



FCC CFR47 PART 15 SUBPART C

BLUETOOTH LOW ENERGY

CERTIFICATION TEST REPORT

FOR

Phone with Bluetooth, DTS/UNII a/b/g/n, ANT+ & NFC

MODEL NUMBER: SM-A500FU

FCC ID: A3LSMA500FU

REPORT NUMBER: 14U19260-E2, REVISION B

ISSUE DATE: December 8, 2014

Prepared for

**SAMSUNG ELECTRONICS CO., LTD.
129 Samsung-ro, Yeongtong-gu, Suwon-si,
Gyeonggi-do, 443-742, 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

Issue			
Rev.	Date	Revisions	Revised By
--	11/7/14	Initial issue	P. Zhang
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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS.....	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION.....	5
4. CALIBRATION AND UNCERTAINTY	5
4.1. MEASURING INSTRUMENT CALIBRATION	5
4.2. SAMPLE CALCULATION.....	6
4.3. MEASUREMENT UNCERTAINTY	6
5. EQUIPMENT UNDER TEST	7
5.1. DESCRIPTION OF EUT.....	7
5.2. MAXIMUM OUTPUT POWER.....	7
5.3. DESCRIPTION OF AVAILABLE ANTENNAS.....	7
5.4. WORST-CASE CONFIGURATION AND MODE.....	8
5.5. DESCRIPTION OF TEST SETUP.....	9
6. TEST AND MEASUREMENT EQUIPMENT	11
7. SUMMARY	12
8. ANTENNA PORT TEST RESULTS	12
8.1. 6 dB BANDWIDTH	13
8.2. 99% BANDWIDTH.....	17
8.3. OUTPUT POWER	21
8.4. AVERAGE POWER.....	25
8.5. POWER SPECTRAL DENSITY	26
8.6. CONDUCTED SPURIOUS EMISSIONS.....	30
9. RADIATED TEST RESULTS	37
9.1. LIMITS AND PROCEDURE	37
9.2. TRANSMITTER ABOVE 1 GHz	39
9.3. WORST-CASE BELOW 1 GHz	52
10. AC POWER LINE CONDUCTED EMISSIONS	55
11. SETUP PHOTOS	59

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: Phone with Bluetooth, DTS/UNII a/b/g/n, ANT+ & NFC
MODEL: SM-A500FU
SERIAL NUMBER: 1989213 (CONDUCTED); 1989211 (RADIATED)
DATE TESTED: NOVEMBER 3-7, 2014

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC 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
CONSUMER TECHNOLOGY DIVISION
PROJECT LEAD
UL Verification Services Inc.



DANTE SBLENDORIO
CONSUMER TECHNOLOGY DIVISION
EMC ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2009, 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
☒ Chamber A(IC: 2324B-1)	☐ Chamber D(IC: 2324B-4)
☐ Chamber B(IC: 2324B-2)	☐ Chamber E(IC: 2324B-5)
☒ Chamber C(IC: 2324B-3)	☐ Chamber F(IC: 2324B-6)
	☐ Chamber G(IC: 2324B-7)
	☐ 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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 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 Phone with Bluetooth, DTS/UNII a/b/g/n, ANT+ & 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	BLE	1.92	1.56

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -4.08 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	EP-TA50EWE	N/A	N/A
Earphone	SAMSUNG	EHS64AVFWE	N/A	N/A

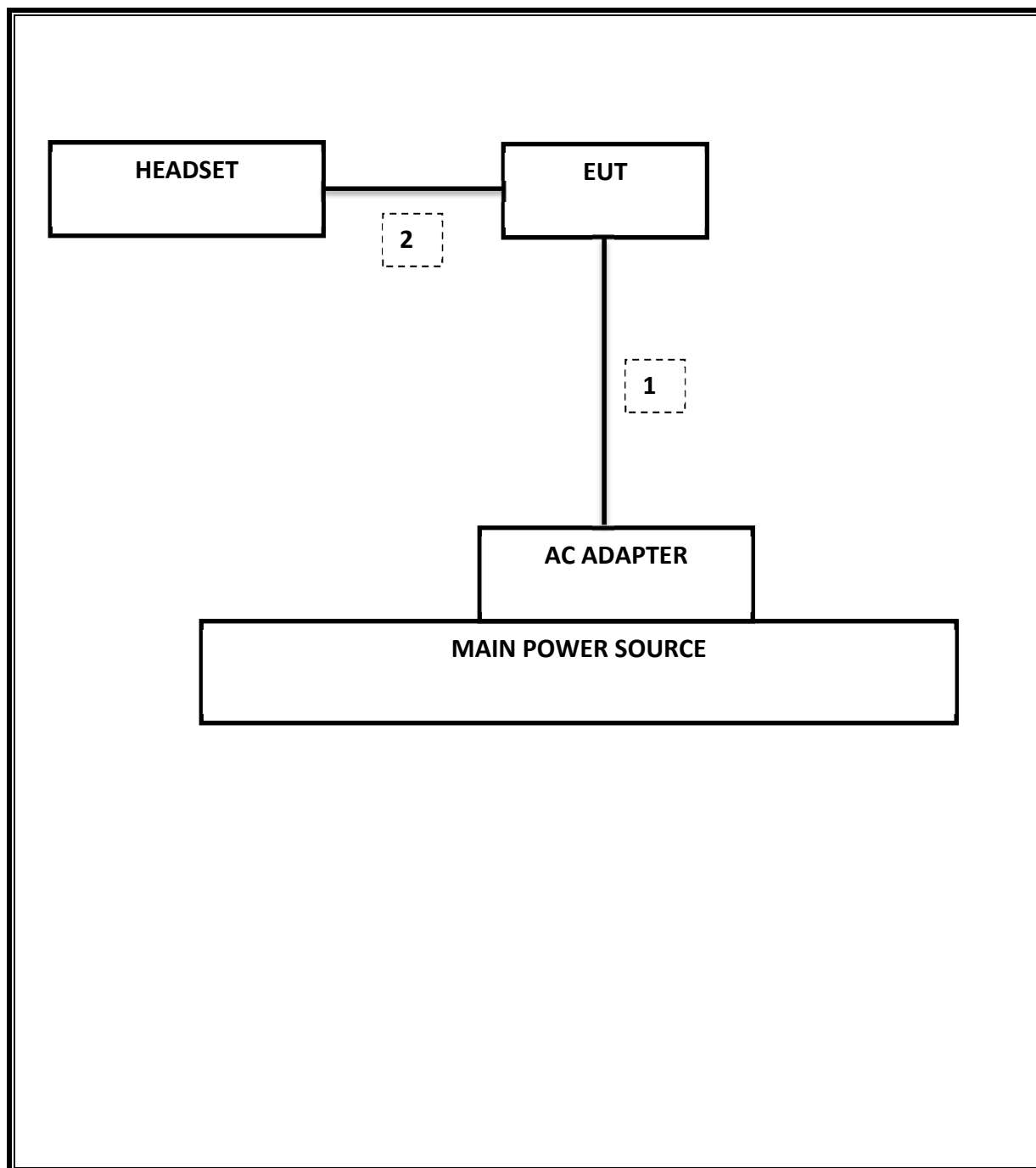
I/O CABLES

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 Samsung Keysting menu 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
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	4/1/2015
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01179	2/26/2015
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	8/18/2015
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	5/8/2015
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	10/22/2015
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	N/A	3/6/2015
Antenna, Horn, 18 GHz	ETS	3117	C01022	2/21/2015
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	12/17/2014
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/2014
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/2014
LISN, 30 MHz	FCC	50/250-25-2	C00626	1/14/2015

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	0.663MHz
2.1051, 15.247 (d)	RSS-210 A8.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-52.82dBm
15.247	RSS-210 A8.4	TX conducted output power	<30dBm		Pass	1.922dBm
15.247	RSS-210 A8.2	PSD	<8dBm		Pass	-13.45dBm
15.207 (a)	RSS-GEN 7.2.2	AC Power Line conducted emissions	Section 10	Radiated	Pass	45.73dBuV
15.205, 15.209	RSS-210 Clause 2.6, RSS-210 Clause 6	Radiated Spurious Emission	< 54dBuV/m		Pass	43.03dBuV/m

ANTENNA PORT TEST RESULTS

8.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

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

TEST PROCEDURE

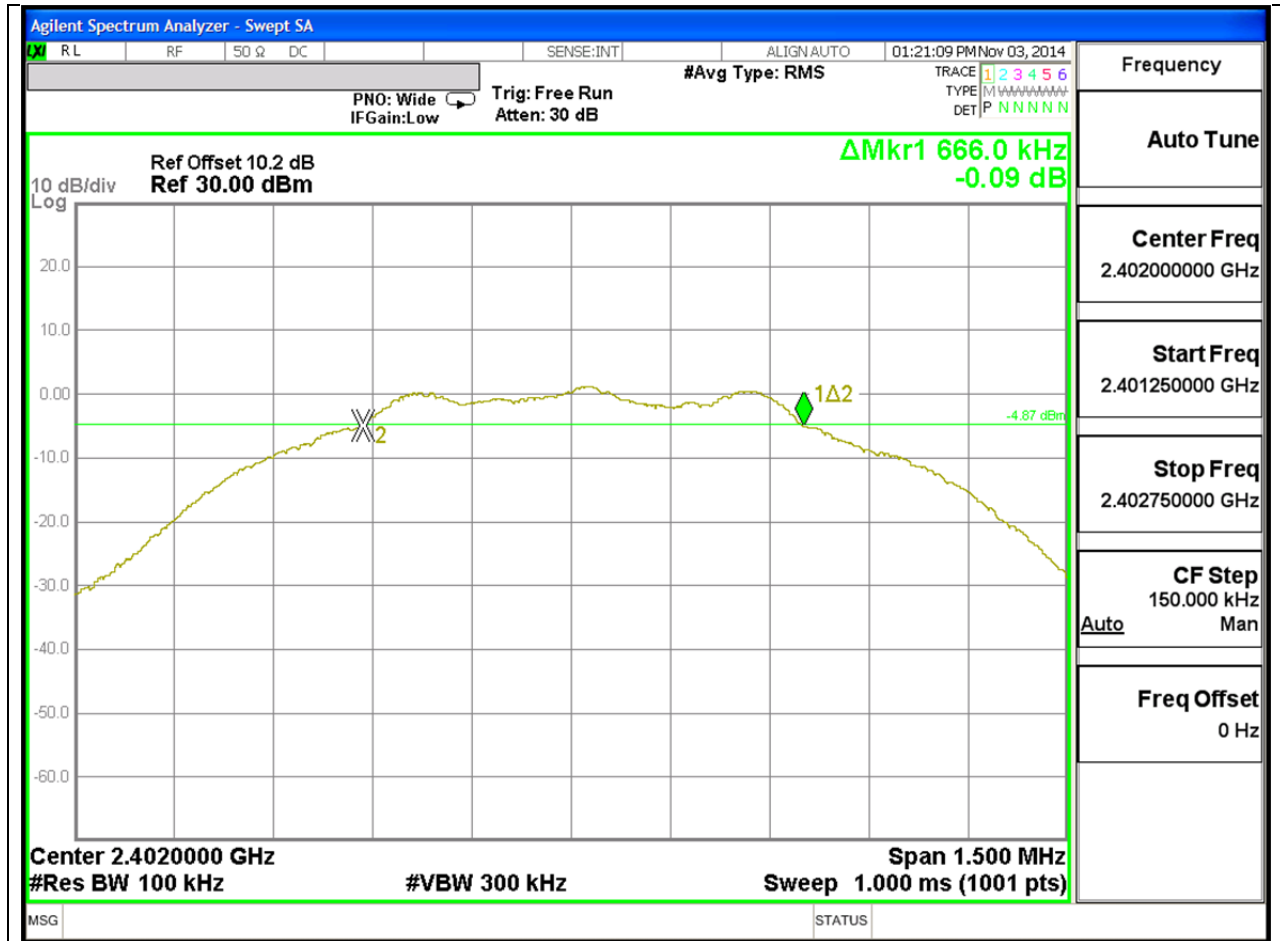
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6660	0.5
Middle	2440	0.6675	0.5
High	2480	0.6630	0.5

6 dB BANDWIDTH PLOTS

LOW CHANNEL



Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω DC SENSE:INT ALIGN AUTO 01:18:07 PM Nov 03, 2014

#Avg Type: RMS PNO: Wide IF Gain: Low Trig: Free Run Atten: 30 dB TRACE 1 2 3 4 5 6 TYPE M N N N N N DET P N N N N N N

Ref Offset 10.2 dB Ref 30.00 dBm $\Delta\text{Mkr}1$ 667.5 kHz -0.01 dB

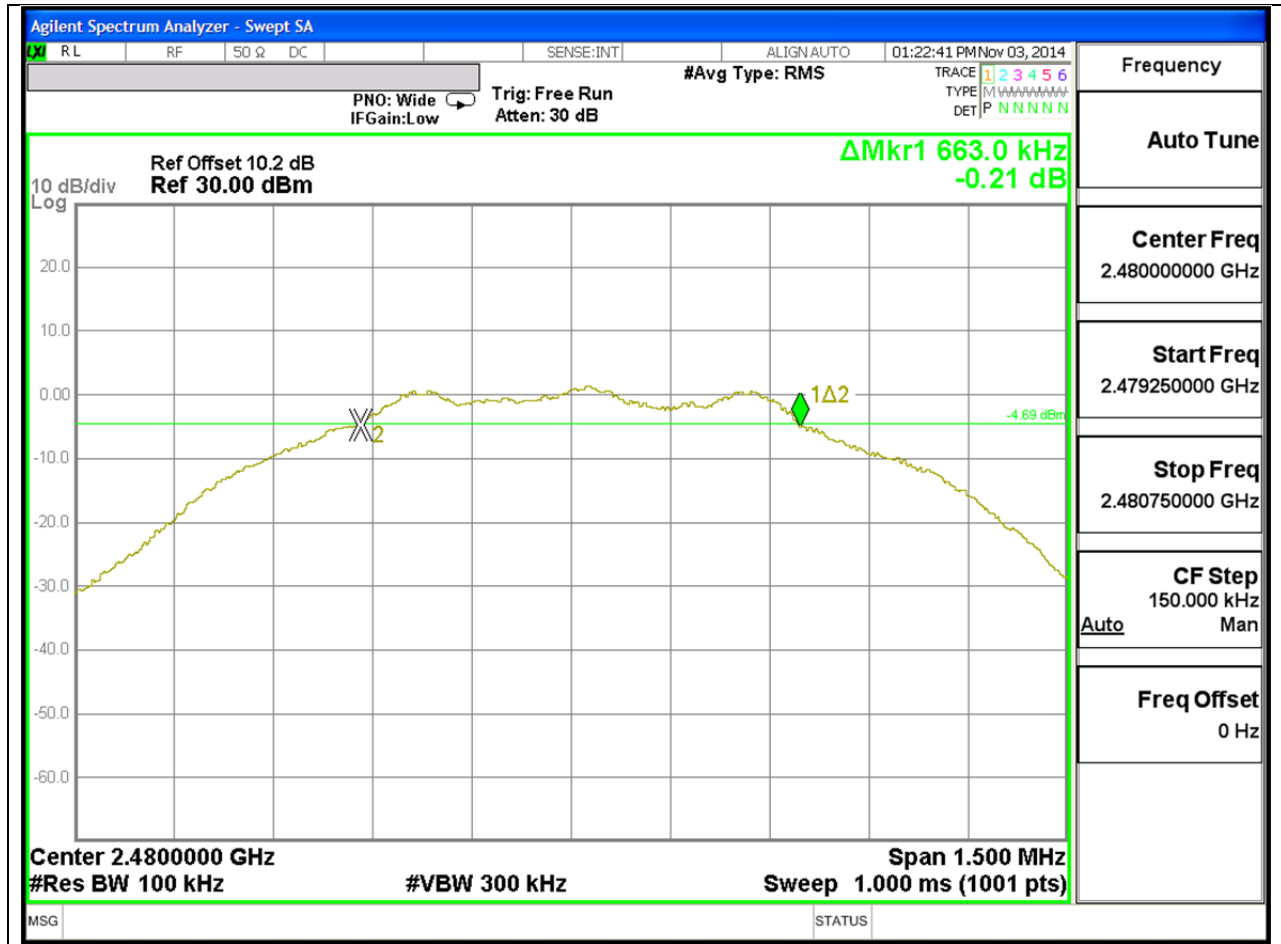
10 dB/div Log

Center 2.4400000 GHz #Res BW 100 kHz Span 1.500 MHz Sweep 1.000 ms (1001 pts)

Start Freq 2.439250000 GHz Stop Freq 2.440750000 GHz CF Step 150.000 kHz Auto Man Freq Offset 0 Hz

The spectrum plot shows a yellow trace representing the signal power across a frequency range from approximately 2.438 GHz to 2.442 GHz. The y-axis represents power in dBm, ranging from -60.0 to 20.0. A green horizontal line indicates the reference level at -4.94 dBm. Two markers are present: a grey 'X' labeled '2' at approximately 2.43925 GHz and a green diamond labeled '1 Δ2' at approximately 2.44075 GHz.

HIGH CHANNEL



8.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

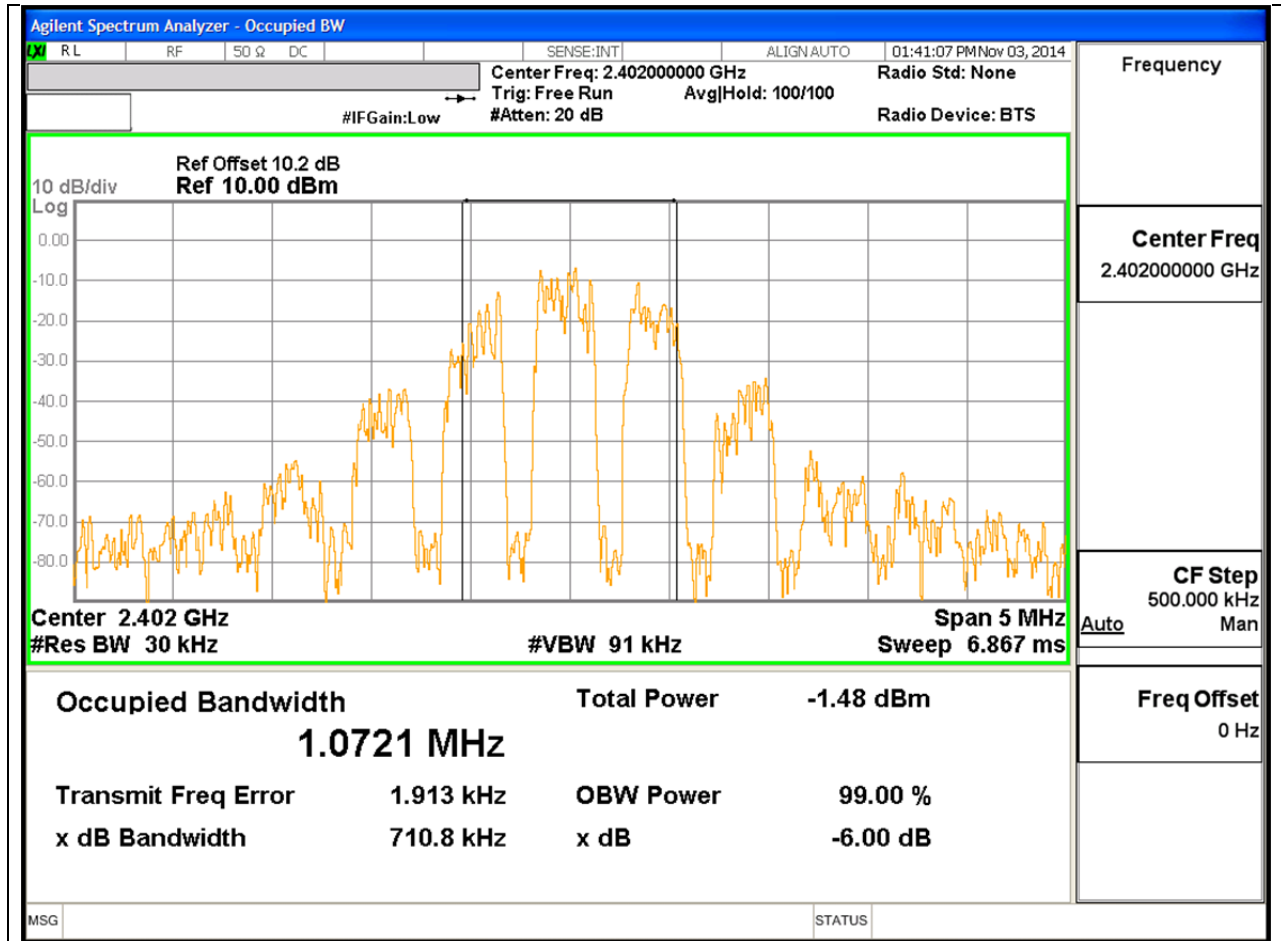
Reference to KDB558074 D01 DTS Meas Guidance v03r01: The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

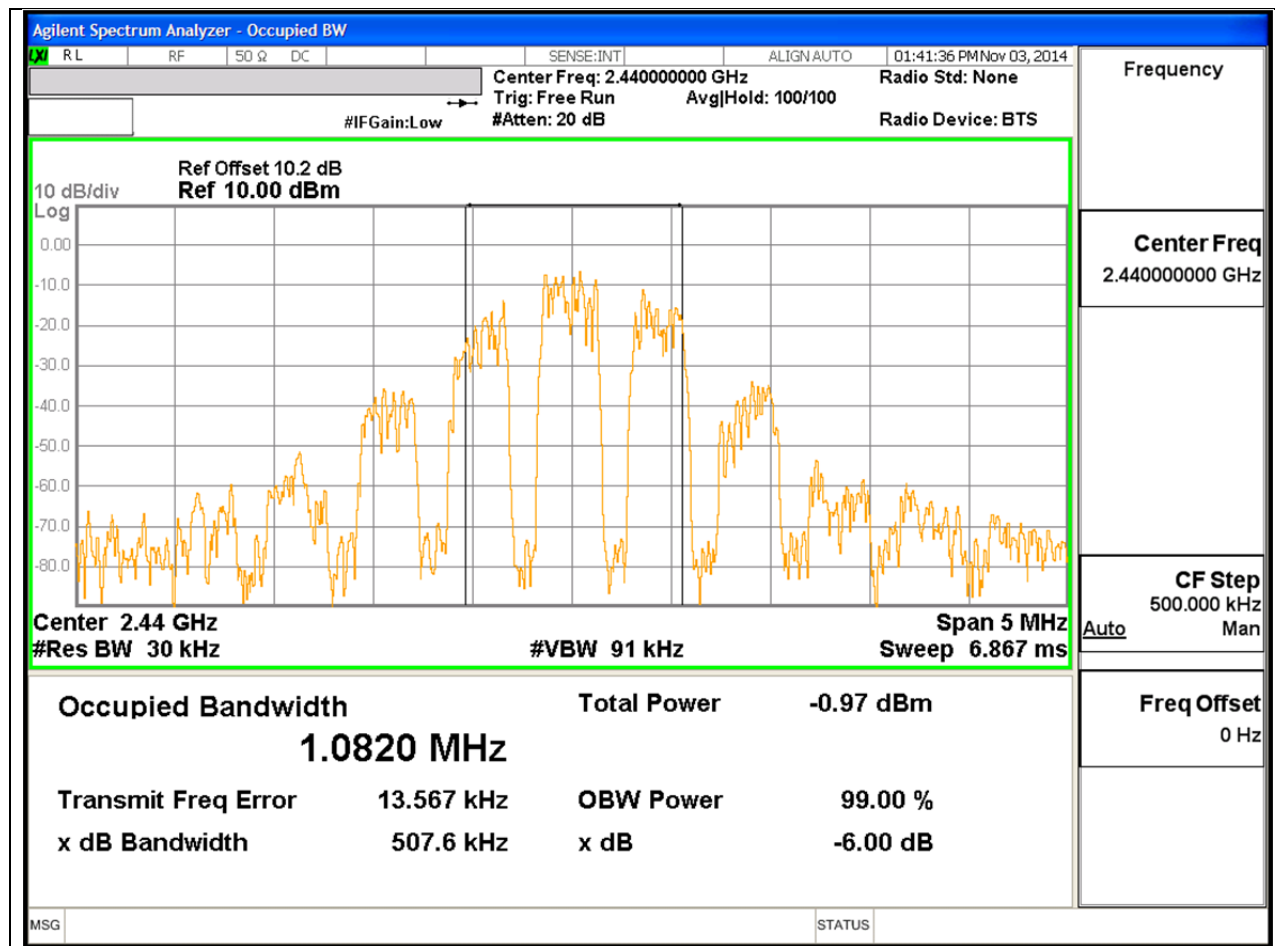
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0721
Middle	2440	1.0820
High	2480	1.0802

99% BANDWIDTH PLOTS

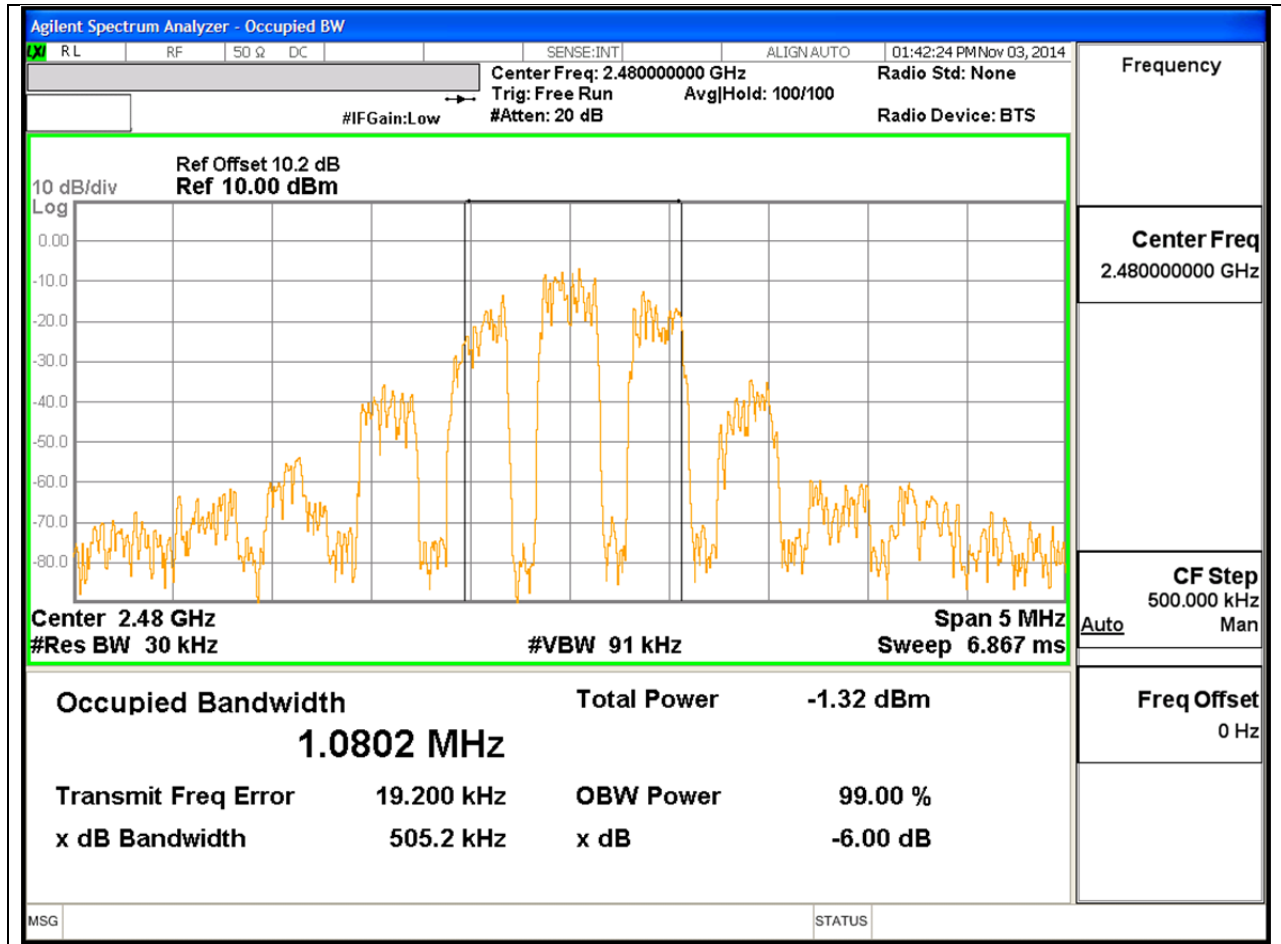
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



8.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

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

TEST PROCEDURE

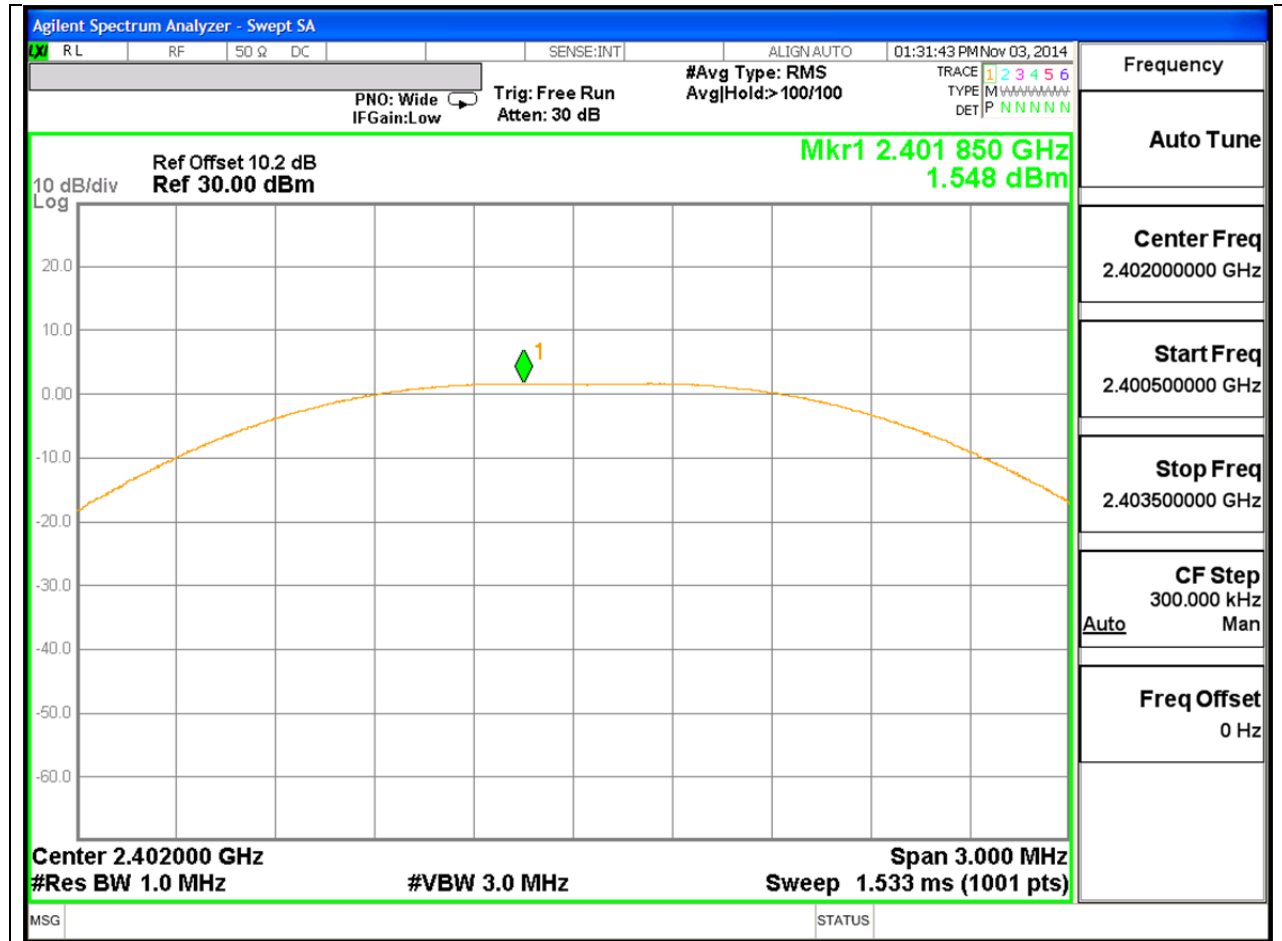
Peak power is measured using KDB558074 D01 DTS Meas Guidance v03r01 April 9, 2013 under section 9.1.1 utilizing spectrum analyzer.

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	1.548	30	-28.452
Middle	2440	1.565	30	-28.435
High	2480	1.922	30	-28.078

OUTPUT POWER PLOTS

LOW CHANNEL



Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω DC SENSE:INT ALIGN: AUTO 01:32:21 PM Nov 03, 2014

PN0: Wide IF Gain: Low Trig: Free Run Atten: 30 dB #Avg Type: RMS Avg/Hold: >100/100

TRACE 1 2 3 4 5 6 TYPE M N N N N N N N DET P N N N N N N

Ref Offset 10.2 dB Ref 30.00 dBm Mkr1 2.440 219 GHz 1.565 dBm

10 dB/div Log

The spectrum analyzer display shows a swept signal. The vertical axis represents power in dBm, ranging from -60.0 to 20.0, with a 10 dB/div scale. The horizontal axis represents frequency in GHz, ranging from 2.4385 to 2.4415. A yellow trace shows a broad peak centered at 2.440 GHz. A green diamond marker labeled '1' is placed on the peak at 2.440219 GHz. The peak power is 1.565 dBm. The center frequency is 2.440000 GHz, the resolution bandwidth (Res BW) is 1.0 MHz, the video bandwidth (VBW) is 3.0 MHz, and the sweep time is 1.533 ms (1001 points). The span is 3.000 MHz. The frequency offset is 0 Hz. The auto tune function is active.

Center 2.440000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Span 3.000 MHz Sweep 1.533 ms (1001 pts)

MSG STATUS

Frequency

Auto Tune

Center Freq 2.440000000 GHz

Start Freq 2.438500000 GHz

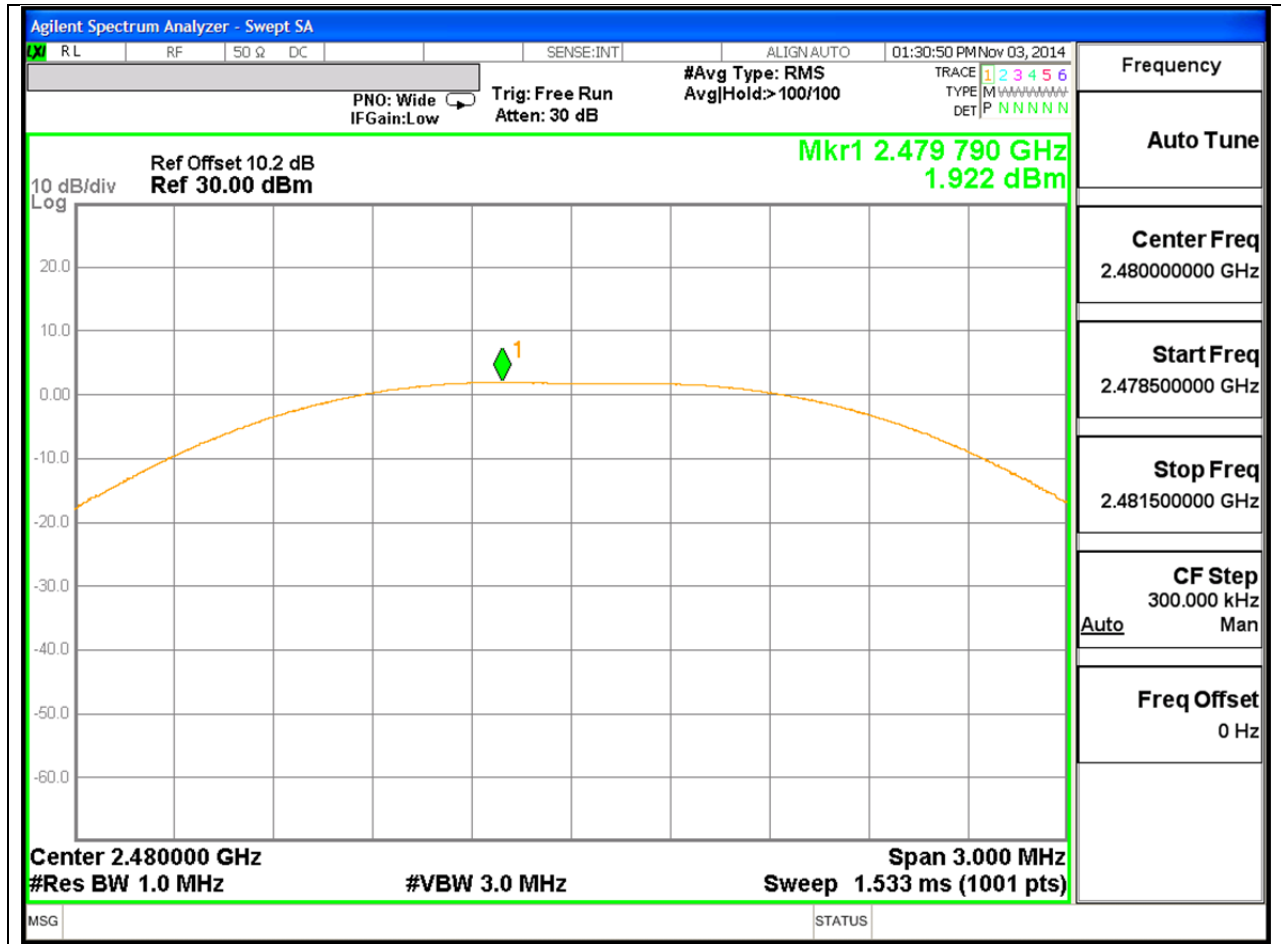
Stop Freq 2.441500000 GHz

CF Step 300.000 kHz

Auto Man

Freq Offset 0 Hz

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

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	-0.1
Middle	2440	1.01
High	2480	1.12

8.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

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

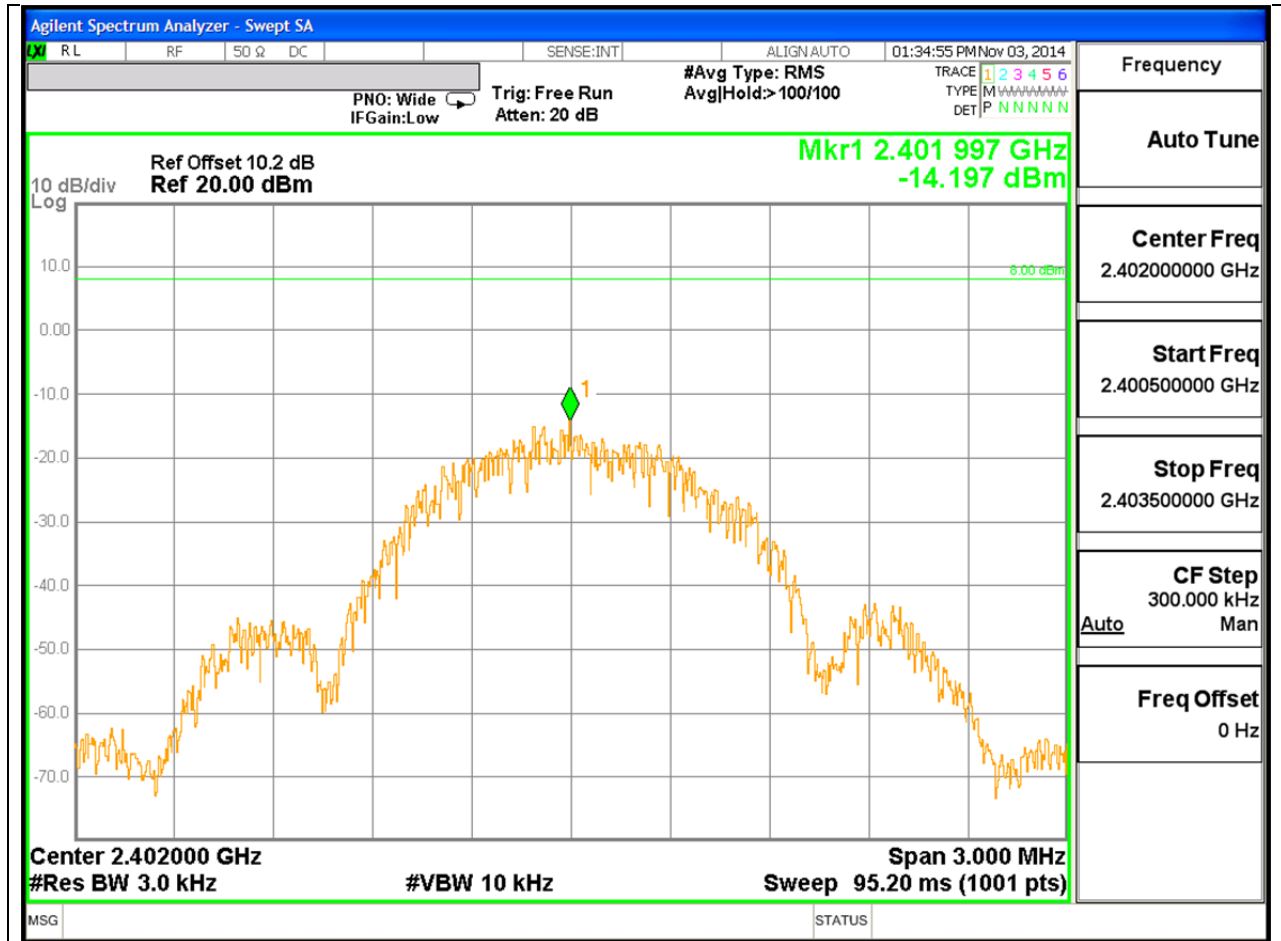
Power Spectral Density was performed utilizing the “Method PKPSD (Peak PSD)” under KDB558074 D01 DTS Meas Guidance v03r01, April 9, 2013

RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-14.20	8	-22.20
Middle	2440	-13.56	8	-21.56
High	2480	-13.45	8	-21.45

POWER SPECTRAL DENSITY PLOTS

LOW CHANNEL



Agilent Spectrum Analyzer - Swept SA

☒ R L RF 50 Ω DC SENSE:INT ALIGN AUTO 01:34:06 PM Nov 03, 2014

PNO: Wide IF Gain: Low Trig: Free Run Atten: 20 dB #Avg Type: RMS Avg|Hold: >100/100

TRACE 1 2 3 4 5 6 TYPE M N N N N N N N DET P N N N N N N

Ref Offset 10.2 dB Ref 20.00 dB Mkr1 2.439 997 GHz -13.559 dBm

10 dB/div Log

Center 2.440000 GHz Span 3.000 MHz
 #Res BW 3.0 kHz #VBW 10 kHz Sweep 95.20 ms (1001 pts)

Frequency
 Auto Tune
 Center Freq 2.440000000 GHz
 Start Freq 2.438500000 GHz
 Stop Freq 2.441500000 GHz
 CF Step 300.000 kHz
 Auto Man
 Freq Offset 0 Hz

MSG STATUS

Agilent Spectrum Analyzer - Swept SA

R/L	RF	50 Ω	DC	SENSE:INT	ALIGN:AUTO	01:34:30 PM Nov 03, 2014
-----	----	------	----	-----------	------------	--------------------------

PNO: Wide IF Gain: Low Trig: Free Run Atten: 20 dB #Avg Type: RMS Avg|Hold>: 100/100
TRACE 1 2 3 4 5 6 TYPE M N P DET P N N N N N

Mkr1 2.479 997 GHz -13.447 dBm

Ref Offset 10.2 dB Ref 20.00 dBm 10 dB/div Log

Center Freq 2.480000000 GHz
Start Freq 2.478500000 GHz
Stop Freq 2.481500000 GHz
CF Step 300.000 kHz Auto Man
Freq Offset 0 Hz

Center 2.480000 GHz Span 3.000 MHz
#Res BW 3.0 kHz Sweep 95.20 ms (1001 pts)
#VBW 10 kHz

MSG STATUS

8.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

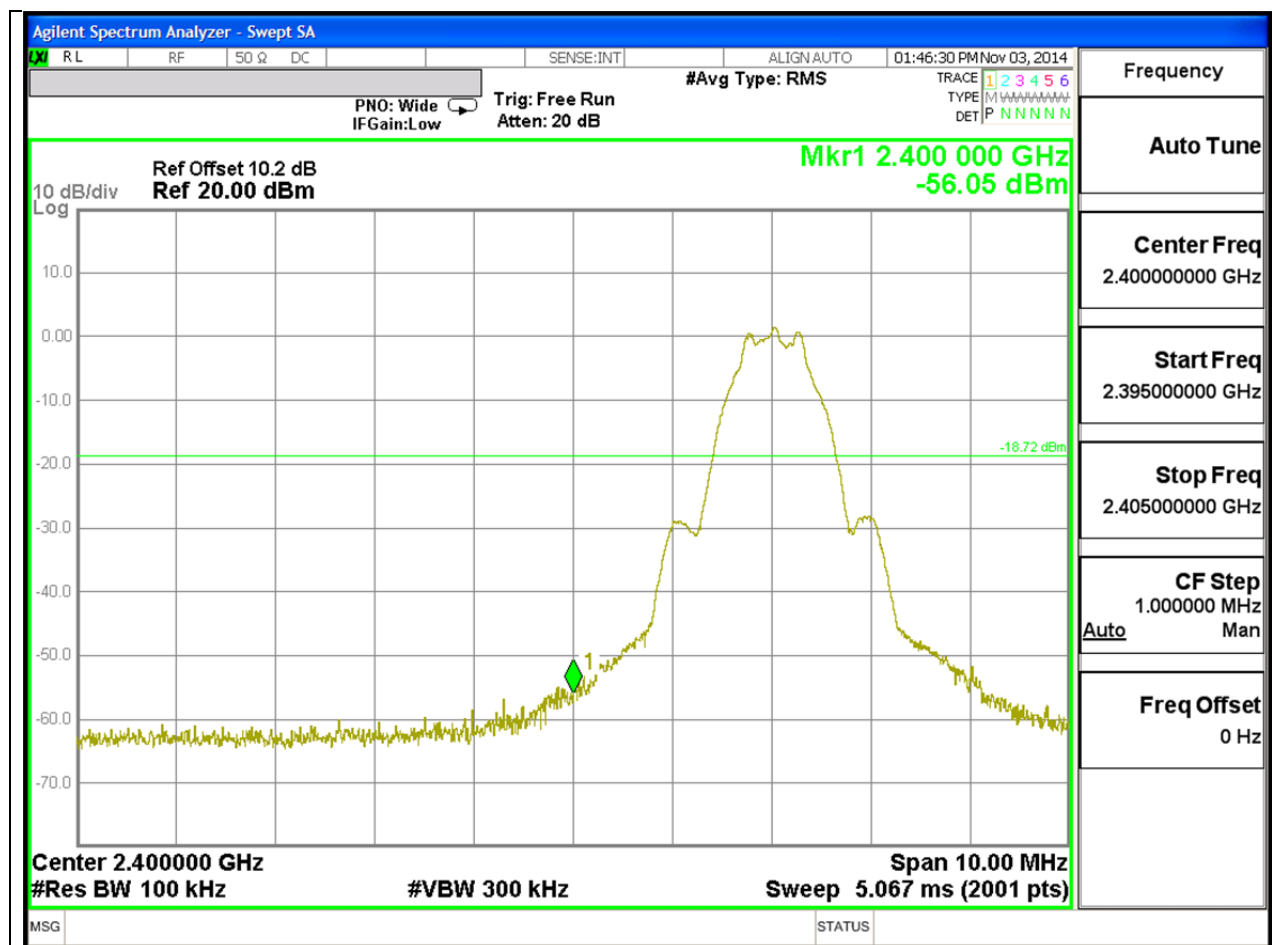
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

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.

SPURIOUS EMISSIONS, LOW CHANNEL



Agilent Spectrum Analyzer - Swept SA

☒ R L RF 50 Ω DC SENSE:INT ALIGN AUTO 01:51:31 PM Nov 03, 2014

PNO: Fast Trig: Free Run #Avg Type: RMS
 IF Gain: Low Atten: 20 dB

TRACE 1 2 3 4 5 6
 TYPE M M M M M M M M
 DET P N N N N N

Ref Offset 10.2 dB
 Ref 20.00 dBm

Mkr2 13.599 GHz
 -53.39 dBm

10 dB/div
 Log

Start 30 MHz Stop 26.00 GHz
 #Res BW 100 kHz #VBW 300 kHz Sweep 954.8 ms (2001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.406 GHz	0.38 dBm			
2	N	1	f	13.599 GHz	-53.39 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

MSG STATUS

Frequency
 Auto Tune
 Center Freq
 13.015000005 GHz
 Start Freq
 30.000000 MHz
 Stop Freq
 26.000000010 GHz
 CF Step
 2.597000001 GHz
 Auto Man
 Freq Offset
 0 Hz

SPURIOUS EMISSIONS, MID CHANNEL

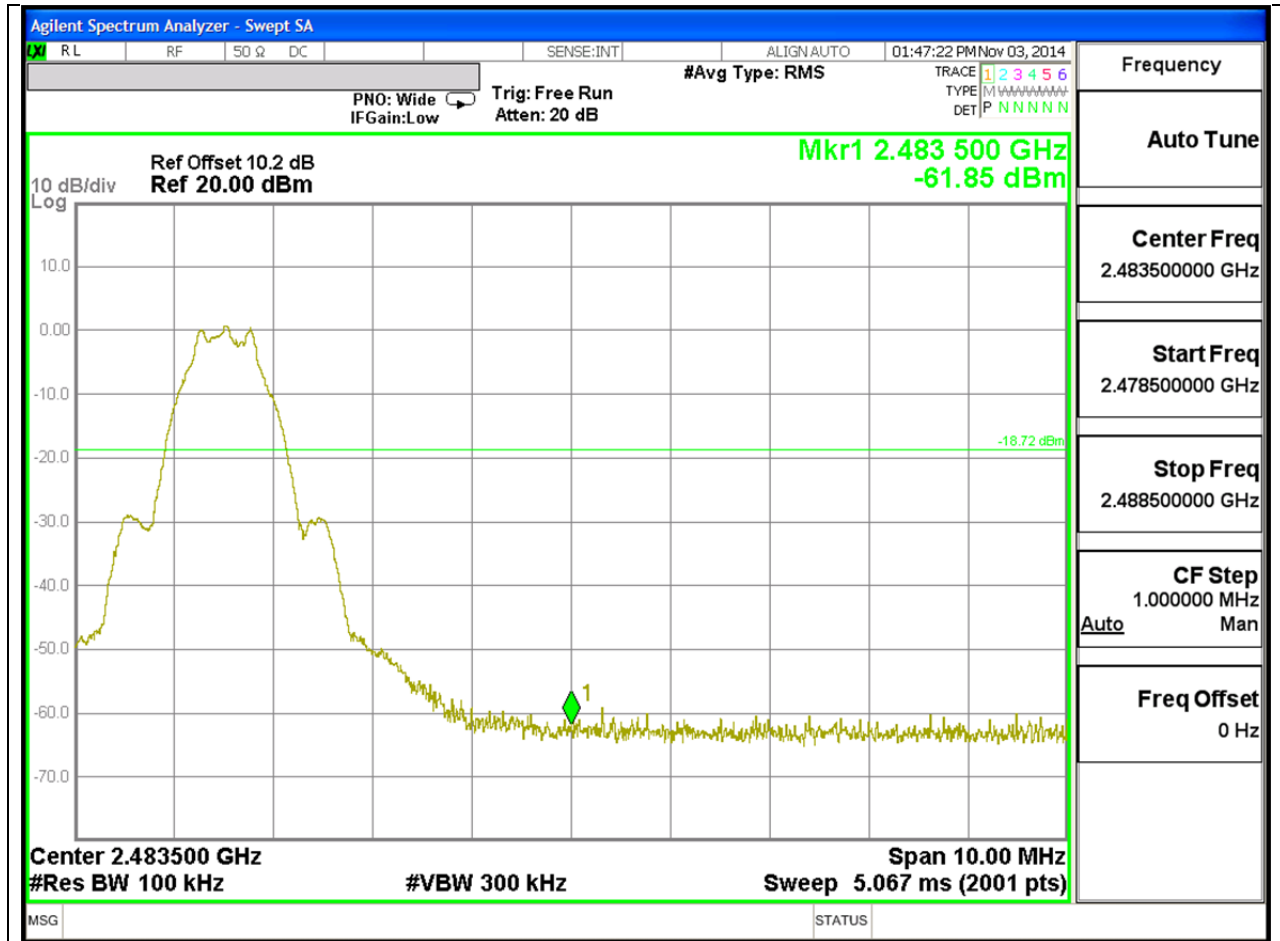
MID CHANNEL REFERENCE



The screenshot displays an Agilent Spectrum Analyzer interface. The main plot shows a frequency spectrum from 30 MHz to 26.00 GHz. A significant signal is observed at 3.718 GHz, labeled as Mkr2 3.718 GHz -55.00 dBm. The plot includes a reference level at -18.72 dBm. The sweep parameters are set to Start 30 MHz, Stop 26.00 GHz, Res BW 100 kHz, VBW 300 kHz, and Sweep 954.8 ms (2001 pts). The right-hand side of the screen features several control panels: Frequency (Auto Tune), Center Freq (13.015000005 GHz), Start Freq (30.000000 MHz), Stop Freq (26.000000010 GHz), CF Step (2.597000001 GHz), Auto Man, Freq Offset (0 Hz), and a STATUS panel.

SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CHANNEL BANDEDGE



Agilent Spectrum Analyzer - Swept SA

R L RF SO Ω DC SENSE:INT ALIGN AUTO 01:49:04 PM Nov 03, 2014

#Avg Type: RMS

PNO: Fast Trg: Free Run
IF Gain: Low Atten: 20 dB

TRACE 1 2 3 4 5 6
TYPE M N N N N N N
DET P N N N N N N

Ref Offset 10.2 dB
Ref 20.00 dBm

Mkr2 16.378 GHz
-52.82 dBm

10 dB/div Log

-18.72 dBm

Start 30 MHz Stop 26.00 GHz
#Res BW 100 kHz #VBW 300 kHz Sweep 954.8 ms (2001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.484 GHz	-0.85 dBm			
2	N	1	f	16.378 GHz	-52.82 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

MSG STATUS

Frequency

Auto Tune

Center Freq
13.015000005 GHz

Start Freq
30.000000 MHz

Stop Freq
26.000000010 GHz

CF Step
2.597000001 GHz

Auto Man

Freq Offset
0 Hz

9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit ($\mu\text{V/m}$) 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 - 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.

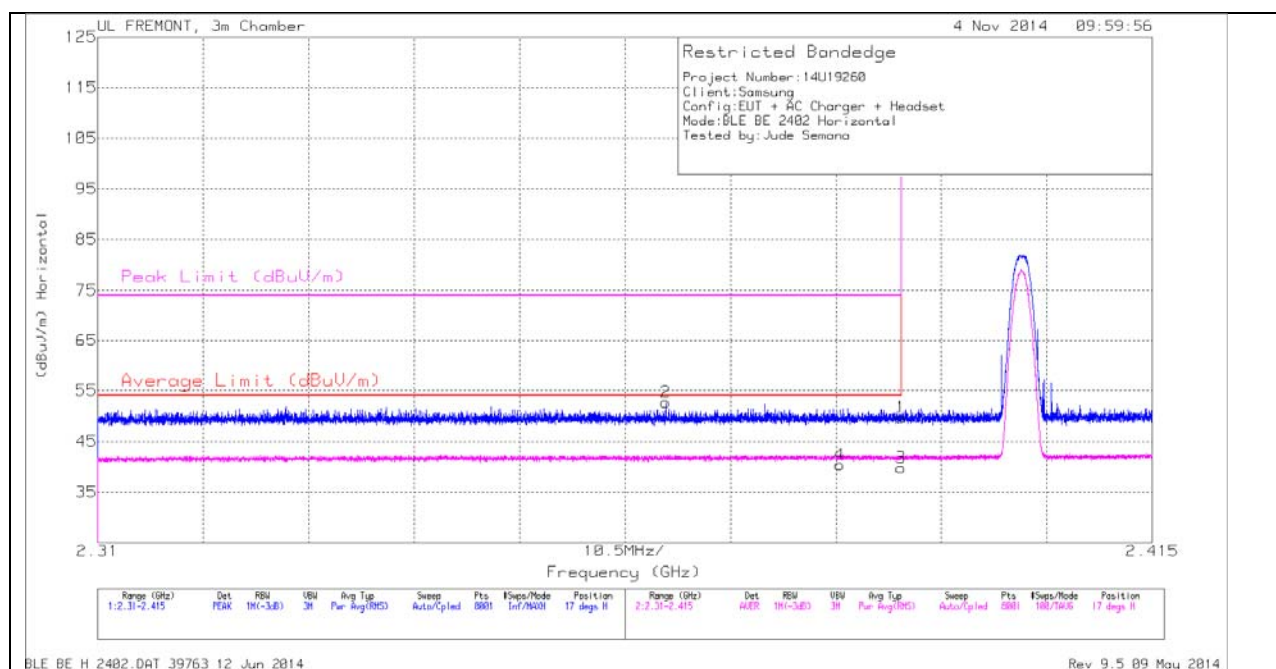
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and add duty cycle factor for average measurements. Duty cycle factor = $10 \log(1/x)$. For this sample: DCF = $10 \log(1/0.618) = 2.1 \text{ dB}$

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.

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

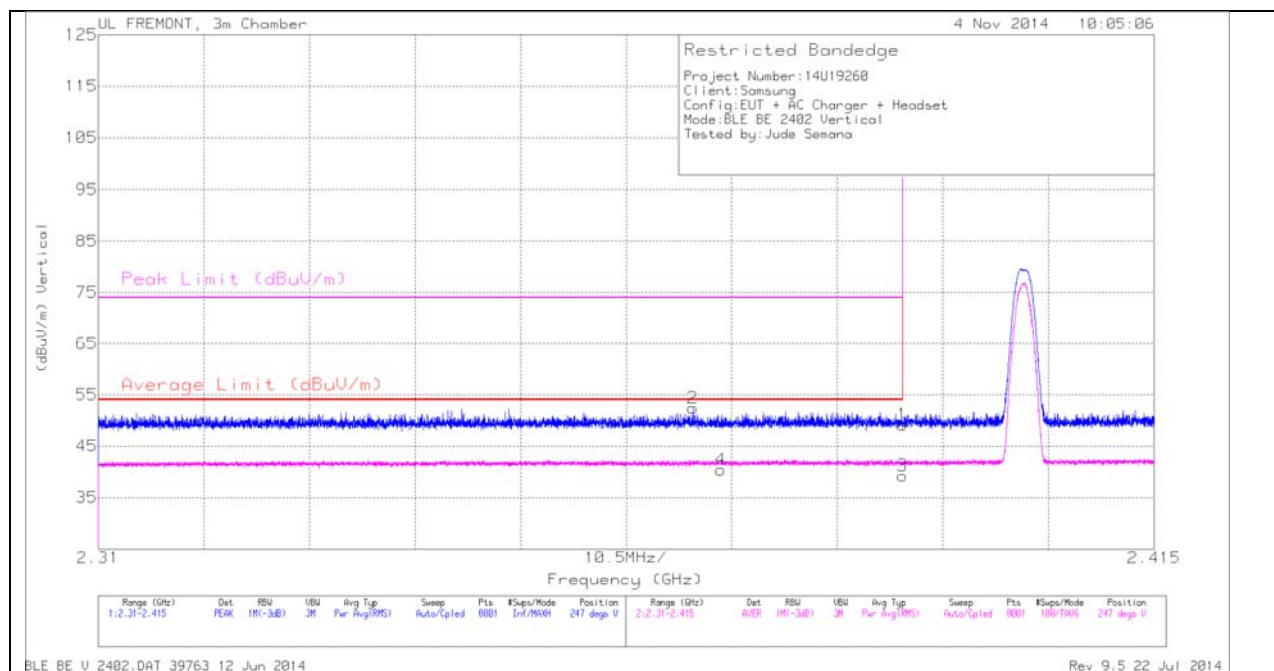
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT119 (dB/m)	Amp/Cbl/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
2	2.367	43.82	PK	32	-23.1	0	52.72	-	-	74	-21.28	17	225	H
4	2.384	31.37	RMS	32.1	-23.1	2.1	42.47	54	-11.53	-	-	17	225	H
1	2.39	40.7	PK	32.1	-23.1	0	49.7	-	-	74	-24.3	17	225	H
3	2.39	30.77	RMS	32.1	-23.1	2.1	41.87	54	-12.13	-	-	17	225	H

VERTICAL PEAK AND AVERAGE PLOT

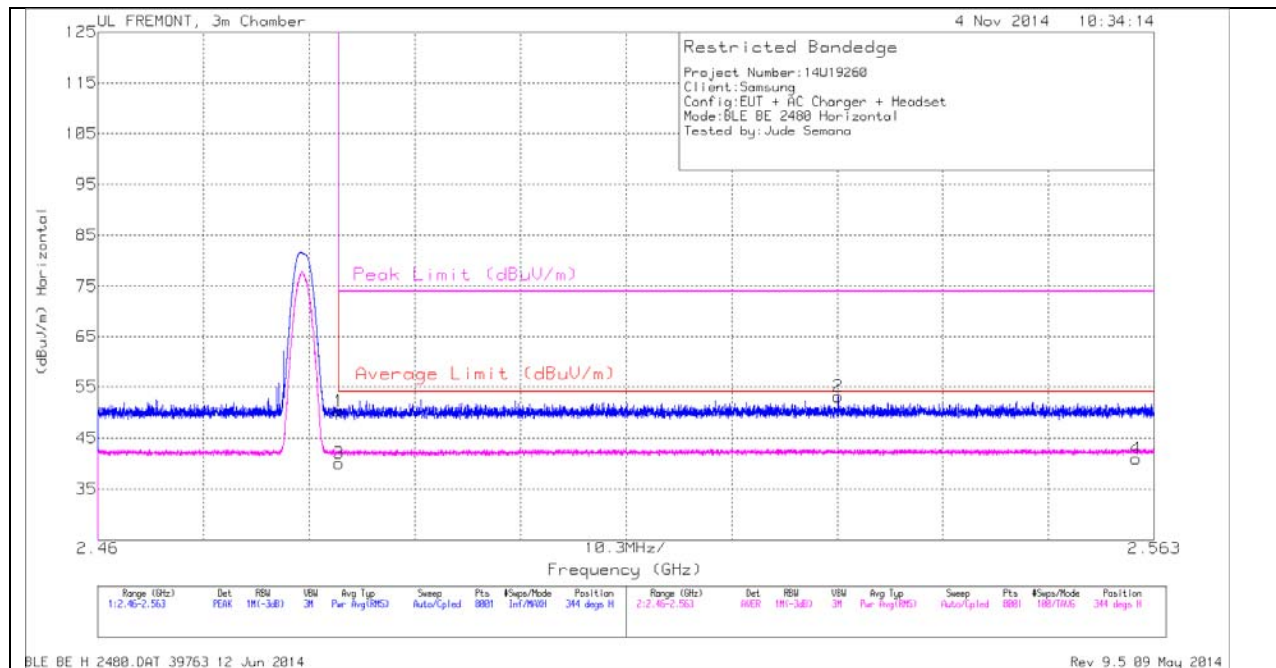


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/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
2	2.369	43.47	PK	32	-23.1	0	52.37	-	-	74	-21.63	247	181	V
4	2.372	31.48	RMS	32	-23.1	2.1	42.44	54	-11.56	-	-	247	181	V
1	2.39	40.13	PK	32.1	-23.1	0	49.13	-	-	74	-24.87	247	181	V
3	2.39	30.24	RMS	32.1	-23.1	2.1	41.3	54	-12.7	-	-	247	181	V

AUTHORIZED BANDEDGE (HIGH CHANNEL)

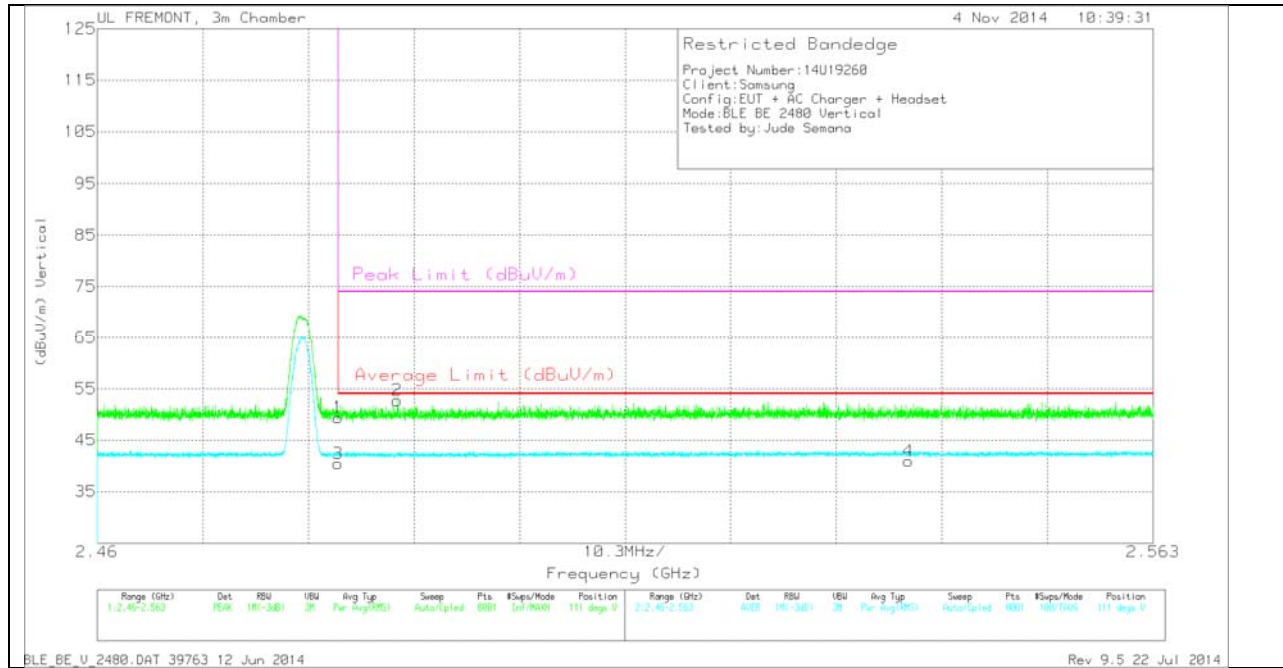
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (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	40.76	PK	32.3	-22.8	0	50.26	-	-	74	-23.74	344	176	H
3	2.484	30.55	RMS	32.3	-22.8	2.1	42.15	54	-11.85	-	-	344	176	H
2	2.532	43.44	PK	32.4	-22.7	0	53.14	-	-	74	-20.86	344	176	H
4	2.561	31.23	RMS	32.4	-22.7	2.1	43.03	54	-10.97	-	-	344	176	H

VERTICAL PEAK AND AVERAGE PLOT

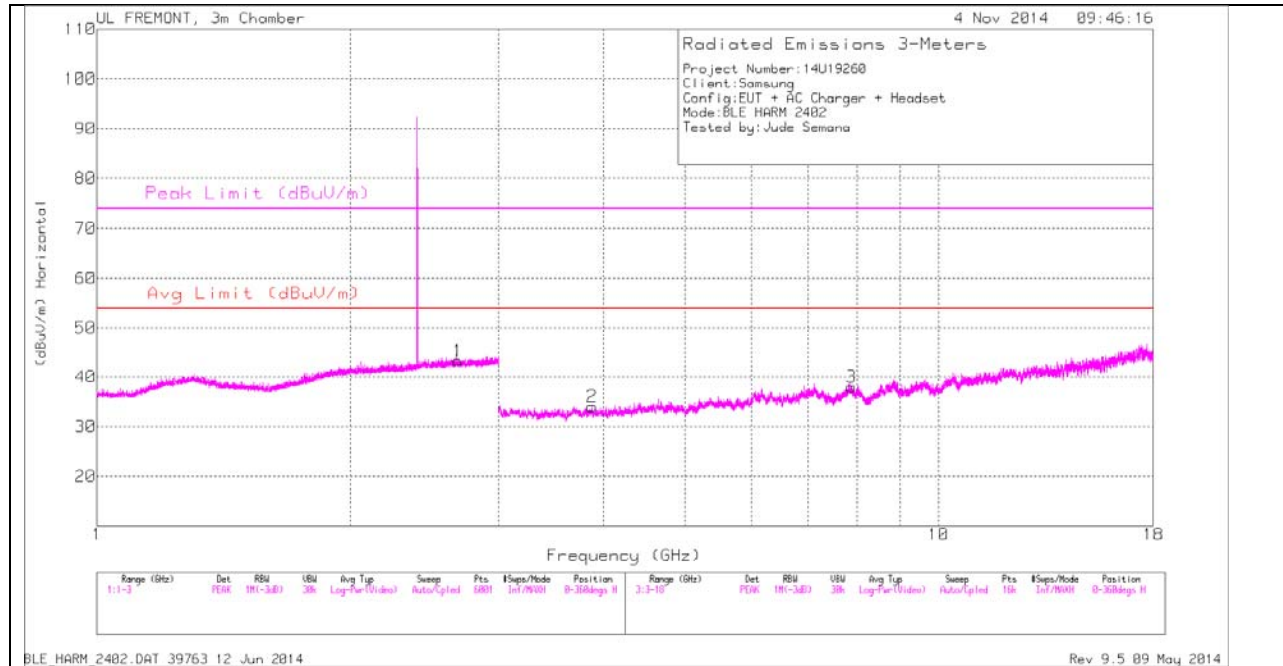


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT119 (dB/m)	Amp/Cb/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	39.9	PK	32.3	-22.8	0	49.4	-	-	74	-24.6	111	249	V
3	2.484	30.92	RMS	32.3	-22.8	2.1	42.48	54	-11.52	-	-	111	249	V
2	2.489	43.22	PK	32.3	-22.8	0	52.72	-	-	74	-21.28	111	249	V
4	2.539	31.23	RMS	32.4	-22.7	2.1	42.99	54	-11.01	-	-	111	249	V

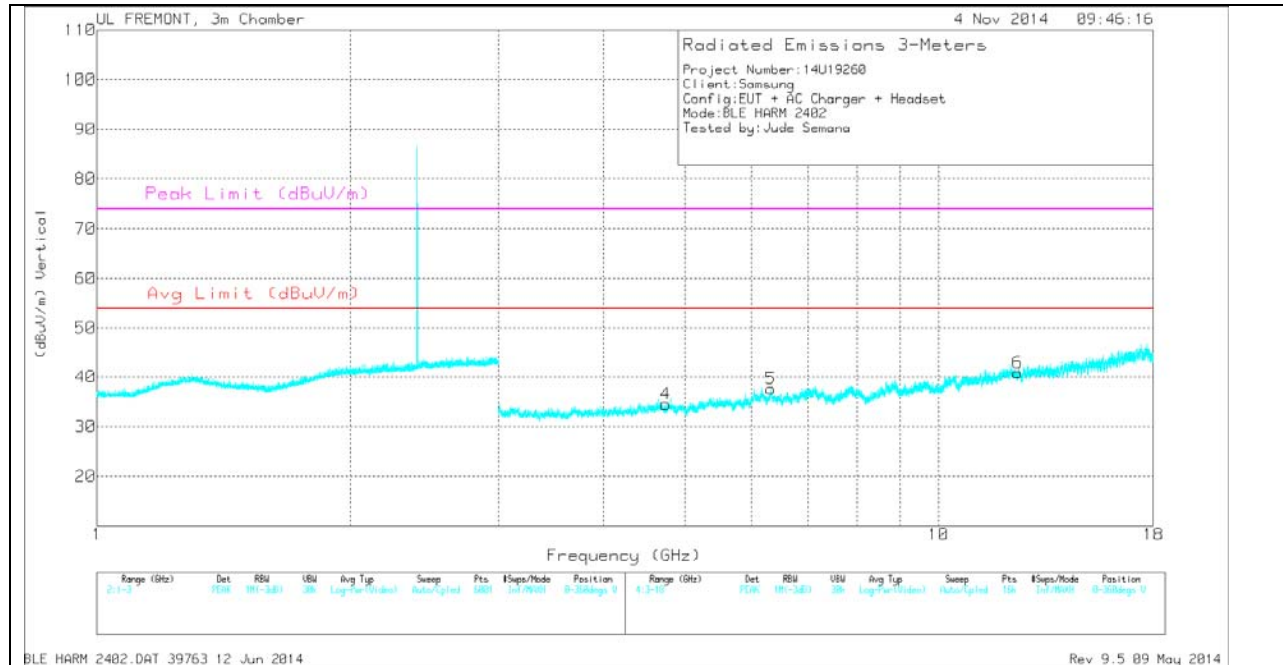
HARMONICS AND SPURIOUS EMISSIONS

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

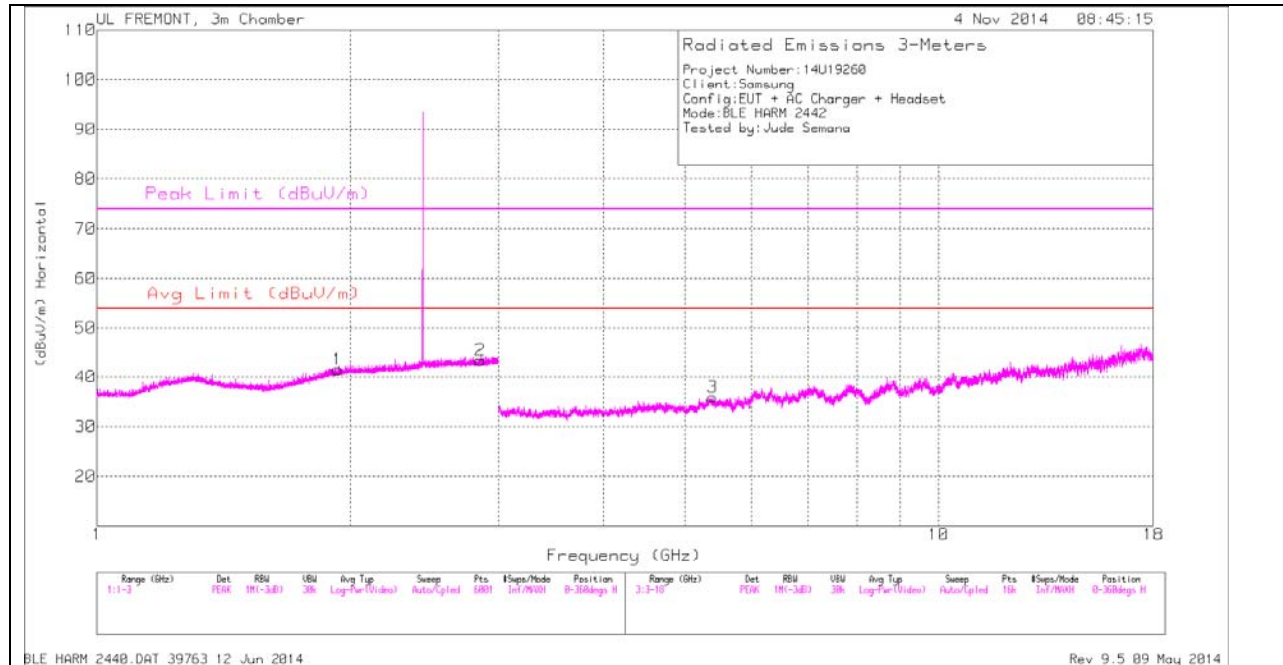
TRACE MARKERS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Filt /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	2.686	33.48	PK	32.6	-22.8	0	43.28	-	-	74	-30.72	0-360	200	H
2	3.878	32.13	PK	33.2	-31.3	0	34.03	-	-	74	-39.97	0-360	100	H
4	4.742	31.31	PK	34.1	-30.9	0	34.51	-	-	74	-39.49	0-360	200	V
5	6.324	31.43	PK	35.4	-29.2	0	37.63	-	-	-	-	0-360	200	V
3	7.883	29.48	PK	35.8	-27.3	0	37.98	-	-	-	-	0-360	200	H
6	12.427	28.52	PK	39.1	-26.8	0	40.82	-	-	74	-33.18	0-360	100	V

PK - Peak detector

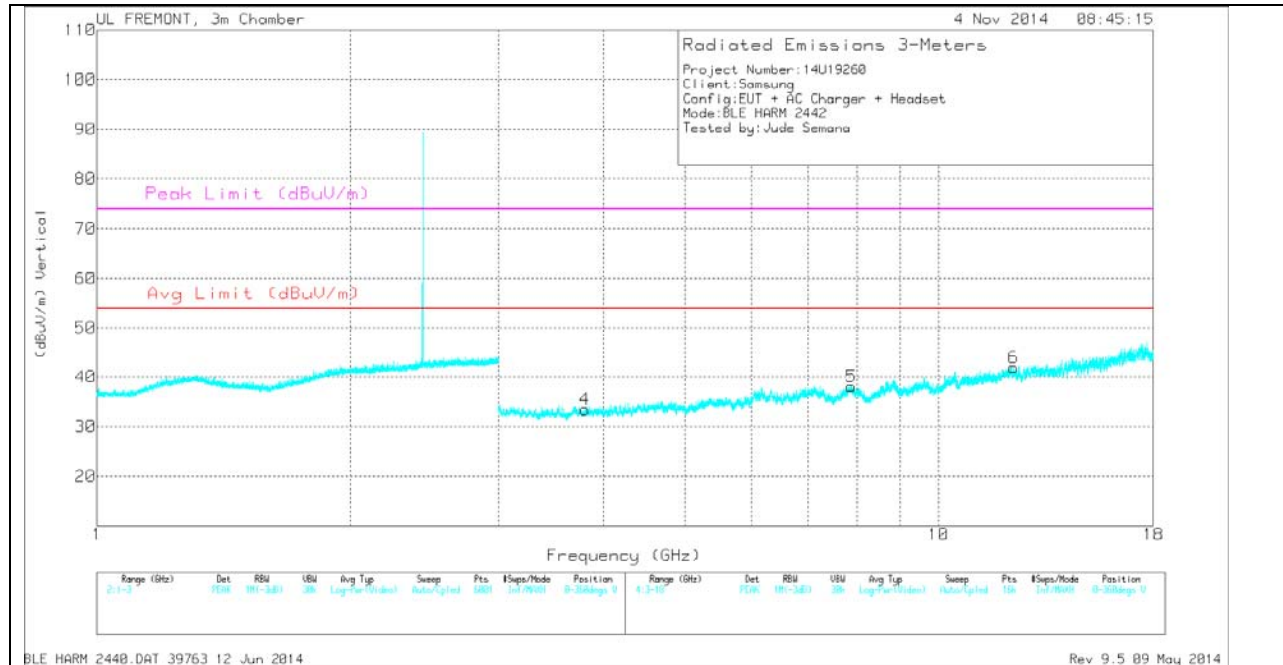
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

MID CHANNEL HORIZONTAL



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

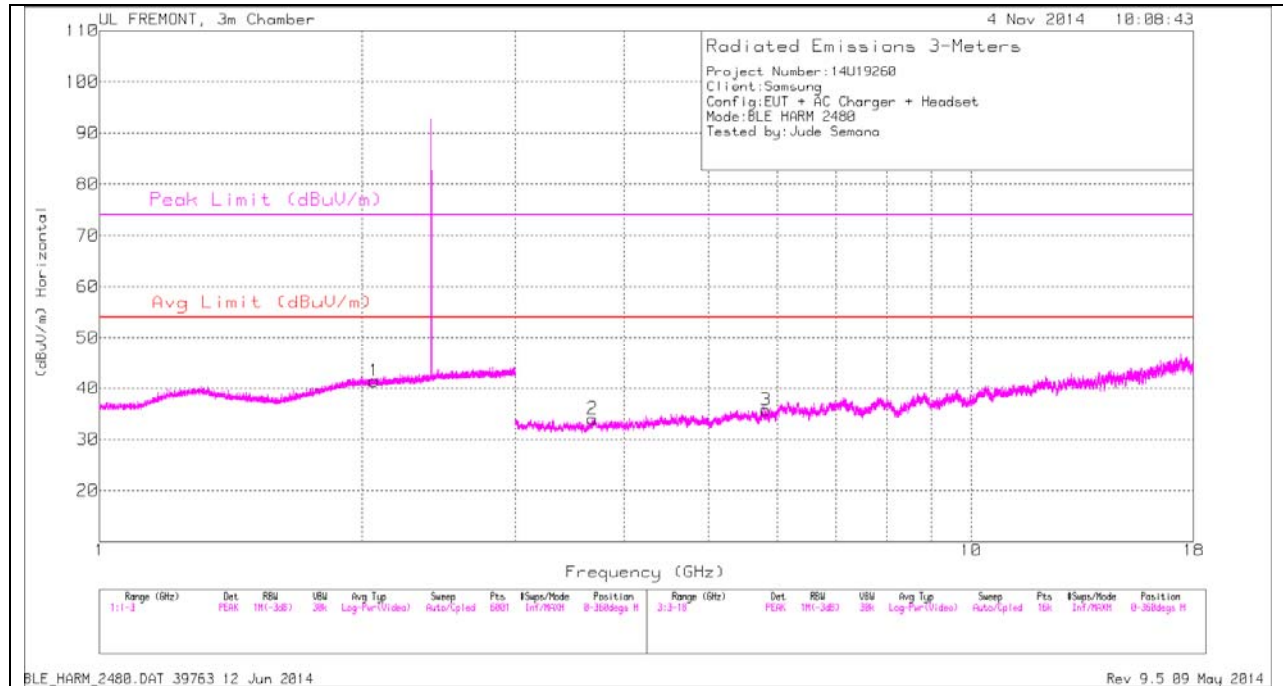
TRACE MARKERS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Filtr /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	1.933	33.32	PK	31.4	-23.2	0	41.52	-	-	-	-	0-360	200	H
2	2.857	33.43	PK	32.7	-22.8	0	43.33	-	-	74	-30.67	0-360	200	H
4	3.802	31.47	PK	33.2	-31.2	0	33.47	-	-	74	-40.53	0-360	100	V
3	5.391	31.94	PK	34.7	-30.7	0	35.94	-	-	74	-38.06	0-360	200	H
5	7.882	29.57	PK	35.8	-27.3	0	38.07	-	-	-	-	0-360	200	V
6	12.288	29.11	PK	39	-26.2	0	41.91	-	-	74	-32.09	0-360	200	V

PK - Peak detector

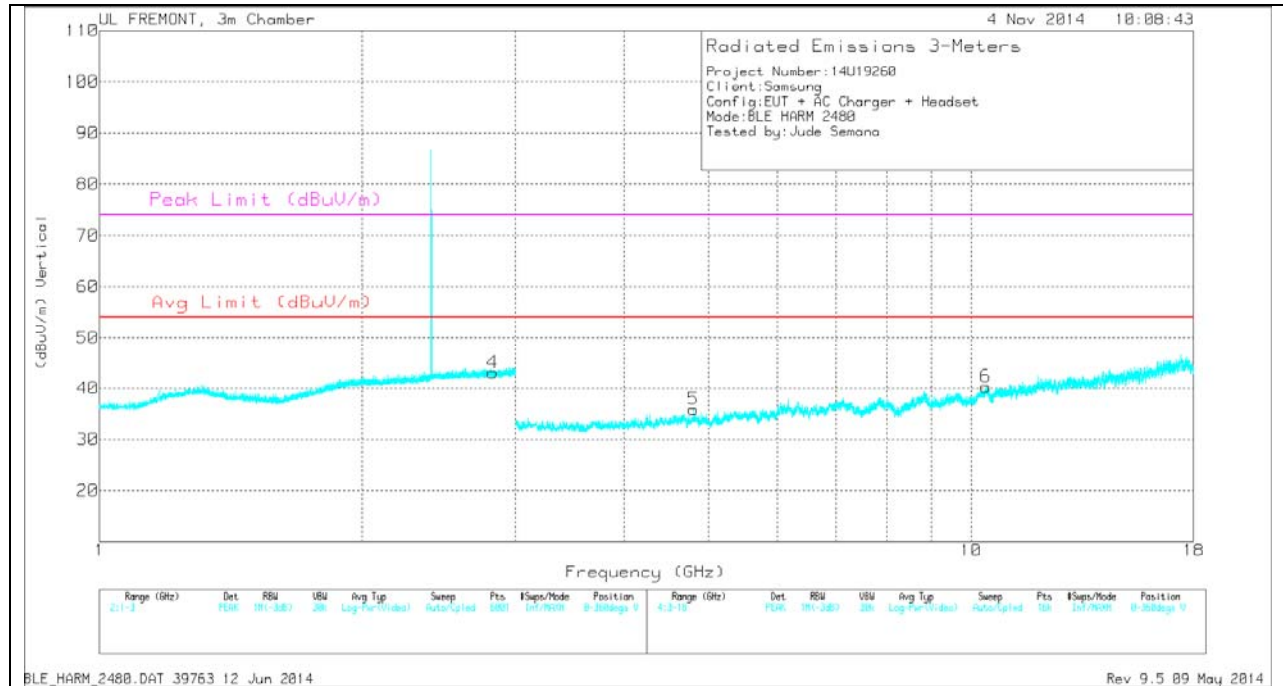
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

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 T119 (dB/m)	Amp/Cbl/Filtr/ 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	2.066	32.89	PK	31.6	-23.1	0	41.39	-	-	-	-	0-360	100	H
4	2.827	33.1	PK	32.7	-22.8	0	43	-	-	74	-31	0-360	200	V
2	3.681	31.51	PK	33.2	-30.7	0	34.01	-	-	74	-39.99	0-360	200	H
5	4.804	32.06	PK	34.1	-30.3	0	35.86	-	-	74	-38.14	0-360	200	V
3	5.818	30.15	PK	34.9	-29.3	0	35.75	-	-	-	-	0-360	200	H
6	10.398	28.27	PK	37.3	-25.3	0	40.27	-	-	-	-	0-360	100	V

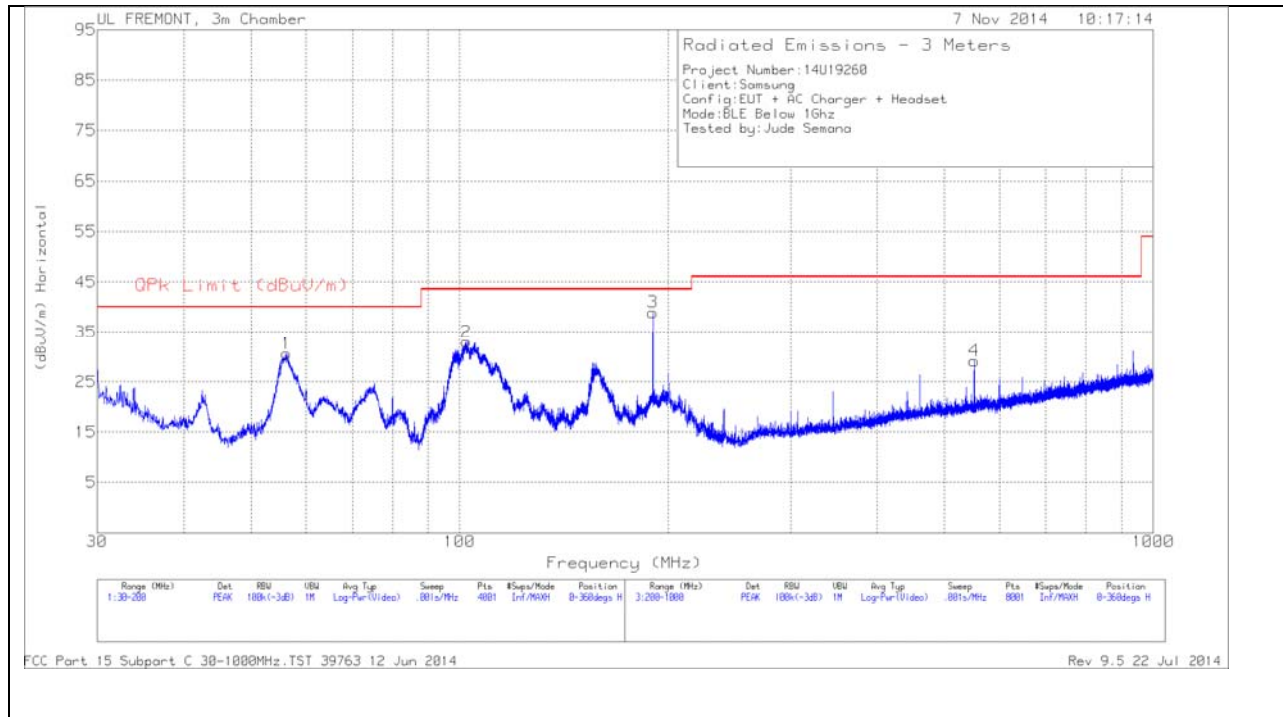
PK - Peak detector

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

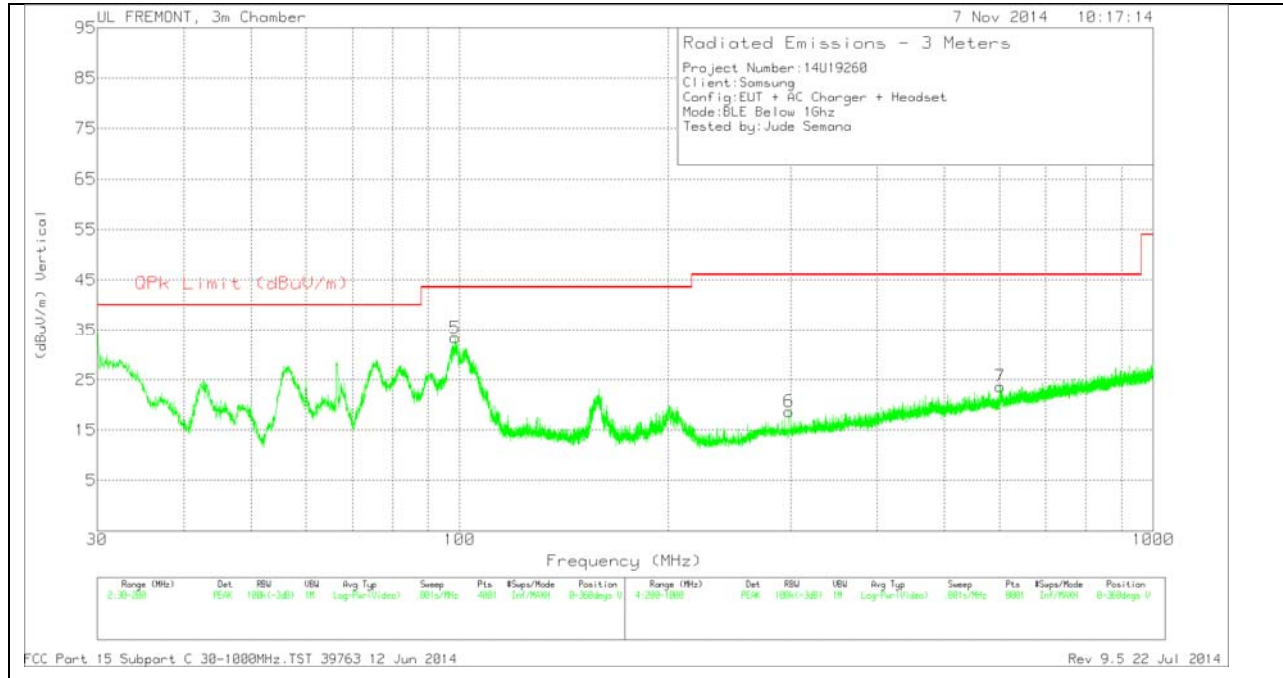
9.3. WORST-CASE BELOW 1 GHz

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 T185 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	56.3075	51.04	PK	6.8	-27.2	30.64	40	-9.36	0-360	400	H
5	98.5525	50.72	PK	9.5	-26.8	33.42	43.52	-10.1	0-360	100	V
2	102.2075	49.33	PK	10.5	-26.8	33.03	43.52	-10.49	0-360	200	H
3	189.885	53.85	PK	11	-25.9	38.95	43.52	-4.57	0-360	200	H
6	298.3	30.61	PK	13.3	-25.2	18.71	46.02	-27.31	0-360	200	V
4	552	36.9	PK	18.1	-25.8	29.2	46.02	-16.82	0-360	200	H
7	602.3	30.92	PK	18.4	-25.6	23.72	46.02	-22.3	0-360	100	V

PK - Peak detector

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

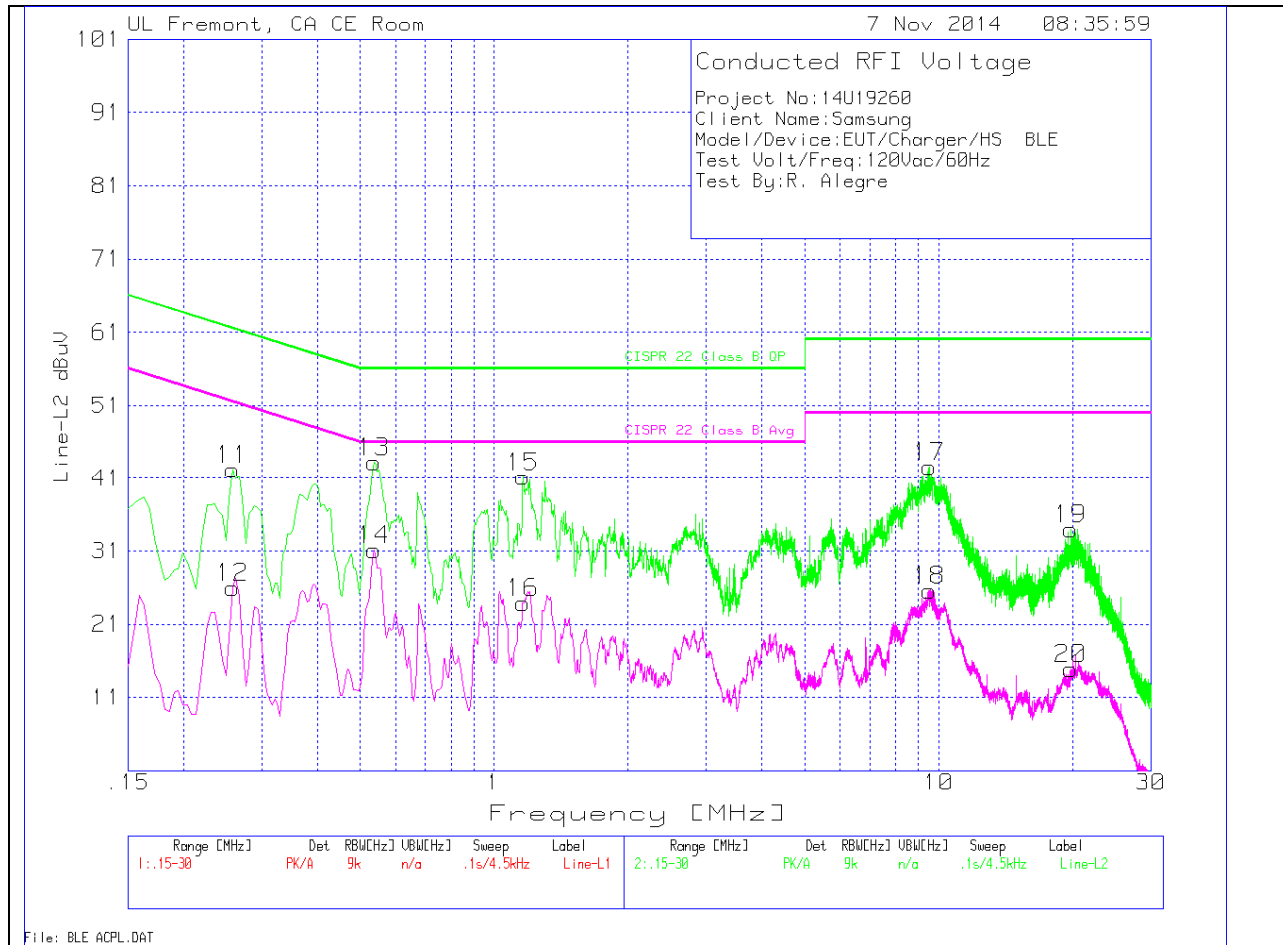
LINE 1 PLOT

LINE 1 RESULTS

Trace Markers

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)
.1545	44.43	PK	1.3	0	45.73	65.8	-20.07	-	-
.1545	29.62	Av	1.3	0	30.92	-	-	55.8	-24.88
.5595	44.01	PK	.3	0	44.31	56	-11.69	-	-
.5595	31.04	Av	.3	0	31.34	-	-	46	-14.66
1.0635	39.23	PK	.2	0	39.43	56	-16.57	-	-
1.0635	24.37	Av	.2	0	24.57	-	-	46	-21.43
9.4695	44.46	PK	.2	.1	44.76	60	-15.24	-	-
9.4695	28.35	Av	.2	.1	28.65	-	-	50	-21.35
19.527	36.91	PK	.3	.2	37.41	60	-22.59	-	-
19.527	21.37	Av	.3	.2	21.87	-	-	50	-28.13

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

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)
.258	41.51	PK	.7	0	42.21	61.5	-19.29	-	-
.258	25.25	Av	.7	0	25.95	-	-	51.5	-25.55
.537	42.89	PK	.3	0	43.19	56	-12.81	-	-
.537	30.87	Av	.3	0	31.17	-	-	46	-14.83
1.1625	40.83	PK	.3	0	41.13	56	-14.87	-	-
1.1625	23.55	Av	.3	0	23.85	-	-	46	-22.15
9.528	42.14	PK	.2	.2	42.54	60	-17.46	-	-
9.528	25.19	Av	.2	.2	25.59	-	-	50	-24.41
19.851	33.41	PK	.3	.2	33.91	60	-26.09	-	-
19.851	14.43	Av	.3	.2	14.93	-	-	50	-35.07