FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

LTE PHONE BLUETOOTH, WLAN (2.4GHZ & 5GHZ) AND NFC

MODEL NUMBER: LG-D500, LGD500, D500, LGMS500, LG-MS500, MS500

FCC ID: ZNFD500

REPORT NUMBER: 13U14980-4

ISSUE DATE: MAY 10, 2013

Prepared for
LG ELECTRONICS MOBILECOMM U.S.A., INC.
1000 SYLVAN AVENUE
ENGLEWOOD CLIFFS, NEW JERSEY 07632

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	05/10/13	Initial Issue	P. Kim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LG ELECTRONICS MOBILECOMM U.S.A., INC.
1000 SYLVAN AVENUE
ENGLEWOOD CLIFFS, NEW JERSEY 07632

EUT DESCRIPTION: LTE Phone Bluetooth, WLAN (2.4GHz & 5GHz) and NFC

MODEL: LG-D500, LGD500, D500, LGMS500, LG-MS500, MS500

SERIAL NUMBER: 303KPCA337171

DATE TESTED: MAY 2 and 10, 2013

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 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 Verification Services Inc. By:

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WISE PROGRAM MANAGER
UL Verification Services Inc.

Tested By:

ROY ZHENG
WISE LAB TECH
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 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 Verification Services Inc. 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 LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC capabilities.

5.1. MAXIMUM OUTPUT POWER

The transmitter maximum E-field at 30m distance is 9.36 dBuV/m

5.2. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an PIFA antenna, with a maximum gain of 1.04 dBi.

5.3. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Kernal, Version 3.4.0.

The EUT driver software installed during testing was Android Version 4.1.2.

The test utility software used during testing was LG870LAP8960JR121210A.

5.4. WORST-CASE CONFIGURATION AND MODE

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

5.5. MODIFICATIONS

No modifications were made during testing.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter	LG	MCS-01WR	RB320071516	N/A
Earphone	I-SOUND CO. LTD	HC-MYD-LG113	N/A	N/A

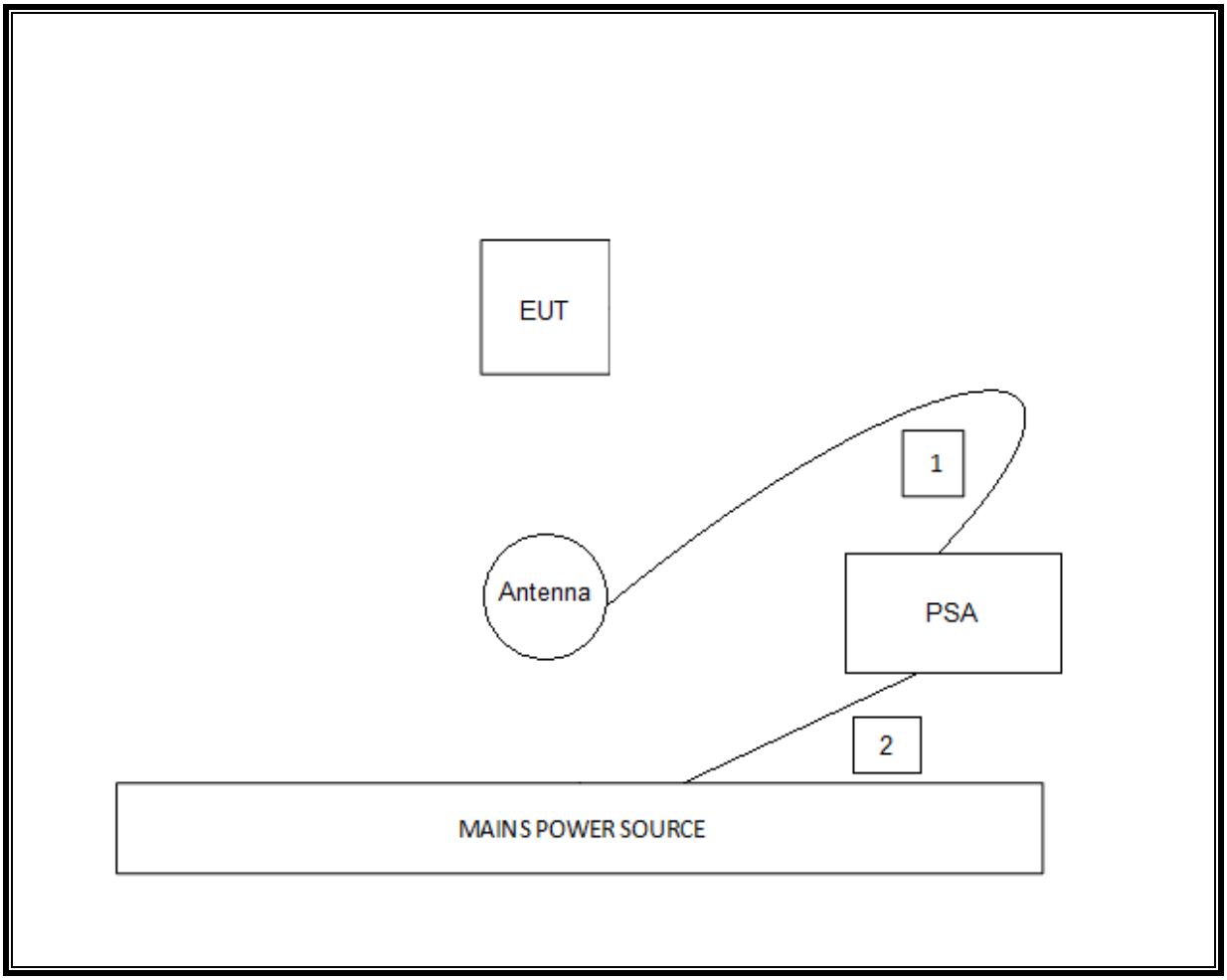
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	US 115V	Un-Shielded	1.8	N/A
2	BNC	1	To PSA	Shielded	N/A	N/A

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



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	04/04/14
Antenna, Loop, 30 MHz	EMCO	6502	C00593	02/20/14
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	C01011	03/23/14
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/28/14
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/08/13
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/14
DMM	Fluke	77-11	N02303	10/31/13
Digital Thermometer	Tektronix	DTM920	None	05/21/13
Temperature Chamber 1.25 cu ft (Rental unit)	Tenney Engineering	TJR-A	13916871	05/07/13

Note: The Frequency Stabilities Test was done before the equipment due date.

6. RADIATED EMISSION TEST RESULTS

6.1. 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 10^{th} harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater (1000MHz)

RESULTS

No non-compliance noted:

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

FCC Part 15, Subpart B & C **10 Meter Distance Measurement At Open Field**

Company: LG
Project #: 13U14980
Model #: D500
Tester: Roy Zheng
Date: May 10, 2013

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
Loop Antenna Face On:												
13.56	58.8		N/A	10.56	-60.00	9.36	N/A	84.00	N/A	-74.6	N/A	Fundamental @ 1m Dist
13.41			N/A	10.54	-60.00	-49.46	N/A	50.48	N/A	-99.9	N/A	13.41-13.553MHz Spious @ 1m/Noise Floor
13.553	53.41		N/A	10.56	-60.00	3.97	N/A	50.48	N/A	-46.5	N/A	13.41-13.553MHz Spious @ 1m
13.567			N/A	10.56	-60.00	-49.44	N/A	50.48	N/A	-99.9	N/A	13.567-13.710MHz Spurious @ 1m/Noise Floor
13.71			N/A	10.57	-60.00	-49.43	N/A	40.51	N/A	-89.9	N/A	13.567-13.710MHz Spurious @ 1m/Noise Floor
13.11			N/A	10.51	-60.00	-49.49	N/A	40.51	N/A	-90.0	N/A	13.110-13.410MHz Spurious @ 1m/Noise Floor
13.41			N/A	10.54	-60.00	-49.46	N/A	40.51	N/A	-90.0	N/A	13.110-13.410MHz Spurious @ 1m/Noise Floor
13.71			N/A	10.57	-60.00	-49.43	N/A	40.51	N/A	-89.9	N/A	13.710-14.010MHz Spurious @ 1m/Noise Floor
14.01			N/A	10.6	-60.00	-49.40	N/A	29.54	N/A	-78.9	N/A	13.710-14.010MHz Spurious @ 1m/Noise Floor
Loop Antenna Face Off:												
13.56	55.49		N/A	10.56	-60.00	6.05	N/A	84.00	N/A	-78.0	N/A	Fundamental @ 1m Dist
13.41			N/A	10.54	-60.00	-49.46	N/A	50.48	N/A	-99.9	N/A	13.41-13.553MHz Spious @ 1m/Noise Floor
13.553	50.36		N/A	10.56	-60.00	0.92	N/A	50.48	N/A	-49.6	N/A	13.41-13.553MHz Spious @ 1m
13.567			N/A	10.56	-60.00	-49.44	N/A	50.48	N/A	-99.9	N/A	13.567-13.710MHz Spurious @ 1m/Noise Floor
13.71			N/A	10.57	-60.00	-49.43	N/A	40.51	N/A	-89.9	N/A	13.567-13.710MHz Spurious @ 1m/Noise Floor
13.11			N/A	10.51	-60.00	-49.49	N/A	40.51	N/A	-90.0	N/A	13.110-13.410MHz Spurious @ 1m/Noise Floor
13.41			N/A	10.54	-60.00	-49.46	N/A	40.51	N/A	-90.0	N/A	13.110-13.410MHz Spurious @ 1m/Noise Floor
13.71			N/A	10.57	-60.00	-49.43	N/A	40.51	N/A	-89.9	N/A	13.710-14.010MHz Spurious @ 1m/Noise Floor
14.01			N/A	10.6	-60.00	-49.40	N/A	29.54	N/A	-78.9	N/A	13.710-14.010MHz Spurious @ 1m/Noise Floor

* 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.

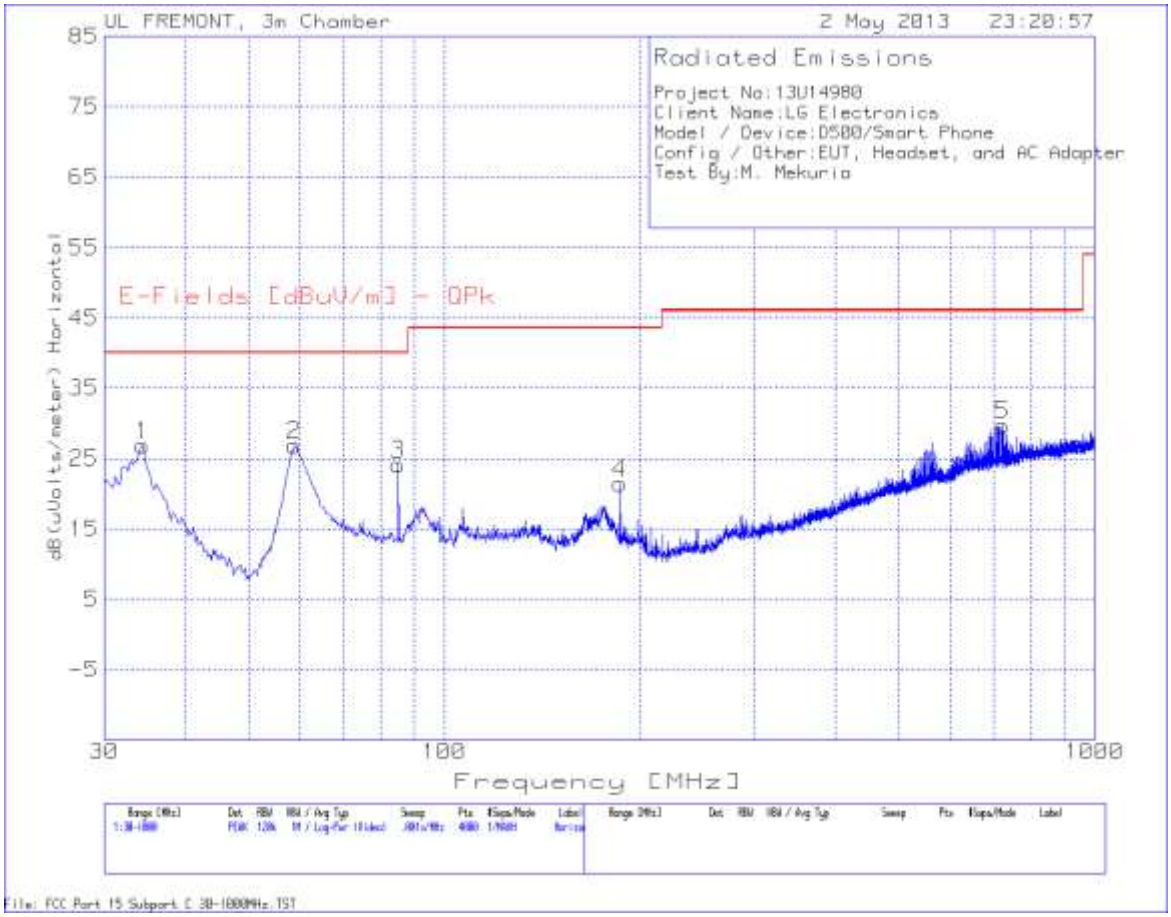
P.K. = Peak
Q.P. = Quasi Peak Reading
A.F. = Antenna factor

Rev. 10.23.09

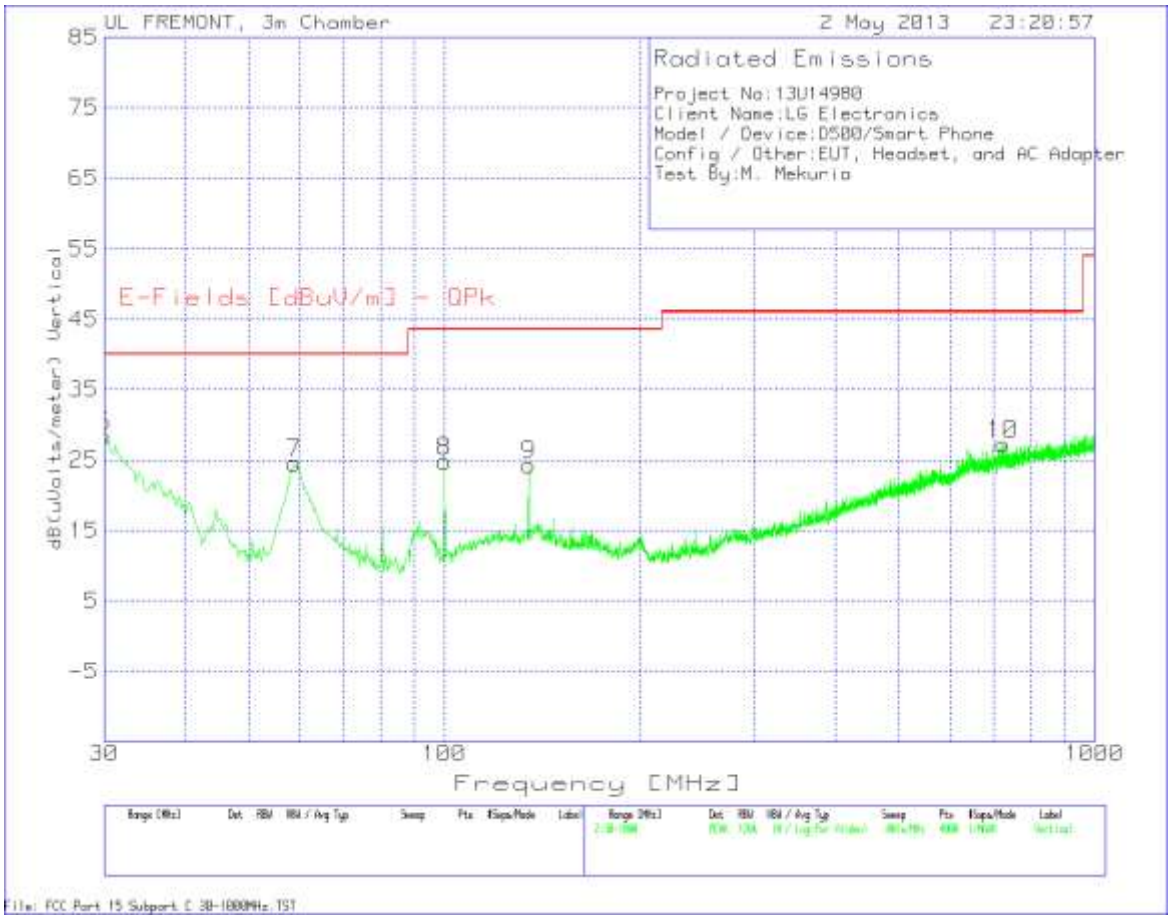
Fundamental was measured at 1m distance since the signal was so low that 10m or 3m distance yielded only noise floor. 9.36 dBuV/m has been corrected with a correction factor of 60 dB to compensate for 30m.

6.1.2. TX SPURIOUS EMISSION 30 TO 1000 MHz

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Project No:13U14980
Client Name:LG Electronics
Model / Device:D500/Smart Phone
Config / Other:EUT, Headset, and AC Adapter
Test By:M. Mekuria

Marker No.	Test Frequency	Meter Reading	Detector	T130 Ant Factor [dB/m]	T64 preamp/ cable loss [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - QPk	Margin (dB)	Height [cm]	Polarity
Horizontal 30 - 1000MHz										
1	34.3617	36.79	PK	17.7	-27.6	26.89	40	-13.11	99	Horz
2	58.8359	46.96	PK	7.3	-27.4	26.86	40	-13.14	400	Horz
3	85.0062	44.04	PK	7.2	-27.1	24.14	40	-15.86	400	Horz
4	186.5376	36.51	PK	11.3	-26.3	21.51	43.52	-22.01	301	Horz
5	723.0302	32.22	PK	20.6	-23.1	29.72	46.02	-16.3	99	Horz
Vertical 30 - 1000MHz										
6	30	35.17	PK	20.9	-27.7	28.37	40	-11.63	199	Vert
7	58.8359	44.63	PK	7.3	-27.4	24.53	40	-15.47	299	Vert
8	100.03	41.77	PK	10.1	-27	24.87	43.52	-18.65	199	Vert
9	134.9238	37.61	PK	13.6	-26.9	24.31	43.52	-19.21	199	Vert
10	723.2725	29.71	PK	20.6	-23	27.31	46.02	-18.71	199	Vert

PK - Peak detector
QP - Quasi-Peak detector
Av - Average detector

7. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within ±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 13.560703786 MHz @ 20ºC Limit: ± 100 ppm = 135.607 kHz				
Power Supply (VDC)	**Environment Temperature (ºC)**	**Frequency Deviation Measureed with Time Elapse**		
		(MHz)	**Delta (ppm)**	**Limit (ppm)**
3.80	50	13.560743330	-0.029	± 100
3.80	40	13.560706842	-0.002	± 100
3.80	30	13.560676928	0.020	± 100
3.80	***20***	***13.560703786***	***0.000***	***± 100***
3.80	10	13.560743795	-0.030	± 100
3.80	0	13.560765317	-0.045	± 100
3.80	-10	13.560776071	-0.053	± 100
3.80	-20	13.562754421	-1.512	± 100
3.20	20	*13.560706305*	-0.002	± 100
4.30	20	*13.560703174*	0.000	± 100