



**FCC CFR47 PART 15 SUBPART C**

**CERTIFICATION TEST REPORT**

**FOR**

**GSM Phone + Bluetooth & WLAN 2.4GHz b/g/n**

**MODEL NUMBER: GT-S7278**

**FCC ID: A3LGTS7278**

**REPORT NUMBER: 13U16294-3, Revision B**

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--	10/25/13	Initial Issue	P. Kim
A	11/5/13	Received antenna gain information	P. Kim
B	11/6/13	Pre-amp 1-26GHz calibration date	P. Kim

## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS .....</b>	<b>5</b>
<b>2. TEST METHODOLOGY .....</b>	<b>6</b>
<b>3. FACILITIES AND ACCREDITATION .....</b>	<b>6</b>
<b>4. CALIBRATION AND UNCERTAINTY .....</b>	<b>6</b>
4.1. <i>MEASURING INSTRUMENT CALIBRATION .....</i>	6
4.2. <i>SAMPLE CALCULATION .....</i>	6
4.3. <i>MEASUREMENT UNCERTAINTY.....</i>	6
<b>5. EQUIPMENT UNDER TEST .....</b>	<b>7</b>
5.1. <i>DESCRIPTION OF EUT .....</i>	7
5.2. <i>MAXIMUM OUTPUT POWER.....</i>	7
5.3. <i>DESCRIPTION OF AVAILABLE ANTENNAS .....</i>	7
5.4. <i>SOFTWARE AND FIRMWARE.....</i>	7
5.5. <i>WORST-CASE CONFIGURATION AND MODE.....</i>	8
5.6. <i>DESCRIPTION OF TEST SETUP.....</i>	9
<b>6. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>11</b>
<b>7. MEASUREMENT METHODS .....</b>	<b>12</b>
<b>8. SUMMARY TABLE .....</b>	<b>13</b>
<b>9. ANTENNA PORT TEST RESULTS .....</b>	<b>14</b>
9.1. <i>6 dB BANDWIDTH.....</i>	14
9.1.1. <i>802.11b MODE IN THE 2.4 GHz BAND.....</i>	15
9.1.2. <i>802.11g MODE IN THE 2.4 GHz BAND.....</i>	15
9.1.3. <i>802.11n HT20 MODE IN THE 2.4 GHz BAND .....</i>	15
9.2. <i>99% BANDWIDTH.....</i>	18
9.2.1. <i>802.11b MODE IN THE 2.4 GHz BAND.....</i>	18
9.2.2. <i>802.11g MODE IN THE 2.4 GHz BAND.....</i>	18
9.2.3. <i>802.11n HT20 MODE IN THE 2.4 GHz BAND .....</i>	18
9.3. <i>AVERAGE POWER.....</i>	21
9.3.1. <i>802.11b MODE IN THE 2.4 GHz BAND.....</i>	22
9.3.2. <i>802.11g MODE IN THE 2.4 GHz BAND.....</i>	22
9.3.3. <i>802.11n HT20 MODE IN THE 2.4 GHz BAND .....</i>	22
9.4. <i>OUTPUT POWER.....</i>	23
9.4.1. <i>802.11b MODE IN THE 2.4 GHz BAND.....</i>	24
9.4.2. <i>802.11g MODE IN THE 2.4 GHz BAND.....</i>	24
9.4.3. <i>802.11n HT20 MODE IN THE 2.4 GHz BAND .....</i>	25
9.5. <i>PSD.....</i>	28
9.5.1. <i>802.11b MODE IN THE 2.4 GHz BAND.....</i>	28

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9.5.2.	802.11g MODE IN THE 2.4 GHz BAND.....	28
9.5.3.	802.11n HT20 MODE IN THE 2.4 GHz BAND .....	29
9.6.	<i>OUT-OF-BAND EMISSIONS</i> .....	32
9.6.1.	802.11b MODE IN THE 2.4 GHz BAND.....	33
<b>10.</b>	<b>RADIATED TEST RESULTS .....</b>	<b>45</b>
10.1.	<i>LIMITS AND PROCEDURE</i> .....	45
10.2.	<i>TRANSMITTER ABOVE 1 GHz</i> .....	46
10.2.1.	TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND.....	46
10.2.1.	TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND.....	60
10.3.	<i>WORST-CASE BELOW 1 GHz</i> .....	87
<b>11.</b>	<b>AC POWER LINE CONDUCTED EMISSIONS .....</b>	<b>89</b>
<b>12.</b>	<b>SETUP PHOTOS .....</b>	<b>94</b>

# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
416, MAETAN 3-DONG, YEONGTONG-GU  
SUWON-CITY, GYEONGGI-DO 443-742, South Korea

**EUT DESCRIPTION:** GSM PHONE + BLUETOOTH & WLAN 2.4GHZ B/G/N

**MODEL:** GT-S7278

**SERIAL NUMBER:** FK-319-C, FK-319-B

**DATE TESTED:** OCTOBER 18-24, 2013

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	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  
WISE PROGRAM MANAGER  
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 FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2009, 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 GSM Phone with Bluetooth and WLAN 2.4G capability.

### 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	19.42	87.50
2412 - 2462	802.11g	20.48	111.69
2412 - 2462	802.11n HT20	19.59	90.99

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -4.2 dBi.

### 5.4. SOFTWARE AND FIRMWARE

Software version was 3.0.8-1432316-eng

The firmware used was S7278ZMEAMJ2.

## 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.

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

802.11b mode: 1 Mbps

802.11g mode: 6 Mbps

802.11n HT20mode: MCS0

Radiated emissions for EUT with antenna was performed and passed; therefore, antenna port spurious was not performed.

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	SAMSUNG	ETA3U31CBC	N/A	N/A
Earphone	SAMSUNG	N/A	N/A	N/A

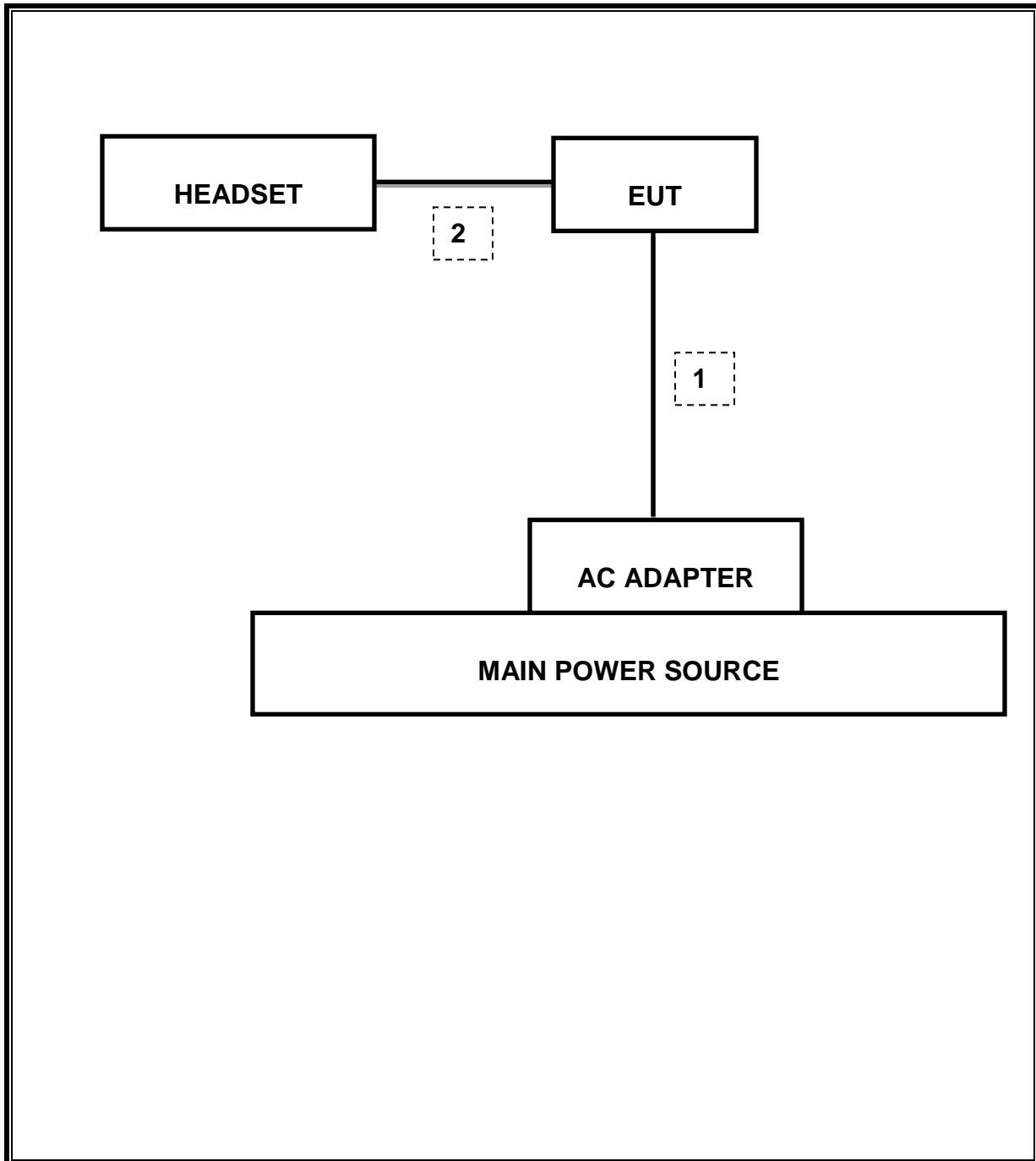
### I/O CABLES

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 a stand-alone unit during the tests. Test software exercised the radio card.

**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	C01016	08/14/13	08/14/14
Antenna, Horn, 18 GHz	ETS	3117	C01006	12/11/12	12/11/13
Antenna, Horn, 25.5 GHz	ARA	MWH-1826/B	C00980	11/14/12	11/14/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/16/13	01/16/14
Preamplifier, 26.5 GHz	Agilent / HP	8449B	F00167	03/23/13	03/23/14
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	10/21/12	10/21/13
PXA SIGNAL ANALYZER	Agilent / HP	N9030A	N/A		05/09/14
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/08/13	08/08/14
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. MEASUREMENT METHODS

KDB 558074 Measurement Procedure PK2 is used for power and PKPSD is used for power spectral density.

Unwanted emissions within Restricted Bands are measured using traditional radiated procedures.

## 8. SUMMARY TABLE

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
15.247 (a)(2)	RSS-210 A8.2(a)	Occupied Band width (6dB)	>500KHz	Conducted	Pass	15.33MHz
2.1051, 15.247 (d)	RSS-210 A8.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-41.86dBm
15.247	RSS-210 A8.4	TX conducted output power	<30dBm		Pass	20.48dBm
15.247	RSS-210 A8.2	PSD	<8dBm		Pass	-5.48dBm
15.207 (a)	RSS-GEN 7.2.2	AC Power Line conducted emissions	Section 10	Radiated	Pass	39.9dBuV
15.205, 15.209	RSS-210 Clause 2.6, RSS-210 Clause 6	Radiated Spurious Emission	< 54dBuV/m		Pass	45.59dBuV/m

## 9. ANTENNA PORT TEST RESULTS

### 9.1. 6 dB BANDWIDTH

#### LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

#### TEST PROCEDURE

Reference to KDB 558074 DTS Meas Guidance 8.0: The transmitter output is connected to a spectrum analyzer with the RBW set to 100kHz, the VBW  $\geq 3 \times$  RBW, peak detector and max hold.

#### RESULTS

**9.1.1. 802.11b MODE IN THE 2.4 GHz BAND**

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	9.00	0.5
Mid	2437	9.03	0.5
High	2462	9.03	0.5
Worst		9.03	

**9.1.2. 802.11g MODE IN THE 2.4 GHz BAND**

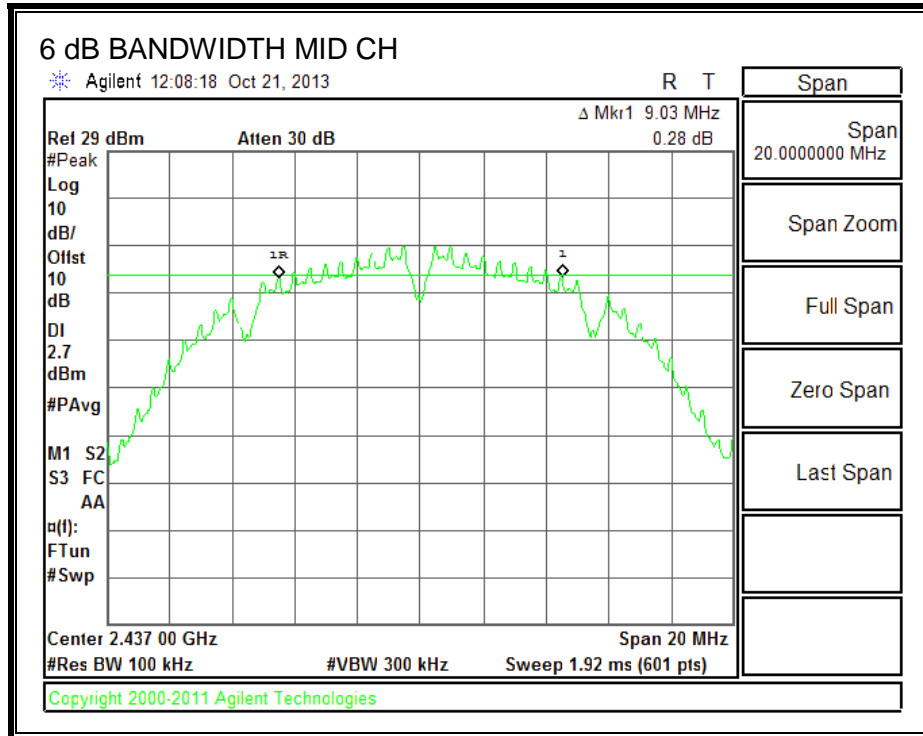
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.29	0.5
Mid	2437	15.29	0.5
High	2462	15.33	0.5
Worst		15.33	

**9.1.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND**

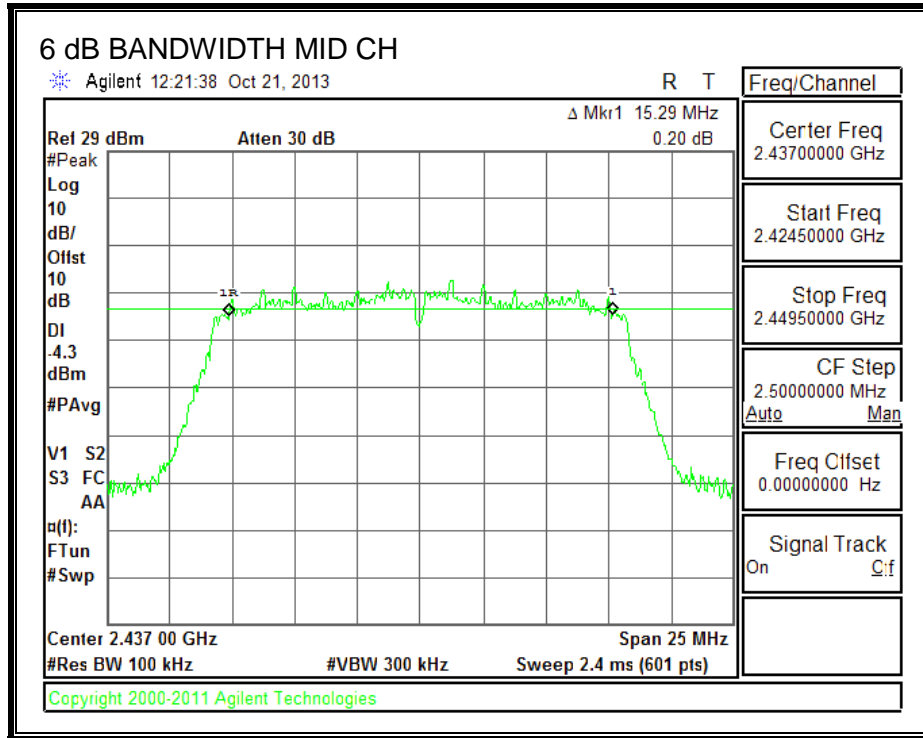
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.33	0.5
Mid	2437	15.38	0.5
High	2462	16.00	0.5
Worst		16.00	

**802.11b 6 dB BANDWIDTH**

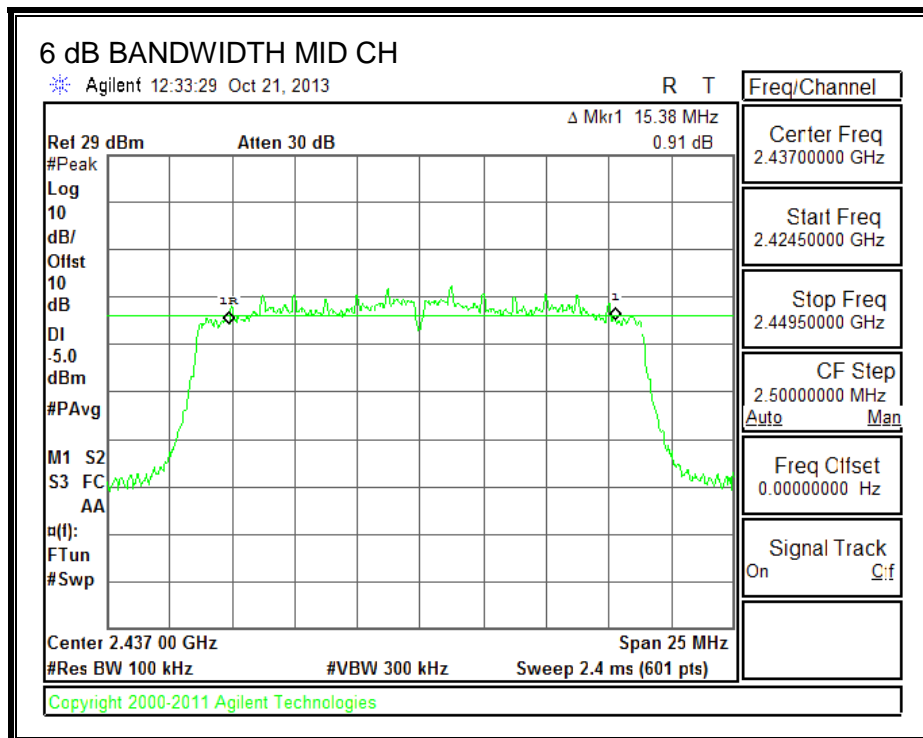
**2.4GHz 802.11b 6 dB BANDWIDTH**



**2.4GHz 802.11g 6 dB BANDWIDTH**



**2.4 GHz 802.11n 6 dB BANDWIDTH**



## 9.2. 99% BANDWIDTH

### LIMITS

None; for reporting purposes only.

### RESULTS

#### 9.2.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	13.11
Mid	2437	13.08
High	2462	13.08
Worst		13.11

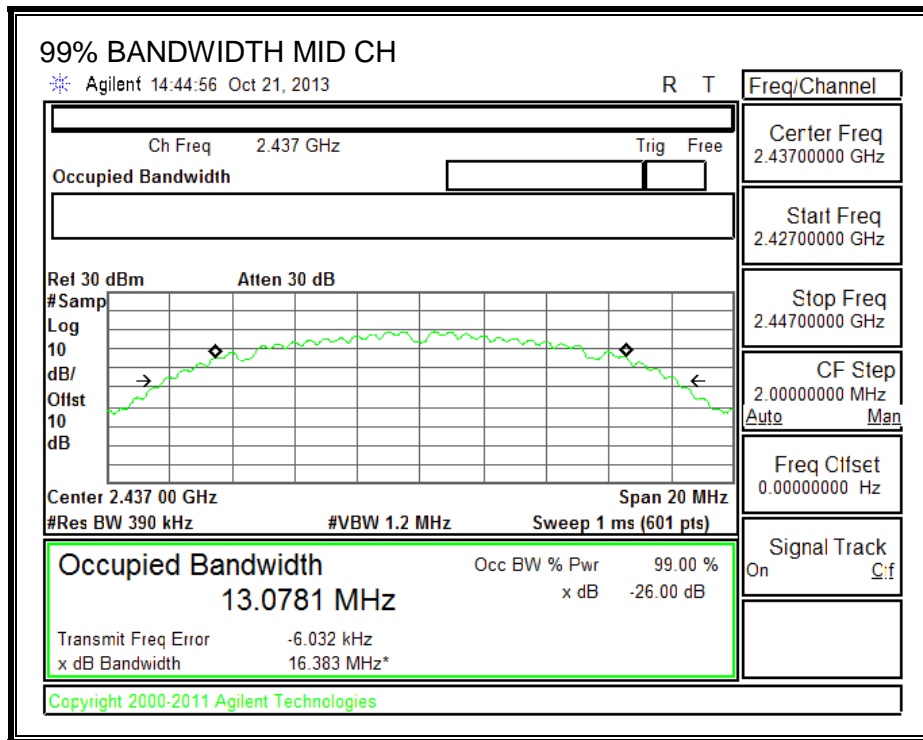
#### 9.2.2. 802.11g MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.74
Mid	2437	16.73
High	2462	16.75
Worst		16.75

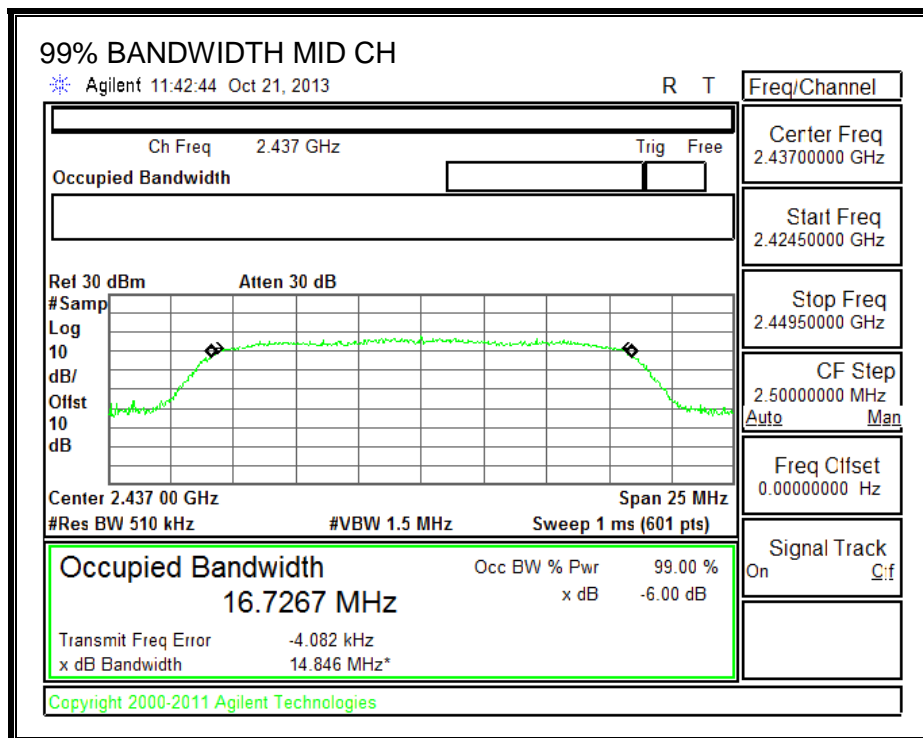
#### 9.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.63
Mid	2437	17.64
High	2462	17.62
Worst		17.64

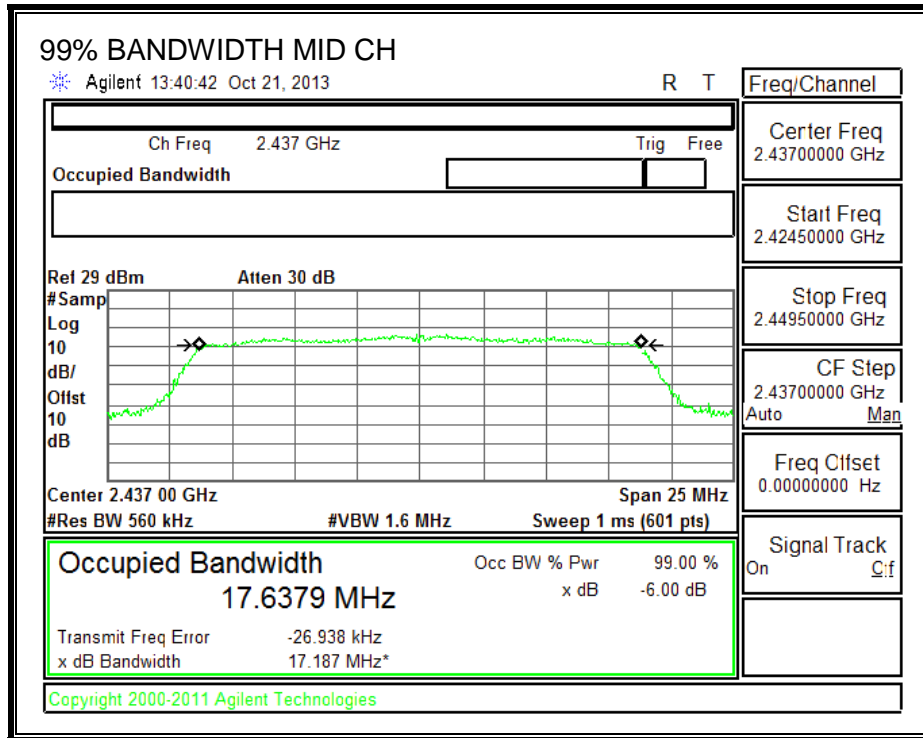
**2.4 GHz 802.11b 99% BANDWIDTH**



**2.4 GHz 802.11g 99% BANDWIDTH**



**2.4 GHz 802.11n 99% BANDWIDTH**



### **9.3. AVERAGE POWER**

#### **LIMITS**

None; for reporting purposes only.

#### **TEST PROCEDURE**

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10 dB was entered as an offset in the power meter to allow for direct reading of power.

#### **RESULTS**

### 9.3.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	2412	15.21
Mid	2437	15.30
High	2462	15.30
Worst		15.300

### 9.3.2. 802.11g MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	2412	11.60
Mid	2437	11.80
High	2462	11.90
Worst		11.900

### 9.3.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	2412	10.40
Mid	2437	10.60
High	2462	10.80
Worst		10.800

## **9.4. OUTPUT POWER**

### **LIMITS**

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **DIRECTIONAL ANTENNA GAIN**

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

**RESULTS**

**9.4.1. 802.11b MODE IN THE 2.4 GHz BAND**

**Limits**

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	-4.20	30.00	30	36	30.00
Mid	2437	-4.20	30.00	30	36	30.00
High	2462	-4.20	30.00	30	36	30.00

**Results**

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	18.92	18.92	30.00	-11.08
Mid	2437	19.24	19.24	30.00	-10.76
High	2462	19.42	19.42	30.00	-10.58
Worst			19.42		

**9.4.2. 802.11g MODE IN THE 2.4 GHz BAND**

**Limits**

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	-4.20	30.00	30	36	30.00
Mid	2437	-4.20	30.00	30	36	30.00
High	2462	-4.20	30.00	30	36	30.00

**Results**

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	20.30	20.30	30.00	-9.70
Mid	2437	19.85	19.85	30.00	-10.15
High	2462	20.48	20.48	30.00	-9.52
Worst			20.48		

**9.4.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND**

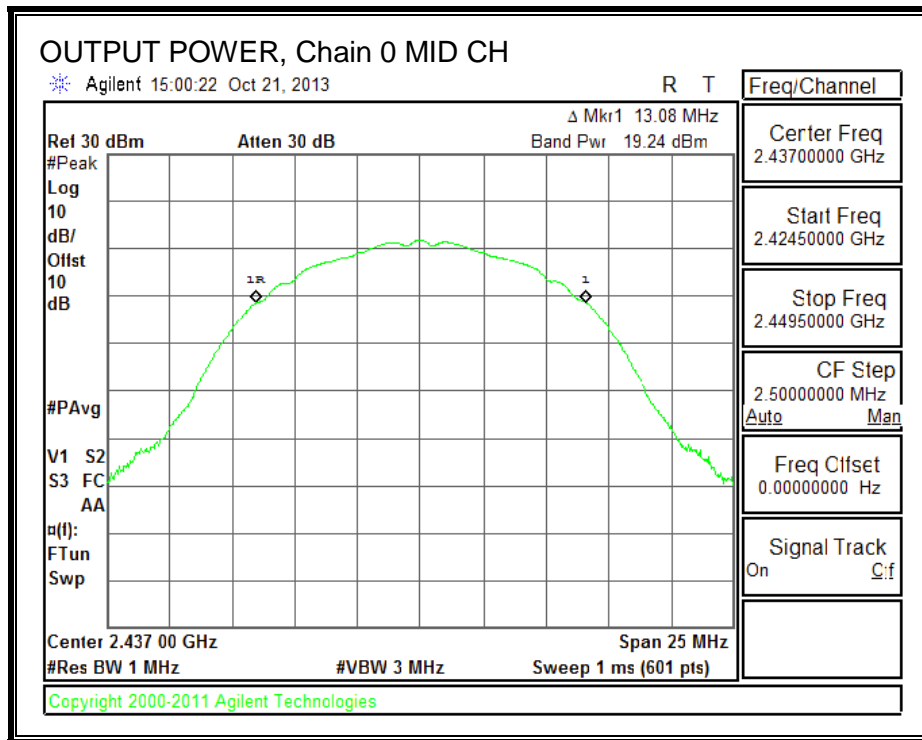
**Limits**

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	-4.20	30.00	30	36	30.00
Mid	2437	-4.20	30.00	30	36	30.00
High	2462	-4.20	30.00	30	36	30.00

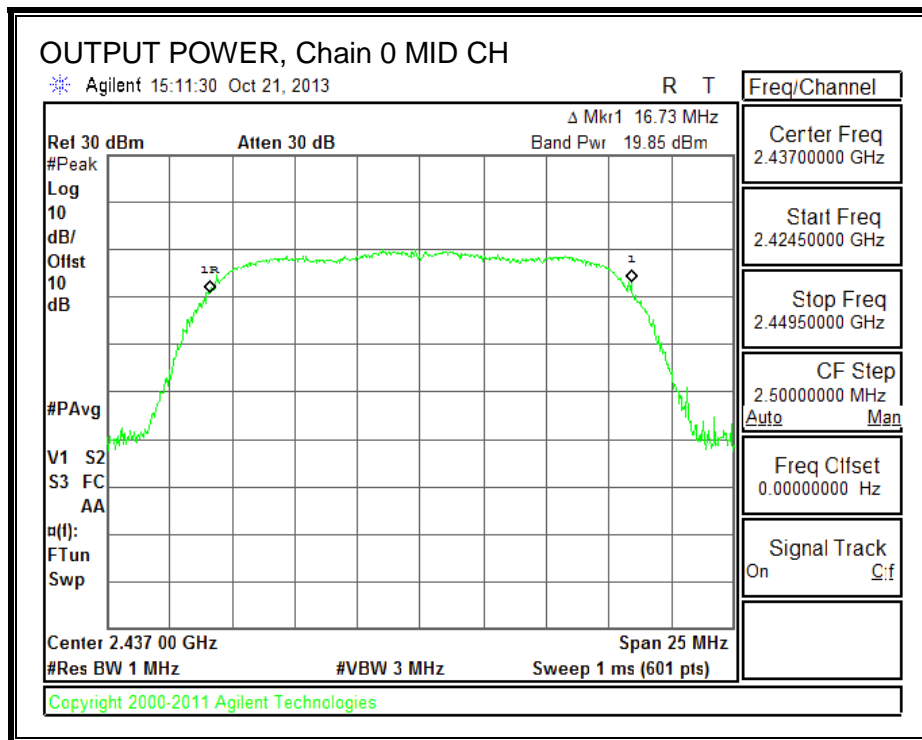
**Results**

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	19.08	19.08	30.00	-10.92
Mid	2437	19.16	19.16	30.00	-10.84
High	2462	19.59	19.59	30.00	-10.41
Worst			19.59		

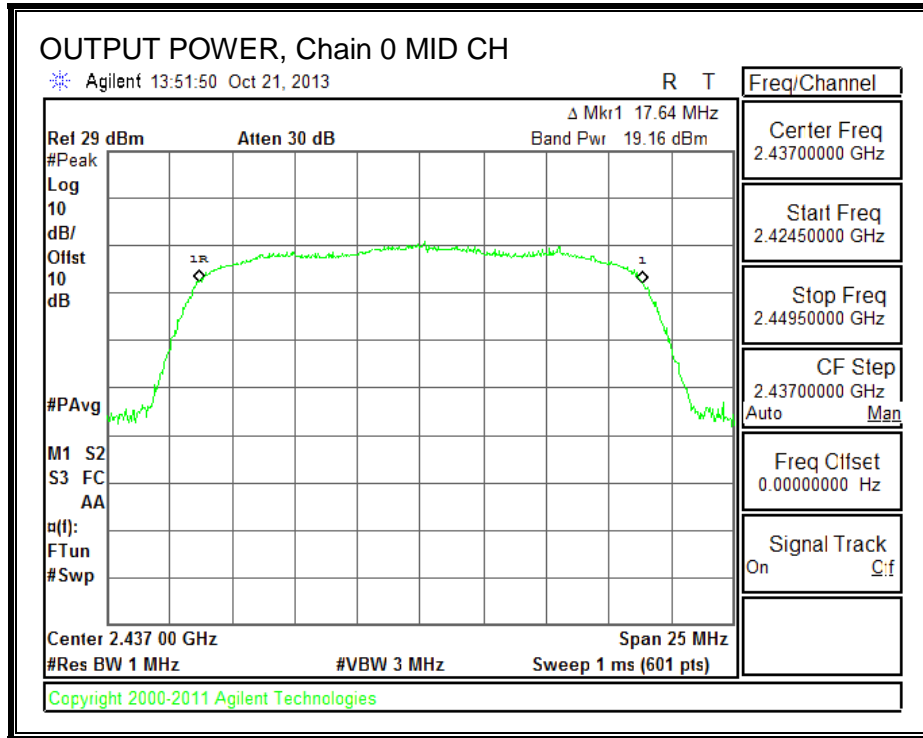
**2.4 GHz 802.11b OUTPUT POWER, Chain 0**



**2.4 GHz 802.11g OUTPUT POWER, Chain 0**



**2.4 GHz 802.11n OUTPUT POWER, Chain 0**



## 9.5. PSD

### LIMITS

FCC §15.247

IC RSS-210 A8.2

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

#### 9.5.1. 802.11b MODE IN THE 2.4 GHz BAND

##### PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-5.84	8.0	-13.8
Mid	2437	-5.38	8.0	-13.4
High	2462	-5.48	8.0	-13.5

#### 9.5.2. 802.11g MODE IN THE 2.4 GHz BAND

##### PSD Results

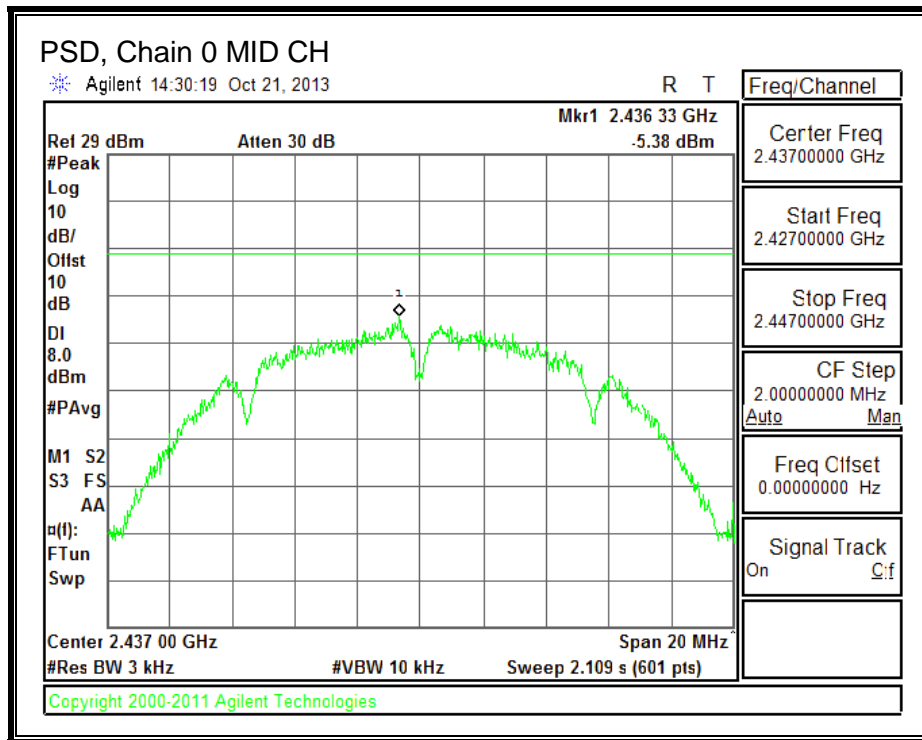
Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-11.16	8.0	-19.2
Mid	2437	-11.84	8.0	-19.8
High	2462	-12.06	8.0	-20.1

### 9.5.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

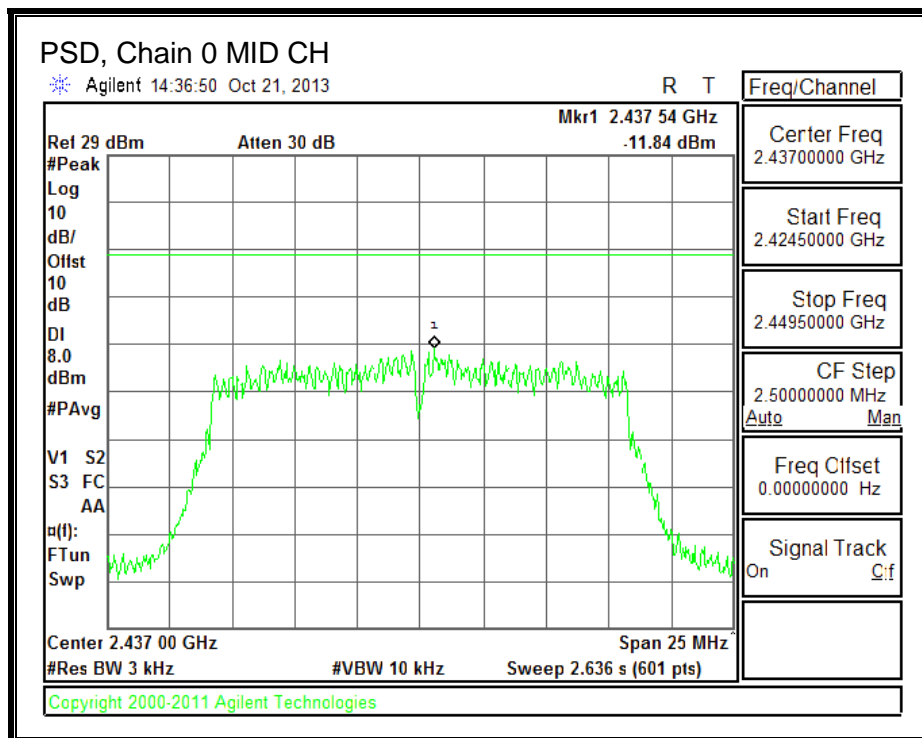
#### PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-13.67	8.0	-21.7
Mid	2437	-13.23	8.0	-21.2
High	2462	-14.22	8.0	-22.2

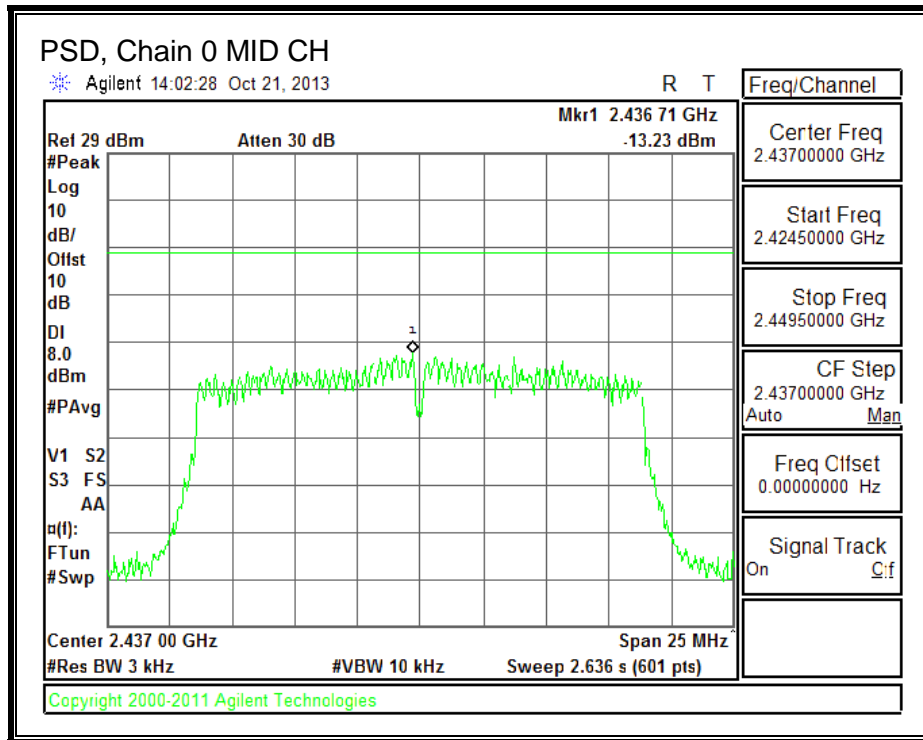
**2.4GHz 802.11b PSD, Chain 0**



**2.4GHz 802.11g PSD, Chain 0**



**2.4GHz 802.11n PSD, Chain 0**



## 9.6. OUT-OF-BAND EMISSIONS

### LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

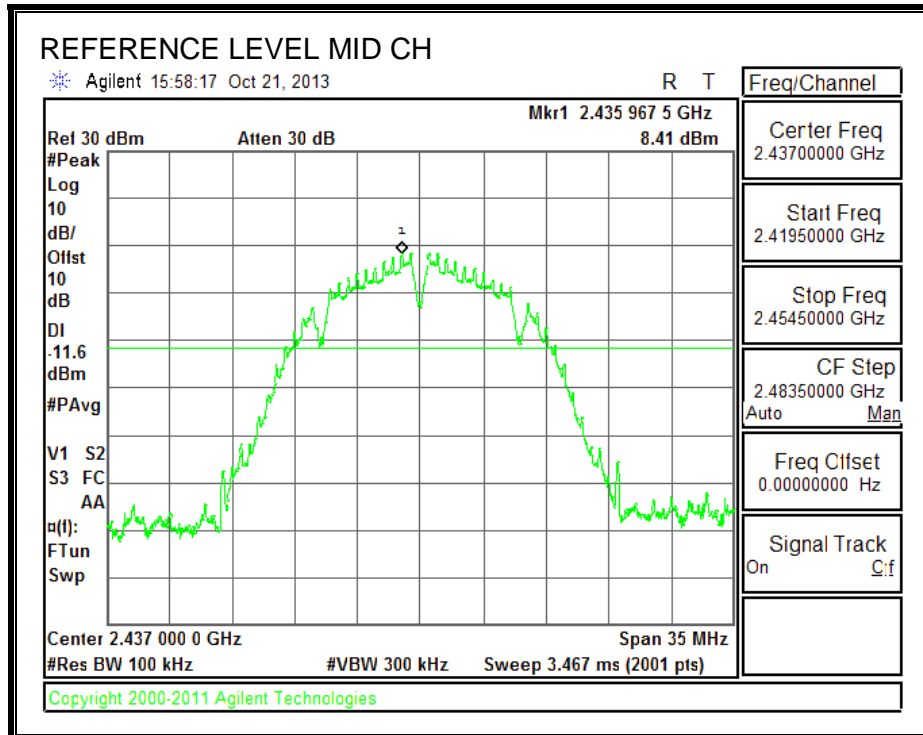
### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

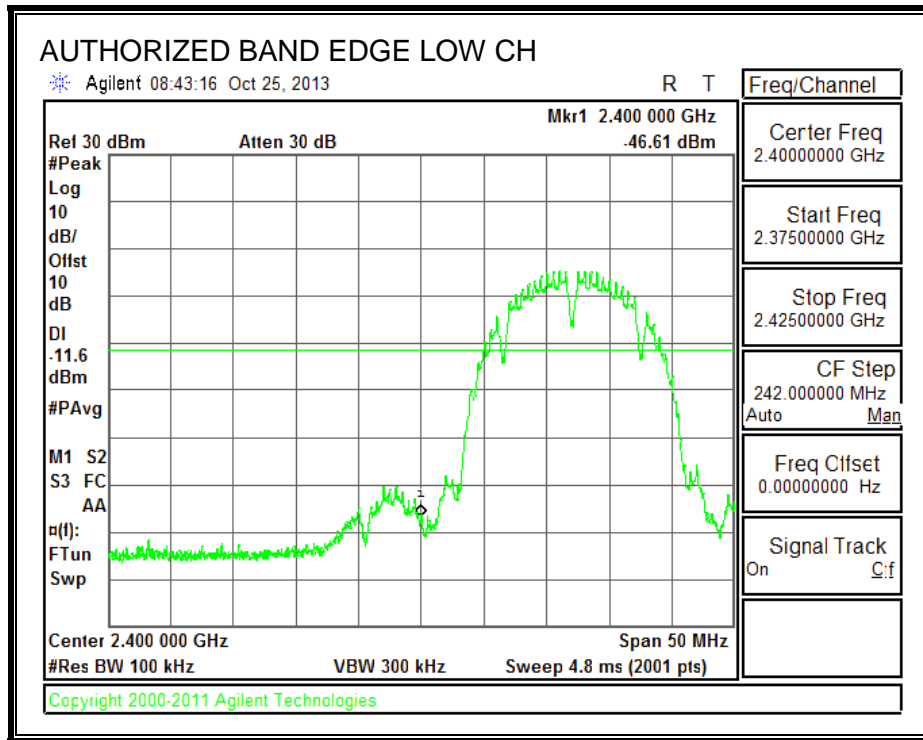
**RESULTS**

**9.6.1. 802.11b MODE IN THE 2.4 GHz BAND**

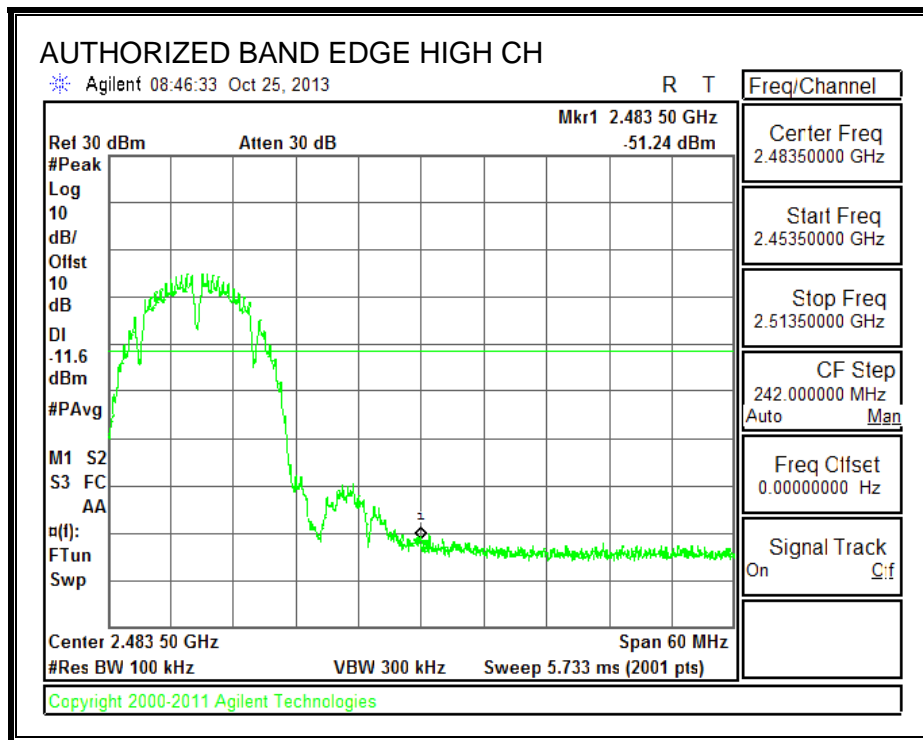
**IN-BAND REFERENCE LEVEL**



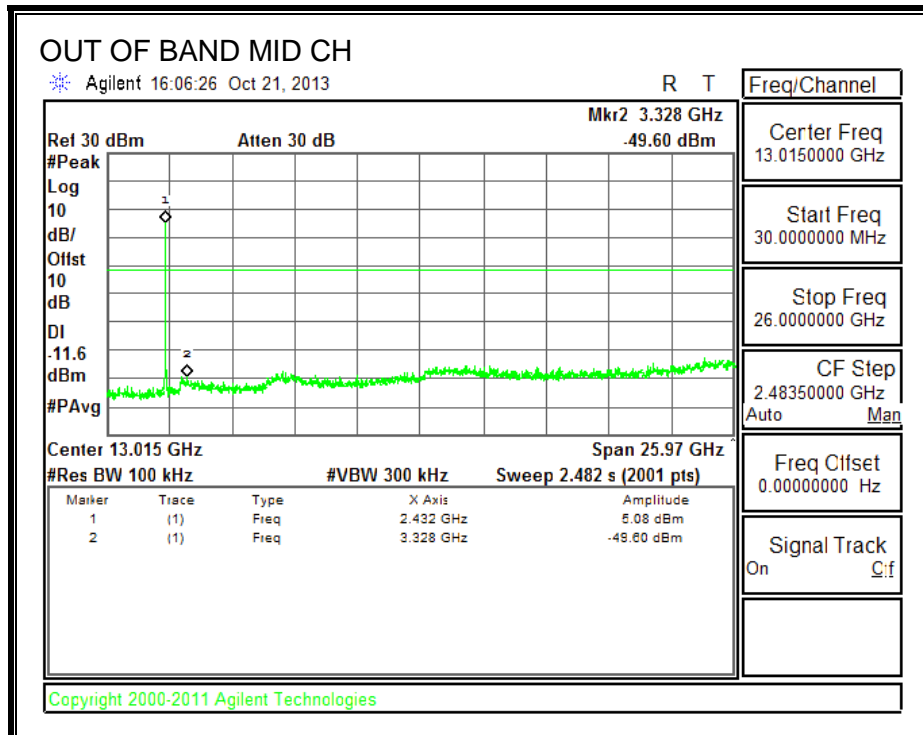
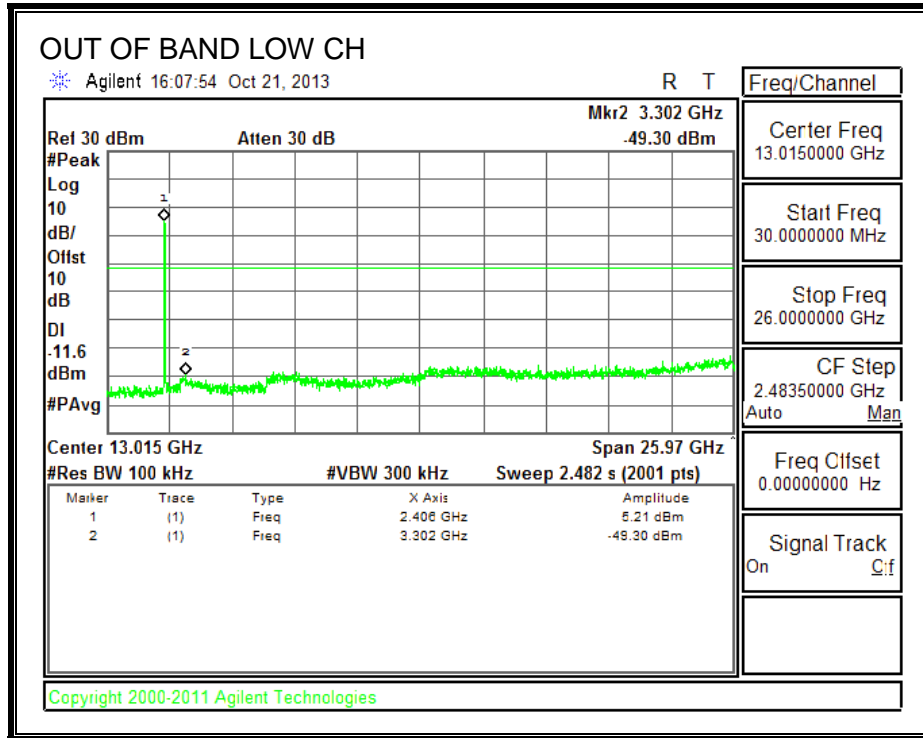
**LOW CHANNEL BANDEDGE**

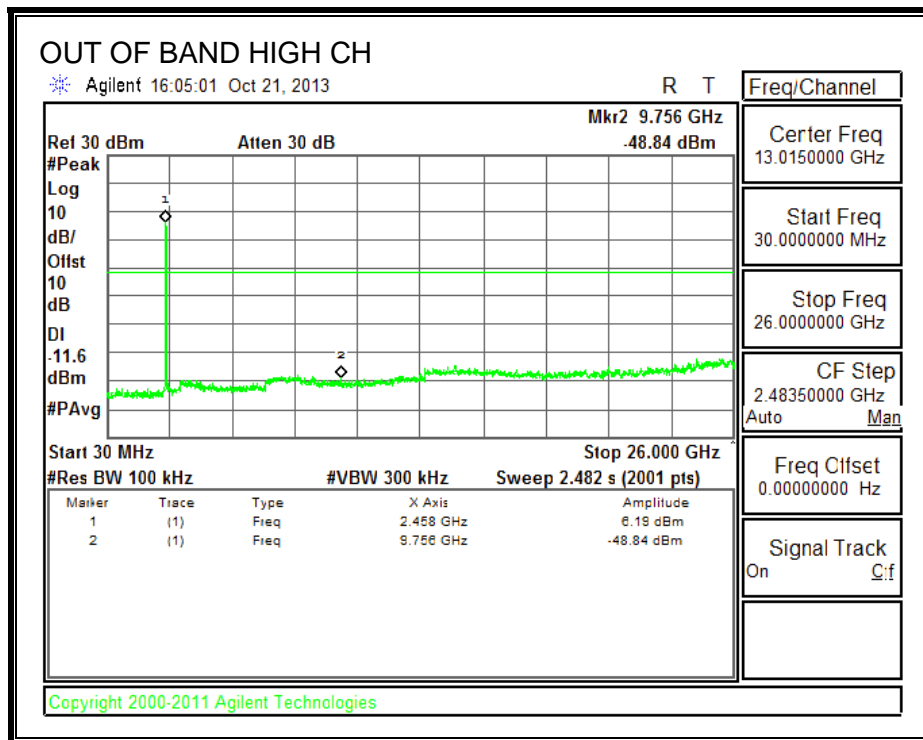


**HIGH CHANNEL BANDEDGE**



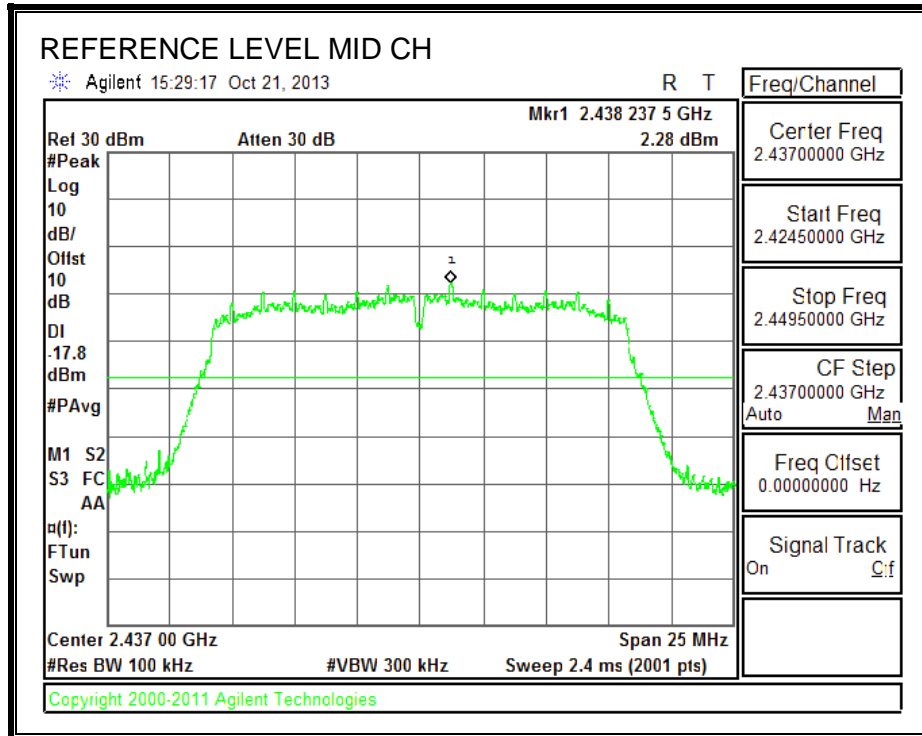
**OUT-OF-BAND EMISSIONS**



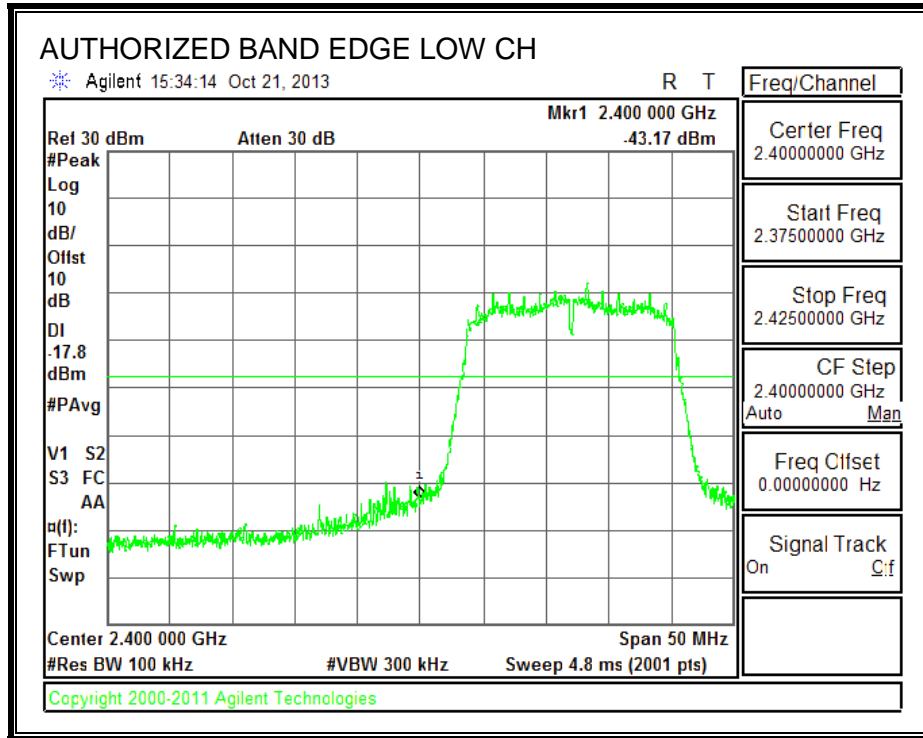


### 9.6.1. 802.11g MODE IN THE 2.4 GHz BAND

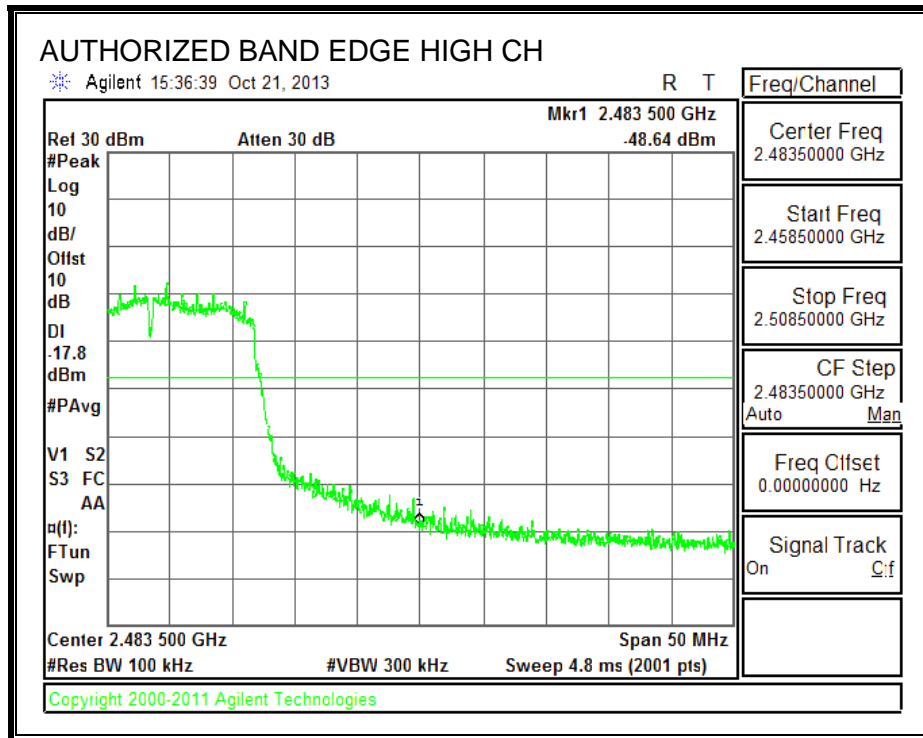
#### IN-BAND REFERENCE LEVEL



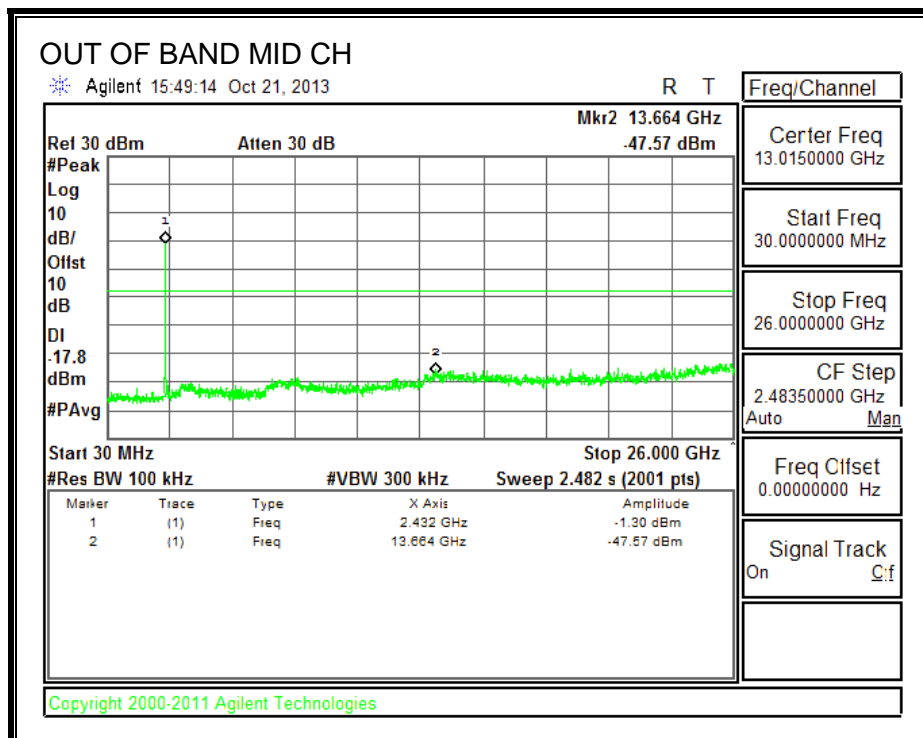
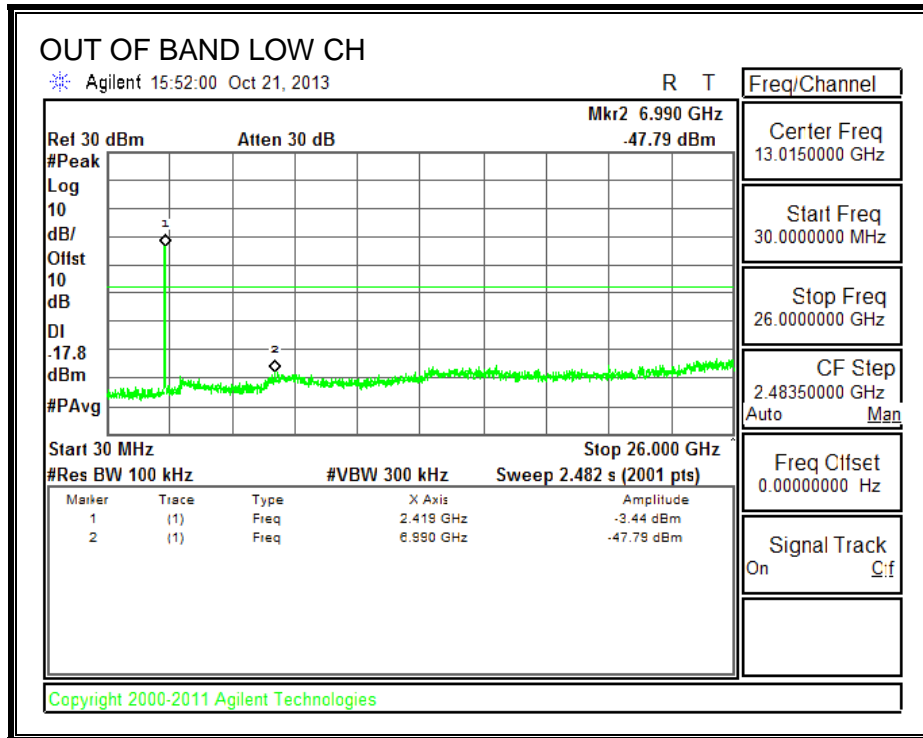
**LOW CHANNEL BANDEDGE**

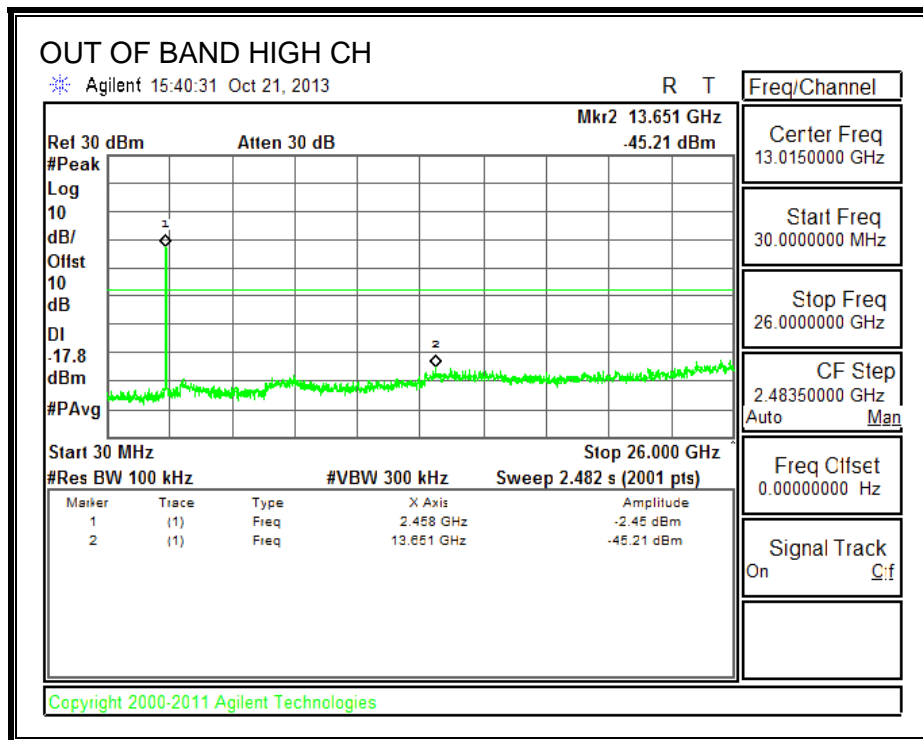


**HIGH CHANNEL BANDEDGE**



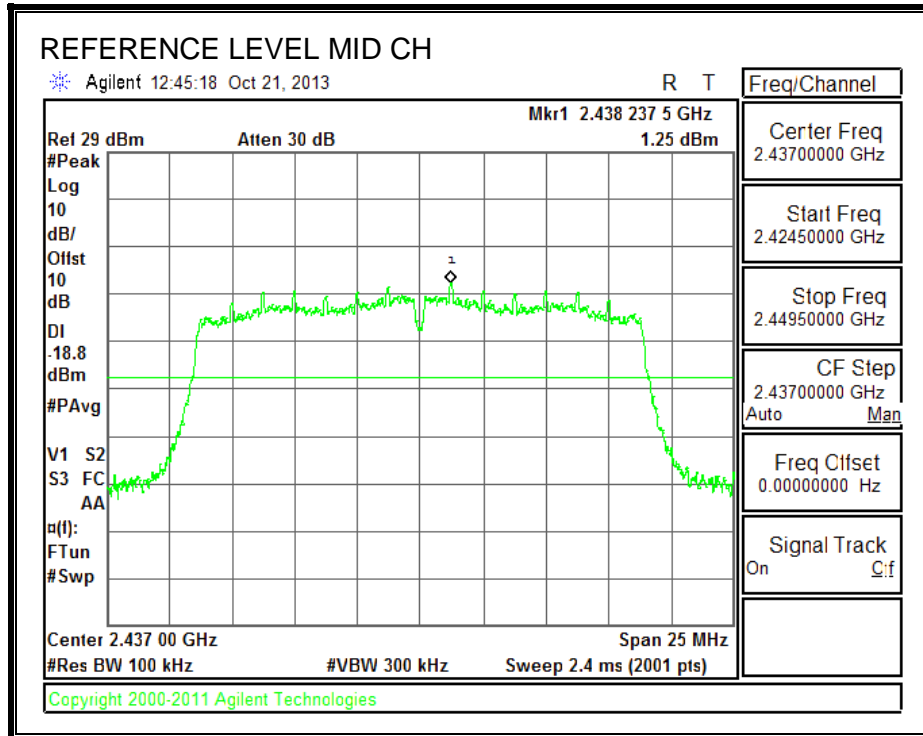
**OUT-OF-BAND EMISSIONS**



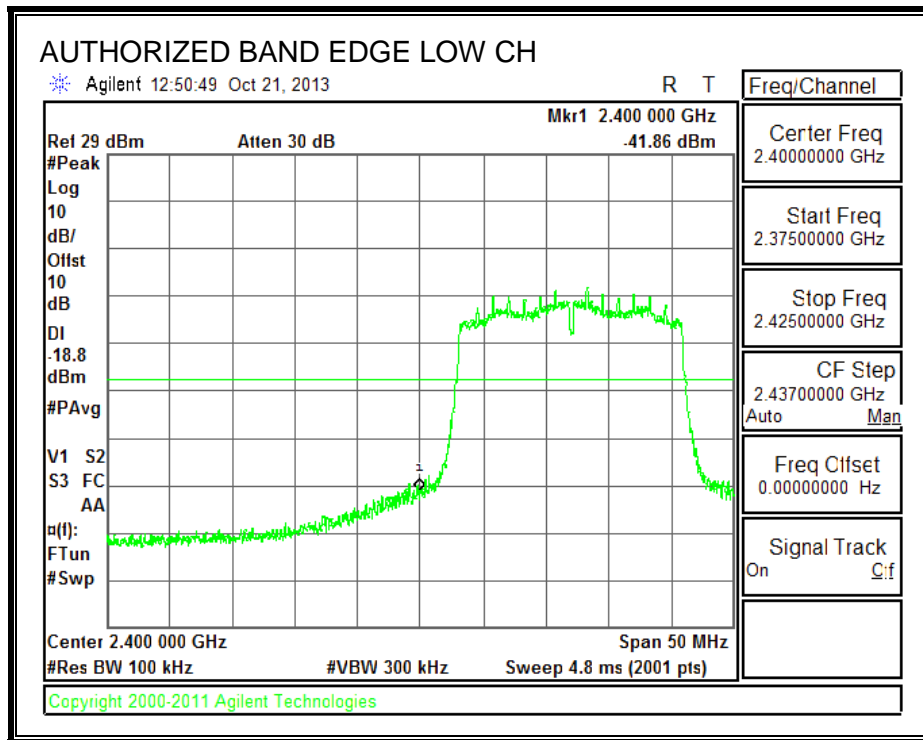


### 9.6.2. 802.11n MODE IN THE 2.4 GHz BAND

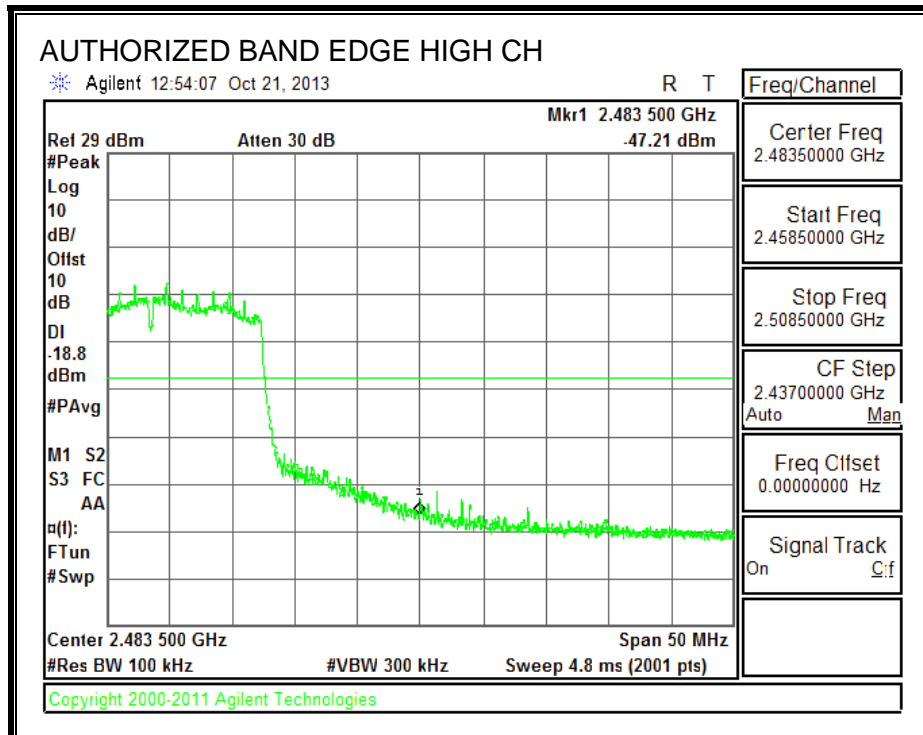
#### IN-BAND REFERENCE LEVEL



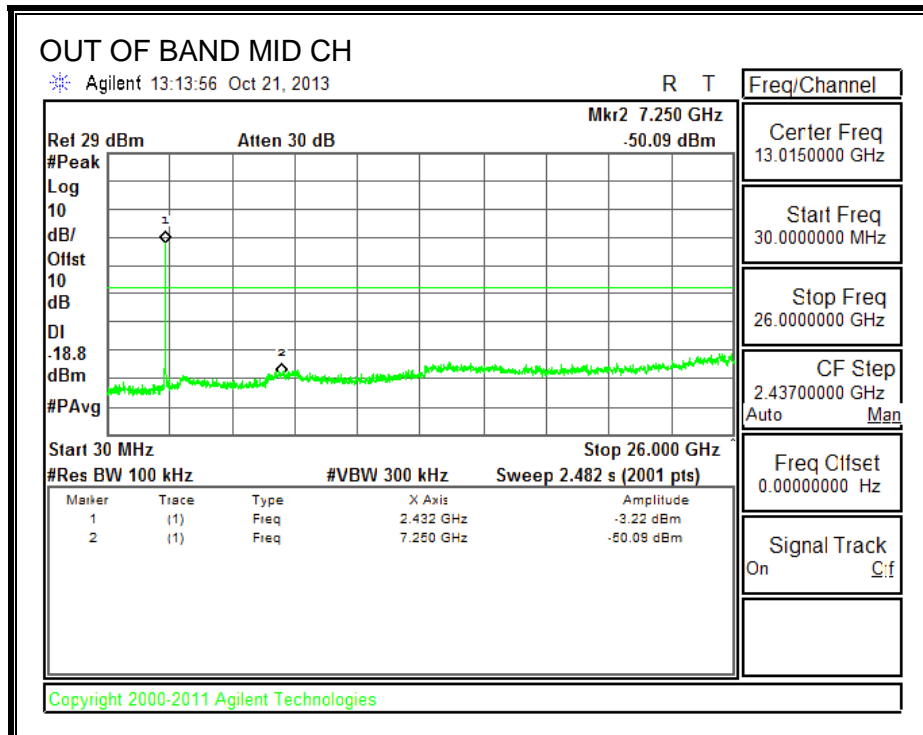
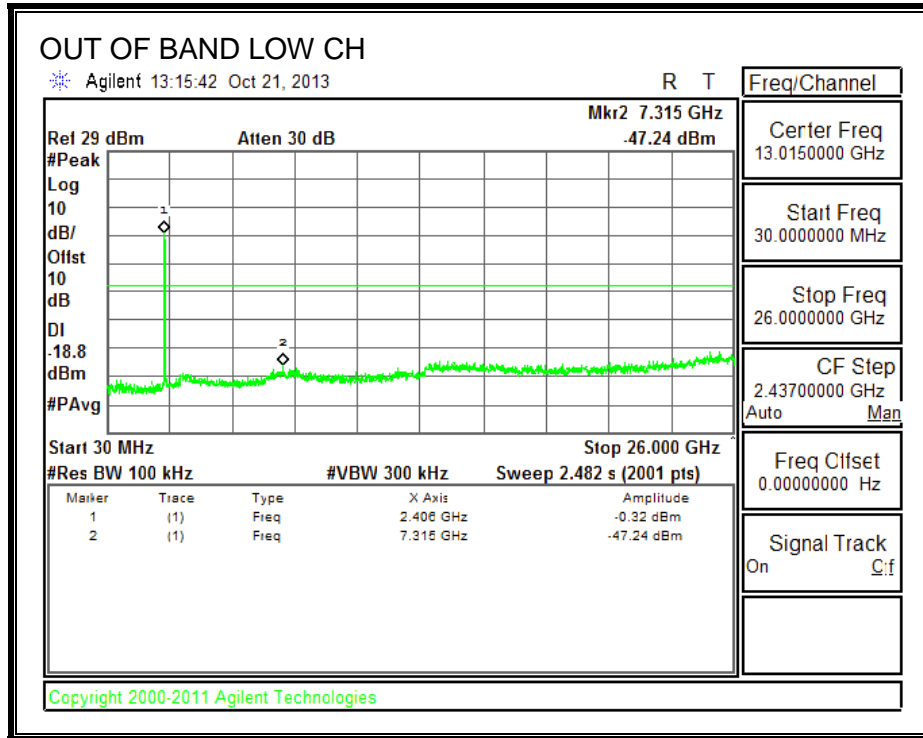
**LOW CHANNEL BANDEDGE**

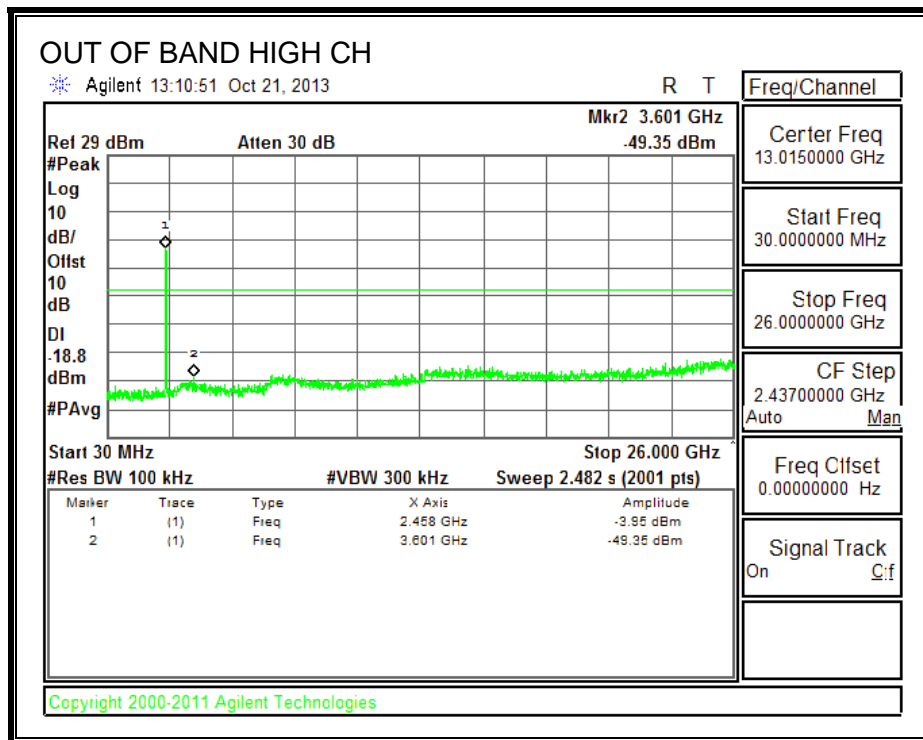


**HIGH CHANNEL BANDEDGE**



**OUT-OF-BAND EMISSIONS**





## 10. RADIATED TEST RESULTS

### 10.1. 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.

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.

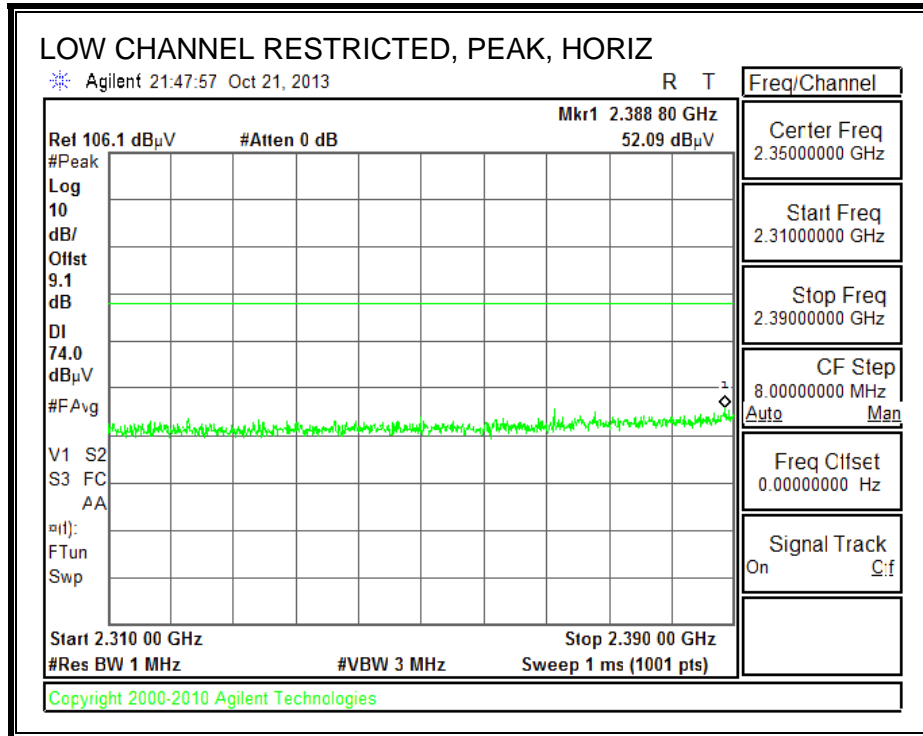
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurements. Duty cycle factor=  $10\log(1/x)$ .

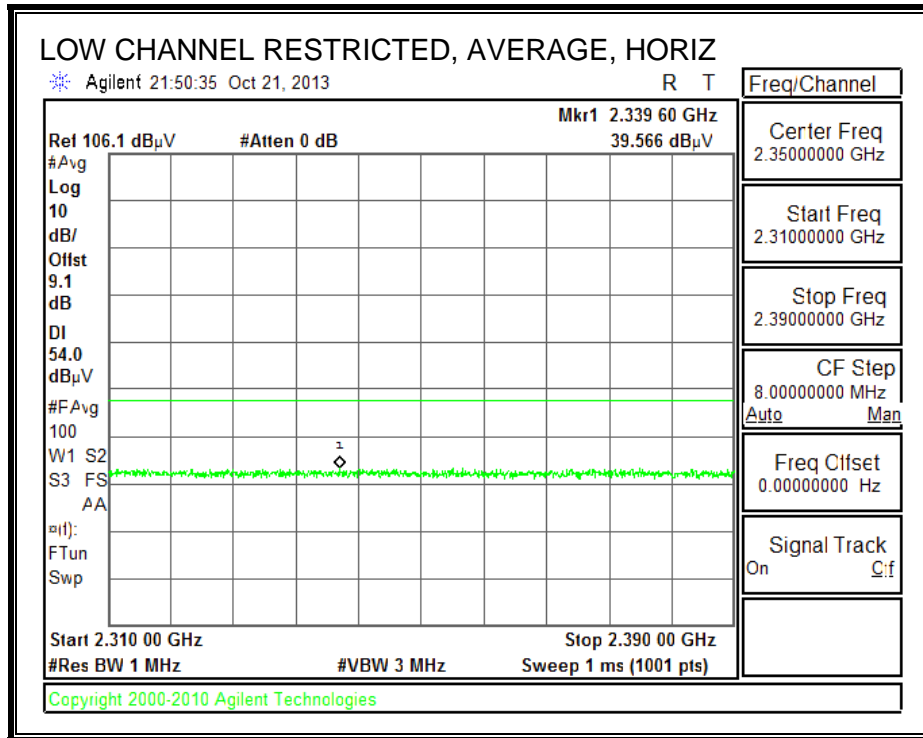
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

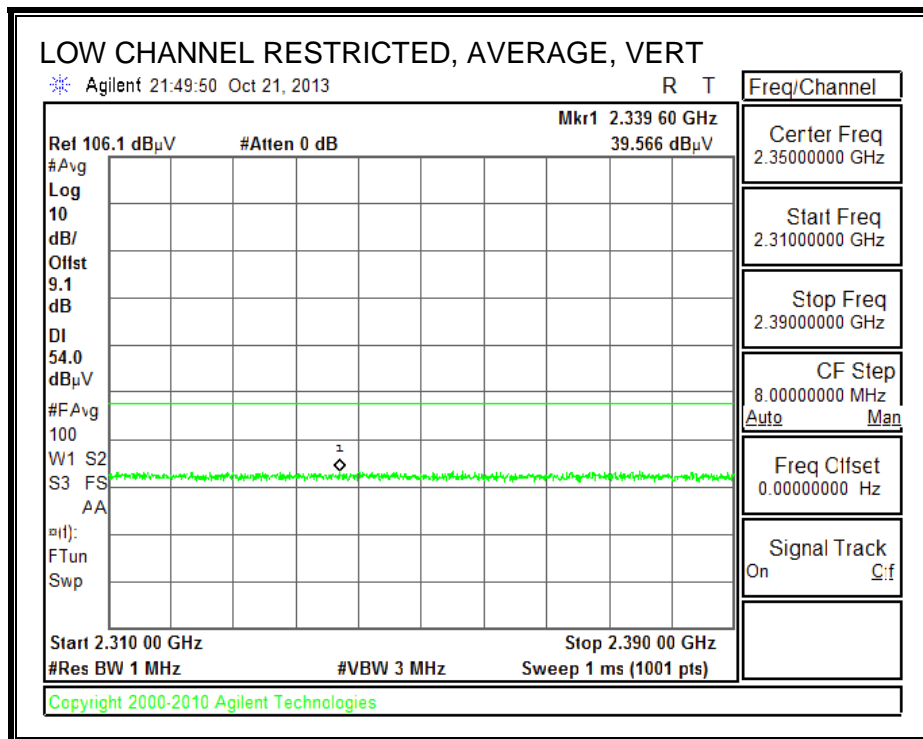
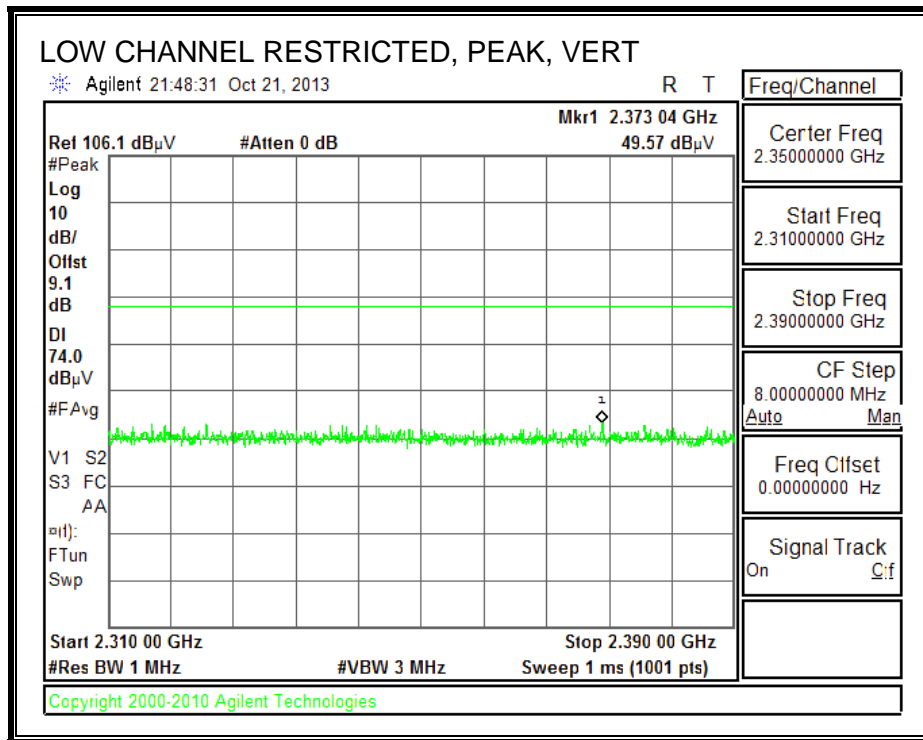
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

## 10.2. TRANSMITTER ABOVE 1 GHz

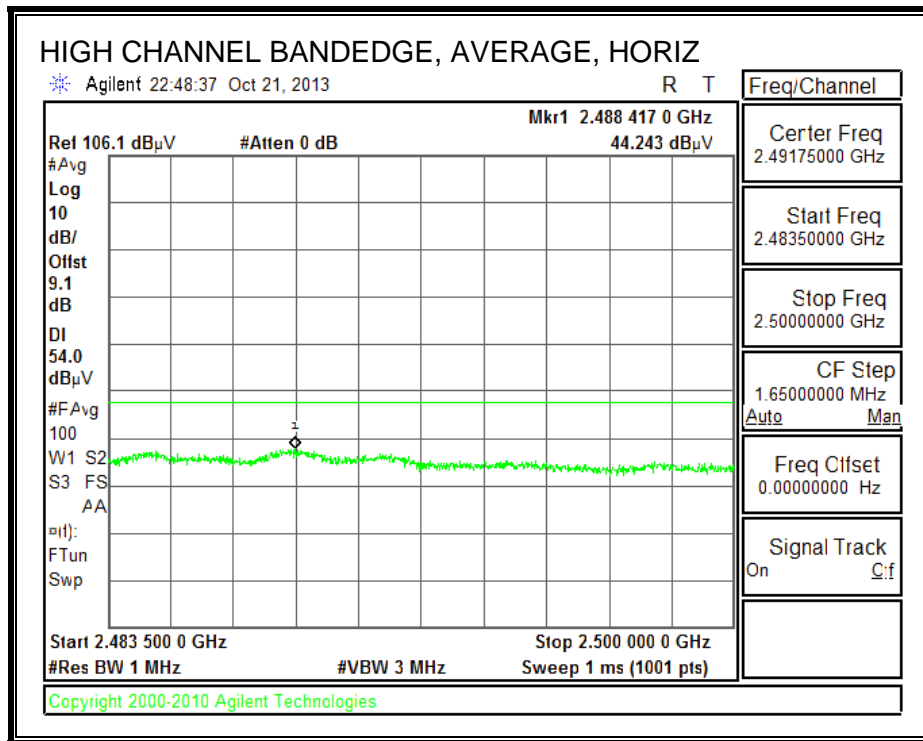
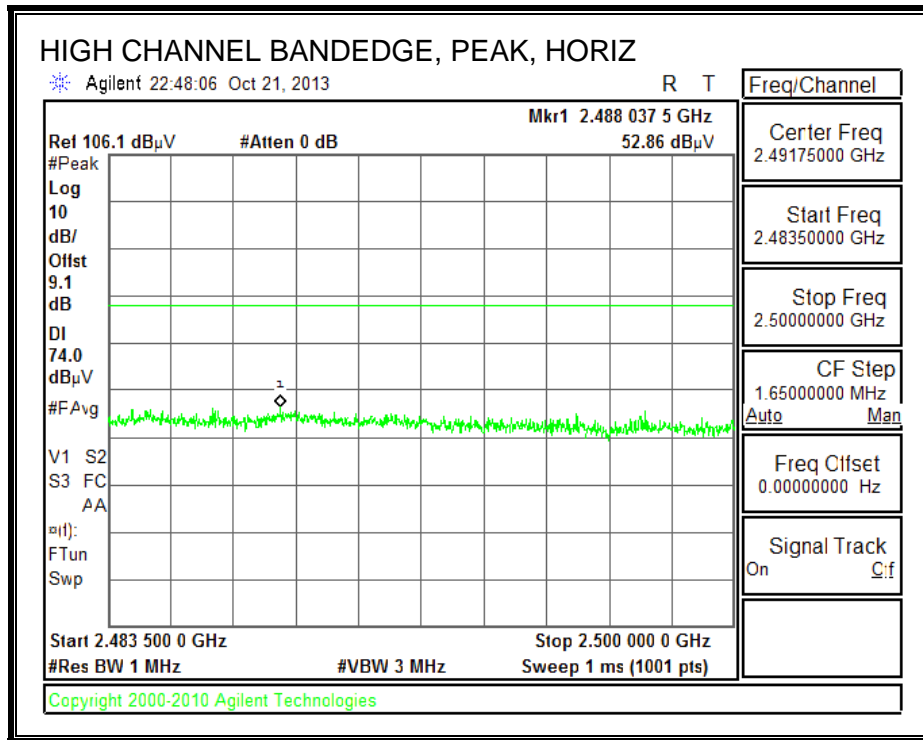
### 10.2.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

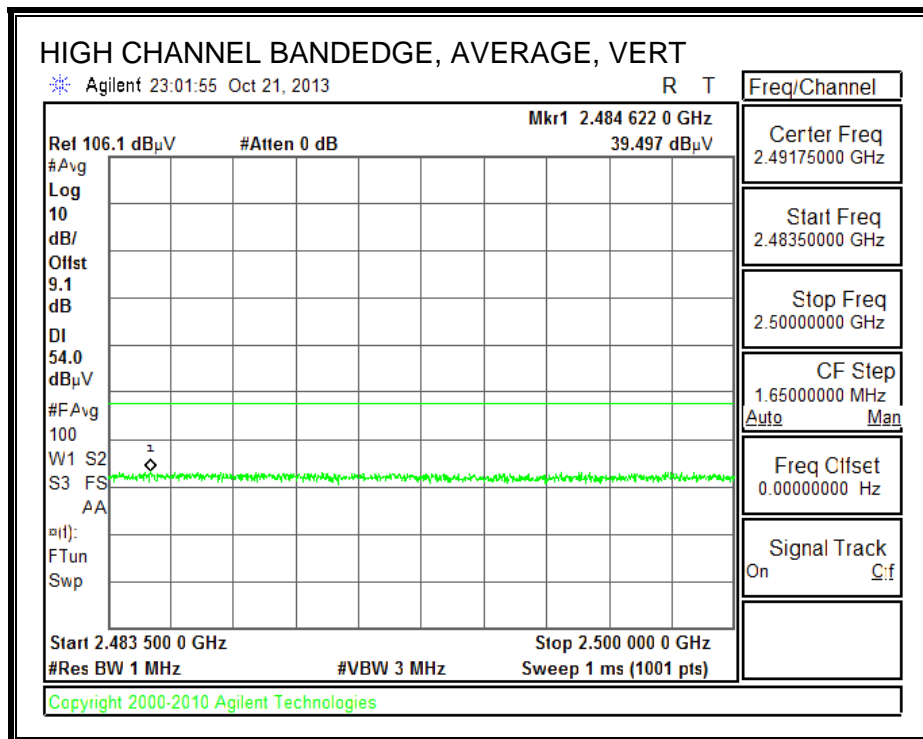
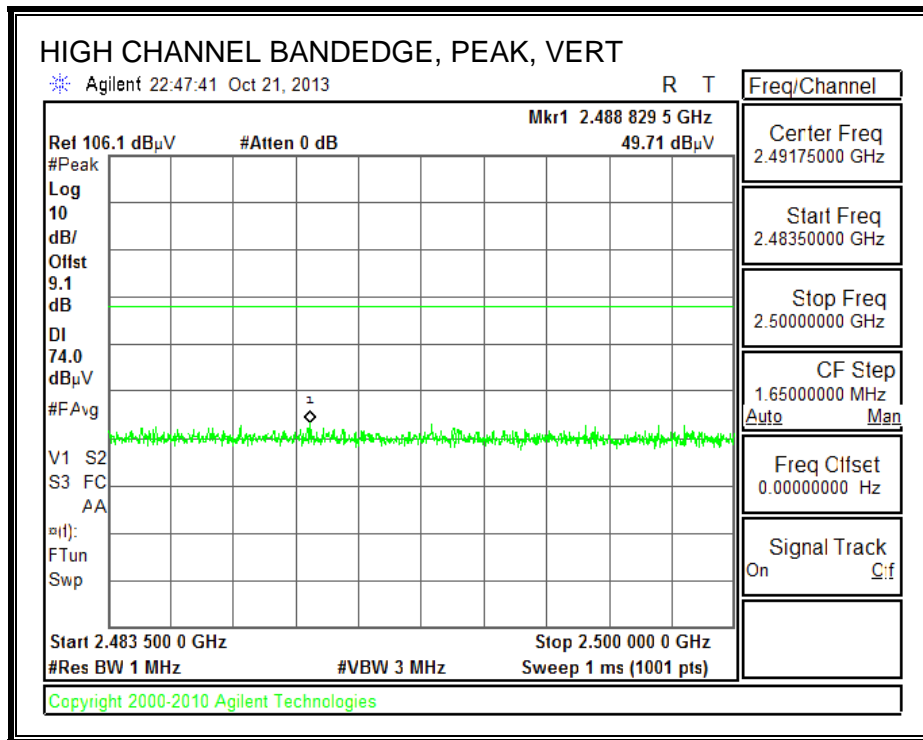






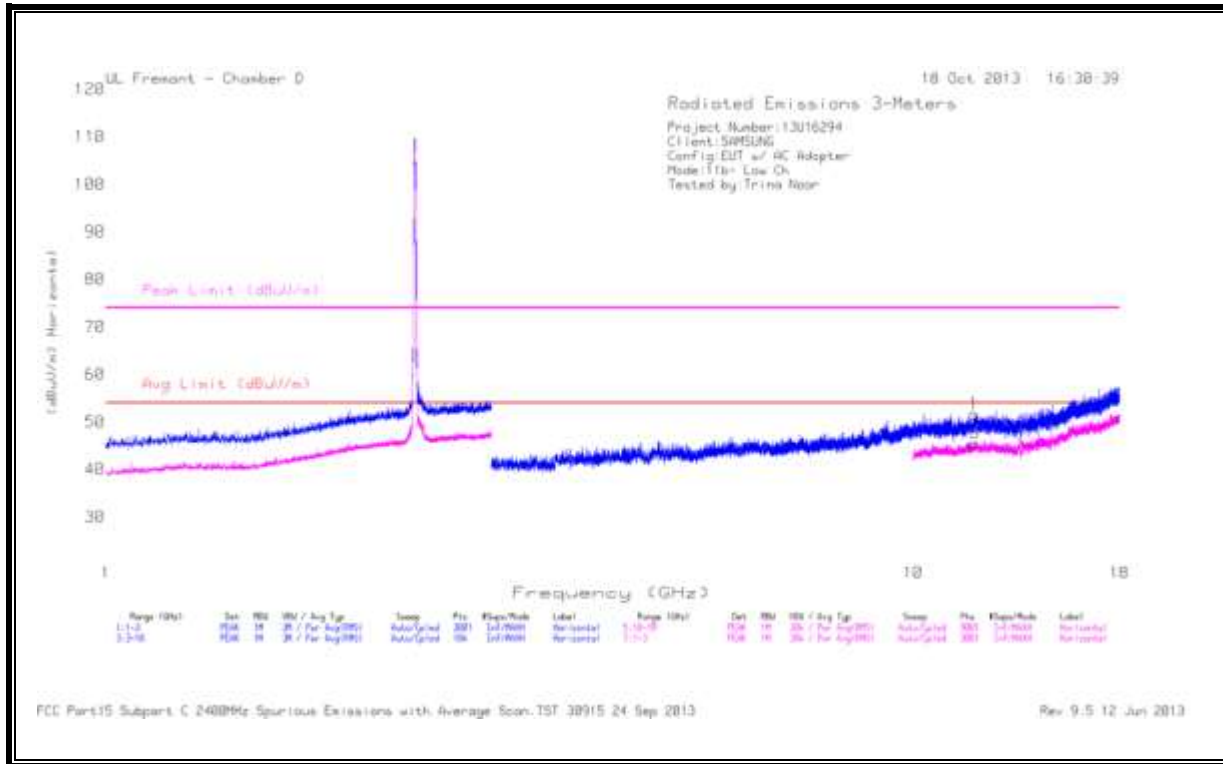
**AUTHORIZED BANDEDGE (HIGH CHANNEL)**



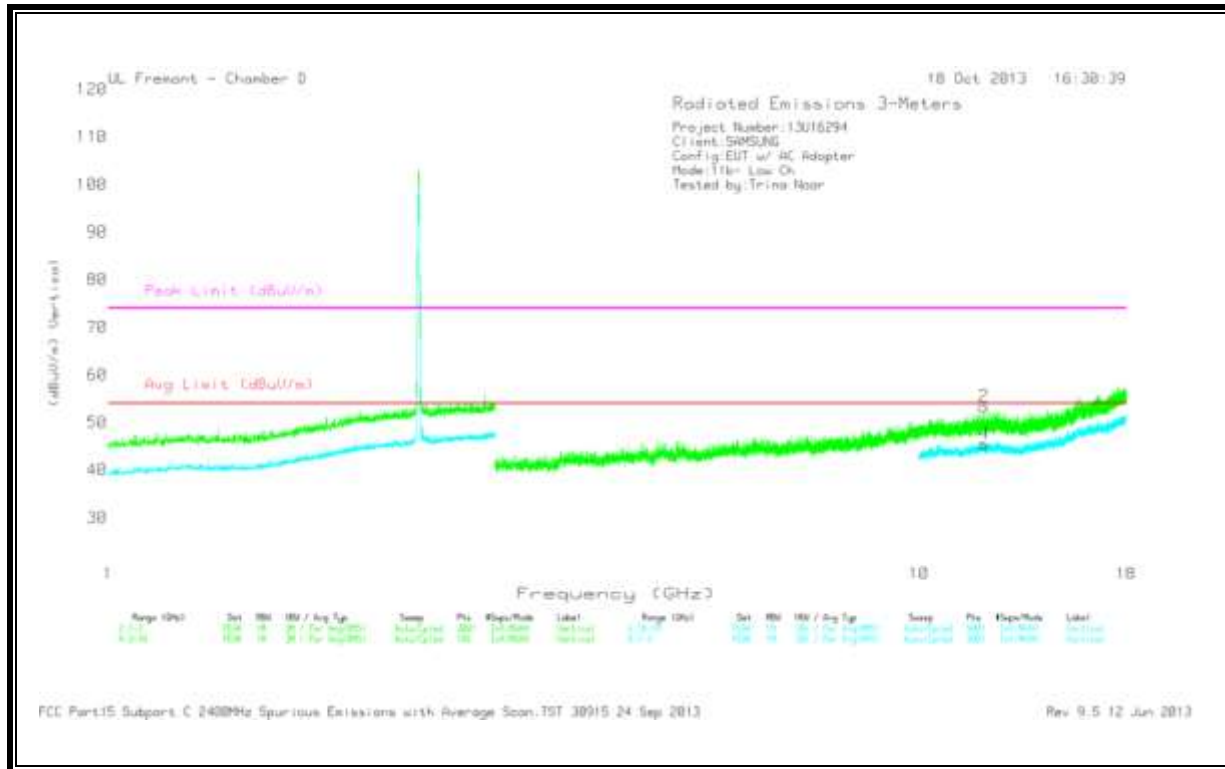


### HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL  
 HORIZONTAL



VERTICAL



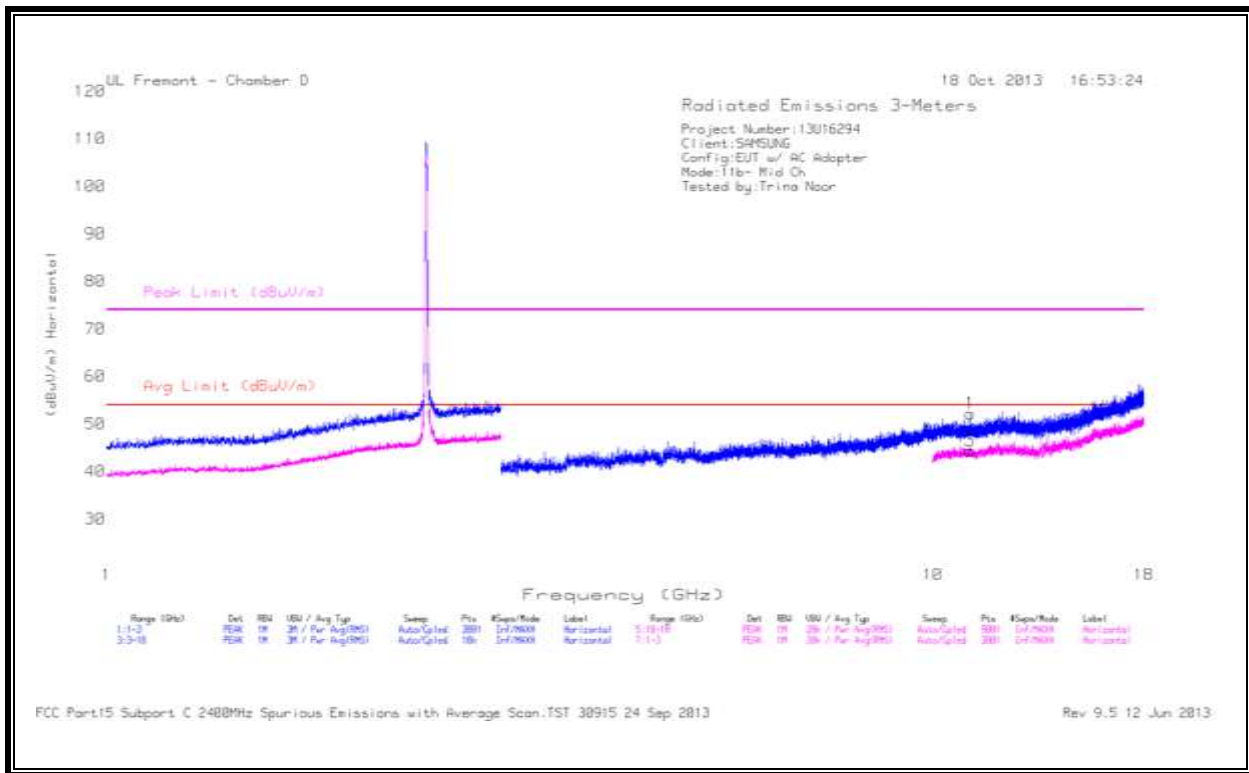
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (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
1	11.89	34.42	PK	39.1	-21.9	51.62	53.97	-2.35	74	-22.38	0-360	100	H
2	12.029	35.93	PK	39.2	-21.8	53.33	53.97	-.64	74	-20.67	0-360	201	V
3	11.9	28.15	PK	39.1	-21.8	45.45	53.97	-8.52	74	-28.55	0-360	201	H
4	12.027	27.93	PK	39.2	-21.7	45.43	53.97	-8.54	74	-28.57	0-360	100	V

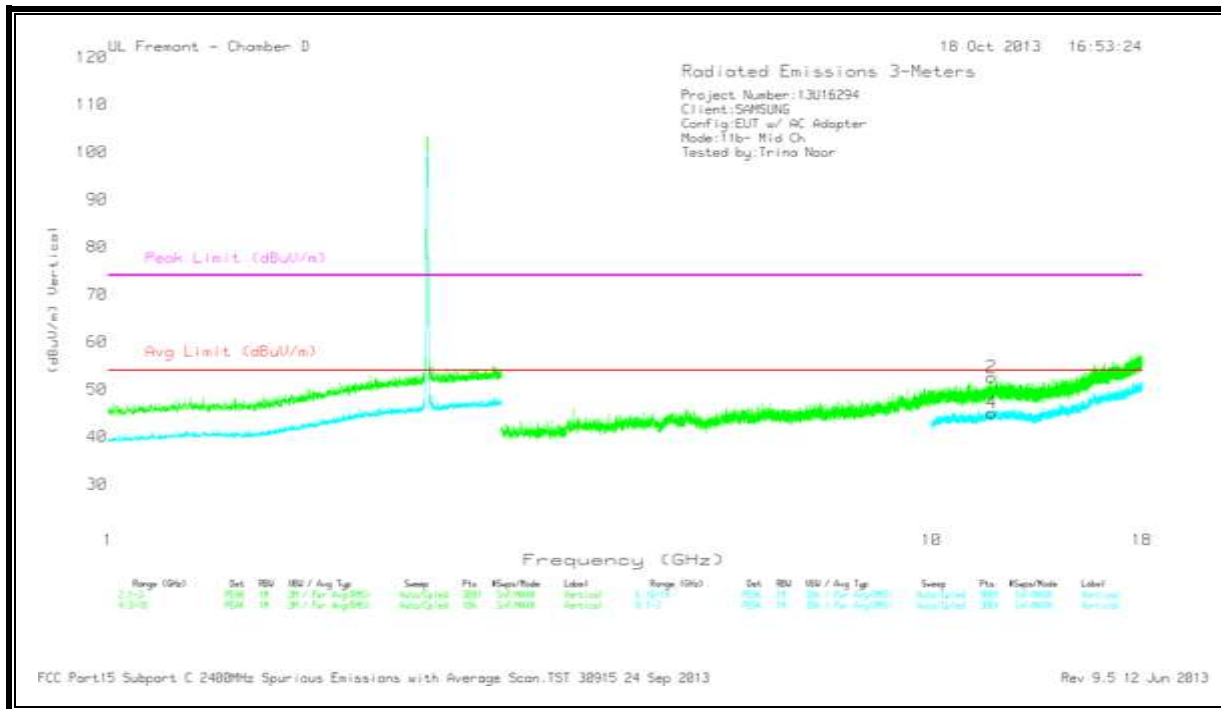
PK - Peak detector

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

MID CHANNEL  
 HORIZONTAL



VERTICAL



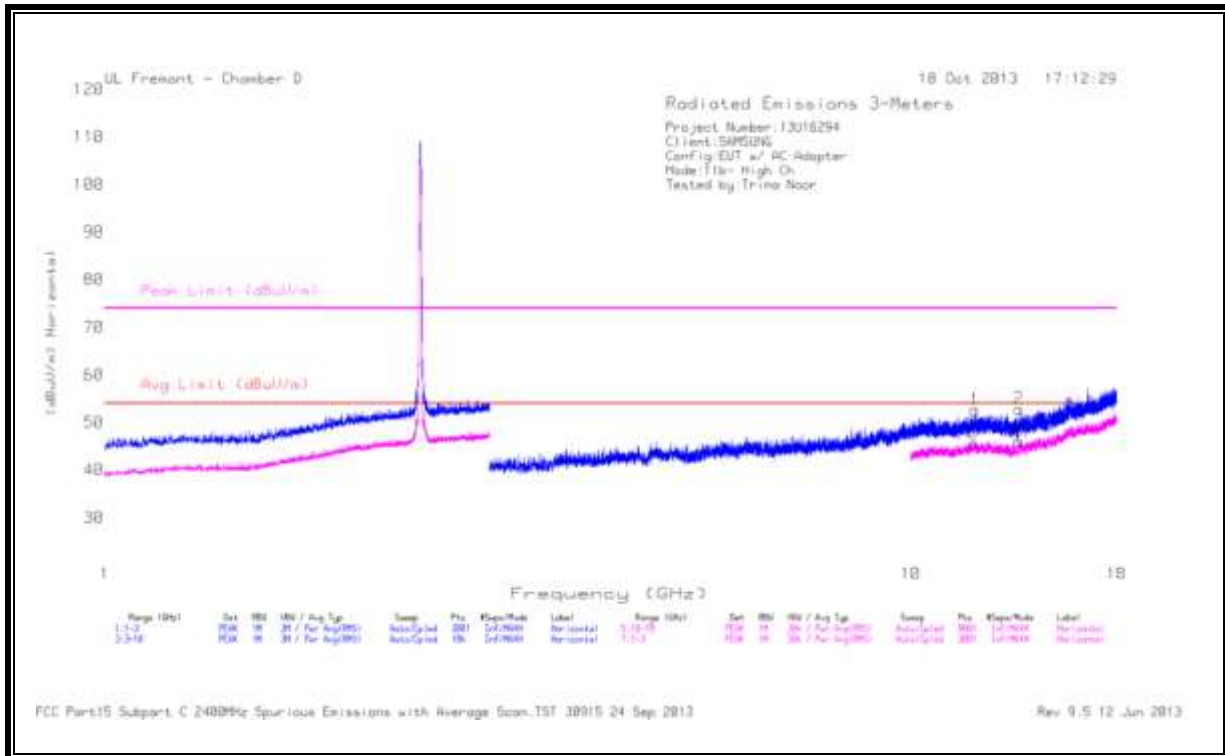
MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	11.1	35.57	PK	38.4	-21.8	52.17	53.97	-1.8	74	-21.83	0-360	100	H
2	11.818	35.46	PK	39	-21.9	52.56	53.97	-1.41	74	-21.44	0-360	100	V
3	11.09	27.86	PK	38.4	-21.9	44.36	53.97	-9.61	74	-29.64	0-360	100	H
4	11.828	27.81	PK	39	-21.8	45.01	53.97	-8.96	74	-28.99	0-360	100	V

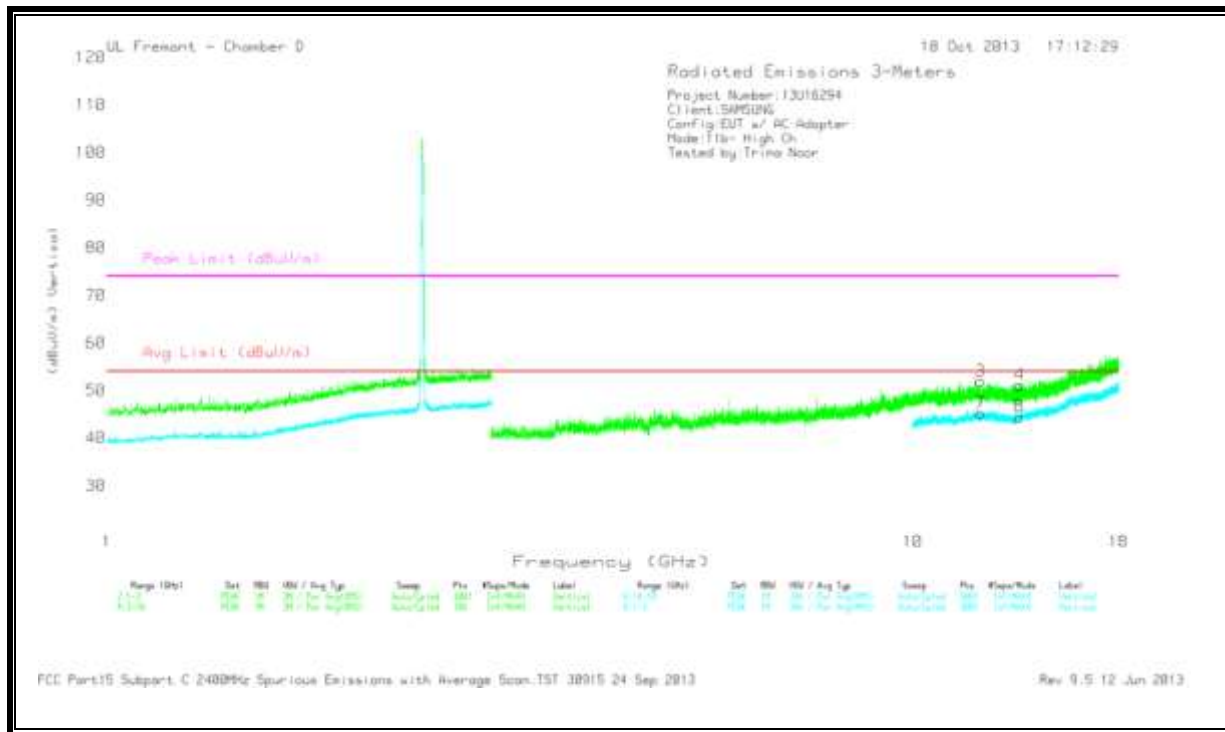
PK - Peak detector

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

HIGH CHANNEL  
 HORIZONTAL



VERTICAL



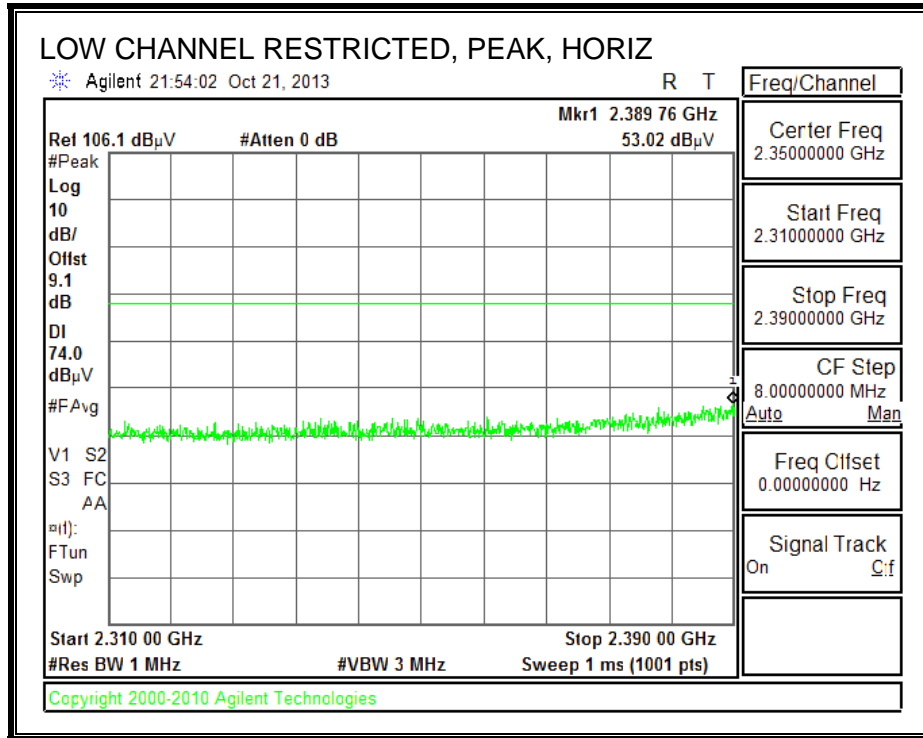
HIGH CHANNEL DATA

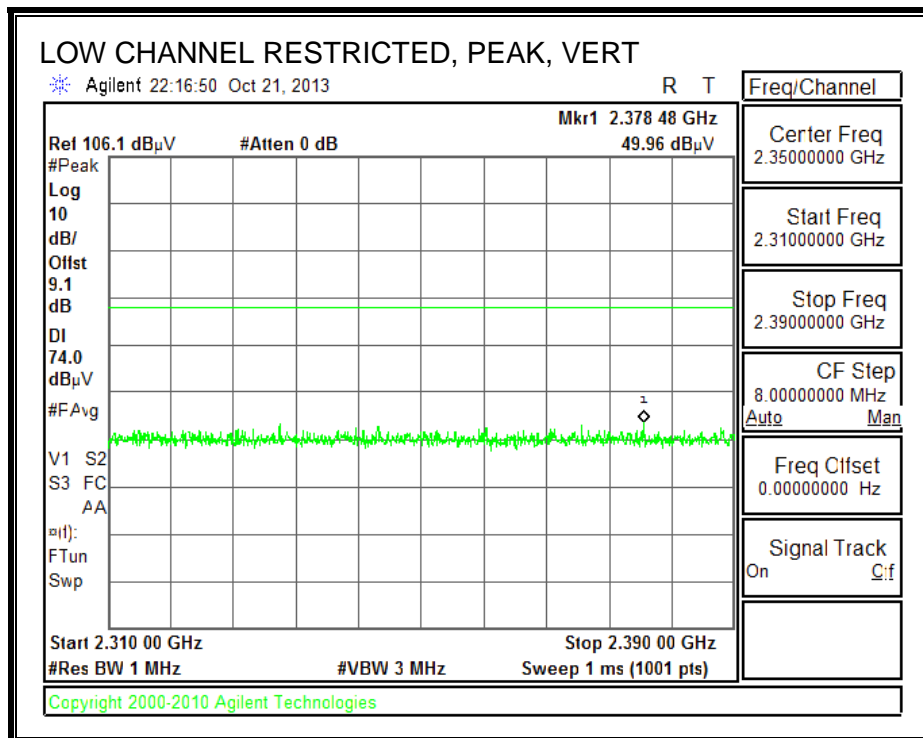
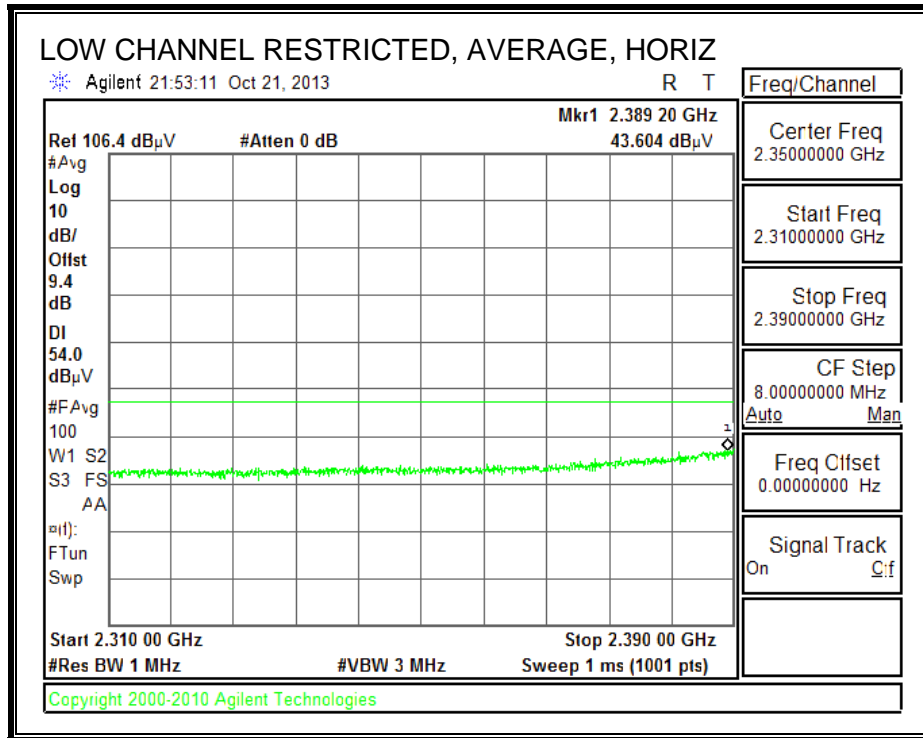
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/F ltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	12.014	34.72	PK	39.2	-21.3	52.62	53.97	-1.35	74	-21.38	0-360	201	H
2	13.621	37.45	PK	39.1	-23.7	52.85	53.97	-1.12	74	-21.15	0-360	201	H
3	12.133	34.95	PK	39.2	-22.2	51.95	53.97	-2.02	74	-22.05	0-360	201	V
4	13.566	35.63	PK	39.1	-23.6	51.13	53.97	-2.84	74	-22.87	0-360	201	V
5	11.997	27.77	PK	39.2	-21.2	45.77	53.97	-8.2	74	-28.23	0-360	100	H
6	13.609	30.4	PK	39.1	-23.4	46.1	53.97	-7.87	74	-27.9	0-360	201	H
7	12.142	27.83	PK	39.2	-21.9	45.13	53.97	-8.84	74	-28.87	0-360	100	V
8	13.555	29	PK	39.1	-23.6	44.5	53.97	-9.47	74	-29.5	0-360	100	V

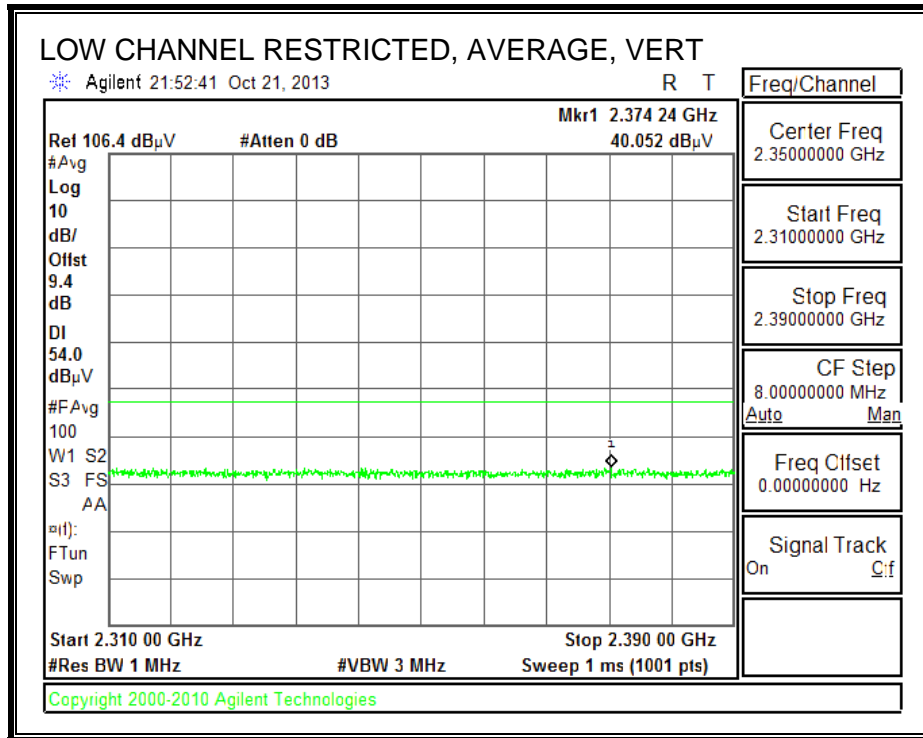
PK - Peak detector

### 10.2.1. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

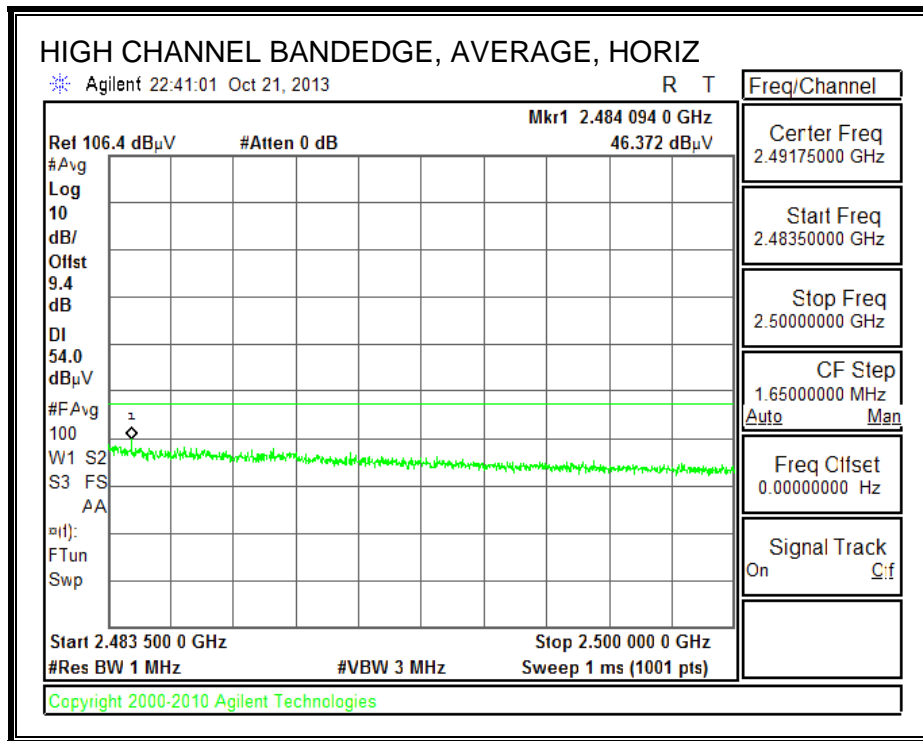
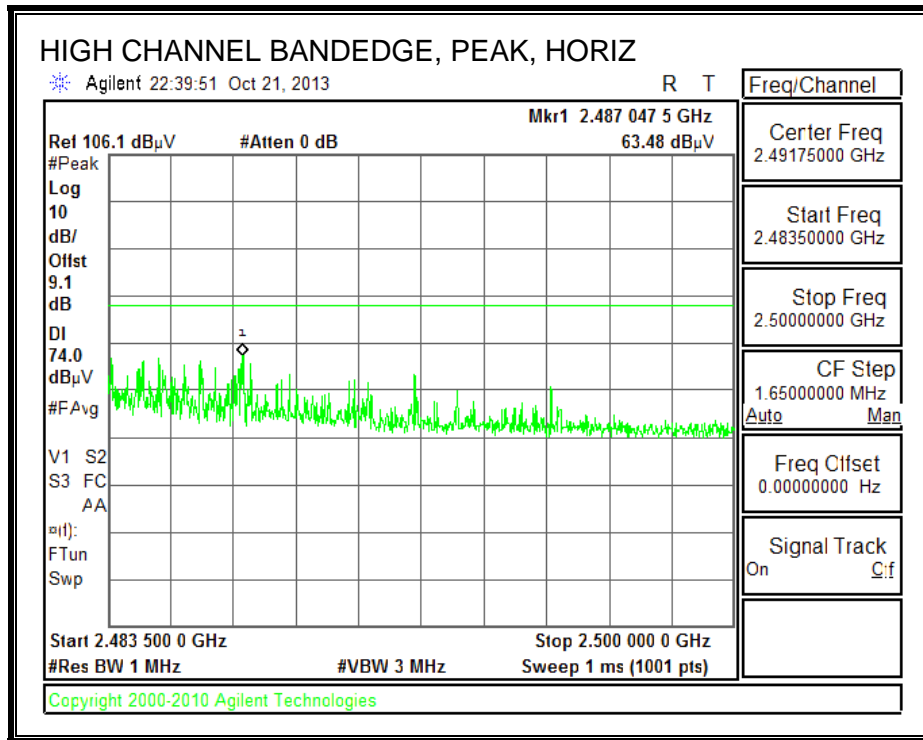
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

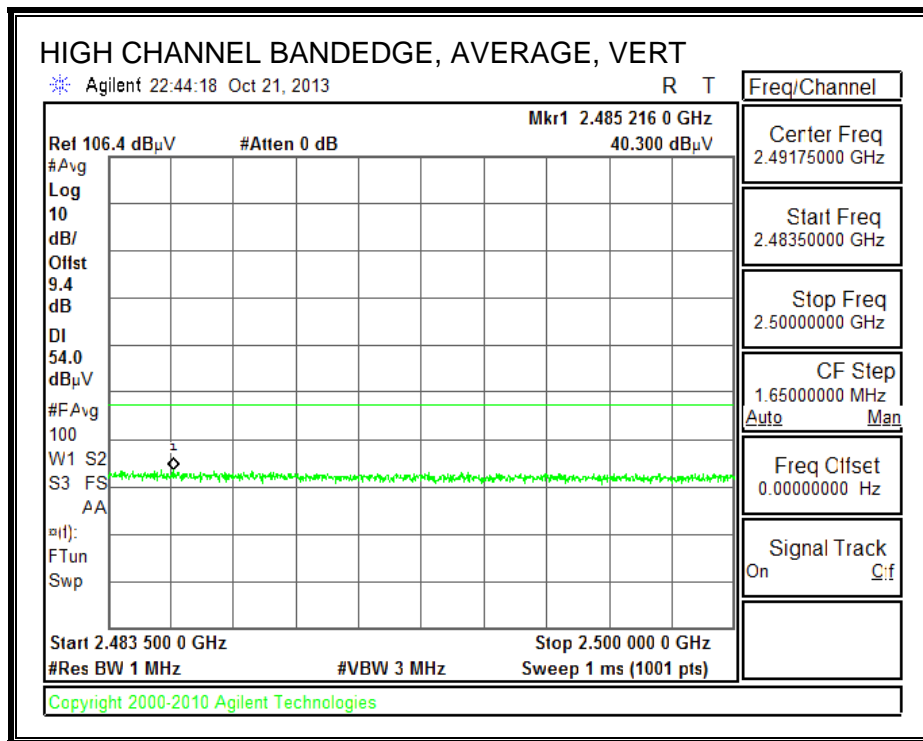
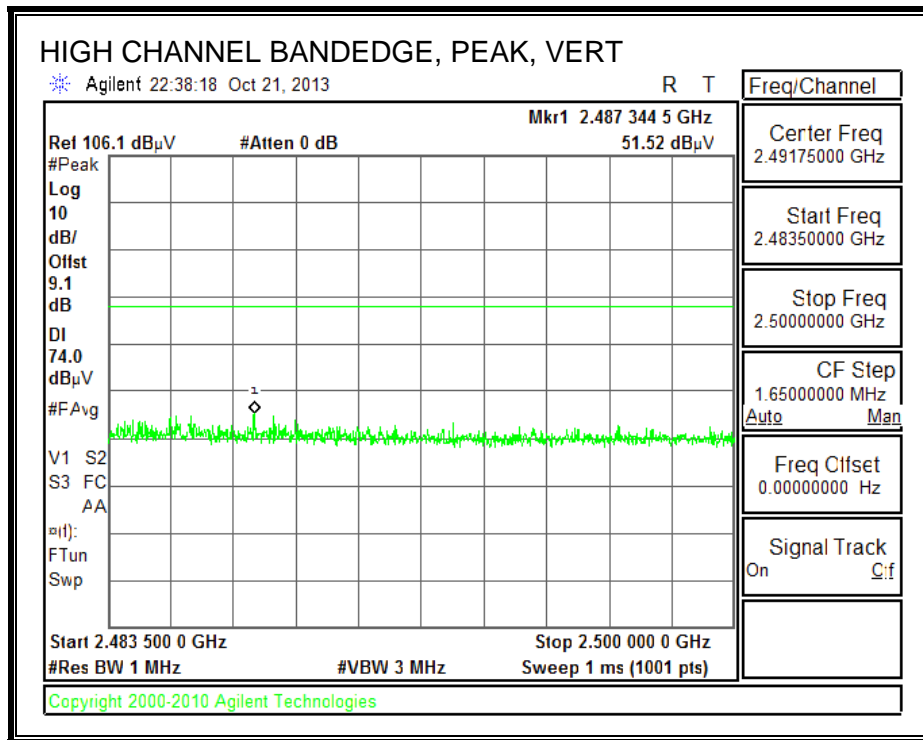






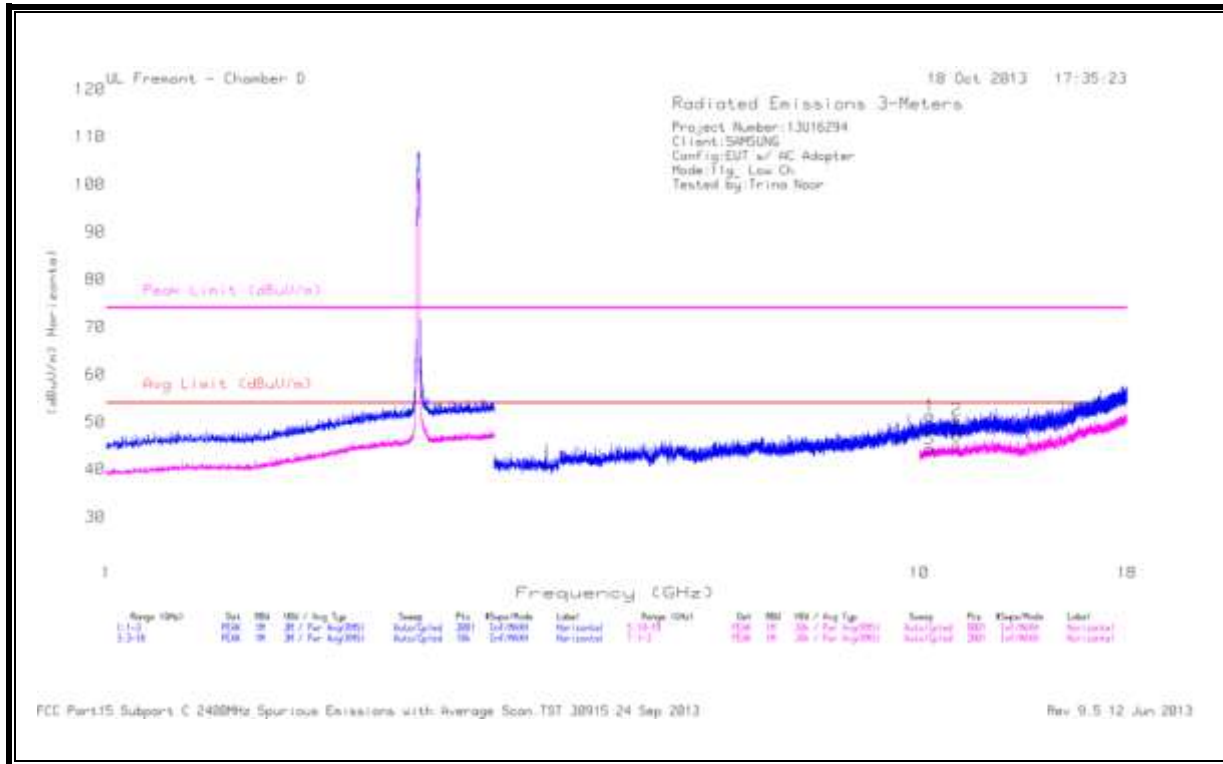
### AUTHORIZED BANDEDGE (HIGH CHANNEL)



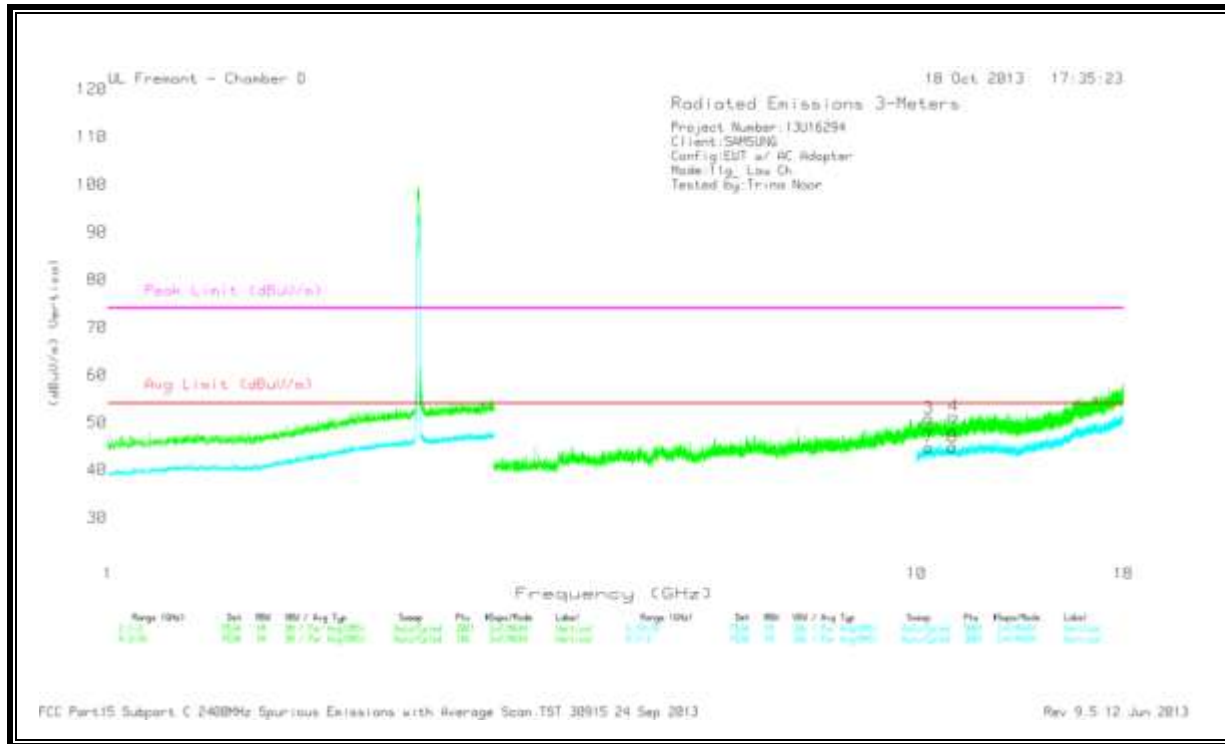


### HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL  
 HORIZONTAL



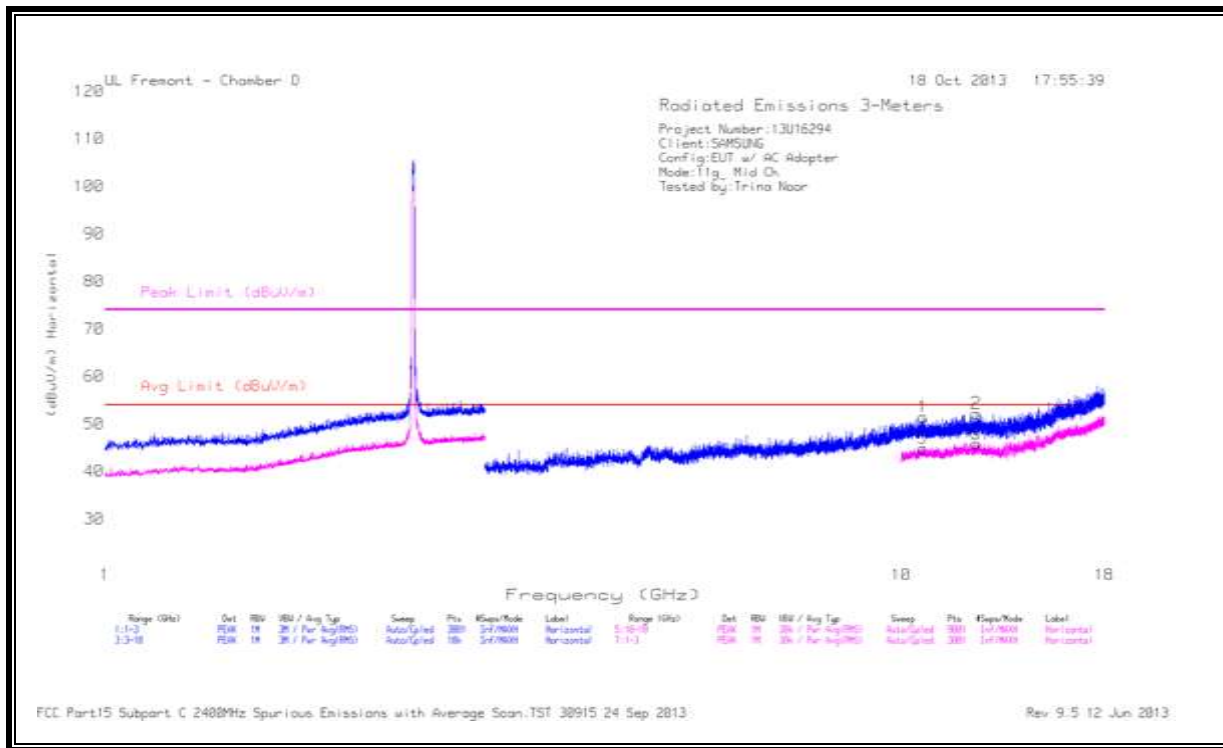
VERTICAL



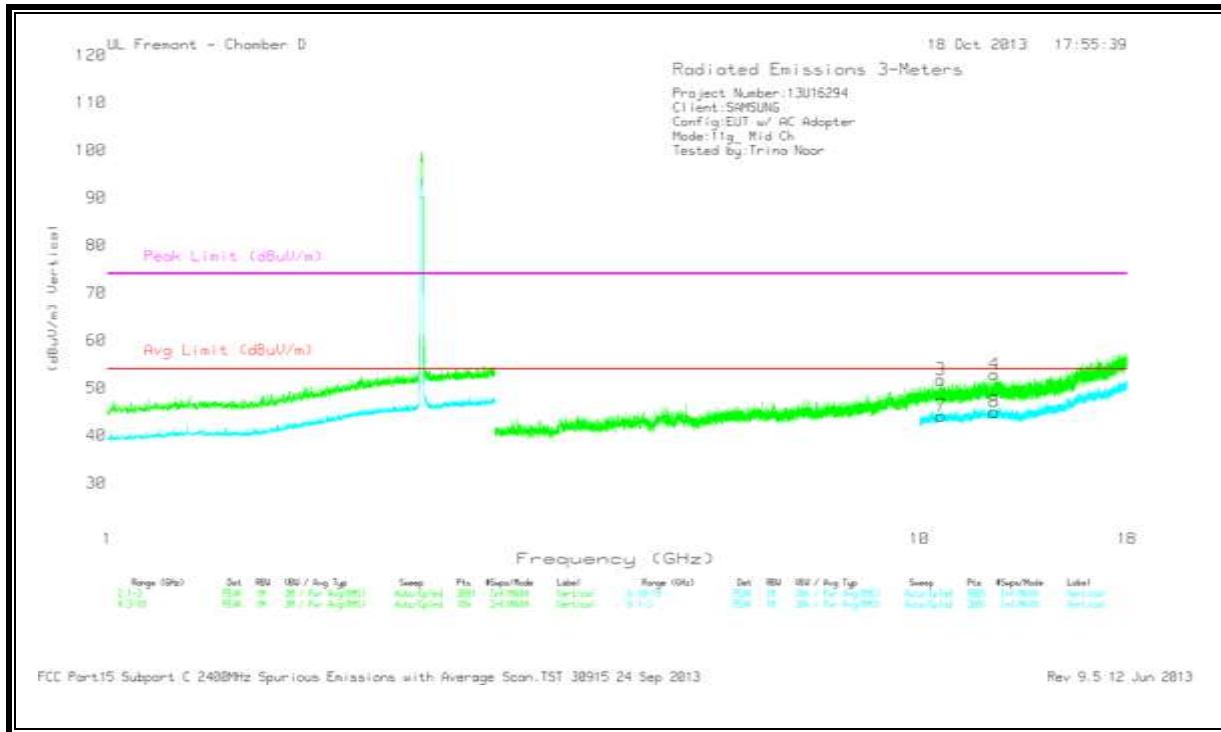
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (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
1	10.302	34.79	PK	38.2	-21.7	51.29	53.97	-2.68	74	-22.71	0-360	100	H
2	11.114	33.27	PK	38.4	-21.3	50.37	53.97	-3.6	74	-23.63	0-360	100	H
3	10.349	34.02	PK	38.2	-21.4	50.82	53.97	-3.15	74	-23.18	0-360	100	V
4	11.111	34.22	PK	38.4	-21.4	51.22	53.97	-2.75	74	-22.78	0-360	100	V
5	10.299	28.04	PK	38.2	-21.9	44.34	53.97	-9.63	74	-29.66	0-360	100	H
6	11.118	27.91	PK	38.4	-21.3	45.01	53.97	-8.96	74	-28.99	0-360	201	H
7	10.347	28.01	PK	38.2	-21.5	44.71	53.97	-9.26	74	-29.29	0-360	201	V
8	11.076	28.3	PK	38.4	-21.9	44.8	53.97	-9.17	74	-29.2	0-360	100	V

MID CHANNEL  
 HORIZONTAL



VERTICAL

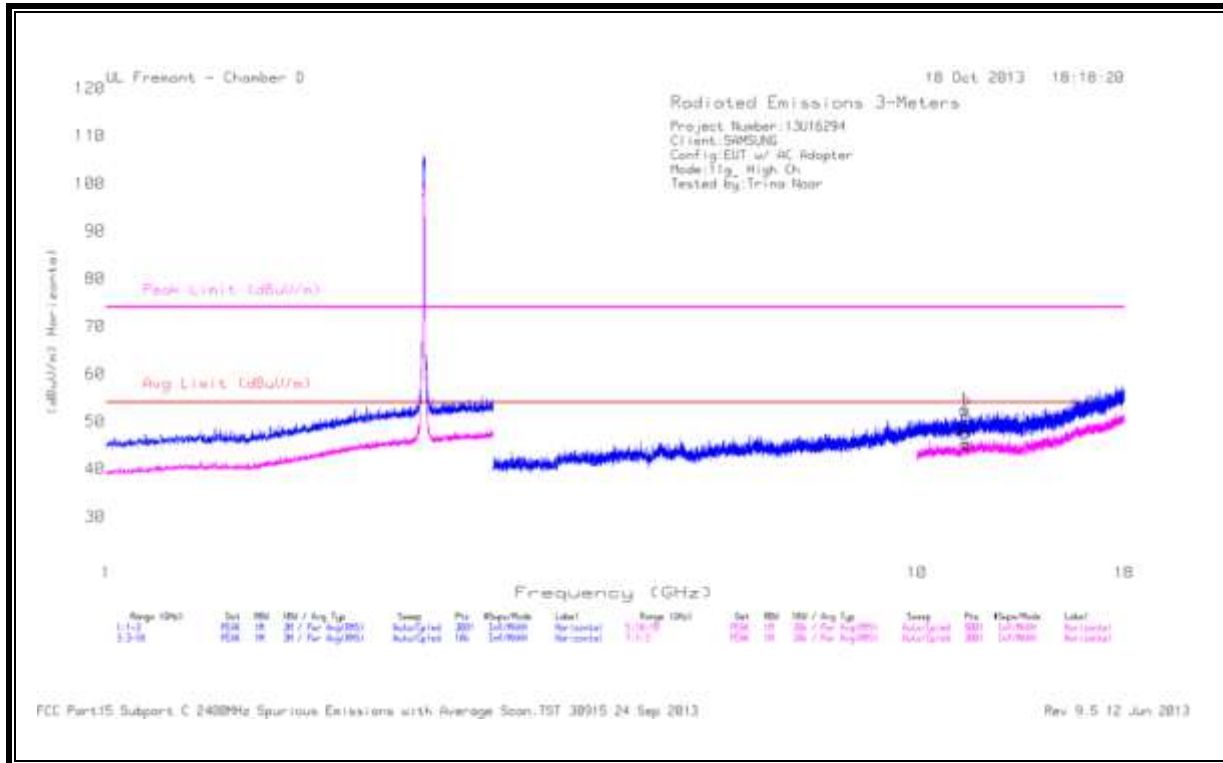


MID CHANNEL DATA

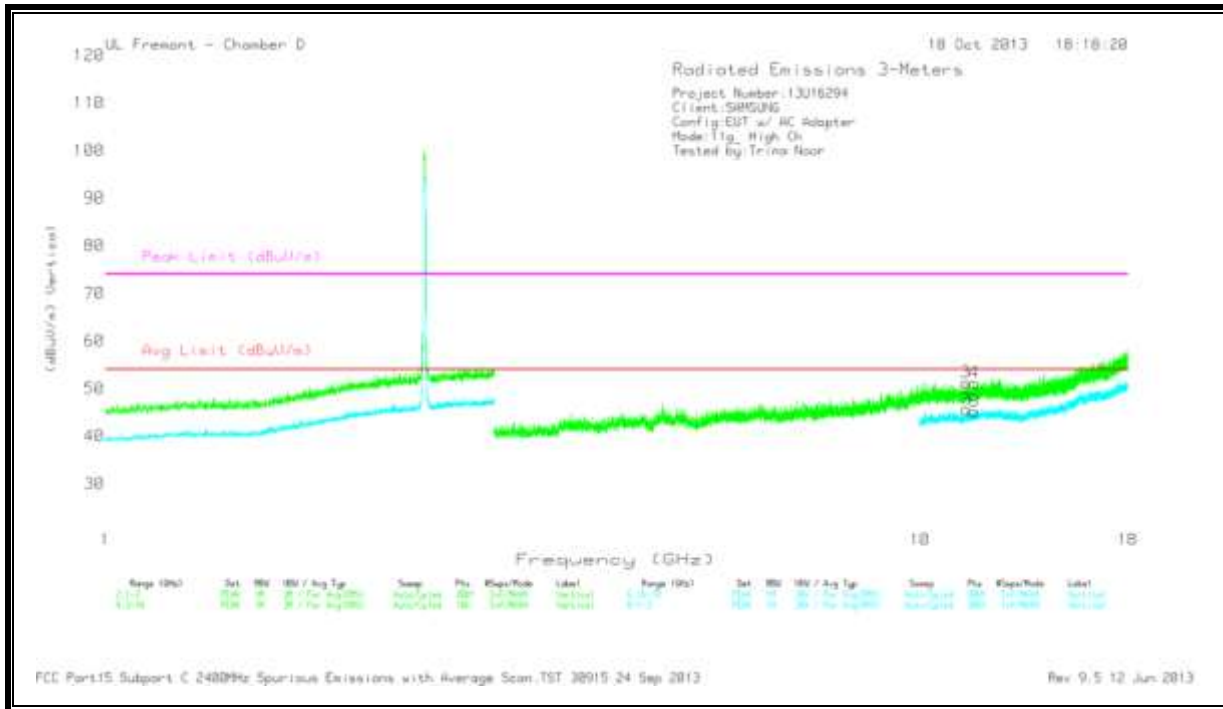
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margi n (dB)	Peak Limit (dBuV/ m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	10.648	34.31	PK	38.4	-21.3	51.41	53.97	-2.56	74	-22.59	0-360	201	H
2	12.428	34.97	PK	39.2	-22	52.17	53.97	-1.8	74	-21.83	0-360	100	H
3	10.611	34.8	PK	38.4	-21.5	51.7	53.97	-2.27	74	-22.3	0-360	100	V
4	12.364	36.02	PK	39.2	-22.4	52.82	53.97	-1.15	74	-21.18	0-360	201	V
5	10.654	27.82	PK	38.4	-21.4	44.82	53.97	-9.15	74	-29.18	0-360	100	H
6	12.422	28.52	PK	39.2	-21.9	45.82	53.97	-8.15	74	-28.18	0-360	100	H
7	10.626	27.1	PK	38.4	-21.4	44.1	53.97	-9.87	74	-29.9	0-360	201	V
8	12.364	28.17	PK	39.2	-22.4	44.97	53.97	-9	74	-29.03	0-360	100	V

PK - Peak detector

HIGH CHANNEL  
 HORIZONTAL



VERTICAL



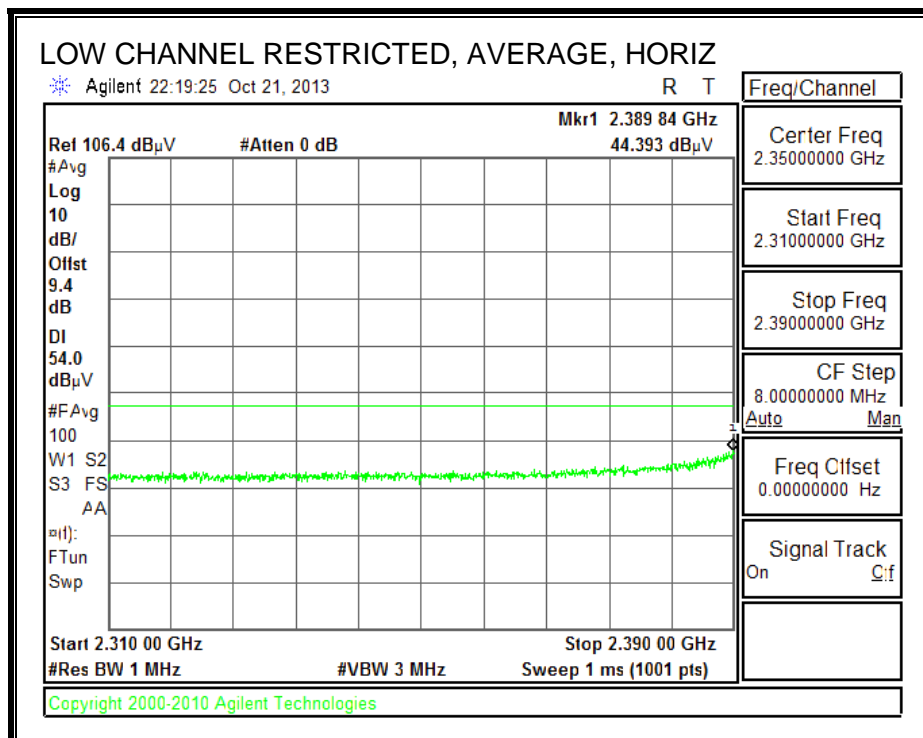
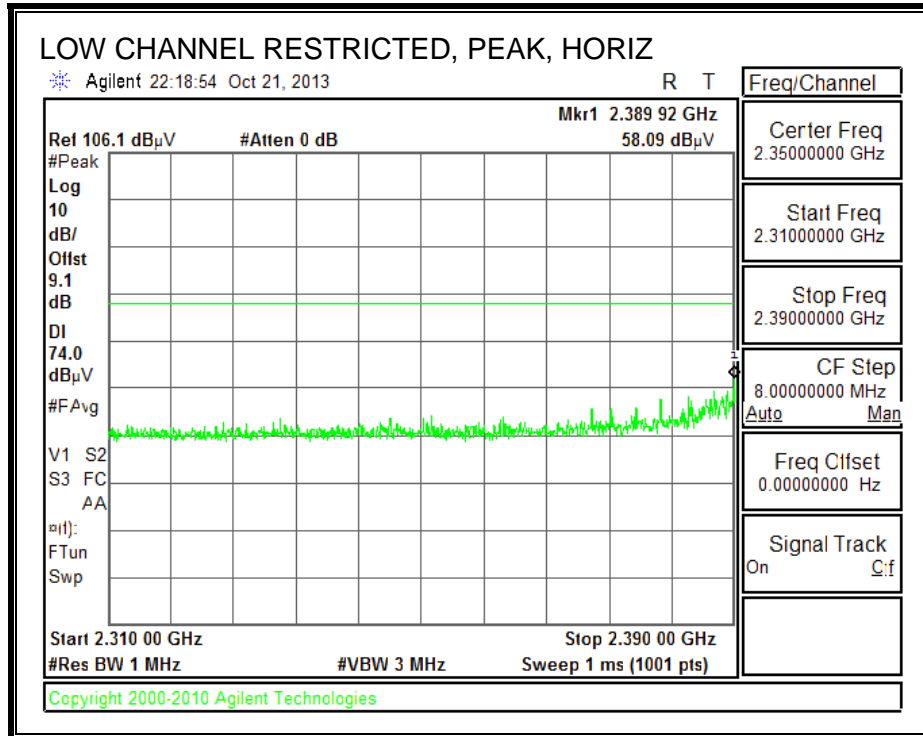
HIGH CHANNEL DATA

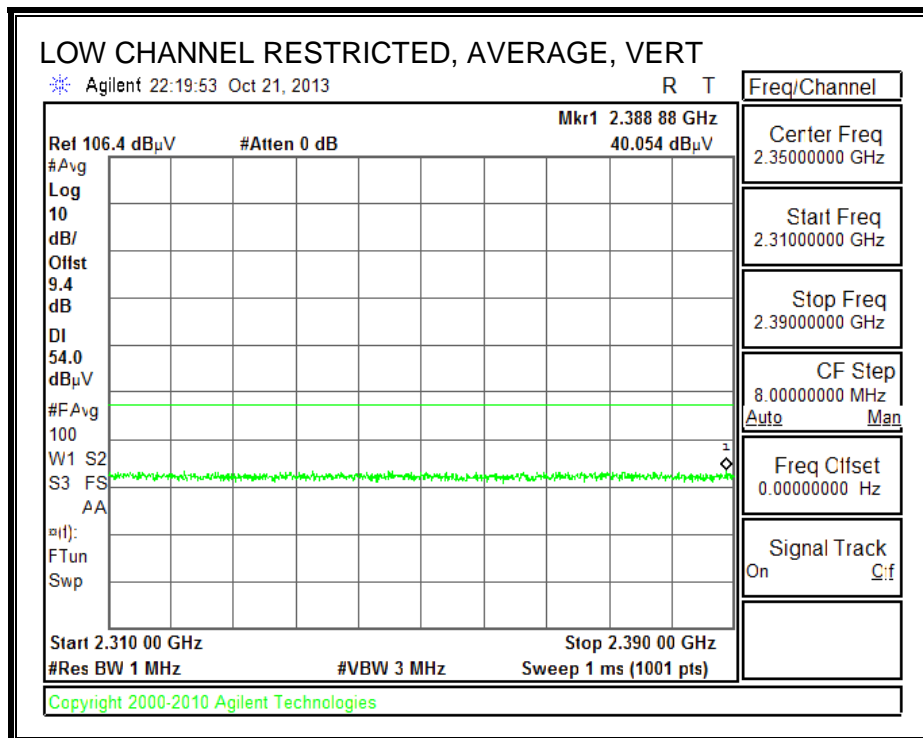
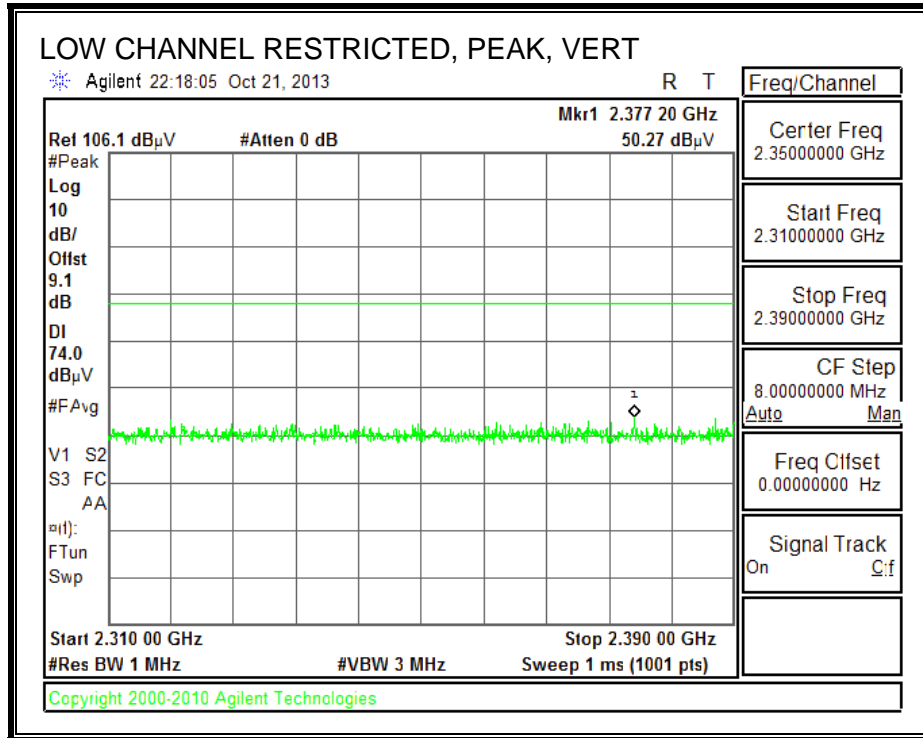
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl /Filtr/Pa d (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m )	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	11.453	35.49	PK	38.6	-21.6	52.49	53.97	-1.48	74	-21.51	0-360	201	H
2	11.514	34.6	PK	38.7	-22	51.3	53.97	-2.67	74	-22.7	0-360	100	H
3	11.391	33.66	PK	38.6	-21	51.26	53.97	-2.71	74	-22.74	0-360	201	V
4	11.656	33.67	PK	38.8	-21.3	51.17	53.97	-2.8	74	-22.83	0-360	100	V
5	11.453	28.23	PK	38.6	-21.6	45.23	53.97	-8.74	74	-28.77	0-360	100	H
6	11.516	28.83	PK	38.7	-22.1	45.43	53.97	-8.54	74	-28.57	0-360	100	H
7	11.388	28.09	PK	38.6	-21.1	45.59	53.97	-8.38	74	-28.41	0-360	100	V
8	11.658	27.69	PK	38.8	-21.3	45.19	53.97	-8.78	74	-28.81	0-360	100	V

PK - Peak detector

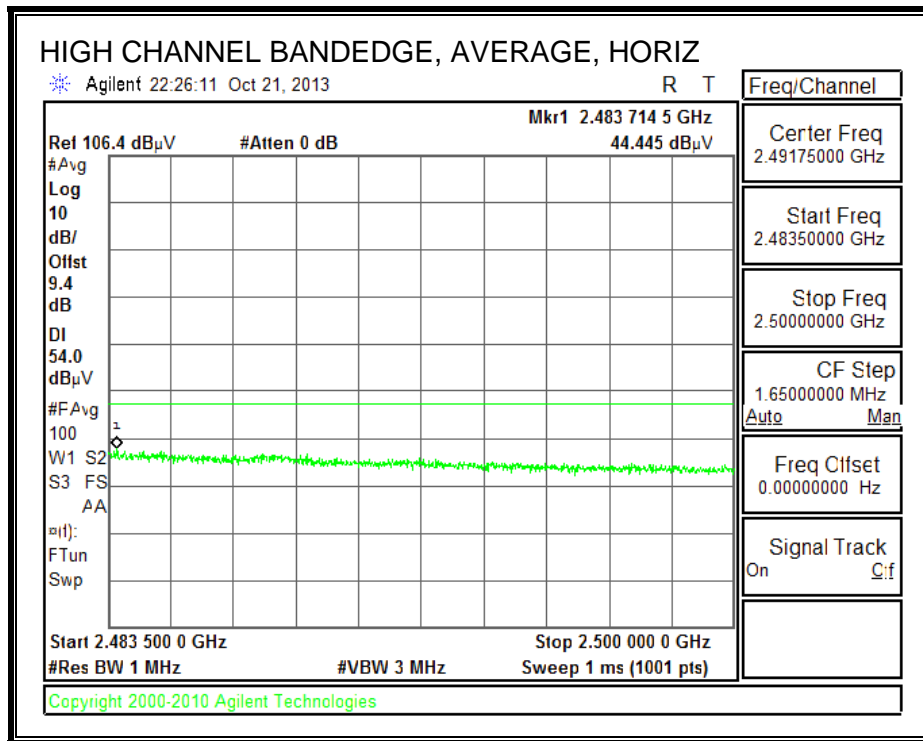
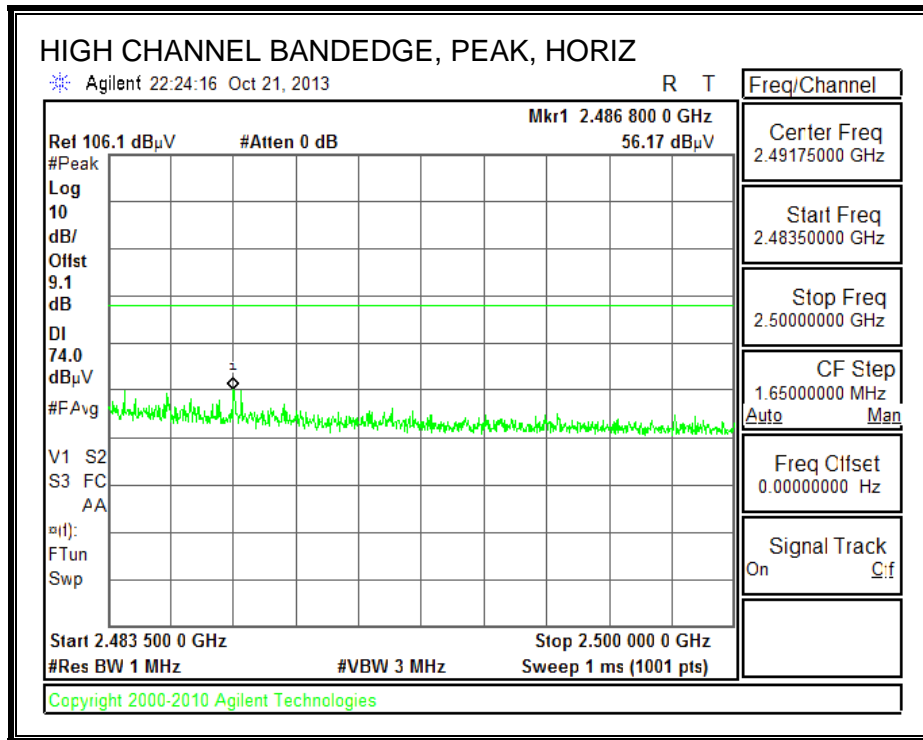
### 10.2.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

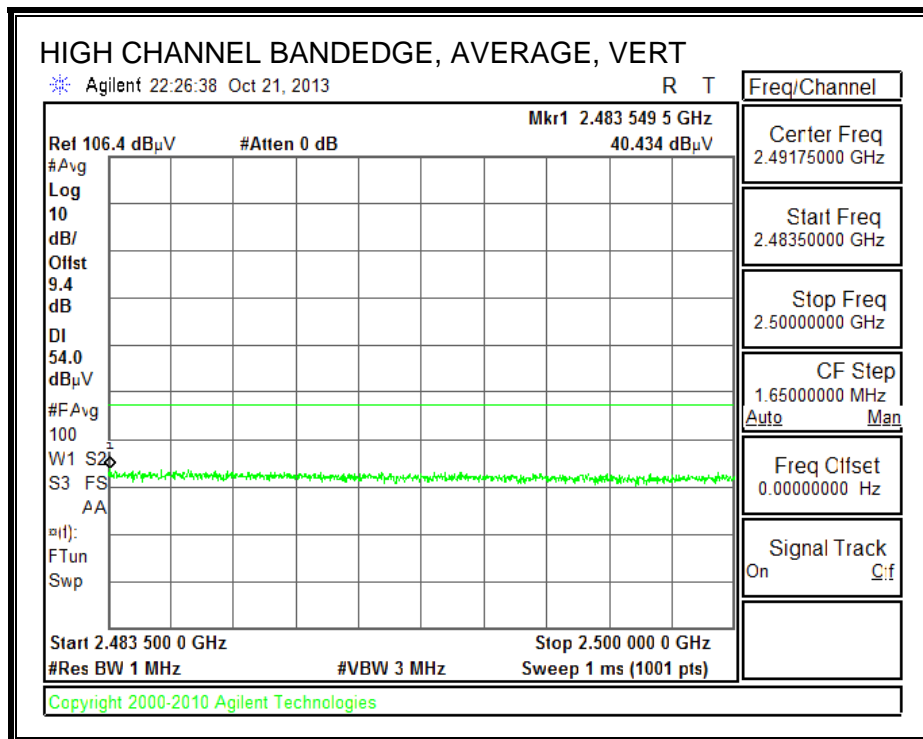
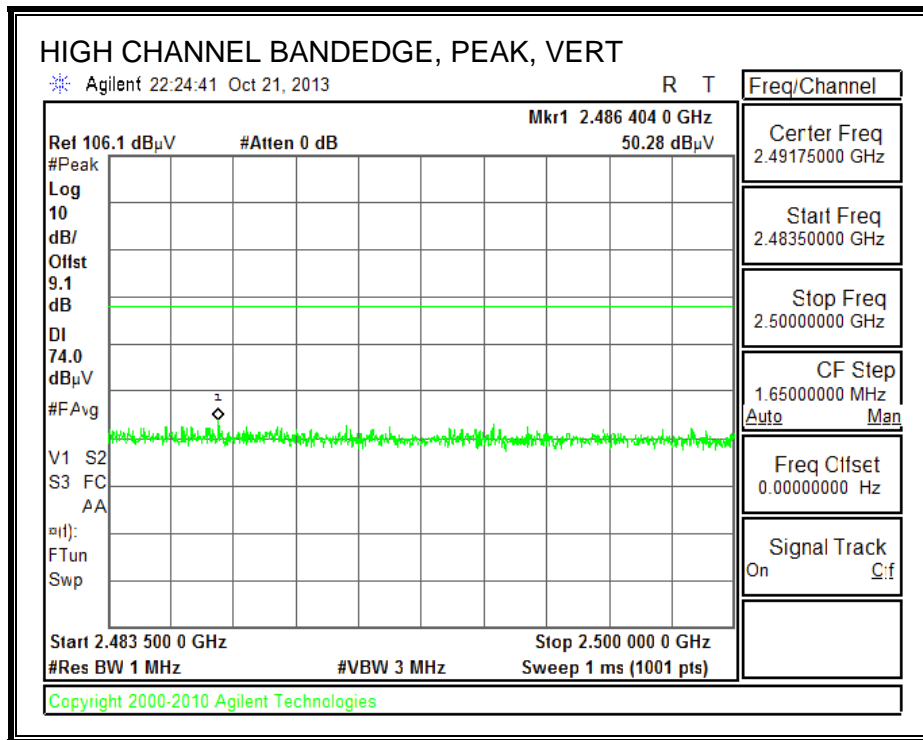
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.





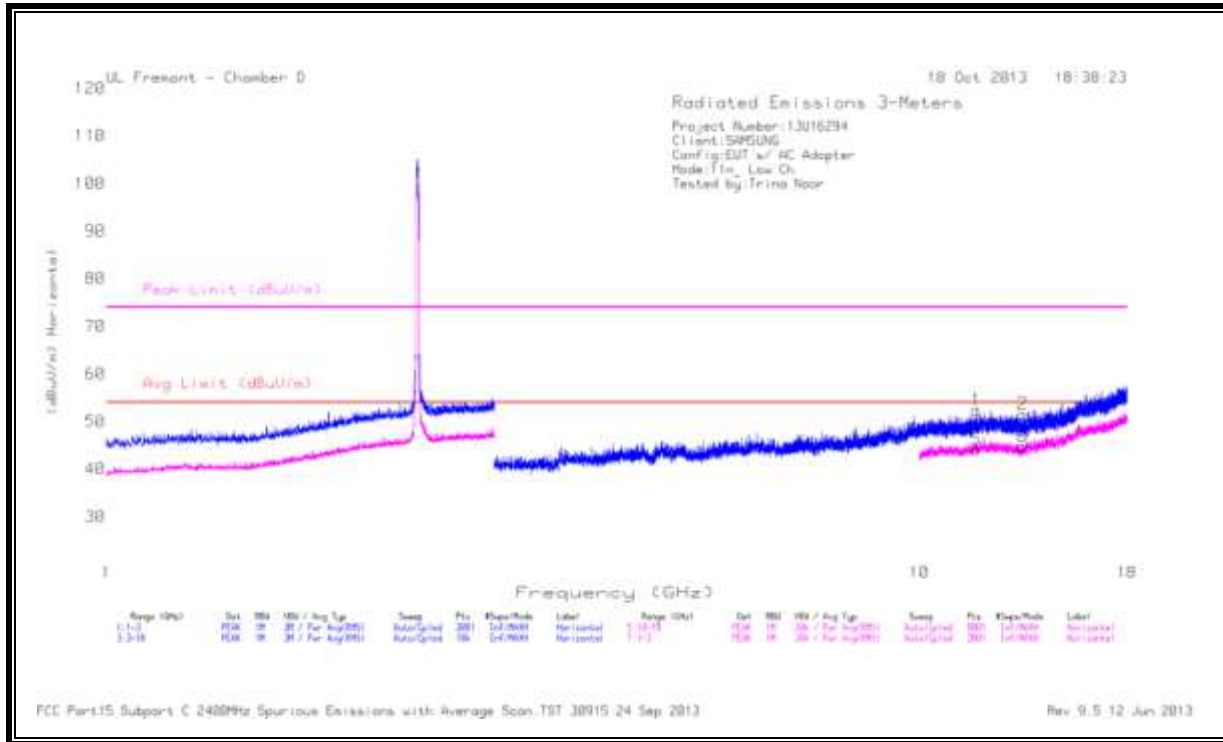
### AUTHORIZED BANDEDGE (HIGH CHANNEL)



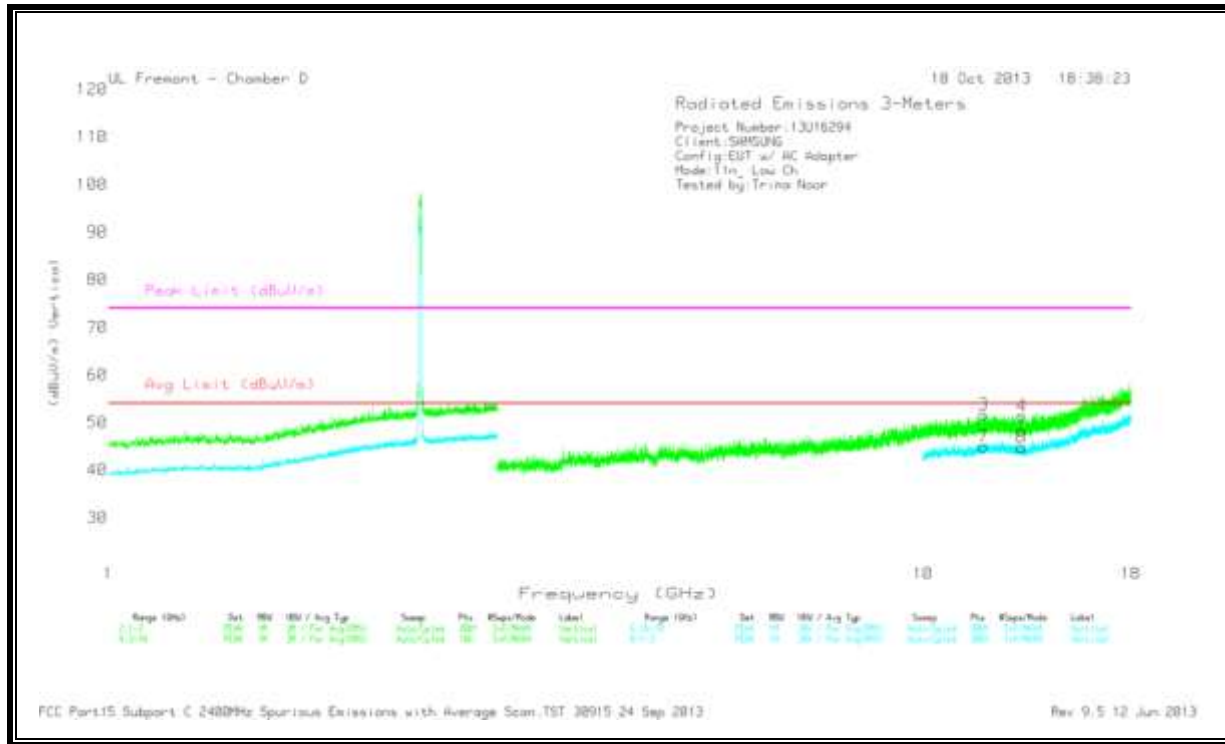


### HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL  
 HORIZONTAL



VERTICAL



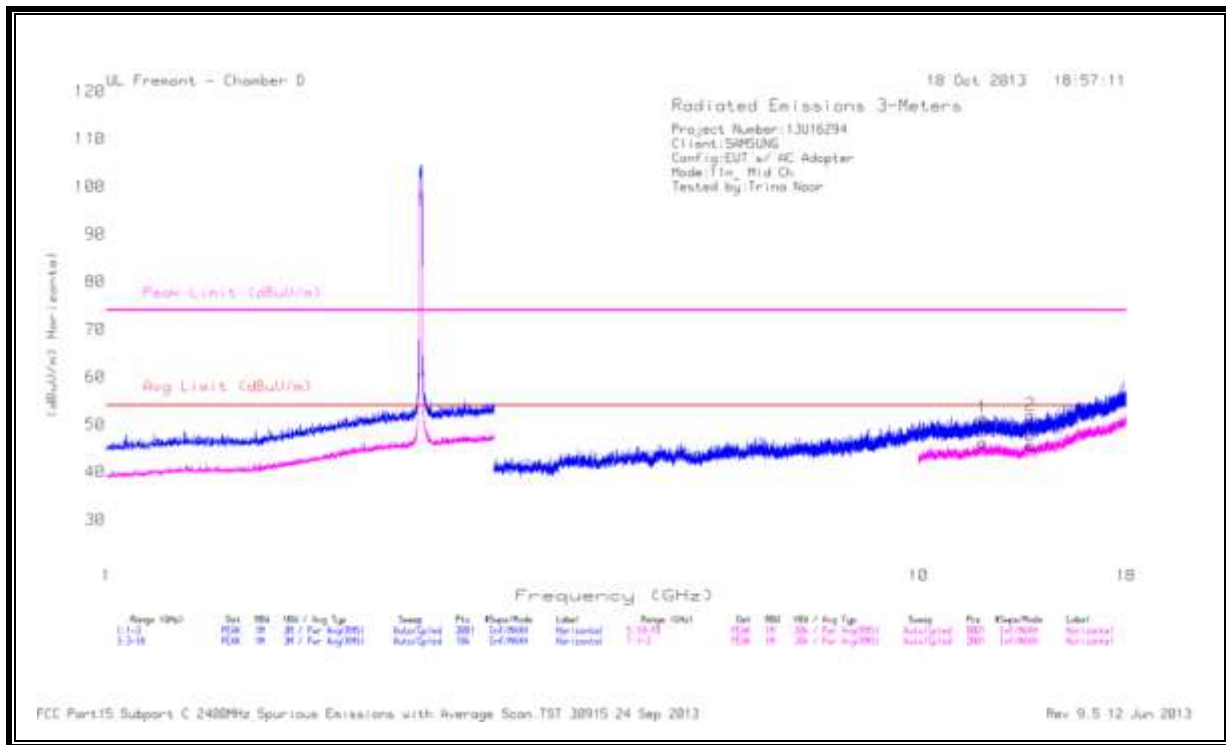
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (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
1	11.755	35.35	PK	38.9	-21.9	52.35	53.97	-1.62	74	-21.65	0-360	201	H
2	13.405	35.58	PK	39.1	-23.2	51.48	53.97	-2.49	74	-22.52	0-360	100	H
3	11.874	34.62	PK	39	-22	51.62	53.97	-2.35	74	-22.38	0-360	100	V
4	13.224	35.24	PK	39	-22.9	51.34	53.97	-2.63	74	-22.66	0-360	100	V
5	11.747	27.31	PK	38.9	-22.1	44.11	53.97	-9.86	74	-29.89	0-360	201	H
6	13.401	28.76	PK	39.1	-23.2	44.66	53.97	-9.31	74	-29.34	0-360	100	H
7	11.882	27.78	PK	39.1	-22	44.88	53.97	-9.09	74	-29.12	0-360	201	V
8	13.217	28.73	PK	39	-22.9	44.83	53.97	-9.14	74	-29.17	0-360	201	V

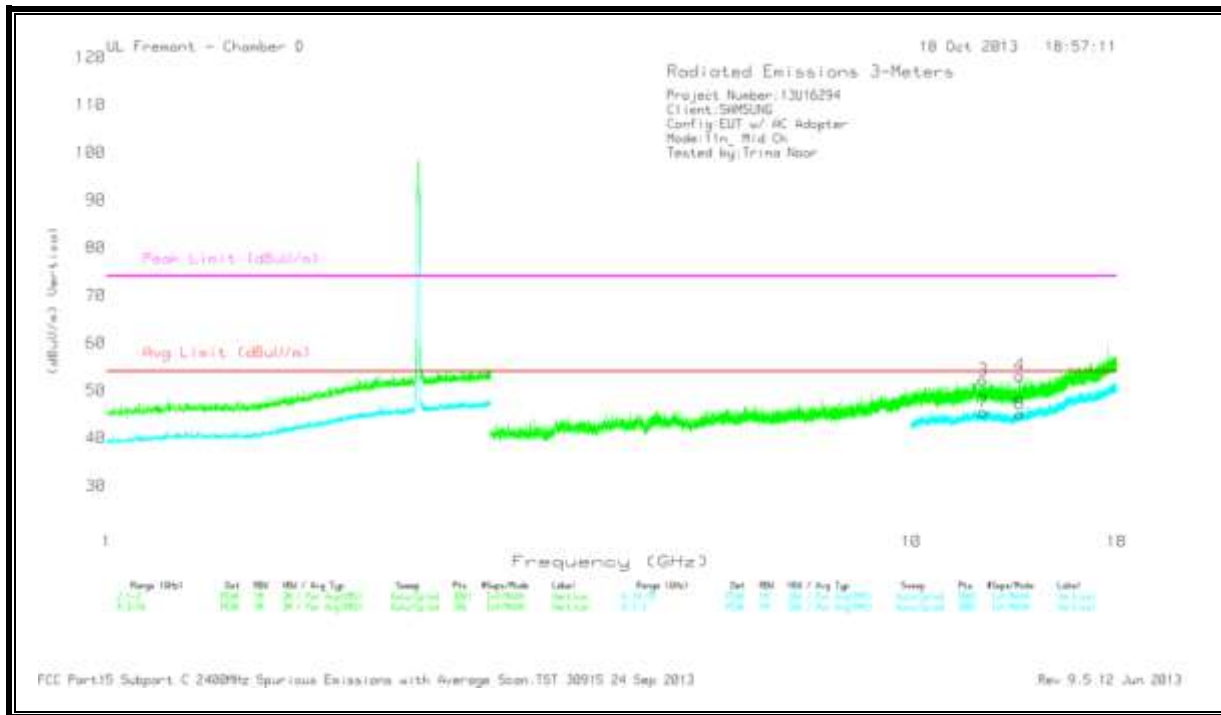
PK - Peak detector

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

MID CHANNEL  
 HORIZONTAL



VERTICAL



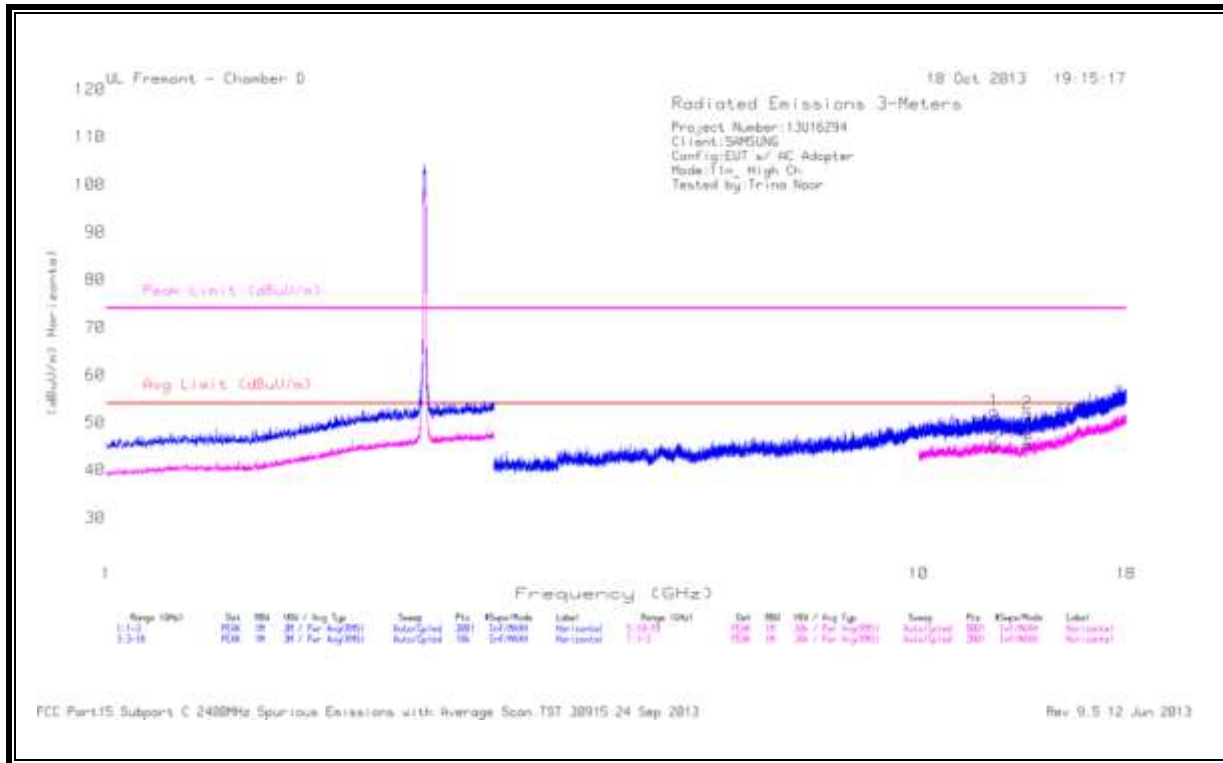
MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT136 (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
1	12.002	33.19	PK	39.2	-21	51.39	53.97	-2.58	74	-22.61	0-360	100	H
2	13.742	35.97	PK	39.2	-23.2	51.97	53.97	-2	74	-22.03	0-360	200	H
3	12.292	35.12	PK	39.2	-22.2	52.12	53.97	-1.85	74	-21.88	0-360	100	V
4	13.639	37.42	PK	39.2	-23.6	53.02	53.97	-.95	74	-20.98	0-360	200	V
5	11.991	28.23	PK	39.2	-21.2	46.23	53.97	-7.74	74	-27.77	0-360	100	H
6	13.74	29.65	PK	39.2	-23.2	45.65	53.97	-8.32	74	-28.35	0-360	100	H
7	12.293	28.41	PK	39.2	-22.2	45.41	53.97	-8.56	74	-28.59	0-360	100	V
8	13.651	29.44	PK	39.2	-23.6	45.04	53.97	-8.93	74	-28.96	0-360	100	V

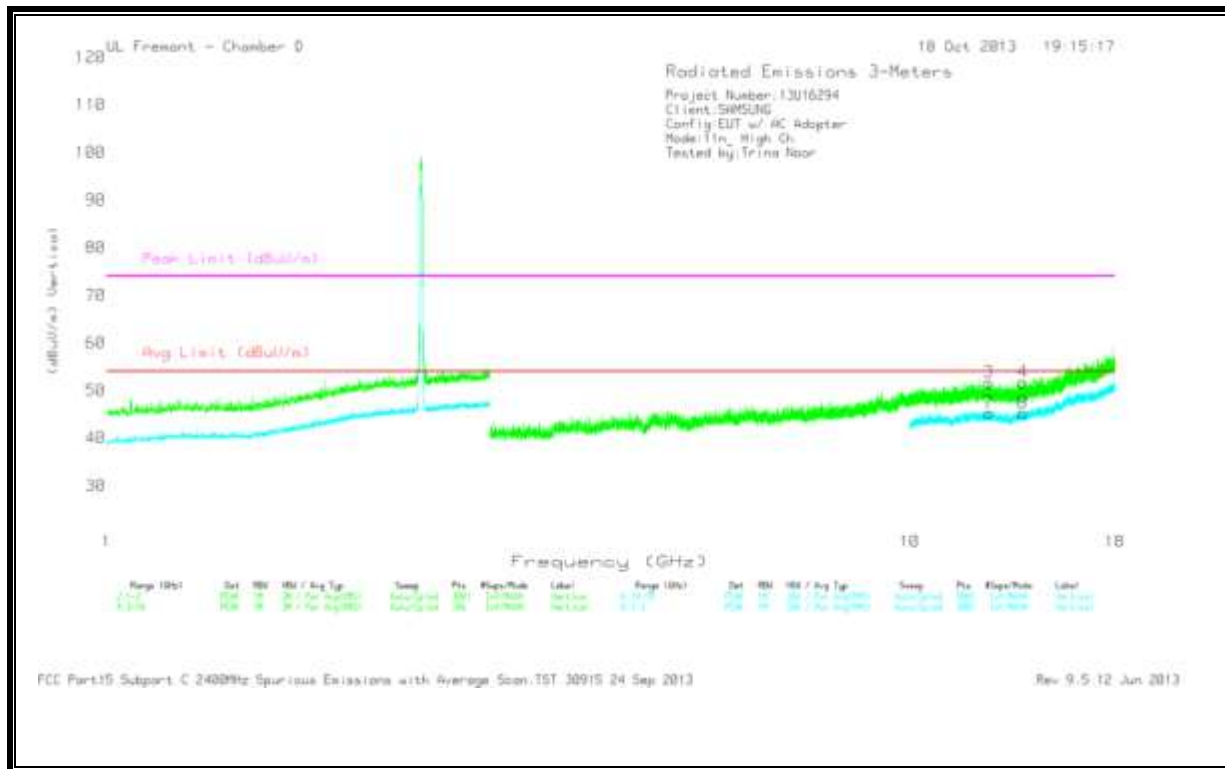
PK - Peak detector

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

HIGH CHANNEL  
 HORIZONTAL



VERTICAL



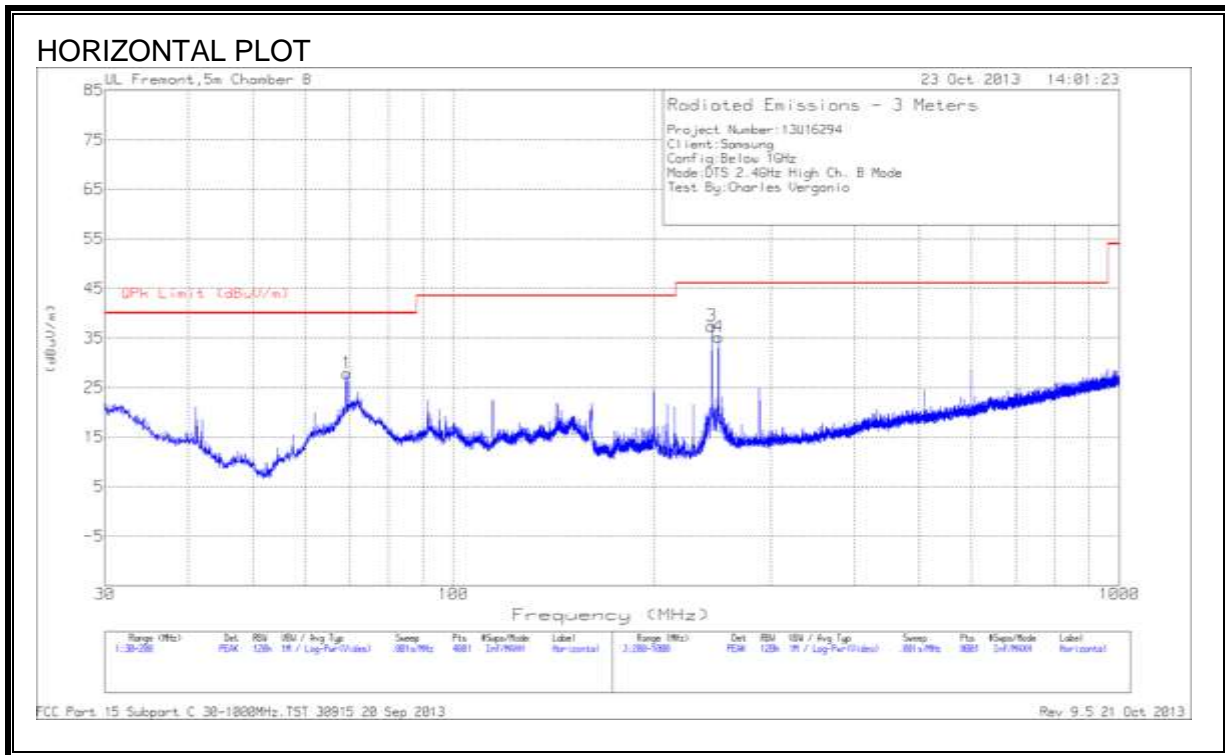
HIGH CHANNEL DATA

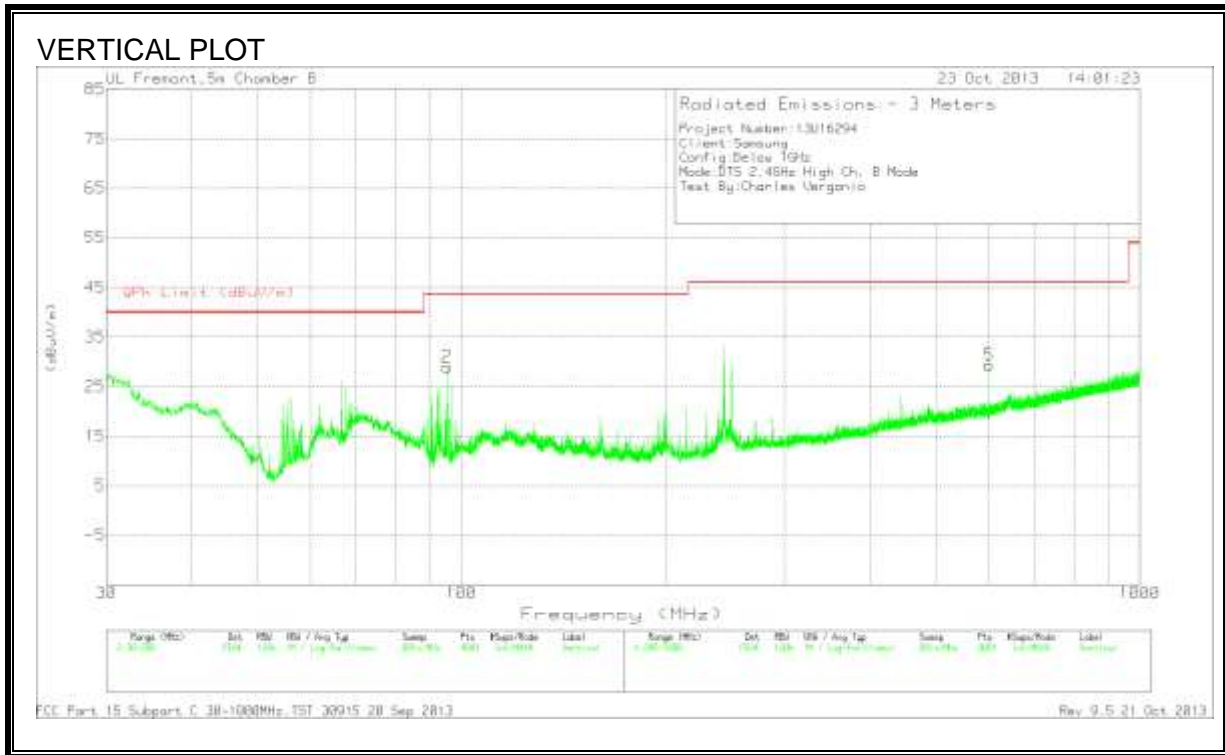
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	12.391	35.52	PK	39.2	-22.3	52.42	53.97	-1.55	74	-21.58	0-360	201	H
2	13.627	36.29	PK	39.2	-23.6	51.89	53.97	-2.08	74	-22.11	0-360	201	H
3	12.533	33.97	PK	39.2	-21.5	51.67	53.97	-2.3	74	-22.33	0-360	100	V
4	13.829	35.91	PK	39.3	-23.5	51.71	53.97	-2.26	74	-22.29	0-360	201	V
5	12.397	28.11	PK	39.2	-22.3	45.01	53.97	-8.96	74	-28.99	0-360	201	H
6	13.638	29.77	PK	39.2	-23.6	45.37	53.97	-8.6	74	-28.63	0-360	100	H
7	12.539	27.27	PK	39.2	-21.2	45.27	53.97	-8.7	74	-28.73	0-360	201	V
8	13.832	29.28	PK	39.3	-23.4	45.18	53.97	-8.79	74	-28.82	0-360	100	V

### 10.3. WORST-CASE BELOW 1 GHz

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

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





**Below 1G Data**

Marker	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
1	69.2275	48.47	PK	7.8	-28.4	27.87	40	-12.13	0-360	200	H
2	95.365	48.13	PK	8.8	-28	28.93	43.52	-14.59	0-360	100	V
3	244.4	52.31	PK	11.6	-26.5	37.41	46.02	-8.61	0-360	100	H
4	250	50.19	PK	11.5	-26.5	35.19	46.02	-10.83	0-360	100	H
5	600	36.28	PK	18.4	-25.4	29.28	46.02	-16.74	0-360	100	V

## 11. 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 <sup>*</sup>	56 to 46 <sup>*</sup>
0.5-5	56	46
5-30	60	50

<sup>\*</sup>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 2009.

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**

Line-L1 .15 - 30MHz

**Trace Markers**

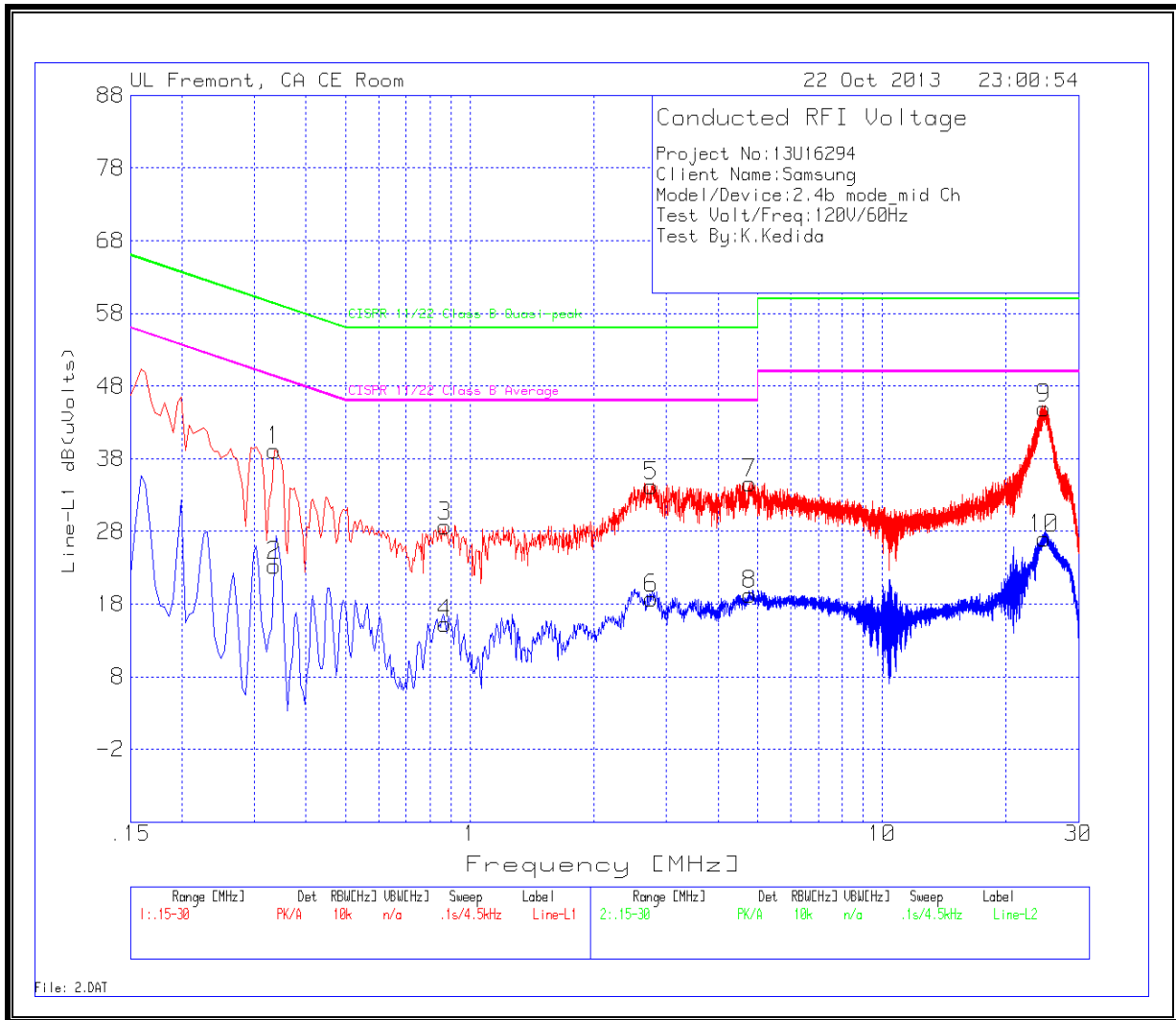
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
1	.3345	39.09	PK	.1	0	39.19	59.3	-20.11	-	-
2	.3345	23.15	Av	.1	0	23.25	-	-	49.3	-26.05
3	.87	28.64	PK	.1	0	28.74	56	-27.26	-	-
4	.87	15.16	Av	.1	0	15.26	-	-	46	-30.74
5	2.7555	34.06	PK	.1	.1	34.26	56	-21.74	-	-
6	2.7555	18.53	Av	.1	.1	18.73	-	-	46	-27.27
7	4.767	34.38	PK	.1	.1	34.58	56	-21.42	-	-
8	4.767	19.05	Av	.1	.1	19.25	-	-	46	-26.75
9	24.7515	44.24	PK	.4	.3	44.94	60	-15.06	-	-
10	24.7515	26.3	Av	.4	.3	27	-	-	50	-23

Line-L2 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
11	.3345	37.8	PK	.1	0	37.9	59.3	-21.4	-	-
12	.3345	27.56	Av	.1	0	27.66	-	-	49.3	-21.64
13	.8205	28.68	PK	.1	0	28.78	56	-27.22	-	-
14	.8205	18.08	Av	.1	0	18.18	-	-	46	-27.82
15	2.5215	32.03	PK	.1	.1	32.23	56	-23.77	-	-
16	2.5215	19.05	Av	.1	.1	19.25	-	-	46	-26.75
17	24.9495	35.03	PK	.5	.3	35.83	60	-24.17	-	-
18	24.9495	21.33	Av	.5	.3	22.13	-	-	50	-27.87

**LINE 1 RESULTS**



**LINE 2 RESULTS**

