



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

**BLUETOOTH LOW ENERGY
CERTIFICATION TEST REPORT**

FOR

MEDIA STREAMING DEVICE with BLE, 2.4GHz and 5GHz WLAN Radios

MODEL NUMBER: RUX-J42

**FCC ID: A4RRUX-J42
IC ID: 10395A-RUXJ42**

REPORT NUMBER: 15U20918-E4

ISSUE DATE: July 22, 2015

Prepared for
Google
1600 Amphitheatre Parkway
Mountain View, CA 94043, U.S.A.

Prepared by
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888



NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	7/22/15	Initial Issue	F. de Anda

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	5
2. TEST METHODOLOGY	6
3. FACILITIES AND ACCREDITATION	6
4. CALIBRATION AND UNCERTAINTY	7
4.1. MEASURING INSTRUMENT CALIBRATION	7
4.2. SAMPLE CALCULATION	7
4.3. MEASUREMENT UNCERTAINTY.....	7
5. EQUIPMENT UNDER TEST	8
5.1. DESCRIPTION OF EUT	8
5.2. MAXIMUM OUTPUT POWER.....	8
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	8
5.4. SOFTWARE AND FIRMWARE.....	8
5.5. WORST-CASE CONFIGURATION AND MODE.....	9
5.6. DESCRIPTION OF TEST SETUP.....	10
6. TEST AND MEASUREMENT EQUIPMENT	13
7. ANTENNA PORT TEST RESULTS	14
7.1. ON TIME, DUTY CYCLE	14
7.2. 6 dB BANDWIDTH.....	16
7.3. 99% BANDWIDTH.....	20
7.4. AVERAGE POWER.....	24
7.5. OUTPUT POWER.....	25
7.6. POWER SPECTRAL DENSITY	30
7.7. CONDUCTED SPURIOUS EMISSIONS.....	34
8. RADIATED TEST RESULTS.....	41
8.1. LIMITS AND PROCEDURE	41
8.2. TRANSMITTER ABOVE 1 GHz	42
8.2.1. RESTRICTED BANDEDGE (ANTENNA 1)	42
8.2.2. HARMONICS AND SPURIOUS EMISSIONS (ANTENNA 1)	46
8.2.3. RESTRICTED BANDEDGE (ANTENNA 2)	52
8.2.4. HARMONICS AND SPURIOUS EMISSIONS (ANTENNA 2)	56
8.3. WORST-CASE BELOW 1 GHz.....	62
8.4. WORST-CASE 18 to 26 GHz.....	64
9. AC POWER LINE CONDUCTED EMISSIONS	65

10. SETUP PHOTOS	68
-------------------------------	-----------

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: GOOGLE
1600 AMPHITHEATRE PARKWAY
MOUNTAIN VIEW, CA 94043, U.S.A.

EUT DESCRIPTION: MEDIA STREAMING DEVICE WITH BLE, 2.4GHZ AND 5GHZ
WLAN RADIOS

MODEL: RUX-J42

SERIAL NUMBER: DVT 2(RADIATED), 5512103ZZBJB (CONDUCTED)

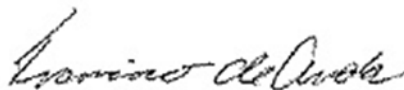
DATE TESTED: JUNE 22 to JULY 14, 2015

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.

Approved & Released For
UL Verification Services Inc. By:



FRANCISCO DE ANDA
PROJECT LEAD
UL Verification Services Inc.

Tested By:



CLIFFORD SUSA
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 for IC test.

Testing for radiated emissions above 1GHz was performed with the EUT elevated at 1.5m instead of 0.8m. 1.5m is the required height in ANSI C63.10:2013 as referenced by RSS GEN issue 4. This test height has been permitted by FCC as discussed in FCC/TCB conference call in December 2014.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

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 checked="" type="checkbox"/> Chamber A	<input type="checkbox"/> Chamber D
<input type="checkbox"/> Chamber B	<input type="checkbox"/> Chamber E
<input checked="" 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:

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

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	± 3.52 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.94 dB
Radiated Disturbance, 1 to 6 GHz	± 3.86 dB
Radiated Disturbance, 6 to 18 GHz	± 4.23 dB
Radiated Disturbance, 18 to 26 GHz	± 5.30 dB
Radiated Disturbance, 26 to 40 GHz	± 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 Media Streaming Device with BLE, 2.4GHz and 5GHz WLAN Radios.

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	7.38	5.47

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	5.53	3.57

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes PCB antennas, with a maximum gain of 3.0dBi for antenna 1 and 3.1dBi for antenna 2.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 15.2.7.09.

The test utility software used during testing was Labtool ver. 2.0.0.71

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

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

Based on the baseline scan, the worst-case data rates were:

BLE: 1 Mbps.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Lenovo	ADLX65NCC2A	11545N0263Z1Z5994AH GRO	N/A
AC Adapter	Google	S005BBU0500100	Proto 1	N/A
Laptop	Lenovo	E440	PF-074E9W 15/01	N/A

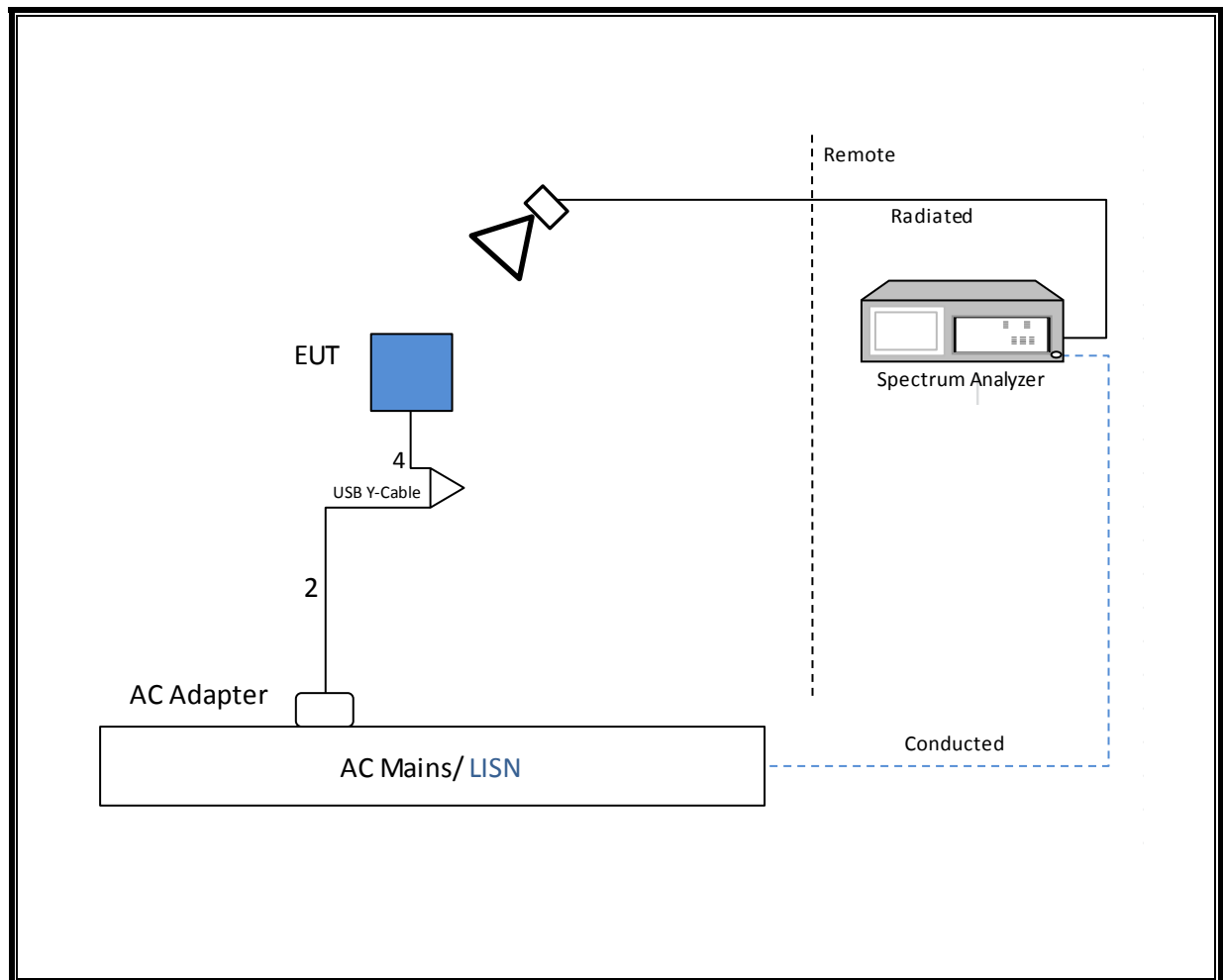
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	Barrel	unshielded	0.8	
2	USB	1	USB	unshielded	1.5	Power cable
3	USB	1	USB	unshielded	2.5	
4	USB	1	Micro USB	unshielded	0.2	Y-cable

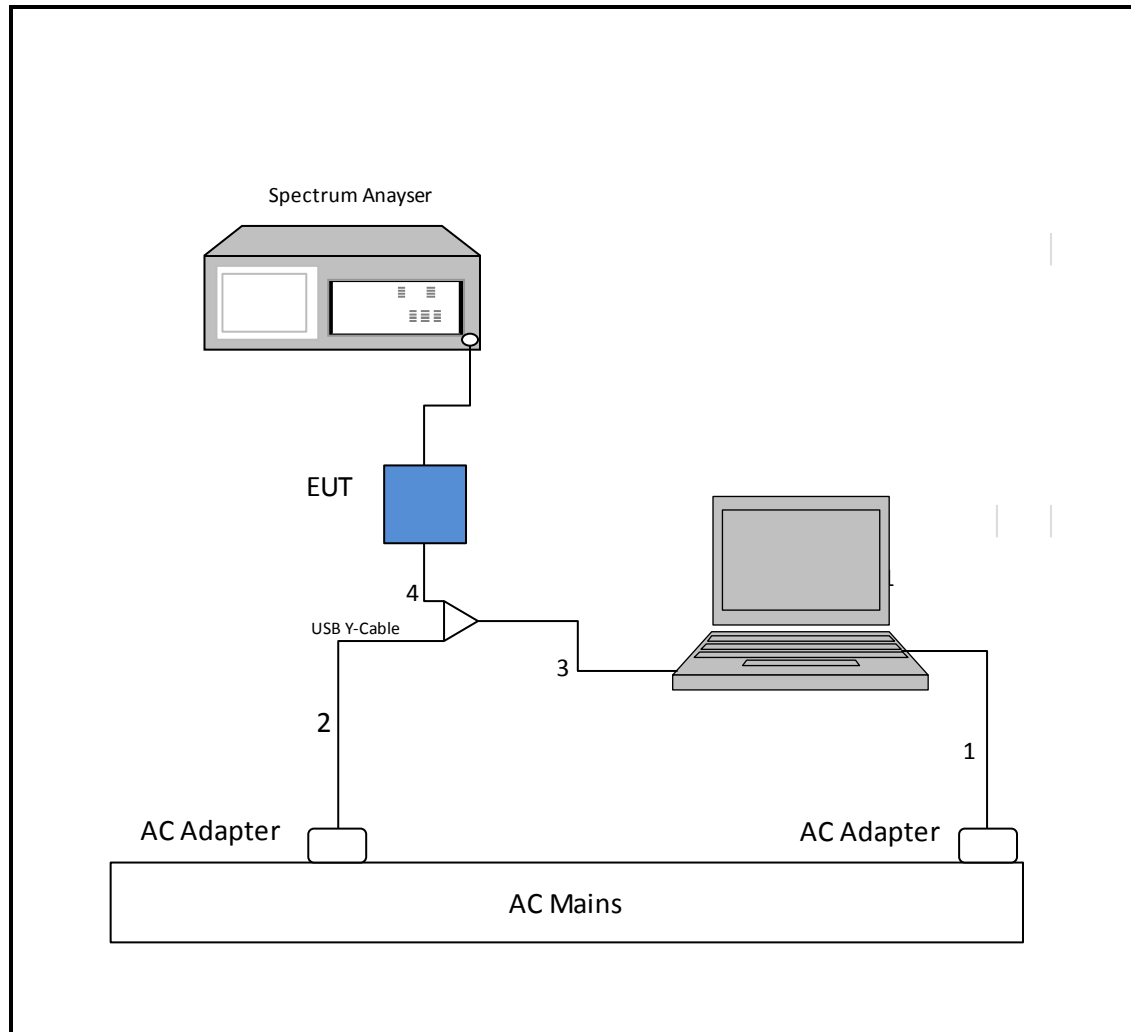
TEST SETUP

The EUT is connected to a host laptop via USB, test software exercised the radio.

SETUP DIAGRAM FOR RADIATED and AC LC TESTS



SETUP DIAGRAM FOR CONDUCTED 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	Asset	Cal Due
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014	
Conducted Software	UL	UL EMC	Ver 2.2, March 31, 2015	
AC Line Conducted Software	UL	UL EMC	Rev. 9.5	
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	341	02/20/16
Antenna, Horn 1-18GHz	ETS Lindgren	3117	120	03/26/16
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB1	122	02/13/16
Amplifier, 10KHz to 1GHz,	Sonoma	310N	173	06/09/16
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	742	01/31/16
Amplifier, 26 - 40GHz	Miteq	NSP4000-SP2	88	4/7/2016
Filter, HPF 3.0GHz	Micro-Tronics	HPM17543	427	01/31/16
Filter, LPF 5.0GHz	Micro-Tronics	LPS17541	421	1/31/2016
Filter, HPF 6GHz HPF	Micro-Tronics	HPS17542	425	1/31/2016
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826	89	12/17/15
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Agilent	8449B	404	04/13/16
Spectrum Analyzer, 40 GHz	Agilent	8564E	106	08/06/15
LISN, 30MHz	FCC	50/250-25-2	24	01/16/16
Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	341	02/20/16
UL EMC Software	UL	UL EMC	Rev 9.5.03	
Antenna Port Software	UL	UL RF	Ver 2.2	

7. ANTENNA PORT TEST RESULTS

7.1. ON TIME, DUTY CYCLE

LIMITS

None; for reporting purposes only.

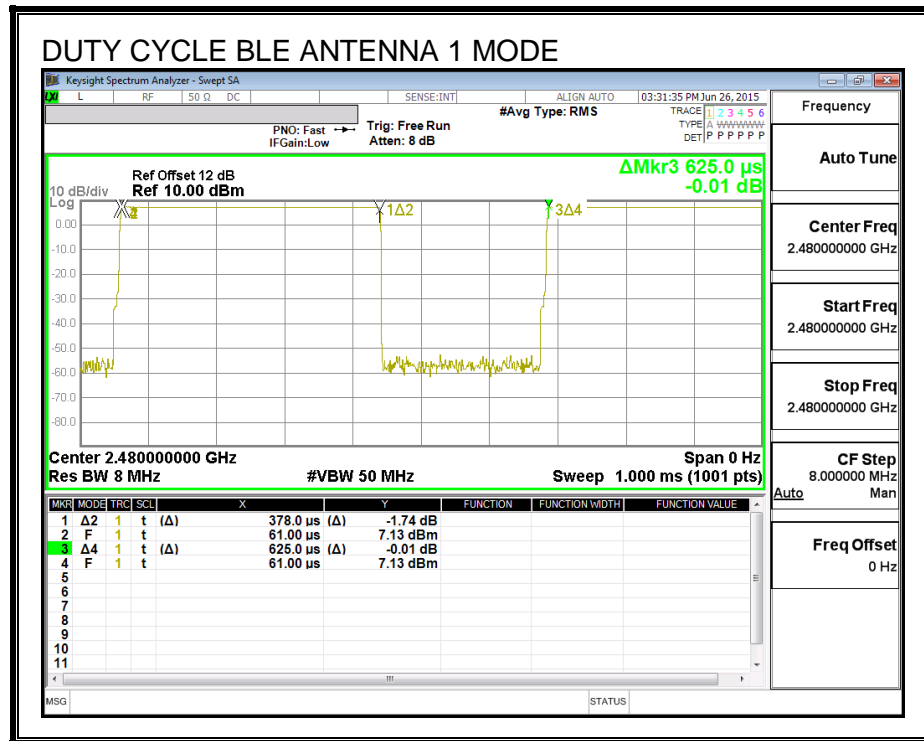
PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE 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	0.378	0.625	0.605	60.48%	2.18	2.646

DUTY CYCLE PLOTS



7.2. 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.

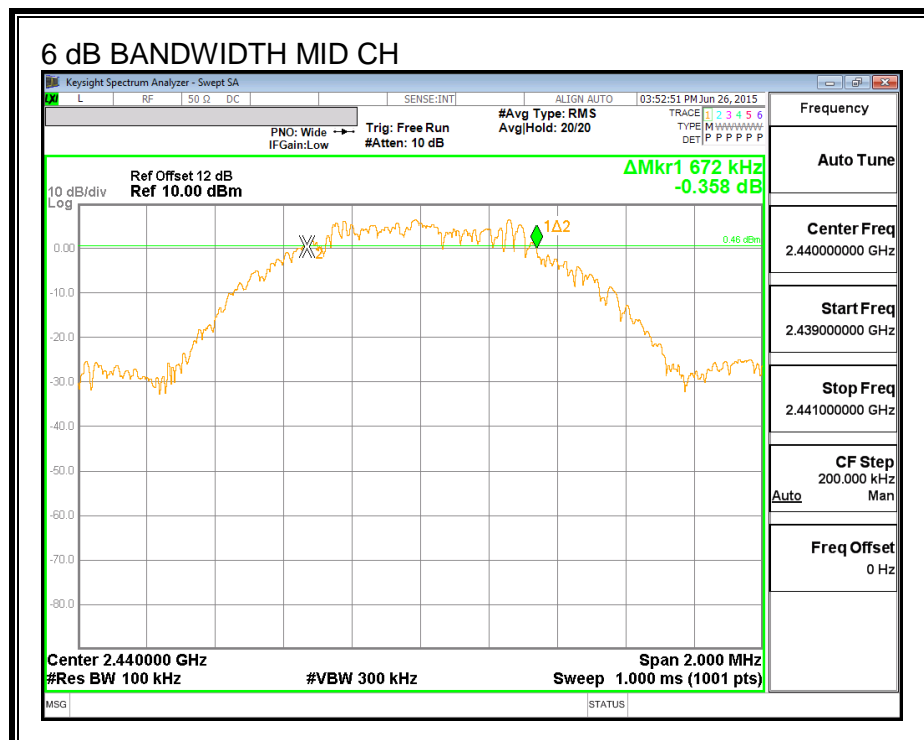
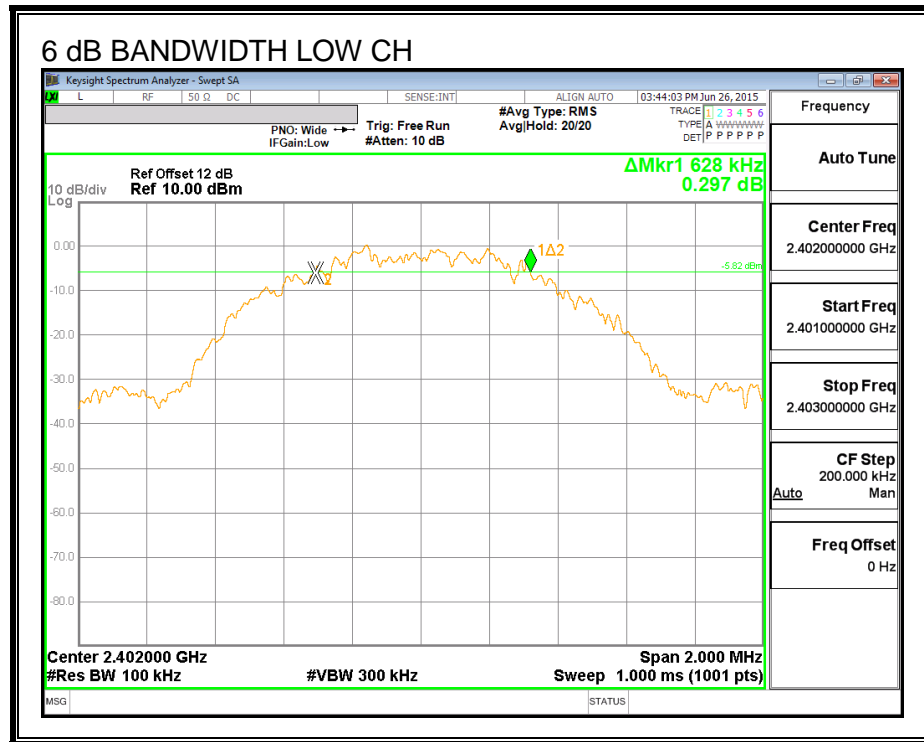
RESULTS

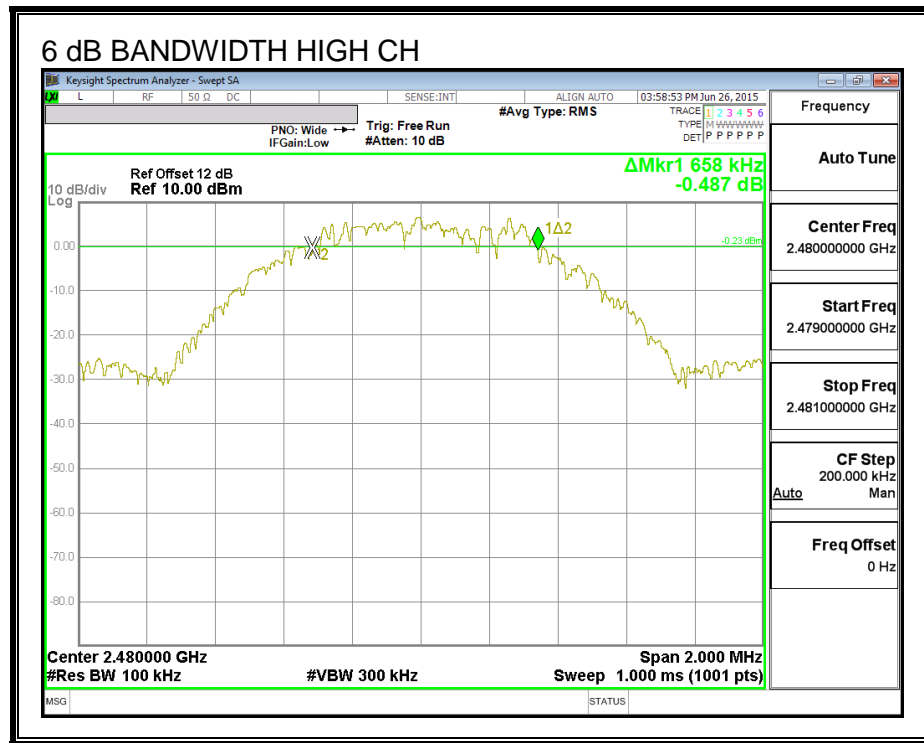
ANTENNA 1

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.628	0.5
Middle	2440	0.672	0.5
High	2480	0.658	0.5

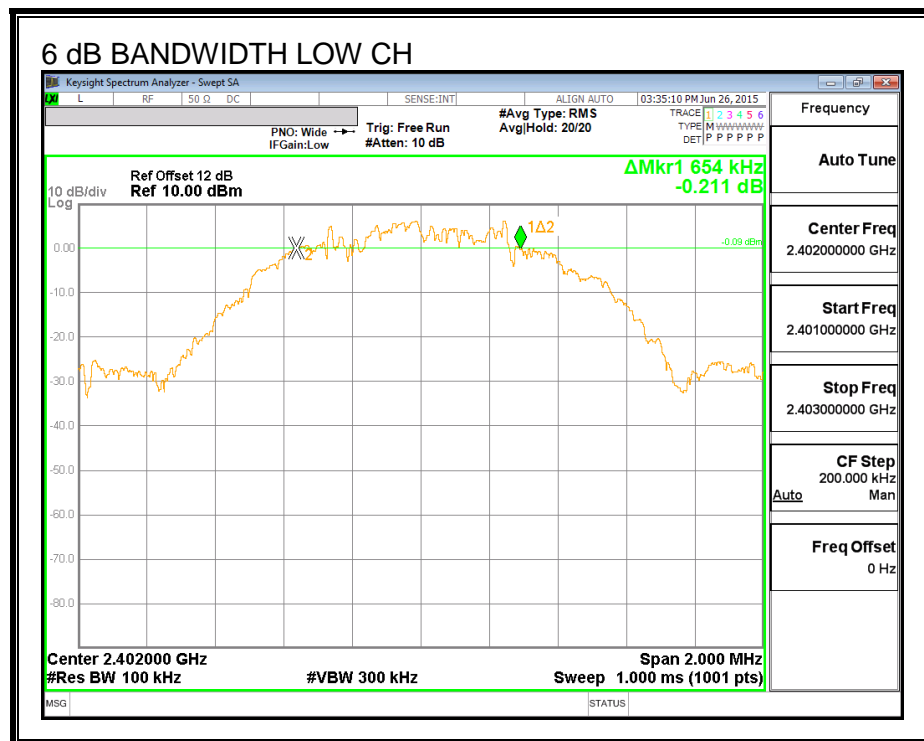
ANTENNA 2

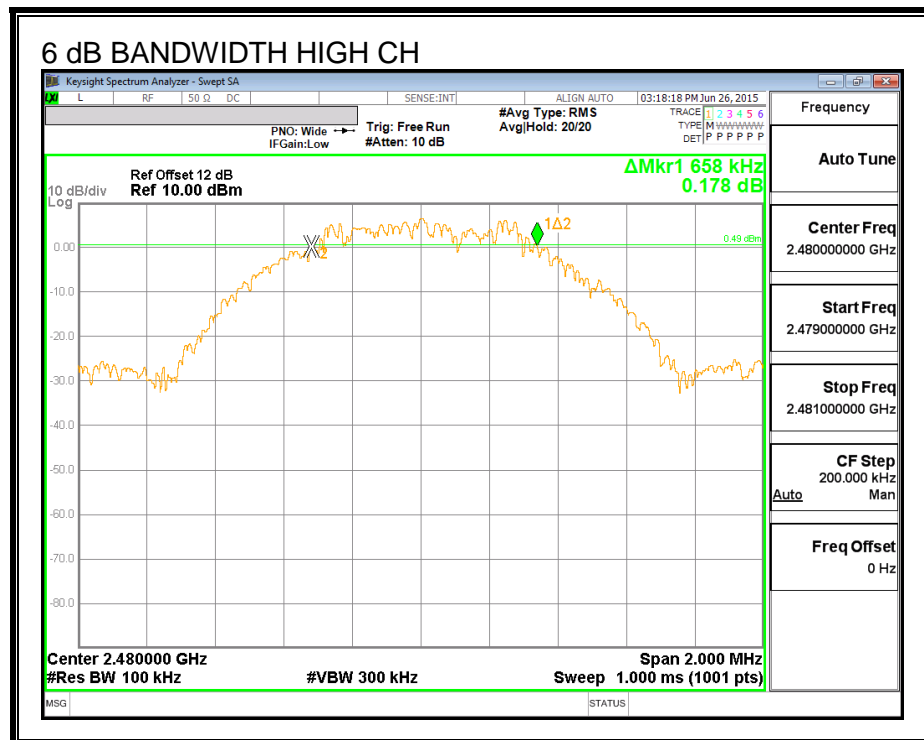
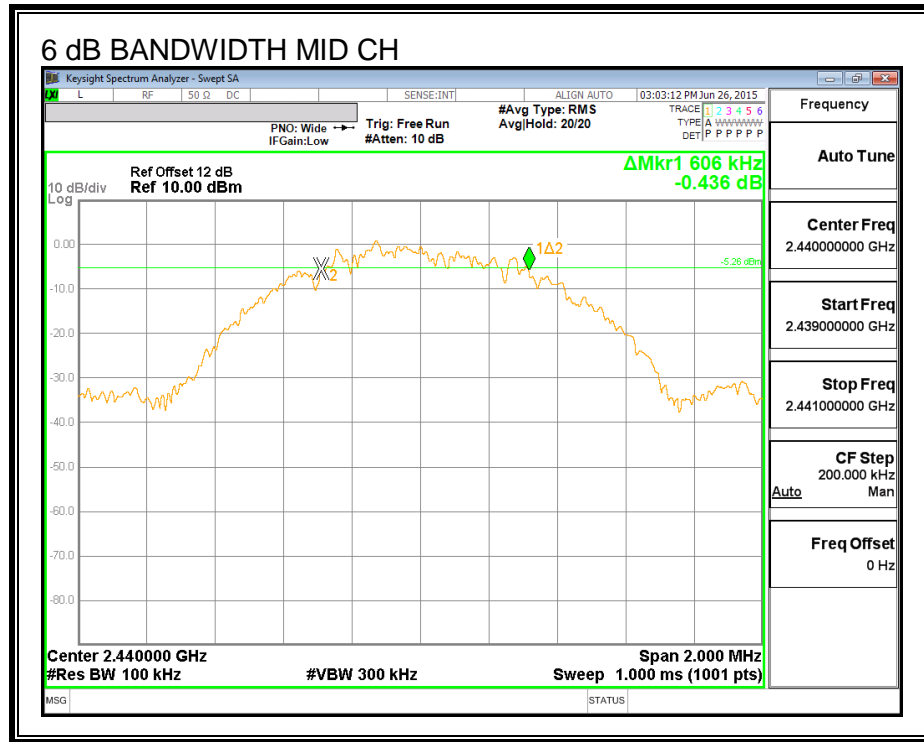
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.654	0.5
Middle	2440	0.606	0.5
High	2480	0.658	0.5

6 dB BANDWIDTH ANTENNA 1



6 dB BANDWIDTH ANTENNA 2





7.3. 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.

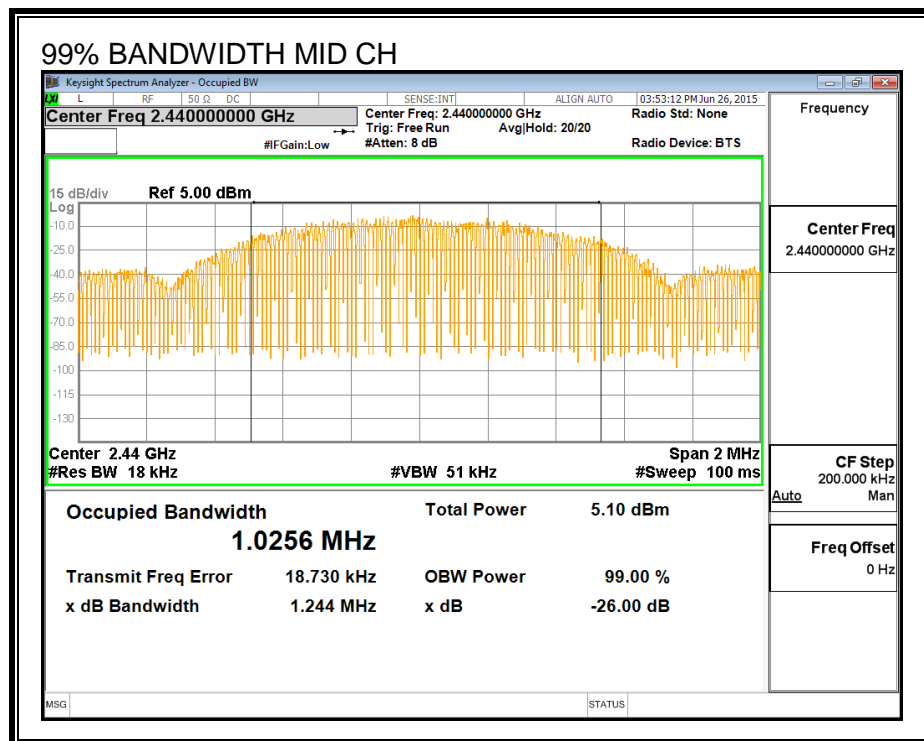
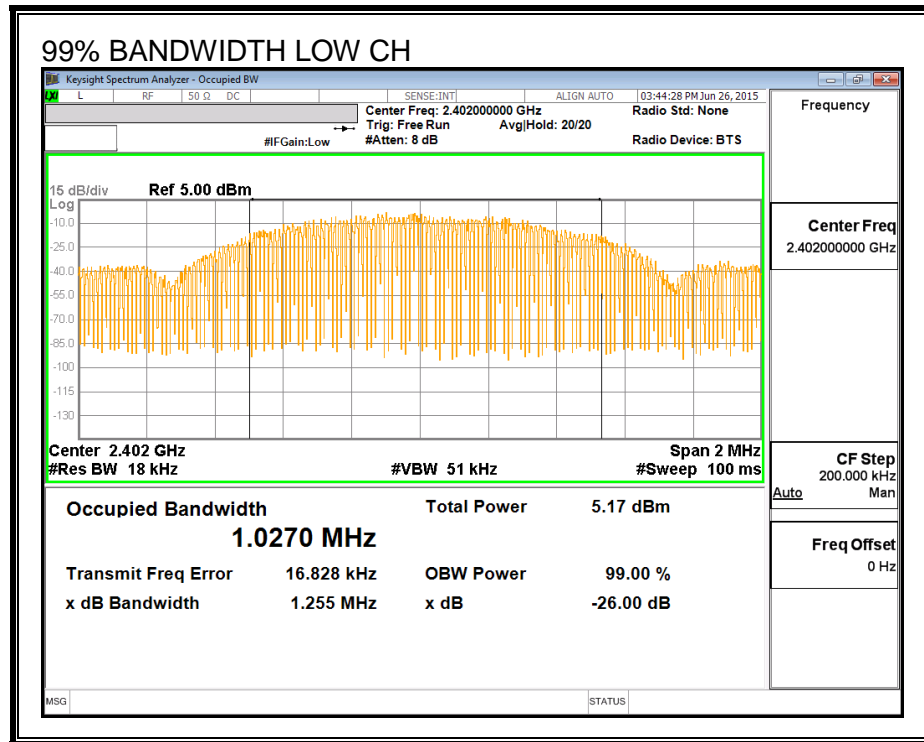
RESULTS

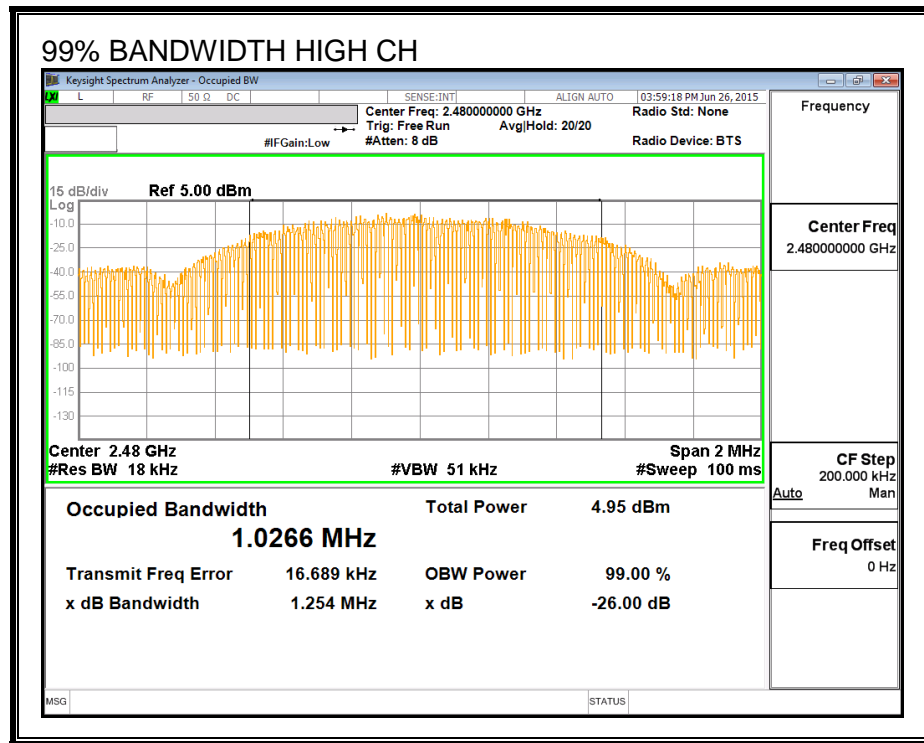
ANTENNA 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0270
Middle	2440	1.0256
High	2480	1.0266

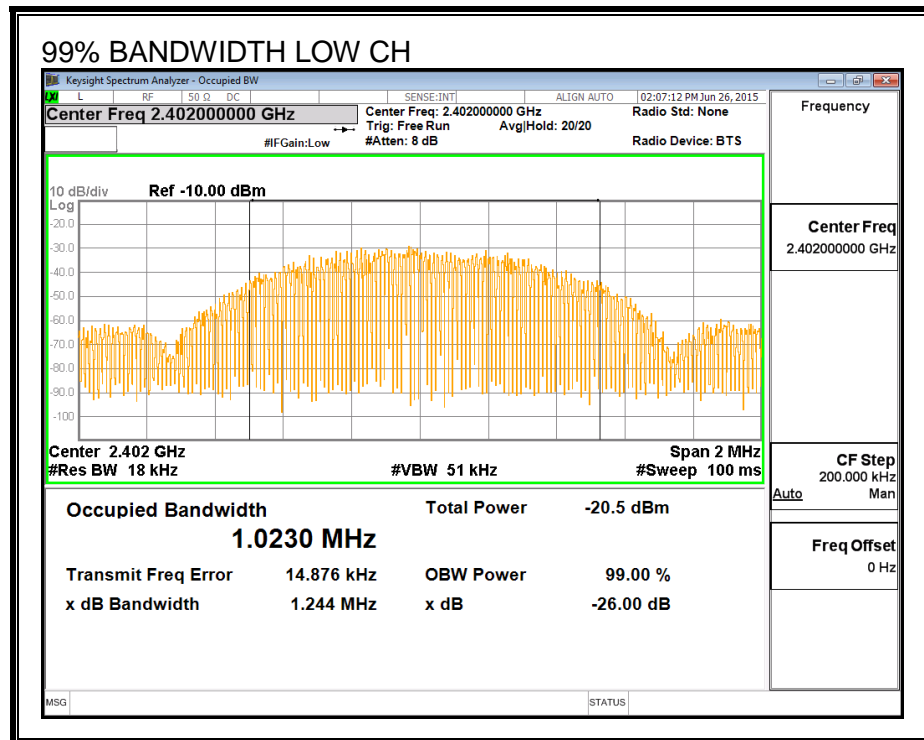
ANTENNA 2

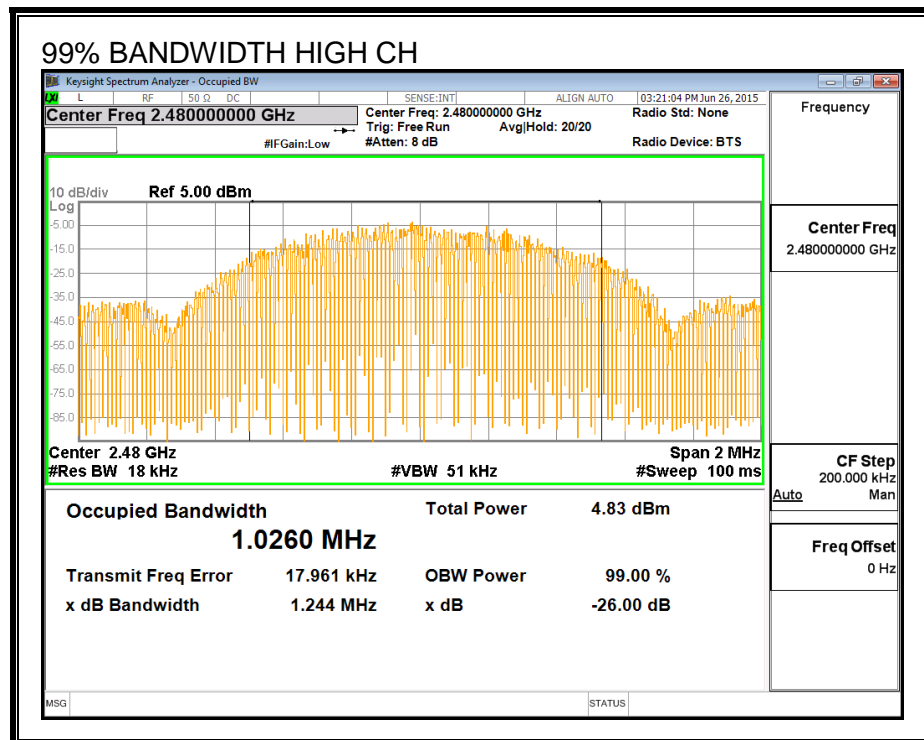
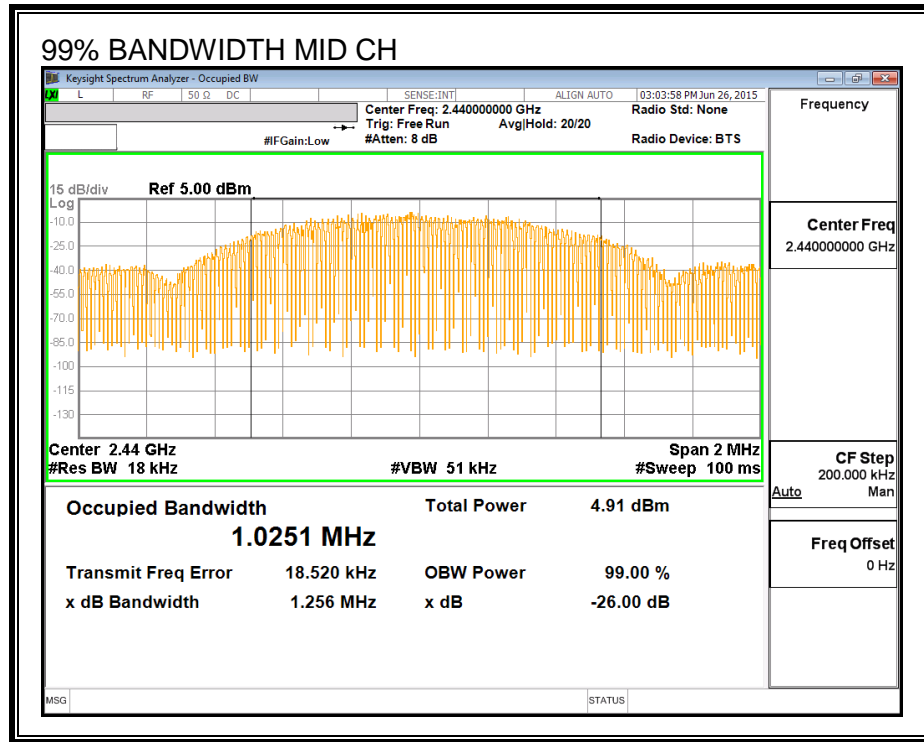
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0230
Middle	2440	1.0251
High	2480	1.0260

99% BANDWIDTH ANTENNA 1



99% BANDWIDTH ANTENNA 2





7.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

RESULTS

The cable assembly insertion loss of 12 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.

ANTENNA 1

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	5.49
Middle	2440	5.47
High	2480	5.38

ANTENNA 2

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	5.5
Middle	2440	5.53
High	2480	5.49

7.5. 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.

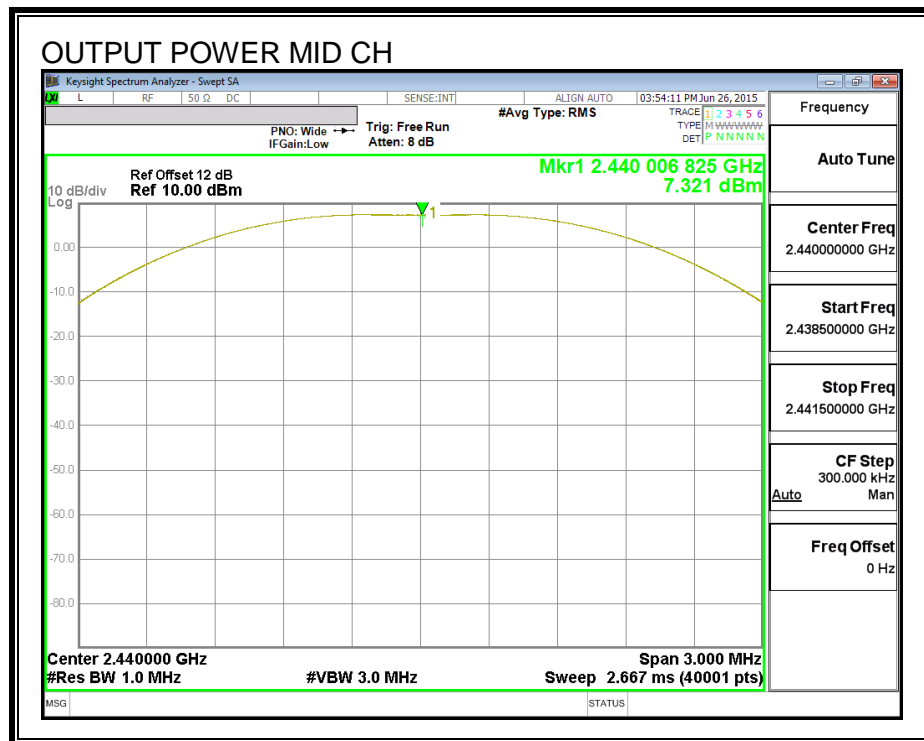
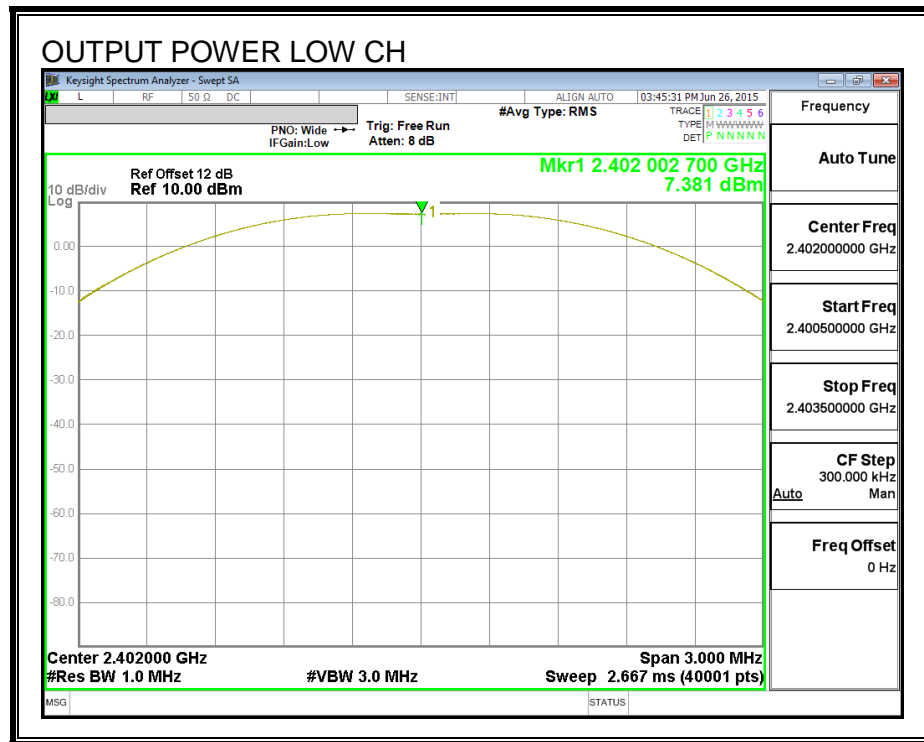
RESULTS

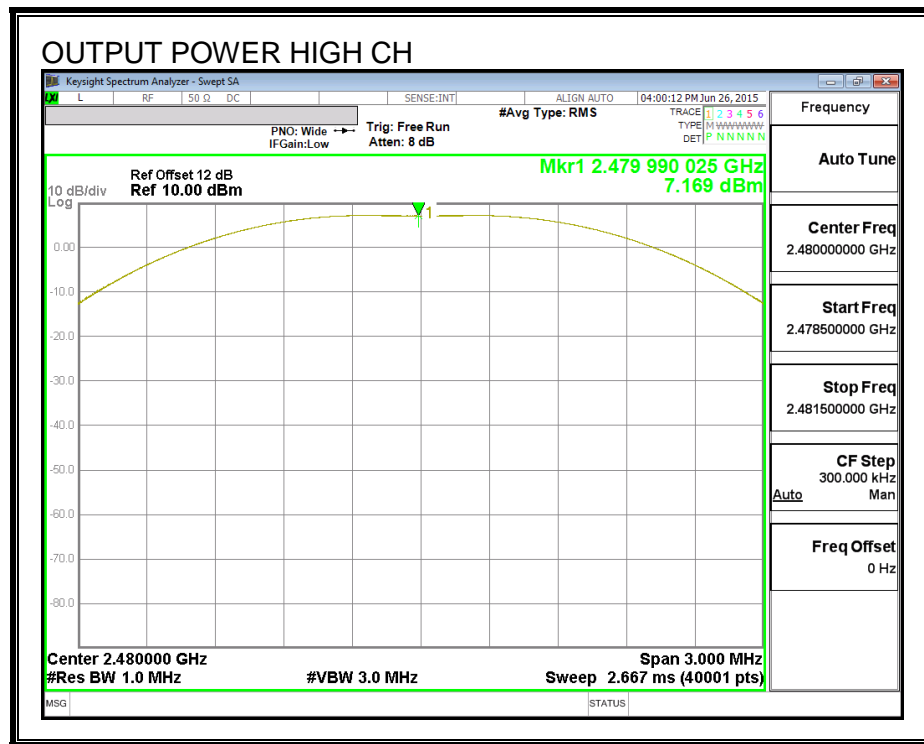
ANTENNA 1

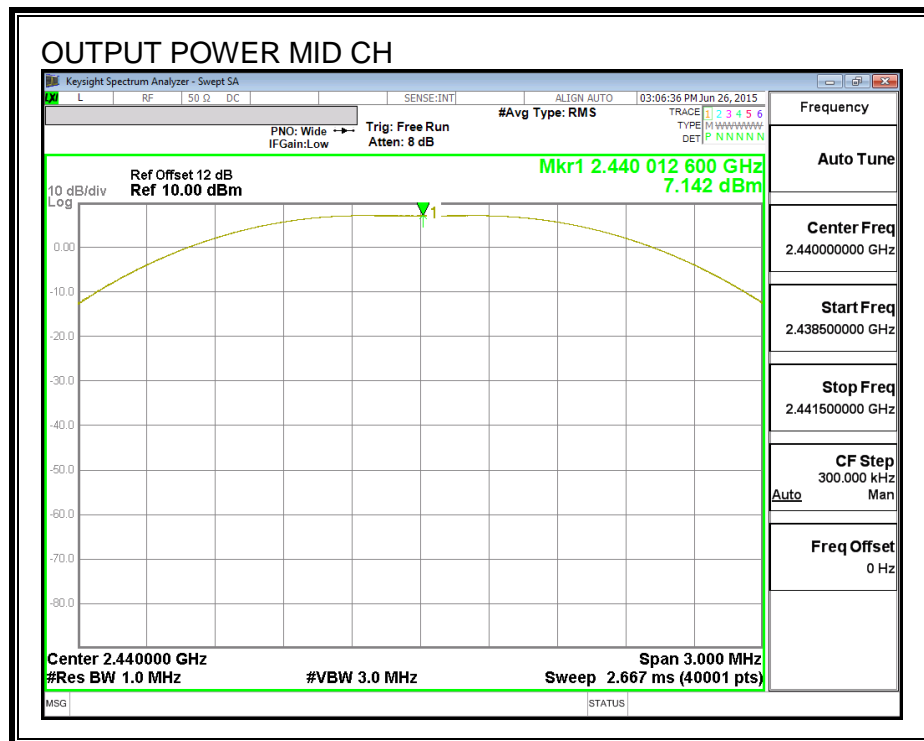
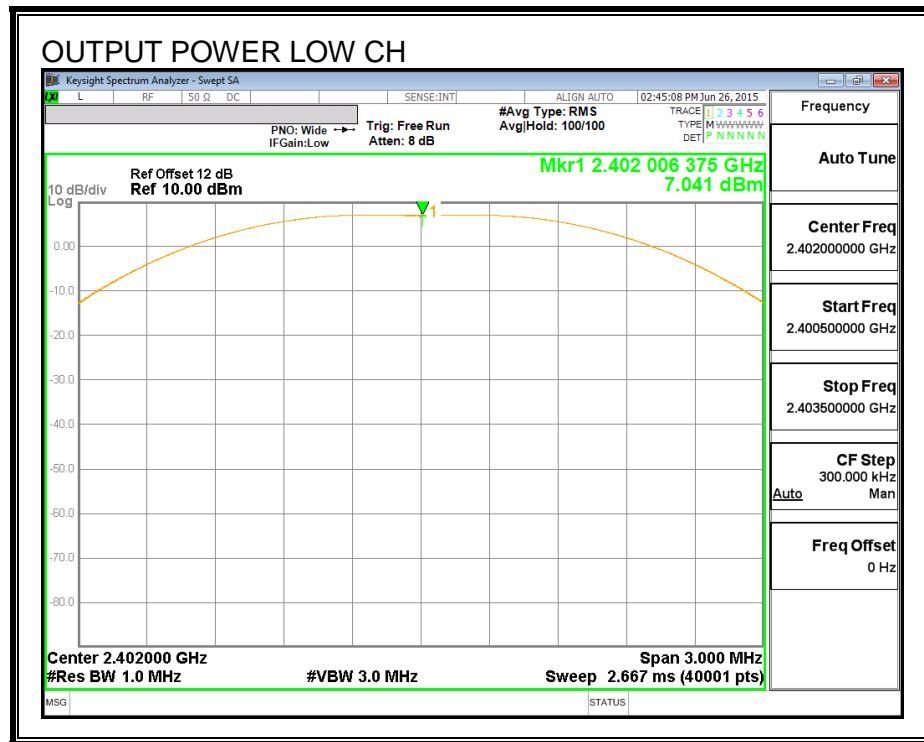
Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.38	30	-22.619
Middle	2440	7.32	30	-22.679
High	2480	7.17	30	-22.831

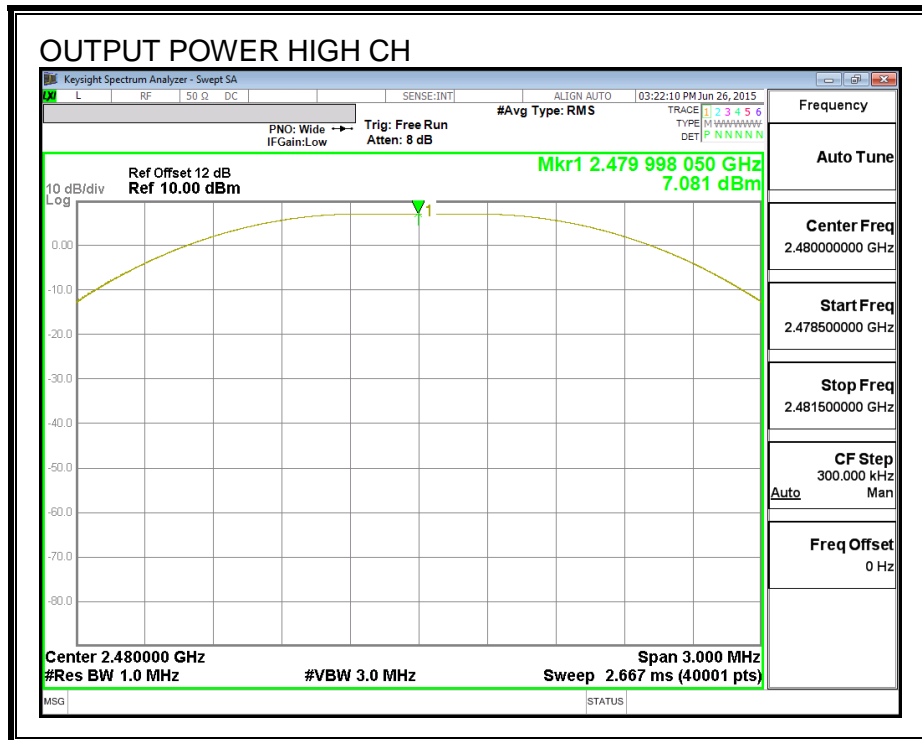
ANTENNA 2

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.04	30	-22.959
Middle	2440	7.14	30	-22.858
High	2480	7.08	30	-22.919

OUTPUT POWER ANTENNA 1



OUTPUT POWER ANTENNA 2



7.6. 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

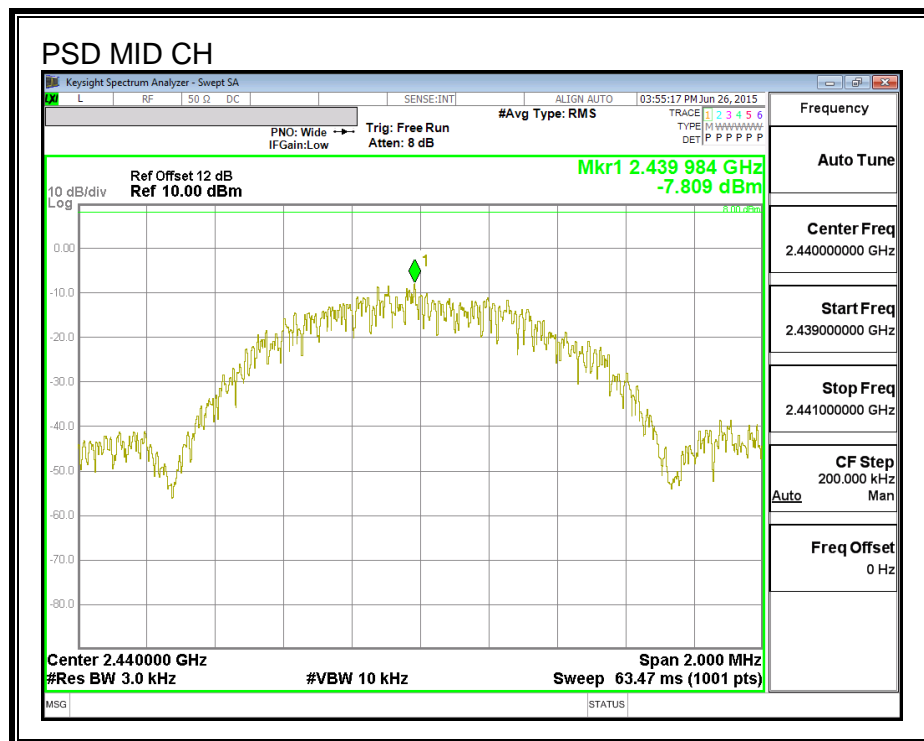
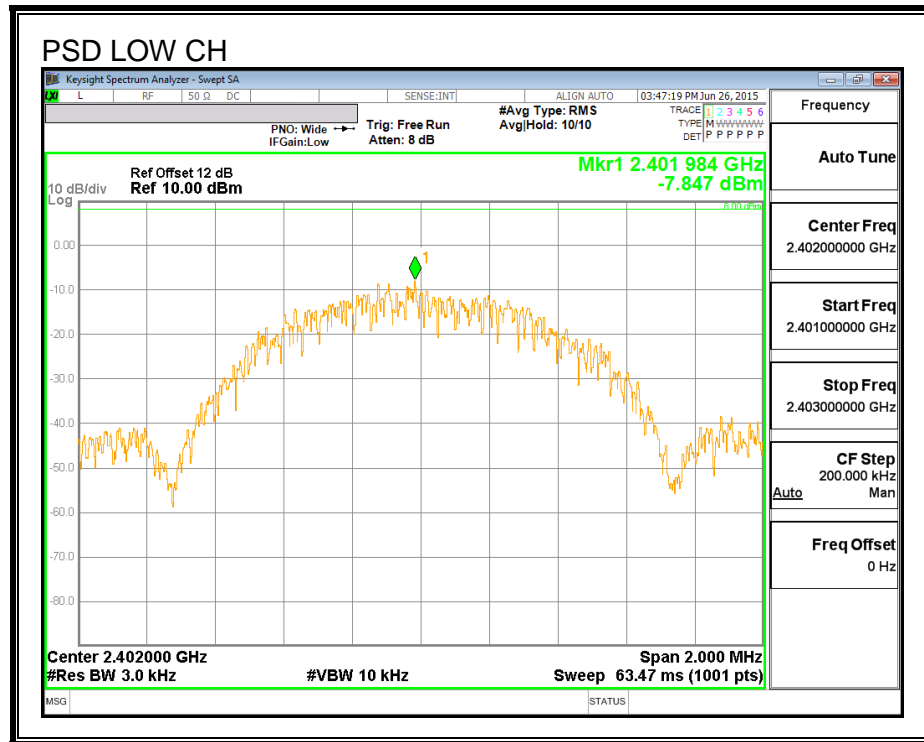
ANTENNA 1

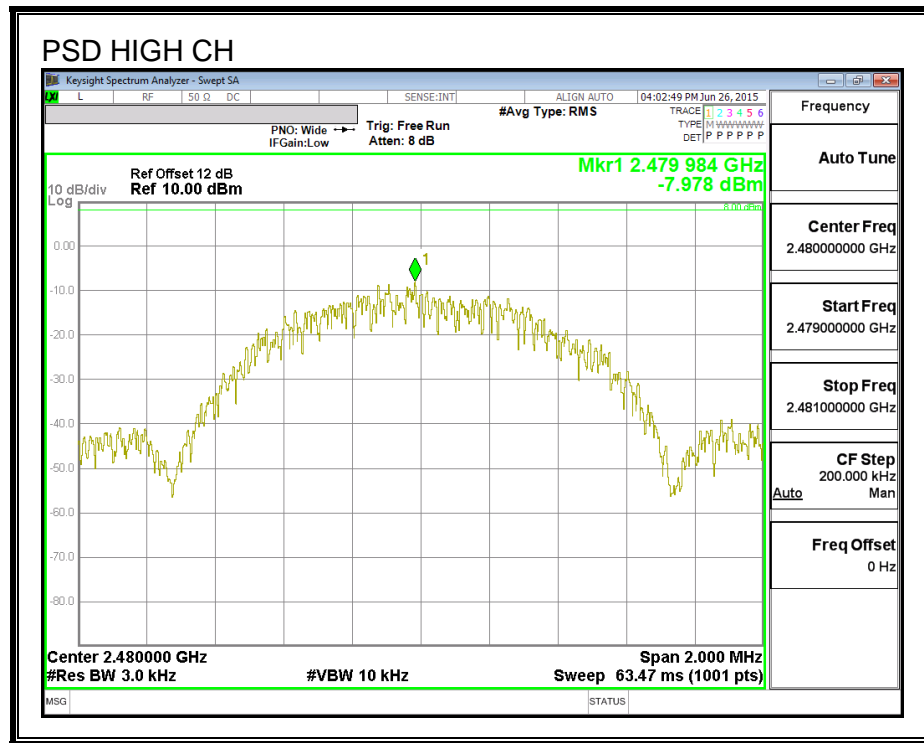
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-7.85	8	-15.85
Middle	2440	-7.81	8	-15.81
High	2480	-7.98	8	-15.98

ANTENNA 2

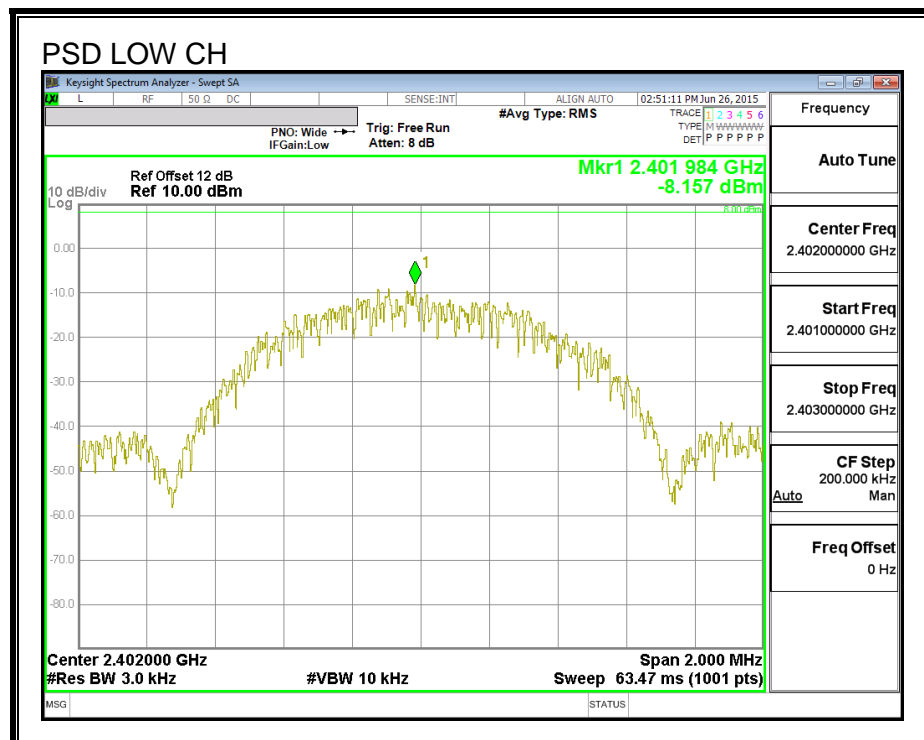
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-8.16	8	-16.16
Middle	2440	-8.02	8	-16.02
High	2480	-8.05	8	-16.05

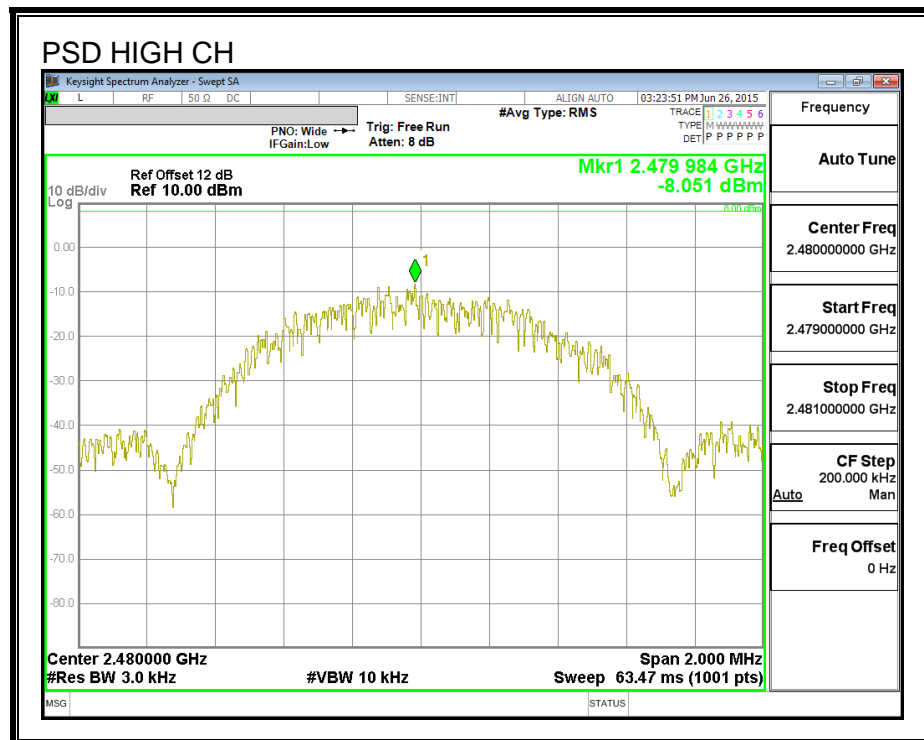
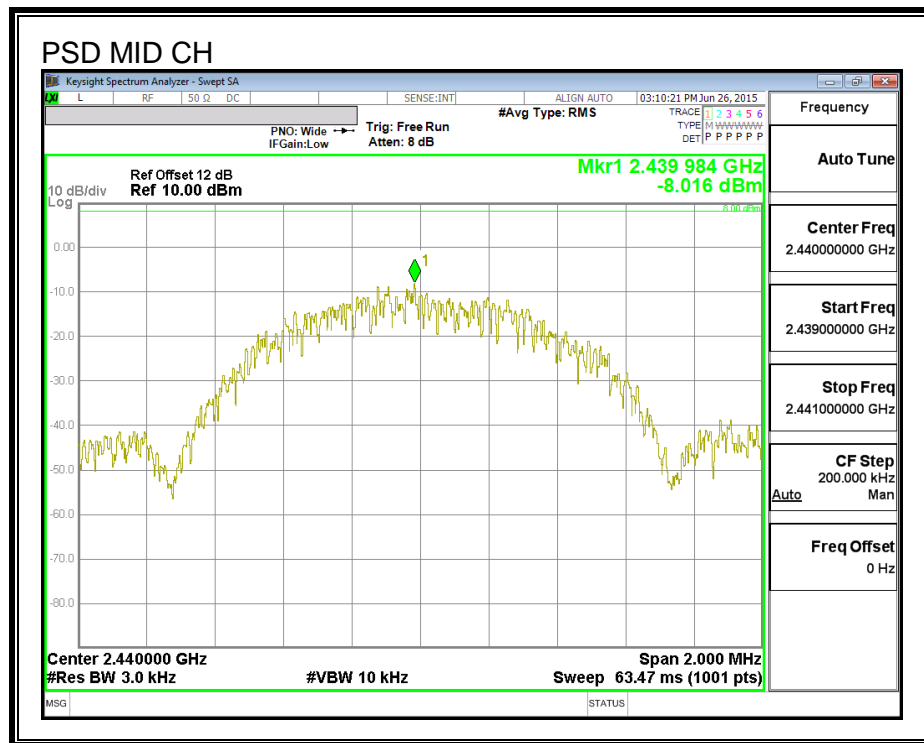
POWER SPECTRAL DENSITY ANTENNA 1





POWER SPECTRAL DENSITY ANTENNA 2





7.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

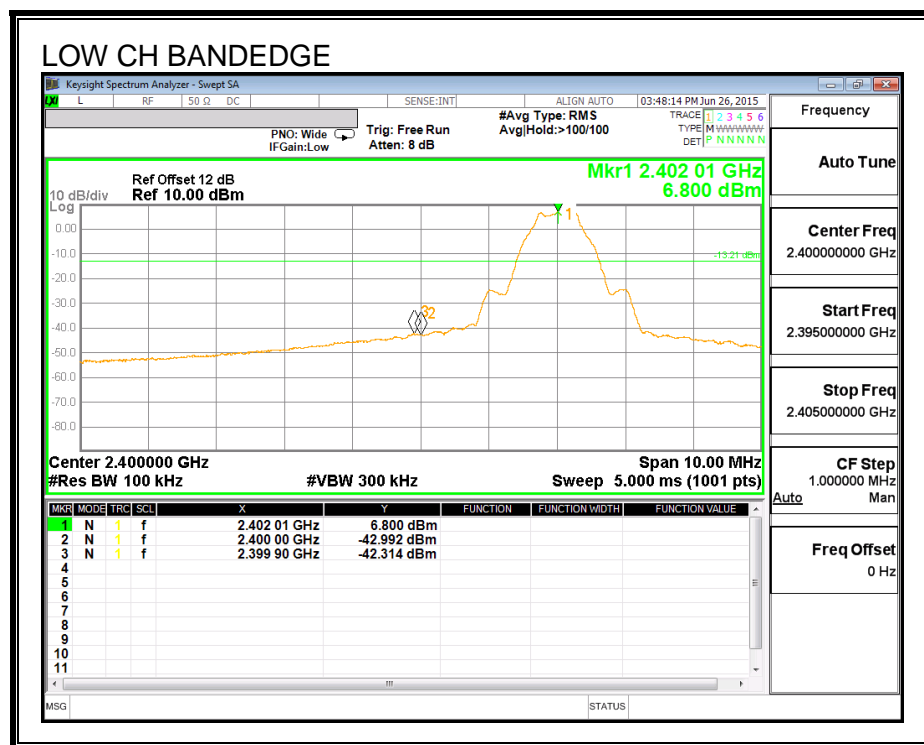
FCC §15.247 (d)

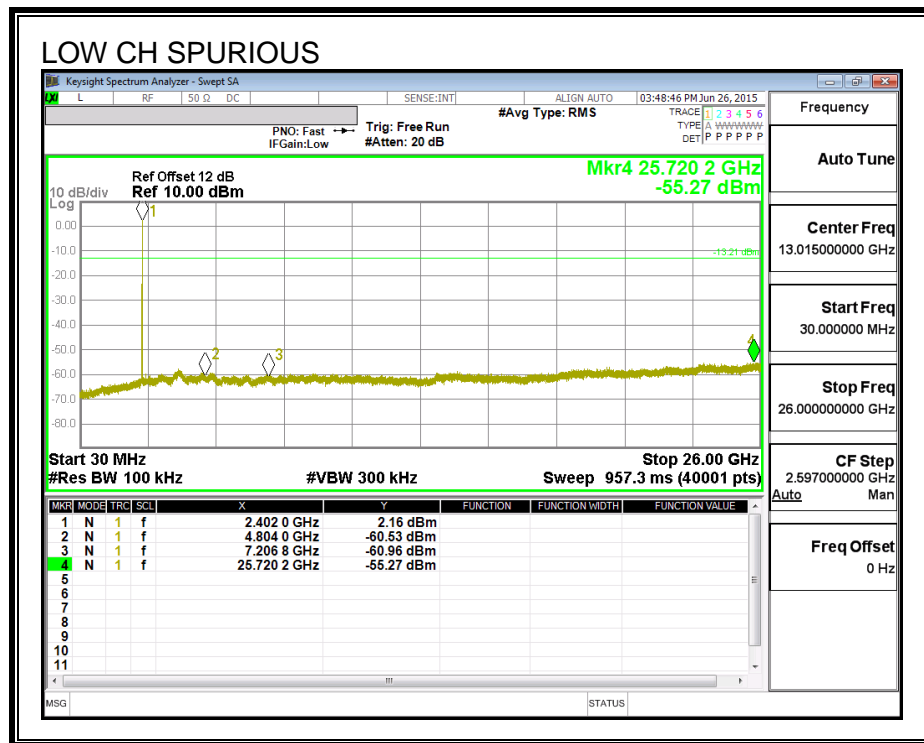
IC RSS-247 (5.5)

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

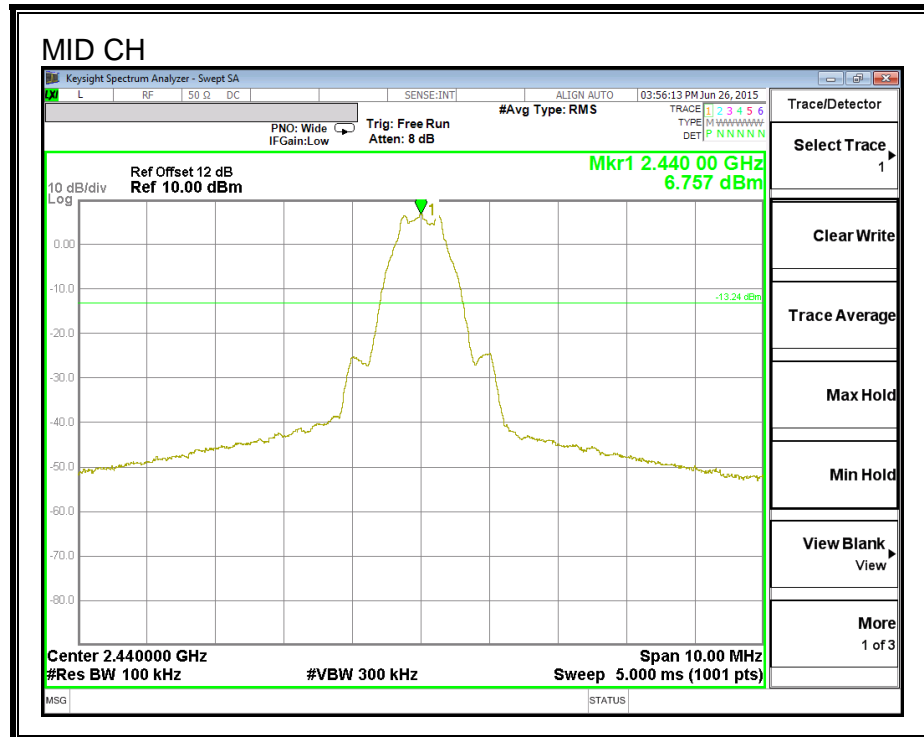
RESULTS

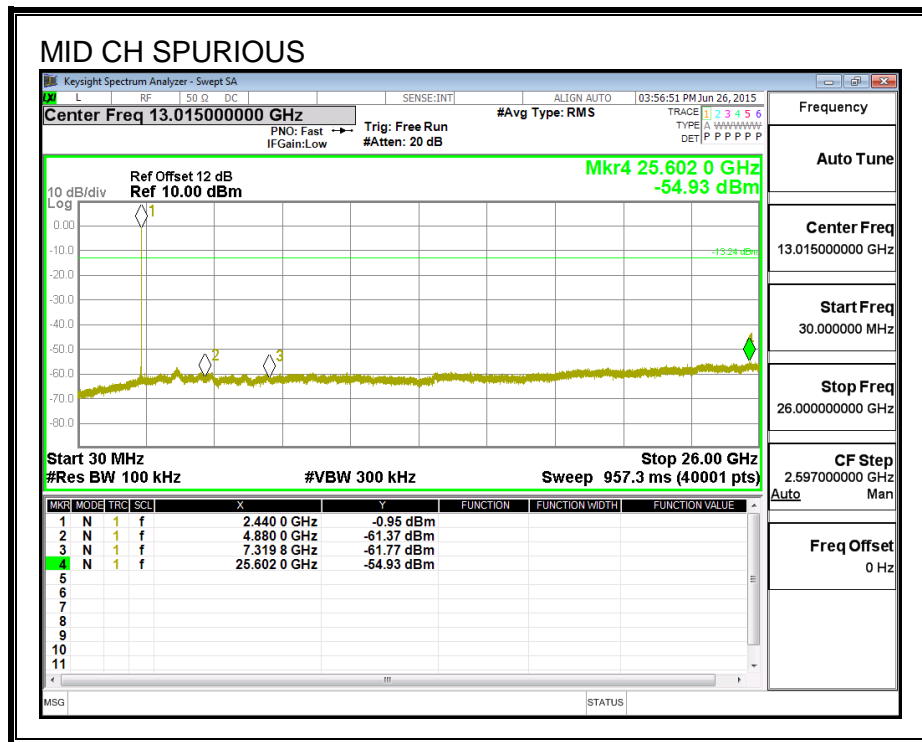
SPURIOUS EMISSIONS, LOW CHANNEL ANTENNA 1



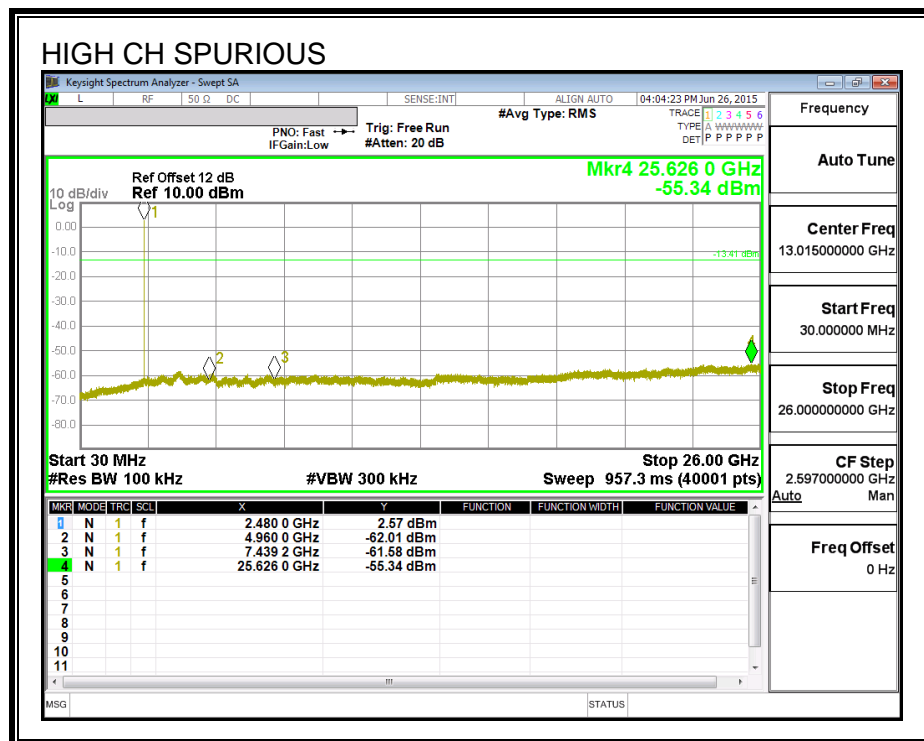
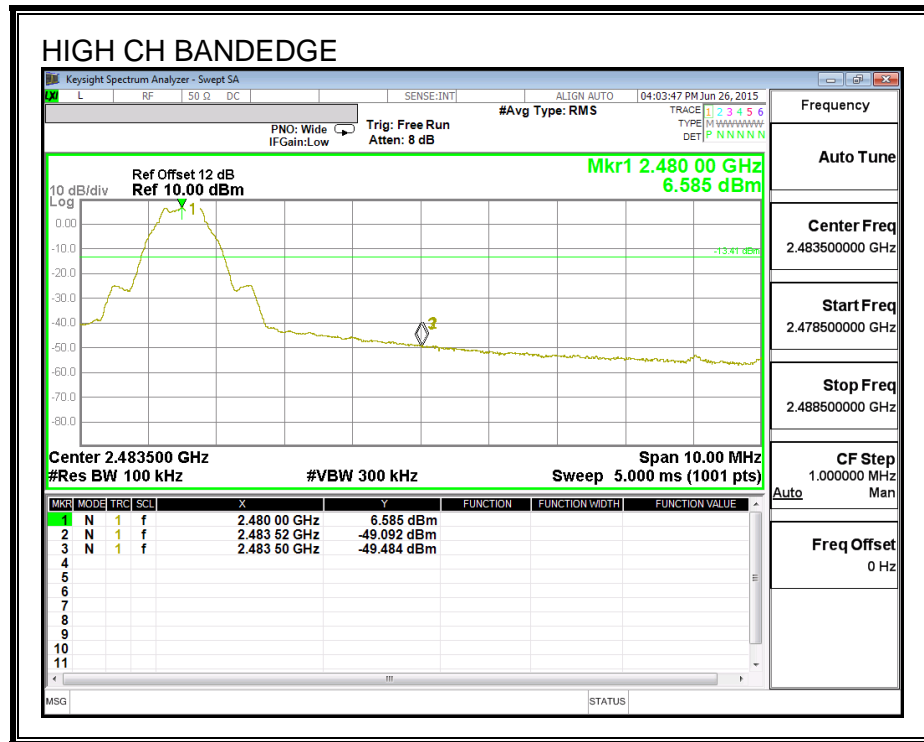


SPURIOUS EMISSIONS, MID CHANNEL ANTENNA 1

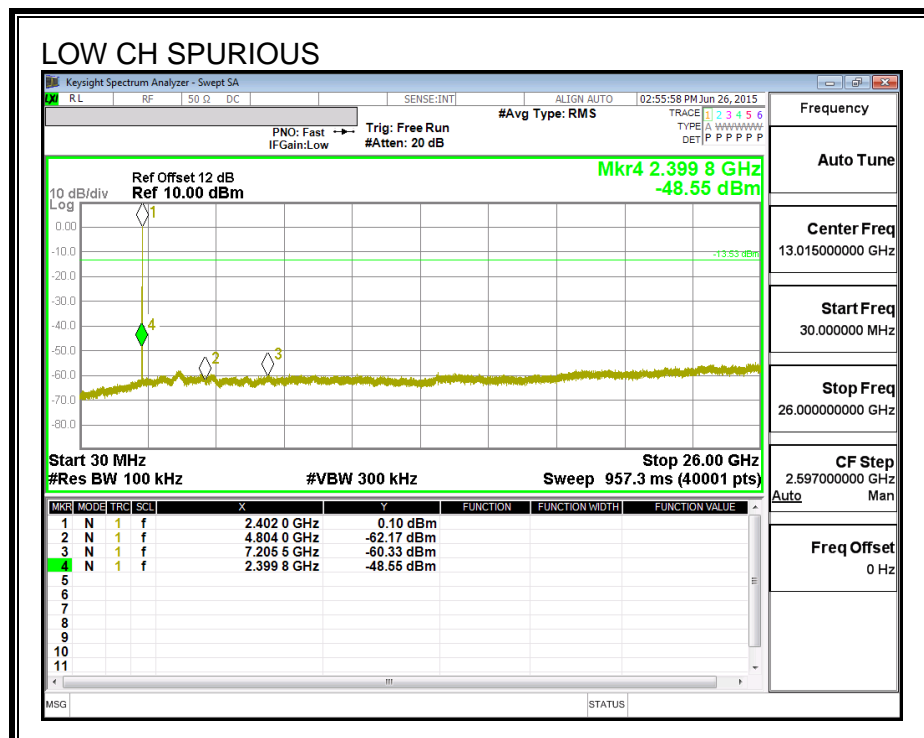
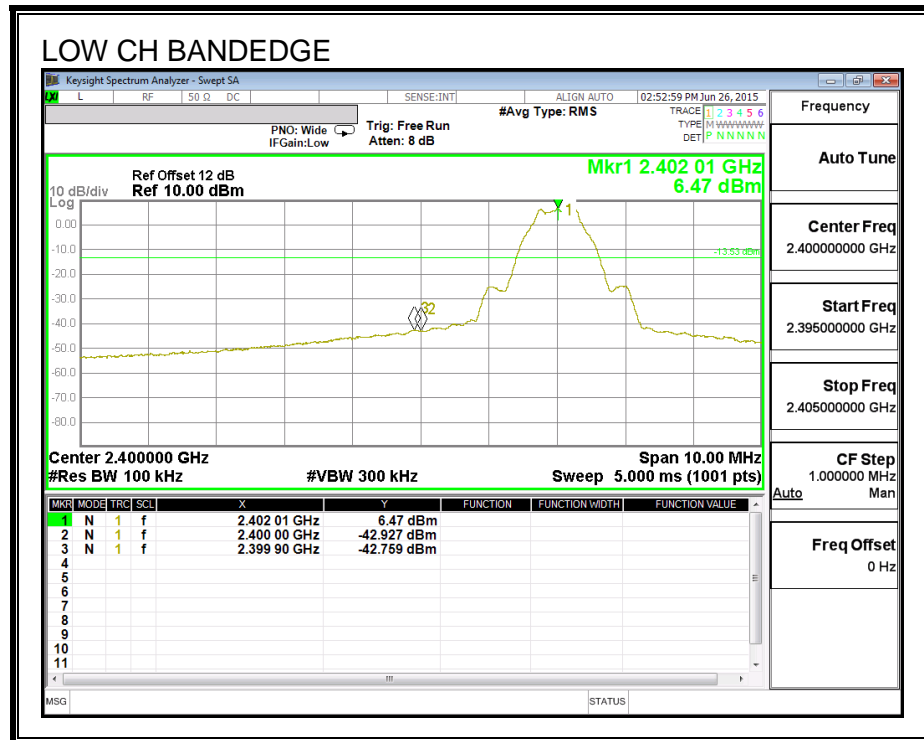




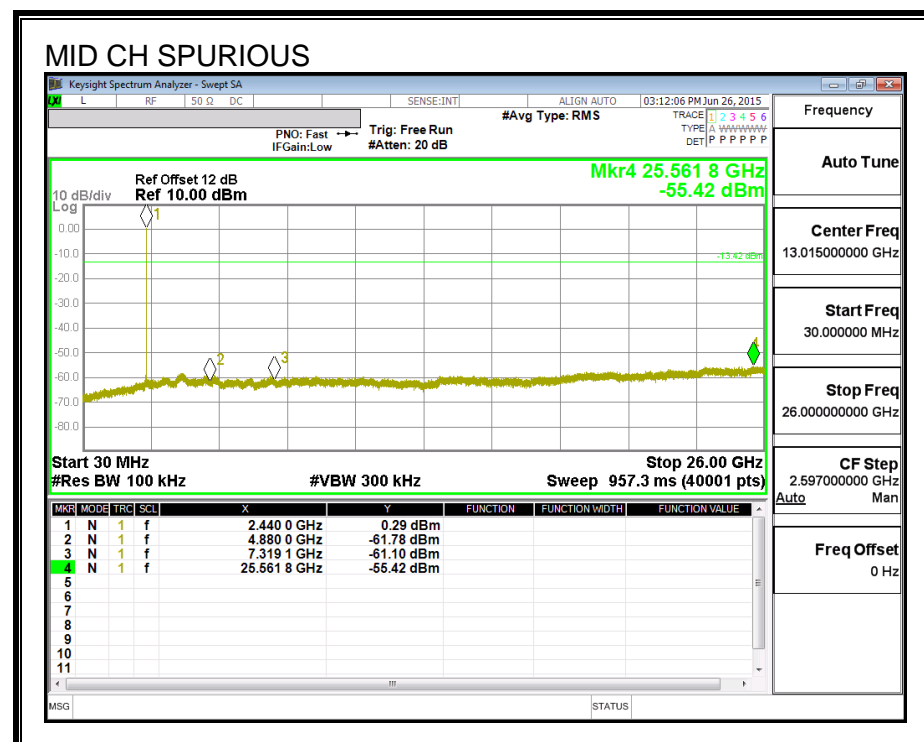
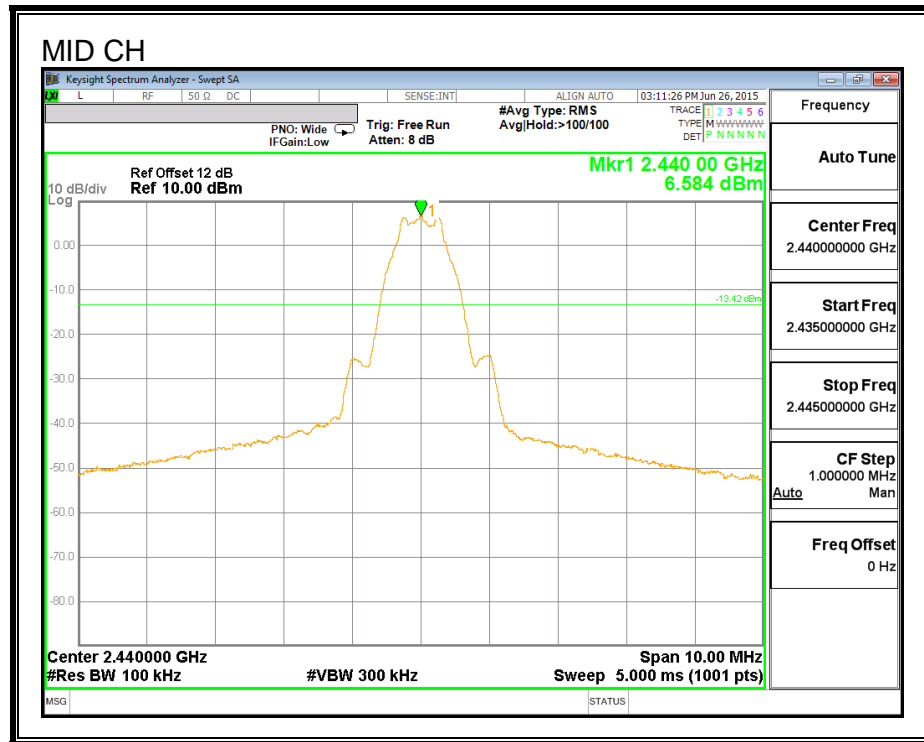
SPURIOUS EMISSIONS, HIGH CHANNEL ANTENNA 1



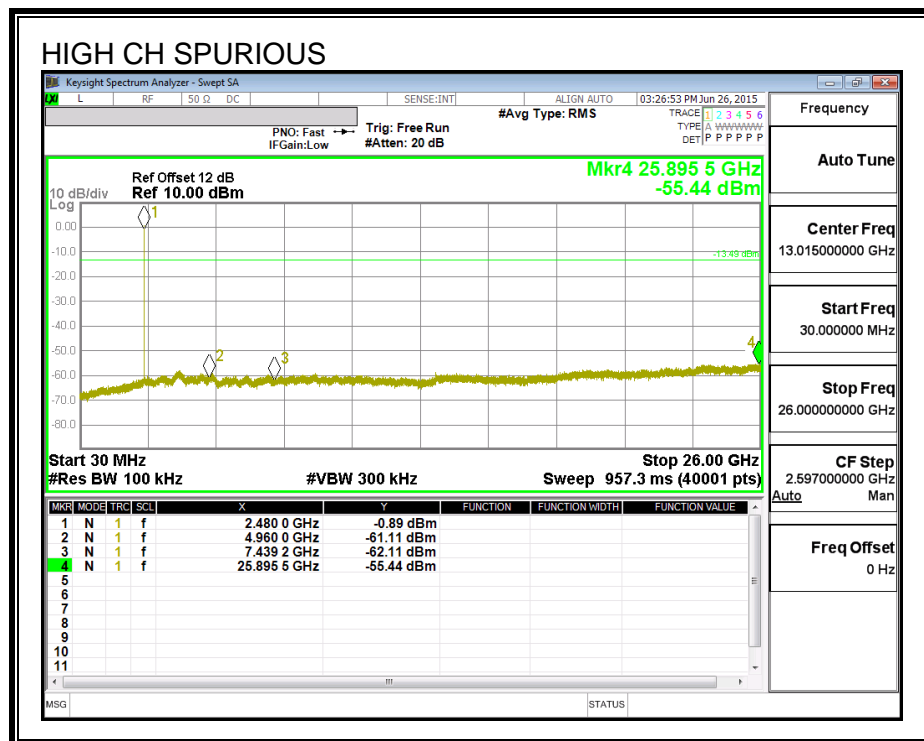
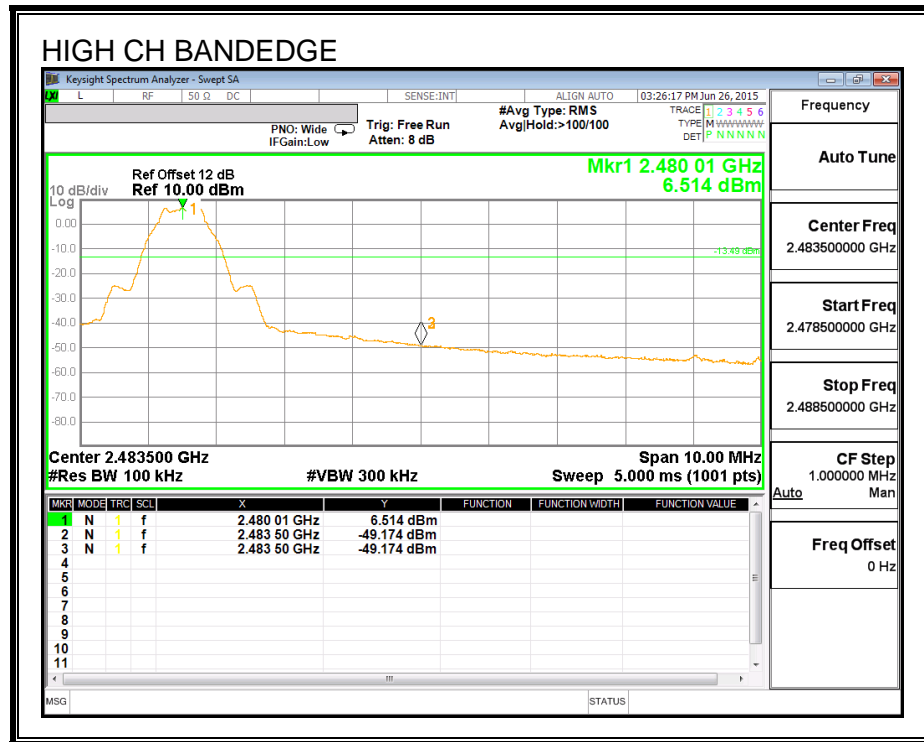
SPURIOUS EMISSIONS, LOW CHANNEL ANTENNA 2



SPURIOUS EMISSIONS, MID CHANNEL ANTENNA 2



SPURIOUS EMISSIONS, HIGH CHANNEL ANTENNA 2



8. RADIATED TEST RESULTS

8.1. 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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. 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.

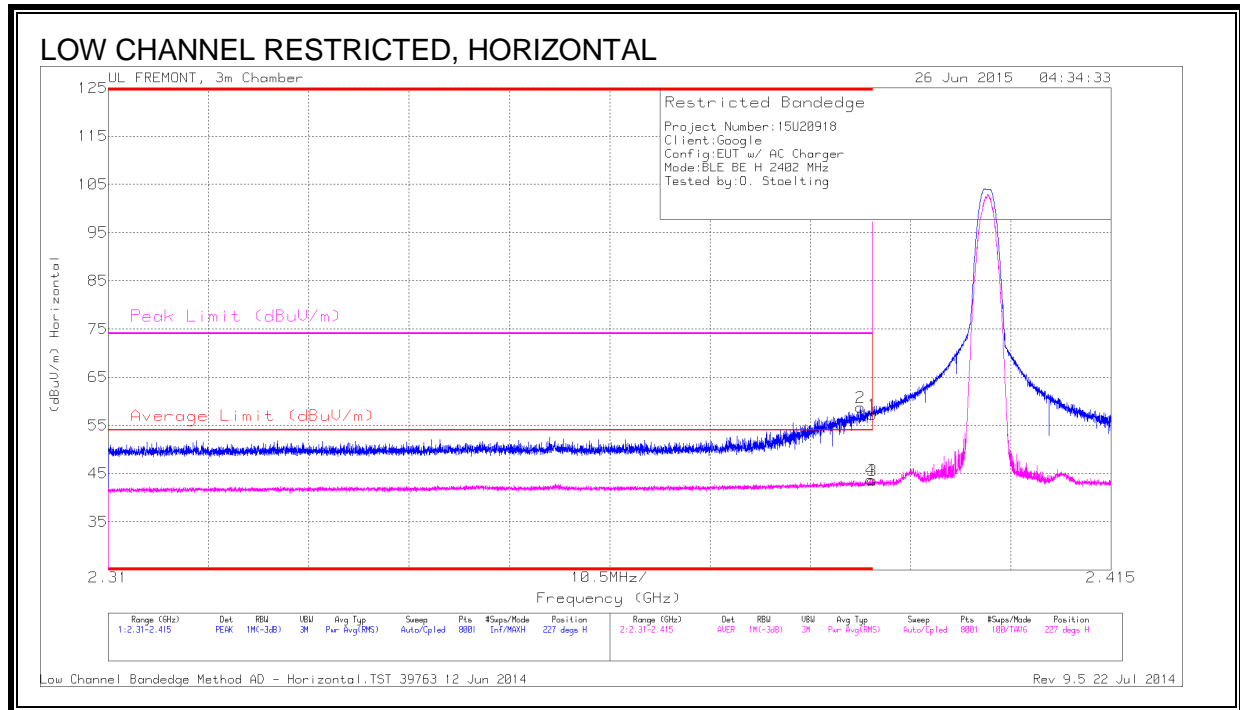
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 3MHz video bandwidth with average detector for average measurements.

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.

8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. RESTRICTED BANDEGE (ANTENNA 1)



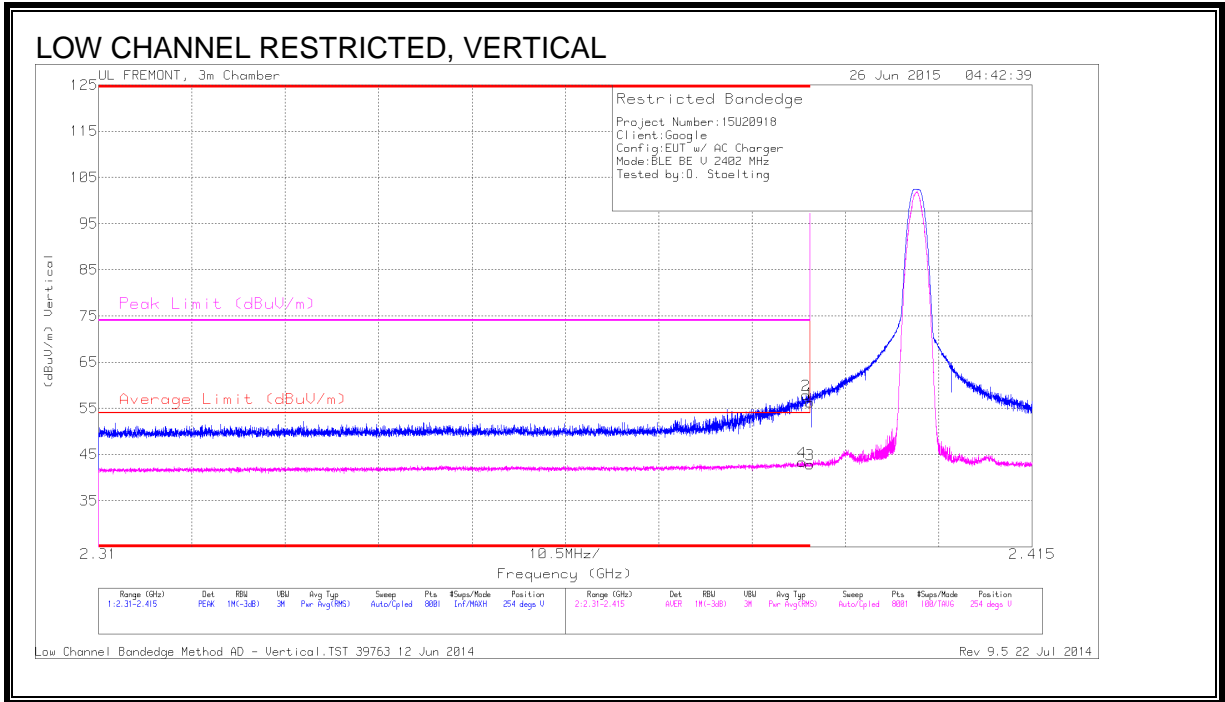
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cb/Fitter/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	47.64	PK	32	-22.4	0	57.24	-	-	74	-16.76	227	298	H
2	* 2.389	49.1	PK	32	-22.4	0	58.7	-	-	74	-15.3	227	298	H
3	* 2.39	31.84	RMS	32	-22.4	2.18	43.62	54	-10.38	-	-	227	298	H
4	* 2.39	31.93	RMS	32	-22.4	2.18	43.71	54	-10.29	-	-	227	298	H

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

PK - Peak detector

RMS - RMS detection



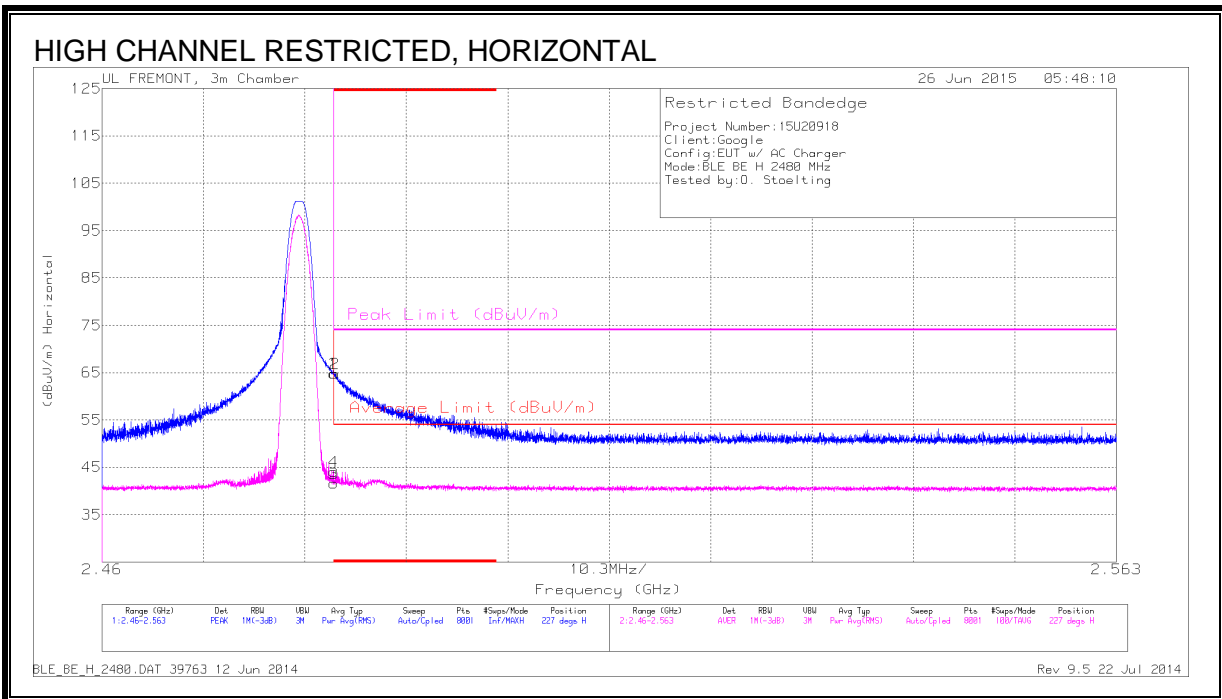
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cb/Fitter/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.389	31.6	RMS	32	-22.4	2.18	43.38	54	-10.42	-	-	254	374	V
1	* 2.39	46.6	PK	32	-22.4	0	56.2	-	-	74	-17.8	254	374	V
2	* 2.39	48.25	PK	32	-22.4	0	57.85	-	-	74	-16.15	254	374	V
3	* 2.39	31.07	RMS	32	-22.4	2.18	42.85	54	-11.15	-	-	254	374	V

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

PK - Peak detector

RMS - RMS detection



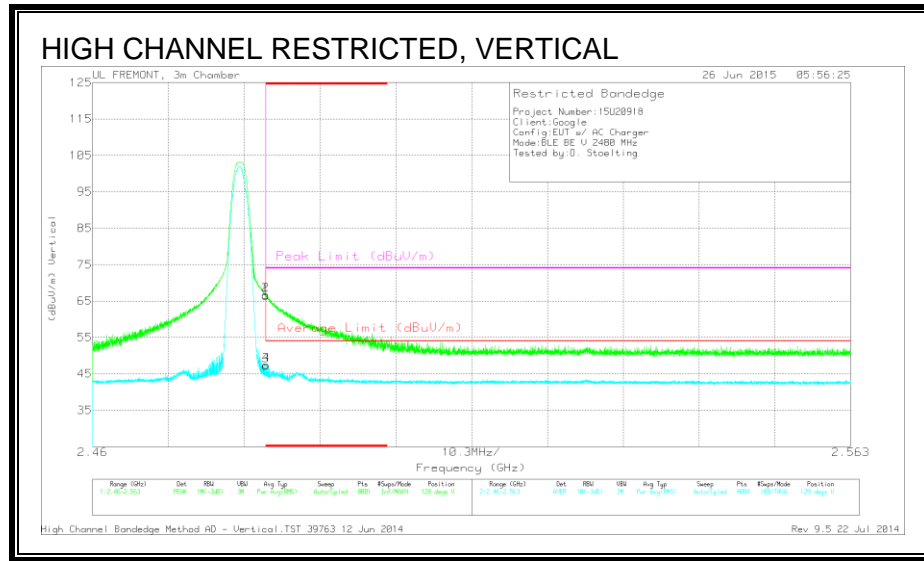
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT119 (dB/m)	Amp/Cb/Filter (dB)	DC Corr (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	54.61	PK	32.3	-22.1	0	64.81	-	-	74	-9.19	227	237	H
2	* 2.484	54.62	PK	32.3	-22.1	0	64.82	-	-	74	-9.18	227	237	H
3	* 2.484	31.35	RMS	32.3	-22.1	2.18	43.73	54	-10.27	-	-	227	237	H
4	* 2.484	33.83	RMS	32.3	-22.1	2.18	46.21	54	-7.79	-	-	227	237	H

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

PK - Peak detector

RMS - RMS detection



DATA

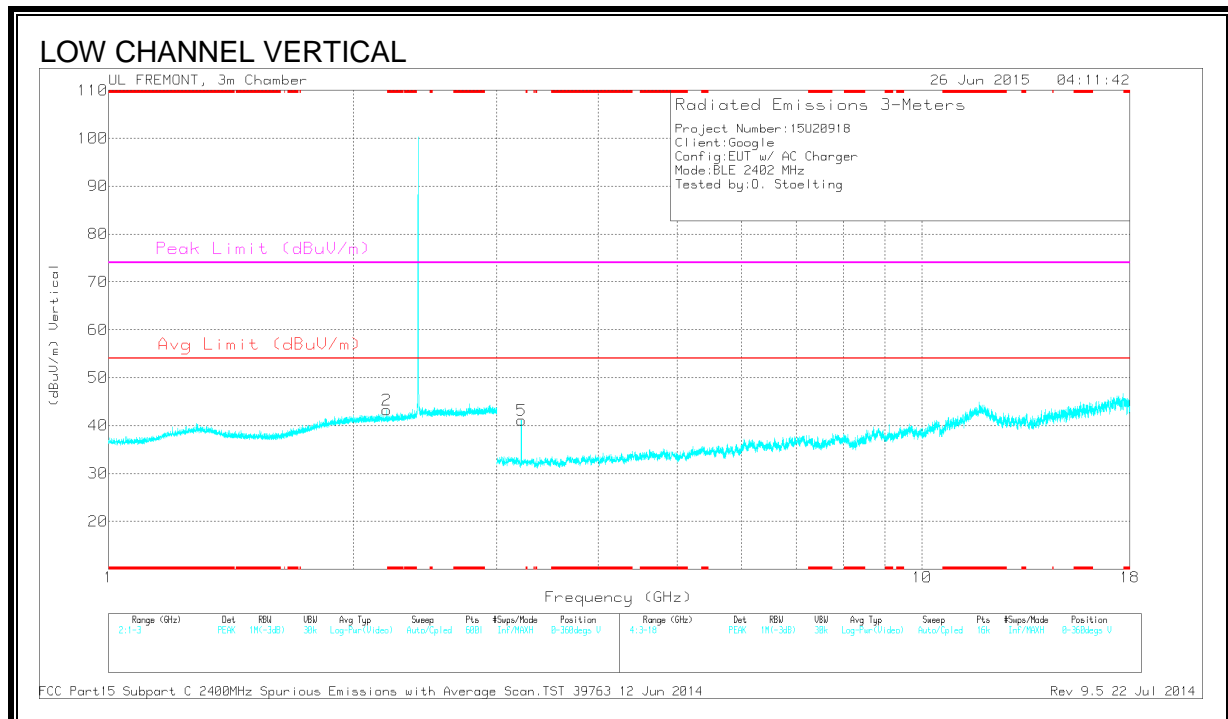
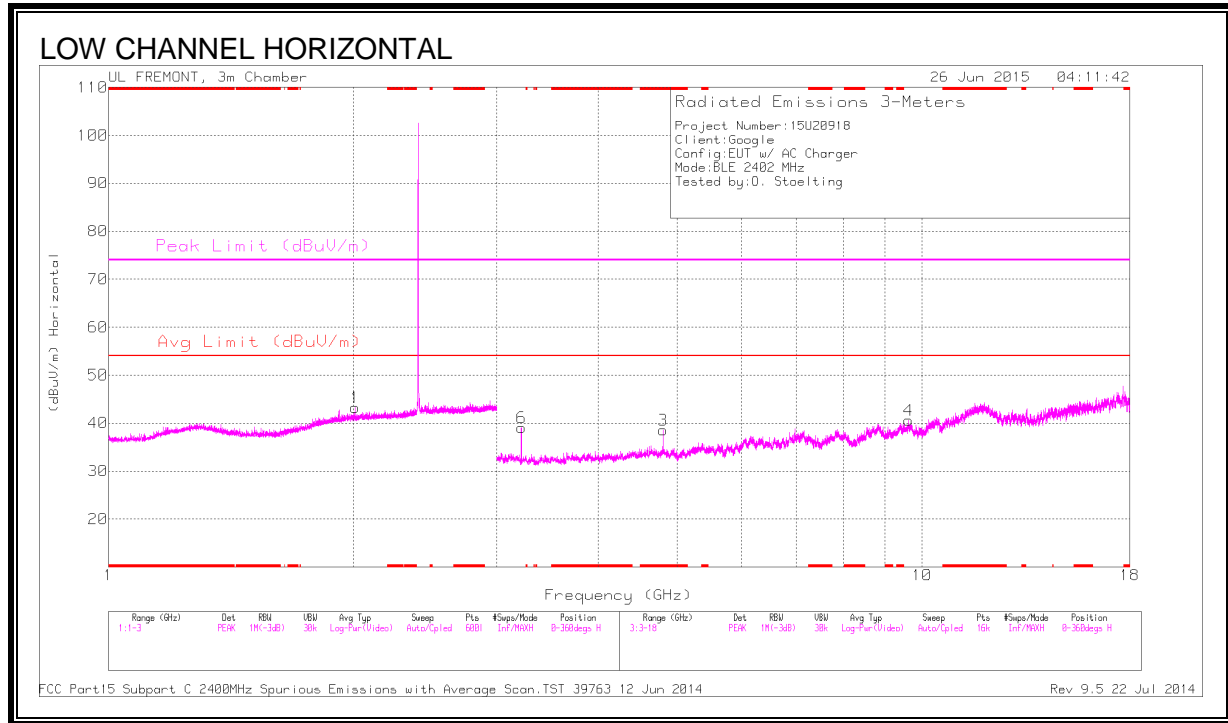
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	56.22	PK	32.3	-22.1	0	66.42	-	-	74	-7.58	128	290	V
2	* 2.484	56.43	PK	32.3	-22.1	0	66.63	-	-	74	-7.37	128	290	V
3	* 2.484	34.91	RMS	32.3	-22.1	2.18	47.29	54	-6.71	-	-	128	290	V
4	* 2.484	35.05	RMS	32.3	-22.1	2.18	47.43	54	-6.57	-	-	128	290	V

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

PK - Peak detector

RMS - RMS detection

8.2.2. HARMONICS AND SPURIOUS EMISSIONS (ANTENNA 1)



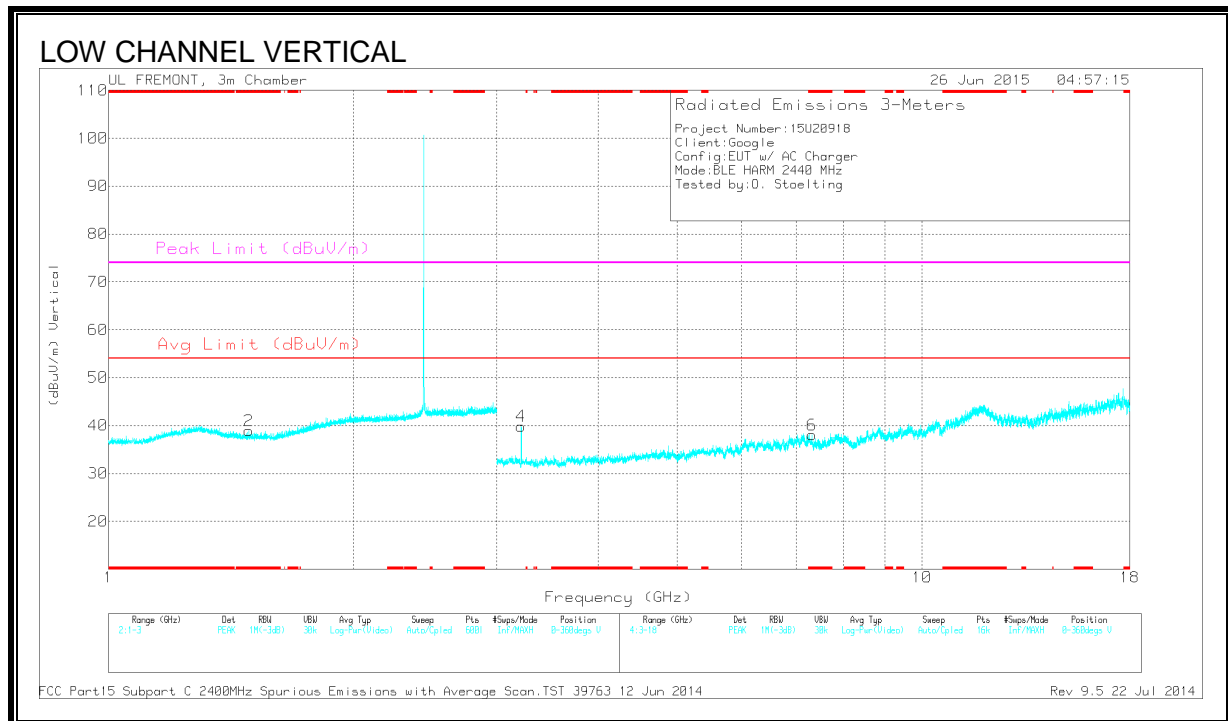
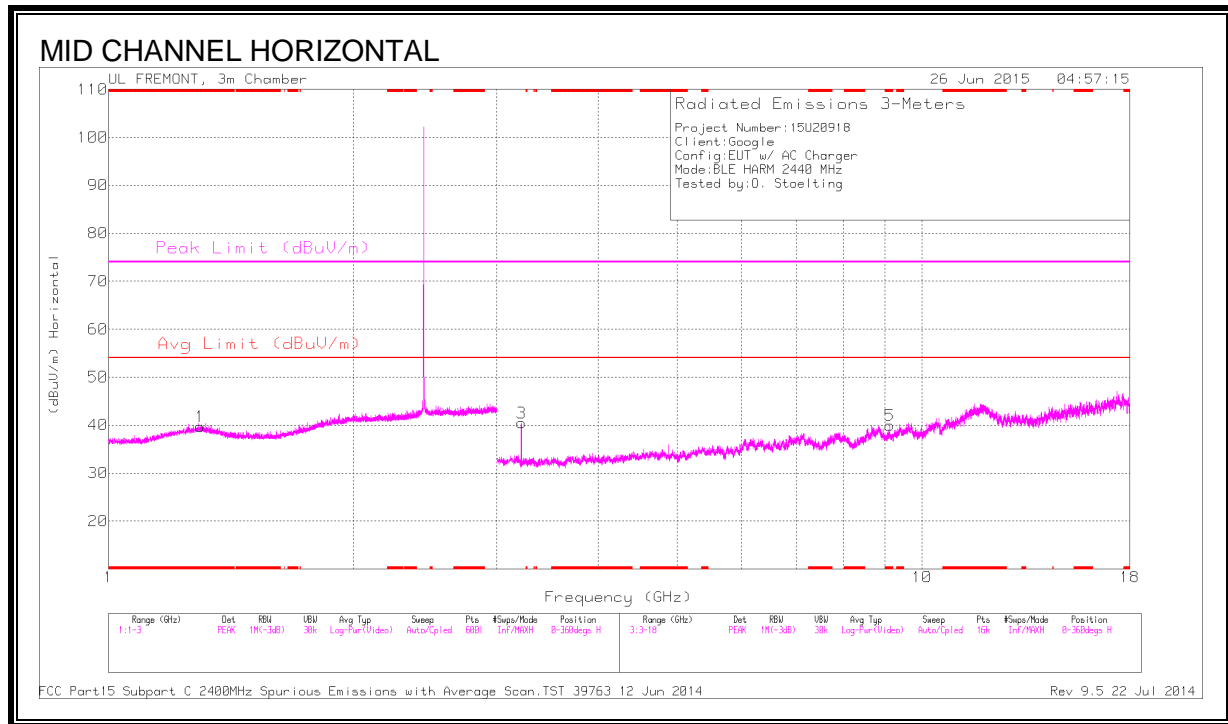
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4.804	41.8	PK2	34	-29.4	0	46.4	-	-	74	-27.6	155	301	H
	* 4.804	29.28	MAv1	34	-29.4	2.18	36.06	54	-17.94	-	-	155	301	H
1	2.008	34.29	PK	31.5	-22.5	0	43.29	-	-	-	-	0-360	100	H
2	2.198	34.19	PK	31.4	-22.3	0	43.29	-	-	-	-	0-360	100	V
6	3.217	37.22	PK	32.6	-30.8	0	39.02	-	-	-	-	0-360	100	H
5	3.217	39.28	PK	32.6	-30.8	0	41.08	-	-	-	-	0-360	200	V
4	9.621	27.49	PK	36.7	-23.6	0	40.59	-	-	-	-	0-360	100	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



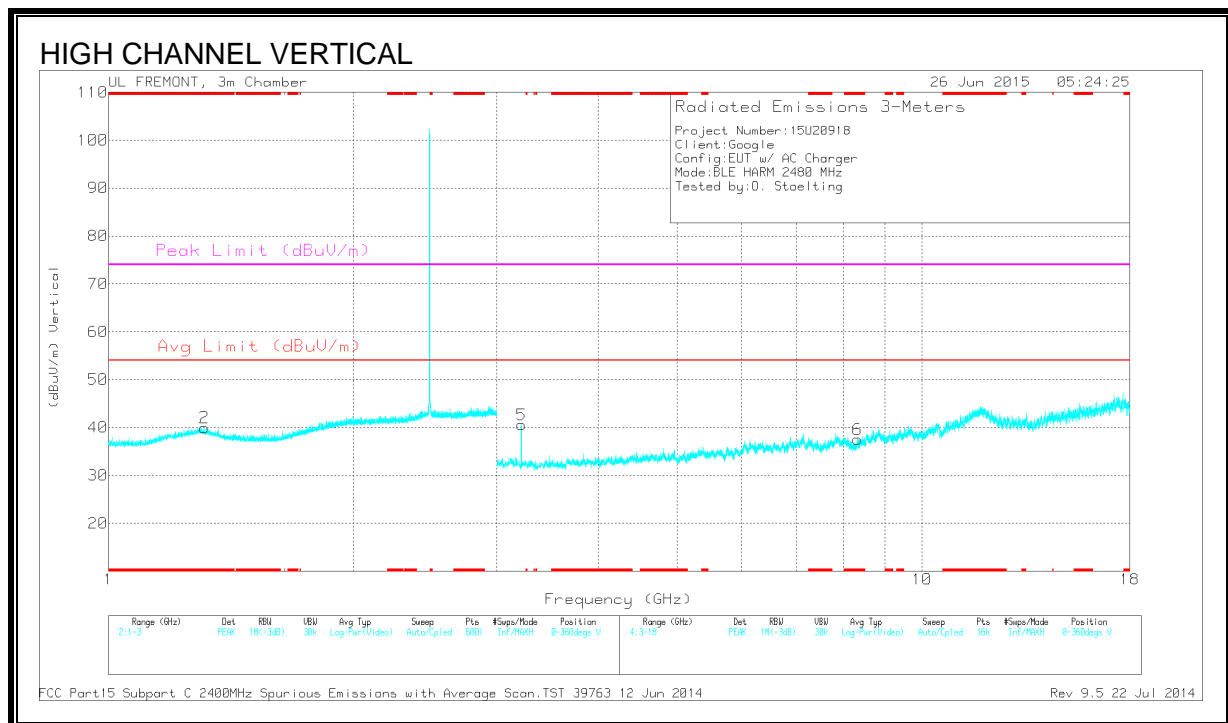
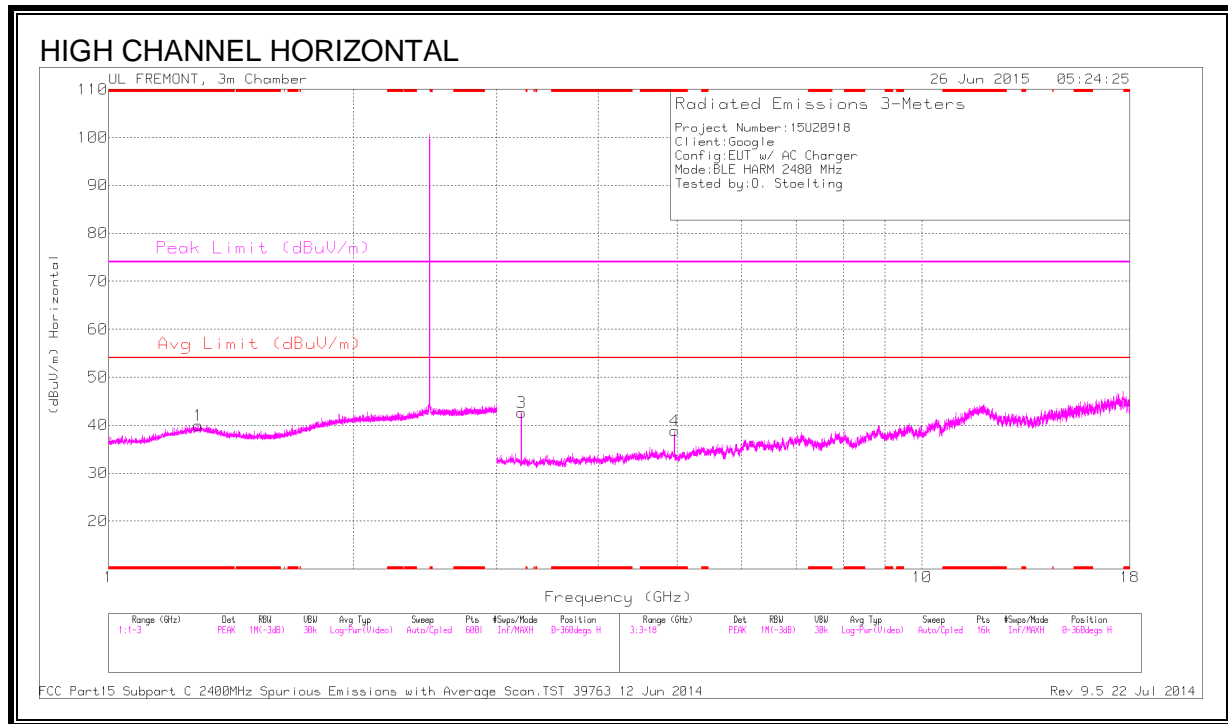
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.296	32.99	PK	29.9	-23.2	0	39.69	-	-	74	-34.31	0-360	100	H
2	* 1.488	33.6	PK	28.2	-22.9	0	38.9	-	-	74	-35.1	0-360	100	V
6	* 7.323	29.63	PK	35.6	-27.2	0	38.03	-	-	74	-35.97	0-360	100	V
5	* 9.126	37.1	PK2	36.1	-24.5	0	48.7	-	-	74	-25.3	321	207	H
	* 9.126	25.72	MAv1	36.1	-24.5	2.18	39.50	54	-14.5	-	-	321	207	H
4	3.216	38.1	PK	32.6	-30.8	0	39.9	-	-	-	-	0-360	200	V
3	3.217	38.71	PK	32.6	-30.8	0	40.51	-	-	-	-	0-360	100	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



DATA

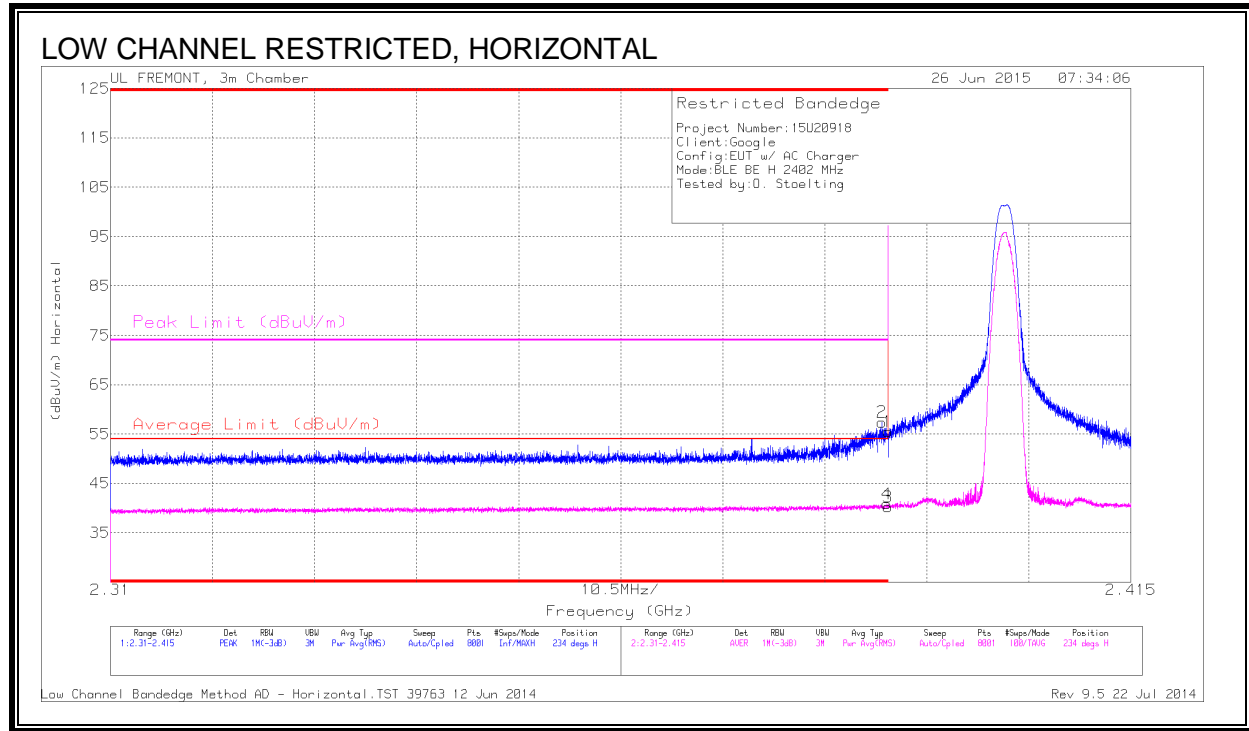
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.289	33.22	PK	29.8	-23.1	0	39.92	-	-	74	-34.08	0-360	200	H
2	* 1.312	33.53	PK	29.7	-23.2	0	40.03	-	-	74	-33.97	0-360	200	V
4	* 4.96	43.61	PK2	34	-30.3	0	47.31	-	-	74	-26.69	226	105	H
	* 4.96	33.54	MAv1	34	-30.3	2.18	39.42	54	-14.58	-	-	226	105	H
6	* 8.328	28.09	PK	35.8	-26.3	0	37.59	-	-	74	-36.41	0-360	200	V
3	3.217	40.81	PK	32.6	-30.8	0	42.61	-	-	-	-	0-360	200	H
5	3.217	38.85	PK	32.6	-30.8	0	40.65	-	-	-	-	0-360	200	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

8.2.3. RESTRICTED BANDEGE (ANTENNA 2)



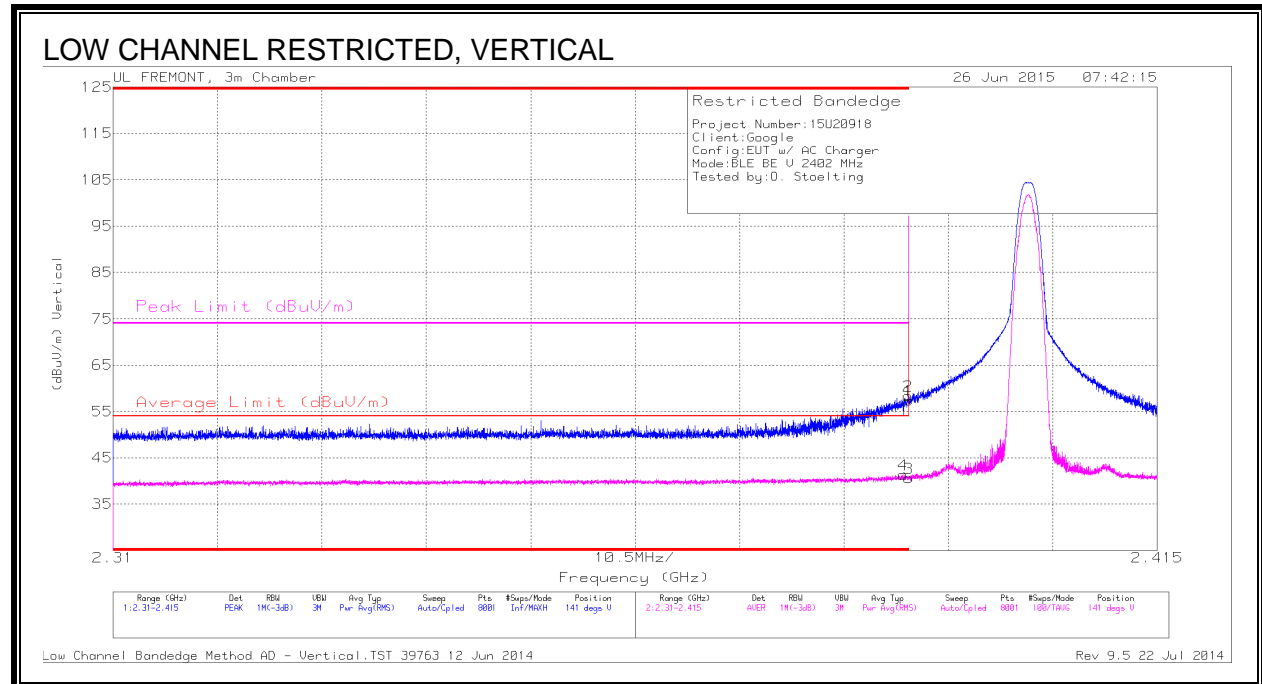
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cb/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	45.88	PK	32	-22.4	0	55.48	-	-	74	-18.52	234	235	H
2	* 2.389	47.83	PK	32	-22.4	0	57.43	-	-	74	-16.57	234	235	H
3	* 2.39	30.58	RMS	32	-22.4	2.18	42.36	54	-11.64	-	-	234	235	H
4	* 2.39	31.22	RMS	32	-22.4	2.18	43.0	54	-11.0	-	-	234	235	H

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

PK - Peak detector

RMS - RMS detection



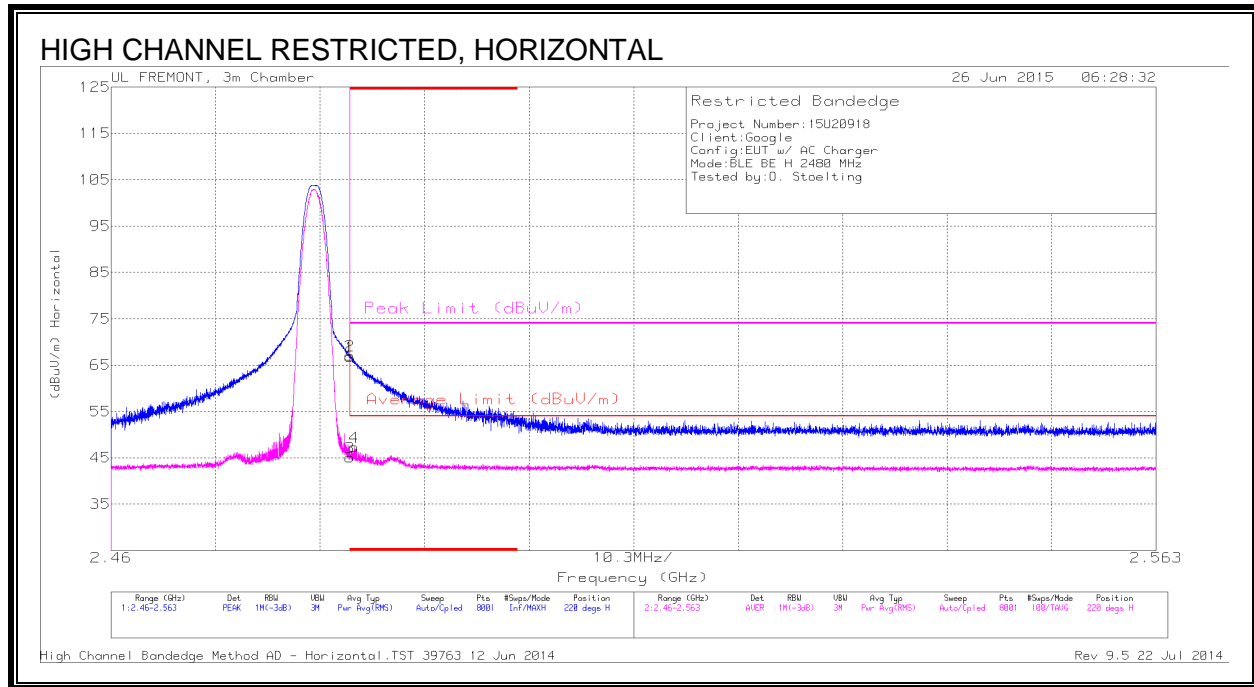
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.389	31.72	RMS	32	-22.4	2.18	43.5	54	-10.5	-	-	141	160	V
1	* 2.39	47.8	PK	32	-22.4	0	57.4	-	-	74	-16.6	141	160	V
2	* 2.39	48.81	PK	32	-22.4	0	58.41	-	-	74	-15.59	141	160	V
3	* 2.39	31.01	RMS	32	-22.4	2.18	42.79	54	-11.21	-	-	141	160	V

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

PK - Peak detector

RMS - RMS detection



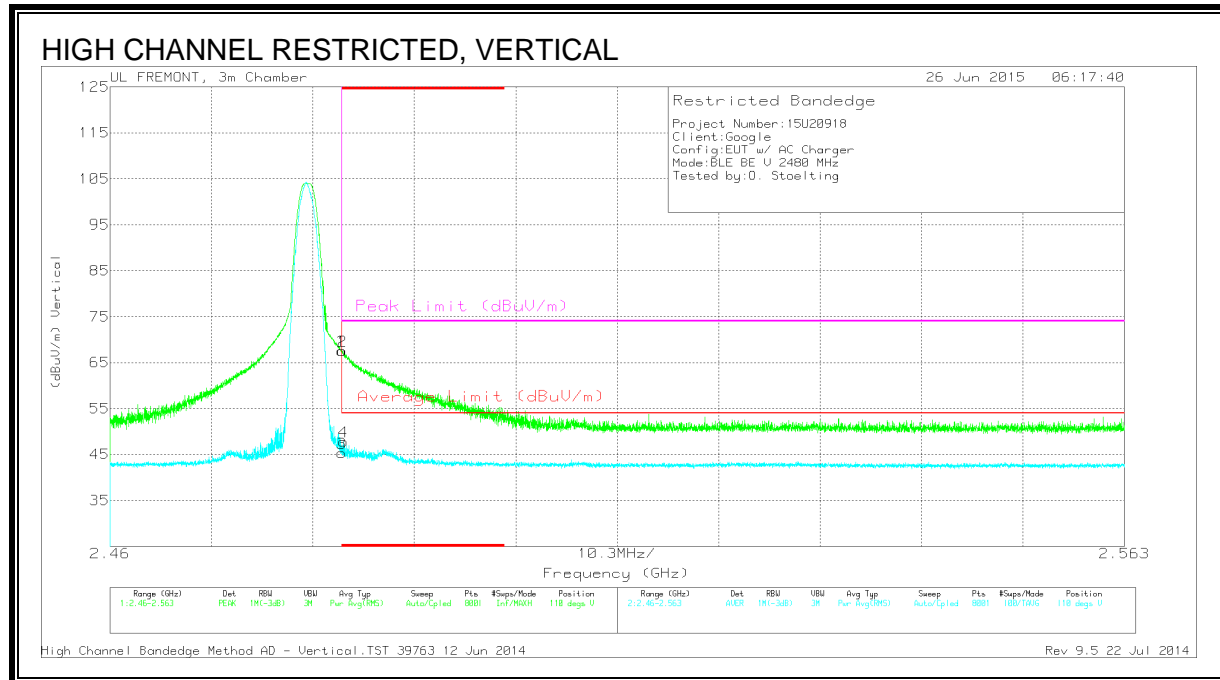
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	DC Corr (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	56.66	PK	32.3	-22.1	0	66.86	-	-	74	-7.14	220	358	H
2	* 2.484	56.86	PK	32.3	-22.1	0	67.06	-	-	74	-6.94	220	358	H
3	* 2.484	32.69	RMS	32.3	-22.1	2.18	45.07	54	-8.93	-	-	220	358	H
4	* 2.484	34.91	RMS	32.3	-22.1	2.18	47.29	54	-6.71	-	-	220	358	H

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

PK - Peak detector

RMS - RMS detection



DATA

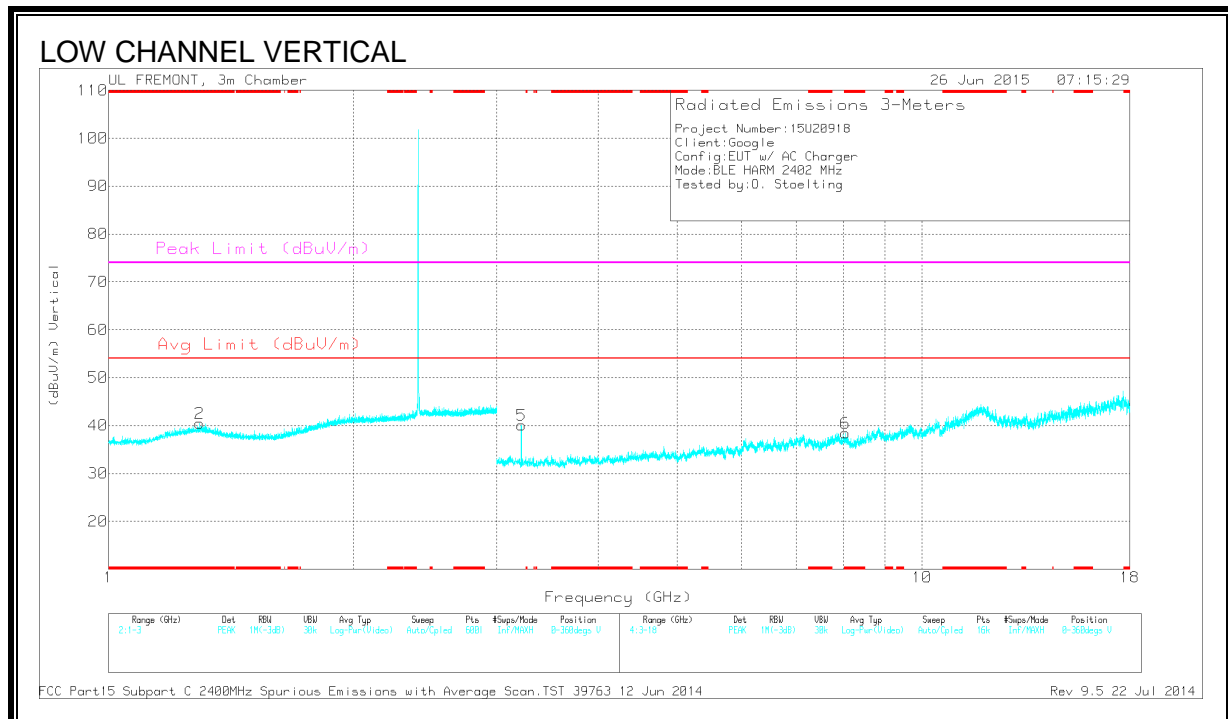
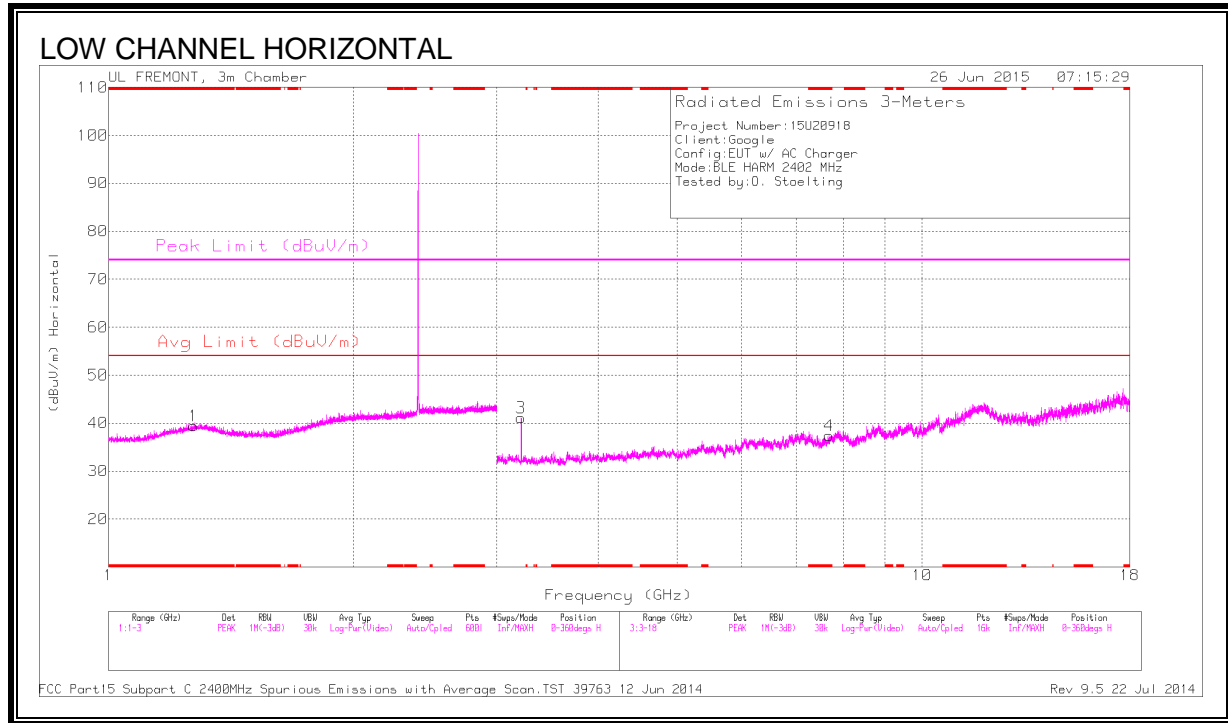
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	57.33	PK	32.3	-22.1	0	67.53	-	-	74	-6.47	110	293	V
2	* 2.484	57.36	PK	32.3	-22.1	0	67.56	-	-	74	-6.44	110	293	V
3	* 2.484	33	RMS	32.3	-22.1	2.18	45.38	54	-8.62	-	-	110	293	V
4	* 2.484	35.45	RMS	32.3	-22.1	2.18	47.83	54	-6.17	-	-	110	293	V

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

PK - Peak detector

RMS - RMS detection

8.2.4. HARMONICS AND SPURIOUS EMISSIONS (ANTENNA 2)



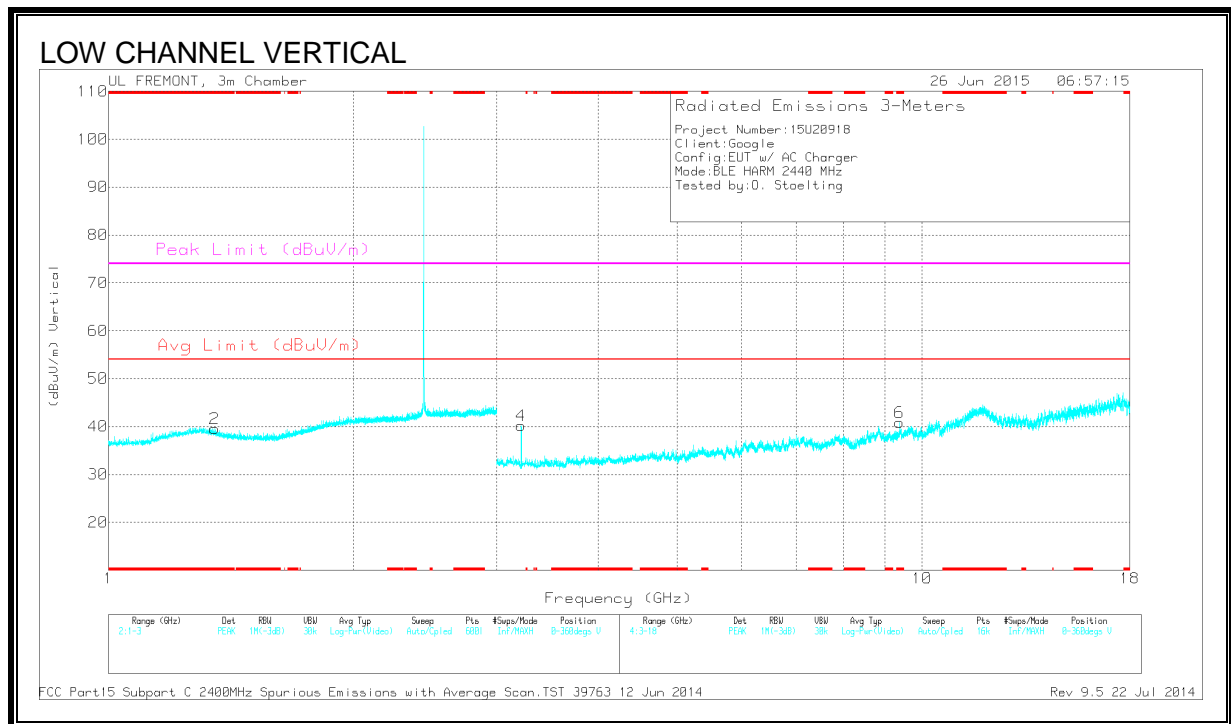
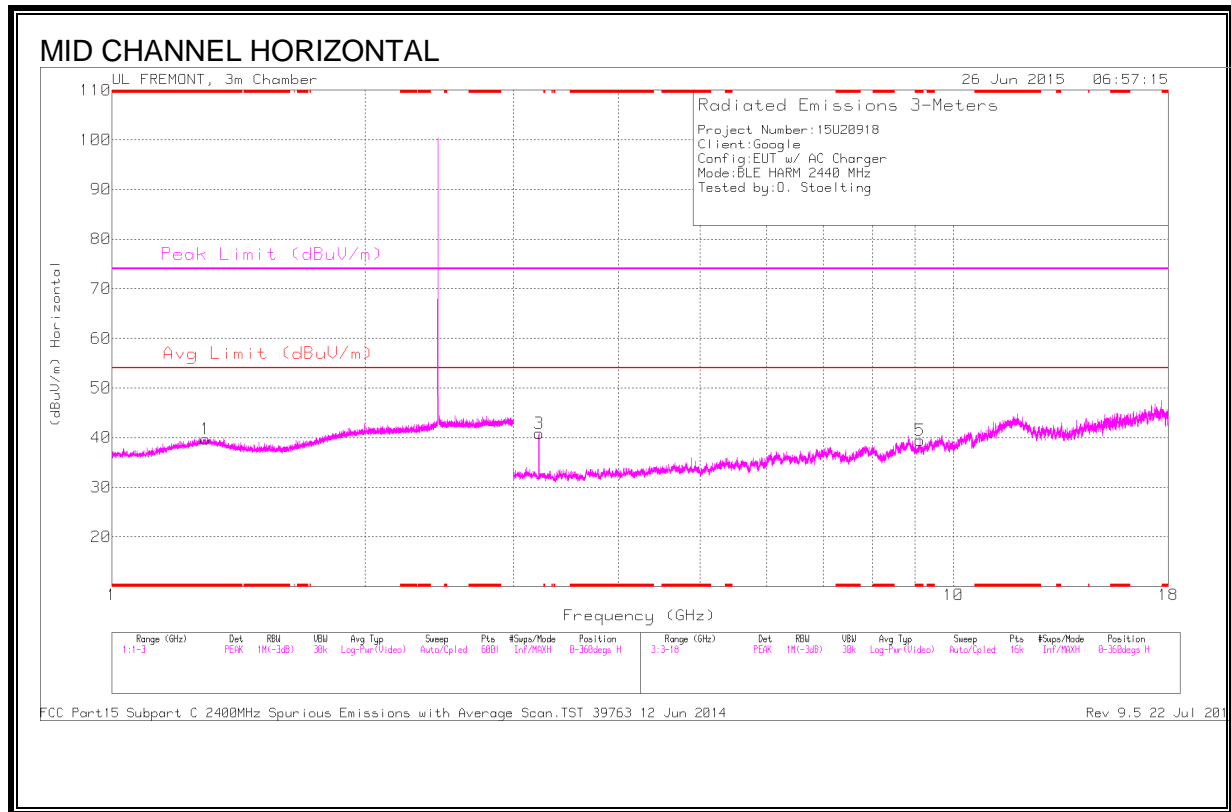
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.271	33.07	PK	29.6	-23.2	0	39.47	-	-	74	-34.53	0-360	100	H
2	* 1.295	33.93	PK	29.8	-23.2	0	40.53	-	-	74	-33.47	0-360	100	V
4	* 7.688	29.57	PK	35.8	-27.9	0	37.47	-	-	74	-36.53	0-360	200	H
6	* 8.054	38.09	PK2	35.7	-26.8	0	46.99	-	-	74	-27.01	86	353	V
	* 8.054	25.44	MAv1	35.7	-26.8	2.18	36.7	54	-17.3	-	-	86	353	V
3	3.216	39.37	PK	32.6	-30.8	0	41.17	-	-	-	-	0-360	200	H
5	3.217	38.34	PK	32.6	-30.8	0	40.14	-	-	-	-	0-360	200	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



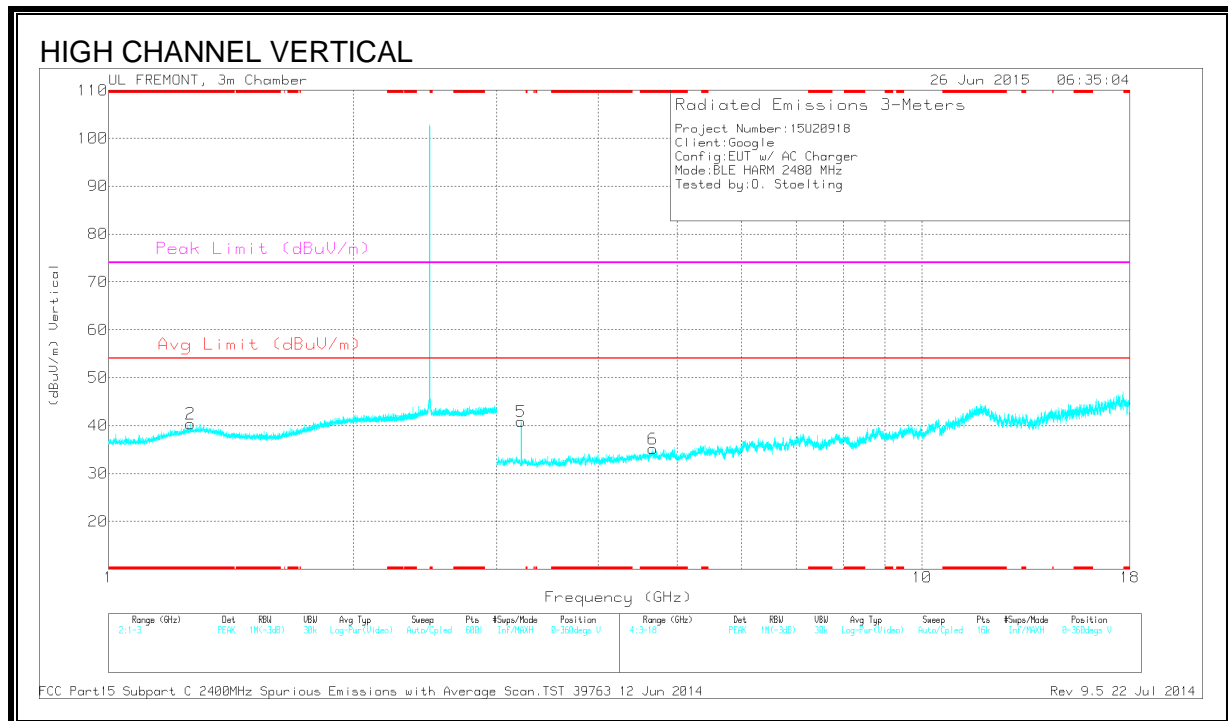
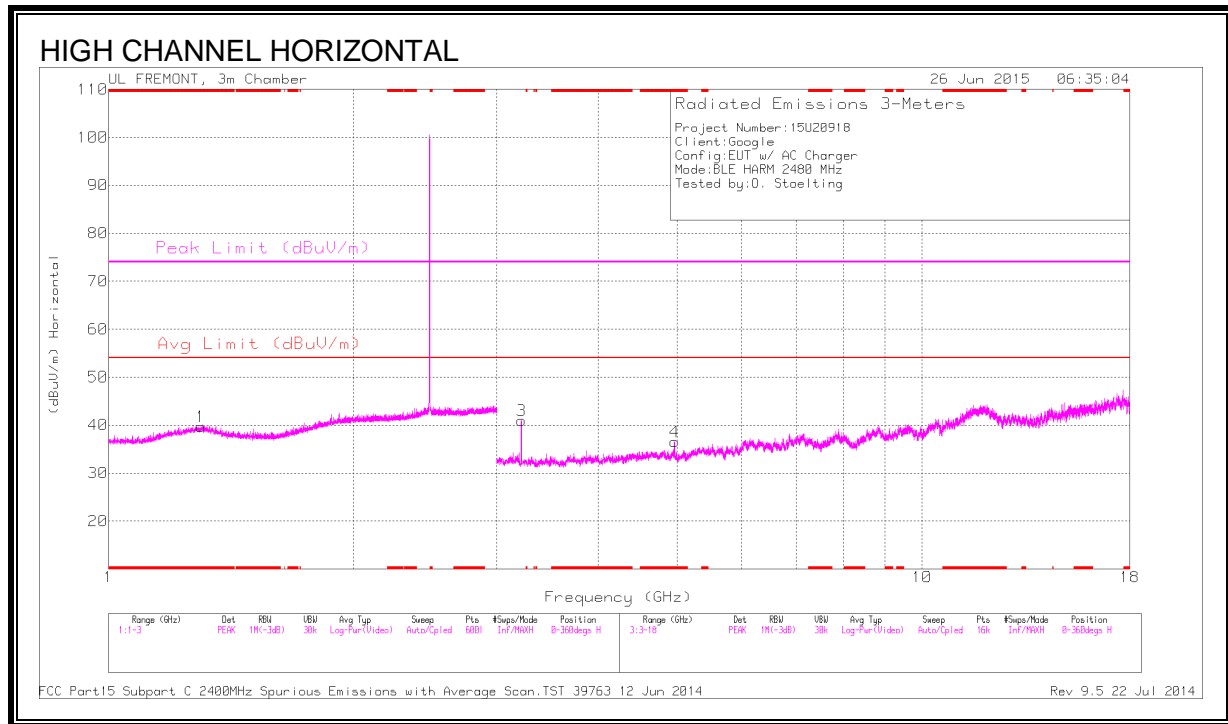
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.292	32.96	PK	29.8	-23.1	0	39.66	-	-	74	-34.34	0-360	200	H
2	* 1.35	33.35	PK	29.3	-23.1	0	39.55	-	-	74	-34.45	0-360	200	V
5	* 9.12	27.91	PK	36.1	-24.5	0	39.51	-	-	74	-34.49	0-360	100	H
6	* 9.379	36.53	PK2	36.4	-24.3	0	48.63	-	-	74	-25.37	106	399	V
	* 9.38	24.61	MAv1	36.4	-24.3	2.18	38.89	54	-15.11	-	-	106	399	V
4	3.216	38.42	PK	32.6	-30.8	0	40.22	-	-	-	-	0-360	200	V
3	3.217	39.07	PK	32.6	-30.8	0	40.87	-	-	-	-	0-360	200	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



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 1.261	34.11	PK	29.5	-23.2	0	40.41	-	-	74	-33.59	0-360	100	V
1	* 1.299	33.04	PK	29.9	-23.2	0	39.74	-	-	74	-34.26	0-360	100	H
6	* 4.67	31.23	PK	34	-30.1	0	35.13	-	-	74	-38.87	0-360	100	V
4	* 4.96	42.26	PK2	34	-30.3	0	45.96	-	-	74	-28.04	228	102	H
	* 4.96	31.58	MAv1	34	-30.3	2.18	37.46	54	-16.54	-	-	228	102	H
5	3.216	39.01	PK	32.6	-30.8	0	40.81	-	-	-	-	0-360	200	V
3	3.217	39.23	PK	32.6	-30.8	0	41.03	-	-	-	-	0-360	200	H

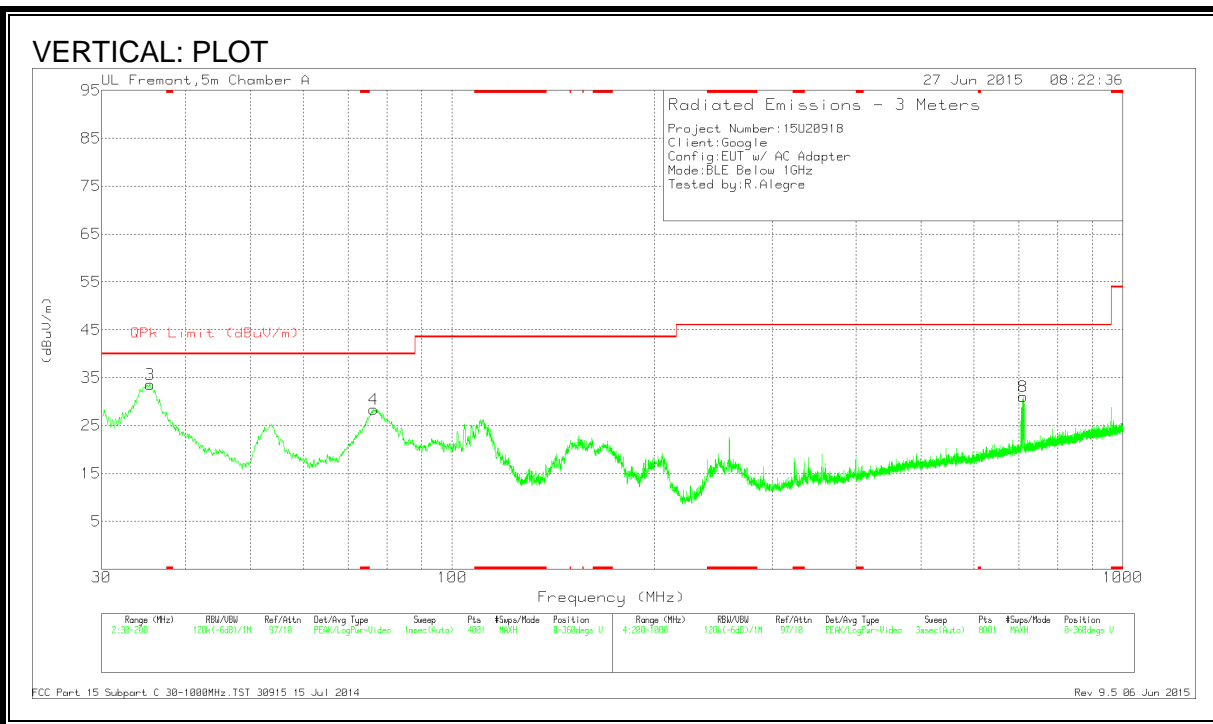
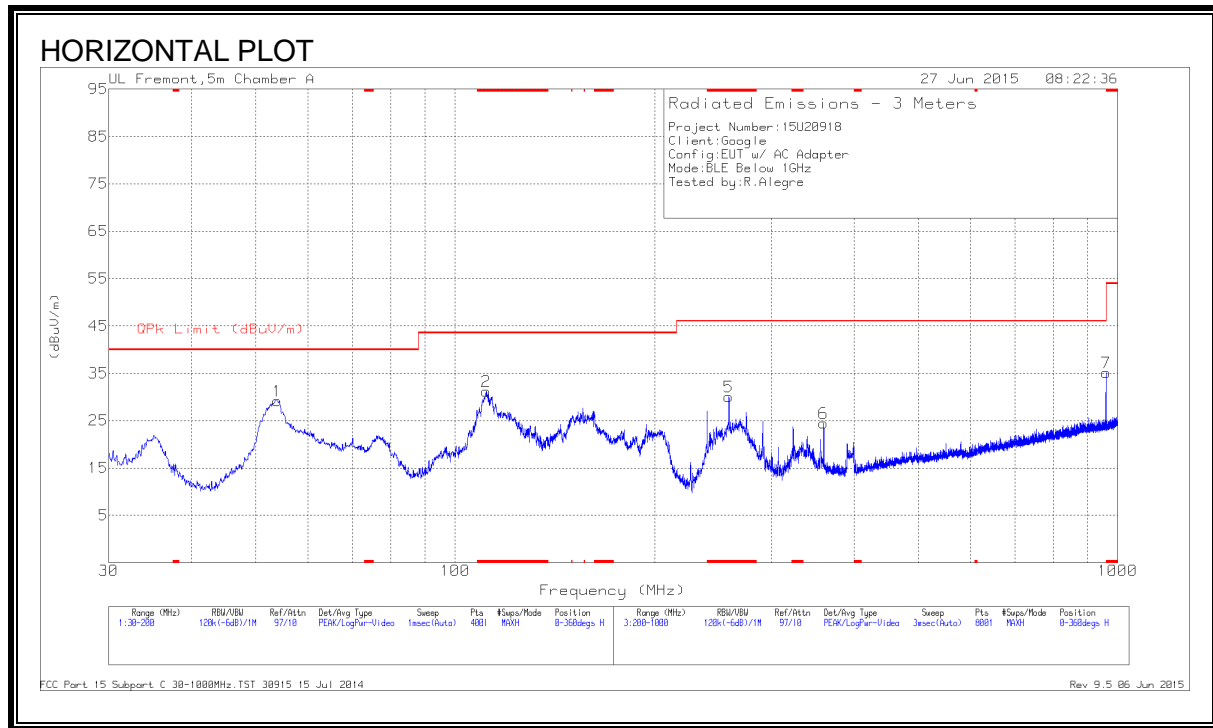
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

8.3. WORST-CASE BELOW 1 GHz

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



DATA

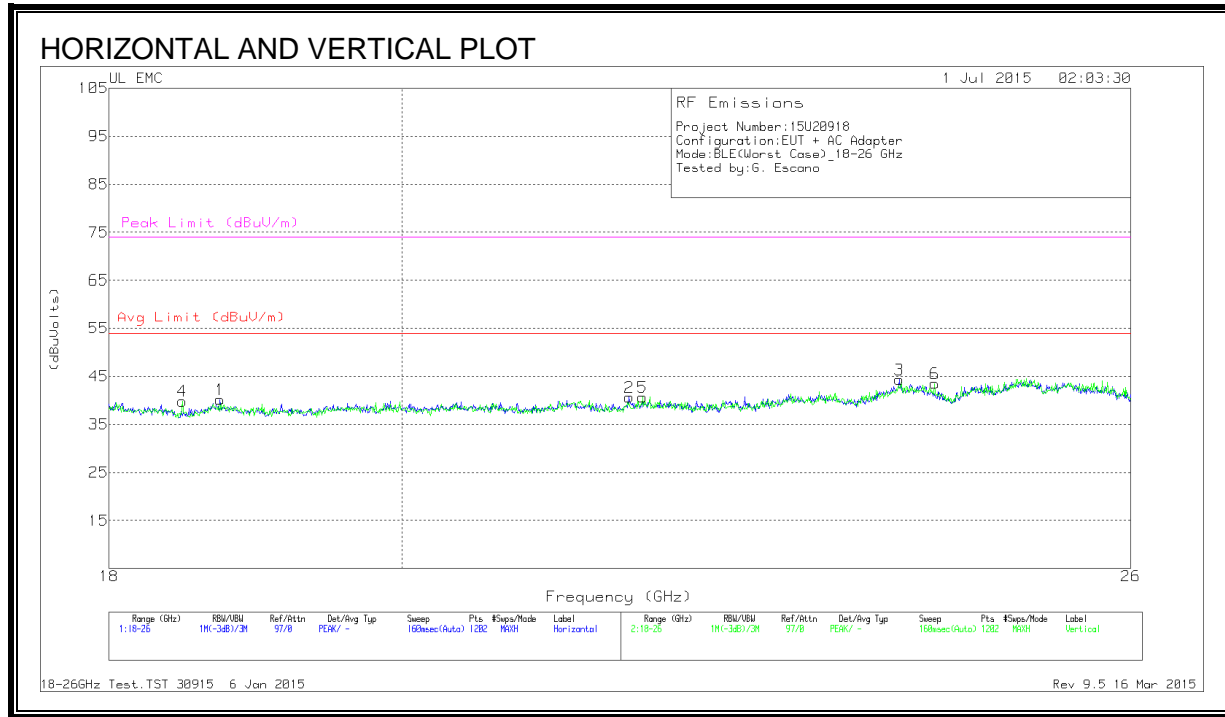
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 111.3875	48.73	Pk	12.8	-30.4	31.13	43.52	-12.39	0-360	299	H
5	* 258.9	47.8	Pk	11.9	-29.6	30.1	46.02	-15.92	0-360	101	H
7	* 960	39.32	Pk	22.7	-26.9	35.12	46.02	-10.9	0-360	101	H
3	35.4188	47.27	Pk	17.5	-31.2	33.57	40	-6.43	0-360	101	V
1	53.9275	52.93	Pk	7.2	-31	29.13	40	-10.87	0-360	399	H
4	76.325	51.61	Pk	7.6	-30.8	28.41	40	-11.59	0-360	101	V
6	360	39.04	Pk	14.6	-29.2	24.44	46.02	-21.58	0-360	101	H
8	710.2	39.17	Pk	20.2	-28.3	31.07	46.02	-14.95	0-360	101	V

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

PK - Peak detector

8.4. WORST-CASE 18 to 26 GHz

SPURIOUS EMISSIONS 18 to 26 GHz (WORST-CASE CONFIGURATION)



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	18.733	41.87	Pk	32.5	-24.7	-9.5	40.17	54	-13.83	74	-33.83
2	21.704	41.47	Pk	33.3	-24.6	-9.5	40.67	54	-13.33	74	-33.33
3	23.922	44.33	Pk	33.4	-23.9	-9.5	44.33	54	-9.67	74	-29.67
4	18.48	42.43	Pk	32.4	-25.5	-9.5	39.83	54	-14.17	74	-34.17
5	21.81	41.27	Pk	33.3	-24.4	-9.5	40.67	54	-13.33	74	-33.33
6	24.228	43.7	Pk	33.5	-24.2	-9.5	43.5	54	-10.5	74	-30.5

PK - Peak detector

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

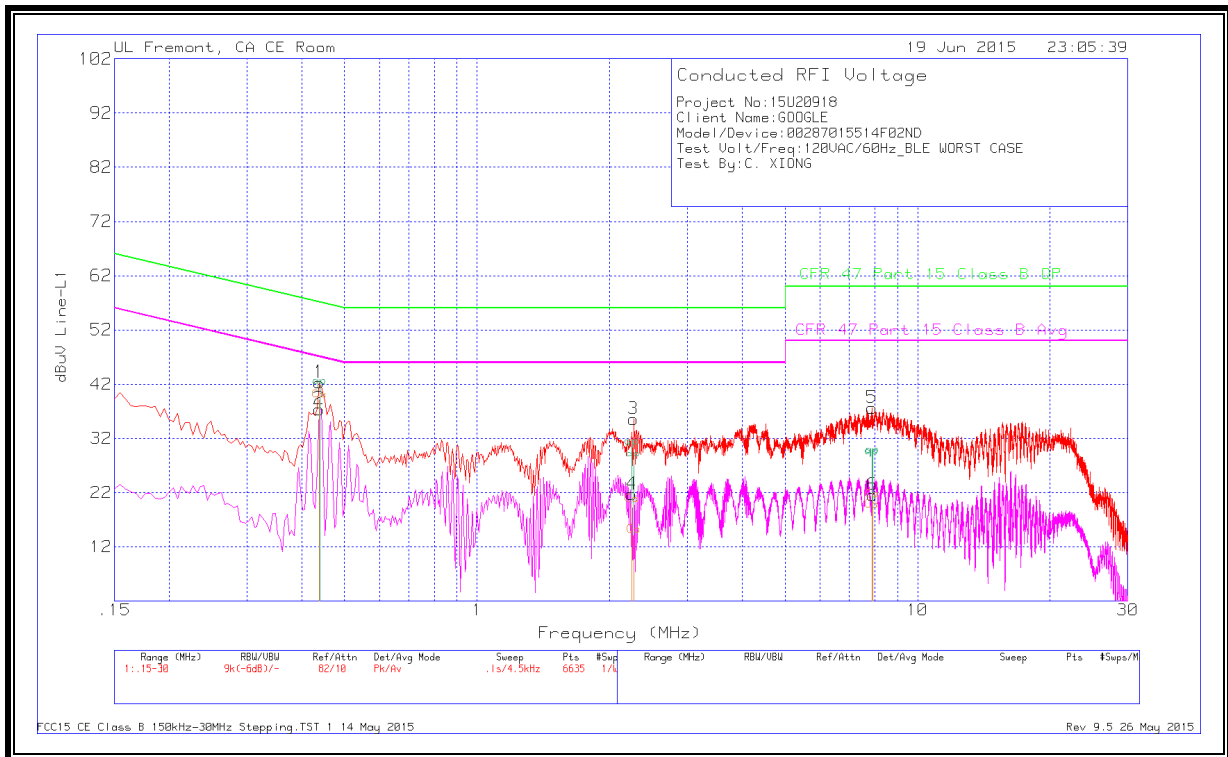
Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

C63.10.

LINE 1 RESULTS



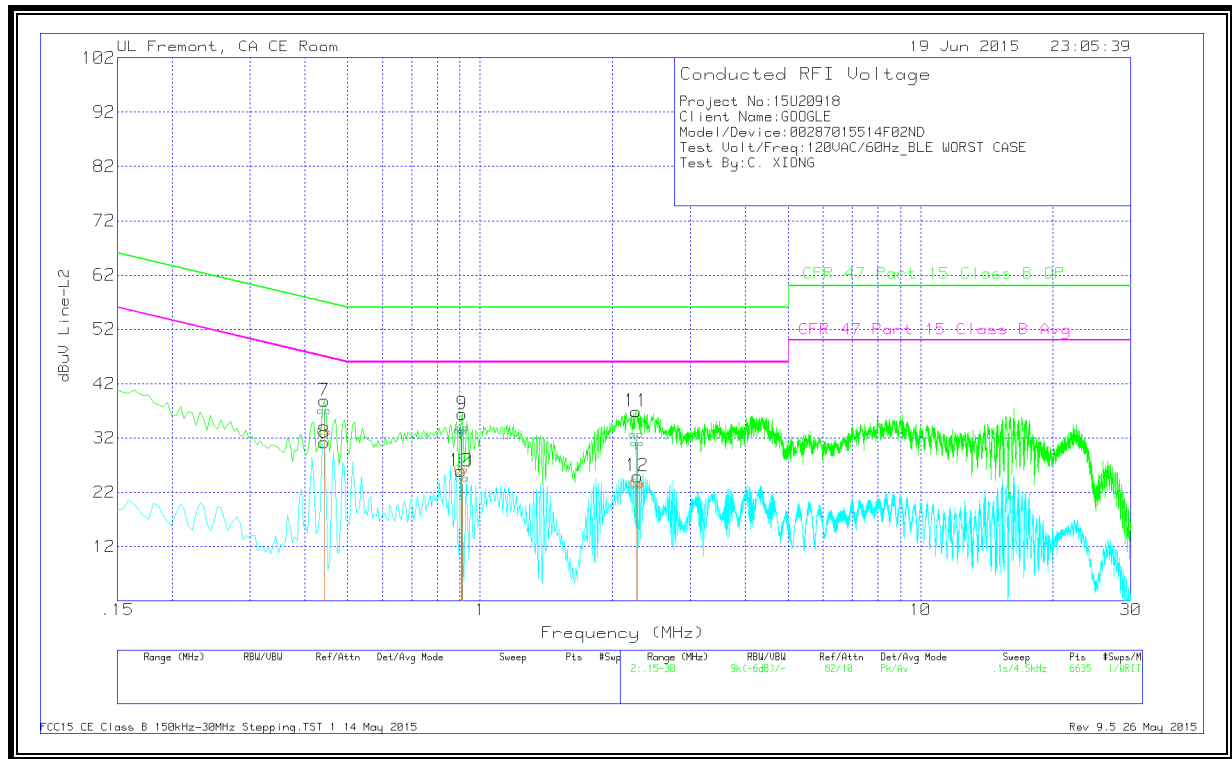
Range 1: Line-L1 .15 - 30MHz

	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	Margin (dB)	CFR 47 Part 15 Class B Avg	Margin (dB)
2	.43913	38.61	Ca	.4	0	39.01	-	-	47.08	-8.07
1	.43913	41.07	Qp	.4	0	41.47	57.08	-15.61	-	-
3	2.26613	27.82	Qp	.2	.1	28.12	56	-27.88	-	-
4	2.24588	19.46	Ca	.2	.1	19.76	-	-	46	-26.24
5	7.87178	28.31	Qp	.2	.1	28.61	60	-31.39	-	-
6	7.89968	20.34	Ca	.2	.1	20.64	-	-	50	-29.36

Ca - CISPR average detection

Qp - Quasi-Peak detector

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	Margin (dB)	CFR 47 Part 15 Class B Avg	Margin (dB)
8	.44228	31.59	Ca	.4	0	31.99	-	-	47.02	-15.03
7	.44228	35.48	Qp	.4	0	35.88	57.02	-21.14	-	-
9	.91028	32.36	Qp	.3	0	32.66	56	-23.34	-	-
10	.90488	24.72	Ca	.3	0	25.02	-	-	46	-20.98
11	2.26163	31.25	Qp	.2	.1	31.55	56	-24.45	-	-
12	2.27468	22.16	Ca	.2	.1	22.46	-	-	46	-23.54

Ca - CISPR average detection

Qp - Quasi-Peak detector