

# EMI CERTIFICATION REPORT

**Applicant:**

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

**Date of Receipt: August 13, 2015**  
**Date of Issue: September 17, 2015**  
**Test Report No. HCT-E-1509-F036**  
**HCT FRN: 0005866421**

**FCC ID:**

**ZNFH650**

**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/WCDMA/LTE Phone with WLAN and Bluetooth  
**Model Name:** LG-H650  
**Test Port:** USB / Earphone Port  
**Date of Test:** August 27, 2015 - September 12, 2015

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**



**Gu-Cheol Yoon**  
Test Engineer  
EMC Team  
Certification Division

**Reviewed By**



**Jin-Pyo Hong**  
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-1509-F036	September 17, 2015	Initial Release



## TABLE OF CONTENTS

	PAGE
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-H650
<b>FCC ID</b>	ZNFH650
<b>EUT Type</b>	Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth
<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) 1712.4 MHz to 1752.6 MHz (WCDMA 1 700) 1 710 MHz to 1 755 MHz (LTE B4) 2 500 MHz to 2 570 MHz (LTE B7) 704 MHz to 716 MHz (LTE B17)
<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) 2 112.4 MHz to 2 152.6 MHz (WCDMA 1 700) 2 110 MHz to 2 155 MHz (LTE B4) 2 620 MHz to 2 690 MHz (LTE B7) 734 MHz to 746 MHz (LTE B17)

### 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-H650	LG	ZNFH650	Notebook PC
USB cable	EAD62150404	CRESYN	-	EUT, Notebook PC
USB cable	EAD62185903	Ningbo Broad	-	EUT, Notebook PC
Earphone	EAB64168701	FOXLINK	-	EUT
Standard Cover	-	-	-	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	16 GB	Samsung	-	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)1.2
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 (kHz)	Quasi-Peak (dB $\mu$ V)	Average (dB $\mu$ V)
0.15 to 0.5	9	66 to 56*	56 to 46*
0.5 to 5	9	56	46
5 to 30	9	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 semi anechoic chamber. 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 (µV/m)	Quasi-Peak (dBµV/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 (dBµV/m)	Average (dBµV/m)
Above 1 000	3	74	54

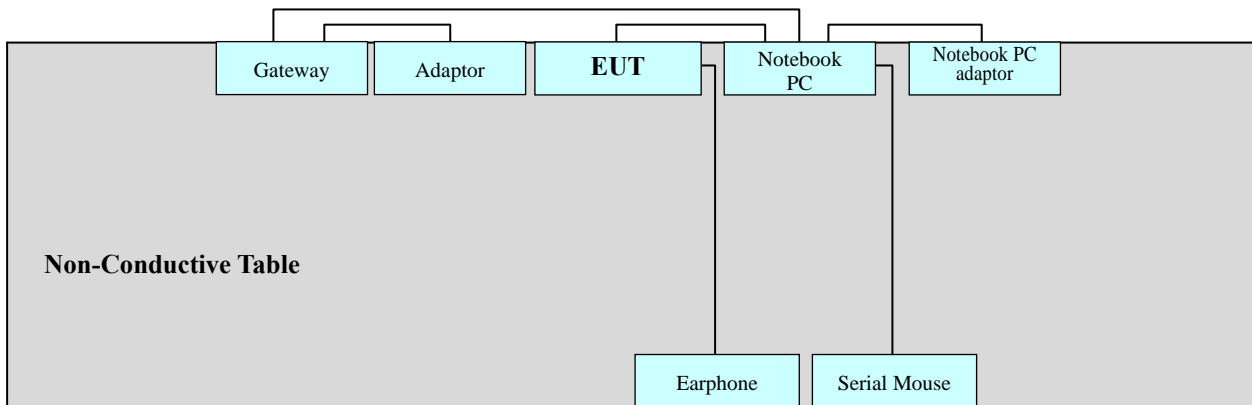


### 2.2.1 Frequency Range of Radiated Measurements

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:

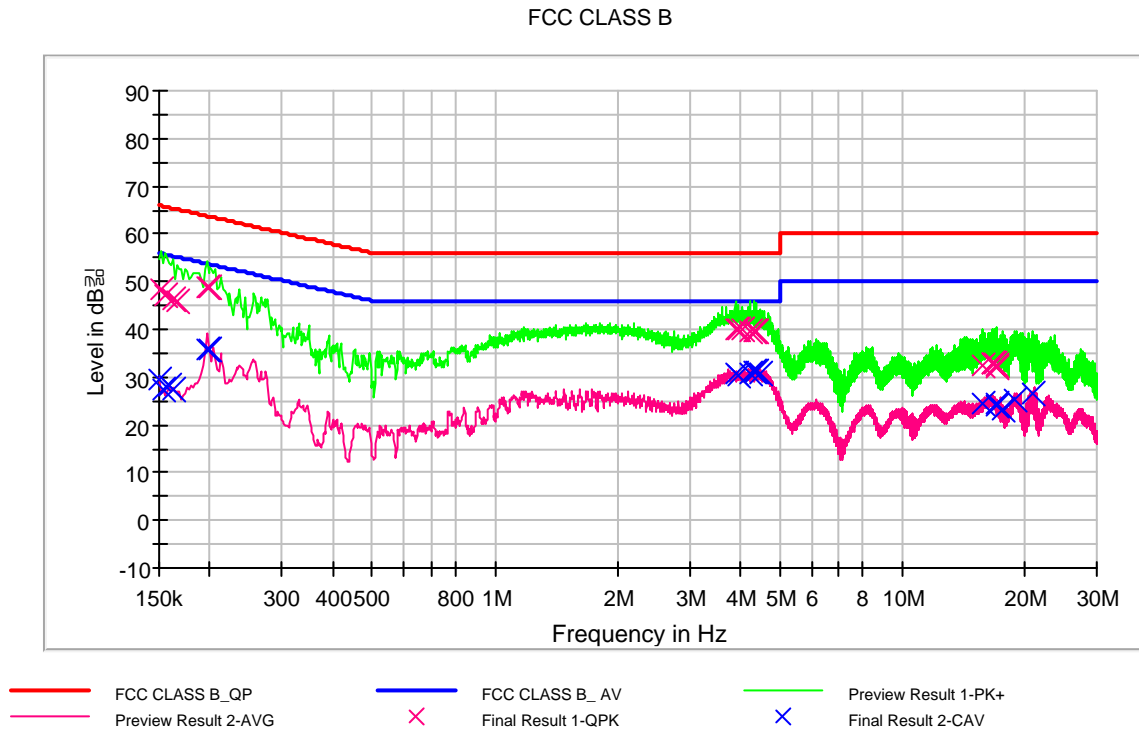
<b>Rule Part / Standard</b>	FCC PART 15 Subpart B Class B
<b>Detector</b>	Quasi-Peak, CISPR-Average
<b>Bandwidth</b>	9 kHz (6 dB)
<b>Operation Mode</b>	Data Communication mode
<b>USB Cable Type</b>	CRESYN *NOTE: The worst-case emissions are reported.
<b>Kind of Test Site</b>	Shielded Room
<b>Temperature</b>	24.1 / 24.9 °C
<b>Relative Humidity</b>	49.6 / 51.8 %
<b>Test Date</b>	August 27, 2015 / August 31, 2015

#### - 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



Figure 1: Spectral Diagrams, Conducted Emission, AC Main Port, Line (L1)





## QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.152000	48.2	9.000	L1	9.6	17.7	65.9
0.156000	47.2	9.000	L1	9.6	18.5	65.7
0.162000	46.5	9.000	L1	9.6	18.9	65.4
0.166000	46.0	9.000	L1	9.6	19.2	65.2
0.196000	49.0	9.000	L1	9.6	14.8	63.8
0.200000	48.8	9.000	L1	9.6	14.8	63.6
3.888000	40.0	9.000	L1	9.8	16.0	56.0
3.958000	39.9	9.000	L1	9.8	16.1	56.0
4.030000	40.2	9.000	L1	9.8	15.8	56.0
4.242000	39.7	9.000	L1	9.8	16.4	56.0
4.312000	39.8	9.000	L1	9.8	16.2	56.0
4.382000	39.5	9.000	L1	9.8	16.5	56.0
15.764000	32.3	9.000	L1	10.2	27.7	60.0
16.616000	32.8	9.000	L1	10.2	27.2	60.0
16.684000	32.9	9.000	L1	10.2	27.1	60.0
16.756000	32.8	9.000	L1	10.2	27.2	60.0
16.964000	32.1	9.000	L1	10.2	27.9	60.0
17.110000	32.6	9.000	L1	10.2	27.4	60.0

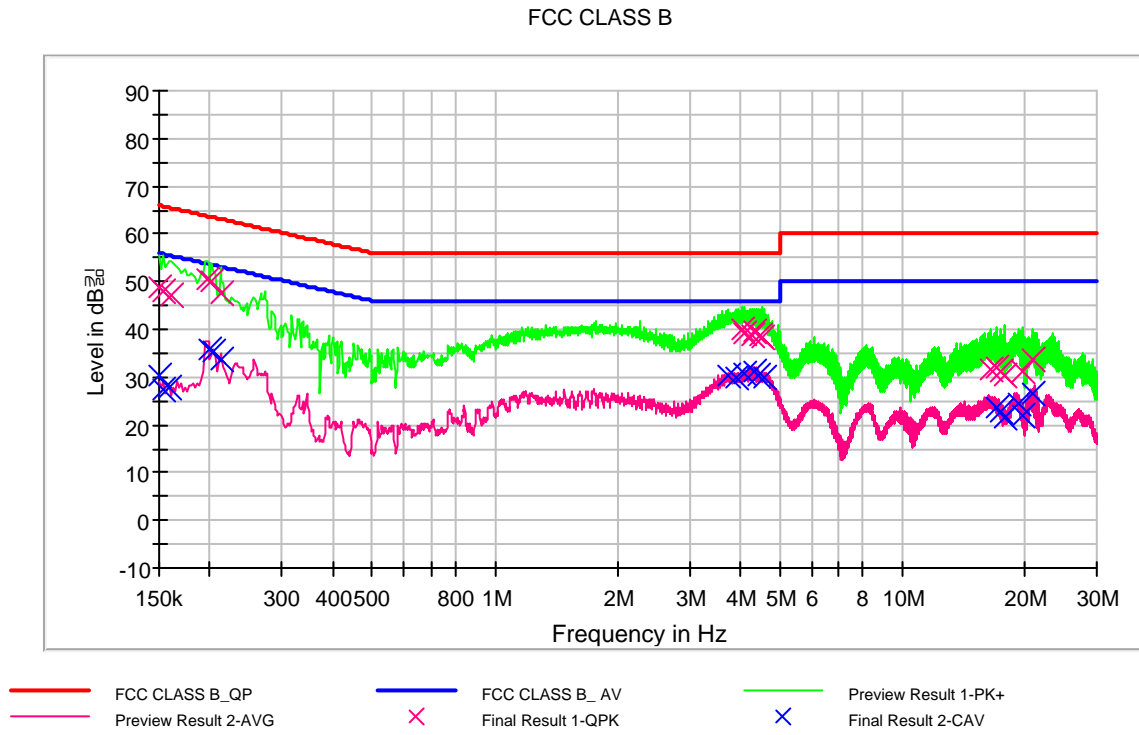


## CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	29.6	9.000	L1	9.6	26.4	56.0
0.154000	27.3	9.000	L1	9.6	28.5	55.8
0.158000	28.2	9.000	L1	9.6	27.4	55.6
0.162000	27.6	9.000	L1	9.6	27.8	55.4
0.196000	35.7	9.000	L1	9.6	18.1	53.8
0.200000	35.9	9.000	L1	9.6	17.7	53.6
3.888000	30.6	9.000	L1	9.8	15.4	46.0
3.958000	30.5	9.000	L1	9.8	15.5	46.0
4.242000	30.9	9.000	L1	9.8	15.1	46.0
4.312000	31.2	9.000	L1	9.8	14.8	46.0
4.382000	31.0	9.000	L1	9.8	15.0	46.0
4.456000	30.6	9.000	L1	9.8	15.4	46.0
15.764000	24.5	9.000	L1	10.2	25.5	50.0
16.964000	24.5	9.000	L1	10.2	25.5	50.0
17.110000	24.0	9.000	L1	10.2	26.0	50.0
17.536000	23.0	9.000	L1	10.2	27.0	50.0
18.806000	25.5	9.000	L1	10.3	24.5	50.0
20.926000	26.7	9.000	L1	10.3	23.3	50.0



Figure 2: Spectral Diagrams, Conducted Emission, AC Main Port, Line (N)







## QuasiPeak Final Result, Line (N)

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.150000	48.7	9.000	N	9.6	17.3	66.0
0.154000	48.1	9.000	N	9.6	17.7	65.8
0.160000	47.2	9.000	N	9.6	18.3	65.5
0.196000	50.4	9.000	N	9.6	13.4	63.8
0.202000	50.1	9.000	N	9.6	13.4	63.5
0.212000	47.7	9.000	N	9.6	15.4	63.1
4.030000	39.9	9.000	N	9.8	16.1	56.0
4.104000	39.3	9.000	N	9.8	16.7	56.0
4.294000	38.7	9.000	N	9.8	17.3	56.0
4.312000	39.4	9.000	N	9.8	16.6	56.0
4.456000	38.6	9.000	N	9.8	17.4	56.0
4.526000	38.4	9.000	N	9.8	17.6	56.0
16.406000	31.5	9.000	N	10.2	28.5	60.0
17.038000	32.0	9.000	N	10.2	28.0	60.0
17.464000	31.1	9.000	N	10.2	28.9	60.0
17.886000	30.4	9.000	N	10.2	29.6	60.0
19.654000	31.0	9.000	N	10.3	29.0	60.0
20.784000	33.9	9.000	N	10.3	26.1	60.0



## CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.150000	30.1	9.000	N	9.6	25.9	56.0
0.154000	27.3	9.000	N	9.6	28.5	55.8
0.158000	27.7	9.000	N	9.6	27.9	55.6
0.198000	35.9	9.000	N	9.6	17.8	53.7
0.204000	35.6	9.000	N	9.6	17.8	53.4
0.212000	33.8	9.000	N	9.6	19.3	53.1
3.716000	30.2	9.000	N	9.8	15.8	46.0
3.888000	30.0	9.000	N	9.8	16.0	46.0
4.102000	30.9	9.000	N	9.8	15.1	46.0
4.312000	31.0	9.000	N	9.8	15.0	46.0
4.424000	30.5	9.000	N	9.8	15.5	46.0
4.600000	29.7	9.000	N	9.8	16.3	46.0
17.038000	23.8	9.000	N	10.2	26.2	50.0
17.464000	22.6	9.000	N	10.2	27.4	50.0
17.886000	21.7	9.000	N	10.2	28.3	50.0
19.374000	24.6	9.000	N	10.3	25.4	50.0
19.654000	22.1	9.000	N	10.3	27.9	50.0
20.784000	26.3	9.000	N	10.3	23.7	50.0



## 4.2 Radiated Emission Test

The test results of radiated emission provide the following information:

### -For Measurement Below 1 GHz

<b>Rule Part / Standard</b>	FCC PART 15 Subpart B Class B
<b>Detector</b>	Quasi-Peak
<b>Bandwidth</b>	120 kHz (6 dB)
<b>Operation Mode</b>	Data Communication mode
<b>USB Cable Type</b>	CRESYN ※NOTE: The worst-case emissions are reported.
<b>Kind of Test Site</b>	3 m semi anechoic chamber
<b>Temperature</b>	22.4 °C
<b>Relative Humidity</b>	50.5 %
<b>Test Date</b>	September 12, 2015

Frequency (MHz)	Quasi Peak (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
34.127776	27.7	115.0	V	136.0	14.9	12.3	40.0
85.228858	33.7	250.0	H	108.0	11.6	6.3	40.0

### - 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>	1.2 GHz
<b>Testing Frequency Range</b>	1 GHz to 6 GHz
<b>Operation Mode</b>	Data Communication mode
<b>USB Cable Type</b>	CRESYN ※NOTE: The worst-case emissions are reported.
<b>Kind of Test Site</b>	3 m semi anechoic chamber
<b>Temperature</b>	24.3 °C
<b>Relative Humidity</b>	50.1 %
<b>Test Date</b>	August 28, 2015

Frequency (MHz)	Peak (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1995.240481	56.3	100.0	V	223.0	-7.9	17.7	74.0

Frequency (MHz)	CAverage (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1995.240481	39.0	100.0	V	223.0	-7.9	15.0	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	01.13.2015
<input checked="" type="checkbox"/> LISN	Rohde & Schwarz	ENV216	100073	1 year	01.13.2015
<input checked="" type="checkbox"/> LISN	Rohde & Schwarz	ESH3-Z5	100282	1 year	06.11.2015
<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	04.01.2015
<input checked="" type="checkbox"/> Trilog Antenna	Schwarzbeck	VULB9160	3301	2 year	11.17.2014
<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"/> EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	06.05.2015
<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	04.01.2015
<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	07.06.2015
<input checked="" type="checkbox"/> Power Amplifier	CERNEX	CBLU5183530	24348	1 year	06.15.2015
<input checked="" type="checkbox"/> Horn Antenna	Schwarzbeck	BBHA 9120D	296	2 year	10.07.2014
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	06.05.2015
<input type="checkbox"/> Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
<input checked="" type="checkbox"/> Software	Rohde & Schwarz	EMC32	-	-	-



## 6. CONCLUSION

The data collected shows that the **EUT Type: Cellular/PCS GSM/WCDMA/LTE Phone with WLAN and Bluetooth, FCC ID: ZNFH650, Model: LG-H650** complies with §15.107 and §15.109 of the FCC rules.