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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: July 30, 2012**

**Test Report No.: HCTE1207FE19**

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

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

**FCC ID:**

**ZNFE970**

Rule Part(s) / Standard(s) : FCC PART 15 Subpart B Class B

Equipment Type : Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSPA and PCS/AWS  
LTE Phone with Bluetooth & WLAN & NFC

Model Name : LG-E970

Port / Connector(s) : USB Port / Headset Port

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
HCTE1207FE19	July 30, 2012	Initial Release

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## TABLE OF CONTENTS

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	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 .....	11
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 **Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSPA and PCS/AWS LTE Phone with Bluetooth & WLAN & NFC, Model: LG-E970** manufactured by **LG Electronics MobileComm U.S.A., Inc.** Its basic purpose is used for communications.

<b>Model</b>	LG-E970
<b>FCC ID</b>	ZNFE970
<b>E.U.T Type</b>	Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSPA and PCS/AWS LTE Phone with Bluetooth & WLAN & NFC
<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) 1 850 MHz to 1 910 MHz (LTE B2) 1 710 MHz to 1 755 MHz (LTE B4) 824 MHz to 849 MHz (LTE B5) 704 MHz to 716 MHz (LTE B17)
<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) 1 930 MHz to 1 990 MHz (LTE B2) 2 110 MHz to 2 155 MHz (LTE B4) 869 MHz to 894 MHz (LTE B5) 734 MHz to 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
E.U.T	LG	LG-E970	ZNFE970	Notebook PC
Notebook PC	LG	X140-02	DoC	E.U.T Notebook PC adaptor
Notebook PC adaptor	DELTA (JIANG SU)	ADP-40PH AD	-	Notebook PC
Mouse	PRIMAX ELECTRONICS	MOARUO	DoC	Notebook PC
SD Card	SanDisk	8GB	-	E.U.T
USB cable	BD	EAD61965801	-	E.U.T Notebook PC
Headset	CRESIN	SGEY0003744	-	E.U.T
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

### 1.4 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
E.U.T	Micro USB	-	Y	(P,D)1.2
	Headset jack	-	N	(D)1.0
Notebook PC	RJ45	-	N	(D)1.5
	USB (Mouse)	-	Y	(D)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
E.U.T	Micro USB	N	N/A	Y	Both End
	Headset jack	N	N/A	Y	E.U.T End
Notebook PC	RJ45	N	N/A	N	Both End
	USB (Mouse)	-	-	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 E.U.T distance of 3 m

## 1.7 Test Facility

The 3 m semi anechoic chamber used to collect the test data is located at the 105-1, Jangam-Ri, Majang-Myeon, Icheon-Si, Kyoungki-Do, Republic of Korea. Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4.

Detailed description of test facilities was submitted to the Commission and accepted dated Mar 02, 2011 (Registration Number: 90661)

## 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

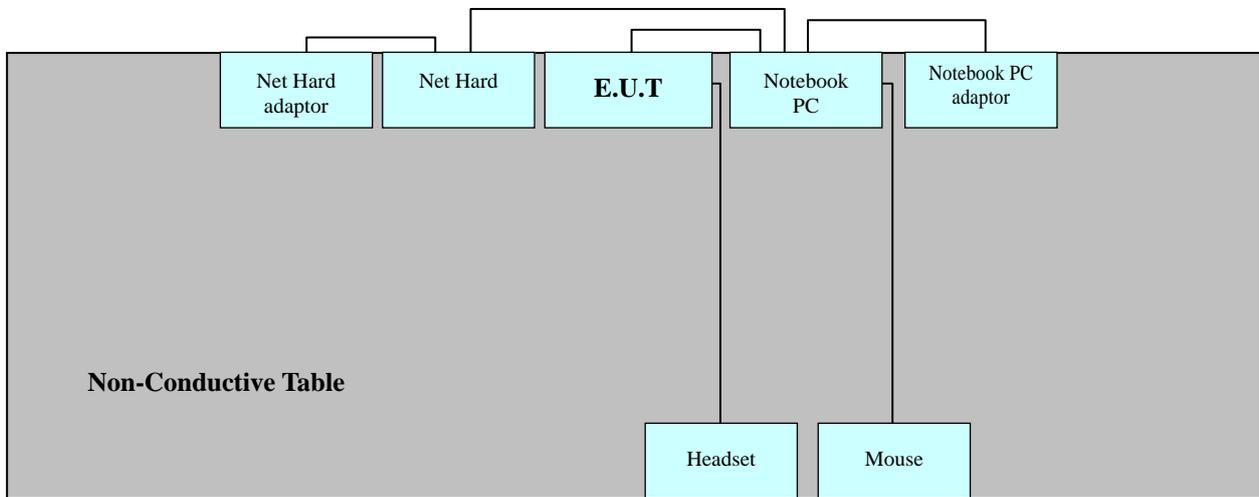
## 2. SYSTEM TEST CONFIGURATION

### 2.1 Configuration of Test System

Power Line Conducted test : E.U.T 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.

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 : 23.2 °C

Humidity Level : 51.8 %

Test Date : July 06, 2012

Frequency (MHz)	Transd (dB)	Conductor	Quasi-Peak			Average		
			Limit	Measurement Level	Result Level	Limit	Measurement Level	Result Level
			(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dBuV)
0.161	9.7	0	65	37.3	47.0	55	15.80	25.50
20.680	10.7	0	60	34.2	44.9	50	-	-
21.032	10.7	0	60	33.9	44.6	50	-	-
0.162	9.9	0	65	37.5	47.4	55	-	-
19.928	11.0	0	60	29.4	40.4	50	-	-
21.012	11.1	0	60	34.3	45.4	50	-	-

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

1. Line H = Hot, Line N = Neutral

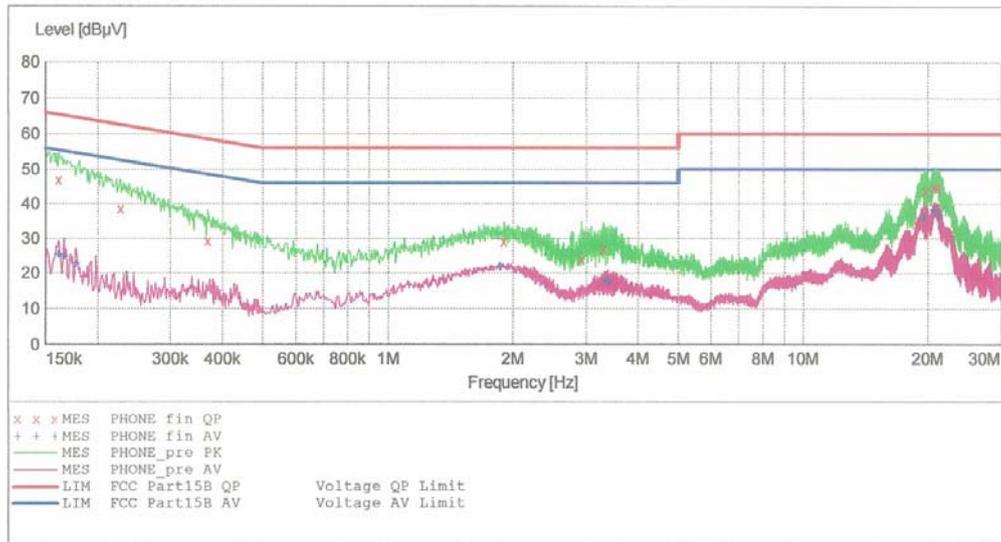
**HCT**

**EMC**

EUT: E970  
 Manufacturer: LG  
 Operating Condition: DATA MODE  
 Test Site: SHIELD ROOM  
 Operator: JH CHOI  
 Test Specification: FCC PART15 CLASS B  
 Comment: H

**SCAN TABLE: "FCC PART 15 B(H)"**

Short Description:			FCC PART 15 CLASS B			
Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	1.0 kHz	MaxPeak	10.0 ms	9 kHz	None
500.0 kHz	5.0 MHz	4.0 kHz	Average			
			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"**

7/6/2012 8:01PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.161010	47.00	9.7	65	18.4	---	---
0.227010	38.70	9.7	63	23.8	---	---
0.368010	29.40	9.7	59	29.2	---	---
1.904000	29.20	9.8	56	26.8	---	---
2.920000	24.10	9.9	56	31.9	---	---
3.308000	27.20	9.9	56	28.8	---	---
19.728000	43.80	10.7	60	16.2	---	---
20.680000	44.90	10.7	60	15.1	---	---
21.032000	44.60	10.7	60	15.4	---	---

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

7/6/2012 8:01PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.161010	25.50	9.7	55	29.9	---	---
0.166010	24.90	9.7	55	30.3	---	---
0.177010	22.60	9.7	55	32.0	---	---
1.864000	21.80	9.8	46	24.2	---	---
3.372000	17.80	9.9	46	28.2	---	---
3.392000	17.60	9.9	46	28.4	---	---
19.524000	36.00	10.7	50	14.0	---	---
20.732000	38.30	10.7	50	11.7	---	---
21.248000	36.50	10.8	50	13.5	---	---

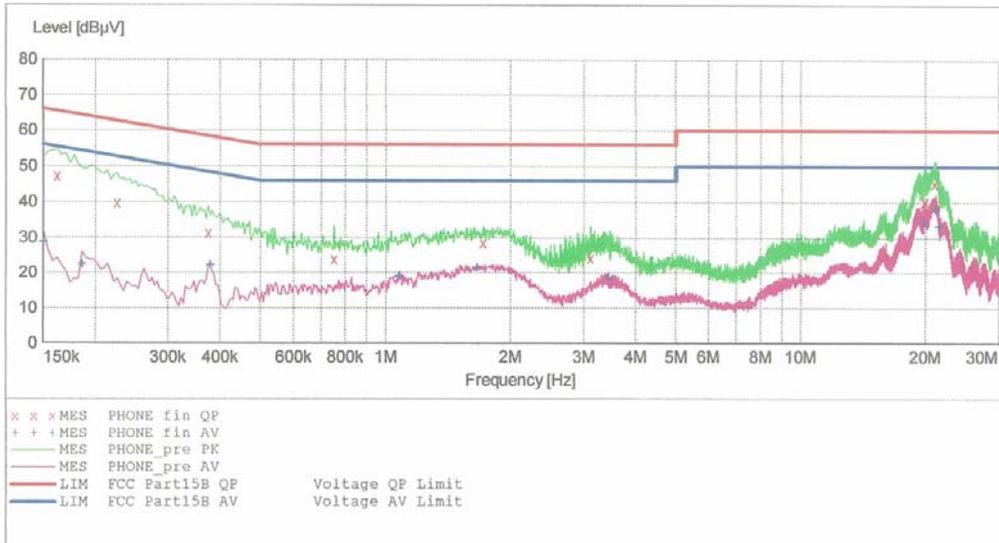
**HCT**

**EMC**

EUT: E970  
 Manufacturer: LG  
 Operating Condition: DATA MODE  
 Test Site: SHIELD ROOM  
 Operator: JH CHOI  
 Test Specification: FCC PART15 CLASS B  
 Comment: N

**SCAN TABLE: "FCC PART 15 B(N)"**

Short Description:		FCC PART 15 CLASS B					
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer	
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"**

7/6/2012 7:50PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.162010	47.40	9.9	65	18.0	---	---
0.226010	39.80	9.9	63	22.8	---	---
0.374010	31.50	9.9	58	27.0	---	---
0.752000	24.00	9.9	56	32.0	---	---
1.720000	28.70	10.0	56	27.3	---	---
3.124000	24.30	10.1	56	31.7	---	---
19.896000	40.30	11.0	60	19.7	---	---
19.928000	40.40	11.0	60	19.6	---	---
21.012000	45.40	11.1	60	14.6	---	---

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

7/6/2012 7:50PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150010	28.80	9.9	56	27.2	---	---
0.186010	22.40	9.9	54	31.8	---	---
0.378010	22.20	9.9	48	26.1	---	---
1.076000	18.90	10.0	46	27.1	---	---
1.664000	21.60	10.0	46	24.4	---	---
3.440000	18.60	10.1	46	27.4	---	---
19.796000	34.30	11.0	50	15.7	---	---
21.160000	38.10	11.1	50	11.9	---	---
21.536000	33.30	11.1	50	16.7	---	---

## 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 : 24.6 °C

Humidity Level : 52.4 %

Test Date : July 20, 2012

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)			
47.400	15.67	V	1.2	12.38	3.55	40.0	31.6	8.4
58.600	16.53	V	1.0	11.97	3.60	40.0	32.1	7.9
80.800	13.28	H	2.7	7.92	3.80	40.0	25.0	15.0
115.500	17.56	H	1.5	11.29	3.95	43.5	32.8	10.7
249.900	26.43	H	1.2	11.77	4.50	46.0	42.7	3.3
344.900	16.93	H	1.0	14.39	4.78	46.0	36.1	9.9

**-For measurement above 1 GHz**

Limit Apply to : FCC PART 15 Subpart B Class B

Detector : Peak mode: Peak (RBW: 1 MHz)  
: Average mode: Peak (RBW: 1 MHz)

Temperature : 24.6 °C

Humidity Level : 52.4 %

Test Date : July 20, 2012

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)
1.9900	57.00	74	17.0	V	30.30	54	23.7
1.5900	47.00	74	27.0	V	29.70	54	24.3
1.2200	45.10	74	28.9	V	28.80	54	25.2

※ 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	2013.05.02
<input type="checkbox"/> LISN	Rohde & Schwarz	ESH3-Z5	100282	1 year	2013.02.03
<input checked="" type="checkbox"/> LISN	Rohde & Schwarz	ENV216	100073	1 year	2013.02.09
<input checked="" type="checkbox"/> LISN	EMCO	3816/2SH	9706-1070	1 year	2013.05.02
<input type="checkbox"/> Attenuator	Rohde & Schwarz	ESH3-Z2	357.8810.352	1 year	2012.08.01
<b><u>Radiated Emission</u></b>					
<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	2013.05.03
<input checked="" type="checkbox"/> Trilog Antenna	Schwarzbeck	VULB9160	3301	2 year	2012.09.13
<input type="checkbox"/> Antenna master	INNCO Systems	MA4000-EP	MA4000/283	N/A	-
<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	2012.09.19
<input checked="" type="checkbox"/> Horn Antenna	Schwarzbeck	BBHA 9120D	937	2 year	2013.10.17

## **7. CONCLUSION**

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The data collected shows that the **Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSPA and PCS/AWS LTE Phone with Bluetooth & WLAN & NFC, Model: LG-E970, FCCID: ZNFE970** complies with §15.107 and §15.109 of the FCC rules.