



FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/CDMA/LTE Phone + Bluetooth, DTS/UNII a/b/g/n/ac & NFC

MODEL NUMBER: LG-US991, US991, LGUS991

FCC ID: ZNFUS991

REPORT NUMBER: 15I20405-E6

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Prepared for
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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. <i>MEASURING INSTRUMENT CALIBRATION</i>	<i>5</i>
4.2. <i>SAMPLE CALCULATION</i>	<i>5</i>
4.3. <i>MEASUREMENT UNCERTAINTY.....</i>	<i>5</i>
5. EQUIPMENT UNDER TEST	6
5.1. <i>DESCRIPTION OF EUT</i>	<i>6</i>
5.2. <i>MAXIMUM OUTPUT POWER.....</i>	<i>6</i>
5.3. <i>WORST-CASE CONFIGURATION AND MODE.....</i>	<i>6</i>
5.4. <i>MODIFICATIONS</i>	<i>6</i>
5.5. <i>DESCRIPTION OF TEST SETUP.....</i>	<i>7</i>
6. TEST AND MEASUREMENT EQUIPMENT	10
7. RADIATED EMISSION TEST RESULTS.....	11
7.1. <i>LIMITS AND PROCEDURE.....</i>	<i>11</i>
7.1.1. <i>FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)</i>	<i>13</i>
7.1.2. <i>FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)(Smart cover) ..</i>	<i>14</i>
7.2. <i>TX SPURIOUS EMISSION 30 TO 1000 MHz</i>	<i>15</i>
7.3. <i>TX SPURIOUS EMISSION 30 TO 1000 MHz (Smart cover with dock)</i>	<i>17</i>
8. AC MAINS LINE CONDUCTED EMISSIONS.....	19
9. FREQUENCY STABILITY	23
10. SETUP PHOTOS	24

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LG ELECTRONICS MOBILECOMM U.S.A., INC.
EUT DESCRIPTION: GSM/WCDMA/CDMA/LTE Phone + Bluetooth, DTS/UNII a/b/g/n/ac & NFC.
MODEL: LG-US991, US991, LGUS991
SERIAL NUMBER: 0699-0249 (Conducted), 0699-0250 (Radiated)
DATE TESTED: MAR 24 – APR 22, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC 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.

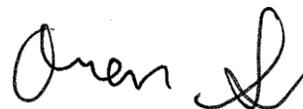
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. 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 LEAD
UL VERIFICATION SERVICES INC

Tested By:



OREN STOELTING
CONSUMER TECHNOLOGY DIVISION
LAB ENGINEER
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 and FCC CFR 47 Part 15C.

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
<input checked="" type="checkbox"/> Chamber A(IC: 2324B-1)	<input type="checkbox"/> Chamber D(IC: 2324B-4)
<input checked="" type="checkbox"/> Chamber B(IC: 2324B-2)	<input type="checkbox"/> Chamber E(IC: 2324B-5)
<input type="checkbox"/> Chamber C(IC: 2324B-3)	<input type="checkbox"/> Chamber F(IC: 2324B-6)
	<input type="checkbox"/> Chamber G(IC: 2324B-7)
	<input type="checkbox"/> 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:

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

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 1000 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/CDMA/LTE Phone + Bluetooth, DTS/UNII a/b/g/n/ac & NFC

5.2. MAXIMUM OUTPUT POWER

The testing was performed at 1meter. The transmitter maximum E-field at 30m distance is 16.20 dBuV/m which convert from the 1 meters data.

5.3. WORST-CASE CONFIGURATION AND MODE

The NFC function was tested at its' fundamental and only operational frequency of 13.56MHz. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that the Z-orientation with cover opened was the worst-case orientation; therefore all final radiated testing was performed with the EUT in the Z-orientation with cover opened while generating continuous emissions.

5.4. MODIFICATIONS

No modifications were made during testing.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	LG	MCS-04WD2	EAY62991904	N/A
Smart Case Cover	LG	LG-P1	DK0227	N/A
Wireless Charger	LG	WCD-110	LF1212625283010049	N/A
Earphone	LG	N/A	N/A	N/A

I/O CABLES

Radiated Emissions above 30 MHz, AC Line Conducted Emissions:

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Micro-USB	Shielded	1 m	None
2	Audio	1	Mini-Jack	Un-Shielded	1 m	None

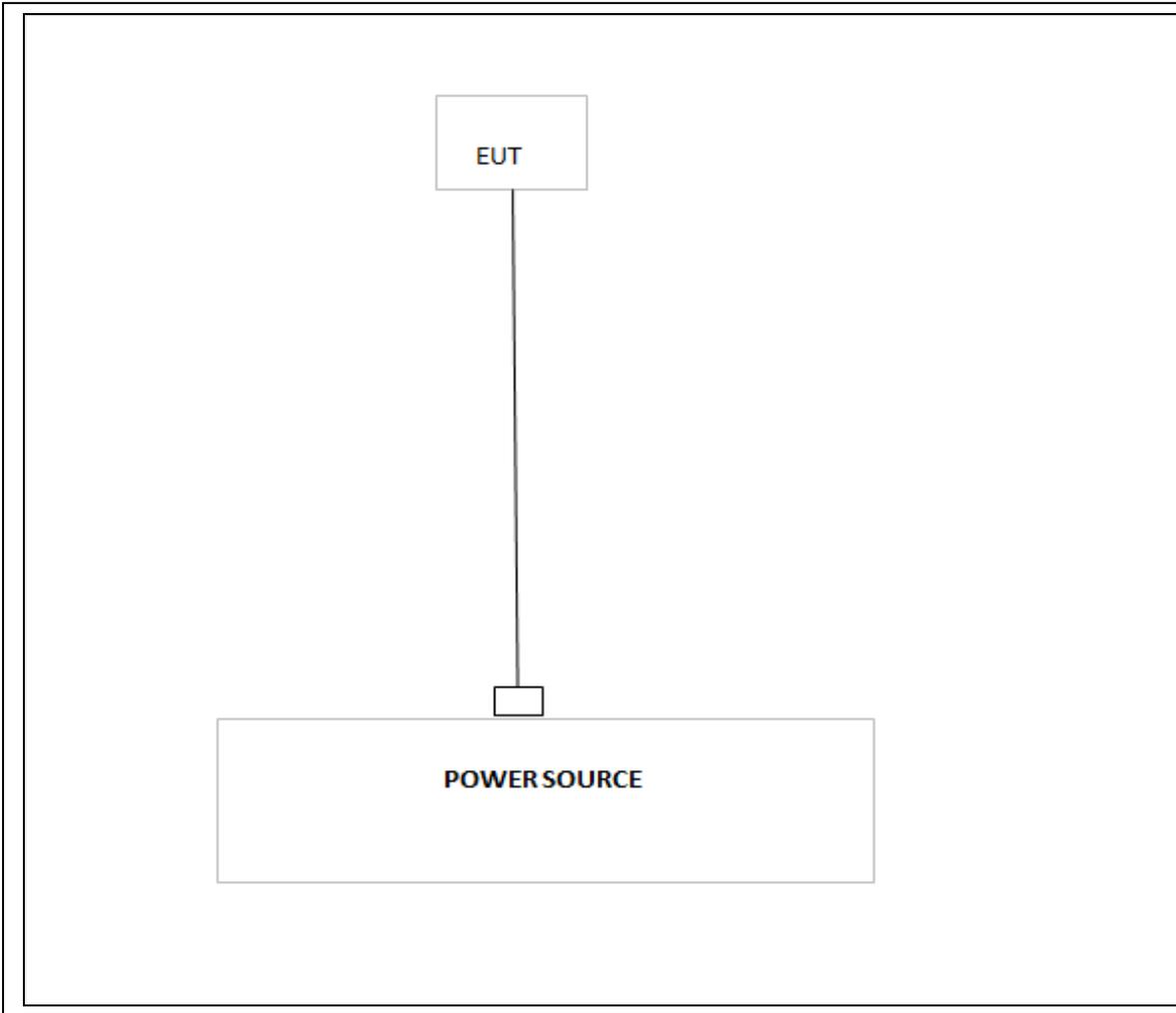
TEST SETUP

The EUT is a stand-alone device configured and tested in a worst-case setup.

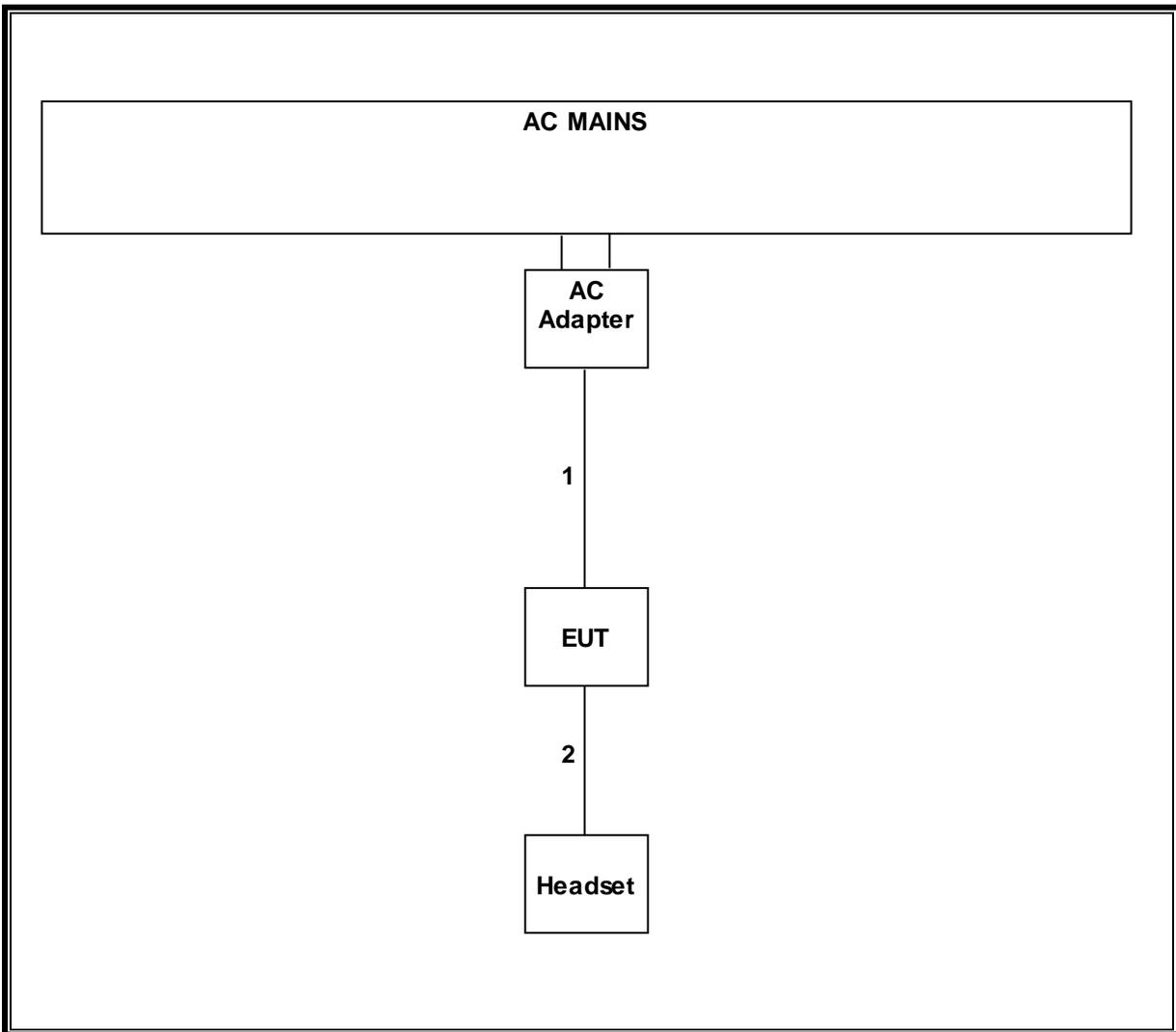
Note: worst case is using worst case orientation with AC charger and headset attached to the EUT with NFC signal continuously transmitting.

SETUP DIAGRAM FOR TESTS

Radiated Emissions Below 30 MHz:



Radiated Emissions above 30 MHz, AC Line Conducted Emissions:



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
ESA-E Spectrum Analyzer, 9kHz-26.5 GHz	Agilent / HP	E4407B	C01098	04/04/16
Antenna, Loop, 30 MHz	EMCO	6502	C00593	02/20/16
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	C01011	03/23/16
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	04/03/16
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/08/15
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/16/16
DMM	Fluke	77-11	N02303	10/31/15
Temperature Chamber	CSZ	2PHS-8-3	T267	03/04/16

7. RADIATED EMISSION TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMIT

§15.225

IC RSS-210, Annex 2, Section A2.6 (Transmitter)

IC RSS-GEN, Section 6 (Receiver)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the filed strength from uV/m to dBuV/m is:

Limit (dBuV/m) = 20 log limit (uV/m)

In addition:

§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

TEST PROCEDURE

ANSI C63.10-2009

The EUT is an intentional radiator that incorporates a digital device. The highest fundamental frequency generated or used in the device is 13.56 MHz. The frequency range was investigated from 0.15 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater (1000MHz)

RESULTS

No non-compliance noted:

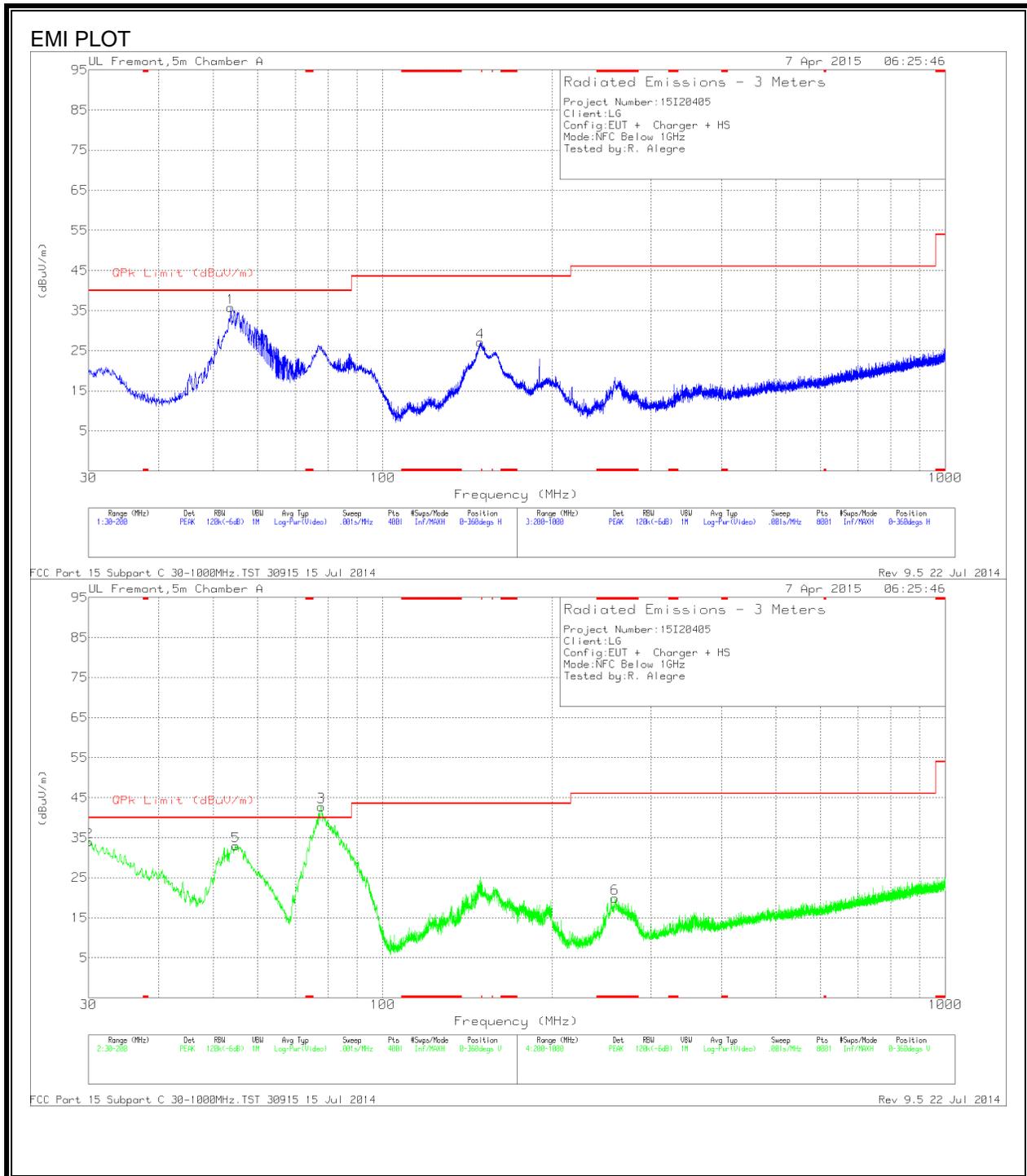
7.1.1. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)

FCC Part 15, Subpart B & C														1 Meter Distance Measurement At Emissions Chamber	
Company:		LG													
Project #:		15I20405													
Model #:		(X73) LG-US991													
Tester:		Jude Semana													
Date:		4/21/2015													
Frequency (MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	AF (dB/m)	Distance (m)	Distance Correction (dB)	PK Corrected Reading (dBuV/m)	AV Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	PK Margin (dB)	AV Margin (dB)	Notes		
Loop Antenna Face On: Z Position															
Fundamental Field Strength & Within Bands:															
13.56	63.32	--	10.56	1	-59.08	14.79	--	84.00	--	-69.2	--	--	Fundamental @ 30m Dist		
13.454	51.83	--	10.55	1	-59.08	3.29	--	50.48	--	-47.2	--	--	13.41-13.553MHz Spurious @ 30m		
13.553	54.91	--	10.56	1	-59.08	6.38	--	50.48	--	-44.1	--	--	13.41-13.553MHz Spurious @ 30m		
13.567	59.42	--	10.56	1	-59.08	10.89	--	50.48	--	-39.6	--	--	13.567-13.710MHz Spurious @ 30m		
13.666	52.59	--	10.57	1	-59.08	4.07	--	40.51	--	-36.4	--	--	13.567-13.710MHz Spurious @ 30m		
13.137	36.45	--	10.51	1	-59.08	-12.12	--	40.51	--	-52.6	--	--	13.110-13.410MHz Spurious @ 30m		
13.348	48.85	--	10.53	1	-59.08	0.30	--	40.51	--	-40.2	--	--	13.110-13.410MHz Spurious @ 30m		
13.772	47.41	--	10.58	1	-59.08	-1.10	--	40.51	--	-41.6	--	--	13.710-14.010MHz Spurious @ 30m		
13.984	35.04	--	10.6	1	-59.08	-13.45	--	29.54	--	-43.0	--	--	13.710-14.010MHz Spurious @ 30m		
Loop Antenna Face Off: Z Position															
Fundamental Field Strength & Within Bands:															
13.56	62.9	--	10.56	1	-59.08	14.37	--	84.00	--	-69.6	--	--	Fundamental @ 30m Dist		
13.454	49.13	--	10.55	1	-59.08	0.59	--	50.48	--	-49.9	--	--	13.41-13.553MHz Spurious @ 30m		
13.553	55.55	--	10.56	1	-59.08	7.02	--	50.48	--	-43.5	--	--	13.41-13.553MHz Spurious @ 30m		
13.567	41.73	--	10.56	1	-59.08	-6.80	--	50.48	--	-57.3	--	--	13.567-13.710MHz Spurious @ 30m		
13.665	49.66	--	10.57	1	-59.08	1.14	--	40.51	--	-39.4	--	--	13.567-13.710MHz Spurious @ 30m		
13.138	33.84	--	10.51	1	-59.08	-14.73	--	40.51	--	-55.2	--	--	13.110-13.410MHz Spurious @ 30m		
13.348	46.31	--	10.53	1	-59.08	-2.24	--	40.51	--	-42.8	--	--	13.110-13.410MHz Spurious @ 30m		
13.772	44.21	--	10.58	1	-59.08	-4.30	--	40.51	--	-44.8	--	--	13.710-14.010MHz Spurious @ 30m		
13.983	32.54	--	10.6	1	-59.08	-15.95	--	29.54	--	-45.5	--	--	13.710-14.010MHz Spurious @ 30m		
Loop Antenna Face On: Z Position															
Spurious Emissions 9kHz - 490kHz:															
0.01	66.01	--	18.7	1	-99.08	-14.37	-14.37	67.60	47.60	-82.0	-62.0	--	9kHz-10kHz Spurious @ 30m		
0.1	62.36	--	10.5	1	-99.08	-26.22	-26.22	47.60	27.60	-73.8	-53.8	--	10kHz-100kHz Spurious @ 30m		
0.109	63.13	--	10.49	1	-99.08	-25.46	-25.46	46.86	26.86	-72.3	-52.3	--	100kHz-489kHz Spurious @ 30m		
Spurious Emissions 490kHz - 30MHz:															
0.49	39.72	--	10.21	1	-59.08	-9.16	--	33.80	--	-43.0	--	--	489kHz-490kHz Spurious @ 30m		
1	57.36	--	10.3	1	-59.08	8.58	--	27.60	--	-19.0	--	--	490kHz-1MHz Spurious @ 30m		
1.366	31.36	--	10.28	1	-59.08	-17.44	--	24.90	--	-42.3	--	--	1MHz-1.705MHz Spurious @ 30 m		
4.133	23.57	--	10.2	1	-59.08	-25.31	--	29.54	--	-54.9	--	--	1.705MHz-5MHz Spurious @ 30m		
6.27	22.04	--	10.2	1	-59.08	-26.84	--	29.54	--	-56.4	--	--	5-10MHz Spurious @ 30m		
24.05	17.4	--	9.49	1	-59.08	-32.19	--	29.54	--	-61.7	--	--	20-30MHz Spurious @ 30m		
* No more emissions were found up to 30MHz															
Note: The emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.															
P.K. = Peak Q.P. = Quasi Peak Readings A.F. = Antenna factor															
Rev. 11.21.14															

7.1.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)(Smart cover)

FCC Part 15, Subpart B & C														1 Meter Distance Measurement At Emissions Chamber	
Company:		LG													
Project #:		15I20405													
Model #:		(X73) LG-US991 (with Smart Cover)													
Tester:		Jude Semana													
Date:		4/21/2015													
Frequency (MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	AF (dB/m)	Distance (m)	Distance Correction (dB)	PK Corrected Reading (dBuV/m)	AV Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	PK Margin (dB)	AV Margin (dB)	Notes		
Loop Antenna Face On: Z Position															
Fundamental Field Strength & Within Bands:															
13.56	64.73	--	10.56	1	--	-59.08	16.20	--	84.00	--	-67.8	--	Fundamental @ 30m Dist		
13.454	51.95	--	10.55	1	--	-59.08	3.41	--	50.48	--	-47.1	--	13.41-13.553MHz Spurious @ 30m		
13.553	58.46	--	10.56	1	--	-59.08	9.93	--	50.48	--	-40.5	--	13.41-13.553MHz Spurious @ 30m		
13.567	59.81	--	10.56	1	--	-59.08	11.28	--	50.48	--	-39.2	--	13.567-13.710MHz Spurious @ 30m		
13.666	52.83	--	10.57	1	--	-59.08	4.31	--	40.51	--	-36.2	--	13.567-13.710MHz Spurious @ 30m		
13.137	39.11	--	10.51	1	--	-59.08	-9.46	--	40.51	--	-50.0	--	13.110-13.410MHz Spurious @ 30m		
13.348	46.85	--	10.53	1	--	-59.08	-1.70	--	40.51	--	-42.2	--	13.110-13.410MHz Spurious @ 30m		
13.772	47.88	--	10.58	1	--	-59.08	-0.63	--	40.51	--	-41.1	--	13.710-14.010MHz Spurious @ 30m		
13.984	34.75	--	10.6	1	--	-59.08	-13.74	--	29.54	--	-43.3	--	13.710-14.010MHz Spurious @ 30m		
Loop Antenna Face Off: Z Position															
Fundamental Field Strength & Within Bands:															
13.56	62.54	--	10.56	1	--	-59.08	14.01	--	84.00	--	-70.0	--	Fundamental @ 30m Dist		
13.454	48.74	--	10.55	1	--	-59.08	0.20	--	50.48	--	-50.3	--	13.41-13.553MHz Spurious @ 30m		
13.553	54.6	--	10.56	1	--	-59.08	6.07	--	50.48	--	-44.4	--	13.41-13.553MHz Spurious @ 30m		
13.567	58.11	--	10.56	1	--	-59.08	9.58	--	50.48	--	-40.9	--	13.567-13.710MHz Spurious @ 30m		
13.665	47.07	--	10.57	1	--	-59.08	-1.45	--	40.51	--	-42.0	--	13.567-13.710MHz Spurious @ 30m		
13.138	38.32	--	10.51	1	--	-59.08	-10.25	--	40.51	--	-50.8	--	13.110-13.410MHz Spurious @ 30m		
13.348	44.25	--	10.53	1	--	-59.08	-4.30	--	40.51	--	-44.8	--	13.110-13.410MHz Spurious @ 30m		
13.772	46.21	--	10.58	1	--	-59.08	-2.30	--	40.51	--	-42.8	--	13.710-14.010MHz Spurious @ 30m		
13.983	32.54	--	10.6	1	--	-59.08	-15.95	--	29.54	--	-45.5	--	13.710-14.010MHz Spurious @ 30m		
Loop Antenna Face On: Z Position															
Spurious Emissions 9kHz - 490kHz:															
0.01	66.38	--	18.7	1	--	-99.08	-14.00	-14.00	67.60	47.60	-81.6	-61.6	9kHz-10kHz Spurious @ 30m		
0.1	63.26	--	10.5	1	--	-99.08	-25.32	-25.32	47.60	27.60	-72.9	-52.9	10kHz-100kHz Spurious @ 30m		
0.109	66.68	--	10.49	1	--	-99.08	-21.91	-21.91	46.86	26.86	-68.8	-48.8	100kHz-489kHz Spurious @ 30m		
Spurious Emissions 490kHz - 30MHz:															
0.49	37.92	--	10.21	1	--	-59.08	-10.96	--	33.80	--	-44.8	--	489kHz-490kHz Spurious @ 30m		
1	55.83	--	10.3	1	--	-59.08	7.05	--	27.60	--	-20.6	--	490kHz-1MHz Spurious @ 30m		
1.366	43.98	--	10.28	1	--	-59.08	-4.82	--	24.90	--	-29.7	--	1MHz-1.705MHz Spurious @ 30m		
4.133	32.73	--	10.2	1	--	-59.08	-16.15	--	29.54	--	-45.7	--	1.705MHz-5MHz Spurious @ 30m		
6.27	18.96	--	10.2	1	--	-59.08	-29.92	--	29.54	--	-59.5	--	5-10MHz Spurious @ 30m		
24.05	10.83	--	9.49	1	--	-59.08	-38.76	--	29.54	--	-68.3	--	20-30MHz Spurious @ 30m		
* No more emissions were found up to 30MHz															
Note: The emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 10000Mhz. Radiated emission limits in these three bands are based on measurements employing an average detector.															
P.K. = Peak Q.P. = Quasi Peak Readings A.F. = Antenna factor															
Rev. 11.21.14															

7.2. TX SPURIOUS EMISSION 30 TO 1000 MHz



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 258.8	37.59	PK	11.9	-29.6	19.89	46.02	-26.13	0-360	100	V
2	30.0425	44.19	PK	21	-31.2	33.99	40	-6.01	0-360	101	V
1	53.715	59.55	PK	7.2	-31	35.75	40	-4.25	0-360	300	H
5	54.82	56.99	PK	7	-31	32.99	40	-7.01	0-360	101	V
3	77.8125	66	PK	7.5	-30.7	42.8	40	2.8	0-360	101	V
4	149.2125	44.64	PK	12.7	-30.2	27.14	43.52	-16.38	0-360	200	H

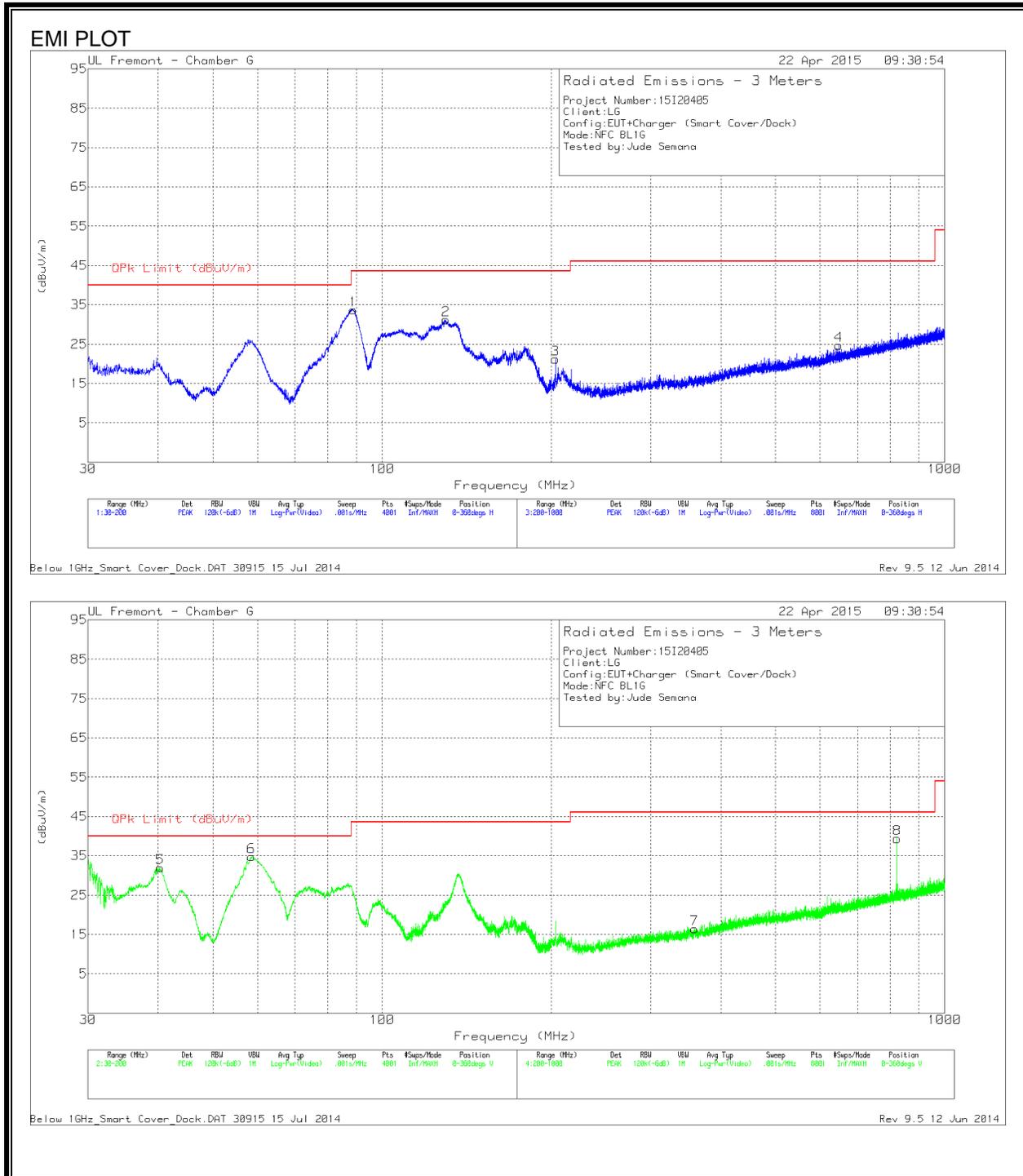
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.
 PK - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
77.8125	54.47	QP	7.5	-30.7	31.27	40	-8.73	234	111	V
77.8125	53.98	QP	7.5	-30.7	30.78	40	-9.22	234	111	V
77.8125	58.13	PK	7.5	-30.7	34.93	40	-5.07	234	111	V
79.9848	56.01	QP	7.2	-30.7	32.51	40	-7.49	234	111	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.
 PK - Peak detector
 QP - Quasi-Peak detector

7.3. TX SPURIOUS EMISSION 30 TO 1000 MHz (Smart cover with dock)



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T899 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 129.7475	44.6	PK	16.8	-30.2	31.2	43.52	-12.32	0-360	202	H
5	40.285	45.96	PK	17.1	-31.1	31.96	40	-8.04	0-360	100	V
6	58.56	55.14	PK	10.5	-30.9	34.74	40	-5.26	0-360	100	V
1	88.905	53.9	PK	10.4	-30.6	33.7	43.52	-9.82	0-360	202	H
3	203.4	35.49	PK	15.3	-29.6	21.19	43.52	-22.33	0-360	201	H
7	359.4	27.55	PK	17.5	-28.6	16.45	46.02	-29.57	0-360	201	V
4	648.7	29.53	PK	22.6	-27.4	24.73	46.02	-21.29	0-360	301	H
8	822.9	41.26	PK	24.7	-26.6	39.36	46.02	-6.66	0-360	301	V

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

PK - Peak detector

8. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207
IC RSS-GEN, Section 7.2.2

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Notes:
1. The lower limit shall apply at the transition frequencies
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

TEST PROCEDURE

ANSI C63.10-2009

RESULTS

No non-compliance noted:

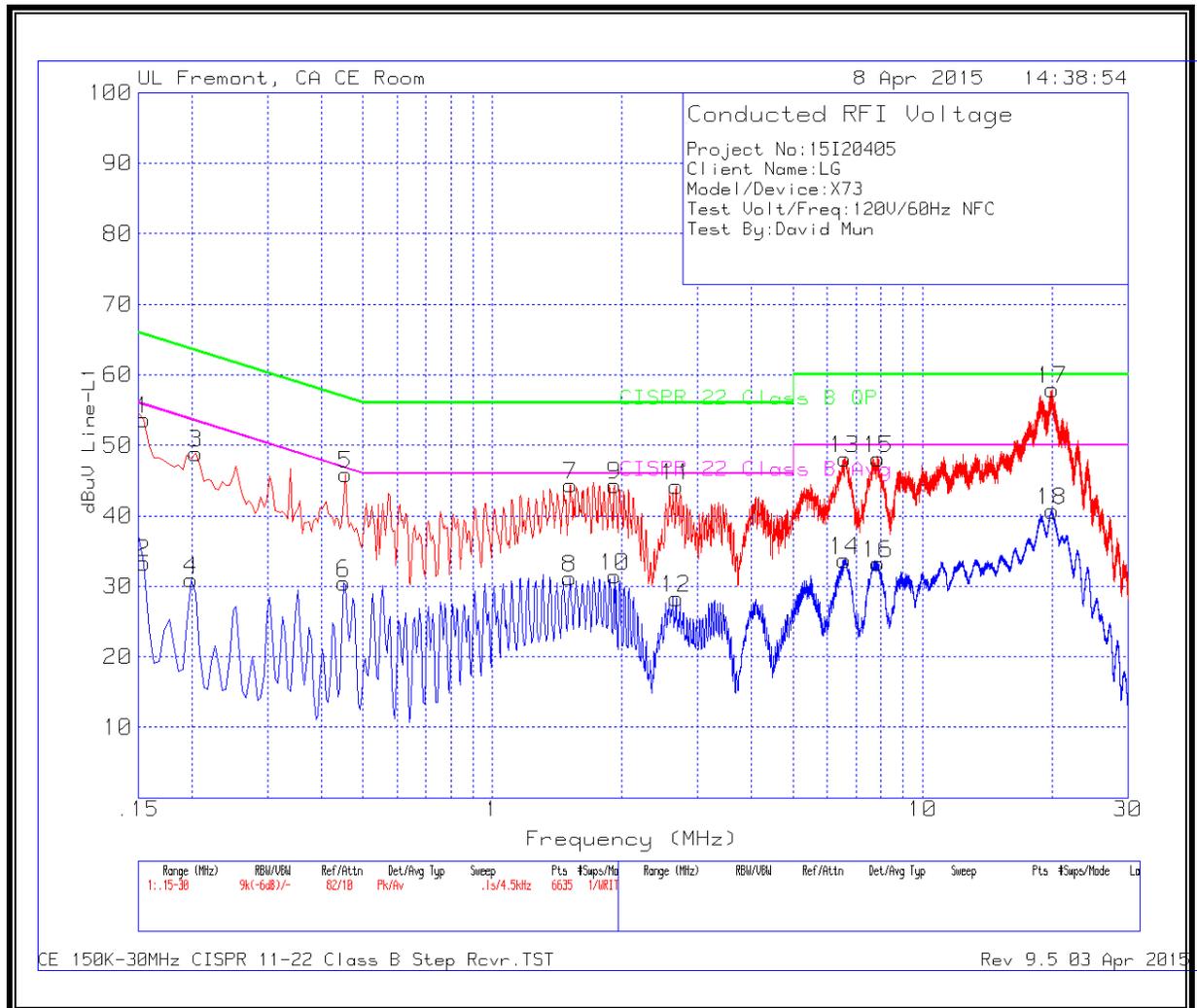
6 WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz

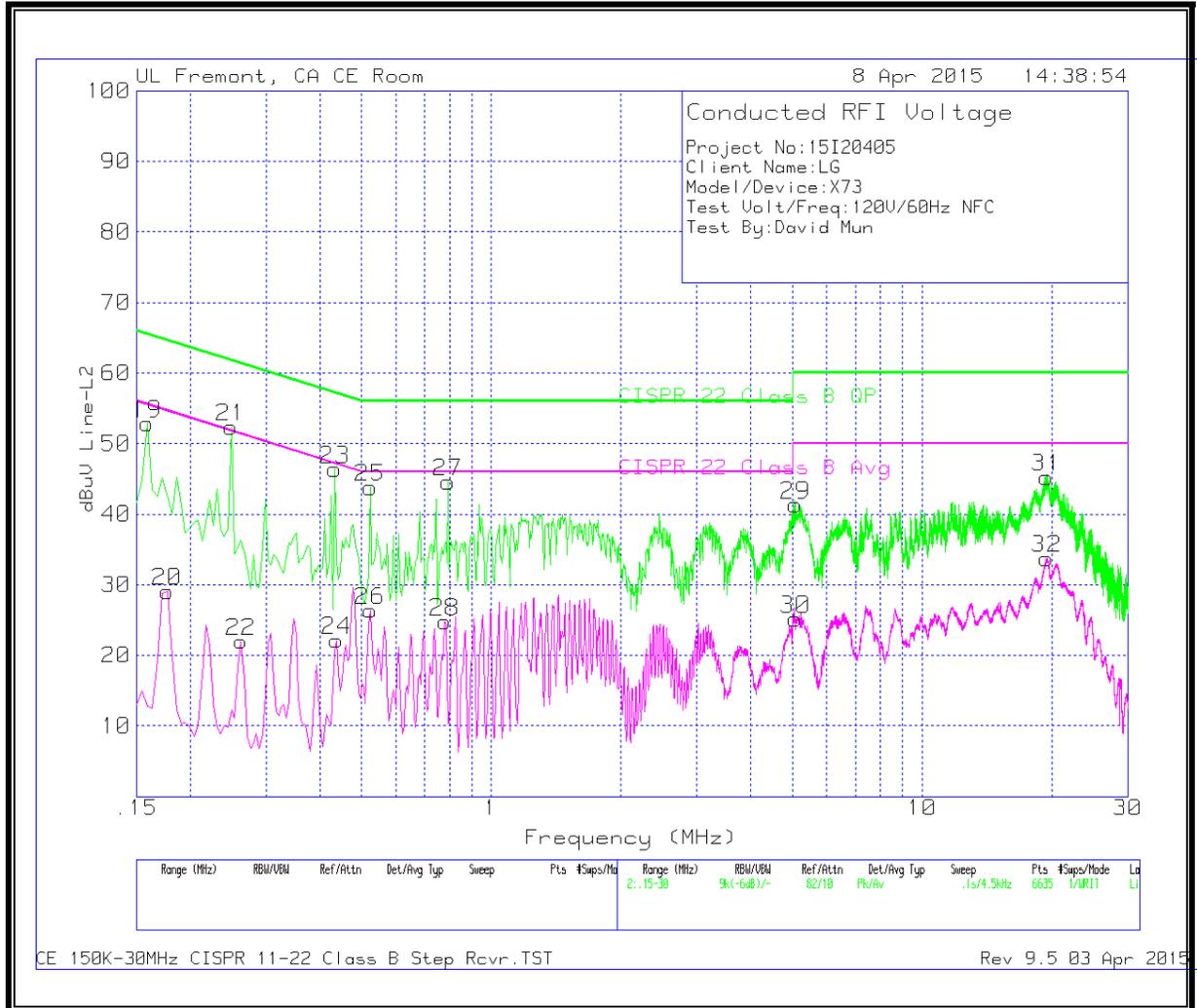
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
1	.1545	52.36	Pk	1.3	0	53.66	65.75	-12.09		
2	.1545	32.04	Av	1.3	0	33.34	65.75	-32.41	55.75	-22.41
3	.204	47.99	Pk	.9	0	48.89	63.45	-14.56		
4	.1995	30.02	Av	.9	0	30.92	63.63	-32.71	53.63	-22.71
5	.456	45.5	Pk	.4	0	45.9	56.77	-10.87		
6	.4515	30.06	Av	.4	0	30.46	56.85	-26.39	46.85	-16.39
7	1.518	44.07	Pk	.2	.1	44.37	56	-11.63		
8	1.5135	30.87	Av	.2	.1	31.17	56	-24.83	46	-14.83
9	1.923	44.05	Pk	.2	.1	44.35	56	-11.65		
10	1.923	31.13	Av	.2	.1	31.43	56	-24.57	46	-14.57
11	2.6745	43.92	Pk	.2	.1	44.22	56	-11.78		
12	2.6745	27.99	Av	.2	.1	28.29	56	-27.71	46	-17.71
13	6.5895	47.8	Pk	.2	.1	48.1	60	-11.9		
14	6.5805	33.38	Av	.2	.1	33.68	60	-26.32	50	-16.32
15	7.881	47.79	Pk	.2	.1	48.09	60	-11.91		
16	7.8765	32.96	Av	.2	.1	33.26	60	-26.74	50	-16.74
17	20.0175	57.41	Pk	.3	.2	57.91	60	-2.09		
18	19.986	40.21	Av	.3	.2	40.71	60	-19.29	50	-9.29

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
19	.159	51.45	Pk	1.4	0	52.85	65.52	-12.67		
20	.177	27.89	Av	1.2	0	29.09	64.63	-35.54	54.63	-25.54
21	.249	51.64	Pk	.7	0	52.34	61.79	-9.45		
22	.2625	21.29	Av	.7	0	21.99	61.35	-39.36	51.35	-29.36
23	.4335	45.97	Pk	.4	0	46.37	57.19	-10.82		
24	.438	21.74	Av	.4	0	22.14	57.1	-34.96	47.1	-24.96
25	.5235	43.41	Pk	.4	0	43.81	56	-12.19		
26	.5235	25.98	Av	.4	0	26.38	56	-29.62	46	-19.62
27	.7935	44.31	Pk	.3	0	44.61	56	-11.39		
28	.78	24.45	Av	.3	0	24.75	56	-31.25	46	-21.25
29	5.0775	41.03	Pk	.2	.1	41.33	60	-18.67		
30	5.0775	24.84	Av	.2	.1	25.14	60	-34.86	50	-24.86
31	19.4415	44.77	Pk	.3	.2	45.27	60	-14.73		
32	19.446	33.21	Av	.3	.2	33.71	60	-26.29	50	-16.29



LINE 2 RESULTS



9. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency, over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

TEST PROCEDURE

ANSI C63.10 Section 13

RESULTS

No non-compliance noted.

Reference Frequency: EUT Channel 13.560000 MHz @ 20°C				
Limit: ± 100 ppm = 1.356 kHz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	13.5602150	0.885	± 100
3.80	40	13.5602200	0.516	± 100
3.80	30	13.5602260	0.074	± 100
3.80	20	13.5602270	0.000	± 100
3.80	10	13.5602170	0.737	± 100
3.80	0	13.5602240	0.221	± 100
3.80	-10	13.5601680	4.351	± 100
3.80	-20	13.5601650	4.572	± 100
3.80	-30	13.5601840	3.171	± 100
End of volt 3.23	20	13.5602290	-0.147	± 100
4.37	20	13.5602280	-0.074	± 100