

# **Emissions Test Report**

**EUT Name:** 2.4 GHz Communications Option Board

EUT Model: ZOB

FCC ID: G8J ZGB1

**IC:** 4557C-ZGB1

FCC Title 47, Part 15, Subpart C, RSS-210 Issue 7

Prepared for:

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Report/Issue Date: 15 October, 2007 Report Number: 30863354.001

# **Statement of Compliance**

Manufacturer:	Elster Integrated Solutions, LLC
	208 South Rogers Lane
	Raleigh, NC 27610
	919-250-5440
Requester / Applicant:	John Casaer
Name of Equipment:	2.4 GHz Communications Option Board
<b>Operation Frequency Range</b>	2405 MHz to 2465 MHz
Type of Equipment:	Intentional Radiator
Application of Regulations:	FCC Title 47, Part 15, Subpart C, RSS-210 Issue 7
Test Dates:	20 November, 2008 to 4 December, 2008

Guidance Documents:

Emissions: FCC 47 CFR Part 15C, RSS-210 Issue 7 FCC 47 CFR Part 15B, ICES-003 Issue 4

Test Methods:

Emissions: ANSI C63.4:2003

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that a sample of one, of the equipment described above, has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in the Executive Summary of this report.

This report must not be used to claim product endorsement by NVLAP or any agency of the U.S. Government. This report contains data that are not covered by NVLAP accreditation. This report shall not be reproduced except in full, without the written authorization of the laboratory.

NVLAP Signa	tory	4 December 2008 Date
<b>NVLAP</b> 200094-0	<b>FCC</b> 90552 and 100881	Industry Canada IC: 3755A

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# 1 Executive Summary

#### 1.1 Scope

This report is intended to document the status of conformance with the requirements of the FCC Title 47, Part 15, Subpart C, RSS-210 Issue 7 based on the results of testing performed on 20 November, 2008 through 4 December, 2008 on the 2.4 GHz Communications Option Board Model No. ZOB manufactured by Elster Integrated Solutions, LLC. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

#### 1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

# 1.3 Summary of Test Results

	2		
Test	Test Method(s)	Test Parameters	Result
Antenna Requirement	FCC Part 15.203	Unique	compliant
Restricted Bands for	FCC 15.205	15.209	compliant
intentional operation	RSS-210	Table 1	compliant
Power Line Conducted	ECC 15 207	Don toot worth ord	
Emissions	FCC 15.207	Per test method	compliant
Spurious Radiated	FCC Part 15.209	Per test method	a a mun li a m 4
Emissions	RSS-210	Table 2	compliant
Occurried Devidentidth	FCC Part 15.247(a)(2)	6 dB Bandwidth &	a a mun li a m t
Occupied Bandwidth	RSS-210, A8.2 (a)	99% Bandwidth	compliant
Mariana Ortant Barran	FCC Part 15.247(b)(3)	< 1 Wett	
Maximum Output Power	RSS-210, A8.4 (4)	< 1 Watt	compliant
Antonno Coin	FCC Part 15.247(b)(4)	( dD;	a a mun li a m 4
Antenna Gain	RSS-210, A8.5(5)	< 6 dBi	compliant
Antenna Conducted	FCC Part 15.247(d)	< 20 dBc	a a mun li a m t
spurious	RSS-210, A8.5	< 20 dBC	compliant
Su a atual Daugita	FCC Part 15.247(e)	< 8dBm	
Spectral Density	RSS-210, A8.2(b)	(3 kHz BW)	compliant
Maximum Permissible	FCC 15.247(i)	> 20 and approximation	a a mun li a m 4
Exposure	IC Safety code 6	>20 cm separation	compliant
Power Line Conducted			
Emissions in receive	FCC Part 15.107(a)	Class B	compliant
mode			-
Radiated Emissions in	FCC Part 15.109(a)	Class B	compliant
receive mode	100 Fait 15.109(a)	Class D	compliant

Table 1 - Summary of Test Results

Overall Results: PASS

# 1.4 Special Accessories

No special accessories were necessary in order to achieve compliance.

### 1.5 Equipment Modifications

No modifications were found to be necessary in order to achieve compliance.

# 2 Laboratory Information

### 2.1 Accreditations & Endorsements

#### 2.1.1 US Federal Communications Commission

TUV Rheinland at the 762 Park Ave. Youngsville, N.C 27596 address is accredited by the commission for performing testing services for the general public on a fee basis. This laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (Registration No 90552 and 100881). The laboratory scope of accreditation includes: Title 47 CFR Part 15, 18, and 90. The accreditation is updated every 3 years.

### 2.1.2 NIST / NVLAP

TUV Rheinland is accredited by the National Voluntary Laboratory Accreditation Program, which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Guide 25 and ISO 9002 (Lab code 200094-0). The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

#### 2.1.3 Canada – Industry Canada

Registration No. IC 3755

#### 2.1.4 Japan – VCCI

The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland at the 762 Park Ave. Youngsville, N.C 27596 address has been assessed and approved in accordance with the Regulations for Voluntary Control Measures. (Registration No. R-1174 and C-1236).

### 2.1.5 Acceptance By Mutual Recognition Arrangement

The United States has an established agreement with specific countries under the Asia Pacific Laboratory Accreditation Corporation (APLAC) Mutual Recognition Arrangement. Under this agreement, all TUV Rheinland at the 762 Park Ave. Youngsville, N.C 27596 address test results and test reports within the scope of the laboratory NIST / NVLAP accreditation will be accepted by each member country.

# 2.2 Test Facilities

All of the test facilities are located at 762 Park Ave., Youngsville, North Carolina 27596, USA.

#### 2.2.1 Emission Test Facility

The Open Area Test Site and AC Line Conducted measurement facility used to collect the radiated and conducted data has been constructed in accordance with ANSI C63.7:1992. The site has been measured in accordance with and verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4:2005, at a test distance of 3 and 10 meters. This site has been described in reports dated May 12, 1997, submitted to the FCC, and accepted by letter dated June 25, 1997 (31040/SIT 1300F2). The site is listed with the FCC and accredited by NVLAP (code 200094-0). The 5m semi-anechoic chamber used to collect the radiated data has been verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4:2005, at a test distance of 3 meters. A report detailing this site can be obtained from TUV Rheinland.

#### 2.2.2 Immunity Test Facility

ESD, EFT, Surge, PQF: These tests are performed in an environmentally controlled room with a 3.7m x 3.7m x 3.175mm thick aluminum floor connected to PE ground. For ESD testing, tabletop equipment is placed on an insulated mat with a surface resistivity of  $10^9$  Ohms/square on a 1.6m x 0.8m x 0.8m high non-conductive table with a 3.175mm aluminum top (Horizontal Coupling Plane). The HCP is connected to the main ground plane via a low impedance ground strap through two 470 k $\Omega$  resistors. The Vertical Coupling Plane consists of an aluminum plate 50cm x 50cm x 3.175mm thick. The VCP is connected to the main ground plane via a low impedance ground strap through two 470 k $\Omega$  resistors. For each of the other tests, the HCP is removed.

RF Field Immunity testing is performed in a 7.3m x 3.7m x 3.2m anechoic chamber.

RF Conducted and Magnetic Field Immunity testing is performed on a 4.9m x 3.7m x 3.175mm thick aluminum ground plane which is connected to one end of the anechoic chamber.

All test areas allow a minimum distance of 1 meter from the EUT to walls or conducting objects.

# 2.3 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1<sup>st</sup> addition, 1995.

*The Combined Standard Uncertainty* is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities, equal to the positive square root of a sum of terms, the terms being the variances or co-variances of these other quantities weighted according to how the measurement result varies with changes in these quantities. The term standard uncertainty is the result of a measurement expressed as a standard deviation.

*The Expanded Uncertainty* defines an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurand. The fraction may be viewed as the coverage probability or level of confidence of the interval.

The test system for conducted emissions is defined as the LISN, spectrum analyzer, coaxial cables, and pads. The test system for radiated emissions is defined as the antenna, spectrum analyzer, pre-amplifier, coaxial cables, and pads. The conducted test system has a combined standard uncertainty of  $\pm$  1.2 dB. The radiated test system has a combined standard uncertainty of  $\pm$  1.6 dB. The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by a coverage factor of 2. Compliance criteria are not based on measurement uncertainty.

# 2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Guide 25.

# 2.5 Product Information

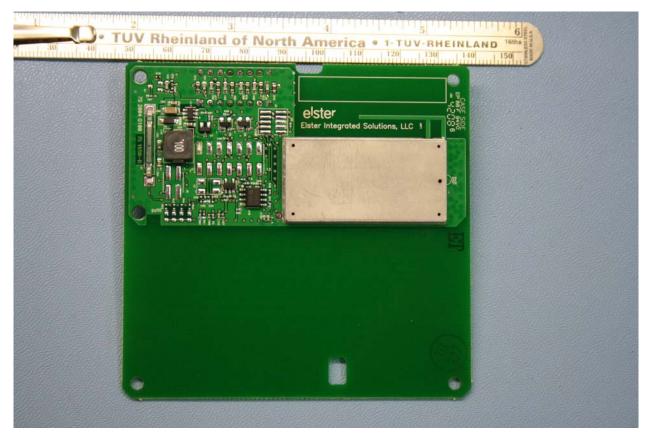


Figure 1: Photo of EUT

# 2.6 Product Description

The EUT is a 2.4 GHz Communications Option Board that contains a 2.4 GHz ISM Band Transceiver. A more detailed description of the EUT can be found in document; G8J ZGB1\_Description for FCC.doc.

The serial number of the EUT submitted for testing was 0003.

# 2.7 Configuration

A representative of Elster Integrated Systems was on site for all testing. Two samples were supplied for testing; one was a standard production-line model for Radiated measurements. The second one was modified with a coax connector mounted to the RF power output, bypassing the internal antenna. A interface module and computer with software for setting channels and modulation was provided and operated by the representative.

For conducted emissions, the EUT was installed in a "REX2" power meter as a typical installation for this option board.

Since the representative was on site, no test plan was included in this test report.

# 3 Justifications, Descriptions, or Deviations

The following justifications for tests not performed or deviations from the above listed specification apply:

- The Antenna requirement specified in FCC part 15.203 (RSS-210 section 5.5), the EUT uses a PCB trace antenna with a gain of 0dBi, there is no user provision to change or modify this antenna.
- The EUT is designed to operate only in the 2400-2483.5 MHz band.
- The antenna gain used by the EUT, as stated above is 0 dBi.
- For Maximum permissible exposure, this device operates at less then 1 Watt in the 2400-2483.5 MHz band and is designed to operate greater than 20 cm from personnel during normal operation. No testing is required, however worst case calculated exposure compliance follows later in this test report.

Testing was performed in accordance with 47 CFR Part 15, ANSI C63.4:2003, RSS-210 Issue 7. These test methods are listed under the laboratory's NVLAP Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

# 4 INTENTIONAL RADIATOR EMISSIONS

# 4.1 Restricted band measurements 15.205

Radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see 15.205(c)). In addition, where an average detector is used for determining compliance with the limits in 15.209(a), there is a corresponding peak limit 20 dB above the specified average limit according to 15.35(b)

Measurements demonstrating compliance with these parts are provided in the sections below.

# 4.1.1 Test Results

All spurious and harmonic emissions outside the band are below the limits of part 15.209(a). Refer to the Radiated Emissions section of this test report.

The EUT is compliant with the rules.

# 4.2 Power Line Conducted Emissions, FCC 15.207, RSS-210 section 2.6

Testing was performed in accordance with FCC part 15.207 and RSS-210-section 2.6.

This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

The EUT was installed in a "REX2" power meter as a typical installation for this option board.

#### 4.2.1 Test Methodology

A test program that controls instrumentation and data logging was used to automate the AC Power Line Conducted emission test procedure. The frequency range of interest was divided into sub-ranges such as to yield a frequency resolution of 9 kHz. For each frequency sub-range, each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a set of  $50\mu$ H /  $50\Omega$  LISNs.

Testing is either performed in the anechoic chamber or on PLC Site 2. The setup photographs clearly identify which site was used. The vertical ground plane used in the anechoic chamber is a  $2m \times 2m$  wooden frame that is covered with  $\frac{1}{4}$  inch hardware cloth and is bonded to the horizontal ground plane.

In the case of tabletop equipment, the EUT is placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane and 40cm from a vertical ground reference plane. The rear of the EUT was positioned flush with the backside of the table and directly over the LISNs. The power and I/O cables were routed over the edge of the table and bundled approximately 40cm from the ground plane. Support equipment was powered from a separate LISN. Floor-standing equipment is placed directly on the ground plane.

#### 4.2.1.1 Deviations

There were no deviations from this test methodology.

#### 4.2.2 Test Results

Section 4.2.2.1 lists the final measurement data under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and 1.5.

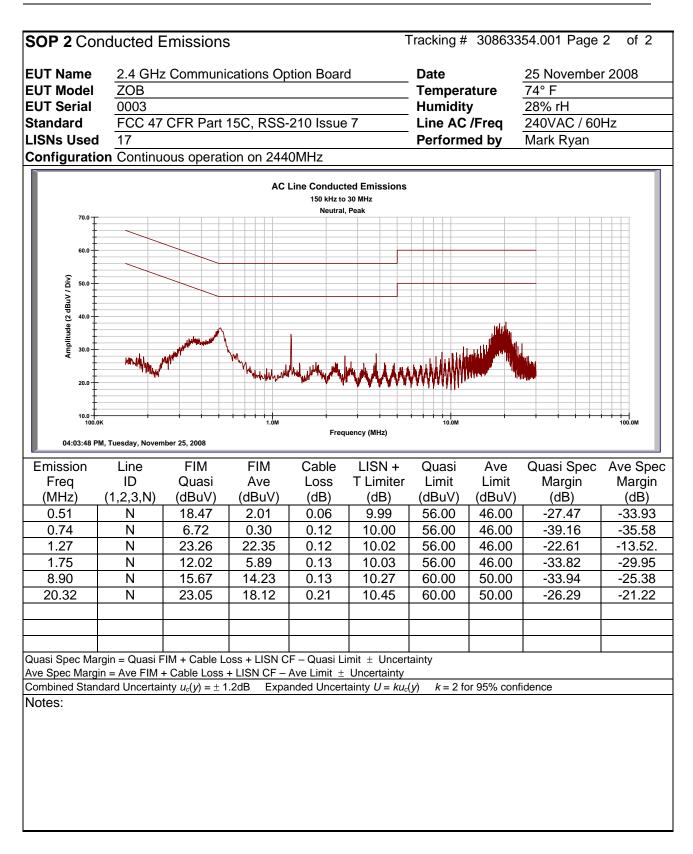
Plots of the EUT's AC Line Conducted emissions are contained in the following sections. The plots show peak and/or average emissions and the corresponding peak and/or average limits. If the peak emissions are below the average limit, then the EUT is considered to pass and no average measurements are made. If the peak emissions are below the quasi-peak limit and the average emissions are below the average limit, then the EUT is considered to pass and no further measurements are made. Otherwise, individual frequencies are measured and compared to the corresponding limit for the detector used (quasi-peak or average).

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

#### 4.2.2.1 Final Data

The data recorded in this section contains the final results under the worst-case conditions and with any modifications or special accessories implemented as the manufacturer intends.

5 <b>0P 2</b> Co	nducted E	Emissions	6		٦	Tracking #	308633	54.001 Page	1 of 2
UT Name	2.4 GHz	z Communi	cations Op	tion Board	b	Date		25 Novembe	r 2008
UT Model	lodel ZOB Te						ature	74° F	
UT Serial	0003					Humidit	у	28% rH	
Standard	FCC 47	CFR Part	15C, RSS-	210 Issue	7	Line AC	/Freq	240VAC / 60	Hz
ISNs Used	18					Perform	ed by	Mark Ryan	
Configurati	on Continu	ous operati	ion on 244	0MHz			2		
			AC	150 kHz t	cted Emission o 30 MHz 1, Peak	s			
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Freq	Line ID	Quasi	Ave	Loss	T Limiter	Limit	Limit	Margin	Margin
	Line								
Freq (MHz) 0.52	Line ID	Quasi (dBuV) 18.48	Ave (dBuV) 2.16	Loss (dB) 0.07	T Limiter (dB) 10.00	Limit (dBuV) 56.00	Limit (dBuV) 46.00	Margin (dB) -27.46	Margin (dB) -33.78
Freq (MHz) 0.52 0.74	Line ID (1,2,3,N) 1 1	Quasi (dBuV) 18.48 18.03	Ave (dBuV) 2.16 11.95	Loss (dB) 0.07 0.12	T Limiter (dB) 10.00 10.00	Limit (dBuV) 56.00 56.00	Limit (dBuV) 46.00 46.00	Margin (dB) -27.46 -27.84	Margin (dB) -33.78 -23.92
Freq (MHz) 0.52 0.74 1.27	Line ID (1,2,3,N)	Quasi (dBuV) 18.48 18.03 25.02	Ave (dBuV) 2.16 11.95 23.52	Loss (dB) 0.07 0.12 0.12	T Limiter (dB) 10.00 10.00 10.03	Limit (dBuV) 56.00 56.00 56.00	Limit (dBuV) 46.00 46.00	Margin (dB) -27.46 -27.84 -20.83	Margin (dB) -33.78 -23.92 -12.33
Freq (MHz) 0.52 0.74	Line ID (1,2,3,N) 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94	Ave (dBuV) 2.16 11.95	Loss (dB) 0.07 0.12	T Limiter (dB) 10.00 10.00 10.03 10.06	Limit (dBuV) 56.00 56.00	Limit (dBuV) 46.00 46.00	Margin (dB) -27.46 -27.84	Margin (dB) -33.78 -23.92 -12.33 -24.91
Freq (MHz) 0.52 0.74 1.27 1.75 8.90	Line ID (1,2,3,N) 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74	Loss (dB) 0.07 0.12 0.12 0.13 0.13	T Limiter (dB) 10.00 10.03 10.03 10.06 10.51	Limit (dBuV) 56.00 56.00 56.00 56.00 60.00	Limit (dBuV) 46.00 46.00 46.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54	Margin (dB) -33.78 -23.92 -12.33 -24.91 -28.62
Freq (MHz) 0.52 0.74 1.27 1.75	Line ID (1,2,3,N) 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94	Ave (dBuV) 2.16 11.95 23.52 10.90	Loss (dB) 0.07 0.12 0.12 0.13	T Limiter (dB) 10.00 10.00 10.03 10.06	Limit (dBuV) 56.00 56.00 56.00 56.00	Limit (dBuV) 46.00 46.00 46.00	Margin (dB) -27.46 -27.84 -20.83 -28.87	Margin (dB) -33.78 -23.92 -12.33 -24.91
Freq (MHz) 0.52 0.74 1.27 1.75 8.90	Line ID (1,2,3,N) 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74	Loss (dB) 0.07 0.12 0.12 0.13 0.13	T Limiter (dB) 10.00 10.03 10.03 10.06 10.51	Limit (dBuV) 56.00 56.00 56.00 56.00 60.00	Limit (dBuV) 46.00 46.00 46.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54	Margin (dB) -33.78 -23.92 -12.33 -24.91 -28.62
Freq (MHz) 0.52 0.74 1.27 1.75 8.90	Line ID (1,2,3,N) 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74	Loss (dB) 0.07 0.12 0.12 0.13 0.13	T Limiter (dB) 10.00 10.03 10.03 10.06 10.51	Limit (dBuV) 56.00 56.00 56.00 56.00 60.00	Limit (dBuV) 46.00 46.00 46.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54	Margin (dB) -33.78 -23.92 -12.33 -24.91 -28.62
Freq (MHz) 0.52 0.74 1.27 1.75 8.90	Line ID (1,2,3,N) 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74	Loss (dB) 0.07 0.12 0.12 0.13 0.13	T Limiter (dB) 10.00 10.03 10.03 10.06 10.51	Limit (dBuV) 56.00 56.00 56.00 56.00 60.00	Limit (dBuV) 46.00 46.00 46.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54	Margin (dB) -33.78 -23.92 -12.33 -24.91 -28.62
Freq (MHz) 0.52 0.74 1.27 1.75 8.90 20.32	Line ID (1,2,3,N) 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82 23.23	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74 18.05	Loss (dB) 0.07 0.12 0.12 0.13 0.13 0.21	T Limiter (dB) 10.00 10.03 10.06 10.51 11.02	Limit (dBuV) 56.00 56.00 56.00 56.00 60.00 60.00	Limit (dBuV) 46.00 46.00 46.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54	Margin (dB) -33.78 -23.92 -12.33 -24.91 -28.62
Freq (MHz) 0.52 0.74 1.27 1.75 8.90 20.32 0uasi Spec Ma ve Spec Marg	Line ID (1,2,3,N) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82 23.23 	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74 18.05 	Loss (dB) 0.07 0.12 0.13 0.13 0.13 0.21 F – Quasi Li Ave Limit ±	T Limiter (dB) 10.00 10.03 10.06 10.51 11.02 mit ± Uncert Uncertainty	Limit (dBuV) 56.00 56.00 56.00 60.00 60.00 tainty	Limit (dBuV) 46.00 46.00 46.00 50.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54 -25.54	Margin (dB) -33.78 -23.92 -12.33 -24.91 -28.62
Freq (MHz) 0.52 0.74 1.27 1.75 8.90 20.32 20.32	Line ID (1,2,3,N) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82 23.23 	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74 18.05 	Loss (dB) 0.07 0.12 0.13 0.13 0.13 0.21 F – Quasi Li Ave Limit ±	T Limiter (dB) 10.00 10.03 10.06 10.51 11.02 mit ± Uncert	Limit (dBuV) 56.00 56.00 56.00 60.00 60.00 tainty	Limit (dBuV) 46.00 46.00 46.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54 -25.54	Margin (dB) -33.78 -23.92 -12.33 -24.91 -28.62
Freq (MHz) 0.52 0.74 1.27 1.75 8.90 20.32 0uasi Spec Ma ve Spec Marg	Line ID (1,2,3,N) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82 23.23 	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74 18.05 	Loss (dB) 0.07 0.12 0.13 0.13 0.13 0.21 F – Quasi Li Ave Limit ±	T Limiter (dB) 10.00 10.03 10.06 10.51 11.02 mit ± Uncert Uncertainty	Limit (dBuV) 56.00 56.00 56.00 60.00 60.00 tainty	Limit (dBuV) 46.00 46.00 46.00 50.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54 -25.54	(dB) -33.78 -23.92 -12.33 -24.91 -28.62
Freq (MHz) 0.52 0.74 1.27 1.75 8.90 20.32 20.32	Line ID (1,2,3,N) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82 23.23 	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74 18.05 	Loss (dB) 0.07 0.12 0.13 0.13 0.13 0.21 F – Quasi Li Ave Limit ±	T Limiter (dB) 10.00 10.03 10.06 10.51 11.02 mit ± Uncert Uncertainty	Limit (dBuV) 56.00 56.00 56.00 60.00 60.00 tainty	Limit (dBuV) 46.00 46.00 46.00 50.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54 -25.54	Margin (dB) -33.78 -23.92 -12.33 -24.91 -28.62
Freq (MHz) 0.52 0.74 1.27 1.75 8.90 20.32 20.32	Line ID (1,2,3,N) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82 23.23 	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74 18.05 	Loss (dB) 0.07 0.12 0.13 0.13 0.13 0.21 F – Quasi Li Ave Limit ±	T Limiter (dB) 10.00 10.03 10.06 10.51 11.02 mit ± Uncert Uncertainty	Limit (dBuV) 56.00 56.00 56.00 60.00 60.00 tainty	Limit (dBuV) 46.00 46.00 46.00 50.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54 -25.54	Margin (dB) -33.78 -23.92 -12.33 -24.91 -28.62
Freq (MHz) 0.52 0.74 1.27 1.75 8.90 20.32 20.32	Line ID (1,2,3,N) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82 23.23 	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74 18.05 	Loss (dB) 0.07 0.12 0.13 0.13 0.13 0.21 F – Quasi Li Ave Limit ±	T Limiter (dB) 10.00 10.03 10.06 10.51 11.02 mit ± Uncert Uncertainty	Limit (dBuV) 56.00 56.00 56.00 60.00 60.00 tainty	Limit (dBuV) 46.00 46.00 46.00 50.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54 -25.54	Margin (dB) -33.78 -23.92 -12.33 -24.91 -28.62
Freq (MHz) 0.52 0.74 1.27 1.75 8.90 20.32 20.32	Line ID (1,2,3,N) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82 23.23 	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74 18.05 	Loss (dB) 0.07 0.12 0.13 0.13 0.13 0.21 F – Quasi Li Ave Limit ±	T Limiter (dB) 10.00 10.03 10.06 10.51 11.02 mit ± Uncert Uncertainty	Limit (dBuV) 56.00 56.00 56.00 60.00 60.00 tainty	Limit (dBuV) 46.00 46.00 46.00 50.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54 -25.54	Margin (dB) -33.78 -23.92 -12.33 -24.91 -28.62
Freq (MHz) 0.52 0.74 1.27 1.75 8.90 20.32 20.32	Line ID (1,2,3,N) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82 23.23 	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74 18.05 	Loss (dB) 0.07 0.12 0.13 0.13 0.13 0.21 F – Quasi Li Ave Limit ±	T Limiter (dB) 10.00 10.03 10.06 10.51 11.02 mit ± Uncert Uncertainty	Limit (dBuV) 56.00 56.00 56.00 60.00 60.00 tainty	Limit (dBuV) 46.00 46.00 46.00 50.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54 -25.54	Margin (dB) -33.78 -23.92 -12.33 -24.91 -28.62
Freq (MHz) 0.52 0.74 1.27 1.75 8.90 20.32 uasi Spec Ma ve Spec Marg ombined Stan	Line ID (1,2,3,N) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82 23.23 	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74 18.05 	Loss (dB) 0.07 0.12 0.13 0.13 0.13 0.21 F – Quasi Li Ave Limit ±	T Limiter (dB) 10.00 10.03 10.06 10.51 11.02 mit ± Uncert Uncertainty	Limit (dBuV) 56.00 56.00 56.00 60.00 60.00 tainty	Limit (dBuV) 46.00 46.00 46.00 50.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54 -25.54	Margin (dB) -33.78 -23.92 -12.33 -24.91 -28.62
Freq (MHz) 0.52 0.74 1.27 1.75 8.90 20.32 uasi Spec Ma ve Spec Marg ombined Stan	Line ID (1,2,3,N) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Quasi (dBuV) 18.48 18.03 25.02 16.94 12.82 23.23 	Ave (dBuV) 2.16 11.95 23.52 10.90 10.74 18.05 	Loss (dB) 0.07 0.12 0.13 0.13 0.13 0.21 F – Quasi Li Ave Limit ±	T Limiter (dB) 10.00 10.03 10.06 10.51 11.02 mit ± Uncert Uncertainty	Limit (dBuV) 56.00 56.00 56.00 60.00 60.00 tainty	Limit (dBuV) 46.00 46.00 46.00 50.00 50.00	Margin (dB) -27.46 -27.84 -20.83 -28.87 -36.54 -25.54	Margin (dB) -33.78 -23.92 -12.33 -24.91 -28.62



# 4.3 Radiated Emissions FCC Part 15.209, RSS-210 section 2.6

#### 4.3.1 Test Methodology

Testing was performed in accordance with FCC part 15.209 and RSS-210-section 2.6. These test methods are listed under the laboratory's NVLAP Scope of Accreditation. This test measures the levels emanating from the EUT in transmit mode, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

#### 4.3.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 300 kHz and provide a reading at each frequency for each 6° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

#### 4.3.1.2 Final Test

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m nonconductive table 80cm above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

#### 4.3.1.3 Deviations

There were no deviations from this test methodology.

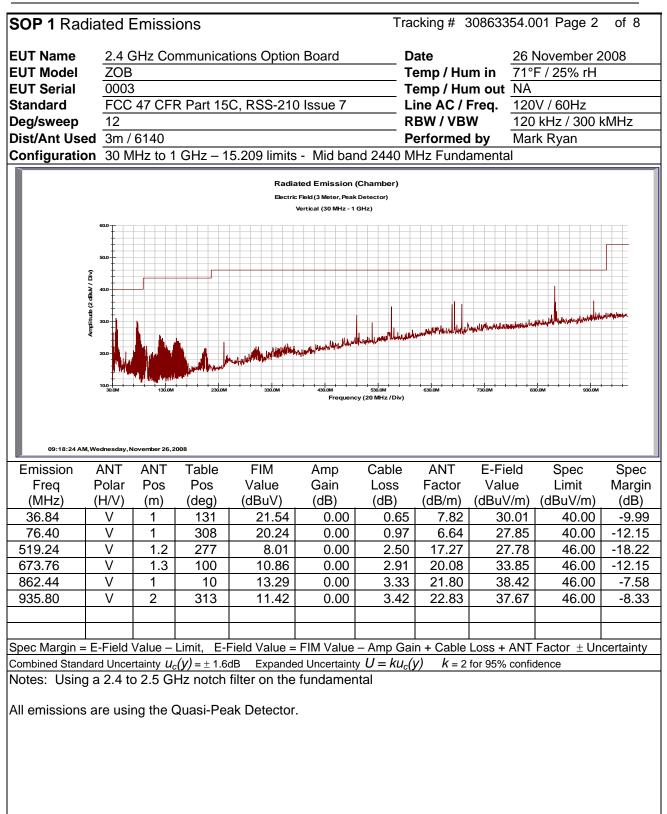
#### 4.3.2 Test Results

All Spurious and harmonic emissions are below the limits of part 15.209(a).

Since all harmonic and spurious emissions outside the frequency band were below the part 15.209 limits, the data for parts the restricted bands of part 15.205 and 15.247(d) (excluding the band edge measurements shown in section 4.7 of this report) are also included in the tables below

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

	ated E	missi	ons			Tra	cking # 3	308633	54.0	01 Page 1	of 8
EUT Name	<u>2.4 G</u>	Hz Co	mmunica	tions Optior	Board	D	ate			November 2	008
EUT Model	ZOB					T	Temp / Hum in 71°F / 25% rH				
EUT Serial	0003					T	Temp / Hum out NA				
Standard	FCC	47 CFF	R Part 15	C, RSS-210	Issue 7		ine AC / F			V / 60Hz	
Deg/sweep	12				BW / VB		-	kHz / 300 k	(Hz		
Dist/Ant Used		61/0					erformed			k Ryan	(11 <u>2</u>
Configuration						Бу	Iviai	ктуан			
	60.0			Electric	ted Emission ( Field (3 Meter, Peak orizontal (30 MHz - 1	Detector)					
Amalitude (2, GAU / , DV)	40.0							Ly hold water	yale Hubber	when provide the second	444.246.6
4				iller to put to the		1 Martin Martineter	alter for the other and the former a	MMu			
09:15:48 AM, V	10.0 1 10.0 1 10.0 10 10 10 10 10 10 10 10 10 10 10 10 10	130.0M	230.0M	330.0M	430.0M Frequenc	530.0M y (20 MHz /Div)	630.0M	730.0M	83	<u>↓</u>	
Emission	ANT	ANT	Table	FIM	Amp	Cable	ANT	E-Fie	əld	Spec	Spec
_	Polar	Pos	Pos	Value	Gain	Loss	Factor	Valu	Je	Limit	Margin
Freq			(deg)	(dBuV)	(dB)	(dB)	(dB/m)	(dBu∖	//m)	(dBuV/m)	(dB)
Freq (MHz)	(H/V)	(m)	(ucg)				7 00	~ ~ ~		43.50	
	(H/V) H	(m) 1.9	(deg) 287	16.48	0.00	1.19	7.33	- 25	5.00	40.00	-18.50
(MHz)	` '	· · /		16.48 14.77	0.00 0.00	<u>1.19</u> 1.36	8.16		4.29	43.50	-18.50 -19.21
(MHz) 118.80	Ή	1.9	287					24			-19.21
(MHz) 118.80 154.28	H H	1.9 1.9	287 270	14.77	0.00	1.36	8.16	24 22	1.29	43.50	-19.21 -23.29
(MHz) 118.80 154.28 240.00	H H H	1.9 1.9 1	287 270 267	14.77 9.40	0.00 0.00	1.36 1.71	8.16 11.60	24 22 43	4.29 2.71	43.50 46.00	-19.21 -23.29 -2.88
(MHz) 118.80 154.28 240.00 669.28	H H H H	1.9 1.9 1 1.5	287 270 267 61	14.77 9.40 20.03	0.00 0.00 0.00	1.36 1.71 2.89	8.16 11.60 20.20	24 22 43 35	1.29 2.71 3.12	43.50 46.00 46.00	-19.21 -23.29 -2.88 -10.59
(MHz) 118.80 154.28 240.00 669.28 856.04	H H H H H H	1.9 1.9 1 1.5 1.5	287 270 267 61 331	14.77 9.40 20.03 9.98	0.00 0.00 0.00 0.00	1.36 1.71 2.89 3.31	8.16 11.60 20.20 22.12	24 22 43 35	4.29 2.71 3.12 5.41	43.50 46.00 46.00 46.00	-19.21 -23.29 -2.88 -10.59
(MHz) 118.80 154.28 240.00 669.28 856.04	H H H H H H	1.9 1.9 1 1.5 1.5	287 270 267 61 331	14.77 9.40 20.03 9.98	0.00 0.00 0.00 0.00	1.36 1.71 2.89 3.31	8.16 11.60 20.20 22.12	24 22 43 35	4.29 2.71 3.12 5.41	43.50 46.00 46.00 46.00	-19.21 -23.29 -2.88 -10.59
(MHz) 118.80 154.28 240.00 669.28 856.04 935.76	H H H H H H	1.9 1.9 1.5 1.5 1.6	287 270 267 61 331 322	14.77 9.40 20.03 9.98 6.45	0.00 0.00 0.00 0.00 0.00	1.36 1.71 2.89 3.31 3.42	8.16 11.60 20.20 22.12 22.93	24 22 43 35 32	4.29 2.71 3.12 5.41 2.80	43.50 46.00 46.00 46.00 46.00	-19.21 -23.29 -2.88 -10.59 -13.20
(MHz) 118.80 154.28 240.00 669.28 856.04 935.76 Spec Margin = R Combined Standa	H H H H H E-Field V ard Uncer	1.9 1.9 1 1.5 1.5 1.6 /alue – tainty <i>U<sub>c</sub></i>	$287 \\ 270 \\ 267 \\ 61 \\ 331 \\ 322 \\ \\ Limit, E-I \\ (y) = \pm 1.60 \\ (y) = 1.60 \\ ($	14.77 9.40 20.03 9.98 6.45 Field Value = dB Expande	0.00 0.00 0.00 0.00 0.00 FIM Value d Uncertainty	1.36 1.71 2.89 3.31 3.42 - Amp Gai / U = ku <sub>c</sub> (	8.16 11.60 20.20 22.12 22.93 in + Cable	24 22 43 35 32	4.29 2.71 3.12 5.41 2.80 ANT	43.50 46.00 46.00 46.00 46.00 Factor ± Un	-19.21 -23.29 -2.88 -10.59 -13.20
(MHz) 118.80 154.28 240.00 669.28 856.04	H H H H H E-Field V ard Uncer	1.9 1.9 1 1.5 1.5 1.6 /alue – tainty <i>U<sub>c</sub></i>	$287 \\ 270 \\ 267 \\ 61 \\ 331 \\ 322 \\ \\ Limit, E-I \\ (y) = \pm 1.60 \\ (y) = 1.60 \\ ($	14.77 9.40 20.03 9.98 6.45 Field Value = dB Expande	0.00 0.00 0.00 0.00 0.00 FIM Value d Uncertainty	1.36 1.71 2.89 3.31 3.42 - Amp Gai / U = ku <sub>c</sub> (	8.16 11.60 20.20 22.12 22.93 in + Cable	24 22 43 35 32 Loss +	4.29 2.71 3.12 5.41 2.80 ANT	43.50 46.00 46.00 46.00 46.00 Factor ± Un	-19.21 -23.29 -2.88 -10.59 -13.20



SOP 1 Radia	ated E	Emissi	ons	racking # 3	308633	54.0	01 Page 3	of 8				
EUT Name	2.4 0	GHz Co	mmunica	tions Optio	n Board		Date		24	November 2	8008	
EUT Model	ZOB				Temp /			m in	73°F / 24% rH			
EUT Serial	0003						Temp / Hu	m out	NA			
Standard	FCC	47 CFI	R Part 15	C, RSS-21	0 Issue 7		Line AC /	Freq.	120	120V / 60Hz		
Deg/sweep	6						RBW / VB	W	1M	Hz / 3 MHz		
Dist/Ant Used	3m /	3115-2	236				Performed	l by	Ma	rk Ryan		
Configuration	1-10	GHz Ho	orizontal -	- 15.209 lin	nits - Mid b	and 24	40 MHz Fu	ndame	ntal			
			er)									
	80.0											
	70.0											
	60.0											
Amplitueb (dBuV)	50.0											
plitud	40.0					the states		للحور وعالية		ويهدا الملاجعة والمعديد فالمقدوقين	deset of the second	
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	20.0		V									
	Ē											
	10.0 1.0G	2.0G	3.0	3 4.0G	5.0G		6.0G 7.0G 8.0G 9.0G 10					
					Freq	uency (MHz)						
10:23:03 AM, M	-					<u> </u>						
	ANT	ANT	Table	FIM	Amp	Cable		E-Fie		Spec	Spec	
	Polar	Pos	Pos	Value	Gain		Factor	Valu		Limit	Margin	
(MHz) (	H/V)	(m)	(deg)	(dBuV)	(dB)	(dB)	(dB/m)	(dBu∖	/m)	(dBuV/m)	(dB)	
Spec Margin = E	-Field	Value –	Limit, E-F	- ield Value =	FIM Value	– Amp G	ain + Cable	Loss +	ANT	Factor ± Un	certainty	
Combined Standar								for 95%				
Notes: The pe											input to	
the preamp						-						
							<b></b>					
All emissions o	ther w	ere ind	istinguish	able from t	he noise flo	oor of th	e EMI Test	Receiv	ver.			

SOP 1 Radia	ons	racking # 3	308633	54.001 Page 4 of 8								
EUT Name	2.4 GI	Hz Coi	mmunica	tions Optior	n Board		Date		24	November 2	8008	
EUT Model	ZOB						Temp / Hum in			73°F / 24% rH		
EUT Serial	0003						Temp / Hu					
Standard		17 CFF	R Part 15	C, RSS-210	) Issue 7		Line AC /		120V / 60Hz			
Deg/sweep	6			,			RBW / VB	-		Hz/3MHz		
Dist/Ant Used	3m / 3	115-2	236				Performed	l bv	Ma	rk Ryan		
Configuration				5.209 limits	- Mid ban					<b>,</b>		
				Radiated	Emission Profi 5 Field (3-Meter, Peak Vertical (1 GHz to 10	ile (Chambe Detector)						
Sector (SE2 OF											10.00	
Emission	ANT	ANT	Table	FIM	Amp	Cable	ANT	E-Fie	əld	Spec	Spec	
Freq F	Polar	Pos	Pos	Value	Gain	Loss	Factor	Valu	le	Limit	Margin	
(MHz) (	H/V)	(m)	(deg)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV	′/m)	(dBuV/m)	(dB)	
Spec Margin = E Combined Standar Notes: The pe the preamp All emissions o	d Uncerta ak is the	ainty <i>U<sub>c</sub></i> e funda	<i>(y)</i> = ± 1.60 amental f	dB Expande requency a	ed Uncertainty ttenuated I	<u>v U = ku</u> by use c	<u>c(y)                                    </u>	for 95% GHz no	confid otch	dence		

SOP 1 Radia	ted Emissi	ons	Tra	acking # 30863	354.0	01 Page 5	of 8			
EUT Name EUT Model EUT Serial Standard Deg/sweep Dist/Ant Used Configuration	2.4 GHz Co ZOB 0003 FCC 47 CFI 6 3m / 3115-2 10-18GHz H	R Part 150	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Date Femp / Hum in Femp / Hum ou Line AC / Freq. RBW / VBW Performed by 40 MHz Fundar	73° NA 120 1M Ma	November 2 F / 24% rH V / 60Hz Hz / 3 MHz rk Ryan	008			
			ile (Chamber Detector) 24 GHz)	)						
Porizontal (10 GHz to 24 GHz)										
Freq F	ANT ANT Polar Pos H/V) (m)	Table Pos (deg)	FIM Value (dBuV)	Amp Gain (dB)	Cable Loss (dB)	Factor Va	ield lue V/m)	Spec Limit (dBuV/m)	Spec Margin (dB)	
Spec Margin = E- Combined Standard Notes: All emis	d Uncertainty <i>U</i> a	$f_{c}(y) = \pm 1.6$ dl	B Expande	ed Uncertainty	$U = ku_c$	(y) $k = 2$ for 95%	6 confi	dence	certainty	

SOP 1 Radia	ated Emiss	ions			Tra	acking # 3086	3354.0	001 Page 6	of 8	
EUT Name		ommunicatio	ns Option	Board		Date		24 November 2008		
EUT Model	ZOB					<b>Temp / Hum in</b> <u>73°F / 24% rH</u>				
EUT Serial	0003					Femp / Hum o				
Standard	FCC 47 CF	R Part 15C,	RSS-210	Issue 7		_ine AC / Freq	)V / 60Hz			
Deg/sweep	6			RBW / VBW	1M	Hz / 3 MHz				
Dist/Ant Used	3m / 3115-2	2236	F	Performed by	Ма	rk Ryan				
Configuration	10-18GHz \	Vertical – 15	nd 2440	MHz Fundame	ental					
			Electric Fie	mission Profile eld (3-Meter, Peak D tical (1 GHz to 10 Gl	etector)					
Ambitues (GB.04)				log · · ·	4.0G ICY (MHz)				1805	
Emission Freq	ANT ANT Polar Pos (H/V) (m)	Table Pos (deg)	FIM Value (dBuV)	Amp Gain (dB)	Cable Loss (dB)	Factor V	Field alue uV/m)	Spec Limit (dBuV/m)	Spec Margin (dB)	
						ain + Cable Loss (y) $k = 2$ for 95			certainty	
						( <i>y)                                    </i>				

SOP 1 Radia	ated Emiss	sions			Tracking	# 308633	354.001 Page 7	of 8		
EUT Name	2.4 GHz C	ommunicat	tions Optio	n Board	Date		20 November	2008		
EUT Model	ZOB		I		_ Temp /	Hum in	73°F / 24% rH			
EUT Serial	0003				Temp /					
Standard		FR Part 150	C. RSS-21	0 Issue 7		C / Freq.	120V / 60Hz			
Deg/sweep	6				RBW /		1MHz / 3 MHz			
Dist/Ant Used		552			_	Performed by Mark Ryan				
			tal - 15 20'	9 limits - Mid ba			,			
Agilent	14:36:58									
Ref 90 dBµV		#F	Atten 0 dE	3				225 GHz 3 dBµV		
Peak Log										
10		+	+							
dB/		+								
man.		$1 \sim$	hann	m	mon	mm	minun	mm		
V1 S2	$\rightarrow$	7	+							
S3 FC		+	+							
		<u> </u>								
Start 18 GHz #Res BW 120	kHz		ι.	/BW 300 kHz		Swe	Stop 4 ep 1.119 s	25 GHz 01 pts)		
_ · ·	<u></u>				A N 1					
	ANT ANT		FIM	Amp Gain	AN <sup>®</sup>			Spec		
	Polar Pos		Value	+ Cable Loss				Margin		
(IVI⊟Z) (	H/V) (m)	(deg)	(dBuV)	(dB)	(dB/i	n) (dBu\	<u>//m) (dBuV/m)</u>	(dB)		
								<u> </u>		
				FIM Value – Amp				ncertainty		
				ed Uncertainty $U = $	ки <sub>с</sub> (у) к	= 2 for 95%	confidence			
Notes: Plot sho	own without	correction	factors app	blied.						
	mianian (hal	ow) for wor	at acco am	iaaian						
See Vertical Er	nission (bei	JW) IOF WOR	st case em	lission.						
All other emissi	ions were in	distinguish	ahle from t	he noise floor of	the EMI T	est Recei	ver			
		usunguisti					vor.			

SOP 1 Radia	ated E	Emissi	ons			٦	Fracking # 3	308633	54.0	01 Page 8	of 8
EUT Name	2.4 G	Hz Co	mmunica	tions Optio	n Board		Date		20	November 2	2008
EUT Model	ZOB						Temp / Hum in 73°F / 24% rH				
EUT Serial	0003						Temp / Hum out NA				
Standard	FCC	47 CF	R Part 150	C, RSS-210	) Issue 7		Line AC / Freq. 120V / 60Hz				
Deg/sweep	6						RBW / VB	w	1M	Hz / 3 MHz	
<b>Dist/Ant Used</b>	1m /	MA865	52			Performed	l by	Mai	rk Ryan		
Configuration	18 –	25 GH	z Vertical	– 15.209 li	mits - Mid ba	nd 2	2440 MHz Fu	undame	ental	-	
🔆 Agilent	14:39	1:08 N	lov 20, 2	008							
Ref90 dBµV Peak <b>[</b>			#Ĥ	ltten 0 dB	;				MI		25 GHz dBµV
Log											
10 dB/											
			1								
			Ŷ								
	_				- Ambay	mh			m	mant	mo
V1 S2	-	~~~~			<u> </u>				$\rightarrow$		
S3 FC											
AA											
Start 18 GHz		I		· ·							25 GHz
#Res BW 120	kHz			V	BW 300 kHz			Swee	p 1.	.119 s (40	1 pts)
L											
Emission	ANT	ANT	Table	FIM	Amp Gain		ANT	E-Fie	əld	Spec	Spec
	Polar	Pos	Pos	Value	+ Cable los		Factor	Valu		Limit	Margin
(MHz) (	(H/V)	(m)	(deg)	(dBuV)	(dB)		(dB/m)	(dBu∖	//m)	(dBuV/m)	(dB)
19523.42	V	1	350	43.02	27.4		40.11		9.73	64.00	-4.27
19523.42	V	1	350	50.88	27.4		40.11	67	7.59	84.00	-16.41
Spec Margin = E											certainty
Combined Standar						l = k	$u_c(y)  k=2$	for 95%	confi	dence	
Notes: Plot sh	own w	ithout c	correction	factors app	blied.						
The limits have	hoon	incroa	eod ±10d	3 to compo	neato for the	1 m i	measuring a	ntonna	dict	2000	
	been	increa		o to compe			neasuring a	петпа	uist	ance.	
Emissions sho	wn in <mark>E</mark>	3LUE a	are usina t	he Average	e detector and	d em	issions show	wn in G	REE	N are using	the
Peak Detector.		•							_		
All other emiss	ions w	ere ind	listinguish	able from t	he noise floor	of t	he EMI Test	Receiv	/er.		

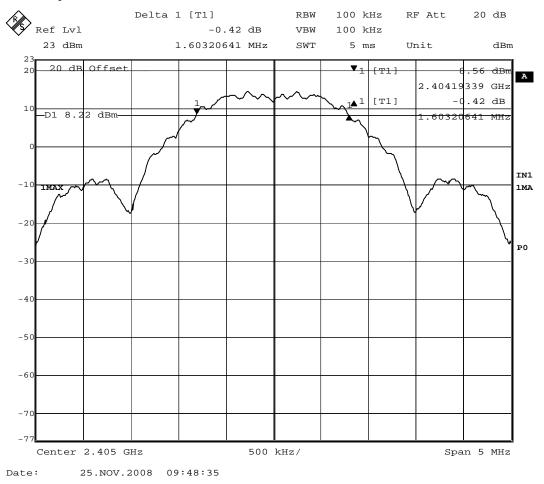
# 4.4 6 dB Bandwidth of Digitally Modulated Systems FCC Part 15.247(a)(2)

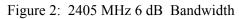
Systems using digital modulation techniques may operate in the 2400-2483.5 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.

#### 4.4.1 Test Results

BW = 1.6 MHz which is greater than the minimum 500 kHz 6 dB Bandwidth

The EUT is compliant with the rules.





Note: The above plot is the worst case. The other 6 dB bandwidth plots are on file at TUV Rheinland

Spectrum Analyzer Parameters: RBW=100 kHz Span=5 MHz VBW= 100 kHz LOG dB/div.= 10dB Sweep = Auto Detector = peak detector, max hold

# 4.5 Bandwidth RSS-210 Section A1.1.3

For the purpose of Section A1.1, the 99% bandwidth shall be no wider than .25% of the center frequency for devices operating between 70-900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency.

Using the procedures of RSS-GEN section 4.6.1, the resolution bandwidth is 1% of the 5 MHz span.

The limit of the bandwidth would be 0. 5% of 2405 MHz, or 12.03 MHz. The measured 99% bandwidth is 2.425 MHz.

#### 4.5.1 Test Results

The EUT is compliant to the requirements of RSS-210 A1.1.3

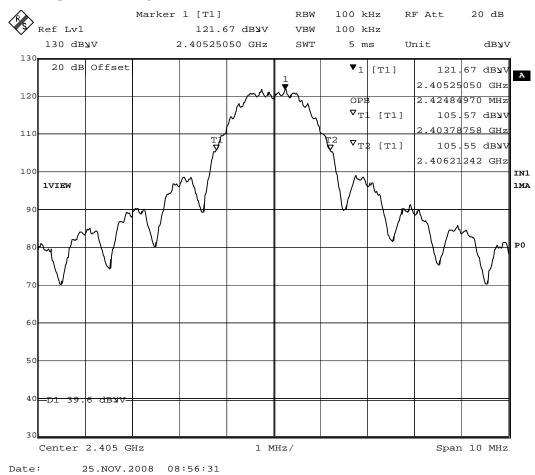


Figure 3 – 99% Bandwidth

Spectrum Analyzer Parameters: RBW=100 kHz Span=10 MHz VBW= 100 kHz LOG dB/div.= 10dB Sweep = Auto Detector = peak detector, max hold

# 4.6 Peak Output Power FCC Part 15.247(b)(3)

For systems using digital modulation in the 2400-2483.5 MHz band: 1 Watt.

As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

The EUT was set to transmit an un-modulated carrier for peak power measurements

Test Setup



#### Measured Peak Power Output

Lowest Channel; CH 11: 2405 MHz = 17.9 dBm = 61.7 mW Mid Channel; CH 18: 2440 MHz = 18.74 dBm = 74.8 mW Highest Channel; CH 23: 2465 MHz = 18.27 dBm = 66.7 mW

#### 4.6.1 Results

The Maximum power output of the EUT is 74.8mW, which is .925 Watts below the 1 Watt limit

The EUT is compliant with the rules.

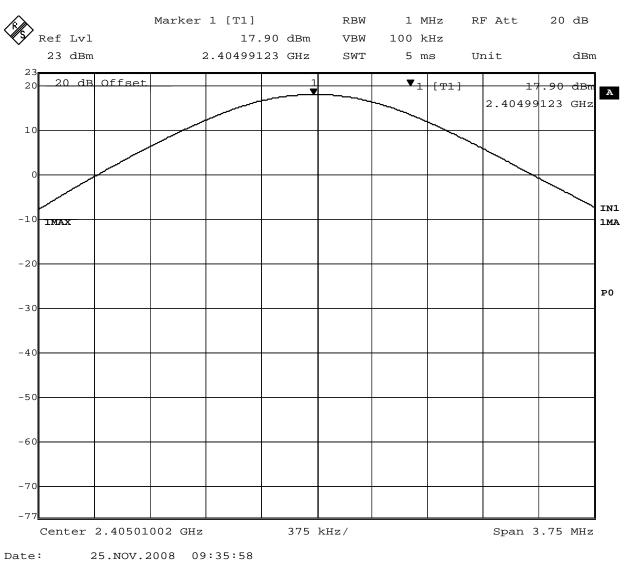


Figure 4: CH 1 (2405 MHz) Peak Output Power

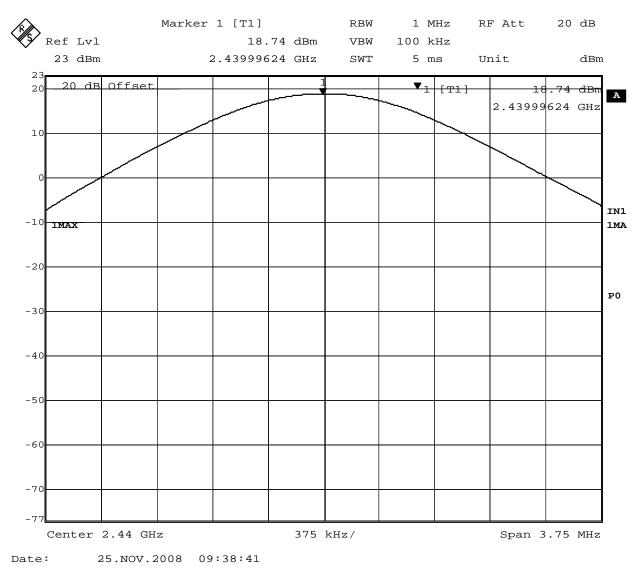


Figure 5: CH 31 (2440 MHz) Peak Output Power

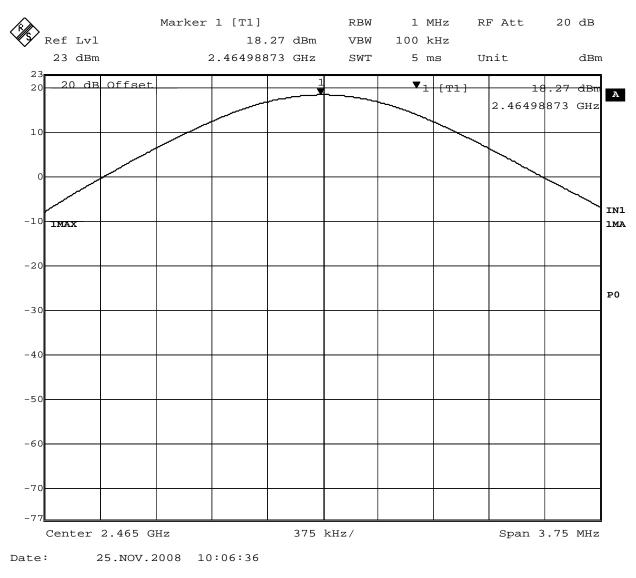


Figure 6: CH 48 (2465 MHz) Peak Output Power

#### 4.6.2 Antenna Gain

As noted in Section 3 of this report the Antenna requirement specified in FCC part 15.203 (RSS-210 section 5.5), the EUT uses a PCB trace antenna with a gain of 0 dBi, there is no user provision to change or modify this antenna.

### 4.6.2.1 Results

Antenna is 0 dBi gain.

# 4.7 Band Edge FCC Part 15.247(d)

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power, based on either RF conducted or radiated measurements. Conducted antenna port measurements are provided below to show that the EUT meets these requirements at the band edges.

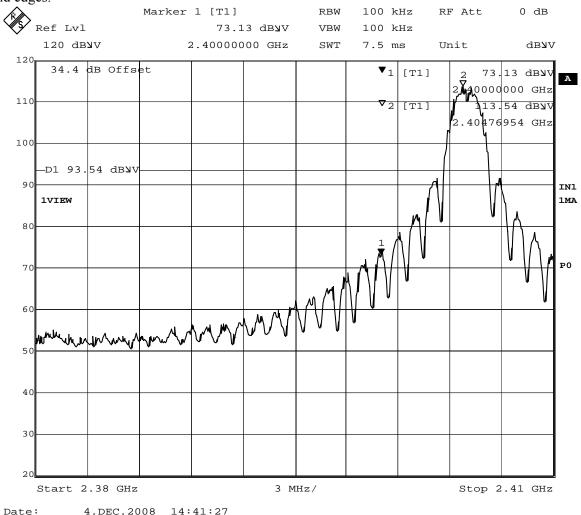


Figure 7: Lower Band Edge Measurement Using Peak Detector (Display line is 20 dB below carrier) Note: Marker 2 is highest peak power, Marker 1 is the 2400MHz band edge.

The EUT lowest operating frequency is 20.4 dB below the 20 dB band edge limit.

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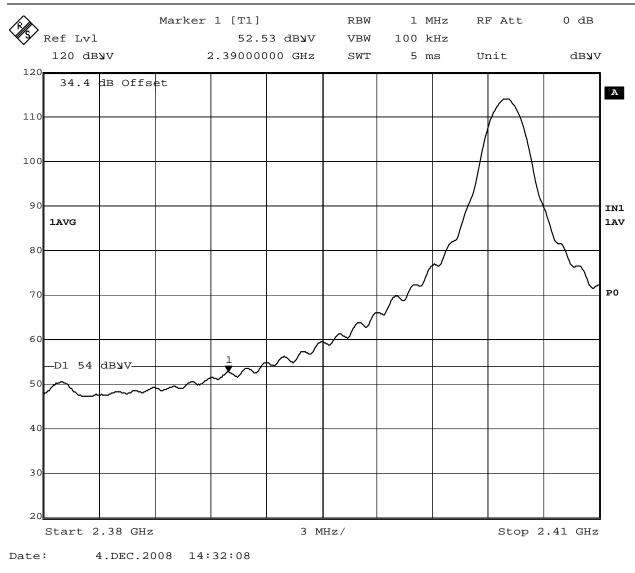
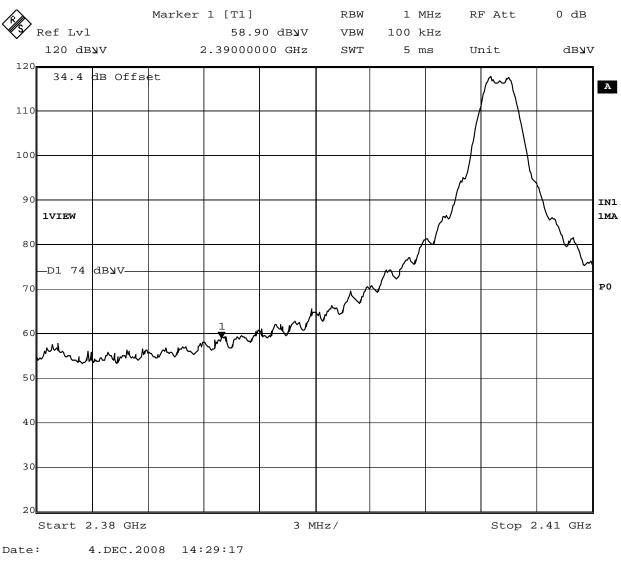


Figure 8: Lower Band Edge Measurement Using Average Detector (54 dB $\mu$ V = 500  $\mu$ V) Note: Marker 1 the edge of the restricted band at 2390 MHz.

The EUT lowest operating frequency is 1.5 dB below the average limit at the restricted band.

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Note: Marker 1 is the edge of the restricted band at 2390 MHz.

The EUT lowest operating frequency is 15.1 dB below the peak limit at the restricted band.

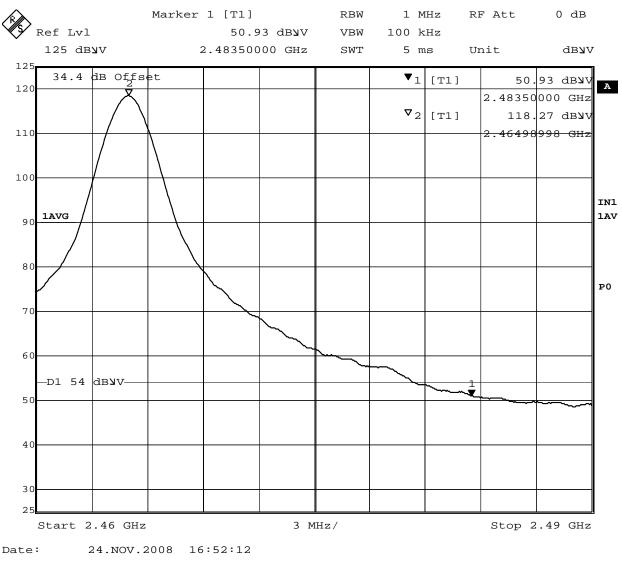


Figure 10: High Band Edge Measurement Using Average Detector (54 dB $\mu$ V = 500  $\mu$ V)

Note: Marker 1 is highest average power, Marker 2 the 2423.5MHz band edge, which is also the start of a restricted band.

The EUT's highest operating frequency is 3 dB below the limit at the restricted band.

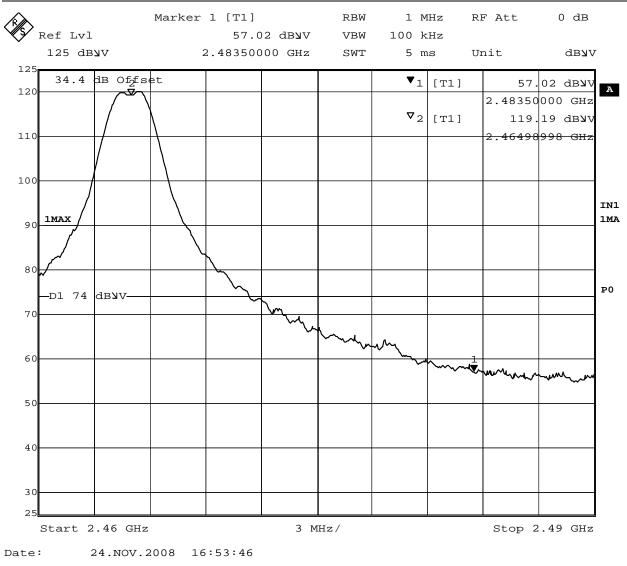


Figure 11: High Band Edge Measurement Using Average Detector (74 dB $\mu$ V = 5000  $\mu$ V)

Note: Marker 1 the 2423.5MHz band edge, which is also the start of a restricted band. . The EUT's highest operating frequency is 17 dB below the limit at the restricted band.

# 4.7.1 Test Results

The EUT is compliant with the rules.

# 4.8 Power Spectral Density FCC Part 15.247(e)

For digitally modulated 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. The same method of determining the conducted output power shall be used to determine the power spectral density.

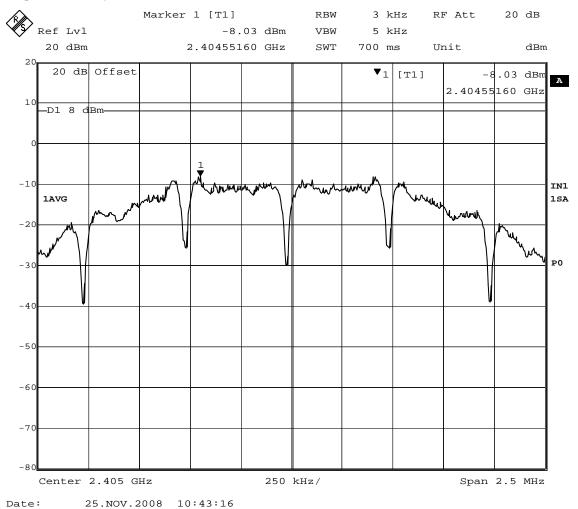


Figure 12: Low channel (2405MHz) PPSD = -8.03 dBm which is 16 dB below the 8 dBm limit

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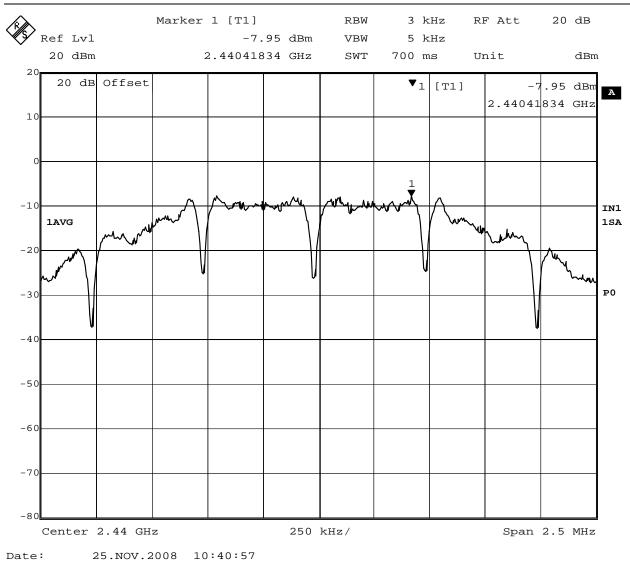
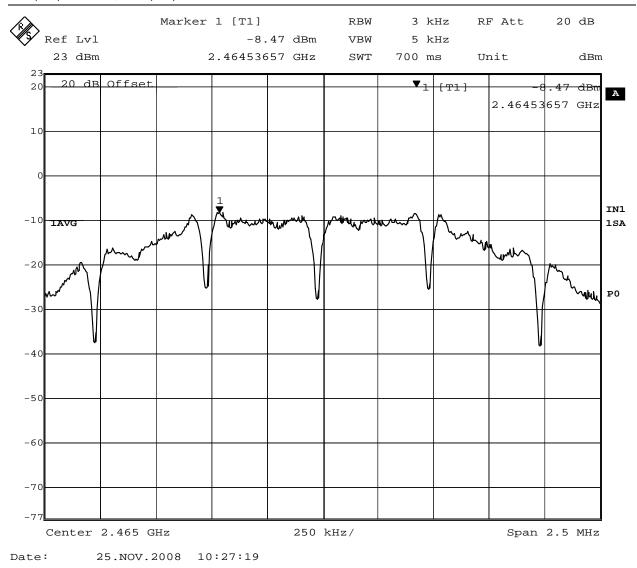


Figure 13: Mid channel (2444 MHz) PPSD = -7.99 dBm which is 16 dB below the +8 dBm limit





Spectrum Analyzer Parameters: RBW=3 kHz Span=2.5 MHz VBW= 5 kHz LOG dB/div.= 10dB Sweep = Auto Detector = sample detector, 100 sample average

# 4.8.1 Test Results

The EUT is compliant with the rules.

# 4.9 Maximum Permissible Exposure FCC Part 15.247(i), IC Safety code 6

#### 4.9.1 Test Methodology

In this document, we try to prove the safety of radiation harmfulness to the human body for our product. The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The Gain of the antenna used in this product is measured in a Semi-Anechoic Chamber, and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis transmission formula is a far field assumption, the calculated result of that is an overprediction for near field power density. We will take that as the worst case to specify the safety range.

### 4.9.2 **RF Exposure Limit**

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

Frequency Range (MHz)	Electric Field Strength (V/m)	e		Average Time (minutes)					
(A)Limits For Occupational / Control Exposures									
300-1500			F/300	6					
1500-100,000			5	6					
(B)Limits For General Population / Uncontrolled Exposure									
300-1500			F/1500	6					
1500-100,000			1.0	30					

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

F = Frequency in MHz

# **4.9.3 EUT Operating Condition**

The software provided by Manufacturer enabled the EUT to transmit data at lowest, middle and highest channel individually.

#### 4.9.4 Classification

The antenna of the product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance with the antenna should be included in users manual.

# 4.9.5 Calculation Results

#### 4.9.5.1 Antenna Gain

The stated, Antenna Gain is 0 dBi or a numeric gain of 1.

#### 4.9.5.2 Output Power into Antenna & RF Exposure value at distance 20cm:

Calculations for this report are based on highest power measurement and the highest gain of the antenna. Limit for MPE (from FCC part 1.1310 table 1) is  $1 \text{ mW/cm}^2$ 

Highest Pout is 74.8 mW, highest antenna gain (in linear scale) is 1, and R is 20cm.

Pd =  $(74.8 * 1) / (4 * 20^{2} * \pi) = 0.015 \text{ mW/cm}^{2}$ , which is 4.985 mW/cm<sup>2</sup> below to the limit.

#### 4.9.6 Sample Calculation

The Friis transmission formula:  $Pd = (P_{out} *G) / (4 * R^2 * \pi)$ 

Where;

 $\begin{array}{l} Pd = power \ density \ in \ mW/cm_2 \\ P_{out} = output \ power \ to \ antenna \ in \ mW \\ G = gain \ of \ antenna \ in \ linear \ scale \\ \pi \approx 3.1416 \\ R = distance \ between \ observation \ point \ and \ center \ of \ the \ radiator \ in \ cm \end{array}$ 

Ref. : David K. Cheng, Field and Wave Electromagnetics, Second Edition, Page 640, Eq. (11-133).

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

# **5 UNINTENTIONAL RADIATOR EMISSIONS**

# 5.1 Power Line Conducted Emissions, FCC part 15.107, ICES-003

Testing was performed in accordance with 47 CFR 15B, ICES-003. These test methods are listed under the laboratory's NVLAP Scope of Accreditation.

This test measures the levels emanating from the EUT in receive mode, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

### 5.1.1 Test Methodology

A test program that controls instrumentation and data logging was used to automate the AC Power Line Conducted emission test procedure. The frequency range of interest was divided into sub-ranges such as to yield a frequency resolution of 9 kHz. For each frequency sub-range, each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a set of  $50\mu$ H /  $50\Omega$  LISNs.

Testing is either performed in the anechoic chamber or on PLC Site 2. The setup photographs clearly identify which site was used. The vertical ground plane used in the anechoic chamber is a  $2m \times 2m$  wooden frame that is covered with  $\frac{1}{4}$  inch hardware cloth and is bonded to the horizontal ground plane.

In the case of tabletop equipment, the EUT is placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane and 40cm from a vertical ground reference plane. The rear of the EUT was positioned flush with the backside of the table and directly over the LISNs. The power and I/O cables were routed over the edge of the table and bundled approximately 40cm from the ground plane. Support equipment was powered from a separate LISN. Floor-standing equipment is placed directly on the ground plane.

# 5.1.1.1 Deviations

There were no deviations from this test methodology.

#### 5.1.2 Test Results

This Section lists the final measurement data under the worst case operating modes, configurations, and/or cable positions. As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Plots of the EUT's AC Line Conducted emissions are contained in the following sections. The plots show peak and/or average emissions and the corresponding peak and/or average limits. If the peak emissions are below the average limit, then the EUT is considered to pass and no average measurements are made. If the peak emissions are below the quasi-peak limit and the average emissions are below the average limit, then the EUT is considered to pass and no further measurements are made. Otherwise, individual frequencies are measured and compared to the corresponding limit for the detector used (quasi-peak or average).

# 5.1.2.1 Final Data

The data recorded in this section contains the final results under the worst-case conditions and with any modifications or special accessories implemented as the manufacturer intends.

- (/	0000, 1 0.0	(												
SOP 2 Cor	nducted E	Emissions	;		٦	Fracking #	308633	54.001 Page	1 of 2					
EUT Name	2 4 GH <del>7</del>	Communi	cations On	tion Boar	d	Date		24-Nov 2008						
EUT Model	ZOB	Communi		tion bour	<u>u</u>	Tempera	aturo	74° F						
EUT Serial	0003					-		27% rH						
				002 1000	<u> </u>									
Standard	-	CFR Part	15B, ICES	-003 ISSU	e 4			120VAC / 60						
LISNs Used	18					Perform		Michael Mora	anha					
Configuration	Configuration EUT installed in a typical application (REX2 power meter), in Receive Mode													
AC Line Conducted Emissions 150 kHz to 30 MHz Phase 1, Peak														
‡														
70.0														
Ē														
ê 60.0														
(2, G0, G0, G0, G0, G0, G0, G0, G0, G0, G0														
편 전 전 50.0														
e () 30.0														
	h.													
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30.0 +			www.www.www.upowyphing	10.11.11.10.11.10.100		and the second second second								
Ē														
20.0 100.0H	<	-+ + +	1.0M		- + + +	10.0M								
00-44-55 A	I, Monday, Novemb	24 2008		Freq	uency (MHz)									
09.41.55 AN	, Monday, Novenik	Jei 24, 2008												
Emission	Line	FIM	FIM	Cable	LISN +	Quasi	Ave	Quasi Spec	Ave Spec					
Freq	ID	Quasi	Ave	Loss	T Limiter	Limit	Limit	Margin	Margin					
(MHz)	(1,2,3,N)	(dBuV)	(dBuV)	(dB)	(dB)	(dBuV)	(dBuV)	(dB)	(dB)					
0.18	1	29.87	23.75	0.00	9.99	64.44	54.44	-24.58	-20.70					
0.24	1	27.44	22.86	0.12	9.99	62.03	52.03	-24.47	-19.05					
12.00	1	19.18	11.43	0.12	10.80	60.00	50.00	-29.89	-27.64					
12.00	1	19.10	11.45	0.15	10.00	00.00	30.00	-29.09	-27.04					
					-									
Quasi Spec Mar						ainty								
Ave Spec Margin Combined Stand					tainty $U = ku_c$	(.) k ) k	or 95% conf	idanaa						
Notes: 1.433					tainty $O = K u_c$	(y) $k = 2 R$	JI 95 /6 CUIII	Idence						
NOICES. 1.433	winz is am	bient emis	51011.											

SOP 2 Con	SOP 2 Conducted Emissions       Tracking # 30863354.001 Page 2 of 2											
EUT Name	2.4 GHz	Communio	cations Op	tion Boar	d	Date		24-Nov 2008				
EUT Model	ZOB	••••				Tempera	ature	74° F /				
EUT Serial	0003					Humidit		27% rH				
Standard	-	CFR Part 2	ISB ICES	003 660	- 1	Line AC		120VAC / 60	Ц7			
	-	CFK Fait	15D, ICES	-003 15506	5 4		•					
LISNs Used	17					Perform		Michael Mora	anna			
Configuration EUT installed in a typical application (REX2 power meter), in Receive Mode												
AC Line Conducted Emissions 150 kHz to 30 MHz Neutral, Peak												
80.0 70.0 70.0 70.0 70.0 70.0 70.0 70.0	Monday, Novemb	er 24, 2008	1.0M			10.0M			100.0M			
Emission Freq	Line ID	FIM Quasi	FIM Ave	Cable Loss	LISN + T Limiter	Quasi Limit	Ave Limit	Quasi Spec Margin	Ave Spec Margin			
	(1,2,3,N)	(dBuV)	(dBuV)	(dB)	(dB)	(dBuV)	(dBuV)	(dB)	(dB)			
0.18	N	27.90	23.50	0.00	9.99	64.44	54.44	-26.55	-20.95			
14.65	Ν	20.50	15.10	0.20	10.34	60.00	50.00	-28.96	-24.36			
16.28	Ν	18.99	12.04	0.19	10.35	60.00	50.00	-30.46	-27.41			
Quasi Spec Margin = Quasi FIM + Cable Loss + LISN CF - Quasi Limit $\pm$ Uncertainty         Ave Spec Margin = Ave FIM + Cable Loss + LISN CF - Ave Limit $\pm$ Uncertainty         Combined Standard Uncertainty $u_c(y) = \pm 1.2$ dB         Expanded Uncertainty $U = ku_c(y)$ $k = 2$ for 95% confidence         Notes: 1.433 Mhz is ambient emission.												

# 5.1.3 Sample Calculation

The signal strength is calculated by adding the LISN Correction Factor and Cable Loss to the measured reading. The basic equation is as follows:

Field Strength  $(dB\mu V/m) = FIM + CBL + LCF$ Where: FIM = Field Intensity Meter  $(dB\mu V)$  CBL = Cable Loss (dB) LCF = LISN Loss (dB) $\mu V/m = 10^{\frac{dB\mu V/m}{20}}$ 

# 5.2 Radiated Emissions, FCC part 15.109, ICES-003

Testing was performed in accordance with 47 CFR 15B, ICES-003. These test methods are listed under the laboratory's NVLAP Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

### 5.2.1 Test Methodology

#### 5.2.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 300 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

#### 5.2.1.2 Final Test

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m nonconductive table 80cm above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

#### 5.2.1.3 Deviations

There were no deviations from this test methodology.

#### 5.2.2 Test Results

Section 6 contains preliminary test data as well as any engineering data used to determine any modifications or special accessories. Section 5.2.2.1 lists the final measurement data under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and 1.5.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

# 5.2.2.1 Final Data

The data recorded in this section contains the final results under the worst-case conditions and with any modifications or special accessories implemented as the manufacturer intends.

### 5.2.3 Sample Calculation

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dB $\mu$ V/m) = FIM - AMP + CBL + ACF Where: FIM = Field Intensity Meter (dB $\mu$ V) AMP = Amplifier Gain (dB) CBL = Cable Loss (dB) ACF = Antenna Correction Factor (dB/m)  $\mu$ V/m =  $10^{\frac{dB\mu V/m}{20}}$ 

SOP 1 Radia	ated Emiss	ions			Trac	cking # 3	308633	54.0	01 Page 1	of 2	
EUT Name	2.4 GHz C	tions Optior	Da	<b>Date</b> 25-Nov-2008							
EUT Model	ZOB					emp / Hu	m in				
EUT Serial	0003					emp / Hu			25-Nov-2008 74° F / 27% rH V/A 120V / 60 Hz Wichael Moranha Mode		
Standard	FCC 47 CF	R Part 15		ine AC / I			N/A 20V / 60 Hz ⁄lichael Moranha				
Deg/sweep	12	INT all 15	D, ICL3-00	5 133UE 4		BW / VB		120	00112		
Dist/Ant Used						erformed		Mio	haal Maran	20	
Configuration		od in o tur	ical applica	tion (DEV						la	
			Radiat Electric F	ed Emission (C Field (3 Meter, Peak Do rizontal (30 MHz - 1 C	hamber)		(eceive				
Artplitue (2 dBaV / Div)			Minsel and Minghing Lines		coom coo			600.0M		UNIV:	
Emission / Freq F	ANT ANT Polar Pos	Table Pos	FIM Value	Amp Gain	Cable Loss	ANT Factor	E-Fie Valu	le	Limit	Margin	
(MHz) ( 210.23	H/V) (m)	(deg)	(dBuV)	(dB)	(dB)	(dB/m)	(dBu∖		· · · / ·	. /	
302.57	H 1.00		9.81 13.66	0.00	1.60 1.93	10.60 13.00					
907.73	H 1.00		7.64	0.00	3.38	22.55		3.59 3.58			
Spec Margin = E Combined Standar Notes:							_oss + <i>I</i> for 95%			ertainty	

		ix. (313)											
SOP 1 Radia	ated E	missi	ons			Tra	acking # (	308633	354.0	01 Page 2	of 2		
EUT Name	2.4 G	Hz Cor	ions Optior	Date 25-Nov-2			Nov-2008	008					
EUT Model	ZOB	001					'emp / Hu	m in					
EUT Serial	0003						'emp / Hu						
	-		Dort 15										
Standard	-	47 CFF	R Part 15	B, ICES-00	3 Issue 4		ine AC /	-	240	Alchael Moranha Mode			
Deg/sweep	12						RBW / VB						
Dist/Ant Used							Performed				na		
Configuration	EUTi	installe	d in a typ	ical applica	tion (REX2	2 power n	neter), in I	Receiv	e Mo	de			
				Electric F	ed Emission (C ield (3 Meter, Peak De rtical (30 MHz - 1 GH	etector)							
Amplitude (2.08a/ / Div)	600			Warman	www.w.w.w.w.		and the law of the second	A second s	un luna adu	, alamenta ang f	æk.		
	0 <del>      </del>	100.0M	+ + + + + + 200.0M	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		20 MHz / Div)	0.0M 7700.C	<del>, , , , , ,</del>	800.0M	+ + + + + + + + + + + + + + + + + + +	1.00		
11:27:27 AM, Tu	iesday, Novem	ber 25,2008											
Emission	ANT	ANT	Table	FIM	Amp	Cable	ANT	E-Fi	eld	Spec	Spec		
	Polar	Pos	Pos	Value	Gain	Loss	Factor	Valu		Limit	Margin		
•	(H/V)	(m)	(deg)	(dBuV)	(dB)	(dB)	(dB/m)	(dBu∖		(dBuV/m)	(dB)		
69.52	V	1.00	0	10.55	0.00	0.92	1 · · · · · ·	ì	3.72	40.00	-21.28		
862.40	V	1.00	10	8.89	0.00	3.33			4.02	46.00	-11.98		
912.20	V	1.00	5	9.72	0.00	3.40	21.30		+.02 5.42	46.00	-10.58		
Spec Margin = E	-Field V	/alue - L	imit, E-F	ield Value =	FIM Value -	Amp Gai	n + Cable I	_oss + /	ANT F	actor ± Unc	ertainty		
Combined Standa					d Uncertainty			for 95%			,		
Notes:													

# 6 Test Equipment Use List

# 6.1 Test Equipment use list

Equipment	Manufacturer	Model #	Model # Serial/Inst #		Next Cal dd/mm/yy					
SOP 1 – Radiated and Antenna Port Conducted Emissions (5 Meter Chamber)										
Amplifier, preamp	Agilent Technologies	8449B	3008A01480	30-Jan-08	30-Jan-09					
Antenna Horn 1-18GHz	EMCO	3115	5770	16-Jun-08	16-Jun-10					
Antenna Horn 18-26GHz	Advanced Receiver Research	MA86552	8426	7-Jan-08	7-Jan-10					
Ant. BiconiLog	Chase	CBL6140A	1108	13-Jun-08	13-Jun-10					
Receiver, EMI <sup>1</sup>	Rohde & Schwarz	ESIB40	100043	9-Jun-08	9-Jun-09					
Cable, Coax	Andrew	FSJ1-50A	003	25-Jan-08	25-Jan-09					
Cable, Coax	Andrew	FSJ1-50A	030	30-Jan-08	30-Jan-09					
Cable, Coax	Andrew	FSJ1-50A	045	30-Jan-08	30-Jan-09					
			·	•	·					
	SOP 2 - Cor	nducted Emissions (AC	C/DC)							
LISN 15-18 (NSLK 8126)	Schwarzbeck		003885	11-Jan-08	11-Jan-09					
Spectrum Analyzer	Agilent Tec.	E7405A	US39440161	7-Aug-08	7-Aug-09					
Cable, Coax	Belden	RG-213	004	25-Jan-08	25-Jan-09					

- Calibration of equipment past due for re-calibration will be performed expeditiously. If any equipment is found to be out of tolerance at that time, affected customers will be notified accordingly.
- 1) This equipment was also used for antenna port conducted measurements.