FCC CFR47 PART 15 SUBPART C

BLUETOOTH LOW ENERGY
C2PC CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE PHONE + BLUETOOTH & 2.4GHz DTS b/g/n

MODEL NUMBER: LG-L33L, LGL33L, L33L, LG-H343, LGH343, H343

FCC ID: ZNFL33L

REPORT NUMBER: 15I19923-E3

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Prepared for

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	02/16/15	Initial Issue	D. Coronia

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	LG ELECTRONICS MOBILECOMM U.S.A., INC
EUT DESCRIPTION:	GSM/WCDMA/LTE PHONE + BLUETOOTH & 2.4GHz DTS b/g/n
MODEL:	LG-L33L, LGL33L, L33L, LG-H343, LGH343, H343
SERIAL NUMBER:	501CYMR000195
DATE TESTED:	February 6, 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 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, 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(IC: 2324B-1)	☐ Chamber D(IC: 2324B-4)
☐ Chamber B(IC: 2324B-2)	☐ Chamber E(IC: 2324B-5)
☐ Chamber C(IC: 2324B-3)	☒ Chamber F(IC: 2324B-6)
	☐ Chamber G(IC: 2324B-7)
	☐ Chamber H(IC: 2324B-8)

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 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 GSM/WCDMA/LTE PHONE + BLUETOOTH & 2.4GHz DTS b/g/n

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:
See original report for details.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -2.7dBi.

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-02WR	RA4Y1031433	N/A
Earphone	LG	N/A	N/A	N/A

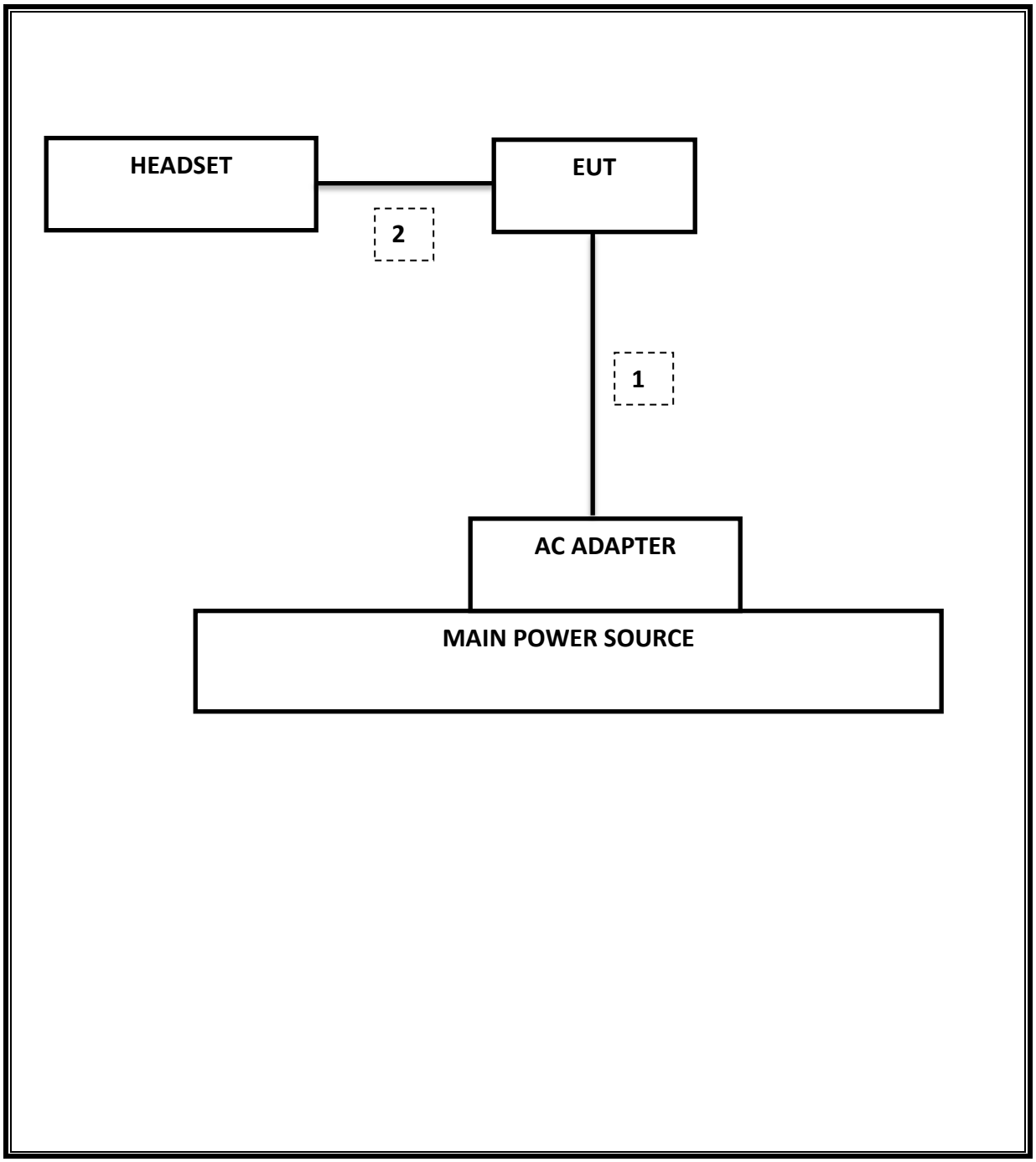
I/O CABLES

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

TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests.

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 Due**
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	C01171	02/13/15
Antenna, Horn, 18GHz	EMCO	3115	C00783	10/25/15
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	11/14/15
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/28/15
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/15
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/15
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/15
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/15
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/16/16
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/15
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/15

Test Software List			
Description	**Manufacturer**	**Model**	**Version**
Radiated Software	UL	UL EMC	Version 9.5, 07/22/14
Conducted Software	UL	UL EMC	Version 9.5, 05/17/14
CLT Software	UL	UL RF	Version 1.0, 02/02/15
Antenna Port Software	UL	UL RF	Version 2.1.1.1, 1/20/15

7. SUMMARY

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	See Original
2.1051, 15.247 (d)	RSS-210 A8.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	See Original
15.247	RSS-210 A8.4	TX conducted output power	<30dBm		Pass	See Original
15.247	RSS-210 A8.2	PSD	<8dBm		Pass	See Original
15.207 (a)	RSS-GEN 7.2.2	AC Power Line conducted emissions	Section 10	Radiated	Pass	See Original
15.205, 15.209	RSS-210 Clause 2.6, RSS-210 Clause 6	Radiated Spurious Emission	< 54dBuV/m		Pass	42.5 dBuV/m

8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

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. 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 (1/0.62)=2.04dB
(Spectrum Analyzer round it up to 2.1dB)

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.

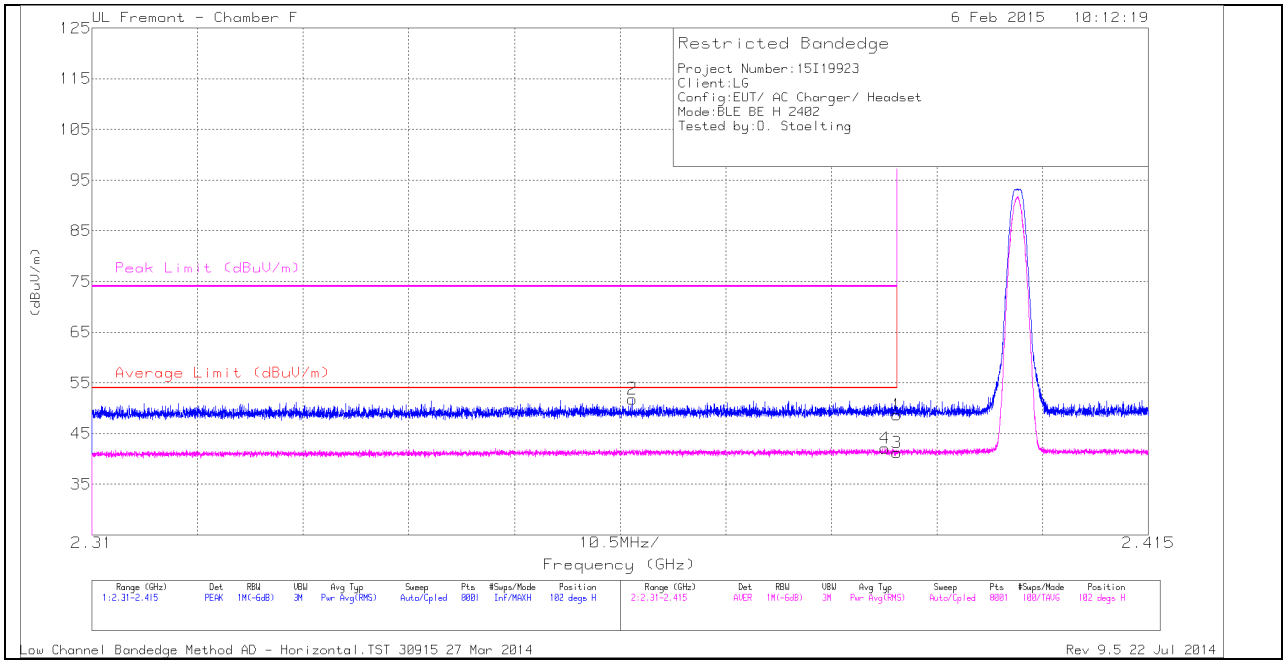
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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)

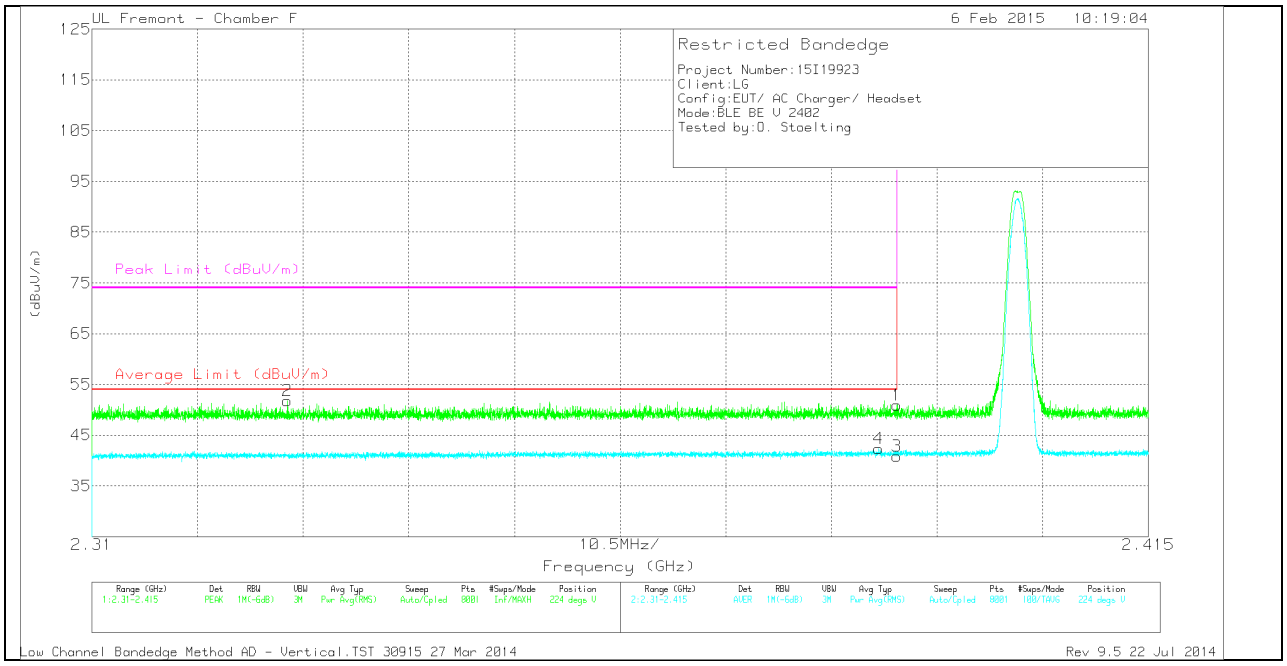
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (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	37.38	PK	32.2	-20.9	0	48.68	-	-	74	-25.32	102	108	H
2	* 2.364	40.64	PK	32.1	-20.9	0	51.84	-	-	74	-22.16	102	108	H
3	* 2.39	27.88	RMS	32.2	-20.9	2.04	41.22	54	-12.78	-	-	102	108	H
4	* 2.389	28.75	RMS	32.2	-20.9	2.04	42.09	54	-11.91	-	-	102	108	H

VERTICAL PEAK AND AVERAGE PLOT

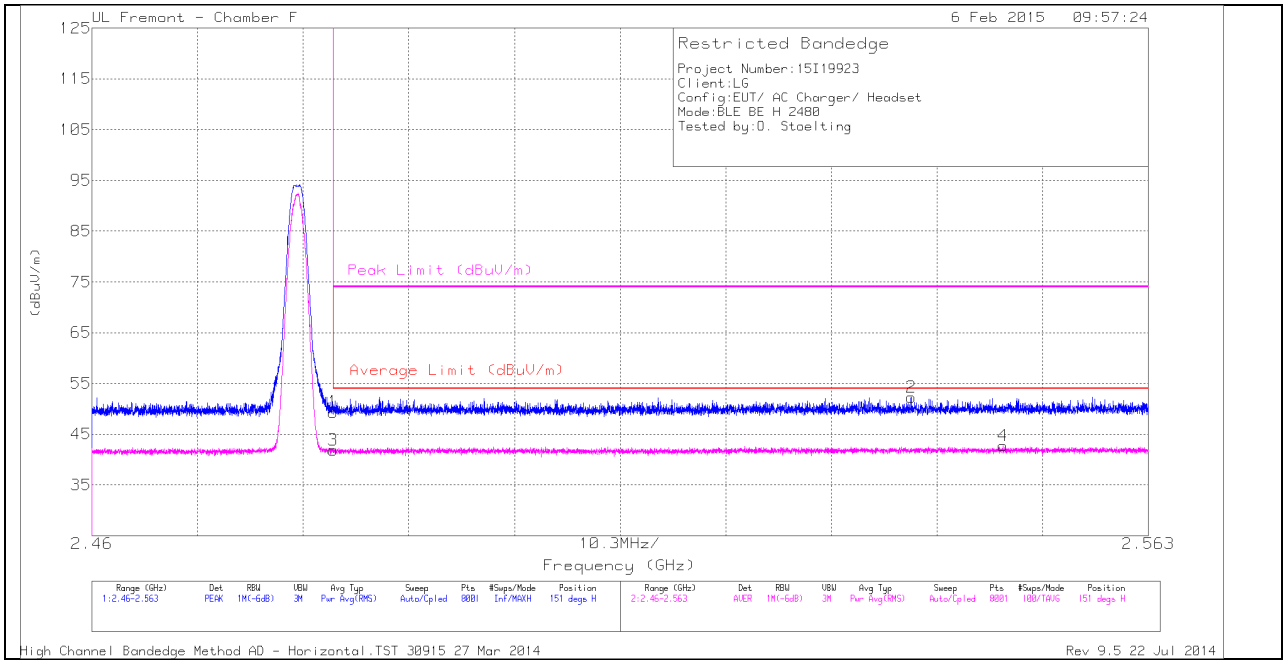


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (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	* 2.39	39.6	PK	32.2	-20.9	0	50.9	-	-	74	-23.1	224	201	V
2	* 2.329	40.9	PK	31.9	-21	0	51.8	-	-	74	-22.2	224	201	V
3	* 2.39	27.49	RMS	32.2	-20.9	2.04	40.83	54	-13.17	-	-	224	201	V
4	* 2.388	28.99	RMS	32.2	-20.9	2.04	42.33	54	-11.67	-	-	224	201	V

AUTHORIZED BANDEDGE (HIGH CHANNEL)

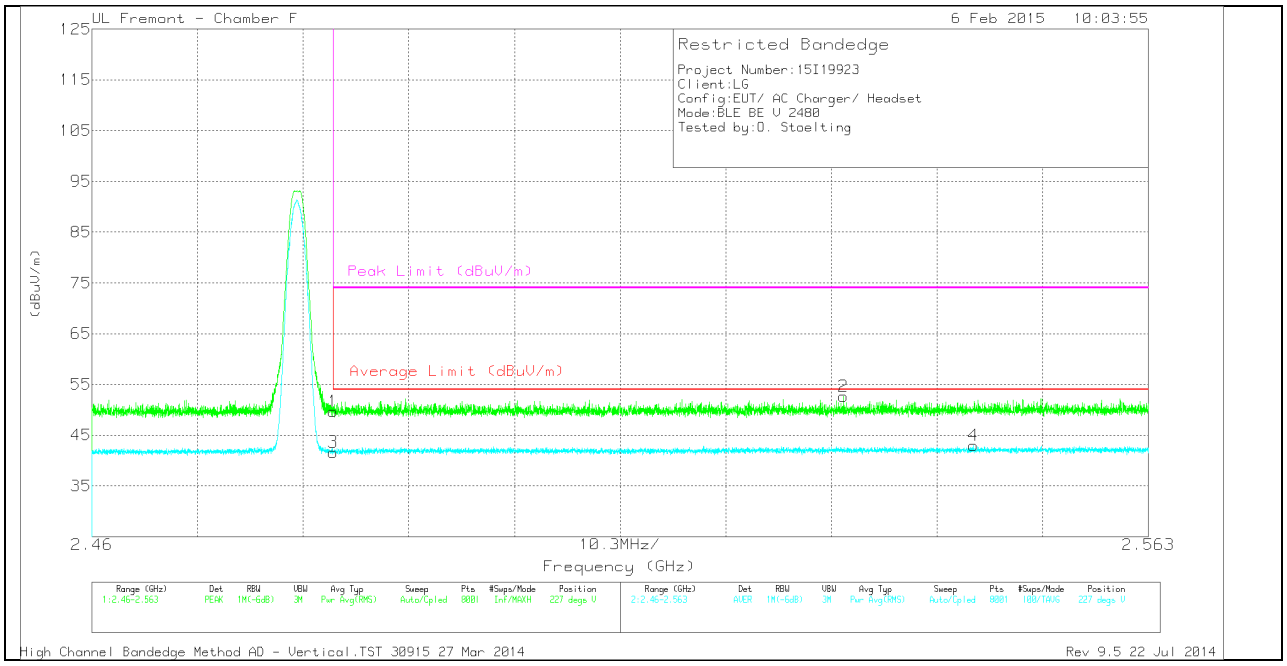
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (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	37.66	PK	32.6	-20.9	0	49.36	-	-	74	-24.64	151	167	H
2	2.54	40.53	PK	32.7	-20.9	0	52.33	-	-	74	-21.67	151	167	H
3	* 2.484	28.06	RMS	32.6	-20.9	2.04	41.8	54	-12.2	-	-	151	167	H
4	2.549	28.89	RMS	32.7	-20.9	2.04	42.73	54	-11.27	-	-	151	167	H

VERTICAL PEAK AND AVERAGE PLOT

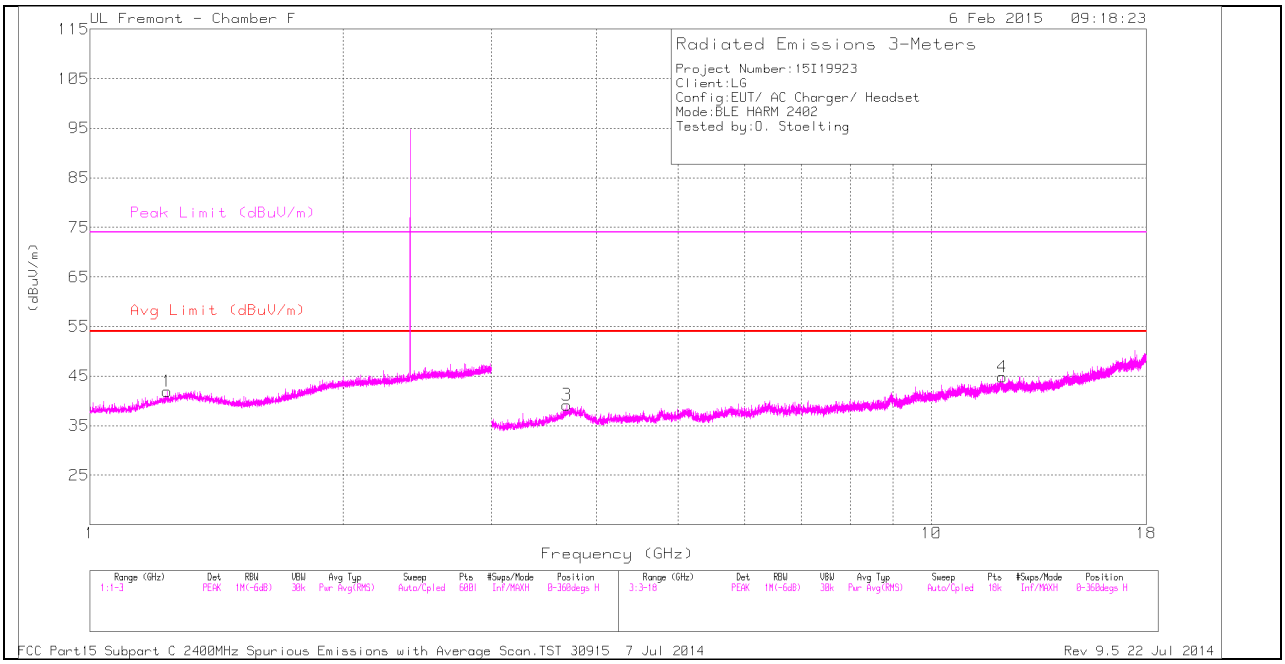


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (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	38.02	PK	32.6	-20.9	0	49.72	-	-	74	-24.28	227	189	V
2	2.533	40.8	PK	32.7	-20.9	0	52.6	-	-	74	-21.4	227	189	V
3	* 2.484	27.92	RMS	32.6	-20.9	2.04	41.66	54	-12.34	-	-	227	189	V
4	2.546	29.08	RMS	32.7	-20.9	2.04	42.92	54	-11.08	-	-	227	189	V

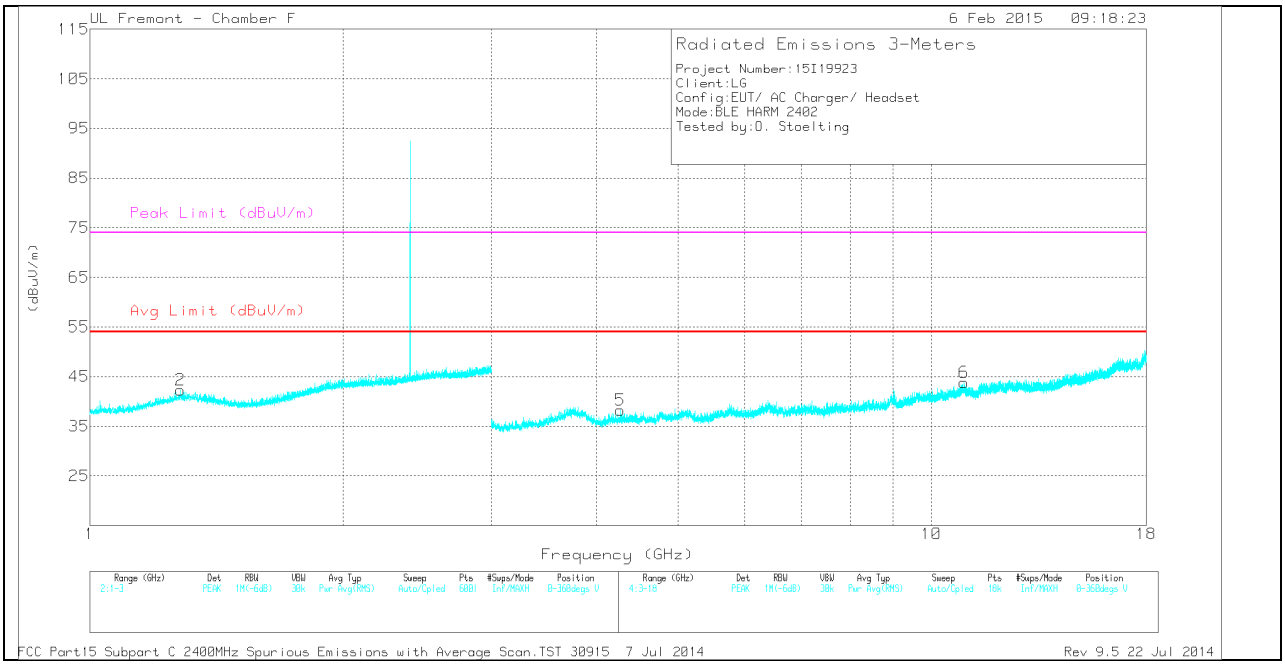
HARMONICS AND SPURIOUS EMISSIONS

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.

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.

LOW CHANNEL DATA

TRACE MARKERS

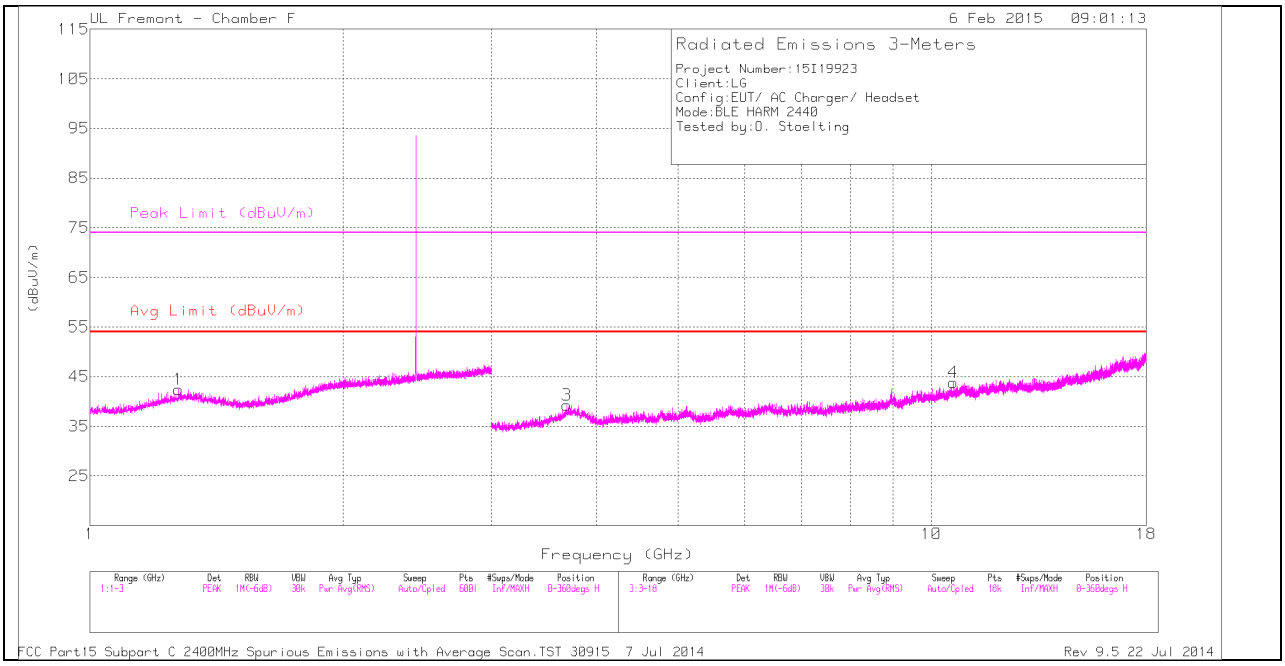
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fltr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.235	34.87	PK	29.3	-22.3	0	41.87	-	-	74	-32.13	0-360	201	H
2	* 1.28	34.69	PK	29.8	-22.2	0	42.29	-	-	74	-31.71	0-360	101	V
3	* 3.69	33.59	PK	34.9	-29.3	0	39.19	-	-	74	-34.81	0-360	201	H
4	* 12.129	27.9	PK	39	-22.1	0	44.8	-	-	74	-29.2	0-360	201	H
5	* 4.271	33	PK	33.7	-28.5	0	38.2	-	-	74	-35.8	0-360	201	V
6	* 10.925	27.13	PK	38.1	-21.4	0	43.83	-	-	74	-30.17	0-360	101	V

PK - Peak detector

RADIATED EMISSIONS

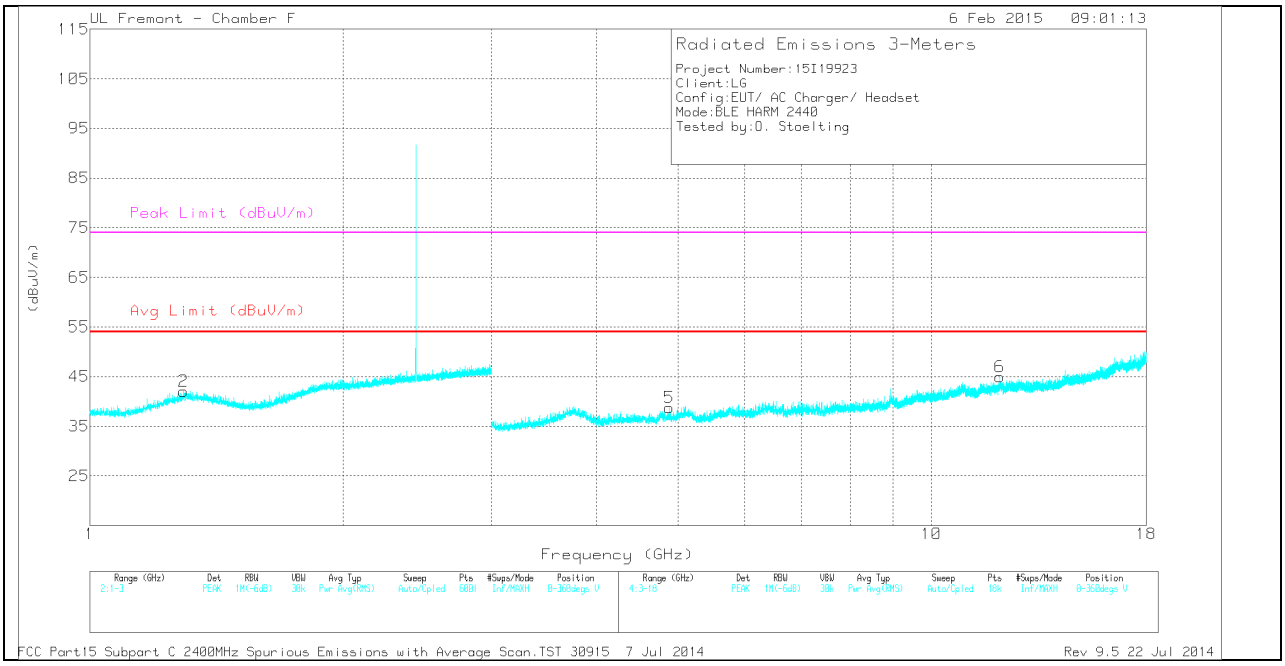
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fltr/Pad (db)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 12.129	34.82	PK2	39	-22.1	0	51.72	-	-	74	-22.28	64	362	H
* 12.128	22.83	MAv1	39	-22.1	2.04	41.77	54	-12.23	-	-	64	362	H

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.

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.

MID CHANNEL DATA

TRACE MARKERS

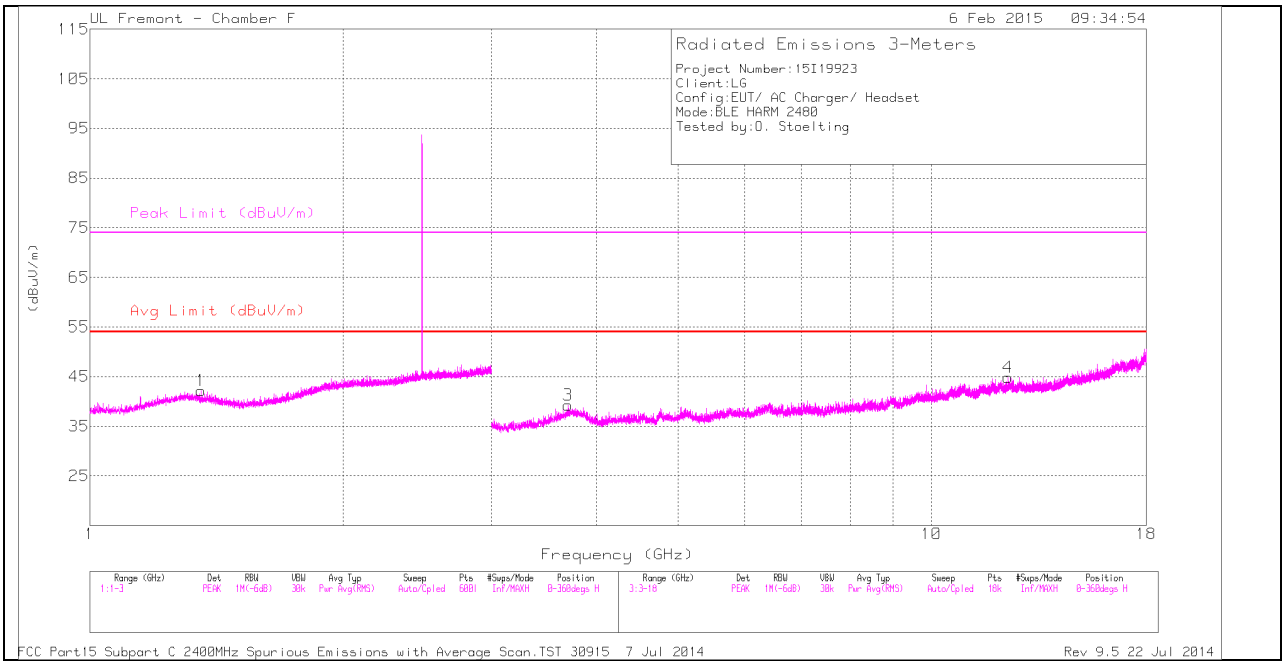
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fltr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.274	34.89	PK	29.8	-22.3	0	42.39	-	-	74	-31.61	0-360	201	H
2	* 1.293	34.3	PK	30	-22.2	0	42.1	-	-	74	-31.9	0-360	101	V
3	* 3.688	33.71	PK	34.9	-29.3	0	39.31	-	-	74	-34.69	0-360	100	H
4	* 10.61	27.66	PK	37.9	-21.7	0	43.86	-	-	74	-30.14	0-360	201	H
5	* 4.879	32.39	PK	34.2	-27.9	0	38.69	-	-	74	-35.31	0-360	101	V
6	* 12.061	27.84	PK	39	-21.9	0	44.94	-	-	74	-29.06	0-360	201	V

PK - Peak detector

RADIATED EMISSIONS

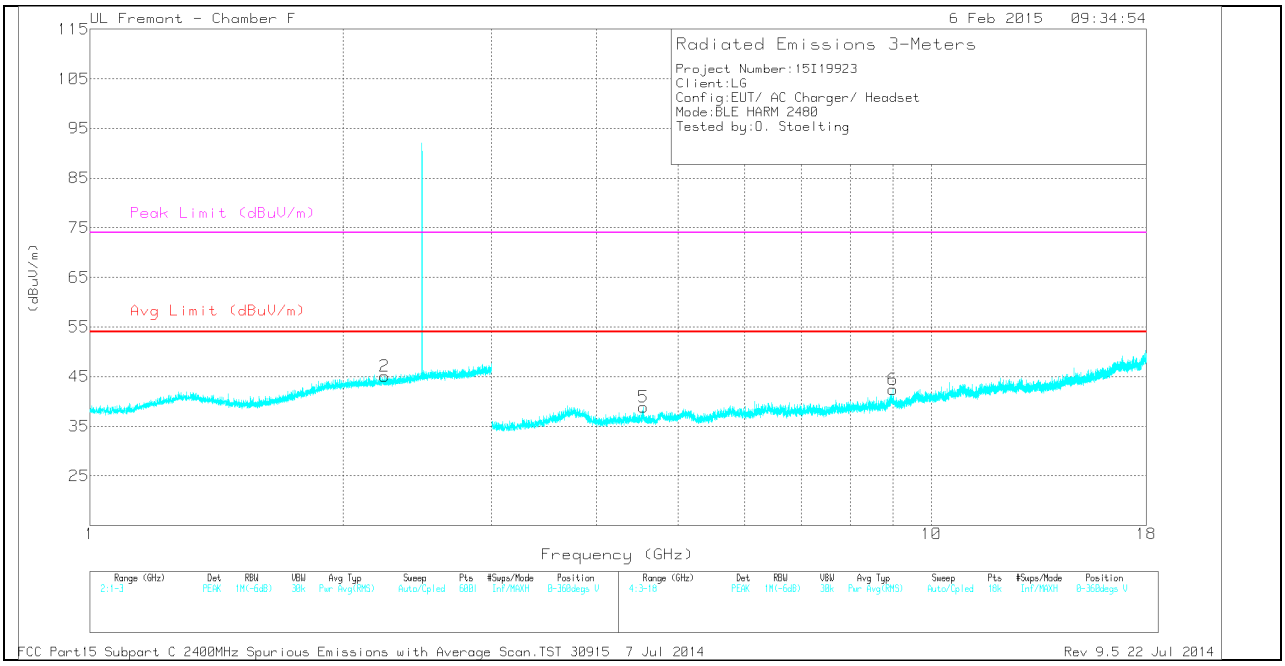
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fltr/Pad (db)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 12.063	33.85	PK2	39	-21.9	0	50.95	-	-	74	-23.05	272	264	V
* 12.062	23.1	MAv1	39	-21.9	2.04	42.24	54	-11.76	-	-	272	264	V

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.

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.

HIGH CHANNEL DATA

TRACE MARKERS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (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	* 1.355	34.68	PK	29.6	-22.1	0	42.18	-	-	74	-31.82	0-360	100	H
2	* 2.24	34.27	PK	31.8	-21	0	45.07	-	-	74	-28.93	0-360	101	V
3	* 3.701	33.75	PK	34.8	-29.3	0	39.25	-	-	74	-34.75	0-360	100	H
4	* 12.325	28.55	PK	38.9	-22.6	0	44.85	-	-	74	-29.15	0-360	100	H
5	* 4.545	32.74	PK	34	-27.9	0	38.84	-	-	74	-35.16	0-360	101	V
6	* 9.002	28.39	PK	36.1	-22.1	0	42.39	-	-	74	-31.61	0-360	201	V

PK - Peak detector

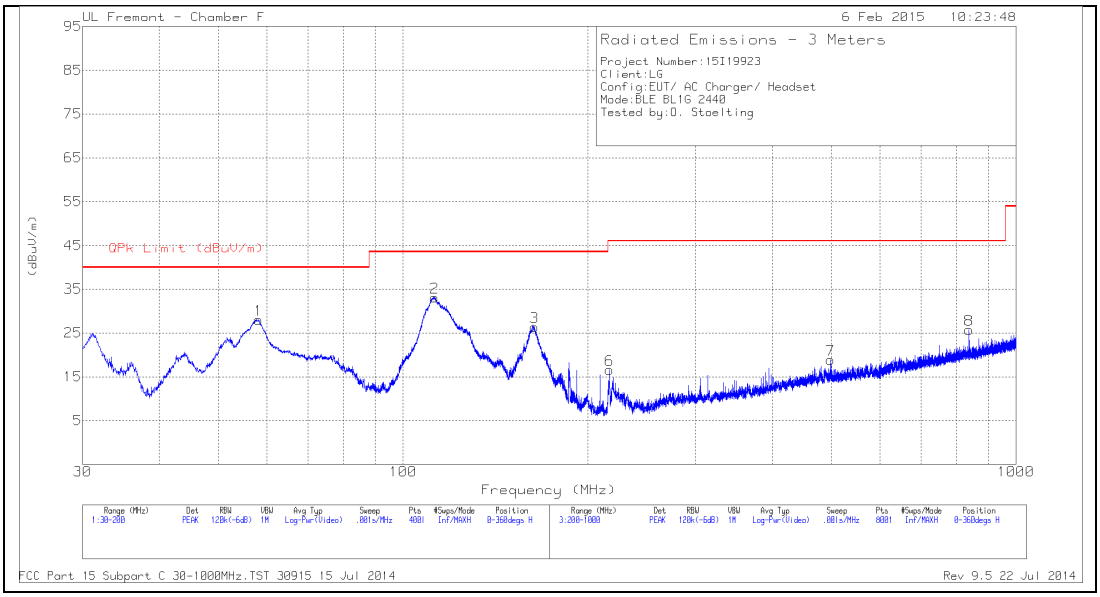
RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (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
* 2.239	41.64	PK2	31.8	-21	0	52.44	-	-	74	-21.56	209	105	V
* 2.242	29.76	MAv1	31.8	-21.1	2.04	42.5	54	-11.5	-	-	209	105	V

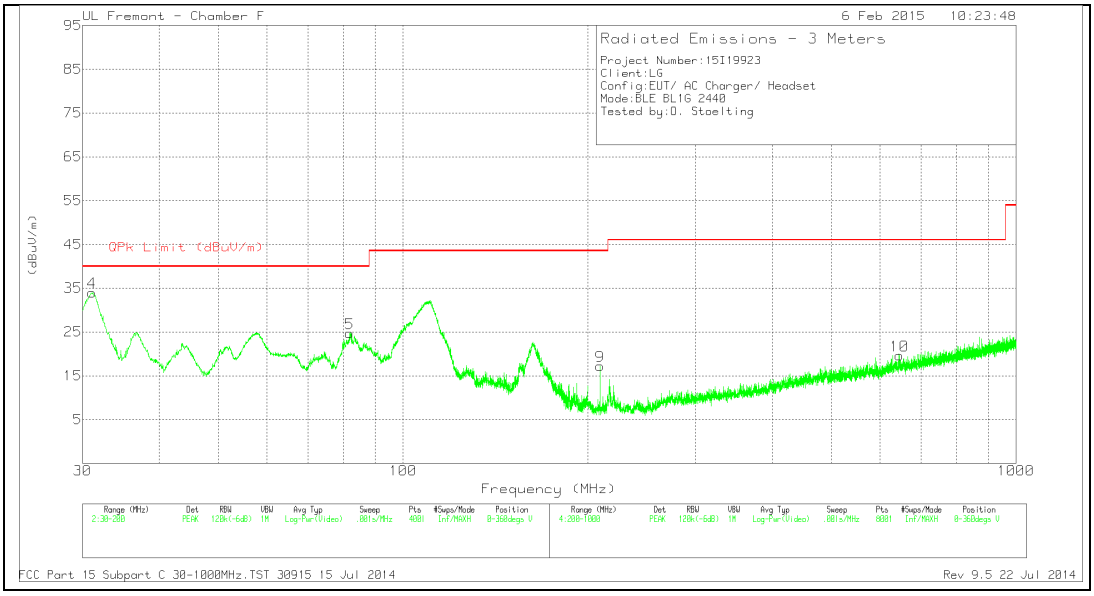
8.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	58.0925	52.31	PK	7.4	-31.7	28.01	40	-11.99	0-360	401	H
2	* 112.6625	51.61	PK	13	-31.5	33.11	43.52	-10.41	0-360	301	H
3	* 163.9175	45.47	PK	12.1	-31.2	26.37	43.52	-17.15	0-360	101	H
4	31.105	45.54	PK	20.5	-32	34.04	40	-5.96	0-360	100	V
5	81.8075	48.86	PK	7.5	-31.7	24.66	40	-15.34	0-360	100	V
6	217	36.96	PK	10.6	-31	16.56	46.02	-29.46	0-360	100	H
7	497.6	31.4	PK	17.5	-30	18.9	46.02	-27.12	0-360	100	H
8	838.1	33.08	PK	21.7	-29.1	25.68	46.02	-20.34	0-360	100	H
9	209.5	37.74	PK	10.5	-31	17.24	43.52	-26.28	0-360	100	V
10	644.5	29.65	PK	19.9	-29.9	19.65	46.02	-26.37	0-360	100	V

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

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 112.8814	31.42	QP	13.1	-31.5	13.02	43.52	-30.5	312	299	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
QP - Quasi-Peak detector