LS RESEARCH, LLC
WIRELESS PRODUCT DEVELOPMENT
ACCREDITED
Testing Cert. 1255.01
W66 N220 Commerce Court ● Cedarburg, WI 53012 ● USA
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TEST REPORT # 310138
LSR Job #: C-912

Compliance Testing of:
INNCOM GS2

Test Date(s):
May 18th and 29th, June 15th and 24th , July 6th to 10th 2010

Prepared For:
INNCOM International
277 West Main Street
Niantic, CT 6357

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: 07.26.10

Test Report Reviewed by:	**Tested by:**
Signature: Thomas T. Smith Date: 07.26.10	Khairul Aidi Zainal, Senior EMC Engineer Signature: Date: 07.21.10

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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 Annex 8	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 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:	**INNCOM International**
Address:	**277 West Main St. Niantic CT. 6357**
Contact Name:	**Ryan Gardner**

2.2 EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information has been supplied by the applicant.

Product Name:	GS2
Model Number:	02-7060
Serial Number:	Engineering prototype

2.3 ASSOCIATED ANTENNA DESCRIPTION

The antenna used is a Johanson Technology (part number: 2450AT43B100) 2.4GHz ceramic antenna.

2.4 EUT'S TECHNICAL SPECIFICATIONS

Additional Information:

EUT Frequency Range (in MHz)	2405 to 2480 MHz
RF Power in Watts	
Minimum:	0.00027 Watts
Maximum:	0.00104 Watts
Conducted Output Power (in dBm)	-0.1 dBm
Field Strength at 3 meters	95.4 dBµV/m at 2475MHz
Occupied Bandwidth	20 dB (99%) = 3.13 MHz 6 dB =1.68 MHz
Type of Modulation	QPSK DSSS
Emission Designator	3M13G1D
EIRP (in mW)	1.2 mW
Transmitter Spurious (worst case) at 3 meters	53.4 dBuV/m at 4950 MHz
Stepped (Y/N)	N
Step Value:	N/A
Frequency Tolerance %, Hz, ppm	Better than 100 ppm
Microprocessor Model # (if applicable)	ST Micro STM32F101 ARM
Antenna Information	
Detachable/non-detachable	Non-detachable
Type	Ceramic chip antenna
Gain (in dBi)	Peak =1.0 dBi Average = -0.5 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?	Mobile

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: 0.00245 ☐ V/m ☐ A/m ☒ W/m^2
  ☐ Measured ☐ Computed ☒ Calculated

2.5 PRODUCT DESCRIPTION

The GS2 is an easy to use lighting, drape and amenities control system. The GS2 allows guest control of multiple loads from many locations. In combination with the Wall Box Infrastructure (WBI), the system consists of user interfaces, low voltage interfaces, wired and wireless communications, wall box dimmers and wall box switches designed to operate within INNCOM's Integrated Room Automation System (IRAS).

EXHIBIT 3. EUT OPERATING CONDITIONS & CONFIGURATIONS DURING TESTS

3.1 CLIMATE TEST CONDITIONS

Temperature:	71° Fahrenheit
Humidity:	52%
Pressure:	751.8 mmHg

3.2 APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC and IC Paragraph	Test Requirements	Compliance (yes/no)
FCC : 15.207 IC : RSS GEN sect. 7.2.2	Power Line Conducted Emissions Measurements	Yes
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)**

The power level of channel 26 (2480MHz) was lowered to -3.4dBm to comply with band-edge requirements. The next highest channel, channel 25 (2475), was maintained at the highest power level.

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, 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 continuously transmitting modulated mode using power as provided by the AC mains. The unit has the capability to operate on 7 channels, controllable via a push-button integrated onto the EUT PC board.

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 four (4) standard channels: **2405 MHz**, **2445 MHz**, **2475MHz** and high **2480MHz** to comply with FCC Part 15.35.

Note: All channels except channel 2480 operates at the same power level. Channel 2480 MHz is operating at a lower power level.

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. From 18 GHz to 25 GHz, the EUT was measured using a standard gain Horn Antenna and pre-amplifier.

In the frequency range of 30 MHz to 4 GHz, the maximum radiated RF emissions were found by raising and lowering the antenna between 1 and 4 meters in height while for the range of 4 GHz to 25 GHz the antenna was raised and lowered between 1 and 1.8 meters in height. In addition, the polarity of the antenna was switched between horizontal and vertical polarity.

The EUT was positioned it its normal operation orientation for the duration of the test.

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 IEC/ISO 17025 accredited calibration laboratory, traceable to the SI standard. In addition, the Connecting Cables were measured for losses using a calibrated Signal Generator and an EMI Receiver. 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 resolution bandwidths as prescribed in ANSI C63.4.

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, 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

5.6 RADIATED EMISSIONS TEST DATA CHART

Measurements of Electromagnetic Radiated Emissions
Frequency Range Inspected: 30 MHz to 25000 MHz

Manufacturer:	Inncom International						
Date(s) of Test:	May 18th and 29th , June 15th and 24th , July 6th to 10th 2010						
Project Engineer:	Khairul Aidi Zainal						
Test Engineer(s):	Khairul Aidi Zainal and Ryan Urness						
Voltage:	120 VAC						
Operation Mode:	continuous transmit, modulated						
Environmental Conditions in the Lab:	Temperature: 71° F Relative Humidity: 52 %						
EUT Power:	X	Single Phase 120 VAC		3 Phase ___VAC			
		Battery		Other:			
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 (other than harmonics) found:

Frequency	Antenna	EUT	Height	Azimuth	Peak	Q.Peak	Average	Limit	Margin
MHz			(m)	(0° - 360°)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
3958.0	H	V	1.00	0	49.1	44.1	36.3	54.0	17.7
186.5	H	V	1.15	74	25.5	21.2	16.6	43.0	21.9
38.2	V	V	1.33	0	26.1	22.2	15.5	40.0	17.8
81.7	V	V	1.00	249	28.8	24.6	19.5	40.0	15.4
79.9	V	V	1.24	103	27.8	26.0	19.0	40.0	14.1
159.2	V	V	1.00	191	28.6	24.8	16.7	43.0	18.2
120.4	V	V	1.00	153	28.3	24.0	18.7	43.0	19.0

Note:
1. H = Horizontal, V = Vertical polarization.
2. EUT is always in vertical orientation.

RADIATED EMISSIONS DATA CHART *(continued)*

The following table depicts the level of harmonic emissions seen on Channel 2405:

Antenna Polarization	Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (°)
Vertical	4810	63.6	56.7	63.5	6.8	106.5	312
Vertical	7215	58.1	47.9	84.2	36.3	100.0	32
Horizontal	9620	53.1	43.0	84.2	41.2	108.8	323
Horizontal	12025	51.3	41.3	63.5	22.2	118.7	327
Vertical	14430	52.1	40.0	84.2	44.2	104.4	7
Horizontal	16835	52.4	40.5	84.2	43.7	102.5	5
	19240		Note 3				
	21645		Note 3				
	24050		Note 3				

The following table depicts the level of harmonic emissions seen on Channel 2445:

Antenna Polarization	Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (°)
Vertical	4890	67.2	60.4	63.5	3.1	104.5	309
Horizontal	7335	58.8	48.3	63.5	15.2	108.5	16
Horizontal	9780	58.1	48.4	82.9	34.5	108.3	333
Vertical	12225	53.6	43.3	63.5	20.2	115.4	310
Horizontal	14670	51.8	39.9	82.9	43.0	104.8	9
Horizontal	17115	54.6	42.7	82.9	40.2	102.8	8
	19560		Note 3				
	22005		Note 3				
	24450		Note 3				

The following table depicts the level of harmonic emissions seen on Channel 2475:

Antenna Polarization	Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (°)
Vertical	4950	69.4	62.9	63.5	0.6	106.4	343
Vertical	7425	70.3	59.6	63.5	3.9	100.0	357
Vertical	9900	60.1	49.7	84.9	35.2	114.6	216
Vertical	12375	53.0	43.1	63.5	20.4	118.8	230
Horizontal	14850	51.7	40.0	84.9	44.9	100.0	18
Horizontal	17325	55.7	43.5	84.9	41.4	104.1	5
	19800		Note 3				
	22275		Note 3				
	24750		Note 3				

The following table depicts the level of harmonic emissions seen on Channel 2480:

Antenna Polarization	Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (°)
Vertical	4960	66.4	58.7	63.5	4.8	104.8	340
Vertical	7440	54.9	45.3	63.5	18.2	107.2	35
Vertical	9920	50.3	39.4	79.0	39.6	102.7	214
Vertical	12400	50.6	37.8	63.5	25.7	107.2	2
Horizontal	14880	52.1	39.9	79.0	39.1	109.5	5
Horizontal	17360	56.4	44.1	79.0	34.9	104.1	6
	19840		Note 3				
	22320		Note 3				
	24800		Note 3				

Notes:

1) A Peak Detector was used in measurements above 1 GHz, for average measurement, the peak detector was used with lower VBW. 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 meter of separation from the EUT.
3) Measurement at receiver system noise floor.

The following table depicts the level of radiated fundamental :

Frequency MHz	Antenna	EUT	Height (m)	Azimuth (0° - 360°)	Peak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2405.0	V	V	1.07	290	96.0	94.7	125.2	30.5
2445.0	H	V	1.15	358	94.8	93.4	125.2	31.8
2475.0	V	V	1.02	324	97.0	95.4	125.2	29.9
2480.0	H	V	1.21	176	90.9	89.5	125.2	35.7

Note:

1. H = Horizontal, V = Vertical polarization.
2. EUT is always in vertical orientation.

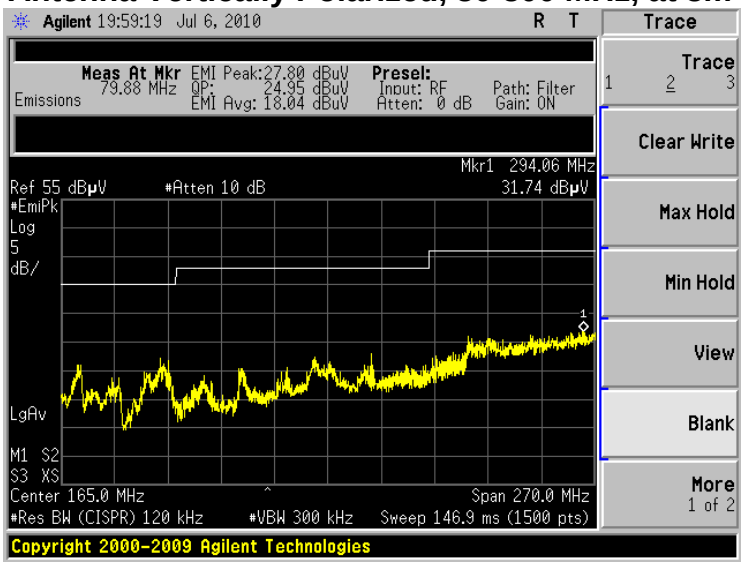
5.7 Test Setup Photo(s) – Radiated Emissions Test

5.8 Screen Captures - Radiated Emissions Test

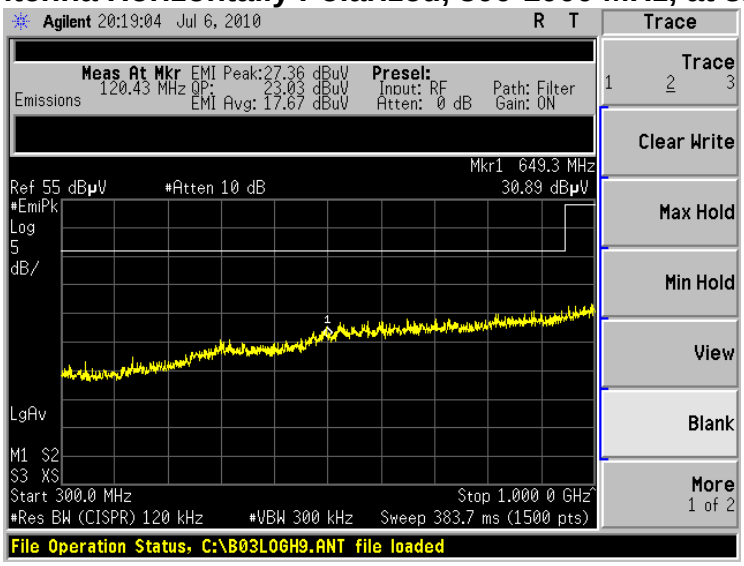
These screen captures represent Peak Emissions. For radiated emission measurements, a Quasi-Peak detector function is utilized when measuring frequencies below 1 GHz, and a peak detector with video averaging is utilized when measuring frequencies above 1 GHz.

The signature scans shown here are from worst-case emissions, as measured on channels 2405 MHz, 2445 MHz, 2475 MHz or 2480 MHz, with the sense antenna both in vertical and horizontal polarity for worst case presentations.

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

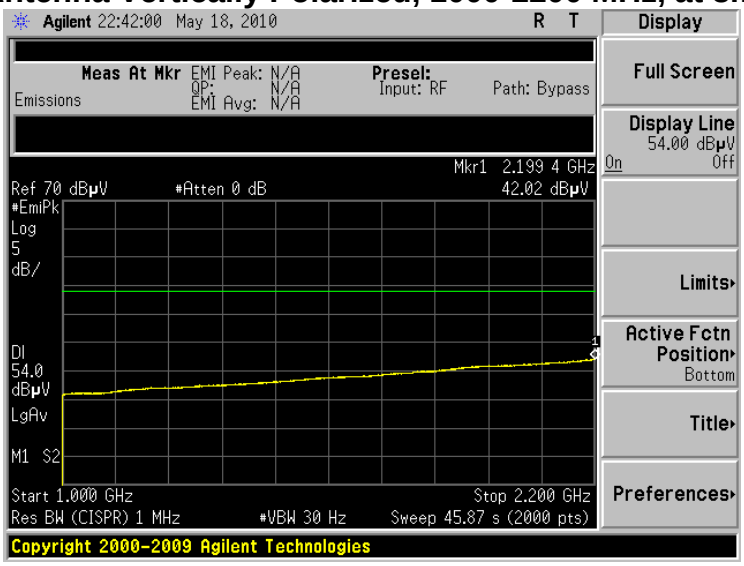


Antenna Horizontally Polarized, 300-1000 MHz, at 3m

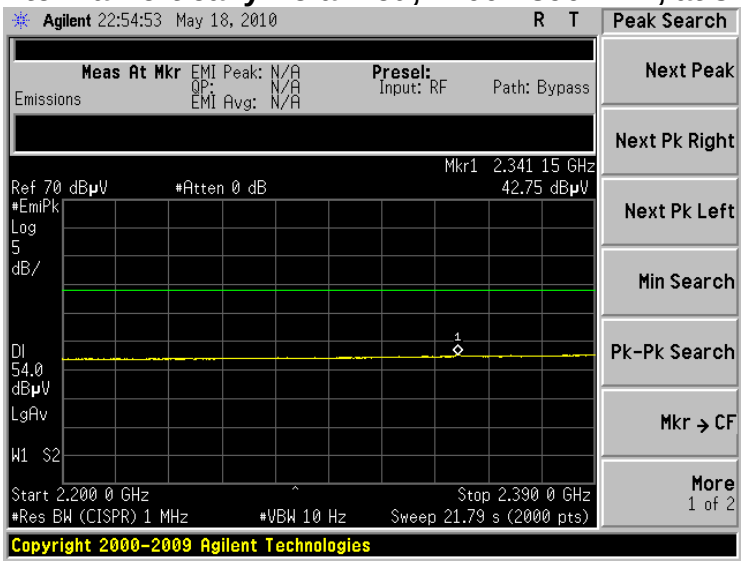


Screen Captures - Radiated Emissions Testing *(continued)*

Antenna Vertically Polarized, 1000-2200 MHz, at 3m

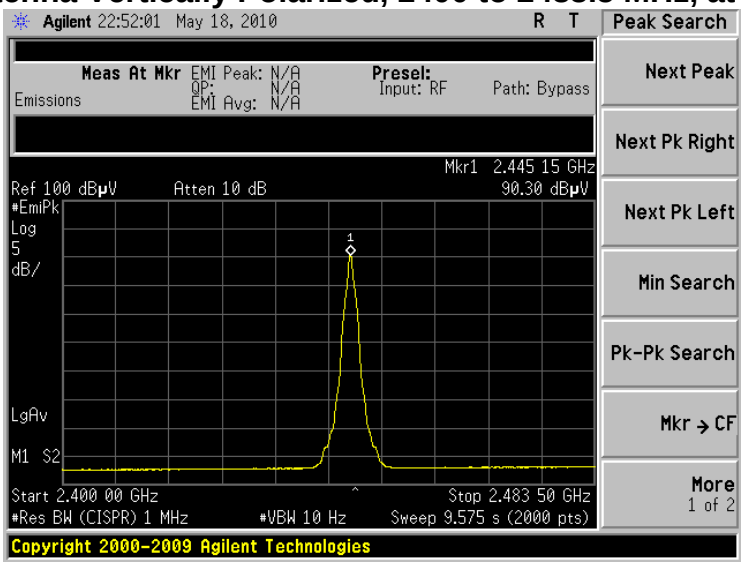


Antenna Vertically Polarized, 2200-2390 MHz, at 3m

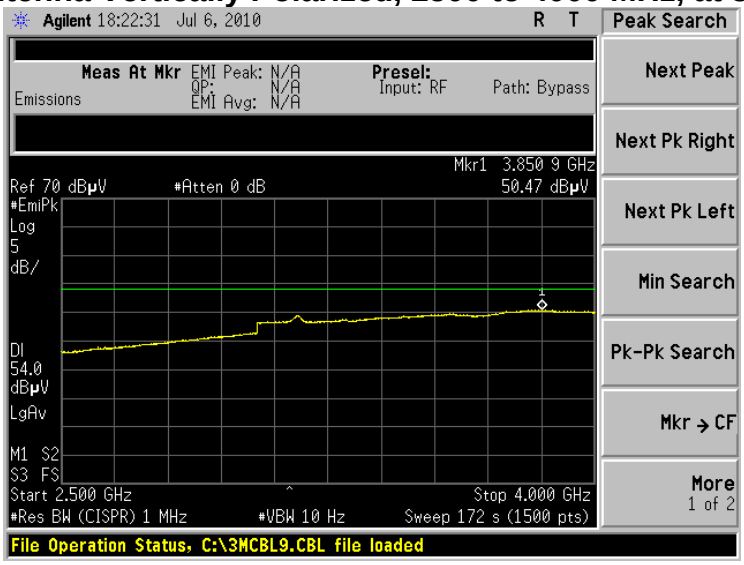


Screen Captures - Radiated Emissions Testing *(continued)*

Antenna Vertically Polarized, 2400 to 2483.5 MHz, at 3m



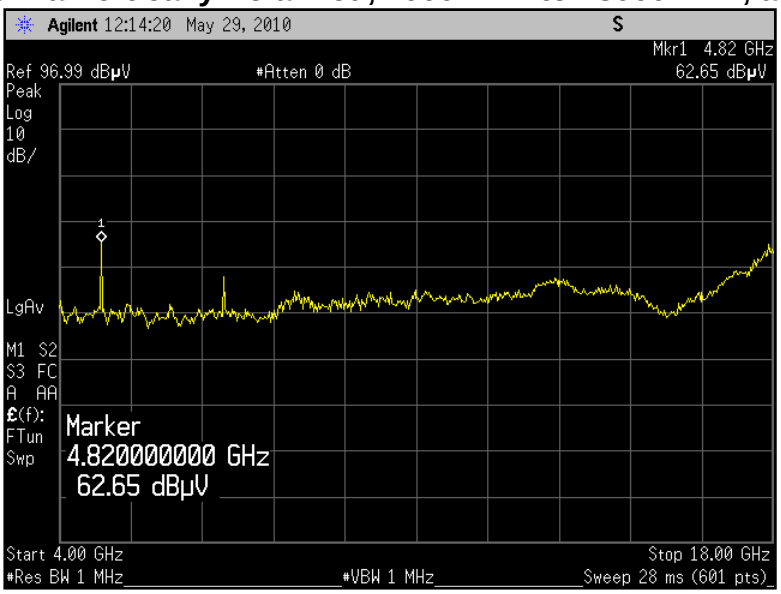
Antenna Vertically Polarized, 2500 to 4000 MHz, at 3m



Note: The ranges 2390 MHz to 2400 MHz and 2483.5 MHz to 2500 MHz will be in the band edge section (Exhibit 8).

Screen Captures - Radiated Emissions Testing *(continued)*

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



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

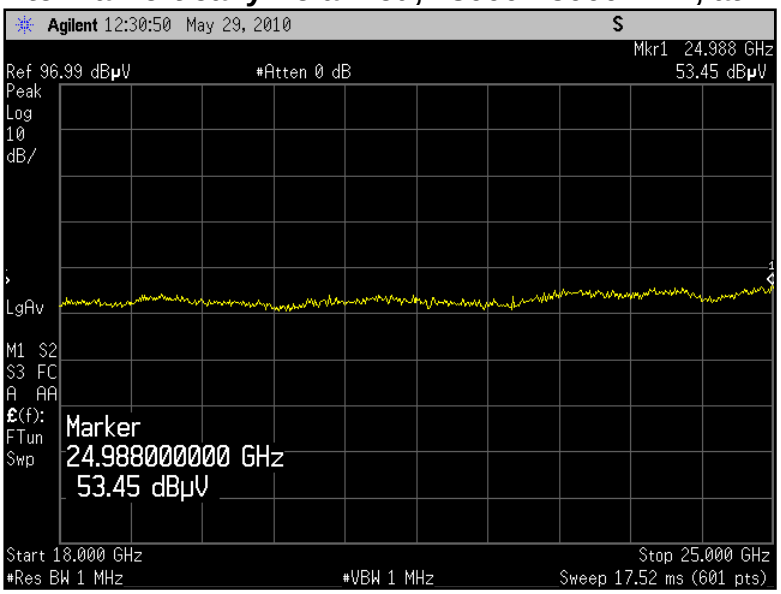


EXHIBIT 6. CONDUCTED EMISSIONS TEST, AC POWER LINE:

6.1 Test Setup

The test area and setup are in accordance with ANSI C63.4 and with Title 47 CFR, FCC Part 15, Industry Canada RSS-210 and RSS GEN. The EUT was placed on a non-conductive wooden table, with a height of 80 cm above the reference ground plane. The EUT's power cable was plugged into a 50Ω (ohm), 50/250 μH Line Impedance Stabilization Network (LISN). The AC power supply of 120V was provided 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 EMI receiver System. 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. The appropriate frequency range and bandwidths were selected on the EMI Receiver, and measurements were made. The bandwidth used for these measurements is 9 kHz, as specified in CISPR 16-1, Section 1, Table 1, for Quasi-Peak and Average detectors in the frequency range of 150 kHz to 30 MHz. Final readings were then taken and recorded.

6.3 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 were performed at an IEC/ISO 17025 accredited calibration laboratory, traceable to the SI standard. All cables are calibrated and checked periodically for conformance. The emissions are measured on the EMI System, which has automatic correction for all factors stored in memory and allows direct readings to be taken.

6.4 Test Results

The EUT was found to **MEET** the Conducted Emission requirements of FCC Part 15.207 and RSS GEN 7.2.2 for Conducted Emissions for an Intentional Radiator. See the Data Charts and Graphs for more details of the test results.

6.5 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.			

6.6 CONDUCTED EMISSIONS TEST DATA CHART

Frequency Range inspected: 150 KHz to 30 MHz

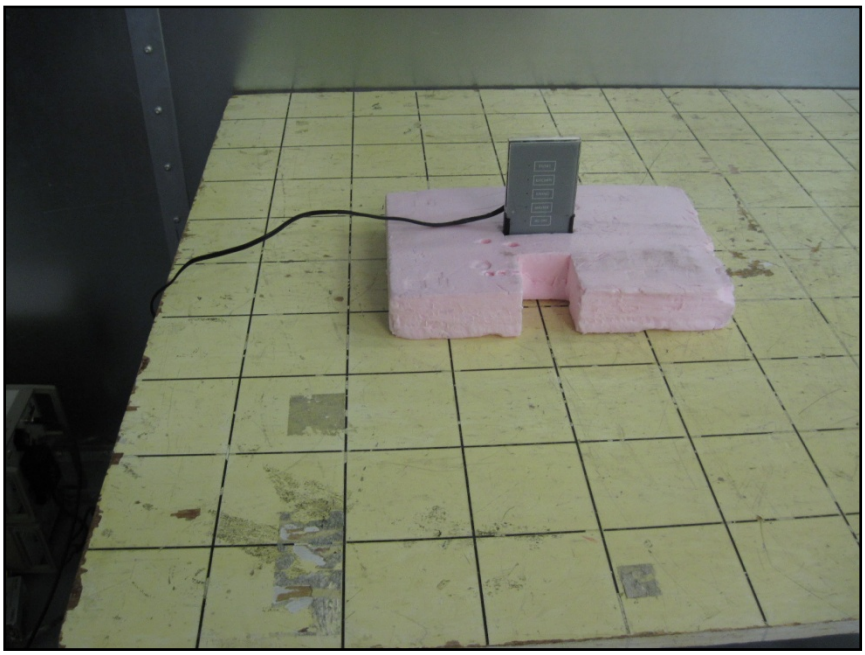
Manufacturer:	INNCOM International					
Date(s) of Test:	July 10th 2010					
Project Engineer:	Khairul Aidi Zainal					
Test Engineer:	Khairul Aidi Zainal					
Voltage:	120 VAC					
Operation Mode:	continuous transmit and modulated					
Environmental Conditions in the Lab:	Temperature: 23° C Relative Humidity: 48 %					
Test Location:	X	AC Mains Test area				Chamber
EUT Placed On:	X	40cm from Vertical Ground Plane				10cm Spacers
	X	80cm above Ground Plane				Other:
Measurements:		Pre-Compliance		Preliminary	X	Final
Detectors Used:		Peak	X	Quasi-Peak	X	Average

		QUASI-PEAK			AVERAGE		
Frequency (MHz)	Line	Q-Peak Reading (dBµV)	Q-Peak Limit (dBµ V)	Quasi-Peak Margin (dB)	Average Reading (dBµV)	Average Limit (dBµ V)	Average Margin (dB)
0.460	1.0	29.9	56.7	26.8	18.2	46.7	28.5
1.600	1.0	23.0	56.0	33.0	16.5	46.0	29.5
4.000	1.0	27.2	56.0	28.8	24.7	46.0	21.3
0.459	2.0	31.8	56.7	24.9	24.0	46.7	22.7
0.907	2.0	23.0	56.0	33.0	17.2	46.0	28.8
2.803	2.0	20.6	56.0	35.4	15.4	46.0	30.6

Notes:

1) The emissions listed are characteristic of the power supply used, and did not change by the EUT.
2) All other emissions were better than 20 dB below the limits.
3) The EUT exhibited similar emissions across the Low, Middle and High channels tested.

6.7 Test Setup Photo(s) – Conducted Emissions Test

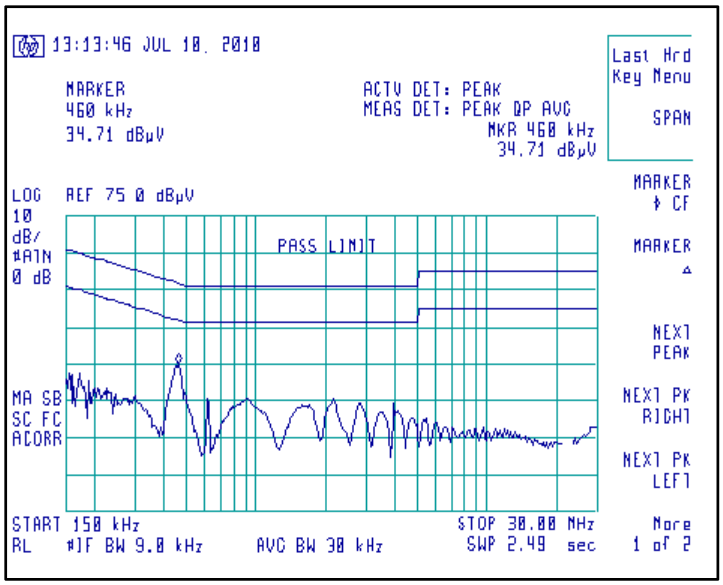


6.8 Screen Captures – Conducted Emissions Test

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 and RSS GEN 7.2.2 (Table 2).

The signature scans shown here are from channel 2445 MHz, chosen as being a good representative of channels.

Line 1



Line 2

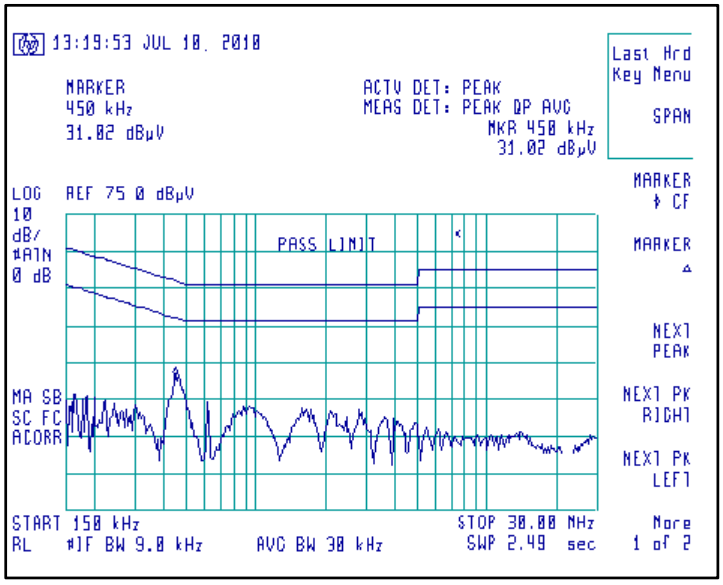


EXHIBIT 7. OCCUPIED BANDWIDTH:

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 (2007) 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 100 kHz RBW and VBW=300 kHz.

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 aspectrum analyzer. An attenuator was placed in series with the cable to protect the spectrum analyzer. The loss from the cable and the attenuator were added on the analyzer as gain offset settings, allowing direct measurements, without the need for any further corrections. The 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.

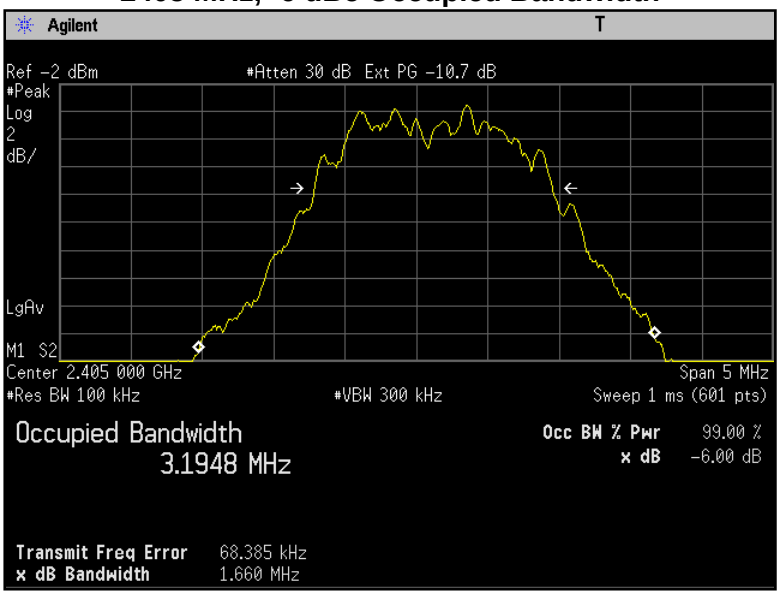
From this data, the closest measurement (6 dB bandwidth) when compared to the specified limit, is **1660 kHz**, which is above the minimum of 500 kHz.

7.3 Test Data

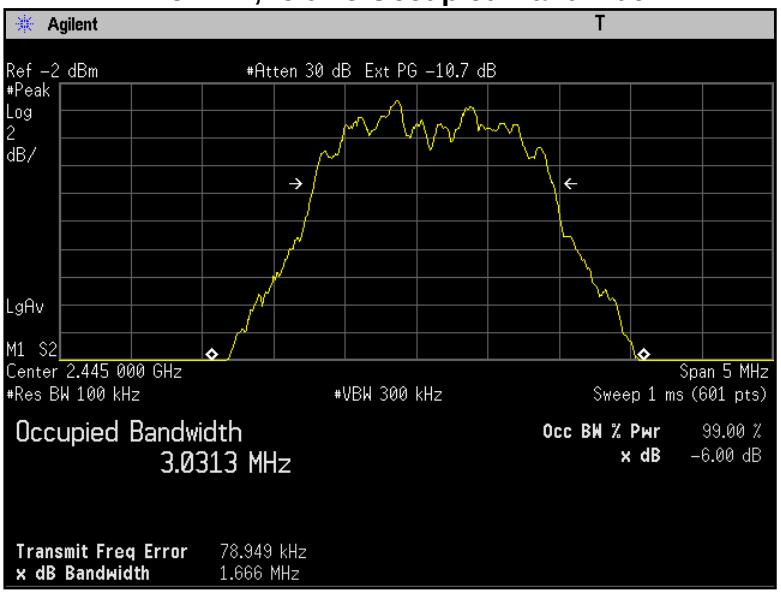
Center Frequency (MHz)	Measured -6 dBc Occ. BW (kHz)	Minimum -6 dBc Limit (kHz)	Measured -20 dBc Occ.Bw (MHz)
2405	1660	500	3.13
2445	1670	500	2.70
2475	1680	500	2.77
2480	1660	500	2.58

7.4 Screen Captures - OCCUPIED BANDWIDTH

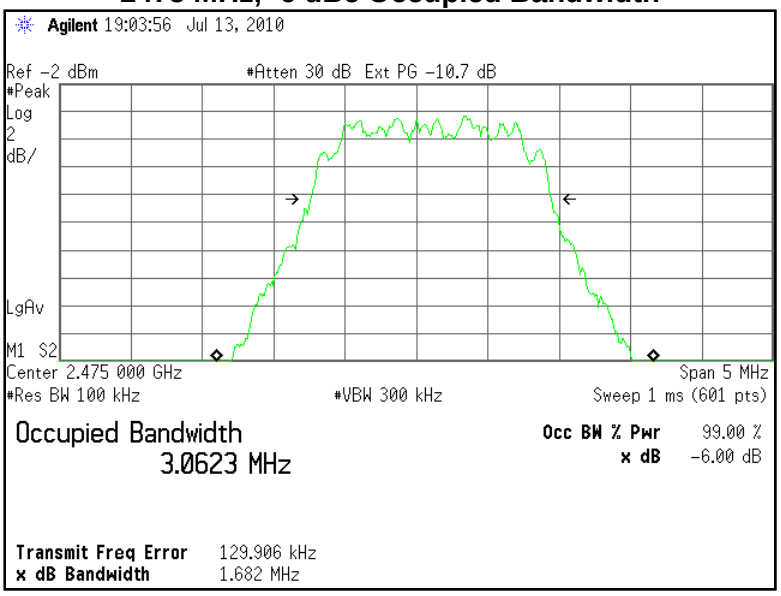
2405 MHz, -6 dBc Occupied Bandwidth



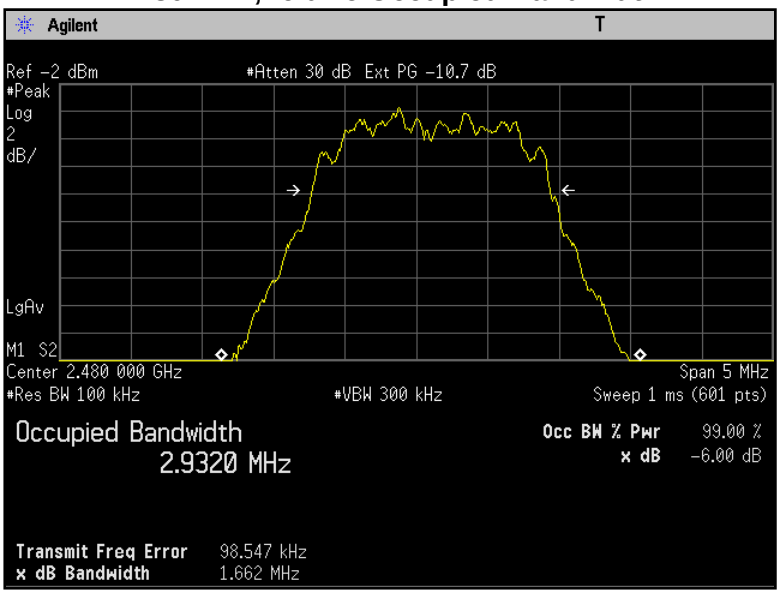
2445 MHz, -6 dBc Occupied Bandwidth



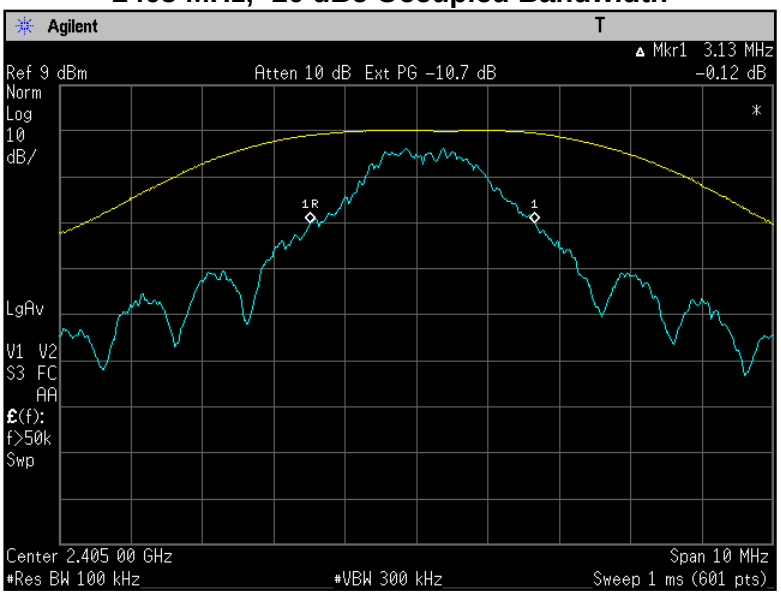
2475 MHz, -6 dBc Occupied Bandwidth



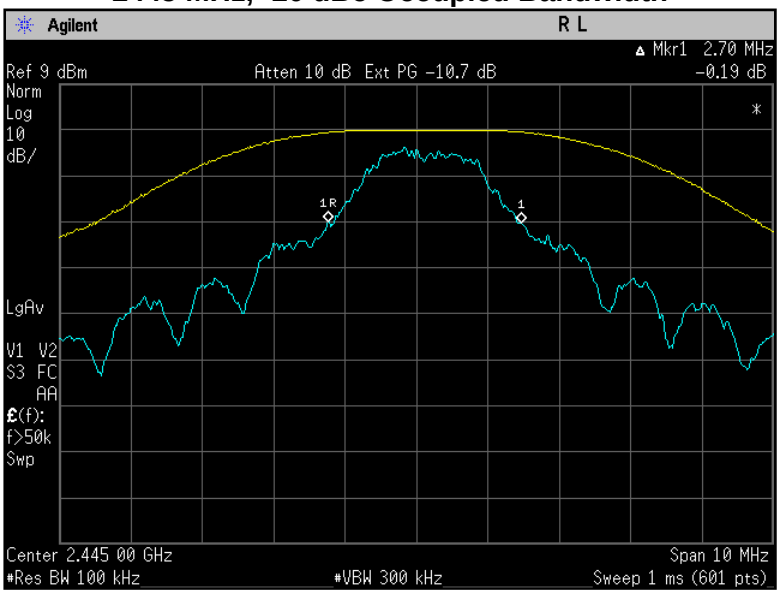
2480 MHz, -6 dBc Occupied Bandwidth



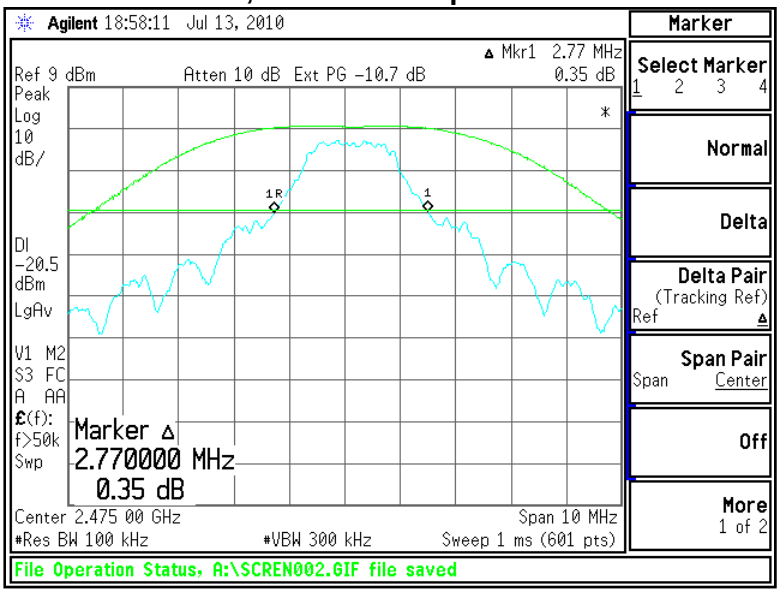
2405 MHz, -20 dBc Occupied Bandwidth



2445 MHz, -20 dBc Occupied Bandwidth



2475 MHz, -20 dBc Occupied Bandwidth



2480 MHz, -20 dBc Occupied Bandwidth

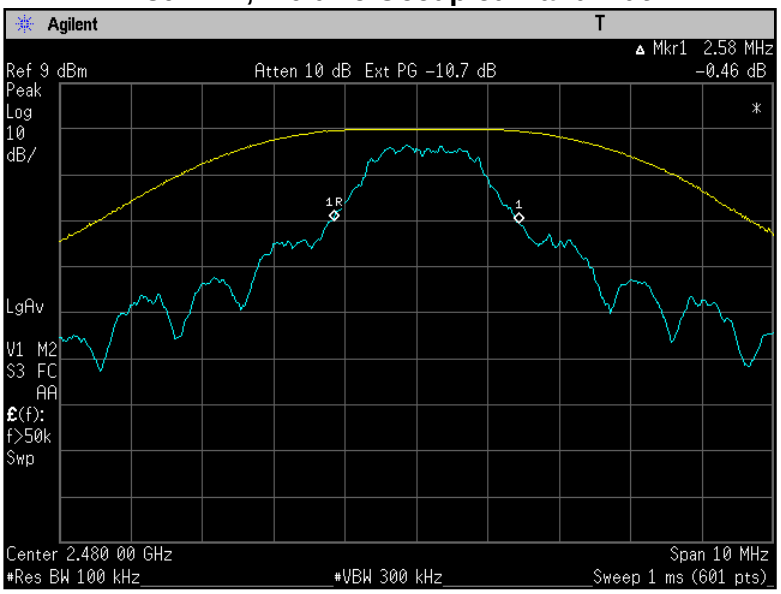
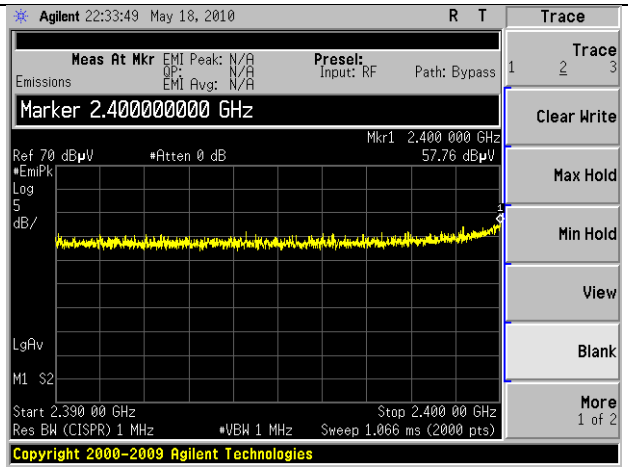


EXHIBIT 8. BAND-EDGE MEASUREMENTS

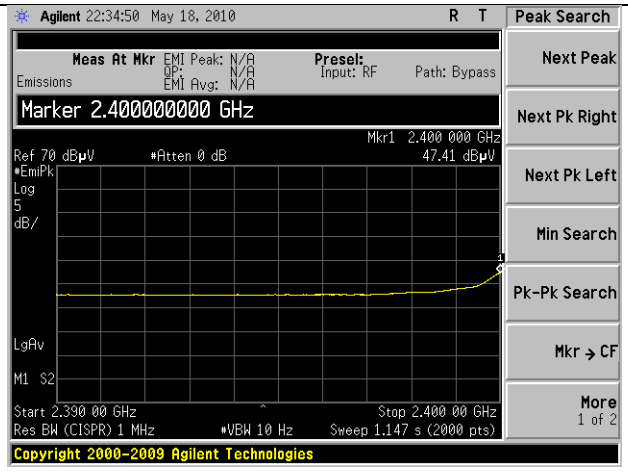
8.1 Method of Measurements

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. 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.

Screen Capture Demonstrating Compliance at the **Lower Band-Edge**



Peak

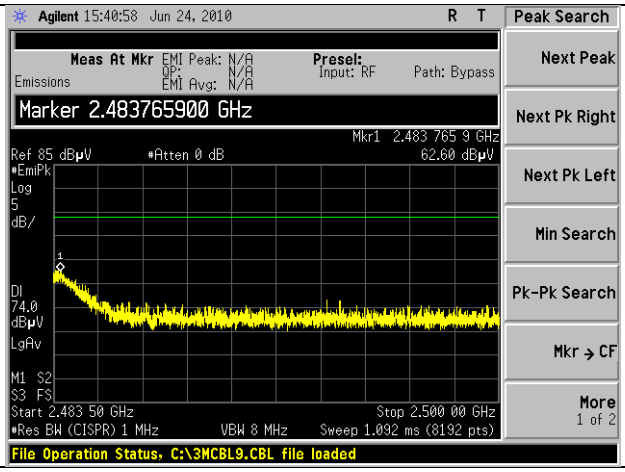


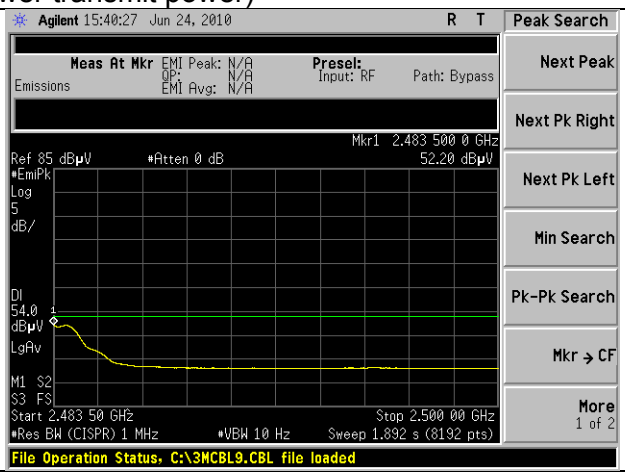
Average

The Lower Band-Edge limit, in this case, would be + 74.7 dBµV/m at 3m.

Screen Capture Demonstrating Compliance at the **Higher Band-Edge**

Channel 2480 MHz (lower transmit power)

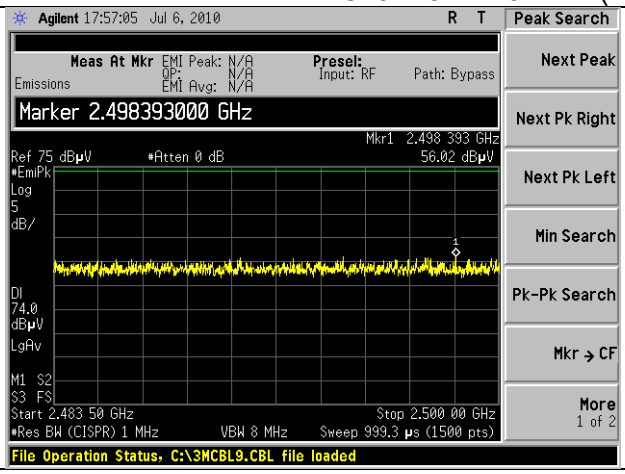


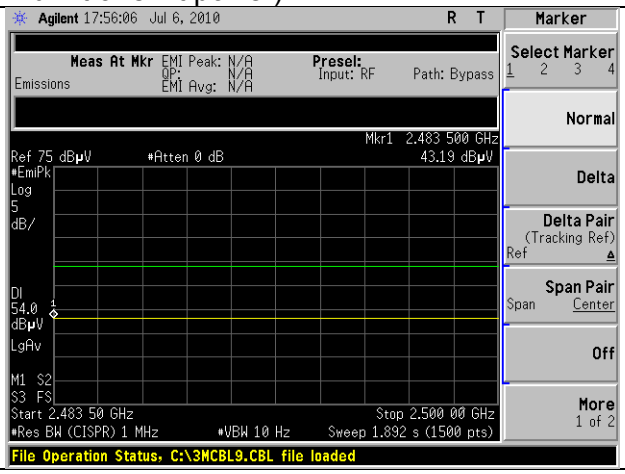


Peak	**Average**

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

Channel 2475 MHz (Maximum transmit power)





Peak	Average

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. The loss from the cable and the attenuator were added on the analyzer as gain offset settings, allowing direct measurements without the need for any further corrections. 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 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.

9.2 Test Data

Freq. (MHz)	Peak Power at Antenna Terminal (dBm)	Calculated EIRP (dBm) [1]	Conducted Power Limit (dBm)	Margin (dB)
2405	-0.1	0.9	30.0	30.1
2445	-0.5	0.5	30.0	30.5
2475	-0.5	0.5	30.0	30.5
2480	-3.4	-2.4	30.0	33.4

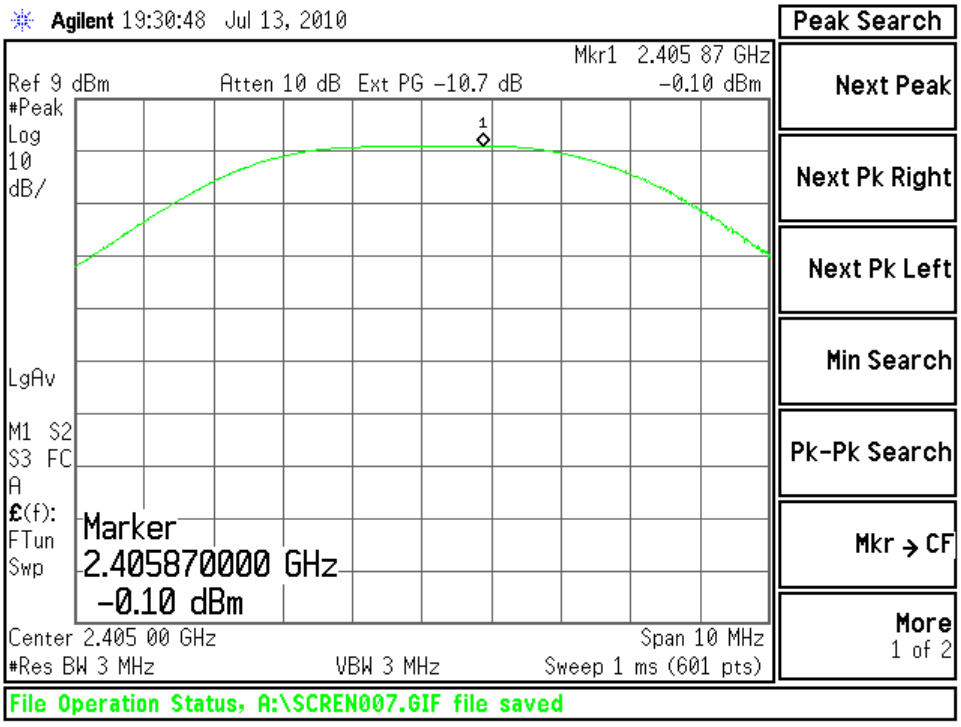
[1] EIRP Calculation:
EIRP = (Peak power at antenna terminal in dBm) + (EUT Antenna peak gain in dBi)

Peak antenna gain = 1.0 dBi

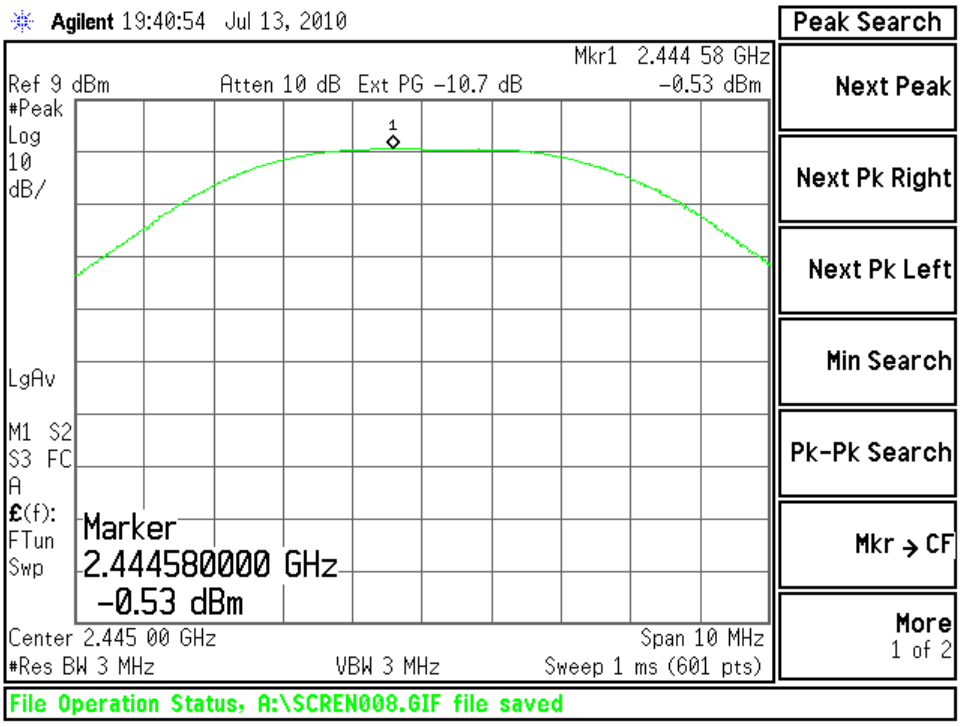
Maximum RF Power Output (in Watts): 0.00098 Watts.
Minimum RF Power Output (in Watts): 0.00046 Watts.

9.3 Screen Captures – Power Output (Conducted)

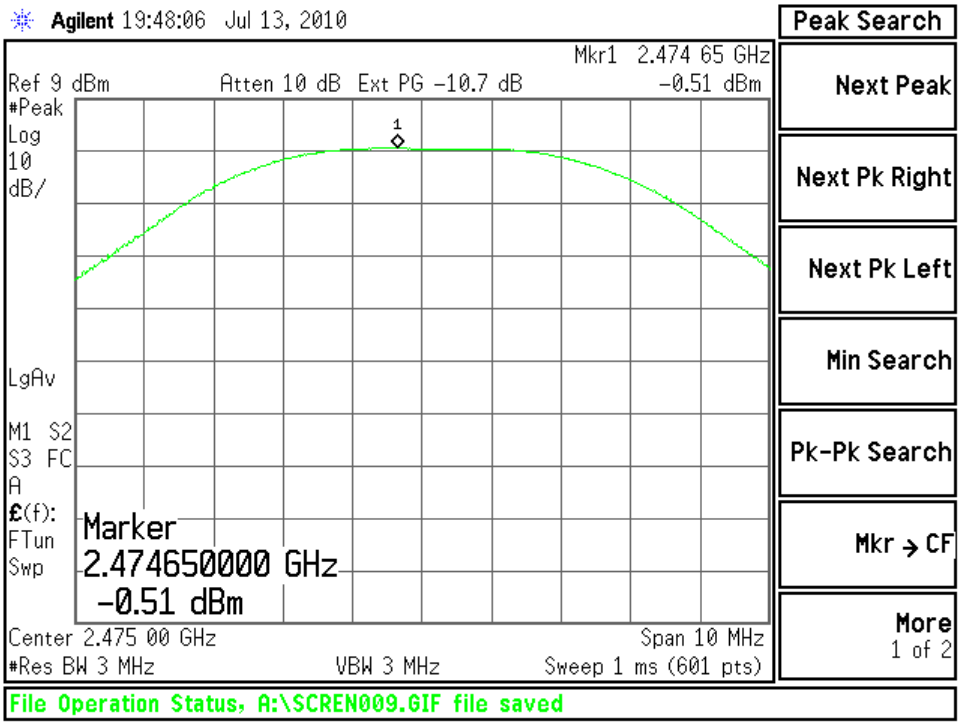
2405 MHz



2445 MHz



2475 MHz



2480 MHz

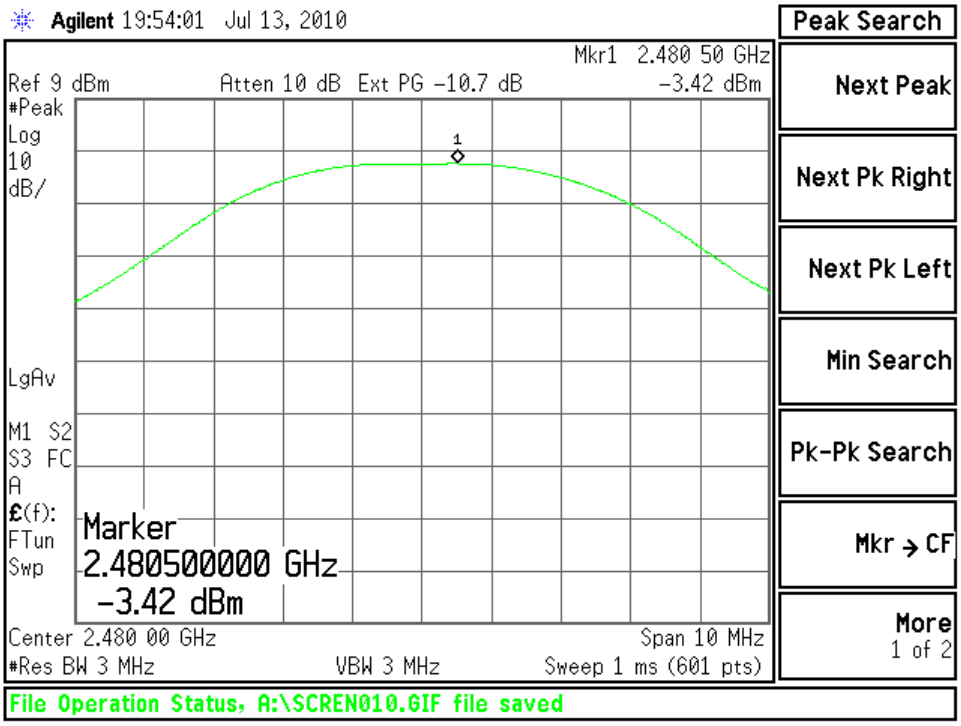


EXHIBIT 10. POWER SPECTRAL DENSITY: 15.247(e)

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.

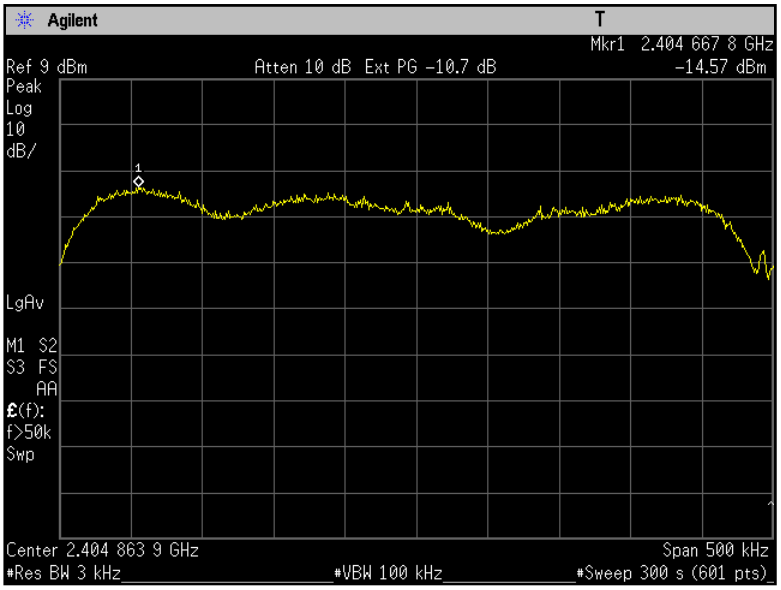
In accordance with FCC Part 15.247(e) and RSS 210 A8.2(b), the peak power spectral density should not exceed +8 dBm in any 3 kHz band. This measurement was performed along with the conducted power output readings performed as described in previous sections. The peak output frequency for each representative frequency was scanned, with a narrow bandwidth, and reduced sweep. The highest density was found to be **-14.43 dBm**, which is under the allowable limit by 22.4dB.

10.2 Test Data

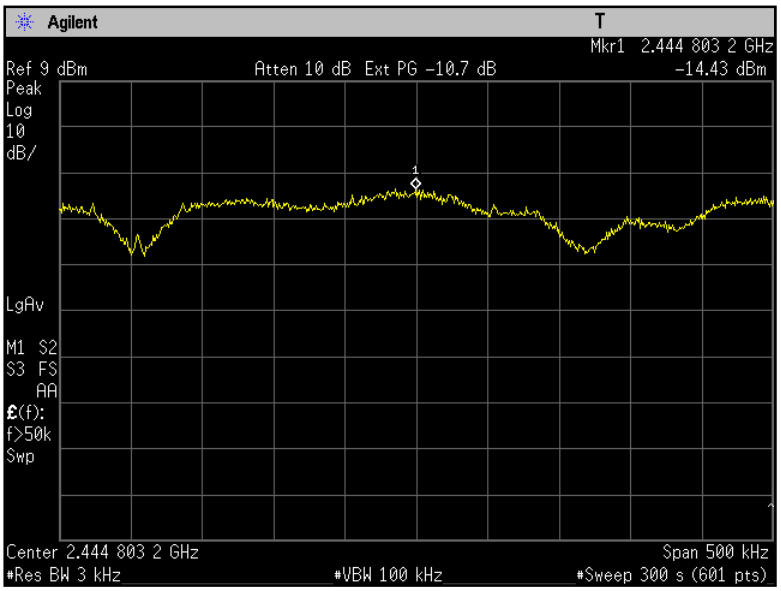
Frequency (MHz)	Spectral Density	Limit (dBm/3 kHz)	Margin (dB)	Comments Pass/Fail
2405	-14.57	8.0	22.57	Pass
2445	-14.43	8.0	22.43	Pass
2475	-14.43	8.0	22.43	Pass
2480	-17.54	8.0	25.54	Pass

10.3 Screen Captures – Power Spectral Density

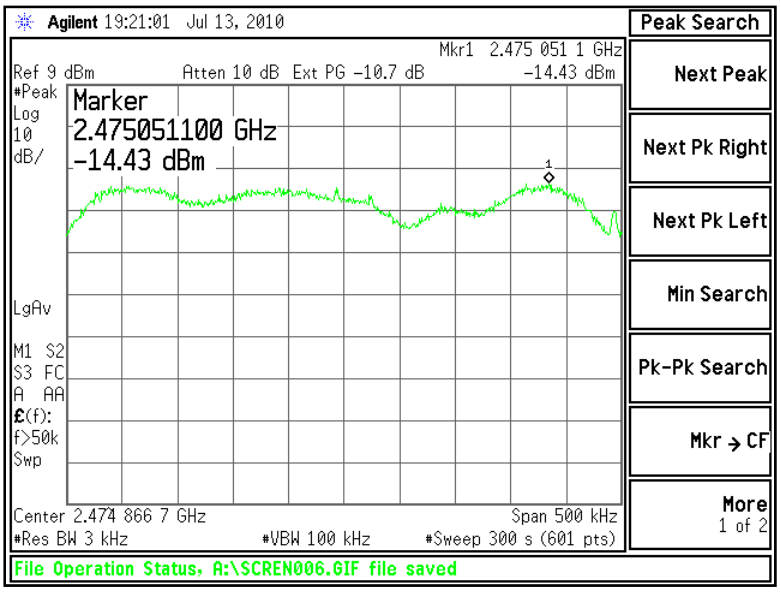
2405 MHz



2445 MHz



2475 MHz



2480 MHz

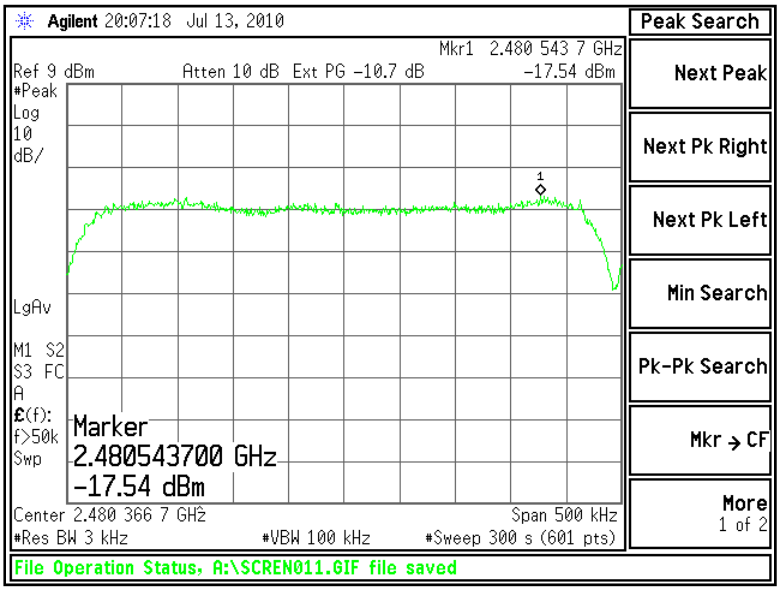


EXHIBIT 11. CONDUCTED SPURIOUS EMISSIONS: 15.247(d)

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.

FCC Part 15.247(d) and IC RSS 210 A8.5 require 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 along with an attenuator as protection for the spectrum analyzer. The loss from the cable and the attenuator 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. A 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.

11.2 Test Data

Fundamental and harmonics:

	2405 MHz	2445 MHz	2475 MHz	2480 MHz
Fundamental	-4.4 dBm	-4.1 dBm	-5.0 dBm	-6.7 dBm
2nd Harmonic	-37.0 dBm	-37.9 dBm	-38.5 dBm	-45.1 dBm
3rd Harmonic	-44.0 dBm	-48.8 dBm	-55.3 dBm	-67.2 dBm
4th Harmonic	-63.9 dBm	-61.3 dBm	-62.3 dBm	-72.9 dBm
5th Harmonic	Note (1)	Note (1)	Note (1)	Note (1)
6th Harmonic	Note (1)	Note (1)	Note (1)	Note (1)
7th Harmonic	Note (1)	Note (1)	Note (1)	Note (1)
8th Harmonic	Note (1)	Note (1)	Note (1)	Note (1)
9th Harmonic	Note (1)	Note (1)	Note (1)	Note (1)
10th Harmonic	Note (1)	Note (1)	Note (1)	Note (1)

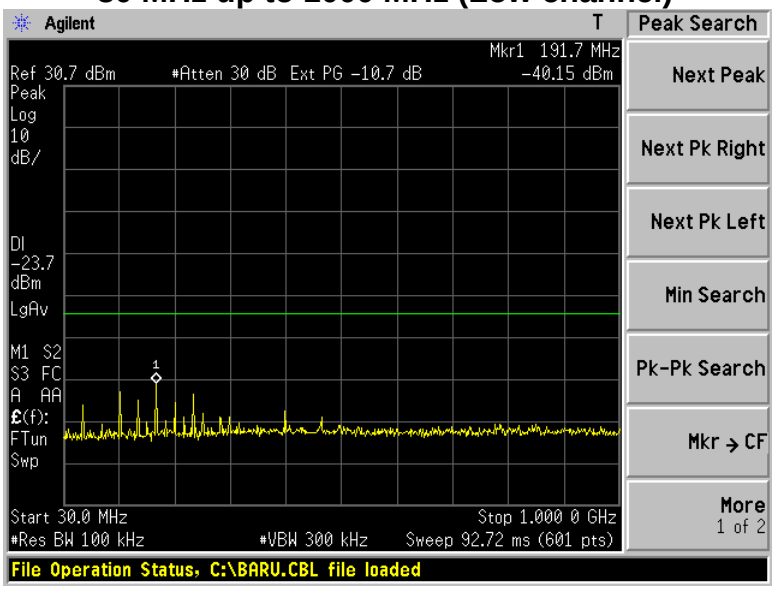
Notes:
(1) Measurement at system noise floor.

Other significant spurious emissions:

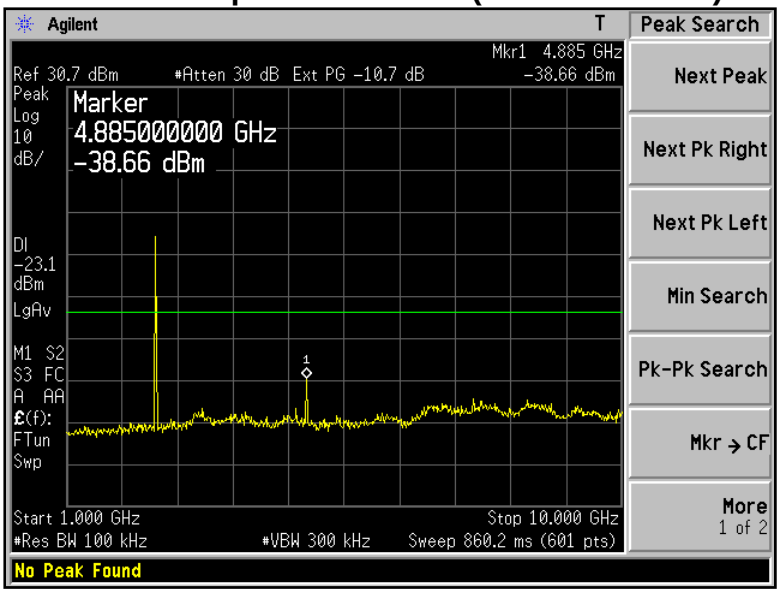
Freq(MHz)	Chan	level(dBm)
191.7	MID	-40.0
128.6	LOW	-43.0
64.0	LOW	-45.6
256.3	LOW	-44.3

11.3 Screen Captures – Spurious Radiated Emissions

30 MHz up to 1000 MHz (Low channel)



1000 MHz up to 10000 MHz (Middle channel)



10000 MHz up to 25000 MHz (Low Channel)

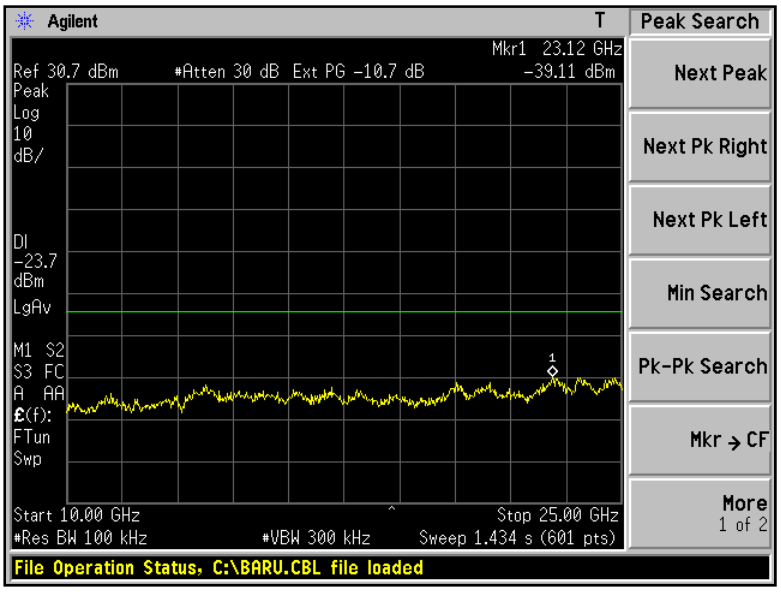


EXHIBIT 12. FREQUENCY & POWER STABILITY OVER VOLTAGE VARIATIONS

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.

In this case, the EUT is powered via the AC mains. Therefore, using a variable AC power supply, the voltage was varied by ± 15%.

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.

102		120		138	
Power	Frequency	Power	Frequency	Power	Frequency
-0.1	2404953000	**-0.1**	2404953060	**-0.1**	2404953060
-0.5	2445108190	**-0.5**	2445108210	**-0.5**	2445108240
-0.5	2475109560	**-0.5**	2475109560	**-0.5**	2475109530
-3.3	2480109990	**-3.4**	2480109970	**-3.4**	2480109980

The power was then cycled On/Off to observe system response. No unusual response was observed, the emission characteristics 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 and the frequency stability was better than 100 ppm during the voltage variation tests.

EXHIBIT 13. MPE CALCULATIONS

The following MPE calculations are based on a ceramic chip antenna, with a measured ERP of 95.4 dBµV/m (at 3 meters) and conducted RF power of -0.1 dBm as presented to the antenna. The peak gain of this antenna, based on the data sheet is 1.0 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:	-0.10	(dBm)
Maximum peak output power at antenna input terminal:	0.977	(mW)
Antenna gain(typical):	1	(dBi)
Maximum antenna gain:	1.259	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2405	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm^2)
Power density at prediction frequency:	0.000245	(mW/cm^2)
Maximum allowable antenna gain:	37.1	(dBi)
Margin of Compliance at 20 cm =	36.1	dB

APPENDIX A

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 18-May-2010 Type Test : Power Spectral Density Job # : C-912

Prepared By: Aidi Customer : INNCOM International Quote #: 310138

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	AA 960143	Phaseflex	Gore	EKD01D01048.0	5546519	9/16/2009	9/16/2010	Active Calibration
2	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/17/2009	9/17/2010	Active Calibration

Project Engineer: Aidi Quality Manager: Ryan

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 18-May-2010 Type Test : Conducted Power Output Job # : C-912

Prepared By: R. Urness Customer : INNCOM International Quote #: 310138

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	AA 960143	Phaseflex	Gore	EKD01D01048.0	5546519	9/16/2009	9/16/2010	Active Calibration
2	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/17/2009	9/17/2010	Active Calibration

Project Engineer: Quality Assurance:

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 18-May-2010 Type Test : Occupied Bandwidth (6dB & 20dB) Job # : C-912

Prepared By: R. Urness Customer : INNCOM International Quote #: 310138

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	AA 960143	Phaseflex	Gore	EKD01D01048.0	5546519	9/16/2009	9/16/2010	Active Calibration
2	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/17/2009	9/17/2010	Active Calibration

Project Engineer: Quality Assurance: Thomas T Smith

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 18-May-2010 Type Test : Radiated Emissions (109) Job # : C-912

Prepared By: S. Rismeyer Customer : INNCOM International Quote #: 310138

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960158	RF Preselecter	Agilent	N9039A	MY46520110	6/7/2010	6/7/2011	Active Calibration
2	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY48250225	6/7/2010	6/7/2011	Active Calibration
3	AA 960078	Log Periodic Antenna	EMCO	93146	9701-4855	10/16/2009	10/16/2010	Active Calibration
4	AA 960007	Double Ridge Horn Antenna	EMCO	3115	9311-4138	11/10/2009	11/10/2010	Active Calibration
5	AA 960150	Bicon Antenna	ETS	3110B	0003-3346	11/3/2009	11/3/2010	Active Calibration
6	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/17/2009	9/17/2010	Active Calibration
7	AA 960081	Double Ridge Horn Antenna	EMCO	3115	6907	12/22/2009	12/22/2010	Active Calibration
8	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	6/25/2009	6/25/2010	Active Calibration
9	EE 960146	Std. Gain Horn Ant. w/preamp	Adv. Micro	WLA622-4	123001	6/30/2009	6/30/2010	Active Calibration

Project Engineer: Quality Assurance:

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 18-May-2010 Type Test : Spurious Emissions Job # : C-912

Prepared By: S. Rismeyer Customer : INNCOM International Quote #: 310138

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960158	RF Preselecter	Agilent	N9039A	MY46520110	6/7/2010	6/7/2011	Active Calibration
2	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY48250225	6/7/2010	6/7/2011	Active Calibration
3	AA 960078	Log Periodic Antenna	EMCO	93146	9701-4855	10/16/2009	10/16/2010	Active Calibration
4	AA 960007	Double Ridge Horn Antenna	EMCO	3115	9311-4138	11/10/2009	11/10/2010	Active Calibration
5	AA 960150	Bicon Antenna	ETS	3110B	0003-3346	11/3/2009	11/3/2010	Active Calibration
6	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/17/2009	9/17/2010	Active Calibration
7	AA 960081	Double Ridge Horn Antenna	EMCO	3115	6907	12/22/2009	12/22/2010	Active Calibration
8	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	6/25/2009	6/25/2010	Active Calibration
9	EE 960146	Std. Gain Horn Ant. w/preamp	Adv. Micro	WLA622-4	123001	6/30/2009	6/30/2010	Active Calibration

Project Engineer: Quality Assurance:

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 18-May-2010 Type Test : Band-Edge Job # : C-912

Prepared By: S. Rismeyer Customer : INNCOM International Quote #: 310138

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960158	RF Preselecter	Agilent	N9039A	MY46520110	6/7/2010	6/7/2011	Active Calibration
2	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY48250225	6/7/2010	6/7/2011	Active Calibration
3	AA 960007	Double Ridge Horn Antenna	EMCO	3115	9311-4138	11/10/2009	11/10/2010	Active Calibration

Project Engineer: Quality Assurance:

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 18-May-2010 Type Test : Radiated Fundamental and AC Mains Job # : C-912

Prepared By: S. Rismeyer Customer : INNCOM International Quote #: 310138

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960158	RF Preselecter	Agilent	N9039A	MY46520110	6/7/2010	6/7/2011	Active Calibration
2	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY48250225	6/7/2010	6/7/2011	Active Calibration
3	AA 960007	Double Ridge Horn Antenna	EMCO	3115	9311-4138	11/10/2009	11/10/2010	Active Calibration
4	ee 960013	EMI Receiver	HP	8546A System	3617A00320;3448A	9/17/2009	9/17/2010	Active Calibration
5	EE 960014	EMI Receiver-filter section	HP	85460A	3448A00296	9/17/2009	9/17/2010	Active Calibration
6	AA 960031	Transient Limiter	HP	11947A	3107A01708	9/15/2009	9/15/2010	Active Calibration
7	AA 960008	LISN	EMCO	3816/2NM	9701-1057	12/15/2009	12/15/2010	Active Calibration

Project Engineer: Quality Assurance:

APPENDIX B

TEST STANDARDS – CURRENT PUBLICATION DATES RADIO

STANDARD #	DATE	Am. 1	Am. 2
ANSI C63.4	2009		
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	2007-05		
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	2009		
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	incl in 2008-04	2009-12 FD

STANDARD #	DATE	Am. 1	Am. 2
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	2007-06		
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	2007-06		
RSS 213	2005-12		
RSS 243	2005-11		
RSS 310	2007-06		

Note 1: Test not on LSR Scope of Accreditation.

Updated on 02-03-10

P=Project FD= Final Draft

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

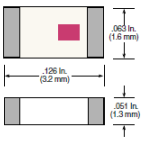
Appendix D

Antenna Specification(s)

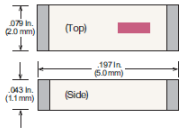
CERAMIC CHIP ANTENNAS

Part Number	Frequency (MHz)	Peak Gain	Ave. Gain	Return Loss	Case Size
0920AT50A080	880 - 960	-0.7 dBi typ (XZ-V)	-2.6 dBi typ (XZ-V)	8.5 dB min.	Case 50
1575AT43A40	1555 - 1595	- 1.5 dBi typ (XZ-V)	-2.5 dBi typ (XZ-V)	9.5 dB min.	Case 43-1
1575AT47A40_	1555 - 1595	-1.0 dBi typ (XZ-V)	-3.0 dBi typ (XZ-V)	9.5 dB min.	Case 47-1
2450AT18A100	2400 - 2500	0.5 dBi typ (XZ-V)	-0.5 dBi typ (XZ-V)	9.5 dB min.	Case 18-4
2450AT42A100	2400 - 2500	0 dBi typ (XZ-V)	-1 dBi typ (XZ-V)	9.5 dB min.	Case 42-1
2450AT42B100	2400 - 2500	0 dBi typ (XZ-V)	-1.5 dBi typ (XZ-V)	9.5 dB min.	Case 42-2
2450AT43A100	2400 - 2500	2.0 dBi typ (XZ-V)	0.5 dBi typ (XZ-V)	9.5 dB min.	Case 43-1
2450AT43B100	2400 - 2500	1.0 dBi typ (XZ-V)	-0.5 dBi typ (XZ-V)	9.5 dB min.	Case 43-2
2450AT44A100_	2400 - 2500	1.3 dBi typ (XZ-V)	0 dBi typ (XZ-V)	9.5 dB min.	Case 44-1
2450AT45A100_	2400 - 2500	3.0 dBi typ (XZ-V)	1.0 dBi typ (XZ-V)	9.5 dB min.	Case 45-1
2450AD46A5400 (Dual Band)	LB: 2400 - 2500 HB: 4900 - 5900	1.0 dBi typ (XZ-V) -2.5 dBi typ (XZ-V)	-1.5 dBi typ (YZ-V) -2.5 dBi typ (YZ-V)	8.5 dB min. 8.5 dB min.	Case 46-1
2500AT52M3555	WiMax (Tri-Band)	See spec sheet	See spec sheet	9.5 dB min.	TBD
5250AT43A200_	5150 - 5350	3.6 dBi typ (XZ-V)	-2.3 dBi typ (XZ-V)	9.5 dB min.	Case 43-1
5400AT18A1000	4900 - 5900	2.0 dBi typ. (XZ-V)	-2.5 dBi typ (XZ-V)	9.5 dB min.	Case 18-4
5775AT43A100_	5725 - 5825	3.9 dBi typ (XZ-V)	-1.5 dBi typ (XZ-V)	9.5 dB min.	Case 43-1

Case 18-4



Case 42-1



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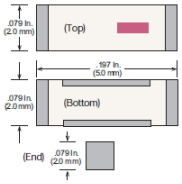
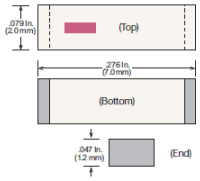
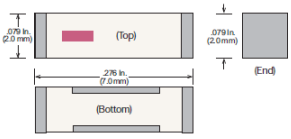


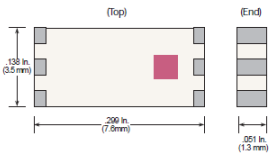
Case 43-1



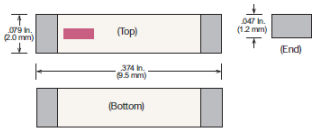
Case 43-2



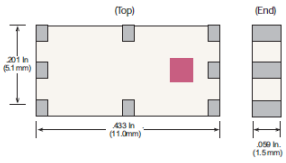
Case 44-1



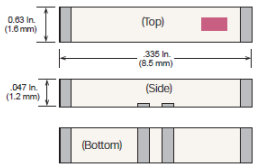
Case 45-1



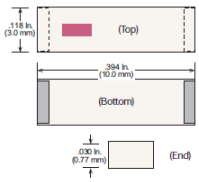
Case 50



Case 46-1



Case 47-1



Detailed specifications and performance curves for the RF Ceramic Component line are located on our website.

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