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

Applicant Name:

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

Date of Testing:

7/20 - 8/11/2017

Test Site/Location:

PCTEST Lab, Columbia, MD, USA

Test Report Serial No.:

1M1707180221-05-R1.ZNF

FCC ID:

ZNFV30A

APPLICANT:

LG Electronics MobileComm U.S.A

Application Type:

Class II Permissive Change

Model:

LG-H931

Additional Model(s):

LGH931, H931, H933, LG-H933, LGH933, LG-VS996, LGVS996, VS996,
LG-US998, LGUS998, US998

EUT Type:

Portable Handset

FCC Classification:

Unlicensed National Information Infrastructure (UNII)

FCC Rule Part(s):

Part 15.407

Test Procedure(s):

KDB 789033 D02 v01r04, KDB 648474 D03 v01r04, KDB 662911 D01
v02r01

Class II Permissive Change:

Please see FCC change document

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 789033 D02 v01r04. Test results reported herein relate only to the item(s) tested.

This revised Test Report (S/N: 1M1707180221-05-R1.ZNF) supersedes and replaces the previously issued test report (S/N: 1M1707180221-05.ZNF) on the same subject device for the same type of testing as indicated. Please discard the previously issued test report(s).

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: ZNFV30A	 PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 1 of 114

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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	7
2.4 EMI Suppression Device(s)/Modifications	7
3.0 DESCRIPTION OF TESTS	8
3.1 Evaluation Procedure	8
3.2 Radiated Emissions	8
3.3 Environmental Conditions	8
4.0 ANTENNA REQUIREMENTS	9
5.0 MEASUREMENT UNCERTAINTY	10
6.0 TEST EQUIPMENT CALIBRATION DATA	11
7.0 TEST RESULTS	12
7.1 Summary	12
7.2 Radiated Spurious Emission Measurements – Above 1GHz	13
7.7.1 Antenna-1 Radiated Spurious Emission Measurements	17
7.7.2 Antenna-2 Radiated Spurious Emission Measurements	31
7.7.3 Simultaneous Tx Radiated Spurious Emissions Measurements	45
7.7.4 Antenna-1 Radiated Band Edge Measurements (20MHz BW)	49
7.7.5 Antenna-1 Radiated Band Edge Measurements (40MHz BW)	55
7.7.6 Antenna-1 Radiated Band Edge Measurements (80MHz BW)	61
7.7.7 Antenna-2 Radiated Band Edge Measurements (20MHz BW)	67
7.7.8 Antenna-2 Radiated Band Edge Measurements (40MHz BW)	73
7.7.9 Antenna-2 Radiated Band Edge Measurements (80MHz BW)	79
7.7.10 MIMO Radiated Band Edge Measurements (20MHz BW)	85
7.7.11 MIMO Radiated Band Edge Measurements (40MHz BW)	91
7.7.12 MIMO Radiated Band Edge Measurements (80MHz BW)	97
7.3 Radiated Spurious Emissions Measurements – Below 1GHz	108
8.0 CONCLUSION	114

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 2 of 114



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-H931

FCC ID: ZNFV30A

FCC CLASSIFICATION: Unlicensed National Information Infrastructure (UNII)

Test Device Serial No.: 15532, 15482, 15490, ☐ Production ☒ Pre-Production ☐ Engineering
15508, 15482

DATE(S) OF TEST: 7/20 - 8/11/2017

TEST REPORT S/N: 1M1707180221-05-R1.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: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 3 of 114

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.

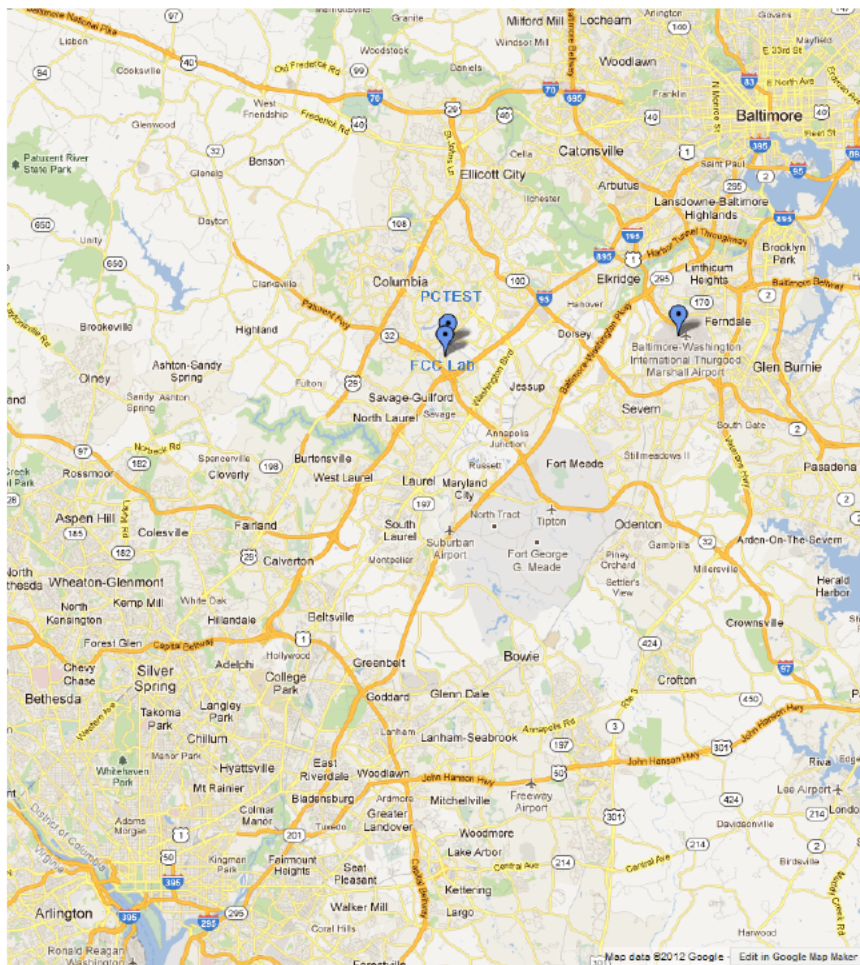


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 4 of 114

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFV30A**. 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, 1x Advanced (BC0, BC1), 850/1900 GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n/ac WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE), NFC

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	120	5600	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		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	5550	159	5795
				:	:		
				142	5710		

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

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

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

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 5 of 114

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 KDB 789033 D02 v01r04. 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	ANT2	MIMO
5GHz	a	94.3	94.3	94.9
	n (HT20)	93.7	94.1	94.5
	ac (HT20)	93.8	93.9	90.3
	n (HT40)	91.3	92.1	93.6
	ac (HT40)	91.9	91.9	86.7
	ac (HT80)	91.4	91.5	85.8

Table 2-4. Measured Duty Cycles

- The device employs MIMO technology. Below are the possible configurations.

WiFi Configurations		SISO		SDM		CDD	
		ANT1	ANT2	ANT1	ANT2	ANT1	ANT2
5GHz	11a	✓	✓	✗	✗	✓	✓
	11n (20MHz)	✓	✓	✓	✓	✓	✓
	11n (40MHz)	✓	✓	✓	✓	✓	✓
	11ac (80MHz)	✓	✓	✓	✓	✓	✓

Table 2-5. Frequency / Channel Operations

✓ = Support ; ✗ = NOT Support

SISO = Single Input Single Output

SDM = Spatial Diversity Multiplexing – MIMO function

CDD = Cyclic Delay Diversity - 2Tx Function

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)
 13/14.4, 26.28.9, 39/43.3, 52/57.8, 78/86.7, 104/115.6, 117/130, 130/144.4Mbps (MIMO n/ac – 20MHz)
 156/173Mbps (MIMO ac – 20MHz)
 27/30, 54/60, 81/90, 108/120, 162/180, 216/240, 243/270, 270/300Mbps (MIMO n/ac – 40MHz) 324/360, 360/400Mbps (MIMO ac – 40MHz)
 58.5/65, 117/130, 175.5/195, 234/260, 351/390, 468/520, 526.5/585, 585/650, 702/780, 780/866.7Mbps (MIMO ac – 80MHz)

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset	Page 6 of 114	

3. This device supports simultaneous transmission operation, which allows for two SISO channels to operate independent of one another in the 2.4GHz and 5GHz bands simultaneously on each antenna. The following tables show the worst case configurations determined during testing. The data for these configurations is contained in this test report.

Configuration 1: ANT1 transmitting in 2.4GHz mode and ANT2 in 5GHz mode

Description	2.4 GHz Emission	5 GHz Emission
Antenna	1	2
Channel	6	48
Operating Frequency (MHz)	2437	5240
Data Rate (Mbps)	MCS0	MCS0
Mode	802.11n	802.11n

Table 2-6. Config-1 (ANT1 2.4GHz & ANT2 5GHz)

2.3 Test Configuration

The EUT was tested per the guidance of KDB 789033 D02 v01r04. 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.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on a certified wireless charging pad (WCP) while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

2.4 EMI Suppression Device(s)/Modifications

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

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 7 of 114

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 v01r04 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: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 8 of 114

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: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 9 of 114

5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 10 of 114

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)	6/21/2017	Annual	6/21/2018	RE1
Agilent	N9038A	MXE EMI Receiver	4/26/2017	Annual	4/26/2018	MY51210133
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	941001
Anritsu	MA2411B	Pulse Power Sensor	10/14/2015	Biennial	10/14/2017	846215
Emco	6502	Active Loop Antenna (10k - 30 MHz)	8/9/2016	Biennial	8/9/2018	2936
Emco	3115	Horn Antenna (1-18GHz)	3/10/2016	Biennial	3/10/2018	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	3/27/2015	Triennial	3/27/2018	9203-2178
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	8/23/2016	Biennial	8/23/2018	135427
ETS Lindgren	3160-10	26.5-40 GHz Standard Gain Horn	8/23/2016	Biennial	8/23/2018	130993
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	4/26/2016	Biennial	4/26/2018	125518
Huber+Suhner	Sucoflex 102A	40GHz Radiated Cable	10/3/2016	Annual	10/3/2017	251425001
PCTEST	-	EMC Switch System	6/21/2017	Annual	6/21/2018	NM2
PCTEST	-	EMC Switch System	6/21/2017	Annual	6/21/2018	NM1
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/31/2017	Annual	7/31/2018	100348
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100037
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100040
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/2/2016	Biennial	3/2/2018	N/A

Table 6-1. Annual Test Equipment Calibration Schedule

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 11 of 114

7.0 TEST RESULTS

7.1 Summary

Company Name: LG Electronics MobileComm U.S.A
 FCC ID: ZNFV30A
 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

Notes:

- 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.

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset	Page 12 of 114	

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 v01r04, 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 v01r04 – 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: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 13 of 114

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.

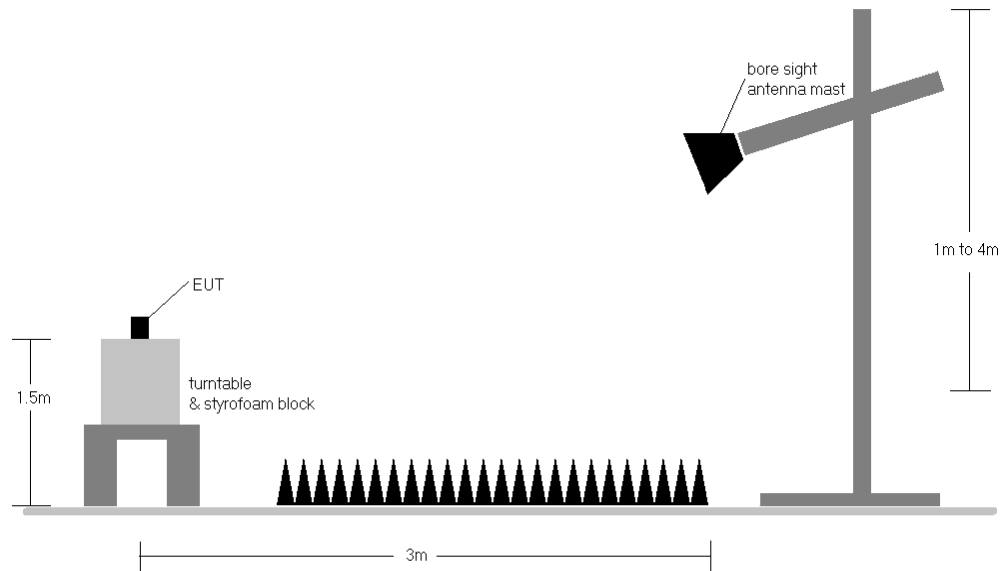


Figure 7-1. Test Instrument & Measurement Setup

Test Notes

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 14 of 114

1. All radiated spurious emissions levels were measured in a radiated test setup per the guidance of KDB 789033 D02 v01r04 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. Radiated spurious emissions were investigated while operating in MIMO/CDD mode, however, it was determined that single antenna operation produced the worst case emissions. Since the emissions produced from MIMO/CDD operation were found to be more than 20dB below the limit, the MIMO/CDD emissions are not reported.
9. 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.
10. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset	Page 15 of 114	

Sample Calculations

Determining Spurious Emissions Levels

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

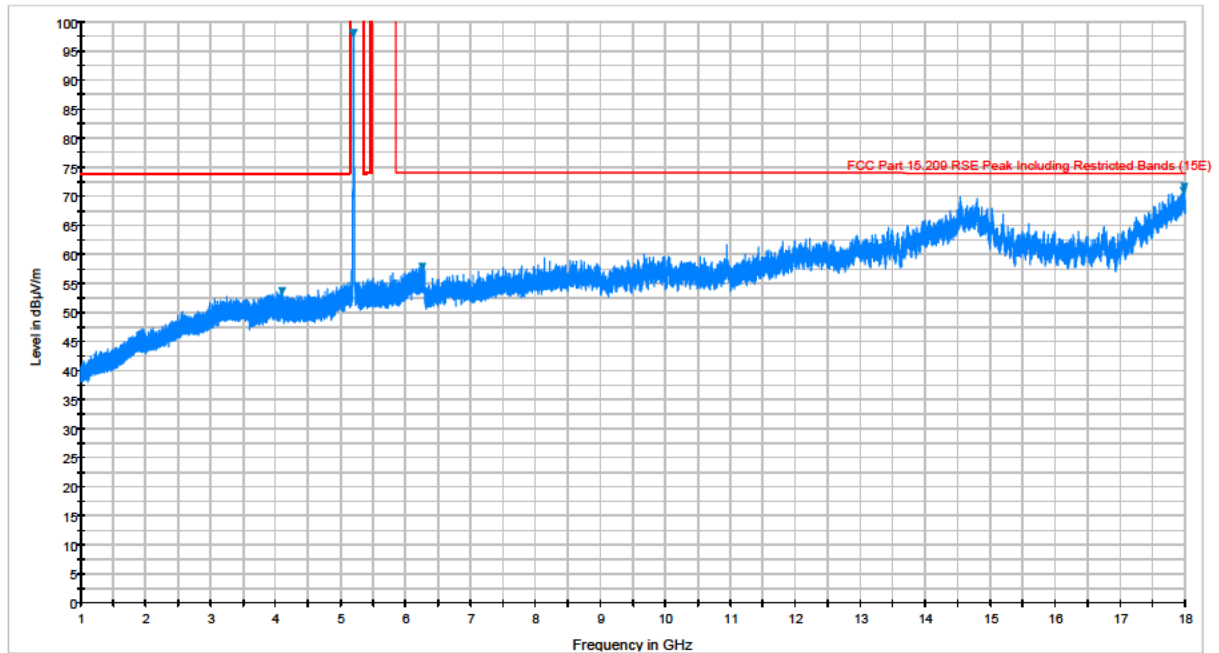
Radiated Band Edge Measurement Offset

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

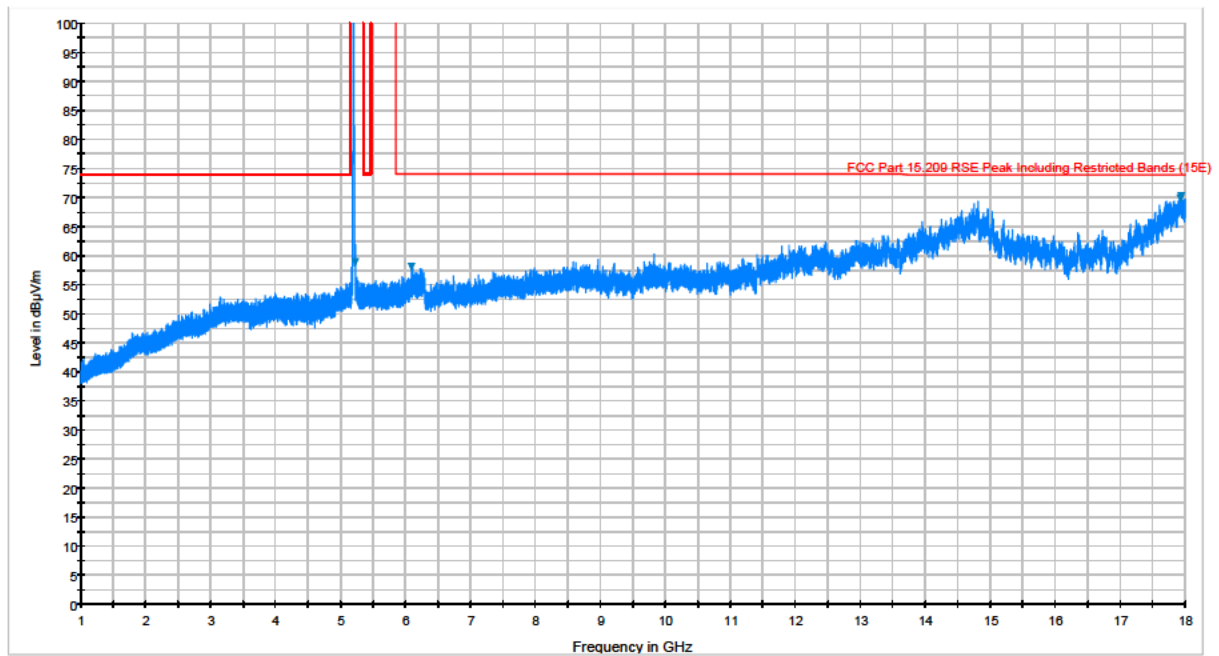
$$\text{Offset (dB)} = (\text{Antenna Factor} + \text{Cable Loss} + \text{Attenuator}) - \text{Preamplifier Gain}$$

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 16 of 114

7.7.1 Antenna-1 Radiated Spurious Emission Measurements

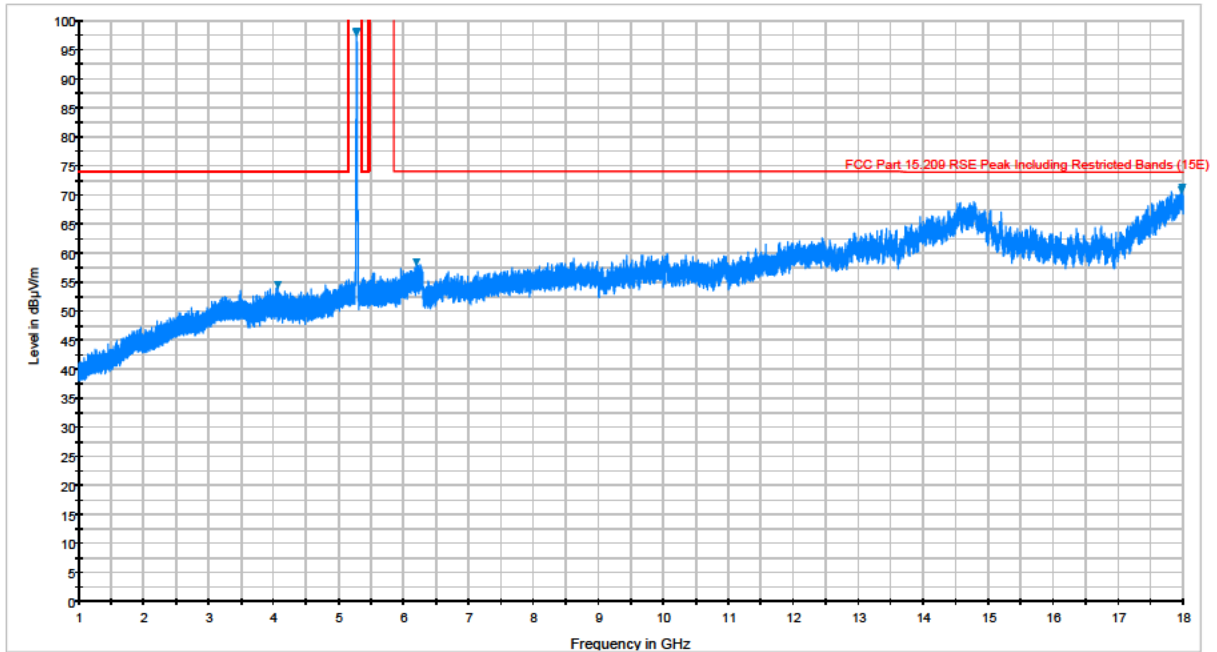


Plot 7-1. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. H)

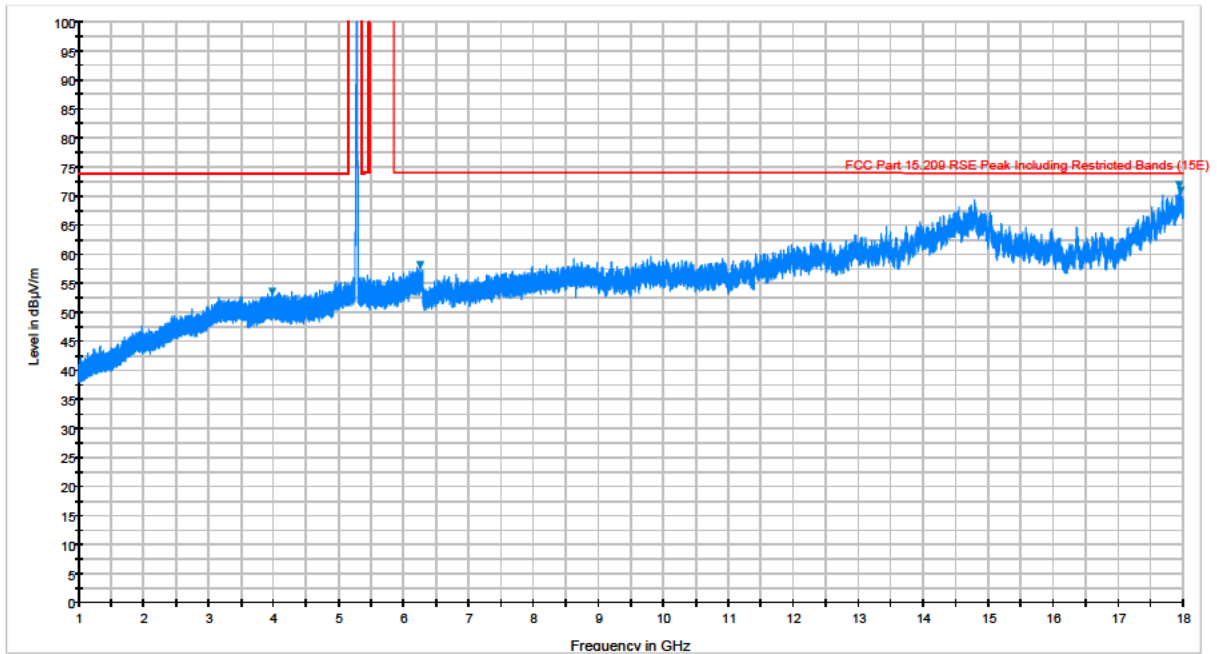


Plot 7-2. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. V)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 17 of 114

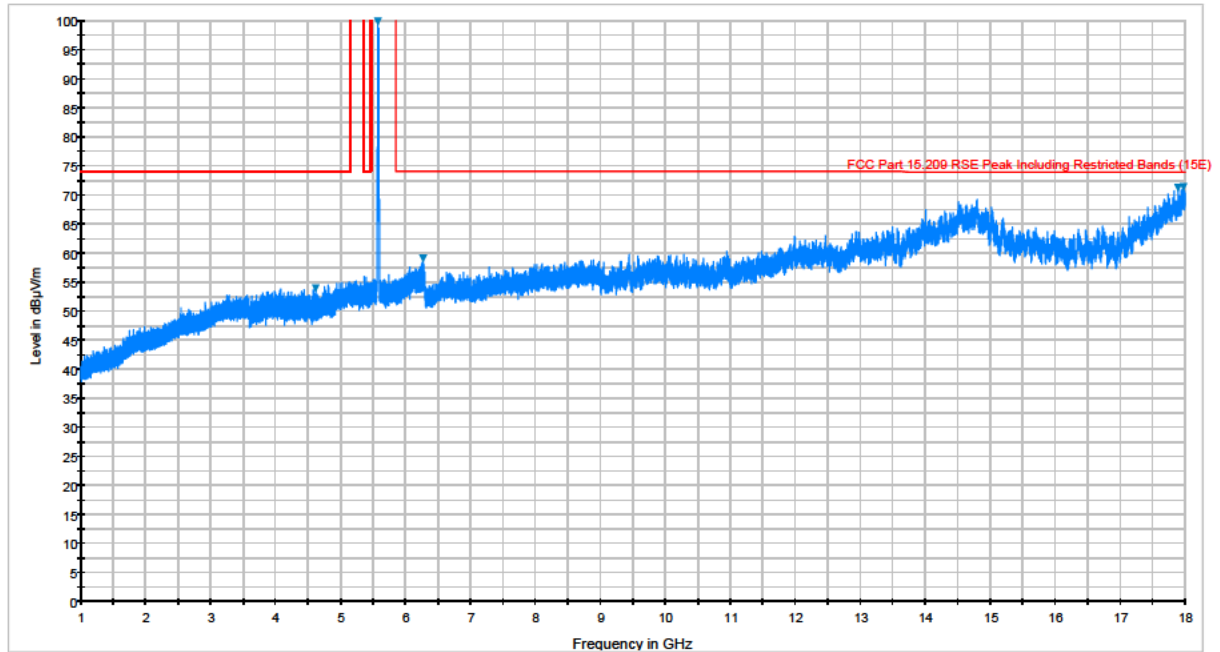


Plot 7-3. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. H)

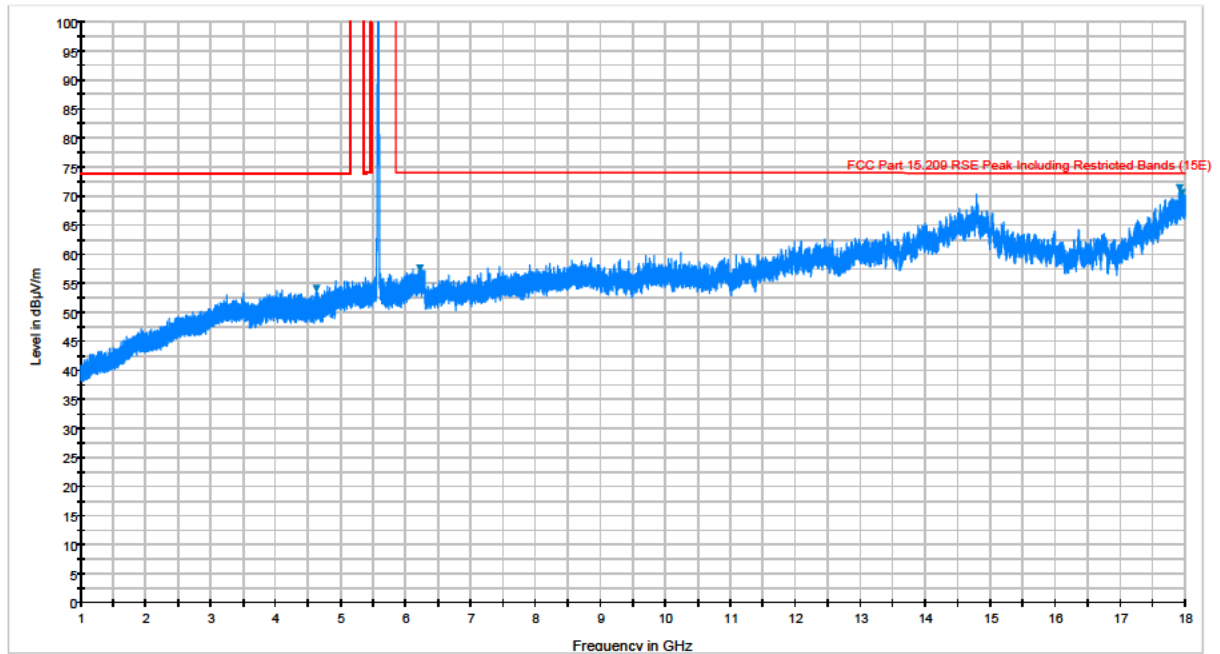


Plot 7-4. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. V)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 18 of 114

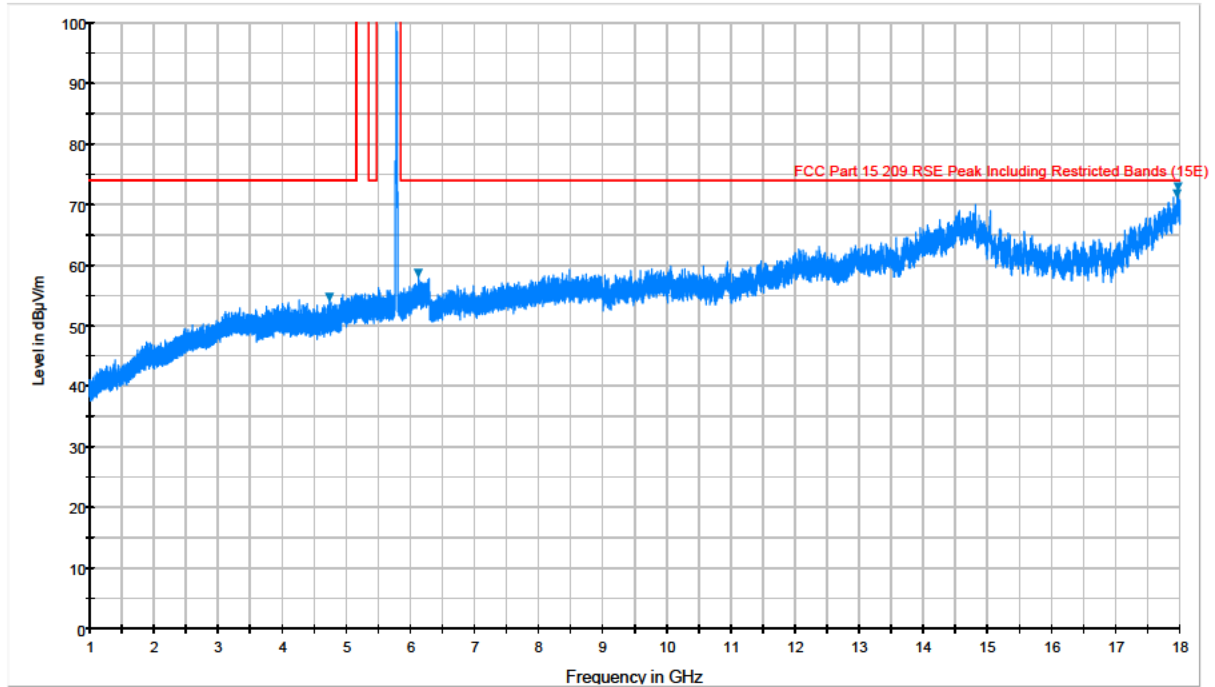


Plot 7-5. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 120, Ant. Pol. H)

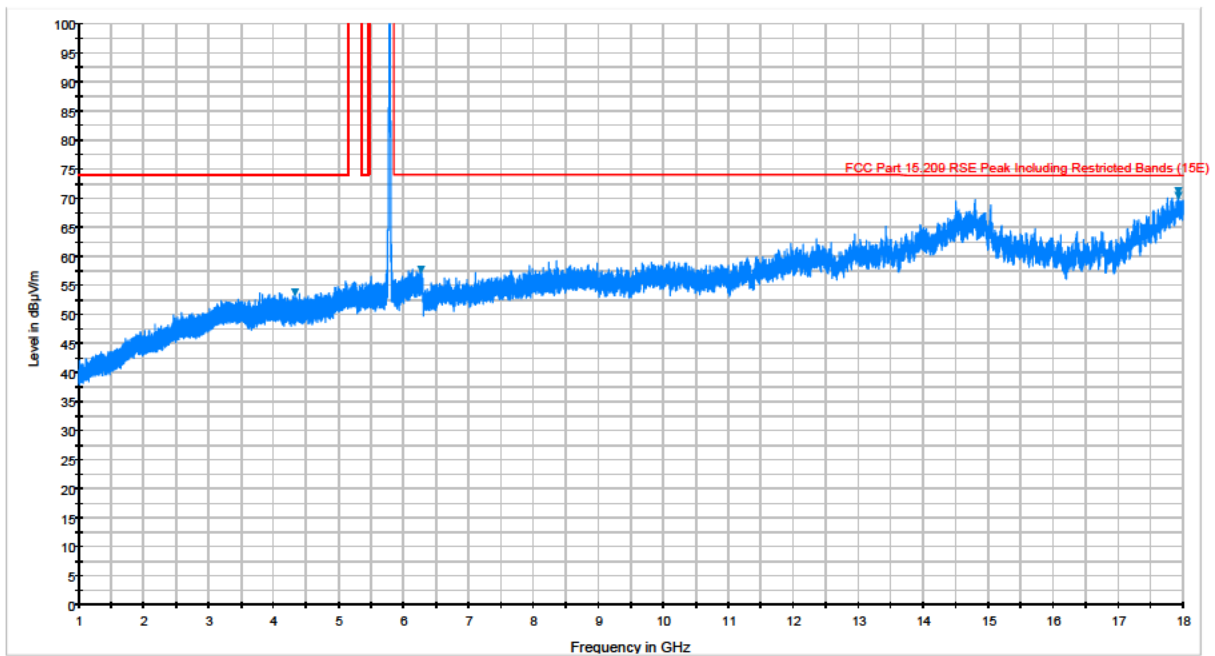


Plot 7-6. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 120, Ant. Pol. V)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 19 of 114



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

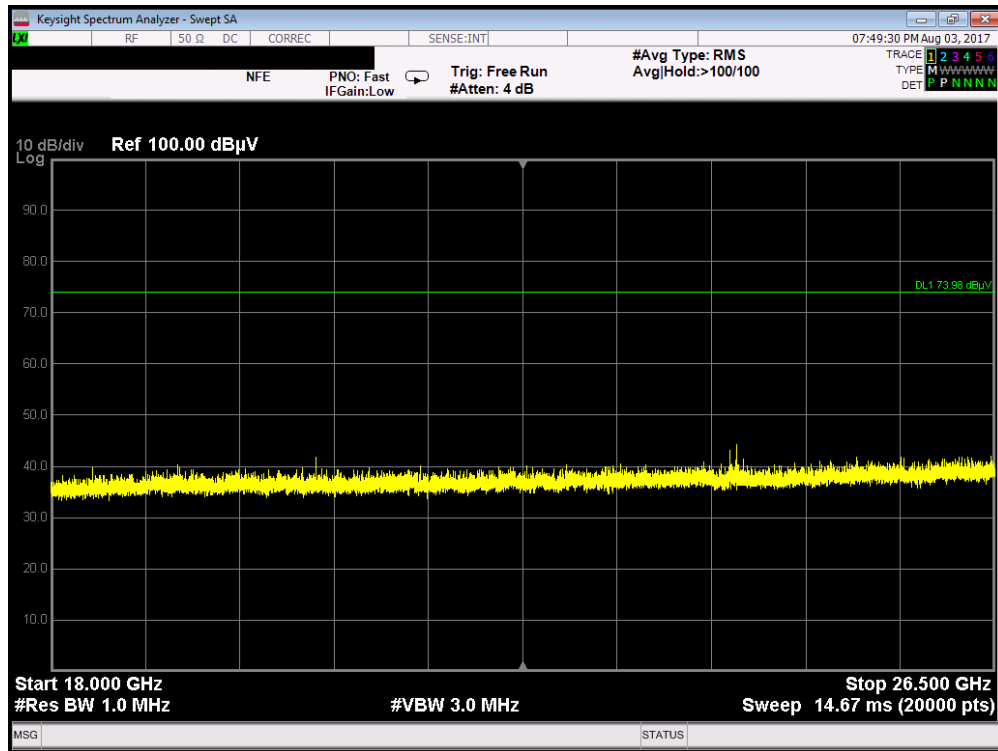


Plot 7-8. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)

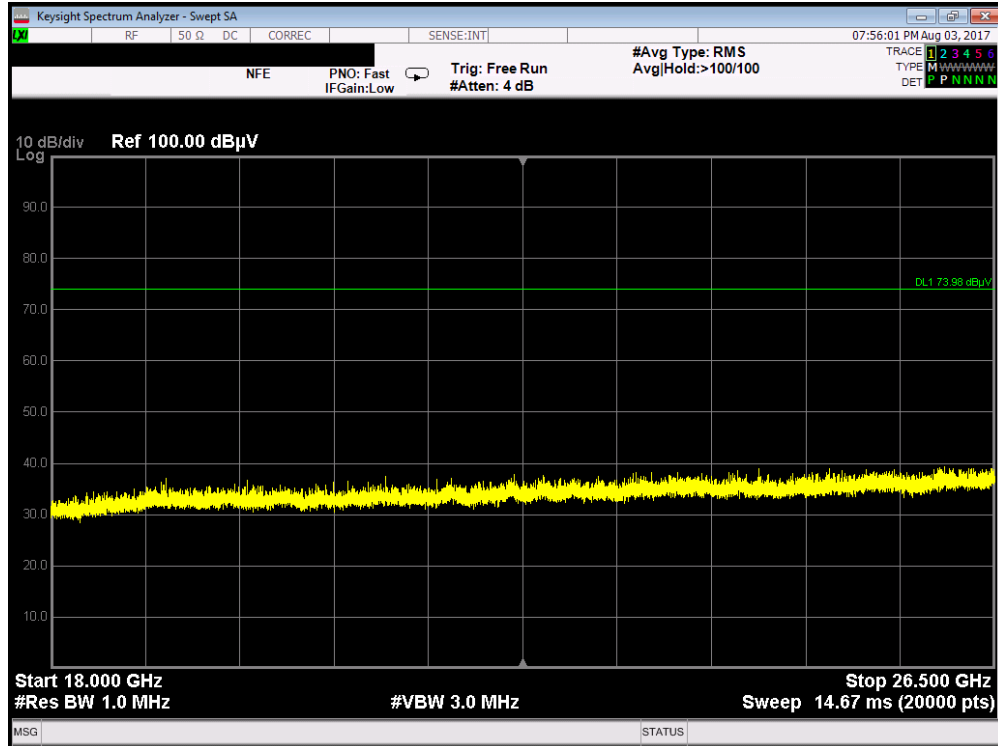
FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 20 of 114

Antenna-1 Radiated Spurious Emissions Measurements (Above 18GHz)

\$15.209



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

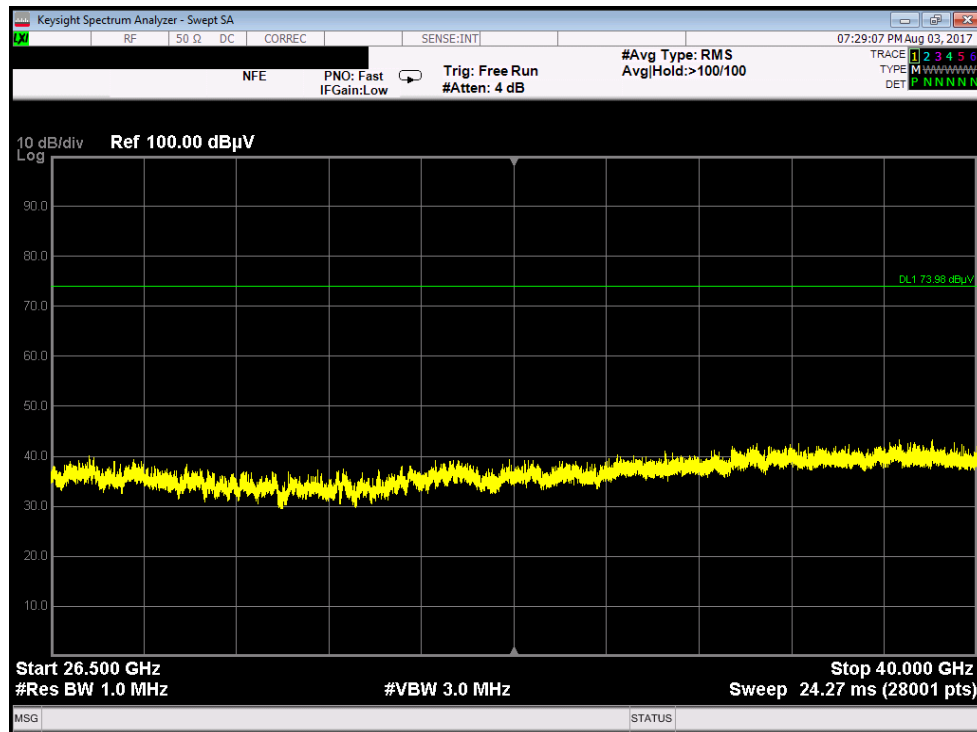


Plot 7-10. Radiated Spurious Plot above 18GHz - 26.5GHz (802.11a – Ant. Pol. V)

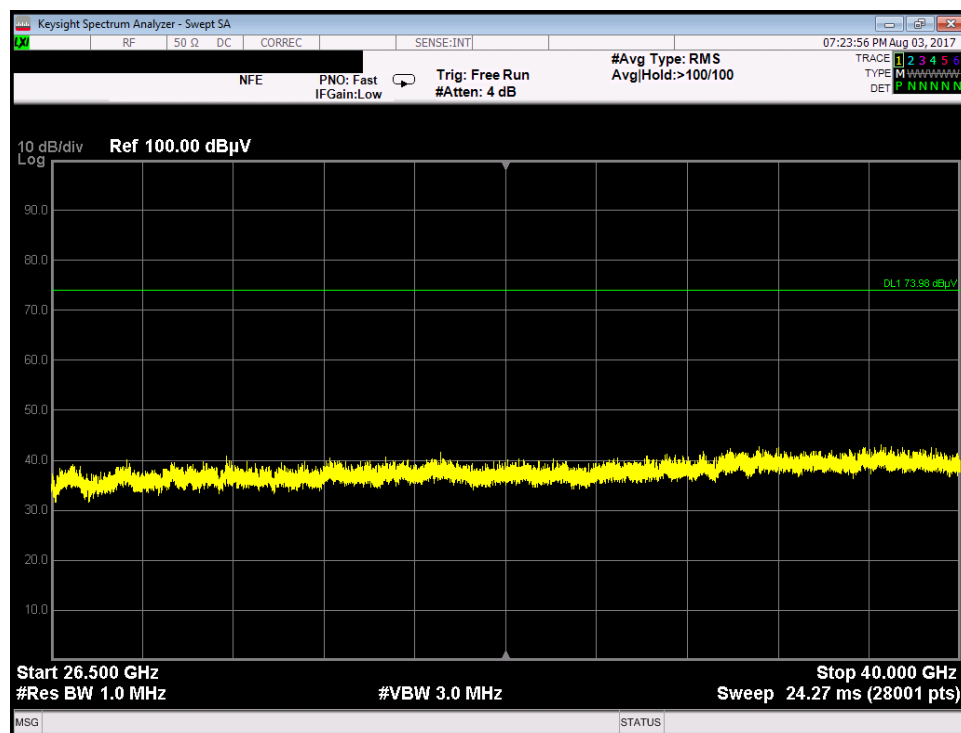
FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 21 of 114

Antenna-1 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: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 22 of 114

Antenna-1 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 Meter
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	142	-62.75	12.13	-9.54	46.84	68.20	-21.36
* 15540.00	Average	H	-	-	-74.63	14.49	-9.54	37.32	53.98	-16.66
* 15540.00	Peak	H	-	-	-63.74	14.49	-9.54	48.21	73.98	-25.77
* 20720.00	Average	H	-	-	-70.44	7.94	-9.54	34.96	53.98	-19.02
* 20720.00	Peak	H	-	-	-62.68	7.94	-9.54	42.72	73.98	-31.26
25900.00	Peak	H	-	-	-60.58	8.46	-9.54	45.34	68.20	-22.86

Table 7-3. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	121	-63.88	12.12	-9.54	45.70	68.20	-22.50
* 15600.00	Average	H	-	-	-74.40	14.31	-9.54	37.36	53.98	-16.62
* 15600.00	Peak	H	-	-	-64.79	14.31	-9.54	46.98	73.98	-27.00
* 20800.00	Average	H	-	-	-70.59	7.95	-9.54	34.82	53.98	-19.16
* 20800.00	Peak	H	-	-	-62.37	7.95	-9.54	43.04	73.98	-30.94
26000.00	Peak	H	-	-	-60.32	8.61	-9.54	45.74	68.20	-22.46

Table 7-4. Radiated Measurements

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 23 of 114

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	355	-64.27	12.09	-9.54	45.28	68.20	-22.92
* 15720.00	Average	H	-	-	-70.61	14.02	-9.54	40.87	53.98	-13.11
* 15720.00	Peak	H	-	-	-64.59	14.02	-9.54	46.89	73.98	-27.08
* 20960.00	Average	H	-	-	-70.38	7.91	-9.54	35.00	53.98	-18.98
* 20960.00	Peak	H	-	-	-61.99	7.91	-9.54	43.38	73.98	-30.60
26200.00	Peak	H	-	-	-59.84	8.62	-9.54	46.23	68.20	-21.97

Table 7-5. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	360	-64.78	12.13	-9.54	44.81	68.20	-23.39
* 15540.00	Average	H	-	-	-75.63	14.49	-9.54	36.33	53.98	-17.65
* 15540.00	Peak	H	-	-	-65.95	14.49	-9.54	46.00	73.98	-27.98
* 20720.00	Average	H	-	-	-70.65	7.94	-9.54	34.75	53.98	-19.23
* 20720.00	Peak	H	-	-	-63.26	7.94	-9.54	42.14	73.98	-31.84
25900.00	Peak	H	-	-	-61.62	8.46	-9.54	44.30	68.20	-23.90

Table 7-6. Radiated Measurements with WCP

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 24 of 114

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	347	-61.92	12.16	-9.54	47.69	68.20	-20.51
* 15780.00	Average	H	-	-	-73.26	14.03	-9.54	38.22	53.98	-15.76
* 15780.00	Peak	H	-	-	-64.74	14.03	-9.54	46.75	73.98	-27.23
* 21040.00	Average	H	-	-	-71.24	7.92	-9.54	34.14	53.98	-19.84
* 21040.00	Peak	H	-	-	-62.29	7.92	-9.54	43.09	73.98	-30.89
26300.00	Peak	H	-	-	-60.43	8.73	-9.54	45.76	68.20	-22.44

Table 7-7. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	343	-62.40	12.04	-9.54	47.10	68.20	-21.10
* 15840.00	Average	H	-	-	-73.15	14.25	-9.54	38.55	53.98	-15.43
* 15840.00	Peak	H	-	-	-64.98	14.25	-9.54	46.72	73.98	-27.26
* 21120.00	Average	H	-	-	-70.40	7.97	-9.54	35.02	53.98	-18.96
* 21120.00	Peak	H	-	-	-62.76	7.97	-9.54	42.66	73.98	-31.32
26400.00	Peak	H	-	-	-60.67	8.94	-9.54	45.73	68.20	-22.47

Table 7-8. Radiated Measurements

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 25 of 114

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	330	-71.57	12.06	-9.54	37.95	53.98	-16.02
* 10640.00	Peak	H	100	330	-62.75	12.06	-9.54	46.77	73.98	-27.21
* 15960.00	Average	H	-	-	-72.59	14.55	-9.54	39.42	53.98	-14.56
* 15960.00	Peak	H	-	-	-65.39	14.55	-9.54	46.62	73.98	-27.36
* 21280.00	Average	H	-	-	-70.30	8.04	-9.54	35.20	53.98	-18.78
* 21280.00	Peak	H	-	-	-63.11	8.04	-9.54	42.39	73.98	-31.59
26600.00	Peak	H	-	-	-53.07	-9.45	-9.54	34.94	68.20	-33.26

Table 7-9. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	75	-72.56	12.06	-9.54	36.96	53.98	-17.02
* 10640.00	Peak	H	100	75	-64.56	12.06	-9.54	44.96	73.98	-29.02
* 15960.00	Average	H	-	-	-72.62	14.55	-9.54	39.39	53.98	-14.59
* 15960.00	Peak	H	-	-	-66.02	14.55	-9.54	45.99	73.98	-27.99
* 21280.00	Average	H	-	-	-70.31	8.04	-9.54	35.19	53.98	-18.79
21280.00	Peak	H	-	-	-63.54	8.04	-9.54	41.96	73.98	-32.02
26600.00	Peak	H	-	-	-53.32	-9.45	-9.54	34.69	68.20	-33.51

Table 7-10. Radiated Measurements with WCP

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 26 of 114

Worst Case Mode: 802.11a
 Worst Case Transfer Rate: 6 Mbps
 Distance of Measurements: 1 Meter
 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	325	-73.54	12.87	-9.54	36.79	53.98	-17.19
* 11000.00	Peak	H	100	325	-64.88	12.87	-9.54	45.45	73.98	-28.53
16500.00	Peak	H	-	-	-65.32	16.61	-9.54	48.74	68.20	-19.46
22000.00	Peak	H	-	-	-63.16	8.43	-9.54	42.73	68.20	-25.47
27500.00	Peak	H	-	-	-51.55	-8.80	-9.54	37.11	68.20	-31.09

Table 7-11. Radiated Measurements

Worst Case Mode: 802.11a
 Worst Case Transfer Rate: 6 Mbps
 Distance of Measurements: 1 Meter
 Operating Frequency: 5600MHz
 Channel: 120

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	327	-72.70	12.64	-9.54	37.40	53.98	-16.58
* 11160.00	Peak	H	100	327	-64.37	12.64	-9.54	45.72	73.98	-28.26
16740.00	Peak	H	-	-	-64.35	16.21	-9.54	49.32	68.20	-18.88
* 22320.00	Average	H	-	-	-70.19	8.08	-9.54	35.35	53.98	-18.63
* 22320.00	Peak	H	-	-	-61.58	8.08	-9.54	43.96	73.98	-30.02
27900.00	Peak	H	-	-	-52.14	-9.07	-9.54	36.25	68.20	-31.95

Table 7-12. Radiated Measurements

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 27 of 114

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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]
* 11400.00	Average	H	100	343	-72.64	12.47	-9.54	37.29	53.98	-16.69
* 11400.00	Peak	H	100	343	-65.18	12.47	-9.54	44.75	73.98	-29.23
17100.00	Peak	H	-	-	-64.46	18.06	-9.54	51.06	68.20	-17.14
* 22800.00	Average	H	-	-	-70.46	8.37	-9.54	35.37	53.98	-18.61
* 22800.00	Peak	H	-	-	-62.34	8.37	-9.54	43.50	73.98	-30.48
28500.00	Peak	H	-	-	-51.16	-8.95	-9.54	37.34	68.20	-30.86

Table 7-13. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
Operating Frequency: 5600MHz
Channel: 120

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	350	-72.82	12.64	-9.54	37.27	53.98	-16.71
* 11160.00	Peak	H	100	350	-64.87	12.64	-9.54	45.22	73.98	-28.76
16740.00	Peak	H	-	-	-65.26	16.21	-9.54	48.41	68.20	-19.79
22320.00	Average	H	-	-	-70.27	8.08	-9.54	35.27	53.98	-18.71
22320.00	Peak	H	-	-	-62.49	8.08	-9.54	43.05	73.98	-30.93
27900.00	Peak	H	-	-	-52.16	-9.07	-9.54	36.22	68.20	-31.98

Table 7-14. Radiated Measurements with WCP

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 28 of 114

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	345	-72.77	12.43	-9.54	37.12	53.98	-16.86
* 11490.00	Peak	H	100	345	-63.81	12.43	-9.54	46.07	73.98	-27.90
17235.00	Peak	H	-	-	-64.58	18.61	-9.54	51.48	68.20	-16.72
* 22980.00	Average	H	-	-	-69.42	8.16	-9.54	36.20	53.98	-17.78
* 22980.00	Peak	H	-	-	-61.92	8.16	-9.54	43.70	73.98	-30.28
28725.00	Peak	H	-	-	-51.01	-9.24	-9.54	37.21	68.20	-30.99

Table 7-15. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	342	-73.75	12.54	-9.54	36.24	53.98	-17.74
* 11570.00	Peak	H	100	342	-64.91	12.54	-9.54	45.08	73.98	-28.90
17355.00	Peak	H	-	-	-64.41	18.73	-9.54	51.77	68.20	-16.43
23140.00	Peak	H	-	-	-62.52	8.37	-9.54	43.31	68.20	-24.89
28925.00	Peak	H	-	-	-51.59	-9.65	-9.54	36.22	68.20	-31.98

Table 7-16. Radiated Measurements

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 29 of 114

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	336	-73.43	12.99	-9.54	37.02	53.98	-16.96
* 11650.00	Peak	H	100	336	-65.36	12.99	-9.54	45.09	73.98	-28.89
17475.00	Peak	H	-	-	-65.17	19.25	-9.54	51.53	68.20	-16.67
23300.00	Peak	H	-	-	-61.62	8.50	-9.54	44.33	68.20	-23.87
29125.00	Peak	H	-	-	-52.15	-9.87	-9.54	35.44	68.20	-32.76

Table 7-17. Radiated Measurements

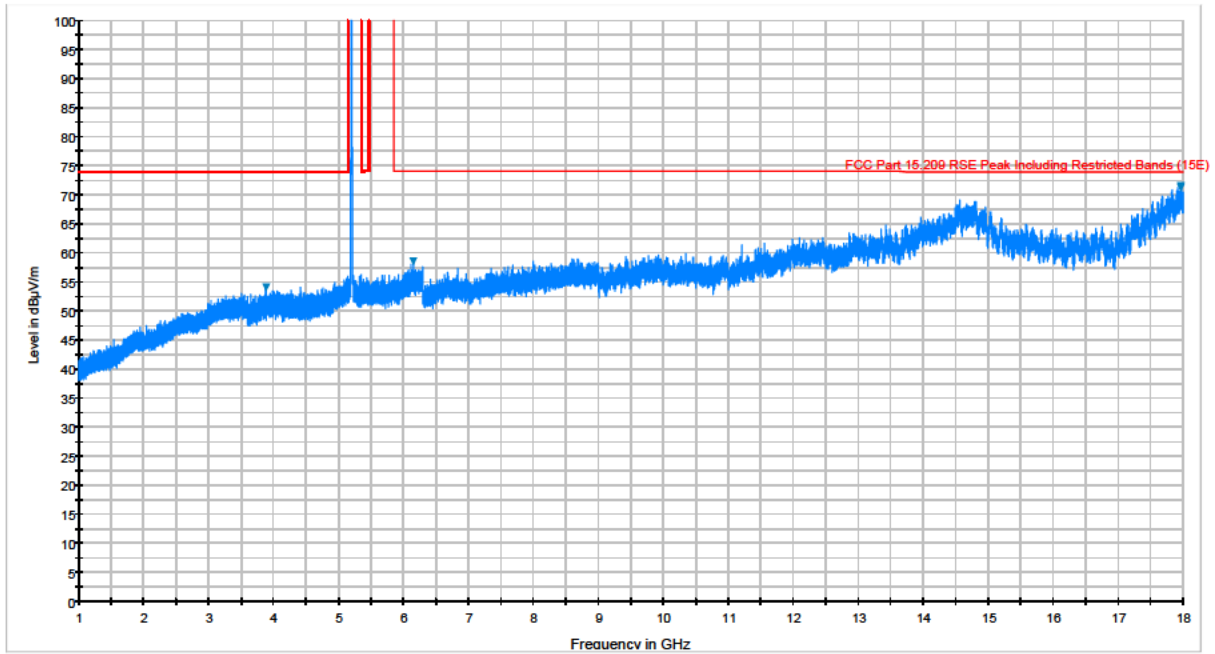
Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
Operating Frequency: 5745 MHz
Channel: 149

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	-	-	-73.48	12.43	-9.54	36.40	53.98	-17.57
* 11490.00	Peak	H	-	-	-65.08	12.43	-9.54	44.81	73.98	-29.17
17235.00	Peak	H	-	-	-64.79	18.61	-9.54	51.28	68.20	-16.92
22980.00	Average	H	-	-	-69.80	8.16	-9.54	35.82	53.98	-18.16
22980.00	Peak	H	-	-	-62.30	8.16	-9.54	43.32	73.98	-30.66
28725.00	Peak	H	-	-	-52.04	-9.24	-9.54	36.17	68.20	-32.03

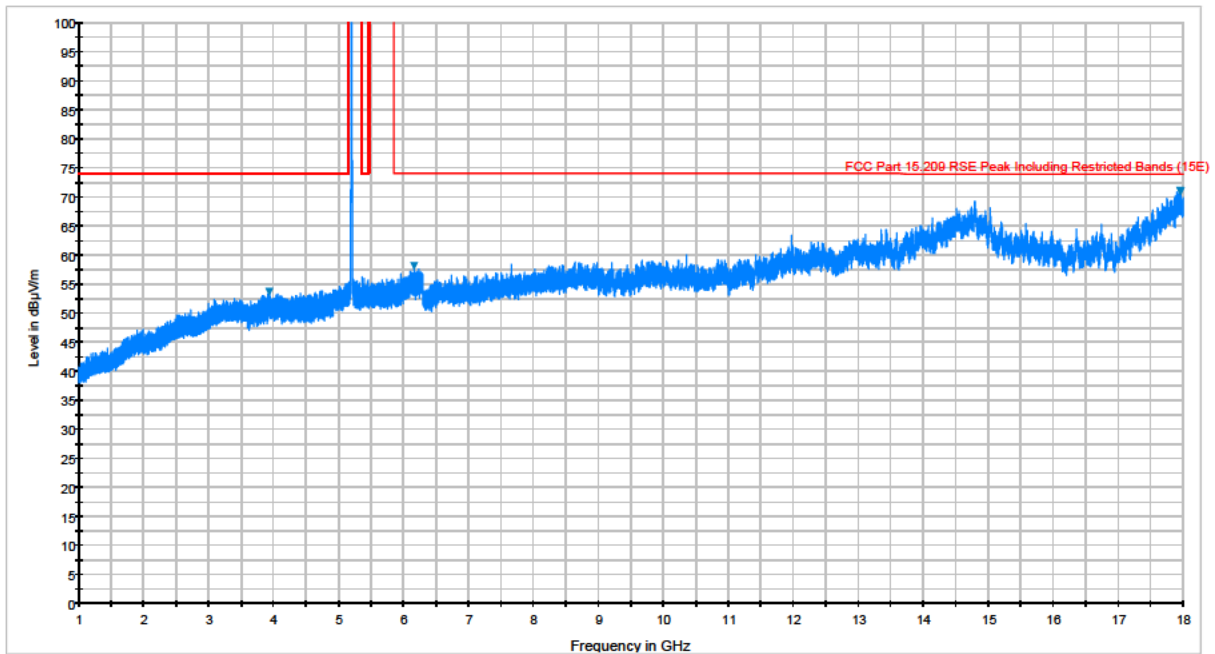
Table 7-18. Radiated Measurements with WCP

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 30 of 114

7.7.2 Antenna-2 Radiated Spurious Emission Measurements

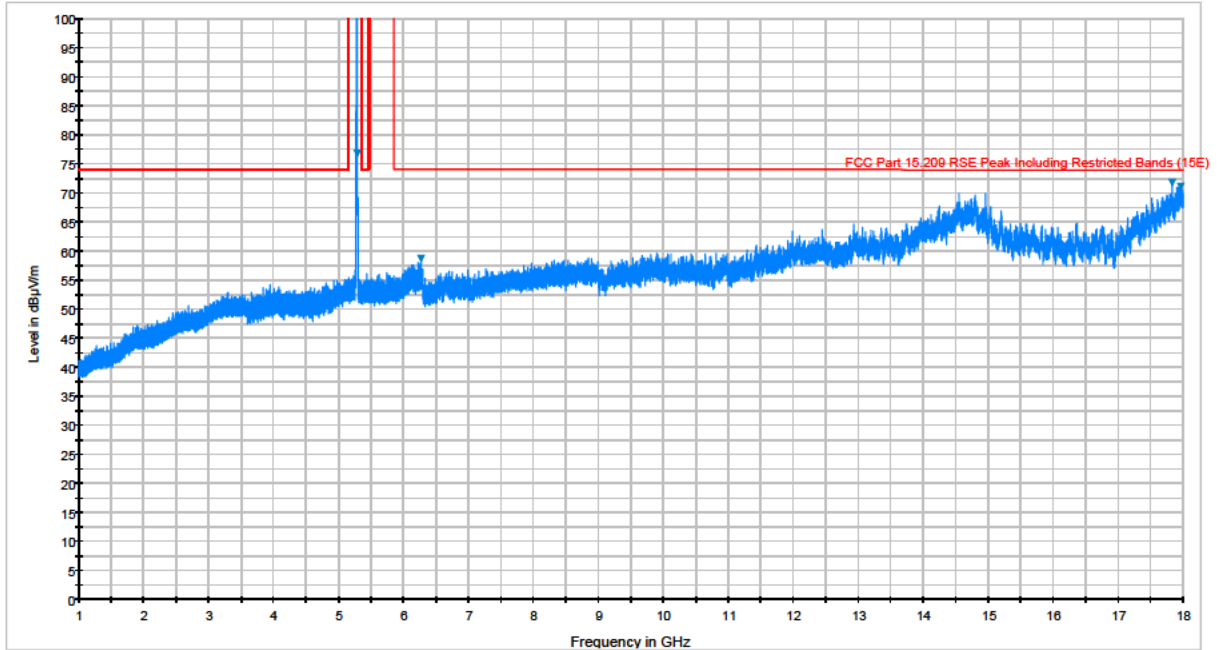


Plot 7-13. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. H)

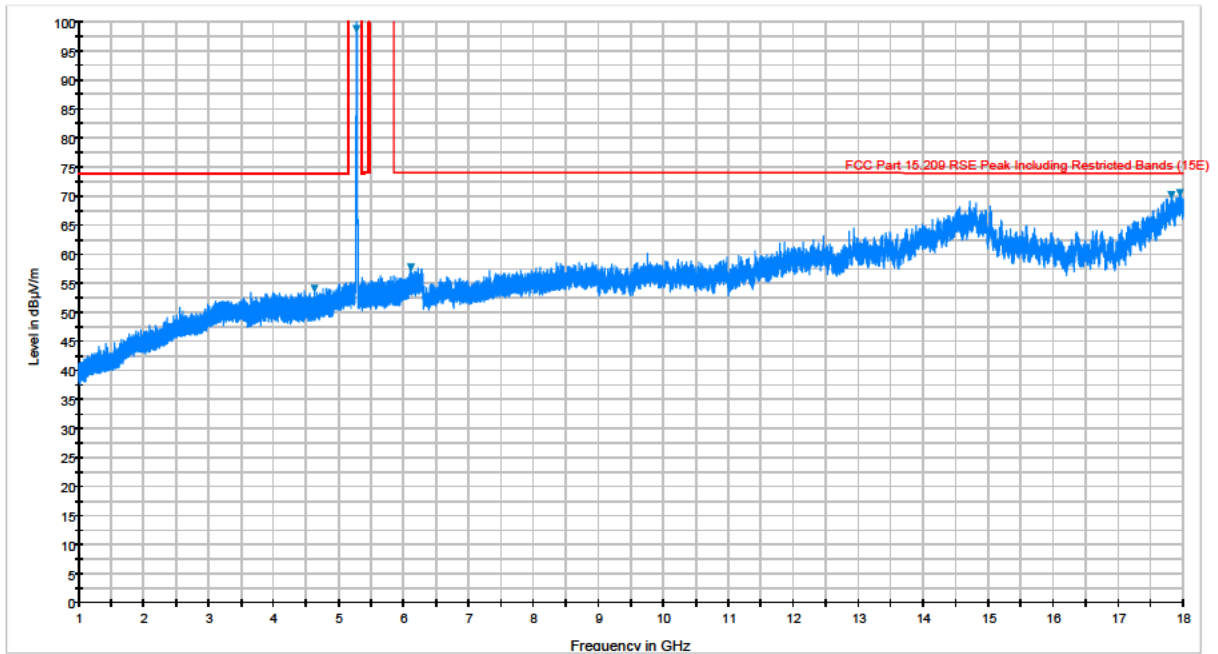


Plot 7-14. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. V)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 31 of 114

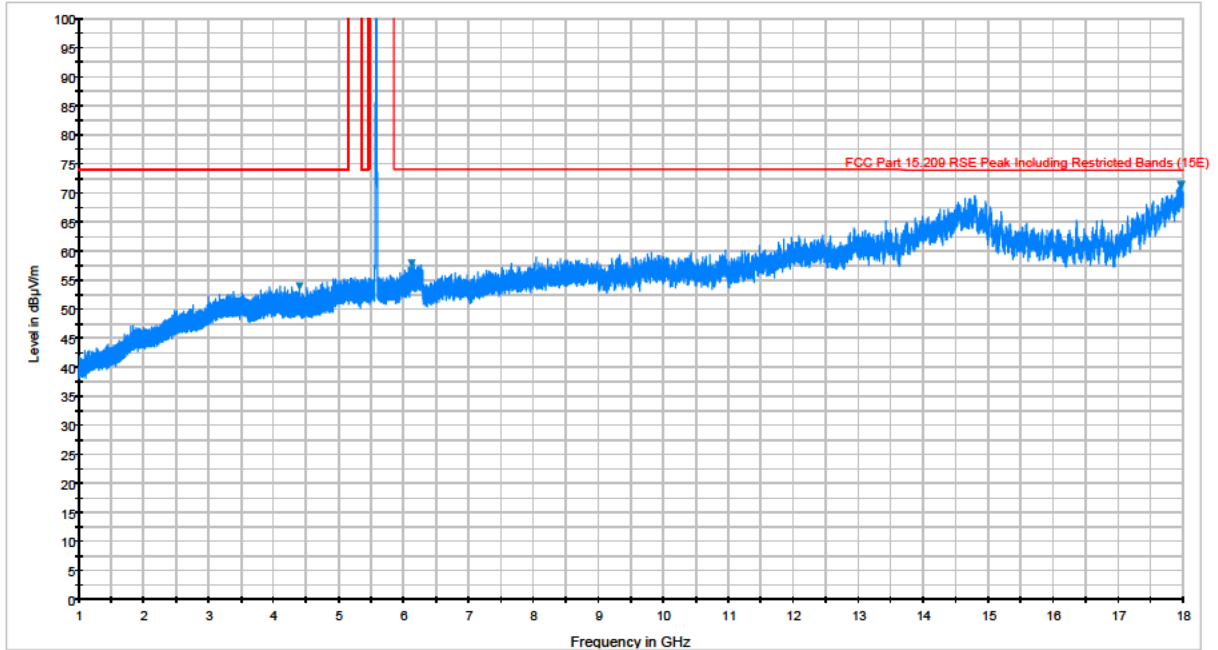


Plot 7-15. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. H)

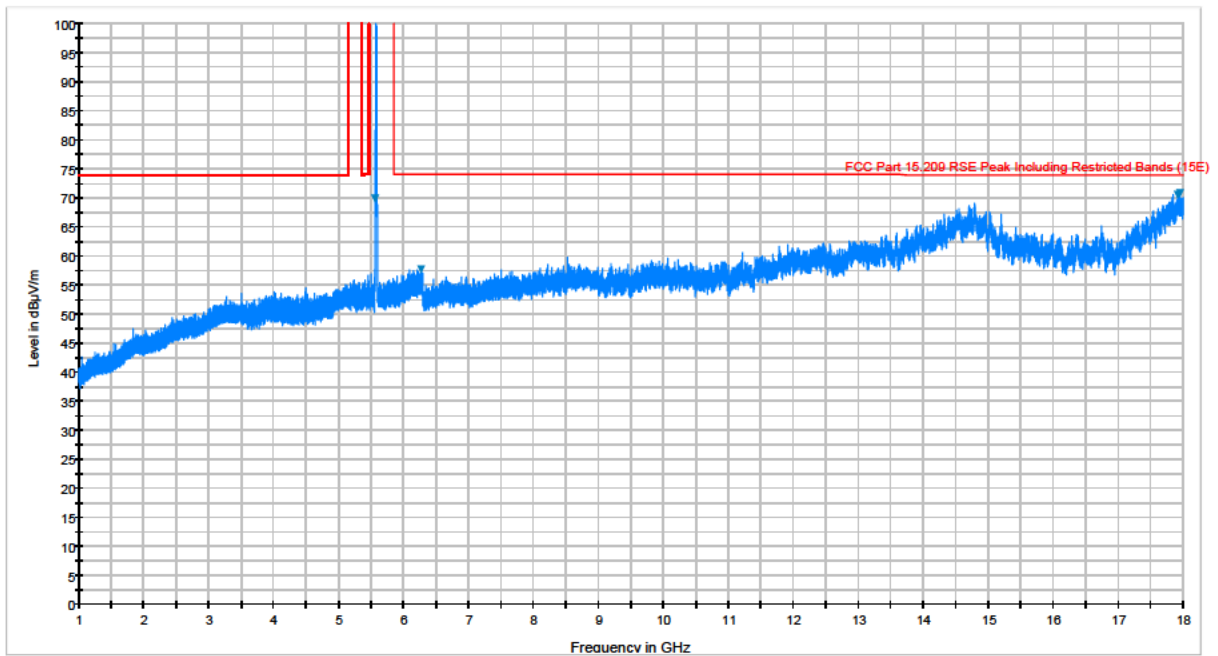


Plot 7-16. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. V)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 32 of 114

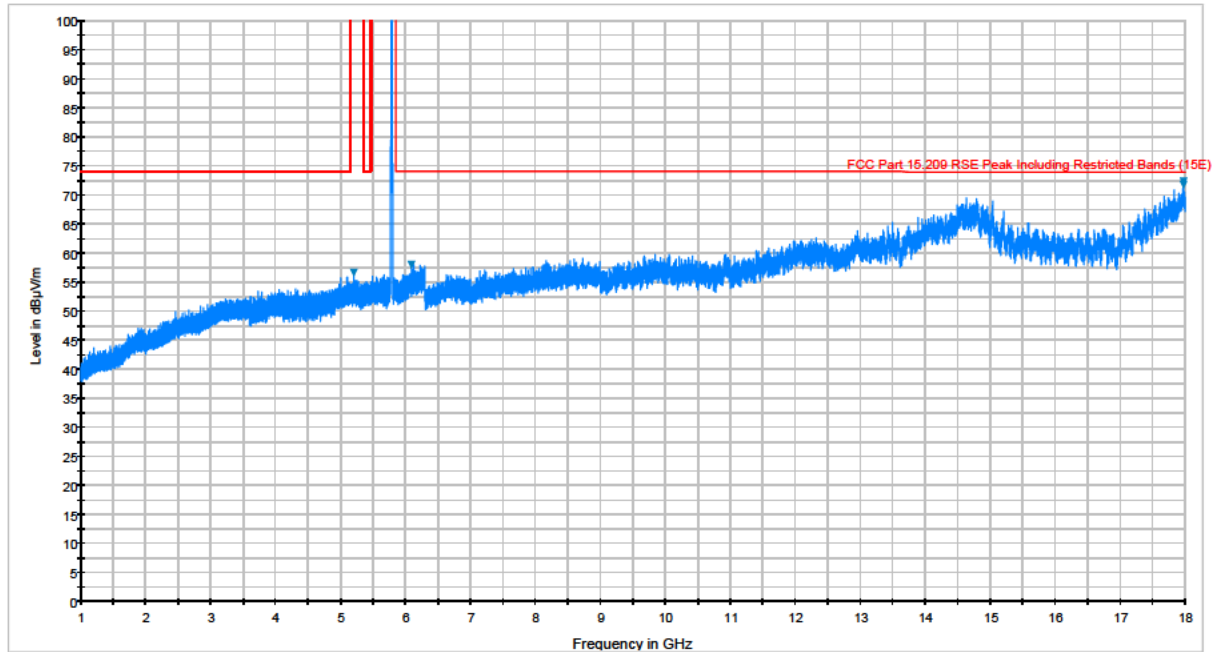


Plot 7-17. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 120, Ant. Pol. H)

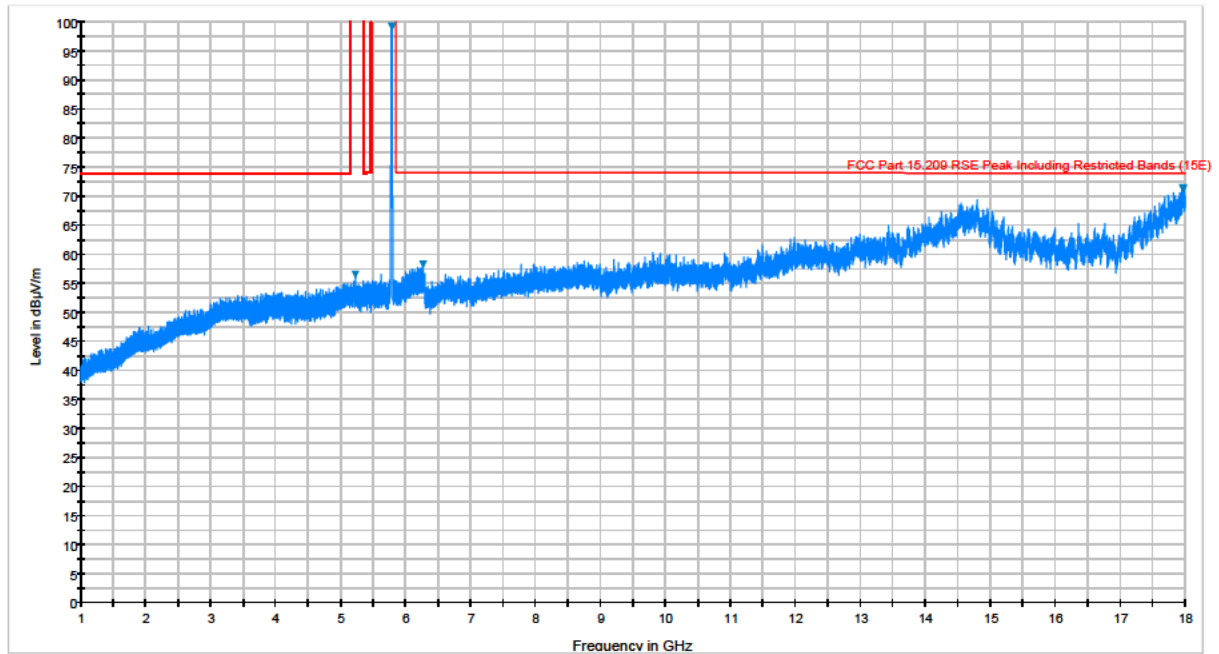


Plot 7-18. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 120, Ant. Pol. V)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 33 of 114



Plot 7-19. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)

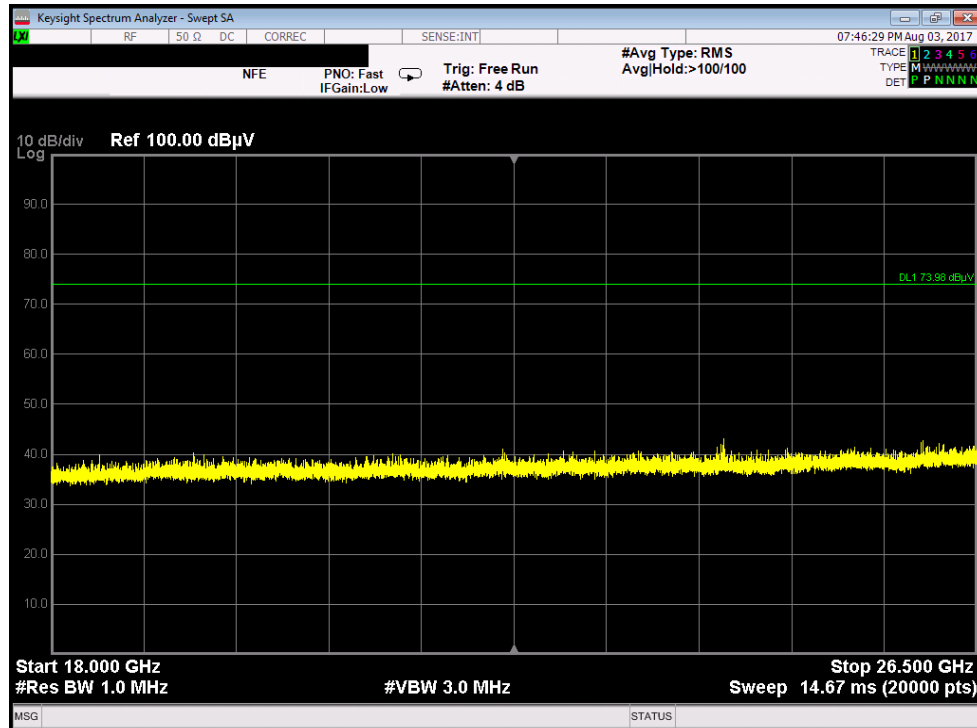


Plot 7-20. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)

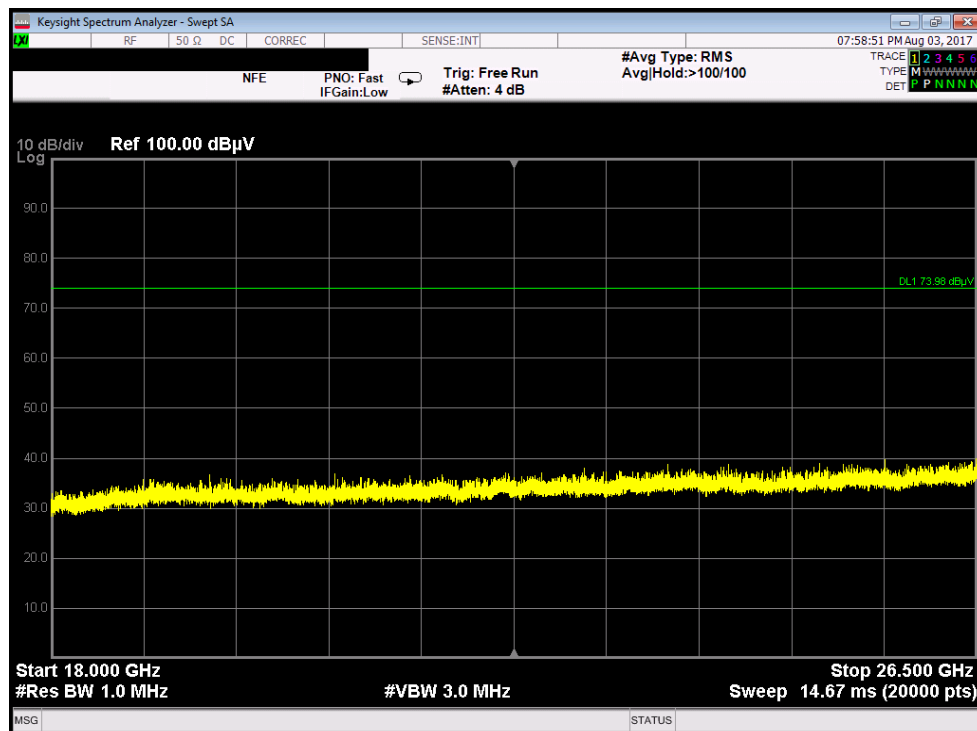
FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 34 of 114

Antenna-2 Radiated Spurious Emissions Measurements (Above 18GHz)

\$15.209



Plot 7-21. Radiated Spurious Plot above 18GHz - 26.5GHz (802.11a – Ant. Pol. H)

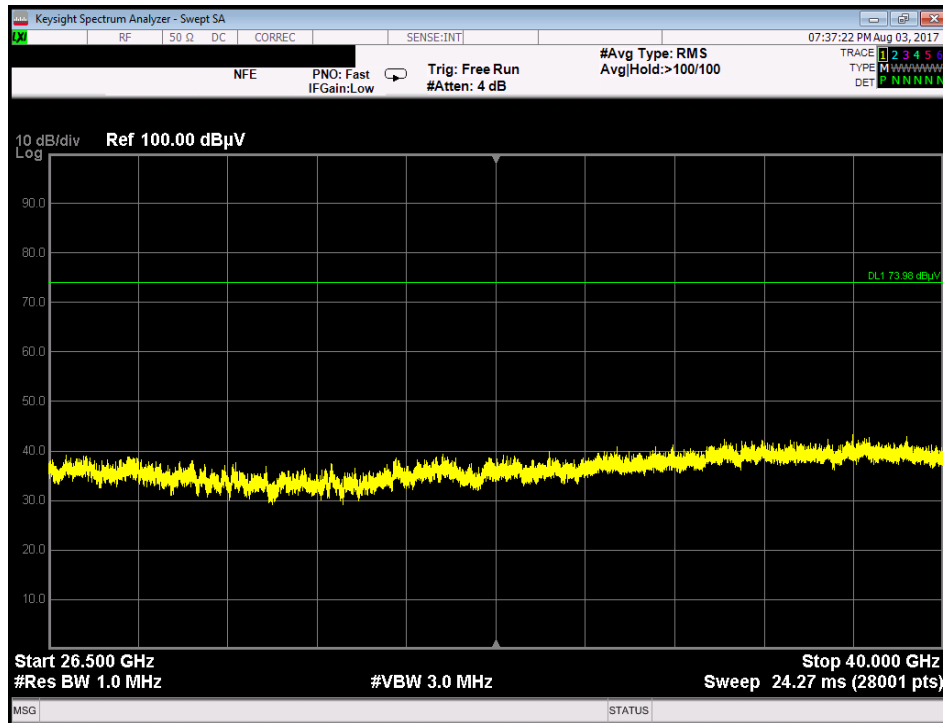


Plot 7-22. Radiated Spurious Plot above 18GHz - 26.5GHz (802.11a – Ant. Pol. V)

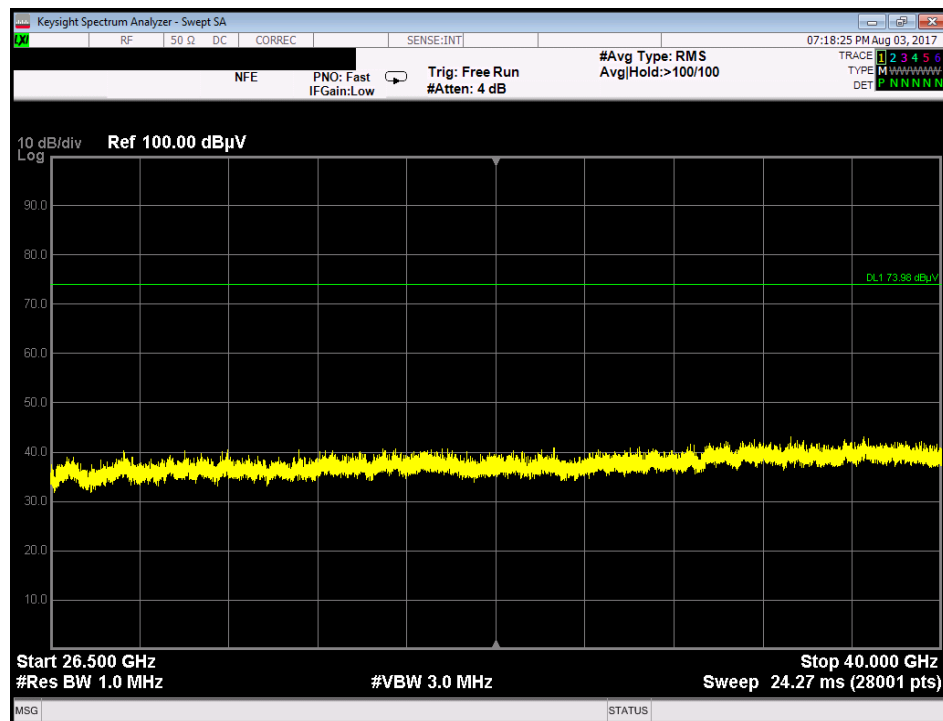
FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 35 of 114

Antenna-2 Radiated Spurious Emissions Measurements (Above 18GHz)

\$15.209



Plot 7-23. Radiated Spurious Plot 26.5GHz - 40GHz (802.11a – Ant. Pol. H)



Plot 7-24. Radiated Spurious Plot above 26.5GHz - 40GHz (802.11a – Ant. Pol. V)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 36 of 114

Antenna-2 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 Meter
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	-	-	-65.39	12.13	-9.54	44.19	68.20	-24.01
* 15540.00	Average	H	-	-	-72.71	14.49	-9.54	39.24	53.98	-14.74
* 15540.00	Peak	H	-	-	-64.23	14.49	-9.54	47.72	73.98	-26.25
* 20720.00	Average	H	-	-	-70.41	7.94	-9.54	34.99	53.98	-18.99
* 20720.00	Peak	H	-	-	-62.84	7.94	-9.54	42.56	73.98	-31.42
25900.00	Peak	H	-	-	-60.34	8.46	-9.54	45.58	68.20	-22.62

Table 7-19. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	290	-64.32	12.12	-9.54	45.26	68.20	-22.94
* 15600.00	Average	H	-	-	-73.06	14.31	-9.54	38.71	53.98	-15.27
* 15600.00	Peak	H	-	-	-64.53	14.31	-9.54	47.24	73.98	-26.74
* 20800.00	Average	H	-	-	-70.05	7.95	-9.54	35.36	53.98	-18.62
* 20800.00	Peak	H	-	-	-62.16	7.95	-9.54	43.25	73.98	-30.73
26000.00	Peak	H	-	-	-59.35	8.61	-9.54	46.72	68.20	-21.48

Table 7-20. Radiated Measurements

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 37 of 114

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	290	-64.87	12.09	-9.54	44.68	68.20	-23.52
* 15720.00	Average	H	-	-	-72.58	14.02	-9.54	38.90	53.98	-15.08
* 15720.00	Peak	H	-	-	-64.20	14.02	-9.54	47.28	73.98	-26.70
* 20960.00	Average	H	-	-	-70.26	7.91	-9.54	35.11	53.98	-18.87
* 20960.00	Peak	H	-	-	-62.19	7.91	-9.54	43.19	73.98	-30.79
26200.00	Peak	H	-	-	-58.62	8.62	-9.54	47.45	68.20	-20.75

Table 7-21. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	352	-65.67	12.12	-9.54	43.91	68.20	-24.29
* 15600.00	Average	H	-	-	-74.47	14.31	-9.54	37.30	53.98	-16.68
* 15600.00	Peak	H	-	-	-66.43	14.31	-9.54	45.33	73.98	-28.65
* 20800.00	Average	H	-	-	-70.49	7.95	-9.54	34.92	53.98	-19.06
* 20800.00	Peak	H	-	-	-62.60	7.95	-9.54	42.81	73.98	-31.17
26000.00	Peak	H	-	-	-61.35	8.61	-9.54	44.72	68.20	-23.48

Table 7-22. Radiated Measurements with WCP

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 38 of 114

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	289	-64.67	12.16	-9.54	44.95	68.20	-23.25
* 15780.00	Average	H	-	-	-72.75	14.03	-9.54	38.74	53.98	-15.24
* 15780.00	Peak	H	-	-	-64.07	14.03	-9.54	47.42	73.98	-26.56
* 21040.00	Average	H	-	-	-70.30	7.92	-9.54	35.08	53.98	-18.90
* 21040.00	Peak	H	-	-	-61.97	7.92	-9.54	43.41	73.98	-30.57
26300.00	Peak	H	-	-	-60.12	8.73	-9.54	46.06	68.20	-22.14

Table 7-23. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	287	-65.32	12.04	-9.54	44.18	68.20	-24.02
* 15840.00	Average	H	-	-	-73.41	14.25	-9.54	38.30	53.98	-15.68
* 15840.00	Peak	H	-	-	-64.58	14.25	-9.54	47.12	73.98	-26.86
* 21120.00	Average	H	-	-	-70.26	7.97	-9.54	35.16	53.98	-18.81
* 21120.00	Peak	H	-	-	-61.56	7.97	-9.54	43.87	73.98	-30.11
26400.00	Peak	H	-	-	-59.91	8.94	-9.54	46.49	68.20	-21.71

Table 7-24. Radiated Measurements

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 39 of 114

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	-	-	-72.55	12.06	-9.54	36.97	53.98	-17.01
* 10640.00	Peak	H	-	-	-64.28	12.06	-9.54	45.24	73.98	-28.74
* 15960.00	Average	H	-	-	-72.65	14.55	-9.54	39.36	53.98	-14.62
* 15960.00	Peak	H	-	-	-63.89	14.55	-9.54	48.12	73.98	-25.86
* 21280.00	Average	H	-	-	-70.29	8.04	-9.54	35.20	53.98	-18.78
* 21280.00	Peak	H	-	-	-62.05	8.04	-9.54	43.45	73.98	-30.53
26600.00	Peak	H	-	-	-52.19	-9.45	-9.54	35.82	68.20	-32.38

Table 7-25. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	345	-66.38	12.16	-9.54	43.23	68.20	-24.97
* 15780.00	Average	H	-	-	-73.29	14.03	-9.54	38.20	53.98	-15.78
* 15780.00	Peak	H	-	-	-65.01	14.03	-9.54	46.48	73.98	-27.50
* 21040.00	Average	H	-	-	-70.37	7.92	-9.54	35.01	53.98	-18.97
* 21040.00	Peak	H	-	-	-62.00	7.92	-9.54	43.38	73.98	-30.60
26300.00	Peak	H	-	-	-60.95	8.73	-9.54	45.24	68.20	-22.96

Table 7-26. Radiated Measurements with WCP

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 40 of 114

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	-	-	-73.87	12.87	-9.54	36.46	53.98	-17.52
* 11000.00	Peak	H	-	-	-65.59	12.87	-9.54	44.74	73.98	-29.24
16500.00	Peak	H	-	-	-63.79	16.61	-9.54	50.28	68.20	-17.92
22000.00	Peak	H	-	-	-62.21	8.43	-9.54	43.68	68.20	-24.52
27500.00	Peak	H	-	-	-50.55	-8.80	-9.54	38.11	68.20	-30.09

Table 7-27. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
Operating Frequency: 5600MHz
Channel: 120

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	-	-	-73.00	12.64	-9.54	37.09	53.98	-16.89
* 11160.00	Peak	H	-	-	-64.06	12.64	-9.54	46.04	73.98	-27.94
16740.00	Peak	H	-	-	-64.29	16.21	-9.54	49.38	68.20	-18.82
* 22320.00	Average	H	-	-	-70.27	8.08	-9.54	35.26	53.98	-18.72
* 22320.00	Peak	H	-	-	-61.73	8.08	-9.54	43.81	73.98	-30.17
27900.00	Peak	H	-	-	-50.86	-9.07	-9.54	37.53	68.20	-30.67

Table 7-28. Radiated Measurements

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 41 of 114

Worst Case Mode: 802.11a
 Worst Case Transfer Rate: 6 Mbps
 Distance of Measurements: 1 Meter
 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]
* 11400.00	Average	H	-	-	-73.34	12.47	-9.54	36.58	53.98	-17.40
* 11400.00	Peak	H	-	-	-65.23	12.47	-9.54	44.69	73.98	-29.29
17100.00	Peak	H	-	-	-63.77	18.06	-9.54	51.75	68.20	-16.45
* 22800.00	Average	H	-	-	-70.03	8.37	-9.54	35.81	53.98	-18.17
* 22800.00	Peak	H	-	-	-61.56	8.37	-9.54	44.27	73.98	-29.70
28500.00	Peak	H	-	-	-51.52	-8.95	-9.54	36.99	68.20	-31.21

Table 7-29. Radiated Measurements

Worst Case Mode: 802.11a
 Worst Case Transfer Rate: 6 Mbps
 Distance of Measurements: 1 Meter
 Operating Frequency: 5600MHz
 Channel: 120

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	-	-	-73.08	12.64	-9.54	37.02	53.98	-16.96
* 11160.00	Peak	H	-	-	-64.79	12.64	-9.54	45.30	73.98	-28.68
16740.00	Peak	H	-	-	-64.46	16.21	-9.54	49.21	68.20	-18.99
22320.00	Average	H	-	-	-70.28	8.08	-9.54	35.25	53.98	-18.73
22320.00	Peak	H	-	-	-63.09	8.08	-9.54	42.45	73.98	-31.53
27900.00	Peak	H	-	-	-51.33	-9.07	-9.54	37.06	68.20	-31.14

Table 7-30. Radiated Measurements with WCP

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 42 of 114

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	-	-	-73.96	12.43	-9.54	35.92	53.98	-18.05
* 11490.00	Peak	H	-	-	-65.20	12.43	-9.54	44.69	73.98	-29.29
17235.00	Peak	H	-	-	-62.42	18.61	-9.54	53.65	68.20	-14.55
* 22980.00	Average	H	-	-	-69.89	8.16	-9.54	35.73	53.98	-18.25
* 22980.00	Peak	H	-	-	-60.78	8.16	-9.54	44.84	73.98	-29.14
28725.00	Peak	H	-	-	-51.55	-9.24	-9.54	36.67	68.20	-31.53

Table 7-31. Radiated Measurements

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	-	-	-73.36	12.54	-9.54	36.64	53.98	-17.34
* 11570.00	Peak	H	-	-	-65.04	12.54	-9.54	44.96	73.98	-29.02
17355.00	Peak	H	-	-	-64.54	18.73	-9.54	51.64	68.20	-16.56
23140.00	Peak	H	-	-	-61.64	8.37	-9.54	44.19	68.20	-24.01
28925.00	Peak	H	-	-	-51.83	-9.65	-9.54	35.98	68.20	-32.22

Table 7-32. Radiated Measurements

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 43 of 114

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 Meter
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	-	-	-73.83	12.99	-9.54	36.61	53.98	-17.37
* 11650.00	Peak	H	-	-	-65.26	12.99	-9.54	45.19	73.98	-28.79
17475.00	Peak	H	-	-	-63.11	19.25	-9.54	53.59	68.20	-14.61
23300.00	Peak	H	-	-	-60.97	8.50	-9.54	44.98	68.20	-23.22
29125.00	Peak	H	-	-	-51.82	-9.87	-9.54	35.77	68.20	-32.43

Table 7-33. Radiated Measurements

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	-	-	-73.92	12.54	-9.54	36.08	53.98	-17.90
* 11570.00	Peak	H	-	-	-65.81	12.54	-9.54	44.19	73.98	-29.79
17355.00	Peak	H	-	-	-64.66	18.73	-9.54	51.52	68.20	-16.68
23140.00	Peak	H	-	-	-63.45	8.37	-9.54	42.38	68.20	-25.82
28925.00	Peak	H	-	-	-53.17	-9.65	-9.54	34.64	68.20	-33.56

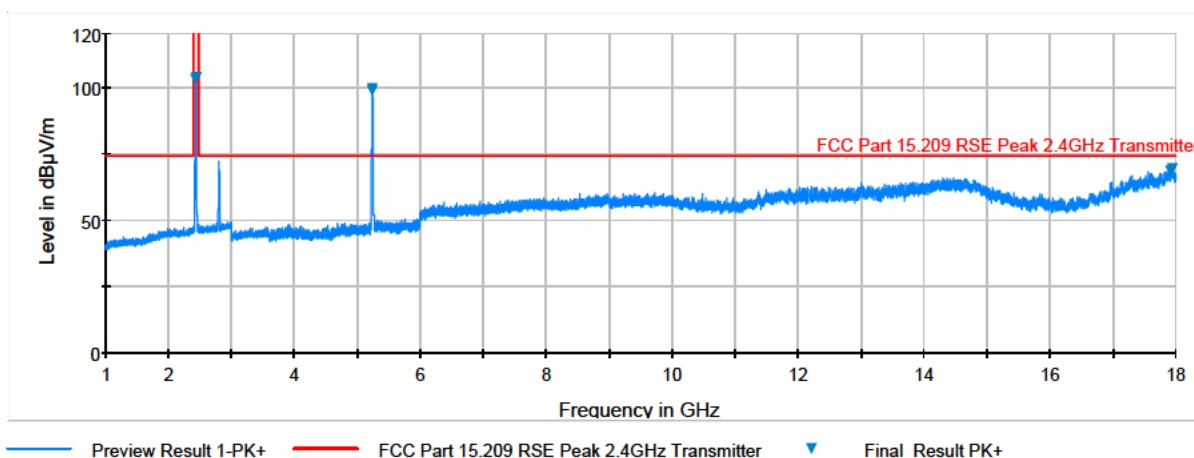
Table 7-34. Radiated Measurements with WCP

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 44 of 114

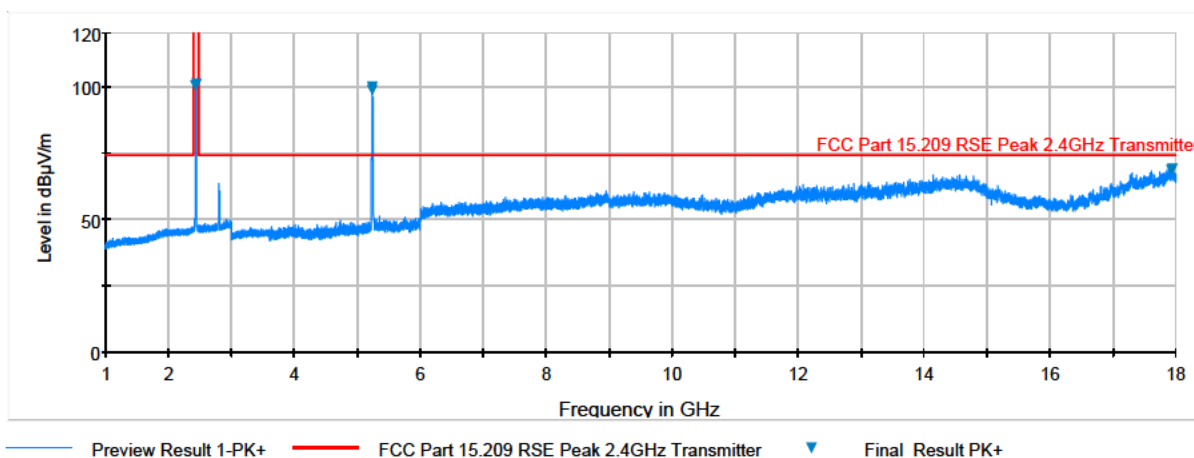
7.7.3 Simultaneous Tx Radiated Spurious Emissions Measurements §15.247(d) §15.205 & §15.209

Description	2.4 GHz Emission	5 GHz Emission
Antenna	1	2
Channel	6	48
Operating Frequency (MHz)	2437	5240
Data Rate (Mbps)	MCS0	MCS0
Mode	n	n

Table 7-35. Simultaneous Transmission Config-1

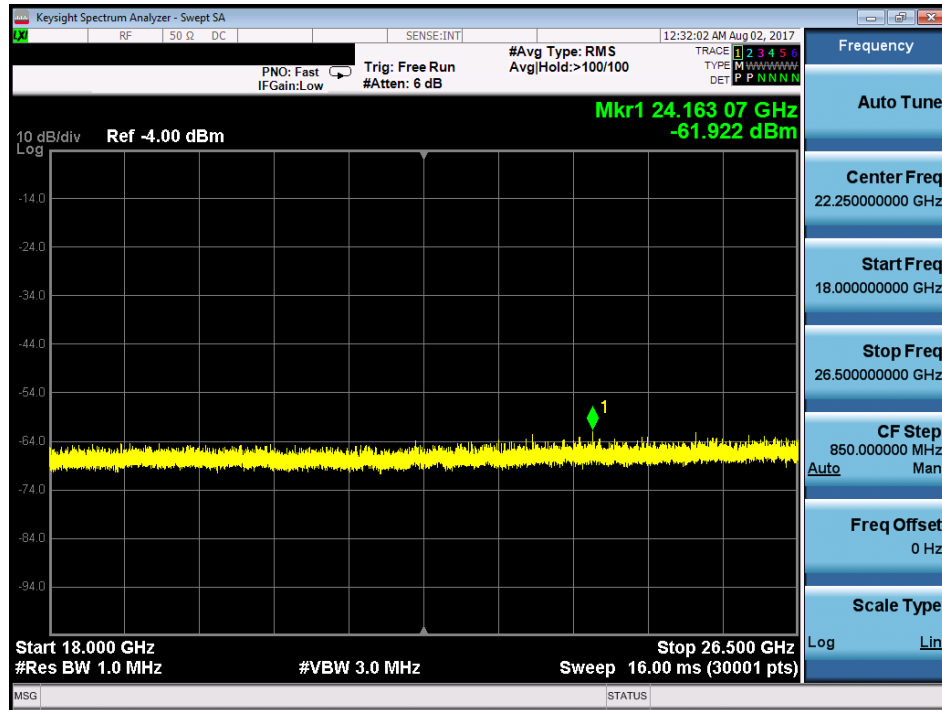


Plot 7-25. Radiated Spurious Plot above 1GHz (2.4GHz – 5GHz, Ant. Pol. H)

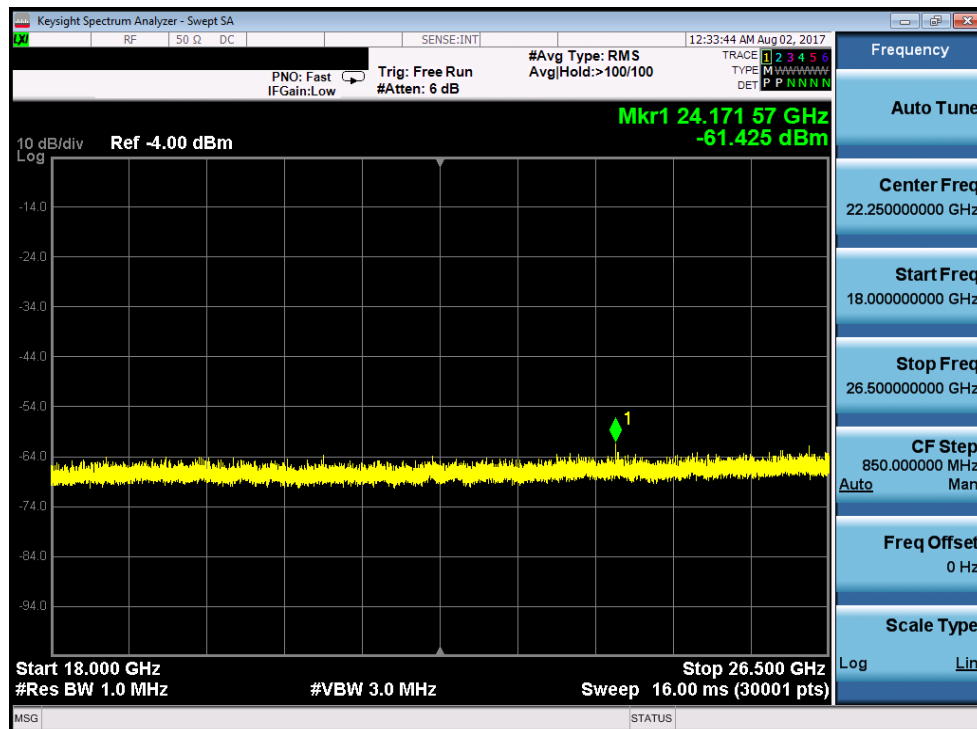


Plot 7-26. Radiated Spurious Plot above 1GHz (2.4GHz – 5GHz, Ant. Pol. V)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 45 of 114

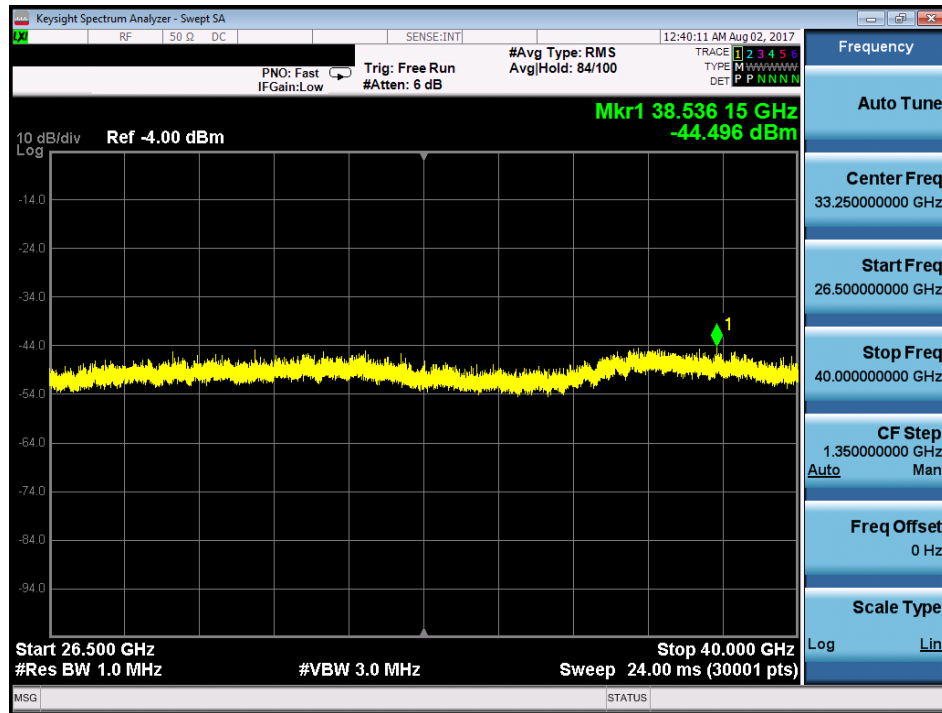


Plot 7-27. Radiated Spurious Plot 18GHz – 26.5GHz (2.4GHz – 5GHz, Ant. Pol. H)

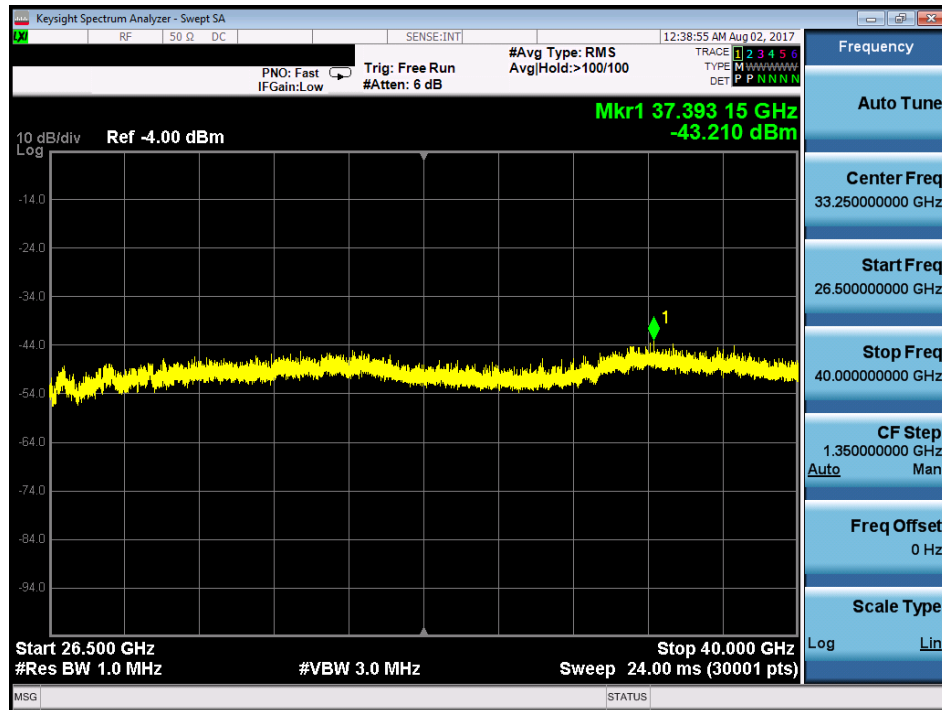


Plot 7-28. Radiated Spurious Plot 18GHz – 26.5GHz (2.4GHz – 5GHz, Ant. Pol. V)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 46 of 114



Plot 7-29. Radiated Spurious Plot above 26.5GHz (2.4GHz – 5GHz, Ant. Pol. H)



Plot 7-30. Radiated Spurious Plot above 26.5GHz (2.4GHz – 5GHz, Ant. Pol. V)

Note:

The wide spectrum spurious emissions plots shown above (Plots 7-27 to 7-30) are used only for the purpose of emission identification.

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 47 of 114

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	3169.00	Average	H	-	-	-69.29	-3.44	34.27	53.98	-19.71
*	3169.00	Peak	H	-	-	-58.10	-3.44	45.46	73.98	-28.52
*	5972.00	Average	H	-	-	-70.85	3.42	39.57	53.98	-14.41
*	5972.00	Peak	H	-	-	-59.02	3.42	51.40	73.98	-22.58
*	8043.00	Average	H	-	-	-71.14	11.30	47.16	53.98	-6.82
*	8043.00	Peak	H	-	-	-59.48	11.30	58.82	73.98	-15.16
*	8775.00	Average	H	-	-	-71.59	13.02	48.43	53.98	-5.55
*	8775.00	Peak	H	-	-	-58.57	13.02	61.45	73.98	-12.53
*	10846.00	Peak	H	-	-	-60.08	12.16	59.08	73.98	-14.90
	10846.00	Average	H	-	-	-72.81	12.16	46.35	53.98	-7.63
	13649.00	Peak	H	-	-	-61.58	17.82	63.24	73.98	-10.74
*	13649.00	Average	H	-	-	-77.31	17.82	47.51	53.98	-6.47
*	16452.00	Peak	H	-	-	-65.29	16.81	58.52	73.98	-15.46

Table 7-36. Radiated Measurements (ANT1 2.4GHz – ANT2 5GHz)

FCC ID: ZNFV30A		FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 48 of 114

7.7.4 Antenna-1 Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

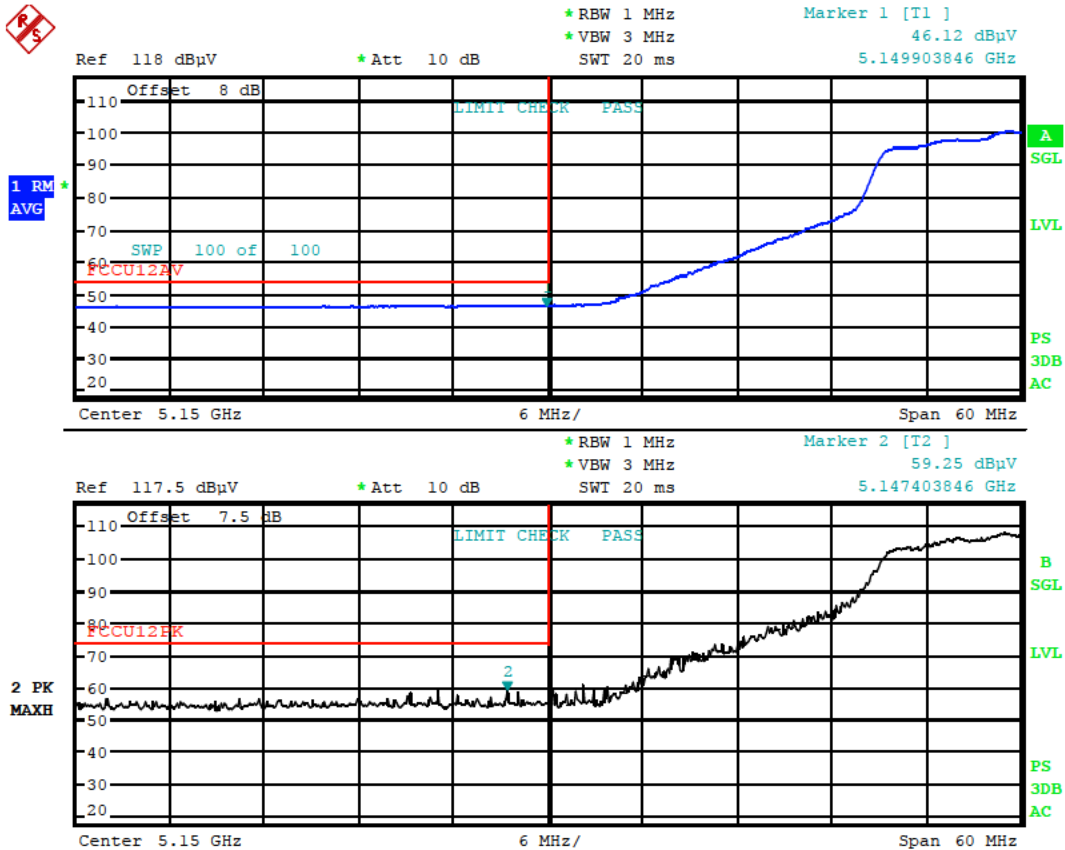
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5180MHz

Channel: 36



Date: 27.JUL.2017 23:02:51

Plot 7-31. Radiated Restricted Lower Band Edge Plot (Average & Peak – UNII Band 1)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 49 of 114

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Antenna-1 Radiated Band Edge Measurements (20MHz BW)

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

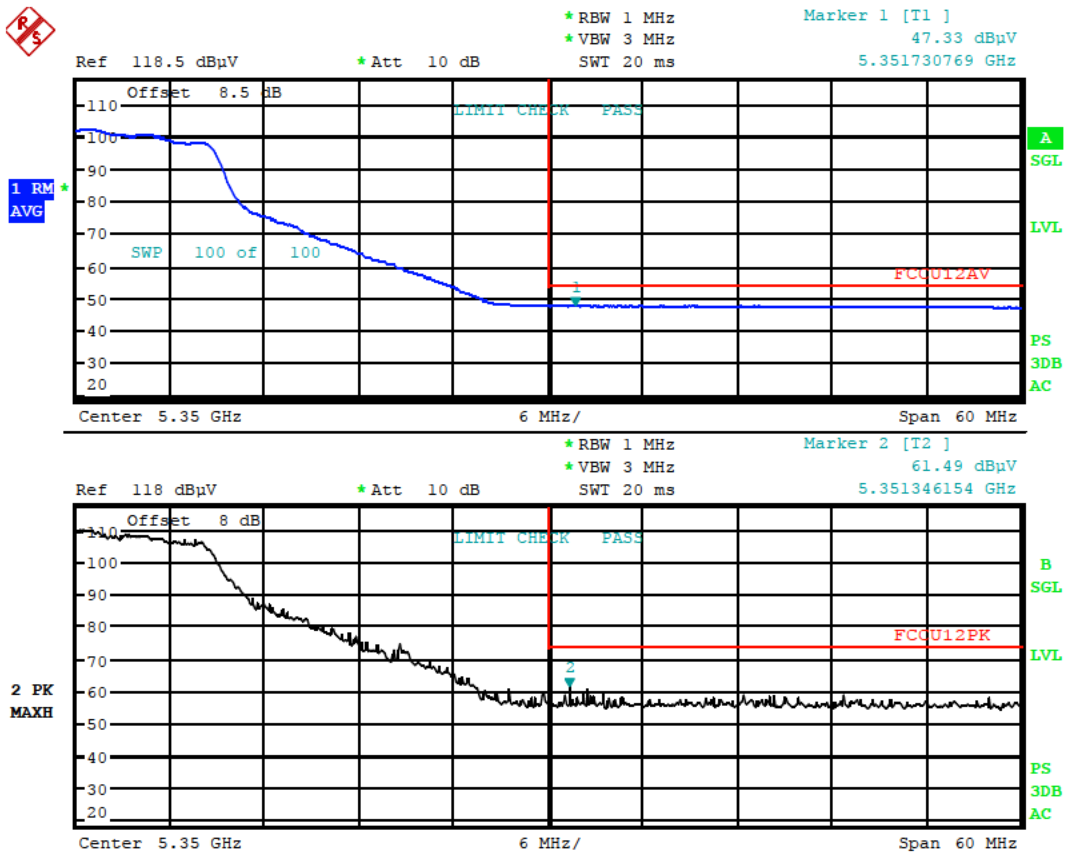
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5320MHz

Channel: 64



Date: 27.JUL.2017 23:08:06

Plot 7-32. Radiated Restricted Upper Band Edge Plot (Average & Peak – UNII Band 2A)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 50 of 114

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Antenna-1 Radiated Band Edge Measurements (20MHz BW)

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

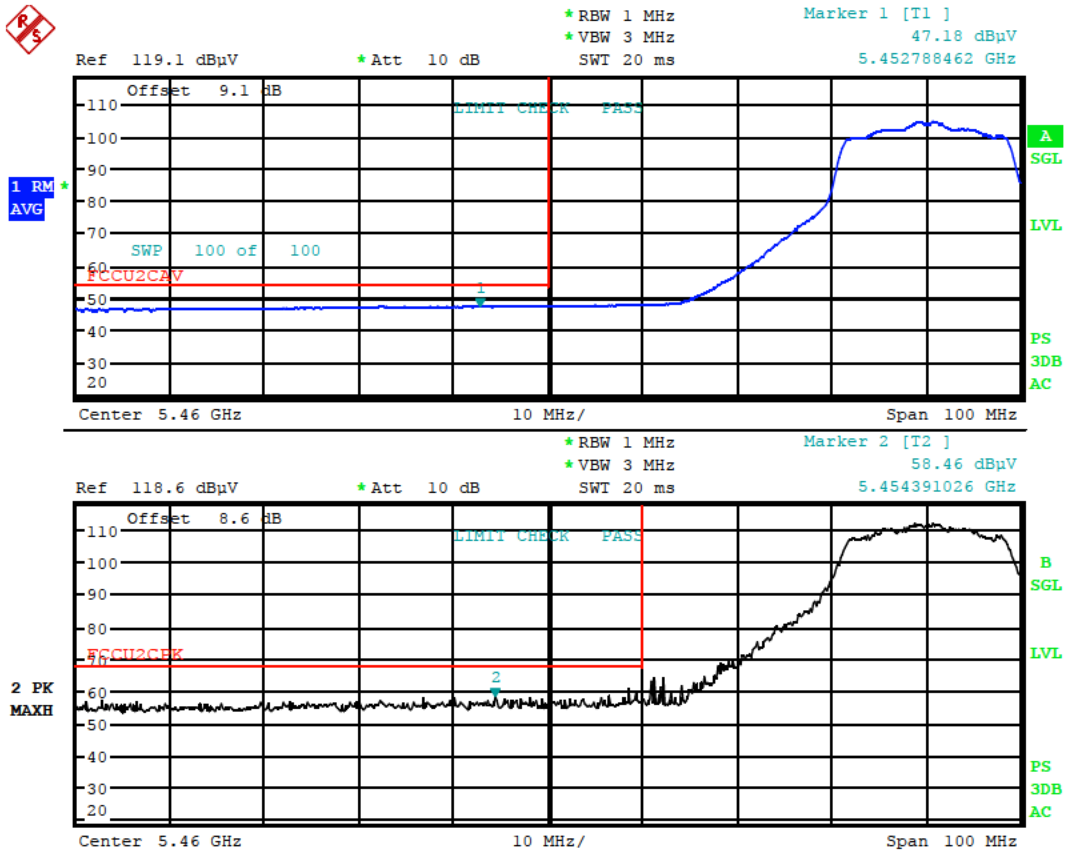
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5500MHz

Channel: 100



Date: 27.JUL.2017 23:13:10

Plot 7-33. Radiated Restricted Lower Band Edge Plot (Average & Peak – UNII Band 2C)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 51 of 114

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Antenna-1 Radiated Band Edge Measurements (20MHz BW)

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

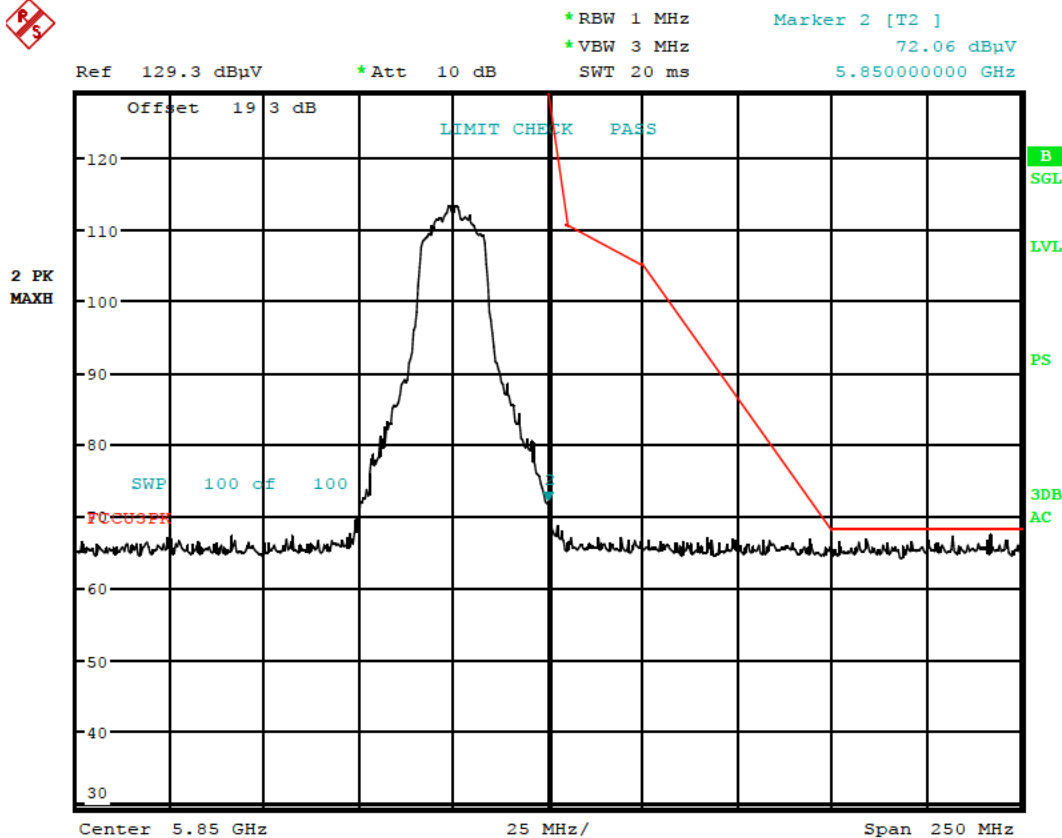
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5825MHz

Channel: 165



Date: 27.JUL.2017 23:23:22

Plot 7-34. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 52 of 114

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Antenna-1 WCP Radiated Band Edge Measurements (20MHz BW) **\$15.407(b.1)(b.2) \$15.205 \$15.209**

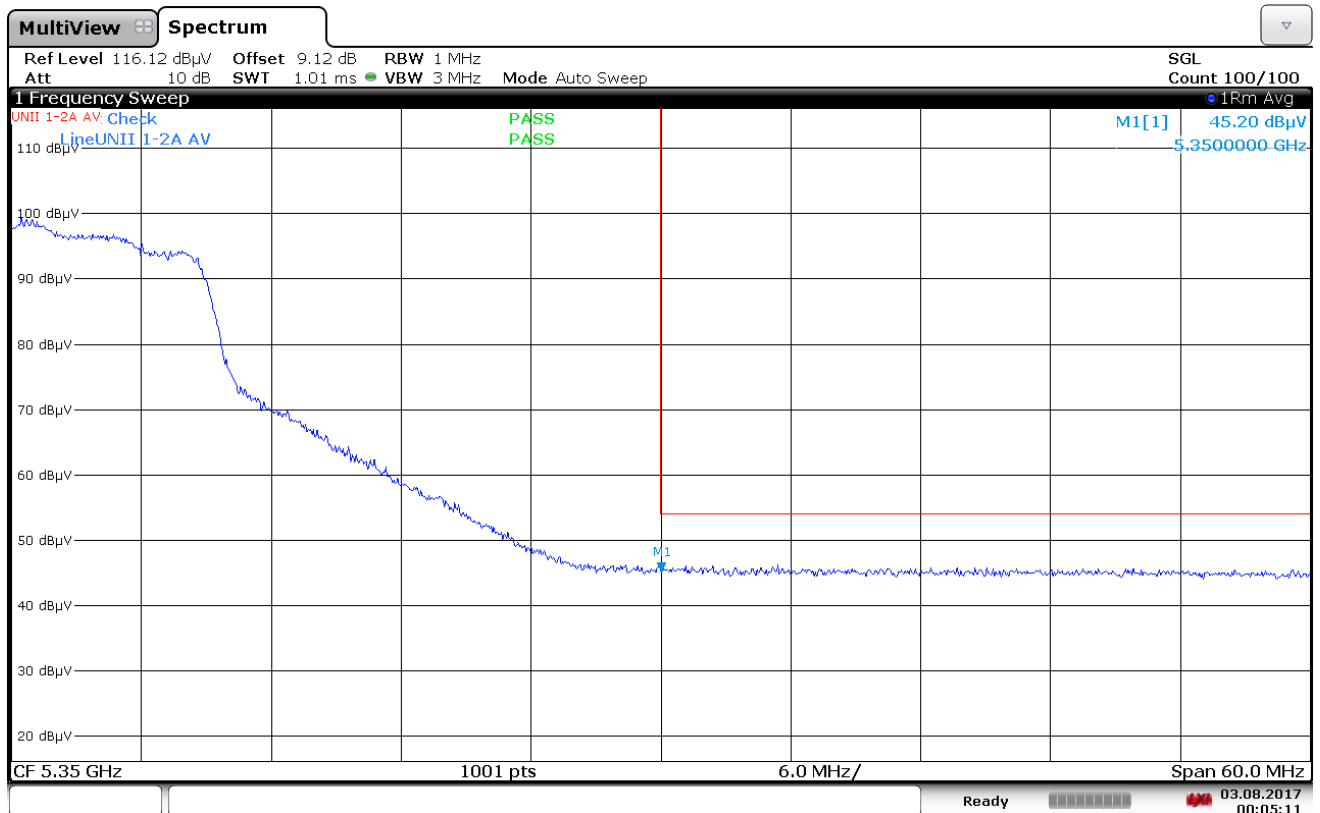
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5320MHz

Channel: 64



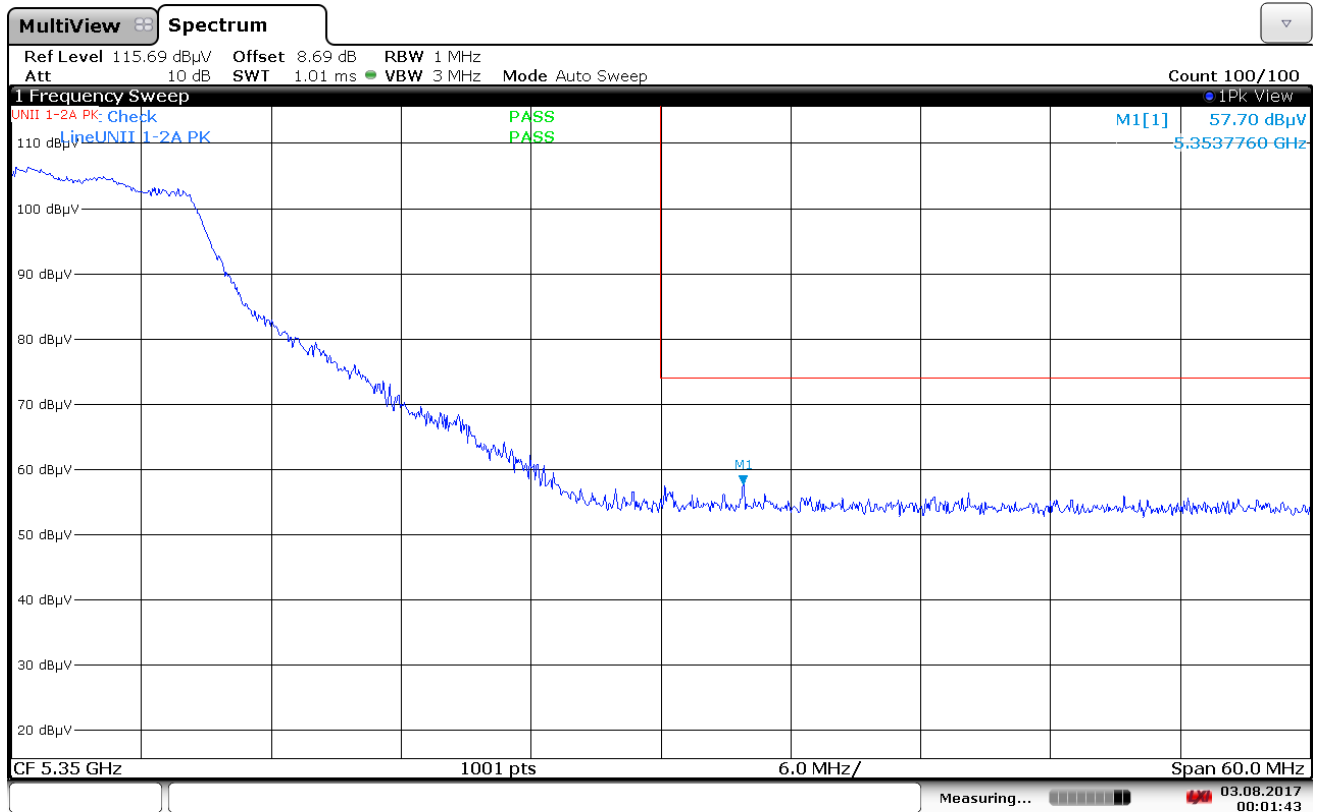
00:05:11 03.08.2017

Plot 7-35. Radiated Restricted Band Edge Plot with WCP (Average)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 53 of 114

Antenna-1 WCP Radiated Band Edge Measurements (20MHz BW)

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



00:01:44 03.08.2017

Plot 7-36. Radiated Restricted Band Edge Plot with WCP (Peak)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 54 of 114

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7.7.5 Antenna-1 Radiated Band Edge Measurements (40MHz BW)

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

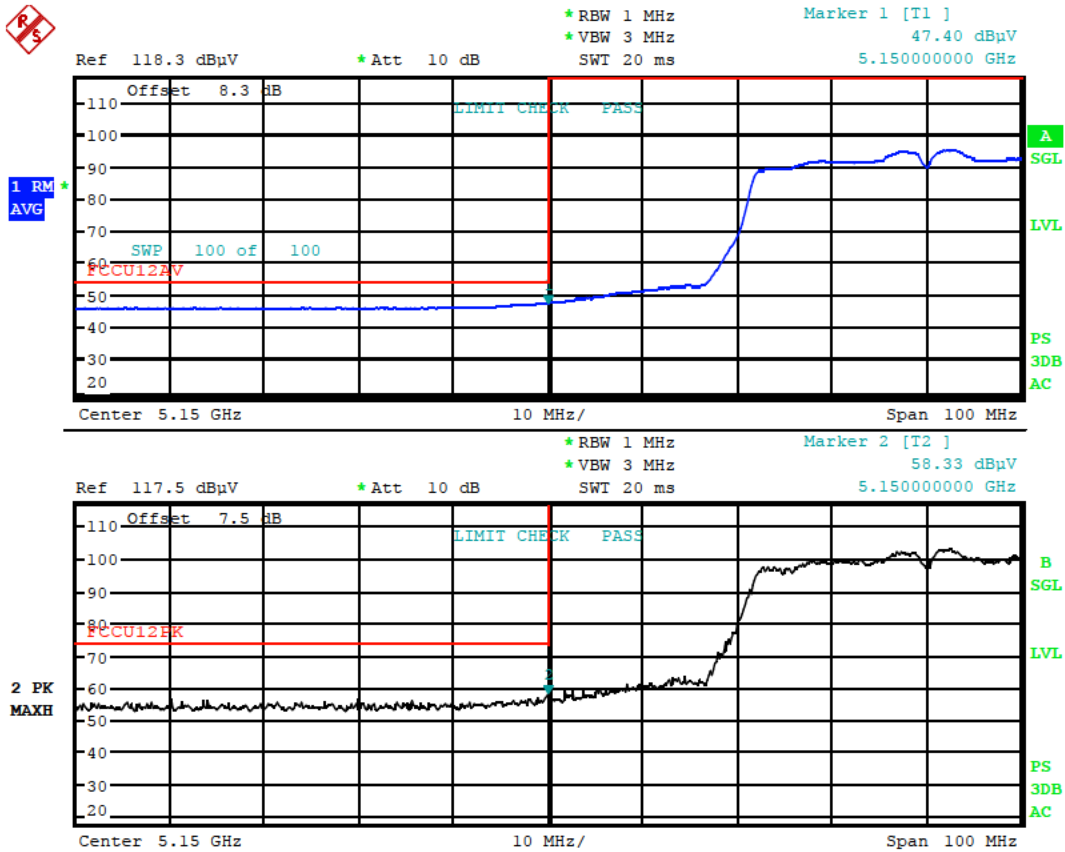
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5190MHz

Channel: 38



Date: 27.JUL.2017 23:42:08

Plot 7-37. Radiated Restricted Lower Band Edge Plot (Average & Peak – UNII Band 1)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
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Antenna-1 Radiated Band Edge Measurements (40MHz BW)

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

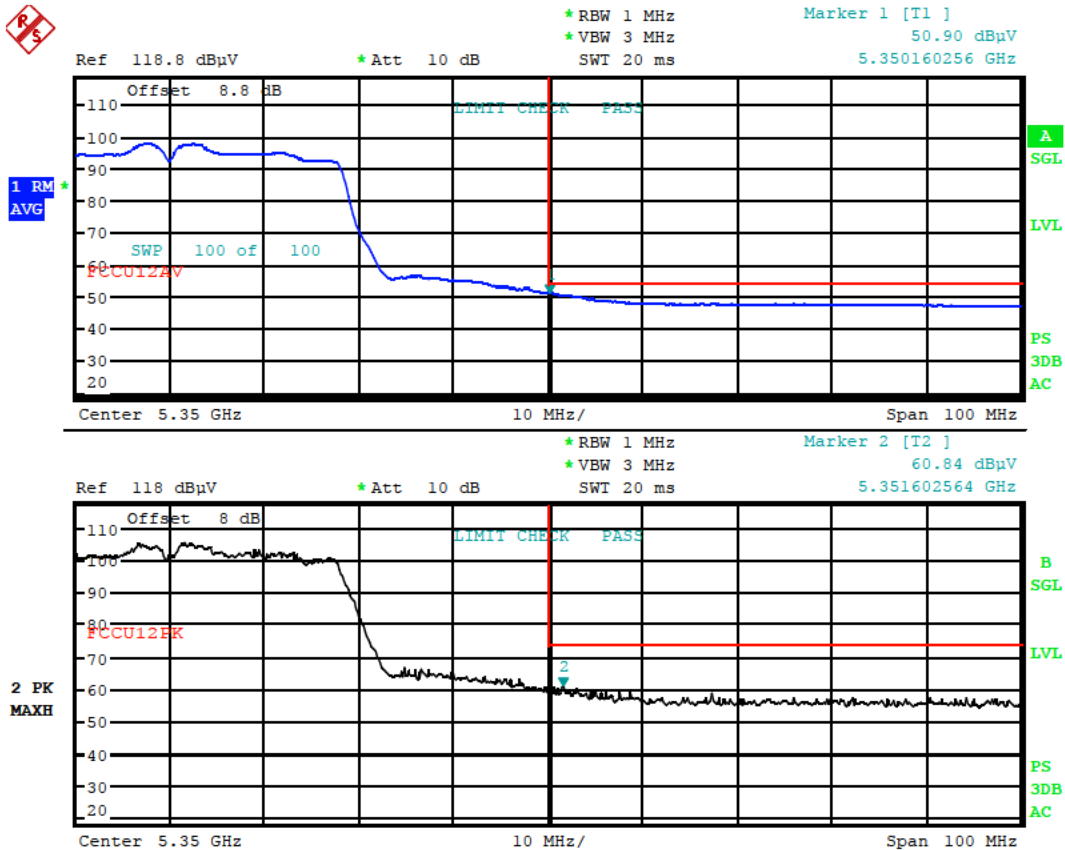
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5310MHz

Channel: 62



Date: 27.JUL.2017 23:46:27

Plot 7-38. Radiated Restricted Upper Band Edge Plot (Average & Peak – UNII Band 2A)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 56 of 114

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Antenna-1 Radiated Band Edge Measurements (40MHz BW)

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

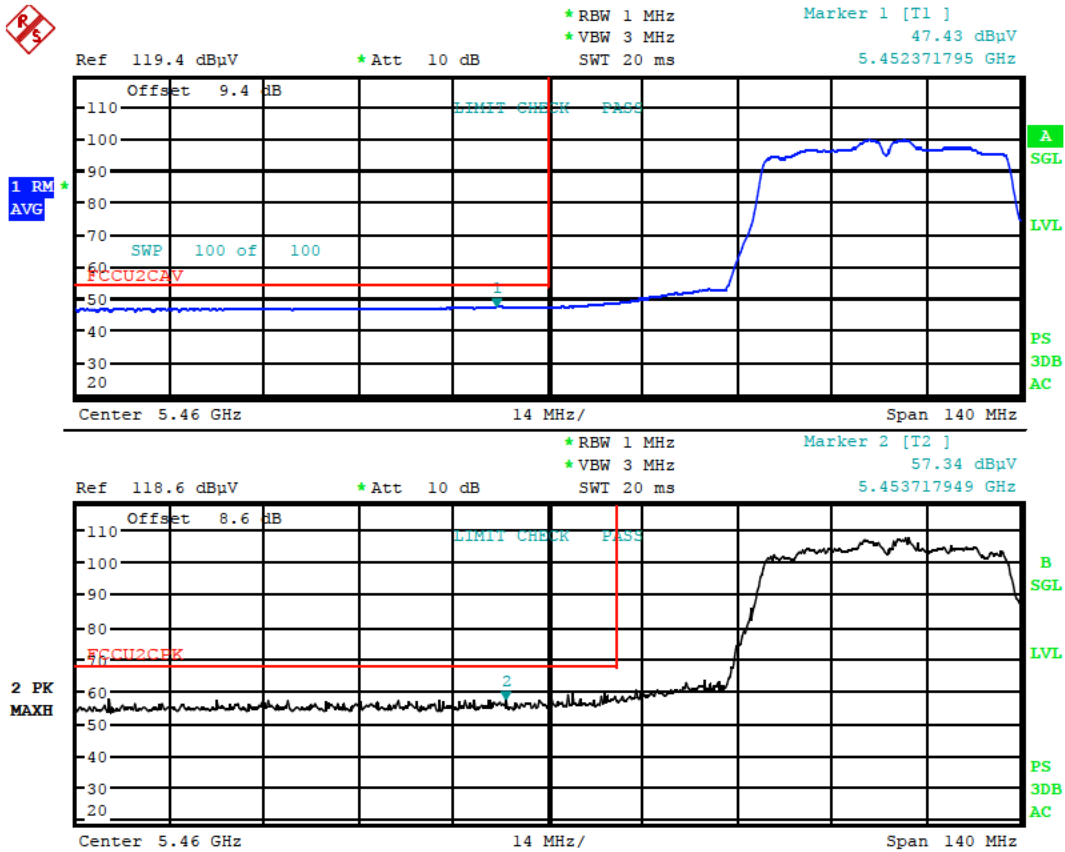
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5510MHz

Channel: 102



Date: 27.JUL.2017 23:51:12

Plot 7-39. Radiated Restricted Lower Band Edge Plot (Average & Peak – UNII Band 2C)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 57 of 114

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Antenna-1 Radiated Band Edge Measurements (40MHz BW)

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

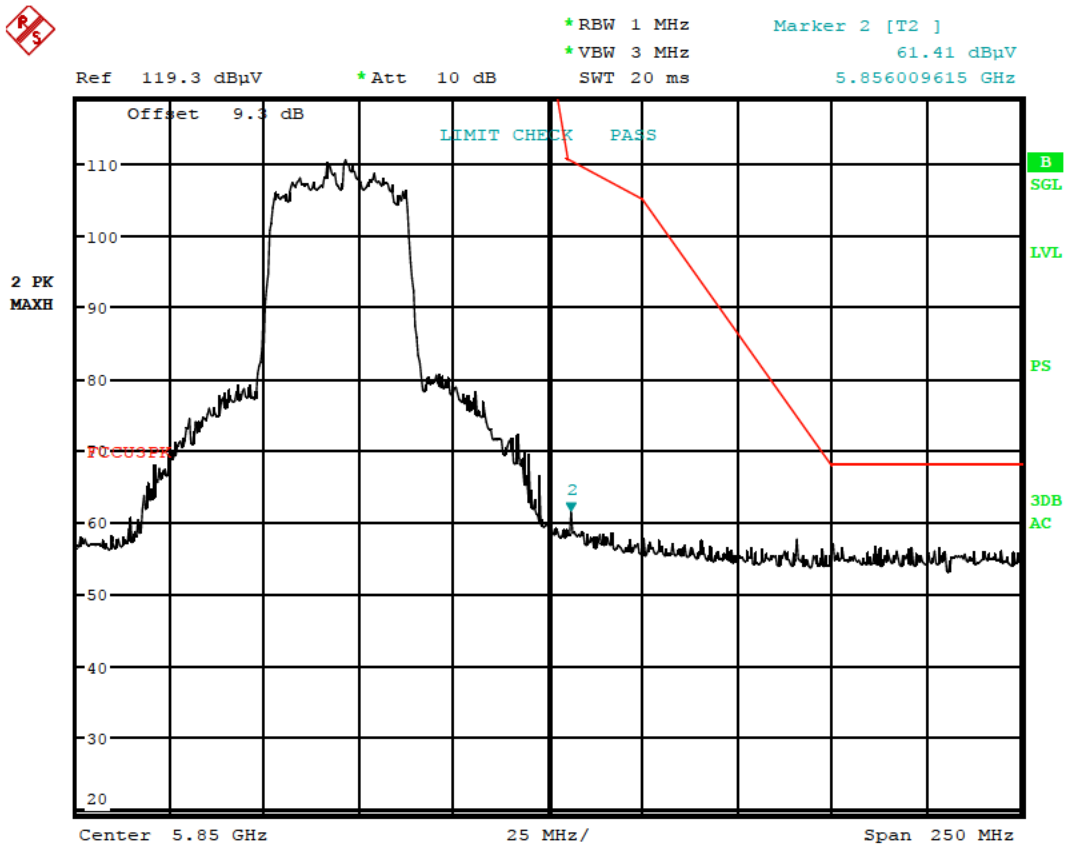
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5795MHz

Channel: 159



Date: 27.JUL.2017 23:55:57

Plot 7-40. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 58 of 114

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

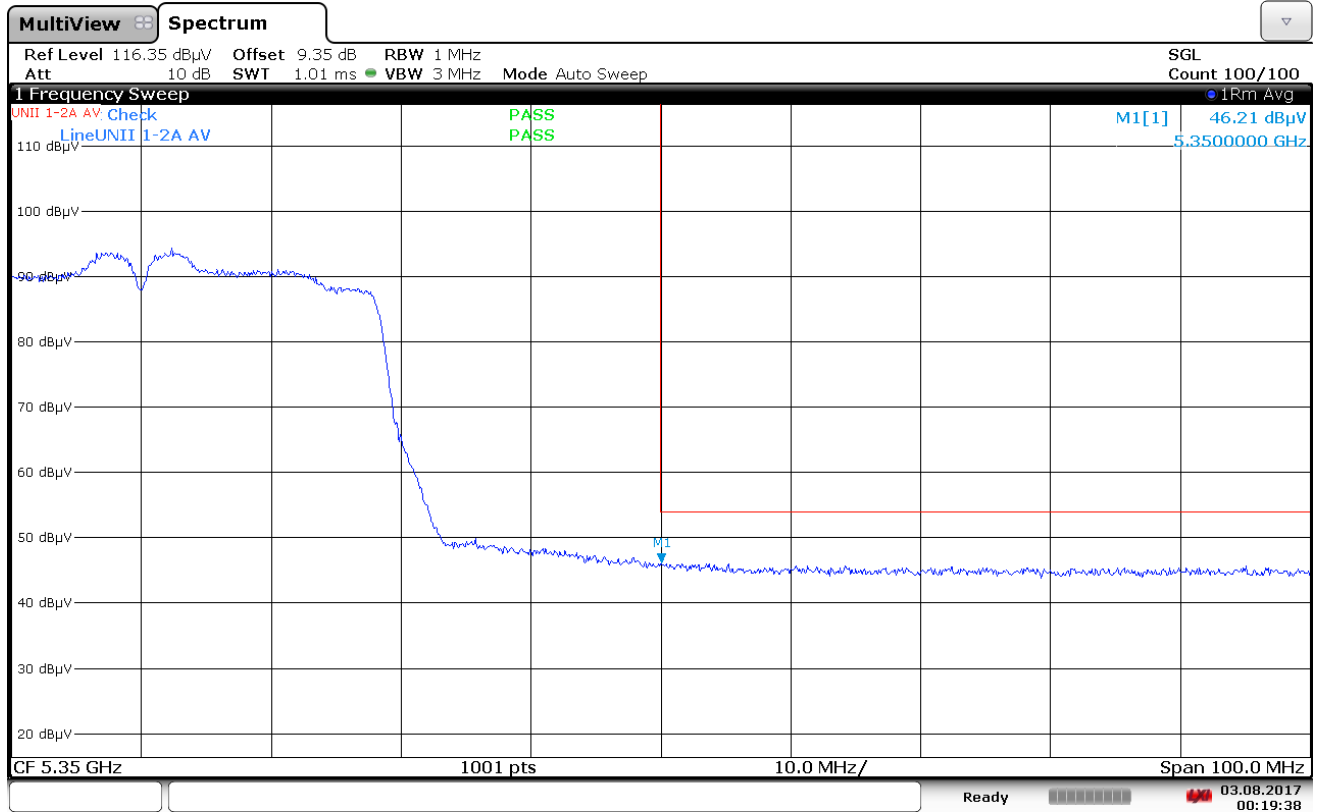
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5310MHz

Channel: 62



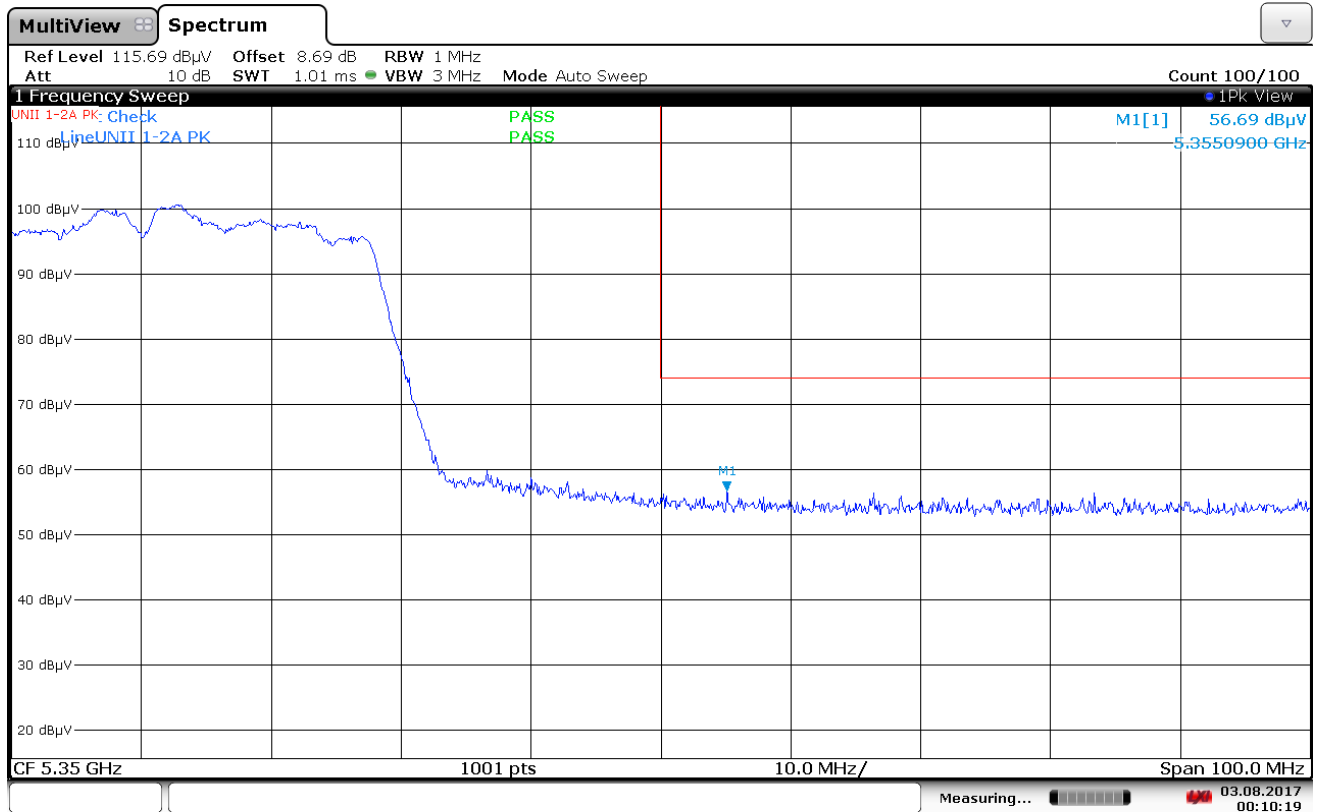
00:19:38 03.08.2017

Plot 7-41. Radiated Restricted Band Edge Plot with WCP (Average)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 59 of 114

Antenna-1 WCP Radiated Band Edge Measurements (40MHz BW)

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



00:10:20 03.08.2017

Plot 7-42. Radiated Restricted Band Edge Plot with WCP (Peak)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 60 of 114

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7.7.6 Antenna-1 Radiated Band Edge Measurements (80MHz BW)

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

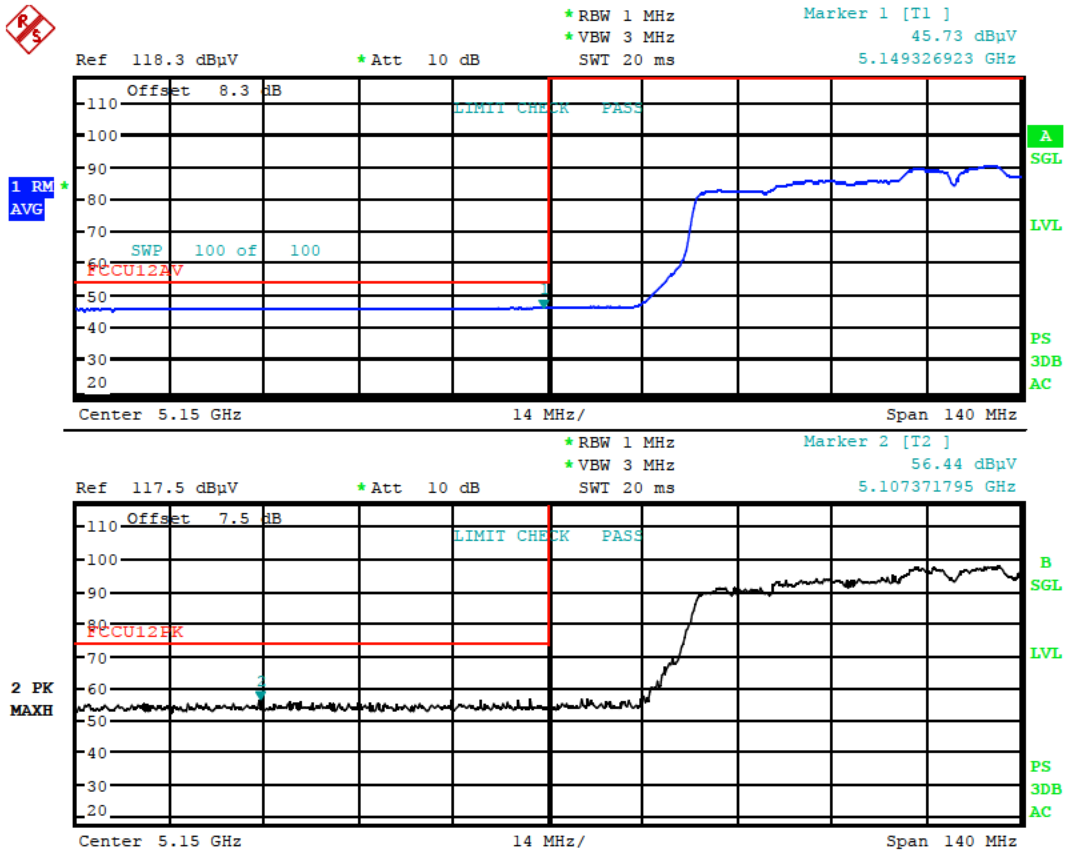
Worst Case Mode: 802.11n (80MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5210MHz

Channel: 42



Date: 28.JUL.2017 00:04:16

Plot 7-43. Radiated Restricted Lower Band Edge Plot (Average & Peak – UNII Band 1)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 61 of 114

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Antenna-1 Radiated Band Edge Measurements (80MHz BW)

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

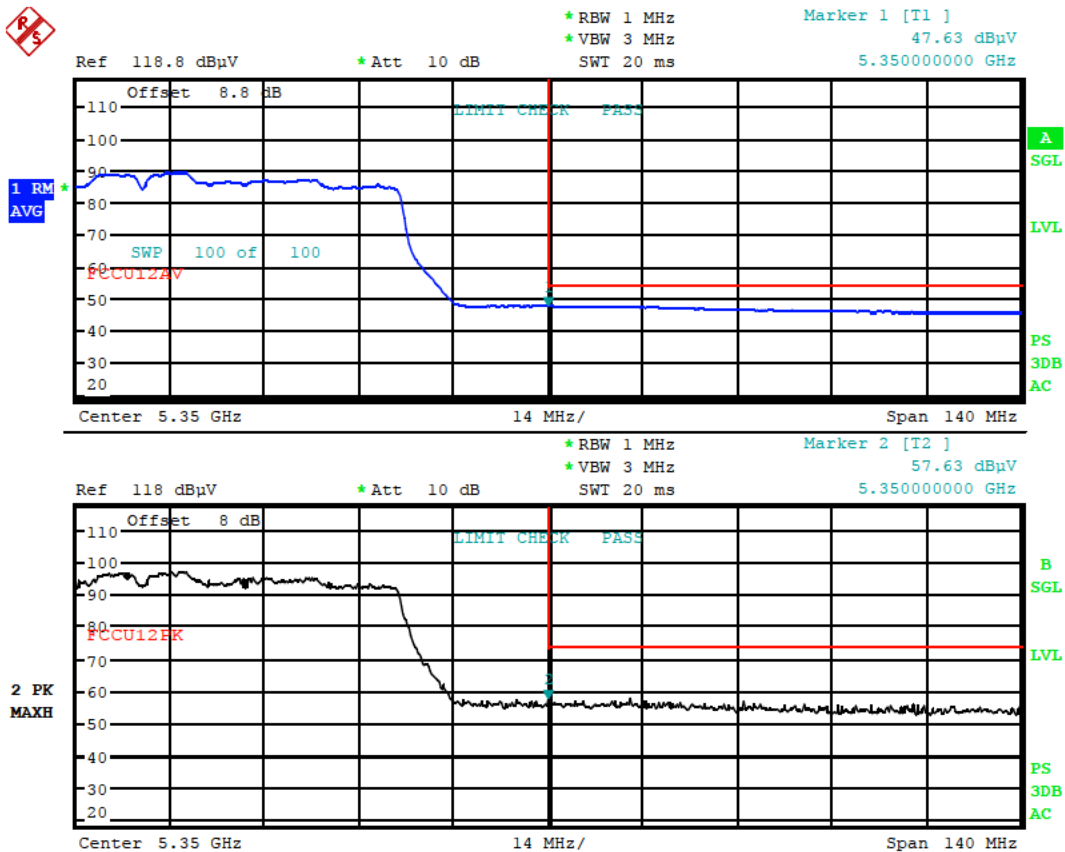
Worst Case Mode: 802.11ac (80MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5290MHz

Channel: 58



Date: 28.JUL.2017 00:07:58

Plot 7-44. Radiated Restricted Upper Band Edge Plot (Average & Peak – UNII Band 2A)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 62 of 114

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Antenna-1 Radiated Band Edge Measurements (80MHz BW)

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

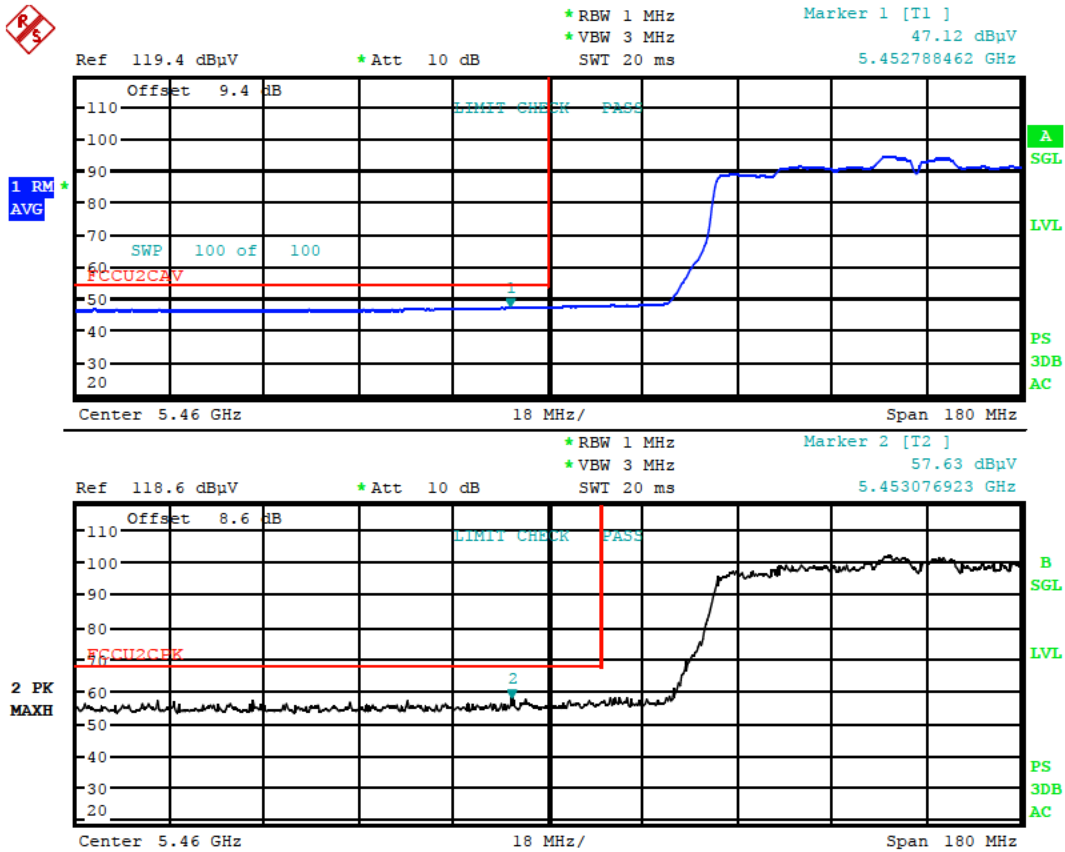
Worst Case Mode: 802.11ac (80MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5530MHz

Channel: 106



Date: 28.JUL.2017 00:18:10

Plot 7-45. Radiated Restricted Lower Band Edge Plot (Average & Peak– UNII Band 2C)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 63 of 114

Antenna-1 Radiated Band Edge Measurements (80MHz BW)

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

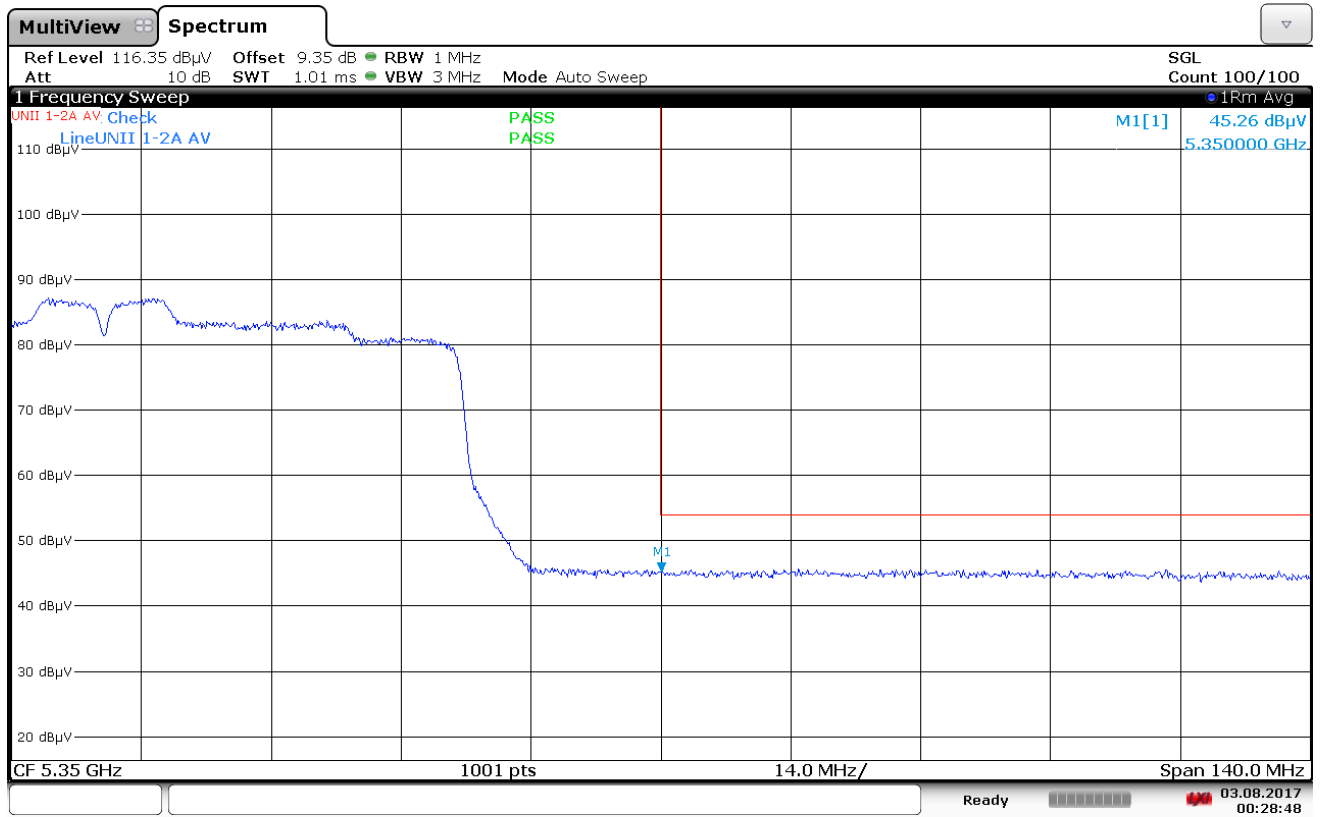
Worst Case Mode: 802.11ac (80MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5775MHz

Channel: 155



00:28:48 03.08.2017

Plot 7-46. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 64 of 114

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Antenna-1 WCP Radiated Band Edge Measurements (80MHz BW) **\$15.407(b.1)(b.2) \$15.205 \$15.209**

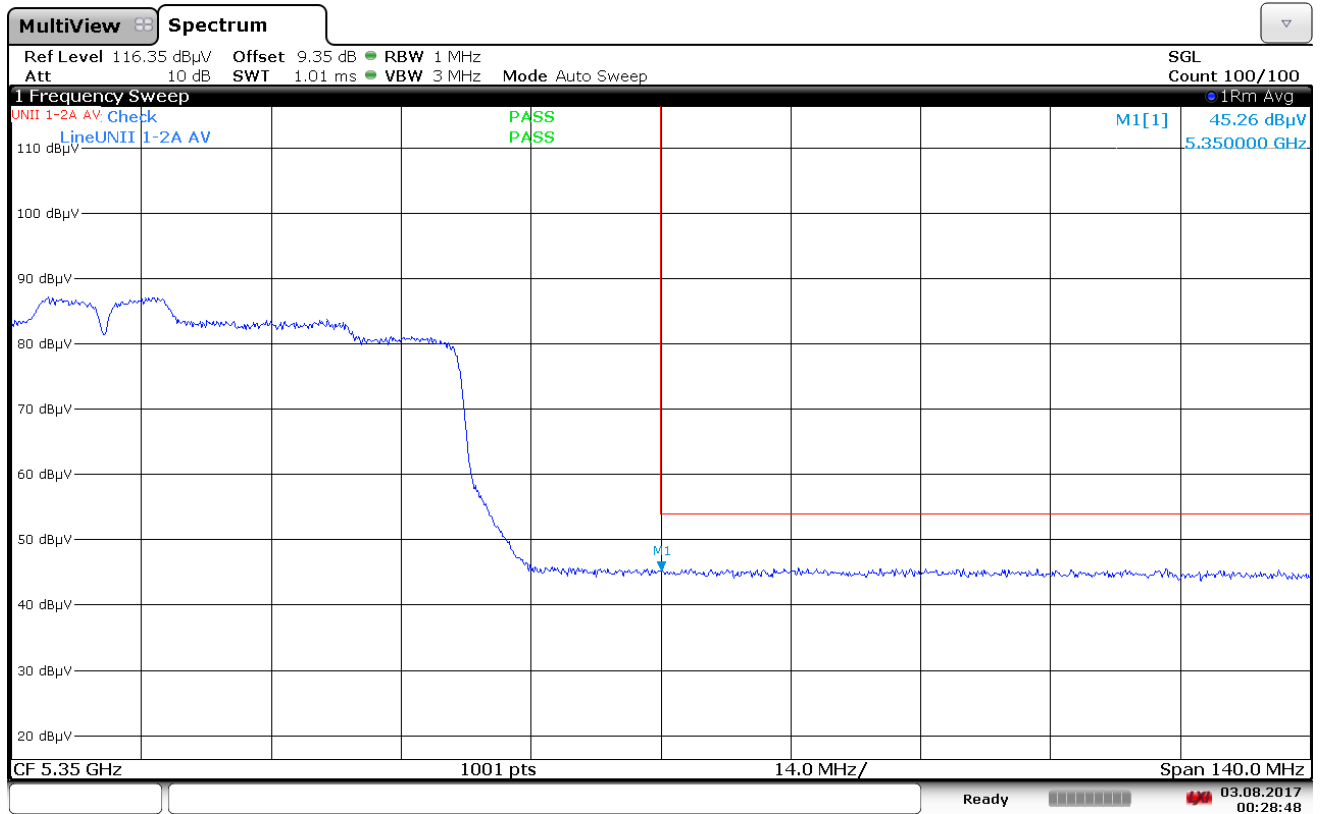
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5290MHz

Channel: 58



00:28:48 03.08.2017

Plot 7-47. Radiated Restricted Band Edge Plot with WCP (Average)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
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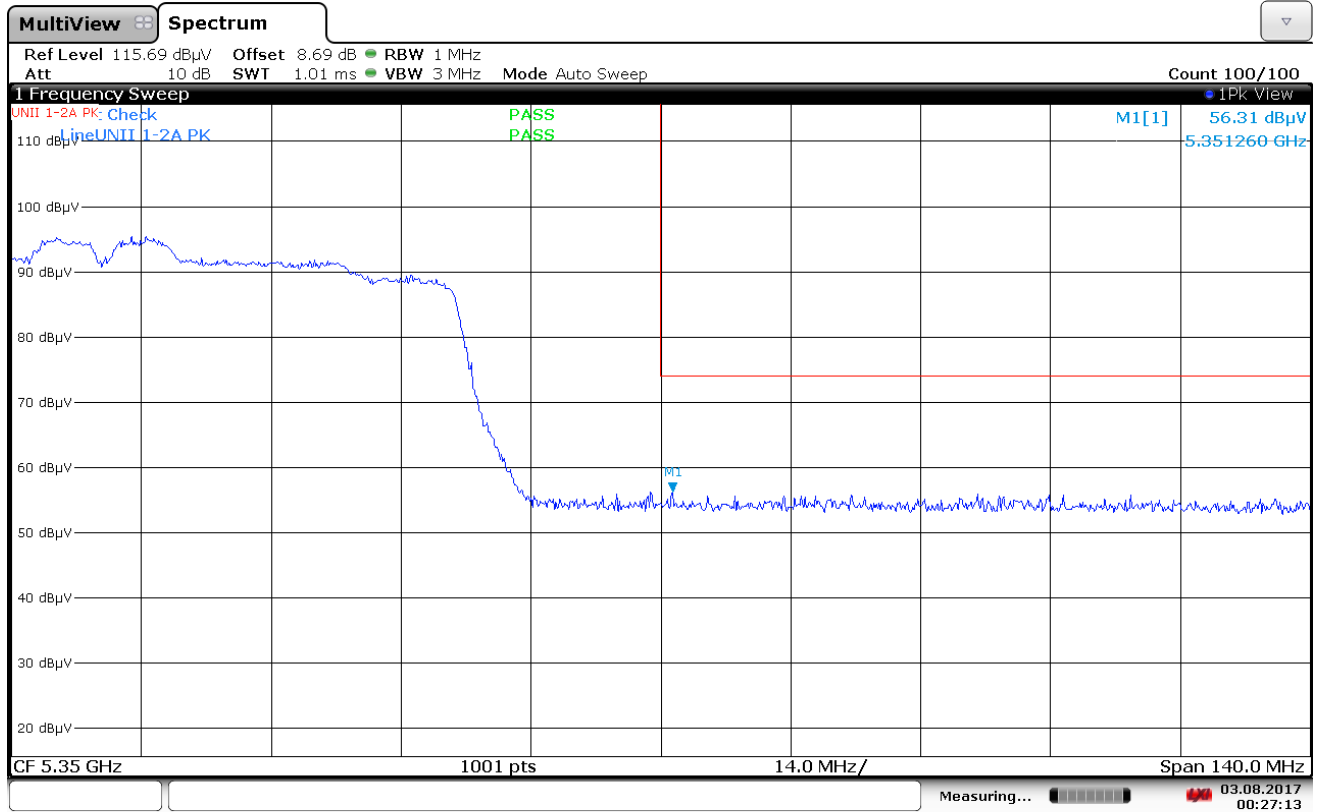
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Antenna-1 WCP Radiated Band Edge Measurements (80MHz BW)

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



00:27:13 03.08.2017

Plot 7-48. Radiated Restricted Band Edge Plot with WCP (Peak)

FCC ID: ZNFV30A	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11 UNII a/n/ac MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	LG	Approved by: Quality Manager
Test Report S/N: 1M1707180221-05-R1.ZNF	Test Dates: 7/20 - 8/11/2017	EUT Type: Portable Handset		Page 66 of 114

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