

MEASUREMENT REPORT

FCC Part 15.407 UNII 802.11a/n/ac

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

Date of Testing:
8/10 - 8/25/2015
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
0Y1508101529.ZNF

FCC ID:	ZNFVS990
APPLICANT:	LG Electronics MobileComm U.S.A

Application Type: Certification
Model(s): LG-VS990, LGVS990, VS990, LG-VS990W, LGVS990W, VS990W
EUT Type: Portable Handset
FCC Classification: Unlicensed National Information Infrastructure (UNII)
FCC Rule Part(s): Part 15.407
Test Procedure(s): KDB 789033 D02 v01, KDB 644545 v01r02, KDB 648474 D03 v01r02

Mode	UNII Band	Channel Bandwidth (MHz)	Tx Frequency (MHz)	Conducted Power	
				Max. Power (mW)	Max. Power (dBm)
802.11a	1	20	5180 - 5240	27.040	14.32
	2A	20	5260 - 5320	27.542	14.40
	2C	20	5500 - 5720	25.942	14.14
	3	20	5745 - 5825	23.067	13.63
802.11n	1	20	5180 - 5240	24.717	13.93
	2A	20	5260 - 5320	25.003	13.98
	2C	20	5500 - 5720	23.878	13.78
	3	20	5745 - 5825	21.528	13.33
802.11ac	1	20	5180 - 5240	24.210	13.84
	2A	20	5260 - 5320	25.645	14.09
	2C	20	5500 - 5720	23.496	13.71
	3	20	5745 - 5825	21.677	13.36
802.11n	1	40	5190 - 5230	14.060	11.48
	2A	40	5270 - 5310	14.791	11.70
	2C	40	5510 - 5710	14.191	11.52
	3	40	5755 - 5795	13.305	11.24
802.11ac	1	40	5190 - 5230	11.695	10.68
	2A	40	5270 - 5310	12.190	10.86
	2C	40	5510 - 5710	14.588	11.64
	3	40	5755 - 5795	14.322	11.56
802.11ac	1	80	5210	10.666	10.28
	2A	80	5290	8.831	9.46
	2C	80	5530 - 5690	10.617	10.26
	3	80	5775	9.908	9.96

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 v01 and KDB 644545 v01r02. 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



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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-VS990

FCC ID: ZNFVS990

FCC CLASSIFICATION: Unlicensed National Information Infrastructure (UNII)

Test Device Serial No.: 353149070006919, ☐ Production ☒ Pre-Production ☐ Engineering
353149070006927,
353149070006976

DATE(S) OF TEST: 8/10 - 8/25/2015

TEST REPORT S/N: 0Y1508101529.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.

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the 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 C63.4-2009 on February 15, 2012.

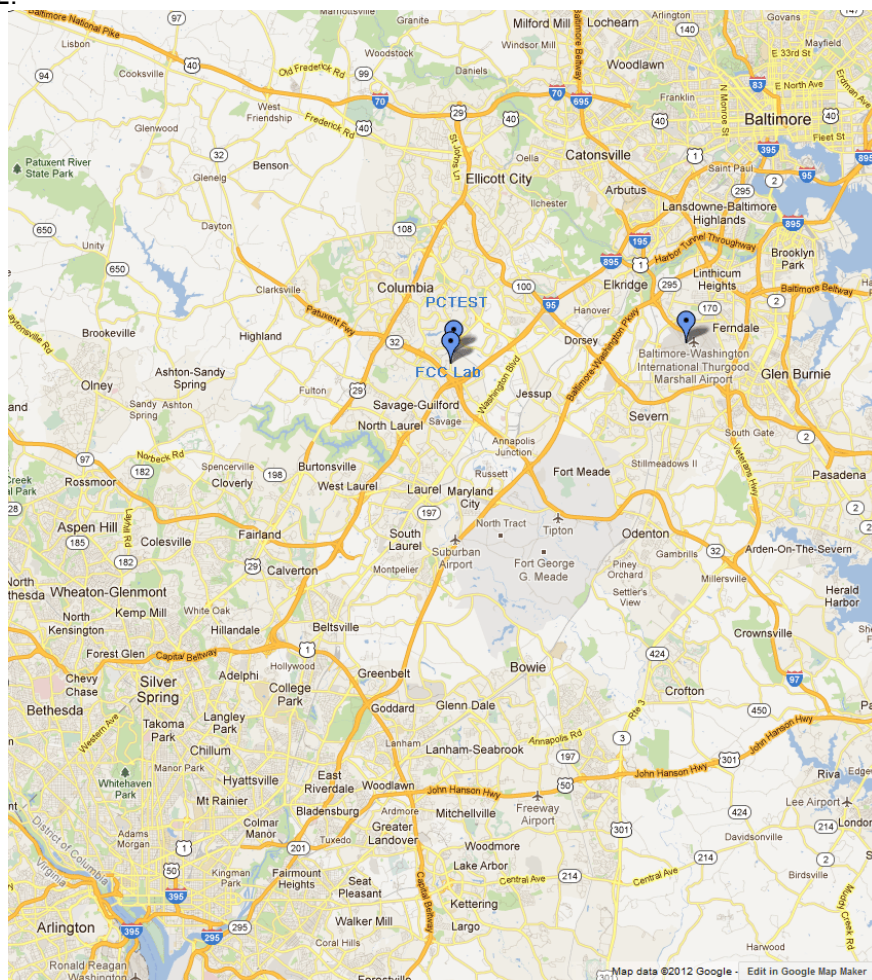


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFVS990**. 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/ac WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE), NFC

Note: 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. 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	99.09
	n (HT20)	99.57
	ac (HT20)	99.57
	n (HT40)	99.20
	ac (HT40)	99.16
	ac (HT80)	98.24

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

2.3 Test Configuration

The LG Portable Handset FCC ID: ZNFVS990 was tested per the guidance of KDB 789033 D02 v01. ANSI C63.10-2009 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups, 3.3 for radiated emissions test setups, and 6.2, 6.3, 6.4, and 6.5 for antenna port conducted emissions test setups.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r02. Additional radiated spurious emission measurements were performed with the EUT wirelessly charging via 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.

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3.0 DESCRIPTION OF TEST

3.1 Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2009) and the guidance provided in KDB 789033 D02 v01 were used in the measurement of **LG Portable Handset FCC ID: ZNFVS990**.

Deviation from measurement procedure.....None

3.2 AC Line Conducted Emissions

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

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

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 6.9.

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3.3 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Clause 5, Figure 5.7 of ANSI C63.4-2009. For measurements above 1GHz 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 below 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 0.8 meter high, 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, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

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

3.4 Environmental Conditions

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

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4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

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

- The antennas of the Portable Handset are **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The **LG Portable Handset FCC ID: ZNFVS990** unit complies with the requirement of §15.203.

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 4-1. 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		
				:	:		
				142	5710	159	5795

Table 4-2. 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 4-3. 802.11ac (80MHz BW) Frequency / Channel Operations

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5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	4/28/2015	Annual	4/28/2016	N/A
-	WL25-1	Conducted Cable Set (25GHz)	4/8/2015	Annual	4/8/2016	N/A
Agilent	8447D	Broadband Amplifier	6/12/2015	Annual	6/12/2016	2443A01900
Agilent	E4448A	PSA (3Hz-50GHz) Spectrum Analyzer	3/19/2015	Annual	3/19/2016	US42510244
Agilent	N9020A	MXA Signal Analyzer	10/27/2014	Annual	10/27/2015	US46470561
Agilent	N9030A	PXA Signal Analyzer (44GHz)	3/24/2015	Annual	3/24/2016	MY52350166
Agilent	N9038A	MXE EMI Receiver	3/24/2015	Annual	3/24/2016	MY51210133
Anritsu	MA2411B	Pulse Power Sensor	2/3/2014	Biennial	2/3/2016	1339026
Anritsu	ML2495A	Power Meter	10/31/2013	Biennial	10/31/2015	941001
Espec	ESX-2CA	Environmental Chamber	3/17/2015	Annual	3/17/2016	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	4/8/2014	Biennial	4/8/2016	125518
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	6/17/2014	Biennial	6/17/2016	135427
ETS-Lindgren	3816/2NM	Line Impedance Stabilization Network	11/11/2014	Biennial	11/11/2016	114451
Huber+Suhner	Sucoflex 102A	40GHz Radiated Cable	4/20/2015	Annual	4/20/2016	251425001
K & L	11SH10-6000/T18000	High Pass Filter	12/1/2014	Annual	12/1/2015	1
Pasternack	NMLC-1	Line Conducted Emissions Cable (NM)	4/28/2015	Annual	4/28/2016	N/A
Rhode & Schwarz	TS-PR18	Pre-Amplifier	3/5/2015	Annual	3/5/2016	101622
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/17/2015	Annual	7/17/2016	100348
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	3/3/2015	Annual	3/3/2016	100040
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	3/3/2015	Annual	3/3/2016	100037
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/18/2014	Biennial	3/18/2016	N/A
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/28/2014	Biennial	1/28/2016	A051107
VWR	62344-734	Thermometer with Clock	2/20/2014	Biennial	2/20/2016	140140420

Table 5-1. Annual Test Equipment Calibration Schedule

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6.0 TEST RESULTS

6.1 Summary

Company Name: LG Electronics MobileComm U.S.A
 FCC ID: ZNFVS990
 Method/System: Unlicensed National Information Infrastructure (UNII)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MODE (TX)					
N/A	26dB Bandwidth	N/A	CONDUCTED	PASS	Section 6.2
15.407(e)	6dB Bandwidth	>500kHz(5725-5850MHz)		PASS	Section 6.3
15.407 (a.1)	Maximum Conducted Output Power	< 250mW (23.98dBm) (5150-5250MHz) < 250mW (23.98dBm) (5250-5350MHz) < 250mW (23.98dBm) (5470-5725MHz) < 1W (30dBm) (5725-5850MHz)		PASS	Section 6.4
15.407 (a.1), (5)	Maximum Power Spectral Density	< 11 dBm/MHz (5150-5250MHz, 5250-5350MHz, 5470-5725MHz) < 30 dBm/500kHz (5725-5850MHz)		PASS	Section 6.5
15.407(g)	Frequency Stability	N/A		PASS	Section 6.6
15.407(h)	Dynamic Frequency Selection	See DFS Test Report		PASS	See DFS Test Report
15.407(b.1), (2),(3)	Undesirable Emissions	< -27 dBm/MHz EIRP (outside 5150-5350MHz, 5470-5725MHz, 5715-5860MHz) < -17 dBm/MHz EIRP (within 5715-5725MHz and 5850-5860MHz)	RADIATED	PASS	Section 6.7
15.205, 15.407(b.1), (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 6.7, 6.8
15.407	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits	LINE CONDUCTED	PASS	Section 6.9

Table 6-1. 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.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "UNII Automation," Version 3.5.
- 5) For radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "Chamber Automation," Version 1.1.2.

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6.2 26dB Bandwidth Measurement – 802.11a/n/ac

Test Overview and Limit

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02 v01, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

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

Test Procedure Used

KDB 789033 D02 v01 – Section C

Test Settings

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

Test Setup

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

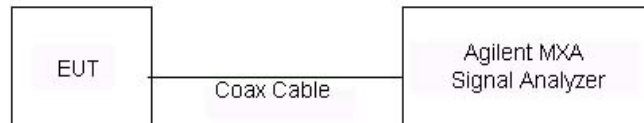


Figure 6-1. Test Instrument & Measurement Setup

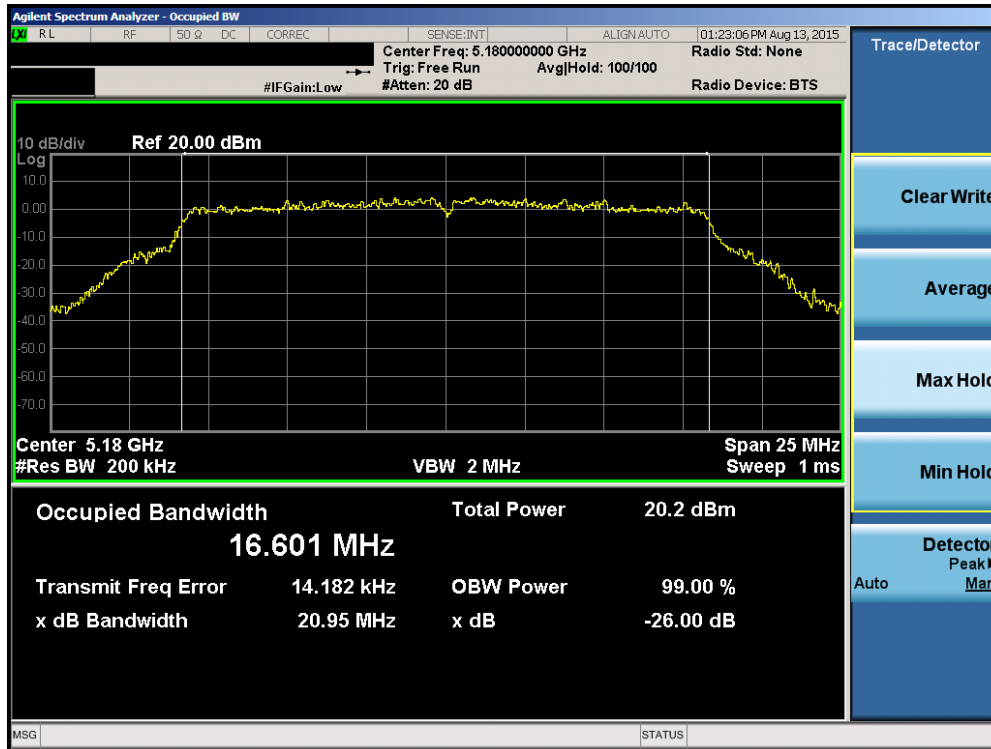
Test Notes

None.

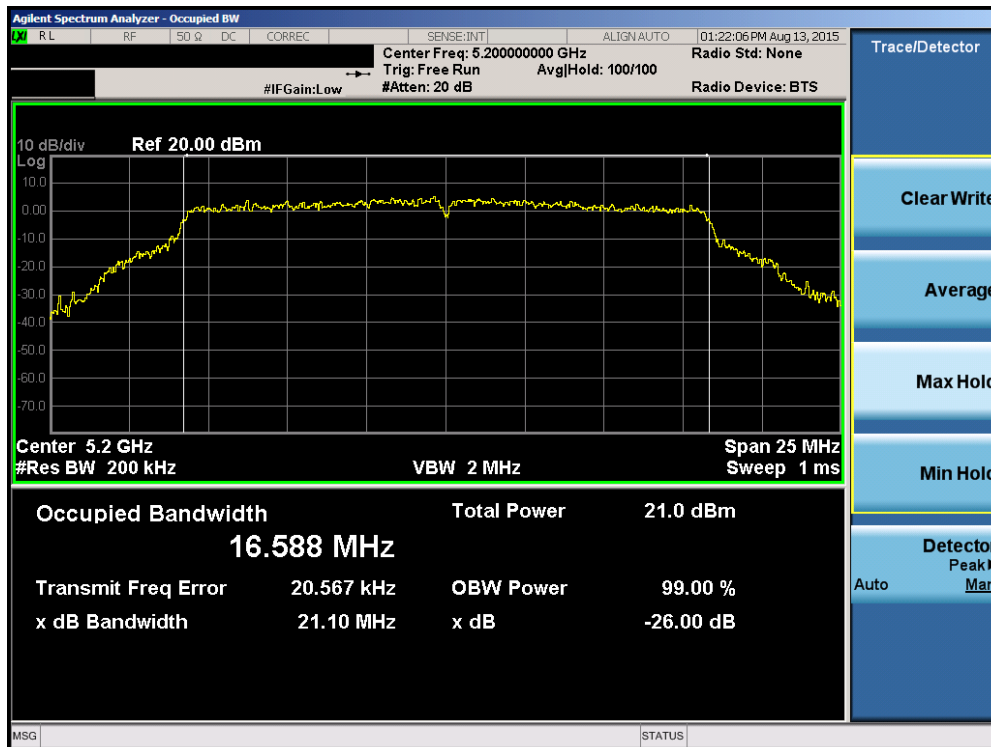
FCC ID: ZNFVS990		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 11 of 125

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]
Band 1	5180	36	a	6	20.95
	5200	40	a	6	21.10
	5240	48	a	6	20.65
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	21.42
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	21.19
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	21.26
	5190	38	n (40MHz)	13.5/15 (MCS0)	39.52
	5230	46	n (40MHz)	13.5/15 (MCS0)	39.56
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	81.29
Band 2A	5260	52	a	6	20.93
	5280	56	a	6	20.92
	5320	64	a	6	21.01
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	21.47
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	21.48
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	21.50
	5270	54	n (40MHz)	13.5/15 (MCS0)	39.55
	5310	62	n (40MHz)	13.5/15 (MCS0)	39.77
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	81.35
Band 2C	5500	100	a	6	20.89
	5580	116	a	6	21.14
	5720	144	a	6	20.93
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	21.34
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	21.37
	5720	144	n (20MHz)	6.5/7.2 (MCS0)	21.31
	5510	102	n (40MHz)	13.5/15 (MCS0)	39.31
	5550	110	n (40MHz)	13.5/15 (MCS0)	39.26
	5710	142	n (40MHz)	13.5/15 (MCS0)	39.68
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	81.35
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	80.76

Table 6-2. Conducted Bandwidth Measurements

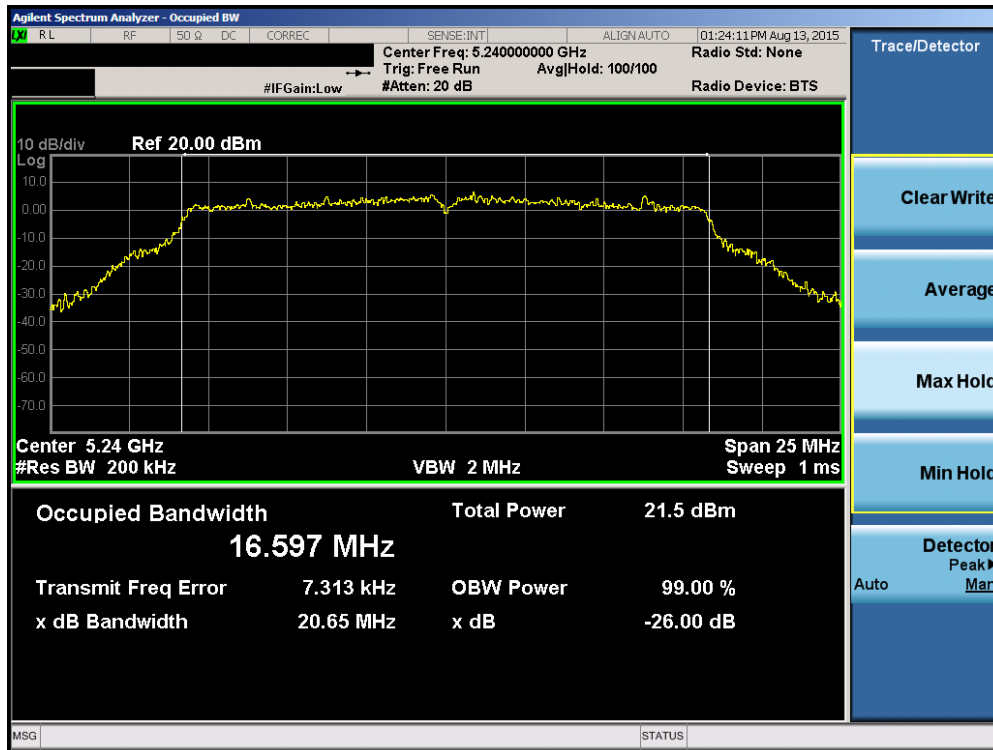


Plot 6-1. 26dB Bandwidth Plot (802.11a (UNII Band 1) – Ch. 36)

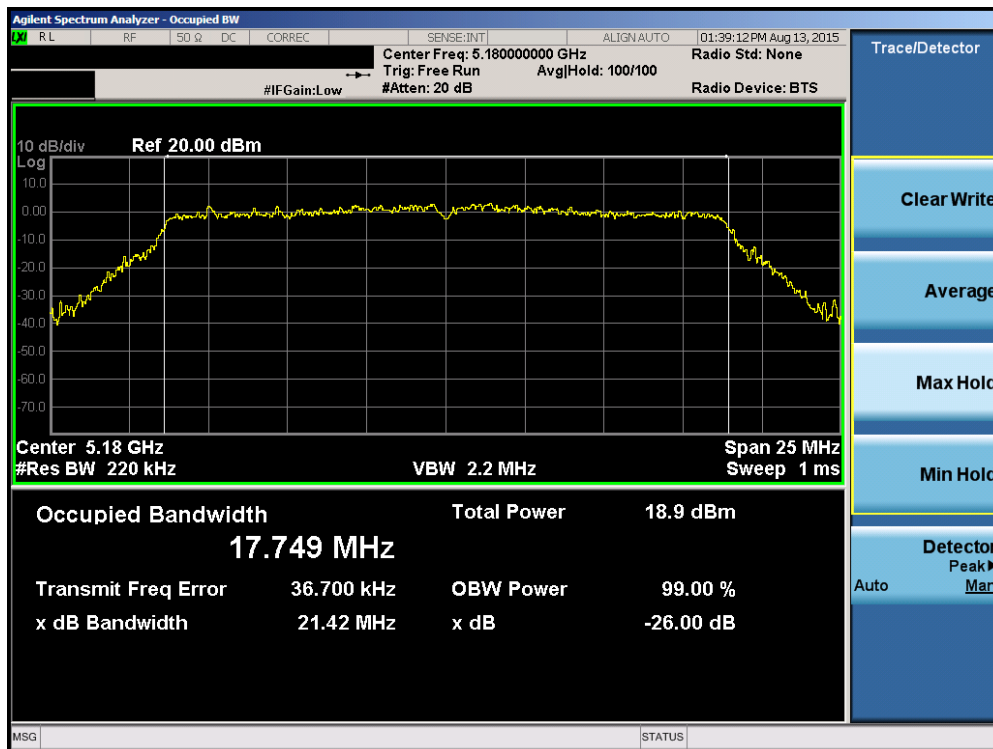


Plot 6-2. 26dB Bandwidth Plot (802.11a (UNII Band 1) – Ch. 40)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 13 of 125

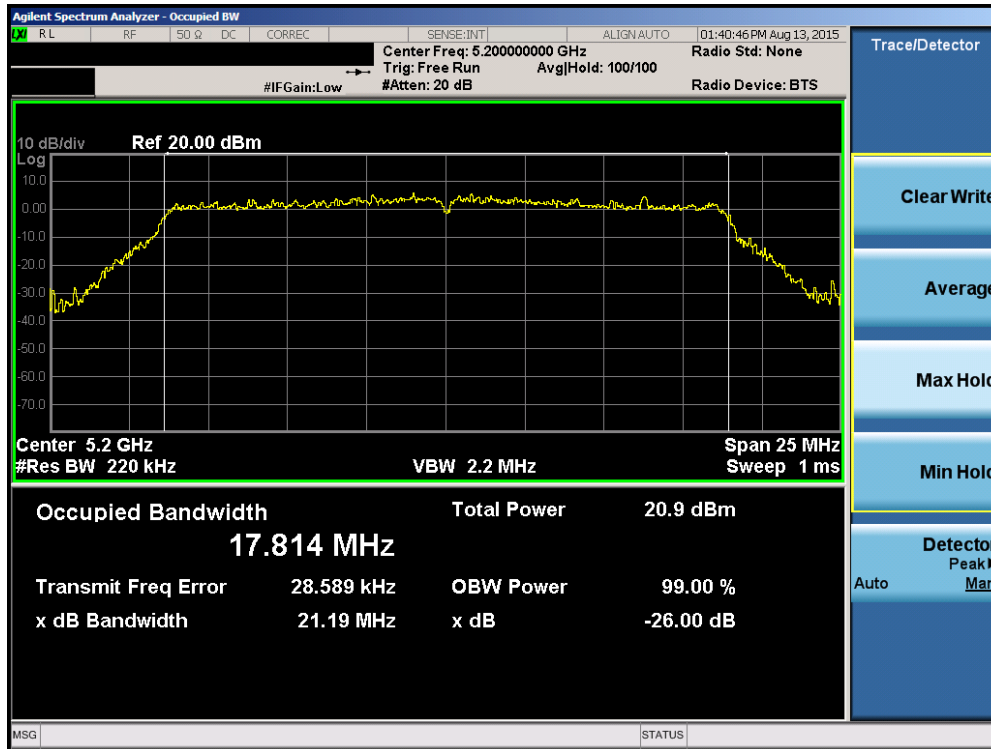


Plot 6-3. 26dB Bandwidth Plot (802.11a (UNII Band 1) – Ch. 48)

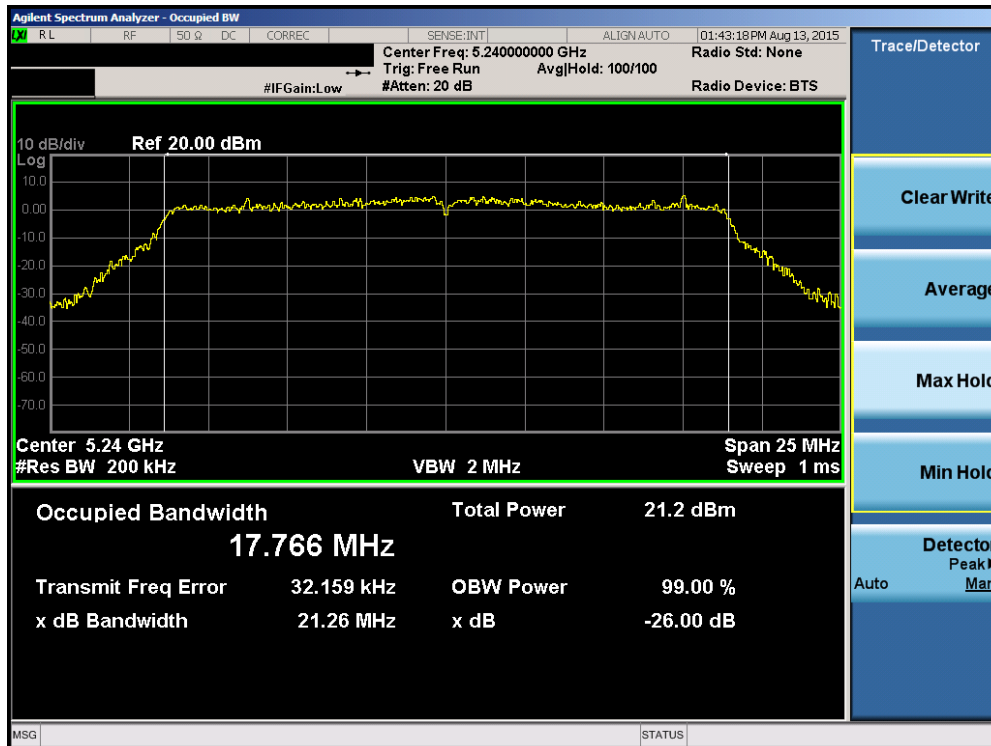


Plot 6-4. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 14 of 125

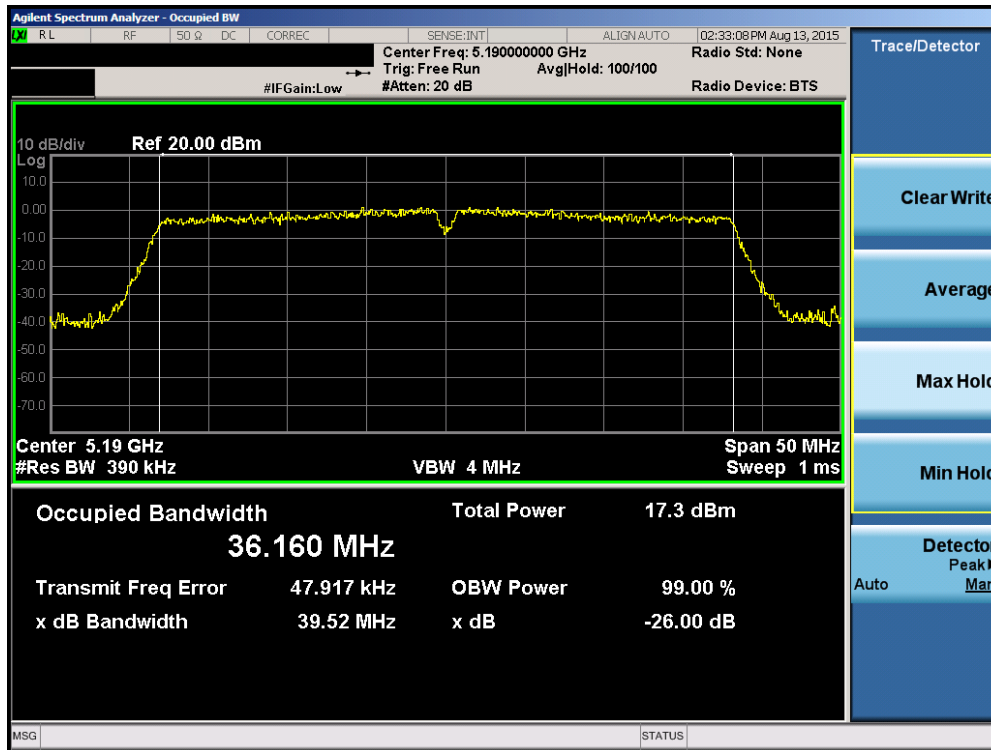


Plot 6-5. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 40)

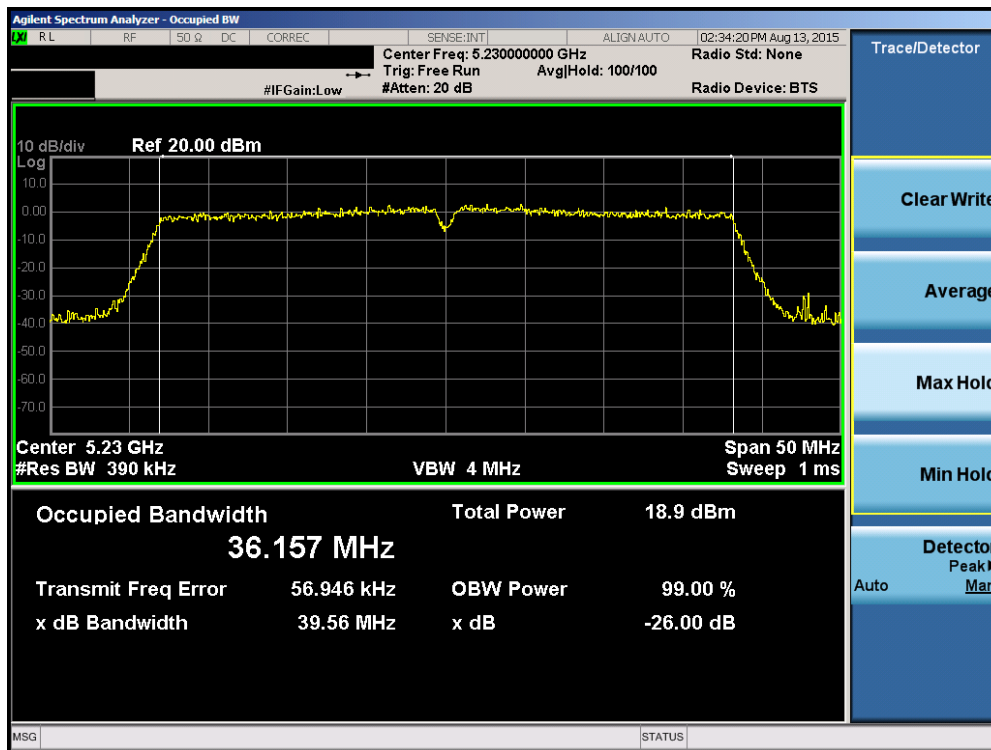


Plot 6-6. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 15 of 125

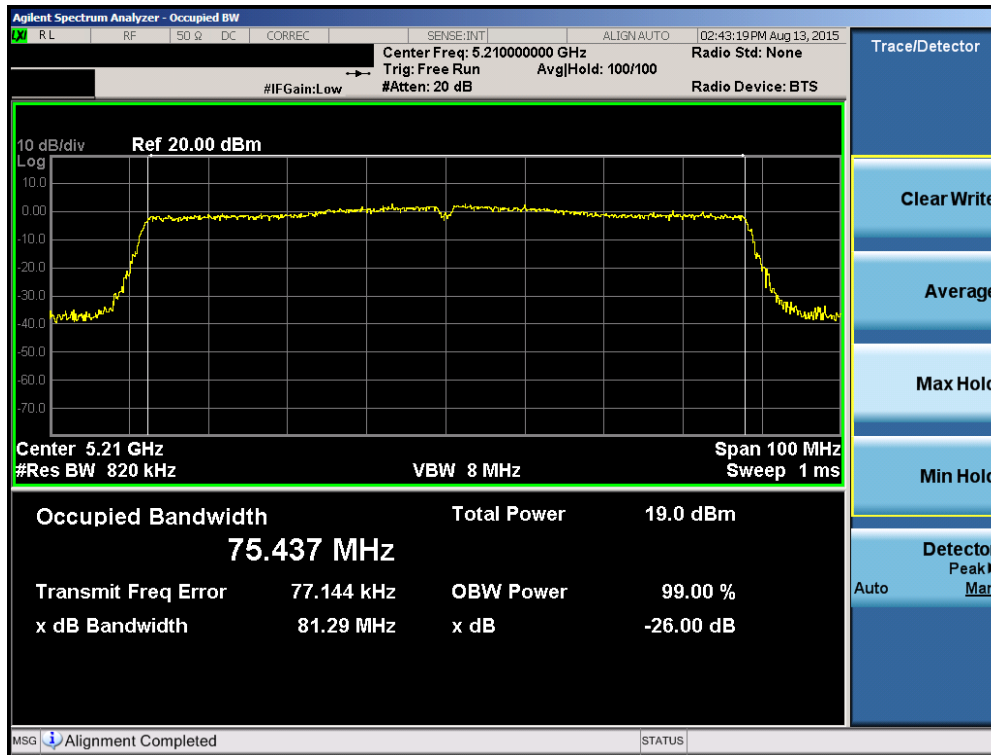


Plot 6-7. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 38)

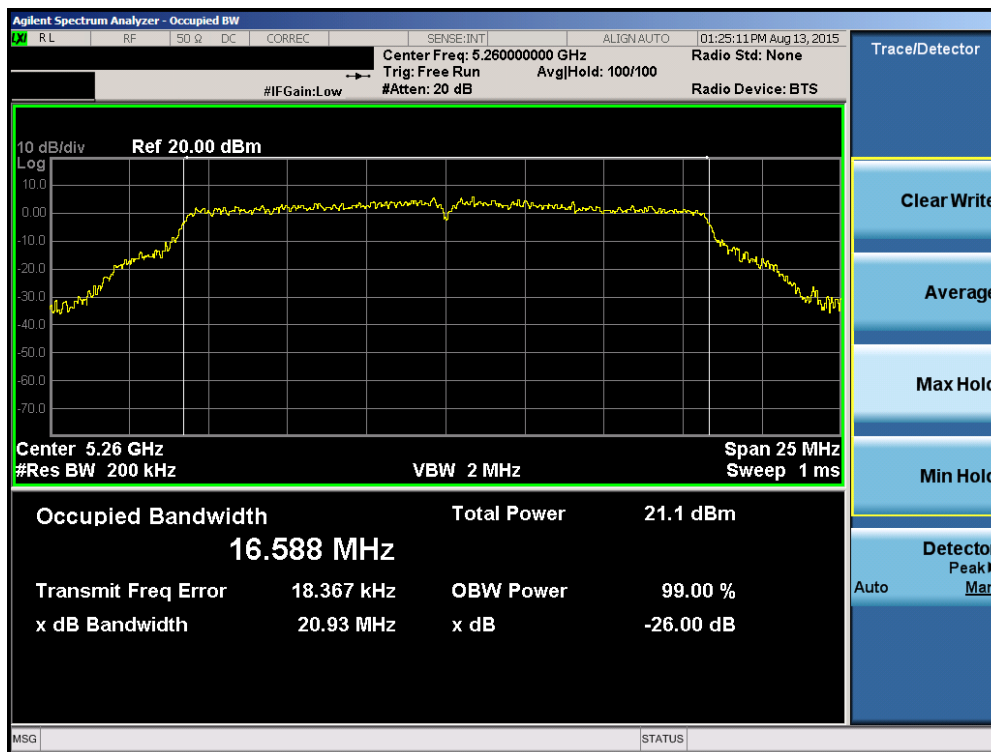


Plot 6-8. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 16 of 125

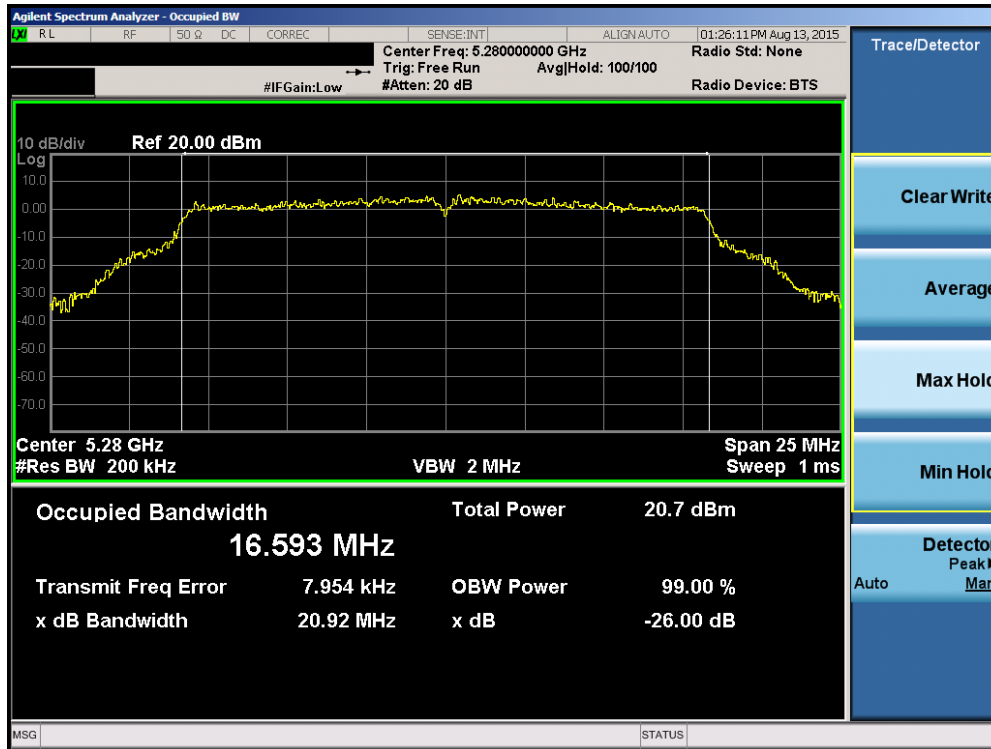


Plot 6-9. 26dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)

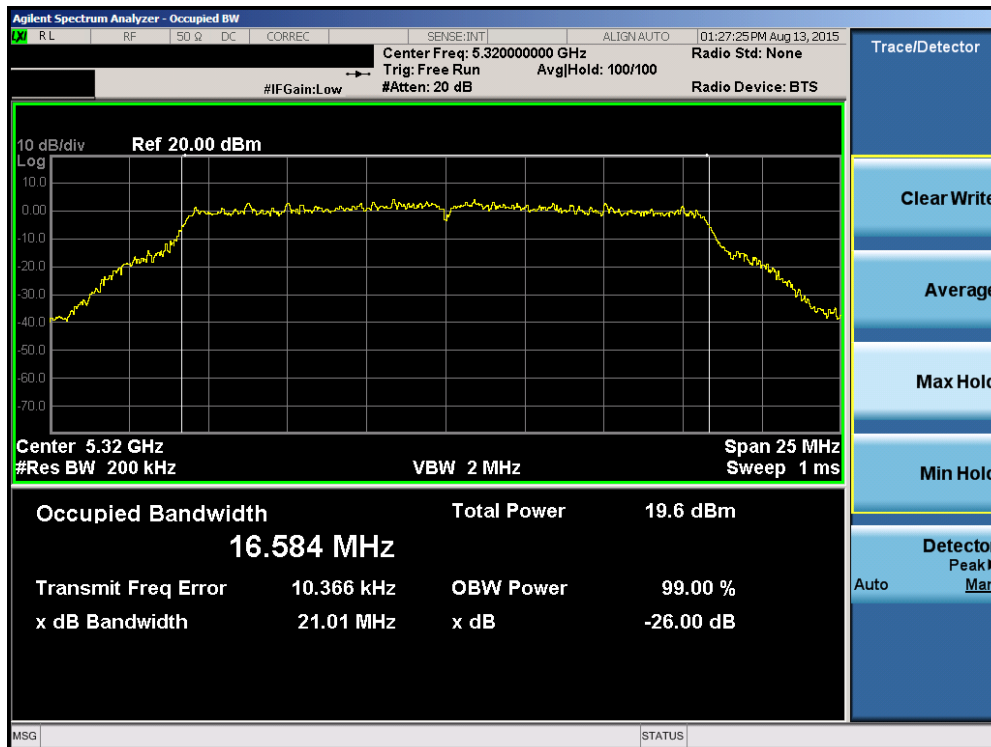


Plot 6-10. 26dB Bandwidth Plot (802.11a (UNII Band 2A) – Ch. 52)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 17 of 125

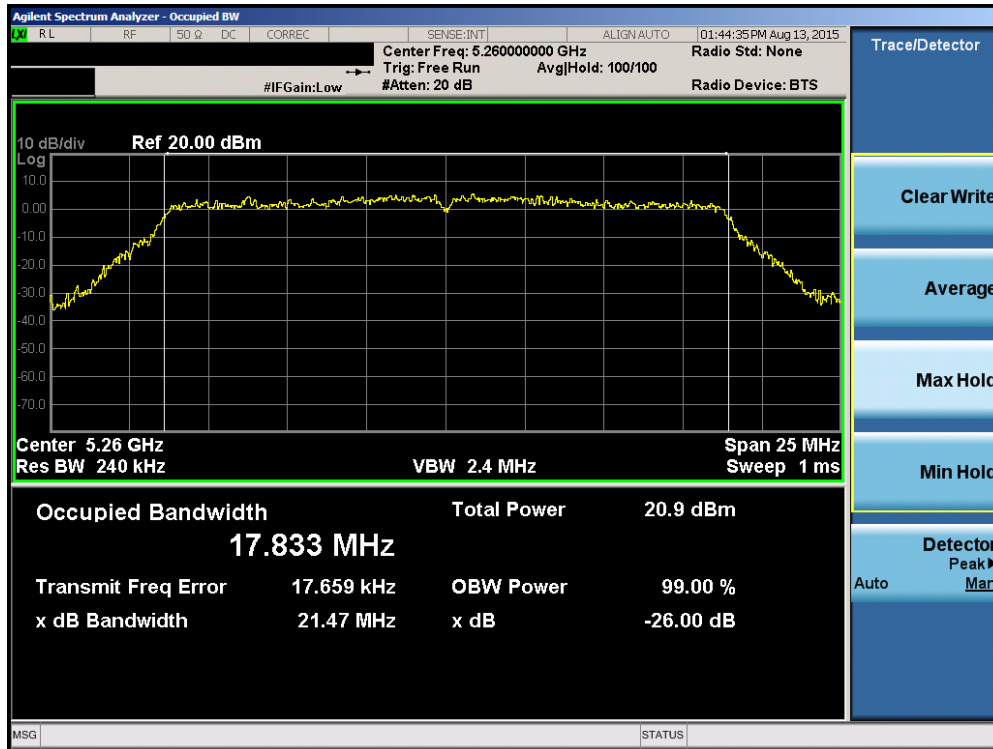


Plot 6-11. 26dB Bandwidth Plot (802.11a (UNII Band 2A) – Ch. 56)

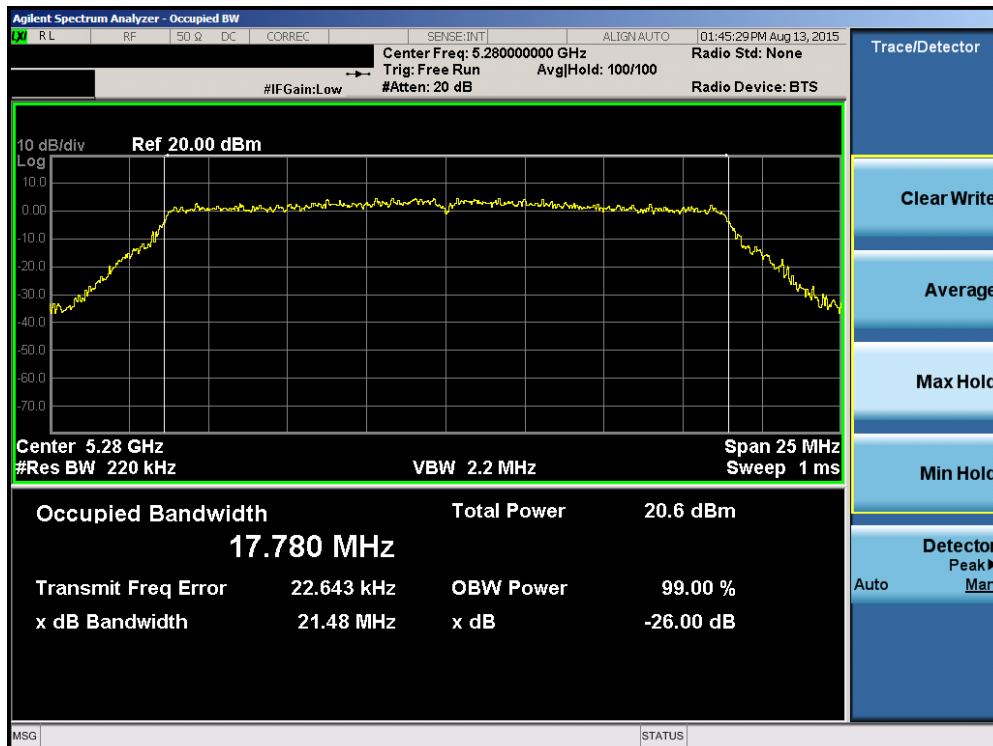


Plot 6-12. 26dB Bandwidth Plot (802.11a (UNII Band 2A) – Ch. 64)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 18 of 125

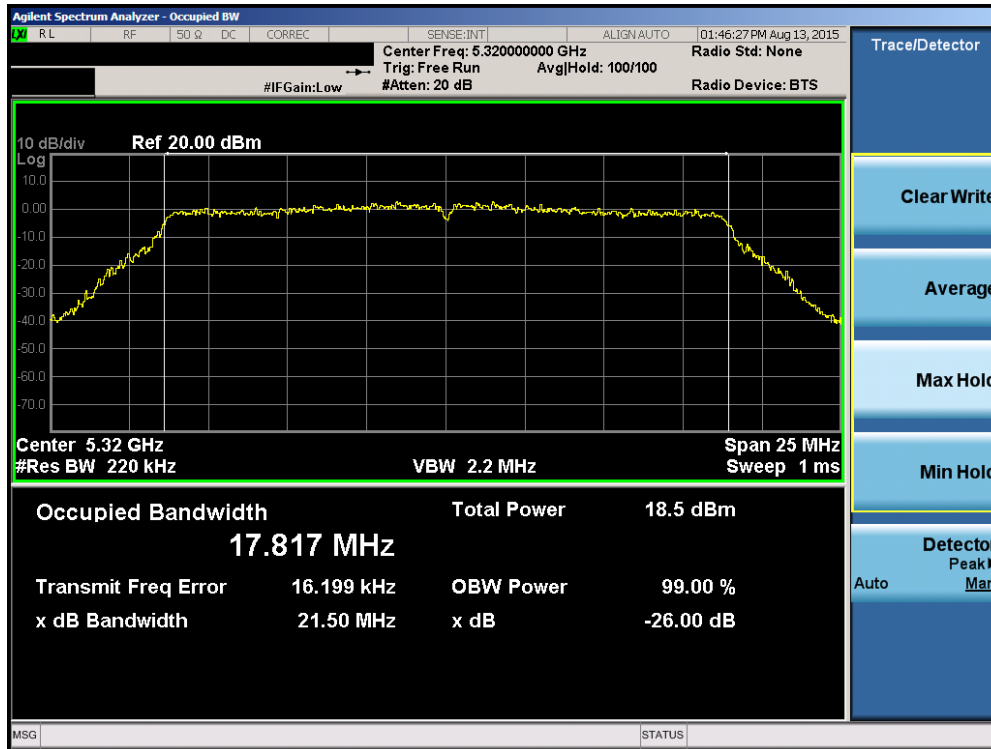


Plot 6-13. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)

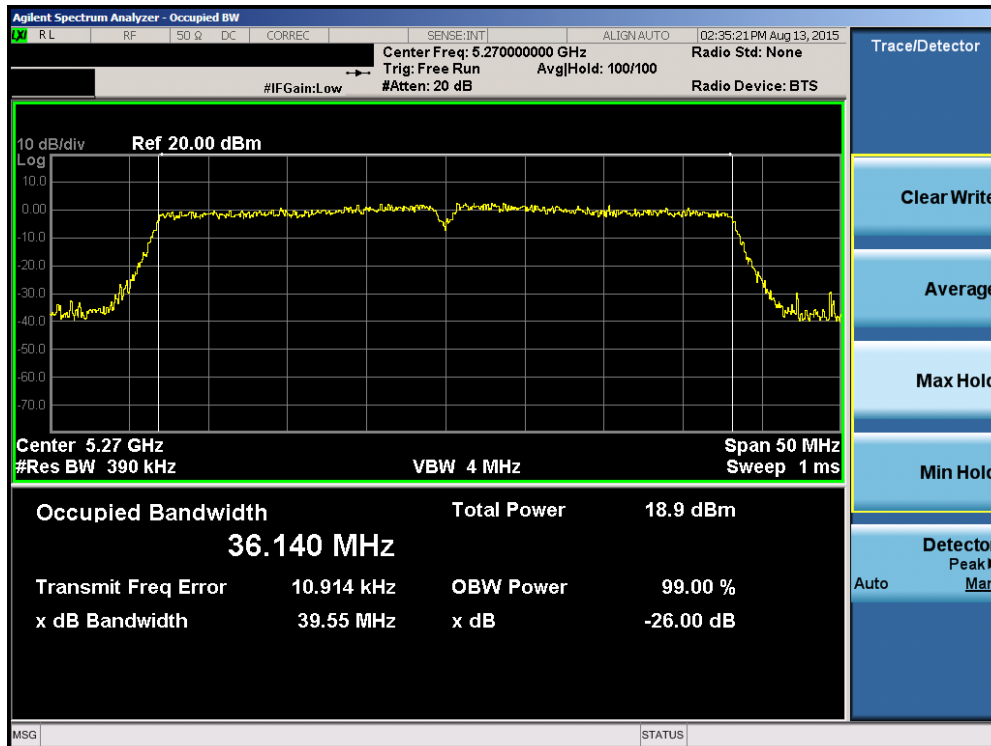


Plot 6-14. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 19 of 125

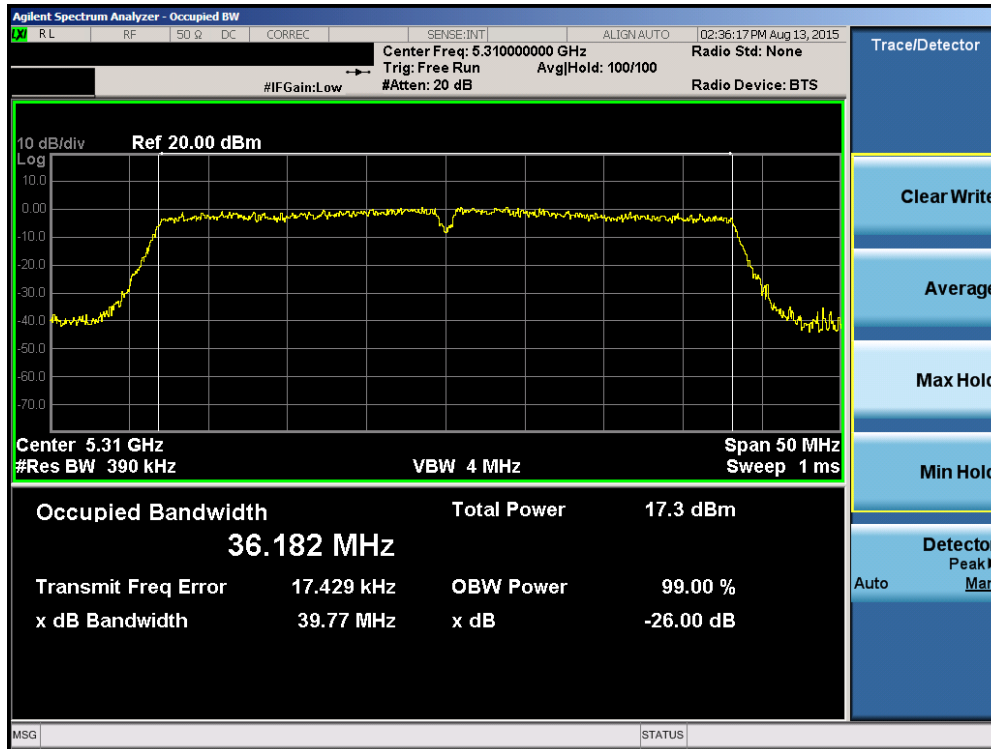


Plot 6-15. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)

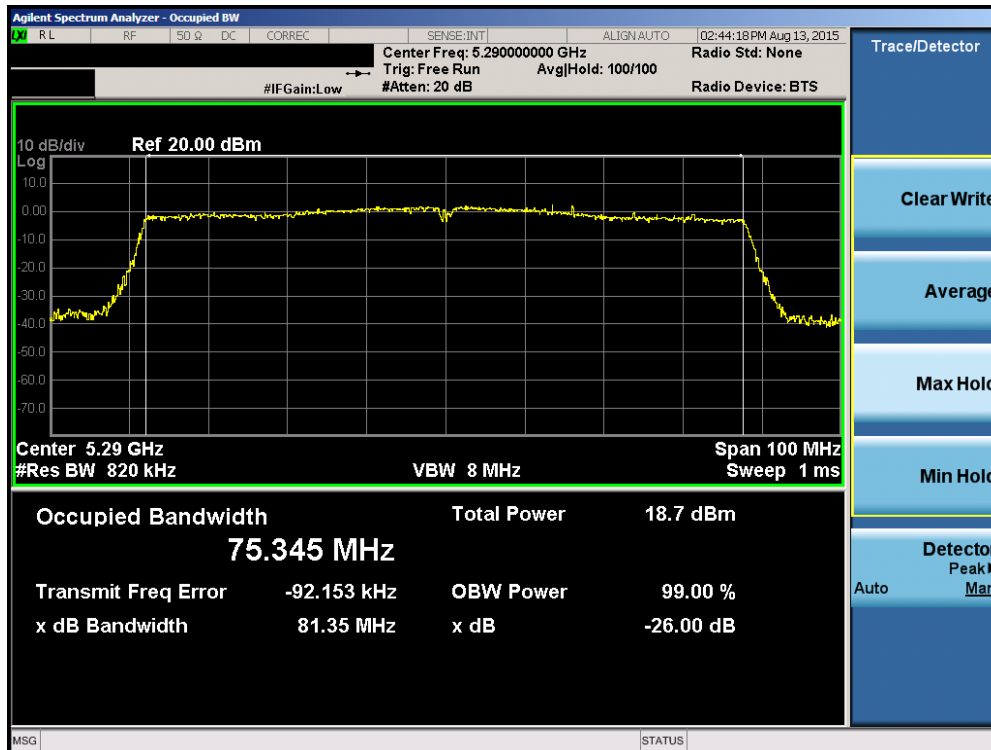


Plot 6-16. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 20 of 125

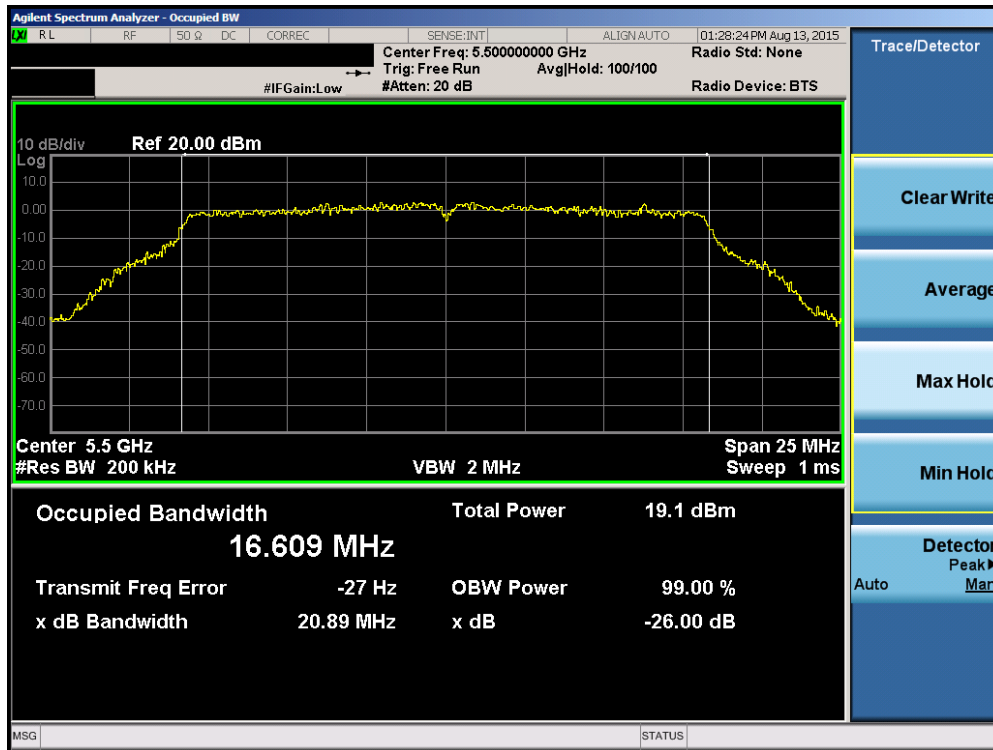


Plot 6-17. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 62)

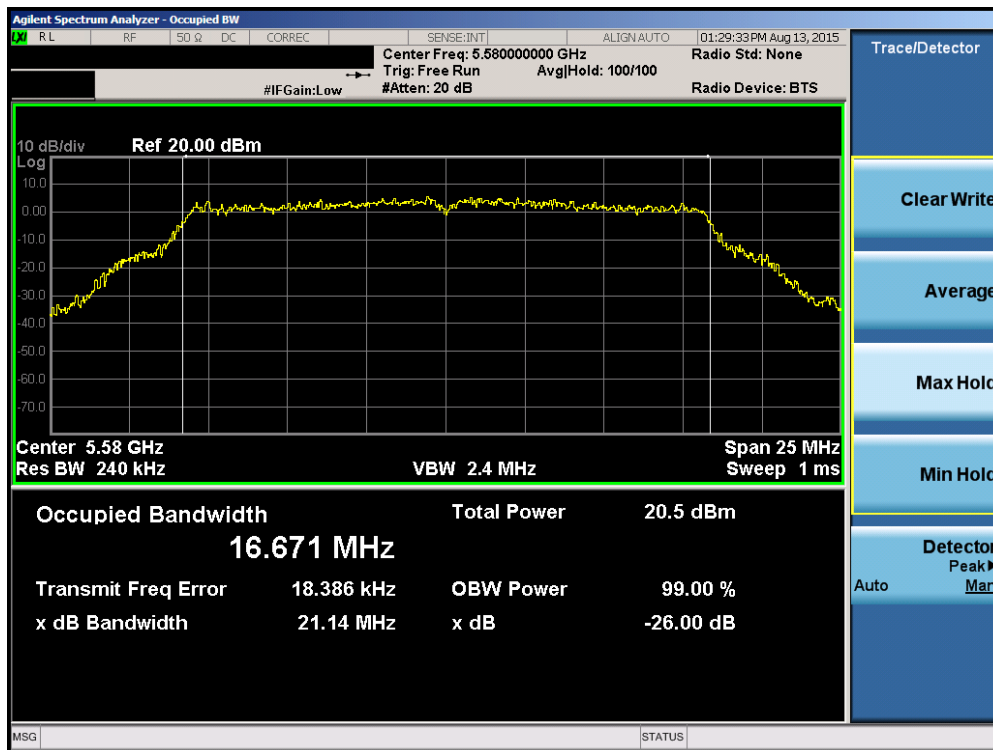


Plot 6-18. 26dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 2A) – Ch. 58)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 21 of 125

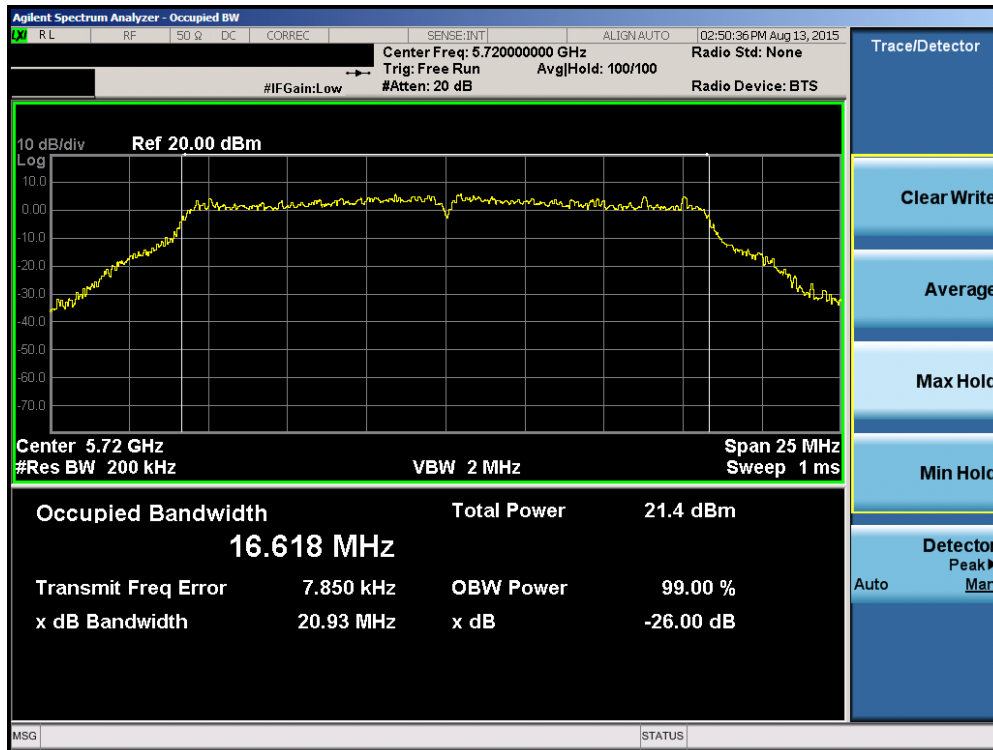


Plot 6-19. 26dB Bandwidth Plot (802.11a (UNII Band 2C) – Ch. 100)

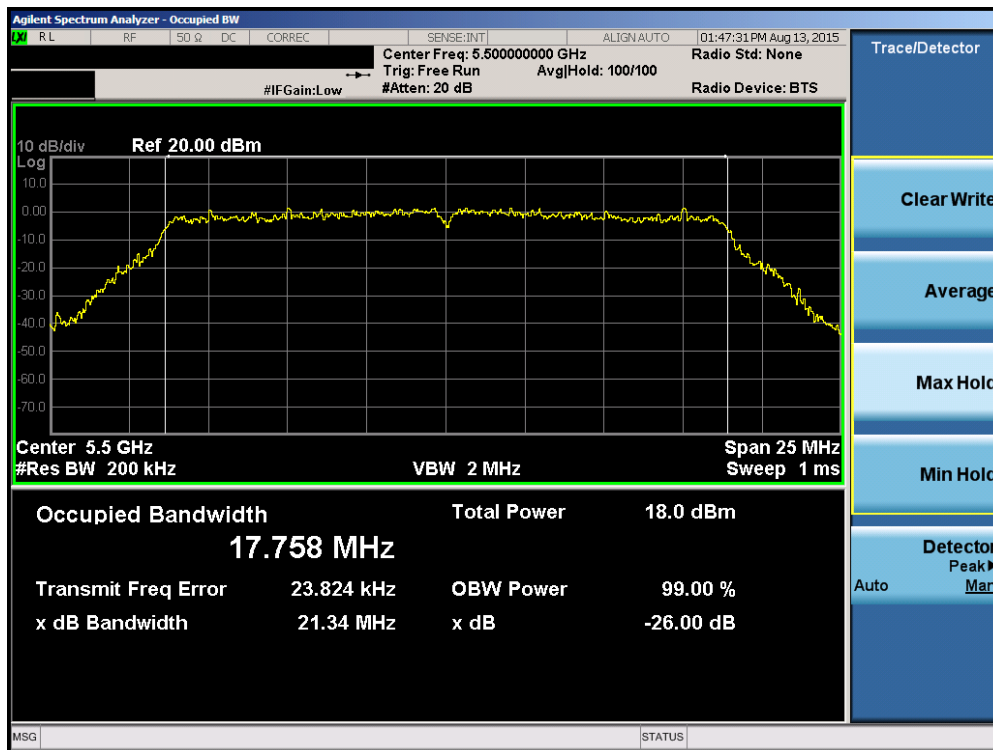


Plot 6-20. 26dB Bandwidth Plot (802.11a (UNII Band 2C) – Ch. 116)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 22 of 125

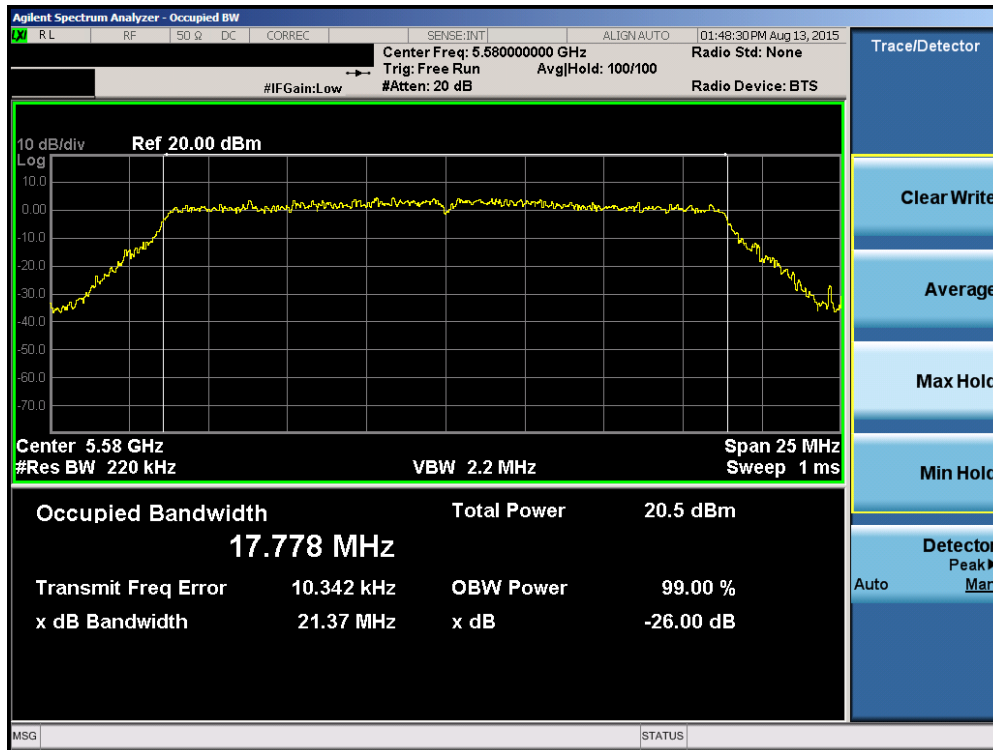


Plot 6-21. 26dB Bandwidth Plot (802.11a (UNII Band 2C) – Ch. 144)

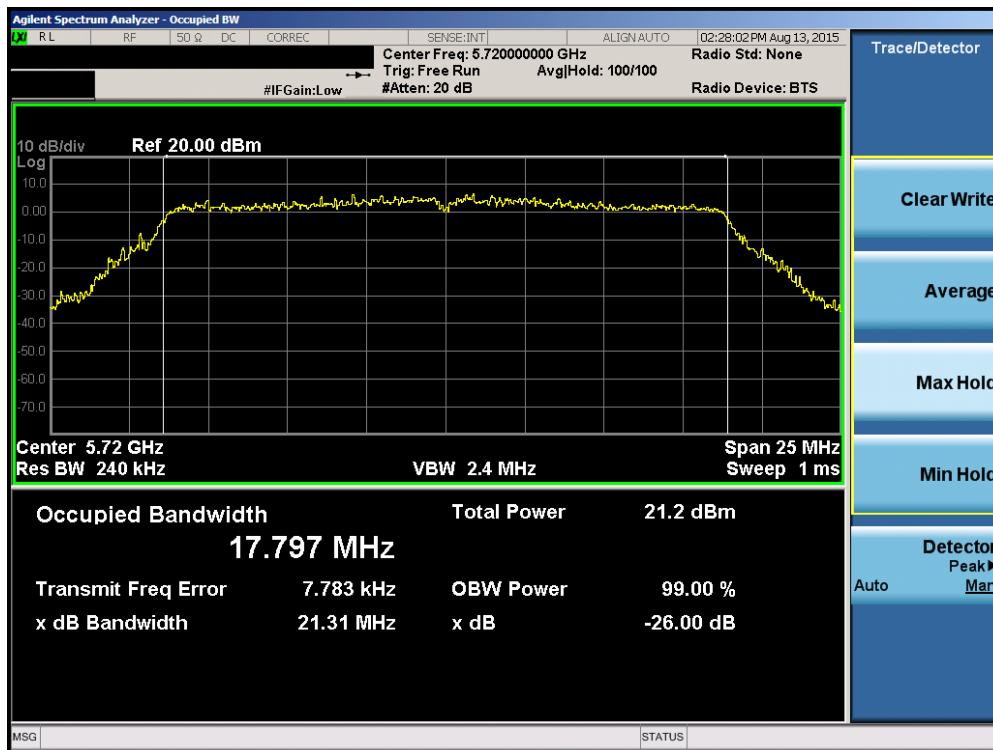


Plot 6-22. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 100)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 23 of 125

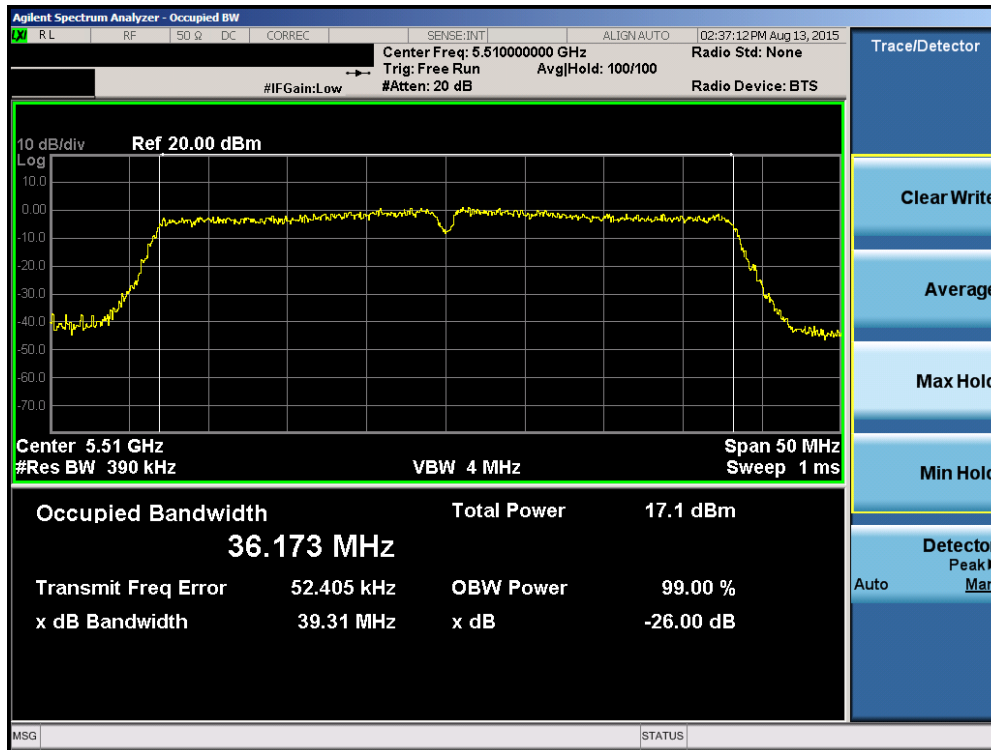


Plot 6-23. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 116)

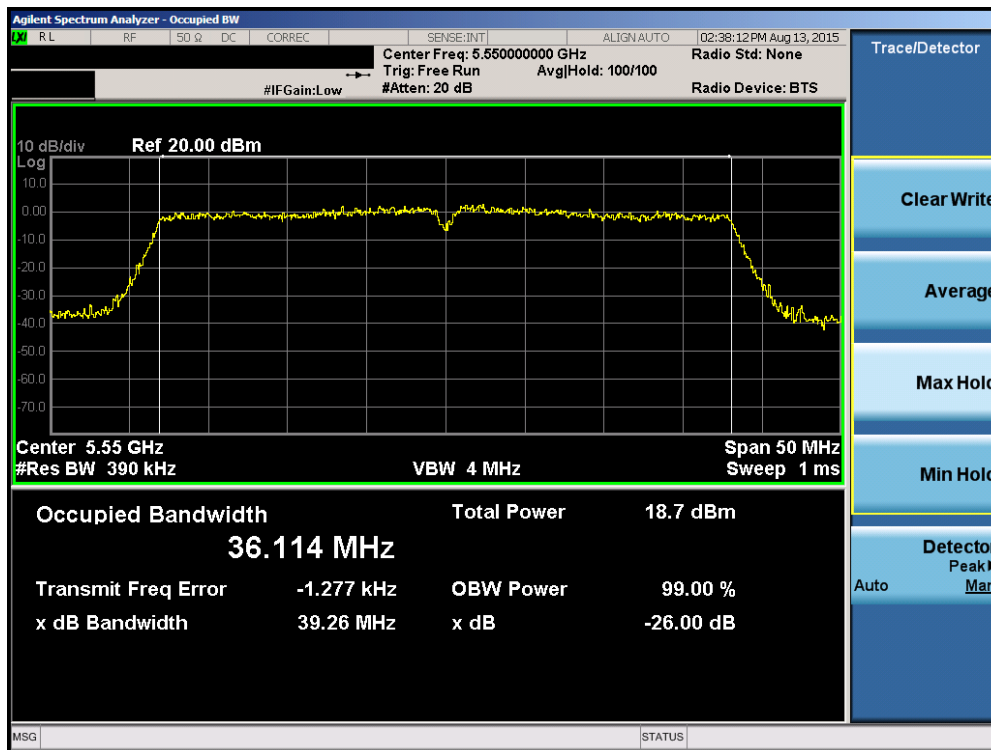


Plot 6-24. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 144)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 24 of 125

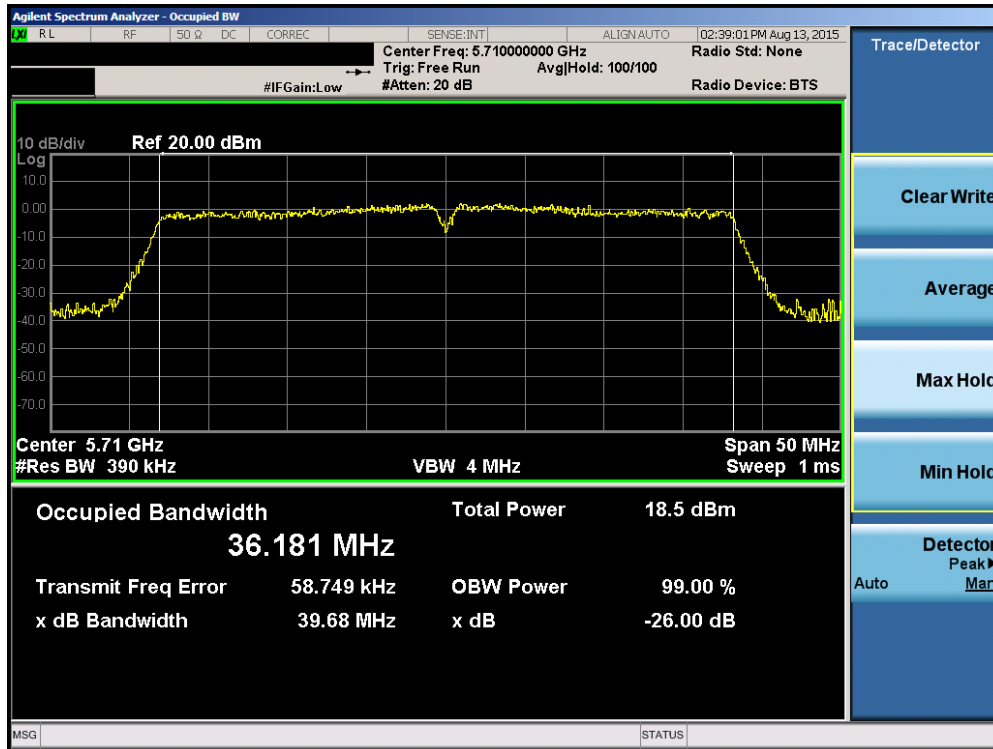


Plot 6-25. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)

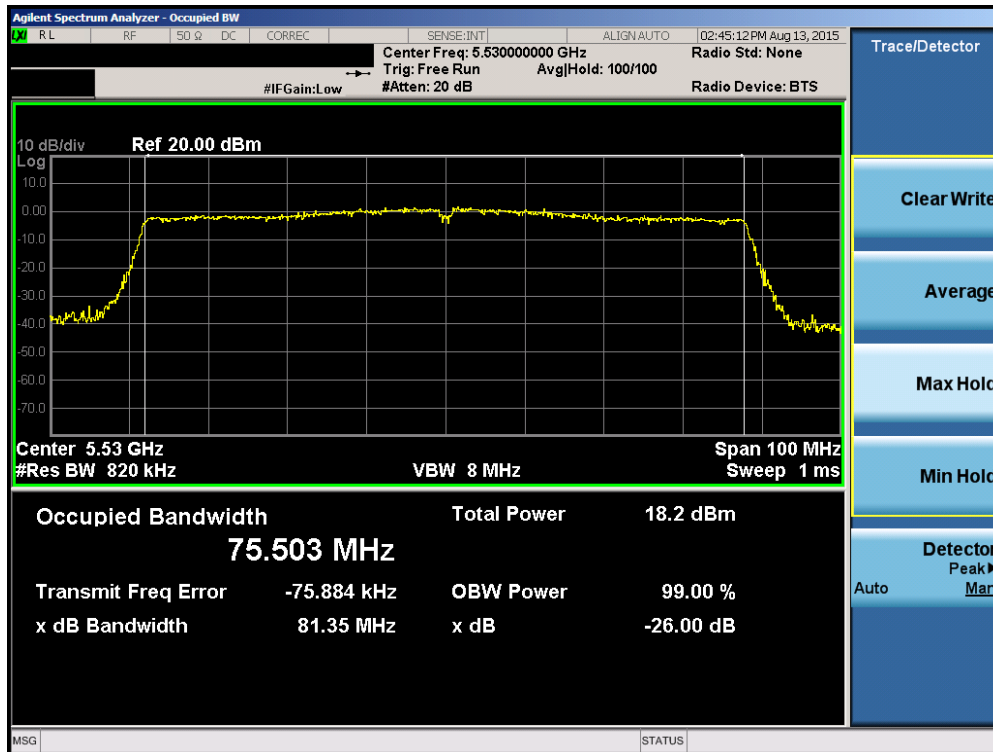


Plot 6-26. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 110)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 25 of 125

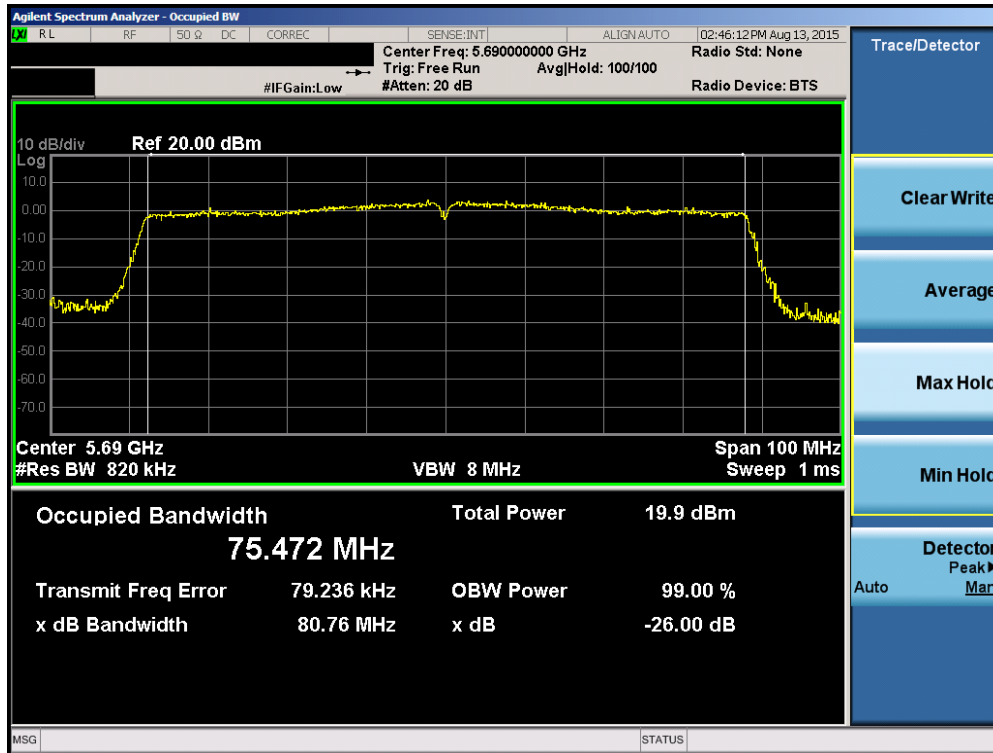


Plot 6-27. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 142)



Plot 6-28. 26dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 2C) – Ch. 106)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 26 of 125



Plot 6-29. 26dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 2C) – Ch. 138)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 27 of 125

6.3 6dB Bandwidth Measurement – 802.11a/n/ac §15.407 (e)

Test Overview and Limit

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02 v01, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 6dB bandwidth.

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

Test Procedure Used

KDB 789033 D02 v01 – Section C

Test Settings

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

Test Setup

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

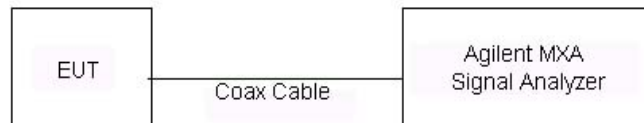


Figure 6-2. Test Instrument & Measurement Setup

Test Notes

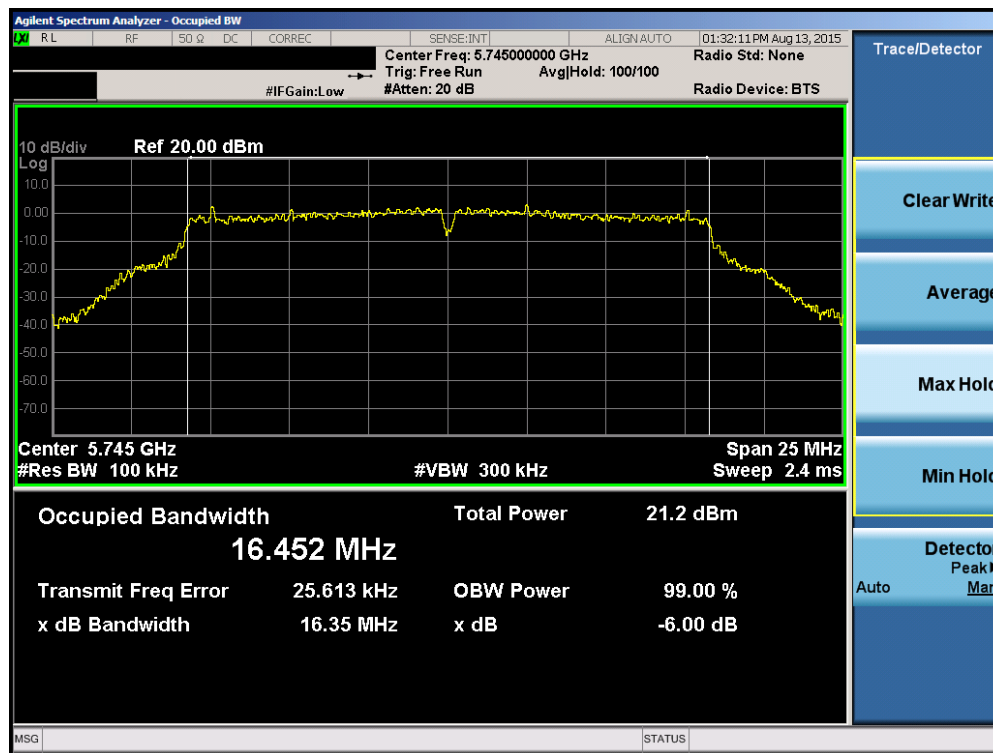
None.

FCC ID: ZNFVS990		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 28 of 125

6 dB Bandwidth Measurements

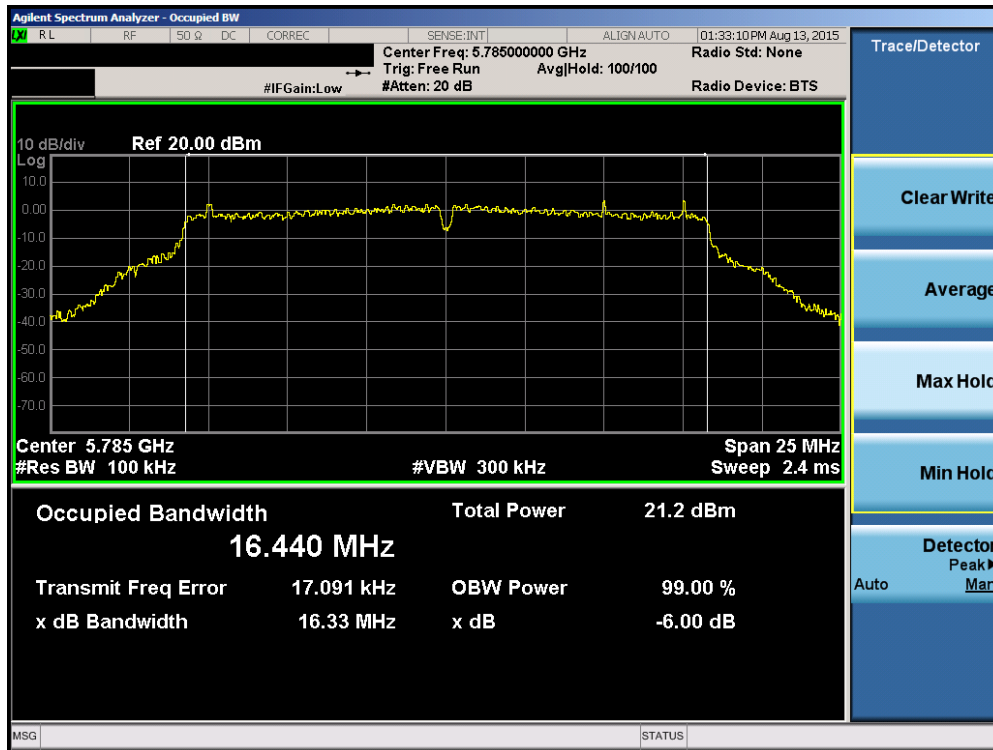
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
Band 3	5745	149	a	6	16.35
	5785	157	a	6	16.33
	5825	165	a	6	16.34
	5745	149	n (20MHz)	6.5/7.2 (MCS0)	17.58
	5785	157	n (20MHz)	6.5/7.2 (MCS0)	17.58
	5825	165	n (20MHz)	6.5/7.2 (MCS0)	17.57
	5755	151	n (40MHz)	13.5/15 (MCS0)	35.76
	5795	159	n (40MHz)	13.5/15 (MCS0)	36.29
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	75.25

Table 6-3. Conducted Bandwidth Measurements

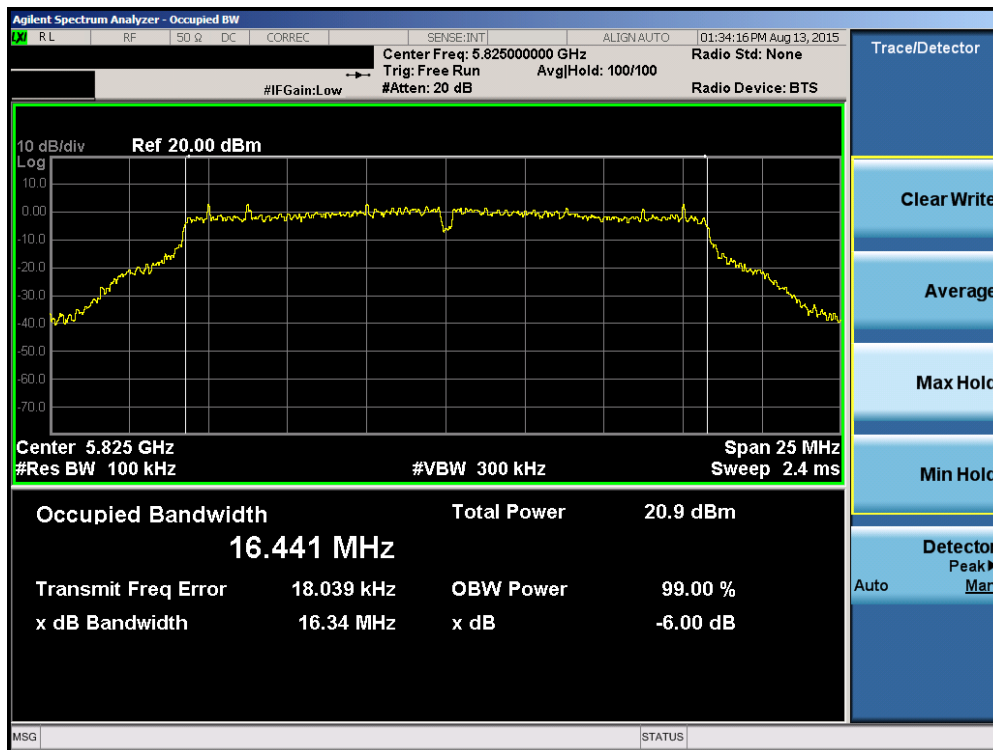


Plot 6-30. 6dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 149)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 29 of 125

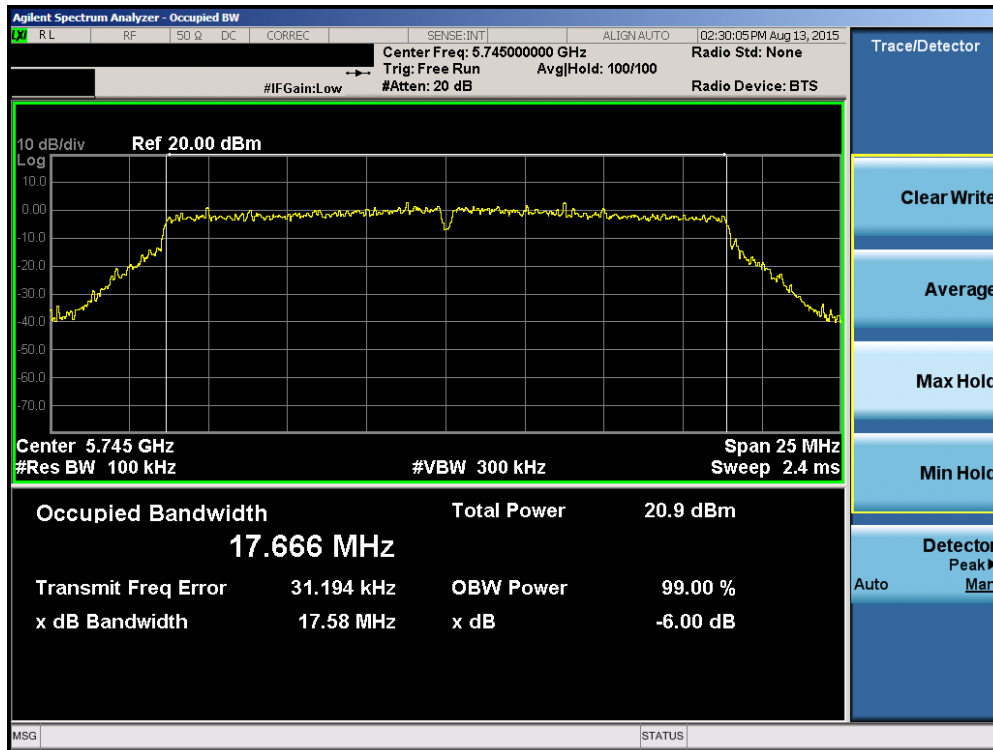


Plot 6-31. 6dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 157)

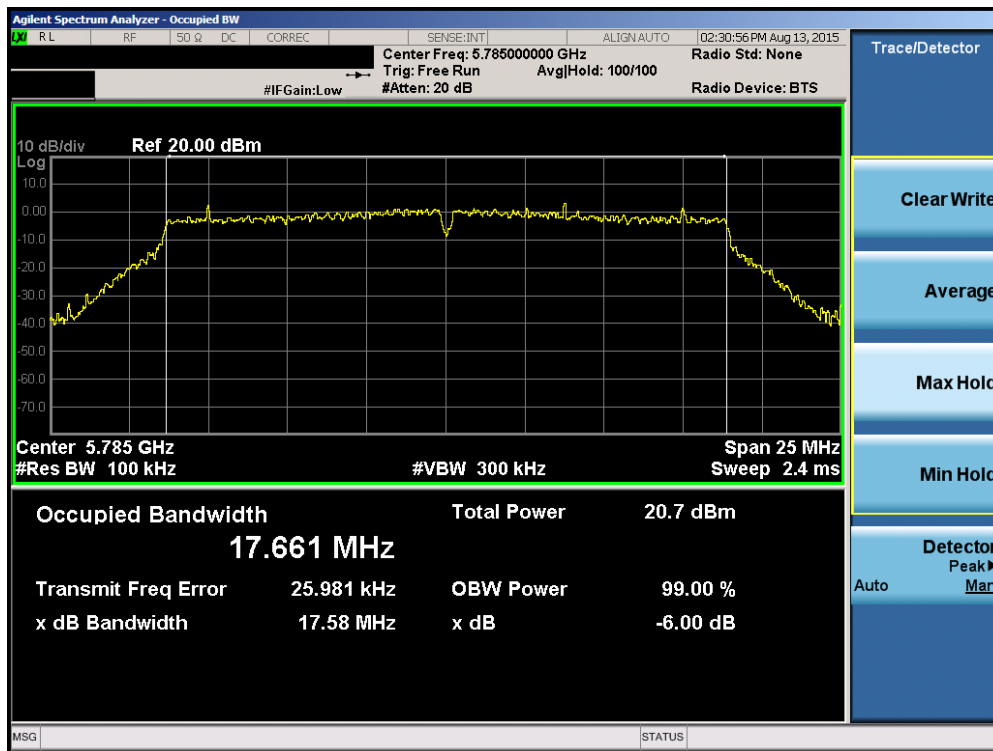


Plot 6-32. 6dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 165)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 30 of 125

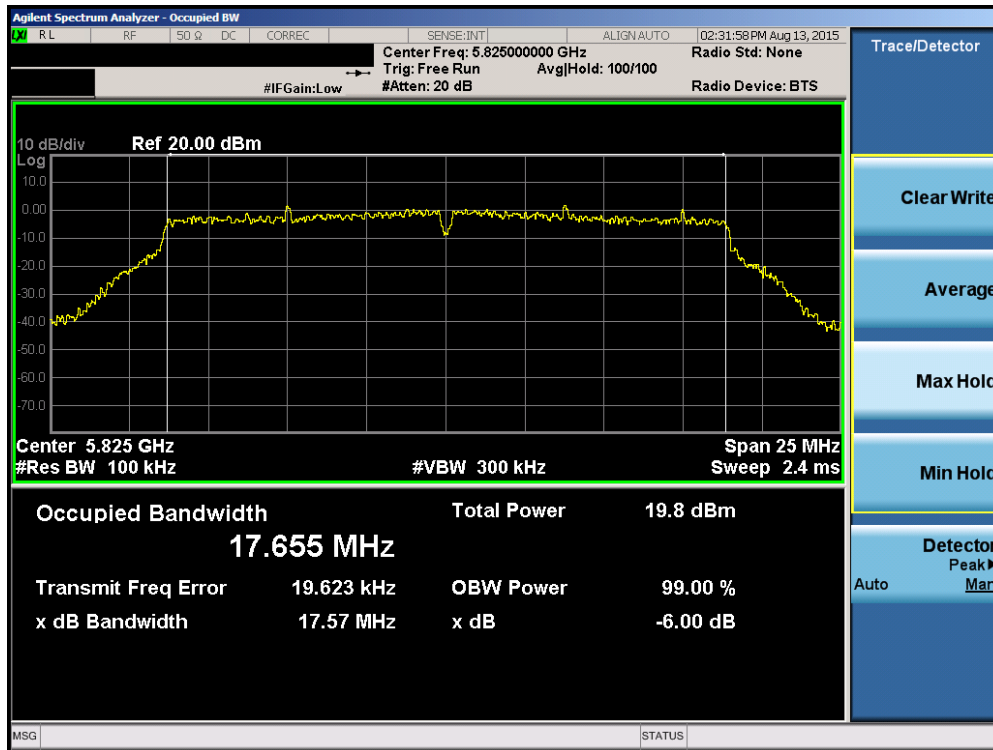


Plot 6-33. 6dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 149)

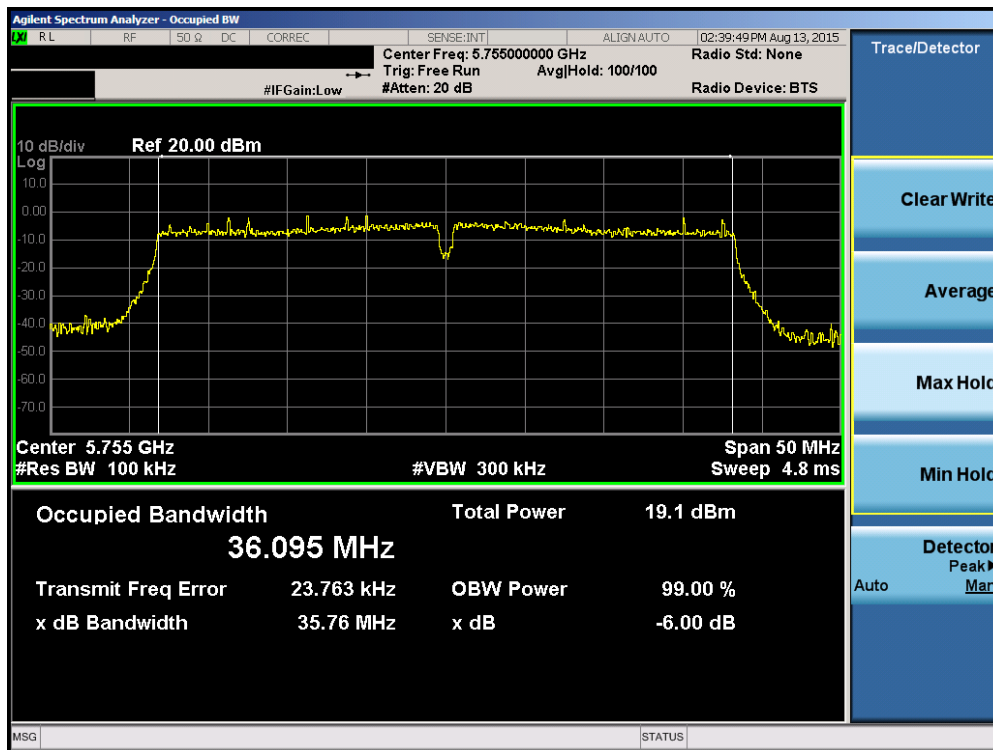


Plot 6-34. 6dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 157)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 31 of 125

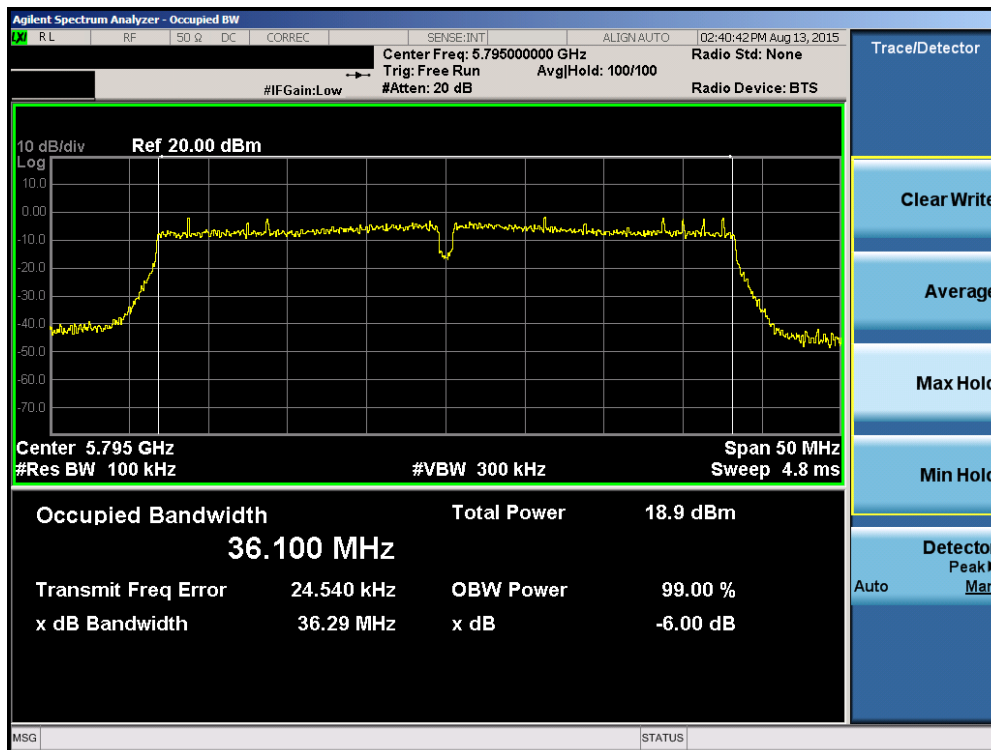


Plot 6-35. 6dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 165)

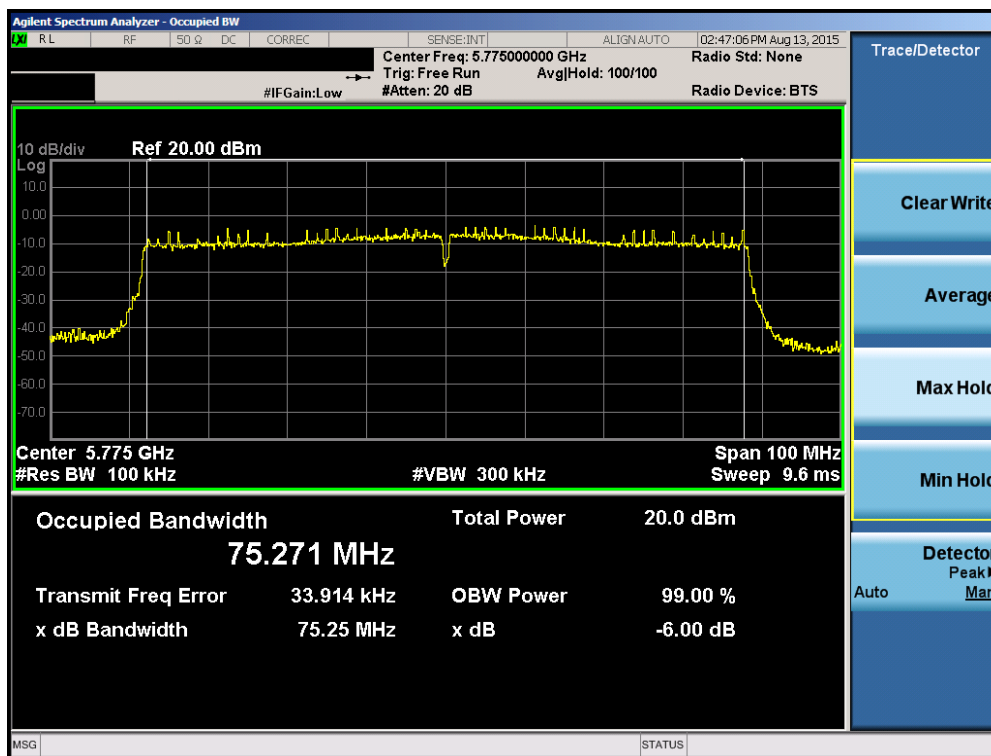


Plot 6-36. 6dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 151)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 32 of 125



Plot 6-37. 6dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 159)



Plot 6-38. 6dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 3) – Ch. 155)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 33 of 125

6.4 UNII Output Power Measurement – 802.11a/n/ac §15.407 (a.1)

Test Overview and Limits

A transmitter antenna terminal of the EUT is connected to the input of an RF pulse power sensor. Measurement is made using a broadband average power meter while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02 v01, and at the appropriate frequencies.

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

In the 5.25 – 5.35GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and $11\text{ dBm} + 10\log_{10}(26\text{dB BW}) = 11\text{ dBm} + 10\log_{10}(20.92) = 24.21\text{dBm}$.

In the 5.47 – 5.725GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and $11\text{ dBm} + 10\log_{10}(26\text{dB BW}) = 11\text{ dBm} + 10\log_{10}(20.89) = 24.20\text{dBm}$.

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

Test Procedure Used

KDB 789033 D02 v01 – Section E)3)b) Method PM-G

Test Settings

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

Test Setup

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

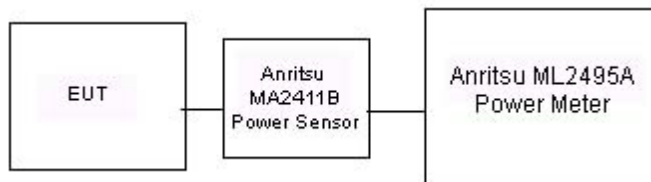


Figure 6-3. Test Instrument & Measurement Setup

Test Notes

None

FCC ID: ZNFVS990		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 34 of 125

Freq [MHz]	Channel	Detector	5GHz (20MHz) Conducted Power [dBm]		
			IEEE Transmission Mode		
			802.11a	802.11n	802.11ac
5180	36	AVG	13.05	11.91	11.88
5200	40	AVG	14.10	13.68	13.78
5220	44	AVG	14.32	13.93	13.80
5240	48	AVG	14.07	13.77	13.84
5260	52	AVG	14.36	13.95	14.04
5280	56	AVG	14.26	13.98	14.03
5300	60	AVG	14.40	13.89	14.09
5320	64	AVG	13.49	12.21	12.15
5500	100	AVG	12.38	11.10	10.86
5520	104	AVG	13.96	13.51	13.63
5540	108	AVG	13.34	13.41	13.47
5560	112	AVG	13.97	13.63	13.69
5580	116	AVG	14.11	13.53	13.62
5660	132	AVG	14.14	13.74	13.66
5700	140	AVG	13.97	13.61	13.71
5720	144	AVG	14.02	13.78	13.62
5745	149	AVG	13.57	13.33	13.36
5785	157	AVG	13.58	13.23	13.25
5825	165	AVG	13.63	12.38	12.34

Table 6-4. 20MHz BW (UNII) Maximum Conducted Output Power

Freq [MHz]	Channel	Detector	5GHz (40MHz) Conducted Power [dBm]	
			IEEE Transmission Mode	
			802.11n	802.11ac
5190	38	AVG	10.45	9.94
5230	46	AVG	11.48	10.68
5270	54	AVG	11.70	10.86
5310	62	AVG	10.92	10.11
5510	102	AVG	9.60	9.52
5550	110	AVG	11.45	11.37
5670	134	AVG	11.50	11.64
5710	142	AVG	11.52	11.59
5755	151	AVG	11.24	11.34
5795	159	AVG	11.12	11.56

Table 6-5. 40MHz BW (UNII) Maximum Conducted Output Power

5GHz (80MHz) Conducted Power [dBm]			
Freq [MHz]	Channel	Detector	IEEE Transmission Mode
			802.11ac
5210	42	AVG	10.28
5290	58	AVG	9.46
5530	106	AVG	9.41
5690	138	AVG	10.26
5775	155	AVG	9.96

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

6.5 Maximum Power Spectral Density – 802.11a/n/ac §15.407(a.1)(2.5)

Test Overview and Limit

The spectrum analyzer was connected to the antenna terminal while the EUT was operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02 v01, and at the appropriate frequencies. Method SA-1, as defined in KDB 789033 D02 v01, was used to measure the power spectral density.

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

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

Test Procedure Used

KDB 789033 D02 v01 – Section F

Test Settings

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

Test Setup

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

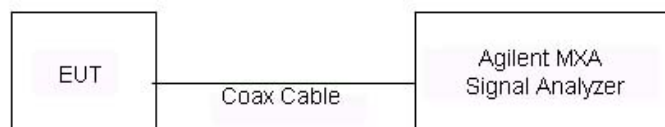


Figure 6-4. Test Instrument & Measurement Setup

Test Notes

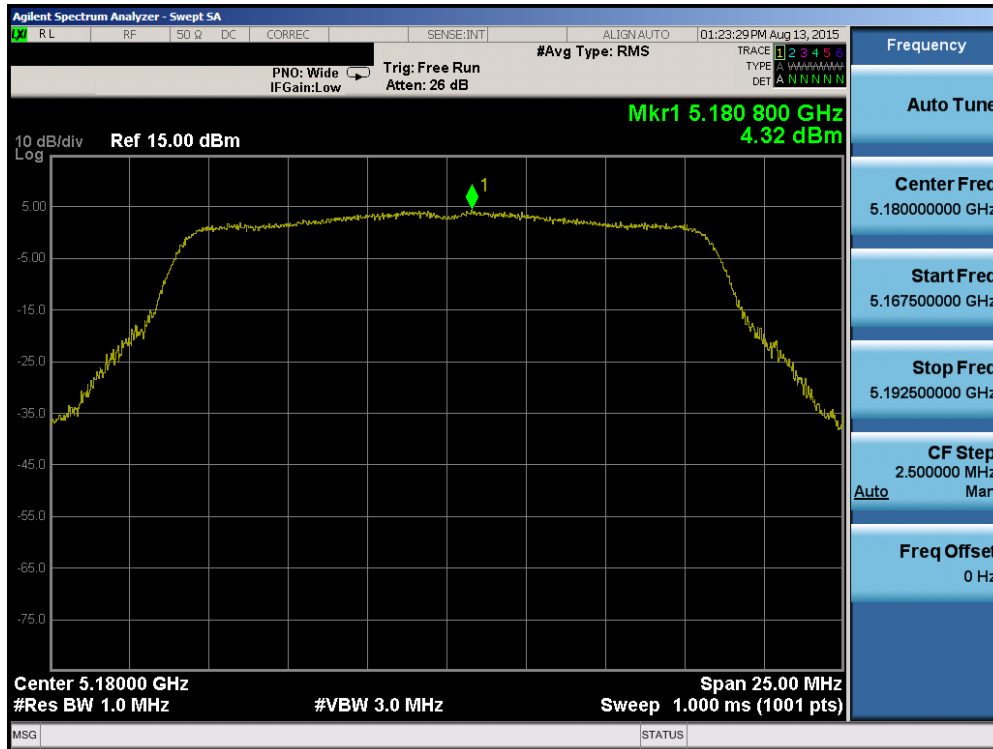
None

FCC ID: ZNFVS990		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset	Page 36 of 125	

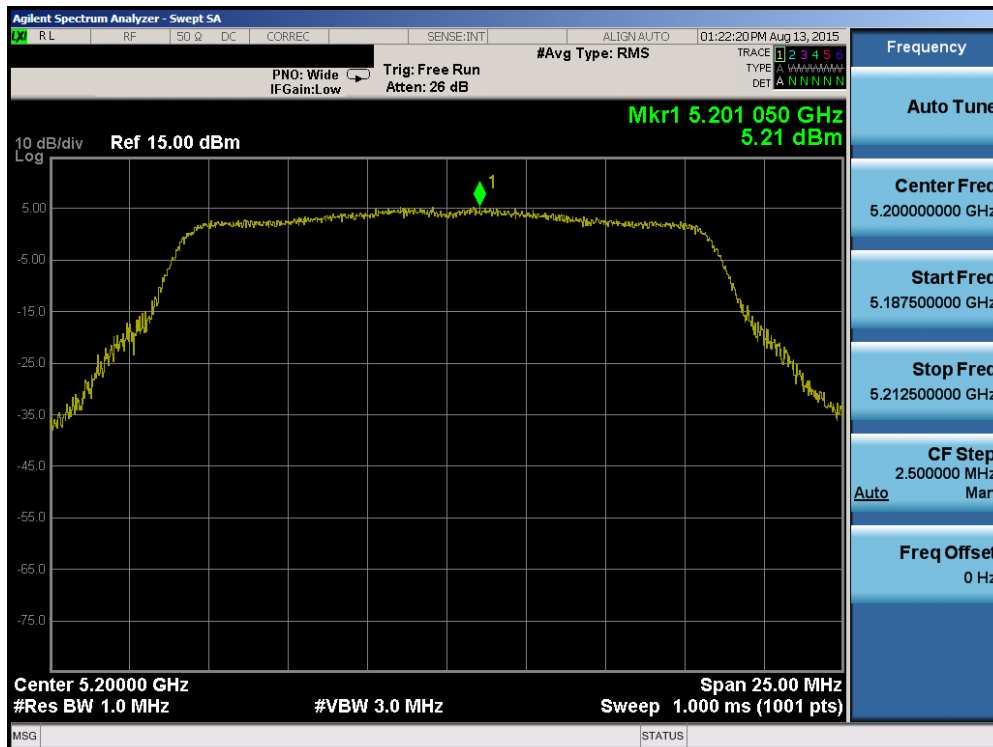
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm]	Max Permissible Power Density [dBm/MHz]	Margin [dB]	Pass / Fail
Band 1	5180	36	a	6	4.32	11.0	-6.68	Pass
	5200	40	a	6	5.21	11.0	-5.80	Pass
	5240	48	a	6	5.54	11.0	-5.46	Pass
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	2.66	11.0	-8.34	Pass
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	4.74	11.0	-6.26	Pass
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	5.08	11.0	-5.92	Pass
	5190	38	n (40MHz)	13.5/15 (MCS0)	-1.73	11.0	-12.73	Pass
	5230	46	n (40MHz)	13.5/15 (MCS0)	-0.34	11.0	-11.34	Pass
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	-4.11	11.0	-15.11	Pass
Band 2A	5260	52	a	6	5.11	11.0	-5.89	Pass
	5280	56	a	6	5.20	11.0	-5.80	Pass
	5320	64	a	6	3.79	11.0	-7.21	Pass
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	5.05	11.0	-5.95	Pass
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	4.71	11.0	-6.29	Pass
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	2.32	11.0	-8.68	Pass
	5270	54	n (40MHz)	13.5/15 (MCS0)	-0.23	11.0	-11.23	Pass
	5310	62	n (40MHz)	13.5/15 (MCS0)	-1.87	11.0	-12.87	Pass
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	-4.25	11.0	-15.25	Pass
Band 2C	5500	100	a	6	3.31	11.0	-7.69	Pass
	5580	116	a	6	4.85	11.0	-6.15	Pass
	5720	144	a	6	5.34	11.0	-5.66	Pass
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	1.93	11.0	-9.07	Pass
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	4.50	11.0	-6.50	Pass
	5720	144	n (20MHz)	6.5/7.2 (MCS0)	5.05	11.0	-5.95	Pass
	5510	102	n (40MHz)	13.5/15 (MCS0)	-1.92	11.0	-12.92	Pass
	5550	110	n (40MHz)	13.5/15 (MCS0)	-0.37	11.0	-11.37	Pass
	5710	142	n (40MHz)	13.5/15 (MCS0)	-0.63	11.0	-11.63	Pass
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	-4.92	11.0	-15.92	Pass
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	-3.16	11.0	-14.16	Pass

Table 6-7. Bands 1, 2A, 2C Conducted Power Spectral Density Measurements

FCC ID: ZNFVS990		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset	Page 37 of 125	

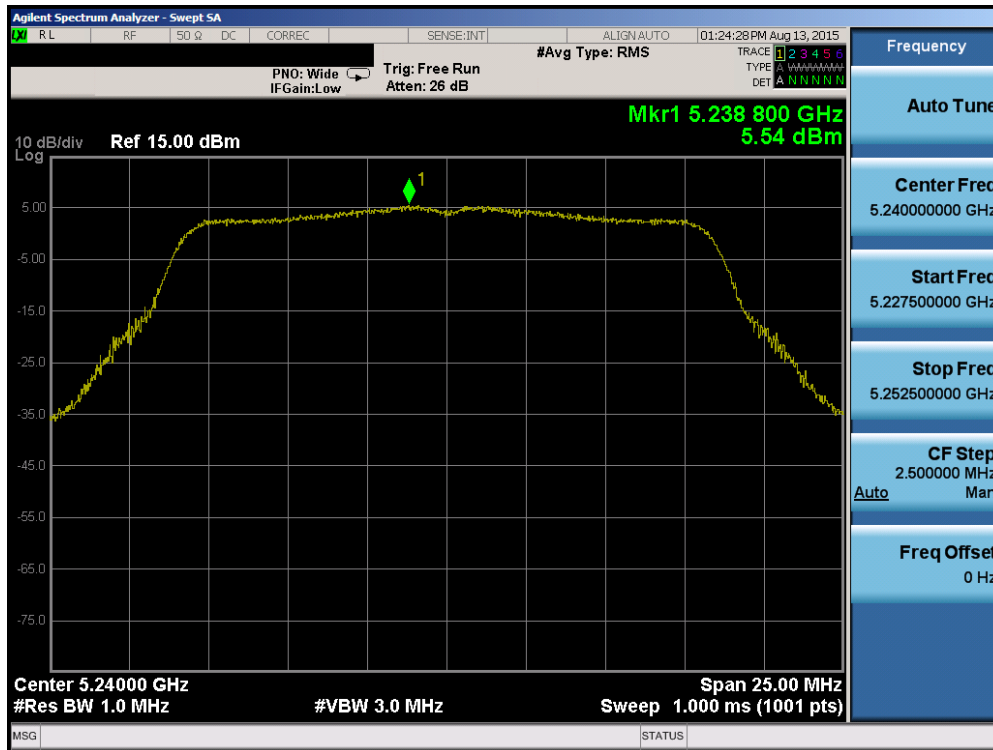


Plot 6-39. Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 36)

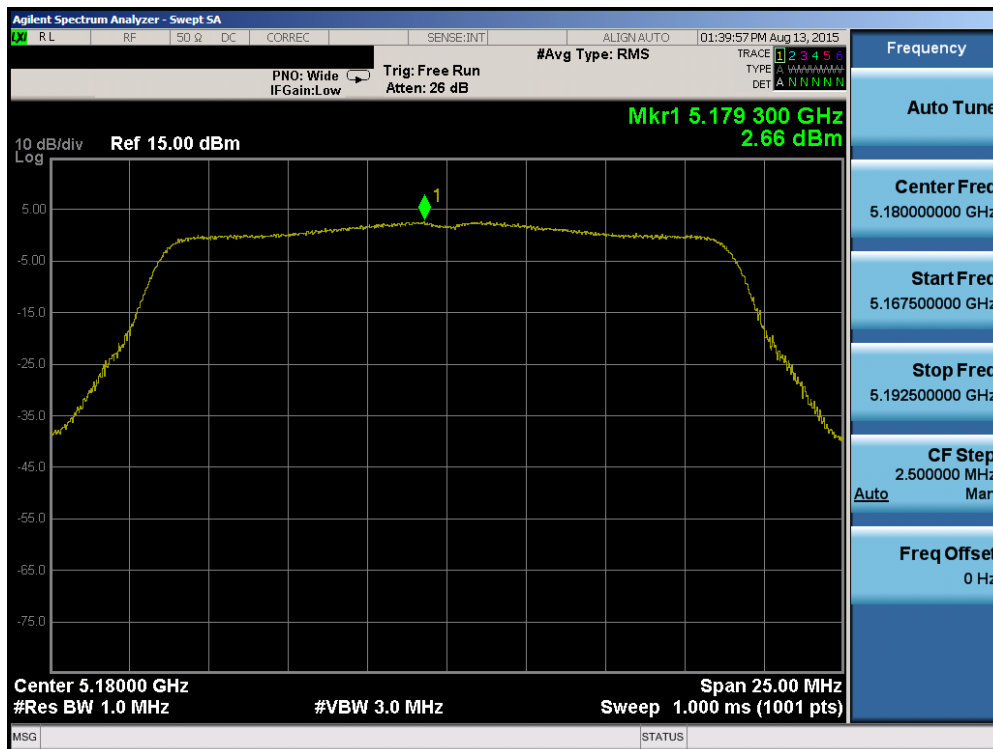


Plot 6-40. Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 40)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 38 of 125

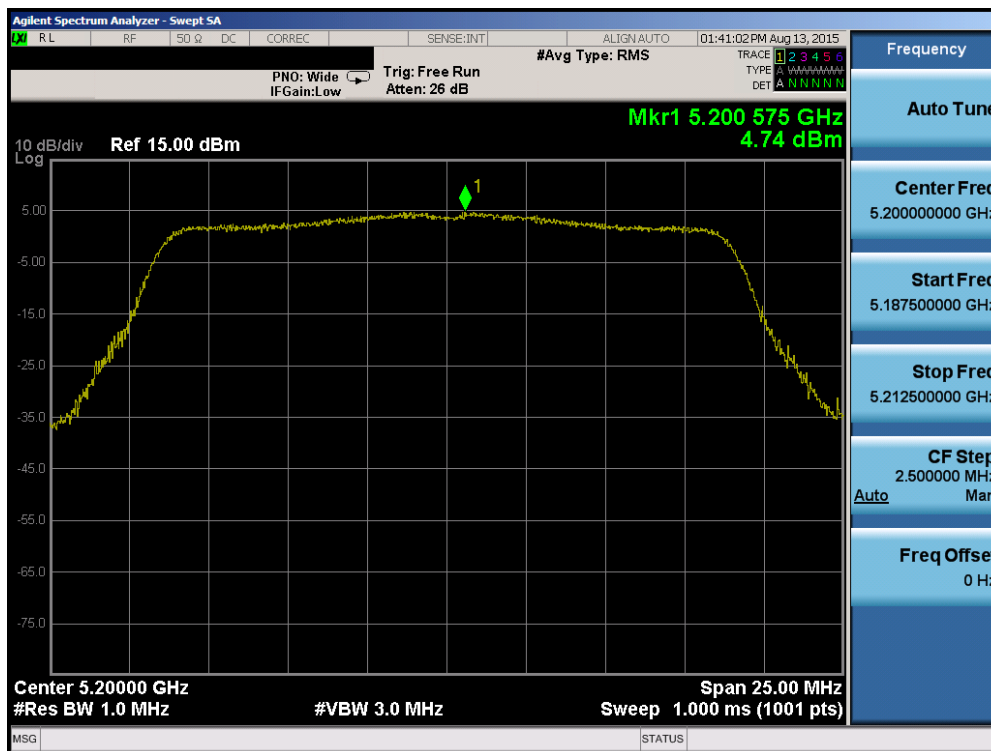


Plot 6-41. Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 48)

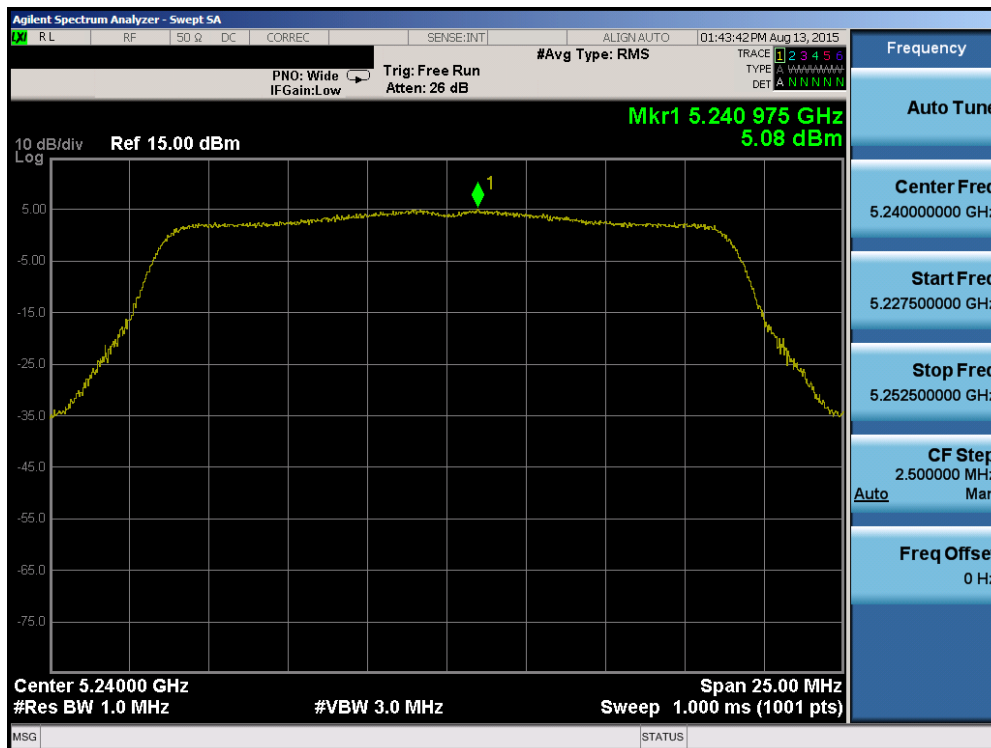


Plot 6-42. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 39 of 125

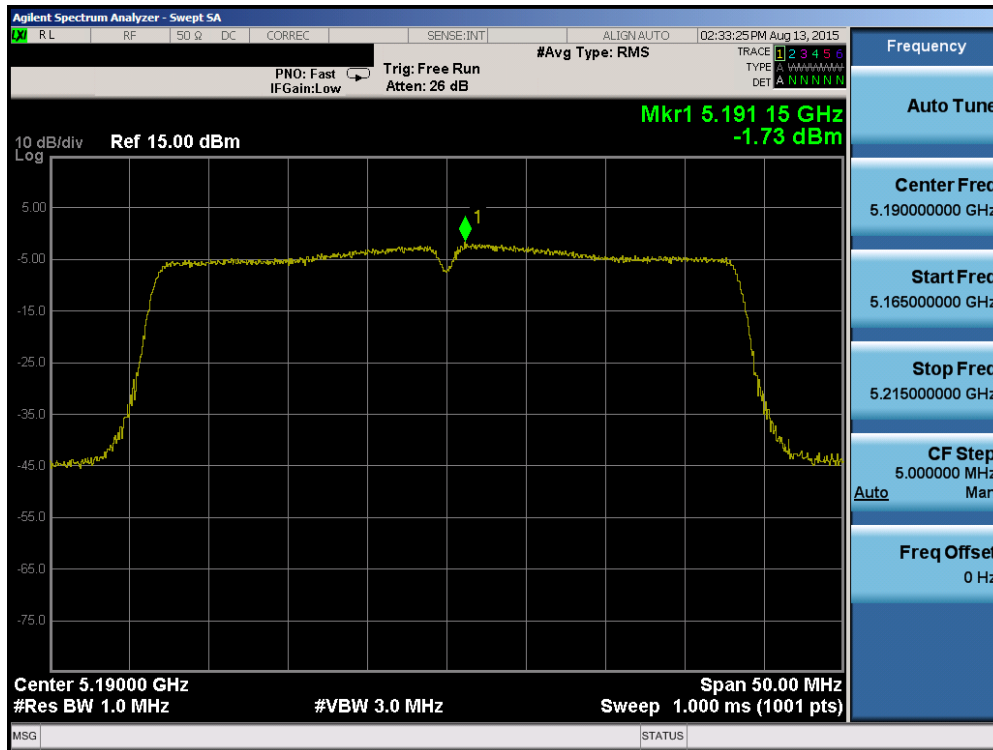


Plot 6-43. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 40)

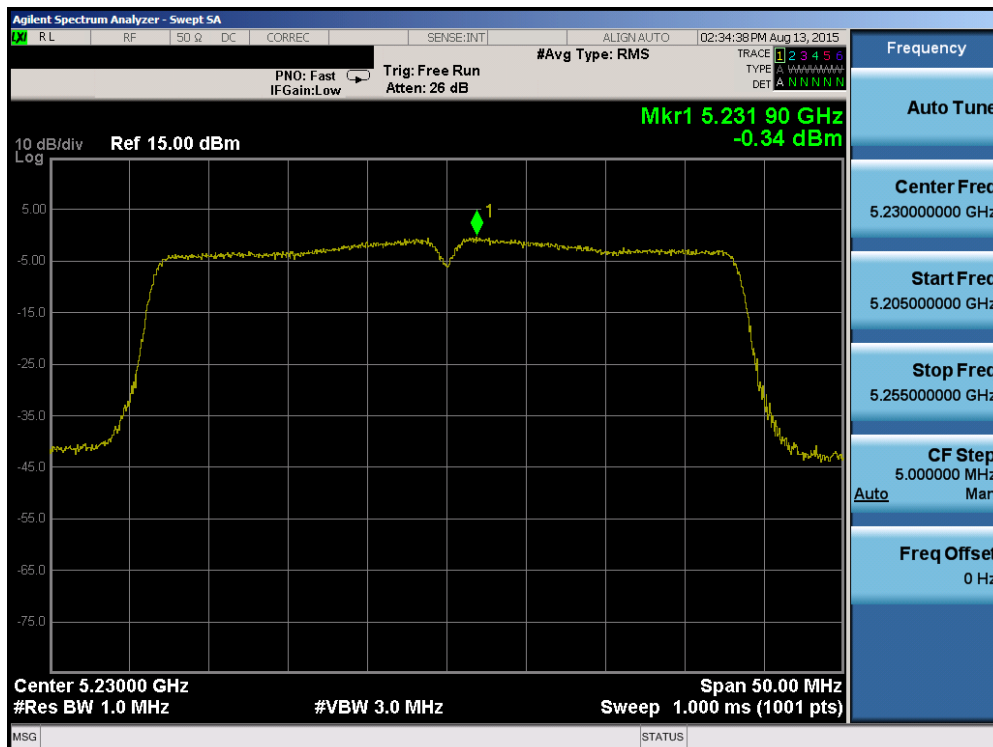


Plot 6-44. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 40 of 125

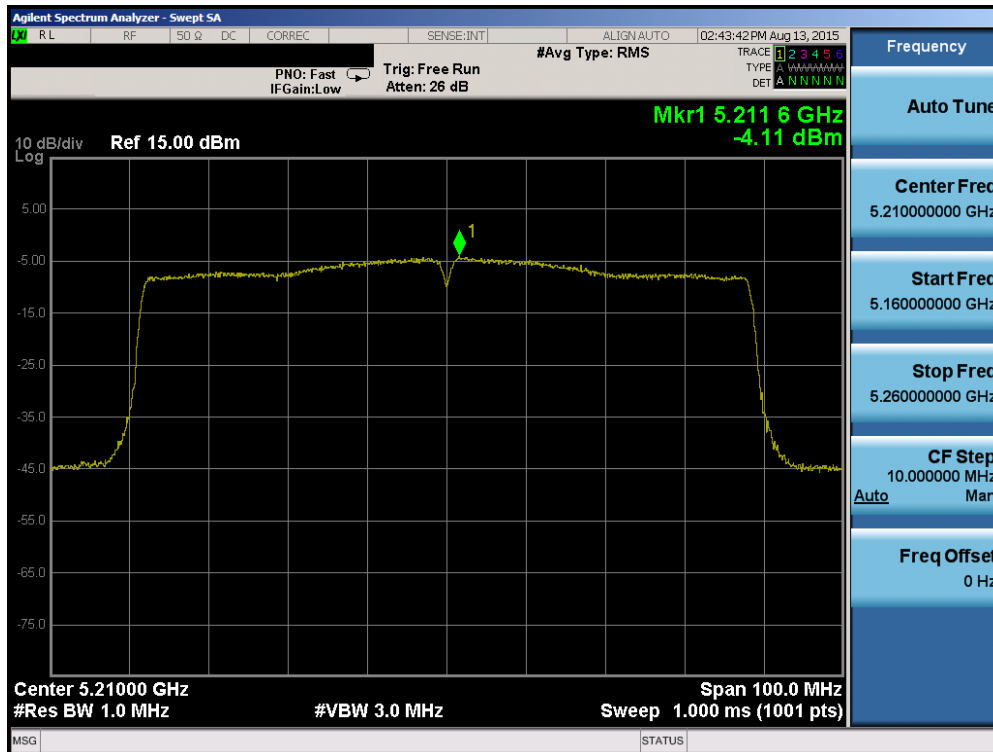


Plot 6-45. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 38)

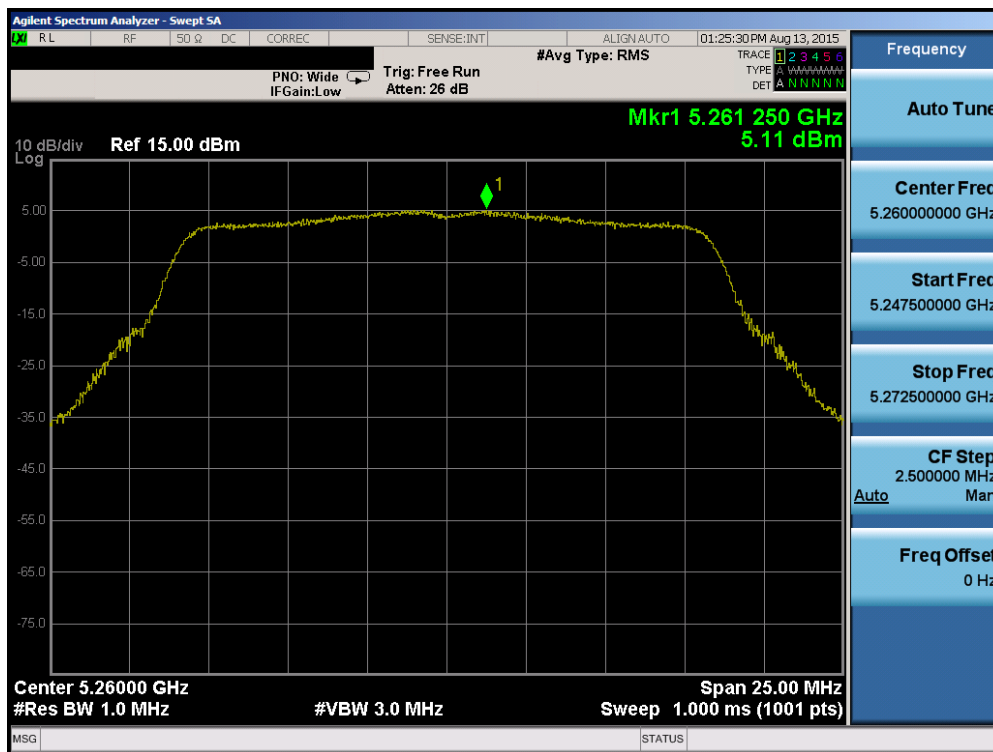


Plot 6-46. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 41 of 125

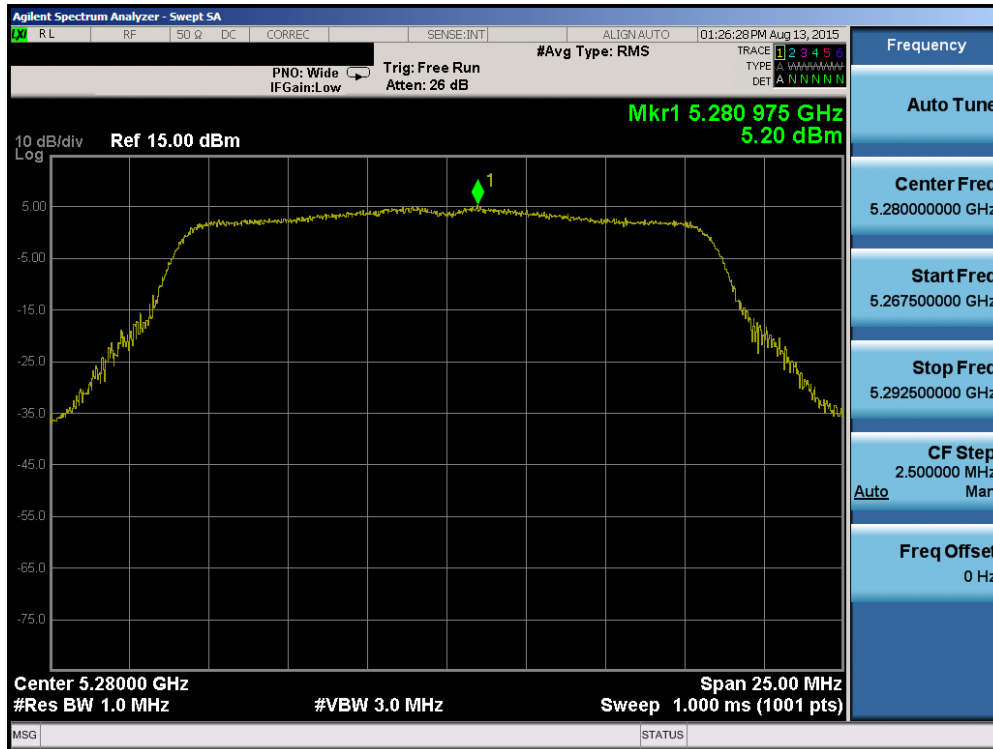


Plot 6-47. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)

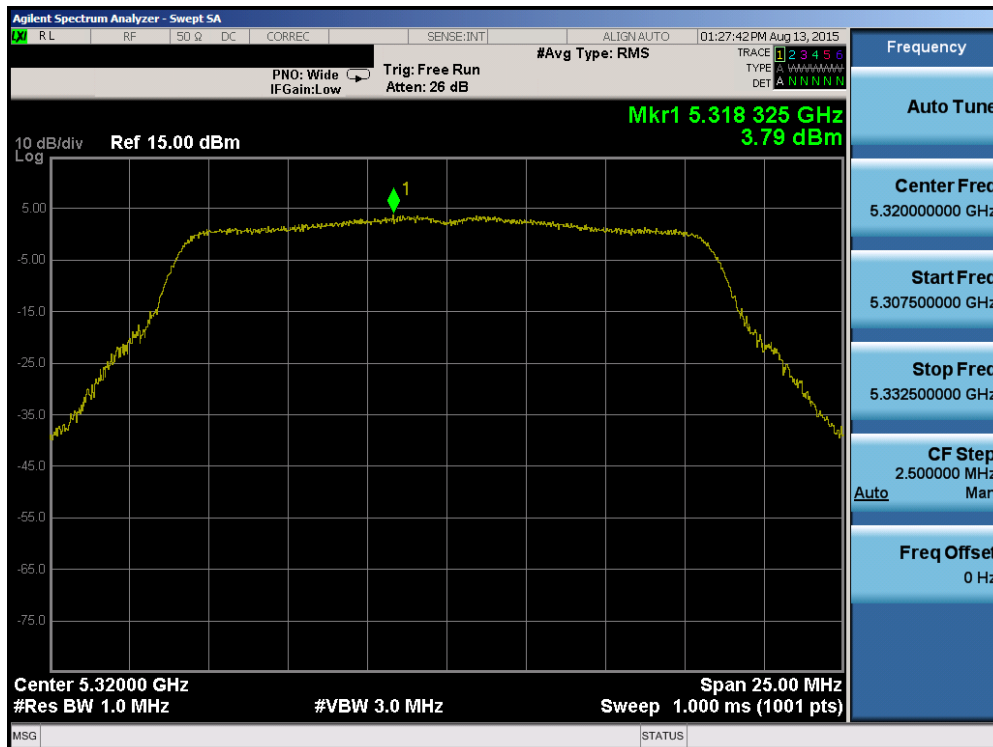


Plot 6-48. Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 52)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 42 of 125

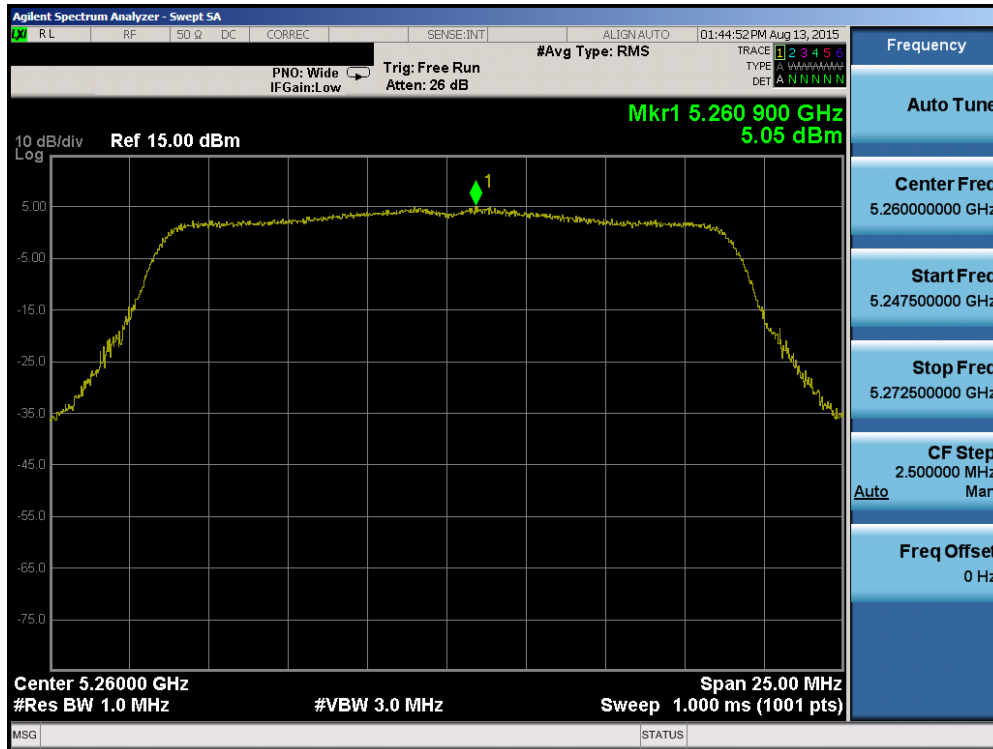


Plot 6-49. Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 56)

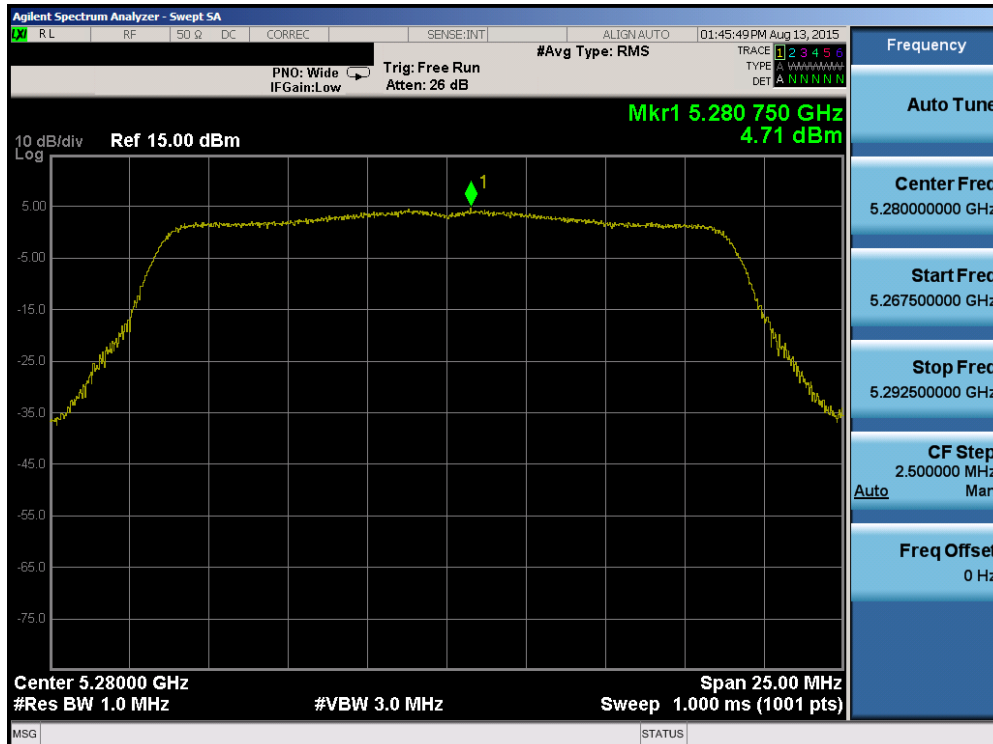


Plot 6-50. Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 64)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 43 of 125

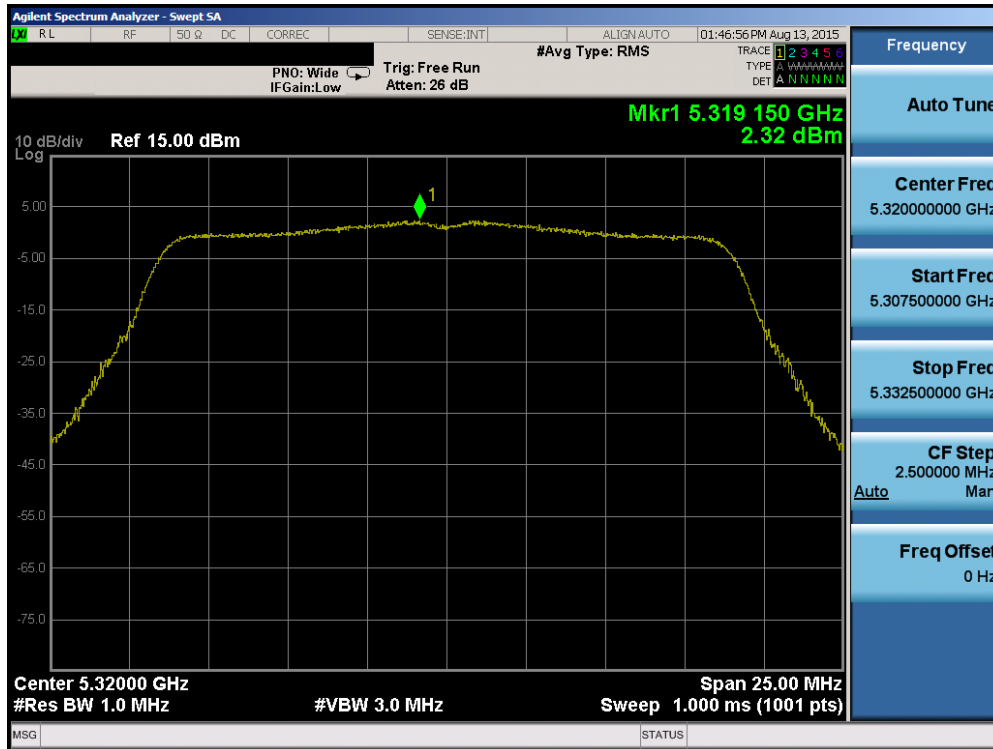


Plot 6-51. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)

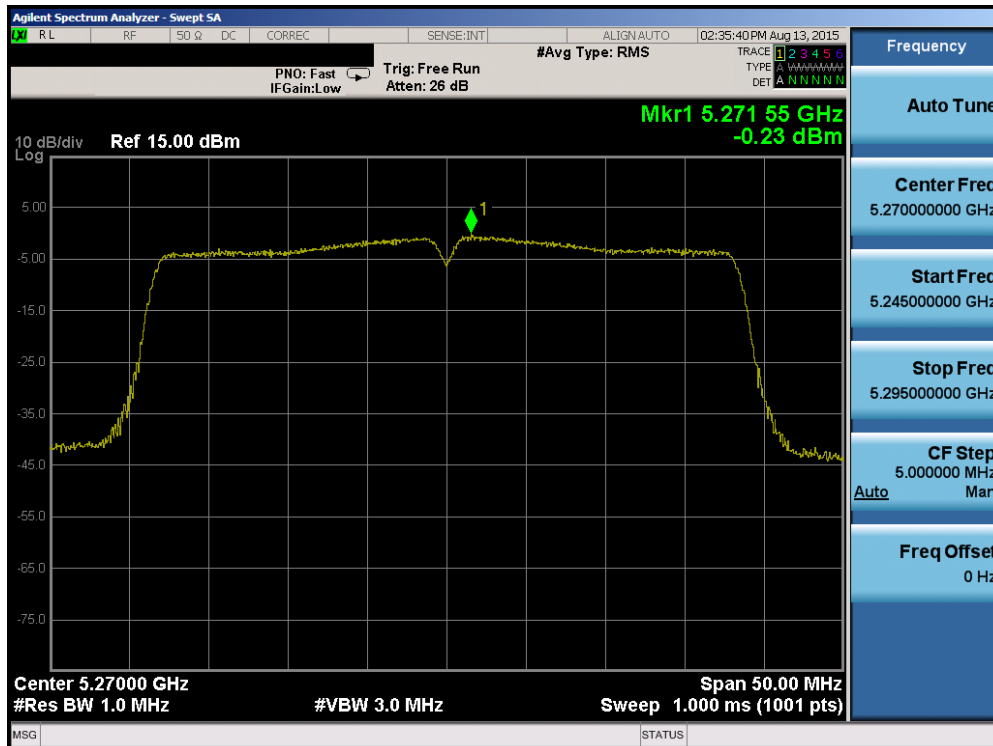


Plot 6-52. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 44 of 125

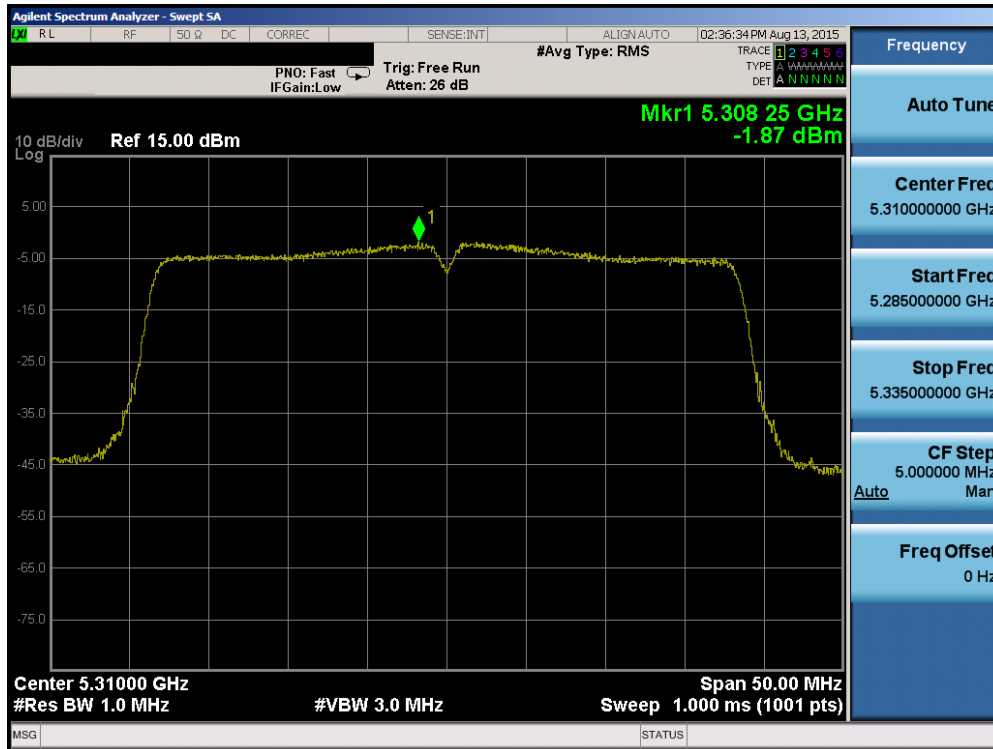


Plot 6-53. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)

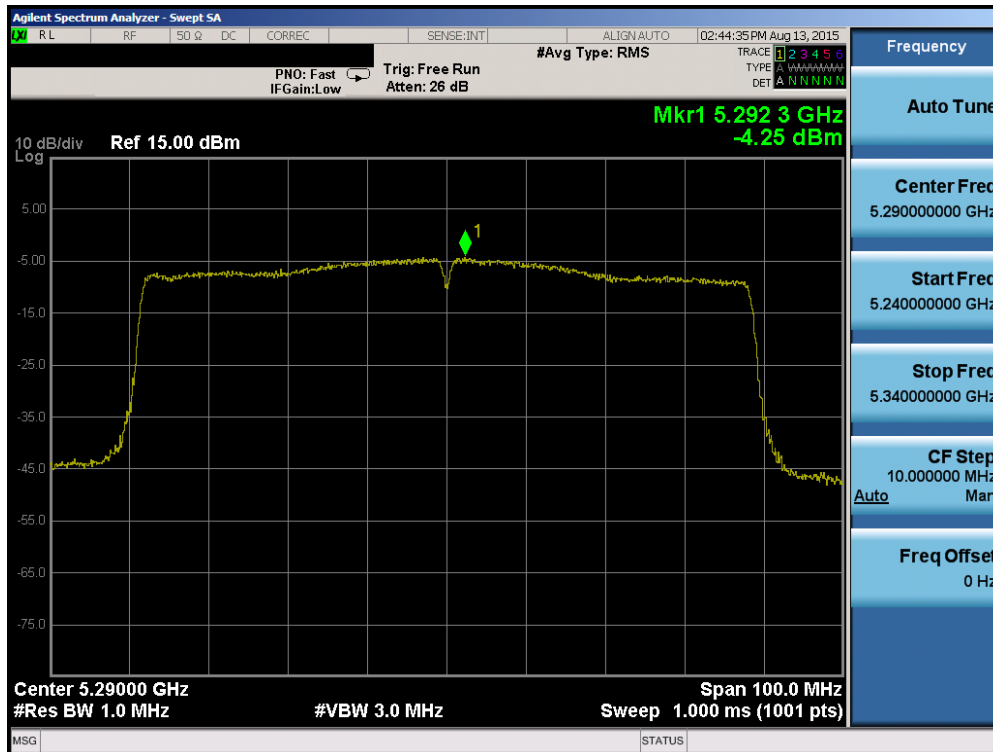


Plot 6-54. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 45 of 125

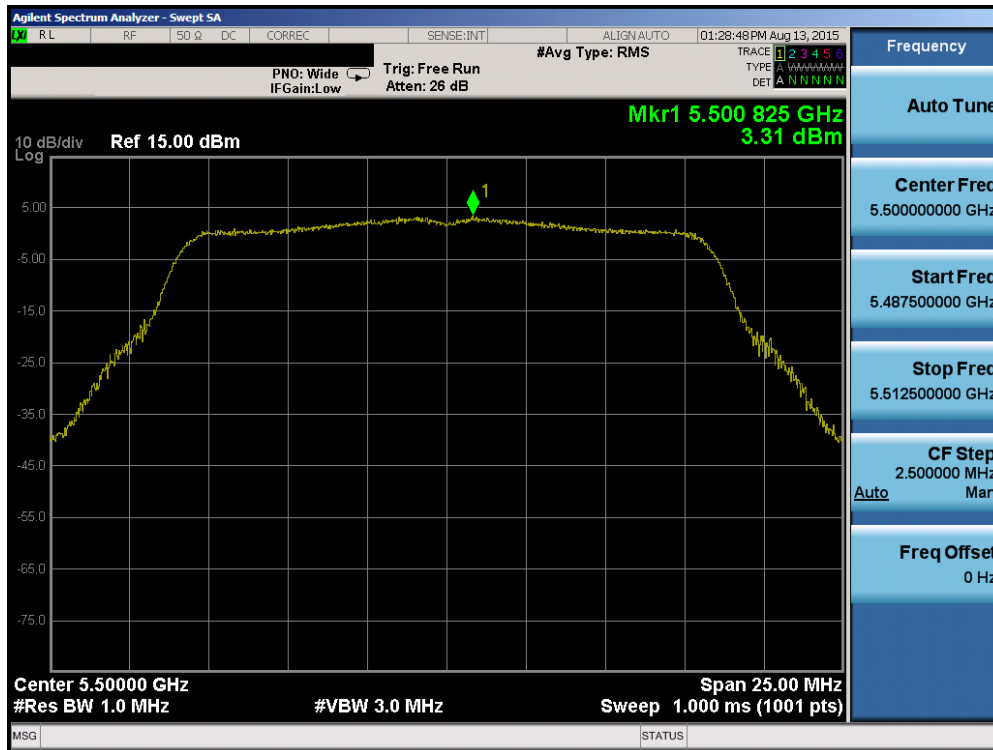


Plot 6-55. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 62)

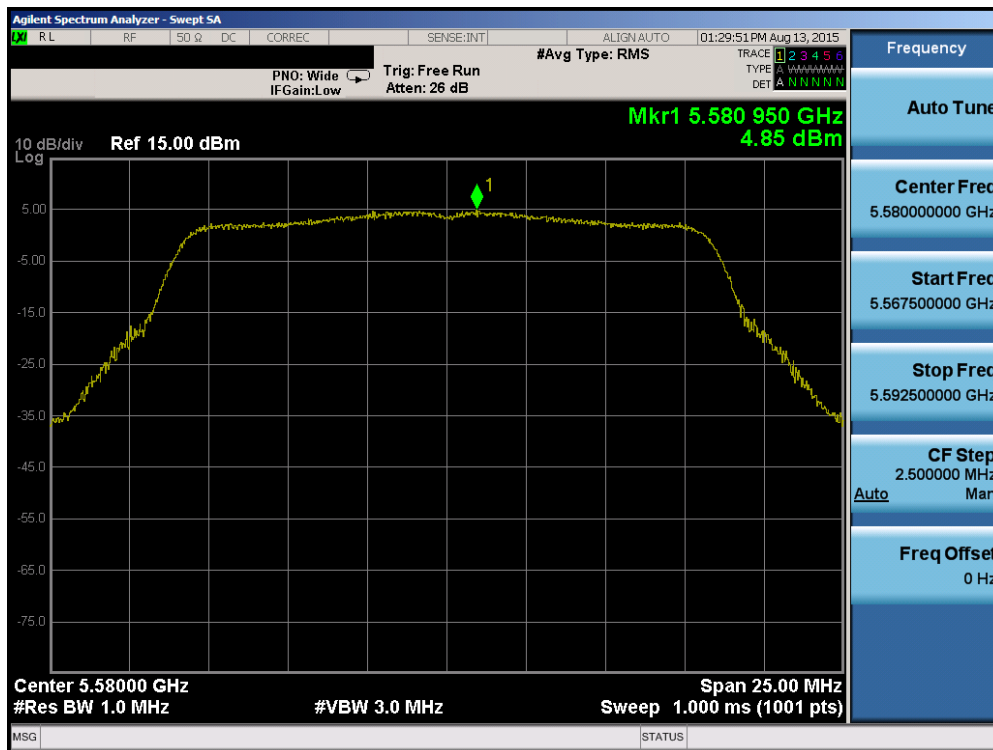


Plot 6-56. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2A) – Ch. 58)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 46 of 125

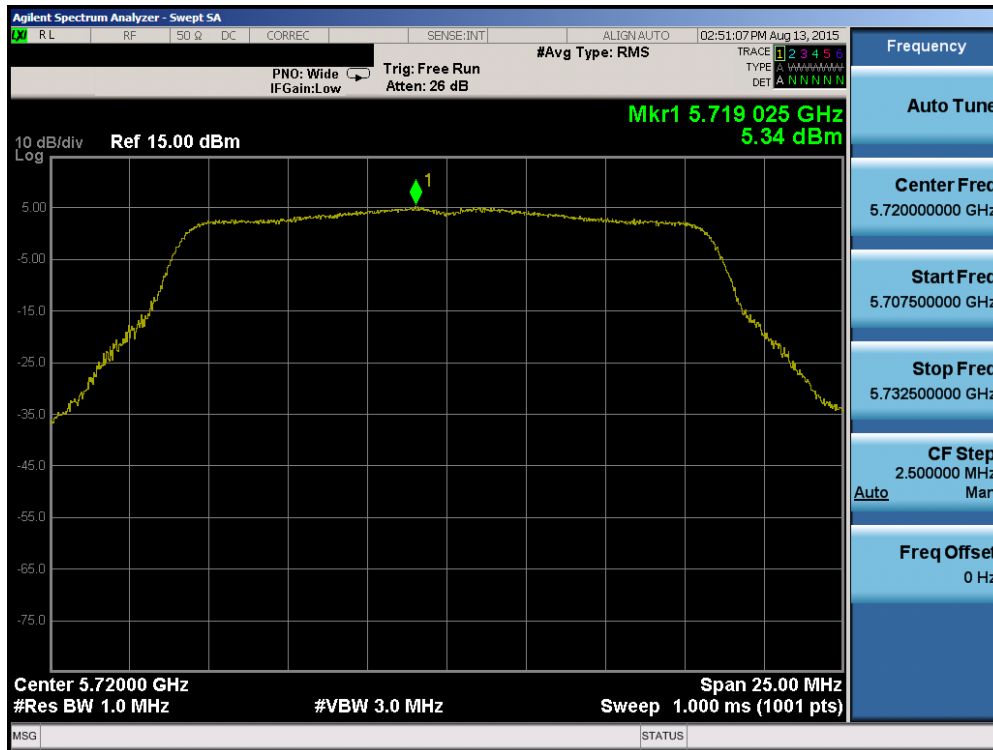


Plot 6-57. Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 100)

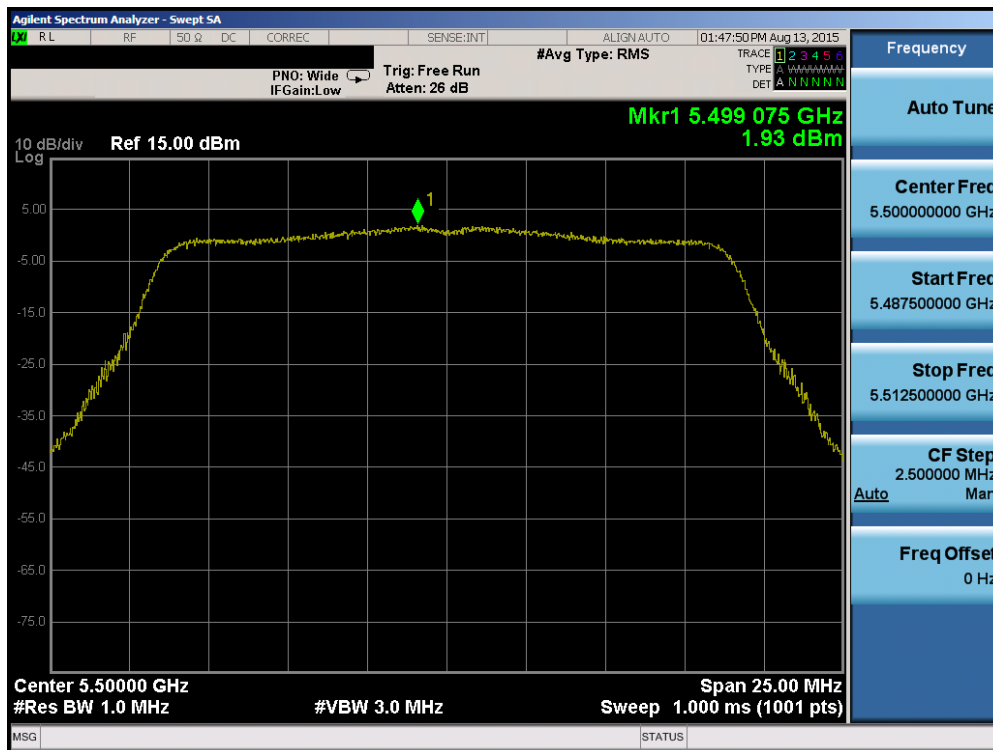


Plot 6-58. Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 116)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 47 of 125

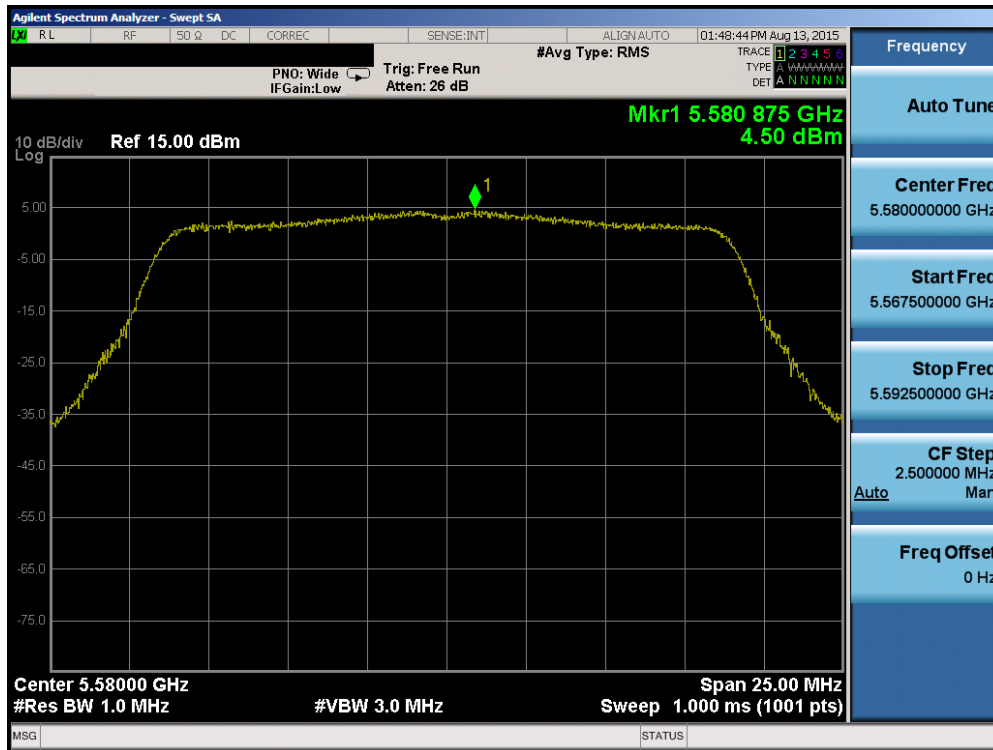


Plot 6-59. Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 144)

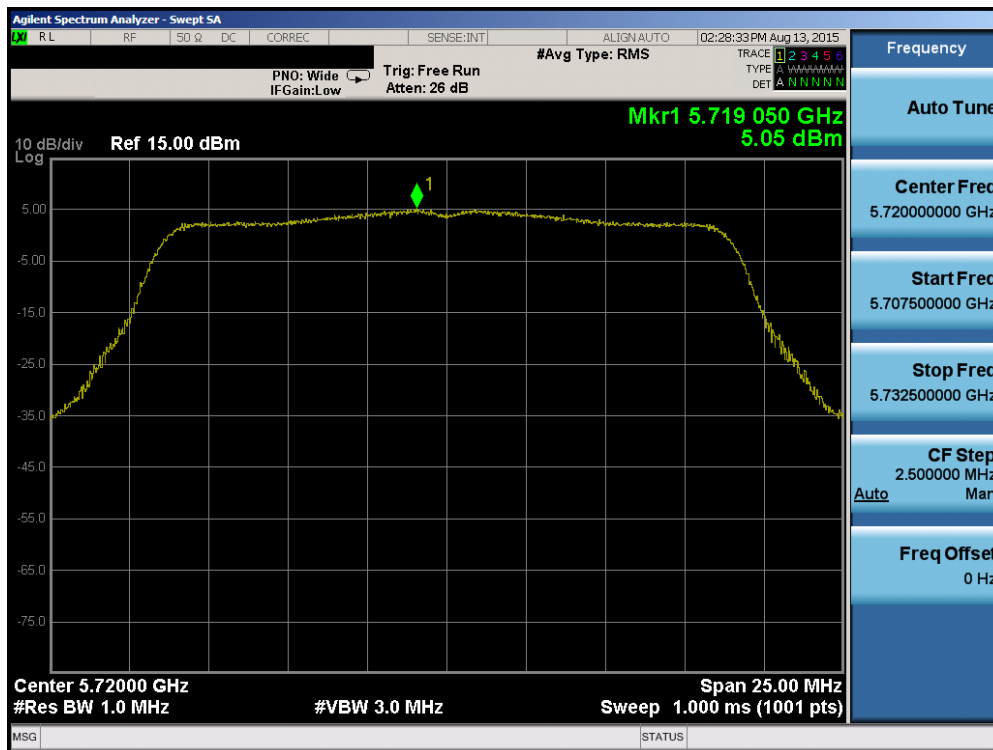


Plot 6-60. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 100)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 48 of 125

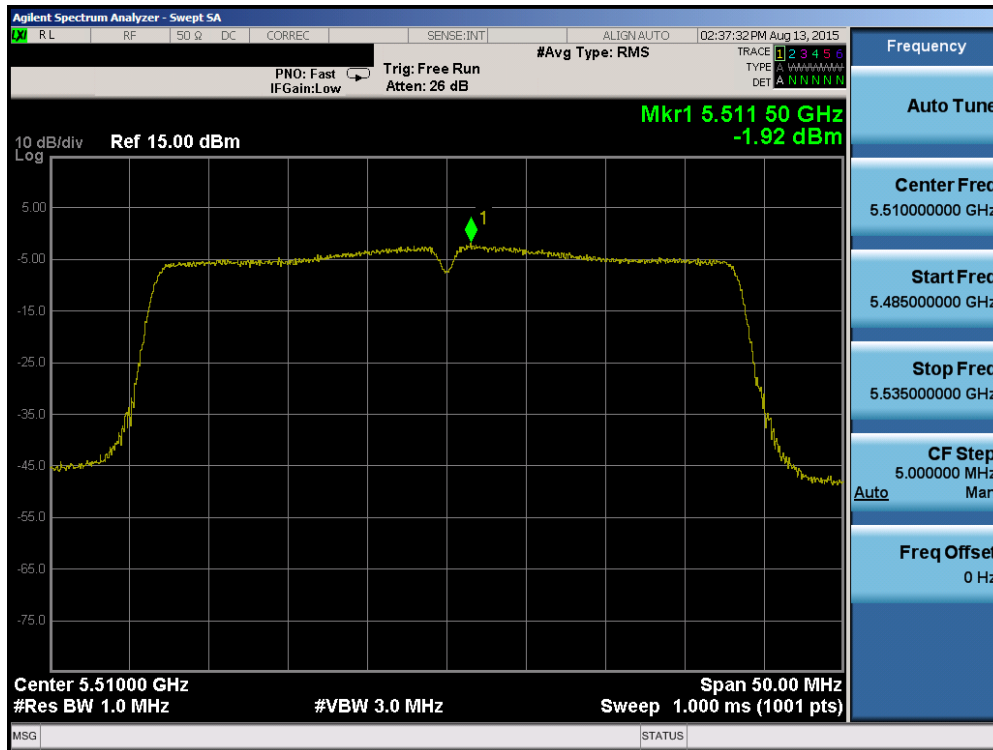


Plot 6-61. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 116)

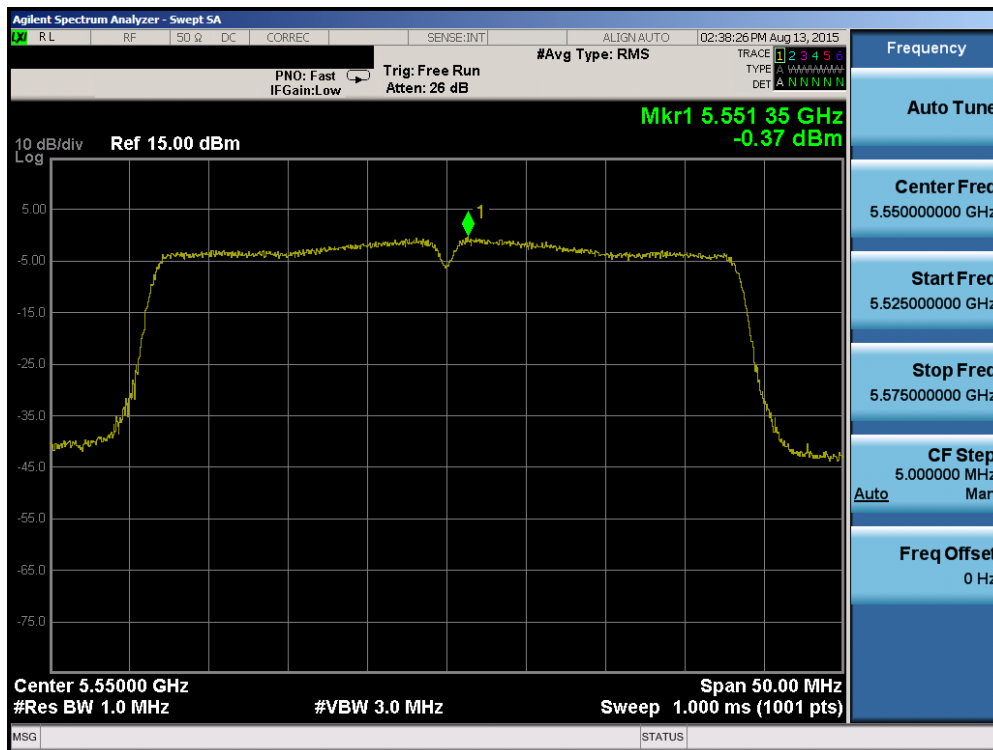


Plot 6-62. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 144)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 49 of 125

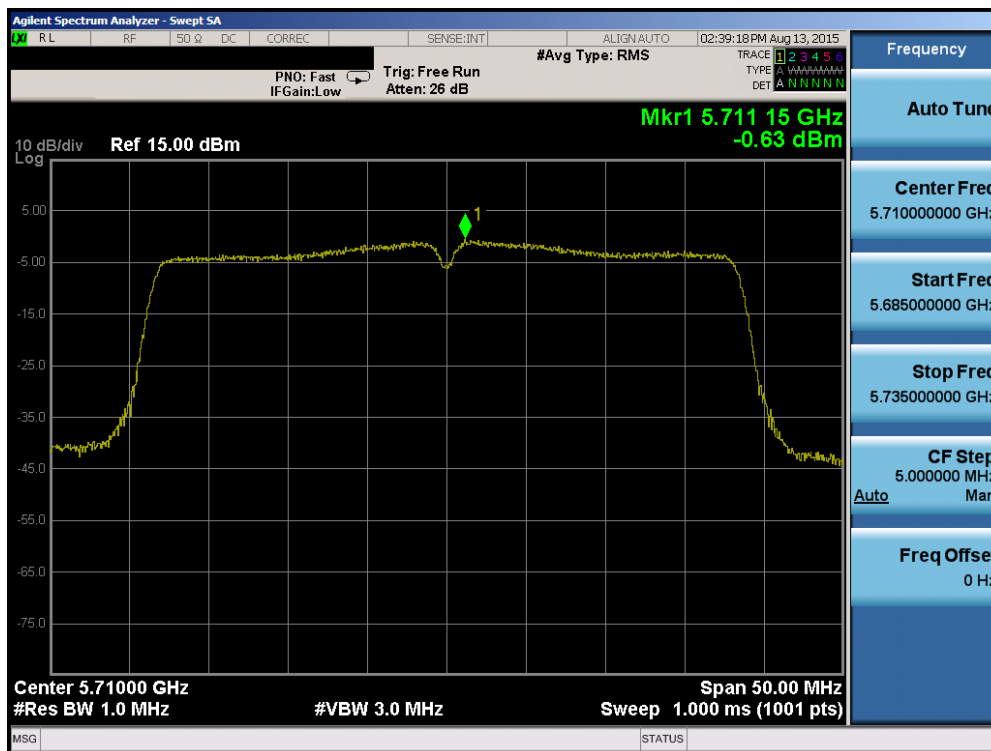


Plot 6-63. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)

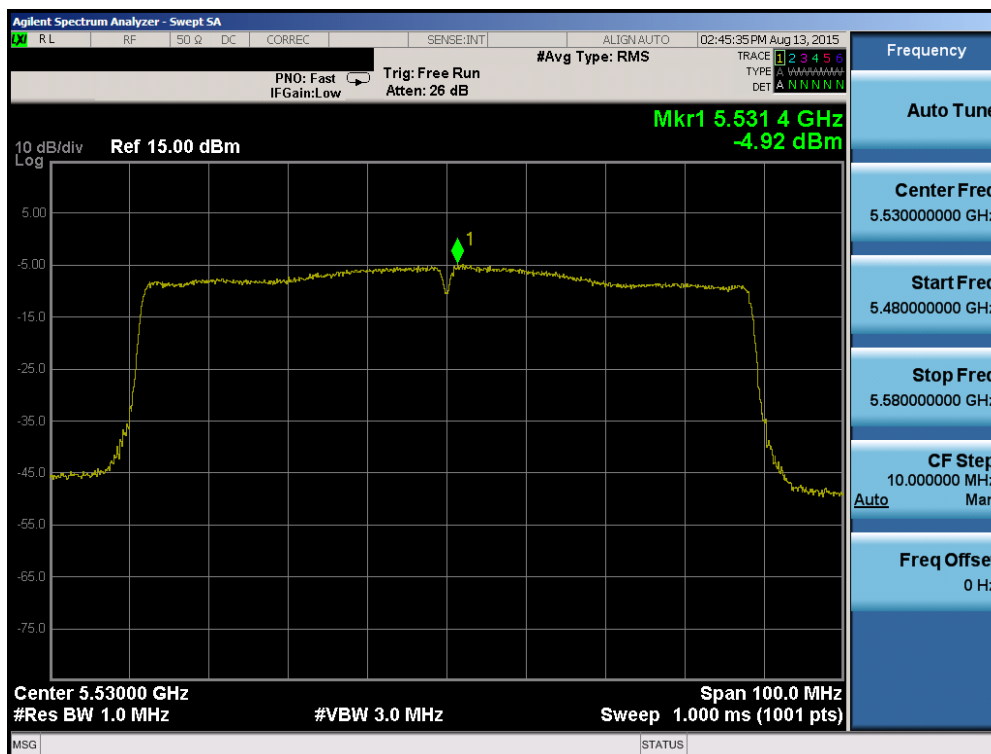


Plot 6-64. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 110)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 50 of 125

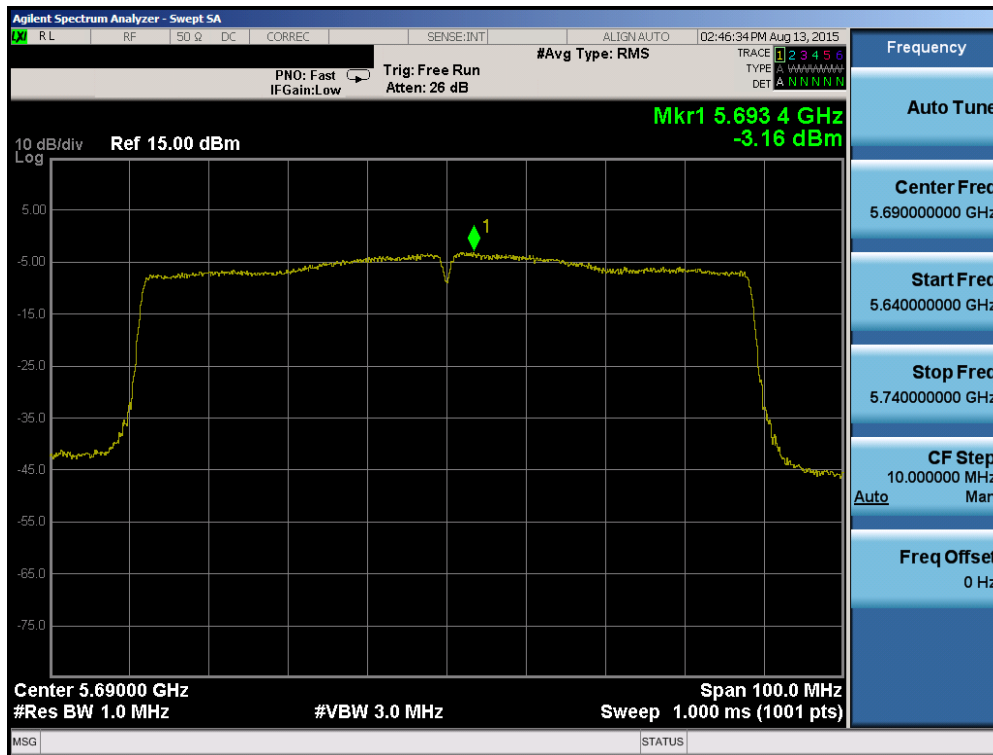


Plot 6-65. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 142)



Plot 6-66. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2C) – Ch. 106)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 51 of 125

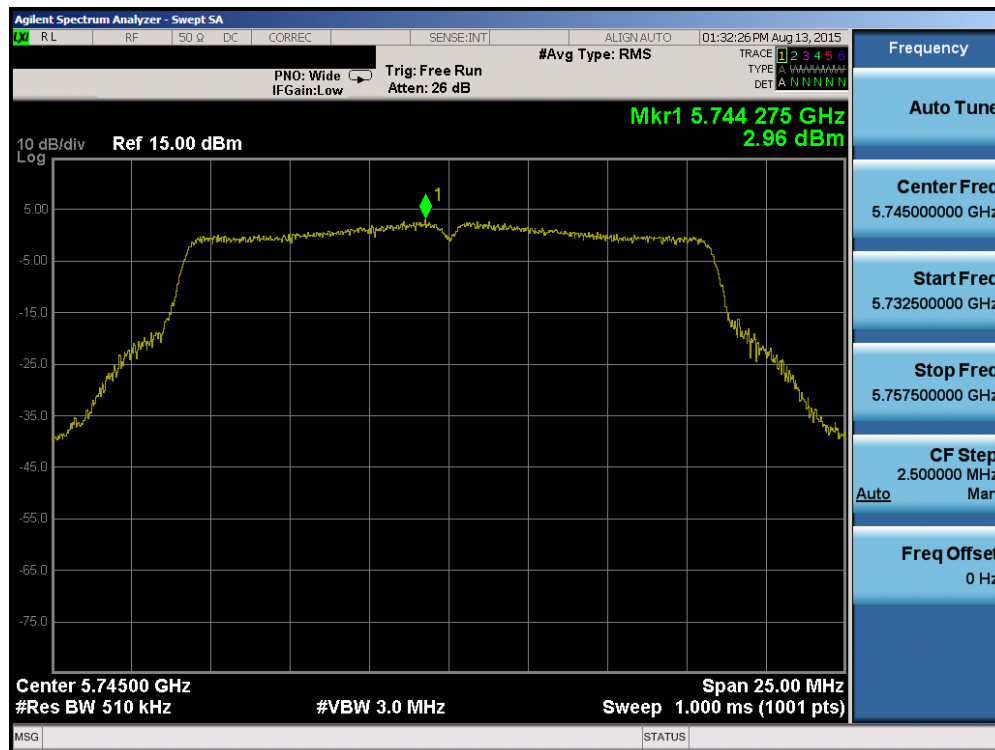


Plot 6-67. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 2C) – Ch. 138)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 52 of 125

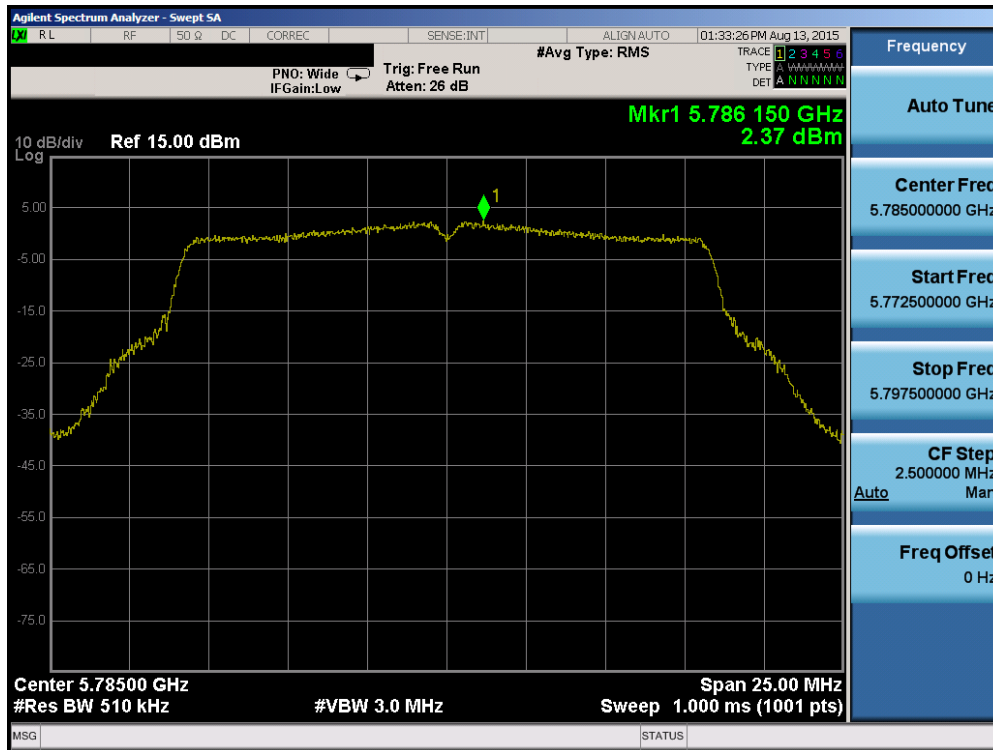
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm]	Max Permissible Power Density [dBm/500kHz]	Margin [dB]	Pass / Fail
Band 3	5745	149	a	6	2.96	30.0	-27.04	Pass
	5785	157	a	6	2.37	30.0	-27.63	Pass
	5825	165	a	6	2.02	30.0	-27.98	Pass
	5745	149	n (20MHz)	6.5/7.2 (MCS0)	2.70	30.0	-27.30	Pass
	5785	157	n (20MHz)	6.5/7.2 (MCS0)	1.96	30.0	-28.04	Pass
	5825	165	n (20MHz)	6.5/7.2 (MCS0)	1.20	30.0	-28.80	Pass
	5755	151	n (40MHz)	13.5/15 (MCS0)	-3.07	30.0	-33.07	Pass
	5795	159	n (40MHz)	13.5/15 (MCS0)	-3.11	30.0	-33.11	Pass
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	-5.88	30.0	-35.88	Pass

Table 6-8. Band 3 Conducted Power Spectral Density Measurements

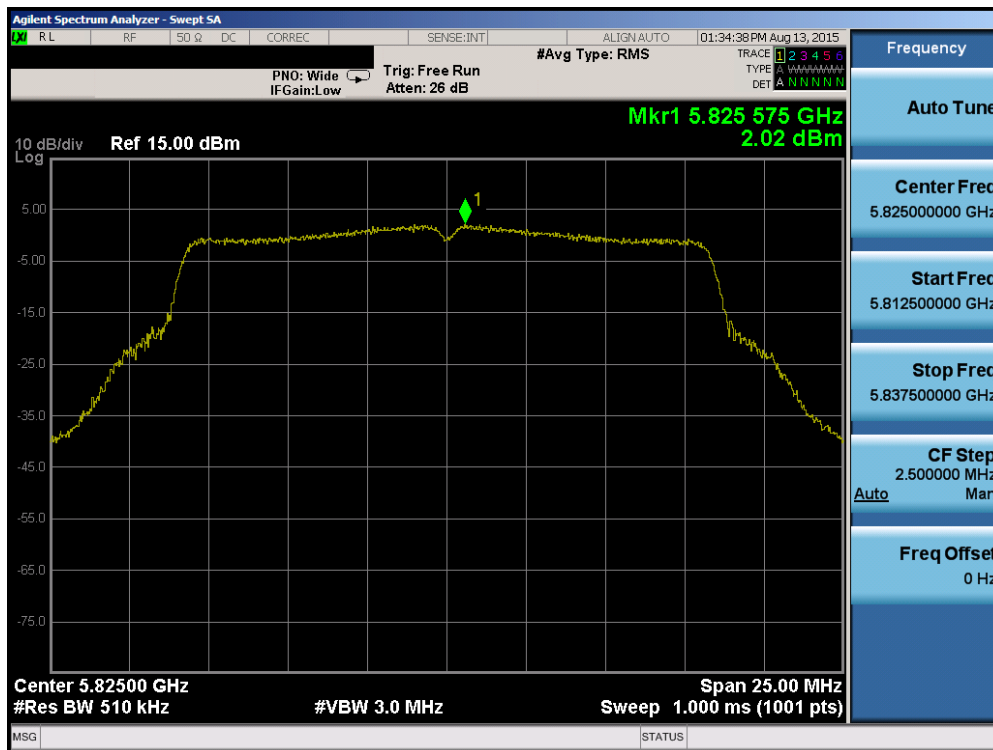


Plot 6-68. Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 149)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 53 of 125

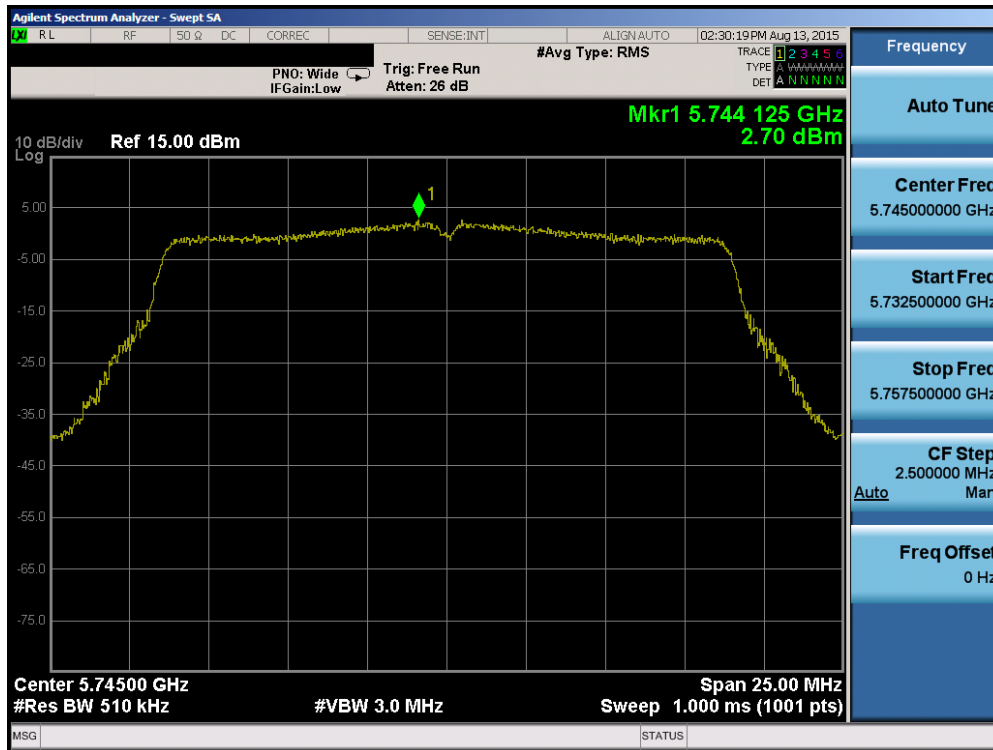


Plot 6-69. Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 157)

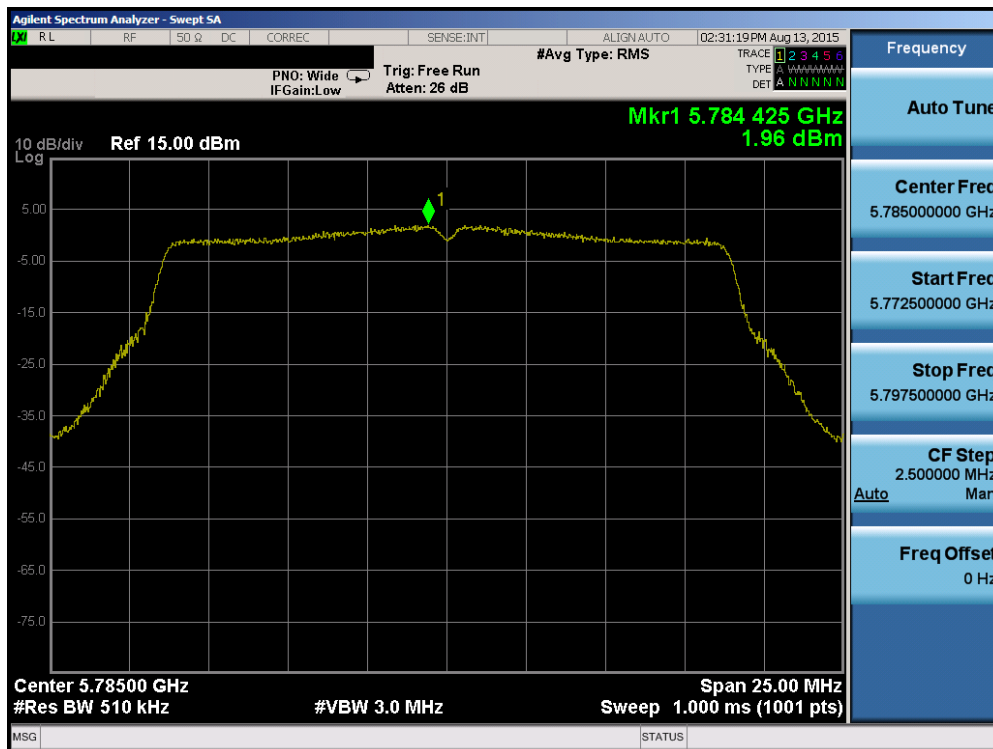


Plot 6-70. Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 165)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 54 of 125

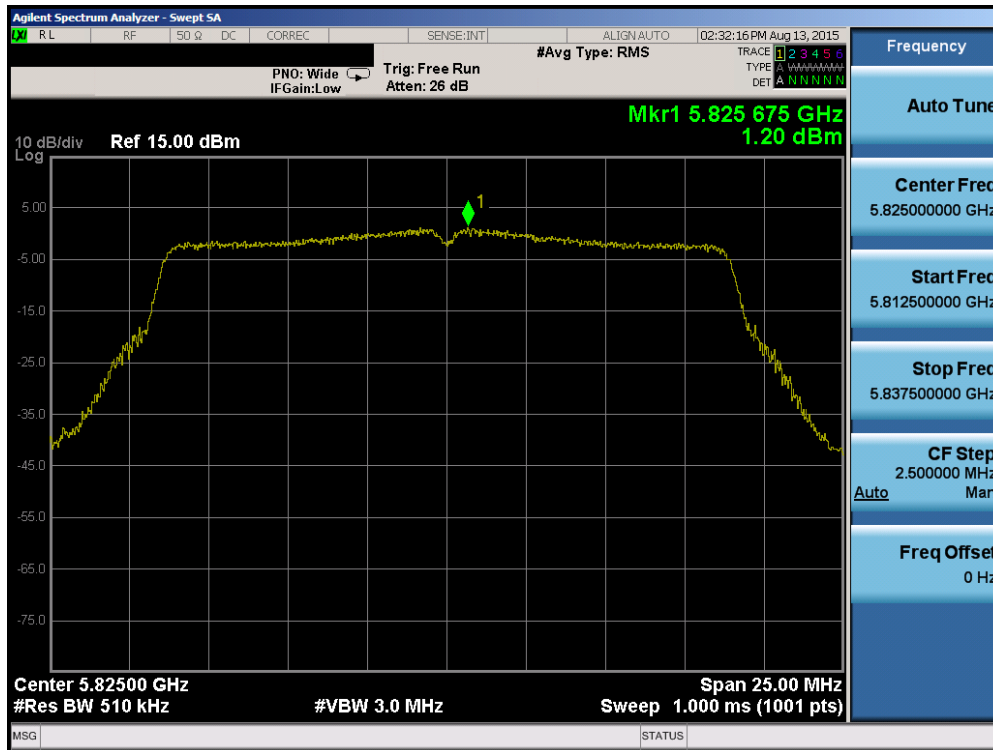


Plot 6-71. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 149)

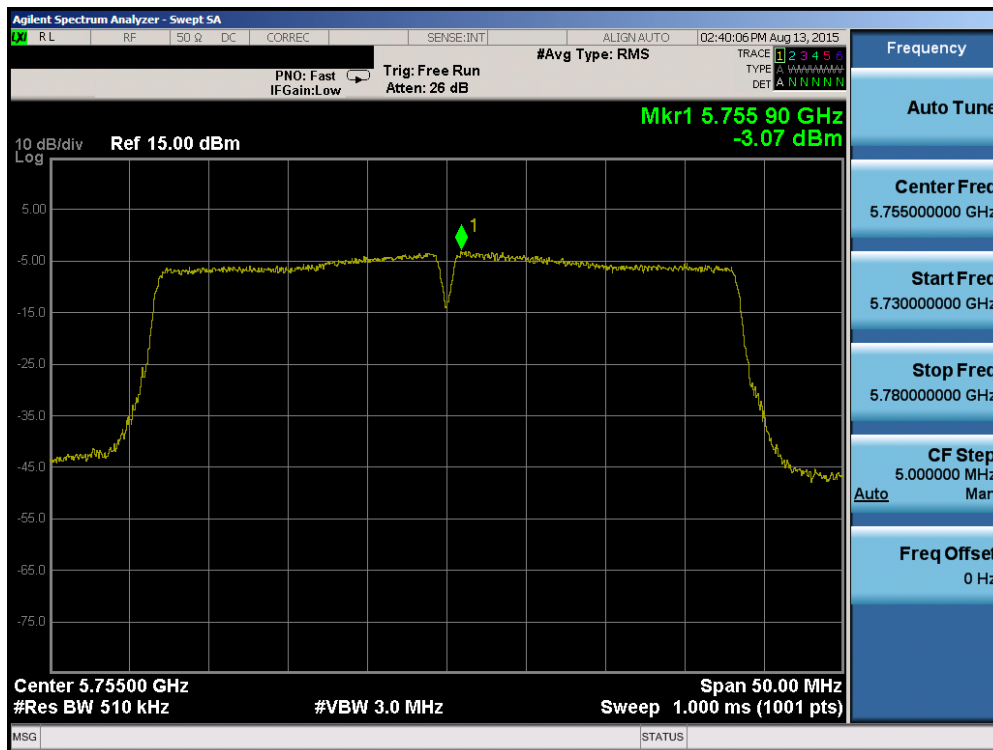


Plot 6-72. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 157)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 55 of 125

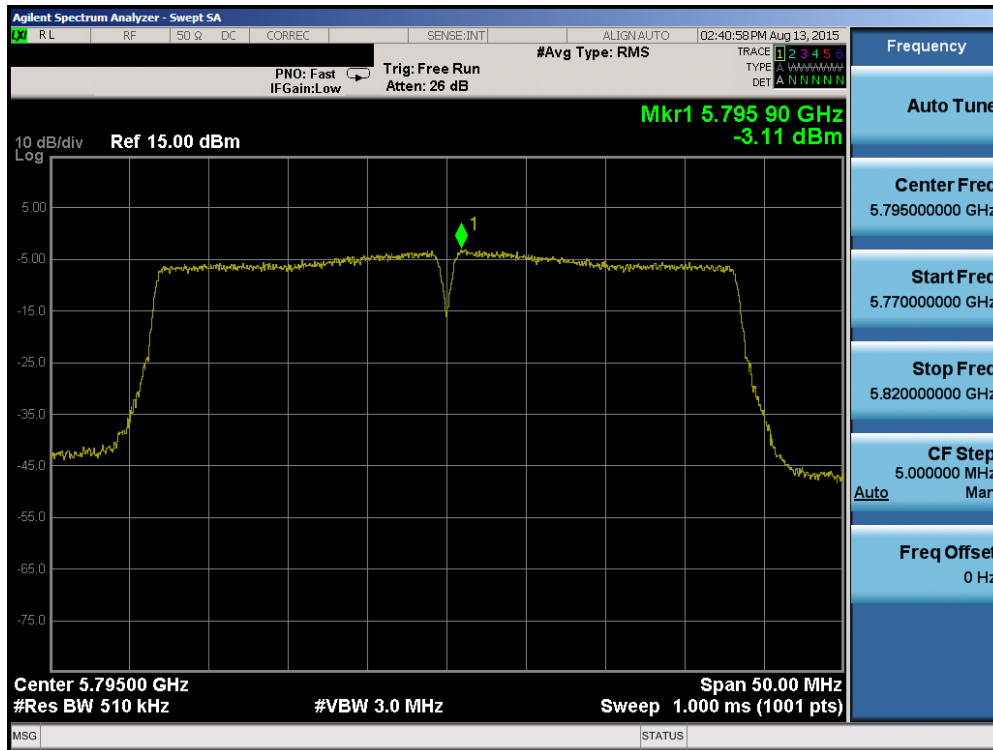


Plot 6-73. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 165)

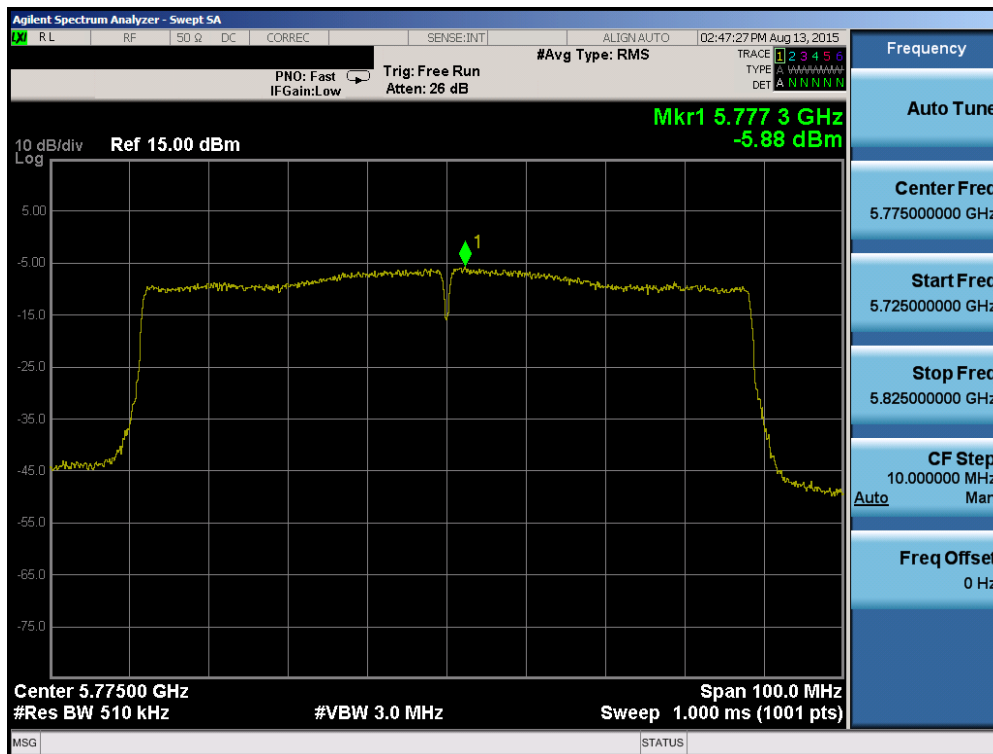


Plot 6-74. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 151)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 56 of 125



Plot 6-75. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 159)



Plot 6-76. Power Spectral Density Plot (80MHz BW 802.11ac (UNII Band 3) – Ch. 155)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 57 of 125

6.6 Frequency Stability

§15.407(g)

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10° intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded. Data for the worst case channel is shown below.

OPERATING FREQUENCY: 5,180,000,000 Hz
 CHANNEL: 36
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	5,179,999,951	-49	-0.00000095
100 %		- 30	5,180,000,061	61	0.00000118
100 %		- 20	5,180,000,429	429	0.00000828
100 %		- 10	5,180,000,338	338	0.00000653
100 %		0	5,180,000,067	67	0.00000129
100 %		+ 10	5,179,999,771	-229	-0.00000442
100 %		+ 20	5,180,000,021	21	0.00000041
100 %		+ 30	5,179,999,887	-113	-0.00000218
100 %		+ 40	5,180,000,216	216	0.00000417
100 %		+ 50	5,179,999,923	-77	-0.00000149
BATT. ENDPOINT	3.45	+ 20	5,180,000,099	99	0.00000191

Table 6-9. Frequency Stability Measurements for UNII Band 1 (Ch. 36)

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC ID: ZNFVS990		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Frequency Stability

§15.407(g)

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10° intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded. Data for the worst case channel is shown below.

OPERATING FREQUENCY: 5,260,000,000 Hz
 CHANNEL: 52
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	5,260,000,055	55	0.00000105
100 %		- 30	5,260,000,048	48	0.00000091
100 %		- 20	5,259,999,906	-94	-0.00000179
100 %		- 10	5,260,000,119	119	0.00000226
100 %		0	5,259,999,890	-110	-0.00000209
100 %		+ 10	5,260,000,160	160	0.00000304
100 %		+ 20	5,259,999,849	-151	-0.00000287
100 %		+ 30	5,260,000,185	185	0.00000352
100 %		+ 40	5,259,999,760	-240	-0.00000456
100 %		+ 50	5,259,999,937	-63	-0.00000120
BATT. ENDPOINT	3.45	+ 20	5,259,999,898	-102	-0.00000194

Table 6-10. Frequency Stability Measurements for UNII Band 2A (Ch. 52)

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC ID: ZNFVS990		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Frequency Stability

§15.407(g)

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10° intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded. Data for the worst case channel is shown below.

OPERATING FREQUENCY: 5,500,000,000 Hz
 CHANNEL: 100
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	5,499,999,913	-87	-0.00000158
100 %		- 30	5,500,000,102	102	0.00000185
100 %		- 20	5,500,000,014	14	0.00000025
100 %		- 10	5,499,999,739	-261	-0.00000475
100 %		0	5,499,999,936	-64	-0.00000116
100 %		+ 10	5,499,999,741	-259	-0.00000471
100 %		+ 20	5,500,000,101	101	0.00000184
100 %		+ 30	5,500,000,338	338	0.00000615
100 %		+ 40	5,499,999,767	-233	-0.00000424
100 %		+ 50	5,500,000,146	146	0.00000265
BATT. ENDPOINT	3.45	+ 20	5,500,000,016	16	0.00000029

Table 6-11. Frequency Stability Measurements for UNII Band 2C (Ch. 100)

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Frequency Stability

§15.407(g)

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C and +50°C. The temperature was incremented by 10° intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded. Data for the worst case channel is shown below.

OPERATING FREQUENCY: 5,745,000,000 Hz
 CHANNEL: 149
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	5,745,000,102	102	0.00000178
100 %		- 30	5,745,000,169	169	0.00000294
100 %		- 20	5,745,000,249	249	0.00000433
100 %		- 10	5,745,000,042	42	0.00000073
100 %		0	5,744,999,952	-48	-0.00000084
100 %		+ 10	5,745,000,146	146	0.00000254
100 %		+ 20	5,744,999,966	-34	-0.00000059
100 %		+ 30	5,745,000,319	319	0.00000555
100 %		+ 40	5,745,000,362	362	0.00000630
100 %		+ 50	5,744,999,950	-50	-0.00000087
BATT. ENDPOINT	3.45	+ 20	5,745,000,174	174	0.00000303

Table 6-12. Frequency Stability Measurements for UNII Band 3 (Ch. 149)

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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6.7 Radiated Spurious Emission Measurements – Above 1GHz

§15.407(b.1)(b.6) §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 v01, 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.

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 6-13 per Section 15.209.

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

Table 6-13. Radiated Limits

Test Procedures Used

KDB 789033 D02 v01 – 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

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

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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.

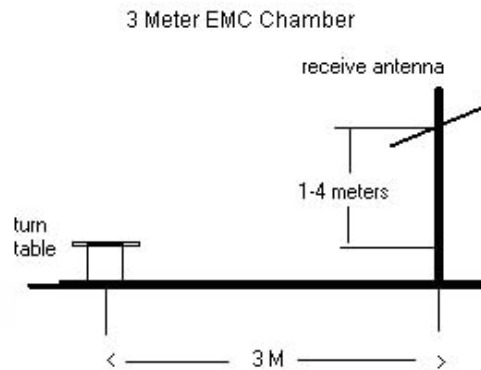


Figure 6-5. Test Instrument & Measurement Setup

Test Notes

1. All radiated spurious emissions levels were measured in a radiated test setup per the guidance of KDB 789033 D02 v01 Section H.
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 6-13.
3. All spurious emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 6-11. 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.

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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.

Sample Calculations

Determining Spurious Emissions Levels

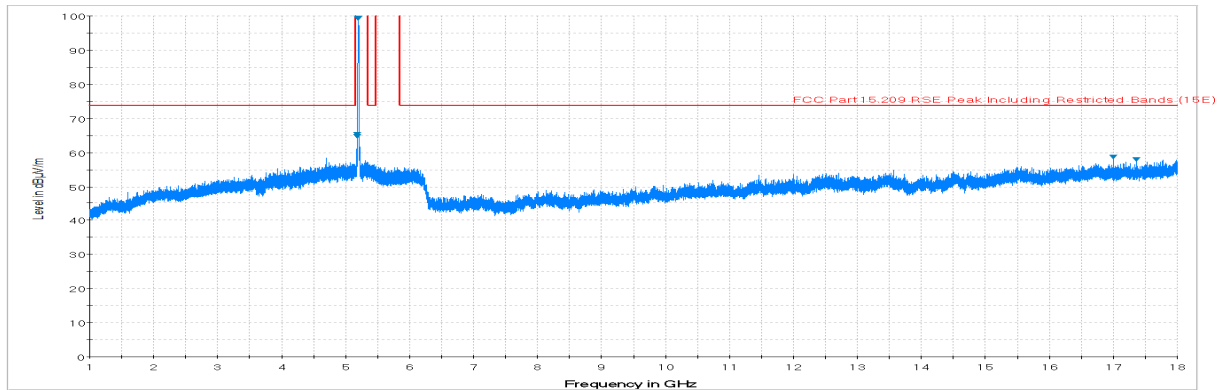
- o Field Strength Level $_{[dB_{\mu V/m}]}$ = Analyzer Level $_{[dBm]}$ + 107 + AFCL $_{[dB/m]}$
- o AFCL $_{[dB/m]}$ = Antenna Factor $_{[dB/m]}$ + Cable Loss $_{[dB]}$
- o Margin $_{[dB]}$ = Field Strength Level $_{[dB_{\mu V/m}]}$ – Limit $_{[dB_{\mu V/m}]}$

Radiated Band Edge Measurement Offset

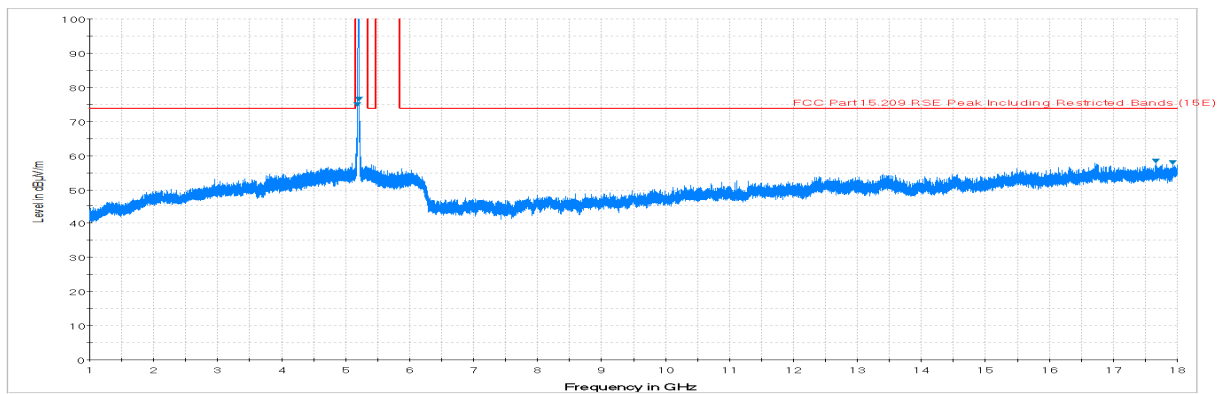
- o The amplitude offset shown in the radiated restricted band edge plots in Section 6.8 was calculated using the formula:
Offset (dB) = (Antenna Factor + Cable Loss + 10 dB Attenuator) – Preamplifier Gain

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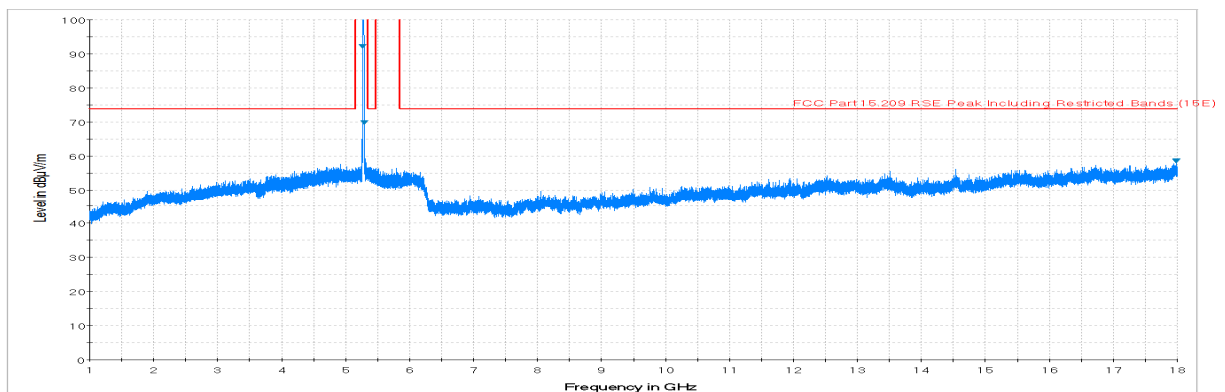
6.7.1 Radiated Spurious Emission Measurements



Plot 6-77. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. H)

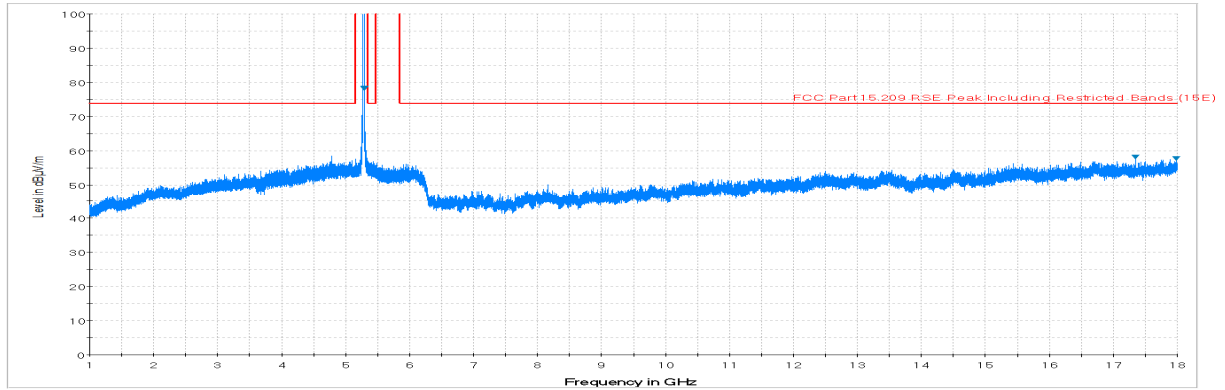


Plot 6-78. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. V)

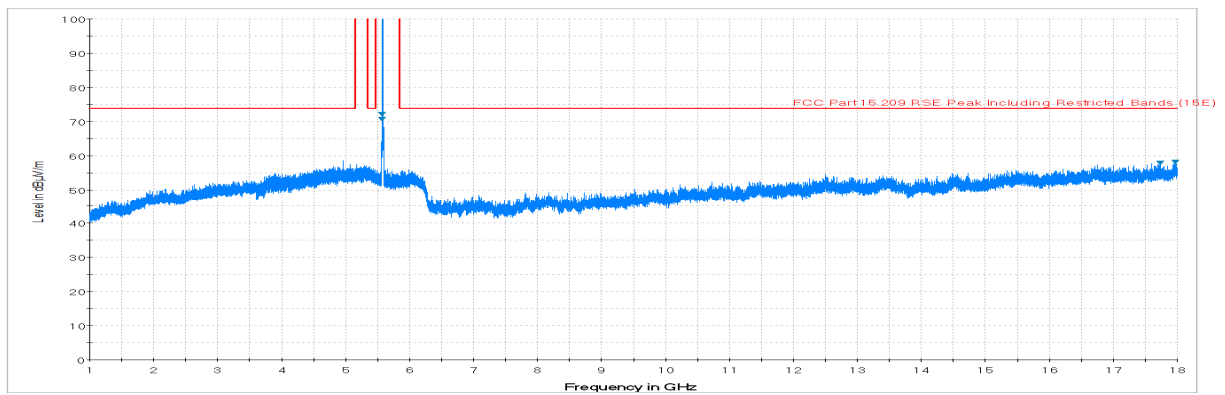


Plot 6-79. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. H)

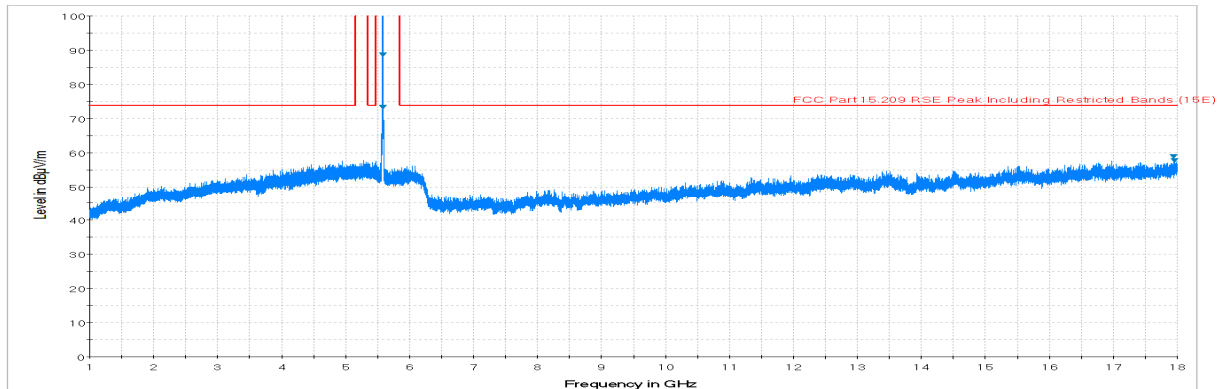
FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
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Plot 6-80. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. V)

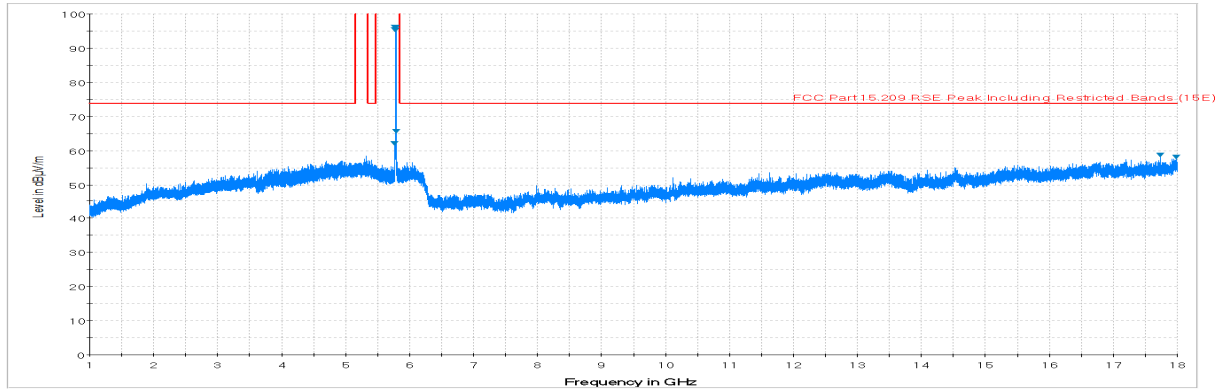


Plot 6-81. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 116, Ant. Pol. H)

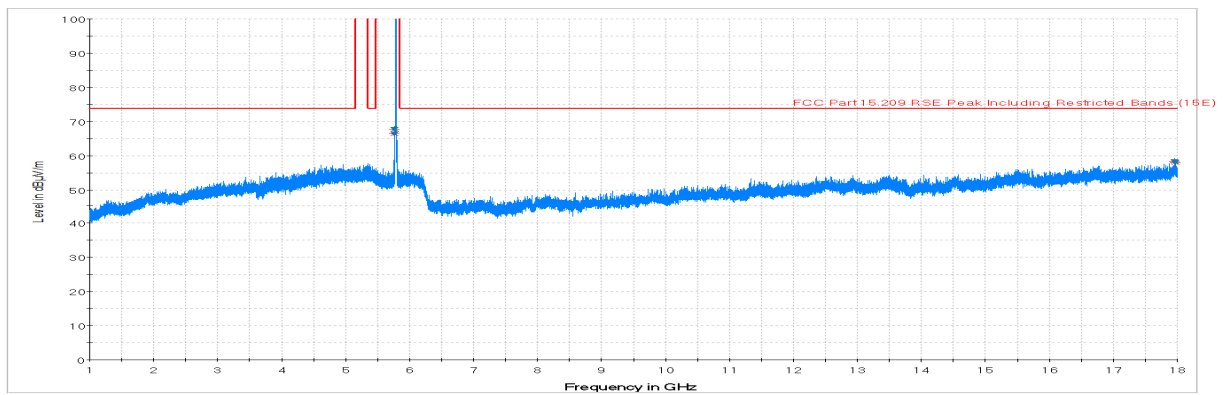


Plot 6-82. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 116, Ant. Pol. V)

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Plot 6-83. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)

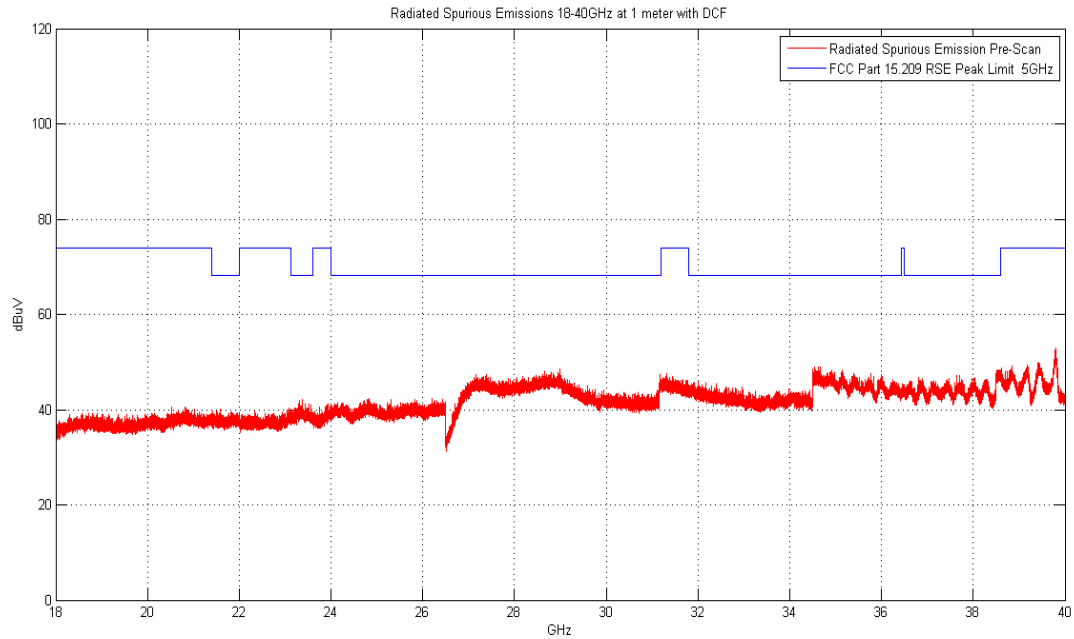


Plot 6-84. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)

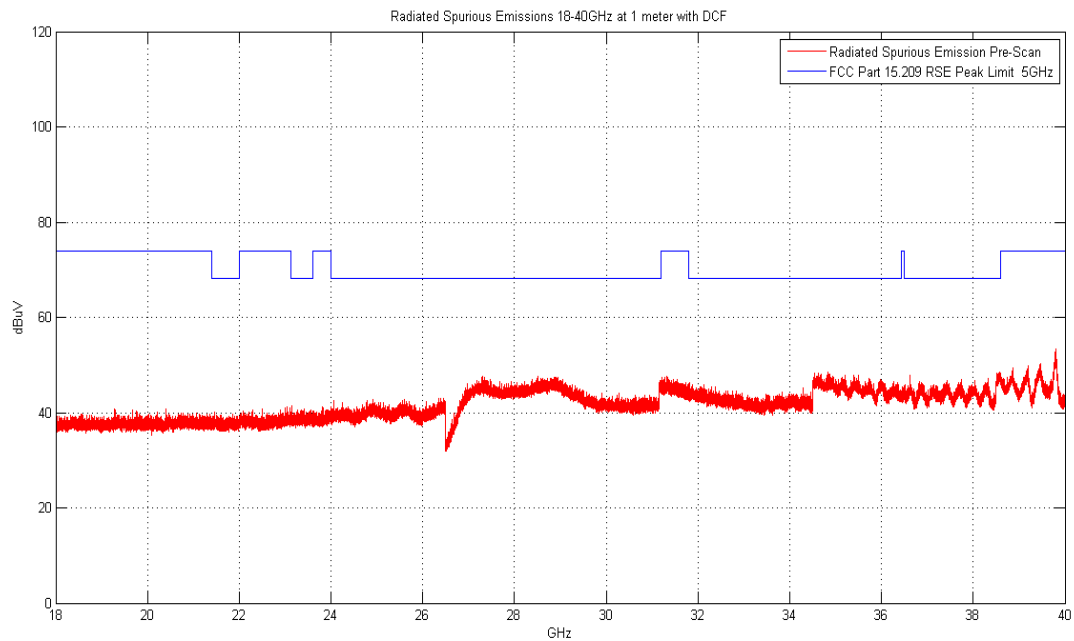
FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset	Page 67 of 125

Radiated Spurious Emissions Measurements (Above 18GHz)

§15.209



Plot 6-85. Radiated Spurious Plot above 18GHz (802.11a – Ant. Pol. H)



Plot 6-86. Radiated Spurious Plot above 18GHz (802.11a – Ant. Pol. V)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset	Page 68 of 125

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]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10360.00	-99.82	Peak	V	47.22	0.00	54.39	68.20	-13.81
* 15540.00	-113.26	Average	V	54.96	0.00	48.70	53.98	-5.28
* 15540.00	-100.35	Peak	V	54.96	0.00	61.61	73.98	-12.37
* 20720.00	-106.36	Average	V	44.39	-9.54	35.49	53.98	-18.49
* 20720.00	-98.31	Peak	V	44.39	-9.54	43.54	73.98	-30.44
25900.00	-97.89	Peak	V	45.11	-9.54	44.68	68.20	-23.52

Table 6-14. 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]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10400.00	-99.79	Peak	V	47.44	0.00	54.65	68.20	-13.55
* 15600.00	-112.47	Average	V	55.17	0.00	49.70	53.98	-4.28
* 15600.00	-98.99	Peak	V	55.17	0.00	63.18	73.98	-10.80
* 20800.00	-105.98	Average	V	44.39	-9.54	35.87	53.98	-18.11
* 20800.00	-97.79	Peak	V	44.39	-9.54	44.06	73.98	-29.92
26000.00	-98.48	Peak	V	45.12	-9.54	44.09	68.20	-24.11

Table 6-15. Radiated Measurements

FCC ID: ZNFVS990		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 69 of 125

Worst Case Mode: 802.11a
 Worst Case Transfer Rate: 6 Mbps
 Distance of Measurements: 1 & 3 Meters
 Operating Frequency: 5240MHz
 Channel: 48

Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10480.00	-100.25	Peak	V	47.79	0.00	54.54	68.20	-13.66
* 15720.00	-112.20	Average	V	54.46	0.00	49.26	53.98	-4.72
* 15720.00	-100.41	Peak	V	54.46	0.00	61.05	73.98	-12.93
* 20960.00	-109.84	Average	V	44.31	-9.54	31.93	53.98	-22.05
* 20960.00	-99.14	Peak	V	44.31	-9.54	42.63	73.98	-31.35
26200.00	-97.09	Peak	V	45.01	-9.54	45.38	68.20	-22.82

Table 6-16. 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]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10400.00	-99.54	Peak	V	47.44	0.00	54.90	68.20	-13.30
* 15600.00	-113.09	Average	V	55.17	0.00	49.08	53.98	-4.90
* 15600.00	-101.39	Peak	V	55.17	0.00	60.78	73.98	-13.20
* 20800.00	-106.32	Average	V	44.39	-9.54	35.53	53.98	-18.45
* 20800.00	-98.63	Peak	V	44.39	-9.54	43.22	73.98	-30.76
26000.00	-98.86	Peak	V	45.12	-9.54	43.71	68.20	-24.49

Table 6-17. Radiated Measurements with WCP

FCC ID: ZNFVS990		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 70 of 125

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

Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10520.00	-100.32	Peak	V	47.85	0.00	54.53	68.20	-13.67
* 15780.00	-112.31	Average	V	54.20	0.00	48.89	53.98	-5.09
* 15780.00	-100.47	Peak	V	54.20	0.00	60.73	73.98	-13.25
* 21040.00	-110.17	Average	V	44.29	-9.54	31.57	53.98	-22.41
* 21040.00	-99.00	Peak	V	44.29	-9.54	42.74	73.98	-31.24
26300.00	-95.34	Peak	V	45.00	-9.54	47.12	68.20	-21.08

Table 6-18. Radiated Measurements

Worst Case Mode: 802.11a
 Worst Case Transfer Rate: 6 Mbps
 Distance of Measurements: 1 & 3 Meters
 Operating Frequency: 5280MHz
 Channel: 56

Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10520.00	-100.32	Peak	V	47.85	0.00	54.53	68.20	-13.67
* 15780.00	-112.31	Average	V	54.20	0.00	48.89	53.98	-5.09
* 15780.00	-100.47	Peak	V	54.20	0.00	60.73	73.98	-13.25
* 21040.00	-110.17	Average	V	44.29	-9.54	31.57	53.98	-22.41
* 21040.00	-99.00	Peak	V	44.29	-9.54	42.74	73.98	-31.24
26300.00	-95.34	Peak	V	45.00	-9.54	47.12	68.20	-21.08

Table 6-19. Radiated Measurements

FCC ID: ZNFVS990		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 71 of 125

Worst Case Mode: 802.11a
Worst Case Transfer Rate: 6 Mbps
Distance of Measurements: 1 & 3 Meters
Operating Frequency: 5320MHz
Channel: 64

Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 10640.00	-112.60	Average	V	47.76	0.00	42.16	53.98	-11.82
* 10640.00	-99.68	Peak	V	47.76	0.00	55.08	73.98	-18.90
* 15960.00	-112.67	Average	V	54.99	0.00	49.32	53.98	-4.66
* 15960.00	-100.13	Peak	V	54.99	0.00	61.86	73.98	-12.12
* 21280.00	-110.49	Average	V	44.26	-9.54	31.23	53.98	-22.75
* 21280.00	-99.73	Peak	V	44.26	-9.54	41.99	73.98	-31.99
26600.00	-102.61	Peak	V	47.61	-9.54	42.46	68.20	-25.74

Table 6-20. 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]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
10640.00	-111.08	Average	V	47.76	0.00	43.68	53.98	-10.30
* 10640.00	-99.30	Peak	V	47.76	0.00	55.46	73.98	-18.52
* 15960.00	-112.69	Average	V	54.99	0.00	49.30	53.98	-4.68
* 15960.00	-100.18	Peak	V	54.99	0.00	61.81	73.98	-12.17
* 21280.00	-108.70	Average	V	44.26	-9.54	33.02	53.98	-20.96
21280.00	-99.41	Peak	V	44.26	-9.54	42.31	73.98	-31.67
26600.00	-102.29	Peak	V	47.61	-9.54	42.78	68.20	-25.42

Table 6-21. Radiated Measurements with WCP

FCC ID: ZNFVS990		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 72 of 125

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

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	11000.00	-111.81	Average	V	48.21	0.00	43.40	53.98	-10.58
*	11000.00	-97.99	Peak	V	48.21	0.00	57.22	73.98	-16.76
	16500.00	-101.18	Peak	V	55.07	0.00	60.89	68.20	-7.31
	22000.00	-98.39	Peak	V	44.50	-9.54	43.56	68.20	-24.64
	27500.00	-104.32	Peak	V	47.97	-9.54	41.11	68.20	-27.09

Table 6-22. 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]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	11160.00	-112.35	Average	V	48.05	0.00	42.71	53.98	-11.27
*	11160.00	-99.38	Peak	V	48.05	0.00	55.68	73.98	-18.30
	16740.00	-100.17	Peak	V	55.43	0.00	62.26	68.20	-5.94
*	22320.00	-109.91	Average	V	44.56	-9.54	32.11	53.98	-21.87
*	22320.00	-98.98	Peak	V	44.56	-9.54	43.04	73.98	-30.94
	27900.00	-104.06	Peak	V	48.08	-9.54	41.48	68.20	-26.72

Table 6-23. Radiated Measurements

FCC ID: ZNFVS990		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 73 of 125

Worst Case Mode: 802.11a
 Worst Case Transfer Rate: 6 Mbps
 Distance of Measurements: 1 & 3 Meters
 Operating Frequency: 5720MHz
 Channel: 144

	Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	11440.00	-113.29	Average	V	48.79	0.00	42.50	53.98	-11.48
*	11440.00	-100.08	Peak	V	48.79	0.00	55.71	73.98	-18.27
	17160.00	-100.10	Peak	V	54.84	0.00	61.74	68.20	-6.46
*	22880.00	-110.17	Average	V	44.56	-9.54	31.84	53.98	-22.14
*	22880.00	-98.19	Peak	V	44.56	-9.54	43.82	73.98	-30.16
	28600.00	-104.37	Peak	V	48.32	-9.54	41.41	68.20	-26.79

Table 6-24. 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]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
*	11160.00	-111.11	Average	V	48.05	0.00	43.95	53.98	-10.03
*	11160.00	-100.12	Peak	V	48.05	0.00	54.94	73.98	-19.04
	16740.00	-100.53	Peak	V	55.43	0.00	61.90	68.20	-6.30
	22320.00	-108.67	Average	V	44.56	-9.54	33.35	53.98	-20.63
	22320.00	-99.38	Peak	V	44.56	-9.54	42.64	73.98	-31.34
	27900.00	-105.76	Peak	V	48.08	-9.54	39.78	68.20	-28.42

Table 6-25. Radiated Measurements with WCP

FCC ID: ZNFVS990		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 74 of 125

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

Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11490.00	-113.63	Average	V	49.09	0.00	42.46	53.98	-11.51
* 11490.00	-99.95	Peak	V	49.09	0.00	56.14	73.98	-17.83
17235.00	-99.31	Peak	V	54.96	0.00	62.65	68.20	-5.55
* 22980.00	-109.69	Average	V	44.68	-9.54	32.45	53.98	-21.53
* 22980.00	-99.28	Peak	V	44.68	-9.54	42.86	73.98	-31.12
28725.00	-103.68	Peak	V	48.26	-9.54	42.04	68.20	-26.16

Table 6-26. 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]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11570.00	-112.32	Average	V	48.99	0.00	43.67	53.98	-10.31
* 11570.00	-99.23	Peak	V	48.99	0.00	56.76	73.98	-17.22
17355.00	-100.10	Peak	V	55.42	0.00	62.31	68.20	-5.89
23140.00	-97.21	Peak	V	44.75	-9.54	45.00	68.20	-23.20
28925.00	-102.99	Peak	V	48.29	-9.54	42.76	68.20	-25.44

Table 6-27. Radiated Measurements

FCC ID: ZNFVS990		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 75 of 125

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

Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11650.00	-112.63	Average	V	48.94	0.00	43.31	53.98	-10.67
* 11650.00	-99.73	Peak	V	48.94	0.00	56.21	73.98	-17.77
17475.00	-100.59	Peak	V	56.20	0.00	62.61	68.20	-5.59
23300.00	-96.97	Peak	V	44.75	-9.54	45.23	68.20	-22.97
29125.00	-104.40	Peak	V	48.28	-9.54	41.35	68.20	-26.85

Table 6-28. 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]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
* 11490.00	-110.81	Average	V	49.09	0.00	45.28	53.98	-8.69
* 11490.00	-98.90	Peak	V	49.09	0.00	57.19	73.98	-16.78
17235.00	-99.49	Peak	V	54.96	0.00	62.47	68.20	-5.73
22980.00	-106.94	Average	V	44.68	-9.54	35.20	53.98	-18.78
22980.00	-98.09	Peak	V	44.68	-9.54	44.05	73.98	-29.93
28725.00	-103.54	Peak	V	48.26	-9.54	42.18	68.20	-26.02

Table 6-29. Radiated Measurements with WCP

6.7.2 Radiated Band Edge Measurements (20MHz BW)

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

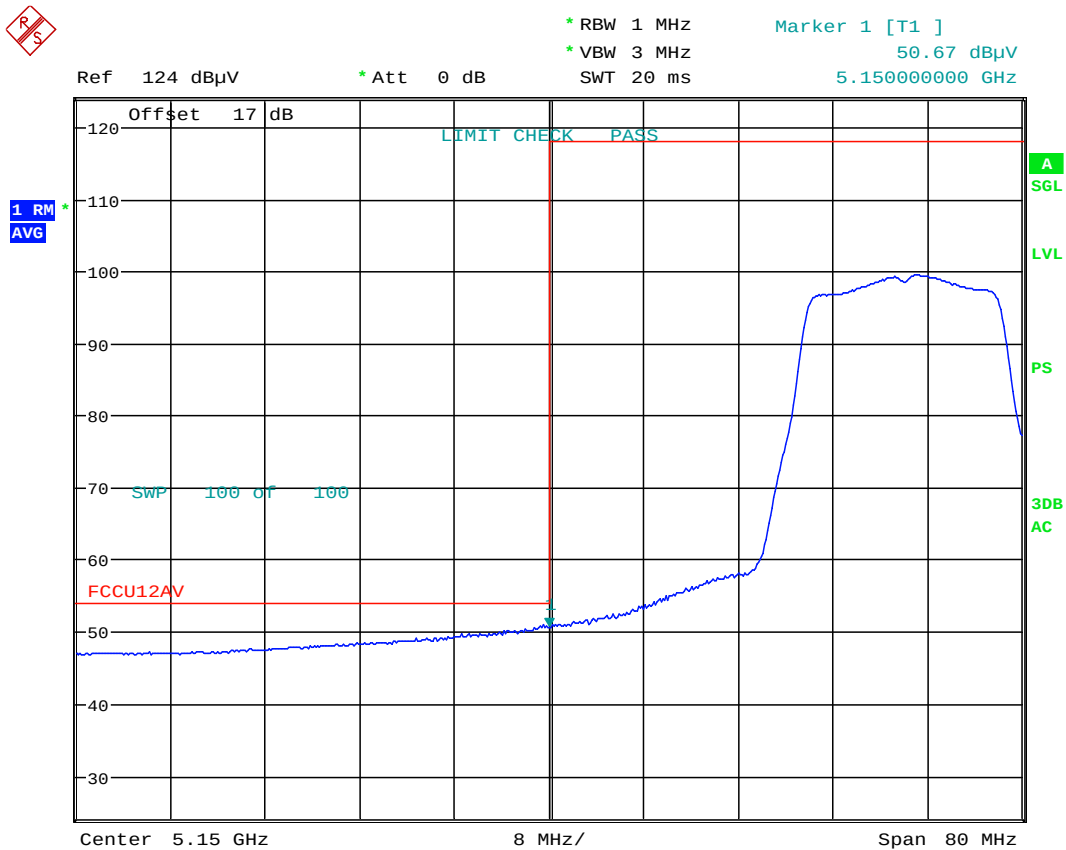
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5180MHz

Channel: 36



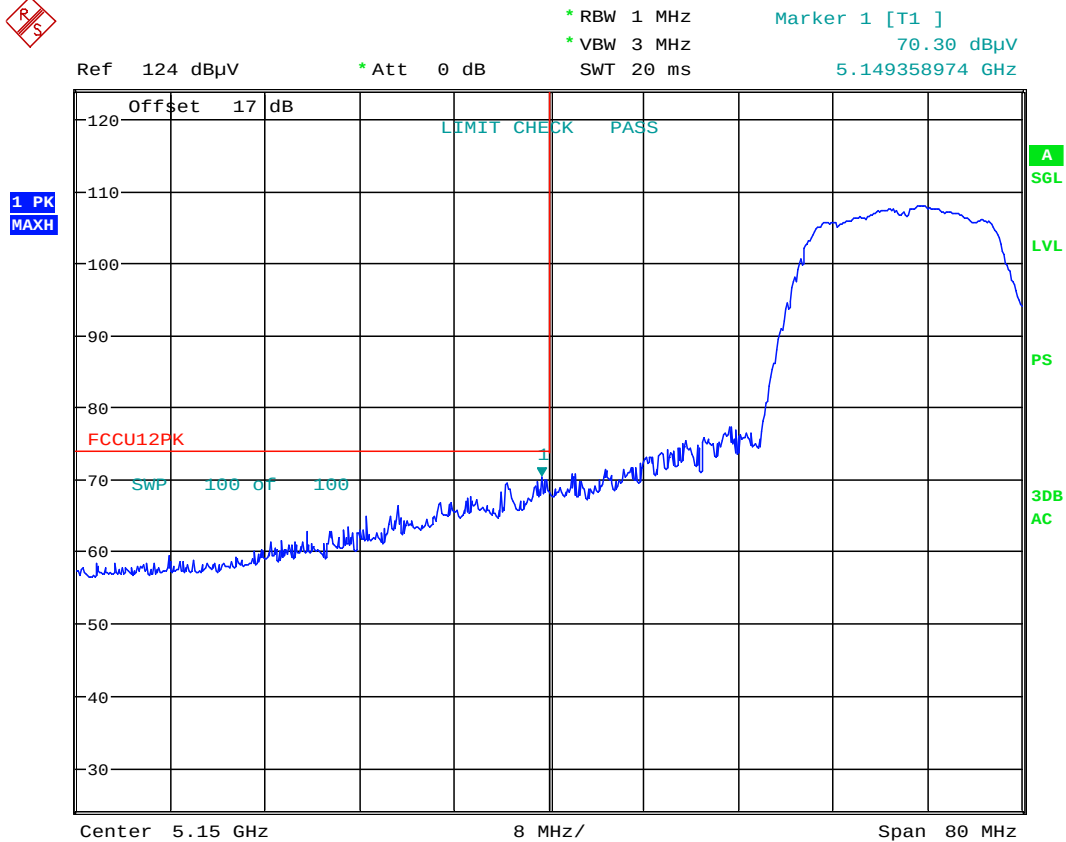
Date: 18.AUG.2015 21:41:11

Plot 6-87. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 77 of 125

Radiated Band Edge Measurements (20MHz BW)

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



Date: 18.AUG.2015 21:39:00

Plot 6-88. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 78 of 125

Radiated Band Edge Measurements (20MHz BW)

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

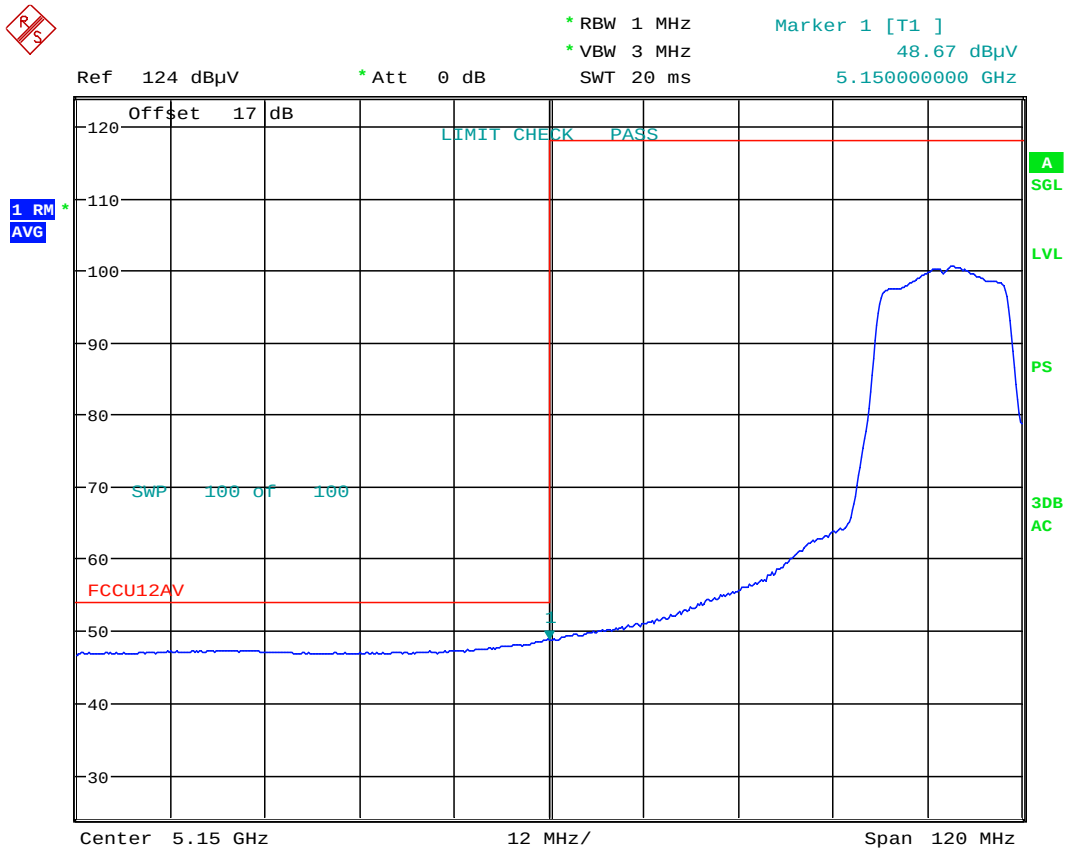
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5200MHz

Channel: 40

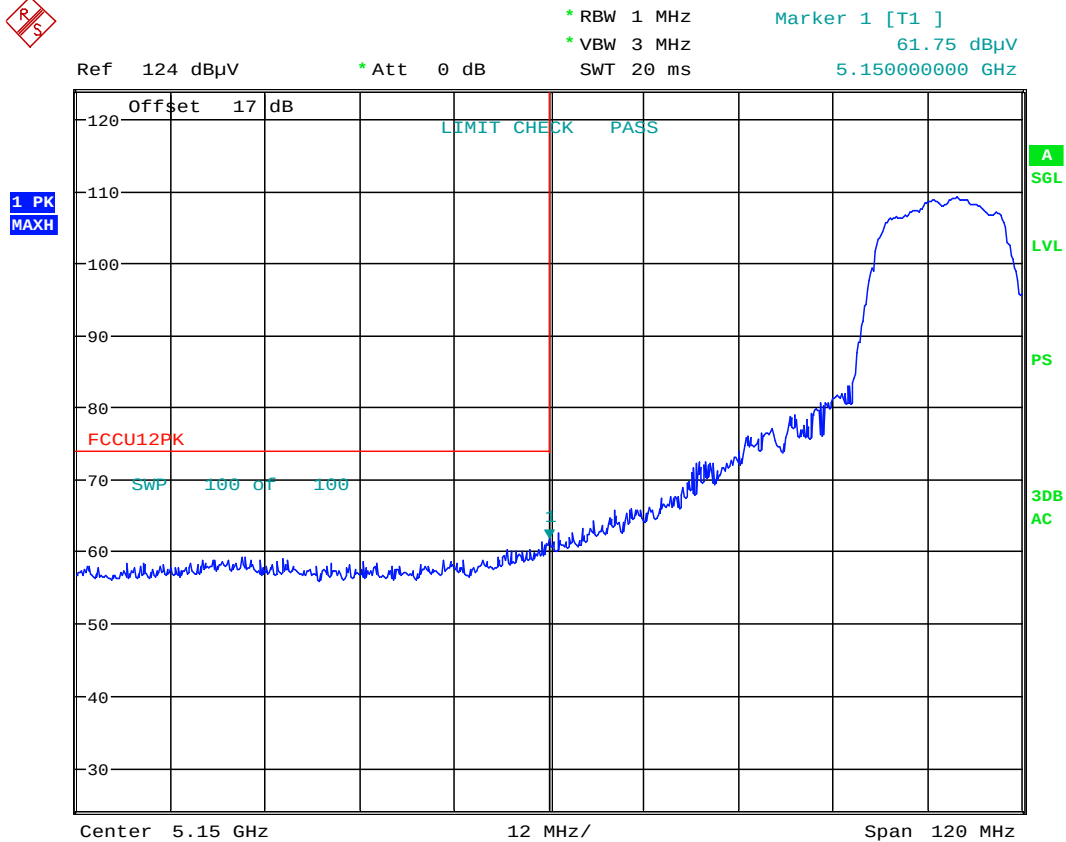


Date: 18.AUG.2015 21:49:54

Plot 6-89. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 79 of 125

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



Date: 18.AUG.2015 21:49:17

Plot 6-90. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 80 of 125

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

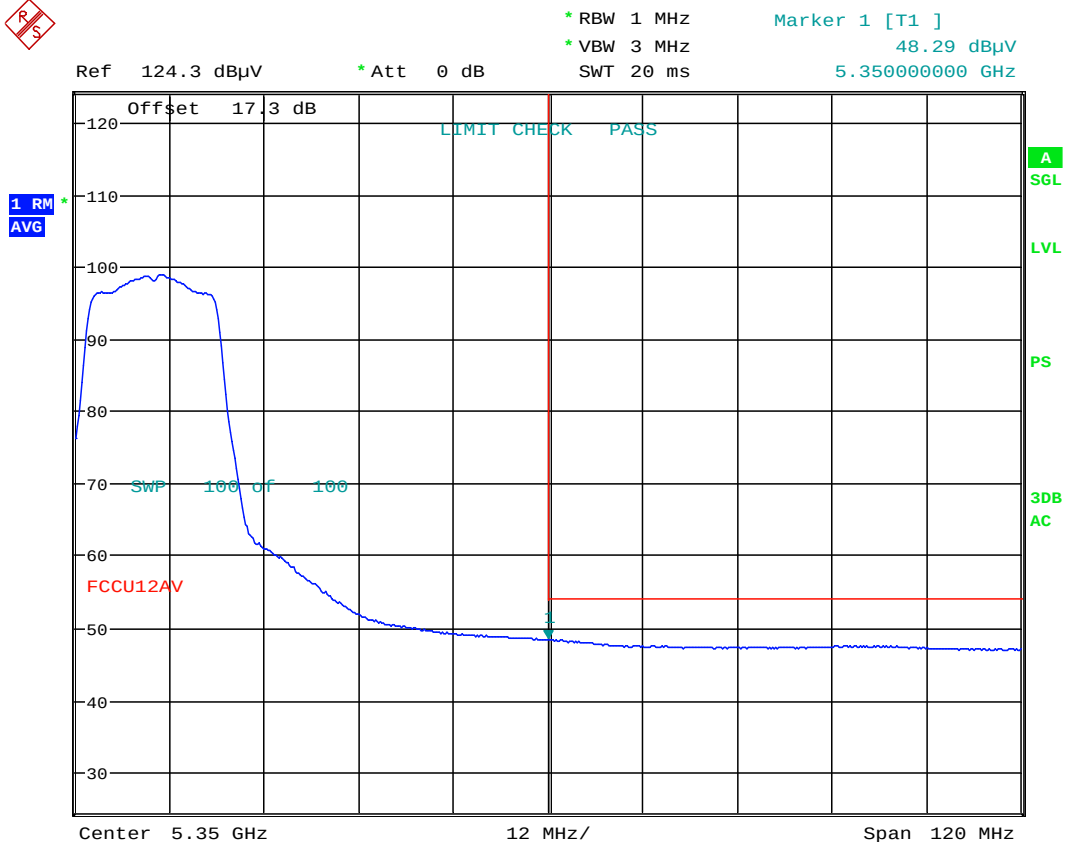
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5300MHz

Channel: 60

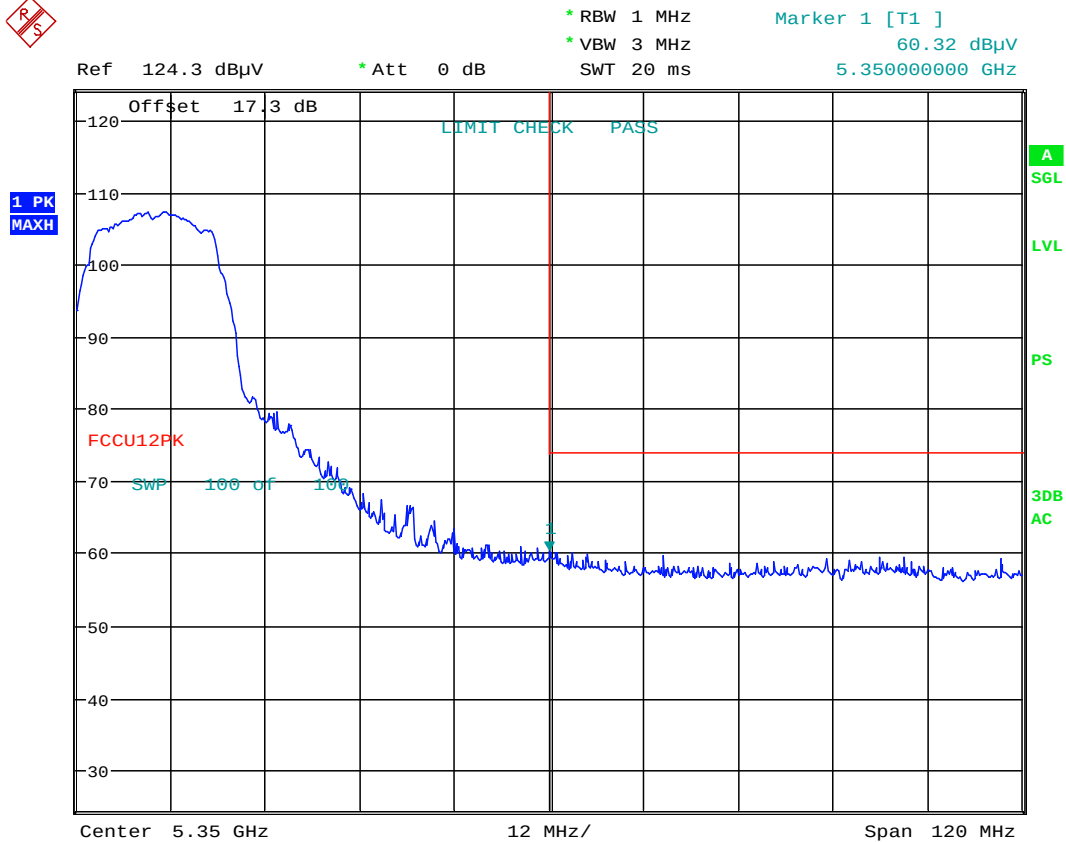


Date: 18.AUG.2015 22:01:22

Plot 6-91. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 81 of 125

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



Date: 18.AUG.2015 21:59:17

Plot 6-92. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 82 of 125

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

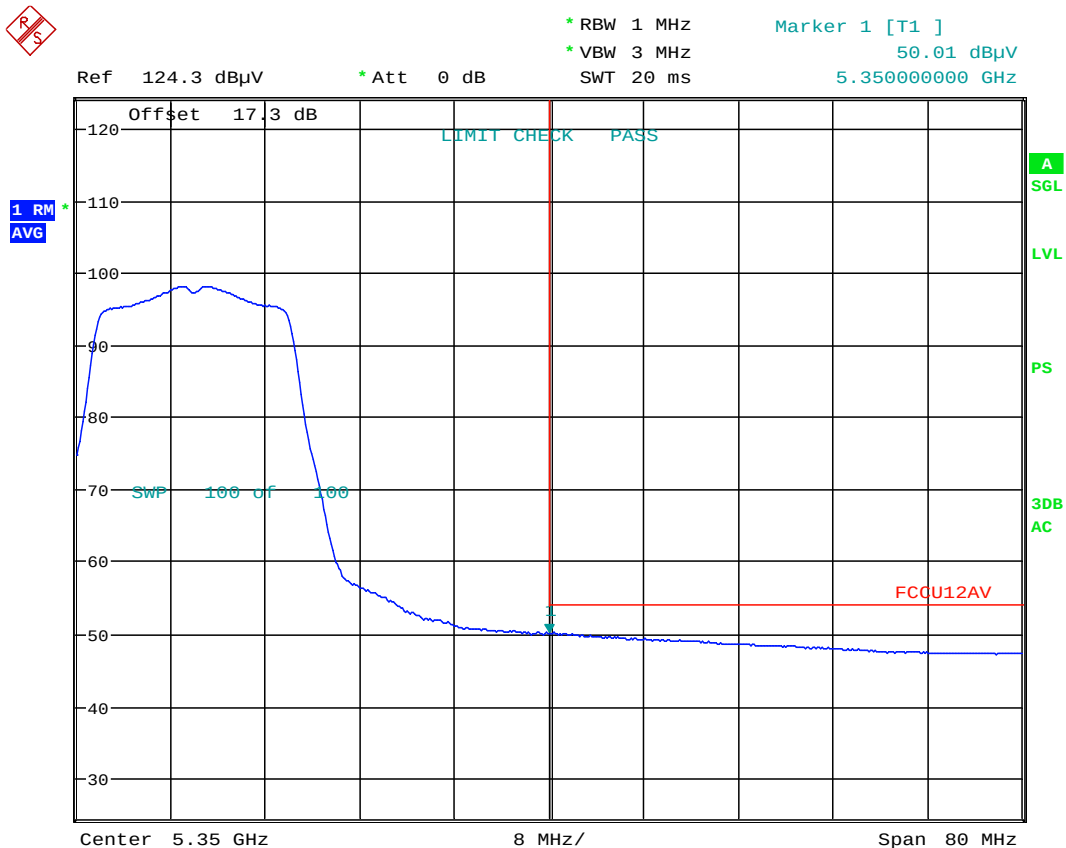
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5320MHz

Channel: 64

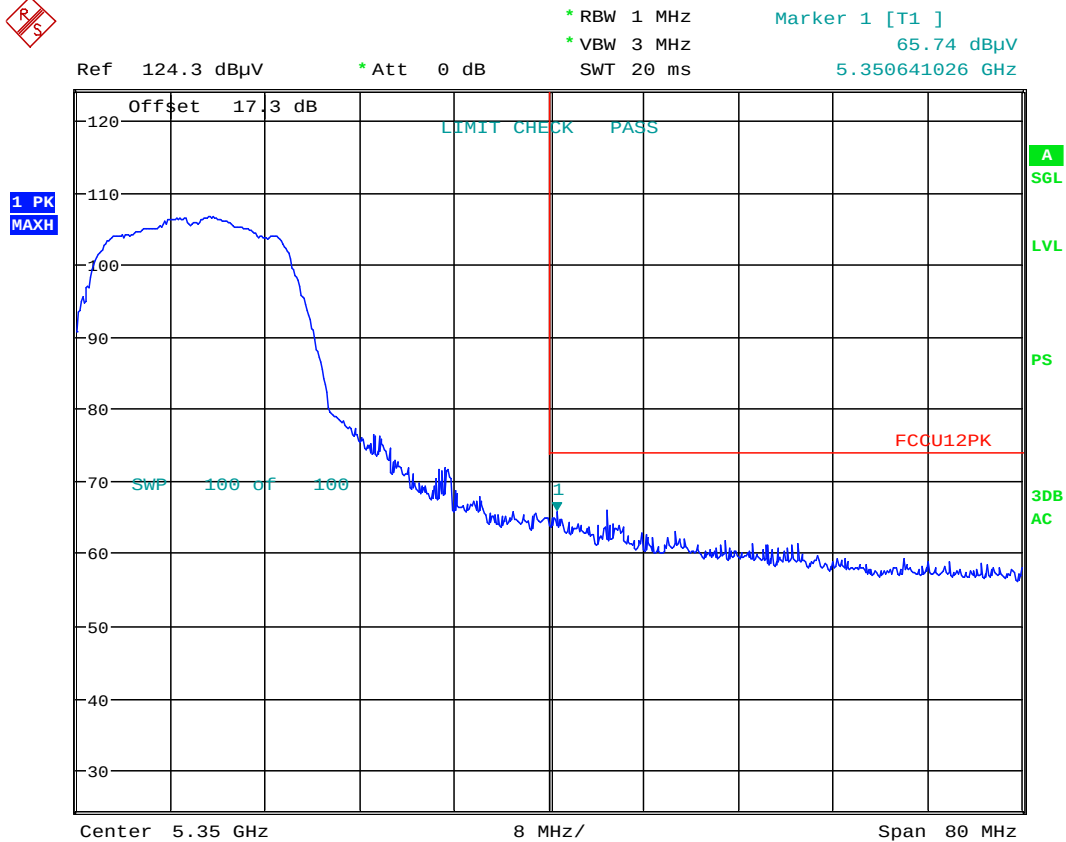


Date: 18.AUG.2015 22:08:06

Plot 6-93. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 83 of 125

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



Date: 18.AUG.2015 22:07:12

Plot 6-94. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 84 of 125

Radiated Band Edge Measurements (20MHz BW)

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

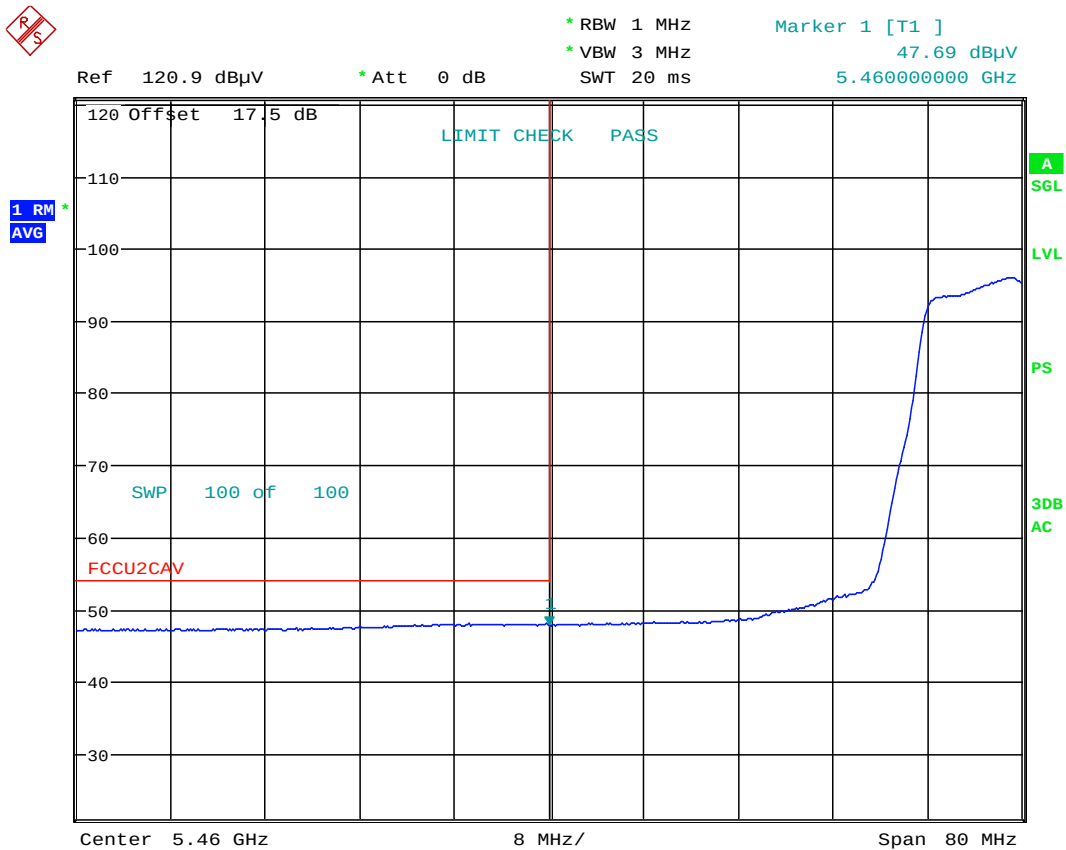
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5500MHz

Channel: 100



Date: 18.AUG.2015 22:17:41

Plot 6-95. Radiated Restricted Lower Band Edge Plot (Average - UNII Band 2C)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 85 of 125

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

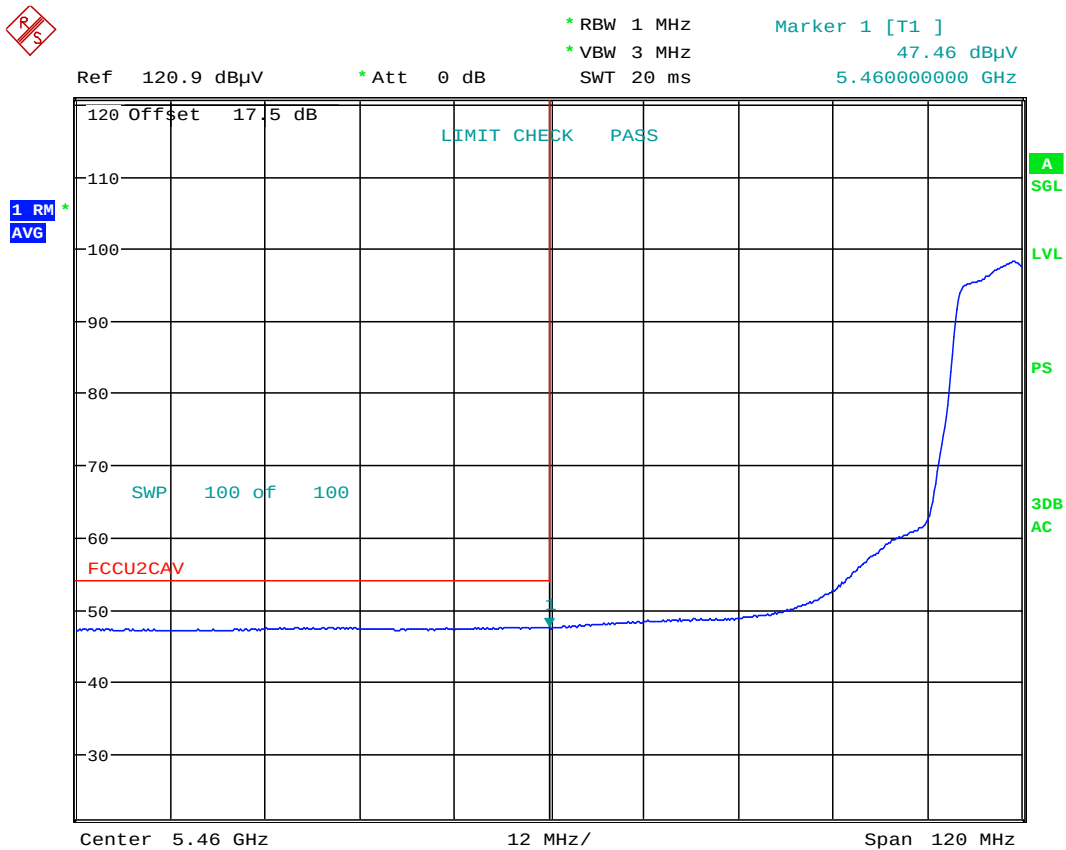
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5520MHz

Channel: 104

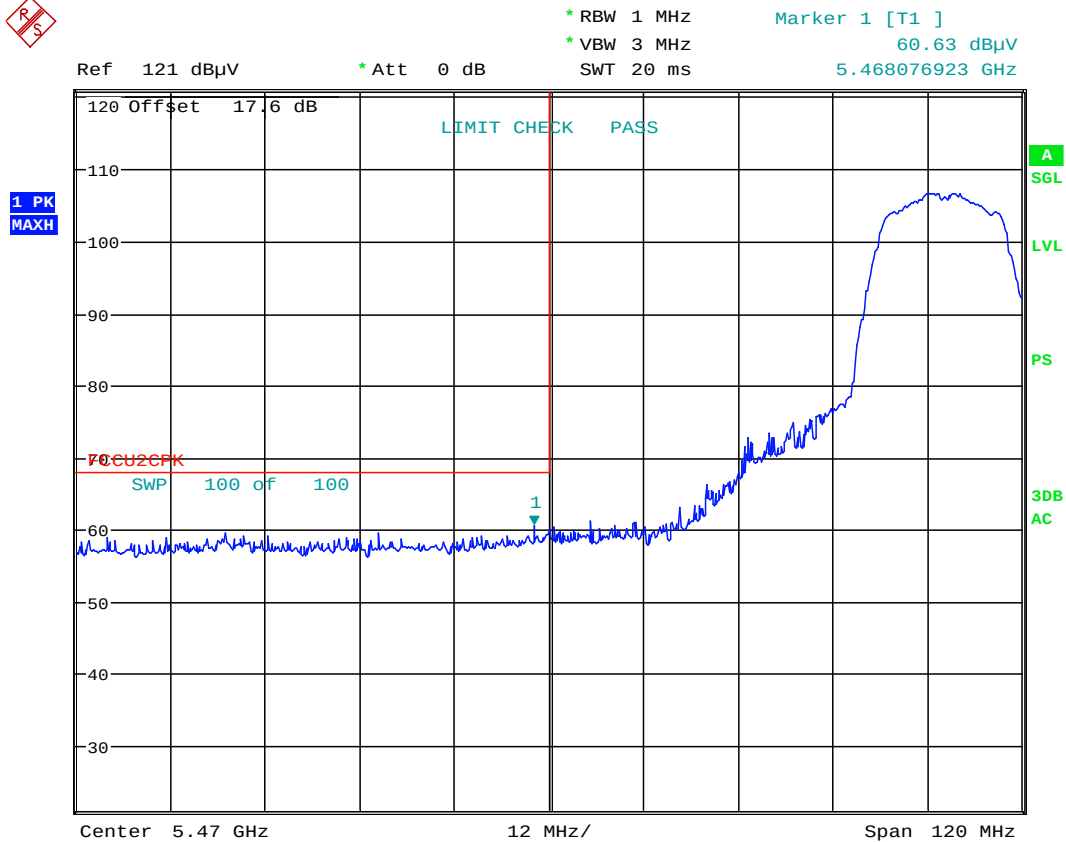


Date: 18.AUG.2015 22:31:47

Plot 6-97. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 87 of 125

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



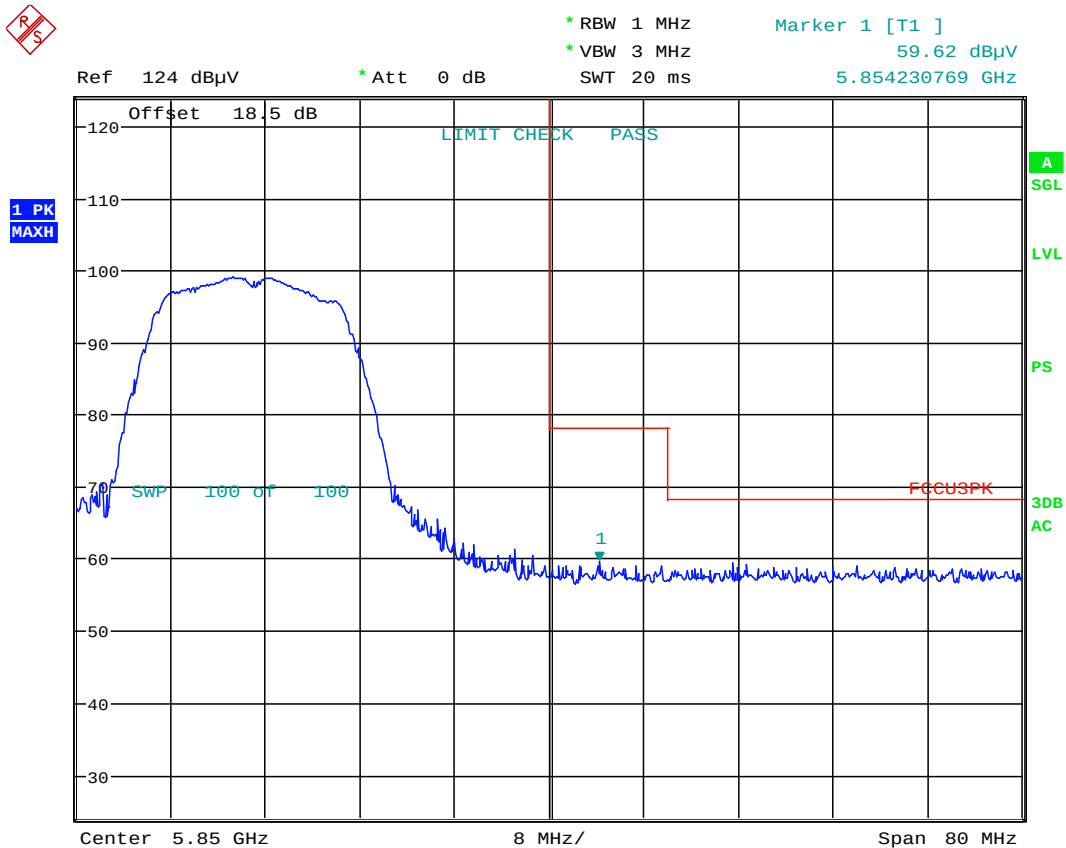
Date: 18.AUG.2015 22:30:38

Plot 6-98. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 88 of 125

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: 18.AUG.2015 22:40:16

Plot 6-99. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 89 of 125

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

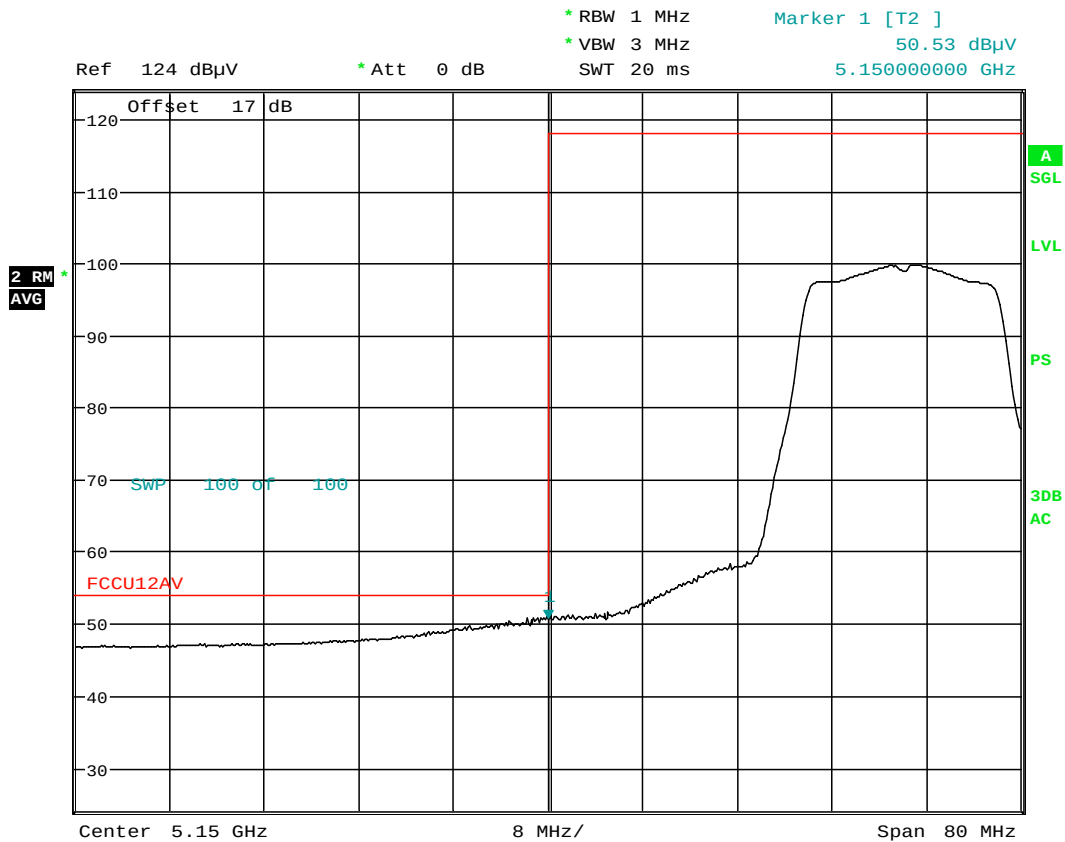
Worst Case Mode: 802.11a

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5180MHz

Channel: 36

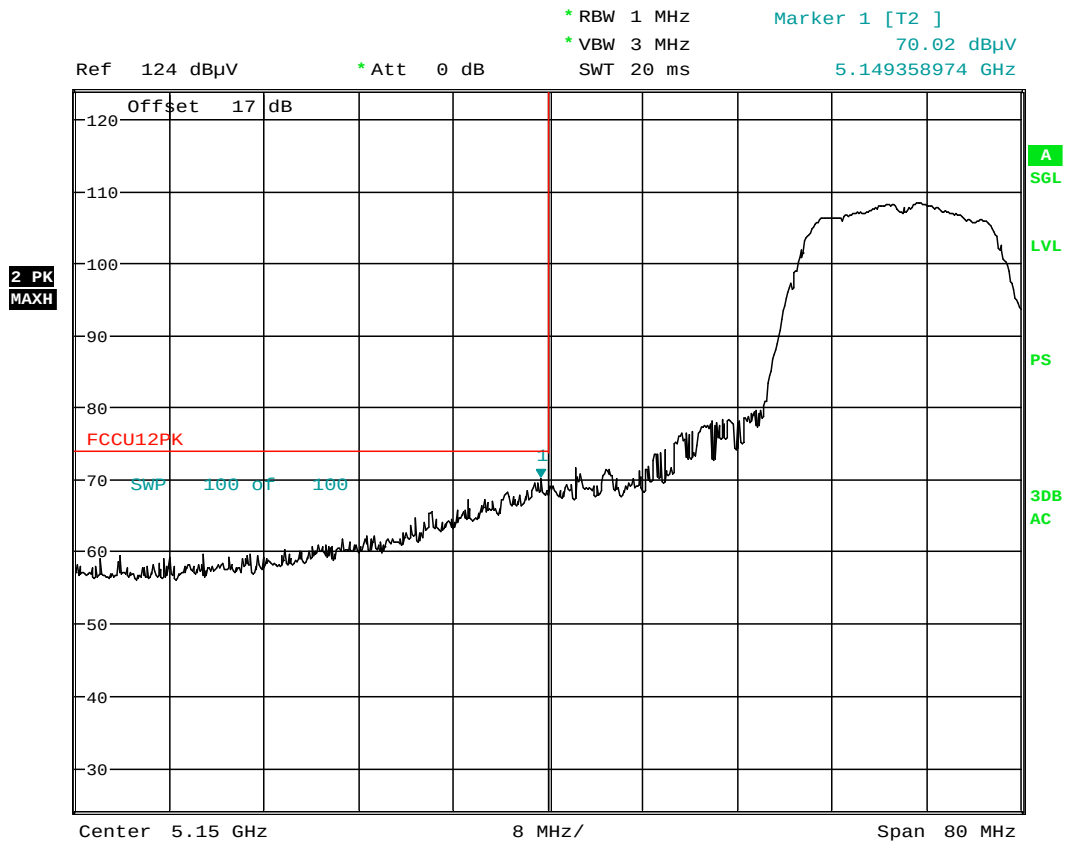


Date: 25.AUG.2015 03:45:53

Plot 6-100. Radiated Restricted Band Edge Plot with WCP (Average – UNII Band 1)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 90 of 125

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



Date: 25.AUG.2015 03:45:08

Plot 6-101. Radiated Restricted Band Edge Plot with WCP (Peak – UNII Band 1)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 91 of 125

6.7.3 Radiated Band Edge Measurements (40MHz BW)

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

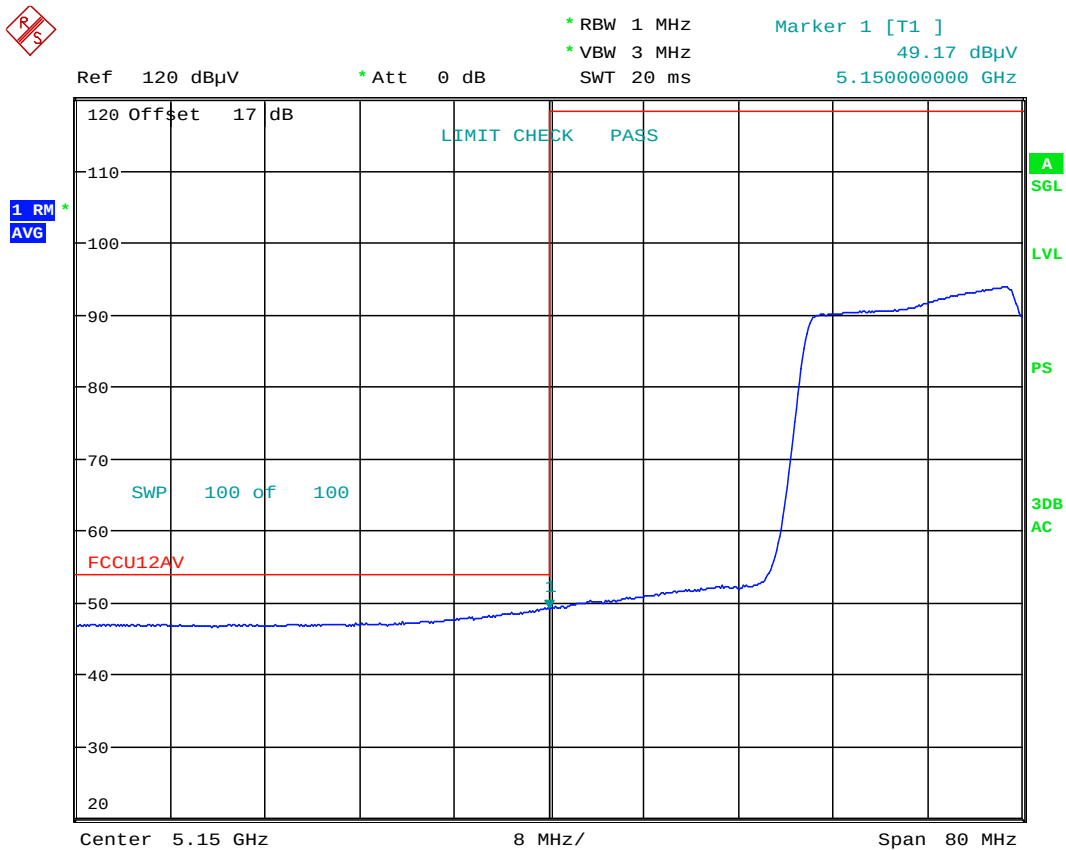
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5190MHz

Channel: 38

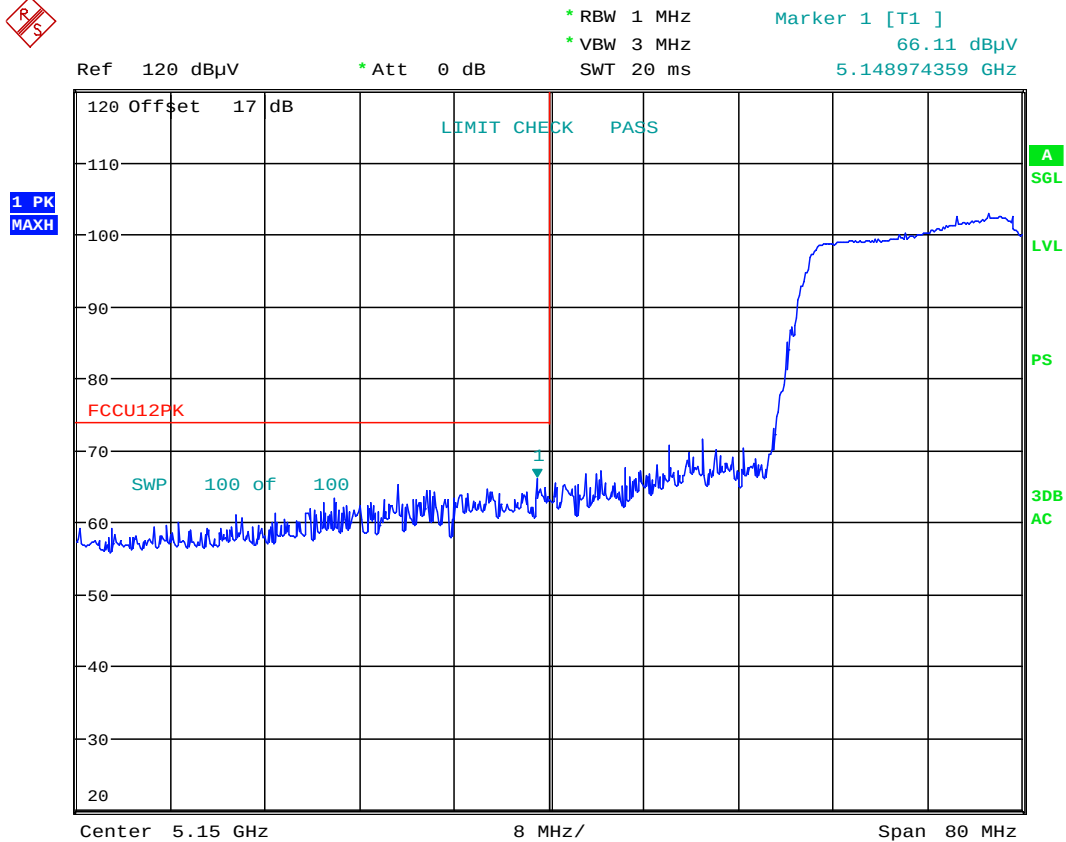


Date: 18.AUG.2015 22:53:39

Plot 6-102. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 92 of 125

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



Date: 18.AUG.2015 22:52:42

Plot 6-103. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 93 of 125

Radiated Band Edge Measurements (40MHz BW)

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

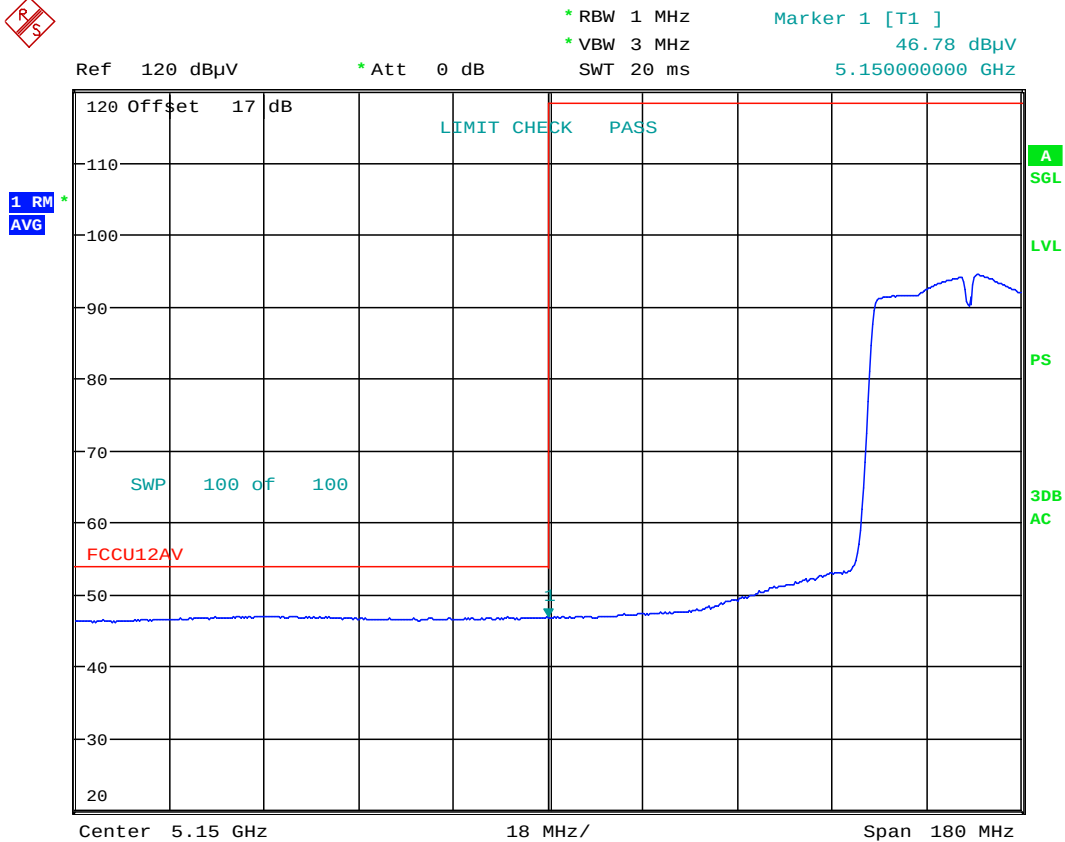
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5230MHz

Channel: 46

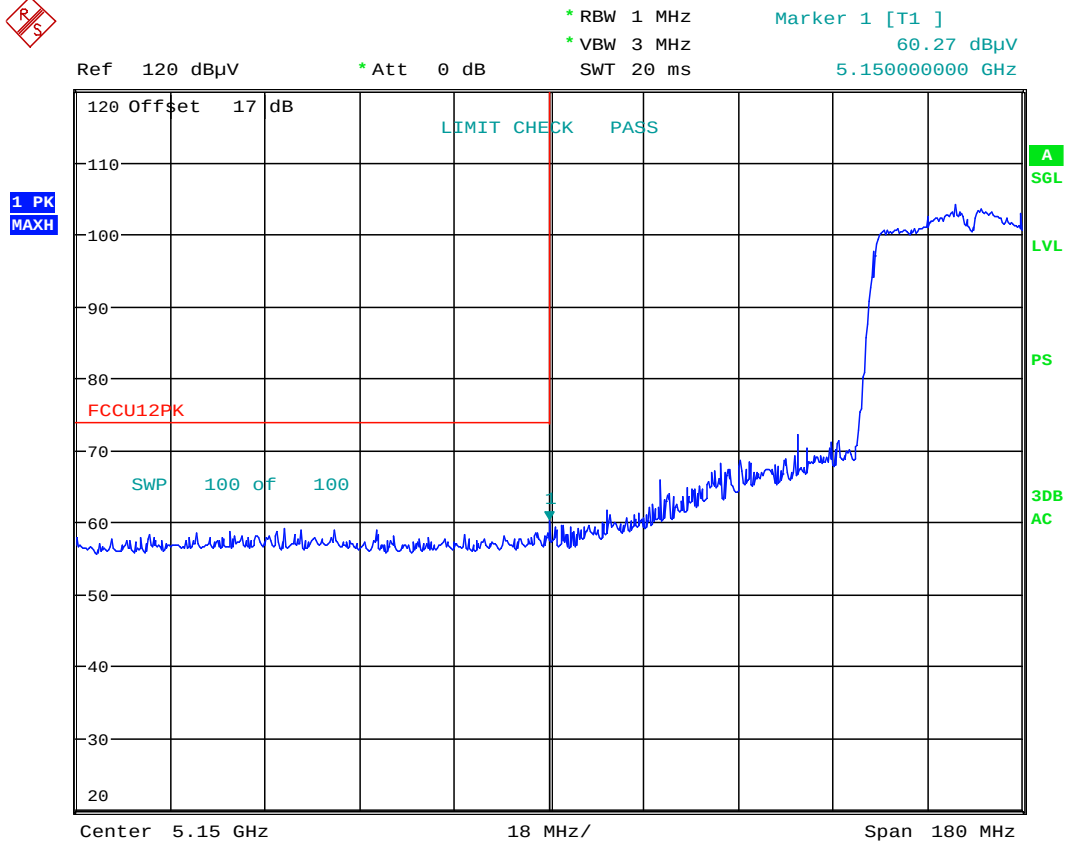


Date: 18.AUG.2015 23:02:05

Plot 6-104. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 94 of 125

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



Date: 18.AUG.2015 23:01:22

Plot 6-105. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 95 of 125

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

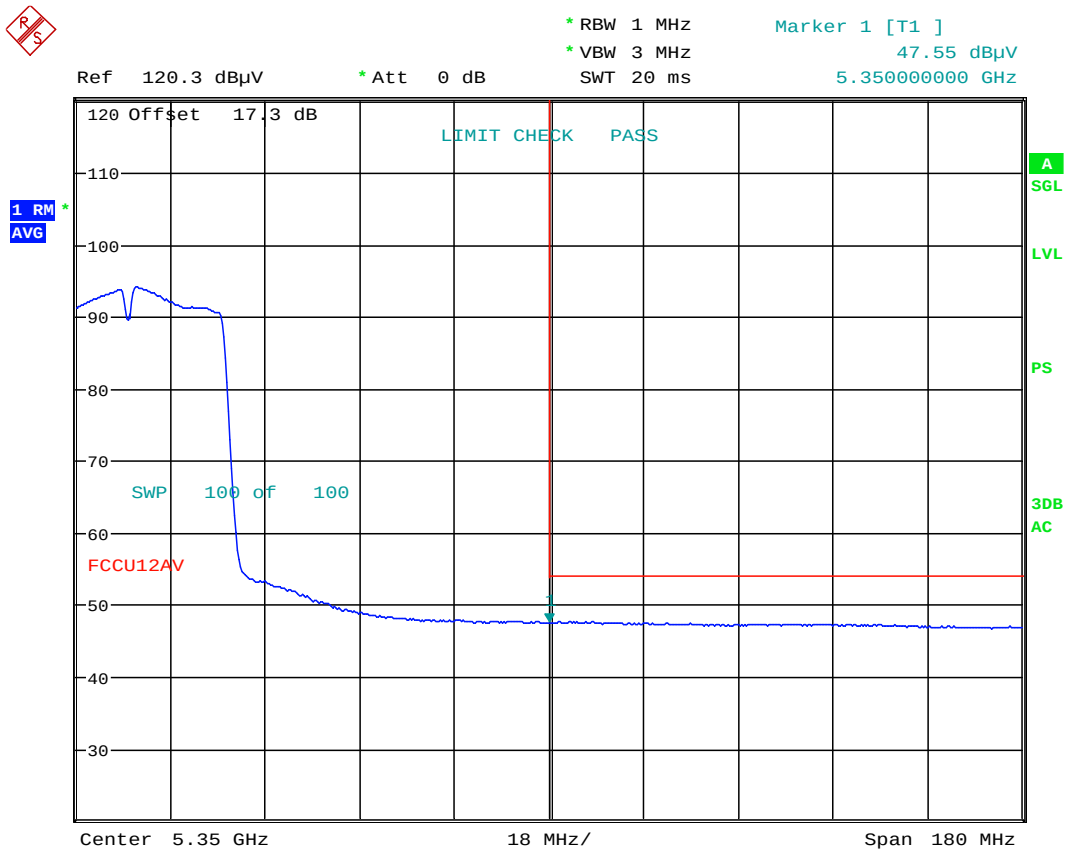
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5270MHz

Channel: 54

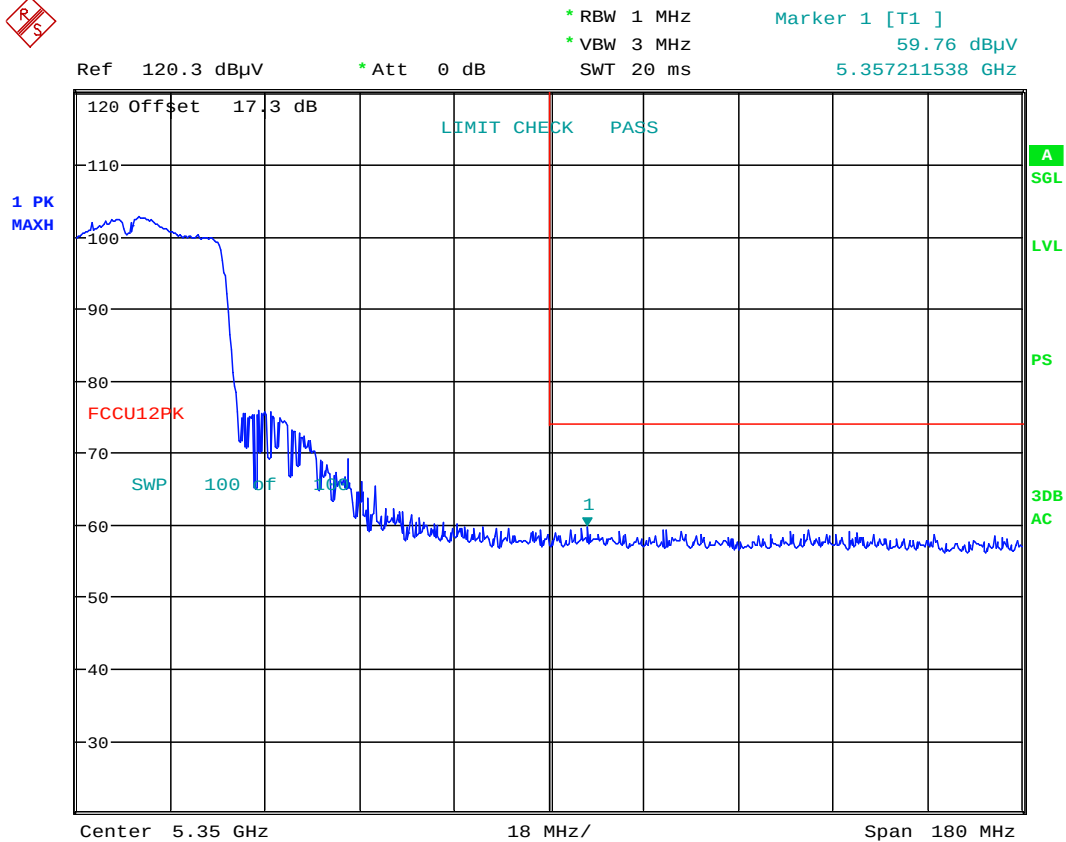


Date: 18.AUG.2015 23:13:23

Plot 6-106. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 96 of 125

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



Date: 18.AUG.2015 23:12:42

Plot 6-107. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 97 of 125

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

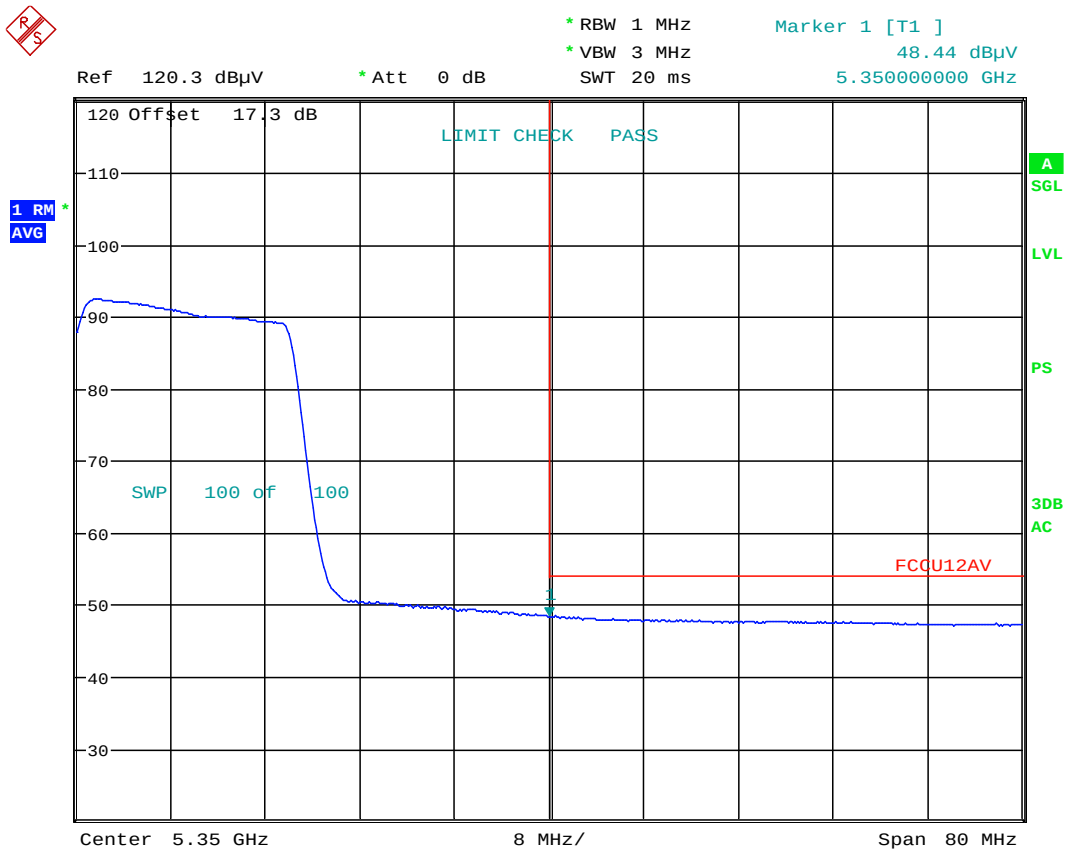
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5310MHz

Channel: 62

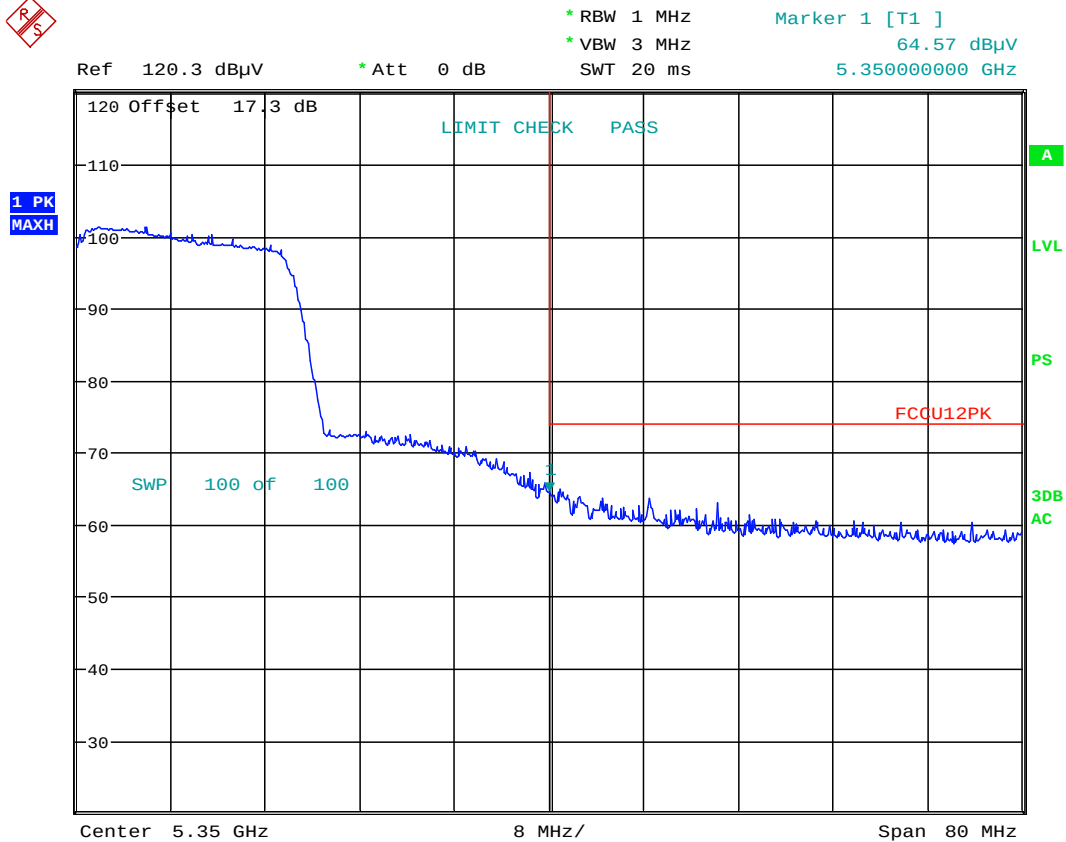


Date: 18.AUG.2015 23:19:41

Plot 6-108. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 98 of 125

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



Date: 18.AUG.2015 23:19:12

Plot 6-109. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 99 of 125

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

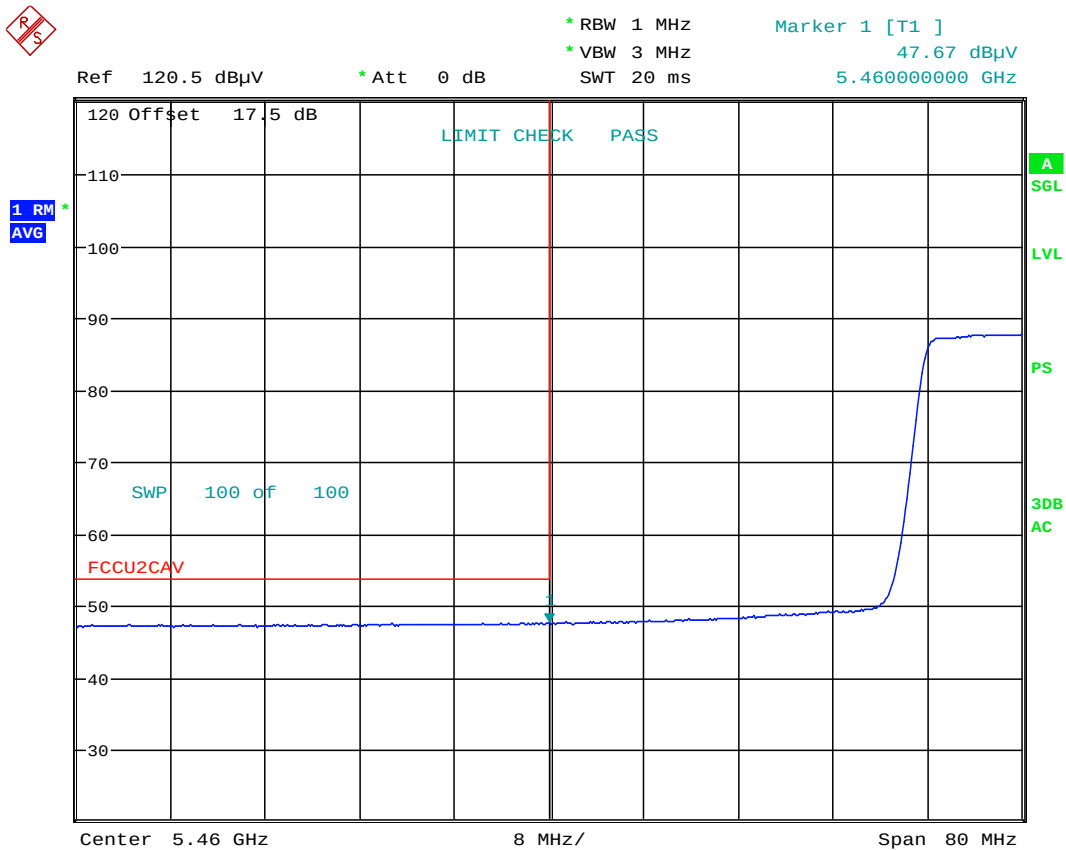
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5510MHz

Channel: 102



Date: 18.AUG.2015 23:28:39

Plot 6-110. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 100 of 125

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

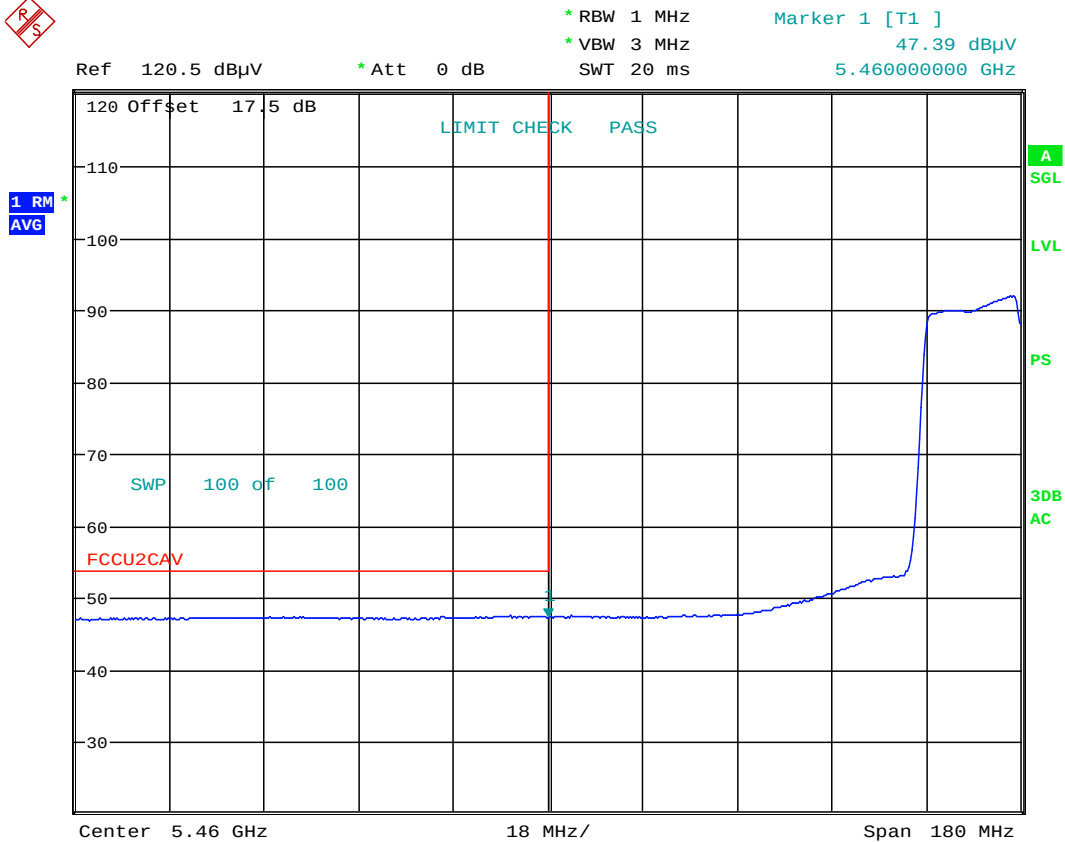
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5550MHz

Channel: 110

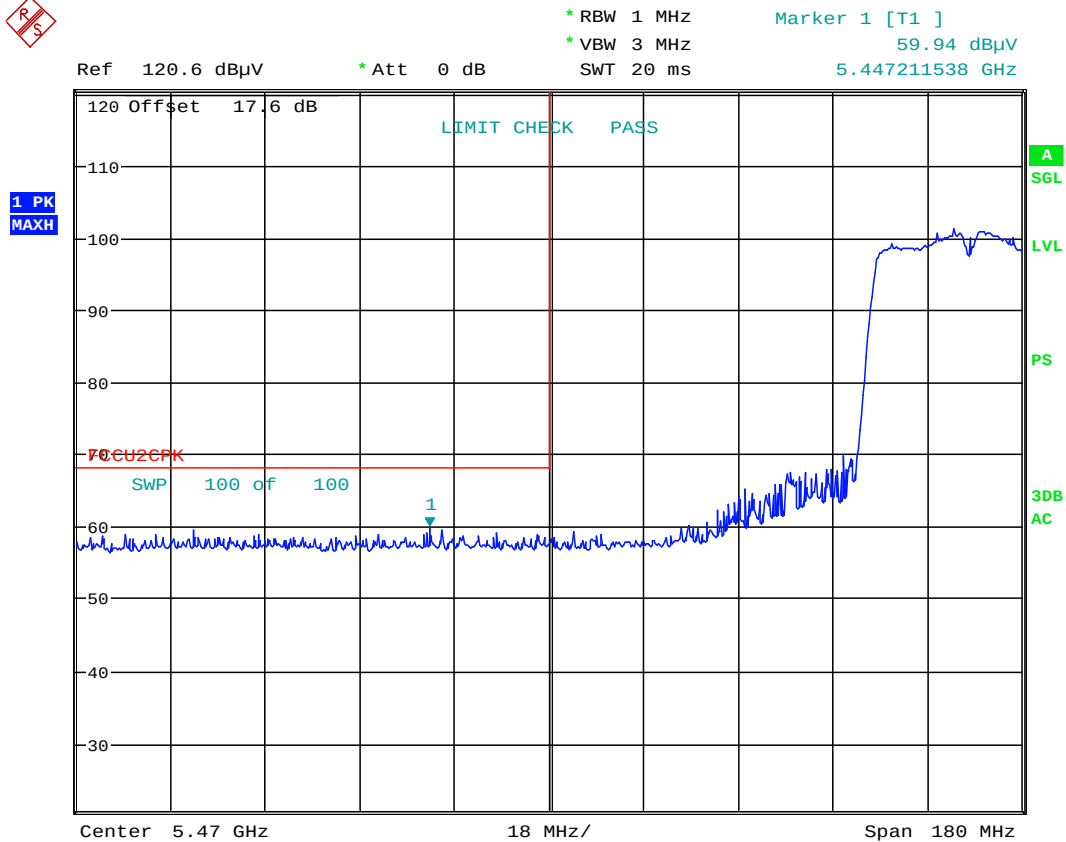


Date: 18.AUG.2015 23:36:29

Plot 6-112. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 102 of 125

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



Date: 18.AUG.2015 23:35:20

Plot 6-113. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 103 of 125

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

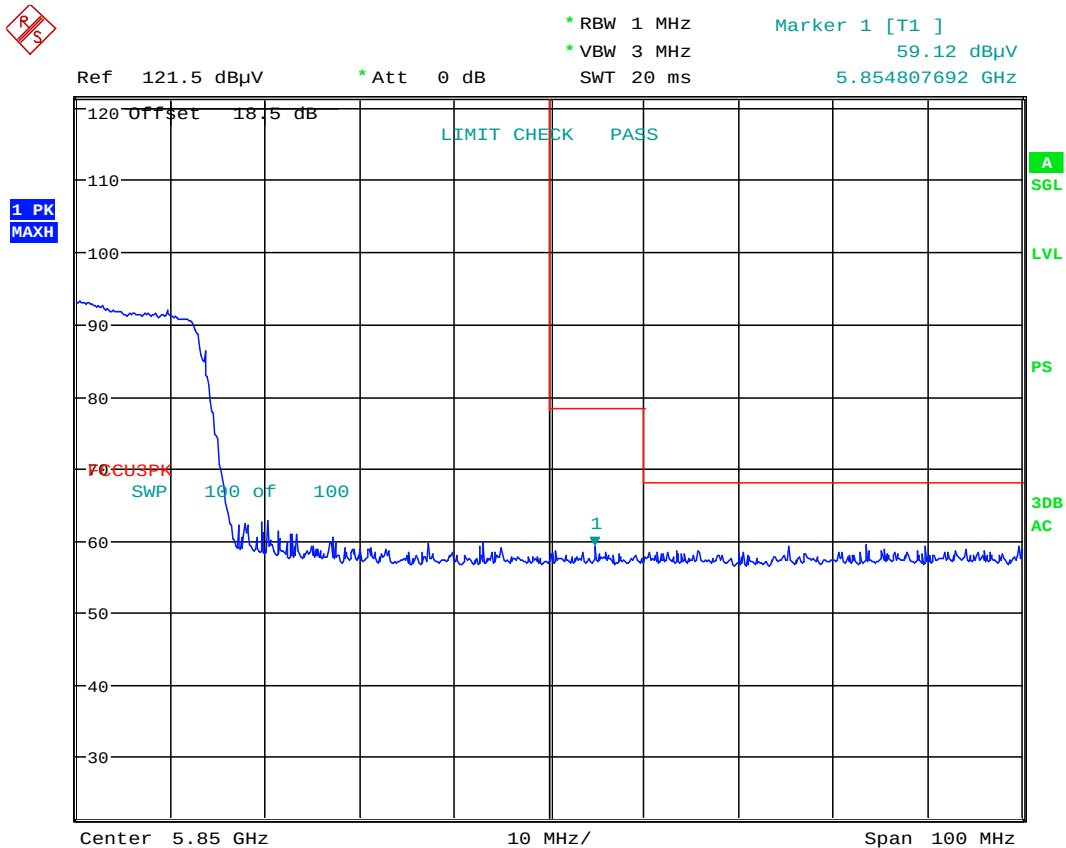
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5795MHz

Channel: 159



Date: 18.AUG.2015 23:43:13

Plot 6-114. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 104 of 125

6.7.4 Radiated Band Edge Measurements (80MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

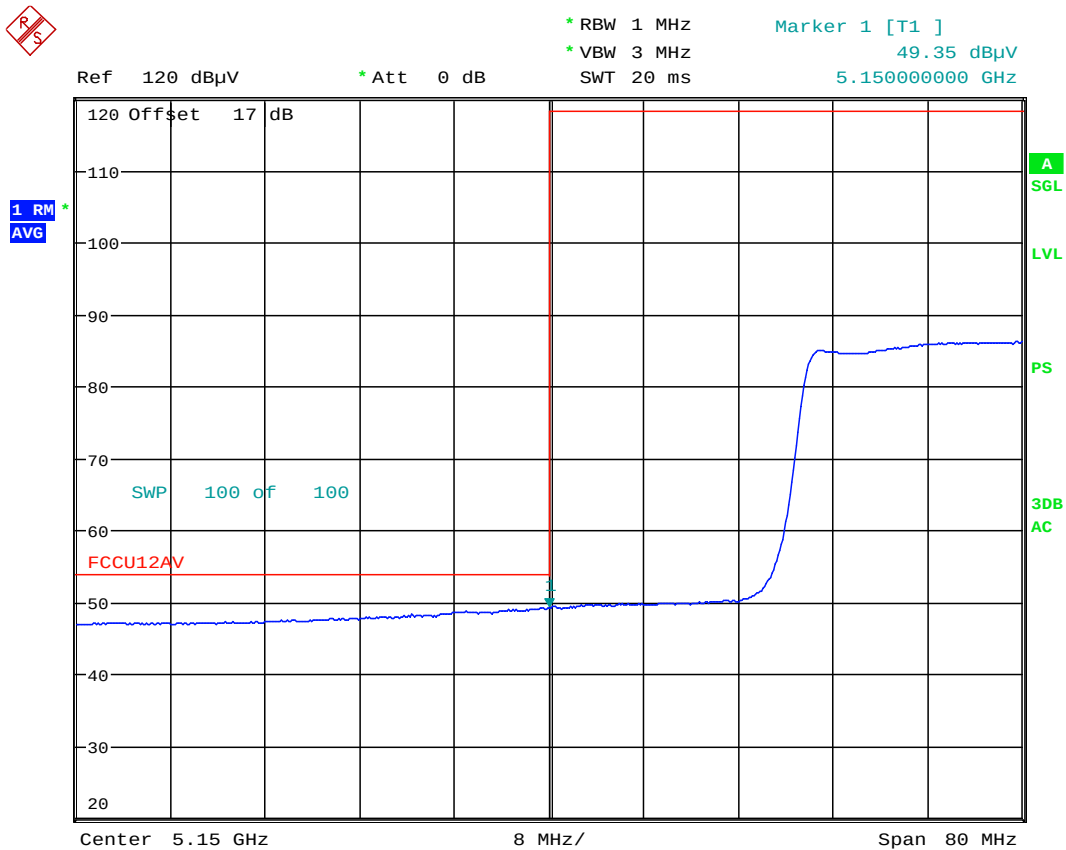
Worst Case Mode: 802.11n (80MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5210MHz

Channel: 42

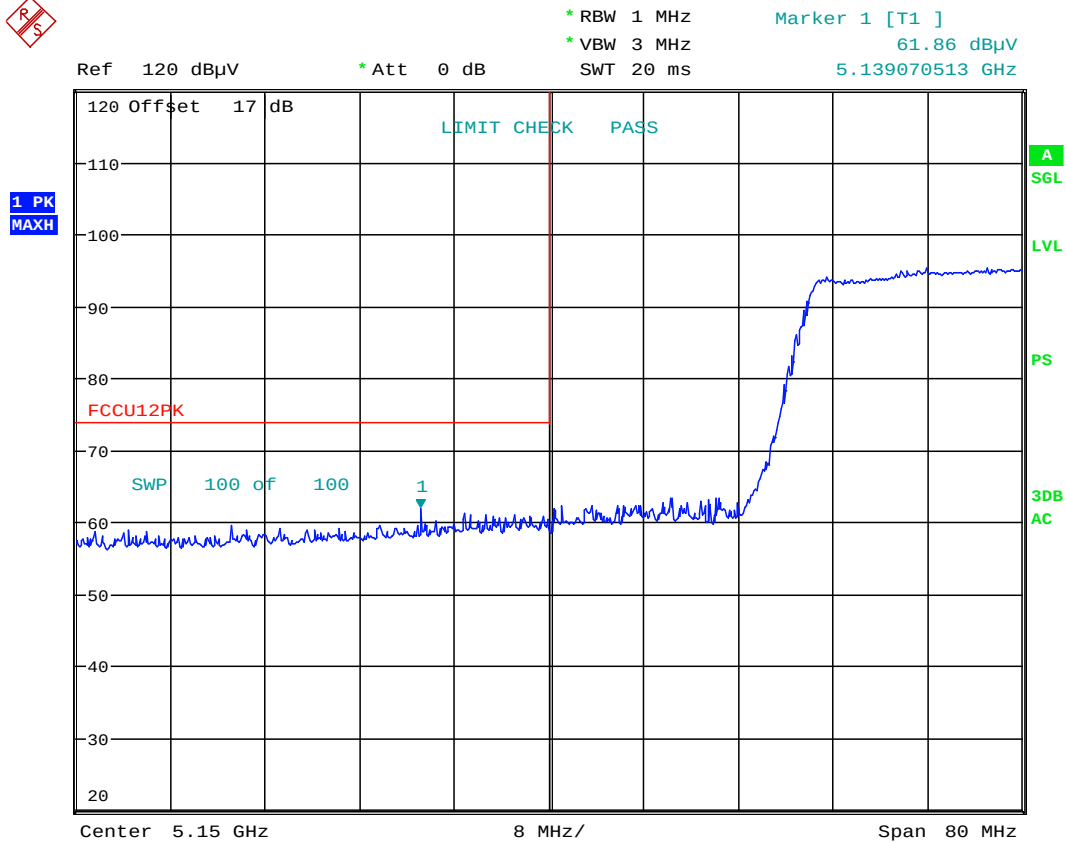


Date: 18.AUG.2015 23:54:53

Plot 6-115. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 105 of 125

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



Date: 18.AUG.2015 23:54:16

Plot 6-116. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 106 of 125

Radiated Band Edge Measurements (80MHz BW) §15.407(b.1)(b.2) §15.205 §15.209

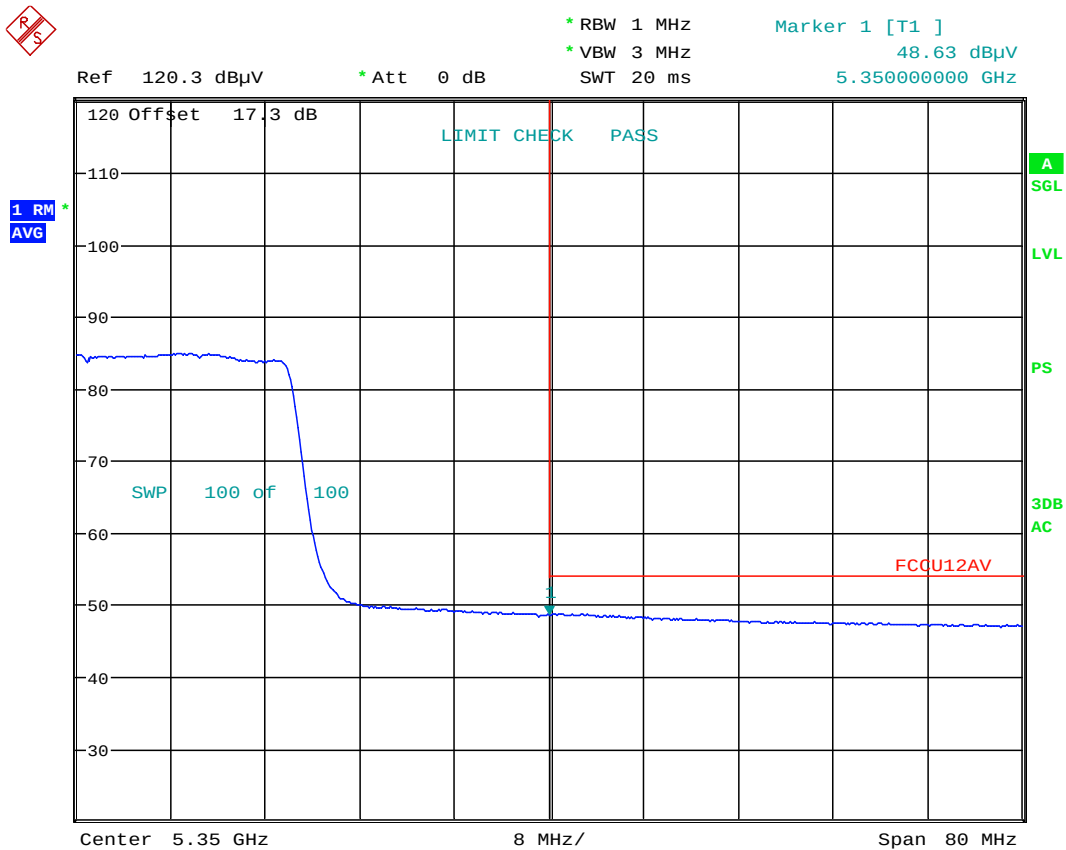
Worst Case Mode: 802.11ac (80MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5290MHz

Channel: 58

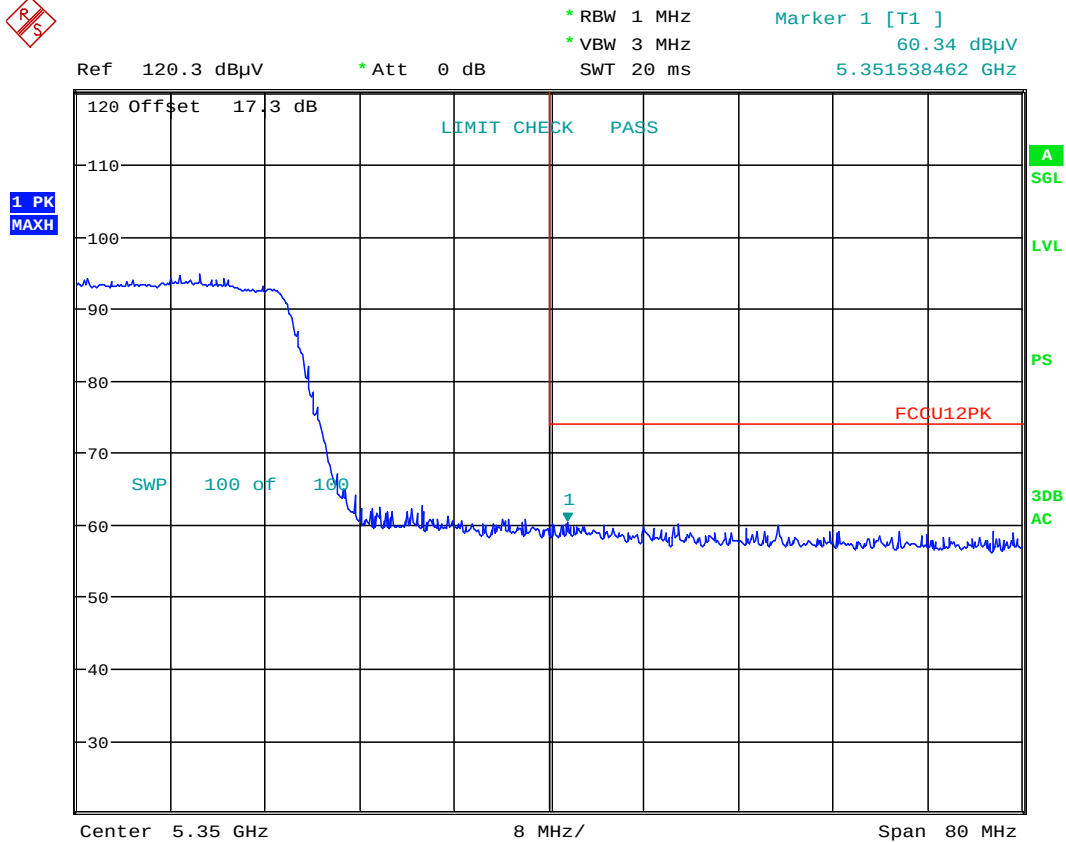


Date: 19.AUG.2015 00:01:42

Plot 6-117. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 107 of 125

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



Date: 19.AUG.2015 00:01:10

Plot 6-118. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 108 of 125

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

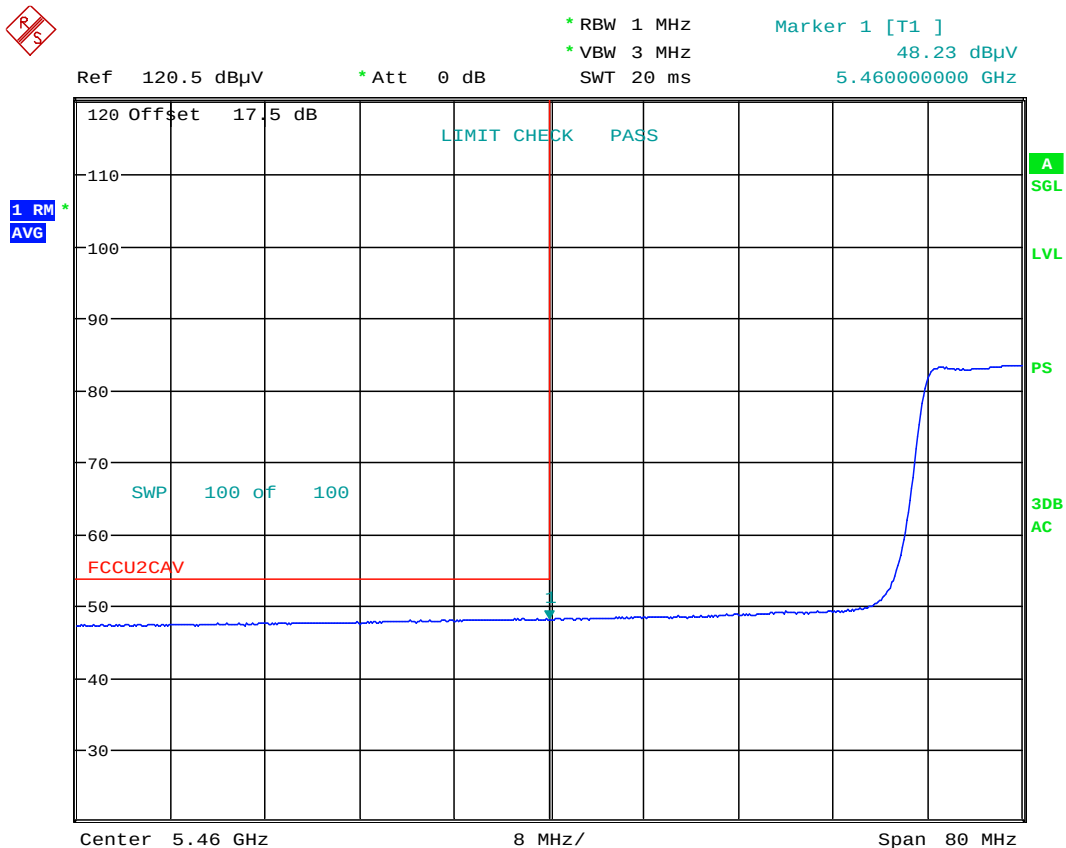
Worst Case Mode: 802.11ac (80MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5530MHz

Channel: 106



Date: 19.AUG.2015 00:12:51

Plot 6-119. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 109 of 125

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

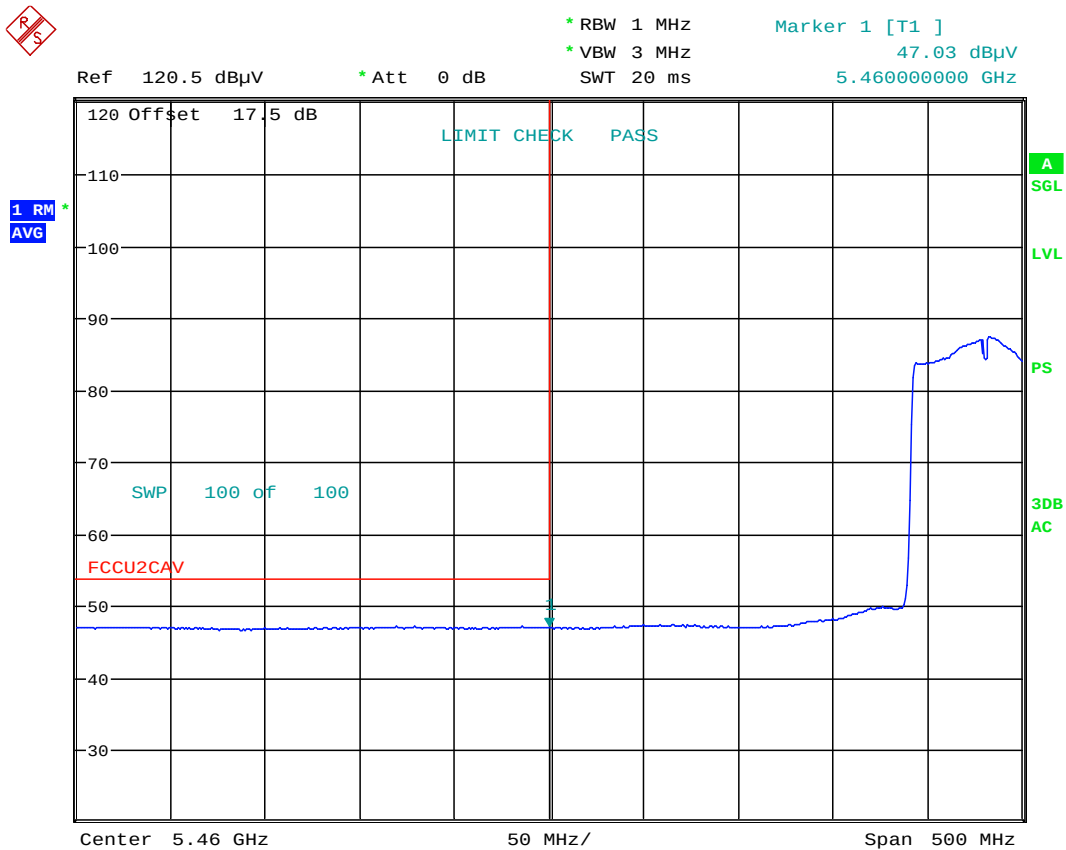
Worst Case Mode: 802.11ac (80MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5690MHz

Channel: 138

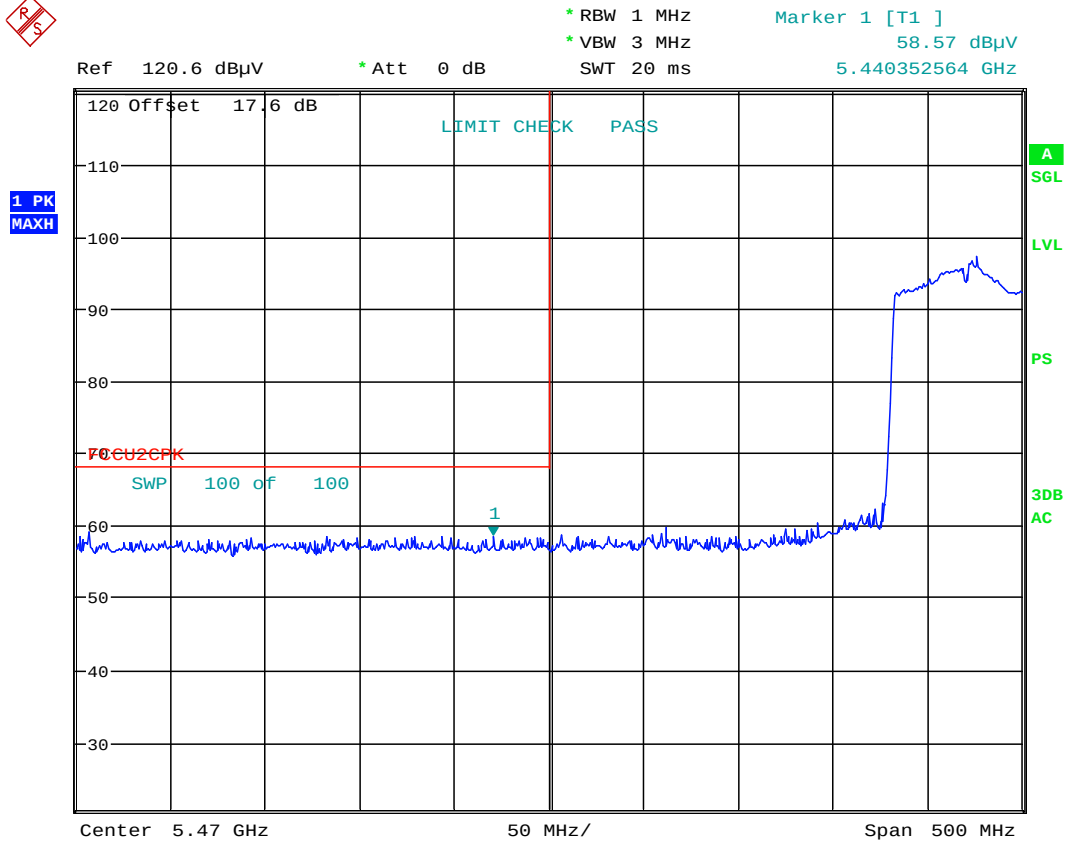


Date: 19.AUG.2015 00:25:38

Plot 6-121. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1508101529.ZNF	Test Dates: 8/10 - 8/25/2015	EUT Type: Portable Handset		Page 111 of 125

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



Date: 19.AUG.2015 00:24:46

Plot 6-122. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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Radiated Band Edge Measurements (80MHz BW) \$15.407(b.1)(b.2) \$15.205 \$15.209

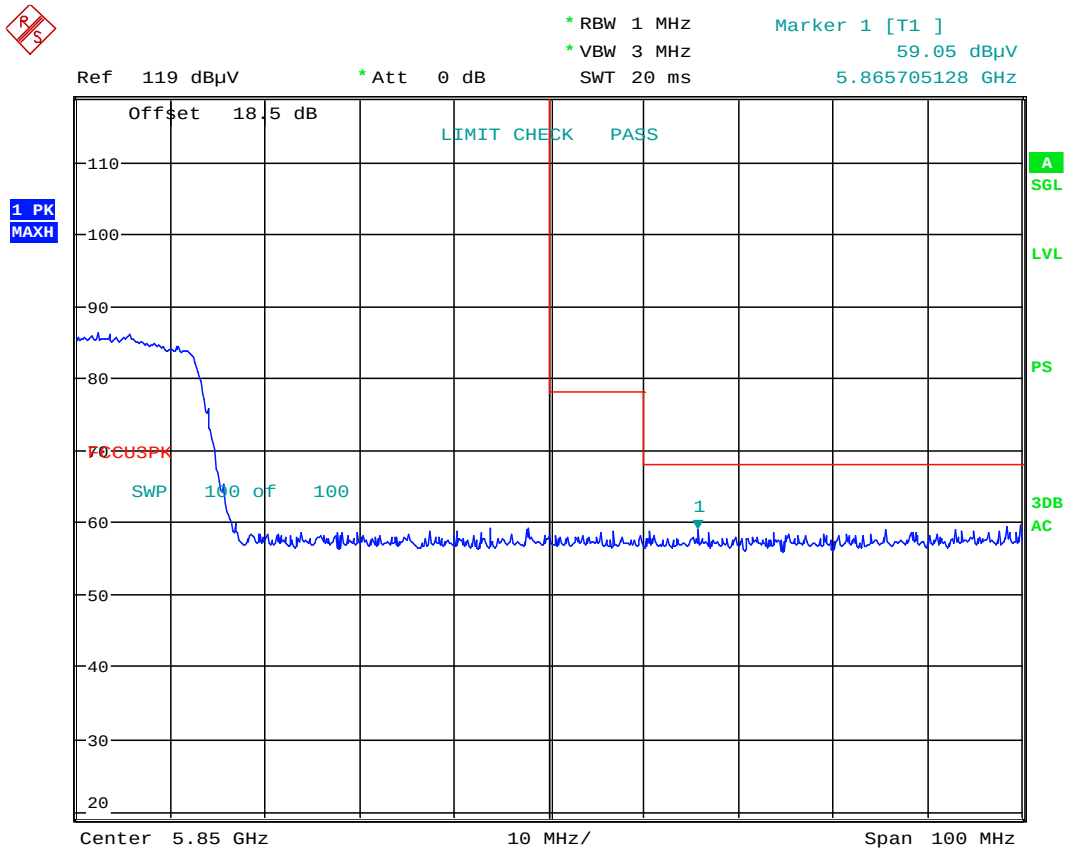
Worst Case Mode: 802.11ac (80MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5775MHz

Channel: 155



Date: 19.AUG.2015 00:31:37

Plot 6-123. Radiated Upper Band Edge Plot (Peak – UNII Band 3)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager
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6.8 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 6-30 per Section 15.209.

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

Table 6-30. Radiated Limits

Test Procedures Used

ANSI C63.4-2009

Test Settings

Quasi-Peak Field Strength Measurements

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

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Test Setup

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

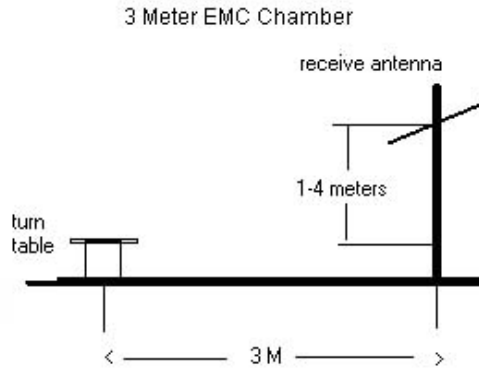


Figure 6-6. Test Instrument & Measurement Setup

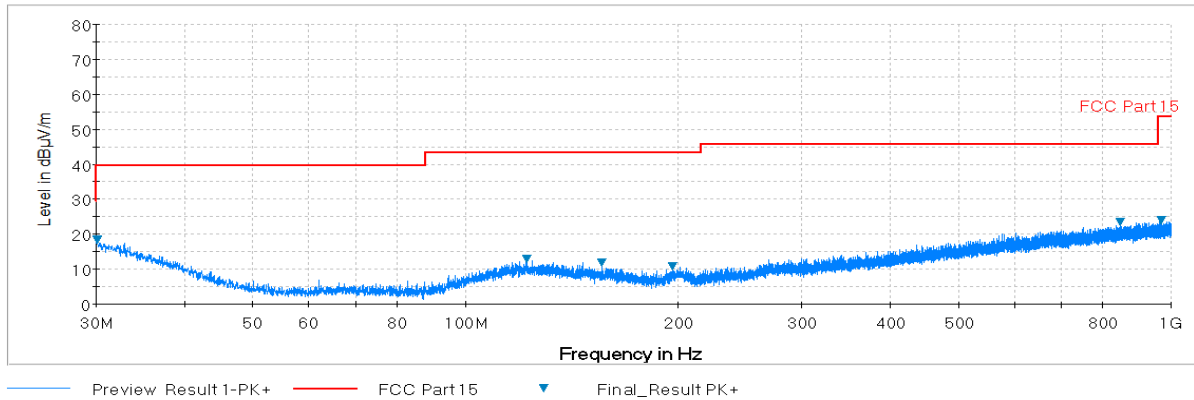
Test Notes

1. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 6-13.
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.

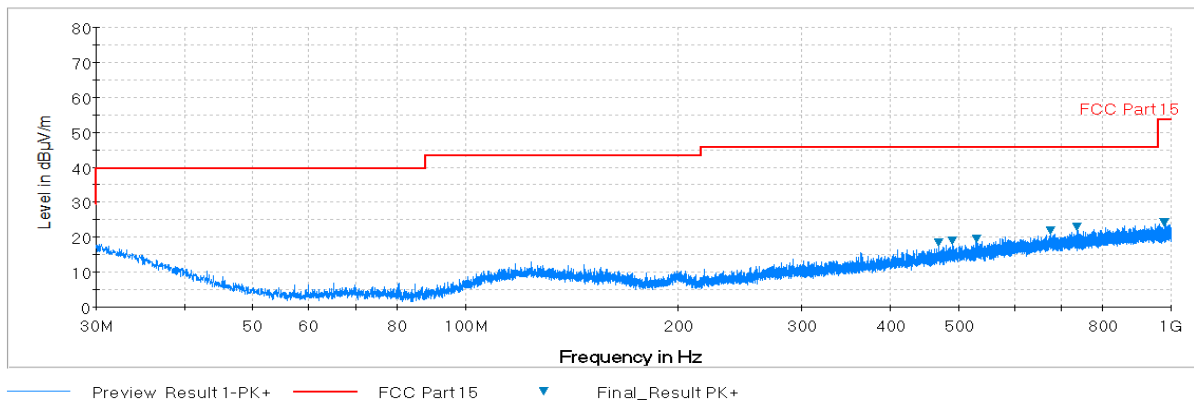
FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
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Radiated Spurious Emissions Measurements (Below 1GHz)

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Plot 6-124. Radiated Spurious Plot below 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)

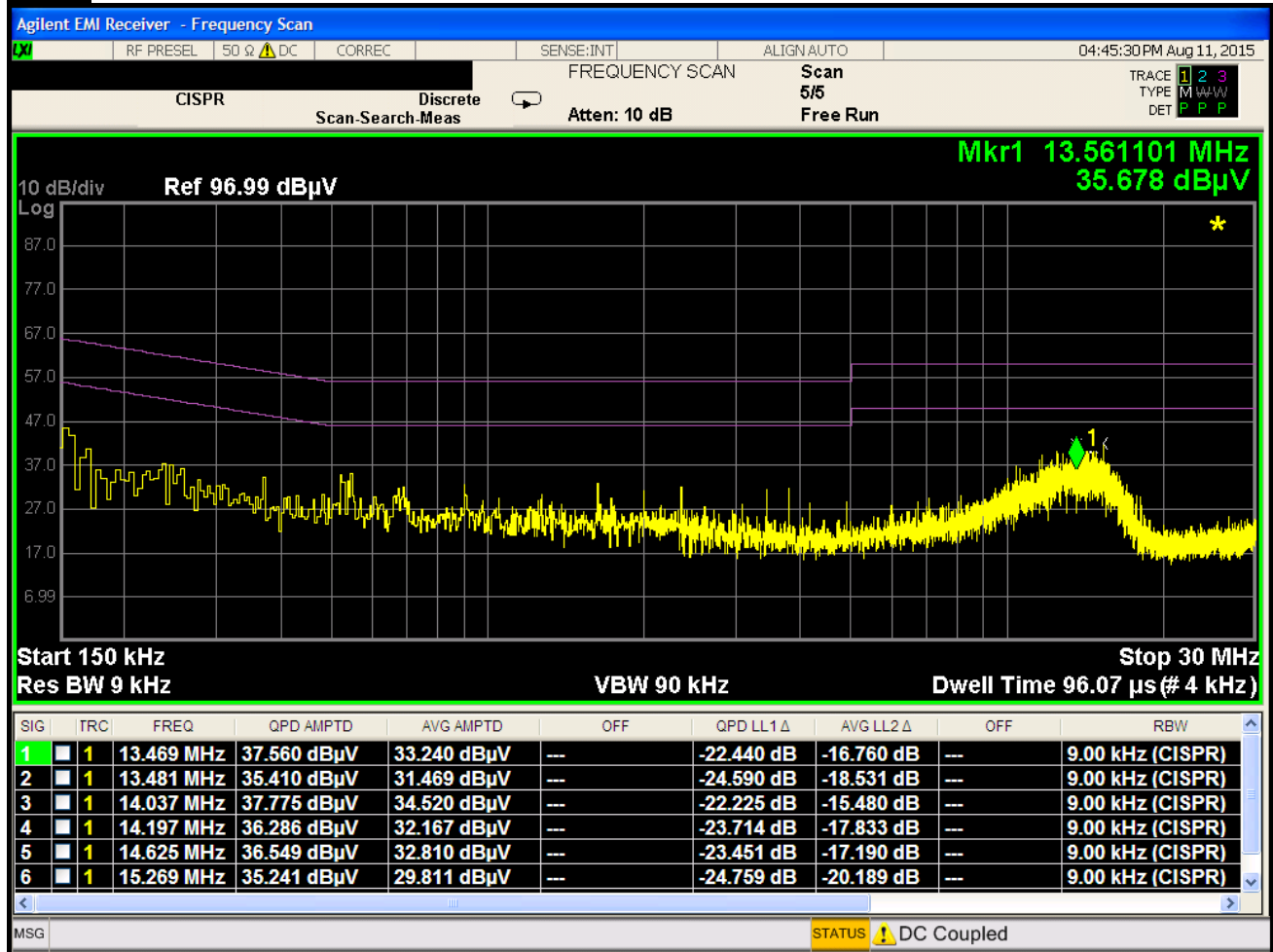


Plot 6-125. Radiated Spurious Plot below 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)

FCC ID: ZNFVS990	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	Reviewed by: Quality Manager
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6.9 Line-Conducted Test Data

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Plot 6-126. Line Conducted Plot with 802.11a UNII Band 1 (L1)

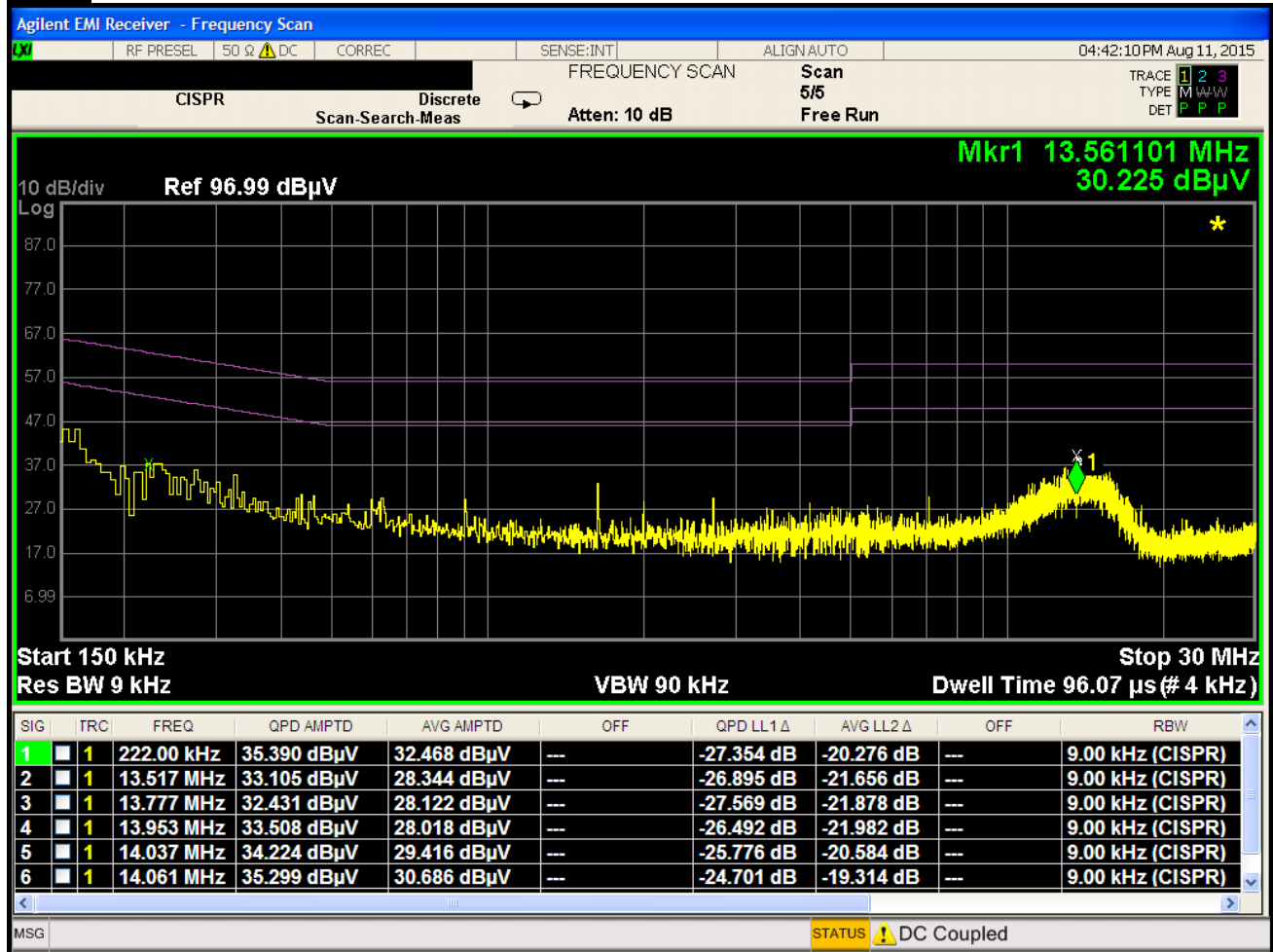
Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 36. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBμV) - QP/AV Level (dBμV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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Line-Conducted Test Data

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Plot 6-127. Line Conducted Plot with 802.11a UNII Band 1 (N)

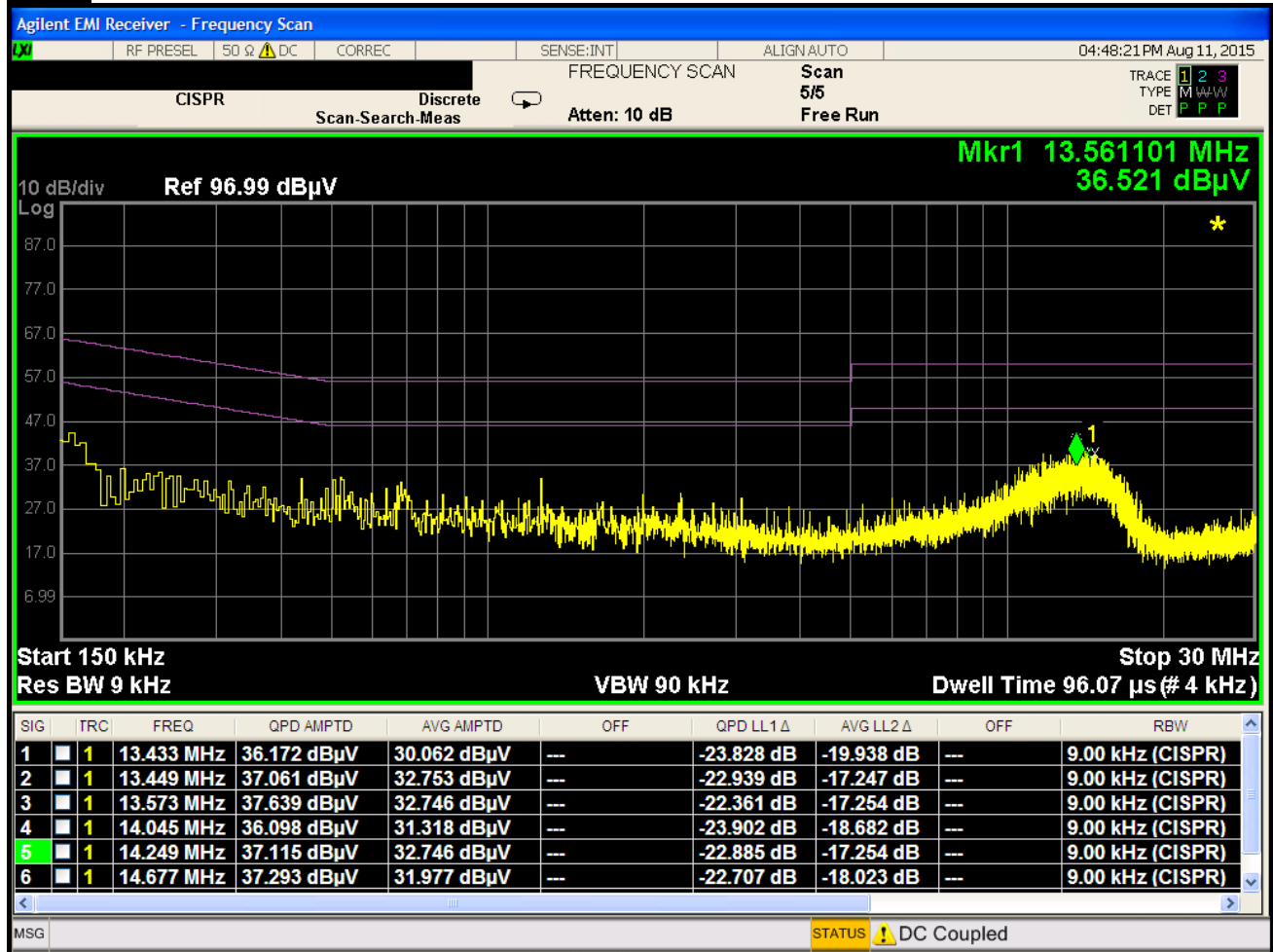
Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 36. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBμV) - QP/AV Level (dBμV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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Line-Conducted Test Data

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Plot 6-128. Line Conducted Plot with 802.11a UNII Band 2A (L1)

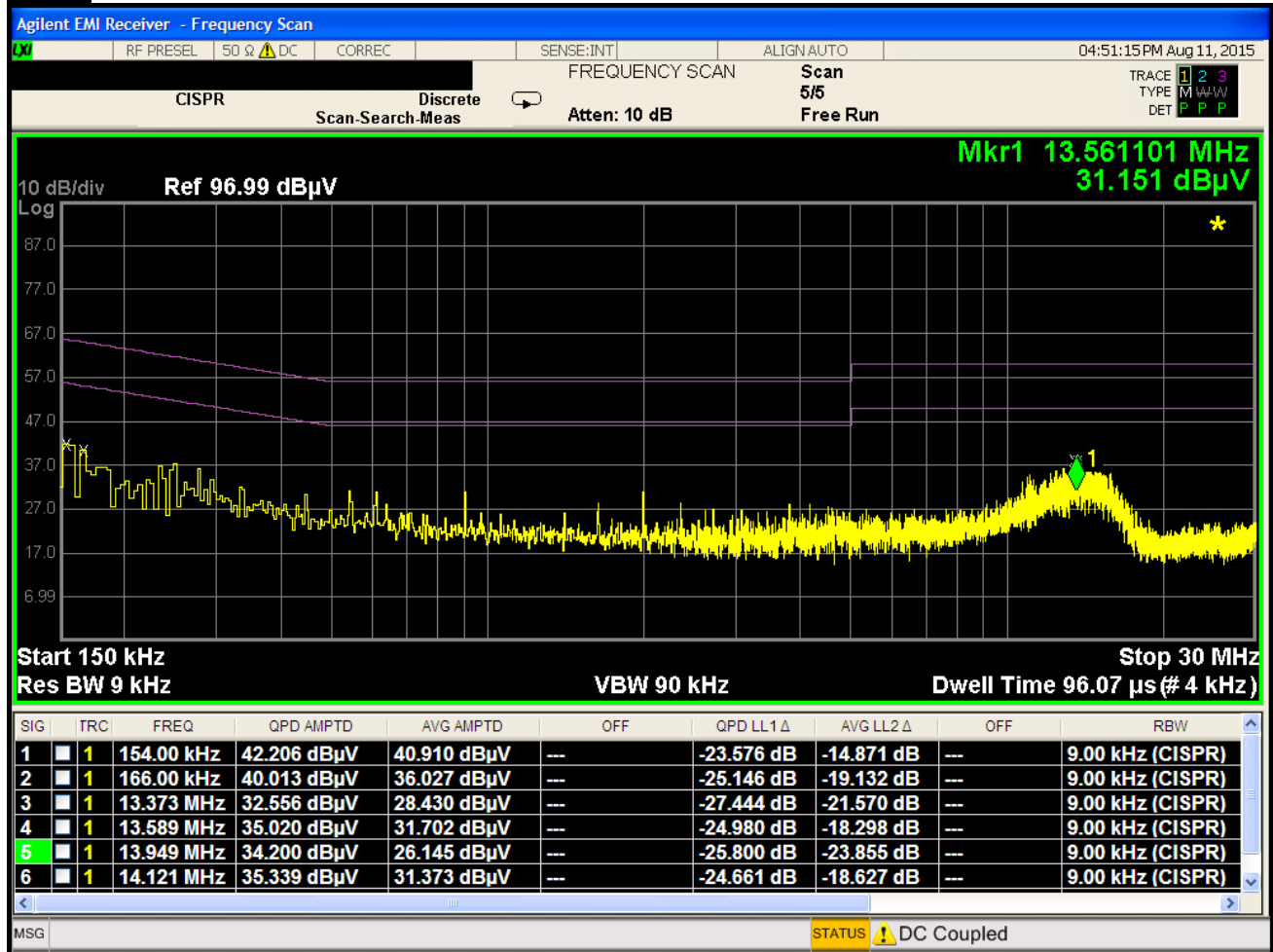
Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 52. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBμV) - QP/AV Level (dBμV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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Plot 6-129. Line Conducted Plot with 802.11a UNII Band 2A (N)

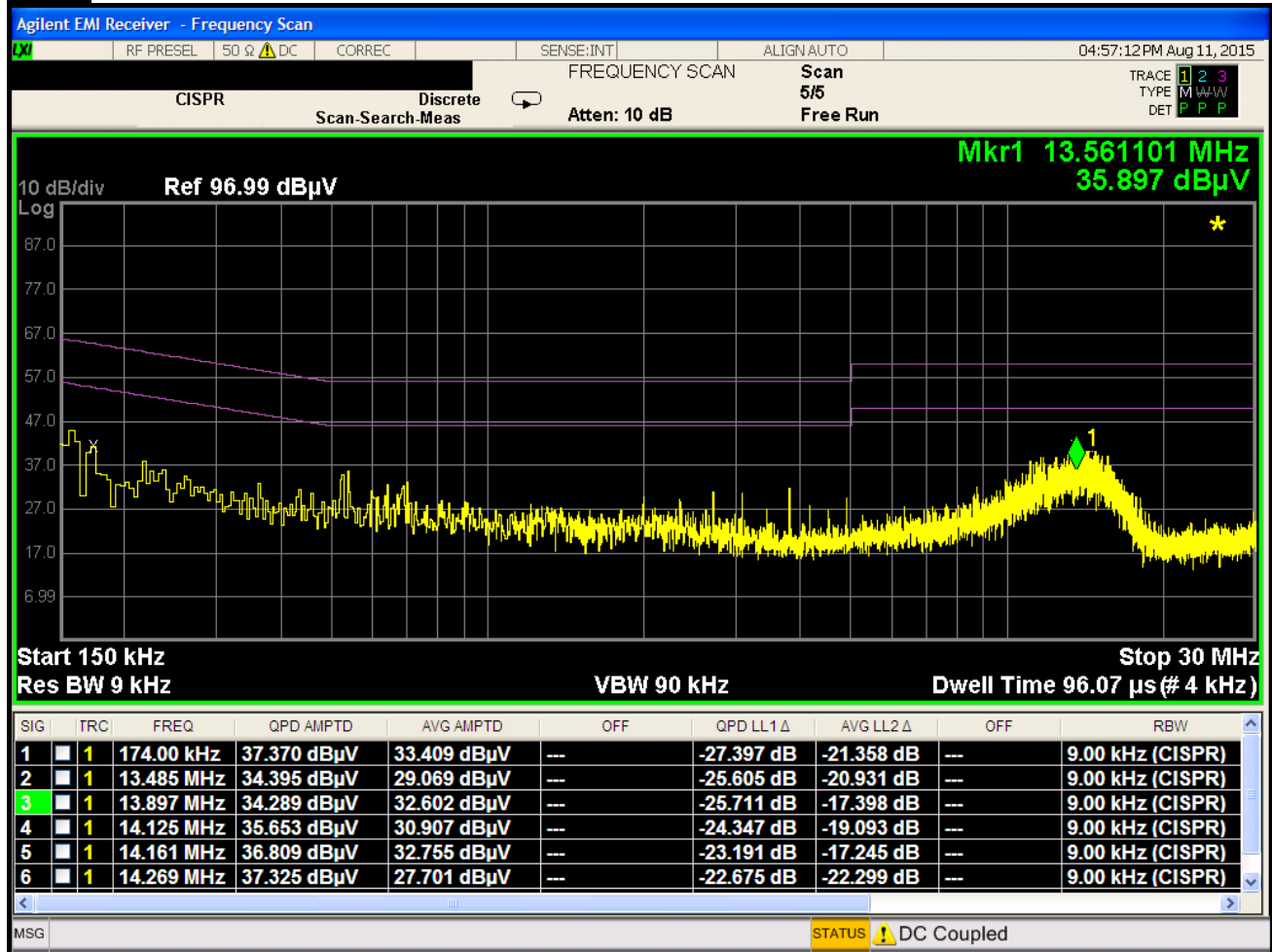
Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 52. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBμV) - QP/AV Level (dBμV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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Line-Conducted Test Data

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Plot 6-130. Line Conducted Plot with 802.11a UNII Band 2C (L1)

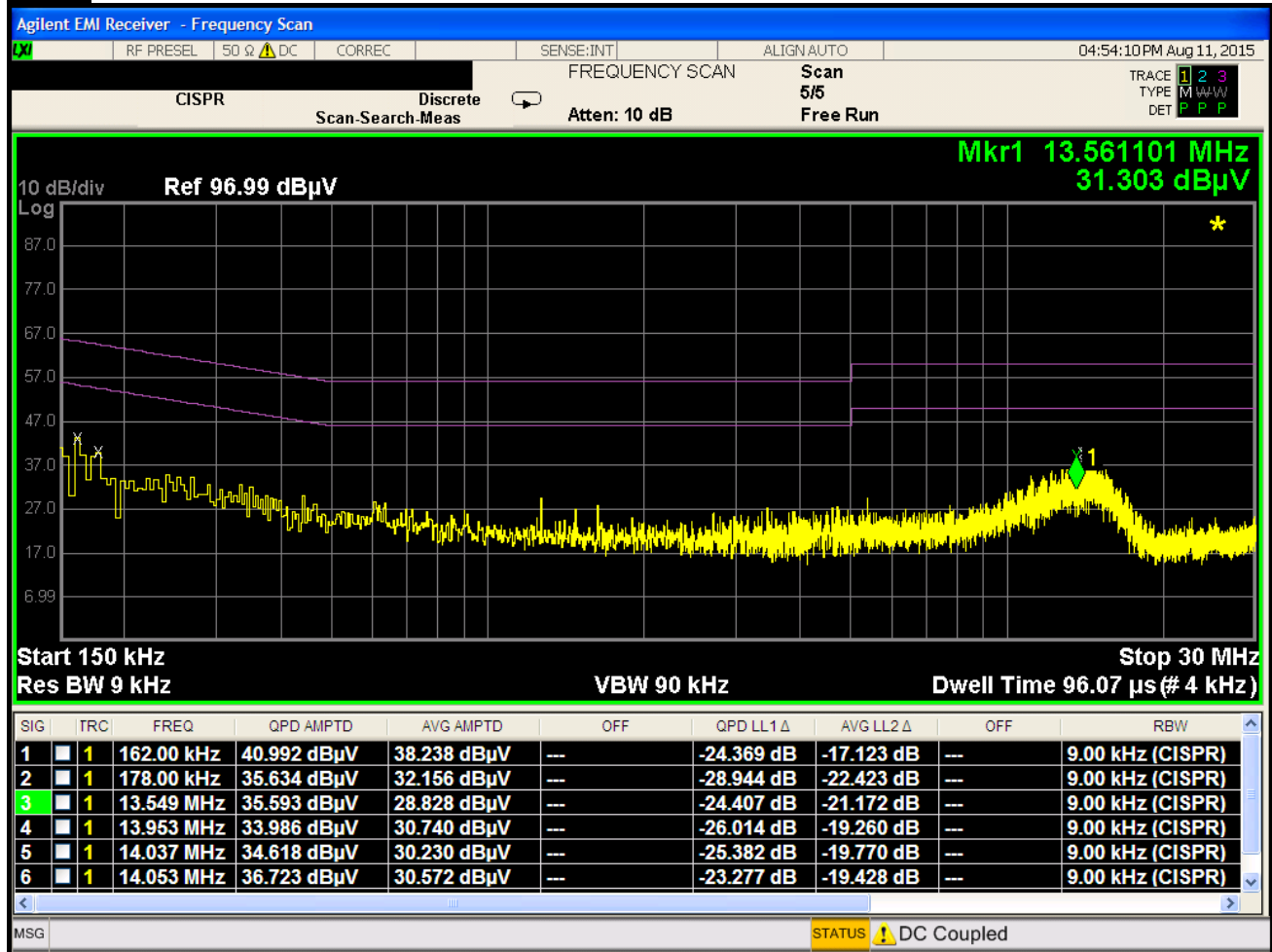
Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 100. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBμV) - QP/AV Level (dBμV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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Line-Conducted Test Data

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Plot 6-131. Line Conducted Plot with 802.11a UNII Band 2C (N)

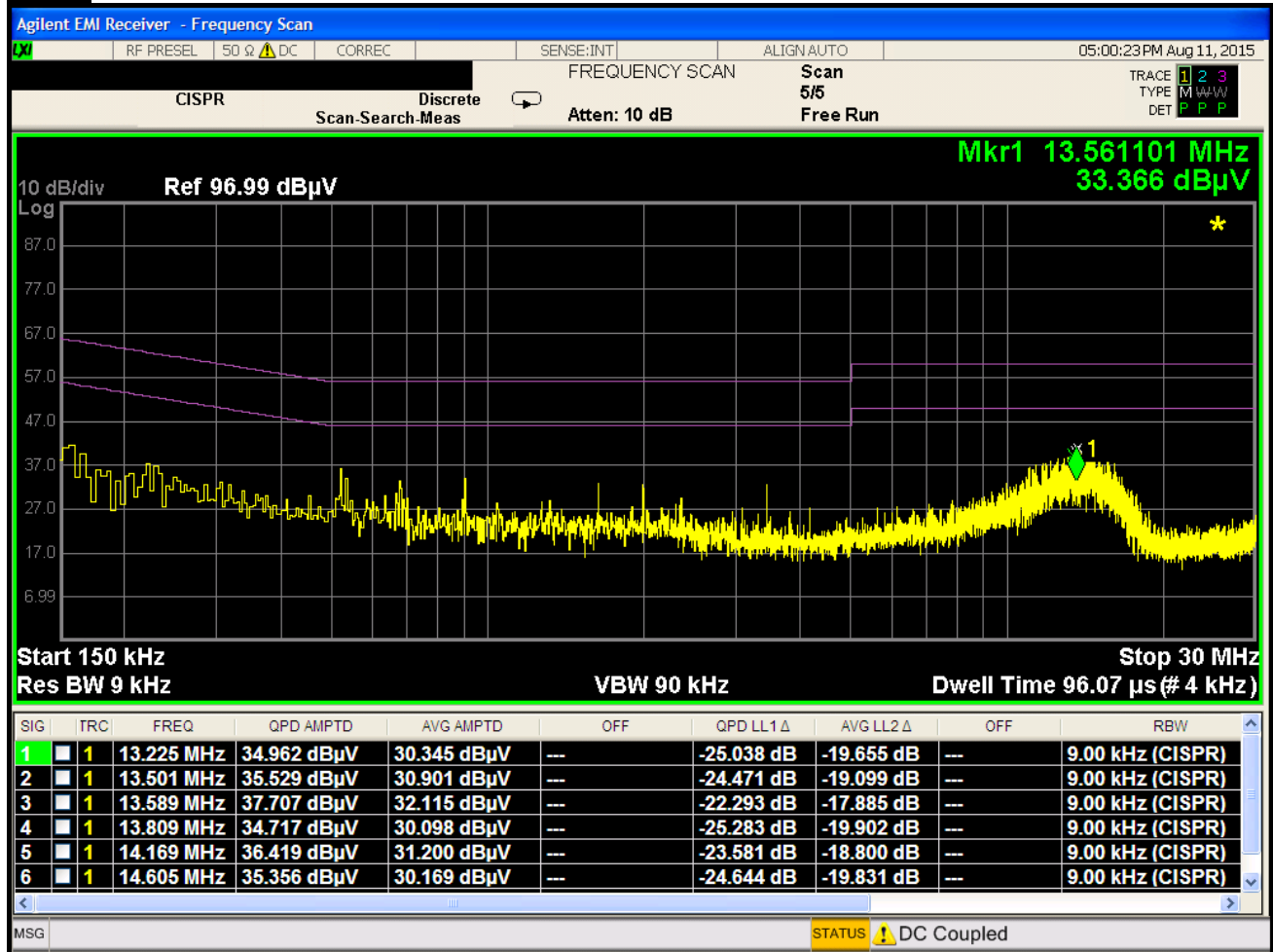
Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 100. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBμV) - QP/AV Level (dBμV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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Line-Conducted Test Data

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Plot 6-132. Line Conducted Plot with 802.11a UNII Band 3 (L1)

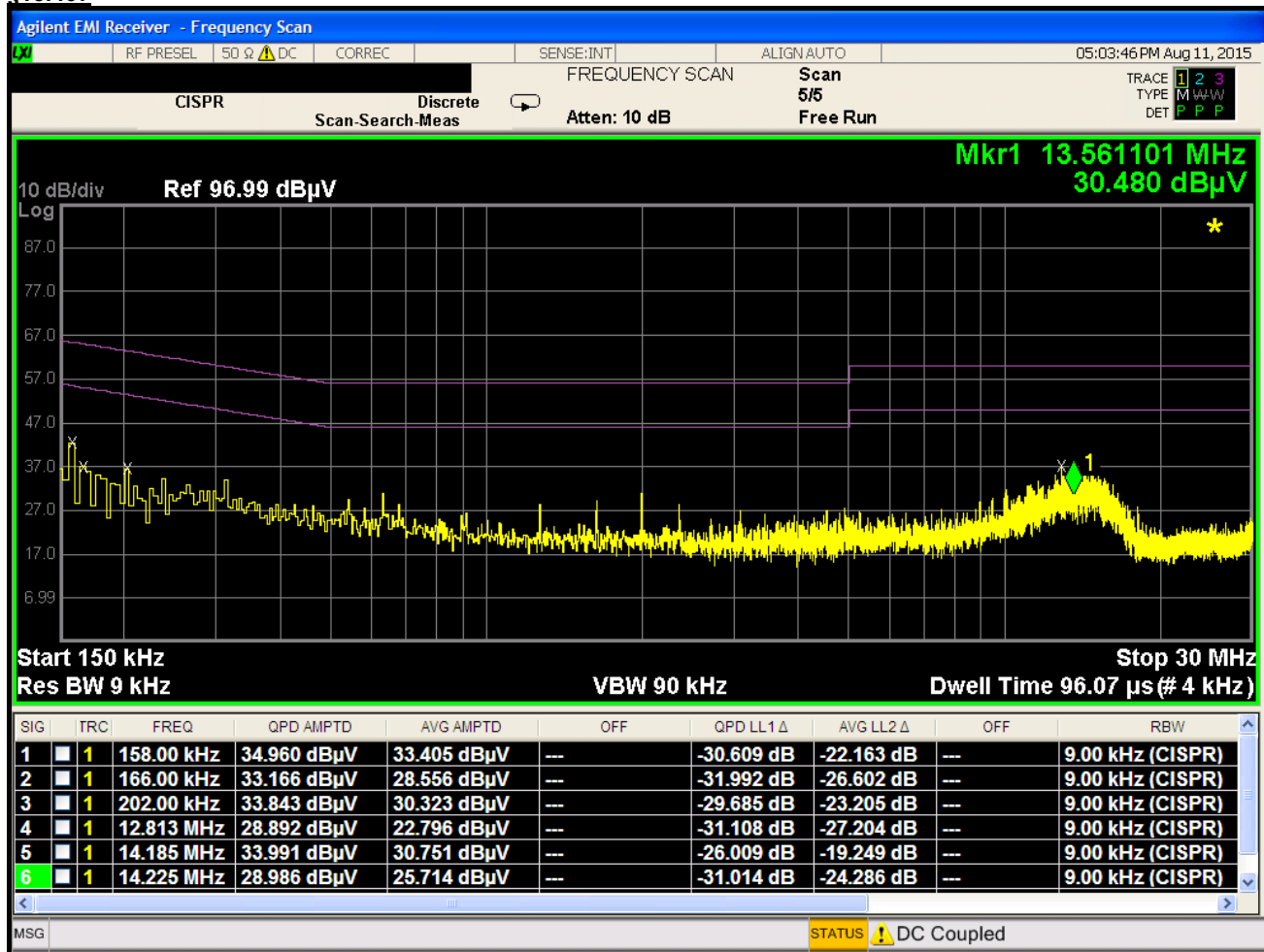
Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 149. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBμV) - QP/AV Level (dBμV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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Plot 6-133. Line Conducted Plot with 802.11a UNII Band 3 (N)

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 149. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Corr. (dB)
6. Margin (dB) = QP/AVLimit (dBμV) - QP/AV Level (dBμV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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7.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFVS990** is in compliance with Part 15E of the FCC Rules.

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