



PCTEST

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MEASUREMENT REPORT GSM / GPRS / EDGE / WCDMA / CDMA

Applicant Name:

LG Electronics USA, Inc.
1000 Sylvan Avenue
Englewood Cliffs, NJ 07632
United States

Date of Testing:

12/30/2019 - 1/8/2020

Test Site/Location:

PCTEST Lab. Columbia, MD, USA

Test Report Serial No.:

1M1911290211-02-R1.ZNF

FCC ID:

ZNFL455DL

APPLICANT:

LG Electronics USA, Inc.

Application Type:

Class II Permissive Change

Model:

LG L455DL

Additional Model(s):

LG-L455DL, LM-K400UM, LM-K400MM, LM-K400QM,
LM-K400VPP, LM-K400QM5, LM-K400QM6, LGL455DL,
LMK400UM, LMK400MM, LMK400QM, LMK400QM5, LMK400QM6,
LMK400VPP, L455DL, K400UM, K400MM, K400QM, K400QM5,
K400QM6, K400VPP

EUT Type:

Portable Handset

FCC Classification:

PCS Licensed Transmitter Held to Ear (PCE)

FCC Rule Part(s):

22, 24, & 27

Test Procedure(s):

ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01

Class II Permissive Change:

Please see FCC change document

Original Grant Date:

12/23/2019

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.

This revised Test Report (S/N: 1M1911290211-02-R1.ZNF) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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

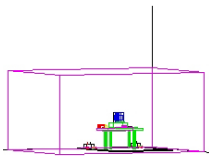


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Mode	FCC Rule Part	Tx Frequency (MHz)	ERP		EIRP	
			Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)
GPRS850	22H	824.2 - 848.8	0.432	26.35	0.708	28.50
EDGE850	22H	824.2 - 848.8	0.157	21.97	0.258	24.12
CDMA850	22H	824.70 - 848.31	0.052	17.14	0.085	19.29
WCDMA850	22H	826.4 - 846.6	0.073	18.62	0.119	20.77
WCDMA1700	27	1712.4 - 1752.6			0.230	23.61
GPRS1900	24E	1850.2 - 1909.8			0.664	28.22
EDGE1900	24E	1850.2 - 1909.8			0.218	23.39
CDMA1900	24E	1851.25 - 1908.75			0.302	24.80
WCDMA1900	24E	1852.4 - 1907.6			0.198	22.96

EUT Overview

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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 Innovation, Science and Economic Development Canada.

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISSED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISSED.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFL455DL**. The test data contained in this report pertains only to the emissions due to the EUT's 2G/3G licensed transmitters.

Test Device Serial No.: 05599, 05581

2.2 Device Capabilities

This device contains the following capabilities:

850/850/1900 CDMA/EvDO Rev0/A, 1x Advanced (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE)

2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. 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.

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Measurement Guidance for Certification of Licensed Digital Transmitters" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

Deviation from Measurement Procedure.....None

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3.2 Radiated Measurements

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 Figure 5.7 of Clause 5 in ANSI C63.4-2014. 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 above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table 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. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

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-E-2016, 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 $P_g \text{ [dBm]} - \text{cable loss [dB]}$.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 474788 D01.

Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI/TIA-603-E-2016.

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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 uncertainty shown below 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 ($\pm$ dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	N9020A	MXA Signal Analyzer	4/20/2019	Annual	4/20/2020	US46470561
Agilent	E5515C	Wireless Communications Test Set	N/A			GB45360985
Agilent	N9038A	MXE EMI Receiver	7/17/2019	Annual	7/17/2020	MY51210133
Agilent	N9030A	PXA Signal Analyzer (44GHz)	6/12/2019	Annual	6/12/2020	MY52350166
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/9/2018	Biennial	8/9/2020	135427
Espec	ESX-2CA	Environmental Chamber	6/13/2019	Annual	6/13/2020	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	2/14/2019	Biennial	2/14/2021	125518
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			107826
Rohde & Schwarz	CMW500	Radio Communication Tester	8/26/2019	Annual	8/26/2020	100976
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	1/31/2019	Annual	1/31/2020	100040
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/23/2019	Annual	9/23/2020	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	5/6/2019	Annual	5/6/2020	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/11/2019	Annual	7/11/2020	102134
Seekonk	NC-100	Torque Wrench (8" lb)	5/10/2018	Biennial	5/10/2020	N/A

Table 5-1. Test Equipment

Notes:

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

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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.

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7.0 TEST RESULTS

7.1 Summary

Company Name: LG Electronics USA, Inc.
 FCC ID: ZNFL455DL
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): GSM / GPRS / EDGE / WCDMA / CDMA

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
22.913(a)(5)	RSS-132(5.4)	Effective Radiated Power	< 7 Watts max. ERP	RADIATED	PASS	Section 7.2
24.232(c)	RSS-133(6.4)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP		PASS	Section 7.3
27.50(d)(4)	RSS-139(6.5)	Equivalent Isotropic Radiated Power	< 1 Watts max. EIRP		PASS	Section 7.2
2.1053 22.917(a) 24.238(a) 27.53(h)	RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)	Radiated Spurious Emissions	> 43 + 10 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.

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7.2 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 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 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – 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.
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".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

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Test Setup

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

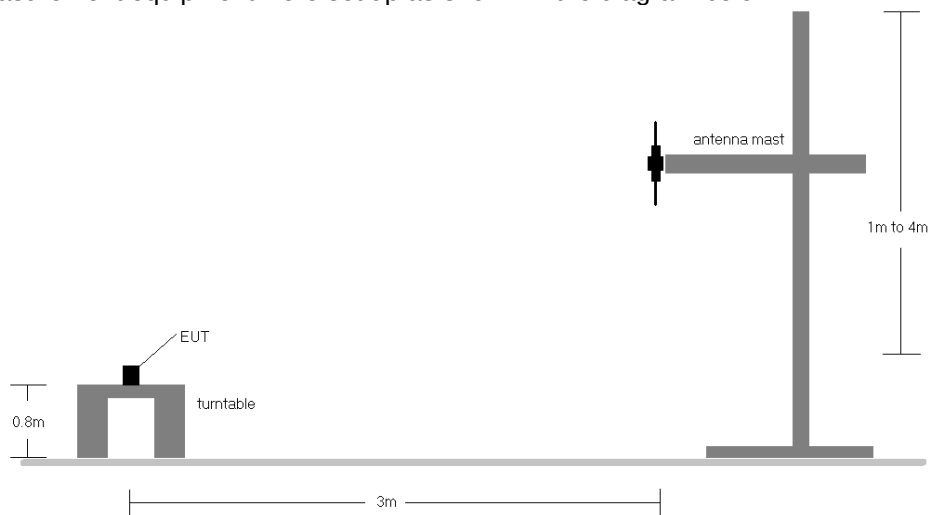


Figure 7-1. Radiated Test Setup <1GHz

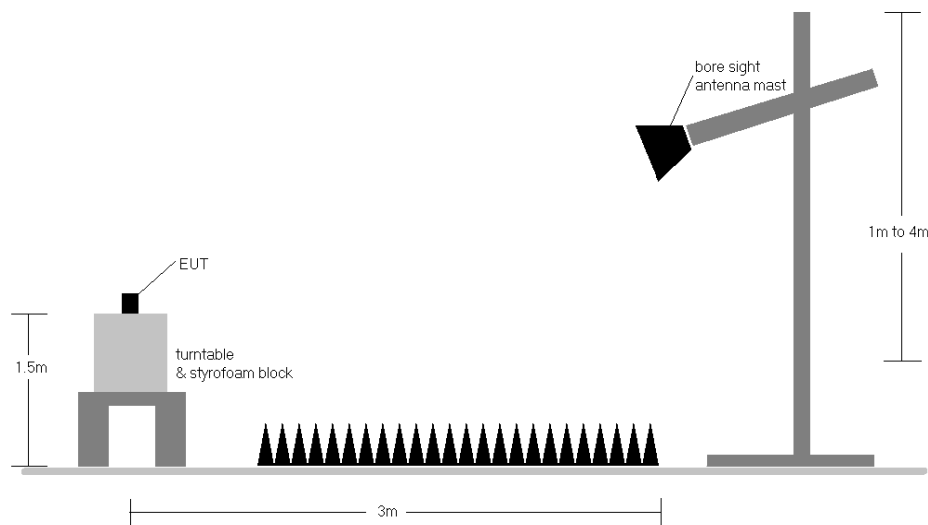


Figure 7-2. Radiated Test Setup >1GHz

Test Notes

- 1) This unit was tested with its standard battery.
- 2) 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.

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Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.20	GPRS850	V	139	174	21.92	6.30	26.07	0.405	38.45	-12.38	28.22	0.664	40.61	-12.39
836.60	GPRS850	V	163	134	22.10	6.40	26.35	0.432	38.45	-12.10	28.50	0.708	40.61	-12.11
848.80	GPRS850	V	128	201	21.41	6.50	25.76	0.377	38.45	-12.69	27.91	0.618	40.61	-12.70
836.60	GPRS850	H	235	310	20.53	6.40	24.78	0.301	38.45	-13.67	26.93	0.493	40.61	-13.68
836.60	EDGE850	V	163	134	17.72	6.40	21.97	0.157	38.45	-16.48	24.12	0.258	40.61	-16.49

Table 7-2. ERP/EIRP (Cellular GPRS)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.70	CDMA850	V	136	177	11.92	6.30	16.07	0.040	38.45	-22.38	18.22	0.066	40.61	-22.39
836.52	CDMA850	V	139	173	12.89	6.40	17.14	0.052	38.45	-21.31	19.29	0.085	40.61	-21.32
848.31	CDMA850	V	142	177	11.99	6.50	16.34	0.043	38.45	-22.11	18.49	0.071	40.61	-22.12
836.52	CDMA850	H	196	174	11.47	6.70	16.02	0.040	38.45	-22.43	18.17	0.066	40.61	-22.44

Table 7-3. ERP/EIRP (Cellular CDMA)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
826.40	WCDMA850	V	139	170	13.59	6.30	17.74	0.059	38.45	-20.71	19.89	0.097	40.61	-20.72
836.60	WCDMA850	V	131	173	14.37	6.40	18.62	0.073	38.45	-19.83	20.77	0.119	40.61	-19.84
846.60	WCDMA850	V	134	172	14.24	6.50	18.59	0.072	38.45	-19.86	20.74	0.119	40.61	-19.87
836.60	WCDMA850	H	202	162	13.27	6.70	17.82	0.061	38.45	-20.63	19.97	0.099	40.61	-20.64

Table 7-4. ERP/EIRP (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	H	109	22	14.18	9.43	23.61	0.230	30.00	-6.39
1732.60	WCDMA1700	H	100	31	14.00	9.31	23.31	0.214	30.00	-6.69
1752.60	WCDMA1700	H	102	21	13.38	9.21	22.59	0.181	30.00	-7.41
1712.40	WCDMA1700	V	115	53	13.37	9.34	22.71	0.187	30.00	-7.29

Table 7-5. EIRP (AWS WCDMA)

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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	H	157	20	17.16	9.48	26.64	0.461	33.01	-6.37
1880.00	GPRS1900	H	155	17	18.32	9.90	28.22	0.664	33.01	-4.79
1909.80	GPRS1900	H	141	19	17.36	10.26	27.62	0.578	33.01	-5.39
1880.00	GPRS1900	V	152	59	17.39	10.10	27.49	0.561	33.01	-5.52
1880.00	EDGE1900	H	155	17	13.49	9.90	23.39	0.218	33.01	-9.62

Table 7-6. EIRP (PCS GPRS)

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]
1851.25	CDMA1900	H	161	21	14.95	9.49	24.44	0.278	33.01	-8.57
1880.00	CDMA1900	H	151	236	14.51	9.90	24.41	0.276	33.01	-8.60
1908.75	CDMA1900	H	150	24	14.55	10.25	24.80	0.302	33.01	-8.21
1908.75	CDMA1900	V	117	40	14.25	10.31	24.56	0.286	33.01	-8.45

Table 7-7. EIRP (PCS CDMA)

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	H	120	21	13.45	9.51	22.96	0.198	33.01	-10.05
1880.00	WCDMA1900	H	161	12	12.76	9.90	22.66	0.184	33.01	-10.35
1907.60	WCDMA1900	H	209	7	12.07	10.24	22.31	0.170	33.01	-10.70
1852.40	WCDMA1900	V	115	85	13.00	9.89	22.89	0.195	33.01	-10.12

Table 7-8. EIRP (PCS WCDMA)

FCC ID: ZNFL455DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 15 of 32

7.3 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 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 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – 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 = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 16 of 32

Test Setup

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

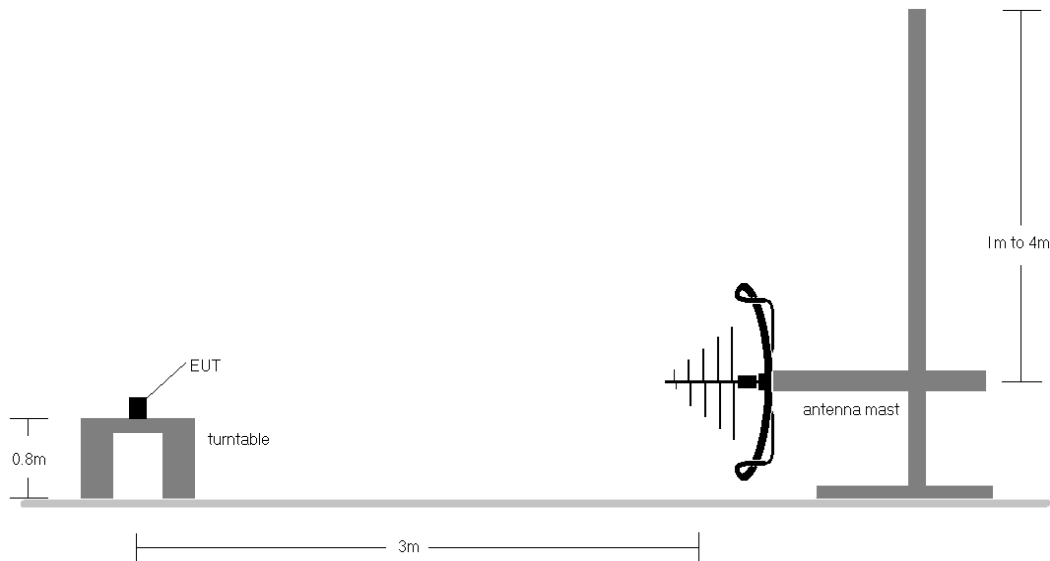


Figure 7-3. Test Instrument & Measurement Setup < 1GHz

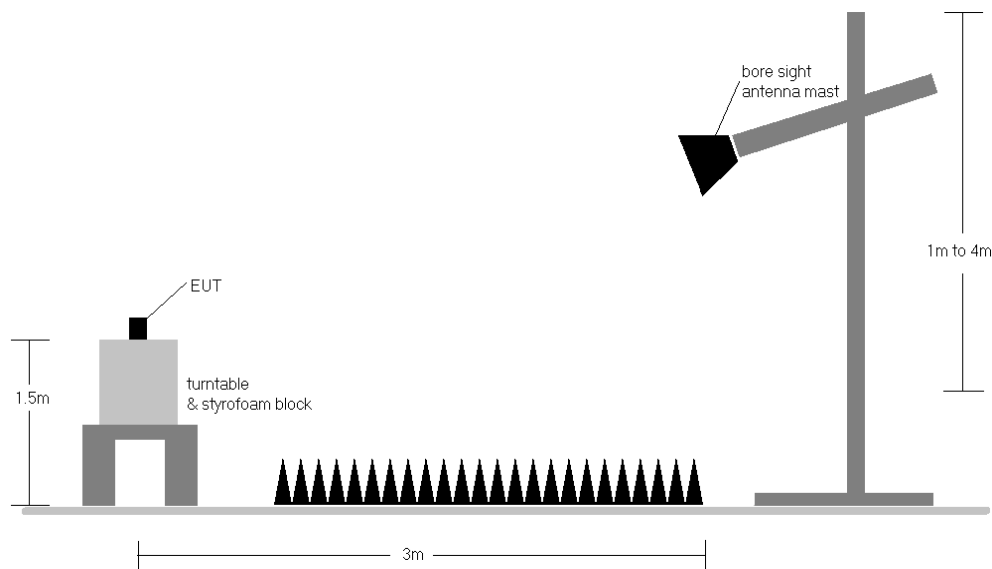


Figure 7-4. Test Instrument & Measurement Setup >1 GHz

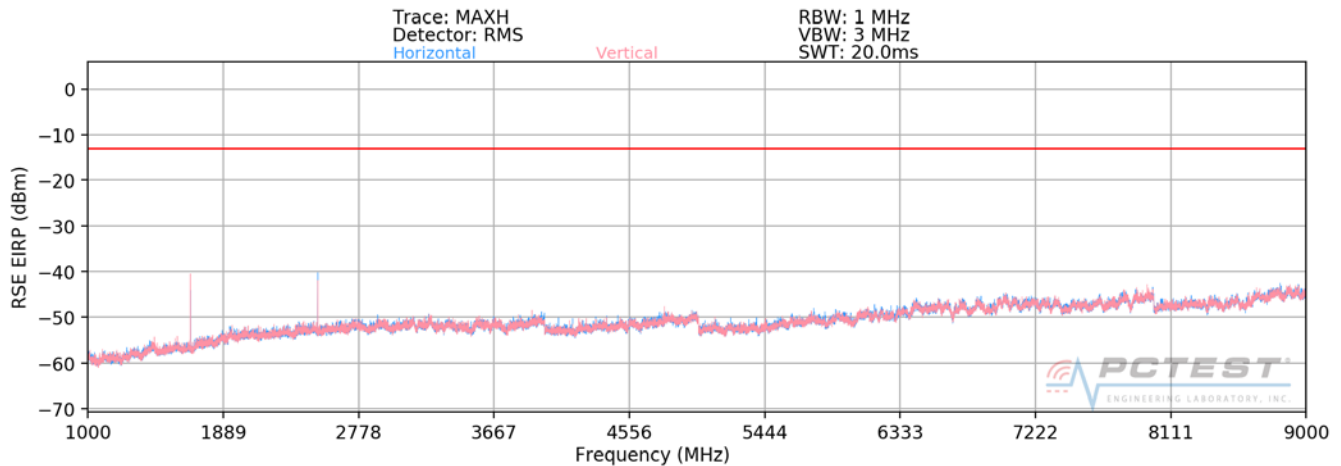
Test Notes

- 1) This unit was tested with its standard battery.
- 2) 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.
- 3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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- 4) 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.
- 5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Cellular GPRS Mode



Plot 7-1. Radiated Spurious Plot above 1GHz (Cellular GPRS Mode)

OPERATING FREQUENCY: 824.20 MHz
 CHANNEL: 128
 MODULATION SIGNAL: GPRS (GMSK)
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
1648.40	H	114	180	-48.37	3.07	-45.30	-32.3
2472.60	H	162	356	-44.87	3.82	-41.05	-28.1
3296.80	H	174	355	-58.89	6.00	-52.89	-39.9
4121.00	H	-	-	-59.83	7.67	-52.16	-39.2
4945.20	H	-	-	-60.21	8.72	-51.49	-38.5

Table 7-9. Radiated Spurious Data (Cellular GPRS Mode – Ch. 128)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 18 of 32

OPERATING FREQUENCY: 836.60 MHz
 CHANNEL: 190
 MODULATION SIGNAL: GPRS (GMSK)
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
1673.20	H	385	173	-47.39	3.10	-44.29	-31.3
2509.80	H	106	318	-42.32	4.02	-38.30	-25.3
3346.40	H	114	355	-58.71	6.03	-52.68	-39.7
4183.00	H	-	-	-60.22	7.79	-52.42	-39.4
5019.60	H	-	-	-60.52	8.78	-51.74	-38.7

Table 7-10. Radiated Spurious Data (Cellular GPRS Mode – Ch. 190)

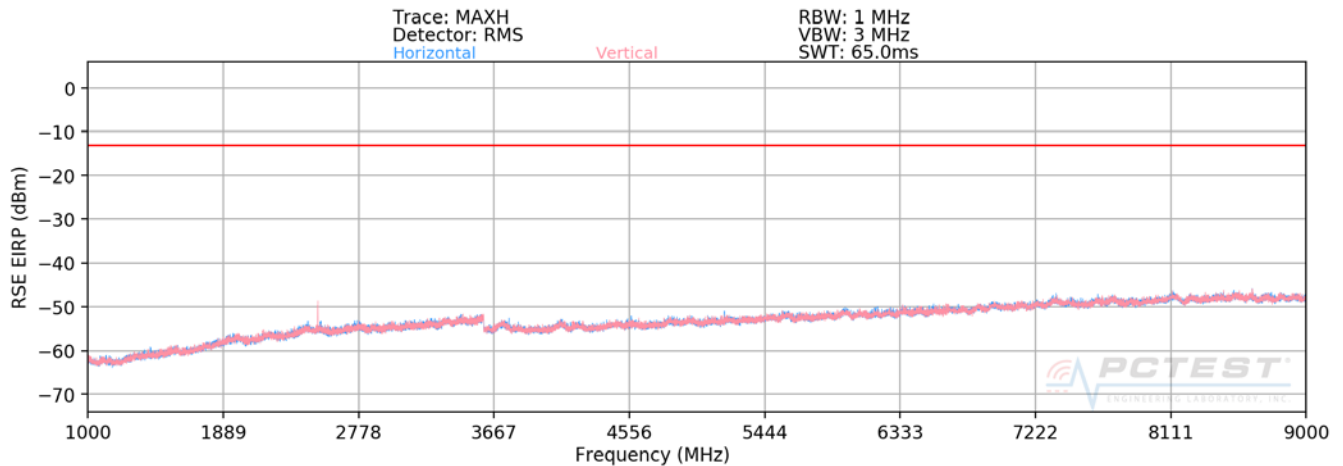
OPERATING FREQUENCY: 848.80 MHz
 CHANNEL: 251
 MODULATION SIGNAL: GPRS (GMSK)
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
1697.60	H	145	359	-49.50	3.15	-46.35	-33.3
2546.40	H	153	209	-44.45	4.15	-40.31	-27.3
3395.20	H	149	345	-58.21	6.24	-51.97	-39.0
4244.00	H	-	-	-60.53	7.97	-52.56	-39.6
5092.80	H	-	-	-60.68	8.88	-51.80	-38.8

Table 7-11. Radiated Spurious Data (Cellular GPRS Mode – Ch. 251)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 19 of 32

Cellular CDMA Mode



Plot 7-2. Radiated Spurious Plot above 1GHz (Cellular CDMA Mode)

OPERATING FREQUENCY: 824.70 MHz
CHANNEL: 1013
MODULATION SIGNAL: CDMA
DISTANCE: 3 meters
LIMIT: -13 dBm

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]	Margin [dB]
1649.40	H	107	188	-66.98	3.97	-63.01	-50.0
2474.10	H	101	325	-64.89	4.54	-60.35	-47.3
3298.80	H	-	-	-69.11	6.00	-63.11	-50.1
4123.50	H	-	-	-69.00	7.68	-61.32	-48.3

Table 7-12. Radiated Spurious Data (Cellular CDMA Mode – Ch. 1013)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 20 of 32

OPERATING FREQUENCY: 836.52 MHz
 CHANNEL: 384
 MODULATION SIGNAL: CDMA
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
1673.04	H	290	183	-67.30	3.90	-63.40	-50.4
2509.56	H	101	318	-64.92	4.72	-60.21	-47.2
3346.08	H	-	-	-68.39	6.12	-62.27	-49.3
4182.60	H	-	-	-69.40	7.79	-61.61	-48.6

Table 7-13. Radiated Spurious Data (Cellular CDMA Mode – Ch. 384)

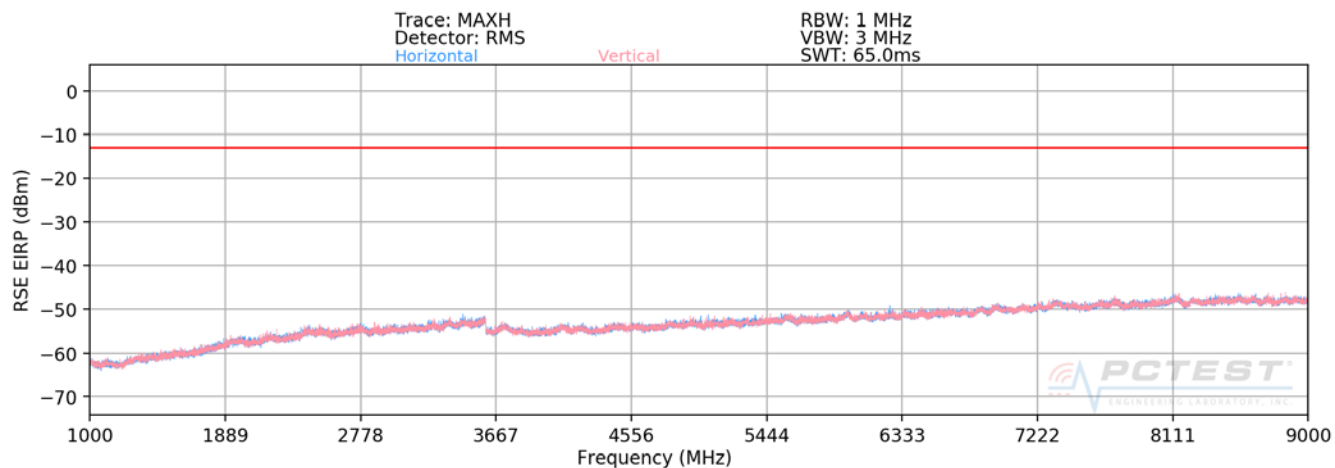
OPERATING FREQUENCY: 848.31 MHz
 CHANNEL: 777
 MODULATION SIGNAL: CDMA
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
1696.62	H	104	171	-64.48	3.92	-60.56	-47.6
2544.93	H	121	321	-64.26	4.84	-59.42	-46.4
3393.24	H	-	-	-68.31	6.33	-61.98	-49.0
4241.55	H	-	-	-69.67	7.96	-61.71	-48.7

Table 7-14. Radiated Spurious Data (Cellular CDMA Mode – Ch. 777)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 21 of 32

Cellular WCDMA Mode



Plot 7-1. Radiated Spurious Plot above 1GHz (Cellular WCDMA Mode)

OPERATING FREQUENCY: 826.40 MHz
CHANNEL: 4132
MODULATION SIGNAL: WCDMA
DISTANCE: 3 meters
LIMIT: -13 dBm

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]	Margin [dB]
1652.80	H	109	188	-67.63	3.09	-64.54	-51.5
2479.20	H	102	210	-63.07	3.91	-59.16	-46.2
3305.60	H	-	-	-68.70	6.00	-62.70	-49.7
4132.00	H	-	-	-69.20	7.72	-61.49	-48.5

Table 7-4. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4132)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 22 of 32

OPERATING FREQUENCY: 836.60 MHz
 CHANNEL: 4183
 MODULATION SIGNAL: WCDMA
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
1673.20	H	151	159	-64.60	3.10	-61.50	-48.5
2509.80	H	107	351	-59.33	4.02	-55.31	-42.3
3346.40	H	-	-	-68.15	6.03	-62.12	-49.1
4183.00	H	-	-	-69.75	7.79	-61.95	-49.0

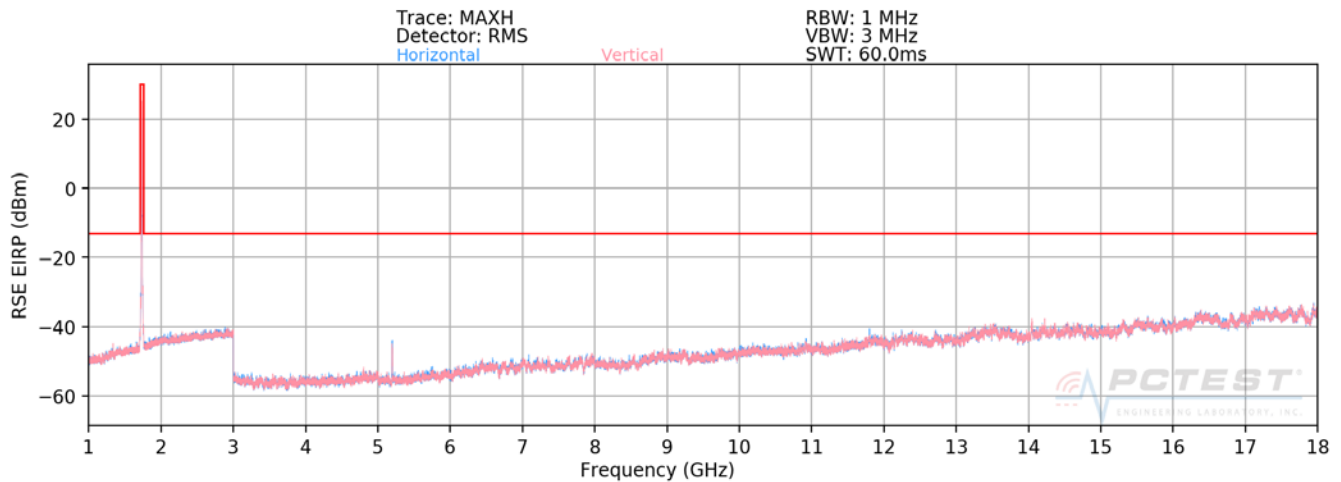
Table 7-16. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4183)

OPERATING FREQUENCY: 846.60 MHz
 CHANNEL: 4233
 MODULATION SIGNAL: WCDMA
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
1693.20	H	178	167	-64.71	3.17	-61.54	-48.5
2539.80	H	101	177	-57.04	4.13	-52.91	-39.9
3386.40	H	-	-	-68.07	6.20	-61.87	-48.9
4233.00	H	-	-	-69.33	7.93	-61.40	-48.4

Table 7-17. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4233)

AWS WCDMA Mode



Plot 7-2. Radiated Spurious Plot above 1GHz (AWS WCDMA Mode)

OPERATING FREQUENCY: 1712.40 MHz
CHANNEL: 1312
MODULATION SIGNAL: WCDMA
DISTANCE: 3 meters
LIMIT: -13 dBm

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]	Margin [dB]
3424.80	V	102	15	-64.72	6.27	-58.45	-45.4
5137.20	V	116	20	-68.30	8.94	-59.36	-46.4
6849.60	V	-	-	-66.34	9.44	-56.89	-43.9
8562.00	V	-	-	-66.73	9.58	-57.15	-44.1

Table 7-18. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1312)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 24 of 32

OPERATING FREQUENCY: 1732.60 MHz
 CHANNEL: 1413
 MODULATION SIGNAL: WCDMA
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
3465.20	V	137	352	-66.93	6.35	-60.58	-47.6
5197.80	V	102	175	-57.35	9.05	-48.30	-35.3
6930.40	V	-	-	-67.75	9.38	-58.37	-45.4
8663.00	V	-	-	-65.58	9.58	-56.00	-43.0

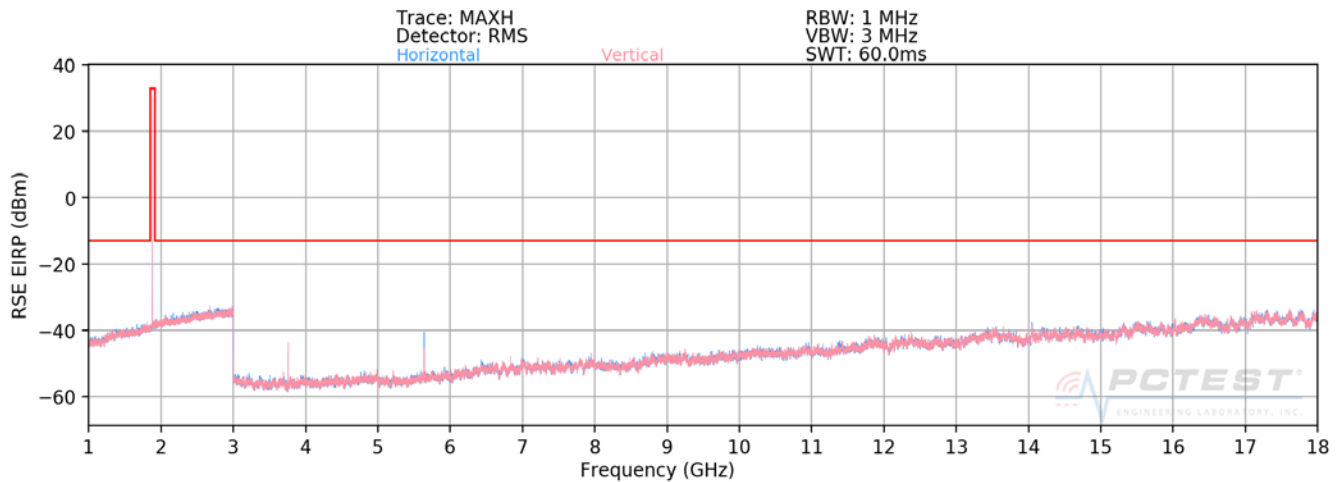
Table 7-19. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1413)

OPERATING FREQUENCY: 1752.60 MHz
 CHANNEL: 1513
 MODULATION SIGNAL: WCDMA
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]	Margin [dB]
3505.20	V	119	358	-66.18	6.50	-59.67	-46.7
5257.80	V	108	180	-59.16	8.96	-50.20	-37.2
7010.40	V	-	-	-66.07	9.14	-56.92	-43.9
8763.00	V	-	-	-64.95	9.58	-55.37	-42.4

Table 7-20. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1513)

PCS GPRS Mode



Plot 7-3. Radiated Spurious Plot above 1GHz (PCS GPRS Mode)

OPERATING FREQUENCY: 1850.20 MHz
CHANNEL: 512
MODULATION SIGNAL: GPRS (GMSK)
DISTANCE: 3 meters
LIMIT: -13 dBm

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]	Margin [dB]
3700.40	H	120	78	-52.77	6.89	-45.88	-32.9
5550.60	H	175	216	-51.92	9.02	-42.90	-29.9
7400.80	H	295	289	-53.15	9.21	-43.94	-30.9
9251.00	H	218	283	-54.40	9.45	-44.95	-31.9
11101.20	H	385	308	-53.24	9.44	-43.80	-30.8
12951.40	H	-	-	-51.57	8.77	-42.79	-29.8
14801.60	H	-	-	-46.77	8.64	-38.13	-25.1

Table 7-5. Radiated Spurious Data (PCS GPRS Mode – Ch. 512)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 26 of 32

OPERATING FREQUENCY: 1880.00 MHz
CHANNEL: 661
MODULATION SIGNAL: GPRS (GMSK)
DISTANCE: 3 meters
LIMIT: -13 dBm

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]	Margin [dB]
3760.00	H	155	66	-52.37	6.93	-45.44	-32.4
5640.00	H	255	359	-50.55	9.15	-41.40	-28.4
7520.00	H	238	289	-53.21	9.31	-43.90	-30.9
9400.00	H	-	-	-55.95	9.49	-46.46	-33.5
11280.00	H	376	36	-53.08	9.48	-43.60	-30.6
13160.00	H	-	-	-50.62	8.71	-41.90	-28.9
15040.00	H	-	-	-48.42	8.85	-39.57	-26.6

Table 7-22. Radiated Spurious Data (PCS GPRS Mode – Ch. 661)

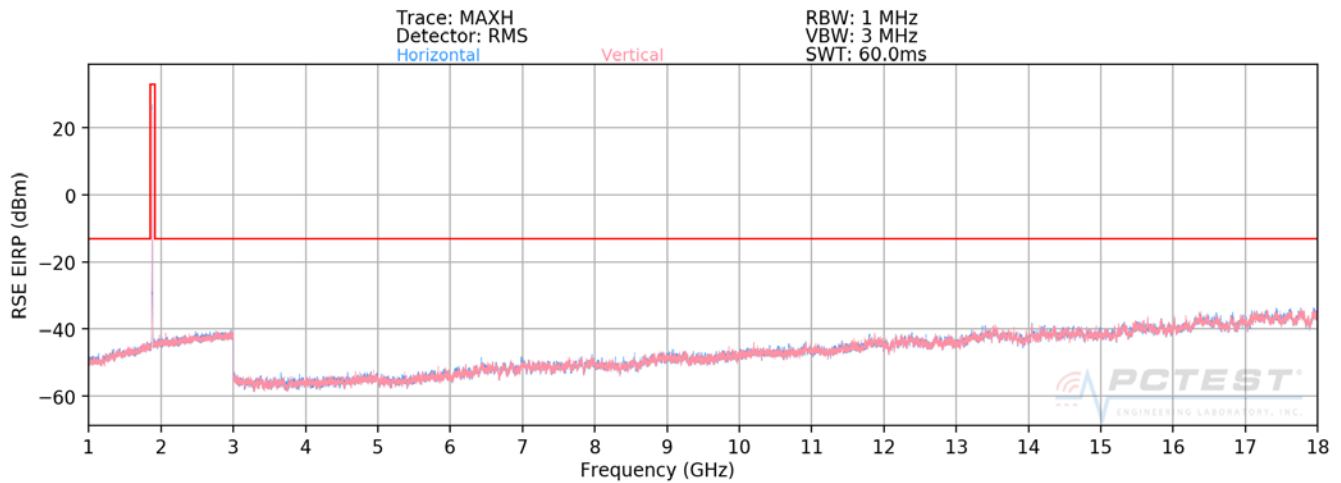
OPERATING FREQUENCY: 1909.80 MHz
CHANNEL: 810
MODULATION SIGNAL: GPRS (GMSK)
DISTANCE: 3 meters
LIMIT: -13 dBm

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]	Margin [dB]
3819.60	H	238	49	-55.68	7.11	-48.57	-35.6
5729.40	H	293	7	-50.18	9.03	-41.15	-28.1
7639.20	H	195	370	-54.95	9.29	-45.66	-32.7
9549.00	H	-	-	-56.51	9.43	-47.08	-34.1
11458.80	H	-	-	-53.53	9.49	-44.04	-31.0

Table 7-23. Radiated Spurious Data (PCS GPRS Mode – Ch. 810)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 27 of 32

PCS CDMA Mode



Plot 7-6. Radiated Spurious Plot above 1GHz (PCS CDMA Mode)

OPERATING FREQUENCY: 1851.25 MHz
CHANNEL: 25
MODULATION SIGNAL: CDMA
DISTANCE: 3 meters
LIMIT: -13 dBm

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]	Margin [dB]
3702.50	H	117	48	-62.62	6.89	-55.73	-42.7
5553.75	H	100	299	-56.47	9.02	-47.45	-34.4
7405.00	H	-	-	-67.34	9.22	-58.12	-45.1
9256.25	H	-	-	-63.90	9.45	-54.45	-41.4

Table 7-6. Radiated Spurious Data (PCS CDMA Mode – Ch. 25)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 28 of 32

OPERATING FREQUENCY: 1880.00 MHz
CHANNEL: 600
MODULATION SIGNAL: CDMA
DISTANCE: 3 meters
LIMIT: -13 dBm

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]	Margin [dB]
3760.00	H	130	312	-67.92	6.93	-60.99	-48.0
5640.00	H	106	299	-60.33	9.15	-51.18	-38.2
7520.00	H	-	-	-67.06	9.31	-57.75	-44.7
9400.00	H	-	-	-65.01	9.49	-55.52	-42.5

Table 7-7. Radiated Spurious Data (PCS CDMA Mode – Ch. 600)

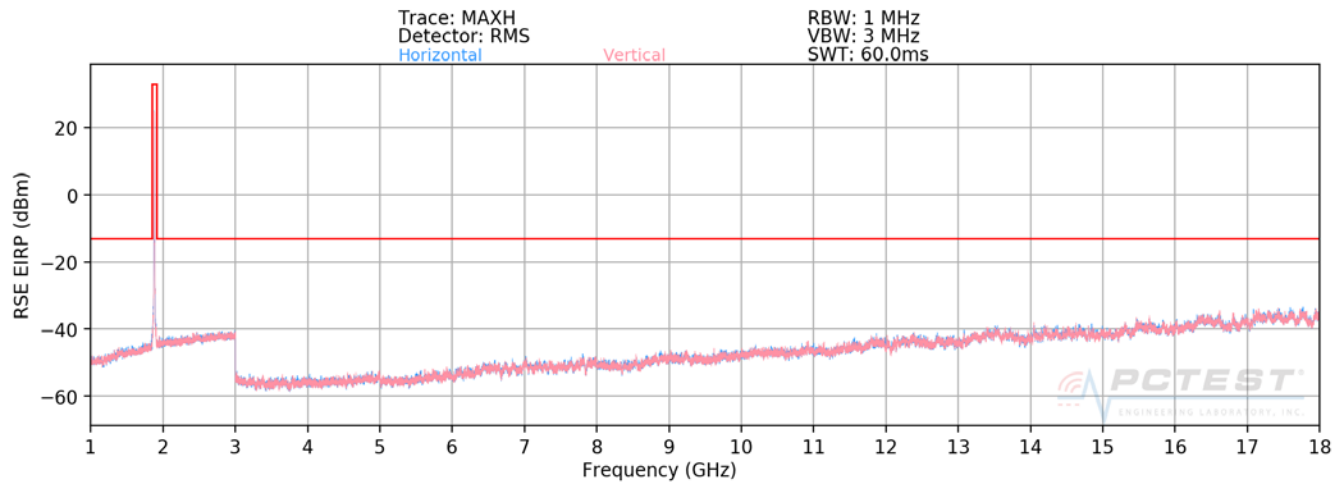
OPERATING FREQUENCY: 1908.75 MHz
CHANNEL: 1175
MODULATION SIGNAL: CDMA
DISTANCE: 3 meters
LIMIT: -13 dBm

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]	Margin [dB]
3817.50	H	117	71	-67.23	7.10	-60.13	-47.1
5726.25	H	112	300	-61.93	9.03	-52.89	-39.9
7635.00	H	-	-	-65.47	9.29	-56.18	-43.2
9543.75	H	-	-	-65.12	9.44	-55.69	-42.7

Table 7-8. Radiated Spurious Data (PCS CDMA Mode – Ch. 1175)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 29 of 32

PCS WCDMA Mode



Plot 7-7. Radiated Spurious Plot above 1GHz (PCS WCDMA Mode)

OPERATING FREQUENCY: 1852.40 MHz
CHANNEL: 9262
MODULATION SIGNAL: WCDMA
DISTANCE: 3 meters
LIMIT: -13 dBm

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]	Margin [dB]
3704.80	H	100	46	-65.81	6.89	-58.91	-45.9
5557.20	H	218	286	-65.72	9.03	-56.69	-43.7
7409.60	H	-	-	-67.27	9.23	-58.04	-45.0
9262.00	H	-	-	-64.26	9.44	-54.82	-41.8

Table 7-27. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9262)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 30 of 32

OPERATING FREQUENCY: 1880.00 MHz
CHANNEL: 9400
MODULATION SIGNAL: WCDMA
DISTANCE: 3 meters
LIMIT: -13 dBm

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]	Margin [dB]
3760.00	H	121	48	-67.45	6.93	-60.52	-47.5
5640.00	H	118	298	-65.78	9.15	-56.63	-43.6
7520.00	H	-	-	-66.88	9.31	-57.57	-44.6
9400.00	H	-	-	-64.31	9.49	-54.82	-41.8

Table 7-28. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9400)

OPERATING FREQUENCY: 1907.60 MHz
CHANNEL: 9538
MODULATION SIGNAL: WCDMA
DISTANCE: 3 meters
LIMIT: -13 dBm

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]	Margin [dB]
3815.20	H	101	54	-67.93	7.09	-60.84	-47.8
5722.80	H	100	301	-64.32	9.04	-55.28	-42.3
7630.40	H	-	-	-65.67	9.28	-56.39	-43.4
9538.00	H	-	-	-64.82	9.44	-55.37	-42.4

Table 7-29. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9538)

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 31 of 32

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset** **FCC ID: ZNFL455DL** complies with all the requirements of Part of the FCC Rules.

FCC ID: ZNFL455DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911290211-02-R1.ZNF	Test Dates: 12/30/2019 – 1/8/2020	EUT Type: Portable Handset		Page 32 of 32