

# EMI CERTIFICATION REPORT

**Applicant:**

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

**Date of Receipt: May 13, 2014****Date of Issue: June 19, 2014****Test Report No. HCT-E-1406-F003-1****HCT FRN: 0005866421****FCC ID:****ZNFB460**

**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** : GSM Phone with Bluetooth, GPS  
**Model Name** : LG-B460  
**Additional Model Name** : LGB460, B460, LG441G  
**Port** : USB Port  
**Date of Test** : May 27, 2014 - May 29, 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**

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EMC Team  
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**Reviewed By**

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## DOCUMENT HISTORY

The revision history for this document is shown in table.

Version	Date	Description
HCT-E-1406-F003	June 02, 2014	Initial Release
HCT-E-1406-F003-1	June 19, 2014	Correct Operation Mode



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**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-B460
<b>FCC ID</b>	ZNFB460
<b>Additional Model</b>	LGB460, B460, LG441G
<b>EUT Type</b>	GSM Phone with Bluetooth, GPS
<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-B460	LG	ZNFB460	Notebook PC
USB cable	EAD62377902	Ningbo Broad	-	EUT, Notebook PC
USB cable	EAD62377903	KSD	-	EUT, Notebook PC
Notebook PC	ProBook6560b	HP	DoC	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



## 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)1.2
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
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). 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(dB $\mu$ V)	Average(dB $\mu$ V)
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 ( $\mu V/m$ )	Quasi-Peak (dB $\mu V/m$ )
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 (dB $\mu V/m$ )	Average (dB $\mu V/m$ )
Above 1 000	3	74	54

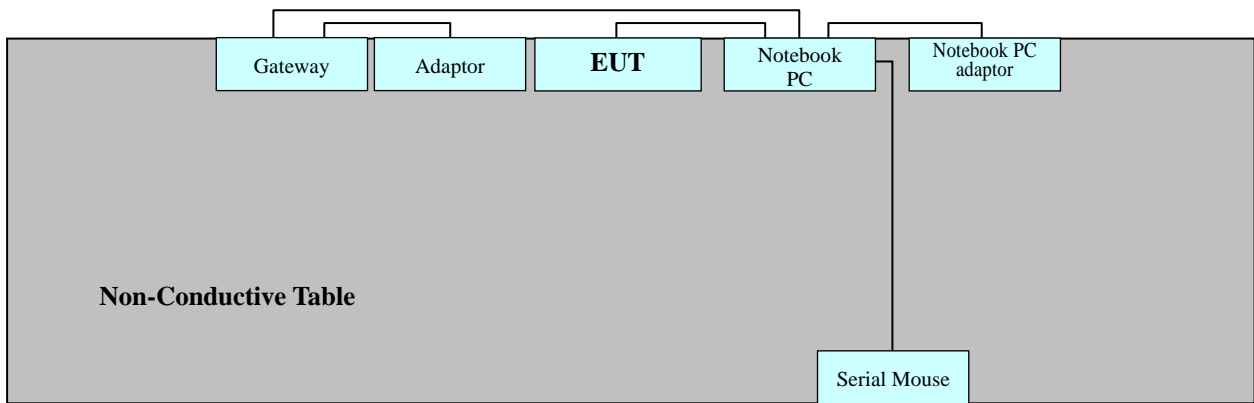


### 2.2.1 Frequency Range of Radiated Measurements

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 link mode, after connecting all peripheral devices.

**Operation Mode:**       Data link mode

#### 3. 2 Radiated Emission Test

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

**Operation Mode:**       Data link mode



## 4. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

### 4.1 Conducted Emission Test

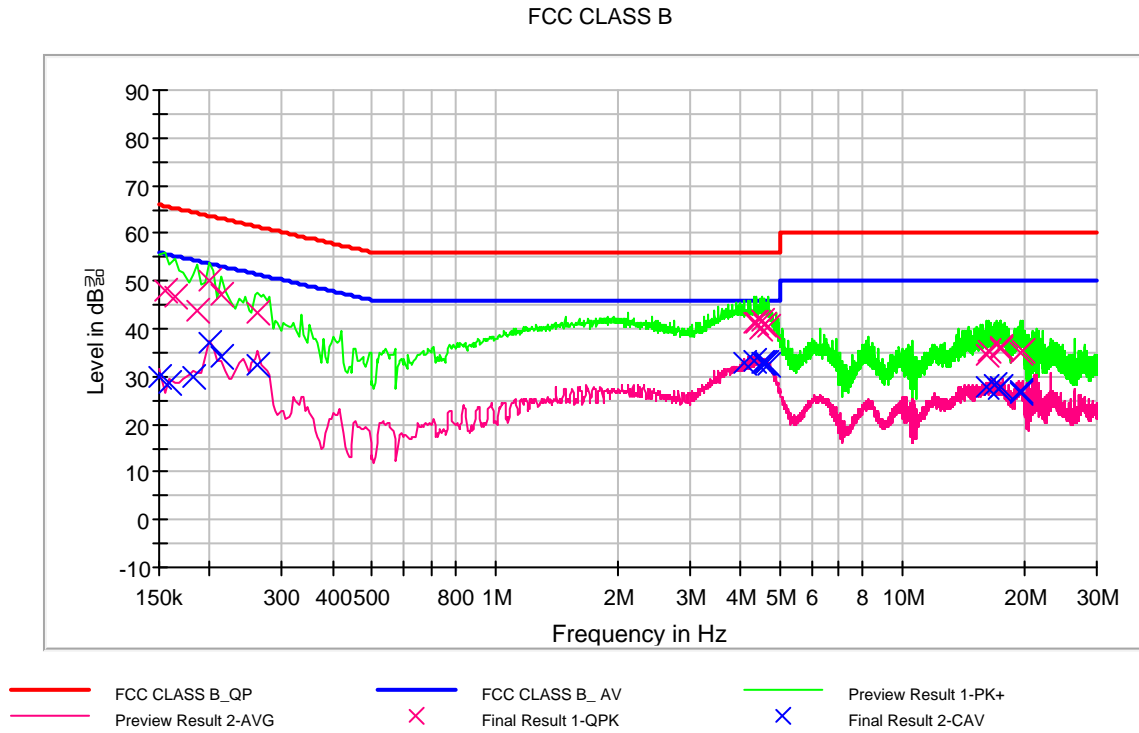
The following table shows the highest levels of conducted emissions on both polarization of hot and neutral line.

Limit Apply to	: FCC PART 15 Subpart B Class B
Detector	: Quasi-Peak, CISPR-Average
6 dB Bandwidth	: 9 kHz
Operation Mode	: Data link mode
USB Manufacturer	: KSD
	※ The worst-case emissions are reported.
Temperature	: 24.8°C
Relative Humidity	: 43.2 %
Test Date	: May 27, 2014

※ NOTE: Refer to page 13 to page 18 for test data.



**Figure 1: Spectral Diagrams, Conducted Emission, Phase (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



## Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154500	48.0	9.000	L1	9.7	17.8	65.8
0.163500	46.5	9.000	L1	9.7	18.8	65.3
0.186000	43.8	9.000	L1	9.7	20.4	64.2
0.199500	50.1	9.000	L1	9.7	13.5	63.6
0.213000	47.1	9.000	L1	9.7	16.0	63.1
0.262500	43.5	9.000	L1	9.7	17.9	61.4
4.316000	41.3	9.000	L1	10.1	14.7	56.0
4.388000	41.1	9.000	L1	10.1	14.9	56.0
4.460000	40.2	9.000	L1	10.1	15.8	56.0
4.527500	41.5	9.000	L1	10.1	14.5	56.0
4.599500	40.9	9.000	L1	10.1	15.1	56.0
4.667000	40.5	9.000	L1	10.1	15.5	56.0
16.155500	34.5	9.000	L1	10.7	25.5	60.0
16.344500	35.5	9.000	L1	10.7	24.5	60.0
17.330000	36.2	9.000	L1	10.8	23.8	60.0
17.474000	35.6	9.000	L1	10.8	24.4	60.0
19.598000	34.8	9.000	L1	10.9	25.2	60.0
19.737500	35.5	9.000	L1	10.9	24.5	60.0

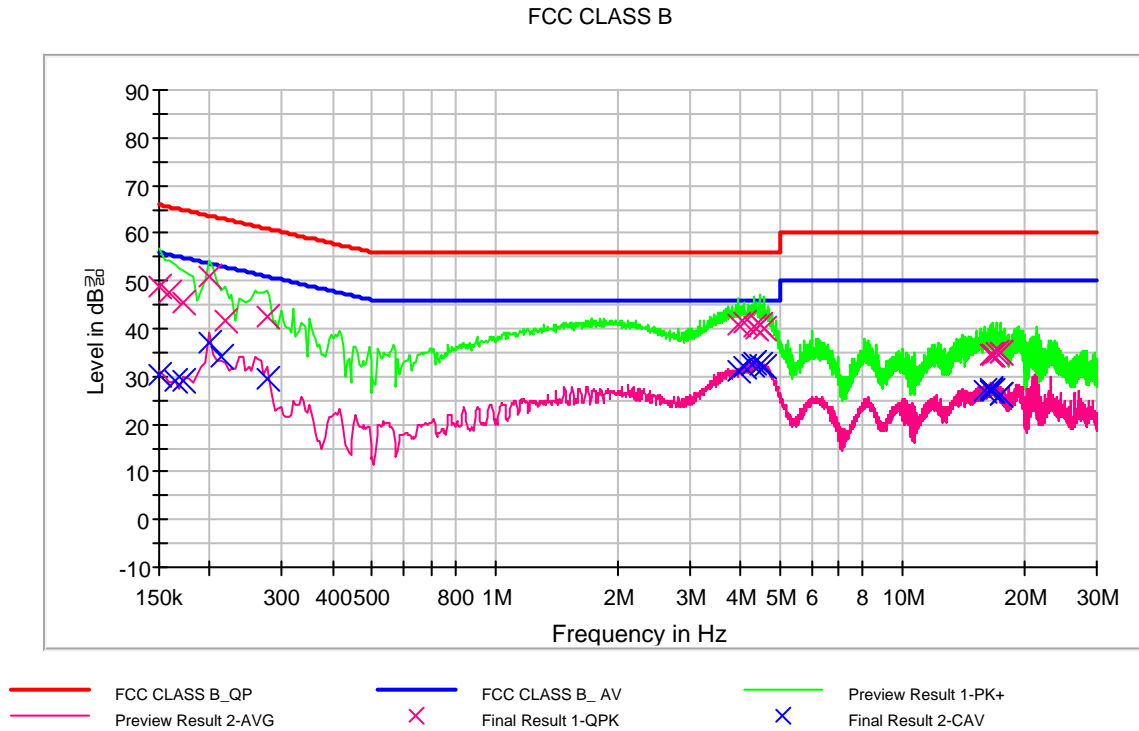


## Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	30.1	9.000	L1	9.7	25.9	56.0
0.159000	28.9	9.000	L1	9.7	26.6	55.5
0.181500	29.8	9.000	L1	9.7	24.6	54.4
0.199500	37.2	9.000	L1	9.7	16.4	53.6
0.213000	34.1	9.000	L1	9.7	19.0	53.1
0.262500	32.3	9.000	L1	9.7	19.1	51.4
4.104500	32.8	9.000	L1	10.1	13.2	46.0
4.316000	33.4	9.000	L1	10.1	12.6	46.0
4.527500	33.0	9.000	L1	10.1	13.0	46.0
4.599500	32.9	9.000	L1	10.1	13.2	46.0
4.617500	32.7	9.000	L1	10.1	13.3	46.0
4.667000	32.4	9.000	L1	10.1	13.6	46.0
16.088000	27.9	9.000	L1	10.7	22.1	50.0
16.799000	28.1	9.000	L1	10.7	21.9	50.0
17.244500	27.6	9.000	L1	10.8	22.4	50.0
17.330000	27.9	9.000	L1	10.8	22.1	50.0
19.517000	27.0	9.000	L1	10.9	23.0	50.0
19.598000	26.4	9.000	L1	10.9	23.6	50.0



**Figure 2: Spectral Diagrams, Conducted Emission, Phase (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





## Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	48.8	9.000	N	9.7	17.2	66.0
0.159000	47.4	9.000	N	9.7	18.1	65.5
0.172500	45.4	9.000	N	9.7	19.4	64.8
0.199500	50.9	9.000	N	9.7	12.7	63.6
0.217500	41.5	9.000	N	9.7	21.4	62.9
0.276000	42.7	9.000	N	9.7	18.2	60.9
3.960500	40.7	9.000	N	10.1	15.3	56.0
4.104500	41.1	9.000	N	10.1	14.9	56.0
4.316000	40.4	9.000	N	10.1	15.6	56.0
4.388000	39.8	9.000	N	10.1	16.2	56.0
4.455500	40.7	9.000	N	10.1	15.3	56.0
4.599500	40.0	9.000	N	10.1	16.0	56.0
16.551500	34.7	9.000	N	10.7	25.3	60.0
16.664000	34.4	9.000	N	10.7	25.6	60.0
16.695500	34.4	9.000	N	10.7	25.6	60.0
17.046500	35.1	9.000	N	10.7	24.9	60.0
17.330000	34.8	9.000	N	10.7	25.2	60.0
17.397500	34.8	9.000	N	10.7	25.2	60.0



## Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	30.5	9.000	N	9.7	25.5	56.0
0.163500	29.0	9.000	N	9.7	26.3	55.3
0.172500	28.9	9.000	N	9.7	25.9	54.8
0.199500	36.9	9.000	N	9.7	16.7	53.6
0.213000	34.0	9.000	N	9.7	19.1	53.1
0.276000	29.5	9.000	N	9.7	21.4	50.9
3.960500	31.1	9.000	N	10.1	14.9	46.0
4.104500	32.2	9.000	N	10.1	13.8	46.0
4.293500	32.6	9.000	N	10.1	13.4	46.0
4.316000	32.7	9.000	N	10.1	13.3	46.0
4.455500	32.4	9.000	N	10.1	13.6	46.0
4.599500	31.9	9.000	N	10.1	14.1	46.0
15.984500	27.1	9.000	N	10.6	22.9	50.0
16.470500	27.4	9.000	N	10.7	22.6	50.0
16.551500	27.0	9.000	N	10.7	23.0	50.0
16.727000	27.1	9.000	N	10.7	22.9	50.0
17.330000	26.3	9.000	N	10.7	23.7	50.0
17.397500	26.0	9.000	N	10.7	24.0	50.0



## 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: : RBW 120 kHz, VBW 300 kHz

Operation Mode : Data link mode

USB Manufacturer : Ningbo Broad

※ The worst-case emissions are reported.

Temperature : 23.5°C

Relative Humidity : 47.4 %

Test Date : May 29, 2014

Frequency (MHz)	Reading (dBuV)	Polarity (H/V)	Antenna Height (m)	Correction Factor		Limit (dBuV/m)	Total Level (dBuV/m)	Margin (dB)
				Antenna (dB/m)	Cable (dB)			
62.0	14.2	V	1.0	11.6	3.6	40.0	29.3	10.7
125.3	13.0	V	1.0	12.0	3.9	43.5	28.9	14.6
266.6	14.6	H	1.2	12.3	4.4	46.0	31.3	14.7
375.0	15.3	H	1.0	15.1	4.8	46.0	35.2	10.8
625.0	13.6	V	1.0	20.0	5.4	46.0	39.0	7.0

### ※ Calculation Formula:

1. Polarity H = Horizontal, Polarity V = Vertical
2. Reading (Receiver Reading) = Total Level – Correction Factor
3. Margin = Limit - Total Level
4. Total Level = Quasi-Peak



### -For Measurement Above 1 GHz

Limit Apply to : FCC PART 15 Subpart B Class B

Detector : Peak mode: Peak (RBW: 1 MHz, VBW: 3 MHz)  
Average mode: Peak (RBW: 1 MHz, VBW: 10 Hz)

Highest Operating Frequency : 230 MHz  
\* Test was measured up to 2 GHz.

Operation Mode : Data link mode

USB Manufacturer : KSD  
\* The worst-case emissions are reported.

Temperature : 23.5°C

Relative Humidity : 47.4 %

Test Date : May 29, 2014

Frequency (GHz)	Polarity (H/V)	Antenna Height (m)	Peak			Average		
			Total Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Total Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
1.3290	V	1.5	49.0	74	25.0	31.3	54	22.7
1.9927	V	1.0	55.9	74	18.1	39.4	54	14.6

#### \* Calculation Formula:

1. Polarity H = Horizontal, Polarity V = Vertical
2. Margin = Limit - Total Level



## 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 type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESCI	100033	1 year	06.23. 2013
<input type="checkbox"/> LISN	Rohde & Schwarz	ESH3-Z5	100282	1 year	07.03. 2013
<input type="checkbox"/> Attenuator	Rohde & Schwarz	ESH3-Z2	357.8810.352	1 year	07.03. 2013
<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"/> Turn Table	HD GmbH	2090	9702/1224	N/A	-
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	07.01. 2013
<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"/> Turn Table	HD GmbH	2090	9702/1224	N/A	-
<input checked="" type="checkbox"/> Power Amplifier	CERNEX	CBLU1183540	21691	1 year	07.24. 2013
<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	07.01. 2013
<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	CBL18265035	22966	1 year	07.24. 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: GSM Phone with Bluetooth, GPS, FCC ID: ZNFB460, Model: LG-B460** complies with §15.107 and §15.109 of the FCC rules.