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:
1/18 - 2/2/2016
Test Site/Location:
PCTEST Lab., Columbia, MD, USA
Test Report Serial No.:
0Y1601180101.ZNF

FCC ID:	**ZNFL81AL**
APPLICANT:	**LG ELECTRONICS MOBILECOMM U.S.A**

Application Type:	Class II Permissive Change
Model(s):	LGL81AL, LG-L81AL, L81AL, LG-K540, LGK540, K540
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 v02r02
Test Device Serial No.:	*identical prototype* [S/N: 03561]
Class II Permissive Change:	Please see FCC change document
Original Grant Date:	1/21/2016

Mode	Tx Frequency (MHz)	Emission Designator	ERP/EIRP	
			Max. Power (W)	Max. Power (dBm)
GSM850	824.2 - 848.8	244KGXW	0.952	29.79
EDGE850	824.2 - 848.8	241KG7W	0.284	24.54
GSM1900	1850.2 - 1909.8	246KGXW	1.580	31.99
EDGE1900	1850.2 - 1909.8	242KG7W	0.732	28.65
WCDMA850	826.4 - 846.6	4M17F9W	0.094	19.73
WCDMA1700	1712.4 - 1752.6	4M17F9W	0.219	23.41
WCDMA1900	1852.4 - 1907.6	4M17F9W	0.268	24.28

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

ACCREDITED
TESTING CERT#2041.01

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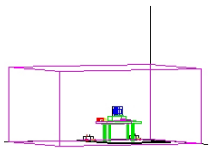


MEASUREMENT REPORT
FCC Part 22, 24, & 27

§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:	LGL81AL
FCC ID:	ZNFL81AL
FCC CLASSIFICATION:	PCS Licensed Transmitter Held to Ear (PCE)
MODE:	GSM / GPRS / EDGE / WCDMA
FREQUENCY TOLERANCE:	±0.00025 % (2.5 ppm)
Test Device Serial No.:	03561 ☐ Production ☒ Pre-Production ☐ Engineering
DATE(S) OF TEST:	1/18 - 2/2/2016
TEST REPORT S/N:	0Y1601180101.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.

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 Internt'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 C63.4-2014 on January 22, 2015.

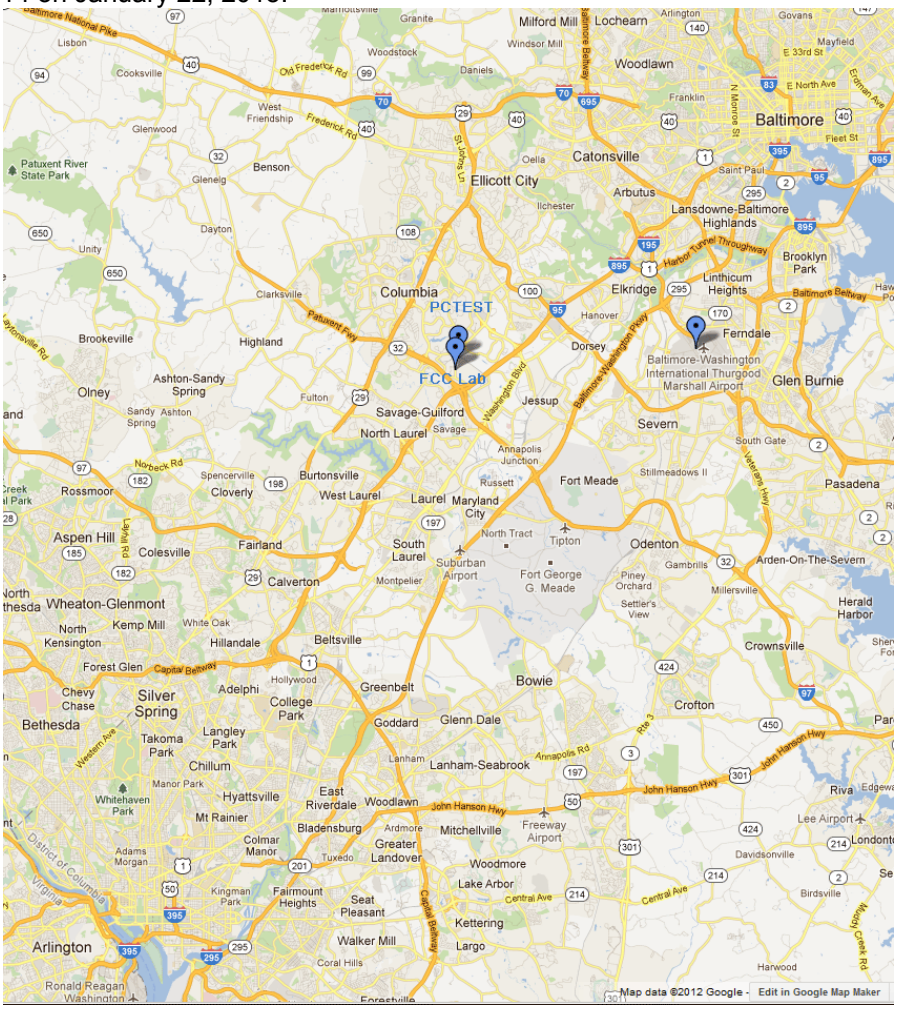


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFL81AL**. 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, Multi-band LTE, 802.11b/g/n WLAN, Bluetooth (1x, EDR, LE)

2.3 Test Configuration

The LG Portable Handset FCC ID: ZNFL81AL was tested per the guidance of ANSI/TIA-603-C-2004 and KDB 971168 v02r02. See Section 7.0 of this test report for a description of the radiated tests.

2.4 EMI Suppression Device(s)/Modifications

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

3.0 DESCRIPTION OF TESTS

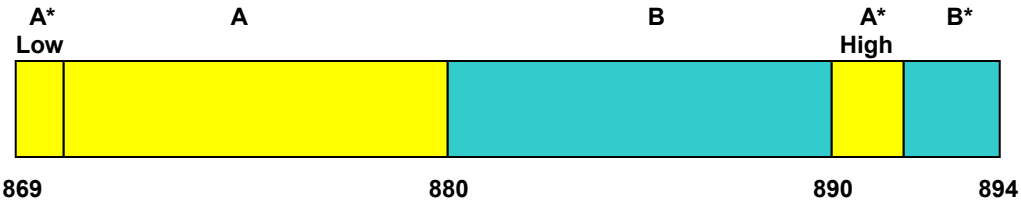
3.1 Evaluation Procedure

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 v02r02) were used in the measurement of the **LG Portable Handset FCC ID: ZNFL81AL.**

Deviation from Measurement Procedure……..None

3.2 Cellular - Base Frequency Blocks

§22.905



BLOCK 1: 869 – 880 MHz (A* Low + A)

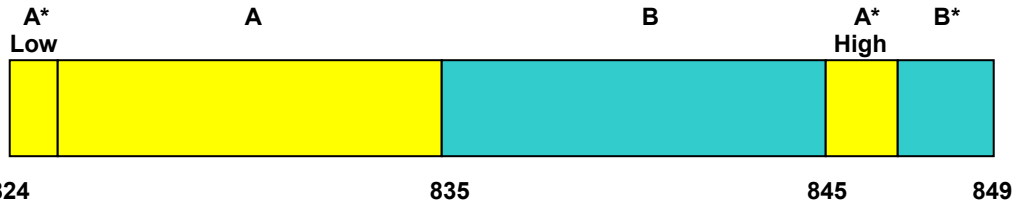
BLOCK 2: 880 – 890 MHz (B)

BLOCK 3: 890 – 891.5 MHz (A* High)

BLOCK 4: 891.5 – 894 MHz (B*)

3.3 Cellular - Mobile Frequency Blocks

§22.905



BLOCK 1: 824 – 835 MHz (A* Low + A)

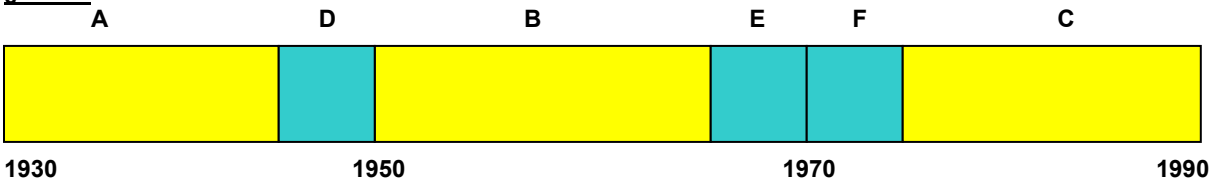
BLOCK 2: 835 – 845 MHz (B)

BLOCK 3: 845 – 846.5 MHz (A* High)

BLOCK 4: 846.5 – 849 MHz (B*)

3.4 PCS - Base Frequency Blocks

§24.229



BLOCK 1: 1930 – 1945 MHz (A)

BLOCK 2: 1945 – 1950 MHz (D)

BLOCK 3: 1950 – 1965 MHz (B)

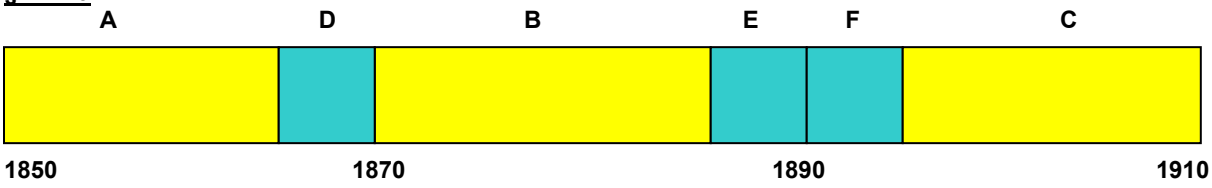
BLOCK 4: 1965 – 1970 MHz (E)

BLOCK 5: 1970 – 1975 MHz (F)

BLOCK 6: 1975 – 1990 MHz (C)

3.5 PCS - Mobile Frequency Blocks

§24.229



BLOCK 1: 1850 – 1865 MHz (A)

BLOCK 2: 1865 – 1870 MHz (D)

BLOCK 3: 1870 – 1885 MHz (B)

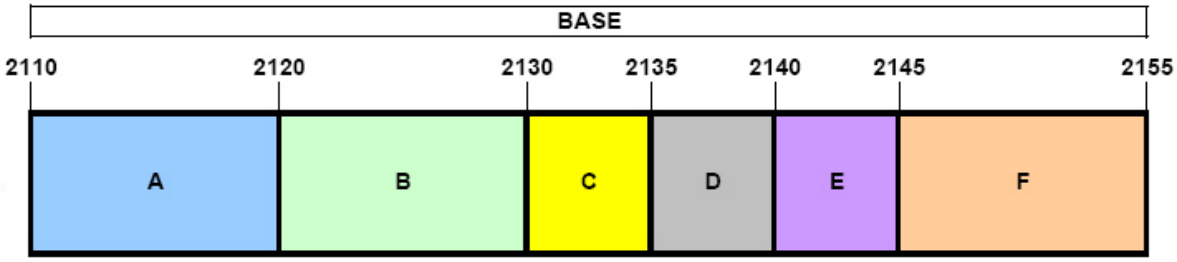
BLOCK 4: 1885 – 1890 MHz (E)

BLOCK 5: 1890 – 1895 MHz (F)

BLOCK 6: 1895 – 1910 MHz (C)

3.6 AWS - Base Frequency Blocks

§27.5(h)



BLOCK 1: 2110 – 2120 MHz (A)

BLOCK 2: 2120 – 2130 MHz (B)

BLOCK 3: 2130 – 2135 MHz (C)

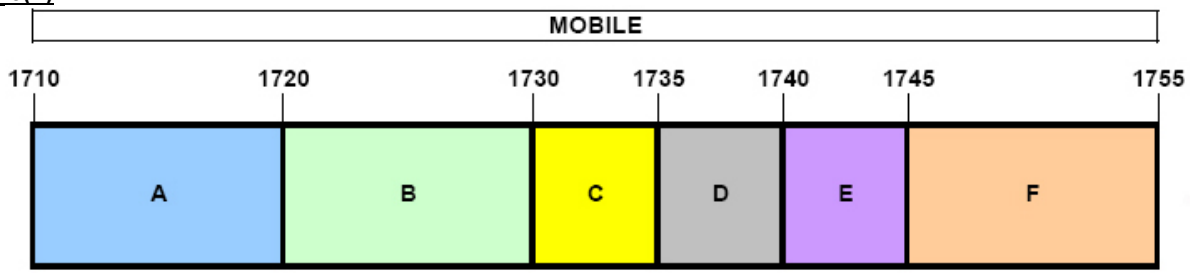
BLOCK 4: 2135 – 2140 MHz (D)

BLOCK 5: 2140 – 2145 MHz (E)

BLOCK 6: 2145 – 2155 MHz (F)

3.7 AWS - Mobile Frequency Blocks

§27.5(h)



BLOCK 1: 1710 – 1720 MHz (A)

BLOCK 2: 1720 – 1730 MHz (B)

BLOCK 3: 1730 – 1735 MHz (C)

BLOCK 4: 1735 – 1740 MHz (D)

BLOCK 5: 1740 – 1745 MHz (E)

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

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. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Clause 5, Figure 5.7 of ANSI C63.4-2009. 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 turntable 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.

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:

$$P_{d\ [dBm]} = P_{g\ [dBm]} - \text{cable loss}_{\ [dB]} + \text{antenna gain}_{\ [dBd/dBi]}$$

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 $P_{g\ [dBm]} - \text{cable loss}_{\ [dB]}$.

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.

4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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
-	LTx1	Licensed Transmitter Cable Set	4/16/2015	Annual	4/16/2016	LTx1
-	RE3	Radiated Emissions Cable Set	4/29/2015	Annual	4/29/2016	N/A
Agilent	8447D	Broadband Amplifier	6/12/2015	Annual	6/12/2016	1937A03348
Agilent	N9020A	MXA Signal Analyzer	11/5/2015	Annual	11/5/2016	US46470561
Emco	3115	Horn Antenna (1-18GHz)	3/30/2014	Biennial	3/30/2016	9704-5182
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	6/17/2014	Biennial	6/17/2016	135427
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2014	Biennial	3/12/2016	128337
K & L	11SH10-3075/U18000	High Pass Filter	7/18/2015	Annual	7/18/2016	11SH10-3075/U18000-2
K & L	13SH10-1000/U1000	N Type High Pass Filter	7/18/2015	Annual	7/18/2016	13SH10-1000/U1000-1
Mini-Circuits	PWR-SENS-4RMS	USB Power Sensor	3/11/2015	Annual	3/11/2016	11210140001
Mini-Circuits	SSG-4000HP	USB Synthesized Signal Generator	N/A			11208010032
Mini-Circuits	TVA-11-422	RF Power Amp	N/A			QA1303002
Rohde & Schwarz	CMU200	Base Station Simulator	6/3/2015	Annual	6/3/2016	109892
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	3/12/2015	Annual	3/12/2016	100342
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	3/5/2015	Annual	3/5/2016	100071
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	3/3/2015	Annual	3/3/2016	100040
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	2/21/2014	Biennial	2/21/2016	9105-2404
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	3/28/2014	Biennial	3/28/2016	A051107

Table 5-1. Test Equipment

Note:

Equipment with a calibration date of “N/A” shown in this list was not used to make direct calibrated measurements.

6.0 SAMPLE CALCULATIONS

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.

7.0 TEST RESULTS

7.1 Summary

Company Name: LG Electronics MobileComm U.S.A

FCC ID: ZNFL81AL

FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)

Mode(s): GSM / GPRS / 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 7.2
24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP		PASS	Section 7.2
27.50(d.4)	Equivalent Isotropic Radiated Power	< 1 Watts max. EIRP		PASS	Section 7.2
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 7.3

Table 7-1. 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.

7.2 Radiated Power (ERP/EIRP)

§22.913(a)(2) 24.232(c) 27.50(d.4)

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 and horizontally 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 RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 v02r02 – 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 ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x 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

Test Setup

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

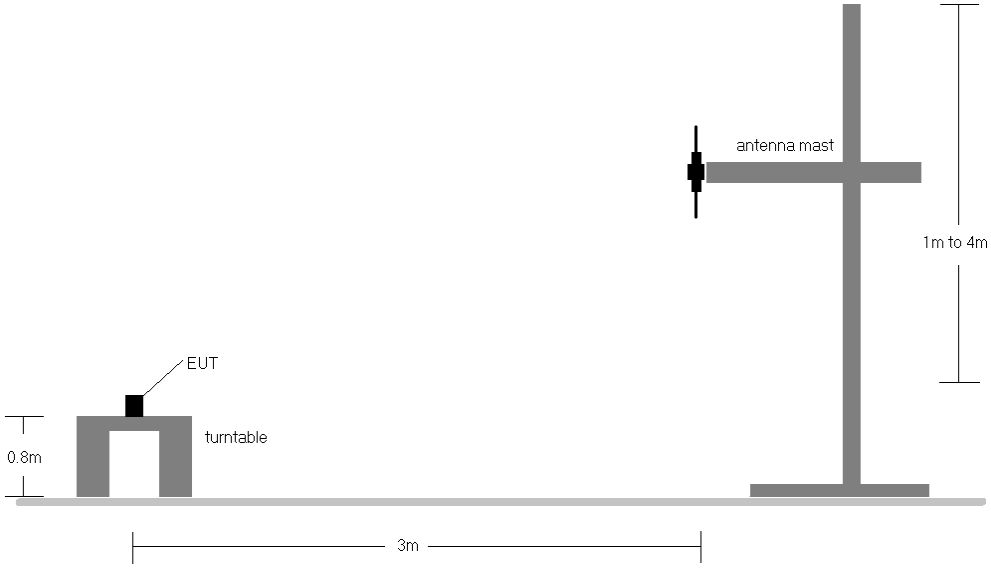


Figure 7-1. Radiated Test Setup <1GHz

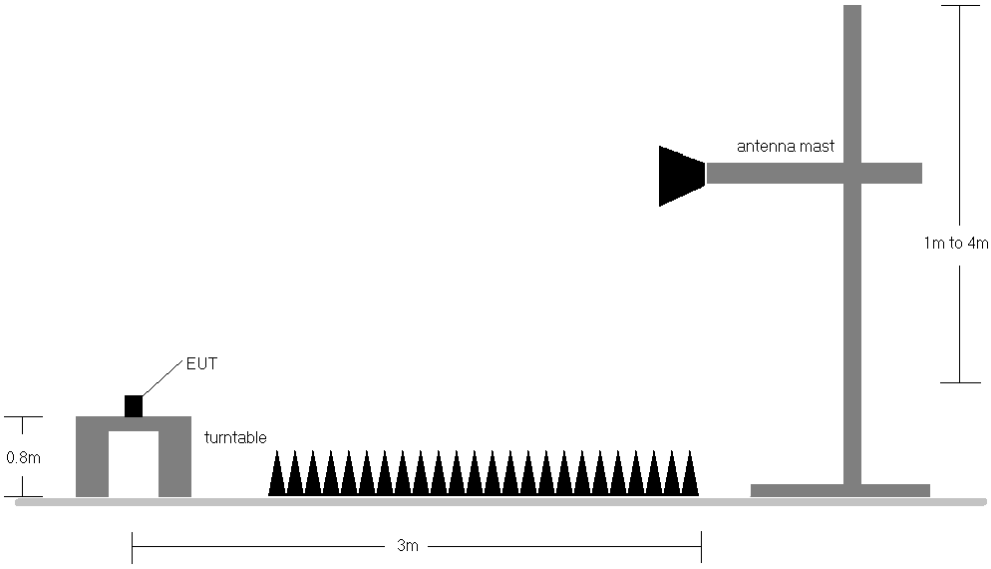


Figure 7-2. Radiated Test Setup >1GHz

Test Notes

1) This device employs GSM, GPRS, and EDGE capabilities. The EUT 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, and HSUPA 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 EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

5) The ERP’s and EIRP’s listed were measured using the Class II Permissive change sample, and were found to be within the measurement tolerances of the original certification samples for radiated power. Side by side comparisons have determined that the output power was not changed for these Class II Permissive Change samples.

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
824.20	GPRS850	V	2.30	238	25.48	4.94	30.42	1.102	38.45	-8.03
836.60	GPRS850	V	2.26	234	26.29	5.00	31.29	1.345	38.45	-7.16
848.80	GPRS850	V	2.22	236	25.76	5.05	30.81	1.206	38.45	-7.64
836.60	EDGE850	V	2.26	234	21.13	5.00	26.13	0.410	38.45	-12.32

Table 7-2. ERP (Cellular GSM)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
826.40	WCDMA850	V	1.61	248	14.35	4.95	19.30	0.085	38.45	-19.15
836.60	WCDMA850	V	1.56	254	15.21	5.00	20.21	0.105	38.45	-18.24
846.60	WCDMA850	V	1.55	254	14.52	5.04	19.56	0.090	38.45	-18.89

Table 7-3. ERP (Cellular WCDMA)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1712.40	WCDMA1700	V	1.66	250	14.36	9.66	24.02	0.252	30.00	-5.98
1732.60	WCDMA1700	V	1.59	250	13.03	9.53	22.56	0.180	30.00	-7.44
1752.60	WCDMA1700	V	1.60	254	12.87	9.40	22.27	0.169	30.00	-7.73

Table 7-4. EIRP (AWS WCDMA)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.20	GPRS1900	V	1.64	266	21.55	9.21	30.76	1.190	33.01	-2.25
1880.00	GPRS1900	V	1.62	257	19.94	9.27	29.21	0.834	33.01	-3.80
1909.80	GPRS1900	V	1.62	261	20.21	9.37	29.58	0.907	33.01	-3.43
1850.20	EDGE1900	V	1.64	266	18.88	9.21	28.09	0.644	33.01	-4.92

Table 7-5. EIRP (PCS GSM)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1852.40	WCDMA1900	V	1.62	257	14.81	9.22	24.03	0.253	33.01	-8.98
1880.00	WCDMA1900	V	1.60	253	12.57	9.27	21.84	0.153	33.01	-11.17
1907.60	WCDMA1900	V	1.63	255	12.41	9.35	21.76	0.150	33.01	-11.25

Table 7-6. EIRP (PCS WCDMA)

7.3 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) 24.238(a) 27.53(h)

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 horizontally 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 v02r02 – 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 ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x 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.

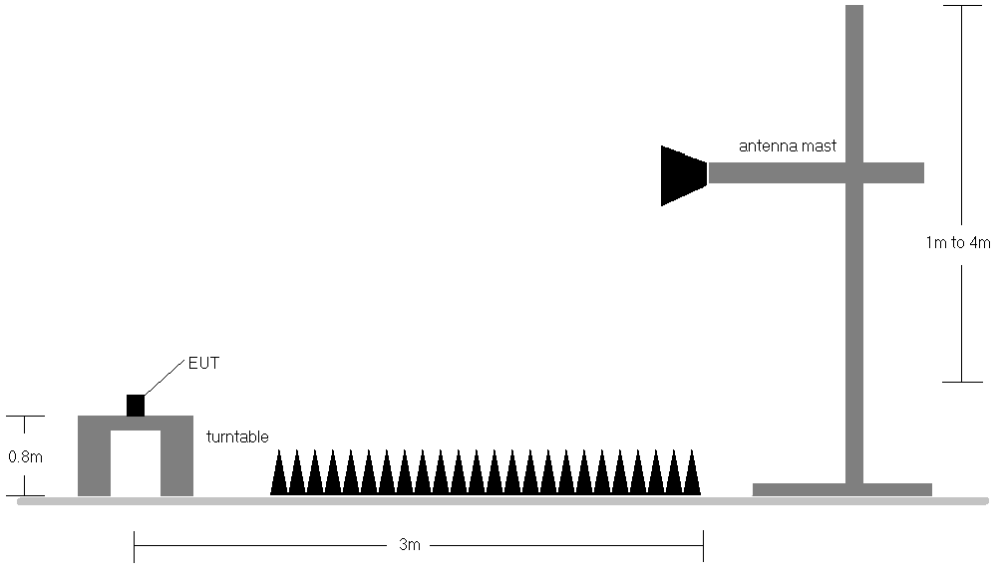


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

1) This device employs GSM, GPRS, and EDGE capabilities. The EUT 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, and HSUPA 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 EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

5) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are 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.

7) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

OPERATING FREQUENCY:	824.20			MHz
CHANNEL:	128			
MEASURED OUTPUT POWER:	30.42	dBm	=	1.102 W
MODULATION SIGNAL:	GPRS (GMSK)			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	43.42		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1648.40	V	1.00	284	-56.05	6.56	-49.49	79.9
2472.60	V	-	-	-63.32	7.29	-56.02	86.4
3296.80	V	-	-	-60.52	7.37	-53.16	83.6
4121.00	V	-	-	-57.14	8.02	-49.12	79.5

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

OPERATING FREQUENCY:	836.60			MHz
CHANNEL:	190			
MEASURED OUTPUT POWER:	31.29	dBm	=	1.345 W
MODULATION SIGNAL:	GPRS (GMSK)			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	44.29		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1673.20	V	1.07	11	-50.18	6.55	-43.62	74.9
2509.80	V	1.00	11	-56.02	7.34	-48.68	80.0
3346.40	V	-	-	-61.18	7.44	-53.74	85.0
4183.00	V	-	-	-57.69	8.20	-49.49	80.8
5019.60	V	-	-	-55.33	8.74	-46.59	77.9

Table 7-8. Radiated Spurious Data (Cellular GSM Mode – Ch. 190)

OPERATING FREQUENCY:	848.80			MHz
CHANNEL:	251			
MEASURED OUTPUT POWER:	30.81	dBm	=	1.206 W
MODULATION SIGNAL:	GPRS (GMSK)			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	43.81		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1697.60	V	1.10	16	-46.13	6.55	-39.58	70.4
2546.40	V	1.11	24	-55.13	7.36	-47.76	78.6
3395.20	V	-	-	-59.89	7.51	-52.38	83.2
4244.00	V	-	-	-56.65	8.40	-48.25	79.1
5092.80	V	-	-	-56.11	8.60	-47.51	78.3

Table 7-9. Radiated Spurious Data (Cellular GSM Mode – Ch. 251)

OPERATING FREQUENCY:	826.40			MHz
CHANNEL:	4132			
MEASURED OUTPUT POWER:	19.30	dBm	=	0.085 W
MODULATION SIGNAL:	WCDMA			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	32.30		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1652.80	V	1.37	67	-58.28	6.56	-51.72	71.0
2479.20	V	-	-	-60.21	7.30	-52.91	72.2
3305.60	V	-	-	-57.31	7.38	-49.93	69.2
4132.00	V	-	-	-55.47	8.05	-47.43	66.7

Table 7-10. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4132)

OPERATING FREQUENCY:	836.60			MHz
CHANNEL:	4183			
MEASURED OUTPUT POWER:	20.21	dBm	= 0.105	W
MODULATION SIGNAL:	WCDMA			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	33.21		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1673.20	V	1.39	71	-60.95	6.55	-54.39	74.6
2509.80	V	1.10	276	-59.22	7.34	-51.88	72.1
3346.40	V	-	-	-56.44	7.44	-49.00	69.2
4183.00	V	-	-	-55.31	8.20	-47.11	67.3
5019.60	V	-	-	-54.04	8.74	-45.30	65.5

Table 7-11. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4183)

OPERATING FREQUENCY:	846.60			MHz
CHANNEL:	4233			
MEASURED OUTPUT POWER:	19.56	dBm	= 0.090	W
MODULATION SIGNAL:	WCDMA			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	32.56		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1693.20	V	1.01	10	-56.72	6.55	-50.18	69.7
2539.80	V	1.05	234	-59.02	7.36	-51.66	71.2
3386.40	V	-	-	-57.26	7.50	-49.76	69.3
4233.00	V	-	-	-54.35	8.36	-45.99	65.5
5079.60	V	-	-	-53.45	8.63	-44.83	64.4

Table 7-12. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4233)

OPERATING FREQUENCY:	1712.40			MHz
CHANNEL:	1312			
MEASURED OUTPUT POWER:	24.02	dBm	=	0.252 W
MODULATION SIGNAL:	WCDMA			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	37.02		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3424.80	V	1.29	306	-61.55	9.68	-51.87	75.9
5137.20	V	-	-	-57.33	10.68	-46.65	70.7
6849.60	V	-	-	-45.27	11.74	-33.52	57.5
8562.00	V	-	-	-48.88	11.05	-37.83	61.9

Table 7-13. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1312)

OPERATING FREQUENCY:	1732.60			MHz
CHANNEL:	1413			
MEASURED OUTPUT POWER:	22.56	dBm	=	0.180 W
MODULATION SIGNAL:	WCDMA			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.56		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3465.20	V	1.34	291	-61.25	9.71	-51.54	75.6
5197.80	V	-	-	-56.73	10.59	-46.14	70.2
6930.40	V	-	-	-49.58	11.75	-37.83	61.9
8663.00	V	-	-	-49.35	11.06	-38.29	62.3

Table 7-14. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1413)

OPERATING FREQUENCY:	1752.60			MHz
CHANNEL:	1513			
MEASURED OUTPUT POWER:	22.27	dBm	= 0.169	W
MODULATION SIGNAL:	WCDMA			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.27		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3505.20	V	1.41	302	-51.88	9.73	-42.15	66.2
5257.80	V	1.01	108	-54.01	10.64	-43.37	67.4
7010.40	V	-	-	-53.57	11.75	-41.81	65.8
8763.00	V	-	-	-50.04	11.00	-39.04	63.1
10515.60	V	-	-	-50.75	12.48	-38.27	62.3

Table 7-15. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1513)

OPERATING FREQUENCY:	1850.20			MHz
CHANNEL:	512			
MEASURED OUTPUT POWER:	30.76	dBm	= 1.190	W
MODULATION SIGNAL:	GPRS (GMSK)			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	43.76		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3700.40	V	1.03	328	-55.60	9.44	-46.16	76.9
5550.60	V	-	-	-54.36	10.78	-43.57	74.3
7400.80	V	-	-	-51.07	10.69	-40.39	71.1
9251.00	V	-	-	-50.67	11.58	-39.09	69.8

Table 7-16. Radiated Spurious Data (PCS GSM Mode – Ch. 512)

OPERATING FREQUENCY:	1880.00			MHz
CHANNEL:	661			
MEASURED OUTPUT POWER:	29.21	dBm	= 0.834	W
MODULATION SIGNAL:	GPRS (GMSK)			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	42.21		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3760.00	V	1.00	286	-53.94	9.28	-44.66	75.4
5640.00	V	-	-	-54.07	11.03	-43.04	73.8
7520.00	V	-	-	-50.79	10.97	-39.82	70.6
9400.00	V	-	-	-46.13	11.53	-34.59	65.4

Table 7-17. Radiated Spurious Data (PCS GSM Mode – Ch. 661)

OPERATING FREQUENCY:	1909.80			MHz
CHANNEL:	810			
MEASURED OUTPUT POWER:	29.58	dBm	= 0.907	W
MODULATION SIGNAL:	GPRS (GMSK)			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	42.58		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3819.60	V	1.05	293	-53.17	9.19	-43.98	74.7
5729.40	V	-	-	-54.16	11.28	-42.87	73.6
7639.20	V	-	-	-51.84	11.17	-40.67	71.4
9549.00	V	-	-	-45.42	11.83	-33.58	64.3

Table 7-18. Radiated Spurious Data (PCS GSM Mode – Ch. 810)

OPERATING FREQUENCY:	1852.40			MHz
CHANNEL:	9262			
MEASURED OUTPUT POWER:	24.03	dBm	=	0.253 W
MODULATION SIGNAL:	WCDMA			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	37.03		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3704.80	V	1.01	92	-57.18	9.43	-47.76	71.8
5557.20	V	-	-	-53.75	10.80	-42.95	67.0
7409.60	V	-	-	-51.73	10.71	-41.02	65.0
9262.00	V	-	-	-49.87	11.58	-38.29	62.3

Table 7-19. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9262)

OPERATING FREQUENCY:	1880.00			MHz
CHANNEL:	9400			
MEASURED OUTPUT POWER:	21.84	dBm	=	0.153 W
MODULATION SIGNAL:	WCDMA			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.84		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3760.00	V	1.01	89	-56.41	9.28	-47.13	71.2
5640.00	V	-	-	-53.82	11.03	-42.79	66.8
7520.00	V	-	-	-51.72	10.97	-40.75	64.8
9400.00	V	-	-	-46.45	11.53	-34.91	58.9

Table 7-20. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9400)

OPERATING FREQUENCY:	1907.60			MHz
CHANNEL:	9538			
MEASURED OUTPUT POWER:	21.76	dBm	=	0.150 W
MODULATION SIGNAL:	WCDMA			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.76		dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3815.20	V	1.00	95	-55.50	9.19	-46.31	70.3
5722.80	V	-	-	-53.76	11.27	-42.49	66.5
7630.40	V	-	-	-51.78	11.17	-40.61	64.6
9538.00	V	-	-	-45.62	11.80	-33.82	57.8

Table 7-21. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9538)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFL81AL** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules.