



PCTEST ENGINEERING LABORATORY, INC.

7185 Oakland Mills Road, Columbia, MD 21046 USA

Tel. 410.290.6652 / Fax 410.290.6654

<http://www.pctestlab.com>



MEASUREMENT REPORT

FCC Part 22, 24, 27

Applicant Name:

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

Date of Testing:

2/4/2014

Test Site/Location:

PCTEST Lab., Columbia, MD, USA

Test Report Serial No.:

0Y1401270186.ZNF

FCC ID:

ZNFD415

APPLICANT:

LG ELECTRONICS MOBILECOMM U.S.A

Application Type:

Class II Permissive Change

Model(s):

LG-D415, D415, LGD415, LG-D415RD, LGD415RD, D415RD, LG-D415RDGO, LGD415RDGO, D415RDGO, LG-D415RDGO1, LGD415RDGO1, D415RDGO1, LG-D415RDGO2, LGD415RDGO2, D415RDGO2

EUT Type:

Portable Handset

FCC Classification:

PCS Licensed Transmitter Held to Ear (PCE)

FCC Rule Part(s):

§2 §22(H) §24(E) §27(L)

Test Procedure(s):

ANSI/TIA-603-C-2004, KDB 971168 v02r01

Test Device Serial No.:

identical prototype [S/N: #7]

Class II Permissive Change:

Please see FCC change documents.

Original Grant Date:

1/29/2014

Mode	Tx Frequency (MHz)	ERP/EIRP	
		Max. Power (W)	Max. Power (dBm)
GSM850	824.2 - 848.8	0.128	21.07
EDGE850	824.2 - 848.8	0.059	17.72
GSM1900	1850.2 - 1909.8	0.610	27.85
EDGE1900	1850.2 - 1909.8	0.353	25.48
WCDMA850	826.4 - 846.6	0.011	10.29
WCDMA1700	1712.4 - 1752.5	0.125	20.96
WCDMA1900	1852.4 - 1907.6	0.124	20.95

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 Ortañez
President

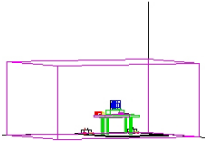


FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset		Page 1 of 26

TABLE OF CONTENTS

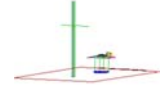
FCC PART 22, 24, 27 MEASUREMENT REPORT	3
1.0 INTRODUCTION	4
1.1 SCOPE	4
1.2 TESTING FACILITY	4
2.0 PRODUCT INFORMATION	5
2.1 EQUIPMENT DESCRIPTION	5
2.2 DEVICE CAPABILITIES	5
2.3 TEST CONFIGURATION	5
2.4 EMI SUPPRESSION DEVICE(S)/MODIFICATIONS	5
3.0 DESCRIPTION OF TESTS	6
3.1 EVALUATION PROCEDURE	6
3.2 CELLULAR - BASE FREQUENCY BLOCKS	6
3.3 CELLULAR - MOBILE FREQUENCY BLOCKS	6
3.4 PCS - BASE FREQUENCY BLOCKS	6
3.5 PCS - MOBILE FREQUENCY BLOCKS	7
3.6 AWS - BASE FREQUENCY BLOCKS	7
3.7 AWS - MOBILE FREQUENCY BLOCKS	7
3.8 RADIATED MEASUREMENTS	8
4.0 TEST EQUIPMENT CALIBRATION DATA	9
5.0 SAMPLE CALCULATIONS	10
6.0 TEST RESULTS	11
6.1 SUMMARY	11
6.2 RADIATED POWER (ERP/EIRP)	12
6.3 RADIATED SPURIOUS EMISSIONS MEASUREMENTS	16
7.0 CONCLUSION	26

FCC ID: ZNFD415	 FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset	Page 2 of 26



MEASUREMENT REPORT

FCC Part 22, 24, 27

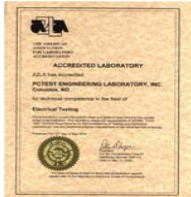


§2.1033 General Information

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 21046 USA
FCC RULE PART(S): §2 §22(H) §24(E) §27(L)
BASE MODEL: LG-D415
FCC ID: ZNFD415
FCC CLASSIFICATION: PCS Licensed Transmitter Held to Ear (PCE)
MODE: GSM/EDGE/WCDMA
FREQUENCY TOLERANCE: $\pm 0.00025\%$ (2.5 ppm)
Test Device Serial No.: #7 ☐ Production ☒ Pre-Production ☐ Engineering
DATE(S) OF TEST: 2/4/2014
TEST REPORT S/N: 0Y1401270186.ZNF

Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, 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 and Industry Canada (2451B-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 (2451B-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.

FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset		Page 3 of 26

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 C63.4-2009 on February 15, 2012.

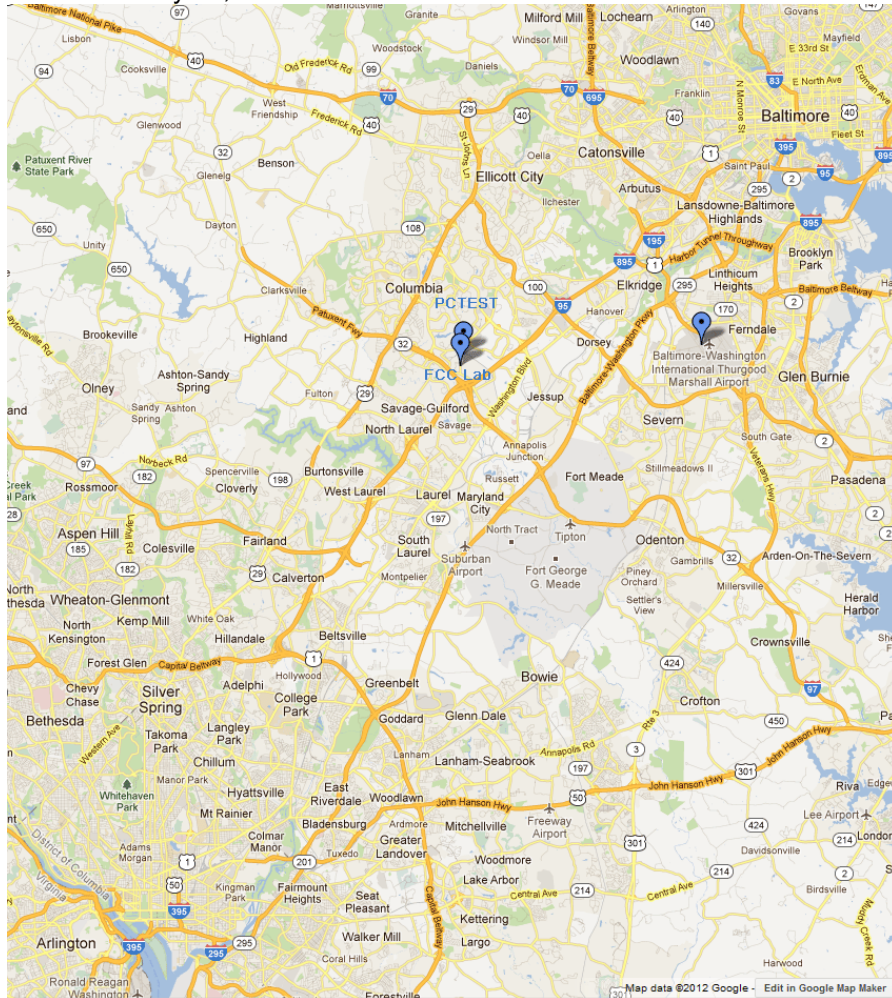


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

FCC ID: ZNFD415	 FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) 		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset	Page 4 of 26

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFD415**. The test data contained in this report pertains only to the emissions due to the EUT's 2G/3G licensed transmitters.

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, 802.11b/g/n WLAN, Bluetooth (1x, EDR, LE)

2.3 Test Configuration

The LG Portable Handset FCC ID: ZNFD415 was tested per the guidance of ANSI/TIA-603-C-2004 and KDB 971168 v02r01. See Section 6.0 of this test report for a description of the radiated emissions tests.

2.4 EMI Suppression Device(s)/Modifications

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

FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset		Page 5 of 26

3.0 DESCRIPTION OF TESTS

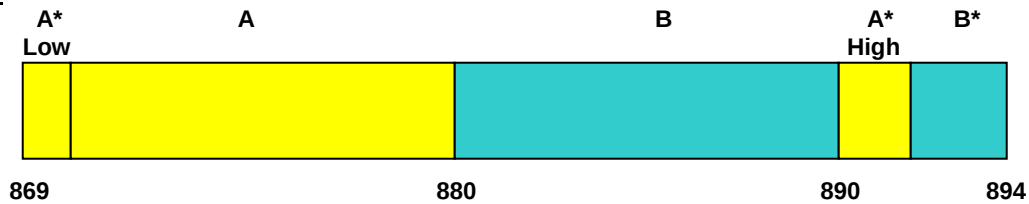
3.1 Evaluation Procedure

The measurement procedures described in the “Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards” (ANSI/TIA-603-C-2004) and “Measurement Guidance for Certification of Licensed Digital Transmitters” (KDB 971168 v02r01) were used in the measurement of the **LG Portable Handset FCC ID: ZNFD415**.

Deviation from Measurement Procedure.....None

3.2 Cellular - Base Frequency Blocks

§22.905



BLOCK 1: 869 – 880 MHz (A* Low + A)

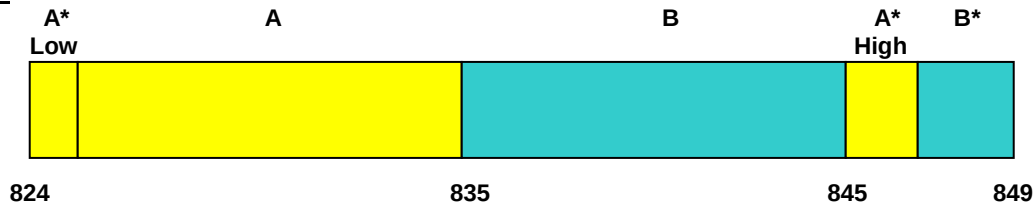
BLOCK 3: 890 – 891.5 MHz (A* High)

BLOCK 2: 880 – 890 MHz (B)

BLOCK 4: 891.5 – 894 MHz (B*)

3.3 Cellular - Mobile Frequency Blocks

§22.905



BLOCK 1: 824 – 835 MHz (A* Low + A)

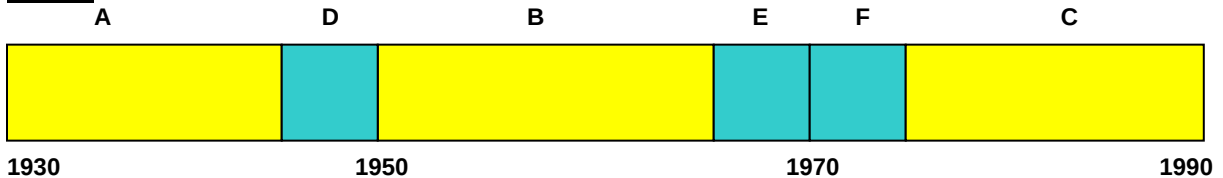
BLOCK 3: 845 – 846.5 MHz (A* High)

BLOCK 2: 835 – 845 MHz (B)

BLOCK 4: 846.5 – 849 MHz (B*)

3.4 PCS - Base Frequency Blocks

§24.229



BLOCK 1: 1930 – 1945 MHz (A)

BLOCK 4: 1965 – 1970 MHz (E)

BLOCK 2: 1945 – 1950 MHz (D)

BLOCK 5: 1970 – 1975 MHz (F)

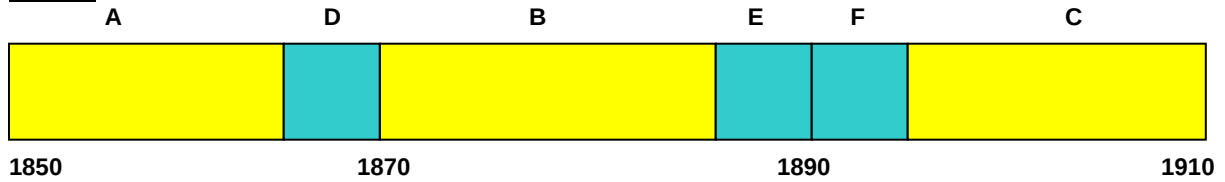
BLOCK 3: 1950 – 1965 MHz (B)

BLOCK 6: 1975 – 1990 MHz (C)

FCC ID: ZNFD415	 FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset	Page 6 of 26

3.5 PCS - Mobile Frequency Blocks

§24.229



BLOCK 1: 1850 – 1865 MHz (A)

BLOCK 4: 1885 – 1890 MHz (E)

BLOCK 2: 1865 – 1870 MHz (D)

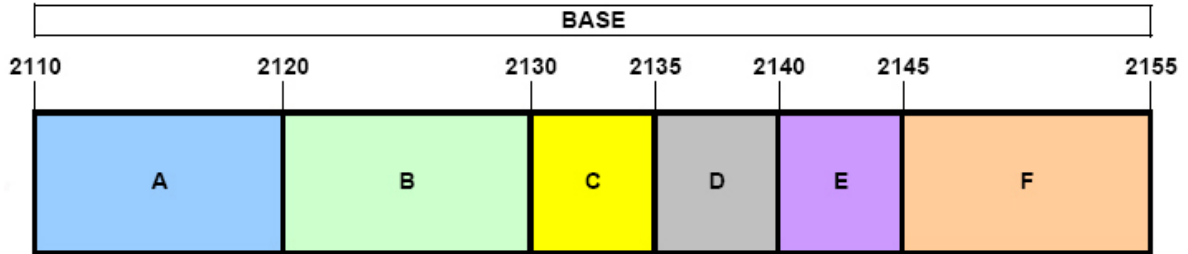
BLOCK 5: 1890 – 1895 MHz (F)

BLOCK 3: 1870 – 1885 MHz (B)

BLOCK 6: 1895 – 1910 MHz (C)

3.6 AWS - Base Frequency Blocks

§27.5(h)



BLOCK 1: 2110 – 2120 MHz (A)

BLOCK 4: 2135 – 2140 MHz (D)

BLOCK 2: 2120 – 2130 MHz (B)

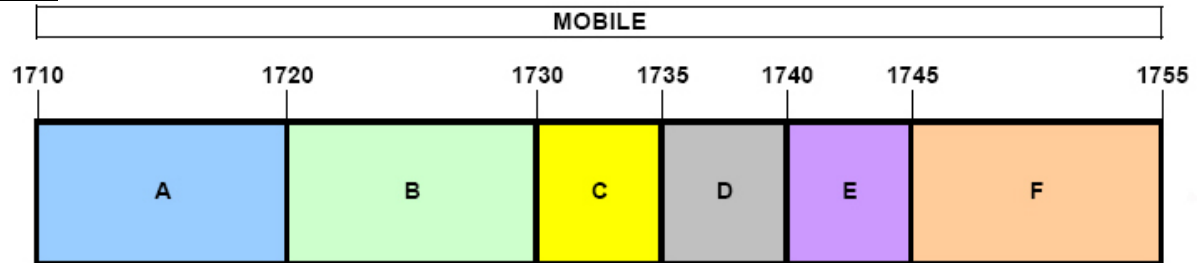
BLOCK 5: 2140 – 2145 MHz (E)

BLOCK 3: 2130 – 2135 MHz (C)

BLOCK 6: 2145 – 2155 MHz (E)

3.7 AWS - Mobile Frequency Blocks

§27.5(h)



BLOCK 1: 1710 – 1720 MHz (A)

BLOCK 4: 1735 – 1740 MHz (D)

BLOCK 2: 1720 – 1730 MHz (B)

BLOCK 5: 1740 – 1745 MHz (E)

BLOCK 3: 1730 – 1735 MHz (C)

BLOCK 6: 1745 – 1755 MHz (F)

3.8 Radiated Measurements

§2.1053 §22.913(a.2) §22.917(a) §24.232(c) §24.238(a) §27.50(d)(10) §27.53(h) RSS-132(4.4) RSS-132(4.5.1) RSS-133(6.4) RSS-133(6.5.1) RSS-139(6.5.2)

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. For the EUT positioning, "H" is defined with the EUT lying flat on the test surface, "H2" is defined with the EUT standing up on its side, and "V" is defined with the EUT standing upright.

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

Radiated power levels are investigated with the receive antenna vertically polarized while radiated spurious emissions levels are investigated with the receive antenna horizontally and vertically polarized per ANSI/TIA-603-C-2004.

FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset		Page 8 of 26

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	1937A03348
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	6/26/2013	Annual	6/26/2014	121034
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
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/30/2013	Annual	10/30/2014	1833460
Gigatronics	8651A	Universal Power Meter	10/30/2013	Annual	10/30/2014	8650319
Mini-Circuits	VHF-1300+	High Pass Filter	1/29/2014	Annual	1/29/2015	30716
Mini-Circuits	VHF-1200+	High Pass Filter	1/27/2014	Annual	1/27/2015	30923
Rohde & Schwarz	CMU200	Base Station Simulator	5/3/2013	Annual	5/3/2014	836371/0079
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	5/31/2013	Annual	5/31/2014	100071
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/31/2013	Annual	5/31/2014	100040
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	1/27/2014	Annual	1/27/2015	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)	1/28/2014	Biennial	1/28/2016	A051107

Table 4-1. Test Equipment

FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset		Page 9 of 26

5.0 SAMPLE CALCULATIONS

GSM Emission Designator

Emission Designator = 250KGXW

GSM BW = 250 kHz
 G = Phase Modulation
 X = Cases not otherwise covered
 W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 250KG7W

EDGE BW = 250 kHz
 G = Phase Modulation
 7 = Quantized/Digital Info
 W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M16F9W

WCDMA BW = 4.16 MHz
 F = Frequency Modulation
 9 = Composite Digital Info
 W = Combination (Audio/Data) (Measured at the 99.75% power bandwidth)

Spurious Radiated Emission

Example: Spurious emission at 3700.40 MHz

The receive 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 3700.40 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.50 dBm so this harmonic was 25.50 dBm - (-24.80) = 50.3 dBc.

FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset		Page 10 of 26

6.0 TEST RESULTS

6.1 Summary

Company Name: LG Electronics MobileComm U.S.A
 FCC ID: ZNFD415
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): GSM/EDGE/WCDMA

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MODE (TX)					
22.913(a.2)	Effective Radiated Power	< 7 Watts max. ERP	RADIATED	PASS	Section 6.2
24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP		PASS	Section 6.2
27.50(d.4)	Equivalent Isotropic Radiated Power (Band 4)	< 1 Watts max. EIRP		PASS	Section 6.2
2.1053 22.917(a) 24.238(a) 27.53(h)	Radiated Spurious Emissions	> 43 + log ₁₀ (P[Watts]) for all out-of-band emissions		PASS	Section 6.3

Table 6-1. Summary of Test Results

Notes:

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

FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset	Page 11 of 26	

6.2 Radiated Power (ERP/EIRP)

§22.913(a)(2) §24.232(c) §27.50(d.4) RSS-132(4.4) [SRSP-503(5.1.3)]

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 v02r01 – Section 5.2.1

ANSI/TIA-603-C-2004 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW $\geq 3 \times$ RBW
4. Span = 1.5 times the OBW
5. No. of sweep points $\geq 2 \times$ span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset		Page 12 of 26

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

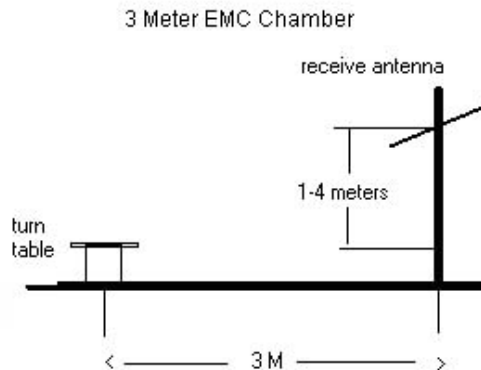


Figure 6-1. Test Instrument & Measurement Setup

Test Notes

- 1) This device was tested under all configurations and the highest power is reported in GPRS mode while transmitting with one slot active.
- 2) This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, HSUPA, and GSM/GPRS/EDGE capabilities. For WCDMA and HSUPA transmission, all configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2kbps with HSDPA inactive and TPC bits all set to "1."
- 3) This unit was tested with its standard battery.
- 4) The worst case test configuration was found in the EUT in the V positioning for Cell Band, and in the H2 positioning for PCS and AWS Bands. The data reported in the table below was measured in this test setup.

FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset		Page 13 of 26

Frequency [MHz]	Mode	Battery Type	Substitute Level [dBm]	Antenna Gain [dBd]	EUT Pol [H/V]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
824.20	GSM850	Standard	21.71	-1.66	V	20.04	0.101	38.45	-18.41
836.60	GSM850	Standard	22.81	-1.73	V	21.07	0.128	38.45	-17.38
848.80	GSM850	Standard	22.80	-1.82	V	20.97	0.125	38.45	-17.48
836.60	EDGE850	Standard	19.45	-1.73	V	17.72	0.059	38.45	-20.74

Table 6-2. ERP (Cellular GSM)

Frequency [MHz]	Mode	Battery Type	Substitute Level [dBm]	Antenna Gain [dBd]	EUT Pol [H/V]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
826.40	WCDMA850	Standard	10.81	-1.66	V	9.15	0.008	38.45	-29.30
836.60	WCDMA850	Standard	11.16	-1.73	V	9.43	0.009	38.45	-29.02
846.60	WCDMA850	Standard	12.11	-1.82	V	10.29	0.011	38.45	-28.16

Table 6-3. ERP (Cellular WCDMA)

FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)						Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset						Page 14 of 26

Frequency [MHz]	Mode	Battery Type	Substitute Level [dBm]	Antenna Gain [dBi]	EUT Pol [H/V]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1712.40	WCDMA1700	Standard	15.41	5.55	H2	20.96	0.125	30.00	-9.04
1732.50	WCDMA1700	Standard	13.77	5.46	H2	19.23	0.084	30.00	-10.77
1752.50	WCDMA1700	Standard	15.05	5.38	H2	20.43	0.110	30.00	-9.57

Table 6-4. EIRP (AWS WCDMA)

Frequency [MHz]	Mode	Battery Type	Substitute Level [dBm]	Antenna Gain [dBi]	EUT Pol [H/V]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.20	GSM1900	Standard	23.09	4.76	H2	27.85	0.610	33.01	-5.16
1880.00	GSM1900	Standard	21.01	4.52	H2	25.53	0.357	33.01	-7.48
1909.80	GSM1900	Standard	21.39	4.37	H2	25.76	0.377	33.01	-7.25
1850.20	EDGE1900	Standard	20.72	4.76	H2	25.48	0.353	33.01	-7.53

Table 6-5. EIRP (PCS GSM)

Frequency [MHz]	Mode	Battery Type	Substitute Level [dBm]	Antenna Gain [dBi]	EUT Pol [H/V]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1852.40	WCDMA1900	Standard	16.20	4.75	H2	20.95	0.124	33.01	-12.07
1880.00	WCDMA1900	Standard	15.50	4.52	H2	20.02	0.100	33.01	-12.99
1907.60	WCDMA1900	Standard	12.94	4.37	H2	17.31	0.054	33.01	-15.70

Table 6-6. EIRP (PCS WCDMA)

FCC ID: ZNFD415	 FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) 					Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset				Page 15 of 26

6.3 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §24.238(a) §27.53(h) RSS-132(4.5.1)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 v02r01 – Section 5.8

ANSI/TIA-603-C-2004 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW $\geq 3 \times$ RBW
3. Span = 1.5 times the OBW
4. No. of sweep points $\geq 2 \times$ span / RBW
5. Detector = Peak
6. Trace mode = max hold
7. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

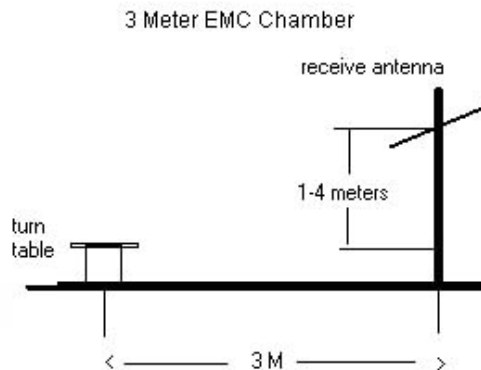


Figure 6-2. Test Instrument & Measurement Setup

FCC ID: ZNFD415	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset		Page 16 of 26

Test Notes

- 1) This device was tested under all configurations and the highest power is reported in GPRS mode while transmitting with one slot active.
- 2) This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, HSUPA, and GSM/GPRS/EDGE capabilities. For WCDMA and HSUPA transmission, all configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2kbps with HSDPA inactive and TPC bits all set to "1."
- 3) This unit was tested with its standard battery.
- 4) The worst case test configuration was found in the EUT in the V positioning for Cell Band, and in the H2 positioning for PCS and AWS Bands. The data reported in the table below was measured in this test setup.
- 5) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
- 6) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset		Page 17 of 26

OPERATING FREQUENCY: 824.20 MHz
 CHANNEL: 128
 MEASURED OUTPUT POWER: 20.04 dBm = 0.101 W
 MODULATION SIGNAL: GSM (GMSK)
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 33.04 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
1648.40	-48.70	3.75	-44.95	H	65.0
2472.60	-48.67	3.61	-45.06	H	65.1
3296.80	-83.28	5.58	-77.69	H	97.7
4121.00	-83.25	6.88	-76.37	H	96.4
4945.20	-82.06	7.78	-74.28	H	94.3

Table 6-7. Radiated Spurious Data (Cellular GSM Mode – Ch. 128)

OPERATING FREQUENCY: 836.60 MHz
 CHANNEL: 190
 MEASURED OUTPUT POWER: 21.07 dBm = 0.128 W
 MODULATION SIGNAL: GSM (GMSK)
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 34.07 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
1673.20	-47.80	3.67	-44.13	H	65.2
2509.80	-49.79	3.65	-46.14	H	67.2
3346.40	-83.43	5.74	-77.69	H	98.8
4183.00	-83.41	7.04	-76.37	H	97.4
5019.60	-81.97	7.90	-74.07	H	95.1

Table 6-8. Radiated Spurious Data (Cellular GSM Mode – Ch. 190)

FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset			Page 18 of 26

OPERATING FREQUENCY: 848.80 MHz
 CHANNEL: 251
 MEASURED OUTPUT POWER: 20.97 dBm = 0.125 W
 MODULATION SIGNAL: GSM (GMSK)
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 33.97 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
1697.60	-39.14	3.58	-35.55	H	56.5
2546.40	-47.71	3.76	-43.95	H	64.9
3395.20	-83.57	5.89	-77.68	H	98.7
4244.00	-83.45	7.15	-76.30	H	97.3
5092.80	-81.71	7.95	-73.76	H	94.7

Table 6-9. Radiated Spurious Data (Cellular GSM Mode – Ch. 251)

OPERATING FREQUENCY: 826.40 MHz
 CHANNEL: 4132
 MEASURED OUTPUT POWER: 9.15 dBm = 0.008 W
 MODULATION SIGNAL: WCDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 22.15 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
1652.80	-63.97	3.74	-60.23	H	69.4
2479.20	-82.53	3.61	-78.92	H	88.1
3305.60	-83.30	5.61	-77.69	H	86.8
4132.00	-83.28	6.91	-76.37	H	85.5
4958.40	-82.05	7.81	-74.25	H	83.4

Table 6-10. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4132)

OPERATING FREQUENCY: 836.60 MHz
 CHANNEL: 4183
 MEASURED OUTPUT POWER: 9.43 dBm = 0.009 W
 MODULATION SIGNAL: WCDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 22.43 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
1673.20	-86.26	3.68	-82.58	H	92.0
2509.80	-82.56	3.64	-78.92	H	88.4
3346.40	-83.41	5.72	-77.69	H	87.1
4183.00	-83.39	7.02	-76.37	H	85.8
5019.60	-82.15	7.90	-74.25	H	83.7

Table 6-11. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4183)

OPERATING FREQUENCY: 846.60 MHz
 CHANNEL: 4233
 MEASURED OUTPUT POWER: 10.29 dBm = 0.011 W
 MODULATION SIGNAL: WCDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 23.29 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
1693.20	-86.18	3.60	-82.58	H	92.9
2539.80	-82.66	3.74	-78.92	H	89.2
3386.40	-83.56	5.86	-77.69	H	88.0
4233.00	-83.51	7.14	-76.37	H	86.7
5079.60	-82.19	7.94	-74.25	H	84.5

Table 6-12. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4233)

FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset		Page 20 of 26

OPERATING FREQUENCY: 1712.40 MHz
 CHANNEL: 1312
 MEASURED OUTPUT POWER: 20.96 dBm = 0.125 W
 MODULATION SIGNAL: WCDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 33.96 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3424.80	-52.98	8.12	-44.86	H	65.8
5137.20	-44.82	10.13	-34.69	H	55.7
6849.60	-48.63	11.32	-37.30	H	58.3
8562.00	-81.82	12.99	-68.84	H	89.8
10274.40	-79.81	13.22	-66.59	H	87.5

Table 6-13. Radiated Spurious Data (AWS WCDMA Mode – Ch. 9262)

OPERATING FREQUENCY: 1732.50 MHz
 CHANNEL: 1412
 MEASURED OUTPUT POWER: 19.23 dBm = 0.084 W
 MODULATION SIGNAL: WCDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 32.23 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3465.00	-52.35	8.23	-44.12	H	63.4
5197.50	-48.56	10.18	-38.37	H	57.6
6930.00	-49.73	11.41	-38.31	H	57.5
8662.50	-81.92	13.00	-68.92	H	88.1
10395.00	-79.26	13.15	-66.11	H	85.3

Table 6-14. Radiated Spurious Data (AWS WCDMA Mode – Ch. 9400)

FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset		Page 21 of 26

OPERATING FREQUENCY: 1752.50 MHz
 CHANNEL: 1862
 MEASURED OUTPUT POWER: 20.43 dBm = 0.110 W
 MODULATION SIGNAL: WCDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 33.43 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3505.00	-50.92	8.32	-42.60	H	63.0
5257.50	-40.99	10.20	-30.79	H	51.2
7010.00	-50.20	11.47	-38.73	H	59.2
8762.50	-81.75	12.97	-68.78	H	89.2
10515.00	-79.09	13.05	-66.05	H	86.5

Table 6-15. Radiated Spurious Data (AWS WCDMA Mode – Ch. 9538)

OPERATING FREQUENCY: 1850.20 MHz
 CHANNEL: 512
 MEASURED OUTPUT POWER: 27.85 dBm = 0.610 W
 MODULATION SIGNAL: GSM (GMSK)
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 40.85 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3700.40	-82.83	8.29	-74.54	H	102.4
5550.60	-40.12	10.57	-29.56	H	57.4
7400.80	-51.96	11.94	-40.02	H	67.9
9251.00	-80.96	13.17	-67.79	H	95.6
11101.20	-78.41	13.25	-65.17	H	93.0

Table 6-16. Radiated Spurious Data (PCS GSM Mode – Ch. 512)

FCC ID: ZNFD415		FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset		Page 22 of 26

OPERATING FREQUENCY: 1880.00 MHz
 CHANNEL: 661
 MEASURED OUTPUT POWER: 25.53 dBm = 0.357 W
 MODULATION SIGNAL: GSM (GMSK)
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 38.53 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3760.00	-49.41	8.32	-41.09	H	66.6
5640.00	-40.08	10.67	-29.40	H	54.9
7520.00	-52.50	12.05	-40.45	H	66.0
9400.00	-80.73	13.16	-67.58	H	93.1
11280.00	-78.10	13.32	-64.77	H	90.3

Table 6-17. Radiated Spurious Data (PCS GSM Mode – Ch. 661)

OPERATING FREQUENCY: 1909.80 MHz
 CHANNEL: 810
 MEASURED OUTPUT POWER: 25.76 dBm = 0.377 W
 MODULATION SIGNAL: GSM (GMSK)
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 38.76 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3819.60	-42.43	8.37	-34.06	H	59.8
5729.40	-41.76	10.73	-31.03	H	56.8
7639.20	-47.54	12.13	-35.41	H	61.2
9549.00	-52.33	13.14	-39.19	H	64.9
11458.80	-77.91	13.36	-64.56	H	90.3

Table 6-18. Radiated Spurious Data (PCS GSM Mode – Ch. 810)

OPERATING FREQUENCY: 1852.40 MHz
 CHANNEL: 9262
 MEASURED OUTPUT POWER: 20.95 dBm = 0.124 W
 MODULATION SIGNAL: WCDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 33.95 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3704.80	-46.02	8.30	-37.72	H	58.7
5557.20	-48.11	10.58	-37.53	H	58.5
7409.60	-82.20	11.95	-70.25	H	91.2
9262.00	-80.94	13.17	-67.77	H	88.7
11114.40	-78.38	13.25	-65.13	H	86.1

Table 6-19. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9262)

OPERATING FREQUENCY: 1880.00 MHz
 CHANNEL: 9400
 MEASURED OUTPUT POWER: 20.02 dBm = 0.100 W
 MODULATION SIGNAL: WCDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 33.02 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3760.00	-43.85	8.32	-35.53	H	55.5
5640.00	-47.89	10.67	-37.21	H	57.2
7520.00	-82.31	12.05	-70.25	H	90.3
9400.00	-80.93	13.16	-67.77	H	87.8
11280.00	-78.46	13.32	-65.13	H	85.2

Table 6-20. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9400)

OPERATING FREQUENCY: 1907.60 MHz
 CHANNEL: 9538
 MEASURED OUTPUT POWER: 17.31 dBm = 0.054 W
 MODULATION SIGNAL: WCDMA
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 30.31 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	EUT POL (H/V)	(dBc)
3815.20	-42.67	8.36	-34.31	H	51.6
5722.80	-49.32	10.73	-38.59	H	55.9
7630.40	-82.38	12.12	-70.25	H	87.6
9538.00	-80.91	13.14	-67.77	H	85.1
11445.60	-78.49	13.36	-65.13	H	82.4

Table 6-21. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9538)

7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset** **FCC ID: ZNFD415** complies with all the requirements of Parts 2, 22, 24, 27 of the FCC rules.

FCC ID: ZNFD415	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, 27 GSM/EDGE/WCDMA MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	 LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1401270186.ZNF	Test Dates: 2/4/2014	EUT Type: Portable Handset	Page 26 of 26	