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MEASUREMENT REPORT FCC Part 24 LTE

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

Date of Testing:
March 18, 2013
Test Site/Location:
PCTEST Lab., Columbia, MD, USA
Test Report Serial No.:
0Y1303060458.ZNF

FCC ID :	ZNFLS720
APPLICANT:	LG ELECTRONICS MOBILECOMM U.S.A

FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s): §2; §24
EUT Type: Portable Handset
Model(s): LS720, LG-LS720, LGLS720
Test Device Serial No.: *identical prototype* [S/N: RF]
Class II Permissive Change: Please see FCC change documents.
Original Grant Date: March 21, 2013

Mode	Tx Frequency (MHz)	Emission Designator	Modulation	ERP/EIRP	
				Max. Power (W)	Max. Power (dBm)
LTE Band 25	1851.5 - 1913.5	2M70G7W	QPSK	0.222	23.47
LTE Band 25	1851.5 - 1913.5	2M68W7W	16QAM	0.167	22.24
LTE Band 25	1852.5 - 1912.5	4M47G7W	QPSK	0.311	24.93
LTE Band 25	1852.5 - 1912.5	4M75W7W	16QAM	0.190	22.80
LTE Band 25	1855 - 1910	8M94G7W	QPSK	0.296	24.71
LTE Band 25	1855 - 1910	8M91W7W	16QAM	0.230	23.61

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

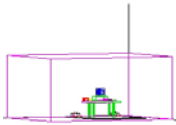


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MEASUREMENT REPORT

FCC Part 24

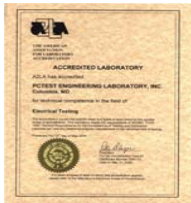


§2.1033 General Information



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 21045 USA
FCC RULE PART(S): §2; §24
BASE MODEL: LS720
FCC ID: ZNFLS720
FCC CLASSIFICATION: PCS Licensed Transmitter Held to Ear (PCE)
FREQUENCY TOLERANCE: ±0.00025 % (2.5 ppm)
Test Device Serial No.: RF Production Pre-Production Engineering
DATE(S) OF TEST: March 18, 2013
TEST REPORT S/N: 0Y1303060458.ZNF

Test Facility / Accreditations

Measurements were performed at **PCTEST Engineering Lab. located in Columbia, MD 21045, 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.
- 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.
- 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 is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (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 C63.4-2003 on February 15, 2012.

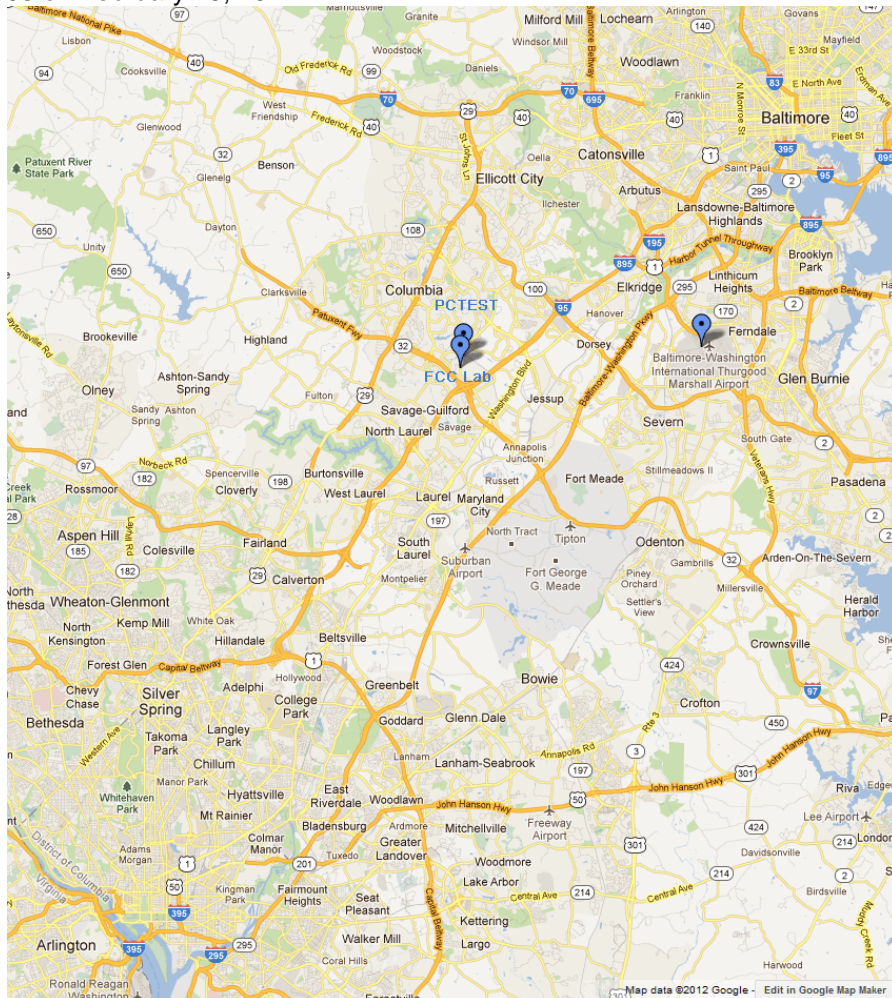


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFLS720**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA/EvDO Rev0/A (BC0, BC1, BC10), Band 25 LTE with 3/5/10 MHz BW, 802.11b/g/n WLAN, Bluetooth (1x,EDR, LE), NFC



2.3 EMI Suppression Device(s)/Modifications

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

2.4 Labeling Requirements

Per 2.925

The FCC identifier shall be permanently affixed to the equipment and shall be readily visible to the purchaser at the time of purchase.

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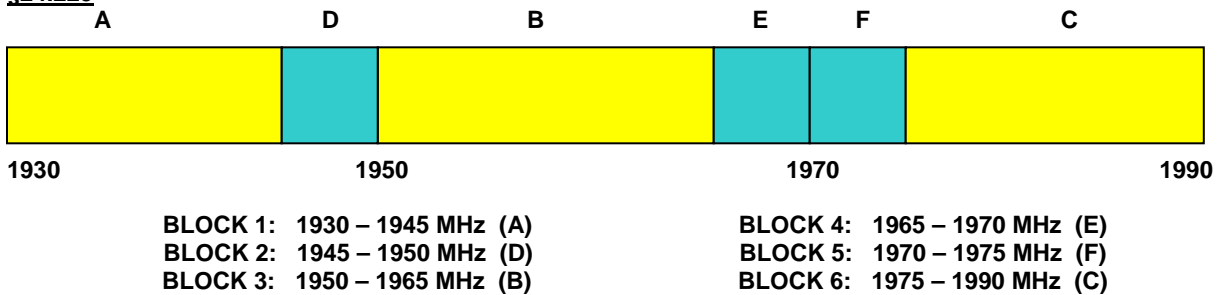
3.0 DESCRIPTION OF TESTS

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-C-2004) was used in the measurement of the **LG Portable Handset FCC ID: ZNFLS720**.

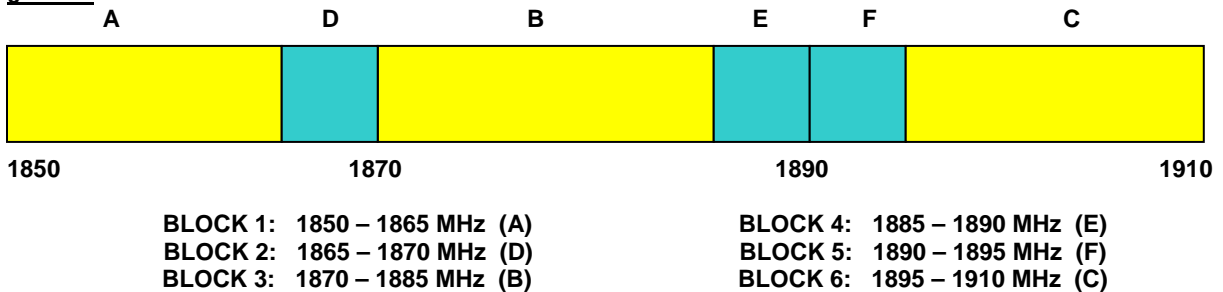
3.2 PCS - Base Frequency Blocks

§24.229



3.3 PCS - Mobile Frequency Blocks

§24.229



3.4 SVLTE



§2.1053 §22.917(a) §24.238(a) §27.53(h) RSS-132(4.5.1) RSS-133(6.5.1) RSS-139(6.5.1)

This device is capable of operating in SVLTE mode in the following cases:

	Capable Transmit Configurations	Notes
1	CDMA BC0 Voice + LTE B25	SVLTE
2	CDMA BC1 Voice + LTE B25	SVLTE
3	CDMA BC10 Voice + LTE B25	SVLTE

Table 3-1. SVLTE Transmit Configurations

All modes of SVLTE operation were investigated. It was determined that this device did not produce any intermodulation products that were within 25dB of the spurious emission limit so the emissions are not reported herein.

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3.5 Radiated Power and Radiated Spurious Emissions

§2.1053

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. An ETS Lindgren Model 2188 raised turntable is used for radiated measurement. It is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. A 78cm high PVC support structure is placed on top of the turntable. A ¾" (~1.9cm) sheet of high density polyethylene is used as the table top and is placed on top of the PVC supports to bring the total height of the table to 80cm.



The equipment under test was transmitting while connected to its integral antenna and is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. 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.

Per the guidance of ANSI/TIA-603-C-2004, a half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

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

Where, P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_g \text{ [dBm]} - \text{cable loss [dB]}$.

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 $43 + 10\log_{10}(\text{Power}_{\text{[Watts]}})$ specified in 22.917(a) and 24.238(a).

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4.0 TEST EQUIPMENT CALIBRATION DATA



Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	LTx1	Licensed Transmitter Cable Set	1/17/2013	Annual	1/17/2014	N/A
-	LTx2	Licensed Transmitter Cable Set	1/17/2013	Annual	1/17/2014	N/A
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	7/10/2012	Annual	7/10/2013	N/A
Agilent	8447D	Broadband Amplifier	5/8/2012	Annual	5/8/2013	1937A03348
Agilent	E8267C	Vector Signal Generator	10/10/2011	Biennial	10/10/2013	US42340152
Agilent	N5183A	MXG Analog Signal Generator	1/6/2013	Annual	1/6/2014	MY50141900
Agilent	N9020A	MXA Signal Analyzer	10/9/2012	Annual	10/9/2013	US46470561
Agilent	N9030A	PXA Signal Analyzer (44GHz)	1/11/2013	Annual	1/11/2014	MY52350166
Agilent	N9038A	MXE EMI Receiver	12/8/2012	Annual	12/8/2013	MY51210133
Anritsu	MA2411B	Pulse Sensor	9/19/2012	Annual	9/19/2013	1027293
Anritsu	ML2495A	Power Meter	10/11/2012	Annual	10/11/2013	1039008
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	7/22/2011	Biennial	7/22/2013	125518
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	5/30/2012	Biennial	5/30/2014	135427
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	11/7/2012	Biennial	11/7/2014	128338
Mini-Circuits	SSG-4000HP	USB Synthesized Signal Generator	N/A		N/A	11208010032
Mini-Circuits	TVA-11-422	RF Power Amp	N/A		N/A	QA1303002
Mini-Circuits	VHF-1200+	High Pass Filter	1/17/2013	Annual	1/17/2014	30923
Mini-Circuits	VHF-3100+	High Pass Filter	1/17/2013	Annual	1/17/2014	30841
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	10/7/2011	Biennial	10/7/2013	103962
Rohde & Schwarz	ESU26	EMI Test Receiver	2/25/2013	Annual	2/25/2014	100342
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	6/26/2012	Annual	6/26/2013	100071
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	11/14/2011	Biennial	11/14/2013	9105-2404
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
Sunol	DRH-118	Horn Antenna (1-18 GHz)	6/17/2011	Biennial	6/17/2013	A042511

Table 4-1. Test Equipment

Note:

Equipment used for signaling with a calibration date of "N/A" shown in this list was only used for maintaining a link between the piece of equipment and the EUT. This equipment was not used to make direct calibrated measurements.

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5.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz
 G = Phase Modulation
 7 = Quantized/Digital Info
 D = Amplitude/Angle Modulated

16QAM Modulation



Emission Designator = 8M45W7D

LTE BW = 8.45 MHz
 W = Amplitude/Angle Modulated
 7 = Quantized/Digital Info
 D = Combination (Audio/Data)

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).

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6.0 TEST RESULTS

6.1 Summary



Company Name: LG Electronics MobileComm U.S.A
 FCC ID: ZNFLS720
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Result	Reference
TRANSMITTER MODE (TX)					
24.232(c)	Equivalent Isotropic Radiated Power (Band 25)	< 2 Watts max. EIRP	RADIATED	PASS	Section 0
2.1053 24.238(a)	Undesirable Emissions	> 43 + 10log ₁₀ (P[Watts]) for all out-of-band emissions		PASS	Section 6.2

Table 6-1. Summary of Test Results

Note:

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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Equivalent Isotropic Radiated Power (EIRP)



§24.232(c) RSS-133(6.4)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Battery	RB Size/Offset	Substitute Level [dBm]	Antenna Gain [dBi]	Pol [H/V]	EIRP [dBm]	EIRP [Watts]	Margin [dB]
1851.50	3	QPSK	Standard	1 / 0	13.88	9.59	H	23.47	0.222	-9.54
1882.50	3	QPSK	Standard	1 / 0	13.29	9.53	H	22.82	0.191	-10.19
1913.50	3	QPSK	Standard	1 / 14	13.47	9.47	H	22.94	0.197	-10.07
1851.50	3	16-QAM	Standard	1 / 0	12.65	9.59	H	22.24	0.167	-10.77
1882.50	3	16-QAM	Standard	1 / 0	12.15	9.53	H	21.68	0.147	-11.33
1913.50	3	16-QAM	Standard	1 / 14	12.59	9.47	H	22.06	0.161	-10.95
1852.50	5	QPSK	Standard	1 / 0	15.34	9.59	H	24.93	0.311	-8.08
1882.50	5	QPSK	Standard	1 / 0	14.37	9.53	H	23.90	0.245	-9.11
1912.50	5	QPSK	Standard	1 / 0	13.79	9.47	H	23.26	0.212	-9.75
1852.50	5	16-QAM	Standard	1 / 0	13.21	9.59	H	22.80	0.190	-10.21
1882.50	5	16-QAM	Standard	1 / 0	13.25	9.53	H	22.78	0.189	-10.23
1912.50	5	16-QAM	Standard	1 / 0	12.59	9.47	H	22.06	0.161	-10.95
1855.00	10	QPSK	Standard	1 / 0	15.12	9.59	H	24.71	0.296	-8.30
1882.50	10	QPSK	Standard	1 / 49	13.55	9.53	H	23.08	0.203	-9.93
1910.00	10	QPSK	Standard	1 / 0	13.89	9.47	H	23.36	0.217	-9.65
1855.00	10	16-QAM	Standard	1 / 0	14.02	9.59	H	23.61	0.230	-9.40
1882.50	10	16-QAM	Standard	1 / 49	12.51	9.53	H	22.04	0.160	-10.97
1910.00	10	16-QAM	Standard	1 / 0	12.98	9.47	H	22.45	0.176	-10.56

Table 6-2. EIRP Data (Band 25)

NOTES:

1. This device was tested under all bandwidths, and RB configurations, and modulations. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB QPSK configurations.
2. This unit was tested with its standard battery. The NFC antenna is integrated into the standard battery and is the only battery available from the manufacturer for this device. All spurious emissions were investigated and the worst case emissions were found with the EUT powered by this battery.
3. The worst case test configuration was found in the horizontal setup.

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6.2 Band 25 Radiated Spurious Emissions

§2.1053 §24.238(a) RSS-133(6.5.1)

Field Strength of SPURIOUS Radiation



OPERATING FREQUENCY: 1852.50 MHz
 MEASURED OUTPUT POWER: 24.93 dBm = 0.311 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 37.93 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
3705.00	-50.25	8.40	-41.85	H	66.78
5557.50	-55.16	10.63	-44.54	H	69.46
7410.00	-50.50	11.84	-38.67	H	63.60
9262.50	-54.16	13.29	-40.87	H	65.80
11115.00	-46.28	13.50	-32.78	H	57.71
12967.50	-75.46	13.68	-61.79	H	86.71

Table 6-3. Radiated Spurious Data

NOTES:

1. This device was tested under all bandwidths, and RB configurations, and modulations. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB QPSK configurations.
2. This unit was tested with its standard battery. The NFC antenna is integrated into the standard battery and is the only battery available from the manufacturer for this device. All spurious emissions were investigated and the worst case emissions were found with the EUT powered by this battery.
3. The worst case test configuration was found in the horizontal setup.

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Band 25 Radiated Spurious Measurements (continued)
§2.1053 §24.238(a) RSS-133(6.5.1)

Field Strength of SPURIOUS Radiation



OPERATING FREQUENCY: 1882.50 MHz
 MEASURED OUTPUT POWER: 23.90 dBm = 0.245 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 36.90 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
3765.00	-49.96	8.44	-41.53	H	65.42
5647.50	-52.69	10.66	-42.03	H	65.93
7530.00	-51.20	11.94	-39.26	H	63.16
9412.50	-53.07	13.23	-39.83	H	63.73
11295.00	-77.07	13.48	-63.59	H	87.49
13177.50	-75.32	13.84	-61.48	H	85.38

Table 6-4. Radiated Spurious Data

NOTES:

1. This device was tested under all bandwidths, and RB configurations, and modulations. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB QPSK configurations.
2. This unit was tested with its standard battery. The NFC antenna is integrated into the standard battery and is the only battery available from the manufacturer for this device. All spurious emissions were investigated and the worst case emissions were found with the EUT powered by this battery.
3. The worst case test configuration was found in the horizontal setup.

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Band 25 Radiated Spurious Measurements (continued)
§2.1053 §24.238(a) RSS-133(6.5.1)

Field Strength of SPURIOUS Radiation



OPERATING FREQUENCY: 1912.50 MHz
 MEASURED OUTPUT POWER: 23.26 dBm = 0.212 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 36.26 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
3825.00	-49.89	8.57	-41.32	H	64.58
5737.50	-52.85	10.69	-42.16	H	65.42
7650.00	-49.22	12.07	-37.15	H	60.41
9562.50	-52.15	13.20	-38.95	H	62.21
11475.00	-50.58	13.42	-37.16	H	60.42
13387.50	-75.24	14.04	-61.20	H	84.46

Table 6-5. Radiated Spurious Data



NOTES:

1. This device was tested under all bandwidths, and RB configurations, and modulations. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB QPSK configurations.
2. This unit was tested with its standard battery. The NFC antenna is integrated into the standard battery and is the only battery available from the manufacturer for this device. All spurious emissions were investigated and the worst case emissions were found with the EUT powered by this battery.
3. The worst case test configuration was found in the horizontal setup.

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7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFLS720** complies with all the requirements of Parts 2, 24 of the FCC rules for LTE operation only.

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