

EMI CERTIFICATION REPORT

Applicant:

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

Date of Receipt: June 17, 2014

Date of Issue: July 23, 2014

Test Report No. HCT-E-1407-F015-1

HCT FRN: 0005866421

FCC ID:

ZNFD690N

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/WCDMA/HSDPA/HSUPA
Phone with Bluetooth, WLAN and NFC
Model Name: LG-D690n
Additional Model Name: LG-D690N, LGD690n, LG-D693n, LG-D693N, LGD693n
Test Port: USB / Earphone Port
Date of Test: July 03, 2014 - July 04, 2014, July 23, 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



Jin-Pyo Hong
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DOCUMENT HISTORY

The revision history for this document is shown in table.

Version	Date	Description
HCT-E-1407-F015	July 16, 2014	Initial Release
HCT-E-1407-F015-1	July 23, 2014	Radiated Emission test (above 1 GHz) was re-measured due to highest operating frequency correction. (Clause 4.2)



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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.

Model	LG-D690n
FCC ID	ZNFD690N
Additional Model	LG-D690N, LGD690n, LG-D693n, LG-D693N, LGD693n
EUT Type	Cellular/PCS GSM/GPRS/EDGE Rx/WCDMA/HSDPA/HSUPA Phone with Bluetooth, WLAN and NFC
TX Frequency	824.2 MHz to 848.8 MHz (GSM 850) 1 850.2 MHz to 1 909.8 MHz (GSM 1 900) 826.4 MHz to 846.6 MHz (WCDMA 850) 1 852.4 MHz to 1 907.6 MHz (WCDMA 1 900)
RX Frequency	869.2 MHz to 893.8 MHz (GSM 850) 1 930.2 MHz to 1 989.8 MHz (GSM 1 900) 871.4 MHz to 891.6 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-D690n	LG	ZNFD690N	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(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 ($\mu\text{V}/\text{m}$)	Quasi-Peak (dB $\mu\text{V}/\text{m}$)
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 $\mu\text{V}/\text{m}$)	Average (dB $\mu\text{V}/\text{m}$)
Above 1 000	3	74	54

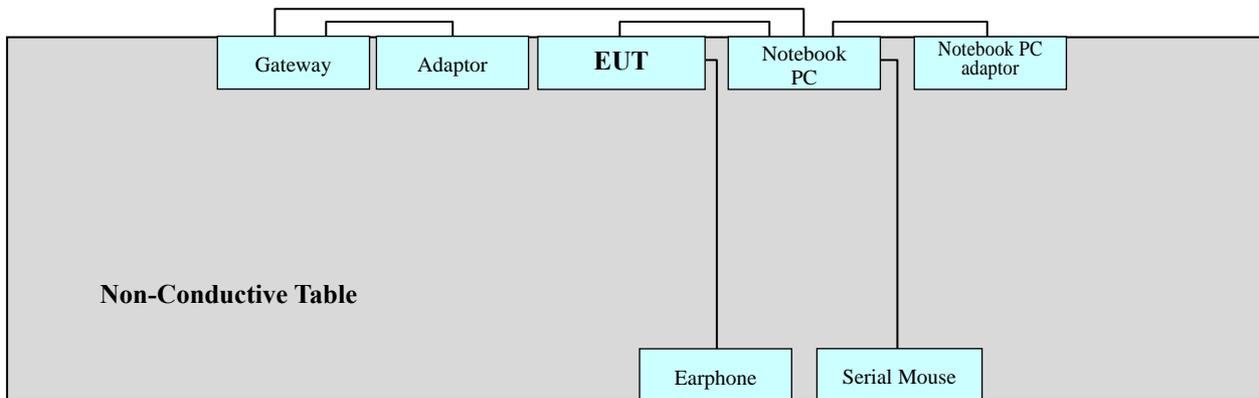


2.2.1 Frequency Range of Radiated Measurements

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

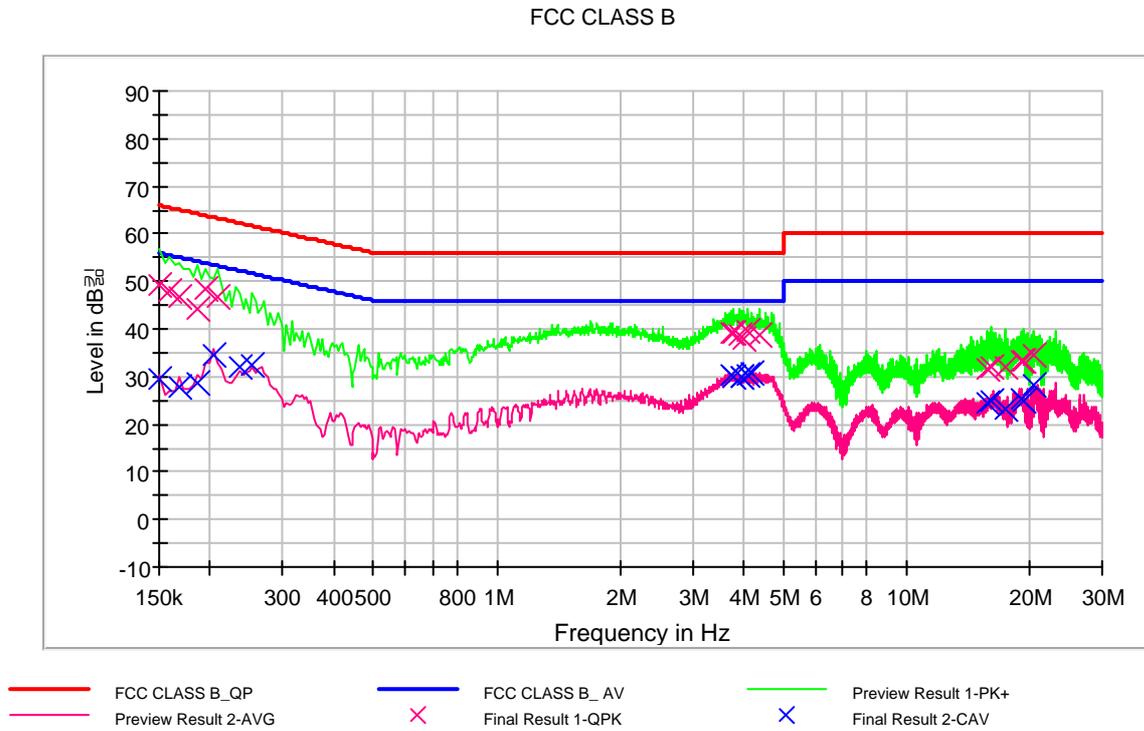
The test results of conducted emission at mains ports provide the following information:

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	24.6°C
Relative Humidity	55.2 %
Test Date	July 04, 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)
0.150000	49.3	9.000	L1	9.6	16.7	66.0
0.159000	47.8	9.000	L1	9.6	17.7	65.5
0.168000	46.6	9.000	L1	9.6	18.5	65.1
0.186000	44.4	9.000	L1	9.6	19.8	64.2
0.195000	48.3	9.000	L1	9.6	15.5	63.8
0.208500	46.6	9.000	L1	9.6	16.7	63.3
3.749000	39.3	9.000	L1	9.9	16.7	56.0
3.780500	39.3	9.000	L1	9.9	16.7	56.0
3.893000	38.7	9.000	L1	9.9	17.3	56.0
3.992000	38.0	9.000	L1	9.9	18.0	56.0
4.104500	39.5	9.000	L1	9.9	16.5	56.0
4.383500	38.7	9.000	L1	9.9	17.3	56.0
15.773000	31.5	9.000	L1	10.3	28.5	60.0
16.052000	32.0	9.000	L1	10.3	28.0	60.0
17.325500	32.0	9.000	L1	10.3	28.0	60.0
19.179500	33.2	9.000	L1	10.4	26.8	60.0
19.233500	33.2	9.000	L1	10.4	26.8	60.0
20.381000	34.6	9.000	L1	10.4	25.4	60.0

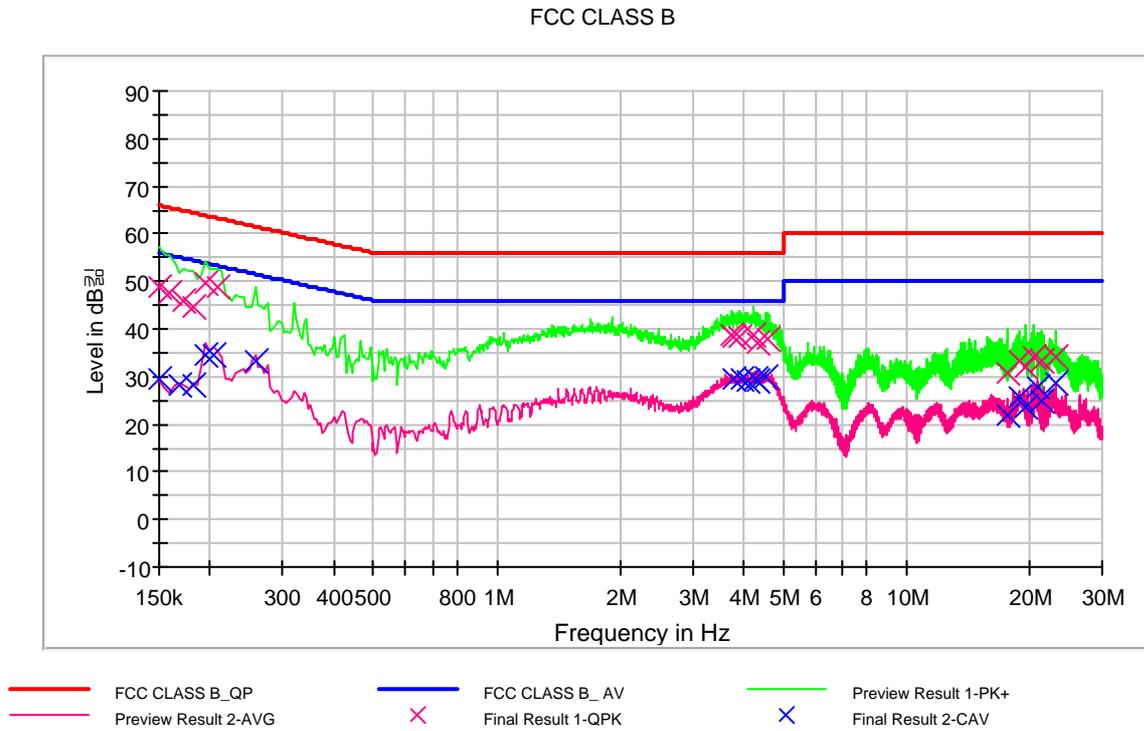


CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	29.6	9.000	L1	9.6	26.4	56.0
0.168000	27.9	9.000	L1	9.6	27.2	55.1
0.186000	28.7	9.000	L1	9.6	25.5	54.2
0.204000	34.6	9.000	L1	9.6	18.8	53.4
0.235500	31.8	9.000	L1	9.7	20.5	52.3
0.253500	32.4	9.000	L1	9.7	19.2	51.6
3.744500	30.3	9.000	L1	9.9	15.7	46.0
3.780500	30.0	9.000	L1	9.9	16.0	46.0
3.947000	29.9	9.000	L1	9.9	16.1	46.0
3.974000	29.9	9.000	L1	9.9	16.1	46.0
4.104500	30.4	9.000	L1	9.9	15.6	46.0
4.167500	30.6	9.000	L1	9.9	15.4	46.0
15.773000	24.5	9.000	L1	10.3	25.5	50.0
16.052000	24.7	9.000	L1	10.3	25.3	50.0
17.325500	23.3	9.000	L1	10.3	26.7	50.0
19.179500	25.5	9.000	L1	10.4	24.5	50.0
19.233500	24.9	9.000	L1	10.4	25.1	50.0
20.381000	28.2	9.000	L1	10.4	21.8	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	48.9	9.000	N	9.6	17.1	66.0
0.159000	47.4	9.000	N	9.6	18.1	65.5
0.172500	45.7	9.000	N	9.7	19.1	64.8
0.181500	44.5	9.000	N	9.7	19.9	64.4
0.195000	49.8	9.000	N	9.7	14.0	63.8
0.208500	48.6	9.000	N	9.7	14.7	63.3
3.749000	38.8	9.000	N	9.9	17.2	56.0
3.789500	38.4	9.000	N	9.9	17.6	56.0
3.924500	38.3	9.000	N	9.9	17.7	56.0
4.244000	38.8	9.000	N	9.9	17.2	56.0
4.338500	37.0	9.000	N	9.9	19.0	56.0
4.595000	37.8	9.000	N	9.9	18.2	56.0
17.537000	30.9	9.000	N	10.3	29.1	60.0
18.950000	33.2	9.000	N	10.3	26.8	60.0
19.521500	32.0	9.000	N	10.3	28.0	60.0
20.439500	34.2	9.000	N	10.3	25.8	60.0
21.357500	33.3	9.000	N	10.4	26.7	60.0
23.130500	34.0	9.000	N	10.4	26.0	60.0



CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	29.6	9.000	N	9.6	26.4	56.0
0.168000	28.2	9.000	N	9.6	26.9	55.1
0.181500	28.0	9.000	N	9.7	26.4	54.4
0.195000	34.7	9.000	N	9.7	19.1	53.8
0.204000	34.7	9.000	N	9.7	18.7	53.4
0.258000	33.1	9.000	N	9.7	18.4	51.5
3.789500	29.7	9.000	N	9.9	16.3	46.0
3.938000	29.3	9.000	N	9.9	16.7	46.0
4.082000	29.3	9.000	N	9.9	16.7	46.0
4.262000	29.7	9.000	N	9.9	16.3	46.0
4.338500	29.0	9.000	N	9.9	17.0	46.0
4.527500	29.9	9.000	N	9.9	16.1	46.0
17.537000	21.9	9.000	N	10.3	28.1	50.0
18.950000	25.7	9.000	N	10.3	24.3	50.0
19.521500	23.6	9.000	N	10.3	26.4	50.0
20.871500	27.7	9.000	N	10.3	22.3	50.0
21.357500	25.0	9.000	N	10.4	25.0	50.0
23.130500	28.7	9.000	N	10.4	21.3	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	24.5°C
Relative Humidity	53.0 %
Test Date	July 03, 2014

Frequency (MHz)	Quasi Peak (dB μ V/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
32.783888	28.2	100.0	V	89.0	14.8	11.8	40.0
56.894429	21.1	100.0	V	229.0	15.5	18.9	40.0
133.346052	29.8	100.0	V	338.0	16.4	13.7	43.5
275.993747	32.4	100.0	H	115.0	17.1	13.6	46.0
375.012024	35.8	100.0	H	268.0	19.9	10.2	46.0
625.029659	40.2	100.0	V	0.0	25.4	5.8	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	1.3 GHz
Testing Frequency Range	1 GHz to 7 GHz
Operation Mode	Data Communication mode
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.8°C
Relative Humidity	57.8 %
Test Date	July 23, 2014

Frequency (MHz)	Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1330.511023	49.5	101.0	V	112.0	-10.1	24.5	74.0
1999.348698	56.3	101.0	V	208.0	-9.7	17.7	74.0
2655.160320	49.3	101.0	V	222.0	-6.8	24.7	74.0

Frequency (MHz)	CAverage (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1330.511023	31.0	101.0	V	112.0	-10.1	23.0	54.0
1999.348698	37.8	101.0	V	208.0	-9.7	16.2	54.0
2655.160320	32.6	101.0	V	222.0	-6.8	21.4	54.0

※ Calculation Formula:

1. POL. H = Horizontal, POL. V = Vertical
2. QuasiPeak 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>					
<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	-	-	-
<u>Radiated Emission</u>					
-For measurement below 1 GHz					
<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	-	-	-
-For measurement above 1 GHz					
<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/WCDMA/HSDPA/HSUPA Phone with Bluetooth, WLAN and NFC, FCC ID: ZNFD690N, Model: LG-D690n** complies with §15.107 and §15.109 of the FCC rules.