FCC CFR47 PART 15 SUBPART C

BLUETOOTH LOW ENERGY CERTIFICATION TEST REPORT

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

MODEL NUMBER: SM-G3502C

REPORT NUMBER: 13I16469-3 Rev A

ISSUE DATE: December 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 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.	Issue Date	Revisions	Revised By
-	11/11/13	Initial Issue	P. Kim
A	12/4/13	Updated equipment list in section 6; Updated summary table	P. Kim

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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 5

4.3. MEASUREMENT UNCERTAINTY 5

5. EQUIPMENT UNDER TEST 6

5.1. DESCRIPTION OF EUT 6

5.2. MAXIMUM OUTPUT POWER 6

5.3. DESCRIPTION OF AVAILABLE ANTENNAS 6

5.4. SOFTWARE AND FIRMWARE 6

5.5. WORST-CASE CONFIGURATION AND MODE 7

5.6. DESCRIPTION OF TEST SETUP 8

6. TEST AND MEASUREMENT EQUIPMENT 10

7. SUMMARY 11

8. ANTENNA PORT TEST RESULTS 11

8.1. 6 dB BANDWIDTH 12

8.2. 99% BANDWIDTH 15

8.3. OUTPUT POWER 18

8.4. AVERAGE POWER 21

8.5. POWER SPECTRAL DENSITY 22

8.6. CONDUCTED SPURIOUS EMISSIONS 25

9. RADIATED TEST RESULTS 29

9.1. LIMITS AND PROCEDURE 29

9.2. TRANSMITTER ABOVE 1 GHz 30

9.3. WORST-CASE BELOW 1 GHz 44

10. AC POWER LINE CONDUCTED EMISSIONS 47

11. SETUP PHOTOS 52

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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:	**802.11 B/G/N 1X1 HT20, + BT4.0 + GSM1900 BAR PHONE**
MODEL:	**SM-G3502C**
SERIAL NUMBER:	**CD837435, CD8c7444**
DATE TESTED:	**November 7 - 12, 2013**

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

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Verification Services Inc. By:

PHILIP KIM
WiSE PROGRAM MANAGER
UL Verification Services Inc.

Tested By:

STEVEN TRAN
WiSE TEST TECHNICIAN
UL Verification Services Inc.

This report shall not be reproduced except in full, without the written approval of 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, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

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

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.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%.

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM Phone with Bluetooth and WLAN 2.4G capability.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402-2480	BLE	0.00	1.00

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of 2.3 dBi.

5.4. SOFTWARE AND FIRMWARE

Software version was cs02ve3gzc-eng 4.3 JLS36C.

The firmware used was G3502CZCEAMK2a.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter	Samsung	ETAOU42CBC	GB4943.1-2011	N/A
Earphone	Samsung	N/A	N/A	N/A

I/O CABLES

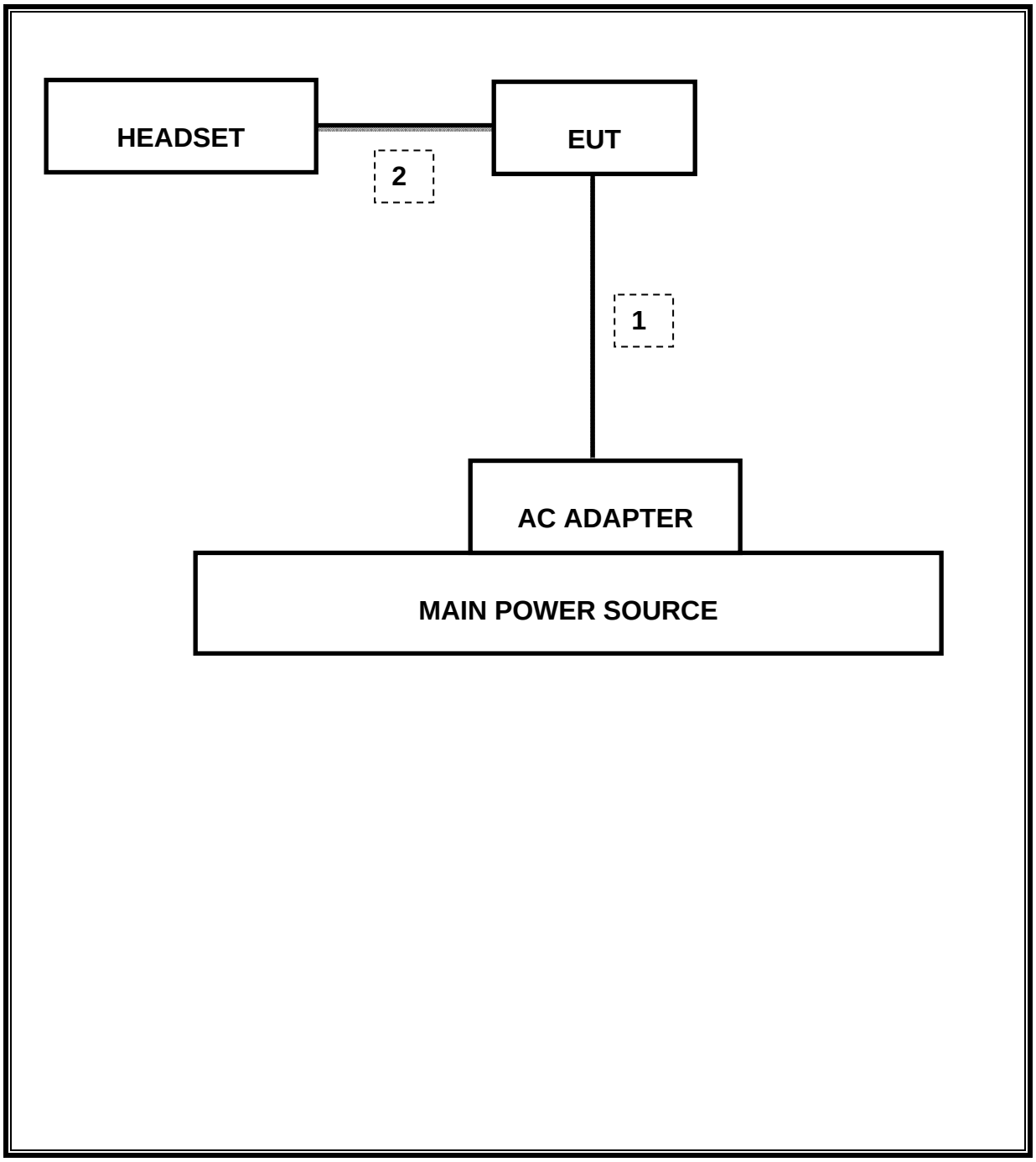
I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A
2	Audio	1	Mini-Jack	Unshielded	1m	N/A

TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests.
EUT was set in the Hidden menu mode to enable BLE communications.

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

SETUP DIAGRAM FOR TESTS



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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**
ntenna, Biconolog, 30MHz-1 GI	Sunol Sciences	JB1	C01171	03/23/13	02/13/14
Antenna, Horn, 18GHz	EMCO	3115	C00783	10/25/13	10/25/14
Antenna, Horn, 25.5 GHz	ARA	MWH-1826/B	C00980	11/14/12	11/14/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/28/13	01/28/14
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/13	10/22/14
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/13	12/20/14
CBT Bluetooth Tester	R & S	CBT	None	07/12/13	07/12/14
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/12	12/13/13
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/12	12/13/13
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/13	01/14/14
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR	CNR

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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	1.06MHz
2.1051, 15.247 (d)	RSS-210 A8.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-57.87dB
15.247	RSS-210 A8.4	TX conducted output power	<30dBm		Pass	0dBm
15.247	RSS-210 A8.2	PSD	<8dBm		Pass	-13.09dBm
15.207 (a)	RSS-GEN 7.2.2	AC Power Line conducted emissions	Section 10	Radiated	Pass	19.07dBuV(AV)
15.205, 15.209	RSS-210 Clause 2.6, RSS-210 Clause 6	Radiated Spurious Emission	< 54dBuV/m		Pass	41.53dBuV/m

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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

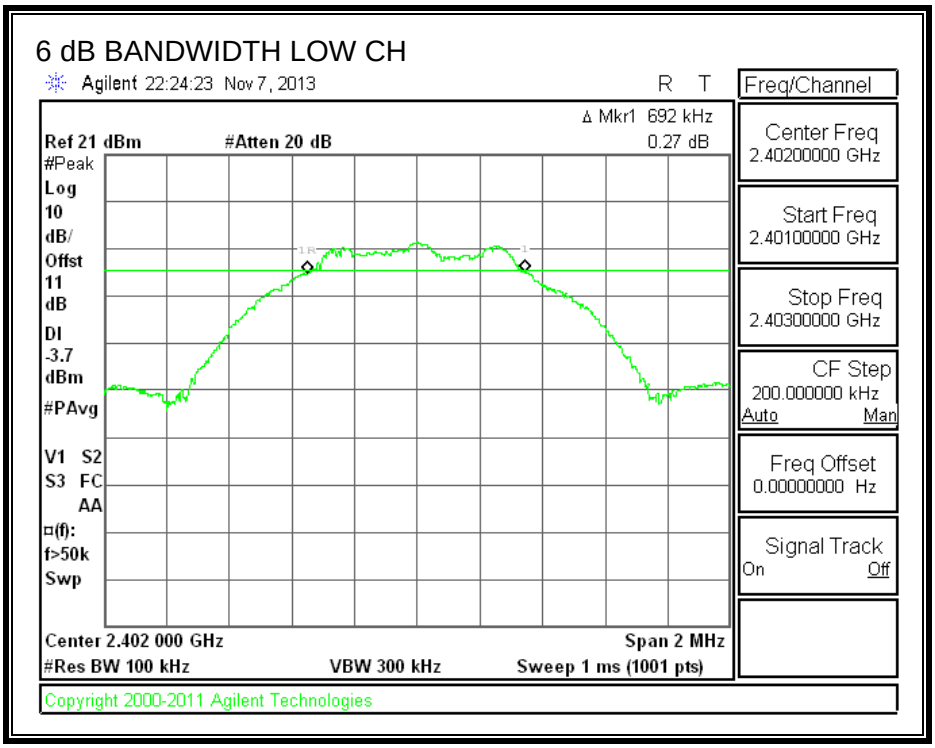
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

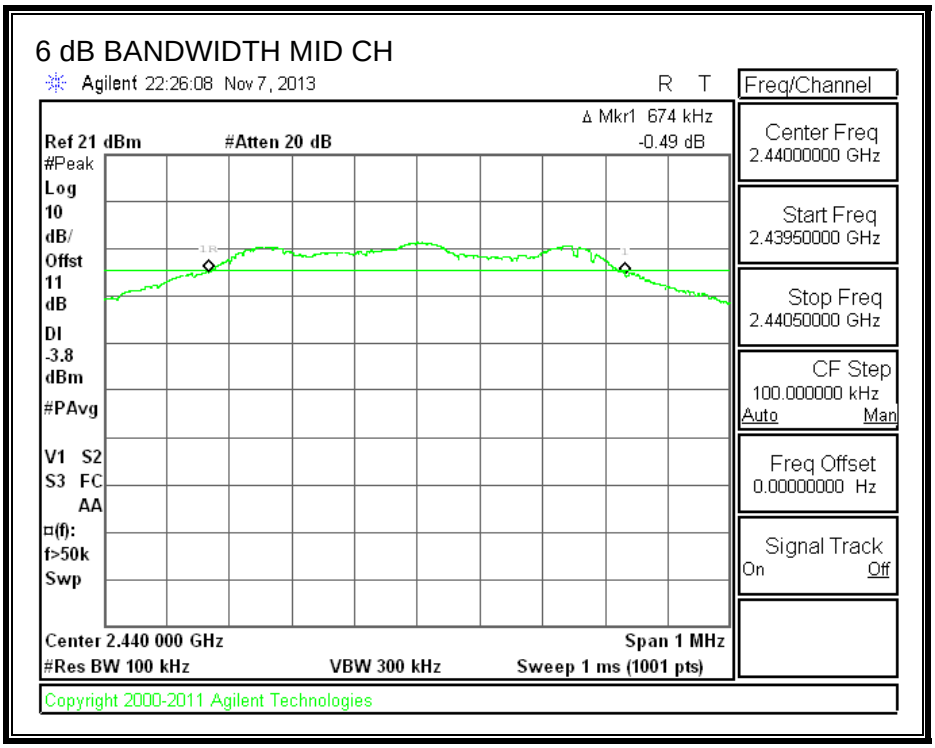
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6920	0.5
Middle	2440	0.6740	0.5
High	2480	0.5870	0.5

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

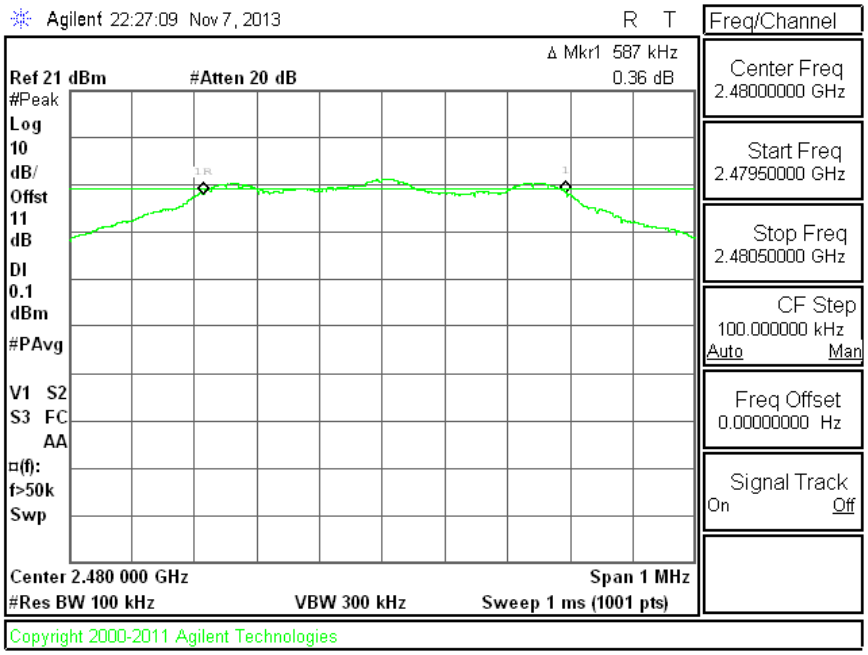
6 dB BANDWIDTH





This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

6 dB BANDWIDTH HIGH CH



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

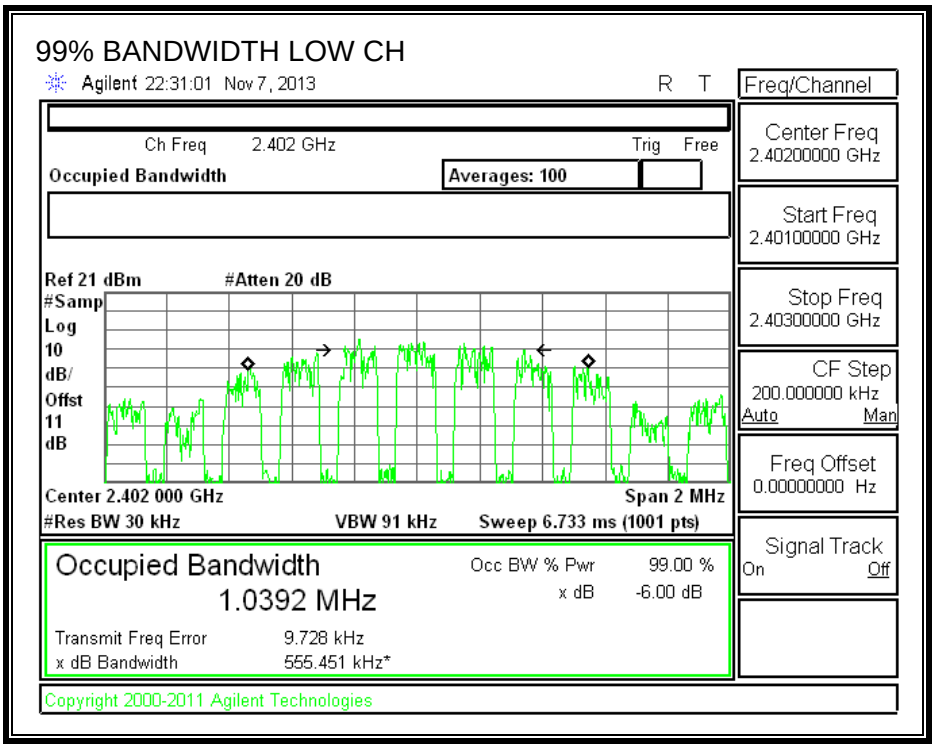
Reference to KDB558074: The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

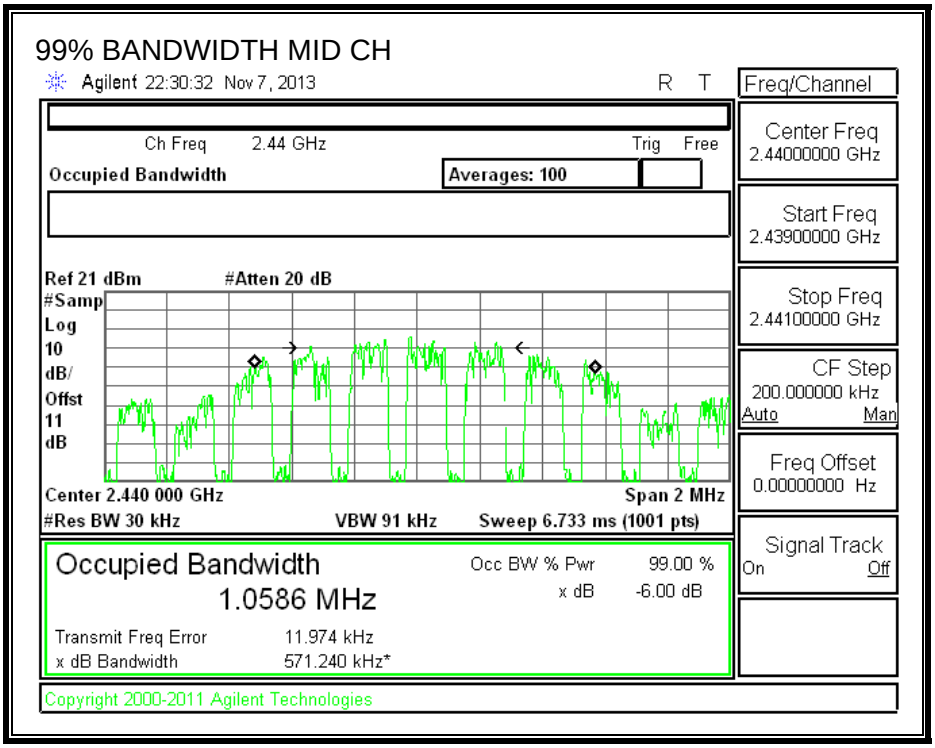
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0390
Middle	2440	1.0590
High	2480	1.0390

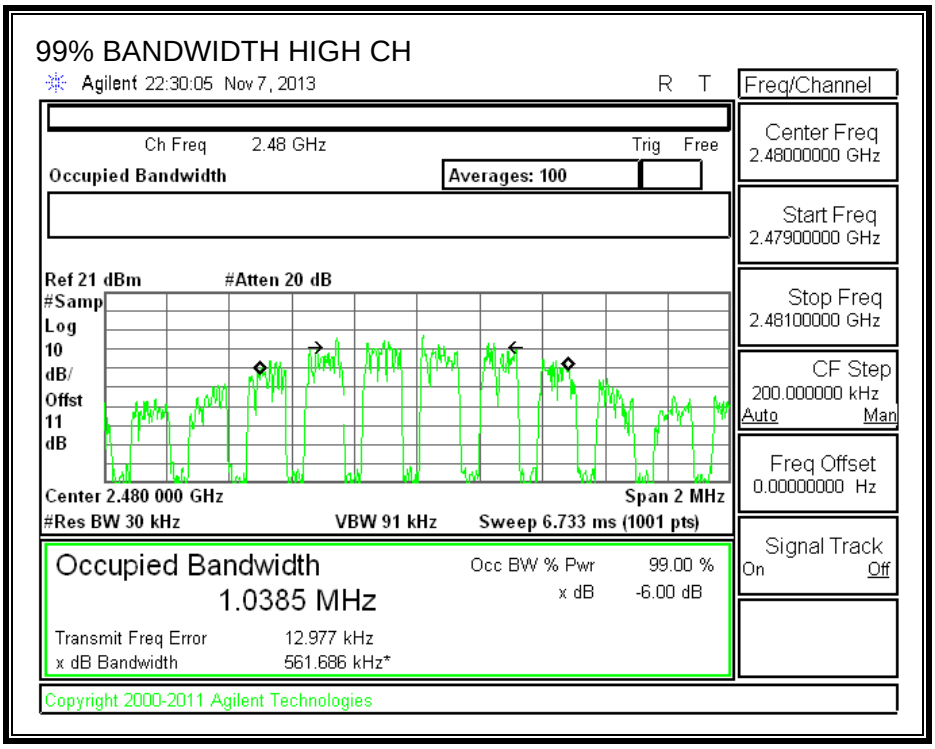
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

99% BANDWIDTH





This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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

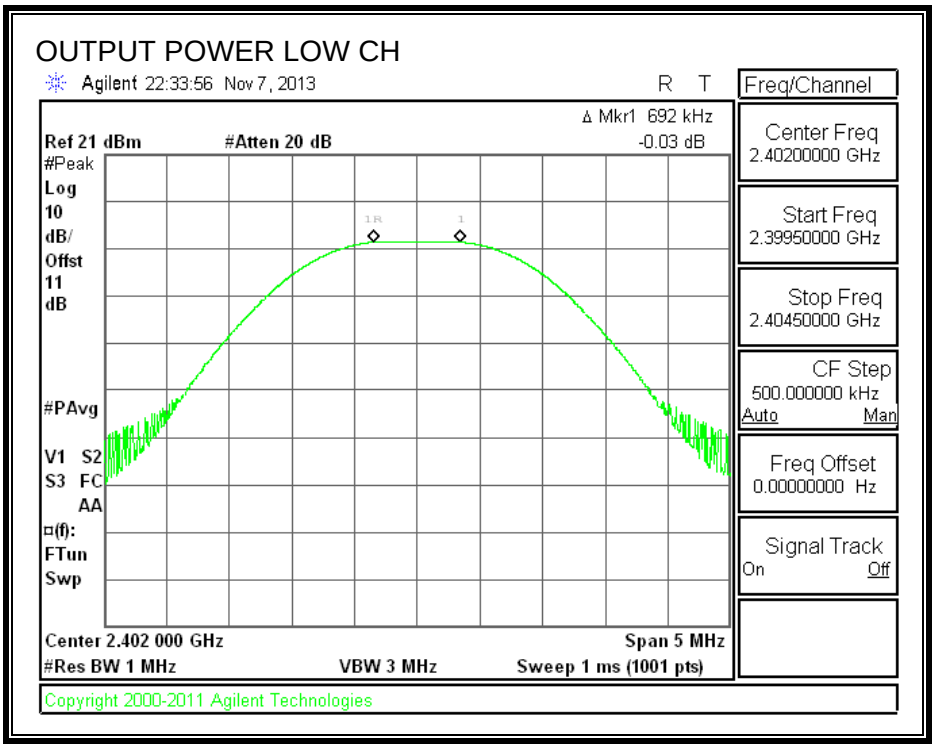
Peak power is measured using KDB558074 April 9, 2013 under section 9.1.1 utilizing spectrum analyze.

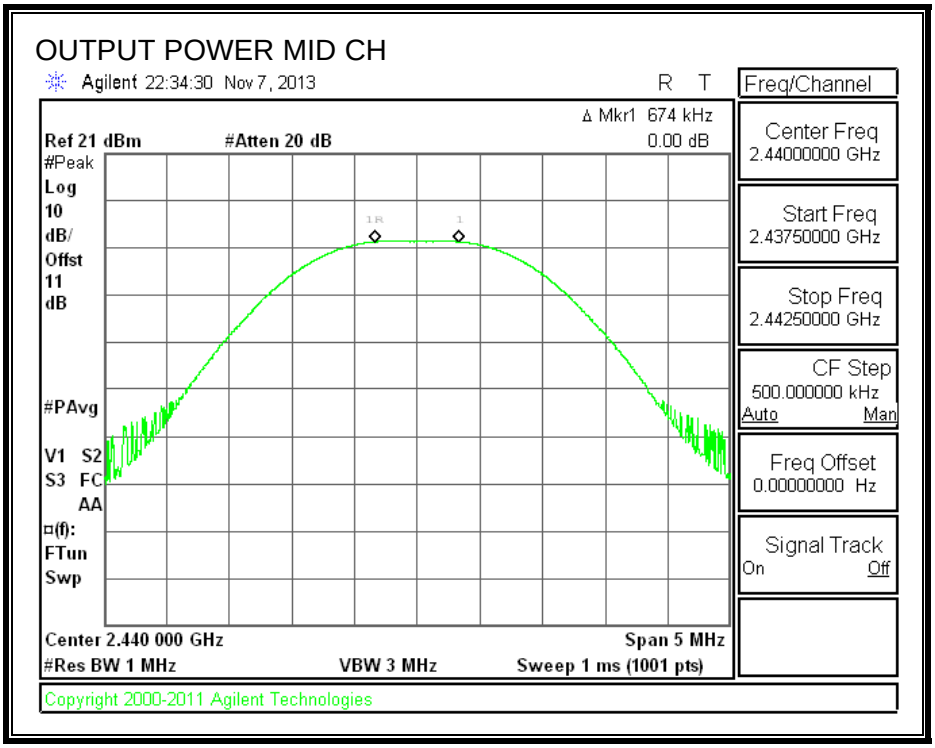
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-0.030	30	-30.030
Middle	2440	0.000	30	-30.000
High	2480	-0.020	30	-30.020

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

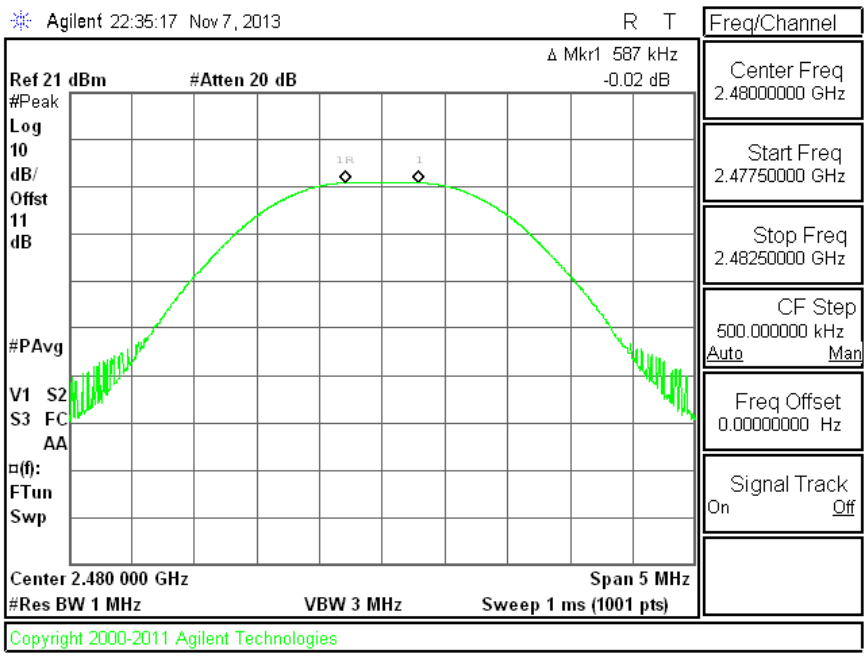
OUTPUT POWER





This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER HIGH CH



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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	-0.58
Middle	2440	-0.63
High	2480	-0.82

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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

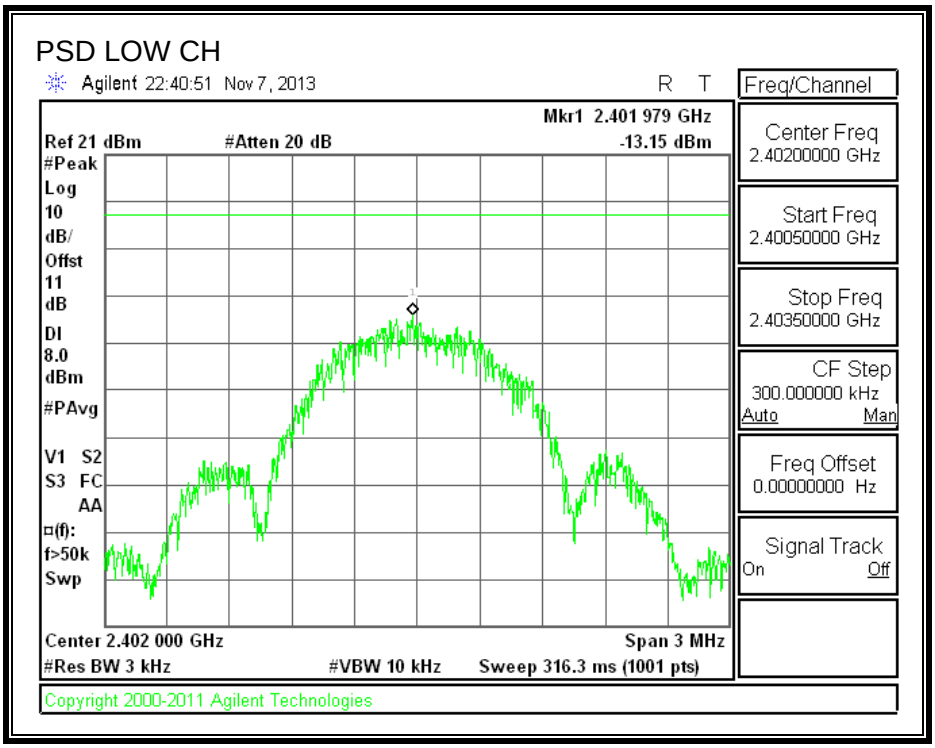
Power Spectral Density was performed utilizing the “Method PKPSD (Peak PSD)” under KDB558074, April 9, 2013

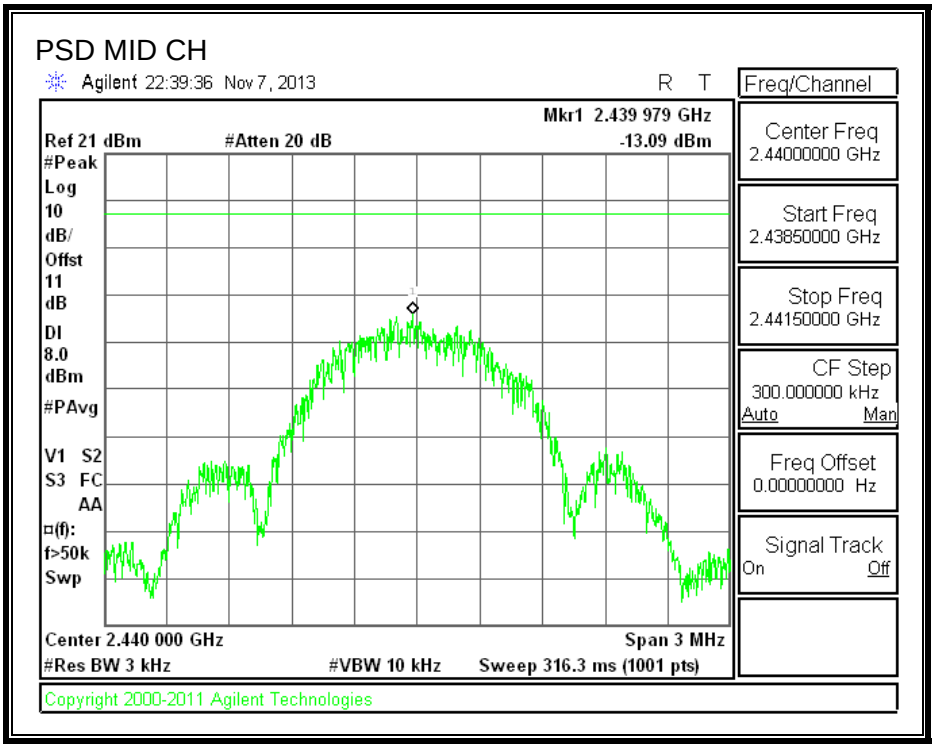
RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-13.15	8	-21.15
Middle	2440	-13.09	8	-21.09
High	2480	-13.29	8	-21.29

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

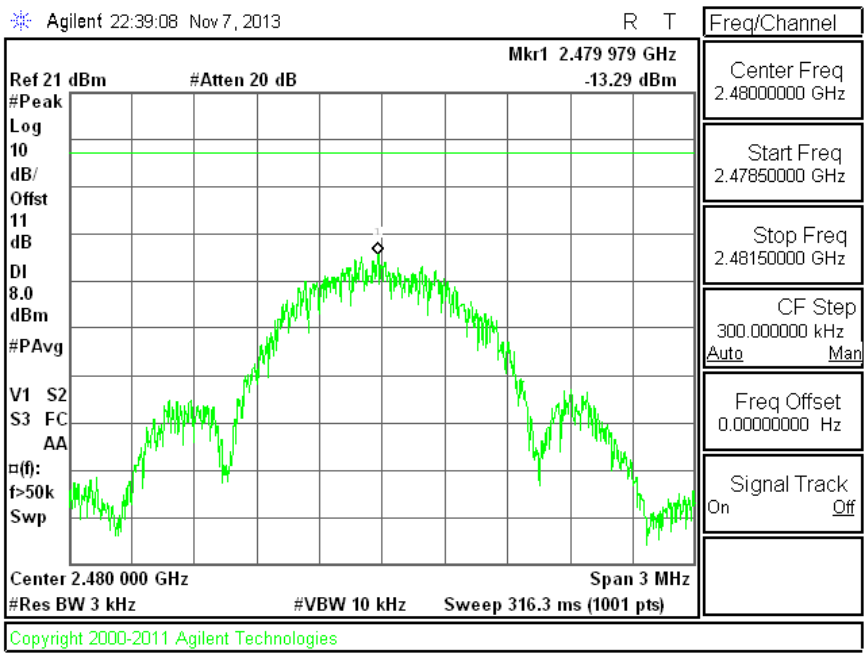
POWER SPECTRAL DENSITY





This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

PSD HIGH CH



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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

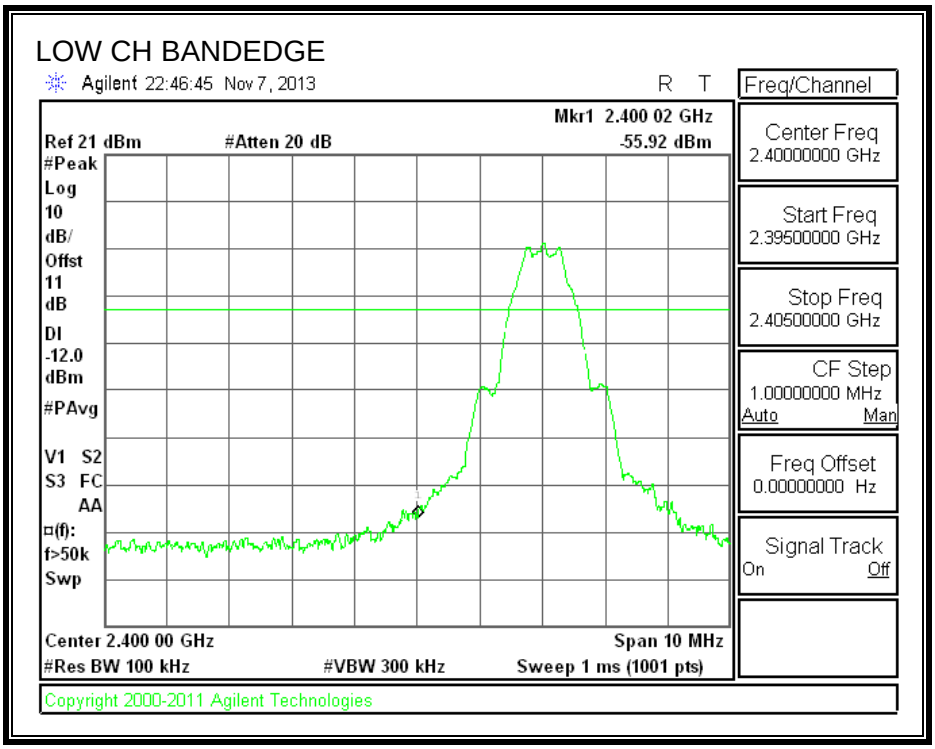
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

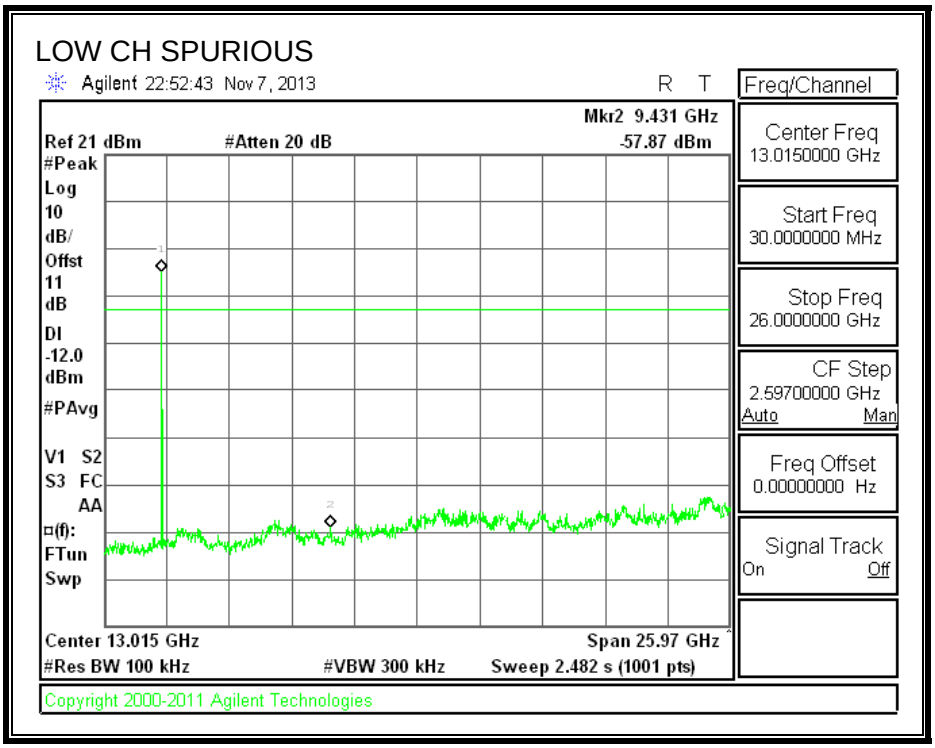
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RESULTS

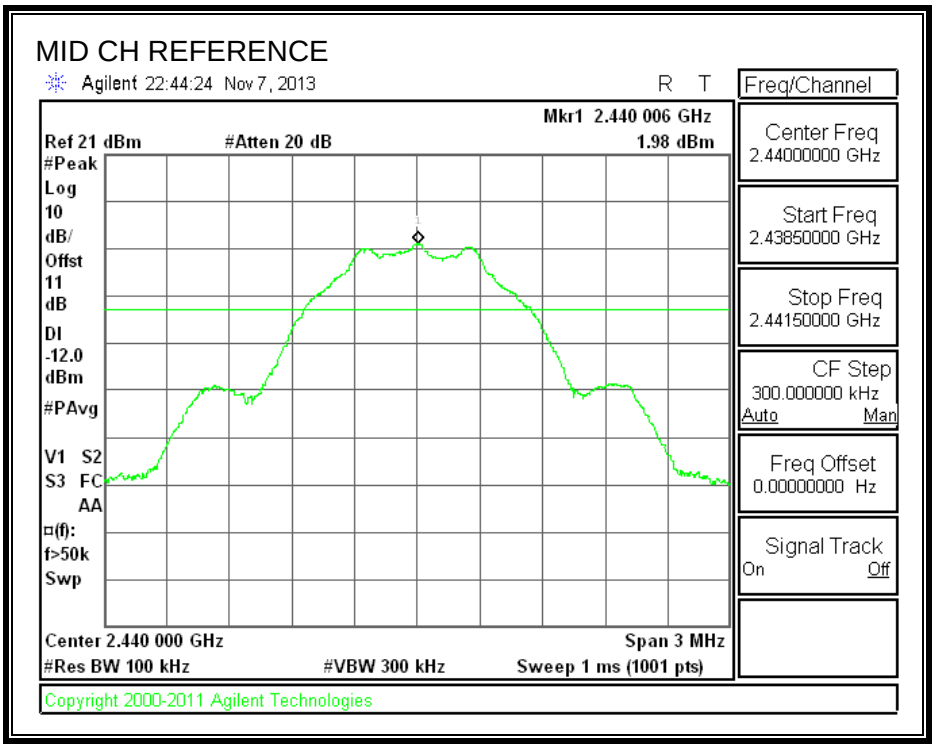
SPURIOUS EMISSIONS, LOW CHANNEL

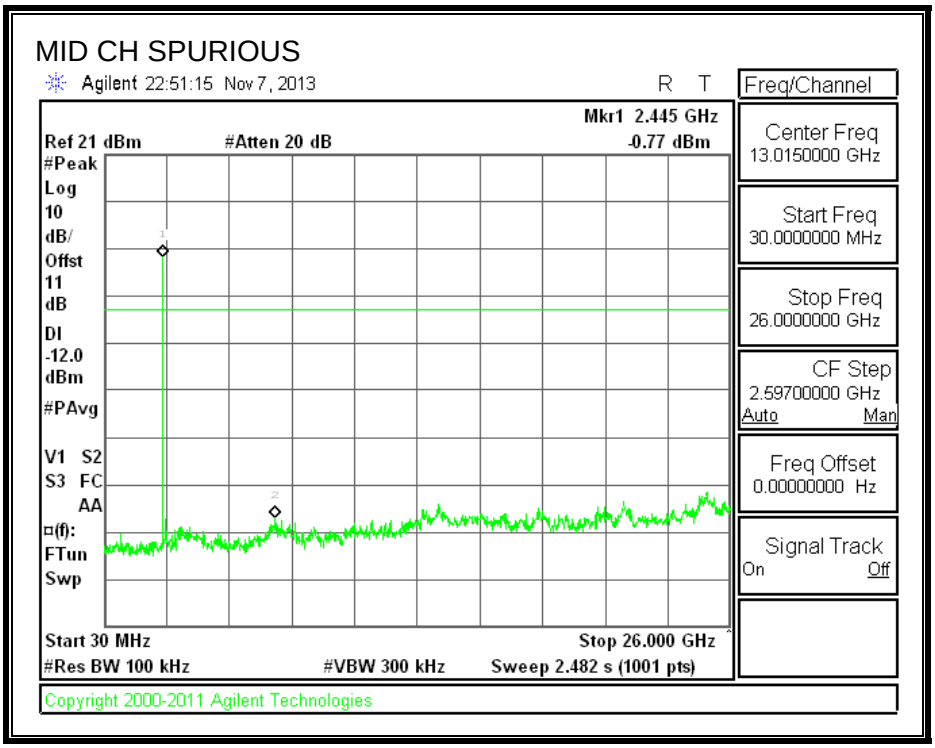




This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

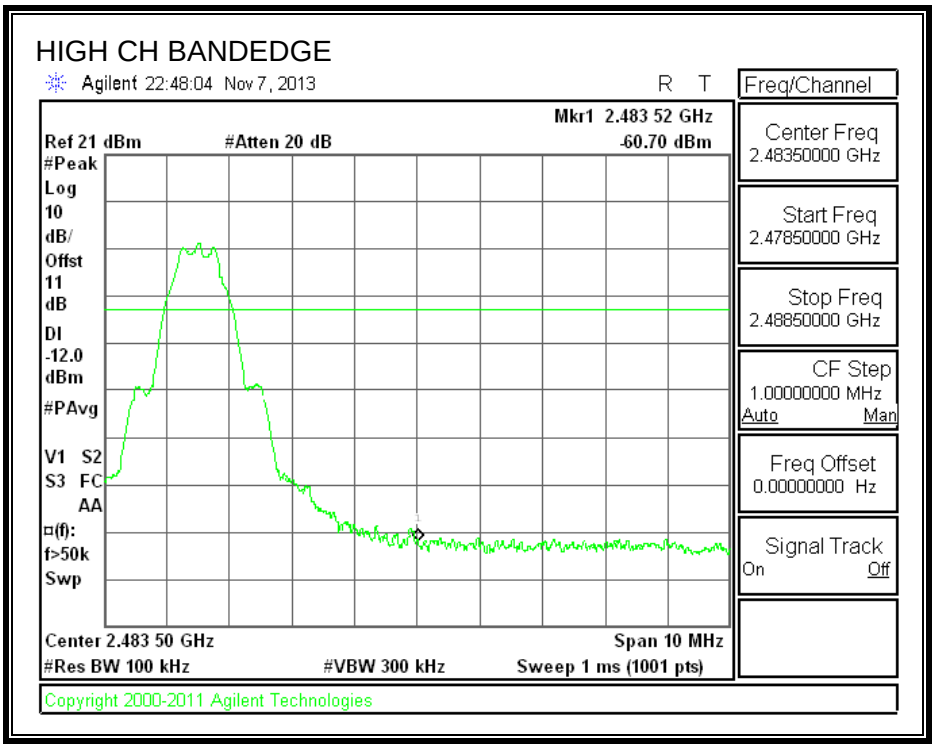
SPURIOUS EMISSIONS, MID CHANNEL

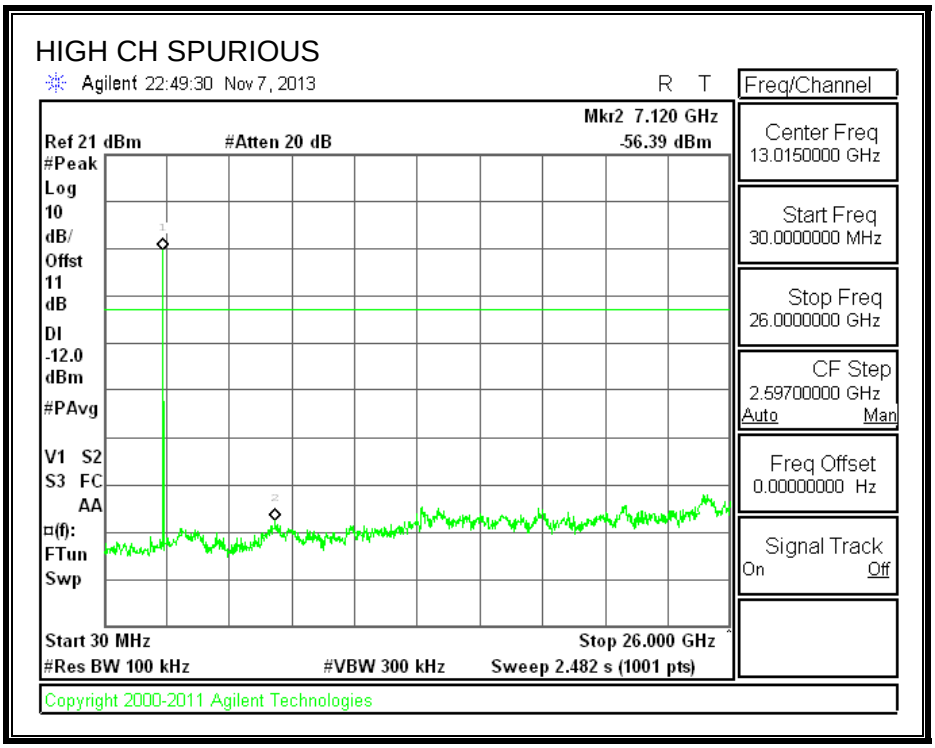




This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

SPURIOUS EMISSIONS, HIGH CHANNEL





This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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 - 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 = 2.02dB
(Spectrum Analyzer round it up to 2 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.

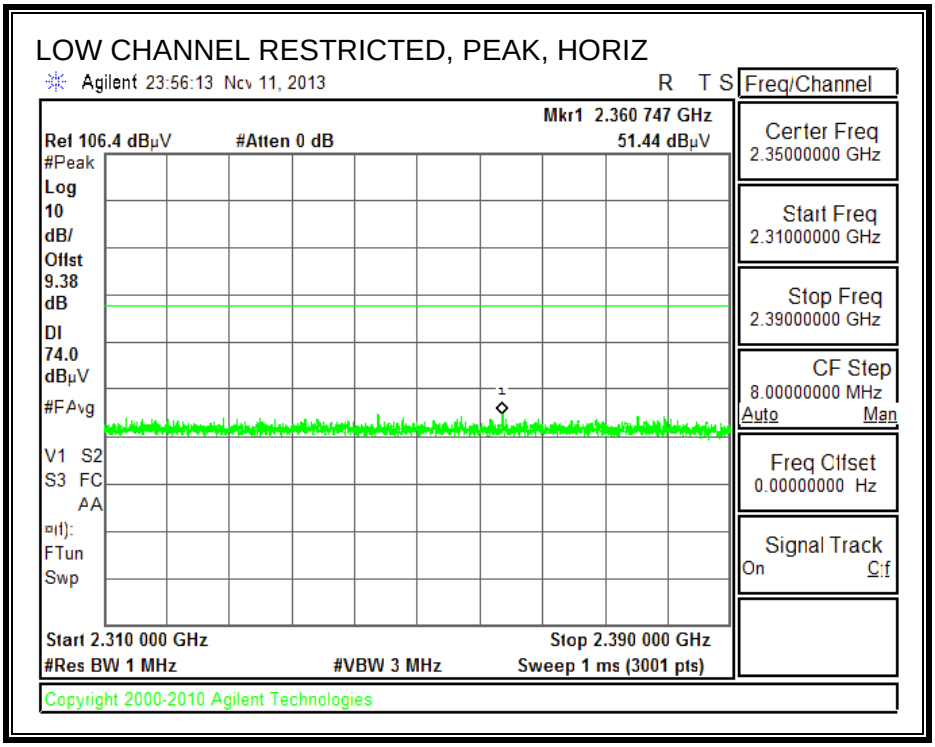
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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.

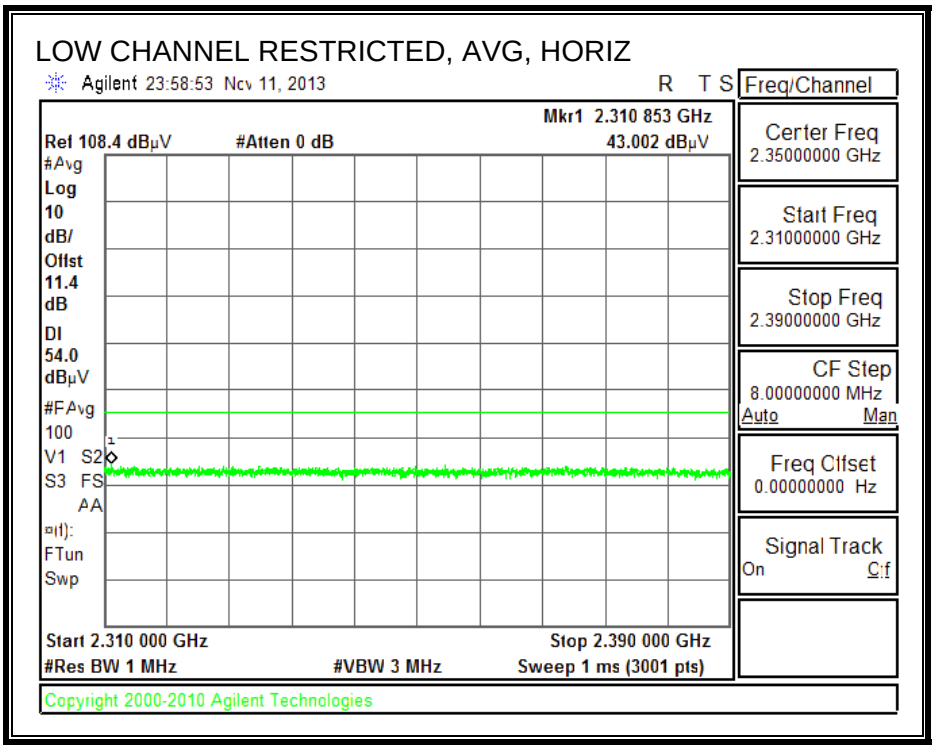
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.2. TRANSMITTER ABOVE 1 GHz

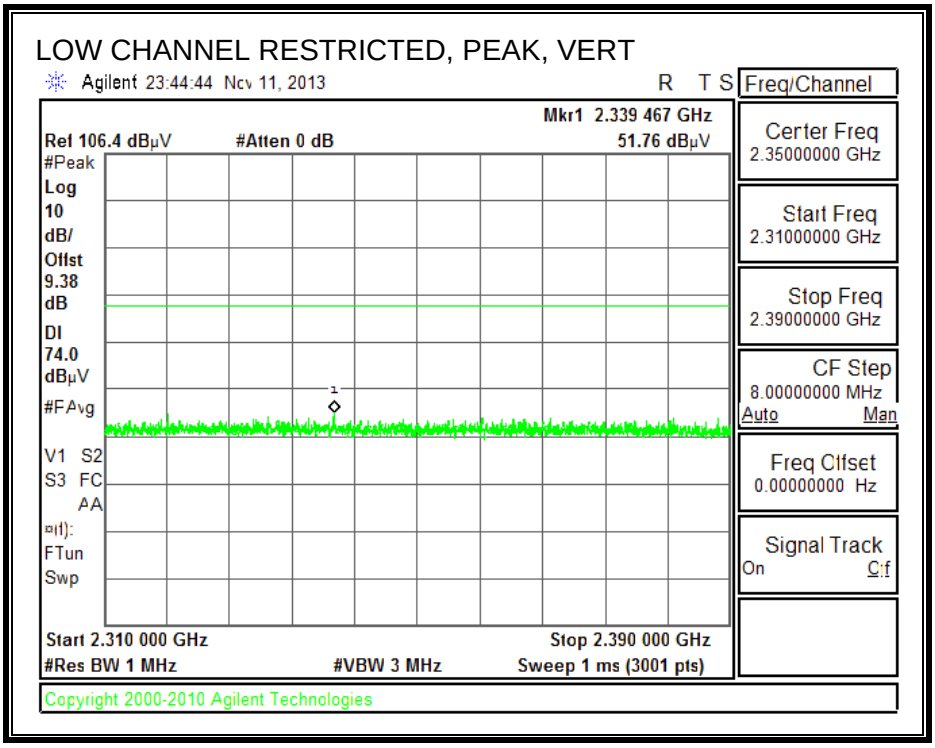
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

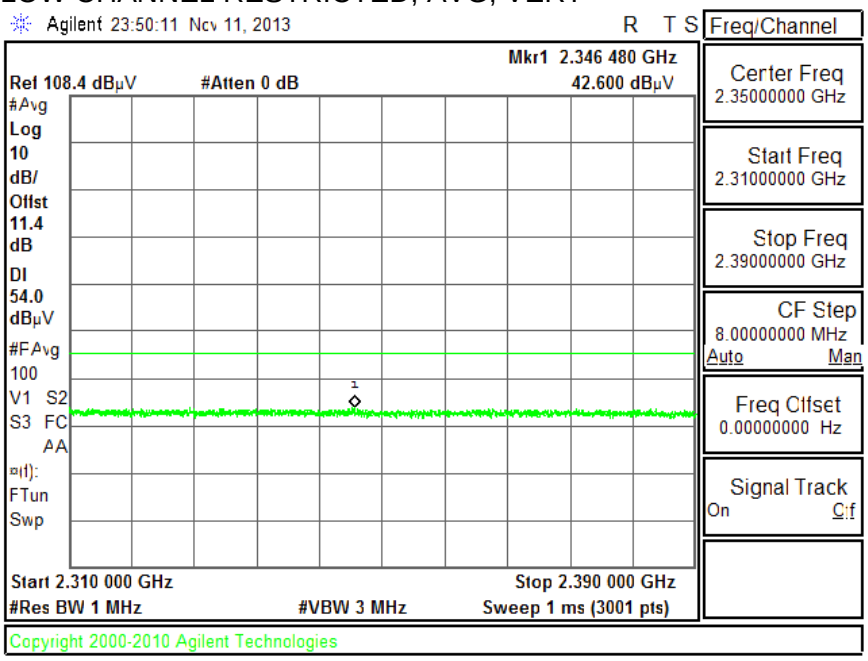


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



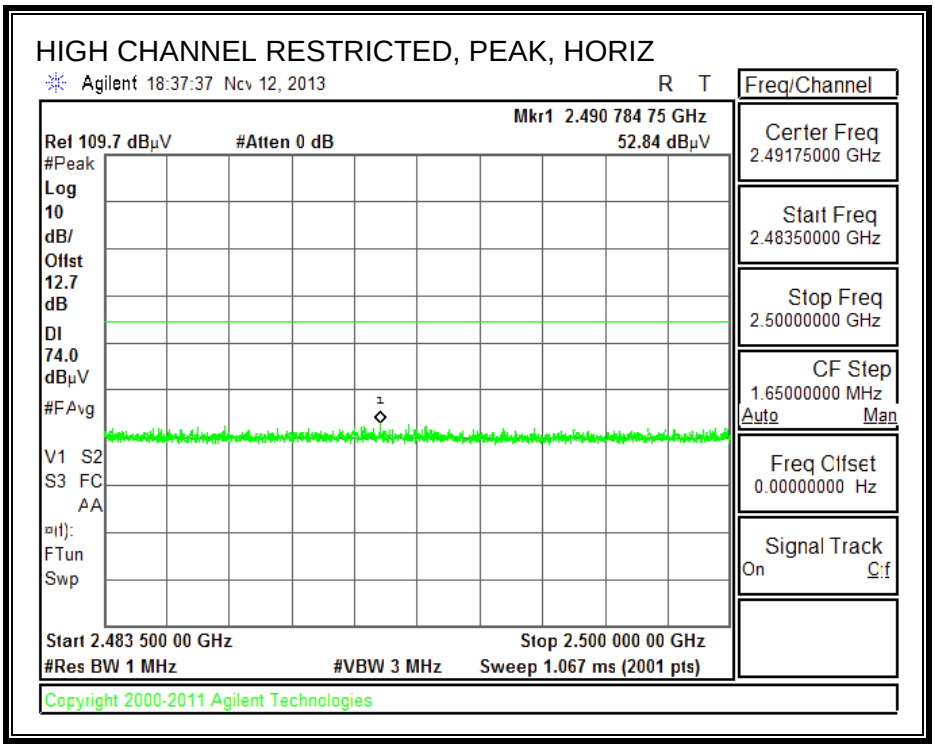
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

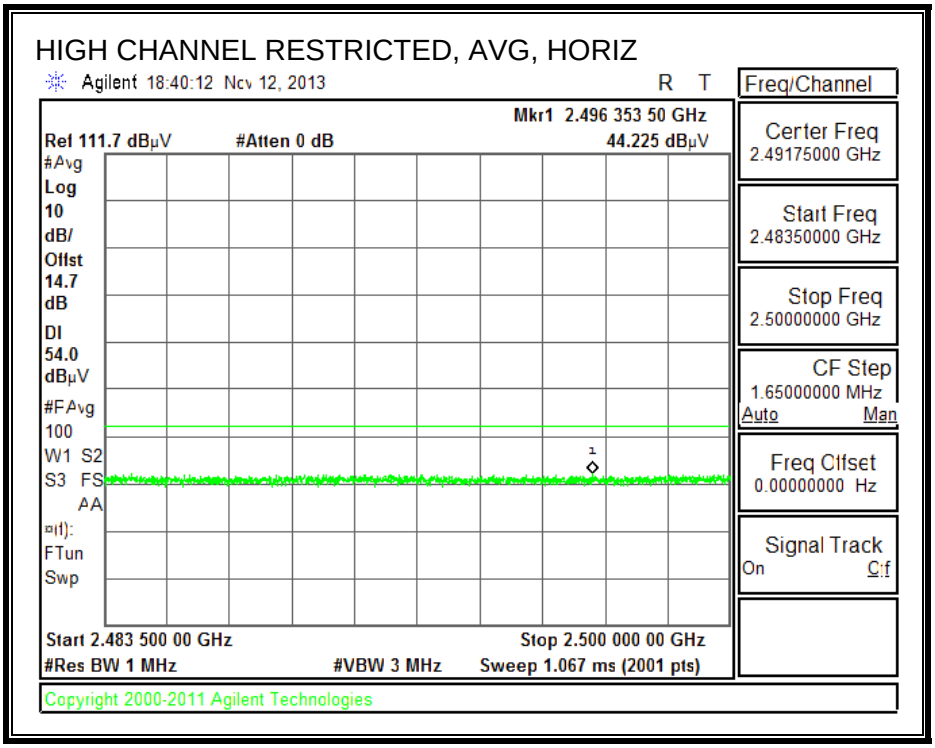
LOW CHANNEL RESTRICTED, AVG, VERT



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

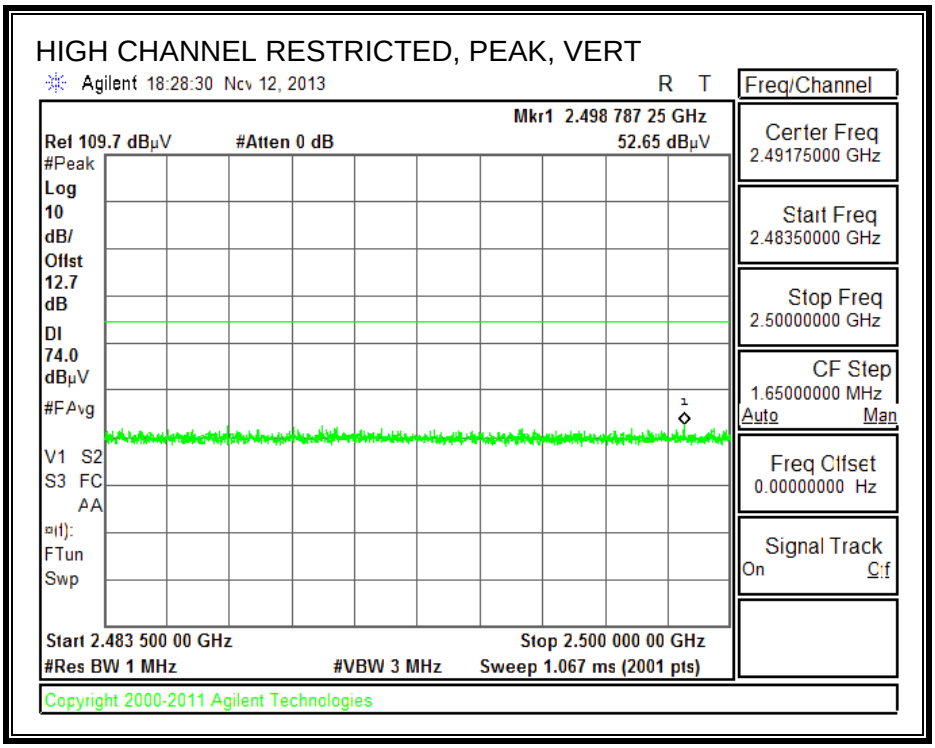
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

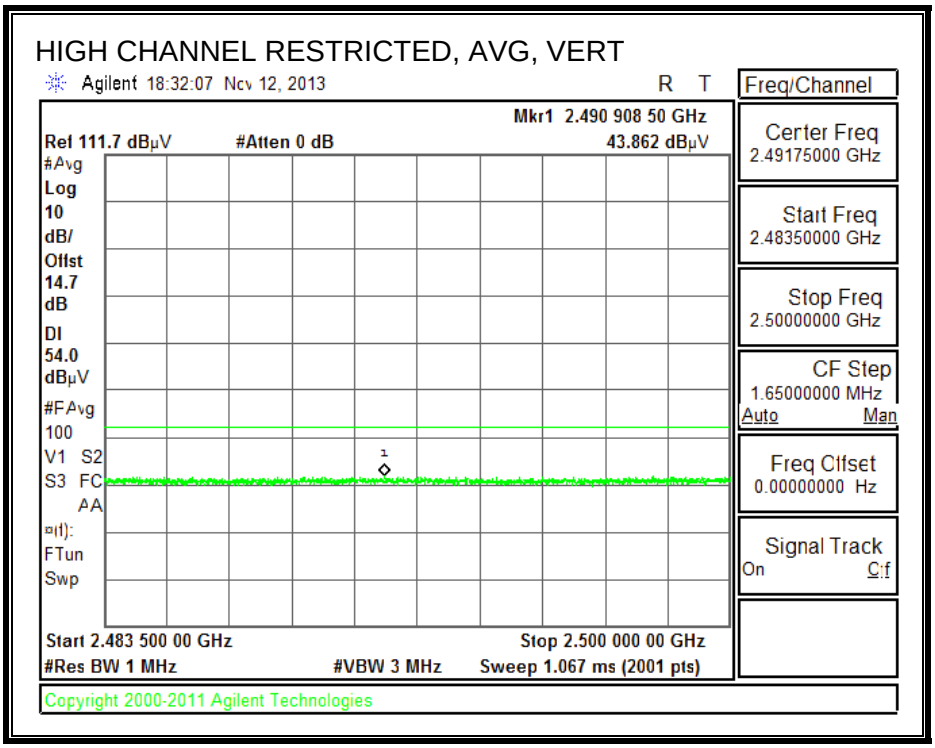




This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

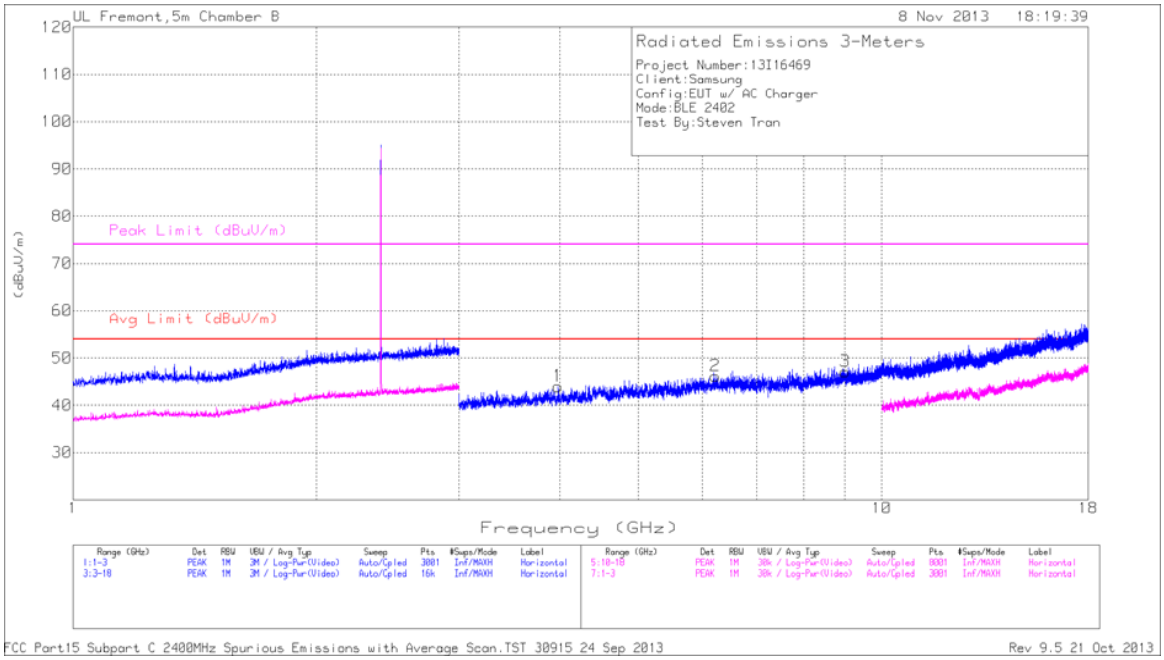




This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HARMONICS AND SPURIOUS EMISSIONS

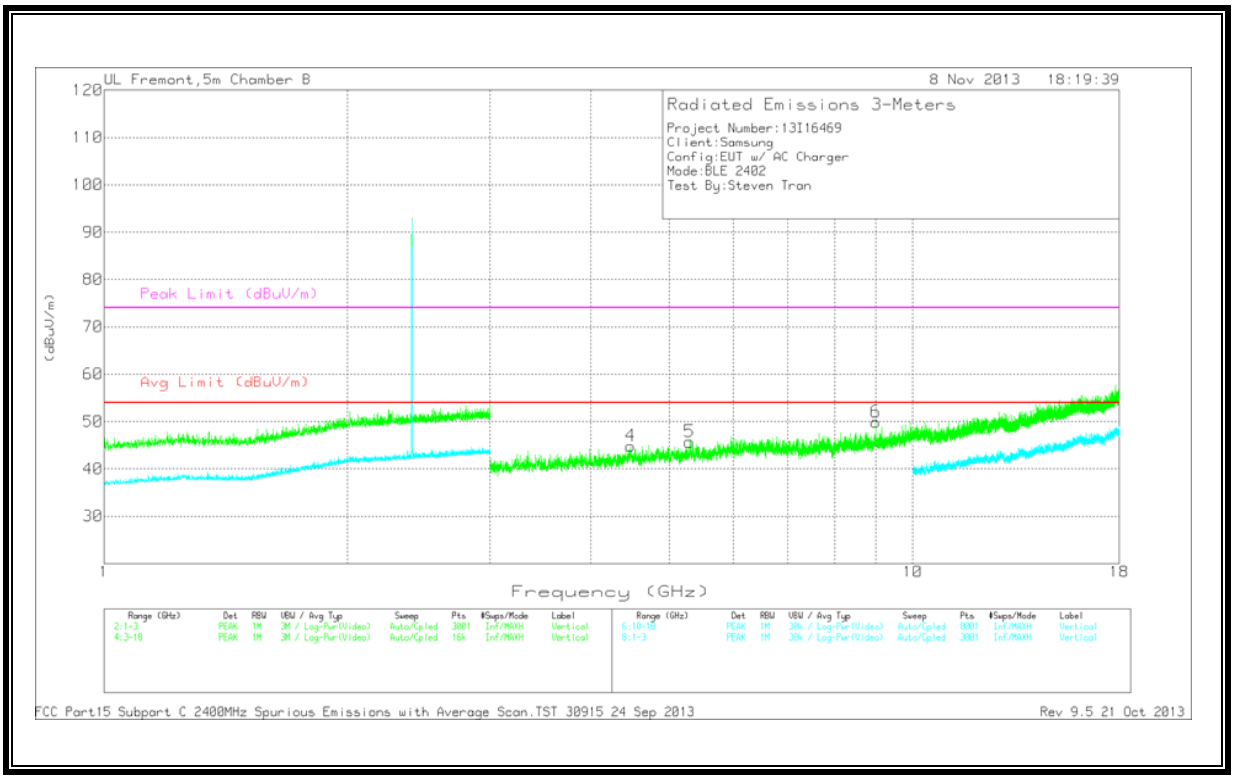
LOW CHANNEL
HORIZONTAL



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

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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.

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

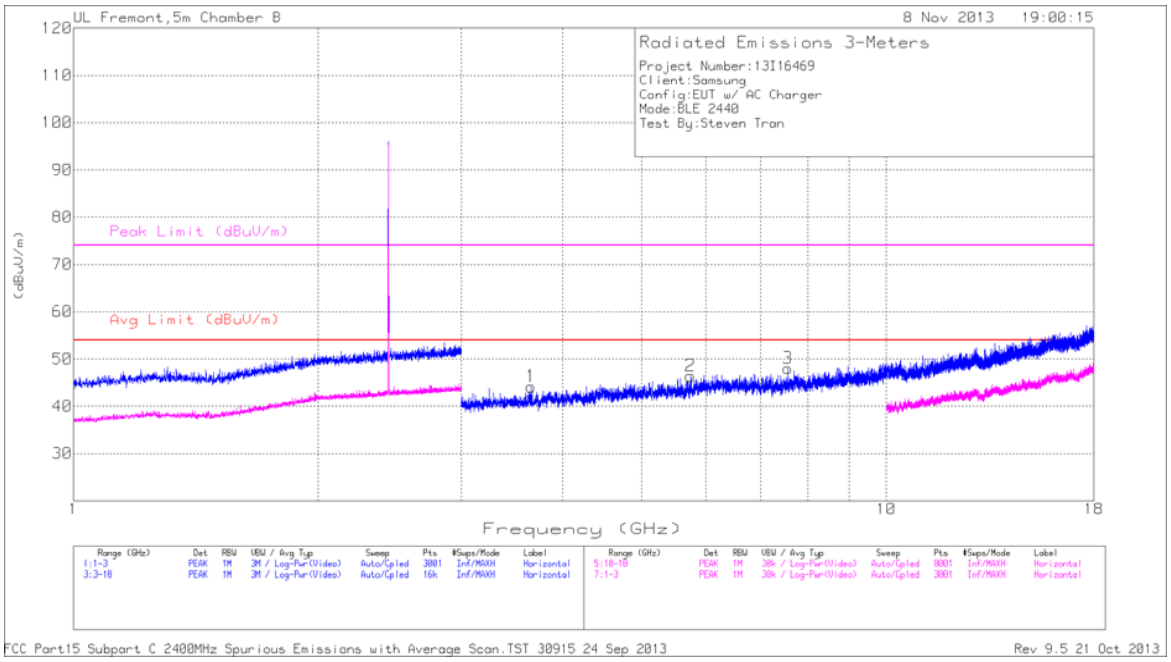
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.978	40.99	PK	33.9	-30.9	43.99	53.97	-9.98	74	-30.01	0-360	99	H
2	6.227	38.1	PK	36	-27.9	46.2	53.97	-7.77	74	-27.8	0-360	201	H
3	9.006	35.22	PK	36.8	-24.9	47.12	53.97	-6.85	74	-26.88	0-360	201	H
4	4.478	39.44	PK	34.5	-29.1	44.84	53.97	-9.13	74	-29.16	0-360	202	V
5	5.296	39.8	PK	34.9	-29	45.7	53.97	-8.27	74	-28.3	0-360	202	V
6	9.004	37.99	PK	36.8	-24.9	49.89	53.97	-4.08	74	-24.11	0-360	202	V

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID CHANNEL

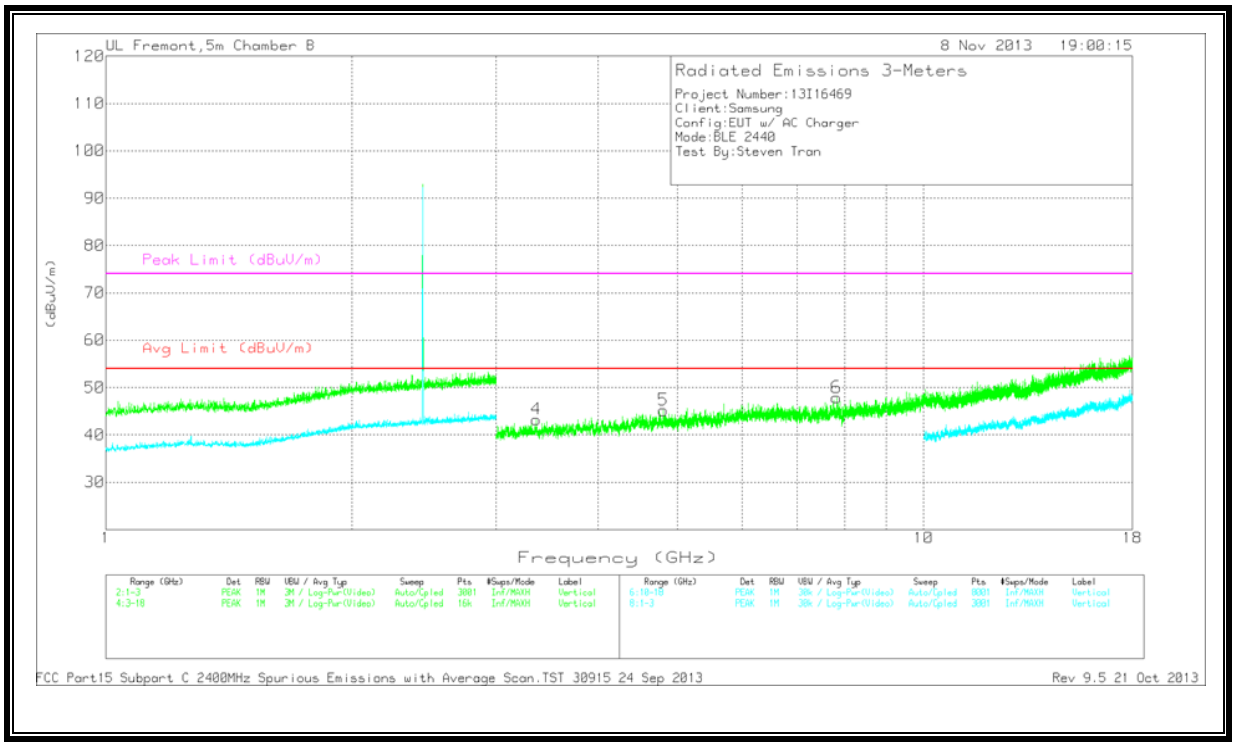
HORIZONTAL



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

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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.

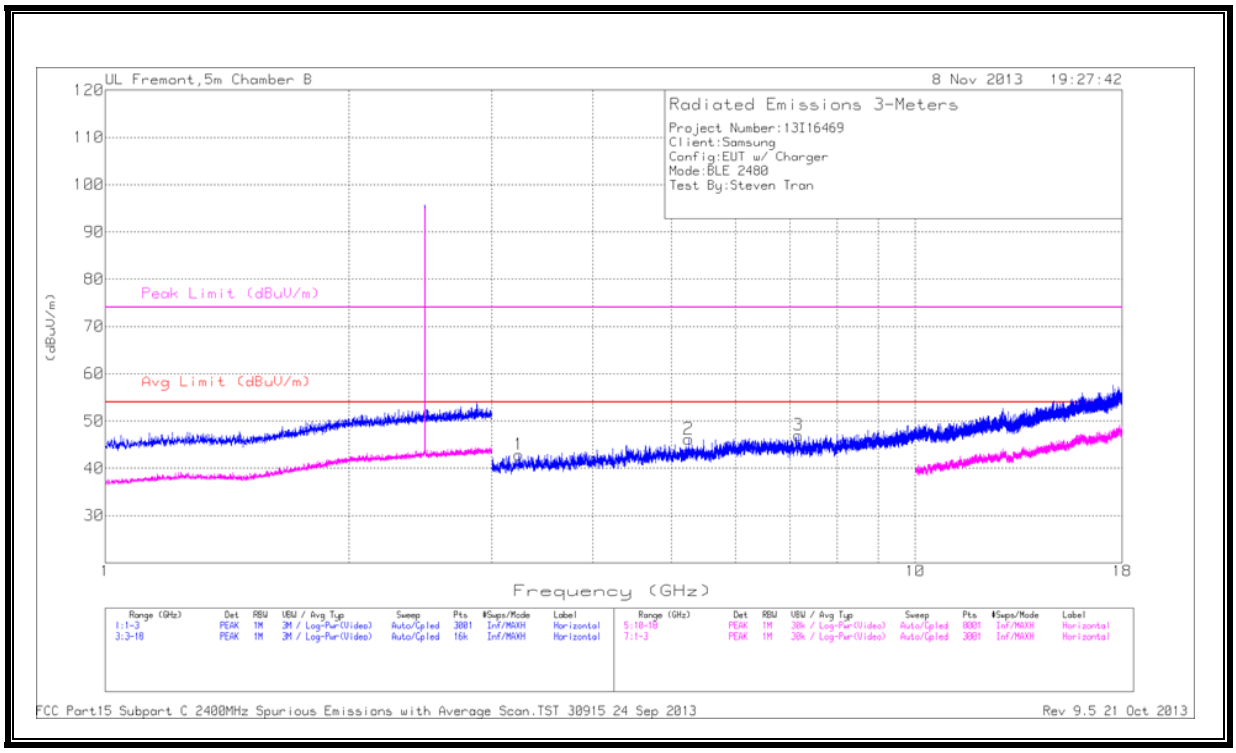
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.655	41.53	PK	33.6	-31	44.13	53.97	-9.84	74	-29.87	0-360	99	H
2	5.742	40.29	PK	35.2	-29.1	46.39	53.97	-7.58	74	-27.61	0-360	99	H
3	7.566	39.19	PK	36.1	-27.3	47.99	53.97	-5.98	74	-26.01	0-360	99	H
4	3.36	41.38	PK	33.3	-31.4	43.28	53.97	-10.69	74	-30.72	0-360	99	V
5	4.807	39.39	PK	34.7	-28.9	45.19	53.97	-8.78	74	-28.81	0-360	99	V
6	7.826	38.46	PK	36.2	-26.8	47.86	53.97	-6.11	74	-26.14	0-360	99	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

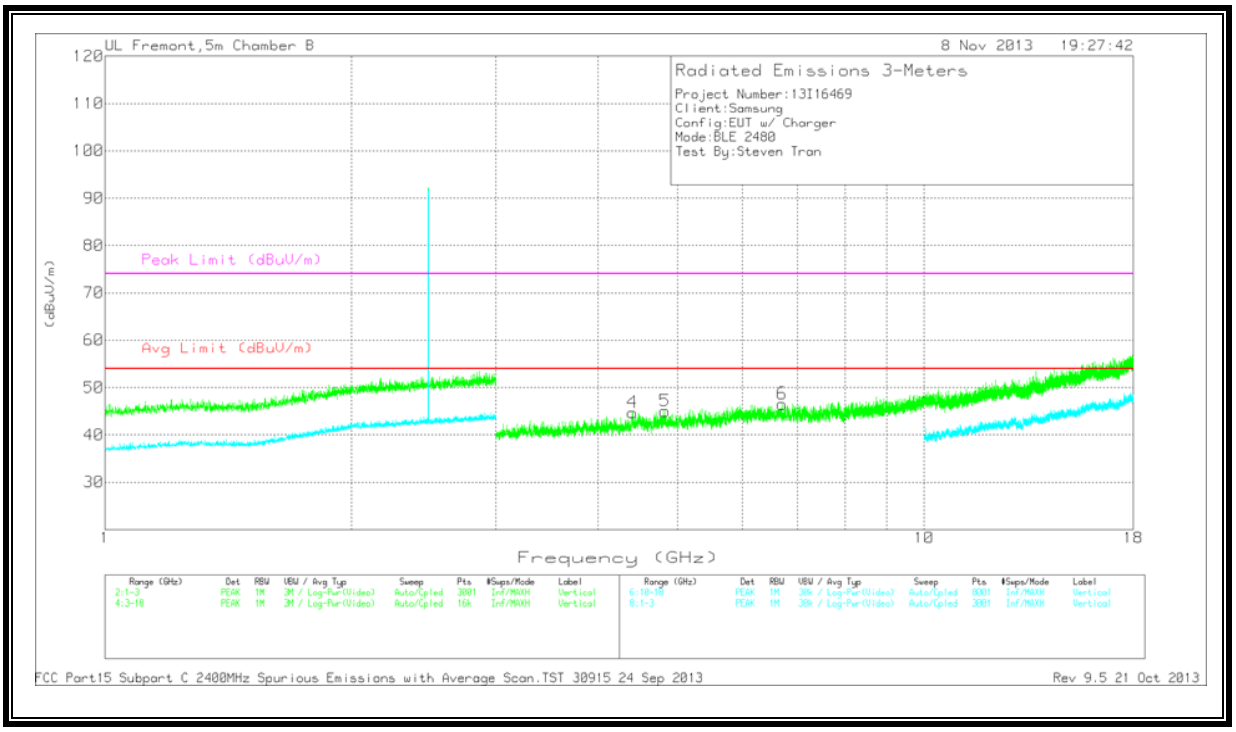
HIGH CHANNEL
HORIZONTAL



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

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CHANNEL DATA

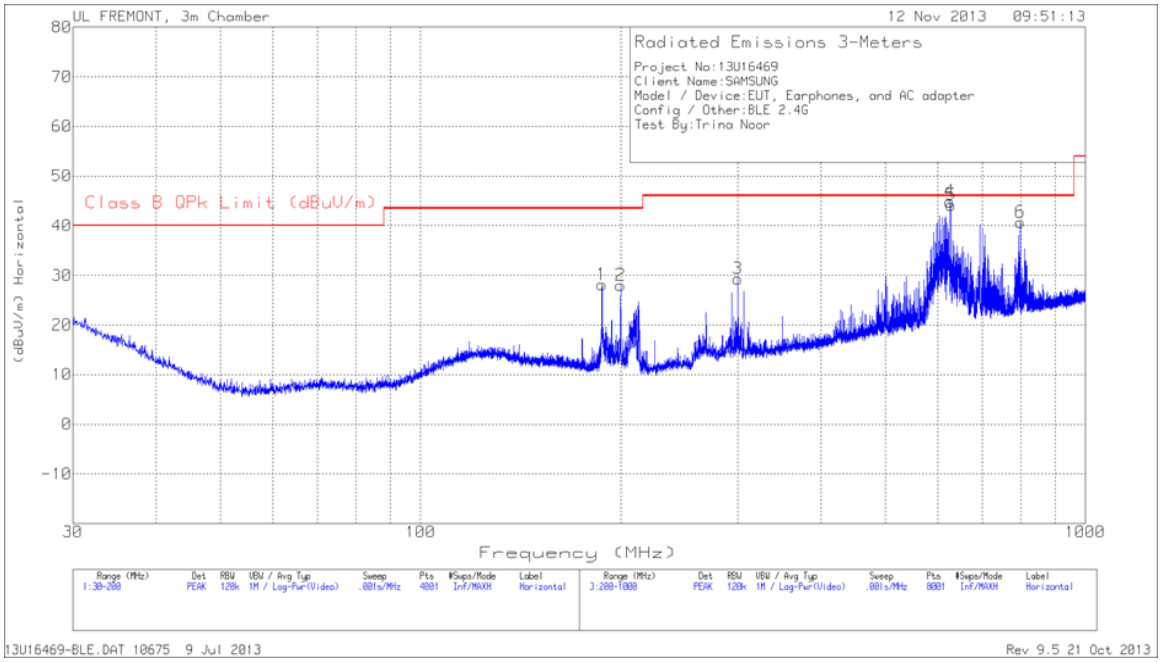
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.242	40.59	PK	33.3	-31	42.89	53.97	-11.08	74	-31.11	0-360	201	H
2	5.251	41.07	PK	34.9	-29.8	46.17	53.97	-7.8	74	-27.83	0-360	201	H
3	7.171	38.5	PK	35.8	-27.3	47	53.97	-6.97	74	-27	0-360	201	H
4	4.405	40.11	PK	34.3	-29.7	44.71	53.97	-9.26	74	-29.29	0-360	99	V
5	4.826	39.73	PK	34.7	-29.4	45.03	53.97	-8.94	74	-28.97	0-360	202	V
6	6.709	39.81	PK	35.8	-29.1	46.51	53.97	-7.46	74	-27.49	0-360	202	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.3. WORST-CASE BELOW 1 GHz

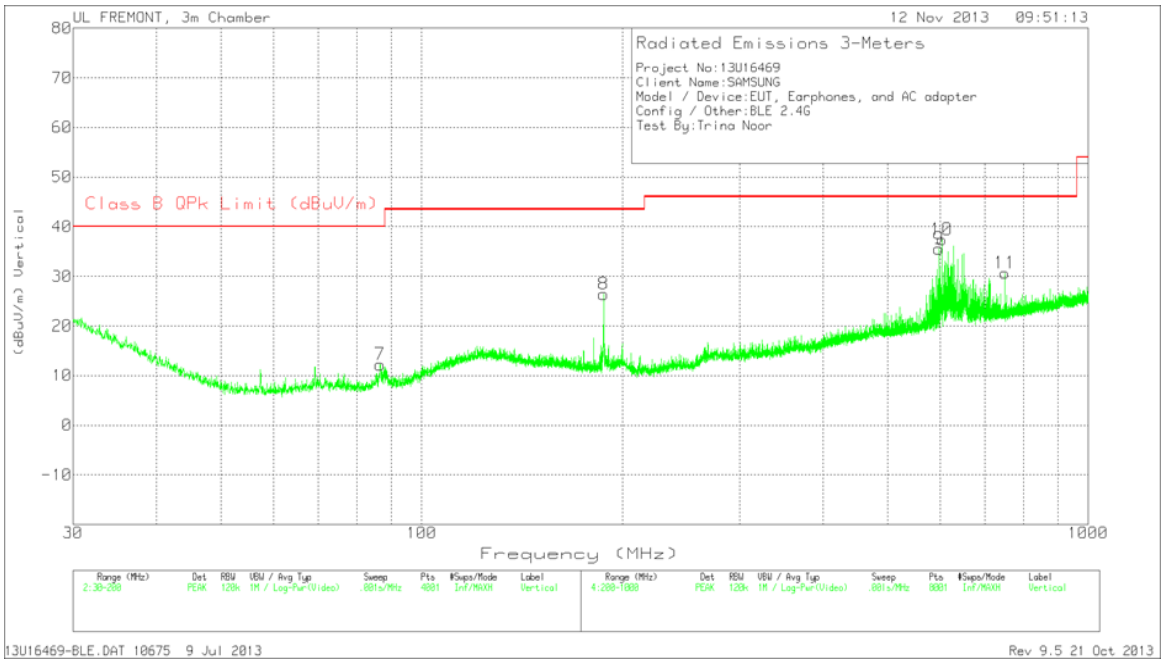
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

HORIZONTAL PLOT



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

VERTICAL PLOT



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	187.4625	43.23	PK	10.9	-26	28.13	43.52	-15.39	0-360	201	H
2	200	41.61	PK	12.3	-25.9	28.01	43.52	-15.51	0-360	99	H
7	86.61	31.6	PK	7.6	-27	12.2	40	-27.8	0-360	99	V
8	187.5475	41.52	PK	10.9	-26	26.42	43.52	-17.1	0-360	99	V
3	300.1	41.22	PK	13.3	-25.2	29.32	46.02	-16.7	0-360	99	H
4	625.1	51.04	PK	19.3	-25.5	44.84	46.02	-1.18	0-360	99	H
5	628.2	50.18	PK	19.4	-25.4	44.18	46.02	-1.84	0-360	99	H
6	797.8	44.09	PK	21	-24.4	40.69	46.02	-5.33	0-360	99	H
9	596.9	42.86	PK	18.3	-25.6	35.56	46.02	-10.46	0-360	301	V
10	603.2	44.49	PK	18.4	-25.5	37.39	46.02	-8.63	0-360	301	V
11	750	34.88	PK	20.6	-24.8	30.68	46.02	-15.34	0-360	99	V

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
116.0451	22.79	QP	13.5	-26.6	9.69	43.52	-33.83	29	222	H
600.0259	46.34	QP	18.3	-25.6	39.04	46.02	-6.98	124	124	H
599.9886	37.38	QP	18.3	-25.6	30.08	46.02	-15.94	182	146	H
628.2	49.74	QP	18.3	-25.6	42.44	46.02	-3.58	171	148	H
625.1	50.86	QP	18.3	-25.6	43.56	46.02	-2.46	116	145	H
600.0081	52.11	QP	18.3	-25.6	44.81	46.02	-1.21	193	131	H

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

6 WORST EMISSIONS

Line-L1 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
1	.2715	41.88	PK	.1	0	41.98	61.1	-19.12	-	-
2	.2715	10.9	Av	.1	0	11	-	-	51.1	-40.1
9	.2715	41.88	PK	.1	0	41.98	61.1	-19.12	-	-
10	.2715	10.9	Av	.1	0	11	-	-	51.1	-40.1
3	.978	34.35	PK	.1	.1	34.55	56	-21.45	-	-
4	.978	10.66	Av	.1	.1	10.86	-	-	46	-35.14
11	.978	34.35	PK	.1	.1	34.55	56	-21.45	-	-
12	.978	10.66	Av	.1	.1	10.86	-	-	46	-35.14
5	5.0055	35.95	PK	.1	.1	36.15	60	-23.85	-	-
6	5.0055	.28	Av	.1	.1	.48	-	-	50	-49.52
13	5.0415	33.88	PK	.1	.1	34.08	60	-25.92	-	-
14	5.0415	1.25	Av	.1	.1	1.45	-	-	50	-48.55
7	15.5985	43.56	PK	.2	.2	43.96	60	-16.04	-	-
8	15.5985	18.67	Av	.2	.2	19.07	-	-	50	-30.93
15	16.0935	42.91	PK	.2	.2	43.31	60	-16.69	-	-
16	16.0935	14.5	Av	.2	.2	14.9	-	-	50	-35.1

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

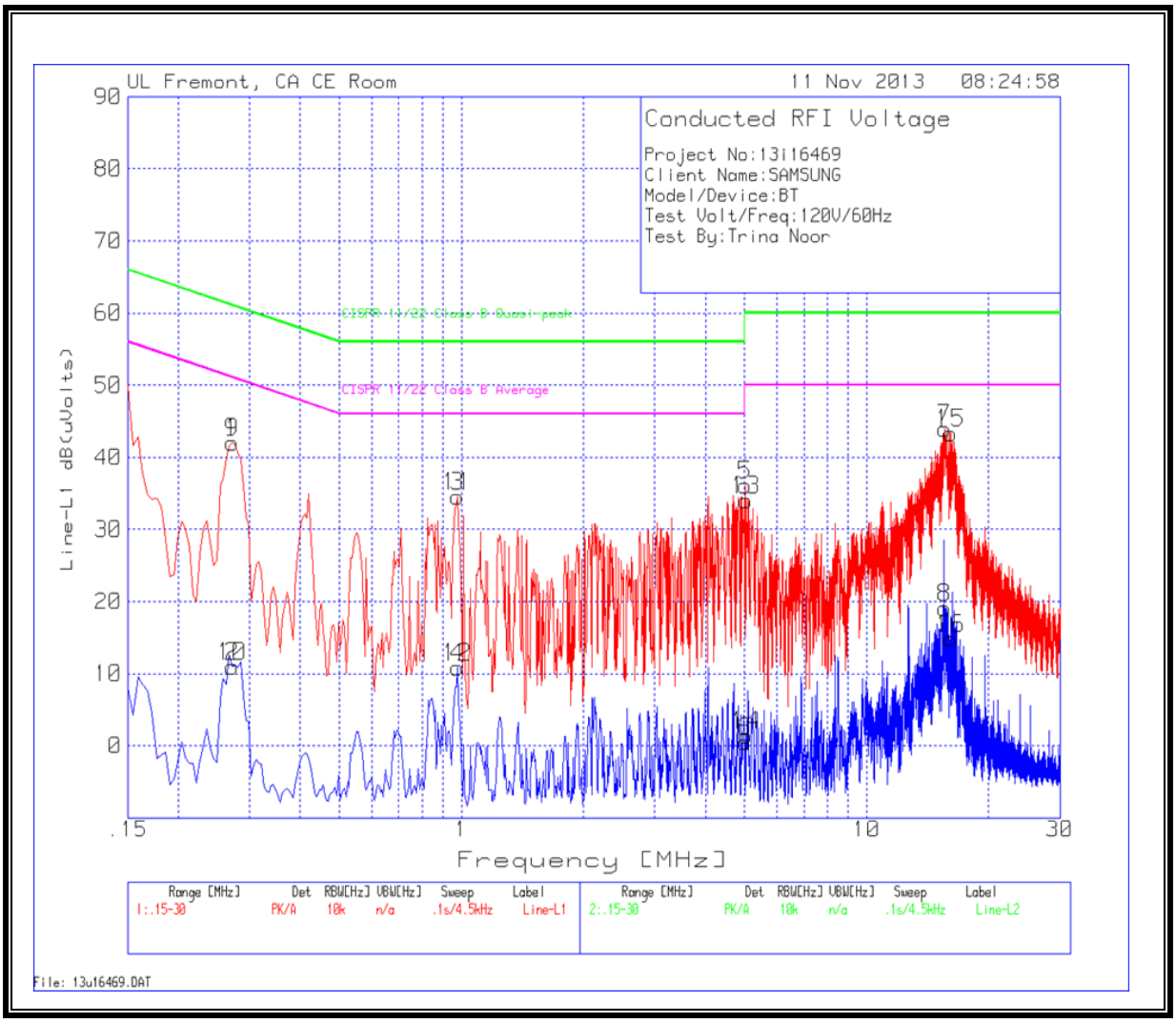
Line-L2 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
9	.2715	42.27	PK	.1	0	42.37	61.1	-18.73	-	-
10	.2715	8.26	Av	.1	0	8.36	-	-	51.1	-42.74
11	.4245	31.4	PK	.1	0	31.5	57.4	-25.9	-	-
12	.4245	3.55	Av	.1	0	3.65	-	-	47.4	-43.75
13	5.235	32.15	PK	.1	.1	32.35	60	-27.65	-	-
14	5.235	5.33	Av	.1	.1	5.53	-	-	50	-44.47
15	15.693	36.02	PK	.2	.2	36.42	60	-23.58	-	-
16	15.693	6.82	Av	.2	.2	7.22	-	-	50	-42.78

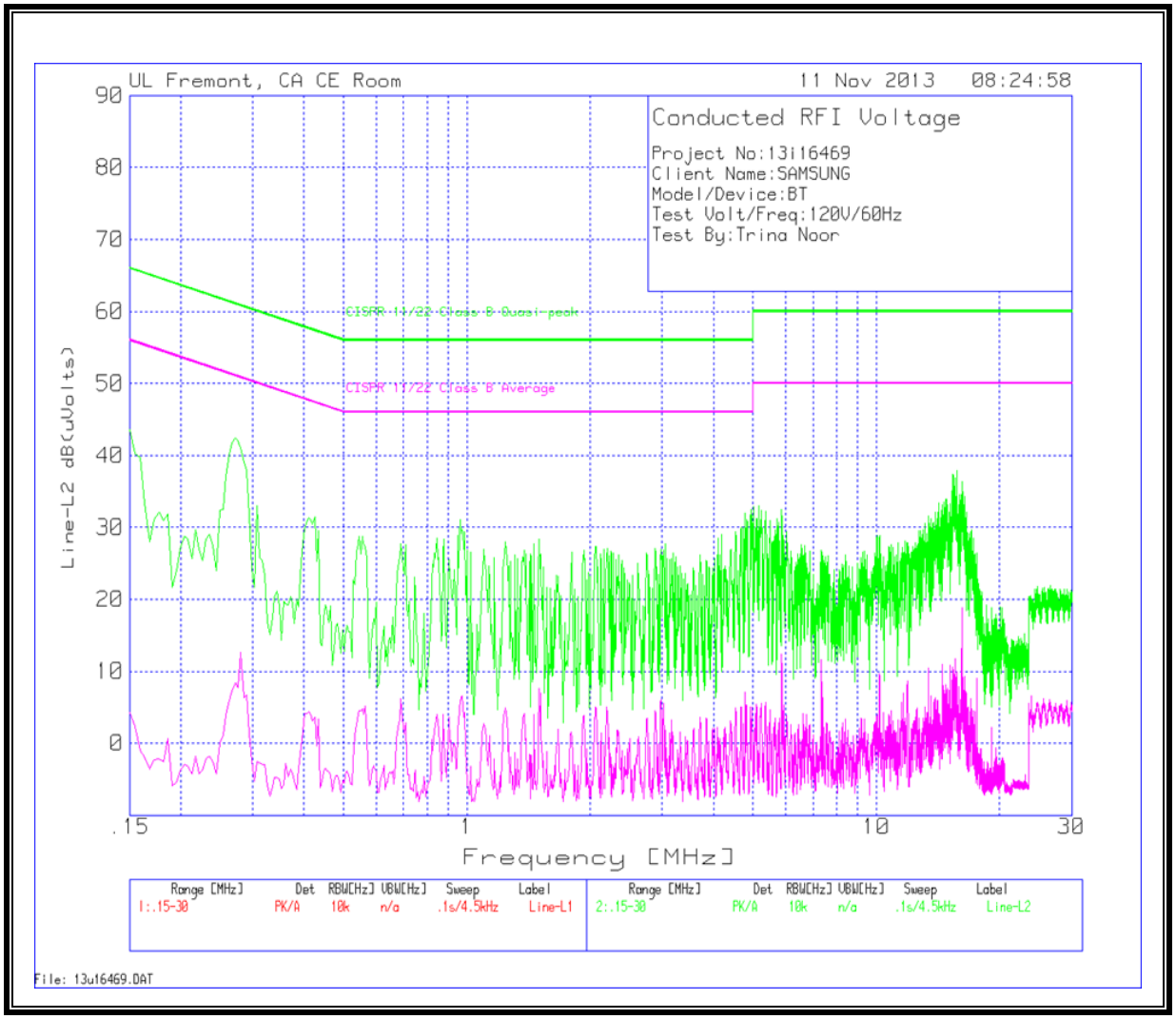
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LINE 1 RESULTS



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LINE 2 RESULTS



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.