



HCT CO., LTD.

HCT CO.,LTD

CERTIFICATION DIVISION  
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## EMI CERTIFICATION REPORT

**Applicant:**

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

**Date of Issue:** January 10, 2014

**Test Report No.:** HCTE1401FE15

**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 GSMWCDMA 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 : January 06, 2014 - January 09, 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 subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

  
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## DOCUMENT HISTORY

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The revision history for this document is shown in table.

Version	Date	Description
HCTE1401FE15	January 10, 2014	Initial Release

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**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.

<b>Model Name</b>	LG-D415RD
<b>Additional Model Name</b>	LG-D415, D415, LGD415, LGD415RD, D415RD
<b>FCC ID</b>	ZNFD415
<b>EUT Type</b>	Cellular/PCS GSM/WCDMA Phone with Bluetooth and WLAN
<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) 1712.4 MHz to 1752.6 MHz (WCDMA 1 700)
<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) 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*	EAD62150402	Broad Ningbo	-	E.U.T Notebook PC
USB cable	EAD62150401	Cresyn		E.U.T Notebook PC
Ear-phone	EAB62209304	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	Axesstel	PH7MV440	Notebook PC, Adaptor
Mouse	Serial 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: 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)1.2
	Ear-phone	N/A	Y	(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.

### 1.5 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 <sup>th</sup> harmonic of the highest frequency or 40 GHz, whichever is lower

## 2. SYSTEM TEST CONFIGURATION

### 2.1 Configuration of Test System

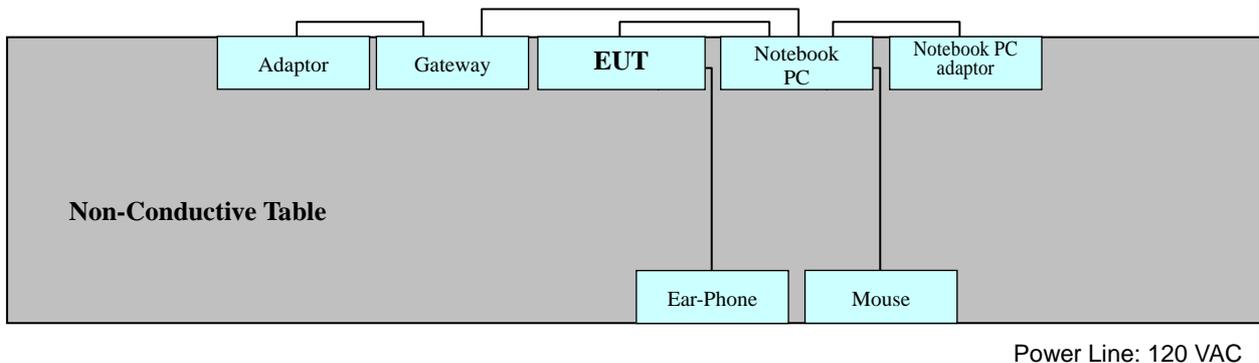
#### 2.1.1 Conducted Emission Test

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 ]



### **3. PRELIMINARY TEST**

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#### **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 Cable	: Broad Ningbo
Temperature	: 21.1°C
Humidity Level	: 30.7 %
Test Date	: January 09, 2014

Frequency (MHz)	Transd (dB)	Conductor	Quasi-Peak			Average		
			Limit	Measurement Level	Result Level	Limit	Measurement Level	Result Level
			(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dBuV]
0.1500	10.0	N	66.0	39.8	49.8	56.0	-	-
0.1545	9.8	H	65.8	38.7	48.5	55.8	-	-
0.1905	9.8	H	64.0	40.1	49.9	54.0	-	-
0.1995	10.0	N	63.6	42.2	52.2	53.6	25.5	35.5
0.2040	9.8	H	63.4	42.0	51.8	53.4	25.7	35.5
4.6625	10.4	N	56.0	24.6	35.0	46.0	18.0	28.4

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

1. Line H = Hot, Line N = Neutral
2. Transd = LISN factor + Cable Loss factor

EMI Auto Test(1)

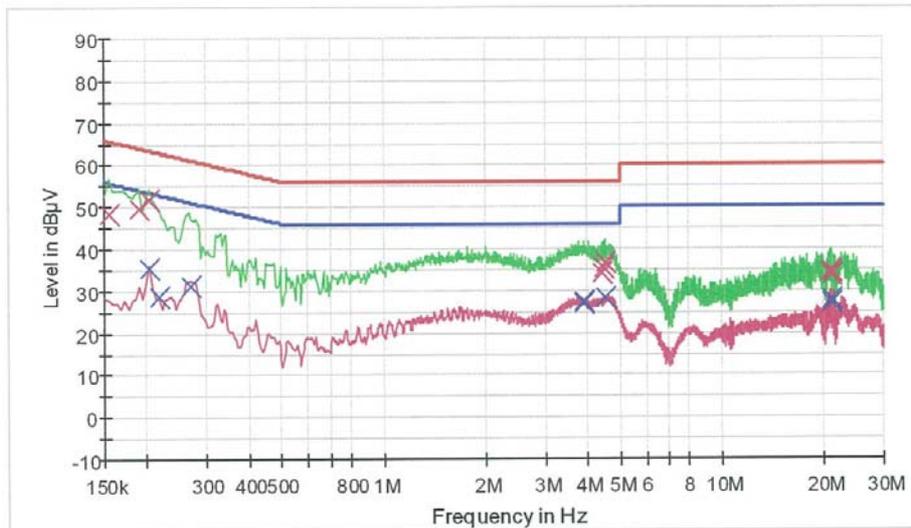
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## HCT TEST Report

### Common Information

EUT: LG-D415RD  
 Manufacturer: LG  
 Test Site: SHIELD ROOM  
 Operating Conditions: DATA MODE, CABLE : BROAD, H LINE  
 Operator Name: GC YOON

FCC CLASS B



— FCC CLASS B\_QP     
 — FCC CLASS B\_AV     
 — Preview Result 1-PK+  
— Preview Result 2-AVG     
 x Final Result 1-CPK     
 x Final Result 2-CAV

### Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154500	48.5	9.000	Off	L1	9.8	17.3	65.8
0.190500	49.9	9.000	Off	L1	9.8	14.1	64.0
0.204000	51.8	9.000	Off	L1	9.8	11.6	63.4
4.415000	34.1	9.000	Off	L1	10.2	21.9	56.0
4.469000	35.2	9.000	Off	L1	10.2	20.8	56.0
4.536500	36.5	9.000	Off	L1	10.2	19.5	56.0
20.988500	34.4	9.000	Off	L1	11.0	25.6	60.0
21.065000	33.6	9.000	Off	L1	11.0	26.4	60.0
21.128000	34.7	9.000	Off	L1	11.0	25.3	60.0

### Final Result 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.204000	35.5	9.000	Off	L1	9.8	17.9	53.4
0.217500	28.7	9.000	Off	L1	9.8	24.2	52.9
0.271500	31.2	9.000	Off	L1	9.8	19.9	51.1

EMI Auto Test(1)

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Frequency (MHz)	CAverage (dB $\mu$ V)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
3.897500	27.4	9.000	Off	L1	10.1	18.6	46.0
3.915500	26.9	9.000	Off	L1	10.1	19.1	46.0
4.536500	28.1	9.000	Off	L1	10.2	17.9	46.0
21.002000	27.2	9.000	Off	L1	11.0	22.8	50.0
21.128000	27.7	9.000	Off	L1	11.0	22.3	50.0
21.200000	27.7	9.000	Off	L1	11.0	22.3	50.0

EMI Auto Test(1)

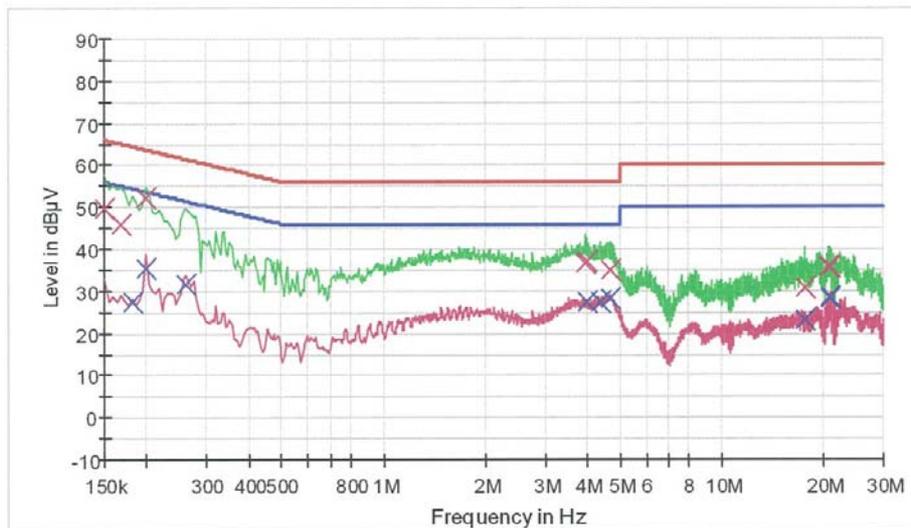
1 / 2

## HCT TEST Report

### Common Information

EUT: LG-D415RD  
 Manufacturer: LG  
 Test Site: SHIELD ROOM  
 Operating Conditions: DATA MODE, CABLE : BROAD, N LINE  
 Operator Name: GC YOON

FCC CLASS B



— FCCCLASS B\_QP      — FCCCLASS 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)
0.150000	49.8	9.000	Off	N	10.0	16.2	66.0
0.168000	46.0	9.000	Off	N	10.0	19.1	65.1
0.199500	52.2	9.000	Off	N	10.0	11.4	63.6
3.969500	36.8	9.000	Off	N	10.3	19.2	56.0
3.983000	37.1	9.000	Off	N	10.3	18.9	56.0
4.662500	35.0	9.000	Off	N	10.4	21.0	56.0
17.582000	30.7	9.000	Off	N	11.1	29.3	60.0
20.696000	35.7	9.000	Off	N	11.3	24.3	60.0
20.772500	35.8	9.000	Off	N	11.3	24.2	60.0

### Final Result 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.181500	27.2	9.000	Off	N	10.0	27.2	54.4
0.199500	35.5	9.000	Off	N	10.0	18.1	53.6
0.262500	31.5	9.000	Off	N	10.0	19.9	51.4

EMI Auto Test(1)

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Frequency (MHz)	CAverage (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
3.983000	27.2	9.000	Off	N	10.3	18.8	46.0
4.397000	27.6	9.000	Off	N	10.3	18.4	46.0
4.662500	28.4	9.000	Off	N	10.4	17.6	46.0
17.582000	23.1	9.000	Off	N	11.1	26.9	50.0
20.916500	28.3	9.000	Off	N	11.3	21.7	50.0
20.979500	28.8	9.000	Off	N	11.3	21.2	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: 120 kHz)

Operation Mode : Data Communication mode

USB Cable : Broad Ningbo

Temperature : 22.6°C

Humidity Level : 28.9 %

Test Date : January 08, 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)			
32.9	11.96	V	1.0	11.42	3.34	40.0	26.72	13.28
47.1	11.36	V	1.0	12.41	3.46	40.0	27.23	12.77
81.4	14.92	H	4.0	7.95	3.68	40.0	26.55	13.45
125.0	15.03	V	1.0	12.01	3.90	43.5	30.94	12.56
375.0	15.37	H	1.4	15.08	4.79	46.0	35.24	10.76
625.0	10.75	V	1.0	19.97	5.39	46.0	36.11	9.89

**-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)

Operation Mode : Data Communication mode

USB Cable : Broad Ningbo

Temperature : 19.4°C

Humidity Level : 27.2 %

Test Date : January 06, 2014

Frequency (GHz)	Peak			POL	Average		
	Total (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)		Total (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
1.3318	50.4	74	23.6	V	27.7	54	26.3
1.9926	55.9	74	18.1	V	31.0	54	23.0
2.0820	50.9	74	23.1	V	29.4	54	24.6

**※ NOTE:**

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

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

### [Radiated Emission Limits]

Frequency of Emission (MHz)	Field Strength	
	$\mu$ V/m	dB $\mu$ 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>
<b><u>Conducted Emission</u></b>					
<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	2014.02.06
<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

### **Radiated Emission**

#### **-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**

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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.