

PCTEST ENGINEERING LABORATORY, INC.

7185 Oakland Mills Road, Columbia, MD 21046 USA

Tel. 410.290.6652 / Fax 410.290.6654

<http://www.pctestlab.com>



MEASUREMENT REPORT FCC Part 15.407 UNII 802.11a/n

Applicant Name:

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

Date of Testing:

01/23 - 02/02/2017

Test Site/Location:

PCTEST Lab, Columbia, MD, USA

Test Report Serial No.:

1M1701170029-05.ZNF

FCC ID: ZNFVS501

APPLICANT: LG Electronics MobileComm U.S.A

Application Type: Class II Permissive Change

Model: LG-VS501

Additional Model(s): LGVS501, VS501

EUT Type: Portable Handset

FCC Classification: Unlicensed National Information Infrastructure (UNII)

FCC Rule Part(s): Part 15.407

Test Procedure(s): KDB 789033 D02 v01r03

Class II Permissive Change: Please see FCC change document

Original Grant Date: 01/20/2017

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 KDB 789033 D02 v01r03. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.


Randy Ortanez
President



FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 1 of 45

© 2017 PCTEST Engineering Laboratory, Inc.

V 6.2

01/09/2016

© 2015 PCTEST Engineering Laboratory, Inc. 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@PCTESTLAB.COM.

TABLE OF CONTENTS

FCC PART 15.407 MEASUREMENT REPORT	3
1.0 INTRODUCTION	4
1.1 Scope	4
1.2 PCTEST Test Location	4
2.0 PRODUCT INFORMATION	5
2.1 Equipment Description	5
2.2 Device Capabilities	5
2.3 Test Configuration	6
2.4 EMI Suppression Device(s)/Modifications	6
3.0 DESCRIPTION OF TESTS	7
3.1 Evaluation Procedure	7
3.2 Radiated Emissions	7
3.3 Environmental Conditions	7
4.0 ANTENNA REQUIREMENTS	8
5.0 MEASUREMENT UNCERTAINTY	9
6.0 TEST EQUIPMENT CALIBRATION DATA	10
7.0 TEST RESULTS	11
7.1 Summary	11
7.2 Radiated Spurious Emission Measurements – Above 1GHz	12
7.7.1 Radiated Spurious Emission Measurements	15
7.7.2 Radiated Band Edge Measurements (20MHz BW)	27
7.7.3 Radiated Band Edge Measurements (40MHz BW)	34
7.3 Radiated Spurious Emissions Measurements – Below 1GHz	41
8.0 CONCLUSION	45

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 2 of 45



MEASUREMENT REPORT

FCC Part 15.407



§ 2.1033 General Information

APPLICANT: LG Electronics MobileComm U.S.A

APPLICANT ADDRESS: 1000 Sylvan Avenue
Englewood Cliffs, NJ 07632, United States

TEST SITE: PCTEST ENGINEERING LABORATORY, INC.

TEST SITE ADDRESS: 7185 Oakland Mills Road, Columbia, MD 21046 USA

FCC RULE PART(S): Part 15.407

BASE MODEL: LG-VS501

FCC ID: ZNFVS501

FCC CLASSIFICATION: Unlicensed National Information Infrastructure (UNII)

Test Device Serial No.: 00486 ☐ Production ☒ Pre-Production ☐ Engineering

DATE(S) OF TEST: 01/23 - 02/02/2017

TEST REPORT S/N: 1M1701170029-05.ZNF

Test Facility / Accreditations

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



- PCTEST facility is an FCC registered (PCTEST Reg. No. 159966) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (2451B-1).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451B-1) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 3 of 45

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 Industry Canada Certification and Engineering Bureau.

1.2 PCTEST Test Location

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Intern'l (BWI) airport, the city of Baltimore and the Washington, DC area. (See Figure 1-1).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The site coordinates are 39° 10'23" N latitude and 76° 49'50" W longitude. The facility is 0.4 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2014 on January 22, 2015.

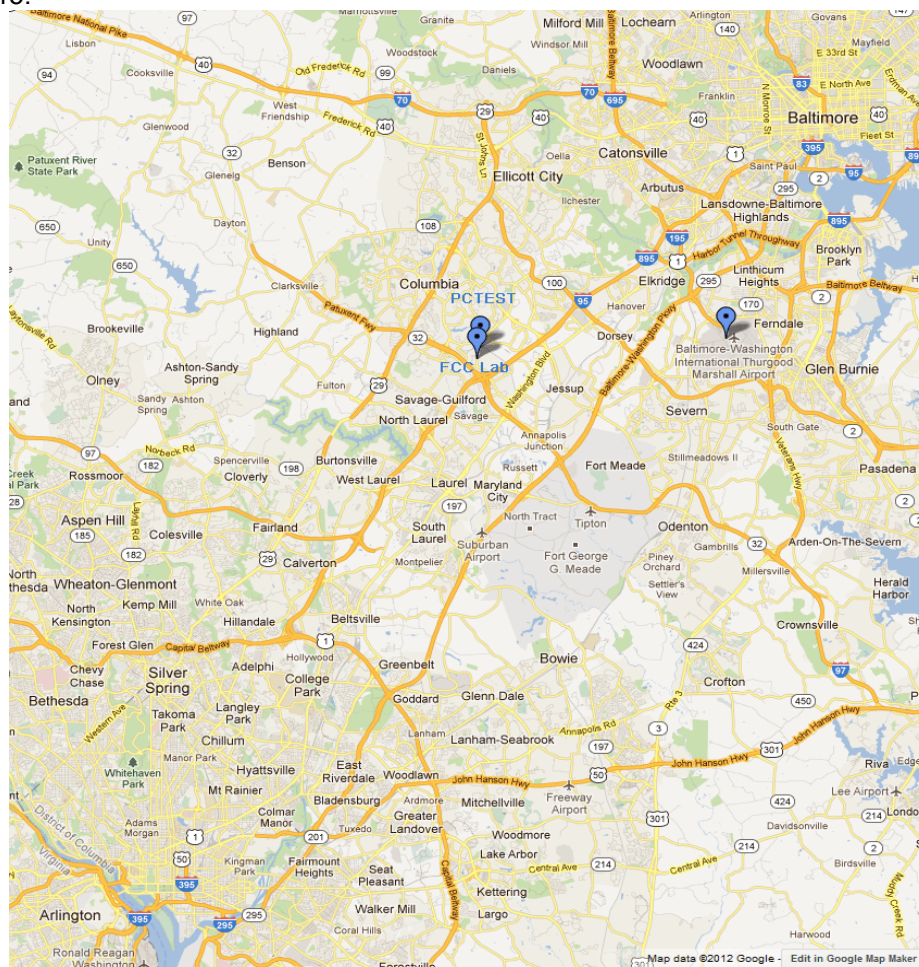


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 4 of 45

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFVS501**. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter.

2.2 Device Capabilities

This device contains the following capabilities:

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

Band 1		Band 2A		Band 2C		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	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 (20MHz) Frequency / Channel Operations

Band 1		Band 2A		Band 2C		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
38	5190	54	5270	102	5510	151	5755
:	:	:	:	:	:	:	:
46	5230	62	5310	110	5500		
				:	:		
				142	5710	159	5795

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

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 5 of 45

Notes:

1. 5GHz NII operation is possible in 20MHz, and 40MHz 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 KDB 789033 D02 v01r03. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Maximum Achievable Duty Cycles		
802.11 Mode/Band		Duty Cycle [%]
		ANT1
5GHz	a	99.2
	n (HT20)	99.1
	n (HT40)	98.5

Table 2-3. Maximum Achievable 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)

2.3 Test Configuration

The EUT was tested per the guidance of KDB 789033 D02 v01r03. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing. See Section 3.2 for radiated emissions test setups.

2.4 EMI Suppression Device(s)/Modifications

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

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 6 of 45

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 v01r03 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

3.2 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. A raised turntable is used for radiated measurement. It is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. 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. A 72.4cm high PVC support structure is placed on top of the turntable. A 3" (~7.6cm) sheet of high density polystyrene is used as the table top and is placed on top of the PVC supports to bring the total height of the table to 80cm. For measurements above 1GHz, a high density expanded polystyrene block 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(b)(1) 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.

3.3 Environmental Conditions

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

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 7 of 45

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.

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 8 of 45

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 data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty ($\pm$ dB)
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 9 of 45

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 C63.5-2006.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	7/11/2016	Annual	7/11/2017	RE1
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	7/30/2015	Biennial	7/30/2017	121034
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	7/6/2016	Annual	7/6/2017	441119
Com-Power	PAM-118A	Pre-Amplifier	7/26/2016	Annual	7/26/2017	551080
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
Huber+Suhner	Sucoflex 102A	40GHz Radiated Cable	4/26/2016	Annual	4/26/2017	251425001
K & L	11SH10-3075/U18000	High Pass Filter	7/11/2016	Annual	7/11/2017	11SH10-3075/U18000-2
K & L	11SH10-6000/T18000	High Pass Filter	7/11/2016	Annual	7/11/2017	11SH10-6000/T18000-1
PCTEST	-	EMC Switch System	7/11/2016	Annual	7/11/2017	NM1
PCTEST	-	EMC Switch System	7/6/2016	Annual	7/6/2017	NM2
Rhode & Schwarz	TS-PR18	Pre-Amplifier	7/6/2016	Annual	7/6/2017	101622
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/16/2016	Annual	5/16/2017	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/15/2016	Annual	7/15/2017	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	7/27/2016	Annual	7/27/2017	103200
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	3/7/2016	Annual	3/7/2017	100040
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	3/7/2016	Annual	3/7/2017	100037
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/2/2016	Biennial	3/2/2018	N/A
Sunol	DRH-118	Horn Antenna (1-18GHz)	7/30/2015	Biennial	7/30/2017	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	3/14/2016	Biennial	3/14/2018	A051107

Table 6-1. Annual Test Equipment Calibration Schedule

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 10 of 45

7.0 TEST RESULTS

7.1 Summary

Company Name: LG Electronics MobileComm U.S.A
 FCC ID: ZNFVS501
 Method/System: Unlicensed National Information Infrastructure (UNII)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407(b.1), (2), (3), (4)	Undesirable Emissions	Undesirable emissions must meet the limits detailed in 15.407(b)	RADIATED	PASS	Section 7.2
15.205, 15.407(b.1), (4), (5), (6)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS	Section 7.2, 7.3

Table 7-1. Summary of Test Results

Note:

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.

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 11 of 45

7.2 Radiated Spurious Emission Measurements – Above 1GHz

§15.407(b) §15.205 §15.209

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 KDB 789033 D02 v01r03, 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 the band edge.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 7-2 per Section 15.209.

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

Table 7-2. Radiated Limits

Test Procedures Used

KDB 789033 D02 v01r03 – 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

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 12 of 45

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.

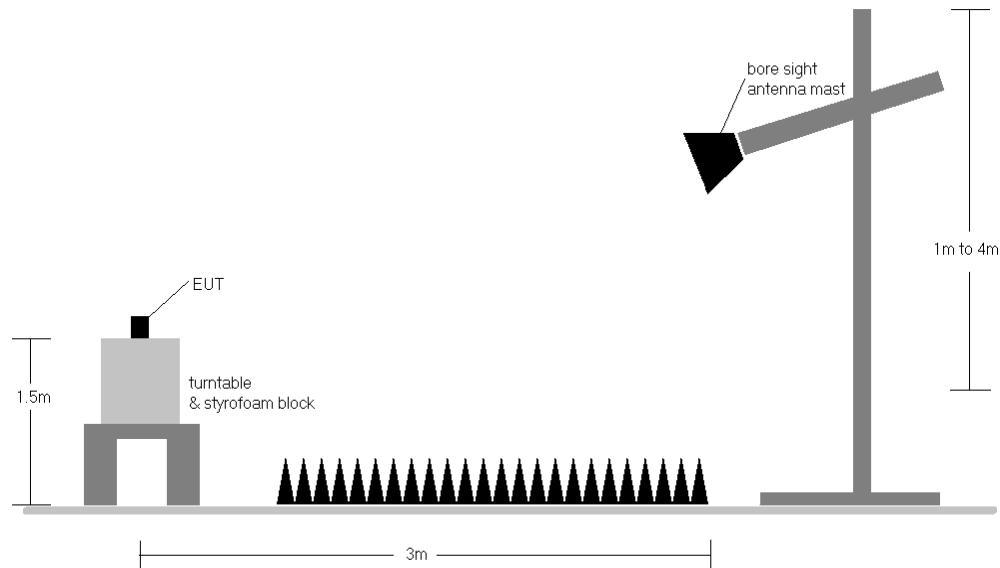


Figure 7-1. Test Instrument & Measurement Setup

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 13 of 45

Test Notes

1. All radiated spurious emissions levels were measured in a radiated test setup per the guidance of KDB 789033 D02 v01r03 Section G.
2. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 are below the limit shown in Table 7-2.
3. All spurious emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-2. 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.
4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
5. This unit was tested with its standard battery.
6. 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.
7. Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
8. The 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. Rohde & Schwarz EMC32, Version 9.15.00 automated test software was used to perform the Radiated Spurious Emissions Pre-Scan testing.
9. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Sample Calculations

Determining Spurious Emissions Levels

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

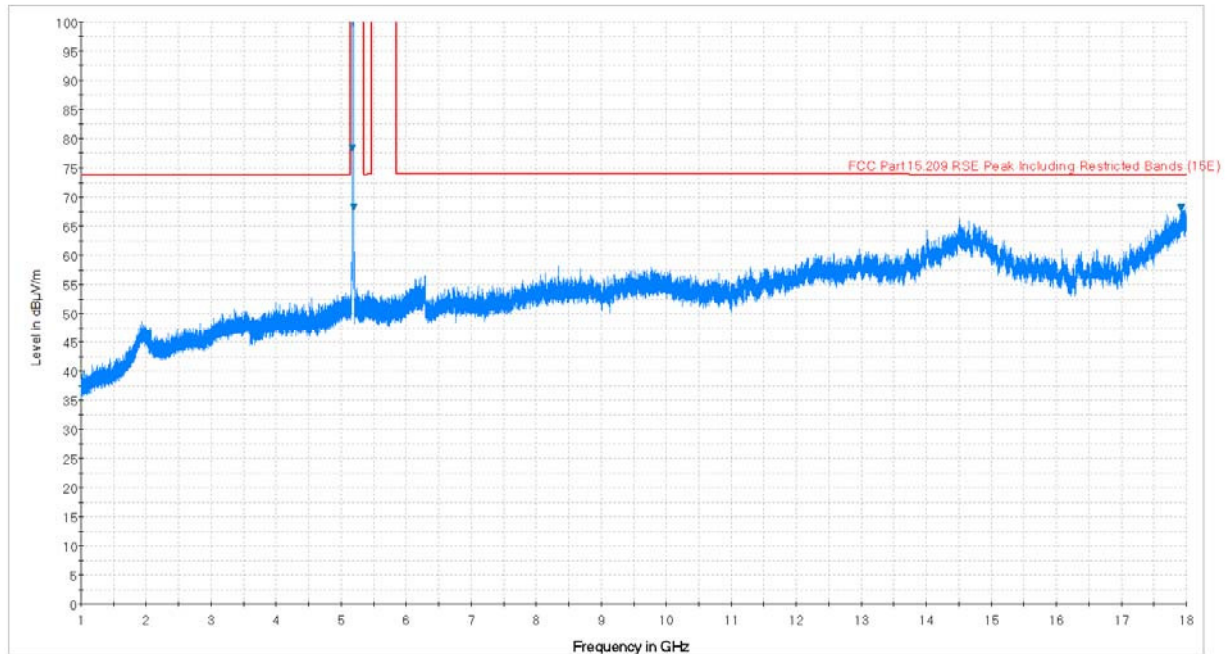
Radiated Band Edge Measurement Offset

- The amplitude offset shown in the radiated restricted band edge plots in Section 7.2 was calculated using the formula:

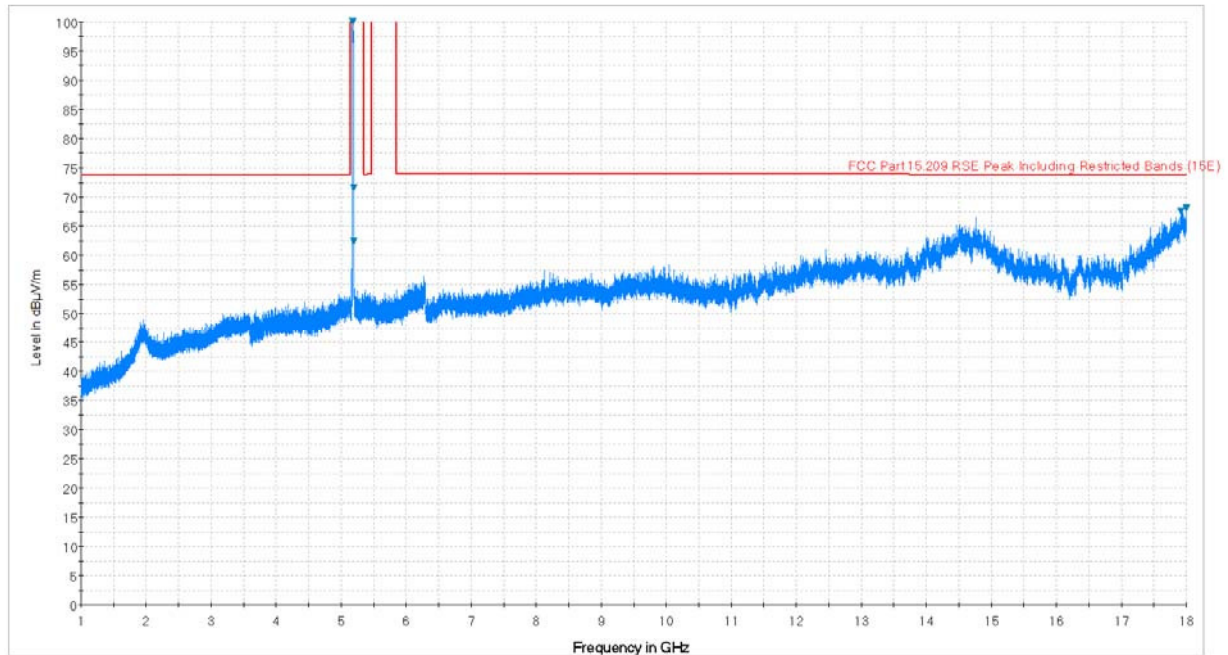
$$\text{Offset (dB)} = (\text{Antenna Factor} + \text{Cable Loss} + \text{Attenuator}) - \text{Preamplifier Gain}$$

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 14 of 45

7.7.1 Radiated Spurious Emission Measurements

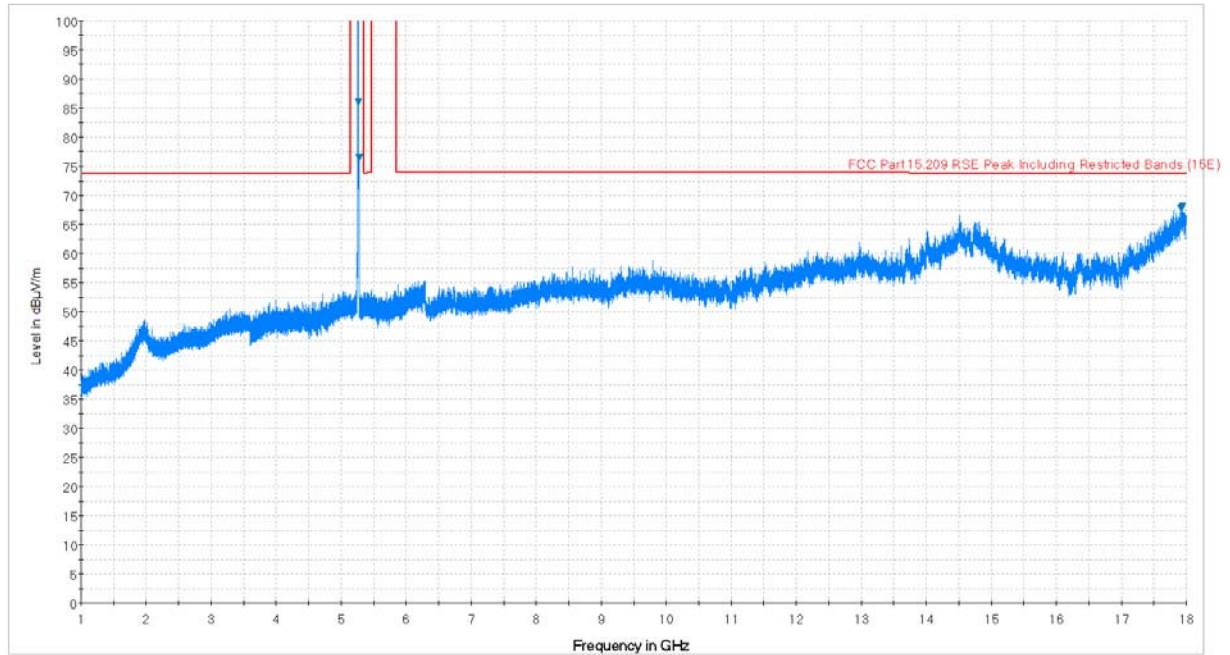


Plot 7-1. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. H)

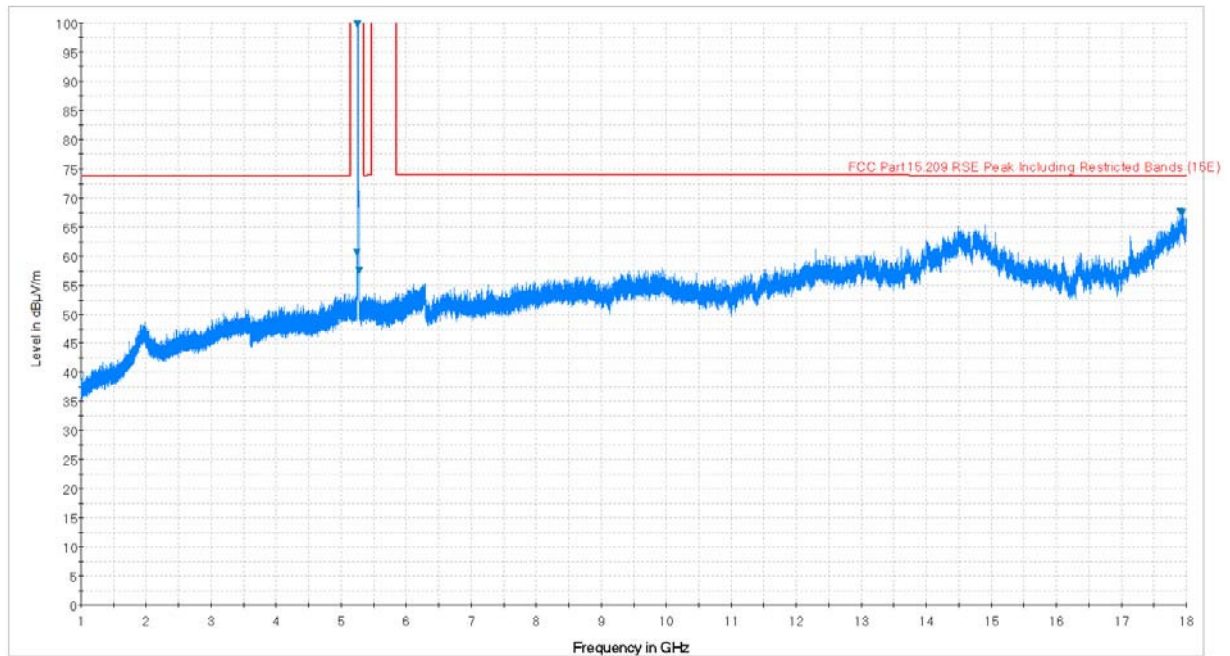


Plot 7-2. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. V)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 15 of 45

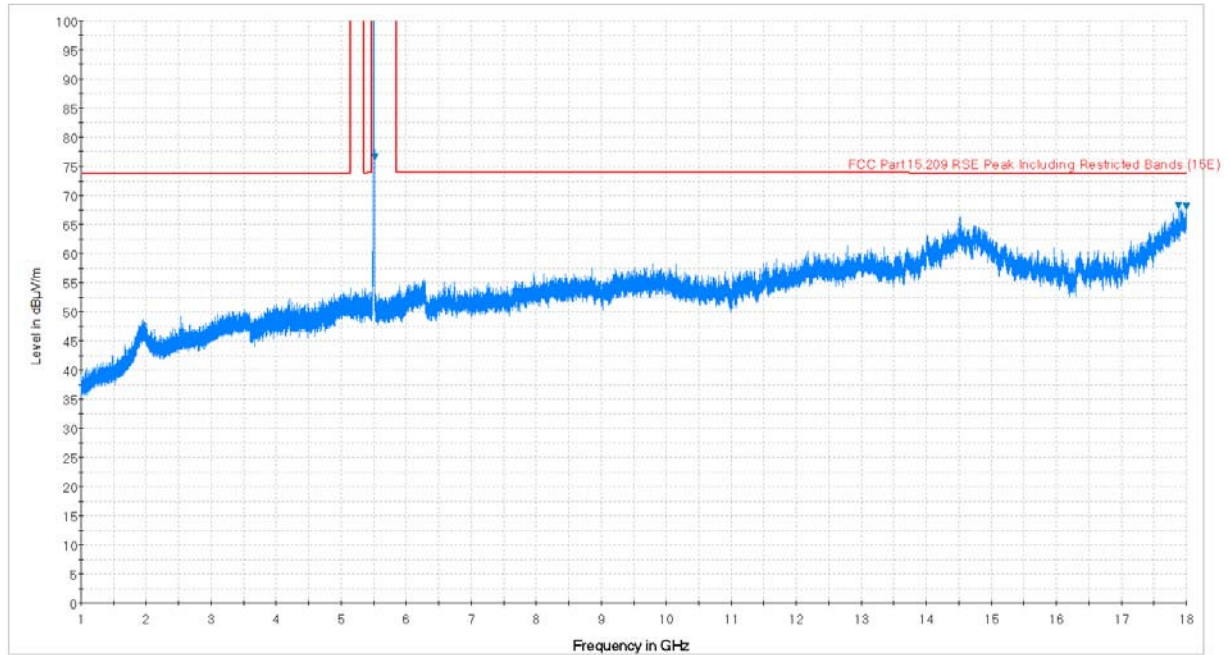


Plot 7-3. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. H)

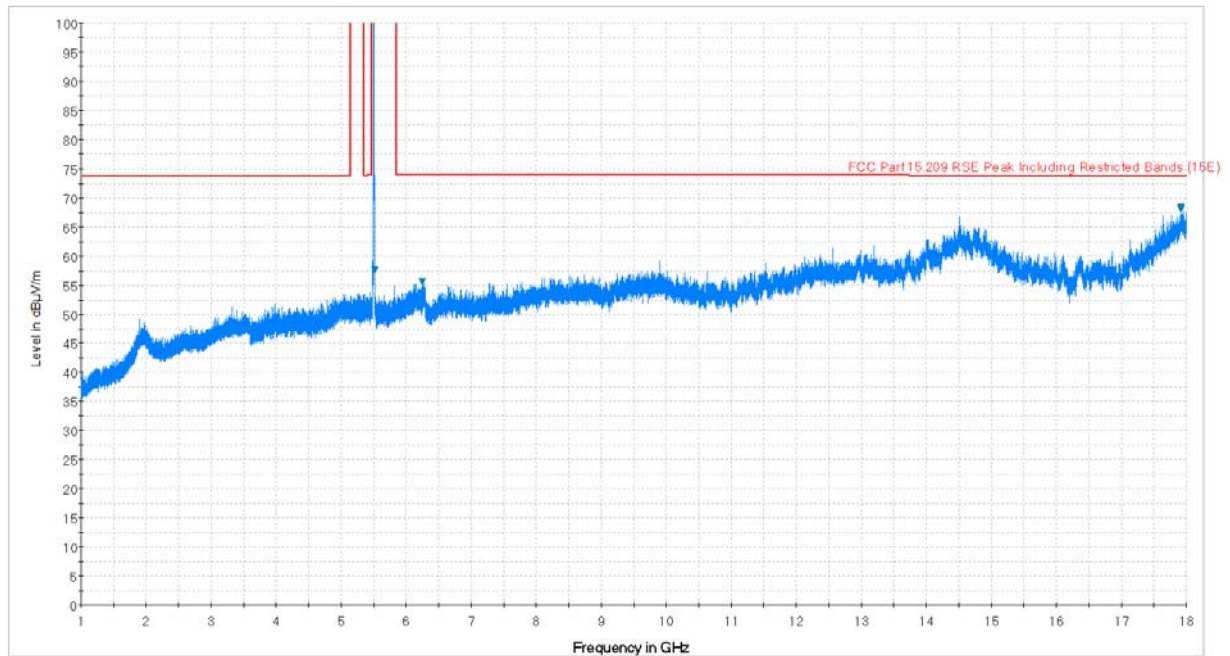


Plot 7-4. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. V)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 16 of 45

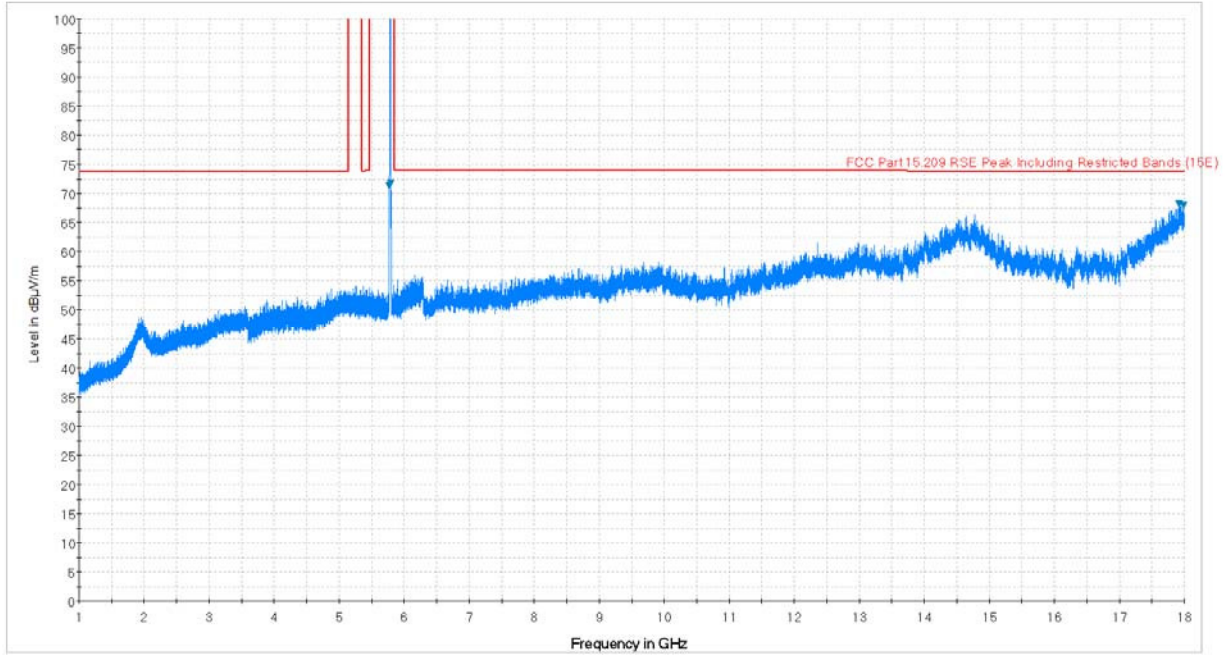


Plot 7-5. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 116, Ant. Pol. H)

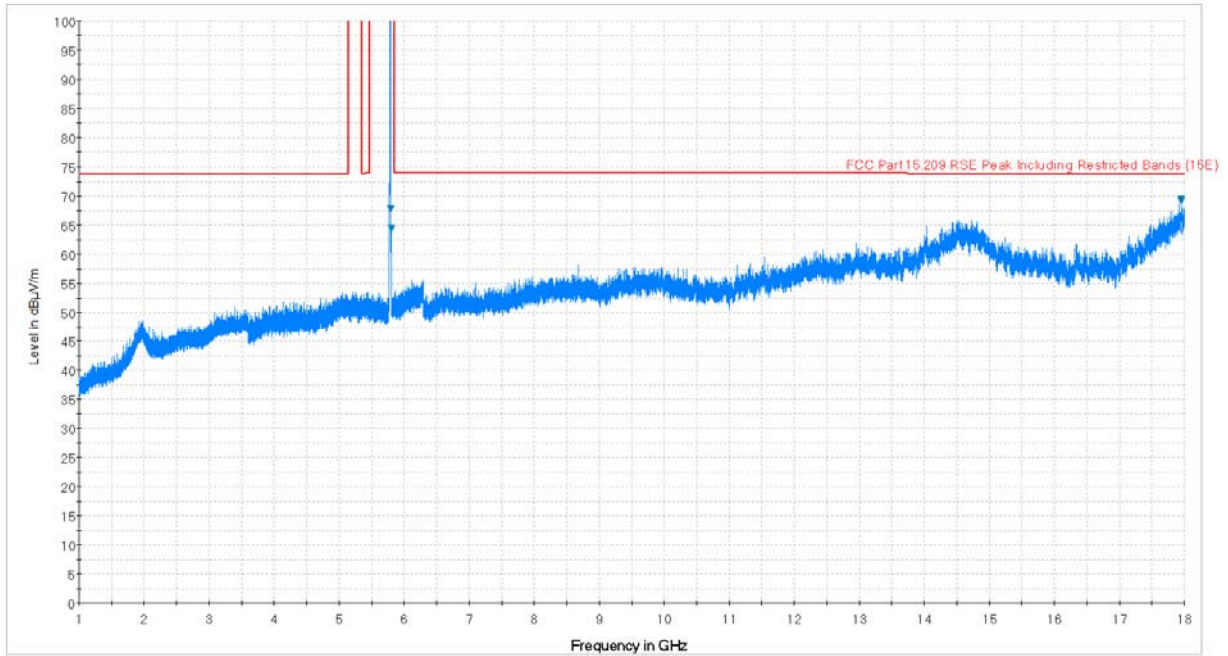


Plot 7-6. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 116, Ant. Pol. V)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 17 of 45



Plot 7-7. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)

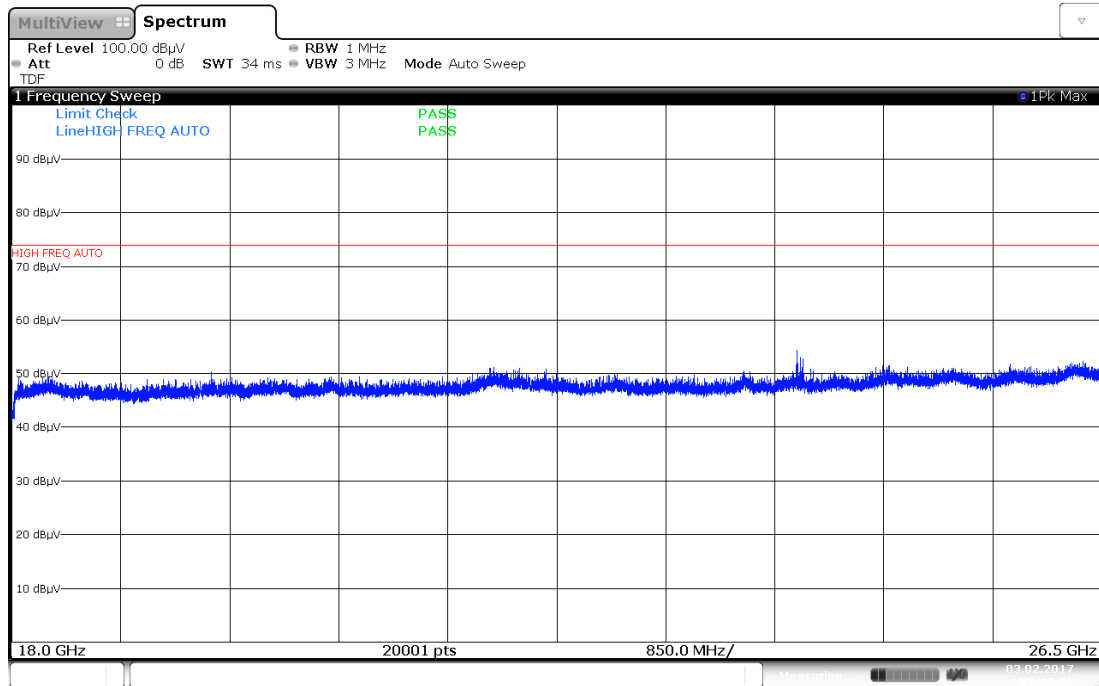


Plot 7-8. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 18 of 45

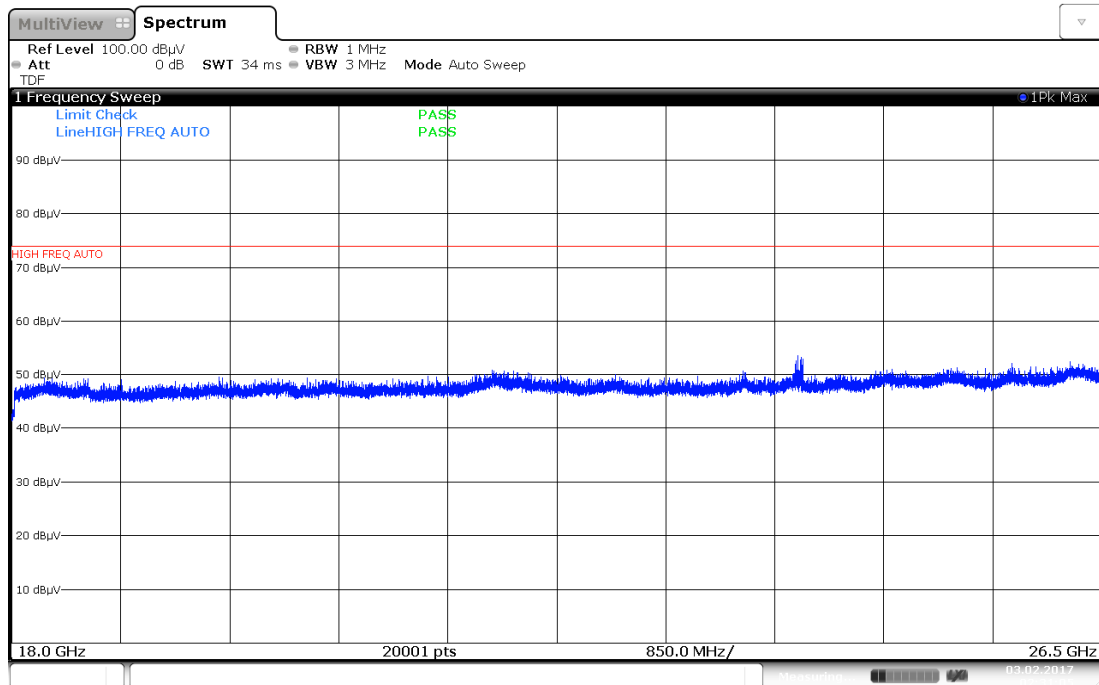
Radiated Spurious Emissions Measurements (Above 18GHz)

\$15.209



02:40:23 03.02.2017

Plot 7-9. Radiated Spurious Plot 18GHz - 26.5GHz (802.11a – Ant. Pol. H)



02:31:06 03.02.2017

Plot 7-10. Radiated Spurious Plot above 18GHz - 26.5GHz (802.11a – Ant. Pol. V)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 19 of 45

© 2017 PCTEST Engineering Laboratory, Inc.

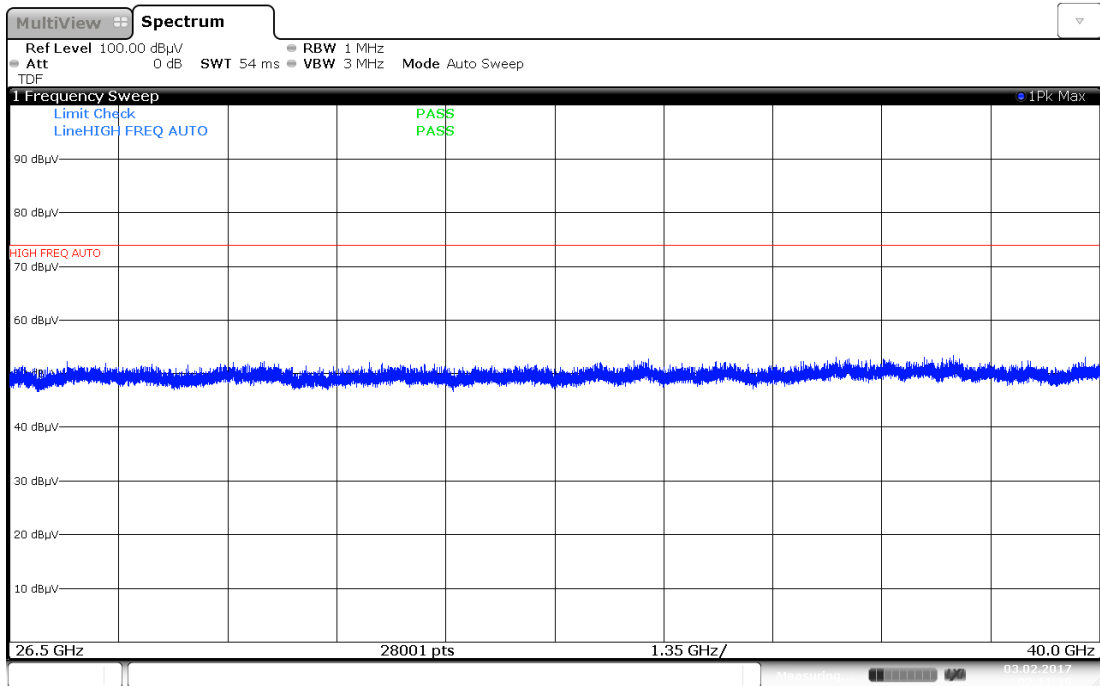
V 6.2

01/09/2016

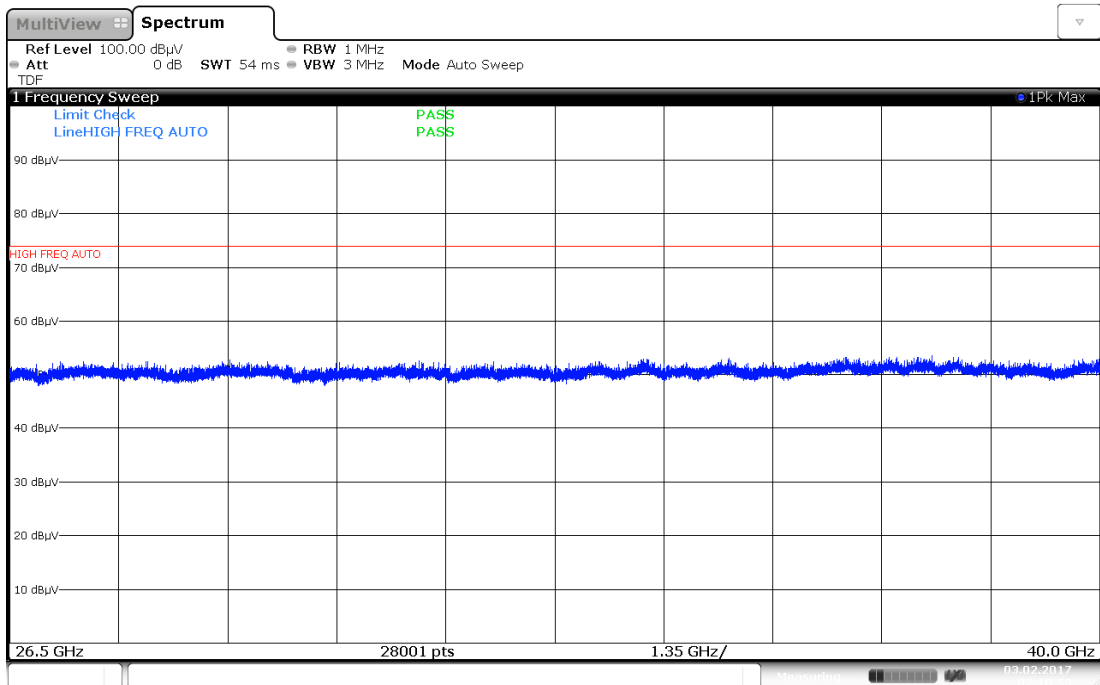
© 2015 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, 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@PCTESTLAB.COM.

Radiated Spurious Emissions Measurements (Above 18GHz)

\$15.209



Plot 7-11. Radiated Spurious Plot 26.5GHz - 40GHz (802.11a – Ant. Pol. H)



Plot 7-12. Radiated Spurious Plot above 26.5GHz - 40GHz (802.11a – Ant. Pol. V)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 20 of 45

© 2017 PCTEST Engineering Laboratory, Inc.

V 6.2

01/09/2016

© 2015 PCTEST Engineering Laboratory, Inc. 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@PCTESTLAB.COM.

Radiated Spurious Emission Measurements

§15.247(d) §15.205 & §15.209

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
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	H	100	126	-58.14	9.88	-9.54	49.20	68.20	-19.00
* 15540.00	Average	H	-	-	-73.85	12.76	-9.54	36.36	53.98	-17.62
* 15540.00	Peak	H	-	-	-62.94	12.76	-9.54	47.27	73.98	-26.71
* 20720.00	Average	H	-	-	-71.92	8.13	-9.54	33.67	53.98	-20.31
* 20720.00	Peak	H	-	-	-60.21	8.13	-9.54	45.38	73.98	-28.60
25900.00	Peak	H	-	-	-57.60	8.50	-9.54	48.36	68.20	-19.84

Table 7-3. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5200MHz
Channel: 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	H	100	126	-57.88	9.89	-9.54	49.47	68.20	-18.73
* 15600.00	Average	H	-	-	-73.03	13.12	-9.54	37.55	53.98	-16.43
* 15600.00	Peak	H	-	-	-62.42	13.12	-9.54	48.16	73.98	-25.82
* 20800.00	Average	H	-	-	-71.68	8.16	-9.54	33.93	53.98	-20.05
* 20800.00	Peak	H	-	-	-60.84	8.16	-9.54	44.77	73.98	-29.21
26000.00	Peak	H	-	-	-58.03	8.52	-9.54	47.95	68.20	-20.25

Table 7-4. Radiated Measurements

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 21 of 45

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
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	H	100	126	-58.94	10.24	-9.54	48.76	68.20	-19.44
* 15720.00	Average	H	-	-	-73.10	13.45	-9.54	37.80	53.98	-16.17
* 15720.00	Peak	H	-	-	-63.24	13.45	-9.54	47.66	73.98	-26.31
* 20960.00	Average	H	-	-	-72.23	8.12	-9.54	33.35	53.98	-20.63
* 20960.00	Peak	H	-	-	-60.20	8.12	-9.54	45.38	73.98	-28.60
26200.00	Peak	H	-	-	-57.76	8.62	-9.54	48.32	68.20	-19.88

Table 7-5. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5260MHz
Channel: 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	H	100	126	-58.01	10.21	-9.54	49.66	68.20	-18.54
* 15780.00	Average	H	-	-	-73.92	13.34	-9.54	36.88	53.98	-17.10
* 15780.00	Peak	H	-	-	-63.08	13.34	-9.54	47.72	73.98	-26.26
* 21040.00	Average	H	-	-	-72.11	8.10	-9.54	33.45	53.98	-20.53
* 21040.00	Peak	H	-	-	-60.87	8.10	-9.54	44.69	73.98	-29.29
26300.00	Peak	H	-	-	-56.50	8.76	-9.54	49.72	68.20	-18.48

Table 7-6. Radiated Measurements

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 22 of 45

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
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	H	100	126	-57.16	9.92	-9.54	50.21	68.20	-17.99
* 15840.00	Average	H	-	-	-73.23	12.96	-9.54	37.19	53.98	-16.79
* 15840.00	Peak	H	-	-	-63.22	12.96	-9.54	47.20	73.98	-26.78
* 21120.00	Average	H	-	-	-71.60	8.09	-9.54	33.94	53.98	-20.04
* 21120.00	Peak	H	-	-	-60.42	8.09	-9.54	45.12	73.98	-28.86
26400.00	Peak	H	-	-	-57.33	8.99	-9.54	49.12	68.20	-19.08

Table 7-7. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5320MHz
Channel: 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	H	100	126	-68.81	9.65	-9.54	38.29	53.98	-15.69
* 10640.00	Peak	H	100	126	-57.44	9.65	-9.54	49.66	73.98	-24.32
* 15960.00	Average	H	-	-	-72.94	12.55	-9.54	37.07	53.98	-16.91
* 15960.00	Peak	H	-	-	-63.12	12.55	-9.54	46.89	73.98	-27.09
* 21280.00	Average	H	-	-	-71.19	8.07	-9.54	34.34	53.98	-19.64
* 21280.00	Peak	H	-	-	-59.46	8.07	-9.54	46.07	73.98	-27.91
26600.00	Peak	H	-	-	-46.82	-8.30	-9.54	42.34	68.20	-25.86

Table 7-8. Radiated Measurements

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 23 of 45

Worst Case Mode: 802.11a
 Worst Case Transfer Rate: 6 Mbps
 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	H	100	86	-69.07	9.94	-9.54	38.33	53.98	-15.65
* 11000.00	Peak	H	100	86	-59.87	9.94	-9.54	47.53	73.98	-26.45
16500.00	Peak	H	-	-	-60.37	12.86	-9.54	49.95	68.20	-18.25
22000.00	Peak	H	-	-	-58.16	8.35	-9.54	47.64	68.20	-20.56
27500.00	Peak	H	-	-	-45.58	-8.93	-9.54	42.95	68.20	-25.25

Table 7-9. Radiated Measurements

Worst Case Mode: 802.11a
 Worst Case Transfer Rate: 6 Mbps
 Distance of Measurements: 1 & 3 Meters
 Operating Frequency: 5580MHz
 Channel: 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	H	100	126	-69.73	10.09	-9.54	37.82	53.98	-16.16
* 11160.00	Peak	H	100	126	-59.85	10.09	-9.54	47.70	73.98	-26.28
16740.00	Peak	H	-	-	-61.61	16.33	-9.54	52.17	68.20	-16.03
* 22320.00	Average	H	-	-	-70.77	8.20	-9.54	34.89	53.98	-19.09
* 22320.00	Peak	H	-	-	-58.63	8.20	-9.54	47.03	73.98	-26.95
27900.00	Peak	H	-	-	-45.03	-9.24	-9.54	43.19	68.20	-25.01

Table 7-10. Radiated Measurements

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 24 of 45

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
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	H	100	126	-69.04	10.72	-9.54	39.13	53.98	-14.85
* 11440.00	Peak	H	100	126	-59.23	10.72	-9.54	48.94	73.98	-25.04
17160.00	Peak	H	100	126	-62.14	15.98	-9.54	51.30	68.20	-16.90
* 22880.00	Average	H	100	126	-71.21	8.29	-9.54	34.53	53.98	-19.45
* 22880.00	Peak	H	100	126	-59.27	8.29	-9.54	46.47	73.98	-27.51
28600.00	Peak	H	100	126	-44.92	-9.03	-9.54	43.51	68.20	-24.69

Table 7-11. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5745MHz
Channel: 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	H	100	126	-68.25	11.06	-9.54	40.27	53.98	-13.71
* 11490.00	Peak	H	100	126	-58.62	11.06	-9.54	49.90	73.98	-24.08
17235.00	Peak	H	-	-	-60.82	17.22	-9.54	53.86	68.20	-14.34
* 22980.00	Average	H	-	-	-72.27	8.19	-9.54	33.38	53.98	-20.60
* 22980.00	Peak	H	-	-	-60.75	8.19	-9.54	44.90	73.98	-29.08
28725.00	Peak	H	-	-	-45.40	-9.45	-9.54	42.61	68.20	-25.59

Table 7-12. Radiated Measurements

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 25 of 45

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
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	H	100	126	-68.52	10.88	-9.54	39.82	53.98	-14.16
* 11570.00	Peak	H	100	126	-59.44	10.88	-9.54	48.90	73.98	-25.08
17355.00	Peak	H	-	-	-60.58	16.71	-9.54	53.59	68.20	-14.61
23140.00	Peak	H	-	-	-60.22	8.47	-9.54	45.70	68.20	-22.50
28925.00	Peak	H	-	-	-44.02	-9.71	-9.54	43.73	68.20	-24.47

Table 7-13. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5825MHz
Channel: 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	H	100	126	-70.08	10.92	-9.54	38.30	53.98	-15.68
* 11650.00	Peak	H	100	126	-60.30	10.92	-9.54	48.08	73.98	-25.90
17475.00	Peak	H	-	-	-59.93	15.81	-9.54	53.34	68.20	-14.86
23300.00	Peak	H	-	-	-61.10	8.60	-9.54	44.96	68.20	-23.24
29125.00	Peak	H	-	-	-45.11	-9.93	-9.54	42.42	68.20	-25.78

Table 7-14. Radiated Measurements

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 26 of 45

7.7.2 Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

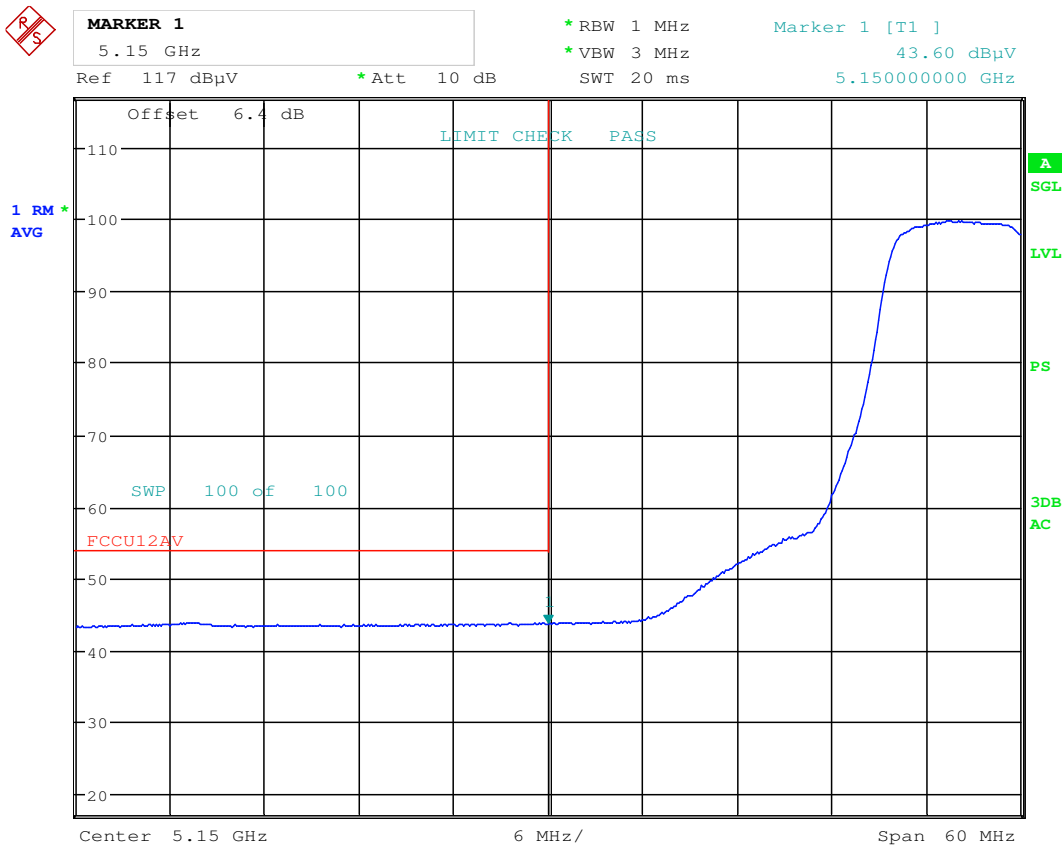
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5180MHz

Channel: 36



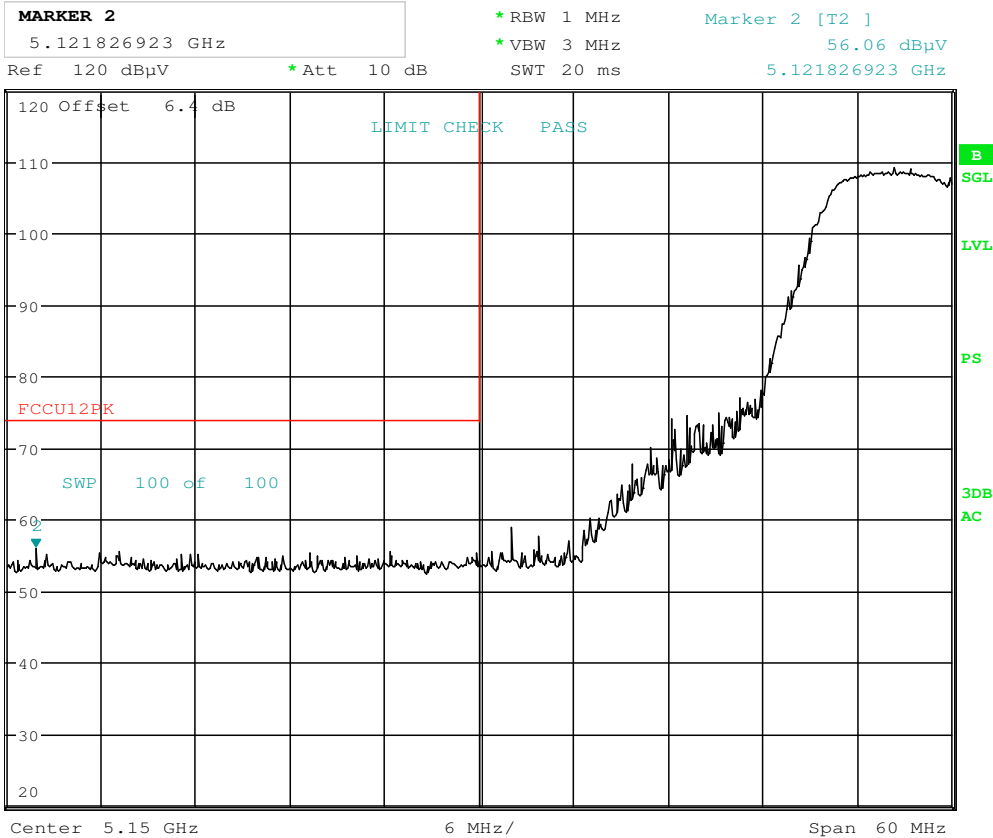
Date: 30.JAN.2017 11:23:06

Plot 7-13. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 27 of 45

Radiated Band Edge Measurements (20MHz BW)

\$15.407(b.1)(b.2) \$15.205 \$15.209



Date: 30.JAN.2017 11:24:26

Plot 7-14. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 28 of 45

© 2017 PCTEST Engineering Laboratory, Inc.

V 6.2

01/09/2016

© 2015 PCTEST Engineering Laboratory, Inc. 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@PCTESTLAB.COM.

Radiated Band Edge Measurements (20MHz BW)

\$15.407(b.1)(b.2) \$15.205 \$15.209

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

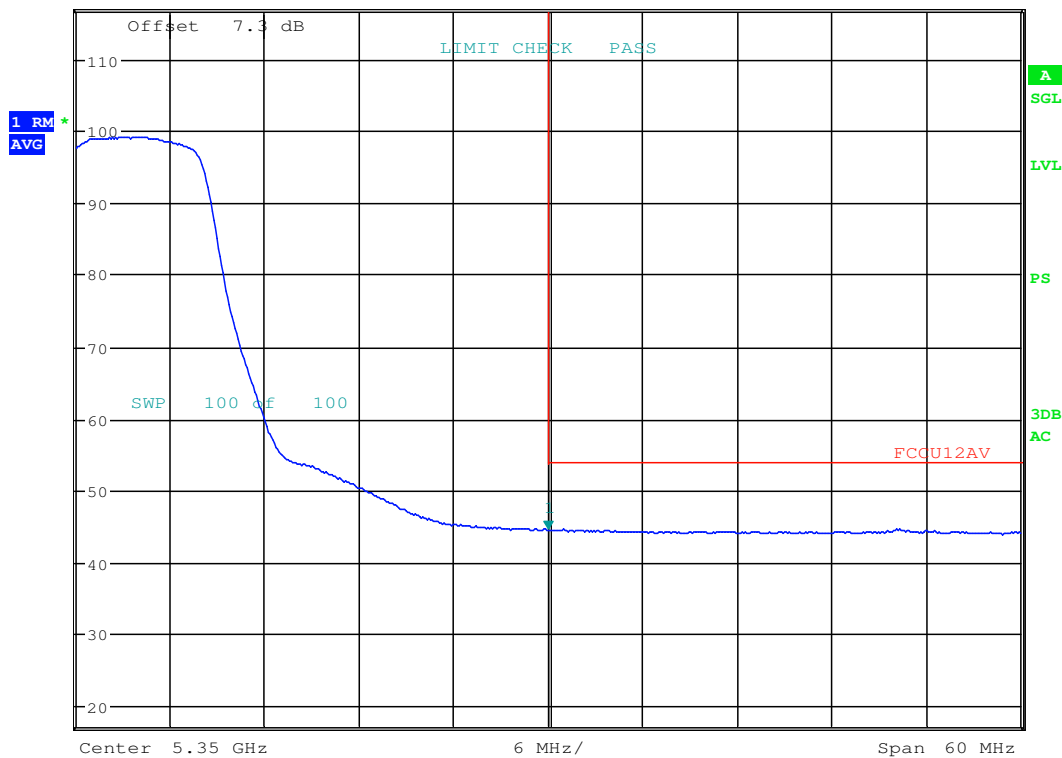
Distance of Measurements: 3 Meters

Operating Frequency: 5320MHz

Channel: 64



MARKER 1
5.35 GHz
Ref 117 dBμV * Att 10 dB
* RBW 1 MHz Marker 1 [T1]
* VBW 3 MHz 44.42 dBμV
SWT 20 ms 5.35000000 GHz



Date: 30.JAN.2017 11:38:52

Plot 7-15. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 29 of 45

Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209



MARKER 2

5.362788462 GHz

*RBW 1 MHz

Marker 2 [T2]

*VBW 3 MHz

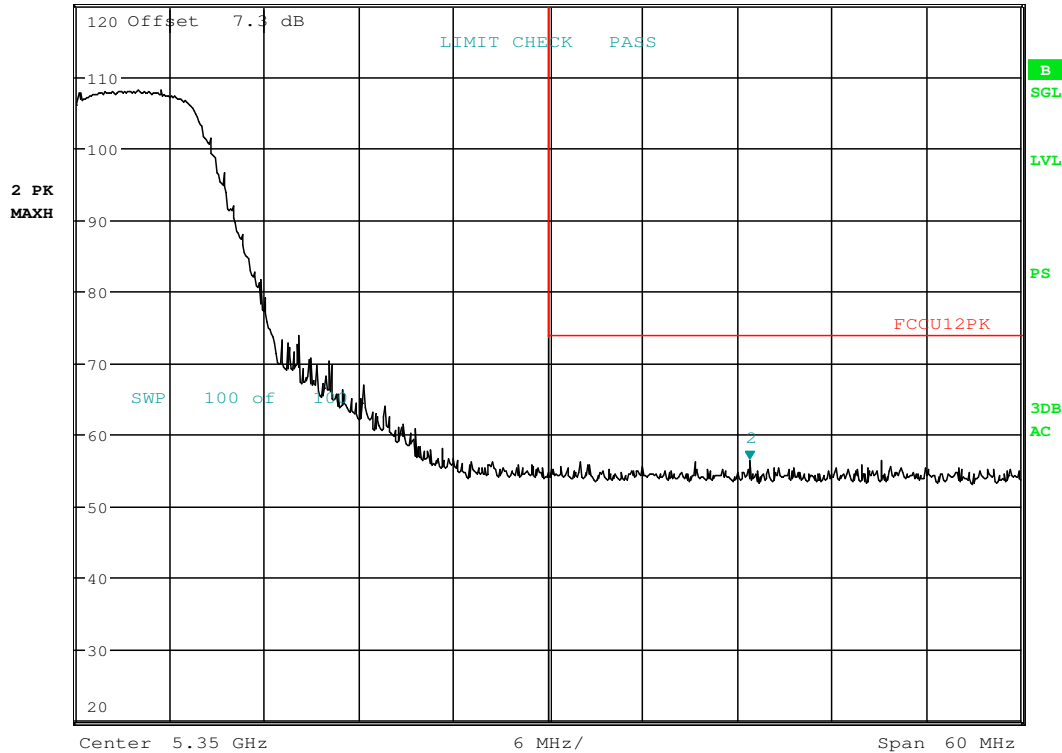
56.46 dBμV

Ref 120 dBμV

*Att 10 dB

SWT 20 ms

5.362788462 GHz



Date: 30.JAN.2017 11:40:29

Plot 7-16. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 30 of 45

© 2017 PCTEST Engineering Laboratory, Inc.

V 6.2

01/09/2016

© 2015 PCTEST Engineering Laboratory, Inc. 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@PCTESTLAB.COM.

Radiated Band Edge Measurements (20MHz BW)

\$15.407(b.1)(b.2) \$15.205 \$15.209

Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

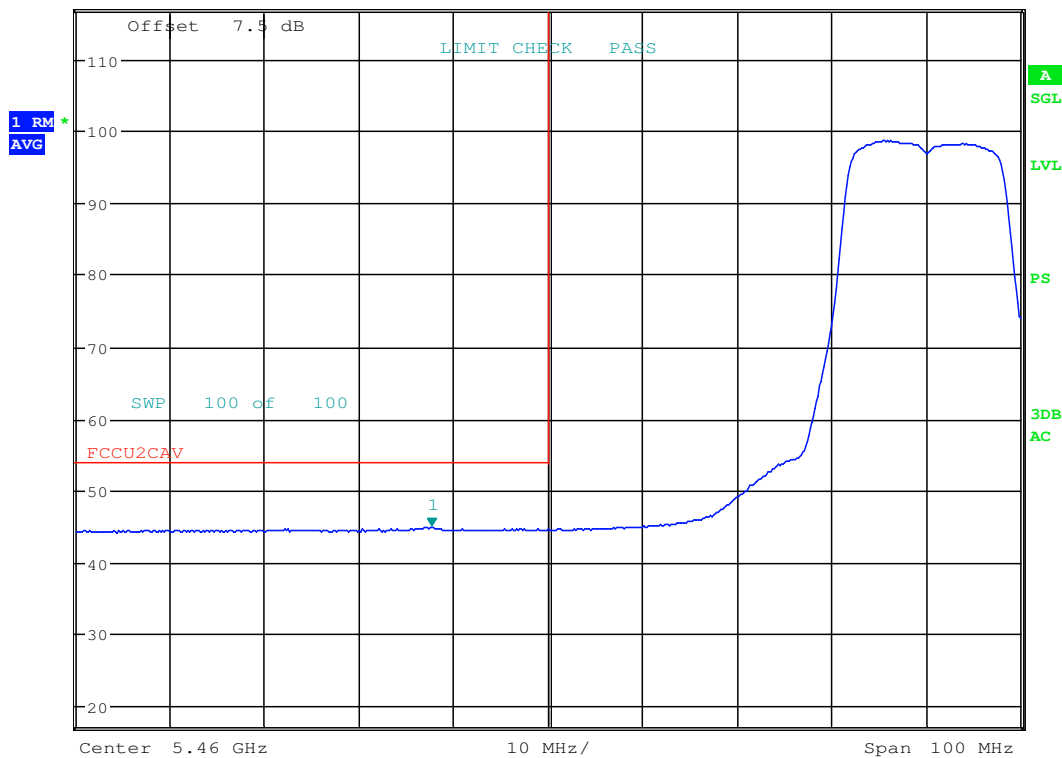
Distance of Measurements: 3 Meters

Operating Frequency: 5500MHz

Channel: 100



MARKER 1
5.447660256 GHz
Ref 117 dBμV * Att 10 dB
* RBW 1 MHz Marker 1 [T1]
* VBW 3 MHz 44.83 dBμV
SWT 20 ms 5.447660256 GHz



Date: 30.JAN.2017 11:52:33

Plot 7-17. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 31 of 45

© 2017 PCTEST Engineering Laboratory, Inc.

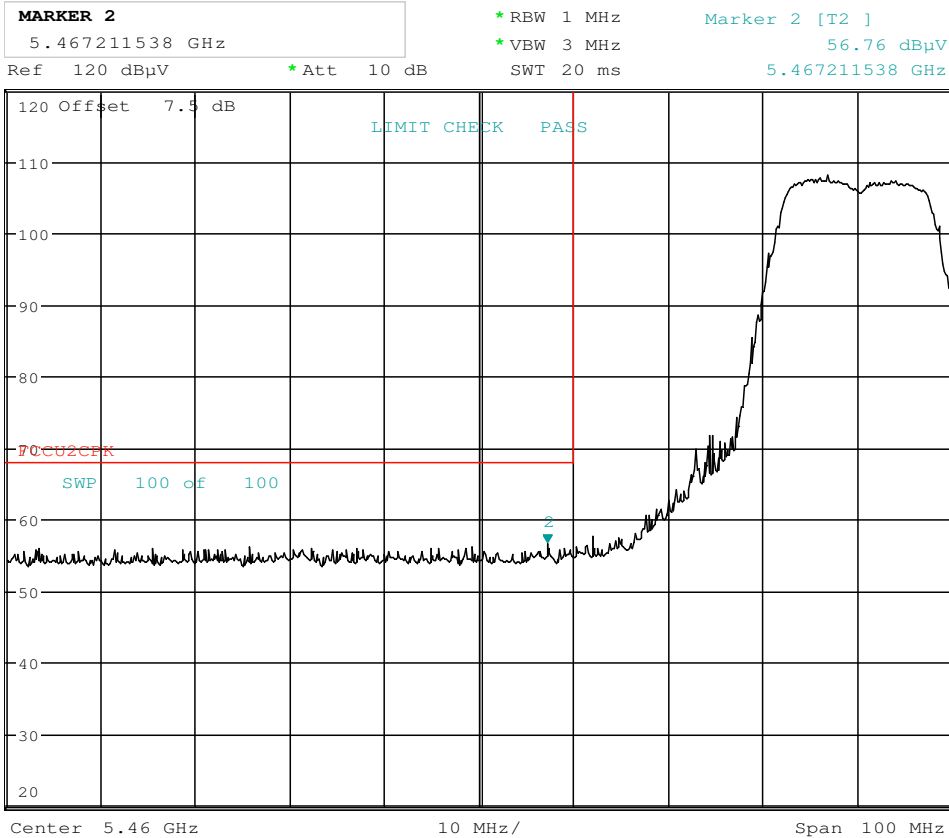
V 6.2

01/09/2016

© 2015 PCTEST Engineering Laboratory, Inc. 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@PCTESTLAB.COM.

Radiated Band Edge Measurements (20MHz BW)

\$15.407(b.1)(b.2) \$15.205 \$15.209



Date: 30.JAN.2017 11:53:21

Plot 7-18. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 32 of 45

© 2017 PCTEST Engineering Laboratory, Inc.

V 6.2

01/09/2016

© 2015 PCTEST Engineering Laboratory, Inc. 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@PCTESTLAB.COM.

Radiated Band Edge Measurements (20MHz BW)

\$15.407(b.1)(b.2) \$15.205 \$15.209

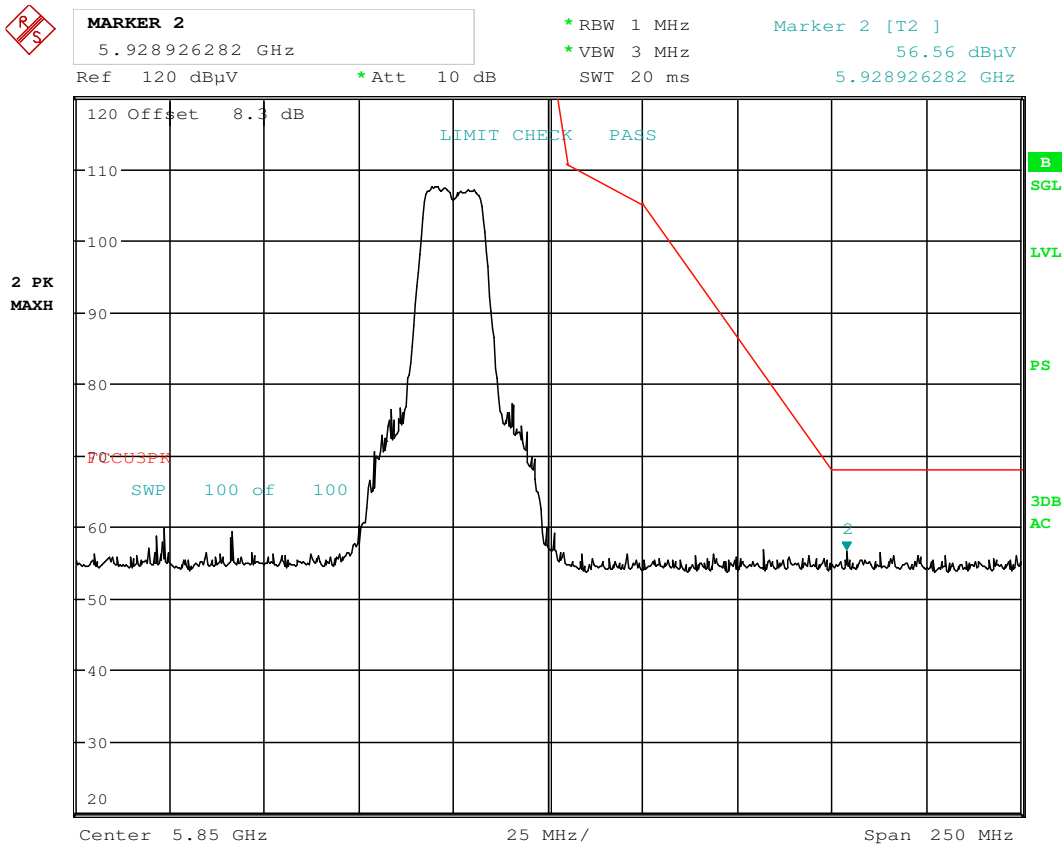
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5825MHz

Channel: 165



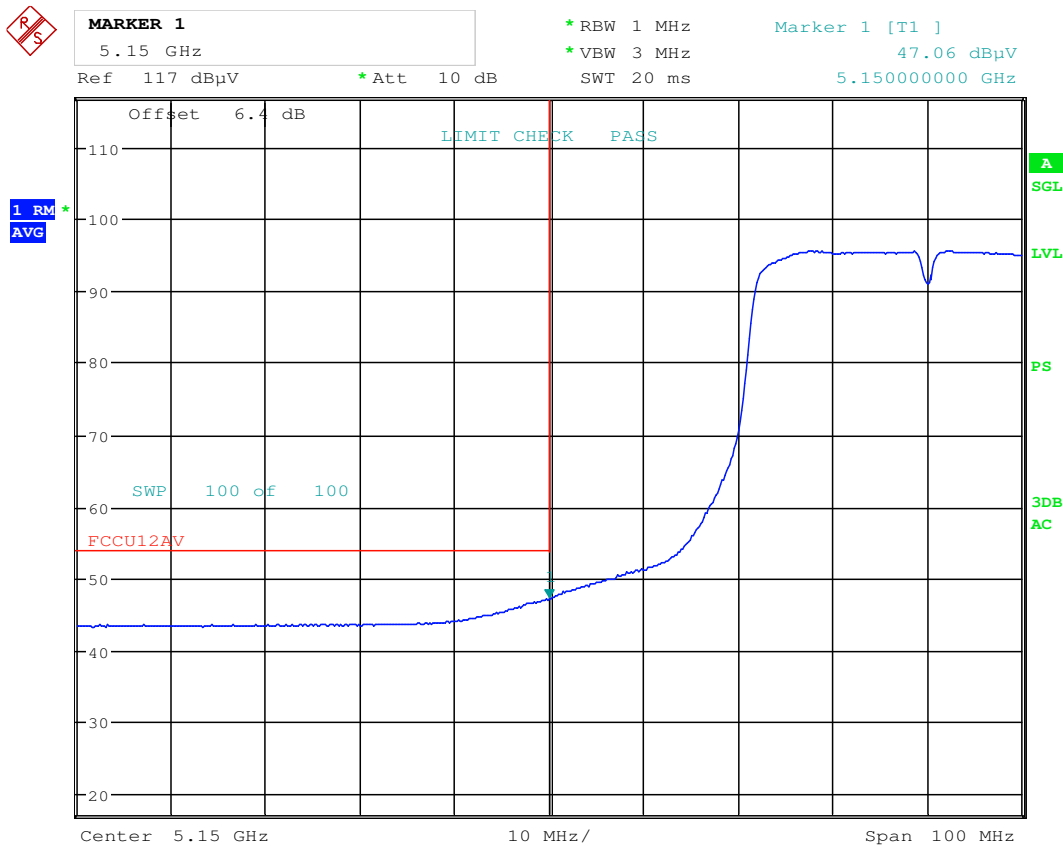
Date: 30.JAN.2017 11:59:04

Plot 7-19. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 33 of 45

7.7.3 Radiated Band Edge Measurements (40MHz BW)

Worst Case Mode:	<u>802.11n (40MHz)</u>
Worst Case Transfer Rate:	<u>MCS0</u>
Distance of Measurements:	<u>3 Meters</u>
Operating Frequency:	<u>5190MHz</u>
Channel:	<u>38</u>



Date: 30.JAN.2017 11:32:18

Plot 7-20. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

FCC ID: ZNFVS501	 FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE) 		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset	Page 34 of 45

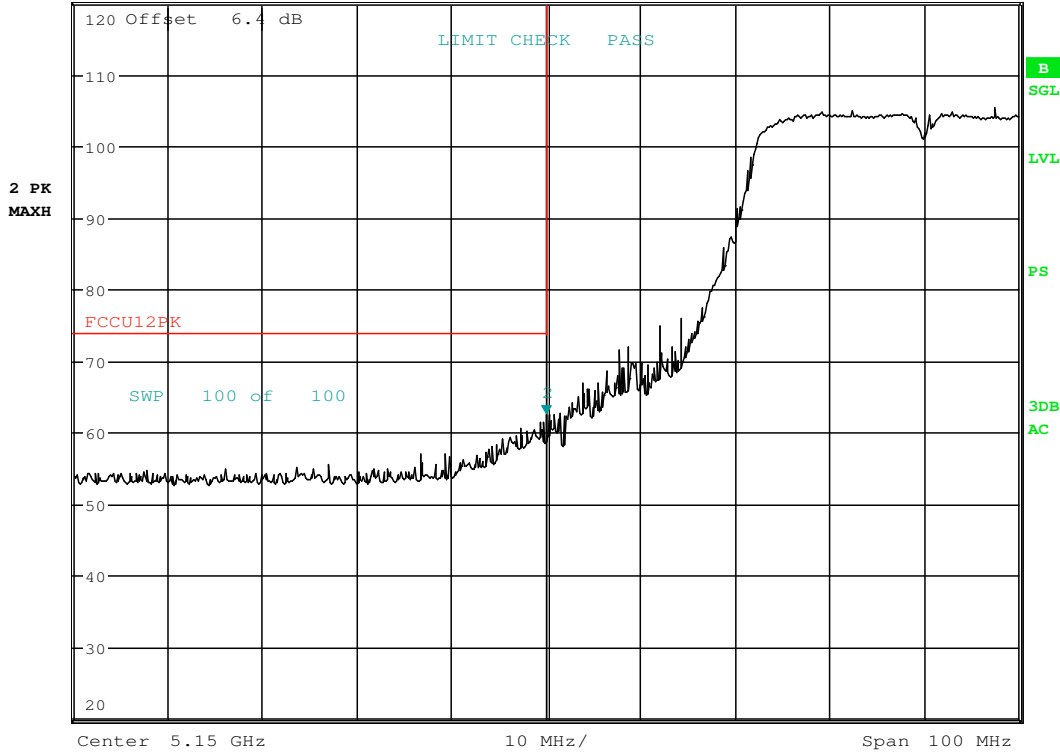
Radiated Band Edge Measurements (40MHz BW)

\$15.407(b.1)(b.2) \$15.205 \$15.209



MARKER 2
5.15 GHz
Ref 120 dBμV * Att 10 dB

* RBW 1 MHz Marker 2 [T2]
* VBW 3 MHz 62.45 dBμV
SWT 20 ms 5.15000000 GHz



Date: 30.JAN.2017 11:34:17

Plot 7-21. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 35 of 45

© 2017 PCTEST Engineering Laboratory, Inc.

V 6.2

01/09/2016

© 2015 PCTEST Engineering Laboratory, Inc. 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@PCTESTLAB.COM.

Radiated Band Edge Measurements (40MHz BW)

\$15.407(b.1)(b.2) \$15.205 \$15.209

Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5310MHz

Channel: 62



MARKER 1
5.35 GHz

* RBW 1 MHz

Marker 1 [T1]

* VBW 3 MHz

46.93 dBμV

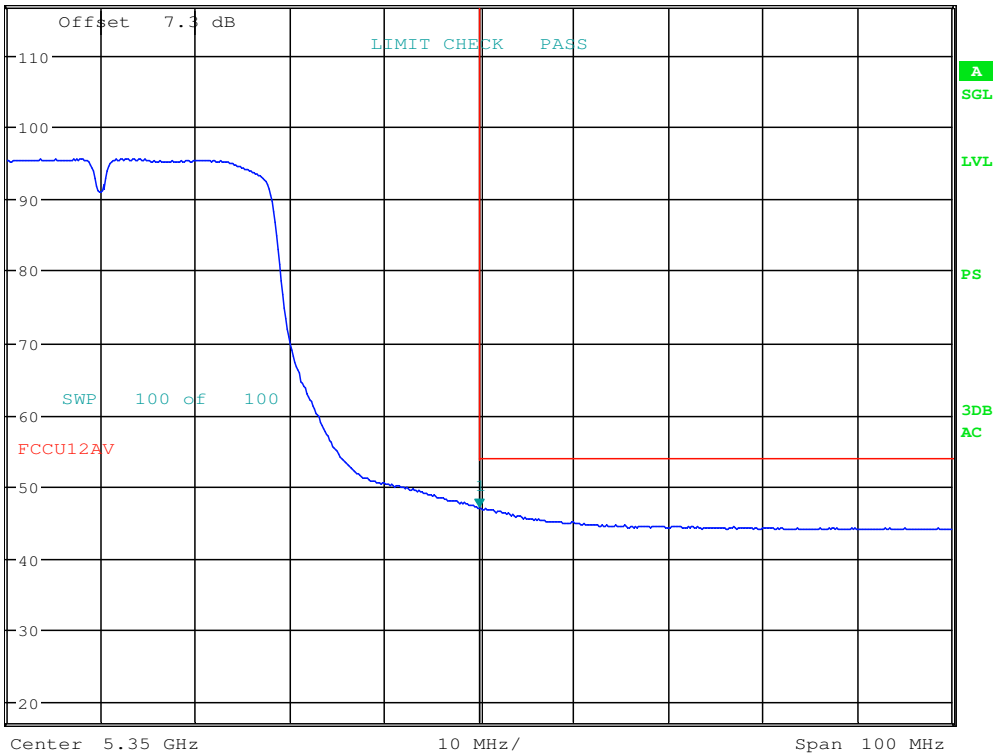
Ref 117 dBμV

* Att 10 dB

SWT 20 ms

5.35000000 GHz

1 RM
AVG



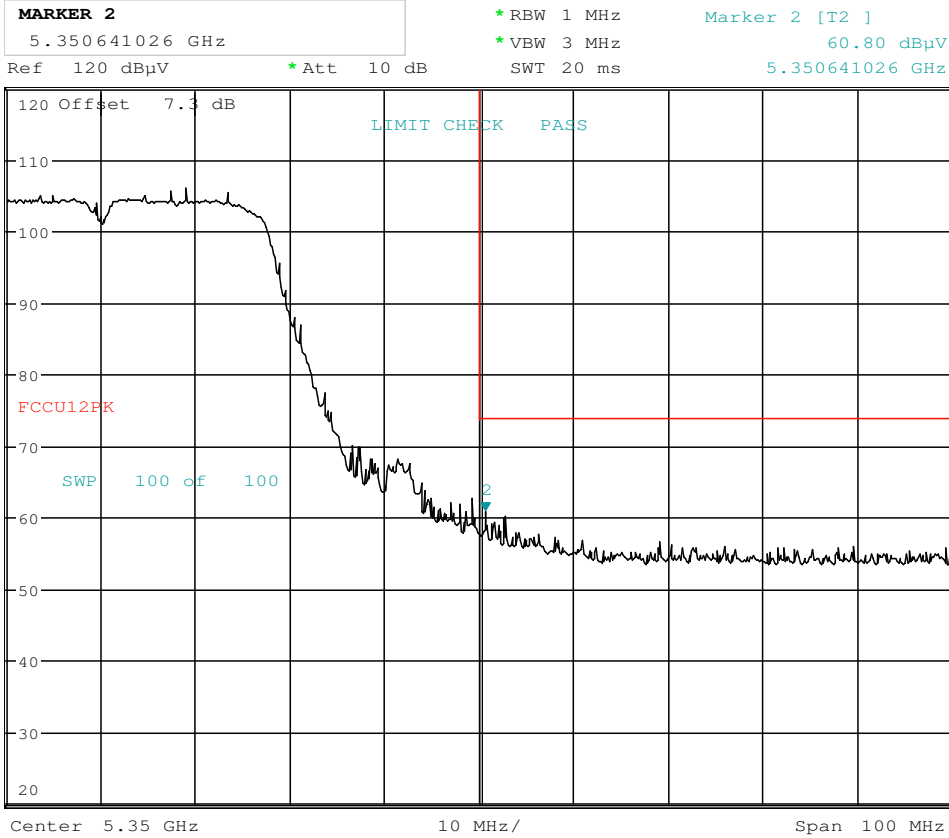
Date: 30.JAN.2017 11:46:23

Plot 7-22. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 36 of 45

Radiated Band Edge Measurements (40MHz BW)

\$15.407(b.1)(b.2) \$15.205 \$15.209



Date: 30.JAN.2017 11:47:04

Plot 7-23. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 37 of 45

© 2017 PCTEST Engineering Laboratory, Inc.

V 6.2

01/09/2016

© 2015 PCTEST Engineering Laboratory, Inc. 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@PCTESTLAB.COM.

Radiated Band Edge Measurements (40MHz BW)

\$15.407(b.1)(b.2) \$15.205 \$15.209

Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

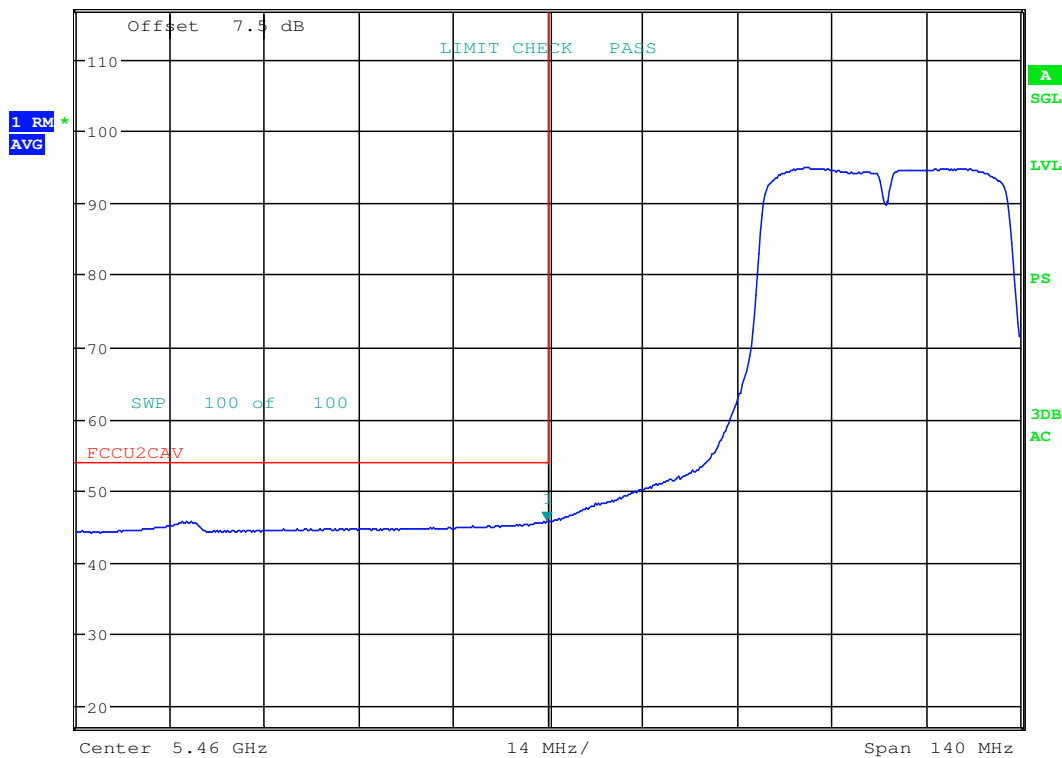
Distance of Measurements: 3 Meters

Operating Frequency: 5510MHz

Channel: 102



MARKER 1
5.459775641 GHz
Ref 117 dBμV * Att 10 dB SWT 20 ms
* RBW 1 MHz * VBW 3 MHz
Marker 1 [T1] 45.72 dBμV
5.459775641 GHz



Date: 30.JAN.2017 11:55:18

Plot 7-24. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 38 of 45

Radiated Band Edge Measurements (40MHz BW)

\$15.407(b.1)(b.2) \$15.205 \$15.209



MARKER 2

5.47 GHz

* RBW 1 MHz

Marker 2 [T2]

* VBW 3 MHz

62.26 dBμV

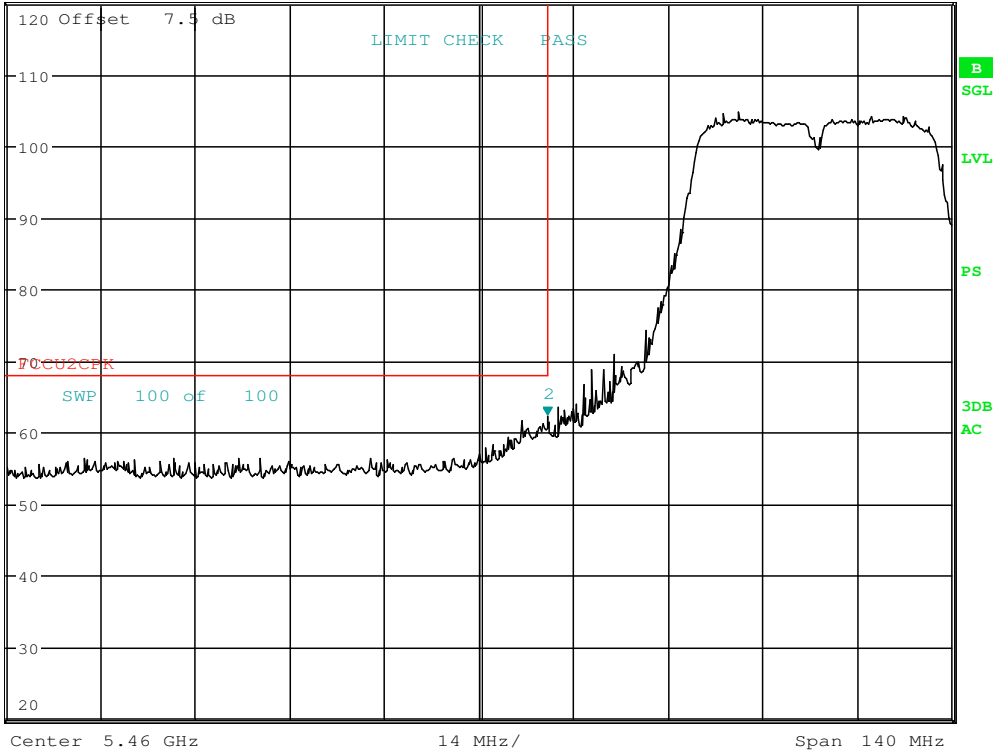
Ref 120 dBμV

* Att 10 dB

SWT 20 ms

5.470000000 GHz

2 PK
MAXH



Date: 30.JAN.2017 11:55:54

Plot 7-25. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 39 of 45

© 2017 PCTEST Engineering Laboratory, Inc.

V 6.2

01/09/2016

© 2015 PCTEST Engineering Laboratory, Inc. 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@PCTESTLAB.COM.

Radiated Band Edge Measurements (40MHz BW) \$15.407(b.1)(b.2) \$15.205 \$15.209

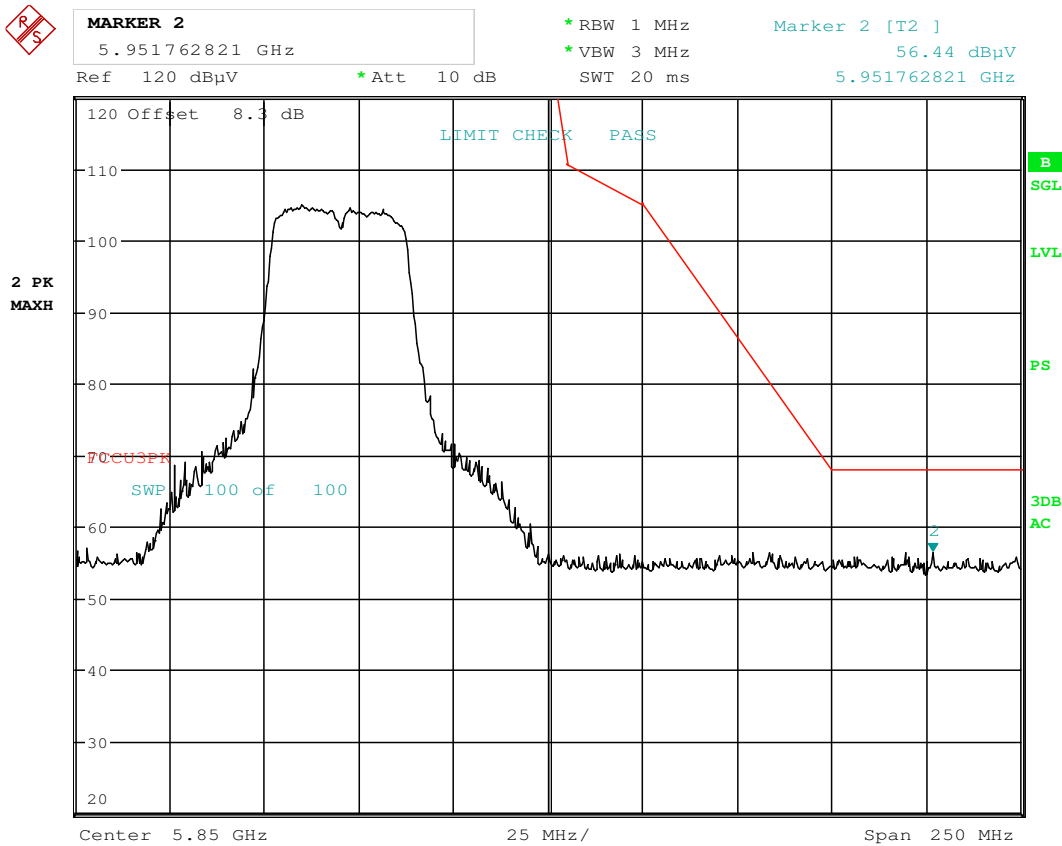
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5795MHz

Channel: 159



Date: 30.JAN.2017 12:00:46

Plot 7-26. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 40 of 45

7.3 Radiated Spurious Emissions Measurements – Below 1GHz

§15.209

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 must not exceed the limits shown in Table 7-15 per Section 15.209.

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 7-15. Radiated Limits

Test Procedures Used

ANSI C63.10-2013

Test Settings

Quasi-Peak Field Strength Measurements

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

FCC ID: ZNFV501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 41 of 45

Test Setup

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

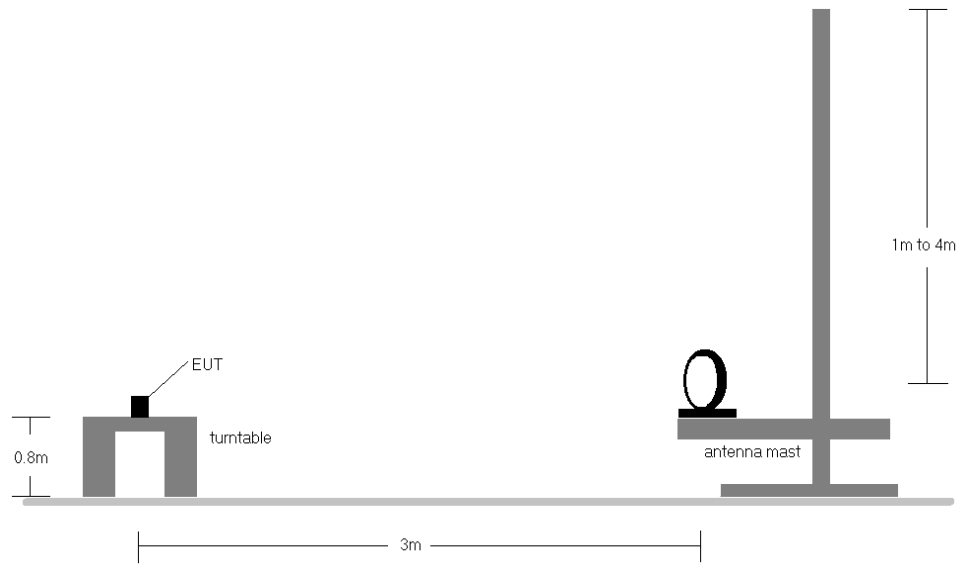


Figure 7-2. Radiated Test Setup < 30MHz

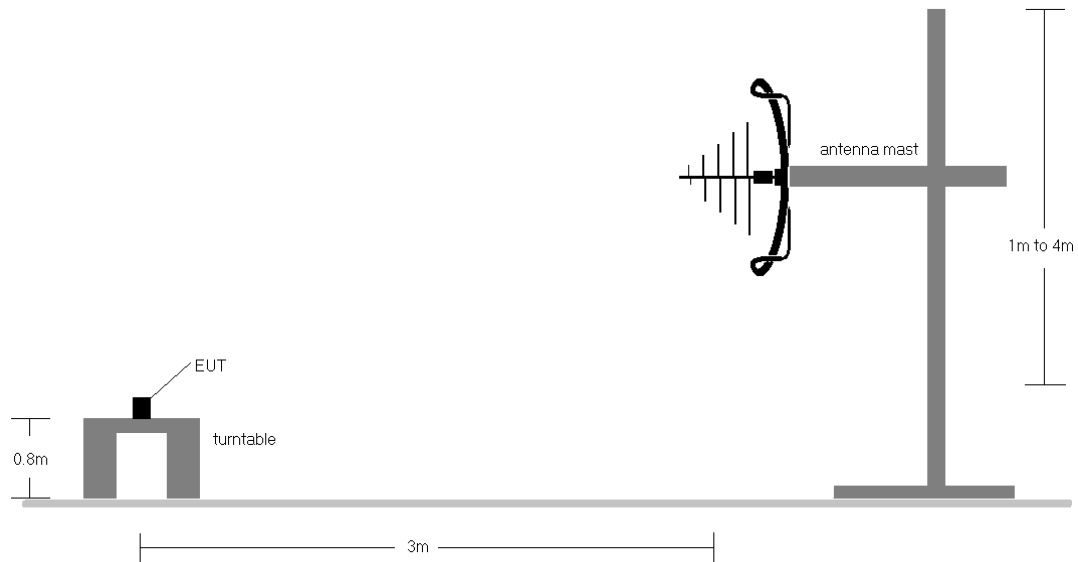


Figure 7-3. Radiated Test Setup < 1GHz

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 42 of 45

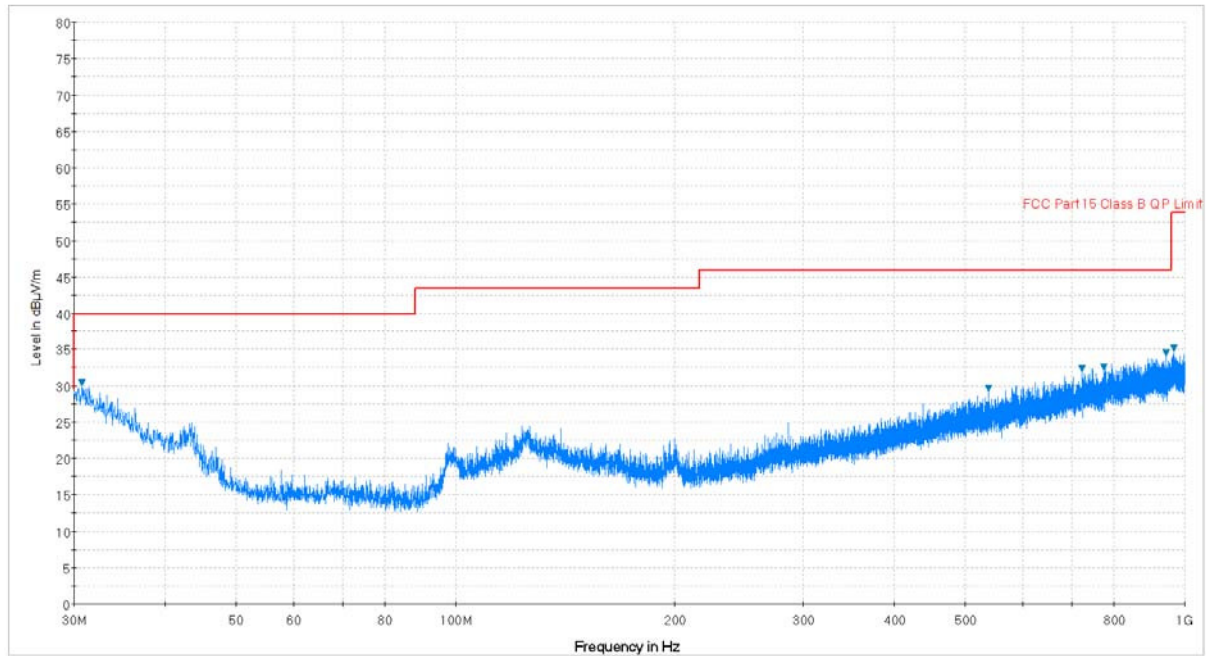
Test Notes

1. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-15.
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
3. This unit was tested with its standard battery.
4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
5. Emissions were measured at a 3 meter test distance.
6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
7. No spurious emissions were detected within 20dB of the limit below 30MHz.
8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
9. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. There were no emissions detected in the 30MHz – 1GHz frequency range, as shown in the subsequent plots.

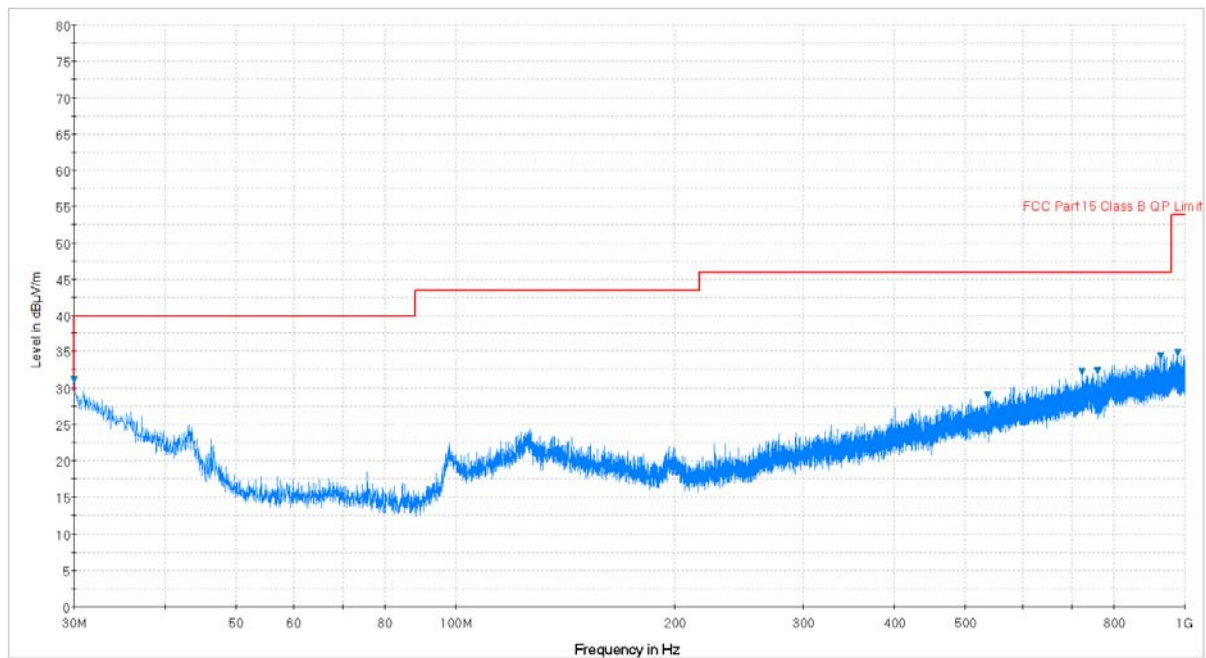
FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 43 of 45

Radiated Spurious Emissions Measurements (Below 1GHz)

§15.209



Plot 7-27. Radiated Spurious Plot below 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)



Plot 7-28. Radiated Spurious Plot below 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)

FCC ID: ZNFVS501	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 44 of 45

8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFVS501** is in compliance with Part 15E of the FCC Rules.

FCC ID: ZNFVS501		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1701170029-05.ZNF	Test Dates: 01/23 - 02/02/2017	EUT Type: Portable Handset		Page 45 of 45