

EMI CERTIFICATION REPORT

Applicant:

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

Date of Receipt: May 27, 2014**Date of Issue: June 30, 2014****Test Report No. HCT-E-1406-F045-2****HCT FRN: 0005866421****FCC ID:****ZNFD213F**

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/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n (2.4 GHz_HT20&HT40), VoIP, Hotspot support
Model Name: LG-D213f
Additional Model Name: LGD213f, D213f, LG-D213k, LGD213k, D213k, LG-D213cf, LGD213cf, D213cf
Test Port: USB / Earphone Port
Date of Test: June 01, 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-1406-F045	June 19, 2014	Initial Release
HCT-E-1406-F045-1	June 27, 2014	1. Revise the measurement method of Conducted Emission (Section 2.1) 2. Add testing frequency range to measurement above 1 GHz (Section 4.2)
HCT-E-1406-F045-2	June 30, 2014	Correct the highest operating frequency and testing frequency range (Section 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-D213f
FCC ID	ZNFD213F
Additional Model	LGD213f, D213f, LG-D213k, LGD213k, D213k, LG-D213cf, LGD213cf, D213cf
EUT Type	GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n (2.4GHz_HT20&HT40), VoIP, Hotspot support
TX Frequency	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)
RX Frequency	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)

1.2 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-D213f	LG	ZNFD213F	Notebook PC, Earphone
USB cable	EAD62377902	Ningbo Broad	-	EUT, Notebook PC
Earphone	EAB62808211	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)	-	Transcend	-	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)1.1
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 ($\mu V/m$)	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

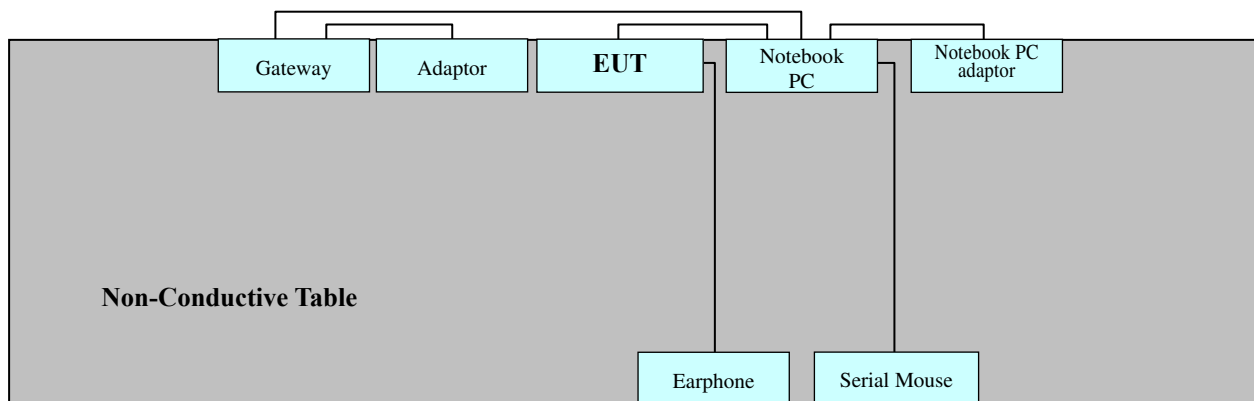


2.2.1 Frequency Range of Radiated Measurements

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

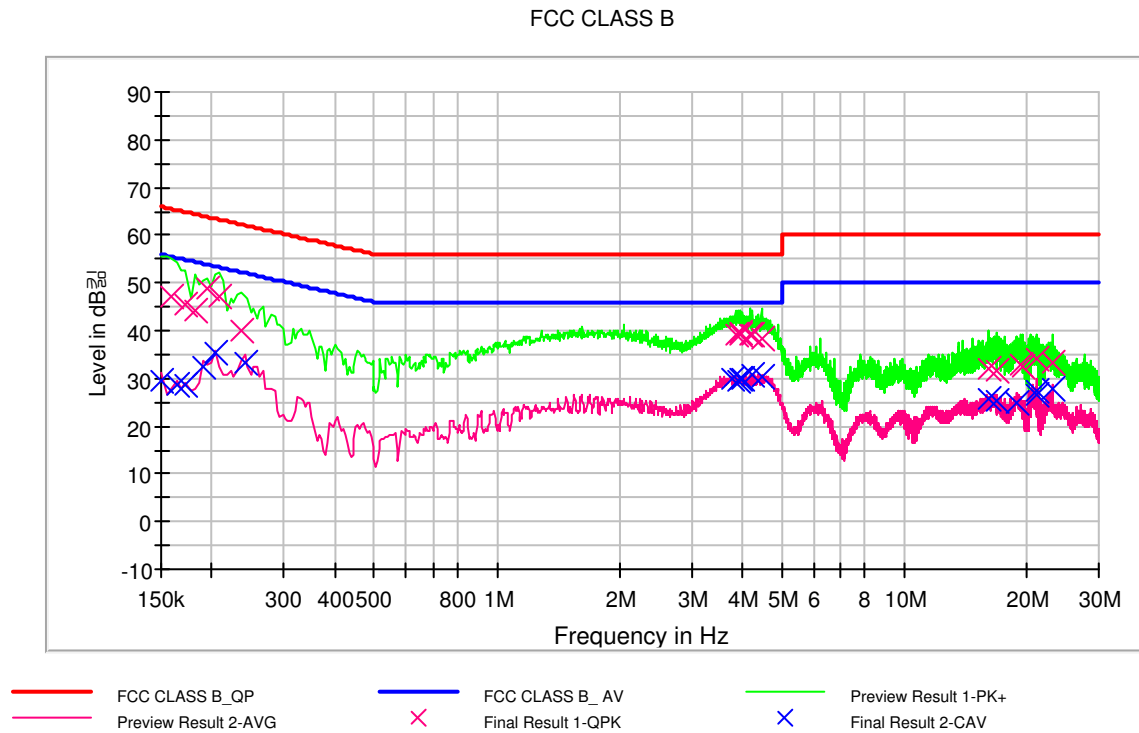
The following table shows the highest levels of conducted emissions on both polarization of hot and neutral line.

Limit Apply to	: FCC PART 15 Subpart B Class B
Detector	: Quasi-Peak, CISPR-Average
6 dB Bandwidth	: 9 kHz
Operation Mode	: Data Communication mode
Temperature	: 23.9°C
Relative Humidity	: 45.1 %
Test Date	: June 01, 2014

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



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

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.159000	47.1	9.000	L1	9.7	18.4	65.5
0.172500	45.3	9.000	L1	9.7	19.5	64.8
0.181500	44.1	9.000	L1	9.7	20.3	64.4
0.195000	48.7	9.000	L1	9.7	15.1	63.8
0.208500	46.9	9.000	L1	9.7	16.4	63.3
0.235500	39.9	9.000	L1	9.7	22.4	62.3
3.848000	39.3	9.000	L1	10.0	16.7	56.0
3.960500	39.6	9.000	L1	10.0	16.4	56.0
3.974000	39.1	9.000	L1	10.0	16.9	56.0
4.172000	39.3	9.000	L1	10.1	16.7	56.0
4.244000	39.0	9.000	L1	10.1	17.0	56.0
4.455500	38.5	9.000	L1	10.1	17.5	56.0
16.128500	32.1	9.000	L1	10.7	27.9	60.0
16.772000	31.7	9.000	L1	10.7	28.3	60.0
19.323500	32.8	9.000	L1	10.9	27.2	60.0
19.476500	32.3	9.000	L1	10.9	27.8	60.0
21.078500	34.2	9.000	L1	11.0	25.8	60.0
23.130500	33.3	9.000	L1	11.1	26.7	60.0

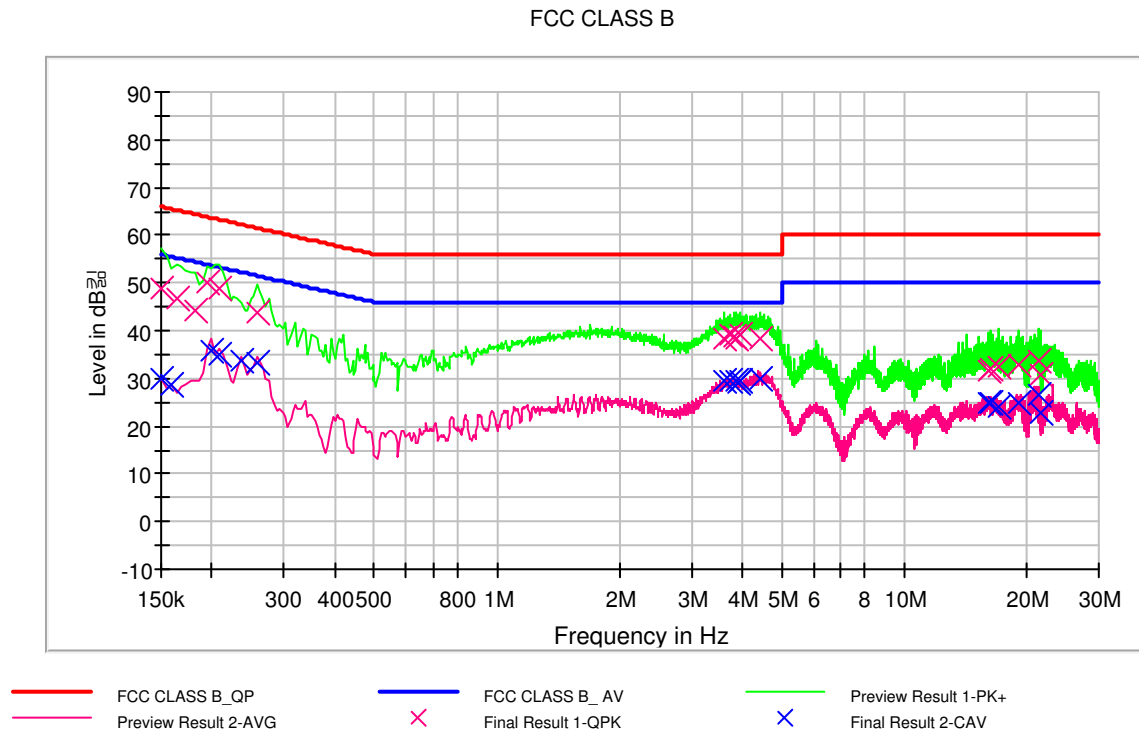


CAverage Final Result

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	29.5	9.000	L1	9.7	26.5	56.0
0.163500	28.6	9.000	L1	9.7	26.7	55.3
0.172500	28.5	9.000	L1	9.7	26.4	54.8
0.190500	32.6	9.000	L1	9.7	21.4	54.0
0.204000	35.3	9.000	L1	9.7	18.1	53.4
0.240000	33.4	9.000	L1	9.7	18.7	52.1
3.794000	30.1	9.000	L1	10.0	15.9	46.0
3.902000	29.6	9.000	L1	10.0	16.4	46.0
3.960500	29.8	9.000	L1	10.0	16.2	46.0
4.014500	29.8	9.000	L1	10.1	16.2	46.0
4.235000	30.8	9.000	L1	10.1	15.2	46.0
4.455500	30.4	9.000	L1	10.1	15.6	46.0
16.128500	25.5	9.000	L1	10.7	24.5	50.0
16.772000	25.1	9.000	L1	10.7	24.9	50.0
18.855500	24.9	9.000	L1	10.9	25.1	50.0
21.078500	26.8	9.000	L1	11.0	23.2	50.0
21.222500	27.4	9.000	L1	11.0	22.6	50.0
23.130500	27.9	9.000	L1	11.1	22.1	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

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	49.0	9.000	N	9.7	17.0	66.0
0.163500	46.9	9.000	N	9.7	18.4	65.3
0.181500	44.3	9.000	N	9.7	20.1	64.4
0.195000	50.0	9.000	N	9.7	13.8	63.8
0.208500	48.8	9.000	N	9.7	14.5	63.3
0.258000	43.7	9.000	N	9.7	17.8	61.5
3.609500	38.5	9.000	N	10.0	17.5	56.0
3.717500	39.0	9.000	N	10.0	17.0	56.0
3.816500	38.9	9.000	N	10.0	17.1	56.0
3.875000	38.5	9.000	N	10.0	17.5	56.0
3.960500	39.2	9.000	N	10.1	16.8	56.0
4.424000	38.3	9.000	N	10.1	17.7	56.0
16.133000	31.7	9.000	N	10.6	28.3	60.0
16.272500	32.1	9.000	N	10.6	27.9	60.0
16.979000	32.5	9.000	N	10.7	27.5	60.0
19.175000	32.9	9.000	N	10.8	27.1	60.0
21.294500	33.7	9.000	N	10.9	26.3	60.0
21.510500	30.6	9.000	N	10.9	29.4	60.0



CAverage Final Result

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	30.0	9.000	N	9.7	26.0	56.0
0.159000	28.5	9.000	N	9.7	27.0	55.5
0.199500	35.8	9.000	N	9.7	17.8	53.6
0.208500	34.9	9.000	N	9.7	18.4	53.3
0.235500	33.7	9.000	N	9.7	18.6	52.3
0.258000	33.1	9.000	N	9.7	18.4	51.5
3.609500	29.5	9.000	N	10.0	16.5	46.0
3.717500	29.6	9.000	N	10.0	16.4	46.0
3.875000	29.4	9.000	N	10.0	16.6	46.0
3.911000	29.2	9.000	N	10.1	16.8	46.0
3.960500	29.3	9.000	N	10.1	16.7	46.0
4.424000	30.1	9.000	N	10.1	15.9	46.0
16.133000	24.7	9.000	N	10.6	25.3	50.0
16.272500	25.0	9.000	N	10.6	25.0	50.0
16.979000	24.2	9.000	N	10.7	25.8	50.0
19.175000	25.0	9.000	N	10.8	25.0	50.0
21.294500	26.6	9.000	N	10.9	23.4	50.0
21.510500	22.8	9.000	N	10.9	27.2	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 Communication mode
Temperature	: 24.0°C
Relative Humidity	: 46.1 %
Test Date	: June 01, 2014

Frequency (MHz)	Quasi Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.640000	32.7	100.0	V	213.0	14.7	7.3	40.0
111.603287	32.6	289.0	H	14.0	14.5	10.9	43.5
624.989659	38.6	100.0	V	202.0	25.4	7.4	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

Limit Apply to : 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 - 6 GHz

※ This product was tested up to the 5th harmonic above frequency.

Operation Mode : Data Communication mode

Temperature : 24.0°C

Relative Humidity : 46.1 %

Test Date : June 01, 2014

Frequency (MHz)	Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
1333.116233	47.5	100.0	V	203.0	-14.2	26.5	74.0
1995.541082	56.0	100.0	V	218.0	-12.7	18.0	74.0
2441.332666	41.9	350.0	H	187.0	-10.0	32.1	74.0

Frequency (MHz)	CAverage (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
1333.116233	29.1	100.0	V	203.0	-14.2	24.9	54.0
1995.541082	38.4	100.0	V	218.0	-12.7	15.6	54.0
2441.332666	29.8	350.0	H	187.0	-10.0	24.2	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>					
☒ 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
☐ LISN	Rohde & Schwarz	ESH3-Z5	100282	1 year	07.03. 2013
☐ Attenuator	Rohde & Schwarz	ESH3-Z2	357.8810.352	1 year	07.03. 2013
☒ Software	Rohde & Schwarz	EMC32	-	-	-

Radiated Emission

-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	07.24. 2013
☒ 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	CBL18265035	22966	1 year	07.24. 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: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4 GHz_HT20&HT40), VoIP, Hotspot support, FCC ID: ZNFD213F, Model: LG-D213f** complies with §15.107 and §15.109 of the FCC rules.