FCC CFR47 PART 15 SUBPART C

BLUETOOTH LOW ENERGY CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER: SM-T360

FCC ID: A3LSMT360

REPORT NUMBER: 14U18495-E2 REVISION A

ISSUE DATE: AUGUST 29, 2014

Prepared for

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

Prepared by

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

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	8/20/14	Initial Issue	P. Zhang
A	8/29/14	Updated equipment list; KDB reference	P. Zhang

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. WORST-CASE CONFIGURATION AND MODE 7

5.5. 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 16

8.3. OUTPUT POWER 20

8.4. AVERAGE POWER 24

8.5. POWER SPECTRAL DENSITY 25

8.6. CONDUCTED SPURIOUS EMISSIONS 29

9. RADIATED TEST RESULTS 36

9.1. LIMITS AND PROCEDURE 36

9.2. TRANSMITTER ABOVE 1 GHz 37

9.3. WORST-CASE BELOW 1 GHz 50

10. AC POWER LINE CONDUCTED EMISSIONS 53

11. SETUP PHOTOS 56

END OF REPORT 61

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.

EUT DESCRIPTION: Tablet with Bluetooth, DTS/UNII a/b/g/n, ANT+ & NFC

MODEL: SM-T360

SERIAL NUMBER: 1934661 (Radiated) and 1934663(Conducted)

DATE TESTED: AUGUST 8-19, 2014

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

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

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

Approved & Released For
UL Verification Services Inc. By:

PENG ZHANG
CONSUMER TECHNOLOGY DIVISION
PROJECT LEADER
UL Verification Services Inc.

Tested By:

CHARLES VERGONIO
CONSUMER TECHNOLOGY DIVISION
LAB ENGINEER
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.

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	☐ Chamber D
☐ Chamber B	☐ Chamber E
☒ Chamber C	☐ Chamber F
	☒ Chamber G

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%.

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 Tablet 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	-0.24	0.95

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -0.73dBi.

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

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.

Both standalone and with back cover configuration investigated through preliminary scanning and final measurement based on worst case configuration with EUT standalone with.

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

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter	SAMSUNG	EP-TA10EWE	N/A	N/A
Earphone	SAMSUNG	N/A	N/A	N/A
Back cover with touch pen	SAMSUNG	N/A	N/A	N/A

I/O CABLES

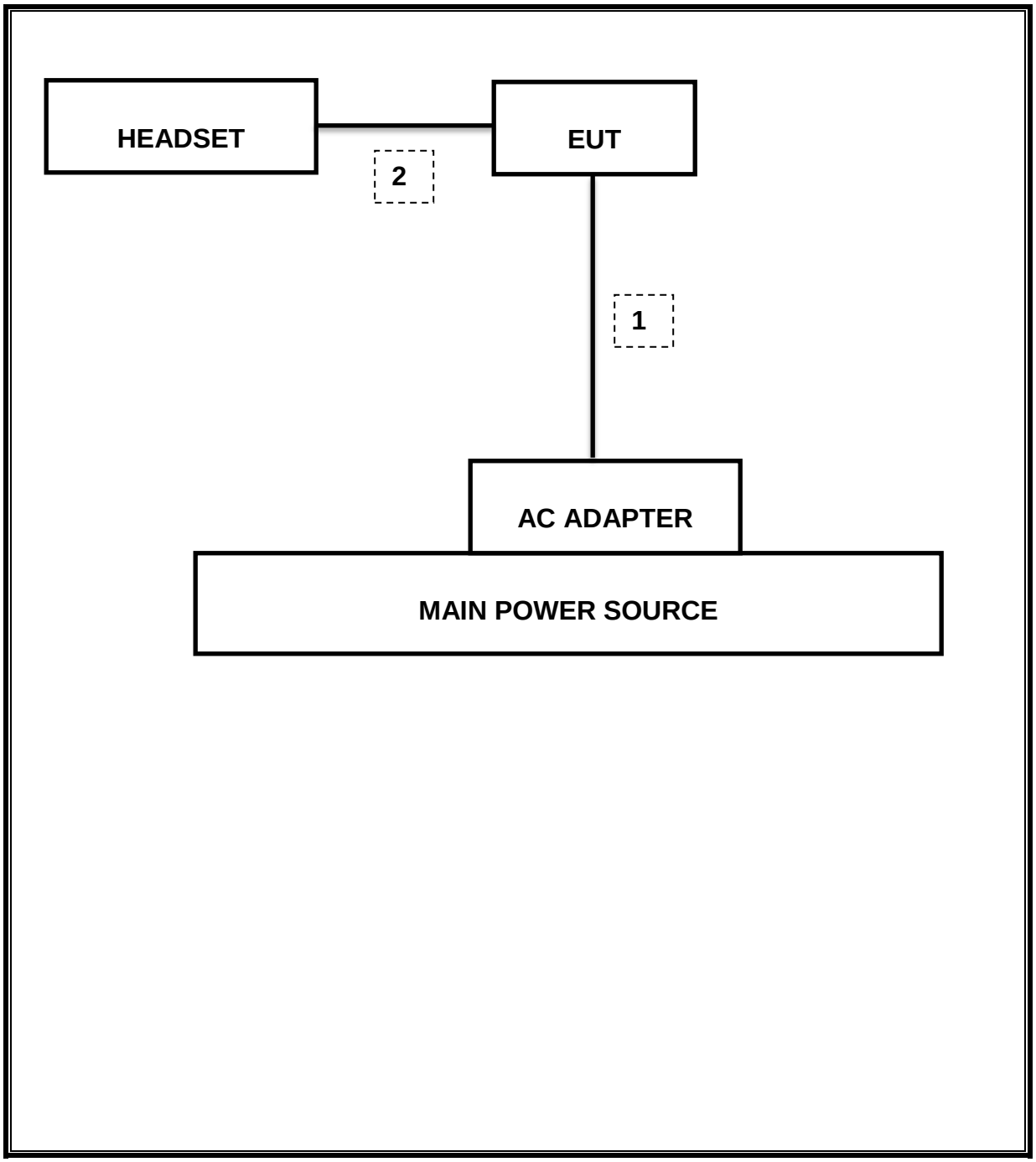
I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A
2	Audio	1	Mini-Jack	Unshielded	1m	N/A

TEST SETUP

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



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. 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**
tenna, Biconolog, 30MHz-1 G	Sunol Sciences	JB1	C01171	02/13/15
Antenna, Horn, 18GHz	EMCO	3115	C00783	10/25/14
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	11/14/14
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/28/15
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/14
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/14
CBT Bluetooth Tester	R & S	CBT	None	07/12/15
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/14
Peak / Average Power Senso	Agilent / HP	E9327A	C00964	12/13/14
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/15
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR

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

7. SUMMARY

The model FCC ID: A3LSMT360 shares the same enclosure and circuit board as mode FCC ID: A3LSMT365. The WLAN/Bluetooth circuitry and layout, including antenna, are almost identical between the two units. The WLAN/Bluetooth antenna and surrounding circuitry is the same between these two units.

After confirming through preliminary radiated emissions that the performance of the A3LSMT365 BT remains representative of this model (FCC ID: A3LSMT360) test data for FCC ID: A3LSMT365 is being submitted for this application.

Only different between these two models is A3LSMT360 don't have WWAN radio module which is loaded on A3LSMT365.

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	0.728MHz
2.1051, 15.247 (d)	RSS-210 A8.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-41.68dBm
15.247	RSS-210 A8.4	TX conducted output power	<30dBm		Pass	-0.24dBm
15.247	RSS-210 A8.2	PSD	<8dBm		Pass	-15.42dBm
15.207 (a)	RSS-GEN 7.2.2	AC Power Line conducted emissions	Section 10	Radiated	Pass	57.03dBuV
15.205, 15.209	RSS-210 Clause 2.6, RSS-210 Clause 6	Radiated Spurious Emission	< 54dBuV/m		Pass	42.93dBuV/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.

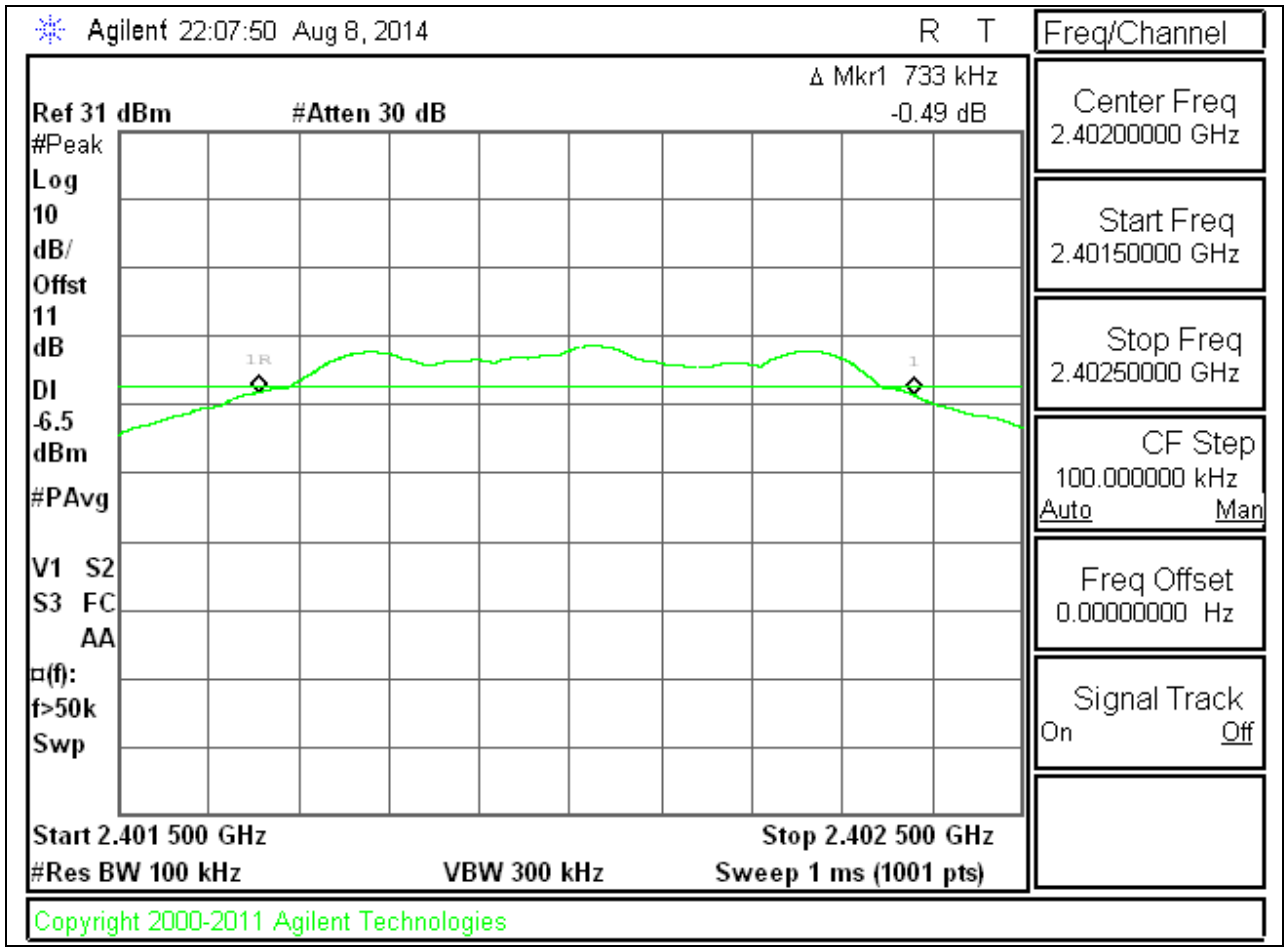
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.7330	0.5
Middle	2440	0.7390	0.5
High	2480	0.7280	0.5

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.

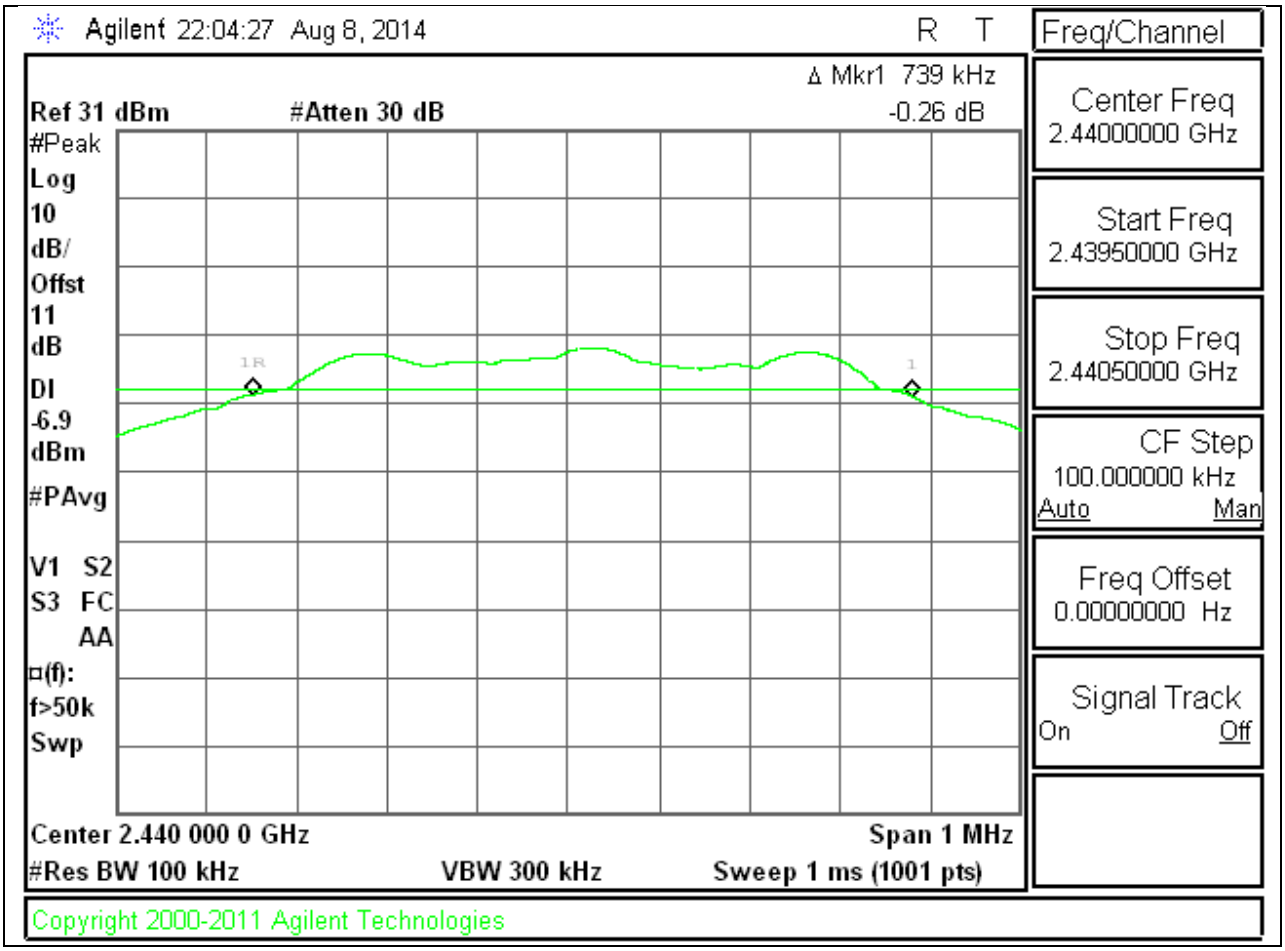
6 dB BANDWIDTH PLOTS

LOW CHANNEL



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

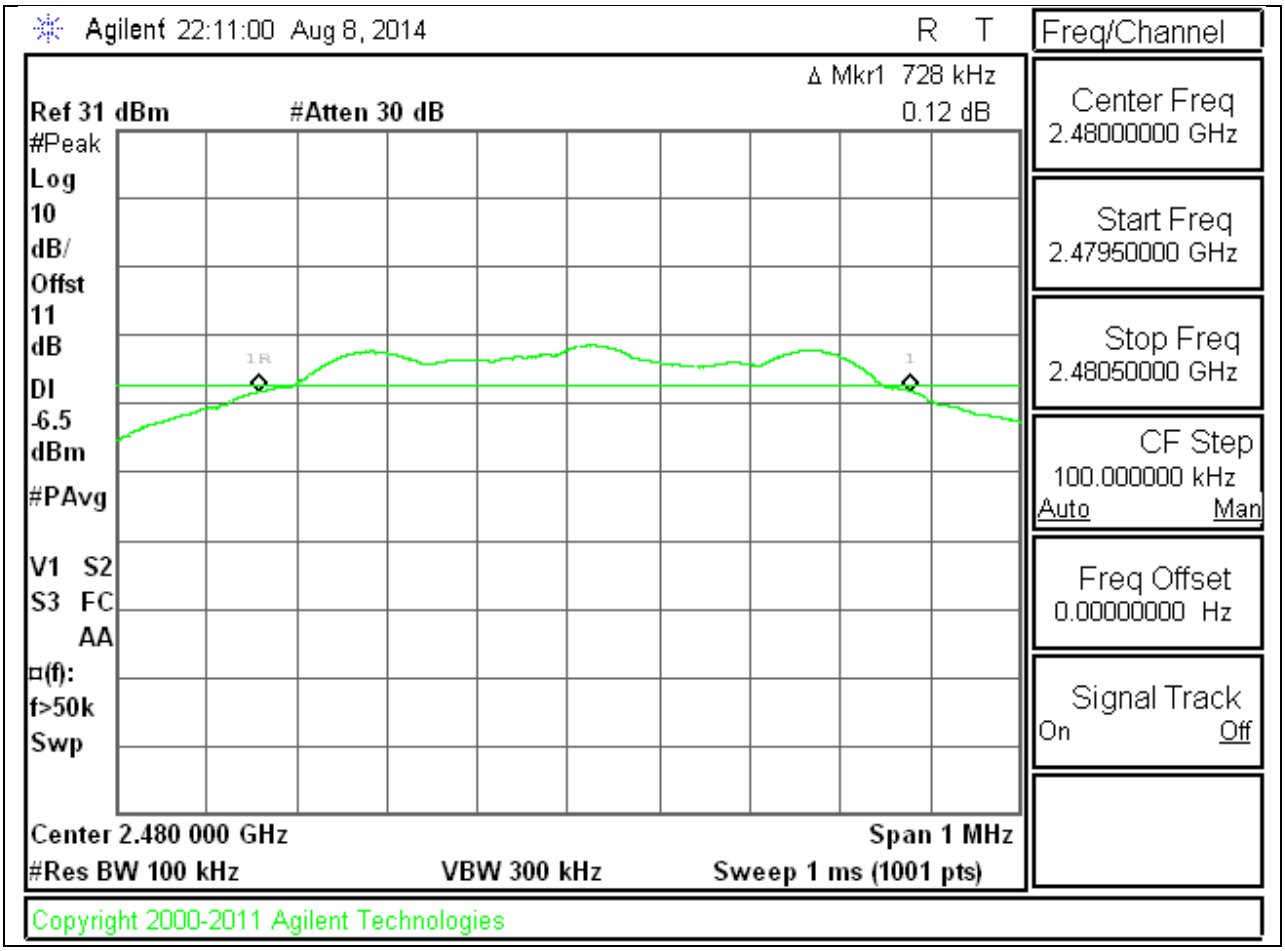
MID CHANNEL



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

FORM NO: CCSUP4701I
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CHANNEL



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4701I
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 D01 DTS Meas Guidance v03r02: The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

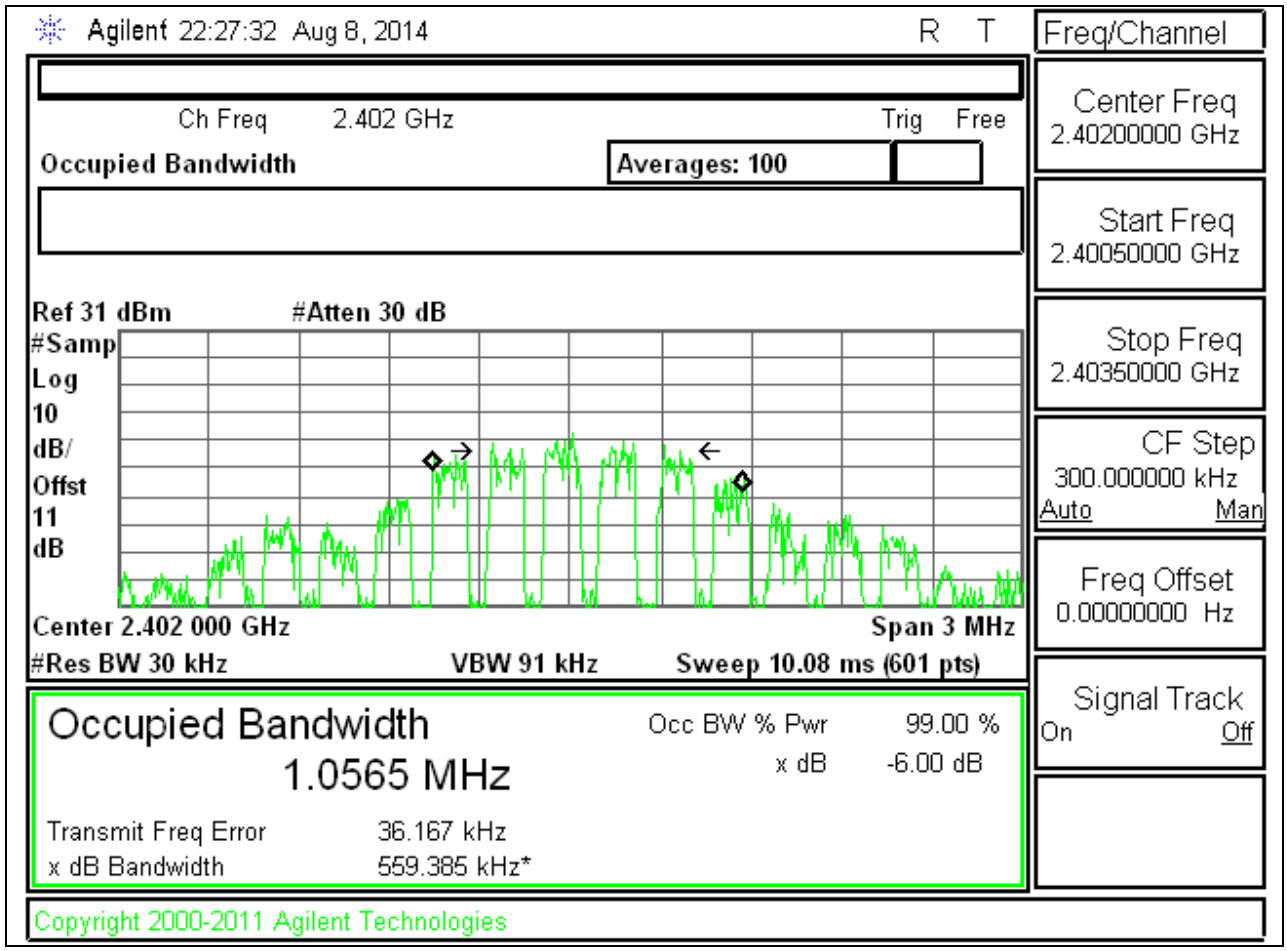
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0600
Middle	2440	1.0500
High	2480	1.0500

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.

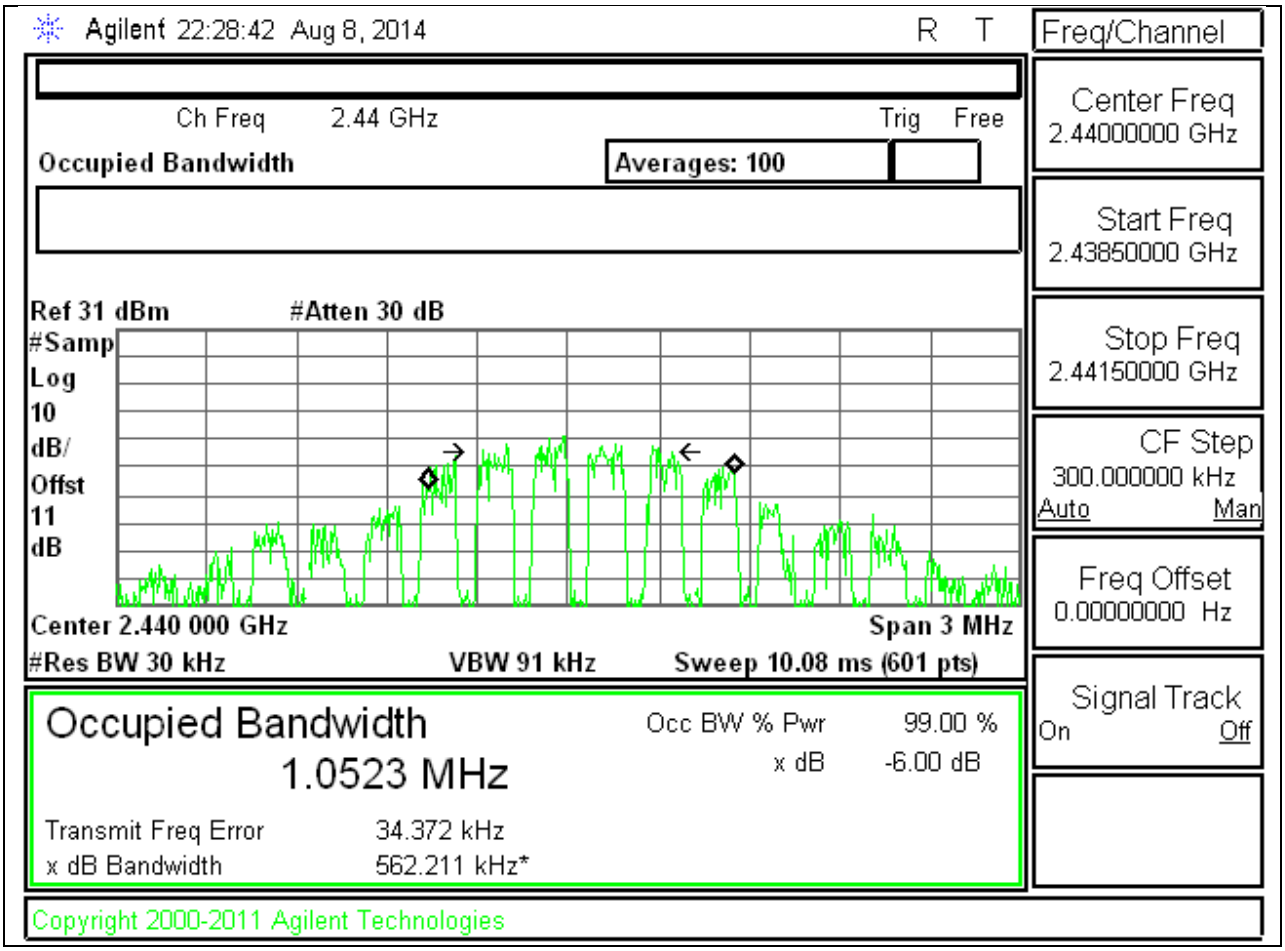
99% BANDWIDTH PLOTS

LOW CHANNEL



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

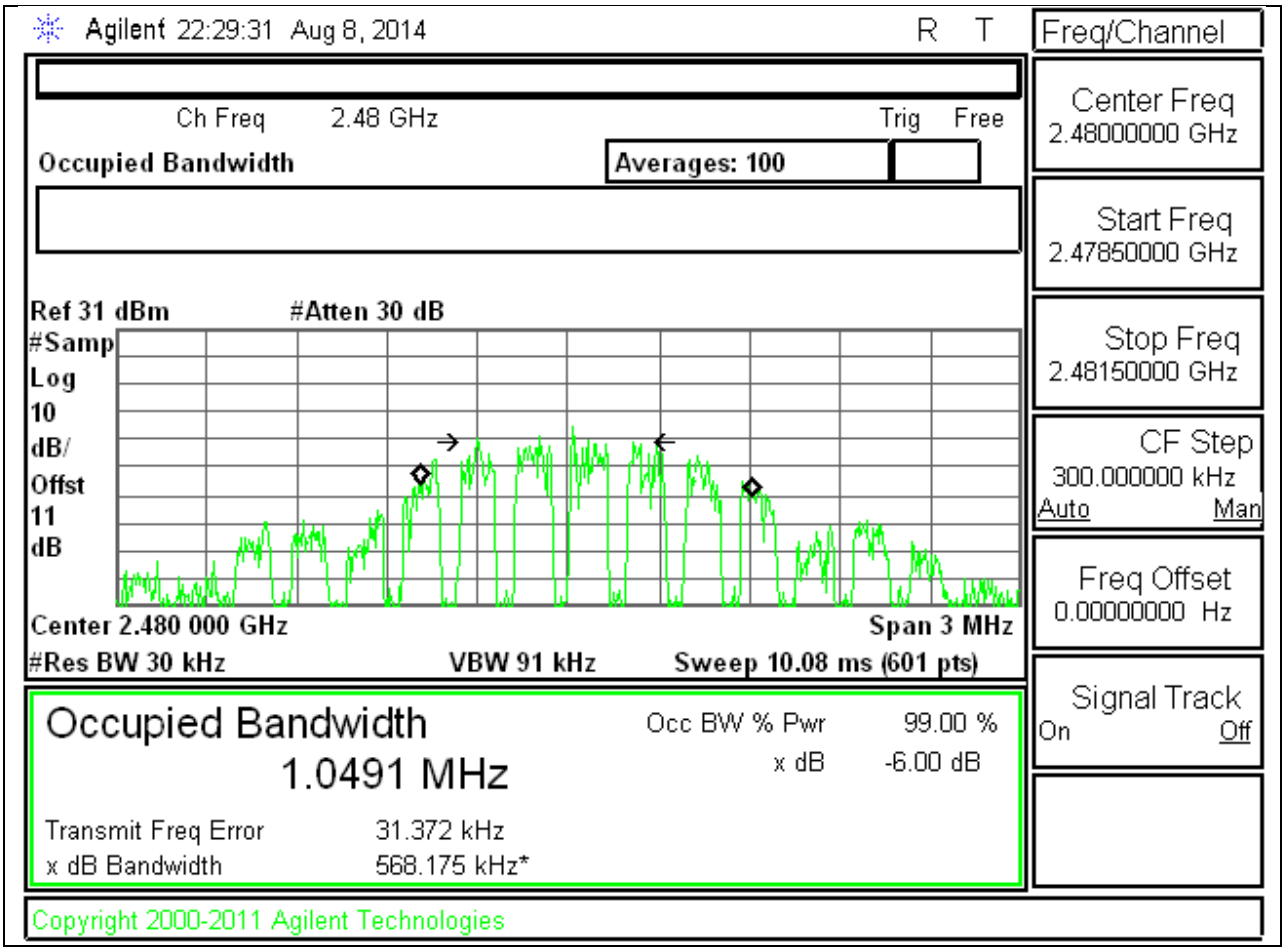
MID CHANNEL



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

FORM NO: CCSUP4701I
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CHANNEL



UL VERIFICATION SERVICES INC.
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.

8.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

Peak power is measured using KDB558074 D01 DTS Meas Guidance v03r02 June 5, 2014 under section 9.1.1 utilizing spectrum analyze.

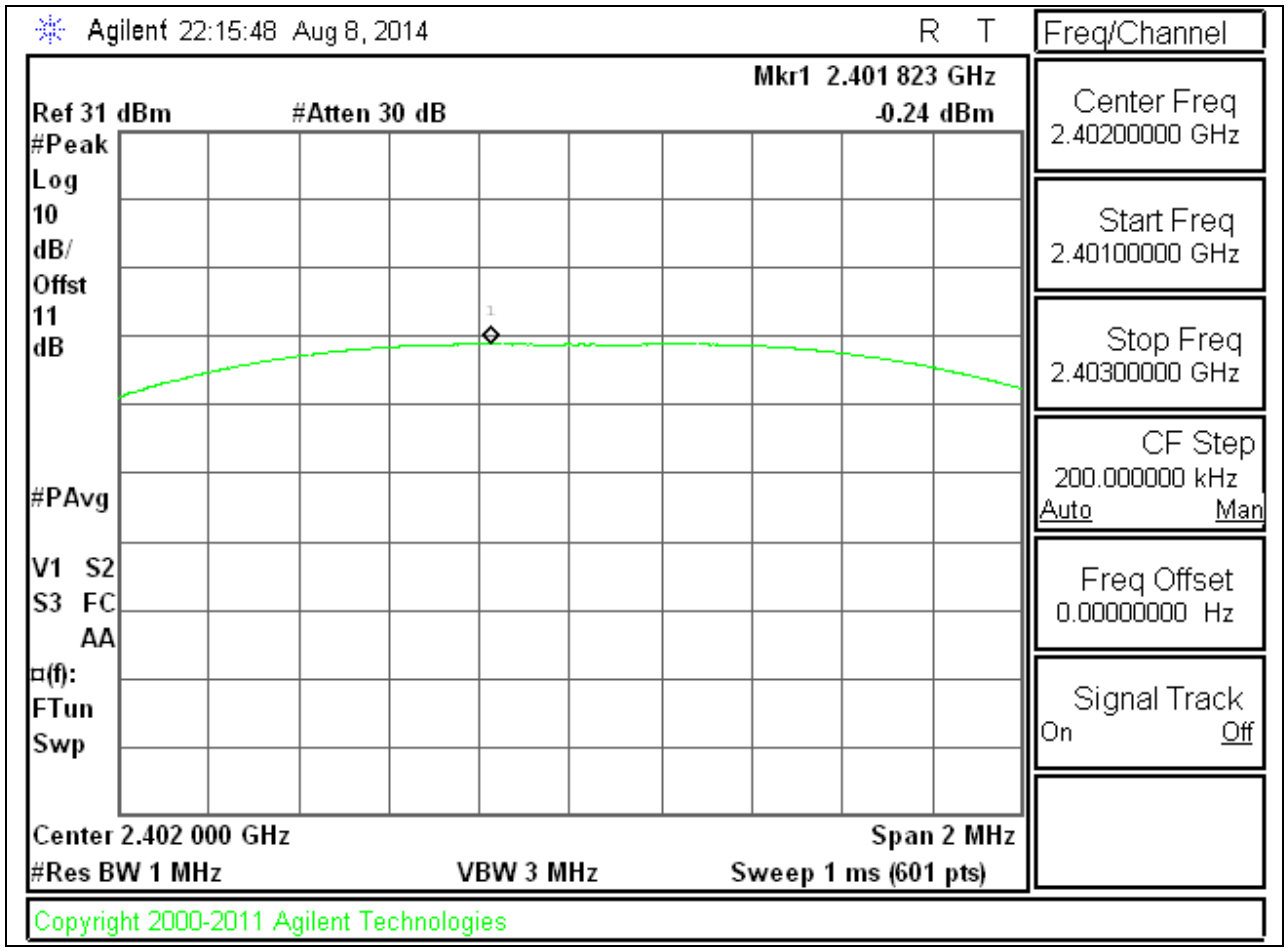
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-0.240	30	-30.240
Middle	2440	-0.640	30	-30.640
High	2480	-0.250	30	-30.250

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

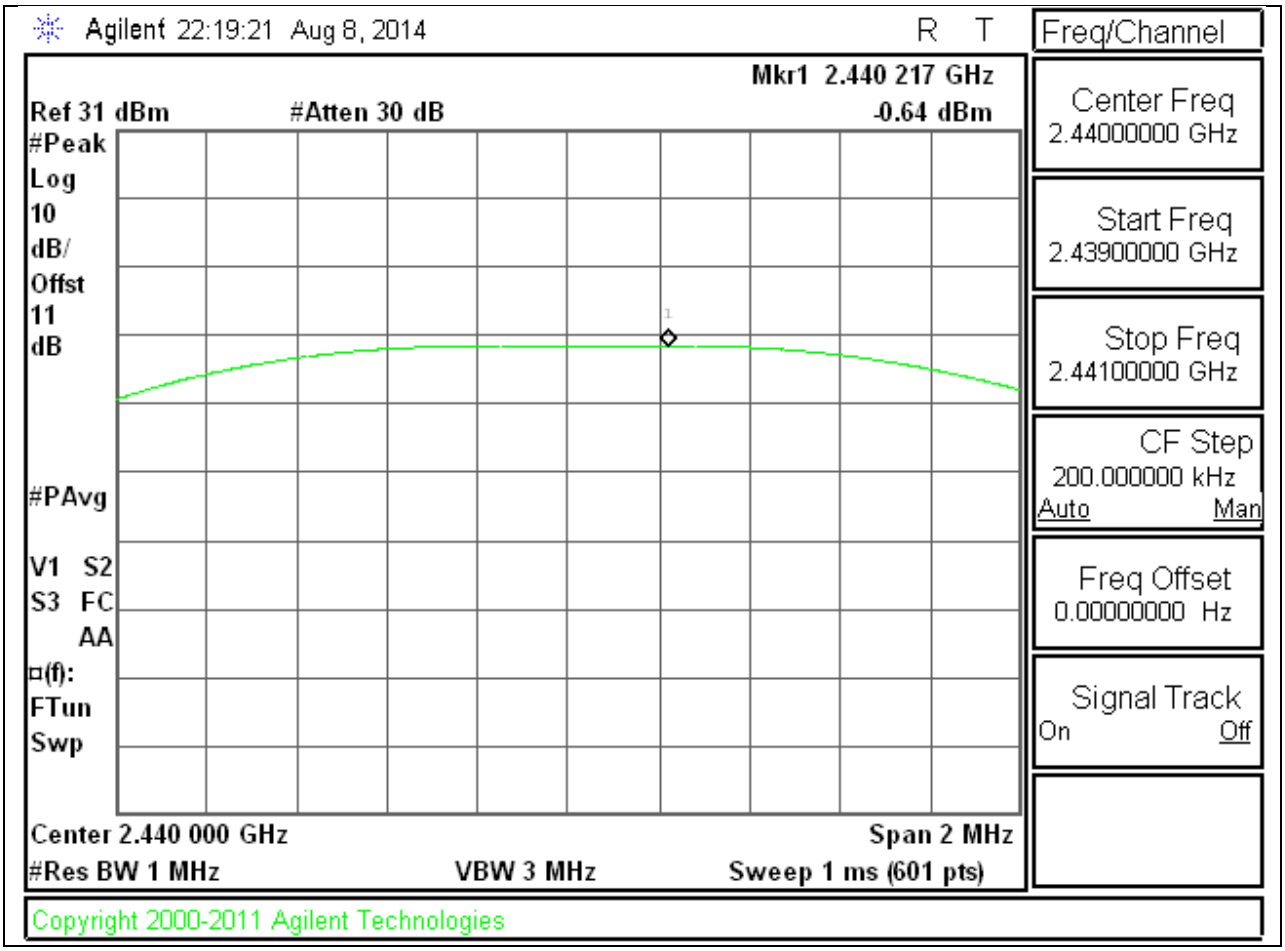
OUTPUT POWER PLOTS

LOW CHANNEL



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

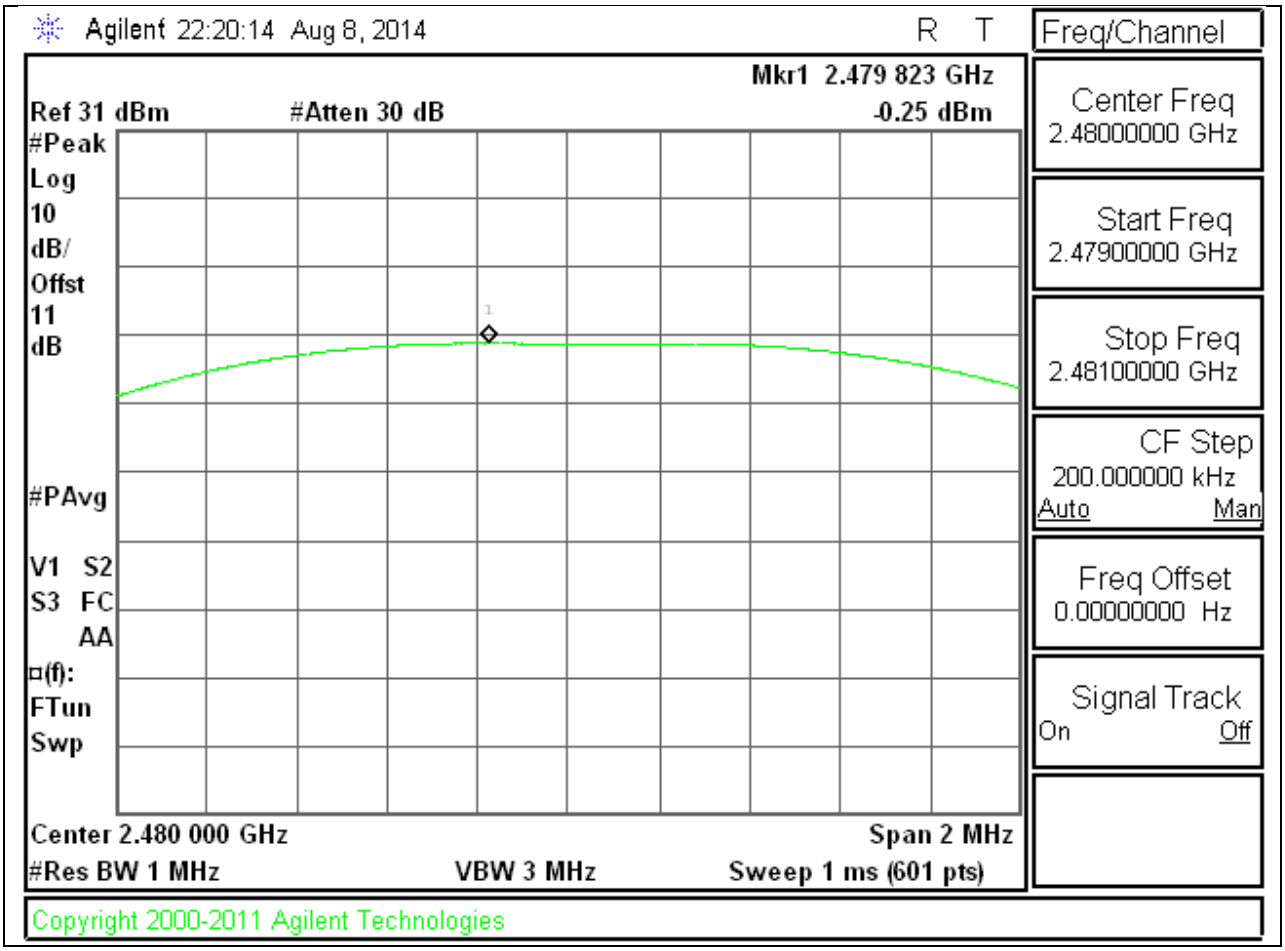
MID CHANNEL



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

FORM NO: CCSUP4701I
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CHANNEL



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

FORM NO: CCSUP4701I
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 10.2 dB (including 10 dB pad and 0.2 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	-1.4
Middle	2440	-1.4
High	2480	-1.3

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 D01 DTS Meas Guidance v03r02, June 5, 2014

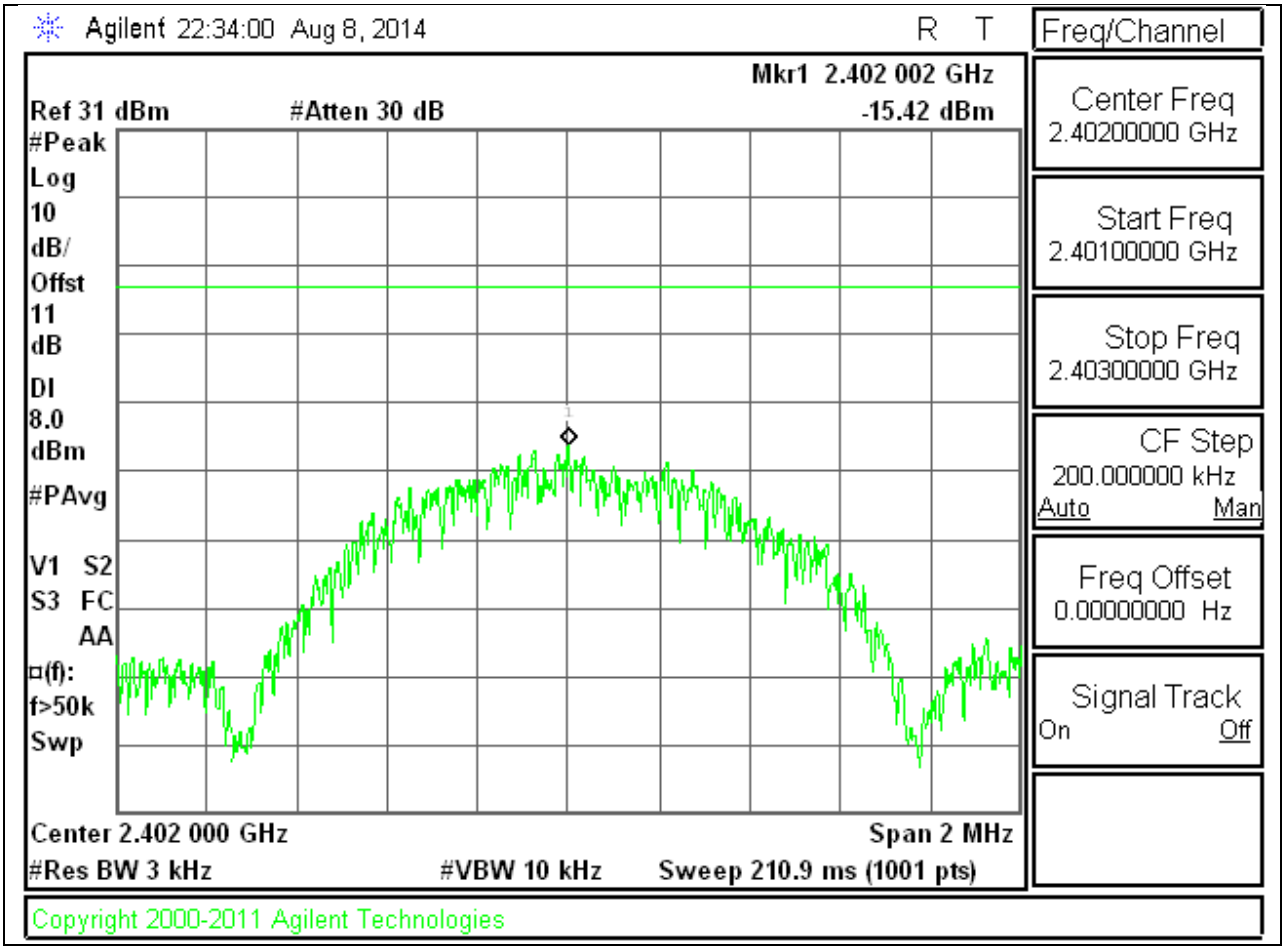
RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-15.42	8	-23.42
Middle	2440	-15.85	8	-23.85
High	2480	-15.48	8	-23.48

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

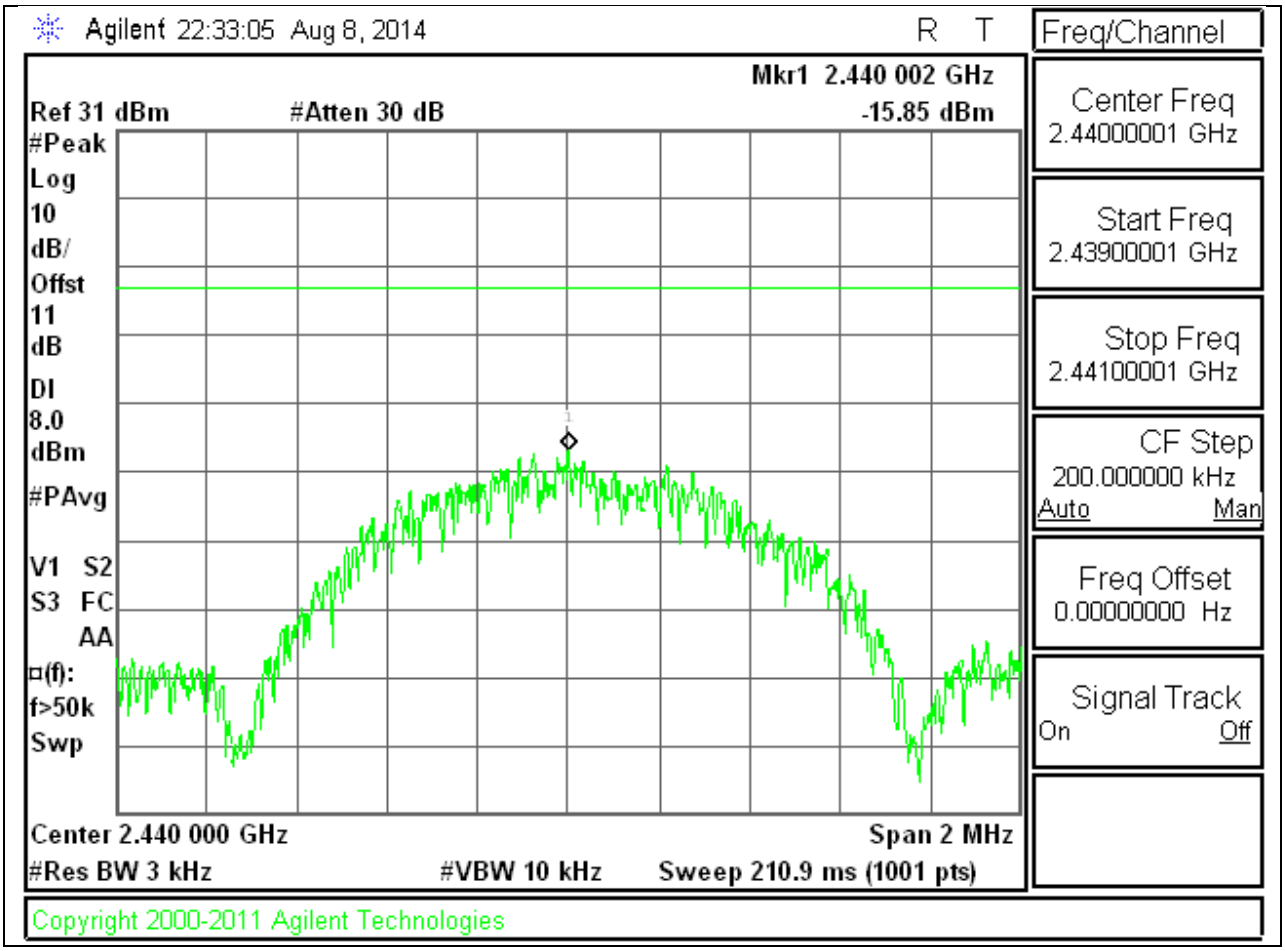
POWER SPECTRAL DENSITY PLOTS

LOW CHANNEL



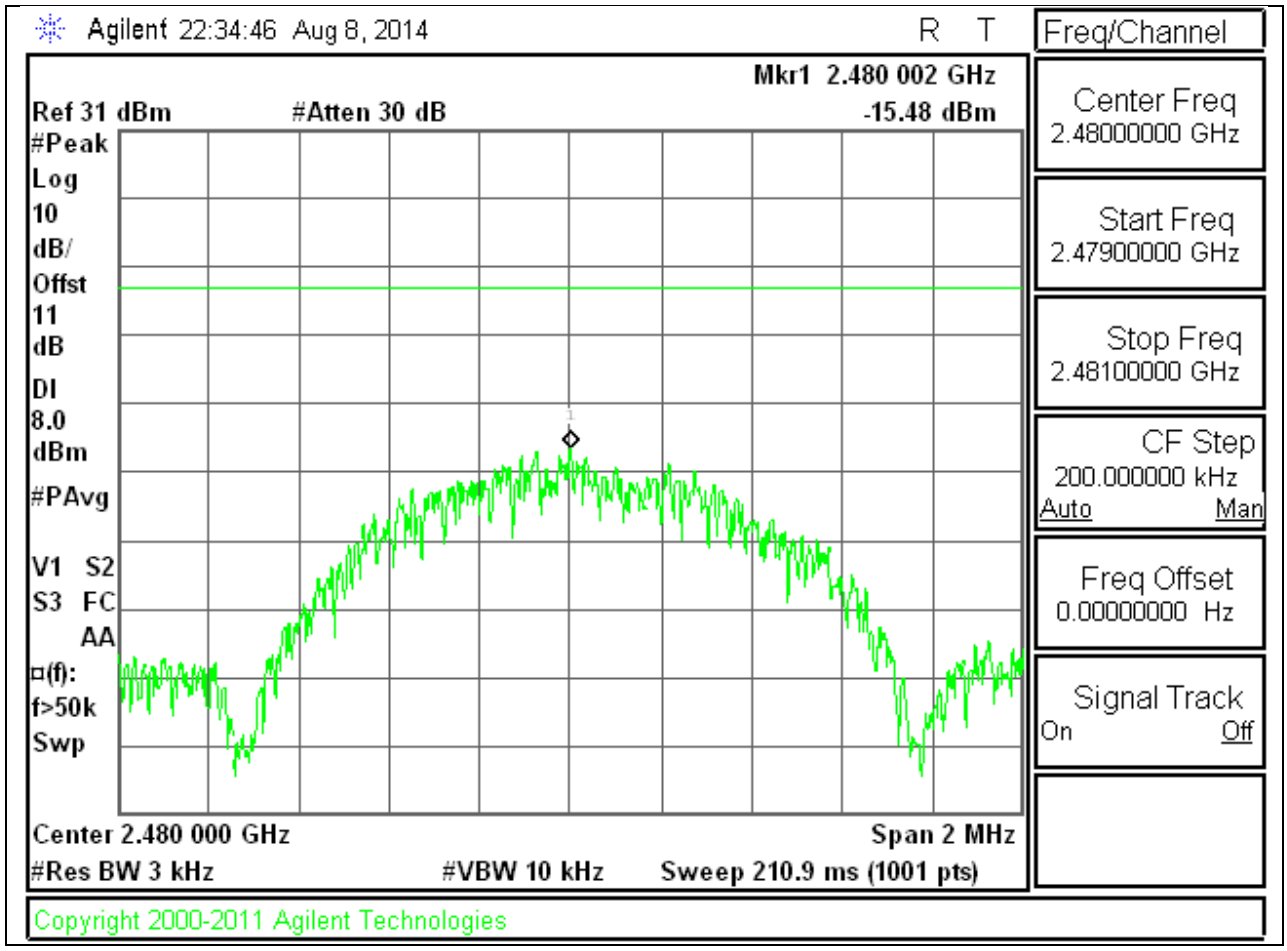
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID CHANNEL



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

HIGH CHANNEL



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

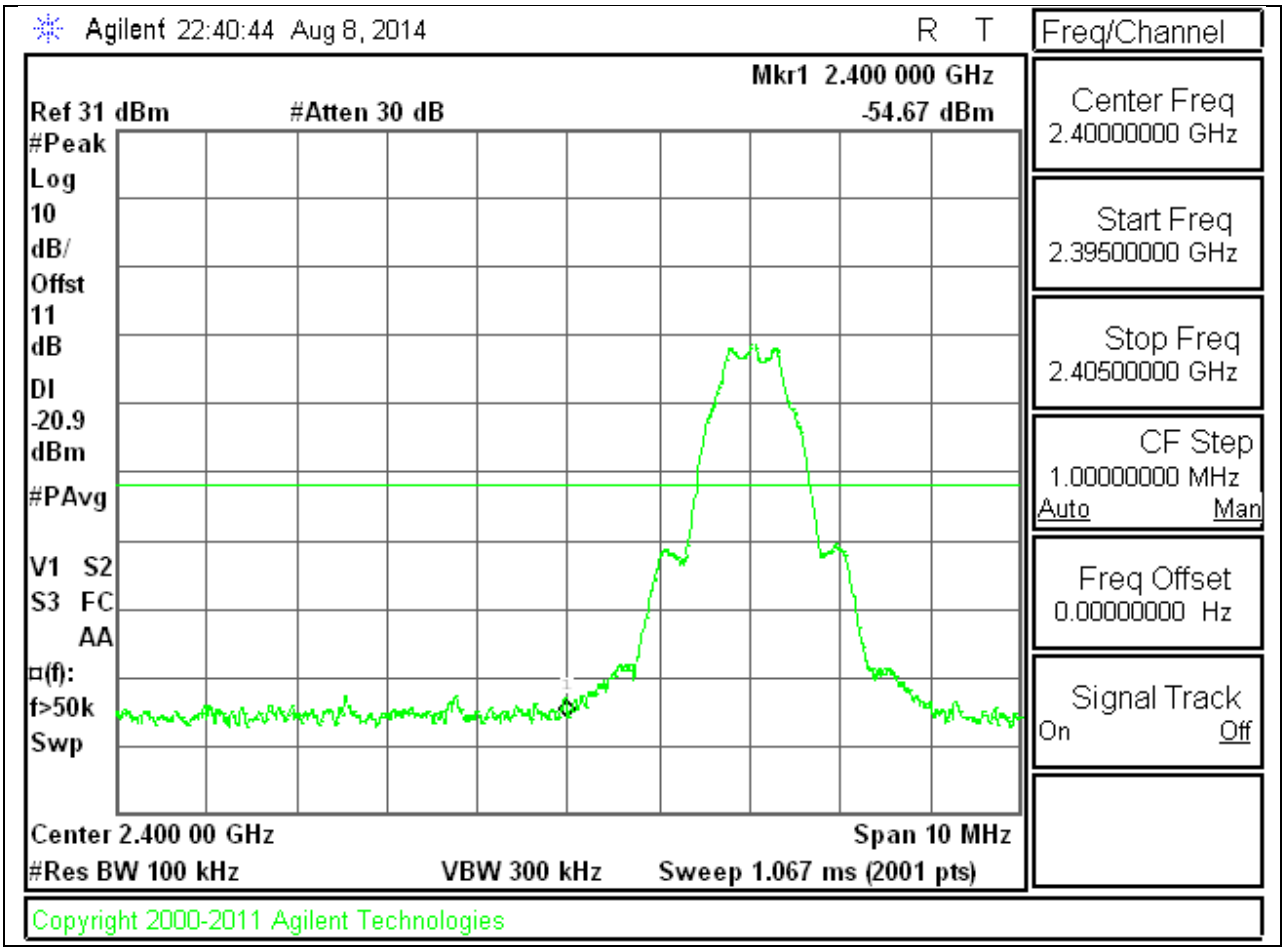
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

RESULTS

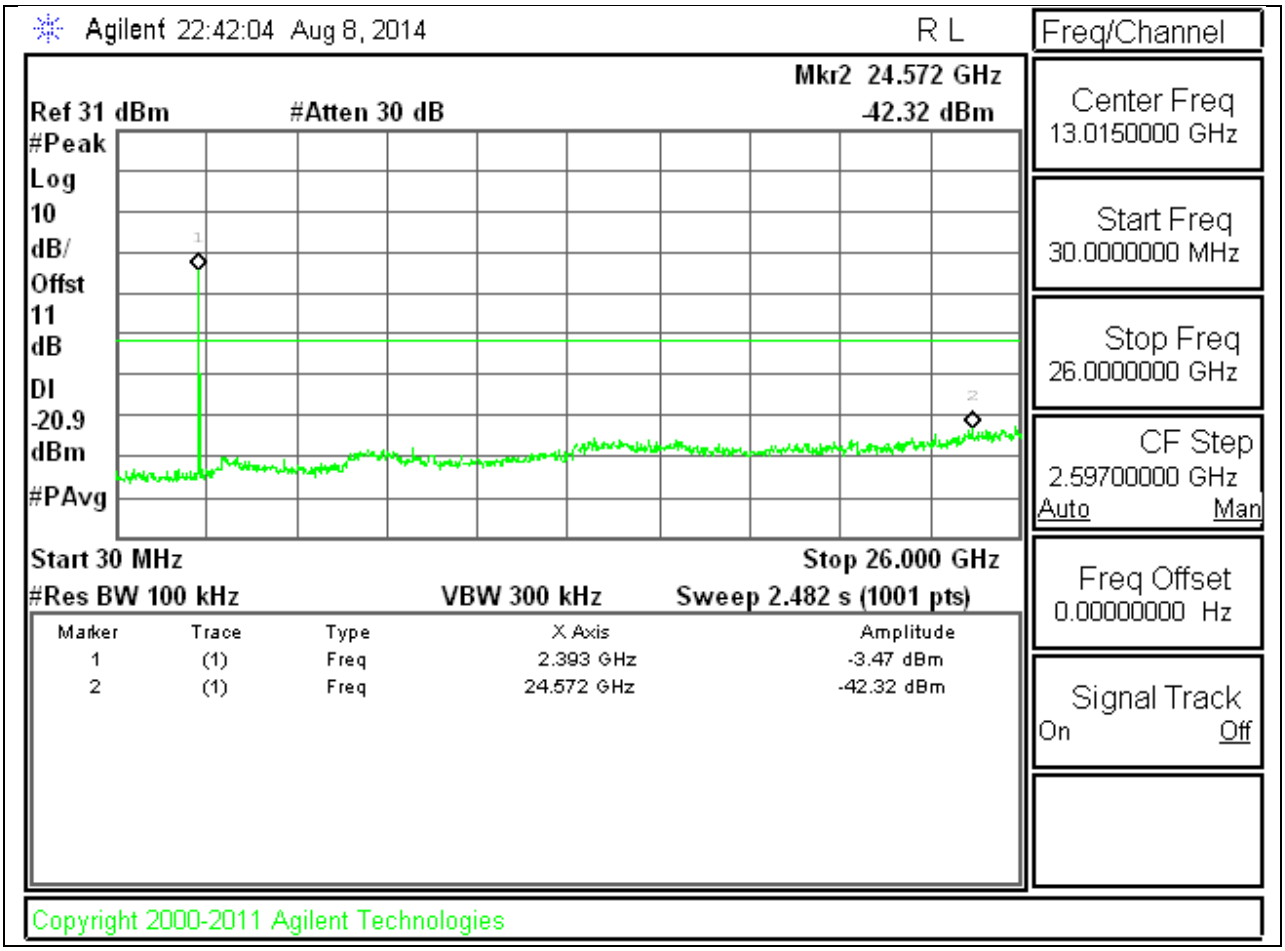
SPURIOUS EMISSIONS, LOW CHANNEL

LOW CHANNEL BANDEDGE



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

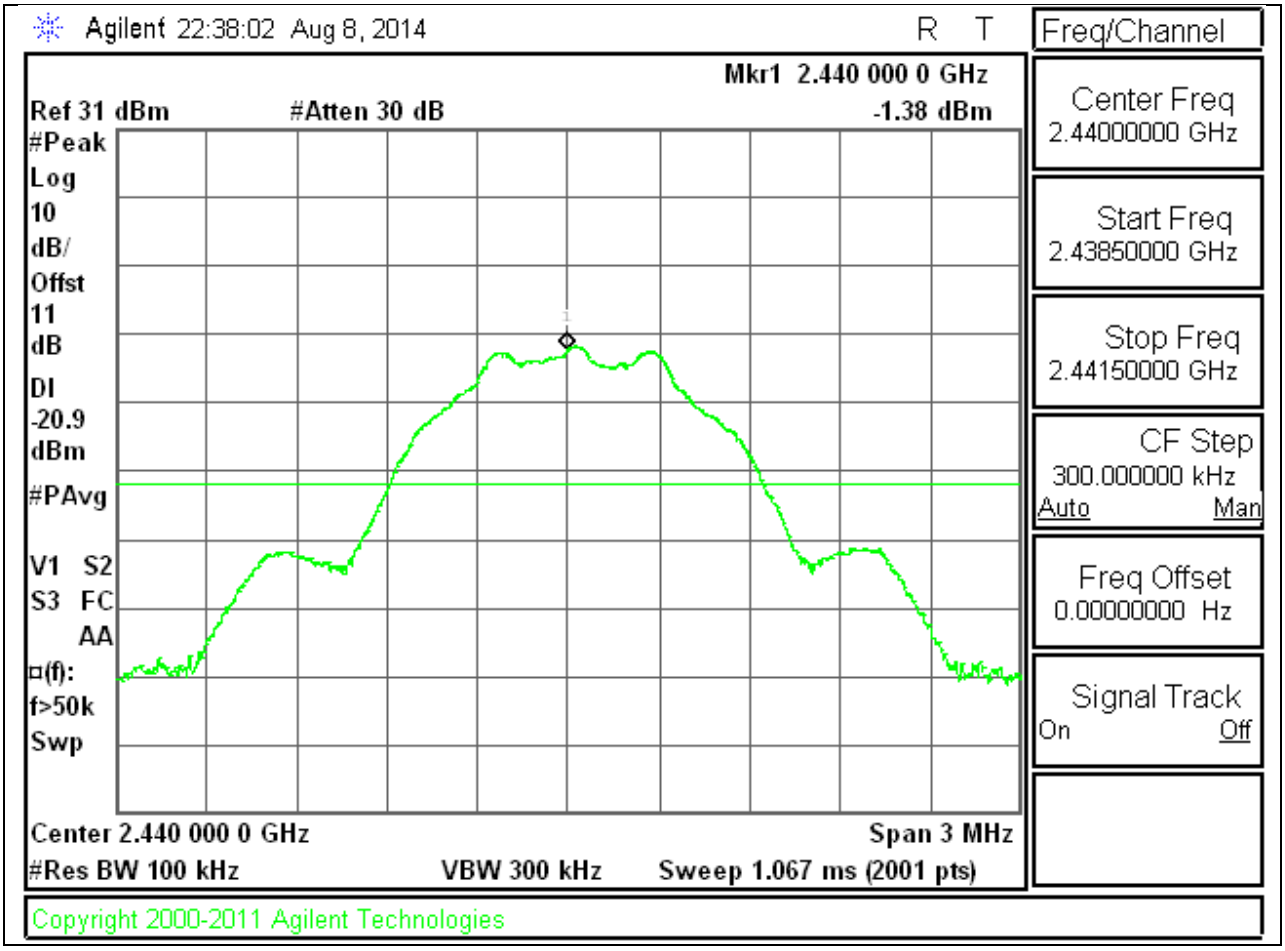
LOW CHANNEL SPURIOUS



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

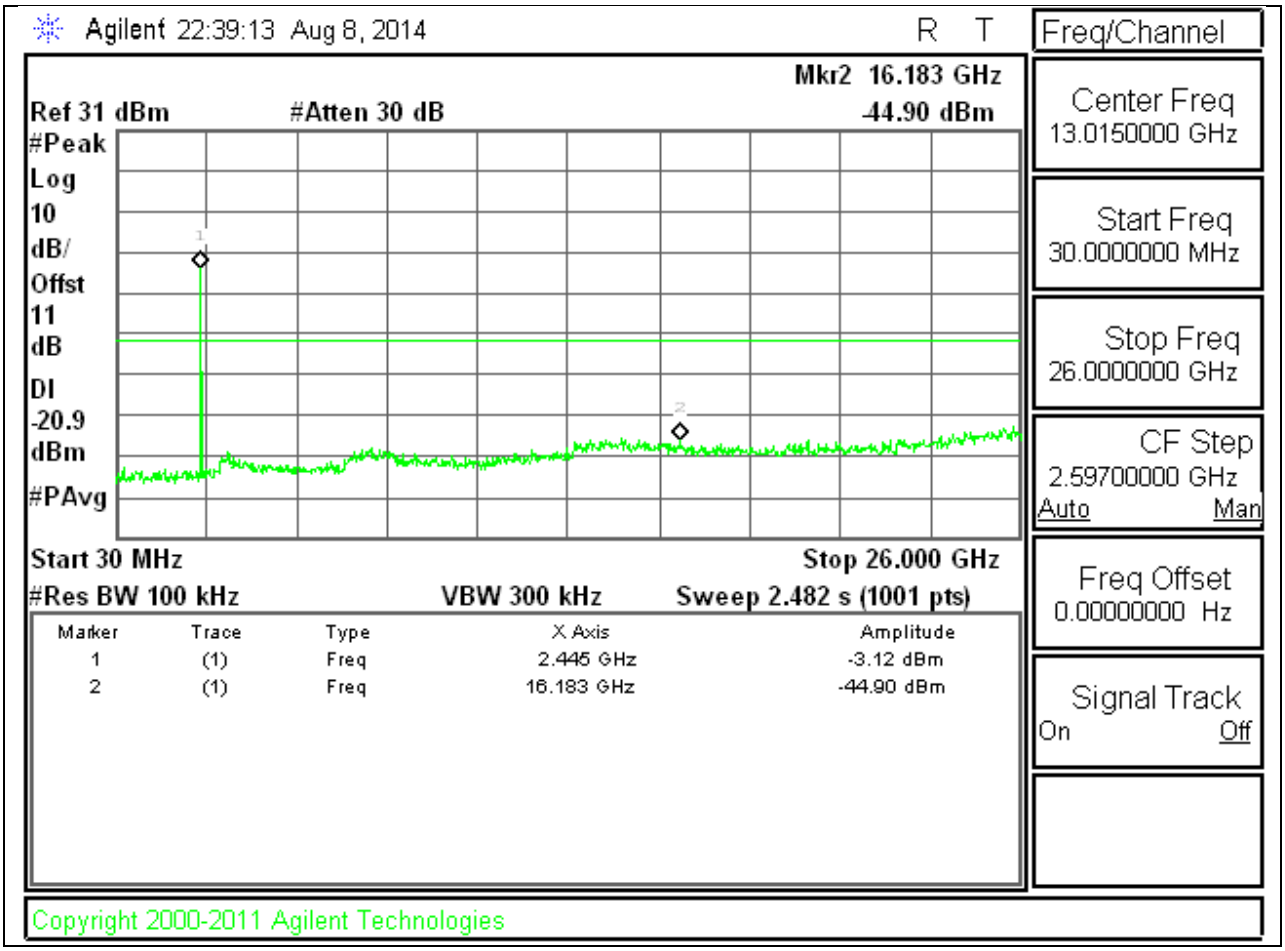
SPURIOUS EMISSIONS, MID CHANNEL

MID CHANNEL REFERENCE



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

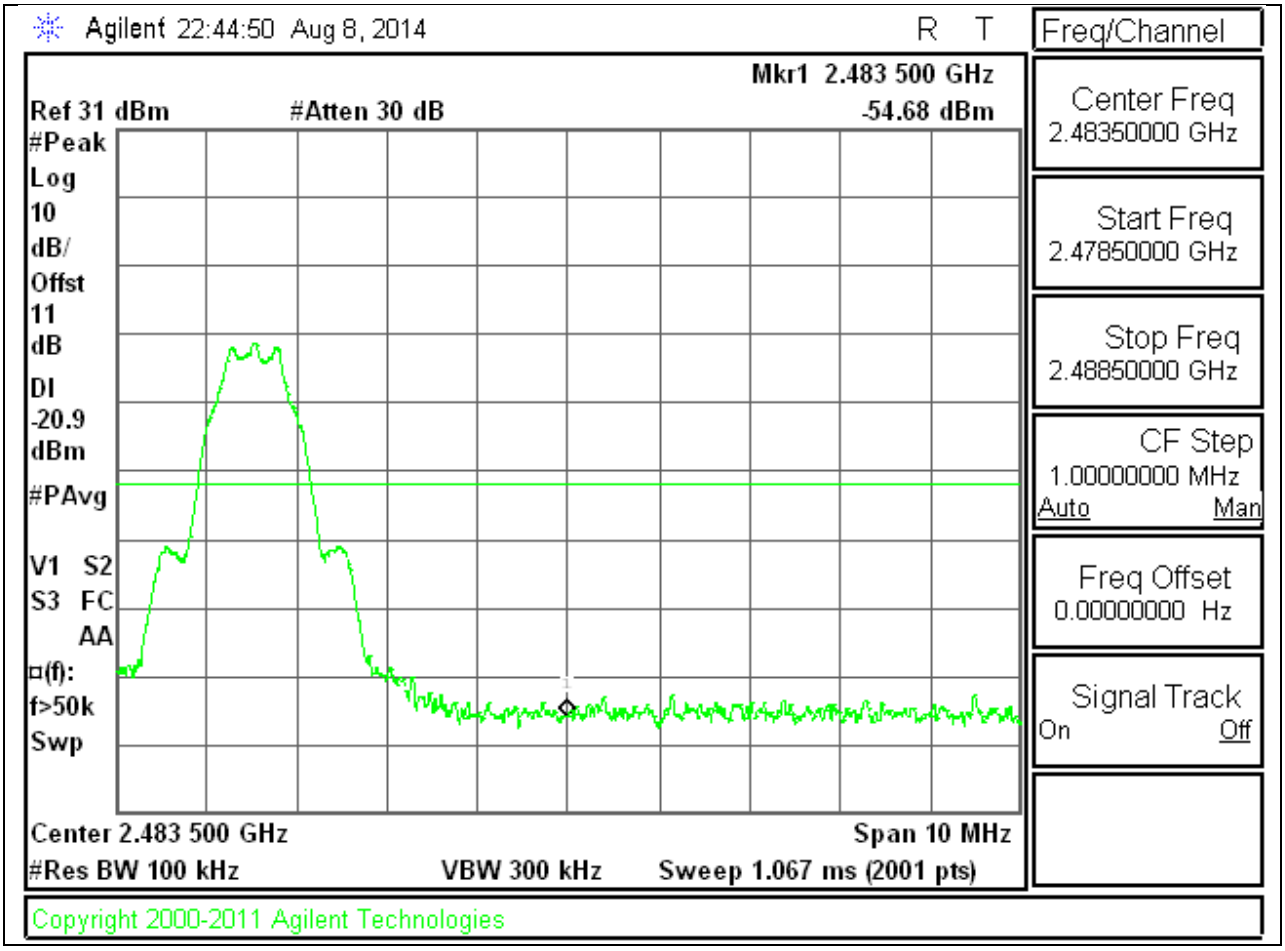
MID CHANNEL SPURIOUS



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

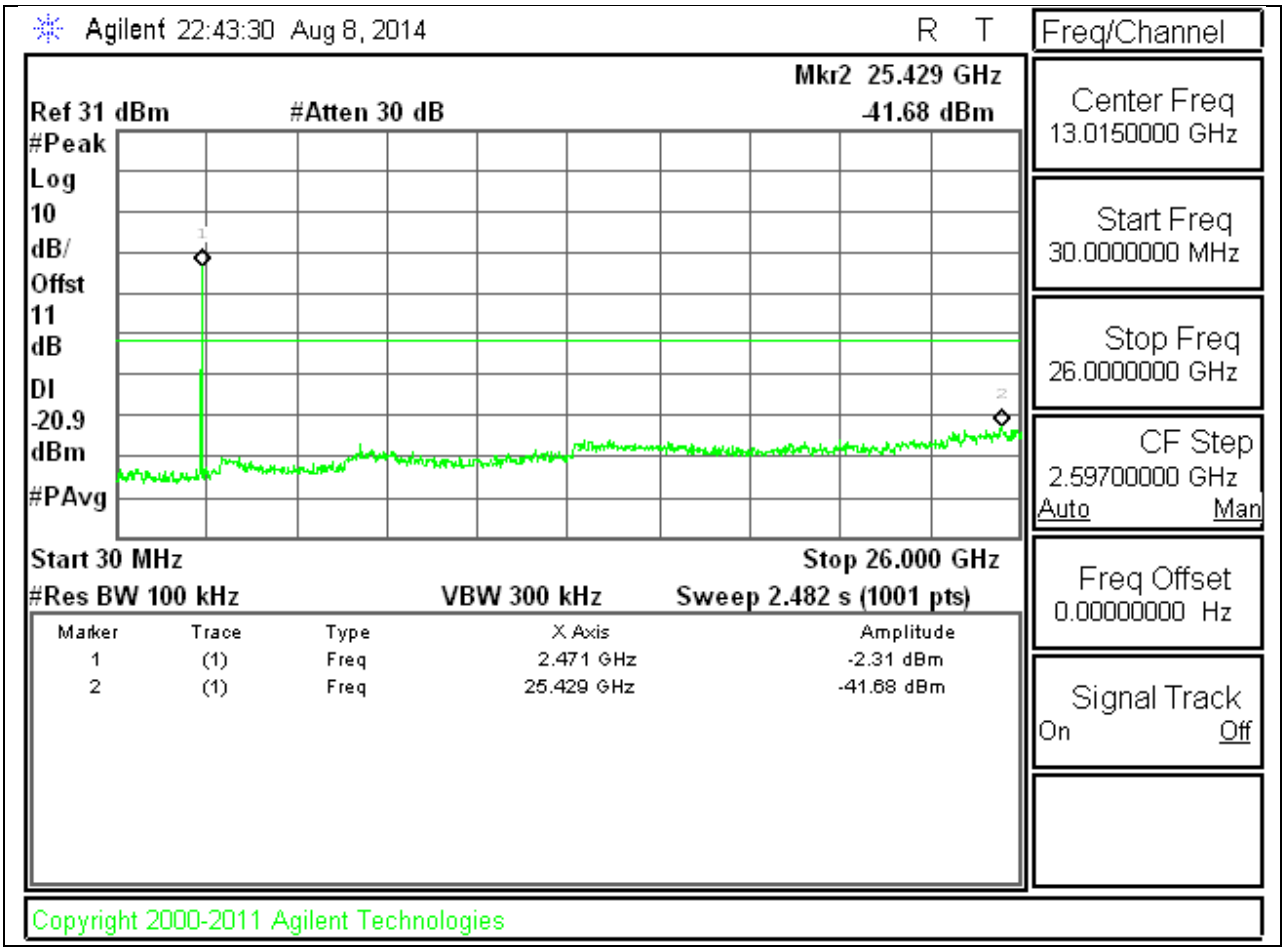
SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CHANNEL BANDEDGE



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

HIGH CHANNEL SPURIOUS



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4701I
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 = 10log(1/0.618)=2.08dB

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.

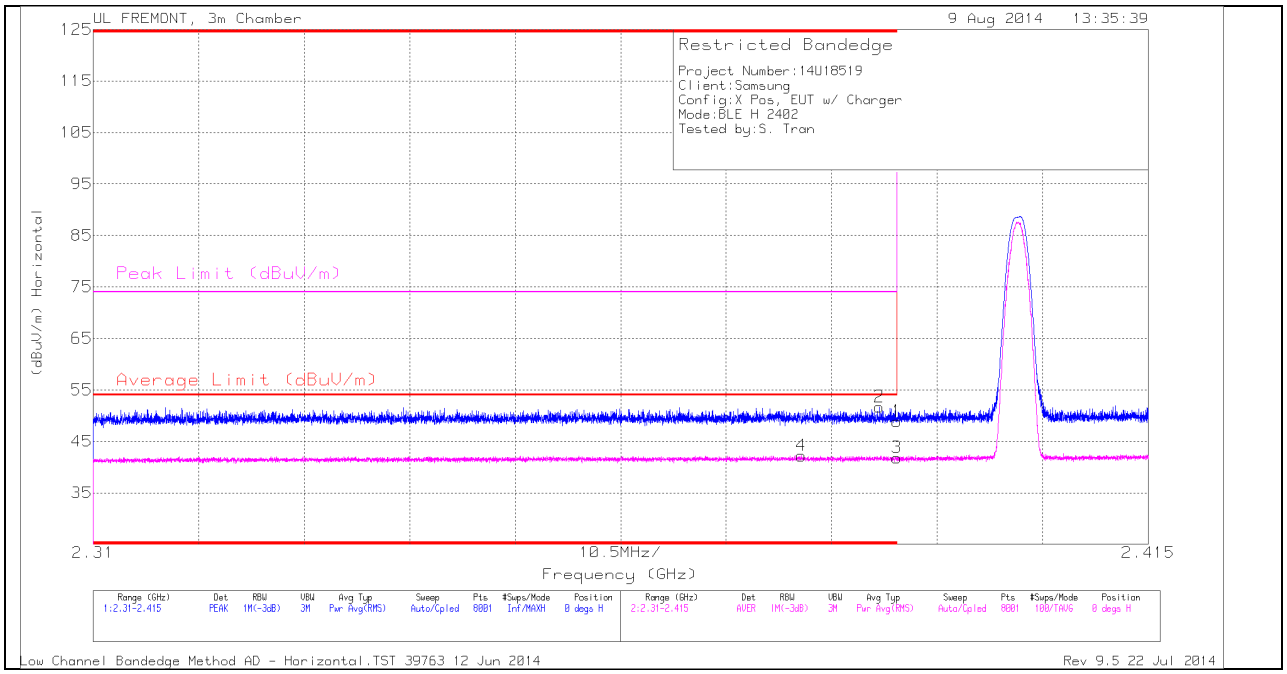
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Flt 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
4	* 2.38	31.14	RMS	32.1	-23.1	2.08	42.22	54	-11.78	-	-	0	211	H
2	* 2.388	42.7	PK	32.1	-23.1	0	51.7	-	-	74	-22.3	0	211	H
1	* 2.39	39.89	PK	32.1	-23.1	0	48.89	-	-	74	-25.11	0	211	H
3	* 2.39	30.75	RMS	32.1	-23.1	2.08	41.83	54	-12.17	-	-	0	211	H

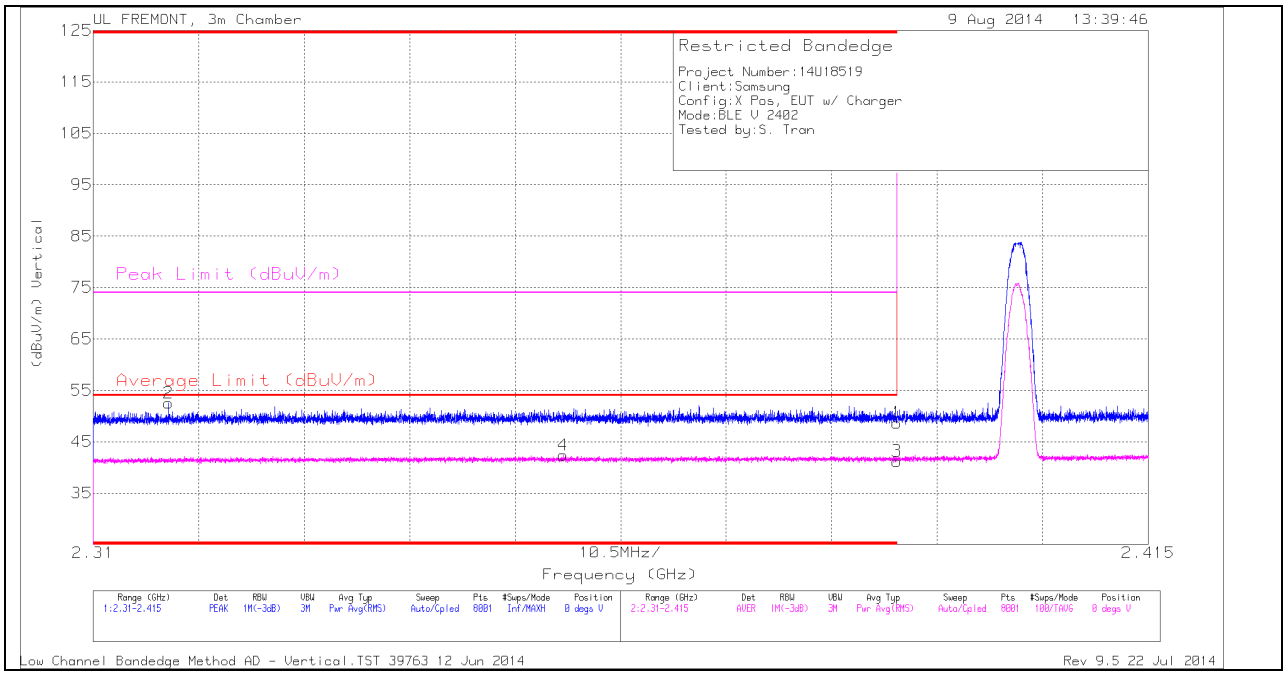
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

RMS - RMS detection

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 PEAK AND AVERAGE PLOT



VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/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	* 2.317	43.73	PK	31.9	-23.1	0	52.53	-	-	74	-21.47	0	211	V
4	* 2.357	31.41	RMS	32	-23.1	2.08	42.39	54	-11.61	-	-	0	211	V
1	* 2.39	39.67	PK	32.1	-23.1	0	48.67	-	-	74	-25.33	0	211	V
3	* 2.39	30.13	RMS	32.1	-23.1	2.08	41.21	54	-12.79	-	-	0	211	V

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

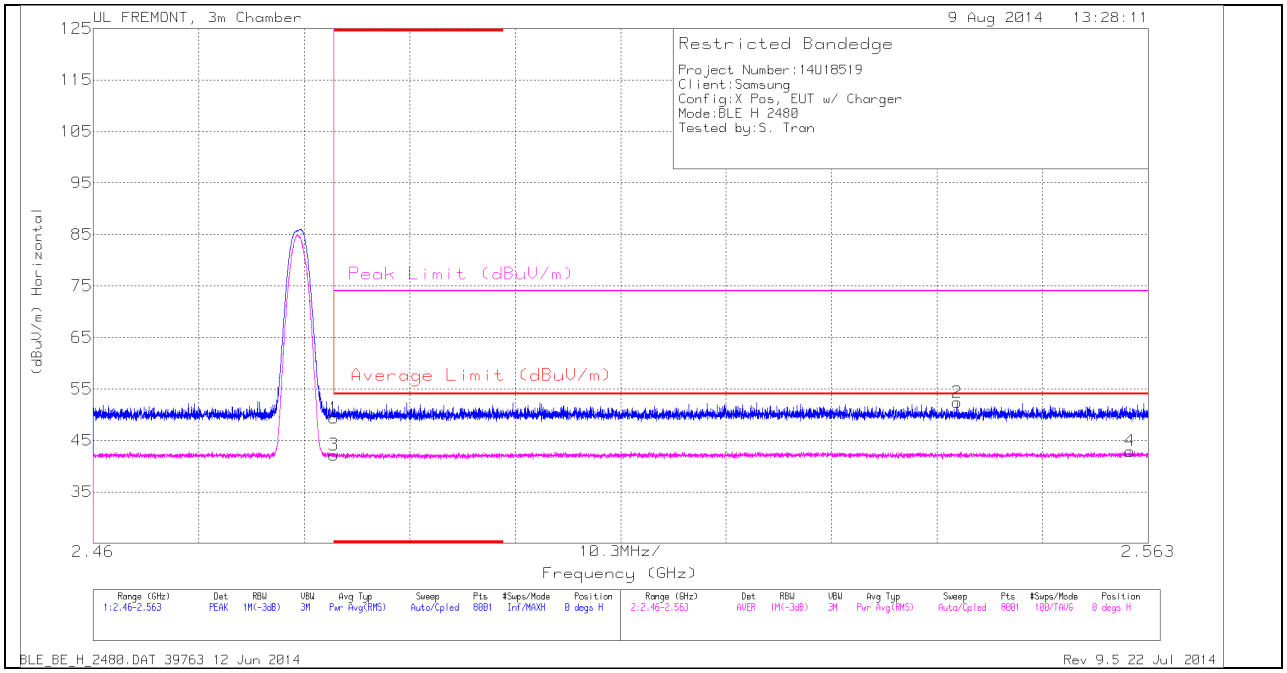
PK - Peak detector

RMS - RMS detection

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

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/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	39.82	PK	32.3	-22.8	0	49.32	-	-	74	-24.68	0	211	H
3	* 2.484	30.6	RMS	32.3	-22.8	2.08	42.18	54	-11.82	-	-	0	211	H
2	2.544	42.71	PK	32.4	-22.7	0	52.41	-	-	74	-21.59	0	211	H
4	2.561	31.15	RMS	32.4	-22.7	2.08	42.93	54	-11.07	-	-	0	211	H

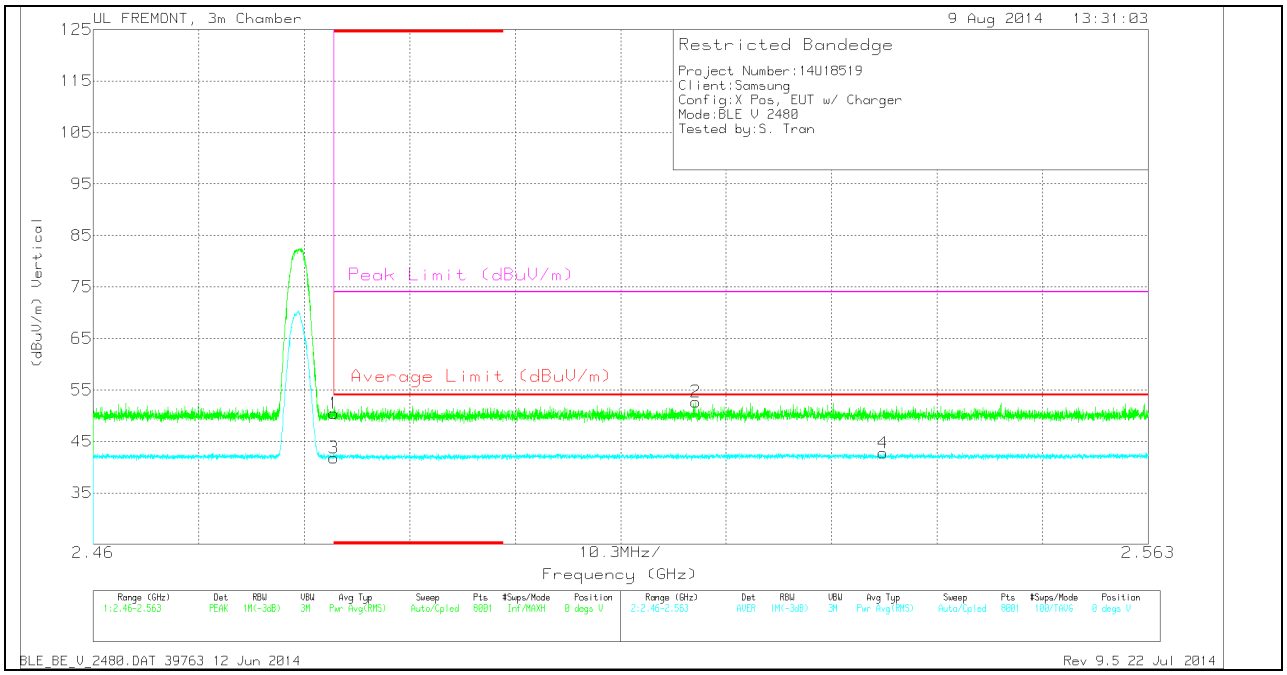
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

RMS - RMS detection

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Flt 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	40.93	PK	32.3	-22.8	0	50.43	-	-	74	-23.57	0	211	V
3	* 2.484	30.21	RMS	32.3	-22.8	2.08	41.79	54	-12.21	-	-	0	211	V
2	2.519	43.08	PK	32.4	-22.8	0	52.68	-	-	74	-21.32	0	211	V
4	2.537	30.96	RMS	32.4	-22.7	2.08	42.74	54	-11.26	-	-	0	211	V

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

PK - Peak detector

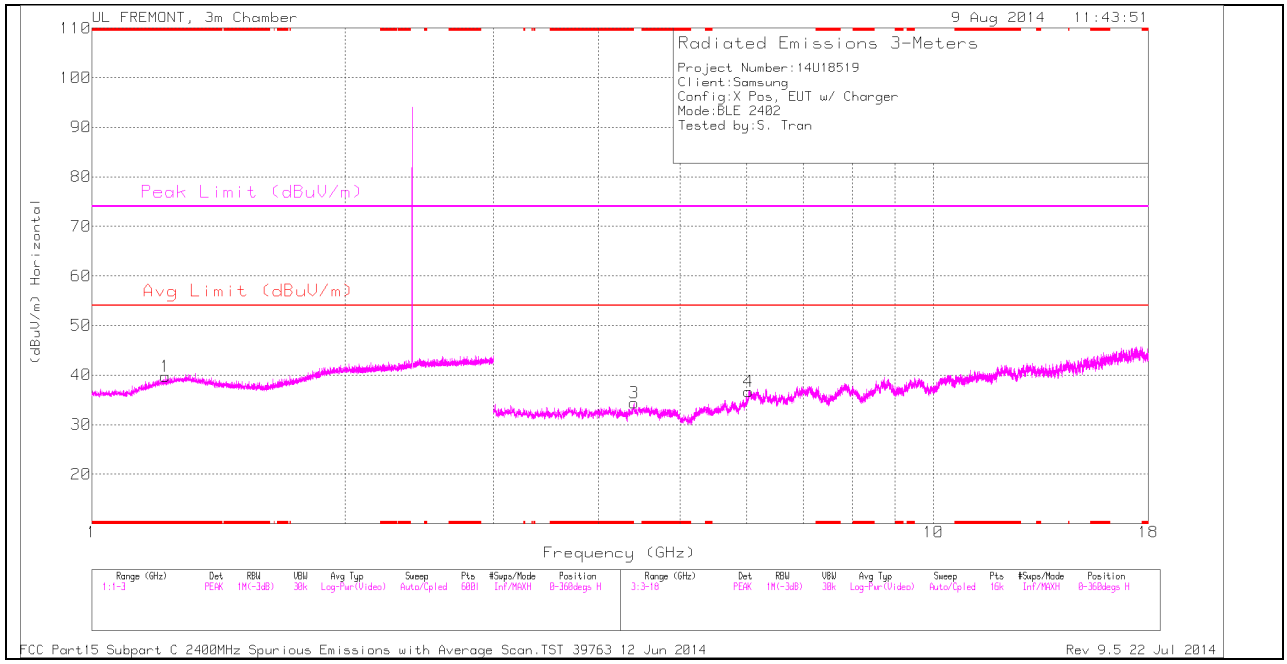
RMS - RMS detection

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

FORM NO: CCSUP4701I
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

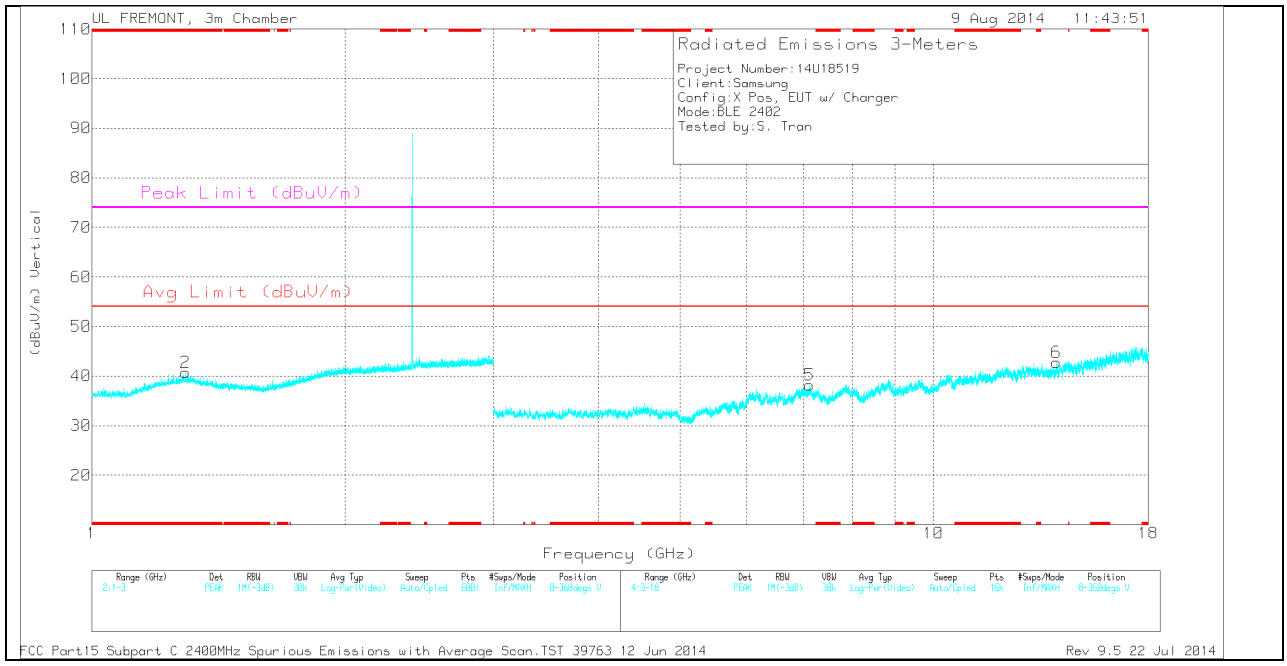


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

FORM NO: CCSUP4701I
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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.

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

FORM NO: CCSUP4701I
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CHANNEL DATA

TRACE MARKERS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr /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	* 1.223	33.96	PK	29.5	-23.8	0	39.66	-	-	74	-34.34	0-360	200	H
2	* 1.291	34.27	PK	30.2	-23.8	0	40.67	-	-	74	-33.33	0-360	200	V
3	4.406	30.86	PK	33.7	-30.2	0	34.36	-	-	-	-	0-360	200	H
4	6.033	30.81	PK	35.3	-29.5	0	36.61	-	-	-	-	0-360	200	H
5	7.119	30.59	PK	35.6	-28	0	38.19	-	-	-	-	0-360	200	V
6	14.01	31.42	PK	38.8	-27.5	0	42.72	-	-	-	-	0-360	100	V

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

PK - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/ Fltr/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
* 1.29	42.85	PK2	30.1	-23.7	0	49.25	-	-	74	-24.75	360	200	V
* 1.292	31.32	MAv1	30.2	-23.8	2.08	39.8	54	-14.2	-	-	360	200	V

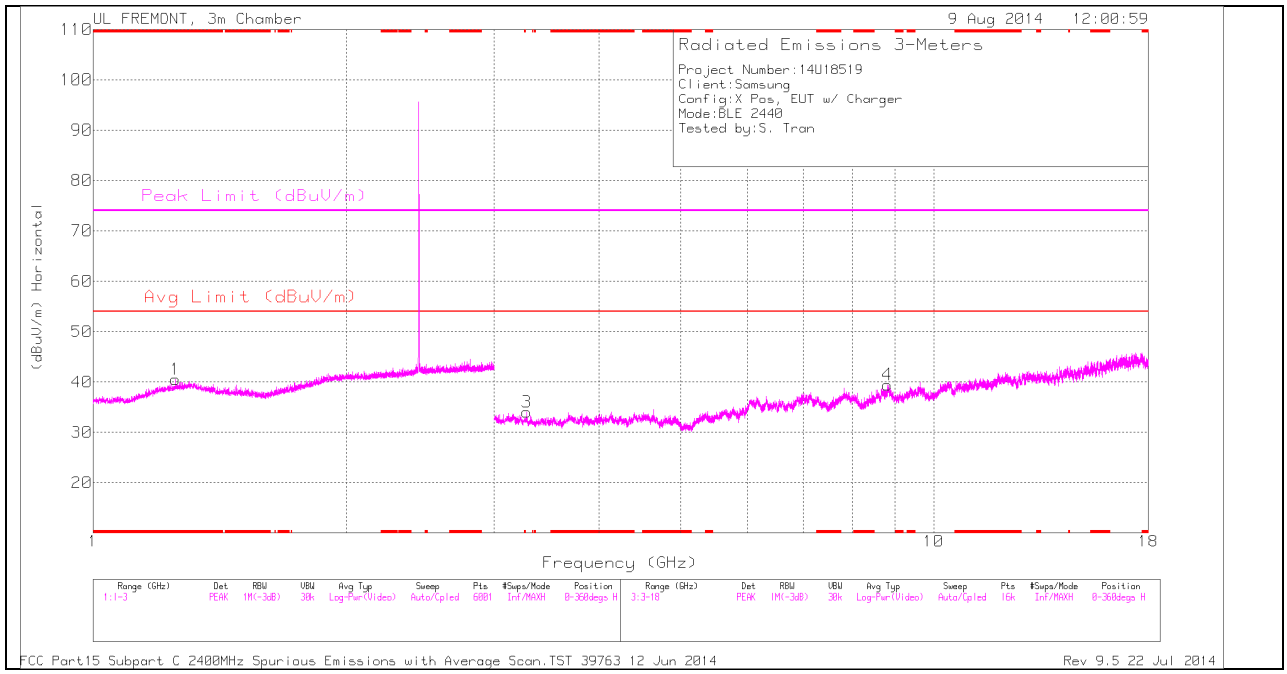
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

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.

MID CHANNEL HORIZONTAL

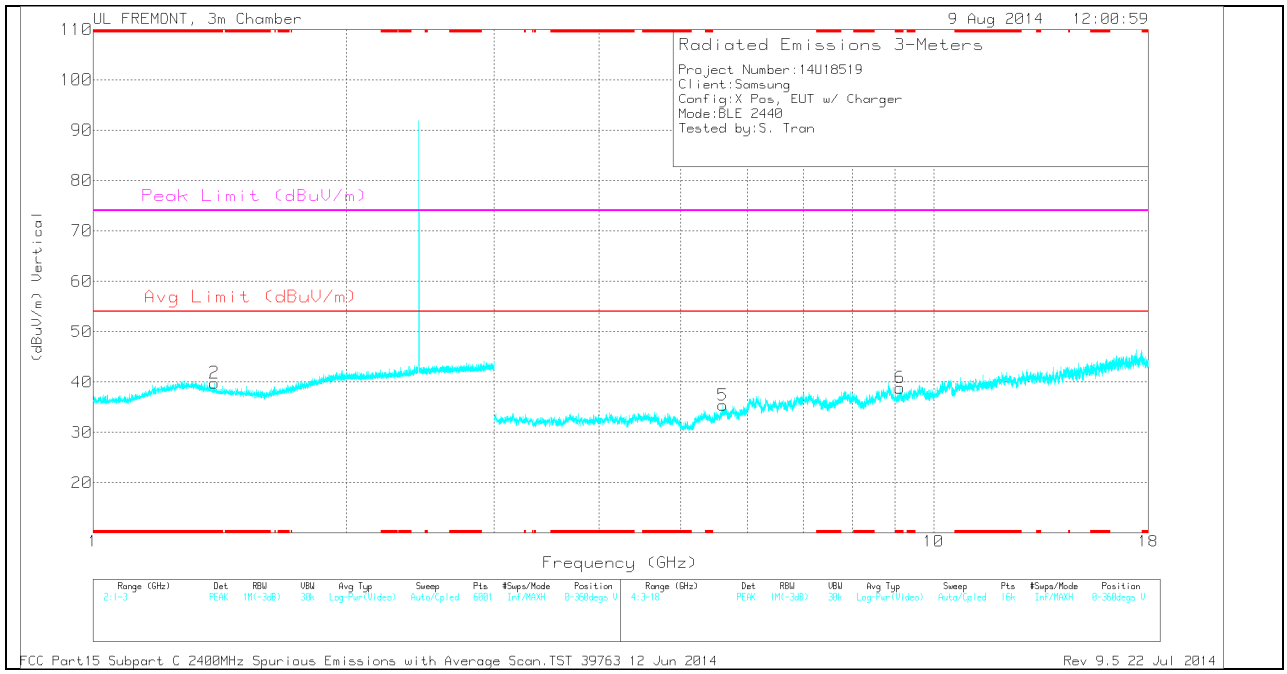


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

FORM NO: CCSUP4701I
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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.

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

FORM NO: CCSUP4701I
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID CHANNEL DATA

TRACE MARKERS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr /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	* 1.253	34.52	PK	29.8	-23.8	0	40.52	-	-	74	-33.48	0-360	200	H
2	* 1.394	34.33	PK	29.2	-23.7	0	39.83	-	-	74	-34.17	0-360	200	V
6	* 9.115	28.96	PK	36.2	-26.3	0	38.86	-	-	74	-35.14	0-360	100	V
3	3.279	32.82	PK	32.9	-31.7	0	34.02	-	-	-	-	0-360	200	H
5	5.615	30.21	PK	34.7	-29.5	0	35.41	-	-	-	-	0-360	100	V
4	8.816	30.04	PK	36	-26.6	0	39.44	-	-	-	-	0-360	100	H

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

PK - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/ Fltr/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
* 9.116	37.52	PK2	36.2	-26.2	0	47.52	-	-	74	-26.48	360	100	V
* 9.113	26.55	MAv1	36.2	-26.3	2.08	38.53	54	-15.47	-	-	360	100	V

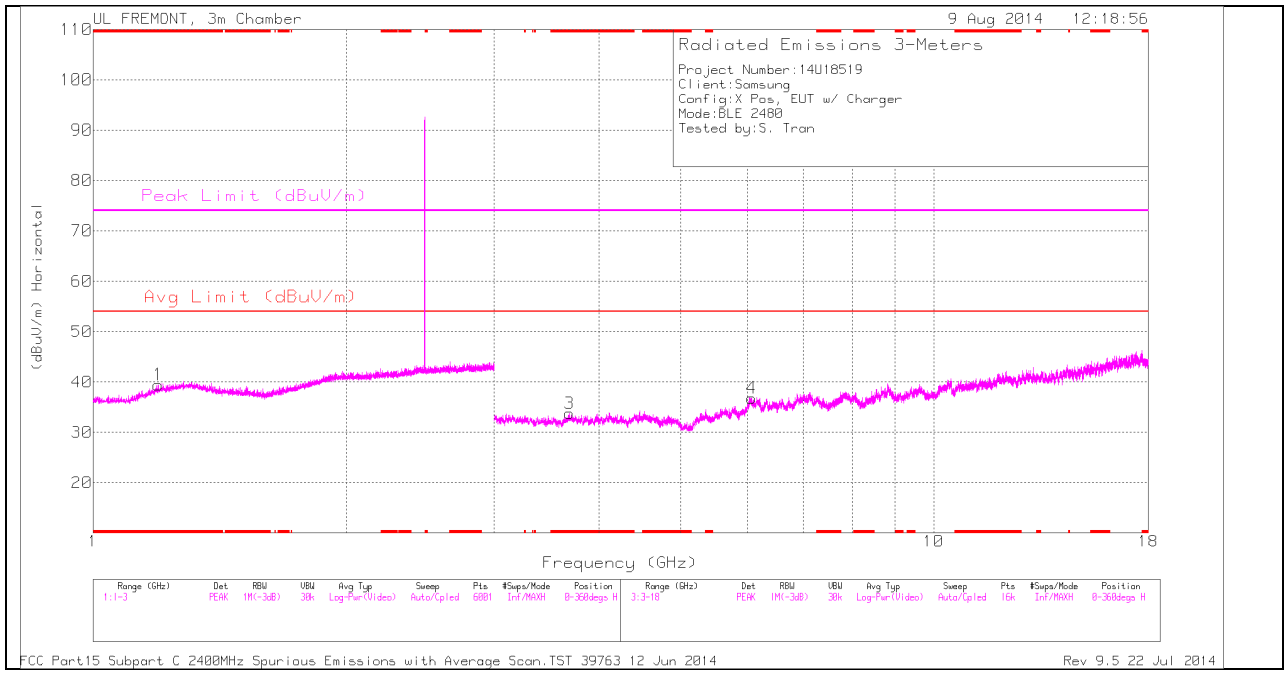
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

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

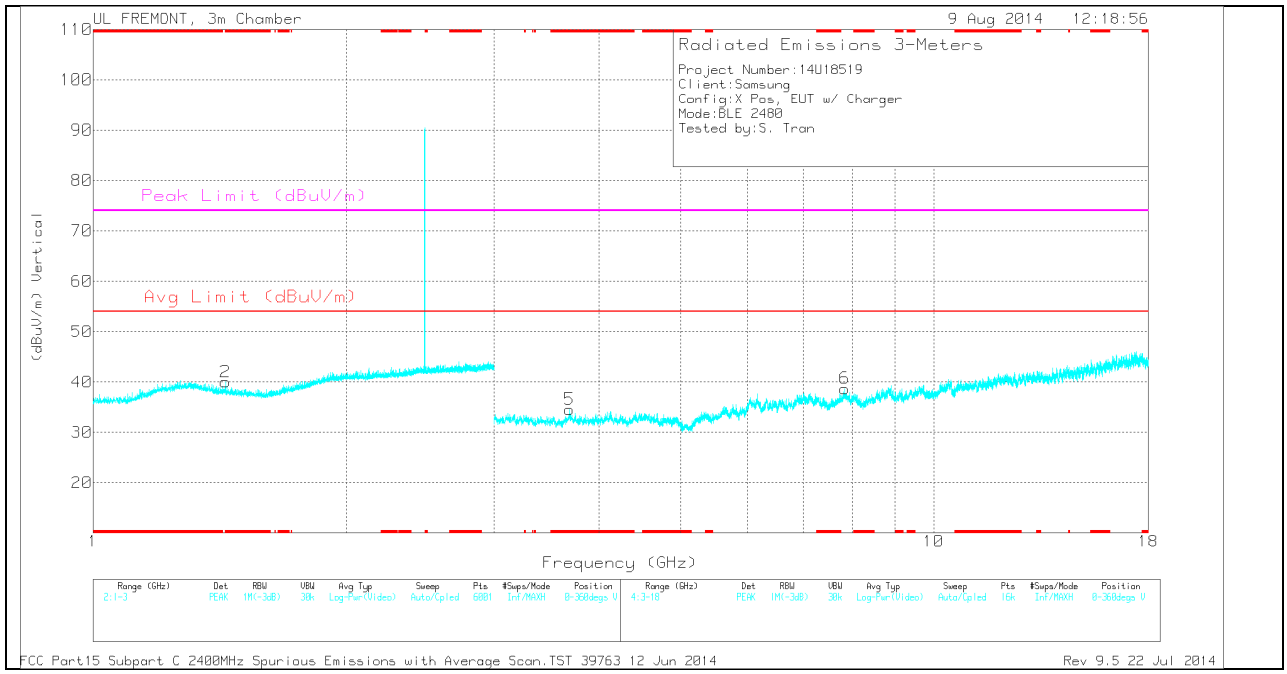


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

FORM NO: CCSUP4701I
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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.

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

FORM NO: CCSUP4701I
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CHANNEL DATA

TRACE MARKERS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr /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	* 1.195	34.05	PK	29.1	-23.7	0	39.45	-	-	74	-34.55	0-360	200	H
2	* 1.437	34.81	PK	28.9	-23.7	0	40.01	-	-	74	-33.99	0-360	200	V
3	* 3.687	31.38	PK	33.2	-30.8	0	33.78	-	-	74	-40.22	0-360	100	H
5	* 3.69	32.15	PK	33.2	-30.8	0	34.55	-	-	74	-39.45	0-360	200	V
4	6.079	30.51	PK	35.3	-29	0	36.81	-	-	-	-	0-360	200	H
6	7.833	30.51	PK	35.8	-27.6	0	38.71	-	-	-	-	0-360	200	V

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

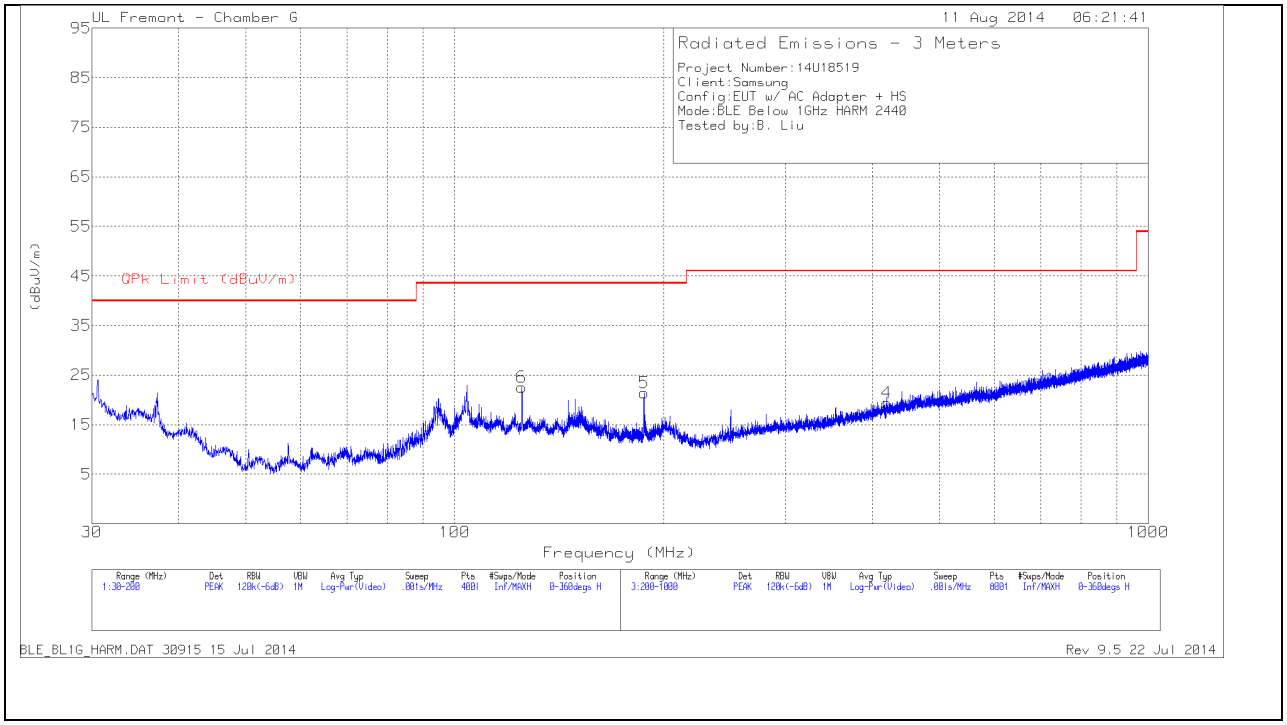
PK - Peak detector

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

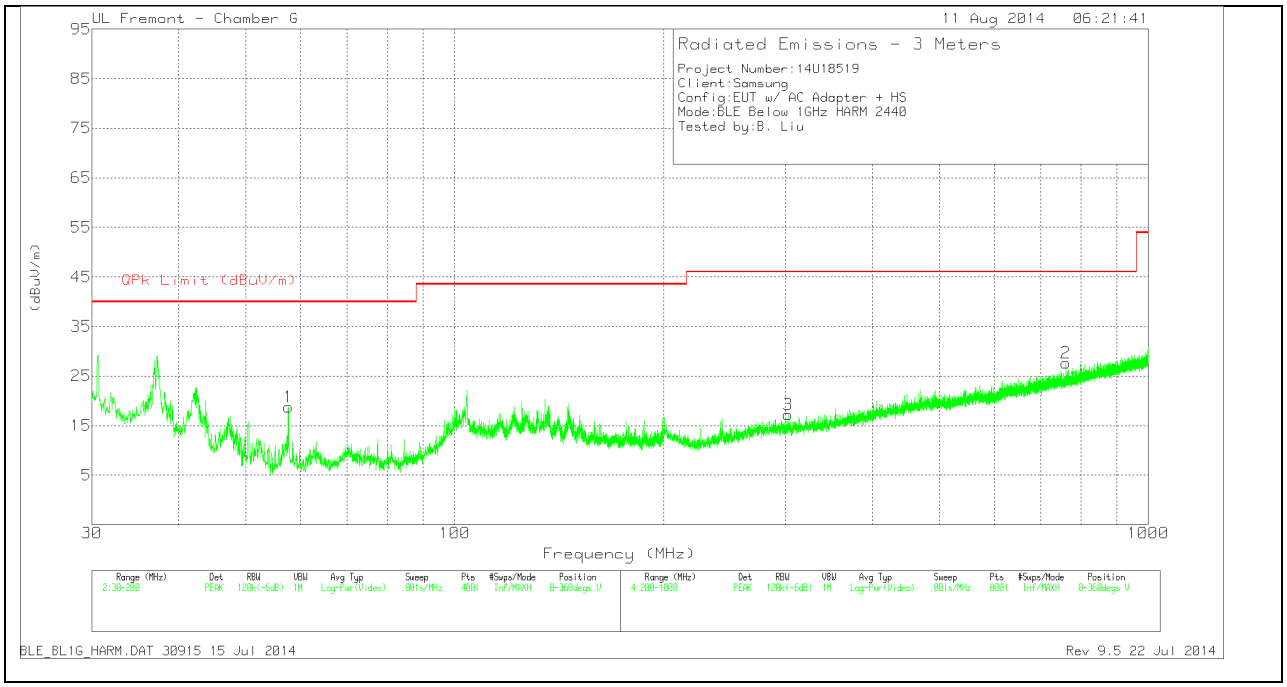
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

HORIZONTAL PLOT



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

VERTICAL PLOT



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

FORM NO: CCSUP4701I
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

BELOW 1 GHz TABLE

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Hybrid	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 125.03	35.63	PK	16.8	-29.9	22.53	43.52	-20.99	0-360	201	H
1	57.5825	38.99	PK	10.4	-30.6	18.79	40	-21.21	0-360	100	V
5	187.4625	36.44	PK	14.3	-29.3	21.44	43.52	-22.08	0-360	100	H
3	302.7	29.15	PK	16.5	-28.4	17.25	46.02	-28.77	0-360	301	V
4	419.8	28.11	PK	19.2	-27.9	19.41	46.02	-26.61	0-360	301	H
2	761	30.41	PK	23.7	-26.5	27.61	46.02	-18.41	0-360	301	V

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

PK - Peak detector

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.

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

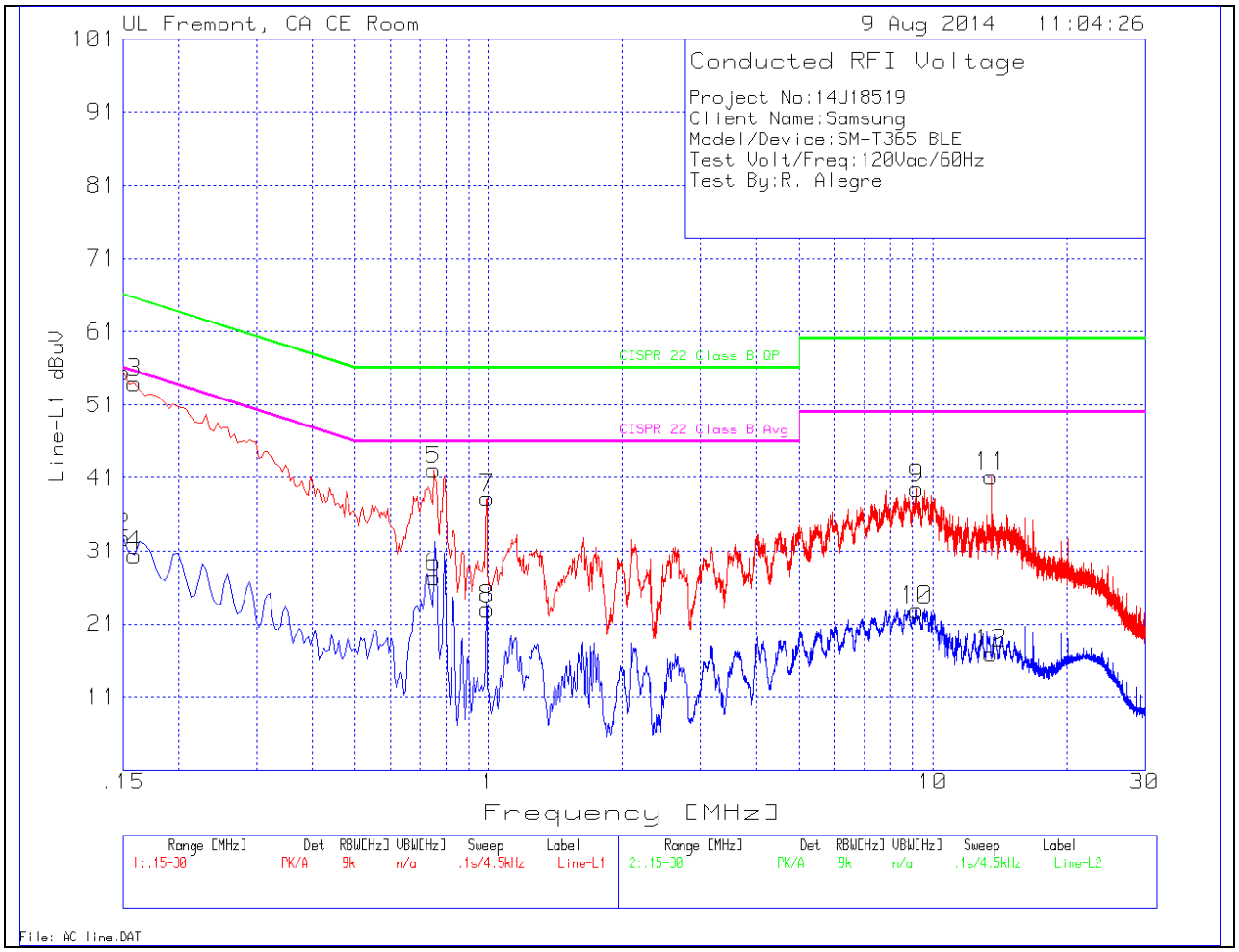
ANSI C63.4 - 2009

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.

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

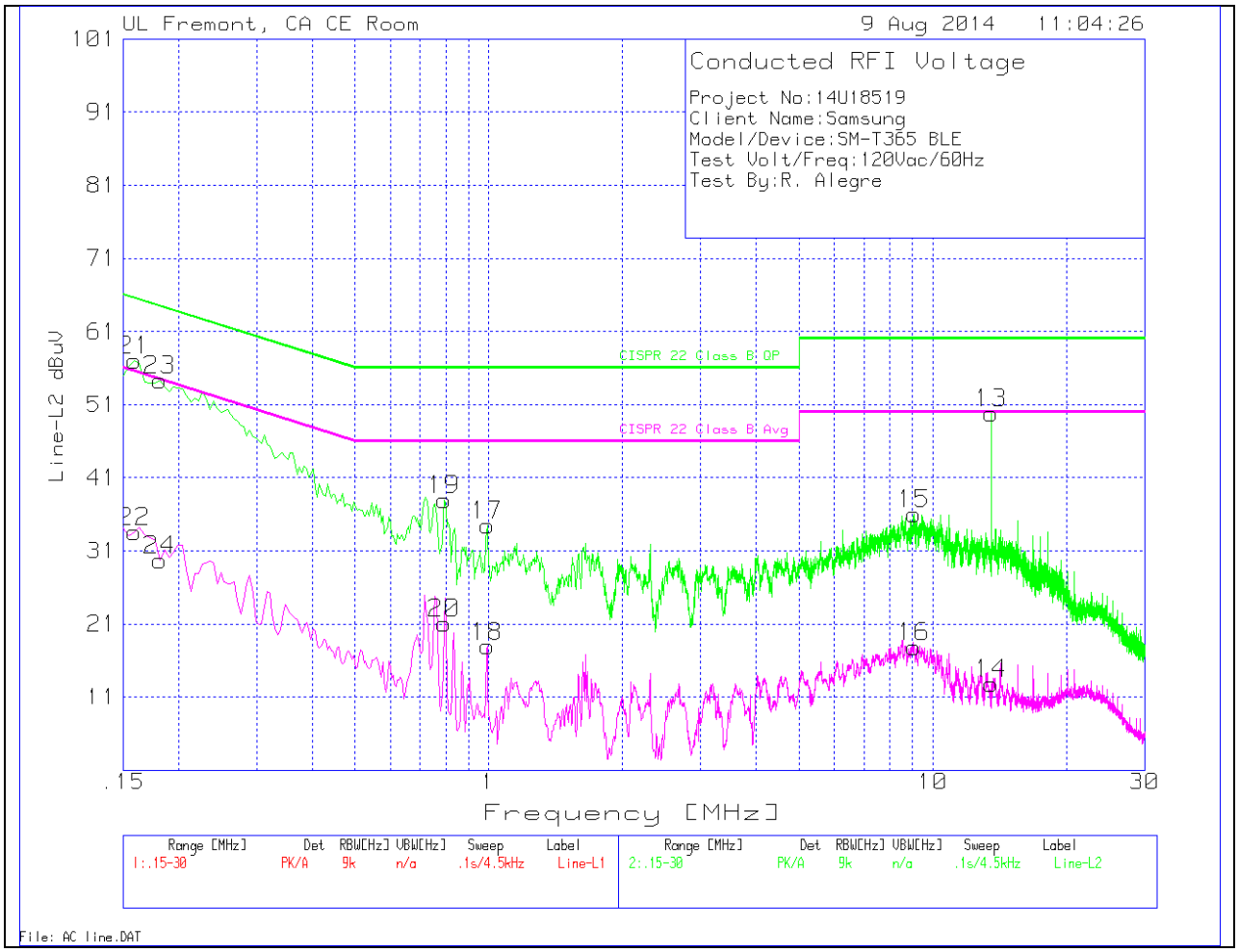
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
1	.15	54.1	PK	1.4	0	55.5	66	-10.5	-	-
2	.15	31.35	Av	1.4	0	32.75	-	-	56	-23.25
3	.159	52.6	PK	1.3	0	53.9	65.5	-11.6	-	-
4	.159	29.04	Av	1.3	0	30.34	-	-	55.5	-25.16
5	.753	41.72	PK	.3	0	42.02	56	-13.98	-	-
6	.753	27.09	Av	.3	0	27.39	-	-	46	-18.61
7	.9915	37.96	PK	.3	0	38.26	56	-17.74	-	-
8	.9915	22.76	Av	.3	0	23.06	-	-	46	-22.94
9	9.195	39.11	PK	.2	.2	39.51	60	-20.49	-	-
10	9.195	22.5	Av	.2	.2	22.9	-	-	50	-27.1
11	13.569	40.76	PK	.2	.2	41.16	60	-18.84	-	-
12	13.569	16.52	Av	.2	.2	16.92	-	-	50	-33.08

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

FORM NO: CCSUP4701I
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
21	.159	55.63	PK	1.4	0	57.03	65.5	-8.47	-	-
22	.159	32.12	Av	1.4	0	33.52	-	-	55.5	-21.98
23	.1815	53.11	PK	1.2	0	54.31	64.4	-10.09	-	-
24	.1815	28.53	Av	1.2	0	29.73	-	-	54.4	-24.67
19	.7935	37.69	PK	.3	0	37.99	56	-18.01	-	-
20	.7935	20.72	Av	.3	0	21.02	-	-	46	-24.98
17	.9915	34.21	PK	.3	0	34.51	56	-21.49	-	-
18	.9915	17.61	Av	.3	0	17.91	-	-	46	-28.09
15	9.0645	35.78	PK	.2	.1	36.08	60	-23.92	-	-
16	9.0645	17.59	Av	.2	.1	17.89	-	-	50	-32.11
13	13.5645	49.31	PK	.3	.2	49.81	60	-10.19	-	-
14	13.5645	12.33	Av	.3	.2	12.83	-	-	50	-37.17

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

FORM NO: CCSUP4701I
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.