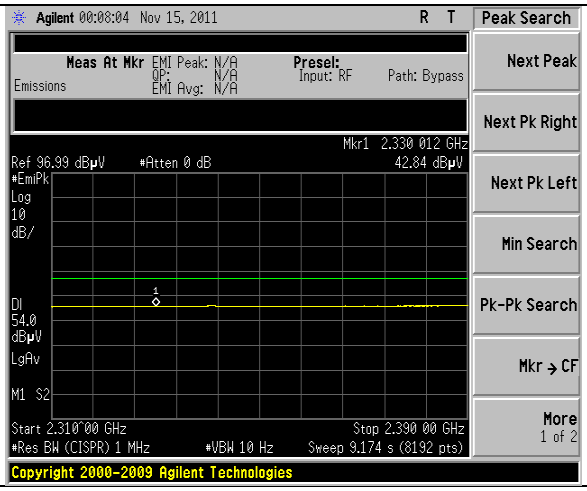
FCC 15.209(b) and 15.247(d) require a measurement of spurious emission levels to be at least 20 dB lower than the fundamental emission level, in particular at the Band-Edges where the intentional radiator operates. Also, RSS 210 Section 2.2 requires that unwanted emissions meet limits listed in tables 2 and 3 of the same standard and also to the limits in the applicable annex. The following screen captures demonstrate compliance of the intentional radiator at the 2400-2483.5 MHz Band-Edges. The EUT was operated in continuous transmit mode with continuous modulation, with internally generated data as the modulating source. The EUT was operated at the lowest channel for the investigation of the lower Band-Edge, and at the highest channel for the investigation of the higher Band-Edge.

The Lower Band-Edge limit, in this case, would be + 54 dBµV/m at 3m from 2310-2390 MHz and -20 dBc with respect to the fundamental level from 2390-2400 MHz.

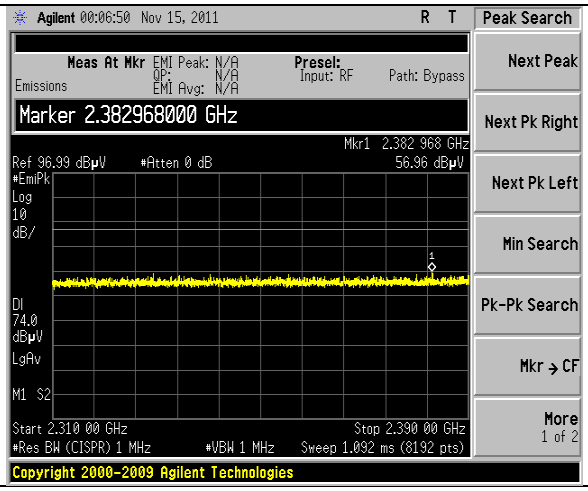
The Upper Band-Edge limit, in this case, would be + 54 dBµV/m at 3m.

7.2 Screen Captures

Screen Capture Demonstrating Compliance at the Lower Band-Edge

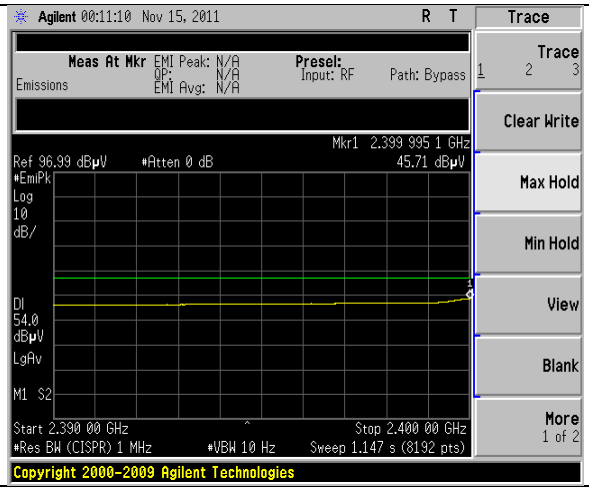


2310-2390 MHz Lower Bandedge Average

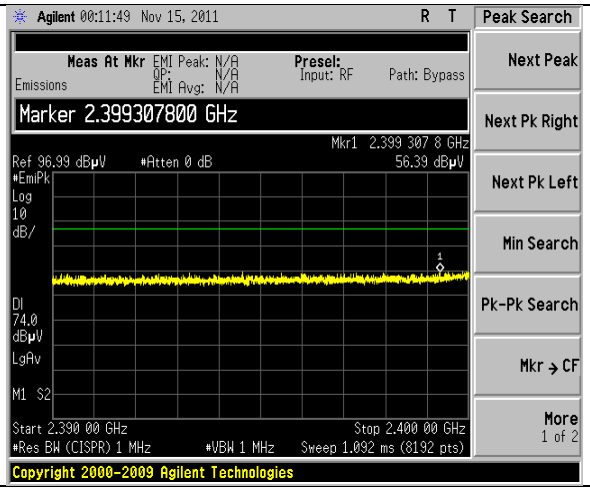


2310-2390 MHz Lower Bandedge Peak

Screen Capture Demonstrating Compliance at the Lower Band-Edge

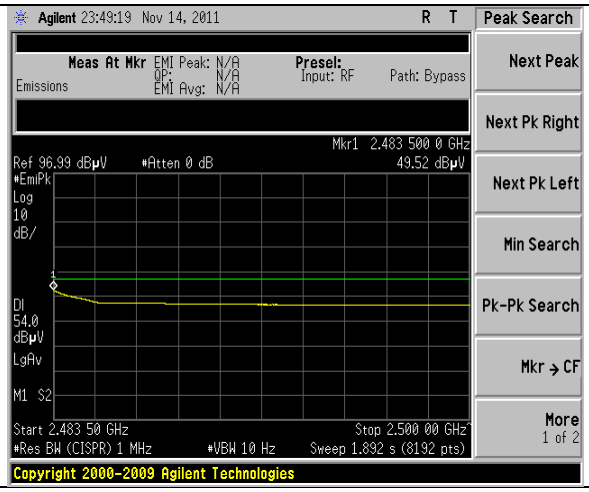


2390-2400 MHz Lower Bandedge Average

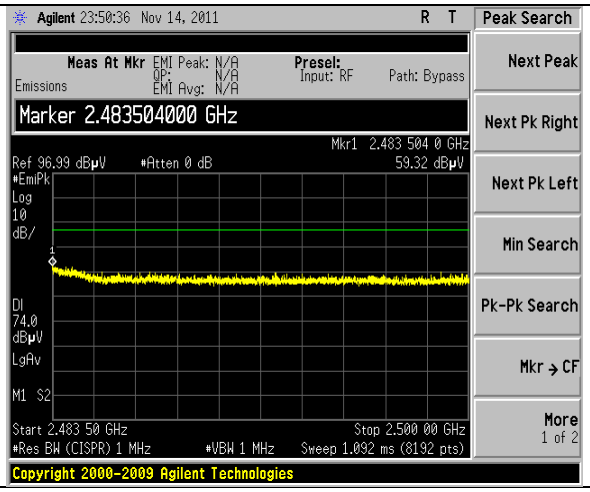


2390-2400 MHz Lower Bandedge Peak

Screen Capture Demonstrating Compliance at the Higher Band-Edge



Upper Bandedge Average



Upper Bandedge Peak

EXHIBIT 8. POWER OUTPUT (CONDUCTED): 15.247(b)

8.1 Method of Measurements

The conducted RF output power of the EUT was measured at the antenna port using a short RF cable for the spectrum analyzer. The loss from the cable is accounted for by an internal correction file stored on the spectrum analyzer hard drive and an offset was added on the analyzer as gain offset settings, thereby allowing direct measurements without the need for any further corrections. The unit was configured to run in a continuous modulated transmit mode. The spectrum analyzer was used with resolution and video bandwidths set to 3 MHz, and a span of 10 MHz, with measurements from a peak detector presented in the chart below.

8.2 Test Equipment List

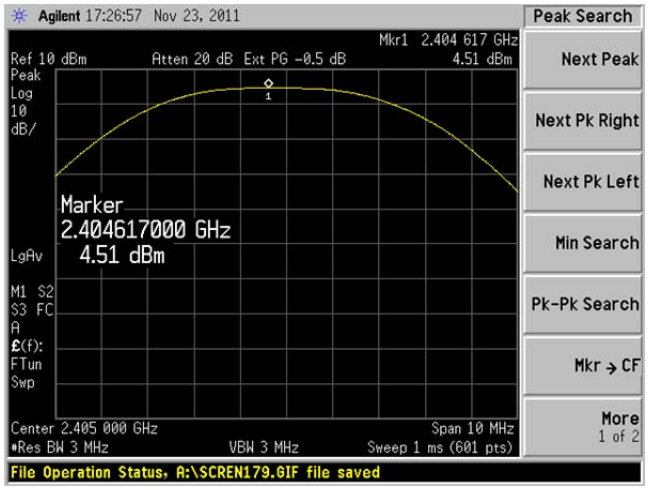
Please see Appendix A

8.3 Test Data

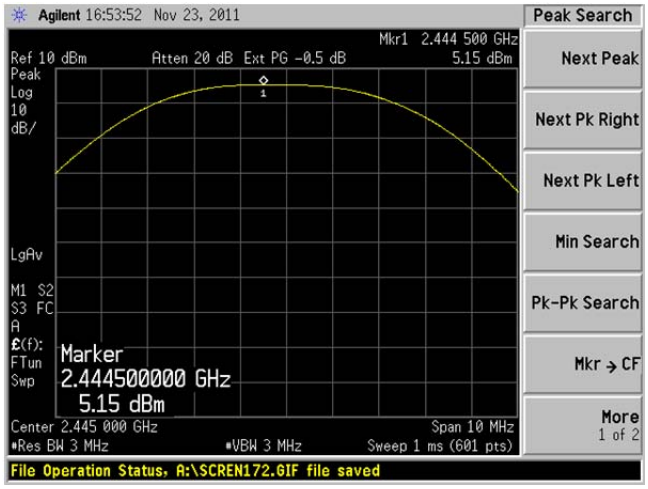
CHANNEL	CENTER FREQ (MHz)	MEASURED POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
11	2405	4.5	30.0 dBm	25.5
19	2445	5.2	30.0 dBm	24.8
26	2480	4.9	30.0 dBm	25.1

8.4 Screen Captures – Power Output (Conducted)

Channel 11



Channel 19



Channel 26

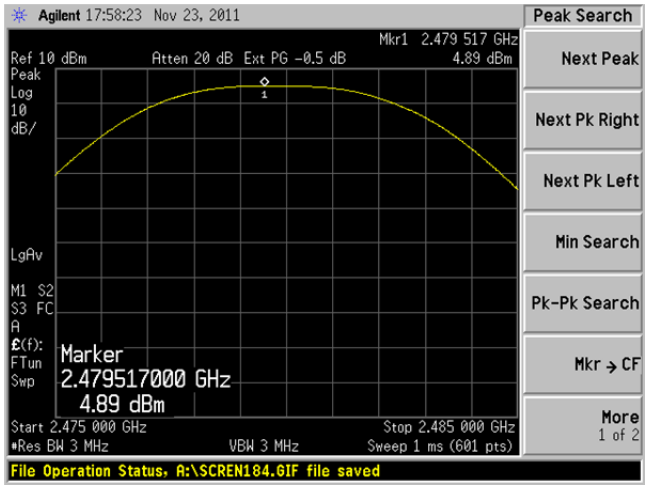


EXHIBIT 9 POWER SPECTRAL DENSITY: 15.247(e)

9.1 Limits

For digitally modulate systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

In accordance with FCC Part 15.247(e) and RSS 210 A8.2(b), the peak power spectral density should not exceed +8 dBm in any 3 kHz band. This measurement was performed along with the conducted power output readings performed as described in previous sections. The peak output frequency for each representative frequency was scanned, with a narrow bandwidth, and reduced sweep, and a power density measurement was performed using the utility built into the Agilent E4446A Analyzer. The resultant density was then corrected to a 3 kHz bandwidth. The highest density was found to be no greater than -19.9 dBm, which is under the allowable limit by 27.9 dB.

9.2 Test Equipment List

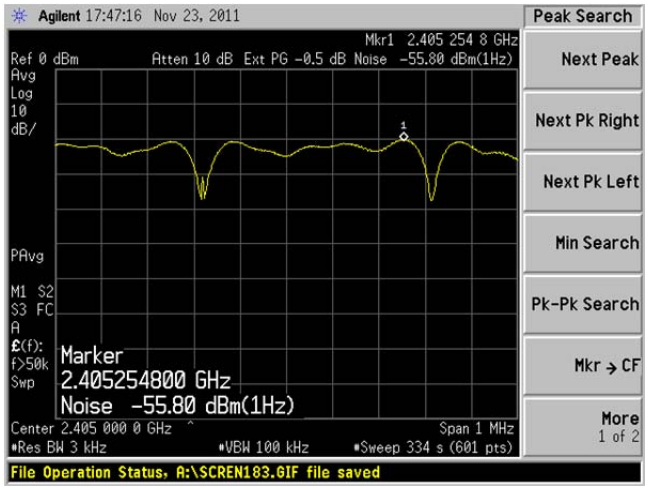
Please see Appendix A

9.3 Test Data

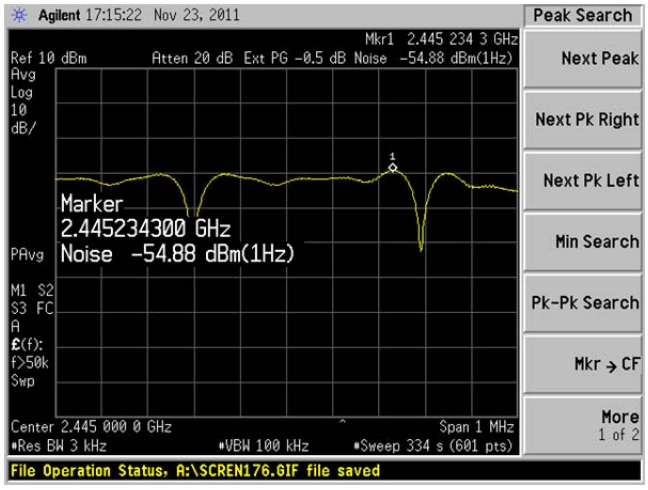
Channel	Center Frequency (MHz)	Measured Channel Power (dBm/1Hz)	3 kHz Correction (dB)	Corrected Power Measurement (dBm/3kHz)	Limit (dBm)	Margin (dB)
11	2405	-55.8	35.0	-20.8	+8.0	28.8
19	2445	-54.9	35.0	-19.9	+8.0	27.9
26	2480	-55.3	35.0	-20.3	+8.0	28.3

9.4 Screen Captures – Power Spectral Density

Channel 11



Channel 19



Channel 26

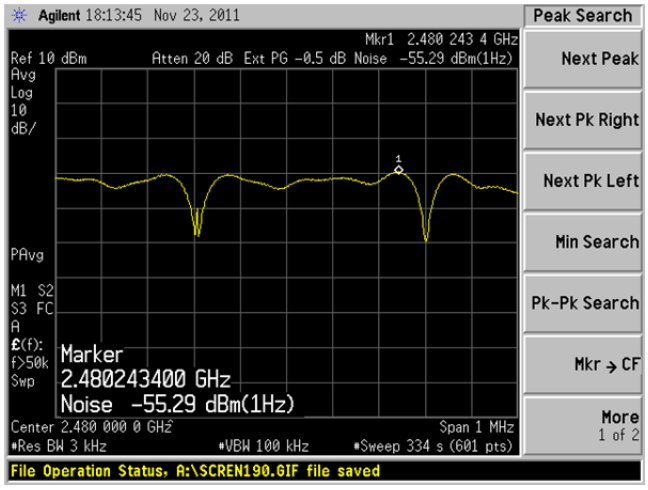


EXHIBIT 10. SPURIOUS CONDUCTED EMISSIONS: 15.247(d)

10.1 Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 db below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

FCC Part 15.247(d) and IC RSS 210 A8.5 requires a measurement of conducted harmonic and spurious RF emission levels, as reference to the carrier level when measured in a 100 kHz bandwidth. For this test, the spurious and harmonic RF emissions from the EUT were measured at the EUT antenna port using a short RF cable. The loss from the cable was accounted for by loading a correction file stored on the hard drive spectrum analyzer and the connection cable were added on the analyzer as gain offset settings, there by allowing direct readings of the measurements made without the need for any further corrections. An Agilent model E4446A spectrum analyzer was used with the resolution bandwidth set to 100 kHz for this portion of the tests. The unit was configured to run in a continuous transmit mode, while being supplied with typical data as a modulation source. The spectrum analyzer was used with measurements from a peak detector presented in the chart below. Screen captures were acquired and any noticeable spurious and harmonic signals were identified and measured.

No significant emissions could be noted within -37.4 dBc of the fundamental level for this product.

10.2 Test Equipment List

Please see Appendix A

10.3 Test Data

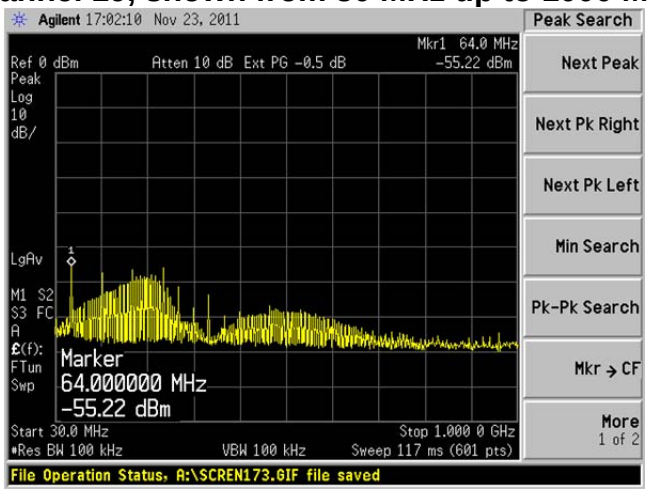
Frequency Test Range: 30-25000 MHz

Freq\Chan	11\2405	19\2445	24\2480
fo	1.0	1.3	0.9
2fo	-48.0	-46.4	-49.5
3fo	-46.8	-38.7	-43.9
4fo	-57.1	-61.5	-59.9
5fo	-62.8	-71.7	-68.0
6fo	NF	-72.1	-73.5
7fo	Note 1	Note 1	Note 1
8fo	Note 1	Note 1	Note 1
9fo	Note 1	Note 1	Note 1
10fo	Note 1	Note 1	Note 1

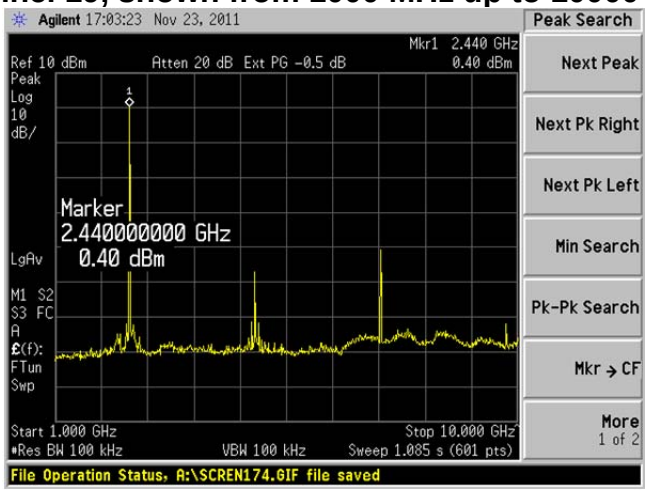
Note:
(1) Measurement at system noise floor.

10.4 Screen Captures – Conducted Spurious emissions

Channel 19, shown from 30 MHz up to 1000 MHz



Channel 19, shown from 1000 MHz up to 10000 MHz



Channel 19, shown from 10000 MHz up to 25000 MHz

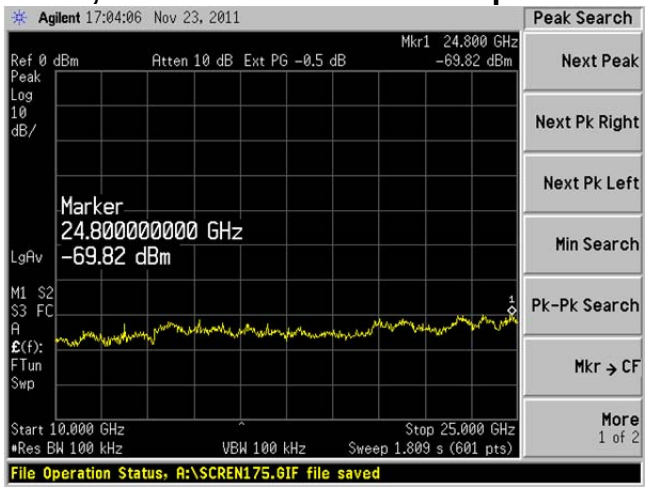


EXHIBIT 11. FREQUENCY & POWER STABILITY OVER VOLTAGE VARIATIONS

The stability of the device was examined as a function of the input voltage available to the EUT. A Spectrum Analyzer was used to measure the frequency at the appropriate frequency markers. The transmitter portion of the EUT placed in modulated continuous transmit mode. Power was supplied by an external bench-type variable power supply, and the frequency of operation was monitored using the spectrum analyzer.

A spectrum analyzer was used to measure the frequency at the appropriate frequency markers. For this test, the EUT was placed in continuous transmit CW mode. Power to the EUT was supplied by an external bench-type variable power supply. The frequency of operation was monitored using the spectrum analyzer with RBW=VBW=1 kHz settings while the voltage was varied.

The RF Power Output of the EUT was also monitored in a separate test, also using a Spectrum Analyzer with RBW=VBW=3 MHz setting while the voltage was varied.

2.7 VDC		3.0 VDC		3.3 VDC		
Power	Frequency	Power	Frequency	Power	Frequency	Channel
4.6	2404.870000	4.6	2404.870000	4.6	2404.870000	11
5.2	2445.225000	5.2	2445.225000	5.2	2445.225000	19
4.9	2479.375000	4.9	2479.375000	4.9	2479.375000	26

The power was then cycled On/Off to observe system response. No unusual response was observed, the emission characterizes were well behaved, and the system returned to the same state of operation as before the power cycle.

No anomalies were noted in the measured transmit power during the voltage variation tests.

APPENDIX A

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 9-Nov-2011 Type Test : Radiated Emissions Job # : C-1316

Prepared By: Peter Feilen Customer : Vigil Health Solutions Quote #: 311232

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	AA 960081	Double Ridge Horn Antenna	EMCO	3115	6907	1/4/2011	1/4/2012	Active Calibration
2	EE 960147	Pre-Amp	Adv. Micro	WLA612	123101	1/4/2011	1/4/2012	Active Calibration
3	AA 960153	2.4GHz High Pass Filter	KWM	HPF-L-14186	7272-04	2/28/2011	2/28/2012	Active Calibration
4	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	6/1/2011	6/1/2012	Active Calibration
5	EE 960156	100kHz-1GHz Analog Signal Generator	Agilent	N5181A	MY49060062	6/6/2011	6/6/2012	Active Calibration
6	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY48250225	6/6/2011	6/6/2012	Active Calibration
7	EE 960158	RF Preselecter	Agilent	N9039A	MY46520110	6/11/2011	6/11/2012	Active Calibration
8	AA 960004	Log Periodic Antenna	EMCO	93146	9512-4276	9/19/2011	9/19/2012	Active Calibration
9	AA 960005	Biconical Antenna	EMCO	93110B	9601-2280	6/10/2011	6/10/2012	Active Calibration

Project Engineer: Peter Feilen Quality Assurance: Thomas T. Smith

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 9-Nov-2011 Type Test : Radiated Emissions Job # : C-1316

Prepared By: Peter Feilen Customer : Vigil Health Solutions Quote #: 311232

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	AA 960081	Double Ridge Horn Antenna	EMCO	3115	6907	1/4/2011	1/4/2012	Active Calibration
2	EE 960147	Pre-Amp	Adv. Micro	WLA612	123101	1/4/2011	1/4/2012	Active Calibration
3	AA 960153	2.4GHz High Pass Filter	KWM	HPF-L-14186	7272-04	2/28/2011	2/28/2012	Active Calibration
4	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	6/1/2011	6/1/2012	Active Calibration
5	EE 960156	100kHz-1GHz Analog Signal Generator	Agilent	N5181A	MY49060062	6/6/2011	6/6/2012	Active Calibration
6	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY48250225	6/6/2011	6/6/2012	Active Calibration
7	EE 960158	RF Preselecter	Agilent	N9039A	MY46520110	6/11/2011	6/11/2012	Active Calibration
8	AA 960004	Log Periodic Antenna	EMCO	93146	9512-4276	9/19/2011	9/19/2012	Active Calibration
9	AA 960005	Biconical Antenna	EMCO	93110B	9601-2280	6/10/2011	6/10/2012	Active Calibration

Project Engineer: Peter Feilen Quality Assurance: Thomas T. Smith

APPENDIX B – TEST STANDARDS: CURRENT PUBLICATION DATES

STANDARD #	DATE	Am. 1	Am. 2
ANSI C63.4	2003		
ANSI C63.10	2009		
CISPR 11	2009-05	2009-12 P	
CISPR 12	2007-05		
CISPR 14-1	2005-11	2008-11	
CISPR 14-2	2001-11	2001-11	2008-05
CISPR 16-1-1 Note 1	2010-01		
CISPR 16-1-2 Note 1	2003	2004-04	2006-07
CISPR 22	2008-09		
CISPR 24	1997-09	2001-07	2002-10
EN 55011	2009		
EN 55014-1	2006		
EN 55014-2	1997		
EN 55022	2006	2007	
EN 60601-1-2	2007-03		
EN 61000-3-2	2006-05		
EN 61000-3-3	2008-12		
EN 61000-4-2	2009-05		
EN 61000-4-3	2006-07	2008-05	
EN 61000-4-4	2004		
EN 61000-4-5	2006-12		
EN 61000-4-6	2009-05		
EN 61000-4-8	1994	2001	
EN 61000-4-11	2004-10		
EN 61000-6-1	2007-02		
EN 61000-6-2	2005-12		
EN 61000-6-3	2007-02		
EN 61000-6-4	2007-02		
FCC 47 CFR, Parts 0-15, 18, 90, 95	2011		
FCC Public Notice DA 00-1407	2000		
FCC ET Docket # 99-231	2002		
FCC Procedures	2007		
ICES 001	2006-06		
ICES 002	2009-08		
ICES 003	2004-02		
IEC 60601-1-2 Note 1	2007-03		
IEC 61000-3-2	2005-11	2008-03	2009-02
IEC 61000-3-3	2008-06		
IEC 61000-4-2	2008-12		
IEC 61000-4-3	2008-04	2008-04	2009-12 FD

STANDARD #	DATE	Am. 1
IEC 61000-4-4	2004-07	2010-10
IEC 61000-4-5	2005-11	
IEC 61000-4-6	2008-10	
IEC 61000-4-8	2009-09	
IEC 61000-4-11	2004-03	
IEC 61000-6-1	2005-03	
IEC 61326-1	2006-06	
ISO 14982	1998-07	
MIL Std. 461E	1999-08	
RSS GEN	2010-12	
RSS 119	2007-06	
RSS 123	1999-11	
RSS 125	2000-03	
RSS 131	2003-07	
RSS 136	2002-10	
RSS 137	2009-02	
RSS 210	2010-12	
RSS 213	2005-12	
RSS 243	2010-02	
RSS 310	2007-06	
Updated on 08-23-11		

Note 1: Test not on LSR Scope of Accreditation.

APPENDIX C
Uncertainty Statement

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of k=2.

Table of Expanded Uncertainty Values, (K=2) for Specified Measurements

Measurement Type	Particular Configuration	Uncertainty Values
Radiated Emissions	3 – Meter chamber, Biconical Antenna	4.24 dB
Radiated Emissions	3-Meter Chamber, Log Periodic Antenna	4.8 dB
Radiated Emissions	10-Meter OATS, Biconical Antenna	4.18 dB
Radiated Emissions	10-Meter OATS, Log Periodic Antenna	3.92 dB
Conducted Emissions	Shielded Room/EMCO LISN	1.60 dB
Radiated Immunity	3 Volts/Meter in 3-Meter Chamber	1.128 Volts/Meter
Conducted Immunity	3 Volts level	1.0 V