

PCTEST ENGINEERING LABORATORY, INC.

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MEASUREMENT REPORT FCC PART 15.407 UNII 802.11a/n/ac

Applicant Name:

FCC ID:

LG Electronics U.S.A, INC 1000 Sylvan Avenue Englewood Cliffs, NJ 07632 **United States**

Date of Testing: 7/31 - 8/21/2018 **Test Site/Location:** PCTEST Lab. Columbia, MD, USA **Test Report Serial No.:** 1M1808100154-06.ZNF

ZNFH871S

APPLICANT:

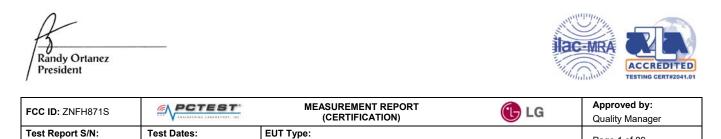
Test Dates:

LG Electronics U.S.A, INC

| Application Type: | Certification |
|----------------------|-------------------------------------------------------|
| Model: | LG-H871S |
| Additional Model(s): | LGH871S, H871S |
| EUT Type: | Portable Handset |
| Frequency Range: | 5180 – 5825MHz |
| FCC Classification: | Unlicensed National Information Infrastructure (UNII) |
| FCC Rule Part(s): | Part 15 Subpart C (15.407) |
| Test Procedure(s): | ANSI C63.10-2013, KDB 789033 D02 v02r01 |

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 789033 D02 v02r01. 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.



Page 1 of 89 1M1808100154-06.ZNF 7/31 - 8/21/2018 Portable Handset © 2018 PCTEST Engineering Laboratory, Inc. V 8.3 07/10/2018 All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.



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MEASUREMENT REPORT



| | | | Conducte | Conducted Power | | |
|-----------|-------------------------------|-----------------------|-----------------------|------------------------|--|--|
| UNII Band | Channel Bandwidth (MHz) | Tx Frequency (MHz) | Max. Power (mW) | Max. Power (dBm) | | |
| 1 | | 5180 - 5240 | 22.080 | 13.44 | | |
| 2A | 20 | 5260 - 5320 | 22.336 | 13.49 | | |
| 2C | | 5500 - 5720 | 22.336 | 13.49 | | |
| 3 | | 5745 - 5825 | 22.233 | 13.47 | | |
| 1 | | 5190 - 5230 | 17.742 | 12.49 | | |
| 2A | 40 | 5270 - 5310 | 17.498 | 12.43 | | |
| 2C | 40 | 5510 - 5710 | 17.742 | 12.49 | | |
| 3 | | 5755 - 5795 | 17.338 | 12.39 | | |
| 1 | | 5210 | 16.482 | 12.17 | | |
| 2A | 80 | 5290 | 16.904 | 12.28 | | |
| 2C | | 5530 - 5690 | 16.482 | 12.17 | | |
| 3 | | 5775 | 16.255 | 12.11 | | |

EUT Overview

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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 17025-2005 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.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFH871S**. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter.

Test Device Serial No.: 00851, 05876, 00844

2.2 Device Capabilities

This device contains the following capabilities:

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

| | Band 1 | | Band 2A | | Band 2C | | Band 3 |
|-----|-----------------|-----|-----------------|-----|-----------------|-----|-----------------|
| Ch. | Frequency (MHz) |
| 36 | 5180 | 52 | 5260 | 100 | 5500 | 149 | 5745 |
| : | : | : | : | : | : | : | : |
| 42 | 5210 | 56 | 5280 | 116 | 5580 | 157 | 5785 |
| : | : | : | : | : | : | : | : |
| 48 | 5240 | 64 | 5320 | 144 | 5720 | 165 | 5825 |
| - | | | | | | | |

Table 2-1. 802.11a / 802.11n / 802.11ac (20MHz) Frequency / Channel Operations

| | Band 1 |
|-----|--------------------|
| Ch. | Frequency (MHz) |
| 38 | 5190 |
| : | : |
| 46 | 5230 |
| | |

| | Band 2A |
|----|--------------------|
| h. | Frequency (MHz) |
| 4 | 5270 |
| | : |
| 2 | 5310 |
| | |

С

5

6

| /Hz) Frequency / Chann | | | | | |
|------------------------|--------------------|--|--|--|--|
| | Band 2C | | | | |
| Ch. | Frequency (MHz) | | | | |
| 102 | 5510 | | | | |
| : | : | | | | |
| 110 | 5550 | | | | |
| : | : | | | | |
| | | | | | |

5710

| Ch. |
|-----|
| 151 |
| : |
| • |

5795

159

Table 2-2. 802.11n / 802.11ac (40MHz BW) Frequency / Channel Operations

142

| | Band 1 | | Band 2A | _ | Band 2C | | Band 3 |
|-----|-----------------|-----|-----------------|-----|-----------------|-----|-----------------|
| Ch. | Frequency (MHz) |
| 42 | 5210 | 58 | 5290 | 106 | 5530 | 155 | 5775 |
| | | | | : | : | | |
| | | | | 138 | 5690 | | |

Table 2-3. 802.11ac (80MHz BW) Frequency / Channel Operations

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Notes:

5GHz NII operation is possible in 20MHz, and 40MHz, and 80MHz channel bandwidths. 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 B)2)b) of ANSI C63.10-2013 and KDB 789033 D02 v02r01. 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 | | | | |
|--------------------------------|-----------------------------------------------------------------|--|--|--|
| 002 11 Made /David | | | | |
| 802.11 Mode/Band | | | | |
| а | 99.3 | | | |
| n (HT20) | 99.2 | | | |
| ac (HT20) | 99.2 | | | |
| n (HT40) | 99.2 | | | |
| ac (HT40) | 99.2 | | | |
| ac (HT80) | 98.2 | | | |
| | ode/Band a n (HT20) ac (HT20) n (HT40) ac (HT40) | | | |

Table 2-4. Measured Duty Cycles

Data Rate(s) Tested:

6, 9, 12, 18, 24, 36, 48, 54Mbps (802.11a) 6.5/7.2, 13/14.4, 19.5/21.7, 26/28.9, 39/43.3, 52/57.8, 58.5/65, 65/72.2 (n – 20MHz) 13.5/15, 27/30, 40.5/45, 54/60, 81/90, 108/120, 121.5/135, 135/150 (n – 40MHz BW) 29.3/32.5, 58.5/65, 87.8/97.5, 117/130, 175.5/195, 234/260, 263.3/292.5, 292.5/325, 351/390, 390/433.3 (ac – 80MHz BW)

2.3 Test Configuration

The EUT was tested per the guidance of KDB 789033 D02 v02r01. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups, 3.3 for radiated emissions test setups, and 7.2, 7.3, 7.4, and 7.5 for antenna port conducted 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.

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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 789033 D02 v02r01 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, $50\Omega/50\mu$ H Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (100dB Minimum Insertion Loss, 14kHz – 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

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 RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 7.8. The EMI Receiver mode of the Agilent MXE was used to perform AC line conducted emissions testing.

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3.3 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.

3.4 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).

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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 connection to an external antenna.

Conclusion:

The EUT complies with the requirement of §15.203.

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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 (±dB) |
|-------------------------------------|----------------------------|
| Conducted Bench Top Measurements | 1.13 |
| Line Conducted Disturbance | 3.09 |
| Radiated Disturbance (<1GHz) | 4.98 |
| Radiated Disturbance (>1GHz) | 5.07 |
| Radiated Disturbance (>18GHz) | 5.09 |

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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 |
|-----------------|---------------|--------------------------------------|------------|--------------|------------|---------------|
| - | WL25-1 | Conducted Cable Set (25GHz) | 1/23/2018 | Annual | 1/23/2019 | WL25-1 |
| Agilent | N9020A | MXA Signal Analyzer | 1/24/2018 | Annual | 1/24/2019 | US46470561 |
| Agilent | N9030A | PXA Signal Analyzer (44GHz) | 5/25/2018 | Annual | 5/25/2019 | MY52350166 |
| Anritsu | MA2411B | Pulse Power Sensor | 10/22/2017 | Annual | 10/22/2018 | 846215 |
| Anritsu | ML2495A | Power Meter | 10/22/2017 | Annual | 10/22/2018 | 941001 |
| 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) | 8/23/2016 | Biennial | 8/23/2018 | 135427 |
| EMCO | 3160-10 | Small Horn (26.5 - 40GHz) | 8/23/2016 | Biennial | 8/23/2018 | 130993 |
| ETS Lindgren | 3117 | 1-18 GHz DRG Horn (Medium) | 12/1/2016 | Biennial | 12/1/2018 | 125518 |
| ETS-Lindgren | 3816/2NM | Line Impedance Stabilization Network | 12/27/2016 | Biennial | 12/27/2018 | 114451 |
| Huber + Suhner | Sucoflex 102A | 40GHz Radiated Cable Set | 1/23/2018 | Annual | 1/23/2019 | 251425001 |
| Pasternack | NMLC-2 | Line Conducted Emissions Cable (NM) | 1/23/2018 | Annual | 1/23/2019 | NMLC-2 |
| 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 | FSW67 | Signal / Spectrum Analyzer | 8/11/2017 | Annual | 8/11/2018 | 103200 |
| Rohde & Schwarz | SFUNIT-Rx | Shielded Filter Unit | 6/18/2018 | Annual | 6/18/2019 | 102134 |
| Rohde & Schwarz | SFUNIT-Rx | Shielded Filter Unit | 6/25/2018 | Annual | 6/25/2019 | 102133 |
| Rohde & Schwarz | TS-PR8 | Preamplifier-Antenna SYS; 30MHz-8GHz | 10/19/2017 | Annual | 10/19/2018 | 102324 |
| Rohde & Schwarz | TS-PR26 | 18-26.5 GHz Pre-Amplifier | 1/24/2018 | Annual | 1/24/2019 | 100040 |
| Rohde & Schwarz | TS-PR40 | 26.5-40 GHz Pre-Amplifier | 1/24/2018 | Annual | 1/24/2019 | 100037 |
| Seekonk | NC-100 | Torque Wrench | 12/28/2017 | Annual | 12/28/2018 | N/A |
| Sunol | DRH-118 | Horn Antenna (1-18GHz) | 8/11/2017 | Biennial | 8/11/2019 | A050307 |
| Sunol | JB5 | Bi-Log Antenna (30M - 5GHz) | 4/19/2018 | Biennial | 4/19/2020 | A051107 |

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.

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7.0 TEST RESULTS

7.1 Summary

| Company Name: | LG Electronics U.S.A, INC |
|---------------------|-------------------------------------------------------|
| FCC ID: | ZNFH871S |
| FCC Classification: | Unlicensed National Information Infrastructure (UNII) |

| FCC Part Section(s) | RSS Section(s) | Test Description | Test Limit | Test Condition | Test Result | Reference |
|------------------------------------------|-------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------------------|----------------|------------------------|
| N/A | RSS-Gen [6.6] | 26dB Bandwidth | N/A | | PASS | Section 7.2 |
| 15.407(e) | RSS-Gen [6.6] | 6dB Bandwidth | >500kHz(5725-5850MHz) | | PASS | Section 7.3 |
| 15.407 (a.1.iv), (a.2), (a.3) | RSS-247 [6.2] | Maximum Conducted Output Power | Maximum conducted powers must meet the limits detailed in 15.407 (a) (RSS-247 [6.2]) | CONDUCTED | PASS | Section 7.4 |
| 15.407 (a.1.iv), (a.2), (a.3) | RSS-247 [6.2] | Maximum Power Spectral Density | Maximum power spectral density must meet the limits detailed in 15.407 (a) (RSS-247 [6.2]) | | PASS | Section 7.5 |
| 15.407(h) | RSS-247 [6.3] | Dynamic Frequency Selection | See DFS Test Report | | PASS | See DFS Test Report |
| 15.407(b.1), (2), (3), (4) | RSS-247 [6.2] | Undesirable Emissions | Undesirable emissions must meet the limits detailed in 15.407(b) (RSS-247 [6.2]) | | PASS | Section 7.6 |
| 15.205, 15.407(b.1), (4), (5), (6) | 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 | Section 7.6, 7.7 |
| 15.407 | RSS-Gen [8.8] | AC Conducted Emissions 150kHz – 30MHz | < FCC 15.207 (RSS-Gen [8.8]) limits | LINE CONDUCTED | PASS | Section 7.8 |

Notes:

Table 7-1. Summary of Test Results

- 1) All channels, modes, and modulations/data rates were investigated among all UNII bands. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "UNII Automation," Version 4.6.
- 5) For radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "Chamber Automation," Version 0.2.8.

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 12 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 12 of 89 |
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7.2 26dB Bandwidth Measurement – 802.11a/n/ac RSS-Gen [6.2]

Test Overview and Limit

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

The 26dB bandwidth is used to determine the conducted power limits.

Test Procedure Used

ANSI C63.10-2013 – Section 12.4 KDB 789033 D02 v02r01 – Section C

Test Settings

- The signal analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = approximately 1% of the emission bandwidth
- 3. VBW <u>></u> 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold

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

None.

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dega 12 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 13 of 89 |
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| | Frequency [MHz] | Channel No. | 802.11 Mode | Data Rate [Mbps] | Measured 26dB Bandwidth [MHz] |
|---------|--------------------|----------------|-------------|------------------|-------------------------------------|
| | 5180 | 36 | а | 6 | 21.13 |
| | 5200 | 40 | а | 6 | 20.94 |
| | 5240 | 48 | а | 6 | 20.75 |
| Ξ | 5180 | 36 | n (20MHz) | 6.5/7.2 (MCS0) | 21.40 |
| Band 1 | 5200 | 40 | n (20MHz) | 6.5/7.2 (MCS0) | 21.13 |
| ä | 5240 | 48 | n (20MHz) | 6.5/7.2 (MCS0) | 21.34 |
| | 5190 | 38 | n (40MHz) | 13.5/15 (MCS0) | 39.55 |
| | 5230 | 46 | n (40MHz) | 13.5/15 (MCS0) | 39.35 |
| | 5210 | 42 | ac (80MHz) | 29.3/32.5 (MCS0) | 81.52 |
| | 5260 | 52 | а | 6 | 20.97 |
| | 5280 | 56 | а | 6 | 20.89 |
| | 5320 | 64 | а | 6 | 20.85 |
| 2A | 5260 | 52 | n (20MHz) | 6.5/7.2 (MCS0) | 21.32 |
| Band 2A | 5280 | 56 | n (20MHz) | 6.5/7.2 (MCS0) | 21.34 |
| Ва | 5320 | 64 | n (20MHz) | 6.5/7.2 (MCS0) | 21.34 |
| | 5270 | 54 | n (40MHz) | 13.5/15 (MCS0) | 39.05 |
| | 5310 | 62 | n (40MHz) | 13.5/15 (MCS0) | 39.72 |
| | 5290 | 58 | ac (80MHz) | 29.3/32.5 (MCS0) | 81.04 |
| | 5500 | 100 | а | 6 | 20.79 |
| | 5580 | 116 | а | 6 | 20.95 |
| | 5720 | 144 | а | 6 | 20.94 |
| | 5500 | 100 | n (20MHz) | 6.5/7.2 (MCS0) | 21.44 |
| 2C | 5580 | 116 | n (20MHz) | 6.5/7.2 (MCS0) | 21.28 |
| Band 2C | 5720 | 144 | n (20MHz) | 6.5/7.2 (MCS0) | 21.48 |
| Ba | 5510 | 102 | n (40MHz) | 13.5/15 (MCS0) | 39.85 |
| | 5550 | 110 | n (40MHz) | 13.5/15 (MCS0) | 39.66 |
| | 5710 | 142 | n (40MHz) | 13.5/15 (MCS0) | 39.66 |
| | 5530 | 106 | ac (80MHz) | 29.3/32.5 (MCS0) | 81.26 |
| | 5690 | 138 | ac (80MHz) | 29.3/32.5 (MCS0) | 81.66 |

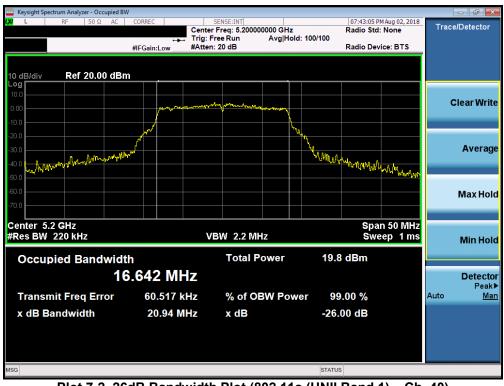
Table 7-2. Conducted Bandwidth Measurements

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕑 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 14 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 14 of 89 |
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Plot 7-1. 26dB Bandwidth Plot (802.11a (UNII Band 1) - Ch. 36)

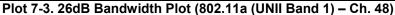


Plot 7-2. 26dB Bandwidth Plot (802.11a (UNII Band 1) - Ch. 40)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 15 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 15 of 89 |
| © 2018 PCTEST Engineering Laboratory, Inc. | | | | V 8.3 07/10/2018 |









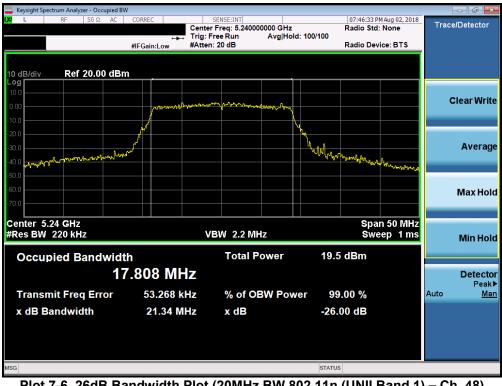
Plot 7-4. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) - Ch. 36)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 16 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 16 of 89 |
| © 2018 PCTEST Engineering Laboratory, Inc. | | | | V 8.3 07/10/2018 |





Plot 7-5. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) - Ch. 40)

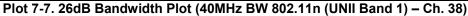


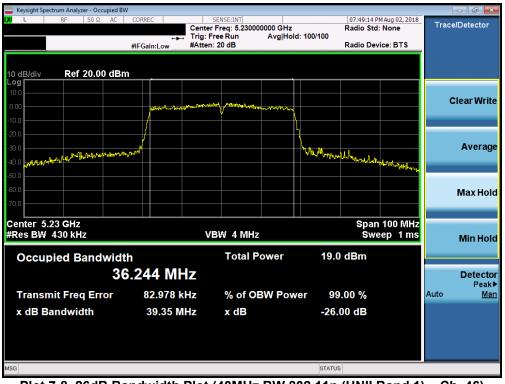
Plot 7-6. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) - Ch. 48)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 17 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 17 of 89 |
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Plot 7-8. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 1) - Ch. 46)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕑 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 19 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 18 of 89 |
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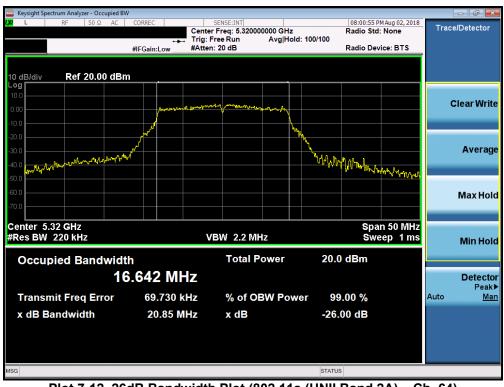
Plot 7-10. 26dB Bandwidth Plot (802.11a (UNII Band 2A) - Ch. 52)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕑 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 10 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 19 of 89 |
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Plot 7-11. 26dB Bandwidth Plot (802.11a (UNII Band 2A) - Ch. 56)



Plot 7-12. 26dB Bandwidth Plot (802.11a (UNII Band 2A) - Ch. 64)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 20 of 80 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 20 of 89 |
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Plot 7-13. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2A) - Ch. 52)



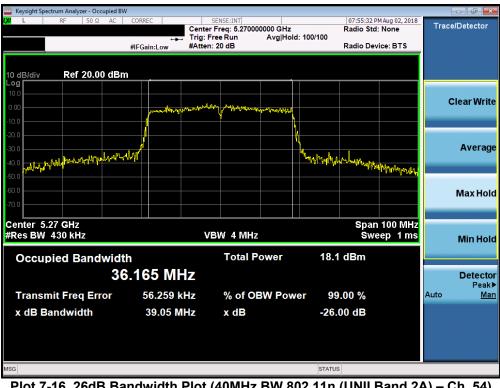
Plot 7-14. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 21 of 20 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 21 of 89 |
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Plot 7-15. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2A) - Ch. 64)



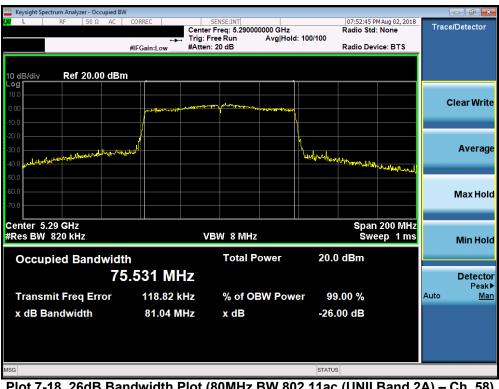
Plot 7-16. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2A) - Ch. 54)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|----|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 22 of 20 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 22 of 89 |
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Plot 7-17. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2A) - Ch. 62)



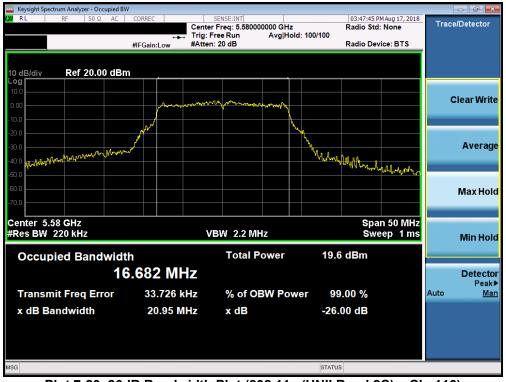
Plot 7-18. 26dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 22 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 23 of 89 |
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Plot 7-20. 26dB Bandwidth Plot (802.11a (UNII Band 2C) - Ch. 116)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 24 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 24 of 89 |
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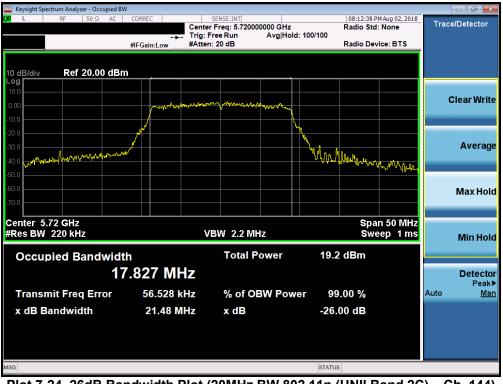
Plot 7-22. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2C) - Ch. 100)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 25 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 25 of 89 |
| © 2018 PCTEST Engineering Laboratory, Inc. | | | | V 8.3 07/10/2018 |







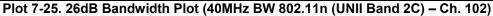


Plot 7-24. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2C) - Ch. 144)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|--|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 26 of 20 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 26 of 89 |
| © 2018 PCTEST Engineering Laboratory, Inc. | | | | V 8.3 07/10/2018 |









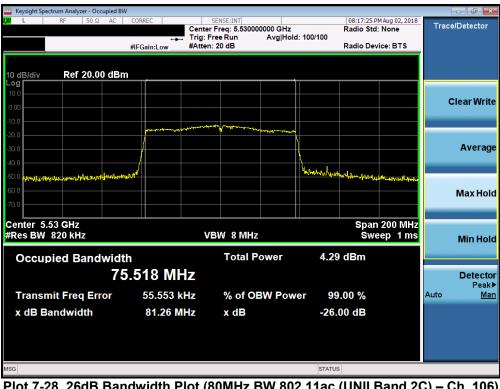
Plot 7-26. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2C) - Ch. 110)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 27 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 27 of 89 |
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| Keysight Spectrum Analyzer - Occupied BV | V | | | | | | × |
|------------------------------------------|----------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------|----------------|----|
| LXU L RF 50Ω AC | CORREC | SENSE:INT Center Freg: 5.59000 | 0000 GHz | 08:15:17 PM/ Radio Std: N | | Trace/Detector | |
| | - - | Trig: Free Run | Avg Hold: 100/100 | | | | |
| | #IFGain:Low | #Atten: 20 dB | | Radio Devic | e: BTS | | |
| | | | | | | | |
| 10 dB/div Ref 20.00 dBr | n | | | | | | |
| 10.0 | | | | | | | |
| 0.00 | | | | | | Clear Wri | te |
| -10.0 | | | | | | | |
| -20.0 | penponther dem | along the second and the second | mermon | | | | |
| -30.0 | | | <u> </u> | | | Avera | ge |
| -40.0 | | | <u> </u> | | | | |
| -50.0 www.manner. | when | | hour hours have been and here | herever white | | | |
| -60.0 | | | | | mare wyteres | Max Ho | Jd |
| -70.0 | | | | | | Max Hu | u |
| | | | | | | | |
| Center 5.59 GHz | | | | | 100 MHz | | |
| #Res BW 430 kHz | | VBW 4 MHz | | Swee | ep 1 ms | Min Ho | ld |
| Occupied Bandwidt | h | Total P | ower 4.51 | l dBm | | | |
| | 5.217 MH | - | | | | Detect | or |
| | | 2 | | | | Pea | |
| Transmit Freq Error | 22.365 kH | z % of OE | 3W Power 99 | 0.00 % | | Auto <u>M</u> | an |
| x dB Bandwidth | 39.66 MH | z xdB | -26. | 00 dB | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| MSG | | | STATU | S | | | _ |

Plot 7-27. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 142)



Plot 7-28. 26dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 2C) - Ch. 106)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 29 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 28 of 89 |
| © 2018 PCTEST Engineering La | V 8.3 07/10/2018 | | | |



| Keysight Spectrum Analyzer - Occupied BW | | | | | | | - • • |
|-----------------------------------------------------------------------------------------------------------------|-------------|----------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------|--------------|
| L RF 50 Ω AC COF | RREC | SENSE:INT enter Freg: 5.69000 | 0000 GHz | | 04 PM Aug 02, 2018 Std: None | Trac | e/Detector |
| | Tr | ig: Free Run | Avg Hold: 10 | 00/100 | | | |
| #IF | Gain:Low #A | tten: 20 dB | | Radio | Device: BTS | | |
| | | | | | | | |
| 10 dB/div Ref 20.00 dBm | | | | | | | |
| 10.0 | | | | | | | |
| 0.00 | | man mana | | | | (| Clear Write |
| -10.0 | | | | | | | |
| -20.0 | | | | | | | |
| 22.0 | | | μ | | | | Average |
| and a start and | | | <u> </u> | al data to . | | | Average |
| -40.0 MT11/ 41/10/04/1 | | | | and the full of th | hullyn highlaghyan | | |
| -50.0 | | | | | | | |
| -60.0 | | | | | | | Max Hold |
| -70.0 | | | | | | | |
| Center 5.69 GHz | | | | Sp | an 200 MHz | | |
| #Res BW 820 kHz | | VBW 8 MHz | | | weep 1 ms | | Min Hold |
| | | | | | | | Millinoid |
| Occupied Bandwidth | | Total P | ower | 19.0 dBm | | | |
| 75.5 | 53 MHz | | | | | | Detector |
| | | | | ~~~~~ | | | Peak► |
| Transmit Freq Error | 158.43 kHz | % of O | BW Power | 99.00 % | | Auto | Man |
| x dB Bandwidth | 81.66 MHz | x dB | | -26.00 dB | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| MSG | | | | STATUS | | | |

Plot 7-29. 26dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 2C) – Ch. 138)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 20 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 29 of 89 |
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7.3 6dB Bandwidth Measurement – 802.11a/n/ac §15.407 (e); RSS-Gen [6.2]

Test Overview and Limit

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 6dB bandwidth.

In the 5.725 – 5.850GHz band, the 6dB bandwidth must be \geq 500 kHz.

Test Procedure Used

ANSI C63.10-2013 – Section 6.9.2 KDB 789033 D02 v02r01 – Section C

Test Settings

- The signal analyzers' automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 100 kHz
- 3. VBW <u>></u> 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple

Test Setup

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





Test Notes

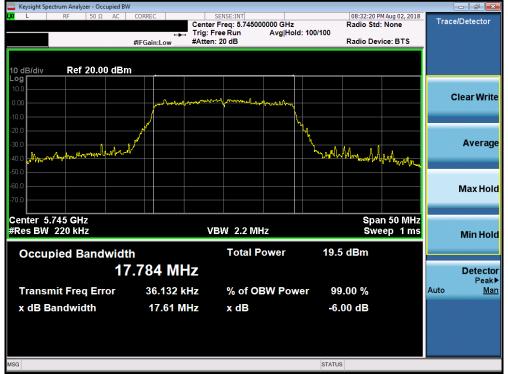
None.

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Daga 20 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 30 of 89 |
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| | Frequency [MHz] | Channel No. | 802.11 Mode | Data Rate [Mbps] | Measured 6dB Bandwidth [MHz] |
|------|--------------------|----------------|-------------|------------------|------------------------------------|
| | 5745 | 149 | а | 6 | 17.61 |
| | 5785 | 157 | а | 6 | 16.28 |
| | 5825 | 165 | а | 6 | 16.35 |
| e | 5745 | 149 | n (20MHz) | 6.5/7.2 (MCS0) | 17.58 |
| Band | 5785 | 157 | n (20MHz) | 6.5/7.2 (MCS0) | 17.52 |
| ä | 5825 | 165 | n (20MHz) | 6.5/7.2 (MCS0) | 17.57 |
| | 5755 | 151 | n (40MHz) | 13.5/15 (MCS0) | 36.40 |
| | 5795 | 159 | n (40MHz) | 13.5/15 (MCS0) | 35.91 |
| | 5775 | 155 | ac (80MHz) | 29.3/32.5 (MCS0) | 76.01 |

Table 7-3. Conducted Bandwidth Measurements

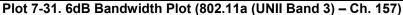


Plot 7-30. 6dB Bandwidth Plot (802.11a (UNII Band 3) - Ch. 149)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 21 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 31 of 89 |
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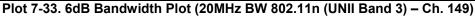


Plot 7-32. 6dB Bandwidth Plot (802.11a (UNII Band 3) - Ch. 165)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Page 32 of 89 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | |
| © 2018 PCTEST Engineering Laboratory. Inc. | | | | V 8.3 07/10/2018 |







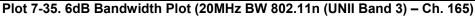


Plot 7-34. 6dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) - Ch. 157)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Page 33 of 89 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | |
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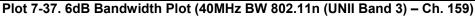


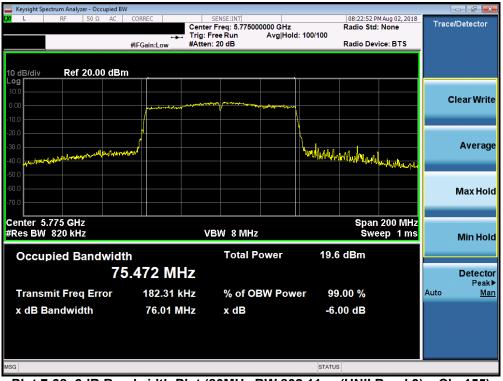
Plot 7-36. 6dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) - Ch. 151)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Page 34 of 89 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | |
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Plot 7-38. 6dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 3) - Ch. 155)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Page 35 of 89 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | |
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7.4 UNII Output Power Measurement – 802.11a/n/ac §15.407(a.1.iv) §15.407(a.2) §15.407(a.3); RSS-247 [6.2]

Test Overview and Limits

A transmitter antenna terminal of the EUT is connected to the input of an RF pulse power sensor. Measurement is made using a broadband average power meter while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies.

In the 5.15 – 5.25GHz band, the maximum permissible conducted output power is 250mW (23.98dBm).

In the 5.25 – 5.35GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and 11 dBm + $10\log_{10}(26dB BW) = 11 dBm + 10\log_{10}(20.85) = 24.19dBm$.

In the 5.47 – 5.725GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and 11 dBm + $10log_{10}(26dB BW) = 11 dBm + <math>10log_{10}(20.79) = 24.18dBm$.

In the 5.725 – 5.850GHz band, the maximum permissible conducted output power is 1W (30dBm).

Test Procedure Used

ANSI C63.10-2013 – Section 12.3.3.2 Method PM-G KDB 789033 D02 v02r01 – Section E)3)b) Method PM-G

Test Settings

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

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

Per RSS-247 Section 6.2.3, transmission on channels which overlap the 5600-5650 MHz is prohibited. This device operates under these frequencies only under the control of a certified master device and does not support active scanning on these channels. This device does not transmit any beacons or initiate any transmissions in UNII Bands 2A or 2C.

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------------------|---------------------------------|
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| Freq [MHz] | Channel | Detector | IEEE Transmission Mode | | | | | Conducted Power Limit | Conducted Power |
|------------|---------|----------|------------------------|---------|----------|-------|-------------|--------------------------|--------------------|
| | | | 802.11a | 802.11n | 802.11ac | [dBm] | Margin [dB] | | |
| 5180 | 36 | AVG | 13.34 | 12.98 | 12.98 | 23.98 | -10.64 | | |
| 5200 | 40 | AVG | 13.44 | 13.03 | 12.98 | 23.98 | -10.54 | | |
| 5220 | 44 | AVG | 13.41 | 13.00 | 13.16 | 23.98 | -10.57 | | |
| 5240 | 48 | AVG | 13.42 | 13.23 | 13.14 | 23.98 | -10.56 | | |
| 5260 | 52 | AVG | 13.48 | 13.11 | 13.05 | 23.98 | -10.50 | | |
| 5280 | 56 | AVG | 13.49 | 13.05 | 13.07 | 23.98 | -10.49 | | |
| 5300 | 60 | AVG | 13.48 | 13.04 | 13.04 | 23.98 | -10.50 | | |
| 5320 | 64 | AVG | 13.44 | 13.03 | 13.16 | 23.98 | -10.54 | | |
| 5500 | 100 | AVG | 13.49 | 13.31 | 13.21 | 23.98 | -10.49 | | |
| 5580 | 116 | AVG | 13.45 | 13.06 | 13.12 | 23.98 | -10.53 | | |
| 5660 | 132 | AVG | 13.43 | 12.77 | 12.86 | 23.98 | -10.55 | | |
| 5720 | 144 | AVG | 13.12 | 12.73 | 12.62 | 23.98 | -10.86 | | |
| 5745 | 149 | AVG | 13.47 | 13.23 | 13.21 | 30.00 | -16.53 | | |
| 5785 | 157 | AVG | 13.46 | 12.98 | 12.86 | 30.00 | -16.54 | | |
| 5825 | 165 | AVG | 13.27 | 12.79 | 12.93 | 30.00 | -16.73 | | |

Table 7-4. 20MHz BW (UNII) Maximum Conducted Output Power

| Freq [MHz] | Channel Detector | | Conducted Power Limit | Conducted Power | | |
|------------|------------------|-----|--------------------------|--------------------|-------|-------------|
| | | | 802.11n 802.11ac | | [dBm] | Margin [dB] |
| 5190 | 38 | AVG | 12.27 | 12.38 | 23.98 | -11.60 |
| 5230 | 46 | AVG | 12.37 | 12.49 | 23.98 | -11.49 |
| 5270 | 54 | AVG | 12.27 | 12.23 | 23.98 | -11.71 |
| 5310 | 62 | AVG | 12.40 | 12.43 | 23.98 | -11.55 |
| 5510 | 102 | AVG | 12.48 | 12.49 | 23.98 | -11.49 |
| 5550 | 110 | AVG | 12.42 | 12.41 | 23.98 | -11.56 |
| 5670 | 134 | AVG | 12.08 | 12.21 | 23.98 | -11.77 |
| 5710 | 142 | AVG | 12.00 | 12.06 | 23.98 | -11.92 |
| 5755 | 151 | AVG | 12.39 | 12.34 | 30.00 | -17.61 |
| 5795 | 159 | AVG | 12.25 | 12.26 | 30.00 | -17.74 |

Table 7-5. 40MHz BW (UNII) Maximum Conducted Output Power

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|-----------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 27 of 90 |
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| Freq [MHz] | Channel | Detector | IEEE Transmission <u>Mode</u> 802.11ac | Conducted Power Limit [dBm] | Conducted Power Margin [dB] |
|------------|---------|----------|-------------------------------------------------|-----------------------------------|-----------------------------------|
| 5210 | 42 | AVG | 12.17 | 23.98 | -11.81 |
| 5290 | 58 | AVG | 12.28 | 23.98 | -11.70 |
| 5530 | 106 | AVG | 12.17 | 23.98 | -11.81 |
| 5690 | 138 | AVG | 11.85 | 23.98 | -12.13 |
| 5775 | 155 | AVG | 12.11 | 30.00 | -17.89 |

Table 7-6. 80MHz BW (UNII) Maximum Conducted Output Power

| FCC ID: ZNFH871S | PCTEST | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 29 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 38 of 89 |
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7.5 Maximum Power Spectral Density – 802.11a/n/ac §15.407(a.1.iv) §15.407(a.2) §15.407(a.3); RSS-247 [6.2]

Test Overview and Limit

The spectrum analyzer was connected to the antenna terminal while the EUT was operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies. Method SA-1, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, was used to measure the power spectral density.

In the 5.15 – 5.25GHz, 5.25 – 5.35GHz, 5.47 – 5.725GHz bands, the maximum permissible power spectral density is 11dBm/MHz.

In the 5.725 – 5.850GHz band, the maximum permissible power spectral density is 30dBm/500kHz.

Test Procedure Used

ANSI C63.10-2013 – Section 12.3.2.2 KDB 789033 D02 v02r01 – Section F

Test Settings

- 1. Analyzer was set to the center frequency of the UNII channel under investigation
- 2. Span was set to encompass the entire emission bandwidth of the signal
- 3. RBW = 1MHz
- 4. VBW = 3MHz
- 5. Number of sweep points $\geq 2 \times (\text{span/RBW})$
- 6. Sweep time = auto
- 7. Detector = power averaging (RMS)
- 8. Trigger was set to free run for all modes
- 9. Trace was averaged over 100 sweeps
- 10. The peak search function of the spectrum analyzer was used to find the peak of the spectrum.

Test Setup

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



Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | Dage 20 of 20 |
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| | Frequency [MHz] | Channel No. | 802.11 Mode | Data Rate [Mbps] | Measured Power Density [dBm] | Max Power Density [dBm/MHz] | Margin [dB] |
|---------|--------------------|----------------|-------------|------------------|------------------------------------|-----------------------------------|----------------|
| | 5180 | 36 | а | 6 | 3.40 | 11.0 | -7.60 |
| | 5200 | 40 | а | 6 | 3.28 | 11.0 | -7.72 |
| | 5240 | 48 | а | 6 | 3.19 | 11.0 | -7.81 |
| - | 5180 | 36 | n (20MHz) | 6.5/7.2 (MCS0) | 2.17 | 11.0 | -8.83 |
| Band 1 | 5200 | 40 | n (20MHz) | 6.5/7.2 (MCS0) | 2.63 | 11.0 | -8.37 |
| ä | 5240 | 48 | n (20MHz) | 6.5/7.2 (MCS0) | 2.54 | 11.0 | -8.46 |
| | 5190 | 38 | n (40MHz) | 13.5/15 (MCS0) | -0.97 | 11.0 | -11.97 |
| | 5230 | 46 | n (40MHz) | 13.5/15 (MCS0) | -0.90 | 11.0 | -11.90 |
| | 5210 | 42 | ac (80MHz) | 29.3/32.5 (MCS0) | -4.13 | 11.0 | -15.13 |
| | 5260 | 52 | а | 6 | 2.98 | 11.0 | -8.02 |
| | 5280 | 56 | а | 6 | 3.09 | 11.0 | -7.91 |
| | 5320 | 64 | а | 6 | 3.13 | 11.0 | -7.87 |
| 2A | 5260 | 52 | n (20MHz) | 6.5/7.2 (MCS0) | 2.52 | 11.0 | -8.48 |
| Band 2A | 5280 | 56 | n (20MHz) | 6.5/7.2 (MCS0) | 1.81 | 11.0 | -9.19 |
| Ba | 5320 | 64 | n (20MHz) | 6.5/7.2 (MCS0) | 2.62 | 11.0 | -8.39 |
| | 5270 | 54 | n (40MHz) | 13.5/15 (MCS0) | -0.77 | 11.0 | -11.77 |
| | 5310 | 62 | n (40MHz) | 13.5/15 (MCS0) | -0.79 | 11.0 | -11.79 |
| | 5290 | 58 | ac (80MHz) | 29.3/32.5 (MCS0) | -4.03 | 11.0 | -15.03 |
| | 5500 | 100 | а | 6 | 3.30 | 11.0 | -7.70 |
| | 5580 | 116 | а | 6 | 3.22 | 11.0 | -7.78 |
| | 5720 | 144 | а | 6 | 3.29 | 11.0 | -7.71 |
| | 5500 | 100 | n (20MHz) | 6.5/7.2 (MCS0) | 1.21 | 11.0 | -9.80 |
| SC | 5580 | 116 | n (20MHz) | 6.5/7.2 (MCS0) | 2.63 | 11.0 | -8.37 |
| Band 2C | 5720 | 144 | n (20MHz) | 6.5/7.2 (MCS0) | 2.35 | 11.0 | -8.65 |
| Ba | 5510 | 102 | n (40MHz) | 13.5/15 (MCS0) | -0.74 | 11.0 | -11.74 |
| | 5550 | 110 | n (40MHz) | 13.5/15 (MCS0) | -0.72 | 11.0 | -11.72 |
| | 5710 | 142 | n (40MHz) | 13.5/15 (MCS0) | -1.14 | 11.0 | -12.14 |
| | 5530 | 106 | ac (80MHz) | 29.3/32.5 (MCS0) | -4.11 | 11.0 | -15.11 |
| | 5690 | 138 | ac (80MHz) | 29.3/32.5 (MCS0) | -4.46 | 11.0 | -15.46 |

Table 7-7. Bands 1, 2A, 2C Conducted Power Spectral Density Measurements

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 40 of 90 |
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| Keysight Sp | pectrum Analyze | r - Swep | ot SA | | | | | | | | | |
|------------------|----------------------|----------|-----------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------|--------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------|---------------------------------|
| XI L | RF | 50 Ω | AC | CORREC | ast ⊶⊷ | | #Avg Typ | e: RMS | TRAC | Aug 02, 2018 E 1 2 3 4 5 6 E A WWWW T A N N N N N | Fr | equency |
| 10 dB/div Log | Ref 10. | 00 di | Зm | IFGain:L | | #Atten: 2 | | Mkr | 5.180 7 | | | Auto Tune |
| 0.00 | , | | مرجنة فر و د ا ل | where the state of | all a state of the | an a | A Strage march staff of the | anan - Ingan | a marked a second se | | | Center Fred 0000000 GH: |
| -10.0 | will when | | | | | | | | | h brug | 5.16 | Start Fred 7500000 GH: |
| -30.0 | | | | | | | | | | North North | 5.19 | Stop Fred 2500000 GH: |
| 50.0 | | | | | | | | | | | Auto ² | CF Stej 2.500000 MH Ma |
| 70.0 | | | | | | | | | | | | Freq Offse 0 H |
| -80.0 | 10000 01 | | | | | | | | 0 | 5 00 BALL | Log | Scale Type |
| | .18000 GH 1.0 MHz | IZ | | \$ | ≠vbw | 3.0 MHz | | Sweep | Span 2 1.000 ms (| 5.00 MHz 1001 pts) | Log | |
| //SG | | | | | | | | STATU | S | | | |

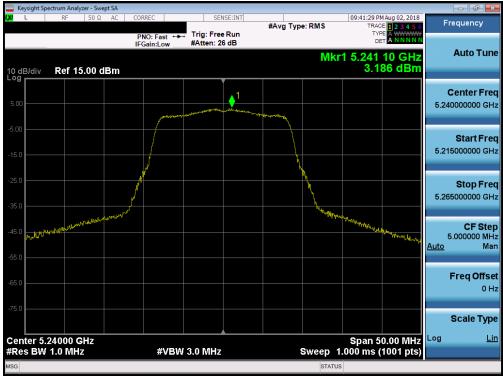
Plot 7-39. Power Spectral Density Plot (802.11a (UNII Band 1) - Ch. 36)



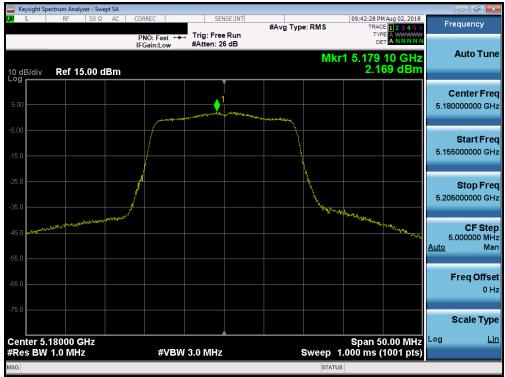
Plot 7-40. Power Spectral Density Plot (802.11a (UNII Band 1) - Ch. 40)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 41 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 41 of 89 |
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Plot 7-41. Power Spectral Density Plot (802.11a (UNII Band 1) - Ch. 48)



Plot 7-42. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) - Ch. 36)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Daga 42 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 42 of 89 |
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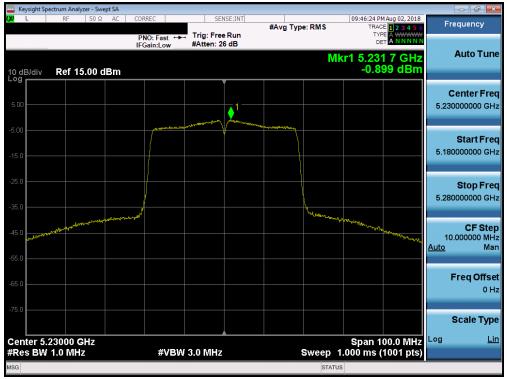
Plot 7-44. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) - Ch. 48)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕑 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dama 42 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 43 of 89 |
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| L | Spectrum Analy | 50 Ω A | | RREC | SEI | NSE:INT | | | 09:45:29 PI | 4 Aug 02, 2018 | |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|----------------------|------------------------|-----------|---------|----------|---------------|-----------------------------|--------------------------------------------|----------------------------------------|
| | | | Р | NO: Fast ↔ Gain:Low | | e Run | #Avg Typ | e: RMS | TRAC | E 1 2 3 4 5 6 E A WWWW T A N N N N N | Frequency |
|) dB/div | Ref 1 | 5.00 dBr | | Jam.Low | | | | Mk | r1 5.18 -0.9 | 8 4 GHz 70 dBm | Auto Tui |
| i.00 | | | | | | 1 | | | | | Center Fr 5.190000000 G |
| 5.0 | | | | Antopolynum | | | | | | | Start Fr 5.140000000 G |
| 5.0 | | | | | | | | | | | Stop Fr 5.240000000 G |
| 5.0 •••••• | and the second s | and the second | היישיאלי היישיאלי | | | | | Markey Markey | hard mail many | there was the second | CF Ste 10.000000 M <u>Auto</u> M |
| 5.0 | | | | | | | | | | | Freq Offs 0 |
| 5.0 | | | | | | | | | | | Scale Ty |
| | 5.19000 G W 1.0 MH: | | | #VBW | / 3.0 MHz | | | Sweep 1 | Span 1 .000 m <u>s (</u> | 00.0 MHz 1001 pts) | Log <u>L</u> |
| G | | | | | | | | STATUS | | | |

Plot 7-45. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) - Ch. 38)



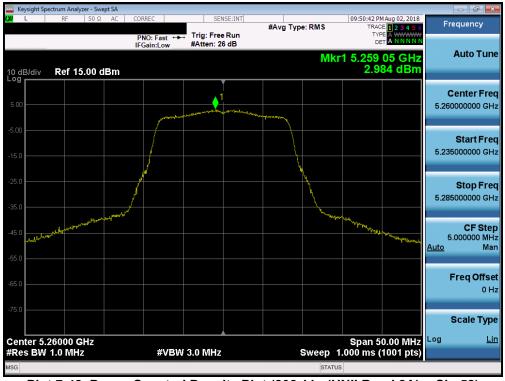
Plot 7-46. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) - Ch. 46)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager | |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 11 of 90 | |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 44 of 89 | |
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| Keysight S | Spectrum Analyz | zer - Swept S/ 50 Ω A | | REC | | NSE:INT | | | 00:47:49.0 | M Aug 02, 2018 | |
|----------------|------------------------|--------------------------|------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|------------------------------------------|
| L | | 1 20 32 A | PN | NO: Fast ↔ Gain:Low | | Run | #Avg Typ | e: RMS | TRAC | DE 1 2 3 4 5 6 DE A WWWW ET A NNNNN | Frequency |
| 0 dB/div og | Ref 15 | .00 dBr | | Sam:Low | #Atten: 2 | u B | | MI | (r1 5.21) -4. | 3 2 GHz 13 dBm | Auto Tui |
| 5.00 | | | | | | ↓ 1 | | | | | Center Fre 5.210000000 GI |
| 5.0 | | | | myanar (ndistring) mily | and the second sec | | han any of the start | | | | Start Fre 5.110000000 GI |
| 5.0 | | | | | | | | | | | Stop Fre 5.310000000 GI |
| 5.0 | works | ntwood and | hermon and | | | | | & work of the has | an grant and a start of the sta | to lynn yw yw yr b | CF Ste 20.000000 Mi <u>Auto</u> Mi |
| 5.0 | | | | | | | | | | | Freq Offs 0 I |
| /5.0 | | | | | | | | | | | Scale Typ |
| | 5.2100 GH V 1.0 MHz | | | #VBW | / 3.0 MHz | | | Sweep 1 | Span 2 .000 ms (| 00.0 MHz 1001 pts) | Log <u>L</u> |
| SG | | | | | | | | STATU | 5 | | |





Plot 7-48. Power Spectral Density Plot (802.11a (UNII Band 2A) - Ch. 52)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager | |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 45 of 90 | |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 45 of 89 | |
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| 🔤 Keysight Sp | pectrum Analyz | er - Swept SA | | | | | | | | | | |
|----------------------|-----------------------------|---------------|-------|-----------------------------|-----------------------------------------------------------------------------------------------------------------|---|-------------|------------------------------------------|----------------------|------------------------------------------------------------|------------------|--------------------------------|
| <mark>XI</mark> L | RF | 50 Ω A | PN | EC │ D:Fast ↔ ain:Low | | | #Avg Typ | e: RMS | TRAC | Aug 02, 2018 E 1 2 3 4 5 6 E A WWWW T A N N N N N | Fr | equency |
| 10 dB/div | Ref 15 | .00 dBn | | an:Low | #Atten: 2 | | | Mkı | r1 5.280 | | | Auto Tune |
| 5.00 | | | | | the and the second s | 1 | anglanselag | | | | | enter Fred 0000000 GH |
| -5.00 | | | | | | | | | | | 5.255 | Start Fre 5000000 GH |
| -25.0 | | | - All | | | | | NA N | | | 5.305 | Stop Fre 5000000 GH |
| -45.0 | feating the feature for the | mithing | × . | | | | | · • • • • • • • • | al Anderwood and | water where and the | 5 <u>Auto</u> | CF Ste 000000 MH Ma |
| 65.0 | | | | | | | | | | | ľ | F req Offs e 0 H |
| -75.0 | | | | | | | | | | | | Scale Typ |
| Center 5. #Res BW | .28000 G 1.0 MHz | Hz | | #VBW | / 3.0 MHz | | | Sweep 1 | 5 Span 1.000 ms (| 0.00 10112 | Log | <u>Lir</u> |
| MSG | | | | | | | | STATU | s | | | |

Plot 7-49. Power Spectral Density Plot (802.11a (UNII Band 2A) - Ch. 56)



Plot 7-50. Power Spectral Density Plot (802.11a (UNII Band 2A) - Ch. 64)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 46 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 46 of 89 |
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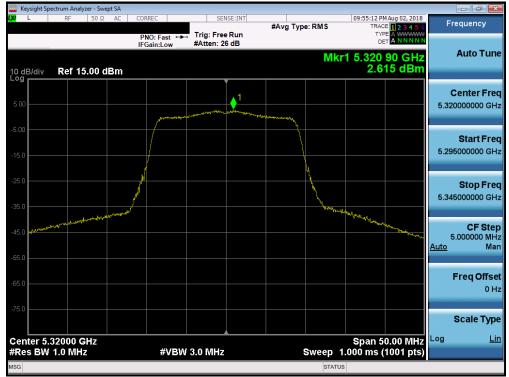
Plot 7-51. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) - Ch. 52)



Plot 7-52. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 47 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 47 of 89 |
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Plot 7-53. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) - Ch. 64)



| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|---------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 49 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | Page 48 of 89 | |
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| 🔤 Keysight Sp | ectrum Analyze | | | | | | | | | | _ | |
|----------------------|----------------|---------|----------------|------------------|-------------------------|---------|----------|--------------|------------------|------------------------|---------------------|------------------|
| LXI L | RF | 50 Ω AC | CORREC | | SEN | ISE:INT | #Avg Typ | e: RMS | | MAug 02, 2018 | Fred | uency |
| | _ | | PNO: IFGain | Fast ↔→→ :Low | Trig: Free #Atten: 2 | | | | TY D | | | |
| 10 dB/div Log | Ref 15. | .00 dBm | | | | | | М | kr1 5.31 -0.7 | 1 6 GHz 93 dBm | A | uto Tune |
| | | | | | , | | | | | | | nter Freq |
| 5.00 | | | | | www.www. | 1 1 | | | | | 5.3100 | 00000 GHz |
| -5.00 | | | | | | / | | | | | | Start Freq |
| -15.0 | | | | | | | | | | | 5.2600 | 00000 GHz |
| -25.0 | | | | | | | | } | | | 5 | Stop Fred |
| -35.0 | | | | | | | | <u></u> | | | 5.3600 | 00000 GHz |
| -45.0 | man | manne | umpered | | | | | Marin Marine | in my want of an | Λ. | | CF Step |
| -55.0 | | | | | | | | | | - Vien menustra | 10.0 <u>Auto</u> | 00000 MHz Mar |
| -65.0 | | | | | | | | | | | Fr | eq Offse |
| -05:0 | | | | | | | | | | | | 0 H: |
| -75.0 | | | | | | | | | | | S | cale Type |
| Center 5. #Res BW | | | | #VBW | 3.0 MHz | | | Sween | Span 1 | 00.0 MHz (1001 pts) | Log | Lin |
| MSG | | | | | 010 11112 | | | STATU | | (1001-pt5) | | |

Plot 7-55. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) - Ch. 62)



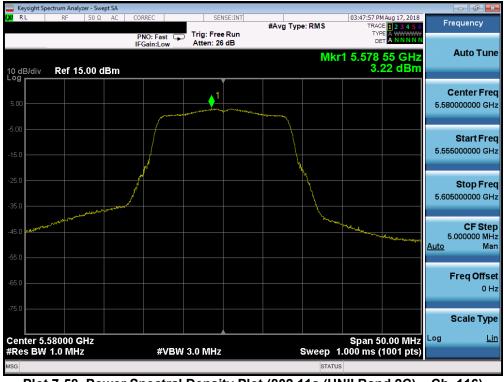
Plot 7-56. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|---------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dega 40 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | Page 49 of 89 | |
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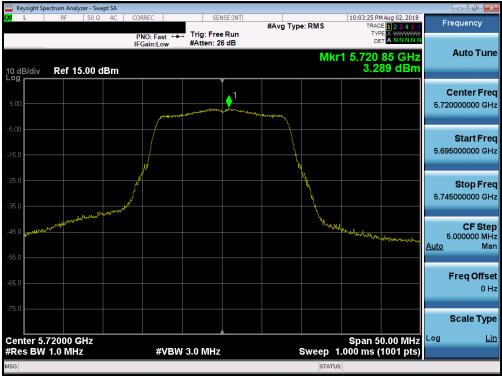




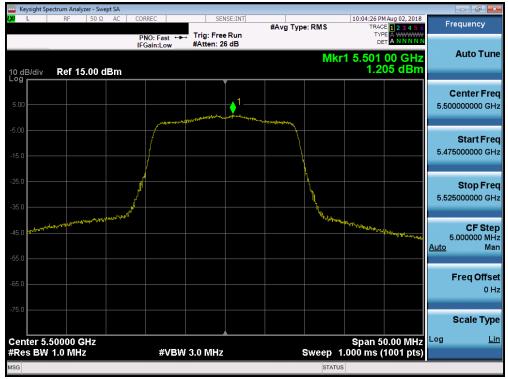
Plot 7-58. Power Spectral Density Plot (802.11a (UNII Band 2C) - Ch. 116)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager | |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 50 of 90 | |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 50 of 89 | |
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Plot 7-59. Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 144)



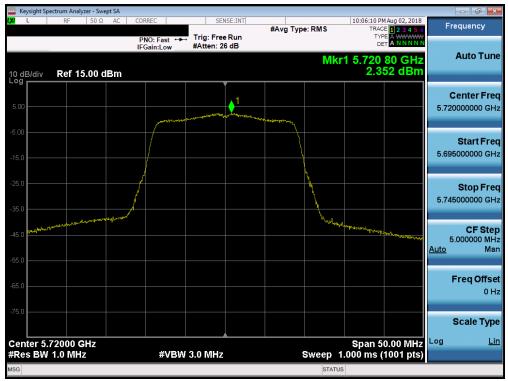
Plot 7-60. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) - Ch. 100)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 51 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 51 of 89 |
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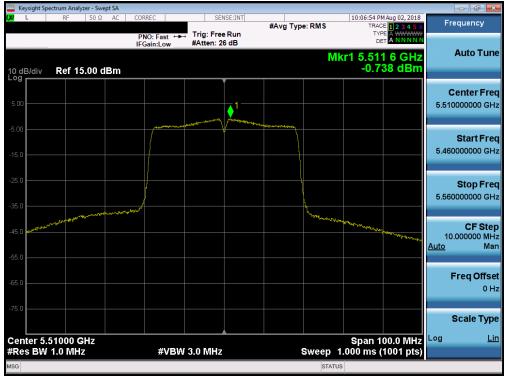
Plot 7-61. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 116)



Plot 7-62. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) - Ch. 144)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 52 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 52 of 89 |
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Plot 7-63. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)



Plot 7-64. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) - Ch. 110)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 52 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 53 of 89 |
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| 🔤 Keysight Sp | ectrum Analy: | | | | | | | | | | | | |
|----------------------|-----------------|----------|-------|---------|---------------|-------------------------|--------------|----------|--------|-------------------|-----------------------------------|---------------------------------------|----------------|
| L <mark>XI</mark> L | RF | 50 Ω | AC | CORREC | | SEI | ISE:INT | #Avg Typ | e: RMS | | PM Aug 02, 2018 CE 1 2 3 4 5 6 | Free | quency |
| | _ | | | PNO: Fa | ast ↔→ .ow | Trig: Free #Atten: 2 | | • // | | T` [| | | uto Tune |
| 10 dB/div Log | Ref 15 | .00 dB | im. | | | | | | N | 1kr1 5.70 -1.1 | 8 0 GHz 38 dBm | , , , , , , , , , , , , , , , , , , , | |
| | | | | | | | | | | | | Ce | enter Fred |
| 5.00 | | | | | | water and the second | (management | | | | | 5.7100 | 00000 GH: |
| -5.00 | | | | | | <u> </u> | /' | | | | | : | Start Free |
| -15.0 | | | | | | | | | | | | 5.6600 | 00000 GH: |
| -25.0 | | | | | | | | | | | | : | Stop Free |
| -35.0 | | | | _ | | | | | | | | 5.7600 | 00000 GH |
| -45.0 | der and a start | from and | ሊዲሥራታ | | | | | | hubrow | whether whether | | | CF Step |
| .55.0 | | | | | | | | | | are a ford of | Wy Part Mar Branch Same | 10.0 <u>Auto</u> | 00000 MH Ma |
| | | | | | | | | | | | | FI | req Offse |
| -65.0 | | | | | | | | | | | | | . он |
| -75.0 | | | | | | | | | | | | S | cale Type |
| Center 5. #Res BW | | | | | ŧv/RM | 3.0 MHz | | | Sweep | Span | 100.0 MHz (1001 pts) | Log | Lir |
| ARCS DW | 1.0 10112 | | | 1 | FV DVV | 3.0 WIN2 | | | Sweep | | (1001 pts) | | |

Plot 7-65. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) - Ch. 142)



Plot 7-66. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2C) - Ch. 106)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 54 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 54 of 89 |
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| Keysight Spectrum | ectrum Analyzer | - Swept S | | | | | | | | | | × |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|------------------------------|----------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------------------------------------------------------------------------------|----------|-----------------------|-------------------------------------------------------------------------|---------------------------------------|-----------------|
| UL | RF 5 | 50Ω 4 | P | RREC NO: Fast Gain:Low | | Free Run | #Avg Typ | e: RMS | TRAC | M Aug 02, 2018 DE 1 2 3 4 5 6 PE A WWWWW ET A N N N N N | Frequency | |
| 0 dB/div | Ref 15.0 | 0 dBi | | Gam.Low | | | | MI | kr1 5.69 -4.4 | 3 6 GHz 63 dBm | Auto Tu | In |
| 5.00 | | | | | | ▲ ¹ | | | | | Center Fr 5.690000000 G | |
| 15.0 | | | | | Interest Production of the second | | and the second | | | | Start Fi 5.590000000 G | |
| 35.0 | | | | | | | | | | | Stop Fi 5.790000000 G | |
| 15.0 | and and and an and a state of the state of t | physes of the | Alerander, ber | | | | | - marine | 13 Yuna Wanada a yana | manufun | CF St 20.000000 M <u>Auto</u> M | |
| 5.0 | | | | | | | | | | | Freq Off 0 | is)⊦ |
| | 6900 GHz | | | | | | | | Span 2 | 200.0 MHz | Scale Ty | ур <u>Li</u> |
| | 1.0 MHz | | | #VE | 3W 3.0 M | Hz | | | .000 ms (| (1001 pts) | | |
| SG | | | | | | | | STATU | S | | | |

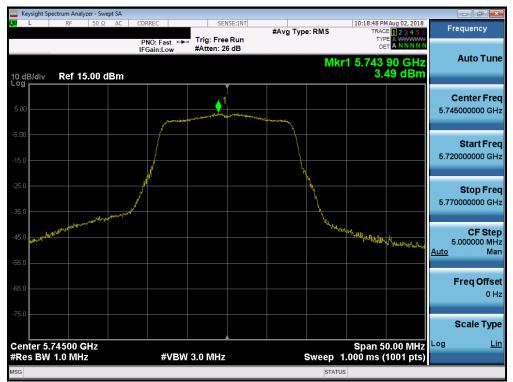
Plot 7-67. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2C) – Ch. 138)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
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| | Frequency [MHz] | Channel No. | 802.11 Mode | Data Rate [Mbps] | Measured Power Density [dBm] | Max Permissible Power Density [dBm/500kHz] | Margin [dB] |
|------|--------------------|----------------|-------------|------------------|------------------------------------|--------------------------------------------------|----------------|
| | 5745 | 149 | а | 6 | 3.49 | 30.0 | -26.51 |
| | 5785 | 157 | а | 6 | 3.42 | 30.0 | -26.58 |
| | 5825 | 165 | а | 6 | 3.45 | 30.0 | -26.55 |
| m | 5745 | 149 | n (20MHz) | 6.5/7.2 (MCS0) | 2.62 | 30.0 | -27.38 |
| Band | 5785 | 157 | n (20MHz) | 6.5/7.2 (MCS0) | 2.96 | 30.0 | -27.05 |
| ä | 5825 | 165 | n (20MHz) | 6.5/7.2 (MCS0) | 2.66 | 30.0 | -27.34 |
| | 5755 | 151 | n (40MHz) | 13.5/15 (MCS0) | -0.50 | 30.0 | -30.50 |
| | 5795 | 159 | n (40MHz) | 13.5/15 (MCS0) | -0.61 | 30.0 | -30.61 |
| | 5775 | 155 | ac (80MHz) | 29.3/32.5 (MCS0) | -3.33 | 30.0 | -33.33 |

Table 7-8. Band 3 Conducted Power Spectral Density Measurements



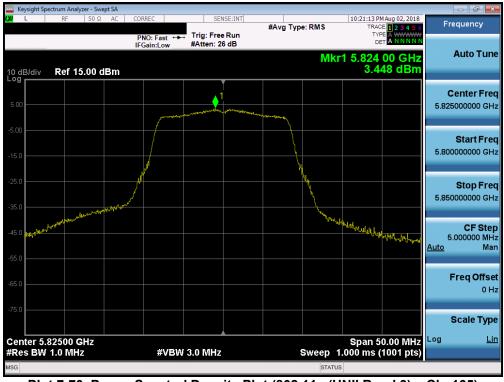
Plot 7-68. Power Spectral Density Plot (802.11a (UNII Band 3) - Ch. 149)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 56 of 90 |
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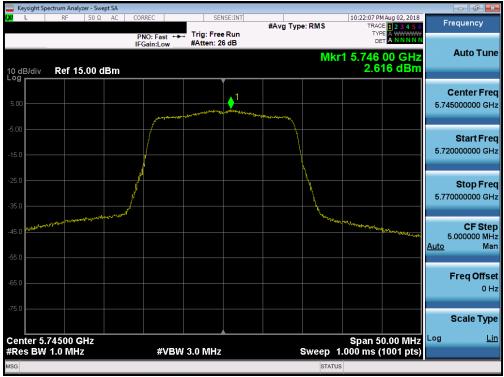




Plot 7-70. Power Spectral Density Plot (802.11a (UNII Band 3) - Ch. 165)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 57 of 90 |
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Plot 7-71. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) - Ch. 149)



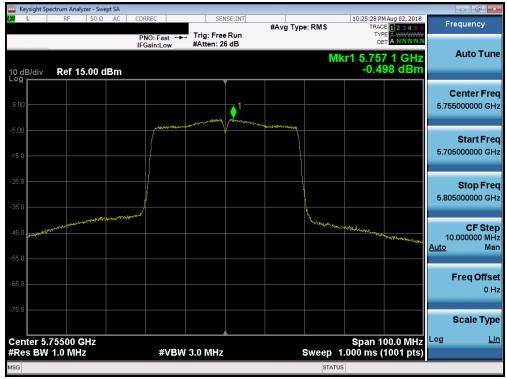
Plot 7-72. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) - Ch. 157)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|-----------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Daga 59 of 90 |
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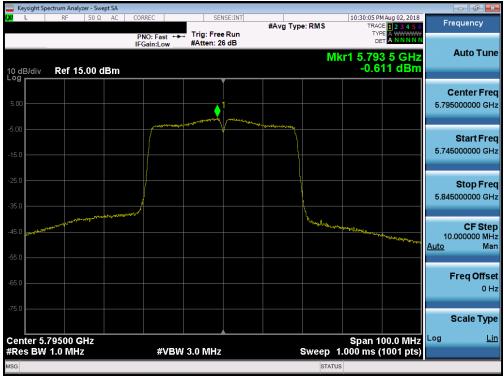
Plot 7-73. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) - Ch. 165)



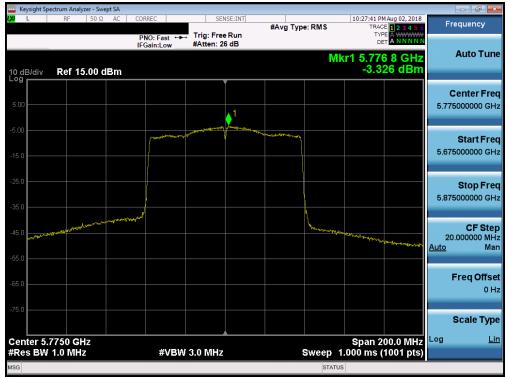
Plot 7-74. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) - Ch. 151)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 50 of 90 |
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Plot 7-75. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 159)



Plot 7-76. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 3) - Ch. 155)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 60 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 60 of 89 |
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7.6 Radiated Spurious Emission Measurements – Above 1GHz §15.407(b) §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 its maximum power control level, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies. All channels, modes (e.g. 802.11a, 802.11n (20MHz BW), 802.11n (40MHz BW), and 802.11ac (80MHz)), and modulations/data rates were investigated among all UNII bands. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

For transmitters operating in the 5.15-5.25 GHz and 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of −27 dBm/MHz.

For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of −27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at 5 MHz above or below the band edge.

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 7-9 per Section 15.209 and RSS-Gen (8.9).

| Frequency | Field Strength [μV/m] | Measured Distance [Meters] | |
|-----------------|--------------------------|-------------------------------|--|
| Above 960.0 MHz | 500 | 3 | |

Table 7-9. Radiated Limits

Test Procedures Used

ANSI C63.10-2013 – Sections 12.7.7.2, 12.7.6, 12.7.5 KDB 789033 D02 v02r01 – Section G

Test Settings

Average Measurements above 1GHz (Method AD)

- 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. Averaging type = power (RMS)
- 7. Sweep time = auto couple
- 8. Trace was averaged over 100 sweeps

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Peak Measurements above 1GHz

- 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

Peak Measurements below 1GHz

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. Span was set greater than 1MHz
- 3. RBW = 120kHz
- 4. Detector = CISPR quasi-peak
- 5. Sweep time = auto couple
- 6. Trace was allowed to stabilize

Test Setup

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

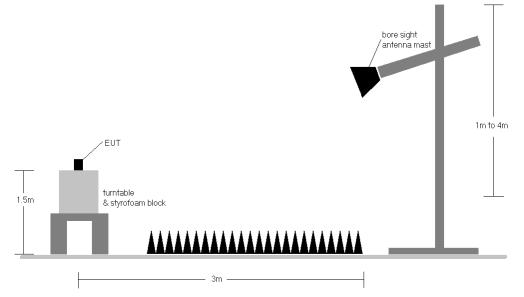


Figure 7-5. Test Instrument & Measurement Setup

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|------------------------------|------------------|---------------------------------------|--|---------------------------------|--|
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Test Notes

- 1. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-9.
- 2. All spurious emissions lying in restricted bands specified in §15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-9. All spurious emissions that do not lie in a restricted band are subject to a peak limit of -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBµV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBµV/m.
- 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.
- 8. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Sample Calculations

Determining Spurious Emissions Levels

- ο Field Strength Level [dBµV/m] = Analyzer Level [dBm] + 107 + AFCL [dB/m]
- AFCL [dB/m] = Antenna Factor [dB/m] + Cable Loss [dB]
- ο Margin [dB] = Field Strength Level [dBμV/m] Limit [dBμV/m]

Radiated Band Edge Measurement Offset

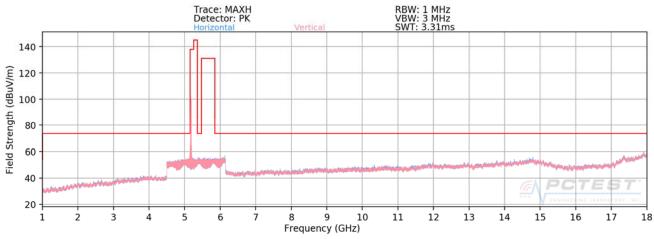
• The amplitude offset shown in the radiated restricted band edge plots in Section 7.6 was calculated using the formula:

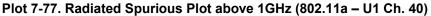
Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain

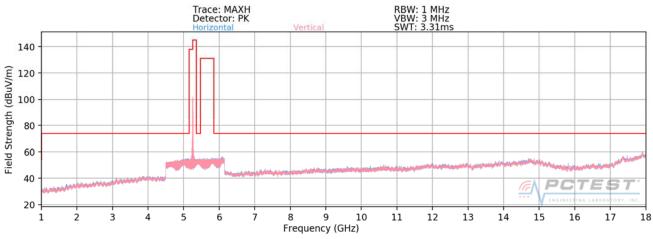
| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager | |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 62 of 90 | |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 63 of 89 | |
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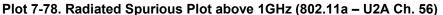


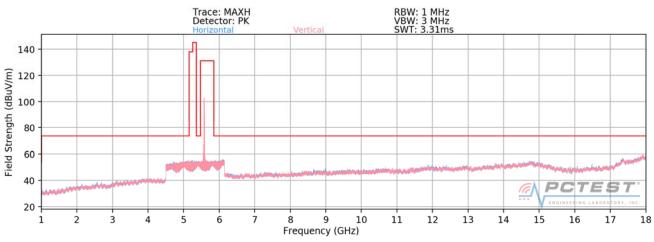
7.6.1 Radiated Spurious Emission Measurements







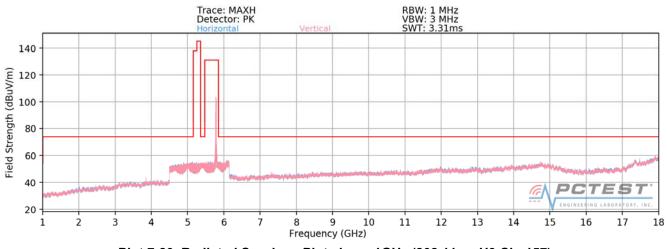


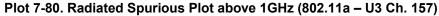


Plot 7-79. Radiated Spurious Plot above 1GHz (802.11a - U2C Ch. 116)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager | |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Page 64 of 89 | |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | | |
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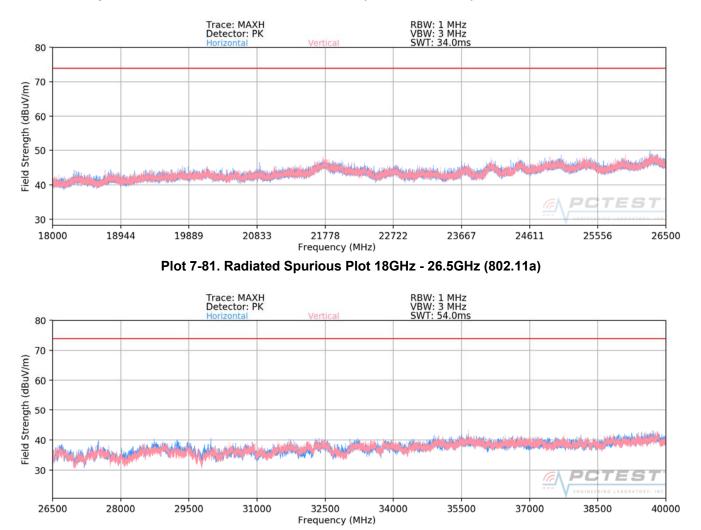






| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 65 of 90 |
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Plot 7-82. Radiated Spurious Plot 26.5GHz - 40GHz (802.11a)

Radiated Spurious Emissions Measurements (Above 18GHz)

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | Approved by: Quality Manager | | | | |
|-------------------------------------------------------------|------------------|---------------------------------------|---------------------------------|---------------|--|--|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dege 66 of 90 | | | |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 66 of 89 | | | |
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Radiated Spurious Emission Measurements §15.407(b) §15.205 & §15.209; RSS-Gen [8.9]

| Worst Case Mode: | 802.11a |
|---------------------------|--------------|
| Worst Case Transfer Rate: | 6Mbps |
| Distance of Measurements: | 1 & 3 Meters |
| Operating Frequency: | 5180MHz |
| Channel: | 36 |
| | |

| | 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] |
|---|--------------------|----------|-----------------------|---------------------------|----------------------------------|----------------------------|----------------|------------------------------------------|-------------------------------|-------------------|----------------|
| | 10360.00 | Peak | V | 107 | 17 | -66.73 | 10.68 | 0.00 | 50.95 | 68.20 | -17.25 |
| * | 15540.00 | Average | V | - | - | -81.03 | 13.80 | 0.00 | 39.77 | 53.98 | -14.21 |
| * | 15540.00 | Peak | V | - | - | -69.97 | 13.80 | 0.00 | 50.83 | 73.98 | -23.15 |
| * | 20720.00 | Average | V | - | - | -71.10 | 7.94 | -9.54 | 34.30 | 53.98 | -19.68 |
| * | 20720.00 | Peak | V | - | - | -59.48 | 7.94 | -9.54 | 45.92 | 73.98 | -28.06 |
| | 25900.00 | Peak | V | - | - | -56.90 | 8.46 | -9.54 | 49.02 | 68.20 | -19.18 |

Table 7-10. Radiated Measurements

Worst Case Mode: Worst Case Transfer Rate: Distance of Measurements: Operating Frequency: Channel:

| 802.11a | |
|--------------|--|
| 6Mbps | |
| 1 & 3 Meters | |
| 5200MHz | |
| 40 | |

| | 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] |
|---|--------------------|----------|-----------------------|---------------------------|----------------------------------|----------------------------|----------------|------------------------------------------|-------------------------------|-------------------|----------------|
| | 10400.00 | Peak | V | 107 | 28 | -67.56 | 10.90 | 0.00 | 50.34 | 68.20 | -17.86 |
| * | 15600.00 | Average | V | - | - | -81.24 | 13.62 | 0.00 | 39.38 | 53.98 | -14.60 |
| * | 15600.00 | Peak | V | - | - | -69.70 | 13.62 | 0.00 | 50.92 | 73.98 | -23.06 |
| * | 20800.00 | Average | V | - | - | -71.05 | 7.95 | -9.54 | 34.36 | 53.98 | -19.62 |
| * | 20800.00 | Peak | V | - | - | -59.73 | 7.95 | -9.54 | 45.68 | 73.98 | -28.30 |
| | 26000.00 | Peak | V | - | - | -57.69 | 8.60 | -9.54 | 48.37 | 68.20 | -19.83 |

Table 7-11. Radiated Measurements

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager | |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 67 of 90 | |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 67 of 89 | |
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| Worst Case Mode: | 802.11a |
|---------------------------|--------------|
| Worst Case Transfer Rate: | 6Mbps |
| Distance of Measurements: | 1 & 3 Meters |
| Operating Frequency: | 5240MHz |
| Channel: | 48 |
| | |

| | 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] |
|---|--------------------|----------|-----------------------|---------------------------|----------------------------------|----------------------------|----------------|------------------------------------------|-------------------------------|-------------------|----------------|
| | 10480.00 | Peak | V | 335 | 34 | -68.33 | 11.30 | 0.00 | 49.97 | 68.20 | -18.23 |
| * | 15720.00 | Average | V | - | - | -81.09 | 12.07 | 0.00 | 37.98 | 53.98 | -16.00 |
| * | 15720.00 | Peak | V | - | - | -69.88 | 12.07 | 0.00 | 49.19 | 73.98 | -24.79 |
| * | 20960.00 | Average | V | - | - | -71.48 | 7.91 | -9.54 | 33.89 | 53.98 | -20.09 |
| * | 20960.00 | Peak | V | - | - | -59.55 | 7.91 | -9.54 | 45.82 | 73.98 | -28.16 |
| | 26200.00 | Peak | V | - | - | -56.97 | 8.62 | -9.54 | 49.11 | 68.20 | -19.09 |

Table 7-12. Radiated Measurements

Worst Case Mode: Worst Case Transfer Rate: Distance of Measurements: Operating Frequency: Channel: 802.11a 6Mbps 1 & 3 Meters 5260MHz 52

| | 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] |
|---|--------------------|----------|-----------------------|---------------------------|----------------------------------|----------------------------|----------------|------------------------------------------|-------------------------------|-------------------|----------------|
| | 10520.00 | Peak | V | - | - | -68.87 | 10.99 | 0.00 | 49.12 | 68.20 | -19.08 |
| * | 15780.00 | Average | V | - | - | -81.15 | 11.07 | 0.00 | 36.92 | 53.98 | -17.06 |
| * | 15780.00 | Peak | V | - | - | -69.95 | 11.07 | 0.00 | 48.12 | 73.98 | -25.86 |
| * | 21040.00 | Average | V | - | - | -71.24 | 7.92 | -9.54 | 34.14 | 53.98 | -19.84 |
| * | 21040.00 | Peak | V | - | - | -59.26 | 7.92 | -9.54 | 46.12 | 73.98 | -27.86 |
| | 26300.00 | Peak | V | - | - | -56.18 | 8.73 | -9.54 | 50.01 | 68.20 | -18.19 |

Table 7-13. Radiated Measurements

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Daga 68 of 90 |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 68 of 89 |
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| Worst Case Mode: | 802.11a | | | |
|---------------------------|--------------|--|--|--|
| Worst Case Transfer Rate: | 6Mbps | | | |
| Distance of Measurements: | 1 & 3 Meters | | | |
| Operating Frequency: | 5280MHz | | | |
| Channel: | 56 | | | |

| | 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] |
|---|--------------------|----------|-----------------------|---------------------------|----------------------------------|----------------------------|----------------|------------------------------------------|-------------------------------|-------------------|----------------|
| | 10560.00 | Peak | V | - | - | -68.38 | 11.16 | 0.00 | 49.78 | 68.20 | -18.42 |
| * | 15840.00 | Average | V | - | - | -80.60 | 11.20 | 0.00 | 37.60 | 53.98 | -16.38 |
| * | 15840.00 | Peak | V | - | - | -69.38 | 11.20 | 0.00 | 48.82 | 73.98 | -25.16 |
| * | 21120.00 | Average | V | - | - | -70.64 | 7.96 | -9.54 | 34.78 | 53.98 | -19.20 |
| * | 21120.00 | Peak | V | - | - | -59.43 | 7.96 | -9.54 | 45.99 | 73.98 | -27.99 |
| | 26400.00 | Peak | V | - | - | -56.70 | 8.94 | -9.54 | 49.70 | 68.20 | -18.50 |

Table 7-14. Radiated Measurements

Worst Case Mode: Worst Case Transfer Rate: Distance of Measurements: Operating Frequency: Channel:

802.11a 6Mbps 1 & 3 Meters 5320MHz 64

| | 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] |
|---|--------------------|----------|-----------------------|---------------------------|----------------------------------|----------------------------|----------------|------------------------------------------|-------------------------------|-------------------|----------------|
| * | 10640.00 | Average | V | - | - | -80.01 | 11.47 | 0.00 | 38.46 | 53.98 | -15.52 |
| * | 10640.00 | Peak | V | - | - | -67.91 | 11.47 | 0.00 | 50.56 | 73.98 | -23.42 |
| * | 15960.00 | Average | V | - | - | -80.22 | 12.78 | 0.00 | 39.56 | 53.98 | -14.42 |
| * | 15960.00 | Peak | V | - | - | -68.73 | 12.78 | 0.00 | 51.05 | 73.98 | -22.93 |
| * | 21280.00 | Average | V | - | - | -70.27 | 8.04 | -9.54 | 35.23 | 53.98 | -18.75 |
| * | 21280.00 | Peak | V | - | - | -59.08 | 8.04 | -9.54 | 46.42 | 73.98 | -27.56 |
| | 26600.00 | Peak | V | - | - | -48.84 | -8.30 | -9.54 | 40.31 | 68.20 | -27.89 |

Table 7-15. Radiated Measurements

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager | | | | | | |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|--|--|--|--|--|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 60 of 90 | | | | | | |
| 1M1808100154-06.ZNF | 7/31 - 8/21/2018 | Portable Handset | | Page 69 of 89 | | | | | | |
| © 2010 DOTECT Engineering La | | | | | | | | | | |



| Worst Case Mode: | 802.11a |
|---------------------------|--------------|
| Worst Case Transfer Rate: | 6Mbps |
| Distance of Measurements: | 1 & 3 Meters |
| Operating Frequency: | 5500MHz |
| Channel: | 100 |

| | 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] |
|---|--------------------|----------|-----------------------|---------------------------|----------------------------------|----------------------------|----------------|------------------------------------------|-------------------------------|-------------------|----------------|
| * | 11000.00 | Average | V | - | - | -80.51 | 11.57 | 0.00 | 38.06 | 53.98 | -15.92 |
| * | 11000.00 | Peak | V | - | - | -68.92 | 11.57 | 0.00 | 49.65 | 73.98 | -24.33 |
| | 16500.00 | Peak | V | - | - | -69.21 | 13.23 | 0.00 | 51.02 | 68.20 | -17.18 |
| | 22000.00 | Peak | V | - | - | -58.44 | 8.43 | -9.54 | 47.44 | 68.20 | -20.76 |
| | 27500.00 | Peak | V | - | - | -48.47 | -8.80 | -9.54 | 40.19 | 68.20 | -28.01 |

| able 7-1 | 6. Radiated | Measurements |
|----------|-------------|--------------|
| able 7-1 | 6. Radiated | Measurements |

Worst Case Mode: Worst Case Transfer Rate: Distance of Measurements: Operating Frequency: Channel: 802.11a 6Mbps 1 & 3 Meters 5580MHz 116

| | 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] |
|---|--------------------|----------|-----------------------|---------------------------|----------------------------------|----------------------------|----------------|------------------------------------------|-------------------------------|-------------------|----------------|
| * | 11160.00 | Average | V | - | - | -80.53 | 11.17 | 0.00 | 37.64 | 53.98 | -16.34 |
| * | 11160.00 | Peak | V | - | - | -69.44 | 11.17 | 0.00 | 48.73 | 73.98 | -25.25 |
| | 16740.00 | Peak | V | - | - | -69.45 | 13.05 | 0.00 | 50.60 | 68.20 | -17.60 |
| * | 22320.00 | Average | V | - | - | -70.00 | 8.08 | -9.54 | 35.54 | 53.98 | -18.44 |
| * | 22320.00 | Peak | V | - | - | -58.06 | 8.08 | -9.54 | 47.48 | 73.98 | -26.50 |
| | 27900.00 | Peak | V | - | - | -49.68 | -9.08 | -9.54 | 38.70 | 68.20 | -29.50 |

Table 7-17. Radiated Measurements

| | C DOTEOT | MEASUREMENT REPORT | | Approved by: | |
|------------------------------|------------------|--------------------|------|------------------|--|
| FCC ID: ZNFH871S | | (CERTIFICATION) | 🕒 LG | Quality Manager | |
| Test Report S/N: | Test Dates: | EUT Type: | | Dega 70 of 90 | |
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| Worst Case Mode: | 802.11a | | |
|---------------------------|--------------|--|--|
| Worst Case Transfer Rate: | 6Mbps | | |
| Distance of Measurements: | 1 & 3 Meters | | |
| Operating Frequency: | 5720MHz | | |
| Channel: | 144 | | |

| | 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] |
|---|--------------------|----------|-----------------------|---------------------------|----------------------------------|----------------------------|----------------|------------------------------------------|-------------------------------|-------------------|----------------|
| * | 11440.00 | Average | V | - | - | -80.85 | 12.38 | 0.00 | 38.53 | 53.98 | -15.45 |
| * | 11440.00 | Peak | V | - | - | -69.80 | 12.38 | 0.00 | 49.58 | 73.98 | -24.40 |
| | 17160.00 | Peak | V | - | - | -69.60 | 13.94 | 0.00 | 51.34 | 68.20 | -16.86 |
| * | 22880.00 | Average | V | - | - | -70.50 | 8.37 | -9.54 | 35.33 | 53.98 | -18.65 |
| * | 22880.00 | Peak | V | - | - | -59.37 | 8.37 | -9.54 | 46.46 | 73.98 | -27.52 |
| | 28600.00 | Peak | V | - | - | -48.81 | -8.95 | -9.54 | 39.70 | 68.20 | -28.50 |

 Table 7-18. Radiated Measurements

Worst Case Mode: Worst Case Transfer Rate: Distance of Measurements: Operating Frequency: Channel: 802.11a 6Mbps 1 & 3 Meters 5745MHz 149

| | 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] |
|---|--------------------|----------|-----------------------|---------------------------|----------------------------------|----------------------------|----------------|------------------------------------------|-------------------------------|-------------------|----------------|
| * | 11490.00 | Average | V | - | - | -80.47 | 10.99 | 0.00 | 37.52 | 53.98 | -16.46 |
| * | 11490.00 | Peak | V | - | - | -69.11 | 10.99 | 0.00 | 48.88 | 73.98 | -25.10 |
| | 17235.00 | Peak | V | - | - | -69.70 | 16.64 | 0.00 | 53.94 | 68.20 | -14.26 |
| * | 22980.00 | Average | V | - | - | -71.23 | 8.16 | -9.54 | 34.39 | 53.98 | -19.59 |
| * | 22980.00 | Peak | V | - | - | -59.92 | 8.16 | -9.54 | 45.70 | 73.98 | -28.28 |
| | 28725.00 | Peak | V | - | - | -47.37 | -9.24 | -9.54 | 40.85 | 68.20 | -27.35 |

Table 7-19. Radiated Measurements

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|--|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Daga 71 of 90 |
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| Worst Case Mode: | 802.11a | | |
|---------------------------|--------------|--|--|
| Worst Case Transfer Rate: | 6Mbps | | |
| Distance of Measurements: | 1 & 3 Meters | | |
| Operating Frequency: | 5785MHz | | |
| Channel: | 157 | | |

| | 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] |
|---|--------------------|----------|-----------------------|---------------------------|----------------------------------|----------------------------|----------------|------------------------------------------|-------------------------------|-------------------|----------------|
| * | 11570.00 | Average | V | - | - | -80.08 | 11.81 | 0.00 | 38.73 | 53.98 | -15.25 |
| * | 11570.00 | Peak | V | - | - | -68.13 | 11.81 | 0.00 | 50.68 | 73.98 | -23.30 |
| | 17355.00 | Peak | V | - | - | -68.67 | 19.70 | 0.00 | 58.03 | 68.20 | -10.17 |
| | 23140.00 | Peak | V | - | - | -59.35 | 8.37 | -9.54 | 46.48 | 68.20 | -21.72 |
| | 28925.00 | Peak | V | - | - | -47.29 | -9.65 | -9.54 | 40.52 | 68.20 | -27.68 |

Table 7-20. Radiated Measurements

Worst Case Mode: Worst Case Transfer Rate: Distance of Measurements: Operating Frequency: Channel: 802.11a 6Mbps 1 & 3 Meters 5825MHz 165

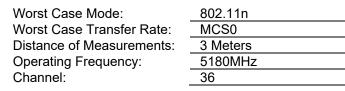
| | Frequency [MHz] | Detector | Ant. Pol. [H/V] | Antenna Height [cm] | Turntable Azimuth [degree] | Analyzer Level [dBm] | AFCL [dB/m] | Distance Correction Factor [dB] | Field Strength [dBµV/m] | Limit [dBµV/m] | Margin [dB] |
|---|--------------------|----------|-----------------------|---------------------------|----------------------------------|----------------------------|----------------|------------------------------------------|-------------------------------|-------------------|----------------|
| * | 11650.00 | Average | V | - | - | -79.96 | 11.32 | 0.00 | 38.36 | 53.98 | -15.62 |
| * | 11650.00 | Peak | V | - | - | -68.67 | 11.32 | 0.00 | 49.65 | 73.98 | -24.33 |
| | 17475.00 | Peak | V | - | - | -69.29 | 19.69 | 0.00 | 57.40 | 68.20 | -10.80 |
| | 23300.00 | Peak | V | - | - | -59.75 | 8.50 | -9.54 | 46.21 | 68.20 | -21.99 |
| | 29125.00 | Peak | V | - | - | -47.68 | -9.87 | -9.54 | 39.91 | 68.20 | -28.29 |

Table 7-21. Radiated Measurements

| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕑 LG | Approved by: Quality Manager |
|------------------------------|------------------|---------------------------------------|------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: Portable Handset | | Dago 72 of 90 |
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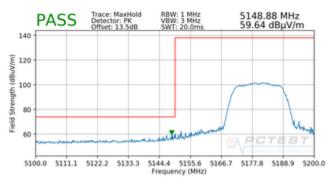


7.6.2 Radiated Band Edge Measurements (20MHz BW) §15.407(b.1)(b.2) §15.205 §15.209; RSS-Gen [8.9]; RSS-Gen [8.9]

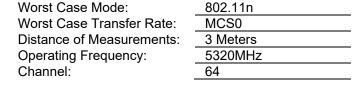


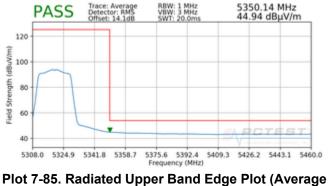


Plot 7-83. Radiated Lower Band Edge Plot (Average – UNII Band 1)

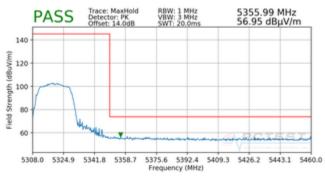


Plot 7-84. Radiated Lower Band Edge Plot (Peak – UNII Band 1)







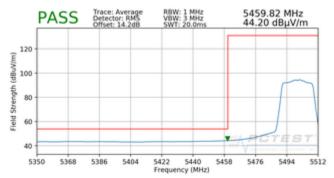




| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 72 of 90 |
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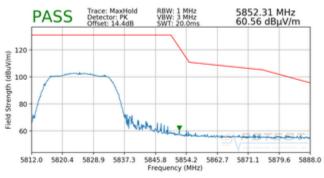


Worst Case Mode:802.11nWorst Case Transfer Rate:MCS0Distance of Measurements:3 MetersOperating Frequency:5500MHzChannel:100

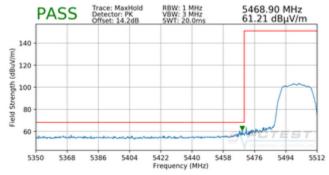


Plot 7-87. Radiated Lower Band Edge Plot (Average – UNII Band 2C)

| Worst Case Mode: | 802.11n |
|---------------------------|----------|
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5825MHz |
| Channel: | 165 |



Plot 7-89. Radiated Upper Band Edge Plot (Peak – UNII Band 3)



Plot 7-88. Radiated Lower Band Edge Plot (Peak – UNII Band 2C)

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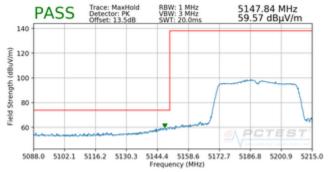


7.6.3 Radiated Band Edge Measurements (40MHz BW) §15.407(b.1)(b.2) §15.205 §15.209; RSS-Gen [8.9]

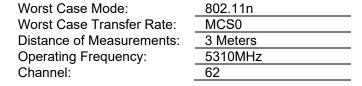
| Worst Case Mode: | 802.11n |
|---------------------------|----------|
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5190MHz |
| Channel: | 38 |



Plot 7-90. Radiated Lower Band Edge Plot (Average – UNII Band 1)

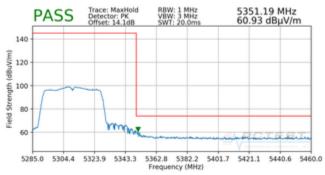










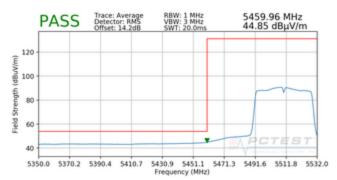




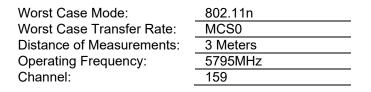
| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
|--------------------------------------------|------------------|---------------------------------------|------------------|---------------------------------|
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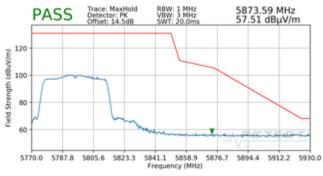


Worst Case Mode:802.11nWorst Case Transfer Rate:MCS0Distance of Measurements:3 MetersOperating Frequency:5510MHzChannel:102

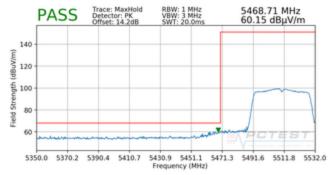


Plot 7-94. Radiated Lower Band Edge Plot (Average – UNII Band 2C)





Plot 7-96. Radiated Upper Band Edge Plot (Peak – UNII Band 3)





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7.6.4 Radiated Band Edge Measurements (80MHz BW) §15.407(b.1)(b.2) §15.205 §15.209; RSS-Gen [8.9]

| Worst Case Mode: | 802.11ac |
|---------------------------|----------|
| Worst Case Transfer Rate: | MCS0 |
| Distance of Measurements: | 3 Meters |
| Operating Frequency: | 5210MHz |
| Channel: | 42 |



Plot 7-97. Radiated Lower Band Edge Plot (Average - UNII Band 1)



RBW: 1 MHz VBW: 3 MHz SWT: 20.0m

5146.08 MHz 61.92 dBµV/m

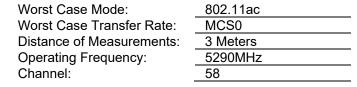
Trace: MaxHold Detector: PK Offset: 13.5dB

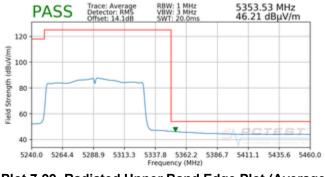
Detector: Offset: 13

PASS

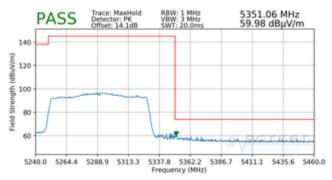
140













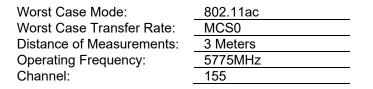
| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | 🕒 LG | Approved by: Quality Manager |
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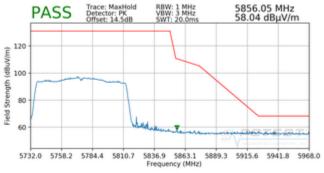


Worst Case Mode:802.11acWorst Case Transfer Rate:MCS0Distance of Measurements:3 MetersOperating Frequency:5530MHzChannel:106

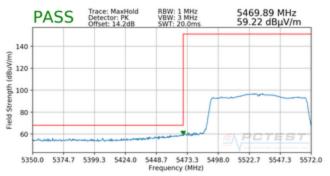


Plot 7-101. Radiated Lower Band Edge Plot (Average – UNII Band 2C)





Plot 7-103. Radiated Upper Band Edge Plot (Peak – UNII Band 3)





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7.7 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 7-22 per Section 15.209 and RSS-Gen (8.9).

| Frequency | Field Strength [μV/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 7-22. 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

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Test Setup

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

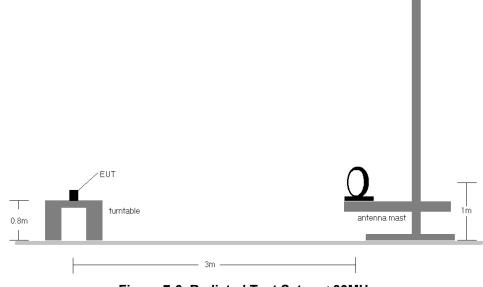
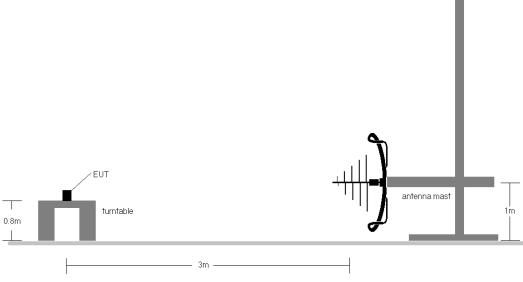
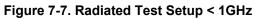


Figure 7-6. Radiated Test Setup < 30MHz





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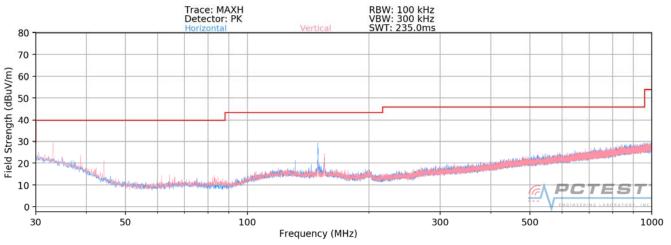


- 1. All emissions lying in restricted bands specified in §15.205 and RSS-Gen (8.10) are below the limit shown in Table 7-22.
- 2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
- 3. 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.
- 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.

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



Plot 7-104. Radiated Spurious Plot below 1GHz (802.11a - U3 Ch. 157)

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7.8 Line-Conducted Test Data §15.407; RSS-Gen [8.8]

Test Overview and Limit

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN 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 conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.

All conducted emissions must not exceed the limits shown in the table below, per Section 15.207 and RSS-Gen (8.8).

| Frequency of emission | Conducted Limit (dBµV) | | | | | |
|-----------------------|------------------------|-----------|--|--|--|--|
| (MHz) | Quasi-peak | Average | | | | |
| 0.15 – 0.5 | 66 to 56* | 56 to 46* | | | | |
| 0.5 – 5 | 56 | 46 | | | | |
| 5 – 30 | 60 | 50 | | | | |

Table 7-23. Conducted Limits

*Decreases with the logarithm of the frequency.

Test Procedures Used

ANSI C63.10-2013, Section 6.2

Test Settings

Quasi-Peak Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the spurious emission of interest
- 2. RBW = 9kHz (for emissions from 150kHz 30MHz)
- 3. Detector = quasi-peak
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

Average Field Strength Measurements

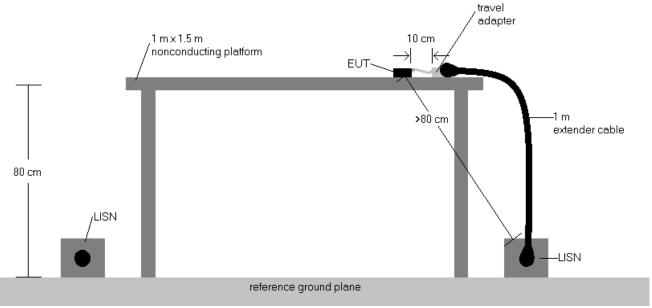
- 1. Analyzer center frequency was set to the frequency of the spurious emission of interest
- 2. RBW = 9kHz (for emissions from 150kHz 30MHz)
- 3. Detector = RMS
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

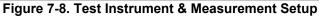
| FCC ID: ZNFH871S | | MEASUREMENT REPORT (CERTIFICATION) | Approved by: Quality Manager |
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Test Setup

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



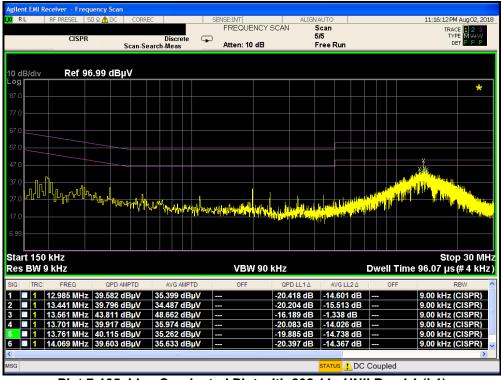


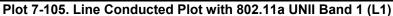
Test Notes

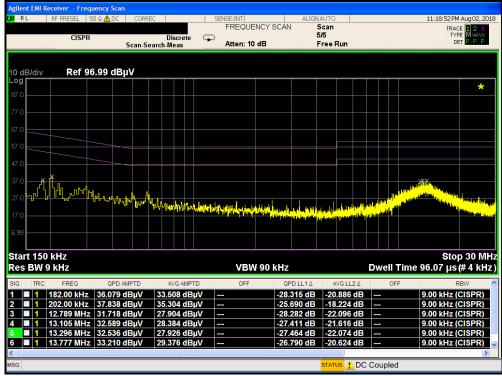
- All modes of operation were investigated and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
- 2. The limit for an intentional radiator from 150kHz to 30MHz are specified in 15.207 and RSS-Gen (8.8).
- 3. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
- 4. QP/AV Level (dB μ V) = QP/AV Analyzer/Receiver Level (dB μ V) + Corr. (dB)
- 5. Margin (dB) = QP/AV Limit (dB μ V) QP/AV Level (dB μ V)
- 6. Traces shown in plot are made using a peak detector.
- 7. Deviations to the Specifications: None.

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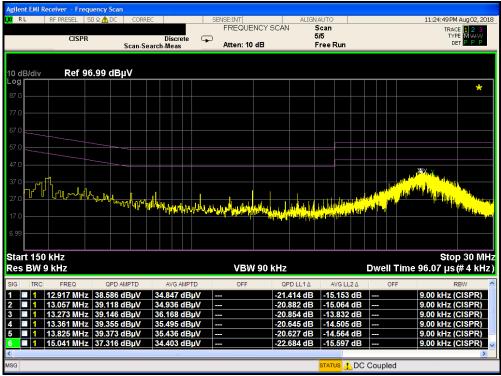




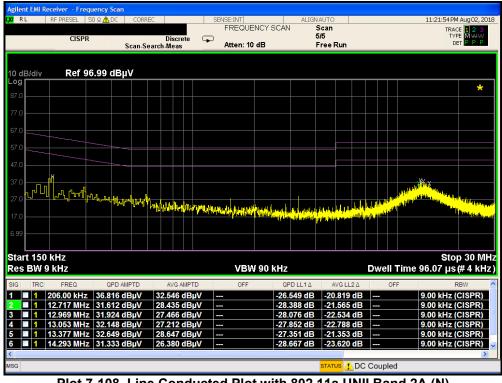
Plot 7-106. Line Conducted Plot with 802.11a UNII Band 1 (N)

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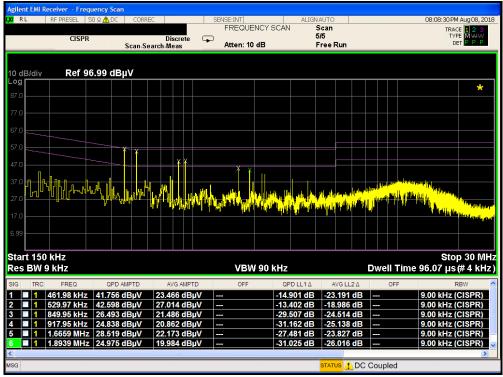
Plot 7-107. Line Conducted Plot with 802.11a UNII Band 2A (L1)



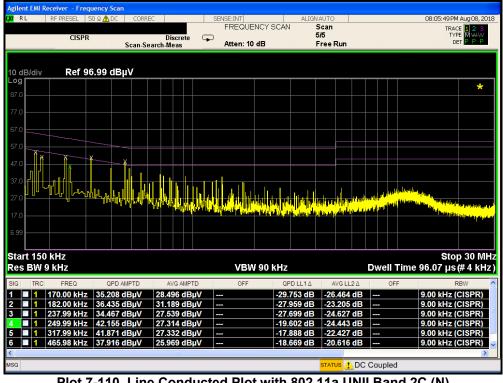
Plot 7-108. Line Conducted Plot with 802.11a UNII Band 2A (N)

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Plot 7-109. Line Conducted Plot with 802.11a UNII Band 2C (L1)



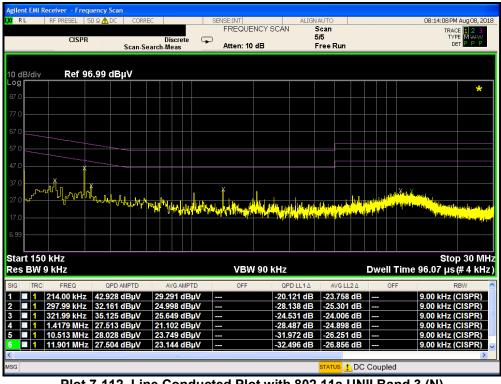
Plot 7-110. Line Conducted Plot with 802.11a UNII Band 2C (N)

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| s BW 9 | kHz | | | | | | | | | VB۱ | V 90 | kHz | | | | | D٧ | /ell | Time | 96. | 07 µs | ;(#4 kl | |
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| | 186.00 kHz | | 979 dB | | | | 6 dE | | | | | | 234 dI | | 4.39 | | | | | 9.00 |) kHz | (CISPR |) |
| | 98.00 kHz | | 28 dE | | | | 8 dE | | | | | _ | 467 di | | 25.23 | | | | | | | (CISPR | |
| | 229.99 kHz 237.99 kHz | | / <u>35 dB</u> 909 dB | | | | 3 dE 6 dE | | | | | | 715 di 257 di | | 21.08 25.70 | | | | | | | (CISPR) | |
| | 297.99 kHz 297.99 kHz | | /39 dB | | | | 7 dE | | | | | | 267 de 560 de | | 22.72 | | - | | | | | (CISPR | |
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Plot 7-111. Line Conducted Plot with 802.11a UNII Band 3 (L1)



Plot 7-112. Line Conducted Plot with 802.11a UNII Band 3 (N)

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8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFH871S** is in compliance with Part 15 Subpart C (15.407) of the FCC Rules.

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