FCC CFR47 PART 15 SUBPART C

BLUETOOTH LOW ENERGY

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

FCC ID: PY7-PM0941

REPORT NUMBER: 16J22997–E3V2

ISSUE DATE: 4/4/2016

Prepared for
SONY MOBILE COMMUNICATIONS, INC.
4-12-3 Higashi-Shinagawa, Shinagawa-Ku,
TOKYO, 140-0002 JAPAN

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
V1	3/18/2016	Initial issue	C. OOI
V2	4/4/2016	Update Section 7	J. WU

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 5

2. TEST METHODOLOGY 6

3. FACILITIES AND ACCREDITATION 6

4. CALIBRATION AND UNCERTAINTY 6

4.1. MEASURING INSTRUMENT CALIBRATION 6

4.2. SAMPLE CALCULATION 6

4.3. MEASUREMENT UNCERTAINTY 7

5. EQUIPMENT UNDER TEST 8

5.1. DESCRIPTION OF EUT 8

5.2. MAXIMUM OUTPUT POWER 8

5.3. DESCRIPTION OF AVAILABLE ANTENNAS 8

5.4. SOFTWARE AND FIRMWARE 8

5.5. WORST-CASE CONFIGURATION AND MODE 8

5.6. DESCRIPTION OF TEST SETUP 9

6. TEST AND MEASUREMENT EQUIPMENT 11

7. SUMMARY TABLE 12

8. ANTENNA PORT TEST RESULTS 13

8.1. ON TIME, DUTY CYCLE 13

8.2. 6 dB BANDWIDTH 14

8.2.1. 6 dB BANDWIDTH PLOTS AND TABLE 15

8.3. 99% BANDWIDTH 16

8.3.1. 99% BANDWIDTH PLOTS AND TABLE 17

8.4. OUTPUT POWER 18

8.4.1. OUTPUT POWER PLOTS 19

8.5. AVERAGE POWER 20

8.6. POWER SPECTRAL DENSITY 21

8.6.1. POWER SPECTRAL DENSITY PLOTS AND TABLE 22

8.7. CONDUCTED SPURIOUS EMISSIONS 23

8.7.1. BANDEDGE AND SPURIOUS EMISSIONS PLOTS 24

9. RADIATED TEST RESULTS 25

9.1. TRANSMITTER ABOVE 1 GHz 26

9.2. WORST-CASE BELOW 1 GHz 39

10. AC POWER LINE CONDUCTED EMISSIONS 41

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.

11. SETUP PHOTOS 44

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: SONY MOBILE COMMUNICATIONS, INC.

EUT DESCRIPTION: GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

SERIAL NUMBER: CB5129YWFF, CB5129YWGW, CB5129YNPZ, CB5129YNZZ

DATE TESTED: March 7 - 17, 2015

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 revision 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:

CHOON OOI
CONSUMER TECHNOLOGY DIVISION
WiSE PROJECT LEAD
UL VERIFICATION SERVICES INC

Prepared By:

JEFFREY WU
CONSUMER TECHNOLOGY DIVISION
WiSE 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 C63.10-2013 for FCC, FCC CFR 47 Part 2, and 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
	☐ Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

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

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

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, 9KHz to 30 MHz	2.14 dB
Radiated Disturbance, 30 to 1000 MHz	4.98 dB
Radiated Disturbance,1000 to 6000 MHz	3.86 dB
Radiated Disturbance,6000 to 18000 MHz	4.23 dB
Radiated Disturbance,18000 to 26000 MHz	5.30 dB
Radiated Disturbance,26000 to 40000 MHz	5.23 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/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & 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	6.594	4.56

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes intergrated antenna, with a maximum as below:

Frequency (MHz)	Antenna Gain (dBi)
2.402	-7.0
2.441	-6.2
2.480	-6.9

5.4. SOFTWARE AND FIRMWARE

The firmware/SW installed in the EUT during testing was SONY, s_atp_xxxx_1_600_7_9

The hardware version was A

The test utility software used during testing was Tera Term, rev 4.8.3(SVN#5602)

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit on the channel with higher 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.

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	SONY	UCH 20 1295-70821	N/A	N/A
Earphone	SONY	N/A	N/A	N/A
DC Power Supplier	Sorensen	XHR60-18	130A01935	N/A
Laptop	Lenovo	T450	PC-04ACGP	N/A
Laptop AC Adapter	Lenovo	ADLX65NLC2A	11S45N025971Z9751KU2U	N/A

I/O CABLES

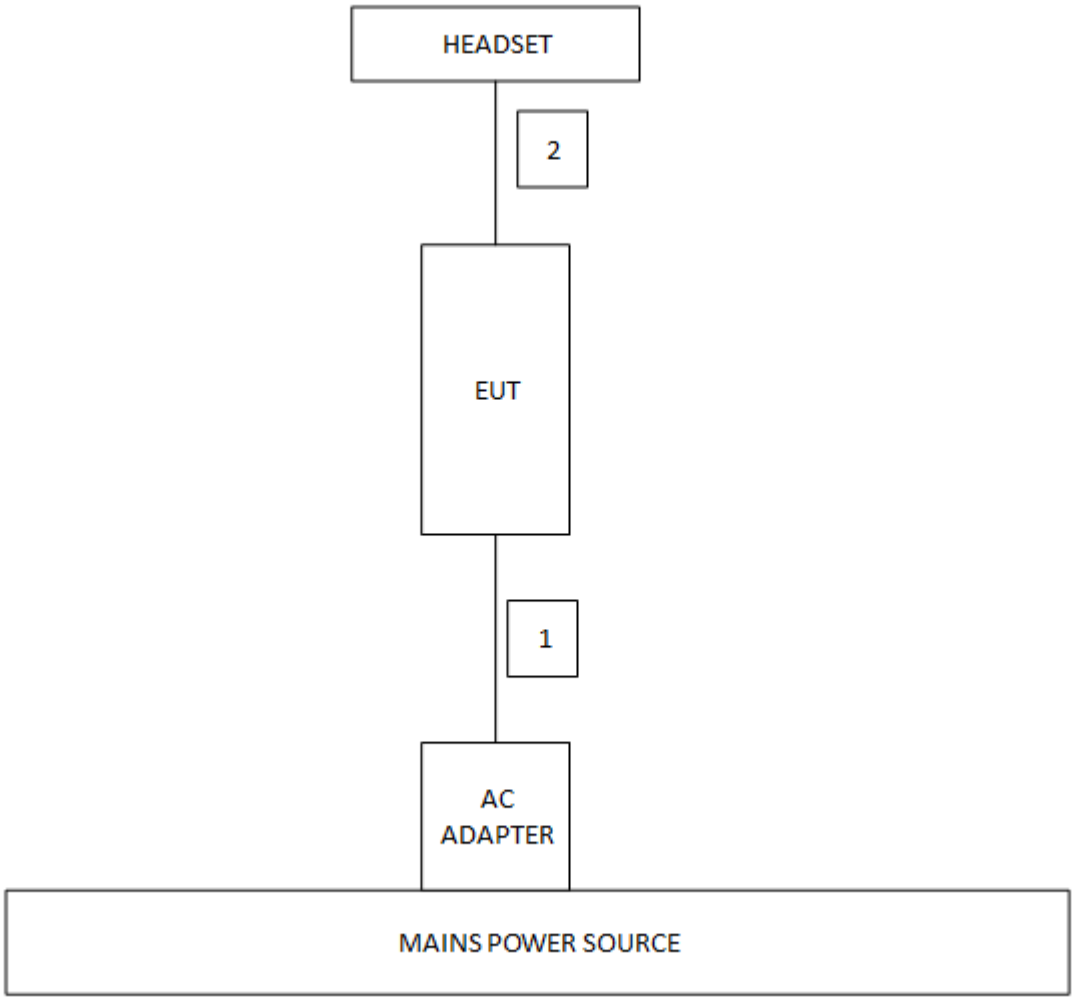
I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A
2	Audio	1	Mini-Jack	Unshielded	1m	N/A

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.

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.

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**	**T Number**	**Cal Due**
Amplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	493	03/09/17
Amplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	1165	07/20/16
Amplifier, 1-8GHz, 35 dB	Miteq	AMF-4D-01000800-30-29P	1156	03/09/17
Amplifier, 1-8GHz, 35 dB	Miteq	AMF-4D-01000800-30-29P	1172	07/20/16
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	122	01/29/17
Antenna, Horn, 18GHz	ETS Lindgren	3117	344	02/22/17
Antenna, Horn, 18GHz	ETS Lindgren	3117	345	02/22/17
Antenna, Horn, 18GHz	ETS Lindgren	3117	346	02/22/17
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	447	05/12/16
Bluetooth Tester	Rohde & Schwarz	CBT	258	06/30/16
ESR7 EMI Test Receiver 7GHz	Rohde & Schwarz	ESR	1436	12/19/16
High Pass Filter 3GHz	Micro-Tronics	HPS17543	485	03/09/17
High Pass Filter 3GHz	Micro-Tronics	HPS17543	486	07/20/16
High Pass Filter 6GHz	Micro-Tronics	HPS17542	483	03/09/17
High Pass Filter 6GHz	Micro-Tronics	HPS17542	484	07/20/16
LISN, 30 MHz	FCC	FCC-LISN-50/250-25-2	24	2/9/2017
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	482	03/09/17
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	481	07/20/16
Peak / Average Power Sensor	Keysight	N1921A	750	09/17/16
Peak Power Meter	Agilent / HP	N1911A	1268	07/06/17
RF Preamplifier, 1GHz - 18GHz	Miteq	NSP4000-SP2	88	04/07/16
RF Preamplifier, 1GHz - 26.5GHz	HP	8449B	404	06/29/16
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	99	06/10/16
Spectrum Analyzer, PXA, 3 Hz to 44 GHz	Keysight	N9030A	PRE0126762	03/09/17
Spectrum Analyzer, PXA, 3 Hz to 44 GHz	Keysight	N9030A	PRE0126777	12/21/16
Spectrum Analyzer, PXA, 3 Hz to 44 GHz	Keysight	N9030A	907	01/06/17

Test Software List			
Description	**Manufacturer**	**Model**	**Version**
Radiated Software	UL	UL EMC	Ver 9.5, June 24, 2015
Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015
Antenna Port Software	UL	UL RF	Ver 4.2, Mar 7, 2016

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

7. SUMMARY TABLE

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	RSS-247 5.2.1	Occupied Bandwidth (6dB)	>500KHz	Conducted	Pass
2.1051, 15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass
15.247	RSS-247 5.4.4	TX conducted output power	<30dBm		Pass
15.247	RSS-247 5.2.2	PSD	<8dBm		Pass
15.207 (a)	RSS-GEN 8.8	AC Power Line conducted emissions	Section 10	Radiated	Pass
15.205, 15.209, 15.247(d)	RSS-GEN 8.9/7	Radiated Spurious Emission	< 54dBuV/m		Pass

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. ANTENNA PORT TEST RESULTS

8.1. ON TIME, DUTY CYCLE

LIMITS

None; for reporting purposes only

PROCEDURE

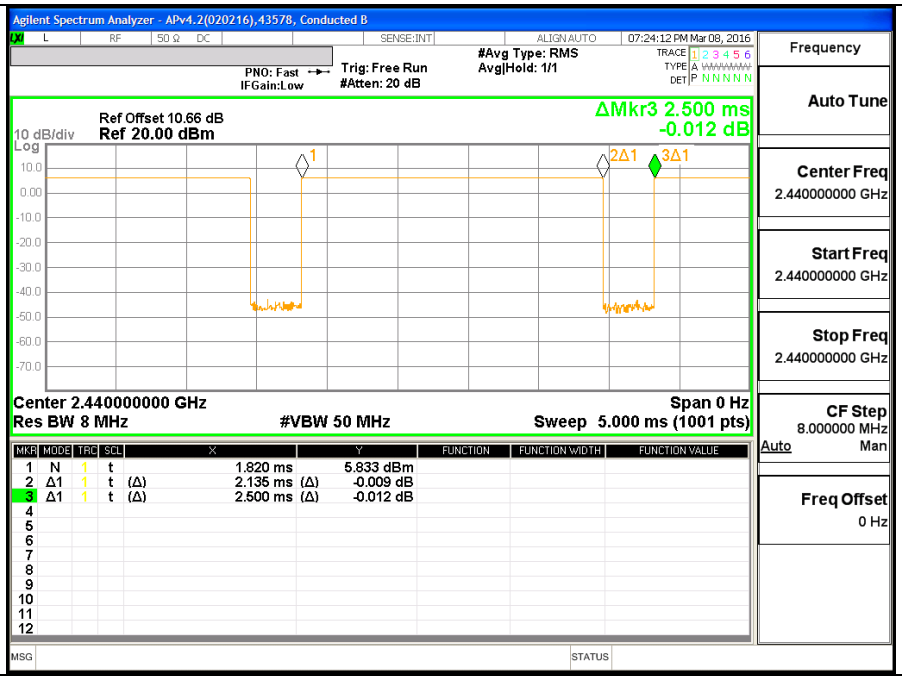
KDB 558074 Zero-Span Spectrum Analyzer Method

RESULTS

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
BLE	2.135	2.500	0.854	85.40%	0.69	0.468

DUTY CYCLE PLOTS



NOTE: --

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

8.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

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

TEST PROCEDURE

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

RESULTS

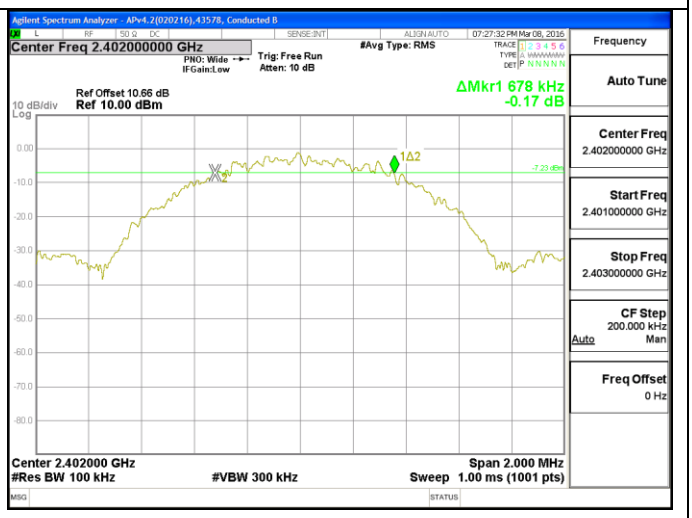
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.2.1. 6 dB BANDWIDTH PLOTS AND TABLE

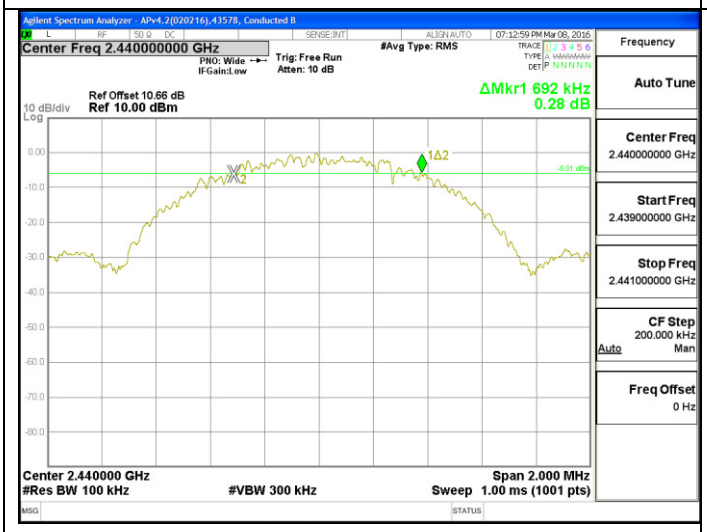
TEST RESULT TABLE

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)
Low	2402	0.678
Middle	2440	0.692
High	2480	0.736

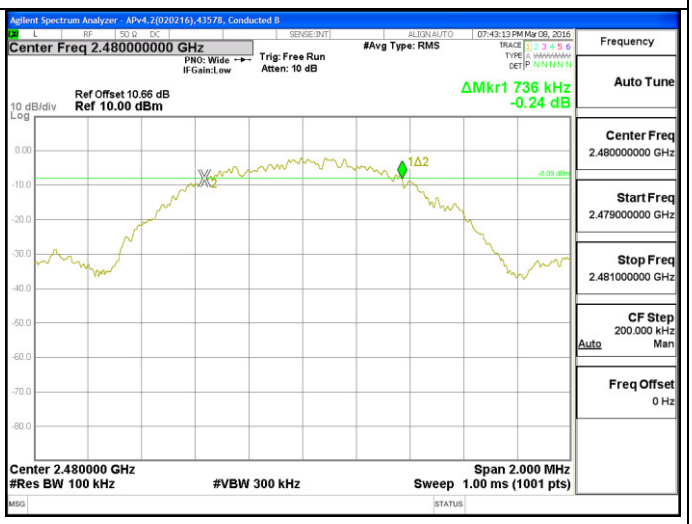
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



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

8.3. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Refer to KDB558074 D01 DTS Meas Guidance v03r04: 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

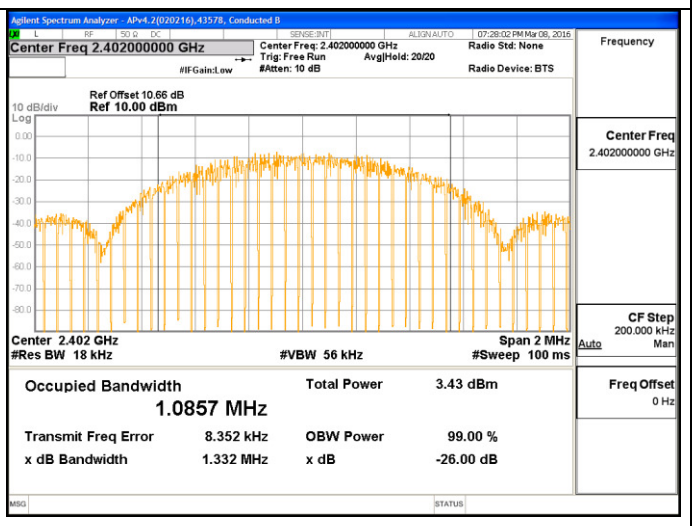
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.3.1. 99% BANDWIDTH PLOTS AND TABLE

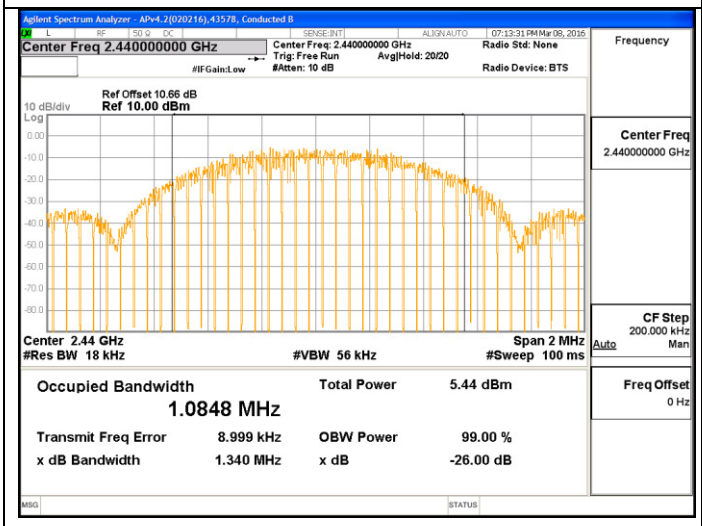
TEST RESULT TABLE

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0857
Middle	2440	1.0848
High	2480	1.0852

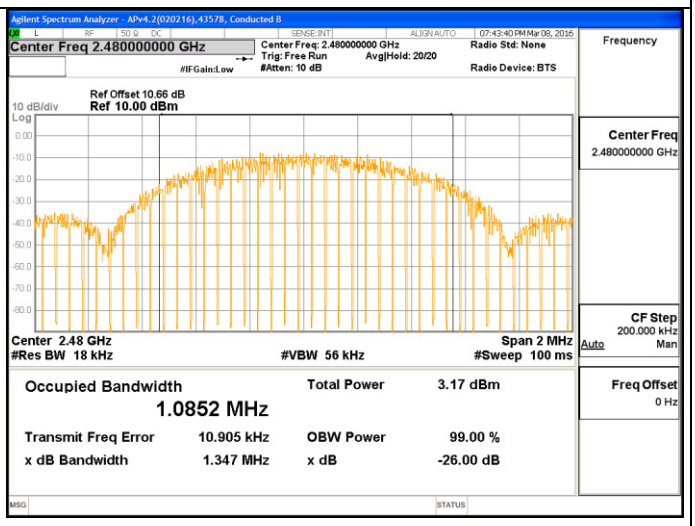
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



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

8.4. OUTPUT POWER

LIMITS

FCC §15.247 (b)

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

TEST PROCEDURE

Peak power is measured using KDB558074 D01 DTS Meas Guidance v03r04 spectrum analyzer.

RESULTS

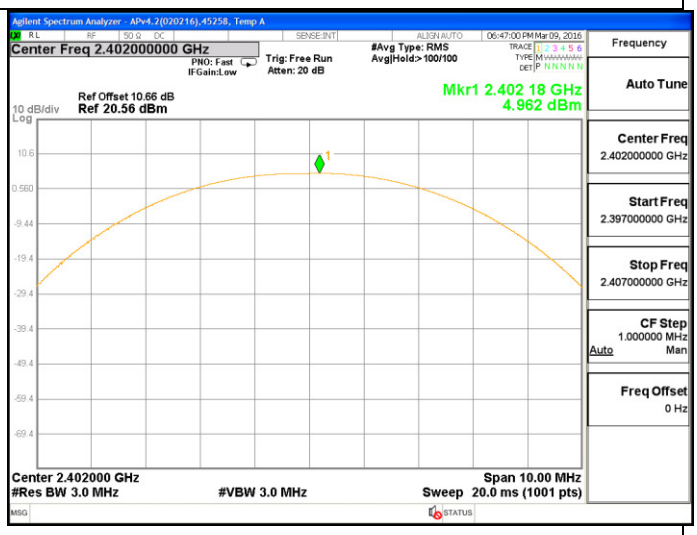
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.4.1. OUTPUT POWER PLOTS

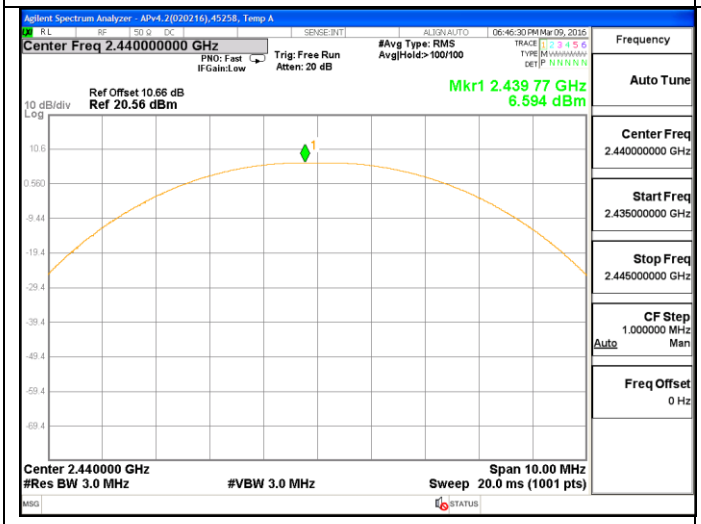
TEST RESULT TABLE

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.962	30	-25.04
Middle	2440	6.594	30	-23.41
High	2480	4.414	30	-25.59

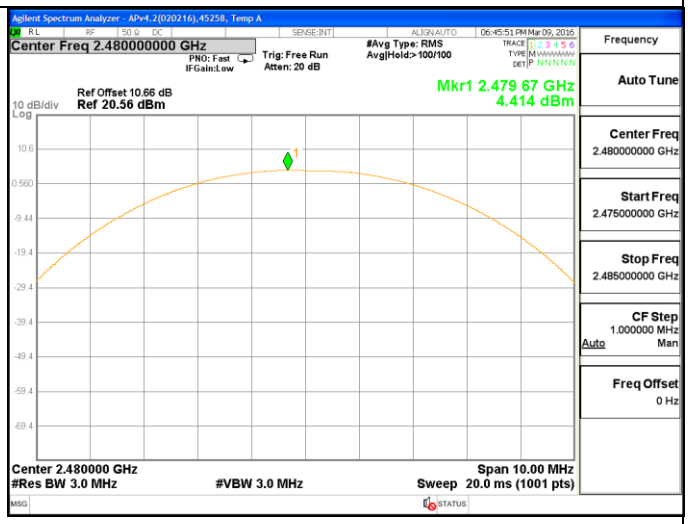
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



NOTE:

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

8.5. 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 10.6 dB (including 10 dB pad and 0.6 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	4.36
Middle	2440	6.11
High	2480	3.87

NOTE: --

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.

8.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Power Spectral Density was performed utilizing the “Method PKPSD (Peak PSD)” under KDB558074 D01 DTS Meas Guidance v03r04.

RESULTS

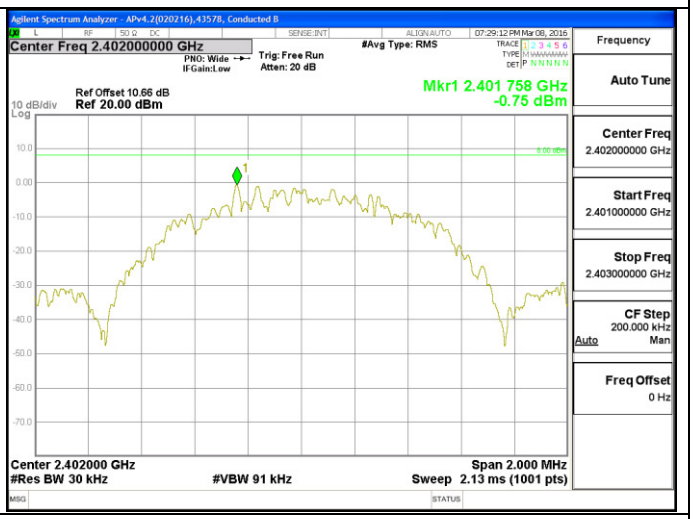
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.6.1. POWER SPECTRAL DENSITY PLOTS AND TABLE

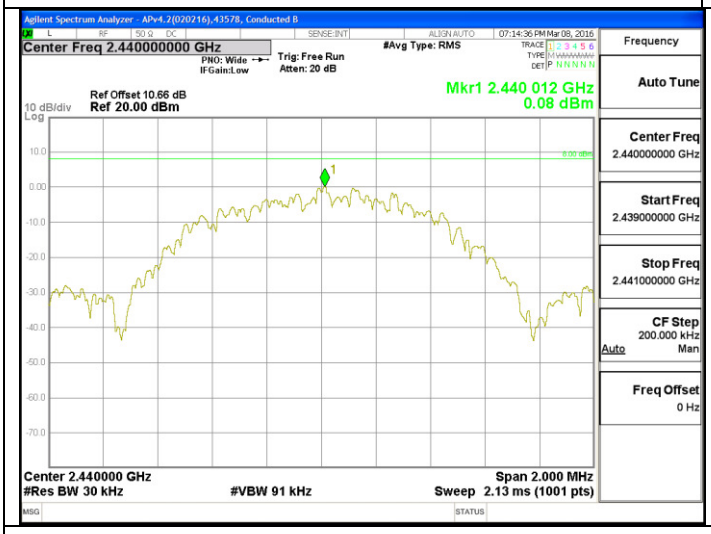
TEST RESULT TABLE

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-0.75	8	-8.75
Middle	2440	0.08	8	-7.92
High	2480	-2.09	8	-10.09

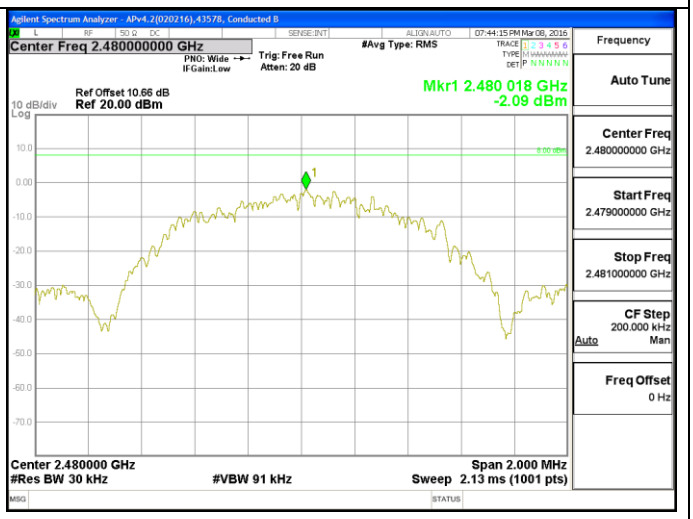
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



NOTE:

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

8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

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

TEST PROCEDURE

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

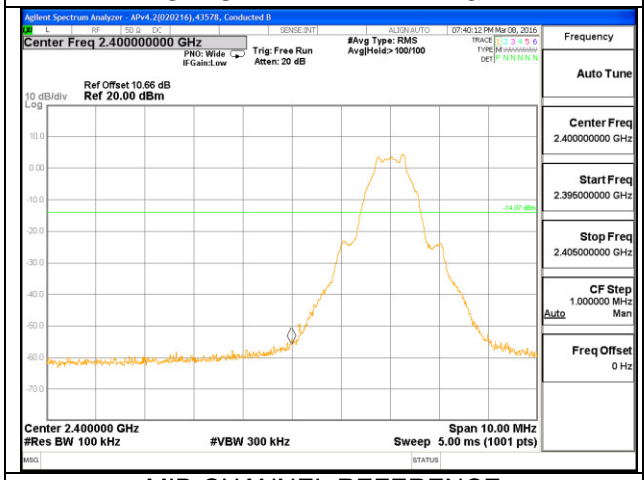
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

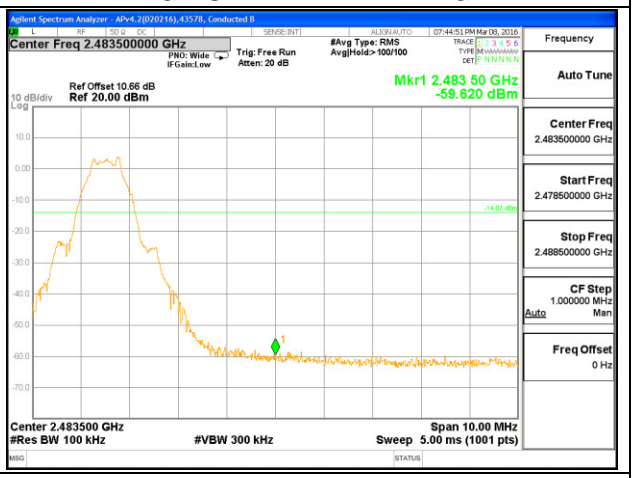
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.7.1. BANDEDGE AND SPURIOUS EMISSIONS PLOTS

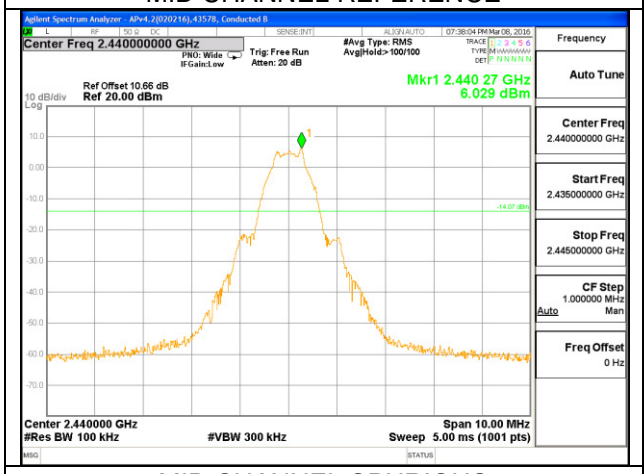
LOW CHANNEL BANDEDGE



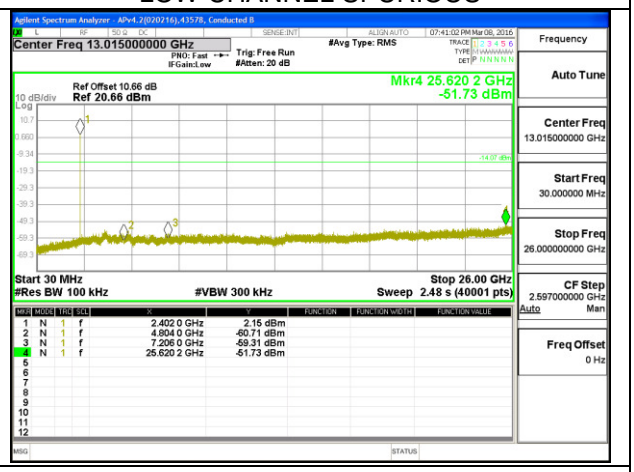
HIGH CHANNEL BANDEDGE



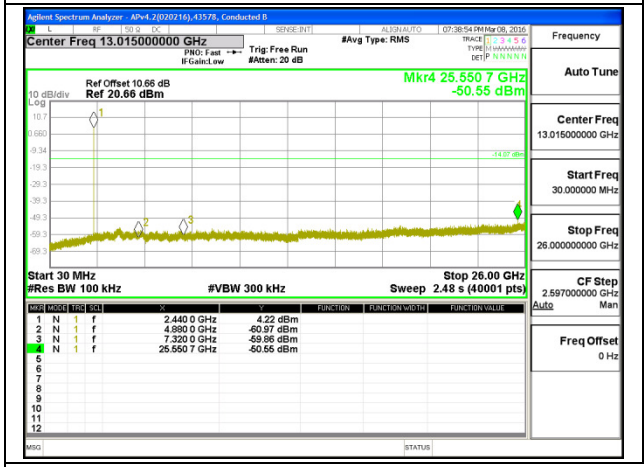
MID CHANNEL REFERENCE



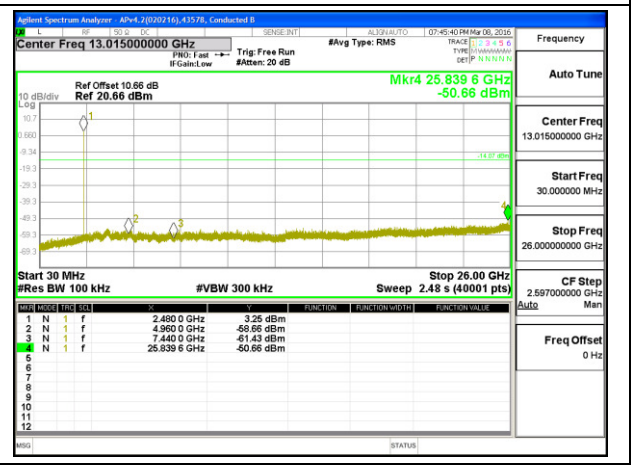
LOW CHANNEL SPURIOUS



MID CHANNEL SPURIOUS



HIGH CHANNEL SPURIOUS



NOTE:--

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. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

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 for below 1GHz and 150cm for above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. 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. Please refer to test report section 8.1 for duty cycle factor information.

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.

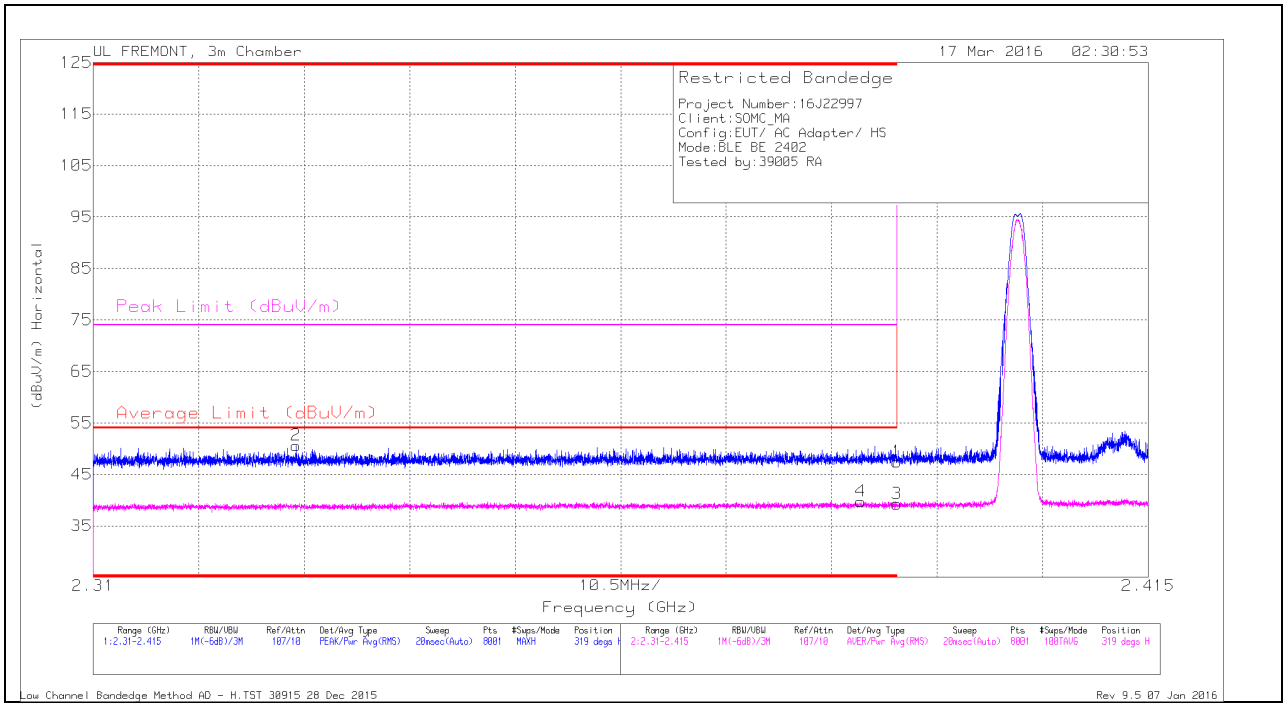
RESULTS

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.

9.1. TRANSMITTER ABOVE 1 GHz

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL 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)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	37.62	Pk	32	-22.2	0	47.42	-	-	74	-26.58	319	327	H
2	* 2.33	41.23	Pk	31.7	-22.3	0	50.63	-	-	74	-23.37	319	327	H
3	* 2.39	28.8	RMS	32	-22.2	.69	39.29	54	-14.71	-	-	319	327	H
4	* 2.386	29.27	RMS	32	-22.2	.69	39.76	54	-14.24	-	-	319	327	H

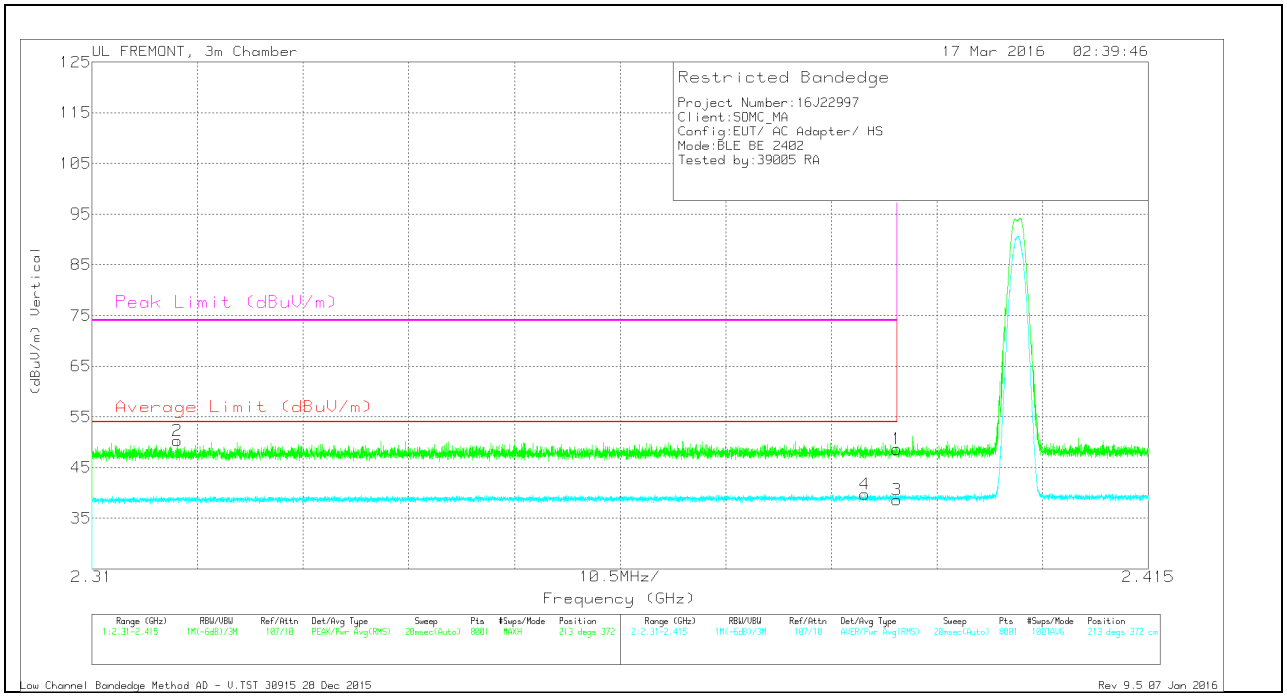
* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Pk - Peak detector

RMS - RMS detection

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

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)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	2.319	40.75	Pk	31.7	-22.2	0	50.25	-	-	74	-23.75	213	372	V
4	2.387	29.28	RMS	32	-22.2	.69	39.77	54	-14.23	-	-	213	372	V
1	2.39	38.82	Pk	32	-22.2	0	48.62	-	-	74	-25.38	213	372	V
3	2.39	28.17	RMS	32	-22.2	.69	38.66	54	-15.34	-	-	213	372	V

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

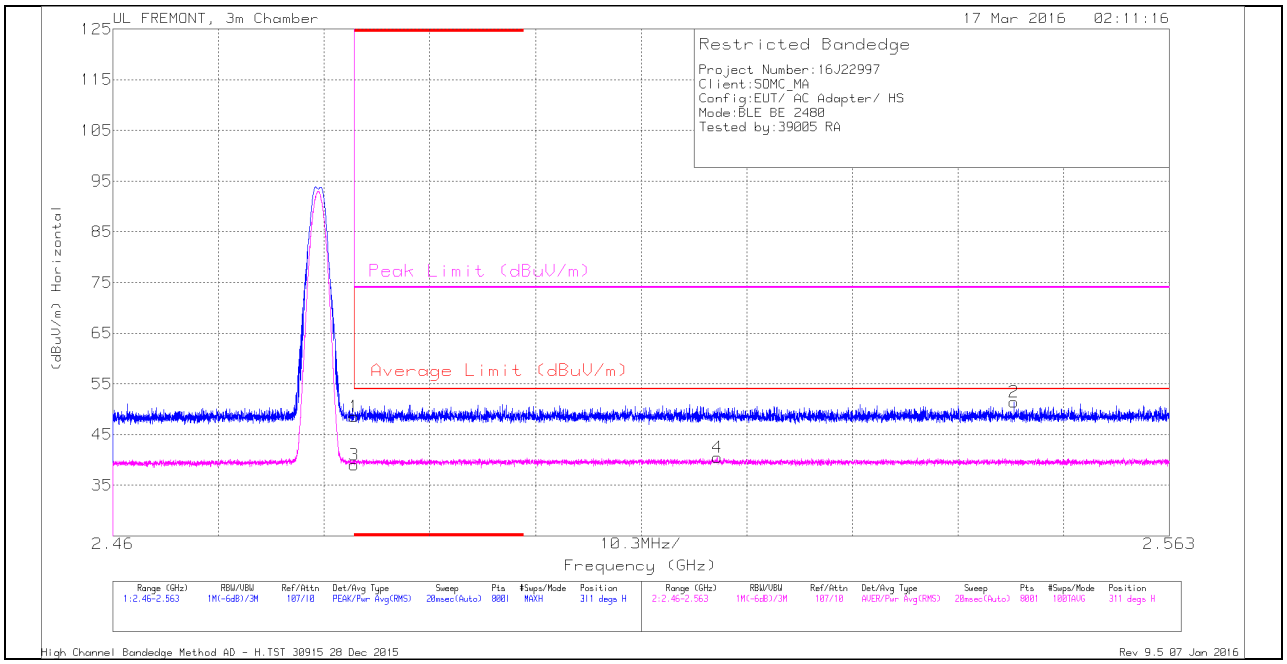
Pk - Peak detector

RMS - RMS detection

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

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)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	38.29	Pk	32.3	-22	0	48.59	-	-	74	-25.41	311	309	H
3	* 2.484	27.98	RMS	32.3	-22	.69	38.97	54	-15.03	-	-	311	309	H
4	2.519	29.35	RMS	32.3	-21.9	.69	40.44	54	-13.56	-	-	311	309	H
2	2.548	40.91	Pk	32.4	-21.9	0	51.41	-	-	74	-22.59	311	309	H

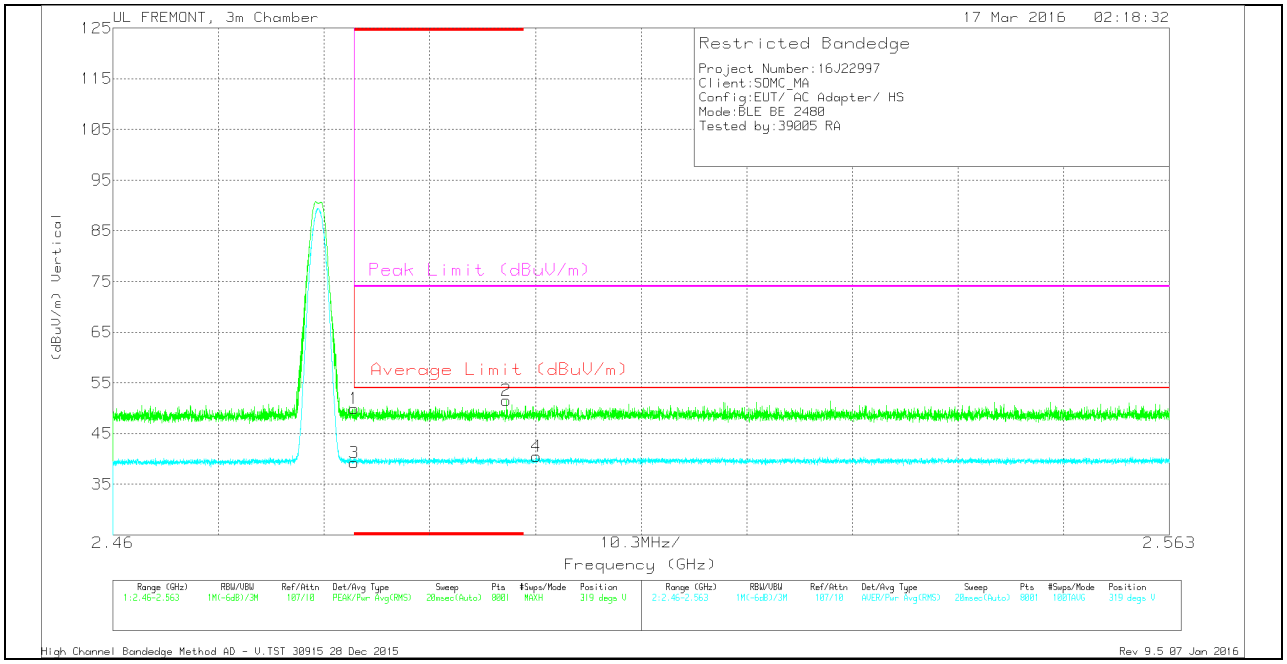
* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

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

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)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.64	Pk	32.3	-22	0	49.94	-	-	74	-24.06	319	347	V
2	* 2.498	41.21	Pk	32.3	-22	0	51.51	-	-	74	-22.49	319	347	V
3	* 2.484	28.2	RMS	32.3	-22	.69	39.19	54	-14.81	-	-	319	347	V
4	2.501	29.34	RMS	32.3	-21.9	.69	40.43	54	-13.57	-	-	319	347	V

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

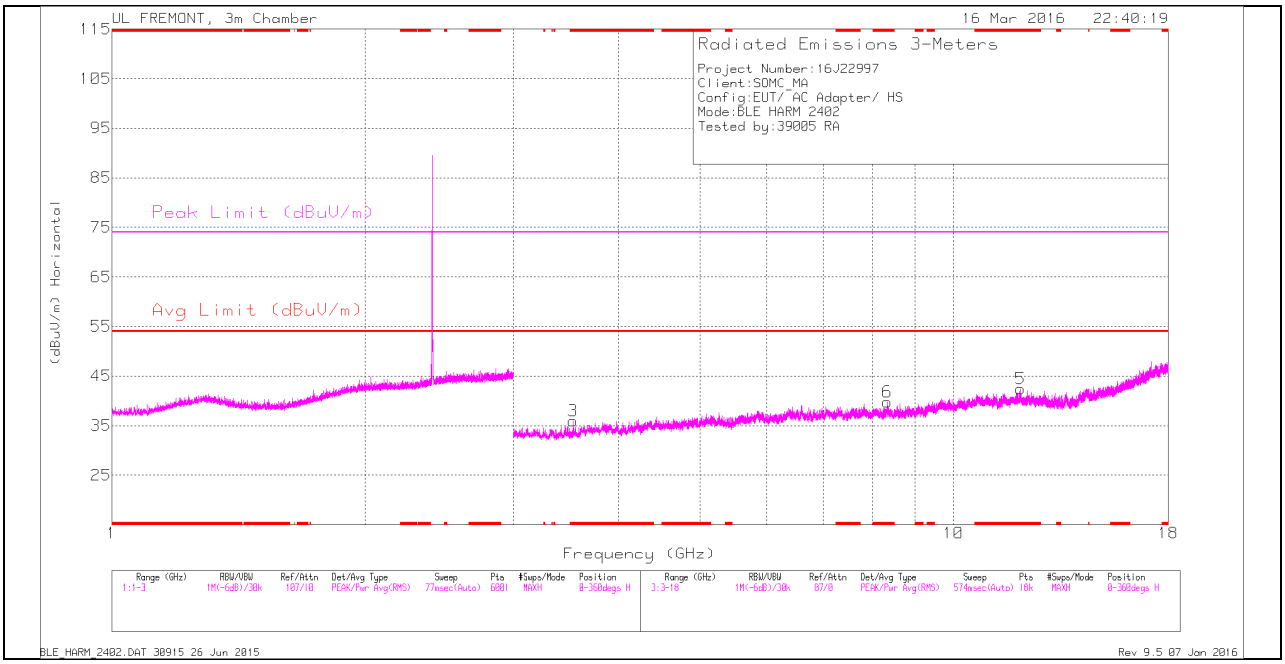
Pk - Peak detector

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.

HARMONICS AND SPURIOUS EMISSIONS

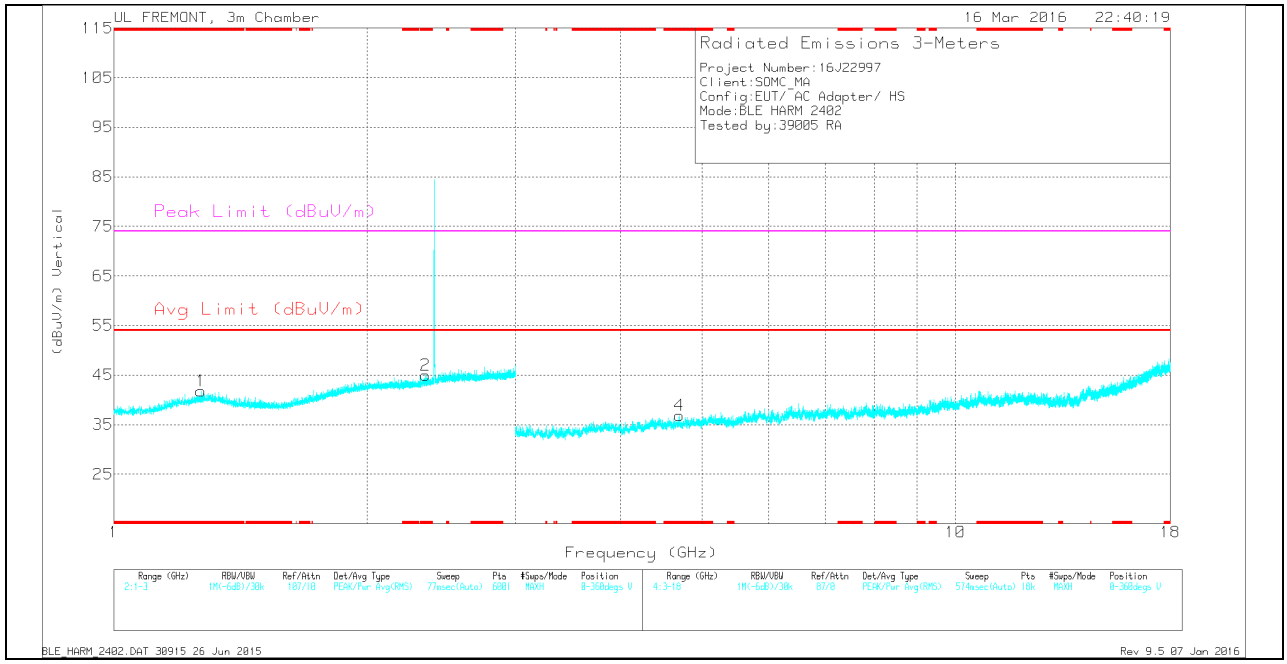
LOW CHANNEL HORIZONTAL



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.

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.

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	* 1.269	35.45	Pk	29.6	-23.2	0	41.85	-	-	74	-32.15	0-360	200	V
2	* 2.346	35.49	Pk	31.8	-22.3	0	44.99	-	-	74	-29.01	0-360	100	V
3	* 3.534	33.37	Pk	32.8	-30.2	0	35.97	-	-	74	-38.03	0-360	100	H
5	* 12.01	26.39	Pk	39.1	-23.1	0	42.39	-	-	74	-31.61	0-360	200	H
6	* 8.351	29.46	Pk	35.8	-25.5	0	39.76	-	-	74	-34.24	0-360	200	H
4	* 4.697	32.59	Pk	34.1	-29.8	0	36.89	-	-	74	-37.11	0-360	200	V

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Avg - Video bandwidth < Resolution bandwidth

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
* 1.268	40.87	PK2	29.6	-23.2	0	47.27	-	-	74	-26.73	189	192	V
* 1.268	29.02	MAv1	29.6	-23.2	.69	36.11	54	-17.89	-	-	189	192	V
* 2.347	40.67	PK2	31.8	-22.3	0	50.17	-	-	74	-23.83	198	183	V
* 2.346	29.13	MAv1	31.8	-22.3	.69	39.32	54	-14.68	-	-	198	183	V
* 3.534	39.14	PK2	32.8	-30.2	0	41.74	-	-	74	-32.26	323	200	H
* 3.534	26.41	MAv1	32.8	-30.2	.69	29.7	54	-24.3	-	-	323	200	H
* 12.01	31.71	PK2	39.1	-23.1	0	47.71	-	-	74	-26.29	300	185	H
* 12.009	20.86	MAv1	39.1	-23.1	.69	37.55	54	-16.45	-	-	300	185	H
* 8.351	34.69	PK2	35.8	-25.5	0	44.99	-	-	74	-29.01	286	194	H
* 8.351	23.5	MAv1	35.8	-25.5	.69	34.49	54	-19.51	-	-	286	194	H
* 4.698	38.79	PK2	34.1	-29.8	0	43.09	-	-	74	-30.91	260	220	V
* 4.697	27.2	MAv1	34.1	-29.8	.69	32.19	54	-21.81	-	-	260	220	V

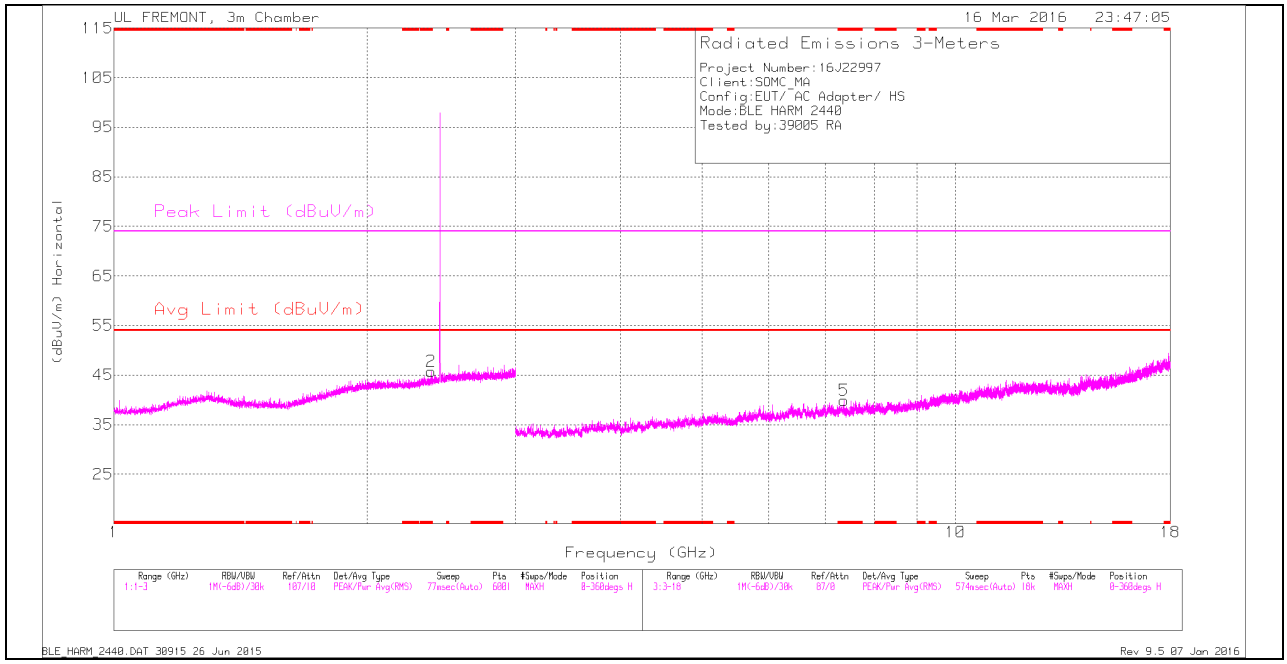
* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

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.

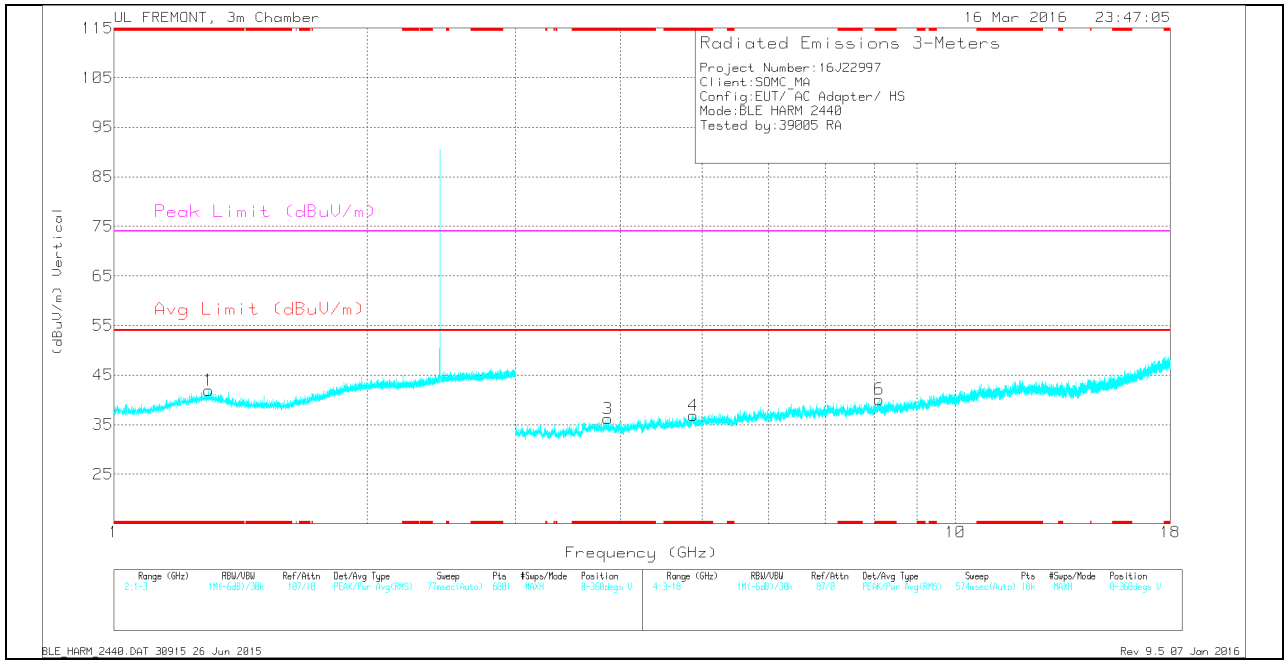
MID CHANNEL HORIZONTAL



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

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.

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
2	* 2.384	35.88	Pk	32	-22.2	0	45.68	-	-	74	-28.32	0-360	100	H
1	* 1.296	35.08	Pk	29.9	-23.1	0	41.88	-	-	74	-32.12	0-360	200	V
5	* 7.369	30.79	Pk	35.6	-26.5	0	39.89	-	-	74	-34.11	0-360	100	H
3	* 3.865	33.18	Pk	33.1	-30.1	0	36.18	-	-	74	-37.82	0-360	100	V
4	* 4.879	31.7	Pk	34	-28.8	0	36.9	-	-	74	-37.1	0-360	100	V
6	* 8.112	30.28	Pk	35.7	-25.9	0	40.08	-	-	74	-33.92	0-360	200	V

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Avg - Video bandwidth < Resolution bandwidth

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
* 2.383	41.33	PK2	32	-22.2	0	51.13	-	-	74	-22.87	135	350	H
* 2.385	28.87	MAv1	32	-22.2	.69	39.36	54	-14.64	-	-	135	350	H
* 1.296	40.69	PK2	29.8	-23.1	0	47.39	-	-	74	-26.61	209	207	V
* 1.296	29.31	MAv1	29.9	-23.1	.69	36.8	54	-17.2	-	-	209	207	V
* 7.369	36.4	PK2	35.6	-26.5	0	45.5	-	-	74	-28.5	195	180	H
* 7.368	24.91	MAv1	35.6	-26.6	.69	34.6	54	-19.4	-	-	195	180	H
* 3.865	39.22	PK2	33.1	-30.1	0	42.22	-	-	74	-31.78	254	230	V
* 3.865	27.76	MAv1	33.1	-30.1	.69	31.45	54	-22.55	-	-	254	230	V
* 4.879	38.32	PK2	34	-28.8	0	43.52	-	-	74	-30.48	111	178	V
* 4.879	26.18	MAv1	34	-28.8	.69	32.07	54	-21.93	-	-	111	178	V
* 8.111	34.69	PK2	35.7	-25.9	0	44.49	-	-	74	-29.51	328	204	V
* 8.114	23.36	MAv1	35.7	-26	.69	33.75	54	-20.25	-	-	328	204	V

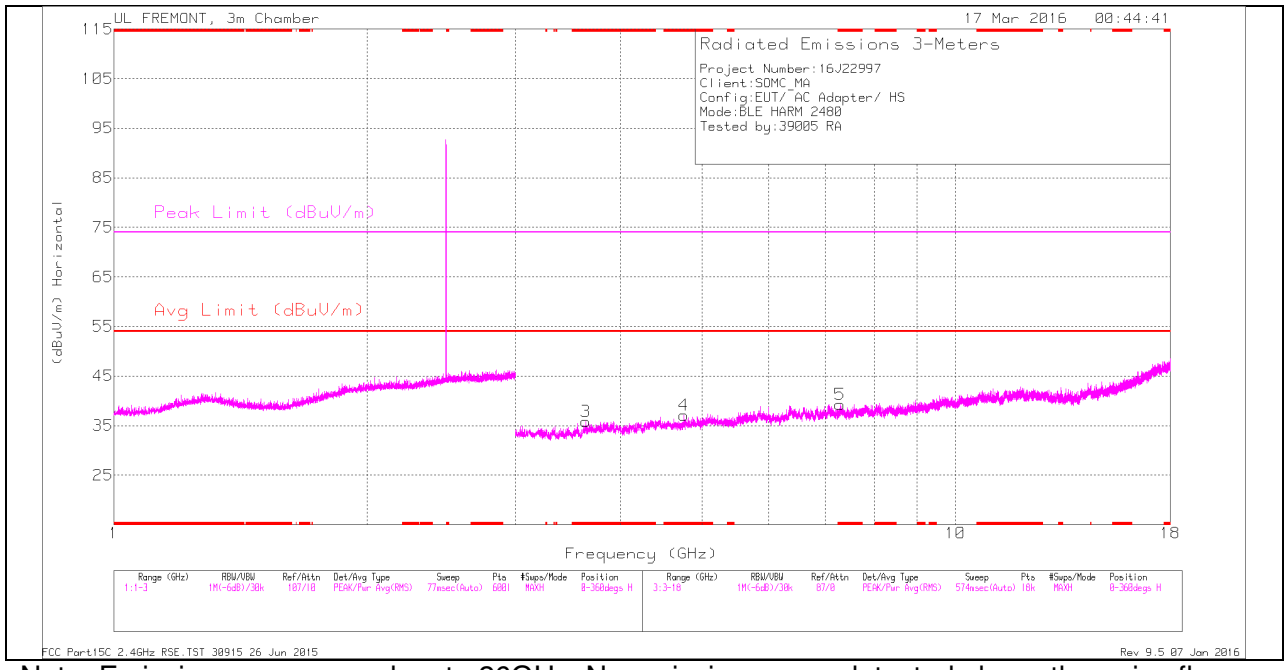
* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

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.

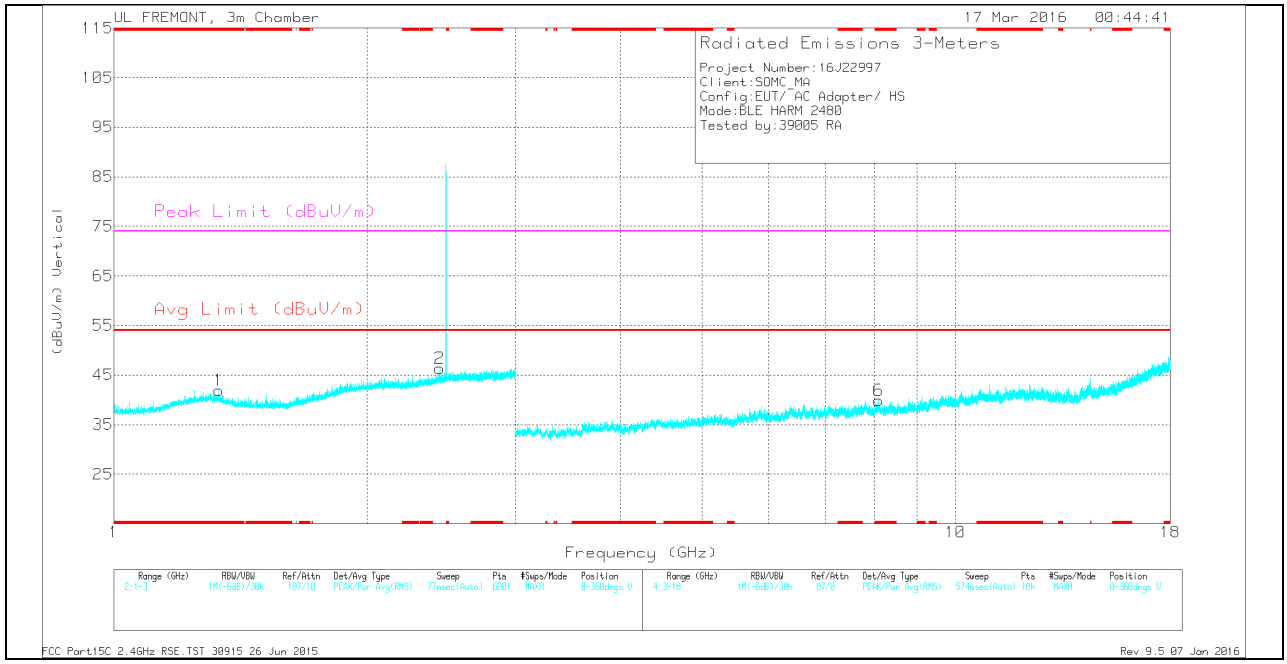
HIGH CHANNEL HORIZONTAL



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

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. 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

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	* 1.332	35.66	Pk	29.5	-23.2	0	41.96	-	-	74	-32.04	0-360	100	V
3	* 3.637	33.13	Pk	32.9	-30.2	0	35.83	-	-	74	-38.17	0-360	200	H
4	* 4.756	32.88	Pk	34	-29.8	0	37.08	-	-	74	-36.92	0-360	100	H
5	* 7.291	30.7	Pk	35.6	-27.1	0	39.2	-	-	74	-34.8	0-360	100	H
6	* 8.101	30.06	Pk	35.7	-25.9	0	39.86	-	-	74	-34.14	0-360	100	V
2	2.438	36.39	Pk	32.1	-22.1	0	46.39	-	-	-	-	0-360	100	V

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Avg - Video bandwidth < Resolution bandwidth

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
* 1.332	42.02	PK2	29.5	-23.2	0	48.32	-	-	74	-25.68	296	295	V
* 1.331	28.92	MAv1	29.5	-23.2	.69	35.91	54	-18.09	-	-	296	295	V
* 3.638	39.48	PK2	32.9	-30.2	0	42.18	-	-	74	-31.82	54	254	H
* 3.638	27.14	MAv1	32.9	-30.2	.69	30.53	54	-23.47	-	-	54	254	H
* 4.755	38.88	PK2	34	-29.8	0	43.08	-	-	74	-30.92	79	217	H
* 4.757	27.48	MAv1	34	-29.8	.69	32.37	54	-21.63	-	-	79	217	H
* 7.29	37.13	PK2	35.6	-27.2	0	45.53	-	-	74	-28.47	239	197	H
* 7.291	24.97	MAv1	35.6	-27.1	.69	34.16	54	-19.84	-	-	239	197	H
* 8.102	36.12	PK2	35.7	-25.9	0	45.92	-	-	74	-28.08	189	210	V
* 8.101	23.83	MAv1	35.7	-25.9	.69	34.32	54	-19.68	-	-	189	210	V
2.438	40.89	PK2	32.1	-22.1	0	50.89	-	-	74	-23.11	270	224	V
2.438	29.21	MAv1	32.1	-22.1	.69	39.9	54	-14.1	-	-	270	224	V

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

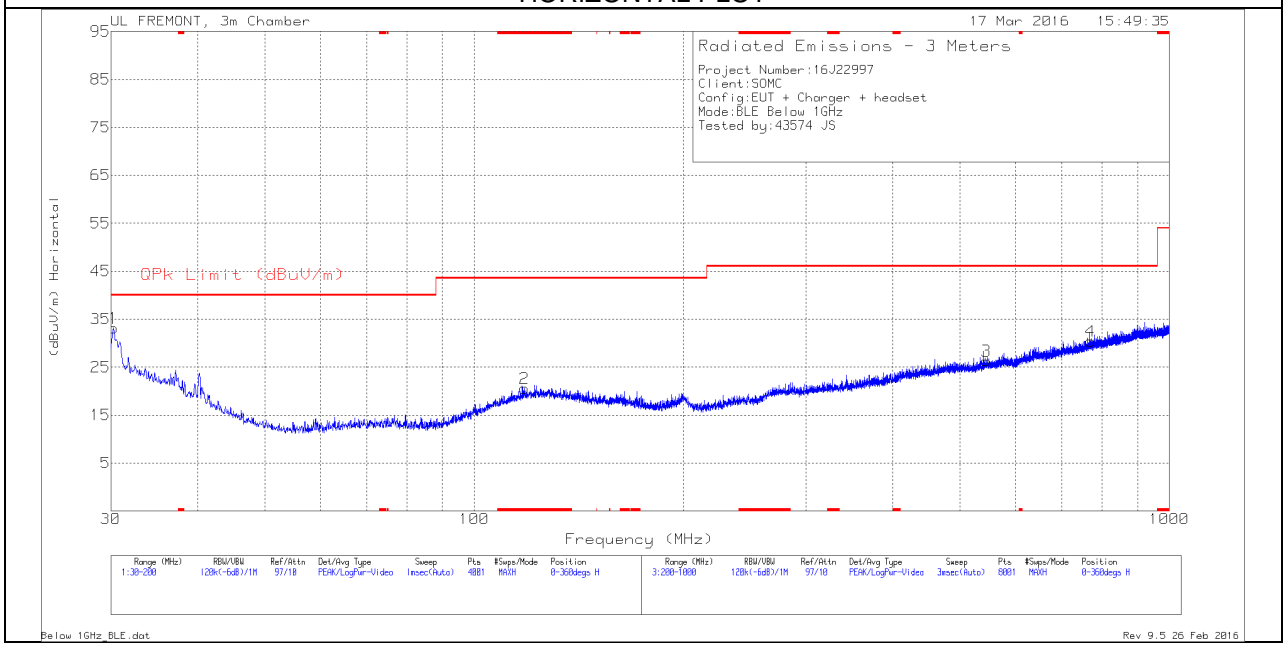
MAv1 - KDB558074 Option 1 Maximum RMS Average

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.

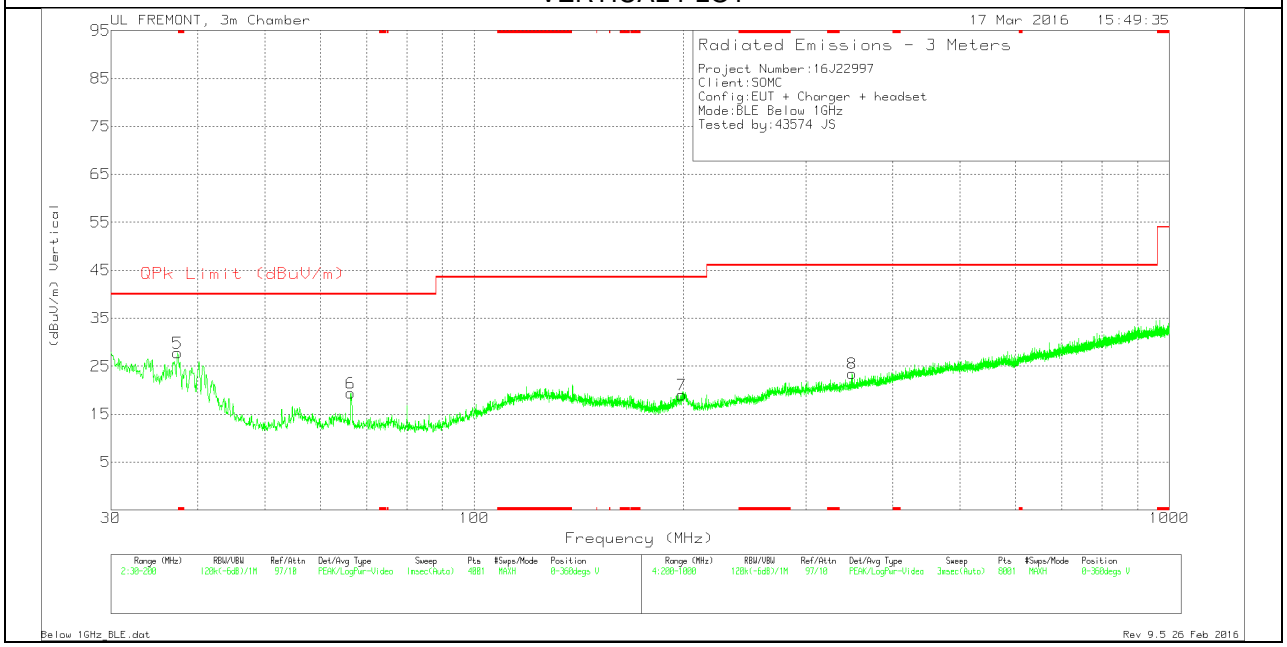
9.2. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



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

BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T122 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 118.145	28.97	Pk	17.7	-26.1	20.57	43.52	-22.95	0-360	400	H
1	30.255	35.22	Pk	25.1	-27.2	33.12	40	-6.88	0-360	200	H
5	37.4375	35.04	Pk	19.8	-27.1	27.74	40	-12.26	0-360	100	V
6	66.4225	34.27	Pk	11.8	-26.7	19.37	40	-20.63	0-360	100	V
7	198.8525	27.82	Pk	16.4	-25.2	19.02	43.52	-24.5	0-360	100	V
8	349.7	29.74	Pk	18.2	-24.5	23.44	46.02	-22.58	0-360	200	V
3	545.4	28.99	Pk	22.2	-24.9	26.29	46.02	-19.73	0-360	100	H
4	770.7	29.22	Pk	24.8	-23.6	30.42	46.02	-15.6	0-360	200	H

* - indicates frequency in CFR15.205/IC 8.10 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)

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

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 C63.10.

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

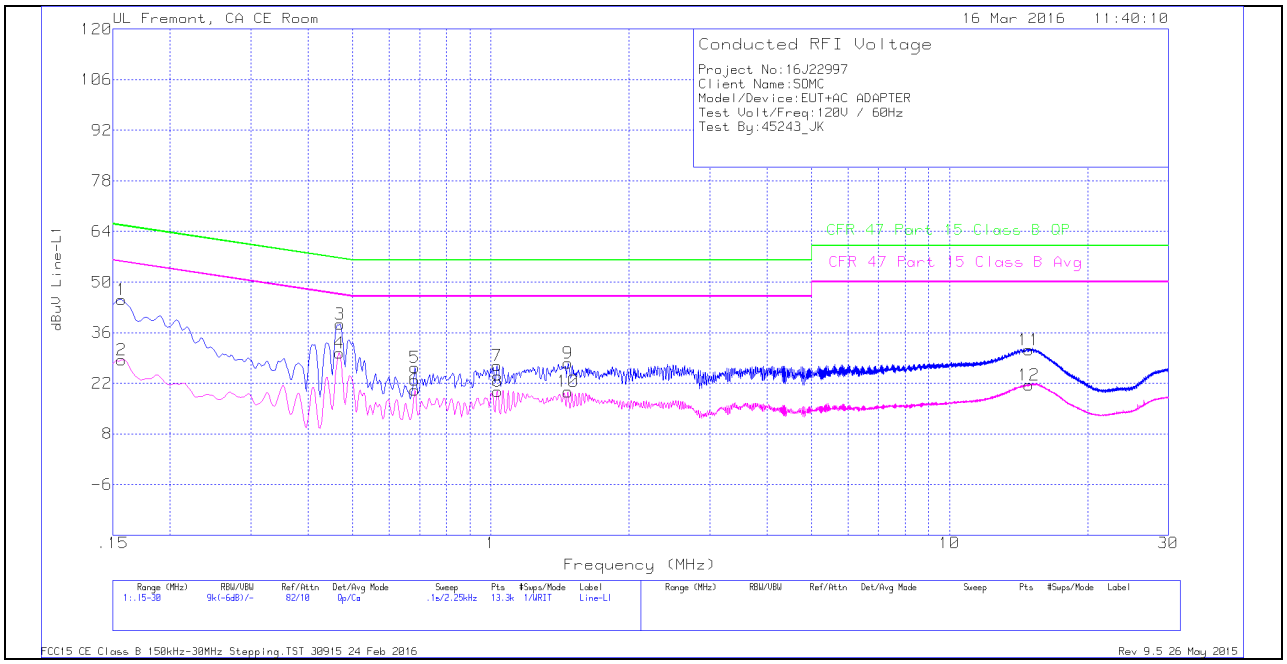
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

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

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULT

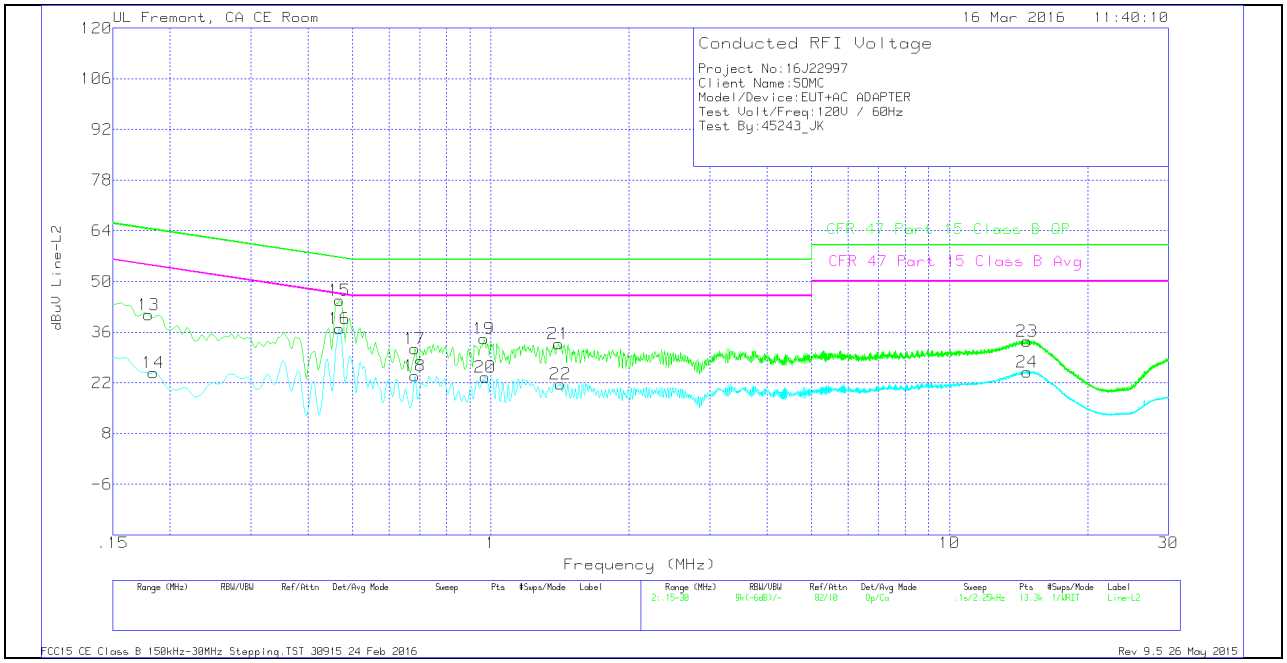
Trace Markers

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.15675	33.79	Qp	1.3	0	10.1	45.19	65.63	-20.44	-	-
2	.15675	17.07	Ca	1.3	0	10.1	28.47	-	-	55.63	-27.16
3	.4695	27.84	Qp	.4	0	10.1	38.34	56.52	-18.18	-	-
4	.46725	19.89	Ca	.4	0	10.1	30.39	-	-	46.56	-16.17
5	.68325	15.96	Qp	.3	0	10.1	26.36	56	-29.64	-	-
6	.68325	9.68	Ca	.3	0	10.1	20.08	-	-	46	-25.92
7	1.032	16.48	Qp	.3	0	10.1	26.88	56	-29.12	-	-
8	1.03425	9.41	Ca	.3	0	10.1	19.81	-	-	46	-26.19
9	1.47525	17.13	Qp	.2	.1	10.1	27.53	56	-28.47	-	-
10	1.473	9.27	Ca	.2	.1	10.1	19.67	-	-	46	-26.33
11	14.90213	20.6	Qp	.2	.2	10.2	31.2	60	-28.8	-	-
12	14.9055	10.96	Ca	.2	.2	10.2	21.56	-	-	50	-28.44

Pk - Peak detector
Av - Average detection

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

LINE 2 PLOT



LINE 2 RESULT

Trace Markers

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.17925	29.41	Qp	1.2	0	10.1	40.71	64.52	-23.81	-	-
14	.18375	13.59	Ca	1.1	0	10.1	24.79	-	-	54.31	-29.52
15	.46725	34.24	Qp	.4	0	10.1	44.74	56.56	-11.82	-	-
16	.46725	26.41	Ca	.4	0	10.1	36.91	-	-	46.56	-9.65
17	.68325	20.93	Qp	.3	0	10.1	31.33	56	-24.67	-	-
18	.68325	13.49	Ca	.3	0	10.1	23.89	-	-	46	-22.11
19	.96675	23.73	Qp	.3	0	10.1	34.13	56	-21.87	-	-
20	.97125	13.18	Ca	.3	0	10.1	23.58	-	-	46	-22.42
21	1.40325	22.51	Qp	.2	0	10.1	32.81	56	-23.19	-	-
22	1.41675	11.29	Ca	.2	.1	10.1	21.69	-	-	46	-24.31
23	14.7435	22.81	Qp	.2	.2	10.2	33.41	60	-26.59	-	-
24	14.7435	14.41	Ca	.2	.2	10.2	25.01	-	-	50	-24.99

Pk - Peak detector

Av - Average detection

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