



**FCC CFR47 PART 15 SUBPART C
CLASS II PERMISSIVE CHANGE**

CERTIFICATION TEST REPORT

FOR

**CELL PHONE WITH GSM/CDMA/WCDMA/LTE+BT LE+802.11ABGN (HT20) + NFC
WITH WIRELESS BACK COVER**

**MODEL NUMBER: LG-VS930 and VS930
FCC ID: ZNFVS930**

REPORT NUMBER: 12U14433-5

ISSUE DATE: JUNE 07, 2012

Prepared for
**LG ELECTRONICS MOBILECOMM U.S.A., INC.
1000 SYLVAN AVE.
ENGLEWOOD CLIFFS, NJ
UNITED STATES 07632**

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
	06/07/12	Original	T. LEE

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LG ELECTRONICS MOBILECOMM U.S.A., INC.
1000 SYLVAN AVE.
ENGLEWOOD CLIFFS, NJ
UNITED STATES 07632

EUT DESCRIPTION: CELL PHONE WITH GSM/CDMA/WCDMA/LTE+BT
LE+802.11ABGN (HT20) WITH WIRELESS BACK COVER

MODEL: LG-VS930 and VS930

SERIAL NUMBER: 990000760004152

DATE TESTED: JUNE 4~7, 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:

Tested By:



TIM LEE
STAFF ENGINEER
UL CCS



TOM CHEN
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, 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 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:

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

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 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 Cell Phone with GSM/CDMA/WCDMA/LTE+BT LE+802.11abgn (HT20) + NFC with Wireless Back Cover

5.2. MAXIMUM OUTPUT POWER

The measured average power values were within ± 0.5 dB of the original values. Refer to original report number "12U14331-9 FCC IC BLE 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.

- Changed BT/WIFI matching value.
- Changed Shield CAN structure.
- Changed minor HW for improvement of durability and reliability

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA (Planar Inverted F Antenna) with a maximum peak gain of -2.44dBi.

5.5. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was VS930_0311

The test utility software used during testing was FCC Test - LG.

The firmware used during testing was 3.0.8.00001_g114383

5.6. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1 GHz and power line conducted emissions were performed with the EUT set to the channel with highest output power.

For the fundamental investigation, since the EUT is a portable device that has three orientations; X, Y and Z orientations have been investigated, also with AC/DC adapter, and earphone, and the worst case was found to be at Y orientation with AC adapter and earphone.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

STANDARD AND INDUCTIVE COVER

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	Manufacturer	Model	Serial Number
AC ADAPTER	LG ELECTRONICS	MCS-01WT	TA1Z0000522
HEADSET	LG ELECTRONICS	NA	N/A

INDUCTIVE CHARGER WITH INDUCTIVE COVER

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	Manufacturer	Model	Serial Number
AC ADAPTER	LG ELECTRONICS	WCAD01WT	TA120012180
HEADSET	LG ELECTRONICS	NA	N/A
INDUCTIVE CHARGER PAD	LG ELECTRONICS	WCP-700	A1108WP000002

I/O CABLES

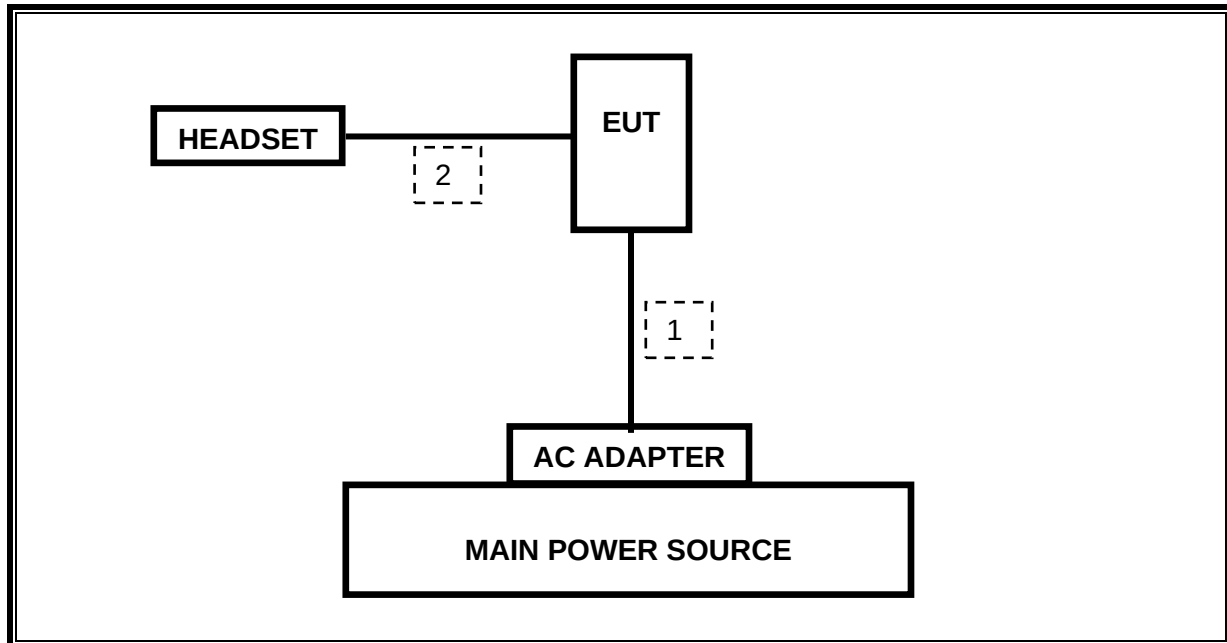
STANDARD AND INDUCTIVE COVER

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	DC	1	MINI USB	UN-SHELEDDED	1.0m	N/A
2	AUDIO	1	MINI JACK	UN-SHELEDDED	1.0m	Volume control on cable

TEST SETUP

SETUP DIAGRAM FOR TESTS

STANDARD AND INDUCTIVE COVER



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	C01063	07/12/12
Antenna, Horn, 18 GHz	EMCO	3115	C00872	06/29/12
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	07/16/12
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	11/11/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/12/12
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESC1 7	1000741	07/06/12
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/12
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
Peak Power Meter	Agilent / HP	E4416A	C00963	03/22/13
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/12
Bluetooth Test	R&S	CBT	NA	05/01/13
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	07/28/12

7. RADIATED TEST RESULTS

7.1. 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. 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.

For 2.4 GHz band, 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.

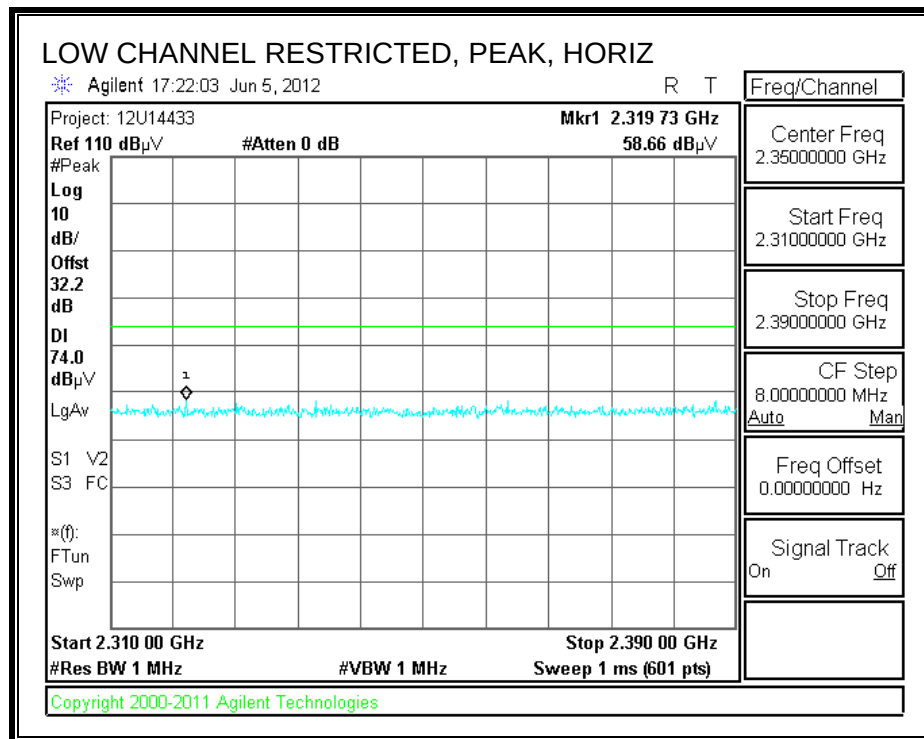
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

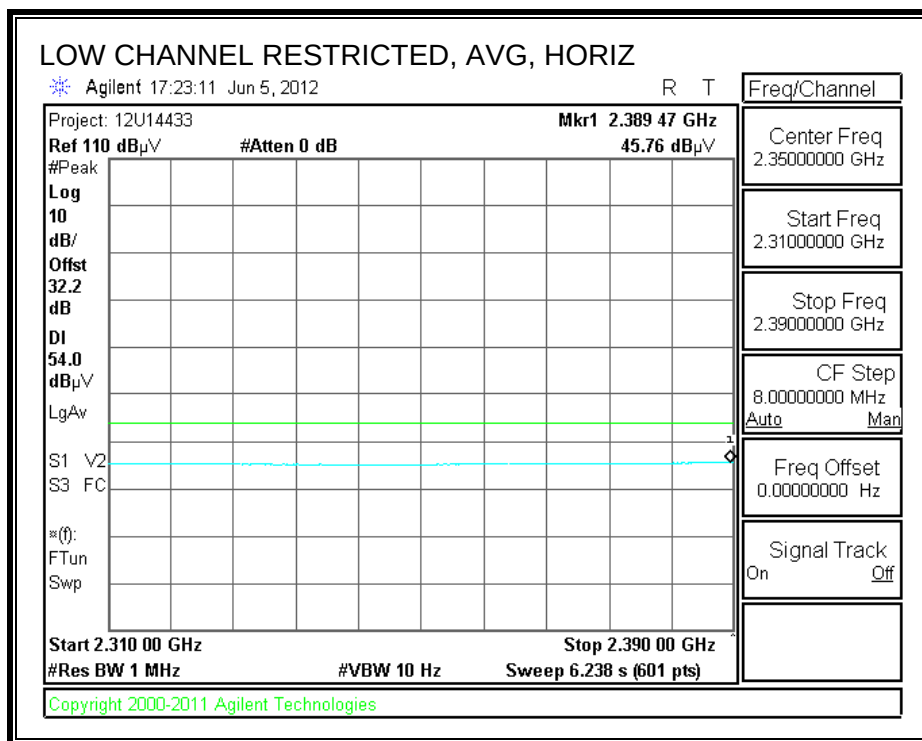
7.2. TRANSMITTER ABOVE 1 GHz

STANDARD COVER

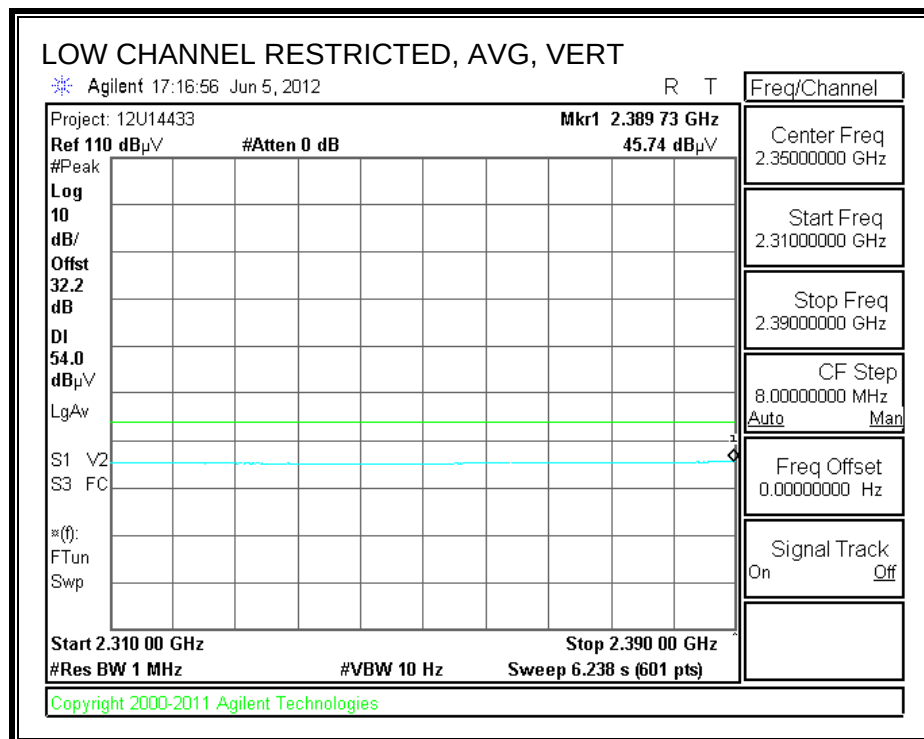
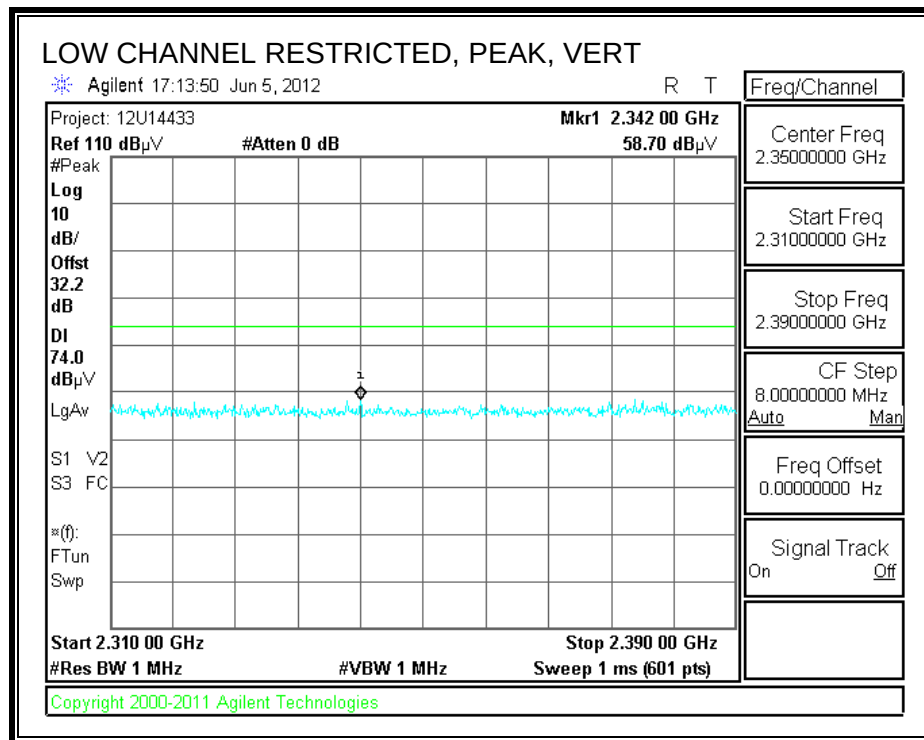
Note: Based on preliminary testing, it was determined that standard cover was the worst case from the 3 configurations of standard cover, inductive cover, and inductive cover with charger. Therefore, only standard cover data is presented.

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

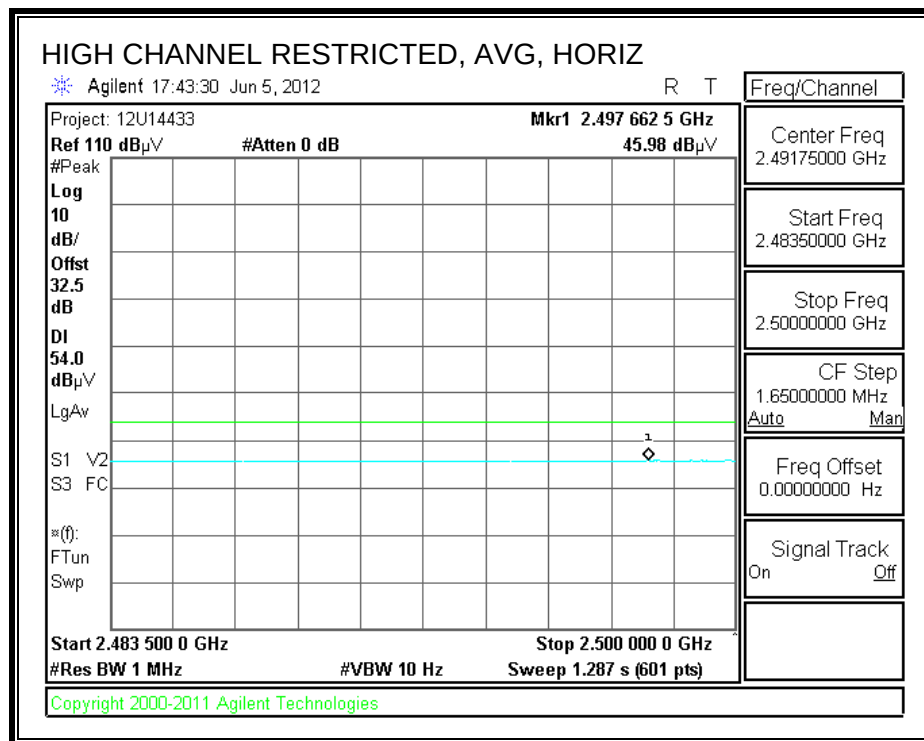
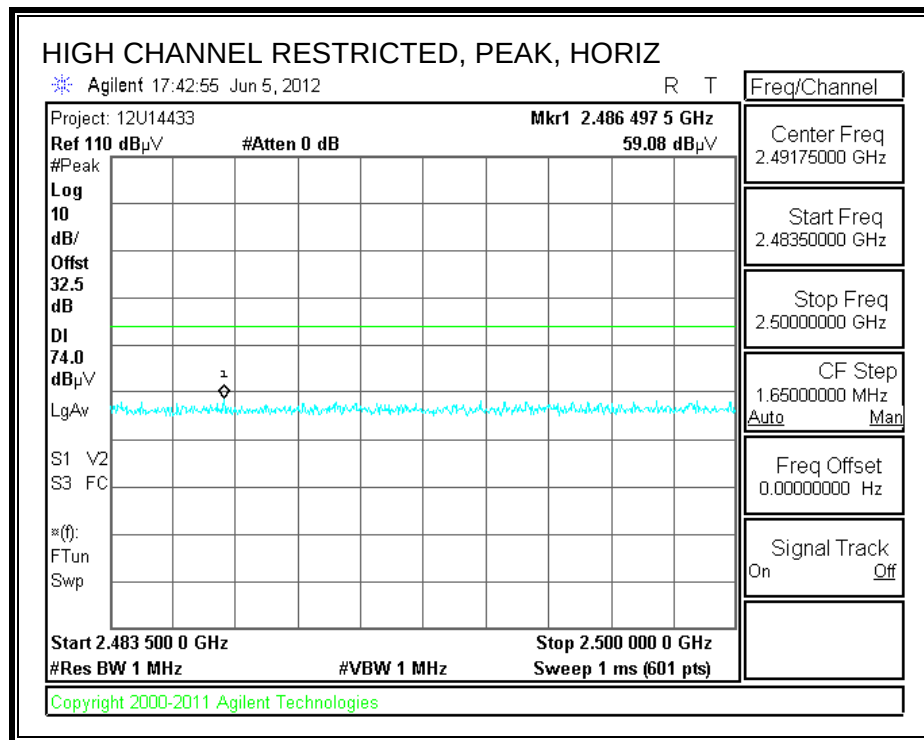




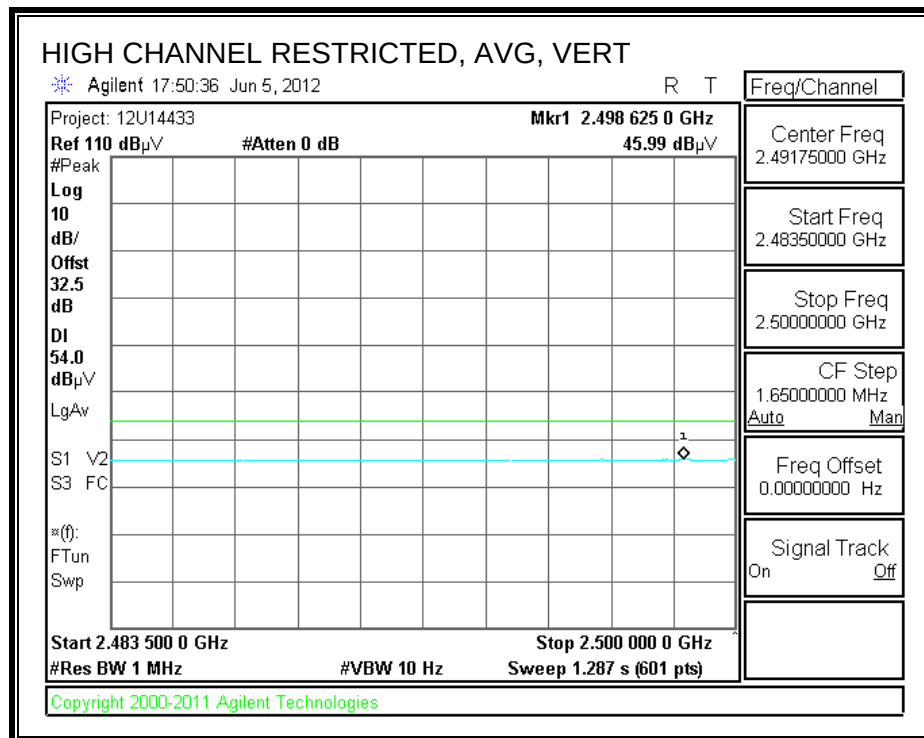
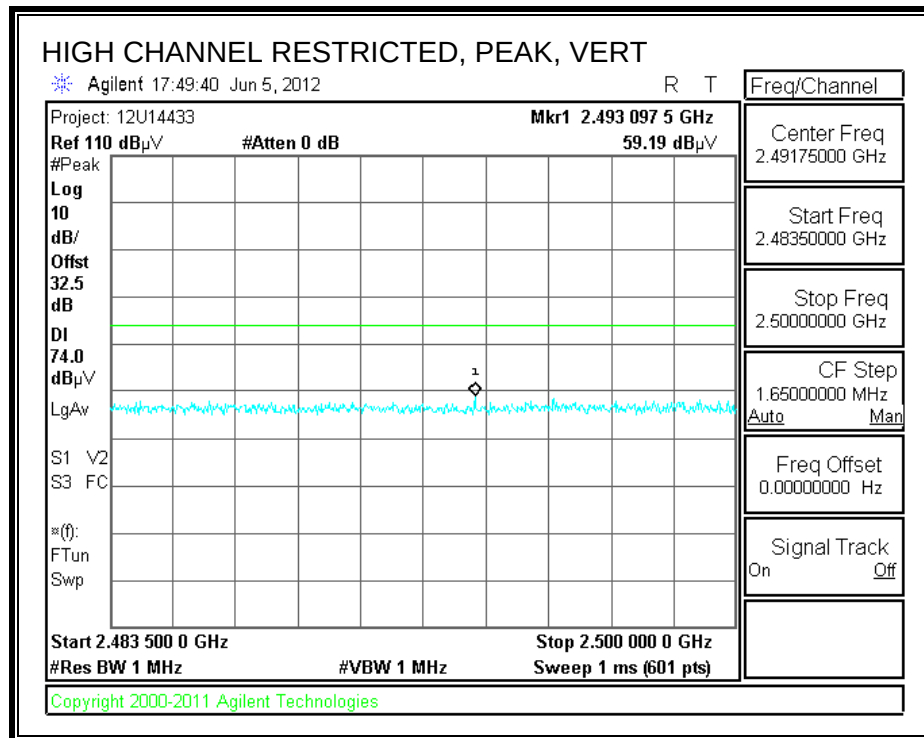
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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:
Date: Tom Chen
Project #: 12U14433
Company: LG Electronics Inc.
Test Target: FCC Class B
Mode Oper: Bluetooth LE, 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													
4.804	3.0	38.7	33.1	6.3	-34.8	0.0	0.0	43.3	74.0	-30.8	V	P	
4.804	3.0	25.7	33.1	6.3	-34.8	0.0	0.0	30.2	54.0	-23.8	V	A	
4.804	3.0	39.0	33.1	6.3	-34.8	0.0	0.0	43.5	74.0	-30.5	H	P	
4.804	3.0	25.6	33.1	6.3	-34.8	0.0	0.0	30.2	54.0	-23.8	H	A	
2440 MHz													
4.880	3.0	48.2	33.1	6.3	-34.8	0.0	0.0	52.8	74.0	-21.2	H	P	
4.880	3.0	28.0	33.1	6.3	-34.8	0.0	0.0	32.7	54.0	-21.3	H	A	
4.880	3.0	46.3	33.1	6.3	-34.8	0.0	0.0	50.9	74.0	-23.1	V	P	
4.880	3.0	27.6	33.1	6.3	-34.8	0.0	0.0	32.2	54.0	-21.8	V	A	
2480 MHz													
4.960	3.0	47.7	33.2	6.4	-34.8	0.0	0.0	52.4	74.0	-21.6	V	P	
4.960	3.0	28.0	33.2	6.4	-34.8	0.0	0.0	32.8	54.0	-21.2	V	A	
4.960	3.0	49.7	33.2	6.4	-34.8	0.0	0.0	54.5	74.0	-19.5	H	P	
4.960	3.0	28.4	33.2	6.4	-34.8	0.0	0.0	33.2	54.0	-20.8	H	A	

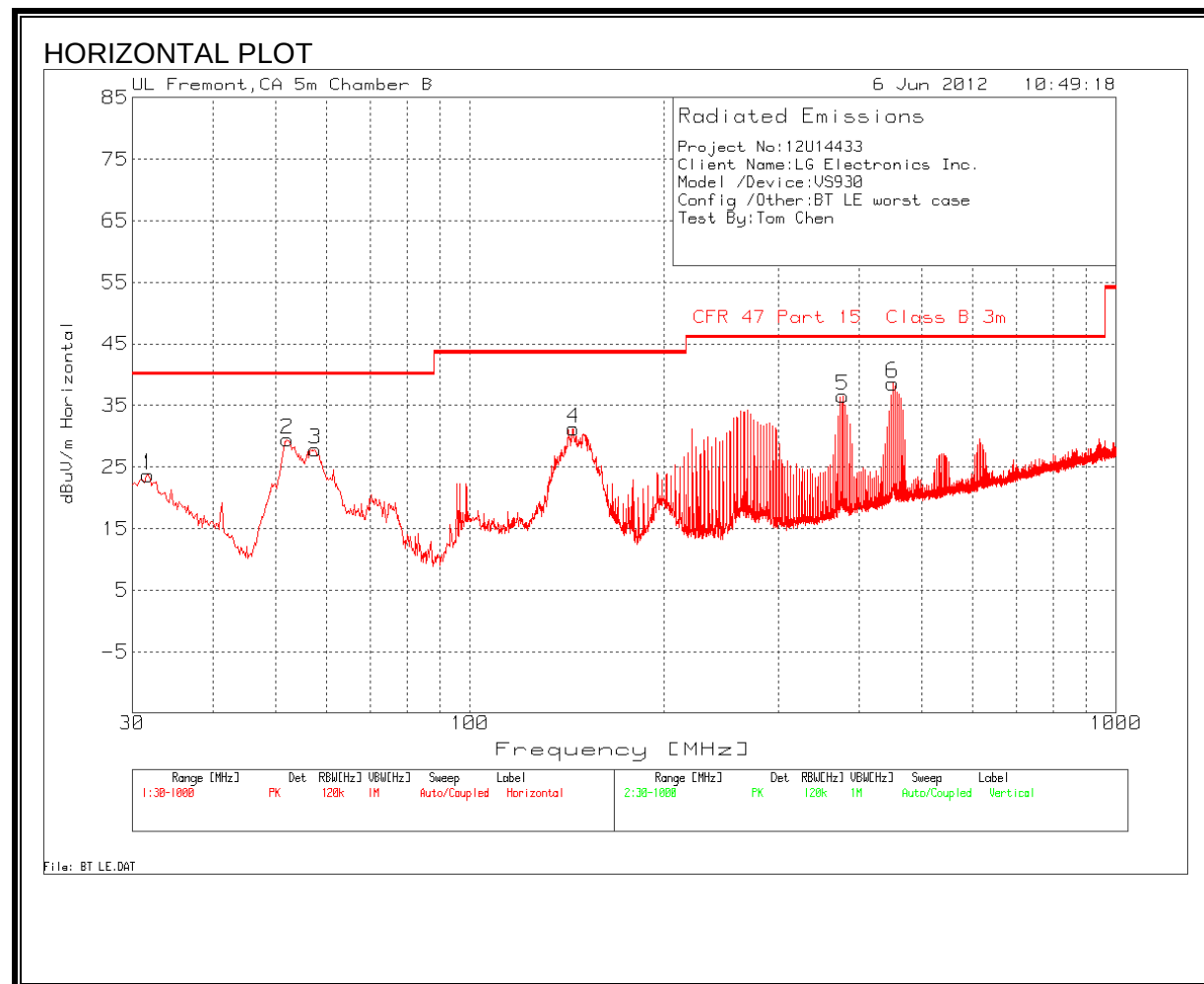
Rev. 4.1.2.7

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

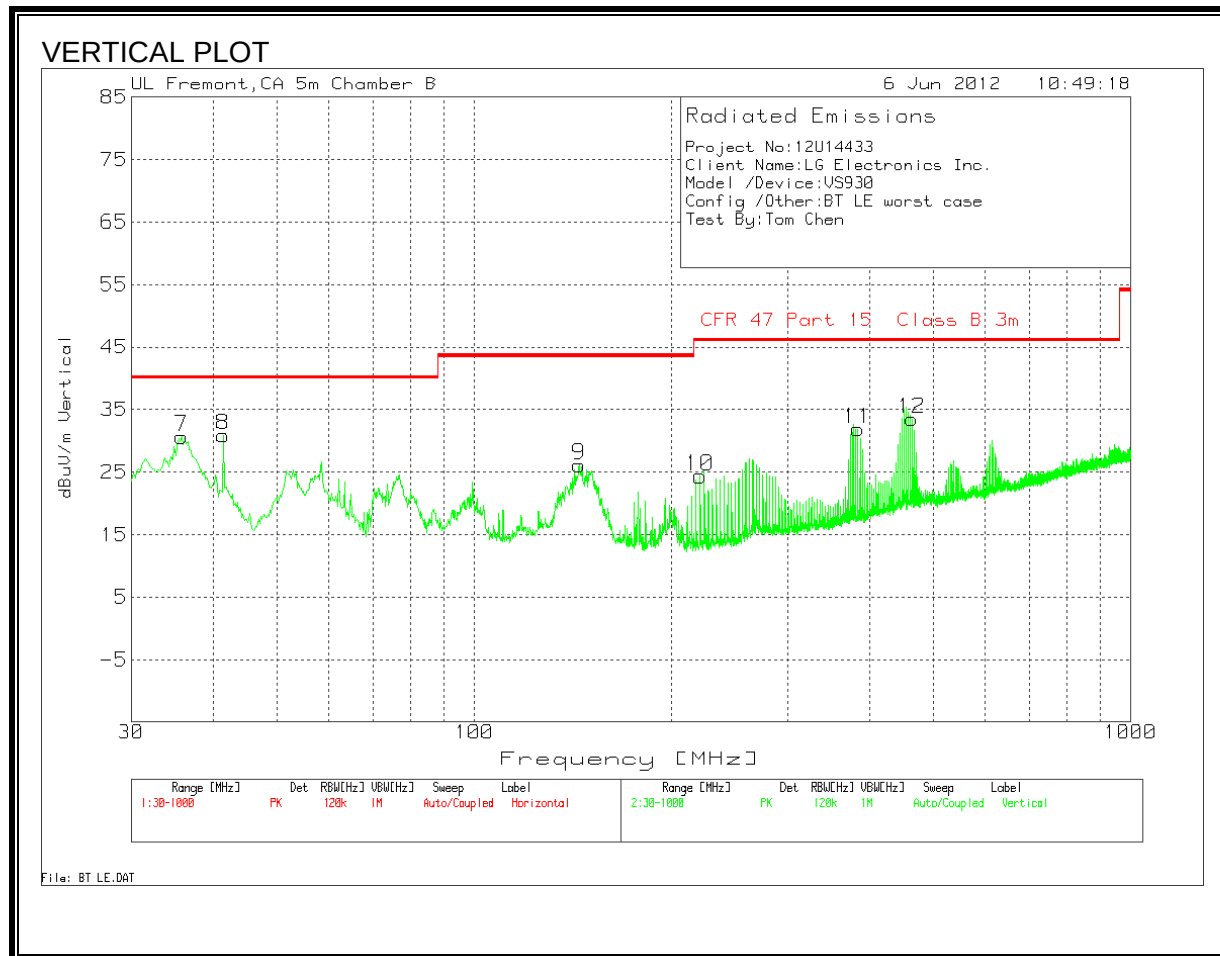
WORST-CASE BELOW 1 GHz

STANDARD COVER

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



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



HORIZONTAL AND VERTICAL DATA

Project No:12U14433								
Client Name:LG Electronics Inc.								
Model /Device:VS930								
Config /Other:BT LE worst case								
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
31.7446	32.77	PK	20.1	-29.2	23.67	40	-16.33	Horz
52.0983	50.86	PK	7.6	-29	29.46	40	-10.54	Horz
57.526	49.52	PK	7.3	-29	27.82	40	-12.18	Horz
144.5624	46.52	PK	12.8	-28.1	31.22	43.5	-12.28	Horz
377.5639	48.34	PK	15	-26.8	36.54	46	-9.46	Horz
451.225	48.67	PK	16.8	-26.9	38.57	46	-7.43	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
35.8153	42.91	PK	16.9	-29.2	30.61	40	-9.39	Vert
41.4369	47.39	PK	12.7	-29.2	30.89	40	-9.11	Vert
144.3685	41.39	PK	12.8	-28.1	26.09	43.5	-17.41	Vert
220.7434	41.06	PK	10.7	-27.4	24.36	46	-21.64	Vert
383.9608	43.68	PK	15	-26.8	31.88	46	-14.12	Vert
464.0188	43.2	PK	17.2	-26.9	33.5	46	-12.5	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

ANSI C63.4

RESULTS

6 WORST EMISSIONS

STANDARD COVER

Project No:12U14433									
Client Name:LG Electronics Inc.									
Model/Device:VS930 BT LE / NFC cover									
Test Volt/Freq:115VAC / 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
0.1545	47.02	PK	0.1	0	47.12	65.8	-18.68	-	-
0.1545	26.91	Av	0.1	0	27.01	-	-	55.8	-28.79
0.465	51.84	QP	0.1	0	51.94	56.6	-4.66	-	-
0.465	45.21	Av	0.1	0	45.31	-	-	46.6	-1.29
2.022	44.76	PK	0.1	0.1	44.96	56	-11.04	-	-
2.022	28.3	Av	0.1	0.1	28.5	-	-	46	-17.5
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
0.276	39.89	PK	0.1	0	39.99	60.9	-20.91	-	-
0.276	22.29	Av	0.1	0	22.39	-	-	50.9	-28.51
0.465	51.94	PK	0.1	0	52.04	56.6	-4.56	-	-
0.465	38.39	Av	0.1	0	38.49	-	-	46.6	-8.11
2.049	42.34	PK	0.1	0.1	42.54	56	-13.46	-	-
2.049	21.15	Av	0.1	0.1	21.35	-	-	46	-24.65

INDUCTIVE COVER

Project No:12U14433									
Client Name:LG Electronics Inc.									
Model/Device:VS930 BT LE, worst case									
Test Volt/Freq:115 VAC / 60 Hz									
Test By:Tom Chen									
Line-L1 .15 - 30MHz									

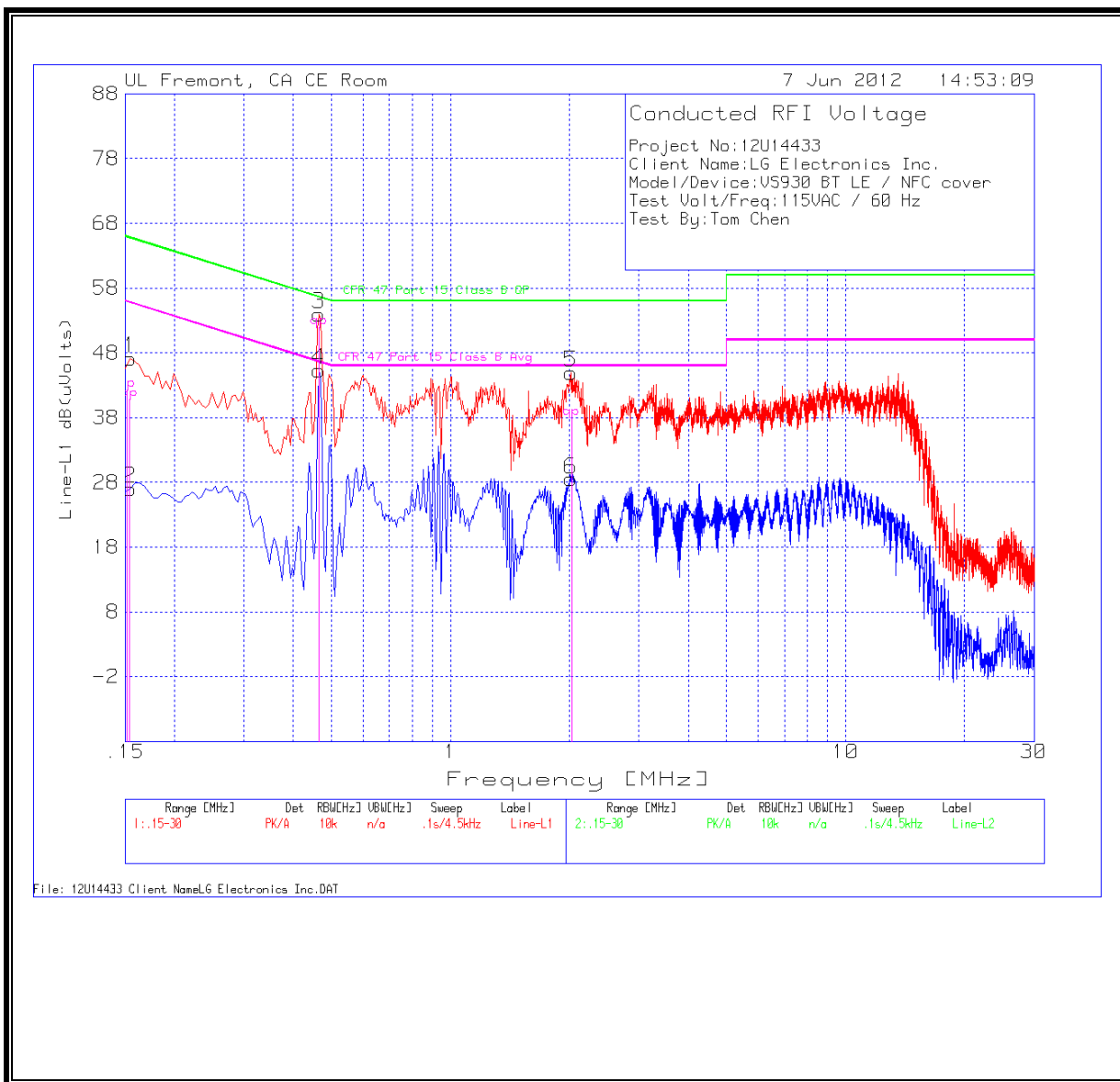
Test Frequency	Meter Reading	Detector	T24 IL L1.TXT (dB)	LC Cables 1&3.TXT (dB)	dB(uVolts)	CFR 47 Part 15 Class B QP	Margin	CFR 47 Part 15 Class B Avg	Margin
0.1545	54.26	PK	0.1	0	54.36	65.8	-11.44	-	-
0.1545	30.09	Av	0.1	0	30.19	-	-	55.8	-25.61
0.467	51.54	QP	0.1	0	51.64	56.57	-4.93	-	-
0.465	46.36	Av	0.1	0	46.46	-	-	46.6	-0.14
2.1525	47.81	PK	0.1	0.1	48.01	56	-7.99	-	-
2.1525	26.94	Av	0.1	0.1	27.14	-	-	46	-18.86

Line-L2 .15 - 30MHz									
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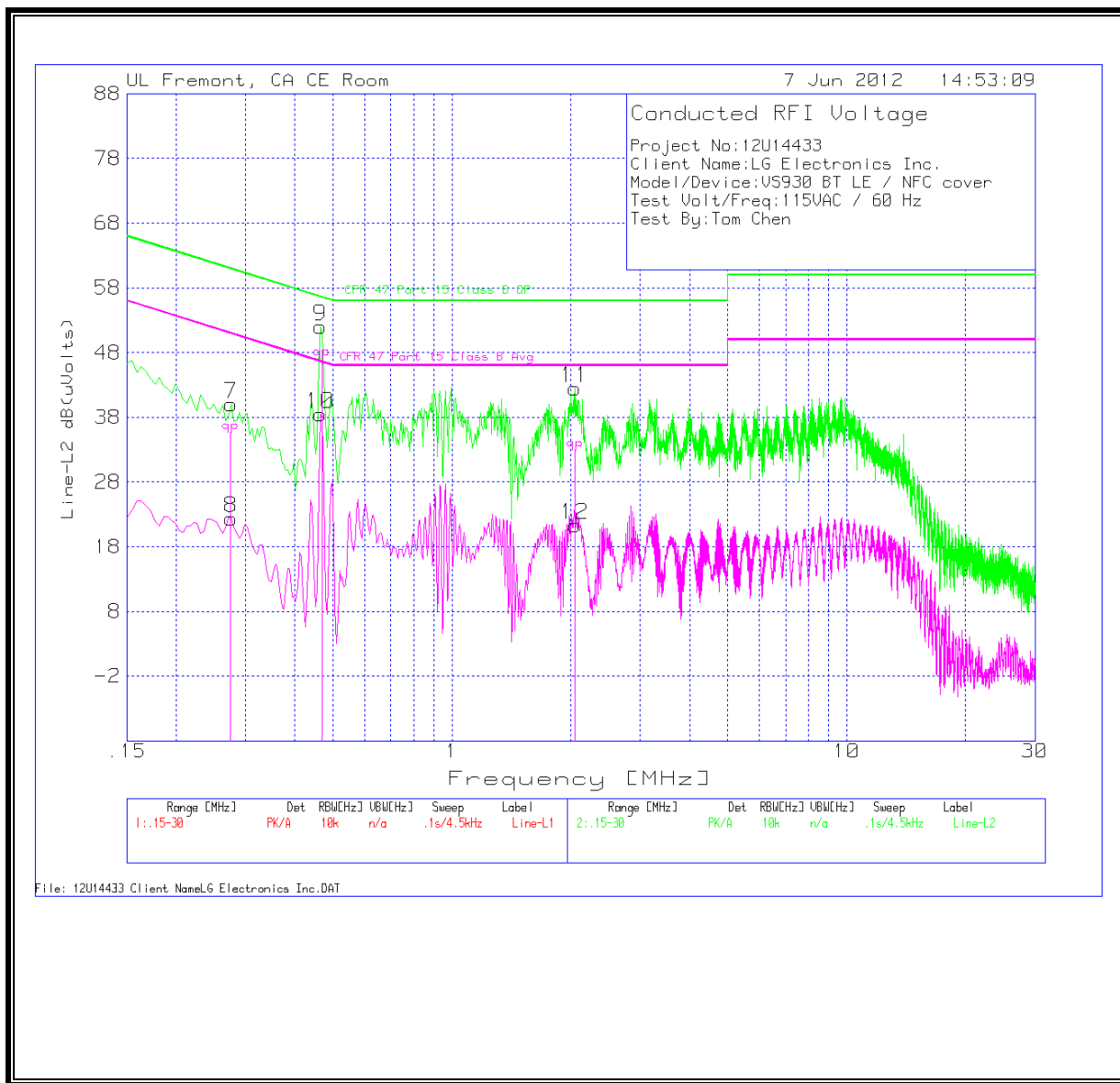
Test Frequency	Meter Reading	Detector	T24 IL L2.TXT (dB)	LC Cables 2&3.TXT (dB)	dB(uVolts)	CFR 47 Part 15 Class B QP	Margin	CFR 47 Part 15 Class B Avg	Margin
0.1545	45.1	PK	0.1	0	45.2	65.8	-20.6	-	-
0.1545	22.66	Av	0.1	0	22.76	-	-	55.8	-33.04
0.4695	51	PK	0.1	0	51.1	56.5	-5.4	-	-
0.4695	37.64	Av	0.1	0	37.74	-	-	46.5	-8.76
1.8105	39.3	PK	0.1	0.1	39.5	56	-16.5	-	-
1.8105	21.9	Av	0.1	0.1	22.1	-	-	46	-23.9

STANDARD COVER

LINE 1 RESULTS

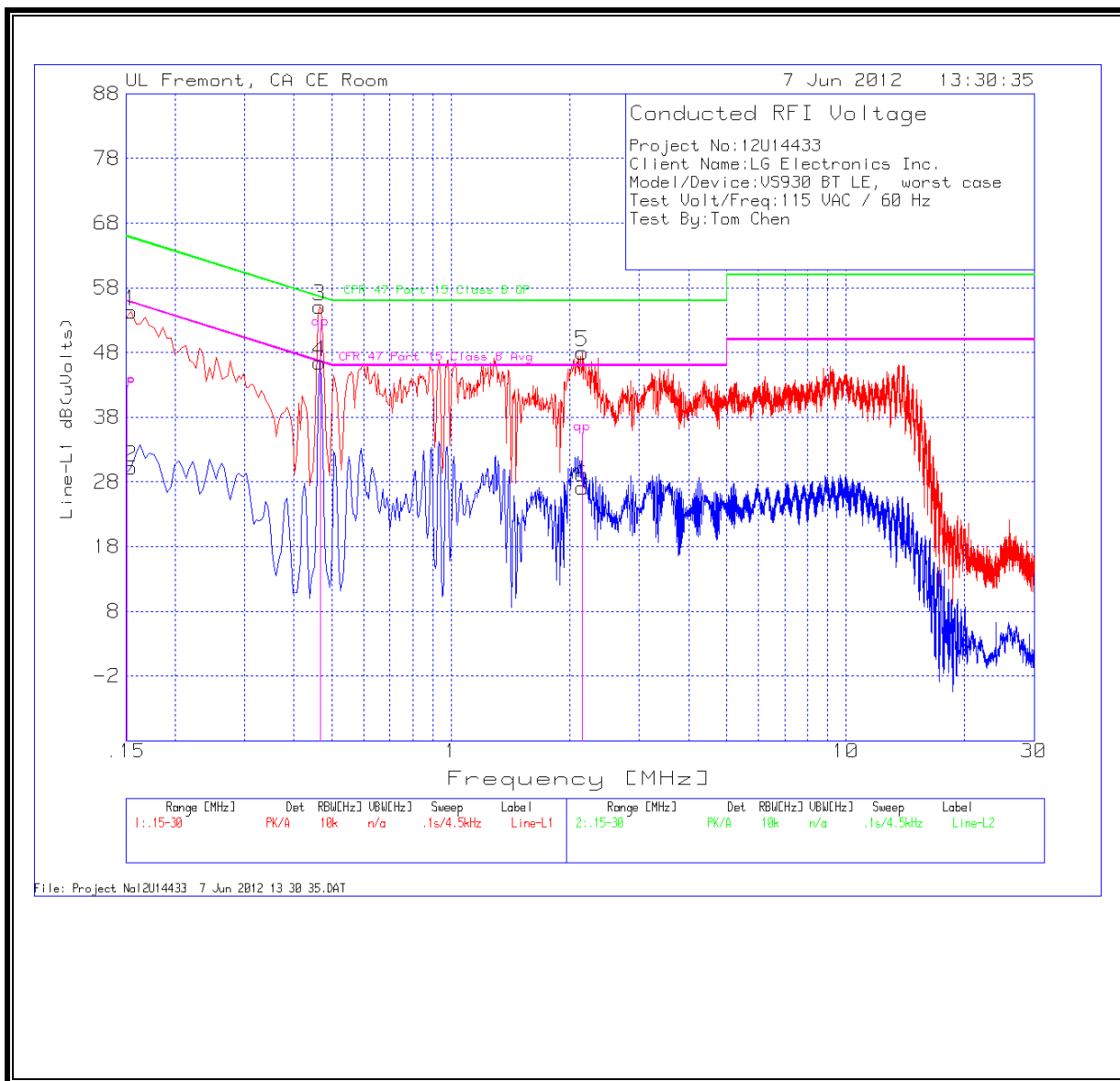


LINE 2 RESULTS



INDUCTIVE COVER

LINE 1 RESULTS



LINE 2 RESULTS

