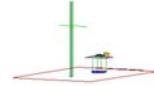




# PCTEST ENGINEERING LABORATORY, INC.

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http://www.pctestlab.com



## MEASUREMENT REPORT FCC PART 15.407 (UNII)

**Applicant Name:**  
Samsung Electronics Co., Ltd.  
129, Samsung-ro, Yeongtong-gu  
Suwon-city, Gyeonggi-do, 443-803  
Republic of Korea

**Date of Testing:**  
July 2-18, 2013  
**Test Site/Location:**  
PCTEST Lab, Columbia, MD, USA  
**Test Report Serial No.:**  
0Y1306201045.A3L

<b>FCC ID:</b>	<b>A3LSCHP729</b>
<b>APPLICANT:</b>	<b>Samsung Electronics Co., Ltd.</b>

**Application Type:** Certification  
**Model(s):** SCH-P729  
**EUT Type:** Portable Handset  
**FCC Classification:** Unlicensed National Information Infrastructure (UNII)  
**FCC Rule Part(s):** Part 15.407  
**Test Procedure(s):** KDB 789033 v01r03, KDB 644545 v01r01

Mode	UNII Band	Channel Bandwidth (MHz)	Tx Frequency (MHz)	Conducted Power	
				Max. Power (mW)	Max. Power (dBm)
802.11a	1	20	5180 - 5240	10.375	10.16
	2	20	5260 - 5320	10.839	10.35
	3	20	5500 - 5700	10.023	10.01
802.11n	1	20	5180 - 5240	10.641	10.27
	2	20	5260 - 5320	10.864	10.36
	3	20	5500 - 5700	9.705	9.87
802.11n	1	40	5190 - 5230	9.977	9.99
	2	40	5270 - 5310	10.000	10.00
	3	40	5510 - 5670	8.790	9.44
802.11ac	1	80	5210	10.568	10.24
	2	80	5290	10.593	10.25
	3	80	5530	10.093	10.04

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 v01r03 and KDB 644545 v01r01. Test results reported herein relate only to the item(s) tested.

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

Randy Ortanez  
President

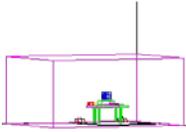


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<b>Test Report S/N:</b> 0Y1306201045.A3L	<b>Test Dates:</b> July 2-18, 2013	<b>EUT Type:</b> Portable Handset		Page 1 of 76

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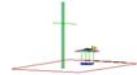
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# MEASUREMENT REPORT

## FCC Part 15.407



### § 2.1033 General Information

**APPLICANT:** Samsung Electronics Co., Ltd.

**APPLICANT ADDRESS:** 129, Samsung-ro, Yeongtong-gu  
Suwon-city, Gyeonggi-do, 443-803, Republic of Korea

**TEST SITE:** PCTEST ENGINEERING LABORATORY, INC.

**TEST SITE ADDRESS:** 6660-B Dobbin Road, Columbia, MD 21045 USA

**FCC RULE PART(S):** Part 15.407

**IC SPECIFICATION(S):** RSS-210 Issue 8

**MODEL NAME:** SCH-P729

**FCC ID:** A3LSCHP729

**Test Device Serial No.:** FK 181 D, FK 181 E     Production     Pre-Production     Engineering

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

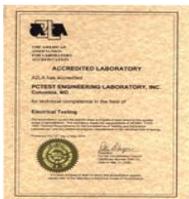
**DATE(S) OF TEST:** July 2-18, 2013

**TEST REPORT S/N:** 0Y1306201045.A3L

### 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. 90864) 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 (2451A-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 (2451A-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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<b>Test Report S/N:</b> 0Y1306201045.A3L	<b>Test Dates:</b> July 2-18, 2013	<b>EUT Type:</b> Portable Handset	Page 3 of 76	

# 1.0 INTRODUCTION

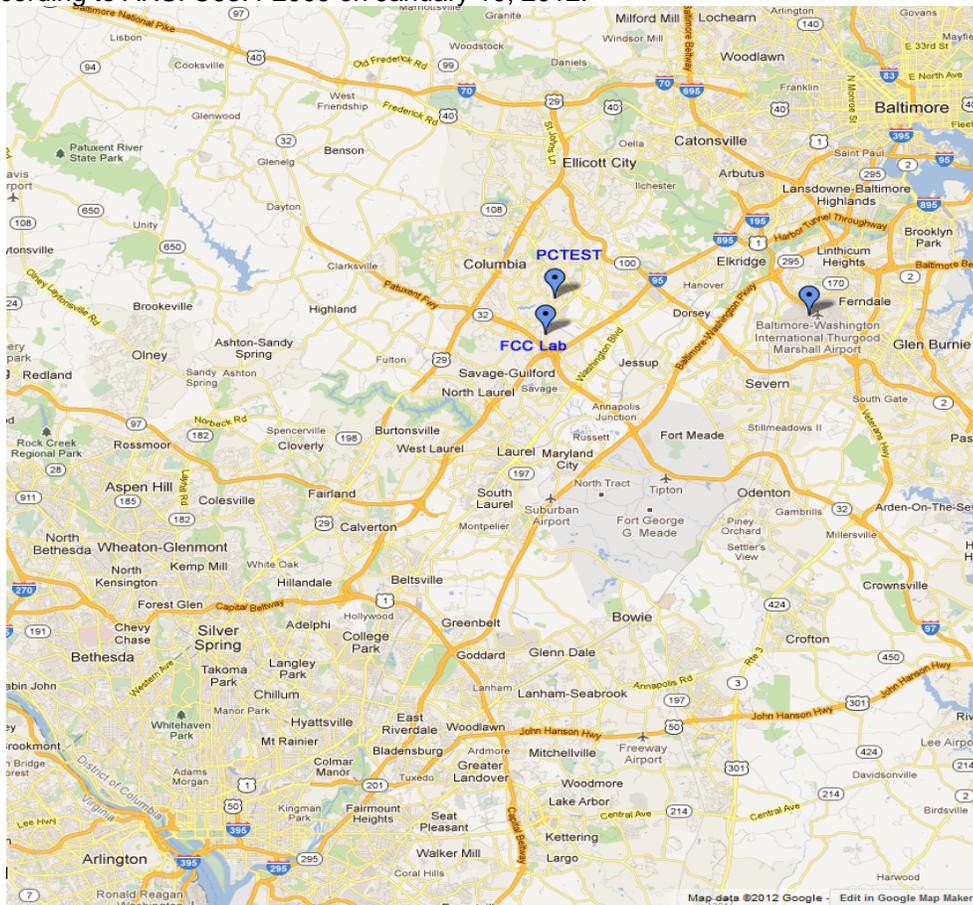
## 1.1 Scope

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'tl (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 in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. 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 January 10, 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 **Samsung Portable Handset FCC ID: A3LSCHP729**. 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:

1900 CDMA (BC1), 850/1900 GSM/GPRS, 802.11a/b/g/n/ac WLAN (DTS/NII), Bluetooth (1x,EDR, LE), NFC

**Note:** 5GHz WLAN (DTS/NII) operation is possible in 20MHz, 40MHz, and 80MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section B)2)b) of KDB 789033. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

- 802.11a/n 20MHz Bandwidth – 98.31%
- 802.11n 40MHz Bandwidth – 98.76%
- 802.11ac 80MHz Bandwidth – 98.7%

### 2.3 Test Configuration

The Samsung Portable Handset FCC ID: A3LSCHP729 was tested per the guidance of KDB 789033 v01r03. ANSI C63.10-2009 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 6.11, 3.3, and 6.1 of this test report for a description of the AC line conducted emissions, radiated emissions, and antenna port conducted emissions test setups, respectively.

### 2.4 EMI Suppression Device(s)/Modifications

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

### 2.5 Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

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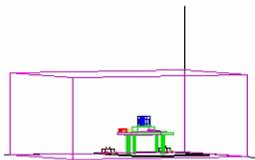
## 3.0 DESCRIPTION OF TEST

### 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 v01r03 were used in the measurement of **Samsung Portable Handset FCC ID: A3LSCHP729**.

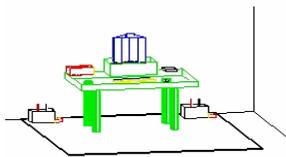
Deviation from measurement procedure.....None

### 3.2 AC Line Conducted Emissions



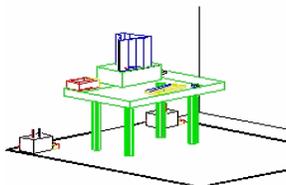
**Figure 3-1. Shielded Enclosure Line-Conducted Test Facility**

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure, manufactured by Ray Proof Series 81 (see Figure 3-1). 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 1.5m away from the sidewall of the shielded room (see Figure 3-2). Two 10kHz-30MHz, 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (see Figure 3-3). Power to the LISNs are filtered by a high-current high-insertion loss Ray Proof power line filter (100dB 14Hz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with an inner diameter of ½”.



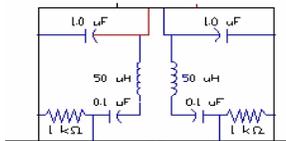
**Figure 3-2. Line Conducted Emission Test Set-Up**

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 Solar LISN. The LISN schematic diagram is shown (see Figure 3-4). 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.



**Figure 3-3. Wooden Table & Bonded LISNs**

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. 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 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, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; 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 bandwidth for final measurements. Each emission reported was calibrated using a signal generator.

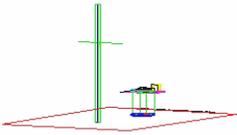


**Figure 3-4. LISN Schematic Diagram**

Line conducted emissions test results are shown in Section 6.11. Automated test software was used to perform the AC line conducted emissions testing. Automated measurement software utilized is the PCTEST Conduction Automatic Measurement, Version 2.7.

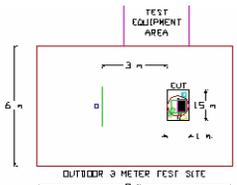
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### 3.3 Radiated Emissions



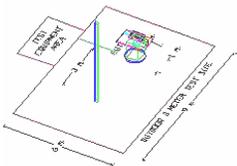
**Figure 3-5. 3-Meter Test Site**

The radiated test facilities consisted of an indoor semi-anechoic chamber used for exploratory measurements and an open area test site (OATS) used for final measurements. 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 higher than the upper frequency range of the broadband antenna used for testing, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used.



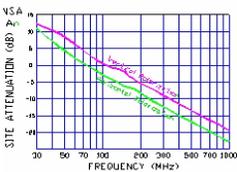
**Figure 3-6. Dimensions of Outdoor Test Site**

Exploratory measurements were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies 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 a 0.8 meter high non-metallic 1 x 1.5 meter table (see Figure 3-7). 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, turntable azimuth, and receive antenna height was noted for each frequency found. To record the exploratory measurements, the analyzers' detector function was set to peak mode and the bandwidth was set to 100kHz.



**Figure 3-7. Turntable and System Setup**

Final measurements were made on the OATS at 3 meter test range using calibrated, linearly polarized broadband or horn antennas (see Figure 3-5). The measurement area is situated on an 18 meter x 20 meter galvanized 1/2" hardware cloth as the conducting ground plane. This material is sewn together in sections 4 feet wide and 60 feet long. A total of eighteen sections are required to cover the entire measurement area. Sections are laid across the width of the pad, overlapped 1" and sewn and soldered together at intervals of 3" (7.6 cm.) The terrain of the test site is reasonably flat and level. Power and cable to the test site are buried 18" deep into the ground outside the perimeter of the site. An all-weather non-metallic housing is situated on a 2 x 3 meter area adjacent to the measurement area to house the test equipment (see Figure 3-6). The test set-up was again placed on top of the same a 0.8 meter high non-metallic 1 x 1.5 meter table on the OATS as used for exploratory measurements in the indoor chamber. The test set-up was re-configured to the same setup that was previously determined through exploratory measurements to have produced the worst case emissions. The spectrum analyzer was set to the frequencies found to have caused the highest radiated disturbances with respect to the limit during preliminary radiated measurements. The turntable containing the system 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. For the EUT positioning, "H" is defined with the EUT lying flat on the test surface, "H2" is defined with the EUT standing up on its side, and "V" is defined with the EUT standing upright. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 3-8.



**Figure 3-8. Normalized Site Attenuation Curves (H&V)**

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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 **Samsung Portable Handset FCC ID: A3LSCHP729** unit complies with the requirement of §15.203.

Band 1		Band 2		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
36	5180	52	5260	100	5500
:	:	:	:	:	:
42	5210	56	5280	116	5580
:	:	:	:	:	:
48	5240	64	5320	140	5700

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

Band 1		Band 2		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
38	5190	54	5270	102	5510
:	:	:	:	:	:
46	5230	62	5310	110	5550
				:	:
				134	5670

**Table 4-2. 802.11n (40MHz BW) Frequency / Channel Operations**

Band 1		Band 2		Band 3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
42	5210	58	5290	106	5530

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

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## 5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	7/10/2012	Annual	7/10/2013	N/A
-	WL25-1	Conducted Cable Set (25GHz)	1/16/2013	Annual	1/16/2014	N/A
-	WL40-1	Conducted Cable Set (40GHz)	1/29/2013	Annual	1/29/2014	N/A
Agilent	8449B	(1-26.5GHz) Pre-Amplifier	4/17/2013	Annual	4/17/2014	3008A00985
Agilent	N9038A	MXE EMI Receiver	12/8/2012	Annual	12/8/2013	MY51210133
Agilent	N9030A	PXA Signal Analyzer (44GHz)	1/11/2013	Annual	1/11/2014	MY52350166
Agilent	N9020A	MXA Signal Analyzer	10/9/2012	Annual	10/9/2013	US46470561
Agilent	85650A	Quasi-Peak Adapter	4/17/2013	Annual	4/17/2014	2043A00301
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	4/17/2013	Annual	4/17/2014	2542A11898
Anritsu	MA2411B	Pulse Sensor	9/19/2012	Annual	9/19/2013	1027293
Anritsu	ML2495A	Power Meter	10/11/2012	Annual	10/11/2013	1039008
Emco	3116	Horn Antenna (18 - 40GHz)	1/20/2012	Triennial	1/20/2015	9203-2178
Emco	3816/2	LISN	2/12/2013	Biennial	2/12/2015	9707-1077
Huber+Suhner	Sucoflex 102A	40GHz Radiated Cable	3/1/2013	Annual	3/1/2014	251425001
Mini-Circuits	VHF-3100+	High Pass Filter	1/21/2013	Annual	1/21/2014	31144
Mini-Circuits	VHF-8400+	3.4GHz - 9.9GHz High Pass Filter	1/17/2013	Annual	1/17/2014	31048
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	5/31/2013	Annual	5/31/2014	100071
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/31/2013	Annual	5/31/2014	100040
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	6/6/2012	Biennial	6/6/2014	100037
Sunol	DRH-118	Horn Antenna (1 - 18GHz)	6/19/2013	Biennial	6/19/2015	A050307

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

**Note:**

For equipment listed above that has a calibration due date that falls within the test date range, care was taken to ensure that this equipment was utilized prior to the calibration due date.

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## 6.0 TEST RESULTS

### 6.1 Summary

Company Name: Samsung Electronics Co., Ltd.  
 FCC ID: A3LSCHP729  
 Method/System: Unlicensed National Information Infrastructure (UNII)  
 Data Rate(s) Tested: 6, 9, 12, 18, 24, 36, 48, 54Mbps (802.11a)  
6.5/7.2, 13/14.4, 19.5/21.7, 26/28.9, 39/43.3, 52/57.8, 58.5/65, 65/72.2 (n – 20MHz)  
13.5/15, 27/30, 40.5/45, 54/60, 81/90, 108/120, 121.5/135, 135/150 (n – 40MHz BW)  
29.3/32.5Mbps, 58.5/65Mbps, 87.8/97.5Mbps, 117/130Mbps, 175.5/195Mbps,  
234/260Mbps, 263.3/292.5Mbps, 292.5/325Mbps, 351/390Mbps, 390/433.3Mbps  
(ac – 80MHz BW)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
<b>TRANSMITTER MODE (TX)</b>						
N/A	RSS-210 [A9.2]	26dB Bandwidth [FCC] Occupied Bandwidth [IC]	N/A	CONDUCTED	PASS	Section 6.2
15.407 (a)(1)	RSS-210 [A9.2]	Maximum Conducted Output Power	< 4 + 10log <sub>10</sub> (BW) dBm (5150-5250MHz) [FCC] < 10 + 10log <sub>10</sub> (BW) dBm (5150-5250MHz) [IC] < 11 + 10log <sub>10</sub> (B) dBm (5250-5350MHz, 5470 – 5725MHz)		PASS	Section 6.3
15.407 (a)(1), (5)	RSS-210 [A9.2]	Peak Power Spectral Density	< 4 dBm/MHz (5150-5250) [FCC] < 10dBm/MHz (5150-5250) [IC] < 11dBm/MHz (5250-5350) < 11dBm/MHz (5470-5725)		PASS	Section 6.3
15.407(a)(6)	N/A	Peak Excursion	< 13 dB/MHz maximum difference		PASS	Section 6.5
15.407(g)	N/A	Frequency Stability	N/A		PASS	Section 6.6
15.407(h)	RSS-210 [A9.3]	Dynamic Frequency Selection	See DFS Test Report		PASS	See DFS Test Report
15.407(b)(1), (2),(3)	RSS-210 [A9.2]	Undesirable Emissions	< -27 dBm/MHz EIRP (5150-5350MHz, 5470-5725MHz)	RADIATED	PASS	Section 6.7
15.205, 15.407(b)(1), (5), (6)	RSS-Gen [7.2.3.2]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-210 table 3 limits)		PASS	Section 6.8, 6.9, 6.10
15.207	RSS-Gen [7.2.2]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits or < RSS-Gen table 2 limits		LINE CONDUCTED	PASS

**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 2.2.

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

### Test Overview and Limit

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle (>98%), at its maximum power control level, as defined in KDB 789033 v01r03, 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

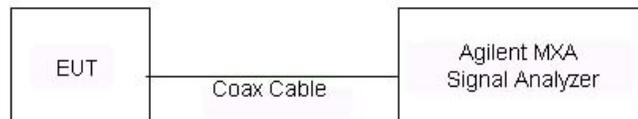
KDB 789033 v01r03 – Section C

### 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

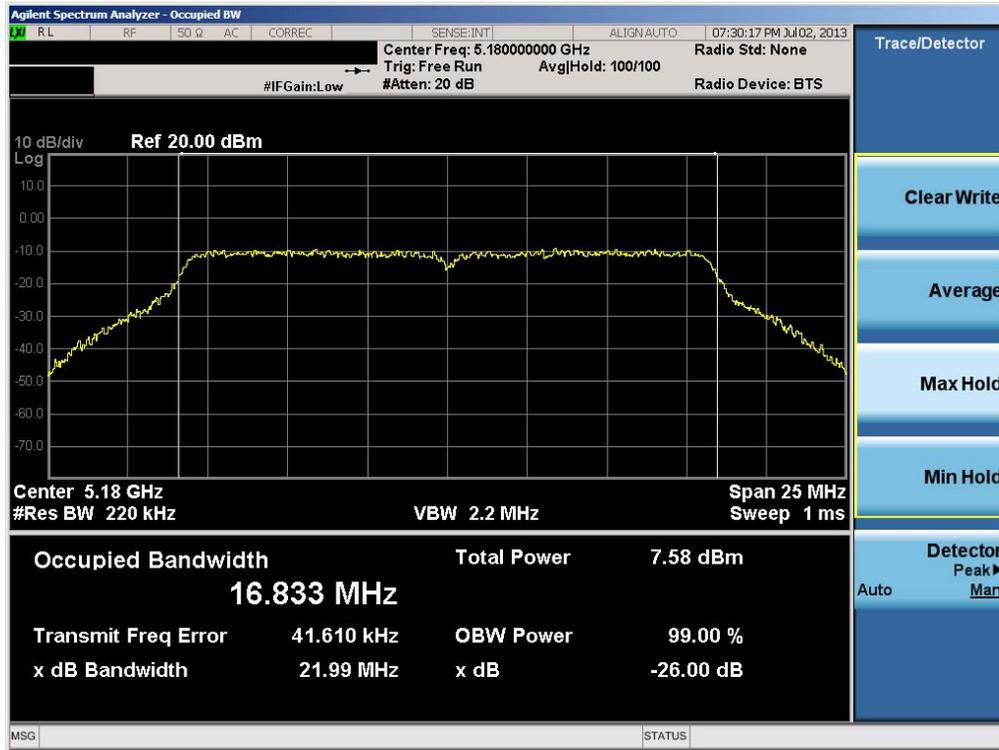
Per 15.407(b)(2), spurious emissions of transmitters that operate in the 5250 – 5350MHz (UNII 2) band are required to meet all applicable technical requirements for operation in the 5150 – 5250MHz (UNII 1) band. Per KDB 644545 v01r01 and 15.215(c), a 20dB bandwidth measurement can be performed to demonstrate that the entire emission of a particular channel lies solely within the UNII 2 band. A 20dB bandwidth plot is included at the end of this section to show that no additional measurements are necessary for compliance with the out-of-band emission requirements of the UNII 2 band.

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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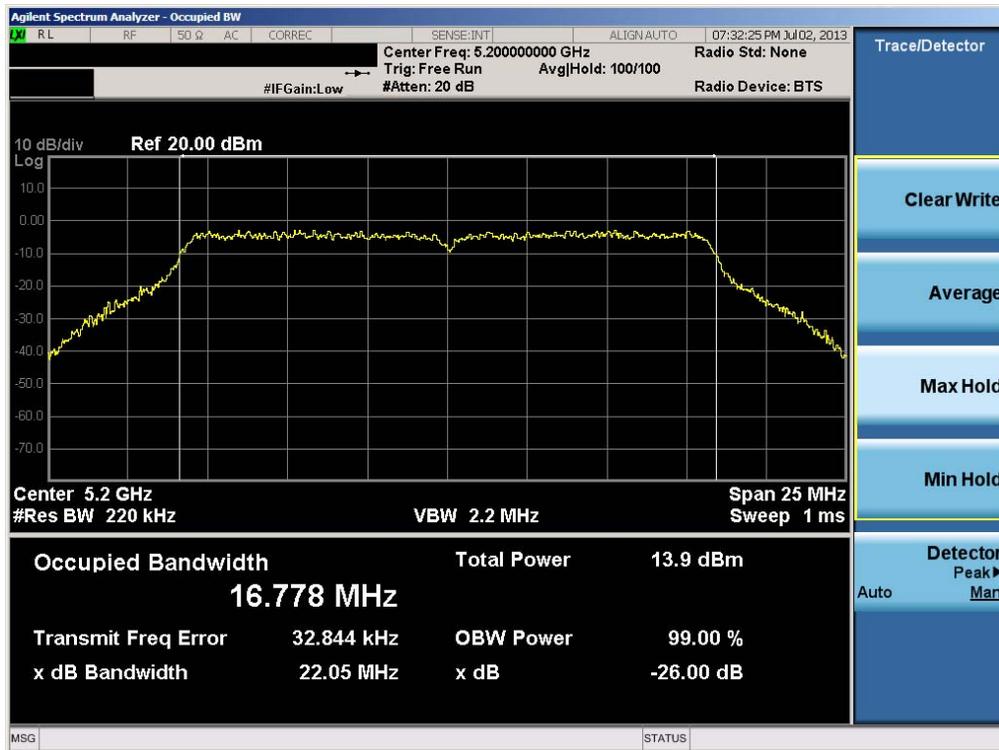
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]
Band I	5180	36	a	6	21.99
	5200	40	a	6	22.05
	5240	48	a	6	21.44
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	22.41
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	20.86
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	22.18
	5190	38	n (40MHz)	13.5/15 (MCS0)	43.27
	5230	46	n (40MHz)	13.5/15 (MCS0)	42.97
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	81.53
Band II	5260	52	a	6	21.75
	5280	56	a	6	21.54
	5320	64	a	6	21.39
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	21.93
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	22.26
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	21.94
	5270	54	n (40MHz)	13.5/15 (MCS0)	42.52
	5310	62	n (40MHz)	13.5/15 (MCS0)	42.43
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	83.35
Band III	5500	100	a	6	21.59
	5580	116	a	6	21.93
	5700	140	a	6	21.68
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	21.94
	5580	116	n (20MHz)	6.5/7.2 (MCS0)	22.06
	5700	140	n (20MHz)	6.5/7.2 (MCS0)	22.18
	5510	102	n (40MHz)	13.5/15 (MCS0)	43.37
	5550	110	n (40MHz)	13.5/15 (MCS0)	43.65
	5670	134	n (40MHz)	13.5/15 (MCS0)	42.67
5530	106	ac (80MHz)	29.3/32.5 (MCS0)	83.36	

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

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 6-1. 26dB Bandwidth Plot (802.11a (UNII Band 1) – Ch. 36)

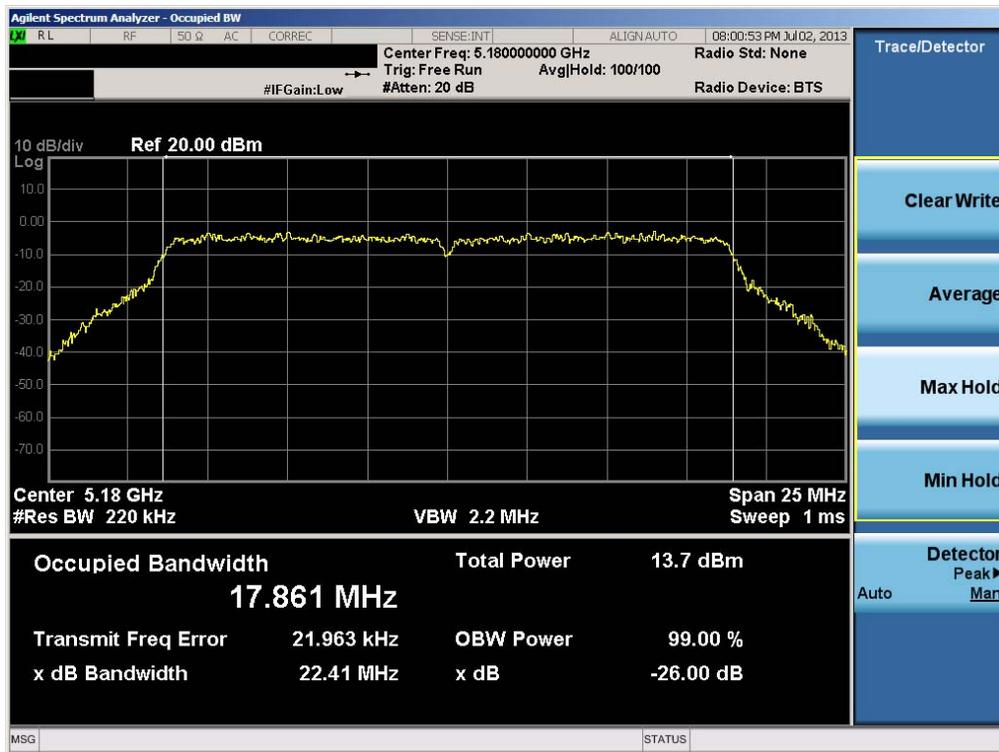


Plot 6-2. 26dB Bandwidth Plot (802.11a (UNII Band 1) – Ch. 40)

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1306201045.A3L	Test Dates: July 2-18, 2013	EUT Type: Portable Handset		Page 13 of 76

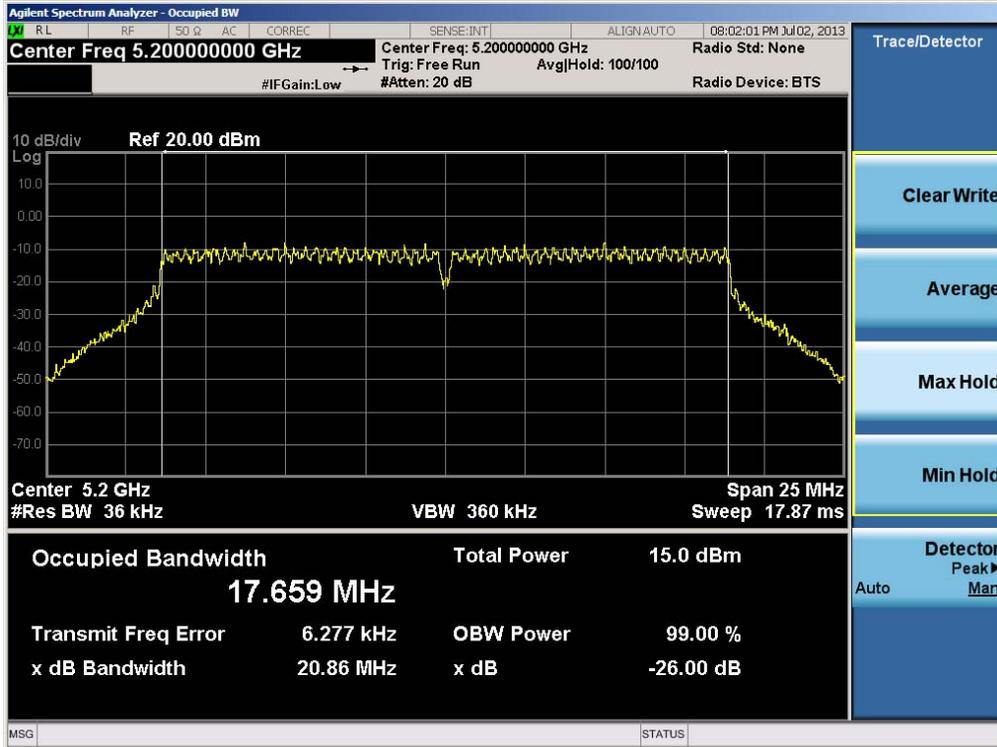


Plot 6-3. 26dB Bandwidth Plot (802.11a (UNII Band 1) – Ch. 48)



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

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1306201045.A3L	Test Dates: July 2-18, 2013	EUT Type: Portable Handset		Page 14 of 76

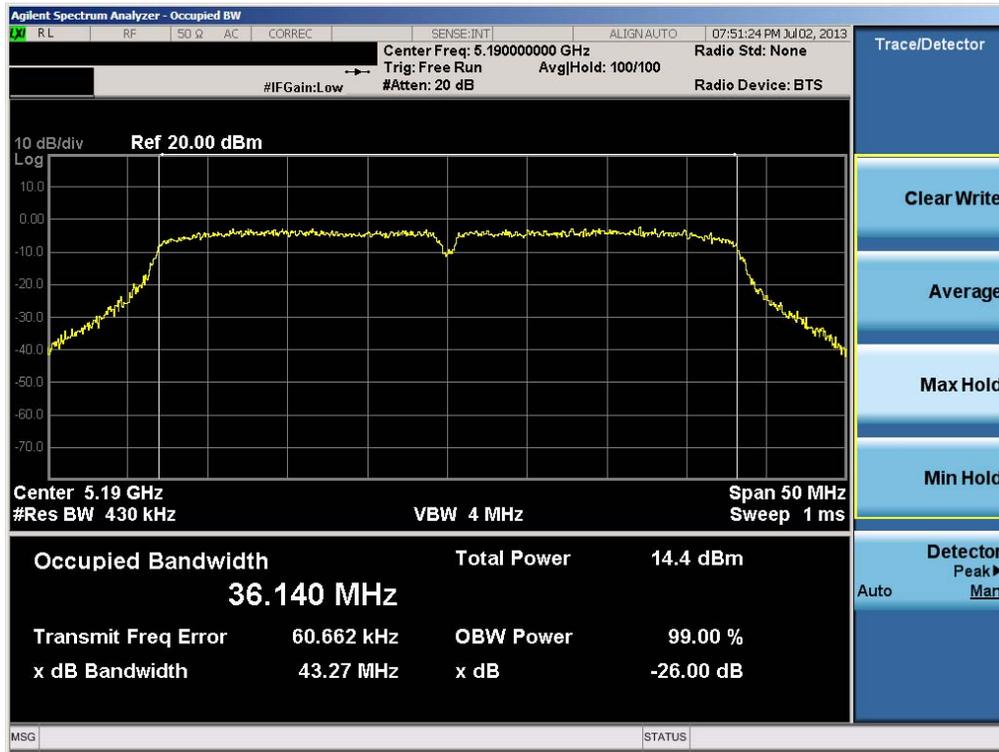


Plot 6-5. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 40)

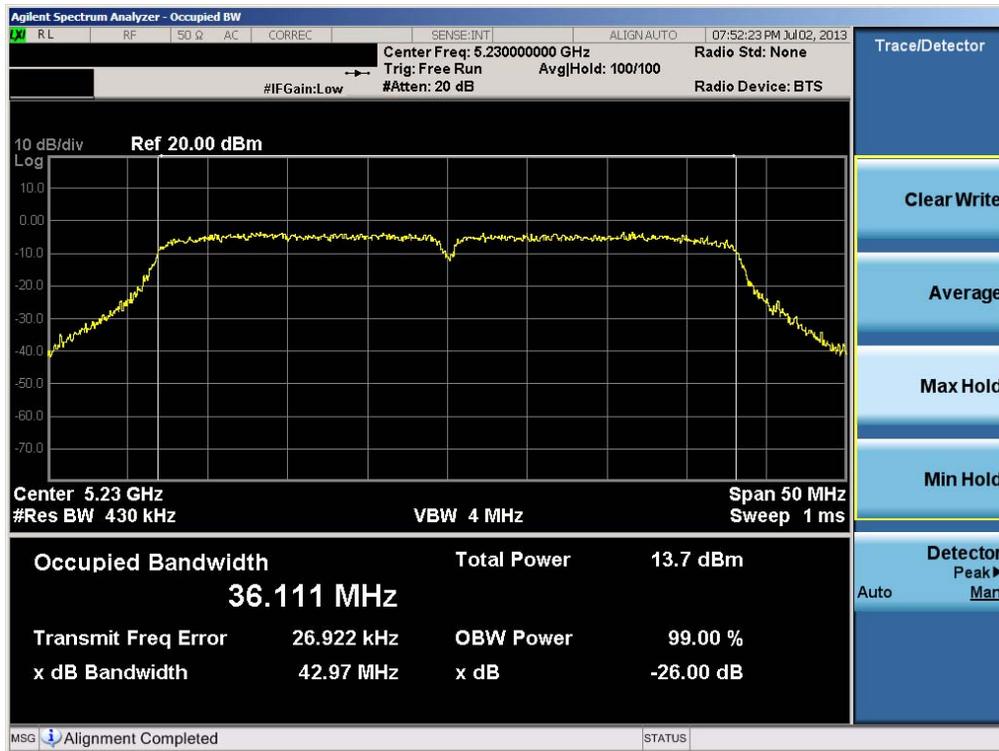


Plot 6-6. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 1) – Ch. 48)

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1306201045.A3L	Test Dates: July 2-18, 2013	EUT Type: Portable Handset		Page 15 of 76

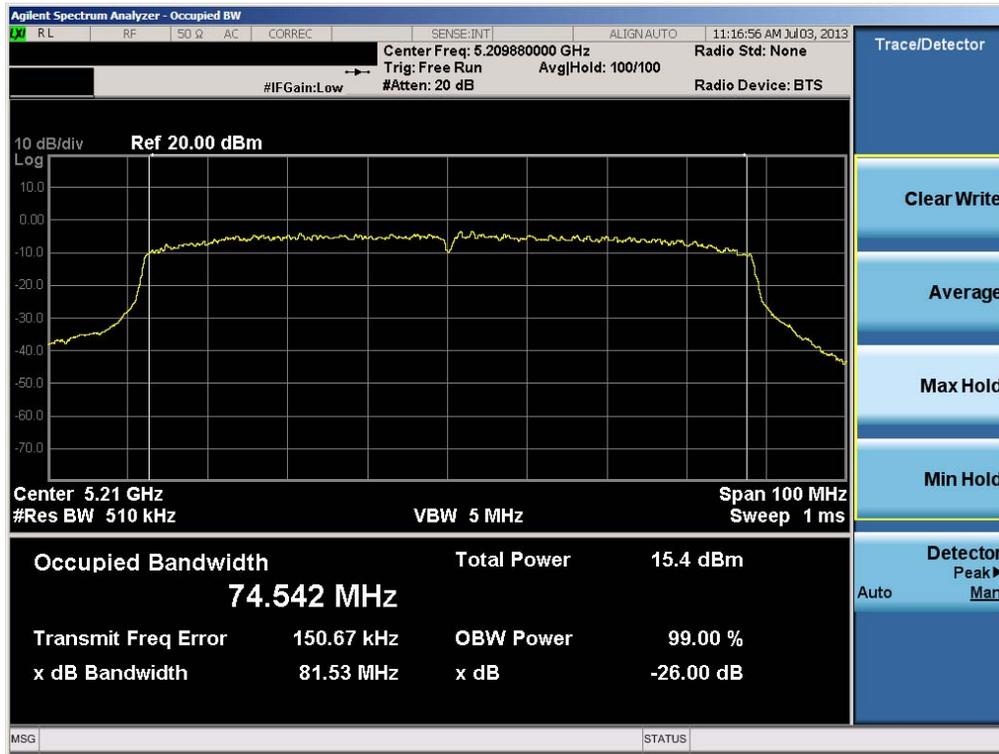


Plot 6-7. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 38)

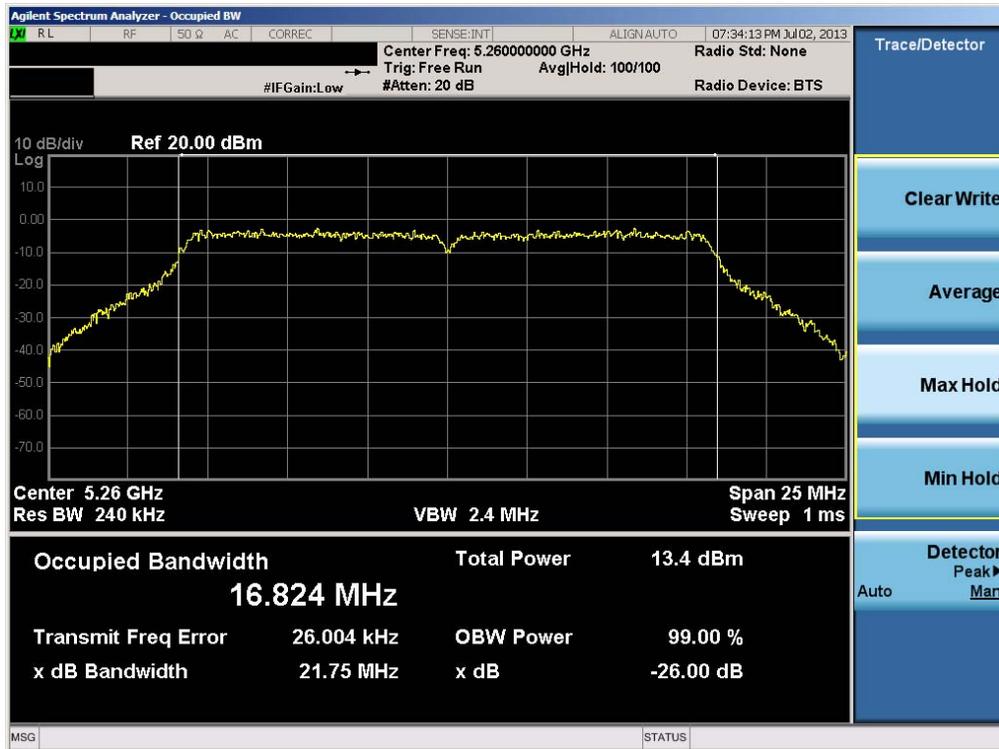


Plot 6-8. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 1) – Ch. 46)

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1306201045.A3L	Test Dates: July 2-18, 2013	EUT Type: Portable Handset		Page 16 of 76

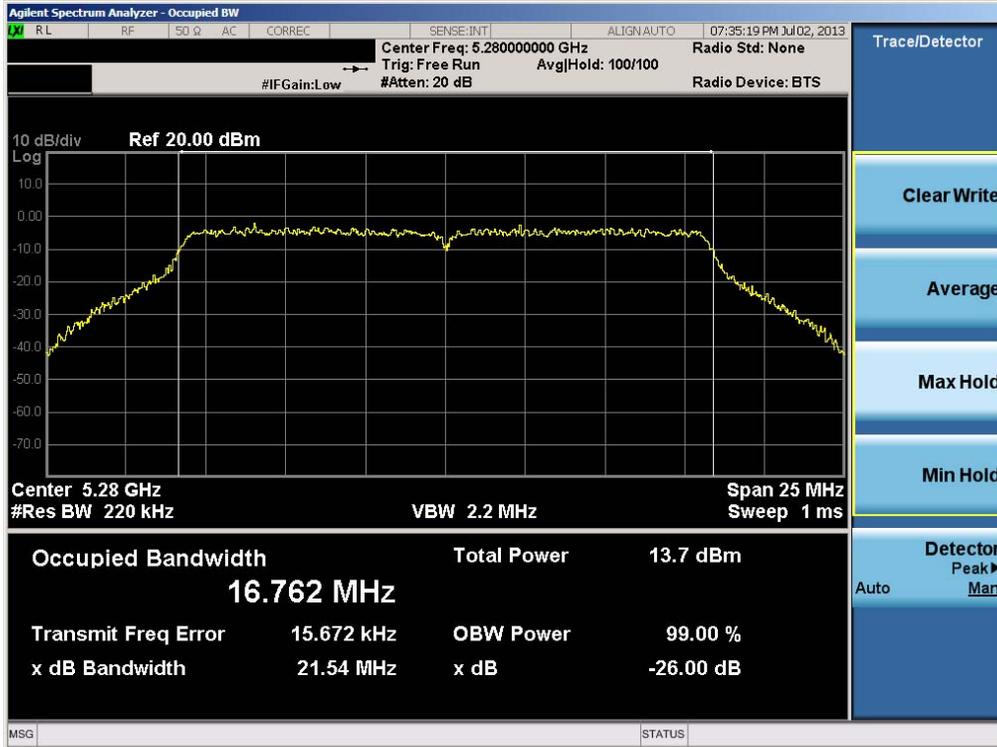


Plot 6-9. 26dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 1) – Ch. 42)

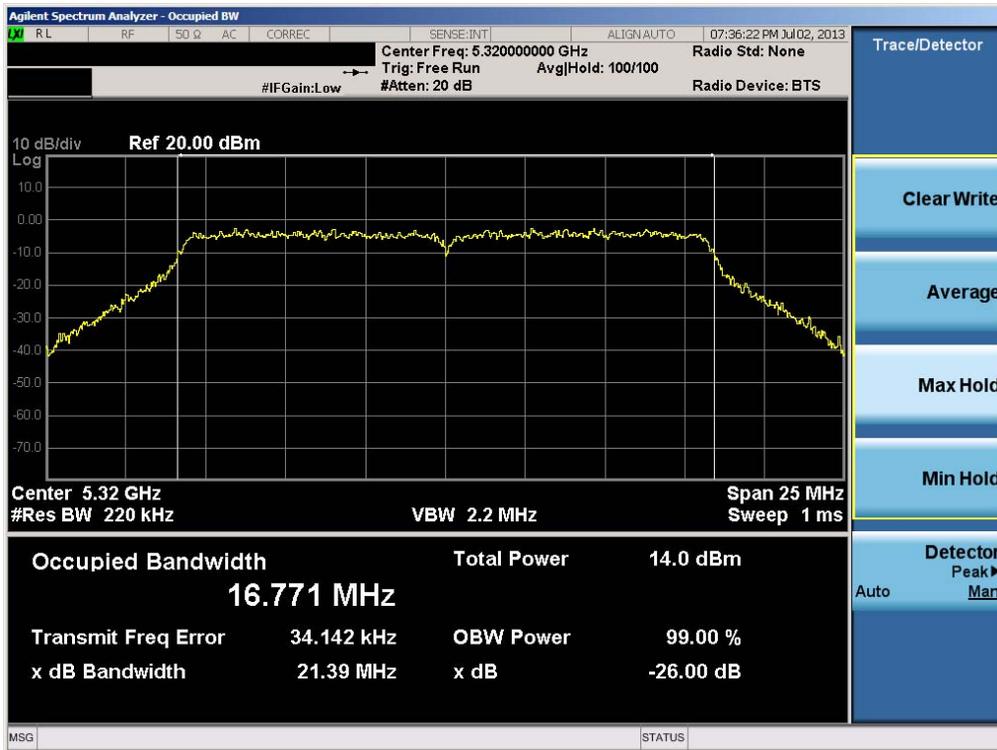


Plot 6-10. 26dB Bandwidth Plot (802.11a (UNII Band 2) – Ch. 52)

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1306201045.A3L	Test Dates: July 2-18, 2013	EUT Type: Portable Handset		Page 17 of 76

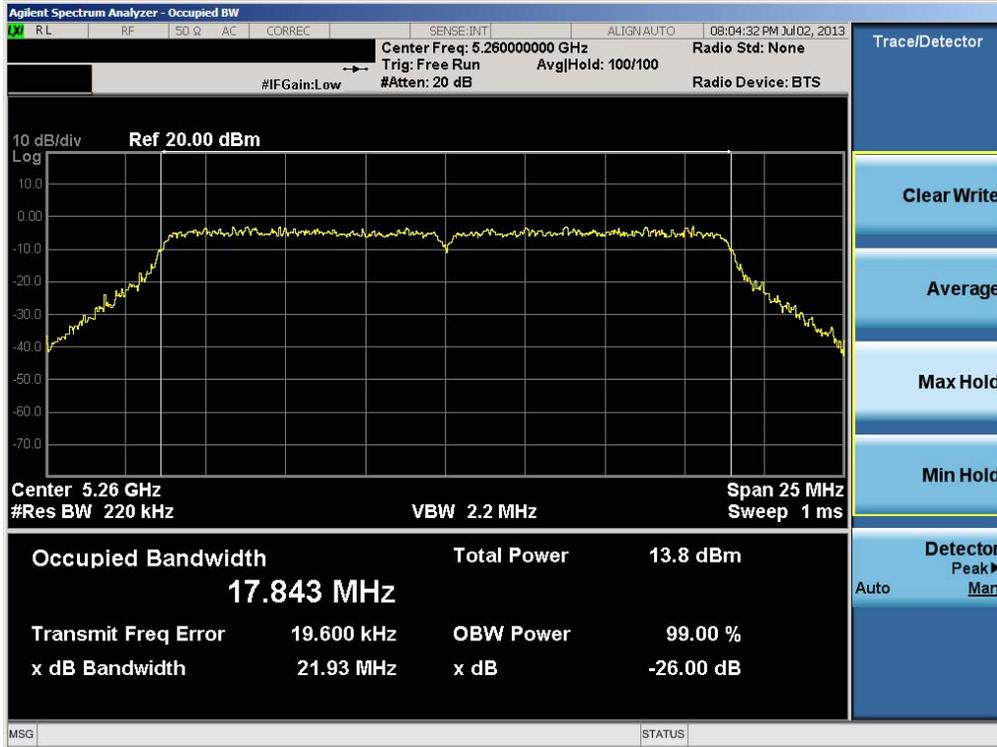


Plot 6-11. 26dB Bandwidth Plot (802.11a (UNII Band 2) – Ch. 56)

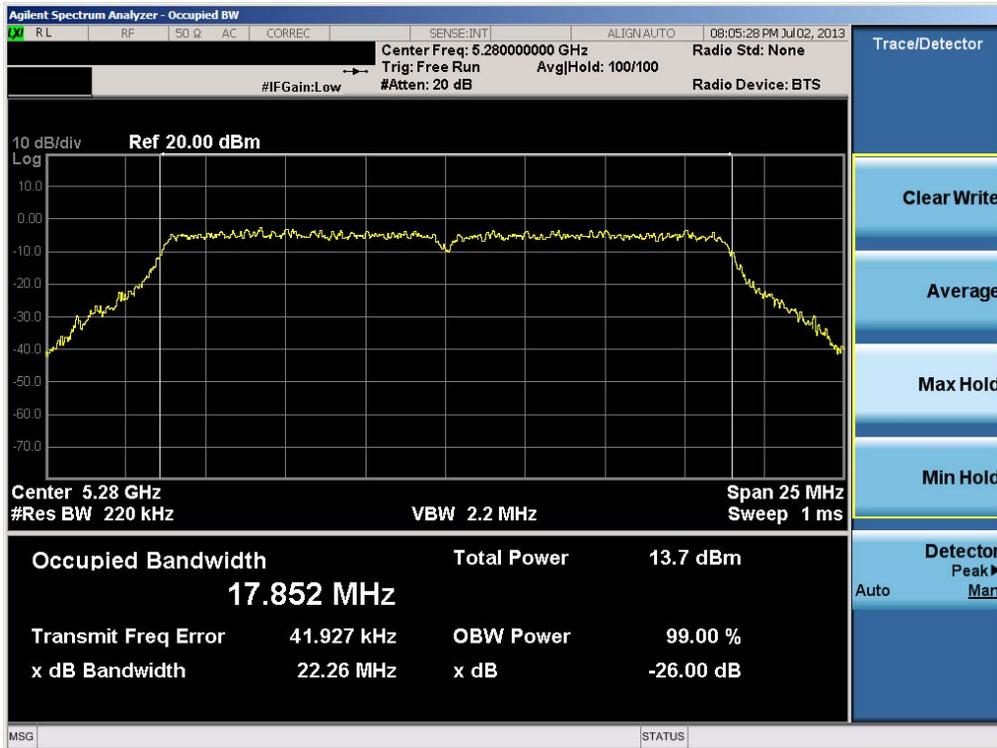


Plot 6-12. 26dB Bandwidth Plot (802.11a (UNII Band 2) – Ch. 64)

FCC ID: A3LSCHP729	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)	<b>SAMSUNG</b>	Reviewed by: Quality Manager
Test Report S/N: 0Y1306201045.A3L	Test Dates: July 2-18, 2013	EUT Type: Portable Handset		Page 18 of 76

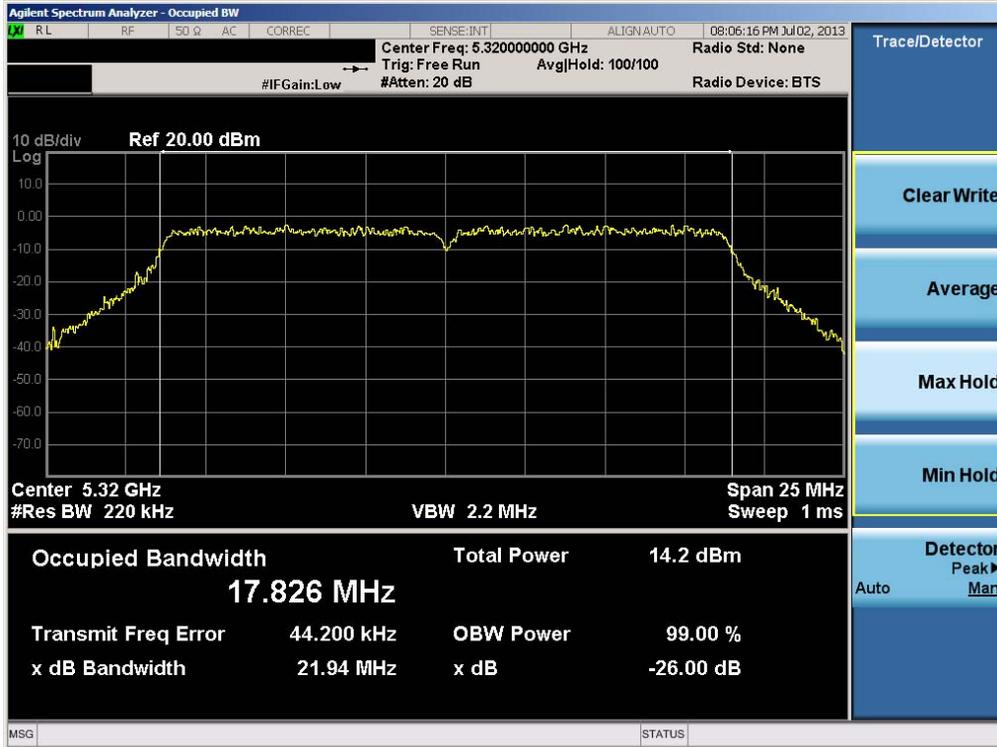


Plot 6-13. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 52)

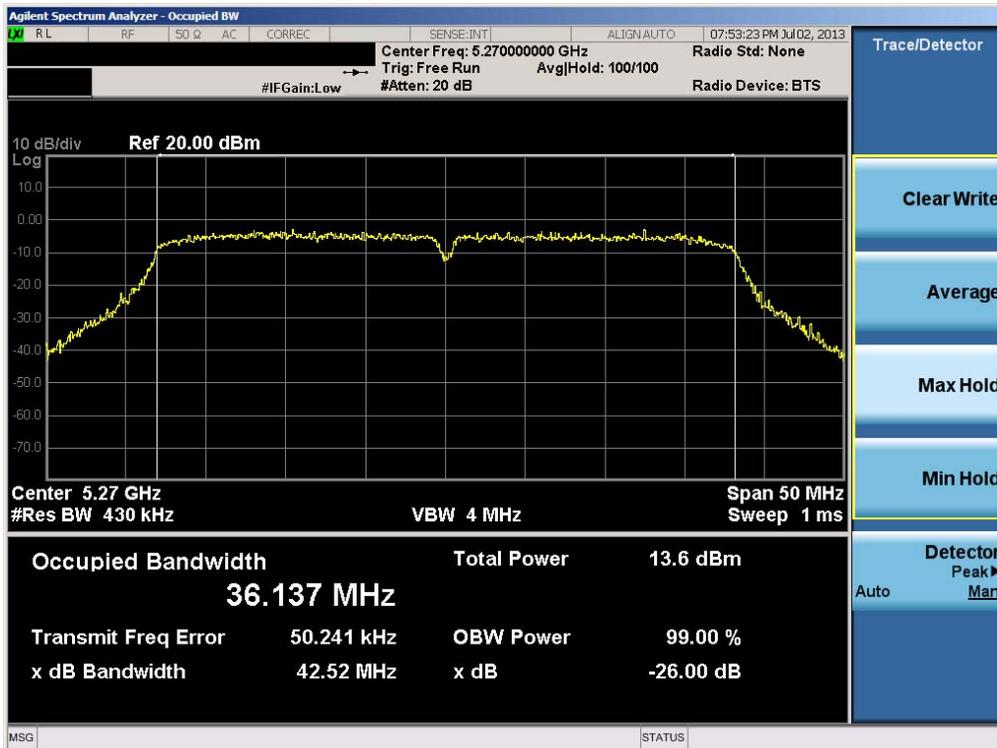


Plot 6-14. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 56)

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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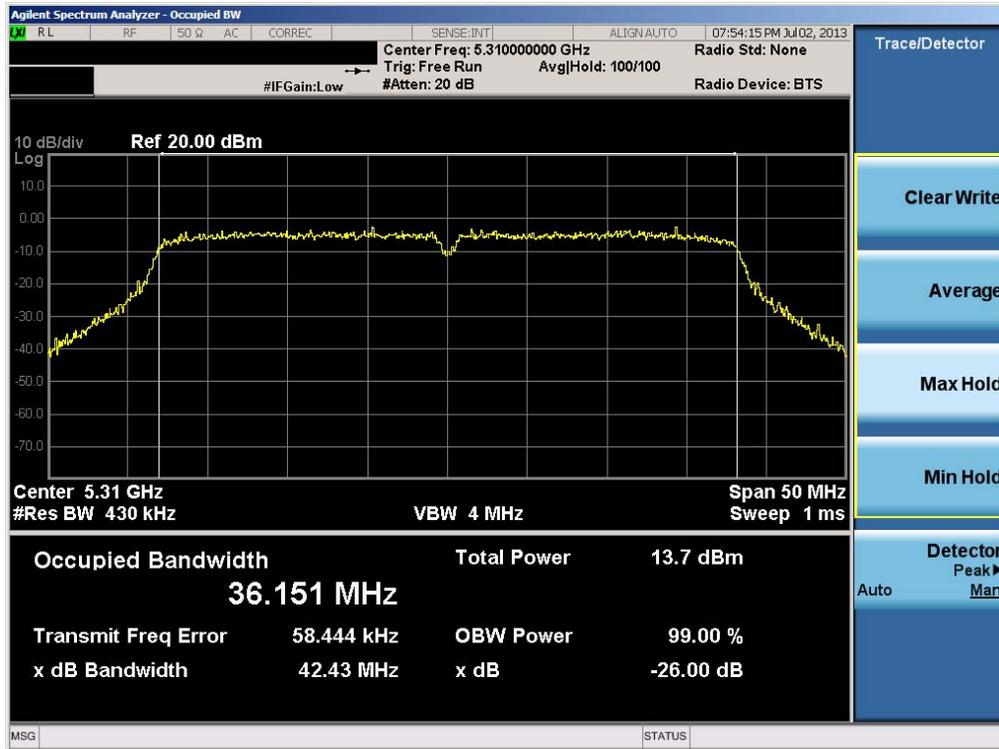


Plot 6-15. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 2) – Ch. 64)



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

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1306201045.A3L	Test Dates: July 2-18, 2013	EUT Type: Portable Handset		Page 20 of 76



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



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

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1306201045.A3L	Test Dates: July 2-18, 2013	EUT Type: Portable Handset		Page 21 of 76

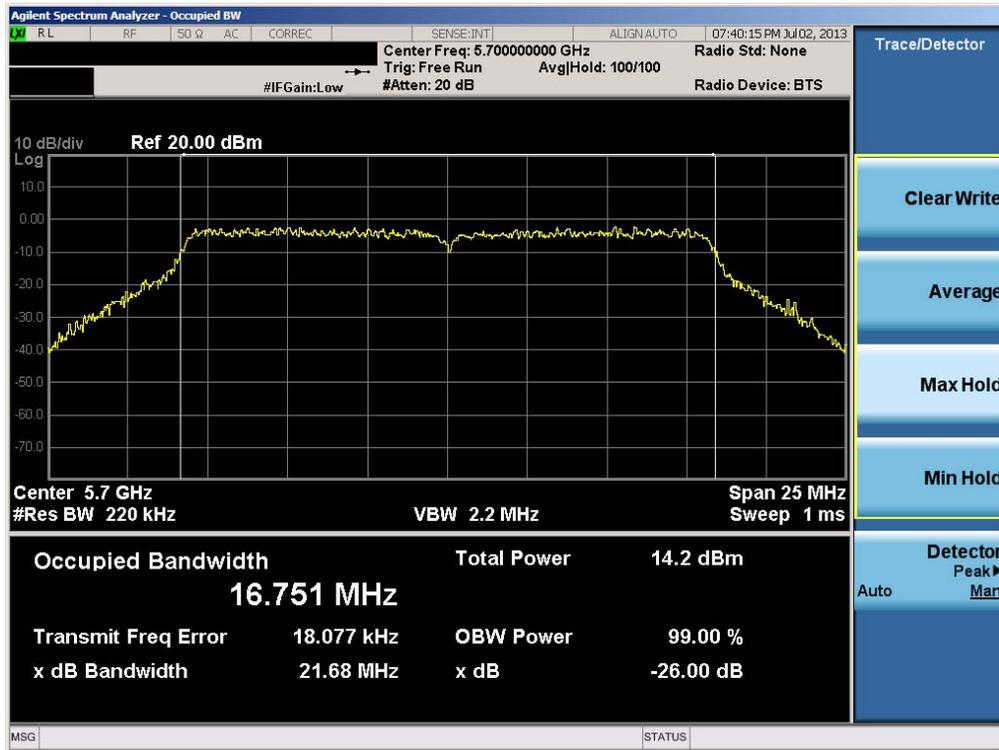


Plot 6-19. 26dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 100)

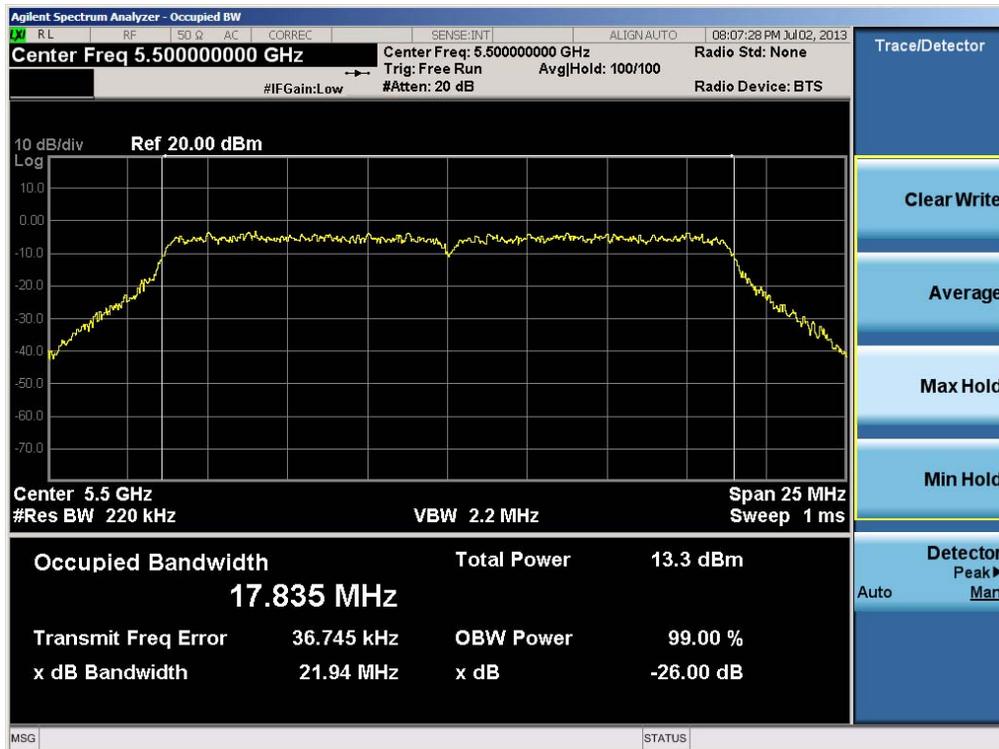


Plot 6-20. 26dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 116)

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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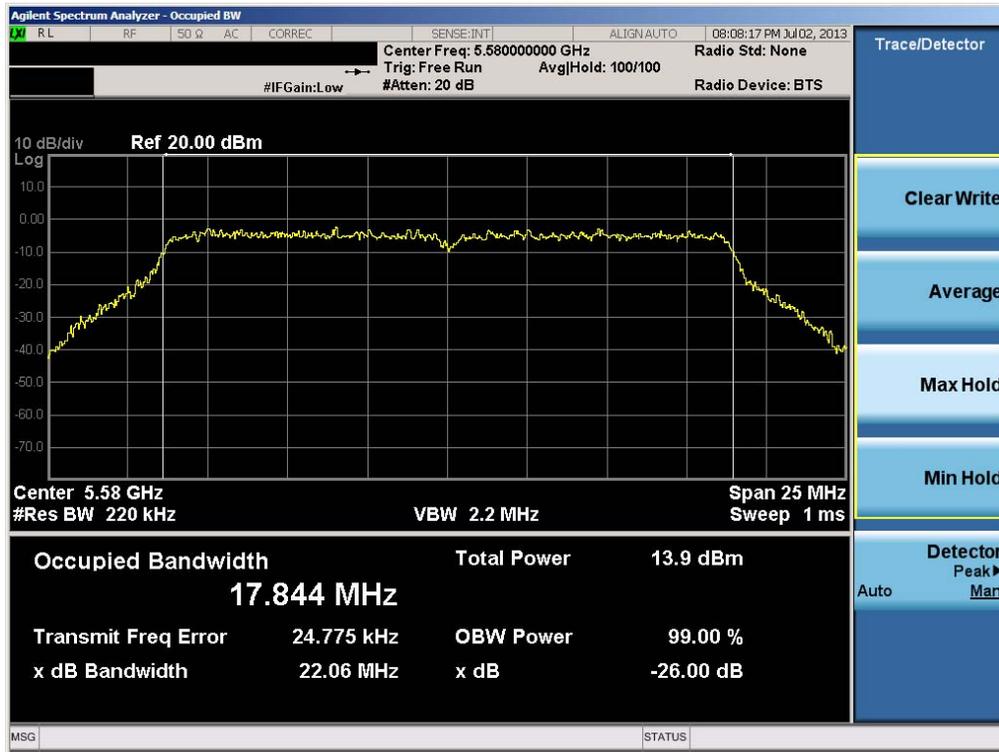


Plot 6-21. 26dB Bandwidth Plot (802.11a (UNII Band 3) – Ch. 140)

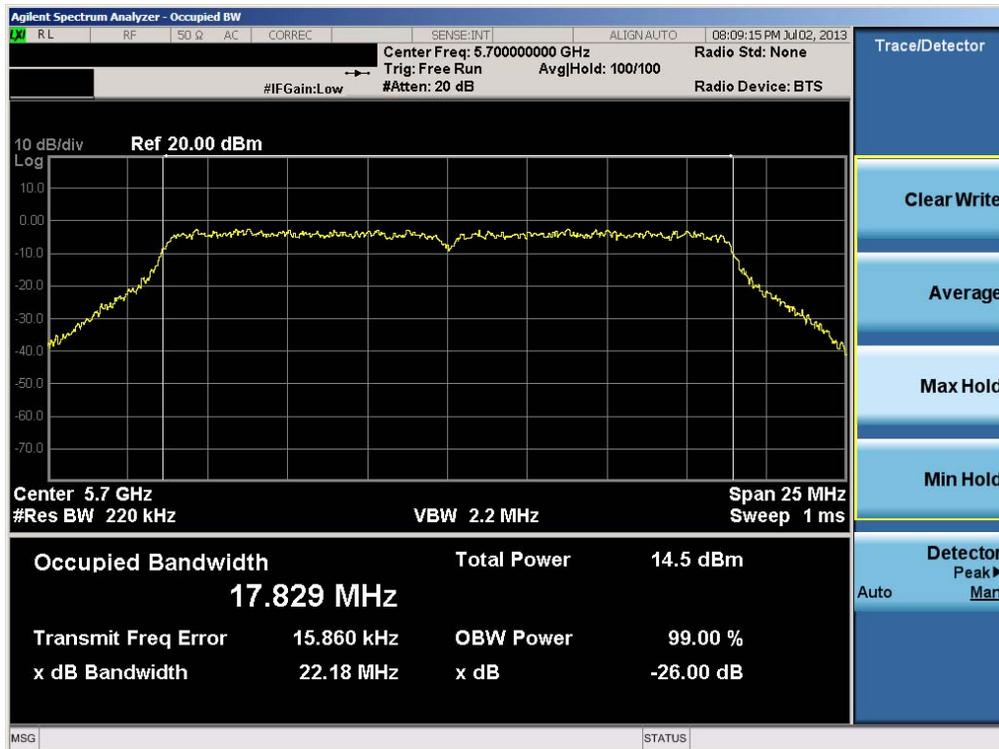


Plot 6-22. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 100)

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 6-23. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 116)

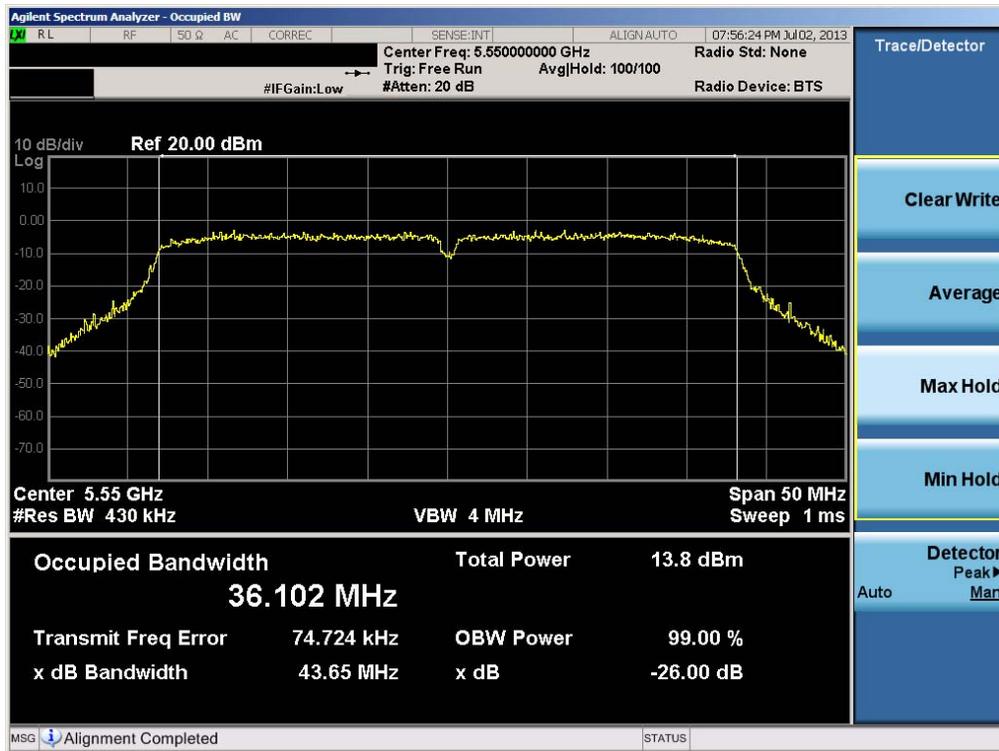


Plot 6-24. 26dB Bandwidth Plot (20MHz BW 802.11n (UNII Band 3) – Ch. 140)

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1306201045.A3L	Test Dates: July 2-18, 2013	EUT Type: Portable Handset		Page 24 of 76

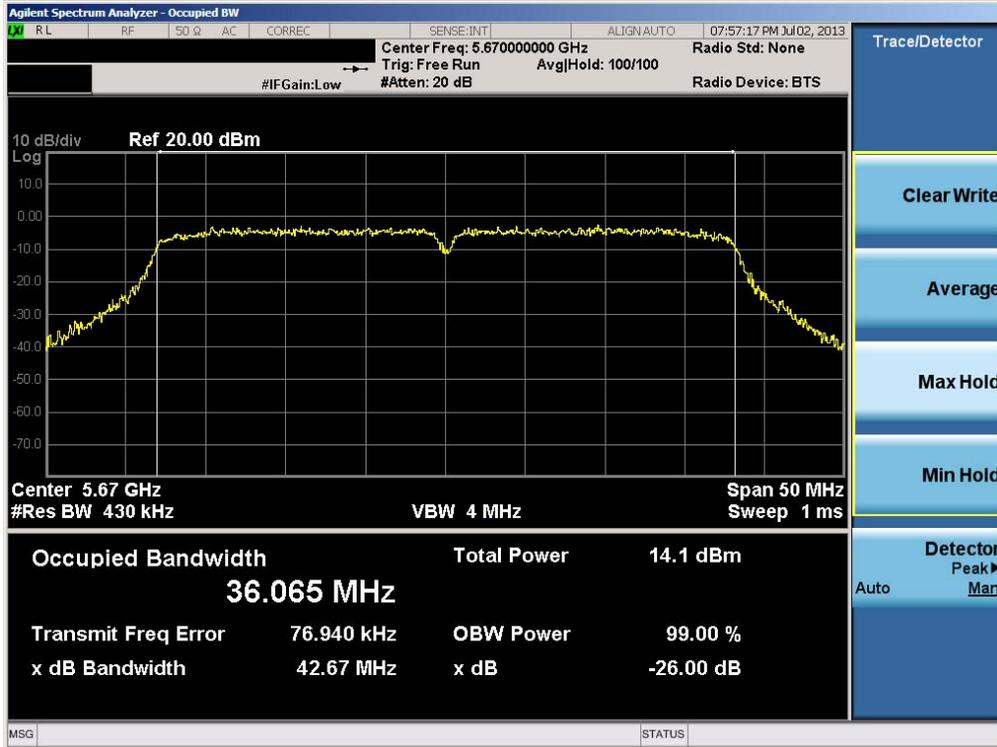


Plot 6-25. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 102)



Plot 6-26. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 110)

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1306201045.A3L	Test Dates: July 2-18, 2013	EUT Type: Portable Handset		Page 25 of 76

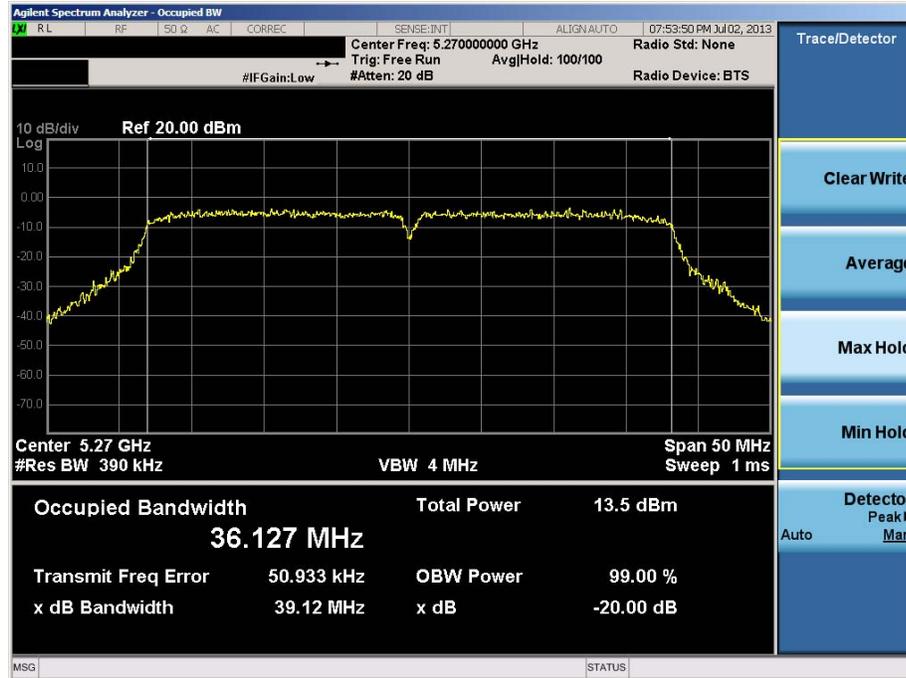


Plot 6-27. 26dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 3) – Ch. 134)



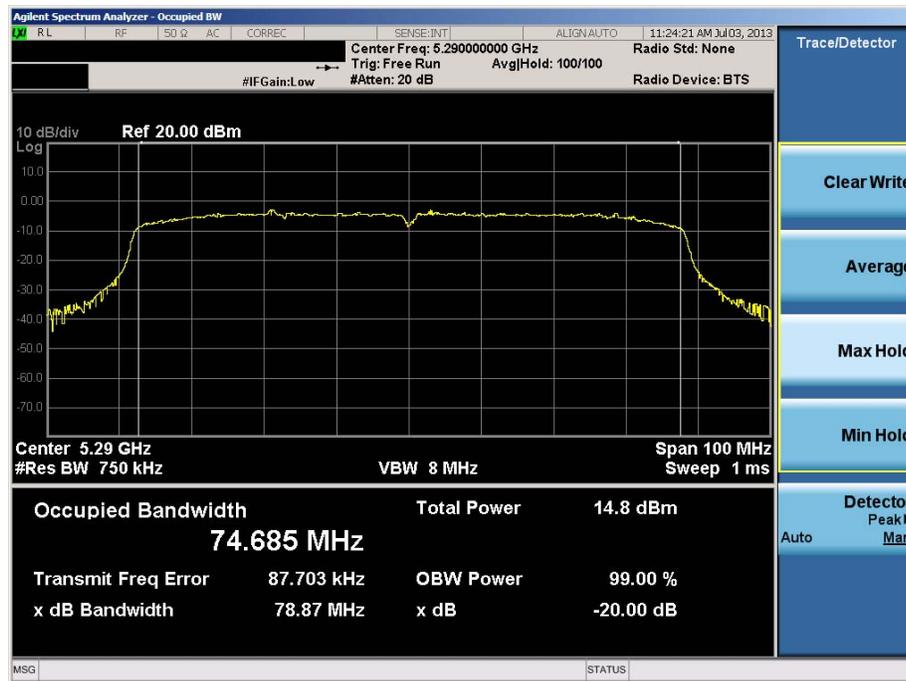
Plot 6-28. 26dB Bandwidth Plot (80MHz BW 802.11ac (UNII Band 3) – Ch. 106)

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1306201045.A3L	Test Dates: July 2-18, 2013	EUT Type: Portable Handset		Page 26 of 76



**Plot 6-29. 20dB Bandwidth Plot (40MHz BW 802.11n (UNII Band 2) – Ch. 54)**

**Note:** The 20dB bandwidth plot of the UNII Band 2 low channel was found to be within 40MHz and is, therefore, operating solely within the UNII Band 2 frequencies as per KDB 644545 v01r01.



**Plot 6-30. 20dB Bandwidth Plot (80MHz BW 802.11n (UNII Band 2) – Ch. 58)**

**Note:** The 20dB bandwidth plot of the UNII Band 2 low channel was found to be within 80MHz and is, therefore, operating solely within the UNII Band 2 frequencies as per KDB 644545 v01r01.

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1306201045.A3L	Test Dates: July 2-18, 2013	EUT Type: Portable Handset	Page 27 of 76	

### 6.3 UNII Output Power Measurement – 802.11a/n/ac §15.407 (a)(1): RSS-210 [A9.2]

#### Test Overview and Limits

A transmitter antenna terminal of the EUT is connected to the input of an RF pulse power sensor. Measurement is made using a broadband average power meter while the EUT is operating at its maximum duty cycle (>98%), at its maximum power control level, as defined in KDB 789033 v01r03, and at the appropriate frequencies.

*In the 5.15 – 5.25GHz band, the maximum permissible conducted output power is the lesser of 50mW (16.99dBm) and  $4 \text{ dBm} + 10\log_{10}(26\text{dB BW}) = 4 \text{ dBm} + 10\log_{10}(20.86) = 17.19\text{dBm}$ .*

*In the 5.25 – 5.35GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and  $11 \text{ dBm} + 10\log_{10}(26\text{dB BW}) = 11 \text{ dBm} + 10\log_{10}(21.39) = 24.3\text{dBm}$ .*

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

#### Test Procedure Used

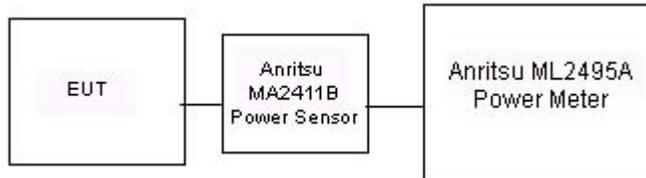
KDB 789033 v01r03 – Section E)3)b) Method PM-G

#### 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 6-2. Test Instrument & Measurement Setup**

#### Test Notes

None

FCC ID: A3LSCHP729		FCC Pt. 15.407 802.11a/n/ac UNII MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1306201045.A3L	Test Dates: July 2-18, 2013	EUT Type: Portable Handset	Page 28 of 76	

Mode	Freq [MHz]	Channel	Detector	802.11a Conducted Power [dBm]							
				Data Rate [Mbps]							
				6	9	12	18	24	36	48	54
802.11a	5180	36	AVG	10.00	10.12	10.15	10.15	10.00	10.05	9.92	9.97
802.11a	5200	40	AVG	10.14	10.16	10.10	10.15	10.07	10.11	9.97	10.06
802.11a	5220	44	AVG	10.01	10.10	10.09	10.10	10.08	10.09	10.07	10.07
802.11a	5240	48	AVG	10.08	10.01	10.02	10.04	10.00	9.95	10.05	9.99
802.11a	5260	52	AVG	9.98	10.05	10.00	10.03	10.02	10.11	10.07	9.99
802.11a	5280	56	AVG	10.16	10.12	10.16	10.18	10.18	10.23	10.04	10.02
802.11a	5300	60	AVG	10.23	10.24	10.15	10.12	10.16	10.04	10.12	10.01
802.11a	5320	64	AVG	10.35	10.22	10.22	10.17	10.16	10.03	10.08	10.05
802.11a	5500	100	AVG	9.54	9.53	9.50	9.53	9.48	9.64	9.52	9.52
802.11a	5520	104	AVG	9.85	9.91	9.71	9.82	9.68	9.63	9.58	9.78
802.11a	5540	108	AVG	9.68	9.50	9.56	9.63	9.45	9.51	9.58	9.44
802.11a	5560	112	AVG	9.58	9.50	9.55	9.57	9.47	9.52	9.48	9.41
802.11a	5580	116	AVG	9.88	9.85	9.88	9.96	9.73	9.70	9.58	9.61
802.11a	5660	132	AVG	9.79	9.78	9.79	9.71	9.74	9.66	9.69	9.66
802.11a	5680	136	AVG	10.00	10.01	9.96	9.98	9.96	9.89	9.77	9.85
802.11a	5700	140	AVG	9.79	9.97	9.84	9.95	9.77	9.86	9.78	9.77

Table 6-3. 802.11a (UNII) Maximum Conducted Output Power

Mode	Freq [MHz]	Channel	Detector	20MHz BW 802.11n (5GHz) Conducted Power [dBm]							
				Data Rate [Mbps]							
				6.5/7.2	13/14.4	19.5/21.7	26/28.9	39/43.4	52/57.8	58.5/65	65/72.2
802.11n	5180	36	AVG	10.16	10.26	10.25	10.23	10.19	10.16	10.09	10.05
802.11n	5200	40	AVG	10.18	10.27	10.26	10.26	10.23	10.16	10.14	10.07
802.11n	5220	44	AVG	10.17	10.27	10.22	10.18	10.08	10.05	10.10	10.12
802.11n	5240	48	AVG	10.06	10.08	10.03	10.04	10.02	10.03	10.08	10.12
802.11n	5260	52	AVG	10.29	10.17	10.16	10.17	10.13	10.09	10.05	10.11
802.11n	5280	56	AVG	10.20	10.28	10.20	10.22	10.15	10.18	10.20	10.22
802.11n	5300	60	AVG	10.29	10.32	10.14	10.18	10.10	10.14	10.10	10.14
802.11n	5320	64	AVG	10.31	10.32	10.36	10.23	10.24	10.29	10.19	10.17
802.11n	5500	100	AVG	9.54	9.61	9.51	9.48	9.52	9.52	9.59	9.43
802.11n	5520	104	AVG	9.55	9.54	9.45	9.44	9.56	9.58	9.57	9.62
802.11n	5540	108	AVG	9.45	9.47	9.39	9.30	9.31	9.45	9.26	9.25
802.11n	5560	112	AVG	9.29	9.31	9.28	9.30	9.20	9.18	9.18	9.13
802.11n	5580	116	AVG	9.65	9.64	9.59	9.43	9.46	9.48	9.53	9.52
802.11n	5660	132	AVG	9.46	9.52	9.55	9.57	9.43	9.50	9.50	9.51
802.11n	5680	136	AVG	9.70	9.87	9.66	9.76	9.66	9.73	9.61	9.66
802.11n	5700	140	AVG	9.63	9.65	9.56	9.63	9.59	9.61	9.63	9.59

Table 6-4. 20MHz BW 802.11n (UNII) Maximum Conducted Output Power

Mode	Freq [MHz]	Channel	Detector	40MHz BW 802.11n (5GHz) Conducted Power [dBm]							
				Data Rate [Mbps]							
				13.5/15	27/30	40.5/45	54/60	81/90	108/120	121.5/135	135/150
802.11n	5190	38	AVG	9.89	9.96	9.99	9.88	9.96	9.86	9.72	9.83
802.11n	5230	46	AVG	9.73	9.74	9.89	9.73	9.76	9.76	9.61	9.72
802.11n	5270	54	AVG	10.00	9.92	9.92	9.88	9.79	9.96	9.78	9.85
802.11n	5310	62	AVG	9.87	9.86	9.84	9.79	9.82	9.83	9.87	9.86
802.11n	5510	102	AVG	9.35	9.25	9.25	9.11	9.10	9.16	9.05	9.14
802.11n	5550	110	AVG	9.04	9.10	8.95	8.94	8.94	8.96	8.97	8.95
802.11n	5670	134	AVG	9.34	9.44	9.32	9.23	9.17	9.09	9.08	9.24

Table 6-5. 40MHz BW 802.11n (UNII) Maximum Conducted Output Power

Mode	Freq [MHz]	Channel	Detector	80MHz BW 802.11ac (5GHz) Conducted Power [dBm]									
				Data Rate [Mbps]									
				29.3/32.5	58.5/65	87.8/97.5	117/130	175.5/195	234/260	263.3/292.5	292.5/325	351/390	390/433.3
802.11ac	5210	42	AVG	10.15	10.22	9.92	10.04	10.09	9.97	9.78	9.87	10.07	10.24
802.11ac	5290	58	AVG	10.01	9.95	10.25	10.21	10.05	10.09	9.96	10.00	10.22	10.01
802.11ac	5530	106	AVG	9.80	9.93	9.84	10.04	9.84	10.00	9.87	9.94	9.88	9.86

Table 6-6. 80MHz BW 802.11ac (UNII) Maximum Conducted Output Power

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