



**FCC 47 CFR PART 15 SUBPART C  
INDUSTRY CANADA RSS-210 ISSUE 8**

**CERTIFICATION TEST REPORT  
FOR  
GSM/CDMA/WCDMA/LTE Phone + Bluetooth &  
WLAN (2.4GHz & 5GHz) and NFC**

**MODEL NUMBER: LG-D820, LGD820 and D820  
FCC ID: ZNFD820  
IC: 2703C-D820**

**REPORT NUMBER: 13U15420-2A  
ISSUE DATE: JULY 31, 2013**

*Prepared for*  
**LG ELECTRONICS MOBILECOMM U.S.A., INC.  
1000 SYLVAN AVENUE  
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**NVLAP LAB CODE 200065-0**

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--	7/17/13	Initial Issue	P. Kim
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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** LG ELECTRONICS MOBILECOMM U.S.A., INC.  
1000 SYLVAN AVENUE  
ENGLEWOOD CLIFFS, NEW JERSEY 07632

**EUT DESCRIPTION:** GSM/CDMA/WCDMA + LTE Phone Bluetooth, WLAN (2.4GHz & 5GHz) and NFC

**MODEL:** LG-D820, LGD820 and D820

**SERIAL NUMBER:** (0021EDF624E7C39B) CONDUCTED  
(0021E9AAE056EE83) RADIATED

**DATE TESTED:** July 3 – July 9, 2013

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 ISSUE 8	Pass
INDUSTRY CANADA RSS-GEN ISSUE 3	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:

Tested By:



PHILIP KIM  
EMC SUPERVISOR  
UL Verification Services Inc.

CHARLES VERGONIO  
WISE LAB TECHNICIAN  
UL Verification Services Inc.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

## 3. FACILITIES AND ACCREDITATION

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

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsenc.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. 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	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a LTE Phone Bluetooth, WLAN(2.4GHz & 5GHz) and NFC

### 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	Basic GFSK	10.12	10.28
2402 - 2480	Enhanced 8PSK	9.11	8.15

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -1.96 dBi.

### 5.4. SOFTWARE AND FIRMWARE

Software version was 3.4.0-g9f6ebe1-00072-gcee1ab4b

The firmware used was M8974A-0.0.19.0.01.

## **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 Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	LG	MCS.01WR	EAY62768913	N/A
Earphone	QuadBeat	LE 410	EAB62729001	N/A

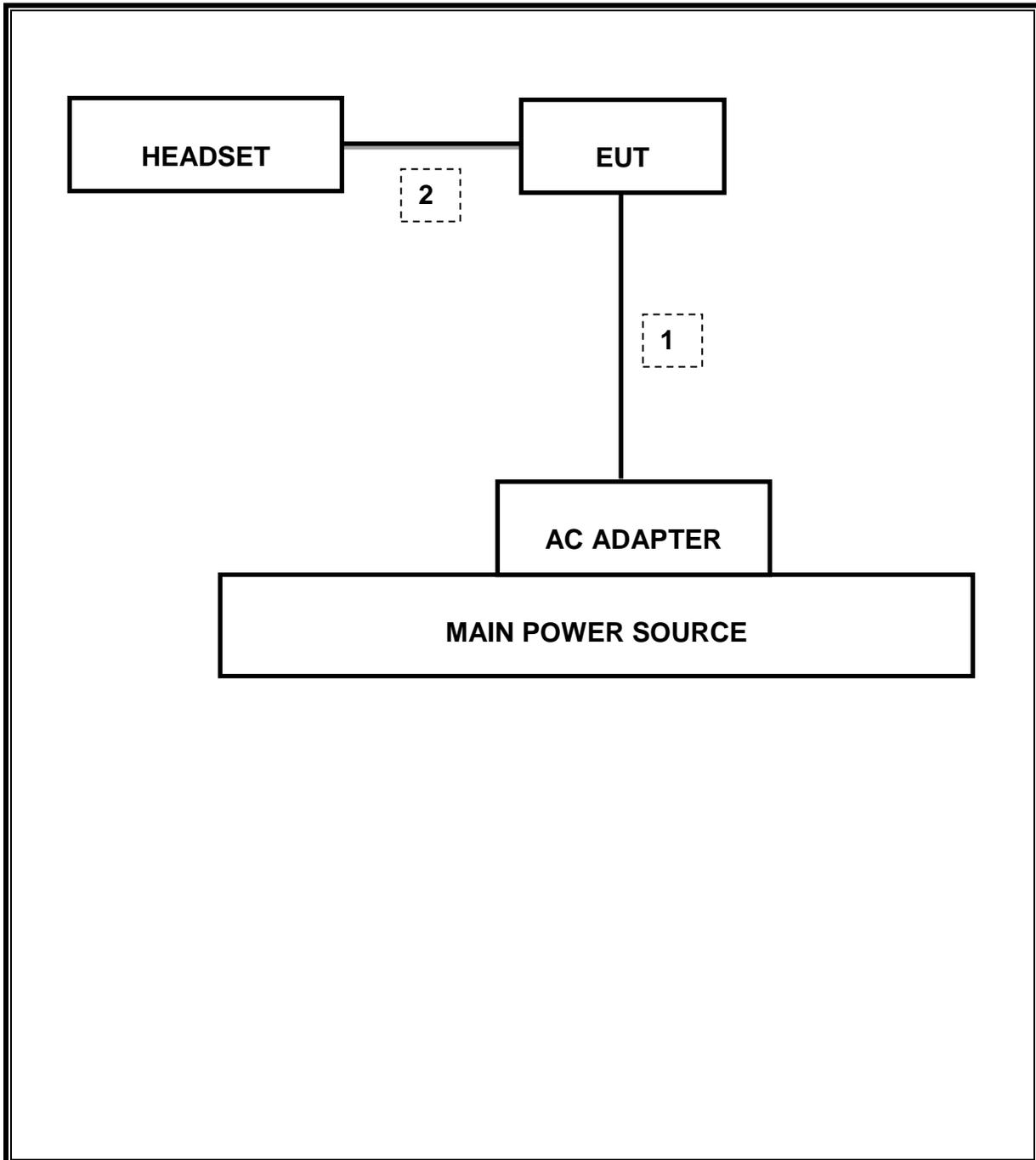
### I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A
2	Audio	1	Mini-Jack	Unshielded	1m	N/A

### TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests. EUT was set in the Hidden menu mode to enable BT communications.

**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	Asset	Cal Date	Cal Due
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	C01171	03/23/12	02/13/14
Antenna, Horn, 18GHz	EMCO	3115	C00783	10/25/12	10/25/13
Antenna, Horn, 25.5 GHz	ARA	MWH-1826/B	C00980	11/14/12	11/14/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/28/13	01/28/14
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/12	10/22/13
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/12	12/20/13
CBT Bluetooth Tester	R & S	CBT	None	07/12/13	07/12/14
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/12	12/13/13
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/12	12/13/13
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/13	01/14/14
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR	CNR

## 7. ANTENNA PORT TEST RESULTS

### 7.1. BASIC DATA RATE GFSK MODULATION

#### 7.1.1. 20 dB AND 99% BANDWIDTH

##### LIMIT

None; for reporting purposes only.

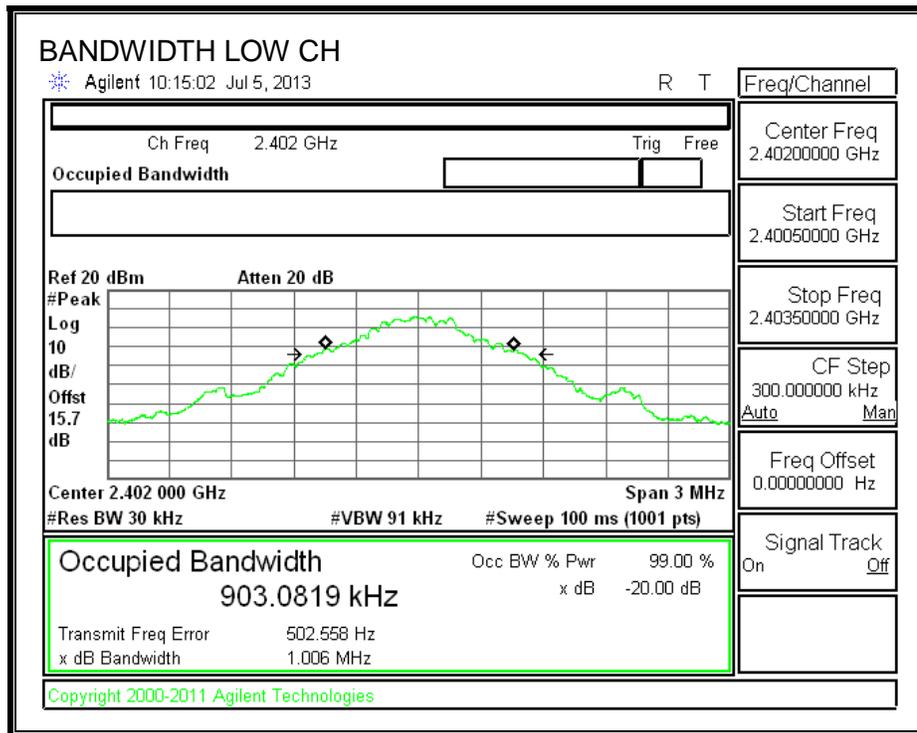
##### TEST PROCEDURE

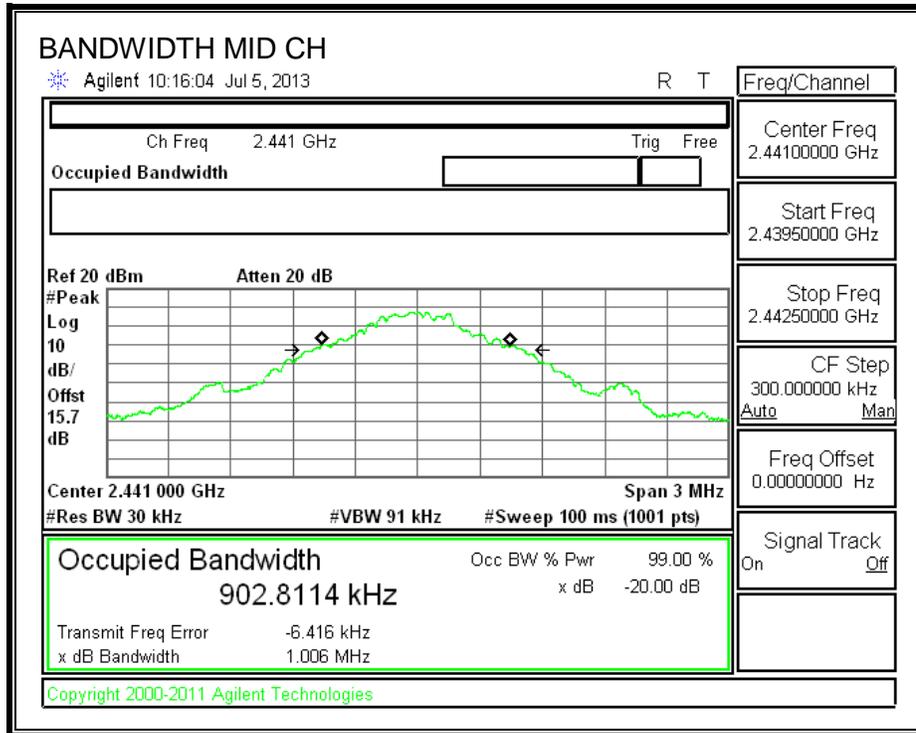
The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq 1\%$  of the 20 dB bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

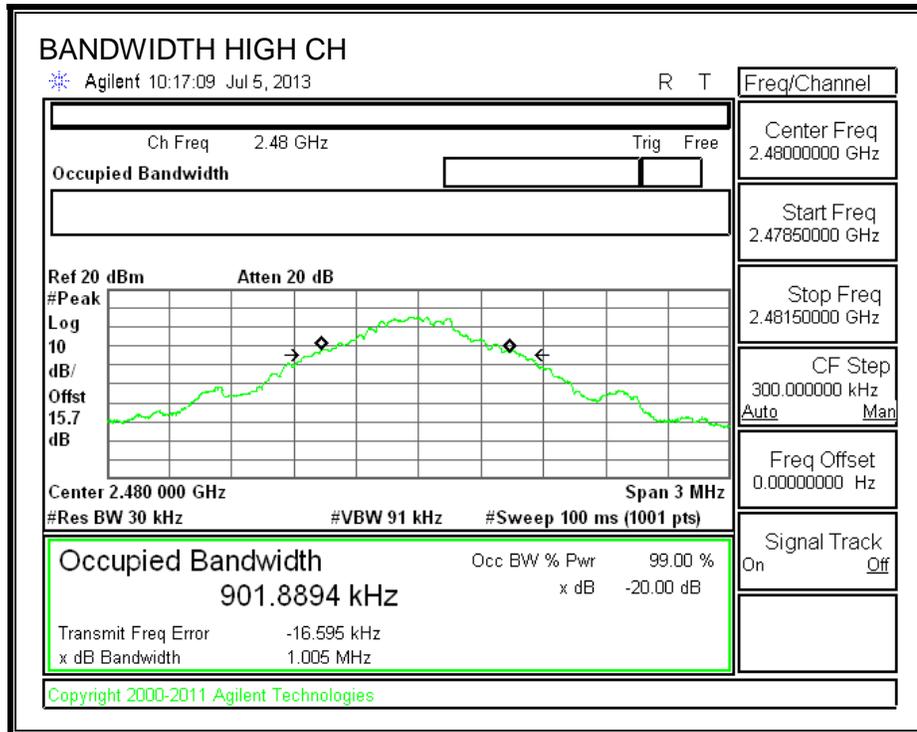
##### RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1006	926.8819
Middle	2441	1006	912.3405
High	2480	1005	885.4962

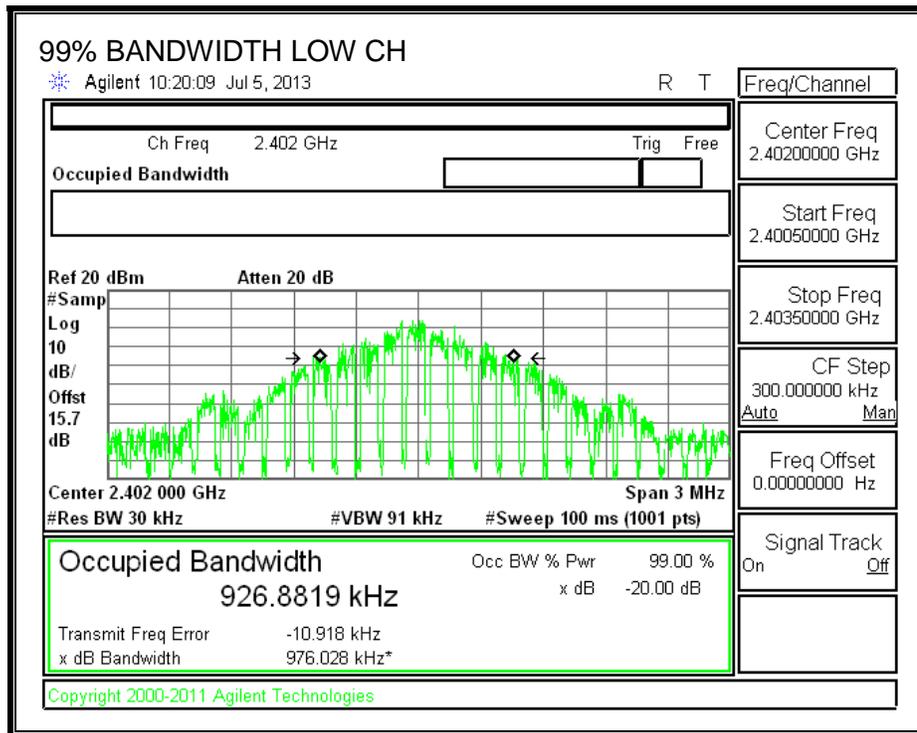
**20 dB BANDWIDTH**

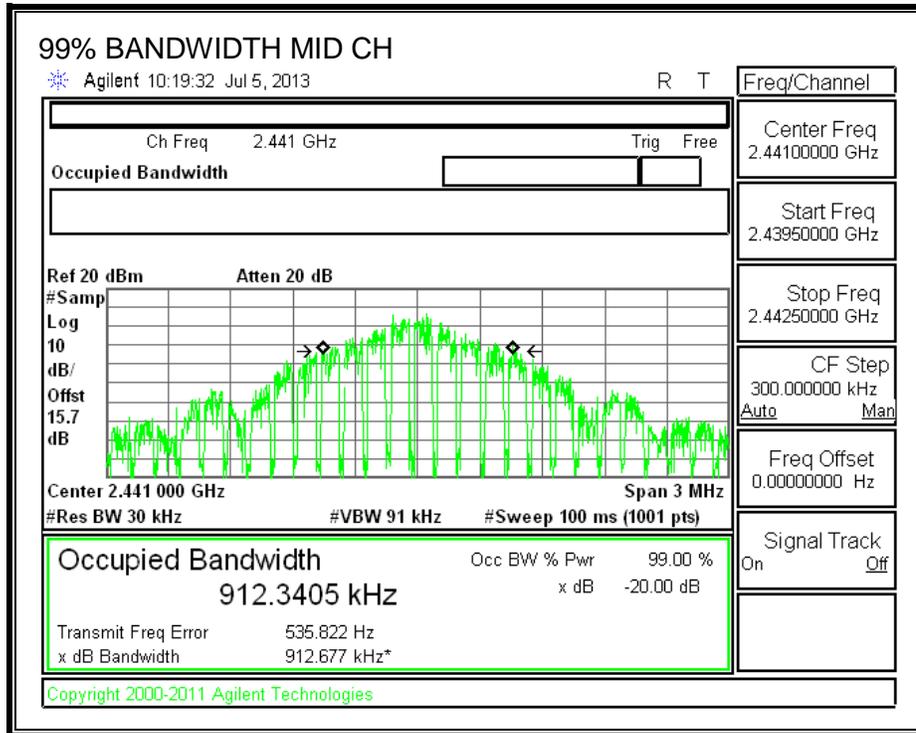


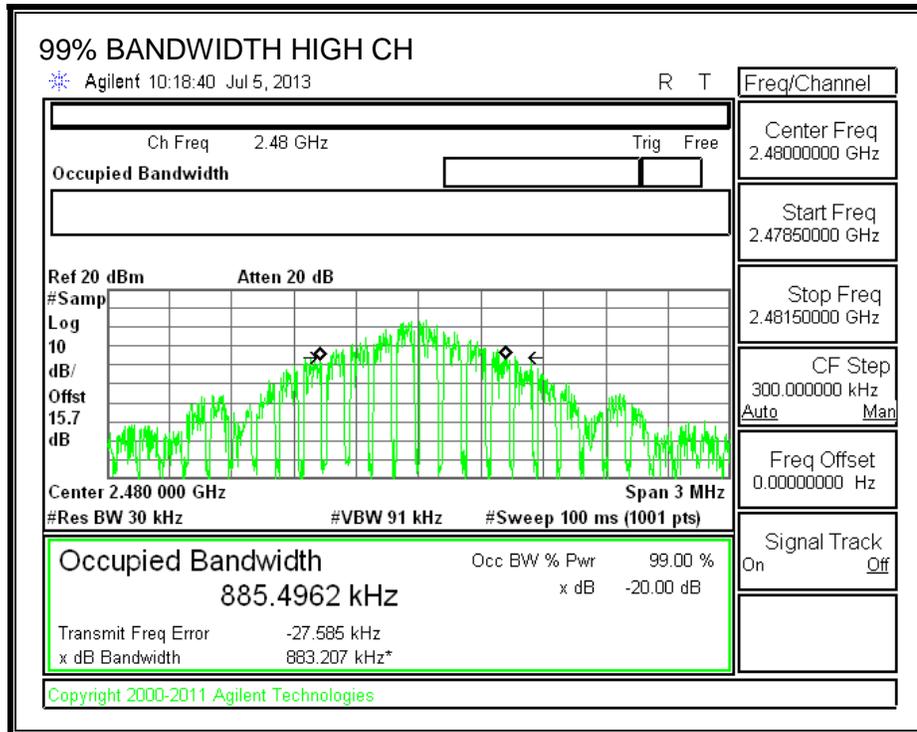




**99% BANDWIDTH**







## 7.1.2. HOPPING FREQUENCY SEPARATION

### LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

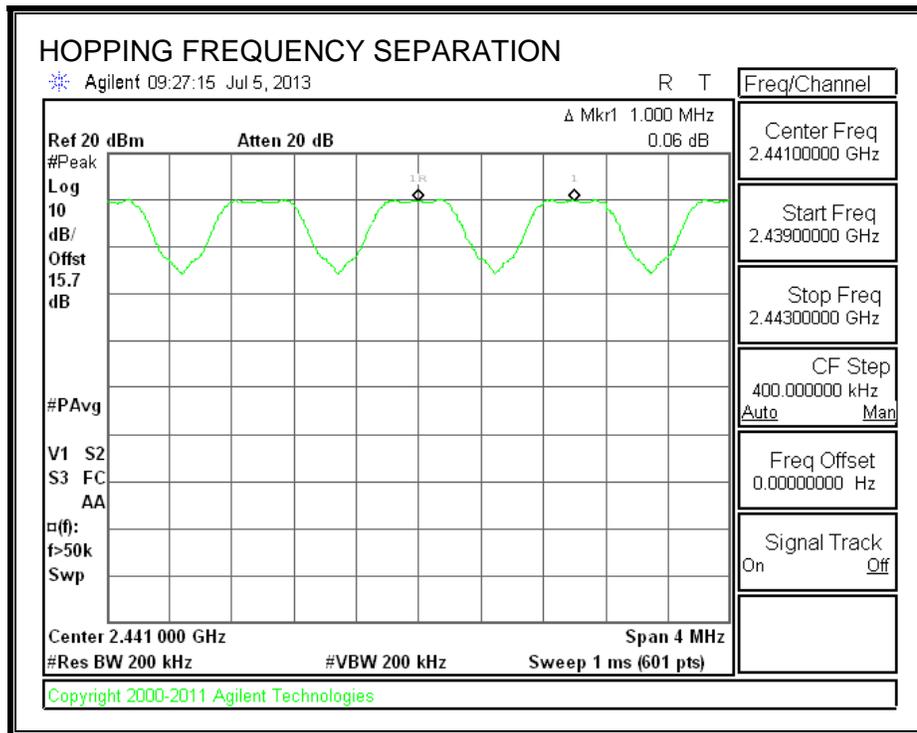
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

### RESULTS

**HOPPING FREQUENCY SEPARATION**



### **7.1.3. NUMBER OF HOPPING CHANNELS**

#### **LIMIT**

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

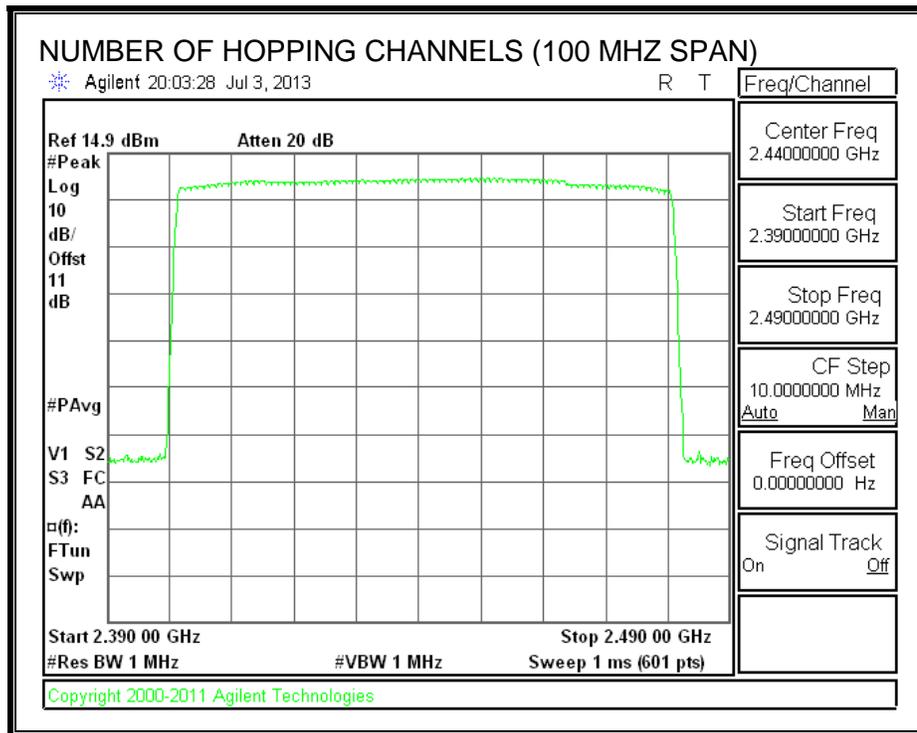
#### **TEST PROCEDURE**

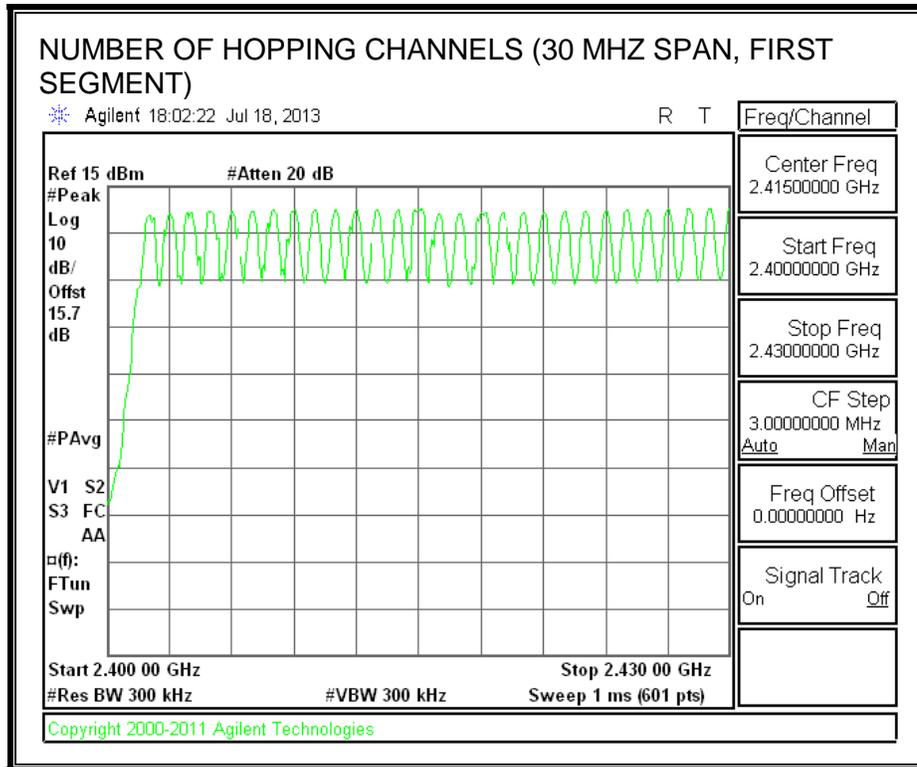
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

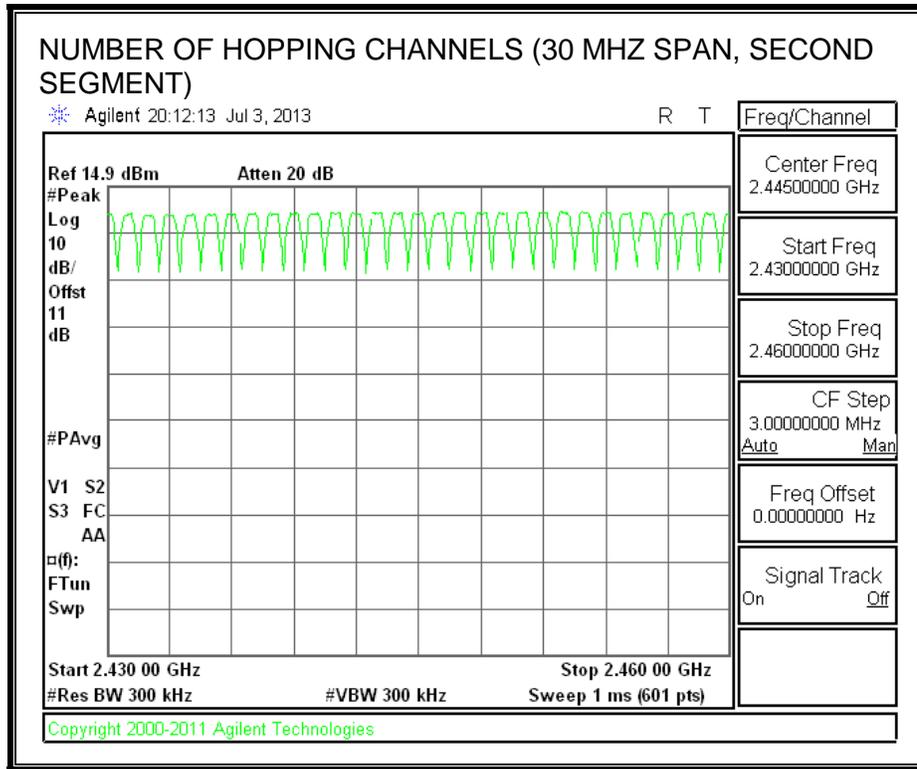
#### **RESULTS**

Normal Mode: 79 Channels observed.

**NUMBER OF HOPPING CHANNELS**









### 7.1.4. AVERAGE TIME OF OCCUPANCY

**LIMIT**

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

**TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

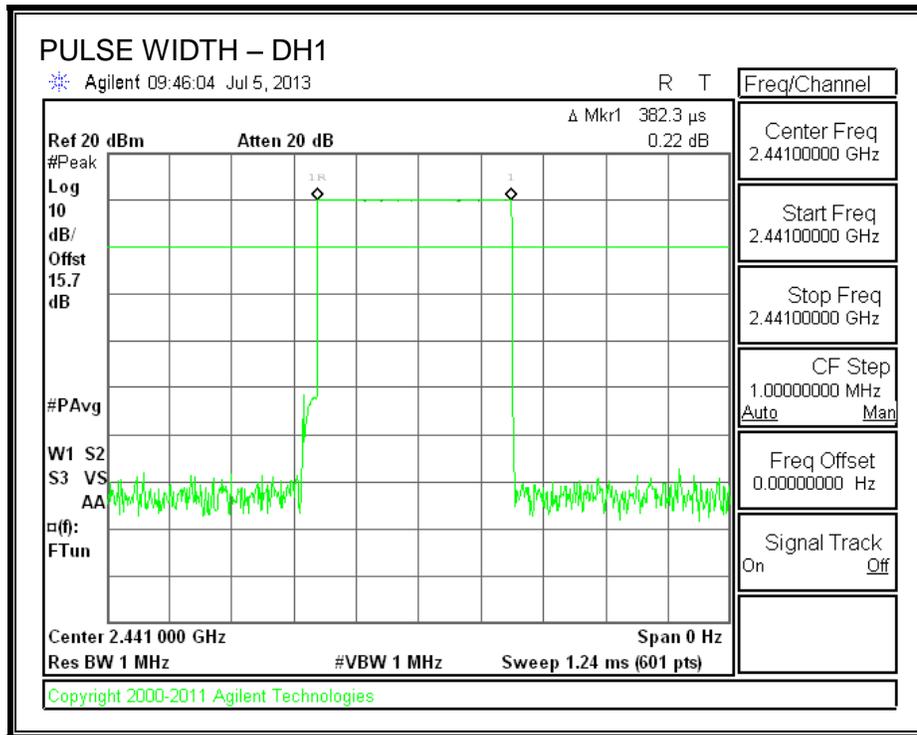
The average time of occupancy in the specified 31.6 second period (79 channels \* 0.4 s) is equal to  $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$ .

For AFH mode, the average time of occupancy in the specified 8 second period (20 channels \* 0.4 seconds) is equal to  $10 * (\# \text{ of pulses in } 0.8 \text{ s}) * \text{ pulse width}$ .

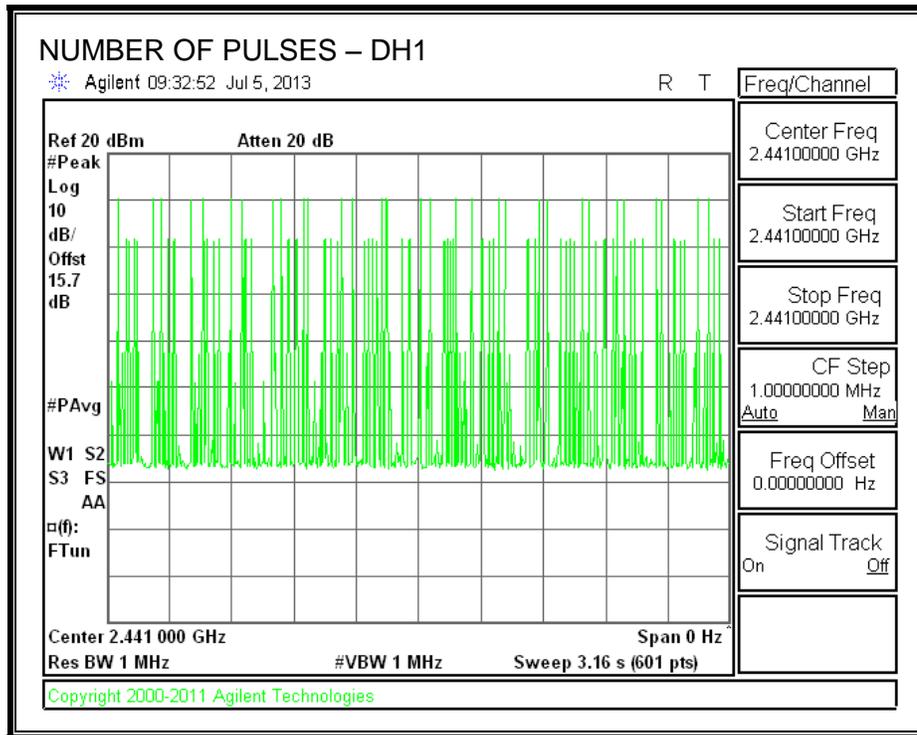
**RESULTS**

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
<b>GFSK Normal Mode</b>					
DH1	0.3823	31	0.119	0.4	-0.281
DH3	1.64	14	0.230	0.4	-0.170
DH5	2.894	8	0.232	0.4	-0.168
<b>GFSK AFH Mode</b>					
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
DH1	0.3823	64	0.245	0.4	-0.155
DH3	1.64	21	0.344	0.4	-0.056
DH5	2.894	13	0.376	0.4	-0.024

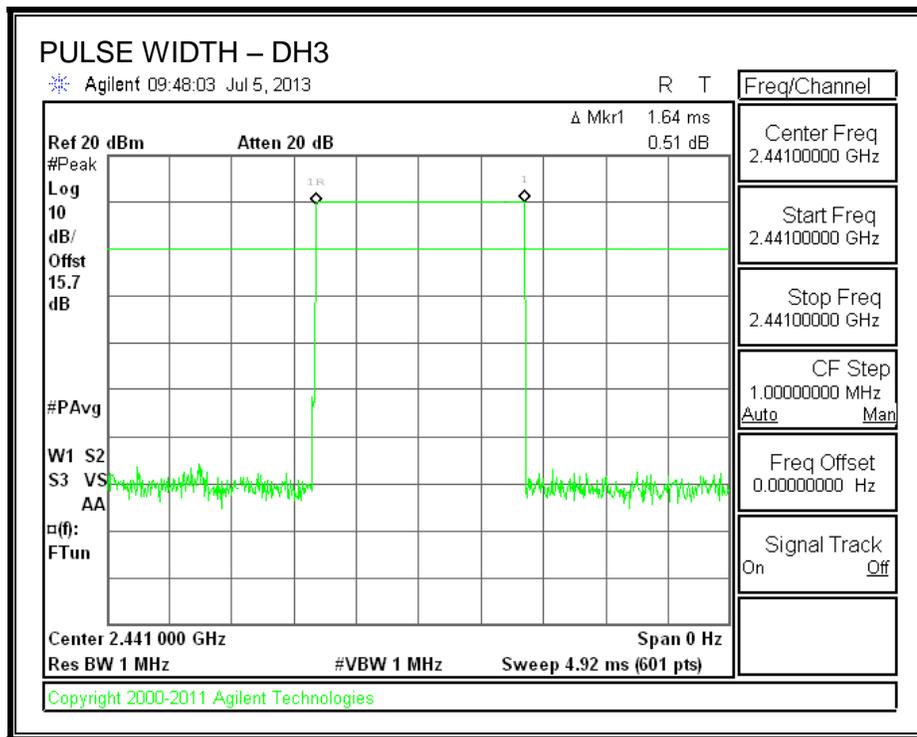
**PULSE WIDTH - DH1**



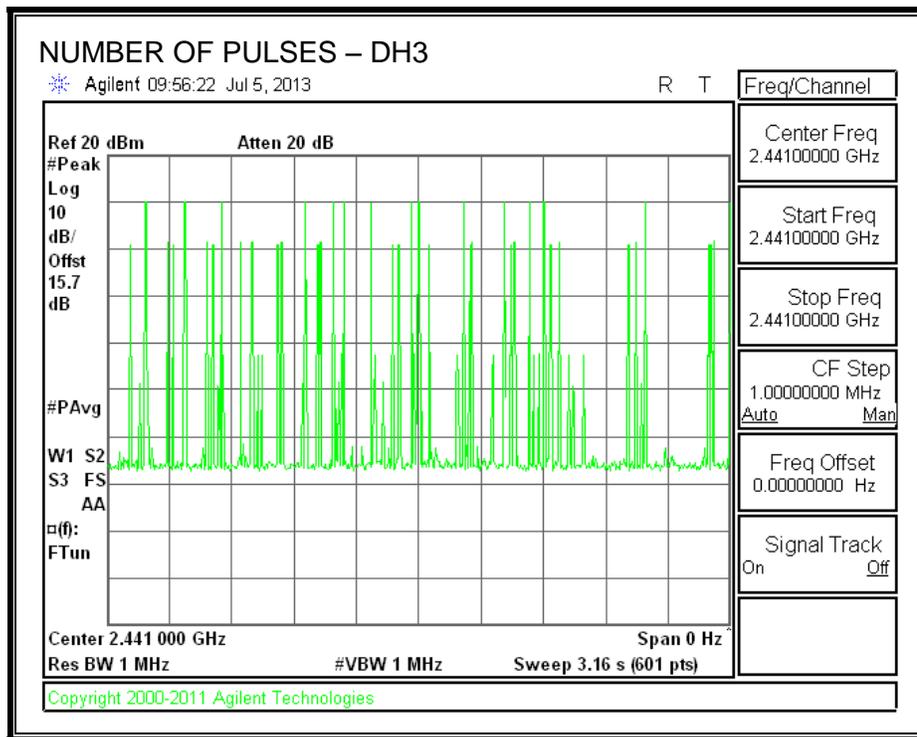
**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1**



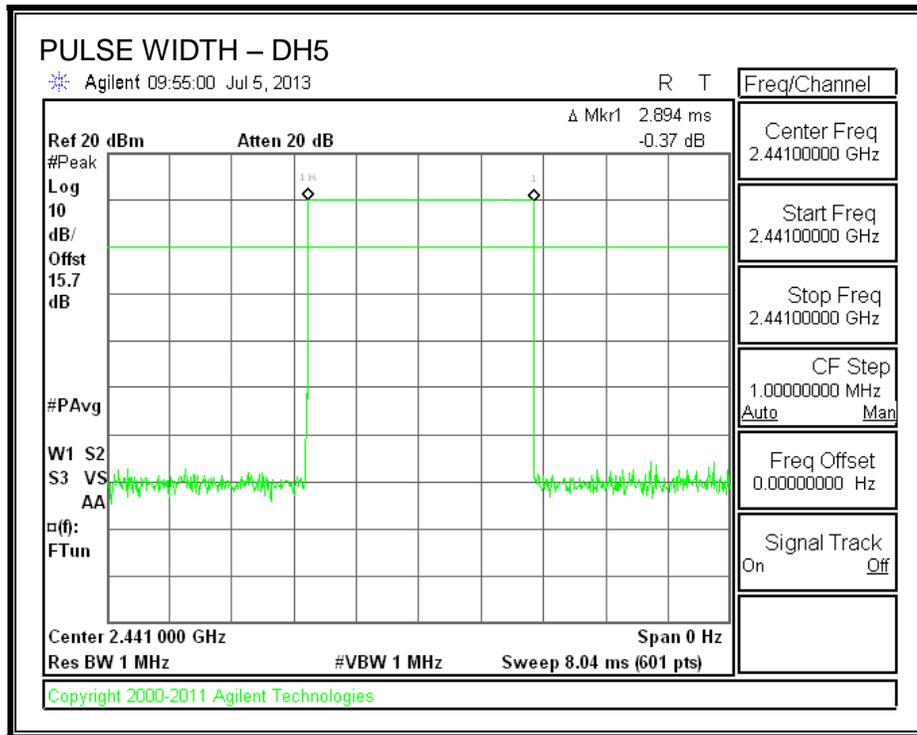
**PULSE WIDTH – DH3**



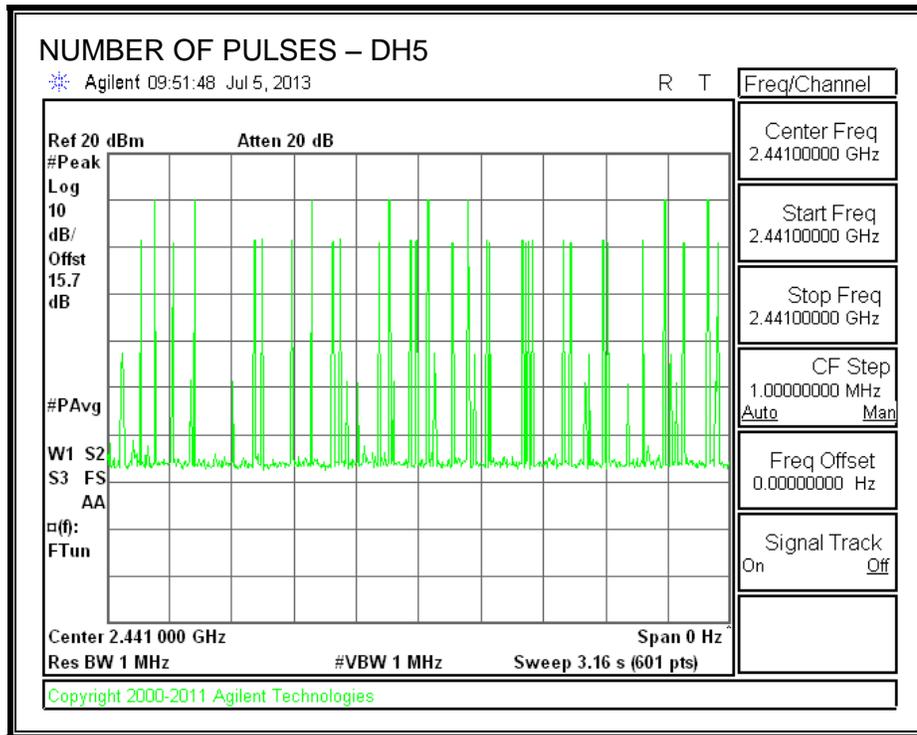
**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3**



**PULSE WIDTH – DH5**



**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5**



### 7.1.5. OUTPUT POWER

#### LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 21 dBm.

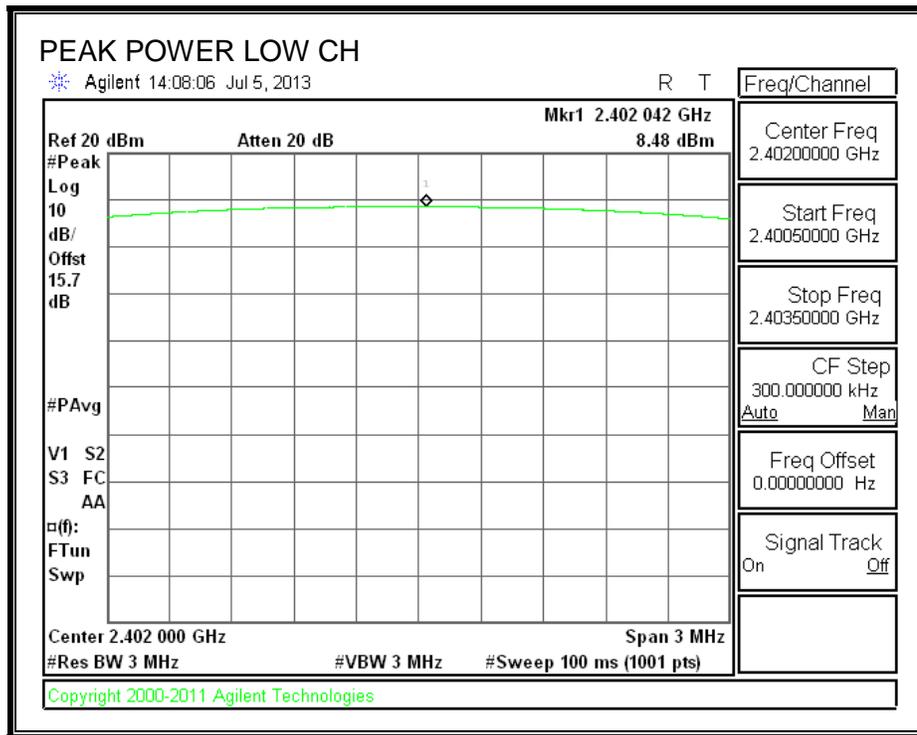
#### TEST PROCEDURE

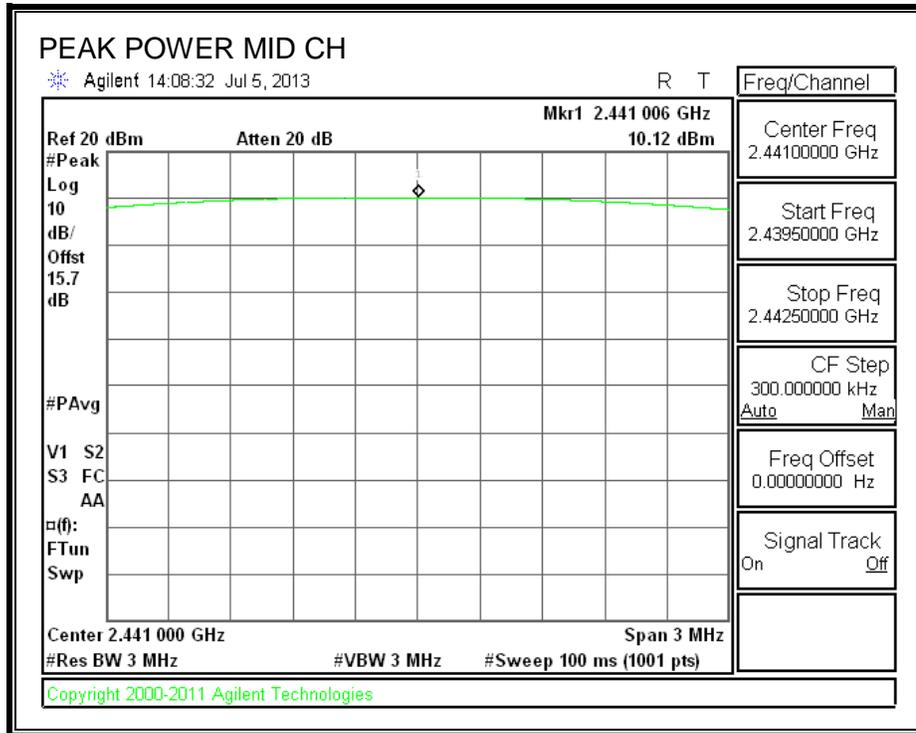
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

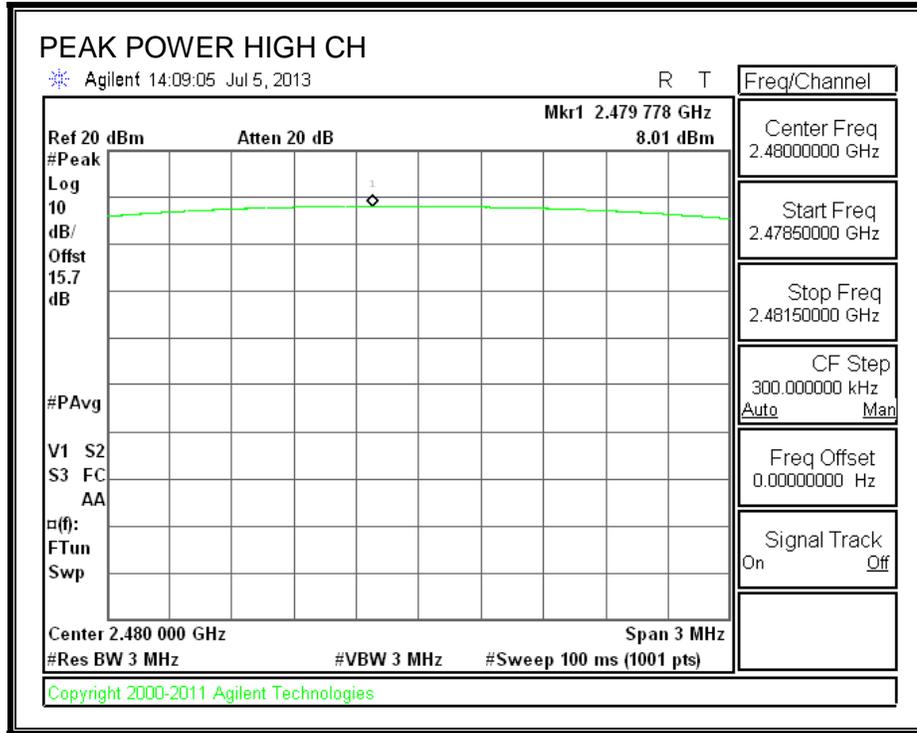
#### RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.48	21	-12.52
Middle	2441	10.12	21	-10.88
High	2480	8.01	21	-12.99

**OUTPUT POWER**







### 7.1.6. AVERAGE POWER

#### LIMIT

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

#### RESULTS

The cable assembly insertion loss of 15.7 dB (including 15 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.30
Middle	2441	9.93
High	2480	7.63

## 7.1.7. CONDUCTED SPURIOUS EMISSIONS

### LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

### TEST PROCEDURE

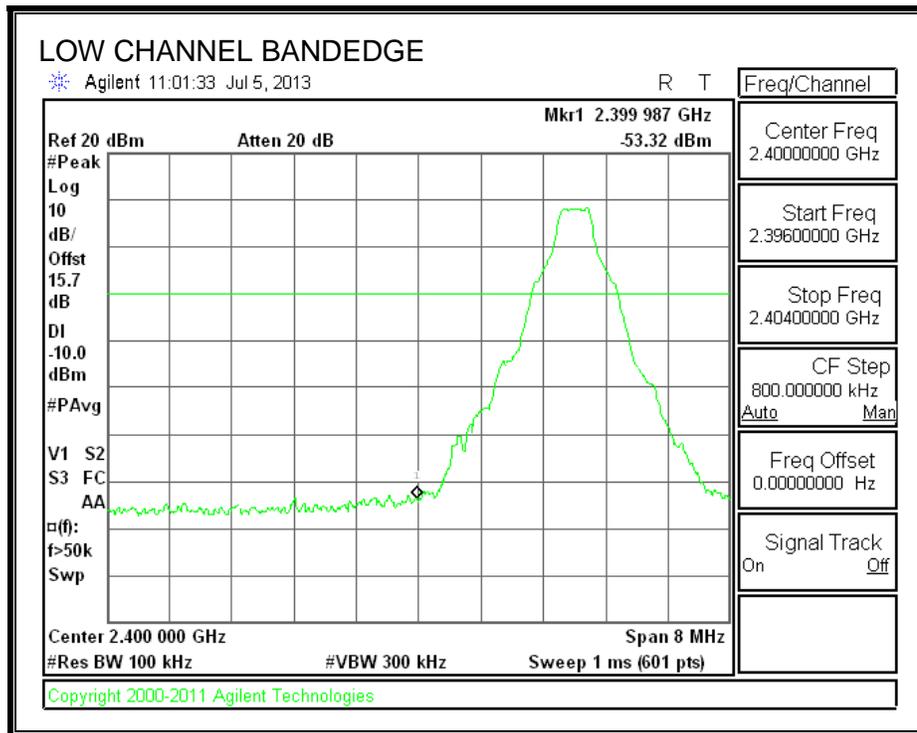
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

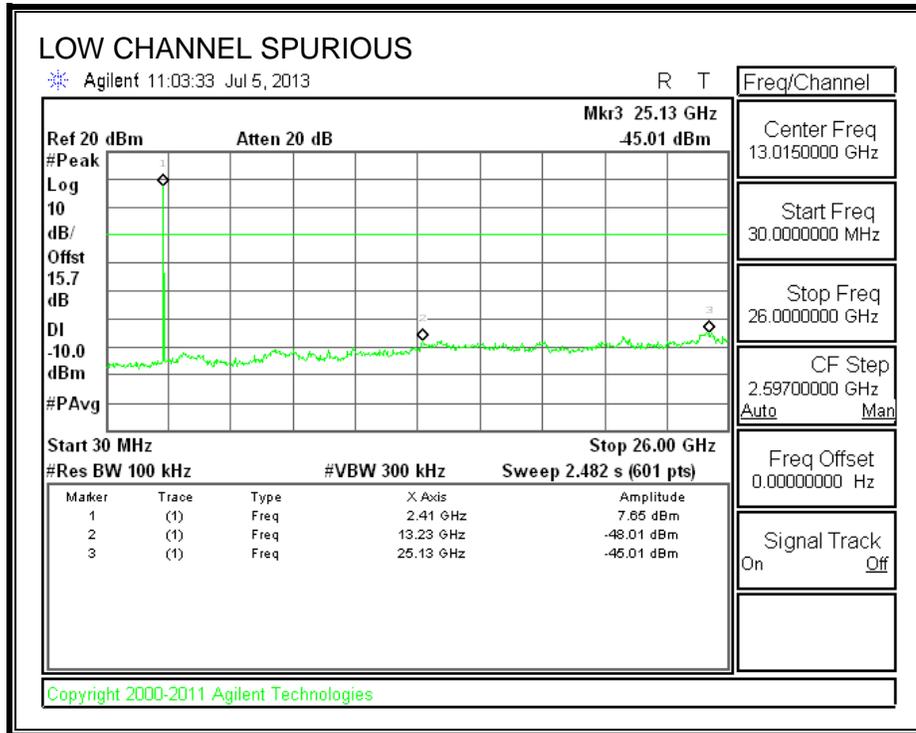
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

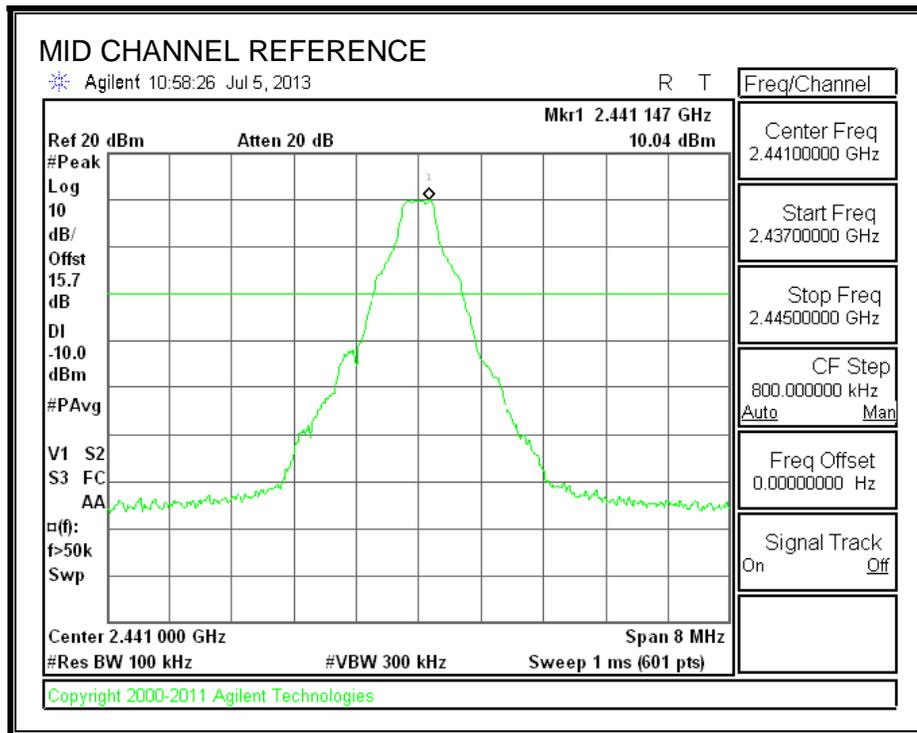
### RESULTS

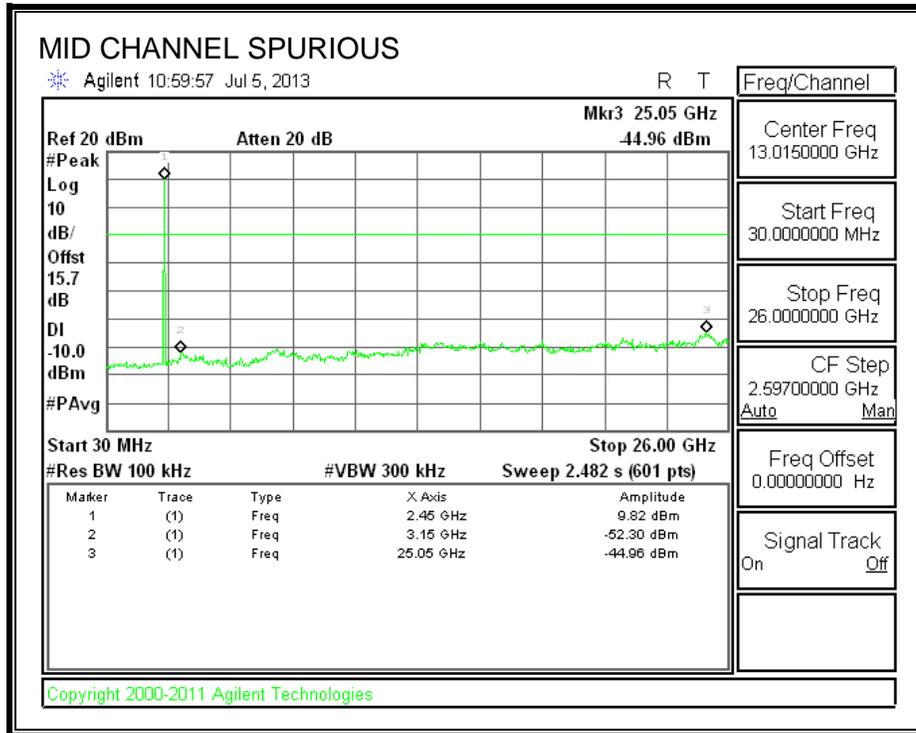
**SPURIOUS EMISSIONS, LOW CHANNEL**



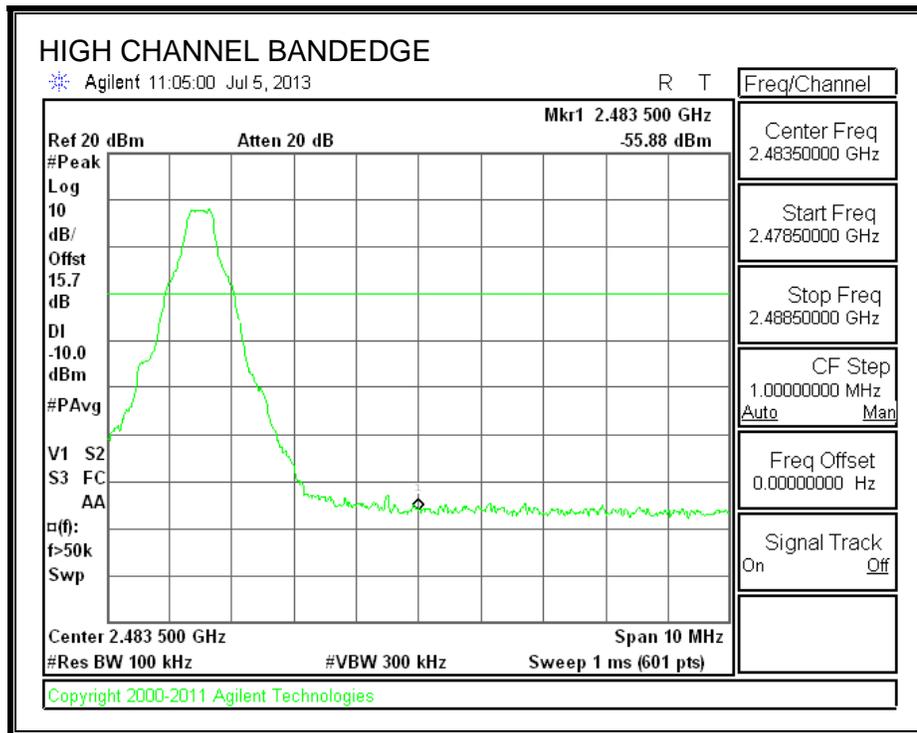


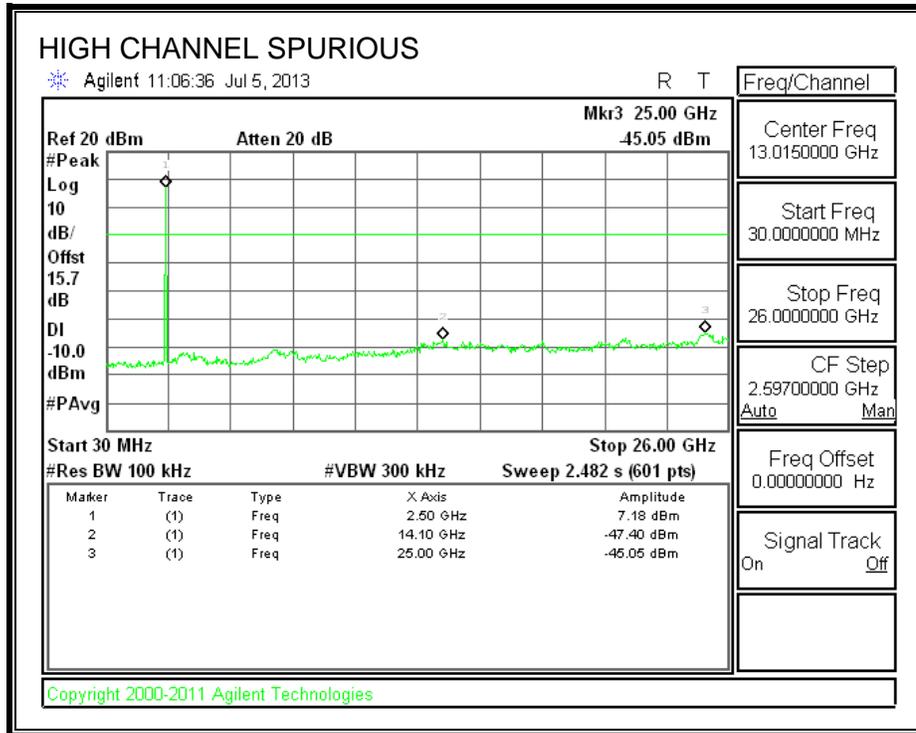
**SPURIOUS EMISSIONS, MID CHANNEL**



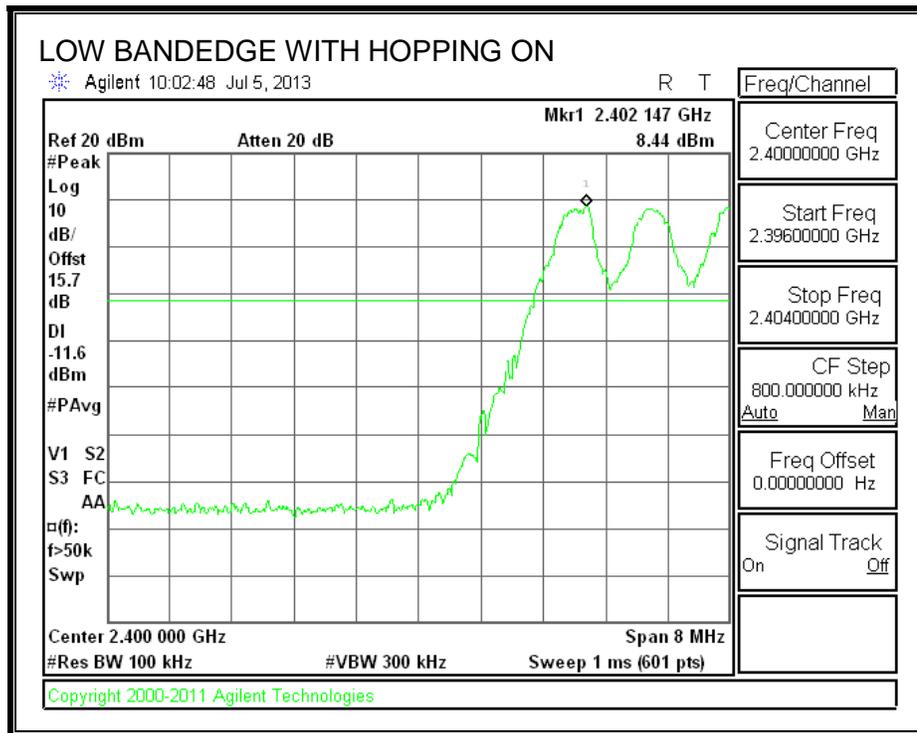


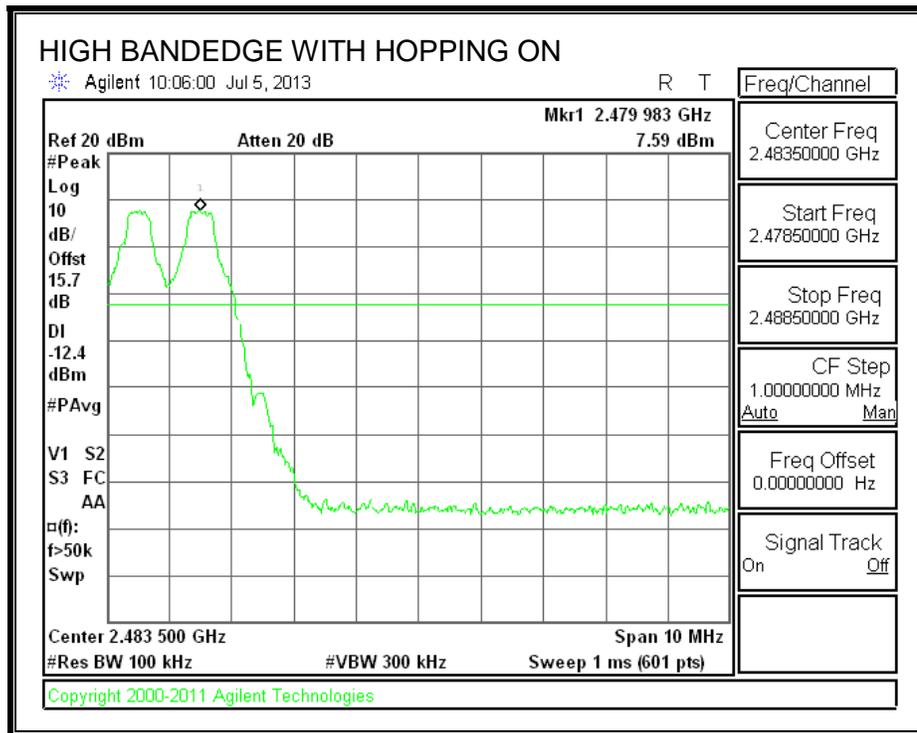
**SPURIOUS EMISSIONS, HIGH CHANNEL**





**SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**





## 7.2. ENHANCED DATA RATE 8PSK MODULATION

### 7.2.1. 20 dB AND 99% BANDWIDTH

#### LIMIT

None; for reporting purposes only.

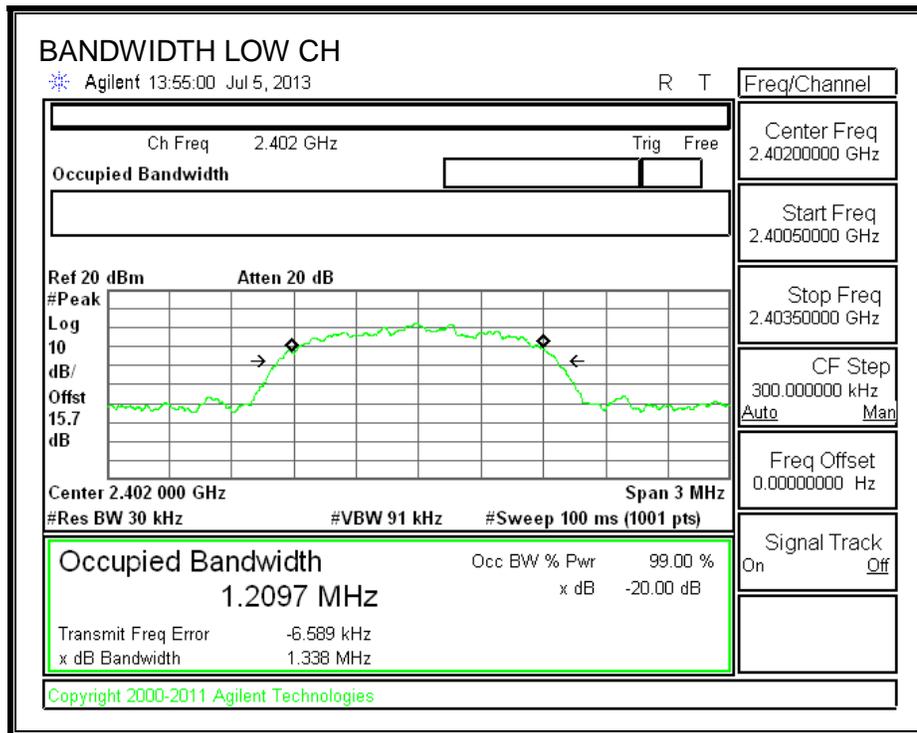
#### TEST PROCEDURE

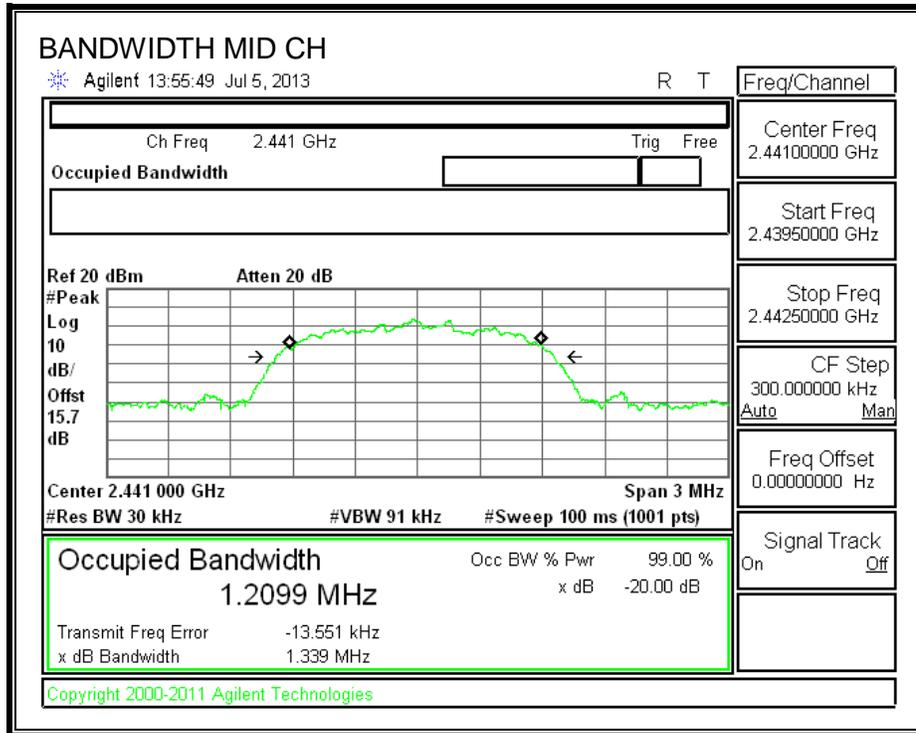
The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq 1\%$  of the 20 dB bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

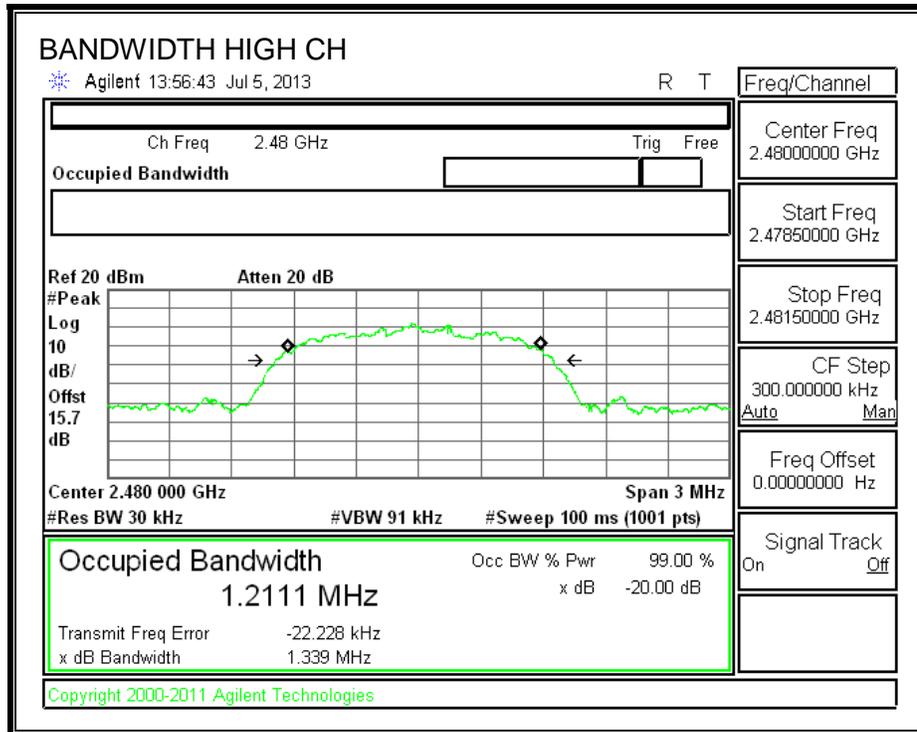
#### RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1338	1179.7
Middle	2441	1339	1193.9
High	2480	1339	1243

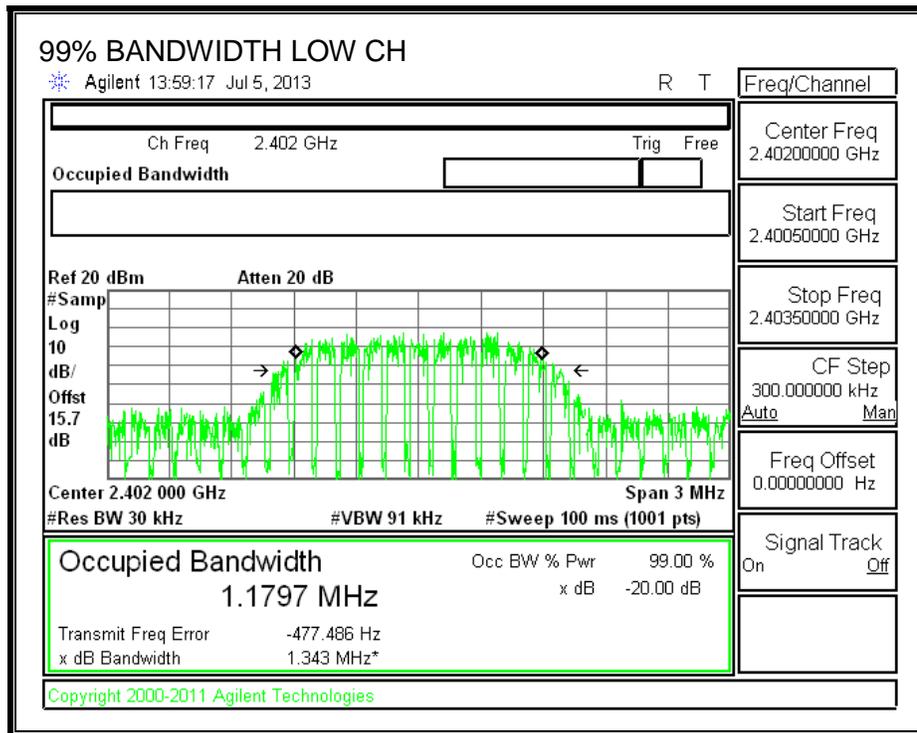
**20 dB BANDWIDTH**

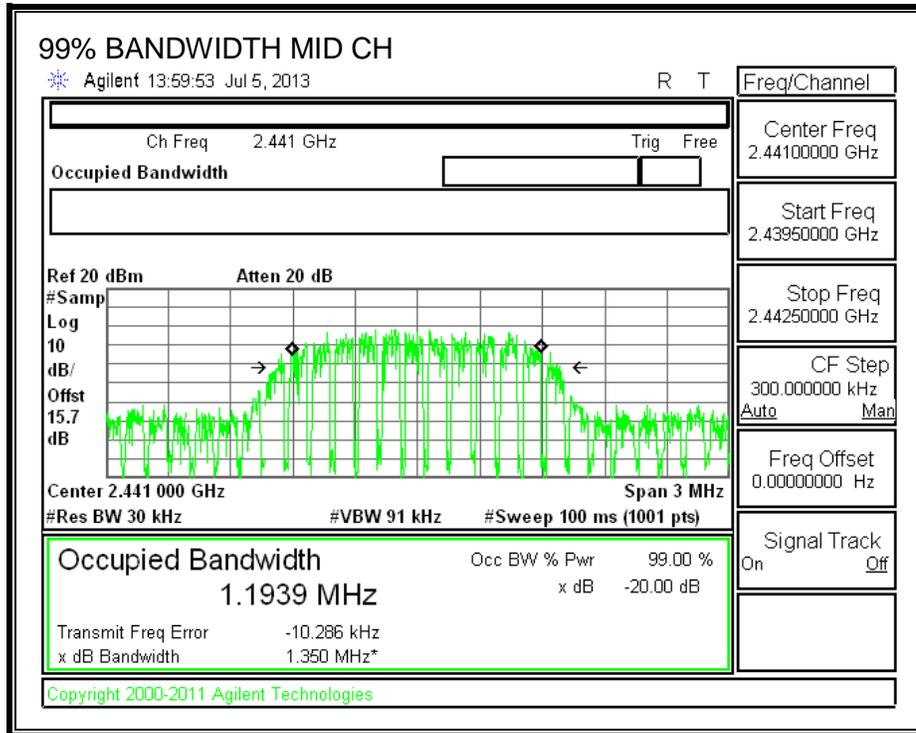


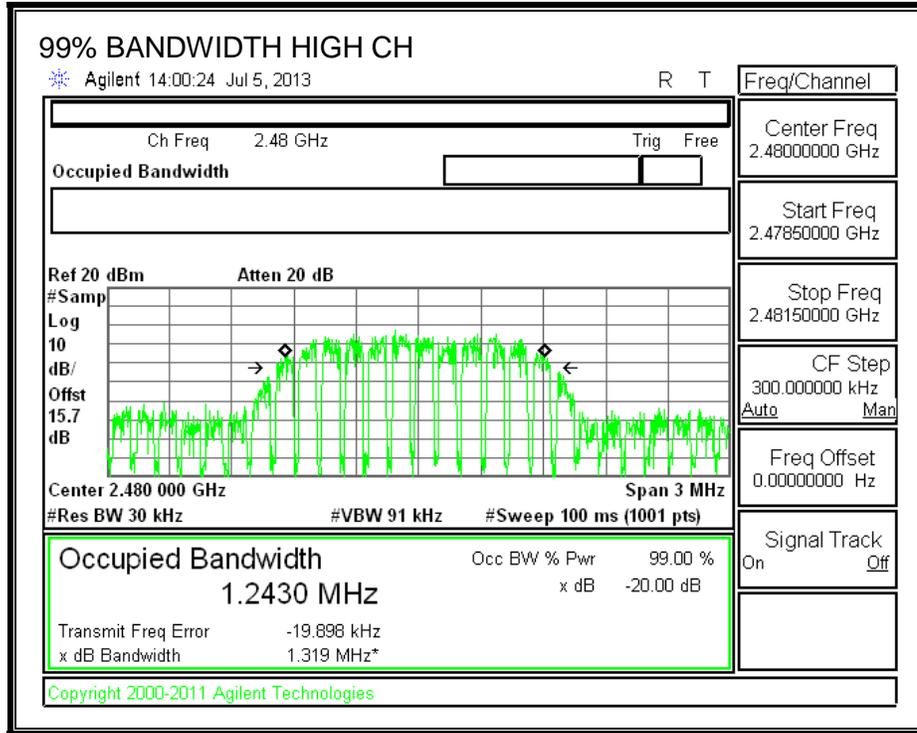




**99% BANDWIDTH**







## 7.2.2. OUTPUT POWER

### LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 21 dBm.

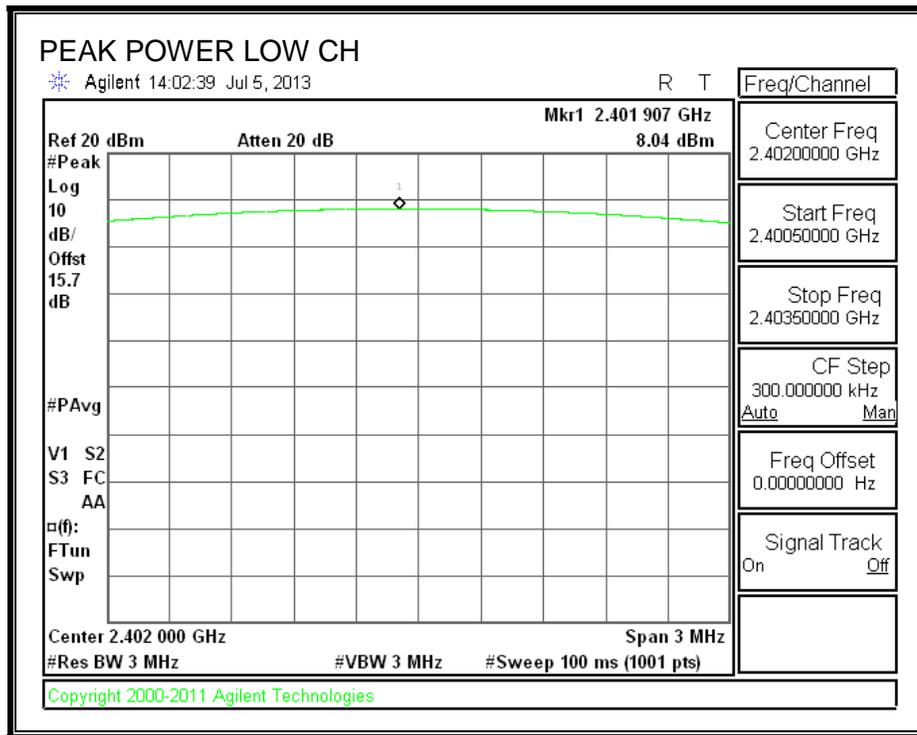
### TEST PROCEDURE

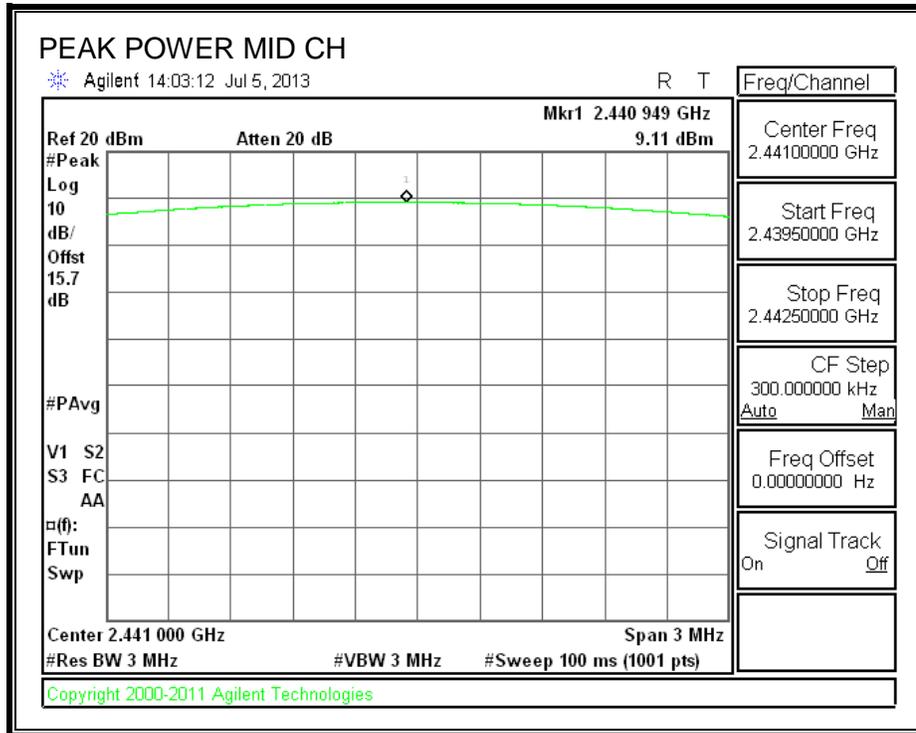
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

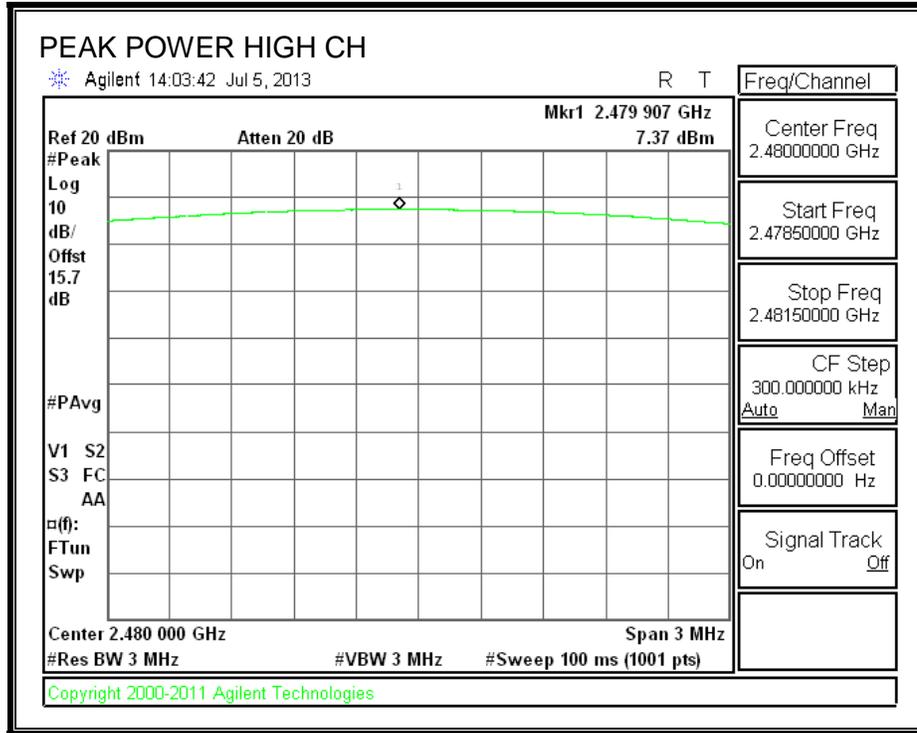
### RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.04	21	-12.96
Middle	2441	9.11	21	-11.89
High	2480	7.37	21	-13.63

**OUTPUT POWER**







### 7.2.3. AVERAGE POWER

#### LIMIT

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

#### RESULTS

The cable assembly insertion loss of 0 dB (including 10 dB pad and 0 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	5.30
Middle	2441	6.20
High	2480	4.60

## **7.2.4. CONDUCTED SPURIOUS EMISSIONS**

### **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

### **TEST PROCEDURE**

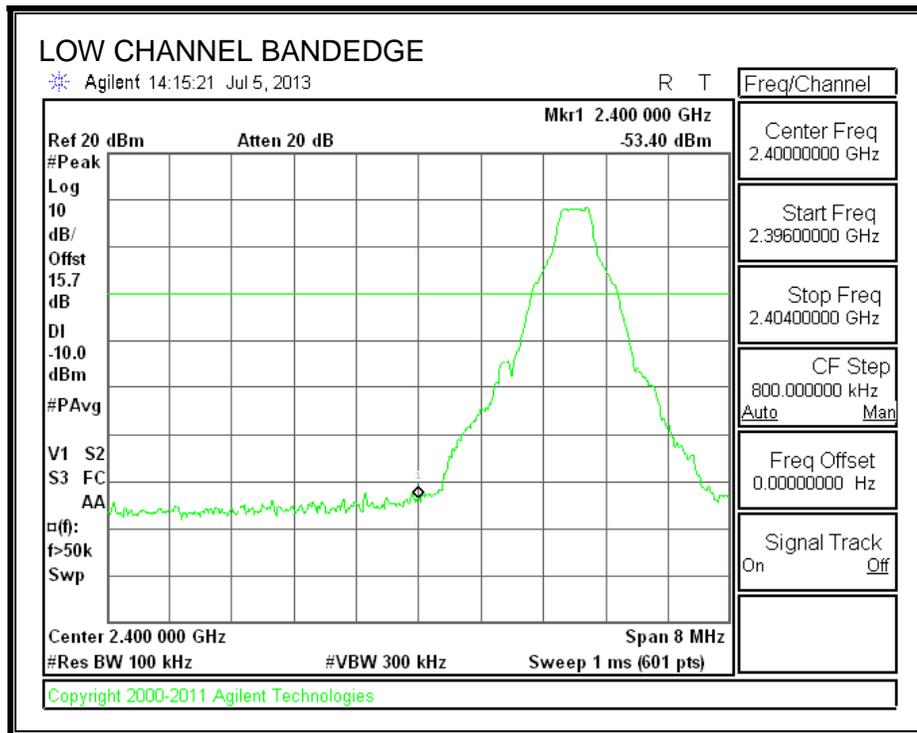
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

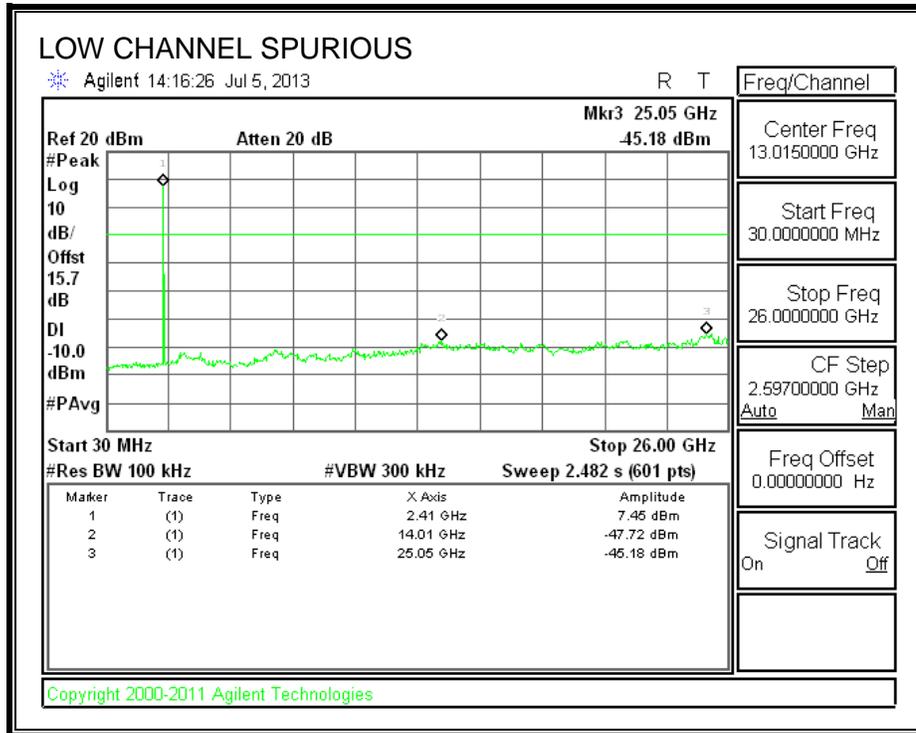
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

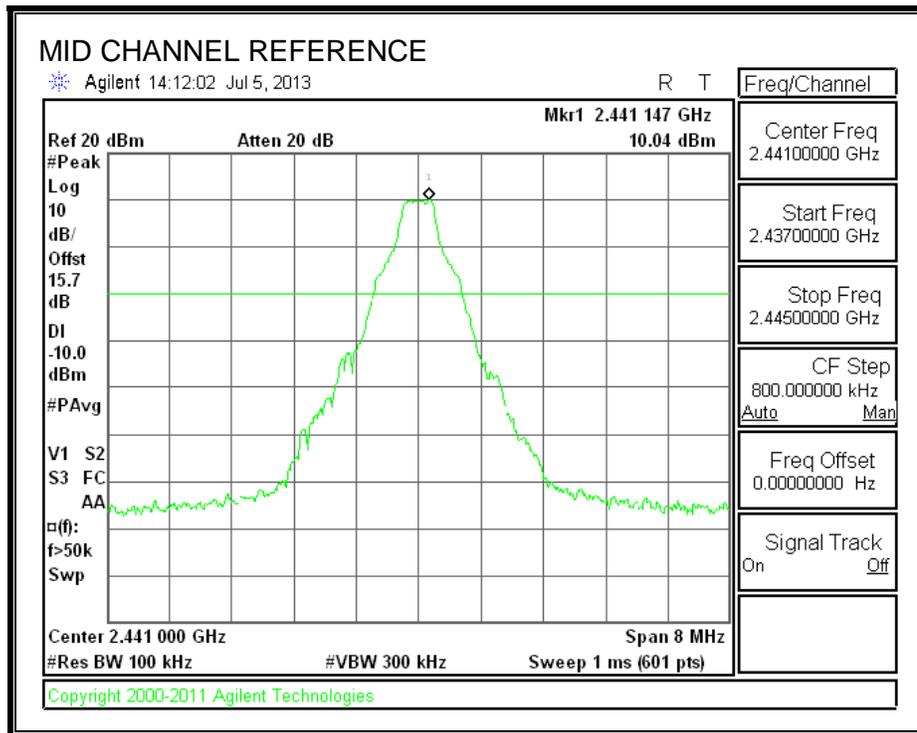
### **RESULTS**

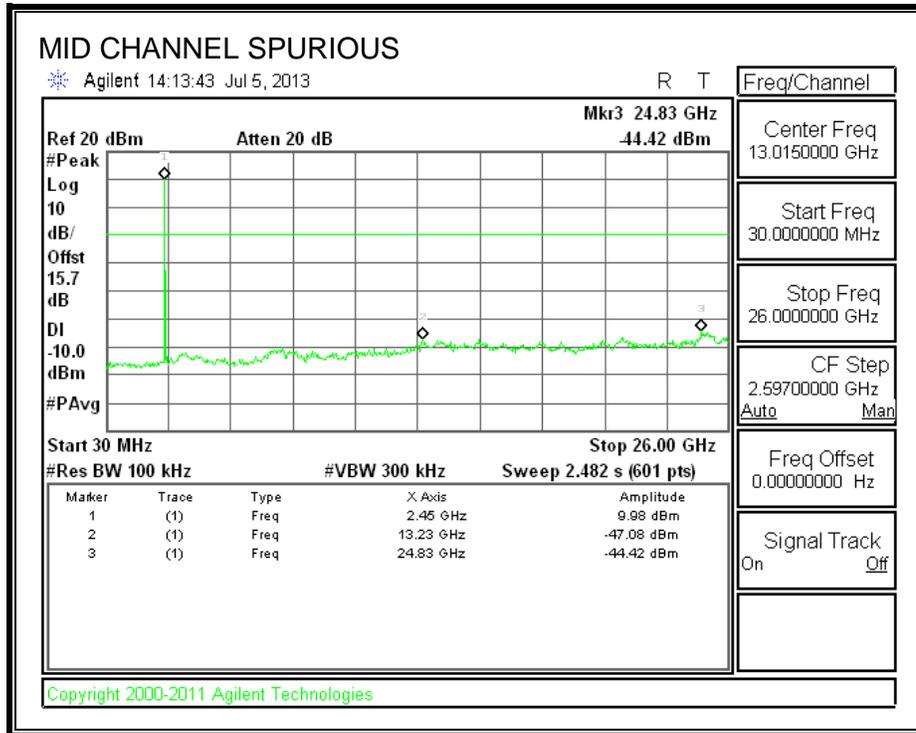
**SPURIOUS EMISSIONS, LOW CHANNEL**



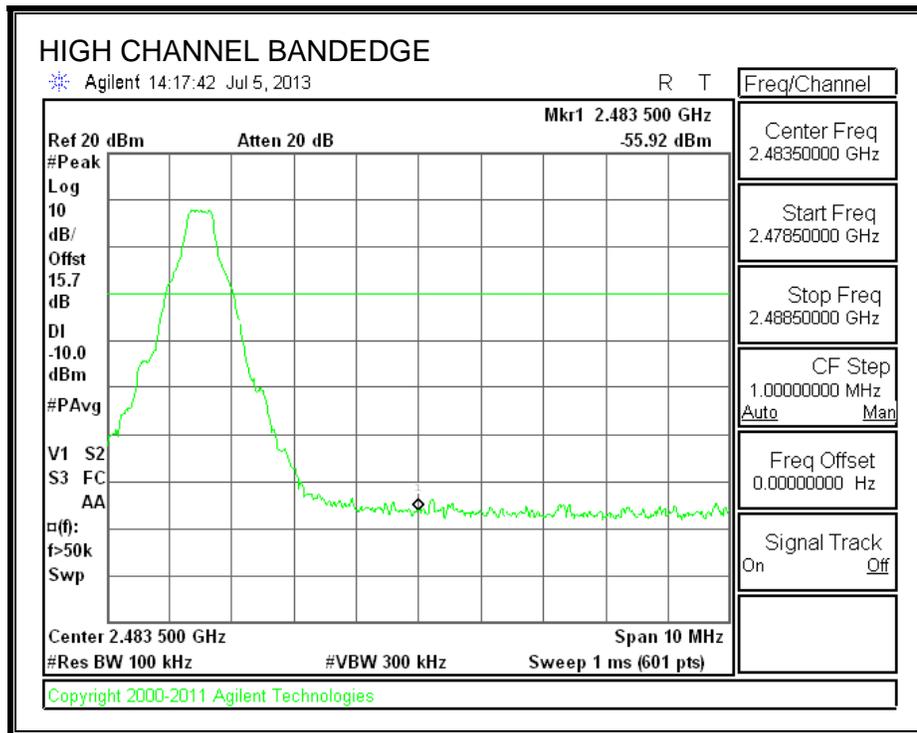


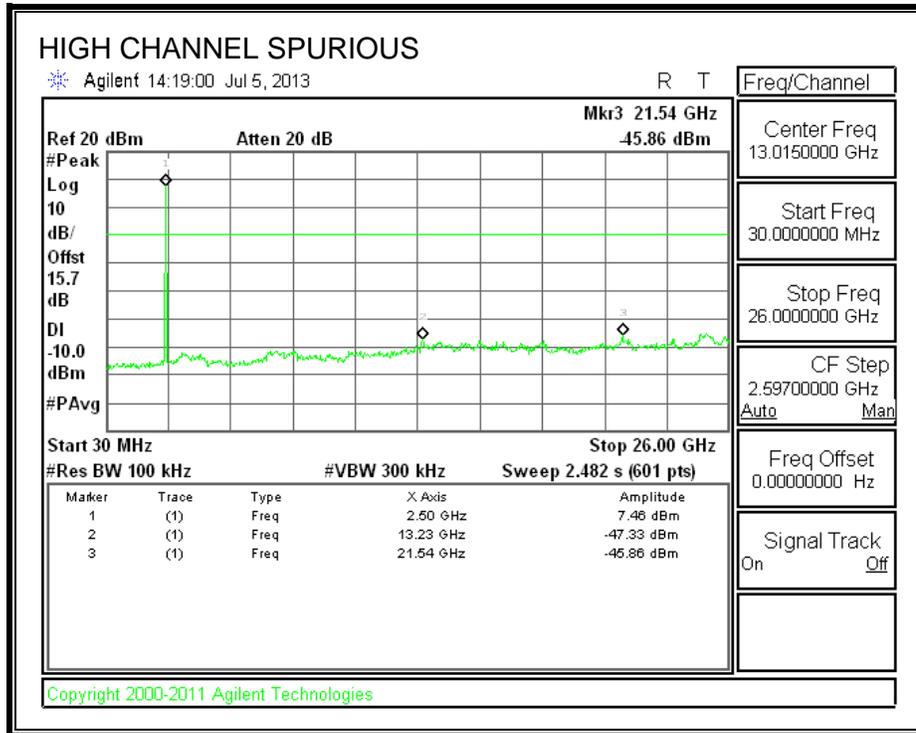
**SPURIOUS EMISSIONS, MID CHANNEL**



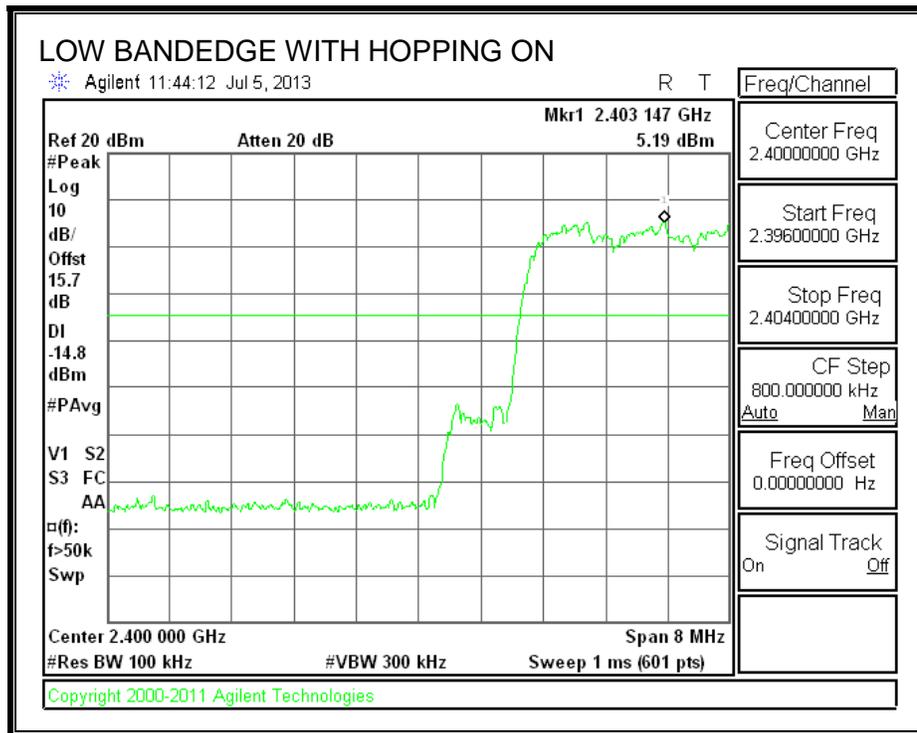


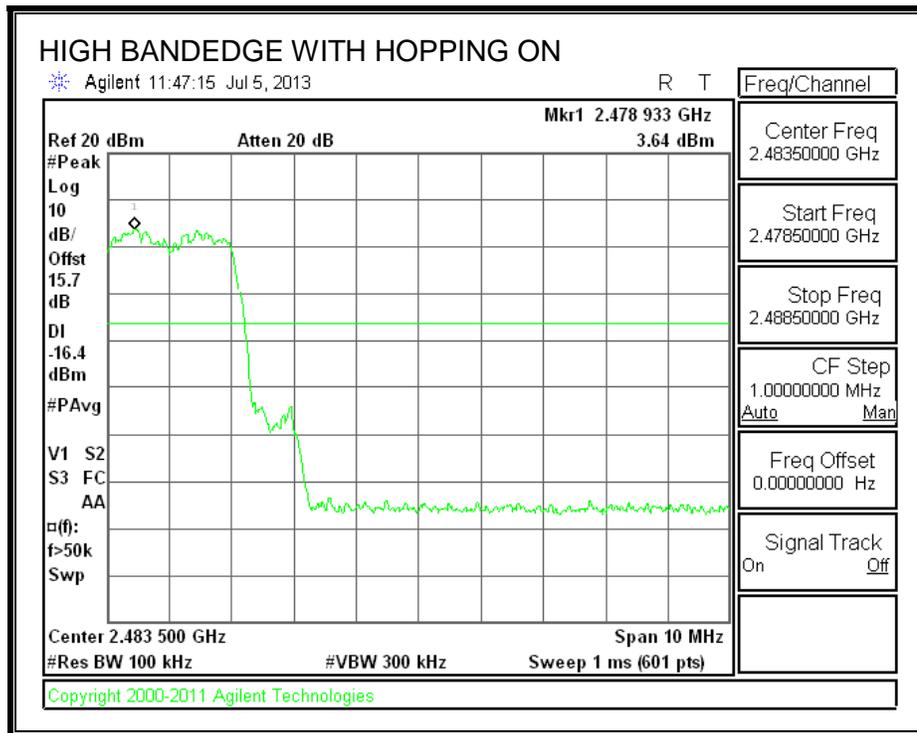
**SPURIOUS EMISSIONS, HIGH CHANNEL**





**SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**







## 8. RADIATED TEST RESULTS

### 8.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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. 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.

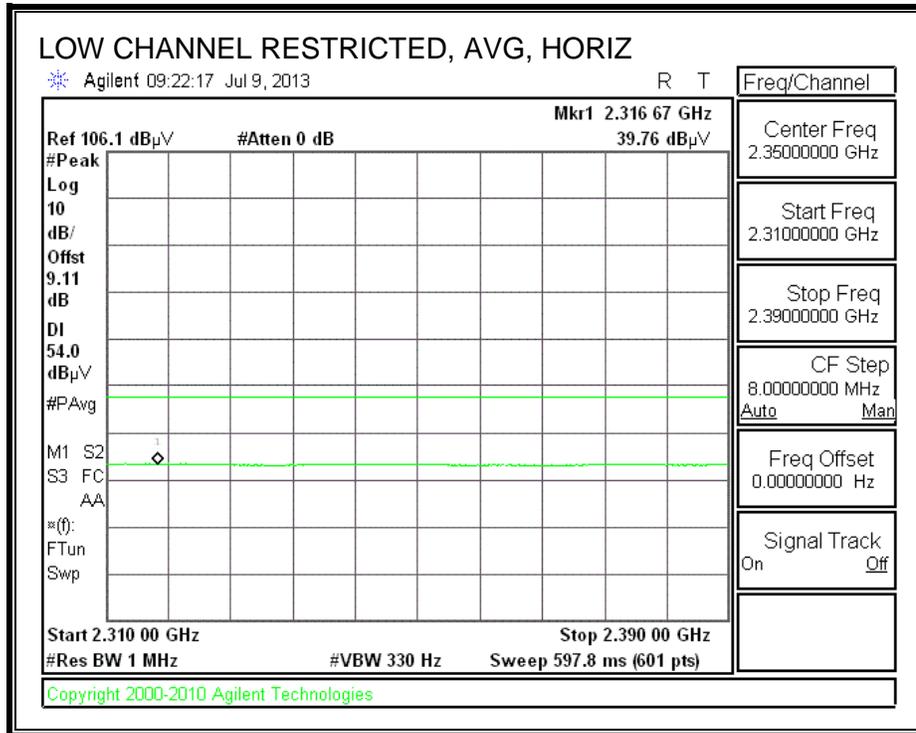
For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

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.

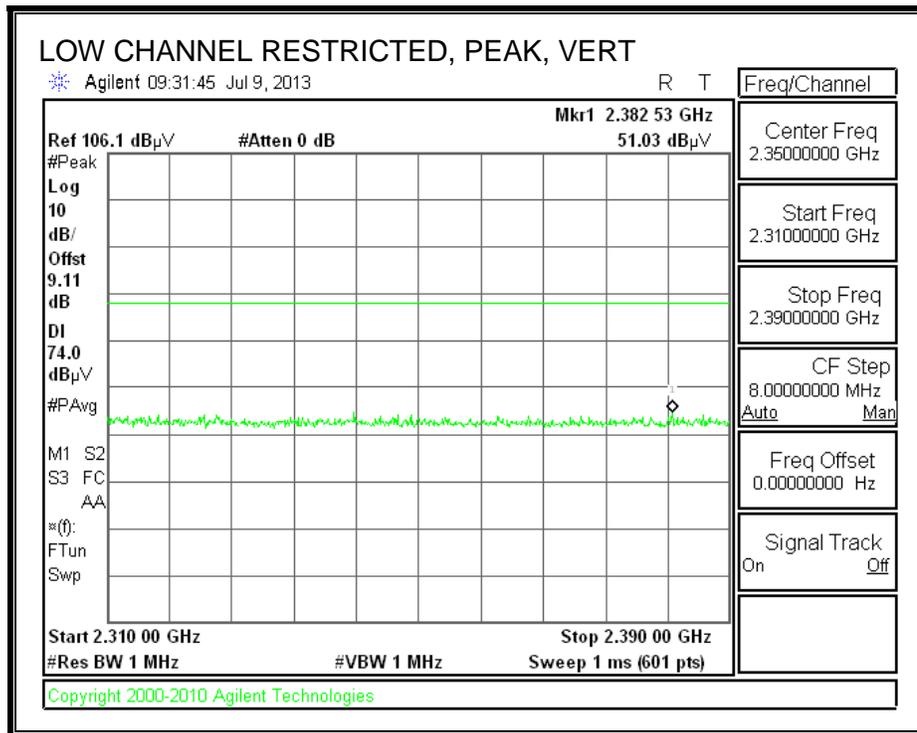
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

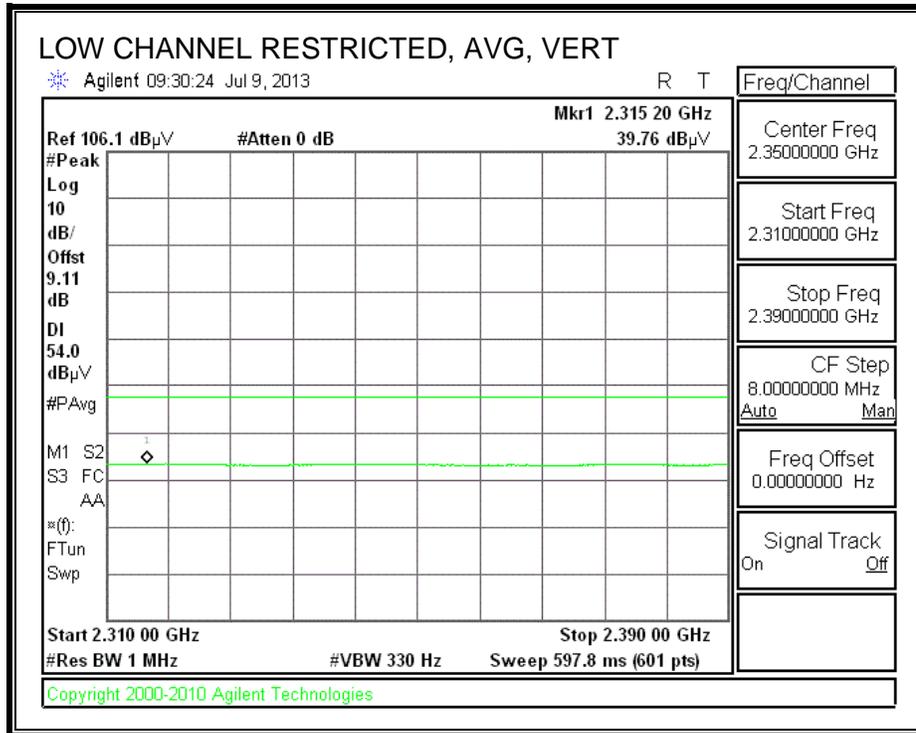
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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



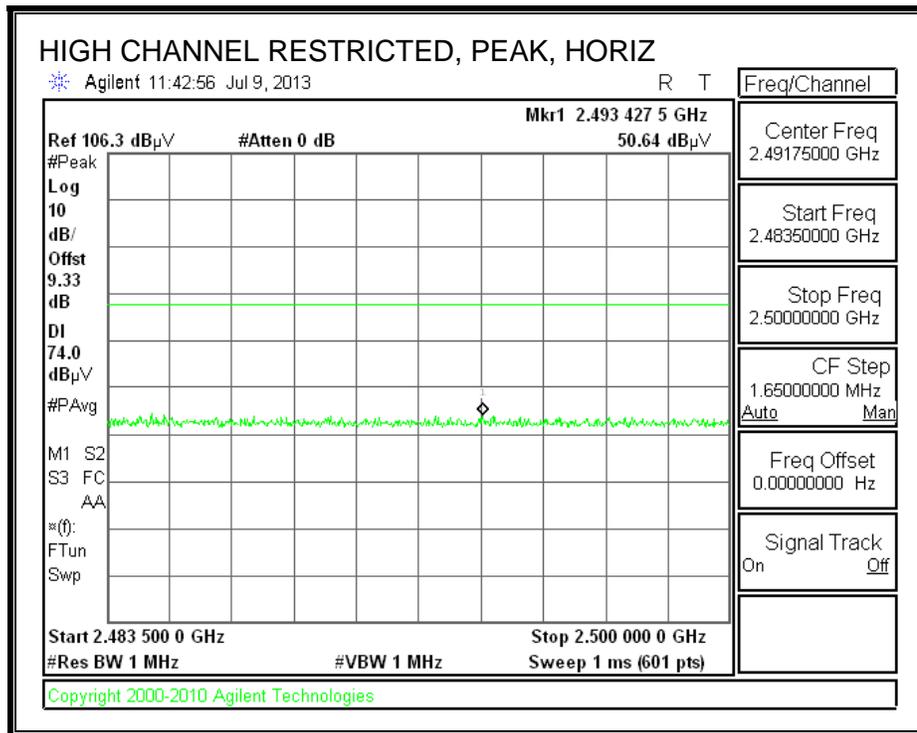


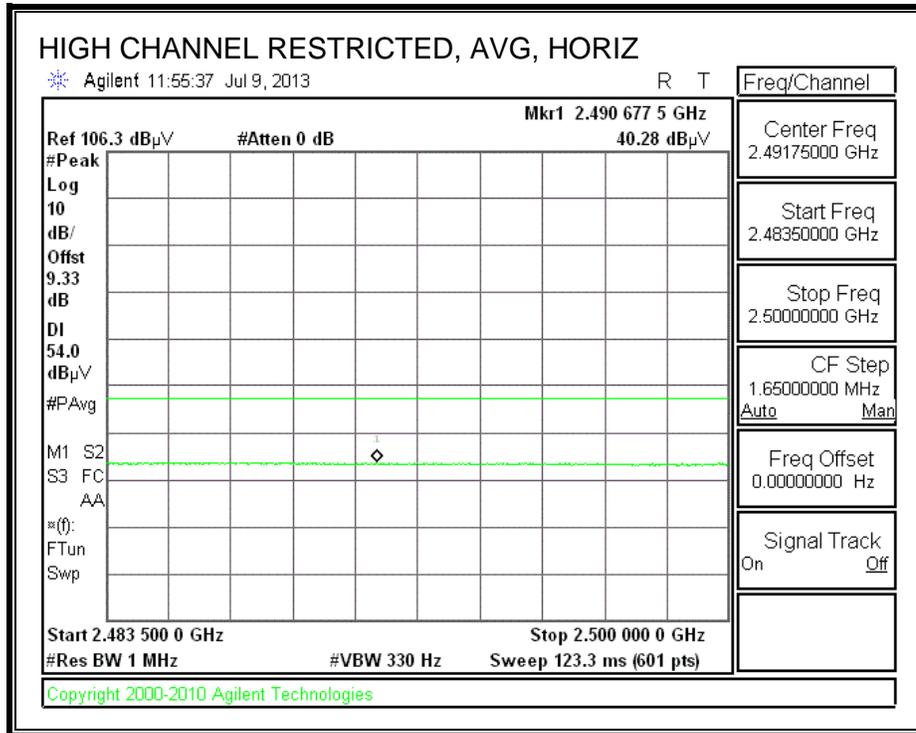
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



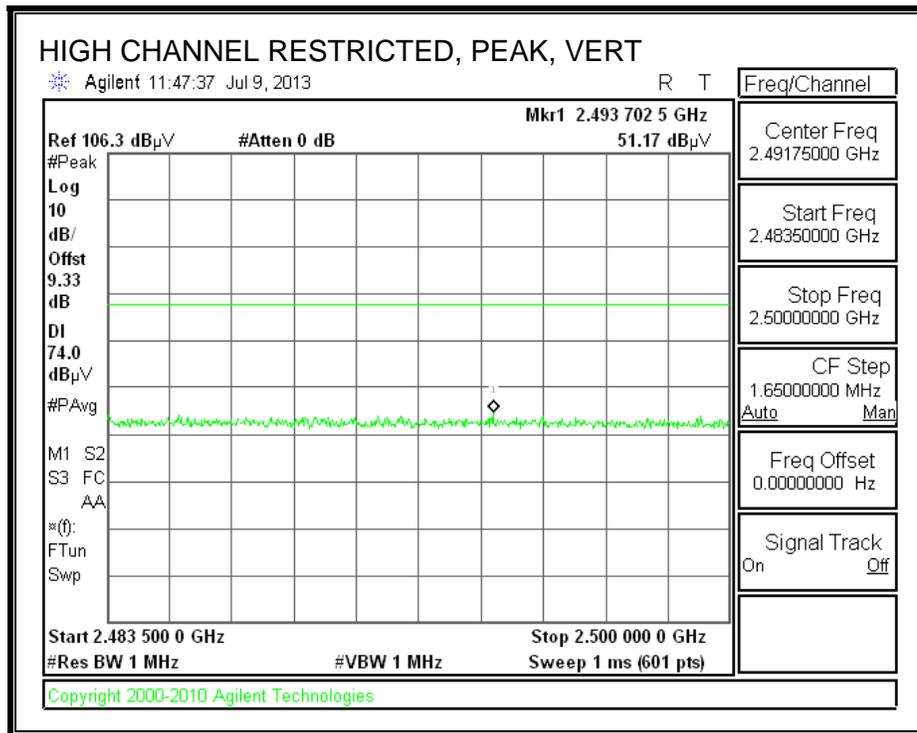


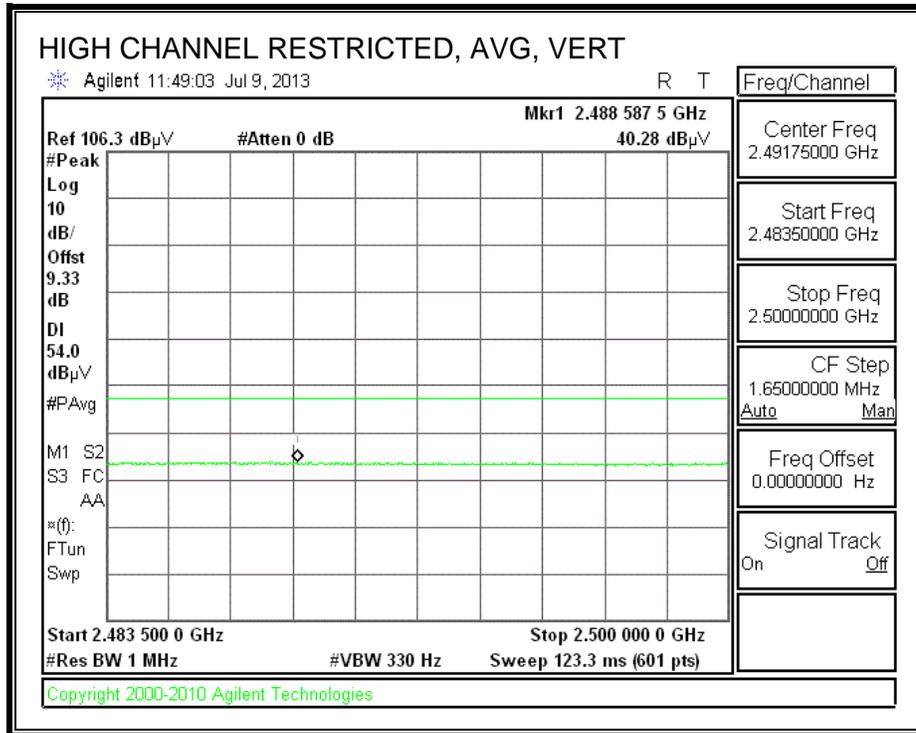
**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**





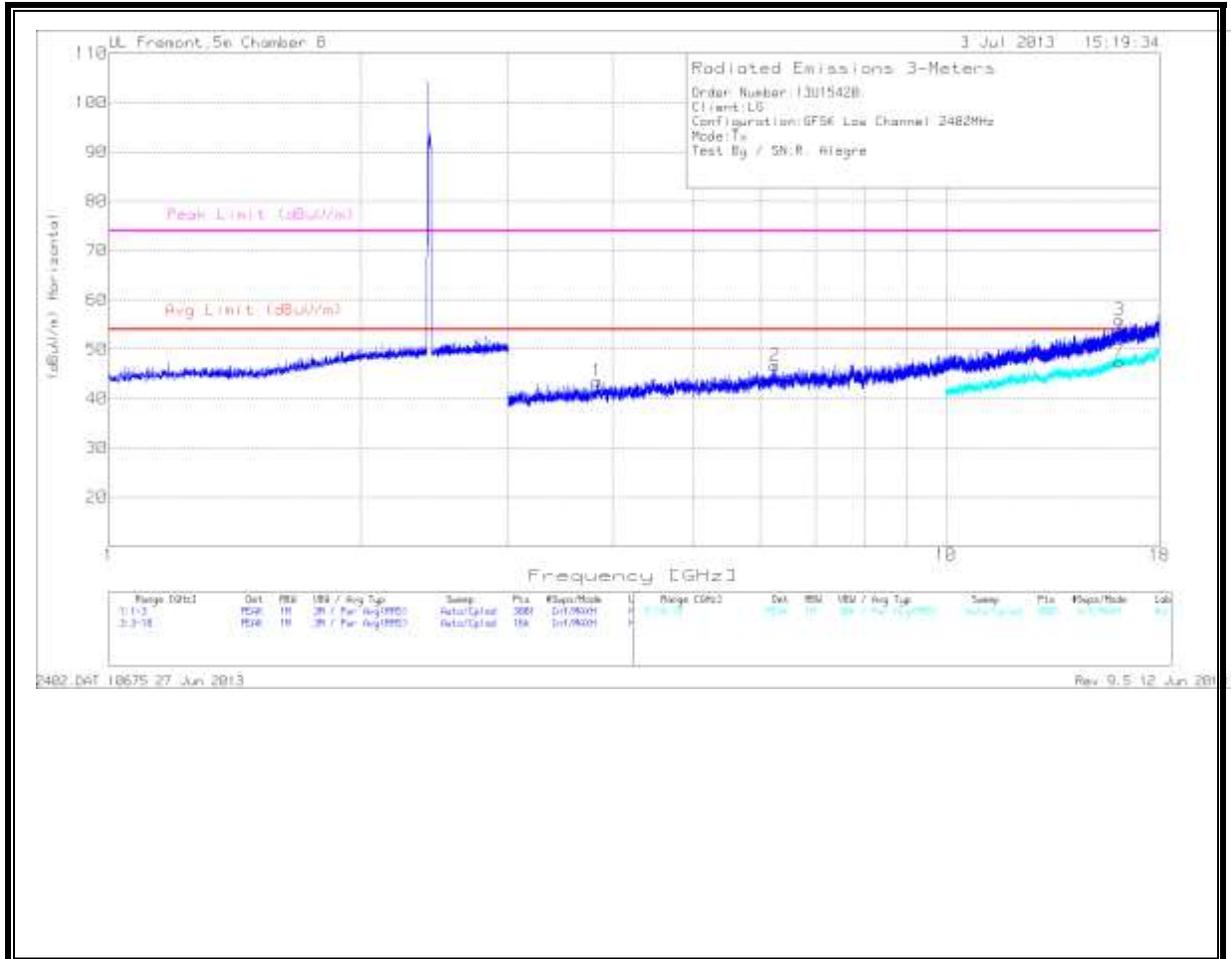
**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



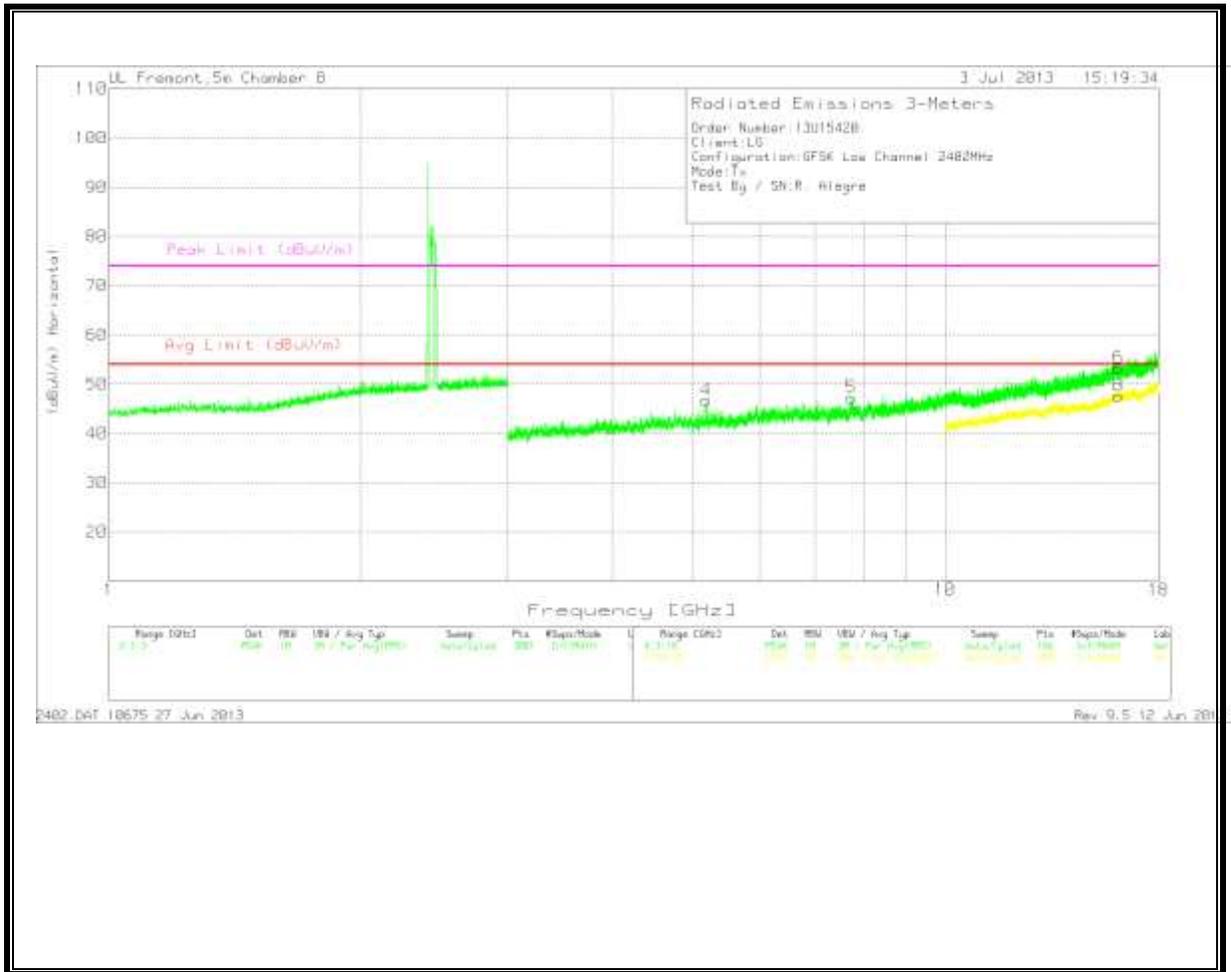


**HARMONICS AND SPURIOUS EMISSIONS**

LOW CHANNEL  
 HORIZONTAL



VERTICAL

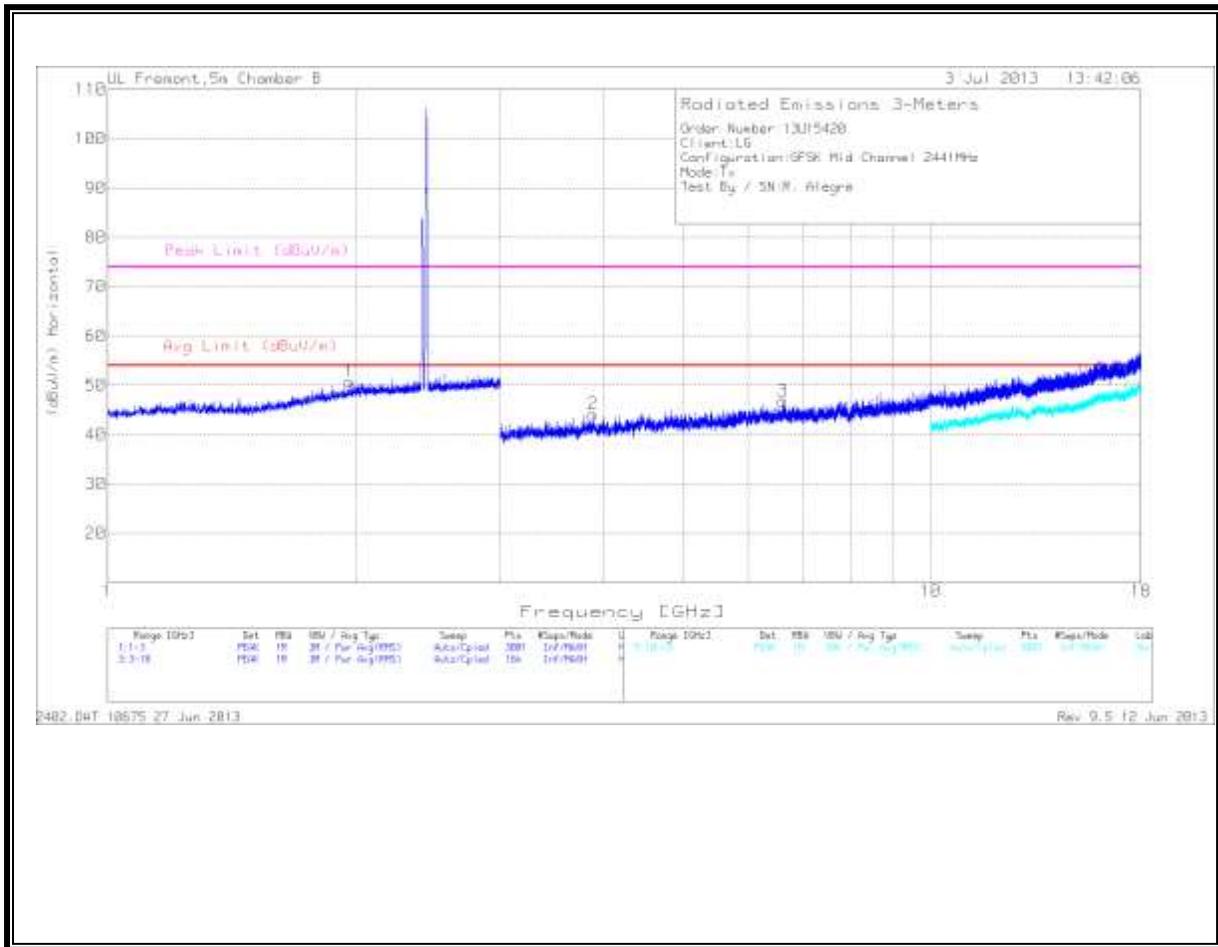


LOW CHANNEL DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3.832	40.63	PK	33.8	-30.9	43.53	53.97	-10.44	74	-30.47	0-360	200	H
6.252	39.28	PK	36	-28.6	46.68	53.97	-7.29	74	-27.32	0-360	200	H
5.18	42.56	PK	34.8	-30.6	46.76	53.97	-7.21	74	-27.24	0-360	100	V
7.721	36.68	PK	36.2	-25.6	47.28	53.97	-6.69	74	-26.72	0-360	200	V
16.105	32.67	PK	41.5	-20.9	53.27	53.97	-0.7	74	-20.73	0-360	100	V
16.107	26.78	PK	41.5	-20.9	47.38	53.97	-6.59	74	-26.62	0-360	200	H
16.1	27.03	PK	41.5	-20.9	47.63	53.97	-6.34	74	-26.37	0-360	200	V

PK - Peak detector

MID CHANNEL  
 HORIZONTAL



VERTICAL

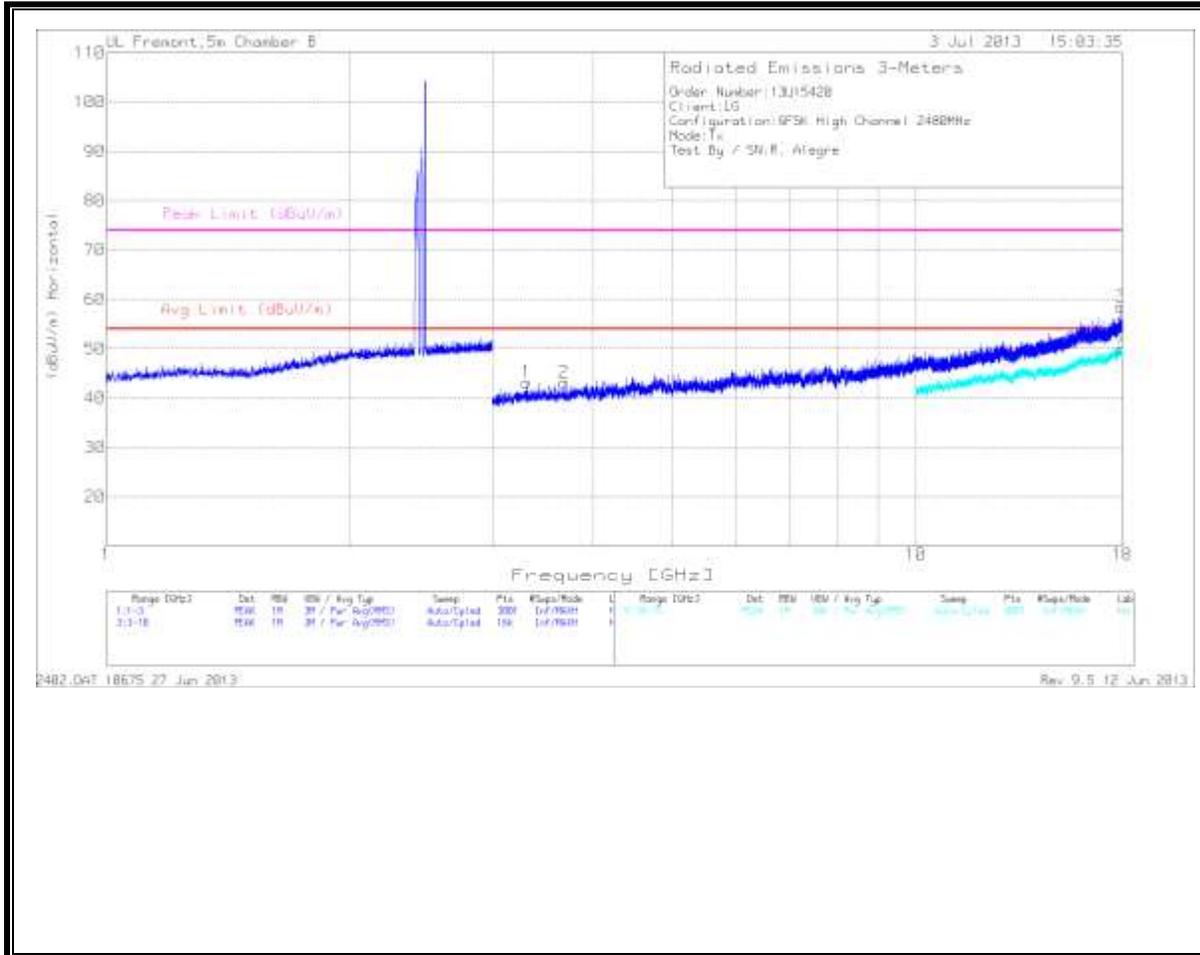


MID CHANNEL DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.967	43.18	PK	31.6	-24.1	50.68	53.97	-3.29	74	-23.32	0-360	100	H
1.973	43.24	PK	31.6	-24	50.84	53.97	-3.13	74	-23.16	0-360	200	V
3.89	40.79	PK	33.9	-30.6	44.09	53.97	-9.88	74	-29.91	0-360	200	H
6.615	39.02	PK	35.9	-28.1	46.82	53.97	-7.15	74	-27.18	0-360	200	H
3.874	41.57	PK	33.8	-30.8	44.57	53.97	-9.4	74	-29.43	0-360	200	V
6.616	38.37	PK	35.9	-28.1	46.17	53.97	-7.8	74	-27.83	0-360	100	V

PK - Peak detector

HIGH CHANNEL  
 HORIZONTAL



VERTICAL



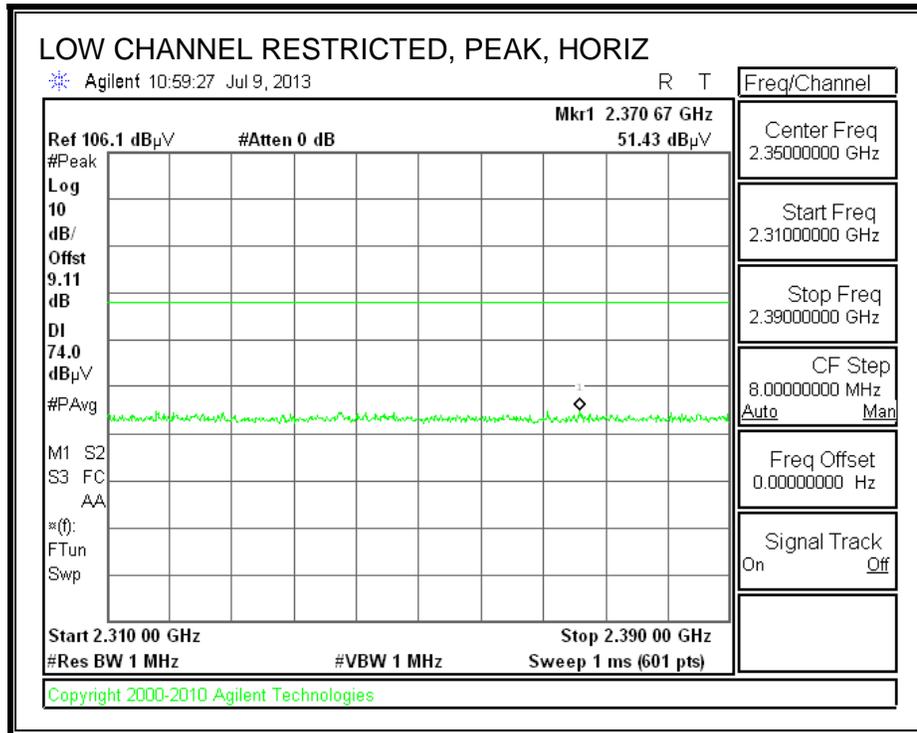
HIGH CHANNEL DATA

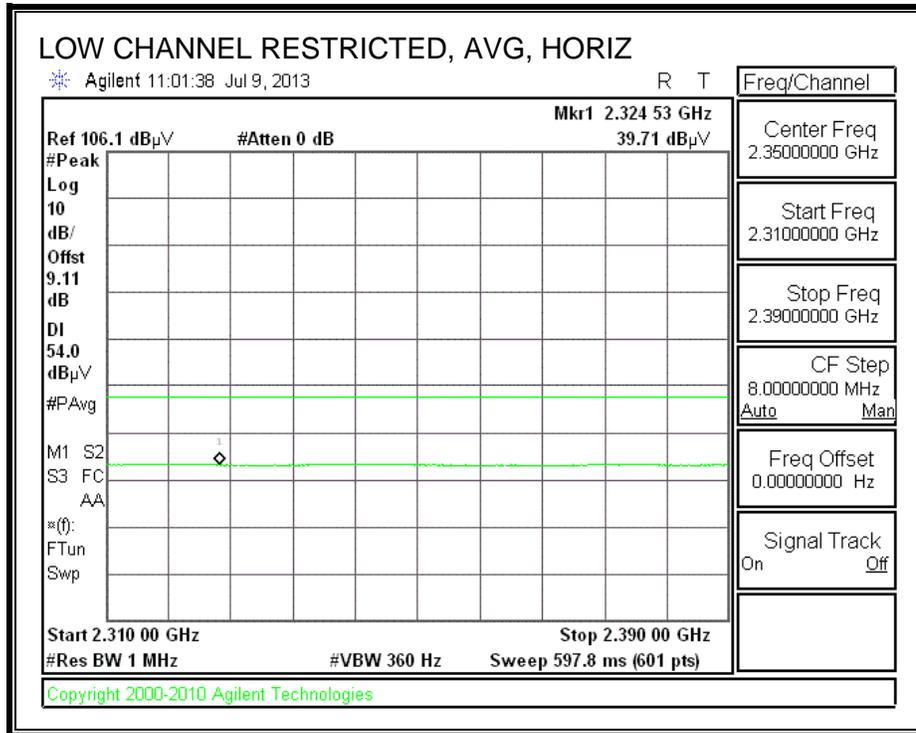
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3.306	41.37	PK	33.3	-31.5	43.17	53.97	-10.8	74	-30.83	0-360	100	H
3.68	41.14	PK	33.6	-31.6	43.14	53.97	-10.83	74	-30.86	0-360	200	H
4.848	40.56	PK	34.7	-30.4	44.86	53.97	-9.11	74	-29.14	0-360	200	V
8.527	38.34	PK	36.2	-26.5	48.04	53.97	-5.93	74	-25.96	0-360	100	V
17.934	26.22	PK	42.2	-18.5	49.92	53.97	-4.05	74	-24.08	0-360	100	H
16.157	26.85	PK	41.5	-20.8	47.55	53.97	-6.42	74	-26.45	0-360	100	V

PK - Peak detector

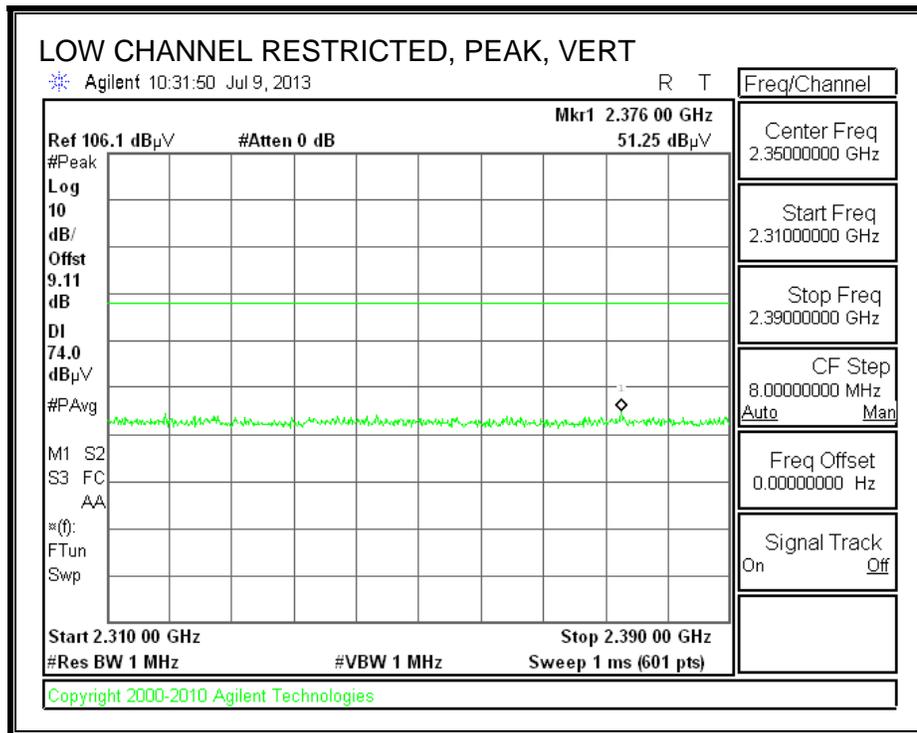
### 8.2.2. ENHANCED DATA RATE 8PSK MODULATION

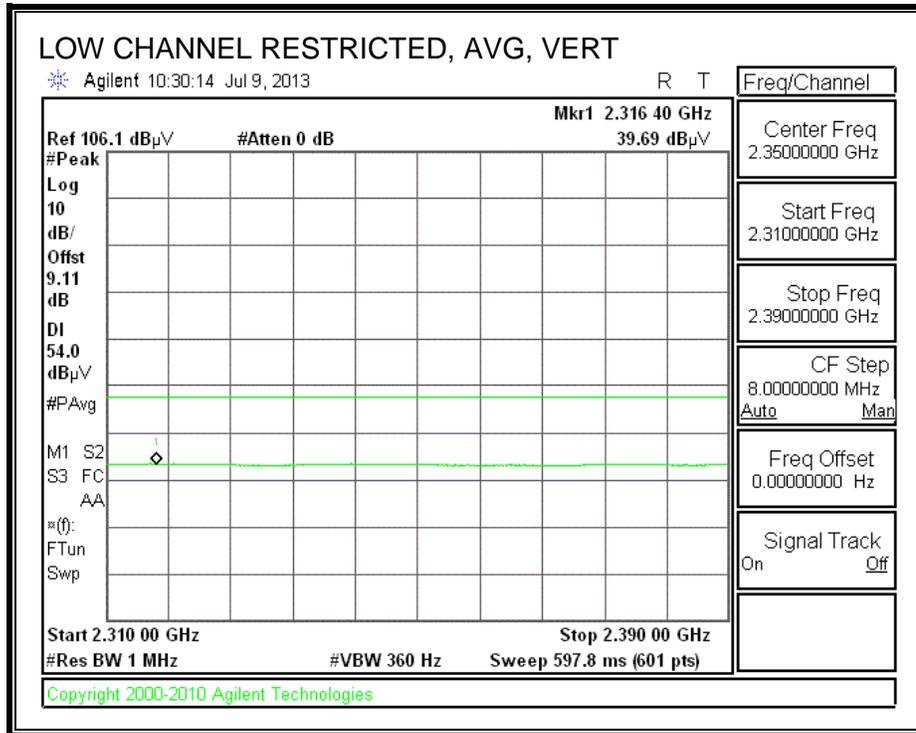
#### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



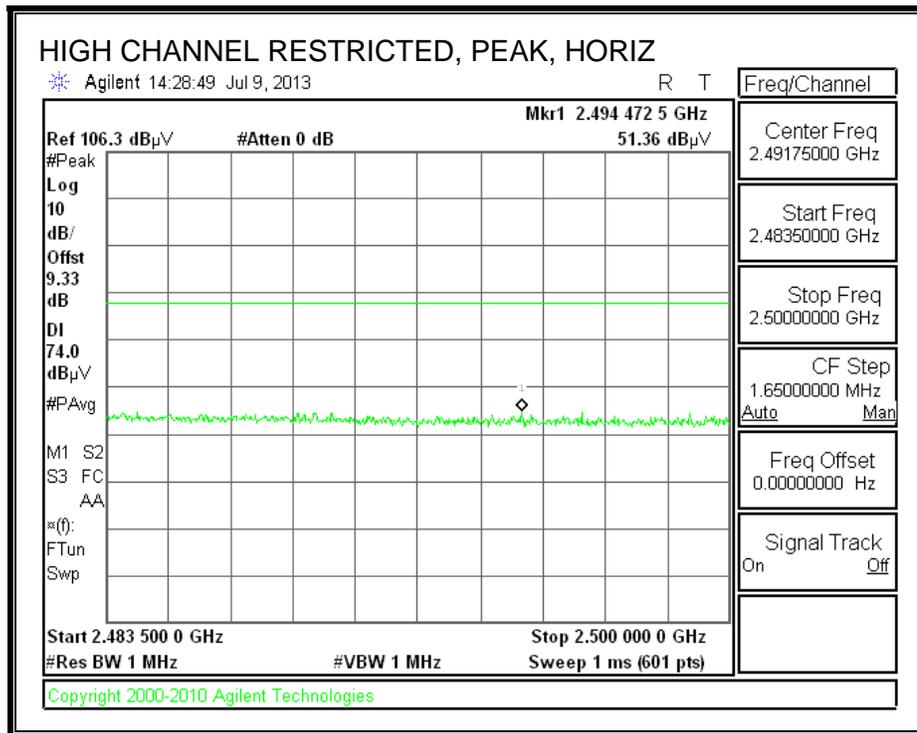


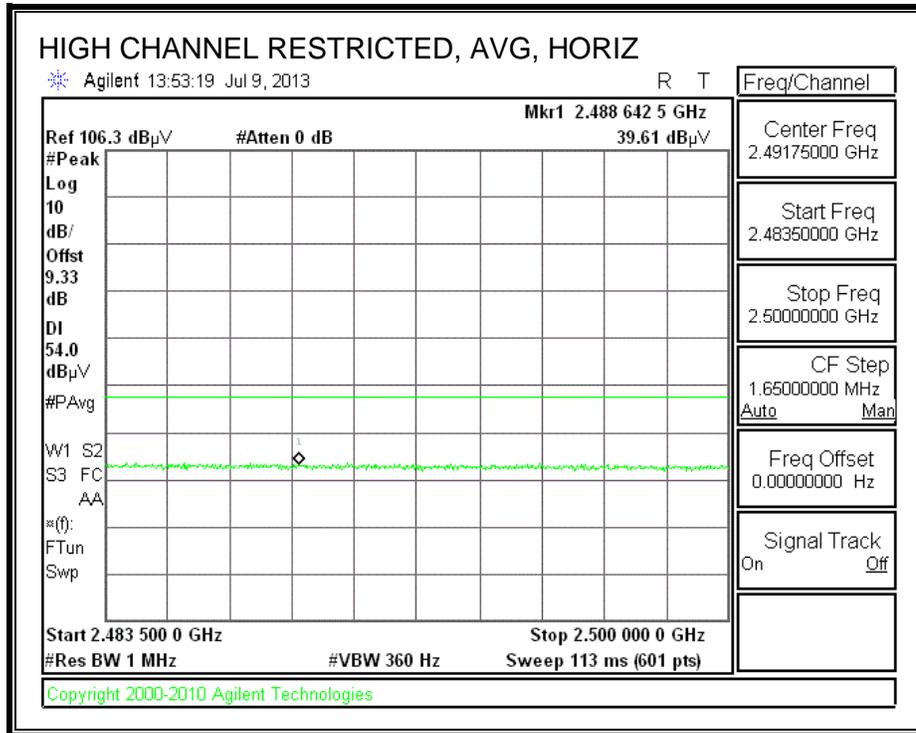
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



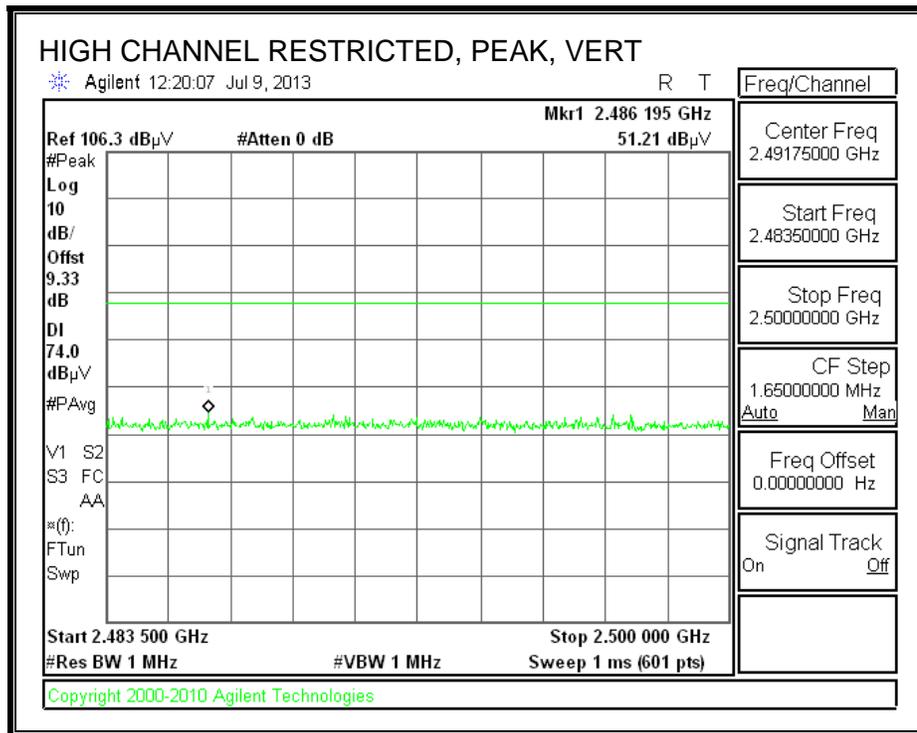


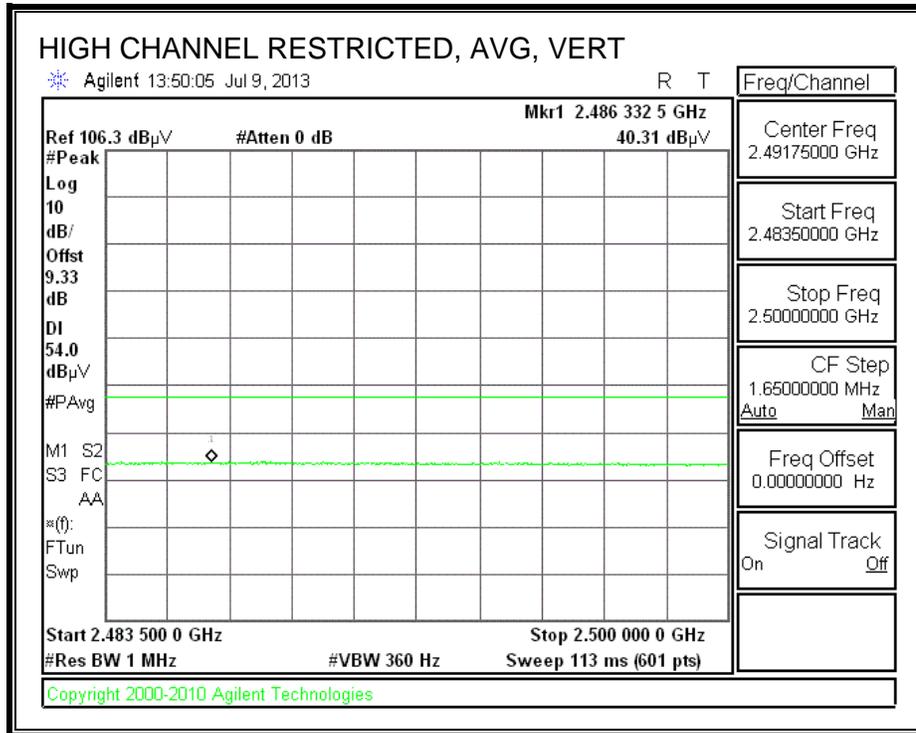
**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**





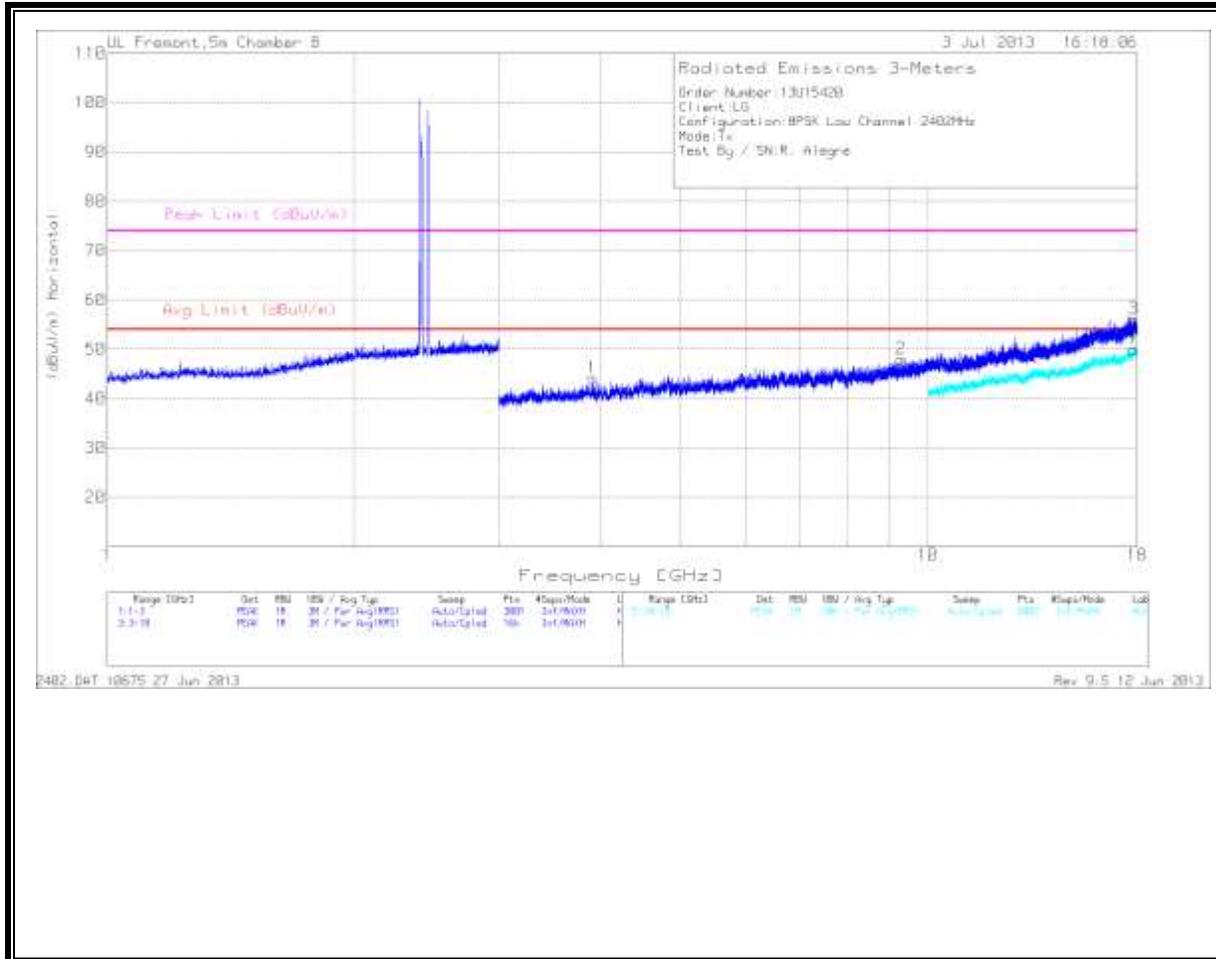
**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**





**HARMONICS AND SPURIOUS EMISSIONS**

LOW CHANNEL  
 HORIZONTAL



VERTICAL

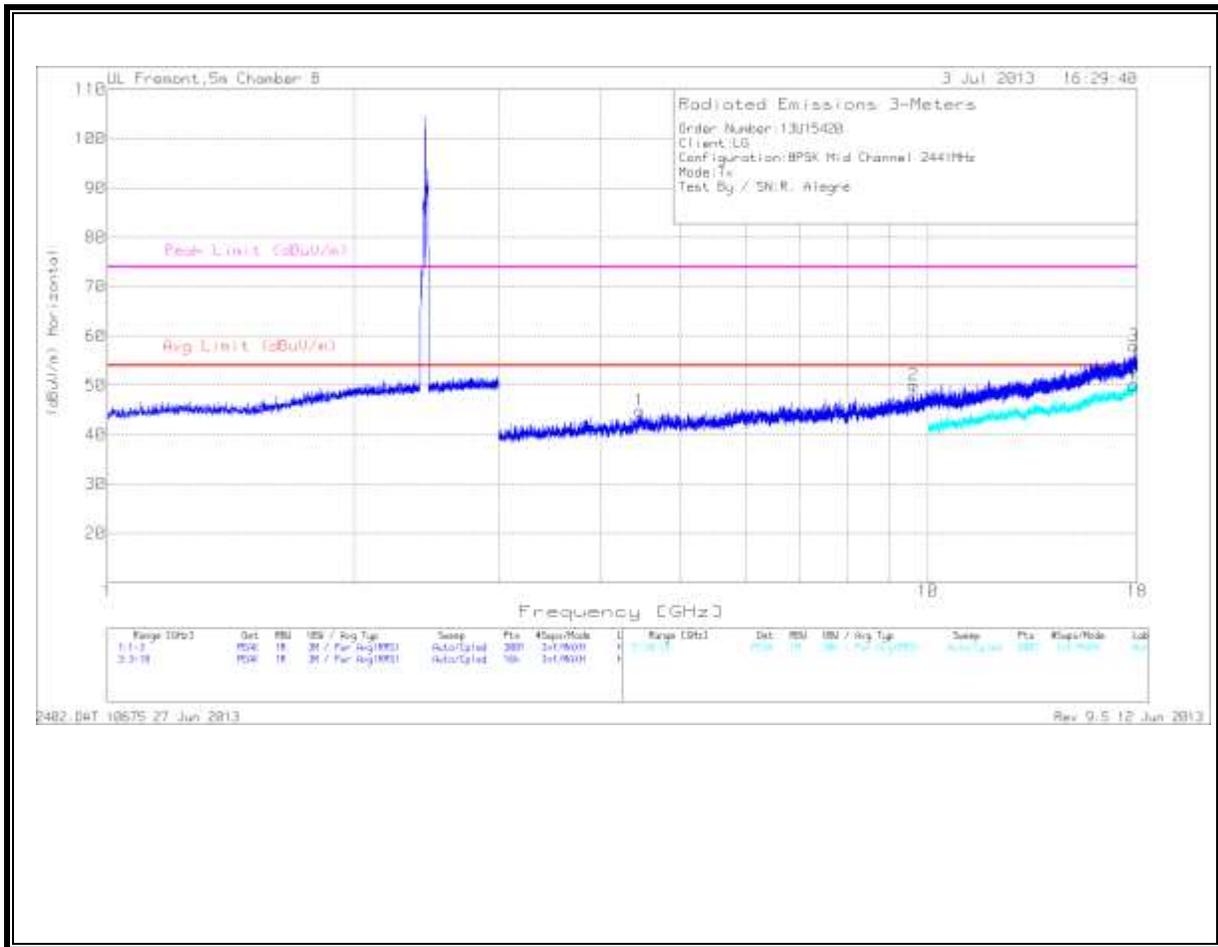


LOW CHANNEL DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3.907	41.09	PK	33.9	-30.9	44.09	53.97	-9.88	74	-29.91	0-360	200	H
9.28	35.72	PK	36.9	-24.6	48.02	53.97	-5.95	74	-25.98	0-360	200	H
4.052	41.46	PK	33.9	-31.6	43.76	53.97	-10.21	74	-30.24	0-360	100	V
6.68	40.29	PK	35.8	-29.3	46.79	53.97	-7.18	74	-27.21	0-360	200	V
17.804	26.83	PK	42.2	-19.1	49.93	53.97	-4.04	74	-24.07	0-360	100	H
17.834	27.04	PK	42.2	-18.7	50.54	53.97	-3.43	74	-23.46	0-360	100	V

PK - Peak detector

MID CHANNEL  
 HORIZONTAL



VERTICAL

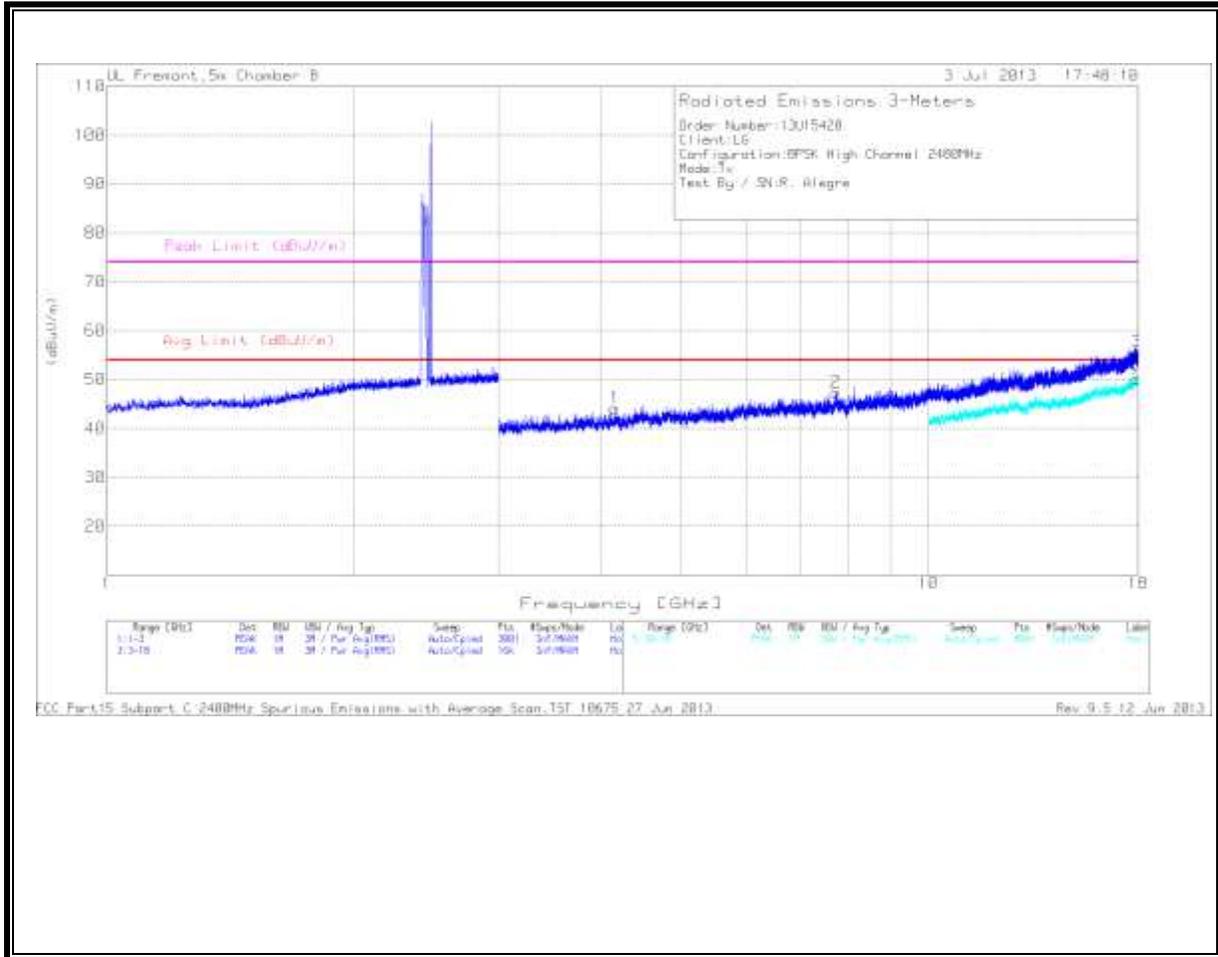


MID CHANNEL DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4.459	39.75	PK	34.4	-29.4	44.75	53.97	-9.22	74	-29.25	0-360	200	H
9.616	36.93	PK	37.3	-24.2	50.03	53.97	-3.94	74	-23.97	0-360	200	H
4.466	39.1	PK	34.4	-29.2	44.3	53.97	-9.67	74	-29.7	0-360	200	V
9.828	36	PK	37.6	-24.5	49.1	53.97	-4.87	74	-24.9	0-360	200	V
17.84	26.42	PK	42.2	-18.5	50.12	53.97	-3.85	74	-23.88	0-360	200	H
17.833	27.45	PK	42.2	-18.7	50.95	53.97	-3.02	74	-23.05	0-360	100	V

PK - Peak detector

HIGH CHANNEL  
 HORIZONTAL



VERTICAL



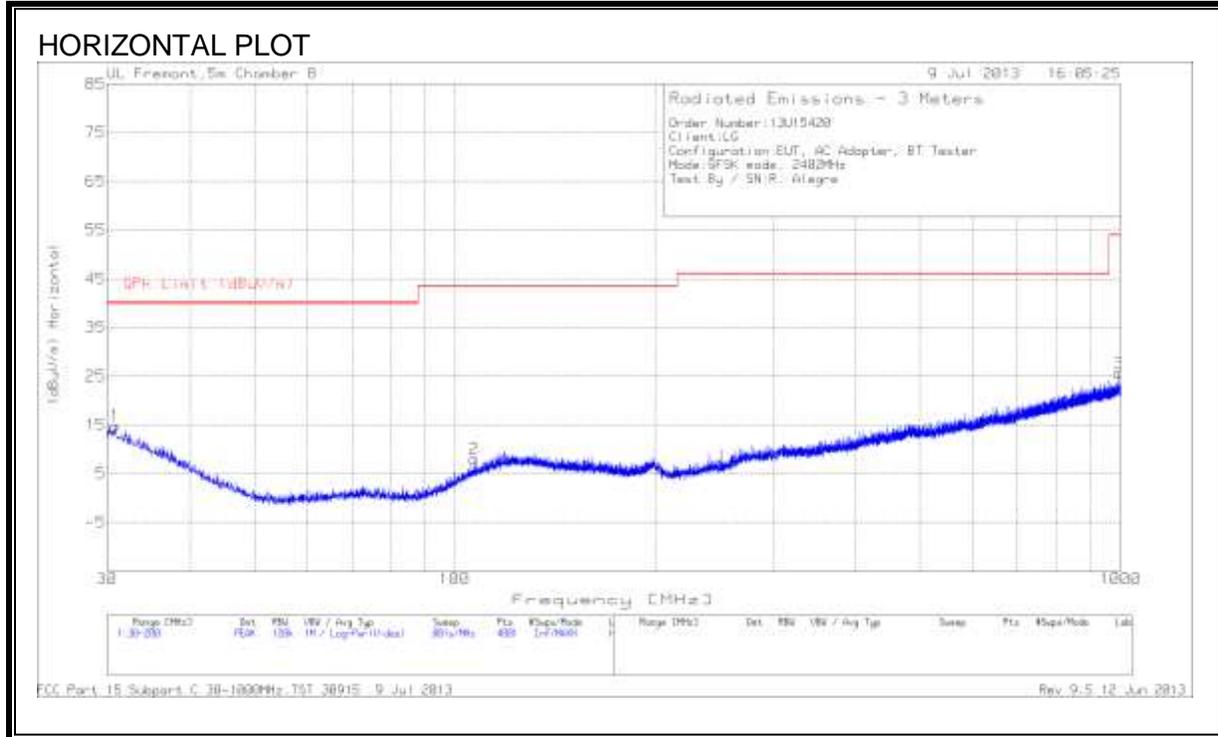
HIGH CHANNEL DATA

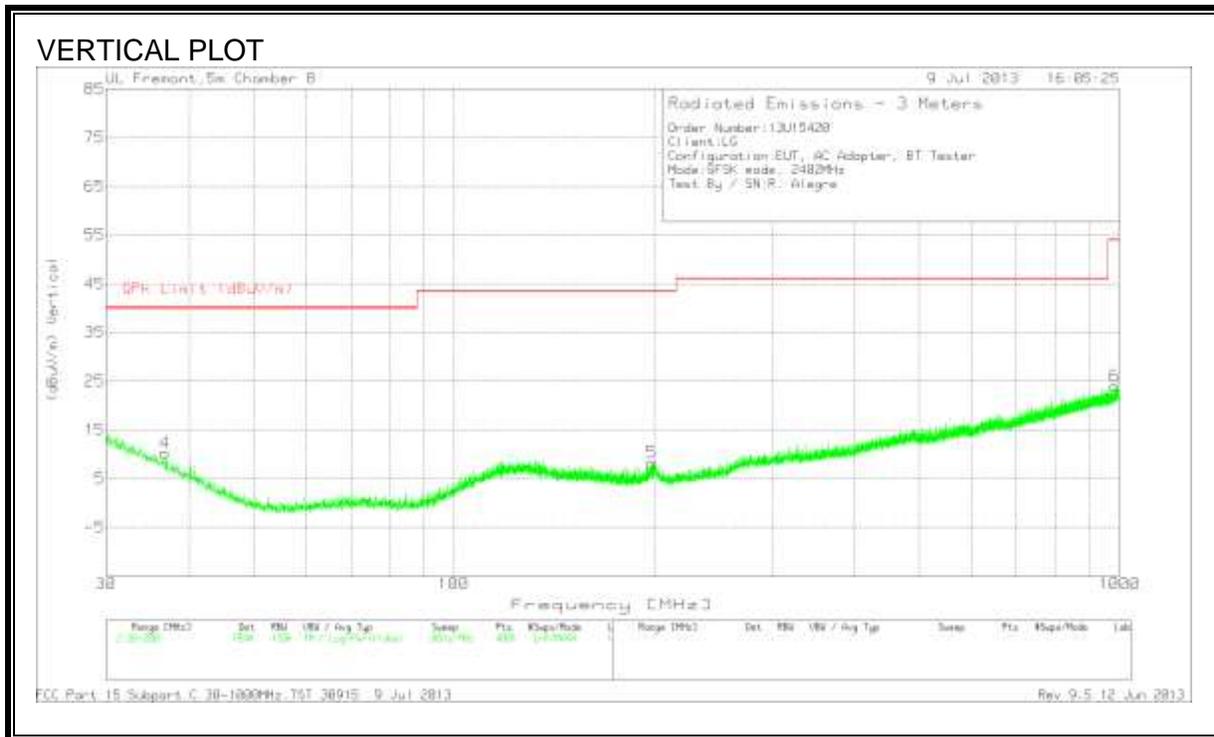
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4.153	40.43	PK	34	-30.3	44.13	53.97	-9.84	74	-29.87	0-360	200	H
7.719	36.83	PK	36.2	-25.7	47.33	53.97	-6.64	74	-26.67	0-360	200	H
4.536	40.54	PK	34.5	-30.2	44.84	53.97	-9.13	74	-29.16	0-360	100	V
6.105	40.65	PK	35.9	-30	46.55	53.97	-7.42	74	-27.45	0-360	200	V
17.907	26.38	PK	42.2	-18.5	50.08	53.97	-3.89	74	-23.92	0-360	200	H
17.912	26.27	PK	42.2	-18.5	49.97	53.97	-4	74	-24.03	0-360	100	V

PK - Peak detector

### 8.3. WORST-CASE BELOW 1 GHz

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





DATA

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
30.85	23.17	PK	20.4	-28.8	14.77	40	-25.23	0-360	300	H
106.925	24	PK	12	-28	8	43.52	-35.52	0-360	400	H
36.8	23.13	PK	15.9	-28.8	10.23	40	-29.77	0-360	100	V
198.3	23.07	PK	12.2	-27	8.27	43.52	-35.25	0-360	100	V
994.5	24.7	PK	23.3	-22.4	25.6	53.97	-28.37	0-360	400	H
983.9	23.4	PK	23.1	-22.5	24	53.97	-29.97	0-360	300	V

PK - Peak detector

## 9. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	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

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

### RESULTS

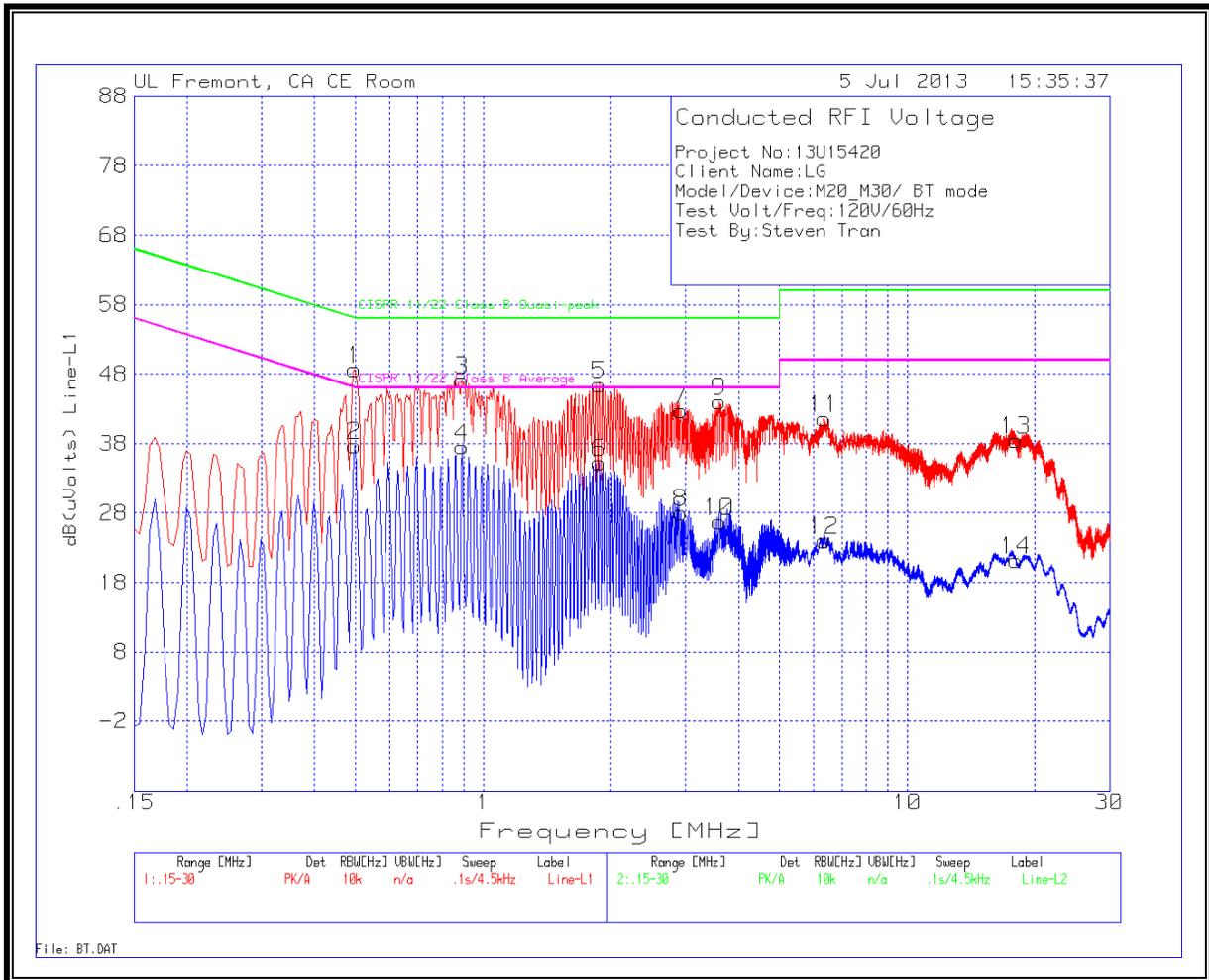
**6 WORST EMISSIONS**

Project No:13U15420  
 Client Name:LG  
 Model/Device:M20\_M30/ BT mode  
 Test Volt/Freq:120V/60Hz  
 Test By:Steven Tran

Test Frequency	Meter Reading	Detector	T24 IL L1.TXT (dB)	LC Cables 1&3.TXT (dB)	dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin	CISPR 11/22 Class B Average	Margin
<b>Line-L1 .15 - 30MHz</b>									
0.4965	48.52	PK	0.1	0	48.62	56.1	-7.48	-	-
0.4965	37.59	Av	0.1	0	37.69	-	-	46.1	-8.41
0.8925	46.99	PK	0.1	0	47.09	56	-8.91	-	-
0.8925	37.42	Av	0.1	0	37.52	-	-	46	-8.48
1.878	46.28	PK	0.1	0.1	46.48	56	-9.52	-	-
1.878	35.08	Av	0.1	0.1	35.28	-	-	46	-10.72
2.922	42.6	PK	0.1	0.1	42.8	56	-13.2	-	-
2.922	27.87	Av	0.1	0.1	28.07	-	-	46	-17.93
3.606	43.69	PK	0.2	0.1	43.99	56	-12.01	-	-
3.606	26.51	Av	0.2	0.1	26.81	-	-	46	-19.19
6.378	41.4	PK	0.1	0.1	41.6	60	-18.4	-	-
6.378	23.82	Av	0.1	0.1	24.02	-	-	50	-25.98
18.0105	38.14	PK	0.2	0.2	38.54	60	-21.46	-	-
18.0105	20.82	Av	0.2	0.2	21.22	-	-	50	-28.78
<b>Line-L2 .15 - 30MHz</b>									
0.708	45.06	PK	0.1	0	45.16	56	-10.84	-	-
0.708	32.04	Av	0.1	0	32.14	-	-	46	-13.86
1.788	44.05	PK	0.1	0.1	44.25	56	-11.75	-	-
1.788	27.61	Av	0.1	0.1	27.81	-	-	46	-18.19
2.868	41.36	PK	0.1	0.1	41.56	56	-14.44	-	-
2.868	25.53	Av	0.1	0.1	25.73	-	-	46	-20.27
3.885	41.44	PK	0.1	0.1	41.64	56	-14.36	-	-
3.885	25.92	Av	0.1	0.1	26.12	-	-	46	-19.88
6.324	40.06	PK	0.1	0.1	40.26	60	-19.74	-	-
6.324	23.57	Av	0.1	0.1	23.77	-	-	50	-26.23
17.5335	39.76	PK	0.2	0.2	40.16	60	-19.84	-	-
17.5335	23.21	Av	0.2	0.2	23.61	-	-	50	-26.39

PK - Peak detector  
 Av - Average detector

**LINE 1 RESULTS**



**LINE 2 RESULTS**

