

EMI CERTIFICATION REPORT

Applicant:

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

Date of Receipt: August 07, 2014**Date of Issue: August 22, 2014****Test Report No. HCT-E-1408-F016****HCT FRN: 0005866421****FCC ID:****ZNFLS660**

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: CDMA, LTE phone with Bluetooth and WLAN
Model Name: LG-LS660
Additional Model Name: LS660, LGLS660
Test Port: USB / Earphone Port
Date of Test: August 13, 2014 - August 18, 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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DOCUMENT HISTORY

The revision history for this document is shown in table.

Version	Date	Description
HCT-E-1408-F016	August 22, 2014	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.

Model	LG-LS660
FCC ID	ZNFLS660
Additional Model	LS660, LGLS660
EUT Type	CDMA, LTE phone with Bluetooth and WLAN
TX Frequency	824.70 MHz to 848.31 MHz (CDMA BC0) 1 851.25 MHz to 1 908.75 MHz (CDMA BC1) 817.90 MHz to 823.10 MHz (CDMA BC10) 1 850 MHz to 1 915 MHz (LTE B25) 814 MHz to 849 MHz (LTE B26) 2 496 MHz to 2 690 MHz (LTE B41)
RX Frequency	869.70 MHz to 893.31 MHz (CDMA BC0) 1 931.25 MHz to 1 988.75 MHz (CDMA BC1) 862.00 MHz to 894.00 MHz (CDMA BC10) 1 925 MHz to 1 990 MHz (LTE B25) 859 MHz to 894 MHz (LTE B26) 2 496 MHz to 2 690 MHz (LTE B41)

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-LS660	LG	ZNFLS660	Notebook PC, Earphone
USB cable	EAD62786801	Ningbo Broad	-	EUT, Notebook PC
Earphone	EAB62910502	CRESYN	-	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	N	(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	Quasi-Peak(dB μ V)	Average(dB μ 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

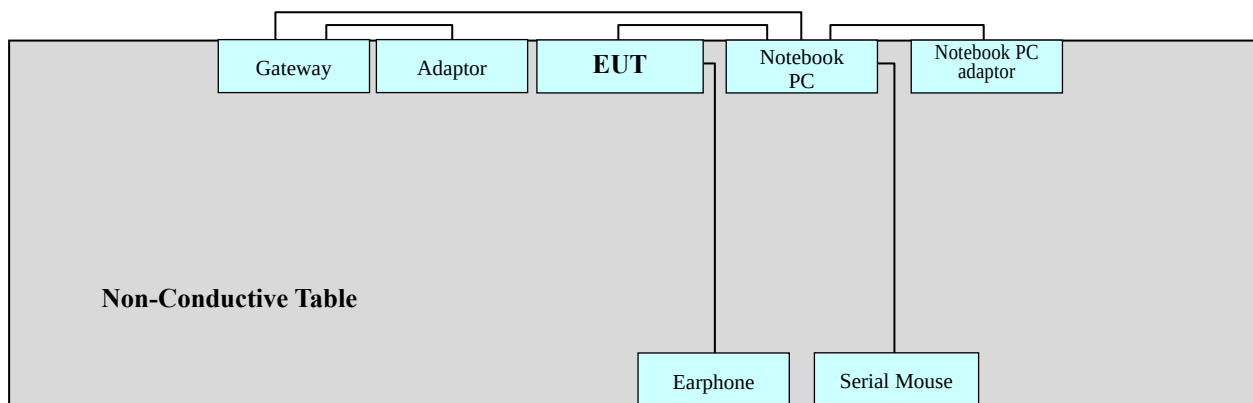


2.2.1 Frequency Range of Radiated Measurements

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 th 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

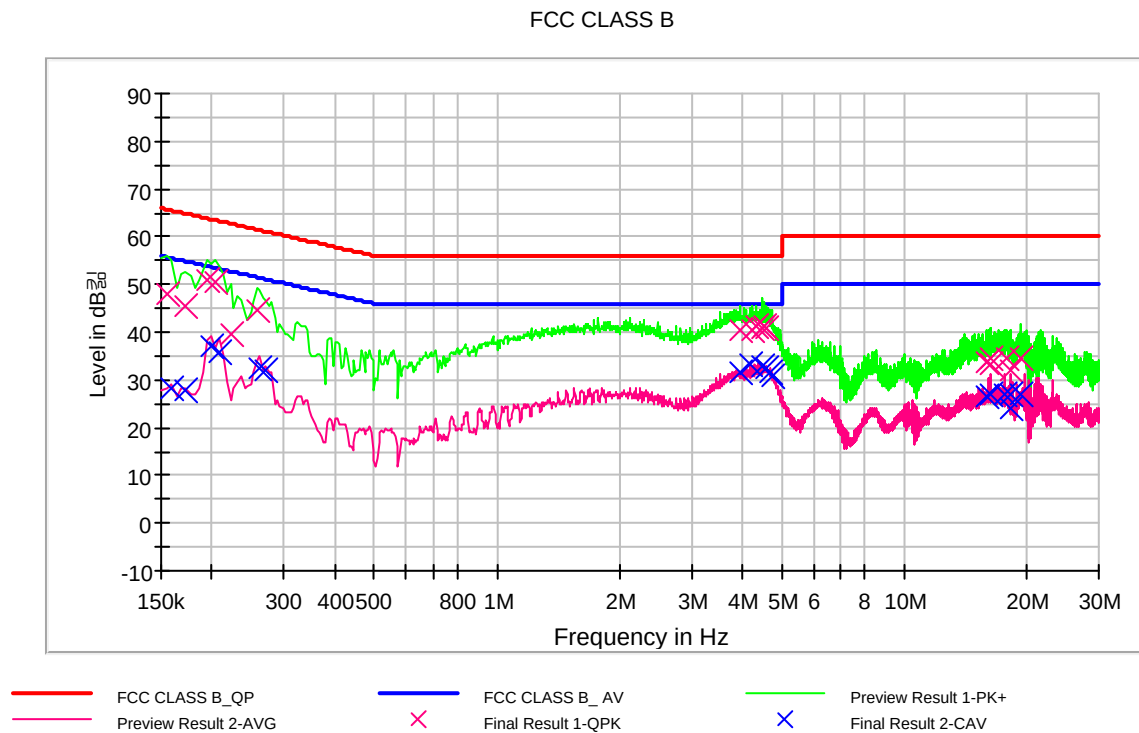
The test results of conducted emission at mains ports provide the following information:

Rule Part / Standard	FCC PART 15 Subpart B Class B
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 kHz (6 dB)
Operation Mode	Data Communication mode
Kind of Test Site	Shielded Room
Temperature	23.7 °C
Relative Humidity	58.8 %
Test Date	August 18, 2014

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



Figure 1: Spectral Diagrams, Conducted Emission, AC Mains (0.15 - 30)MHz, 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)
0.154500	48.1	9.000	L1	9.6	17.7	65.8
0.172500	45.4	9.000	L1	9.6	19.4	64.8
0.195000	51.0	9.000	L1	9.6	12.8	63.8
0.204000	50.4	9.000	L1	9.6	13.0	63.4
0.222000	39.4	9.000	L1	9.6	23.3	62.7
0.258000	44.6	9.000	L1	9.7	16.9	61.5
3.965000	40.5	9.000	L1	9.9	15.5	56.0
4.248500	40.4	9.000	L1	9.9	15.6	56.0
4.316000	41.4	9.000	L1	9.9	14.6	56.0
4.460000	40.7	9.000	L1	9.9	15.3	56.0
4.527500	41.1	9.000	L1	9.9	14.9	56.0
4.599500	40.8	9.000	L1	9.9	15.2	56.0
15.899000	33.6	9.000	L1	10.3	26.4	60.0
16.223000	33.5	9.000	L1	10.3	26.5	60.0
16.344500	34.6	9.000	L1	10.3	25.4	60.0
17.762000	34.7	9.000	L1	10.3	25.3	60.0
18.261500	32.2	9.000	L1	10.4	27.8	60.0
19.391000	34.6	9.000	L1	10.4	25.4	60.0

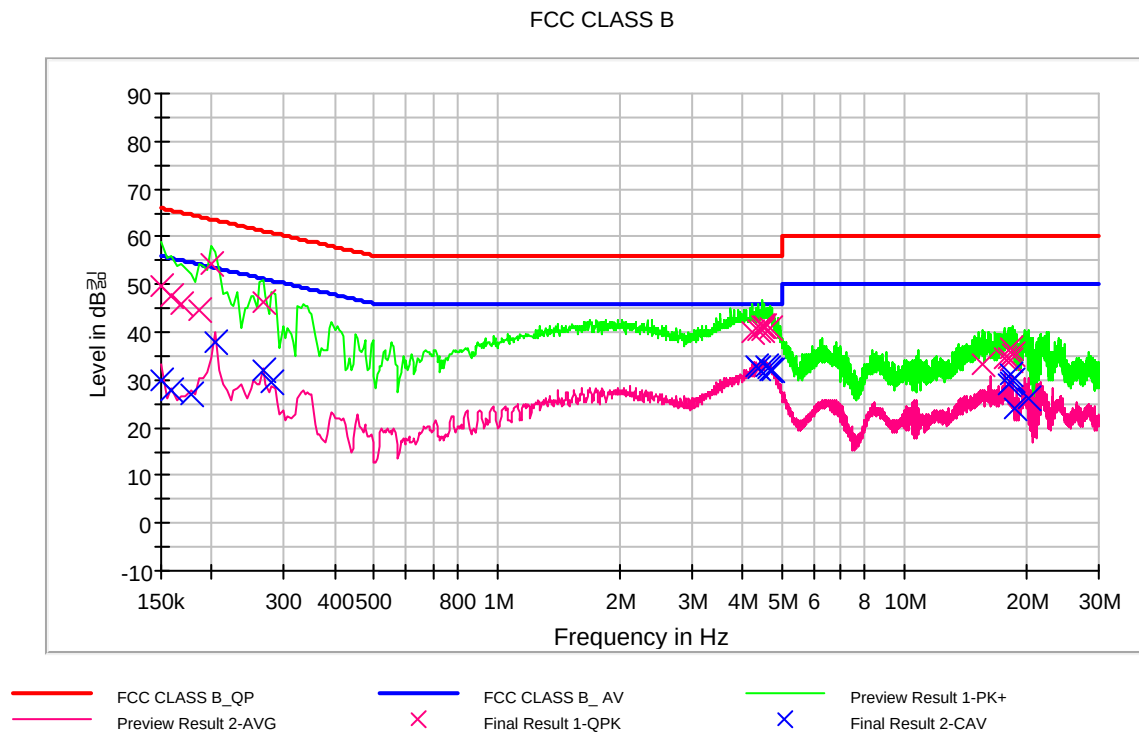


CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.159000	28.3	9.000	L1	9.6	27.2	55.5
0.172500	28.0	9.000	L1	9.6	26.8	54.8
0.199500	37.2	9.000	L1	9.6	16.4	53.6
0.208500	35.8	9.000	L1	9.6	17.5	53.3
0.262500	32.4	9.000	L1	9.7	19.0	51.4
0.271500	32.0	9.000	L1	9.7	19.1	51.1
3.965000	31.7	9.000	L1	9.9	14.3	46.0
4.172000	33.3	9.000	L1	9.9	12.7	46.0
4.460000	32.8	9.000	L1	9.9	13.2	46.0
4.599500	32.3	9.000	L1	9.9	13.7	46.0
4.680500	31.5	9.000	L1	9.9	14.5	46.0
4.739000	30.9	9.000	L1	9.9	15.1	46.0
15.899000	26.5	9.000	L1	10.3	23.5	50.0
16.344500	26.9	9.000	L1	10.3	23.1	50.0
17.618000	27.2	9.000	L1	10.3	22.8	50.0
18.180500	27.0	9.000	L1	10.4	23.0	50.0
18.261500	24.0	9.000	L1	10.4	26.0	50.0
19.391000	26.8	9.000	L1	10.4	23.2	50.0



Figure 2: Spectral Diagrams, Conducted Emission, AC Mains (0.15 - 30)MHz, 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	49.5	9.000	N	9.6	16.5	66.0
0.159000	47.7	9.000	N	9.6	17.8	65.5
0.168000	46.1	9.000	N	9.6	19.0	65.1
0.186000	44.4	9.000	N	9.7	19.8	64.2
0.199500	54.2	9.000	N	9.7	9.4	63.6
0.267000	46.5	9.000	N	9.7	14.7	61.2
4.235000	39.9	9.000	N	9.9	16.1	56.0
4.392500	40.3	9.000	N	9.9	15.7	56.0
4.460000	41.5	9.000	N	9.9	14.6	56.0
4.491500	40.3	9.000	N	9.9	15.7	56.0
4.532000	41.1	9.000	N	9.9	14.9	56.0
4.671500	40.7	9.000	N	9.9	15.3	56.0
15.579500	33.4	9.000	N	10.2	26.6	60.0
17.636000	34.7	9.000	N	10.3	25.3	60.0
17.987000	34.6	9.000	N	10.3	25.4	60.0
18.198500	34.0	9.000	N	10.3	26.0	60.0
18.243500	36.6	9.000	N	10.3	23.4	60.0
18.365000	35.4	9.000	N	10.3	24.6	60.0



CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	29.7	9.000	N	9.6	26.3	56.0
0.159000	27.9	9.000	N	9.6	27.6	55.5
0.177000	27.1	9.000	N	9.7	27.5	54.6
0.204000	37.8	9.000	N	9.7	15.6	53.4
0.267000	32.1	9.000	N	9.7	19.1	51.2
0.280500	29.6	9.000	N	9.7	21.2	50.8
4.320500	32.9	9.000	N	9.9	13.1	46.0
4.392500	32.6	9.000	N	9.9	13.4	46.0
4.604000	33.0	9.000	N	9.9	13.0	46.0
4.622000	32.3	9.000	N	9.9	13.7	46.0
4.671500	32.2	9.000	N	9.9	13.8	46.0
4.748000	31.8	9.000	N	9.9	14.2	46.0
17.937500	29.1	9.000	N	10.3	20.9	50.0
18.243500	31.4	9.000	N	10.3	18.6	50.0
18.306500	29.3	9.000	N	10.3	20.7	50.0
18.365000	29.8	9.000	N	10.3	20.2	50.0
18.621500	23.8	9.000	N	10.3	26.2	50.0
20.129000	26.2	9.000	N	10.3	23.8	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	24.8 °C
Relative Humidity	59.7 %
Test Date	August 13, 2014

Frequency (MHz)	Quasi Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
34.647776	32.7	100.0	V	207.0	14.8	7.3	40.0
85.428858	29.9	350.0	H	64.0	11.4	10.1	40.0
125.010501	34.9	100.0	V	246.0	15.9	8.6	43.5
266.554309	33.8	122.0	H	115.0	16.7	12.2	46.0
375.012024	38.9	100.0	H	269.0	19.9	7.1	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

Rule Part / Standard	FCC PART 15 Subpart B Class B
Detector	Peak mode: Peak (RBW: 1 MHz, VBW: 3 MHz) CISPR-Average mode: Peak (RBW: 1 MHz, VBW: 10 Hz)
Highest Operating Frequency	1.2 GHz
Testing Frequency Range	1 GHz to 6 GHz
Operation Mode	Data Communication mode
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.8 °C
Relative Humidity	59.7 %
Test Date	August 13, 2014

Frequency (MHz)	Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
1333.116233	51.0	100.0	V	108.0	-10.1	23.0	74.0
1998.847696	58.2	100.0	V	203.0	-9.7	15.8	74.0
2663.777555	51.5	100.0	V	13.0	-6.8	22.5	74.0
5990.931864	50.3	164.0	V	83.0	0.4	23.7	74.0

Frequency (MHz)	CAverage (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
1333.116233	31.6	100.0	V	108.0	-10.1	22.4	54.0
1998.847696	39.6	100.0	V	203.0	-9.7	14.4	54.0
2663.777555	33.0	100.0	V	13.0	-6.8	21.0	54.0
5990.931864	37.1	164.0	V	83.0	0.4	16.9	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>
<u>Conducted Emission</u>					
☒ EMI Test Receiver	Rohde & Schwarz	ESCI	100584	1 year	01.24. 2014
☒ LISN	EMCO	3816/2SH	9706-1070	1 year	04.07. 2014
☒ LISN	Rohde & Schwarz	ENV216	100073	1 year	01.29. 2014
☒ Software	Rohde & Schwarz	EMC32	-	-	-
<u>Radiated Emission</u>					
-For measurement below 1 GHz					
☒ EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	04.07. 2014
☒ Trilog Antenna	Schwarzbeck	VULB9160	3301	2 year	12.17. 2012
☒ Antenna master	HD GmbH	MA240	240/520	N/A	-
☒ Antenna master controller	HD GmbH	HD 100	100/637	N/A	-
☒ Turn Table	EMCO	1060-2M	-	N/A	-
☒ Turn Table controller	EMCO	2090	9702-1224	N/A	-
☐ EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	06.18.2014
☐ Trilog Antenna	Schwarzbeck	VULB9168	185	2 year	04.16. 2013
☐ Antenna master	INNCO Systems	MA4000-EP	MA4000/283	N/A	-
☐ Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
☒ Software	Rohde & Schwarz	EMC32	-	-	-
-For measurement above 1 GHz					
☒ EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	04.07. 2014
☒ Antenna master	HD GmbH	MA240	240/520	N/A	-
☒ Antenna master controller	HD GmbH	HD 100	100/637	N/A	-
☒ Turn Table	EMCO	1060-2M	-	N/A	-
☒ Turn Table controller	EMCO	2090	9702-1224	N/A	-
☐ Power Amplifier	CERNEX	CBLU1183540	21691	1 year	07.11.2014
☒ Power Amplifier	CERNEX	CBLU5183530	24348	1 year	06.11. 2014
☒ Horn Antenna	Schwarzbeck	BBHA 9120D	296	2 year	12.13. 2012
☐ EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	06.18. 2014
☐ Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
☐ Antenna master	INNCO Systems	MA4000-EP	MA4000/283	N/A	-
☐ Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170124	2 year	10.30. 2013
☐ Power Amplifier	CERNEX	CBL26405040	19660	1 year	04.04. 2014
☒ Software	Rohde & Schwarz	EMC32	-	-	-



6. CONCLUSION

The data collected shows that the **EUT Type: CDMA, LTE phone with Bluetooth and WLAN, FCC ID: ZNFLS660, Model: LG-LS660** complies with §15.107 and §15.109 of the FCC rules.