



FCC CFR47 PART 15 SUBPART C
BLUETOOTH LOW ENERGY
C2PC CERTIFICATION TEST REPORT
FOR

CDMA/LTE Phone + Bluetooth & DTS/UNII a/b/g/n + NFC

MODEL NUMBER: LG-VS876, LGVS876, VS876, LG-AS876, AS876 and LGAS876

FCC ID: ZNFVS876

REPORT NUMBER: 14U16955-3

ISSUE DATE: February 11, 2014

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LG ELECTRONICS MOBILECOMM U.S.A., INC
EUT DESCRIPTION: CDMA/LTE Phone + Bluetooth & DTS/UNII a/b/g/n + NFC
MODEL: LG-VS876, LGVS876, VS876, LG-AS876, AS876 and LGAS876
SERIAL NUMBER: 1801187-VS
DATE TESTED: FEBRUARY 7 - 11, 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.

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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 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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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 18000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a CDMA/LTE Phone + Bluetooth & DTS/UNII a/b/g/n + 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	2.32	1.71

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -2.09 dBi.

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.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	LG	MCS-02WD	DA3Y0035121	N/A
Earphone	LG	EAB62209201	N/A	N/A

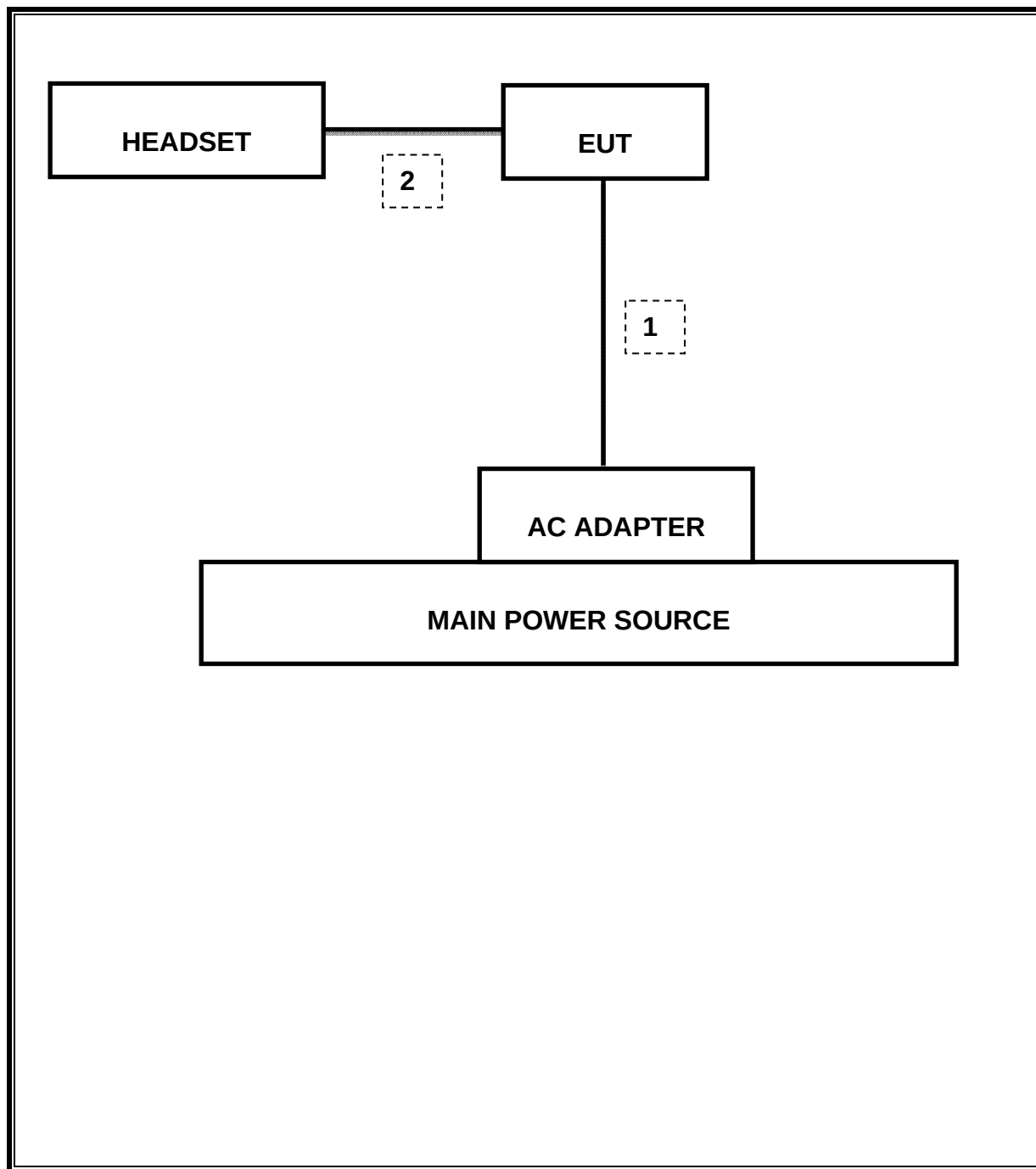
I/O CABLES

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.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	C01016	08/14/13	08/14/14
Antenna, Horn, 18 GHz	ETS	3117	C01006	12/11/13	12/11/14
Antenna, Horn, 25.5 GHz	ARA	MWH-1826/B	C00980	11/14/13	11/14/14
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/16/14	01/16/15
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	10/22/13	10/22/14
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	10/21/13	10/21/14
PXA SIGNAL ANALYZER	Agilent / HP	N9030A	N/A	05/09/13	05/09/14
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/08/13	08/08/14
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/14	01/14/15
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR	CNR

7. SUMMARY

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
15.205, 15.209	RSS-210 Clause 2.6, RSS-210 Clause 6	Radiated Spurious Emission	< 54dBuV/m		Pass	42.89dBuV/m

8. RADIATED TEST RESULTS

8.1. 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.

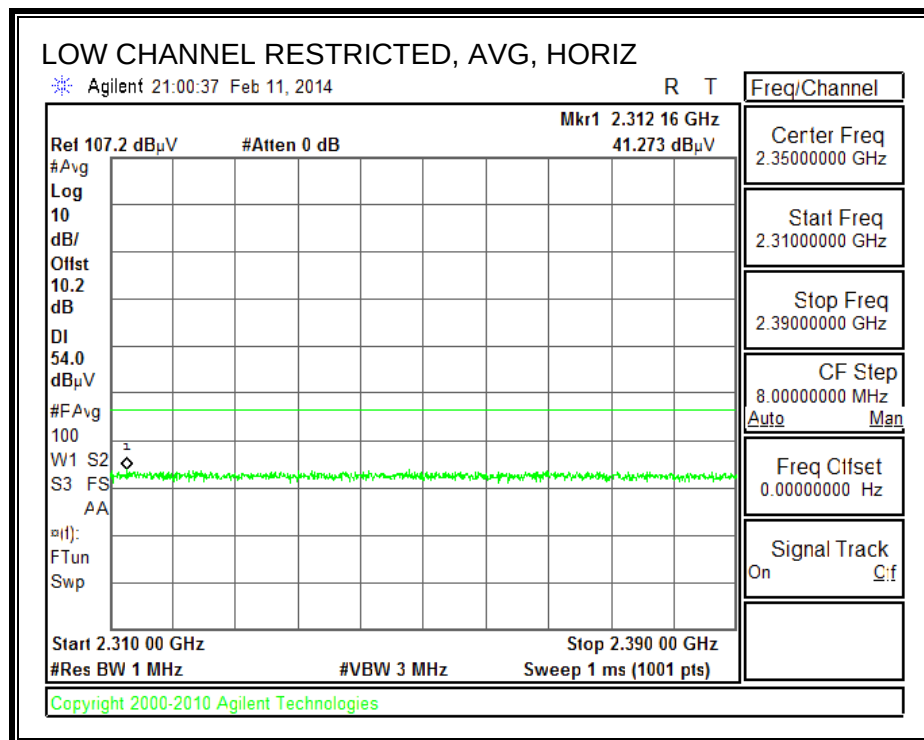
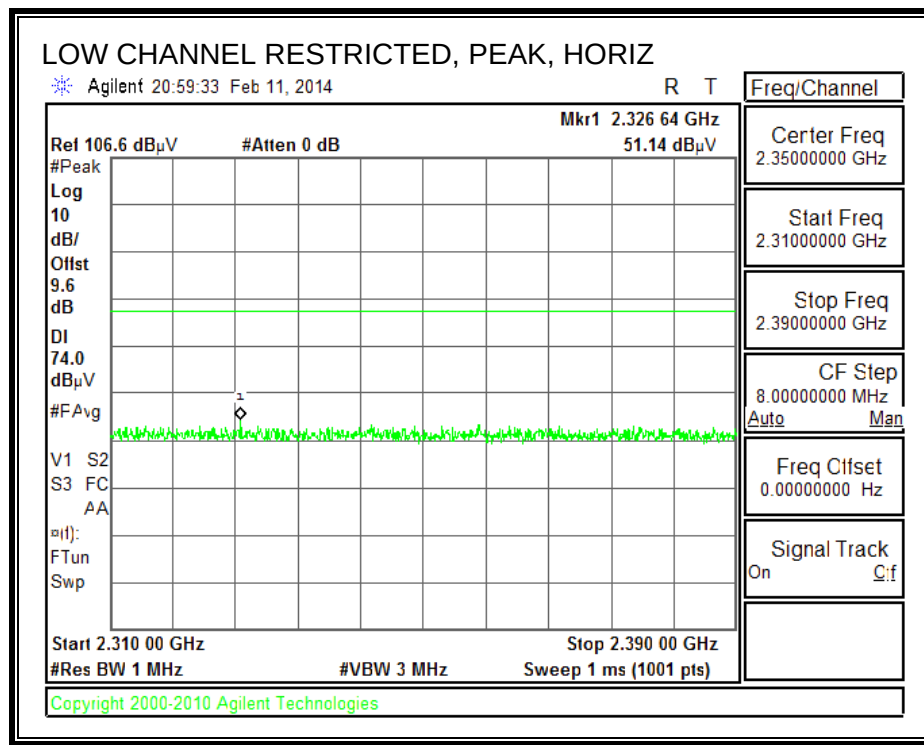
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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.

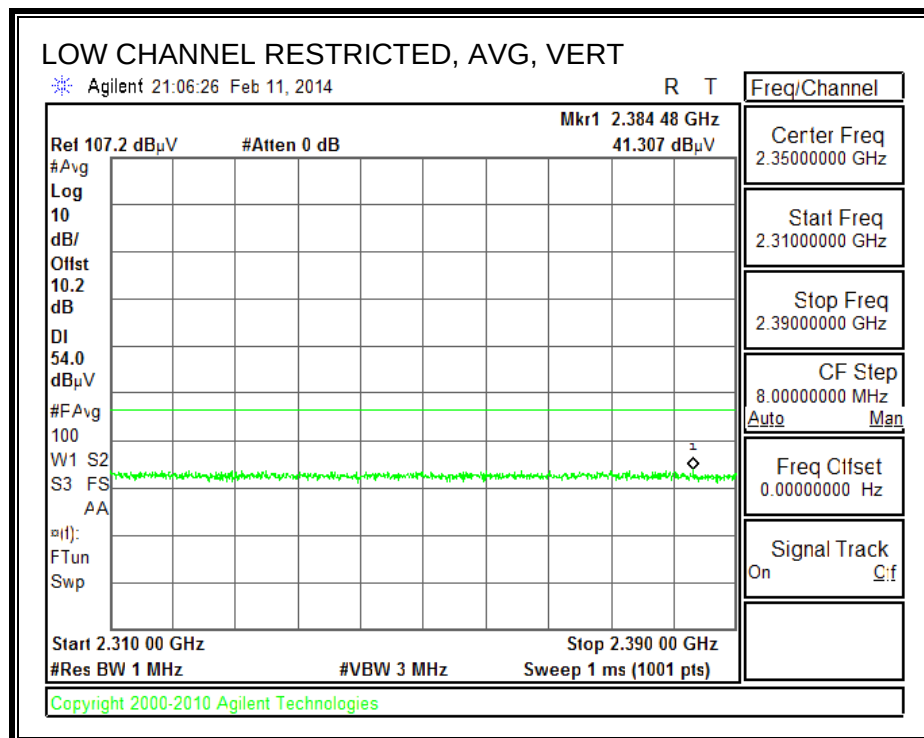
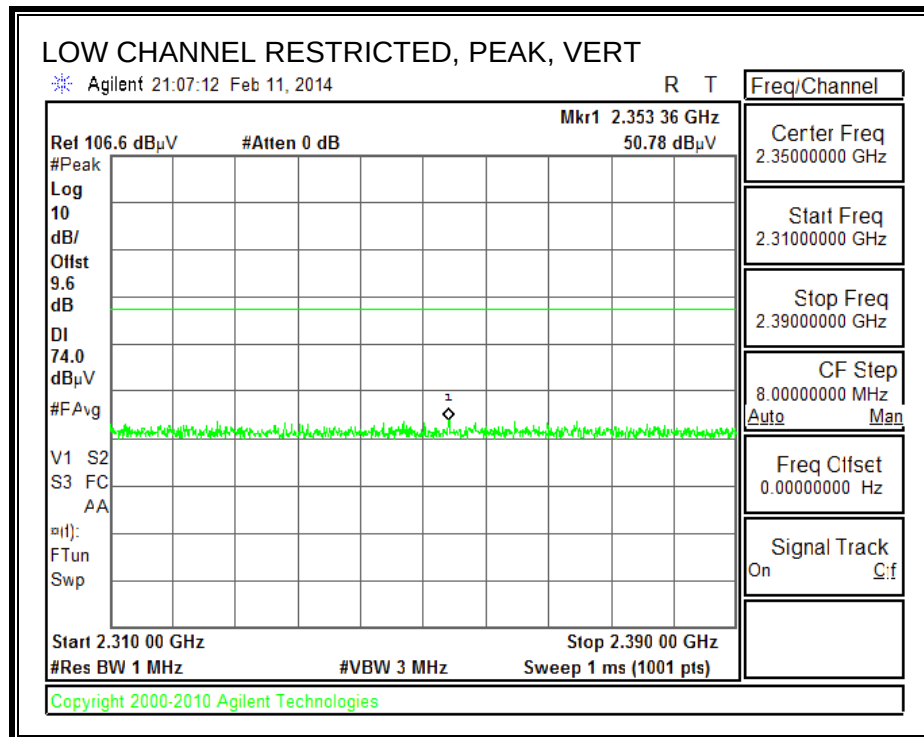
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

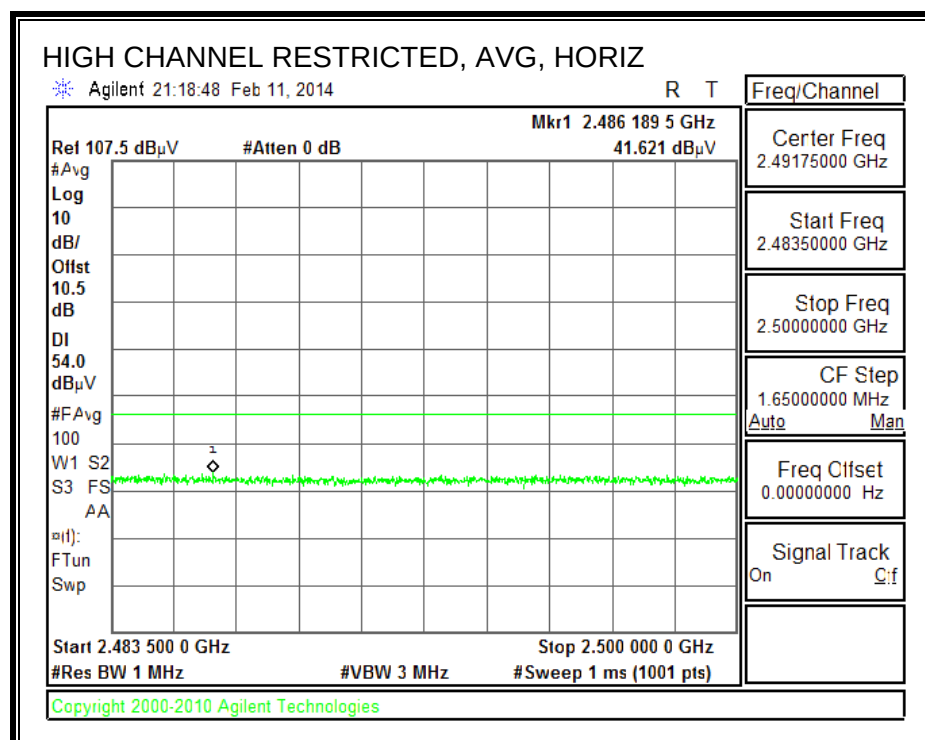


HIGH CHANNEL RESTRICTED, PEAK, HORIZ

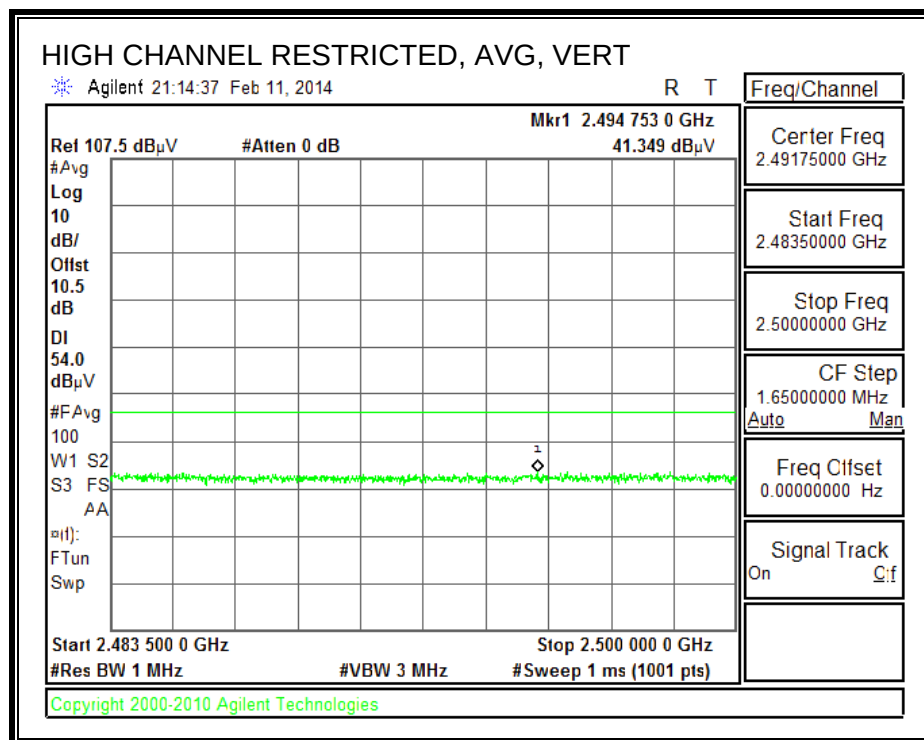
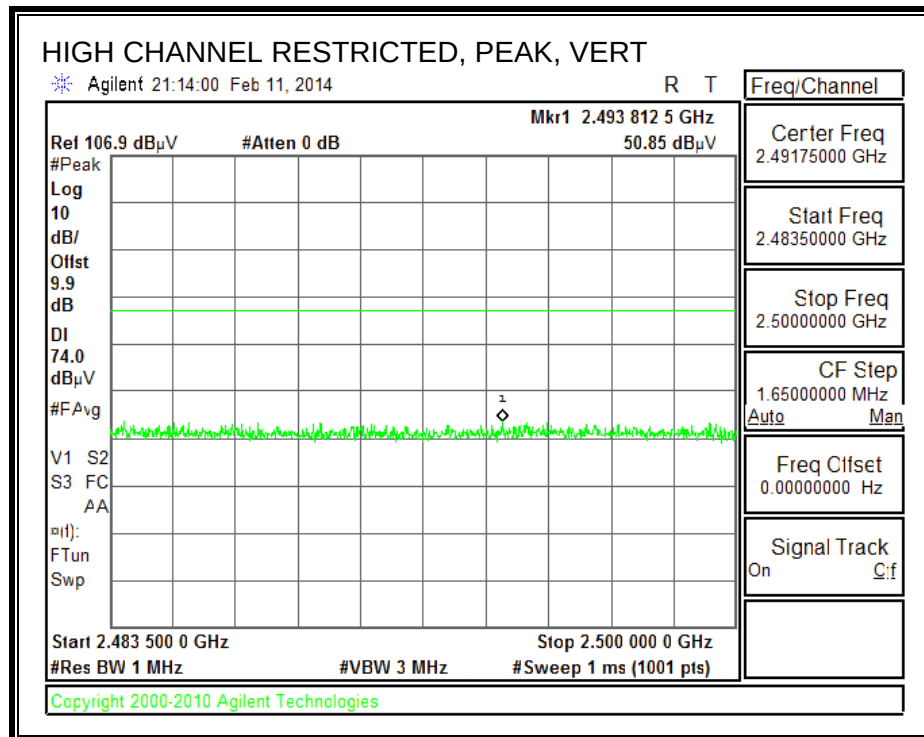
Agilent 21:20:15 Feb 11, 2014
R T

Mkr1 2.498 185 0 GHz		Center Freq 2.49175000 GHz	
Ref 106.9 dB μ V	#Atten 0 dB	51.31 dB μ V	
#Peak			
Log			
10			
dB/			
Offst			
9.9			
dB			
DI			
74.0			
dB μ V			
#FAvg			
V1 S2			
S3 FC			
AA			
m(t):			
FTun			
Swp			
Start 2.483 500 0 GHz		Stop 2.500 000 0 GHz	
#Res BW 1 MHz	#VBW 3 MHz	#Sweep 1 ms (1001 pts)	

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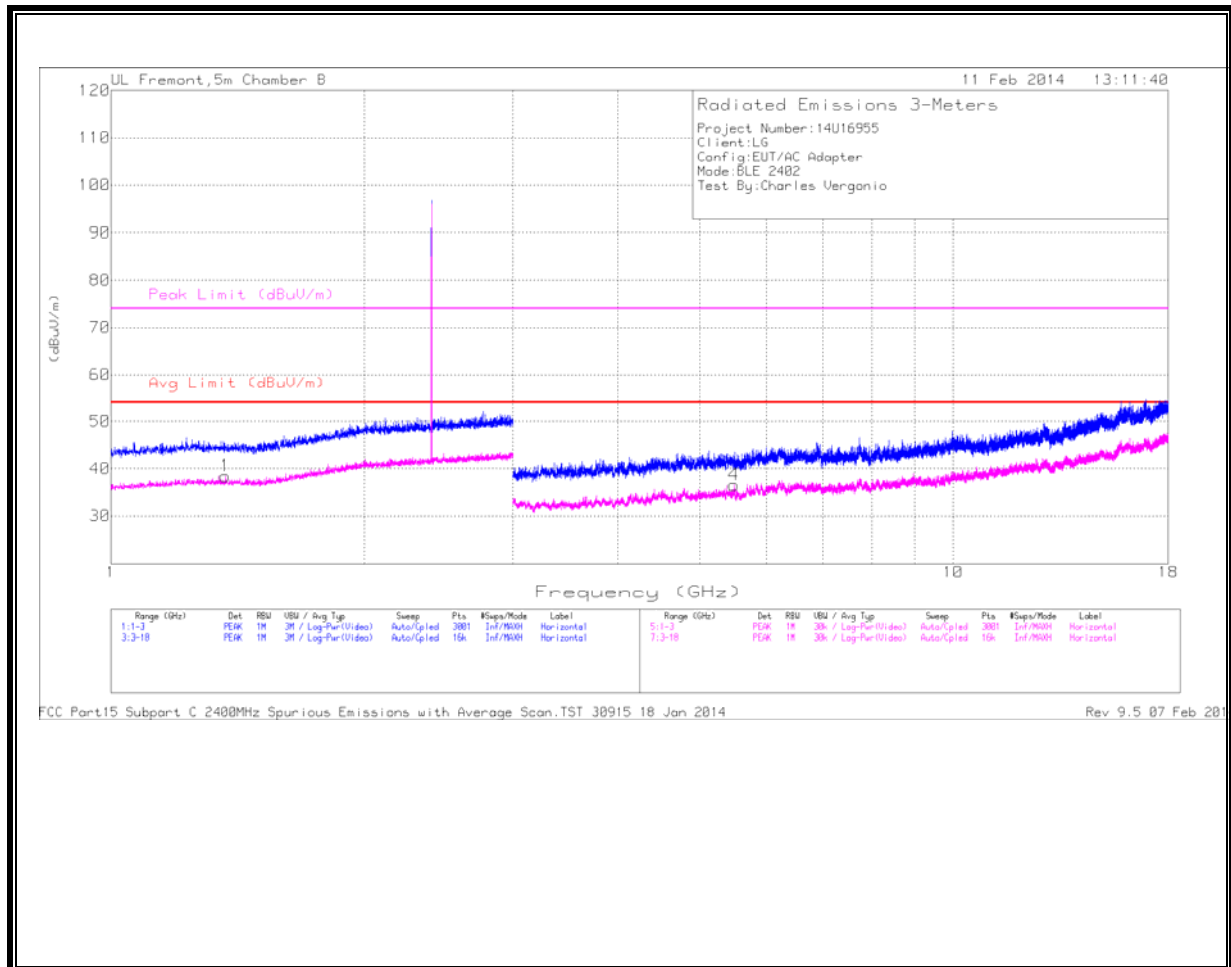


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



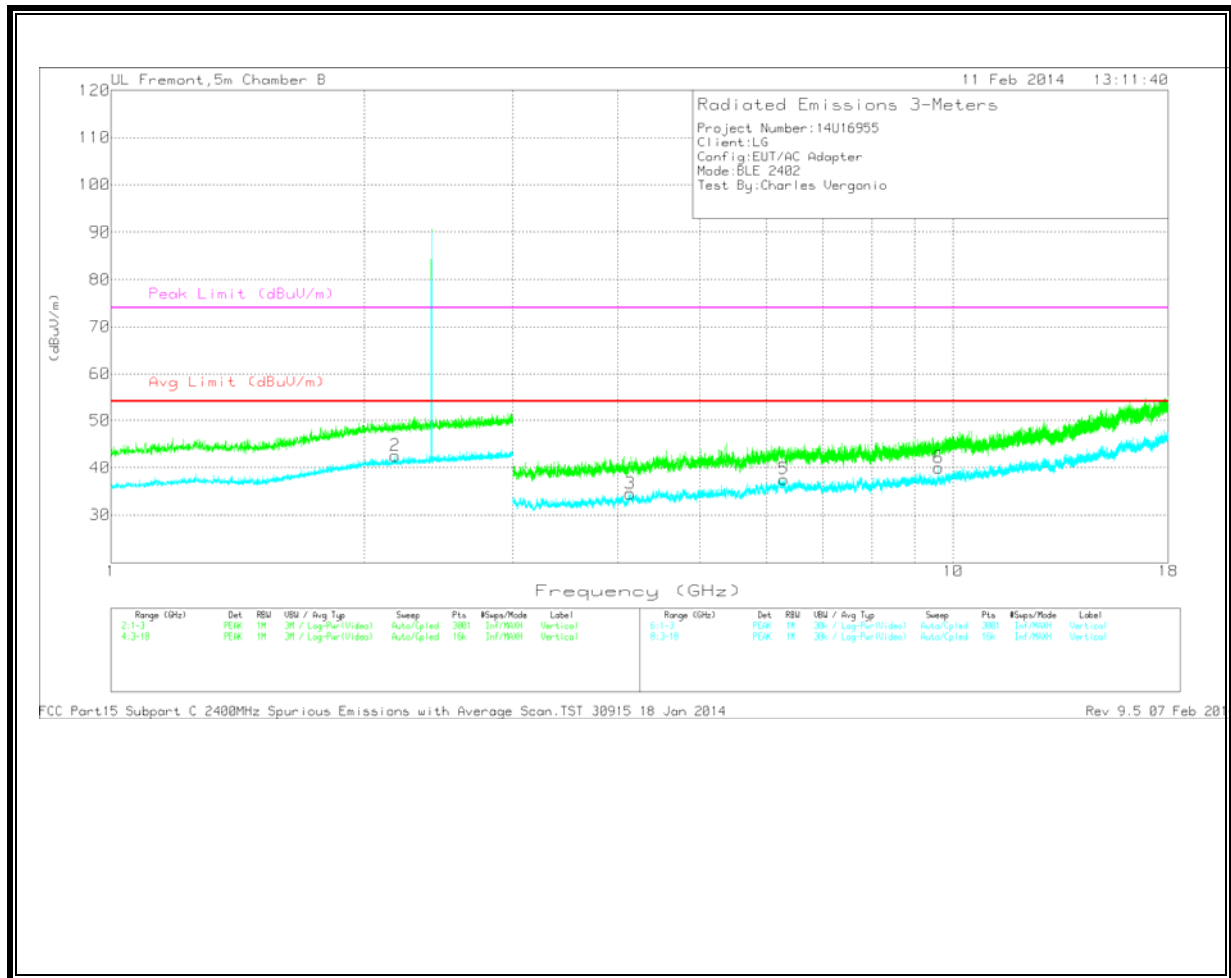
HARMONICS AND SPURIOUS EMISSIONS

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.

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.

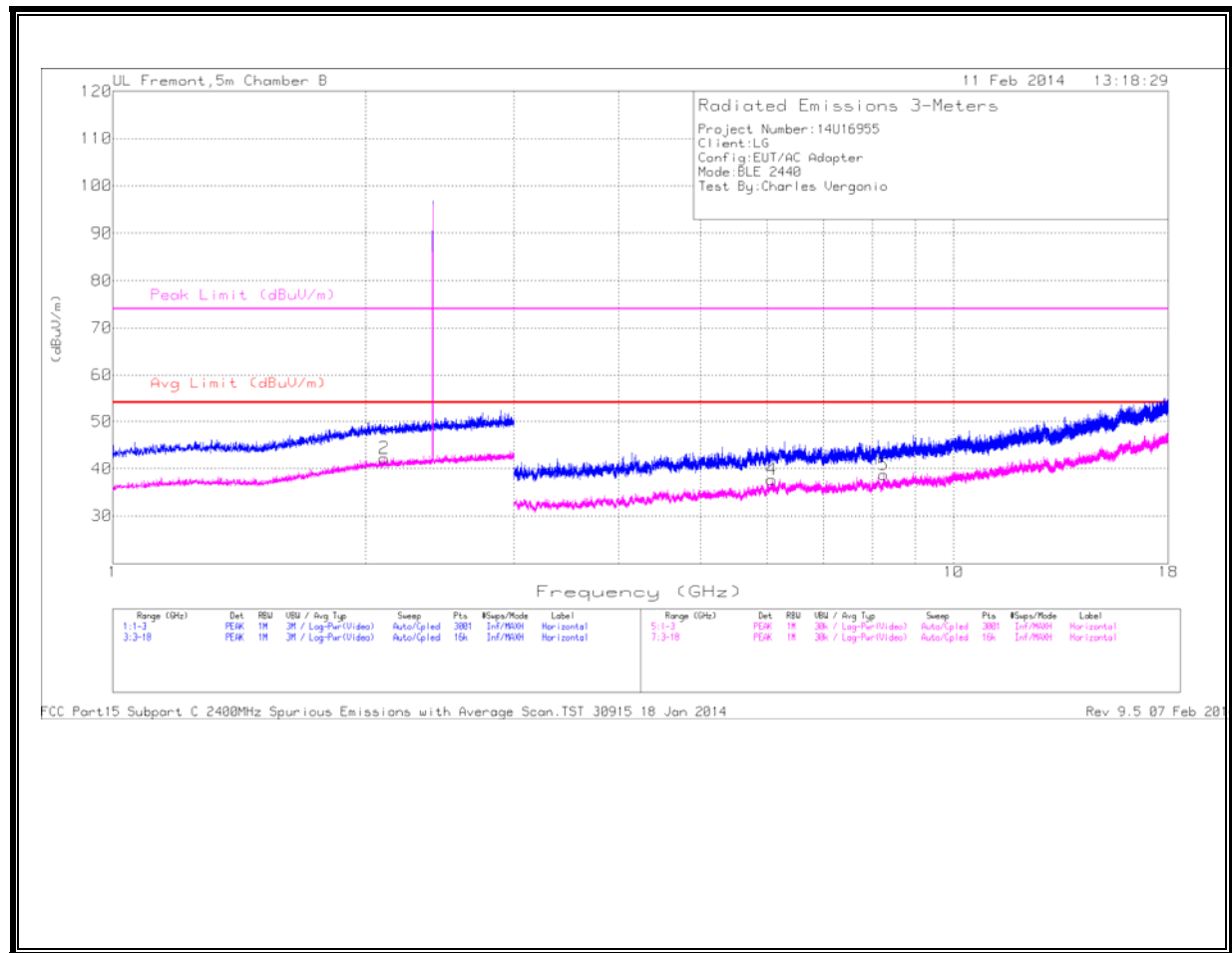
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/F ltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.367	34.52	Avg	28.4	-24.5	38.42	54	-15.58	-	-	0-360	99	H
2	2.175	33.71	Avg	32	-23.2	42.51	54	-11.49	-	-	0-360	202	V
3	4.134	30.32	Avg	34	-29.8	34.52	54	-19.48	-	-	0-360	99	V
4	5.49	31.46	Avg	34.9	-29.8	36.56	54	-17.44	-	-	0-360	99	H
5	6.297	29.67	Avg	36	-28.1	37.57	54	-16.43	-	-	0-360	202	V
6	9.608	26.8	Avg	37.3	-24.1	40	54	-14	-	-	0-360	202	V

All peak readings were 20dB below the peak limit. Average measurements at discrete frequencies are provided in the table below for frequencies that are within 6dB of the average limit.

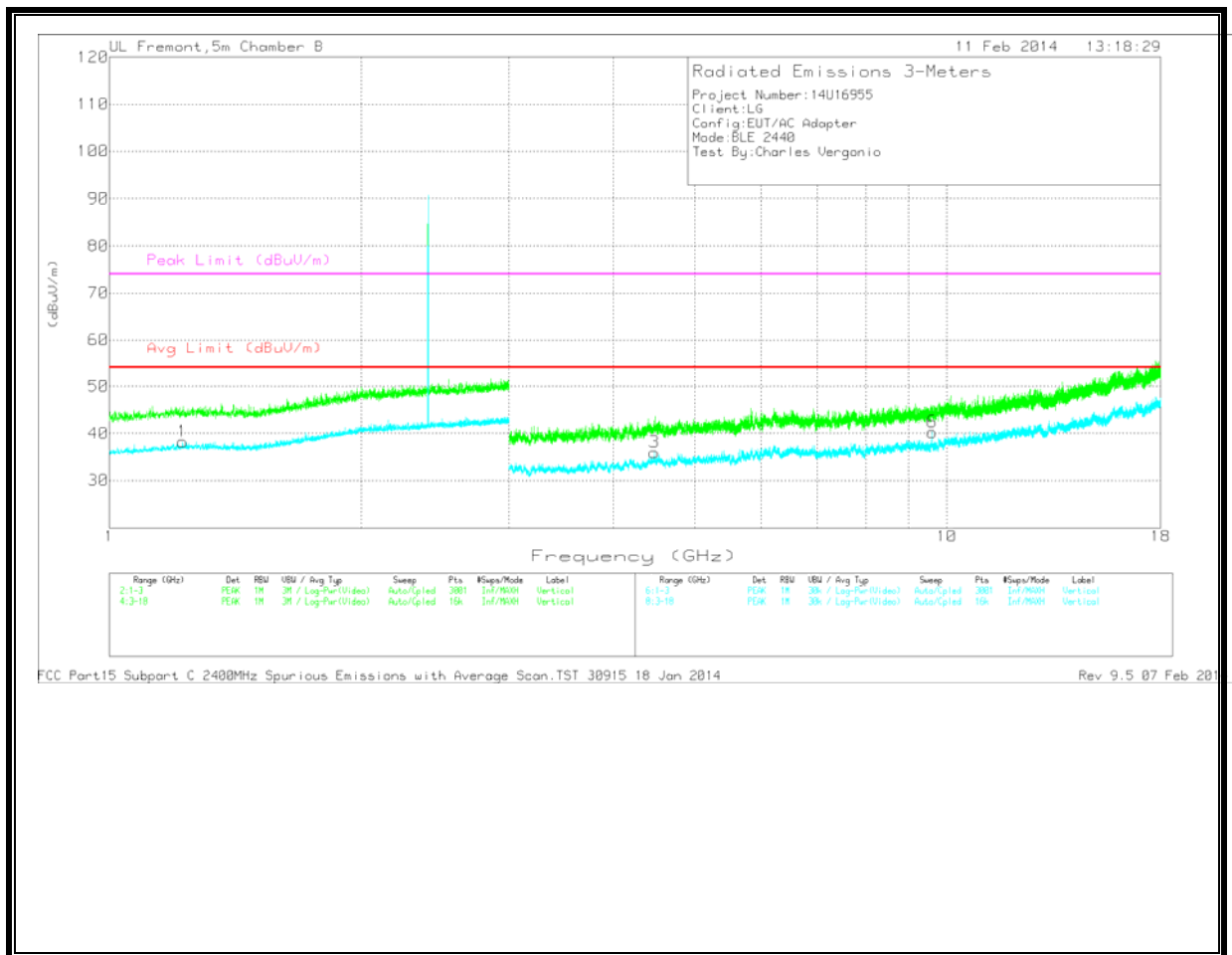
MID CHANNEL

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.

VERTICAL



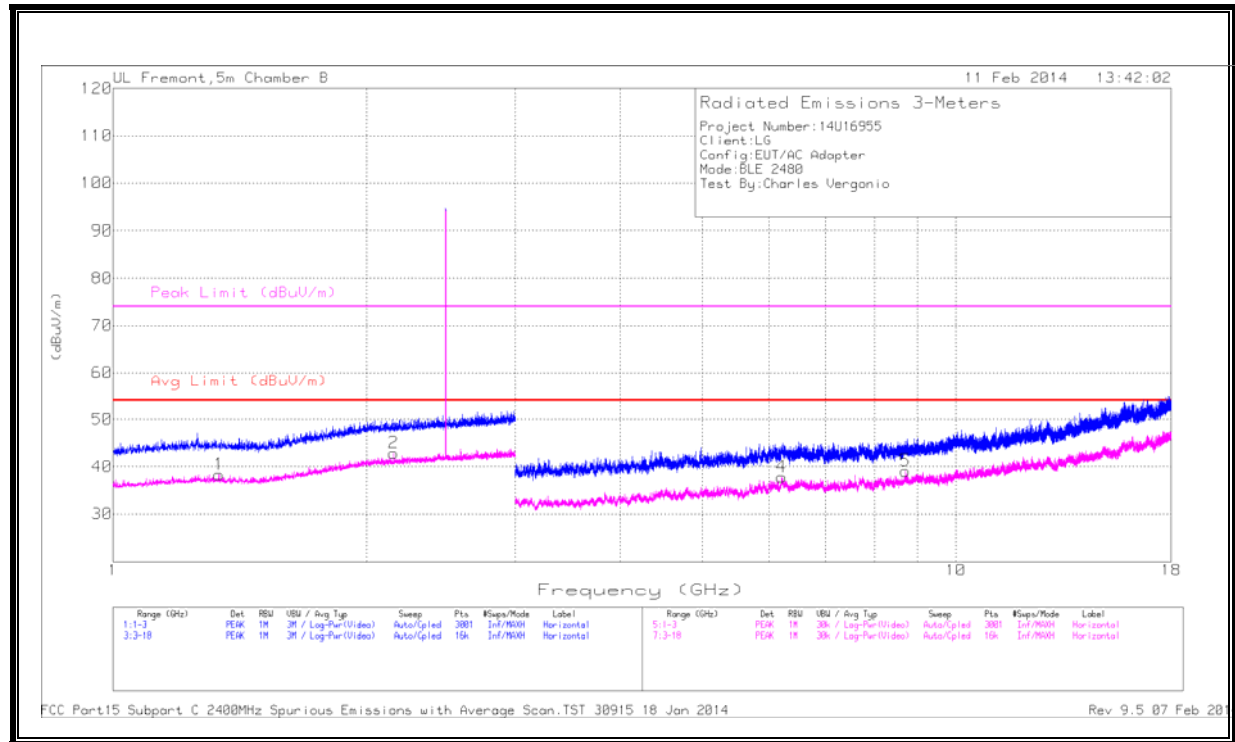
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/F ltr/Pad (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	34.45	Avg	28.5	-24.7	38.25	54	-15.75	-	-	0-360	202	V
2	2.103	33.59	Avg	31.9	-23.3	42.19	54	-11.81	-	-	0-360	201	H
3	4.476	30.57	Avg	34.5	-29.1	35.97	54	-18.03	-	-	0-360	202	V
4	6.078	30.87	Avg	35.9	-29.1	37.67	54	-16.33	-	-	0-360	202	H
5	8.257	28.9	Avg	36.1	-26.3	38.7	54	-15.3	-	-	0-360	202	H
6	9.608	27.06	Avg	37.3	-24.1	40.26	54	-13.74	-	-	0-360	202	V

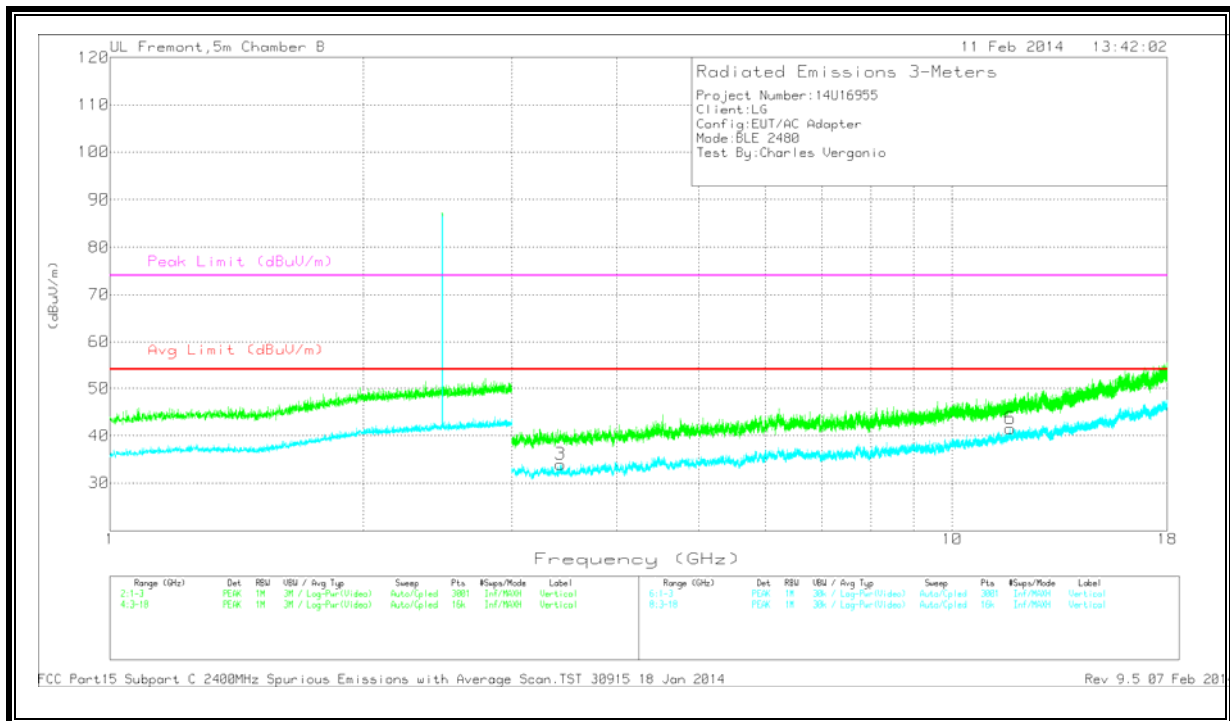
All peak readings were 20dB below the peak limit. Average measurements at discrete frequencies are provided in the table below for frequencies that are within 6dB of the average limit.

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.

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.

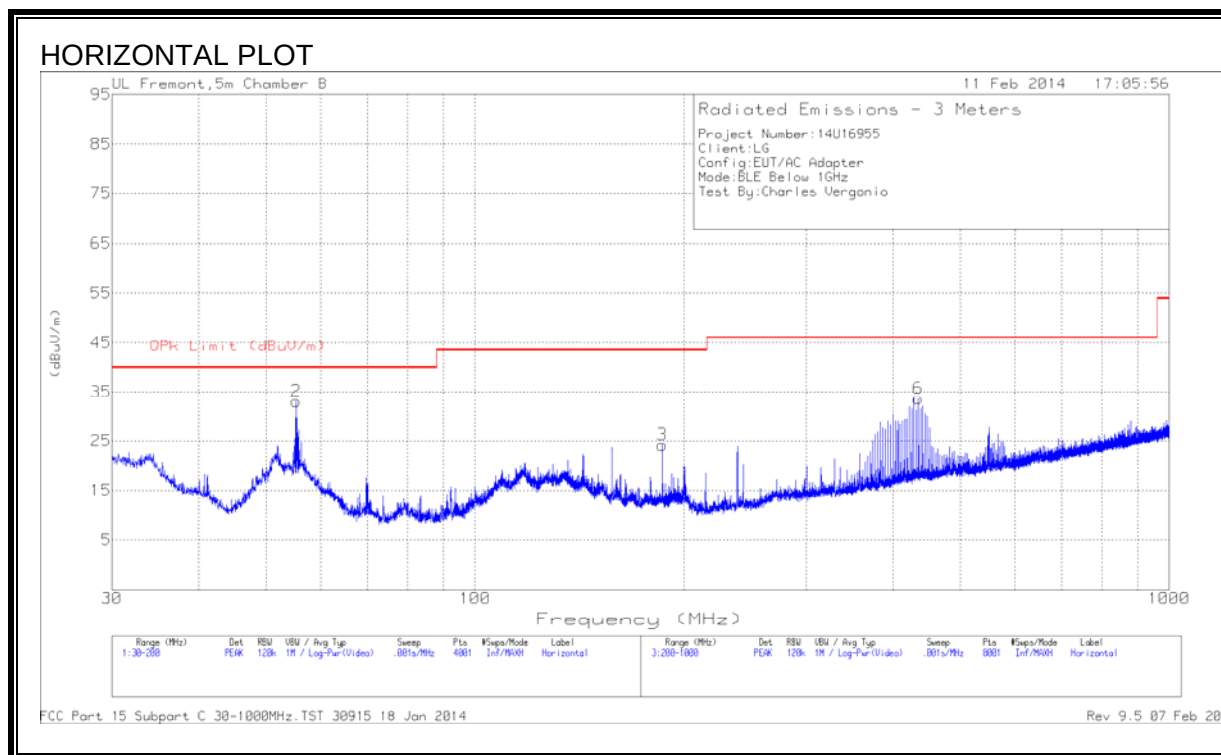
HIGH CHANNEL DATA

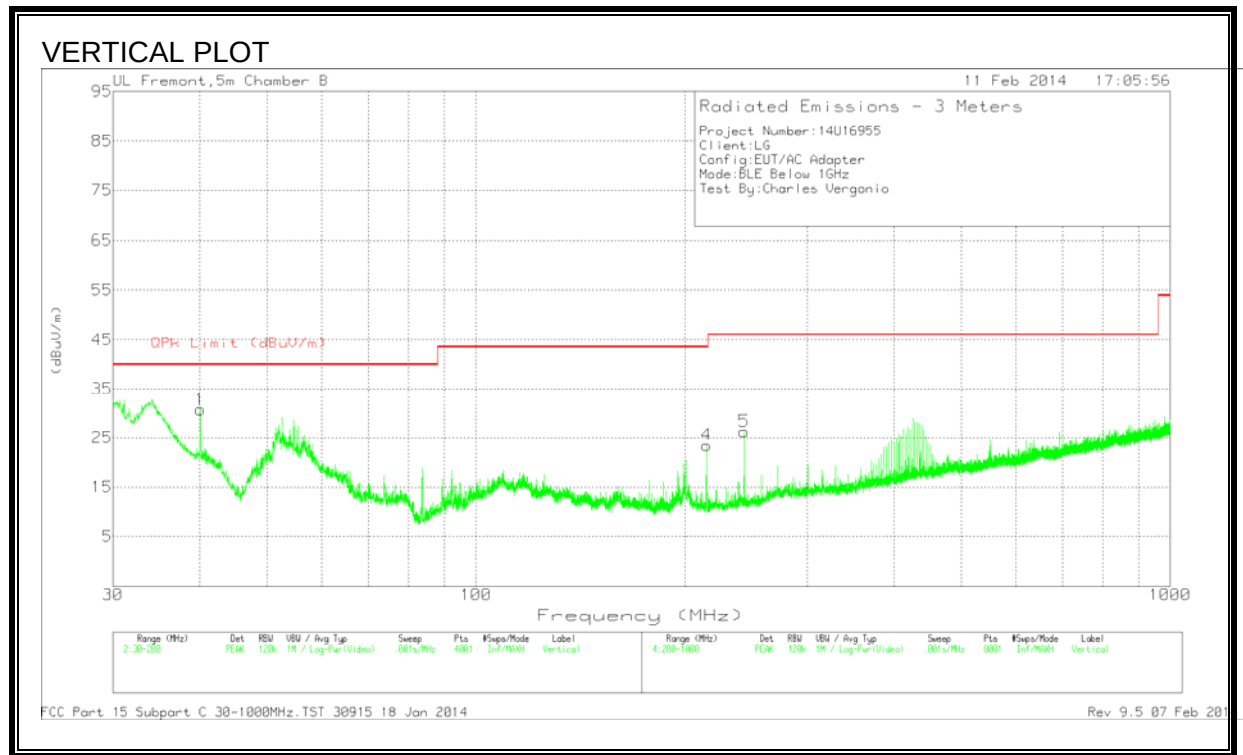
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/F ltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.336	34.43	Avg	28.5	-24.6	38.33	54	-15.67	-	-	0-360	99	H
2	2.153	34.09	Avg	32	-23.2	42.89	54	-11.11	-	-	0-360	202	H
3	3.427	31.75	Avg	33.2	-31	33.95	54	-20.05	-	-	0-360	202	V
4	6.212	29.61	Avg	36	-27.8	37.81	54	-16.19	-	-	0-360	202	H
5	8.709	28.28	Avg	36.4	-25.6	39.08	54	-14.92	-	-	0-360	202	H
6	11.717	24.81	Avg	39	-22.3	41.51	54	-12.49	-	-	0-360	99	V

All peak readings were 20dB below the peak limit. Average measurements at discrete frequencies are provided in the table below for frequencies that are within 6dB of the average limit.

8.3. WORST-CASE BELOW 1 GHz

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





DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	40.0725	46.06	PK	13.4	-28.7	30.76	-	-	0-360	101	V
2	55.2875	54.86	PK	6.8	-28.6	33.06	-	-	0-360	300	H
3	186.145	40.26	PK	11	-27.1	24.16	-	-	0-360	101	H
4	214.8	39.78	PK	10.5	-26.8	23.48	-	-	0-360	200	V
5	243.4	41.14	PK	11.6	-26.5	26.24	-	-	0-360	200	V
6	435.2	43.04	PK	16.6	-26	33.64	-	-	0-360	200	H

PK - Peak detector