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MEASUREMENT REPORT FCC Part 90 CDMA / LTE

Applicant:

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

Date of Testing:

Aug. 1-5, 2013

Test Site/Location:

PCTEST Lab., Columbia, MD, USA

Test Report Serial No.:

0Y1307031177.ZNF

FCC ID:

ZNFLS980

APPLICANT:

LG ELECTRONICS MOBILECOMM U.S.A

Applicant Type:

Class II Permissive Change

FCC Classification:

PCS Licensed Transmitter Held to Ear (PCE)

FCC Rule Part:

§90.691

EUT Type:

Portable Handset

Model(s):

LS-980, LGLS980

Test Device Serial No.:

identical prototype [S/N: LTE/CDMA]

Class II Permissive Change:

Please see FCC change documents.

Original Grant Date:

7/23/2013

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

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.


Randy Ortanez
President

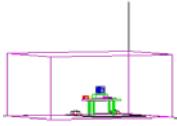


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MEASUREMENT REPORT

FCC Part 90 CDMA / LTE

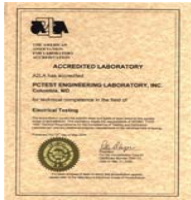


§2.1033 General Information

APPLICANT: LG Electronics MobileComm U.S.A.
APPLICANT ADDRESS: 1000 Sylvan Avenue
 Englewood Cliffs, NJ 07632, United States
TEST SITE: PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS: 7185 Oakland Mills Road, Columbia, MD 21045 USA
BASE MODEL: LS-980
FCC CLASSIFICATION: PCS Licensed Transmitter Held to Ear (PCE)
MODE: CDMA / EvDO / LTE
FREQUENCY TOLERANCE: $\pm 0.00025\%$ (2.5 ppm)
Test Device Serial No.: LTE/CDMA ☐ Production ☒ Pre-Production ☐ Engineering
DATE(S) OF TEST: Aug. 1-5, 2013
TEST REPORT S/N: 0Y1307031177.ZNF

Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab. located in Columbia, MD 21045, U.S.A.



- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (2451A-1).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025:2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451A-1) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2 Testing Facility

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Intern't'l (BWI) airport, the city of Baltimore and the Washington, DC area. (See Figure 1-1).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003/2009 on January 10, 2012.

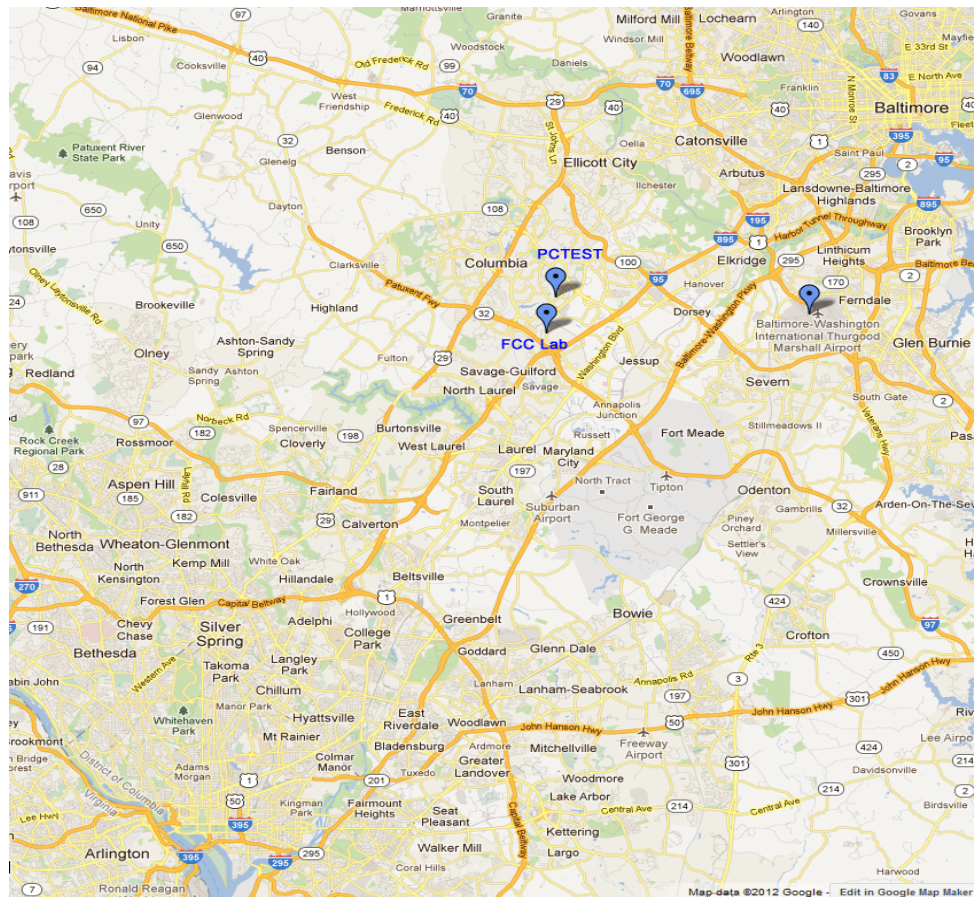


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFLS980**. The EUT consisted of the following component(s):

Trade Name / Base Model	FCC ID	Description
LG / Model: LS-980	ZNFLS980	Portable Handset

Table 2-1. EUT Equipment Description

Note: All data contained in this report is applicable for the device operation in the 814.7 – 824 MHz frequency range (In addition, data in this report is both from the CDMA and LTE transmitter in the respective band). Test data shown supports the devices compliance with §90.691 of the FCC Rules and Regulation.

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA/EvDO Rev0/A (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, 850/1900 WCDMA/HSPA, Band 25 (3,5,10MHz), 26 (1.4,3,5,10 MHz), 41 (10,15,20 MHz) LTE, 802.11a/b/g/n/ac WLAN (DTS/NII), Bluetooth (1x,EDR, LE), NFC

2.3 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the “Land Mobile FM or PM – Communications Equipment Measurements and Performance Standards” (ANSI/TIA-603-C-2004) was used in the measurement of the measurement of the **LG Portable Handset FCC ID: ZNFLS980**.

3.2 Radiated Power and Radiated Spurious Emissions

§2.1053, §90.635, §90.691

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. An ETS Lindgren Model 2188 raised turntable is used for radiated measurement. It is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. A 78cm high PVC support structure is placed on top of the turntable. A ¾” (~1.9cm) sheet of high density polyethylene is used as the table top and is placed on top of the PVC supports to bring the total height of the table to 80cm.

The equipment under test was transmitting while connected to its integral antenna and is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer “Channel Power” function with the integration band set to the emissions’ occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168.

Per the guidance of ANSI/TIA-603-C-2004, a half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_d \text{ [dBm]} = P_g \text{ [dBm]} - \text{cable loss [dB]} + \text{antenna gain [dBd/dBi]}$$

Where, P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_g \text{ [dBm]} - \text{cable loss [dB]}$.

The calculated P_d levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of $43 + 10\log_{10}(\text{Power [Watts]})$ specified in 90.691.

For fundamental radiated power measurements, the guidance of KDB 971168 is used to record the EUT power level that is subsequently matched via the aforementioned substitution method given in ANSI/TIA-603-C-2004.

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4.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	3/29/2013	Annual	3/29/2014	N/A
-	RE2	Radiated Emissions Cable Set (VHF/UHF)	3/29/2013	Annual	3/29/2014	N/A
-	LTx2	Licensed Transmitter Cable Set	1/17/2013	Annual	1/17/2014	N/A
Agilent	8449B	(1-26.5GHz) Pre-Amplifier	4/17/2013	Annual	4/17/2014	3008A00985
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/10/2012	Annual	10/10/2013	3613A00315
Agilent	N9020A	MXA Signal Analyzer	10/9/2012	Annual	10/9/2013	US46470561
Agilent	N9038A	MXE EMI Receiver	12/8/2012	Annual	12/8/2013	MY51210133
Anritsu	MA2411B	Pulse Sensor	9/19/2012	Annual	9/19/2013	1027293
Anritsu	ML2495A	Power Meter	10/11/2012	Annual	10/11/2013	1039008
Mini-Circuits	VHF-1300+	High Pass Filter	1/21/2013	Annual	1/21/2014	30716
Mini-Circuits	VHF-3100+	High Pass Filter	1/21/2013	Annual	1/21/2014	31144
Rohde & Schwarz	CMU200	Base Station Simulator	N/A		N/A	836536/0005
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Tx	10/3/2011	Biennial	10/3/2013	91052522TX
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	10/3/2011	Biennial	10/3/2013	91052523RX
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
Sunol	DRH-118	Horn Antenna (1 - 18GHz)	6/19/2013	Biennial	6/19/2015	A050307
Sunol	DRH-118	Horn Antenna (1-18 GHz)	6/19/2013	Biennial	6/19/2015	A042511

Table 4-1. Test Equipment

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5.0 SAMPLE CALCULATIONS

Spurious Radiated Emission – BC10

Example: Channel 476 CDMA BC10 Mode 3rd Harmonic (2453.70MHz)

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was –81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of –81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 2453.70 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80) = 50.3 dBc.

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6.0 TEST RESULTS

6.1 Summary

Company Name: LG Electronics MobileComm U.S.A
 FCC ID: ZNFLS980
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): LTE / CDMA / EvDO

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
§2.1053, §90.691	Undesirable Emissions	$< 43 + 10\log_{10}(P[\text{Watts}])$ for all out-of-band emissions	CONDUCTED	PASS	Sections 6.2, 6.3

Table 6-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) Band Class 10 - CDMA High Channel for this device is Channel 670.

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6.2 BC10 CDMA Radiated Measurements

§2.1053, §90.691

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 817.90 MHz
 CHANNEL: 476
 MODULATION SIGNAL: CDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ -13.00 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin (dB)
1635.80	-43.31	8.58	-34.73	H	-21.73
2453.70	-58.58	8.78	-49.79	H	-36.79
3271.60	-120.95	9.08	-111.87	H	-98.87
4089.50	-118.85	9.58	-109.26	H	-96.26
4907.40	-119.43	11.28	-108.15	H	-95.15

Table 6-2. Radiated Spurious Data (Ch. 476)

NOTES:

1. This device was tested under all R.C.s and S.O.s and the worst case is reported with RC3/SO55 with "All Up" power control bits.
2. This unit was tested with its standard battery.
3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found in the horizontal setup. The data reported in the table above was measured in this test setup.

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BC10 CDMA Radiated Measurements (Cont'd)

§2.1053, §90.691

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 822.75 MHz
 CHANNEL: 670
 MODULATION SIGNAL: CDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ -13.00 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin (dB)
1645.50	-44.72	8.51	-36.21	H	-23.21
2468.25	-59.36	8.75	-50.61	H	-37.61
3291.00	-120.91	9.11	-111.80	H	-98.80
4113.75	-119.04	9.71	-109.33	H	-96.33
4936.50	-119.24	11.24	-108.00	H	-95.00

Table 6-3. Radiated Spurious Data (Ch. 670)

NOTES:

1. This device was tested under all R.C.s and S.O.s and the worst case is reported with RC3/SO55 with "All Up" power control bits.
2. This unit was tested with its standard battery.
3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found in the horizontal setup. The data reported in the table above was measured in this test setup.

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6.3 Band 26 LTE Radiated Measurements

§2.1053, §90.691

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 814.70 MHz
 CHANNEL: 26697
 MEASURED OUTPUT POWER: 24.01 dBm = 0.252 W
 MODULATION SIGNAL: QPSK
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ -13.00 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin (dB)
1629.40	-41.00	8.58	-32.43	H	-19.43
2444.10	-58.46	8.78	-49.68	H	-36.68
3258.80	-49.42	9.08	-40.34	H	-27.34
4073.50	-118.85	9.58	-109.26	H	-96.26
4888.20	-119.43	11.28	-108.15	H	-95.15

Table 6-4. Radiated Spurious Data

NOTES:

1. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1/0.
2. This unit was tested with its standard battery.
3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found in the horizontal setup. The data reported in the table above was measured in this test setup.

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Band 26 LTE Radiated Measurements (Cont'd)

§2.1053, §90.691

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 823.30 MHz
 CHANNEL: 26783
 MEASURED OUTPUT POWER: 24.20 dBm = 0.263 W
 MODULATION SIGNAL: QPSK
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ -13.00 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin (dB)
1646.60	-43.04	8.51	-34.53	H	-21.53
2469.90	-58.77	8.75	-50.01	H	-37.01
3293.20	-49.26	9.11	-40.15	H	-27.15
4116.50	-119.04	9.71	-109.33	H	-96.33
4939.80	-119.24	11.24	-108.00	H	-95.00

Table 6-5. Radiated Spurious Data

NOTES:

1. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1/0.
2. This unit was tested with its standard battery.
3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found in the horizontal setup. The data reported in the table above was measured in this test setup.

7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset** **FCC ID: ZNFLS980** complies with all the requirements of Parts 90 of the FCC rules.

FCC ID: ZNFLS980		Part 90 CDMA / EvDO / LTE MEASUREMENT REPORT (Class II Permissive Change)		Reviewed by: Quality Manager
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