

## EMI CERTIFICATION REPORT

**Applicant:**

**LG Electronics MobileComm U.S.A., Inc.**  
**1000 Sylvan Avenue, Englewood Cliffs NJ 07632**

**Date of Receipt: July 21, 2014**

**Date of Issue: August 26, 2014**

**Test Report No. HCT-E-1408-F004-1**

**HCT FRN: 0005866421**

**FCC ID:**

**ZNFD690**

**Rule Part(s) / Standard(s):** FCC CFR 47 PART 15 Subpart B Class B  
**FCC Classification:** JBP (Part 15 B – Class B Computing Device Peripheral)  
**EUT Type:** Cellular/PCS GSM/GPRS/EDGE Rx only and WCDMA  
HSDPA/HSUPA with Bluetooth and WLAN  
**Model Name:** LG-D690  
**Additional Model(s):** LGD690, D690, LG-D693, LGD693, D693  
**Test Port:** USB / Earphone Port  
**Date of Test:** August 04, 2014 - August 06, 2014

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003. (See Test Report if any modifications were made for compliance)

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

HCT certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

**Tested By**



**Gyeong Seon Kim**  
**Test Engineer**  
**EMC Team**  
**Certification Division**

**Reviewed By**



**Sang-Jun Lee**  
**Technical Manager**  
**EMC Team**  
**Certification Division**

This report only responds to the tested sample and may not be reproduced, except in full, without written approval of the HCT Co., Ltd.



## DOCUMENT HISTORY

The revision history for this document is shown in table.

Version	Date	Description
HCT-E-1408-F004	August 13, 2014	Initial Release
HCT-E-1408-F004-1	August 26, 2014	Add Additional Model



## TABLE OF CONTENTS

	<b>PAGE</b>
1. GENERAL INFORMATION .....	4
1.1 Description of EUT .....	4
1.2 Related Submittal(s) / Grant(s).....	4
1.3 Test Facility .....	5
1.4 Tested System Details.....	6
1.5 Cable Description .....	7
1.6 Noise Suppression Parts on Cable. (I/O Cable) .....	7
2. DESCRIPTION OF TEST .....	8
3. PRELIMINARY TEST .....	11
3.1 Conducted Emission Test .....	11
3.2 Radiated Emission Test .....	11
4. CONDUCTED AND RADIATED EMISSION TEST SUMMARY .....	12
4.1 Conducted Emission Test .....	12
4.2 Radiated Emission Test .....	19
5. LIST OF TEST EQUIPMENT .....	21
6. CONCLUSION .....	22

**ATTACHMENT: TEST SETUP PHOTOGRAPHS**



## 1. GENERAL INFORMATION

### 1.1 Description of EUT

Equipment Under Test is manufactured by **LG Electronics MobileComm U.S.A., Inc.**  
Its basic purpose is used for communications.

<b>Model</b>	LG-D690
<b>Additional Model(s)</b>	LGD690, D690, LG-D693, LGD693, D693
<b>FCC ID</b>	ZNFD690
<b>EUT Type</b>	Cellular/PCS GSM/GPRS/EDGE Rx only and WCDMA HSDPA/HSUPA with Bluetooth and WLAN
<b>TX Frequency</b>	824.20 MHz to 848.80 MHz (GSM 850) 1 850.20 MHz to 1 909.80 MHz (GSM 1 900) 826.40 MHz to 846.60 MHz (WCDMA 850) 1 852.4 MHz to 1 907.6 MHz (WCDMA 1 900)
<b>RX Frequency</b>	869.20 MHz to 893.80 MHz (GSM 850) 1 930.20 MHz to 1 989.80 MHz (GSM 1 900) 871.40 MHz to 891.60 MHz (WCDMA 850) 1 932.4 MHz to 1 987.6 MHz (WCDMA 1 900)

### 1.2 Related Submittal(s) / Grant(s)

Original submittal only.



### 1.3 Test Facility

Test site is located at 74, SEOICHEON-RO, 578BEON-GIL, MAJANG-MYEON, ICHEON-SI, GYEONGGI-DO, SOUTH KOREA. Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4-2003.

Measurement Facilities	Reg. No.
Radiated Field strength measurement facility (3 m)	90661 (February 28, 2014)
Radiated Field strength measurement facility (10 m)	90661 (February 28, 2014)



## 1.4 Tested System Details

All equipment descriptions used in the tested system (including inserted cards) are:

Device Type	Model Name	Manufacturer	FCC ID / DoC	Connected To
EUT	LG-D690	LG	ZNFD690	Notebook PC, Earphone
USB cable	EAD62377902	Ningbo Broad	-	EUT, Notebook PC
Earphone	EAB62808401	I-SOUND	-	EUT
Notebook PC	ProBook6560b	HP	DoC	EUT, Notebook PC adaptor
Notebook PC adaptor	PPP009D	DELTA Electronics (JIANGSU)LTD	-	Notebook PC
Gateway	MV440	Axesstel	PH7MV440	Notebook PC, Adaptor
Serial mouse	Serial 2 button mouse	Radio shack	FSUGMZE3	Notebook PC
Adaptor	DA-60M12	Yang Ming Industrial	-	Gateway
RJ45 cable	-	-	-	Notebook PC, Gateway
Micro SD card	8 GB	SanDisk	-	EUT



## 1.5 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	Micro USB	Y	Y	(P,D)1.0
	Earphone	N/A	Y	(D)1.1
Notebook PC	RJ 45	N/A	N	(D)1.5
	Serial (Mouse)	N/A	Y	(D)1.8
	DC in	N	N/A	(P)1.8
Gateway	DC in	N	N/A	(P)1.8

\* The marked "(D)" means the data cable and "(P)" means the power cable.

## 1.6 Noise Suppression Parts on Cable. (I/O Cable)

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	Micro USB	N	N/A	Y	Both End
	Earphone	N	N/A	Y	EUT End
Notebook PC	RJ 45	N	N/A	N	N/A
	Serial (Mouse)	N	N/A	Y	Notebook PC End



## 2. DESCRIPTION OF TEST

### 2.1 Measurement of Conducted Emission

The test procedure was in accordance with ANSI C63.4-2003, Clause 7

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN).  
If the EUT is connected to the PC through USB, the AC power-line adapter of the PC is directly connected to a line impedance stabilization network (LISN).  
Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both conducted lines are measured in Quasi-Peak and Average mode, including the worst-case data points for each tested configuration.
- c. The frequency range from 150 kHz to 30 MHz was searched.

#### [ Conducted Emission Limits ]

Frequency (MHz)	Resolution Bandwidth	Quasi-Peak (dBuV)	Average (dBuV)
0.15 to 0.5	9 kHz	66 to 56*	56 to 46*
0.5 to 5	9 kHz	56	46
5 to 30	9 kHz	60	50

*\*Decreases with the logarithm of the frequency.*





## 2.2 Measurement of Radiated Emission

The test procedure was in accordance with ANSI C63.4-2003, Clause 8

- a. The EUT was placed on the top of a turn table 0.8 meters above the ground at a 3 m shield room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from 1 m to 4 m above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 m to 4 m and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to Peak and Average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- g. The antenna height scans apply for both horizontal and vertical polarizations, except that for vertical polarization, the minimum height of the center of the antenna shall be increased so that the lowest point of the bottom of the lowest antenna element clears the site reference ground plane by at least 25 cm. (below 1 GHz)

### [ Radiated Emission Limits ]

Frequency (MHz)	Antenna Distance (m)	Field Strength (uV/m)	Quasi-Peak (dBuV/m)
30 to 88	3	100	40.0
88 to 216	3	150	43.5
216 to 960	3	200	46.0
Above 960	3	500	54.0
Frequency (MHz)	Antenna Distance (m)	Peak (dBuV/m)	Average (dBuV/m)
Above 1 000	3	74	54

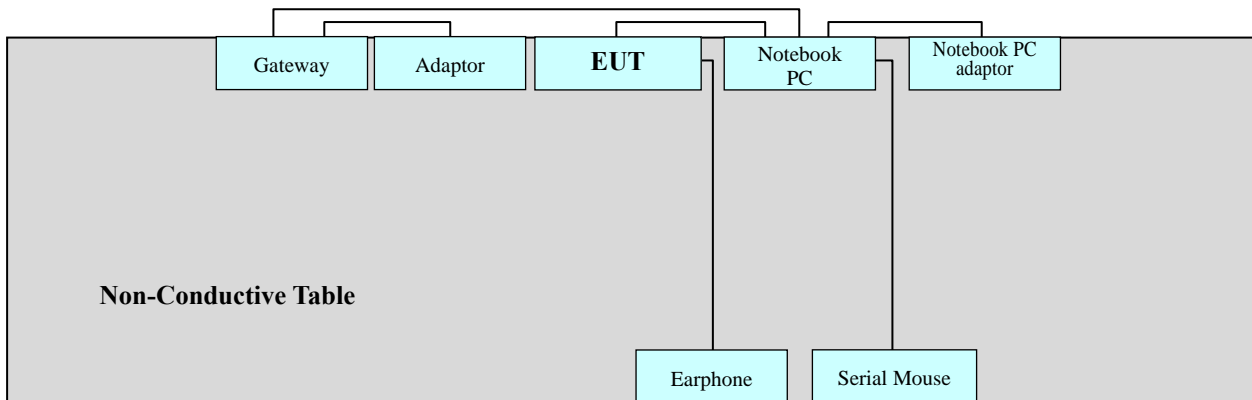


### 2.2.1 Frequency Range of Radiated Measurements

An unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a Radiated Emission limit is specified, up to the frequency shown in the following table

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705 to 108	1 000
108 to 500	2 000
500 to 1 000	5 000
Above 1 000	5 <sup>th</sup> harmonic of the highest frequency or 40 GHz, whichever is lower

### 2.3 Configuration of Tested System



Power Line: 120 VAC, 60 Hz



### 3. PRELIMINARY TEST

#### 3.1 Conducted Emission Test

It was tested Data Communication mode, after connecting all peripheral devices.

**Operation Mode:**       Data Communication mode

#### 3. 2 Radiated Emission Test

It was tested Data Communication mode, after connecting all peripheral devices.

**Operation Mode:**       Data Communication mode



## 4. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

### 4.1 Conducted Emission Test

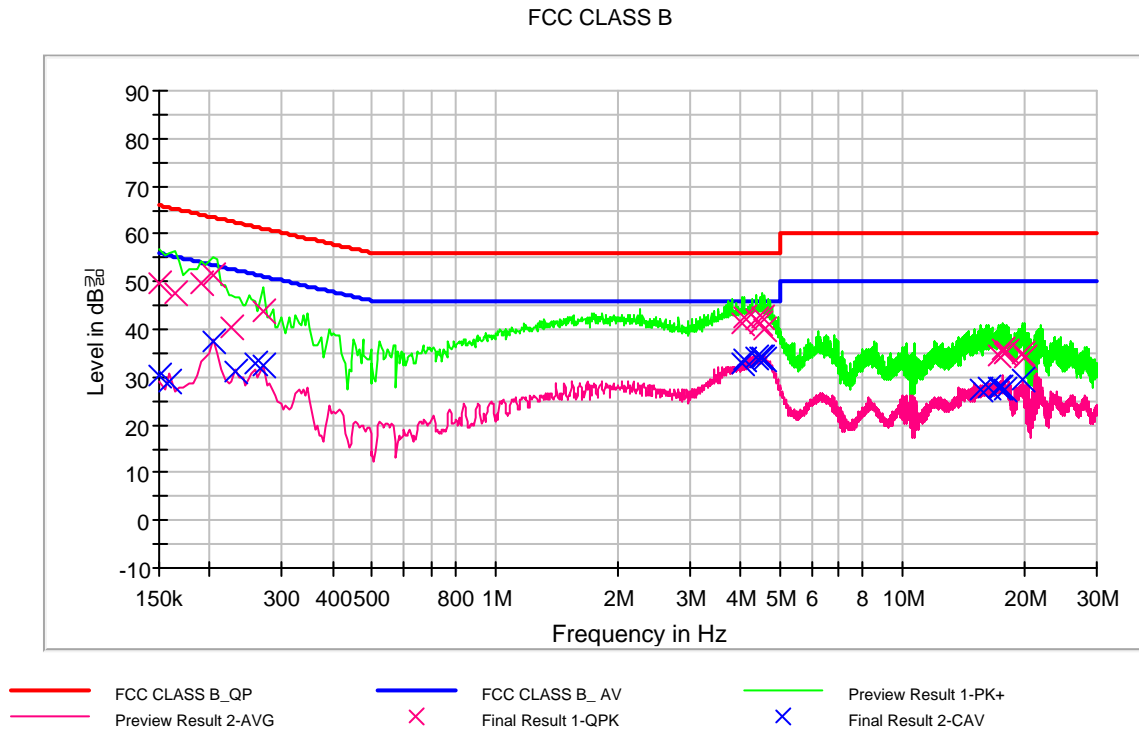
The test results of conducted emission at mains ports provide the following information:

<b>Rule Part / Standard</b>	FCC PART 15 Subpart B Class B
<b>Detector</b>	Quasi-Peak, CISPR-Average
<b>Bandwidth</b>	9 kHz (6 dB)
<b>Operation Mode</b>	Data Communication mode
<b>Kind of Test Site</b>	EMI Shielded Room
<b>Temperature</b>	25.3°C
<b>Relative Humidity</b>	58.6 %
<b>Test Date</b>	August 06, 2014

※ **NOTE: Refer to page 13 to page 18 for details.**



**Figure 1: Spectral Diagrams, Conducted Emission, Line (L1)**



**※ Calculation Formula:**

1. Conductor L1 = Hot, Conductor N = Neutral
2. Corr. = LISN Factor + Cable Loss
3. QuasiPeak or CAverage= Receiver Reading + Corr.
4. Margin = Limit – QuasiPeak or CAverage



## QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	49.5	9.000	L1	9.6	16.5	66.0
0.163500	47.4	9.000	L1	9.6	17.9	65.3
0.190500	49.5	9.000	L1	9.6	14.5	64.0
0.204000	51.4	9.000	L1	9.6	12.0	63.4
0.226500	40.6	9.000	L1	9.6	22.0	62.6
0.271500	44.0	9.000	L1	9.7	17.1	61.1
4.037000	41.4	9.000	L1	9.9	14.6	56.0
4.104500	42.5	9.000	L1	9.9	13.5	56.0
4.388000	42.2	9.000	L1	9.9	13.8	56.0
4.460000	41.2	9.000	L1	9.9	14.8	56.0
4.527500	42.6	9.000	L1	9.9	13.4	56.0
4.604000	40.2	9.000	L1	9.9	15.8	56.0
17.186000	34.7	9.000	L1	10.3	25.3	60.0
17.690000	35.8	9.000	L1	10.3	24.2	60.0
17.838500	34.8	9.000	L1	10.3	25.2	60.0
17.969000	35.4	9.000	L1	10.4	24.6	60.0
19.674500	34.9	9.000	L1	10.4	25.1	60.0
20.025500	34.3	9.000	L1	10.4	25.7	60.0

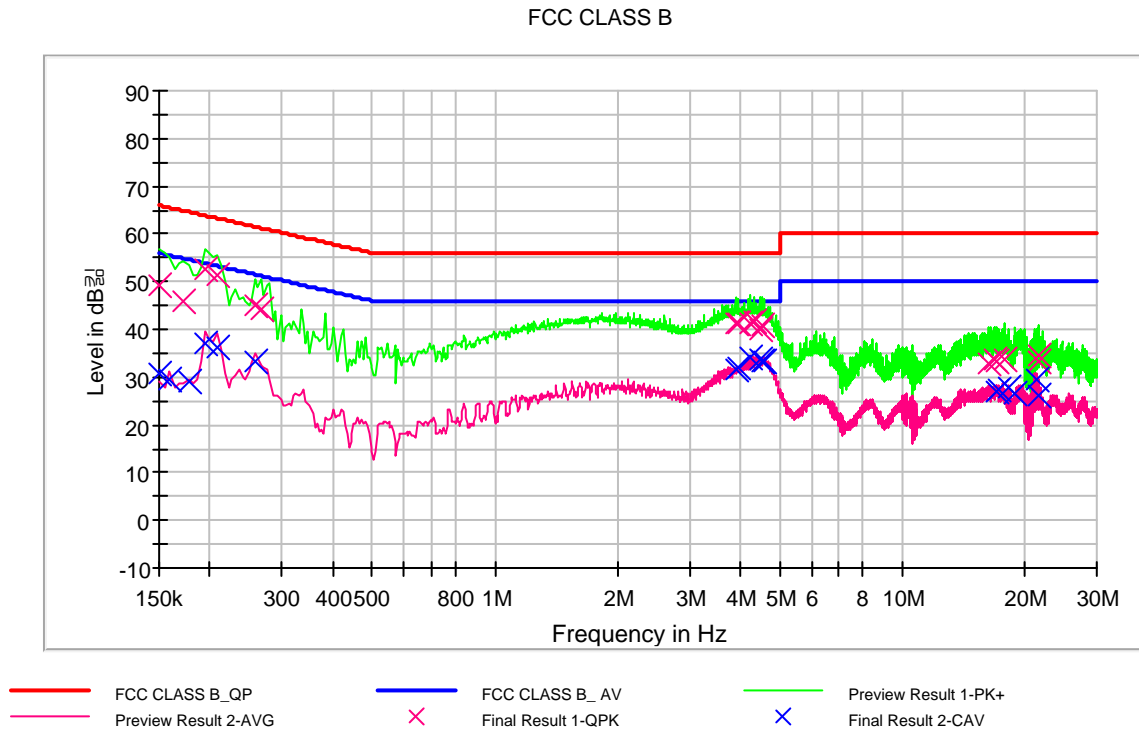


## CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	30.5	9.000	L1	9.6	25.5	56.0
0.159000	28.9	9.000	L1	9.6	26.6	55.5
0.204000	37.5	9.000	L1	9.6	15.9	53.4
0.231000	31.0	9.000	L1	9.6	21.4	52.4
0.258000	32.9	9.000	L1	9.7	18.6	51.5
0.271500	32.3	9.000	L1	9.7	18.8	51.1
4.037000	32.8	9.000	L1	9.9	13.2	46.0
4.104500	33.7	9.000	L1	9.9	12.3	46.0
4.388000	34.2	9.000	L1	9.9	11.8	46.0
4.460000	34.1	9.000	L1	9.9	11.9	46.0
4.527500	34.0	9.000	L1	9.9	12.0	46.0
4.604000	33.5	9.000	L1	9.9	12.5	46.0
15.566000	27.3	9.000	L1	10.3	22.7	50.0
16.205000	27.8	9.000	L1	10.3	22.2	50.0
17.312000	27.8	9.000	L1	10.3	22.2	50.0
17.442500	28.0	9.000	L1	10.3	22.0	50.0
17.838500	27.6	9.000	L1	10.3	22.4	50.0
19.710500	29.3	9.000	L1	10.4	20.7	50.0



**Figure 2: Spectral Diagrams, Conducted Emission, Line (N)**



**※ Calculation Formula:**

1. Conductor L1 = Hot, Conductor N = Neutral
2. Corr. = LISN Factor + Cable Loss
3. QuasiPeak or CAverage= Receiver Reading + Corr.
4. Margin = Limit – QuasiPeak or CAverage





## QuasiPeak Final Result, Line (N)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	49.4	9.000	N	9.6	16.6	66.0
0.172500	46.0	9.000	N	9.7	18.8	64.8
0.195000	52.4	9.000	N	9.7	11.4	63.8
0.208500	51.2	9.000	N	9.7	12.1	63.3
0.258000	45.1	9.000	N	9.7	16.4	61.5
0.267000	44.2	9.000	N	9.7	17.0	61.2
3.888500	41.3	9.000	N	9.9	14.7	56.0
3.960500	41.2	9.000	N	9.9	14.8	56.0
4.244000	41.4	9.000	N	9.9	14.6	56.0
4.311500	41.7	9.000	N	9.9	14.3	56.0
4.460000	39.9	9.000	N	9.9	16.1	56.0
4.527500	41.0	9.000	N	9.9	15.0	56.0
16.214000	33.0	9.000	N	10.2	27.0	60.0
16.830500	33.8	9.000	N	10.2	26.2	60.0
17.046500	33.5	9.000	N	10.2	26.5	60.0
17.820500	33.7	9.000	N	10.3	26.3	60.0
21.497000	33.3	9.000	N	10.4	26.7	60.0
21.636500	34.5	9.000	N	10.4	25.5	60.0



## CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	30.8	9.000	N	9.6	25.2	56.0
0.159000	29.3	9.000	N	9.6	26.2	55.5
0.177000	28.9	9.000	N	9.7	25.7	54.6
0.195000	37.1	9.000	N	9.7	16.7	53.8
0.208500	36.4	9.000	N	9.7	16.9	53.3
0.258000	33.4	9.000	N	9.7	18.1	51.5
3.888500	31.8	9.000	N	9.9	14.2	46.0
3.960500	32.0	9.000	N	9.9	14.0	46.0
4.235000	34.3	9.000	N	9.9	11.7	46.0
4.455500	33.7	9.000	N	9.9	12.3	46.0
4.527500	33.4	9.000	N	9.9	12.6	46.0
4.595000	33.4	9.000	N	9.9	12.6	46.0
17.046500	26.9	9.000	N	10.2	23.1	50.0
17.253500	27.2	9.000	N	10.3	22.8	50.0
18.243500	27.8	9.000	N	10.3	22.2	50.0
18.963500	26.5	9.000	N	10.3	23.5	50.0
21.479000	29.6	9.000	N	10.4	20.4	50.0
21.564500	26.3	9.000	N	10.4	23.7	50.0



## 4.2 Radiated Emission Test

The test results of radiated emission provide the following information:

### -For Measurement Below 1 GHz

Rule Part / Standard	FCC PART 15 Subpart B Class B
Detector	Quasi-Peak
Bandwidth	120 kHz (6 dB)
Operation Mode	Data Communication mode
Kind of Test Site	3 m semi anechoic chamber
Temperature	25.0 °C
Relative Humidity	60.9 %
Test Date	August 06, 2014

Frequency (MHz)	Quasi Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
85.348858	31.0	250.0	H	97.0	11.4	9.0	40.0
124.970501	30.1	100.0	V	199.0	15.9	13.4	43.5
265.610421	30.5	100.0	H	132.0	16.7	15.5	46.0
375.012024	37.9	138.0	V	201.0	19.9	8.1	46.0
625.029659	38.7	100.0	V	200.0	25.4	7.3	46.0

#### ※ Calculation Formula:

1. POL. H = Horizontal, POL. V = Vertical
2. QuasiPeak = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor + Cable Loss
4. Margin = Limit - QuasiPeak



## -For Measurement Above 1 GHz

<b>Rule Part / Standard</b>	FCC PART 15 Subpart B Class B
<b>Detector</b>	Peak mode: Peak (RBW: 1 MHz, VBW: 3 MHz) CISPR-Average mode: Peak (RBW: 1 MHz, VBW: 10 Hz)
<b>Highest Operating Frequency</b>	1.3 GHz
<b>Testing Frequency Range</b>	1 GHz to 7 GHz
<b>Operation Mode</b>	Data Communication mode
<b>Kind of Test Site</b>	3 m semi anechoic chamber
<b>Temperature</b>	25.7 °C
<b>Relative Humidity</b>	55.6 %
<b>Test Date</b>	August 04, 2014

Frequency (MHz)	Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1329.509018	49.8	146.0	V	100.0	-10.1	24.2	74.0
1995.641283	56.4	100.0	V	193.0	-9.7	17.6	74.0
2660.671342	49.8	100.0	V	167.0	-6.8	24.2	74.0

Frequency (MHz)	CAverage (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1329.509018	31.3	146.0	V	100.0	-10.1	22.7	54.0
1995.641283	37.6	100.0	V	193.0	-9.7	16.4	54.0
2660.671342	32.8	100.0	V	167.0	-6.8	21.2	54.0

### ※ Calculation Formula:

1. POL. H = Horizontal, POL. V = Vertical
2. Peak or CAverage = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor+ Cable Loss –Amplifier Gain
4. Margin = Limit - Peak or CAverage



## 5. LIST OF TEST EQUIPMENT

<u>Type</u>	<u>Manufacturer</u>	<u>Model Name</u>	<u>Serial Number</u>	<u>Calibration Cycle</u>	<u>CAL Date</u>
<b><u>Conducted Emission</u></b>					
<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESCI	100584	1 year	01.24. 2014
<input checked="" type="checkbox"/> LISN	EMCO	3816/2SH	9706-1070	1 year	04.07. 2014
<input checked="" type="checkbox"/> LISN	Rohde & Schwarz	ENV216	100073	1 year	01.29. 2014
<input checked="" type="checkbox"/> Software	Rohde & Schwarz	EMC32	-	-	-
<b><u>Radiated Emission</u></b>					
<b>-For measurement below 1 GHz</b>					
<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	04.07. 2014
<input checked="" type="checkbox"/> Trilog Antenna	Schwarzbeck	VULB9160	3301	2 year	12.17. 2012
<input checked="" type="checkbox"/> Antenna master	HD GmbH	MA240	240/520	N/A	-
<input checked="" type="checkbox"/> Antenna master controller	HD GmbH	HD 100	100/637	N/A	-
<input checked="" type="checkbox"/> Turn Table	EMCO	1060-2M	-	N/A	-
<input checked="" type="checkbox"/> Turn Table controller	EMCO	2090	9702-1224	N/A	-
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	06.18.2014
<input type="checkbox"/> Trilog Antenna	Schwarzbeck	VULB9168	185	2 year	04.16. 2013
<input type="checkbox"/> Antenna master	INNCO Systems	MA4000-EP	MA4000/283	N/A	-
<input type="checkbox"/> Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
<input checked="" type="checkbox"/> Software	Rohde & Schwarz	EMC32	-	-	-
<b>-For measurement above 1 GHz</b>					
<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	04.07. 2014
<input checked="" type="checkbox"/> Antenna master	HD GmbH	MA240	240/520	N/A	-
<input checked="" type="checkbox"/> Antenna master controller	HD GmbH	HD 100	100/637	N/A	-
<input checked="" type="checkbox"/> Turn Table	EMCO	1060-2M	-	N/A	-
<input checked="" type="checkbox"/> Turn Table controller	EMCO	2090	9702-1224	N/A	-
<input type="checkbox"/> Power Amplifier	CERNEX	CBLU1183540	21691	1 year	07.11.2014
<input checked="" type="checkbox"/> Power Amplifier	CERNEX	CBLU5183530	24348	1 year	06.11. 2014
<input checked="" type="checkbox"/> Horn Antenna	Schwarzbeck	BBHA 9120D	296	2 year	12.13. 2012
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	06.18. 2014
<input type="checkbox"/> Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
<input type="checkbox"/> Antenna master	INNCO Systems	MA4000-EP	MA4000/283	N/A	-
<input type="checkbox"/> Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170124	2 year	10.30. 2013
<input type="checkbox"/> Power Amplifier	CERNEX	CBL26405040	19660	1 year	04.04. 2014
<input checked="" type="checkbox"/> Software	Rohde & Schwarz	EMC32	-	-	-



## 6. CONCLUSION

The data collected shows that the **EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only and WCDMA HSDPA/HSUPA with Bluetooth and WLAN, FCC ID: ZNFD690, Model: LG-D690** complies with §15.107 and §15.109 of the FCC rules.