

EMI CERTIFICATION REPORT

Applicant:

LG Electronics MobileComm U.S.A., Inc.

1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Date of Issue: February 10, 2014

Test Report No.: HCTE1402F010

Test Site: HCT CO., LTD.

HCT FRN: 0005-8664-21

FCC ID:

ZNFD415

Rule Part(s) / Standard(s) : FCC PART 15 Subpart B Class B
Equipment Type : Cellular/PCS GSM/WCDMA Phone with Bluetooth and WLAN
Model Name : LG-D415RD
Additional Model Name : LG-D415, D415, LGD415, LGD415RD, D415RD
Port / Connector(s) : USB / Earphone Port
Date of Test : February 06, 2014 – February 08, 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



Seul-Ki Lee
Test Engineer
EMC Team
Certification Division

Reviewed By



Sang-Jun Lee
Technical Manager
EMC Team
Certification Division

This report only responds to the tested sample and may not be reproduced, except in full, without written approval of the HCT Co., Ltd.



DOCUMENT HISTORY

The revision history for this document is shown in table.

Version	Date	Description
HCTE1402F010	February 10, 2014	Initial Release



TABLE OF CONTENTS

	PAGE
1. GENERAL INFORMATION	4
1.1 Product Description	4
1.2 Related Submittal(s) / Grant(s).....	4
1.3 Tested System Details.....	5
1.4 Cable Description	6
1.5 Noise Suppression Parts on Cable. (I/O cable)	6
1.6 Test Methodology	7
1.7 Test Facility	7
1.8 Frequency Range of Radiated Measurements	7
2. SYSTEM TEST CONFIGURATION.....	8
2.1 Configuration of Test System	8
3. PRELIMINARY TEST	9
3.1 Conducted Emission Test	9
3.2 Radiated Emission Test	9
4. CONDUCTED AND RADIATED EMISSION TEST SUMMARY	10
4.1 Conducted Emission Test	10
4.2 Radiated Emission Test	105
5. FIELD STRENGTH CALCULATION	17
6. TEST EQUIPMENT	18
7. CONCLUSION	19

ATTACHMENT: TEST SETUP PHOTOGRAPHS



1. GENERAL INFORMATION

1.1 Product Description

Equipment Under Test is manufactured by **LG Electronics MobileComm U.S.A., Inc.**
Its basic purpose is used for communications.

Model Name	LG-D415RD
Additional Model Name	LG-D415, D415, LGD415, LGD415RD, D415RD
FCC ID	ZNFD415
EUT Type	Cellular/PCS GSM/WCDMA Phone with Bluetooth and WLAN
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) 1 852.4 MHz to 1 907.6 MHz (WCDMA 1 900) 1712.4 MHz to 1752.6 MHz (WCDMA 1 700)
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) 1 932.4 MHz to 1 987.6 MHz (WCDMA 1 900) 2 112.4 MHz to 2 152.6 MHz (WCDMA 1 700)

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	Model Name	Manufacturer	FCC ID / DoC	Connected To
EUT	LG-D415RD	LG	ZNFD415	Notebook PC Ear-phone
USB cable	EAD62150403	CRESYN	-	E.U.T Notebook PC
USB cable*	EAD62150405	Ningbo Broad	-	E.U.T Notebook PC
Ear-phone	EAB62209201	I-SOUND	-	E.U.T
Notebook PC	ProBook6560b	H.P	DoC	EUT Notebook PC adaptor
Notebook PC adaptor	PPP009D	DELTA Electronics (JIANGSU)LTD	-	Notebook PC
Gateway	MV440	Axisstel	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	8GB	SanDisk	-	E.U.T

※Note:

1* . The worst-case emissions are reported.



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)1.0
	Ear-phone	N/A	N	(D)1.2
Notebook PC	RJ 45	N/A	N	(D)1.5
	Serial (Mouse)	N/A	N	(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 C63.4/2003.

Measurement Facilities	Reg. No.
Radiated Field strength measurement facility (3m)	90661 (June 21, 2011)
Radiated Field strength measurement facility (10m)	90661 (June 21, 2011)

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 th harmonic of the highest frequency or 40 GHz, whichever is lower



2. SYSTEM TEST CONFIGURATION

2.1 Configuration of Test System

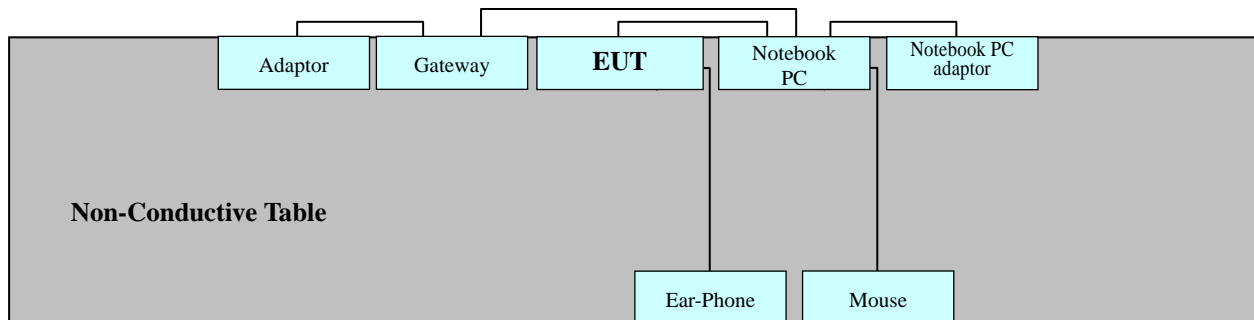
2.1.1 Conducted Emission Test

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]



Power Line: 120 VAC



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, Average (6 dB Bandwidth: 9 kHz)
Operation Mode	: Data Communication mode
USB Manufacturer	: Ningbo Broad
Temperature	: 19.6°C
Humidity Level	: 27.8 %
Test Date	: February 08, 2014

Frequency (MHz)	Transd (dB)	Conductor	Quasi-Peak			Average		
			Limit (dBuV)	Measurement Level (dBuV)	Result Level (dBuV)	Limit (dBuV)	Measurement Level (dBuV)	Result Level (dBuV)
0.1995	9.7	N	63.6	44.7	54.4	53.6	29.1	38.8
0.1995	9.7	H	63.6	43.3	53.0	53.6	28.8	38.5
0.2535	9.7	N	61.6	41.1	50.8	51.6	-	-
0.2535	9.7	H	61.6	41.4	51.1	51.6	-	-

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

1. Conductor H = Hot, Conductor N = Neutral
2. Transducer = LISN Factor + Cable Loss Factor
3. Result Level = Measurement Level + Transducer Factor

* 'Result Level' in above table is same as the 'Quasi-Peak' and 'Average' of the test data



EMI Auto Test(1)

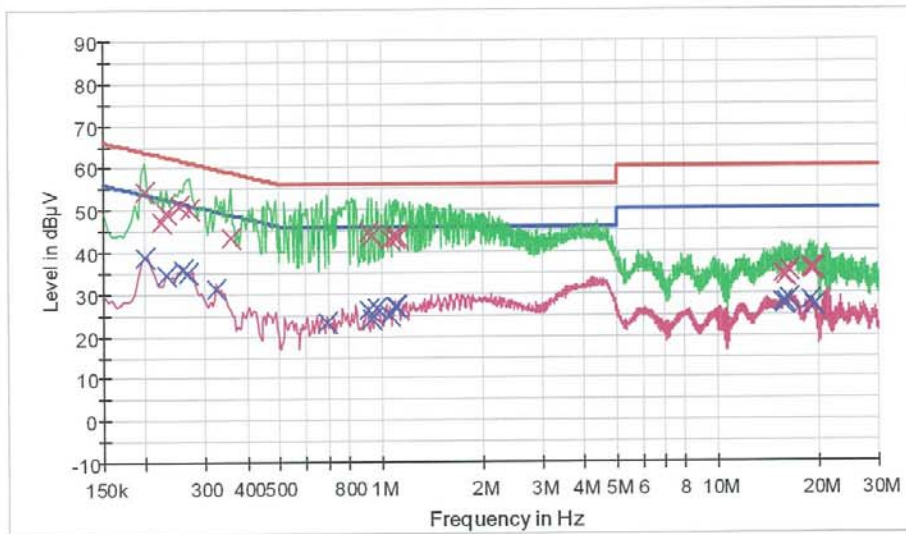
1 / 2

HCT TEST Report

Common Information

EUT: LG-D415RD
 Manufacturer: LG
 Test Site: SHIELD ROOM
 Operating Conditions: DATA MODE (BROAD)
 Operator Name:

FCC CLASS B



— FCC CLASS B_OP — FCC CLASS B_AV — Preview Result 1-PK+
 — Preview Result 2-AVG x Final Result 1-GPK x Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.199500	54.4	9.000	Off	N	9.7	9.2	63.6
0.222000	47.2	9.000	Off	N	9.7	15.5	62.7
0.231000	49.2	9.000	Off	N	9.7	13.2	62.4
0.253500	50.8	9.000	Off	N	9.7	10.8	61.6
0.271500	50.2	9.000	Off	N	9.7	10.9	61.1
0.357000	43.5	9.000	Off	N	9.7	15.3	58.8
0.914000	44.6	9.000	Off	N	9.8	11.4	56.0
0.941000	44.0	9.000	Off	N	9.8	12.0	56.0
1.062500	43.0	9.000	Off	N	9.8	13.0	56.0
1.094000	43.4	9.000	Off	N	9.8	12.6	56.0
1.112000	43.9	9.000	Off	N	9.8	12.1	56.0
1.130000	43.4	9.000	Off	N	9.8	12.6	56.0
15.494000	34.5	9.000	Off	N	10.7	25.5	60.0
15.881000	33.9	9.000	Off	N	10.7	26.1	60.0
16.245500	35.3	9.000	Off	N	10.7	24.7	60.0
18.932000	36.0	9.000	Off	N	10.8	24.0	60.0

2/8/2014

10:17:12



EMI Auto Test(1)

2 / 2

Frequency (MHz)	QuasiPeak (dB μ V)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
19.157000	35.7	9.000	Off	N	10.8	24.3	60.0
19.355000	35.8	9.000	Off	N	10.8	24.2	60.0

Final Result 2

Frequency (MHz)	CAverage (dB μ V)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.199500	38.8	9.000	Off	N	9.7	14.8	53.6
0.231000	34.5	9.000	Off	N	9.7	17.9	52.4
0.258000	35.6	9.000	Off	N	9.7	15.9	51.5
0.267000	34.9	9.000	Off	N	9.7	16.3	51.2
0.325500	31.0	9.000	Off	N	9.7	18.6	49.6
0.693500	23.1	9.000	Off	N	9.8	22.9	46.0
0.914000	26.3	9.000	Off	N	9.8	19.7	46.0
0.941000	23.9	9.000	Off	N	9.8	22.1	46.0
0.968000	26.7	9.000	Off	N	9.8	19.3	46.0
1.062500	24.7	9.000	Off	N	9.8	21.3	46.0
1.098500	26.9	9.000	Off	N	9.8	19.1	46.0
1.112000	26.8	9.000	Off	N	9.8	19.2	46.0
15.494000	27.7	9.000	Off	N	10.7	22.3	50.0
15.687500	27.4	9.000	Off	N	10.7	22.6	50.0
15.881000	27.7	9.000	Off	N	10.7	22.3	50.0
16.245500	28.7	9.000	Off	N	10.7	21.3	50.0
18.932000	28.3	9.000	Off	N	10.8	21.7	50.0
19.355000	26.9	9.000	Off	N	10.8	23.1	50.0

2/8/2014

10:17:12



EMI Auto Test(1)

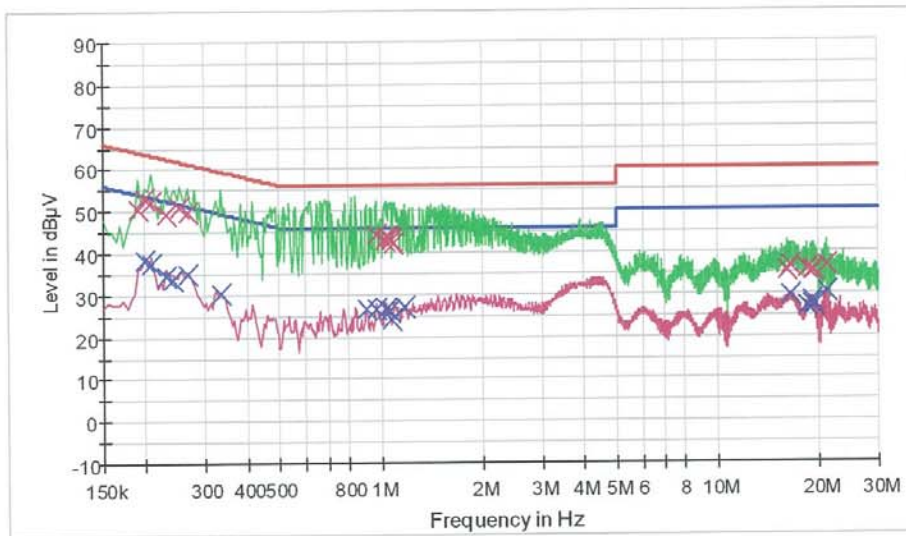
1 / 2

HCT TEST Report

Common Information

EUT: LG-D415RD
 Manufacturer: LG
 Test Site: SHIELD ROOM
 Operating Conditions: DATA MODE (BROAD)
 Operator Name:

FCC CLASS B



— FCC CLASS B_QP
 — FCC CLASS B_AV
 — Preview Result 1-PK+
— Preview Result 2-AVG
 x Final Result 1-QPK
 x Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190500	50.5	9.000	Off	L1	9.7	13.5	64.0
0.199500	53.0	9.000	Off	L1	9.7	10.6	63.6
0.208500	52.4	9.000	Off	L1	9.7	10.9	63.3
0.231000	49.2	9.000	Off	L1	9.7	13.2	62.4
0.253500	51.1	9.000	Off	L1	9.7	10.5	61.6
0.267000	49.7	9.000	Off	L1	9.7	11.5	61.2
0.968000	44.2	9.000	Off	L1	9.8	11.8	56.0
1.026500	43.1	9.000	Off	L1	9.8	12.9	56.0
1.044500	43.8	9.000	Off	L1	9.8	12.2	56.0
1.058000	43.4	9.000	Off	L1	9.8	12.6	56.0
1.076000	43.0	9.000	Off	L1	9.8	13.0	56.0
1.085000	42.0	9.000	Off	L1	9.8	14.0	56.0
16.070000	35.5	9.000	Off	L1	10.7	24.5	60.0
16.389500	36.5	9.000	Off	L1	10.8	23.5	60.0
18.500000	35.7	9.000	Off	L1	10.8	24.3	60.0
19.103000	35.6	9.000	Off	L1	10.9	24.4	60.0

2/8/2014

10:09:57



EMI Auto Test(1)

2 / 2

Frequency (MHz)	QuasiPeak (dB μ V)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
19.328000	35.5	9.000	Off	L1	10.9	24.5	60.0
21.051500	36.7	9.000	Off	L1	10.9	23.3	60.0

Final Result 2

Frequency (MHz)	CAverage (dB μ V)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.199500	38.5	9.000	Off	L1	9.7	15.1	53.6
0.208500	37.5	9.000	Off	L1	9.7	15.8	53.3
0.231000	34.5	9.000	Off	L1	9.7	17.9	52.4
0.240000	33.5	9.000	Off	L1	9.7	18.6	52.1
0.267000	34.8	9.000	Off	L1	9.7	16.4	51.2
0.334500	30.3	9.000	Off	L1	9.7	19.0	49.3
0.905000	26.4	9.000	Off	L1	9.8	19.6	46.0
0.968000	26.5	9.000	Off	L1	9.8	19.5	46.0
1.044500	26.5	9.000	Off	L1	9.8	19.5	46.0
1.058000	26.2	9.000	Off	L1	9.8	19.8	46.0
1.076000	23.8	9.000	Off	L1	9.8	22.2	46.0
1.179500	26.9	9.000	Off	L1	9.8	19.1	46.0
16.389500	29.4	9.000	Off	L1	10.8	20.6	50.0
18.500000	27.0	9.000	Off	L1	10.8	23.0	50.0
19.103000	27.5	9.000	Off	L1	10.9	22.5	50.0
19.143500	28.1	9.000	Off	L1	10.9	21.9	50.0
19.328000	27.2	9.000	Off	L1	10.9	22.8	50.0
21.051500	30.4	9.000	Off	L1	10.9	19.6	50.0

2/8/2014

10:09:57



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
USB Manufacturer	: Ningbo Broad
Temperature	: 19.2°C
Humidity Level	: 28.8 %
Test Date	: February 06, 2014

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)			
99.90	20.44	H	3.21	9.20	3.76	43.5	33.40	10.10
276.90	15.89	H	1.22	12.65	4.46	46.0	33.00	13.00
625.00	13.44	V	1.00	19.97	5.39	46.0	38.80	7.20



-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)

USB Manufacturer : Ningbo Broad

Temperature : 19.2°C

Humidity Level : 28.8 %

Test Date : February 06, 2014

Frequency (GHz)	Peak			POL	Average		
	Total (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)		Total (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1.3295	52.0	74	22.0	V	27.1	54	26.9
1.9715	50.7	74	23.3	V	28.2	54	25.8
2.0573	49.7	74	24.3	V	29.5	54	24.5
2.6587	51.4	74	22.6	V	30.6	54	23.4

※ **NOTE:**

1. Measurement above 1 GHz was performed from 1 GHz to the 5th 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 μ V is obtained. The antenna factor of 7.4 dB/m and a cable factor of 1.1 dB are added. The 30 dB μ V/m value is mathematically converted to its corresponding level in μ V/m.

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

[Radiated Emission Limits]

Frequency of Emission (MHz)	Field Strength	
	μ V/m	dB μ 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>
<u>Conducted Emission</u>					
<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESCI	100584	1 year	2014.04.25
<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	2015.01.29
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESCI	100033	1 year	2014.06.23
<input type="checkbox"/> LISN	Rohde & Schwarz	ESH3-Z5	100282	1 year	2014.07.03
<input type="checkbox"/> Attenuator	Rohde & Schwarz	ESH3-Z2	357.8810.352	1 year	2014.07.03
<u>Radiated Emission</u>					
-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	-
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	2014.07.01
<input type="checkbox"/> Trilog Antenna	Schwarzbeck	VULB9168	185	2 year	2015.04.16
<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	-
-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	CERNEX	CBLU1183540	21690	1 year	2014.07.12
<input checked="" type="checkbox"/> Horn Antenna	Schwarzbeck	BBHA 9120D	296	2 year	2014.12.13
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	2014.07.01
<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	-



7. CONCLUSION

The data collected shows that the **EUT type: Cellular/PCS GSM/WCDMA Phone with Bluetooth and WLAN, FCC ID: ZNFD415, Model: LG-D415RD** complies with §15.107 and §15.109 of the FCC rules.