



**FCC 47 CFR PART 15 SUBPART C  
INDUSTRY CANADA RSS-247 ISSUE 1**

**BLUETOOTH LOW ENERGY  
CERTIFICATION TEST REPORT**

**FOR**

**TABLET DEVICE**

**MODEL NUMBER: A1538**

**FCC ID: BCGA1538  
IC: 579C-A1538**

**REPORT NUMBER: 14U19186-E2, REVISION C**

**ISSUE DATE: JUNE 17, 2015**

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**NVLAP**<sup>®</sup>

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	04/21/2015	Initial Issue	M. Mekuria
A	05/04/2015	Revised report to address TCB's question	T. Chu
B	06/01/2015	Revised report to RSS-247 standard, updated Section 2 and Section 7.1	T. Chu
C	06/17/2015	Updated Section 7.1 KDB version	T. Chu

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** APPLE, INC.  
1 INFINITE LOOP  
CUPERTINO, CA 95014, U.S.A.

**EUT DESCRIPTION:** TABLET DEVICE

**MODEL:** A1538Error! Reference source not found.

**SERIAL NUMBER:** F4KP600FGJJT (CONDUCTED); F4KP606TGJJV (RADIATED);

**DATE TESTED:** FEBRUARY 17, 2015 – MARCH 11, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 1	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. 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 UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

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Tested By:

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SENIOR ENGINEER  
UL VERIFICATION SERVICES INC.

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NANCY GARCIA  
EMC ENGINEER  
UL VERIFICATION SERVICES INC.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-247 Issue 1, and ANSI C63.10-2009 for FCC test and ANSI C63.10-2013 with deviation of measurement height of 0.8m rather than 1.5m for IC test.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
<input type="checkbox"/> Chamber A	<input checked="" type="checkbox"/> Chamber D
<input type="checkbox"/> Chamber B	<input type="checkbox"/> Chamber E
<input type="checkbox"/> Chamber C	<input type="checkbox"/> Chamber F
	<input type="checkbox"/> Chamber G
	<input type="checkbox"/> Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

## 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. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	$\pm 3.52$ dB
Radiated Disturbance, 30 to 1000 MHz	$\pm 4.94$ dB
Radiated Disturbance, 1 to 6 GHz	$\pm 3.86$ dB
Radiated Disturbance, 6 to 18 GHz	$\pm 4.23$ dB
Radiated Disturbance, 18 to 26 GHz	$\pm 5.30$ dB
Radiated Disturbance, 26 to 40 GHz	$\pm 5.23$ dB

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a tablet with multimedia functions (music, application support, and video), IEEE 802.11a/b/g/n/ac radio, and Bluetooth radio. The rechargeable battery is not user accessible

### 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	7.72	5.92

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Gain
	Antenna B
2.4	2.00

### 5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 12H33.

## 5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The following configurations were investigated and EUT powered by AC/DC adapter was the worst-case scenario. AC power line and below 1G radiated tests were conducted on configuration 1.

Configuration	Descriptions
1	EUT powered by AC/DC adapter via USB cable
2	EUT powered by host PC via USB cable

The fundamental of the EUT was investigated in three orthogonal orientations X/Y/Z, it was determined that Y-landscape orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y-landscape orientation.

Worst-case data rates as provided by the client were:

BLE: 1 Mbps.

There are two vendors of the WiFi/Bluetooth radio modules: variant 1 and variant 2. The WiFi/Bluetooth radio modules have the same mechanical outline (e.g., the same package dimension and pin-out layout), use the same on-board antenna matching circuit, have an identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances.

Baseline testing was performed on the two variants to determine the worst case on all conducted power and radiated emissions.

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop AC/DC adapter	Lenovo	92P1160	11S92P1160Z1ZBGH798B12	NA
Laptop	Lenovo	7659	L3-AL664 08/03	NA
Earphone	Apple	NA	NA	NA
EUT AC/DC adapter	Apple	MD836LL/A	NA	NA

### I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	1	SMA	Un-Shielded	0.2	To spectrum Analyzer
2	USB	1	USB	Shielded	1	N/A

### I/O CABLES (RADIATED ABOVE 1 GHZ)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
None used						

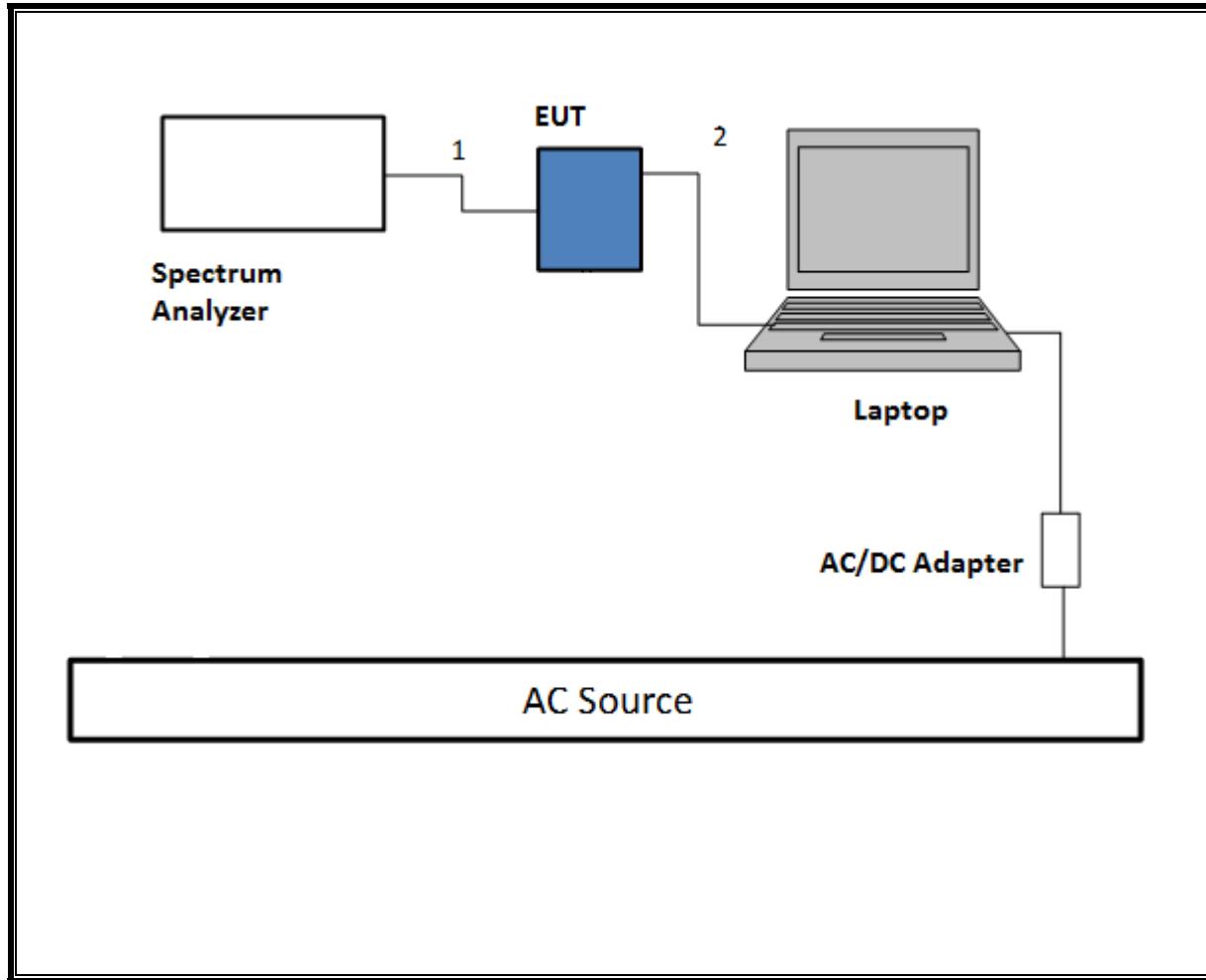
### I/O CABLES (AC POWER CONDUCTED TEST and below 1 GHZ)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	US115	Un-Shielded	0.8	NA
2	DC	1	lightning	Un-Shielded	1	NA
3	Audio	1	Jack	Un-Shielded	0.5	NA

**TEST SETUP- CONDUCTED PORT**

The EUT was tested connected to a host Laptop via USB cable adapter and spectrum analyzer to antenna port. Test software exercised the EUT.

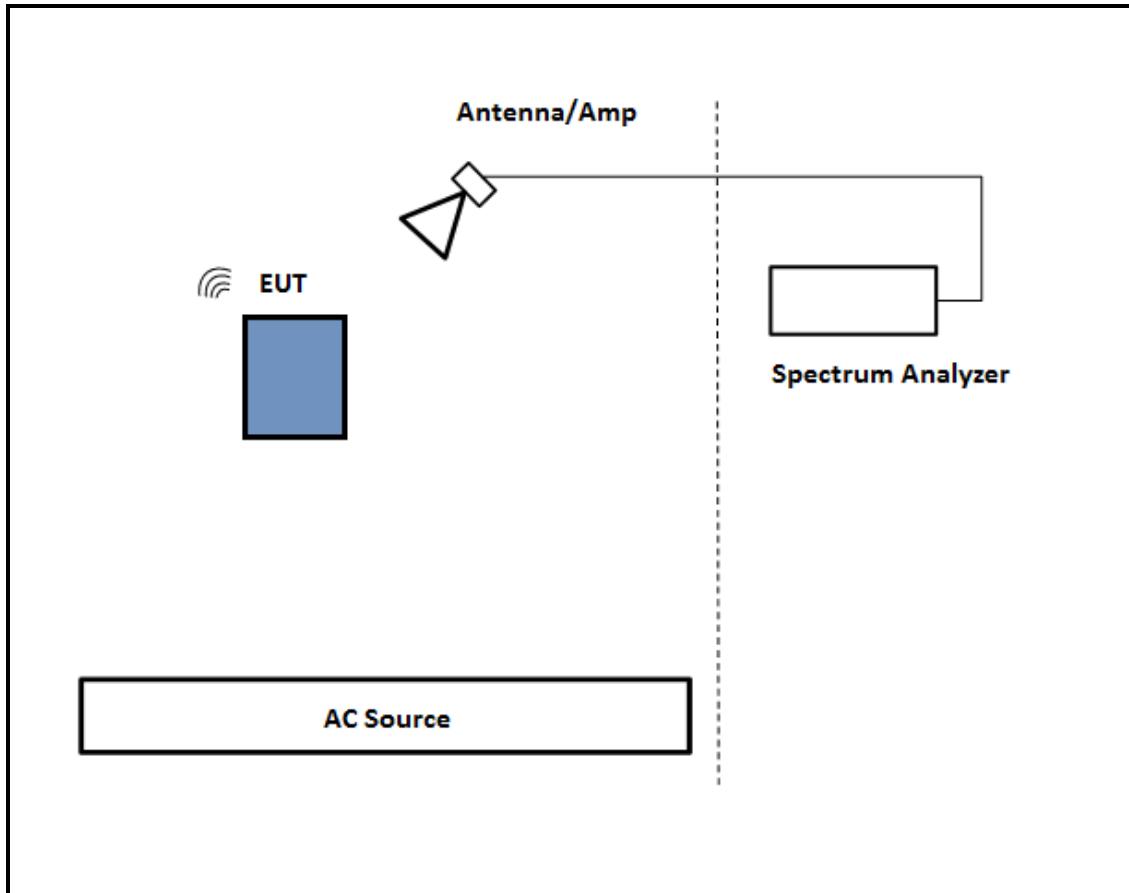
**SETUP DIAGRAM**



**TEST SETUP- RADIATED-ABOVE 1 GHZ**

The EUT was tested battery powered. Test software exercised the EUT.

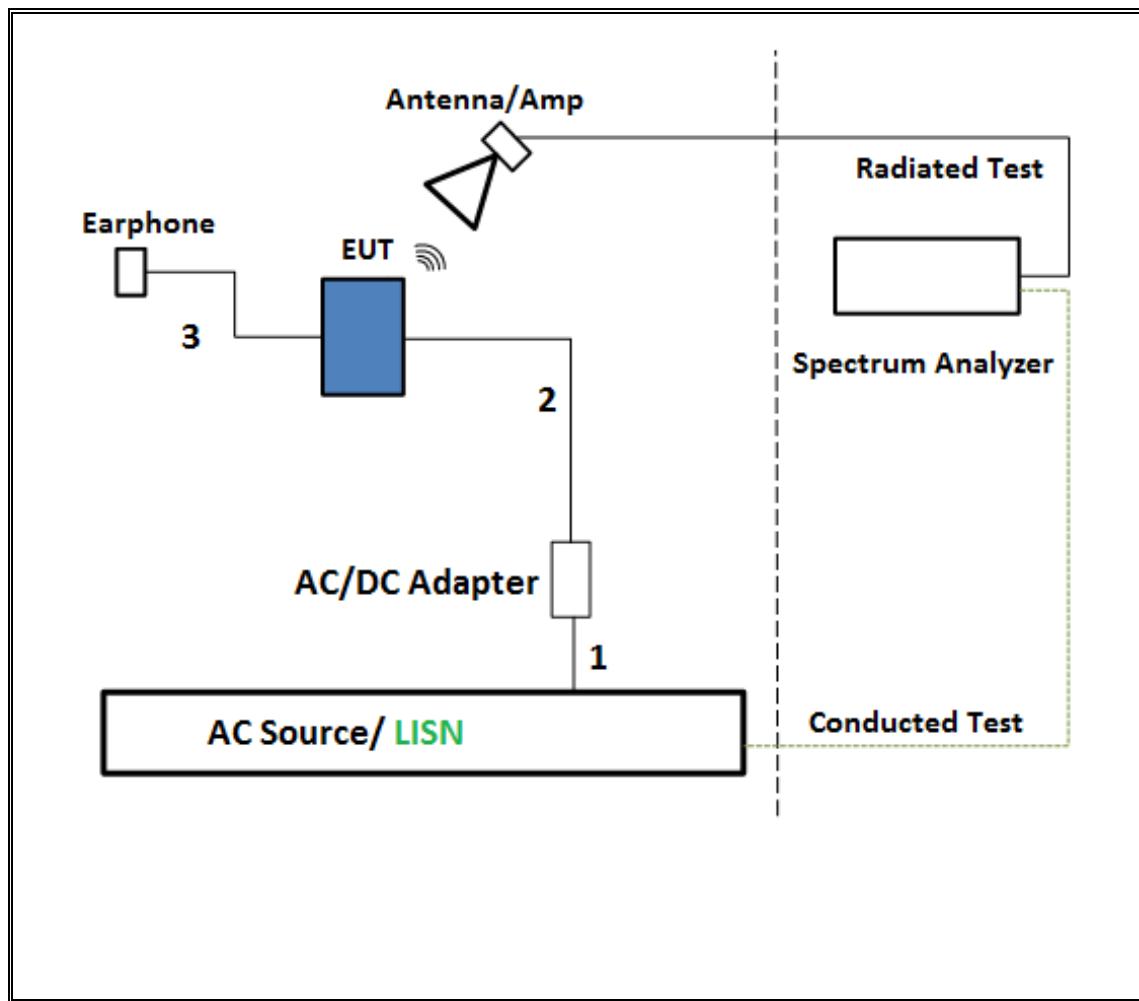
**SETUP DIAGRAM**



### TEST SETUP- BELOW 1GHZ & AC LINE CONDUCTED TESTS

The EUT was tested with earphone connected and powered by AC adapter. Test software exercised the EUT.

#### SETUP DIAGRAM



## 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	Asset	Cal Due
Antenna, Horn 1-18GHz	ETS Lindgren	3117	00143449	2/10/2016
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	A022813-1	1/14/2016
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	1782158	1/26/2016
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	323561	5/28/2015
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	US51350187	5/2/2015
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB1	A121003	2/13/2016
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	185623	6/7/2015
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	MY51380911	2/20/2016
Power Meter, P-series single channel	Agilent	N1911A	GB45100212	10/9/2015
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Agilent	N1921A	MY53260010	7/12/2015
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826	1049	12/17/2015
Spectrum Analyzer, 40 GHz	Agilent	8564E	3943A01643	8/6/2015
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Agilent	8449B	3008A01114	10/4/2015
AC Line Conducted				
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	100935	9/16/2015
LISN for Conducted Emissions CISPR-16	FCC	50/250-25-2	114	1/16/2016
Power Cable, Line Conducted Emissions ANSI 63.4	UL	PG1	N/A	7/28/2015
UL SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014	
Conducted Software	UL	UL EMC	Ver 2.1.2, February 23, 2015	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, February 26, 2015	

## 7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

### 7.1. MEASUREMENT METHODS

#### **MEASUREMENT METHODS**

6 dB BW: KDB 558074 D01 v03r03, Section 8.1.

Output Power: KDB 558074 D01 v03r03, Section 9.1.2.

Power Spectral Density: KDB 558074 D01 v03r03, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r03, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r03, Section 12.1.

Band-edge: KDB 558074 D01 v03r03, Section 12.1

### ON TIME AND DUTY CYCLE

#### LIMITS

None; for reporting purposes only.

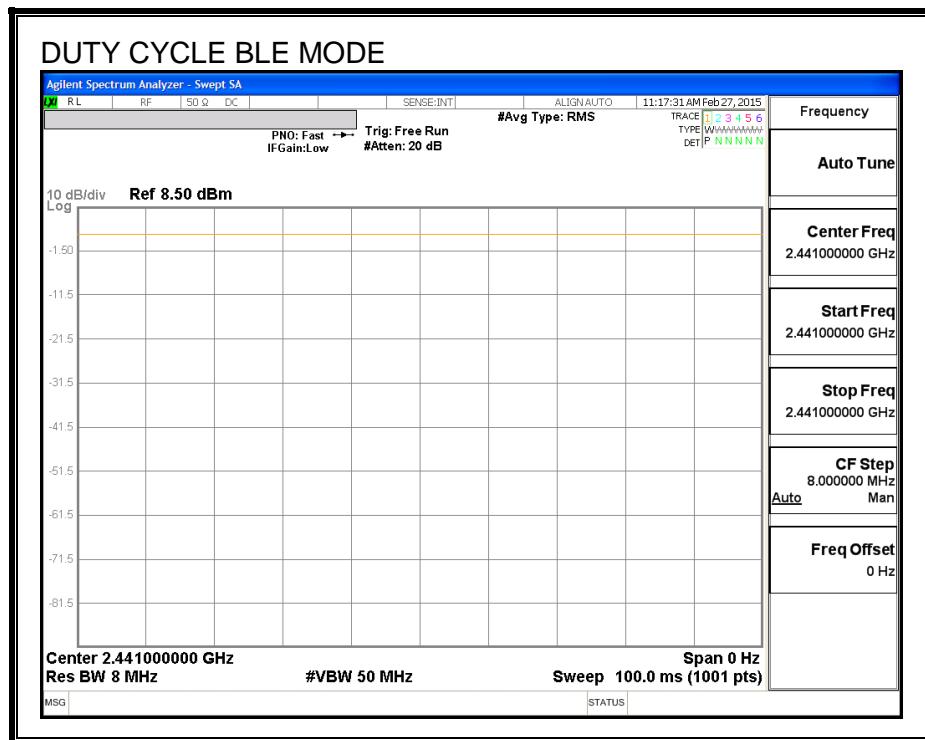
#### PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

#### RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
BLE	100.000	100.000	1.000	100.00%	0.00	0.010

## DUTY CYCLE PLOTS



## 8. ANTENNA PORT TEST RESULTS

### 8.1. 6 dB BANDWIDTH

#### LIMITS

FCC §15.247 (a) (2)

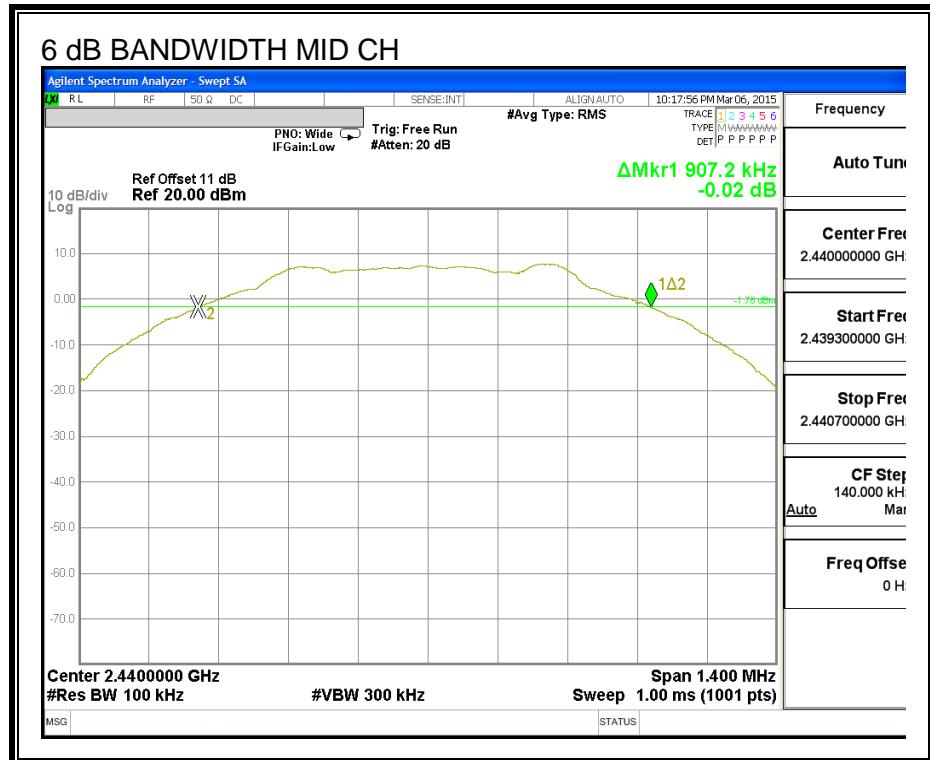
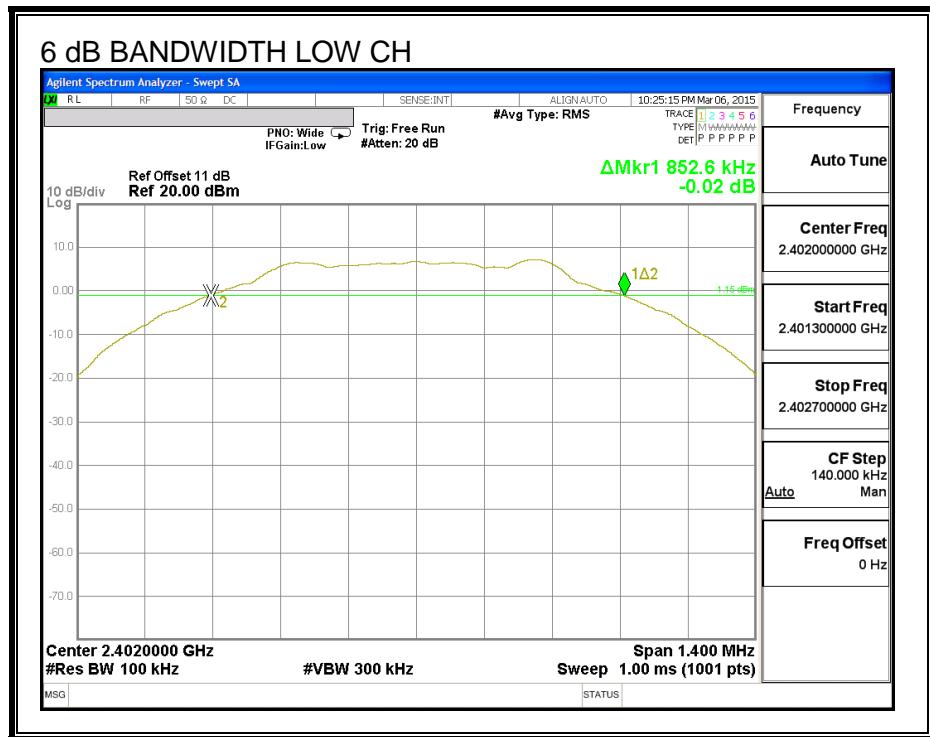
IC RSS-247 (5.2) (1)

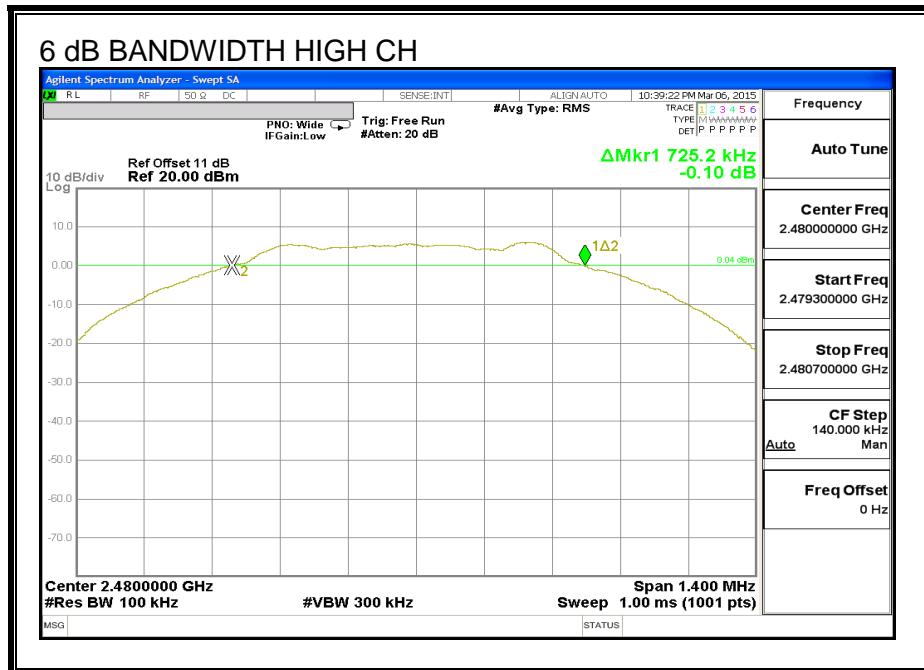
The minimum 6 dB bandwidth shall be at least 500 kHz.

#### RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.825.6	0.5
Middle	2440	0.907.2	0.5
High	2480	0.725.2	0.5

## 6 dB BANDWIDTH





## 8.2. 99% BANDWIDTH

### LIMITS

None; for reporting purposes only.

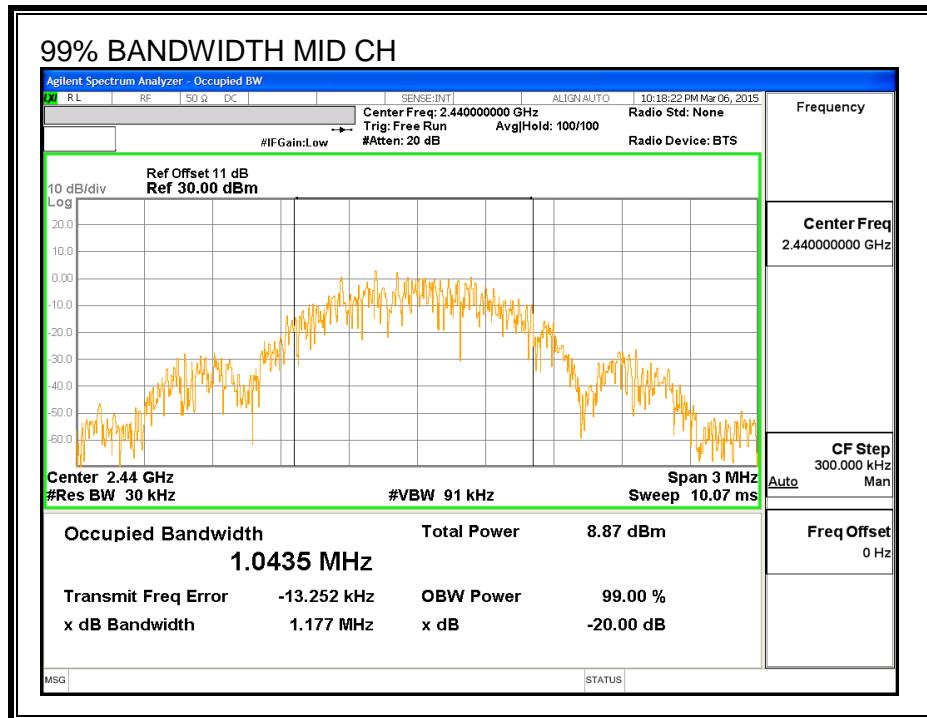
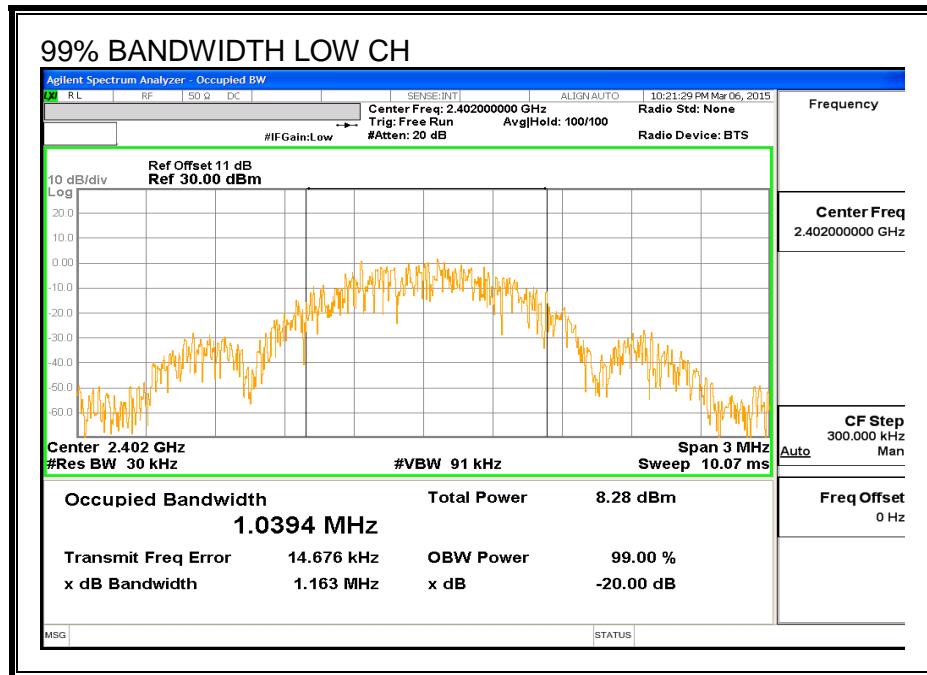
### TEST PROCEDURE

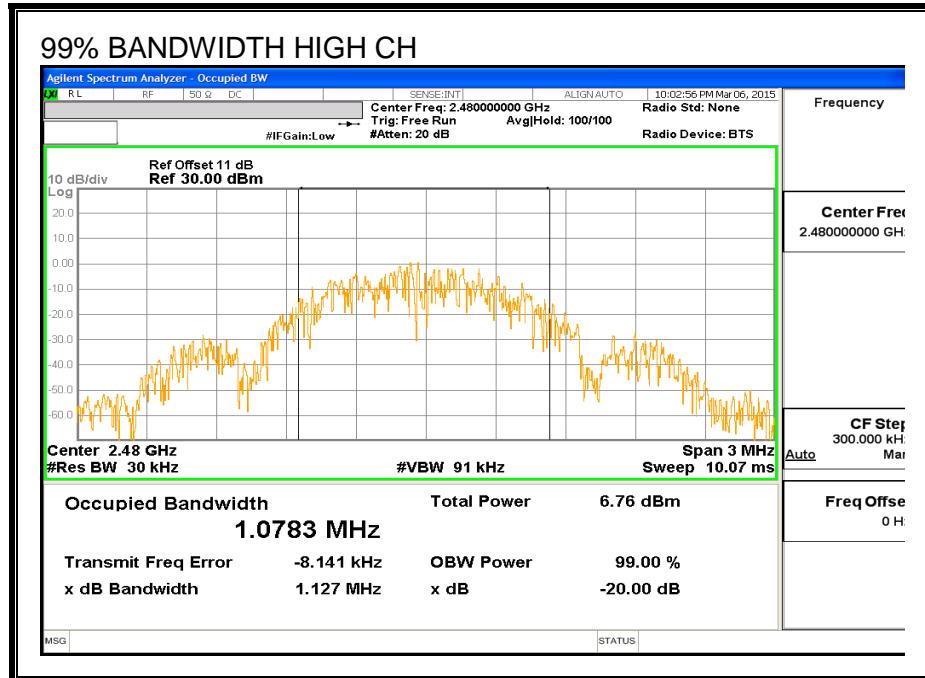
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0394
Middle	2440	1.0435
High	2480	1.0783

**99% BANDWIDTH**





### 8.3. OUTPUT POWER

#### LIMITS

FCC §15.247 (b)

IC RSS-247 (5.4) (4)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

#### RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.67	30	-22.330
Middle	2440	7.72	30	-22.280
High	2480	7.40	30	-22.600

## 8.4. AVERAGE POWER

### LIMITS

None; for reporting purposes only.

### RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	7.45
Middle	2440	7.48
High	2480	7.17

## 8.5. POWER SPECTRAL DENSITY

### LIMITS

FCC §15.247 (e)

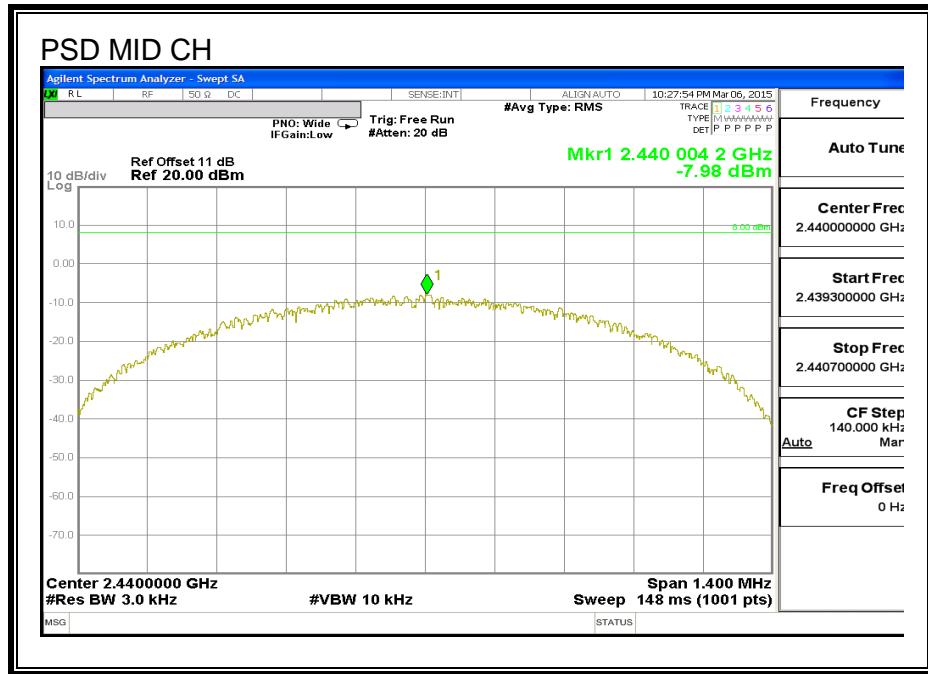
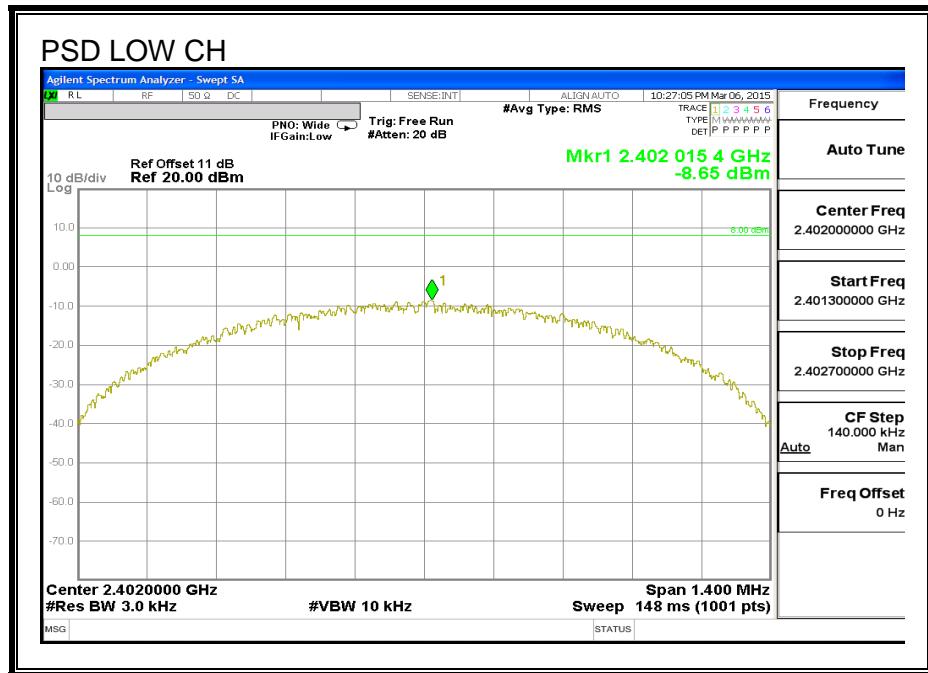
IC RSS-247 (5.2) (2)

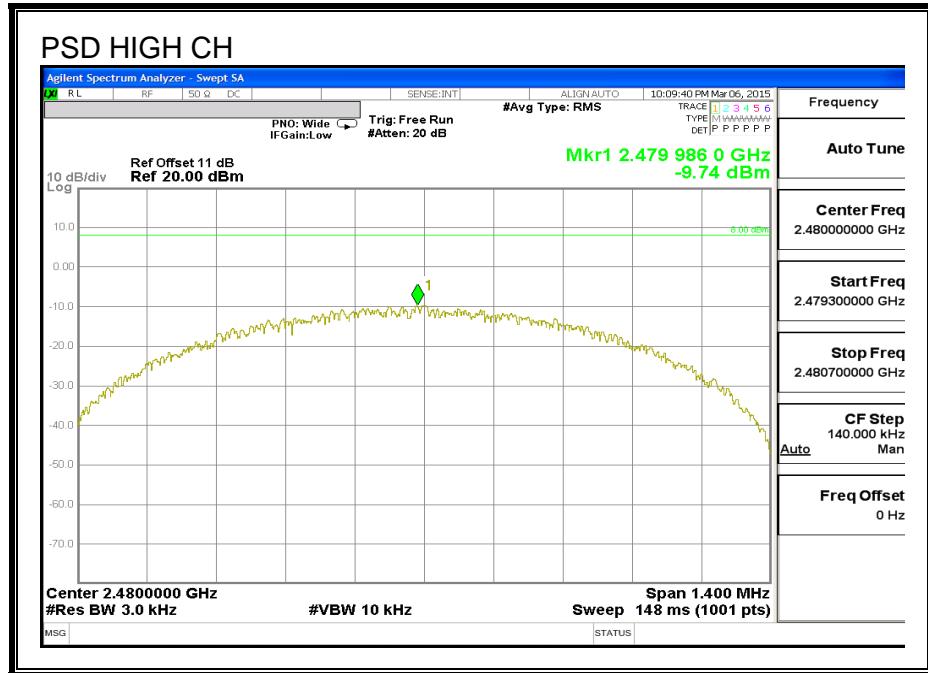
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-8.65	8	-16.65
Middle	2440	-7.98	8	-15.98
High	2480	-9.74	8	-17.74

## POWER SPECTRAL DENSITY





## 8.6. CONDUCTED SPURIOUS EMISSIONS

### LIMITS

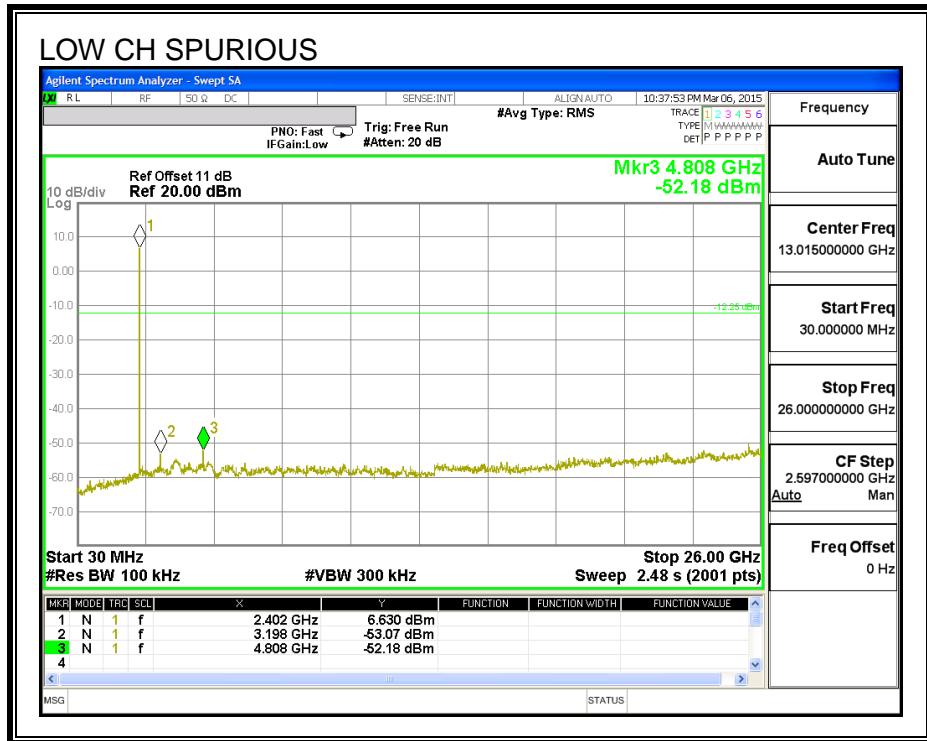
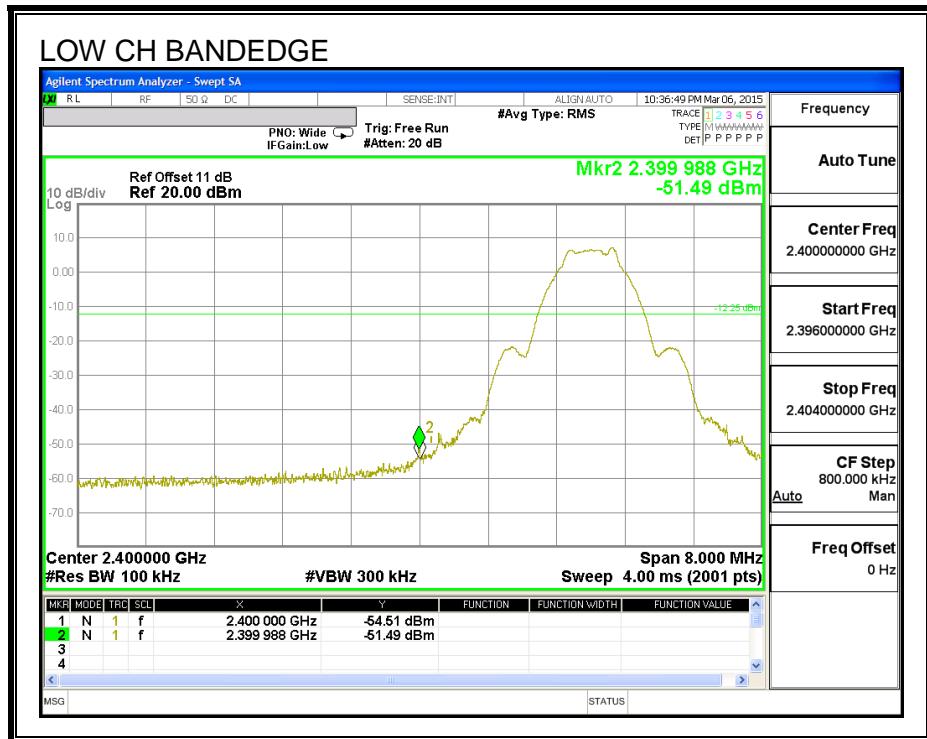
FCC §15.247 (d)

IC RSS-247 (5.5)

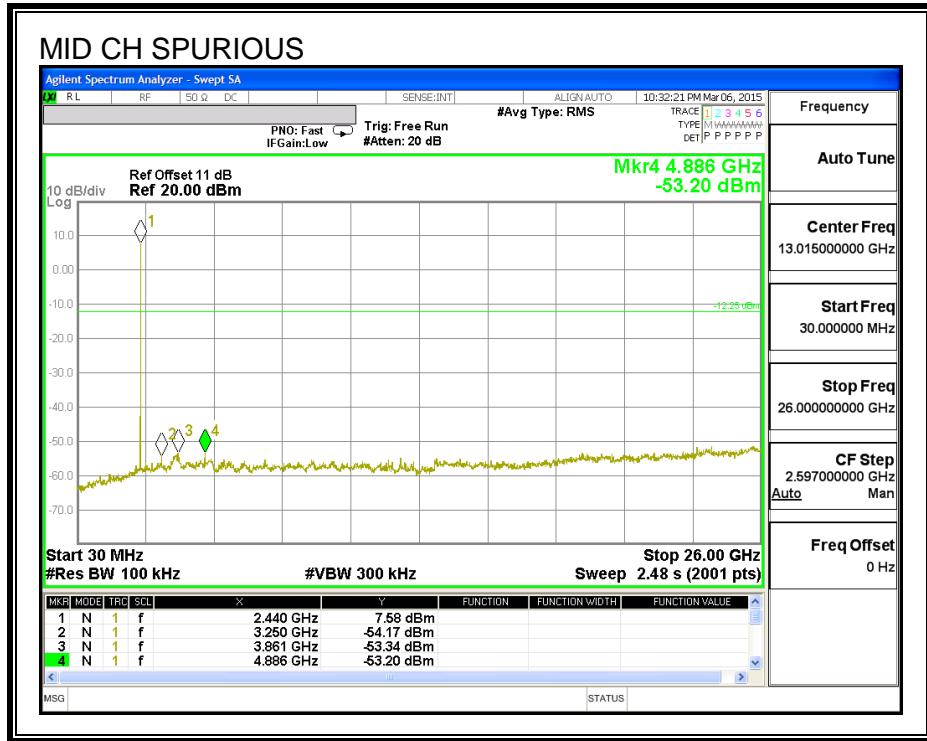
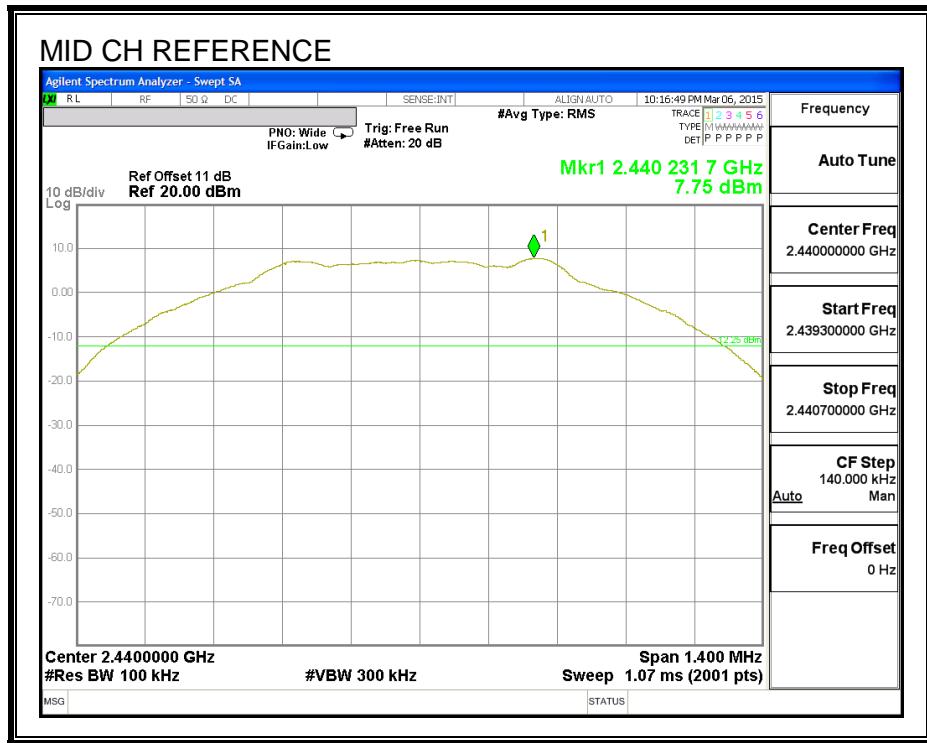
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

## RESULTS

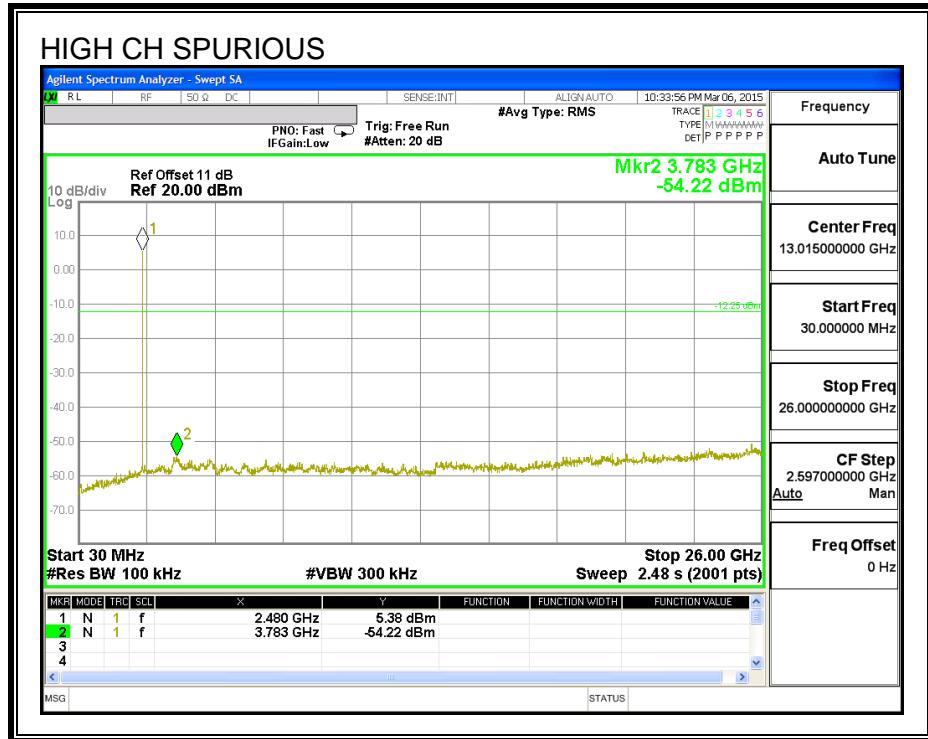
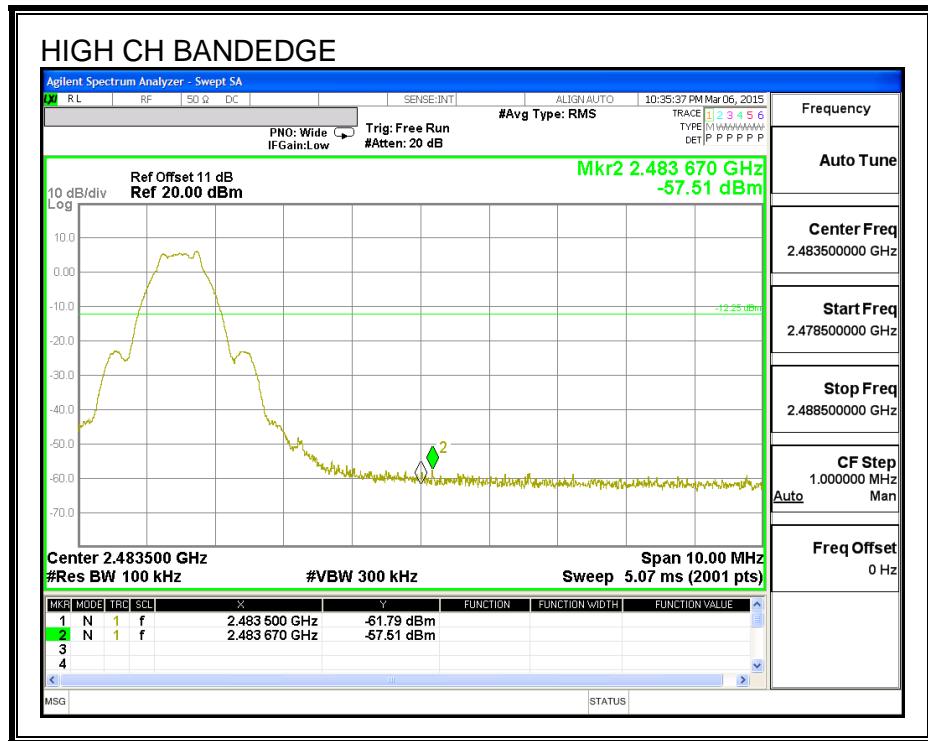
### SPURIOUS EMISSIONS, LOW CHANNEL



**SPURIOUS EMISSIONS, MID CHANNEL**



**SPURIOUS EMISSIONS, HIGH CHANNEL**



## 9. RADIATED TEST RESULTS

### 9.1. LIMITS AND PROCEDURE

#### LIMITS

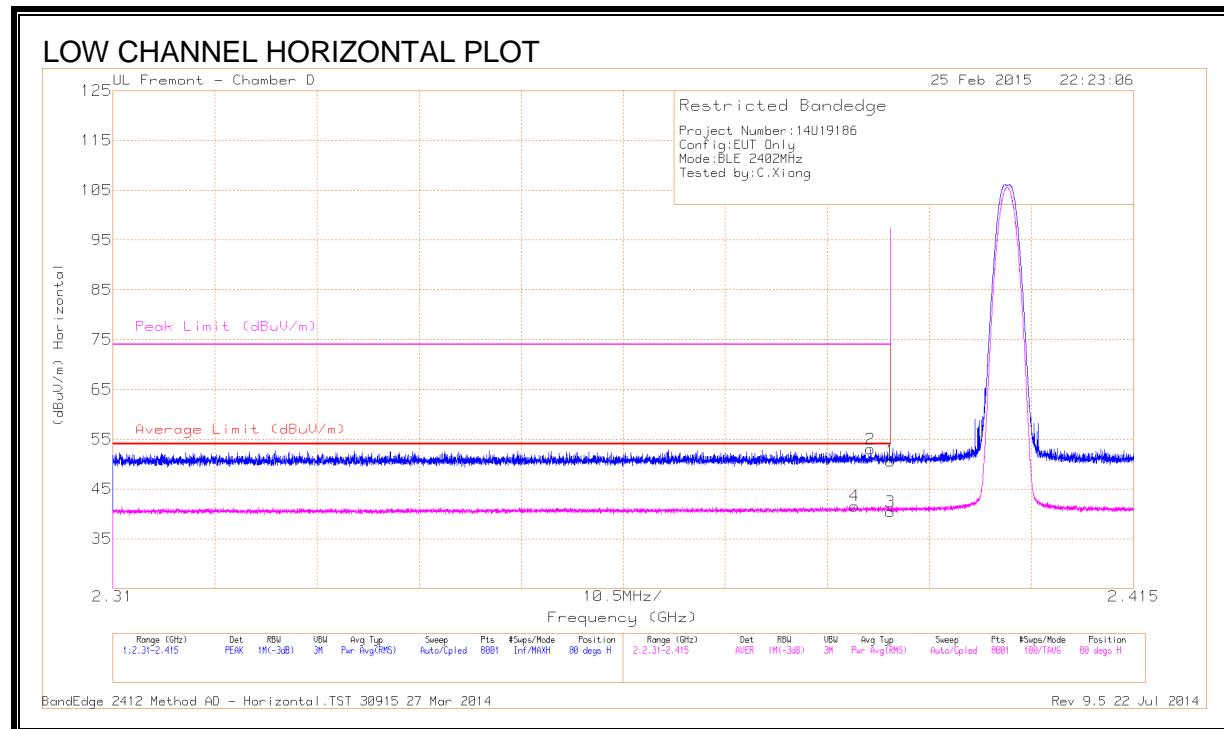
FCC §15.205 and §15.209

IC RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

## 9.2. TRANSMITTER ABOVE 1 GHz

### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



### DATA

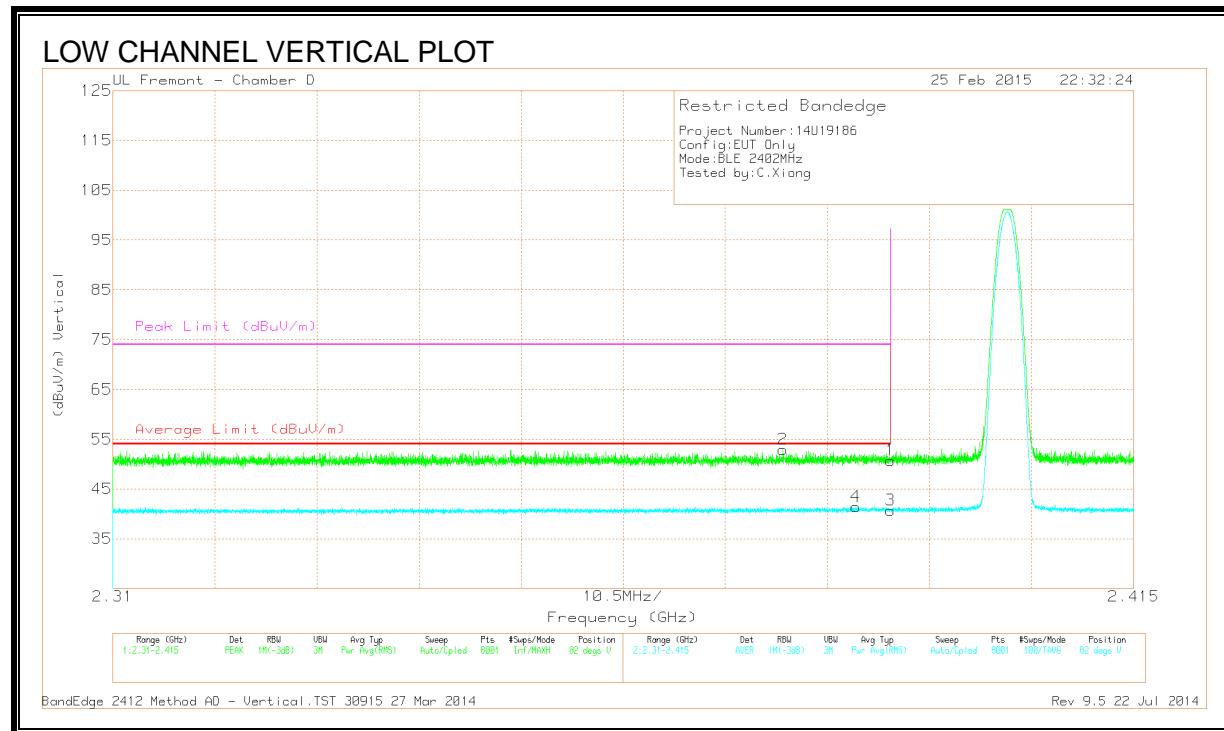
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Ftr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.386	30.29	RMS	32.1	-20.8	41.59	54	-12.41	-	-	80	149	H
2	* 2.388	41.72	PK	32.1	-20.8	53.02	-	-	74	-20.98	80	149	H
1	* 2.39	39.21	PK	32.1	-20.7	50.61	-	-	74	-23.39	80	149	H
3	* 2.39	29.03	RMS	32.1	-20.7	40.43	54	-13.57	-	-	80	149	H

\* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

RMS - RMS detection

### **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



## **DATA**

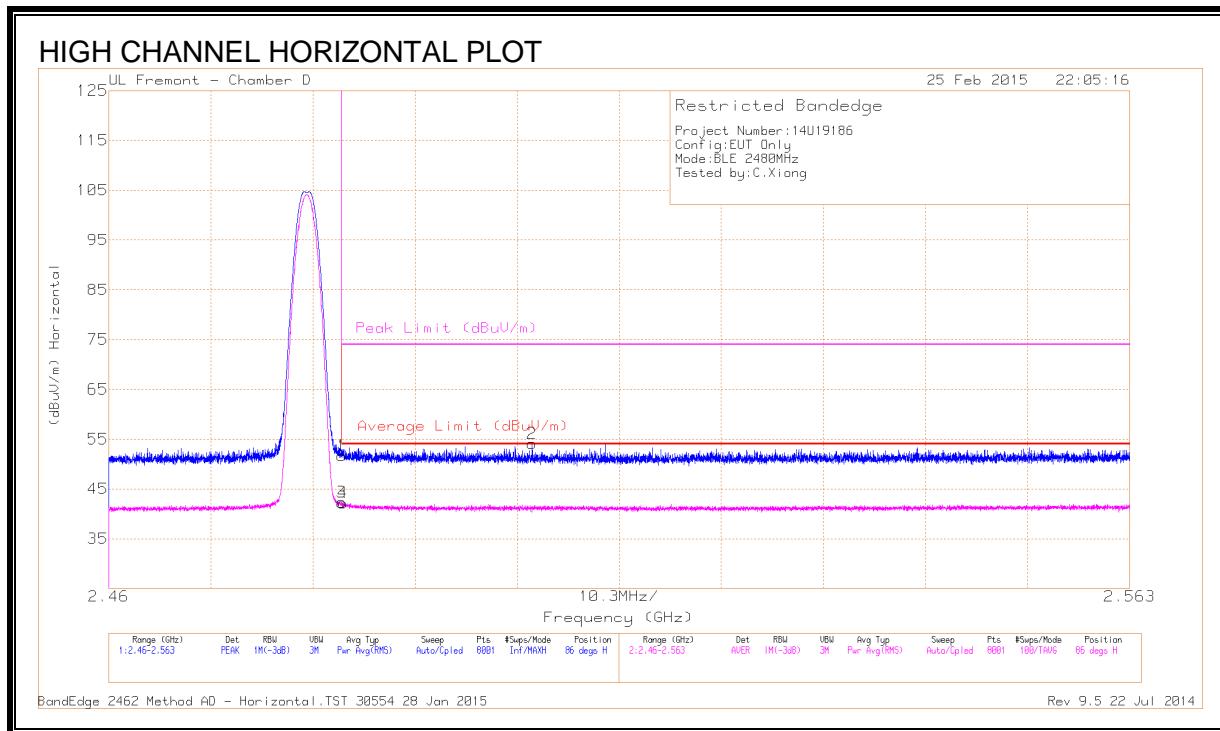
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.379	41.65	PK	32.1	-20.8	52.95	-	-	74	-21.05	82	142	V
4	* 2.386	30.16	RMS	32.1	-20.8	41.46	54	-12.54	-	-	82	142	V
1	* 2.39	39.35	PK	32.1	-20.7	50.75	-	-	74	-23.25	82	142	V
3	* 2.39	29.34	RMS	32.1	-20.7	40.74	54	-13.26	-	-	82	142	V

\* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

## RMS - RMS detection

**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**



**DATA**

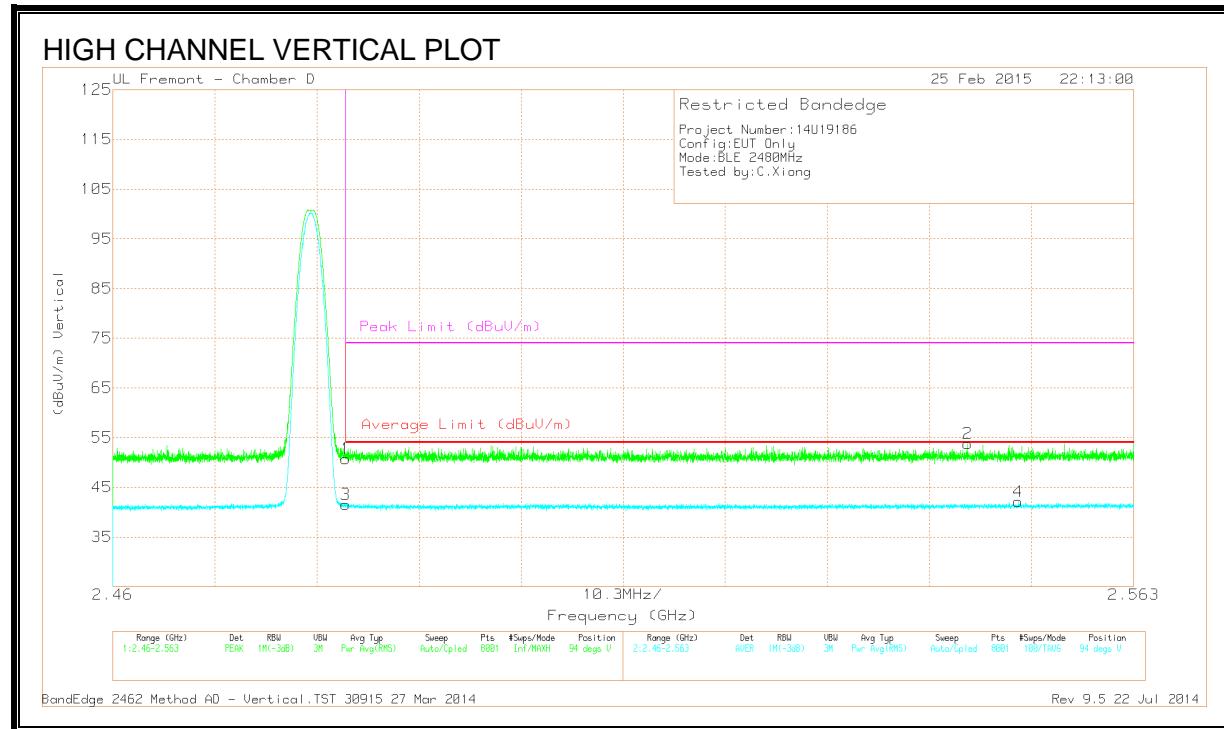
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.29	PK	32.2	-20.8	51.69	-	-	74	-22.31	86	139	H
3	* 2.484	30.93	RMS	32.2	-20.8	42.33	54	-11.67	-	-	86	139	H
4	* 2.484	30.8	RMS	32.2	-20.8	42.2	54	-11.8	-	-	86	139	H
2	2.503	42.63	PK	32.2	-20.7	54.13	-	-	74	-19.87	86	139	H

\* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

RMS - RMS detection

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



**DATA**

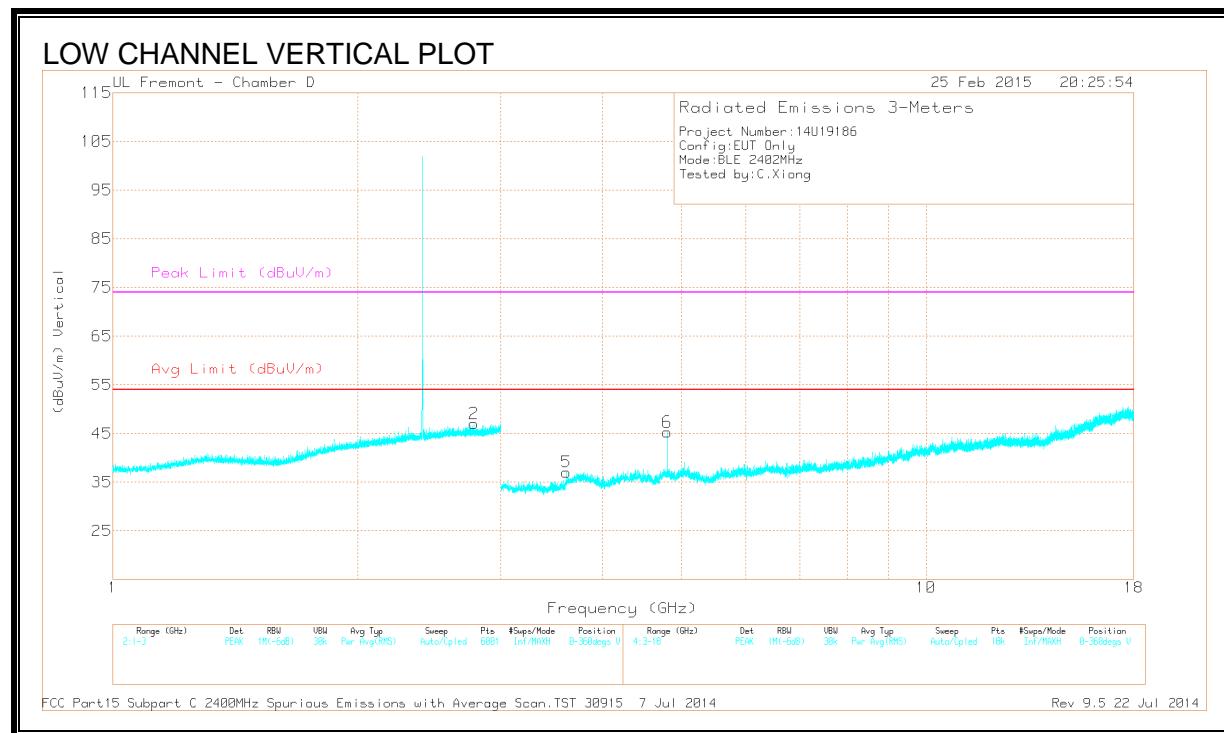
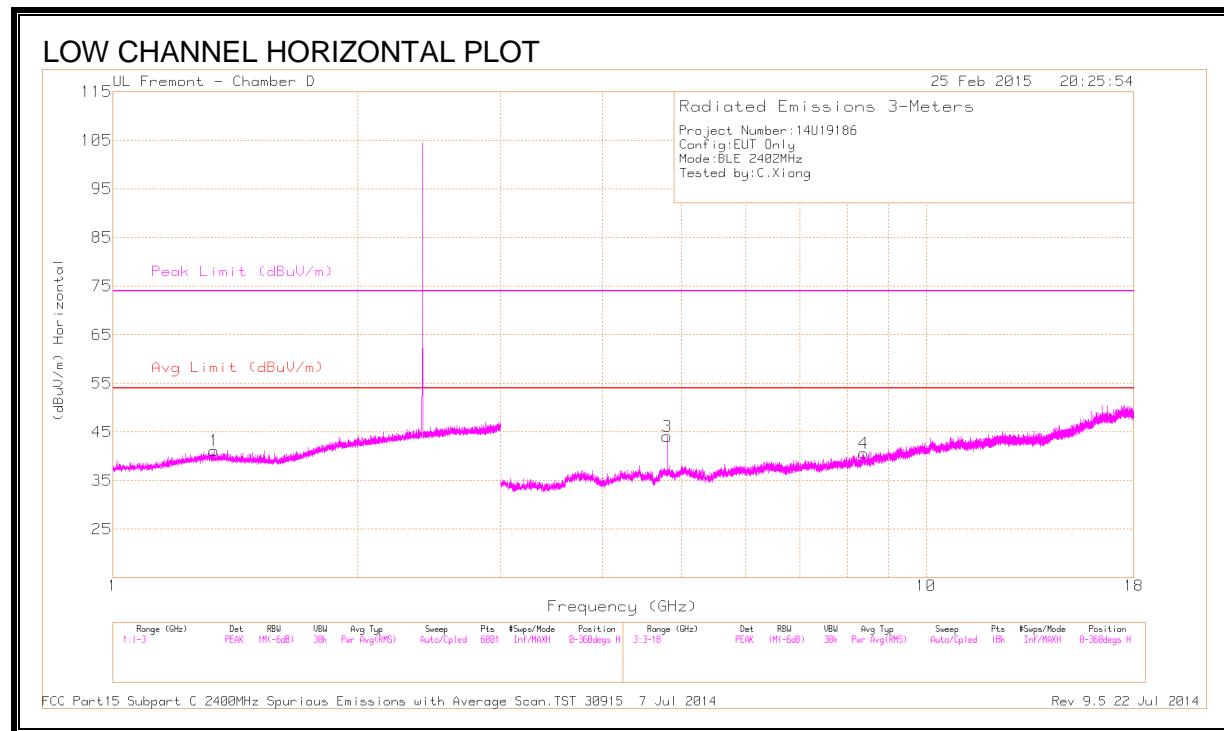
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.33	PK	32.2	-20.8	50.73	-	-	74	-23.27	94	100	V
3	* 2.484	30.15	RMS	32.2	-20.8	41.55	54	-12.45	-	-	94	100	V
2	2.546	42.2	PK	32.3	-20.7	53.8	-	-	74	-20.2	94	100	V
4	2.551	30.51	RMS	32.3	-20.7	42.11	54	-11.89	-	-	94	100	V

\* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

RMS - RMS detection

## HARMONICS AND SPURIOUS EMISSIONS



**DATA**

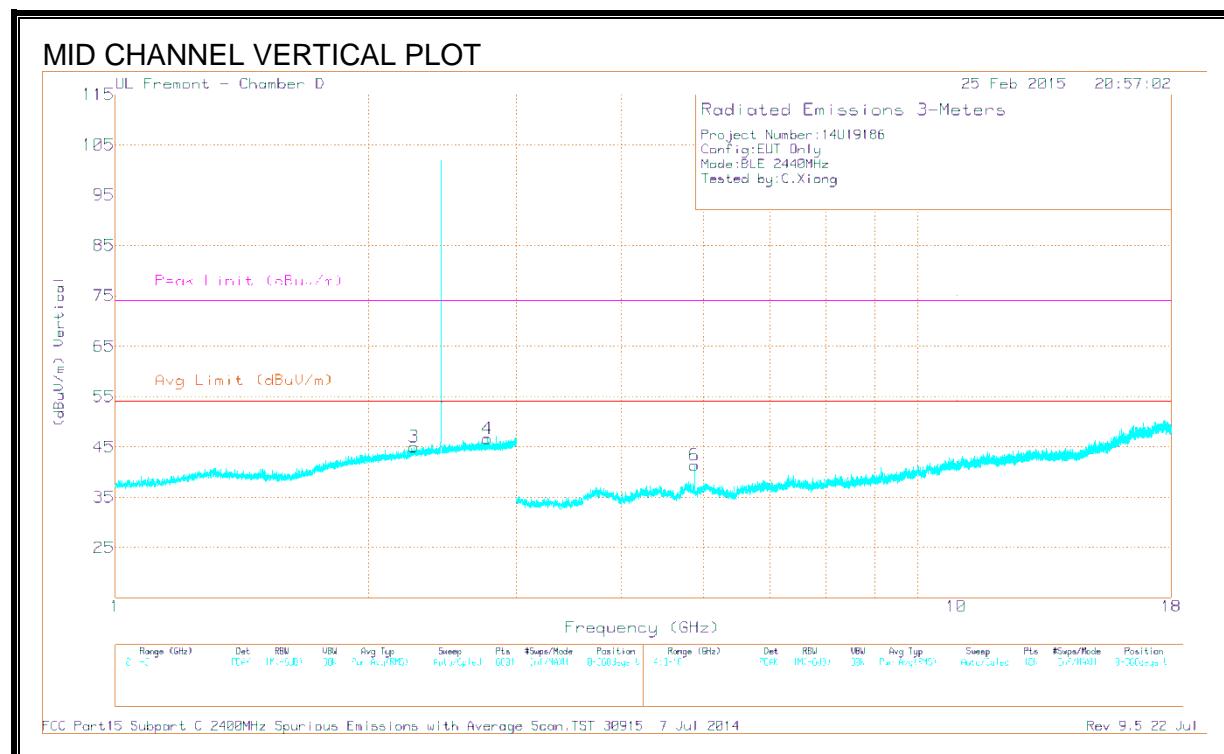
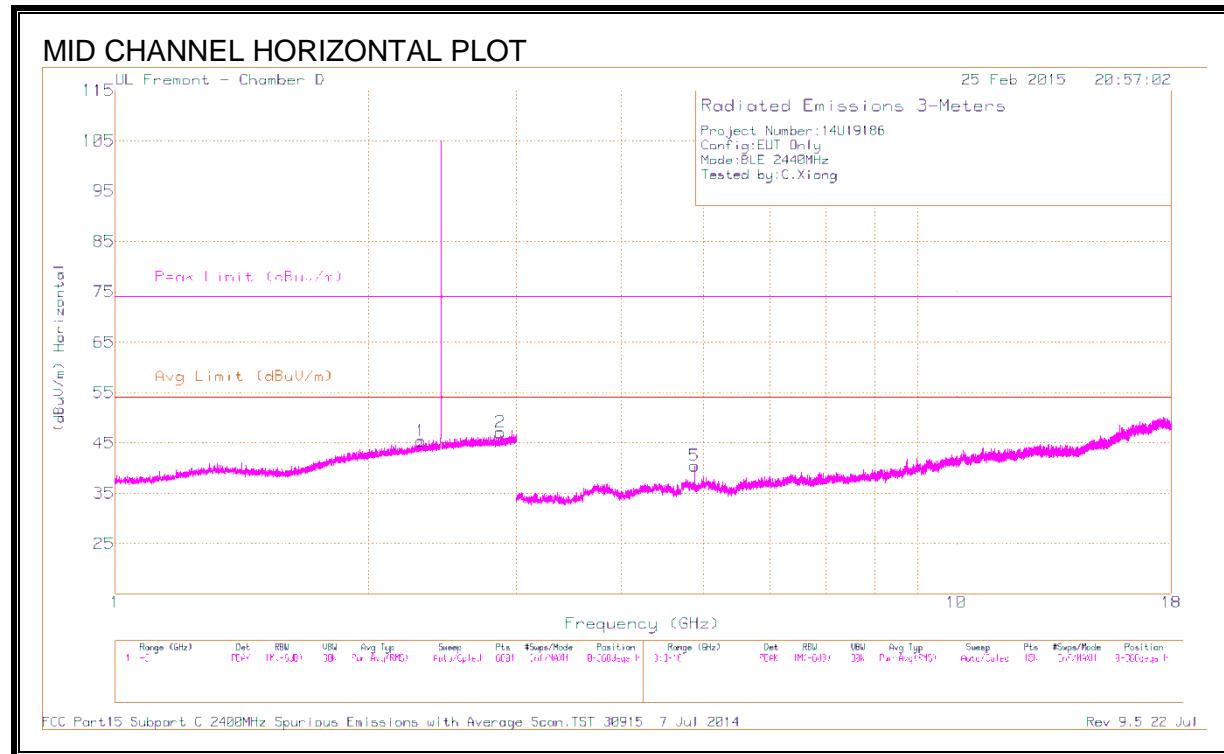
	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.331	41.83	PK2	28.9	-22.2	48.53	-	-	74	-25.47	60	129	H
	* 1.332	30.42	MAv1	28.9	-22.2	37.12	54	-16.88	-	-	60	129	H
2	* 2.782	41.74	PK2	32.5	-20.4	53.84	-	-	74	-20.16	75	179	V
	* 2.784	30.17	MAv1	32.5	-20.4	42.27	54	-11.73	-	-	75	179	V
3	* 4.804	42.07	PK2	34.1	-27	49.17	-	-	74	-24.83	6	228	H
	* 4.804	35.35	MAv1	34.1	-27	42.45	54	-11.55	-	-	6	228	H
4	* 8.38	35.29	PK2	35.7	-23	47.99	-	-	74	-26.01	15	210	H
	* 8.38	24.42	MAv1	35.7	-23	37.12	54	-16.88	-	-	15	210	H
5	* 3.612	38.43	PK2	33.1	-28.5	43.03	-	-	74	-30.97	44	166	V
	* 3.61	27.33	MAv1	33.1	-28.5	31.93	54	-22.07	-	-	44	166	V
6	* 4.803	42.97	PK2	34.1	-27	50.07	-	-	74	-23.93	6	101	V
	* 4.804	35.87	MAv1	34.1	-27	42.97	54	-11.03	-	-	6	101	V

\* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

## **HARMONICS AND SPURIOUS EMISSIONS**



**DATA**

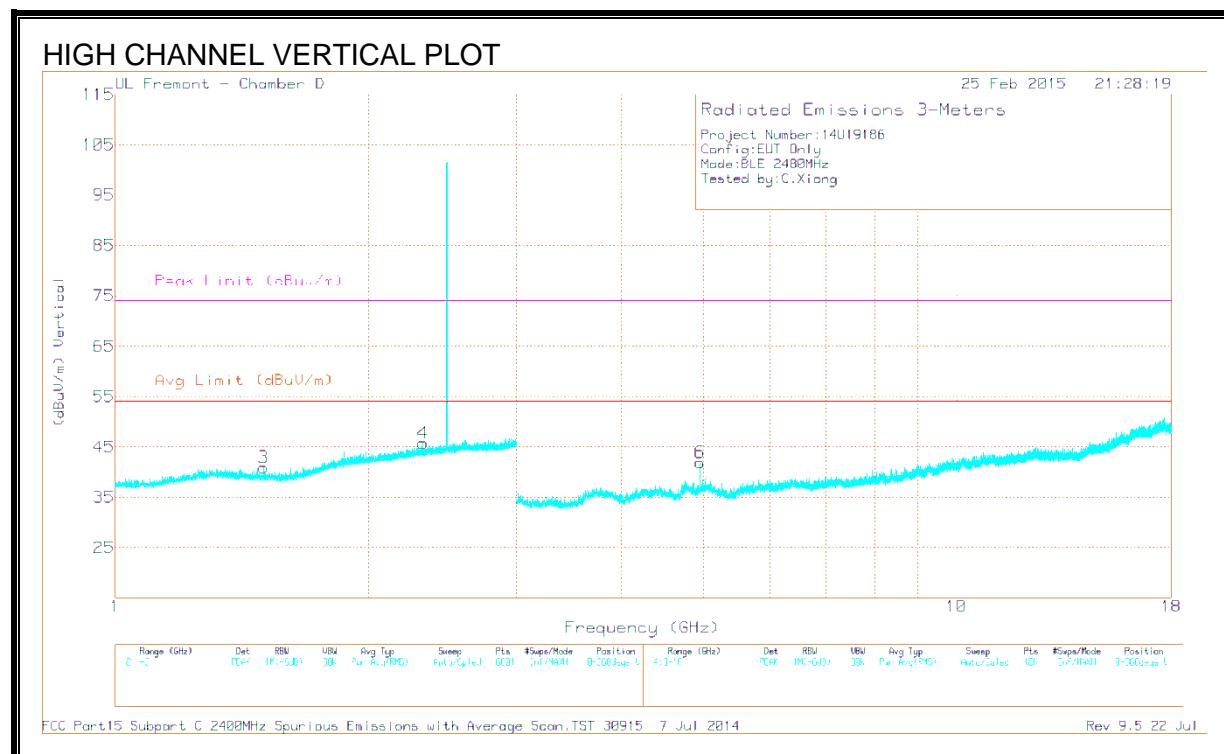
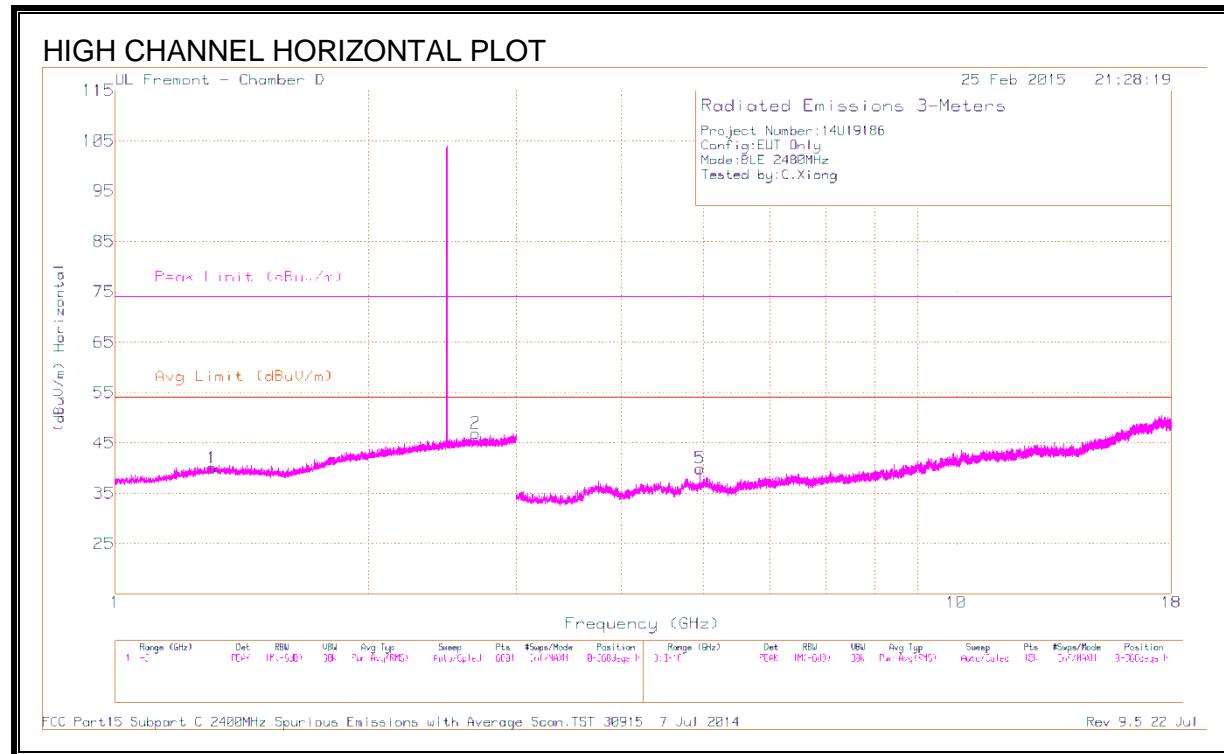
	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.87	41.03	PK2	32.6	-20.3	53.33	-	-	74	-20.67	34	143	H
	* 2.869	29.99	MAv1	32.6	-20.3	42.29	54	-11.71	-	-	34	143	H
3	* 2.266	41.23	PK2	31.9	-20.9	52.23	-	-	74	-21.77	124	183	V
	* 2.267	30.21	MAv1	31.9	-20.9	41.21	54	-12.79	-	-	124	183	V
4	* 2.77	41.59	PK2	32.5	-20.4	53.69	-	-	74	-20.31	109	225	V
	* 2.768	30.18	MAv1	32.5	-20.4	42.28	54	-11.72	-	-	109	225	V
5	* 4.879	41.24	PK2	34.1	-28.1	47.24	-	-	74	-26.76	7	220	H
	* 4.88	32.11	MAv1	34.1	-28.1	38.11	54	-15.89	-	-	7	220	H
6	* 4.879	41.43	PK2	34.1	-28.1	47.43	-	-	74	-26.57	4	100	V
	* 4.88	33.34	MAv1	34.1	-28.1	39.34	54	-14.66	-	-	4	100	V
1	2.31	41.3	PK2	32	-21	52.3	-	-	-	-	10	117	H

\* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

## **HARMONICS AND SPURIOUS EMISSIONS**



**DATA**

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.302	42.14	PK2	29	-22.3	48.84	-	-	74	-25.16	28	243	H
* 1.304	30.39	MAv1	29	-22.3	37.09	54	-16.91	-	-	28	243	H
* 2.68	41.62	PK2	32.4	-20.6	53.42	-	-	74	-20.58	48	210	H
* 2.68	30.29	MAv1	32.4	-20.6	42.09	54	-11.91	-	-	48	210	H
* 1.502	41.47	PK2	28.2	-21.9	47.77	-	-	74	-26.23	65	157	V
* 1.5	30.13	MAv1	28.2	-21.9	36.43	54	-17.57	-	-	65	157	V
* 2.324	41.55	PK2	32	-21	52.55	-	-	74	-21.45	28	188	V
* 2.323	30.16	MAv1	32	-21	41.16	54	-12.84	-	-	28	188	V
* 4.959	39.88	PK2	34.2	-27.7	46.38	-	-	74	-27.62	46	221	H
* 4.96	31.21	MAv1	34.2	-27.7	37.71	54	-16.29	-	-	46	221	H
* 4.96	41.01	PK2	34.2	-27.7	47.51	-	-	74	-26.49	5	101	V
* 4.96	32.46	MAv1	34.2	-27.7	38.96	54	-15.04	-	-	5	101	V

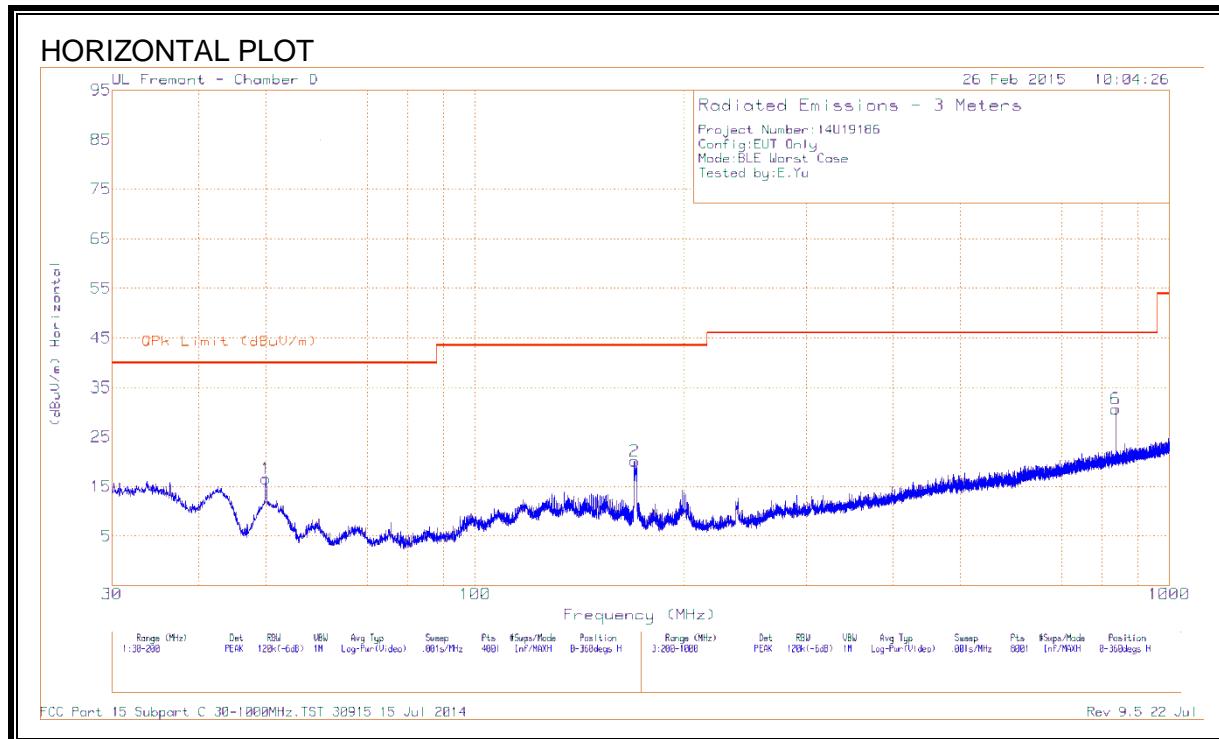
\* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

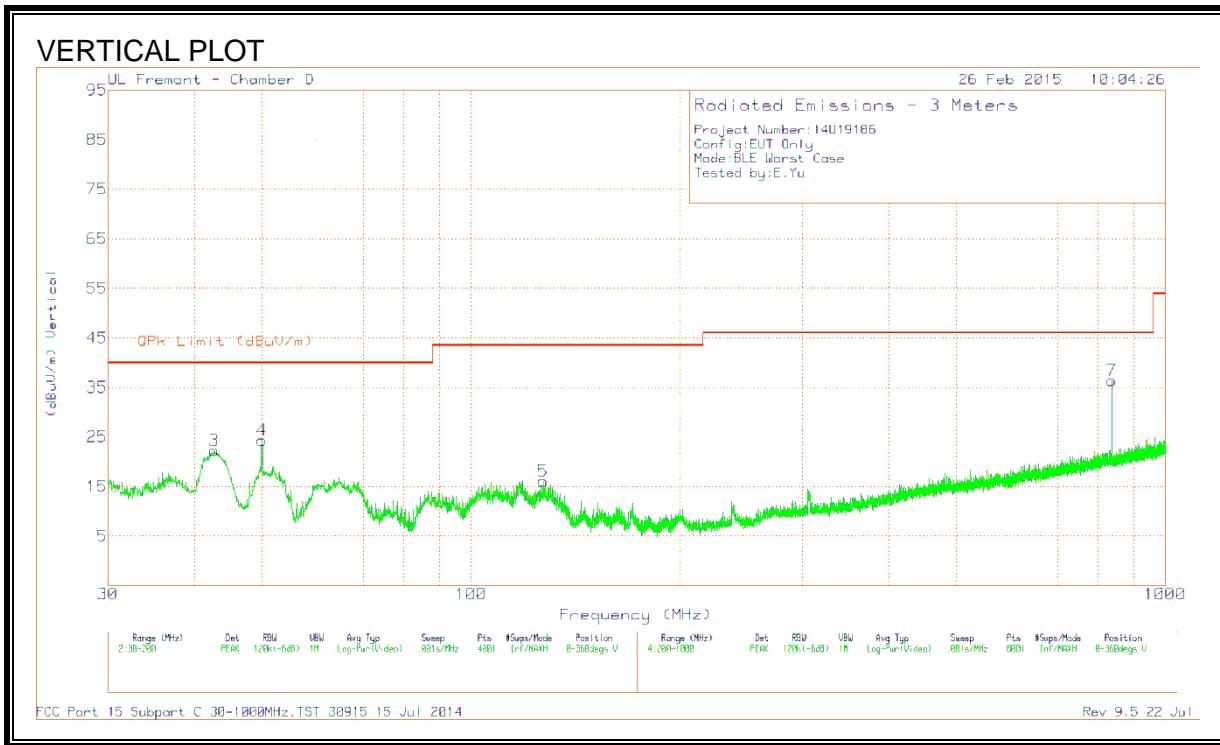
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

### 9.3. WORST-CASE BELOW 1 GHz

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





**HORIZONTAL AND VERTICAL DATA**

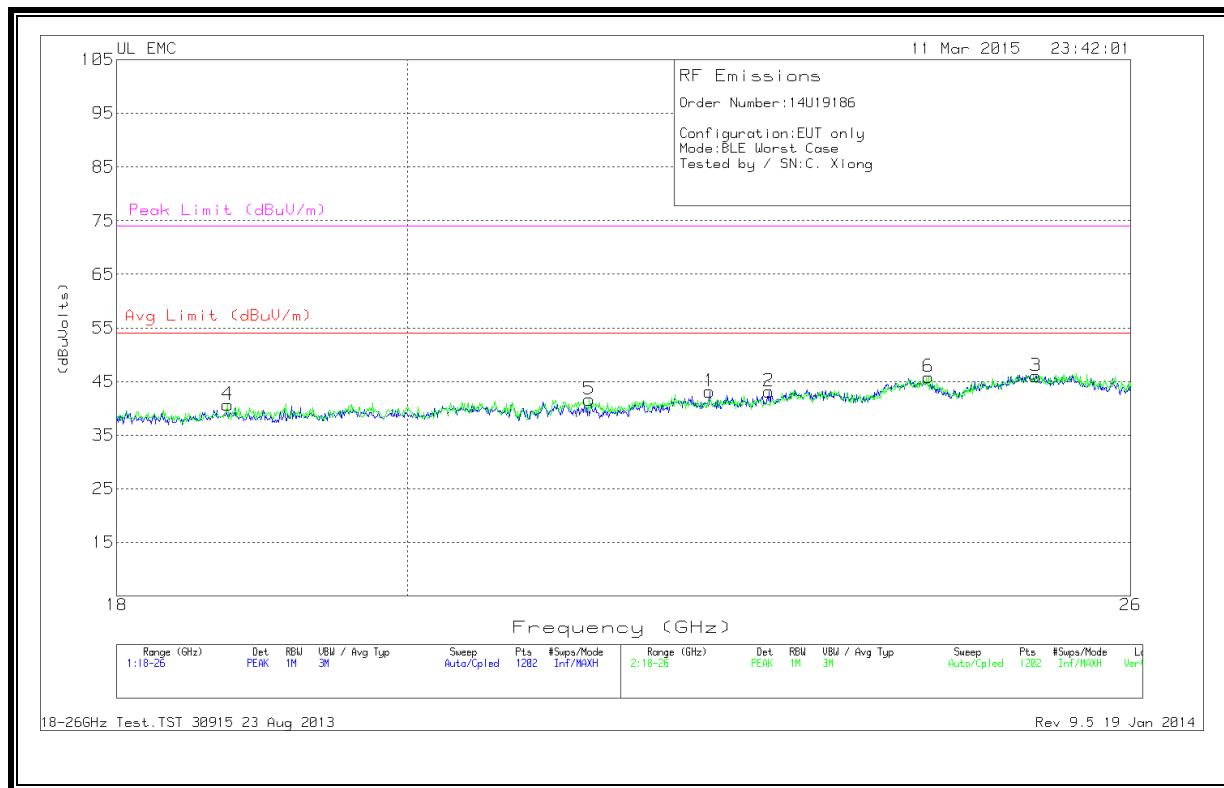
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 169.6125	39.34	PK	11.8	-31	20.14	43.52	-23.38	0-360	101	H
5	* 126.9425	33.73	PK	13.6	-31.2	16.13	43.52	-27.39	0-360	100	V
3	42.7075	42.25	PK	11.8	-31.8	22.25	40	-17.75	0-360	100	V
1	49.975	40.39	PK	7.9	-31.7	16.59	40	-23.41	0-360	301	H
4	49.9963	48.19	PK	7.9	-31.7	24.39	40	-15.61	0-360	100	V
7	836.6	43.5	PK	21.7	-28.8	36.4	46.02	-9.62	0-360	99	V
6	836.7	37.73	PK	21.7	-28.8	30.63	46.02	-15.39	0-360	100	H

\* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

## 9.4. WORST-CASE ABOVE 18 GHz

### SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)



Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	22.316	42.07	PK	33.7	-23.1	-9.5	43.166	54	-10.833	74	-30.833
2	22.803	42.47	PK	33.9	-23.7	-9.5	43.166	54	-10.833	74	-30.833
3	25.121	44.1	PK	34.5	-23.1	-9.5	46	54	-8	74	-28
4	18.739	41.67	PK	32.8	-24.3	-9.5	40.666	54	-13.333	74	-33.333
5	21.364	42.07	PK	33.3	-24.2	-9.5	41.666	54	-12.333	74	-32.333
6	24.162	44.03	PK	34.2	-22.9	-9.5	45.833	54	-8.1666	74	-28.166

PK - Peak detector

## 9.5. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)  
RSS-Gen 8.8

Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

### TEST PROCEDURE

ANSI C63.10

### RESULTS

6 WORST EMISSIONS

## Line-L1 .15 - 30MHz

Trace Markers										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
1	.204	37.51	PK	.9	0	38.41	63.4	-24.99	-	-
2	.204	30.7	Av	.9	0	31.6	-	-	53.4	-21.8
3	.591	43.71	PK	.3	0	44.01	56	-11.99	-	-
4	.591	29.65	Av	.3	0	29.95	-	-	46	-16.05
5	1.68	32.9	PK	.2	.1	33.2	56	-22.8	-	-
6	1.68	18.44	Av	.2	.1	18.74	-	-	46	-27.26
7	9.2085	28.47	PK	.2	.1	28.77	60	-31.23	-	-
8	9.2085	18.23	Av	.2	.1	18.53	-	-	50	-31.47

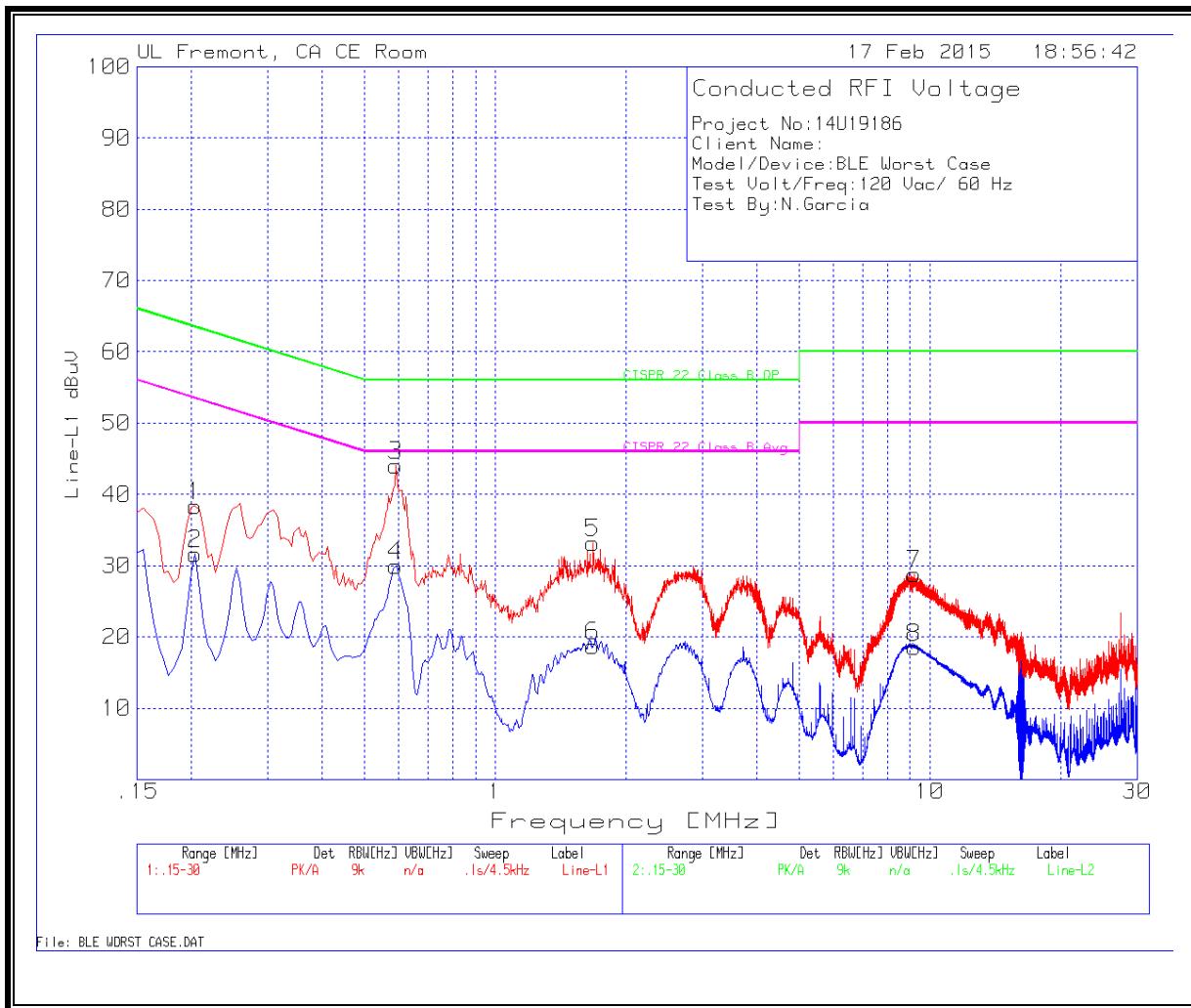
## Line-L2 .15 - 30MHz

Trace Markers										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
9	.2535	38.84	PK	.7	0	39.54	61.6	-22.06	-	-
10	.2535	26.75	Av	.7	0	27.45	-	-	51.6	-24.15
11	.6	38.75	PK	.3	0	39.05	56	-16.95	-	-
12	.6	23.45	Av	.3	0	23.75	-	-	46	-22.25
13	1.428	28.41	PK	.2	.1	28.71	56	-27.29	-	-
14	1.428	11.8	Av	.2	.1	12.1	-	-	46	-33.9
15	8.979	31.07	PK	.2	.1	31.37	60	-28.63	-	-
16	8.979	20.69	Av	.2	.1	20.99	-	-	50	-29.01
17	9.0015	31.18	PK	.2	.1	31.48	60	-28.52	-	-
18	9.0015	20.6	Av	.2	.1	20.9	-	-	50	-29.1

PK - Peak detector

Av - average detection

**LINE 1 RESULTS**



## **LINE 2 RESULTS**

