FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER: GT-S7710L

FCC ID: A3LGTS7710L

REPORT NUMBER: 12I14777-3

ISSUE DATE: JANUARY 26, 2013

Prepared for

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

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
	01/26/13	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 and Bluetooth
MODEL:	GT-S7710L
SERIAL NUMBER:	FJ-334-F and FJ-334-H (RADIATED and ANTENNA PORT CONDUCTED)
DATE TESTED:	JANUARY 25 to 26, 2013

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

Compliance Certification Services (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

Tested By:

THANH NGUYEN
WiSE ENGINEER

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

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

UL 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, GPS and 2.4 GHz mobile hotspot capability.

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	Low Energy (BLE)	7.24	5.30

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an F PCB antenna with a maximum gain of -3.54 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was REV1.0 and the software was S7710L.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 X-orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X-orientation.

5.1. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung Electronics	ETA0U80EBE	SC1C401V8	DoC
Headset	Samsung Electronics	EHS61ASFWE	FJ334B	DoC
USB Cable	Samsung Electronics	ECC1DU4BBE	None	N/A

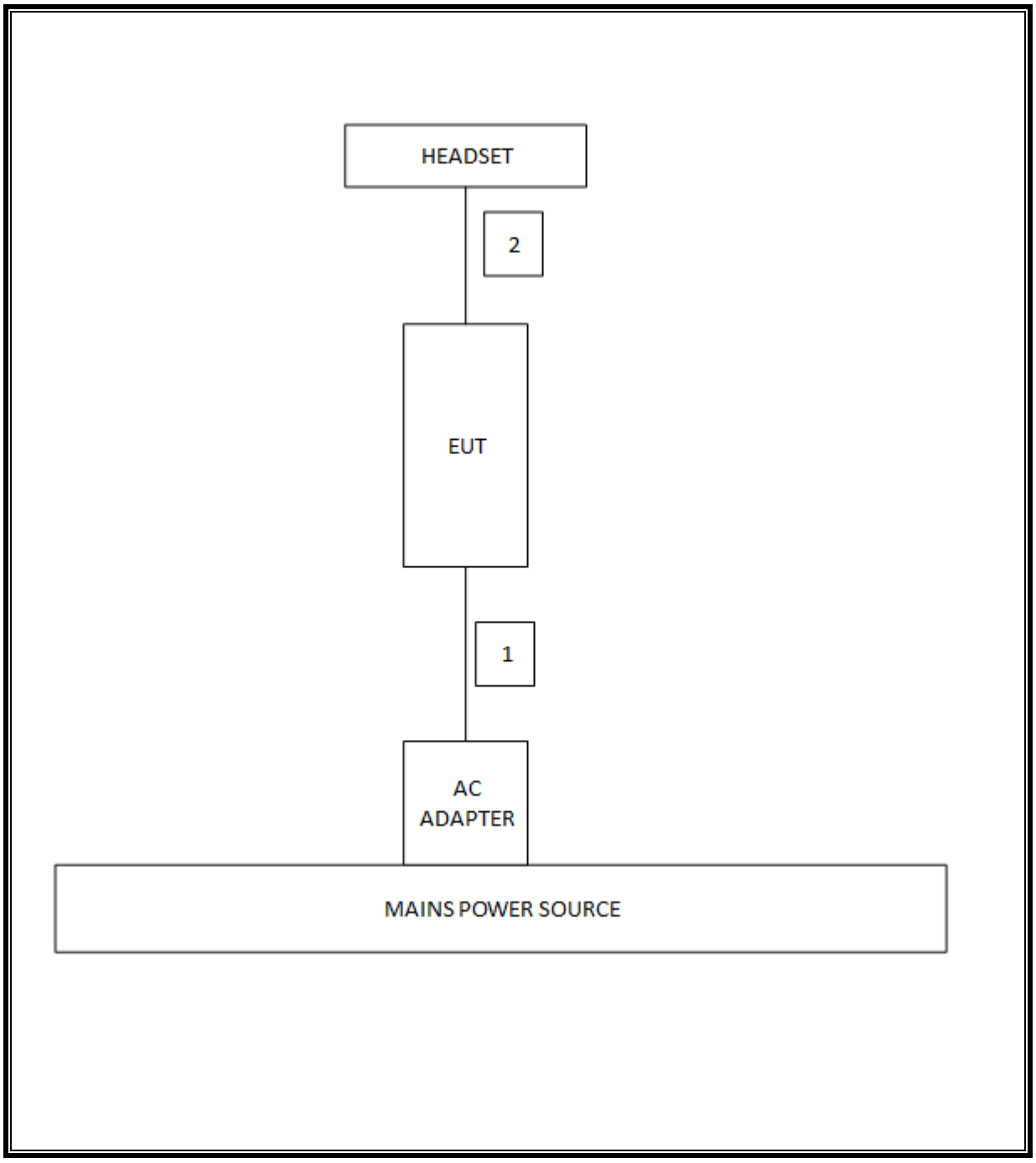
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	USB	Shielded	1.5m	N/A
2	Headset	1	Audio	Shielded	1.5m	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	MWH-1826/B	C00589	07/28/12	07/28/13
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	C01071	07/26/12	07/26/13
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.

7.1. DUTY CYCLE

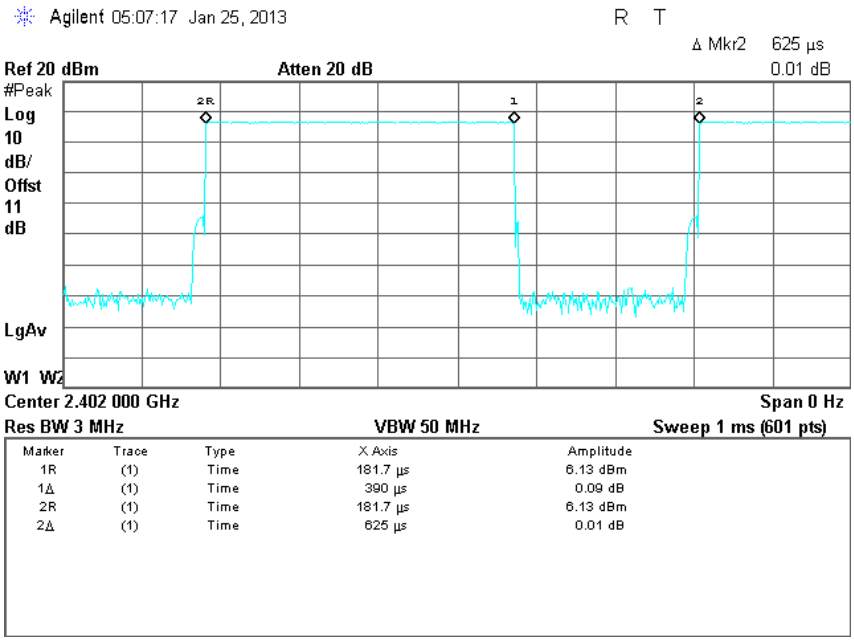
LIMITS

None; for reporting purposes only.

RESULTS

Mode	Tx on (msec)	Tx on + Tx off (msec)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
BT LE	0.39	0.625	62.40	2.05

BT-LE mode



8. ANTENNA PORT TEST RESULTS – LE (LOW ENERGY) MODULATION

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.

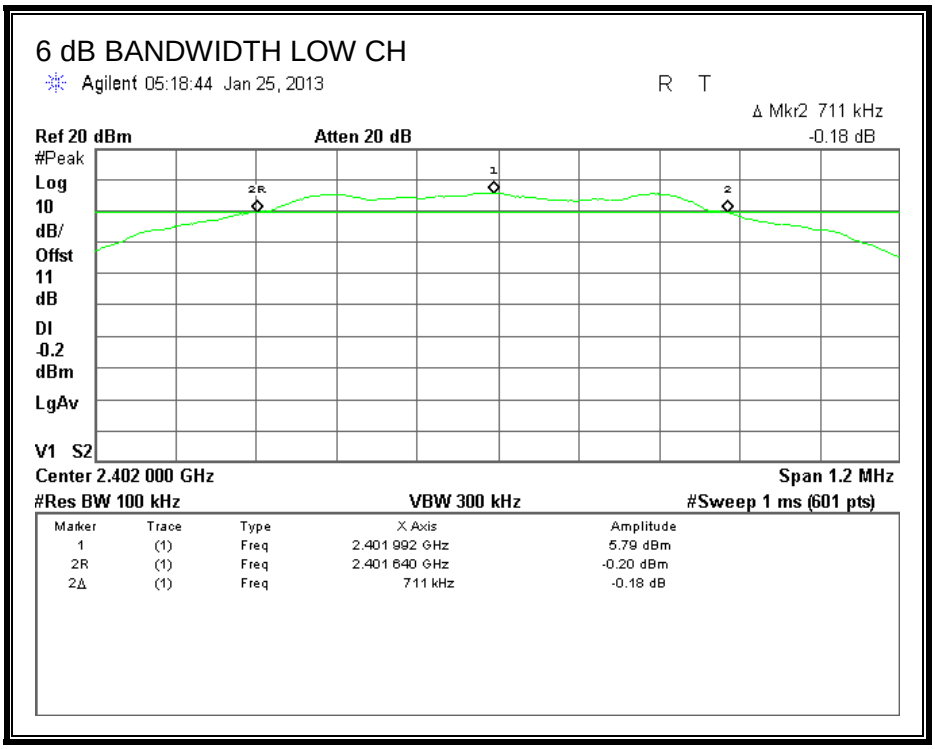
TEST PROCEDURE

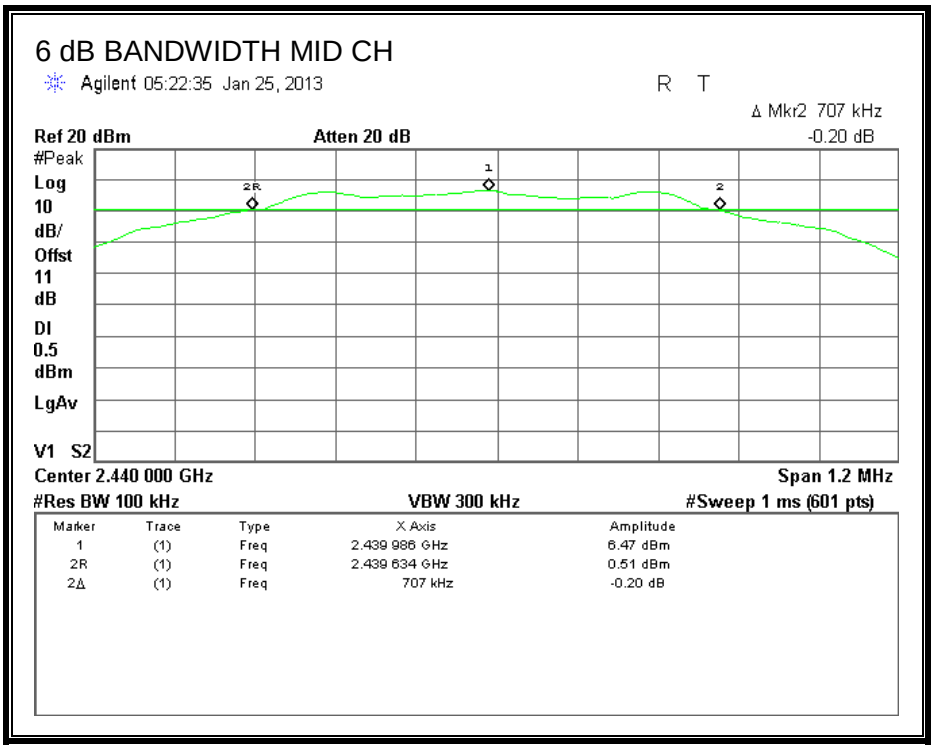
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

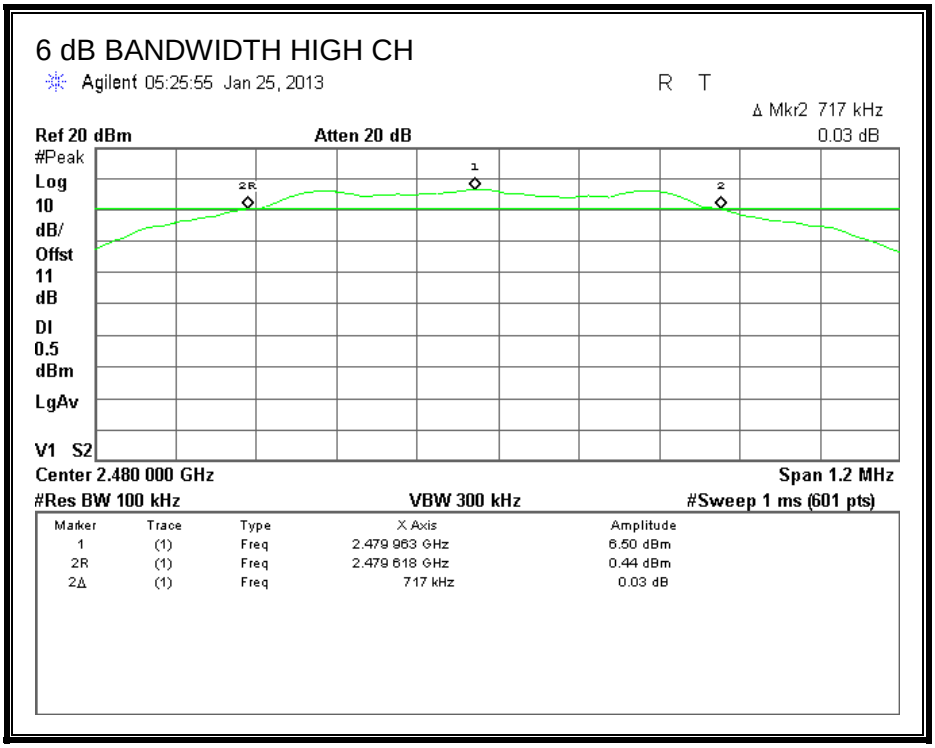
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.711	0.5
Middle	2440	0.707	0.5
High	2480	0.717	0.5

6 dB BANDWIDTH







8.2. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

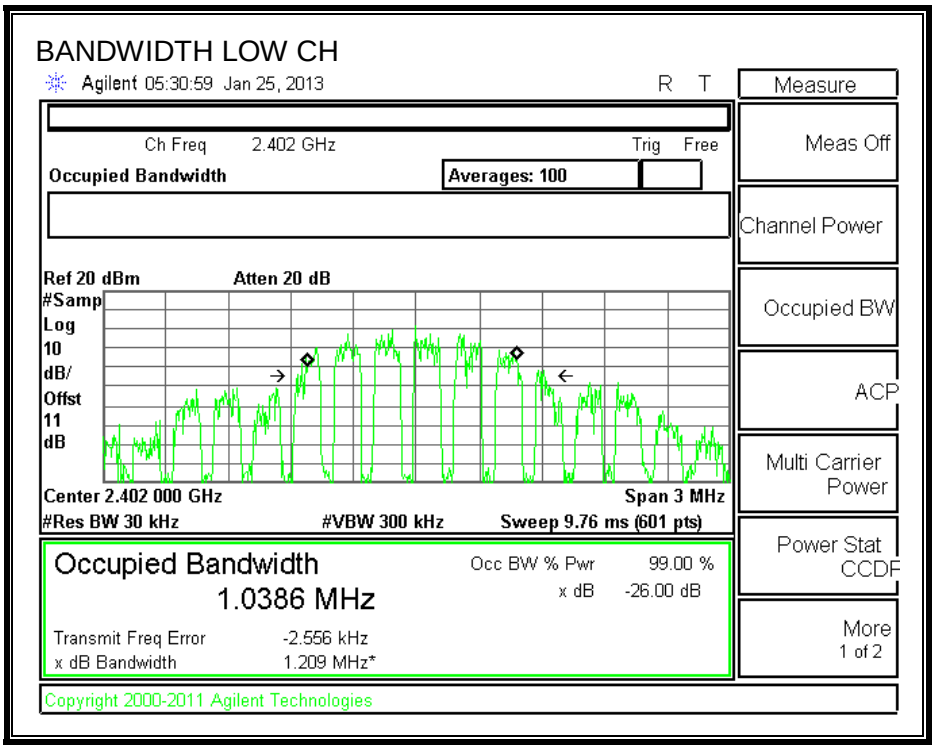
TEST PROCEDURE

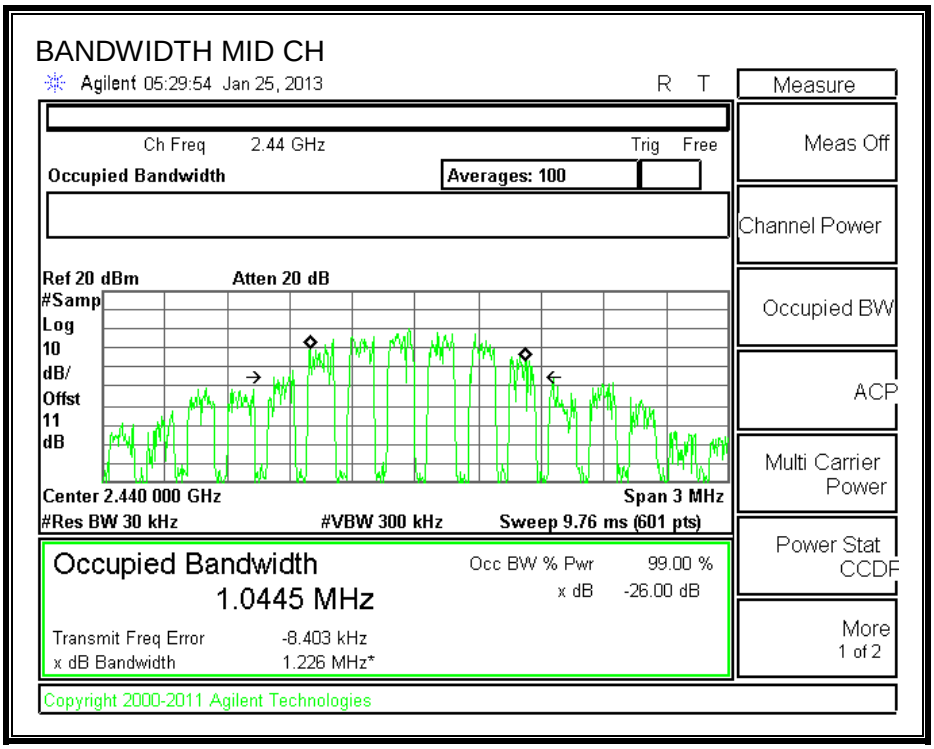
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 99% bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

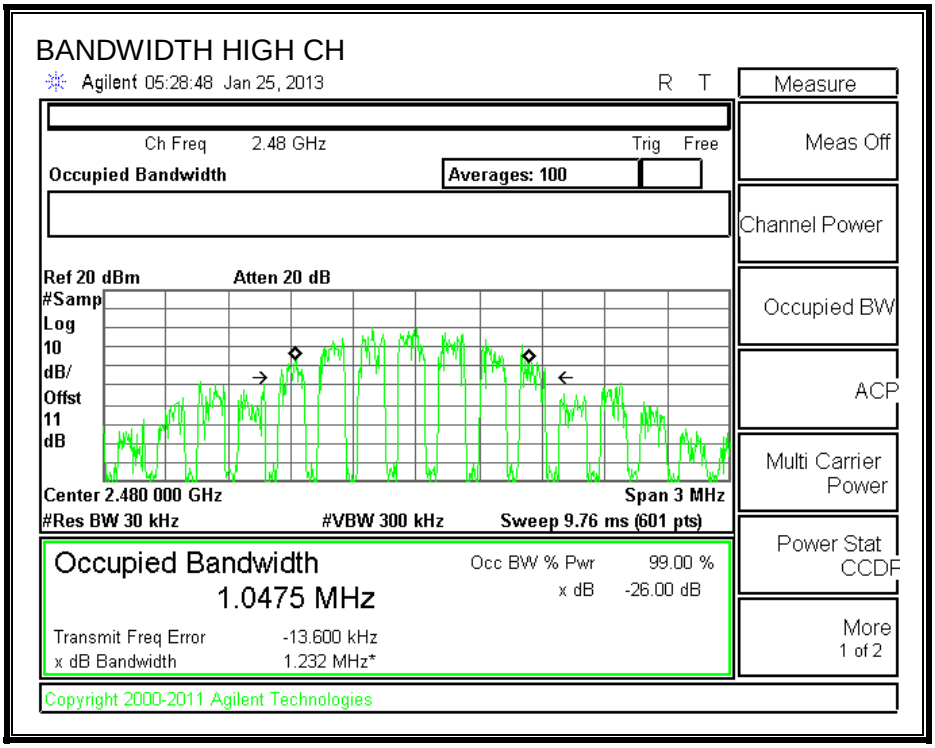
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0386
Middle	2440	1.0445
High	2480	1.0475

99% BANDWIDTH







8.3. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

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

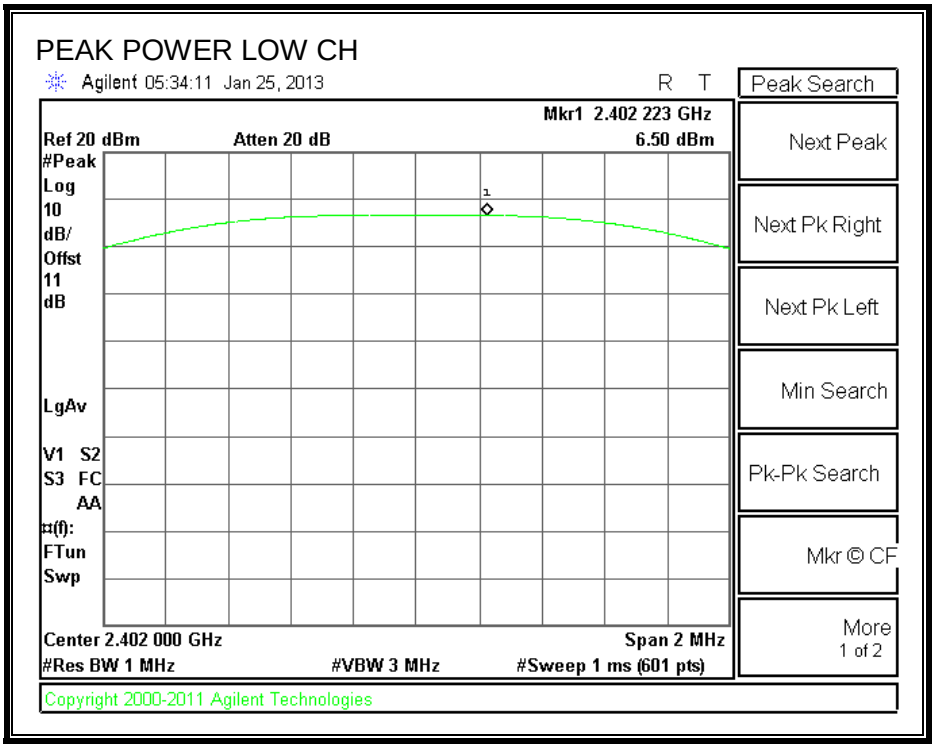
TEST PROCEDURE

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

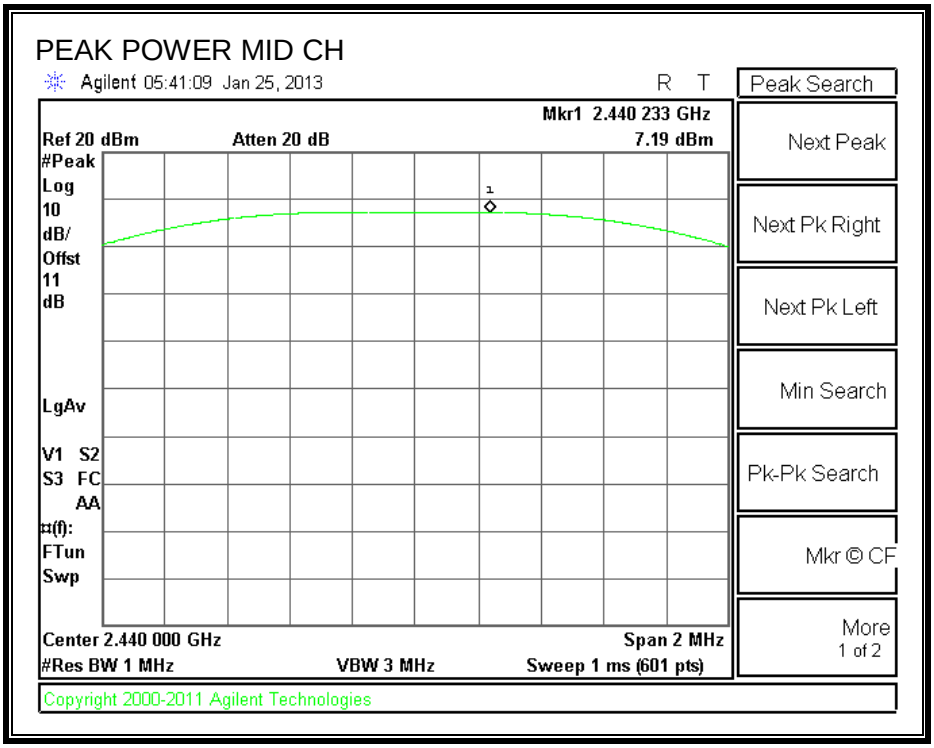
RESULTS

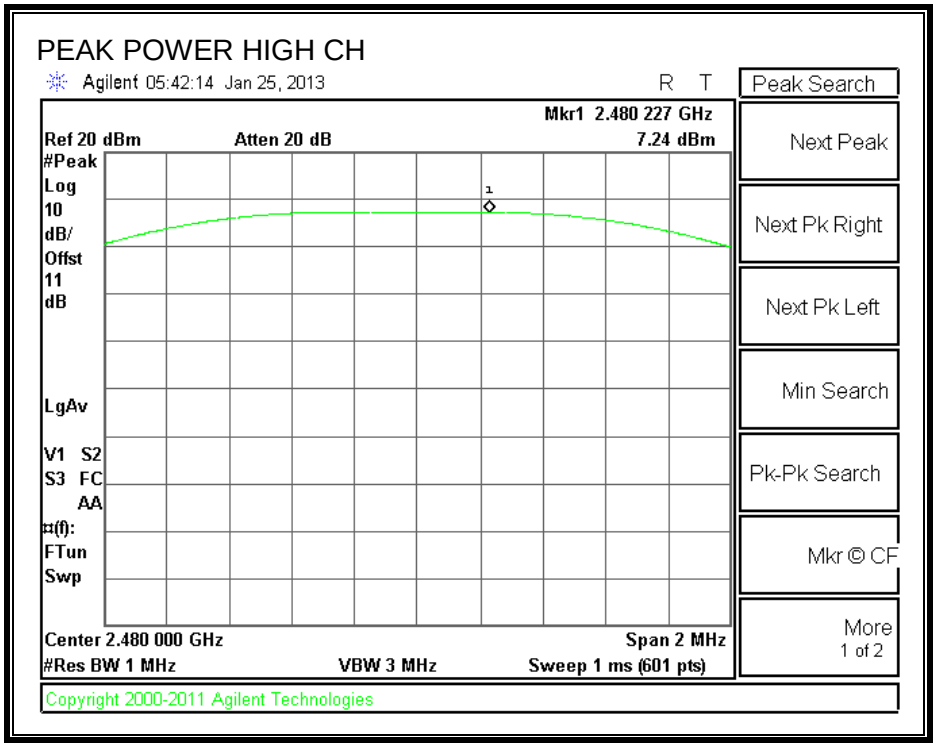
Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	6.50	30	-23.50
Middle	2440	7.19	30	-22.81
High	2480	7.24	30	-22.76

PEAK POWER LOW CH



PEAK POWER MID CH





8.4. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 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)	Average Power (dBm)
Low	2402	4.2
Middle	2441	4.84
High	2480	4.81

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.

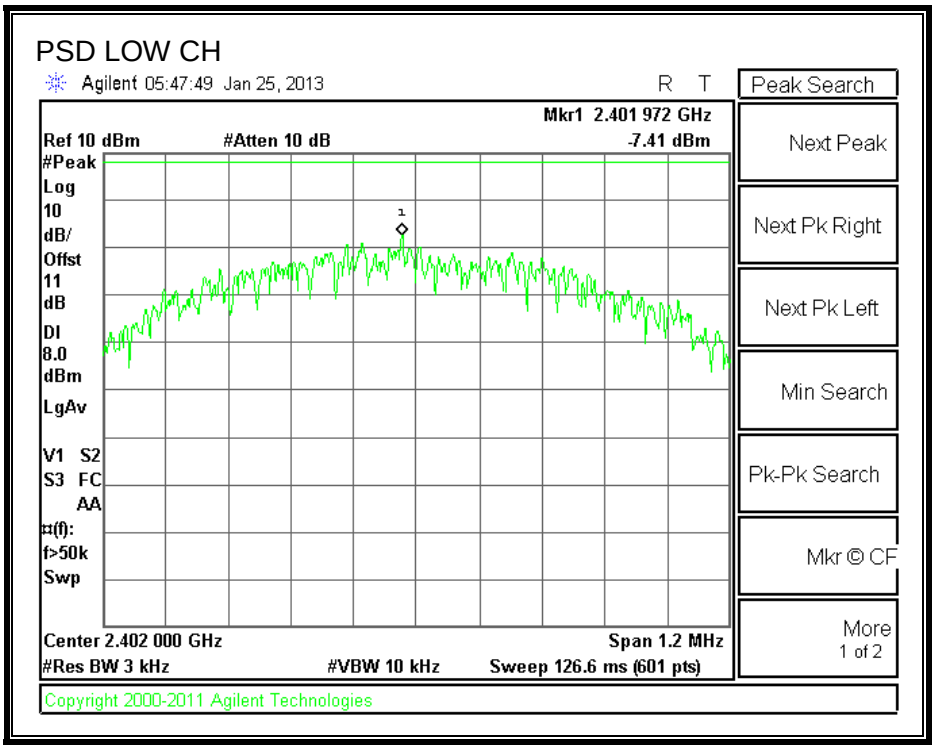
TEST PROCEDURE

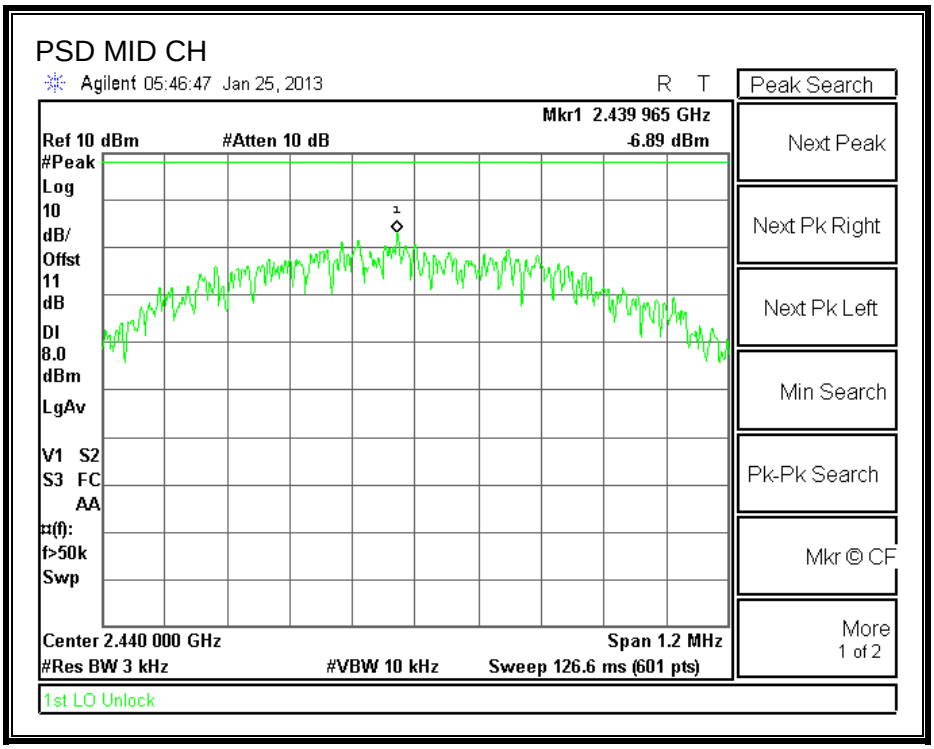
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

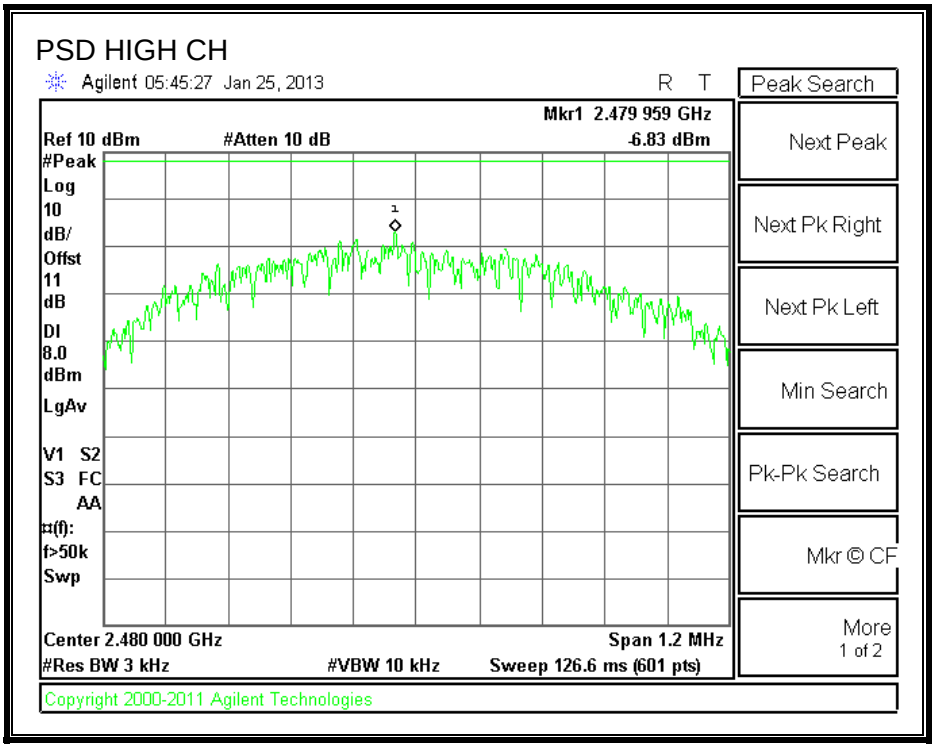
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-7.41	8	-15.41
Middle	2440	-6.89	8	-14.89
High	2480	-6.83	8	-14.83

POWER SPECTRAL DENSITY







8.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

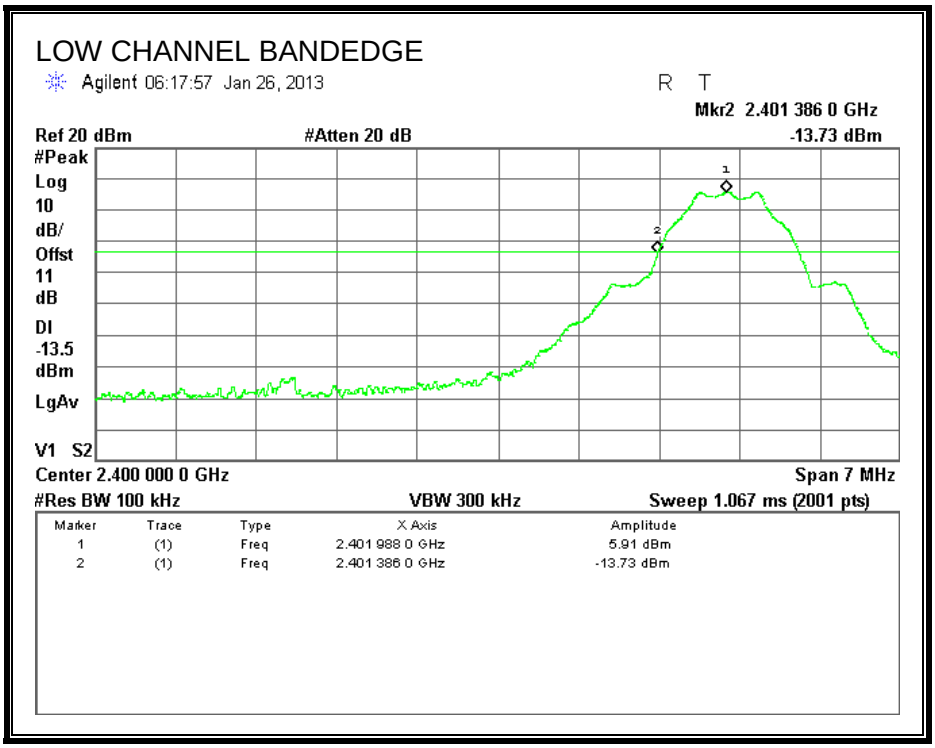
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

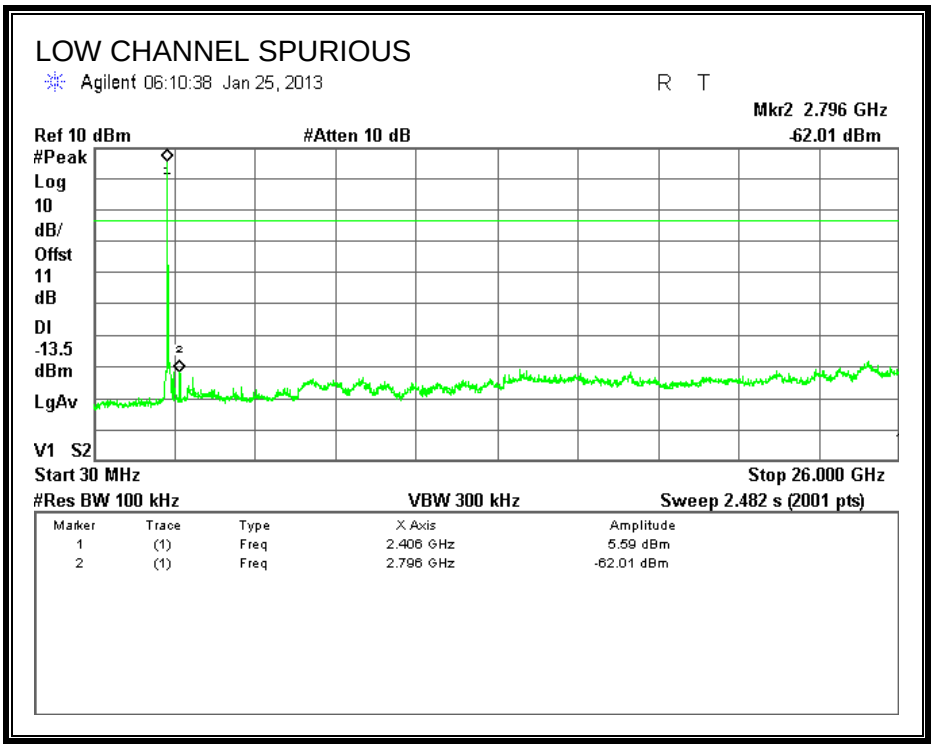
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

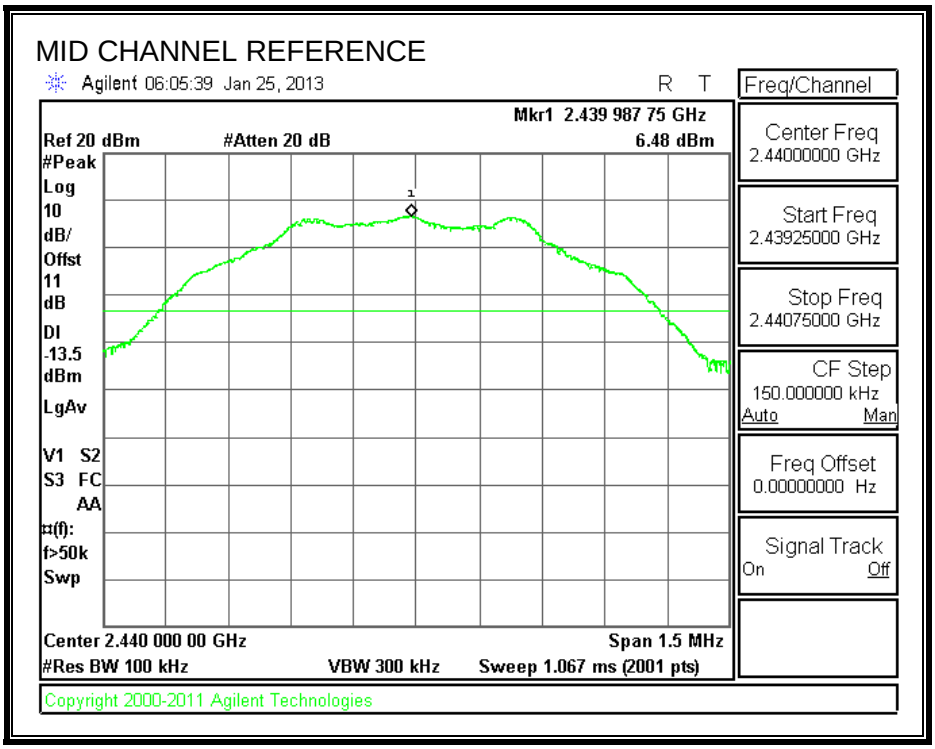
RESULTS

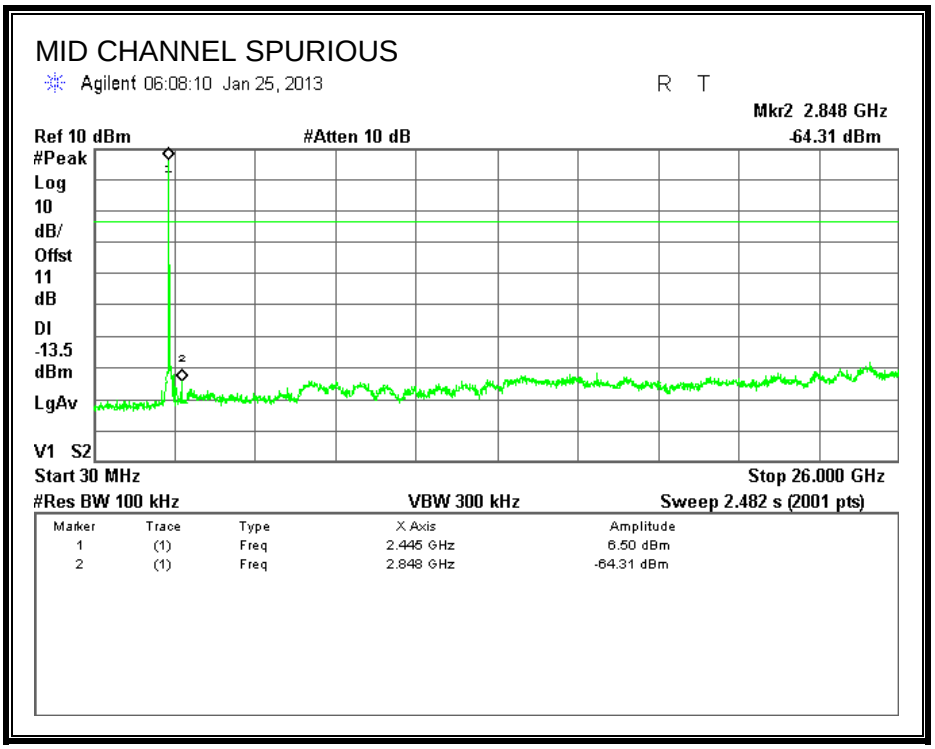
SPURIOUS EMISSIONS, LOW CHANNEL



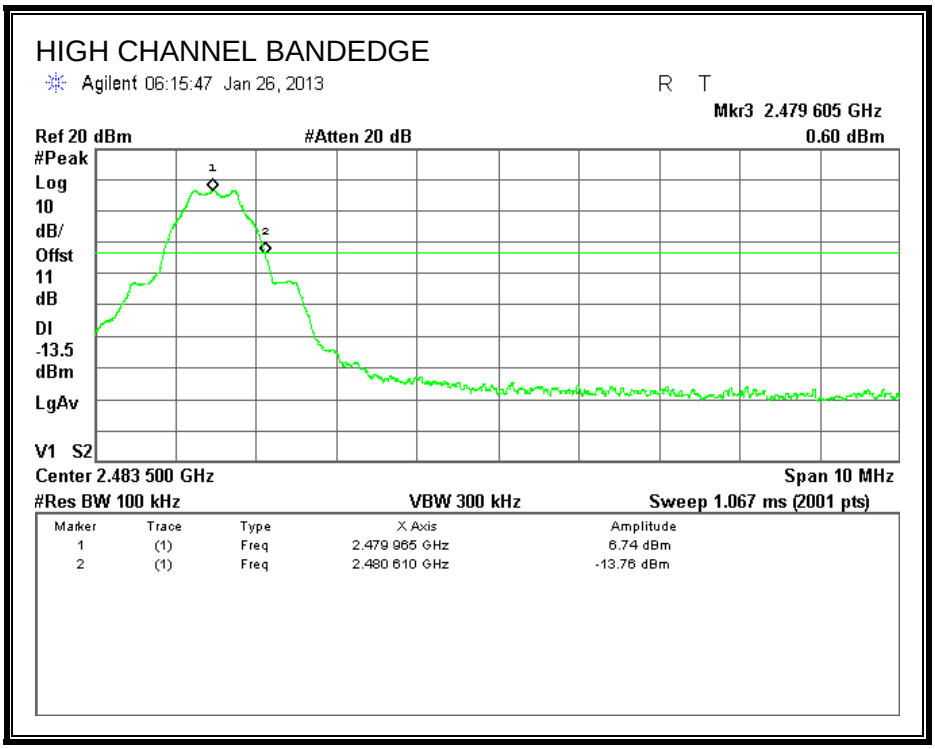


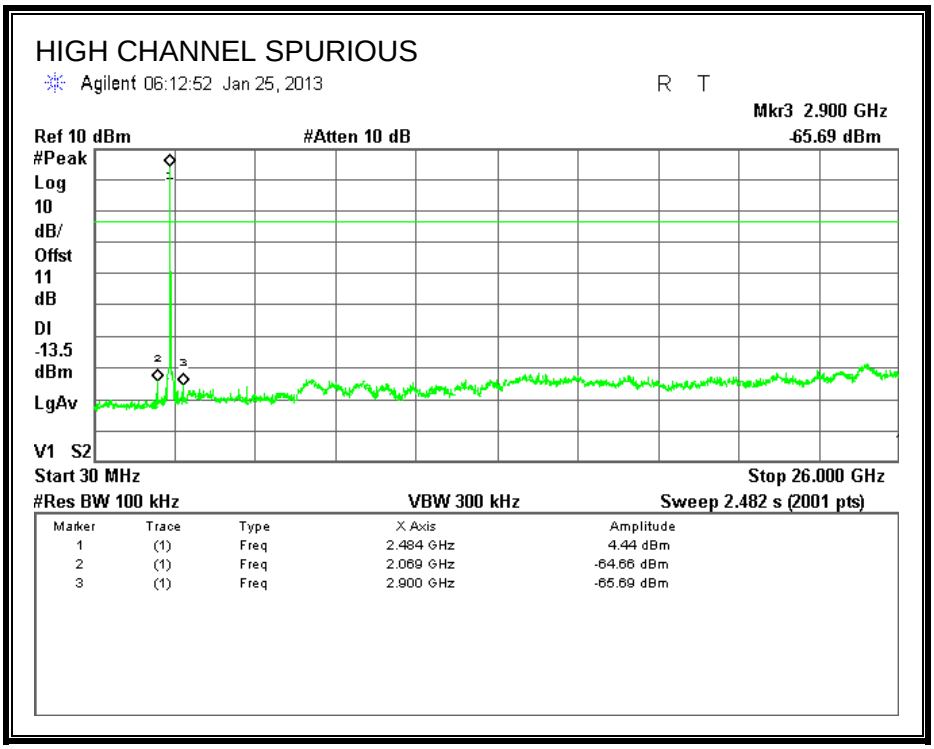
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





9. RADIATED TEST RESULTS – LE (LOW ENERGY) MODULATION

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.

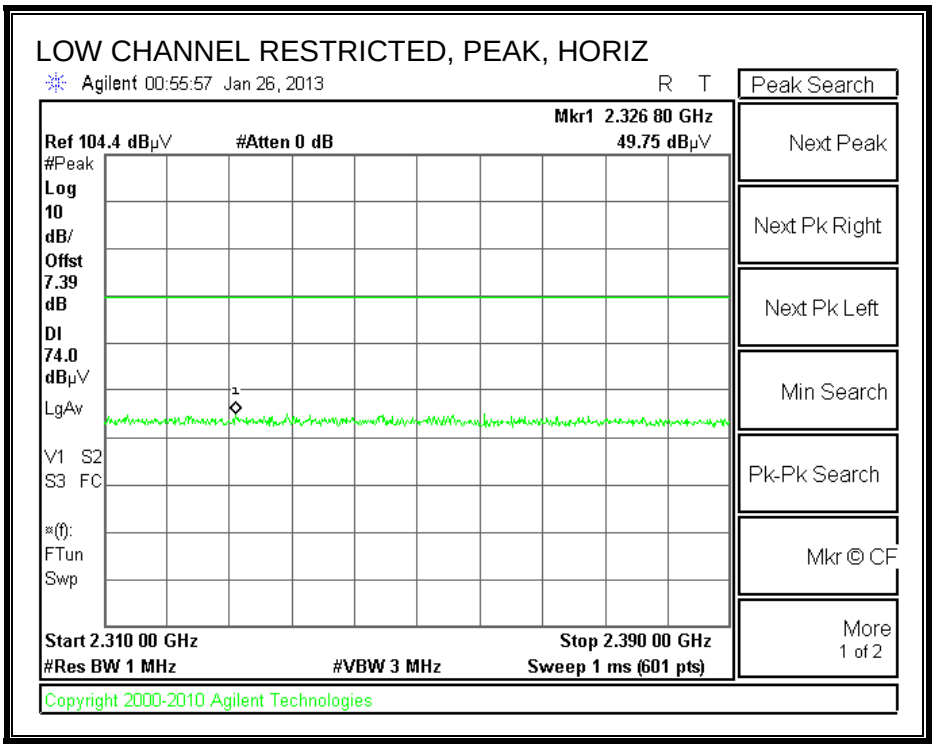
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

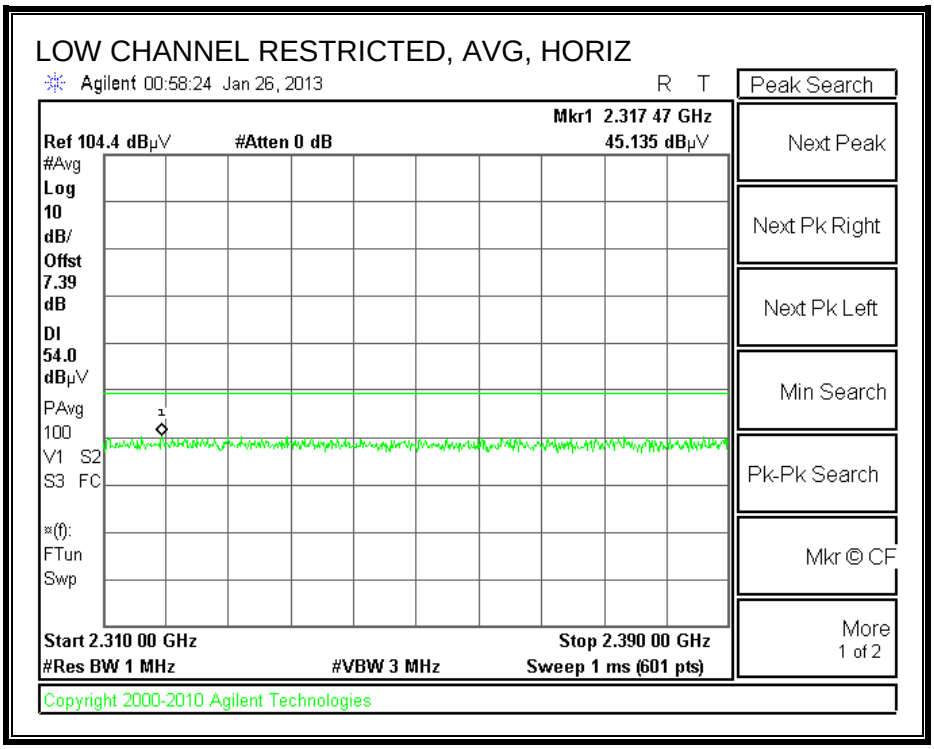
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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

9.1. TRANSMITTER ABOVE 1 GHz

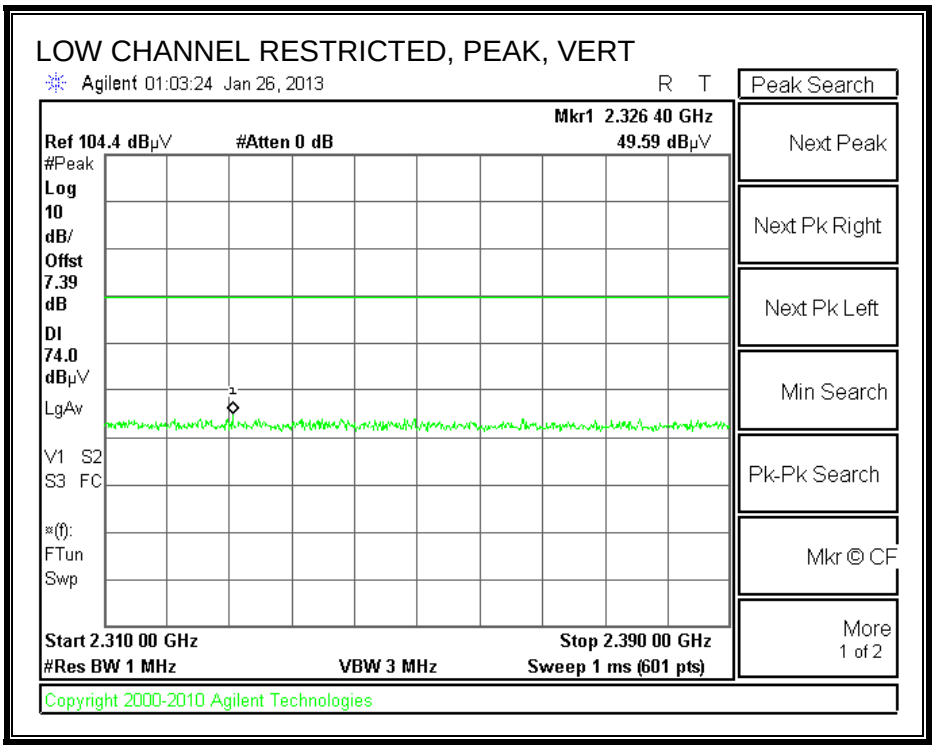
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

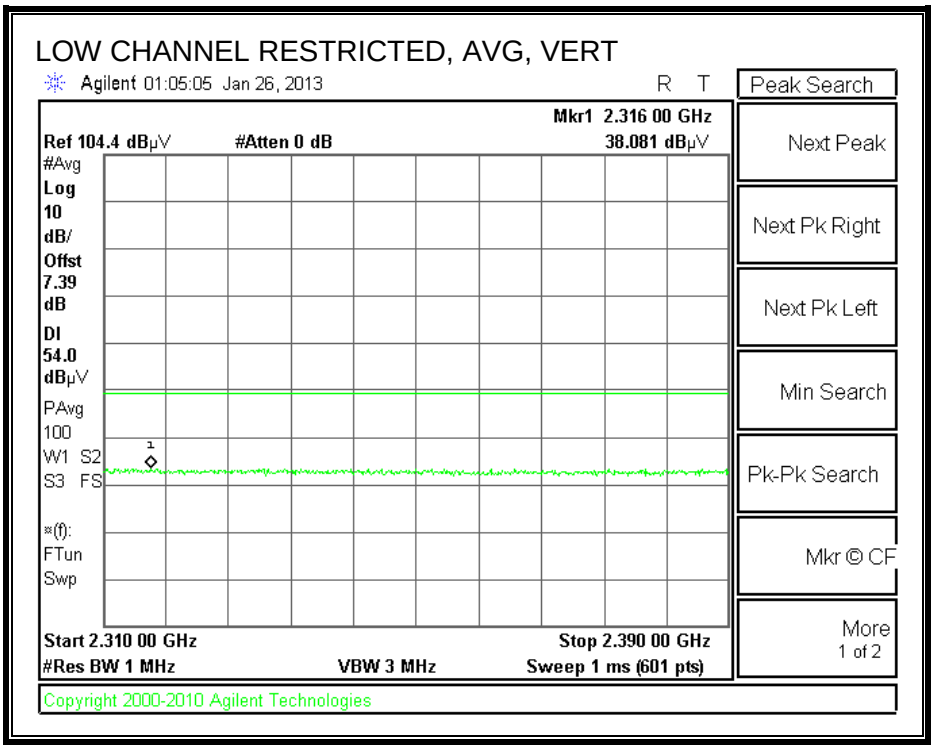




Actual Average = Measured Average + Correction Factor
= 45.135 dBuV + 2.05
= 47.185 dBuV

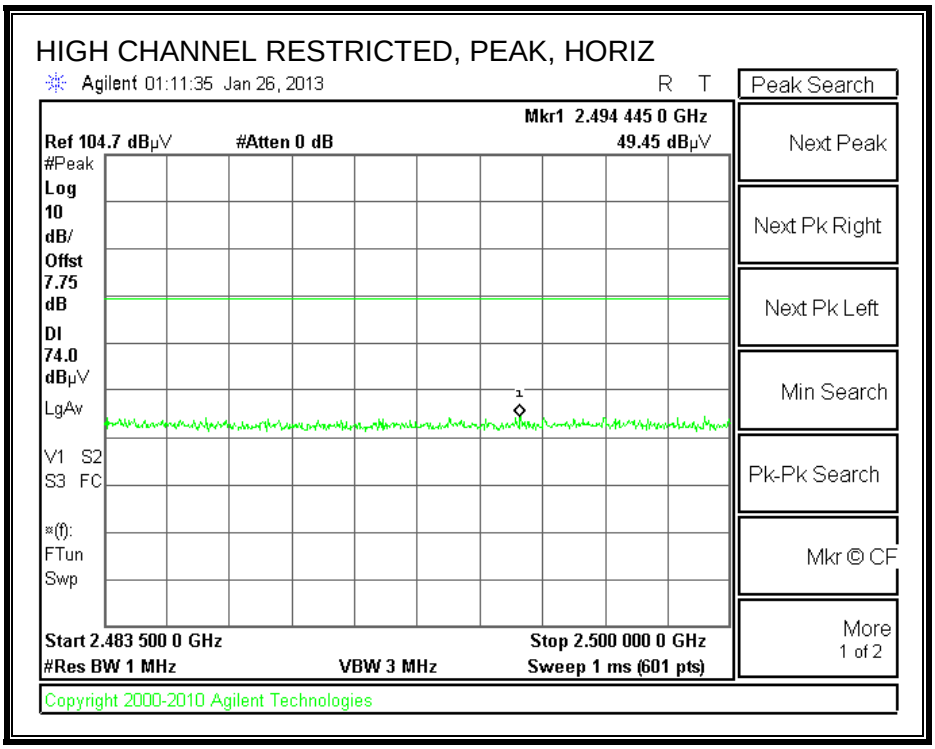
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

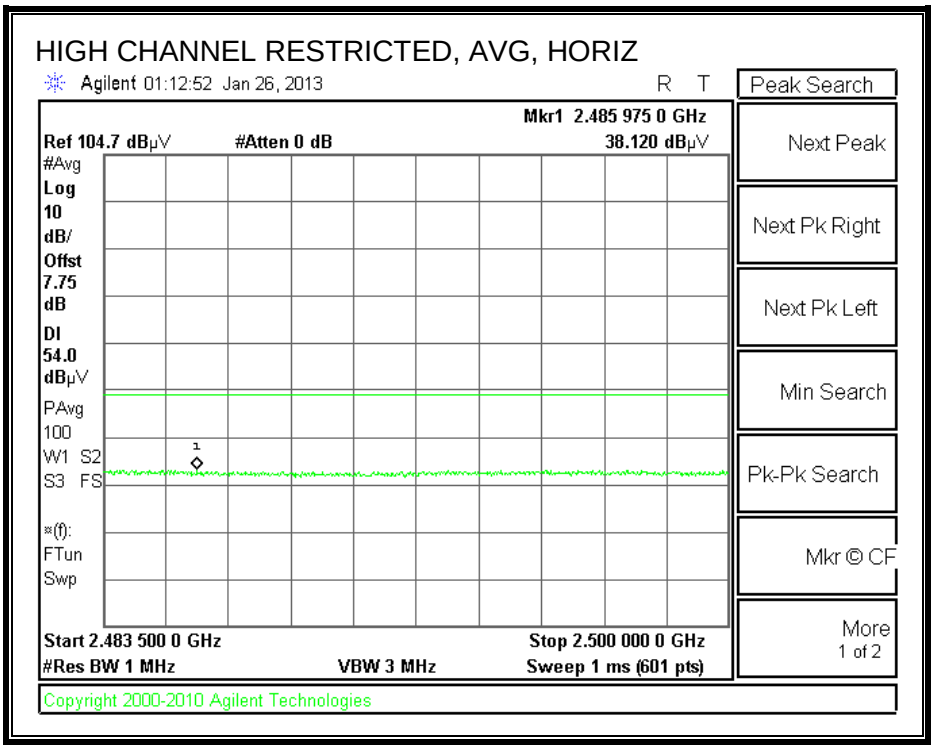




Actual Average = Measured Average + Correction Factor
= 38.081 dBuV + 2.05
= 40.131 dBuV

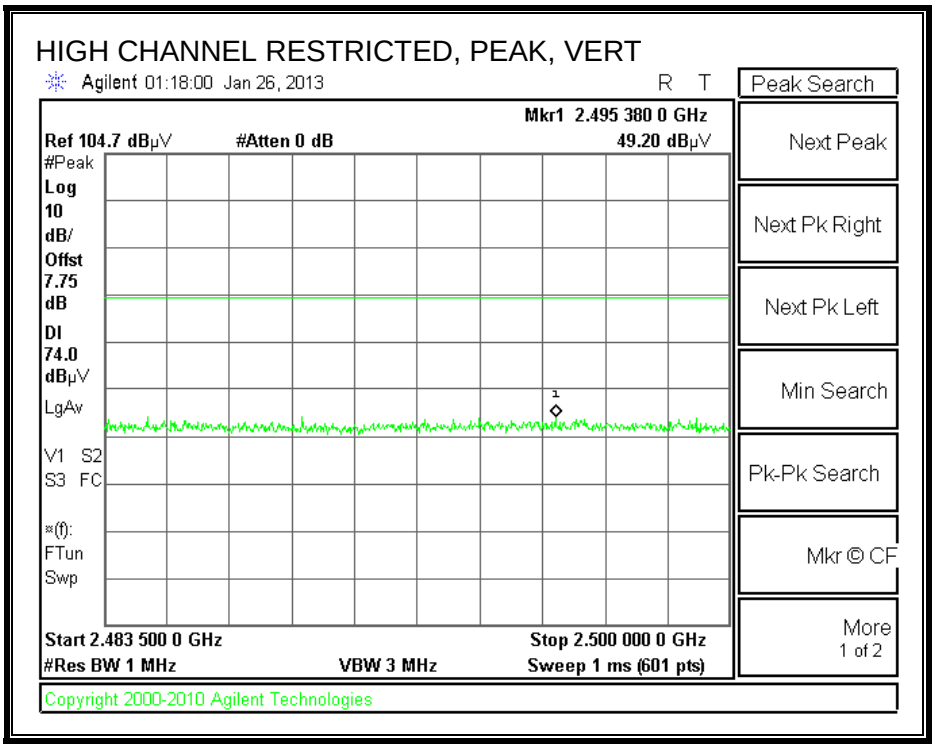
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

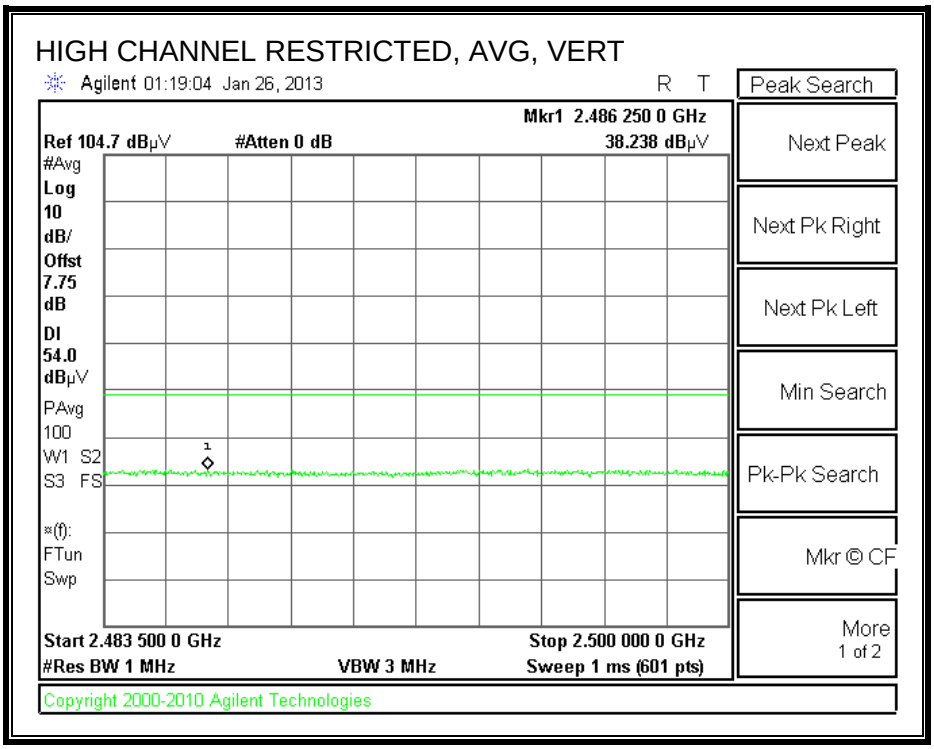




Actual Average = Measured Average + Correction Factor
= 38.120 dBuV + 2.05
= 40.17 dBuV

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





Actual Average = Measured Average + Correction Factor
= 38.238 dBuV + 2.05
= 40.288 dBuV

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber-A

Company:	**SAMSUNG**
Project #:	**12I14777**
Date:	**1/26/2013**
Test Engineer:	**Thanh Nguyen**
Configuration:	**EUT, AC charger, Ear phone plug**
Mode:	**Tx BT LE**

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T145 Agilent 3008A0056		T39; ARA 18-26GHz; S/N:1013	FCC 15.209

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low ch															
4.804	3.0	46.3	41.2	33.4	6.8	-34.8	0.0	0.0	51.7	46.6	74	54	-22.3	-7.4	V
7.206	3.0	41.4	31.4	35.5	8.4	-34.9	0.0	0.0	50.4	40.4	74	54	-23.6	-13.6	Noise floor
4.804	3.0	47.2	42.1	33.4	6.8	-34.8	0.0	0.0	52.6	47.5	74	54	-21.4	-6.5	H
7.206	3.0	41.3	31.3	35.5	8.4	-34.9	0.0	0.0	50.2	40.2	74	54	-23.8	-13.8	Noise floor
Mid ch															
4.880	3.0	48.04	42.1	33.5	6.8	-34.8	0.0	0.0	53.5	47.5	74	54	-20.5	-6.5	V
7.320	3.0	41.6	31.2	35.7	8.4	-34.9	0.0	0.0	50.8	40.4	74	54	-23.2	-13.6	Noise floor
4.880	3.0	49.0	45.5	33.5	6.8	-34.8	0.0	0.0	54.4	50.9	74	54	-19.6	-3.1	H
7.320	3.0	41.4	31.1	35.7	8.4	-34.9	0.0	0.0	50.5	40.3	74	54	-23.5	-13.7	Noise floor
High ch															
4.960	3.0	48.4	43.8	33.6	6.3	-34.8	0.0	0.0	53.4	48.8	74	54	-20.6	-5.2	V
7.440	3.0	41.6	31.3	35.9	8.4	-34.9	0.0	0.0	51.0	40.7	74	54	-23.0	-13.3	Noise floor
4.960	3.0	48.9	44.4	33.6	6.3	-34.8	0.0	0.0	54.0	49.4	74	54	-20.0	-4.6	H
7.440	3.0	42.2	31.2	35.9	8.4	-34.9	0.0	0.0	51.6	40.6	74	54	-22.4	-13.4	Noise floor

The Average value were added 2.05dB duty cycle factor.

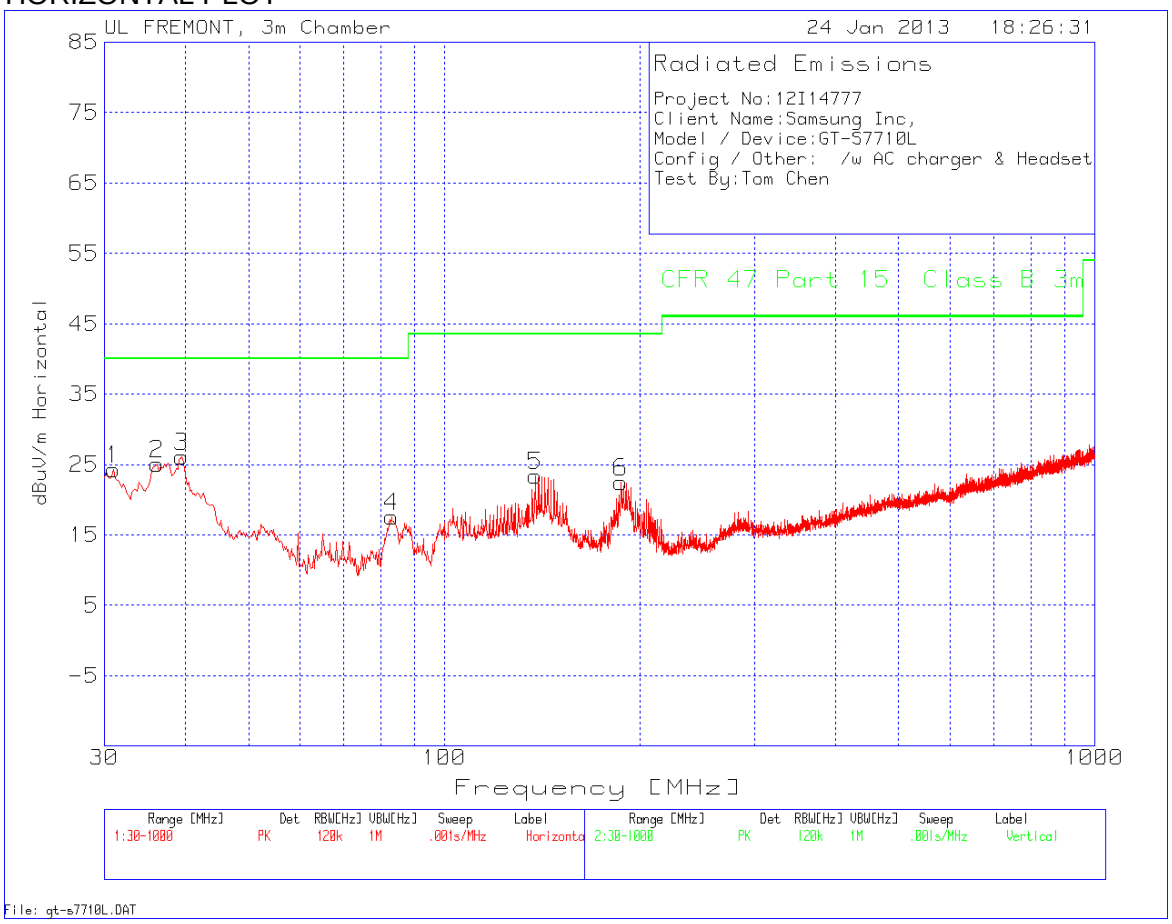
Rev. 11.10.11

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

9.2. WORST-CASE BELOW 1 GHz

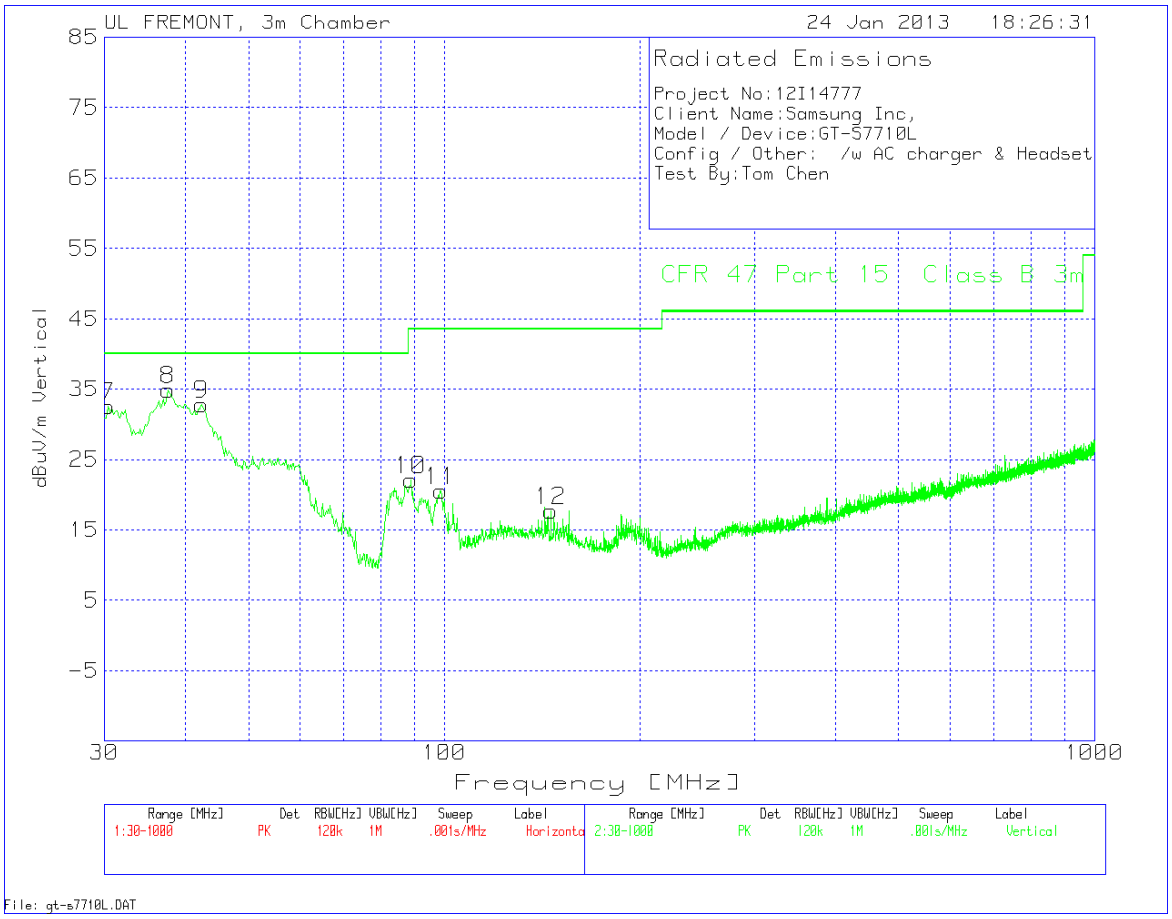
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Project No:12I14777
Client Name:Samsung Inc,
Model / Device:GT-S7710L
Config / Other: /w AC charger & Headset
Test By:Tom Chen

Horizontal 30 - 1000MHz

Marker No.	Test Frequency	Meter Reading	Detector	25MHz-1GHz Chambr 3m Amplified (dB)	Antenna T185 (dB)	dBuV/m	CFR 47 Part 15 Class B 3m	Margin	Polarity
1	30.9692	31.31	PK	-27.5	20.5	24.31	40	-15.69	Horz
2	36.203	35.82	PK	-27.4	16.6	25.02	40	-14.98	Horz
3	39.4984	39.3	PK	-27.4	14.2	26.1	40	-13.9	Horz
4	82.9197	37.06	PK	-27	7.5	17.56	40	-22.44	Horz
5	137.9716	36.56	PK	-26.5	13.3	23.36	43.5	-20.14	Horz
6	187.2082	37.45	PK	-25.9	10.9	22.45	43.5	-21.05	Horz

Vertical 30 - 1000MHz

Marker No.	Test Frequency	Meter Reading	Detector	25MHz-1GHz Chambr 3m Amplified (dB)	Antenna T185 (dB)	dBuV/m	CFR 47 Part 15 Class B 3m	Margin	Polarity
7	30.3877	39.17	PK	-27.5	20.9	32.57	40	-7.43	Vert
8	37.56	46.74	PK	-27.4	15.6	34.94	40	-5.06	Vert
9	42.4061	48.26	PK	-27.4	12	32.86	40	-7.14	Vert
10	88.9289	41.61	PK	-27	7.5	22.11	43.5	-21.39	Vert
11	98.8149	37.92	PK	-26.9	9.5	20.52	43.5	-22.98	Vert
12	145.9193	31.67	PK	-26.4	12.5	17.77	43.5	-25.73	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:12I14770
Client Name:Samsung
Model/Device:GT-S6312, 2.4G TX Worst case
Test Volt/Freq:120 Vac / 60Hz
Test By:Tom Chen

Line-L1 .15 - 30MHz

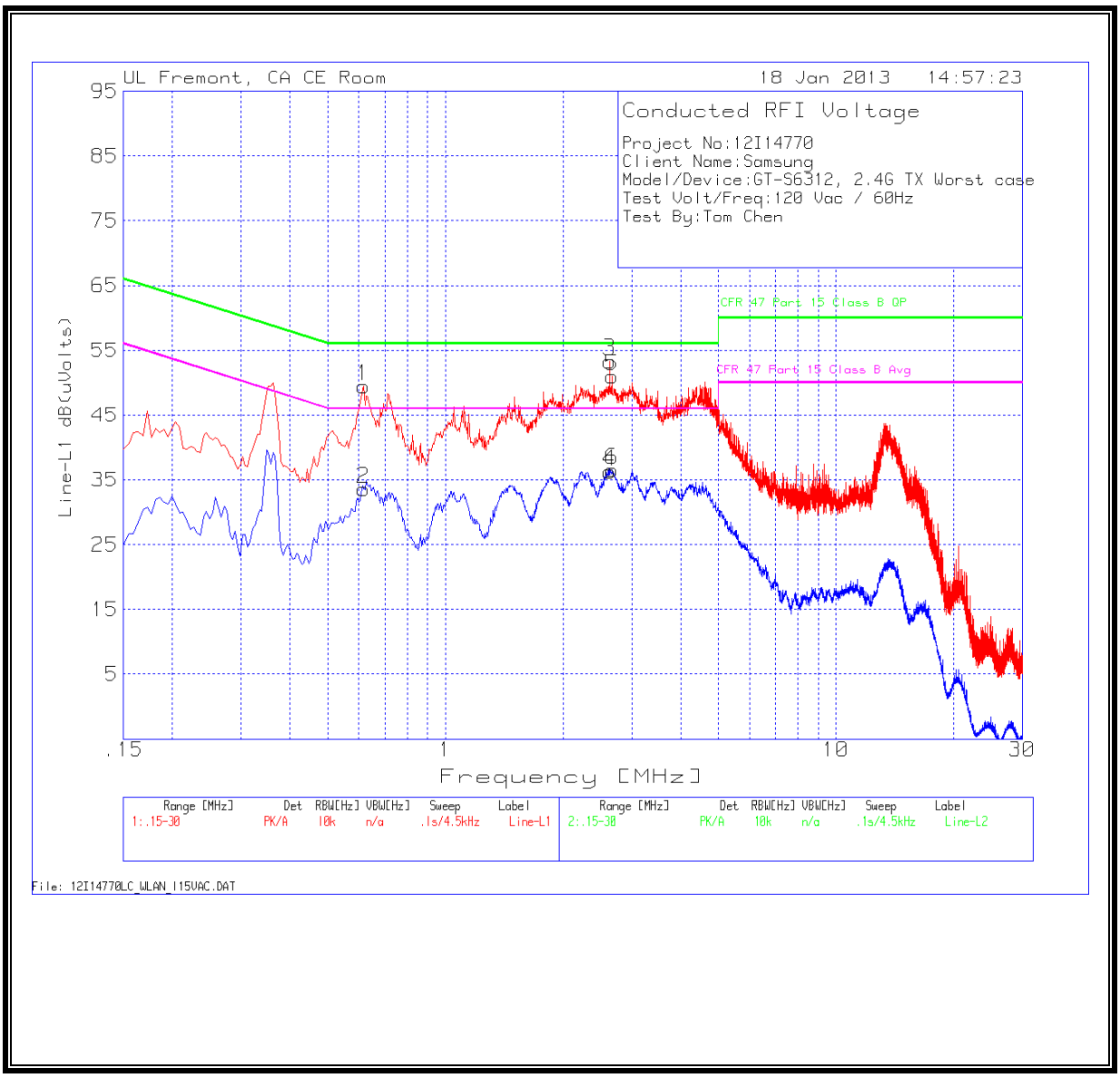
Test Freq. MHz	Meter Reading dB(µV)	Detector Type	LISN Factor dB	Path Loss (dB)	Corrected Reading dB(µV)	Class B Quasi-Peak Limit dB(µV)	Quasi-Peak Margin dB	Class B Average Limit dB(µV)	Average Margin dB
0.618	49.31	PK	0.1	0	49.41	56	-6.59	-	-
0.618	33.52	Av	0.1	0	33.62	-	-	46	-12.38
2.634	53.16	PK	0.1	0.1	53.36	56	-2.64	-	-
2.634	36.11	Av	0.1	0.1	36.31	-	-	46	-9.69
2.6745	50.79	PK	0.1	0.1	50.99	56	-5.01	-	-
2.6745	36.31	Av	0.1	0.1	36.51	-	-	46	-9.49

Line-L2 .15 - 30MHz

Test Freq. MHz	Meter Reading dB(µV)	Detector Type	LISN Factor dB	Path Loss (dB)	Corrected Reading dB(µV)	Class B Quasi-Peak Limit dB(µV)	Quasi-Peak Margin dB	Class B Average Limit dB(µV)	Average Margin dB
2.2695	47.91	PK	0.1	0.1	48.11	56	-7.89	-	-
2.2695	29.69	Av	0.1	0.1	29.89	-	-	46	-16.11
2.6205	48.85	PK	0.1	0.1	49.05	56	-6.95	-	-
2.6205	30.31	Av	0.1	0.1	30.51	-	-	46	-15.49
4.596	48.07	PK	0.1	0.1	48.27	56	-7.73	-	-
4.596	27.24	Av	0.1	0.1	27.44	-	-	46	-18.56

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

LINE 1 RESULTS



LINE 2 RESULTS