



**FCC CFR47 PART 15 SUBPART C  
INDUSTRY CANADA RSS-GEN AND RSS-210  
CLASS II PERMISSIVE CHANGE**

**CERTIFICATION TEST REPORT**

**FOR**

**2.4GHz DSSS RF TRANSCEIVER**

**MODEL NUMBER: ASY-00006**

**FCC ID: VAT-FLNXRF1**

**IC: 7116A-FLNXRF1**

**REPORT NUMBER: 08U12160-1**

**ISSUE DATE: OCTOBER 30, 2008**

*Prepared for*

**FIRELINX, INC.**

**P.O.BOX 8274**

**STATELINE, NV 89452 U.S.A**

*Prepared by*

**COMPLIANCE CERTIFICATION SERVICES**

**47173 BENICIA STREET**

**FREMONT, CA 94538 U.S.A.**

**TEL: (510) 771-1000**

**FAX: (510) 661-0888**



**NVLAP LAB CODE 200065-0**

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	10/30/08	Initial Issue	F. Ibrahim

## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS.....</b>	<b>4</b>
<b>2. TEST METHODOLOGY .....</b>	<b>5</b>
<b>3. FACILITIES AND ACCREDITATION .....</b>	<b>5</b>
<b>4. CALIBRATION AND UNCERTAINTY.....</b>	<b>5</b>
4.1. MEASURING INSTRUMENT CALIBRATION.....	5
4.2. MEASUREMENT UNCERTAINTY.....	5
<b>5. EQUIPMENT UNDER TEST.....</b>	<b>6</b>
5.1. DESCRIPTION OF EUT .....	6
5.2. DESCRIPTION OF AVAILABLE ANTENNAS .....	6
5.3. SOFTWARE AND FIRMWARE .....	7
5.4. WORST-CASE CONFIGURATION AND MODE.....	7
5.5. DESCRIPTION OF TEST SETUP .....	8
<b>6. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>10</b>
<b>7. LIMITS AND RESULTS .....</b>	<b>11</b>
7.1. RADIATED EMISSIONS.....	11
7.1.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS .....	11
7.1.2. TRANSMITTER ABOVE 1 GHz FOR 2400 TO 2483.5 MHz BAND .....	14
7.2. RECEIVER ABOVE 1 GHz.....	23
7.2.1. Receiver above 1 GHz .....	23
7.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz .....	24
<b>8. SETUP PHOTOS.....</b>	<b>26</b>

## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** FIRELINX, INC.  
P.O.BOX 8274  
STATELINE, NV 89452 U.S.A

**EUT DESCRIPTION:** 2.4GHZ DSSS RF TRANSCEIVER

**MODEL:** ASY-00006

**SERIAL NUMBER:** 01943

**DATE TESTED:** OCTOBER 03-04, 2008

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	Pass
RSS-210 Issue 7 Annex 8 and RSS-GEN Issue 2	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All expressions of Pass/Fail in this report are opinions expressed by CCS based on interpretations of the test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

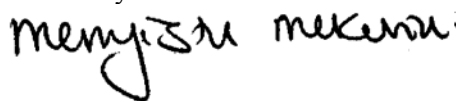
**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:



FRANK IBRAHIM  
EMC SUPERVISOR  
COMPLIANCE CERTIFICATION SERVICES

Tested By:



MENGISTU MEKURIA  
EMC ENGINEER  
COMPLIANCE CERTIFICATION SERVICES

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Radiated Emission, Above 2000 MHz	+/- 4.3 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is an 802.15.4 DSSS RF transceiver.

The radio module is manufactured by eQube International Inc.

### 5.2. DESCRIPTION OF AVAILABLE ANTENNAS

The radio was tested with a Monopole Inverted F Antenna with a maximum gain of 2.9 dBi. Other possible antennas are listed in the table below also applied for this EUT under original report number 07U10961.

Antenna Manufacturer / Model Number	Antenna Type (Dipole, Patch, Panel, Yagi, etc.)	Maximum Peak Antenna Gain (dBi)	Operating Mode
Tower Six/ 07-110076	Inverted F	+2.9dBi	<input checked="" type="checkbox"/> Point to Point <input checked="" type="checkbox"/> Point to Multipoint
Pulse Engineering Inc/ W1027	Dipole	+3.2dBi	<input checked="" type="checkbox"/> Point to Point <input checked="" type="checkbox"/> Point to Multipoint
Pulse Engineering Inc/ W1037	Dipole	+3.2dBi	<input checked="" type="checkbox"/> Point to Point <input checked="" type="checkbox"/> Point to Multipoint
Nearson Inc/ S131AH-2450S	Dipole	+2dBi	<input checked="" type="checkbox"/> Point to Point <input checked="" type="checkbox"/> Point to Multipoint
Nearson Inc/ T145AH-2.4/4.9/5.X-S	Dipole	+2dBi	<input checked="" type="checkbox"/> Point to Point <input checked="" type="checkbox"/> Point to Multipoint
Nearson Inc/ S145FL-4-AH-2450S	Dipole	+2dBi	<input checked="" type="checkbox"/> Point to Point <input checked="" type="checkbox"/> Point to Multipoint

### **5.3. SOFTWARE AND FIRMWARE**

The firmware installed in the EUT during testing was CC2430 Test, rev. 1.0A.

### **5.4. WORST-CASE CONFIGURATION AND MODE**

Based on the previous experience from project number 07U10961, the worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 2405 MHz.

Based on the previous experience from project number 07U10961, the worst-case data rate for this channel is determined to be 250 kb/s.

## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Test Fixture	N/A	N/A	N/A	N/A

### I/O CABLES

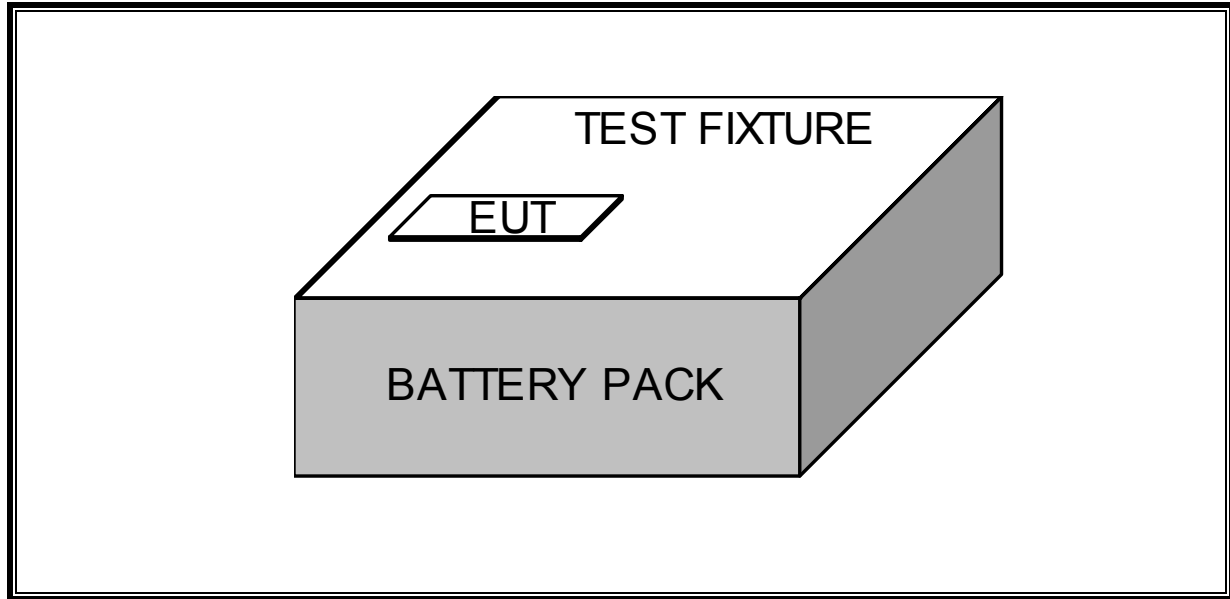
The EUT powered from battery power source

### TEST SETUP

The EUT was configured as a stand-alone with test fixture device that can be powered by batteries. An internal imbedded test software routine exercised the radio



**SETUP DIAGRAM FOR TESTS**



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Cal Due
Antenna, Horn, 18 GHz	EMCO	3115	2238	04/22/09
Preamplifier, 26.5 GHz	Agilent / HP	8449B	3008A00931	08/05/09
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	MY43360112	03/03/09
2.4-2.5 GHz Reject Filter	Micro-Tronics	BRM50702	1	CNR
Antenna, Bilog 30 MHz ~ 2 GHz	Sundt Sciences	JB1	A0022704	02/11/09
Preamplifier, 1300 MHz	Agilent / HP	8447D	1937A02062	03/31/09
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	1049	12/29/09

## 7. LIMITS AND RESULTS

### 7.1. RADIATED EMISSIONS

#### 7.1.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

##### LIMITS

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

## **TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

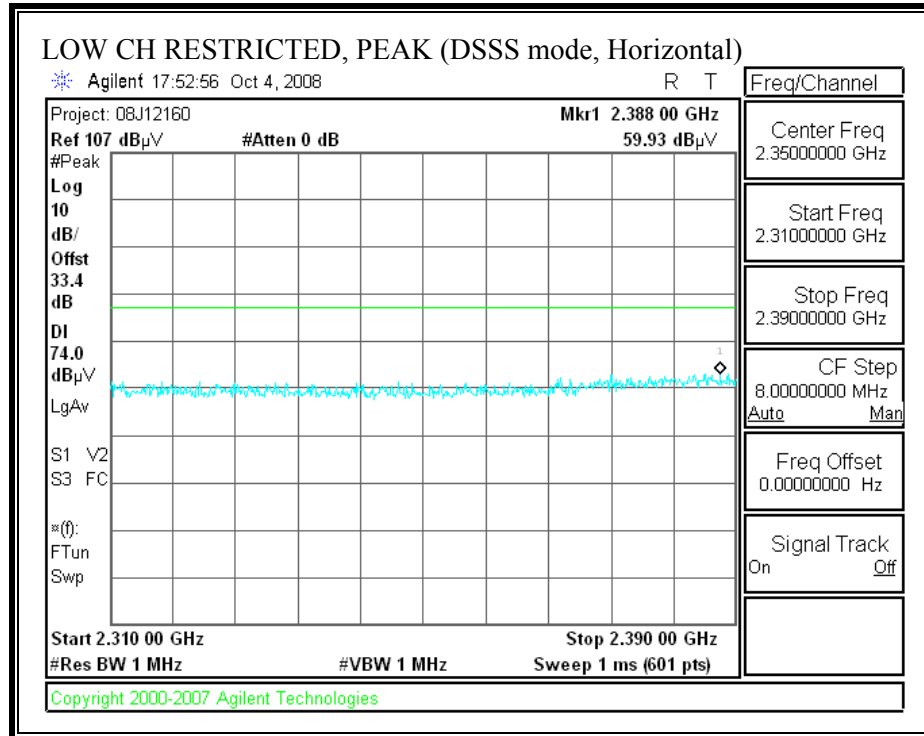
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

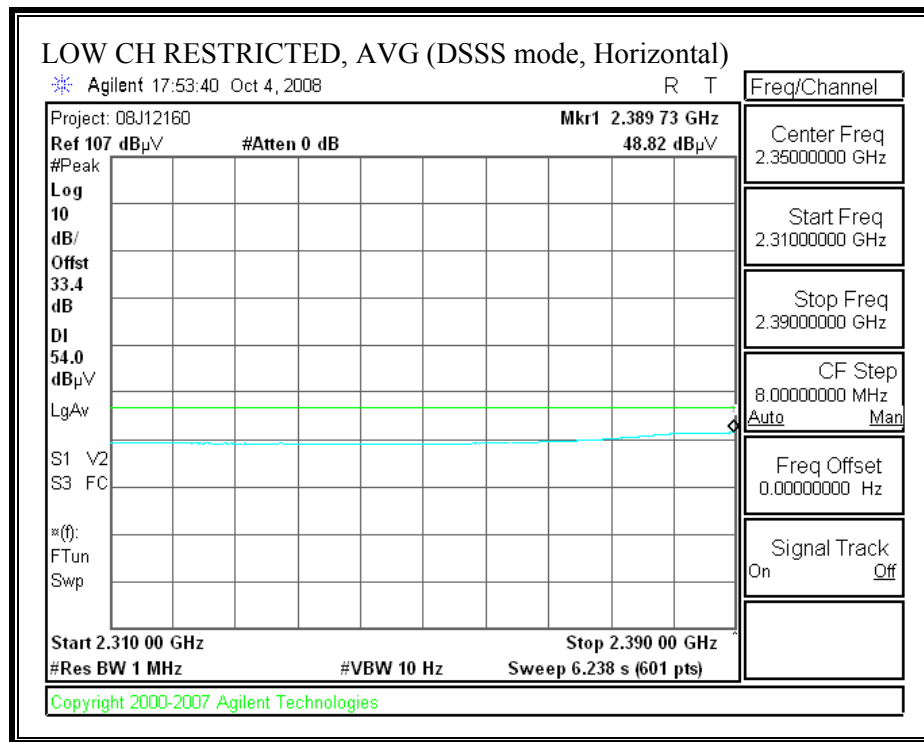
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

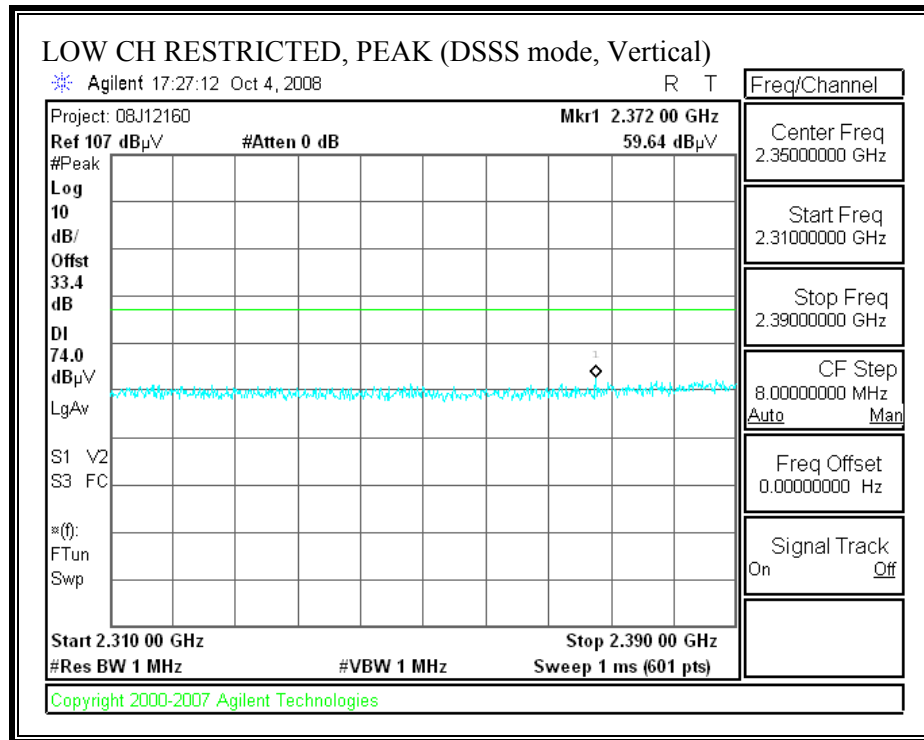
## 7.1.2. TRANSMITTER ABOVE 1 GHz FOR 2400 TO 2483.5 MHz BAND

### RESTRICTED BANDEDGE (DSSS Mode, LOW CHANNEL, HORIZONTAL)

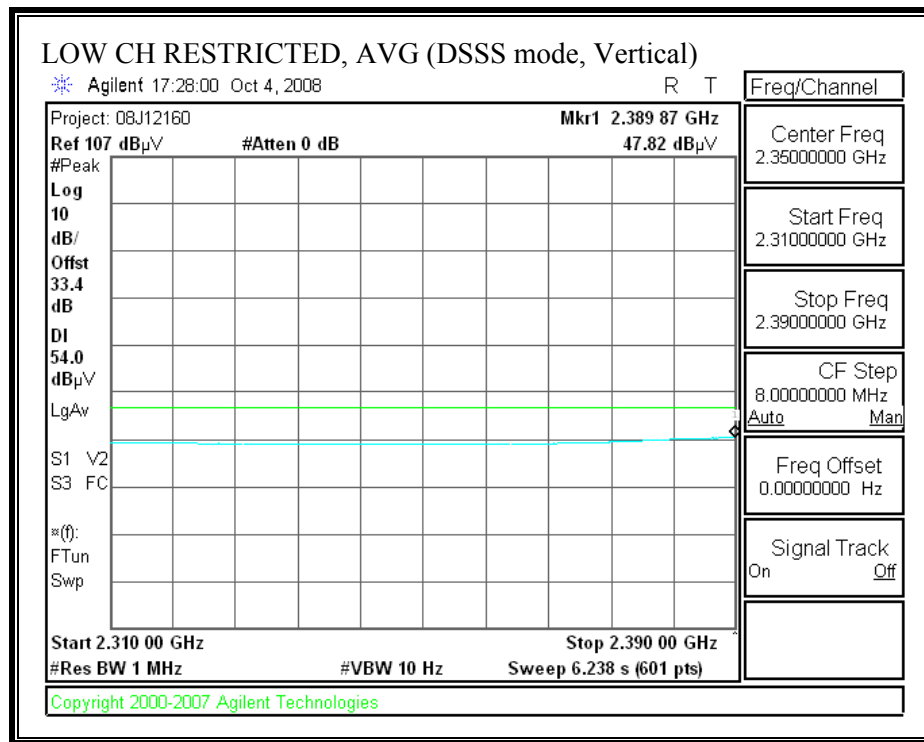




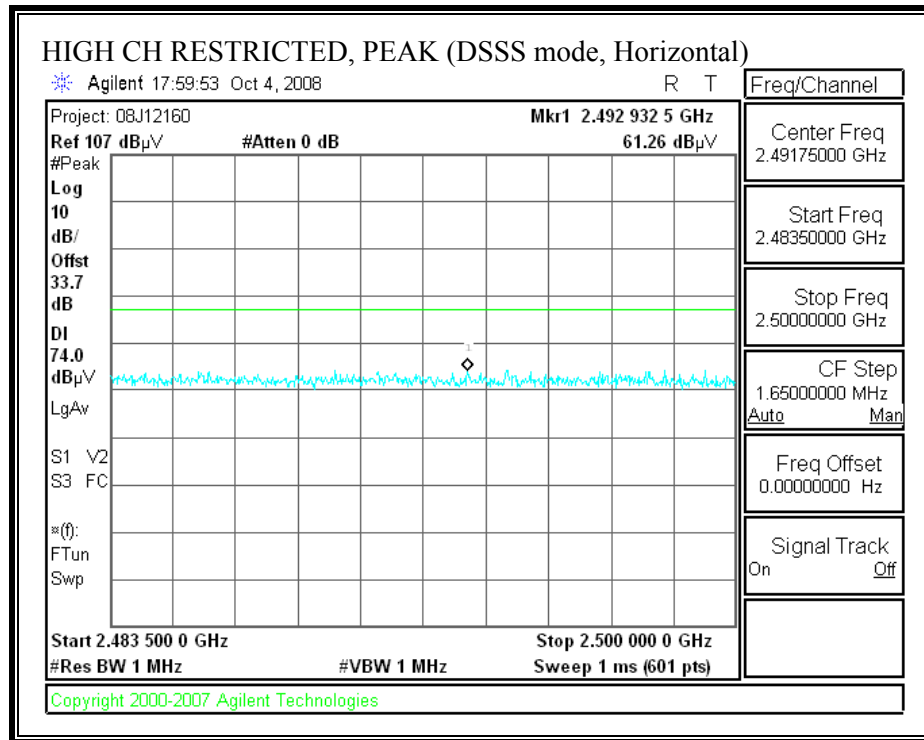
**RESTRICTED BANEDGE (DSSS Mode, LOW CHANNEL, VERTICAL)**

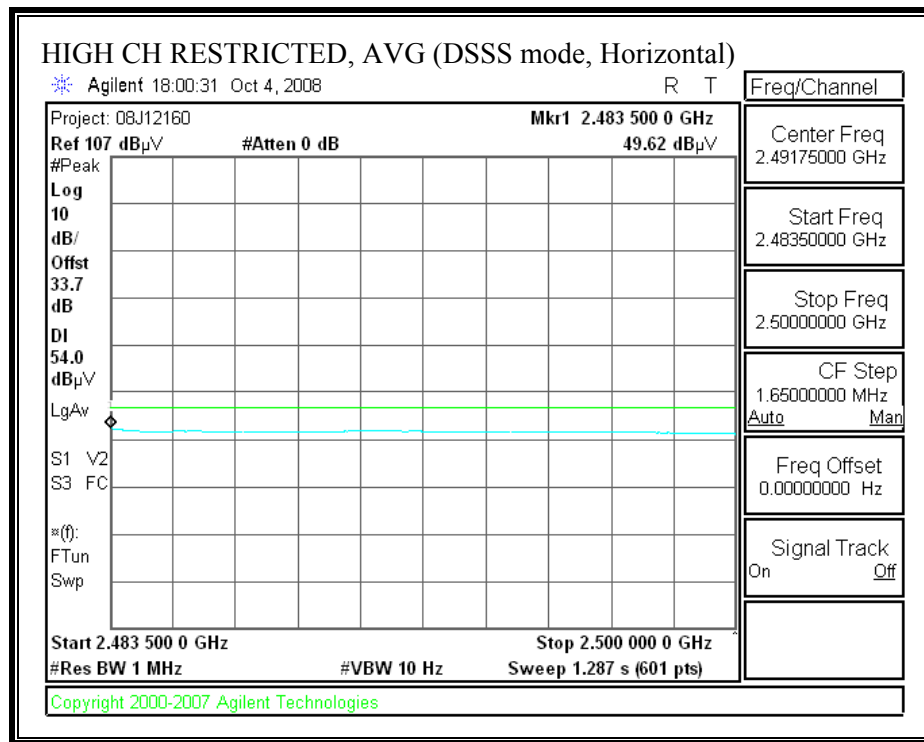




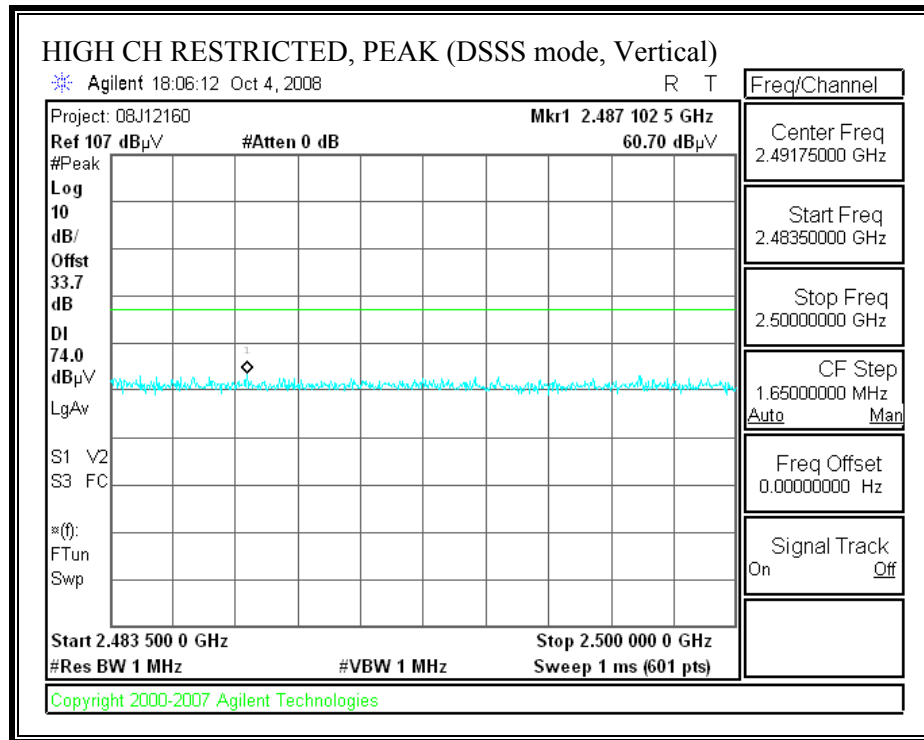


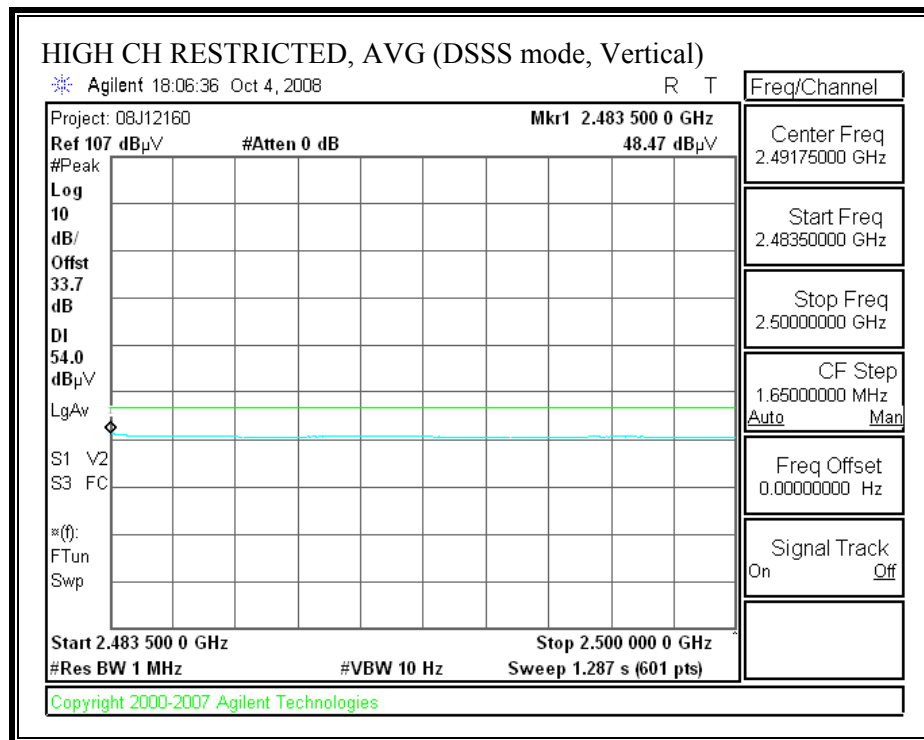
**RESTRICTED BANEDGE (DSSS Mode, HIGH CHANNEL, HORIZONTAL)**





**RESTRICTED BANDEDGE (DSSS Mode, HIGH CHANNEL, VERTICAL)**





# **HARMONICS AND SPURIOUS EMISSIONS (DSSS Mode)**

High Frequency Measurement															
Compliance Certification Services, Fremont 5m Chamber															
Company:		EQUE INTERNATIONAL INC.													
Project #:		08U12160													
Date:		10/3/2008													
Test Engineer:		MENGSITU MEKURIA													
Configuration:		STAND ALONE EUT													
Mode:		TXMODE 60% DUTY CYCLE (THE DUTY CYCLE FACTOR OF 4.43)													
Test Equipment:															
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz				Limit					
T60; S/N: 2238 @3m		T144 Miteq 3008A00931								FCC 15.209					
Hi Frequency Cables															
2 foot cable		3 foot cable		12 foot cable		HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz					
				B-5m Chamber				R_002							
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filt dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CH. (2405 MHz)															
4.810	3.0	51.6	36.3	33.7	7.1	-36.5	0.0	0.0	55.9	40.6	74	54	-18.1	-13.4	V
7.215	3.0	52.4	37.5	36.7	8.6	-36.2	0.0	0.0	61.4	46.5	74	54	-12.6	-7.5	V
9.620	3.0	51.8	36.7	38.4	9.9	-36.9	0.0	0.0	63.2	48.1	74	54	-10.8	-5.9	V
12.025	3.0	53.4	37.6	37.8	12.4	-35.4	0.0	0.0	68.2	52.4	74	54	-5.8	-1.6	V
4.810	3.0	55.6	40.9	33.7	7.1	-36.5	0.0	0.0	59.9	45.2	74	54	-14.1	-8.8	H
7.215	3.0	49.3	33.9	36.7	8.6	-36.2	0.0	0.0	58.3	43.0	74	54	-15.7	-11.0	H
9.620	3.0	49.1	34.6	38.4	9.9	-36.9	0.0	0.0	60.5	46.0	74	54	-13.5	-8.0	H
12.025	3.0	52.0	36.4	37.8	12.4	-35.4	0.0	0.0	66.8	51.1	74	54	-7.2	-2.9	H
MID CH. (2440 MHz)															
4.880	3.0	51.3	36.1	33.7	7.2	-36.5	0.0	0.0	55.7	40.6	74	54	-18.3	-13.4	V
7.320	3.0	56.4	40.8	36.7	8.7	-36.2	0.0	0.0	65.6	50.0	74	54	-8.4	-4.0	V
9.760	3.0	51.8	36.6	38.4	10.0	-37.0	0.0	0.0	63.2	48.0	74	54	-10.8	-6.0	V
12.200	3.0	48.7	33.3	29.8	12.4	-35.4	0.0	0.0	55.5	40.1	74	54	-18.5	-13.9	V
4.880	3.0	57.6	43.1	33.7	7.2	-36.5	0.0	0.0	62.0	47.5	74	54	-12.0	-6.5	H
7.320	3.0	50.0	34.6	36.7	8.7	-36.2	0.0	0.0	59.2	43.7	74	54	-14.8	-10.3	H
9.760	3.0	50.7	35.5	38.4	10.0	-37.0	0.0	0.0	62.1	46.9	74	54	-11.9	-7.1	H
12.200	3.0	50.4	34.7	29.8	12.4	-35.4	0.0	0.0	57.2	41.5	74	54	-16.8	-12.5	H
HI CH. (2475 MHz)															
4.950	3.0	50.3	35.6	33.8	7.2	-36.5	0.0	0.0	54.9	40.2	74	54	-19.1	-13.8	V
7.425	3.0	55.7	40.4	36.8	8.7	-36.2	0.0	0.0	64.9	49.7	74	54	-9.1	-4.3	V
9.900	3.0	54.5	39.1	38.4	10.2	-37.1	0.0	0.0	66.0	50.6	74	54	-8.0	-3.4	V
12.375	3.0	47.6	32.3	21.8	12.4	-35.4	0.0	0.0	46.4	31.1	74	54	-27.6	-22.9	V
4.950	3.0	58.8	44.6	33.8	7.2	-36.5	0.0	0.0	63.3	49.1	74	54	-10.7	-4.9	H
7.425	3.0	51.1	35.4	36.8	8.7	-36.2	0.0	0.0	60.4	44.7	74	54	-13.6	-9.3	H
9.900	3.0	51.5	36.6	38.4	10.2	-37.1	0.0	0.0	63.0	48.1	74	54	-11.0	-5.9	H
12.375	3.0	48.8	33.3	21.8	12.4	-35.4	0.0	0.0	47.6	32.2	74	54	-26.4	-21.8	H
Rev. 4.12.7															
f	Measurement Frequency			Amp	Preamp Gain			Avg Lim	Average Field Strength Limit						
Dist	Distance to Antenna			D Corr	Distance Correct to 3 meters			Pk Lim	Peak Field Strength Limit						
Read	Analyzer Reading			Avg	Average Field Strength @ 3 m			Avg Mar	Margin vs. Average Limit						
AF	Antenna Factor			Peak	Calculated Peak Field Strength			Pk Mar	Margin vs. Peak Limit						
CL	Cable Loss			HPF	High Pass Filter										

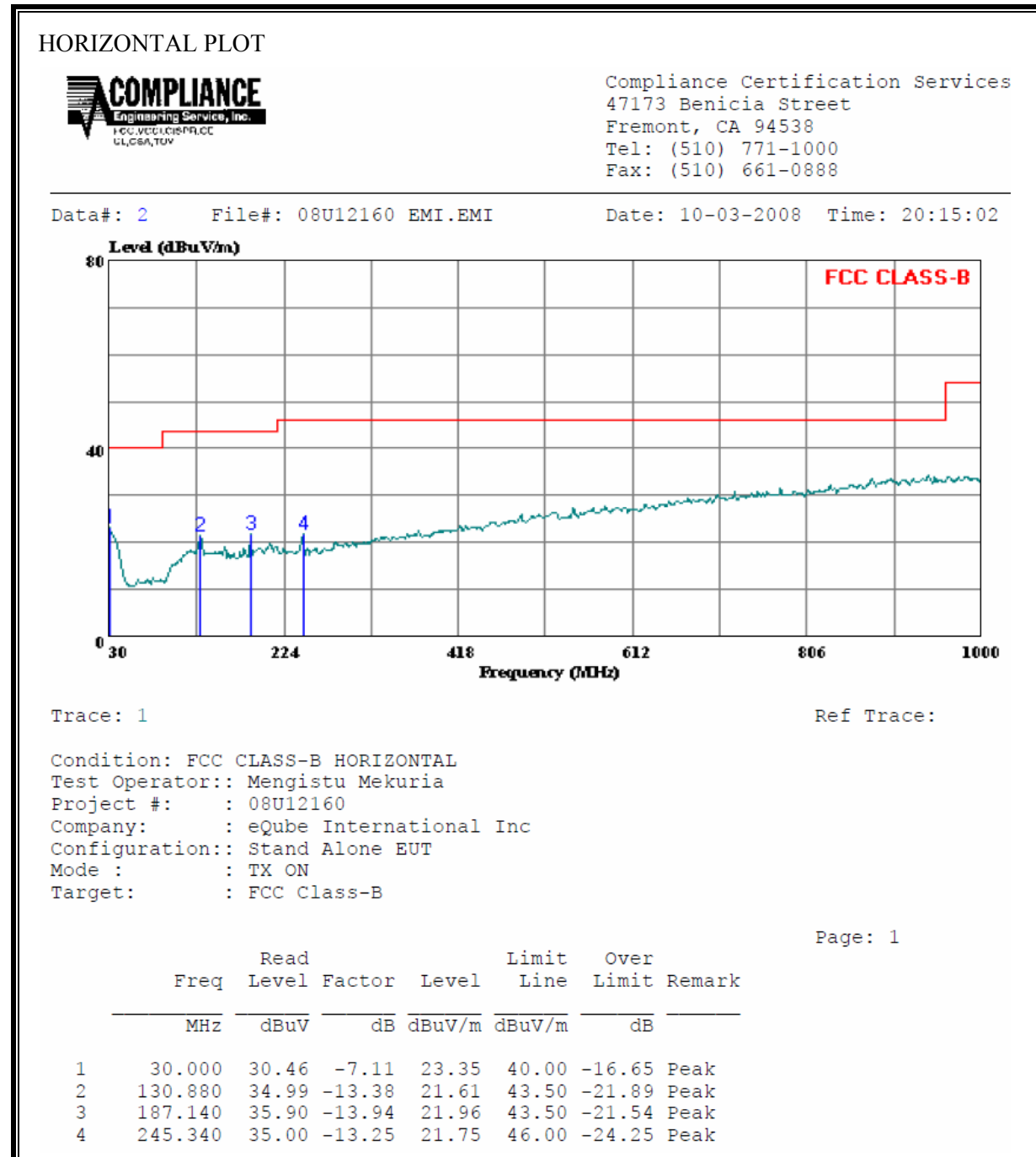
## 7.2. RECEIVER ABOVE 1 GHz

### 7.2.1. Receiver above 1 GHz

High Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber																
Company:		EQUBE INTERNATIONAL INC.														
Project #:		08U12160														
Date:		10/4/2008														
Test Engineer:		MENGSIU MEKURIA														
Configuration:		STAND ALONE EUT														
Mode:		RX MODE														
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit				
T60; S/N: 2238 @3m			T144 Miteq 3008A00931									RX RSS 210				
Hi Frequency Cables																
2 foot cable			3 foot cable			12 foot cable			HPF			Reject Filter			Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz; VBW=10Hz	
						B-5m Chamber										
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fldr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes	
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)	
1.164	3.0	47.4	34.6	26.8	3.4	-39.3	0.0	0.0	38.4	25.6	74	54	-35.6	-28.4	V	
3.476	3.0	43.2	33.1	31.9	6.0	-37.0	0.0	0.0	44.0	33.9	74	54	-30.0	-20.1	H	
Rev. 4.12.7																
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit			
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit			
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit			
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit			
CL	Cable Loss					HPF	High Pass Filter									

### 7.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

#### SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)





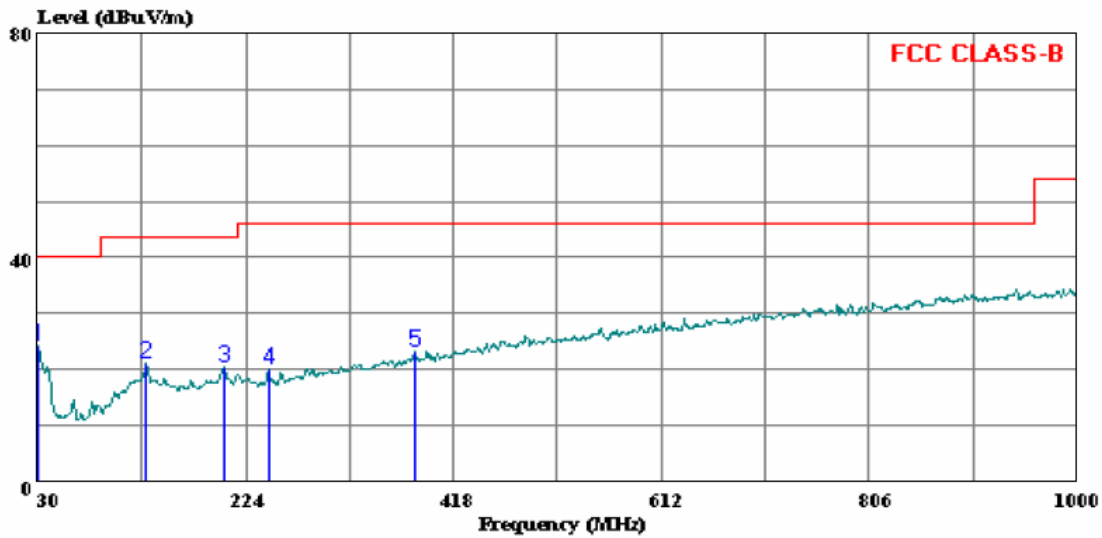
**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)**

VERTICAL PLOT



Compliance Certification Services  
47173 Benicia Street  
Fremont, CA 94538  
Tel: (510) 771-1000  
Fax: (510) 661-0888

Data#: 4 File#: 08U12160 EMI.EMI Date: 10-03-2008 Time: 20:26:43



Trace: 3

Ref Trace:

Condition: FCC CLASS-B VERTICAL  
Test Operator:: Mengistu Mekuria  
Project #: 08U12160  
Company: eQube International Inc  
Configuration: Stand Alone EUT  
Mode: TX ON  
Target: FCC Class-B

Page: 1

	Freq	Read		Limit	Over	
	MHz	Level	Factor	Level	Line	Limit
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB
1	30.000	31.41	-7.11	24.30	40.00	-15.70
2	130.880	34.34	-13.38	20.96	43.50	-22.54
3	203.630	33.40	-13.02	20.38	43.50	-23.12
4	245.340	33.23	-13.25	19.98	46.00	-26.02
5	381.140	32.01	-8.72	23.29	46.00	-22.71

## 8. SETUP PHOTOS

### RADIATED RF MEASUREMENT SETUP



RADIATED BACK PHOTO



**END OF REPORT**