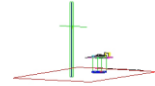




# PCTEST ENGINEERING LABORATORY, INC.

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http://www.pctestlab.com



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

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

**Date of Testing:**  
4/20 - 5/4/2015  
**Test Site/Location:**  
PCTEST Lab, Columbia, MD, USA  
**Test Report Serial No.:**  
0Y1504200768.ZNF

**FCC ID:** ZNFH634  
**APPLICANT:** LG Electronics MobileComm U.S.A

**Application Type:** Certification  
**Model(s):** LG-H634, LGH634, H634  
**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

Mode	UNII Band	Channel Bandwidth (MHz)	Tx Frequency (MHz)	Conducted Power	
				Max. Power (mW)	Max. Power (dBm)
802.11a	1	20	5180 - 5240	27.925	14.46
	2A	20	5260 - 5320	27.990	14.47
	2C	20	5500 - 5700	28.119	14.49
	3	20	5745 - 5825	28.119	14.49
802.11n	1	20	5180 - 5240	28.119	14.49
	2A	20	5260 - 5320	28.119	14.49
	2C	20	5500 - 5700	27.606	14.41
	3	20	5745 - 5825	28.119	14.49
802.11n	1	40	5190 - 5230	25.645	14.09
	2A	40	5270 - 5310	25.527	14.07
	2C	40	5510 - 5670	24.889	13.96
	3	40	5755 - 5795	25.468	14.06

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. 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

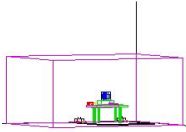


<b>FCC ID:</b> ZNFH634		<b>FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
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# MEASUREMENT REPORT

## 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-H634, LGH634, H634

**FCC ID:** ZNFH634

**FCC CLASSIFICATION:** Unlicensed National Information Infrastructure (UNII)

**Test Device Serial No.:** 359565-06-000067-5,  Production  Pre-Production  Engineering  
359565-06-000066-7

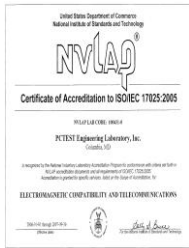
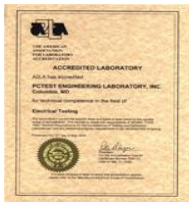
**DATE(S) OF TEST:** 4/20 - 5/4/2015


**TEST REPORT S/N:** 0Y1504200768.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

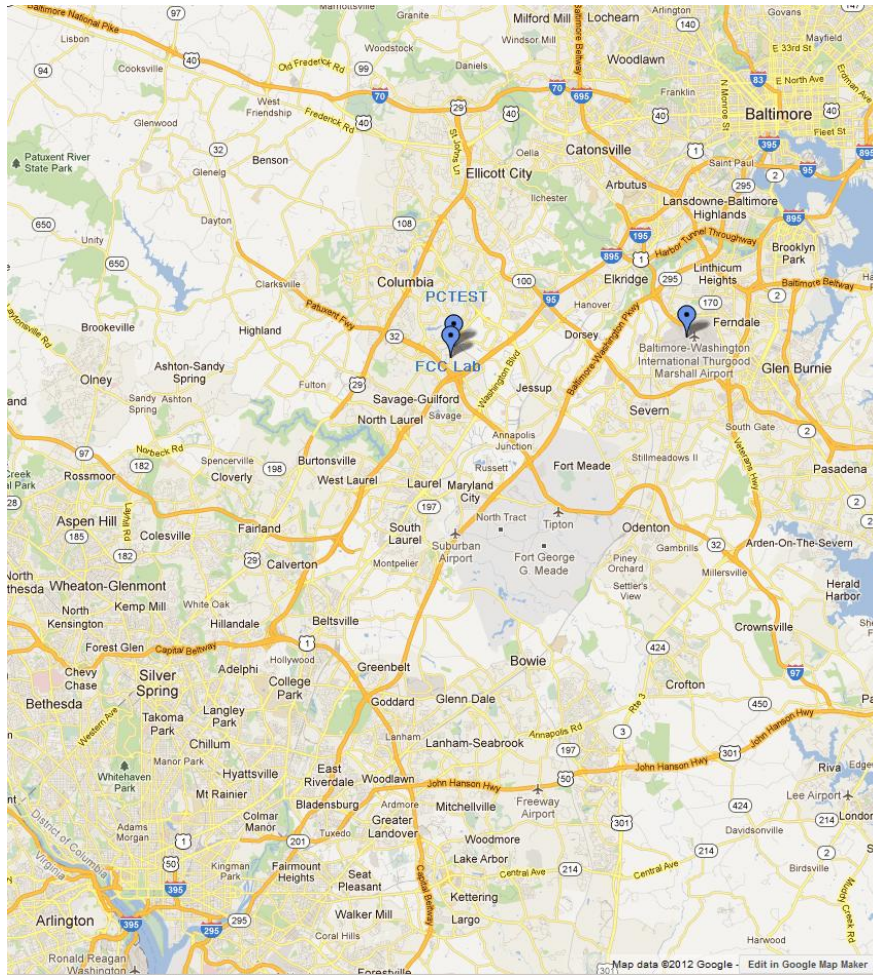
## 1.1 Scope

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't'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: ZNFH634**. 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 GSM/GPRS/EDGE, 850/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, 802.11a/n UNII, Bluetooth (1x, EDR, LE)

**Note:** 5GHz NII operation is possible in 20MHz, and 40MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section B)2)b) of KDB 789033. 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	95.6
	n (HT20)	95.3
	n (HT40)	91.2

Data Rate(s) Tested: 6, 9, 12, 18, 24, 36, 48, 54Mbps (802.11a)  
 6.5/7.2, 13/14.4, 19.5/21.7, 26/28.9, 39/43.3, 52/57.8, 58.5/65, 65/72.2 (n – 20MHz)  
 13.5/15, 27/30, 40.5/45, 54/60, 81/90, 108/120, 121.5/135, 135/150 (n – 40MHz BW)

### 2.3 Test Configuration

The LG Portable Handset FCC ID: ZNFH634 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.

### 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: ZNFH634**.

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. The EMI Receiver mode of the Agilent MXE was used to perform AC line conducted emissions testing.

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### 3.3 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with 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, the absorbers are removed. An ETS Lindgren Model 2188 raised turntable is used for radiated measurement. It is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. A 78cm high PVC support structure is placed on top of the turntable. A ¾" (~1.9cm) sheet of high density polyethylene 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 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: ZNFH634** 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	140	5700	165	5825

**Table 4-1. 802.11a / 802.11n (20MHz) Frequency / Channel Operations**

Band 1		Band 2A		Band 2C		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
38	5190	54	5270	102	5510	151	5755
:	:	:	:	:	:	:	:
46	5230	62	5310		5550		
				:	:		
				134	5670	159	5795

**Table 4-2. 802.11n (40MHz 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)	10/24/2014	Annual	10/24/2015	N/A
-	WL25-1	Conducted Cable Set (25GHz)	10/14/2014	Annual	10/14/2015	N/A
-	WL40-1	Conducted Cable Set (40GHz)	10/14/2014	Annual	10/14/2015	N/A
Agilent	8447D	Broadband Amplifier	5/30/2014	Annual	5/30/2015	2443A01900
Agilent	N9020A	MXA Signal Analyzer	10/27/2014	Annual	10/27/2015	US46470561
Agilent	N9038A	MXE EMI Receiver	3/24/2015	Annual	3/24/2016	MY51210133
Anritsu	ML2495A	Power Meter	10/31/2013	Biennial	10/31/2015	941001
Anritsu	MA2411B	Pulse Sensor	4/8/2014	Biennial	4/8/2016	846215
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	6/26/2013	Biennial	6/26/2015	121034
Emco	3115	Horn Antenna (1-18GHz)	1/30/2014	Biennial	1/30/2016	9704-5182
Espec	ESX-2CA	Environmental Chamber	3/17/2015	Annual	3/17/2016	17620
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	6/17/2014	Biennial	6/17/2016	135427
ETS Lindgren	3160-10	26.5-40 GHz Standard Gain Horn	6/17/2014	Biennial	6/17/2016	130993
ETS-Lindgren	3816/2NM	Line Impedance Stabilization Network	11/11/2014	Biennial	11/11/2016	114451
Huber+Suhner	Sucoflex 102A	40GHz Radiated Cable	10/15/2014	Annual	10/15/2015	251425001
K & L	11SH10-3075/U18000	High Pass Filter	12/1/2014	Annual	12/1/2015	2
Pasternack	NMLC-1	Line Conducted Emissions Cable (NM)	10/17/2014	Annual	10/17/2015	N/A
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	3/5/2015	Annual	3/5/2016	100071
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	3/3/2015	Annual	3/3/2016	100040
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	3/12/2015	Annual	3/12/2016	100342
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	3/3/2015	Annual	3/3/2016	100037
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/28/2014	Biennial	1/28/2016	A051107

**Table 5-1. Annual Test Equipment Calibration Schedule**

<b>FCC ID:</b> ZNFH634		<b>FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
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## 6.0 TEST RESULTS

### 6.1 Summary


Company Name: LG Electronics MobileComm U.S.A  
 FCC ID: ZNFH634  
 Method/System: Unlicensed National Information Infrastructure (UNII)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
<b>TRANSMITTER MODE (TX)</b>					
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) (5825-5850MHz)		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 1.0.0.

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset	Page 10 of 100	

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

### 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

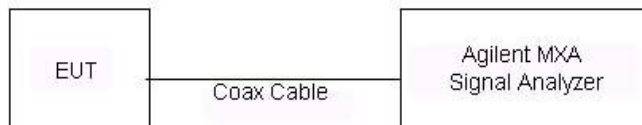
KDB 789033 D02 v01 – Section C

### 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**

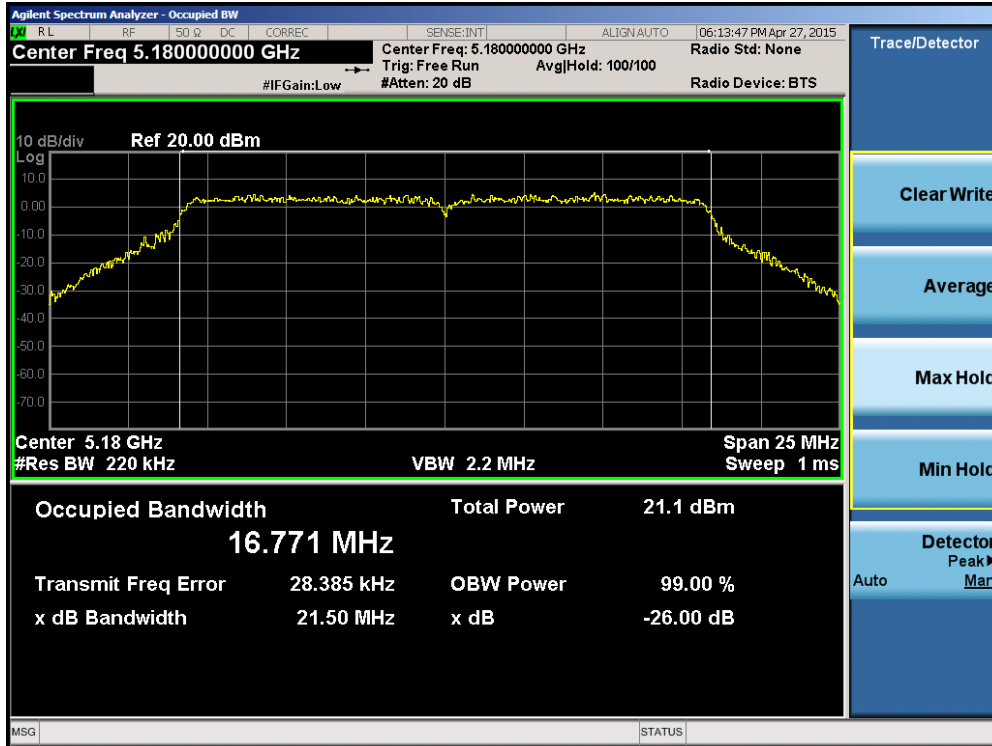
### Test Notes

None.

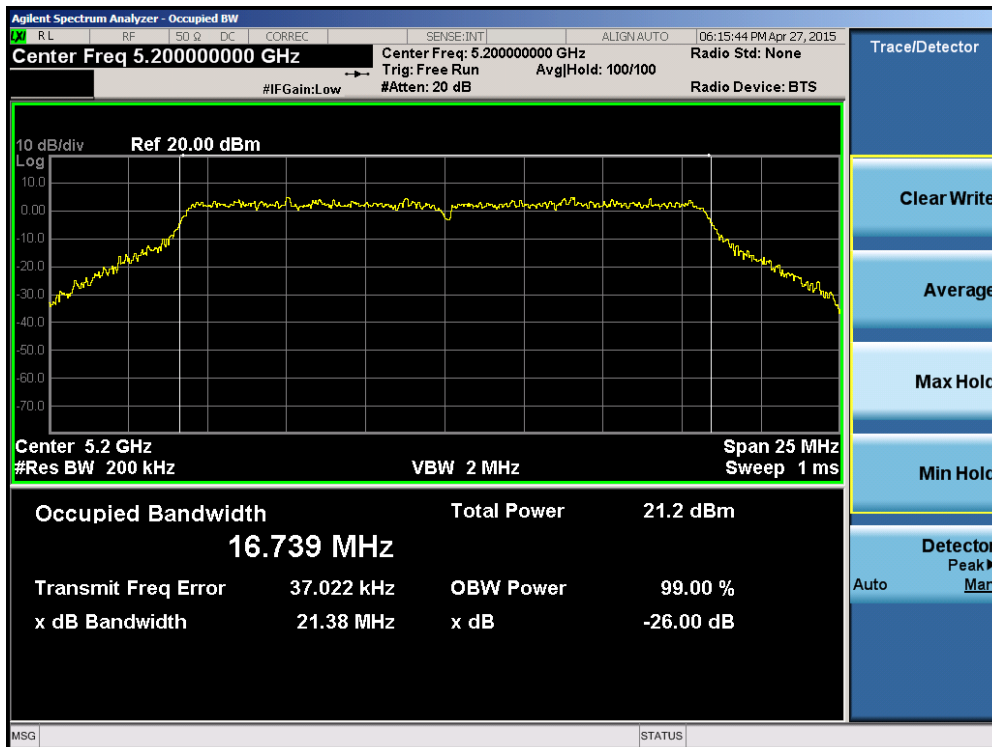
FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset	Page 11 of 100	

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]
Band 1	5180	36	a	6	21.50
	5200	40	a	6	21.38
	5240	48	a	6	21.61
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	22.13
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	21.96
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	21.97
	5190	38	n (40MHz)	13.5/15 (MCS0)	41.97
	5230	46	n (40MHz)	13.5/15 (MCS0)	43.48
Band 2A	5260	52	a	6	22.06
	5280	56	a	6	21.13
	5320	64	a	6	21.88
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	22.46
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	22.48
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	22.00
	5270	54	n (40MHz)	13.5/15 (MCS0)	42.00
	5310	62	n (40MHz)	13.5/15 (MCS0)	41.82
Band 2C	5500	100	a	6	21.59
	5580	116	a	6	21.94
	5700	140	a	6	21.82
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	22.01
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	22.05
	5700	140	n (20MHz)	6.5/7.2 (MCS0)	22.28
	5510	102	n (40MHz)	13.5/15 (MCS0)	42.52
	5550	110	n (40MHz)	13.5/15 (MCS0)	43.89
	5670	134	n (40MHz)	13.5/15 (MCS0)	42.08

**Table 6-2. Conducted Bandwidth Measurements**



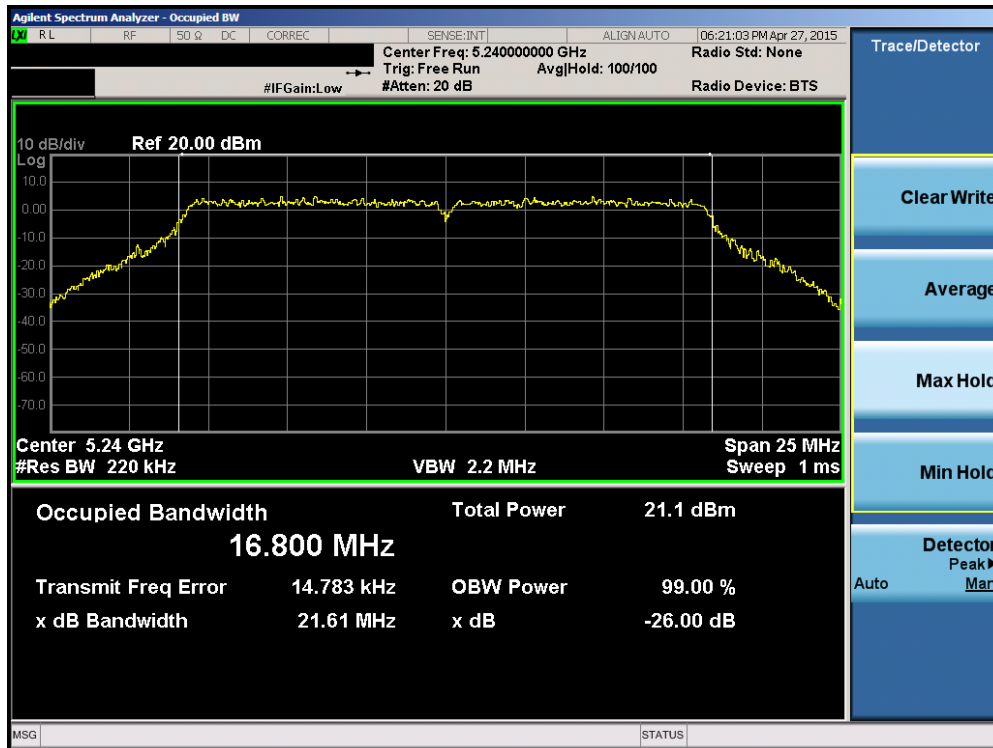
Plot 6-1. 26dB Bandwidth Plot (802.11a (UNII Band 1) – Ch. 36)



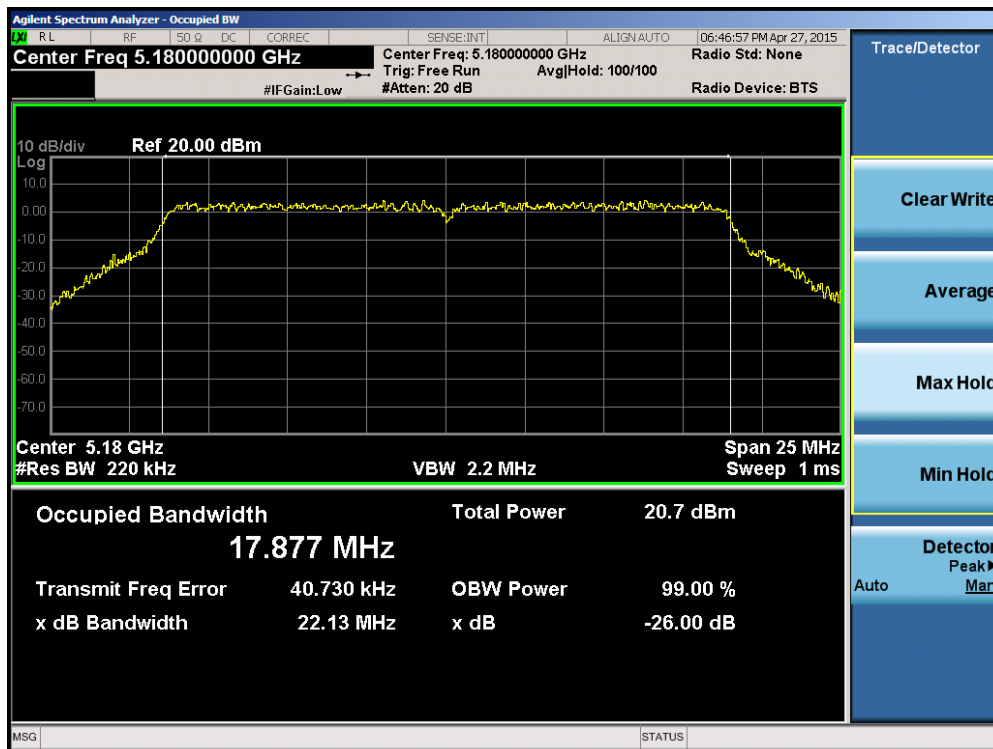
Plot 6-2. 26dB Bandwidth Plot (802.11a (UNII Band 1) – Ch. 40)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 13 of 100



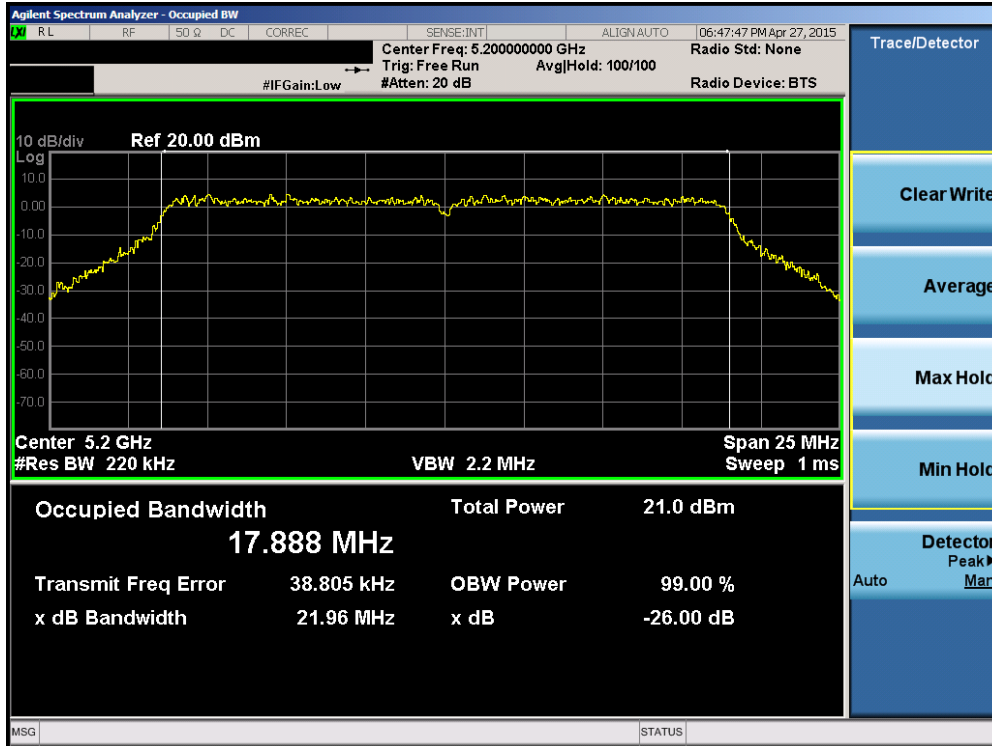


Plot 6-3. 26dB Bandwidth Plot (802.11a (UNII Band 1) – Ch. 48)

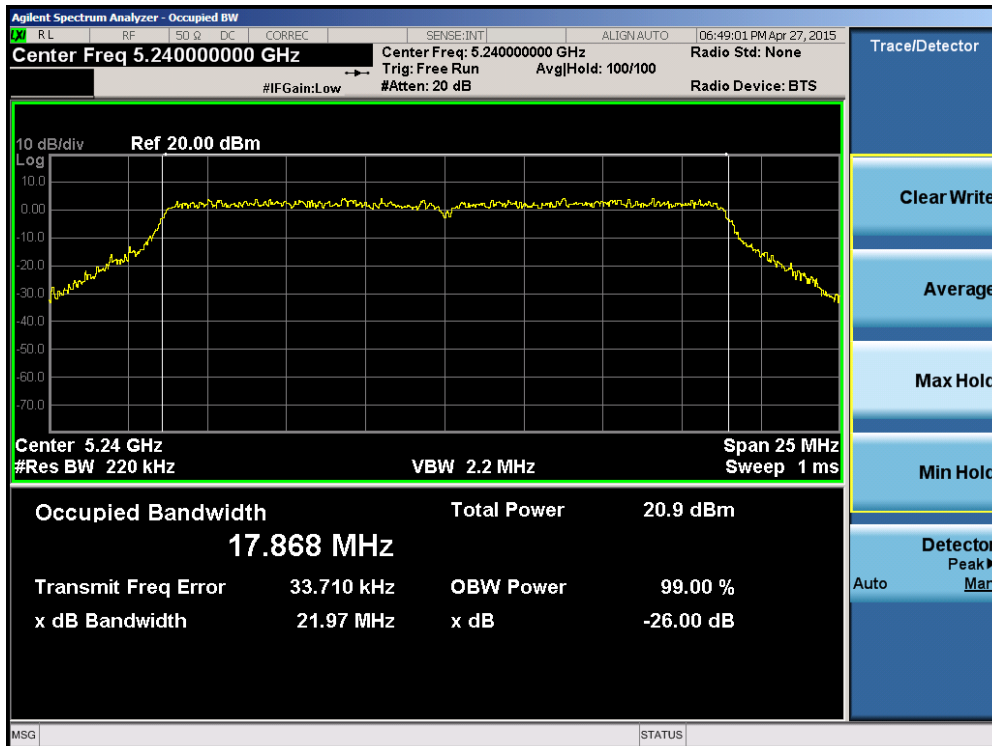


Plot 6-4. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 14 of 100

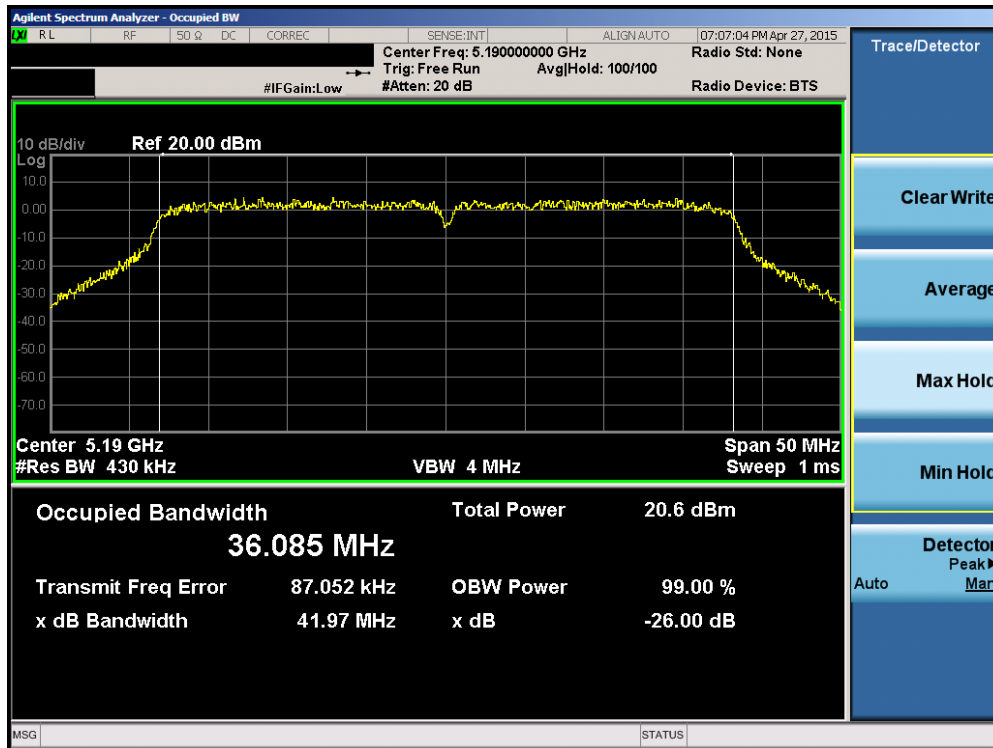


Plot 6-5. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 40)

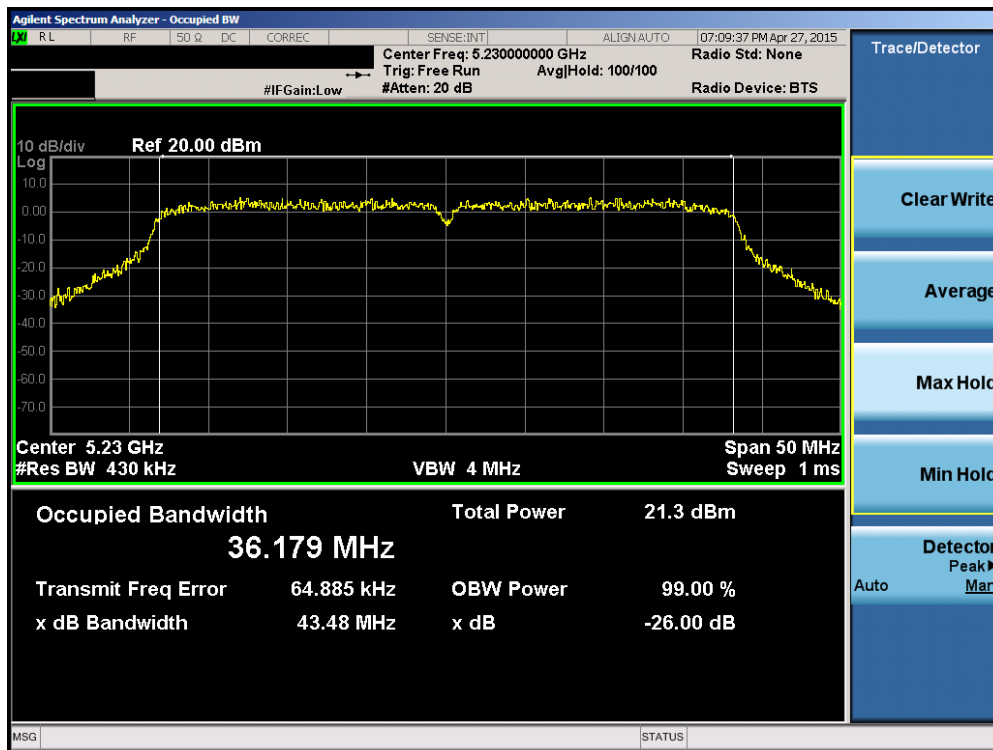


Plot 6-6. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 15 of 100

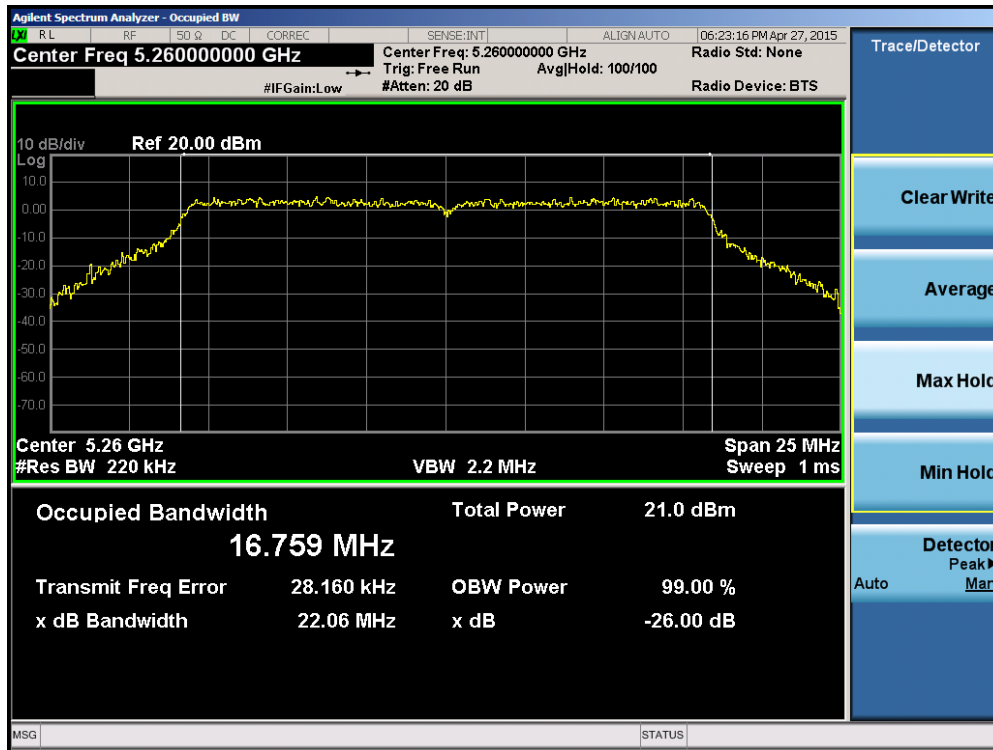


Plot 6-7. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 38)

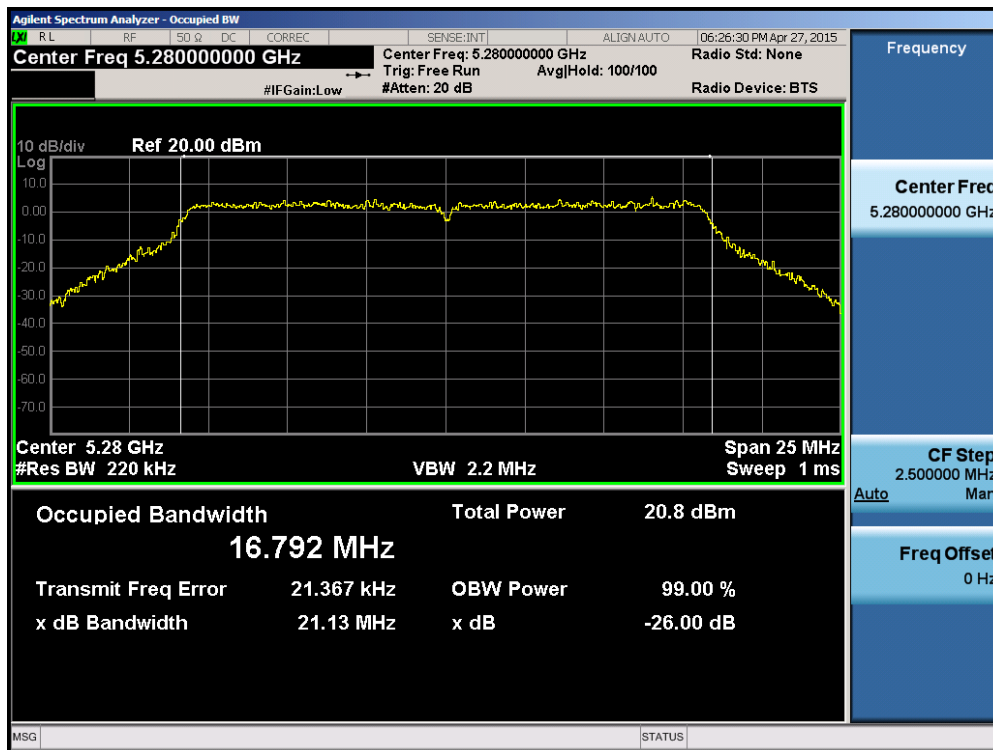


Plot 6-8. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 16 of 100

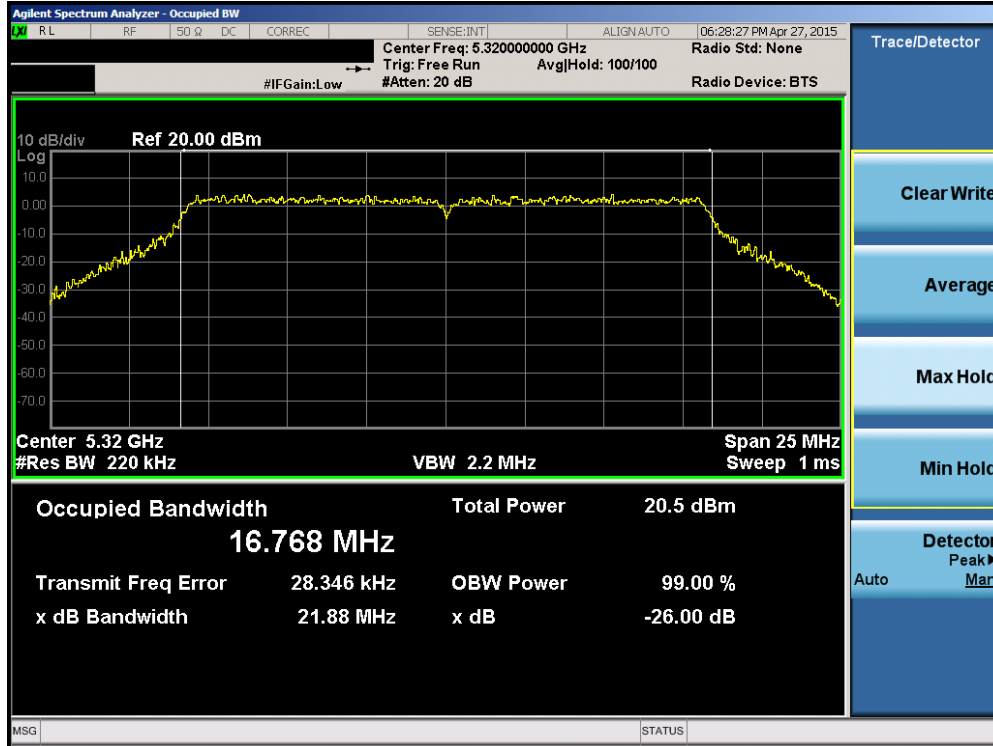


Plot 6-9. 26dB Bandwidth Plot (802.11a (UNII Band 2A) – Ch. 52)

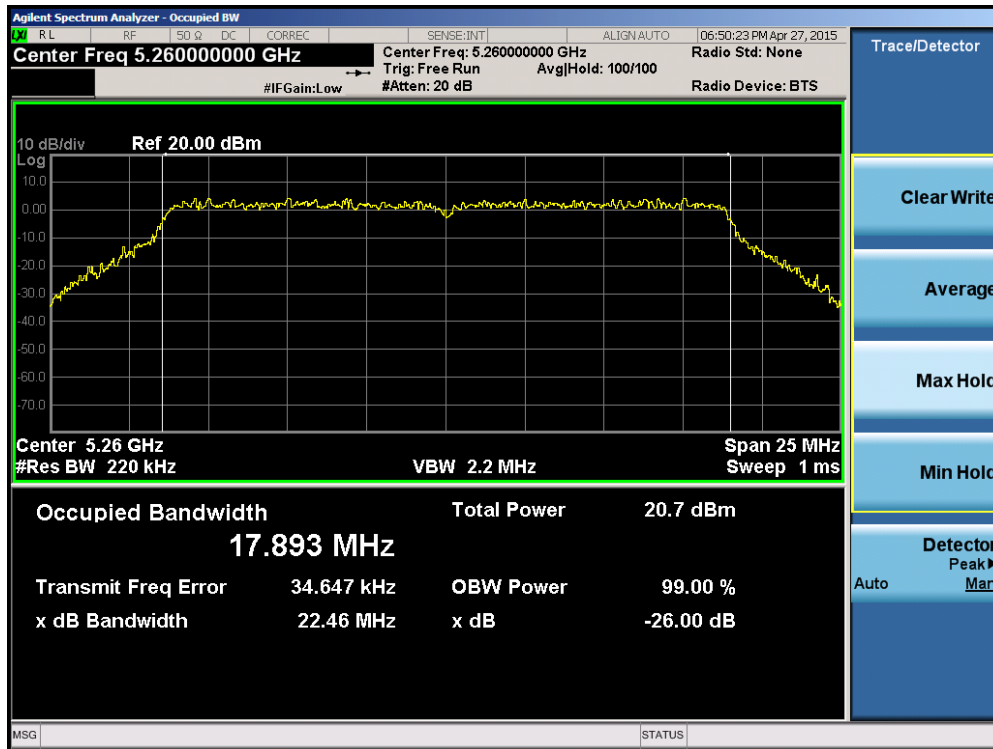


Plot 6-10. 26dB Bandwidth Plot (802.11a (UNII Band 2A) – Ch. 56)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 17 of 100



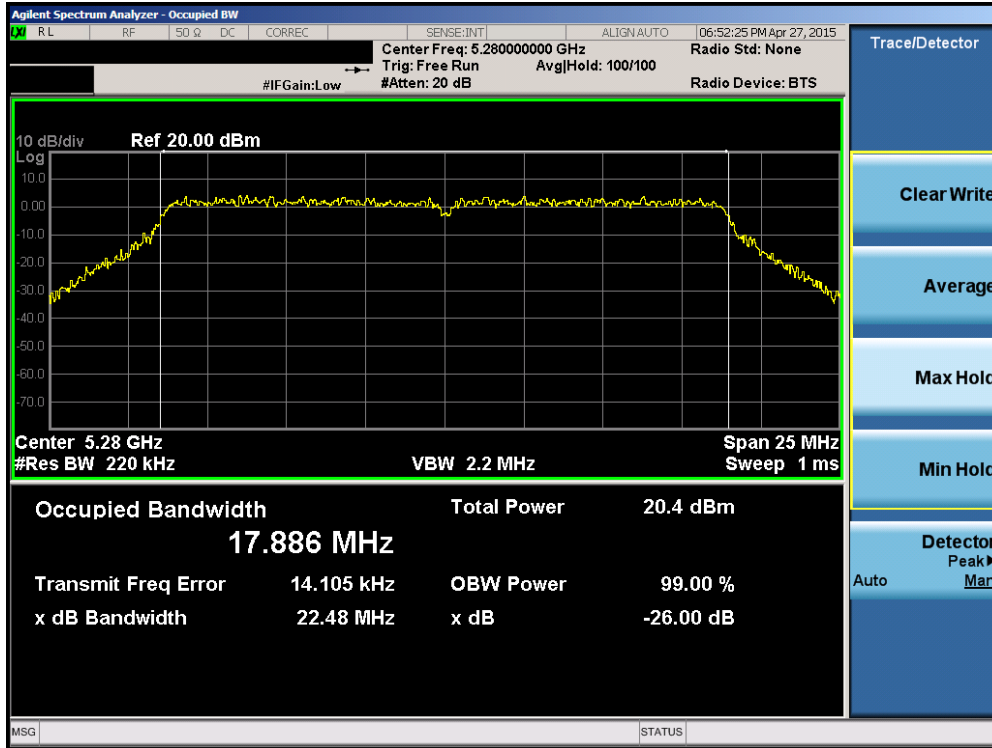
Plot 6-11. 26dB Bandwidth Plot (802.11a (UNII Band 2A) – Ch. 64)



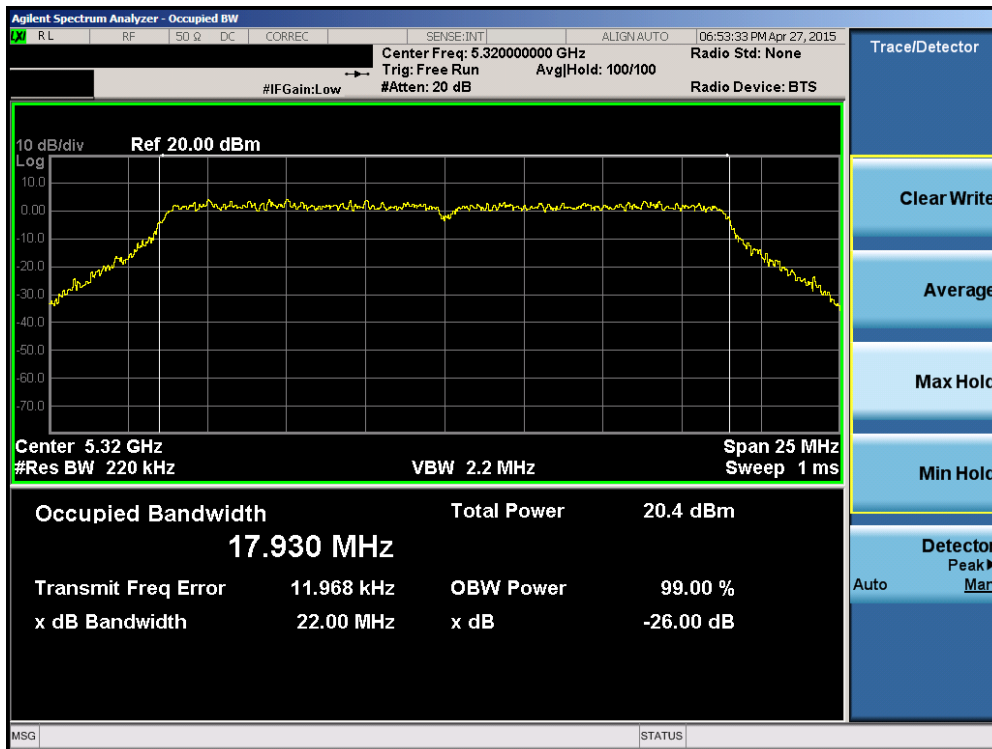
Plot 6-12. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 18 of 100



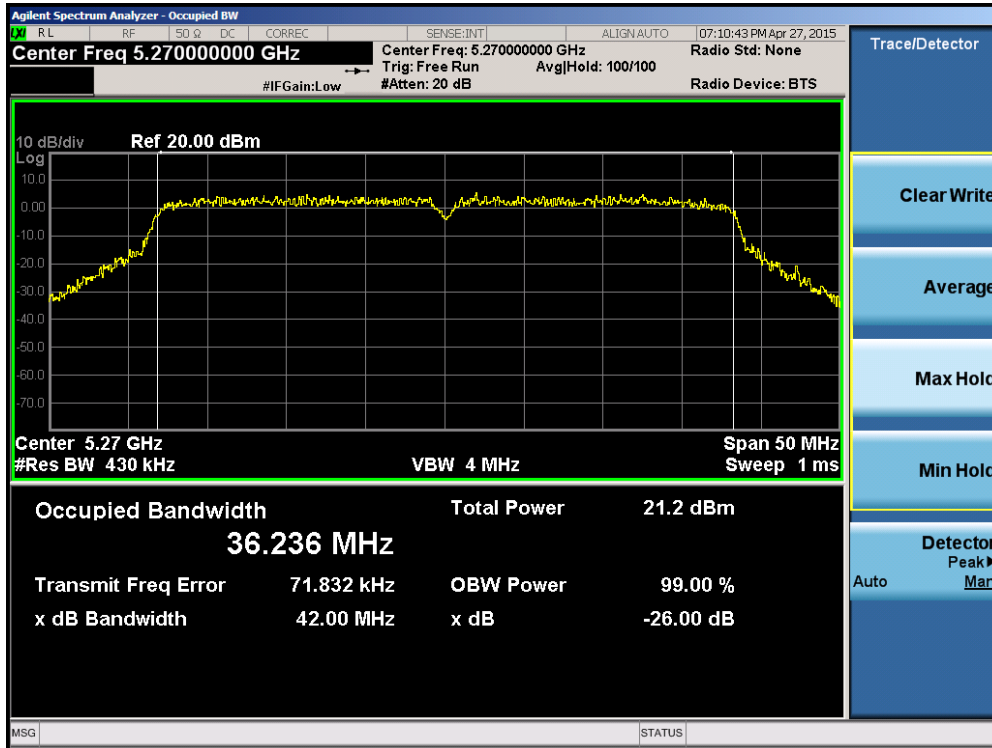


Plot 6-13. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)

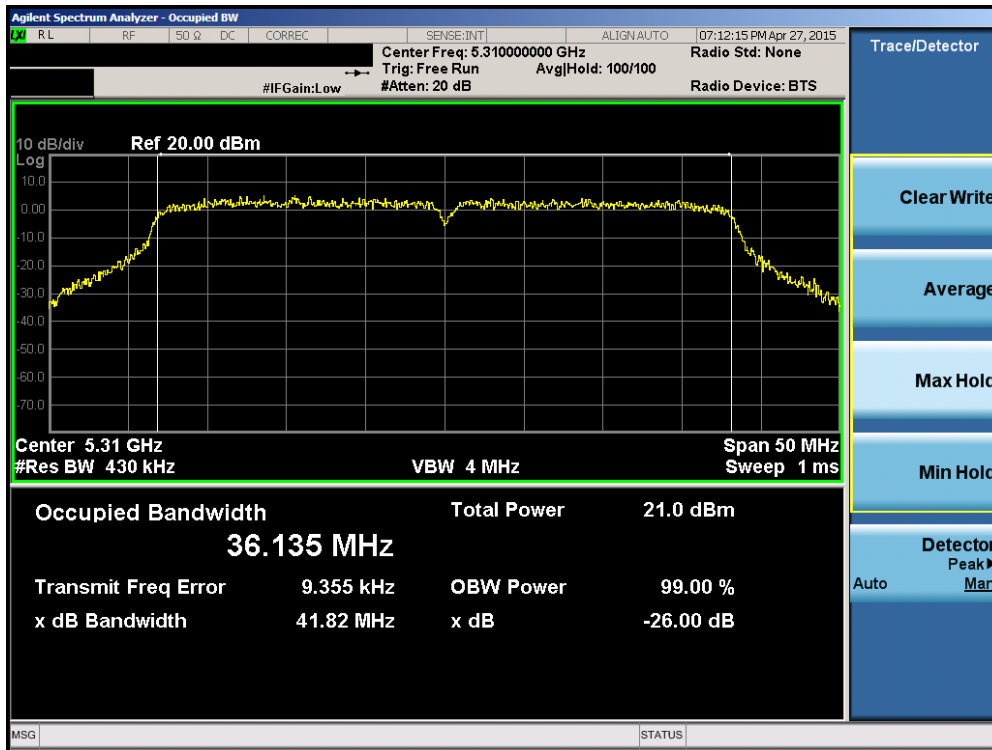


Plot 6-14. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 19 of 100

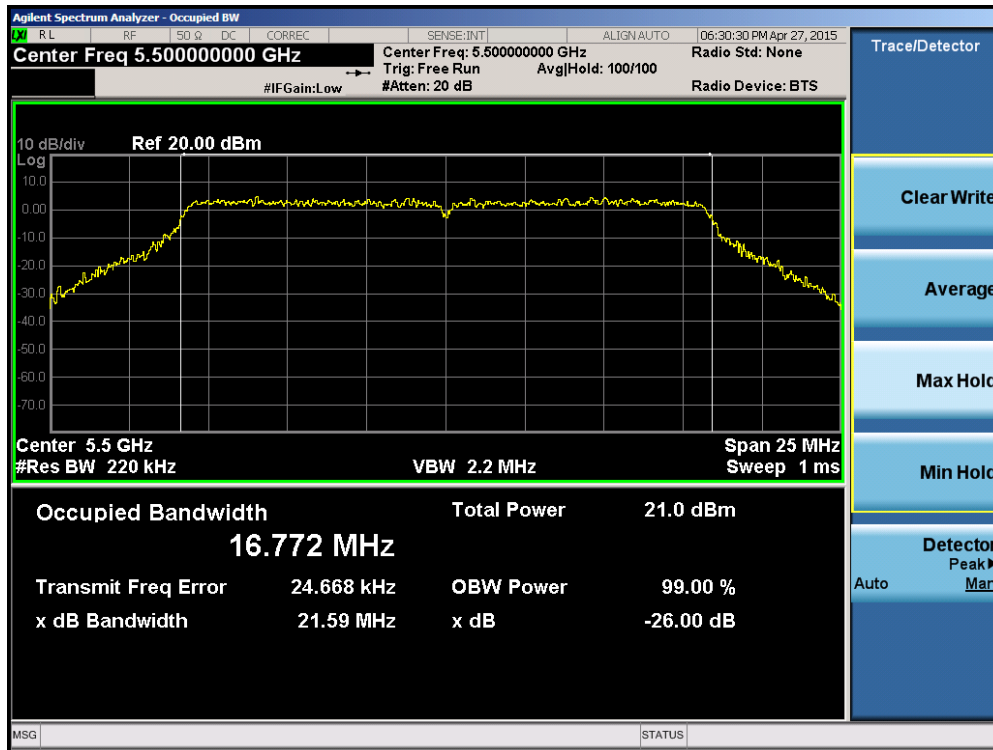


Plot 6-15. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)

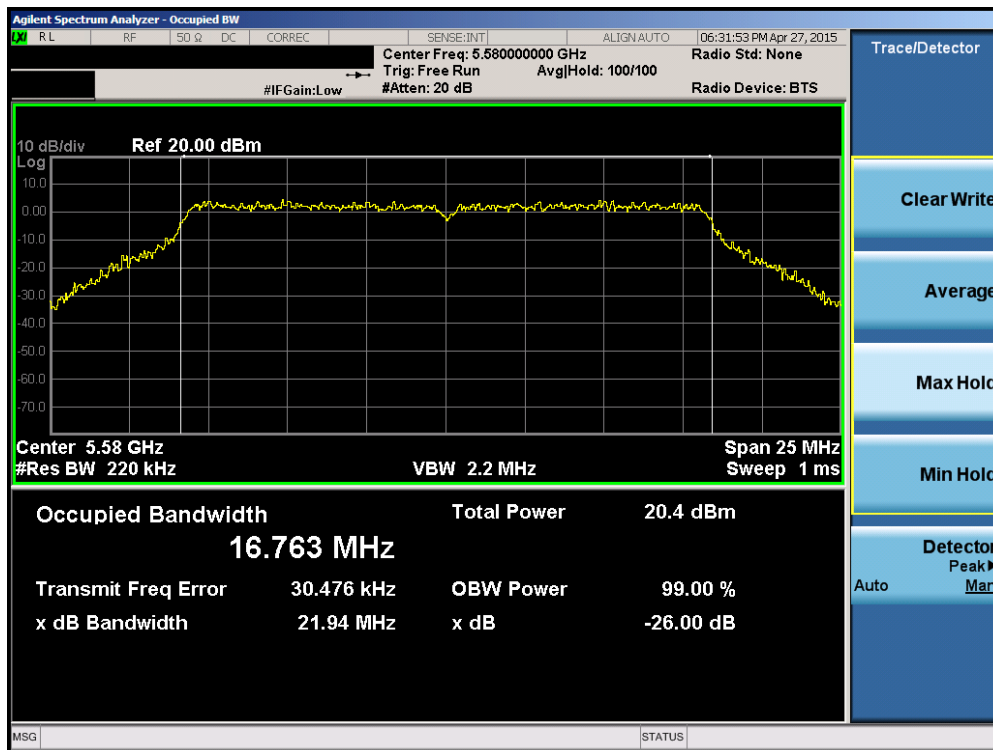


Plot 6-16. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 62)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 20 of 100

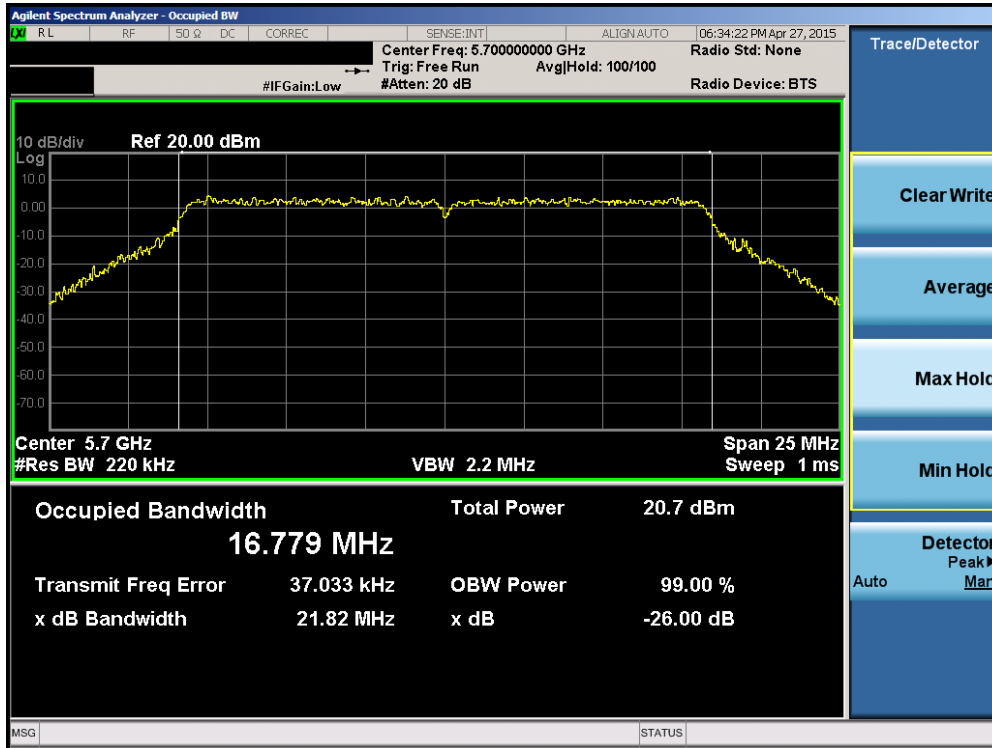


Plot 6-17. 26dB Bandwidth Plot (802.11a (UNII Band 2C) – Ch. 100)

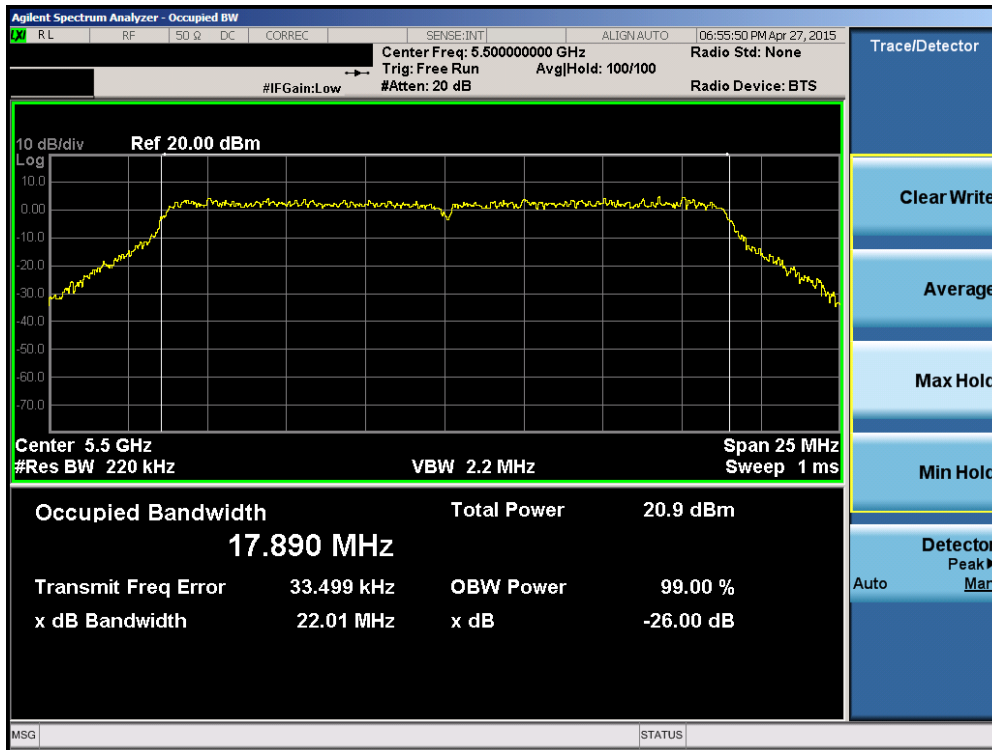


Plot 6-18. 26dB Bandwidth Plot (802.11a (UNII Band 2C) – Ch. 116)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 21 of 100

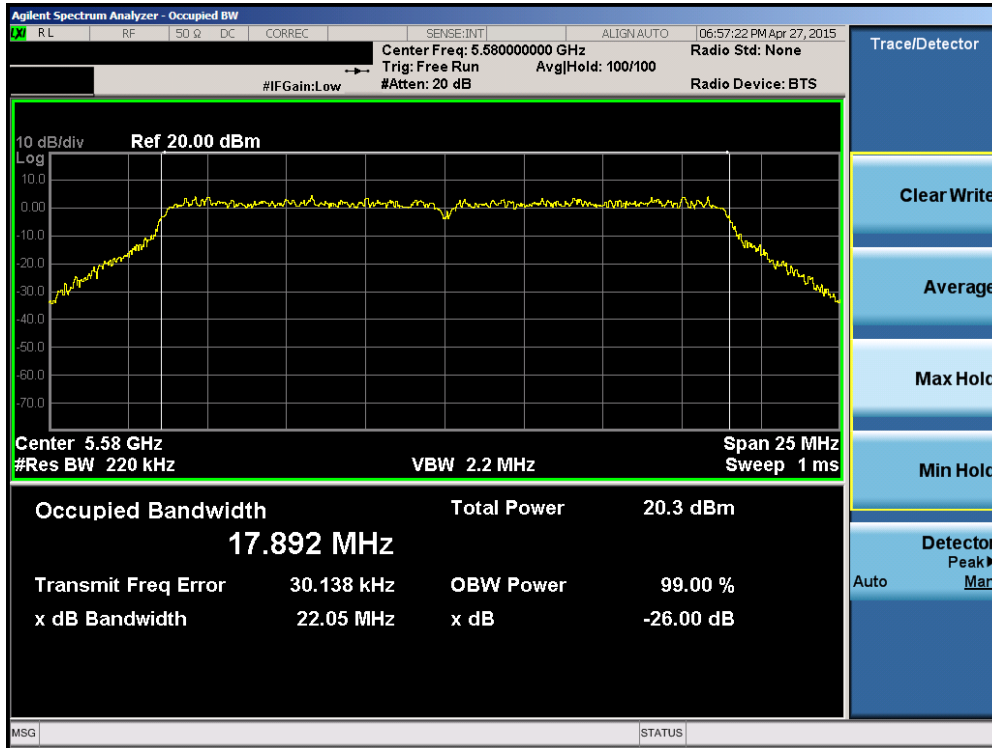


Plot 6-19. 26dB Bandwidth Plot (802.11a (UNII Band 2C) – Ch. 140)

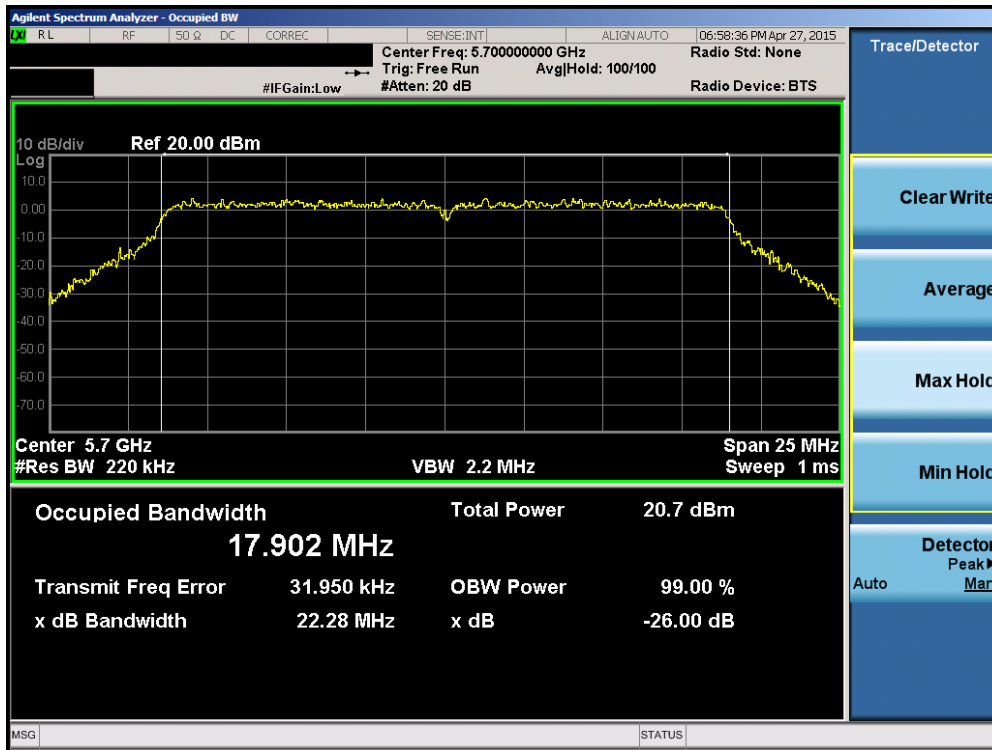


Plot 6-20. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 100)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 22 of 100



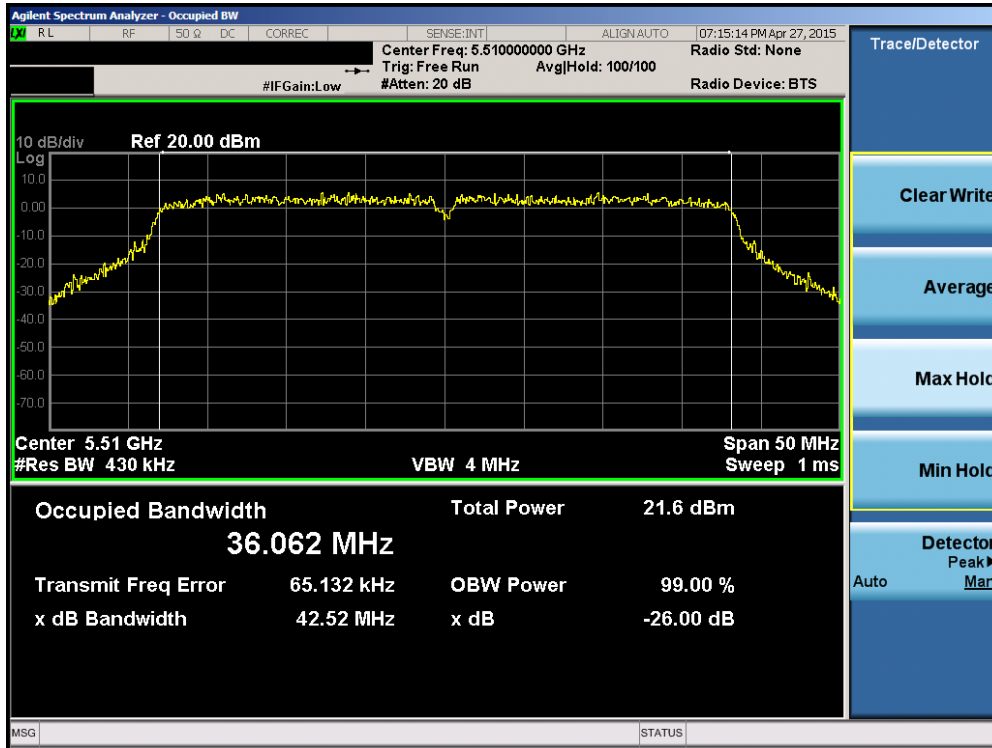
Plot 6-21. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 116)



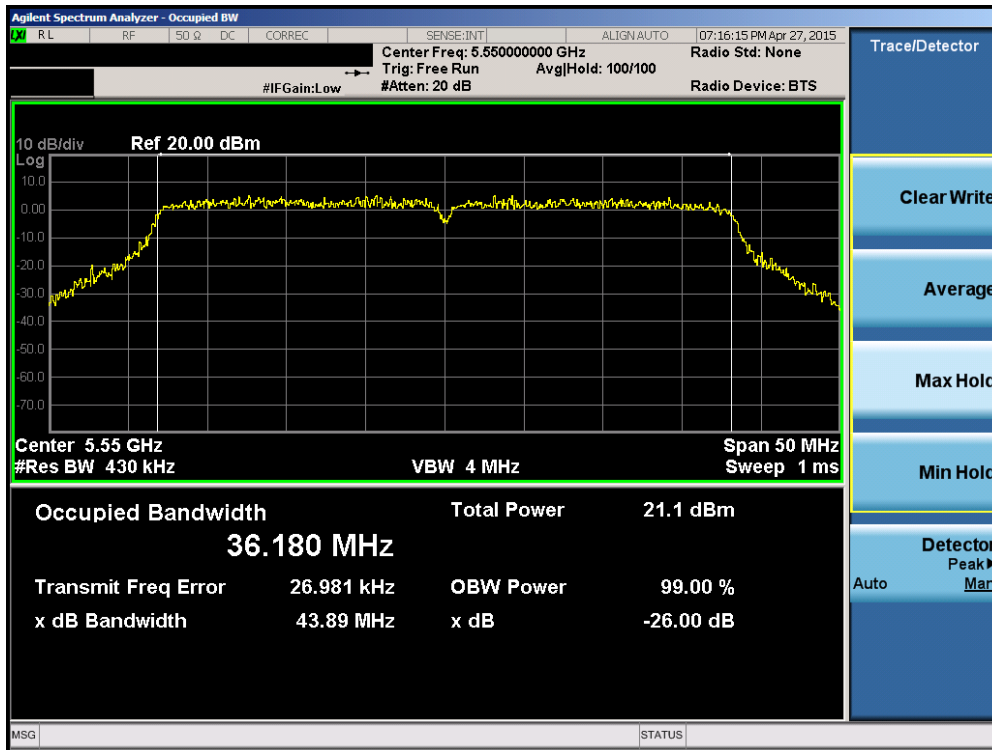
Plot 6-22. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 140)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 23 of 100



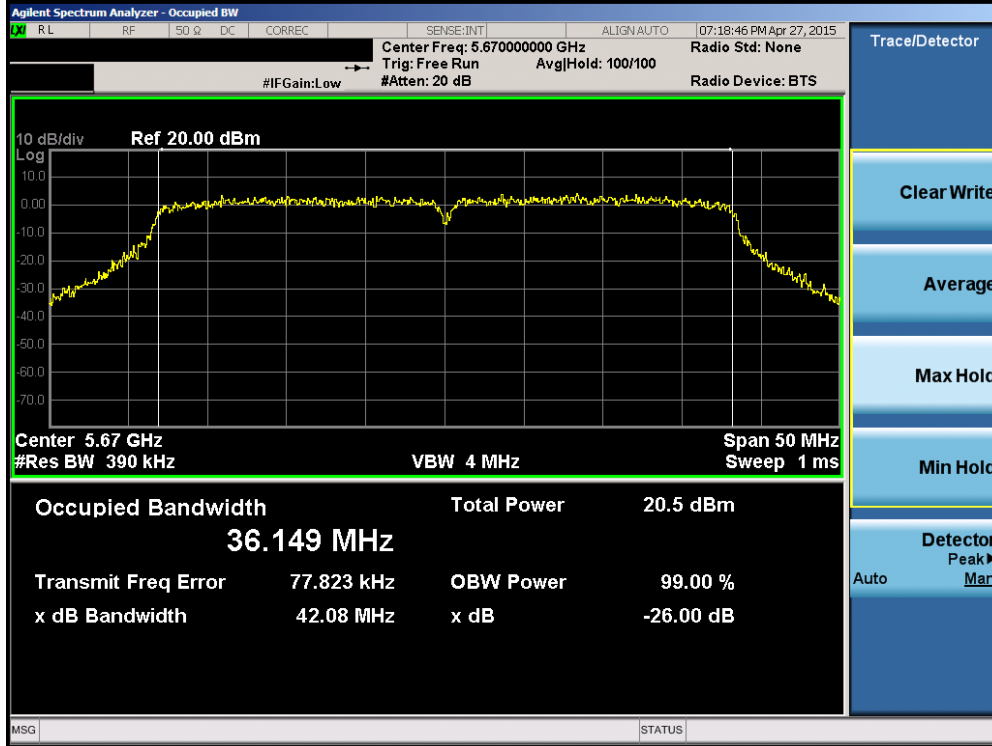


Plot 6-23. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)



Plot 6-24. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 110)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 24 of 100



Plot 6-25. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 134)

FCC ID: ZNFH634	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 25 of 100

### 6.3 6dB Bandwidth Measurement – 802.11a/n §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  $\geq$  500 kHz.*

#### Test Procedure Used

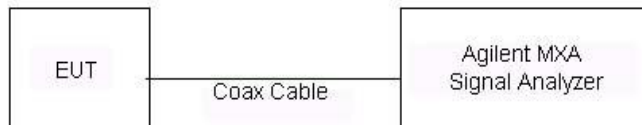
KDB 789033 D02 v01 – Section C

#### 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

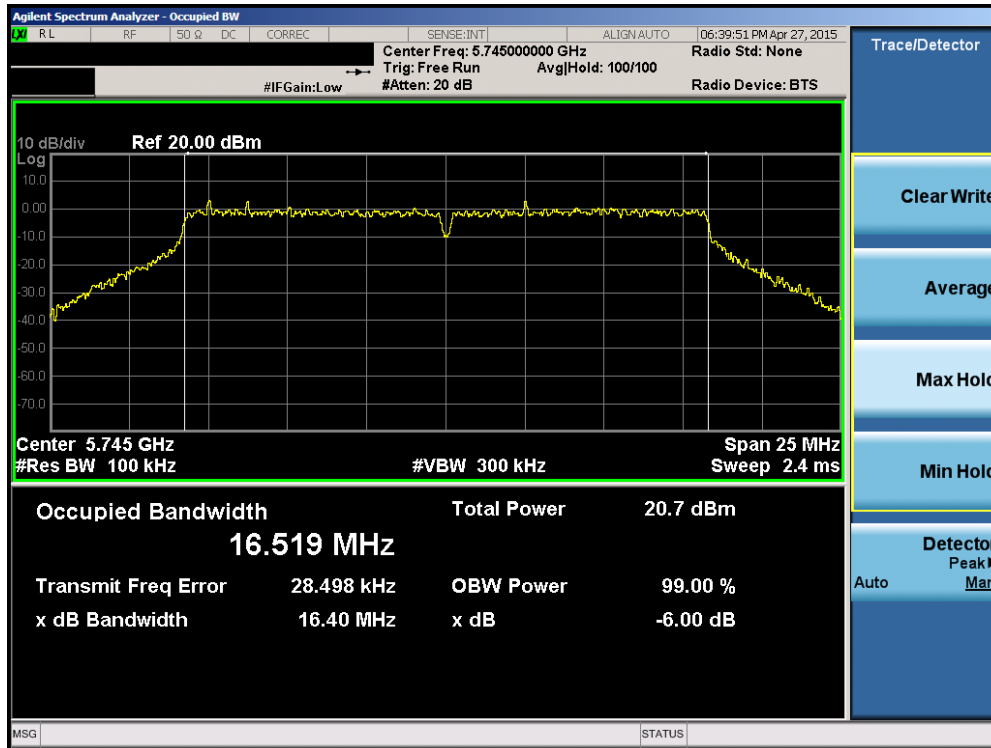
None.

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset	Page 26 of 100	

## Antenna-1 6 dB Bandwidth Measurements

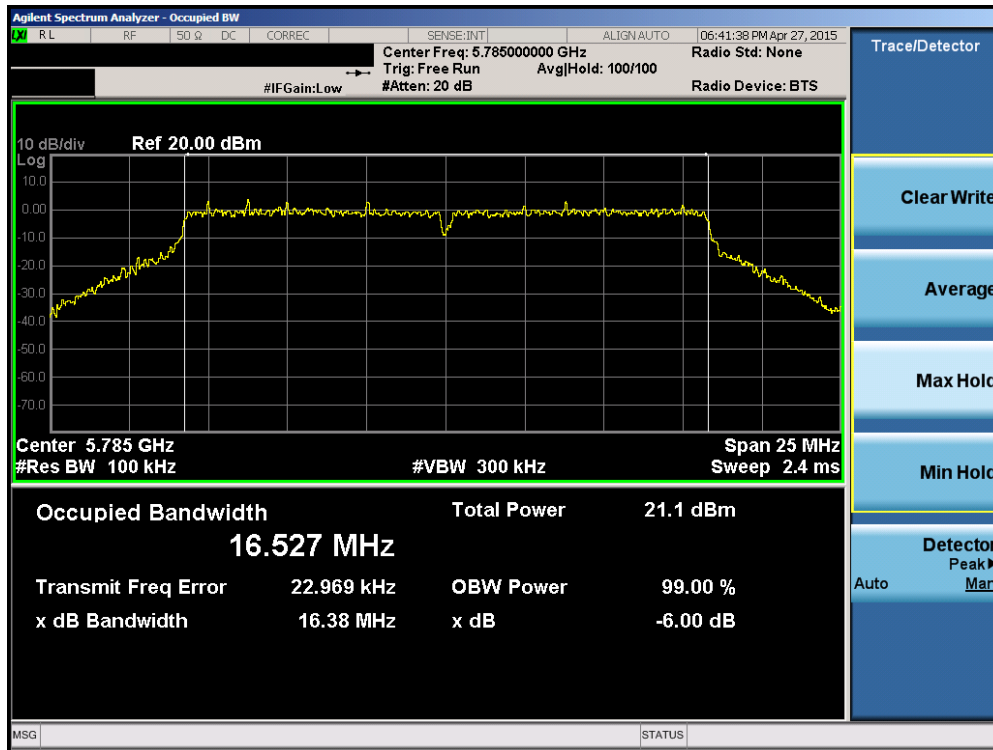
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
<b>Band 3</b>	5745	149	a	6	16.40
	5785	157	a	6	16.38
	5825	165	a	6	16.38
	5745	149	n (20MHz)	6.5/7.2 (MCS0)	17.63
	5785	157	n (20MHz)	6.5/7.2 (MCS0)	17.63
	5825	165	n (20MHz)	6.5/7.2 (MCS0)	17.62
	5755	151	n (40MHz)	13.5/15 (MCS0)	35.18
	5795	159	n (40MHz)	13.5/15 (MCS0)	35.16

**Table 6-3. Conducted Bandwidth Measurements**

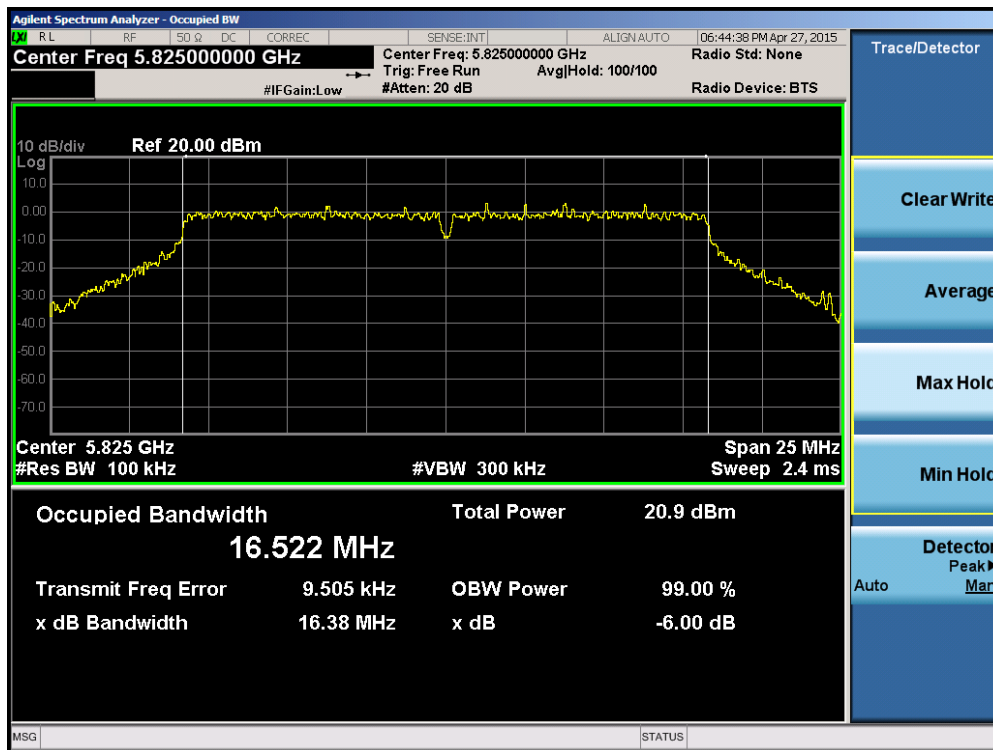


**Plot 6-26. 6dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 149)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 27 of 100

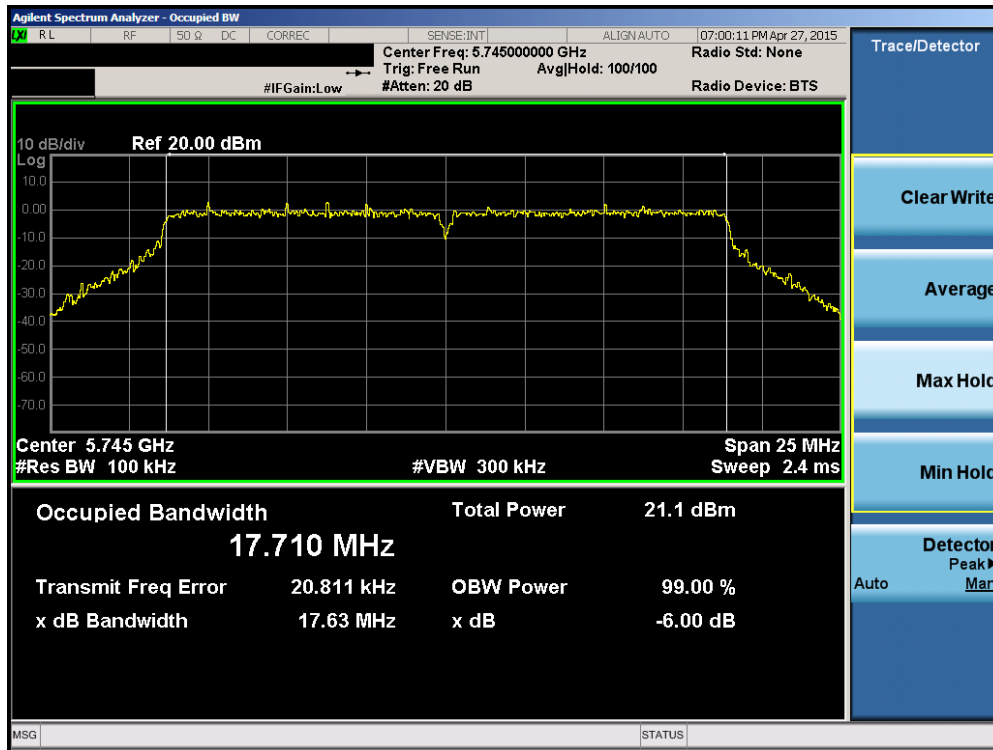


Plot 6-27. 6dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 157)

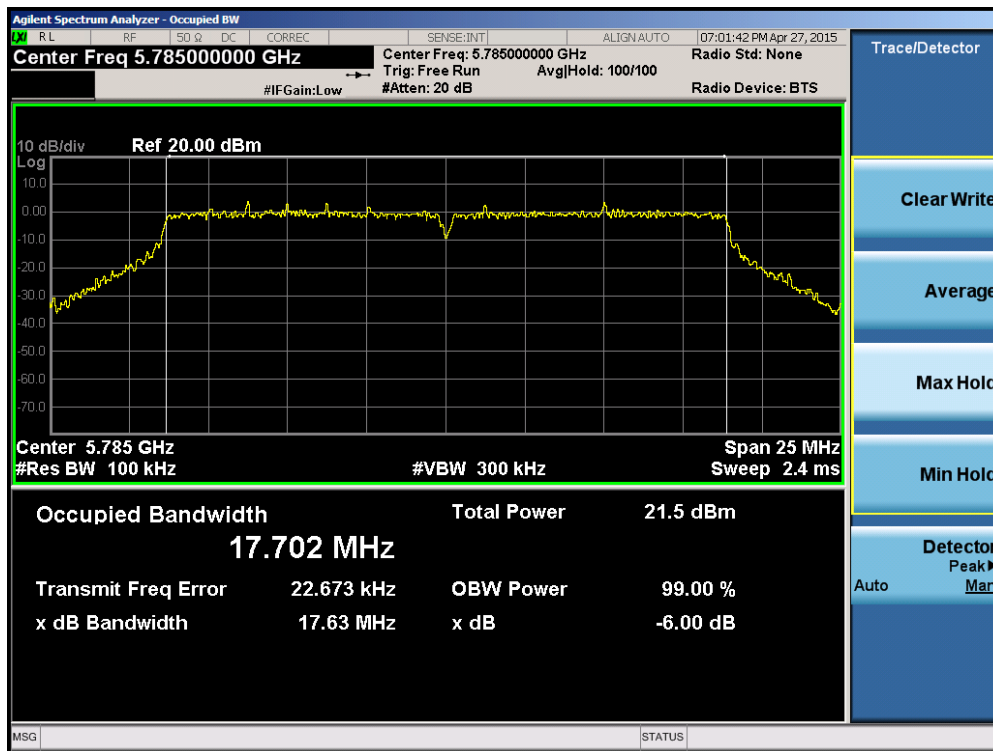


Plot 6-28. 6dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 165)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 28 of 100



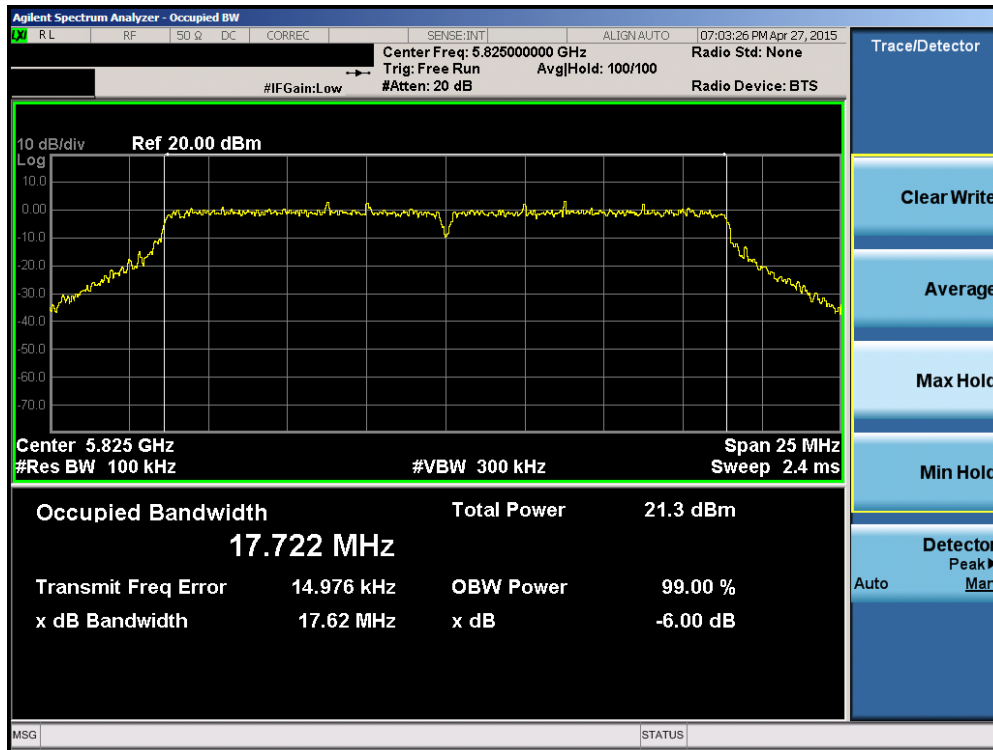
Plot 6-29. 6dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 149)



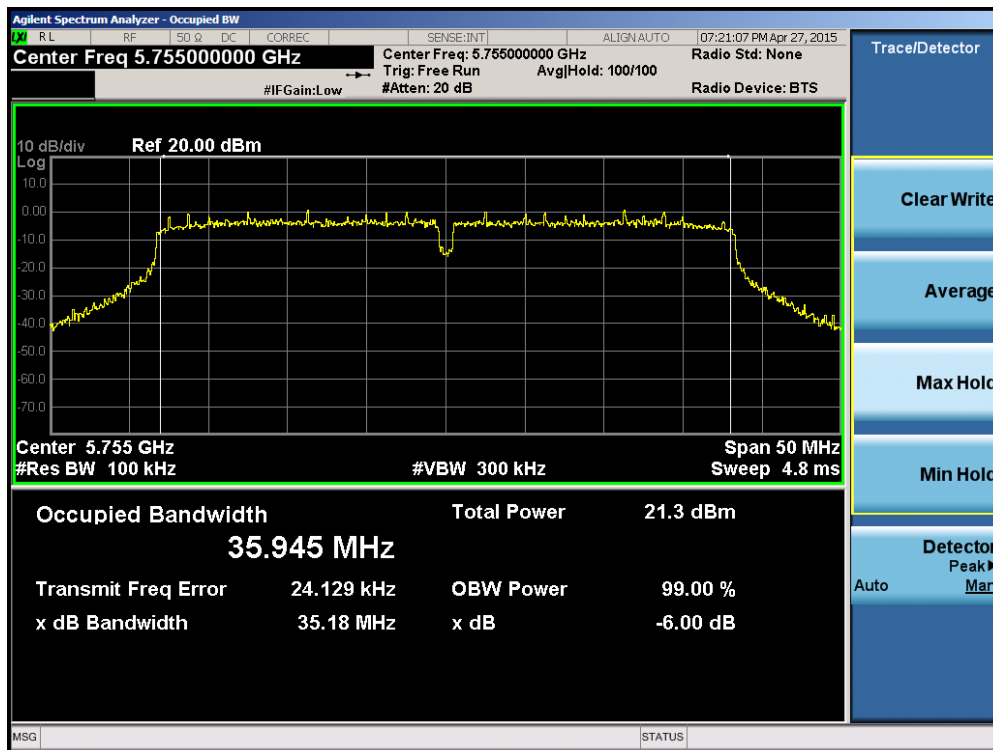
Plot 6-30. 6dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 157)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 29 of 100



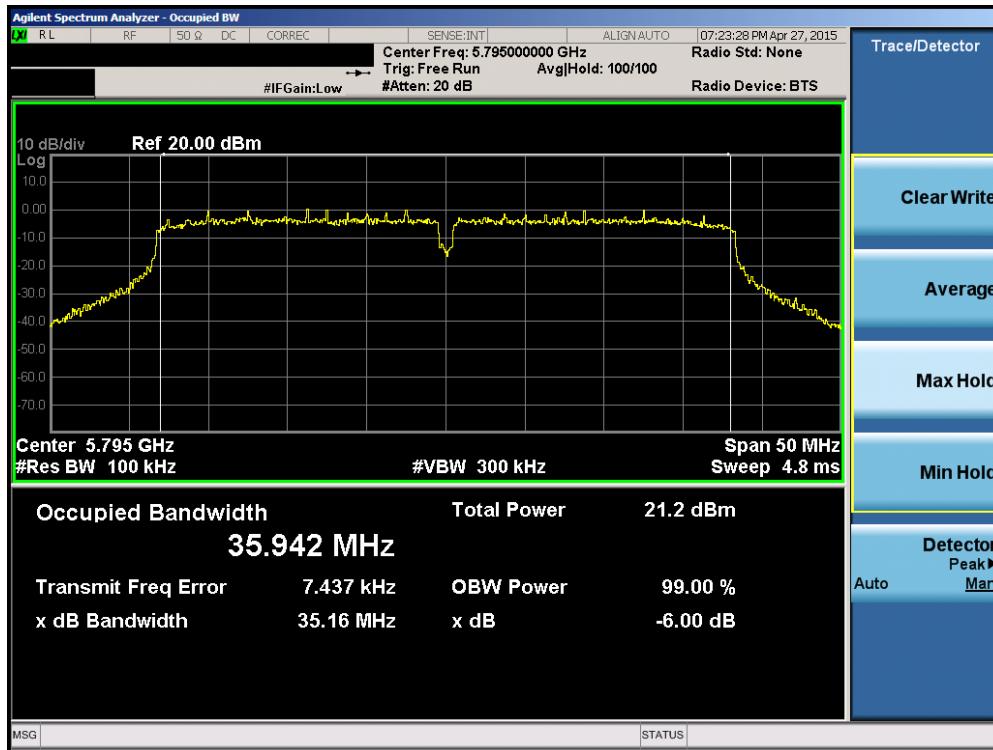


Plot 6-31. 6dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 165)



Plot 6-32. 6dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 151)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 30 of 100



Plot 6-33. 6dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 159)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 31 of 100

## 6.4 UNII Output Power Measurement – 802.11a/n §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  $11 \text{ dBm} + 10\log_{10}(26\text{dB BW}) = 11 \text{ dBm} + 10\log_{10}(21.13) = 24.25\text{dBm}$ .*

*In the 5.47 – 5.725GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and  $11 \text{ dBm} + 10\log_{10}(26\text{dB BW}) = 11 \text{ dBm} + 10\log_{10}(21.59) = 24.34\text{dBm}$ .*

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

### Test Procedure Used

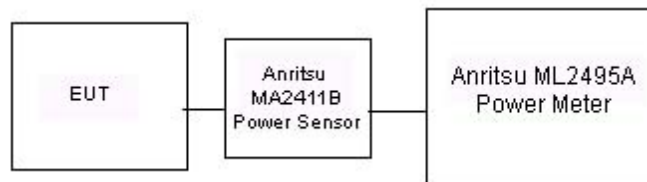
KDB 789033 D02 v01 – Section E)3)b) Method PM-G

### 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: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Freq [MHz]	Channel	Detector	5GHz (20MHz) Conducted Power [dBm]	
			IEEE Transmission Mode	
			802.11a	802.11n
5180	36	AVG	14.21	14.45
5200	40	AVG	14.26	14.36
5220	44	AVG	14.32	14.49
5240	48	AVG	14.46	14.43
5260	52	AVG	14.46	14.34
5280	56	AVG	14.45	14.49
5300	60	AVG	14.47	14.38
5320	64	AVG	14.39	14.45
5500	100	AVG	14.49	14.39
5580	116	AVG	14.26	14.41
5660	132	AVG	14.13	14.20
5700	140	AVG	14.26	14.24
5745	149	AVG	14.27	14.13
5765	153	AVG	14.49	14.49
5785	157	AVG	14.48	14.47
5805	161	AVG	14.46	14.43
5825	165	AVG	14.48	14.47

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

Freq [MHz]	Channel	Detector	5GHz (40MHz) Conducted Power [dBm]
			IEEE Transmission Mode
			802.11n
5190	38	AVG	14.09
5230	46	AVG	13.96
5270	54	AVG	14.04
5310	62	AVG	14.07
5510	102	AVG	13.85
5550	110	AVG	13.96
5670	134	AVG	13.93
5755	151	AVG	14.06
5805	161	AVG	13.79

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

## 6.5 Maximum Power Spectral Density – 802.11a/n §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

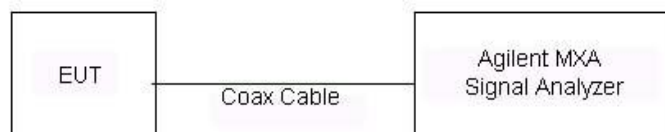
KDB 789033 D02 v01 – Section F

### 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  $\geq 2 \times$  (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

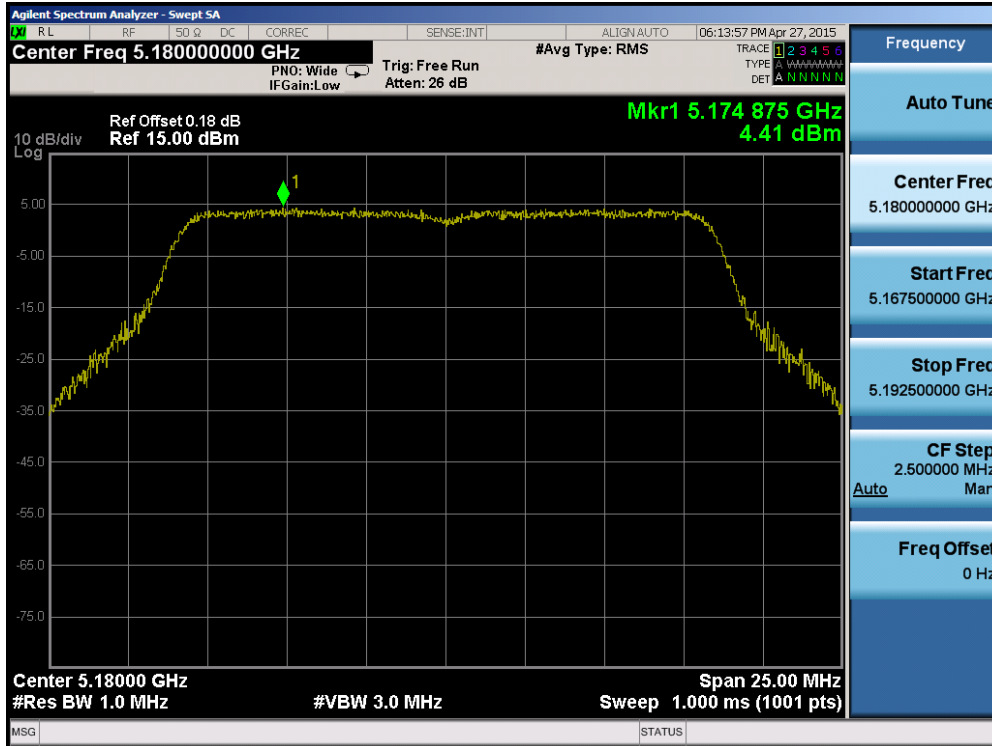
FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset	Page 34 of 100	

	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	4.41	11.0	-6.59	Pass
	5200	40	a	6	4.61	11.0	-6.39	Pass
	5240	48	a	6	4.17	11.0	-6.83	Pass
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	3.87	11.0	-7.13	Pass
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	3.70	11.0	-7.30	Pass
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	3.76	11.0	-7.24	Pass
	5190	38	n (40MHz)	13.5/15 (MCS0)	0.41	11.0	-10.59	Pass
	5230	46	n (40MHz)	13.5/15 (MCS0)	0.70	11.0	-10.30	Pass
Band 2A	5260	52	a	6	4.26	11.0	-6.74	Pass
	5280	56	a	6	4.07	11.0	-6.93	Pass
	5320	64	a	6	3.53	11.0	-7.47	Pass
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	3.18	11.0	-7.82	Pass
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	3.33	11.0	-7.67	Pass
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	3.13	11.0	-7.87	Pass
	5270	54	n (40MHz)	13.5/15 (MCS0)	0.50	11.0	-10.50	Pass
Band 2C	5310	62	n (40MHz)	13.5/15 (MCS0)	0.63	11.0	-10.37	Pass
	5500	100	a	6	3.86	11.0	-7.14	Pass
	5580	116	a	6	3.25	11.0	-7.75	Pass
	5700	140	a	6	3.62	11.0	-7.38	Pass
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	3.58	11.0	-7.42	Pass
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	2.94	11.0	-8.06	Pass
	5700	140	n (20MHz)	6.5/7.2 (MCS0)	3.42	11.0	-7.58	Pass
	5510	102	n (40MHz)	13.5/15 (MCS0)	0.90	11.0	-10.10	Pass
	5550	110	n (40MHz)	13.5/15 (MCS0)	0.53	11.0	-10.47	Pass
5670	134	n (40MHz)	13.5/15 (MCS0)	-0.21	11.0	-11.21	Pass	

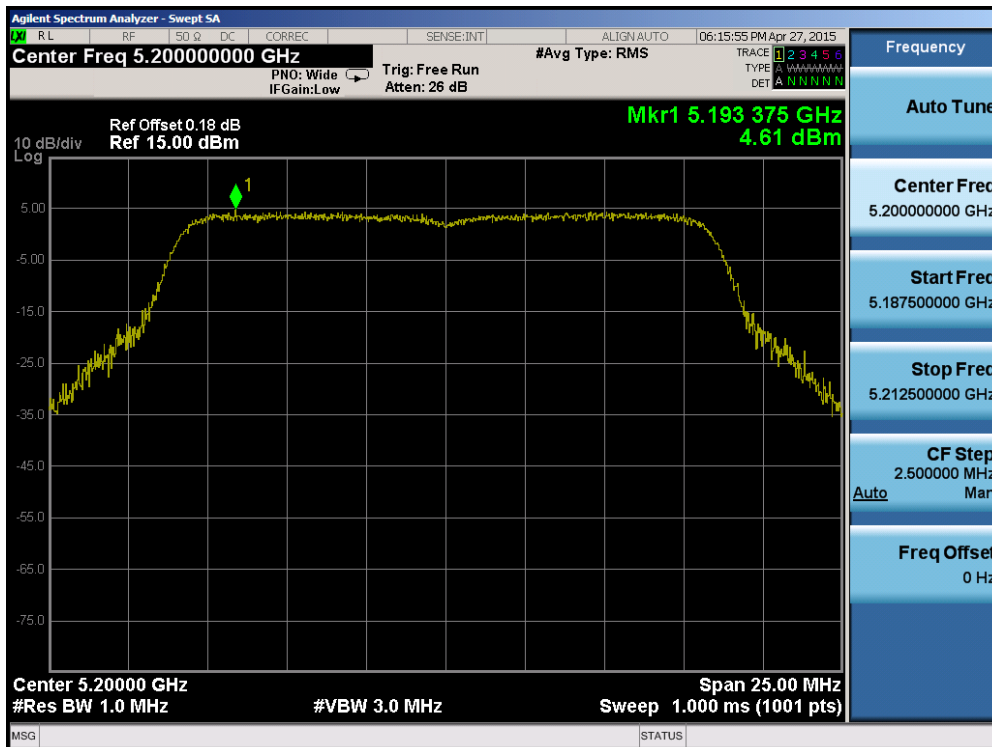
**Table 6-6. Bands 1, 2A, 2C Conducted Power Spectral Density Measurements**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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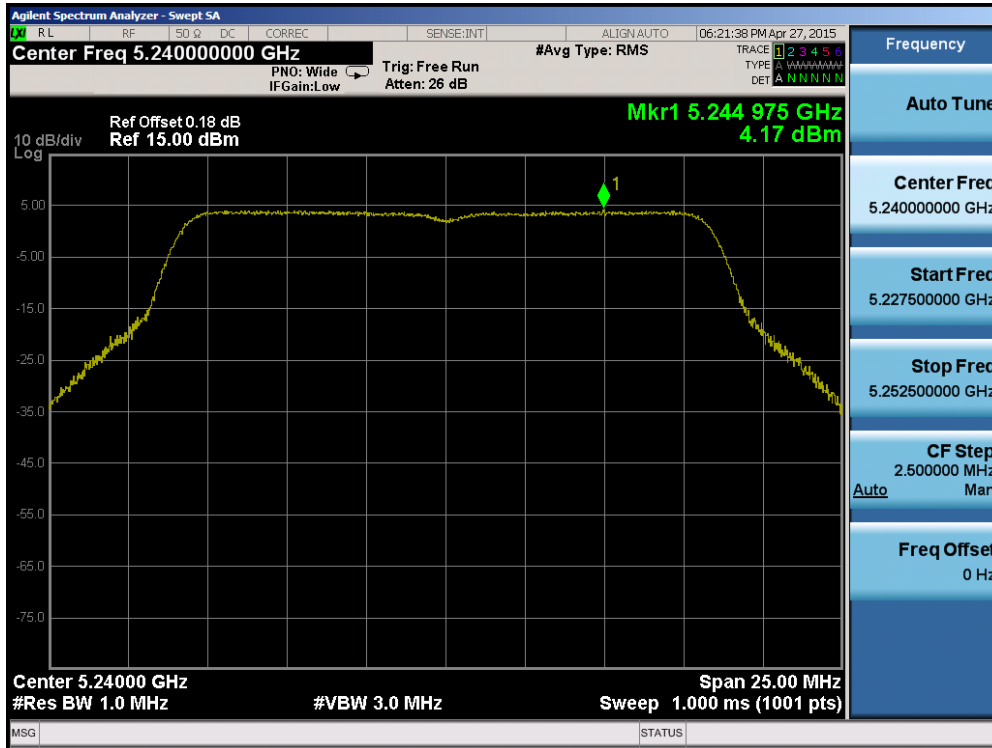


Plot 6-34. Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 36)

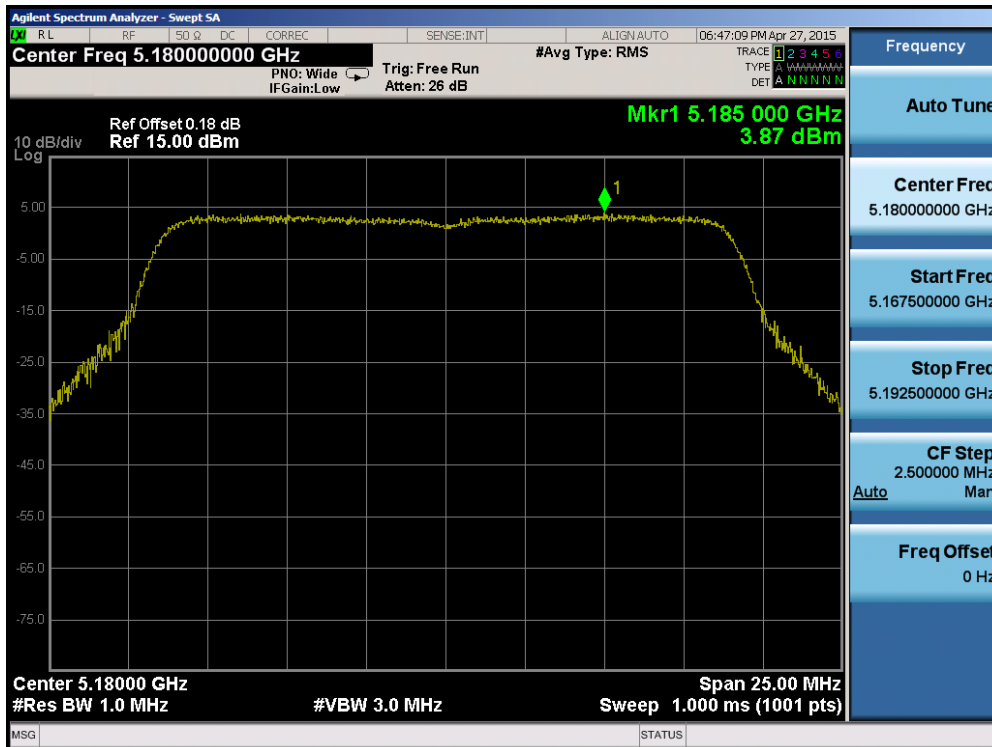


Plot 6-35. Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 40)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 36 of 100

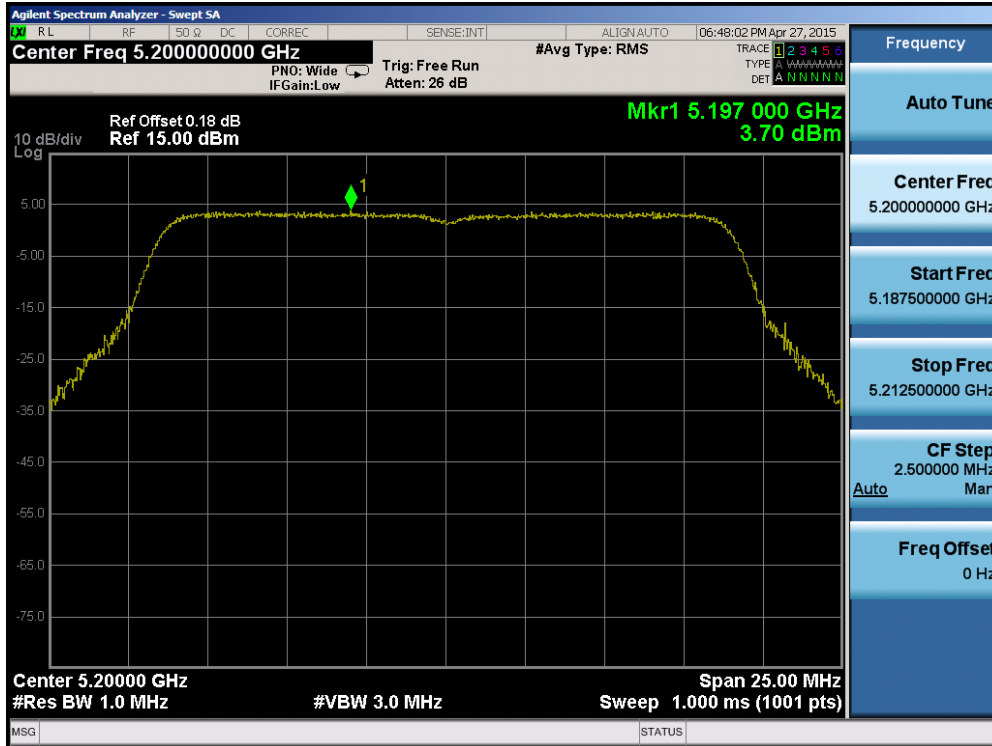


Plot 6-36. Power Spectral Density Plot (802.11a (UNII Band 1) – Ch. 48)

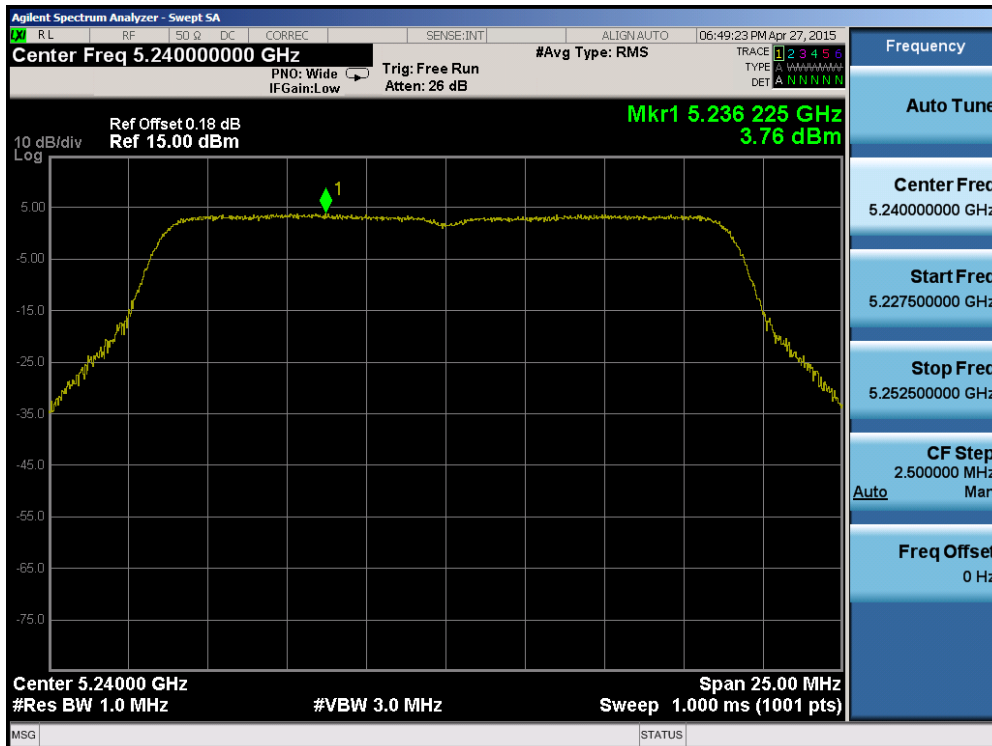


Plot 6-37. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 36)

FCC ID: ZNFH634	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 37 of 100

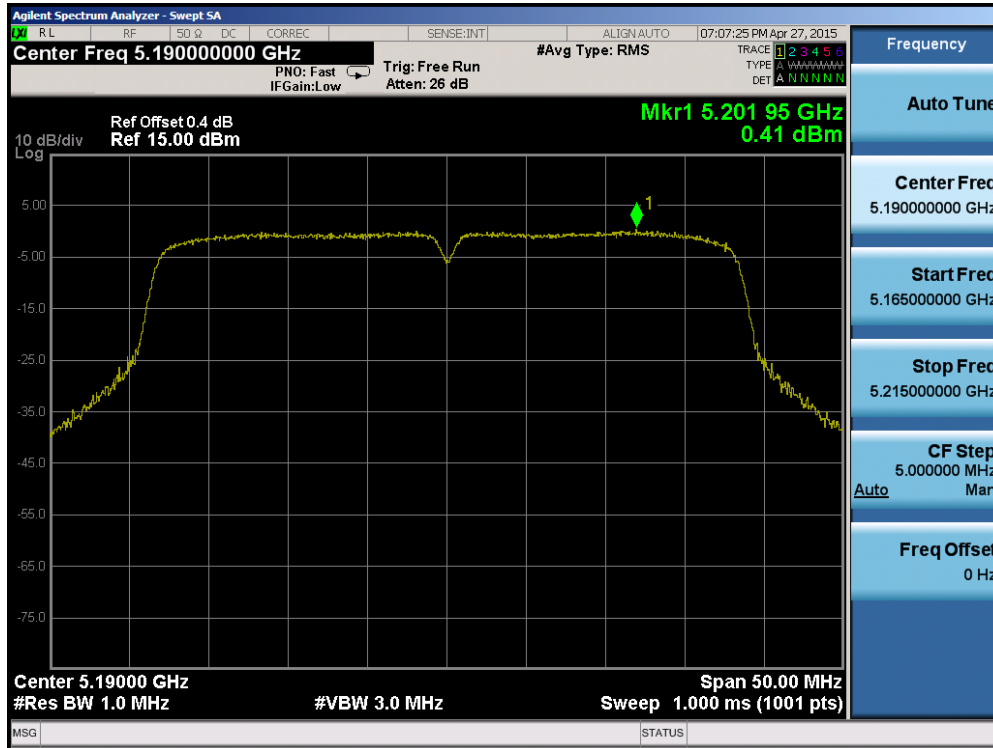


Plot 6-38. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 40)

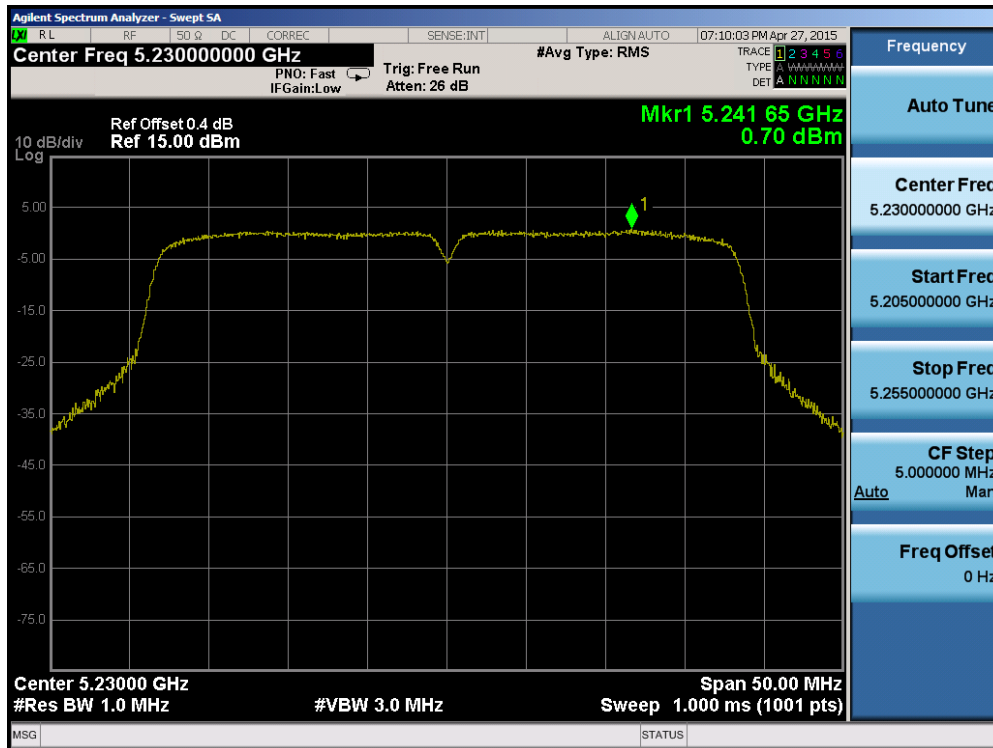


Plot 6-39. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 38 of 100

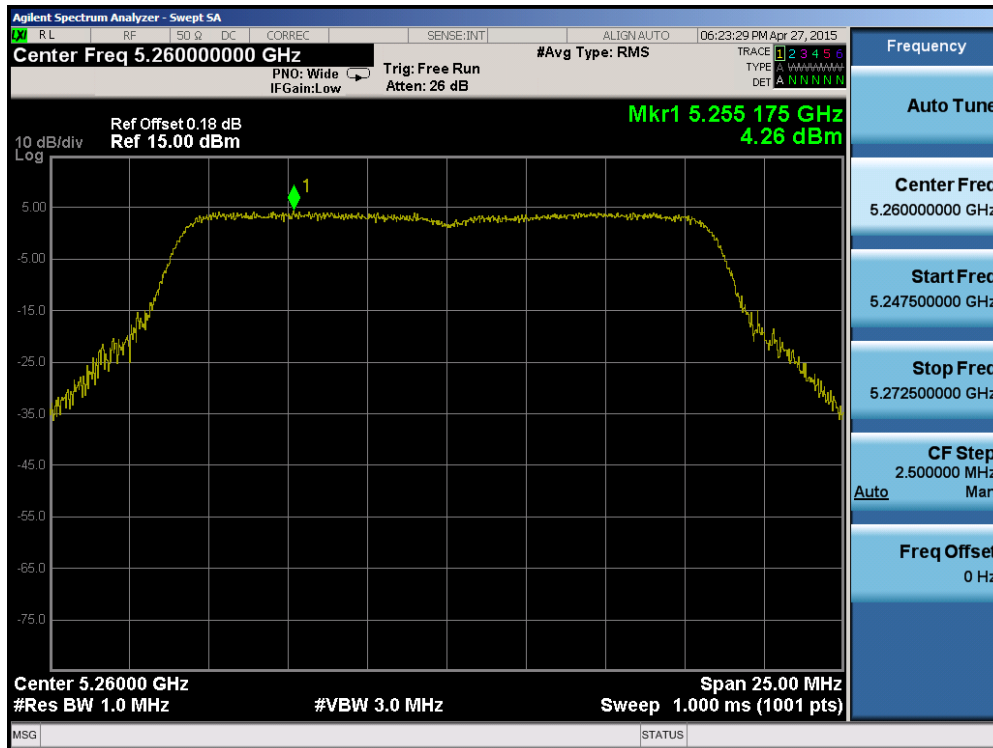


Plot 6-40. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 38)

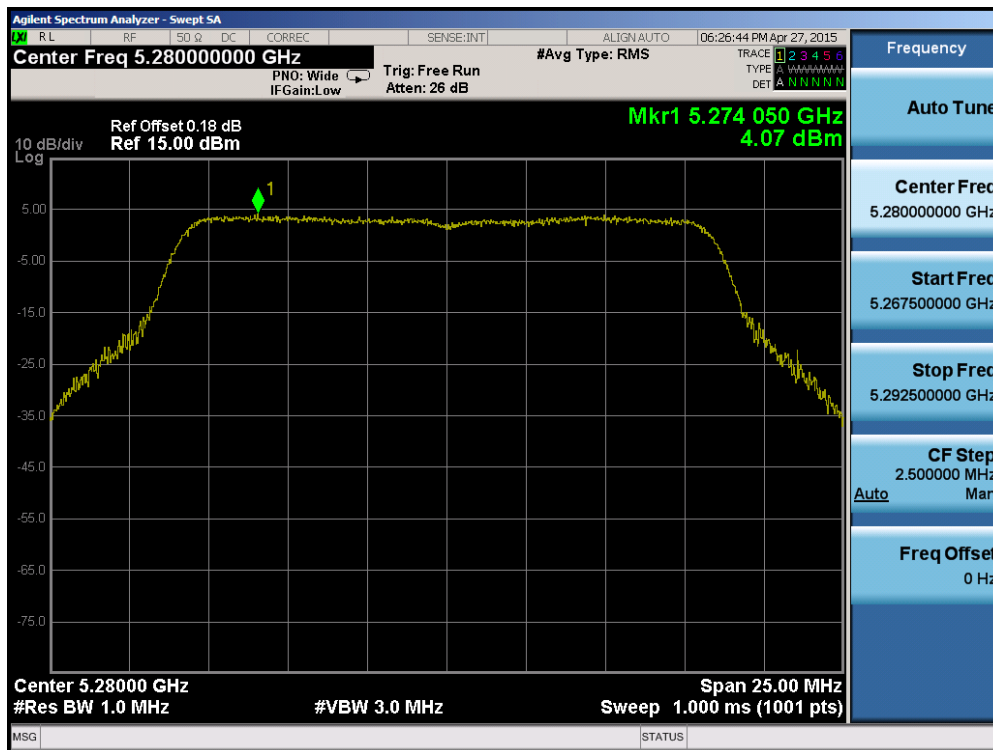


Plot 6-41. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

FCC ID: ZNFH634	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 39 of 100

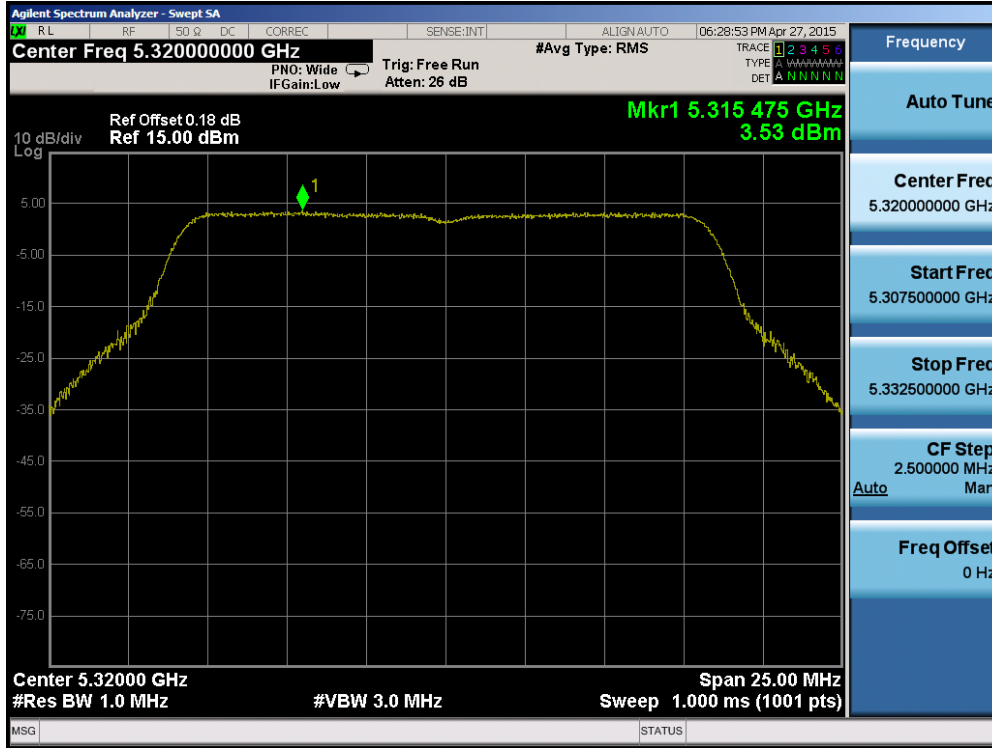


Plot 6-42. Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 52)

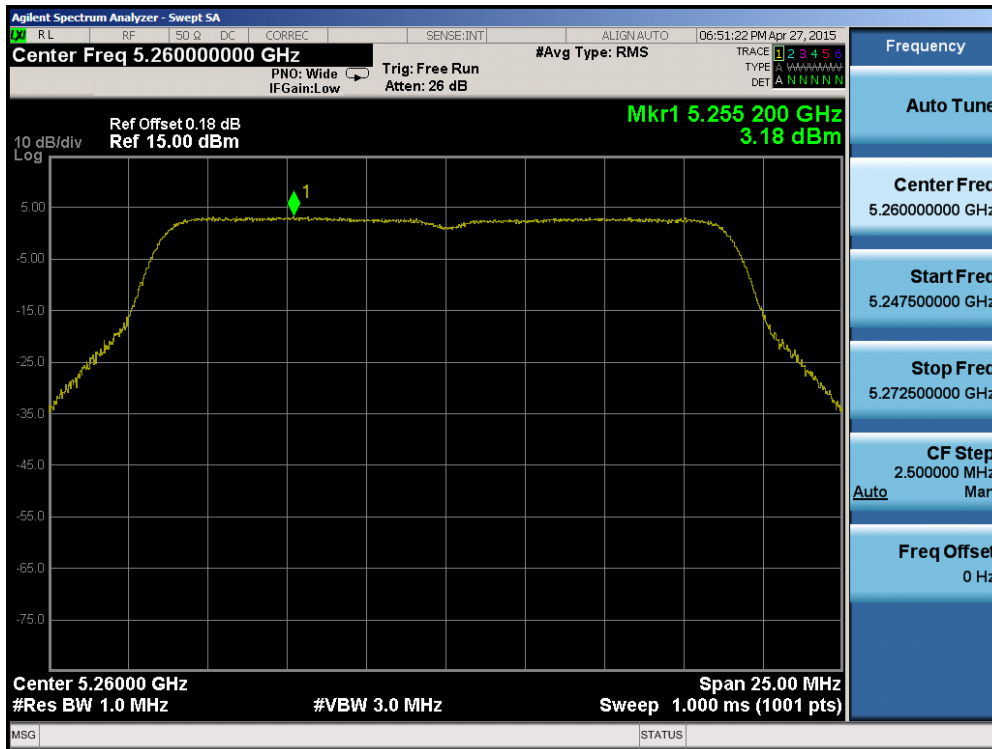


Plot 6-43. Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 56)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 40 of 100



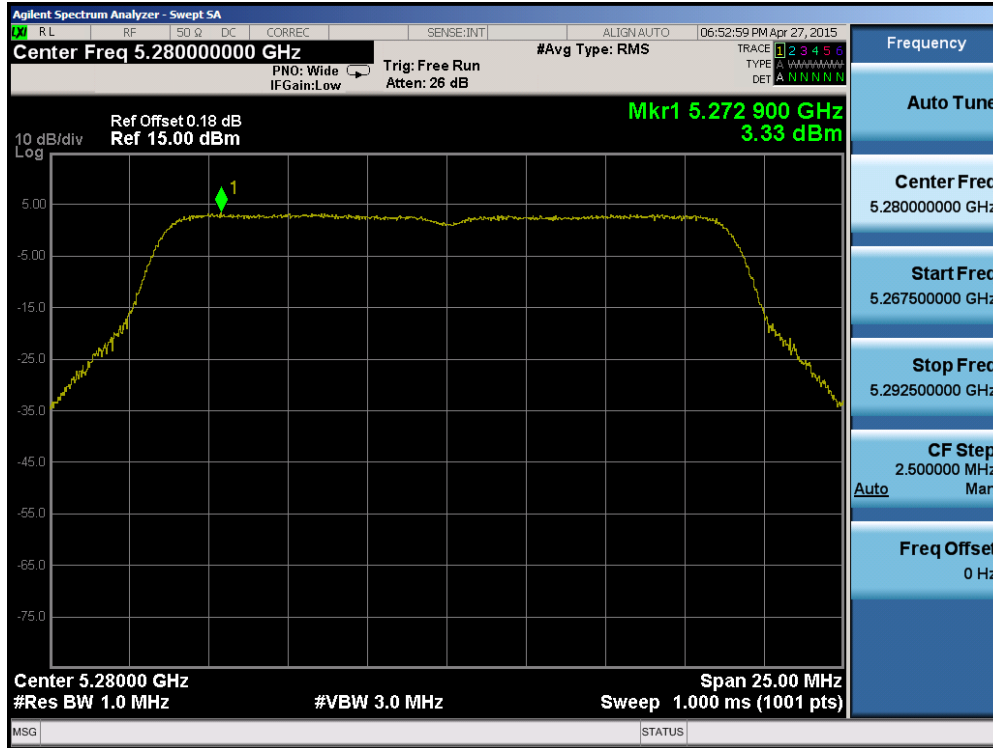
Plot 6-44. Power Spectral Density Plot (802.11a (UNII Band 2A) – Ch. 64)



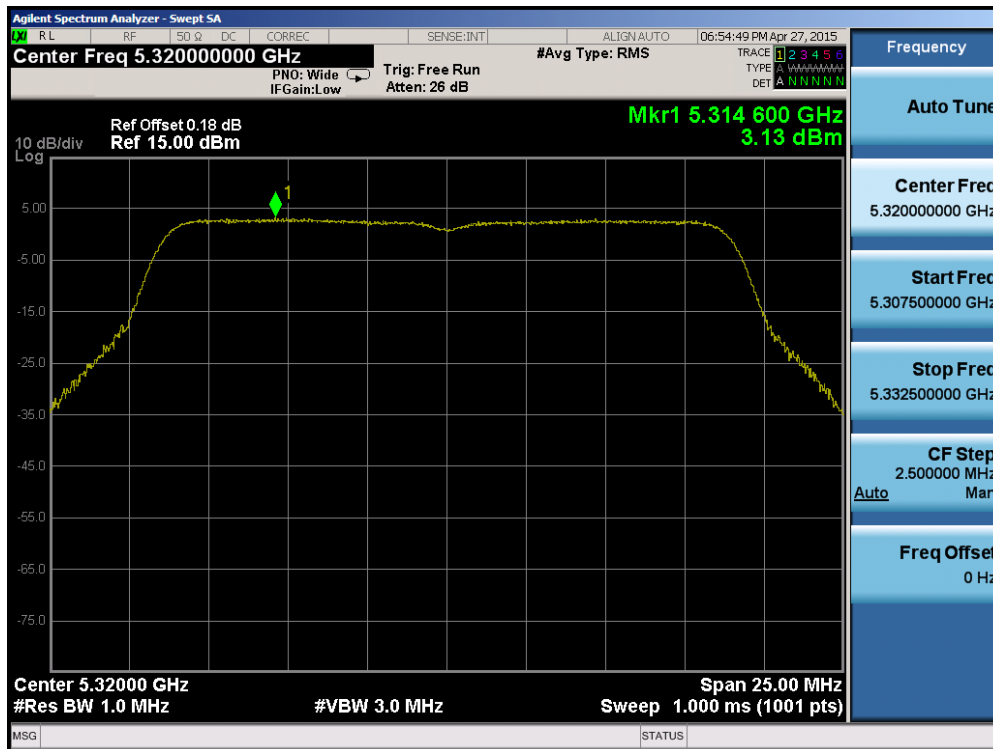
Plot 6-45. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 52)

FCC ID: ZNFH634	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 41 of 100



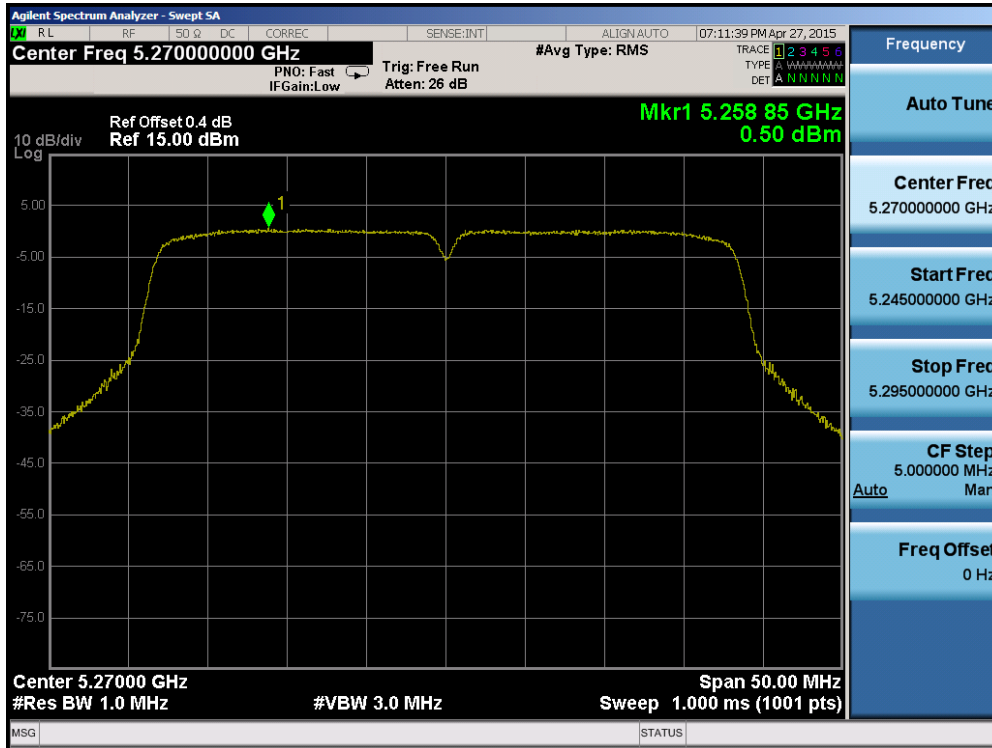


Plot 6-46. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 56)

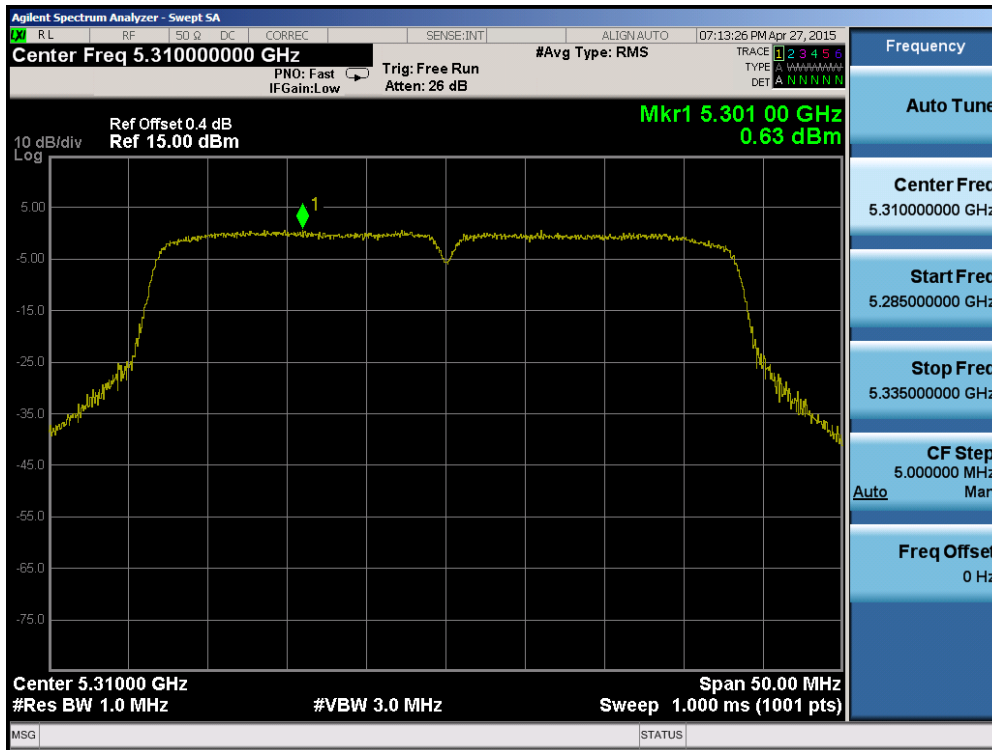


Plot 6-47. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 42 of 100

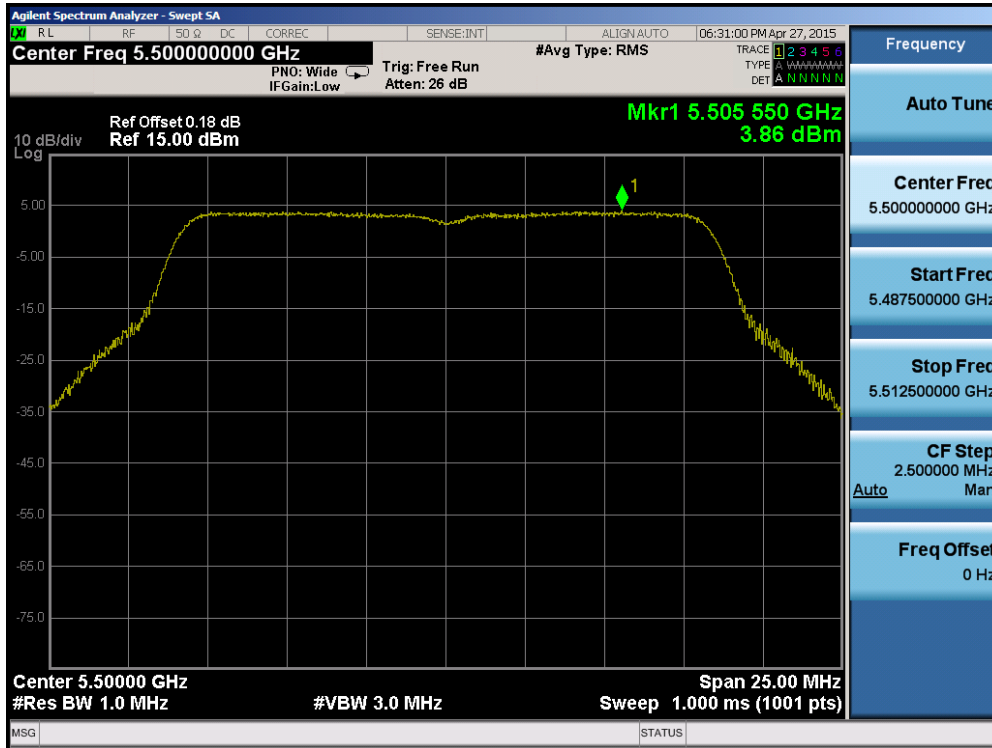


Plot 6-48. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 54)

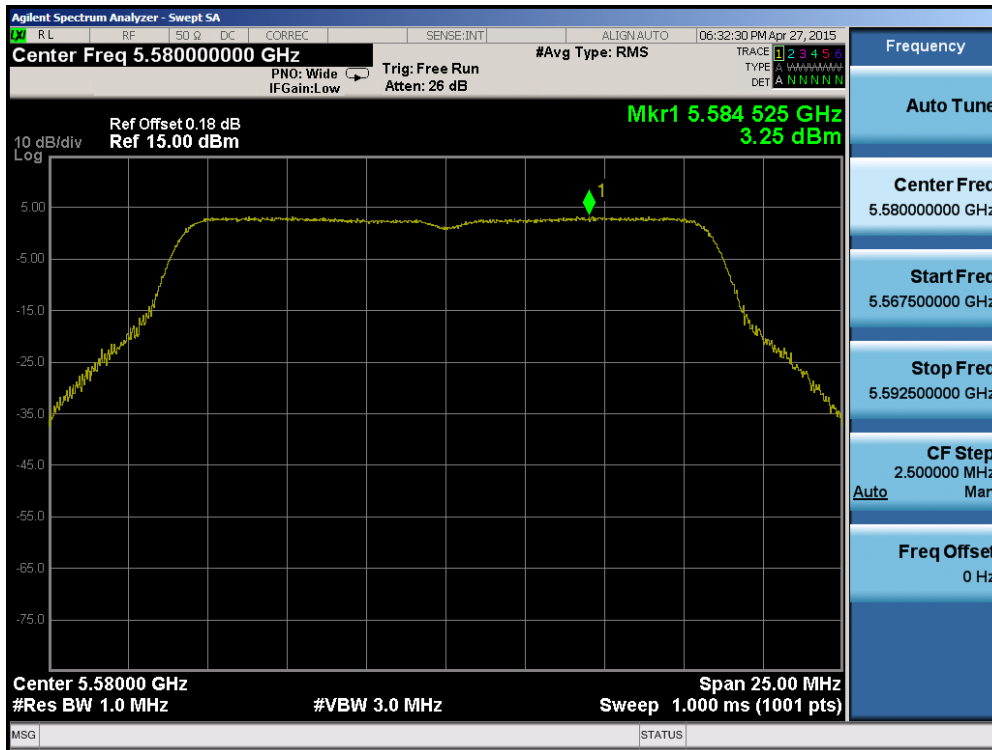


Plot 6-49. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2A) – Ch. 62)

FCC ID: ZNFH634	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 43 of 100

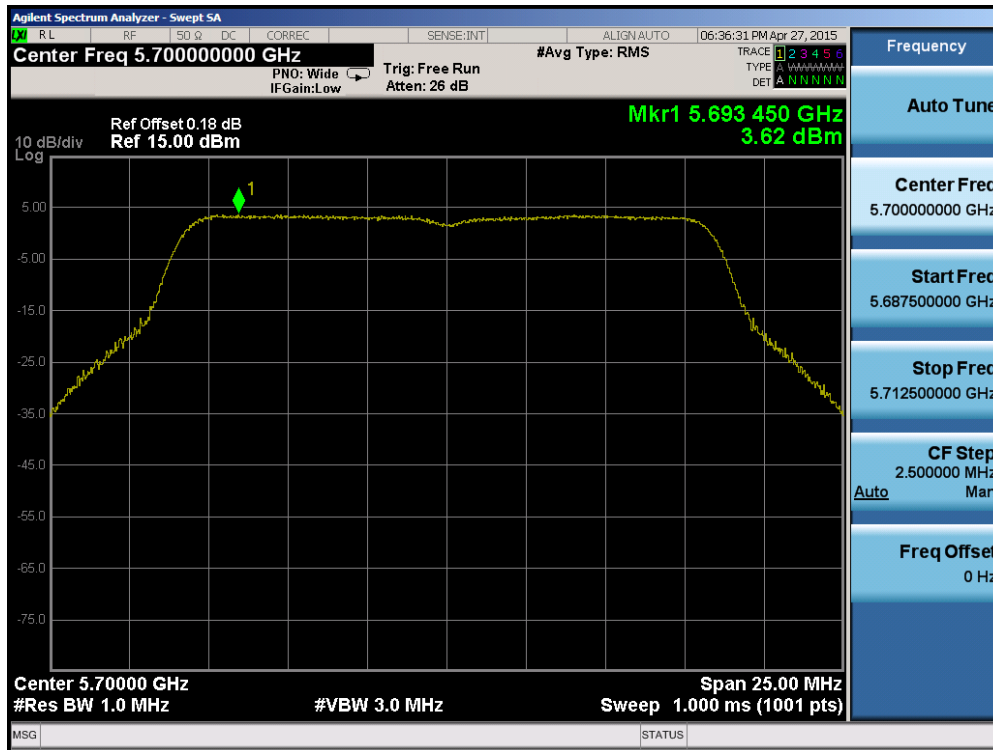


Plot 6-50. Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 100)

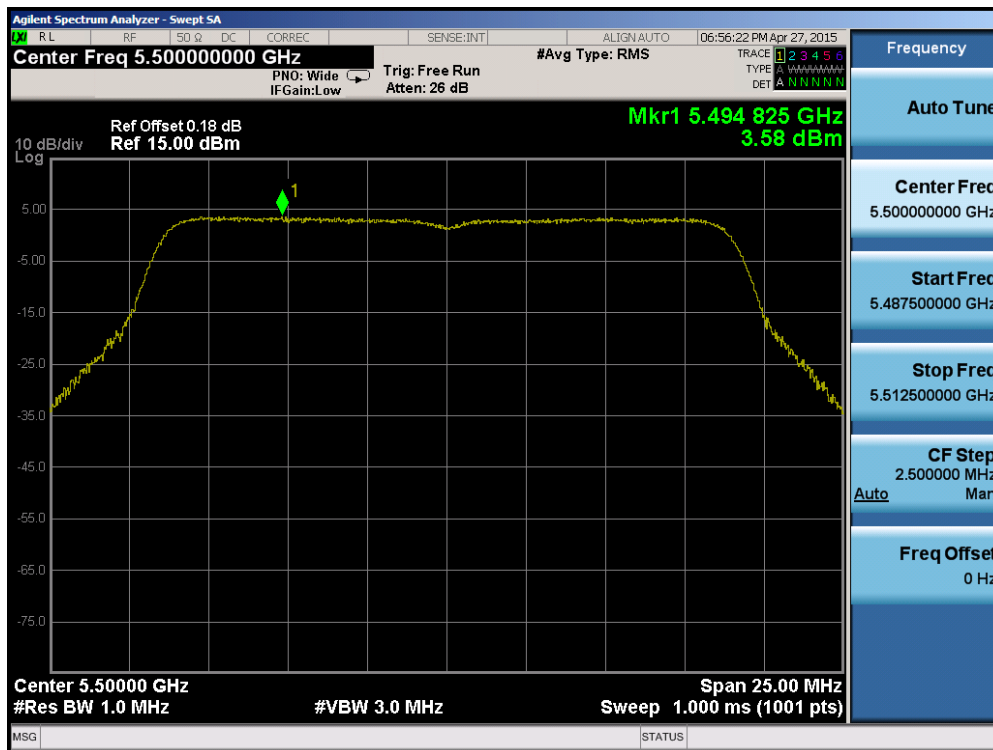


Plot 6-51. Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 116)

FCC ID: ZNFH634	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 44 of 100

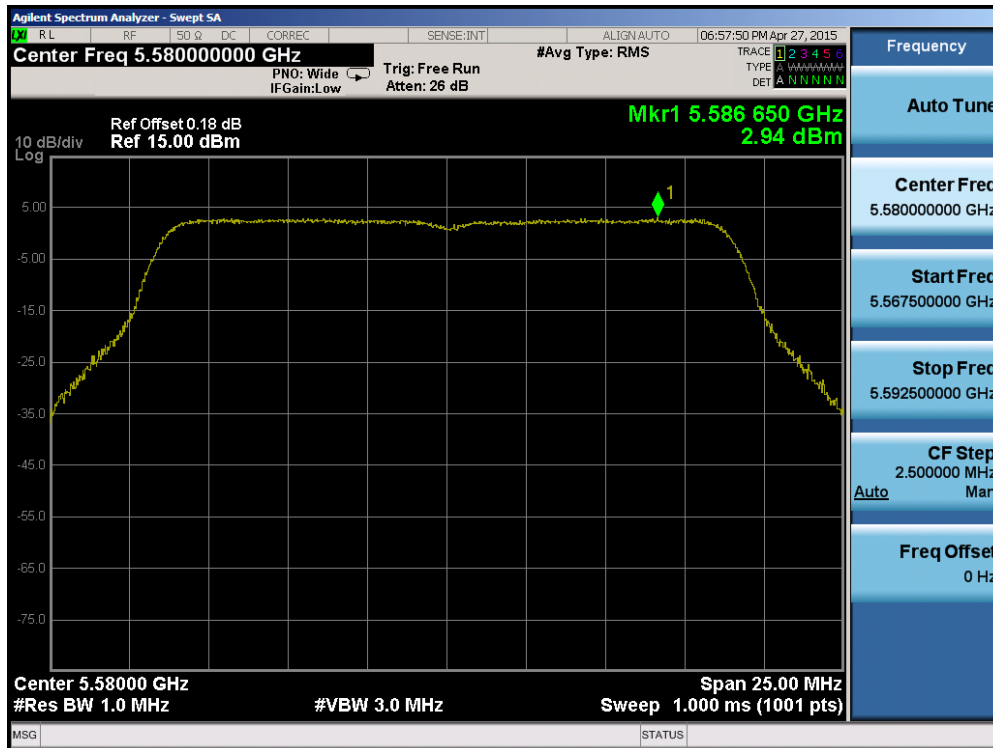


Plot 6-52. Power Spectral Density Plot (802.11a (UNII Band 2C) – Ch. 140

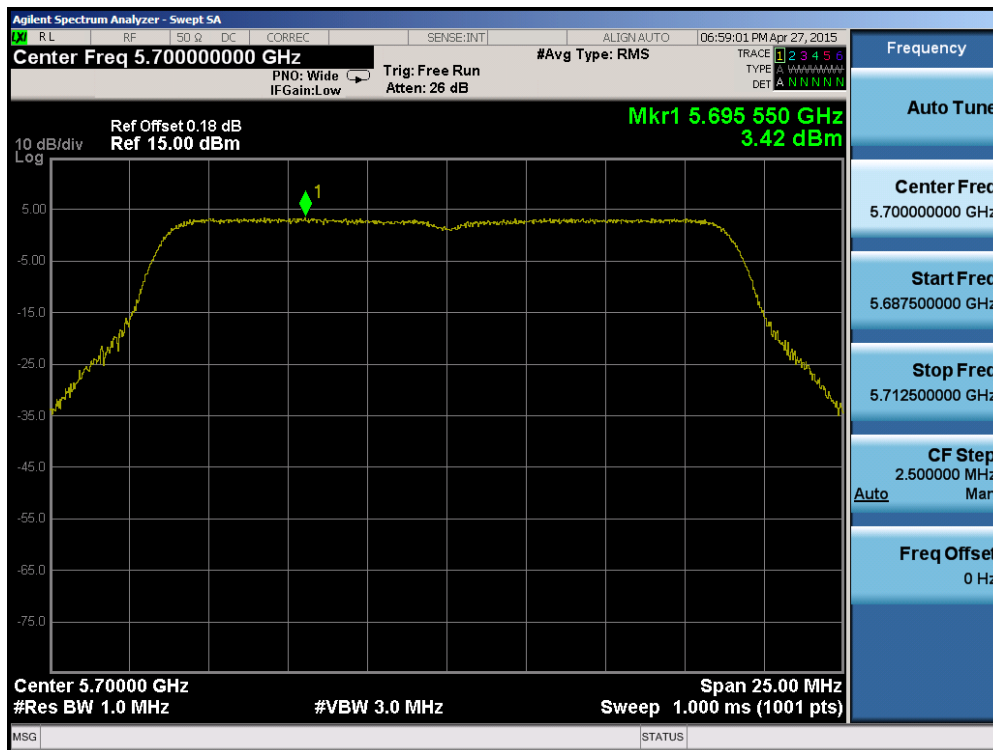


Plot 6-53. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 100)

FCC ID: ZNFH634	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 45 of 100

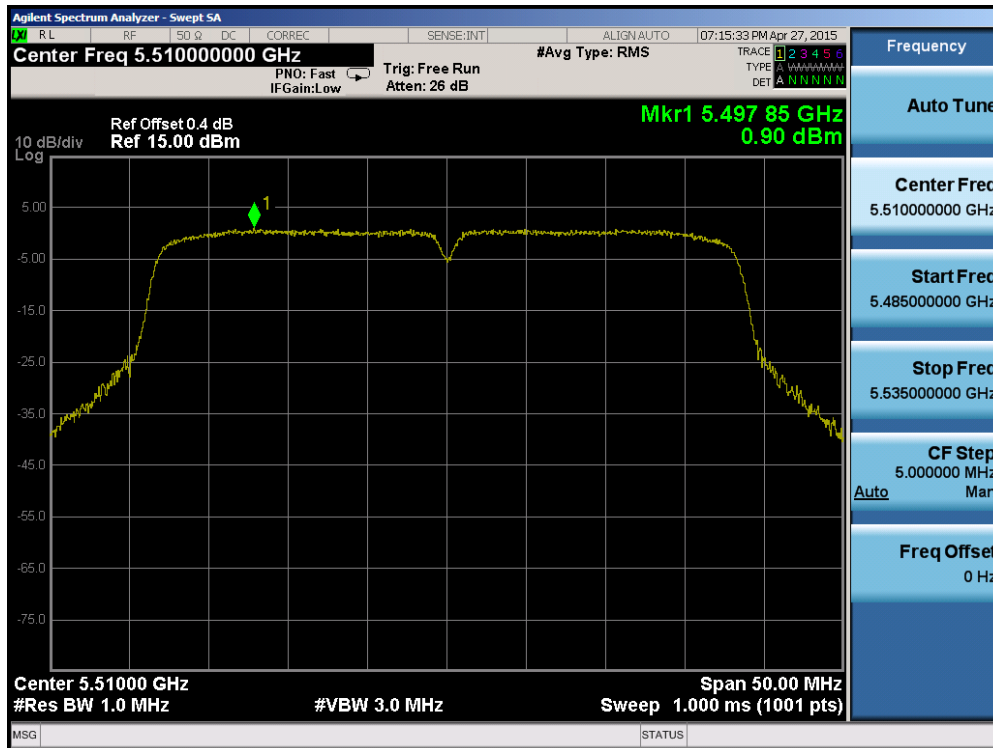


Plot 6-54. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 116)

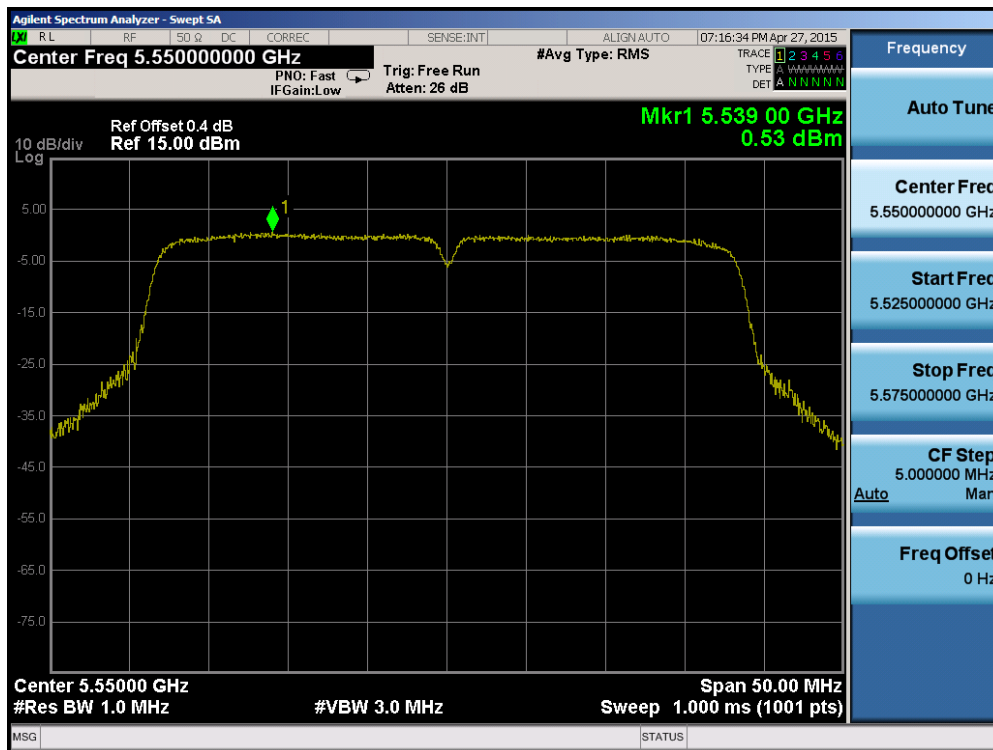


Plot 6-55. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 2C) – Ch. 140)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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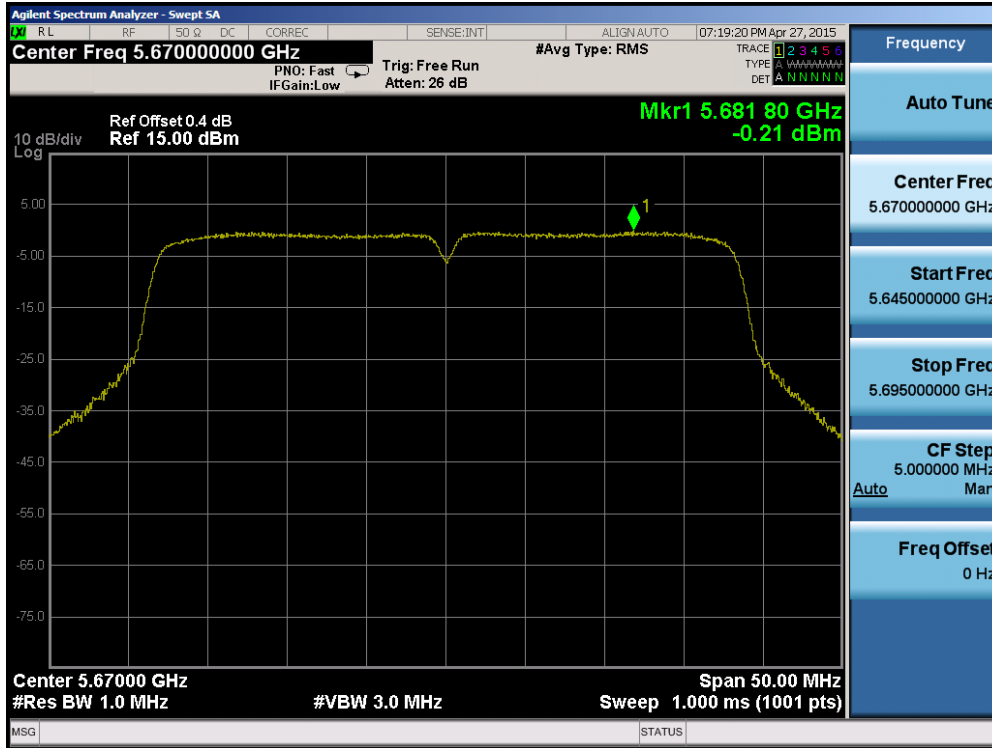
Plot 6-56. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 102)



Plot 6-57. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 110)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 47 of 100



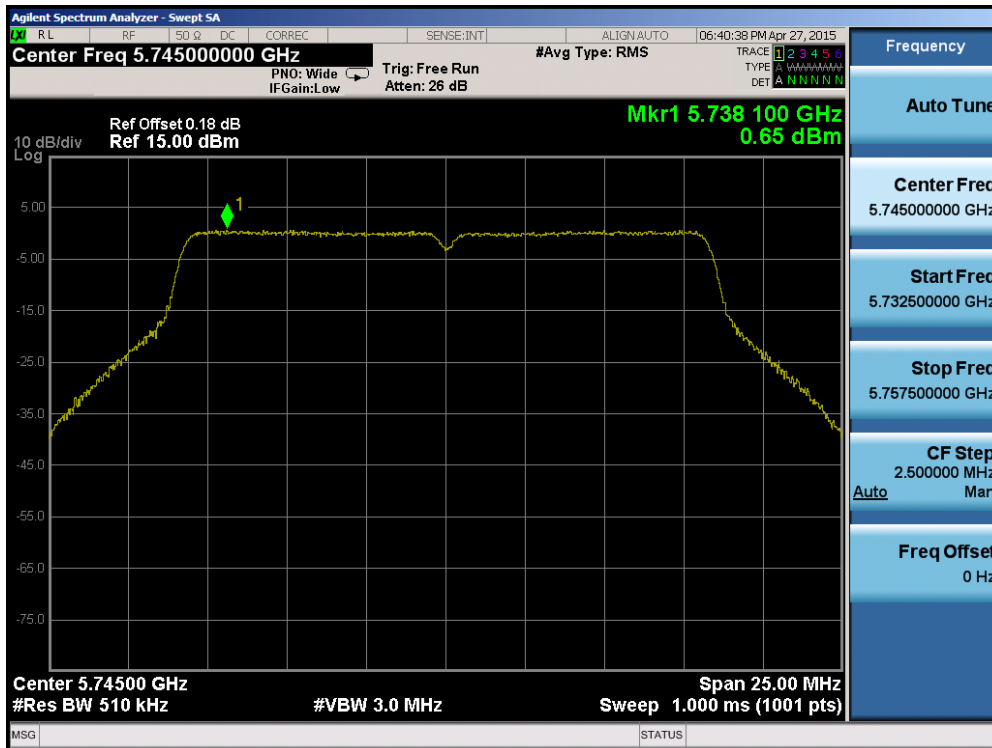


Plot 6-58. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 2C) – Ch. 134)

FCC ID: ZNFH634	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 48 of 100

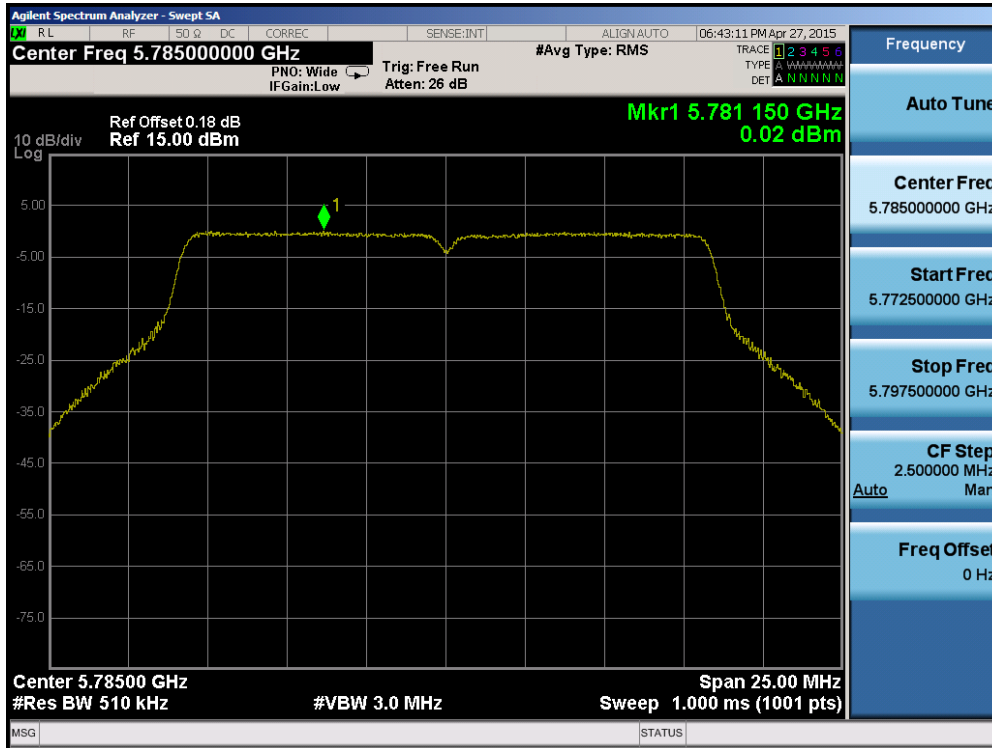
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured Power Density [dBm]	Max Permissible Power Density [dBm/500kHz]	Margin [dB]	Pass / Fail
<b>Band 3</b>	5745	149	a	6	0.65	30.0	-29.35	Pass
	5785	157	a	6	0.02	30.0	-29.98	Pass
	5825	165	a	6	0.67	30.0	-29.33	Pass
	5745	149	n (20MHz)	6.5/7.2 (MCS0)	0.57	30.0	-29.43	Pass
	5785	157	n (20MHz)	6.5/7.2 (MCS0)	1.05	30.0	-28.95	Pass
	5825	165	n (20MHz)	6.5/7.2 (MCS0)	0.33	30.0	-29.67	Pass
	5755	151	n (40MHz)	13.5/15 (MCS0)	-2.51	30.0	-32.51	Pass
	5795	159	n (40MHz)	13.5/15 (MCS0)	-2.46	30.0	-32.46	Pass

**Table 6-7. Band 3 Conducted Power Spectral Density Measurements**

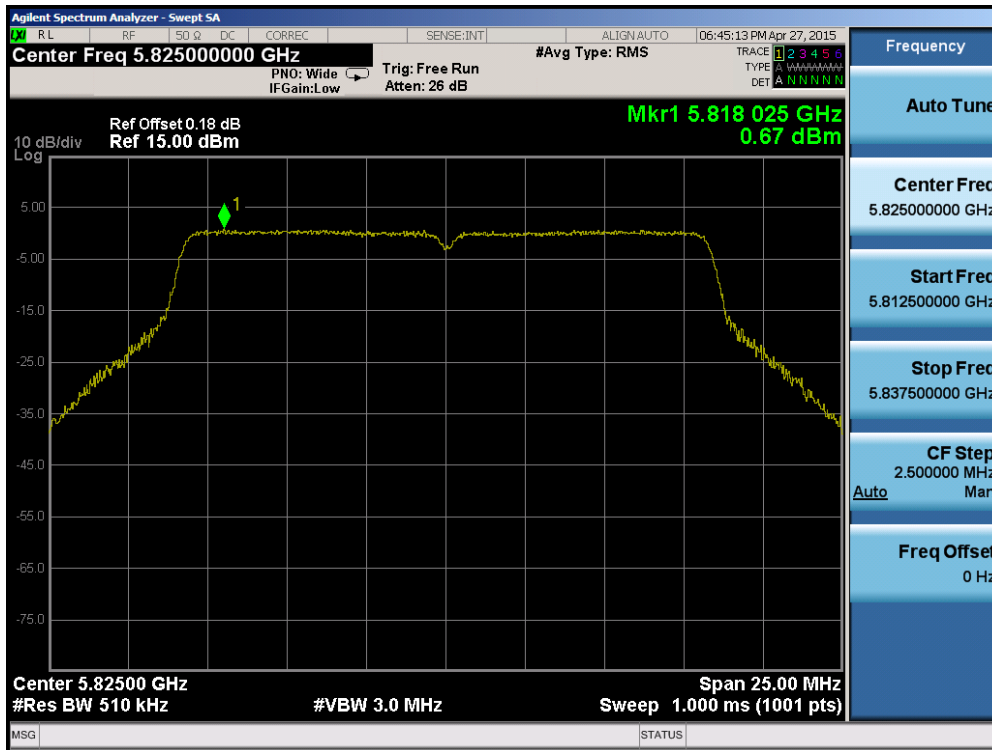


**Plot 6-59. Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 149)**

<b>FCC ID:</b> ZNFH634		<b>FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1504200768.ZNF	<b>Test Dates:</b> 4/20 - 5/4/2015	<b>EUT Type:</b> Portable Handset		Page 49 of 100

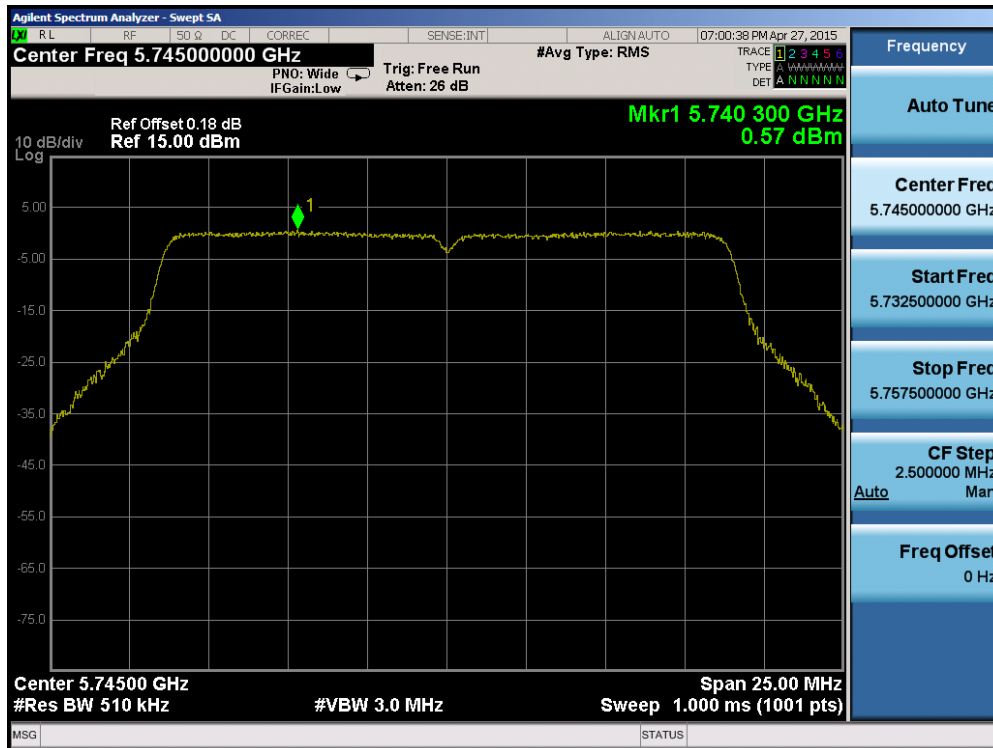


Plot 6-60. Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 157)

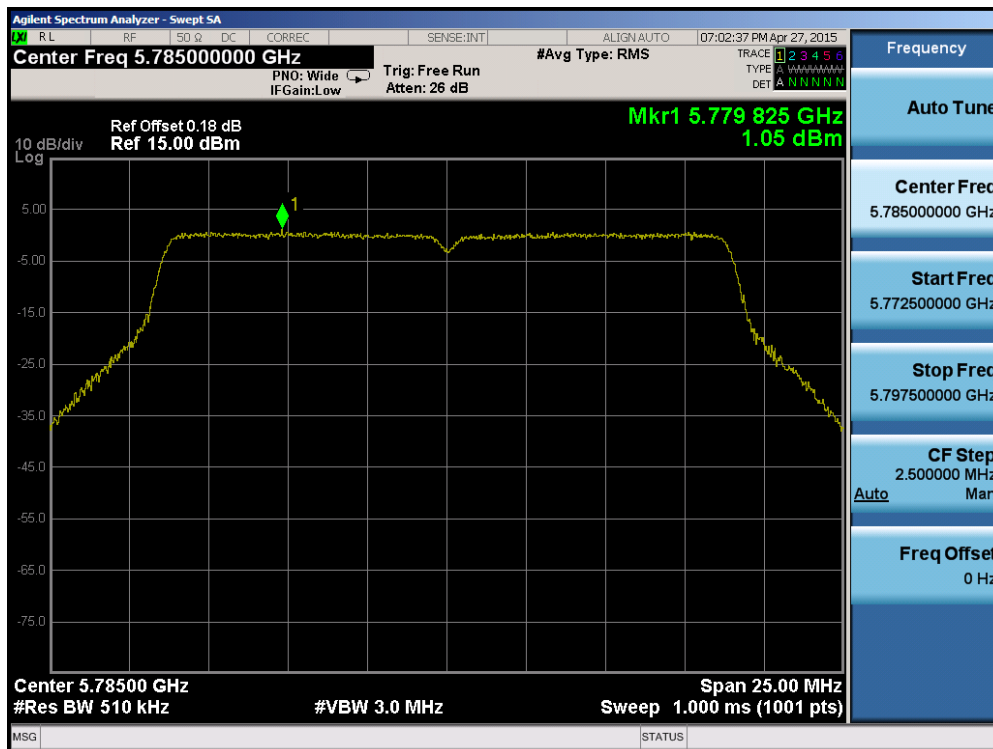


Plot 6-61. Power Spectral Density Plot (802.11a (UNII Band 3) – Ch. 165)

FCC ID: ZNFH634	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 50 of 100

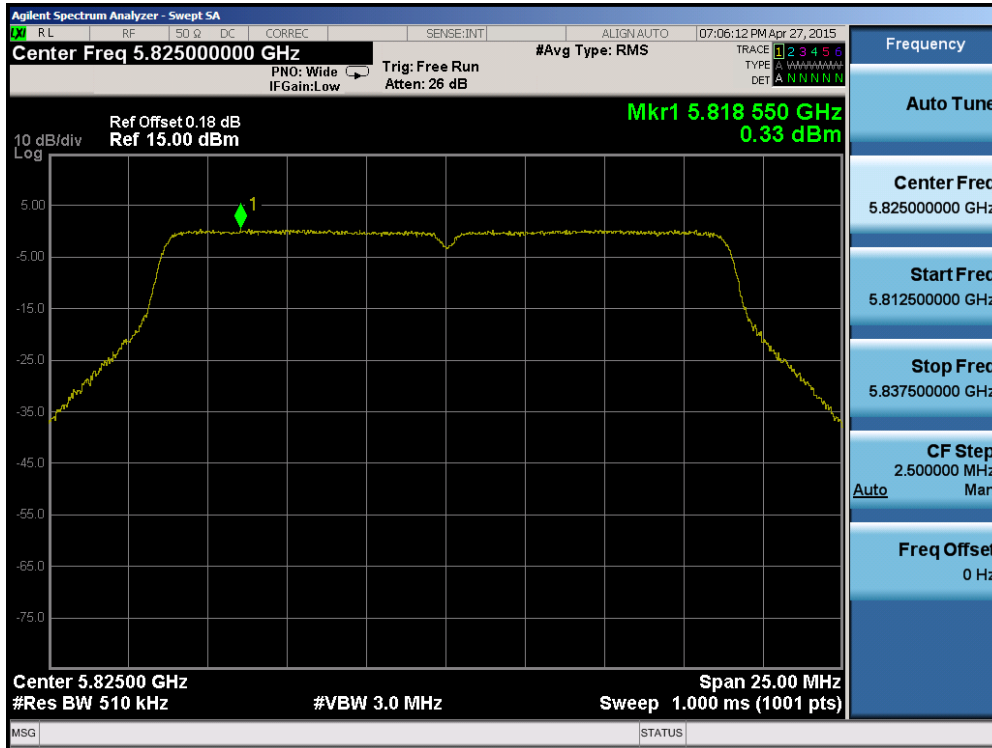


Plot 6-62. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 149)

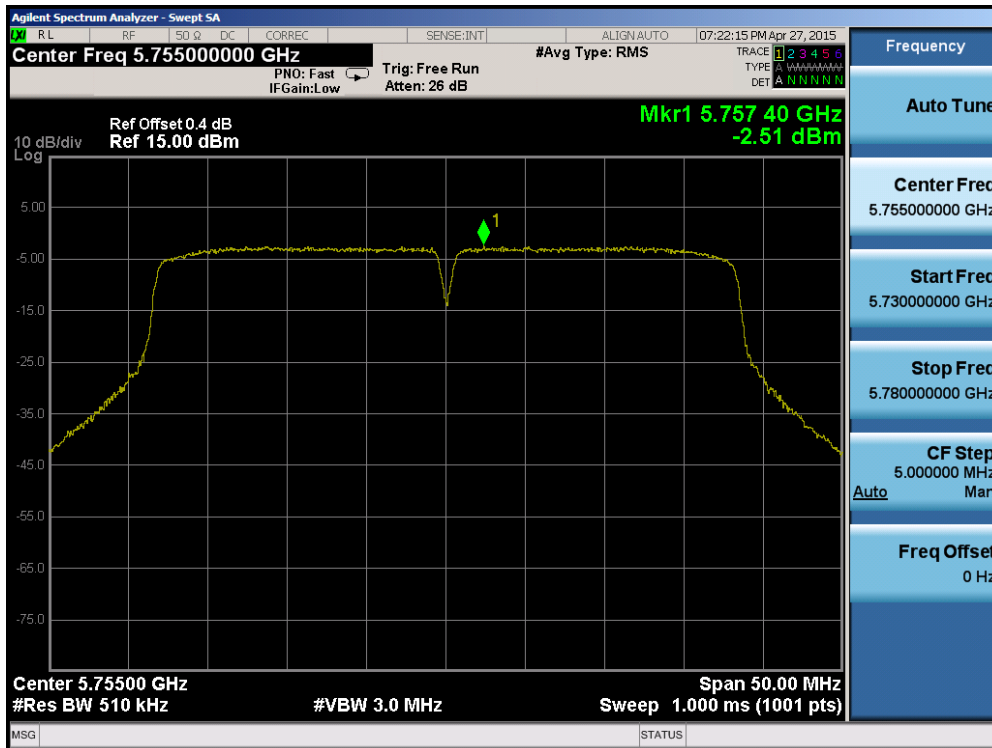


Plot 6-63. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 157)

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 51 of 100

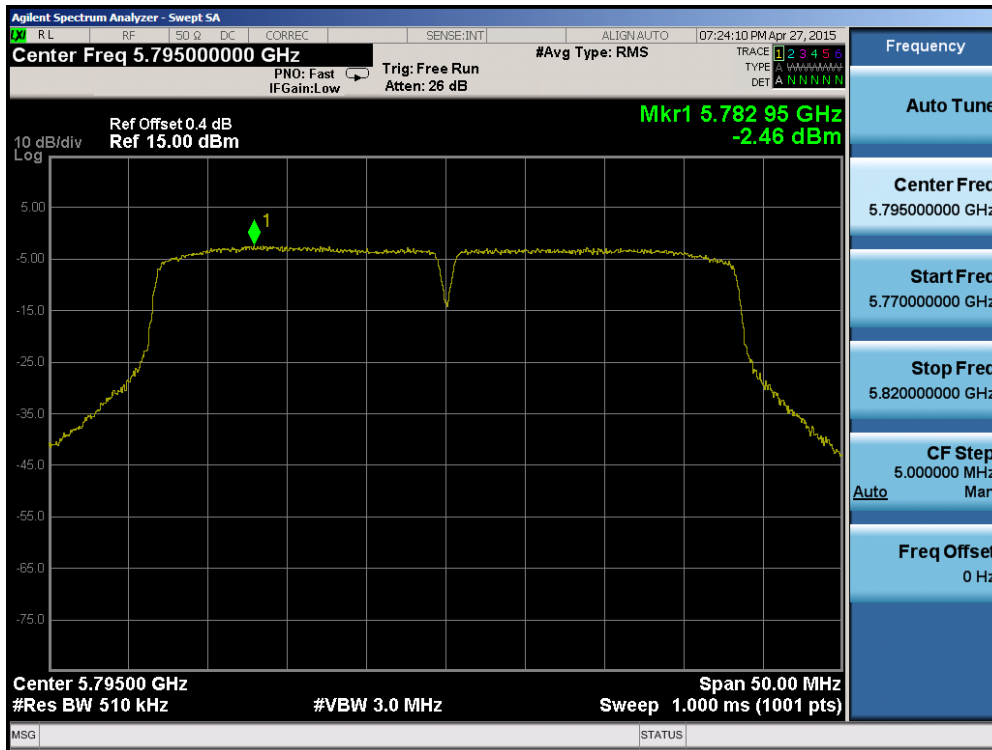


Plot 6-64. Power Spectral Density Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 165)



Plot 6-65. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 151)

FCC ID: ZNFH634	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 52 of 100



Plot 6-66. Power Spectral Density Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 159)

FCC ID: ZNFH634	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 53 of 100

## 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)	5,180,001,733	-76	0.00003346
100 %		- 30	5,180,009,553	229	0.00018442
100 %		- 20	5,179,987,413	347	-0.00024299
100 %		- 10	5,180,007,495	186	0.00014469
100 %		0	5,180,005,595	-26	0.00010801
100 %		+ 10	5,180,003,756	88	0.00007251
100 %		+ 20	5,180,000,478	-224	0.00000923
100 %		+ 30	5,180,010,058	-193	0.00019417
100 %		+ 40	5,179,993,000	53	-0.00013514
100 %		+ 50	5,179,997,434	-441	-0.00004954
BATT. ENDPOINT		3.45	+ 20	5,179,993,584	65

**Table 6-8. 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.

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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)	5,260,001,571	470	0.00002987
100 %		- 30	5,260,000,085	227	0.00000162
100 %		- 20	5,260,008,498	-172	0.00016156
100 %		- 10	5,260,003,745	473	0.00007120
100 %		0	5,260,011,966	-444	0.00022749
100 %		+ 10	5,260,009,693	-2	0.00018428
100 %		+ 20	5,259,994,125	245	-0.00011169
100 %		+ 30	5,260,003,676	193	0.00006989
100 %		+ 40	5,259,990,539	449	-0.00017987
100 %		+ 50	5,259,992,512	-78	-0.00014236
BATT. ENDPOINT		3.45	+ 20	5,259,991,568	7

**Table 6-9. 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.

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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)	5,499,988,019	-453	-0.00021784
100 %		- 30	5,499,991,295	311	-0.00015827
100 %		- 20	5,499,997,005	-464	-0.00005445
100 %		- 10	5,500,007,011	416	0.00012747
100 %		0	5,500,004,578	-67	0.00008324
100 %		+ 10	5,499,998,749	313	-0.00002275
100 %		+ 20	5,499,998,070	355	-0.00003509
100 %		+ 30	5,499,999,651	-32	-0.00000635
100 %		+ 40	5,499,989,576	-217	-0.00018953
100 %		+ 50	5,500,003,540	-241	0.00006436
BATT. ENDPOINT		3.45	+ 20	5,500,012,013	151

**Table 6-10. 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)	5,744,996,959	131	-0.00005293
100 %		- 30	5,745,003,211	162	0.00005589
100 %		- 20	5,744,996,465	396	-0.00006153
100 %		- 10	5,745,003,200	204	0.00005570
100 %		0	5,744,988,124	197	-0.00020672
100 %		+ 10	5,744,987,114	46	-0.00022430
100 %		+ 20	5,745,004,833	-18	0.00008413
100 %		+ 30	5,744,993,438	474	-0.00011422
100 %		+ 40	5,745,007,279	389	0.00012670
100 %		+ 50	5,744,997,174	125	-0.00004919
BATT. ENDPOINT		3.45	+ 20	5,744,994,785	252

**Table 6-11. 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) and 802.11n (40MHz BW), 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 6-12 per Section 15.209.***

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

**Table 6-12. 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

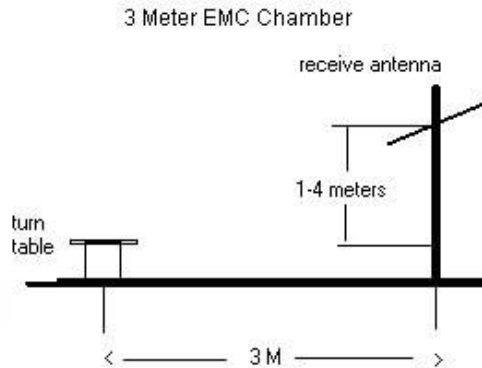
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**Peak Measurements below 1GHz**

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 6-12.
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

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

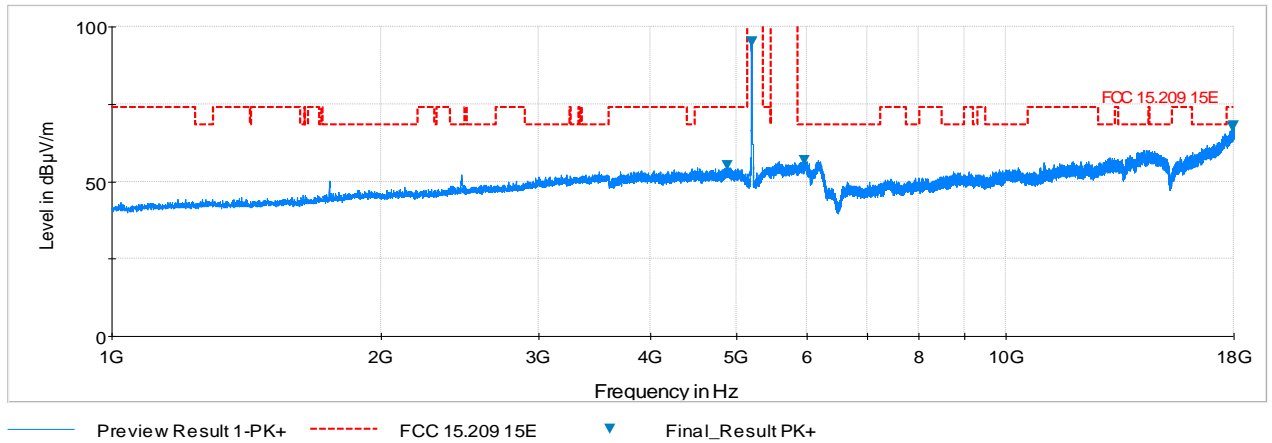
### Radiated Band Edge Measurement Offset

- The amplitude offset shown in the radiated restricted band edge plots in Section 6.8 was calculated using the formula:

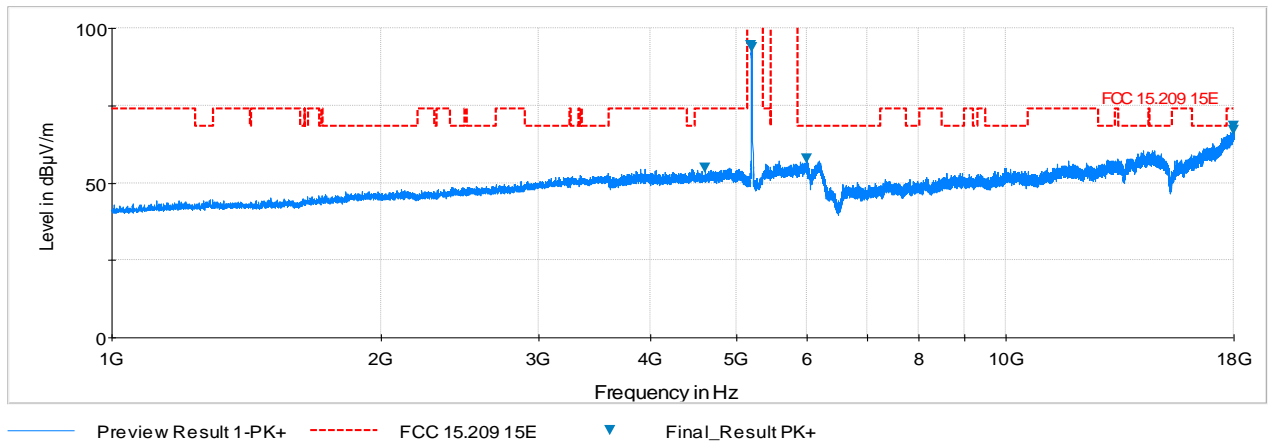
$$\text{Offset (dB)} = (\text{Antenna Factor} + \text{Cable Loss} + 10 \text{ dB Attenuator}) - \text{Preamplifier Gain}$$

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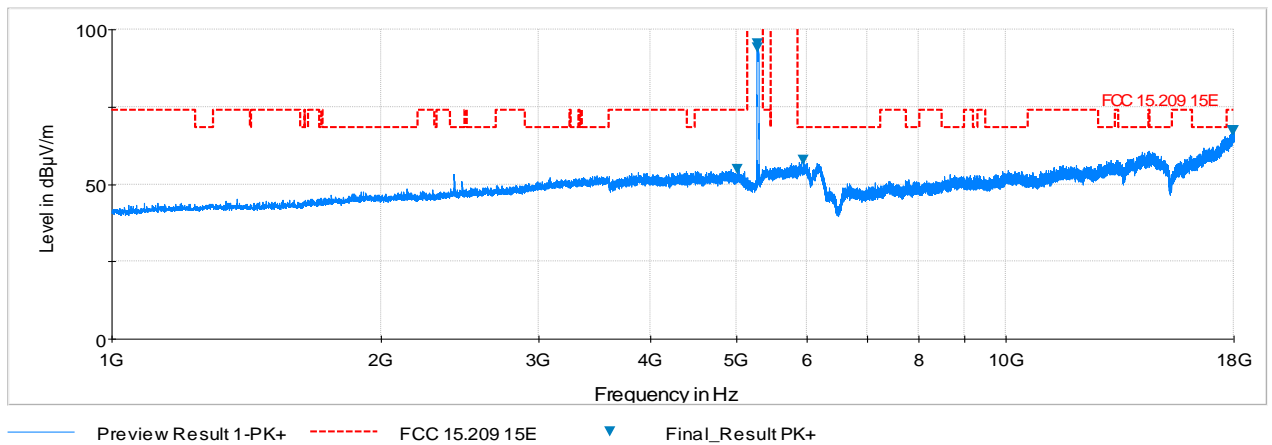
## 6.7.1 Radiated Spurious Emission Measurements



**Plot 6-67. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. H)**



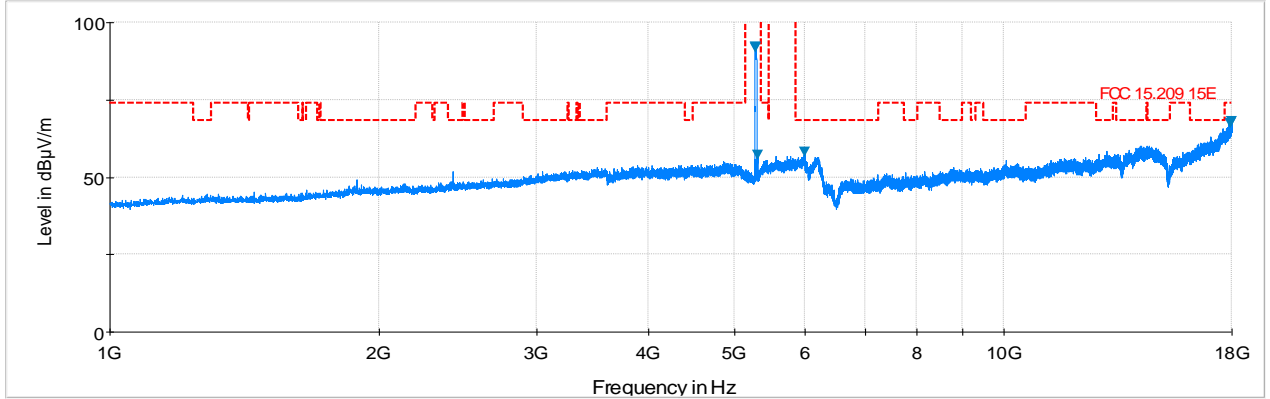
**Plot 6-68. Radiated Spurious Plot above 1GHz (802.11a – U1 Ch. 40, Ant. Pol. V)**



**Plot 6-69. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. H)**

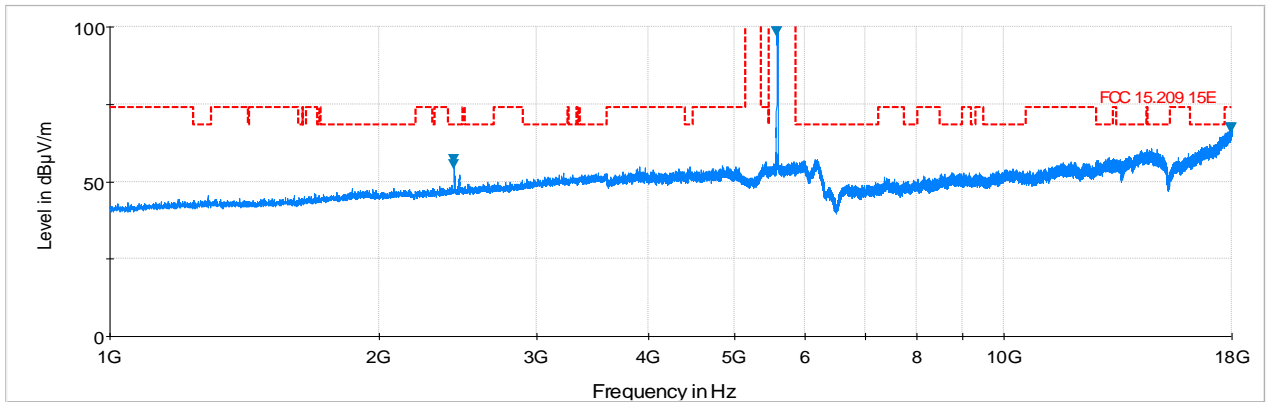
FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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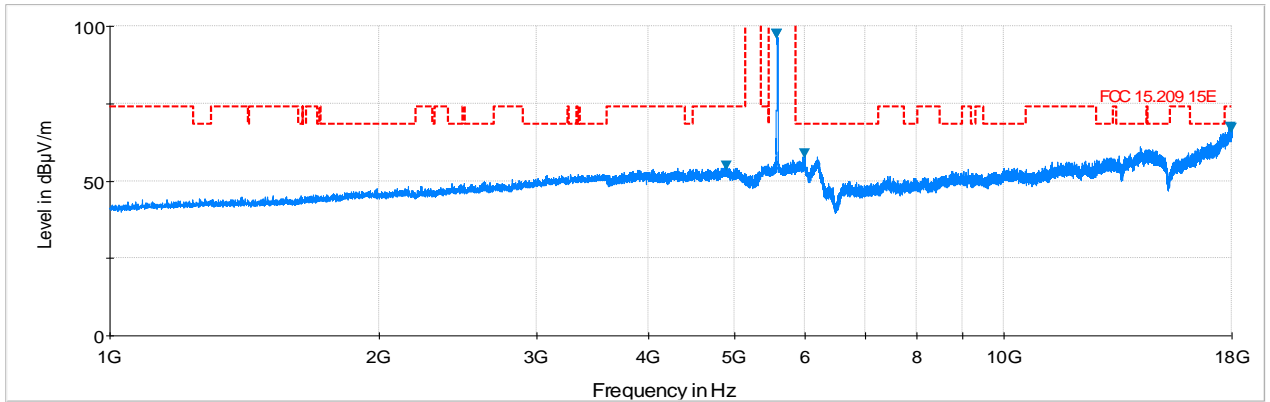
Preview Result 1-PK+    FCC 15.209 15E    Final\_Result PK+

**Plot 6-70. Radiated Spurious Plot above 1GHz (802.11a – U2A Ch. 56, Ant. Pol. V)**



Preview Result 1-PK+    FCC 15.209 15E    Final\_Result PK+

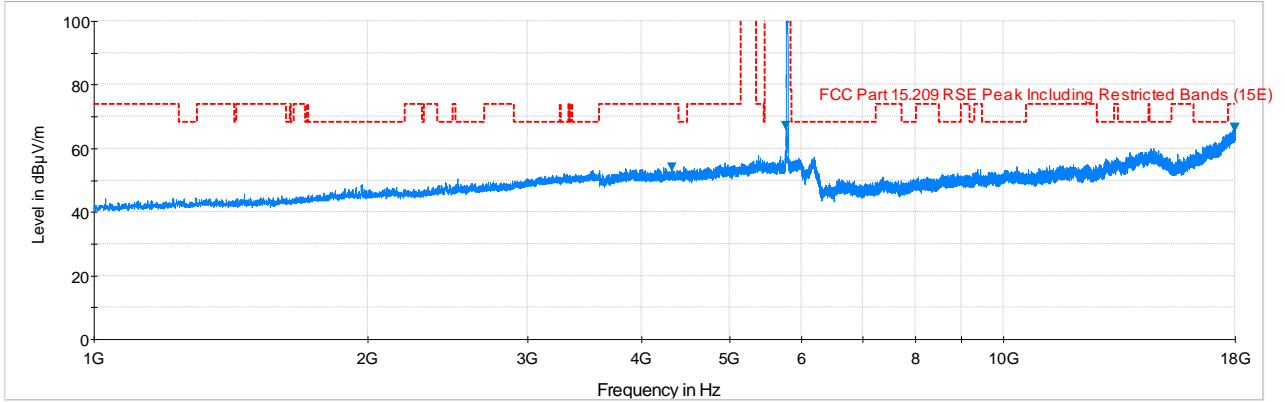
**Plot 6-71. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 116, Ant. Pol. H)**



Preview Result 1-PK+    FCC 15.209 15E    Final\_Result PK+

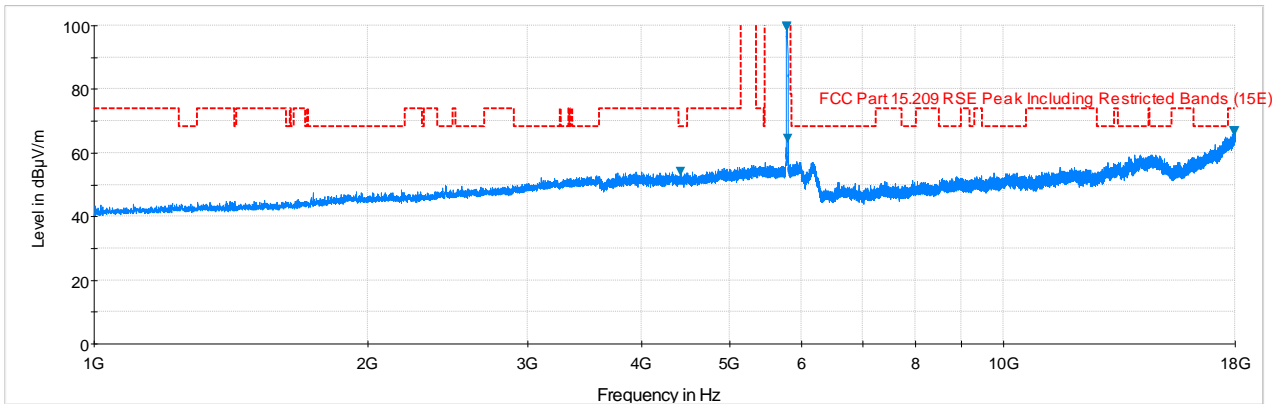
**Plot 6-72. Radiated Spurious Plot above 1GHz (802.11a – U2C Ch. 116, Ant. Pol. V)**

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Preview Result 1-PK+    FCC Part 15.209 RSE Peak Including Restricted Bands (15E)    Final\_Result PK+

**Plot 6-73. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)**



Preview Result 1-PK+    FCC Part 15.209 RSE Peak Including Restricted Bands (15E)    Final\_Result PK+

**Plot 6-74. Radiated Spurious Plot above 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)**

<b>FCC ID:</b> ZNFH634		<b>FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
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## 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	-98.48	Peak	H	47.77	0.00	56.29	68.20	-11.91
* 15540.00	-111.52	Average	H	51.24	0.00	46.71	53.98	-7.26
* 15540.00	-98.85	Peak	H	51.24	0.00	59.38	73.98	-14.59
* 20720.00	-108.68	Average	H	48.60	-9.54	37.38	53.98	-16.60
* 20720.00	-97.61	Peak	H	48.60	-9.54	48.44	73.98	-25.54
25900.00	-97.98	Peak	H	50.96	-9.54	50.44	68.20	-17.76

**Table 6-13. 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	-98.14	Peak	H	47.57	0.00	56.43	68.20	-11.77
15600.00	-111.50	Average	H	51.68	0.00	47.18	53.98	-6.80
15600.00	-97.07	Peak	H	51.68	0.00	61.61	73.98	-12.37
20800.00	-109.84	Average	H	48.72	-9.54	36.33	53.98	-17.65
20800.00	-98.16	Peak	H	48.72	-9.54	48.01	73.98	-25.96
26000.00	-98.59	Peak	H	51.04	-9.54	49.91	68.20	-18.29

**Table 6-14. Radiated Measurements**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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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	-98.35	Peak	H	47.71	0.00	56.37	68.20	-11.83
* 15720.00	-111.63	Average	H	51.57	0.00	46.93	53.98	-7.05
* 15720.00	-97.83	Peak	H	51.57	0.00	60.73	73.98	-13.25
* 20960.00	-110.30	Average	H	48.96	-9.54	36.12	53.98	-17.86
* 20960.00	-98.01	Peak	H	48.96	-9.54	48.40	73.98	-25.58
26200.00	-98.59	Peak	H	51.13	-9.54	49.99	68.20	-18.21

**Table 6-15. Radiated Measurements**

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

Frequency [MHz]	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	-98.38	Peak	H	47.76	0.00	56.39	68.20	-11.81
* 15780.00	-111.40	Average	H	51.50	0.00	47.10	53.98	-6.88
* 15780.00	-98.86	Peak	H	51.50	0.00	59.64	73.98	-14.34
* 21040.00	-109.66	Average	H	49.06	-9.54	36.86	53.98	-17.12
* 21040.00	-99.42	Peak	H	49.06	-9.54	47.09	73.98	-26.89
26300.00	-95.05	Peak	H	51.20	-9.54	53.61	68.20	-14.59

**Table 6-16. Radiated Measurements**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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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]
10560.00	-97.66	Peak	H	47.80	0.00	57.14	68.20	-11.06
* 15840.00	-111.60	Average	H	51.71	0.00	47.11	53.98	-6.87
* 15840.00	-98.31	Peak	H	51.71	0.00	60.40	73.98	-13.58
* 21120.00	-110.51	Average	H	49.14	-9.54	36.09	53.98	-17.89
* 21120.00	-100.43	Peak	H	49.14	-9.54	46.16	73.98	-27.82
26400.00	-95.12	Peak	H	51.32	-9.54	53.66	68.20	-14.54

**Table 6-17. 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	-112.01	Average	H	47.84	0.00	42.83	53.98	-11.15
* 10640.00	-97.44	Peak	H	47.84	0.00	57.40	73.98	-16.58
* 15960.00	-111.37	Average	H	52.55	0.00	48.17	53.98	-5.81
* 15960.00	-97.54	Peak	H	52.55	0.00	62.00	73.98	-11.98
* 21280.00	-110.46	Average	H	49.28	-9.54	36.27	53.98	-17.71
* 21280.00	-99.47	Peak	H	49.28	-9.54	47.26	73.98	-26.72
26600.00	-114.69	Peak	H	47.61	-9.54	30.38	68.20	-37.82

**Table 6-18. Radiated Measurements**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset	Page 66 of 100	

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	-111.32	Average	H	48.22	0.00	43.89	53.98	-10.09
* 11000.00	-99.68	Peak	H	48.22	0.00	55.53	73.98	-18.45
16500.00	-99.18	Peak	H	54.48	0.00	62.29	68.20	-5.91
22000.00	-95.05	Peak	H	49.37	-9.54	51.77	68.20	-16.43
27500.00	-120.29	Peak	H	47.92	-9.54	25.09	68.20	-43.11

**Table 6-19. 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	-111.44	Average	H	48.62	0.00	44.18	53.98	-9.80
* 11160.00	-98.88	Peak	H	48.62	0.00	56.74	73.98	-17.24
16740.00	-99.31	Peak	H	55.71	0.00	63.40	68.20	-4.80
* 22320.00	-109.98	Average	H	49.87	-9.54	37.35	53.98	-16.63
* 22320.00	-100.01	Peak	H	49.87	-9.54	47.32	73.98	-26.66
27900.00	-121.07	Peak	H	48.09	-9.54	24.48	68.20	-43.72

**Table 6-20. Radiated Measurements**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset	Page 67 of 100	

Worst Case Mode: 802.11a  
 Worst Case Transfer Rate: 6 Mbps  
 Distance of Measurements: 1 & 3 Meters  
 Operating Frequency: 5700MHz  
 Channel: 140



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]
* 11400.00	-111.42	Average	H	49.13	0.00	44.71	53.98	-9.27
* 11400.00	-97.57	Peak	H	49.13	0.00	58.56	73.98	-15.42
17100.00	-99.23	Peak	H	56.71	0.00	64.48	68.20	-3.72
* 22800.00	-110.06	Average	H	50.08	-9.54	37.48	53.98	-16.50
* 22800.00	-99.38	Peak	H	50.08	-9.54	48.16	73.98	-25.82
28500.00	-104.43	Peak	H	48.35	-9.54	41.38	68.20	-26.82

**Table 6-21. 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	-111.39	Average	H	49.44	0.00	45.05	53.98	-8.93
* 11490.00	-98.43	Peak	H	49.44	0.00	58.01	73.98	-15.97
17235.00	-100.35	Peak	H	56.60	0.00	63.26	68.20	-4.94
* 22980.00	-110.45	Average	H	49.99	-9.54	36.99	53.98	-16.98
* 22980.00	-99.06	Peak	H	49.99	-9.54	48.39	73.98	-25.59
28725.00	-102.70	Peak	H	48.26	-9.54	43.02	68.20	-25.18

**Table 6-22. Radiated Measurements**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 68 of 100



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	-111.52	Average	H	49.70	0.00	45.18	53.98	-8.80
* 11570.00	-99.20	Peak	H	49.70	0.00	57.50	73.98	-16.48
17355.00	-99.09	Peak	H	57.28	0.00	65.19	68.20	-3.01
23140.00	-97.56	Peak	H	50.09	-9.54	49.99	68.20	-18.21
28925.00	-103.23	Peak	H	48.28	-9.54	42.50	68.20	-25.70

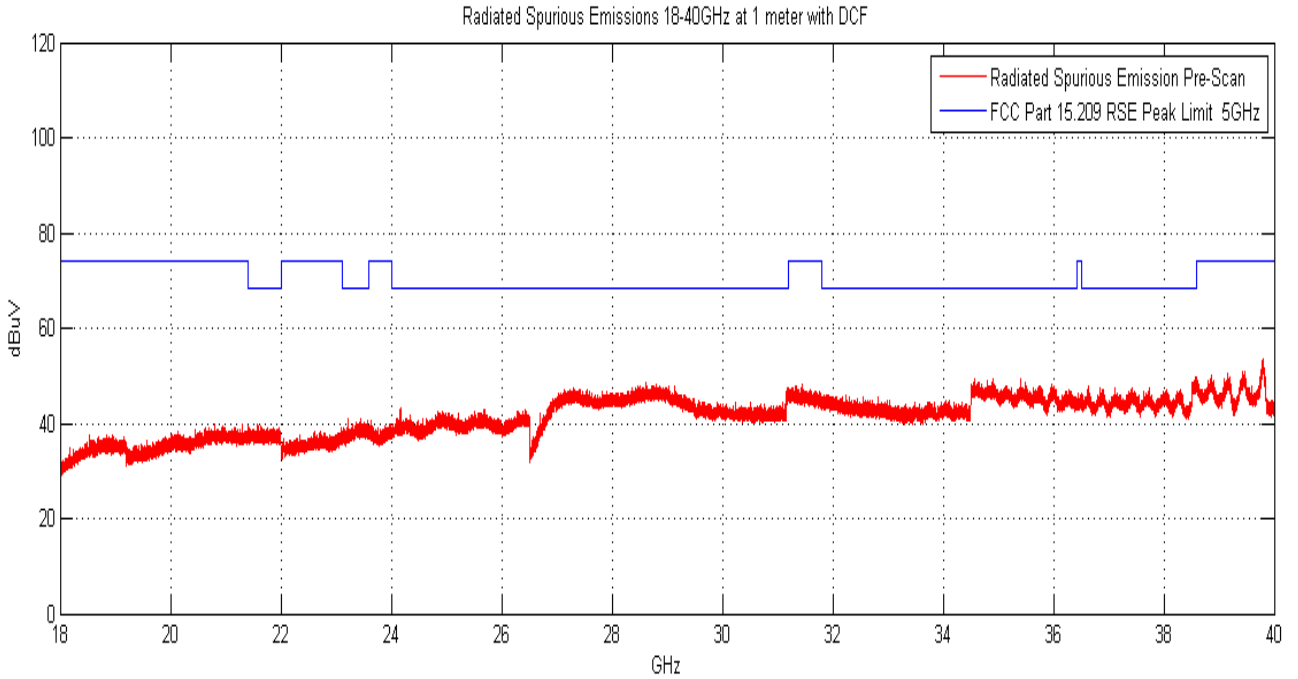
**Table 6-23. Radiated Measurements**

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

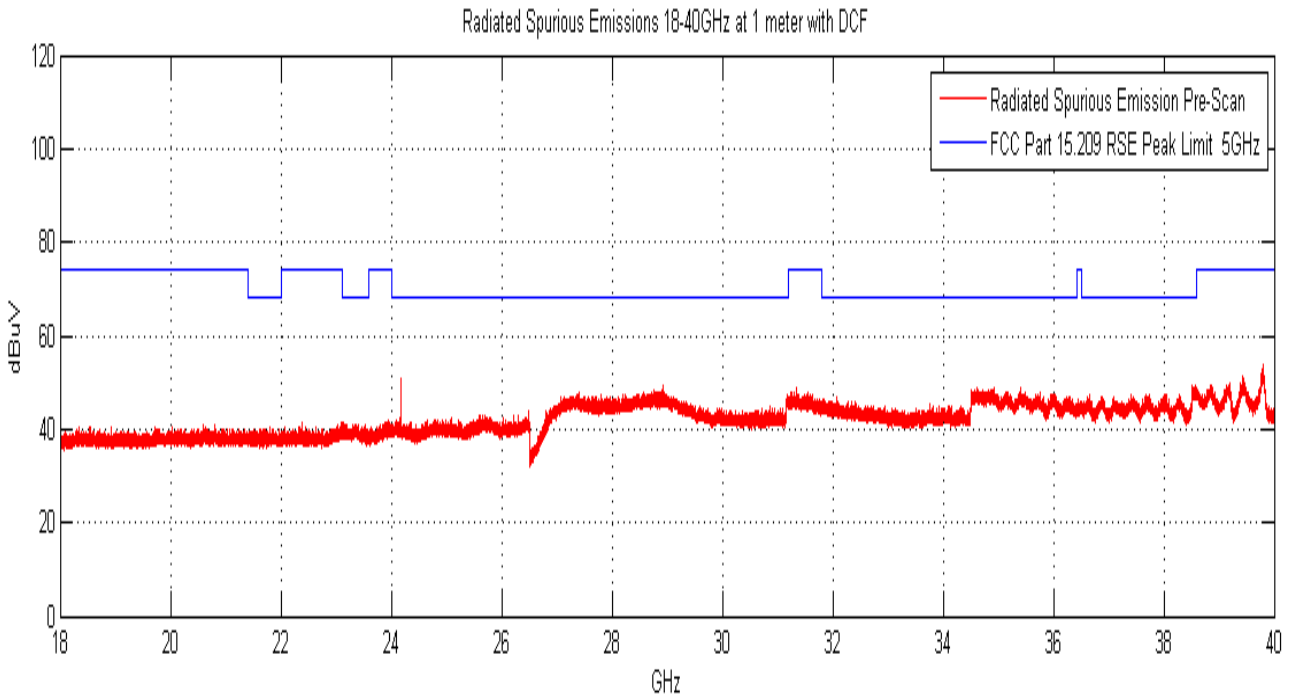
Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
* 11650.00	-111.53	Average	H	49.77	0.00	45.24	53.98	-8.74
* 11650.00	-99.31	Peak	H	49.77	0.00	57.46	73.98	-16.52
17475.00	-100.96	Peak	H	58.93	0.00	64.97	68.20	-3.23
23300.00	-96.43	Peak	H	50.15	-9.54	51.17	68.20	-17.03
29125.00	-102.26	Peak	H	48.24	-9.54	43.44	68.20	-24.76

**Table 6-24. Radiated Measurements**



**Radiated Spurious Emissions Measurements (Above 18GHz)**  
**§15.209**



**Plot 6-75. Radiated Spurious Plot above 18GHz (802.11a – Ant. Pol. H)**



**Plot 6-76. Radiated Spurious Plot above 18GHz (802.11a – Ant. Pol. V)**

<b>FCC ID:</b> ZNFH634		<b>FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1504200768.ZNF	<b>Test Dates:</b> 4/20 - 5/4/2015	<b>EUT Type:</b> Portable Handset		Page 70 of 100

## 6.7.2 Radiated Band Edge Measurements (20MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

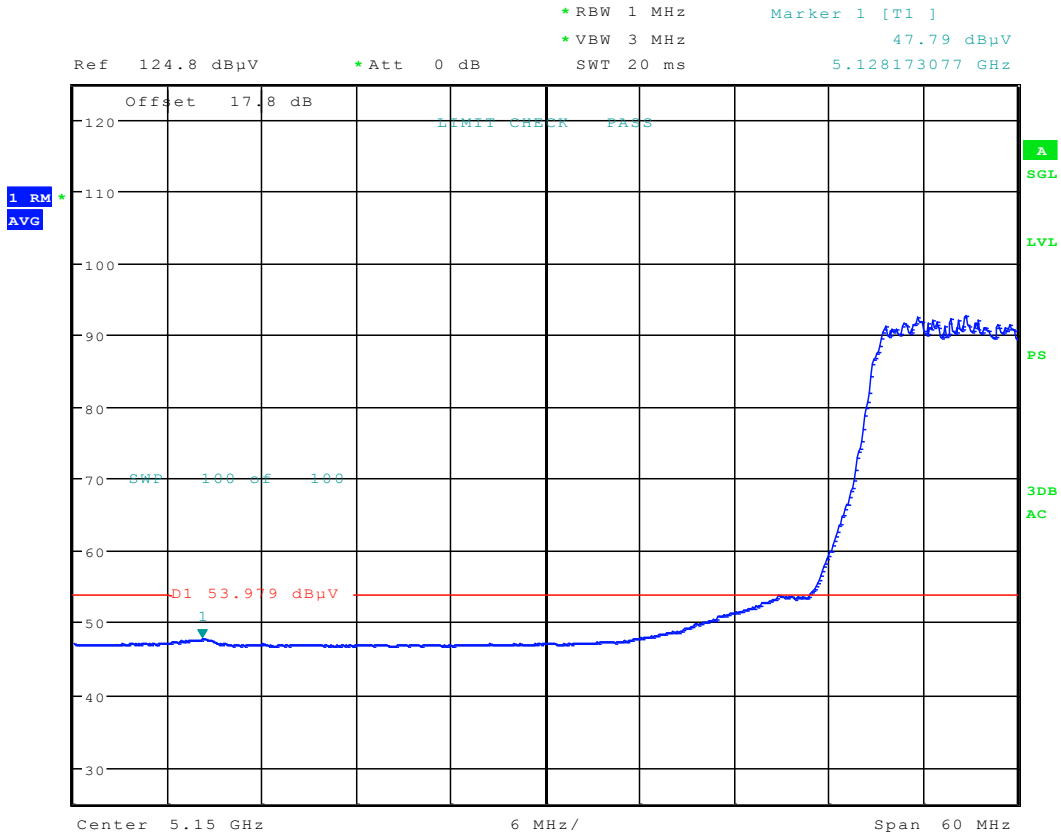
Worst Case Mode: 802.11n (20MHz)

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5180MHz

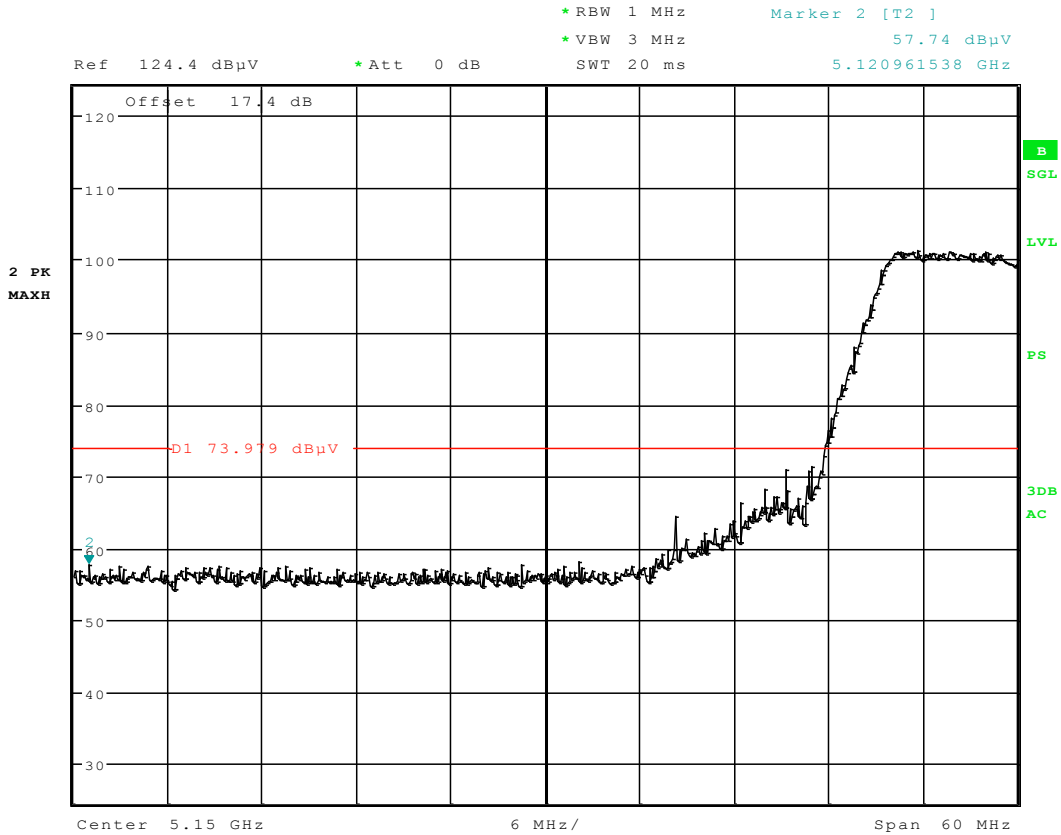
Channel: 36





**Plot 6-77. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 71 of 100

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



**Plot 6-78. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 1)**

<b>FCC ID:</b> ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1504200768.ZNF	<b>Test Dates:</b> 4/20 - 5/4/2015	<b>EUT Type:</b> Portable Handset	Page 72 of 100	

# Radiated Band Edge Measurements (20MHz BW)

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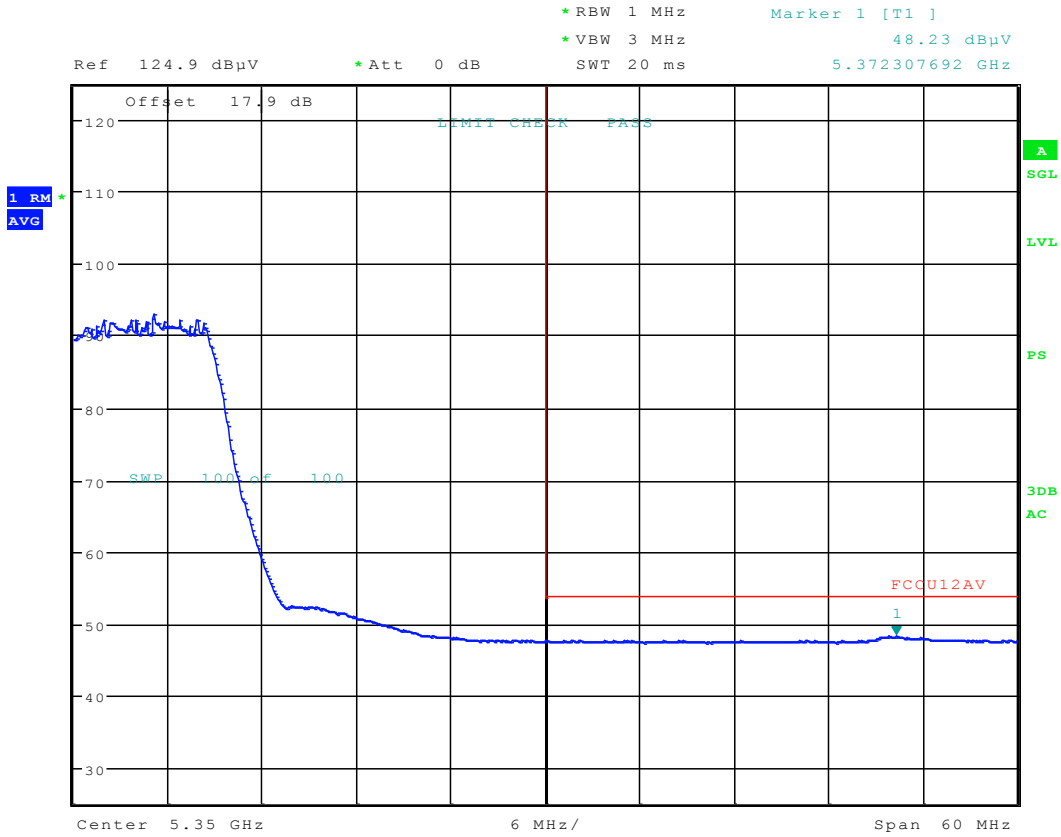
Worst Case Mode: 802.11n (20MHz)

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5320MHz

Channel: 64

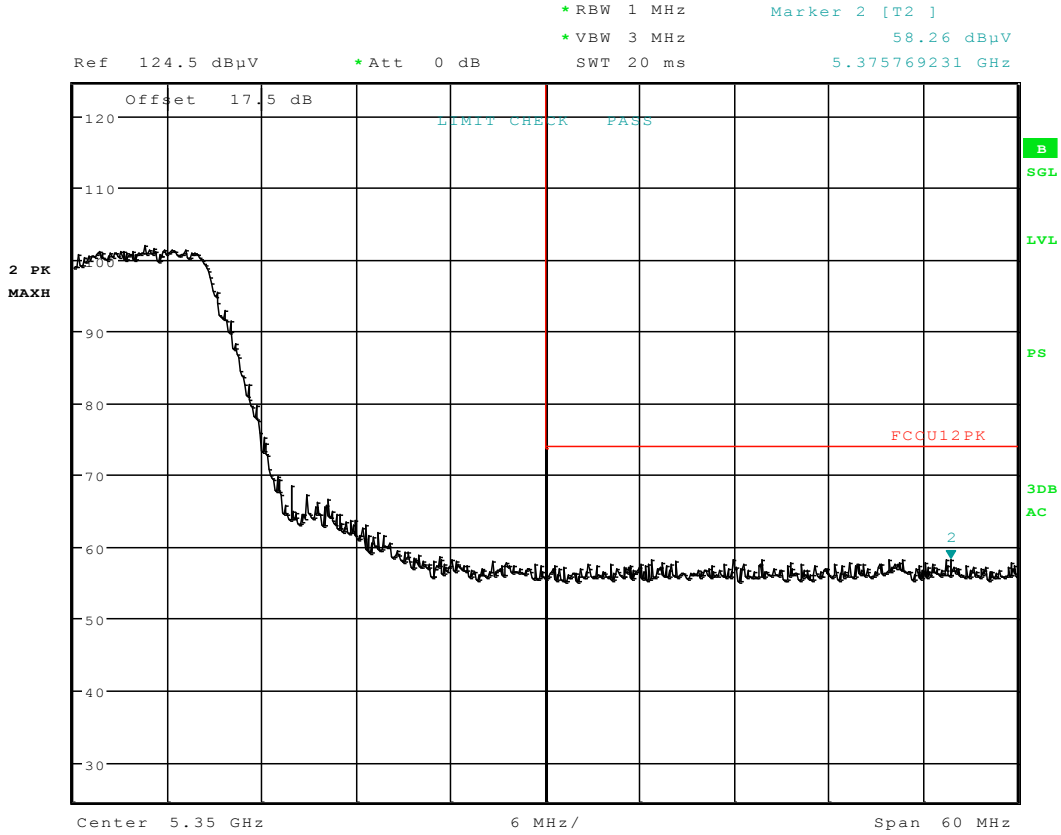


**Plot 6-79. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 73 of 100

# Radiated Band Edge Measurements (20MHz BW)

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**Plot 6-80. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)**

<b>FCC ID:</b> ZNFH634		<b>FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1504200768.ZNF	<b>Test Dates:</b> 4/20 - 5/4/2015	<b>EUT Type:</b> Portable Handset	Page 74 of 100	

# Radiated Band Edge Measurements (20MHz BW)

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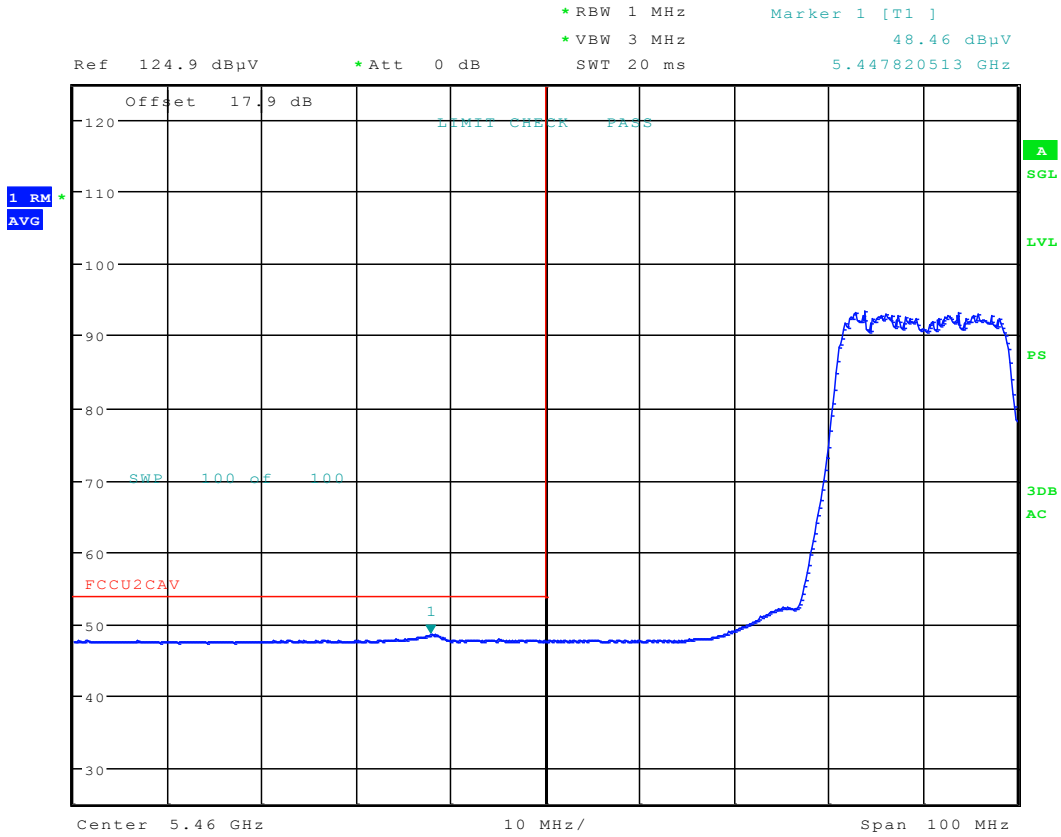
Worst Case Mode: 802.11n (20MHz)

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5500MHz

Channel: 100



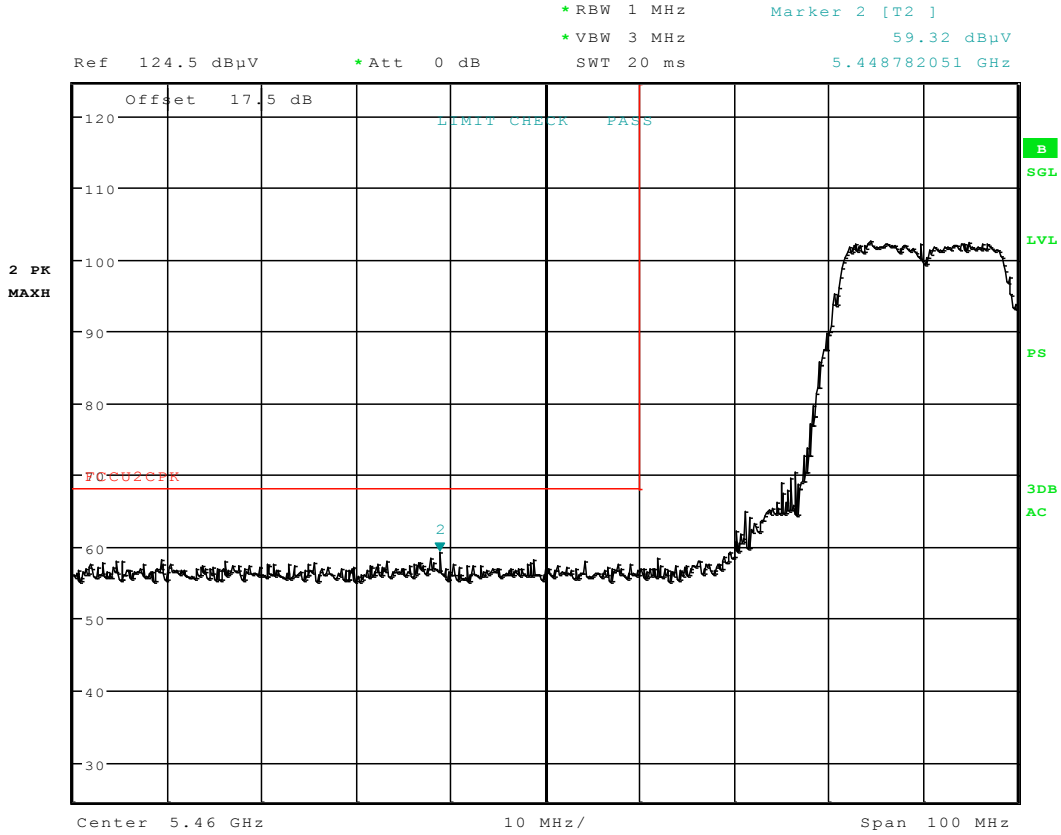
**Plot 6-81. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 75 of 100



# Radiated Band Edge Measurements (20MHz BW)

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**Plot 6-82. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 76 of 100

# Radiated Band Edge Measurements (20MHz BW)

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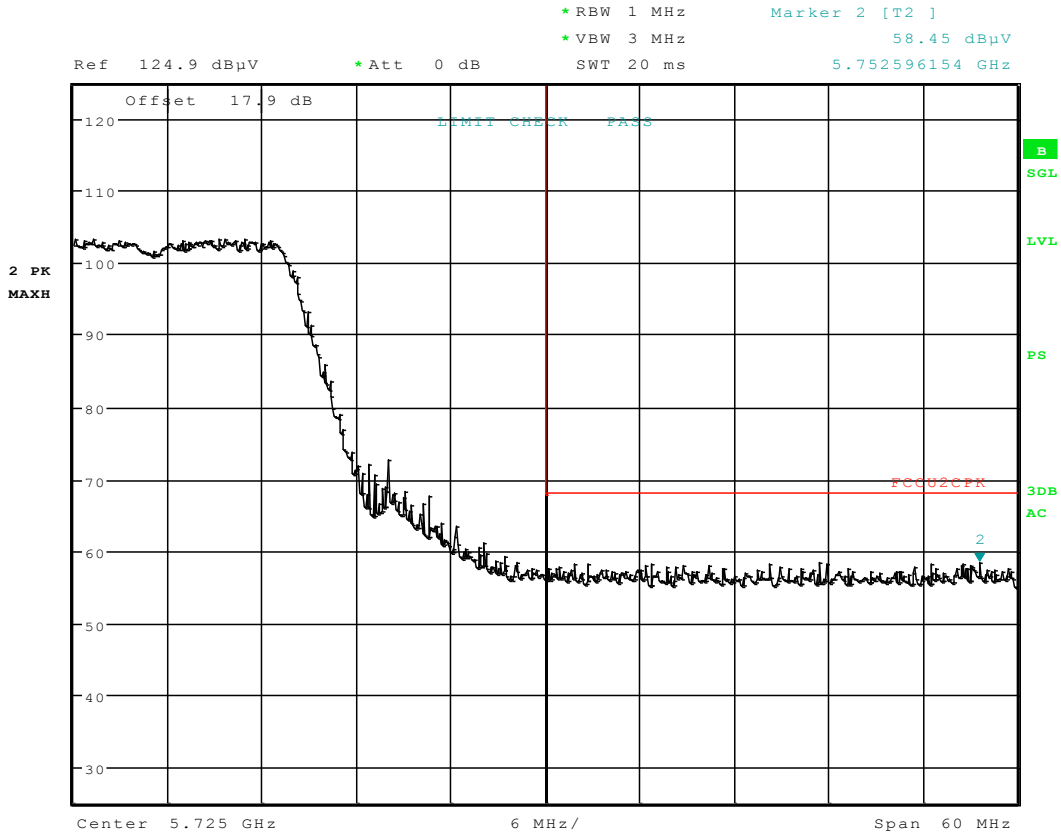
Worst Case Mode: 802.11n (20MHz)

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5700MHz

Channel: 140



**Plot 6-83. Radiated Upper Band Edge Plot (Peak – UNII Band 2C)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 77 of 100

# Radiated Band Edge Measurements (20MHz BW)

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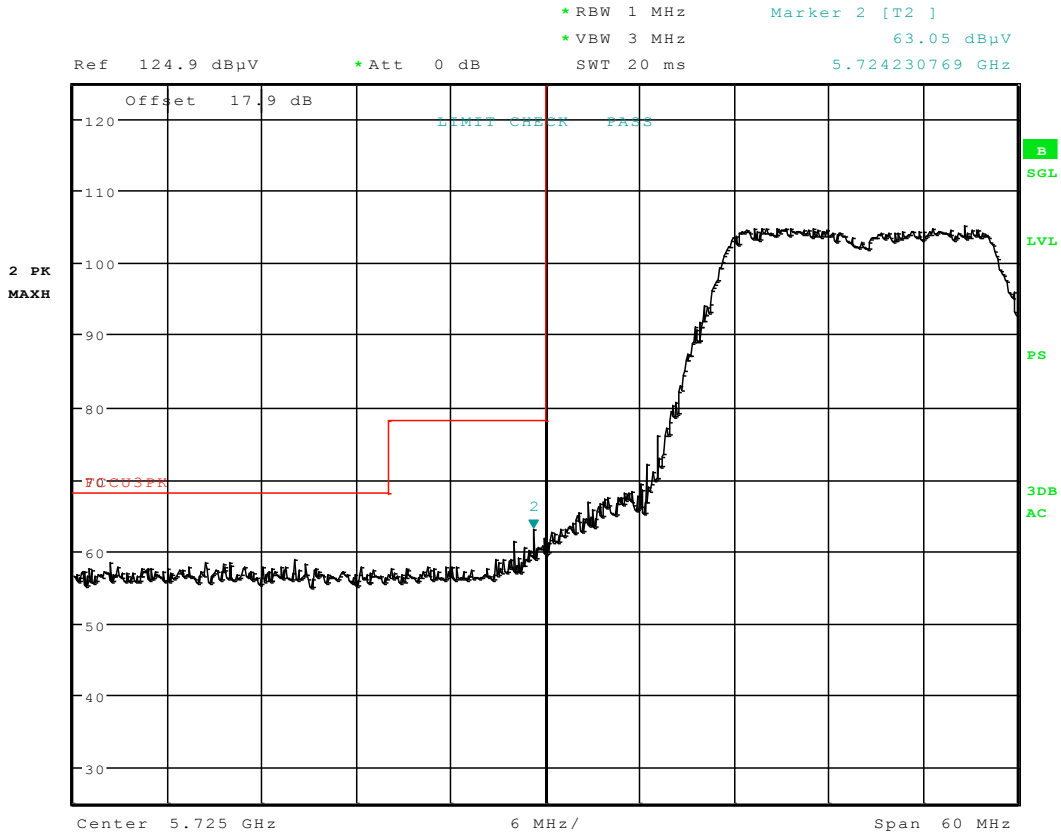
Worst Case Mode: 802.11n (20MHz)

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5745MHz

Channel: 149



**Plot 6-84. Radiated Lower Band Edge Plot (Peak – UNII Band 3)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 78 of 100

# Radiated Band Edge Measurements (20MHz BW)

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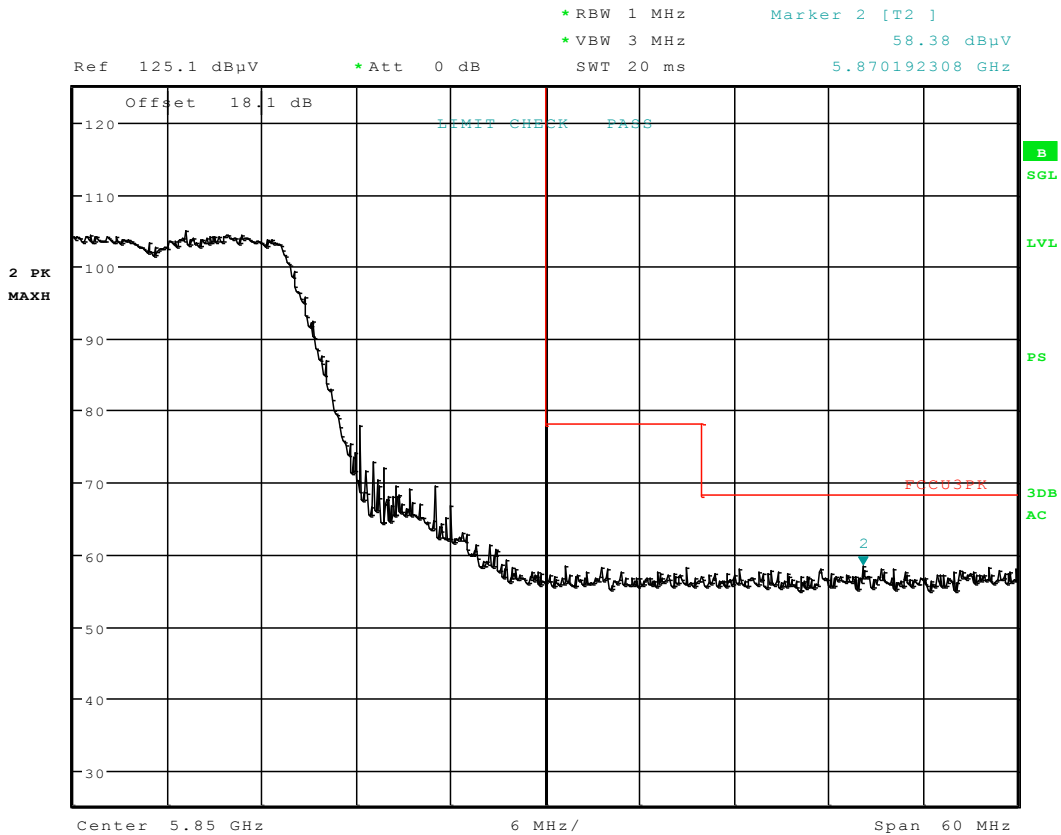
Worst Case Mode: 802.11n (20MHz)

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 5825MHz

Channel: 165



**Plot 6-85. Radiated Upper Band Edge Plot (Peak – UNII Band 3)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 79 of 100

### 6.7.3 Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

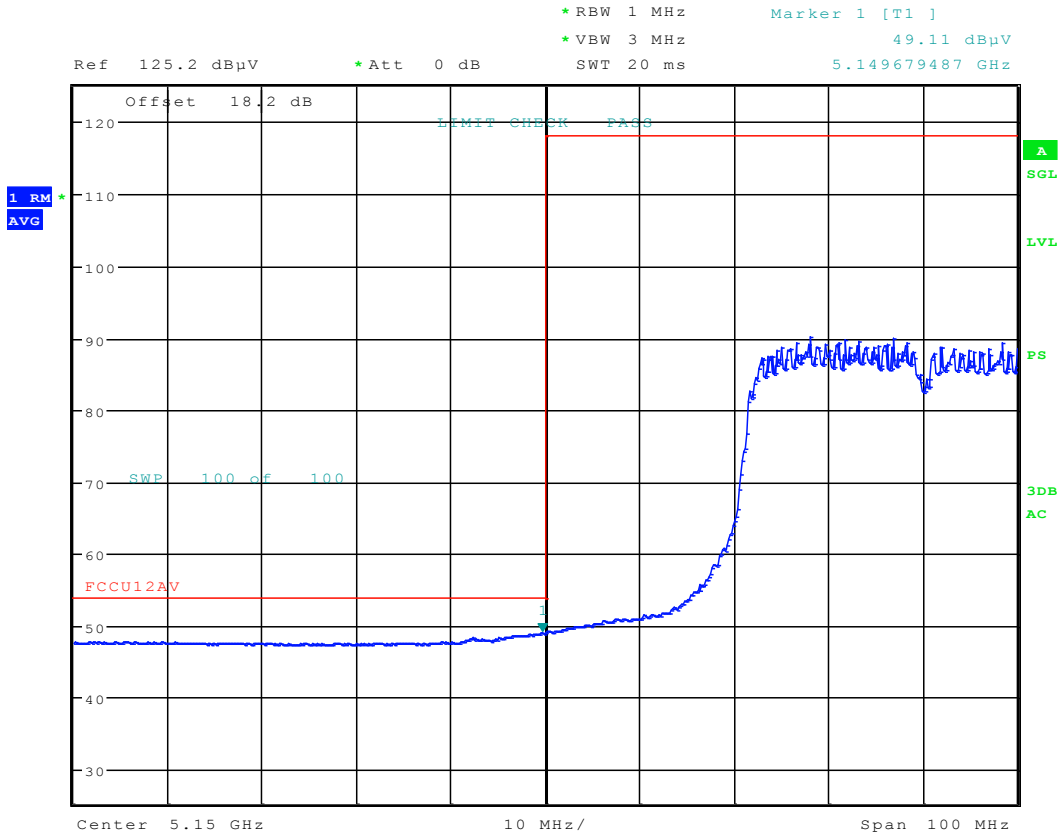
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5190MHz

Channel: 38

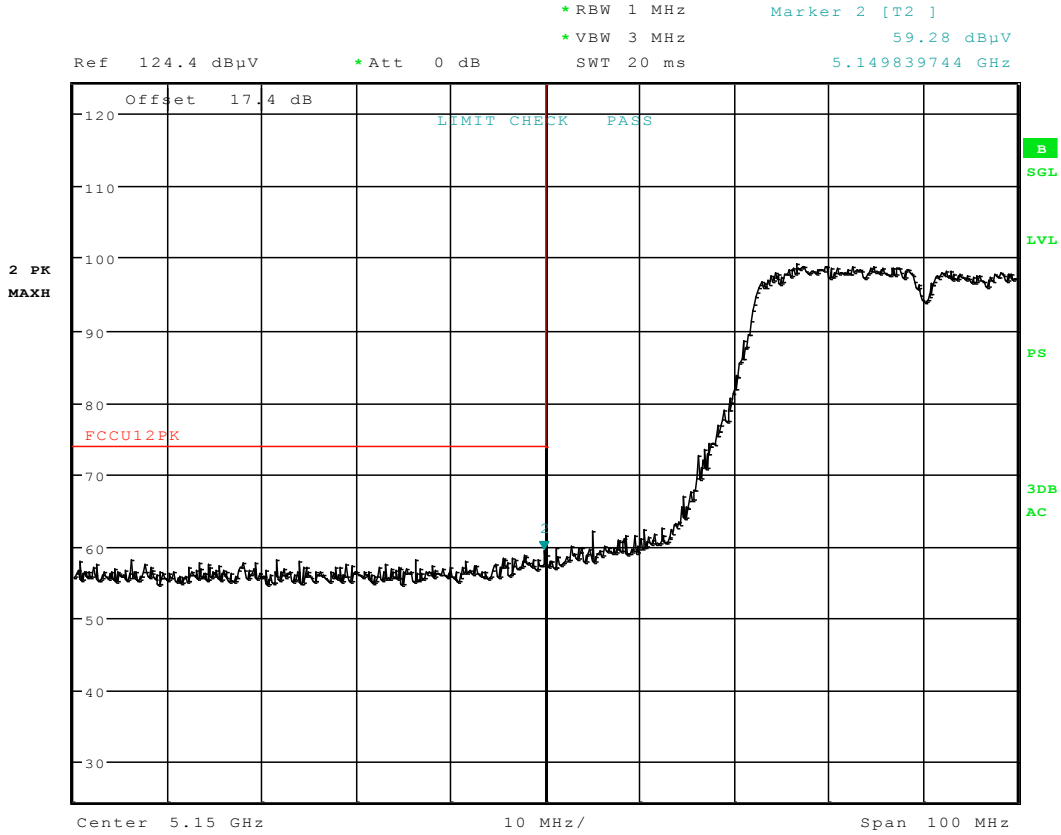


**Plot 6-86. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 1)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 80 of 100

# Radiated Band Edge Measurements (40MHz BW)

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

<b>FCC ID:</b> ZNFH634		<b>FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1504200768.ZNF	<b>Test Dates:</b> 4/20 - 5/4/2015	<b>EUT Type:</b> Portable Handset	Page 81 of 100	

# Radiated Band Edge Measurements (40MHz BW)

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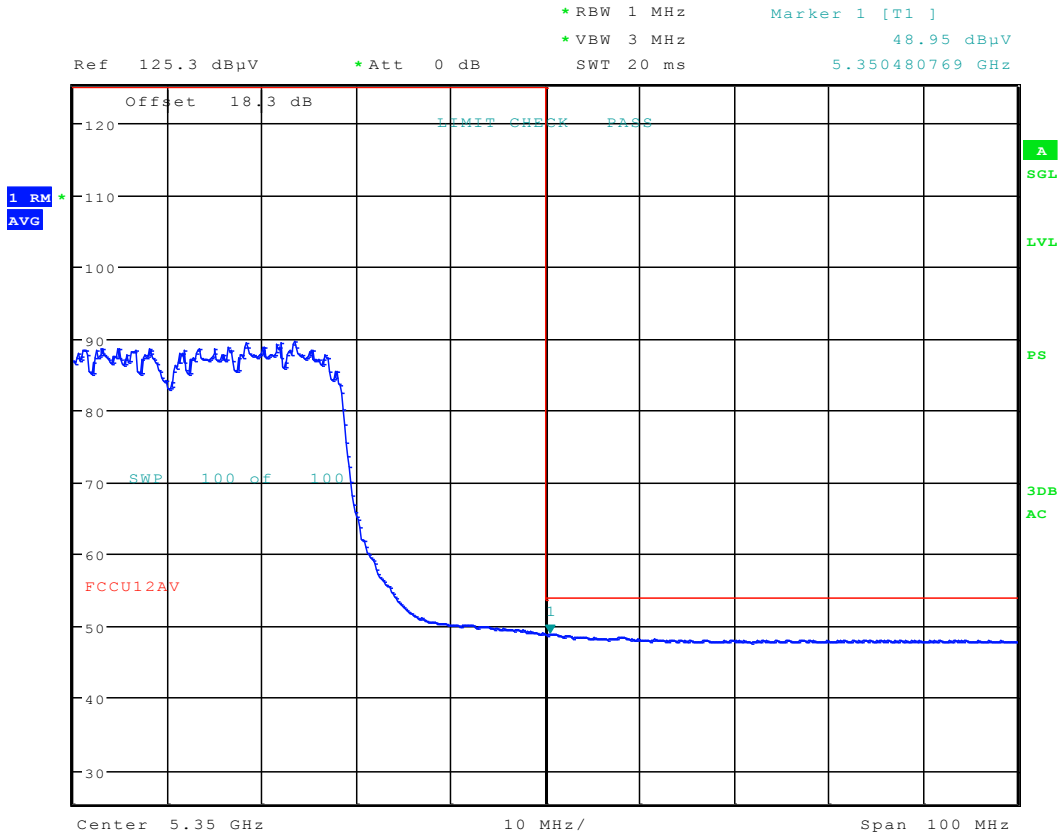
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5310MHz

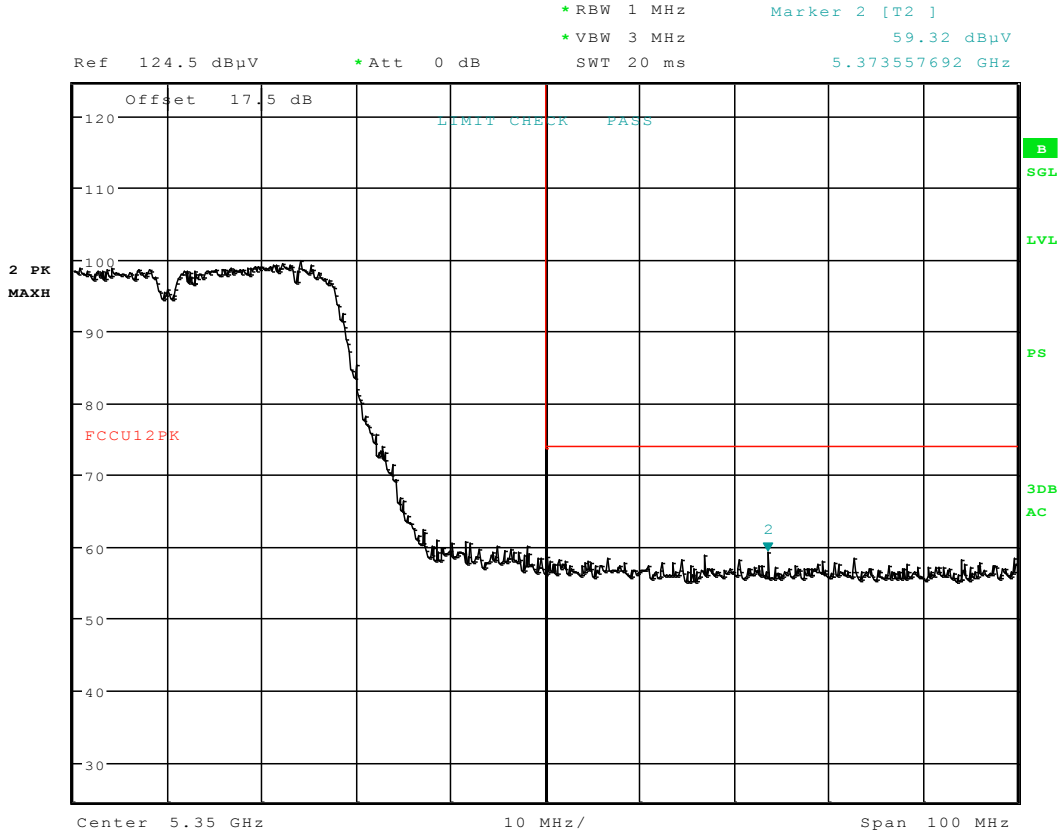
Channel: 62



**Plot 6-88. Radiated Restricted Upper Band Edge Plot (Average – UNII Band 2A)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 82 of 100

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



**Plot 6-89. Radiated Restricted Upper Band Edge Plot (Peak – UNII Band 2A)**

<b>FCC ID:</b> ZNFH634	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	<b>FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT</b> (CERTIFICATION)	<b>LG</b>	<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1504200768.ZNF	<b>Test Dates:</b> 4/20 - 5/4/2015	<b>EUT Type:</b> Portable Handset		Page 83 of 100



# Radiated Band Edge Measurements (40MHz BW)

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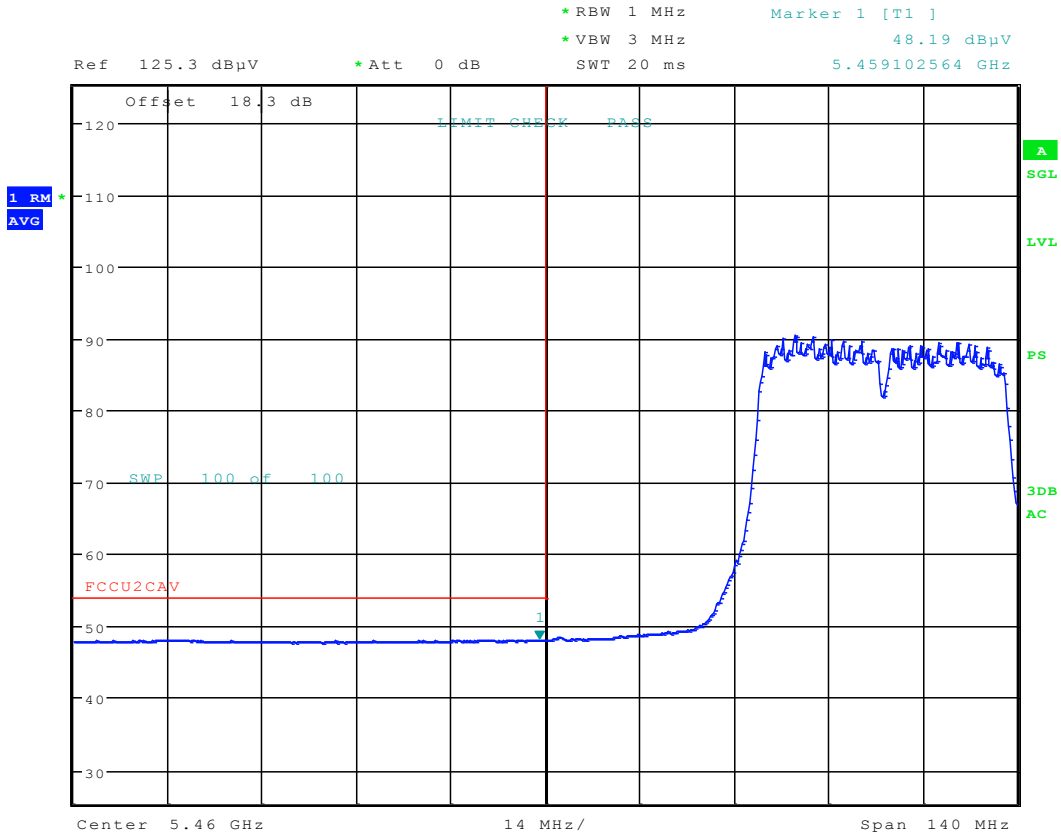
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5510MHz

Channel: 102

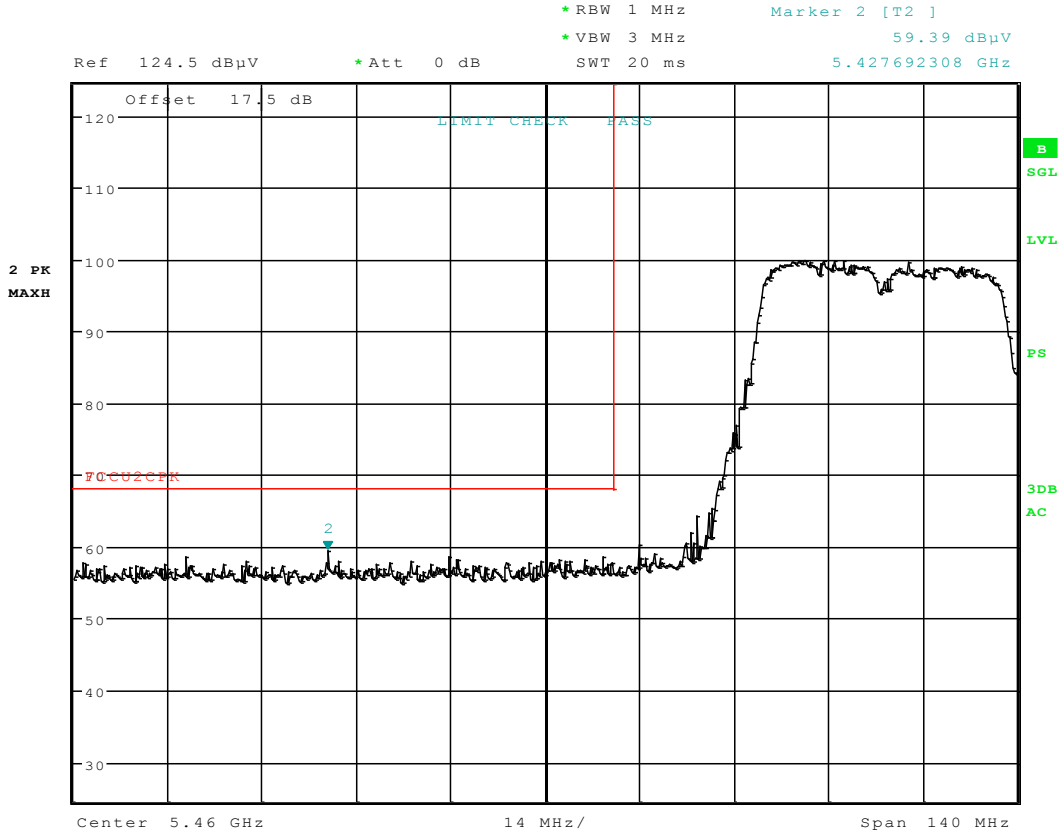


**Plot 6-90. Radiated Restricted Lower Band Edge Plot (Average – UNII Band 2C)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 84 of 100

# Radiated Band Edge Measurements (40MHz BW)

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**Plot 6-91. Radiated Restricted Lower Band Edge Plot (Peak – UNII Band 2C)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 85 of 100

# Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

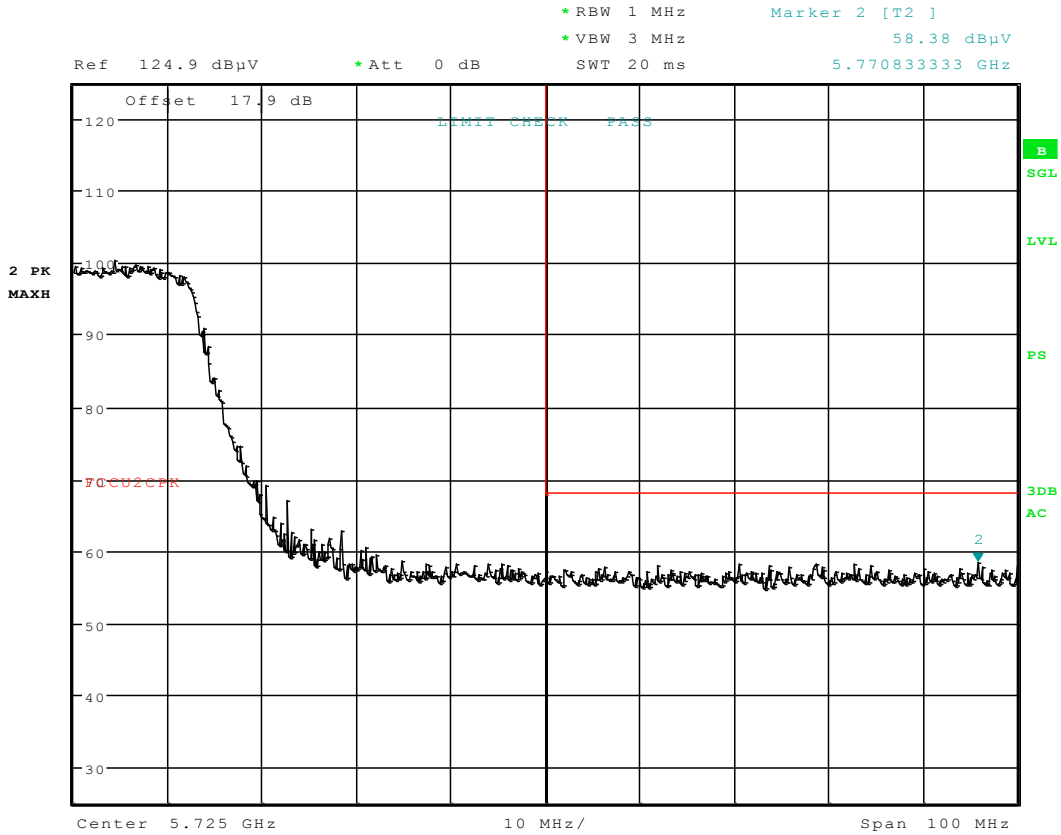
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5670MHz

Channel: 134



**Plot 6-92. Radiated Upper Band Edge Plot (Peak – UNII Band 2C)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 86 of 100

# Radiated Band Edge Measurements (40MHz BW)

§15.407(b.1)(b.2) §15.205 §15.209

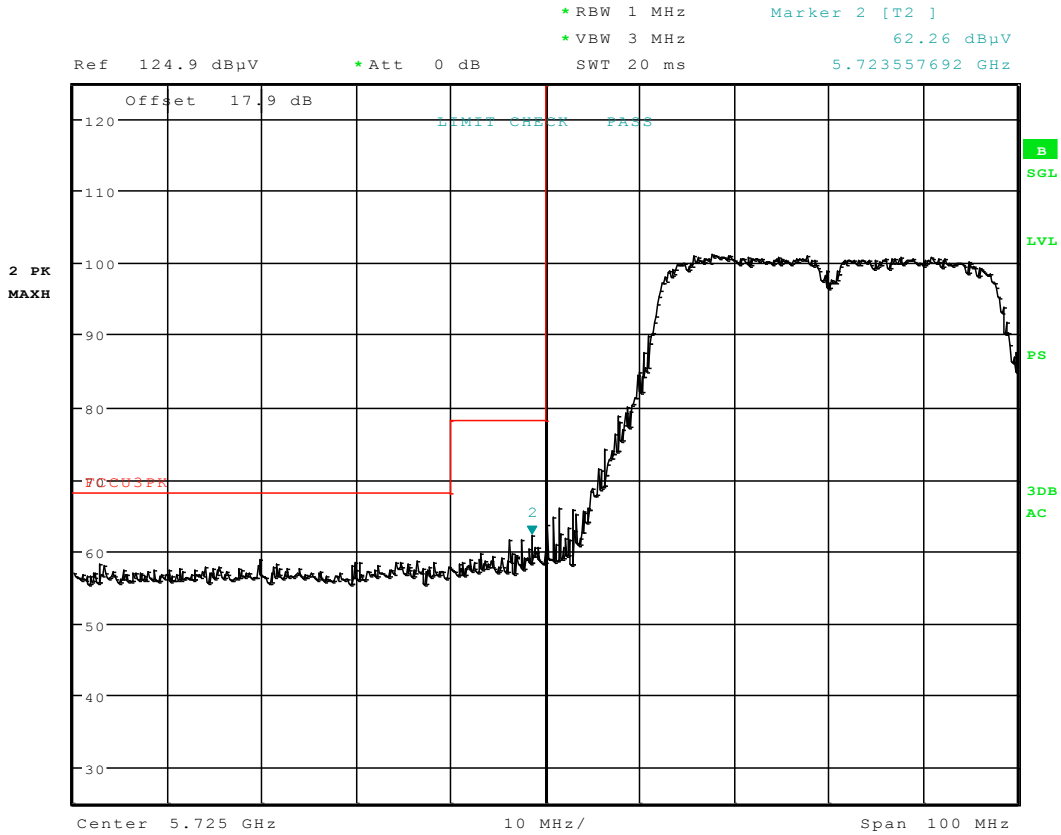
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5755MHz

Channel: 151



**Plot 6-93. Radiated Lower Band Edge Plot (Peak – UNII Band 3)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 87 of 100

# Radiated Band Edge Measurements (40MHz BW)

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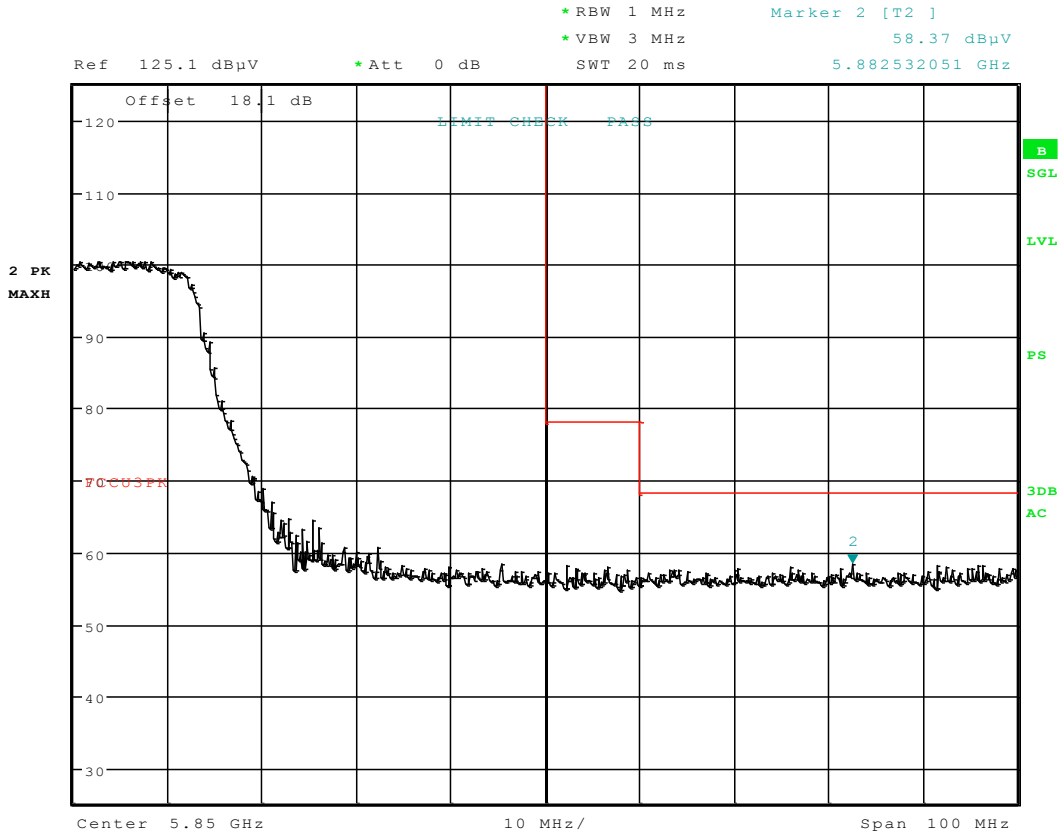
Worst Case Mode: 802.11n (40MHz)

Worst Case Transfer Rate: MCS0

Distance of Measurements: 3 Meters

Operating Frequency: 5795MHz

Channel: 159



**Plot 6-94. Radiated Upper Band Edge Plot (Peak – UNII Band 3)**

FCC ID: ZNFH634		FCC Pt. 15.407 802.11a/n UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1504200768.ZNF	Test Dates: 4/20 - 5/4/2015	EUT Type: Portable Handset		Page 88 of 100

## 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 6-25 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 6-25. Radiated Limits**

#### Test Procedures Used

ANSI C63.4-2009

#### Test Settings

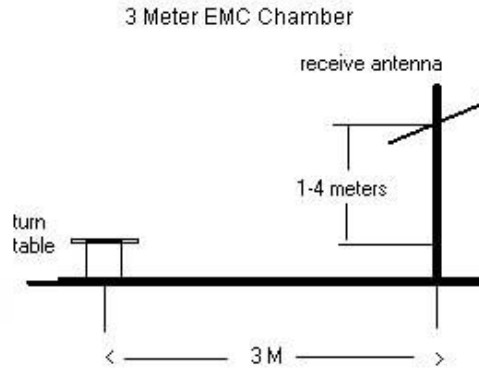
##### Quasi-Peak Field Strength Measurements

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**

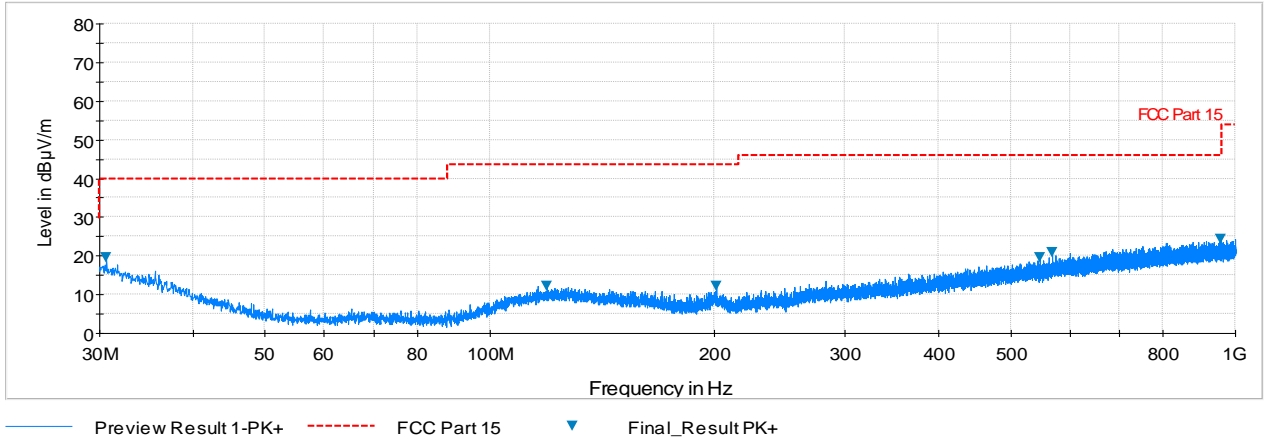
## Test Notes

1. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 6-10.
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.

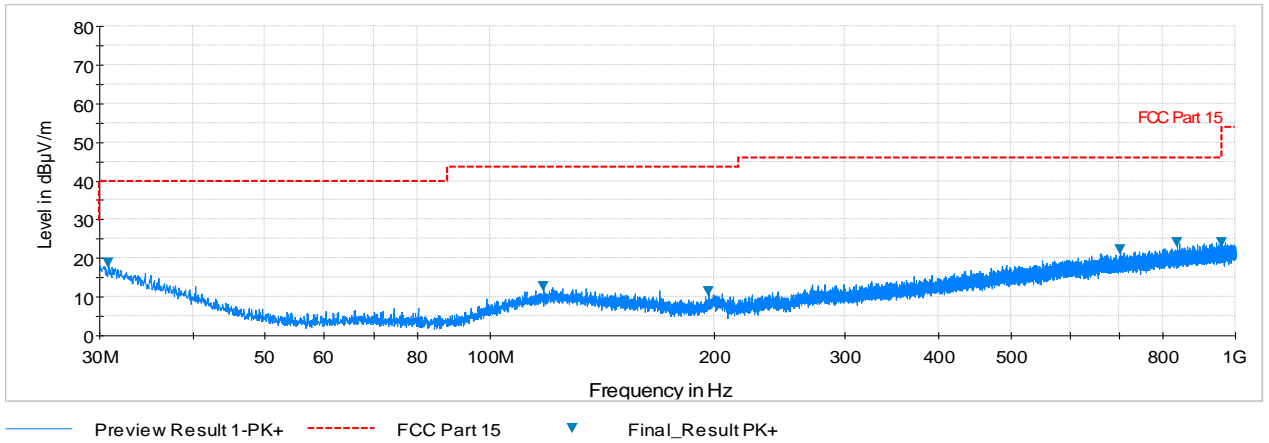
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## Radiated Spurious Emissions Measurements (Below 1GHz)



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**Plot 6-95. Radiated Spurious Plot below 1GHz (802.11a – U3 Ch. 157, Ant. Pol. H)**



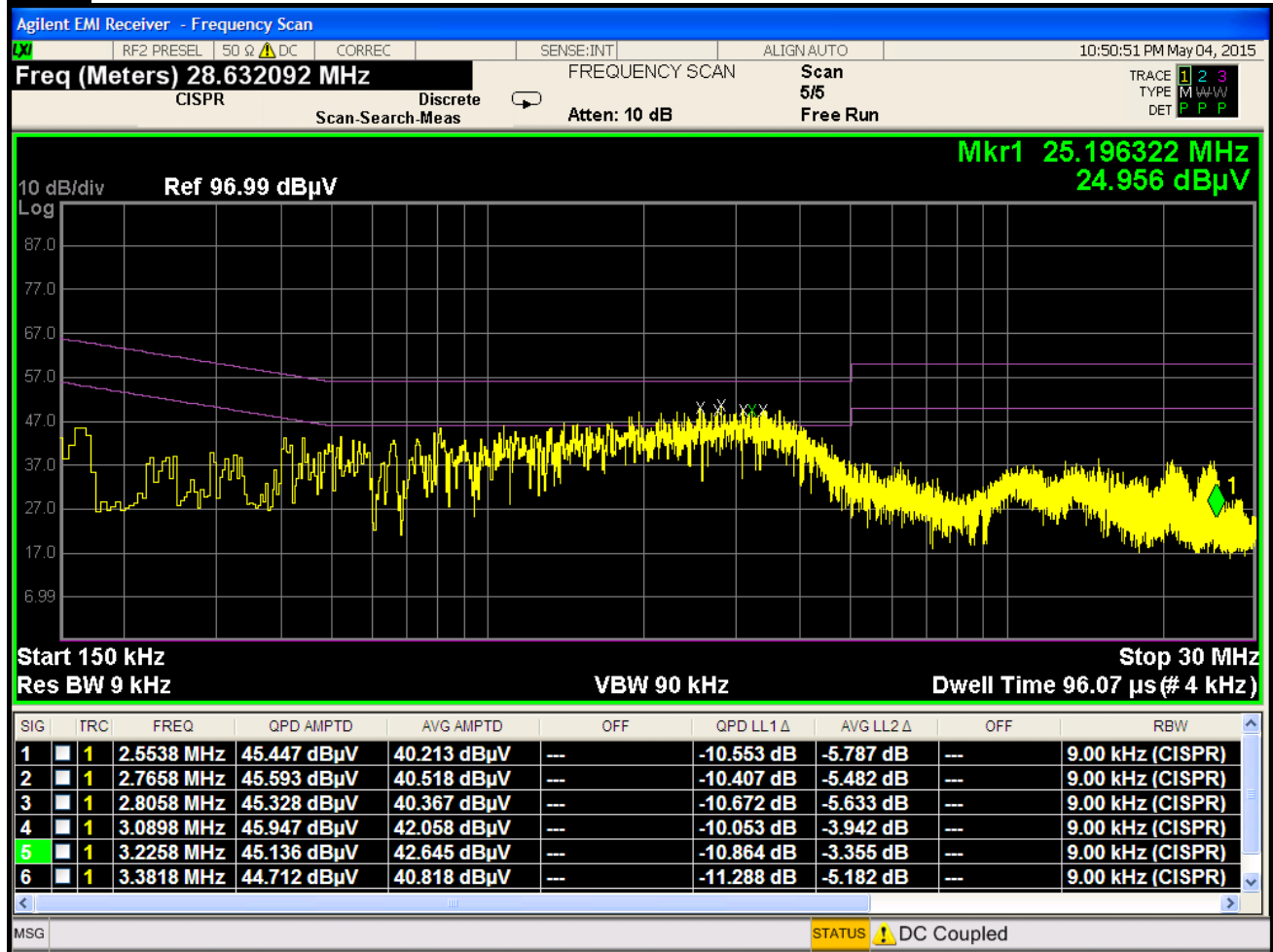
**Plot 6-96. Radiated Spurious Plot below 1GHz (802.11a – U3 Ch. 157, Ant. Pol. V)**

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## 6.9 Line-Conducted Test Data

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Plot 6-97. Line Conducted Plot with 802.11a UNII Band 1 (L1)

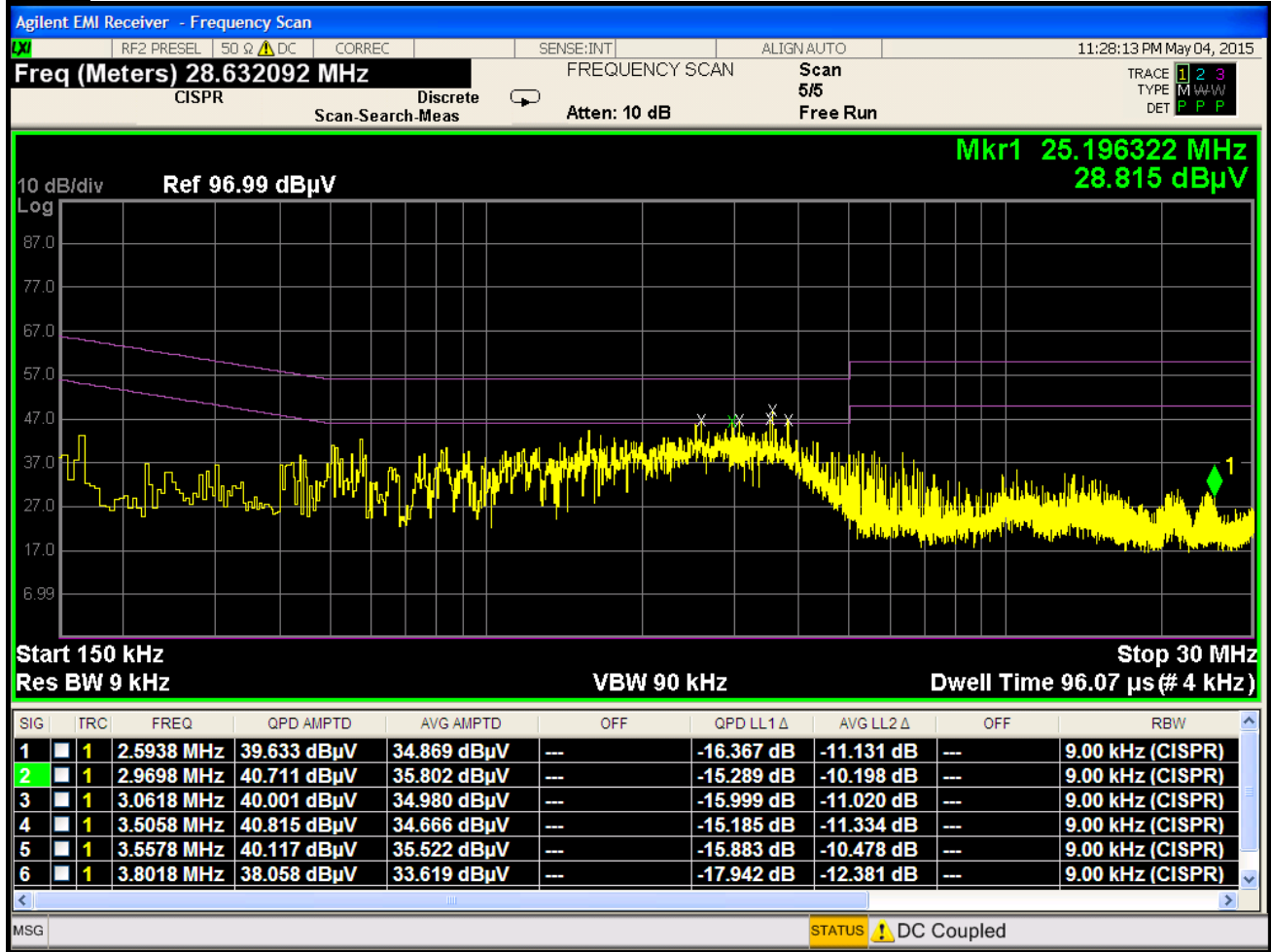
**Notes:**

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 6-98. Line Conducted Plot with 802.11a UNII Band 1 (N)

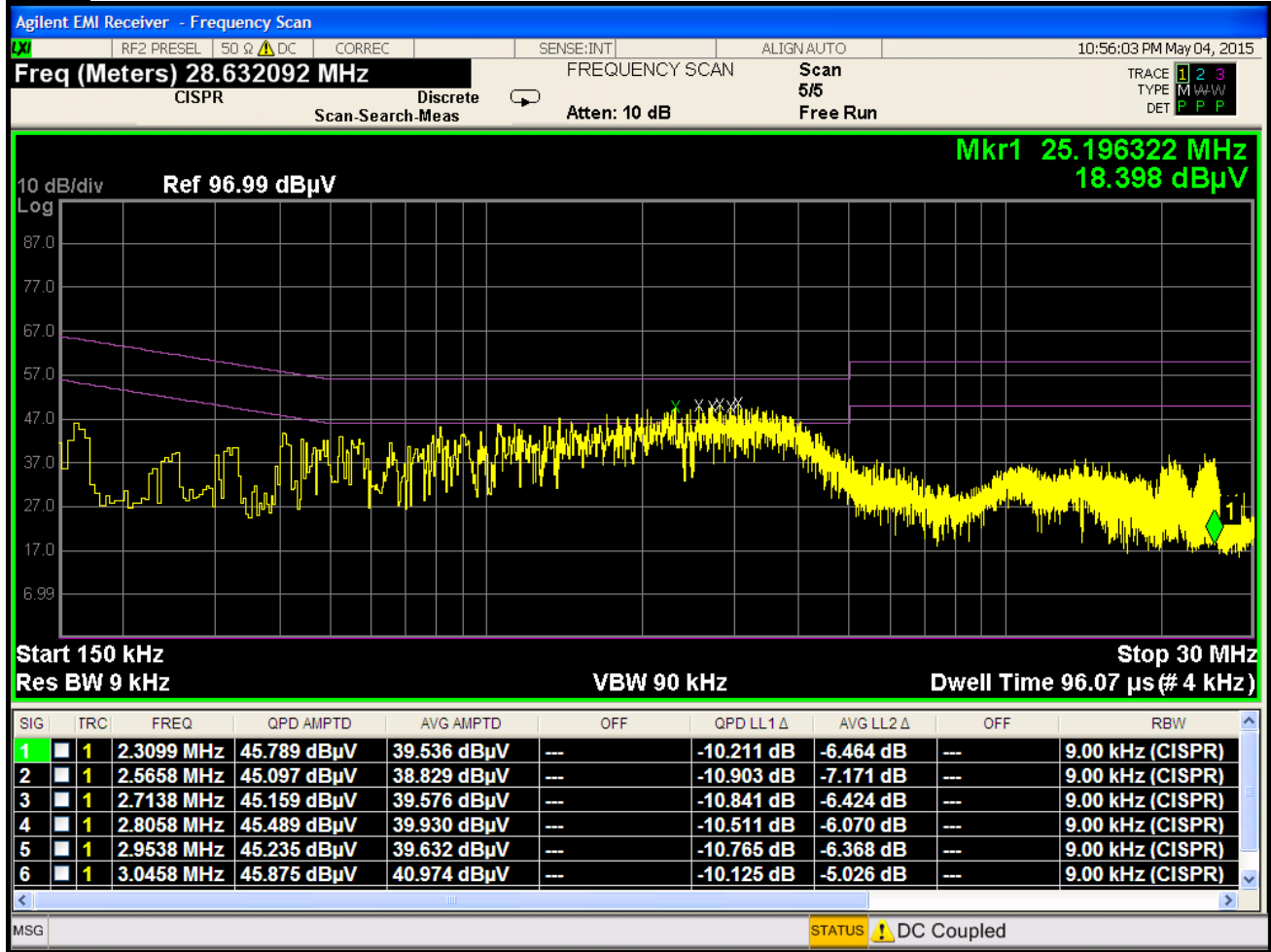
**Notes:**

- 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.
- The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
- L1 = Phase; N = Neutral
- Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
- QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Corr. (dB)
- Margin (dB) = QP/AVLimit (dBμV) - QP/AV Level (dBμV)
- Traces shown in plot are made using a peak detector.
- Deviations to the Specifications: None.

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# Line-Conducted Test Data

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Plot 6-99. Line Conducted Plot with 802.11a UNII Band 2A (L1)

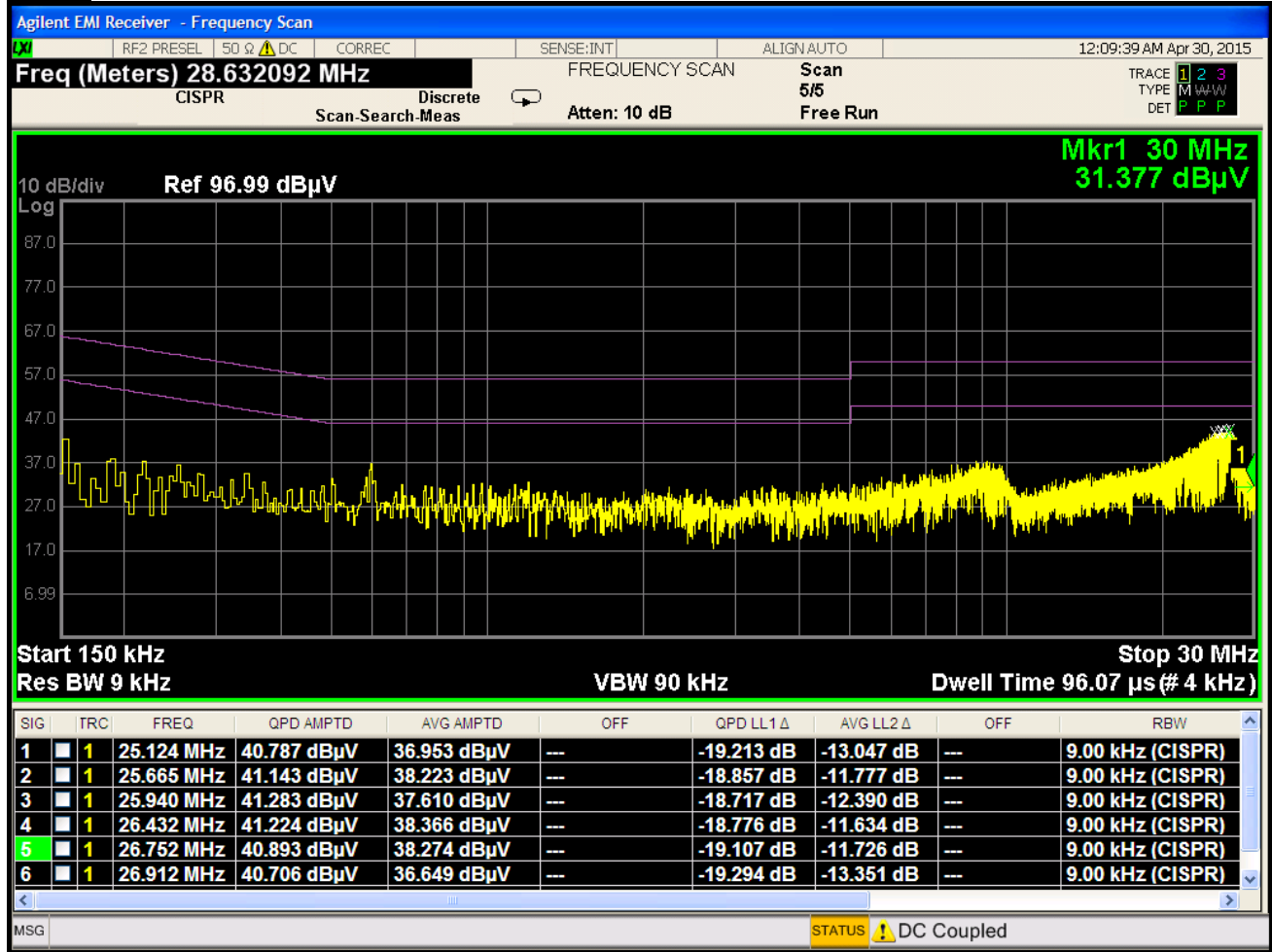
**Notes:**

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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# Line-Conducted Test Data

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Plot 6-100. Line Conducted Plot with 802.11a UNII Band 2A (N)

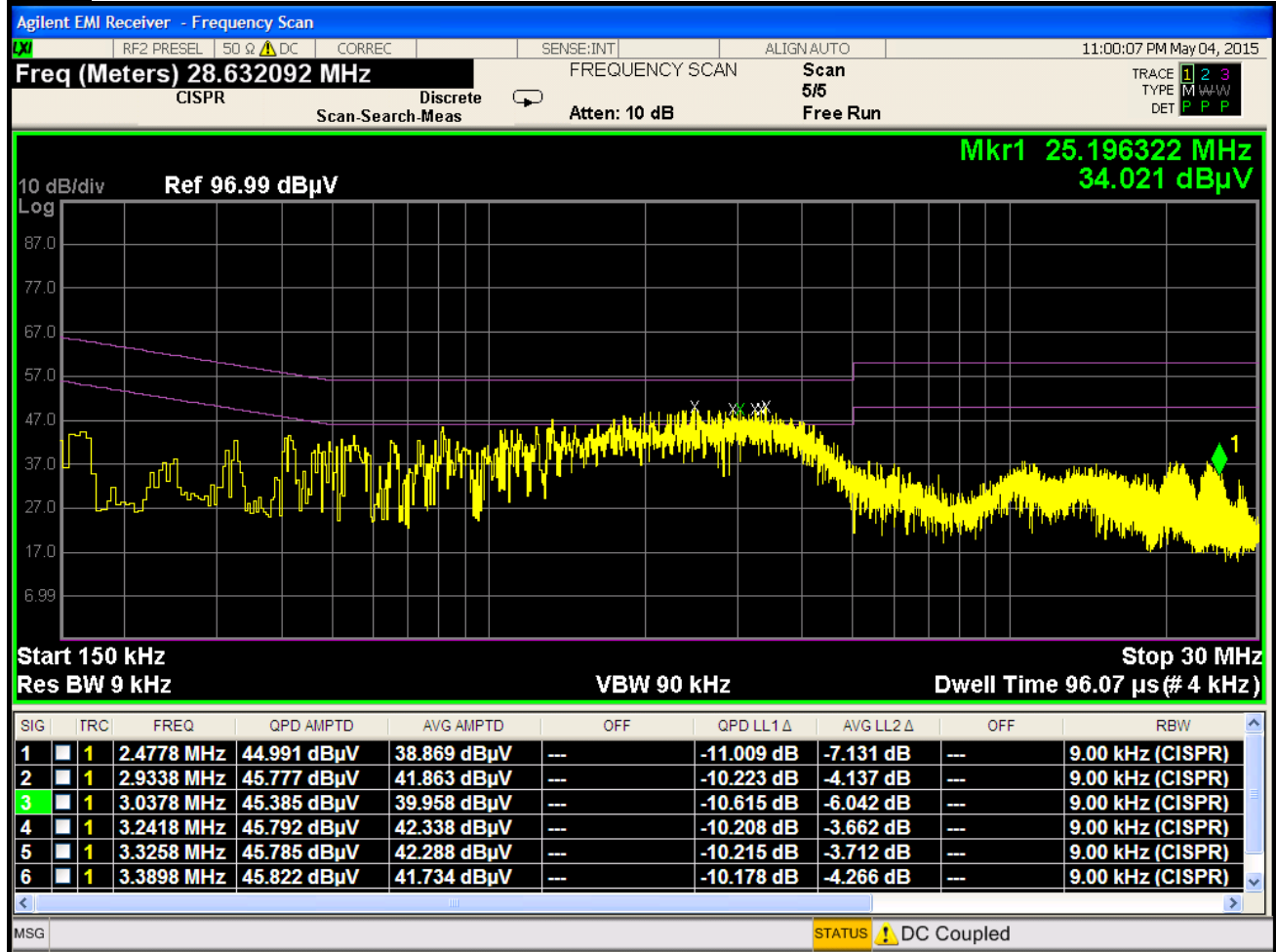
**Notes:**

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 6-101. Line Conducted Plot with 802.11a UNII Band 2C (L1)

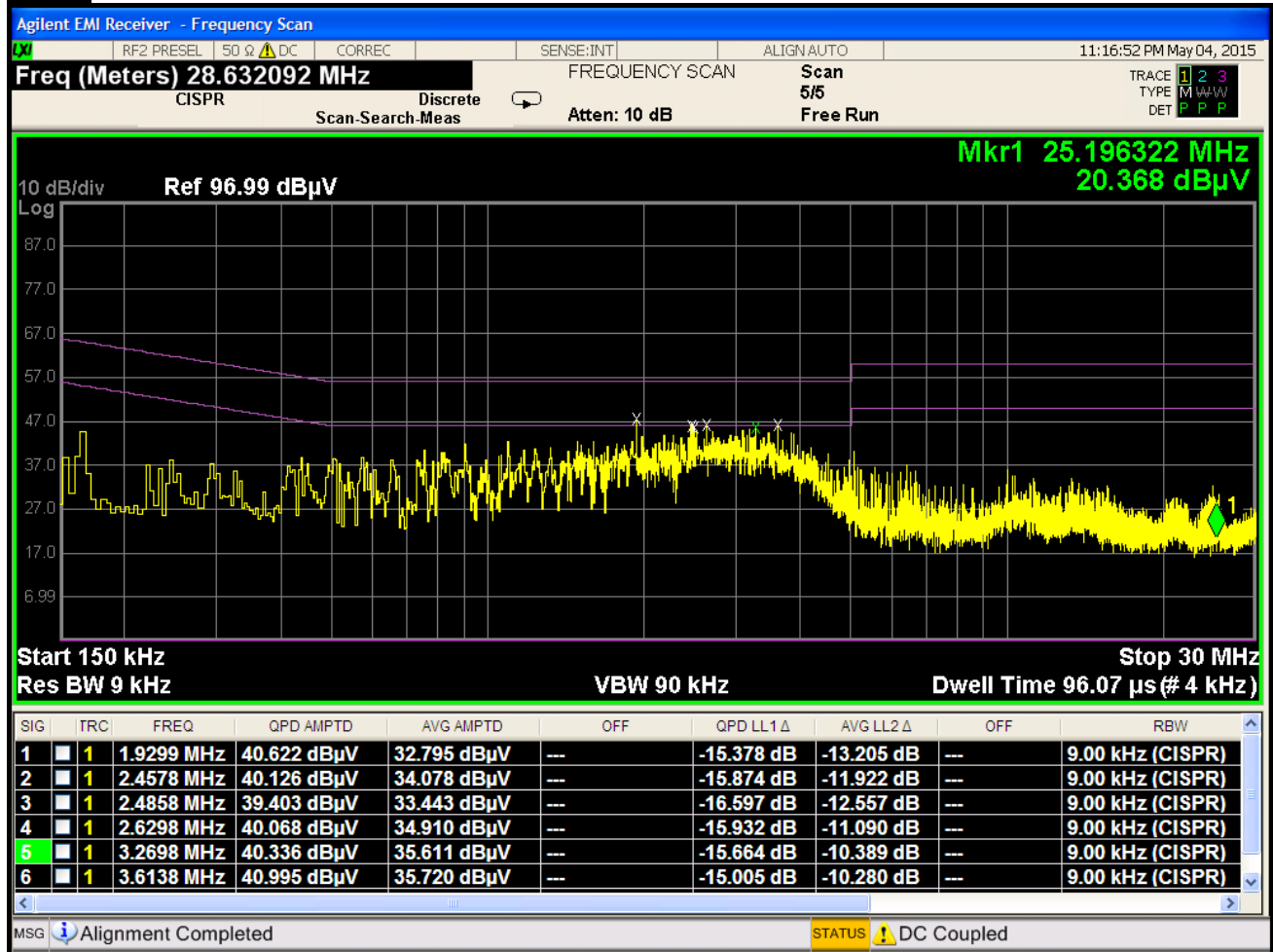
**Notes:**

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 6-102. Line Conducted Plot with 802.11a UNII Band 2C (N)

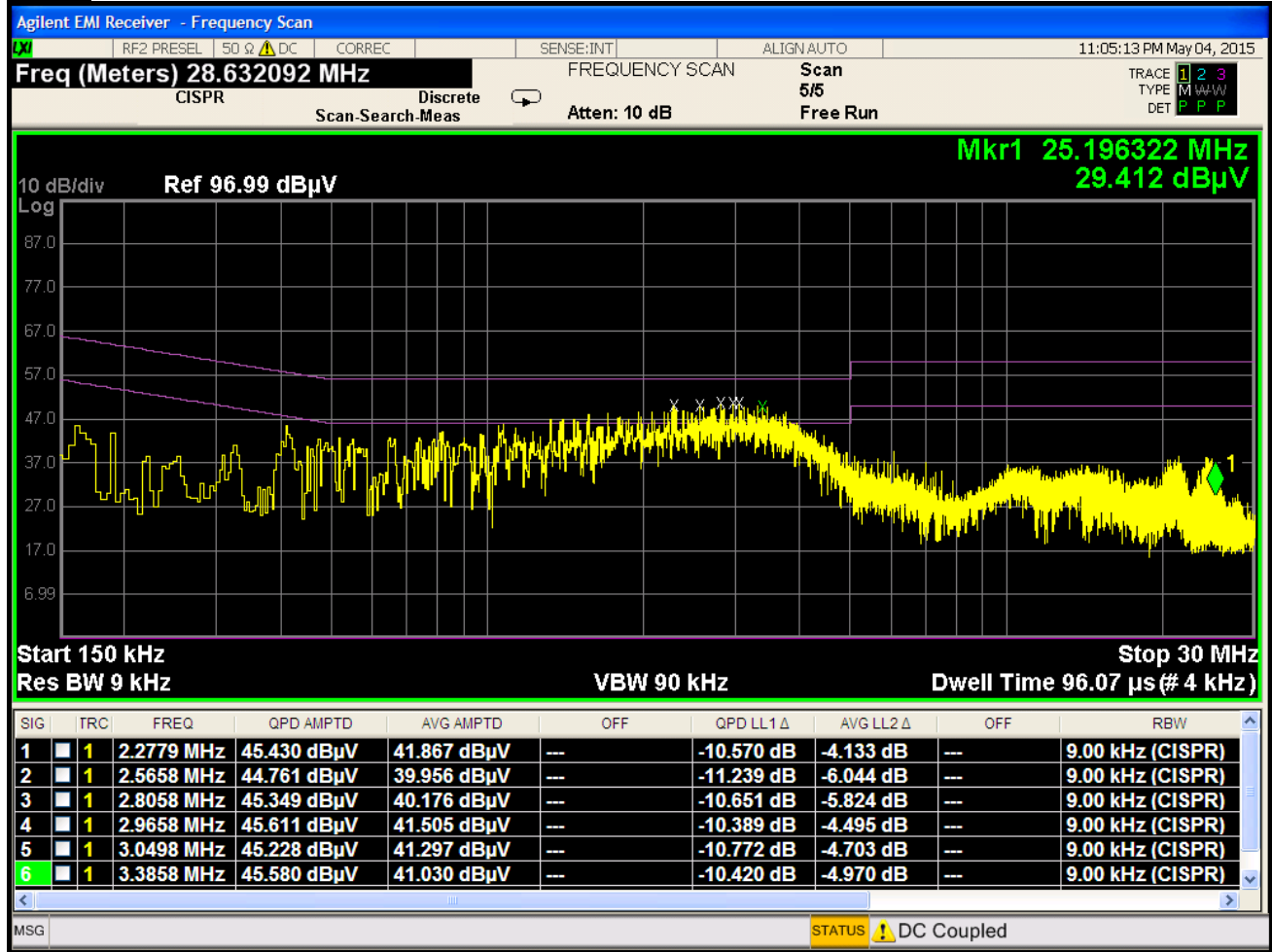
**Notes:**

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 6-103. Line Conducted Plot with 802.11a UNII Band 3 (L1)

**Notes:**

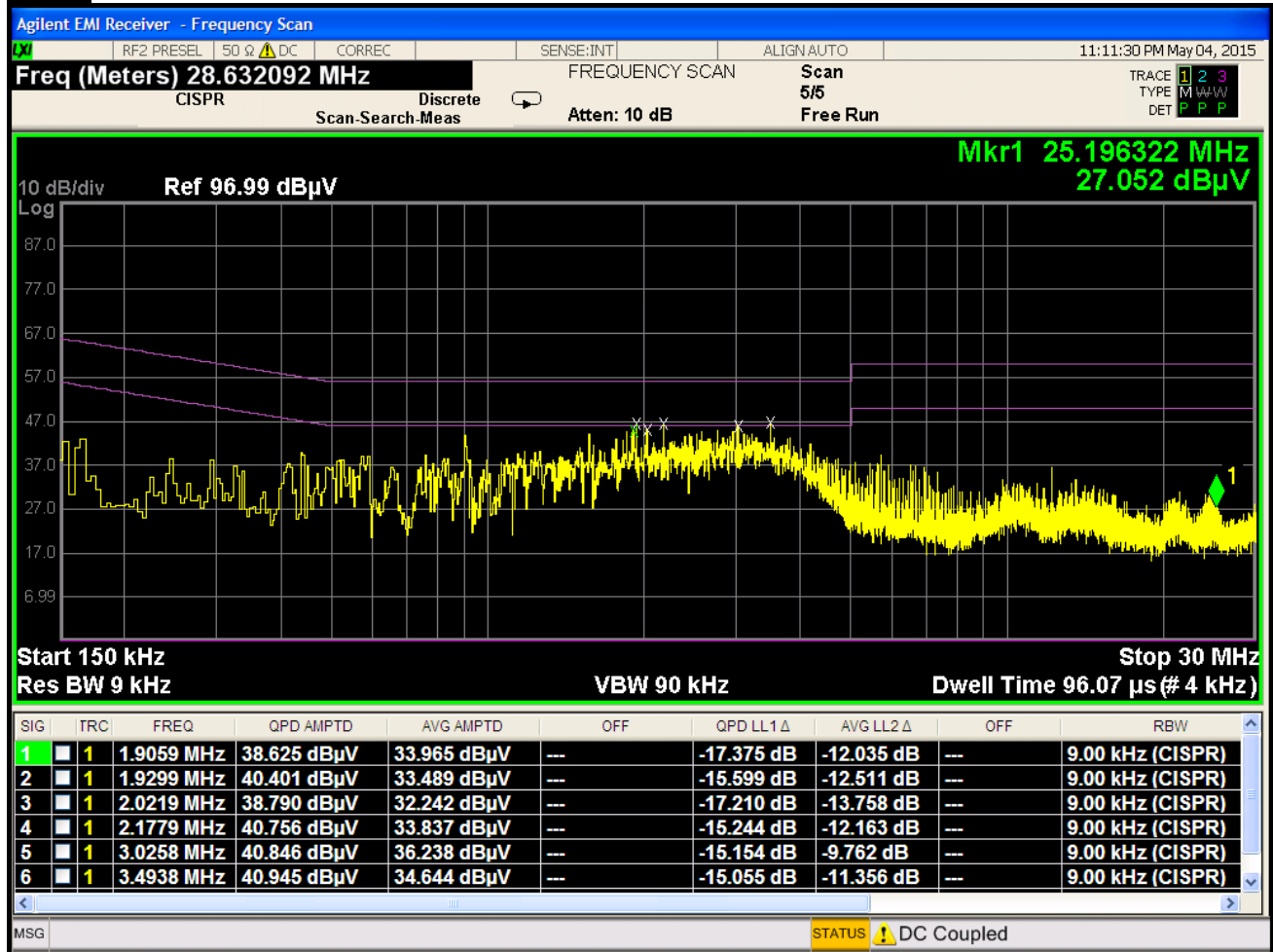
1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11a mode using 6Mbps on Channel 149. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz 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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# Line-Conducted Test Data

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**Plot 6-104. 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: ZNFH634** is in compliance with Part 15E of the FCC Rules.

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