LS Research, LLC
W66 N220 Commerce Court ● Cedarburg, WI 53012 ● USA
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www.lsr.com

ENGINEERING TEST REPORT # 308481

Compliance Testing of:
Model Name: ZICM-2410
Model 3L ZICM-2410-PO-1

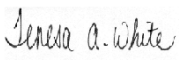
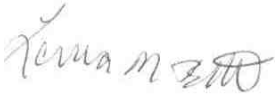
Test Date(s):
January 13-February 12, and May 27, 2009

Prepared For:
CEL
Attn: Mike Richter
1253 N Old Rand Road
Wauconda, IL 60084

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

This Test Report is issued under the Authority of:
K. Aidi Zainal, Sr. EMC Engineer

Signature:  Date: March 10, 2009

Test Report Reviewed by:	**Tested by:**
Teresa A. White, Quality Manager	Laura Bott, EMC Engineer
Signature: 	Signature: 
Date: March 10, 2009	Date: March 10, 2009

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LSC Revision Control

Date	Revision #	Revised By
9-06-06	2.0	AS/TAW

EXHIBIT 1. INTRODUCTION

1.1 SCOPE

Reference:	FCC Part 15, Subpart C, Section 15.247
Title:	Telecommunication – Code of Federal Regulations, CFR 47, Part 15
Reference:	RSS-Gen, Issue 2, June 2007
Title:	General Requirements and Information for the Certification of Radiocommunication Equipment
Reference:	RSS-210, Issue 7, June 2007
Title:	Low-Power License-exempt Radiocommunication Devices (all Frequency Bands): Category I Equipment.
Purpose of Test:	To gain FCC/IC Certification Authorization for Digital Modulation Transmitters operating in the Frequency Band of 2400 MHz – 2483.5 MHz
Test Procedures:	Both conducted and radiated emissions measurements were performed 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 from 9 kHz to 40 GHz.
Environmental Classification:	• Commercial, Industrial or Business • Residential

1.2 NORMATIVE REFERENCES

Publication	Year	Title
47 CFR, Parts 0-15 (FCC)	2005	Code of Federal Regulations - Telecommunications
ANSI C63.4	2003	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	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus.
CISPR 16-2-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 201: Conducted disturbance measurement.
FCC Public Notice DA 00-1407	2000	Part 15 Unlicensed Modular Transmitter Approval
FCC ET Docket No. 99-231	2002	Amendment to FCC Part 15 of the Commission's Rules Regarding Spread Spectrum Devices.
FCC Procedures	2005, 03-23	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:	**California Eastern Laboratories**
Address:	**4590 Patrick Henry Drive** **Santa Clara, CA 95054-1817**
Contact Person:	**Mike Richter & Tom Benson** **847.487.9906 or 847.487.6364**

2.2 EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information has been supplied by the applicant.

Product Name:	ZICM-2410
Model Number:	ZICM-2410-P0-1
Serial Number:	136

2.3 ASSOCIATED ANTENNA DESCRIPTION

Inverted F antenna with a 5.25 dBi gain (which was calculated based off conducted measurements and radiated measurements over a ground plane).

2.4 EUT'S TECHNICAL SPECIFICATIONS

Additional Information:

Frequency Range (in MHz)	2400-2483.5
RF Power in Watts	0.01538 Watts
Minimum:	0.01452 Watts
Maximum:	0.01538 Watts
Conducted Output Power (in dBm)	6.61 dBm
Field Strength (and at what distance)	107.5 dBµV/m @ 3m (2405 MHz)
Occupied Bandwidth (99% BW)	2633 MHz (99% OBW), 1592 MHz (90% OBW) at 2405 MHz
Type of Modulation	O-QPSK
Emission Designator	2M633G1D
EIRP (in mW)	15.38 mW
Transmitter Spurious (worst case) at 3 meters	67.5 dBµV/m Note 2 (4960 MHz)
Receiver Spurious (worst case) at 3 meters	26.5 dBµV/m Note 2 (928.2 MHz)
Stepped (Y/N)	No
Step Value:	N/A
Frequency Tolerance %, Hz, ppm	100 ppm
Microprocessor Model # (if applicable)	ZIC2410QN48
Antenna Information	
Detachable/non-detachable	Non-detachable
Type	Inverted F
Gain (in dBi)	5.25 dBi Note1
EUT will be operated under FCC Rule Part(s)	FCC 15.247
Modular Filing	☒ Yes ☐ No

Note1: Gain was calculated using conducted power and radiated measurements over a ground plane.
Note 2: Measurement taken at 1 meter separation distance, the 9.5 dB correction was added to obtain an equivalent field strength measurement at 3 meters.

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

If RF Evaluation checked above, test engineer to complete the following:

- Evaluated against exposure limits: ☒ General Public Use ☐ Controlled Use
- Duty Cycle used in evaluation: 100 %
- Standard used for evaluation: OET 65
- Measurement Distance: 20 cm
- RF Value: 0.0031 ☐ V/m ☐ A/m ☒ W/m^2
  ☐ Measured ☐ Computed ☒ Calculated

2.5 PRODUCT DESCRIPTION

The ZICM-2410 module uses a Direct Sequence Spread Spectrum transceiver implementing O-QPSK modulation, operating in the 2400-2483.5 MHZ ISM frequency band. The system is based on the IEEE 802.15.4 standard, with 5 MHz channel spacing. The system is capable of operating at 250 Kbps for Zigbee applications, and 500 Kbps or 1 Mbps for custom applications. The module can transmit up to 6.8 dBm into a printed circuit board inverted-F antenna.

PHOTO (Optional)

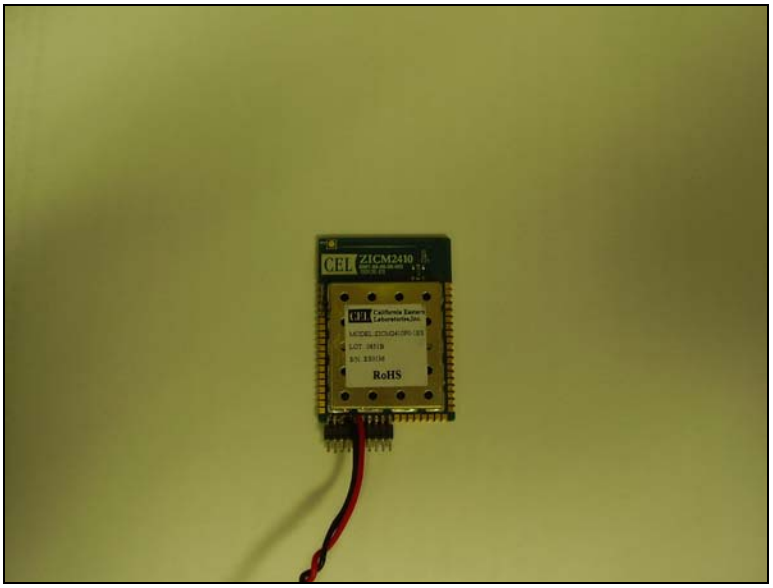


EXHIBIT 3. EUT OPERATING CONDITIONS & CONFIGURATIONS DURING TESTS

3.1 CLIMATE TEST CONDITIONS

Temperature:	20-25°C
Humidity:	30-60%
Pressure:	86-106 kPa

3.2 APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

Standard/Section	Test Requirements	Compliance (yes/no)
FCC § 15.207	Power Line Conducted Emissions Measurements	Yes
FCC § 15.247(a)(2)	6 dB Bandwidth of a Digital Modulation System	Yes
FCC § 15.247(b) & 1.1310	Maximum Output Power	Yes
FCC § 15.247(i), 1.1307, 1.1310, 2.1091 & 2.1093	RF Exposure Limit	Yes
FCC § 15.247(c)	RF Conducted Spurious Emissions at the Transmitter Antenna Terminal	Yes
FCC § 15.247(d)	Transmitted Power Spectral Density of a Digital Modulation System	Yes
FCC § 15.247(c), 15.209 & 15.205	Transmitter Radiated Emissions	Yes
RSS-210 2.6 & RSS-Gen 6	Receiver 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 and the associated Radio Receiver has also been tested and found to comply with Part 15, Subpart B – Radio Receivers. The Receiver Test Report is available upon request.		

3.3 MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

☐ **None** ☒ **Yes (explain below)**

A filter was created added between the output of the radio and the input of the antenna, and the split ground plane was soldered together to simulate the production spec for a uniform ground plane. (Additional information available in Appendix B.)

In order to meet upper band edge limits, it is necessary to reduce power of channel 26 (2480 MHz) to an output power of 6 dBm.

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 7 (2007), 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

Transmit Mode

5.1 Test Setup

The test setup was assembled in accordance with Title 47, CFR FCC Part 15 and ANSI C63.4-2003.

Measurements at frequencies 30 MHz – 4 GHz where taken when 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. Because the radiated emissions limits for unintentional radiators, denoted in FCC §15.109 apply at a 3 meter distance, the measurement antenna was placed 3 meters from the EUT radiating element.

Measurements above 4 GHz were performed at a 1.0 meter separation distance in a semi-anechoic mini chamber. The calculations to determine the limits at the 1.0 meter separation distance are detailed in the following pages.

The EUT was tested in continuous modulated transmit mode. Power was supplied to the EUT by a bench type power supply. The unit has the capability to operate on 16 channels, controllable via a hyperterminal interface to a PC.

The test sample was operated on one of three (3) standard channels: low (2405 MHz), middle (2440 MHz) and high (2480 MHz) to comply with FCC § 15.31(m).

Please refer to Appendix A for a complete list of test equipment.

5.2 Test Procedure

Radiated Emissions measurements were taken from 30-25000 MHz. Measurements from 30 - 4000 MHz were performed a 3 meter Semi-Anechoic, FCC listed Chamber. Measurements from 4000-18000 MHz were taken at a 1 meter separation distance, and 1800-25000 MHz at a separation distance of 30 cm in a semi-anechoic mini chamber. The radiated RF emission levels were manually noted at discrete turntable azimuths and measurement antenna heights, corresponding to peak emission levels at various frequencies.

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, and an EMCO standard gain horn antenna was used for measurements from 18 to 25 GHz. The maximum radiated RF emissions were found by rotating the EUT 360°, and raising and lowering the antenna between 1 and 4 meters, using both horizontal and vertical antenna polarities.

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

Although the high channel power was reduced to meet band edge compliance, all harmonics were tested while that channel (as well as the low and middle channel) transmitted at full power: 8 dBm.

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 a N.I.S.T. traceable site. In addition, the Connecting Cables were measured for losses using a calibrated Signal Generator and a HP 8546A EMI Receiver. The resulting correction factors and the cable loss factors from these calibrations were entered into the HP 8546A EMI Receiver database. As a result, the data taken from the HP 8546A 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.

For measurements 30 MHz – 4 GHz, the HP 8546A EMI receiver was used, and an Agilent E4446A Spectrum Analyzer was utilized for measurements 4 GHz – 25 GHz. An EMCO horn antenna was used for measurements between 1 GHz and 18 GHz (accompanied by a preamp for measurements over 4 GHz), and a standard gain horn with preamp were used for measurements 18-25 GHz.

Test Results

The EUT was found to meet the Radiated Emissions requirements of Title 47 CFR, FCC Part 15.247 for a DTS transmitter [Canada RSS-210 Issue 7 (2007), Annex 8 (section 8.2). The frequencies with significant RF signal strength were recorded and plotted as shown in the Data Charts and Graphs.

5.4 Test Equipment List

Test Equipment	Manufacturer	Model No.	Serial No.
EMI Receiver	HP	8546A	3617A00320
EMI Receiver Pre-Select.	HP	85460A	3448A00296
Spectrum Analyzer	Agilent	E4446A	US45300564
Log Periodic Antenna	EMCO	93146	9701-4855
Horn Antenna	EMCO	3115	6907
Bicon Antenna	EMCO	93110B	9702-2918
Pre-Amp	Adv. Microwave	WLA612	1145A04094
Horn Antenna – Std. Gain	EMCO	3160-09	9809-1120

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), is 1 Watt. The harmonic and spurious RF emissions, measured in any 100 kHz bandwidth, as specified in 15.247 (d), 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).

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.

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	-
960-24,000	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 to 10,000 MHz

500μV/m or 54.0 dB/μV/m at 3 meters

54.0 + 9.5 = 63.5 dB/μV/m at 1 meter

For measurements made at 0.3 meter, a 20 dB correction has been invoked.

960 MHz to 10,000 MHz

500μV/m or 54.0 dB/μV/m at 3 meters

54.0 + 20 = 74 dB/μV/m at 0.3 meters

5.6 RADIATED EMISSIONS DATA CHART

3 Meter Measurements of Electromagnetic Radiated Emissions
Test Standard: 47CFR, Part 15.205 and 15.247(DTS)
Frequency Range Inspected: 30 MHz to 25000 MHz

Manufacturer:	California Eastern Laboratories						
Date(s) of Test:	January 13-February 3, 2009						
Test Engineer(s):	Laura Bott						
Voltage:	3.3 VDC						
Operation Mode:	Normal, 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	x	Other: bench power supply			
EUT Placement:	x	80cm non-conductive table		10cm Spacers			
EUT Test Location:	x	3 Meter Semi-Anechoic FCC Listed Chamber		3/10m OATS			
Measurements:		Pre-Compliance		Preliminary	x	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)	Avg Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
2405	1.11	350	107.5	125	17.5	Horizontal	Vertical
2440	1.09	352	107.1	125	17.9	Horizontal	Vertical
2480	1.11	355	106.5	125	18.5	Horizontal	Vertical

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)	Avg Reading (dBµV/m)	Avg Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
2405	1.11	350	107.5	125.0	17.5	Horizontal	Vertical
4810	1.00	30	55.9	63.5	7.6	Vertical	Horizontal
7215	1.00	112	40.6	97.0	56.4	Vertical	Horizontal
9620	1.08	337	42.7	97.0	54.3	Horizontal	Vertical
12025	1.00	38.8	41.5	63.5	22.0	Horizontal	Flat
14430	1.00	196.4	41.6	97.0	55.4	Horizontal	Flat
16835	1.00	0	40.2	97.0	56.8	Vertical	Horizontal
19240	1.06	319.1	50.7	74.0	23.3	Vertical	Flat
21645	1.10	295.2	49.7	106.5	56.8	Vertical	Vertical
24050	1.24	344.8	49.8	106.5	56.7	Horizontal	Horizontal

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Channel 18:

Frequency (MHz)	Height (m)	Azimuth (degree)	Avg Reading (dBµV/m)	Avg Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
2440	1.09	352	107.1	125.0	17.9	Horizontal	Vertical
4880	1.00	263.3	52.6	63.5	10.9	Horizontal	Flat
7320	1.00	11.2	40.8	63.5	22.7	Horizontal	Horizontal
9760	1.06	335.7	47.0	96.6	49.6	Horizontal	Vertical
12200	1.00	148.7	42.9	63.5	20.6	Horizontal	Vertical
14640	1.00	265.6	42.4	96.6	54.2	Vertical	Vertical
17080	1.63	352.7	43.0	96.6	53.6	Vertical	Vertical
19520	1.12	226	50.9	74.0	23.1	Horizontal	Vertical
21960	1.16	295.4	50.4	106.1	55.7	Vertical	Flat
24400	1.05	346.8	60.8	106.1	45.3	Horizontal	Flat

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

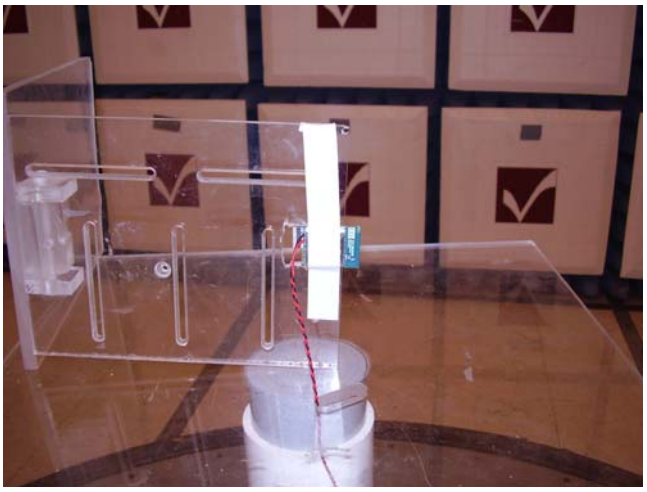
Frequency (MHz)	Height (m)	Azimuth (degree)	Avg Reading (dBµV/m)	Avg Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
2480	1.13	351	106.5	125.0	18.5	Horizontal	Vertical
4960	1.00	244.1	58.0	63.5	5.5	Vertical	Horizontal
7440	1.09	138.8	38.7	63.5	24.8	Horizontal	Vertical
9920	0.999	326.2	45.2	96.0	50.8	Horizontal	Vertical
12400	1.001	144.5	47.0	63.5	16.5	Horizontal	Vertical
14880	1.101	333.6	38.7	96.0	57.3	Horizontal	Vertical
17360	1.207	298.2	44.2	96.0	51.8	Horizontal	Flat
19840	1.07	306.3	51.4	74.0	22.6	Vertical	Vertical
22320	1.15	300.6	50.9	74.0	23.1	Horizontal	Horizontal
24800	1.12	328.2	50.6	105.5	54.9	Vertical	Flat

Notes:

1) A Quasi-Peak Detector was used in measurements below 1 GHz, and a Peak Detector was used in measurements above 1 GHz. Average measurements were obtained using a 10 Hz video averaged signal. Only the results from the Average detector are published in the table above. 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, and at 0.3 m separation for frequencies between 18 – 25 GHz.
3) For measurements of the fundamental power, because of spectral bandwidth, the receiver was set to RBW=VBW=3 MHz.

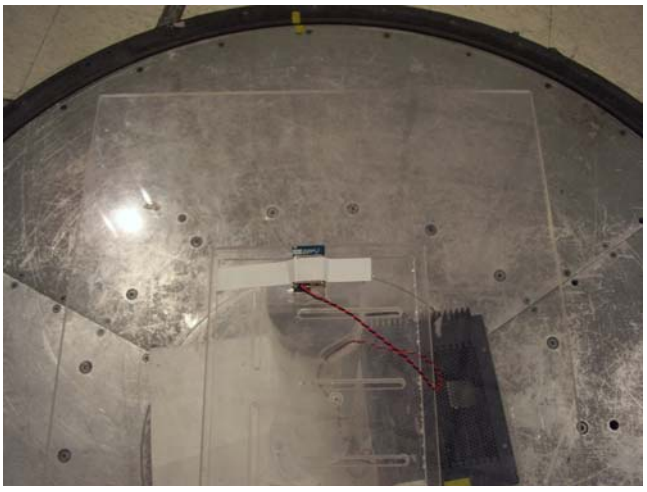
5.7 Test Setup Photo(s) – Radiated Emissions Test

Vertical Orientation



Horizontal Orientation

Flat Orientation

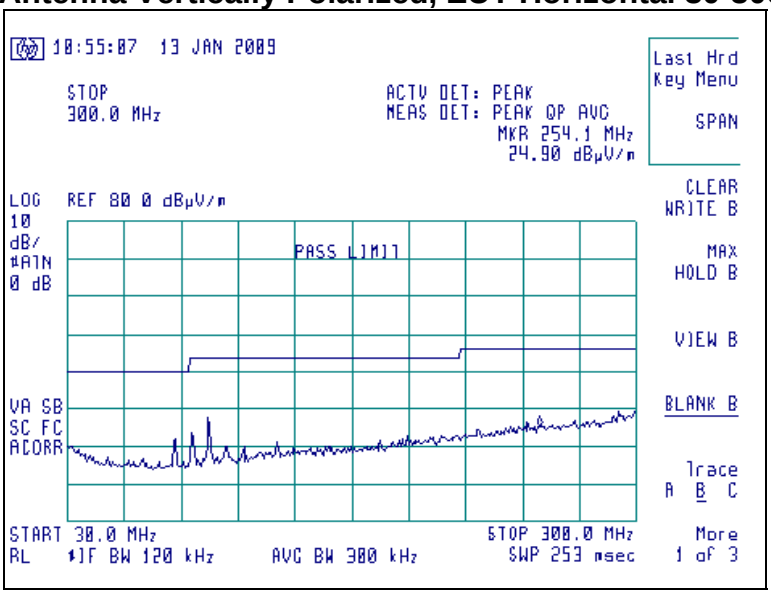


5.8 Screen Captures - Radiated Emissions Testing

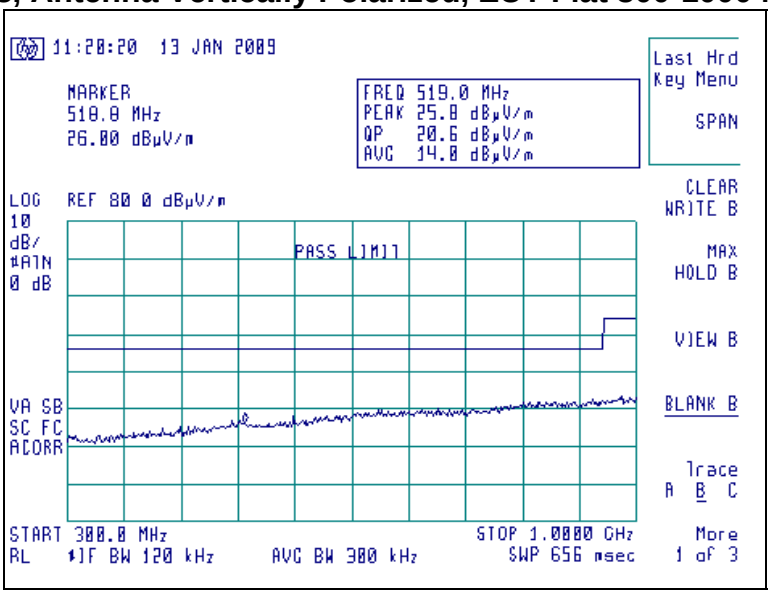
These screen captures represent Peak Emissions. For radiated emission measurements, a Quasi-Peak detector function is utilized when measuring frequencies below 1 GHz, and an Average detector function is utilized when measuring frequencies above 1 GHz.

The signature scans shown here are from worst-case emissions, as measured on channels 11, 18, or 26, with the sense antenna both in vertical and horizontal polarity for worst case presentations.

Channel 18, Antenna Vertically Polarized, EUT Horizontal 30-300 MHz, at 3m

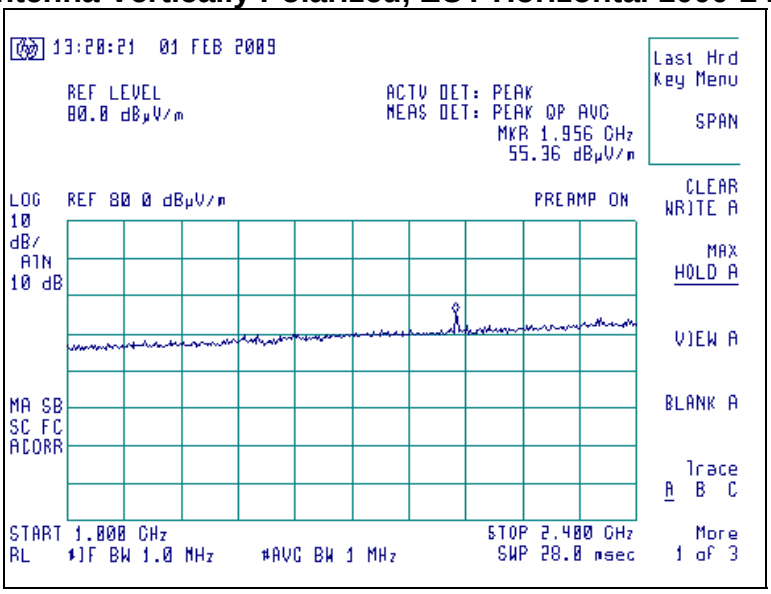


Channel 18, Antenna Vertically Polarized, EUT Flat 300-1000 MHz, at 3m

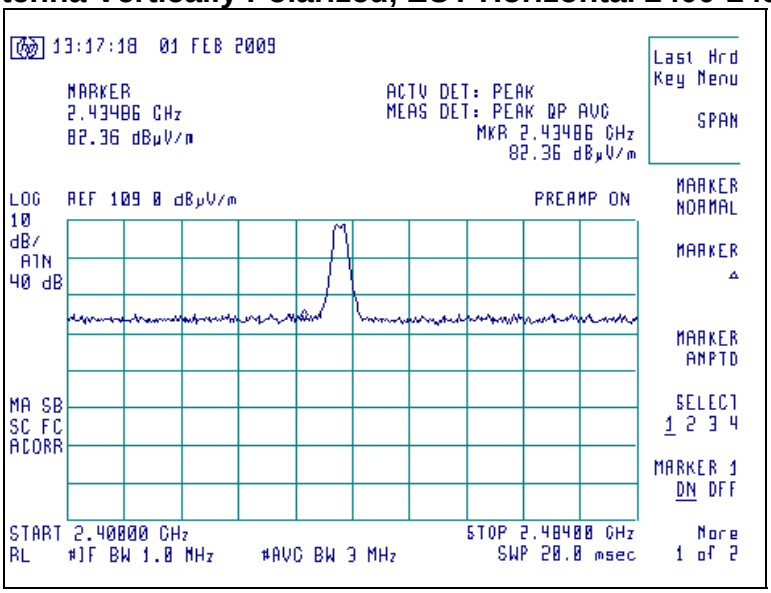


Screen Captures - Radiated Emissions Testing *(continued)*

Channel 18, Antenna Vertically Polarized, EUT Horizontal 1000-2400 MHz, at 3m

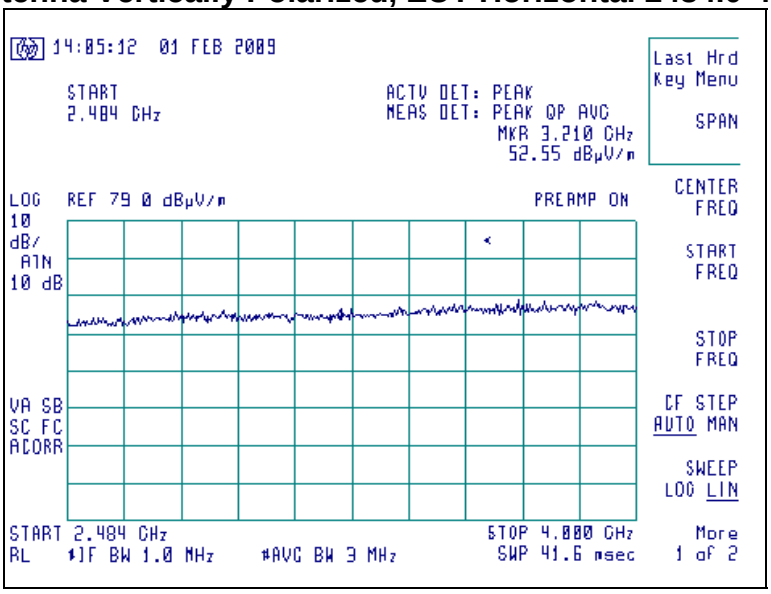


Channel 18, Antenna Vertically Polarized, EUT Horizontal 2400-2483.5 MHz, at 3m

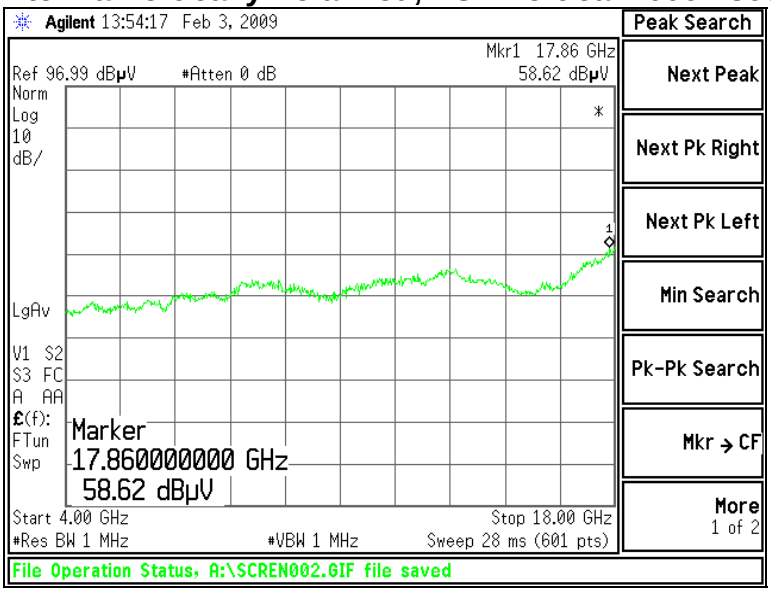


Screen Captures - Radiated Emissions Testing *(continued)*

Channel 18, Antenna Vertically Polarized, EUT Horizontal 2484.0-4000 MHz, at 3m

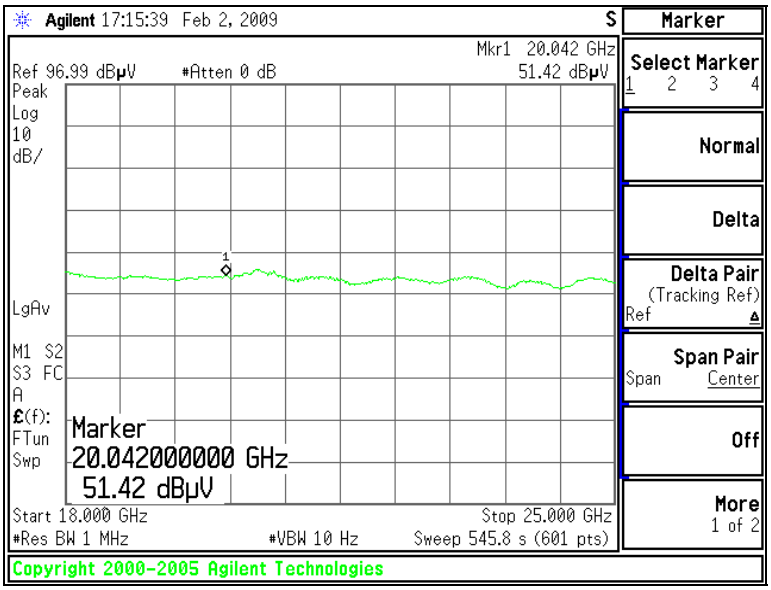


Channel 18, Antenna Vertically Polarized, EUT Vertical 4000-18000 MHz, at 1m



Screen Captures - Radiated Emissions Testing *(continued)*

Channel 11, Antenna Vertically Polarized, 18000-25000 MHz, at 30cm



5.9 Receive Mode

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:

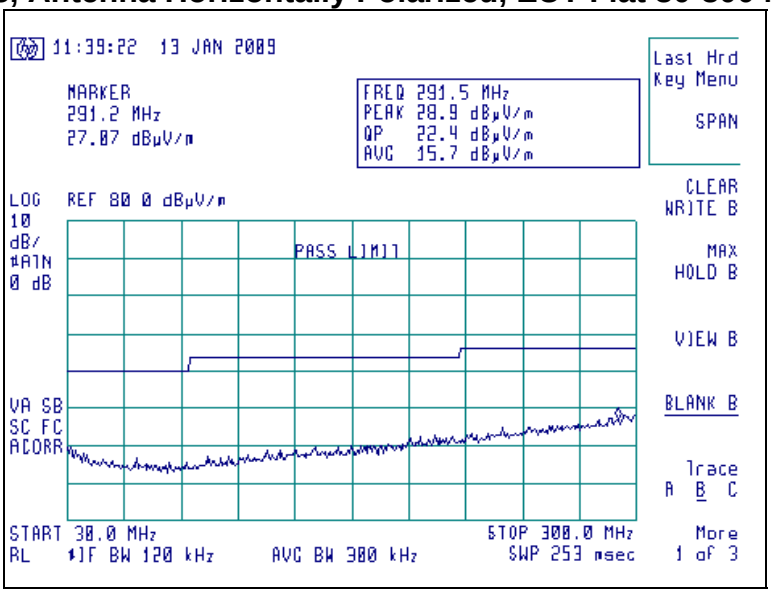
Frequency (MHz)	Height (m)	Azimuth (degree)	Quasi Peak Reading (dBµV/m)	Quasi Peak Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
96.0	1.00	0	26.4	43.5	17.1	Vertical	Horizontal
291.5	1.00	0	22.4	46.0	23.6	Horizontal	Flat
694.2	1.00	0	23.4	46.0	22.6	Vertical	Vertical
928.2	1.00	0	26.8	46.0	19.2	Horizontal	Vertical

Screen Captures - Radiated Emissions Testing

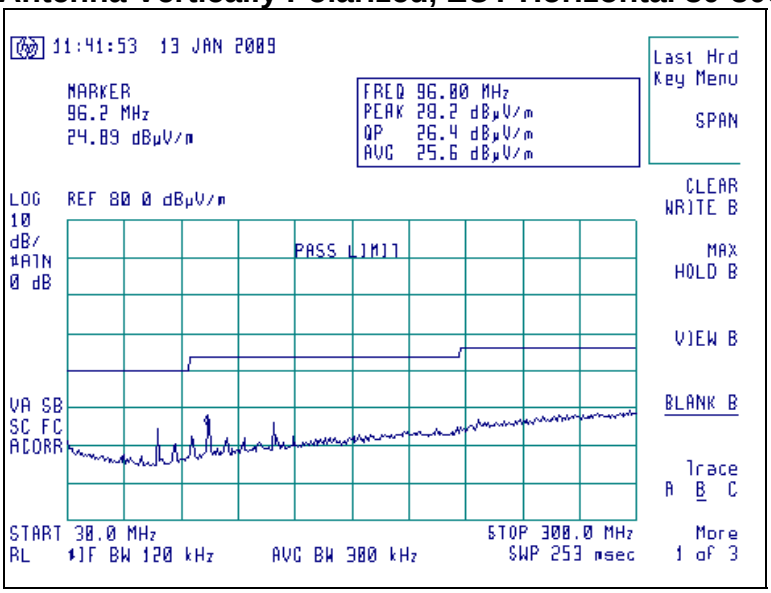
These screen captures represent Peak Emissions. For radiated emission measurements, a Quasi-Peak detector function is utilized when measuring frequencies below 1 GHz, and an Average detector function is utilized when measuring frequencies above 1 GHz.

The signature scans shown here are from worst-case emissions, as measured on channels 11, 18, or 25, with the sense antenna both in vertical and horizontal polarity for worst case presentations.

Channel 18, Antenna Horizontally Polarized, EUT Flat 30-300 MHz, at 3m

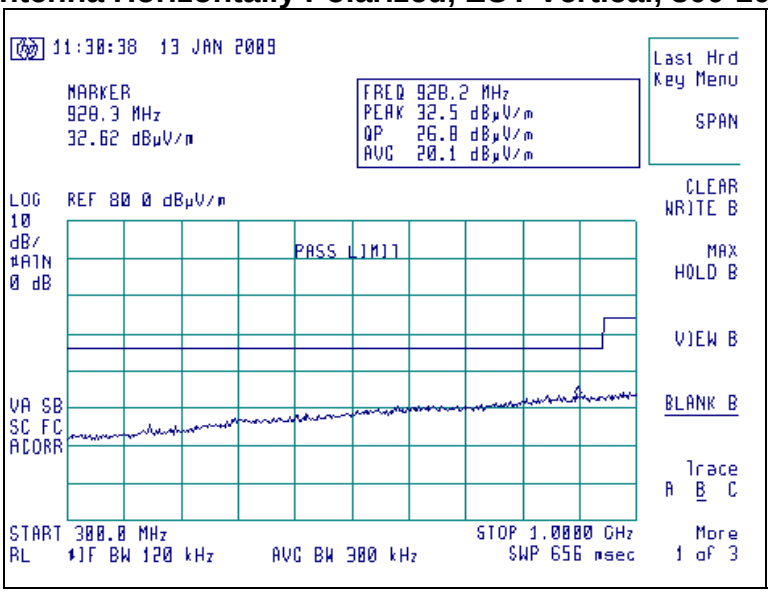


Channel 18, Antenna Vertically Polarized, EUT Horizontal 30-300 MHz, at 3m

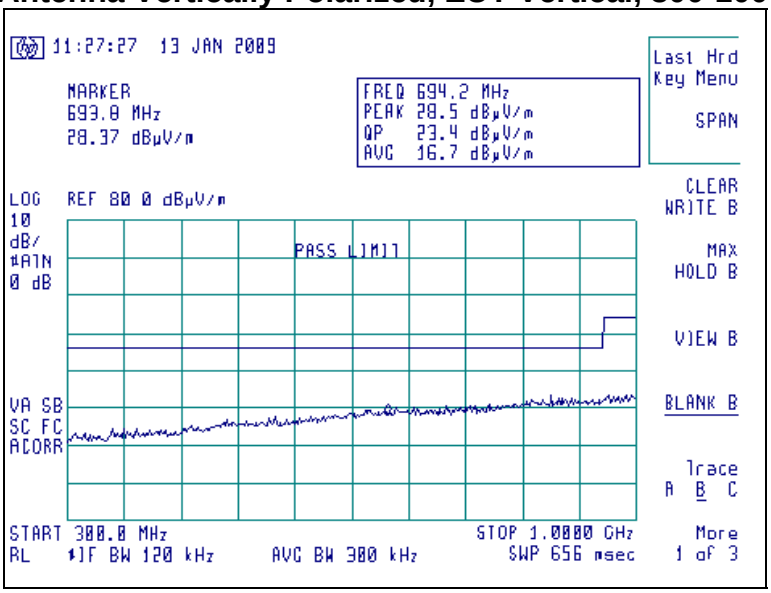


Screen Captures - Radiated Emissions Testing **(continued)**

Channel 18, Antenna Horizontally Polarized, EUT Vertical, 300-1000 MHz, at 3m

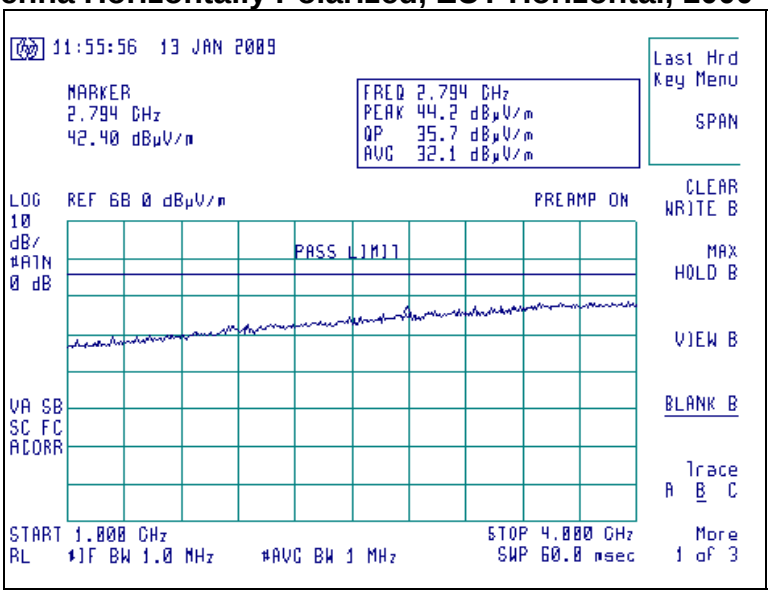


Channel 18, Antenna Vertically Polarized, EUT Vertical, 300-1000 MHz, at 3m

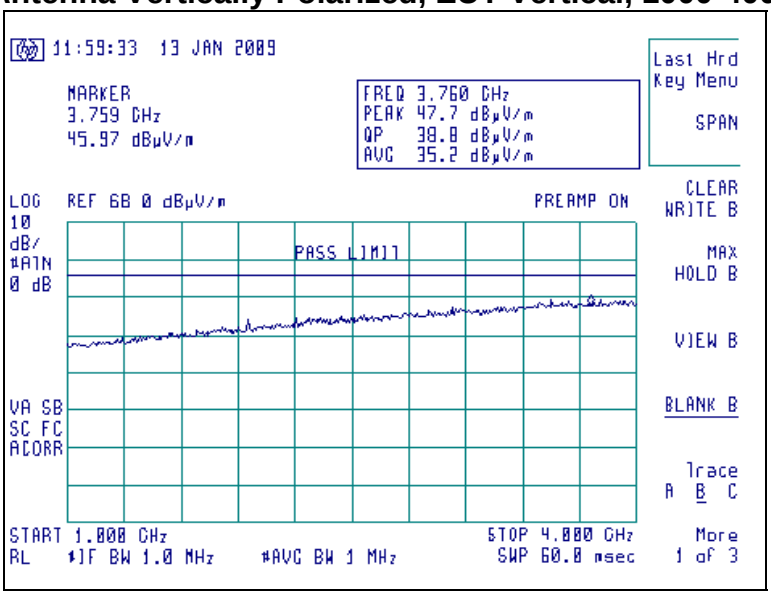


Screen Captures - Radiated Emissions Testing *(continued)*

Channel 18, Antenna Horizontally Polarized, EUT Horizontal, 1000-4000 MHz, at 3m

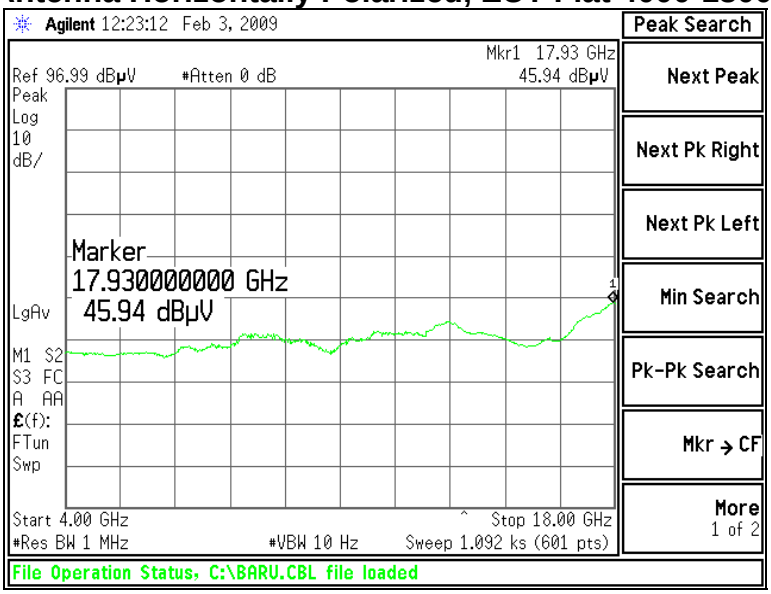


Channel 18, Antenna Vertically Polarized, EUT Vertical, 1000-4000 MHz, at 3m

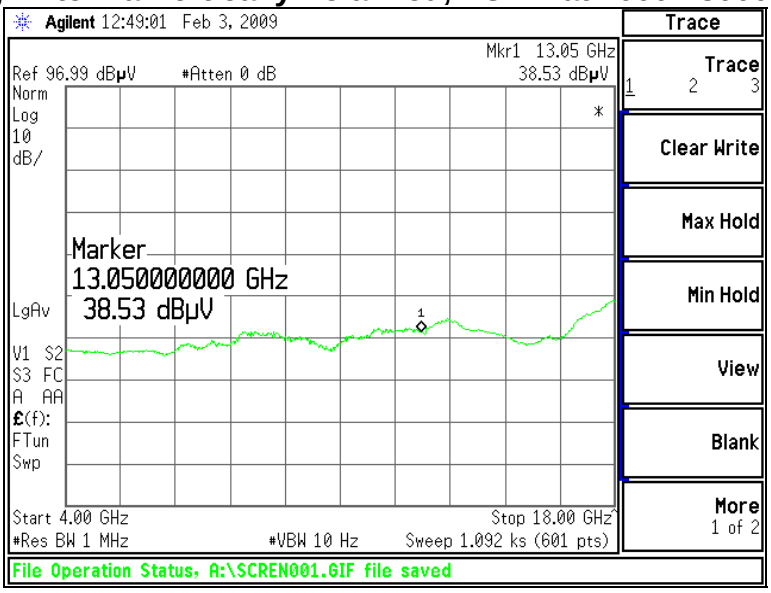


Screen Captures - Radiated Emissions Testing **(continued)**

Channel 18, Antenna Horizontally Polarized, EUT Flat 4000-18000 MHz, at 1m

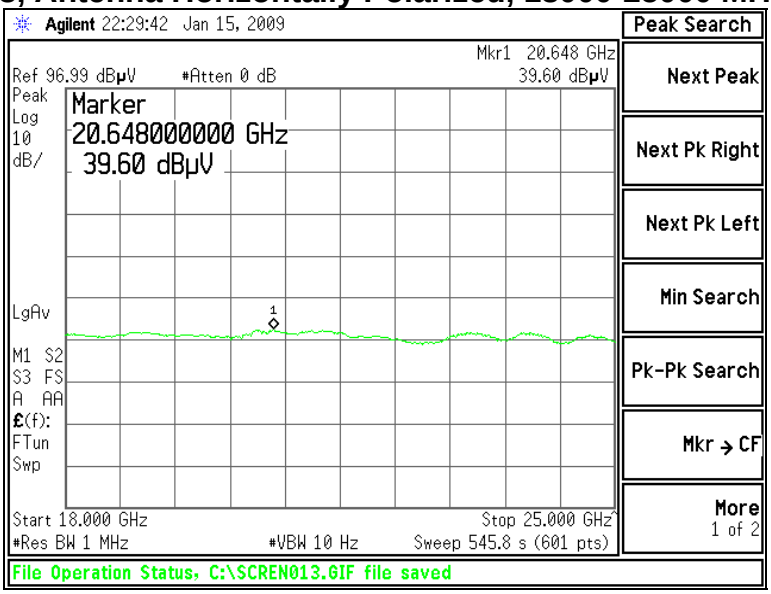


Channel 18, Antenna Vertically Polarized, EUT Flat 4000-18000 MHz, at 1m



Screen Captures - Radiated Emissions Testing **(continued)**

Channel 18, Antenna Horizontally Polarized, 18000-25000 MHz, at 30cm



Channel 18, Antenna Vertically Polarized, 18000-25000 MHz, at 30cm

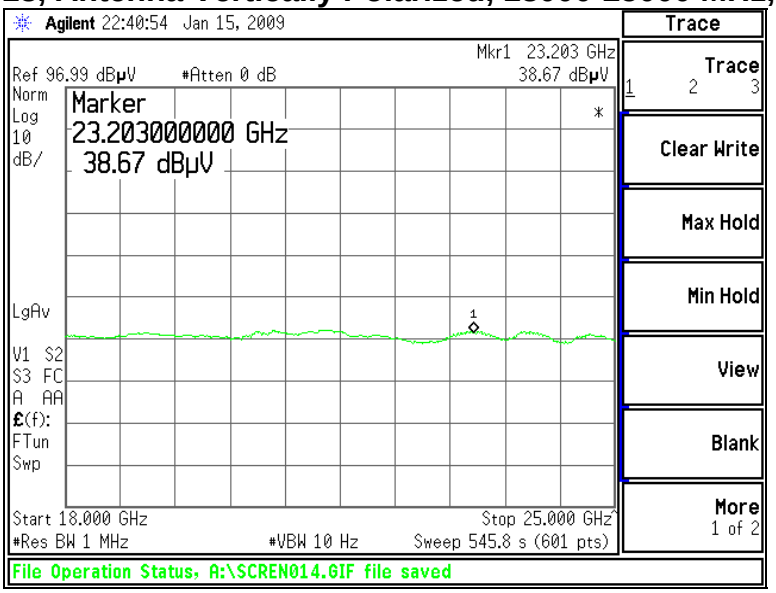


EXHIBIT 6. CONDUCTED EMISSIONS TEST, AC POWER LINE: 15.207

6.1 Test Setup

The test area and setup are in accordance with ANSI C63.4-2003 and with Title 47 CFR, FCC Part 15 (Industry Canada RSS-210, Issue 6). The EUT was placed on a non-conductive wooden table, with a height of 80 cm above the reference ground plane. Power was provided to the EUT via a generic wall pack whose output was connected to a voltage regulator, without additional filtering, to supply the appropriate voltage to the EUT. The wall pack was plugged into a 50Ω (ohm), 50/250 μH Line Impedance Stabilization Network (LISN). The 120 VAC power supply was fed to the test area via an appropriate broadband EMI Filter, and then to the LISN line input. Final readings were then taken and recorded. After the EUT was setup and connected to the LISN, the RF Sampling Port of the LISN was connected to a 10 dB Attenuator-Limiter, and then to the HP 8546A EMI Receiver. The EMCO LISN used has the ability to terminate the unused port with a 50Ω (ohm) load when switched to either L1 (line) or L2 (neutral).

6.2 Test Procedure

The EUT was investigated in continuous modulated transmit mode for this portion of the testing. Measurements were made from 150 kHz-30MHz. The Intermediate Frequency Bandwidth was set to 9.0 kHz and the Average Bandwidth to 30 kHz, per CISPR 16-1 (2003), Section 1, Table 1. Plots of peak values were captured and are shown below. Quasi-peak and average signal strength values were measured at discrete frequencies; these are denoted in the table in Section 6.5 of this report.

Test Equipment Utilized

A list of the test equipment and accessories utilized for the Conducted Emissions test is provided 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. Calibrations of the LISN and Limiter are traceable to N.I.S.T. All cables are calibrated and checked periodically for conformance. The emissions are measured on the HP 8546A EMI Receiver, which has automatic correction for all factors stored in memory and allows direct readings to be taken.

6.3 Test Equipment List

Test Equipment	Manufacturer	Model No.	Serial No.
EMI Receiver	HP	8546A	3617A00320
Spectrum Analyzer	Agilent	E4446A	US45300564
LISN	EMCO	3816/2NM	9701-1057
Transient Limiter	HP	119474A	3107A01708

Test Results

The EUT was found to meet the Conducted Emission requirements of FCC Part 15.207 Conducted Emissions for an Intentional Radiator. See the Data Charts and Graphs for more details of the test results.

6.4 FCC Limits of Conducted Emissions at the AC Mains Ports

Frequency Range (MHz)	Class B Limits (dBµV)		Measuring Bandwidth
	Quasi-Peak	Average	
0.150 -0.50 *	66-56	56-46	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average
0.5 – 5.0	56	46	
5.0 – 30	60	50	
* The limit decreases linearly with the logarithm of the frequency in this range.			

6.5 TEST DATA CHART CONDUCTED EMISSION

Frequency Range inspected: 150 KHz to 30 MHz

Test Standard: FCC 15.207 Class B

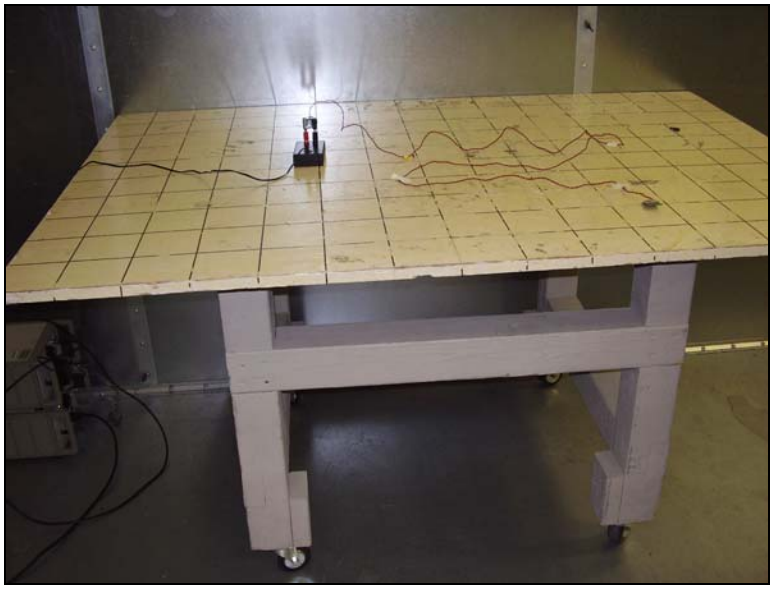
Manufacturer:	California Instrument Laboratories					
Date(s) of Test:	May 27, 2009					
Test Engineer:	Laura Bott					
Model #:	ZICM-2410-P0-1					
Serial #:	136					
Voltage:	3.3 VDC					
Operation Mode:	Normal, continuous transmit, modulated or C.W. mode					
Environmental Conditions in the Lab:	Temperature: 20 – 25˚C Relative Humidity: 30 – 60 %					
Test Location:	√	Conducted emissions area				Chamber
EUT Placed On:		40cm from Vertical Ground Plane				10cm Spacers
	√	80cm above Ground Plane				Other:
Measurements:		Pre-Compliance		Preliminary	√	Final
Detectors Used:	√	Peak	√	Quasi-Peak	√	Average

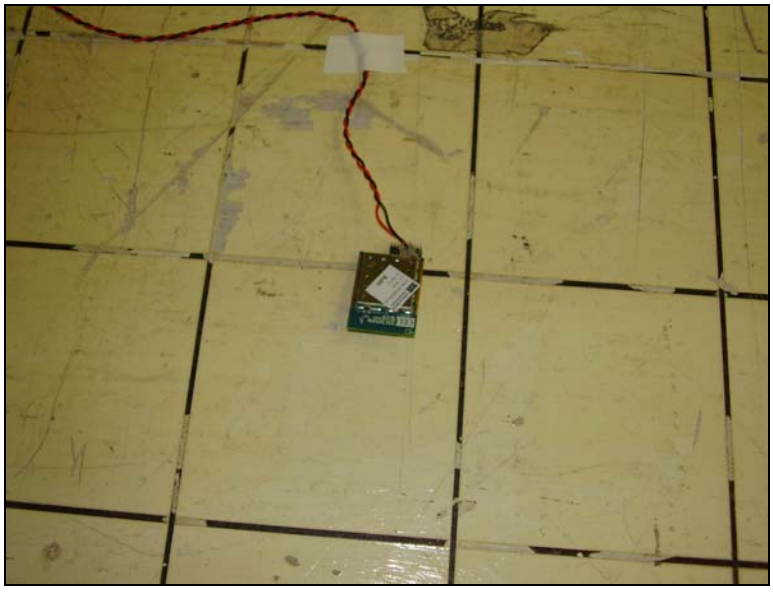
Frequency (MHz)	Line	Q-Peak Reading	Q-Peak Limit	Margin	Average Reading	Average Limit	Margin
0.179	1	27.60	64.56	36.96	15.40	54.56	39.16
0.287	1	25.00	60.62	35.62	1.90	50.62	48.72
1.004	1	23.30	56.00	32.70	1.80	46.00	44.20
3.999	1	36.70	56.00	19.30	35.50	46.00	10.50
0.182	2	26.90	64.39	37.49	13.40	54.39	40.99
1.038	2	24.10	56.00	31.90	2.10	46.00	43.90
4.000	2	36.50	56.00	19.50	35.30	46.00	10.70

Notes:

1) The EUT exhibited similar emissions in transmit and receive modes, and across the Low, Middle and High channels tested.

6.6 Test Setup Photo(s) – Conducted Emissions Test





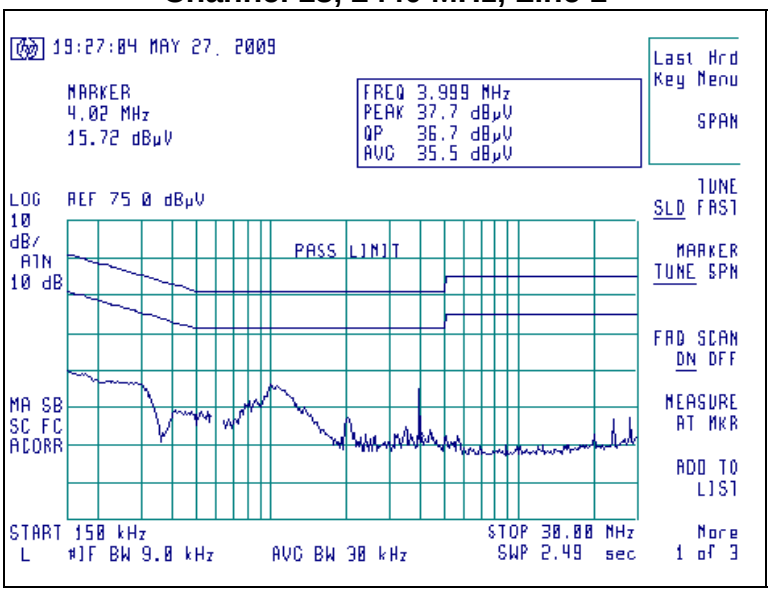
6.7 Screen Captures – Conducted Emissions Test

These screen captures represent Peak Emissions. For conducted emission measurements, both a Quasi-Peak detector function and an Average detector function are utilized. The emissions must meet both the Quasi-peak limit and the Average limit as described in 47 CFR 15.207.

The signature scans shown here are from channel 18, chosen as a good representative of channels.

The EUT exhibited similar conducted emissions signatures in both transmit and receive mode.

Channel 18, 2440 MHz, Line 1



Channel 18, 2440 MHz, Line 2

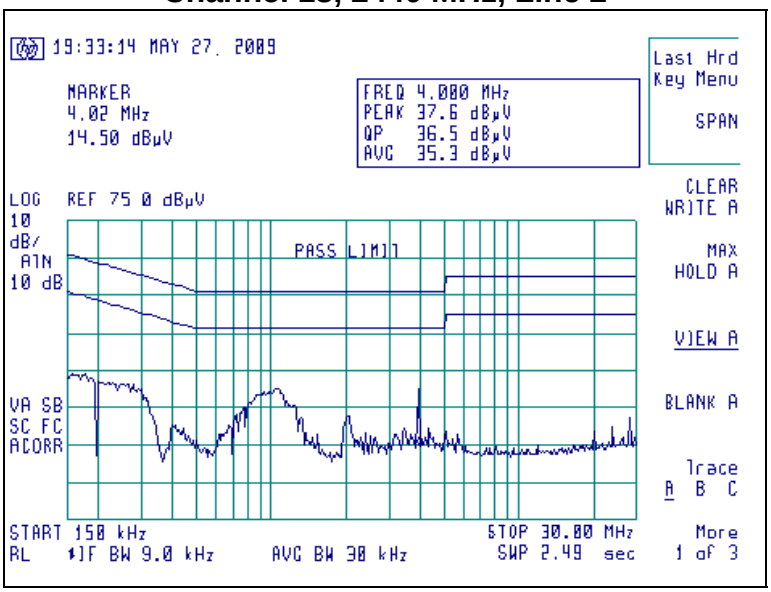


EXHIBIT 7. OCCUPIED BANDWIDTH: 15.247(a)(2)

7.1 Limits

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

7.2 Method of Measurements

Refer to ANSI C63.4 and FCC Procedures (March 23, 2005) for Digital Transmission Systems operating under 15.247.

The transmitter output was connected to the Spectrum Analyzer. The -6 dB occupied bandwidth of the fundamental frequency was measured with the Spectrum Analyzer using 100 kHz RBW and VBW=100 kHz. The -20 dB occupied bandwidth was measured by measuring the peak of the fundamental signal when RBW = 3 MHz, and VBW = 8 MHz, setting that trace to "view," then reducing the RBW to 30 kHz and VBW to 100 kHz and measuring the bandwidth that was 20 dB down from the initial peak value measured when RBW = 3 and VBW = 8.

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 HP E4446A spectrum analyzer. An attenuator was placed in series with the cable to protect the spectrum analyzer. Correction factors for the RF cable were loaded onto the spectrum analyzer and the loss from the attenuator was added on the analyzer as gain offset.

The EUT was configured to run in a continuous transmit, modulated mode. The spectrum analyzer was used in peak-hold mode while measurements were made, as presented in the chart below.

Test Data

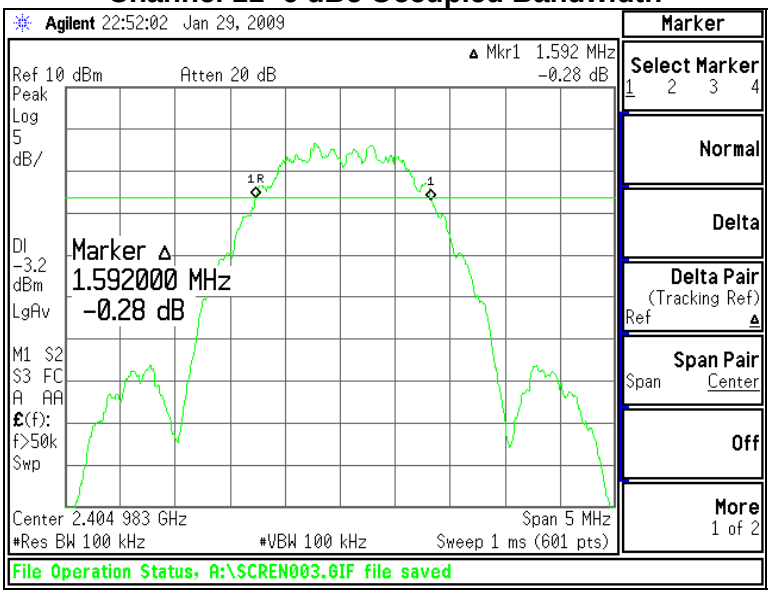
Channel	Center Frequency (MHz)	Measured -6 dBc Occupied Bandwidth (kHz)	Minimum -6 dBc Limit (kHz)	Measured -20 dBc Occupied Bandwidth (kHz)
11	2405	1592	500	2280
18	2440	1583	500	2270
26	2480	1583	500	2250

7.3 Test Equipment List

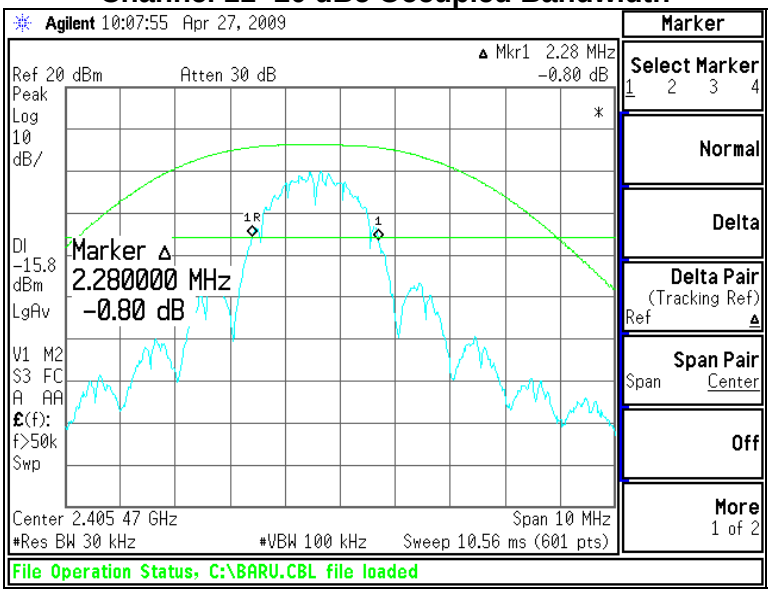
Test Equipment	Manufacturer	Model No.	Serial No.
Spectrum Analyzer	Agilent	E4407B	US39160256
Spectrum Analyzer	Agilent	E4446A	US45300564

7.4 Screen Captures - OCCUPIED BANDWIDTH

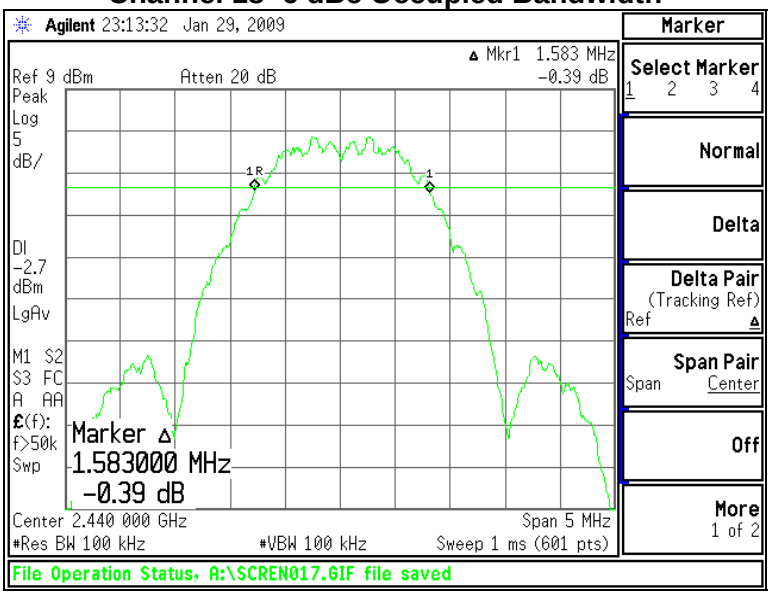
Channel 11 -6 dBc Occupied Bandwidth



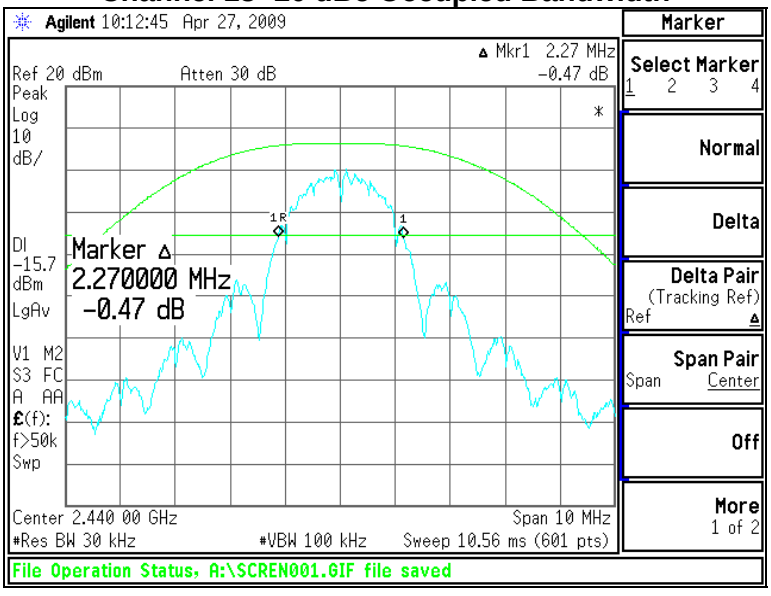
Channel 11 -20 dBc Occupied Bandwidth



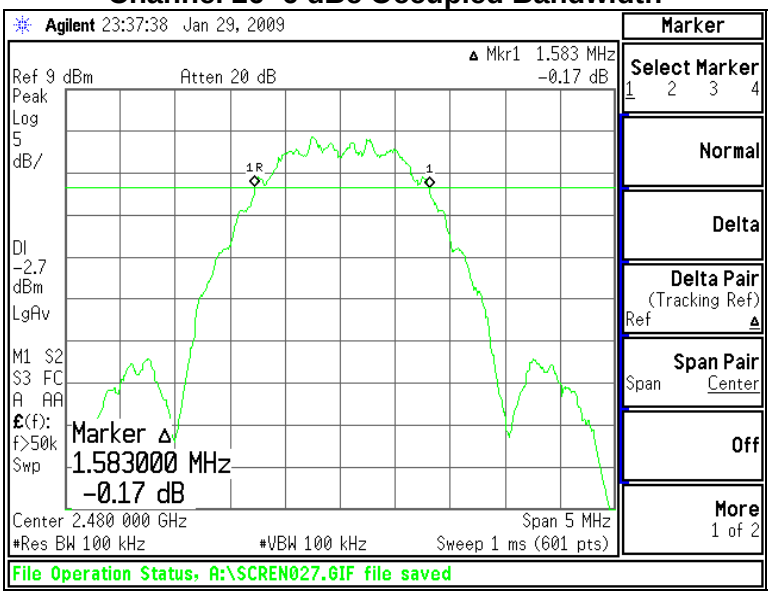
Channel 18 -6 dBc Occupied Bandwidth



Channel 18 -20 dBc Occupied Bandwidth



Channel 26 -6 dBc Occupied Bandwidth



Channel 26 -20 dBc Occupied Bandwidth

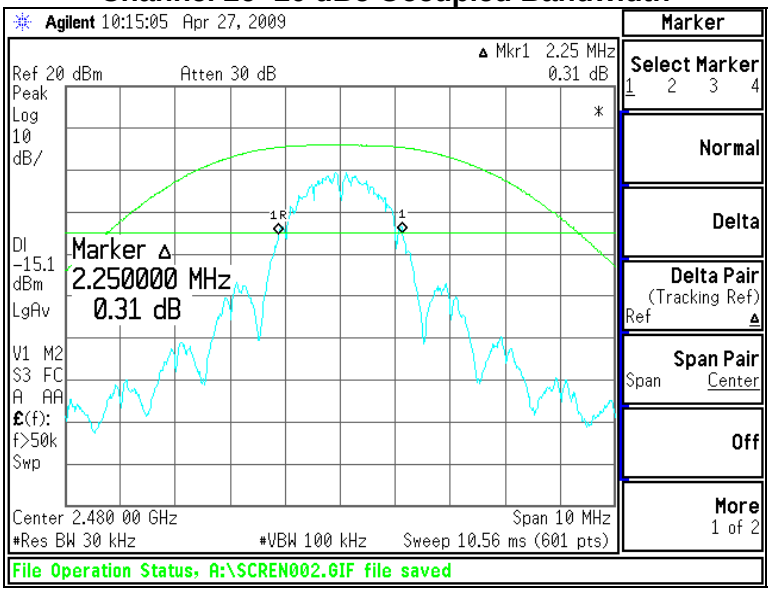


EXHIBIT 8. BAND-EDGE MEASUREMENTS

8.1 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. 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.

Lower Band-Edge Limit,

2.39 GHz = +54 dBµV/m at 3m

2.40 GHz = -20 dBc with respect to the peak fundamental radiated emissions.

Upper Band-Edge Limit,

2.4835 GHz =e + 54 dBµV/m at 3m.

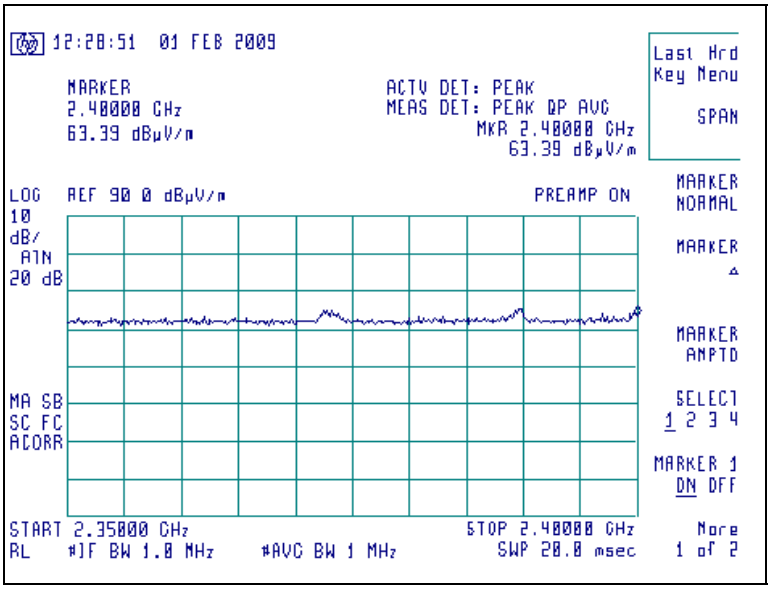
Test Data:

Channel	Power Setting	Frequency (MHz)	Peak (dBµV/m)	Average (dBµV/m)	Pass/Fail
11	8 dBm	2390	63.66	51.83	Pass
11	8 dBm	2400	63.39	51.19	Pass
25	8 dBm	2483.5	61.43	53.46	Pass
26	6 dBm	2483.5	60.96	52.9	Pass

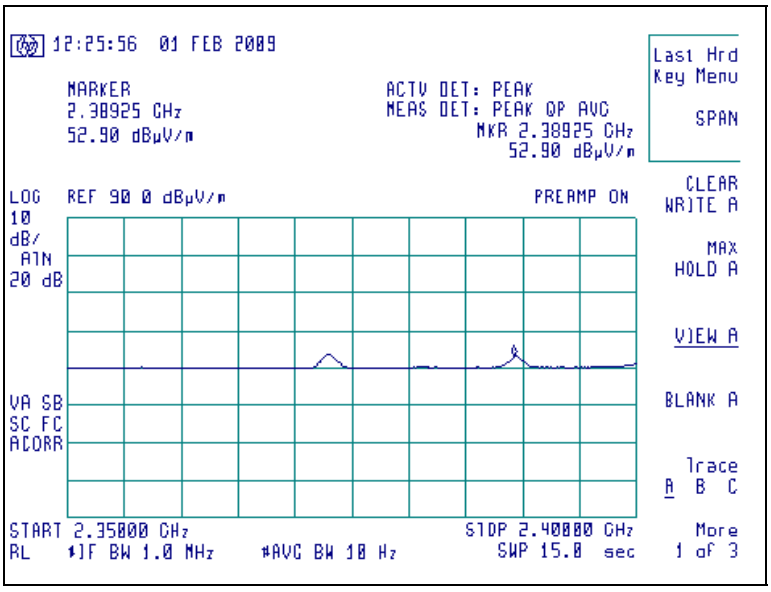
Please note that the power setting does not necessarily reflect the output power of the radio. The Power Setting denotes the number selected from the power setting menu on the firmware used to program the radio. The disparity between the power setting and the measured output power associated with the respective setting is due to loss resulting from some filtering implemented after the original design.

8.2 Screen Captures

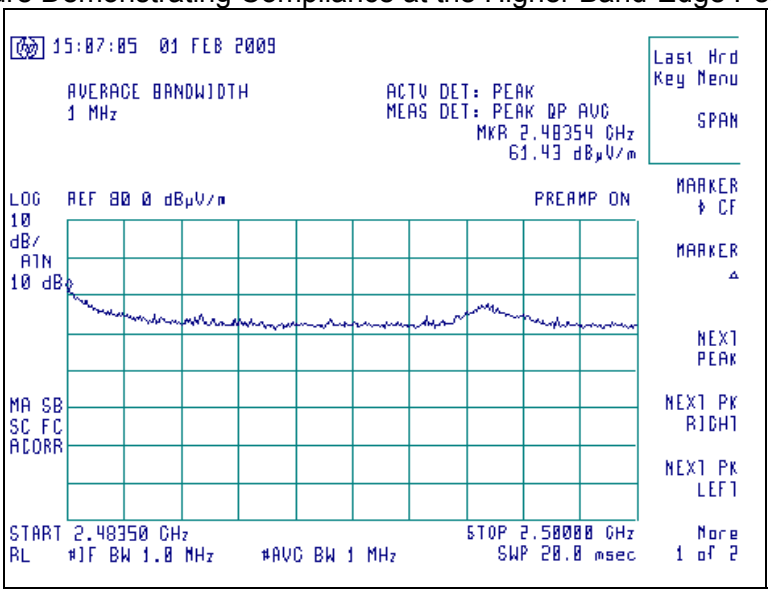
Screen Capture Demonstrating Compliance at the Lower Band-Edge Peak Emissions



Screen Capture Demonstrating Compliance at the Lower Band-Edge Average Emissions



Screen Capture Demonstrating Compliance at the Higher Band-Edge Peak Emissions



Screen Capture Demonstrating Compliance at the Higher Band-Edge Average Emissions

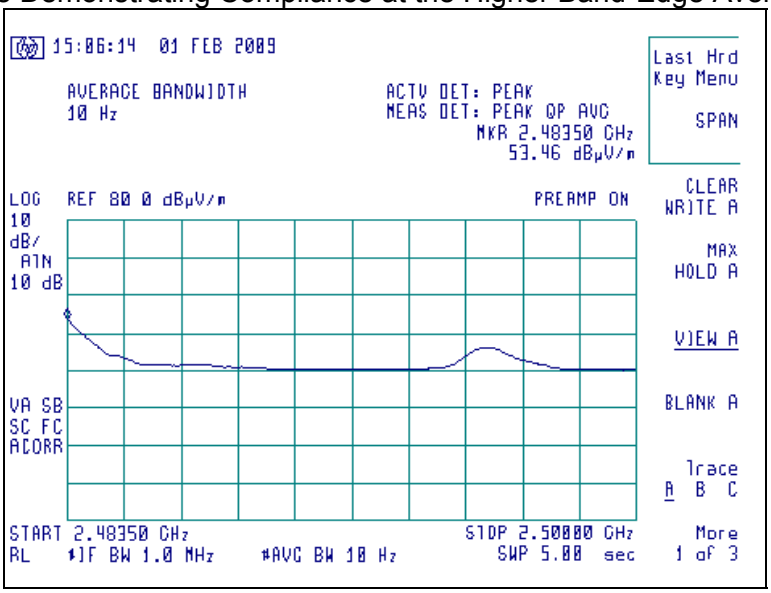


EXHIBIT 9. POWER OUTPUT (CONDUCTED): 15.247(b)

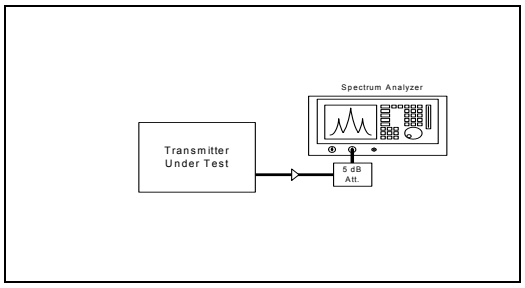
9.1 Method of Measurements

The conducted RF output power of the EUT was measured at the antenna port using a short RF cable along with an attenuator as protection for the spectrum analyzer. Correction factors for the RF cable were loaded onto the spectrum analyzer and the loss from the attenuator was added on the analyzer as gain offset. The unit was configured to run in a continuous transmit mode. The spectrum analyzer was used with resolution and video bandwidths set to 3 MHz, and a span of 5 MHz, with measurements from a peak detector presented in the chart below.

9.2 Test Data

Channel	Center Frequency (MHz)	Measured Power (dBm)	Limit (dBm)	Margin (dB)	Calculated EIRP (dBm)	EIRP Limit (dBm)	Calculated EIRP (mw)
11	2405	6.50	30	23.50	11.76	36.0	15.00
18	2440	6.61	30	23.39	11.87	36.0	15.38
26	2480	6.36	30	23.64	11.62	36.0	14.52

(1) EIRP Calculation:
EIRP = (Peak power at antenna terminal in dBm) + (EUT Antenna gain in dBi)



Rated RF power output (in watts): 0.00063 Watts

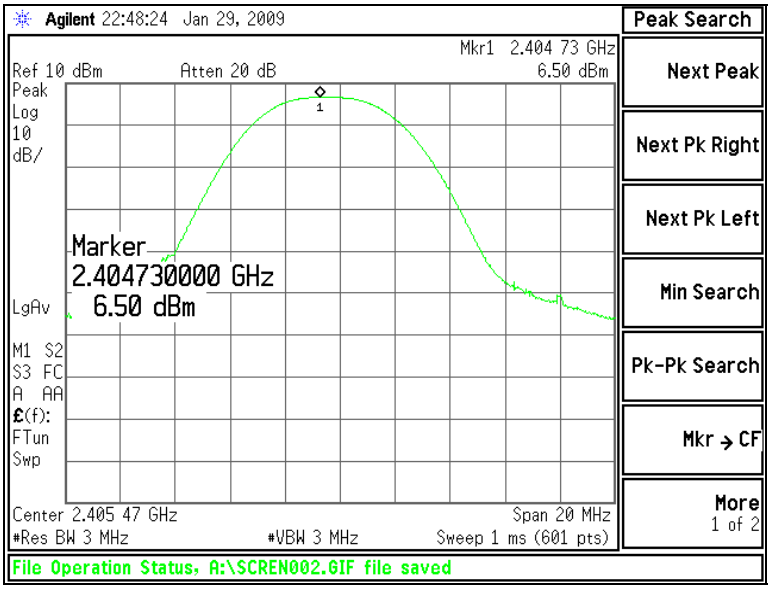
Measured RF Power Output (in Watts): 0.0015
Declared RF Power Output (in Watts):0.00063

9.3 Test Equipment List

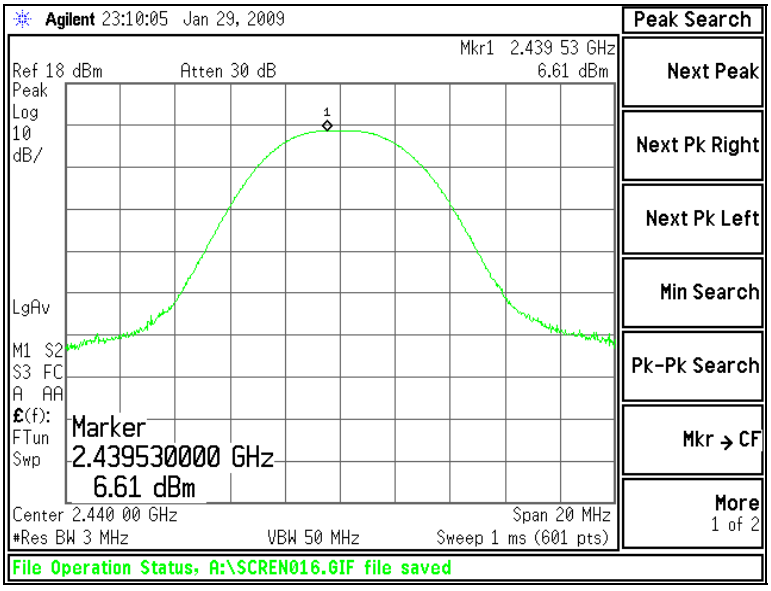
Test Equipment	Manufacturer	Model No.	Serial No.
Spectrum Analyzer	Agilent	E4446A	US45300564

9.4 Screen Captures – Power Output (Conducted)

Channel 11: 2405 MHz



Channel 18: 2440 MHz



Channel 26: 2480 MHz

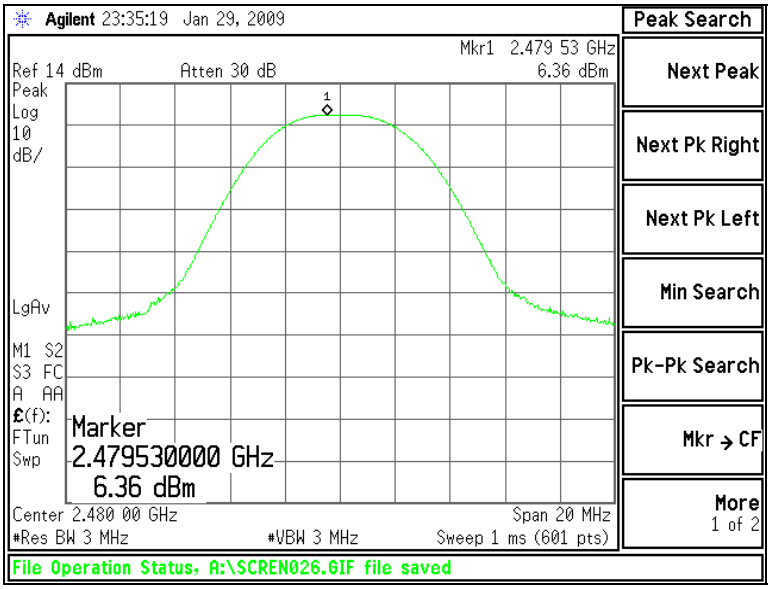


EXHIBIT 10. POWER SPECTRAL DENSITY: 15.247(e)

10.1 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), 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 HP Analyzer. The resultant density was then corrected to a 3 kHz bandwidth.

10.2 Test Equipment List

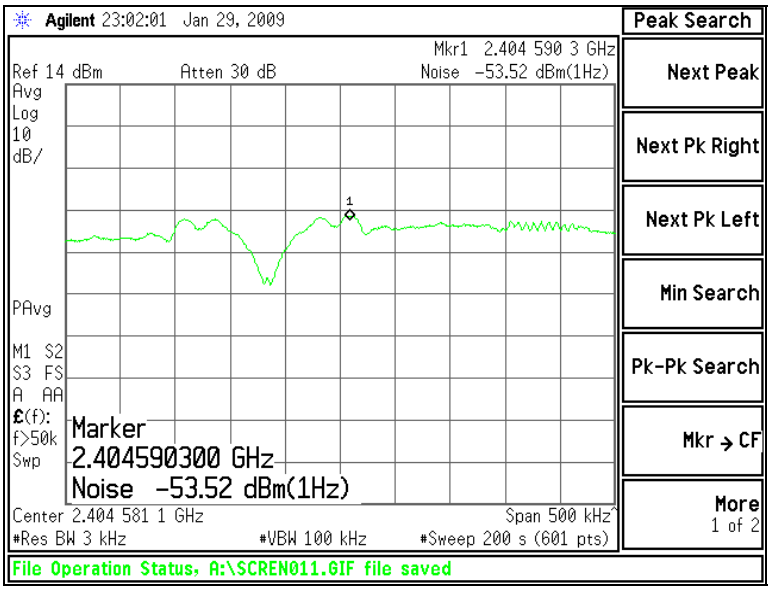
Test Equipment	Manufacturer	Model No.	Serial No.
Spectrum Analyzer	Agilent	E4446A	US45300564

10.3 Test Data

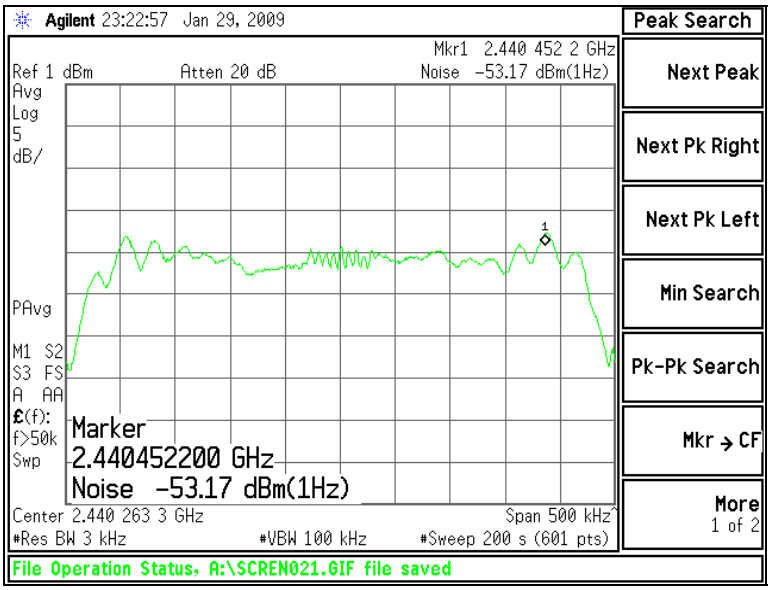
Channel	Center Frequency (MHz)	Measured Channel Power (dBm/1Hz)	3 kHz Correction (dB)	Corrected Power Measurement (dBm/3kHz)	Limit (dBm)	Margin
11	2405	-53.50	34.77	-18.73	8.0	26.7
18	2440	-53.17	34.77	-18.4	8.0	26.4
26	2480	-53.94	34.77	-19.17	8.0	27.2

10.4 Screen Captures – Power Spectral Density

Channel 11



Channel 18



Channel 26

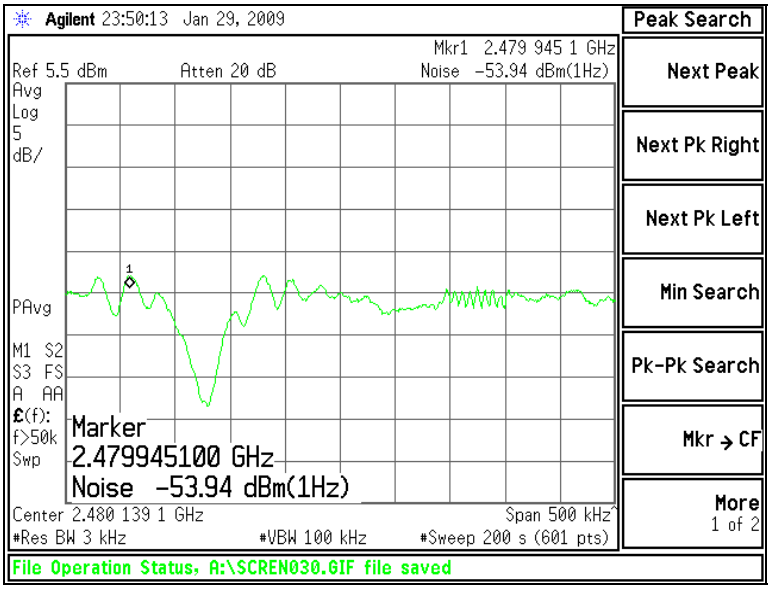

Agilent 23:50:13 Jan 29, 2009
Peak Search
Mkr1 2.479 945 1 GHz
Ref 5.5 dBm
Atten 20 dB
Noise -53.94 dBm(1Hz)
Next Peak
Avg
Log
5
dB/
Next Pk Right
Next Pk Left
PAvg
Min Search
M1 S2
S3 FS
A AA
£(f):
f>50k
Pk-Pk Search
Swp
Marker
2.479945100 GHz
Noise -53.94 dBm(1Hz)
Mkr → CF
More
1 of 2
Center 2.480 139 1 GHz
Span 500 kHz
#Res BW 3 kHz
#VBW 100 kHz
#Sweep 200 s (601 pts)
File Operation Status, A:\SCREN030.GIF file saved

EXHIBIT 11. SPURIOUS CONDUCTED EMISSIONS: 15.247(d)

11.1 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 lease 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.

For data from the radiated measurements, please refer to section 5.6 of this report.

FCC Part 15.247(d) 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 cable calibration file was loaded into the spectrum analyzer to compensate for the loss of the cable between the antenna port of the EUT to the spectrum analyzer. A Hewlett Packard 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. 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 -50 dBc of the fundamental level for this product.

11.2 Test Equipment List

Test Equipment	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer	Agilent	E4446A	US45300564	To 44 GHz

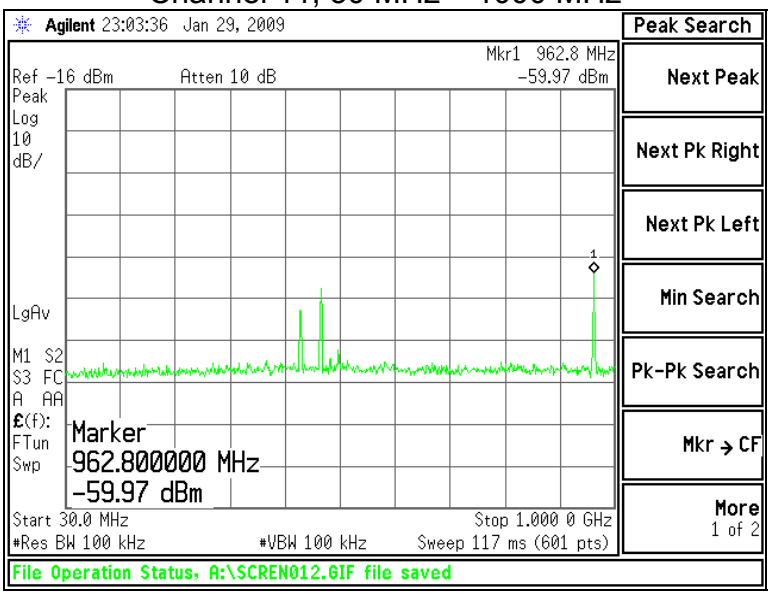
11.3 Test Data

	Channel 11	Channel 18	Channel 26
Fundamental	+ 1.39 (dBm)	+ 3.07 (dBm)	+ 1.58 (dBm)
2nd Harmonic	Note (1)	Note (1)	Note (1)
3rd Harmonic	Note (1)	Note (1)	Note (1)
4th Harmonic	- 57.59 (dBm)	- 62.61 (dBm)	- Note (1) (dBm)
5th Harmonic	- 69.57 (dBm)	- 66.17 (dBm)	- 61.37 (dBm)
6th Harmonic	Note (1)	Note (1)	Note (1)
7th Harmonic	- 72.79 (dBm)	Note (1)	Note (1)
8th Harmonic	Note (1)	Note (1)	Note (1)
9th Harmonic	Note (1)	Note (1)	Note (1)
10th Harmonic	Note (1)	Note (1)	Note (1)

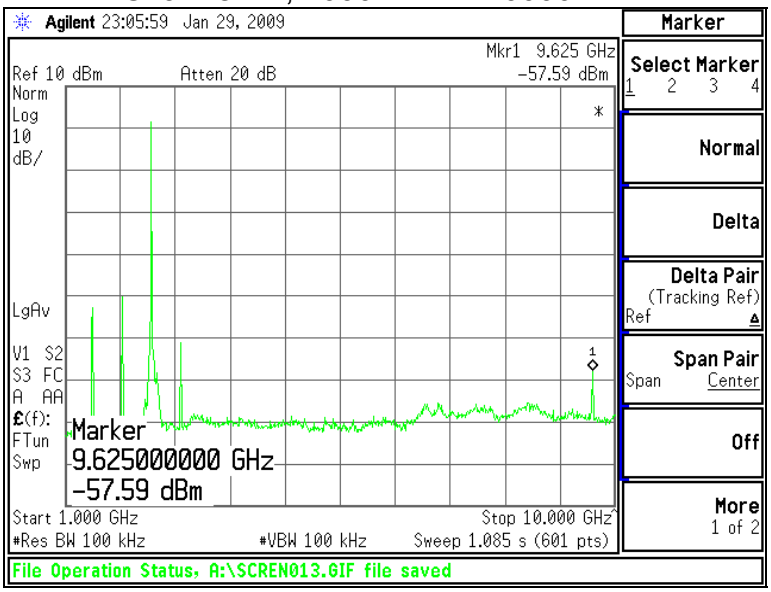
Notes:
(1) Measurement at system noise floor.

11.4 Screen Captures

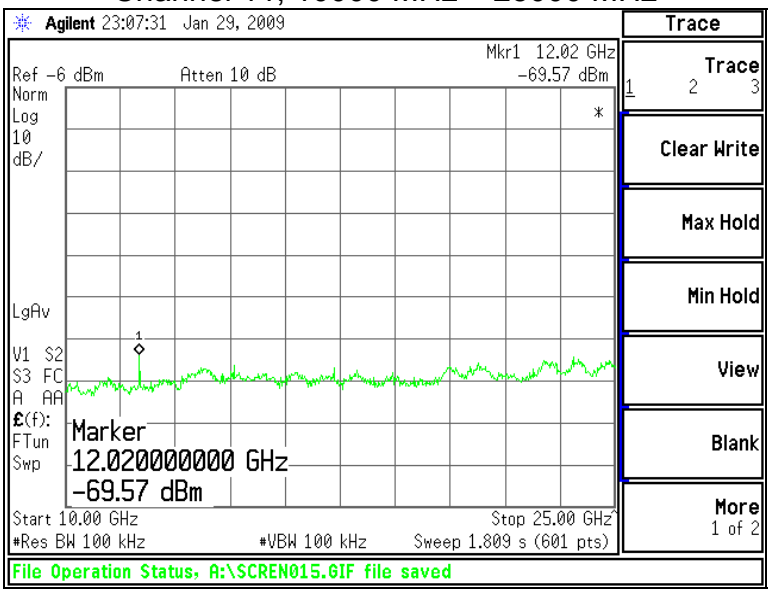
Channel 11, 30 MHz – 1000 MHz



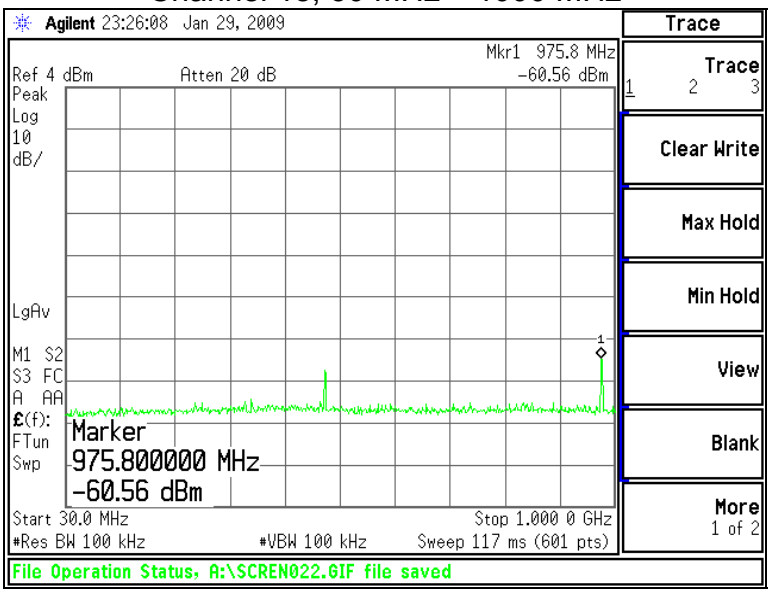
Channel 11, 1000 MHz – 10000 MHz



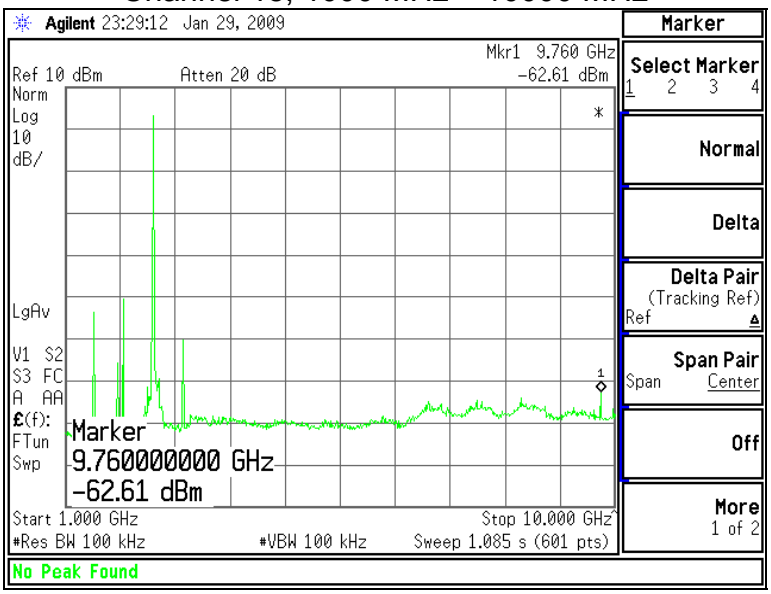
Channel 11, 10000 MHz – 25000 MHz



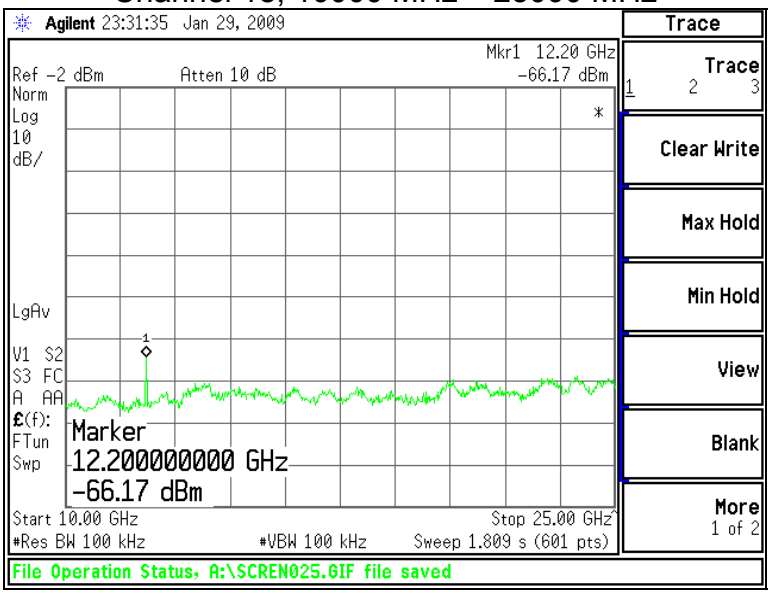
Channel 18, 30 MHz – 1000 MHz



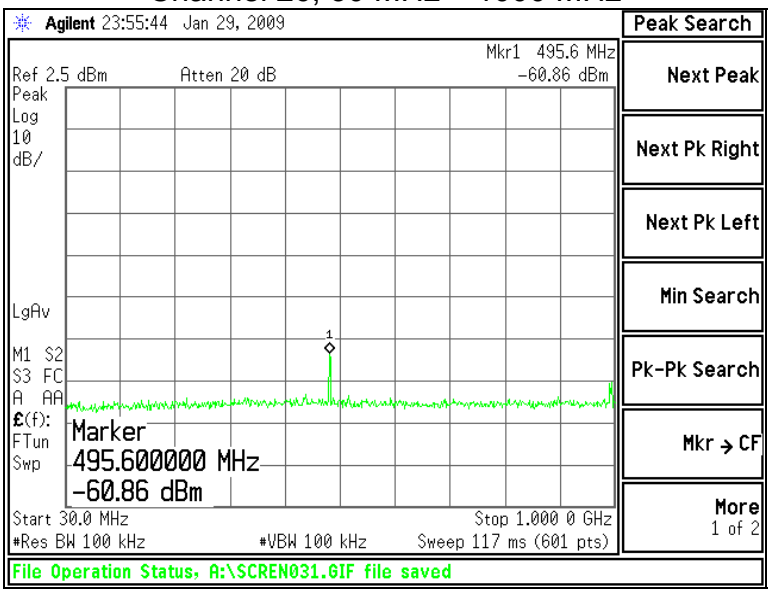
Channel 18, 1000 MHz – 10000 MHz



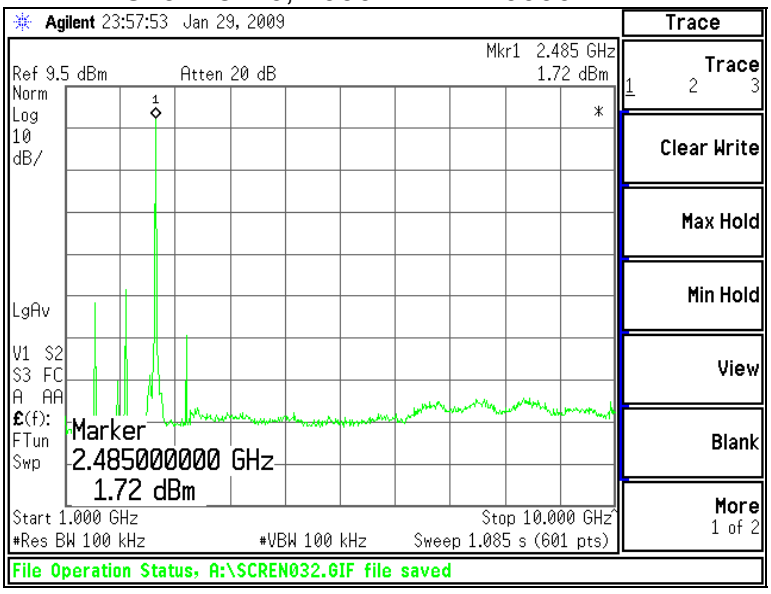
Channel 18, 10000 MHz – 25000 MHz



Channel 26, 30 MHz – 1000 MHz



Channel 26, 1000 MHz – 10000 MHz



Channel 26, 10000 MHz – 25000 MHz

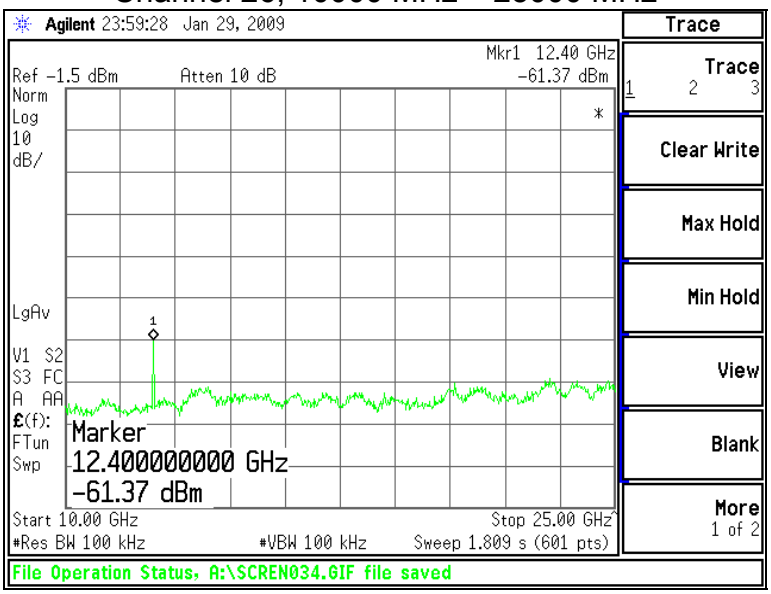


EXHIBIT 12. FREQUENCY & POWER STABILITY OVER VOLTAGE VARIATIONS

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 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.

In this case, the EUT uses a single type operates on a nominal voltage of 3.0 VDC. The test was performed to measure the stability of the frequency and power at ±15% of the nominal operating voltage: 2.55V and 3.45V.

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=10Hz settings while the voltage was varied.

	DC/AC Voltage Source		
	2.805 VDC	3.3 VDC	3.795 VDC
Channel 11	2405.014887 MHz	2405.015045 MHz	2405.014530 MHz
Channel 18	2440.015090 MHz	2440.015090 MHz	2440.014765 MHz
Channel 26	2480.015180 MHz	2480.015200 MHz	2480.014805 MHz

The RF Power Output of the EUT was also monitored in a separate test, also using a Spectrum Analyzer with RBW=VBW=1 MHz setting while the voltage was varied.

	DC/AC Voltage Source		
	2.805 VDC	3.3 VDC	3.795 VDC
Channel 11	5.507 dBm	5.689 dBm	5.507 dBm
Channel 18	5.615 dBm	5.818 dBm	5.611 dBm
Channel 26	5.248 dBm	5.23 dBm	5.273 dBm

EXHIBIT 13. MPE CALCULATIONS

The following MPE calculations are based on a 1.8 centimeter inverted-F printed circuit board trace antenna, with a measured ERP of 107.1 dBµV/m, at 3 meters, and conducted RF power of +6.61 dBm as presented to the antenna. The calculated gain of this antenna, based on the ERP measurements is 5.25 dBi.

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	6.61	(dBm)
Maximum peak output power at antenna input terminal:	4.581	(mW)
Antenna gain(typical):	5.25	(dBi)
Maximum antenna gain:	3.350	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2400	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm^2)

Power density at prediction frequency:	0.003053	(mW/cm^2)
Maximum allowable antenna gain:	30.4	(dBi)
Margin of Compliance at 20 cm =	25.2	dB

APPENDIX A

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 13-Jan-2009 Type Test : Radiated Emissions Radio EMC Job # : C-504

Prepared By: Bott Customer : CEL Quote #: 308481

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/26/2008	9/26/2009	Active Calibration
2	AA 960144	Phaseflex	Gore	EkD01D010720	5800373	6/10/2008	6/10/2009	Active Calibration
3	AA 960004	Log Periodic Antenna	EMCO	93146	9512-4276	8/28/2008	8/28/2009	Active Calibration
4	AA 960005	Biconical Antenna	EMCO	93110B	9601-2280	6/17/2008	6/17/2009	Active Calibration
5	AA 960081	Double Ridge Horn Antenna	EMCO	3115	6907	9/26/2008	9/26/2009	Active Calibration
6	EE 960013	EMI Receiver	HP	8546A System	3617A00320;3448A	9/23/2008	9/23/2009	Active Calibration
7	EE 960014	EMI Receiver-filter section	HP	85460A	3448A00296	9/23/2008	9/23/2009	Active Calibration
8	AA 960063	Pyramidal Horn Antenna	EMCO	3160-09	9809-1120	6/17/2008	6/17/2009	Active Calibration

Note 1 - Equipment calibrated within a traceable system.

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 13-Jan-2009 Type Test : Conducted Power Output Job # : C-504

Prepared By: Bott Customer : CEL Quote #: 308481

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/26/2008	9/26/2009	Active Calibration
2	AA 960144	Phaseflex	Gore	EkD01D010720	5800373	6/10/2008	6/10/2009	Active Calibration

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 13-Jan-2009 Type Test : Occupied Bandwidth (20dB) Job # : C-504

Prepared By: Bott Customer : CEL Quote #: 308481

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/26/2008	9/26/2009	Active Calibration
2	AA 960144	Phaseflex	Gore	EkD01D010720	5800373	6/10/2008	6/10/2009	Active Calibration

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 13-Jan-2009 Type Test : Conducted Emissions Job # : C-504

Prepared By: Bott Customer : CEL Quote #: 308481

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960013	EMI Receiver	HP	8546A System	3617A00320;3448A	9/23/2008	9/23/2009	Active Calibration
2	EE 960014	EMI Receiver-filter section	HP	85460A	3448A00296	9/23/2008	9/23/2009	Active Calibration
3	AA 960009	LISN	EMCO	3810/2NM	9509-1152	9/24/2008	9/24/2009	Active Calibration
4	AA 960031	Transient Limiter	HP	11947A	3107A01708	9/23/2008	9/23/2009	Active Calibration

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

Appendix B

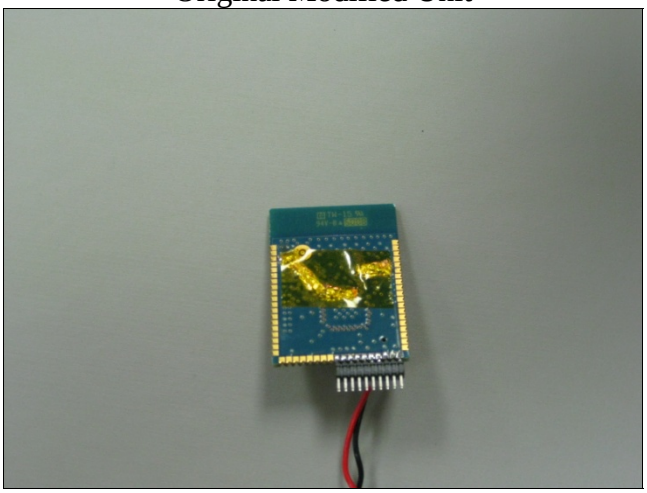
Unit Modifications

The original production run of the module had a split ground plane. Because the split ground plane was responsible for a compliance issue, the planes were soldered together and copper tape was placed on top of the bonding solder bead. The modification was sufficient to fix the failure, and CEL stated that production units would be constructed with a single ground plane. The remainder of the FCC testing was completed with the original modified unit.

Once a new production run with the single ground plane was complete, a sample was sent to LS Research so measurements could be taken and compared to the original modified unit. The frequencies that failed on the original unmodified unit were measured on the unit from the most recent production line, and the values were within 2 dB of the modified unit.

Below are images of the original modified unit and the single ground plane unit from the subsequent production run.

Original Modified Unit



Single Ground Plane Unit