FCC CFR47 PART 15 SUBPART C
CLASS II PERMISSIVE CHANGE

CERTIFICATION TEST REPORT

FOR

CELLULAR/AWS/PCS CDMA & AWS/PCS LTE PHONE WITH BLUETHOOTH AND WLAN

MODEL NUMBER: MS770, LG-MS770, LGMS770, LW770, LG-LW770, LGLW770

FCC ID: ZNFMS770

REPORT NUMBER: 12U14456-2

ISSUE DATE: JUNE 14, 2012

Prepared for
LG ELECTRONICS MOBILECOMM U.S.A., INC.
1000 SYLVAN AVE.
ENGLEWOODS CLIFFS, NJ 07632

Prepared by
COMPLIANCE CERTIFICATION SERVICES (UL CCS)
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
--	06/14/2012	Initial Issue	T. LEE

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	LG ELECTRONICS MOBILECOMM U.S.A., INC. 1000 SYLVAN AVE. ENGLEWOODS CLIFFS, NJ 07632
EUT DESCRIPTION:	Cellular/AWS/PCS CDMA & AWS/PCS LTE Phone with Bluetooth and WLAN
MODEL:	MS770, LG-MS770, LGMS770, LW770, LG-LW770, LGLW770
SERIAL NUMBER:	99000077000285
DATE TESTED:	JUNE 12, 2012

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

Compliance Certification Services (UL CCS) 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 CCS 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS 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 CCS By:

TIM LEE
STAFF ENGINEER
UL CCS

Tested By:

TOM CHEN
EMC ENGINEER
UL CCS

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, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS 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:

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 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 Cellular/AWS/PCS CDMA & AWS/PCS LTE Phone with Bluetooth and WLAN.

The unit supports AFH mode. The manufacturer attested the following.

- It is in compliance with Bluetooth Specification 1.2 or later specification.
- The number of hopping channel in AFH mode is 79 channels
- The output power do not transmit over than 125 mW
- The channel separation is based upon 2/3 of 20 dB channel bandwidth

5.2. MAXIMUM OUTPUT POWER

The measured average power values were within ± 0.5 dB of the original values. Refer to original report number “12U14406-1A FCC IC BLUETOOTH Report” for exact output power values and for all antenna port results.

5.3. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The change filed under this application has the following changes.

- Hardware Changes (Antenna Pattern and OCB Adjustments)
- Other Changes (Shield Can Shape, and components)

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of -0.59 dBi.

5.5. SOFTWARE AND FIRMWARE

The EUT software installed during testing was LAP8960IR120417.

5.5 MODEL DIFFERENCE

Model MS770 is identical to Models LG-MS770, LGMS770, LW770, LG-LW770, and LGLW770 except for model designation.

5.6 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 Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

Worst-case data rates as provided by the client were:

GFSK DH5 mode
QPSK 2-DH5 mode
8PSK 3-DH5 mode

5.7 DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

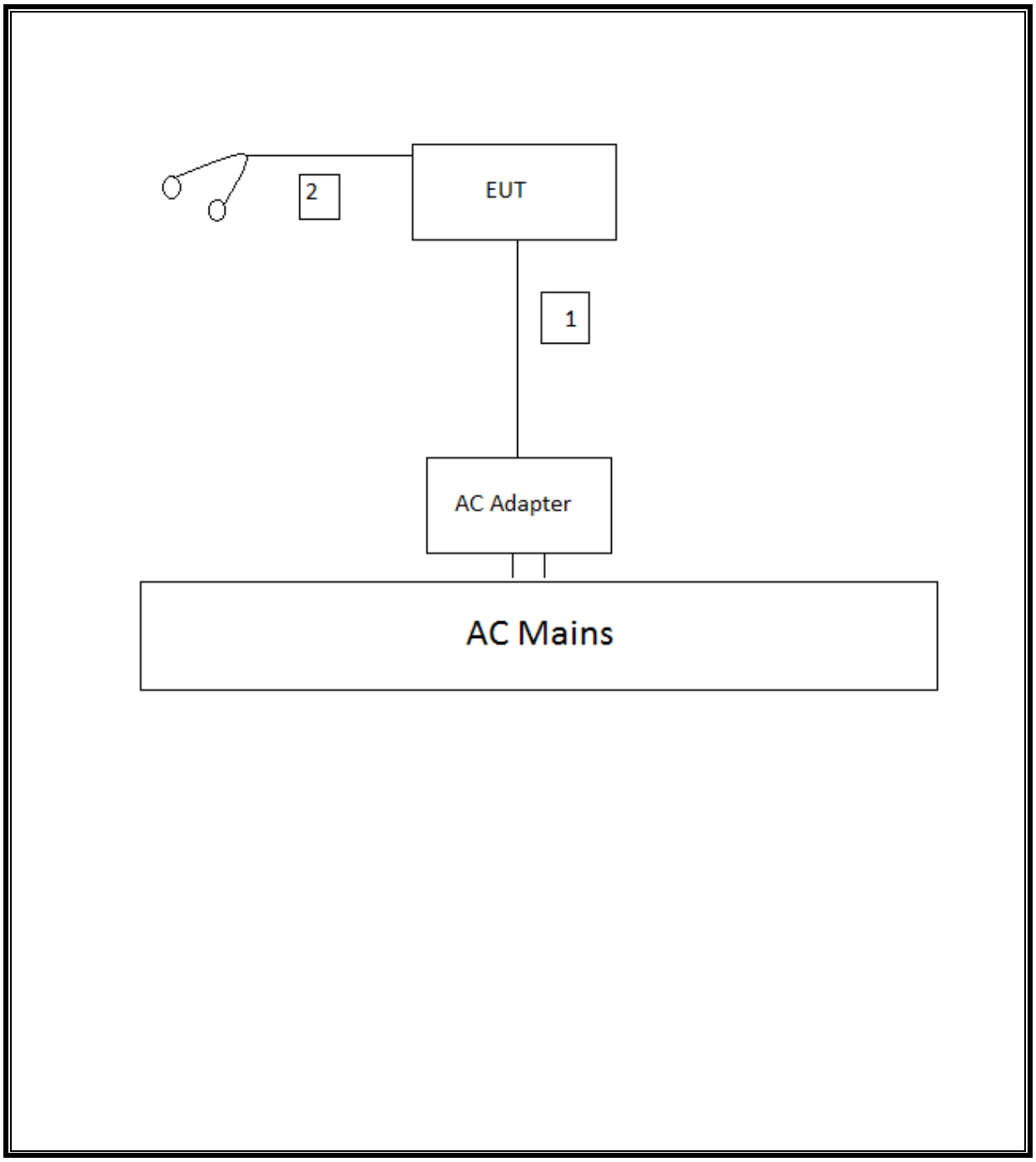
Support Equipment List			
Description	**Manufacturer**	**Model**	**Serial Number**
AC ADAPTER	LG ELECTRONICS	MCS-01WR	RA1Z0051473
HEADSET	LG ELECTRONICS	NA	N/A

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC	1	MINI USB	UN-SHELDED	1.0m	LG-DLC300 (BA21)
2	AUDIO	1	MINI JACK	UN-SHELDED	1.0m	N/A

TEST SETUP

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**
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	07/14/12
Antenna, Horn, 18 GHz	EMCO	3115	C00945	06/29/12
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	11/11/12
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/12/12
Horn Antenna, 26.5 GHz	ARA	MWH-1826/B	C00589	07/28/12
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	03/14/13
Reject Filter, 2.0-2.9 GHz	Micro-Tronics	BRM50702	N02684	CNR
High Pass Filter, 7.6 GHz	Micro-Tronics	HPM13195	N02682	CNR
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	04/09/13
Peak Power Meter	Agilent	N1911A	1260847C	08/04/12
Peak Power Sensor	Agilent	E9323A	1244073F	08/04/12
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
EMI Test Receiver, 30MHz	R & S	ESHS 20	N02396	08/19/13
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	12/13/12

7. RADIATED TEST RESULTS

7.1. 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. 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 10 Hz for average measurements.

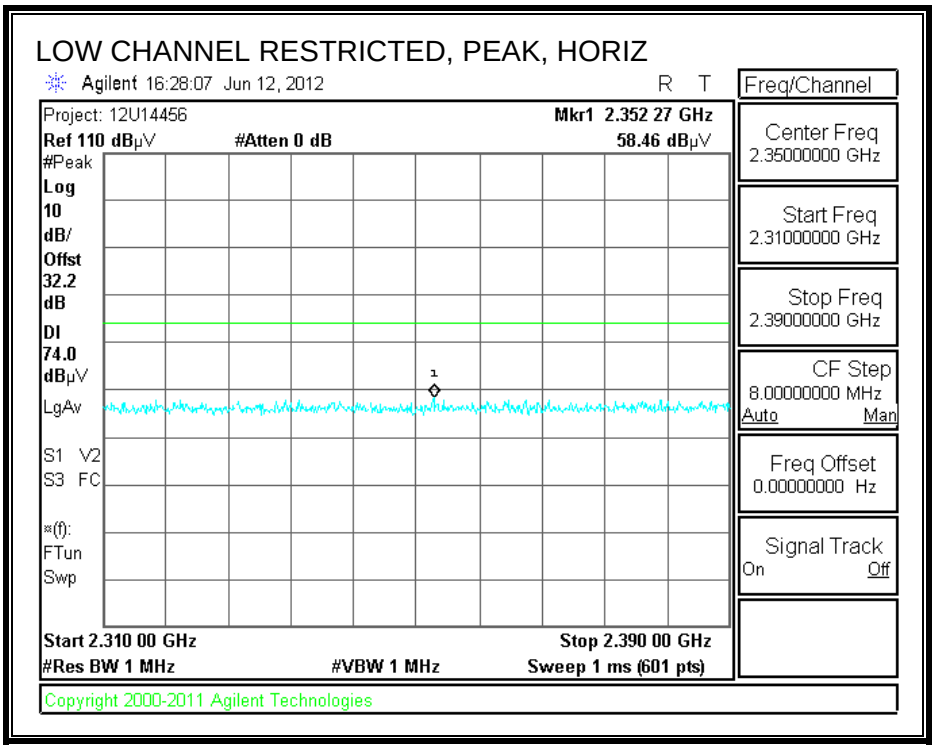
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

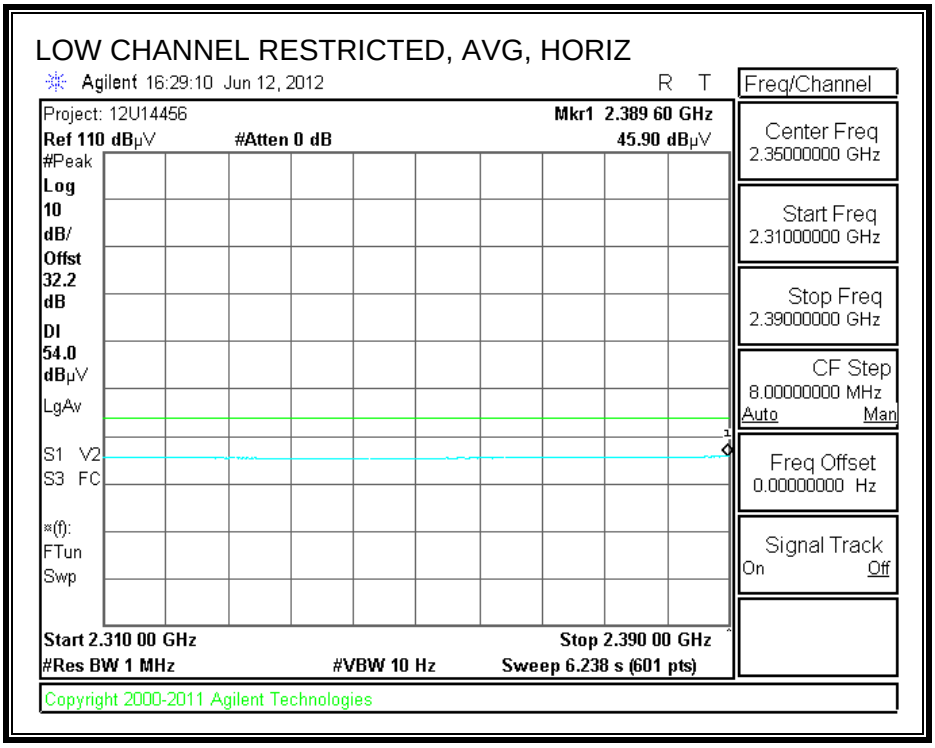
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

7.2. TRANSMITTER ABOVE 1 GHz

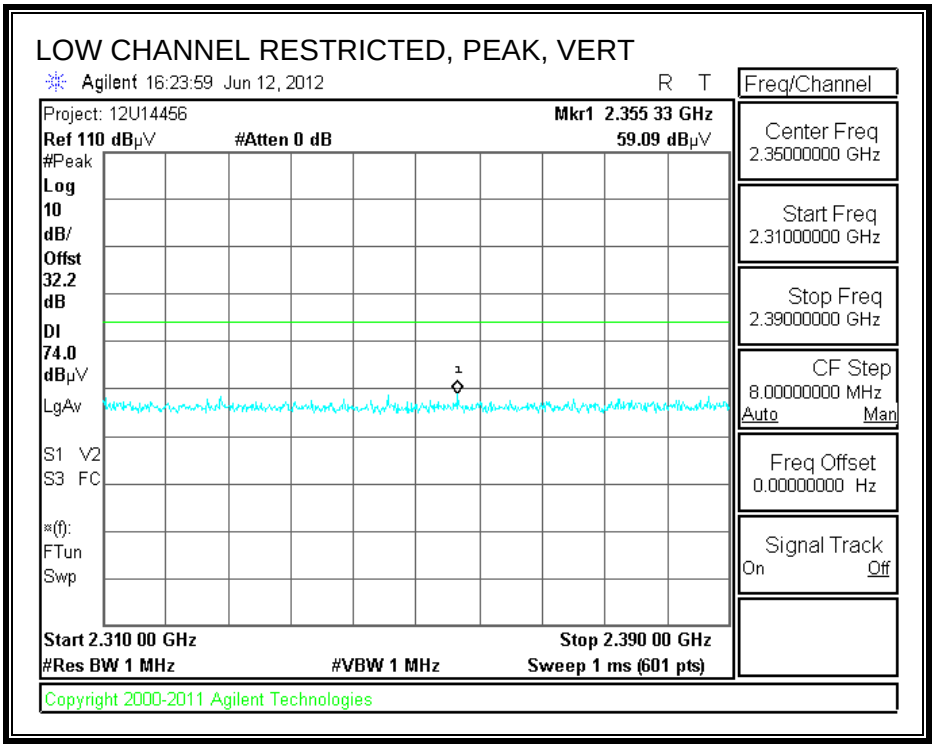
7.2.1. BASIC DATA RATE GFSK MODULATION

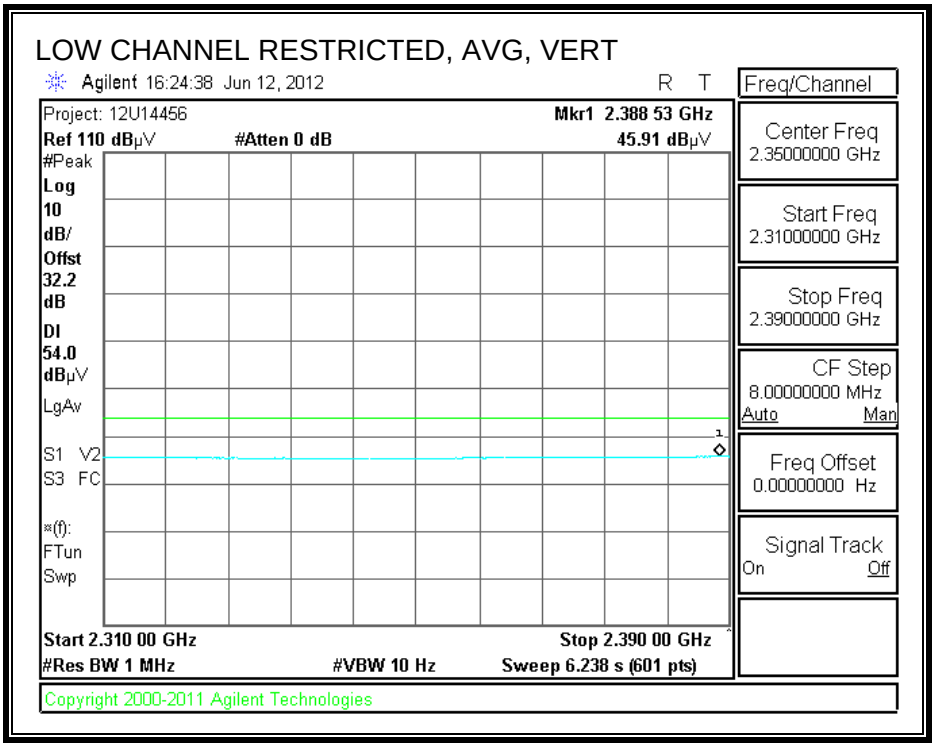
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



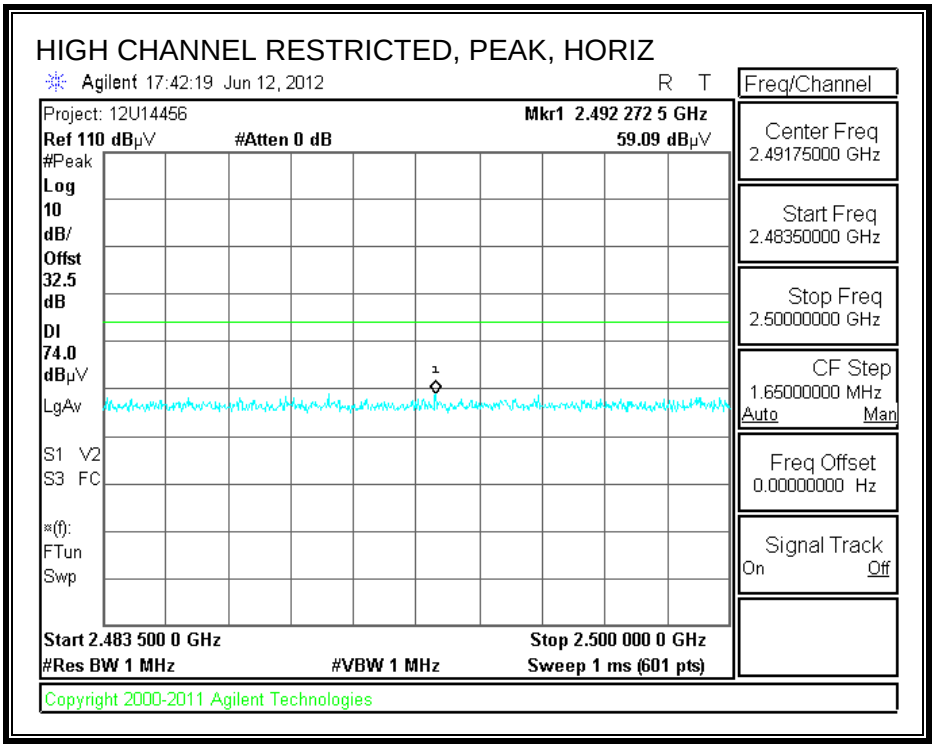


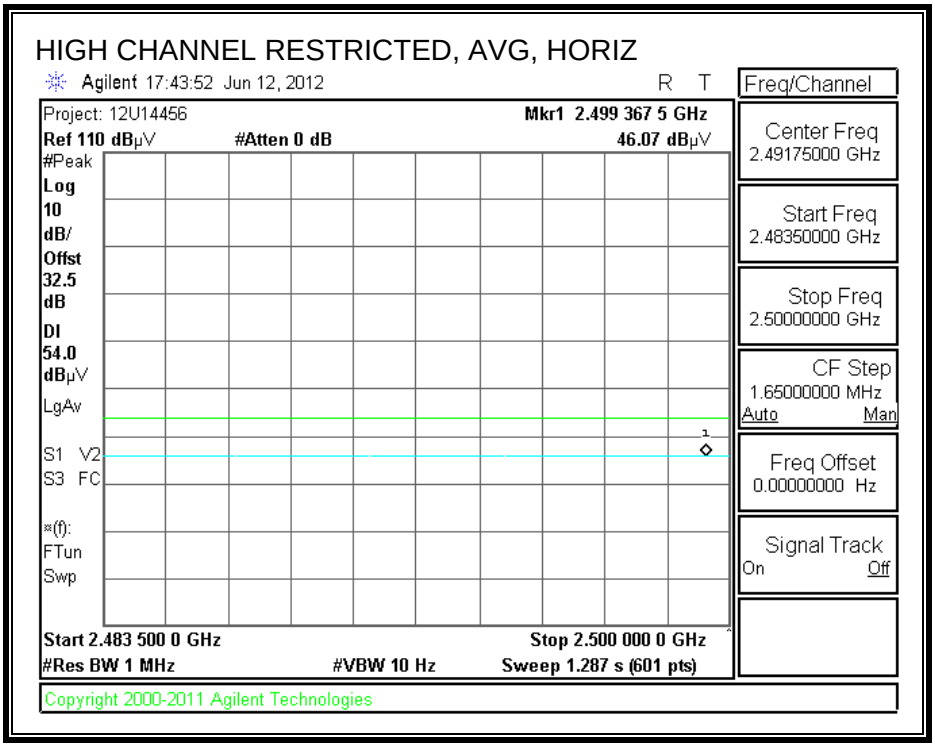
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



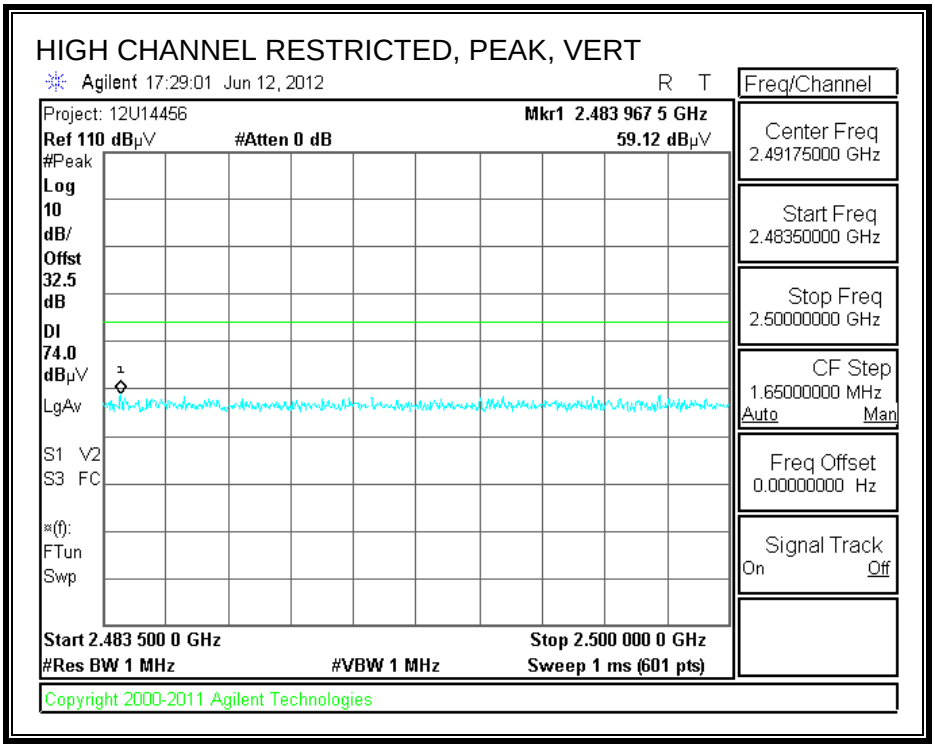


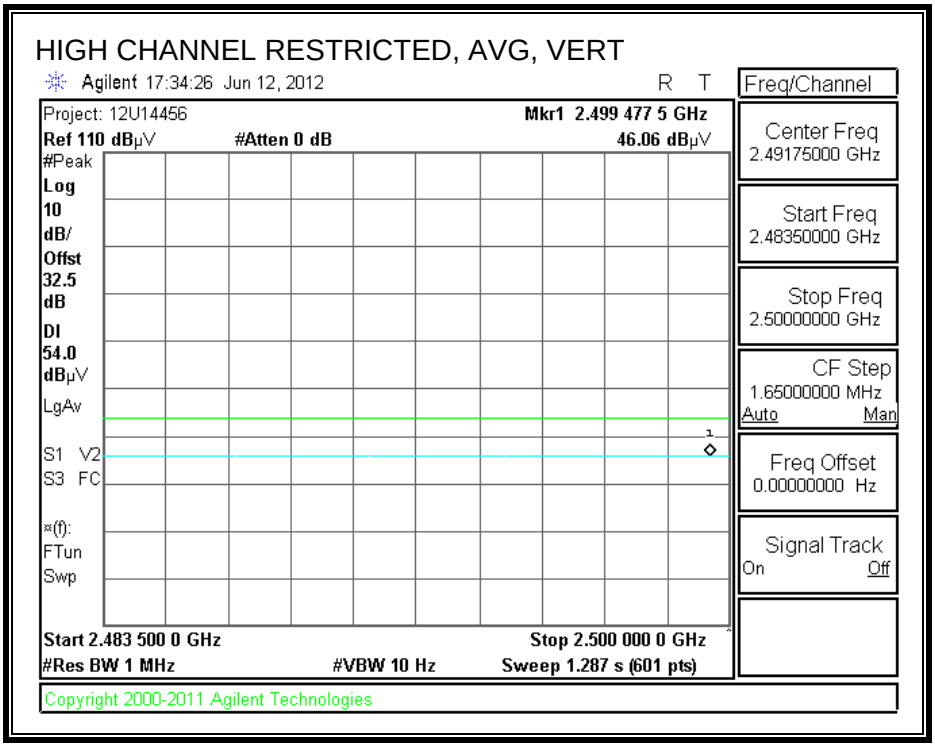
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 06/12/12
Project #: 12U14456
Company: LG Electronics Inc.
Test Target: FCC Class B
Mode Oper: GFSK, TX mode

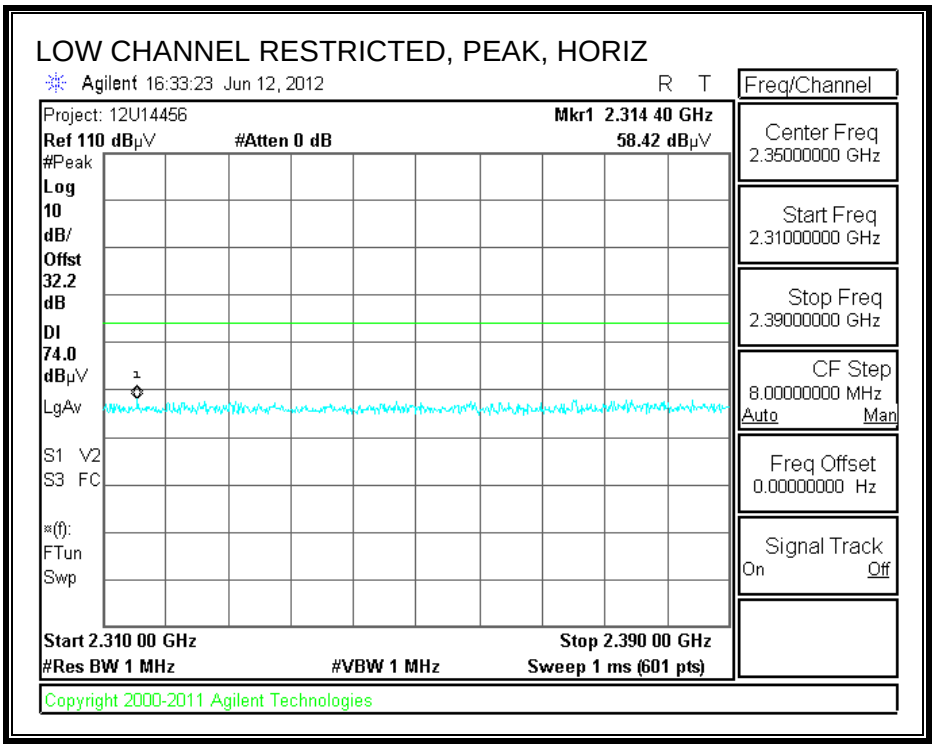
f	Measurement Frequency	Amp	Preamp Gain
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m
AF	Antenna Factor	Peak	Calculated Peak Field Strength
CL	Cable Loss	HPF	High Pass Filter

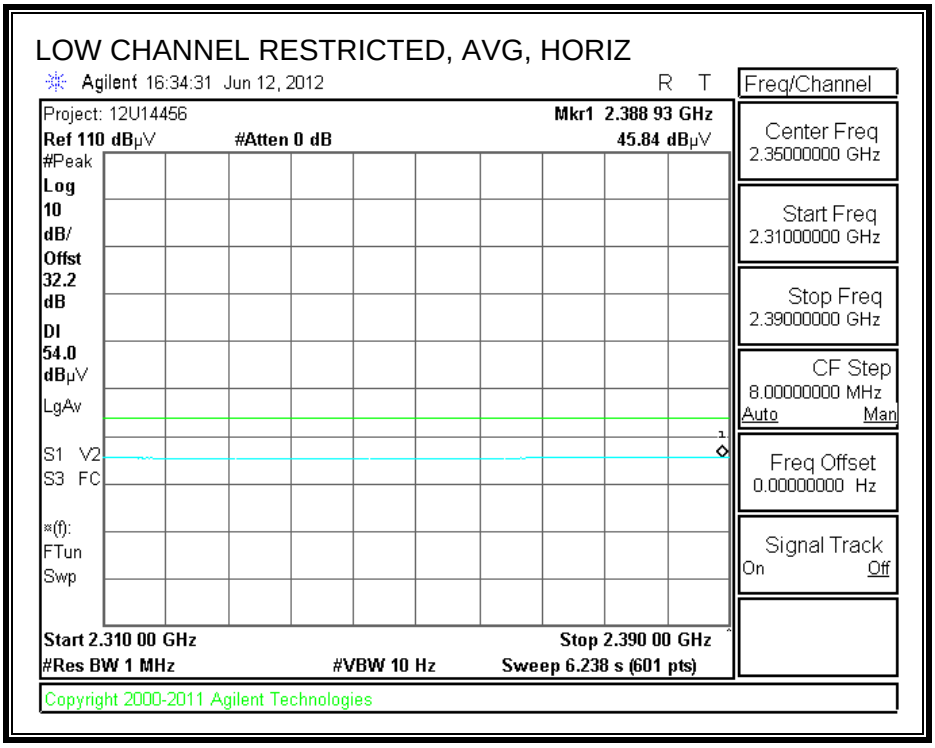
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2402 MHz GFSK													
4.804	3.0	46.9	33.1	6.3	-34.8	0.0	0.0	51.4	74.0	-22.6	H	P	
4.804	3.0	39.6	33.1	6.3	-34.8	0.0	0.0	34.1	54.0	-19.9	H	A	
4.804	3.0	56.6	33.1	6.3	-34.8	0.0	0.0	61.2	74.0	-12.8	V	P	
4.804	3.0	49.0	33.1	6.3	-34.8	0.0	0.0	43.6	54.0	-10.4	V	A	
2441 MHz GFSK													
4.882	3.0	52.6	33.1	6.3	-34.8	0.0	0.0	57.3	74.0	-16.7	V	P	
4.882	3.0	45.4	33.1	6.3	-34.8	0.0	0.0	40.1	54.0	-13.9	V	A	
4.882	3.0	44.4	33.1	6.3	-34.8	0.0	0.0	49.1	74.0	-24.9	H	P	
4.882	3.0	37.0	33.1	6.3	-34.8	0.0	0.0	31.7	54.0	-22.3	H	A	
2480 MHz GFSK													
4.960	3.0	49.8	33.2	6.4	-34.8	0.0	0.0	54.6	74.0	-19.4	V	P	
4.960	3.0	42.5	33.2	6.4	-34.8	0.0	0.0	37.3	54.0	-16.7	V	A	
4.960	3.0	44.2	33.2	6.4	-34.8	0.0	0.0	49.0	74.0	-25.0	H	P	
4.960	3.0	36.8	33.2	6.4	-34.8	0.0	0.0	31.6	54.0	-22.4	H	A	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

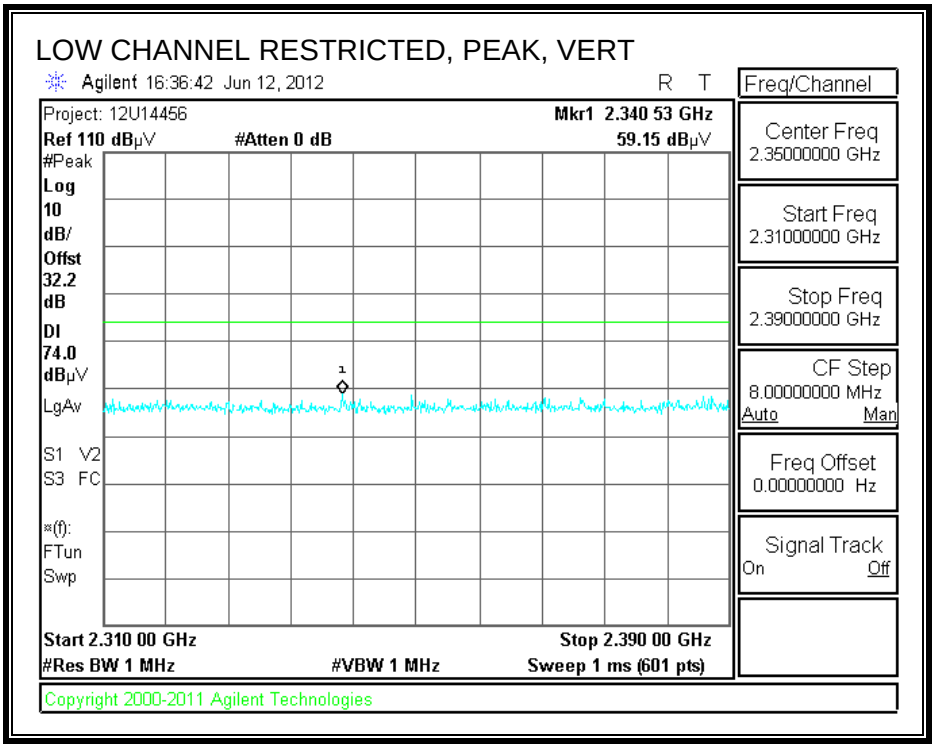
7.2.2. ENHANCED DATA RATE 8PSK MODULATION

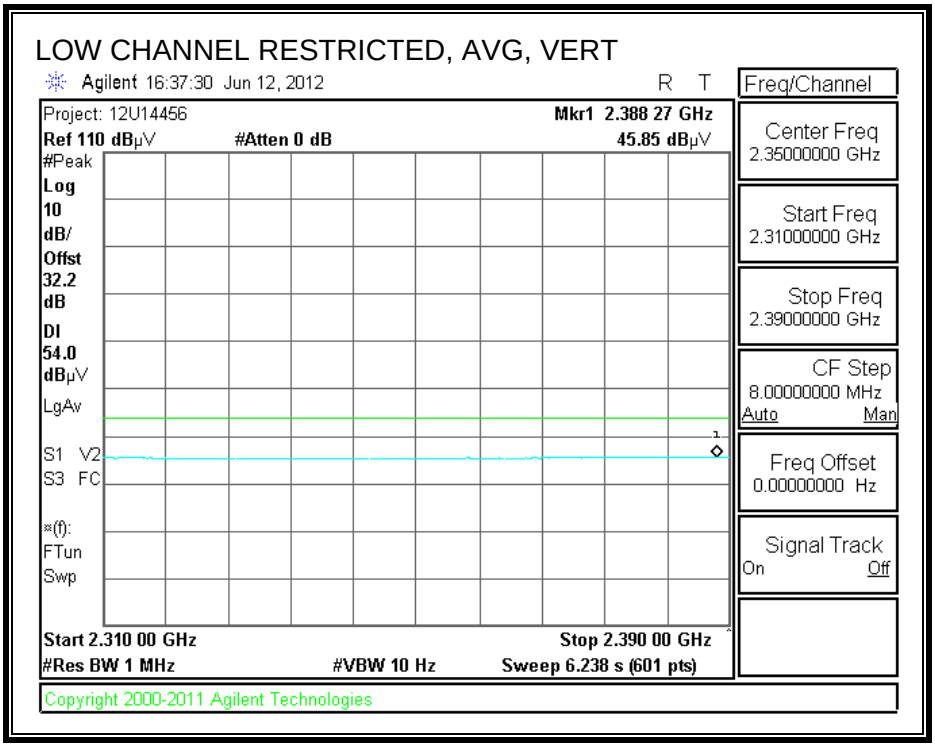
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



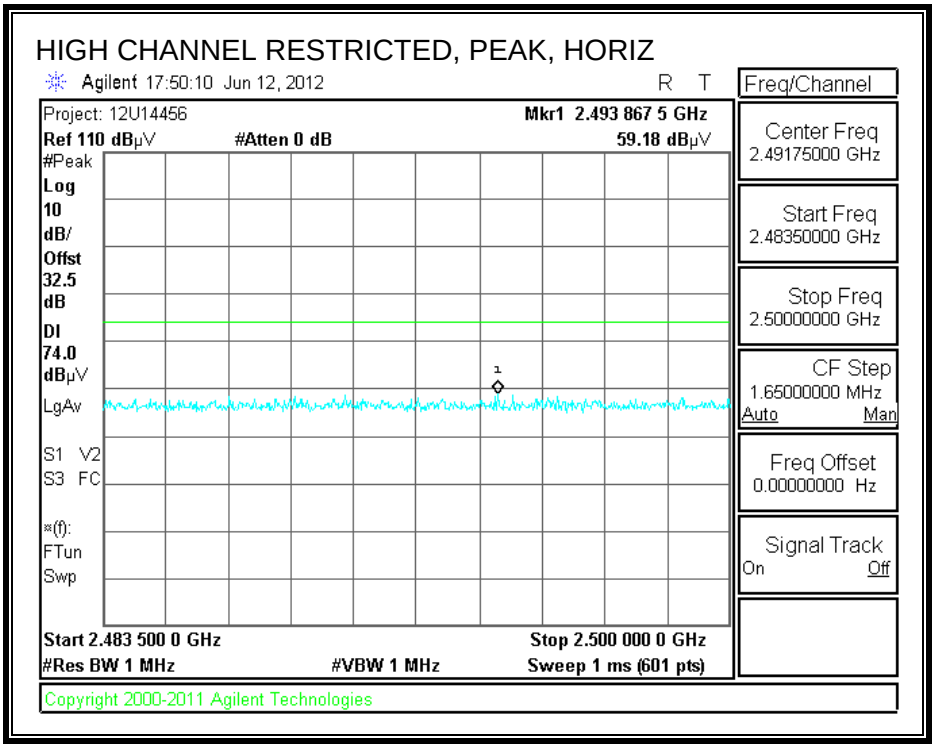


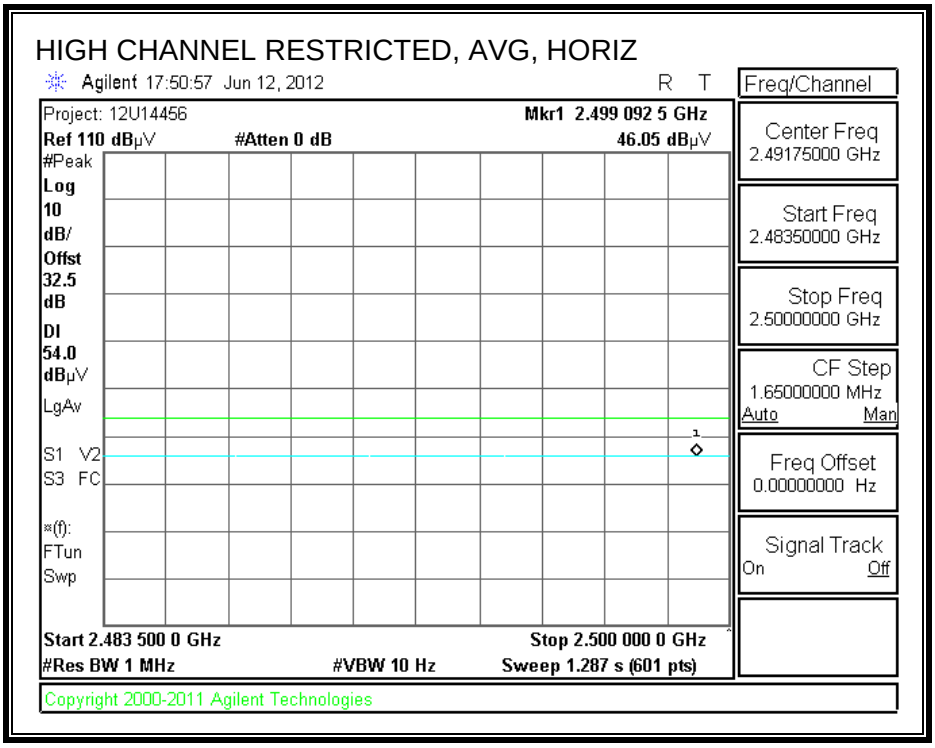
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



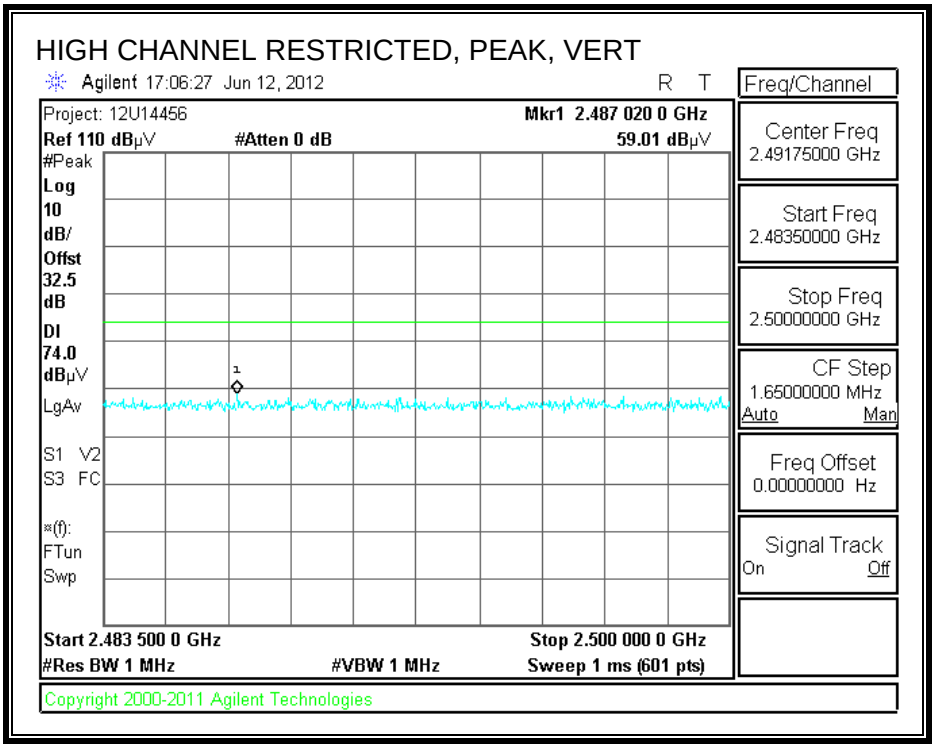


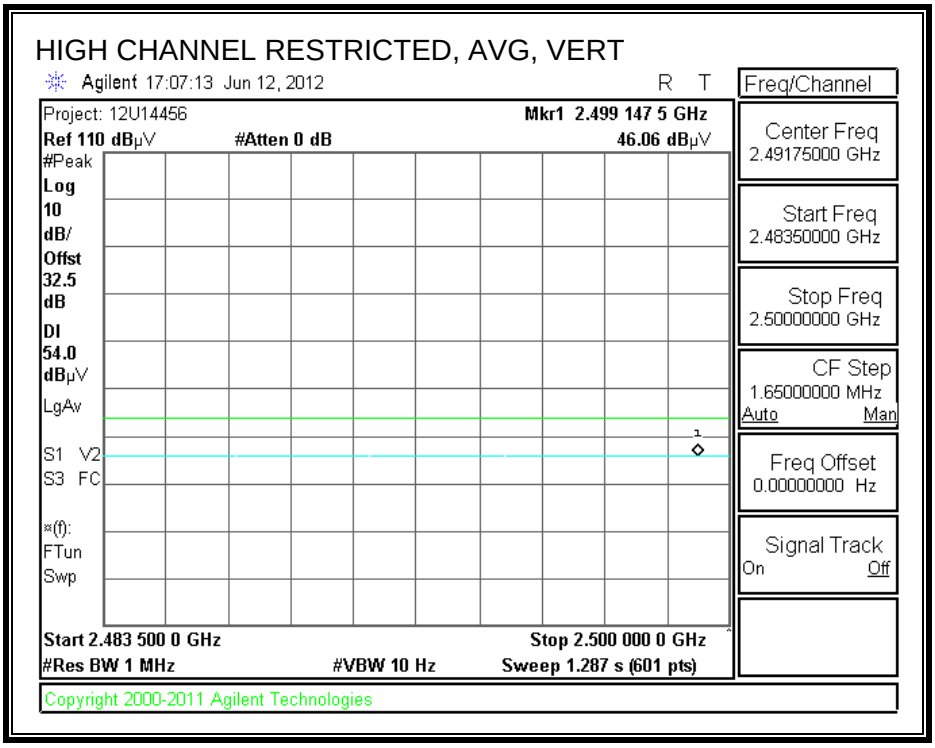
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 06/12/12
Project #: 12U14456
Company: LG Electronics Inc.
Test Target: FCC Class B
Mode Oper: 8PSK, TX mode

f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

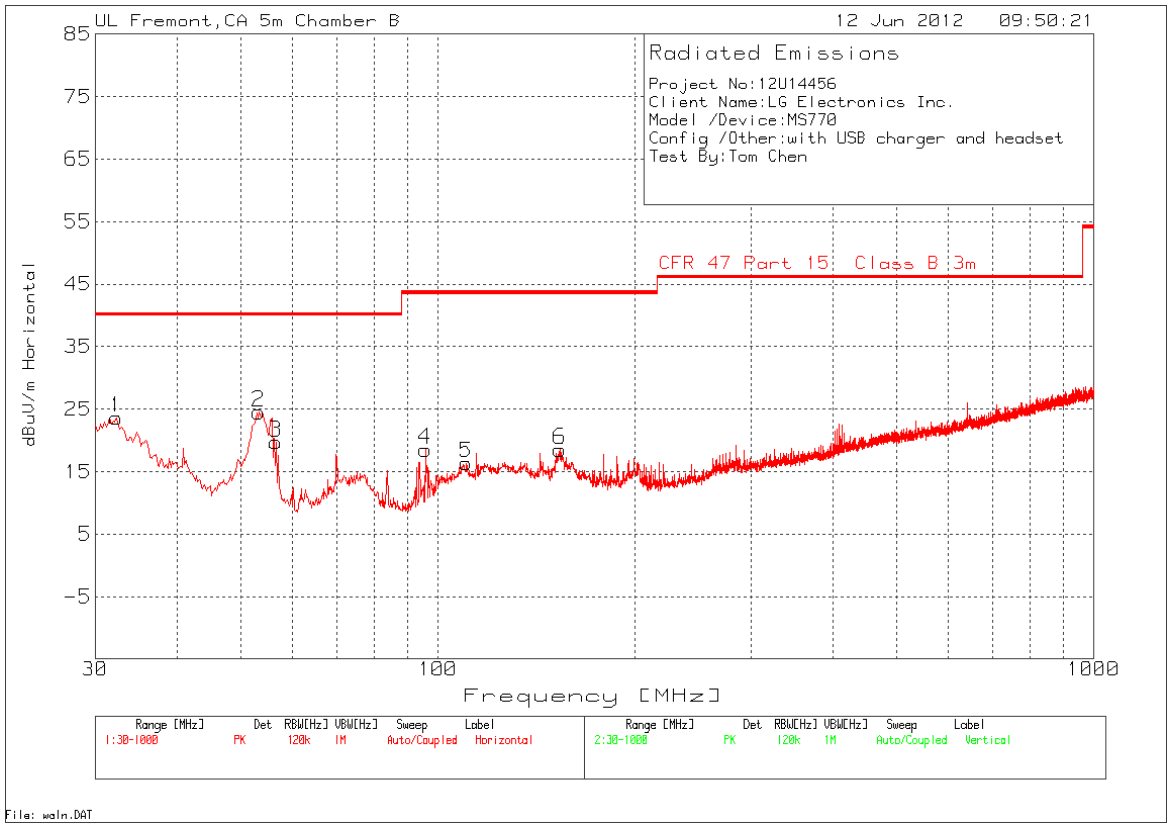
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2402 MHz 8PSK													
4.804	3.0	55.9	33.1	6.3	-34.8	0.0	0.0	60.5	74.0	-13.5	V	P	
4.804	3.0	46.0	33.1	6.3	-34.8	0.0	0.0	40.5	54.0	-13.5	V	A	
4.804	3.0	45.3	33.1	6.3	-34.8	0.0	0.0	49.8	74.0	-24.2	H	P	
4.804	3.0	36.7	33.1	6.3	-34.8	0.0	0.0	31.2	54.0	-22.8	H	A	
2441 MHz 8PSK													
4.882	3.0	43.2	33.1	6.3	-34.8	0.0	0.0	47.9	74.0	-26.1	H	P	
4.882	3.0	34.2	33.1	6.3	-34.8	0.0	0.0	28.9	54.0	-25.1	H	A	
4.882	3.0	51.8	33.1	6.3	-34.8	0.0	0.0	56.4	74.0	-17.6	V	P	
4.882	3.0	43.3	33.1	6.3	-34.8	0.0	0.0	37.9	54.0	-16.1	V	A	
2480 MHz 8PSK													
4.960	3.0	47.3	33.2	6.4	-34.8	0.0	0.0	52.1	74.0	-21.9	V	P	
4.960	3.0	38.6	33.2	6.4	-34.8	0.0	0.0	33.3	54.0	-20.7	V	A	
4.960	3.0	42.1	33.2	6.4	-34.8	0.0	0.0	46.8	74.0	-27.2	V	P	
4.960	3.0	32.7	33.2	6.4	-34.8	0.0	0.0	27.4	54.0	-26.6	V	A	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

7.3. WORST-CASE BELOW 1 GHz

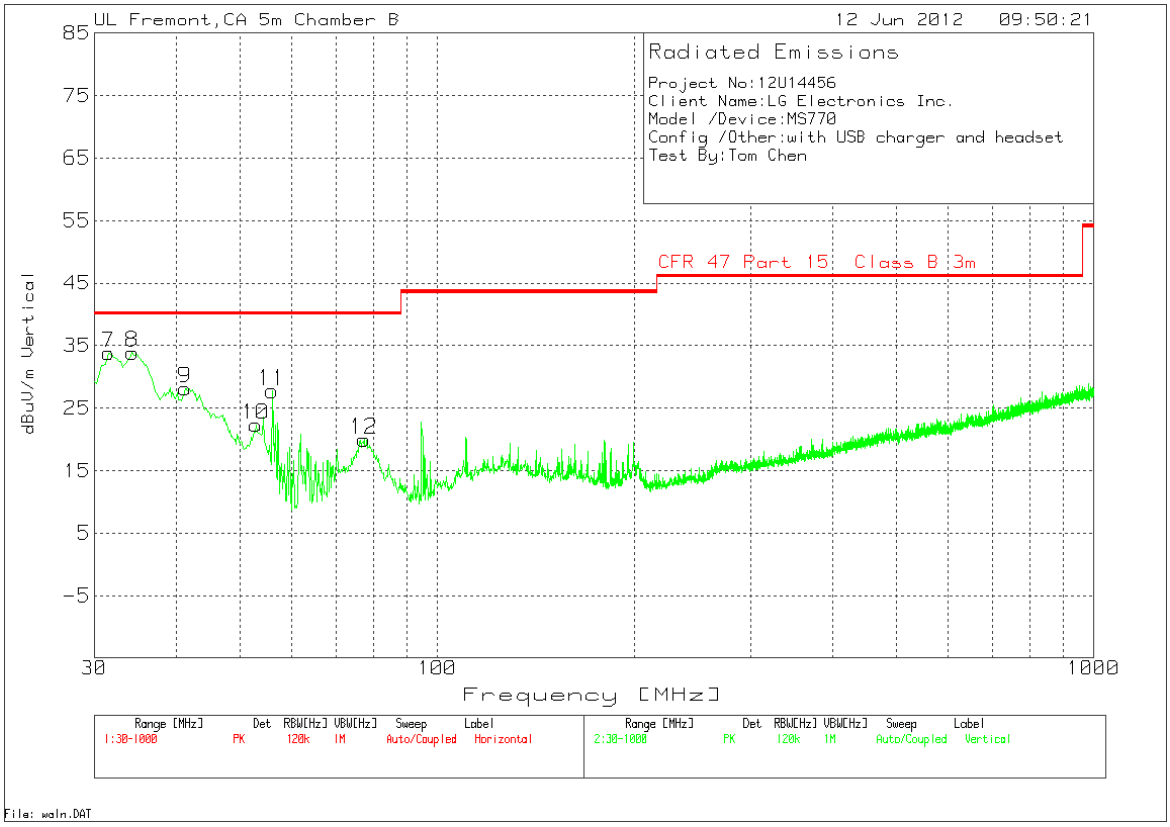
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Project No:12U14456
Client Name:LG Electronics Inc.
Model /Device:MS770
Config /Other:with USB charger and headset
Test By:Tom Chen

Horizontal 30 - 1000MHz

Test Frequency	Meter Reading	Detector	T122 Sunol Bilog.TXT (dB)	5mB Amp Path 30-1000MHz (dB)	dBuV/m	CFR 47 Part 15 Class B 3m	Margin	Polarity
32.3261	33.21	PK	19.6	-29.2	23.61	40	-16.39	Horz
53.2614	46.13	PK	7.4	-29	24.53	40	-15.47	Horz
56.5568	41.39	PK	7.3	-29	19.69	40	-20.31	Horz
95.7134	38.1	PK	9	-28.6	18.5	43.5	-25	Horz
110.4456	32.16	PK	12.7	-28.5	16.36	43.5	-27.14	Horz
153.4792	34	PK	12.5	-28	18.5	43.5	-25	Horz

Vertical 30 - 1000MHz

Test Frequency	Meter Reading	Detector	T122 Sunol Bilog.TXT (dB)	5mB Amp Path 30-1000MHz (dB)	dBuV/m	CFR 47 Part 15 Class B 3m	Margin	Polarity
31.5508	42.82	PK	20.3	-29.3	33.82	40	-6.18	Vert
34.2646	44.88	PK	18.2	-29.2	33.88	40	-6.12	Vert
41.243	44.54	PK	12.8	-29.2	28.14	40	-11.86	Vert
52.8737	43.79	PK	7.5	-29	22.29	40	-17.71	Vert
55.9752	49.56	PK	7.2	-29	27.76	40	-12.24	Vert
77.2982	40.73	PK	8	-28.8	19.93	40	-20.07	Vert

8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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 C63.4.

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

6 WORST EMISSIONS

Project No:12U14456
Client Name:LG Electronics Inc.
Model/Device:MS770 / USB charger, Headset
Test Volt/Freq:115 VAC / 60 Hz
Test By:Tom Chen

Line-L1 .15 - 30MHz

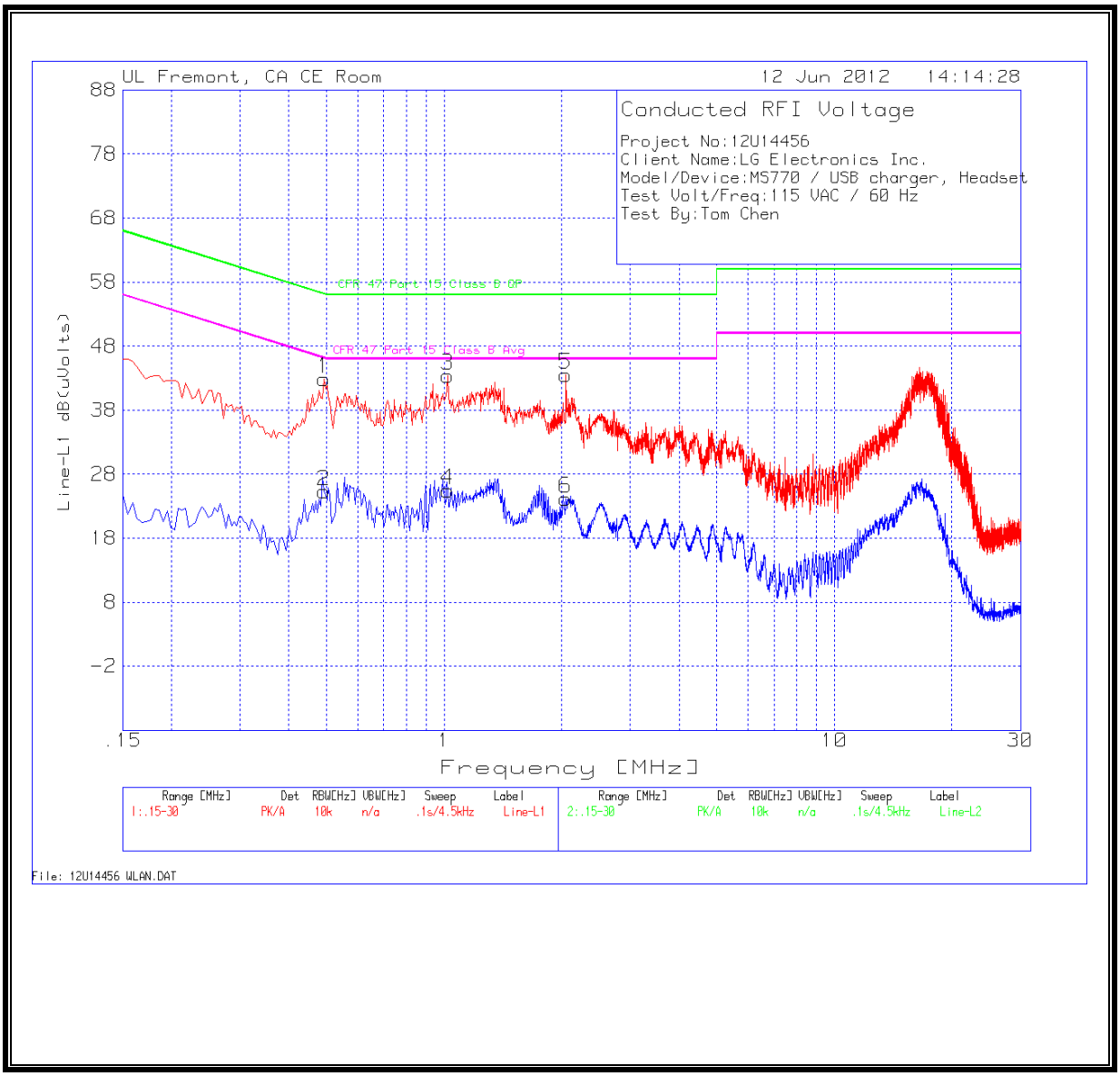
Test Frequency	Meter Reading	Detector	T24 IL L1.TXT (dB)	LC Cables 1&3.TXT (dB)	dB(uVolts)	CFR 47 Part 15 Class B QP	Margin	CFR 47 Part 15 Class B Avg	Margin
0.492	42.82	PK	0.1	0	42.92	56.1	-13.18	-	-
0.492	25.18	Av	0.1	0	25.28	-	-	46.1	-20.82
1.023	43.27	PK	0.1	0	43.37	56	-12.63	-	-
1.023	25.33	Av	0.1	0	25.43	-	-	46	-20.57
2.049	43.29	PK	0.1	0.1	43.49	56	-12.51	-	-
2.049	23.93	Av	0.1	0.1	24.13	-	-	46	-21.87

Line-L2 .15 - 30MHz

Test Frequency	Meter Reading	Detector	T24 IL L2.TXT (dB)	LC Cables 2&3.TXT (dB)	dB(uVolts)	CFR 47 Part 15 Class B QP	Margin	CFR 47 Part 15 Class B Avg	Margin
0.4965	39.39	PK	0.1	0	39.49	56.1	-16.61	-	-
0.4965	21.18	Av	0.1	0	21.28	-	-	46.1	-24.82
1.347	37.11	PK	0.1	0.1	37.31	56	-18.69	-	-
1.347	18.57	Av	0.1	0.1	18.77	-	-	46	-27.23
2.553	32.04	PK	0.1	0.1	32.24	56	-23.76	-	-
2.553	15.32	Av	0.1	0.1	15.52	-	-	46	-30.48

Project No:12U14456
Client Name:LG Electronics Inc.
Model/Device:MS770 / USB charger, Headset
Test Volt/Freq:115 VAC / 60 Hz
Test By:Tom Chen

LINE 1 RESULTS



LINE 2 RESULTS