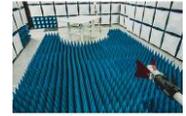




PCTEST ENGINEERING LABORATORY, INC.

7185 Oakland Mills Road, Columbia, MD 21046 USA
410.290.6652 / Fax 410.290.6654
<http://www.pctest.com>



MEASUREMENT REPORT FCC PART 15.247 WLAN 802.11b/g/n

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

Date of Testing:
4/22 - 5/9/2019
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M1904220061-05.ZNF

| | |
|-------------------|---------------------------------|
| FCC ID: | ZNFQ720PS |
| APPLICANT: | LG Electronics USA, Inc. |

| | |
|------------------------------------|---|
| Application Type: | Class II Permissive Change |
| Model: | LM-Q720PS |
| Additional Model(s): | LMQ720PS, Q720PS |
| EUT Type: | Portable Handset |
| Frequency Range: | 2412 – 2462MHz |
| FCC Classification: | Digital Transmission System (DTS) |
| FCC Rule Part(s): | Part 15 Subpart C (15.247) |
| Test Procedure(s): | ANSI C63.10-2013, KDB 558074 D01 v05r02 |
| Class II Permissive Change: | Please see FCC change document |
| Original Grant Date: | 5/10/2019 |

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013 and KDB 558074 D01 v05r02. 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



| | | | | |
|--|---|--|---|--|
| FCC ID: ZNFQ720PS |  | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 1 of 23 | |

TABLE OF CONTENTS

| | | |
|-------|---|----|
| 1.0 | INTRODUCTION..... | 3 |
| 1.1 | Scope | 3 |
| 1.2 | PCTEST Test Location..... | 3 |
| 1.3 | Test Facility / Accreditations..... | 3 |
| 2.0 | PRODUCT INFORMATION | 4 |
| 2.1 | Equipment Description | 4 |
| 2.2 | Device Capabilities | 4 |
| 2.3 | Test Configuration | 5 |
| 2.4 | EMI Suppression Device(s)/Modifications | 5 |
| 3.0 | DESCRIPTION OF TESTS | 6 |
| 3.1 | Evaluation Procedure | 6 |
| 3.2 | Radiated Emissions..... | 6 |
| 3.3 | Environmental Conditions..... | 6 |
| 4.0 | ANTENNA REQUIREMENTS | 7 |
| 5.0 | MEASUREMENT UNCERTAINTY..... | 8 |
| 6.0 | TEST EQUIPMENT CALIBRATION DATA..... | 9 |
| 7.0 | TEST RESULTS..... | 10 |
| 7.1 | Summary..... | 10 |
| 7.2 | Radiated Spurious Emission Measurements – Above 1 GHz..... | 11 |
| 7.2.1 | Radiated Spurious Emission Measurements | 14 |
| 7.2.2 | Radiated Restricted Band Edge Measurements | 18 |
| 7.3 | Radiated Spurious Emissions Measurements – Below 1GHz | 19 |
| 8.0 | CONCLUSION | 23 |

| | | | |
|--|---|---|--|
| FCC ID: ZNFQ720PS |  MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  LG | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 2 of 23 |

1.0 INTRODUCTION

1.1 Scope

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

1.2 PCTEST Test Location

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

1.3 Test Facility / Accreditations

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

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

| | | | | |
|--|---|--|---|--|
| FCC ID: ZNFQ720PS |  | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 3 of 23 | |

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFQ720PS**. The test data contained in this report pertains only to the emissions due to the EUT's WLAN (DTS) transmitter.

Test Device Serial No.: 01538, 06022, 06030

2.2 Device Capabilities

This device contains the following capabilities:

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

| Ch. | Frequency (MHz) | Ch. | Frequency (MHz) |
|-----|-----------------|-----|-----------------|
| 1 | 2412 | 7 | 2442 |
| 2 | 2417 | 8 | 2447 |
| 3 | 2422 | 9 | 2452 |
| 4 | 2427 | 10 | 2457 |
| 5 | 2432 | 11 | 2462 |
| 6 | 2437 | | |

Table 2-1. Frequency/ Channel Operations

Note: The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section 6.0 b) of ANSI C63.10-2013 and KDB 558074 D01 v05r02. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

| Maximum Achievable Duty Cycles | | |
|--------------------------------|---|----------------|
| 802.11 Mode/Band | | Duty Cycle [%] |
| 2.4GHz | b | 99.9 |
| | g | 99.2 |
| | n | 99.3 |

Table 2-2. Measured Duty Cycles

Data Rates Supported: 1Mbps, 2Mbps, 5.5Mbps, 11Mbps (b)
 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps (g)
 6.5/7.2Mbps, 13/14.4Mbps, 19.5/21.7Mbps, 26/28.9Mbps, 39/43.3Mbps,
 52/57.8Mbps, 58.5/65Mbps, 65/72.2Mbps (n)

| | | | | |
|---|---|--|---|---------------------------------|
| FCC ID: ZNFQ720PS |  | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 4 of 23 | |

2.3 Test Configuration

The EUT was tested per the guidance of KDB 558074 D01 v05r02. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing. See Section 3.2 for radiated emissions test setups.

2.4 EMI Suppression Device(s)/Modifications

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

| | | | | |
|--|---|--|---|--|
| FCC ID: ZNFQ720PS |  | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | | Page 5 of 23 |

3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 558074 D01 v05r02 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

3.2 Radiated 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. An 80cm tall test table made of Styrodur is placed on top of the turn table. For measurements above 1GHz, an additional Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33 depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

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.

3.3 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

| | | | |
|---|--|---|---------------------------------|
| FCC ID: ZNFQ720PS |  MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 6 of 23 |

4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- The antennas of the EUT are **permanently attached**.
- There are no provisions for connections to an external antenna.

Conclusion:

The EUT unit complies with the requirement of §15.203.

| | | | |
|--|--|--------------------------------------|--|
| FCC ID: ZNFQ720PS |  MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) | |  Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 7 of 23 |

5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. 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) |
|-------------------------------|----------------------------------|
| Radiated Disturbance (<1GHz) | 4.98 |
| Radiated Disturbance (>1GHz) | 5.07 |
| Radiated Disturbance (>18GHz) | 5.09 |

| | | | |
|---|--|---|---------------------------------|
| FCC ID: ZNFQ720PS |  MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 8 of 23 |

6.0 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 | N9038A | MXE EMI Receiver | 6/11/2018 | Annual | 6/11/2019 | MY51210133 |
| Com-Power | AL-130 | 9kHz - 30MHz Loop Antenna | 10/10/2017 | Biennial | 10/10/2019 | 121034 |
| Emco | 3115 | Horn Antenna (1-18GHz) | 3/28/2018 | Biennial | 3/28/2020 | 9704-5182 |
| EMCO | 3160-09 | Small Horn (18 - 26.5GHz) | 8/9/2018 | Biennial | 8/9/2020 | 135427 |
| Huber + Suhner | Sucoflex 102A | 40GHz Radiated Cable Set | 8/23/2018 | Annual | 8/23/2019 | 251425001 |
| Rohde & Schwarz | TC-TA18 | Vivaldi Antenna | 8/17/2018 | Biennial | 8/17/2020 | 101072 |
| Rohde & Schwarz | SFUNIT-Rx | Shielded Filter Unit | 6/18/2018 | Annual | 6/18/2019 | 102134 |
| Rohde & Schwarz | FSW67 | Signal / Spectrum Analyzer | 8/17/2018 | Annual | 8/17/2019 | 103200 |
| Rohde & Schwarz | ESU26 | EMI Test Receiver (26.5GHz) | 5/21/2018 | Annual | 5/21/2019 | 100342 |
| Rohde & Schwarz | ESU40 | EMI Test Receiver (40GHz) | 8/9/2018 | Annual | 8/9/2019 | 100348 |
| Rohde & Schwarz | TS-PR26 | 18-26.5 GHz Pre-Amplifier | 9/19/2018 | Annual | 9/19/2019 | 100040 |
| Sunol | JB5 | Bi-Log Antenna (30M - 5GHz) | 4/19/2018 | Biennial | 4/19/2020 | A051107 |
| Sunol | DRH-118 | Horn Antenna (1-18GHz) | 8/11/2017 | Biennial | 8/11/2019 | A050307 |

Table 6-1. Annual Test Equipment Calibration Schedule

Note:

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.

| | | | | |
|---|---|--|---|---------------------------------|
| FCC ID: ZNFQ720PS |  | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 9 of 23 | |

7.0 TEST RESULTS

7.1 Summary

Company Name: LG Electronics USA, Inc.
 FCC ID: ZNFQ720PS
 FCC Classification: Digital Transmission System (DTS)

| FCC Part Section(s) | RSS Section(s) | Test Description | Test Limit | Test Condition | Test Result | Reference |
|---------------------|----------------|---|--|----------------|-------------|-------------------|
| 15.205 15.209 | RSS-Gen [8.9] | General Field Strength Limits (Restricted Bands and Radiated Emission Limits) | Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-Gen [8.9]) | RADIATED | PASS | Sections 7.2, 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.

| | | | | |
|---|---|--|---|---------------------------------|
| FCC ID: ZNFQ720PS |  | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 10 of 23 | |

7.2 Radiated Spurious Emission Measurements – Above 1 GHz

§15.247(d) §15.205 & §15.209; RSS-Gen [8.9]

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 6 of RSS-Gen (8.10) must not exceed the limits shown in Table 7-2 per Section 15.209 and RSS-Gen (8.9).

| Frequency | Field Strength [$\mu\text{V/m}$] | Measured Distance [Meters] |
|-----------------|---------------------------------------|-------------------------------|
| Above 960.0 MHz | 500 | 3 |

Table 7-2. Radiated Limits

Test Procedures Used

ANSI C63.10-2013 – Section 6.6.4.3
KDB 558074 D01 v05r02 – Sections 8.6, 8.7

Test Settings

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be $\geq 2 \times \text{span/RBW}$)
6. Sweep time = auto
7. Trace (RMS) averaging was performed over at least 100 traces

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

| | | | | |
|---|---|--|---|---------------------------------|
| FCC ID: ZNFQ720PS |  | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 11 of 23 | |

Test Setup

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

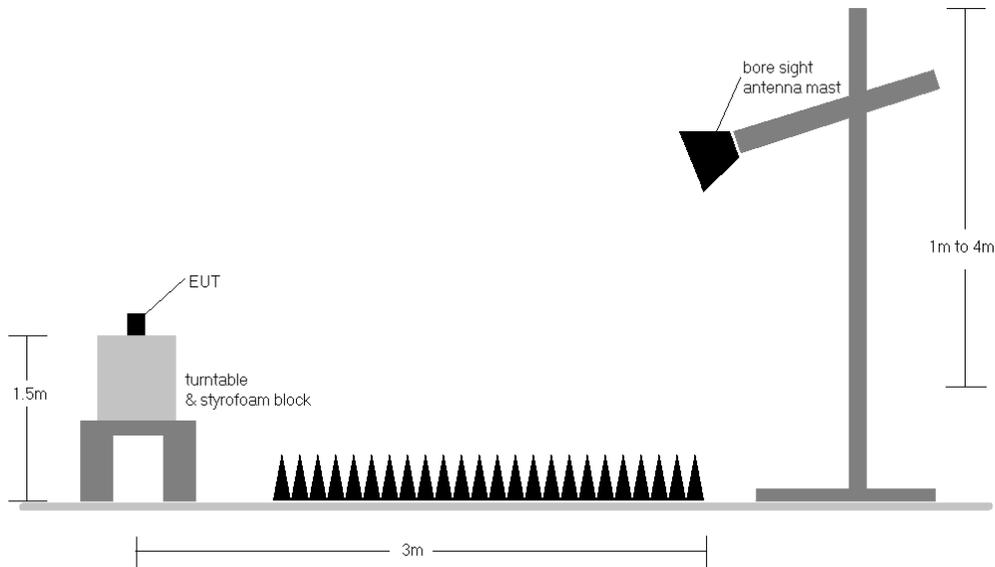


Figure 7-1. Test Instrument & Measurement Setup

Test Notes

1. The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 558074 D01 v05r02 were not used to evaluate this device for compliance to radiated limits. All radiated spurious emissions levels were measured in a radiated test setup.
2. All emissions lying in restricted bands specified in Section 15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-2.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. This unit was tested with its standard battery.
5. The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
6. 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.
7. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. Any emissions found to be within 20dB of the limit are fully investigated and the results are shown in this section.

| | | | | |
|---|---|--|---|---------------------------------|
| FCC ID: ZNFQ720PS |  | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 12 of 23 | |

8. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Sample Calculations

Determining Spurious Emissions Levels

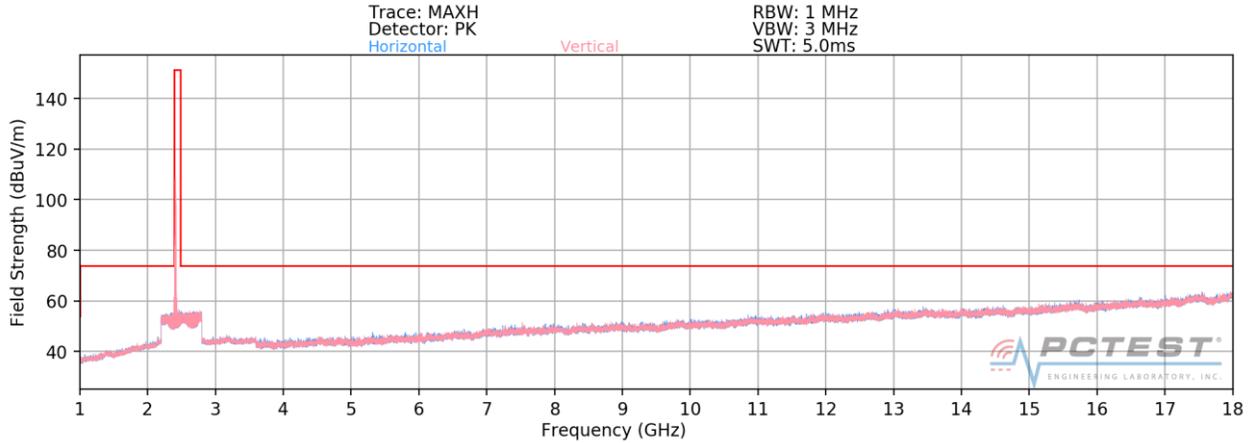
- Field Strength Level $_{[dB_{\mu V/m}]} = \text{Analyzer Level }_{[dBm]} + 107 + \text{AFCL }_{[dB/m]}$
- $\text{AFCL }_{[dB/m]} = \text{Antenna Factor }_{[dB/m]} + \text{Cable Loss }_{[dB]}$
- $\text{Margin }_{[dB]} = \text{Field Strength Level }_{[dB_{\mu V/m}]} - \text{Limit }_{[dB_{\mu V/m}]}$

Radiated Band Edge Measurement Offset

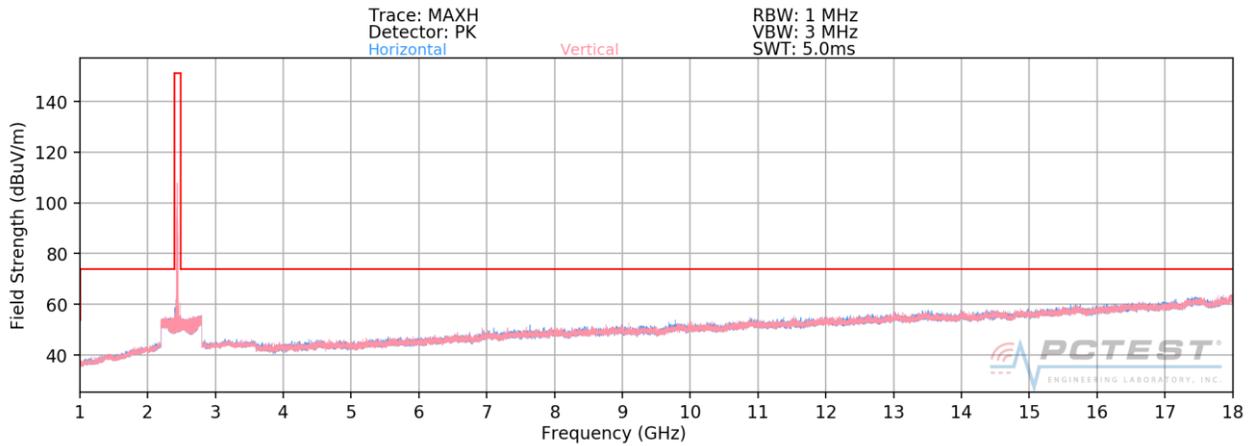
- The amplitude offset shown in the radiated restricted band edge plots in Section 7.2 was calculated using the formula:
 $\text{Offset (dB)} = (\text{Antenna Factor} + \text{Cable Loss} + \text{Attenuator}) - \text{Preamplifier Gain}$

| | | | |
|--|--|--------------------------------------|--|
| FCC ID: ZNFQ720PS |  MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) | |  Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 13 of 23 |

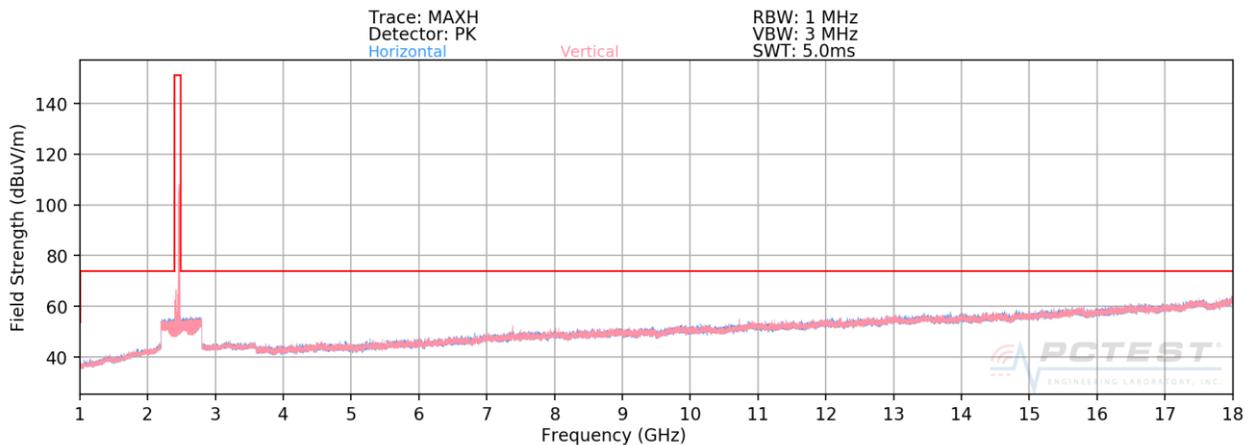
7.2.1 Radiated Spurious Emission Measurements
§15.247(d) §15.205 & §15.209; RSS-Gen [8.9]



Plot 7-1. Radiated Spurious Plot above 1GHz (802.11b – Ch. 1)



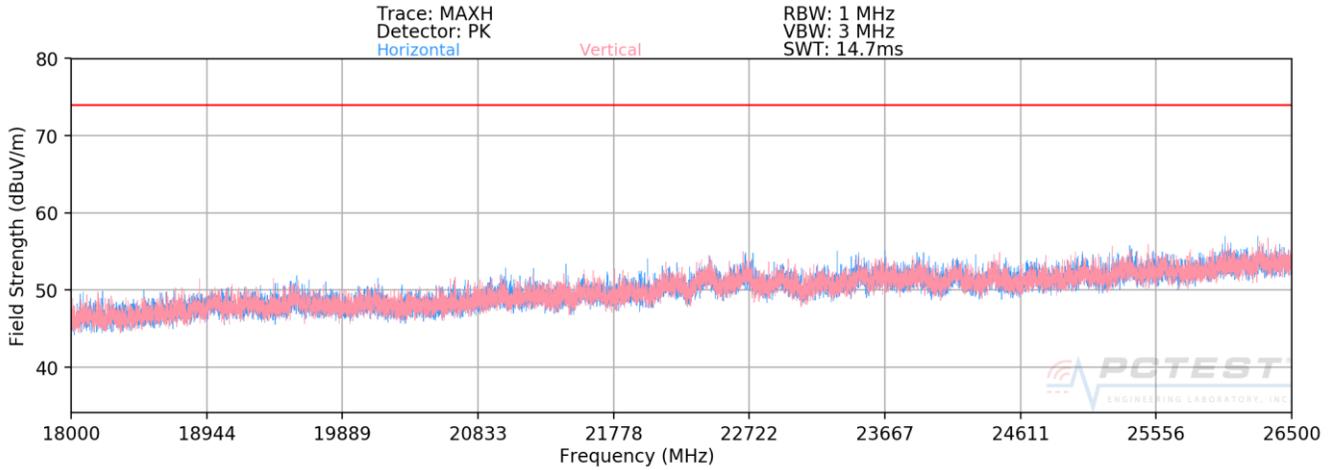
Plot 7-2. Radiated Spurious Plot above 1GHz (802.11b – Ch. 6)



Plot 7-3. Radiated Spurious Plot above 1GHz (802.11b – Ch. 11)

| | | | | |
|---|--|--|----|---------------------------------|
| FCC ID: ZNFQ720PS | PCTEST ENGINEERING LABORATORY, INC. | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) | LG | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | | Page 14 of 23 |

Radiated Spurious Emissions Measurements (Above 18GHz)
§15.209; RSS-Gen [8.9]



Plot 7-4. Radiated Spurious Plot above 18GHz ANT1

| | | | | |
|---|---|--|---|---------------------------------|
| FCC ID: ZNFQ720PS |  | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 15 of 23 | |

Radiated Spurious Emission Measurements

§15.247(d) §15.205 & §15.209; RSS-Gen [8.9]

Worst Case Mode: 802.11b
 Worst Case Transfer Rate: 1 Mbps
 Distance of Measurements: 3 Meters
 Operating Frequency: 2412MHz
 Channel: 01

| Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Distance Correction Factor [dB] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|-----------------|----------|-----------------|---------------------|----------------------------|----------------------|-------------|---------------------------------|-------------------------|----------------|-------------|
| 4824.00 | Avg | H | 164 | 336 | -78.00 | 3.51 | 0.00 | 32.51 | 53.98 | -21.47 |
| 4824.00 | Peak | H | 164 | 336 | -69.65 | 3.51 | 0.00 | 40.86 | 73.98 | -33.12 |
| 12060.00 | Avg | H | - | - | -79.71 | 15.31 | 0.00 | 42.60 | 53.98 | -11.38 |
| 12060.00 | Peak | H | - | - | -69.29 | 15.31 | 0.00 | 53.02 | 73.98 | -20.96 |

Table 7-3. Radiated Measurements ANT1

Worst Case Mode: 802.11b
 Worst Case Transfer Rate: 1 Mbps
 Distance of Measurements: 3 Meters
 Operating Frequency: 2437MHz
 Channel: 06

| Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Distance Correction Factor [dB] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|-----------------|----------|-----------------|---------------------|----------------------------|----------------------|-------------|---------------------------------|-------------------------|----------------|-------------|
| 4874.00 | Avg | H | 112 | 345 | -75.45 | 3.93 | 0.00 | 35.48 | 53.98 | -18.50 |
| 4874.00 | Peak | H | 112 | 345 | -65.84 | 3.93 | 0.00 | 45.09 | 73.98 | -28.89 |
| 7311.00 | Avg | H | 113 | 12 | -73.09 | 8.58 | 0.00 | 42.49 | 53.98 | -11.49 |
| 7311.00 | Peak | H | 113 | 12 | -64.17 | 8.58 | 0.00 | 51.41 | 73.98 | -22.57 |
| 12185.00 | Avg | H | - | - | -79.83 | 15.48 | 0.00 | 42.65 | 53.98 | -11.33 |
| 12185.00 | Peak | H | - | - | -68.71 | 15.48 | 0.00 | 53.77 | 73.98 | -20.21 |

Table 7-4. Radiated Measurements ANT1

| | | | | |
|---|---|--|---|---------------------------------|
| FCC ID: ZNFQ720PS |  | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 16 of 23 | |

Worst Case Mode: 802.11b
 Worst Case Transfer Rate: 1 Mbps
 Distance of Measurements: 3 Meters
 Operating Frequency: 2462MHz
 Channel: 11

| Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Distance Correction Factor [dB] | Field Strength [dBμV/m] | Limit [dBμV/m] | Margin [dB] |
|-----------------|----------|-----------------|---------------------|----------------------------|----------------------|-------------|---------------------------------|-------------------------|----------------|-------------|
| 4924.00 | Avg | H | 112 | 32 | -75.88 | 3.95 | 0.00 | 35.07 | 53.98 | -18.91 |
| 4924.00 | Peak | H | 112 | 32 | -65.95 | 3.95 | 0.00 | 45.00 | 73.98 | -28.98 |
| 7386.00 | Avg | H | 129 | 7 | -69.17 | 8.47 | 0.00 | 46.30 | 53.98 | -7.68 |
| 7386.00 | Peak | H | 129 | 7 | -62.42 | 8.47 | 0.00 | 53.05 | 73.98 | -20.93 |
| 12310.00 | Avg | H | - | - | -79.98 | 15.74 | 0.00 | 42.76 | 53.98 | -11.22 |
| 12310.00 | Peak | H | - | - | -63.98 | 15.74 | 0.00 | 58.76 | 73.98 | -15.22 |

Table 7-5. Radiated Measurements ANT1

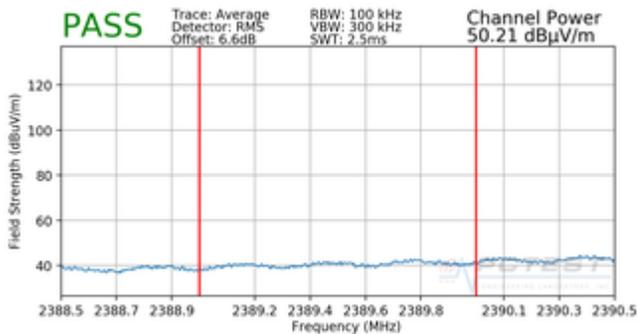
| | | | | |
|---|---|--|---|---------------------------------|
| FCC ID: ZNFQ720PS |  | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 17 of 23 | |

7.2.2 Radiated Restricted Band Edge Measurements

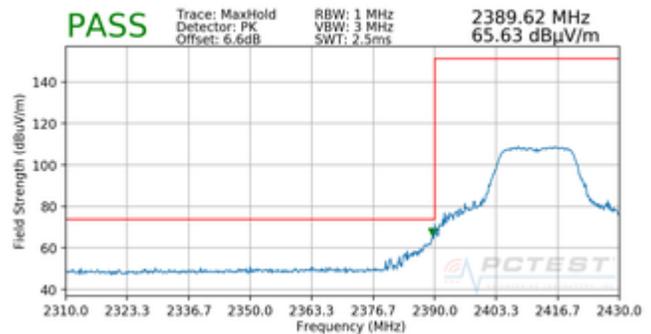
§15.205 §15.209; RSS-Gen [8.9]

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting.

| | |
|---------------------------|----------|
| Worst Case Mode: | 802.11g |
| Worst Case Transfer Rate: | 6Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 2412MHz |
| Channel: | 1 |

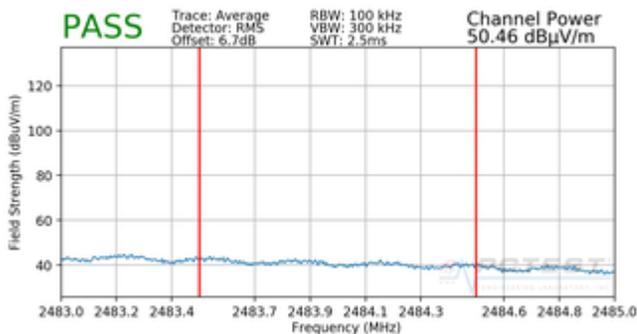


Plot 7-5. Radiated Restricted Lower Band Edge Measurement (Average)

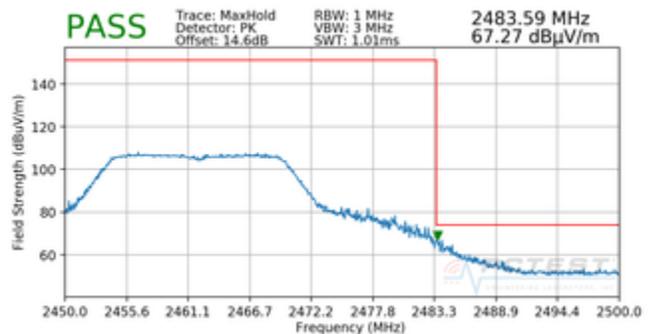


Plot 7-6. Radiated Restricted Lower Band Edge Measurement (Peak)

| | |
|---------------------------|----------|
| Worst Case Mode: | 802.11g |
| Worst Case Transfer Rate: | 6Mbps |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 2462MHz |
| Channel: | 11 |



Plot 7-7. Radiated Restricted Upper Band Edge Measurement (Average)



Plot 7-8. Radiated Restricted Upper Band Edge Measurement (Peak)

| | | | | |
|---|--------------------------------|--|--|---------------------------------|
| FCC ID: ZNFQ720PS | | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) | | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | | Page 18 of 23 |

7.3 Radiated Spurious Emissions Measurements – Below 1GHz §15.209; RSS-Gen [8.9]

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 6 of RSS-Gen (8.10) must not exceed the limits shown in Table 7-6 per Section 15.209 and RSS-Gen (8.9).

| Frequency | Field Strength [$\mu\text{V/m}$] | Measured Distance [Meters] |
|-------------------|---------------------------------------|-------------------------------|
| 0.009 – 0.490 MHz | 2400/F (kHz) | 300 |
| 0.490 – 1.705 MHz | 24000/F (kHz) | 30 |
| 1.705 – 30.00 MHz | 30 | 30 |
| 30.00 – 88.00 MHz | 100 | 3 |
| 88.00 – 216.0 MHz | 150 | 3 |
| 216.0 – 960.0 MHz | 200 | 3 |
| Above 960.0 MHz | 500 | 3 |

Table 7-6. Radiated Limits

Test Procedures Used

ANSI C63.10-2013

Test Settings

Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 120kHz (for emissions from 30MHz – 1GHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

| | | | | |
|---|---|--|---|---------------------------------|
| FCC ID: ZNFQ720PS |  | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 19 of 23 | |

Test Setup

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

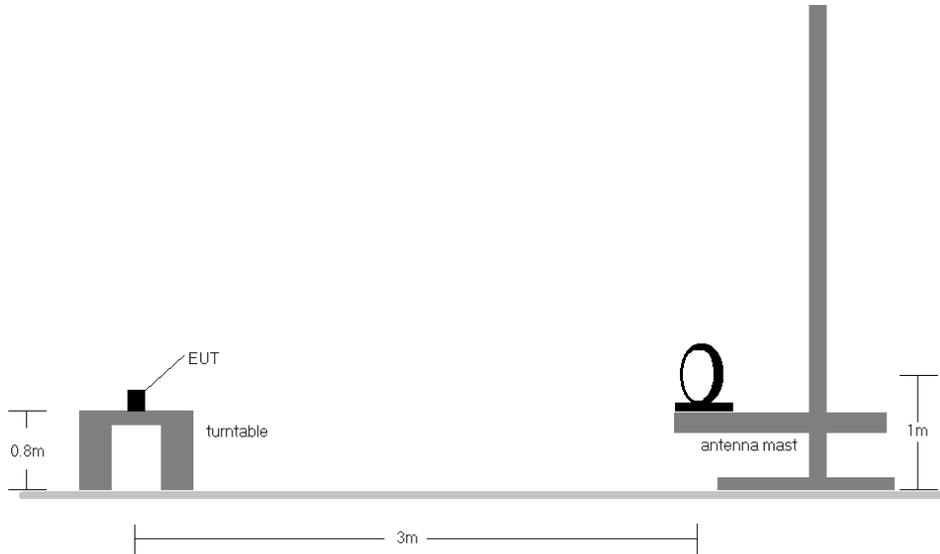


Figure 7-2. Radiated Test Setup < 30Mhz

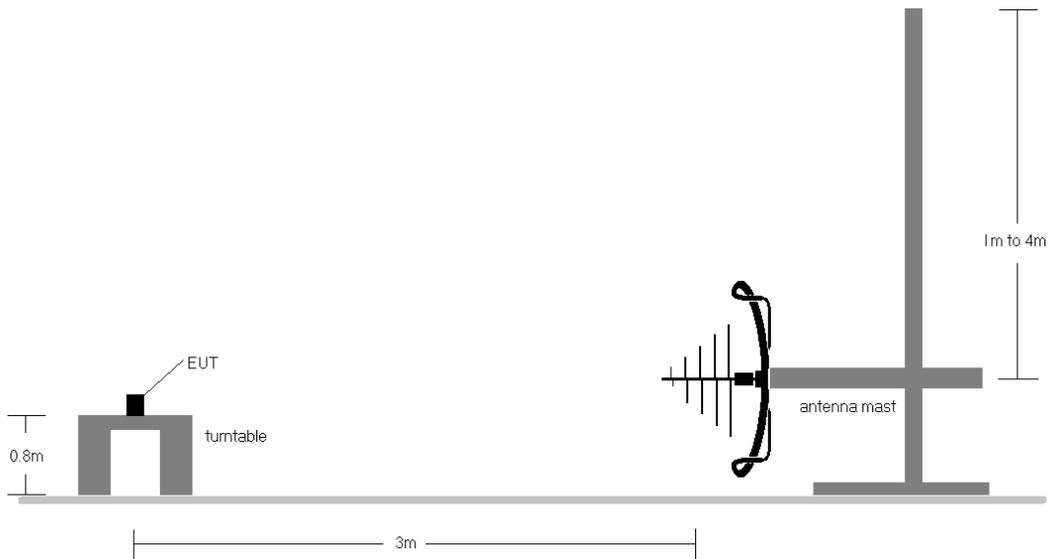


Figure 7-3. Radiated Test Setup < 1GHz

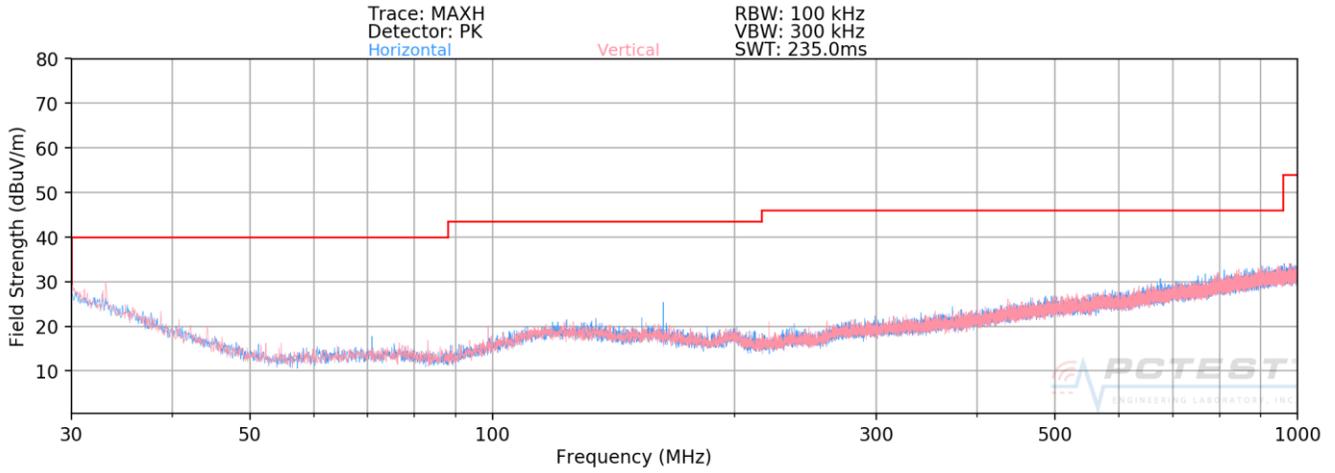
| | | | | |
|---|---|--|---|---------------------------------|
| FCC ID: ZNFQ720PS |  | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | | Page 20 of 23 |

Test Notes

1. All emissions lying in restricted bands specified in §15.205 and RSS-Gen(8.10) are below the limit shown in Table 7-6.
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
3. This unit was tested with its standard battery.
4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
5. Emissions were measured at a 3 meter test distance.
6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
7. No spurious emissions were detected within 20dB of the limit below 30MHz.
8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
9. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. There were no emissions detected in the 30MHz – 1GHz frequency range, as shown in the subsequent plots.

| | | | | |
|--|--|--------------------------------------|---|--|
| FCC ID: ZNFQ720PS |  MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) | |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | | Page 21 of 23 |

Radiated Spurious Emissions Measurements (Below 1GHz)
§15.209; RSS-Gen [8.9]



Plot 7-9. Radiated Spurious Plot below 1GHz

| | | | |
|--|--|--------------------------------------|--|
| FCC ID: ZNFQ720PS |  MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) | |  Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | Page 22 of 23 |

8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFQ720PS** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules.

| | | | | |
|--|---|--|---|--|
| FCC ID: ZNFQ720PS |  | MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) |  | Approved by: Quality Manager |
| Test Report S/N: 1M1904220061-05.ZNF | Test Dates: 4/22 - 5/9/2019 | EUT Type: Portable Handset | | Page 23 of 23 |