



HCT CO., LTD.

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## EMI CERTIFICATION REPORT

**Applicant:**

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

**Date of Issue:** June 04, 2013

**Test Report No.:** HCTE1306FE04

**Test Site:** HCT CO., LTD.

**HCT FRN:** 0005-8664-21

**FCC ID:**

**ZNFE440**

Rule Part(s) / Standard(s) : FCC PART 15 Subpart B Class B  
Equipment Type : GSM Phone with Bluetooth3.0, WIFI802.11 b/g/n  
Model Name : LG-E440  
Additional Model Name : LGE440, E440  
Port / Connector(s) : USB / Earphone Port  
Date of Test : June 03, 2013

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 subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

**Report prepared by**  
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## DOCUMENT HISTORY

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The revision history for this document is shown in table.

Version	Date	Description
HCTE1306FE04	June 04, 2013	Initial Release

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**ATTACHMENT: TEST SETUP PHOTOGRAPHS**

## 1. GENERAL INFORMATION

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### 1.1 Product Description

Equipment Under Test is **EUT type: GSM Phone with Bluetooth3.0, WIFI802.11 b/g/n, Model: LG-E440** manufactured by **LG Electronics MobileComm U.S.A., Inc.** Its basic purpose is used for communications.

<b>Model</b>	LG-E440
<b>FCC ID</b>	ZNFE440
<b>Additional Model</b>	LGE440, E440
<b>EUT Type</b>	GSM Phone with Bluetooth3.0, WIFI802.11 b/g/n
<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)
<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)

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

Original submittal only.

### 1.3 Tested System Details

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

Device Type	Manufacturer	Model Name	FCC ID / DoC	Connected To
EUT	LG	LG-E440	ZNFE440	Notebook PC Ear-phone
USB cable	INTERFACESAMIL	EAD62377901	-	E.U.T Notebook PC
Ear-phone	I-SOUND	EAB62808711	-	E.U.T
Notebook PC	H.P	ProBook6560b	DoC	EUT Notebook PC adaptor
Notebook PC adaptor	CHICONY POWER TECHNOLOGY	Series PPP012H-S	-	Notebook PC
Mouse	Radio shack	Series 2-button mouse	FSUGMZE3	Notebook PC
Adaptor	Yang Ming Industrial	DA-60M12	-	Gateway
Gateway	Axesstel	MV440R	-	Notebook PC, Adaptor
RJ45 cable	-	-	-	Notebook PC, Gateway
Micro SD card	SanDisk	8 GB	-	E.U.T

### 1.4 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)1.1
	Ear-phone	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.

### 1.5 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
	Ear-phone	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

## 1.6 Test Methodology

Both Conducted and Radiated testing was performed according to the procedures in ANSI C63.4/2003. Radiated testing was performed at an antenna to EUT distance of 3 m

## 1.7 Test Facility

Chamber used to collect the test data is located at the 74, SEOICHEON-RO, 578BEON-GIL, MAJANG-MYEON, ICHEON-SI, GYEONGGI-DO, KOREA. Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4.

Measurement Facilities	Reg. No.
Radiated Field strength measurement facility (3m)	90661(Mar. 02, 2011)
Radiated Field strength measurement facility (10m)	90661 (Sep. 03, 2010)

## 1.8 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. SYSTEM TEST CONFIGURATION

### 2.1 Configuration of Test System

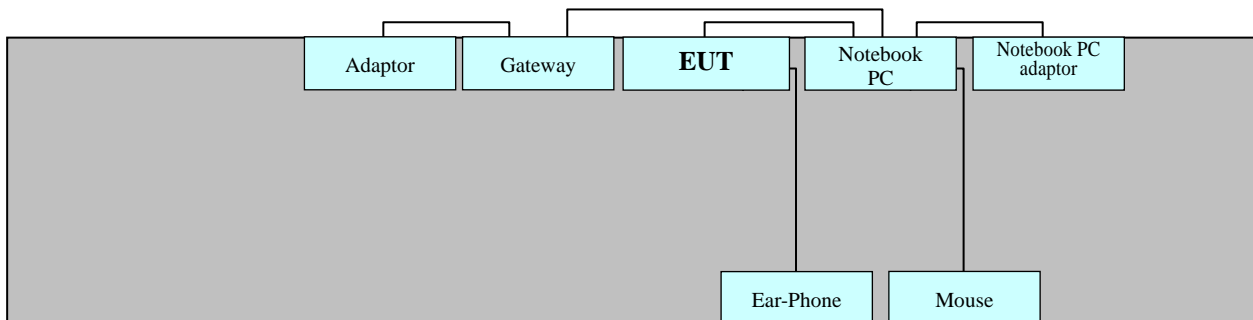
#### 2.1.1 Conducted Emission Test

EUT was connected to LISN via Notebook PC adaptor and Base Station. Preliminary Power Line Conducted Emission tests were performed by using the procedure in ANSI C63.4/2003 7.2.3 to determine the worst operating conditions.

#### 2.1.2 Radiated Emission Test

Preliminary Radiated Emission tests were performed by using the procedure in ANSI C63.4/2003 8.3.1.1 to determine the worst operating condition. Final Radiated Emission tests were performed at 3 m semi-anechoic chamber.

[ Configuration of Tested System ]



Non-Conductive Table  
Power Line: 120 VAC



### **3. PRELIMINARY TEST**

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#### **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 following table shows the highest levels of conducted emissions on both polarization of hot and neutral line.

Limit Apply to	: FCC PART 15 Subpart B Class B
Detector	: Quasi-Peak, Average (6 dB Bandwidth: 9 kHz)
Operation Mode	: Data Communication mode
Temperature	: 23.9 °C
Humidity Level	: 50.2 %
Test Date	: June 03, 2013

Frequency (MHz)	Transd (dB)	Conductor	Quasi-Peak			Average		
			Limit	Measurement Level	Result Level	Limit	Measurement Level	Result Level
			(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dBuV)
0.486	9.8	H	56	24.7	34.5	46	12.40	22.20
0.584	9.8	H	56	24.7	34.5	46	-	-
1.556	10.1	N	56	-	-	46	15.20	25.30
1.876	9.9	H	56	-	-	46	14.20	24.10
16.036	11.1	N	60	-	-	50	14.60	25.70
16.560	11.1	N	60	-	-	50	15.60	26.70

※ **NOTE:** Refer to page 11 to page 14 for details.

1. Line H = Hot, Line N = Neutral
2. Transd = LISN factor + Cable Loss factor

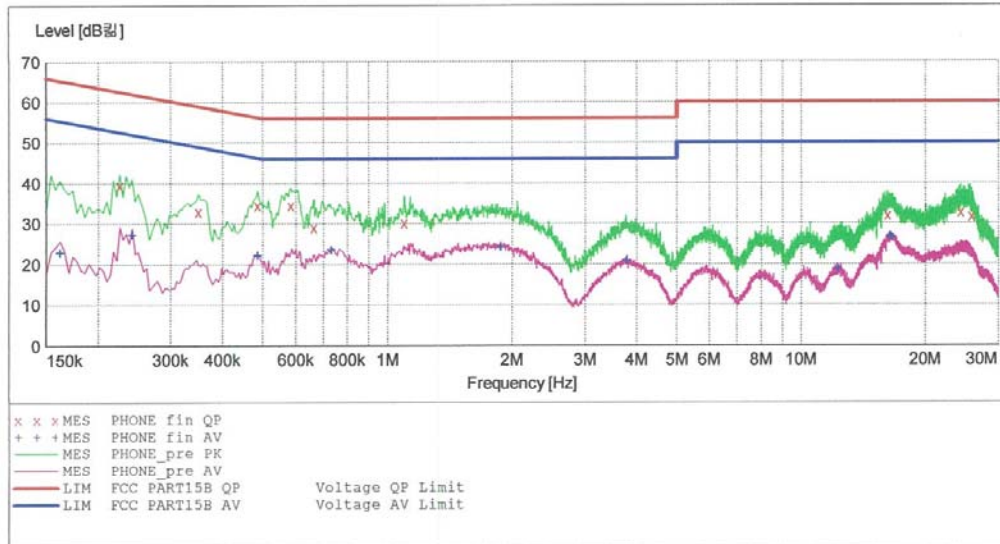
**HCT**

**EMC**

EUT: LG-E440  
 Manufacturer: LG  
 Operating Condition: DATA MODE  
 Test Site: SHIELD ROOM  
 Operator: GC YOON  
 Test Specification: FCC PART15 B  
 Comment: H

**SCAN TABLE: "FCC CLASS B(H)"**

Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	4.0 kHz	KN22 CLASS B	10.0 ms	9 kHz	None
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



**MEASUREMENT RESULT: "PHONE\_fin\_QP"**

2013-06-03 4:54 Ω. ㄸ

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.226001	39.40	9.8	63	23.2	---	---
0.350001	33.00	9.8	59	26.0	---	---
0.486001	34.50	9.8	56	21.8	---	---
0.584000	34.50	9.8	56	21.5	---	---
0.664000	29.00	9.8	56	27.0	---	---
1.100000	30.20	9.9	56	25.8	---	---
16.152000	31.90	10.8	60	28.1	---	---
24.332000	32.70	11.1	60	27.3	---	---
25.892000	31.70	11.2	60	28.3	---	---

**MEASUREMENT RESULT: "PHONE\_fin AV"**

2013-06-03 4:54 Ω-ㅜ

Frequency MHz	Level dB <sub>μV</sub>	Transd dB	Limit dB <sub>μV</sub>	Margin dB	Line	PE
0.162001	22.80	9.8	55	32.5	---	---
0.242001	27.30	9.8	52	24.7	---	---
0.486001	22.20	9.8	46	24.0	---	---
0.732000	23.50	9.8	46	22.5	---	---
1.876000	24.10	9.9	46	21.9	---	---
3.792000	20.80	10.1	46	25.2	---	---
12.264000	18.70	10.6	50	31.3	---	---
16.452000	26.70	10.8	50	23.3	---	---
16.556000	26.50	10.8	50	23.5	---	---

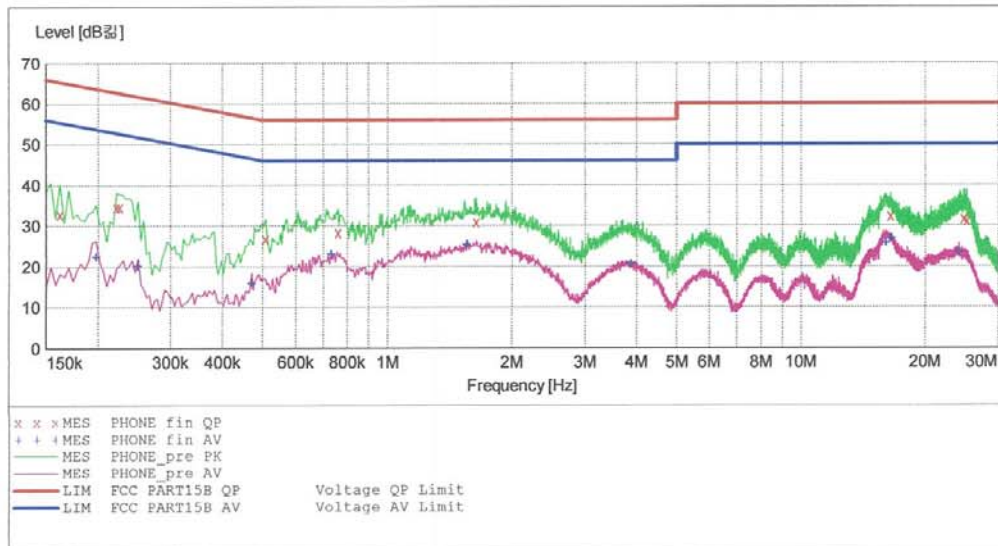
**HCT**

**EMC**

EUT: LG-E440  
 Manufacturer: LG  
 Operating Condition: DATA MODE  
 Test Site: SHIELD ROOM  
 Operator: GC YOON  
 Test Specification: FCC PART15 B  
 Comment: N

**SCAN TABLE: "FCC CLASS B(N)"**

Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	4.0 kHz	KN22 CLASS B	10.0 ms	9 kHz	None
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



**MEASUREMENT RESULT: "PHONE\_fin QP"**

2013-06-03 4:50 오후

Frequency MHz	Level dB	Transd dB	Limit dB	Margin dB	Line	PE
0.162001	32.90	10.0	65	32.4	---	---
0.222001	34.60	10.0	63	28.1	---	---
0.226001	34.70	10.0	63	27.9	---	---
0.508000	26.90	10.0	56	29.1	---	---
0.760000	28.40	10.0	56	27.6	---	---
1.640000	30.90	10.1	56	25.1	---	---
16.484000	32.30	11.1	60	27.7	---	---
24.748000	31.80	11.5	60	28.2	---	---
25.196000	31.20	11.6	60	28.8	---	---

**MEASUREMENT RESULT: "PHONE\_fin AV"**

2013-06-03 4:50오후

Frequency MHz	Level dB <sub>μV</sub>	Transd dB	Limit dB <sub>μV</sub>	Margin dB	Line	PE
0.198001	22.40	10.0	54	31.3	---	---
0.250001	20.20	10.0	52	31.6	---	---
0.470001	16.00	10.0	47	30.5	---	---
0.732000	23.00	10.0	46	23.0	---	---
1.556000	25.30	10.1	46	20.7	---	---
3.880000	20.60	10.3	46	25.4	---	---
16.036000	25.70	11.1	50	24.3	---	---
16.560000	26.70	11.1	50	23.3	---	---
24.148000	23.50	11.5	50	26.5	---	---

## 4.2 Radiated Emission Test

The following table shows the highest levels of Radiated Emissions on both polarization of horizontal and vertical.

### -For measurement below 1 GHz

Limit Apply to : FCC PART 15 Subpart B Class B

Detector : Quasi-Peak (6 dB Bandwidth: 120 kHz)

Operation Mode : Data Communication mode

Temperature : 23.0 °C

Humidity Level : 54.1 %

Test Date : June 03, 2013

Frequency (MHz)	Reading (dBuV)	Polarity (H/V)	Antenna Height (m)	Correction Factor		Limit (dBuV/m)	Level (dBuV/m)	Margin (dB)
				Antenna (dB/m)	Cable (dB)			
41.900	10.94	V	1.0	12.16	3.50	40.0	26.6	13.4
44.000	14.24	V	1.2	12.34	3.53	40.0	30.1	9.9
47.000	12.84	V	1.0	12.41	3.55	40.0	28.8	11.2
51.600	9.82	V	1.0	12.30	3.57	40.0	25.7	14.3
77.500	16.67	V	1.0	8.68	3.75	40.0	29.1	10.9
200.100	14.27	H	1.0	9.79	4.34	43.5	28.4	15.1

**-For measurement above 1 GHz**

Limit Apply to : FCC PART 15 Subpart B Class B

Detector : Peak mode: Peak (RBW: 1 MHz, VBW: 1 MHz)  
 : Average mode: Peak (RBW: 1 MHz, VBW: 10 Hz)

Operation Mode : Data Communication mode

Temperature : 23.0 °C

Humidity Level : 54.1 %

Test Date : June 03, 2013

Frequency (GHz)	Peak			POL	Average		
	Total (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)		Total (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
1.9921	48.10	74	25.9	V	30.10	54	23.9
2.0241	47.40	74	26.6	V	31.00	54	23.0

**※ NOTE:**

1. Measurement above 1 GHz was performed from 1 GHz to the 5<sup>th</sup> harmonic of highest fundamental frequency. Test was measured by 12 GHz.



## 5. FIELD STRENGTH CALCULATION

The field strength is calculated by adding the antenna factor and cable factor.  
The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

Where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 21.5 dB $\mu$ V is obtained. The antenna factor of 7.4 dB/m and a cable factor of 1.1 dB are added. The 30 dB $\mu$ V/m value is mathematically converted to its corresponding level in  $\mu$ V/m.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dB}\mu\text{V}/\text{m}$$

### [Radiated Emission Limits]

Frequency of Emission (MHz)	Field Strength	
	$\mu$ V/m	dB $\mu$ V/m
30 to 88	100	40.0
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

## 6. TEST EQUIPMENT

<u>Type</u>	<u>Manufacturer</u>	<u>Model Name</u>	<u>Serial Number</u>	<u>Calibration Cycle</u>	<u>Next CAL Date</u>
<b><u>Conducted Emission</u></b>					
<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESCI	100584	1 year	2014.04.25
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESCI	100033	1 year	2013.06.18
<input type="checkbox"/> LISN	Rohde & Schwarz	ESH3-Z5	100282	1 year	2013.07.04
<input checked="" type="checkbox"/> LISN	EMCO	3816/2SH	9706-1070	1 year	2014.04.26
<input checked="" type="checkbox"/> LISN	Rohde & Schwarz	ENV216	100073	1 year	2014.02.06
<input type="checkbox"/> Attenuator	Rohde & Schwarz	ESH3-Z2	357.8810.352	1 year	2013.07.31

### **Radiated Emission**

-For measurement below 1 GHz

<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	2014.04.16
<input checked="" type="checkbox"/> Trilog Antenna	Schwarzbeck	VULB9160	3301	2 year	2014.12.17
<input checked="" type="checkbox"/> Antenna master	HD GmbH	MA240	240/520	N/A	-
<input checked="" type="checkbox"/> Turn Table	HD GmbH	2090	9702/1224	N/A	-

-For measurement above 1 GHz

<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	2014.04.16
<input checked="" type="checkbox"/> Antenna master	HD GmbH	MA240	240/520	N/A	-
<input checked="" type="checkbox"/> Turn Table	HD GmbH	2090	9702/1224	N/A	-
<input checked="" type="checkbox"/> Power Amplifier	Rohde & Schwarz	SCU-18	10094	1 year	2013.09.11
<input checked="" type="checkbox"/> Horn Antenna	Schwarzbeck	BBHA 9120D	296	2 year	2014.12.13

## 7. CONCLUSION

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The data collected shows that the **EUT type: GSM Phone with Bluetooth3.0, WIFI802.11 b/g/n, FCC ID: ZNFE440, Model: LG-E440** complies with §15.107 and §15.109 of the FCC rules.