



# PCTEST ENGINEERING LABORATORY, INC.

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## MEASUREMENT REPORT FCC Part 90 Band Class 10 CDMA

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

**Date of Testing:**  
July 27-31, 2012  
**Test Site/Location:**  
PCTEST Lab., Columbia, MD, USA  
**Test Report Serial No.:**  
0Y1207311085.ZNF

<b>FCC ID:</b>	<b>ZNFLS860</b>
<b>APPLICANT:</b>	<b>LG ELECTRONICS MOBILECOMM U.S.A</b>

**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):** LS860, LG-LS860, LGLS860  
**Test Device Serial No.:** *identical prototype* [S/N: N/A]  
**Class II Permissive Change:** Please see change document  
**Original Grant Date:** 8/29/2012

Mode	Tx Frequency (MHz)	Emission Designator	ERP/EIRP	
			Max. Power (W)	Max. Power (dBm)
CDMA800 (BC10)	817.9 - 823.1	1M28F9W	0.090	19.56

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.

*PCTEST certifies that no party to this 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.*

Randy Ortanez  
President





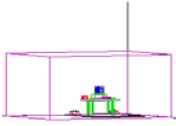
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<b>Test Report S/N:</b> 0Y1207311085.ZNF	<b>Test Dates:</b> July 27-31, 2012	<b>EUT Type:</b> Portable Handset	Page 1 of 13

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# MEASUREMENT REPORT

## BC10 CDMA



### §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:** LS860  
**FCC CLASSIFICATION:** PCS Licensed Transmitter Held to Ear (PCE)  
**MODE:** CDMA / EvDO  
**FREQUENCY TOLERANCE:** ±0.00025 % (2.5 ppm)  
**Test Device Serial No.:** N/A       Production     Pre-Production     Engineering  
**DATE(S) OF TEST:** July 27-31, 2012  
**TEST REPORT S/N:** 0Y1207311085.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. 159966) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.
- 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.
- 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.
- 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

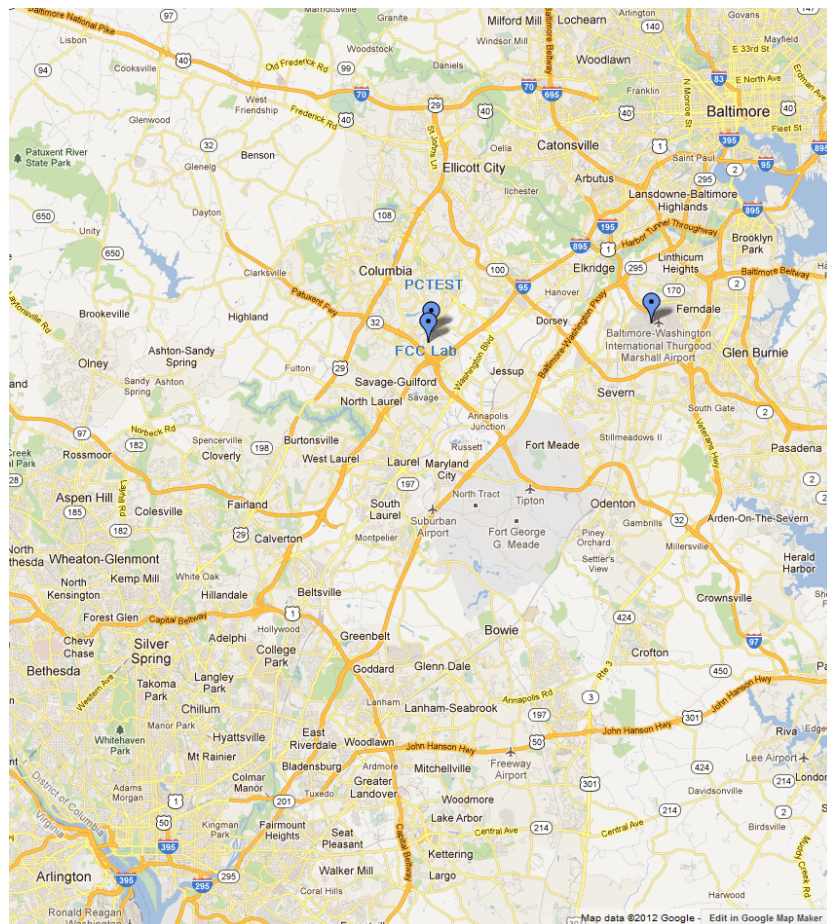
### 1.1 Scope

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 located at 7185 Oakland Mills Road, Columbia, MD 21046. The site coordinates are 39° 10'23" N latitude and 76° 49'50" W longitude. The facility is 0.4 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. 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 on February 15, 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 **LGE Portable Handset FCC ID: ZNFLS860**. The EUT consisted of the following component(s):

Trade Name / Base Model	FCC ID	Description
LGE / Model: LS860	ZNFLS860	Portable Handset

**Table 2-1. EUT Equipment Description**

**Note:** All data contained in this report is applicable for the device operation in the BC10 (817 – 824 MHz). 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 Rev 0/A (BC0, BC1, BC10), Band 25 (5/10 MHz BW) LTE, 802.11b/g/n WLAN, 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 **LGE Portable Handset FCC ID: ZNFLS860**.

### 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:

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

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  $P_g \text{ [dBm]} - \text{cable loss} \text{ [dB]}$ .

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  $43 + 10\log_{10}(\text{Power} \text{ [Watts]})$  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
-	LTx1	Licensed Transmitter Cable Set	1/25/2012	Annual	1/25/2013	N/A
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	7/10/2012	Annual	7/10/2013	N/A
Agilent	8447D	Broadband Amplifier	5/8/2012	Annual	5/8/2013	1937A03348
Agilent	E4448A	PSA (3Hz-50GHz) Spectrum Analyzer	2/15/2012	Annual	2/15/2013	US42510244
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/5/2012	Annual	4/5/2013	MY45470194
Agilent	N9020A	MXA Signal Analyzer	10/10/2011	Annual	10/10/2012	US46470561
Agilent	N9030A	PXA Signal Analyzer	2/23/2012	Annual	2/23/2013	MY49432391
Anritsu	MA2411B	Power Sensor	3/5/2012	Annual	3/5/2013	846215
Anritsu	ML2495A	Power Meter	10/13/2011	Annual	10/13/2012	1039008
Espec	ESX-2CA	Environmental Chamber	4/4/2012	Annual	4/4/2013	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	7/22/2011	Biennial	7/22/2013	125518
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	10/1/2010	Biennial	10/1/2012	128337
Mini-Circuits	VHF-1200+	High Pass Filter	1/15/2012	Annual	1/15/2013	30923
Rohde & Schwarz	CMU200	Base Station Simulator	N/A		N/A	836371/0079
Rohde & Schwarz	RS-PR18	1-18 GHz Pre-Amplifier	6/26/2012	Annual	6/26/2013	100071
Rohde & Schwarz	ESU26	EMI Test Receiver	12/15/2011	Annual	12/15/2012	100342
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	11/14/2011	Biennial	11/14/2013	9105-2404
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Tx	11/14/2011	Biennial	11/14/2013	9105-2403
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/26/2012	Biennial	1/26/2014	A051107

**Table 4-1. Test Equipment**

**Note:** Equipment with Calibration dates 'N/A' were used for signaling purposes only and not for calibrated measurements.



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## 5.0 SAMPLE CALCULATIONS

### Spurious Radiated Emission – BC10

#### **Example: Channel 476 CDMA BC10 Mode 3<sup>rd</sup> 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: ZNFLS860  
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)  
 Mode(s): CDMA / EvDO  
 Band: Band Class 10

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
§90.635	Effective Radiated Power	< 100 Watts max. ERP	RADIATED	PASS	Section 6.2
§2.1053, §90.691	Undesirable Emissions	< $43 + 10\log_{10}(P[\text{Watts}])$ for all out-of-band emissions		PASS	Section 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) The analyzer plots shown in Section 7.0 were taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.

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## 6.2 Effective Radiated Power Output Data



§90.635

Frequency [MHz]	BC10 [Channel]	Battery Type	Substitute Level [dBm]	Antenna Gain [dBd]	Pol [H/V]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
817.90	Ch. 476	Standard	14.90	4.66	H	19.56	0.090	50.00	-30.44
823.10	Ch. 684	Standard	14.22	4.95	H	19.17	0.083	50.00	-30.83

**Table 6-2. Effective Radiated Power Output Data**

### 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 slide-in setup. The data reported in the table above was measured in this test setup.

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### 6.3 BC10 CDMA Radiated Measurements §2.1053, §90.691

#### Field Strength of SPURIOUS Radiation



OPERATING FREQUENCY: 817.90 MHz  
 CHANNEL: 476  
 MEASURED OUTPUT POWER: 19.56 dBm = 0.090 W  
 MODULATION SIGNAL: CDMA  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  32.56 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
1635.80	-53.47	4.88	-48.59	H	68.15
2453.70	-53.58	5.15	-48.43	H	67.99
3271.60	-94.77	7.49	-87.28	H	106.84
4089.50	-94.46	9.15	-85.32	H	104.88
4907.40	-94.70	9.95	-84.75	H	104.31

**Table 6-3. 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 slide-in 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: 823.10 MHz  
 CHANNEL: 684  
 MEASURED OUTPUT POWER: 19.17 dBm = 0.083 W  
 MODULATION SIGNAL: CDMA  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  32.17 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
1646.20	-52.54	4.77	-47.77	H	66.94
2469.30	-54.10	5.06	-49.04	H	68.20
3292.40	-59.54	7.57	-51.97	H	71.13
4115.50	-94.55	9.19	-85.36	H	104.53
4938.60	-94.70	10.00	-84.70	H	103.87

**Table 6-4. Radiated Spurious Data (Ch. 684)**



**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 slide-in setup. The data reported in the table above was measured in this test setup.

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## 7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LGE Portable Handset FCC ID: ZNFLS860** complies with all the requirements of Parts 90 of the FCC rules.

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