



MEASUREMENT REPORT
LTE

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

Date of Testing:
 11/20 - 12/18/2017
Test Site/Location:
 PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
 1M1712050312-03-R1.ZNF


FCC ID:	ZNFL413DL
APPLICANT:	LG Electronics MobileComm U.S.A

Application Type: Class II Permissive Change
Model: LML413DL
Additional Model(s): LM-L413DL, L413DL, LM-X410ULMG, LMX410ULMG, X410ULMG
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 v03
Cass II Permissive Change: Please see FCC change document

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 test report (S/N: 1M1712050312-03-R1.ZNF) supersedes and replaces all previous versions of this test report. Please dispose of all previous versions of this test report 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



FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 1 of 31

TABLE OF CONTENTS

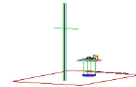
1.0	INTRODUCTION	4
1.1	Scope	4
1.2	PCTEST Test Location.....	4
1.3	Test Facility / Accreditations.....	4
2.0	PRODUCT INFORMATION.....	5
2.1	Equipment Description	5
2.2	Device Capabilities.....	5
2.3	Test Configuration	5
2.4	EMI Suppression Device(s)/Modifications	5
3.0	DESCRIPTION OF TESTS	6
3.1	Measurement Procedure.....	6
3.1	Block C Frequency Range	6
3.2	Block A Frequency Range.....	6
3.3	Cellular - Base Frequency Blocks	6
3.4	Cellular - Mobile Frequency Blocks	7
3.5	PCS - Base Frequency Blocks	7
3.6	PCS - Mobile Frequency Blocks.....	7
3.7	AWS - Base Frequency Blocks	7
3.8	AWS - Mobile Frequency Blocks.....	8
3.9	Radiated Power and Radiated Spurious Emissions	8
4.0	MEASUREMENT UNCERTAINTY	9
5.0	TEST EQUIPMENT CALIBRATION DATA	10
6.0	SAMPLE CALCULATIONS	11
7.0	TEST RESULTS.....	12
7.1	Summary.....	12
7.2	Radiated Power (ERP/EIRP).....	13
7.3	Radiated Spurious Emissions Measurements.....	19
8.0	CONCLUSION.....	31

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 2 of 31



MEASUREMENT REPORT

FCC Part 22, 24, & 27



Mode	FCC Rule Part	Tx Frequency (MHz)	ERP		EIRP		Modulation
			Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)	
LTE Band 12	27	699.7 - 715.3	0.081	19.06	0.132	21.21	QPSK
LTE Band 12	27	699.7 - 715.3	0.067	18.27	0.110	20.42	16QAM
LTE Band 12	27	700.5 - 714.5	0.078	18.90	0.127	21.05	QPSK
LTE Band 12	27	700.5 - 714.5	0.052	17.14	0.085	19.29	16QAM
LTE Band 12	27	701.5 - 713.5	0.077	18.84	0.126	20.99	QPSK
LTE Band 12	27	701.5 - 713.5	0.064	18.04	0.105	20.19	16QAM
LTE Band 12	27	704 - 711	0.079	18.96	0.129	21.11	QPSK
LTE Band 12	27	704 - 711	0.058	17.60	0.094	19.75	16QAM
LTE Band 13	27	779.5 - 784.5	0.182	22.60	0.298	24.75	QPSK
LTE Band 13	27	779.5 - 784.5	0.124	20.93	0.203	23.08	16QAM
LTE Band 13	27	782	0.152	21.81	0.249	23.96	QPSK
LTE Band 13	27	782	0.137	21.36	0.224	23.51	16QAM
LTE Band 5	22H	824.7 - 848.3	0.159	22.02	0.261	24.17	QPSK
LTE Band 5	22H	824.7 - 848.3	0.133	21.23	0.218	23.38	16QAM
LTE Band 5	22H	825.5 - 847.5	0.200	23.00	0.327	25.15	QPSK
LTE Band 5	22H	825.5 - 847.5	0.150	21.75	0.245	23.90	16QAM
LTE Band 5	22H	826.5 - 846.5	0.155	21.90	0.254	24.05	QPSK
LTE Band 5	22H	826.5 - 846.5	0.127	21.04	0.208	23.19	16QAM
LTE Band 5	22H	829 - 844	0.166	22.19	0.272	24.34	QPSK
LTE Band 5	22H	829 - 844	0.141	21.48	0.231	23.63	16QAM
LTE Band 4/66	27	1710.7 - 1779.3			0.244	23.87	QPSK
LTE Band 4/66	27	1710.7 - 1779.3			0.189	22.77	16QAM
LTE Band 4/66	27	1711.5 - 1778.5			0.225	23.52	QPSK
LTE Band 4/66	27	1711.5 - 1778.5			0.194	22.87	16QAM
LTE Band 4/66	27	1712.5 - 1777.5			0.239	23.79	QPSK
LTE Band 4/66	27	1712.5 - 1777.5			0.186	22.71	16QAM
LTE Band 4/66	27	1715 - 1775			0.233	23.68	QPSK
LTE Band 4/66	27	1715 - 1775			0.186	22.69	16QAM
LTE Band 4/66	27	1717.5 - 1772.5			0.235	23.70	QPSK
LTE Band 4/66	27	1717.5 - 1772.5			0.186	22.70	16QAM
LTE Band 4/66	27	1720 - 1770			0.233	23.67	QPSK
LTE Band 4/66	27	1720 - 1770			0.183	22.63	16QAM
LTE Band 2	24E	1850.7 - 1909.3			0.611	27.86	QPSK
LTE Band 2	24E	1850.7 - 1909.3			0.440	26.43	16QAM
LTE Band 2	24E	1851.5 - 1908.5			0.695	28.42	QPSK
LTE Band 2	24E	1851.5 - 1908.5			0.417	26.20	16QAM
LTE Band 2	24E	1852.5 - 1907.5			0.572	27.57	QPSK
LTE Band 2	24E	1852.5 - 1907.5			0.391	25.92	16QAM
LTE Band 2	24E	1855 - 1905			0.452	26.55	QPSK
LTE Band 2	24E	1855 - 1905			0.321	25.07	16QAM
LTE Band 2	24E	1857.5 - 1902.5			0.597	27.76	QPSK
LTE Band 2	24E	1857.5 - 1902.5			0.486	26.87	16QAM
LTE Band 2	24E	1860 - 1900			0.582	27.65	QPSK
LTE Band 2	24E	1860 - 1900			0.391	25.92	16QAM

EUT Overview

Note:

Class II Permissive Change test samples were used for ERP/EIRP measurements. It has been determined that radiated powers were not changed for the ZNFL413DL. Differences in radiated powers from the original certification ERP/EIRP that are reported herein are within expected measurement tolerances.

FCC ID: ZNFL413DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 3 of 31	

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 ISED Standards (RSS)."
- PCTEST facility is a registered (22831) test laboratory with the site description on file with ISED.

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 4 of 31

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LGE Portable Handset FCC ID: ZNFL413DL**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: 18338, 18320, 18387, 18320, 18387

2.2 Device Capabilities

This device contains the following capabilities:

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

LTE Band 66 (1710 - 1780 MHz) overlaps the entire frequency range of LTE Band 4 (1710 - 1755 MHz). Therefore, test data provided in this report covers Band 4 as well as Band 66.

2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

2.4 EMI Suppression Device(s)/Modifications

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

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 5 of 31

3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

The measurement procedures described in the document titled “Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards” (ANSI/TIA-603-E-2016) and “Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems” (KDB 971168 D01 v03) were used in the measurement of the EUT.

3.1 Block C Frequency Range

§27.5(b)(3)

Two paired channels of 11 megahertz each are available for assignment in Block C in the 746-757 MHz and 776-787 MHz bands. In the event that no licenses for two channels in this Block C are assigned based on the results of the first auction in which such licenses were offered because the auction results do not satisfy the applicable reserve price, the spectrum in the 746-757 MHz and 776-787 MHz bands will instead be made available for assignment at a subsequent auction as follows: (i) Two paired channels of 6 megahertz each available for assignment in Block C1 in the 746-752 MHz and 776-782 MHz bands. (ii) Two paired channels of 5 megahertz each available for assignment in Block C2 in the 752-757 MHz and 782-787 MHz bands.

3.2 Block A Frequency Range

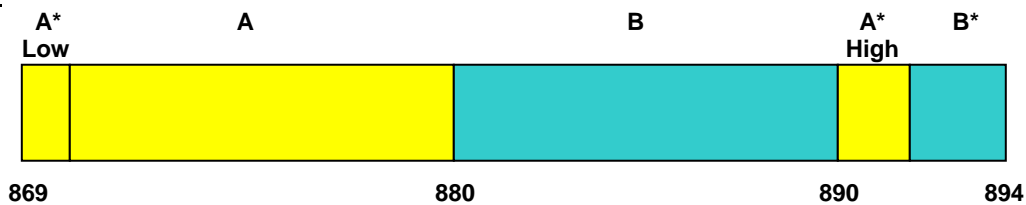
§27.5(c)

698-746 MHz band. The following frequencies are available for licensing pursuant to this part in the 698-746 MHz band: (1) Three paired channel blocks of 12 megahertz each are available for assignment as follows:

Block A: 698-704 MHz and 728-734 MHz;
 Block B: 704-710 MHz and 734-740 MHz; and
 Block C: 710-716 MHz and 740-746 MHz.

3.3 Cellular - Base Frequency Blocks

§22.905



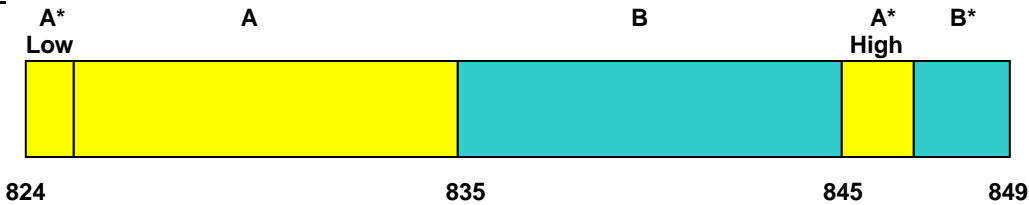
BLOCK 1: 869 – 880 MHz (A* Low + A)
BLOCK 2: 880 – 890 MHz (B)

BLOCK 3: 890 – 891.5 MHz (A* High)
BLOCK 4: 891.5 – 894 MHz (B*)

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset		Page 6 of 31

3.4 Cellular - Mobile Frequency Blocks

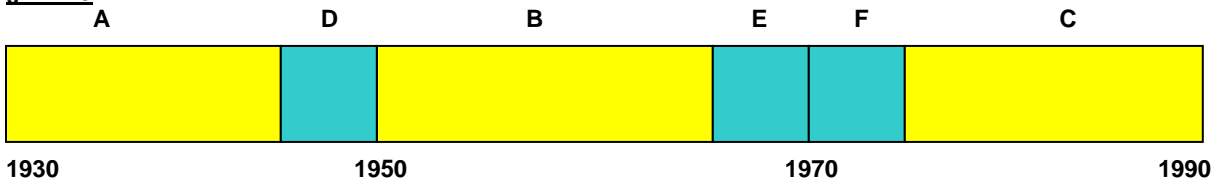
§22.905



BLOCK 1: 824 – 835 MHz (A* Low + A) BLOCK 3: 845 – 846.5 MHz (A* High)
 BLOCK 2: 835 – 845 MHz (B) BLOCK 4: 846.5 – 849 MHz (B*)

3.5 PCS - Base Frequency Blocks

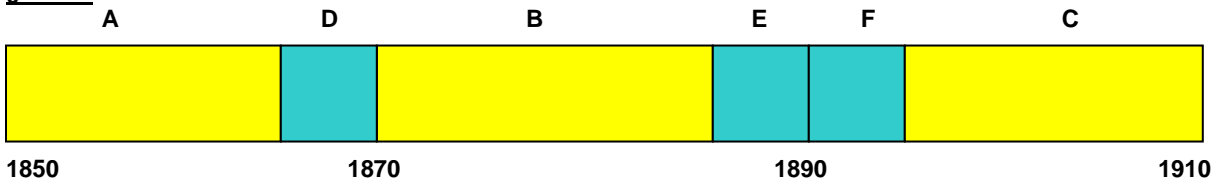
§24.229



BLOCK 1: 1930 – 1945 MHz (A) BLOCK 4: 1965 – 1970 MHz (E)
 BLOCK 2: 1945 – 1950 MHz (D) BLOCK 5: 1970 – 1975 MHz (F)
 BLOCK 3: 1950 – 1965 MHz (B) BLOCK 6: 1975 – 1990 MHz (C)

3.6 PCS - Mobile Frequency Blocks

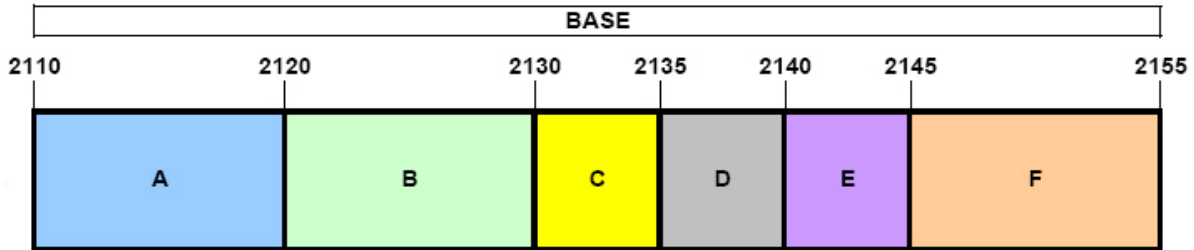
§24.229





BLOCK 1: 1850 – 1865 MHz (A) BLOCK 4: 1885 – 1890 MHz (E)
 BLOCK 2: 1865 – 1870 MHz (D) BLOCK 5: 1890 – 1895 MHz (F)
 BLOCK 3: 1870 – 1885 MHz (B) BLOCK 6: 1895 – 1910 MHz (C)

3.7 AWS - Base Frequency Blocks

§27.5(h)

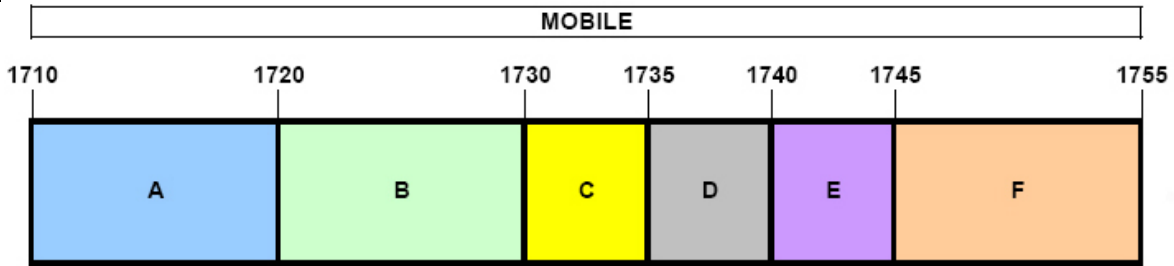


BLOCK 1: 2110 – 2120 MHz (A) BLOCK 4: 2135 – 2140 MHz (D)
 BLOCK 2: 2120 – 2130 MHz (B) BLOCK 5: 2140 – 2145 MHz (E)
 BLOCK 3: 2130 – 2135 MHz (C) BLOCK 6: 2145 – 2155 MHz (F)

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1-ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 7 of 31	

3.8 AWS - Mobile Frequency Blocks

§27.5(h)



- | | |
|------------------------------|------------------------------|
| BLOCK 1: 1710 – 1720 MHz (A) | BLOCK 4: 1735 – 1740 MHz (D) |
| BLOCK 2: 1720 – 1730 MHz (B) | BLOCK 5: 1740 – 1745 MHz (E) |
| BLOCK 3: 1730 – 1735 MHz (C) | BLOCK 6: 1745 – 1755 MHz (F) |

3.9 Radiated Power and Radiated Spurious Emissions

§2.1053 §22.913(a)(2) §22.917(a) §24.232(c) §24.238(a) §27.50(b)(10) §27.50(c)(10) §27.50(d)(4) §27.53(f) §27.53(g) §27.53(h) RSS-130(4.4) RSS-132(5.4) RSS-132(5.5) RSS-133(6.4) RSS-133(6.5) RSS-139(6.5) RSS-139(6.6) RSS-199(4.5)

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. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer “Channel Power” function with the integration band set to the emissions’ occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03.

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:

$$P_d [dBm] = P_g [dBm] - \text{cable loss} [dB] + \text{antenna gain} [dBd/dBi]$$

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

The calculated P_d levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of $43 + 10\log_{10}(\text{Power} [Watts])$.

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset		Page 8 of 31

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

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 9 of 31

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
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	6/21/2017	Annual	6/21/2018	RE1
Anritsu	MT8820C	Radio Communication Analyzer	5/23/2017	Annual	5/23/2018	6201240328
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2017	Biennial	10/10/2019	121034
Emco	3115	Horn Antenna (1-18GHz)	3/10/2016	Biennial	3/10/2018	9704-5182
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	4/26/2016	Biennial	4/26/2018	128337
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	12/1/2016	Biennial	12/1/2018	125518
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini Circuits	PWR-SEN-4GHS	USB Power Sensor	3/24/2017	Annual	3/24/2018	11401010036
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Rohde & Schwarz	TS-PR8	30 MHz-8 GHz Pre-Amplifier	12/22/2016	Annual	12/21/2017	102324
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100040
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102135
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102133
Rohde & Schwarz	CMW500	Radio Communication Tester	10/13/2017	Annual	10/13/2018	102060
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/31/2017	Annual	7/31/2018	100348
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	4/19/2017	Annual	4/19/2018	100342
Rohde & Schwarz	CMW500	Radio Communication Tester	5/4/2017	Annual	5/4/2018	112347
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/2/2016	Biennial	3/2/2018	N/A
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	3/14/2016	Biennial	3/14/2018	A051107

Table 5-1. Test Equipment

Notes:

- For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
- Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset		Page 10 of 31

6.0 SAMPLE CALCULATIONS

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm $- (-24.80)$.

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		 Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 11 of 31

7.0 TEST RESULTS

7.1 Summary

Company Name: LG Electronics MobileComm U.S.A
 FCC ID: ZNFL413DL
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): LTE

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
22.913(a)(2)	RSS-132(5.4)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 5)	< 7 Watts max. ERP < 11.5 Watts max. EIRP	RADIATED	PASS	Section 7.2
27.50(b)(10) 27.50(c)(10)	RSS-130(4.4)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 12, 13)	< 3 Watts max. ERP < 5 Watts max. EIRP		PASS	Section 7.2
24.232(c)	RSS-133(6.4)	Equivalent Isotropic Radiated Power (Band 2)	< 2 Watts max. EIRP		PASS	Section 7.2
27.50(d)(4)	RSS-139(6.5)	Equivalent Isotropic Radiated Power (Band 4/66)	< 1 Watts max. EIRP		PASS	Section 7.2
2.1053 22.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h)	RSS-130(4.6) RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)	Undesirable Emissions (Bands 2, 4/66, 5, 12, 13)	> 43 + 10log ₁₀ (P[Watts]) for all out-of-band emissions		PASS	Section 7.3
27.53(f)	N/A	Undesirable Emissions (Band 13)	< -70 dBW/MHz (for wideband signals) < -80 dBW (for discrete emissions less than 700Hz BW) For all emissions in the band 1559 - 1610 MHz		PASS	Section 7.3

Table 7-1. Summary of Radiated 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.

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 12 of 31	

7.2 Radiated Power (ERP/EIRP)

§22.913(a)(2) §24.232(c.2) §27.50(b)(10) §27.50(c)(10) §27.50(d)(4) RSS-130(4.4) RSS-132(5.4) RSS-133(6.4) RSS-139(6.5)

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 its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03 – 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 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points \geq 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".
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

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset		Page 13 of 31

Test Setup

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

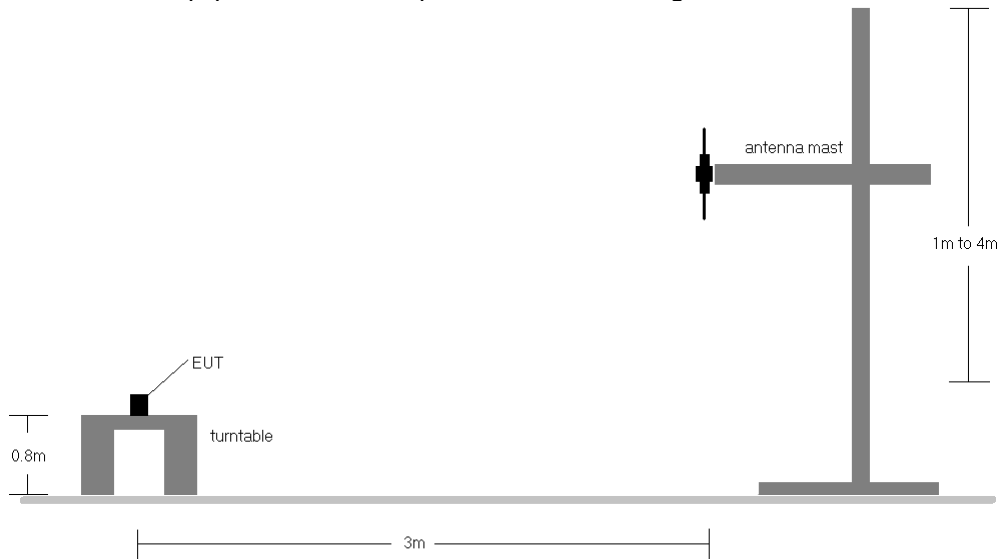


Figure 7-1. Radiated Test Setup <1GHz

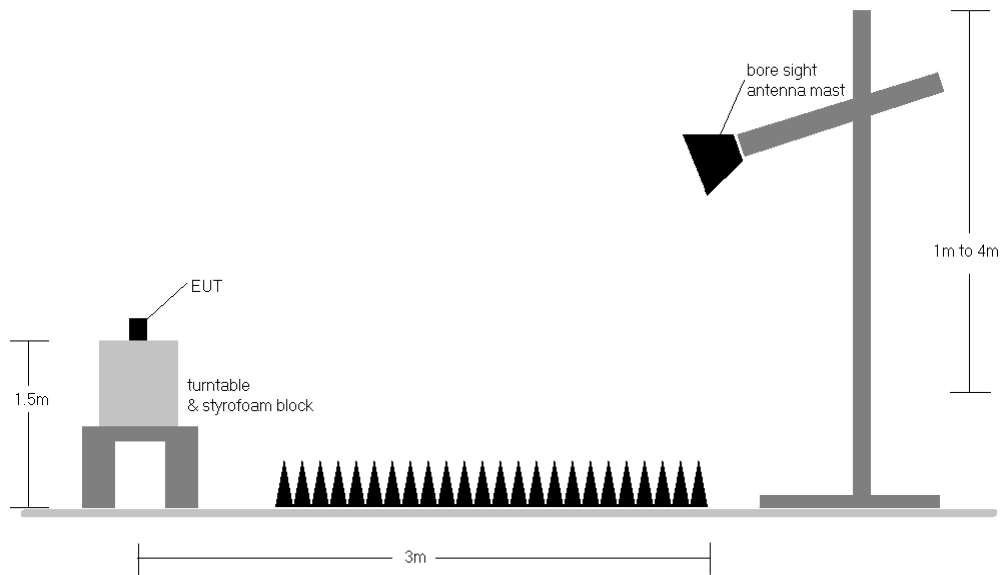



Figure 7-2. Radiated Test Setup >1GHz

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.

FCC ID: ZNFL413DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset		Page 14 of 31

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	V	150	8	1 / 5	19.21	1.10	18.16	0.065	34.77	-16.61	20.31	0.107	36.99	-16.68
707.50	1.4	QPSK	V	150	8	1 / 5	19.80	1.13	18.78	0.076	34.77	-15.99	20.93	0.124	36.99	-16.06
715.30	1.4	QPSK	V	150	13	1 / 5	20.05	1.16	19.06	0.081	34.77	-15.71	21.21	0.132	36.99	-15.78
715.30	1.4	16-QAM	V	150	13	1 / 5	19.26	1.16	18.27	0.067	34.77	-16.50	20.42	0.110	36.99	-16.57
700.50	3	QPSK	V	150	355	1 / 14	19.44	1.10	18.39	0.069	34.77	-16.38	20.54	0.113	36.99	-16.45
707.50	3	QPSK	V	150	354	1 / 14	19.61	1.13	18.59	0.072	34.77	-16.18	20.74	0.119	36.99	-16.25
714.50	3	QPSK	V	150	347	1 / 14	19.89	1.16	18.90	0.078	34.77	-15.87	21.05	0.127	36.99	-15.94
714.50	3	16-QAM	V	150	347	1 / 14	18.13	1.16	17.14	0.052	34.77	-17.63	19.29	0.085	36.99	-17.70
701.50	5	QPSK	V	150	8	1 / 24	19.14	1.11	18.10	0.065	34.77	-16.68	20.25	0.106	36.99	-16.74
707.50	5	QPSK	V	150	6	1 / 24	19.55	1.13	18.53	0.071	34.77	-16.24	20.68	0.117	36.99	-16.31
713.50	5	QPSK	V	150	0	1 / 24	19.84	1.15	18.84	0.077	34.77	-15.93	20.99	0.126	36.99	-16.00
713.50	5	16-QAM	V	150	0	1 / 24	19.04	1.15	18.04	0.064	34.77	-16.73	20.19	0.105	36.99	-16.80
704.00	10	QPSK	V	150	0	1 / 49	19.78	1.12	18.75	0.075	34.77	-16.02	20.90	0.123	36.99	-16.09
707.50	10	QPSK	V	150	350	1 / 49	19.78	1.13	18.76	0.075	34.77	-16.01	20.91	0.123	36.99	-16.08
711.00	10	QPSK	V	150	3	1 / 49	19.97	1.14	18.96	0.079	34.77	-15.81	21.11	0.129	36.99	-15.88
707.50	10	16-QAM	V	150	350	1 / 49	18.62	1.13	17.60	0.058	34.77	-17.17	19.75	0.094	36.99	-17.24
715.30	1.4	QPSK	H	150	194	1/5	19.64	1.16	18.65	0.073	34.77	-16.12	20.80	0.120	36.99	-16.19

Table 7-2. ERP/EIRP Data (Band 12)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
779.50	5	QPSK	V	150	10	1 / 24	23.15	1.32	22.32	0.171	34.77	-12.45	24.47	0.280	36.99	-12.52
782.00	5	QPSK	V	150	5	1 / 24	23.42	1.33	22.60	0.182	34.77	-12.17	24.75	0.298	36.99	-12.24
784.50	5	QPSK	V	150	16	1 / 24	22.70	1.34	21.89	0.154	34.77	-12.88	24.04	0.253	36.99	-12.95
784.50	5	16-QAM	V	150	16	1 / 24	21.74	1.34	20.93	0.124	34.77	-13.84	23.08	0.203	36.99	-13.91
782.00	10	QPSK	V	150	14	1 / 49	22.63	1.33	21.81	0.152	34.77	-12.96	23.96	0.249	36.99	-13.03
782.00	10	16-QAM	V	150	14	1 / 49	22.18	1.33	21.36	0.137	34.77	-13.41	23.51	0.224	36.99	-13.48
782.00	5	QPSK	H	150	5	1/24	23.22	1.33	22.40	0.174	34.77	-12.37	24.55	0.285	36.99	-12.44

Table 7-3. ERP/EIRP Data (Band 13)

FCC ID: ZNFL413DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1-ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 15 of 31	

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	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	1.4	QPSK	V	150	8	1 / 5	21.56	1.50	20.91	0.123	38.45	-17.54	23.06	0.202	40.61	-17.55
836.50	1.4	QPSK	V	150	13	1 / 5	22.48	1.50	21.83	0.152	38.45	-16.62	23.98	0.250	40.61	-16.63
848.30	1.4	QPSK	V	150	13	1 / 5	22.67	1.50	22.02	0.159	38.45	-16.43	24.17	0.261	40.61	-16.44
848.30	1.4	16-QAM	V	150	13	1 / 5	21.88	1.50	21.23	0.133	38.45	-17.22	23.38	0.218	40.61	-17.23
825.50	3	QPSK	V	150	11	1 / 14	21.51	1.50	20.86	0.122	38.45	-17.59	23.01	0.200	40.61	-17.60
836.50	3	QPSK	V	150	4	1 / 14	22.72	1.50	22.07	0.161	38.45	-16.38	24.22	0.264	40.61	-16.39
847.50	3	QPSK	V	150	6	1 / 14	23.65	1.50	23.00	0.200	38.45	-15.45	25.15	0.327	40.61	-15.46
847.50	3	16-QAM	V	150	6	1 / 14	22.40	1.50	21.75	0.150	38.45	-16.70	23.90	0.245	40.61	-16.71
826.50	5	QPSK	V	150	11	1 / 24	21.57	1.50	20.92	0.124	38.45	-17.53	23.07	0.203	40.61	-17.54
836.50	5	QPSK	V	150	0	1 / 24	22.12	1.50	21.47	0.140	38.45	-16.98	23.62	0.230	40.61	-16.99
846.50	5	QPSK	V	150	11	1 / 24	22.55	1.50	21.90	0.155	38.45	-16.55	24.05	0.254	40.61	-16.56
846.50	5	16-QAM	V	150	11	1 / 24	21.69	1.50	21.04	0.127	38.45	-17.41	23.19	0.208	40.61	-17.42
829.00	10	QPSK	V	150	21	1 / 49	22.14	1.50	21.49	0.141	38.45	-16.96	23.64	0.231	40.61	-16.97
836.50	10	QPSK	V	150	11	1 / 49	22.66	1.50	22.01	0.159	38.45	-16.44	24.16	0.261	40.61	-16.45
844.00	10	QPSK	V	150	5	1 / 49	22.84	1.50	22.19	0.166	38.45	-16.26	24.34	0.272	40.61	-16.27
836.50	10	16-QAM	V	150	11	1 / 49	22.13	1.50	21.48	0.141	38.45	-16.97	23.63	0.231	40.61	-16.98
847.50	3	QPSK	H	150	26	1 / 0	22.20	1.50	21.55	0.143	38.45	-16.90	23.70	0.234	40.61	-16.91

Table 7-4. ERP/EIRP Data (Band 5)

FCC ID: ZNFL413DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 16 of 31	

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	150	107	1 / 0	18.31	5.56	23.87	0.244	30.00	-6.13
1745.00	1.4	QPSK	H	150	107	1 / 0	17.91	5.32	23.23	0.211	30.00	-6.77
1779.30	1.4	QPSK	H	150	107	1 / 0	18.40	5.09	23.49	0.223	30.00	-6.51
1710.70	1.4	16-QAM	H	150	107	1 / 0	17.21	5.56	22.77	0.189	30.00	-7.23
1711.50	3	QPSK	H	150	109	1 / 0	17.97	5.55	23.52	0.225	30.00	-6.48
1745.00	3	QPSK	H	150	109	1 / 0	18.11	5.32	23.43	0.220	30.00	-6.57
1778.50	3	QPSK	H	150	112	1 / 0	18.16	5.10	23.26	0.212	30.00	-6.74
1711.50	3	16-QAM	H	150	109	1 / 0	17.32	5.55	22.87	0.194	30.00	-7.13
1712.50	5	QPSK	H	150	107	1 / 0	18.24	5.55	23.79	0.239	30.00	-6.21
1745.00	5	QPSK	H	150	107	1 / 0	18.00	5.32	23.32	0.215	30.00	-6.68
1777.50	5	QPSK	H	150	110	1 / 0	18.26	5.10	23.36	0.217	30.00	-6.64
1712.50	5	16-QAM	H	150	107	1 / 0	17.16	5.55	22.71	0.186	30.00	-7.29
1715.00	10	QPSK	H	150	114	1 / 0	18.15	5.53	23.68	0.233	30.00	-6.32
1745.00	10	QPSK	H	150	111	1 / 0	18.15	5.32	23.47	0.222	30.00	-6.53
1775.00	10	QPSK	H	150	112	1 / 0	18.25	5.12	23.37	0.217	30.00	-6.63
1775.00	10	16-QAM	H	150	112	1 / 0	17.57	5.12	22.69	0.186	30.00	-7.31
1717.50	15	QPSK	H	150	109	1 / 0	18.17	5.51	23.68	0.233	30.00	-6.32
1745.00	15	QPSK	H	150	109	1 / 0	18.38	5.32	23.70	0.235	30.00	-6.30
1772.50	15	QPSK	H	150	109	1 / 0	18.34	5.14	23.48	0.223	30.00	-6.52
1717.50	15	16-QAM	H	150	109	1 / 0	17.19	5.51	22.70	0.186	30.00	-7.30
1720.00	20	QPSK	H	150	105	1 / 0	17.96	5.49	23.45	0.221	30.00	-6.55
1745.00	20	QPSK	H	150	109	1 / 0	18.35	5.32	23.67	0.233	30.00	-6.33
1770.00	20	QPSK	H	150	107	1 / 0	18.36	5.15	23.51	0.225	30.00	-6.49
1745.00	20	16-QAM	H	150	109	1 / 0	17.31	5.32	22.63	0.183	30.00	-7.37
1710.70	1.4	QPSK	V	150	257	1 / 0	17.87	5.56	23.43	0.220	30.00	-6.57

Table 7-5. EIRP Data (Band 4/66)

FCC ID: ZNFL413DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 17 of 31	

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	H	150	6	1 / 5	22.21	4.82	27.03	0.504	33.01	-5.98
1880.00	1.4	QPSK	H	150	6	1 / 5	22.16	4.74	26.90	0.490	33.01	-6.11
1909.30	1.4	QPSK	H	150	9	1 / 0	23.18	4.68	27.86	0.611	33.01	-5.15
1909.30	1.4	16-QAM	H	150	9	1 / 0	21.75	4.68	26.43	0.440	33.01	-6.58
1851.50	3	QPSK	H	150	3	1 / 14	22.01	4.82	26.83	0.481	33.01	-6.18
1880.00	3	QPSK	H	150	8	1 / 14	22.42	4.74	27.16	0.520	33.01	-5.85
1908.50	3	QPSK	H	150	5	1 / 0	23.74	4.68	28.42	0.695	33.01	-4.59
1908.50	3	16-QAM	H	150	5	1 / 0	21.52	4.68	26.20	0.417	33.01	-6.81
1852.50	5	QPSK	H	150	8	1 / 24	21.77	4.81	26.58	0.455	33.01	-6.43
1880.00	5	QPSK	H	150	13	1 / 24	21.64	4.74	26.38	0.435	33.01	-6.63
1907.50	5	QPSK	H	150	9	1 / 24	22.89	4.68	27.57	0.572	33.01	-5.44
1907.50	5	16-QAM	H	150	9	1 / 24	21.24	4.68	25.92	0.391	33.01	-7.09
1855.00	10	QPSK	H	150	19	1 / 0	21.69	4.81	26.50	0.446	33.01	-6.51
1880.00	10	QPSK	H	150	19	1 / 0	21.81	4.74	26.55	0.452	33.01	-6.46
1905.00	10	QPSK	H	150	20	1 / 0	21.57	4.68	26.25	0.422	33.01	-6.76
1880.00	10	16-QAM	H	150	19	1 / 0	20.33	4.74	25.07	0.321	33.01	-7.94
1857.50	15	QPSK	H	150	355	1 / 0	21.78	4.80	26.58	0.455	33.01	-6.43
1880.00	15	QPSK	H	150	352	1 / 74	22.48	4.74	27.22	0.527	33.01	-5.79
1902.50	15	QPSK	H	150	358	1 / 74	23.07	4.69	27.76	0.597	33.01	-5.25
1902.50	15	16-QAM	H	150	358	1 / 74	22.18	4.69	26.87	0.486	33.01	-6.14
1860.00	20	QPSK	H	150	6	1 / 99	21.90	4.79	26.69	0.467	33.01	-6.32
1880.00	20	QPSK	H	150	8	1 / 99	22.16	4.74	26.90	0.490	33.01	-6.11
1900.00	20	QPSK	H	150	6	1 / 99	22.96	4.69	27.65	0.582	33.01	-5.36
1900.00	20	16-QAM	H	150	6	1 / 99	21.23	4.69	25.92	0.391	33.01	-7.09
1908.50	3	QPSK	V	150	313	1 / 0	20.45	4.68	25.13	0.326	33.01	-7.88

Table 7-6. EIRP Data (Band 2)

FCC ID: ZNFL413DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 18 of 31	

7.3 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §24.238(a) §27.53(c) §27.53(f) §27.53(g) §27.53(h) RSS-130(4.6) RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)

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 vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

Test Procedures Used

KDB 971168 D01 v03 – 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 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points \geq 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) 		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 19 of 31

Test Setup

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

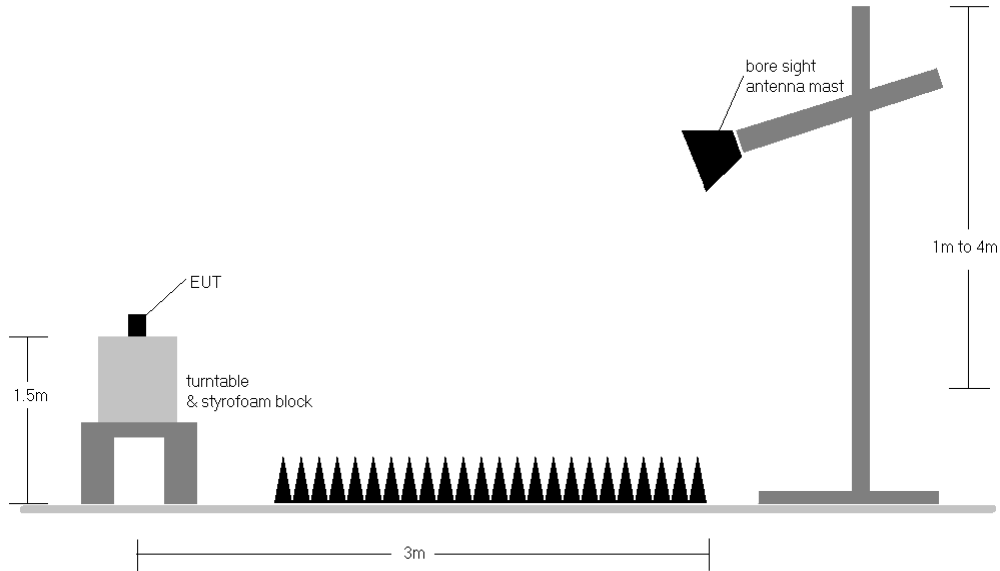



Figure 7-3. Test Instrument & Measurement Setup

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 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.

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 20 of 31	

Band 12

OPERATING FREQUENCY: 699.70 MHz
 CHANNEL: 23017
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 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]
1399.40	V	-	-	-76.98	8.33	-68.65	-55.7
2099.10	V	106	352	-59.59	9.00	-50.59	-37.6
2798.80	V	-	-	-73.02	10.03	-62.98	-50.0
3498.50	V	-	-	-69.80	9.63	-60.17	-47.2
4198.20	V	-	-	-69.77	10.34	-59.43	-46.4

Table 7-7. Radiated Spurious Data (Band 12 – Low Channel)

OPERATING FREQUENCY: 707.50 MHz
 CHANNEL: 23095
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 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]
1415.00	V	164	178	-66.21	8.41	-57.80	-44.8
2122.50	V	121	312	-56.41	8.95	-47.47	-34.5
2830.00	V	-	-	-76.64	10.11	-66.53	-53.5
3537.50	V	260	348	-72.26	9.72	-62.54	-49.5
4245.00	V	-	-	-72.57	10.50	-62.08	-49.1
4952.50	V	-	-	-72.94	11.18	-61.77	-48.8
5660.00	V	-	-	-71.12	11.17	-59.95	-47.0

Table 7-8. Radiated Spurious Data (Band 12 – Mid Channel)

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1-ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset		Page 21 of 31

OPERATING FREQUENCY: 715.30 MHz
 CHANNEL: 23173
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 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]
1430.60	V	110	197	-75.71	8.48	-67.23	-54.2
2145.90	V	153	318	-62.97	8.90	-54.07	-41.1
2861.20	V	-	-	-77.03	10.18	-66.85	-53.8
3576.50	V	258	341	-72.91	9.79	-63.12	-50.1
4291.80	V	-	-	-73.57	10.69	-62.88	-49.9
5007.10	V	-	-	-72.81	11.13	-61.68	-48.7
5722.40	V	-	-	-72.05	11.28	-60.77	-47.8

Table 7-9. Radiated Spurious Data (Band 12 – High Channel)

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset		Page 22 of 31

Band 13

OPERATING FREQUENCY: 779.50 MHz
 CHANNEL: 23205
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 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]
2338.50	H	128	174	-72.43	9.52	-62.92	-49.9
3118.00	H	-	-	-75.71	9.56	-66.15	-53.2

Table 7-10. Radiated Spurious Data (Band 13 – Low Channel)

OPERATING FREQUENCY: 782.00 MHz
 CHANNEL: 23230
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 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]
2346.00	H	107	161	-75.93	9.49	-66.44	-53.4
3128.00	H	-	-	-76.02	9.53	-66.49	-53.5

Table 7-11. Radiated Spurious Data (Band 13 – Mid Channel)

FCC ID: ZNFL413DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset			Page 23 of 31

OPERATING FREQUENCY: 784.50 MHz
 CHANNEL: 23255
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 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]
2353.50	H	128	314	-73.00	9.45	-63.55	-50.5
3138.00	H	-	-	-75.84	9.50	-66.34	-53.3

Table 7-12. Radiated Spurious Data (Band 13 – High Channel)

MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.00 MHz
 DISTANCE: 3 meters
 NARROWBAND EMISSION LIMIT: -50 dBm
 WIDEBAND EMISSION LIMIT: -40 dBm/MHz

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]
1559.00	H	185	171	-77.81	8.72	-69.08	-29.1
1564.00	H	121	137	-75.15	8.73	-66.42	-26.4
1569.00	H	399	349	-77.64	8.74	-68.90	-28.9

Table 7-13. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

FCC ID: ZNFL413DL			MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset			Page 24 of 31

Band 5

OPERATING FREQUENCY: 825.50 MHz
 CHANNEL: 20415
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 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]
1651.00	V	142	321	-73.29	8.85	-64.45	-51.4
2476.50	V	-	-	-75.04	9.18	-65.85	-52.9
3302.00	V	-	-	-73.64	9.43	-64.21	-51.2
4127.50	V	-	-	-71.29	9.88	-61.41	-48.4

Table 7-14. Radiated Spurious Data (Band 5 – Low Channel)

OPERATING FREQUENCY: 836.50 MHz
 CHANNEL: 20525
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 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]
1673.00	V	103	335	-75.28	8.71	-66.57	-53.6
2509.50	V	-	-	-76.19	9.24	-66.95	-54.0
3346.00	V	-	-	-73.80	9.34	-64.46	-51.5
4182.50	V	-	-	-72.40	10.25	-62.15	-49.2

Table 7-15. Radiated Spurious Data (Band 5 – Mid Channel)

FCC ID: ZNFL413DL			MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset			Page 25 of 31

OPERATING FREQUENCY: 847.50 MHz
 CHANNEL: 20635
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 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]
1695.00	V	153	218	-69.39	8.57	-60.83	-47.8
2542.50	V	-	-	-75.42	9.20	-66.22	-53.2
3390.00	V	-	-	-72.80	9.44	-63.37	-50.4
4237.50	V	-	-	-72.43	10.47	-61.96	-49.0

Table 7-16. Radiated Spurious Data (Band 5 – High Channel)

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset		Page 26 of 31

Band 66

OPERATING FREQUENCY: 1710.70 MHz
 CHANNEL: 131979
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 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]
3421.40	H	110	131	-43.45	9.51	-33.94	-20.9
5132.10	H	107	66	-67.74	10.82	-56.93	-43.9
6842.80	H	256	350	-62.17	10.84	-51.33	-38.3
8553.50	H	-	-	-63.55	11.66	-51.89	-38.9
10264.20	H	-	-	-62.34	12.44	-49.90	-36.9
11974.90	H	-	-	-60.45	12.26	-48.19	-35.2

Table 7-17. Radiated Spurious Data (Band 4/66 – Low Channel)

OPERATING FREQUENCY: 1745.00 MHz
 CHANNEL: 132322
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 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]
3490.00	H	178	118	-43.77	9.65	-34.12	-21.1
5235.00	H	-	-	-68.73	10.93	-57.80	-44.8
6980.00	H	213	103	-63.16	10.96	-52.20	-39.2
8725.00	H	-	-	-63.47	11.83	-51.64	-38.6
10470.00	H	-	-	-62.45	12.56	-49.89	-36.9
12215.00	H	-	-	-60.52	12.42	-48.10	-35.1


Table 7-18. Radiated Spurious Data (Band 4/66 – Mid Channel)

FCC ID: ZNFL413DL		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 27 of 31	

OPERATING FREQUENCY: 1779.30 MHz
 CHANNEL: 132665
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 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]
3558.60	H	146	61	-51.28	9.72	-41.56	-28.6
5337.90	H	114	69	-64.62	11.00	-53.62	-40.6
7117.20	H	-	-	-63.87	10.99	-52.88	-39.9
8896.50	H	-	-	-63.29	12.01	-51.27	-38.3
10675.80	H	-	-	-62.70	12.75	-49.95	-36.9

Table 7-19. Radiated Spurious Data (Band 4/66 – High Channel)

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset		Page 28 of 31

Band 2

OPERATING FREQUENCY: 1851.50 MHz
 CHANNEL: 18615
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 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]
3703.00	V	116	206	-57.30	9.82	-47.48	-34.5
5554.50	V	113	138	-52.67	10.98	-41.69	-28.7
7406.00	V	-	-	-66.38	10.73	-55.65	-42.7
9257.50	V	-	-	-67.78	12.32	-55.47	-42.5
11109.00	V	-	-	-66.75	12.96	-53.79	-40.8

Table 7-20. Radiated Spurious Data (Band 2 – Low Channel)

OPERATING FREQUENCY: 1880.00 MHz
 CHANNEL: 18900
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 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	V	390	320	-52.70	9.62	-43.08	-30.1
5640.00	V	100	293	-51.85	11.12	-40.73	-27.7
7520.00	V	-	-	-67.26	11.00	-56.26	-43.3
9400.00	V	-	-	-66.94	12.15	-54.79	-41.8
11280.00	V	-	-	-67.12	13.22	-53.90	-40.9

Table 7-21. Radiated Spurious Data (Band 2 – Mid Channel)

FCC ID: ZNFL413DL			MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset			Page 29 of 31

OPERATING FREQUENCY: 1908.50 MHz
 CHANNEL: 19185
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 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]
3817.00	V	309	59	-51.72	9.25	-42.47	-29.5
5725.50	V	107	299	-49.03	11.28	-37.74	-24.7
7634.00	V	-	-	-68.15	11.28	-56.87	-43.9
9542.50	V	-	-	-66.86	12.21	-54.65	-41.6
11451.00	V	-	-	-67.20	13.25	-53.95	-41.0

Table 7-22. Radiated Spurious Data (Band 2 – High Channel)

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset		Page 30 of 31

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LGE Portable Handset FCC ID: ZNFL413DL** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.

FCC ID: ZNFL413DL	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712050312-03-R1.ZNF	Test Dates: 11/20 - 12/18/2017	EUT Type: Portable Handset	Page 31 of 31