



# PCTEST ENGINEERING LABORATORY, INC.

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<http://www.pctestlab.com>



## MEASUREMENT REPORT FCC Part 90 Band Class 10 CDMA / LTE

**Applicant:**

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

**Date of Testing:**

11/26/2013

**Test Site/Location:**

PCTEST Lab., Columbia, MD, USA

**Test Report Serial No.:**

0Y1311192199.A3L

**FCC ID:****ZNFLS995****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):** LS995, LG-LS995, LG-LS995**Test Device Serial No.:** *identical prototype* [S/N: EIRP #1]**Class II Permissive Change:** Please see FCC change documents.**Original Grant Date:** 11/20/2013

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

FCC ID: ZNFLS995		Part 90 BC10 CDMA/EvDO/LTE MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE		Reviewed by: Quality Manager
Test Report S/N: 0Y1311192199.A3L	Test Dates: 11/26/2013	EUT Type: Portable Handset		Page 1 of 14

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# MEASUREMENT REPORT

## Part 90

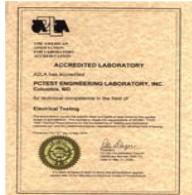


### §2.1033 General Information

**APPLICANT:** LG Electronics MobileComm U.S.A  
**APPLICANT ADDRESS:** 1000 Sylvan Avenue  
**TEST SITE:** Englewood Cliffs, NJ 07632, United States  
**TEST SITE ADDRESS:** PCTEST ENGINEERING LABORATORY, INC.  
**BASE MODEL:** 7185 Oakland Mills Road, Columbia, MD 21045 USA  
**FCC CLASSIFICATION:** LS995  
**MODE:** PCS Licensed Transmitter Held to Ear (PCE)  
**MODE:** CDMA/EvDO/LTE  
**FREQUENCY TOLERANCE:** MODEM  
**Test Device Serial No.:** ±0.00025 % (2.5 ppm)  
**DATE(S) OF TEST:** EIRP #1  Production  Pre-Production  Engineering  
**TEST REPORT S/N:** 11/26/2013  
**TEST REPORT S/N:** 0Y1311192199.A3L

### 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

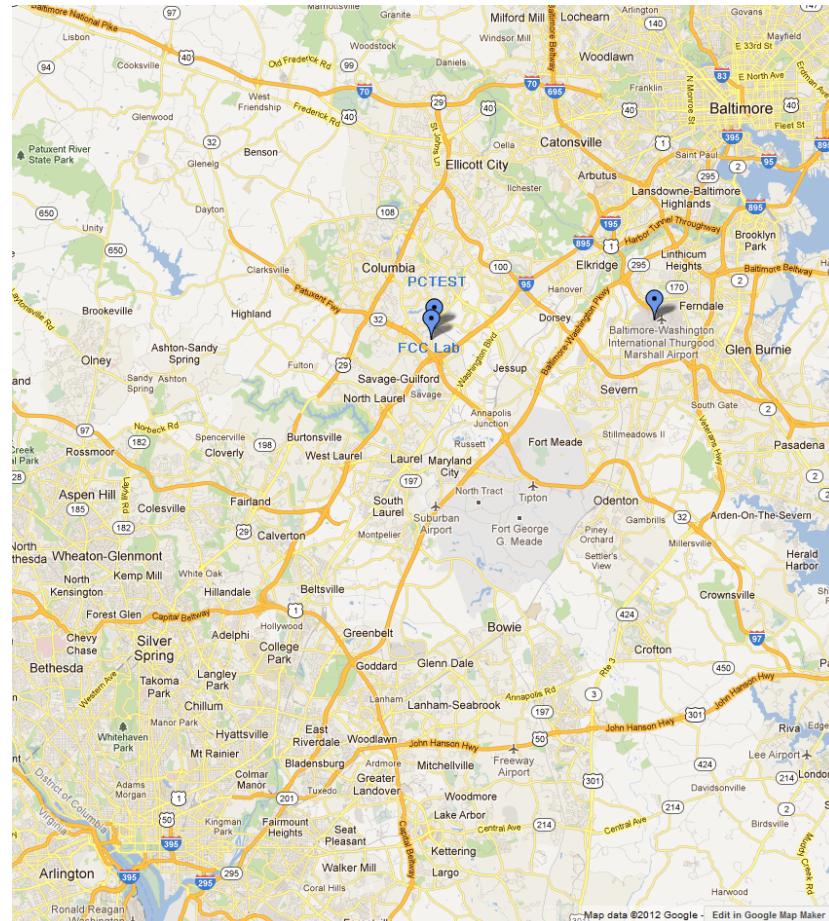
### 1.1 Scope

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 Int'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: ZNFLS995**. The EUT consisted of the following component(s):

Trade Name / Base Model	FCC ID	Description
LGE / Model: LS995	ZNFLS995	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), 850/1900 GSM/GPRS/EDGE, 850/1900 WCDMA/HSPA, Band 25 LTE (3,5, 10MHz BW), Band 26 LTE (1.4, 3, 5, 10MHz BW), Band 41 LTE (10, 15, 20MHz BW), 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 **LGE Portable Handset FCC ID: ZNFLS995**.

### 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  $\frac{3}{4}$ " (~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  $43 + 10\log_{10}(\text{Power [Watts]})$  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
Agilent	8447D	Broadband Amplifier	5/31/2013	Annual	5/31/2014	2443A01900
Agilent	E8267C	Vector Signal Generator	10/31/2013	Biennial	10/31/2015	US42340152
Espec	ESX-2CA	Environmental Chamber	4/16/2013	Annual	4/16/2014	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	7/24/2013	Biennial	7/24/2015	125518
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	5/30/2012	Biennial	5/30/2014	135427
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	11/7/2012	Biennial	11/7/2014	128338
Mini-Circuits	VHF-1200+	High Pass Filter	1/17/2013	Annual	1/17/2014	30923
Mini-Circuits	VHF-3100+	High Pass Filter	1/17/2013	Annual	1/17/2014	30841
Mini-Circuits	SSG-4000HP	USB Synthesized Signal Generator	N/A	N/A	N/A	11208010032
Mini-Circuits	PWR-SENS-4RMS	USB Power Sensor	4/17/2013	Annual	4/17/2014	11210140001
Mini-Circuits	TVA-11-422	RF Power Amp	N/A	N/A	N/A	QA1303002
Rohde & Schwarz	CMU200	Base Station Simulator	N/A	N/A	N/A	836536/0005
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	10/4/2013	Biennial	10/4/2015	103962
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	5/31/2013	Annual	5/31/2014	100071
Rohde & Schwarz	ESU26	EMI Test Receiver	2/25/2013	Annual	2/25/2014	100342
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	11/21/2013	Biennial	11/21/2015	9105-2404
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/26/2012	Biennial	1/26/2014	A051107

Table 4-1. Test Equipment

**Note:**

Equipment used for signaling with a calibration date of "N/A" shown in this list was only used for maintaining a link between the piece of equipment and the EUT. This equipment was not used to make direct calibrated measurements.

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## 5.0 SAMPLE CALCULATIONS

### Emission Designator

#### **CDMA Emission Designator = 1M25F9W**

CDMA BW = 1.25 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data) (Measured at the 99.75% power bandwidth)

#### **LTE QPSK Emission Designator = 8M62G7D**

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Amplitude/Angle Modulated

#### **LTE 16-QAM Emission Designator = 8M45W7D**

LTE BW = 8.45 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Combination (Audio/Data)

### 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: ZNFLS995  
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)  
 Mode(s): CDMA/EvDO/LTE  
 Band: Band Class 10 / Band 26

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	RADIATED	PASS	Sections 6.2 & 6.3

**Table 6-1. Summary of Test Results**

**Note:**

All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.

FCC ID: ZNFLS995		Part 90 BC10 CDMA/EvDO/LTE MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE		Reviewed by: Quality Manager
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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  
 MEASURED OUTPUT POWER: 24.86 dBm = 0.306 W  
 MODULATION SIGNAL: CDMA  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	MARGIN (dB)
1635.80	-55.38	5.94	-49.44	H	-36.44
2453.70	-59.47	5.75	-53.72	H	-40.72
3271.60	-60.21	7.65	-52.55	H	-39.55
4089.50	-117.30	8.97	-108.34	H	-95.34
4907.40	-116.80	9.85	-106.95	H	-93.95

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

### NOTES:

1. For CDMA mode, 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. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
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.

FCC ID: ZNFLS995		Part 90 BC10 CDMA/EvDO/LTE MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE		Reviewed by: Quality Manager
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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				
MEASURED OUTPUT POWER:	24.91	dBm	=	0.310	W
MODULATION SIGNAL:	CDMA				
DISTANCE:	3	meters			
LIMIT:	-13	dBm			

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	MARGIN (dB)
1645.50	-53.15	5.91	-47.25	H	-34.25
2468.25	-61.10	5.76	-55.34	H	-42.34
3291.00	-62.82	7.72	-55.10	H	-42.10
4113.75	-117.40	9.02	-108.38	H	-95.38
4936.50	-116.89	9.91	-106.97	H	-93.97

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

#### NOTES:

1. For CDMA mode, 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. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
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:	24.20	dBm = 0.263 W
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	MARGIN (dB)
1629.40	-43.86	5.97	-37.89	H	-24.89
2444.10	-56.71	5.74	-50.97	H	-37.97
3258.80	-118.26	7.61	-110.65	H	-97.65
4073.50	-117.27	8.95	-108.32	H	-95.32
4888.20	-116.75	9.81	-106.94	H	-93.94

Table 6-4. Radiated Spurious Data

#### NOTES:

1. For CDMA mode, 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. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
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.

FCC ID: ZNFLS995		Part 90 BC10 CDMA/EvDO/LTE MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE		Reviewed by: Quality Manager
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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: 24.17 dBm = 0.261 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 1.4 MHz  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	MARGIN (dB)
1646.60	-46.75	5.91	-40.84	H	-27.84
2469.90	-56.28	5.76	-50.53	H	-37.53
3293.20	-118.36	7.72	-110.63	H	-97.63
4116.50	-117.40	9.02	-108.38	H	-95.38
4939.80	-116.89	9.92	-106.97	H	-93.97

Table 6-5. Radiated Spurious Data

#### NOTES:

1. For CDMA mode, 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. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
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.

FCC ID: ZNFLS995	 PCTEST Engineering Laboratory, Inc.	Part 90 BC10 CDMA/EvDO/LTE MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE	 LG	Reviewed by: Quality Manager
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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: ZNFLS995** complies with all the requirements of Parts 90 of the FCC rules.

FCC ID: ZNFLS995	 <b>PCTEST</b> <sup>®</sup> ENGINEERING LABORATORY, INC.	Part 90 BC10 CDMA/EvDO/LTE MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE	 <b>LG</b>	Reviewed by: Quality Manager
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