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MEASUREMENT REPORT FCC PART 15.247 WLAN 802.11b/g

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

Date of Testing:
March 05 - 06, 2014
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
0Y1403040524.ZNF

FCC ID:	ZNFLG305C
APPLICANT:	LG Electronics MobileComm U.S.A

Application Type: Class II Permissive Change
Model(s): LG305C, LG-305C
EUT Type: Portable Handset
FCC Classification: Digital Transmission System (DTS)
FCC Rule Part(s): Part 15.247
Test Procedure(s): KDB 558074 v03r01
Class II Permissive Change: Please see FCC change documents.
Original Grant Date: January 21, 2014

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 KDB 558074 v03r01. 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

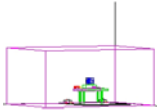


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MEASUREMENT REPORT

FCC Part 15.247



§ 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: 6660-B Dobbin Road, Columbia, MD 21045 USA

FCC RULE PART(S): Part 15.247

IC SPECIFICATION(S): RSS-210 Issue 8

MODEL NAME: LG305C

FCC ID: ZNFLG305C

Test Device Serial No.: 401KPGS0761655 Production Pre-Production Engineering

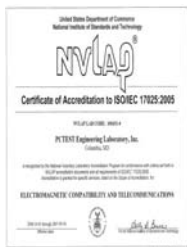
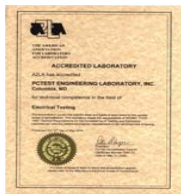
FCC CLASSIFICATION: Digital Transmission System (DTS)

DATE(S) OF TEST: March 05 - 06, 2014



TEST REPORT S/N: 0Y1403040524.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. 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 (EMC) 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 PCTEST Test Location

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Intern'l (BWI) airport, the city of Baltimore and the Washington, DC area. (See Figure 1-1).

Testing was conducted at PCTEST Engineering Laboratory, Inc. facility located in New Concept Business 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 C63.4-2009 on January 10, 2012.

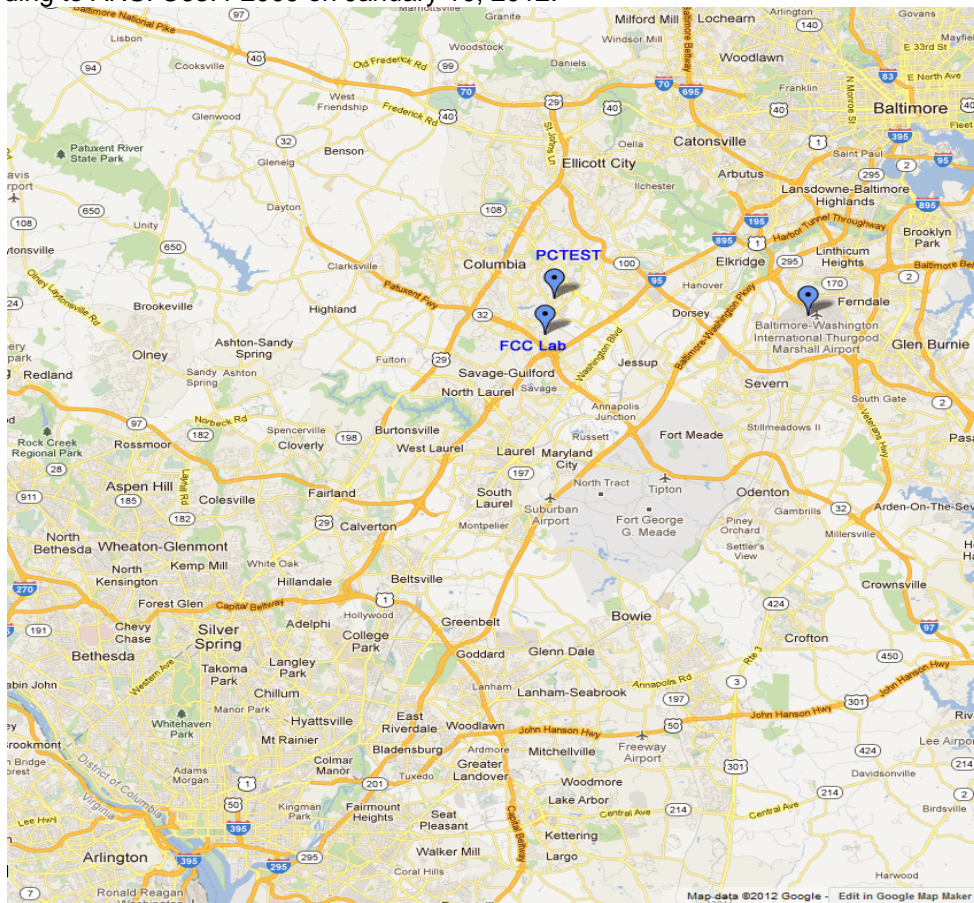




Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFLG305C**. The test data contained in this report pertains only to the emissions due to the EUT's WLAN (DTS) transmitter.

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA (BC0, BC1), 802.11b/g WLAN, Bluetooth (1x,EDR)

2.3 Test Configuration

The LG Portable Handset FCC ID: ZNFLG305C was tested per the guidance of KDB 558074 v03r01. ANSI C63.10-2009 was used to reference the appropriate EUT setup for radiated spurious emissions testing. See Sections 3.2, and 6.1 of this test report for a description of the radiated emissions test setup.



2.4 EMI Suppression Device(s)/Modifications

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

2.5 Labeling Requirements

Per 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.



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3.0 DESCRIPTION OF TEST

3.1 Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2009), and the guidance provided in KDB 558074 v03r01 were used in the measurement of the **LG Portable Handset FCC ID: ZNFLG305C**.

Deviation from measurement procedure.....None

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3.2 Radiated Emissions

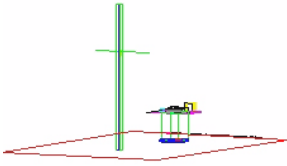


Figure 3-1. 3-Meter Test Site

The radiated test facilities consisted of an indoor semi-anechoic chamber used for exploratory measurements and an open area test site (OATS) used for final measurements. For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies higher than the upper frequency range of the broadband antenna used for testing, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used.

Exploratory measurements were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of a 0.8 meter high non-metallic 1 x 1.5 meter table (see Figure 3-3). The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth, and receive antenna height was noted for each frequency found. To record the exploratory measurements, the analyzers' detector function was set to peak mode and the bandwidth was set to 100kHz.

Figure 3-2. Dimensions of Outdoor Test Site

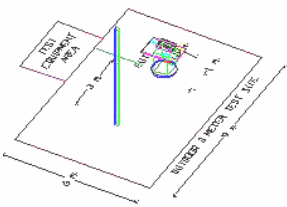


Figure 3-3. Turntable and System Setup

Final measurements were made on the OATS at 3 meter test range using calibrated, linearly polarized broadband or horn antennas (see Figure 3-1). The measurement area is situated on an 18 meter x 20 meter galvanized 1/2" hardware cloth as the conducting ground plane. This material is sewn together in sections 4 feet wide and 60 feet long. A total of eighteen sections are required to cover the entire measurement area. Sections are laid across the width of the pad, overlapped 1" and sewn and soldered together at intervals of 3" (7.6 cm.) The terrain of the test site is reasonably flat and level. Power and cable to the test site are buried 18" deep into the ground outside the perimeter of the site. An all-weather non-metallic housing is situated on a 2 x 3 meter area adjacent to the measurement area to house the test equipment (see Figure 3-2). The test set-up was again placed on top of the same a 0.8 meter high non-metallic 1 x 1.5 meter table on the OATS as used for exploratory measurements in the indoor chamber. The test set-up was re-configured to the same setup that was previously determined through exploratory measurements to have produced the worst case emissions. The spectrum analyzer was set to the frequencies found to have caused the highest radiated disturbances with respect to the limit during preliminary radiated measurements. The turntable containing the system was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. 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.

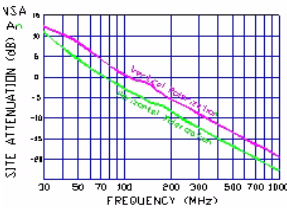


Figure 3-4. Normalized Site Attenuation Curves (H&V)

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4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”



- The antennas of the Portable Handset are **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The **LG Portable Handset FCC ID: ZNFLG305C** unit complies with the requirement of §15.203.

Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

Table 4-1. Frequency/ Channel Operations



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5.0 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
Agilent	8447D	Broadband Amplifier	5/31/2013	Annual	5/31/2014	1937A03348
Agilent	8449B	(1-26.5GHz) Pre-Amplifier	4/17/2013	Annual	4/17/2014	3008A00985
Agilent	N9038A	MXE EMI Receiver	1/3/2014	Annual	1/3/2015	MY51210133
Anritsu	ML2495A	Power Meter	10/31/2013	Annual	10/31/2014	1039008
Anritsu	MA2411B	Pulse Sensor	11/13/2013	Annual	11/13/2014	846215
Emco	3115	Horn Antenna (1-18GHz)	1/30/2014	Biennial	1/30/2016	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	1/20/2012	Triennial	1/20/2015	9203-2178
Emco	6502	Active Loop Antenna (10k - 30 MHz)	5/31/2012	Biennial	5/31/2014	267
Emco	3816/2	Line Impedance Stabilization Network	2/12/2013	Biennial	2/12/2015	9707-1079
Mini-Circuits	VHF-3100+	High Pass Filter	1/29/2014	Annual	1/29/2015	31144
Pasternack	NMLC-1	Line Conducted Emissions Cable (NM)	1/28/2014	Annual	1/28/2015	N/A
Sunol	DRH-118	Horn Antenna (1 - 18GHz)	6/19/2013	Biennial	6/19/2015	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/28/2014	Biennial	1/28/2016	A051107

Table 5-1. Annual Test Equipment Calibration Schedule

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6.0 TEST RESULTS

6.1 Summary



Company Name: LG Electronics MobileComm U.S.A
 FCC ID: ZNFLG305C
 FCC Classification: Digital Transmission System (DTS)
 Data Rate(s) Tested: 1Mbps, 2Mbps, 5.5Mbps, 11Mbps (b)
6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps (g)
6.5/7.2Mbps, 13/14.4Mbps, 19.5/21.7Mbps, 26/28.9Mbps, 39/43.3Mbps,
52/57.8Mbps, 58.5/65Mbps, 65/72.2Mbps (n – 20MHz)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MODE (TX)						
15.205 15.209	RSS-210 [A8.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	RADIATED	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.

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6.2 Radiated Spurious Emission Measurements

§15.247(d) / §15.205 & §15.209; RSS-210 [A8.5]

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle (>98%), at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 6-2 per Section 15.209.



Frequency	Field Strength [$\mu\text{V/m}$]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 6-2. Radiated Limits

Test Settings

Average Field Strength Measurements per Section 12.2.5.1 of KDB 558074 v03r01

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be $\geq 2 \times \text{span/RBW}$)
6. Sweep time = auto
7. Trace (RMS) averaging was performed over at least 100 traces

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Peak Field Strength Measurements per Section 12.2.4 of KDB 558074 v03r01

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Test Setup

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

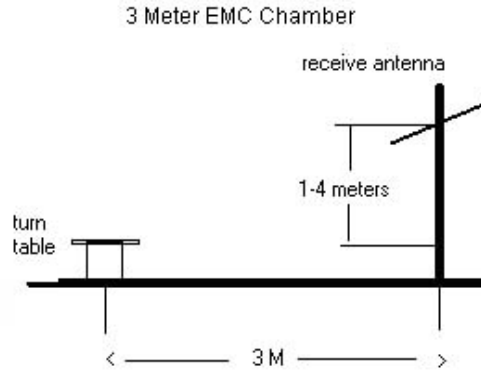




Figure 6-1. Test Instrument & Measurement Setup

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Test Notes

1. The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 558074 v03r01 were not used to evaluate this device for compliance to radiated limits. All radiated spurious emissions levels were measured in a radiated test setup.
2. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 6-10.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. This unit was tested with its standard battery.
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. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
6. Emissions were measured at a 3 meter test distance.
7. Average levels at -135dBm and peak levels at -125dBm represent the analyzer noise floor and signify that no emission was detected.

Sample Calculations



Determining Spurious Emissions Levels

- Field Strength Level $_{[dB\mu V/m]} = \text{Analyzer Level}_{[dBm]} + 107 + \text{AFCL}_{[dB/m]}$
- $\text{AFCL}_{[dB/m]} = \text{Antenna Factor}_{[dB/m]} + \text{Cable Loss}_{[dB]}$
- $\text{Margin}_{[dB]} = \text{Field Strength Level}_{[dB\mu V/m]} - \text{Limit}_{[dB\mu V/m]}$

Radiated Band Edge Measurement Offset

- The amplitude offset shown in the radiated restricted band edge plots in Section 6.8 was calculated using the formula:

$$\text{Offset (dB)} = (\text{Antenna Factor} + \text{Cable Loss} + 10 \text{ dB Attenuator}) - \text{Preamplifier Gain}$$

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Radiated Spurious Emission Measurements (Cont'd)

§15.247(d) / §15.205 & §15.209; RSS-210 [A8.5]

Worst Case Mode: 802.11b
 Worst Case Transfer Rate: 1 Mbps
 Distance of Measurements: 3 Meters
 Operating Frequency: 2412MHz
 Channel: 01



Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4824.00	-104.27	Avg	H	41.35	44.08	53.98	-9.90
4824.00	-94.22	Peak	H	41.35	54.13	73.98	-19.85
12060.00	-135.00	Avg	H	66.83	38.83	53.98	-15.15
12060.00	-125.00	Peak	H	66.83	48.83	73.98	-25.15

Table 6-3. Radiated Measurements

Worst Case Mode: 802.11b
 Worst Case Transfer Rate: 1 Mbps
 Distance of Measurements: 3 Meters
 Operating Frequency: 2437MHz
 Channel: 06

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4874.00	-103.33	Avg	H	41.66	45.33	53.98	-8.65
4874.00	-93.25	Peak	H	41.66	55.41	73.98	-18.57
7311.00	-135.00	Avg	H	48.46	20.46	53.98	-33.52
7311.00	-125.00	Peak	H	48.46	30.46	73.98	-43.52
12185.00	-135.00	Avg	H	72.25	44.25	53.98	-9.73
12185.00	-125.00	Peak	H	72.25	54.25	73.98	-19.73

Table 6-4. Radiated Measurements

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Radiated Spurious Emission Measurements (Cont'd)
§15.247(d) / §15.205 & §15.209; RSS-210 [A8.5]

Worst Case Mode: 802.11b
 Worst Case Transfer Rate: 1 Mbps
 Distance of Measurements: 3 Meters
 Operating Frequency: 2462MHz
 Channel: 11

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4924.00	-104.10	Avg	H	41.95	44.85	53.98	-9.13
4924.00	-93.45	Peak	H	41.95	55.50	73.98	-18.48
7386.00	-135.00	Avg	H	48.46	20.46	53.98	-33.52
7386.00	-125.00	Peak	H	48.46	30.46	73.98	-43.52
12310.00	-135.00	Avg	H	74.17	46.17	53.98	-7.81
12310.00	-125.00	Peak	H	74.17	56.17	73.98	-17.81

Table 6-5. Radiated Measurements

6.3 Radiated Restricted Band Edge Measurements §15.205 / §15.209; RSS-210 [A8.5]

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting.

Worst Case Mode: 802.11g

Worst Case Transfer Rate: 6Mbps



Distance of Measurements: 3 Meters

Operating Frequency: 2412MHz

Channel: 1

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Field Strength [dBmV/m]	Limit [dBmV/m]	Margin [dB]
2374.64	-101.46	Avg	H	35.18	40.71	53.98	-13.27
2374.64	-90.94	Peak	H	35.18	51.23	73.98	-22.75
2385.44	-101.31	Avg	H	35.23	40.92	53.98	-13.06
2385.44	-88.86	Peak	H	35.23	53.37	73.98	-20.61
2390.00	-100.06	Avg	H	35.26	42.20	53.98	-11.78
2390.00	-84.83	Peak	H	35.26	57.43	73.98	-16.55

Table 6-1. Radiated Restricted Lower Band Edge Measurement

FCC ID: ZNFLG305C		FCC Pt. 15.247 802.11b/g MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1403040524.ZNF	Test Dates: March 05 - 06, 2014	EUT Type: Portable Handset	Page 16 of 18	

Radiated Restricted Band Edge Measurements (Cont'd)
§15.205 / §15.209; RSS-210 [A8.5]

Worst Case Mode: 802.11g

Worst Case Transfer Rate: 6Mbps



Distance of Measurements: 3 Meters

Operating Frequency: 2462MHz

Channel: 11



Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Field Strength [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
2483.58	-96.53	Avg	H	35.94	46.40	53.98	-7.58
2483.58	-84.76	Peak	H	35.94	58.17	73.98	-15.81
2486.11	-97.69	Avg	H	35.96	45.26	53.98	-8.72
2486.11	-87.66	Peak	H	35.96	55.29	73.98	-18.69
2499.27	-97.54	Avg	H	36.06	45.52	53.98	-8.46
2499.27	-88.06	Peak	H	36.06	55.00	73.98	-18.98

Table 6-2. Radiated Restricted Upper Band Edge Measurement

FCC ID: ZNFLG305C		FCC Pt. 15.247 802.11b/g MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1403040524.ZNF	Test Dates: March 05 - 06, 2014	EUT Type: Portable Handset	Page 17 of 18	

7.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFLG305C** is in compliance with Part 15C of the FCC Rules.

FCC ID: ZNFLG305C		FCC Pt. 15.247 802.11b/g MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1403040524.ZNF	Test Dates: March 05 - 06, 2014	EUT Type: Portable Handset	Page 18 of 18	