

**MEASUREMENT REPORT**  
**FCC Part 22 & 90****Applicant Name:**LG Electronics USA, Inc.  
1000 Sylvan Avenue  
Englewood Cliffs, NJ 07632  
United States**Date of Testing:**

8/21 - 9/4/2018

**Test Site/Location:**

PCTEST Lab. Columbia, MD, USA

**Test Report Serial No.:**

1M1808210167-04.ZNF

**FCC ID:****ZNFQ910QM****APPLICANT:****LG Electronics USA, Inc.****Application Type:**

Class II Permissive Change

**Model:**

LM-Q910QM

**Additional Model(s):**

LMQ910QM, Q910QM, LM-Q910UM, LMQ910UM, Q910UM

**EUT Type:**

Portable Handset

**FCC Classification:**

PCS Licensed Transmitter Held to Ear (PCE)

**FCC Rule Part:**

§2.1049, §22(H), §90.691

**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.

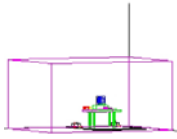
  
Randy Ortanez  
President

|                                                |                                                                                                                                               |                                                                                       |                                        |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> ZNFQ910QM                       |  <b>MEASUREMENT REPORT</b><br>(CLASS II PERMISSIVE CHANGE) |  | <b>Approved by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>1M1808210167-04.ZNF | <b>Test Dates:</b><br>8/21 - 9/4/2018                                                                                                         | <b>EUT Type:</b><br>Portable Handset                                                  | Page 1 of 16                           |

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## MEASUREMENT REPORT

### FCC Part 22(H) & 90



| Mode        | Tx Frequency (MHz) | Measurement | Max. Power (W) | Max. Power (dBm) | Modulation |
|-------------|--------------------|-------------|----------------|------------------|------------|
| LTE Band 26 | 821.5              | ERP         | 0.060          | 17.78            | QPSK       |
| LTE Band 26 | 821.5              | ERP         | 0.044          | 16.45            | 16-QAM     |
| LTE Band 26 | 821.5              | ERP         | 0.033          | 15.19            | 64-QAM     |

#### EUT Overview

|                                                |                                                                                                                                                |                                      |                                                                                       |                                        |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Test Report S/N:</b><br>1M1808210167-04.ZNF | <b>Test Dates:</b><br>8/21 - 9/4/2018                                                                                                          | <b>EUT Type:</b><br>Portable Handset |                                                                                       | Page 3 of 16                           |

## 1.0 INTRODUCTION

### 1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

### 1.2 PCTEST Test Location

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

### 1.3 Test Facility / Accreditations

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

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

|                                         |                                                                                     |                                                    |                                                                                       |                                 |
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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFQ910QM**. 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 22(H) and 90.691.

**Test Device Serial No.:** 19900, 19827, 19810

### 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n/ac WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE), NFC

### 2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated tests.

### 2.4 EMI Suppression Device(s)/Modifications

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

|                                                |                                                                                     |                                                            |                                                                                       |                                        |
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## 3.0 DESCRIPTION OF TESTS

### 3.1 Evaluation Procedure

The measurement procedures described in the 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

**\$2.1053, \$90.635, \$90.691**

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

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  $43 + 10\log_{10}(\text{Power [Watts]})$  specified in 90.691.

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.

|                                         |                                                                                                                                               |                               |                                                                                       |                                 |
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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  $U_{\text{CISPR}}$  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) |
|-------------------------------|----------------------------------|
| Radiated Disturbance (<1GHz)  | 4.98                             |
| Radiated Disturbance (>1GHz)  | 5.07                             |
| Radiated Disturbance (>18GHz) | 5.09                             |

|                                         |                                                                                                                                                |                               |                                                                                       |                                 |
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## 5.0 TEST EQUIPMENT CALIBRATION DATA

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

| Manufacturer    | Model         | Description                          | Cal Date   | Cal Interval | Cal Due    | Serial Number |
|-----------------|---------------|--------------------------------------|------------|--------------|------------|---------------|
| Agilent         | N9030A        | PXA Signal Analyzer (44GHz)          | 5/25/2018  | Annual       | 5/25/2019  | MY52350166    |
| Com-Power       | AL-130        | 9kHz - 30MHz Loop Antenna            | 10/10/2017 | Biennial     | 10/10/2019 | 121034        |
| ETS Lindgren    | 3117          | 1-18 GHz DRG Horn (Medium)           | 12/1/2016  | Biennial     | 12/1/2018  | 125518        |
| ETS-Lindgren    | 3164-10       | Quad Ridge Horn 400MHz - 10000MHz    | 12/14/2016 | Biennial     | 12/14/2018 | 166283        |
| Huber + Suhner  | Sucoflex 102A | 40GHz Radiated Cable Set             | 1/23/2018  | Annual       | 1/23/2019  | 251425001     |
| Rohde & Schwarz | CMW500        | Radio Communication Tester           | 11/3/2017  | Annual       | 11/3/2018  | 100976        |
| Rohde & Schwarz | ESU40         | EMI Test Receiver (40GHz)            | 8/9/2018   | Annual       | 8/9/2019   | 100348        |
| Rohde & Schwarz | TS-PR8        | Preamplifier-Antenna SYS; 30MHz-8GHz | 10/19/2017 | Annual       | 10/19/2018 | 102324        |
| Rohde & Schwarz | TC-TA18       | Cross-Pol Antenna 400MHz-18GHz       | 10/30/2017 | Annual       | 10/30/2018 | 101058        |
| Rohde & Schwarz | SFUNIT-Rx     | Shielded Filter Unit                 | 6/18/2018  | Annual       | 6/18/2019  | 102134        |
| Schwarzbeck     | UHA 9105      | Dipole Antenna (400 - 1GHz) Rx       | 4/30/2018  | Biennial     | 4/30/2020  | 9105-2404     |
| Seekonk         | NC-100        | Torque Wrench 5/16", 8" lbs          | N/A        |              |            | 43961         |
| Sunol           | JB5           | Bi-Log Antenna (30M - 5GHz)          | 4/19/2018  | Biennial     | 4/19/2020  | A051107       |

**Table 5-1. Test Equipment**

|                                                |                                                                                                                                                      |                                      |                                                                                       |                                        |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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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

#### 16QAM 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 2<sup>nd</sup> 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: ZNFQ910QM  
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)  
 Mode(s): LTE  
 Band: Band 26

| FCC Part Section(s) | Test Description                   | Test Limit                                                                                                                                                                               | Test Condition | Test Result | Reference   |
|---------------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|-------------|
| 22.913(a.2)         | Effective Radiated Power (Band 26) | < 7 Watts max. ERP                                                                                                                                                                       | RADIATED       | PASS        | Section 7.2 |
| 2.1053<br>90.691    | Radiated Spurious Emissions        | > 43 + log <sub>10</sub> (P[Watts]) for all outof-band emissions except > 50 + 10log <sub>10</sub> (P[Watts]) at Band Edge and for all out-ofband emissions within 37.5kHz of Block Edge |                |             | Section 7.3 |

**Table 7-1. Summary of Test Results**

#### Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.

|                                         |                                                                                     |                                                    |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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## 7.2 Radiated Power (ERP)

§22.913(a.2) §90.542

### Test Overview

Effective Radiated Power (ERP) 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

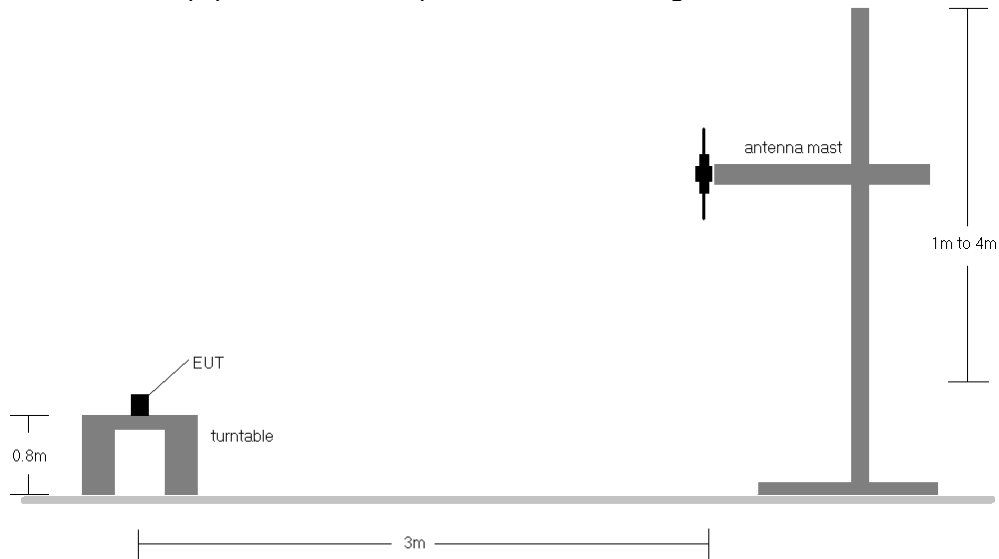
### Test Settings

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**

## 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.

| 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] |
|-----------------|-------------------------|--------|-----------------|---------------------|----------------------------|----------------|------------------------|-----------------|--------------|-------------|-----------------|-------------|
| 821.50          | 15                      | QPSK   | H               | 150                 | 5                          | 1 / 74         | 18.44                  | 1.49            | <b>17.78</b> | 0.060       | 38.45           | -20.67      |
| 821.50          | 15                      | 16-QAM | H               | 150                 | 5                          | 1 / 74         | 17.11                  | 1.49            | <b>16.45</b> | 0.044       | 38.45           | -22.00      |
| 821.50          | 15                      | 64-QAM | H               | 150                 | 5                          | 1 / 74         | 15.85                  | 1.49            | <b>15.19</b> | 0.033       | 38.45           | -23.26      |

**Table 7-1. ERP Data (Band 26)**

|                                                |                                               |                                                           |           |                                        |
|------------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|-----------|----------------------------------------|
| FCC ID: ZNFQ910QM                              | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>MEASUREMENT REPORT</b><br>(CLASS II PERMISSIVE CHANGE) | <b>LG</b> | <b>Approved by:</b><br>Quality Manager |
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## 7.3 Radiated Spurious Emissions Measurements

### §2.1053 §90.691 Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

### Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

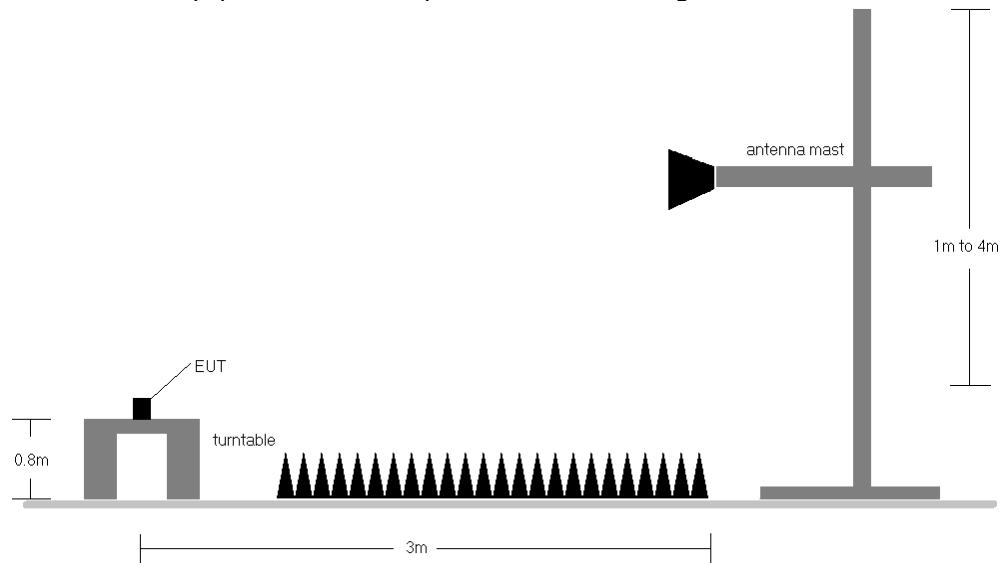
### Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW  $\geq 3 \times$  RBW
3. Span = 1.5 times the OBW
4. No. of sweep points  $\geq 2 \times$  span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

|                                                |                                                                                                                                                      |                                      |                                                                                       |                                        |
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## Test Setup

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



**Figure 7-2. Test Instrument & Measurement Setup**

## Test Notes

1. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
2. This unit was tested with its standard battery.
3. 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.
4. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

|                                         |                                               |                                                    |    |                                 |
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OPERATING FREQUENCY: 814.70 MHz  
 CHANNEL: 26697  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 1.4 MHz  
 DISTANCE: 3 meters  
 LIMIT: -13.00 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] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------------|
| 1629.40         | H               | -                   | -                          | -71.83                           | 4.77                          | -67.07                        | -54.1       |
| 2444.10         | H               | -                   | -                          | -68.10                           | 4.94                          | -63.15                        | -50.2       |

Table 7-2. Radiated Spurious Data (LTE Band 26 – Low Channel)

OPERATING FREQUENCY: 823.30 MHz  
 CHANNEL: 26783  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 1.4 MHz  
 DISTANCE: 3 meters  
 LIMIT: -13.00 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] |
|-----------------|-----------------|---------------------|----------------------------|----------------------------------|-------------------------------|-------------------------------|-------------|
| 1646.60         | H               | -                   | -                          | -69.58                           | 4.81                          | -64.77                        | -51.8       |
| 2469.90         | H               | -                   | -                          | -68.23                           | 4.98                          | -63.25                        | -50.2       |

Table 7-3. Radiated Spurious Data (LTE Band 26 – High Channel)

|                                         |                                                                                                                                               |                               |                                                                                       |                                 |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFQ910QM                       |  <b>MEASUREMENT REPORT</b><br>(CLASS II PERMISSIVE CHANGE) |                               |  | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1808210167-04.ZNF | Test Dates:<br>8/21 - 9/4/2018                                                                                                                | EUT Type:<br>Portable Handset |                                                                                       | Page 15 of 16                   |

## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset** **FCC ID: ZNFQ910QM** complies with all the requirements of Parts 22(H) and 90 of the FCC rules.

|                                         |                                                                                                                                               |                               |                                                                                                 |                                 |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFQ910QM                       |  <b>MEASUREMENT REPORT</b><br>(CLASS II PERMISSIVE CHANGE) |                               |  <b>LG</b> | Approved by:<br>Quality Manager |
| Test Report S/N:<br>1M1808210167-04.ZNF | Test Dates:<br>8/21 - 9/4/2018                                                                                                                | EUT Type:<br>Portable Handset | Page 16 of 16                                                                                   |                                 |