



**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

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

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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) W/ WIRELESS BACK COVER

MODEL: LG-VS930 and VS930

SERIAL NUMBER: 990000760007429

DATE TESTED: JNUE 4~7, 2012

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	Pass
INDUSTRY CANADA RSS-210 Issue 8, Annex 2	Pass
INDUSTRY CANADA RSS-GEN Issue 3	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 C63.10-2009, 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:

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

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 smart phone that features GSM, CDMA, WCDMA, and LTE It also supports BLUETOOTH, WLAN and NFC operating at 13.56MHz.

5.2. MAXIMUM OUTPUT POWER

The transmitter maximum E-field at 10m distance is 21.3 dBuV/m

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. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was VS930_0311

The test utility software used during testing was NFC FCC Test.

The firmware used during testing was 3.0.8.00001_g114383

5.5. MODEL DIFFERNECE

Model LS-VS930 is identical to Model VS930 except for model designation.

5.6. WORST-CASE CONFIGURATION AND MODE

There are three configurations were tested, EUT with Standard cover, EUT with inductive cover, and EUT with inductive charger.

Since the EUT is a portable device, an X, Y, and Z orientations, and worst orientations among X, Y, and Y with Headset and/or AC Adapter were investigated to determine the worst case. After the investigation the worst case turned out to be Y-Orientation with an AC Adapter.

5.7. MODIFICATIONS

No modifications were made during testing.

5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT (RF RADIATED TEST)

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	LG	MCS-01WT	TA1Z0000522	DoC
AC Adapter	LG	WCA-D01WT	TA120012180	DoC
Headset	LG	NA	NA	NA
Inductive Charger	LG	WCP-700	A1201WP000026	NA

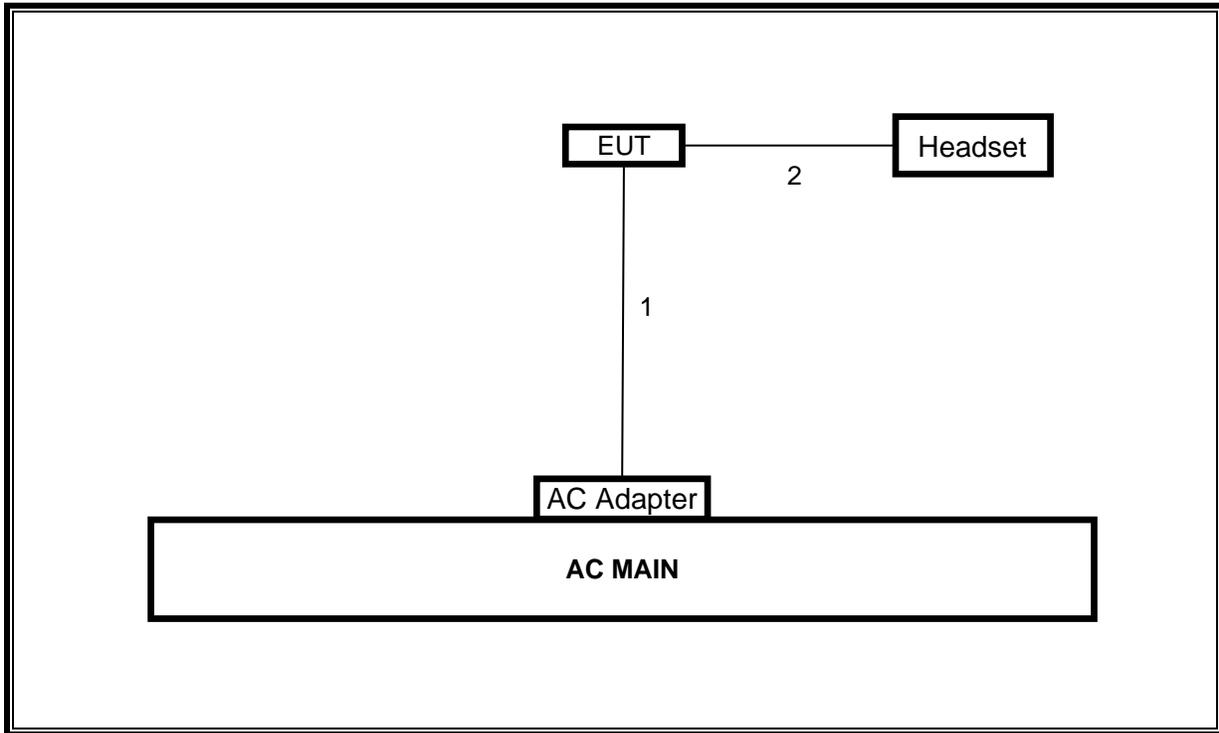
I/O CABLES (RF RADIATED TEST)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	DC	1	USB	Un-shielded	1m	NA
2	DC	1	DC	Un-shielded	1.5m	For Inductive Charger
3	Jack	1	Earphone	Un-shielded	1.5m	NA

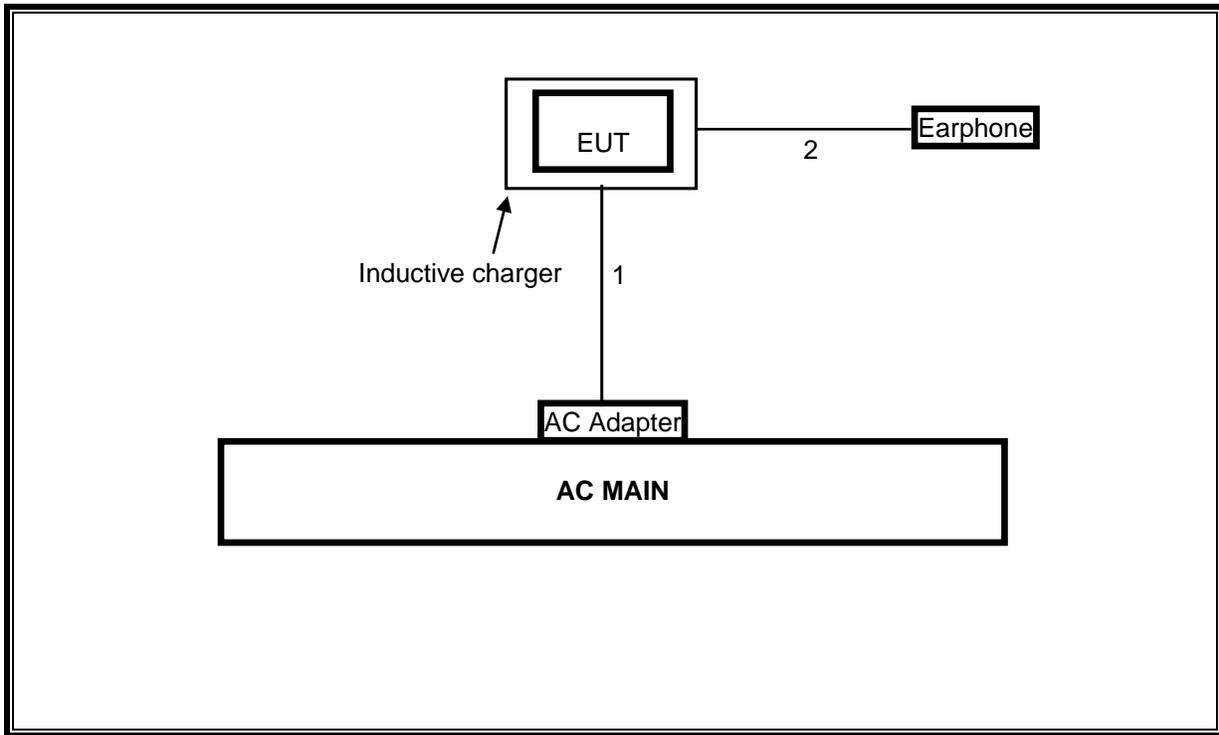
TEST SETUP

The EUT is a stand-alone device. A link is established between the EUT and the communication test set

INDUCTIVE/STANDARD COVER SETUP DIAGRAM FOR RF RADIATED TESTS



INDUCTIVE COVER + CHARGER SETUP DIAGRAM FOR RF RADIATED 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
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	09/02/12
ESA-E Spectrum Analyzer, 9kHz-26.5 GHz	Agilent / HP	E4407B	C01098	03/29/13
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	08/11/12
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/19/13
Antenna, Loop, 30 MHz	EMCO	6502	C00593	02/10/13
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01171	07/16/12
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	11/11/12
LISN, 30 MHz	FCC	50/250-25-2	C00626	12/13/12

7. RADIATED EMISSION TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMIT

§15.225

IC RSS-210, Section 2.6 (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 C63.4

The EUT is an intentional radiator that incorporates a digital device. The highest fundamental frequency generated or used in the device is 19.2 MHz. The frequency range was investigated from 30 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater (1000MHz)

RESULTS

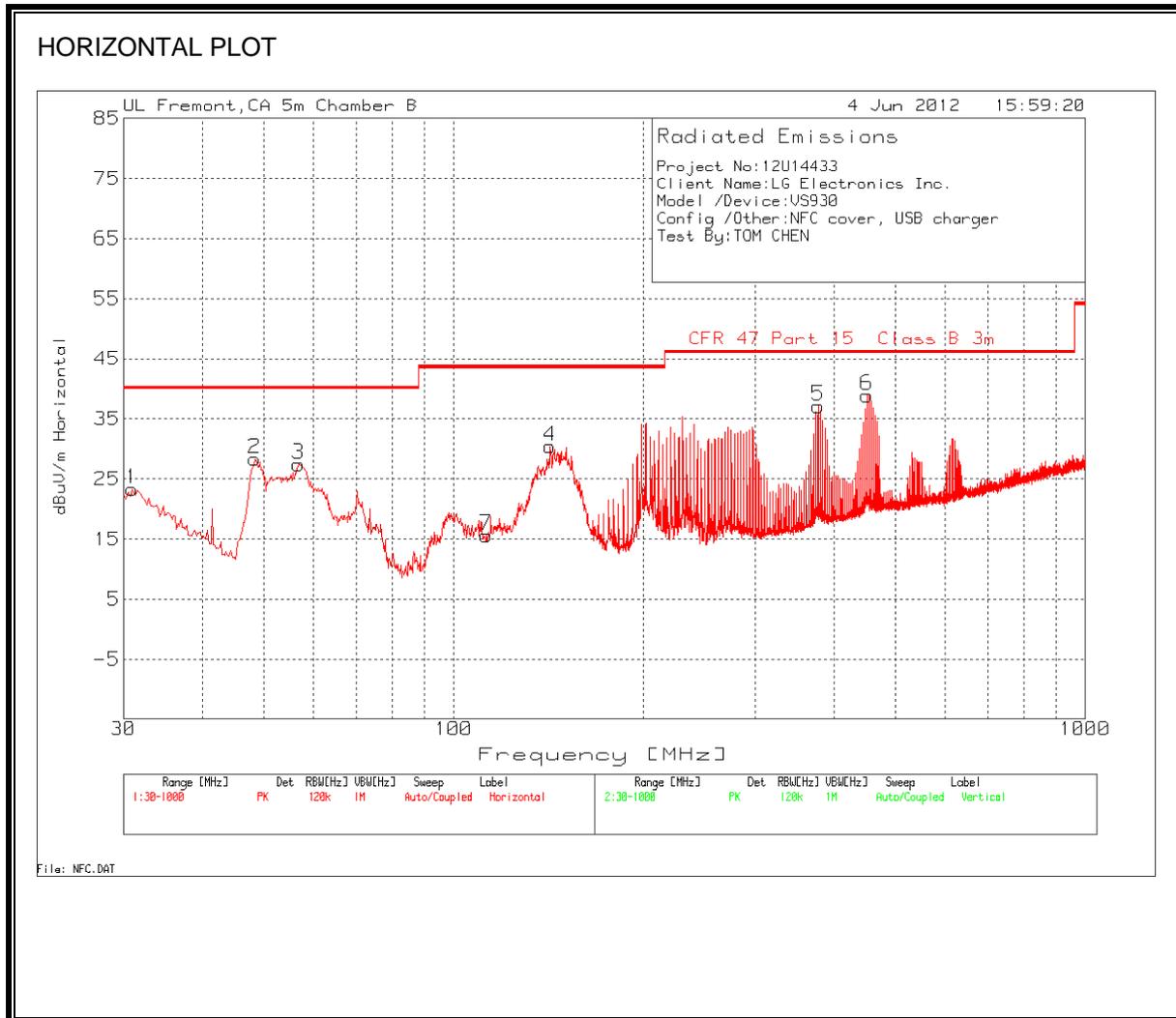
No non-compliance noted:

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

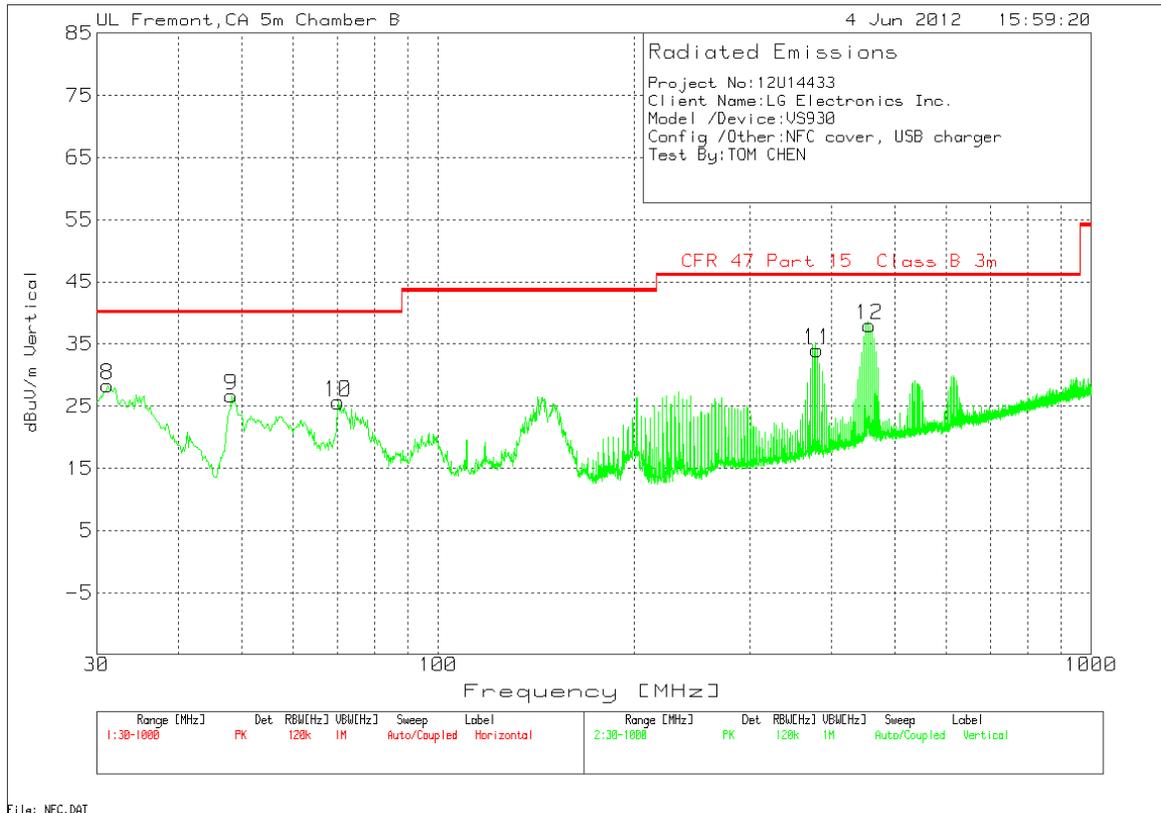
FCC Part 15, Subpart B & C													10 Meter Distance Measurement At Open Field	
Company: LG Electronics Inc.														
Project #: 12U14433														
Model #: VS930														
Tester: Tom Chen														
Date: 6/7/2012														
Frequency (MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	AF (dB/m)	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		
Standard cover														
Y POS Loop Antenna Face On:														
13.56	28.17		N/A	10.56	-19.08	19.64	N/A	84.00	N/A	-64.4	N/A	Fundamental @ 10m Dist		
Loop Antenna Face Off:														
13.56	29.17		N/A	10.56	-19.08	20.64	N/A	84.00	N/A	-63.4	N/A	Fundamental @ 10m Dist		
Z POS Loop Antenna Face On:														
13.56	29.83		N/A	10.56	-19.08	21.30	N/A	84.00	N/A	-62.7	N/A	Fundamental @ 10m Dist		
Loop Antenna Face Off:														
13.56	25.33		N/A	10.56	-19.08	16.80	N/A	84.00	N/A	-67.2	N/A	Fundamental @ 10m Dist		
Inductive Cover														
Y pos Inductive cover														
Loop Antenna Face On:														
13.56	21.33		N/A	10.56	-19.08	12.80	N/A	84.00	N/A	-71.2	N/A	Fundamental @ 10m Dist		
Loop Antenna Face Off:														
13.56	26.17		N/A	10.56	-19.08	17.64	N/A	84.00	N/A	-66.4	N/A	Fundamental @ 10m Dist		
Inductive Cover + Charger														
X pos Inductive cover & charger														
Loop Antenna Face On:														
13.56	25.67		N/A	10.56	-19.08	17.14	N/A	84.00	N/A	-66.9	N/A	Fundamental @ 10m Dist		
Loop Antenna Face Off:														
13.56	28		N/A	10.56	-19.08	19.47	N/A	84.00	N/A	-64.5	N/A	Fundamental @ 10m Dist		
* 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														

7.1.2. TX SPURIOUS EMISSION 30 TO 1000 MHz (HORIZONTAL)

EUT WITH STANDARD COVER



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Project No:12U14433								
Client Name:LG Electronics Inc.								
Model /Device:VS930								
Config /Other:NFC cover, USB charger								
Test By:TOM CHEN								

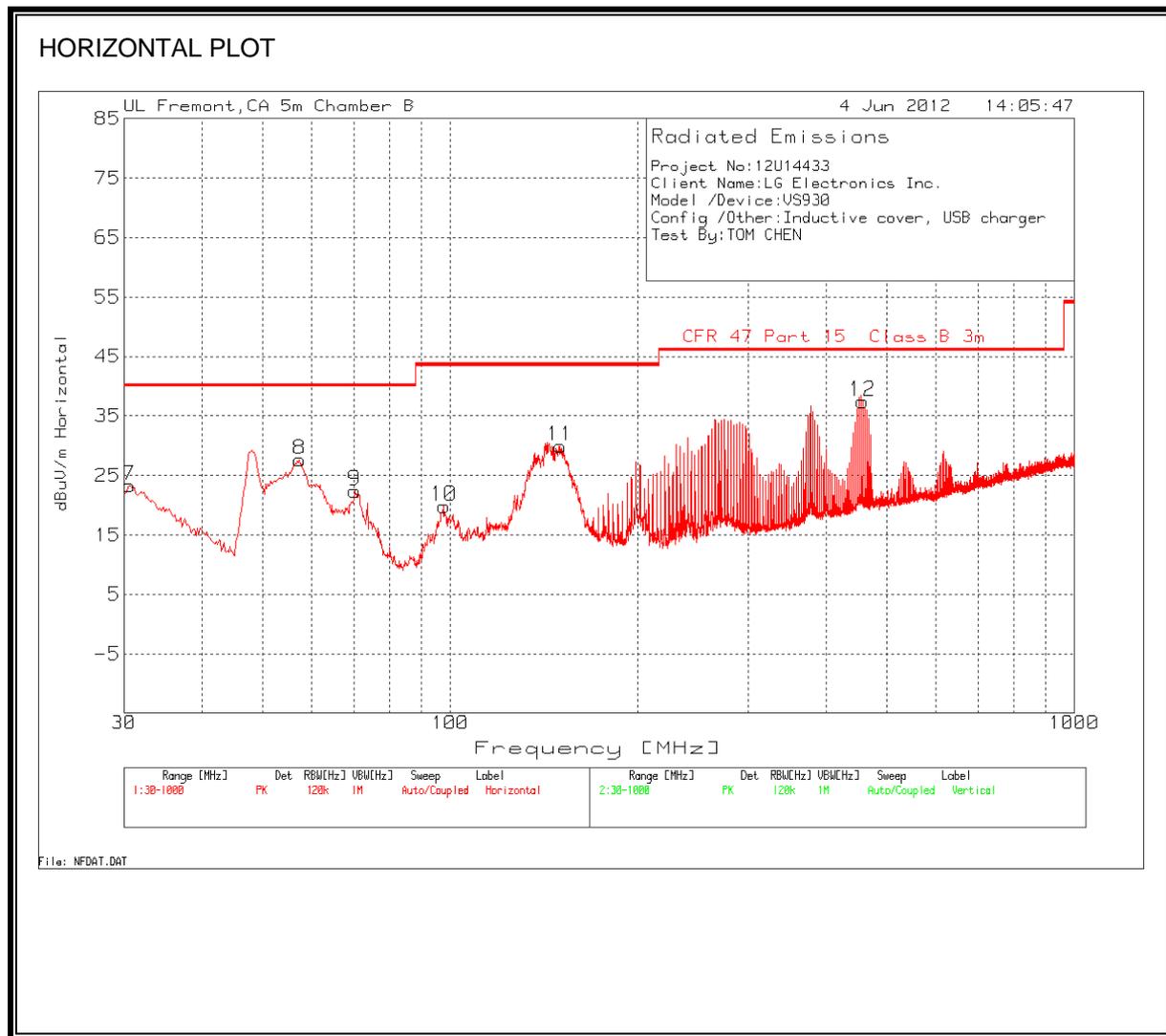
Horizontal 30 - 1000MHz

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
30.9692	31.92	PK	20.7	-29.3	23.32	40	-16.68	Horz
48.4153	48.82	PK	8.6	-29.1	28.32	40	-11.68	Horz
56.7506	49.08	PK	7.3	-29	27.38	40	-12.62	Horz
142.0424	45.47	PK	13	-28.1	30.37	43.5	-13.13	Horz
377.5639	48.92	PK	15	-26.8	37.12	46	-8.88	Horz
451.225	49.01	PK	16.8	-26.9	38.91	46	-7.09	Horz
112.5779	30.88	PK	13.1	-28.4	15.58	43.5	-27.92	Horz

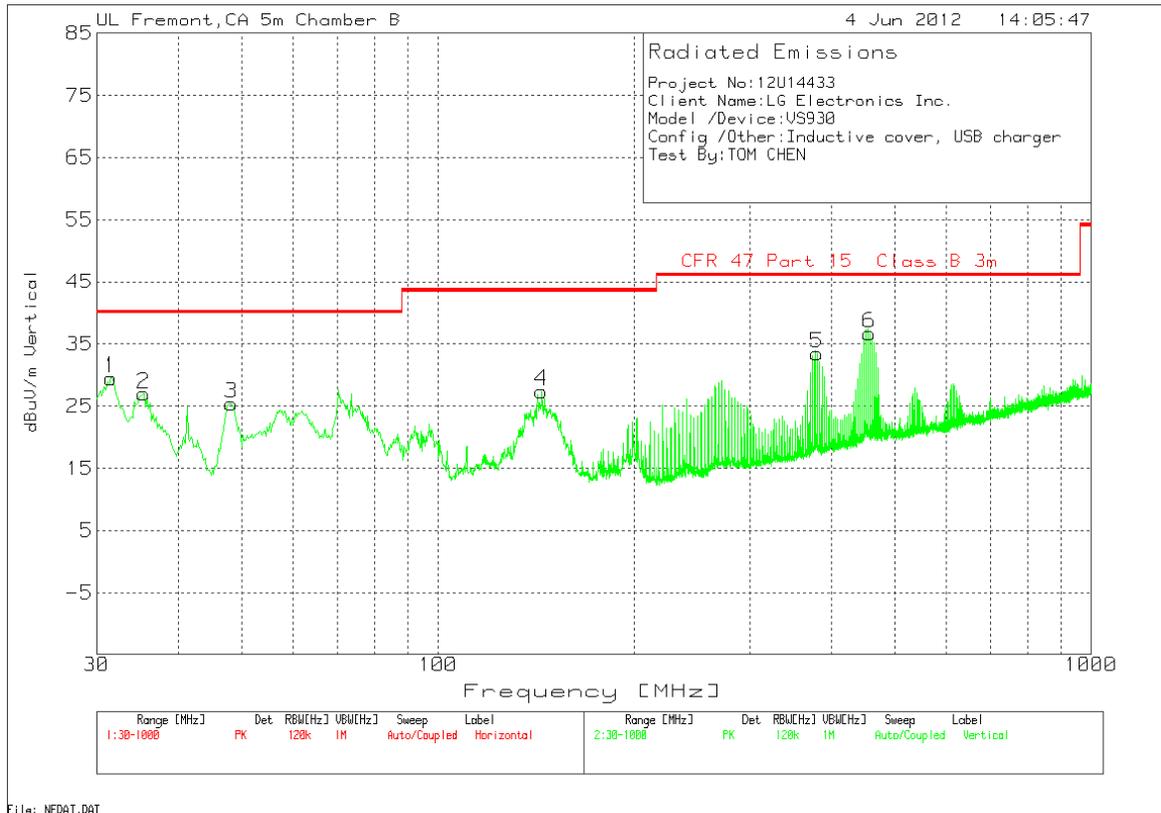
Vertical 30 - 1000MHz

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
31.1631	37.04	PK	20.6	-29.3	28.34	40	-11.66	Vert
48.2214	47.09	PK	8.7	-29.1	26.69	40	-13.31	Vert
70.3197	46.26	PK	8.2	-28.8	25.66	40	-14.34	Vert
380.6655	45.83	PK	15	-26.8	34.03	46	-11.97	Vert
457.6219	48.01	PK	17	-27	38.01	46	-7.99	Vert

EUT WITH INDUCTIVE COVER



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Project No:12U14433
 Client Name:LG Electronics Inc.
 Model /Device:VS930
 Config /Other:Inductive cover, USB charger
 Test By:TOM CHEN

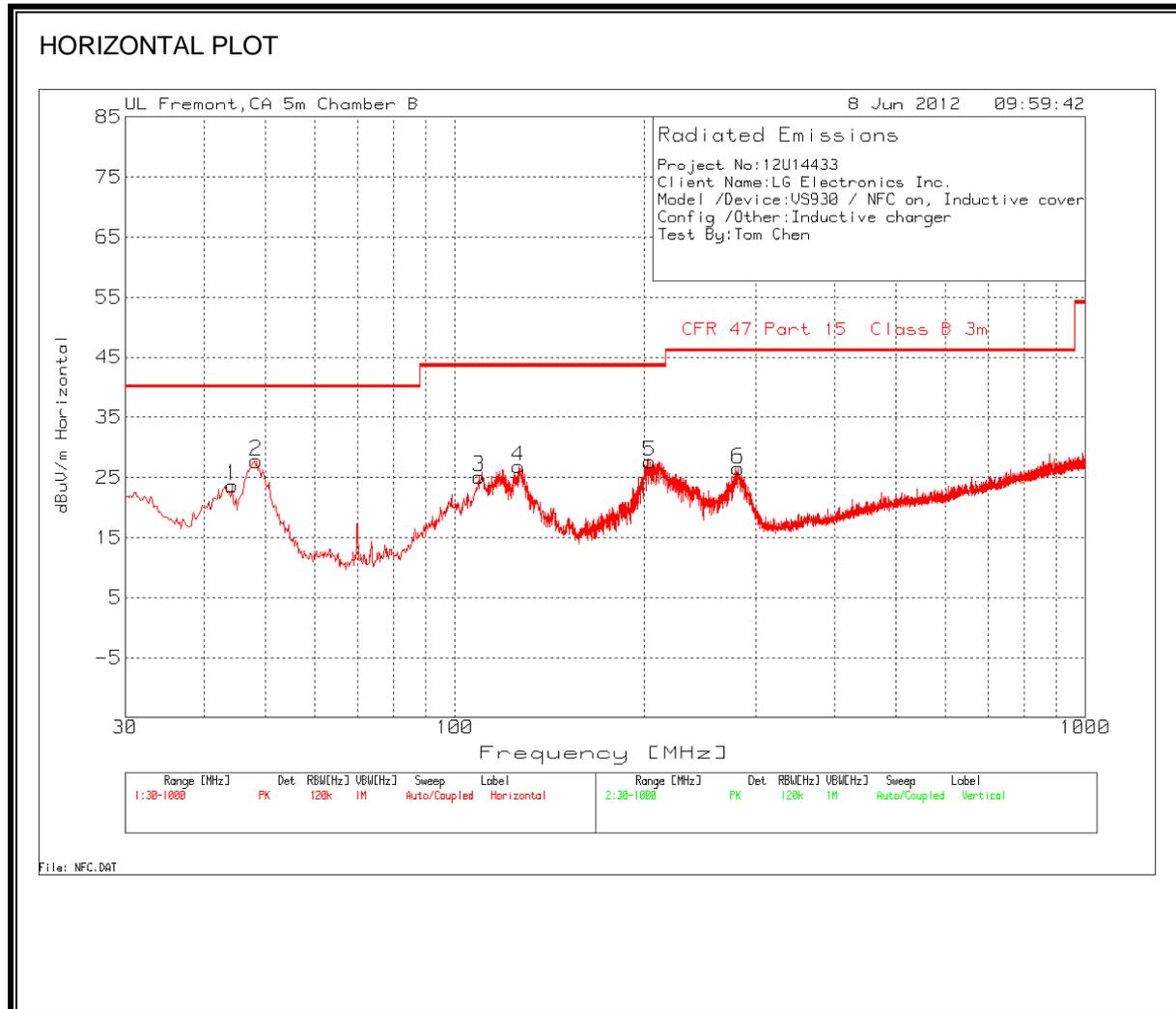
Horizontal 30 - 1000MHz

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
30.5815	31.59	PK	21	-29.3	23.29	40	-16.71	Horz
57.3321	49.32	PK	7.3	-29	27.62	40	-12.38	Horz
70.3197	42.98	PK	8.2	-28.8	22.38	40	-17.62	Horz
97.6519	38.91	PK	9.5	-28.6	19.81	43.5	-23.69	Horz
149.99	45.31	PK	12.6	-28	29.91	43.5	-13.59	Horz
457.6219	47.43	PK	17	-27	37.43	46	-8.57	Horz

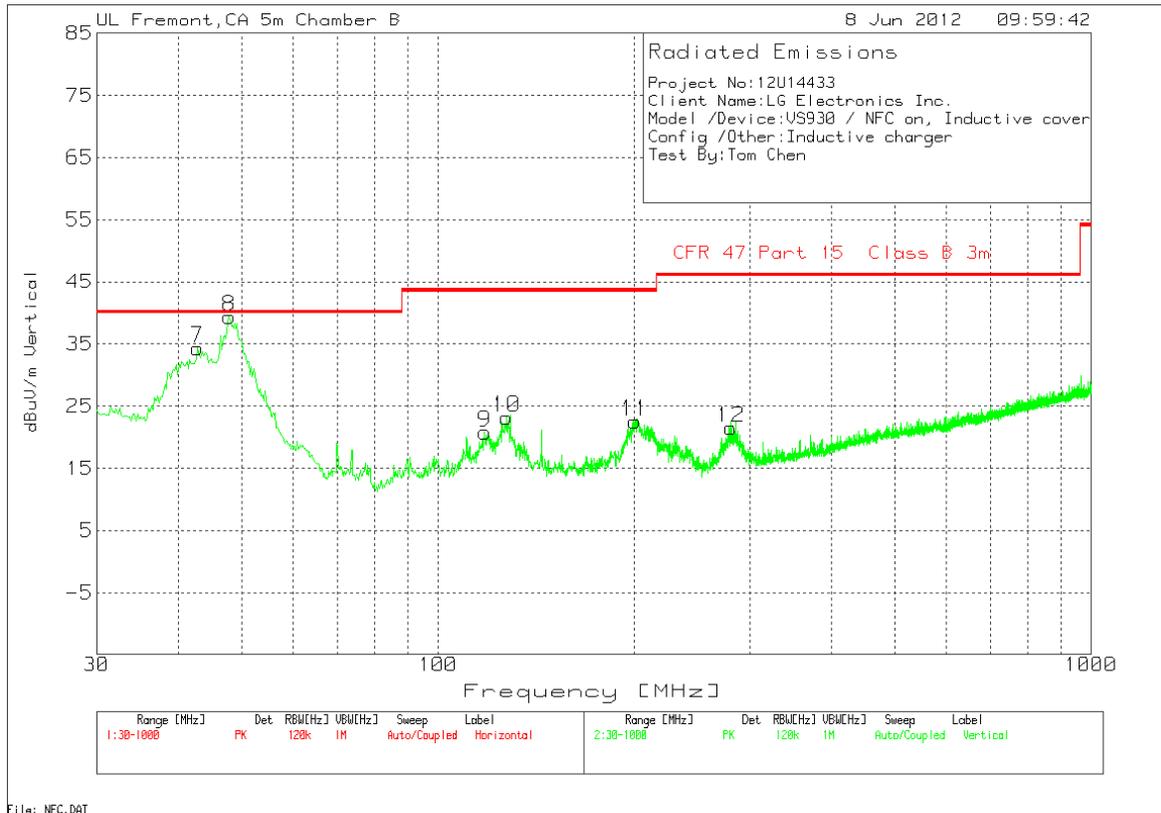
Vertical 30 - 1000MHz

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	38.48	PK	20.3	-29.3	29.48	40	-10.52	Vert
35.4277	38.87	PK	17.3	-29.2	26.97	40	-13.03	Vert
48.2214	45.78	PK	8.7	-29.1	25.38	40	-14.62	Vert
143.9808	42.67	PK	12.8	-28.1	27.37	43.5	-16.13	Vert
380.6655	45.28	PK	15	-26.8	33.48	46	-12.52	Vert
457.6219	46.7	PK	17	-27	36.7	46	-9.3	Vert

EUT WITH INDUCTIVE COVER + CHARGER



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Project No:12U14433								
Client Name:LG Electronics Inc.								
Model /Device:VS930 / NFC on, Inductive cover								
Config /Other:Inductive charger								
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
44.3445	42.09	PK	10.7	-29.1	23.69	40	-16.31	Horz
48.4153	48.26	PK	8.6	-29.1	27.76	40	-12.24	Horz
109.2826	41.04	PK	12.6	-28.5	25.14	43.5	-18.36	Horz
126.1471	40.93	PK	14.2	-28.3	26.83	43.5	-16.67	Horz
203.6851	43.72	PK	11.5	-27.6	27.62	43.5	-15.88	Horz
281.6107	40.08	PK	13.3	-26.9	26.48	46	-19.52	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
42.7938	51.86	PK	11.7	-29.2	34.36	40	-5.64	Vert
47.8337	59.56	PK	8.9	-29.1	39.36	40	-0.64	Vert
117.8118	35.2	PK	13.9	-28.3	20.8	43.5	-22.7	Vert
127.3102	37.37	PK	14.1	-28.3	23.17	43.5	-20.33	Vert
200.1958	37.45	PK	12.7	-27.6	22.55	43.5	-20.95	Vert
280.8353	35.09	PK	13.3	-26.9	21.49	46	-24.51	Vert

8. 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 / TIA / EIA 603 Clause 2.3.1 and 2.3.2

RESULTS

No non-compliance noted.

Reference Frequency: EUT Channel 13.56 MHz @ 20°C				
Limit: ± 100 ppm = 135.597 kHz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	13.5605135	-0.600	± 100
3.80	40	13.5606328	-0.688	± 100
3.80	30	13.5606789	-0.722	± 100
3.8	20	13.5597000	0.000	± 100
3.80	10	13.5607044	-0.741	± 100
3.80	0	13.5607436	-0.770	± 100
3.80	-10	13.5607672	-0.787	± 100
3.80	-20	13.5607646	-0.785	± 100
3.23	20	13.5605564	-0.632	± 100
4.37	20	13.5606327	-0.688	± 100