

PART 27 MEASUREMENT REPORT

Applicant Name:

LG Electronics USA, Inc.
111 Sylvan Avenue, North Building
Englewood Cliffs, NJ 07632
United States

Date of Testing:

1/19/2021 – 1/28/2021

Test Site/Location:

PCTEST Lab. Columbia, MD, USA

Test Report Serial No.:

1M2012230208-12.ZNF

FCC ID:

ZNFK420TM

APPLICANT:

LG Electronics USA, Inc.

Application Type:

Class II Permissive Change

Model:

LM-K420TM

Additional Model(s):

LMK420TM, K420TM, LM-K420MM, LMK420MM, K420MM, LM-K420PM, LMK420PM, K420PM, LG L560DL, LGL560DL, L560DL, LM-K420QM, LMK420QM, K420QM, LM-K420QM5, LMK420QM5, K420QM5, LM-K420QM6, LMK420QM6, K420QM6, LM-K420QA, LMK420QA, K420QA

EUT Type:

Portable Handset

FCC Classification:

PCS Licensed Transmitter Held to Ear (PCE)

FCC Rule Part:

27

Test Procedure(s):

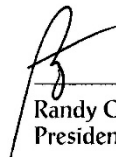
ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01

Class II Permissive Change:

Please see FCC change document

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







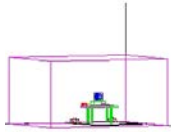
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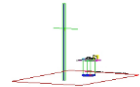
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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	ERP		EIRP	
				Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]
LTE Band 12	10 MHz	QPSK	704.0 - 711.0	0.088	19.45	0.144	21.60
		16QAM	704.0 - 711.0	0.072	18.55	0.117	20.70
		64QAM	704.0 - 711.0	0.057	17.56	0.093	19.71
	5 MHz	QPSK	701.5 - 713.5	0.088	19.47	0.145	21.62
		16QAM	701.5 - 713.5	0.071	18.49	0.116	20.64
		64QAM	701.5 - 713.5	0.051	17.06	0.083	19.21
	3 MHz	QPSK	700.5 - 714.5	0.089	19.49	0.146	21.64
		16QAM	700.5 - 714.5	0.071	18.49	0.116	20.64
		64QAM	700.5 - 714.5	0.051	17.06	0.083	19.21
	1.4 MHz	QPSK	699.7 - 715.3	0.089	19.48	0.145	21.63
		16QAM	699.7 - 715.3	0.070	18.47	0.115	20.62
		64QAM	699.7 - 715.3	0.050	17.00	0.082	19.15
LTE Band 13	10 MHz	QPSK	782.0	0.054	17.33	0.089	19.48
		16QAM	782.0	0.044	16.43	0.072	18.58
		64QAM	782.0	0.036	15.54	0.059	17.69
	5 MHz	QPSK	779.5 - 784.5	0.055	17.41	0.090	19.56
		16QAM	779.5 - 784.5	0.044	16.43	0.072	18.58
		64QAM	779.5 - 784.5	0.037	15.69	0.061	17.84
LTE Band 71	20 MHz	QPSK	673.0 - 688.0	0.068	18.33	0.112	20.48
		16QAM	673.0 - 688.0	0.058	17.65	0.095	19.80
		64QAM	673.0 - 688.0	0.047	16.75	0.078	18.90
	15 MHz	QPSK	670.5 - 690.5	0.064	18.07	0.105	20.22
		16QAM	670.5 - 690.5	0.050	16.97	0.082	19.12
		64QAM	670.5 - 690.5	0.045	16.51	0.073	18.66
	10 MHz	QPSK	668.0 - 693.0	0.065	18.14	0.107	20.29
		16QAM	668.0 - 693.0	0.055	17.39	0.090	19.54
		64QAM	668.0 - 693.0	0.045	16.55	0.074	18.70
	5 MHz	QPSK	665.5 - 695.5	0.065	18.14	0.107	20.29
		16QAM	665.5 - 695.5	0.055	17.39	0.090	19.54
		64QAM	665.5 - 695.5	0.045	16.55	0.074	18.70

Overview Table (<1GHz Bands)

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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP	
				Max. Power [W]	Max. Power [dBm]
WCDMA1700	-	Spread Spectrum	1712.4 - 1752.6	0.220	23.42
LTE Band 66/4	20 MHz	QPSK	1720.0 - 1770.0	0.188	22.73
		16QAM	1720.0 - 1770.0	0.157	21.95
		64QAM	1720.0 - 1770.0	0.126	20.99
	15 MHz	QPSK	1717.5 - 1772.5	0.177	22.48
		16QAM	1717.5 - 1772.5	0.150	21.76
		64QAM	1717.5 - 1772.5	0.114	20.58
	10 MHz	QPSK	1715.0 - 1775.0	0.180	22.54
		16QAM	1715.0 - 1775.0	0.153	21.86
		64QAM	1715.0 - 1775.0	0.115	20.62
	5 MHz	QPSK	1712.5 - 1777.5	0.183	22.62
		16QAM	1712.5 - 1777.5	0.153	21.86
		64QAM	1712.5 - 1777.5	0.117	20.67
	3 MHz	QPSK	1711.5 - 1778.5	0.180	22.55
		16QAM	1711.5 - 1778.5	0.155	21.89
		64QAM	1711.5 - 1778.5	0.114	20.56
	1.4 MHz	QPSK	1710.7 - 1779.3	0.180	22.56
		16QAM	1710.7 - 1779.3	0.152	21.81
		64QAM	1710.7 - 1779.3	0.114	20.57

Overview Table (>1GHz Bands)

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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 17025-2017 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: ZNFK420TM**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 27.

Test Device Serial No.: 23806, 22774

2.2 Device Capabilities

This device contains the following capabilities:



850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, CDMA/EvDO Rev. 0/A 800/850/1900 (BC10/BC0/BC1), 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 emissions 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 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 v03r01) were used in the measurement of the EUT.

3.2 Radiated Power and Radiated Spurious Emissions

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 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 D01 v03r01.



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

For fundamental radiated power measurements, the guidance of KDB 971168 D01 v03r01 is used to record the EUT power level that is subsequently matched via the aforementioned substitution method given in ANSI/TIA-603-E-2016.



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.

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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
Anritsu	MT8820C	Radio Communication Analyzer	N/A			6201300731
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6200901190
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Keysight Technologies	N9020A	MXA Signal Analyzer	4/29/2019	Annual	8/14/2021	MY54500644
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/10/2020	Annual	2/10/2021	102134

Table 5-1. Summary of Test Results

Notes:

1. 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.
2. 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

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz

W = Amplitude/Angle Modulated



7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

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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7.0 TEST RESULTS

7.1 Summary



Company Name: LG Electronics USA, Inc.
 FCC ID: ZNFK420TM
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): WCDMA/LTE

Test Condition	Test Description	FCC Part Section(s)	RSS Section(s)	Test Limit	Test Result	Reference
RADIATED	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 71)	27.50(b)(10)	RSS-130(4.4)	< 3 Watts max. ERP < 5 Watts max. EIRP	PASS	Section 7.2
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 12)				PASS	
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 13)	27.50(c)(10)	RSS-130(4.4)	< 3 Watts max. ERP < 5 Watts max. EIRP	PASS	
	Equivalent Isotropic Radiated Power (WCDMA)	27.50(d)(4)	RSS-139(6.5)	< 1 Watts max. EIRP	PASS	
	Equivalent Isotropic Radiated Power (LTE Band 4/66)				PASS	Section 7.3
	Radiated Spurious Emissions (LTE Band 13)	2.1053, 27.53(f)	RSS-139(6.6)	< -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	
	Radiated Spurious Emissions (LTE B4/66, B71, B12, B13 and WCDMA B4)	2.1053, 27.53	RSS-139(6.6)	> 43 + 10 log10 (P[Watts]) for all out-of-band emissions	PASS	

Table 7-1. Summary of Test Results

Notes:

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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7.3 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power 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. 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 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.

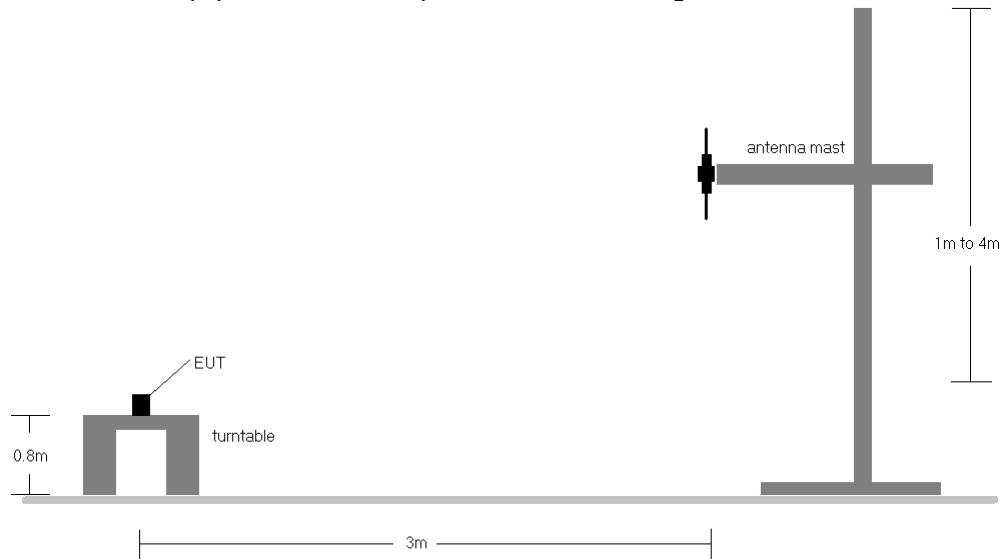


Figure 7-1. Radiated Test Setup <1GHz

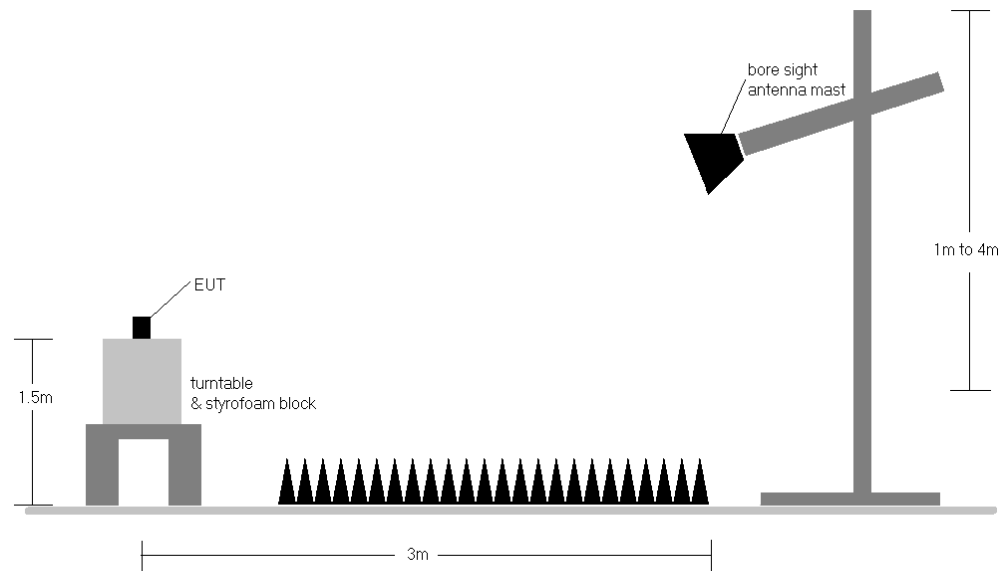






Figure 7-2. Radiated Test Setup >1GHz

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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 device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1".
- 3) This unit was tested with its standard battery
- 4) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.



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Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	EUT Pol.	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
20 MHz	QPSK	1720.0	H	X	151	14	9.41	1 / 0	13.32	22.73	0.188	30.00	-7.27
		1745.0	H	X	138	17	9.26	1 / 0	13.29	22.55	0.180	30.00	-7.45
		1770.0	H	X	143	21	9.27	1 / 0	12.18	21.45	0.140	30.00	-8.55
	64-QAM	1720.0	H	X	151	14	9.41	1 / 0	12.54	21.95	0.157	30.00	-8.05
15 MHz	QPSK	1720.0	H	X	151	14	9.41	1 / 0	11.58	20.99	0.126	30.00	-9.01
		1717.5	H	X	151	14	9.41	1 / 0	13.07	22.48	0.177	30.00	-7.52
		1745.0	H	X	138	17	9.26	1 / 0	12.93	22.19	0.166	30.00	-7.81
	64-QAM	1720.0	H	X	151	14	9.41	1 / 0	11.58	20.99	0.126	30.00	-9.01
10 MHz	QPSK	1717.5	H	X	143	21	9.27	1 / 0	11.81	21.08	0.128	30.00	-8.92
		1745.0	H	X	138	17	9.26	1 / 0	12.50	21.76	0.150	30.00	-8.24
		1745.0	H	X	138	17	9.26	1 / 0	11.32	20.58	0.114	30.00	-9.42
	64-QAM	1745.0	H	X	138	17	9.26	1 / 0	11.32	20.58	0.114	30.00	-9.42
5 MHz	QPSK	1715.0	H	X	151	14	9.41	1 / 0	13.13	22.54	0.180	30.00	-7.46
		1745.0	H	X	138	17	9.26	1 / 0	12.97	22.23	0.167	30.00	-7.77
		1775.0	H	X	143	21	9.27	1 / 0	11.97	21.24	0.133	30.00	-8.76
	64-QAM	1745.0	H	X	138	17	9.26	1 / 0	12.60	21.86	0.153	30.00	-8.14
3 MHz	QPSK	1745.0	H	X	138	17	9.26	1 / 0	11.36	20.62	0.115	30.00	-9.38
		1712.5	H	X	151	14	9.41	1 / 0	13.21	22.62	0.183	30.00	-7.38
		1745.0	H	X	138	17	9.26	1 / 0	12.94	22.20	0.166	30.00	-7.80
	64-QAM	1745.0	H	X	138	17	9.26	1 / 0	11.41	20.67	0.117	30.00	-9.33
1.4 MHz	QPSK	1777.5	H	X	143	21	9.27	1 / 0	11.98	21.25	0.133	30.00	-8.75
		1745.0	H	X	138	17	9.26	1 / 0	12.63	21.89	0.155	30.00	-8.11
		1745.0	H	X	138	17	9.26	1 / 0	11.30	20.56	0.114	30.00	-9.44
	64-QAM	1745.0	H	X	138	17	9.26	1 / 0	11.31	20.57	0.114	30.00	-9.43
20 MHz	Opposite Pol.	1720.0	V	X	154.0	27.0	9.26	1 / 0	11.45	20.71	0.118	30.00	-9.29

Table 7-1. EIRP Data (LTE Band 66/4)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	EUT Pol.	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
10 MHz	QPSK	704.0	H	X	278	296	3.58	1 / 49	17.40	18.83	0.076	34.77	-15.94
		707.5	H	X	280	306	3.72	1 / 49	17.25	18.82	0.076	34.77	-15.95
		711.0	H	X	283	301	3.67	1 / 49	17.93	19.45	0.088	34.77	-15.32
	64-QAM	711.0	H	X	283	301	3.67	1 / 49	17.03	18.55	0.072	34.77	-16.22
5 MHz	QPSK	711.0	H	X	283	301	3.67	1 / 49	16.04	17.56	0.057	34.77	-17.21
		701.5	H	X	278	296	3.58	1 / 49	17.54	18.97	0.079	34.77	-15.80
		707.5	H	X	280	306	3.72	1 / 49	17.36	18.93	0.078	34.77	-15.84
	64-QAM	707.5	H	X	280	306	3.72	1 / 49	16.92	18.49	0.071	34.77	-16.28
3 MHz	QPSK	713.5	H	X	283	301	3.67	1 / 49	17.95	19.47	0.088	34.77	-15.30
		707.5	H	X	280	306	3.72	1 / 49	15.49	17.06	0.051	34.77	-17.71
		700.5	H	X	278	296	3.58	1 / 49	17.42	18.85	0.077	34.77	-15.92
	64-QAM	707.5	H	X	280	306	3.72	1 / 49	15.49	17.06	0.051	34.77	-17.71
1.4 MHz	QPSK	714.5	H	X	283	301	3.67	1 / 49	17.97	19.49	0.089	34.77	-15.28
		707.5	H	X	280	306	3.72	1 / 49	16.92	18.49	0.071	34.77	-16.28
		699.7	H	X	278	296	3.58	1 / 49	17.48	18.91	0.078	34.77	-15.86
	64-QAM	707.5	H	X	280	306	3.72	1 / 49	15.43	17.00	0.050	34.77	-17.77
10 MHz	Opposite Pol.	711.0	V	X	241	224	3.67	1 / 49	16.21	17.54	0.057	34.77	-17.23

Table 7-2. ERP Data (LTE Band 12)

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Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	EUT Pol.	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
10 MHz	QPSK	782.0	V	Z	150	183	5.79	1 / 49	13.69	17.33	0.054	34.77	-17.44
	16-QAM	782.0	V	Z	150	183	5.79	1 / 49	12.79	16.43	0.044	34.77	-18.34
	64-QAM	782.0	V	Z	150	183	5.79	1 / 49	11.90	15.54	0.036	34.77	-19.23
5 MHz	QPSK	779.5	V	Z	150	183	5.70	1 / 24	13.86	17.41	0.055	34.77	-17.36
		782.0	V	Z	150	183	5.79	1 / 24	13.76	17.40	0.055	34.77	-17.37
		784.5	V	Z	150	183	5.82	1 / 24	13.65	17.32	0.054	34.77	-17.45
	16-QAM	782.0	V	Z	150	183	5.79	1 / 24	12.79	16.43	0.044	34.77	-18.34
	64-QAM	782.0	V	Z	150	183	5.79	1 / 24	12.05	15.69	0.037	34.77	-19.08
10 MHz	Opposite Pol.	782.0	H	X	142.0	127.0	5.79	1 / 24	13.76	16.25	0.042	34.77	-18.52



Table 7-3. ERP Data (LTE Band 13)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	EUT Pol.	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
20 MHz	QPSK	673.0	V	Z	101	256	3.09	1 / 50	17.39	18.33	0.068	34.77	-16.44
		680.5	V	Z	104	357	3.19	1 / 0	17.05	18.09	0.064	34.77	-16.69
		688.0	V	Z	107	351	3.28	1 / 0	16.27	17.40	0.055	34.77	-17.37
	16-QAM	673.0	V	Z	101	256	3.09	1 / 50	16.71	17.65	0.058	34.77	-17.12
15 MHz	QPSK	673.0	V	Z	101	256	3.09	1 / 50	15.81	16.75	0.047	34.77	-18.02
		670.5	V	Z	101	256	3.09	1 / 0	17.13	18.07	0.064	34.77	-16.70
		680.5	V	Z	104	357	3.19	1 / 0	16.84	17.88	0.061	34.77	-16.90
	16-QAM	680.5	V	Z	104	357	3.19	1 / 0	15.93	16.97	0.050	34.77	-17.81
	64-QAM	680.5	V	Z	104	357	3.19	1 / 0	15.47	16.51	0.045	34.77	-18.27
10 MHz	QPSK	688.0	V	Z	101	256	3.09	1 / 0	17.20	18.14	0.065	34.77	-16.63
		680.5	V	Z	104	357	3.19	1 / 0	16.89	17.93	0.062	34.77	-16.85
		693.0	V	Z	107	351	3.28	1 / 0	16.20	17.33	0.054	34.77	-17.44
	16-QAM	680.5	V	Z	104	357	3.19	1 / 0	16.35	17.39	0.055	34.77	-17.39
5 MHz	QPSK	680.5	V	Z	104	357	3.19	1 / 0	15.51	16.55	0.045	34.77	-18.23
		665.5	V	Z	101	256	3.09	1 / 0	17.20	18.14	0.065	34.77	-16.63
		680.5	V	Z	104	357	3.19	1 / 0	16.95	17.99	0.063	34.77	-16.79
	16-QAM	680.5	V	Z	104	357	3.19	1 / 0	16.33	17.46	0.056	34.77	-17.31
	64-QAM	680.5	V	Z	104	357	3.19	1 / 0	16.35	17.39	0.055	34.77	-17.39
20 MHz	Opposite Pol.	673.0	H	X	142	241	3.09	1 / 50	17.20	17.40	0.055	34.77	-17.37

Table 7-4. ERP Data (LTE Band 71)

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	149	10	13.52	9.46	22.98	0.199	30.00	-7.02
1732.60	WCDMA1700	H	142	27	14.09	9.34	23.43	0.220	30.00	-6.57
1752.60	WCDMA1700	H	185	300	12.50	9.24	21.74	0.149	30.00	-8.26
1732.60	WCDMA1700	V	166	54	13.63	9.34	22.97	0.198	30.00	-7.03

Table 7-5. EIRP Data (WCDMA AWS)

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7.4 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 RMS 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

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Test Setup

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

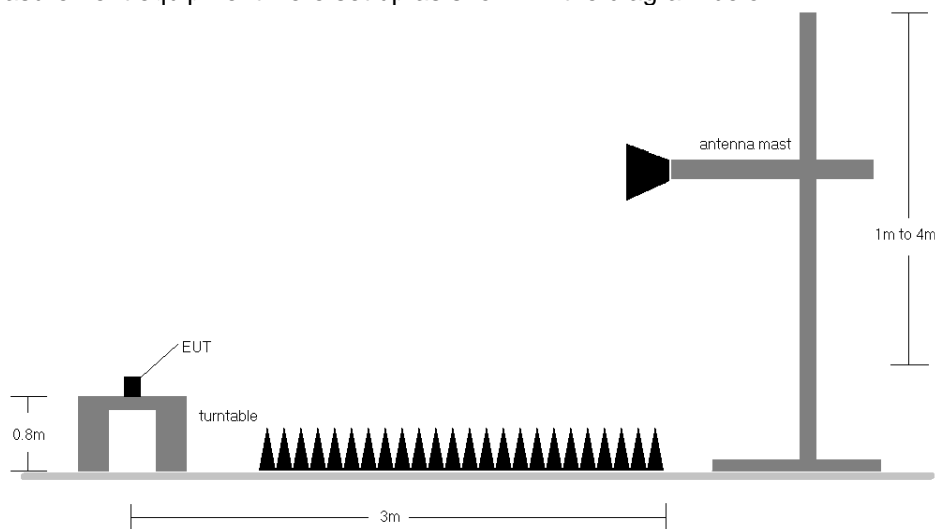


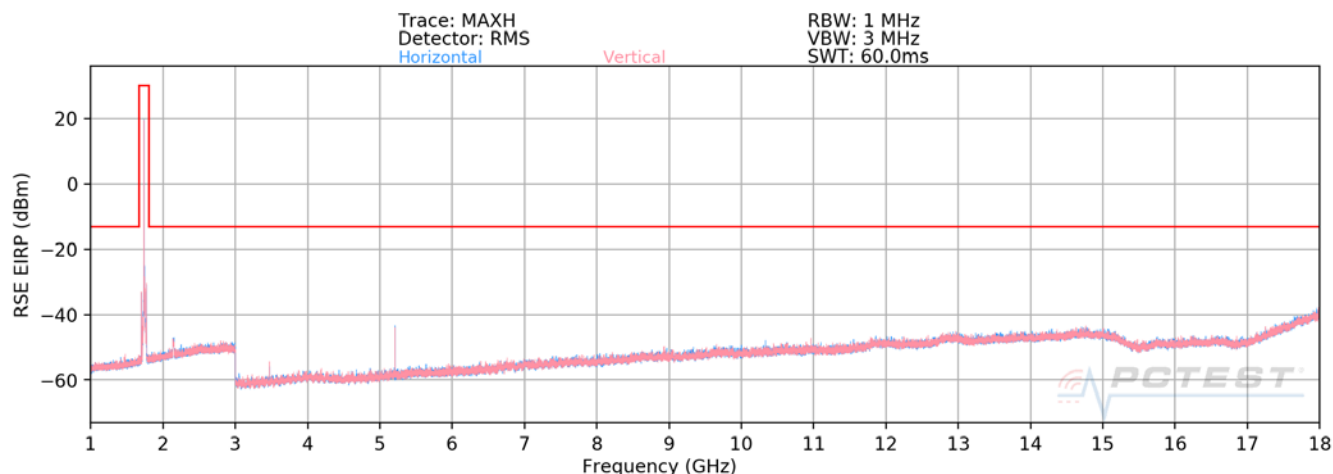
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

- 1) Field strengths are calculated using the Measurement quantity conversions in KDB 971168 Section 5.8.4.
 - a) $E(\text{dB}\mu\text{V/m}) = \text{Measured amplitude level (dBm)} + 107 + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$
 - b) $\text{EIRP (dBm)} = E(\text{dB}\mu\text{V/m}) + 20\log D - 104.8$; where D is the measurement distance in meters.
- 2) 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.
- 3) This device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1".
- 4) This unit was tested with its standard battery.
- 5) 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.
- 6) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 7) 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.
- 8) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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LTE Band 66/4



Plot 7-1. Radiated Spurious Plot (LTE Band 66/4)

Bandwidth (MHz):	20
Frequency (MHz):	1720.0
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3440.0	V	312	49	-73.49	5.48	38.99	-56.27	-13.00	-43.27
5160.0	V	107	75	-71.98	7.69	42.71	-52.55	-13.00	-39.55
6880.0	V	-	-	-79.85	10.93	38.08	-57.18	-13.00	-44.18
8600.0	V	-	-	-80.60	13.03	39.43	-55.83	-13.00	-42.83

Table 7-2. Radiated Spurious Data (LTE Band 66/4 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	1745.0
RB / Offset:	1 / 50



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3490.0	V	180	231	-76.24	5.34	36.10	-59.16	-13.00	-46.16
5235.0	V	100	76	-71.33	7.14	42.81	-52.45	-13.00	-39.45
6980.0	V	-	-	-79.47	10.72	38.25	-57.01	-13.00	-44.01
8725.0	V	-	-	-80.66	13.16	39.50	-55.76	-13.00	-42.76

Table 7-3. Radiated Spurious Data (LTE Band 66/4 – Mid Channel)

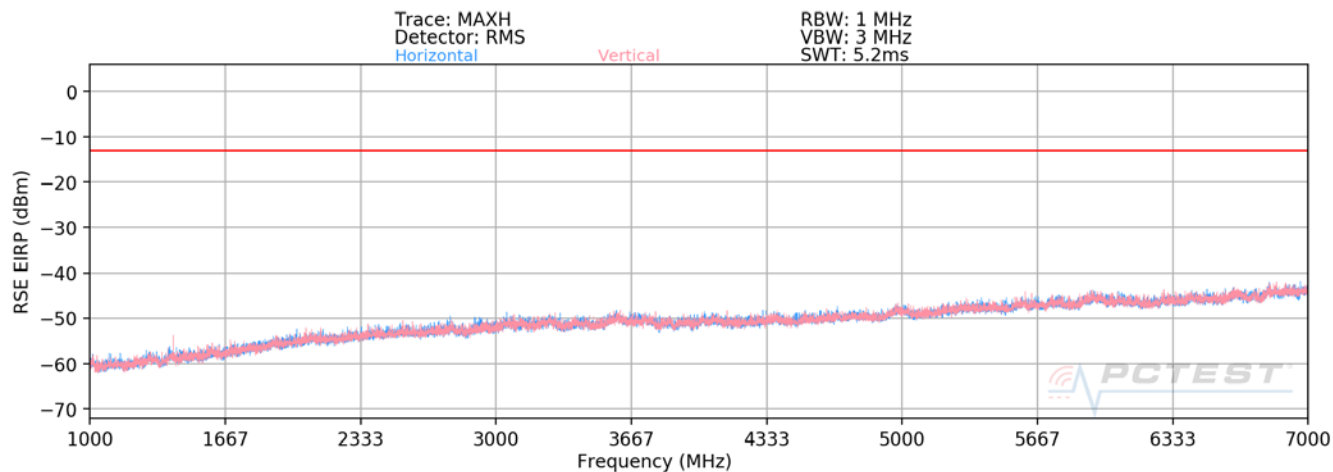
FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Technical Manager
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Bandwidth (MHz):	20								
Frequency (MHz):	1770.0								
RB / Offset:	1 / 50								
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3540.00	V	153	230	-66.75	5.51	45.76	-49.49	-13.00	-36.49
5310.00	V	100	106	-70.45	7.32	43.87	-51.39	-13.00	-38.39
7080.00	V	-	-	-79.92	11.53	38.61	-56.65	-13.00	-43.65
8850.00	V	-	-	-80.15	13.69	40.54	-54.72	-13.00	-41.72

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

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LTE Band 71



Plot 7-2. Radiated Spurious Plot (LTE Band 71)

Bandwidth (MHz):	20
Frequency (MHz):	673.0
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1346.0	H	214	170	-73.82	-1.44	31.74	-63.52	-13.00	-50.52
2019.0	H	110	6	-68.30	3.39	42.08	-53.17	-13.00	-40.17
2692.0	H	-	-	-77.05	5.50	35.45	-59.81	-13.00	-46.81
3365.0	H	-	-	-77.43	7.01	36.58	-58.68	-13.00	-45.68

Table 7-5. Radiated Spurious Data (LTE Band 71 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	680.5
RB / Offset:	1 / 50



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1361.0	H	169	176	-74.84	-0.94	31.22	-64.04	-13.00	-51.04
2041.5	H	194	154	-68.43	3.35	41.92	-53.34	-13.00	-40.34
2722.0	H	-	-	-77.23	6.08	35.84	-59.41	-13.00	-46.41
3402.5	H	-	-	-77.42	7.42	37.00	-58.26	-13.00	-45.26

Table 7-6. Radiated Spurious Data (LTE Band 71 – Mid Channel)

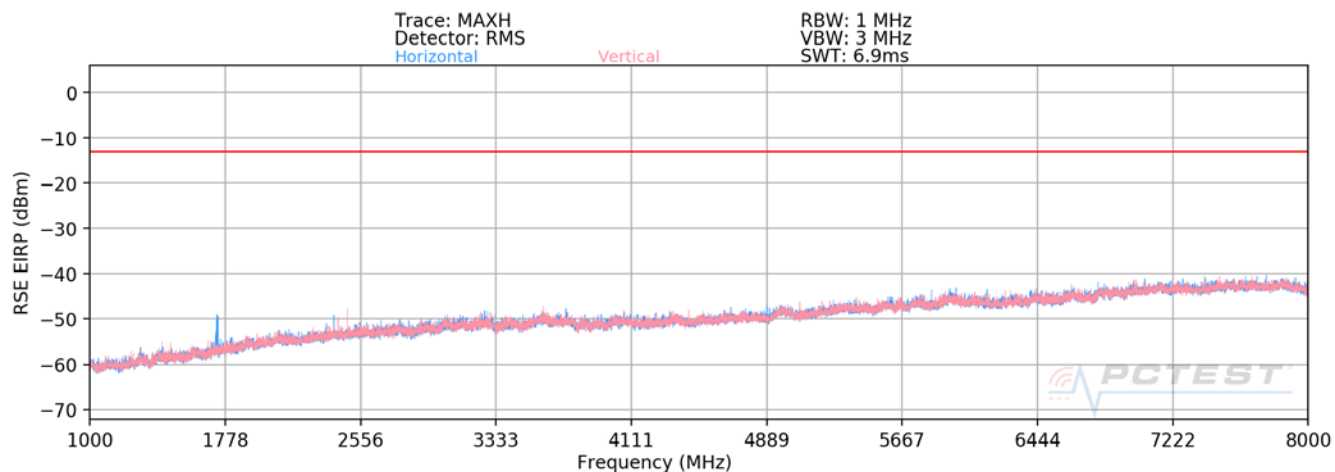
FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Technical Manager
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Bandwidth (MHz):	20								
Frequency (MHz):	688.0								
RB / Offset:	1 / 50								
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1376.0	H	211	160	-74.21	-0.41	32.38	-62.88	-13.00	-49.88
2064.0	H	138	174	-68.21	4.08	42.87	-52.39	-13.00	-39.39
2752.0	H	-	-	-77.68	6.27	35.59	-59.66	-13.00	-46.66
3440.0	H	-	-	-77.82	7.66	36.84	-58.42	-13.00	-45.42

Table 7-7. Radiated Spurious Data (LTE Band 71 – High Channel)

FCC ID: ZNFK420TM	 PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	 LG	Approved by: Technical Manager
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LTE Band 12



Plot 7-3. Radiated Spurious Plot (LTE Band 12)

Bandwidth (MHz):	10
Frequency (MHz):	704.0
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1408.0	H	-	-	-77.12	0.39	30.27	-64.99	-13.00	-51.99
2112.0	H	-	-	-77.19	3.94	33.75	-61.50	-13.00	-48.50

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

Bandwidth (MHz):	10
Frequency (MHz):	707.5
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1415.0	H	158	299	-77.00	0.40	30.40	-64.85	-13.00	-51.85
2122.5	H	-	-	-77.26	3.76	33.50	-61.76	-13.00	-48.76
2830.0	H	-	-	-77.39	5.84	35.46	-59.80	-13.00	-46.80

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

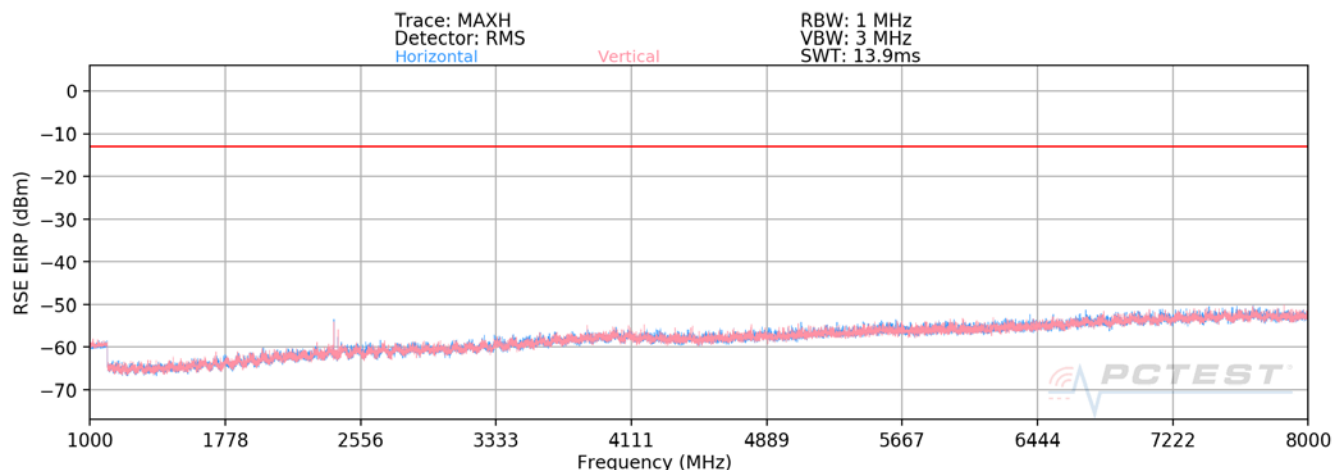
Bandwidth (MHz):	10
Frequency (MHz):	711.0
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1422.0	H	144	5	-76.65	0.23	30.58	-64.68	-13.00	-51.68
2133.0	H	-	-	-77.17	3.61	33.44	-61.81	-13.00	-48.81
2844.0	H	-	-	-77.31	5.80	35.49	-59.77	-13.00	-46.77

Table 7-10. Radiated Spurious Data (LTE Band 12 – High Channel)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Technical Manager
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LTE Band 13



Plot 7-4. Radiated Spurious Plot (LTE Band 13)

Bandwidth (MHz):	5
Frequency (MHz):	779.5
RB / Offset:	1 / 12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1559.0	V	154	210	-74.91	-7.51	24.58	-70.68	-40.00	-30.68
2338.5	V	166	222	-64.63	-3.99	38.38	-56.88	-13.00	-43.88
3118.0	V	-	-	-76.49	-2.17	28.34	-66.92	-13.00	-53.92
3897.5	V	-	-	-77.40	0.52	30.12	-65.14	-13.00	-52.14
4677.0	V	-	-	-77.76	1.20	30.44	-64.82	-13.00	-51.82

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

Bandwidth (MHz):	5
Frequency (MHz):	782.0
RB / Offset:	1 / 12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1564.0	V	140	199	-74.55	-7.48	24.97	-70.29	-40.00	-30.29
2346.0	V	172	221	-63.67	-3.93	39.40	-55.86	-13.00	-42.86
3128.0	V	-	-	-77.21	-2.13	27.66	-67.60	-13.00	-54.60
3910.0	V	-	-	-77.07	0.72	30.65	-64.60	-13.00	-51.60
4692.0	V	-	-	-77.77	1.13	30.36	-64.90	-13.00	-51.90



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

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Technical Manager
Test Report S/N: 1M2012230208-12.ZNF	Test Dates: 1/19/2021 – 1/28/2021	EUT Type: Portable Handset		Page 24 of 28

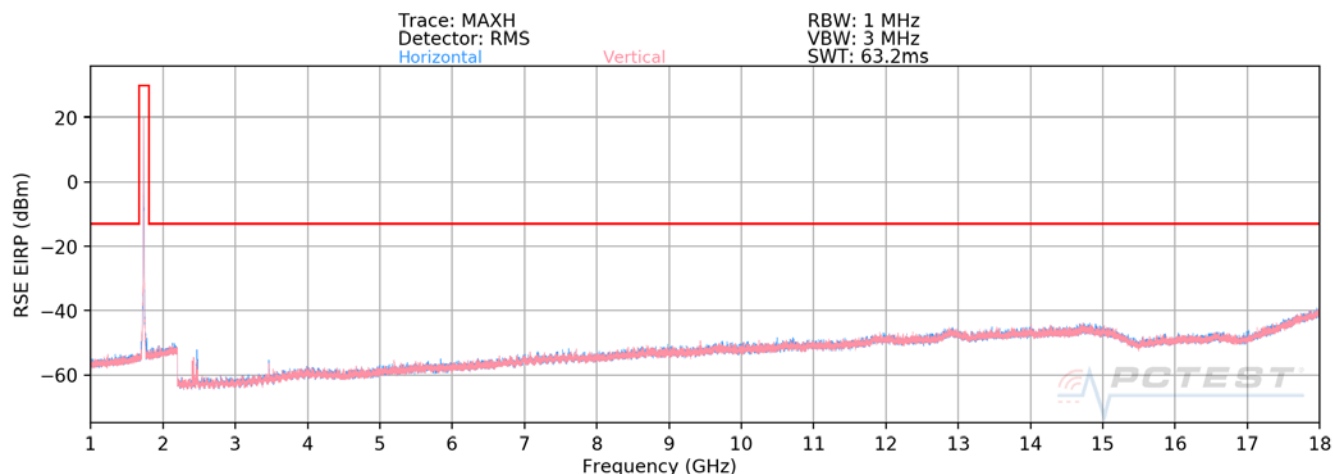
Bandwidth (MHz):	5
Frequency (MHz):	784.5
RB / Offset:	1 / 12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1569.0	V	155	173	-74.37	-7.47	25.16	-70.09	-40.00	-30.09
2353.5	V	170	213	-64.30	-3.86	38.84	-56.41	-13.00	-43.41
3138.0	V	-	-	-77.61	-2.04	27.35	-67.91	-13.00	-54.91
3922.5	V	-	-	-77.19	0.90	30.71	-64.55	-13.00	-51.55
4707.0	V	-	-	-77.37	1.10	30.73	-64.53	-13.00	-51.53

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

FCC ID: ZNFK420TM	 PCTEST [™] Proud to be part of element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	 LG	Approved by: Technical Manager
Test Report S/N: 1M2012230208-12.ZNF	Test Dates: 1/19/2021 – 1/28/2021	EUT Type: Portable Handset		Page 25 of 28

WCDMA AWS



Plot 7-5. Radiated Spurious Plot (WCDMA AWS)

Mode:	WCDMA RMC
Channel:	1312
Frequency (MHz):	1712.4

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3424.8	V	101	100	-74.54	-1.19	31.27	-63.99	-13.00	-50.99
5137.2	V	-	-	-78.09	2.45	31.36	-63.90	-13.00	-50.90
6849.6	V	-	-	-80.05	6.73	33.68	-61.58	-13.00	-48.58
8562.0	V	-	-	-80.71	9.55	35.84	-59.42	-13.00	-46.42

7-14. Radiated Spurious Data (WCDMA AWS – Low Channel)

Mode:	WCDMA RMC
Channel:	1413
Frequency (MHz):	1732.6



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3465.2	V	100	88	-71.11	-1.09	34.80	-60.46	-13.00	-47.46
5197.8	V	-	-	-77.84	2.34	31.50	-63.76	-13.00	-50.76
6930.4	V	-	-	-79.80	7.05	34.25	-61.01	-13.00	-48.01
8663.0	V	-	-	-81.03	10.04	36.01	-59.25	-13.00	-46.25

Table 7-15. Radiated Spurious Data (WCDMA AWS – Mid Channel)

FCC ID: ZNFK420TM	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2012230208-12.ZNF	Test Dates: 1/19/2021 – 1/28/2021	EUT Type: Portable Handset		Page 26 of 28



Mode:	WCDMA RMC								
Channel:	1513								
Frequency (MHz):	1752.6								
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3505.2	V	101	94	-73.06	-0.78	33.16	-62.10	-13.00	-49.10
5257.8	V	-	-	-78.37	2.74	31.37	-63.89	-13.00	-50.89
7010.4	V	-	-	-79.45	7.08	34.63	-60.62	-13.00	-47.62
8763.0	V	-	-	-80.88	10.50	36.62	-58.64	-13.00	-45.64

Table 7-16. Radiated Spurious Data (WCDMA AWS – High Channel)

FCC ID: ZNFK420TM	 PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	 LG	Approved by: Technical Manager
Test Report S/N: 1M2012230208-12.ZNF	Test Dates: 1/19/2021 – 1/28/2021	EUT Type: Portable Handset	Page 27 of 28	

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset** **FCC ID: ZNFK420TM** complies with all the requirements of Part 27 of the FCC rules.

FCC ID: ZNFK420TM	 PCTEST [™] Proud to be part of element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	 LG	Approved by: Technical Manager
Test Report S/N: 1M2012230208-12.ZNF	Test Dates: 1/19/2021 – 1/28/2021	EUT Type: Portable Handset		Page 28 of 28