



HCT CO., LTD.

CERTIFICATION DIVISION

74, SEOICHEON-RO, 578BEON-GIL, MAJANG-MYEON, ICHEON-SI, GYEONGGI-DO, KOREA  
TEL: +82 31 645 6300 FAX: +82 31 645 6401

## EMI CERTIFICATION REPORT

**Applicant:**

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

**Date of Issue:** May 10, 2013

**Test Report No.:** HCTE1305FE11

**Test Site:** HCT CO., LTD.

**HCT FRN:** 0005-8664-21

**FCC ID:**


**ZNFMS659**

Rule Part(s) / Standard(s) : FCC PART 15 Subpart B Class B  
Equipment Type : Cellular/PCS GSM/GPRS/EDGE, Cellular/PCS/AWS WCDMA  
/HSDPA/HSUPA and LTE B4/B17 Phone with Bluetooth, WLAN  
Model Name : LGMS659  
Additional Model Name : LG-MS659, MS659, LG-P659, LGP659, P659, LG-L20L, LGL20L, L20L  
Port / Connector(s) : USB / Earphone Port  
Date of Test : May 06, 2013 – May 10, 2013

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

  
Report prepared by  
: Gu-Cheol Yoon  
Test Engineer of EMC Team

  
Approved by  
: Sang-Jun Lee  
Manager of EMC Team

## DOCUMENT HISTORY

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The revision history for this document is shown in table.

Version	Date	Description
HCTE1305FE11	May 10, 2013	Initial Release

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**ATTACHMENT: TEST SETUP PHOTOGRAPHS**

## 1. GENERAL INFORMATION

### 1.1 Product Description

Equipment Under Test is **EUT type: Cellular/PCS GSM/GPRS/EDGE, Cellular/PCS/AWS WCDMA/HSDPA/HSUPA and LTE B4/B17 Phone with Bluetooth, WLAN, Model: LGMS659** manufactured by **LG Electronics MobileComm U.S.A., Inc.** Its basic purpose is used for communications.

<b>Model</b>	LGMS659
<b>FCC ID</b>	ZNFMS659
<b>Additional Model</b>	LG-MS659, MS659, LG-P659, LGP659, P659, LG-L20L, LGL20L, L20L
<b>EUT Type</b>	Cellular/PCS GSM/GPRS/EDGE, Cellular/PCS/AWS WCDMA/HSDPA/HSUPA and LTE B4/B17 Phone with Bluetooth, WLAN
<b>TX Frequency</b>	824.2 MHz ~ 848.80 MHz (GSM 850) 1850.20 MHz ~ 1909.80 MHz (GSM 1900) 1852.4 MHz ~ 1907.6 MHz (WCDMA B2) 1710 MHz ~ 1755 MHz (WCDMA B4) 826.40 MHz ~ 846.60 MHz (WCDMA B5) 1710 MHz ~ 1755 MHz (LTE B4) 704 MHz ~ 716 MHz (LTE B17)
<b>RX Frequency</b>	869.20 MHz ~ 893.80 MHz (GSM 850) 1930.20 MHz ~ 1989.80 MHz (GSM 1900) 1932.4 MHz ~ 1987.6 MHz (WCDMA B2) 2110 MHz ~ 2155 MHz (WCDMA B4) 871.40 MHz ~ 891.60 MHz (WCDMA B5) 2110 MHz ~ 2155 MHz (LTE B4) 734 MHz ~ 746 MHz (LTE B17)

### 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	Manufacturer	Model Name	FCC ID / DoC	Connected To
EUT	LG	LGMS659	ZNFMS659	Notebook PC Ear-phone
USB cable	CRESYN	OTB-LGE30D CMUA	-	E.U.T Notebook PC
Ear-phone	I-SOUND	HC-MYD-LG1 49	-	E.U.T
Notebook PC	H.P	ProBook6560b	DoC	EUT Notebook PC adaptor
Notebook PC adaptor	CHICONY POWER TECHNOLOGY	Series PPP012H-S	-	Notebook PC
Mouse	Radio shack	Series 2-button mouse	FSUGMZE3	Notebook PC
Net hard	LG	N1A1DD1	DoC	Notebook PC Net hard adaptor
Net hard adaptor	Yang Ming Industrial	DA-60M12	-	Net hard
RJ45 cable	-	-	-	Net hard Notebook PC
Micro SD card	SanDisk	8 GB	-	E.U.T

### 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
Net hard	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.

Measurement Facilities	Reg. No.
Radiated Field strength measurement facility (3m)	90661(Mar. 02, 2011)
Radiated Field strength measurement facility (10m)	90661 (Sep. 03, 2010)

## 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

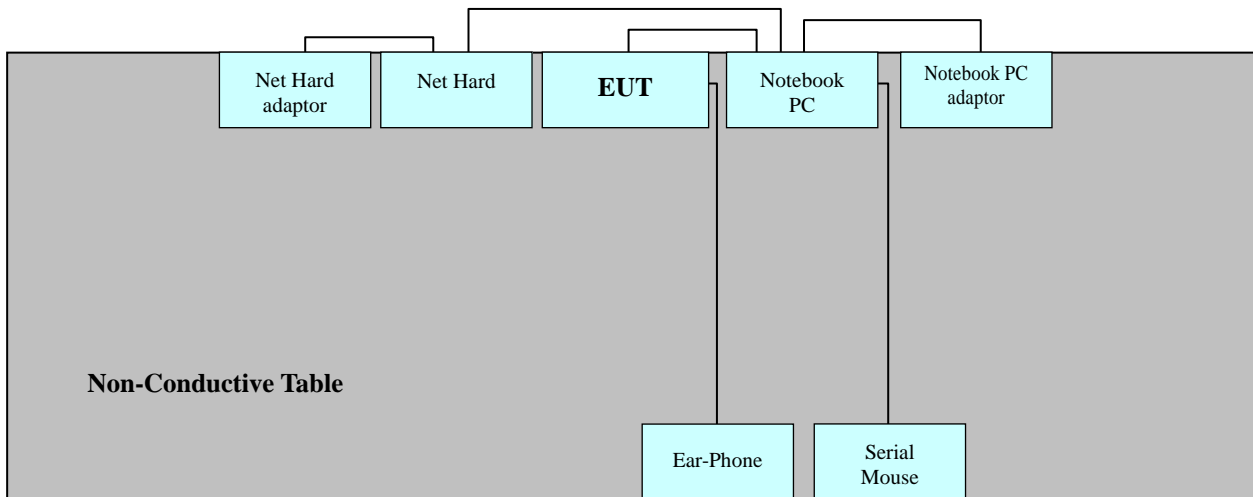
#### 2.1.1 Conducted Emission Test

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]



Power Line: 120 VAC



### **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
Temperature	: 23.4 °C
Humidity Level	: 39.1 %
Test Date	: May 10, 2013

Frequency (MHz)	Transd (dB)	Conductor	Quasi-Peak			Average		
			Limit	Measurement Level	Result Level	Limit	Measurement Level	Result Level
			(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dBuV)
0.474	9.8	H	56	24.5	34.3	46	12.80	22.60
0.728	9.8	H	56	21.7	31.5	46	15.00	24.80
0.736	10.0	N	56	-	-	46	13.50	23.50
1.060	10.1	N	56	-	-	46	13.60	23.70
1.808	9.9	H	56	-	-	46	15.90	25.80
1.864	10.1	N	56	-	-	46	14.50	24.60

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

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

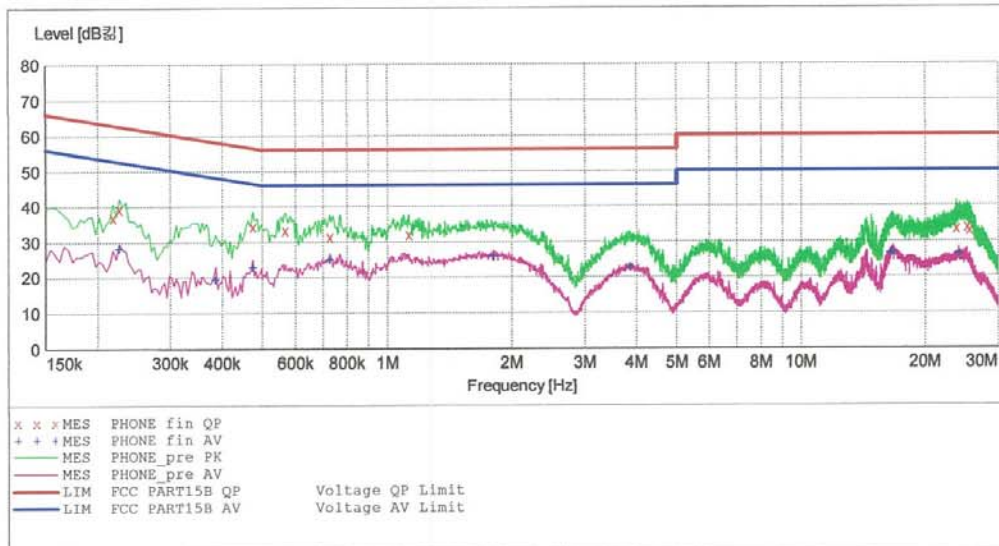
**HCT**

**EMC TEST LAB**

EUT: LGMS659  
 Manufacturer: LG  
 Operating Condition: DATA MODE  
 Test Site: SHIELD ROOM  
 Operator: GC YOON  
 Test Specification: FCC PART15 B  
 Comment: H

**SCAN TABLE: "FCC CLASS B(H)"**

Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	4.0 kHz	KN22 CLASS B	10.0 ms	9 kHz	None
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



**MEASUREMENT RESULT: "PHONE\_fin QP"**

2013-05-10 8:46오전

Frequency MHz	Level dB	Transd dB	Limit dB	Margin dB	Line	PE
0.218001	37.00	9.8	63	25.9	---	---
0.226001	39.20	9.8	63	23.4	---	---
0.474001	34.30	9.8	56	22.1	---	---
0.568000	33.30	9.8	56	22.7	---	---
0.728000	31.50	9.8	56	24.5	---	---
1.128000	32.00	9.9	56	24.0	---	---
23.784000	33.50	11.1	60	26.5	---	---
25.216000	33.90	11.2	60	26.1	---	---
25.568000	33.10	11.2	60	26.9	---	---

**MEASUREMENT RESULT: "PHONE\_fin AV"**

2013-05-10 8:46오전

Frequency MHz	Level dB <sub>μV</sub>	Transd dB	Limit dB <sub>μV</sub>	Margin dB	Line	PE
0.226001	28.10	9.8	53	24.4	---	---
0.386001	19.30	9.8	48	28.8	---	---
0.474001	22.60	9.8	46	23.8	---	---
0.728000	24.80	9.8	46	21.2	---	---
1.808000	25.80	9.9	46	20.2	---	---
3.860000	22.60	10.1	46	23.4	---	---
16.480000	26.50	10.8	50	23.5	---	---
16.700000	26.70	10.8	50	23.3	---	---
24.084000	26.20	11.1	50	23.8	---	---

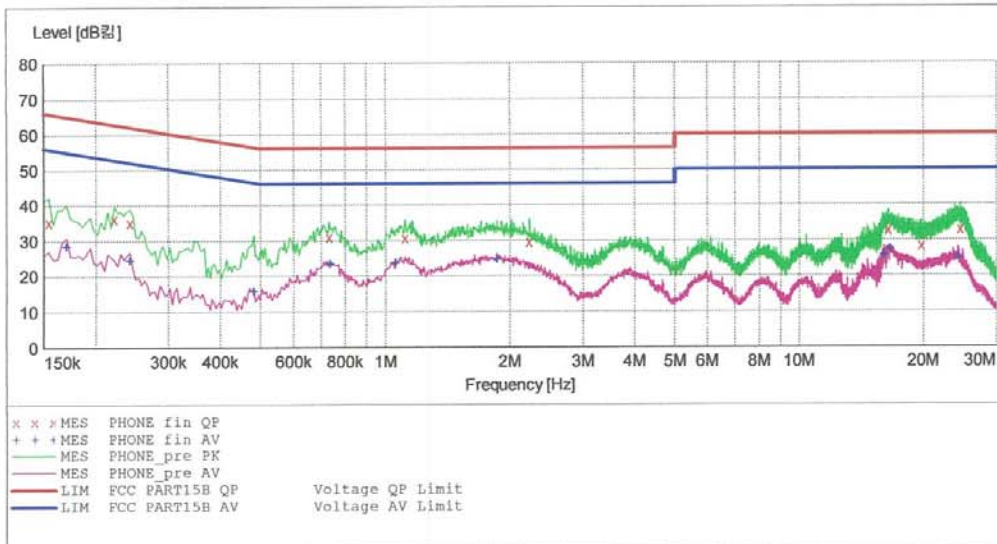
**HCT**

**EMC TEST LAB**

EUT: LGMS659  
 Manufacturer: LG  
 Operating Condition: DATA MODE  
 Test Site: SHIELD ROOM  
 Operator: GC YOON  
 Test Specification: FCC PART15 B  
 Comment: N

**SCAN TABLE: "FCC CLASS B(N)"**

Short Description:			KN22 CLASS B			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



**MEASUREMENT RESULT: "PHONE\_fin\_QP"**

2013-05-10 8:50오전

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.154001	35.30	10.0	66	30.5	---	---
0.222001	36.30	10.0	63	26.5	---	---
0.242001	35.00	10.0	62	27.0	---	---
0.732000	31.00	10.0	56	25.0	---	---
1.116000	30.80	10.1	56	25.2	---	---
2.232000	29.50	10.2	56	26.5	---	---
16.460000	32.70	11.1	60	27.3	---	---
19.752000	28.40	11.2	60	31.6	---	---
24.580000	32.90	11.5	60	27.1	---	---

**MEASUREMENT RESULT: "PHONE\_fin AV"**

2013-05-10 8:50오전

Frequency MHz	Level dB <sub>μV</sub>	Transd dB	Limit dB <sub>μV</sub>	Margin dB	Line	PE
0.170001	28.40	10.0	55	26.5	---	---
0.242001	24.50	10.0	52	27.6	---	---
0.482001	15.80	10.0	46	30.5	---	---
0.736000	23.50	10.0	46	22.5	---	---
1.060000	23.70	10.1	46	22.3	---	---
1.864000	24.60	10.1	46	21.4	---	---
16.044000	25.60	11.1	50	24.4	---	---
16.624000	27.30	11.1	50	22.7	---	---
24.308000	25.00	11.5	50	25.0	---	---

## 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

Temperature : 24.7 °C

Humidity Level : 37.0 %

Test Date : May 06, 2013

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)			
31.900	10.29	V	1.0	11.40	3.42	40.0	25.1	14.9
47.300	17.54	V	1.9	12.41	3.55	40.0	33.5	6.5
49.200	16.34	V	1.0	12.40	3.56	40.0	32.3	7.7
71.700	16.20	V	1.0	10.17	3.73	40.0	30.1	9.9
116.600	15.28	V	1.0	11.34	3.98	43.5	30.6	12.9
250.000	15.93	H	1.0	11.77	4.50	46.0	32.2	13.8

**-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

Temperature : 24.3 °C

Humidity Level : 35.4 %

Test Date : May 08, 2013

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)
1.9118	46.60	74	27.4	V	37.10	54	16.9
1.9719	47.20	74	26.8	V	36.40	54	17.6

**※ 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.

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

### [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 type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESCI	100033	1 year	2013.06.18
<input type="checkbox"/> LISN	Rohde & Schwarz	ESH3-Z5	100282	1 year	2013.07.04
<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"/> Attenuator	Rohde & Schwarz	ESH3-Z2	357.8810.352	1 year	2013.07.31
<b><u>Radiated Emission</u></b>					
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESU26	100241	1 year	2013.07.30
<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"/> 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 checked="" type="checkbox"/> Power Amplifier	Rohde & Schwarz	SCU-18	10094	1 year	2013.09.11
<input checked="" type="checkbox"/> Horn Antenna	Schwarzbeck	BBHA 9120D	296	2 year	2014.12.13

## 7. CONCLUSION

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The data collected shows that the **EUT type: Cellular/PCS GSM/GPRS/EDGE, Cellular/PCS/AWS WCDMA/HSDPA/HSUPA and LTE B4/B17 Phone with Bluetooth, WLAN, Model: LGMS659, FCC ID: ZNFMS659** complies with §15.107 and §15.109 of the FCC rules.