FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

BAR PHONE WITH 802.11b/g/n WLAN, BLUETOOTH AND BLE

MODEL NUMBER: GT-S6810L, GT-S6810B

FCC ID: A3LGTS6810L, A3LGTS6810B

REPORT NUMBER: 13I14813-2

ISSUE DATE: FEBRUARY 4, 2013

Prepared for

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

Prepared by

UL CCS
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	02/04/13	Initial Issue	Tim Lee

TABLE OF CONTENTS

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:	BAR PHONE WITH WLAN 802.11b/g/n, BT, AND BLE
MODEL:	GT-S6810L, GT-S6810B
SERIAL NUMBER:	4790132033afbf00 (RADIATED) and 479013203f5ebf00 (ANTENNA PORT)
DATE TESTED:	JANUARY 24, 2013 to FEBRUARY 4, 2013

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass

UL CCS 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 CCS 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS 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 CCS By:

TIM LEE
WiSE PROGRAM MANAGER
UL CCS

Tested By:

DENNIS HUANG
EMC ENGINEER
UL CCS

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 CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.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:

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 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 bar-style cell phone featuring 802.11b/g/n WLAN, Bluetooth, BLE, GPS and 2.4 GHz mobile hotspot capability.

Testing of Model GT-S6810L (FCC ID: A3LGTS6810L) is considered representative of Model GT-S6810B (FCC ID: A3LGTS6810B). Model GT-S6810L is identical to Model GT-S6810B except for the WWAN functions. Both the WLAN and WWAN antenna locations for both models are identical.

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)
2402-2480	BLE	7.81	6.04

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna with a maximum gain of -1.41 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was S6810L.010.

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

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

5.1. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter	Samsung Electronics	ETA0U10EBE	RT3C421mS/7-E	DoC
Headset	Samsung Electronics	EHS61ASFWE	None	DoC

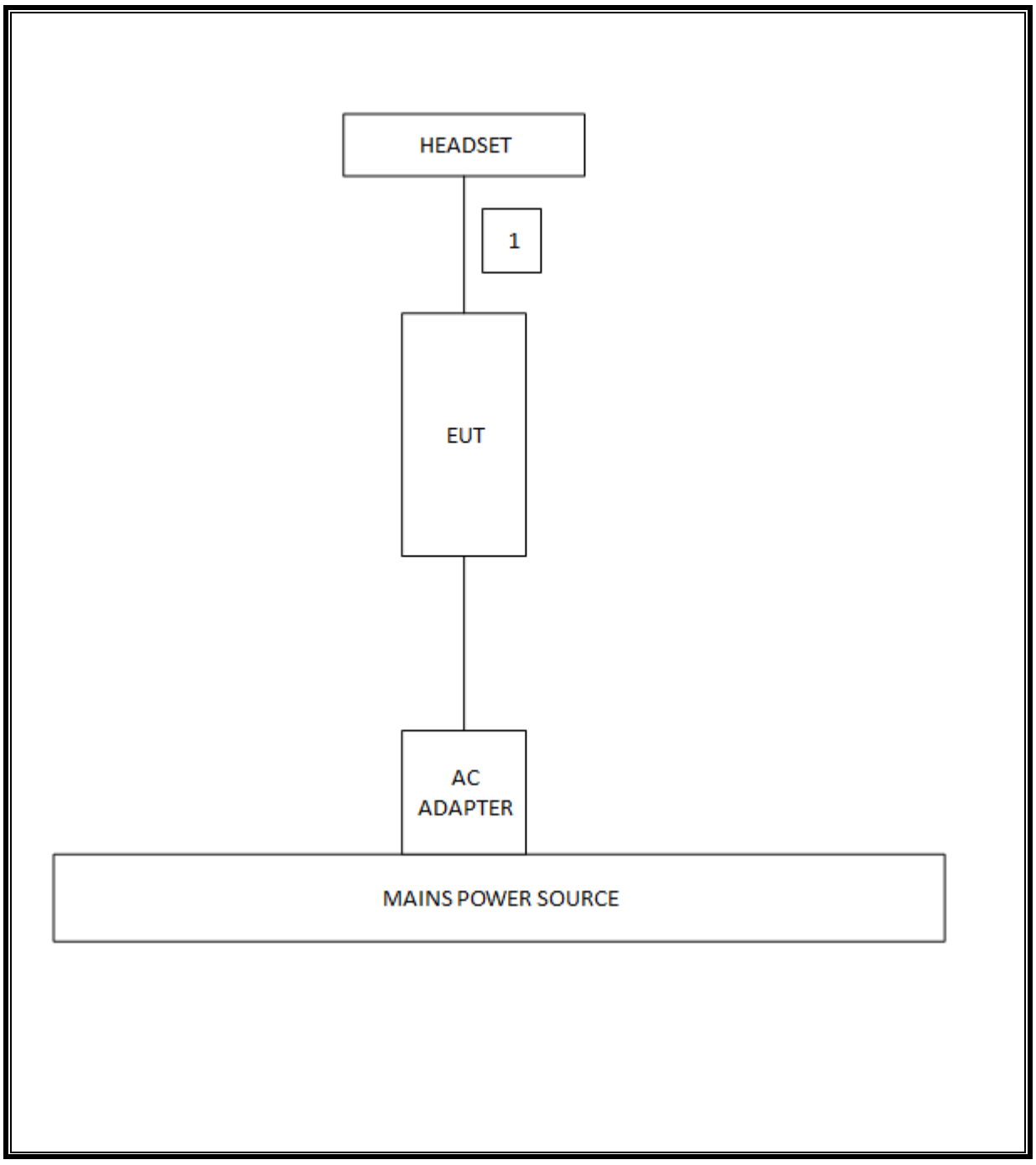
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Headset	1	Audio	Shielded	1m	N/A

TEST SETUP

The EUT is a stand-alone unit that was tested in the worst case orientation and configuration, where applicable, during the tests. Test software exercised the radio.

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, Horn, 18 GHz	EMCO	3115	C00872	09/20/12	09/20/13
Antenna, Horn, 26.5 GHz	ARA	SWH-28	C01015	04/23/12	04/23/13
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	10/21/12	10/21/13
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	10/21/12	10/21/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	02/21/12	02/21/13
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRC13192	N02683	CNR	CNR
Bilog 30-2000MHz	Sunol	JB1		02/07/12	02/07/13
Power meter	HP	437B	T226	06/25/12	06/25/13
Power Sensor	HP	8481A	T233	06/26/12	06/26/13
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	01/14/13	01/14/14
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	03/07/12	03/07/13

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. ANTENNA PORT TEST RESULTS

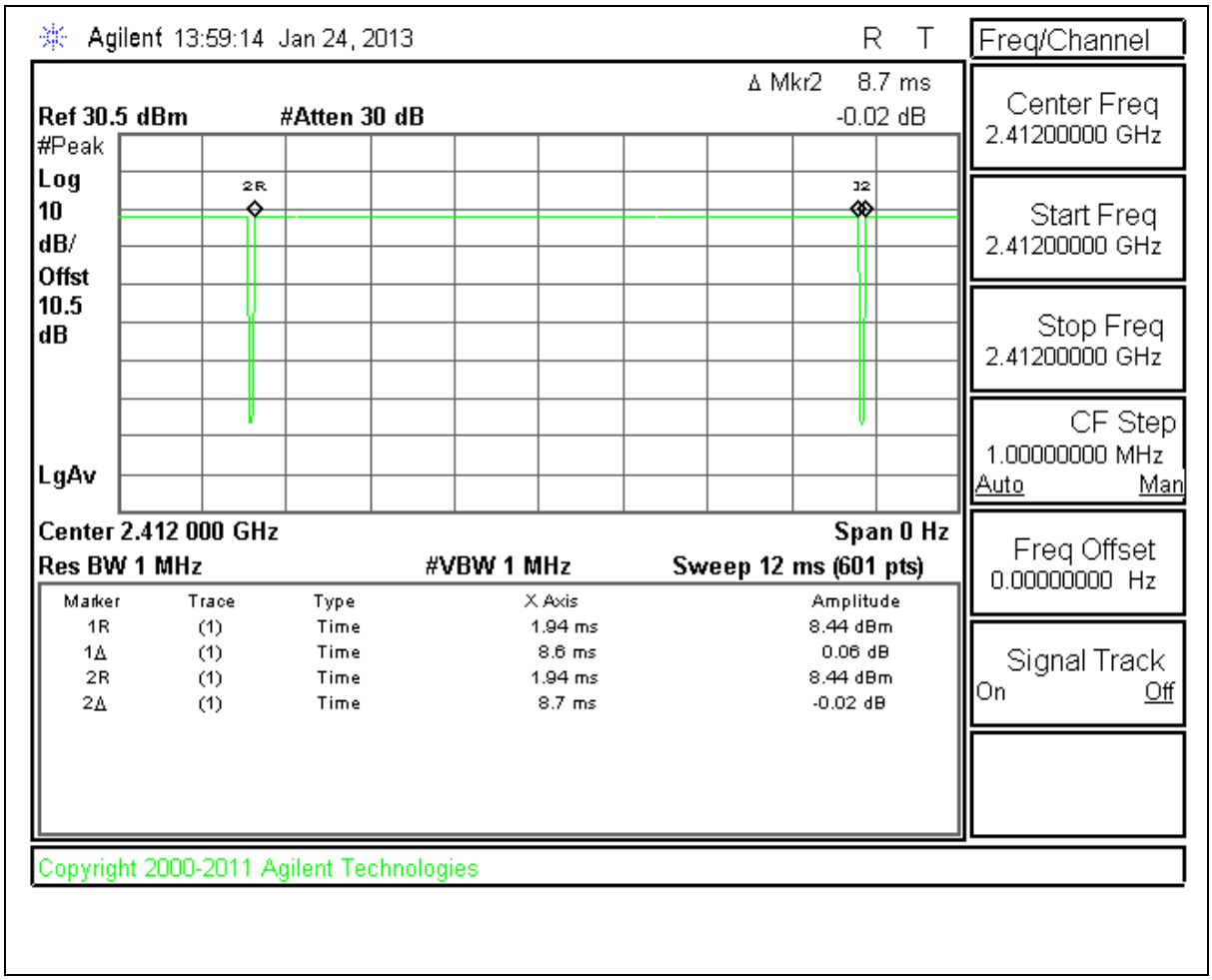
8.1. DUTY CYCLE

LIMITS

None; for reporting purposes only.

RESULTS

Mode	Tx on (usec)	Tx on + Tx off (usec)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
BLE	388.3	625	62.13	2.07



8.2. 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.

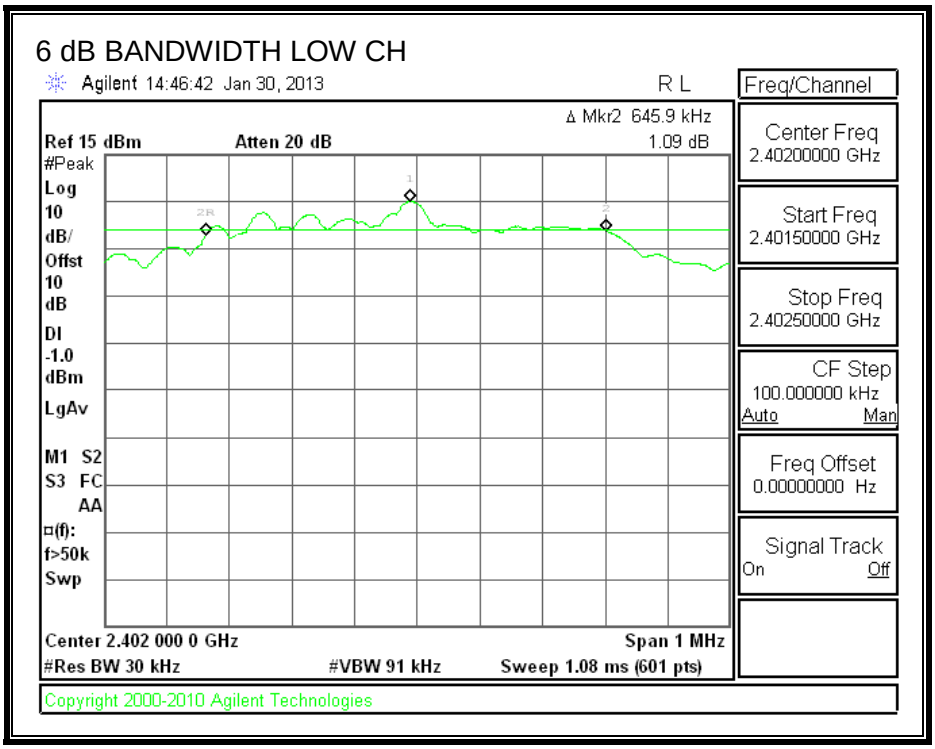
TEST PROCEDURE

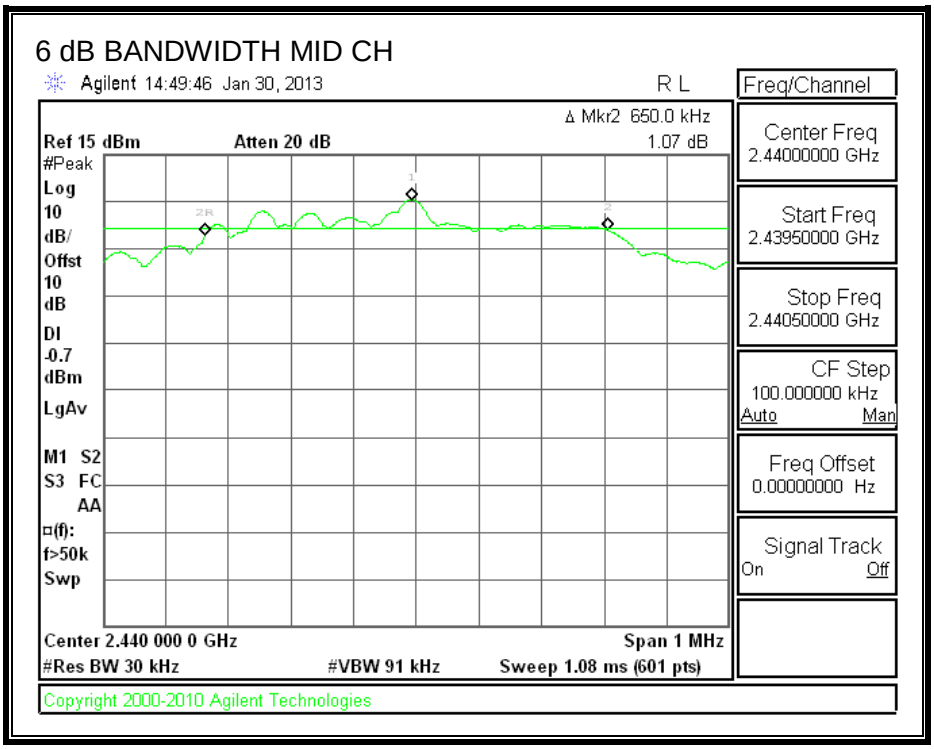
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

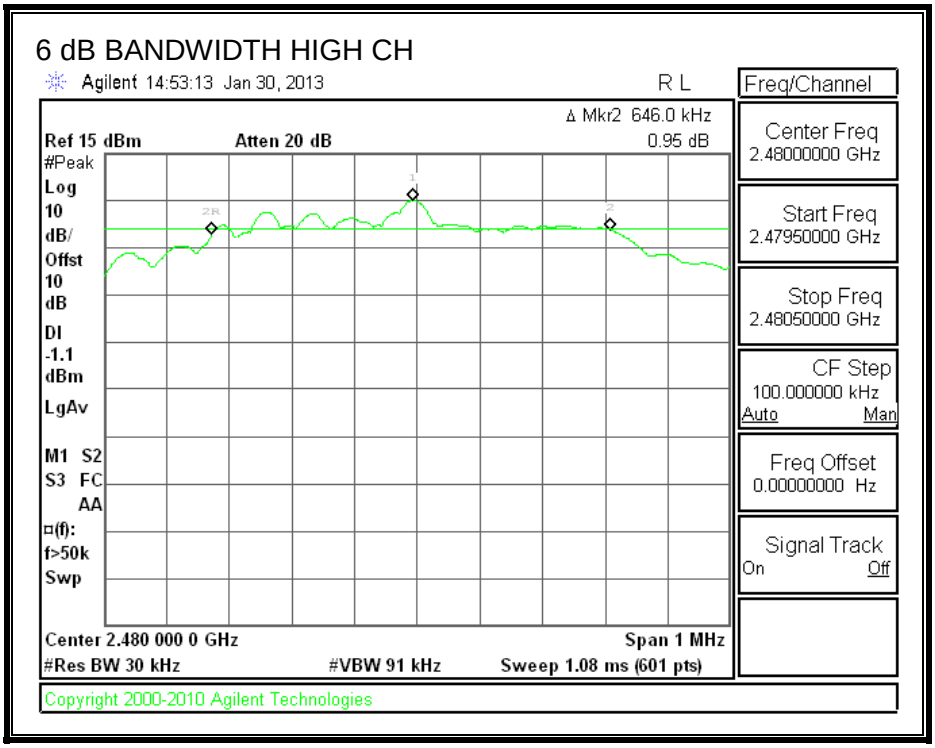
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6459	0.5
Middle	2440	0.6500	0.5
High	2480	0.6460	0.5

6 dB BANDWIDTH







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.

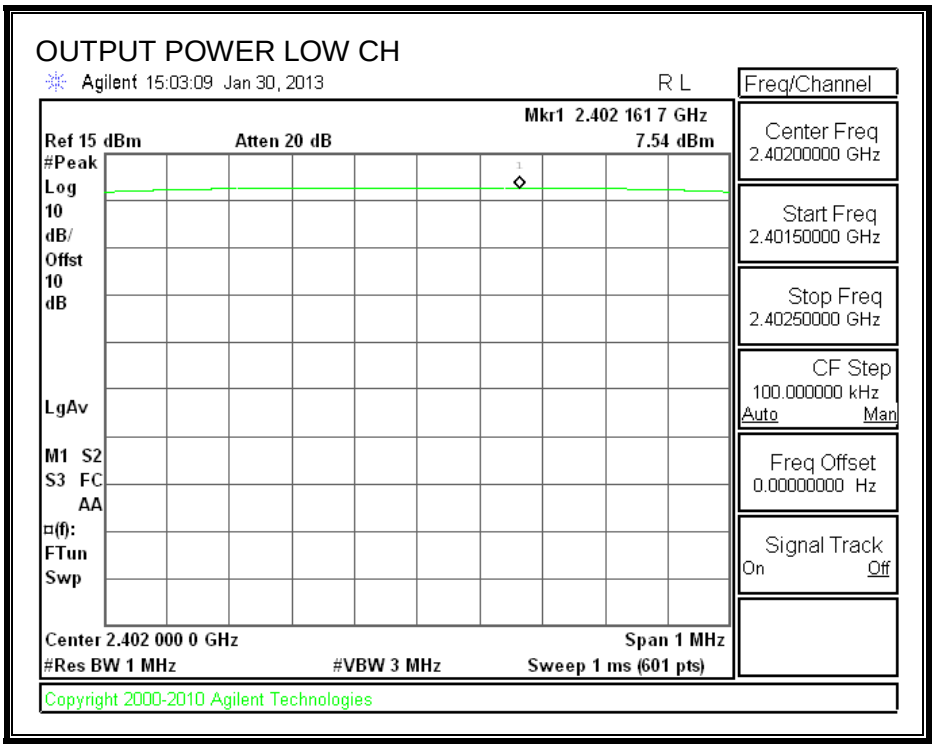
TEST PROCEDURE

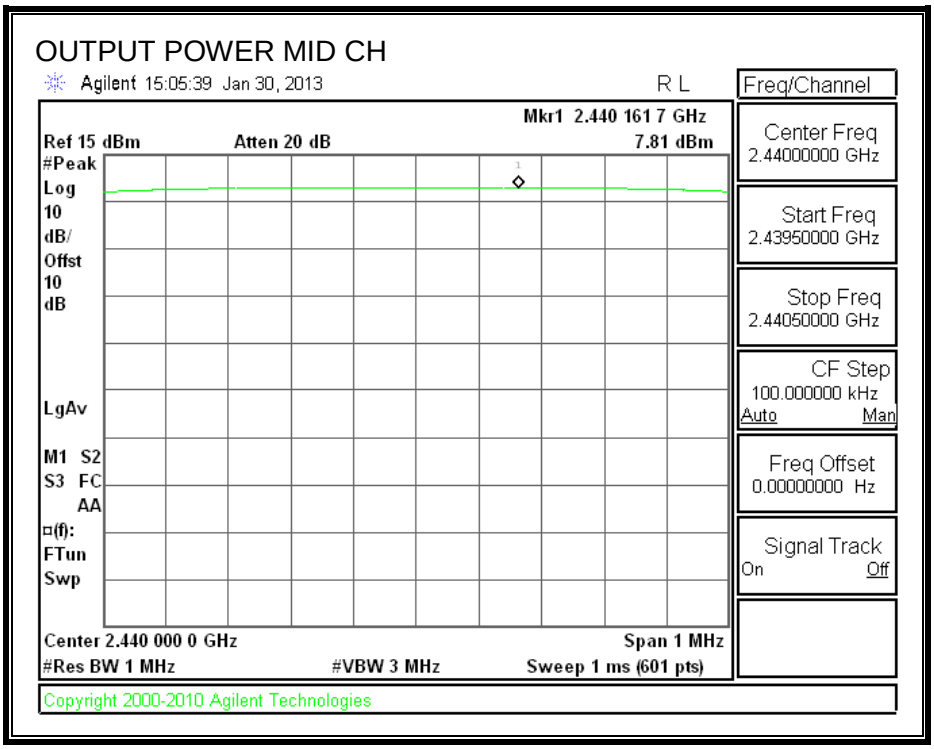
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

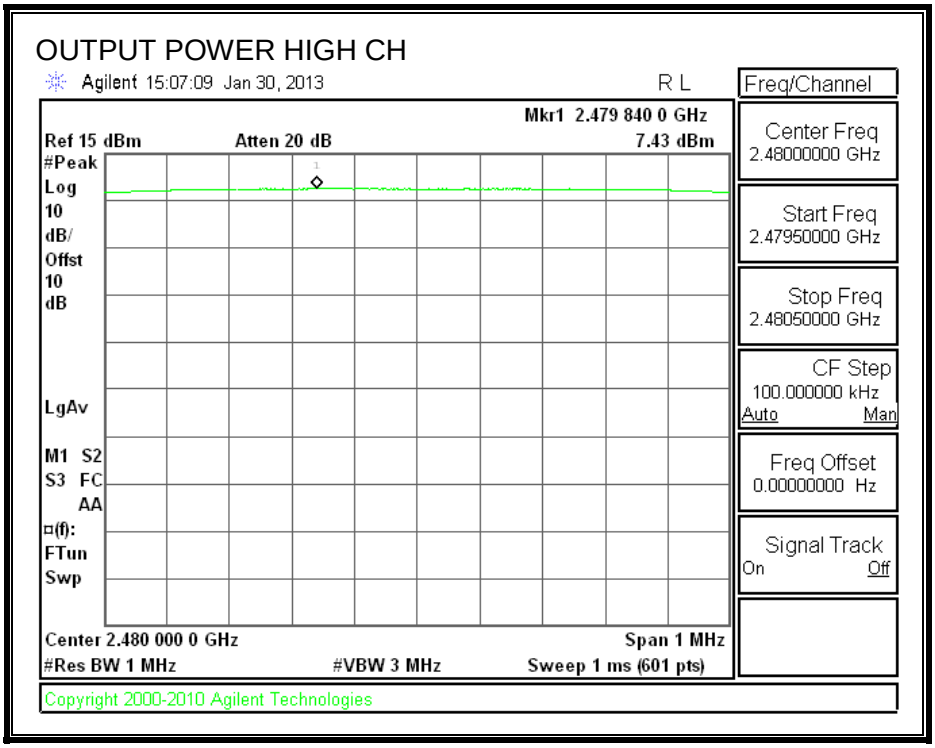
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.540	30	-22.460
Middle	2440	7.810	30	-22.190
High	2480	7.430	30	-22.570

OUTPUT POWER







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 dB pad was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	5.09
Middle	2440	5.37
High	2480	5.00

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

KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

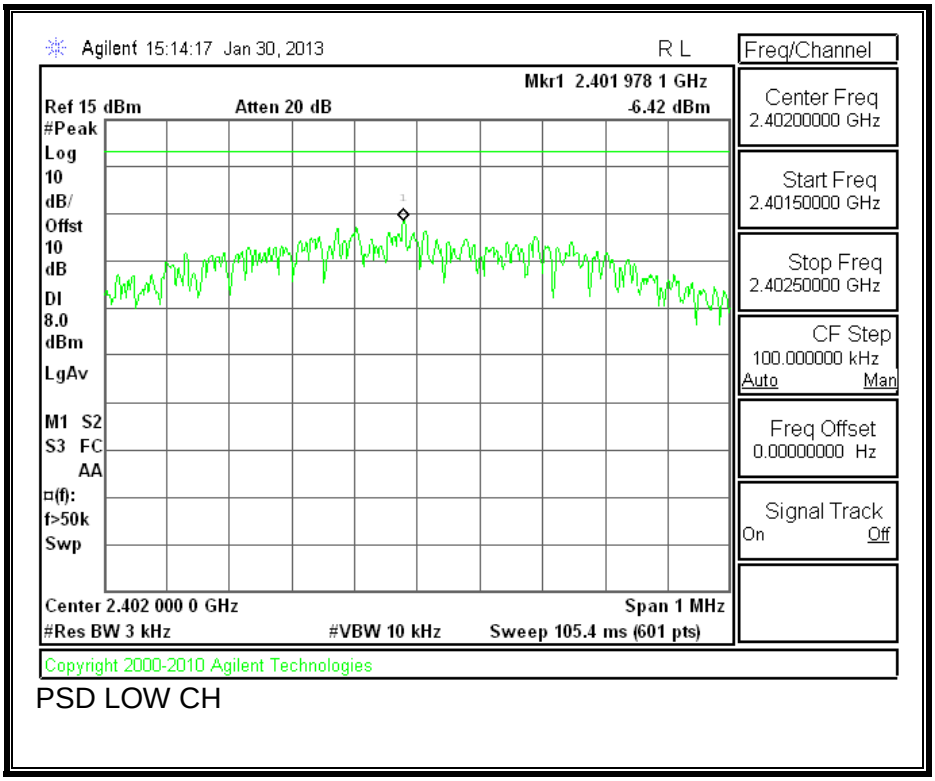
RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-6.42	8	-14.42
Middle	2440	-6.17	8	-14.17
High	2480	-6.52	8	-14.52

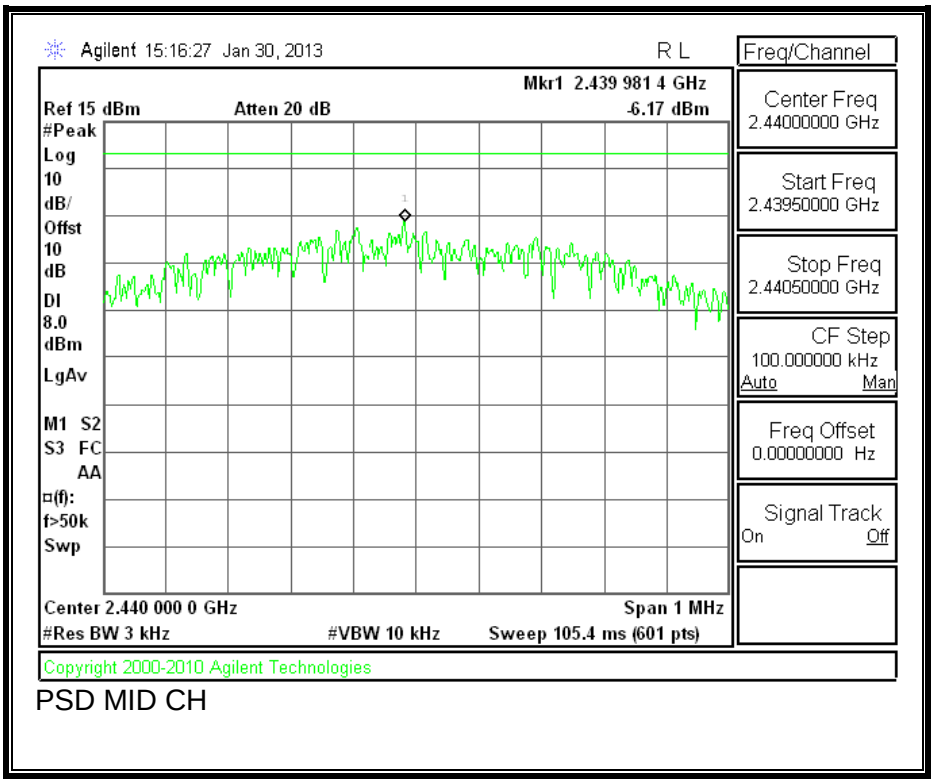
Note:

The spectrum analyzer offset = attenuator loss + cable loss + 10 log (3/100 kHz) = -4.2dB.

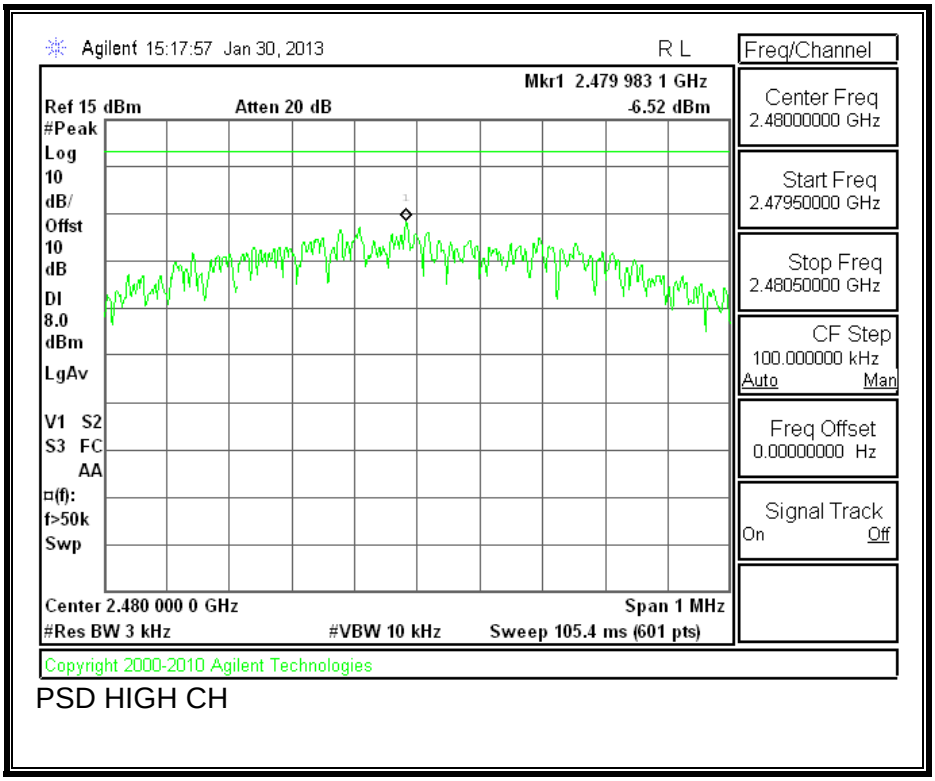
POWER SPECTRAL DENSITY



PSD LOW CH



PSD MID CH



PSD HIGH CH

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.

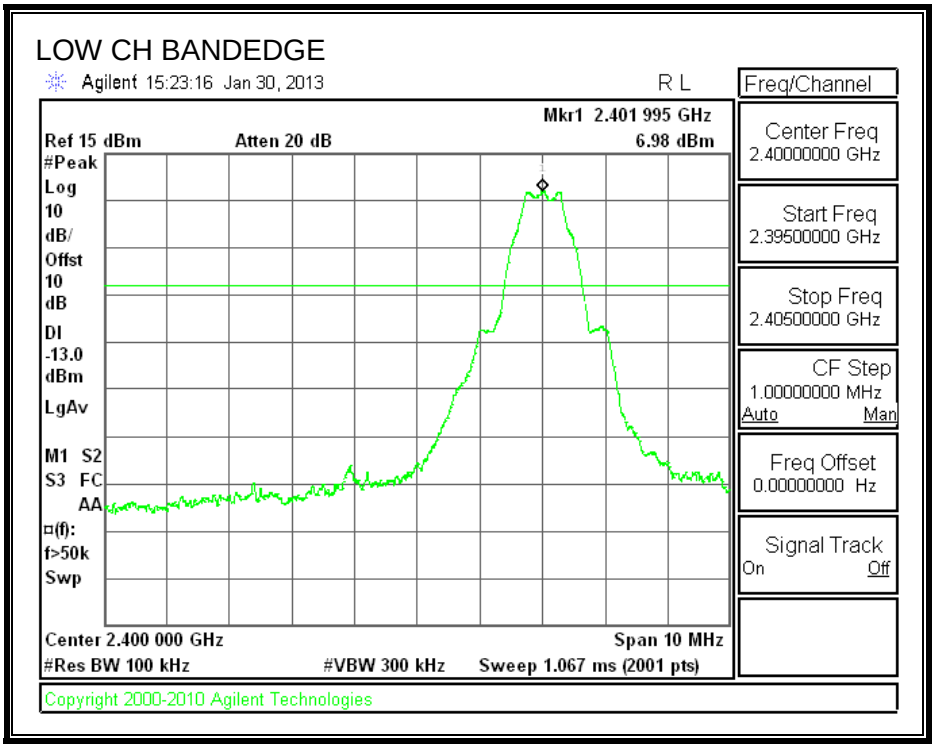
TEST PROCEDURE

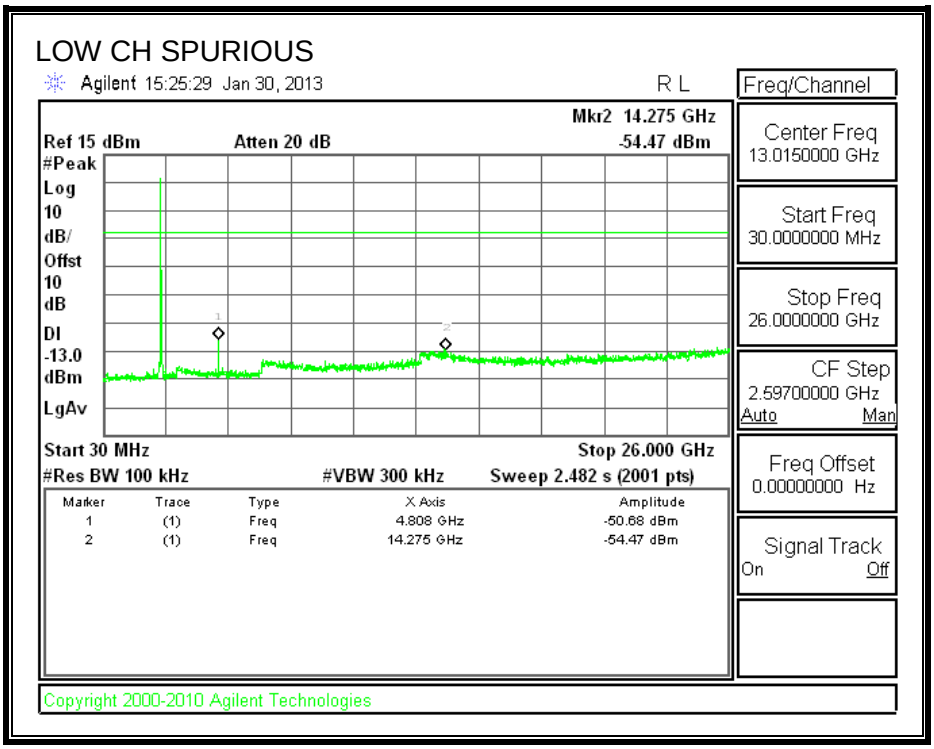
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

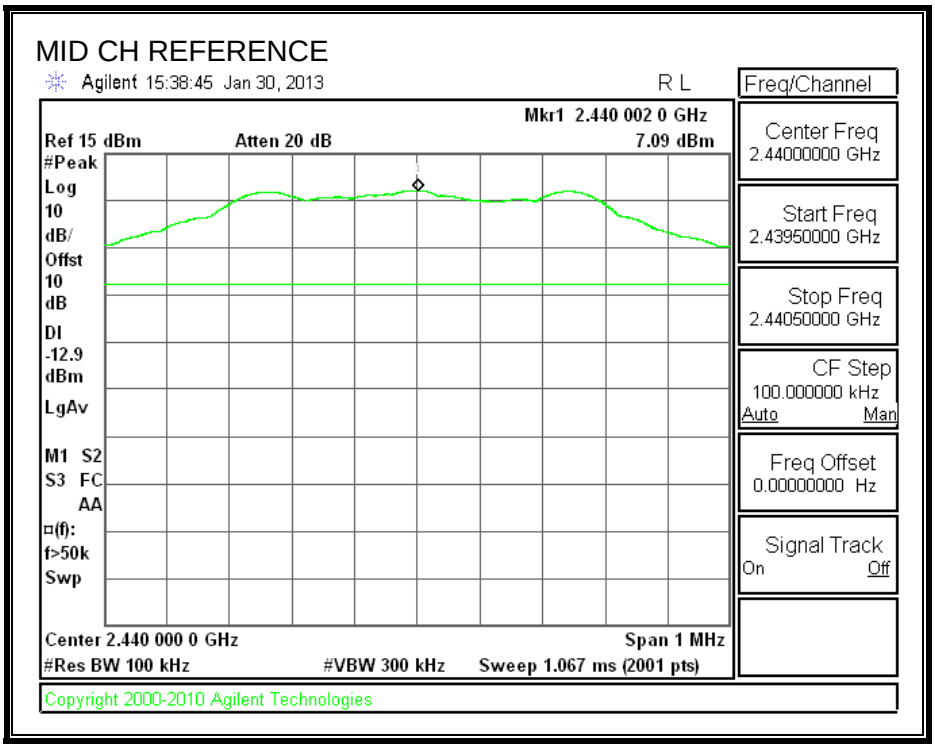
RESULTS

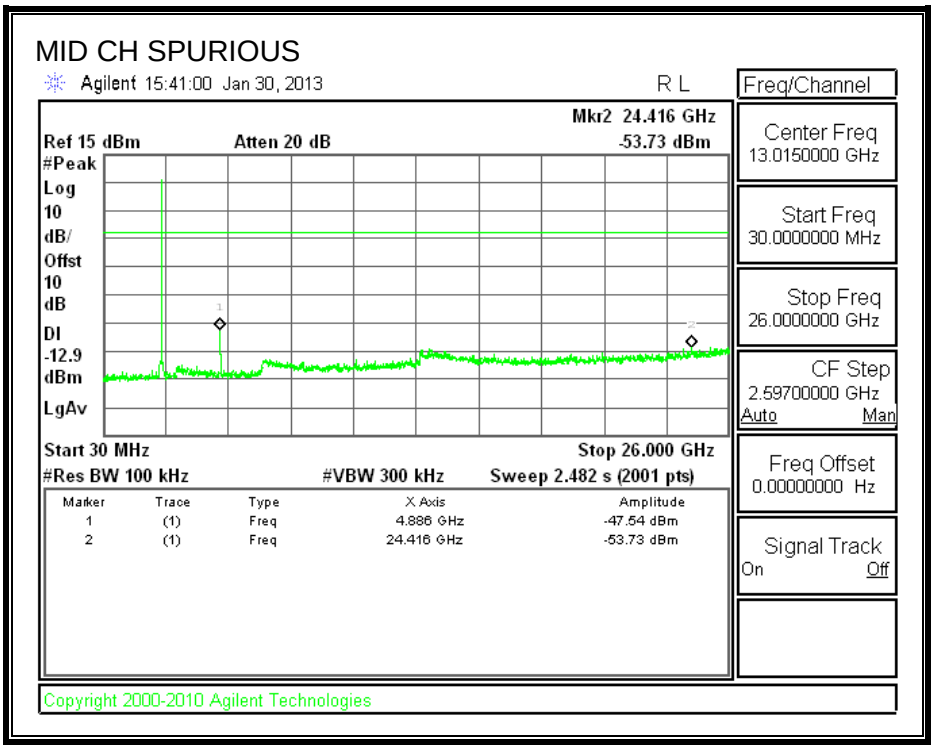
SPURIOUS EMISSIONS, LOW CHANNEL



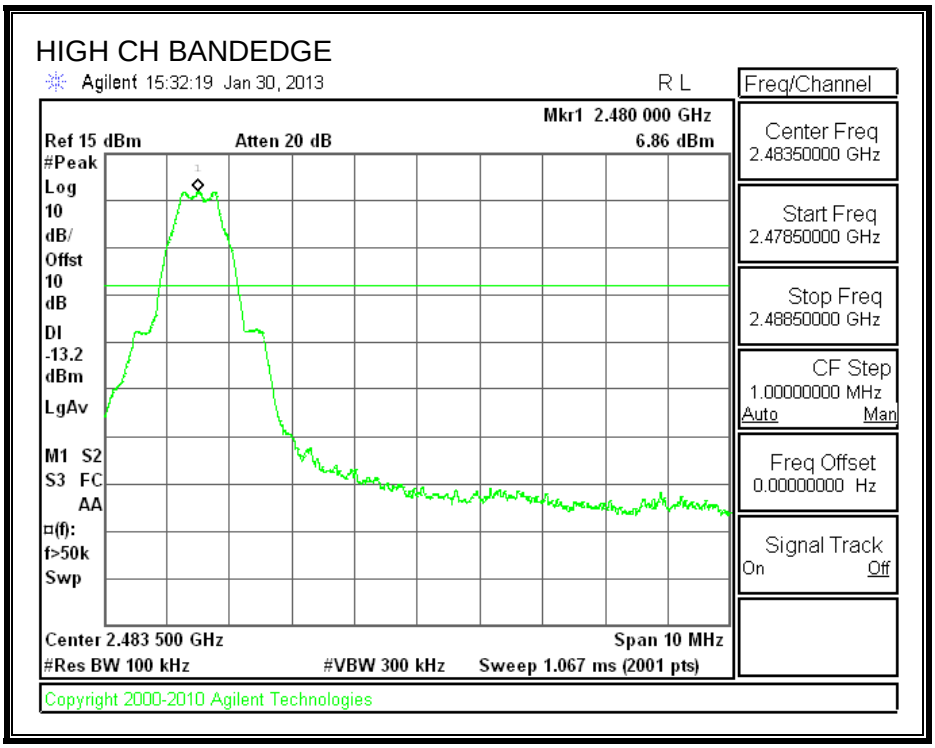


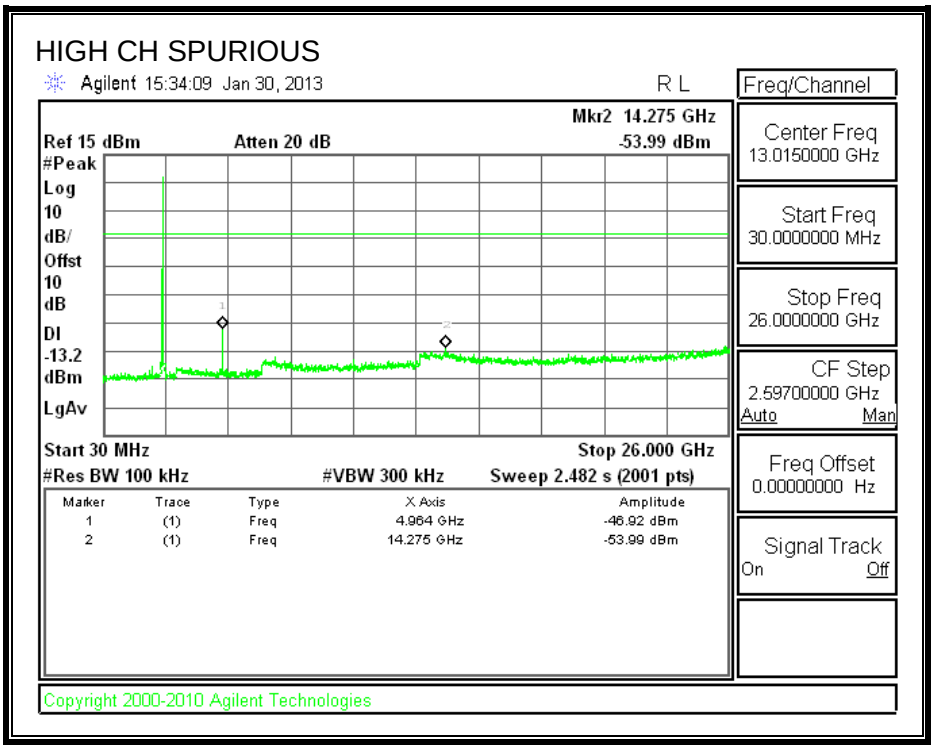
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





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 (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

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

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

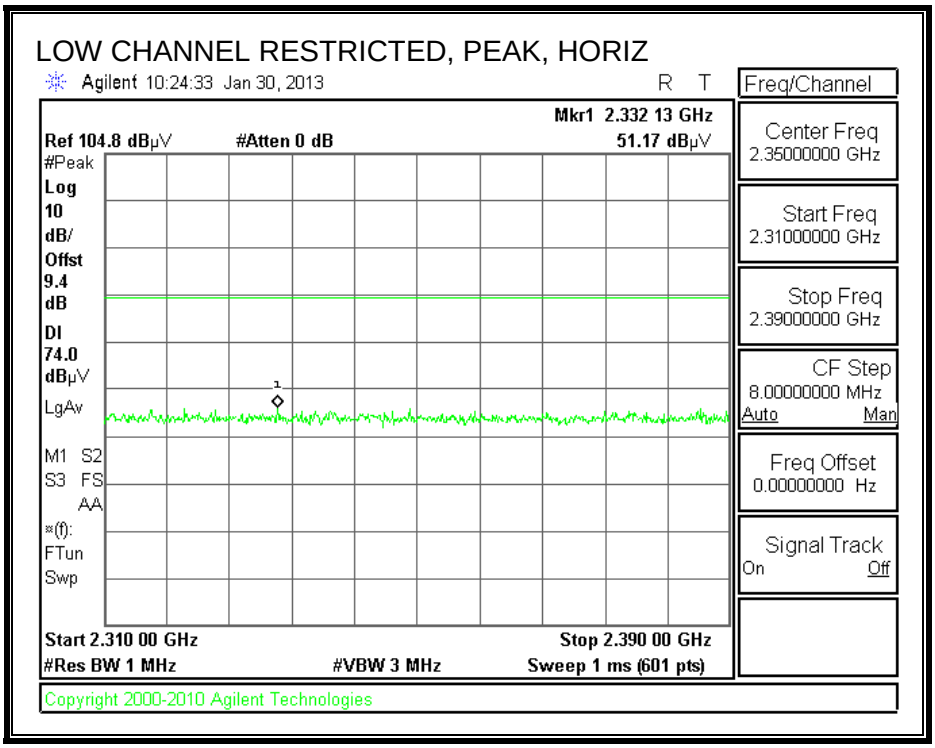
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

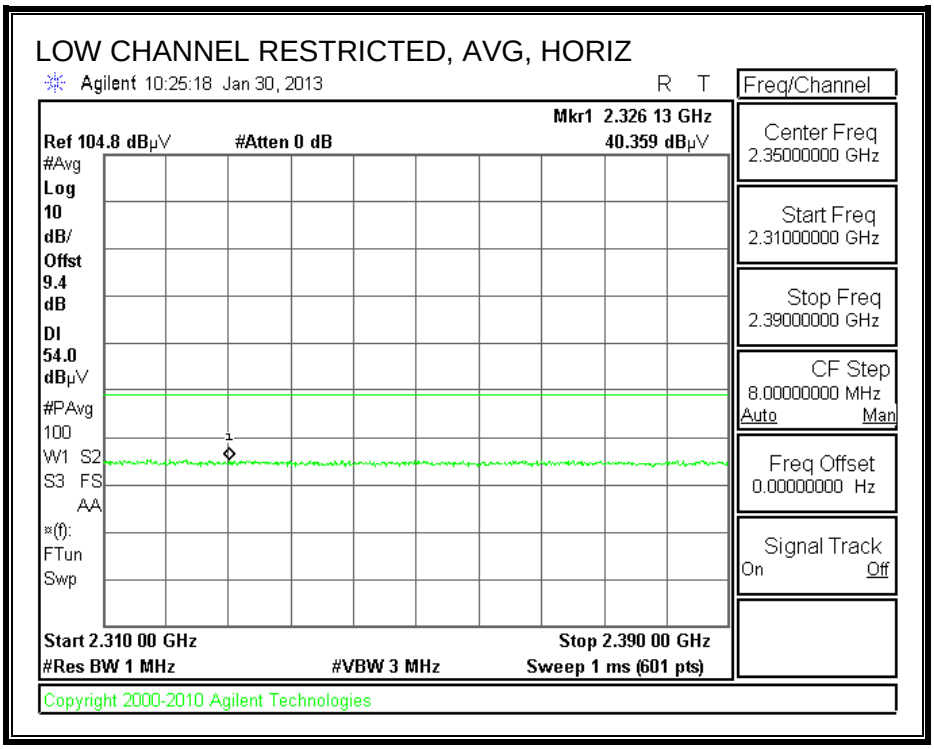
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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

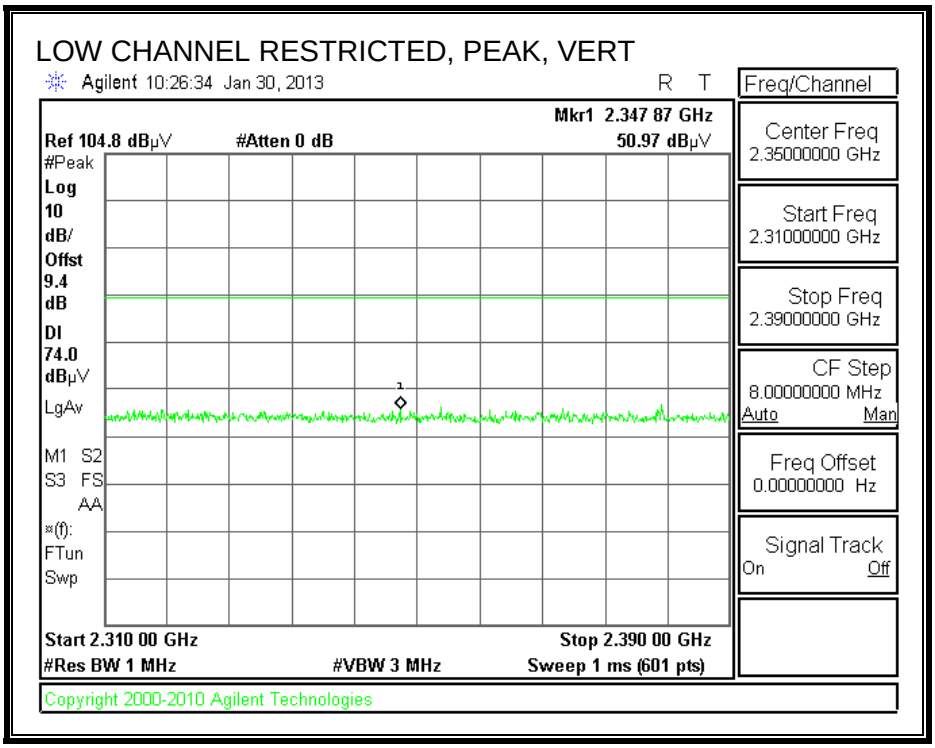
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

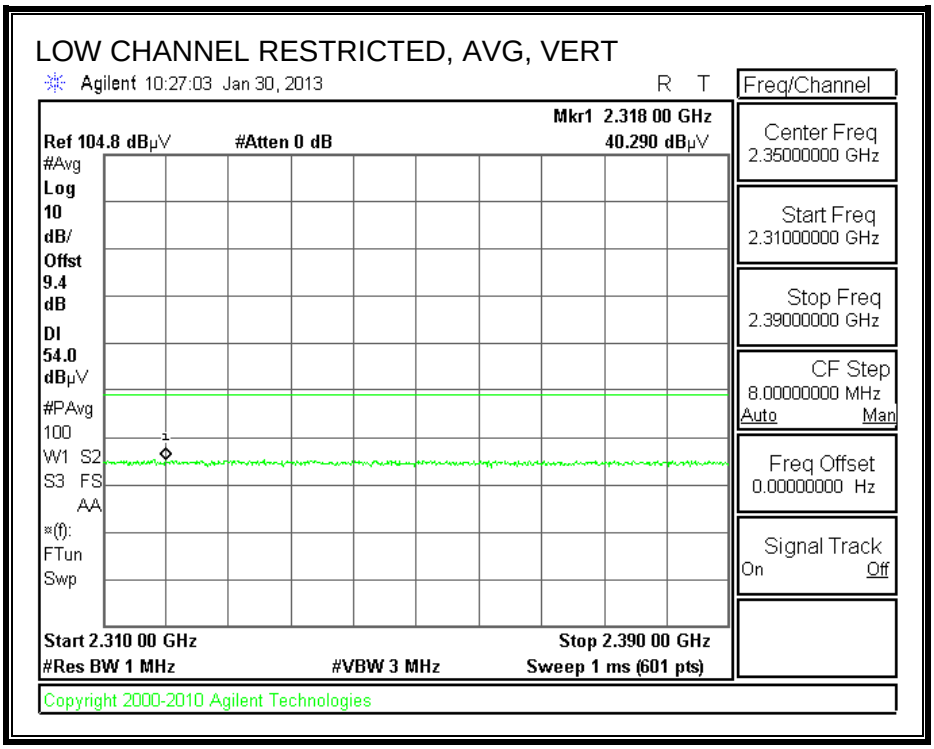




Actual Average = Measured Average + Correction Factor
= 40.359 dBuV + 2.07
= 42.429 dBuV

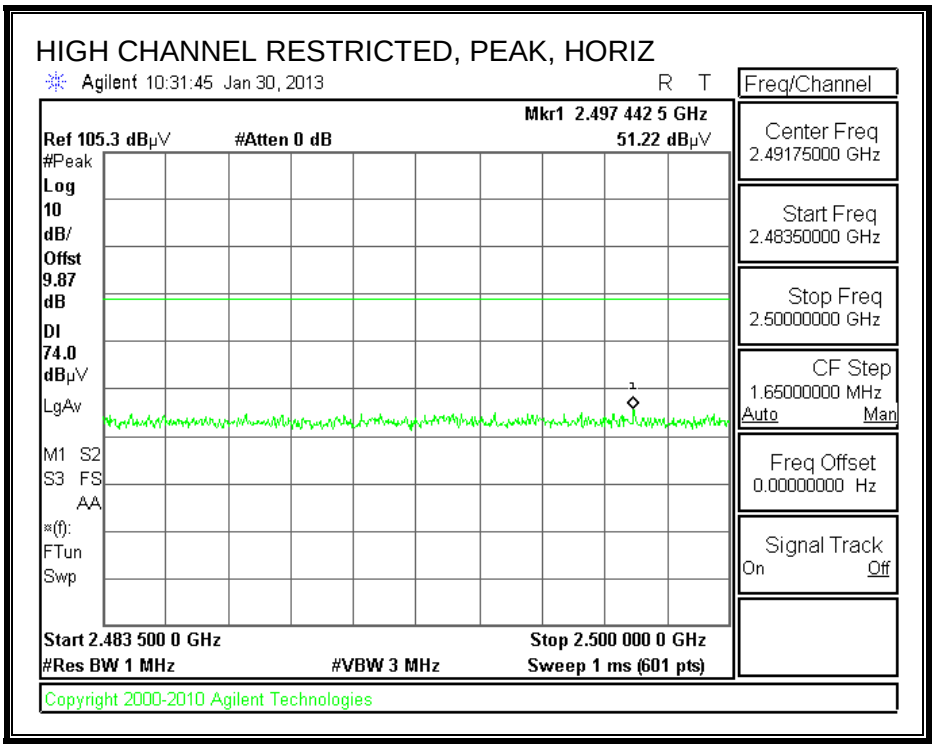
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

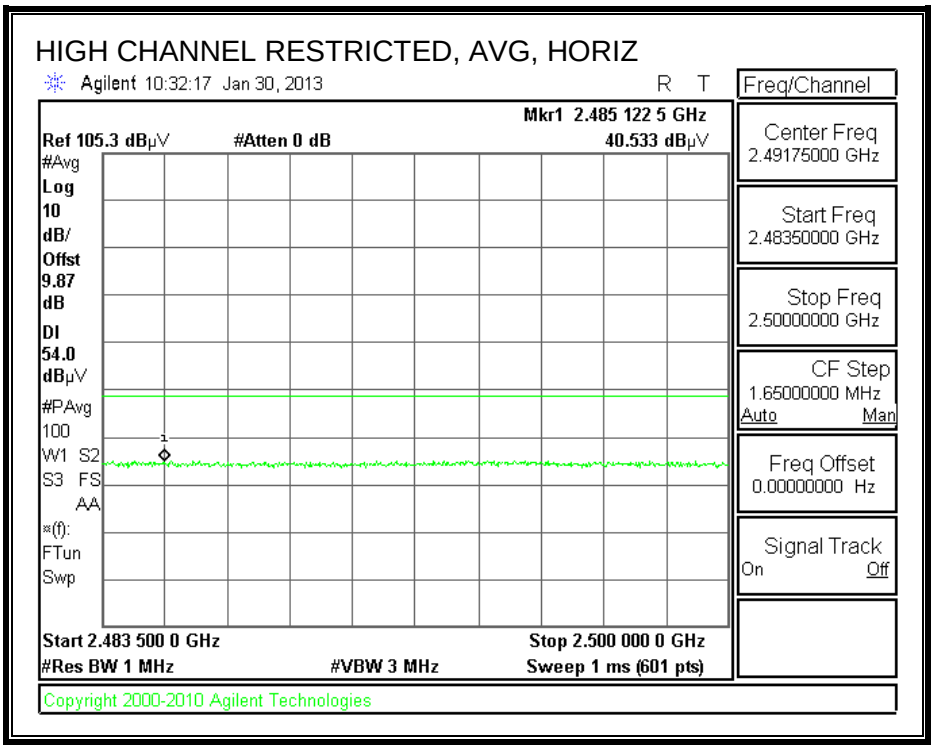




Actual Average = Measured Average + Correction Factor
= 40.290 dBuV + 2.07
= 42.36 dBuV

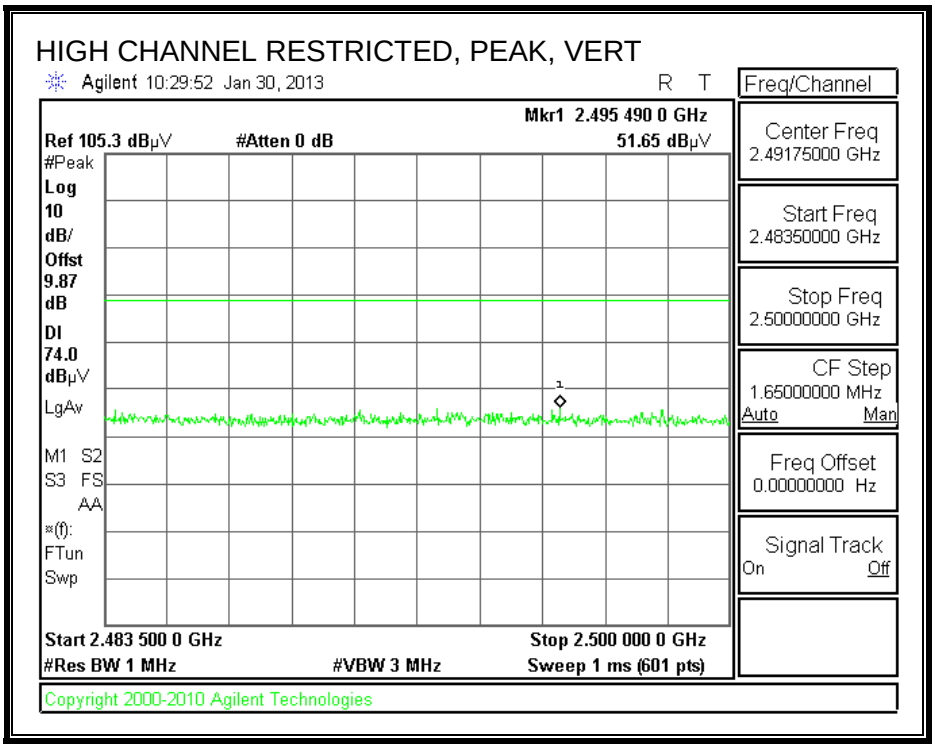
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

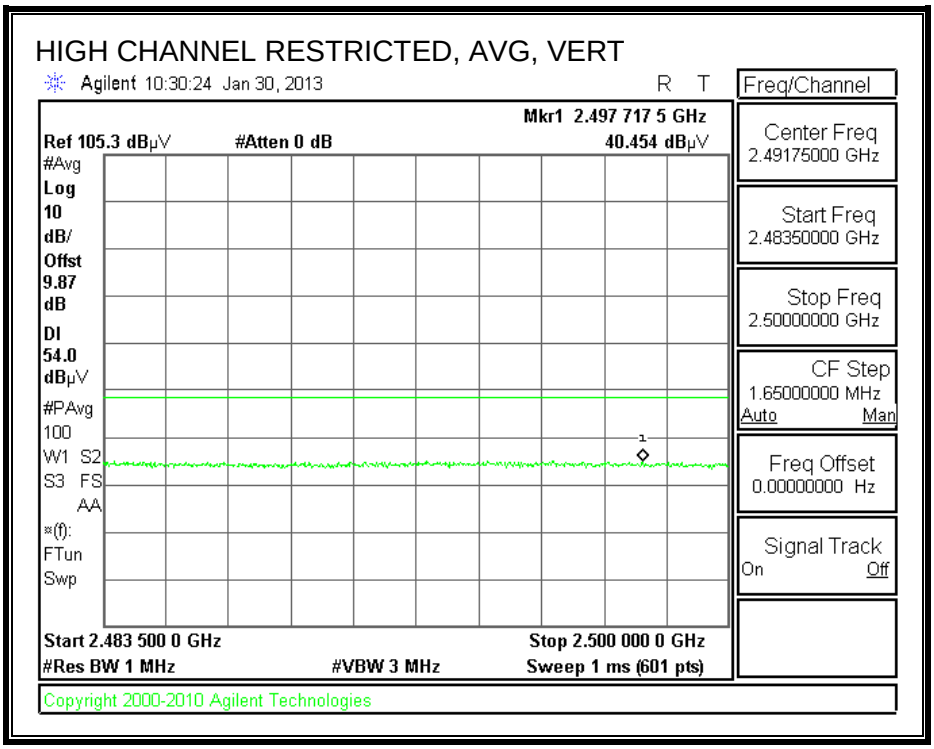




Actual Average = Measured Average + Correction Factor
= 40.533 dBuV + 2.07
= 42.603 dBuV

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





Actual Average = Measured Average + Correction Factor
= 40.454 dBuV + 2.07
= 42.524 dBuV

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Dennis Huang
Date: 01/30/13
Project #: 13I14813
Company: SamSung
Test Target: 15.247 BLE
Mode Oper: Tx Mode

f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter	

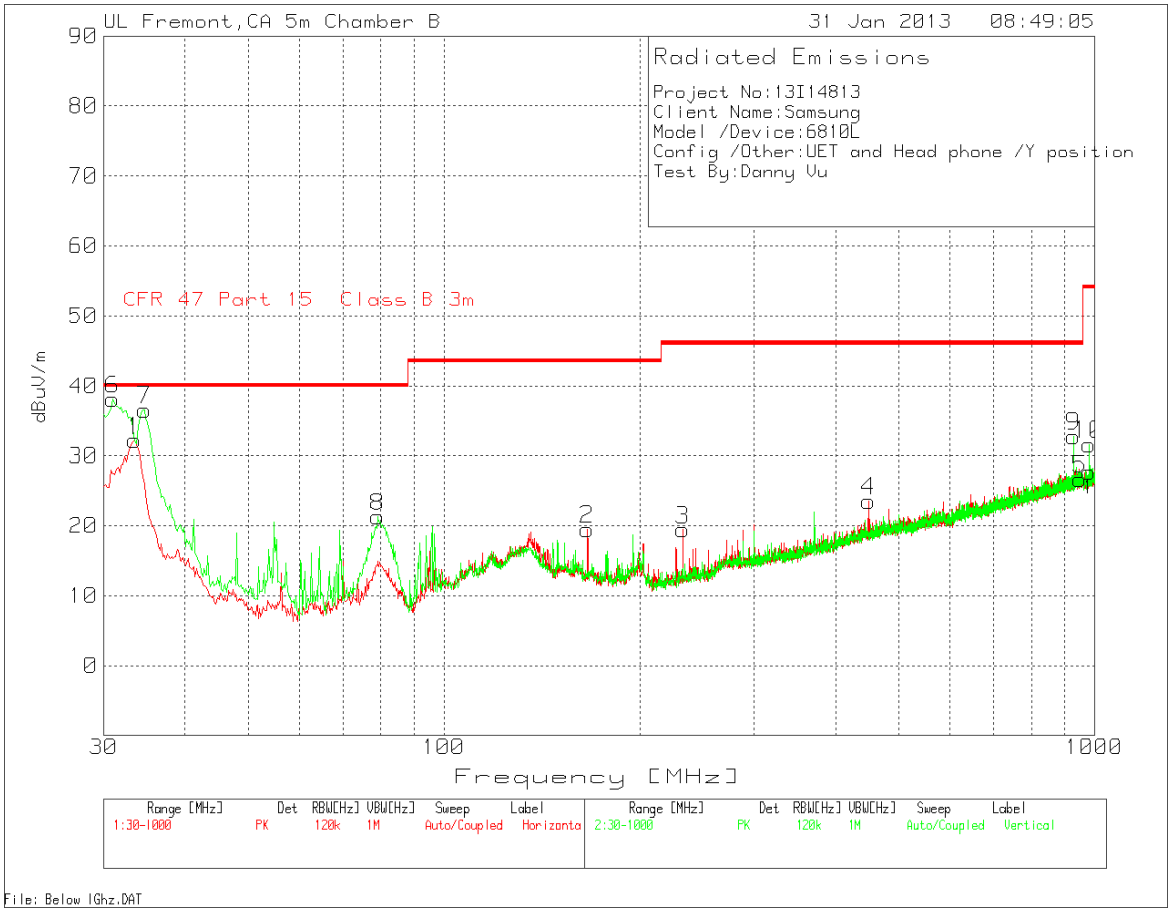
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	DC Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low Channel - 2402MHz															
4.804	3.0	43.3	33.1	6.8	-34.1	0.0	0.0	49.1	74.0	-24.9	H	P	100.0	191.0	
4.804	3.0	35.9	33.1	6.8	-34.1	2.1	0.0	43.8	54.0	-10.2	H	A	100.0	191.0	
4.804	3.0	40.1	33.1	6.8	-34.1	0.0	0.0	45.8	74.0	-28.2	V	P	175.0	221.0	
4.804	3.0	31.2	33.1	6.8	-34.1	2.1	0.0	39.0	54.0	-15.0	V	A	175.0	221.0	
Mid Channel - 2440MHz															
4.880	3.0	44.5	33.1	6.8	-34.0	0.0	0.0	50.4	74.0	-23.6	H	P	98.0	195.0	
4.880	3.0	37.9	33.1	6.8	-34.0	2.1	0.0	45.9	54.0	-8.1	H	A	98.0	195.0	
4.880	3.0	39.1	33.1	6.8	-34.0	0.0	0.0	45.0	74.0	-29.0	V	P	100.0	148.0	
4.880	3.0	30.1	33.1	6.8	-34.0	2.1	0.0	38.0	54.0	-16.0	V	A	100.0	148.0	
High Channel - 2480MHz															
4.960	3.0	44.8	33.2	6.9	-34.0	0.0	0.0	50.9	74.0	-23.1	H	P	98.0	179.0	
4.960	3.0	38.4	33.2	6.9	-34.0	2.1	0.0	46.6	54.0	-7.4	H	A	98.0	179.0	
4.960	3.0	40.0	33.2	6.9	-34.0	0.0	0.0	46.1	74.0	-27.9	V	P	104.0	181.0	
4.960	3.0	31.4	33.2	6.9	-34.0	2.1	0.0	39.5	54.0	-14.5	V	A	104.0	181.0	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

9.3. WORST-CASE BELOW 1 GHz

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

EMI PLOT



DATA

Project No:13I14813	
Client Name:Samsung	
Model /Device:GTS6810L/Cell Phone	
Config /Other:UET and Head phone /Worst Position	
Test By:Danny Vu	

Horizontal 30 - 1000MHz

Marker No.	Test Frequency	Meter Reading	Detector	T122 Sunol Bilog.TXT (dB)	5mB Amp Path 30-1000MHz (dB)	dBuV/m	CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
1	33.4892	42.6	PK	18.8	-29.2	32.2	40	-7.8	200	Horz
2	166.273	35.25	PK	12.2	-27.9	19.55	43.5	-23.95	100	Horz
3	232.9556	35.44	PK	11.3	-27.3	19.44	46	-26.56	100	Horz
4	449.2866	33.78	PK	16.8	-27	23.58	46	-22.42	200	Horz
5	950.9572	28.41	PK	22.8	-24.5	26.71	46	-19.29	300	Horz

Vertical 30 - 1000MHz

Marker No.	Test Frequency	Meter Reading	Detector	T122 Sunol Bilog.TXT (dB)	5mB Amp Path 30-1000MHz (dB)	dBuV/m	CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
6	30.9692	46.67	PK	20.7	-29.3	38.07	40	-1.93	100	Vert
7	34.6523	47.91	PK	17.9	-29.2	36.61	40	-3.39	100	Vert
8	79.0428	42.17	PK	7.9	-28.8	21.27	40	-18.73	100	Vert
9	929.4404	34.91	PK	22.5	-24.6	32.81	46	-13.19	100	Vert
10	981.5847	33.01	PK	22.8	-24.2	31.61	54	-22.39	100	Vert

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

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

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

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

RESULTS

6 WORST EMISSIONS

Project No:13I14813	
Client Name:Samsung	
Model/Device:GT-S6810	
Test Volt/Freq:120V/60Hz	
Test By:Danny Vu	

Line-L1 .15 - 30MHz

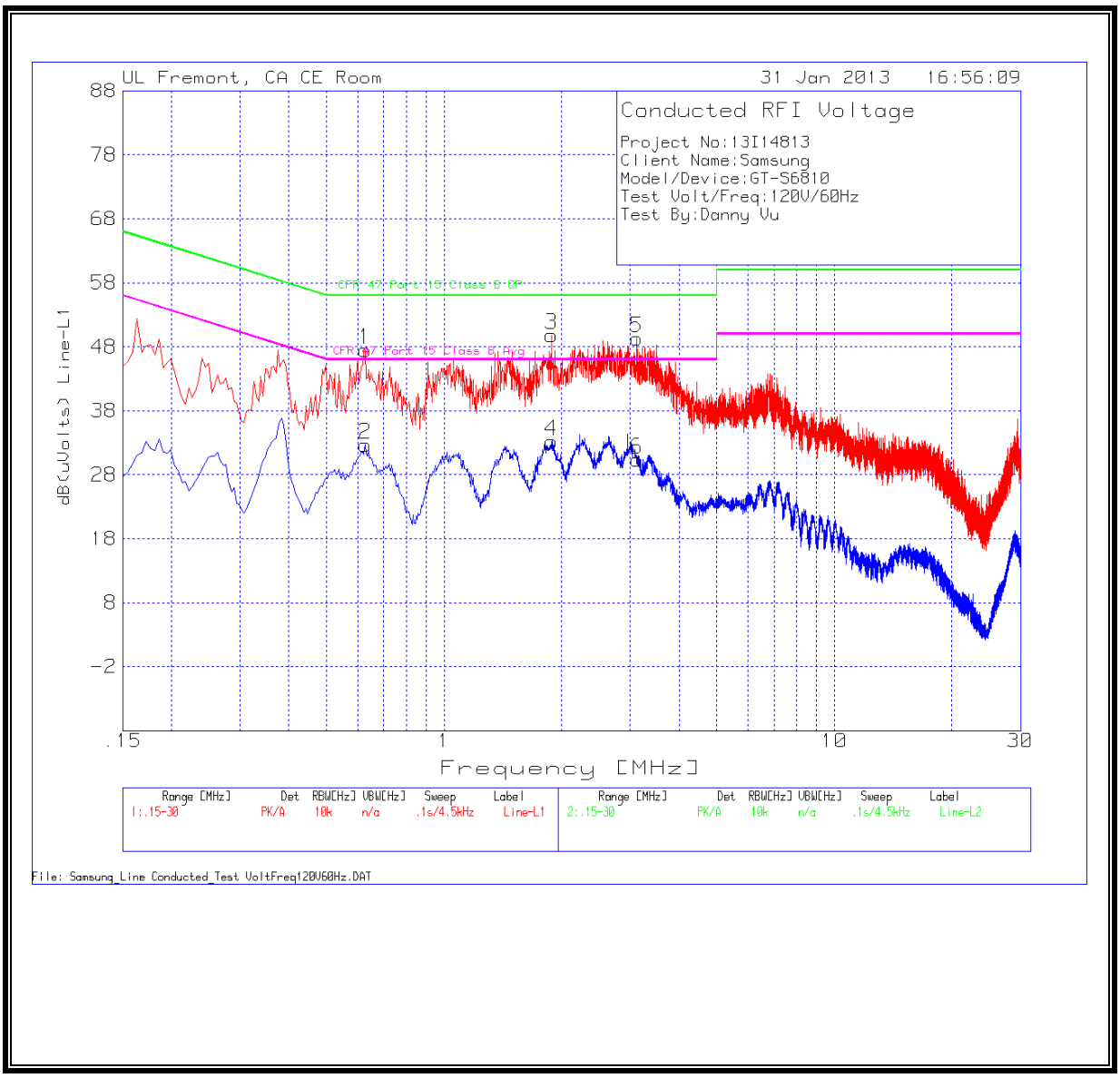
Test Frequency	Meter Reading	Detector	T24 IL L1.TXT (dB)	LC Cables 1&3.TXT (dB)	dB(uVolts)	CFR 47 Part 15 Class B QP	Margin	CFR 47 Part 15 Class B Avg	Margin
0.627	47.38	PK	0.1	0	47.48	56	-8.52	-	-
0.627	32.61	Av	0.1	0	32.71	-	-	46	-13.29
1.8825	49.62	PK	0.1	0.1	49.82	56	-6.18	-	-
1.8825	33.01	Av	0.1	0.1	33.21	-	-	46	-12.79
3.12	49.07	PK	0.1	0.1	49.27	56	-6.73	-	-
3.12	30.18	Av	0.1	0.1	30.38	-	-	46	-15.62

Line-L2 .15 - 30MHz

Test Frequency	Meter Reading	Detector	T24 IL L2.TXT (dB)	LC Cables 2&3.TXT (dB)	dB(uVolts)	CFR 47 Part 15 Class B QP	Margin	CFR 47 Part 15 Class B Avg	Margin
1.3965	46.52	PK	0.1	0.1	46.72	56	-9.28	-	-
1.3965	24.19	Av	0.1	0.1	24.39	-	-	46	-21.61
1.9995	46.92	PK	0.1	0.1	47.12	56	-8.88	-	-
1.9995	23.81	Av	0.1	0.1	24.01	-	-	46	-21.99
2.832	47.51	PK	0.1	0.1	47.71	56	-8.29	-	-
2.832	25.6	Av	0.1	0.1	25.8	-	-	46	-20.2

PK - Peak detector	
QP - Quasi-Peak detector	
Av - Average detector	

LINE 1 RESULTS



LINE 2 RESULTS