



**FCC CFR47 PART 15 SUBPART C**

**BLUETOOTH LOW ENERGY  
CERTIFICATION TEST REPORT  
FOR**

**GSM/WCDMA/LTE Phone + Bluetooth, WLAN 2.4GHz b/g/n & ANT+**

**MODEL NUMBER: SM-A3000**

**FCC ID: A3LSMA3000**

**REPORT NUMBER: 14118652-E3**

**ISSUE DATE: SEPTEMBER 5, 2014**

*Prepared for*  
**SAMSUNG ELECTRONICS CO., LTD.  
416, MAETAN 3-DONG, YEONGTONG-GU  
SUWON-CITY, GYEONGGI-DO 443-742, SOUTH KOREA**

*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.	Date	Revisions	Revised By
--	9/5/14	Initial Issue	P. Zhang

## 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. MEASURING INSTRUMENT CALIBRATION .....	6
4.2. SAMPLE CALCULATION .....	7
4.3. MEASUREMENT UNCERTAINTY.....	7
<b>5. EQUIPMENT UNDER TEST .....</b>	<b>8</b>
5.1. DESCRIPTION OF EUT .....	8
5.2. MAXIMUM OUTPUT POWER.....	8
5.3. DESCRIPTION OF AVAILABLE ANTENNAS .....	8
5.4. WORST-CASE CONFIGURATION AND MODE.....	9
5.5. DESCRIPTION OF TEST SETUP.....	10
<b>6. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>12</b>
<b>7. SUMMARY .....</b>	<b>13</b>
<b>8. ANTENNA PORT TEST RESULTS .....</b>	<b>13</b>
8.1. 6 dB BANDWIDTH.....	14
8.2. 99% BANDWIDTH.....	18
8.3. OUTPUT POWER.....	22
8.4. AVERAGE POWER.....	26
8.5. POWER SPECTRAL DENSITY .....	27
8.6. CONDUCTED SPURIOUS EMISSIONS.....	31
<b>9. RADIATED TEST RESULTS.....</b>	<b>38</b>
9.1. LIMITS AND PROCEDURE .....	38
9.2. TRANSMITTER ABOVE 1 GHz.....	40
9.3. WORST-CASE BELOW 1 GHz.....	53
<b>10. AC POWER LINE CONDUCTED EMISSIONS .....</b>	<b>56</b>

**11. SETUP PHOTOS .....61**

# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** GSM/WCDMA/LTE Phone + Bluetooth, WLAN 2.4GHz b/g/n & ANT+  
**MODEL:** SM-A3000  
**SERIAL NUMBER:** FL-345-A (RADIATED), FL-345-C (CONDUCTED)  
**DATE TESTED:** AUGUST 28 - SEPTEMBER 5, 2014

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:



PENG ZHANG

CHARLES VERGONIO

CONSUMER TECHNOLOGY DIVISION  
PROJECT LEADER  
UL Verification Services Inc.

CONSUMER TECHNOLOGY DIVISION  
LAB ENGINEER  
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.

## 3. FACILITIES AND ACCREDITATION

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

47173 Benicia Street	47266 Benicia Street
<input type="checkbox"/> Chamber A(IC: 2324B-1)	<input type="checkbox"/> Chamber D(IC: 2324B-4)
<input type="checkbox"/> Chamber B(IC: 2324B-2)	<input type="checkbox"/> Chamber E(IC: 2324B-5)
<input type="checkbox"/> Chamber C(IC: 2324B-3)	<input checked="" type="checkbox"/> Chamber F(IC: 2324B-6)
	<input type="checkbox"/> Chamber G(IC: 2324B-7)
	<input type="checkbox"/> Chamber H(IC: 2324B-8)

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:

$$\text{Field Strength (dBuV/m)} = \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Preamp Gain (dB)}$$

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

## 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 26000 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/WCDMA/LTE Phone + Bluetooth, WLAN 2.4GHz b/g/n & ANT+

### 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	1.00	1.26

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -1.85 dBi.

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

## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	SAMSUNG	ETA0U83CBC	N/A	N/A
Earphone	SAMSUNG	EHS64AVFWE	N/A	N/A

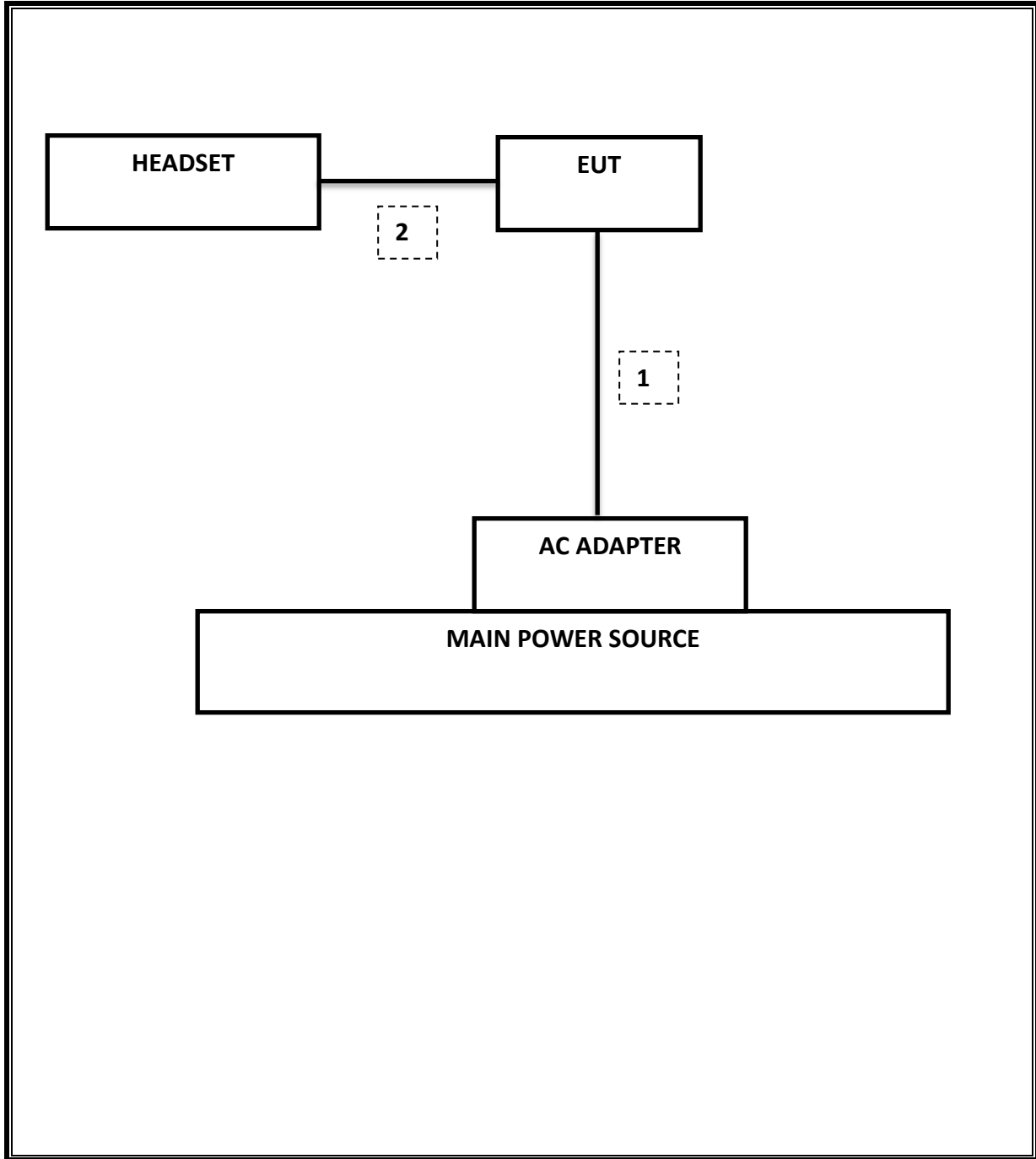
### I/O CABLES

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

EUT was set in the Hidden menu mode to enable BLE 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 Due
Antenna, Biconolog, 30MHz-100MHz	Sunol Sciences	JB1	C01171	02/13/15
Antenna, Horn, 18GHz	EMCO	3115	C00783	10/25/14
Antenna, Horn, 25.5 GHz	ARA	MWH-1826/B	C00980	11/14/14
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/28/15
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/14
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/14
CBT Bluetooth Tester	R & S	CBT	None	07/12/15
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/14
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/14
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/15
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR

## 7. SUMMARY

8.

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	0.67MHz
2.1051, 15.247 (d)	RSS-210 A8.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-42.80dBm
15.247	RSS-210 A8.4	TX conducted output power	<30dBm		Pass	1.0dBm
15.247	RSS-210 A8.2	PSD	<8dBm		Pass	-14.28dBm
15.207 (a)	RSS-GEN 7.2.2	AC Power Line conducted emissions	Section 10	Radiated	Pass	44.63dBuV(AV)
15.205, 15.209	RSS-210 Clause 2.6, RSS-210 Clause 6	Radiated Spurious Emission	< 54dBuV/m		Pass	44.26dBuV/m

## ANTENNA PORT TEST RESULTS

### 8.1. 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

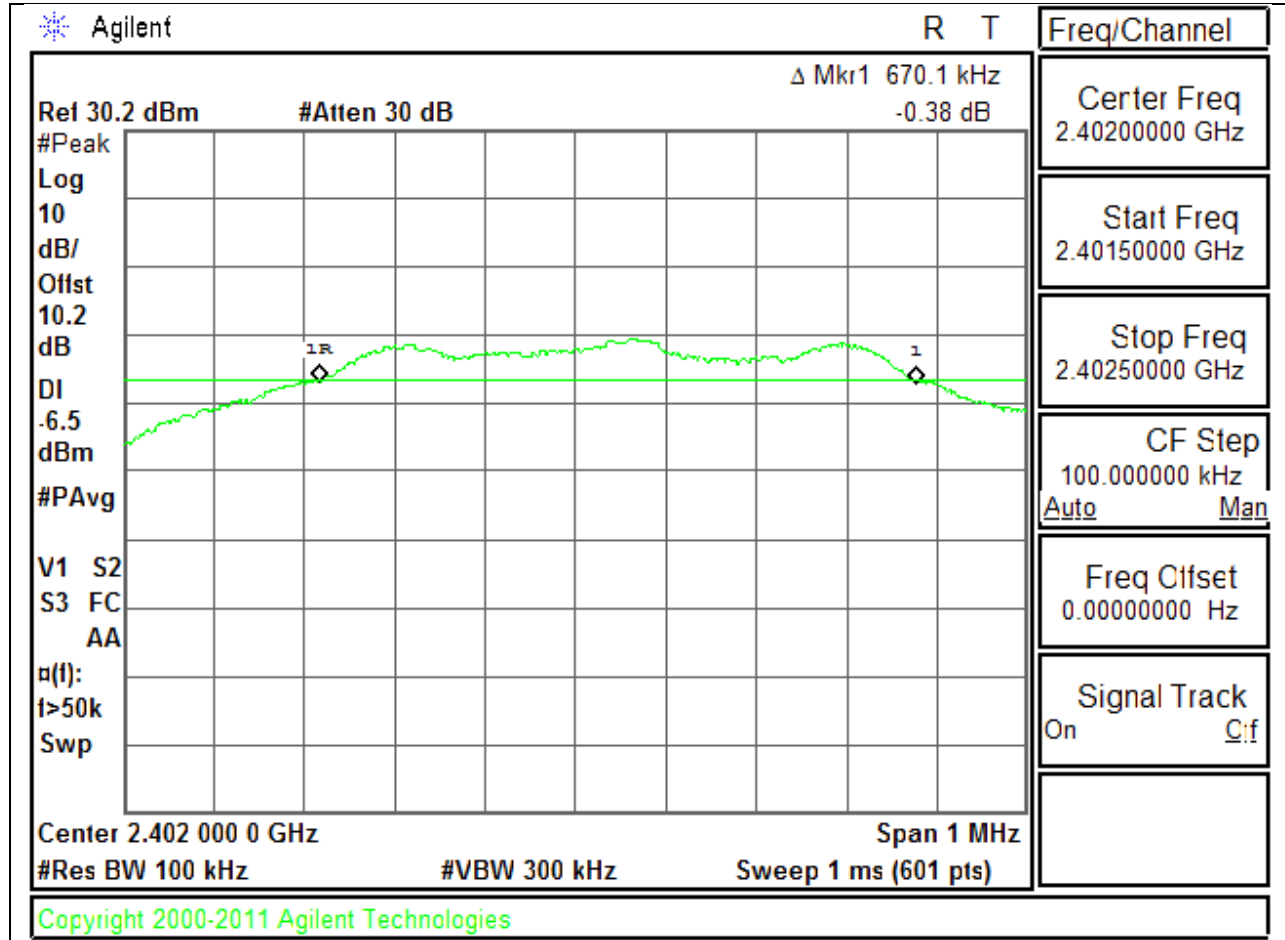
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

#### RESULTS

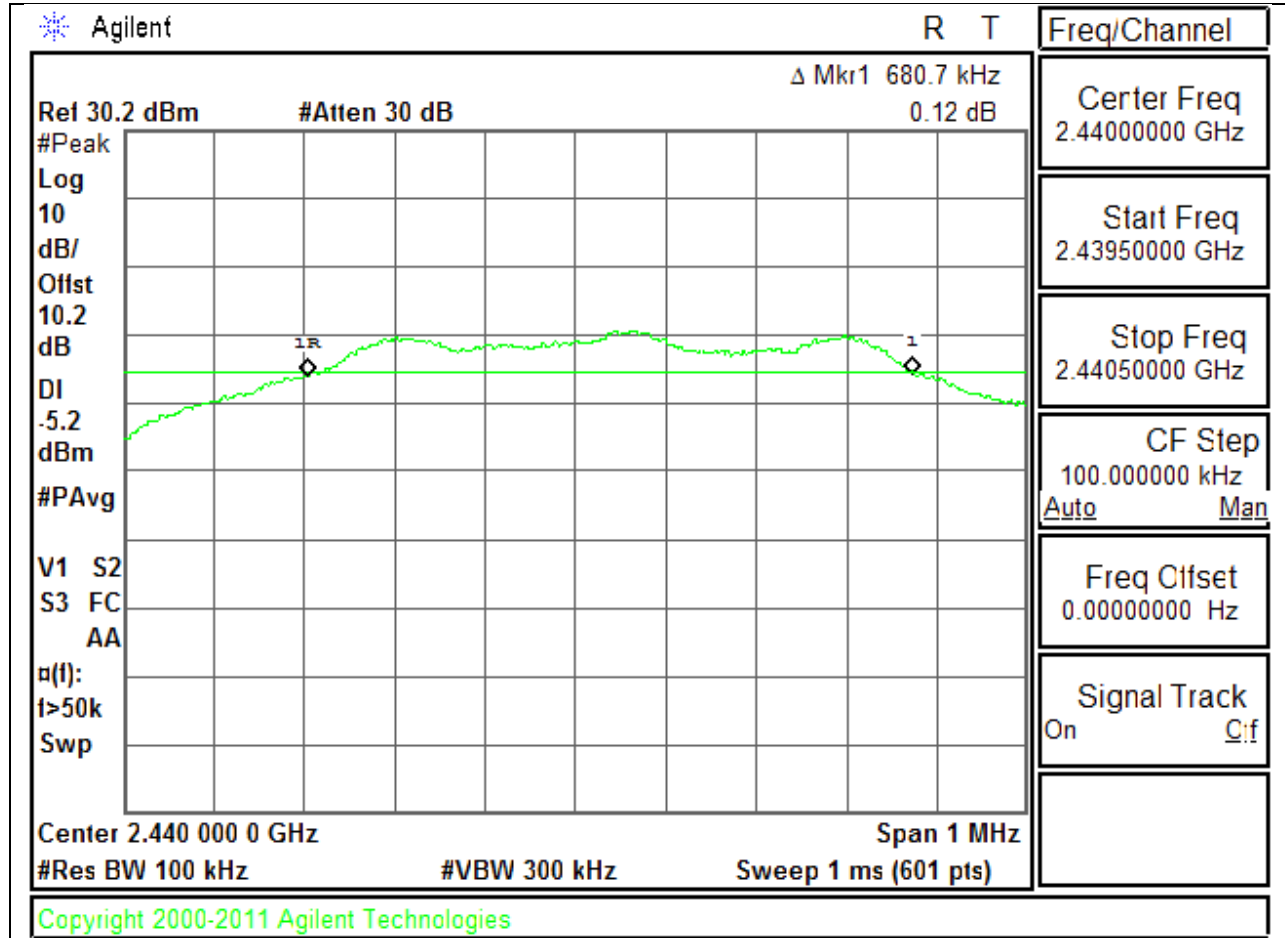
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6700	0.5
Middle	2440	0.6800	0.5
High	2480	0.6800	0.5

**6 dB BANDWIDTH PLOTS**

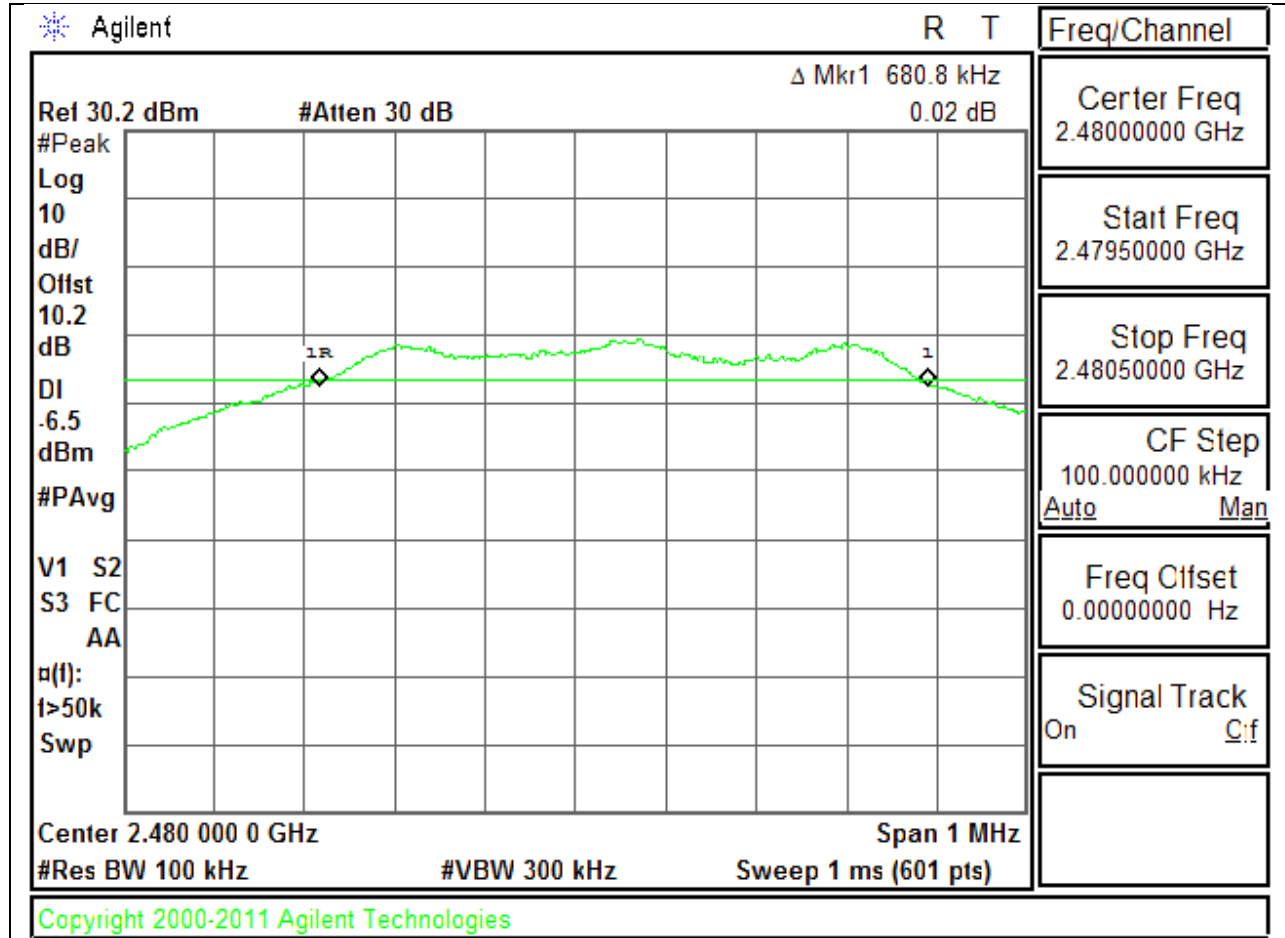
**LOW CHANNEL**



**MID CHANNEL**



### HIGH CHANNEL



## 8.2. 99% BANDWIDTH

### LIMITS

None; for reporting purposes only.

### TEST PROCEDURE

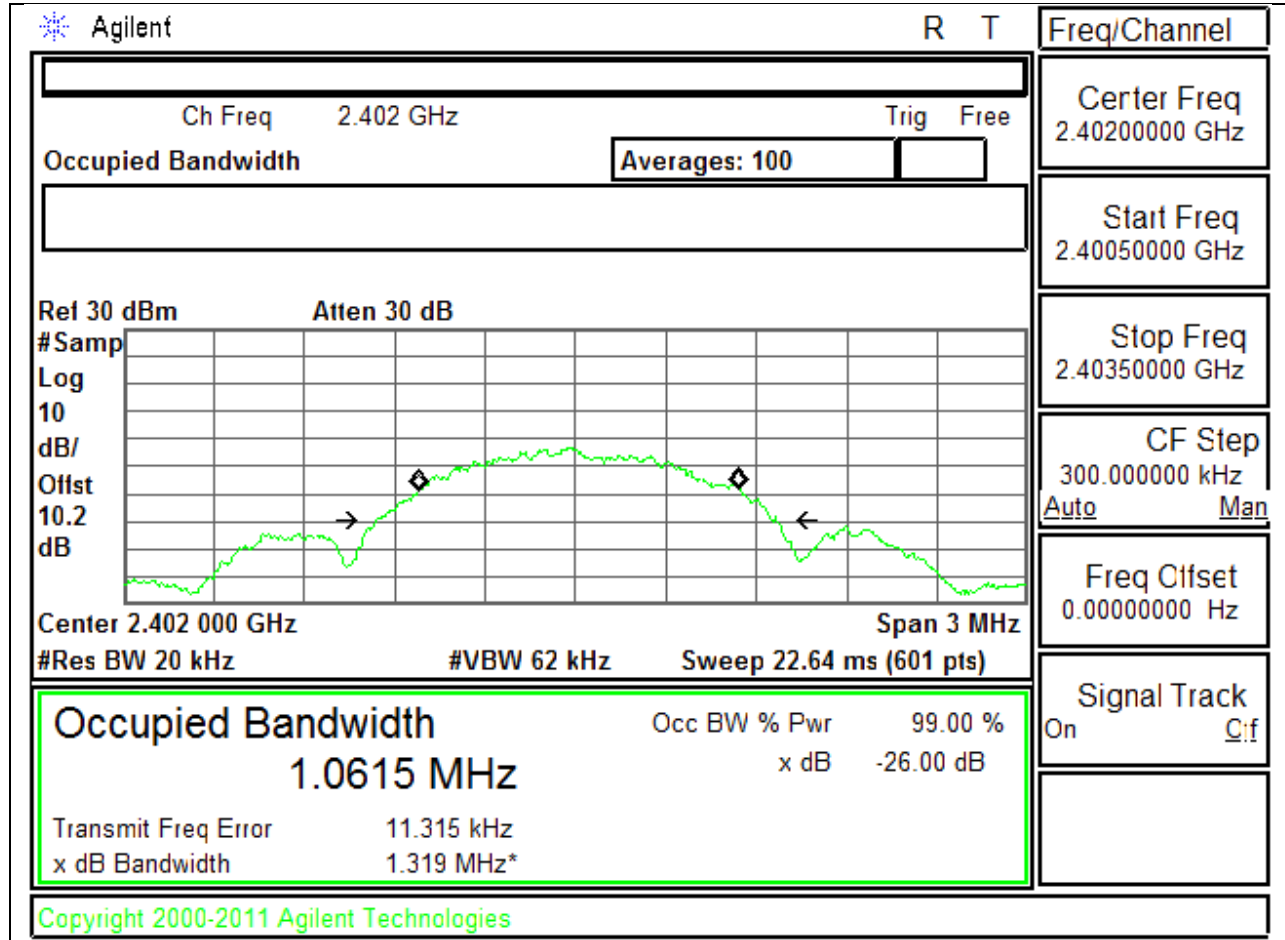
Reference to KDB558074 D01 DTS Meas Guidance v03r02: The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

### RESULTS

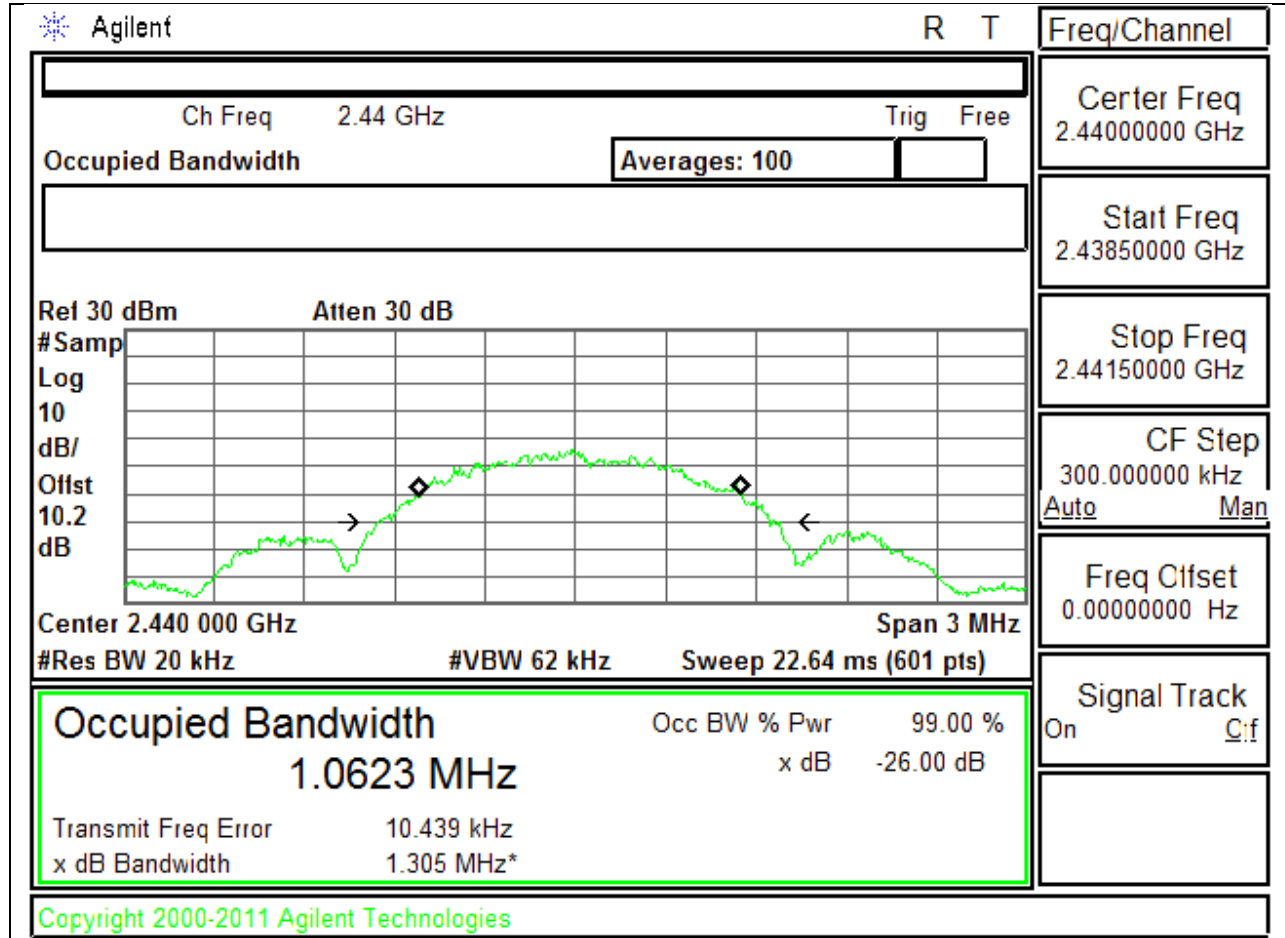
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0615
Middle	2440	1.0623
High	2480	1.0613

**99% BANDWIDTH PLOTS**

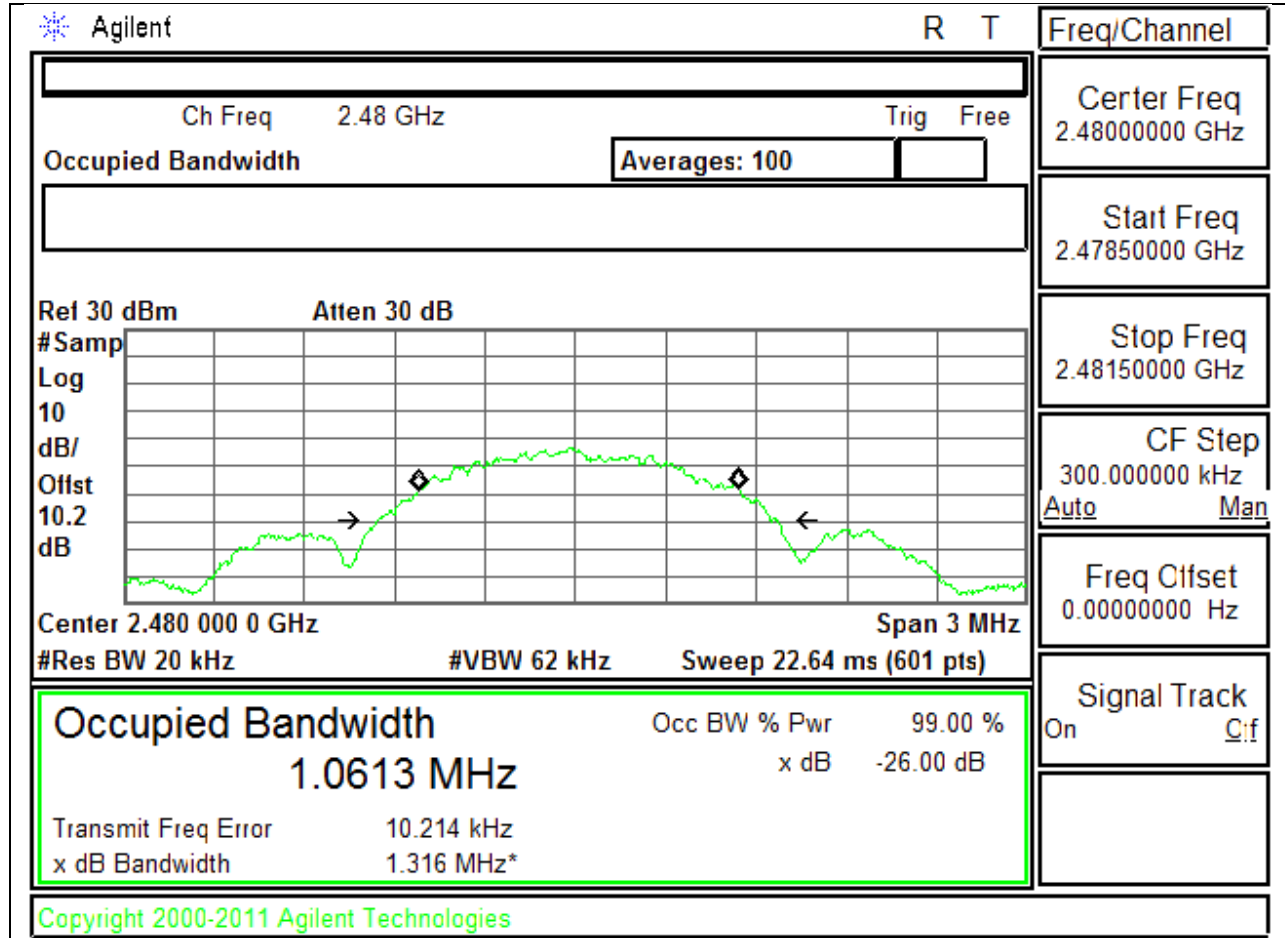
**LOW CHANNEL**



**MID CHANNEL**



### HIGH CHANNEL



### 8.3. OUTPUT POWER

#### LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

#### TEST PROCEDURE

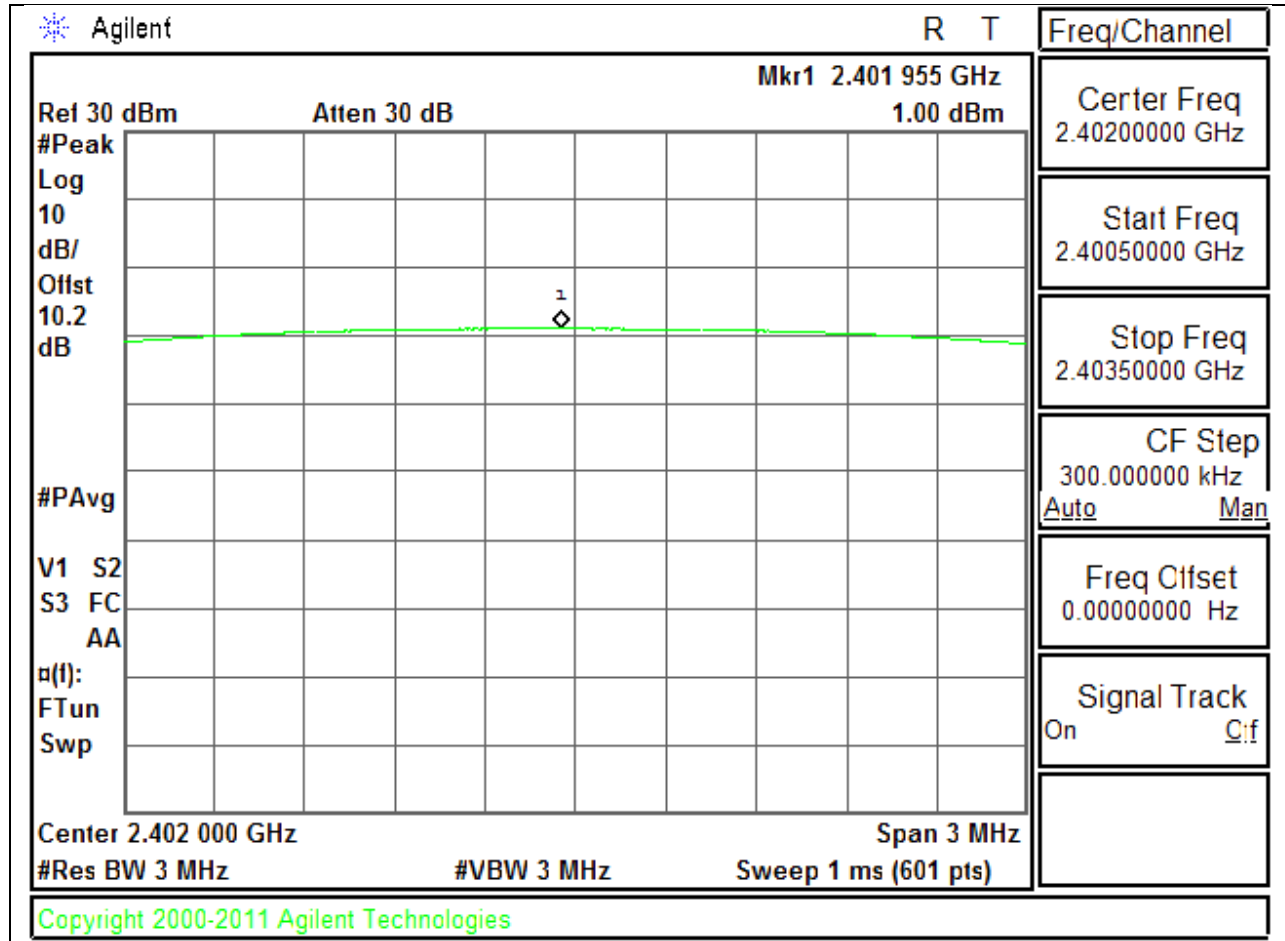
Peak power is measured using KDB558074 D01 DTS Meas Guidance v03r02 under section 9.1.1 utilizing spectrum analyzer.

#### RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	1.000	30	-29.000
Middle	2440	-0.150	30	-30.150
High	2480	0.730	30	-29.270

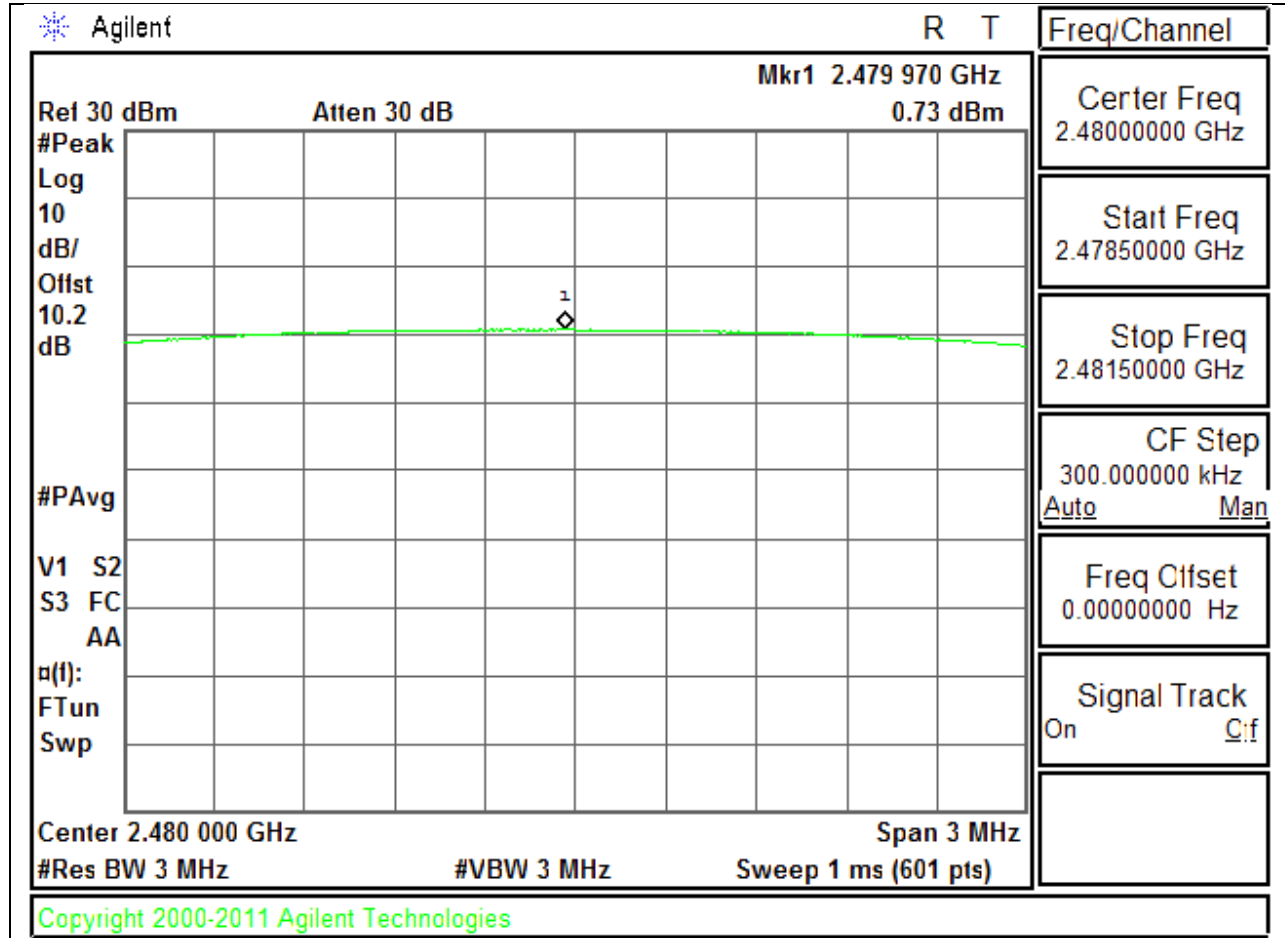
**OUTPUT POWER PLOTS**

**LOW CHANNEL**





### HIGH CHANNEL



## 8.4. AVERAGE POWER

### LIMITS

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

### RESULTS

The cable assembly insertion loss of 10.2 dB (including 10 dB pad and .2 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	0.5
Middle	2440	-0.8
High	2480	0.3

## 8.5. POWER SPECTRAL DENSITY

### LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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.

### TEST PROCEDURE

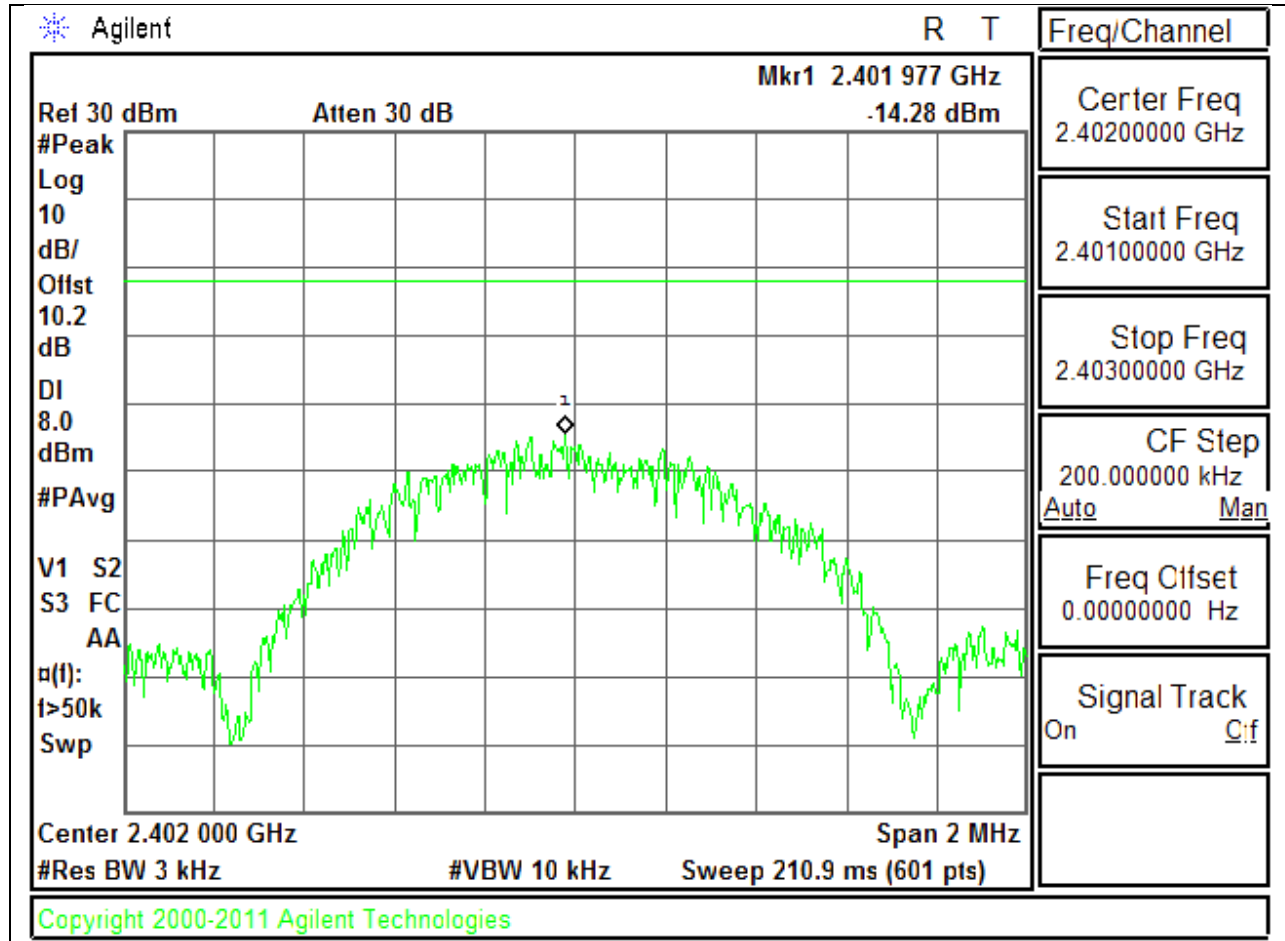
Power Spectral Density was performed utilizing the "Method PKPSD (Peak PSD)" under KDB558074 D01 DTS Meas Guidance v03r02

### RESULTS

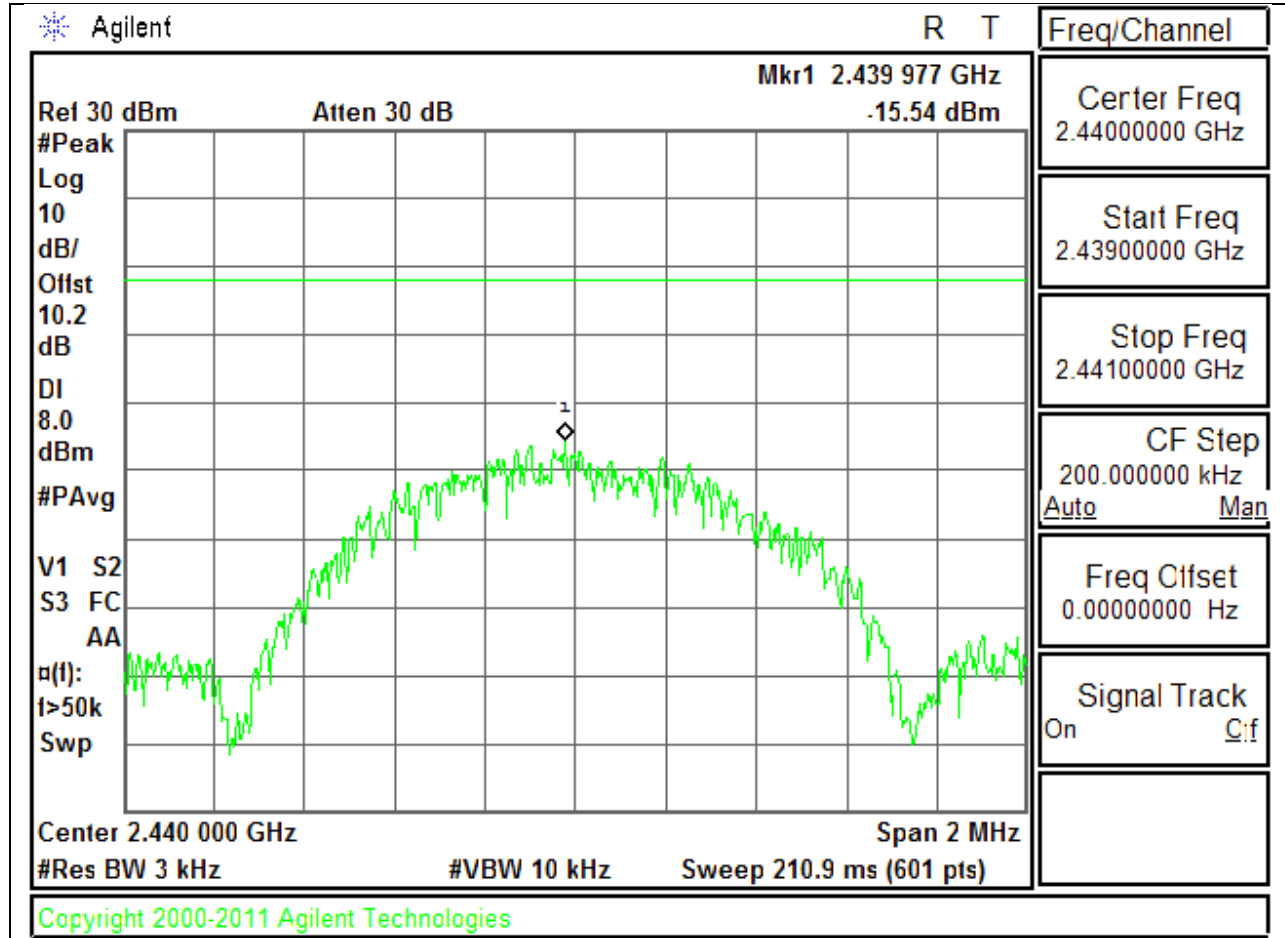
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-14.28	8	-22.28
Middle	2440	-15.54	8	-23.54
High	2480	-14.47	8	-22.47

**POWER SPECTRAL DENSITY PLOTS**

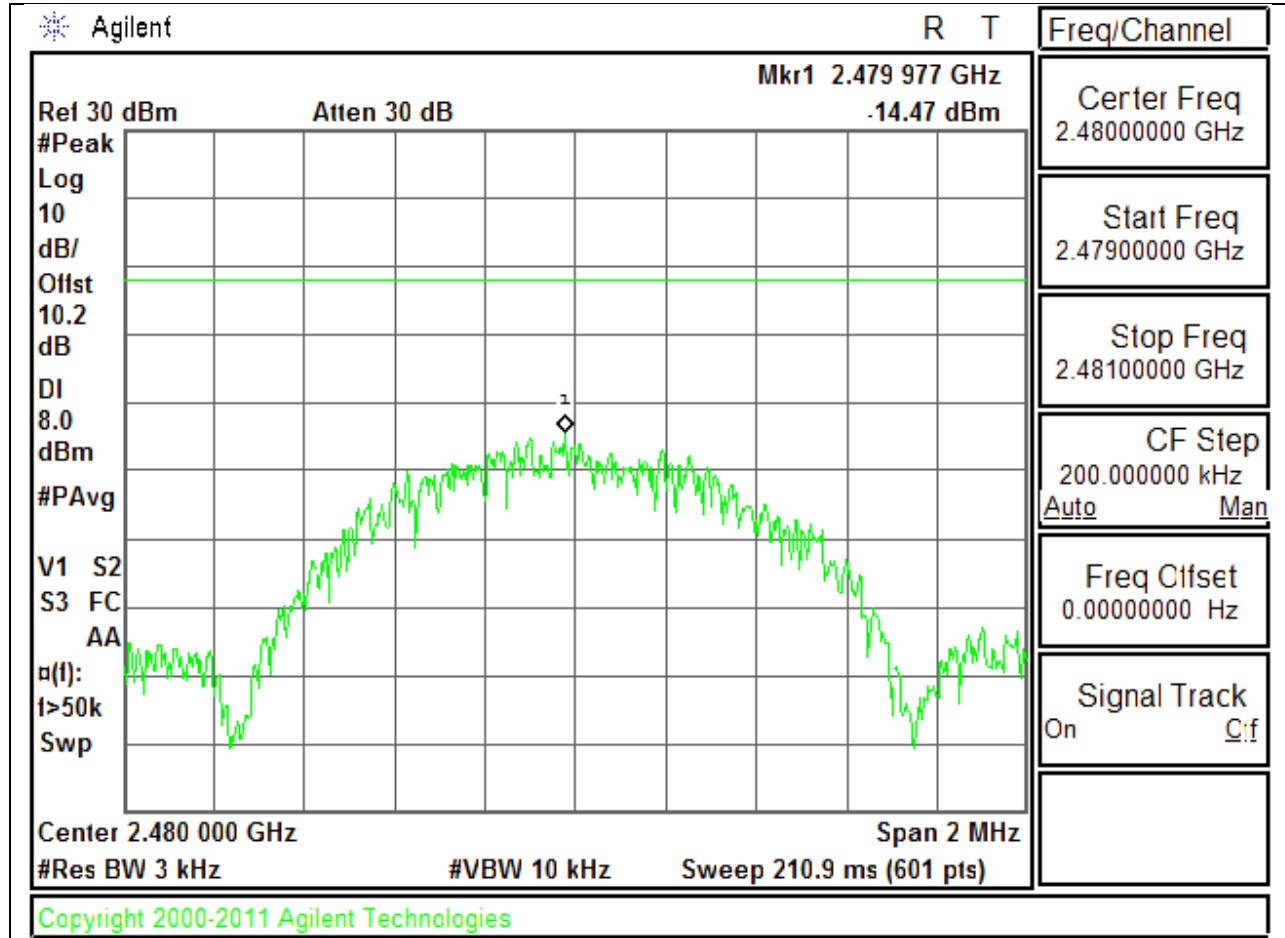
**LOW CHANNEL**



MID CHANNEL



### HIGH CHANNEL



## **8.6. CONDUCTED SPURIOUS EMISSIONS**

### **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

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

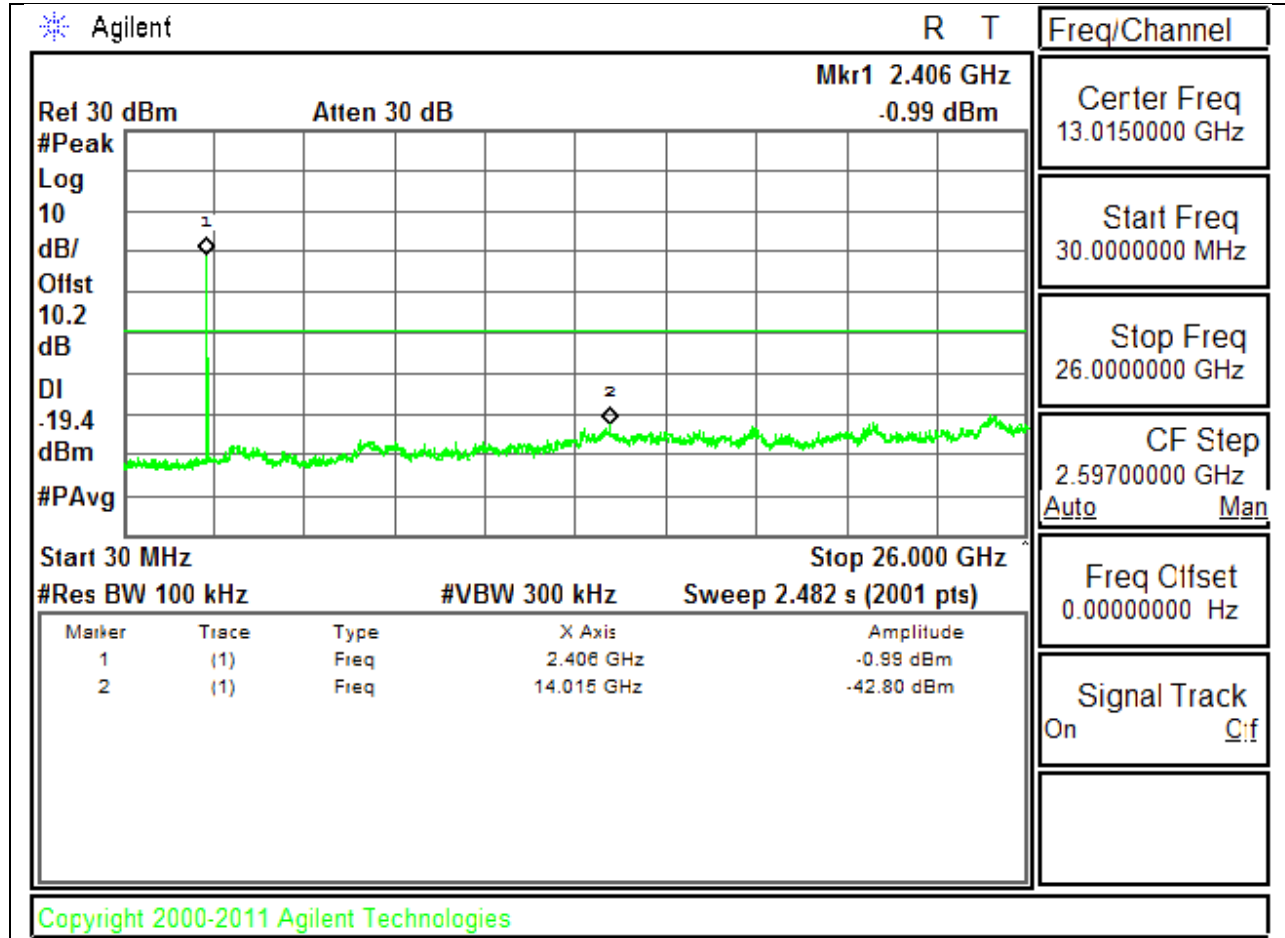
### **TEST PROCEDURE**

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.

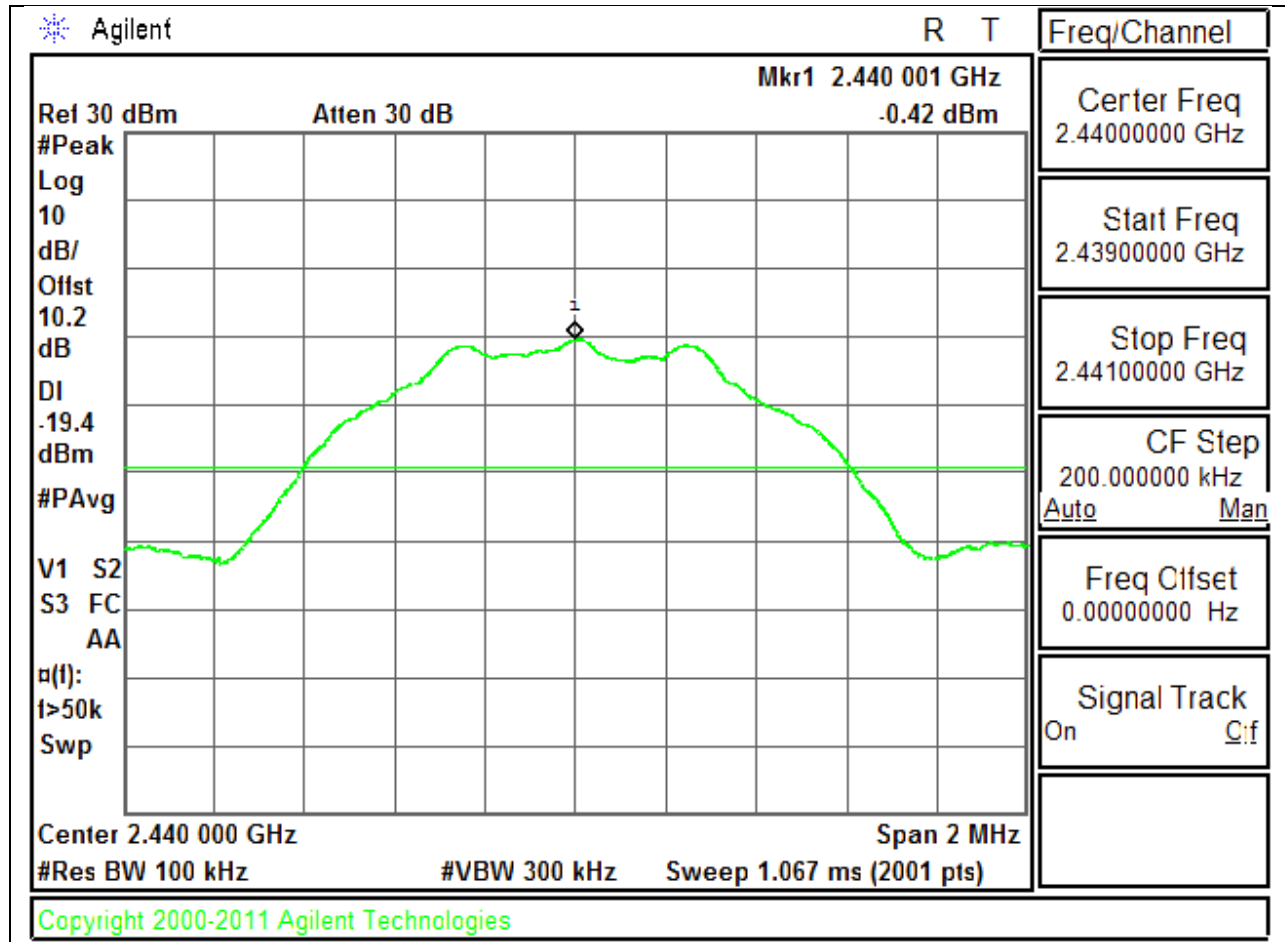


### LOW CHANNEL SPURIOUS

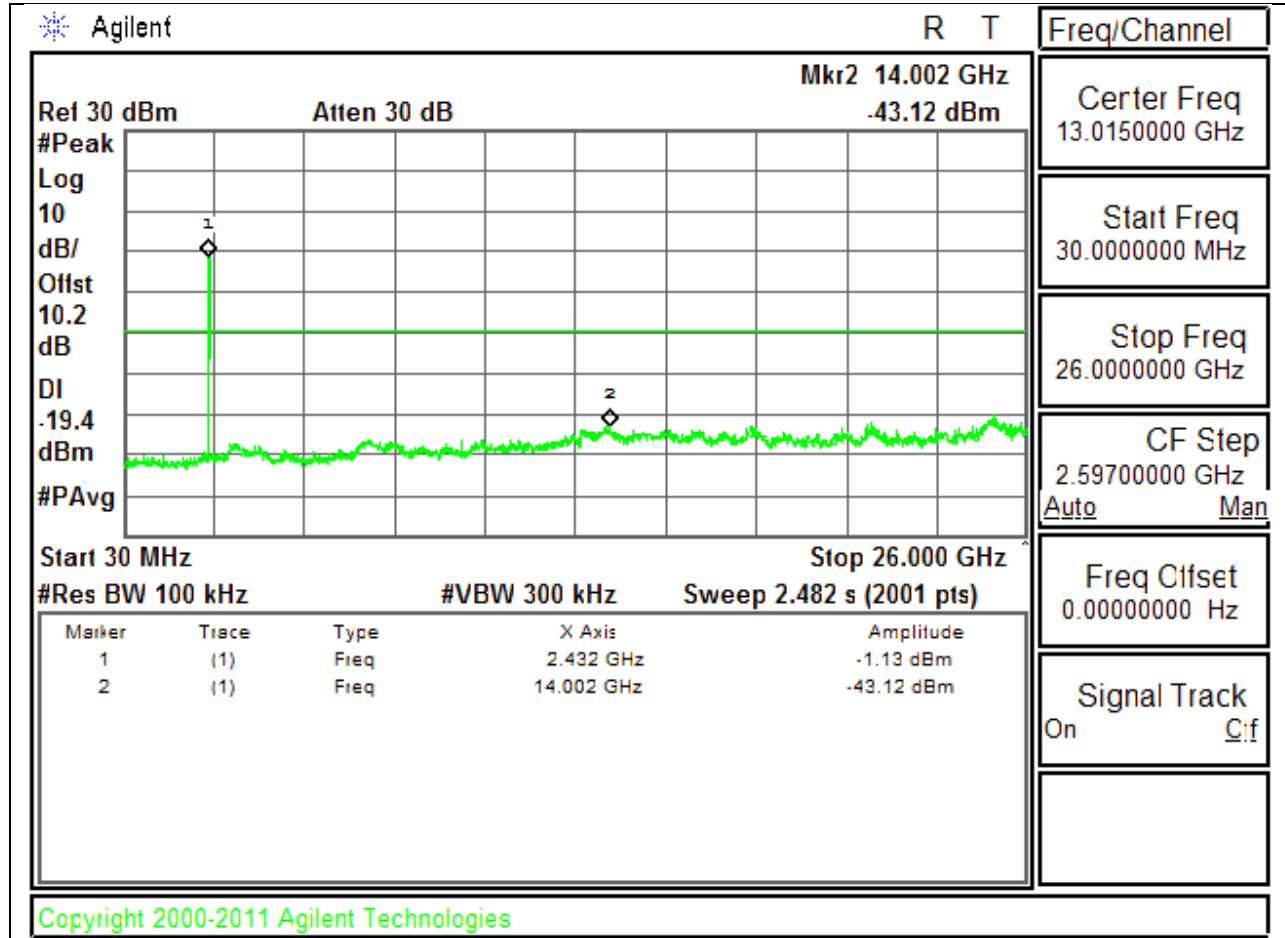


**SPURIOUS EMISSIONS, MID CHANNEL**

**MID CHANNEL REFERENCE**

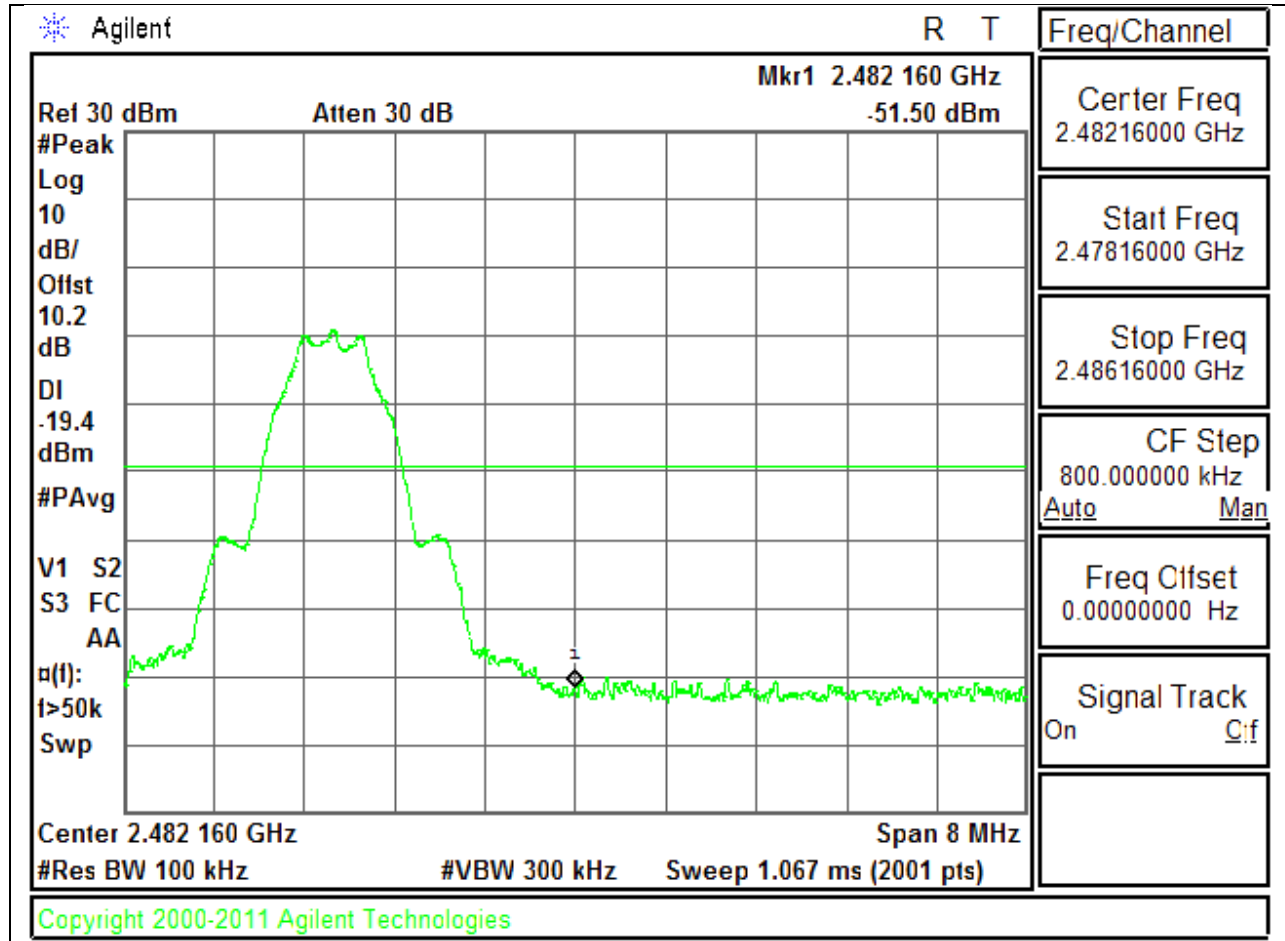


### MID CHANNEL SPURIOUS

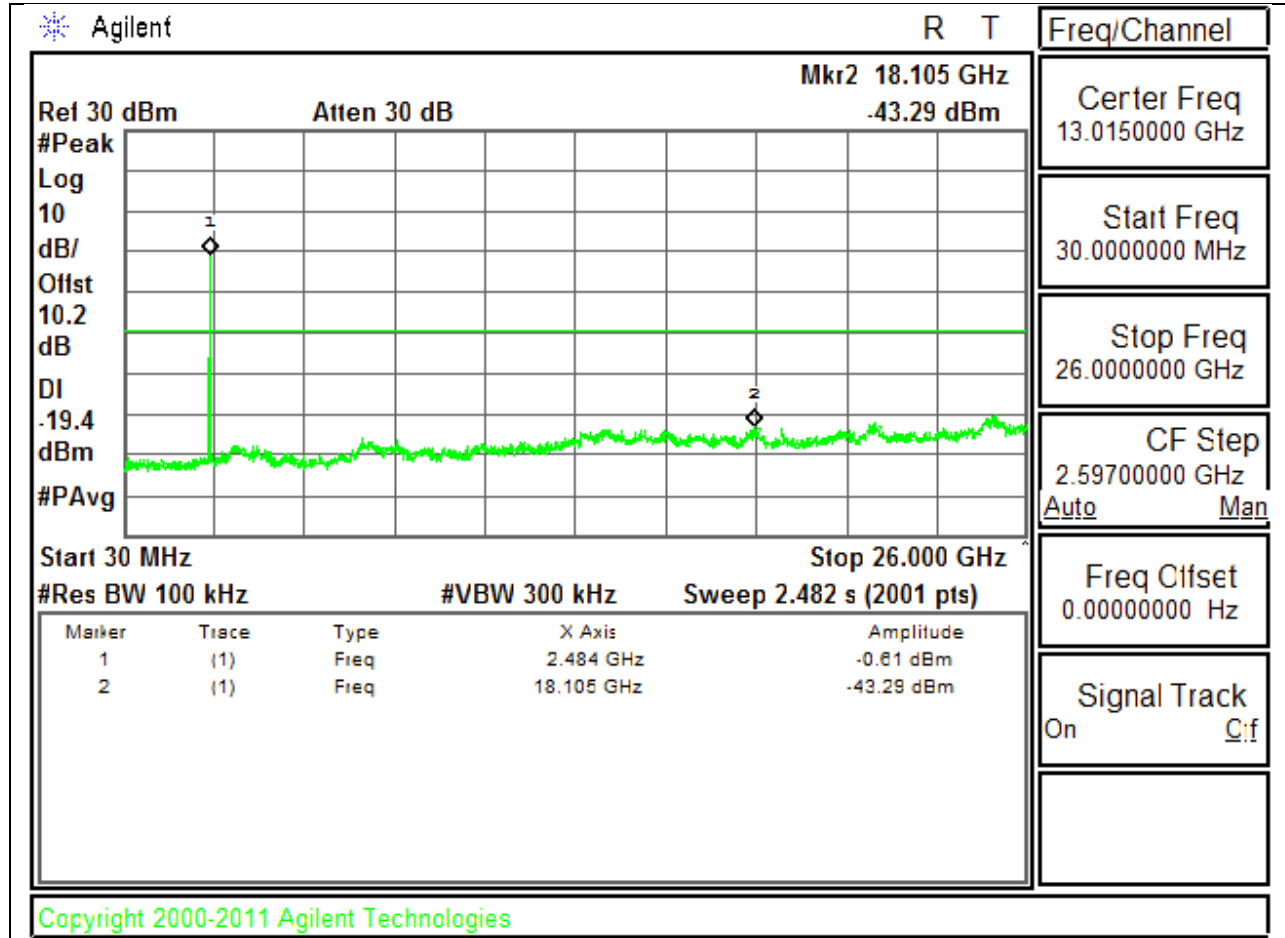


**SPURIOUS EMISSIONS, HIGH CHANNEL**

**HIGH CHANNEL BANDEDGE**



### HIGH CHANNEL SPURIOUS



## 9. RADIATED TEST RESULTS

### 9.1. 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 ( $\mu\text{V}/\text{m}$ ) at 3 m	Field Strength Limit (dB $\mu\text{V}/\text{m}$ ) 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 - 2009. 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 add duty cycle factor for average measurements. Duty cycle factor =  $10 \log (1/x)$ . For this sample:  $DCF = 10\log(1/0.618)=2.05\text{dB}$

(Spectrum Analyzer round it up to 2.1dB)

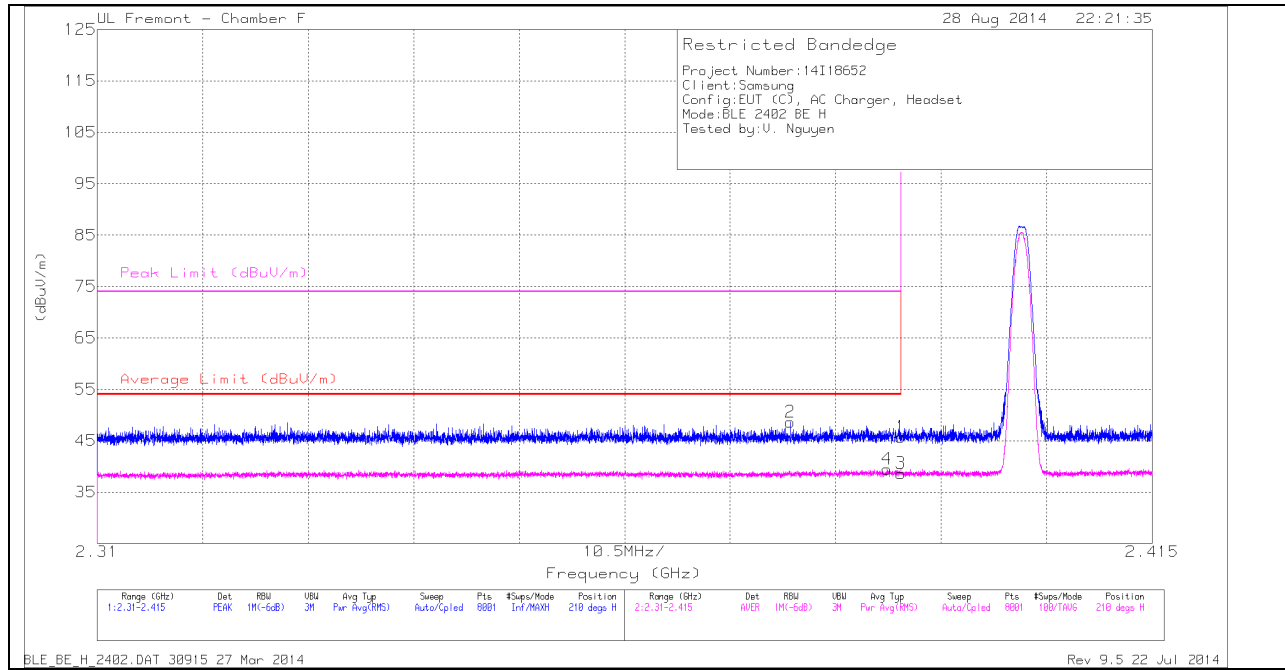
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The 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.

## 9.2. TRANSMITTER ABOVE 1 GHz RESTRICTED BANDEDGE (LOW CHANNEL)

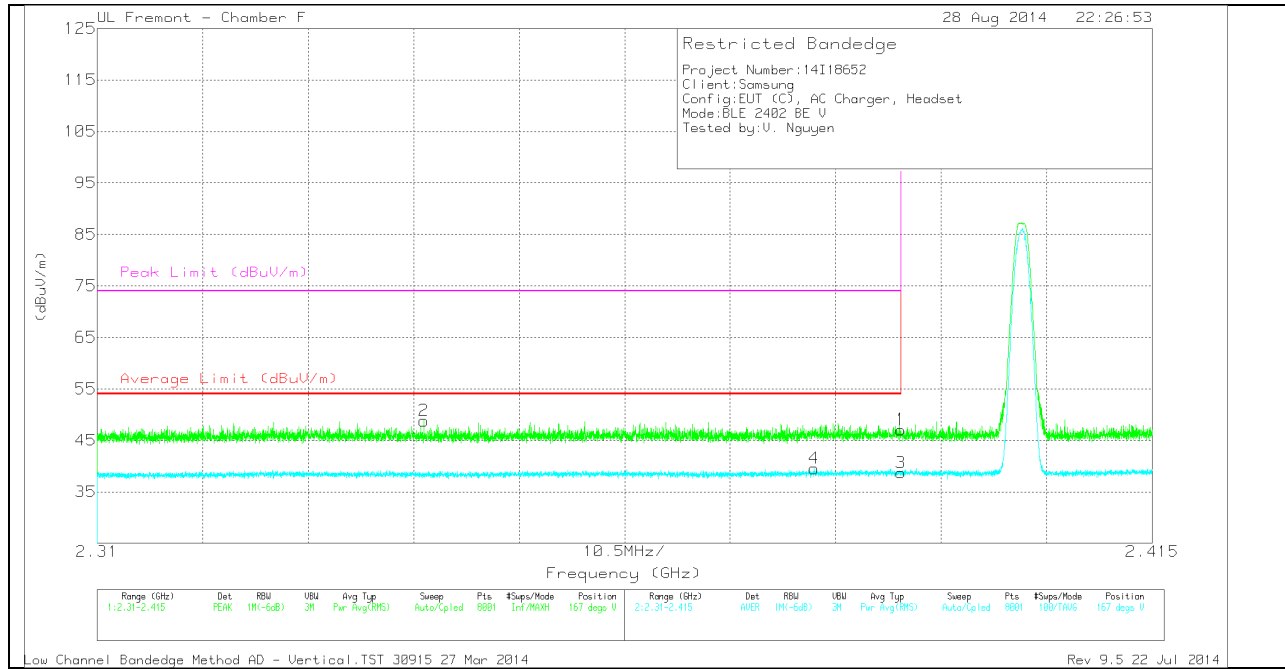
### HORIZONTAL PEAK AND AVERAGE PLOT



### HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/Filter/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	37.34	PK	32.2	-23.8	0	45.74	-	-	74	-28.26	210	281	H
2	* 2.379	40.33	PK	32.1	-23.8	0	48.63	-	-	74	-25.37	210	281	H
3	* 2.39	28.2	RMS	32.2	-23.8	2.05	38.65	54	-15.35	-	-	210	281	H
4	* 2.389	29.05	RMS	32.2	-23.8	2.05	39.5	54	-14.5	-	-	210	281	H

**VERTICAL PEAK AND AVERAGE PLOT**

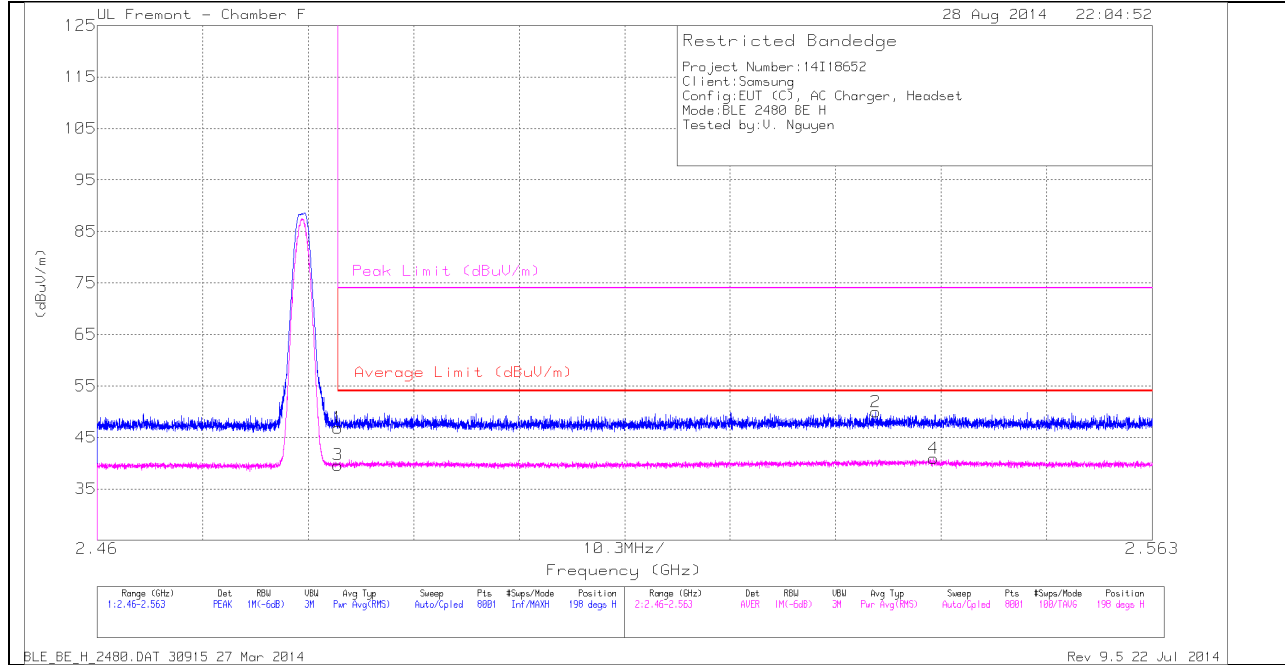


**VERTICAL DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/Fit r/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	38.68	PK	32.2	-23.8	0	47.08	-	-	74	-26.92	167	283	V
2	* 2.343	40.41	PK	32	-23.6	0	48.81	-	-	74	-25.19	167	283	V
3	* 2.39	28.24	RMS	32.2	-23.8	2.05	38.69	54	-15.31	-	-	167	283	V
4	* 2.381	29.18	RMS	32.1	-23.8	2.05	39.53	54	-14.47	-	-	167	283	V

**AUTHORIZED BANDEDGE (HIGH CHANNEL)**

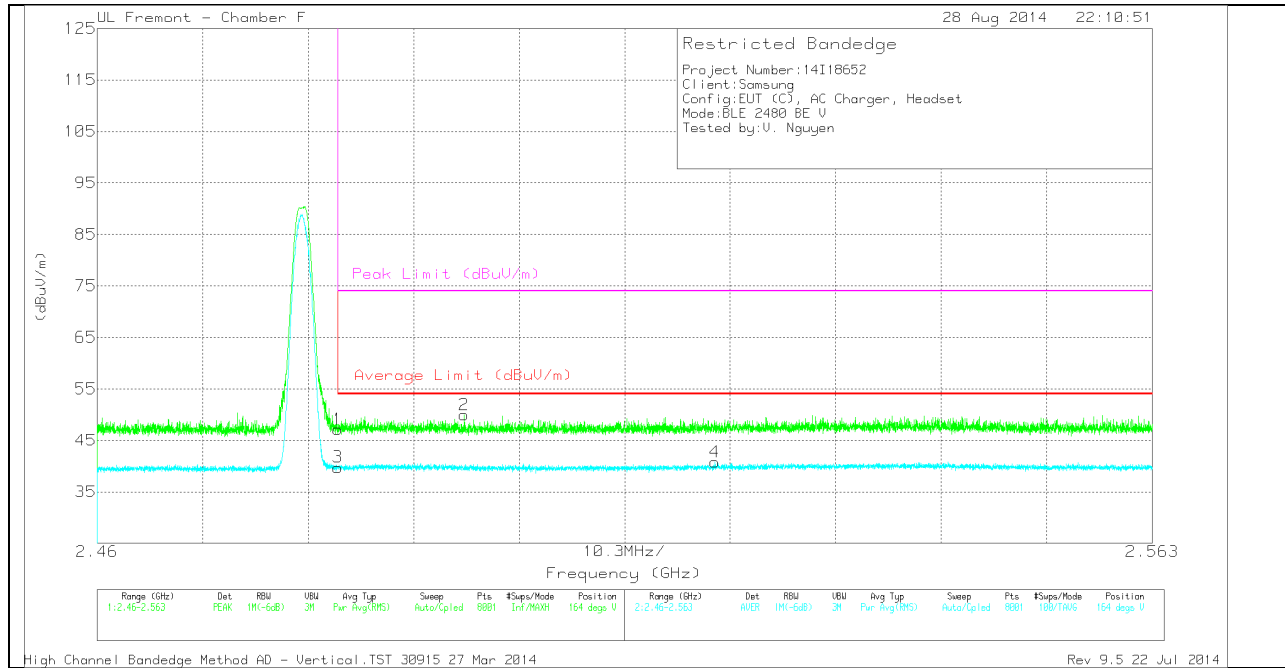
**HORIZONTAL PEAK AND AVERAGE PLOT**



**HORIZONTAL DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/Filter/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	37.25	PK	32.6	-23	0	46.85	-	-	74	-27.15	198	324	H
2	2.536	40.03	PK	32.7	-22.8	0	49.93	-	-	74	-24.07	198	324	H
3	* 2.484	27.99	RMS	32.6	-23	2.05	39.64	54	-14.36	-	-	198	324	H
4	2.542	29.04	RMS	32.7	-22.9	2.05	40.89	54	-13.11	-	-	198	324	H

**VERTICAL PEAK AND AVERAGE PLOT**

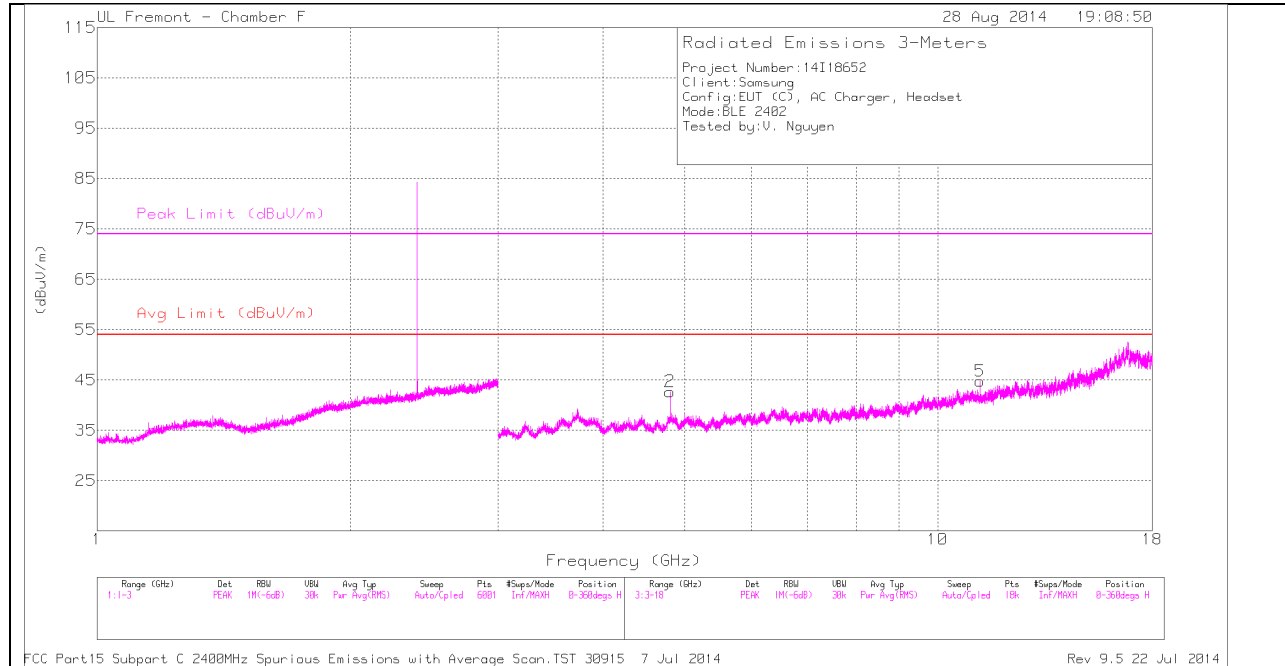


**VERTICAL DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/Fit r/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	37.56	PK	32.6	-23	0	47.16	-	-	74	-26.84	164	325	V
2	* 2.496	40.37	PK	32.6	-23	0	49.97	-	-	74	-24.03	164	325	V
3	* 2.484	28.1	RMS	32.6	-23	2.05	39.75	54	-14.25	-	-	164	325	V
4	2.52	28.96	RMS	32.7	-22.9	2.05	40.81	54	-13.19	-	-	164	325	V

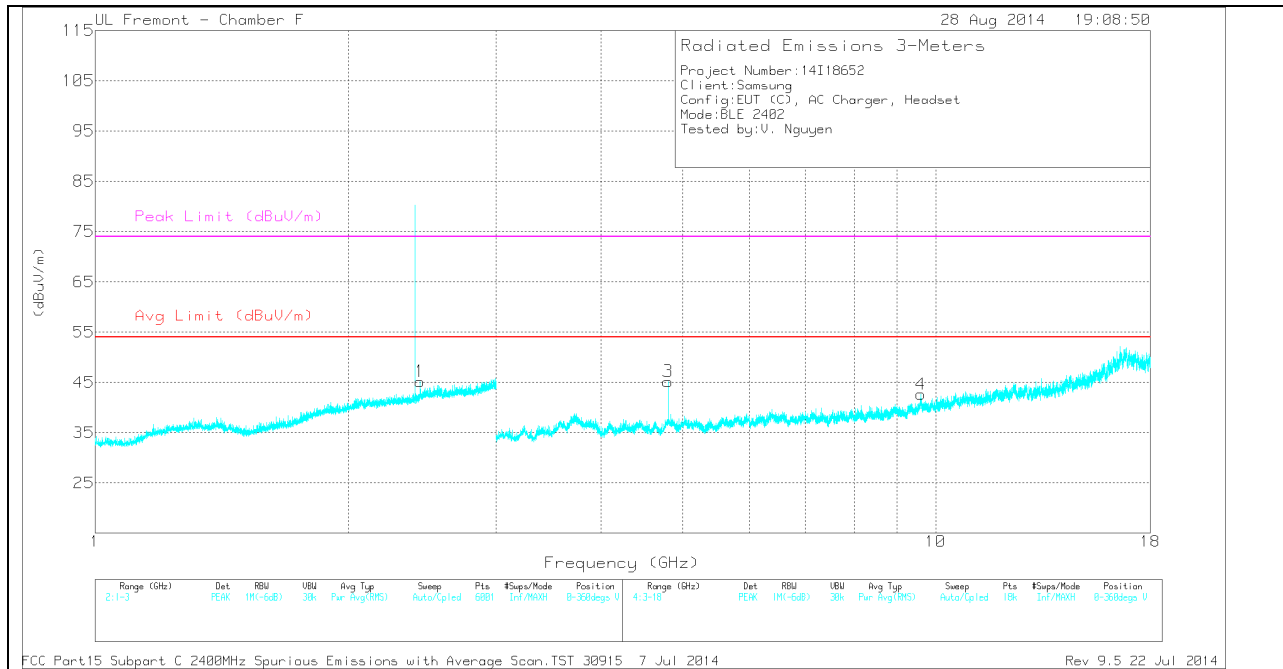
**HARMONICS AND SPURIOUS EMISSIONS**

**LOW CHANNEL HORIZONTAL**



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

### LOW CHANNEL VERTICAL



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

### LOW CHANNEL DATA

*TRACE MARKERS*

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fitr /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	2.436	36.39	PK	32.4	-23.6	0	45.19	-	-	-	-	0-360	201	V
2	* 4.803	36	PK	34.1	-27.4	0	42.7	-	-	74	-31.3	0-360	100	H
5	* 11.223	28.57	PK	38.1	-21.9	0	44.77	-	-	74	-29.23	0-360	100	H
3	* 4.803	38.5	PK	34.1	-27.4	0	45.2	-	-	74	-28.8	0-360	101	V
4	9.608	27.15	PK	36.9	-21.4	0	42.65	-	-	-	-	0-360	201	V

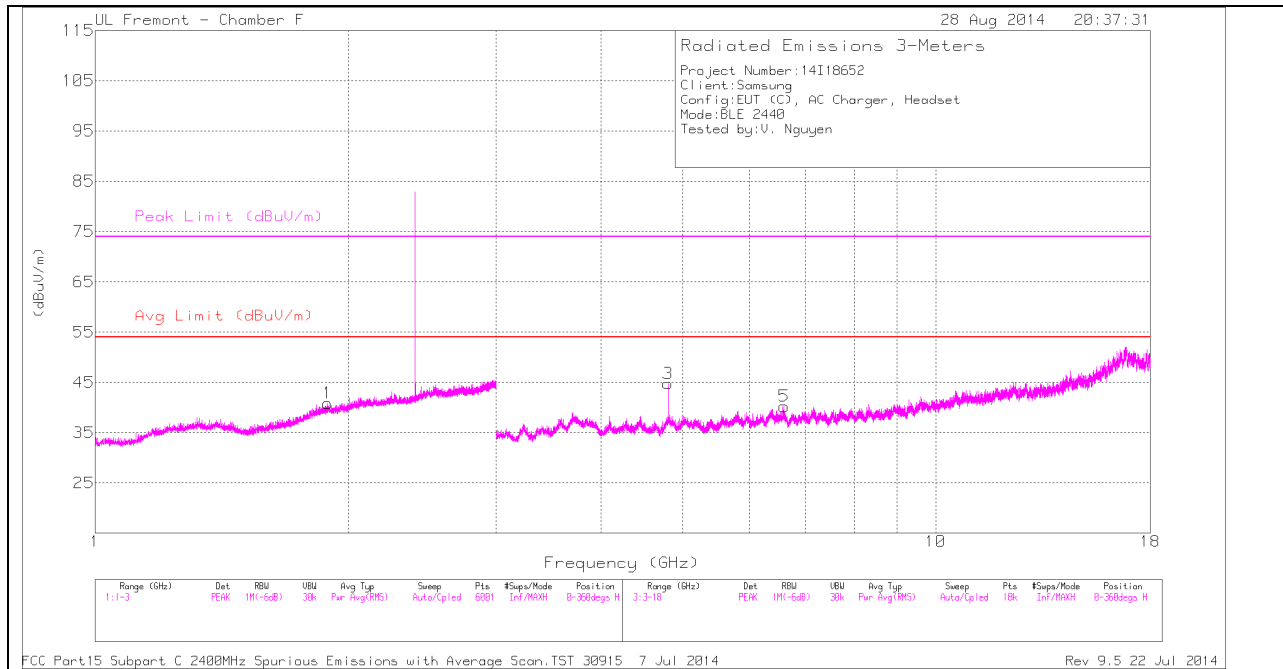
PK - Peak detector

*RADIATED EMISSIONS*

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fitr /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
* 4.805	42.7	PK2	34.1	-27.4	0	49.4	-	-	74	-24.6	58	243	H
* 4.804	33.88	MAV1	34.1	-27.4	2.05	42.63	54	-11.37	-	-	58	243	H
* 11.224	34.32	PK2	38.1	-21.9	0	50.52	-	-	74	-23.48	193	376	H
* 11.222	22.48	MAV1	38.1	-21.9	2.05	40.73	54	-13.27	-	-	193	376	H
* 4.804	43.05	PK2	34.1	-27.4	0	49.75	-	-	74	-24.25	146	222	V
* 4.804	35.51	MAV1	34.1	-27.4	2.05	44.26	54	-9.74	-	-	146	222	V

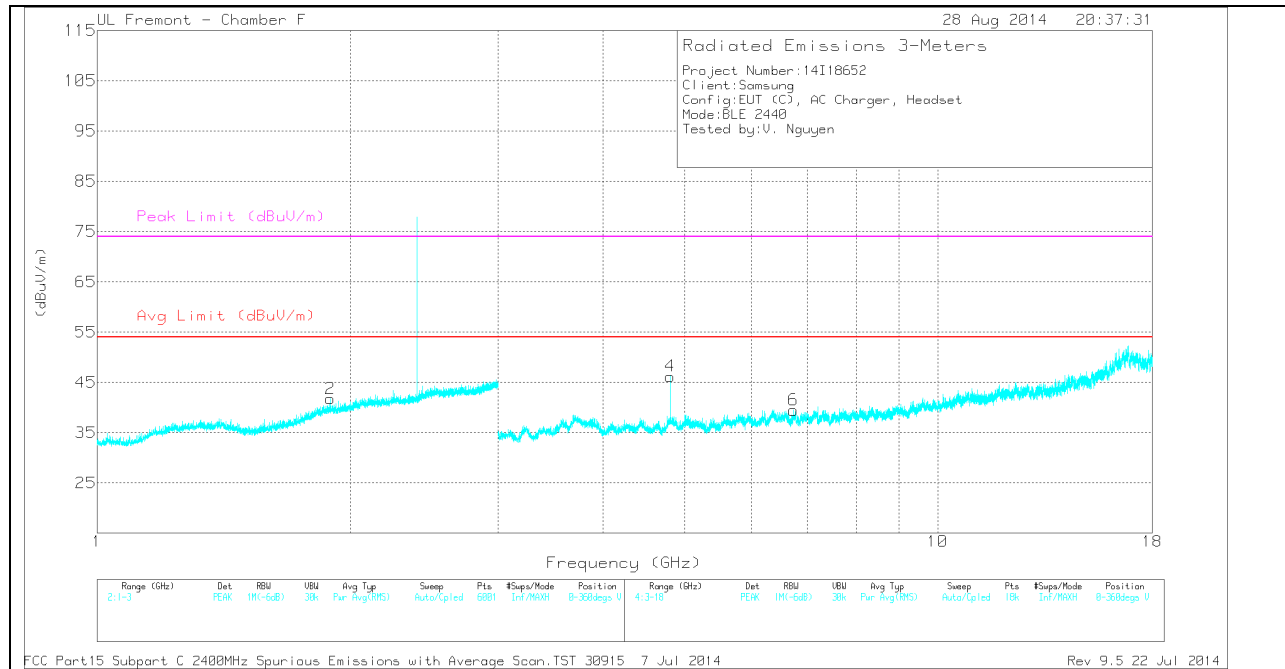
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

### MID CHANNEL HORIZONTAL



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

### MID CHANNEL VERTICAL



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

### MID CHANNEL DATA

#### TRACE MARKERS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Ftr /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	1.892	34.05	PK	31.3	-24.5	0	40.85	-	-	-	-	0-360	101	H
2	1.893	34.96	PK	31.3	-24.5	0	41.76	-	-	-	-	0-360	201	V
3	* 4.803	38.09	PK	34.1	-27.4	0	44.79	-	-	74	-29.21	0-360	201	H
5	6.602	30.94	PK	35.7	-26.4	0	40.24	-	-	-	-	0-360	201	H
4	* 4.805	39.51	PK	34.1	-27.4	0	46.21	-	-	74	-27.79	0-360	101	V
6	6.736	30.68	PK	35.6	-26.8	0	39.48	-	-	-	-	0-360	101	V

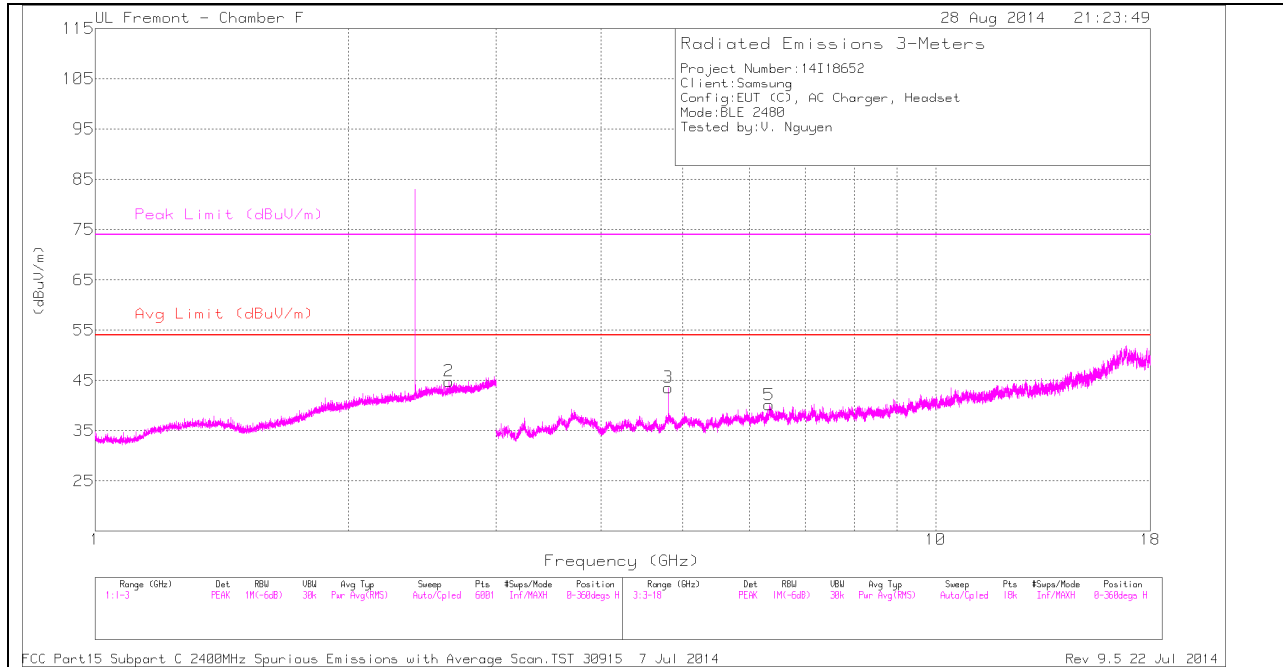
PK - Peak detector

#### RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Ftr /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
* 4.804	42.24	PK2	34.1	-27.4	0	48.94	-	-	74	-25.06	54	195	H
* 4.804	34.13	MAv1	34.1	-27.4	2.05	42.88	54	-11.12	-	-	54	195	H
* 4.804	42.98	PK2	34.1	-27.4	0	49.68	-	-	74	-24.32	136	180	V
* 4.804	35.42	MAv1	34.1	-27.4	2.05	44.17	54	-9.83	-	-	136	180	V

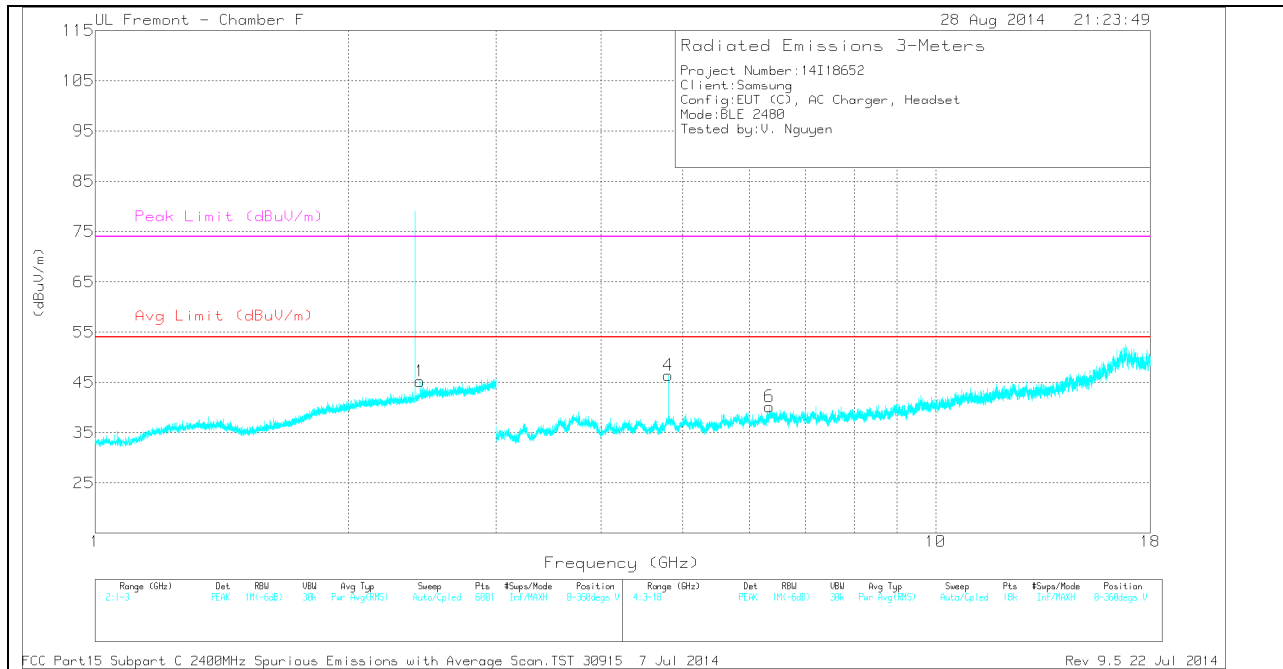
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

### HIGH CHANNEL HORIZONTAL



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

### HIGH CHANNEL VERTICAL



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

### HIGH CHANNEL DATA

*TRACE MARKERS*

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Ftr /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	2.636	35.24	PK	32.7	-23.1	0	44.84	-	-	-	-	0-360	100	H
1	2.436	36.43	PK	32.4	-23.6	0	45.23	-	-	-	-	0-360	201	V
3	* 4.804	36.89	PK	34.1	-27.4	0	43.59	-	-	74	-30.41	0-360	201	H
5	6.336	31.95	PK	35.6	-27.4	0	40.15	-	-	-	-	0-360	201	H
4	* 4.804	39.72	PK	34.1	-27.4	0	46.42	-	-	74	-27.58	0-360	101	V
6	6.344	31.9	PK	35.6	-27.3	0	40.2	-	-	-	-	0-360	201	V

PK - Peak detector

*RADIATED EMISSIONS*

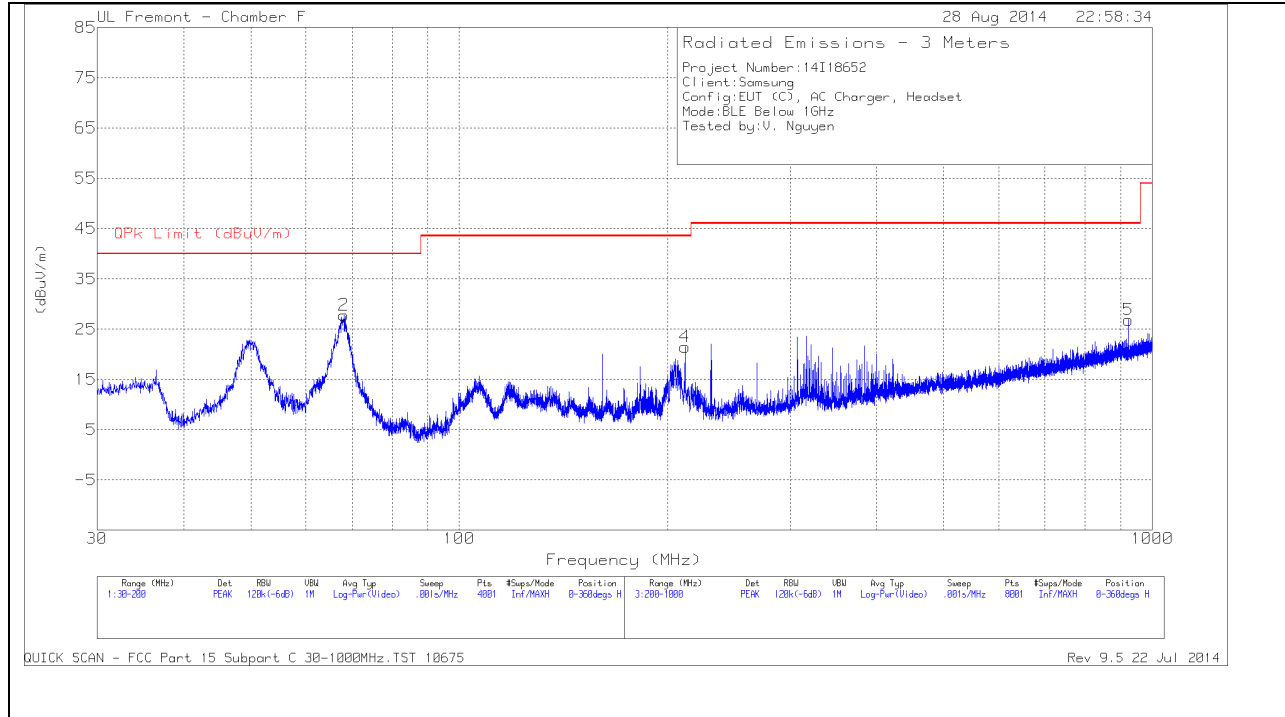
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Ftr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.804	42.63	PK2	34.1	-27.4	0	49.33	-	-	74	-24.67	60	220	H
* 4.804	34.75	MAv1	34.1	-27.4	2.05	43.5	54	-10.5	-	-	60	220	H
* 4.804	42.59	PK2	34.1	-27.4	0	49.29	-	-	74	-24.71	133	304	V
* 4.804	35.36	MAv1	34.1	-27.4	2.05	44.11	54	-9.89	-	-	133	304	V

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

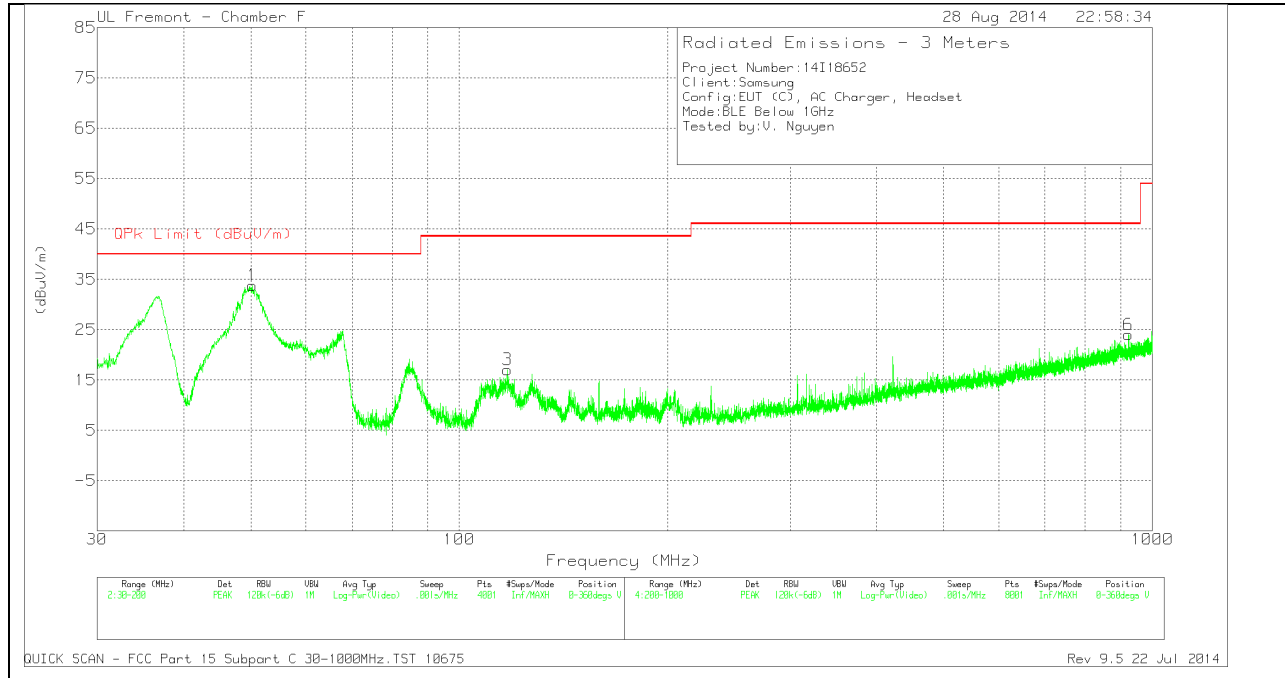
### 9.3. WORST-CASE BELOW 1 GHz

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

#### HORIZONTAL PLOT



### VERTICAL PLOT



**BELOW 1 GHz TABLE**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T122 (dB/m)	Amp/Cbl (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	68.1225	51.3	PK	8.1	-31.6	0	27.8	40	-12.2	0-360	100	H
1	50.23	57.62	PK	8	-31.8	0	33.82	40	-6.18	0-360	100	V
3	* 117.2525	34.77	PK	13.8	-31.5	0	17.07	43.52	-26.45	0-360	100	V
4	211.7	42.08	PK	10.5	-31.1	0	21.48	43.52	-22.04	0-360	100	H
5	923.8	32.84	PK	22.4	-28.4	0	26.84	46.02	-19.18	0-360	100	H
6	923.8	29.99	PK	22.4	-28.4	0	23.99	46.02	-22.03	0-360	100	V

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

**Radiated Emissions**

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T122 (dB/m)	Amp/Cbl (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 117.1925	27.67	QP	13.8	-31.5	0	9.97	43.52	-33.55	148	108	V

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

QP - Quasi-Peak detector

PK - Peak detector

FCC Part 15 Subpart C 30-1000MHz.TST 30915 9 Jul 2013 Rev 9.5 12 Jun 2013

## 10. 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.

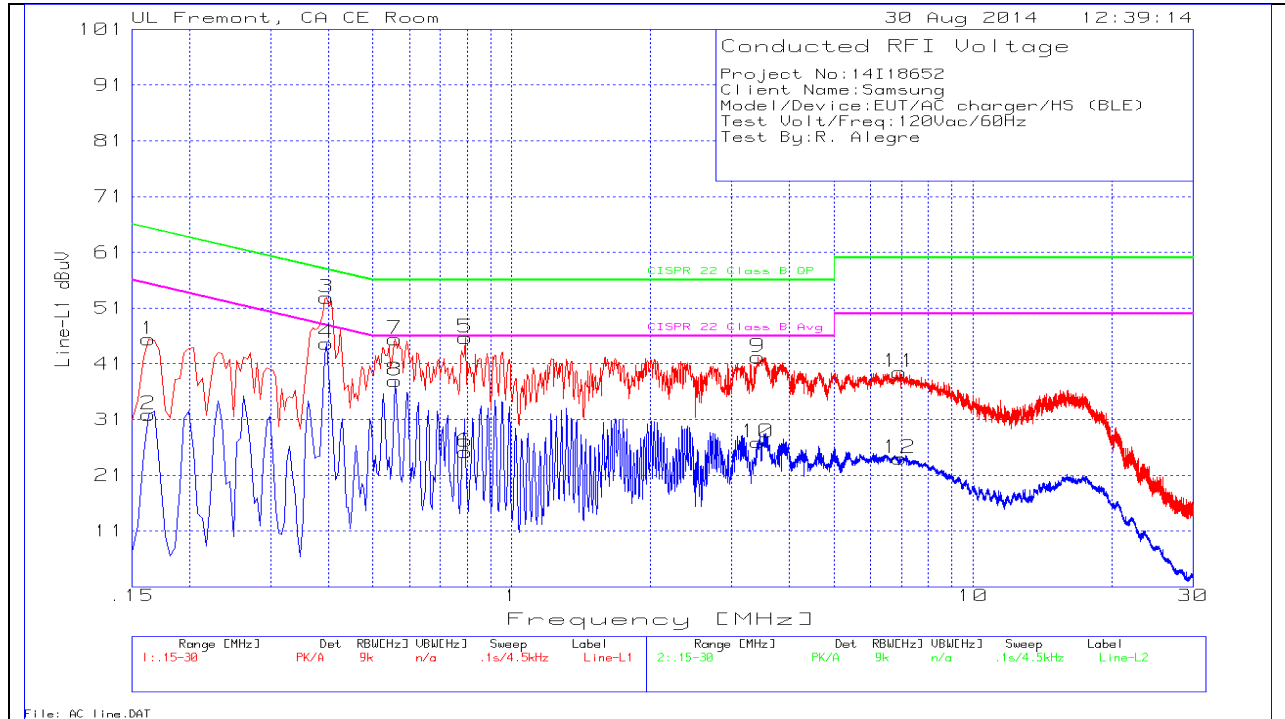
### TEST PROCEDURE

ANSI C63.4 - 2009

**RESULTS**

**6 WORST EMISSIONS**

**LINE 1 PLOT**

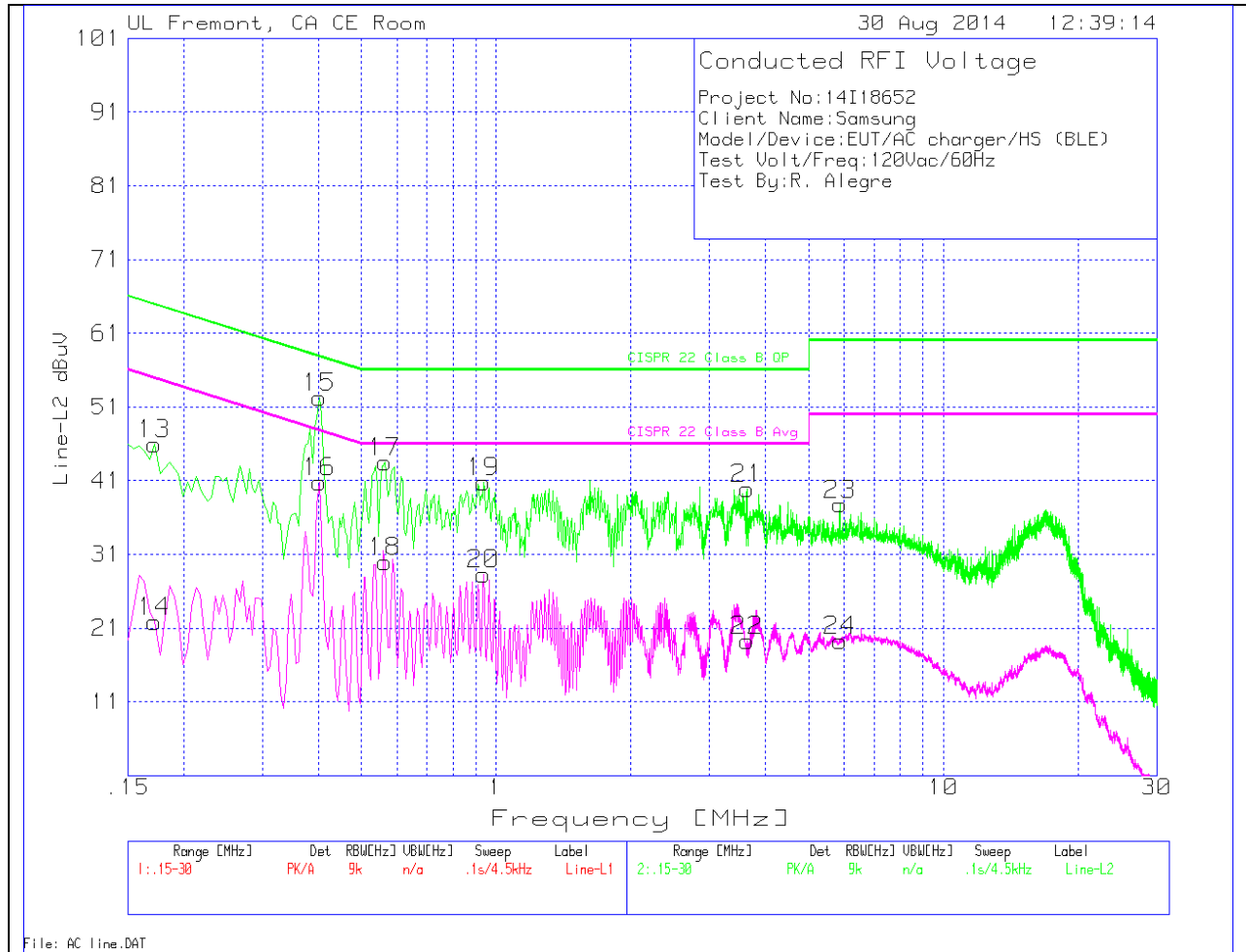


**LINE 1 RESULTS**

**Trace Markers**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
1	.1635	44.17	PK	1.2	0	45.37	65.3	-19.93	-	-
2	.1635	30.72	Av	1.2	0	31.92	-	-	55.3	-23.38
3	.3975	52.45	PK	.4	0	52.85	57.9	-5.05	-	-
4	.3975	44.23	Av	.4	0	44.63	-	-	47.9	-3.27
7	.5595	45.13	PK	.3	0	45.43	56	-10.57	-	-
8	.5595	37.71	Av	.3	0	38.01	-	-	46	-7.99
5	.7935	45.34	PK	.3	0	45.64	56	-10.36	-	-
6	.7935	24.88	Av	.3	0	25.18	-	-	46	-20.82
9	3.417	41.9	PK	.2	.1	42.2	56	-13.8	-	-
10	3.417	26.63	Av	.2	.1	26.93	-	-	46	-19.07
11	6.9405	39.2	PK	.2	.1	39.5	60	-20.5	-	-
12	6.9405	23.78	Av	.2	.1	24.08	-	-	50	-25.92

### LINE 2 PLOT



## LINE 2 RESULTS

---

### Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
13	.1725	44.77	PK	1.2	0	45.97	64.8	-18.83	-	-
14	.1725	20.63	Av	1.2	0	21.83	-	-	54.8	-32.97
15	.402	51.86	PK	.4	0	52.26	57.8	-5.54	-	-
16	.402	40.39	Av	.4	0	40.79	-	-	47.8	-7.01
17	.564	43.17	PK	.3	0	43.47	56	-12.53	-	-
18	.564	29.64	Av	.3	0	29.94	-	-	46	-16.06
19	.9375	40.46	PK	.3	0	40.76	56	-15.24	-	-
20	.9375	28	Av	.3	0	28.3	-	-	46	-17.7
21	3.6375	39.64	PK	.2	.1	39.94	56	-16.06	-	-
22	3.6375	18.96	Av	.2	.1	19.26	-	-	46	-26.74
23	5.865	37.46	PK	.2	.1	37.76	60	-22.24	-	-
24	5.865	18.97	Av	.2	.1	19.27	-	-	50	-30.73

---