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Report No.: 1408RSU00402
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MEASUREMENT REPORT
FCC PART 15.407 / RSS-210 WLAN 802.11a/n/ac

FCC ID:	2ABLK-8X4G-1
IC:	4009A-8X4G1
APPLICANT:	Calix Inc.

Application Type:	Certification
Product:	WIFI dual band 4 GE LAN GPON HGU
Model No.:	844G-1, 854G-1
Brand Name:	Calix
FCC Classification:	Unlicensed National Information Infrastructure (UNII)
FCC Rule Part(s):	Part 15.407
IC Rule(s):	RSS-210 Issue 8
Test Procedure(s):	KDB 789033 D01v01r04, KDB 662911 D01v02r01
Test Date:	July 11 ~ 27, 2014

Reviewed By : Robin Wu
(Robin Wu)

Approved By : Marlin Chen
(Marlin Chen)

The test results relate only to the samples tested.
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 D01v01r04. Test results reported herein relate only to the item(s) tested.
The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date
1408RSU00402	Rev. 01	Initial report	08-06-2014

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§2.1033 General Information

Applicant:	Calix Inc.
Applicant Address:	1035 N. McDowell Blvd Petaluma, CA94954 U.S.A
Manufacturer:	Calix Inc.
Manufacturer Address:	1035 N. McDowell Blvd Petaluma, CA94954 U.S.A
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
MRT FCC Registration No.:	809388
FCC Rule Part(s):	Part 15.407
IC Rule(s)	RSS-210 Issue 8
Model No.:	844G-1, 854G-1
FCC ID:	2ABLK-8X4G-1
IC:	4009A-8X4G1
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	Unlicensed National Information Infrastructure (UNII)
Date(s) of Test:	July 11 ~ 27, 2014
Test Report S/N:	1408RSU00402

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.**
- **MRT facility is a FCC registered (MRT Reg. No. 809388) 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 (11384A-1).**
- **MRT facility is an IC registered (11384A-1) test laboratory with the site description on file at Industry Canada.**

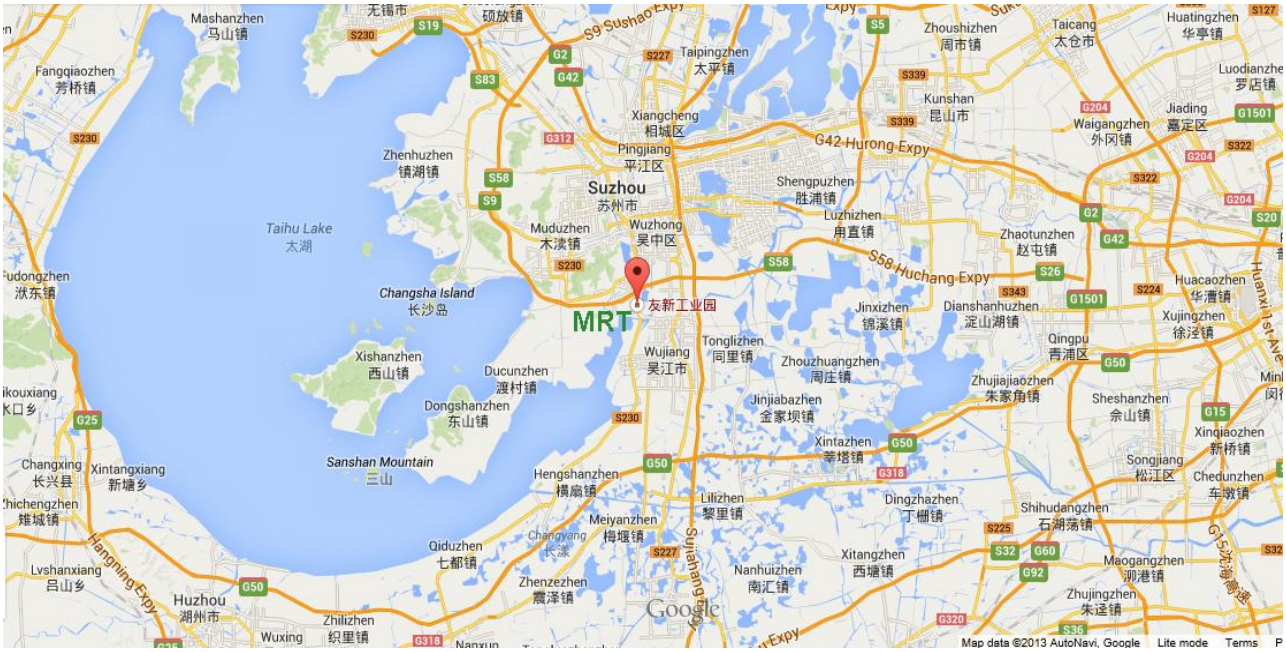
1. INTRODUCTION

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. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. 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 September 30, 2013.



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	WIFI dual band 4 GE LAN GPON HGU
Model No.	844G-1, 854G-1
Frequency Range	For 802.11a/n-HT20/ac-VHT20: 5180~5240MHz For 802.11n-HT40/ac-VHT40: 5190~5230MHz For 802.11ac-VHT80: 5210MHz
Maximum Output Power	802.11a: 15.66dBm 802.11n-HT20: 15.93dBm 802.11n-HT40: 15.89dBm 802.11ac-VHT20: 16.42dBm 802.11ac-VHT40: 16.08dBm 802.11ac-VHT80: 15.87dBm
Type of Modulation	802.11a/n/ac: OFDM

Note: There are different Fiber modules of model number, and evaluated the different Fiber module in "FCC DOC report".

2.5. Device Capabilities

This device contains the following capabilities:

5GHz WLAN (UNII).

Note: 5GHz (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 D01v01r04. 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 20MHz Bandwidth – 98.9%
- 802.11n 20MHz Bandwidth – 98.8%
- 802.11n 40MHz Bandwidth – 97.6%
- 802.11ac 20MHz Bandwidth – 98.6%
- 802.11ac 40MHz Bandwidth – 97.9%
- 802.11ac 80MHz Bandwidth – 94.53%

2.6. Test Configuration

The **WIFI dual band 4 GE LAN GPON HGU FCC ID: 2ABLK-8X4G-1** was tested per the guidance of KDB 789033 D01v01r04. KDB 789033 D01v01r04 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.7. EMI Suppression Device(s)/Modifications

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

2.8. 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.

2.9. Test Software

The test utility software used during testing was “Hyperterminal”.

Power Parameter Value for Non-Beam Forming

Test Mode	Test Freq. (MHz)	Power Parameter Value	Test Mode	Test Freq. (MHz)	Power Parameter Value
11a	5180	10.00	11n-HT20	5180	11.00
	5220	11.00		5220	11.00
	5240	11.00		5240	11.00
11ac-VHT20	5180	11.00	11n-HT40	5190	11.00
	5220	11.00		5230	11.00
	5240	11.00		--	--
11ac-VHT40	5190	11.00	11ac-VHT80	5210	11.00
	5230	11.00		--	--

Power Parameter Value for Beam Forming

Test Mode	Test Freq. (MHz)	Power Parameter Value	Test Mode	Test Freq. (MHz)	Power Parameter Value
11n-HT20	5180	10.00	11ac-VHT20	5180	10.00
	5220	10.00		5220	10.00
	5240	10.00		5240	10.00
11n-HT40	5190	10.00	11ac-VHT40	5190	10.00
	5230	10.00		5230	10.00
11ac-VHT80	5210	10.00	--	--	--

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.4-2009), and the guidance provided in KDB 789033 D01v01r04 were used in the measurement of the **WIFI dual band 4 GE LAN GPON HGU FCC ID: 2ABLK-8X4G-1.**
Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m 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/50uH 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. 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. 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 ground-plane. 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 receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. 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 data exchange speed, 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 are 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.
An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.4-2009 at Clause 4.3.
Line conducted emissions test results are shown in Section 7.10.

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. 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 MF Model 210SS 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. An 80cm high PVC support structure is placed on top of the turntable. 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. According to 3dB Beam-width of horn Antenna, the horn Antenna should be always directed to the EUT when rising height.

4. 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 Antenna of the **WIFI dual band 4 GE LAN GPON HGU** is **permanently attached.**
- There are no provisions for connection to an external Antenna.

Conclusion:

The **WIFI dual band 4 GE LAN GPON HGU FCC ID: 2ABLK-8X4G-1** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	101209	1 year	2014/11/08
Two-Line V-Network	R&S	ENV216	101683	1 year	2014/11/08
Two-Line V-Network	R&S	ENV216	101684	1 year	2014/11/08
Temperature/ Meter Humidity	Anymetre	TH101B	SR2-01	1 year	2014/11/15

Radiated Emission

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	E4447A	MY45300136	1 year	2014/11/18
EMI Test Receiver	R&S	ESR7	101209	1 year	2014/11/08
Preamplifier	MRT	AP01G18	1310002	1 year	2014/10/07
Preamplifier	MRT	AP18G40	1310001	1 year	2014/10/07
Loop Antenna	Schwarzbeck	FMZB1519	1519-041	1 year	2014/11/24
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2014/11/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	1 year	2014/11/24
Broadband Horn Antenna	Schwarzbeck	BBHA9170	9170-549	1 year	2014/12/11
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	1 year	2014/11/15

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9010A	MY5144016A	1 year	2015/01/04
Spectrum Analyzer	Agilent	E4447A	MY45300136	1 year	2014/11/18
Power Sensor	Agilent	U2021XA	MY52450003	1 year	2014/12/14
Temperature & Humidity Chamber	BAOYT	BYH-1500L	1309W043	1 year	2014/11/20
Temperature/Humidity Meter	Anymetre	TH101B	TR3-01	1 year	2014/11/15

6. MEASUREMENT UNCERTAINTY

Where relevAnt, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: ± 3.46dB
Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: ± 4.18dB 1GHz ~ 40GHz: ± 4.76dB

7. TEST RESULT

7.1. Summary

Company Name:	**Calix Inc.**
FCC ID:	**2ABLK-8X4G-1**
FCC Classification:	**Unlicensed National Information Infrastructure (UNII)**
Data Rate(s) Tested:	**6Mbps ~ 54Mbps (a);** **6.5/7.2Mbps ~ 260/288.8Mbps (n-HT20MHz BW);** **13.5/15.0Mbps ~ 540/600Mbps (n-HT40MHz BW);** **6.5/7.2Mbps ~ 312/346.7Mbps (ac-VHT20MHz BW);** **13.5/15Mbps ~ 720/800Mbps (ac-VHT40MHz BW);** **29.3/32.5Mbps ~ 1560/1733.3Mbps (ac-VHT80MHz BW)**

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407(a)	RSS-210 [A9.2]	26dB Bandwidth (FCC) 99% Bandwidth (IC)	N/A	Conducted	Pass	Section 7.2
15.407(a) (1), (2)	RSS-210 [A9.2]	Maximum Conducted Output Power	5150-5250MHz ≤ 50mW or 4dBm + 10log10(-26BW) dBm;		Pass	Section 7.3
		Maximum E.I.R.P	5150~5250MHz ≤ 23 dBm or 10 + 10 log10(99% B);			
15.407(h) (1)	RSS-210 [A9.2]	Transmit Power Control	≤ 24 dBm		N/A	Section 7.4
15.407(a) (1), (2), (5)	RSS-210 [A9.2]	Peak Power Spectral Density	For FCC 5150~5250MHz, ≤ 4 dBm/MHz; For IC e.i.r.p 5150~5250MHz ≤ 10 dBm/MHz;		Pass	Section 7.5
15.407(a) (6)	N/A	Peak Excursion	< 13dB/MHz maximum difference		Pass	Section 7.6
15.407(g)	RSS-Gen [7.2.6]	Frequency Stability	N/A		Pass	Section 7.7
15.407(b) (1), (2), (3)	RSS-210 [A9.2]	Undesirable Emissions	< -27dBm/MHz EIRP	Radiated	Pass	Section 7.8 & 7.9
15.205 15.407(b) (1), (2), (3), (5), (6)	RSS-210 [A9.2]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-Gen 7.2.5)		Pass	
15.207	RSS-Gen [7.2.4]	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits < RSS-Gen 7.2.4 limits	Line Conducted	Pass	Section 7.10

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.

7.2. Bandwidth Measurement*§15.407(a); RSS-210[A9.2]*

7.2.1. Test Limit

N/A

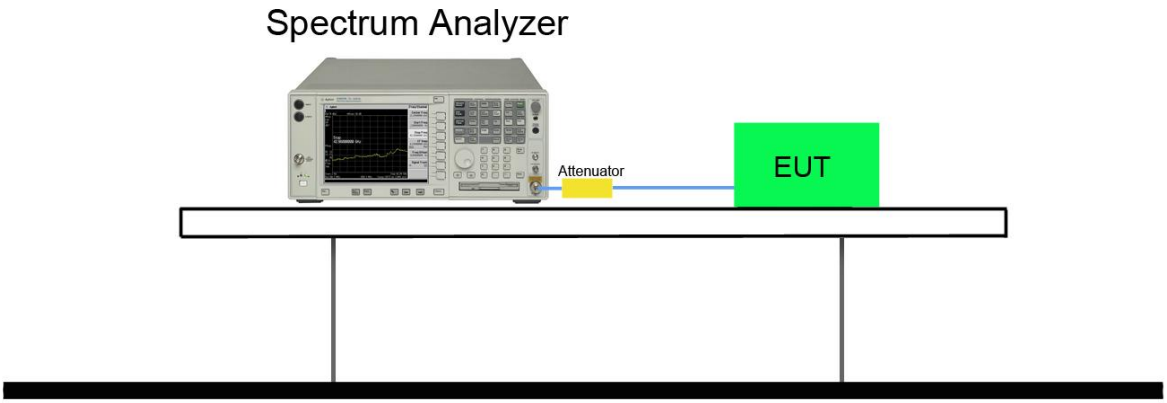
7.2.2. Test Procedure used

KDB 789033 D01v01r04 – Section C.1

7.2.3. Test Setting

1. The 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 intermediated power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth.
3. VBW ≥ 3 × RBW.
4. Detector = Peak.
5. Trace mode = max hold.

7.2.4. Test Setup



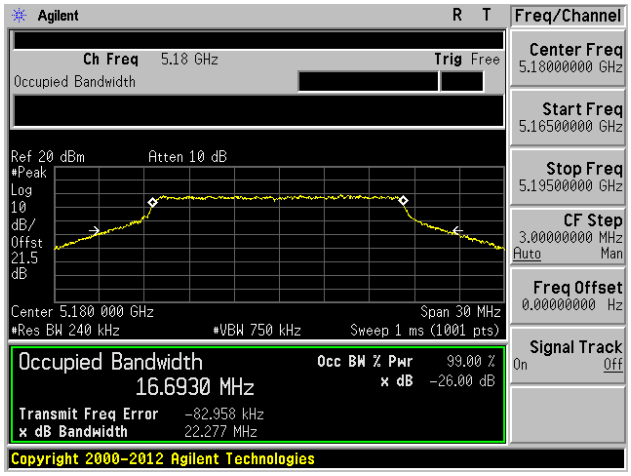
7.2.5. Test Result

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
Ant 0 / Ant 0 + 1 + 2 + 3						
802.11a	6	36	5180	22.28	16.69	Pass
802.11a	6	44	5220	22.17	16.68	Pass
802.11a	6	48	5240	22.19	16.70	Pass
802.11n-HT20	6.5	36	5180	24.39	18.02	Pass
802.11n-HT20	6.5	44	5220	24.16	18.00	Pass
802.11n-HT20	6.5	48	5240	23.76	18.01	Pass
802.11ac-VHT20	6.5	36	5180	24.15	17.02	Pass
802.11ac-VHT20	6.5	44	5220	24.20	18.01	Pass
802.11ac-VHT20	6.5	48	5240	24.35	18.00	Pass
802.11n-HT40	13.5	38	5190	42.70	36.38	Pass
802.11n-HT40	13.5	46	5230	42.33	36.37	Pass
802.11ac-VHT40	13.5	38	5190	42.82	36.47	Pass
802.11ac-VHT40	13.5	46	5230	42.81	36.47	Pass
802.11ac-VHT80	29.3	42	5210	82.33	75.13	Pass
Ant 1 / Ant 0 + 1 + 2 + 3						
802.11a	6	36	5180	22.89	16.80	Pass
802.11a	6	44	5220	22.94	16.75	Pass
802.11a	6	48	5240	22.70	16.77	Pass
802.11n-HT20	6.5	36	5180	24.67	18.01	Pass
802.11n-HT20	6.5	44	5220	24.34	18.04	Pass
802.11n-HT20	6.5	48	5240	24.64	18.00	Pass
802.11ac-VHT20	6.5	36	5180	24.52	18.02	Pass
802.11ac-VHT20	6.5	44	5220	24.73	18.04	Pass
802.11ac-VHT20	6.5	48	5240	24.62	18.03	Pass
802.11n-HT40	13.5	38	5190	41.92	36.31	Pass
802.11n-HT40	13.5	46	5230	41.57	36.27	Pass
802.11ac-VHT40	13.5	38	5190	42.34	36.36	Pass
802.11ac-VHT40	13.5	46	5230	42.64	36.34	Pass
802.11ac-VHT80	29.3	42	5210	79.58	74.87	Pass

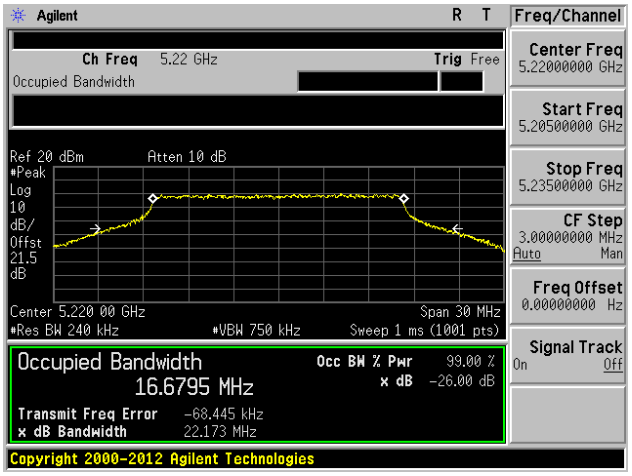
Ant 2 / Ant 0 + 1 + 2 + 3						
802.11a	6	36	5180	22.63	16.68	Pass
802.11a	6	44	5220	22.64	16.71	Pass
802.11a	6	48	5240	22.48	16.68	Pass
802.11n-HT20	6.5	36	5180	23.29	17.88	Pass
802.11n-HT20	6.5	44	5220	23.70	17.91	Pass
802.11n-HT20	6.5	48	5240	23.70	17.88	Pass
802.11ac-VHT20	6.5	36	5180	24.02	17.93	Pass
802.11ac-VHT20	6.5	44	5220	23.51	17.92	Pass
802.11ac-VHT20	6.5	48	5240	23.73	17.95	Pass
802.11n-HT40	13.5	38	5190	42.35	36.38	Pass
802.11n-HT40	13.5	46	5230	42.27	36.32	Pass
802.11ac-VHT40	13.5	38	5190	42.32	36.39	Pass
802.11ac-VHT40	13.5	46	5230	42.33	36.35	Pass
802.11ac-VHT80	29.3	42	5210	80.73	75.12	Pass
Ant 3 / Ant 0 + 1 + 2 + 3						
802.11a	6	36	5180	23.18	16.78	Pass
802.11a	6	44	5220	22.97	16.74	Pass
802.11a	6	48	5240	23.14	16.74	Pass
802.11n-HT20	6.5	36	5180	23.50	17.87	Pass
802.11n-HT20	6.5	44	5220	23.28	17.86	Pass
802.11n-HT20	6.5	48	5240	23.50	17.84	Pass
802.11ac-VHT20	6.5	36	5180	22.67	17.85	Pass
802.11ac-VHT20	6.5	44	5220	23.40	17.85	Pass
802.11ac-VHT20	6.5	48	5240	23.47	17.85	Pass
802.11n-HT40	13.5	38	5190	41.18	36.26	Pass
802.11n-HT40	13.5	46	5230	41.62	36.27	Pass
802.11ac-VHT40	13.5	38	5190	41.39	36.26	Pass
802.11ac-VHT40	13.5	46	5230	41.67	36.25	Pass
802.11ac-VHT80	29.3	42	5210	80.76	75.08	Pass

802.11a 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1 + 2 + 3

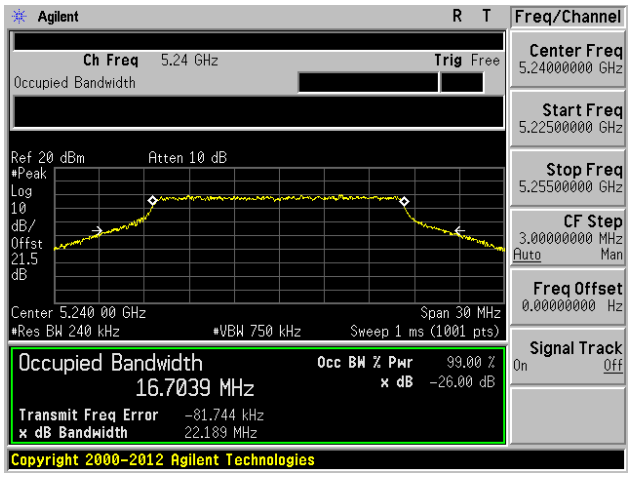
Channel 36 (5180MHz)



Channel 44 (5220MHz)

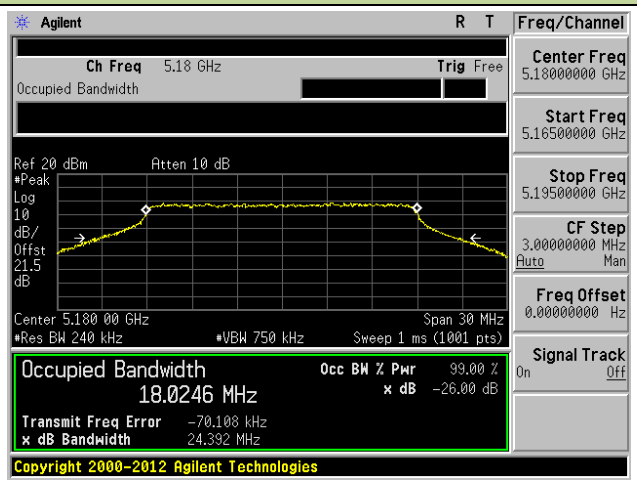


Channel 48 (5240MHz)

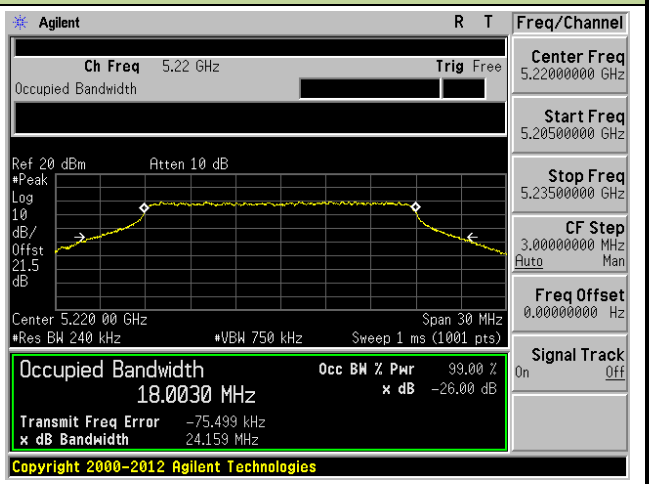


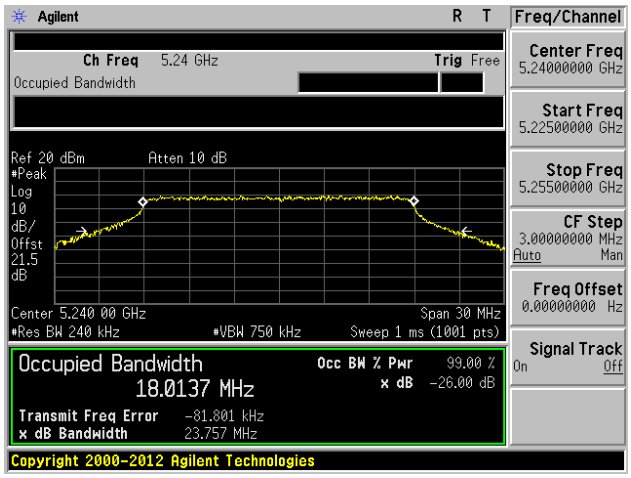
802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1 + 2 + 3

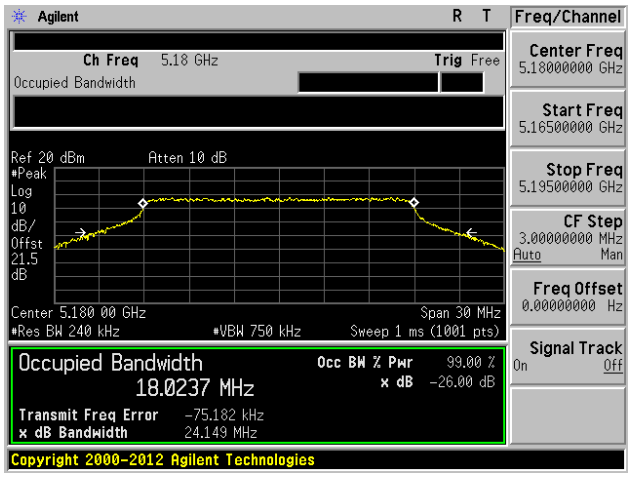
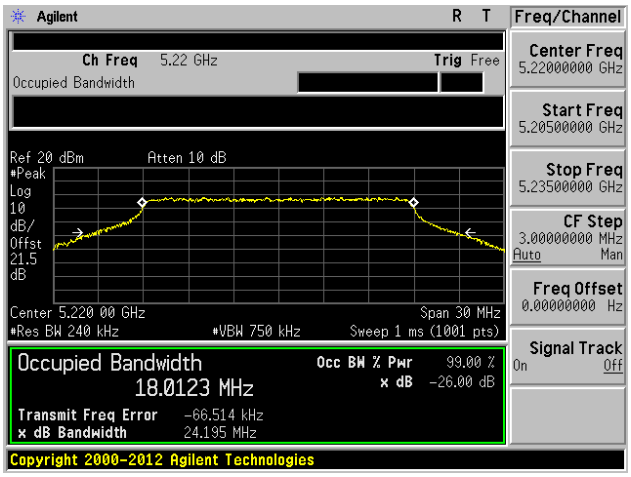
Channel 36 (5180MHz)

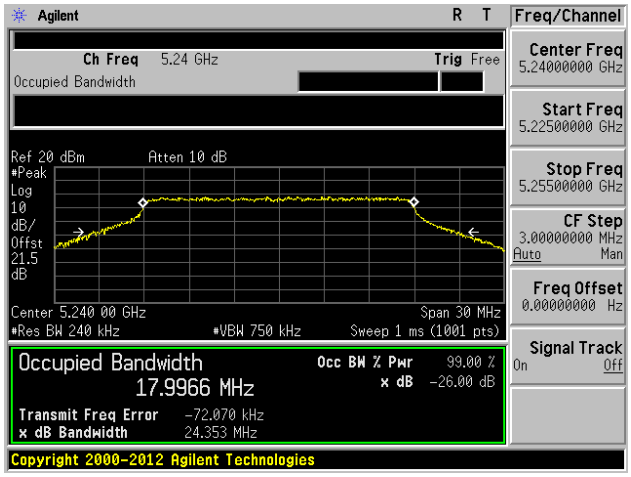


Channel 44 (5220MHz)



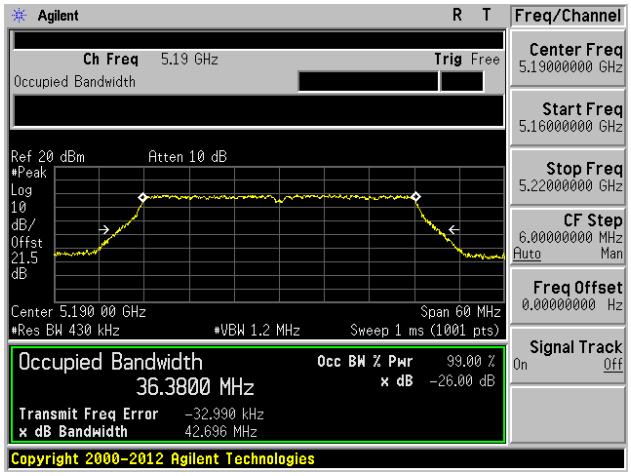
Channel 48 (5240MHz)	
	

802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1 + 2 + 3	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	

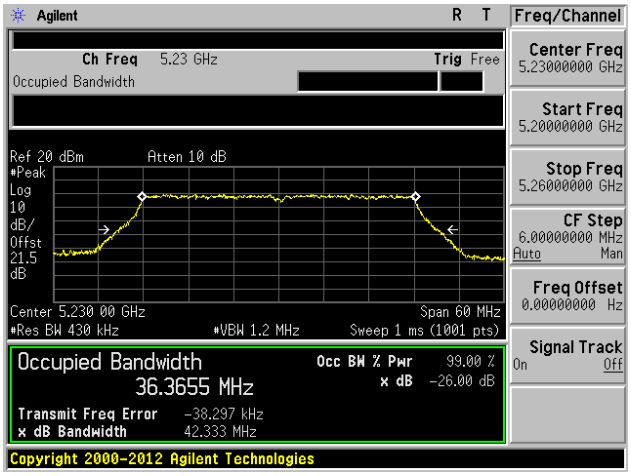
Channel 48 (5240MHz)	
	

802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1 + 2 + 3

Channel 38 (5190MHz)

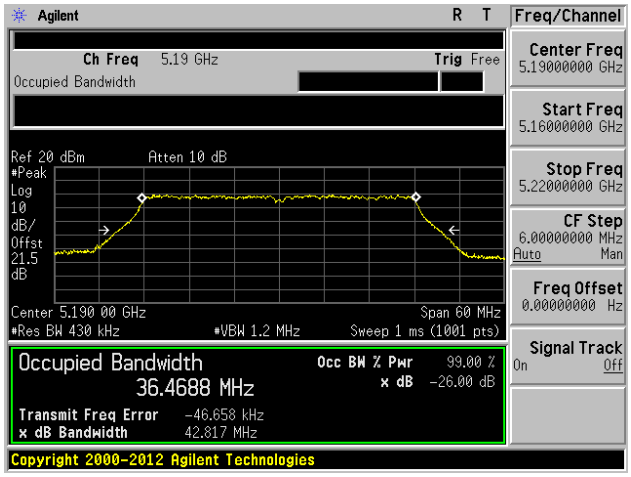


Channel 46 (5230MHz)

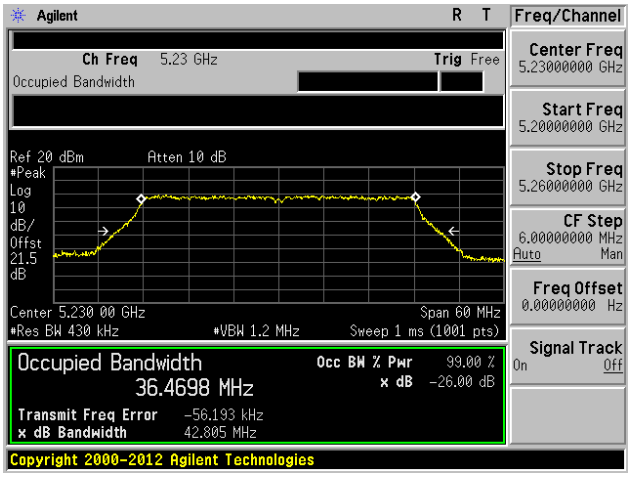


802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1 + 2 + 3

Channel 38 (5190MHz)

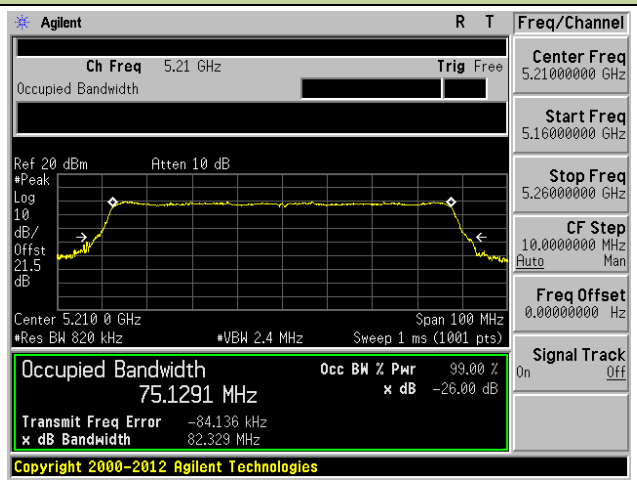


Channel 46 (5230MHz)



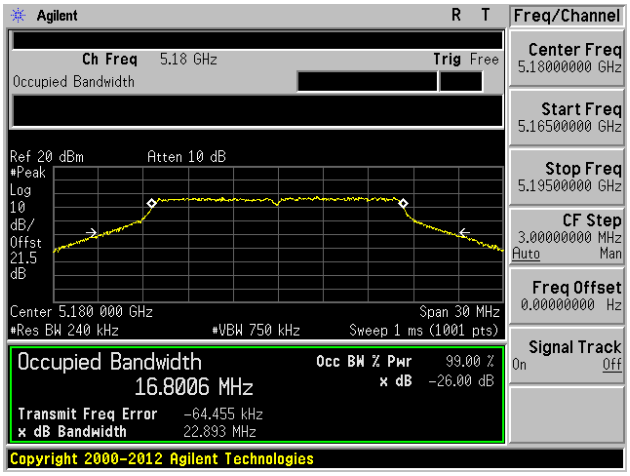
802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1 + 2 + 3

Channel 52 (5210MHz)

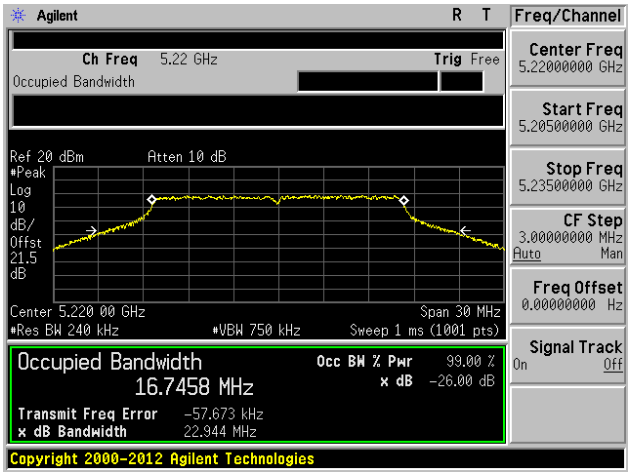


802.11a 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3

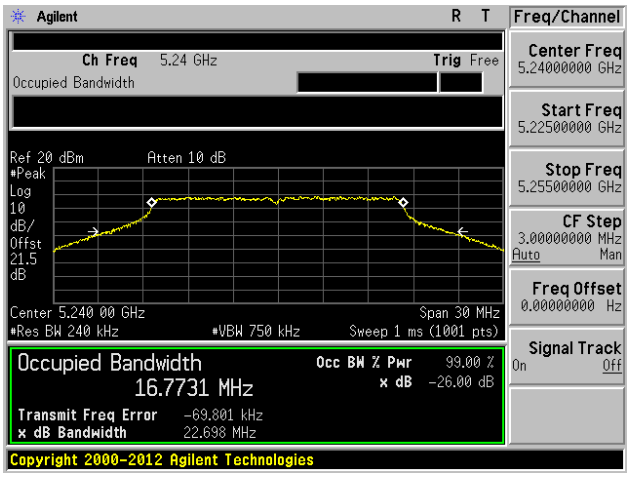
Channel 36 (5180MHz)



Channel 44 (5220MHz)

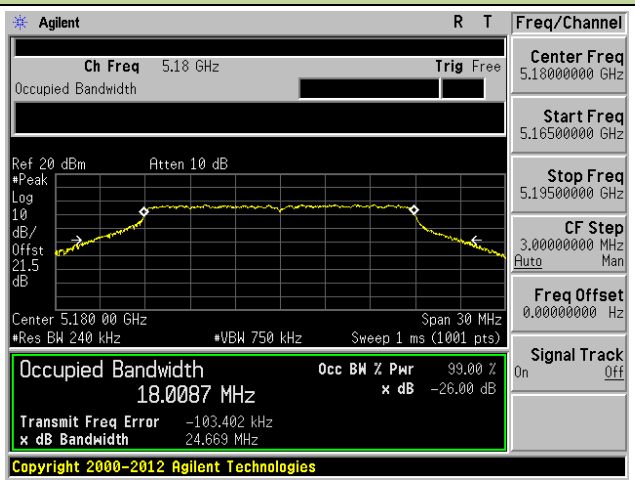


Channel 48 (5240MHz)

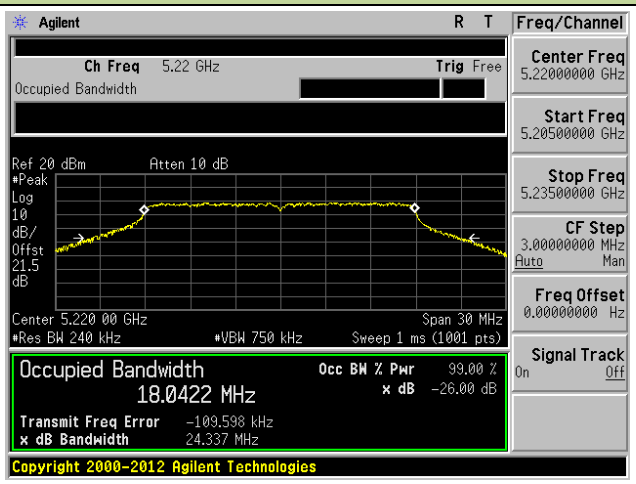


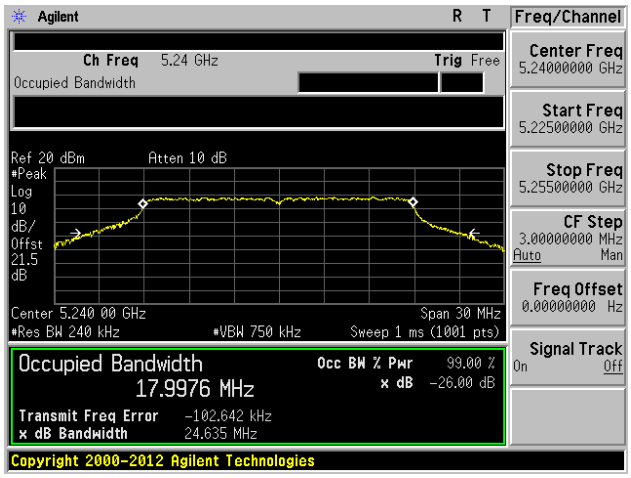
802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 36 (5180MHz)

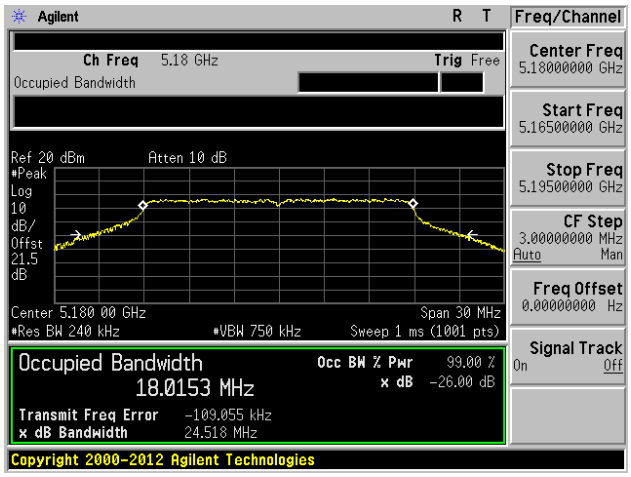
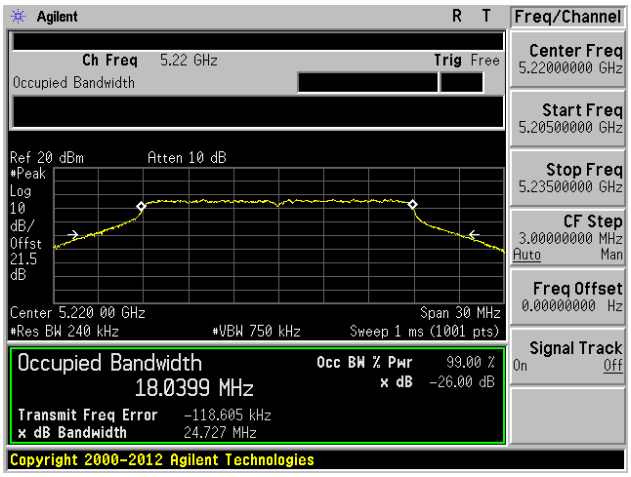


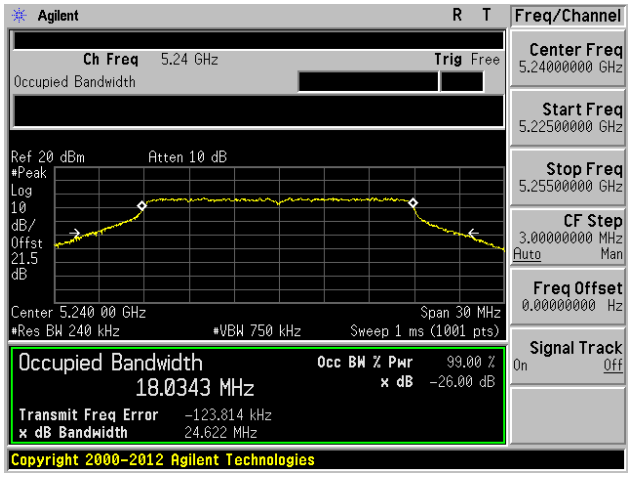
Channel 44 (5220MHz)



Channel 48 (5240MHz)	
	

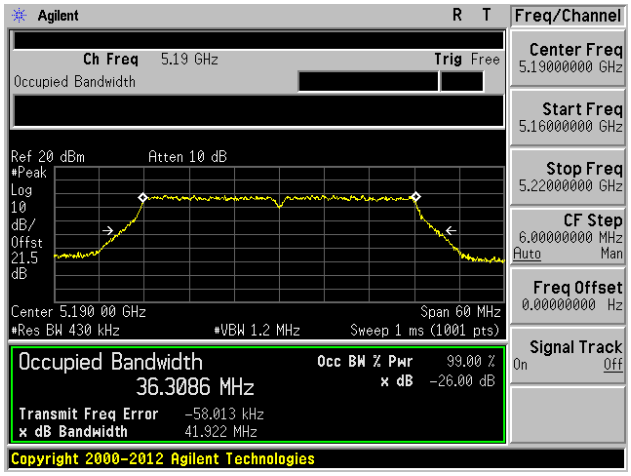
802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 36 (5180MHz)	Channel 44 (5220MHz)
	

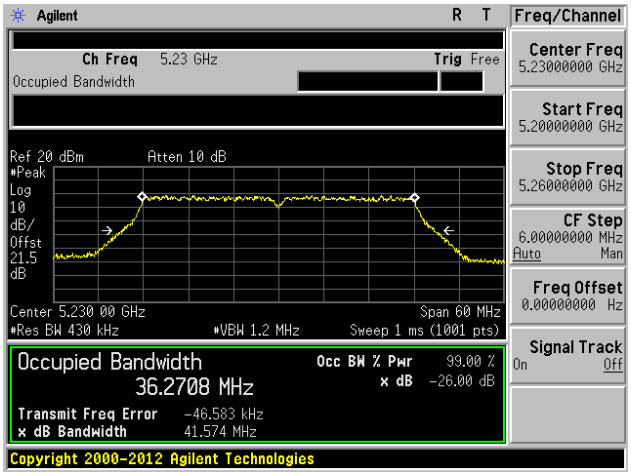
Channel 48 (5240MHz)	
	

802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 38 (5190MHz)

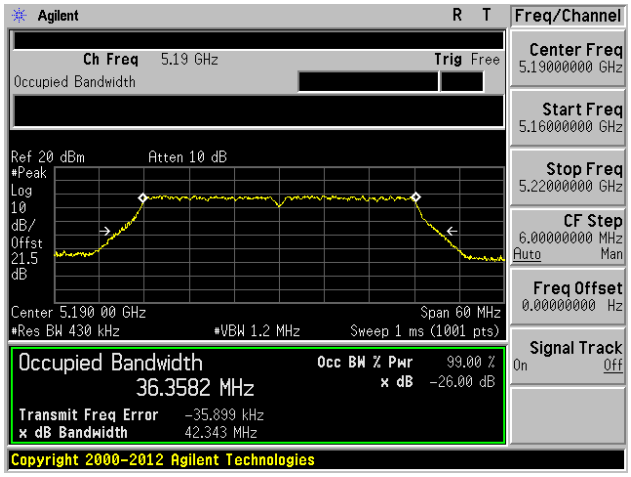


Channel 46 (5230MHz)

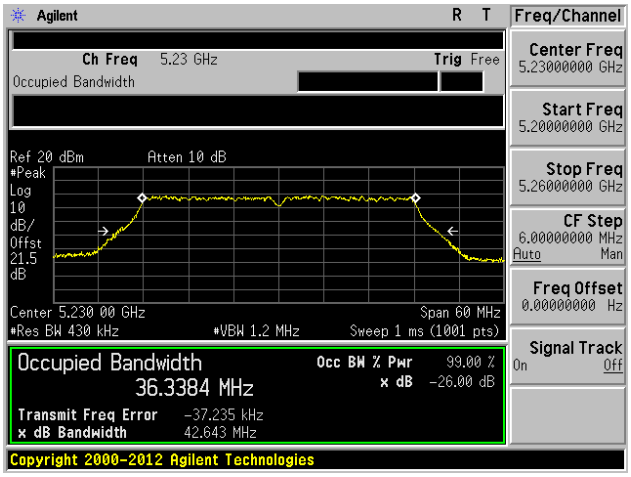


802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 38 (5190MHz)

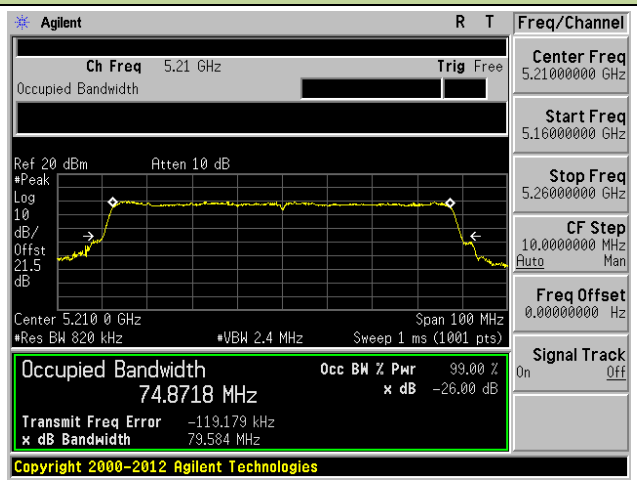


Channel 46 (5230MHz)



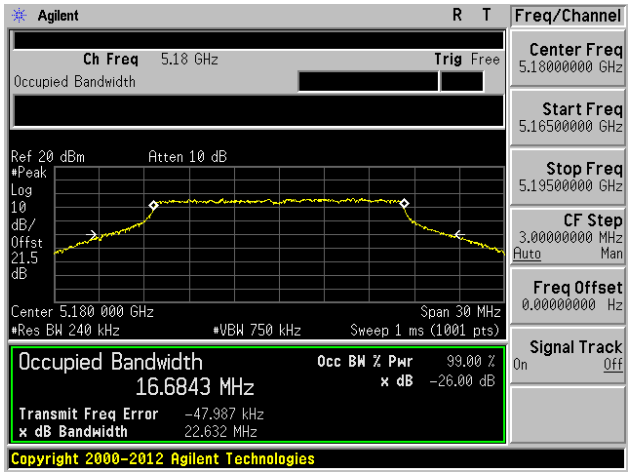
802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3

Channel 52 (5210MHz)

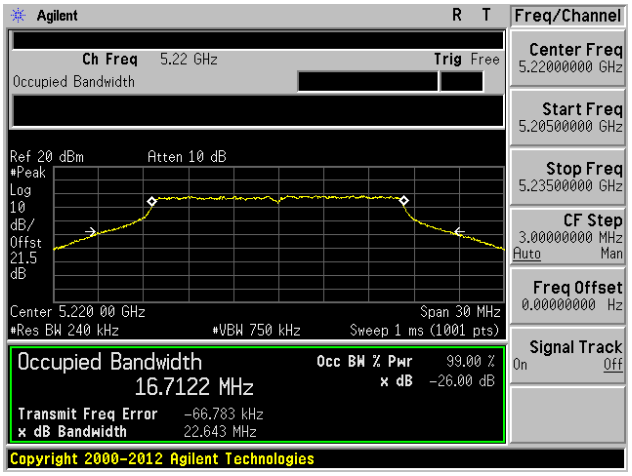


802.11a 26dB Bandwidth & 99% Bandwidth - Ant 2 / Ant 0 + 1 + 2 + 3

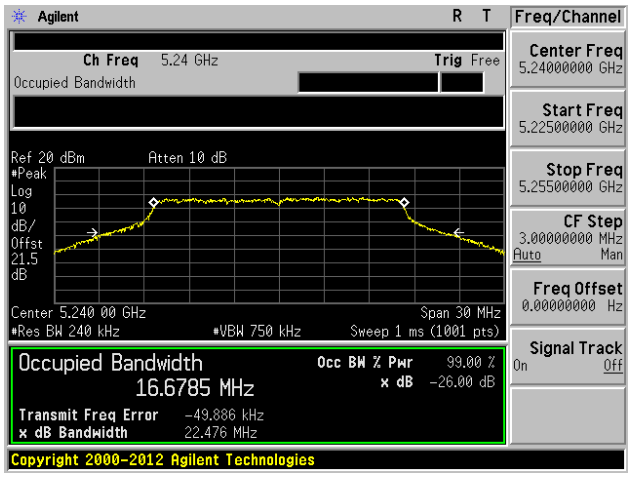
Channel 36 (5180MHz)



Channel 44 (5220MHz)

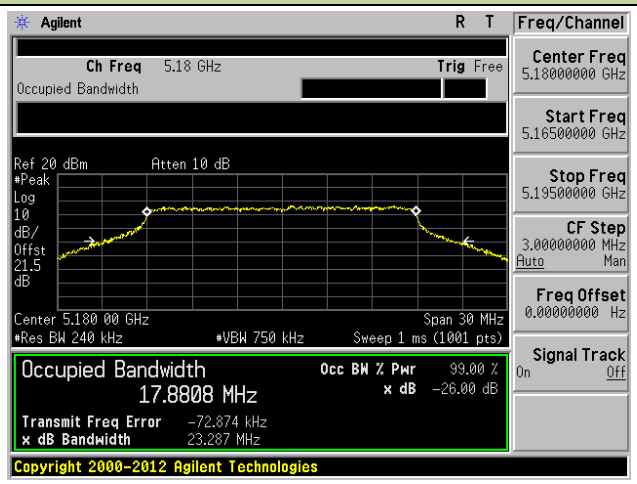


Channel 48 (5240MHz)

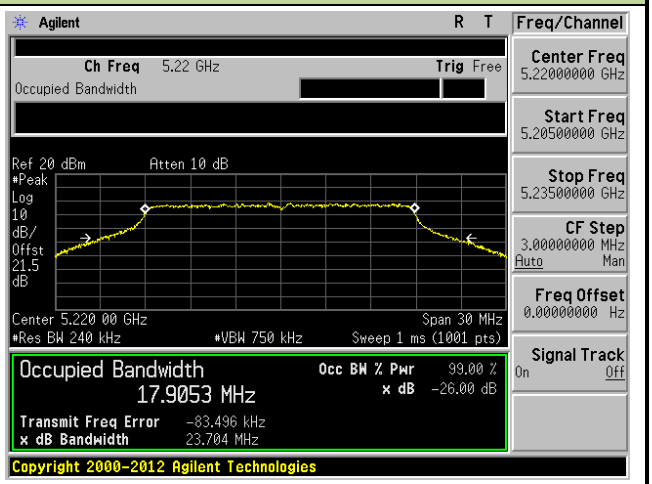


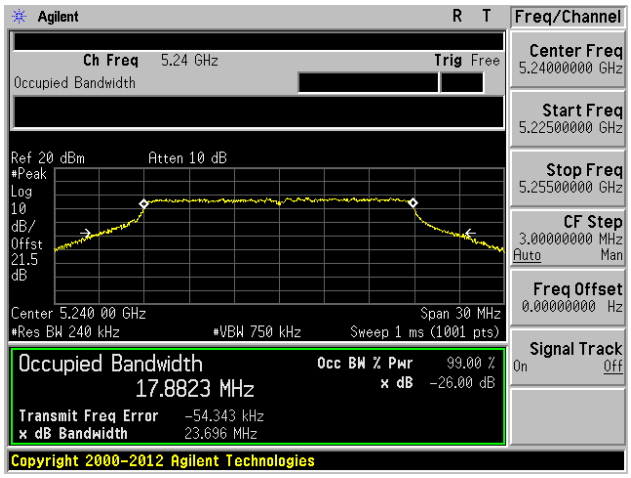
802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 2 / Ant 0 + 1 + 2 + 3

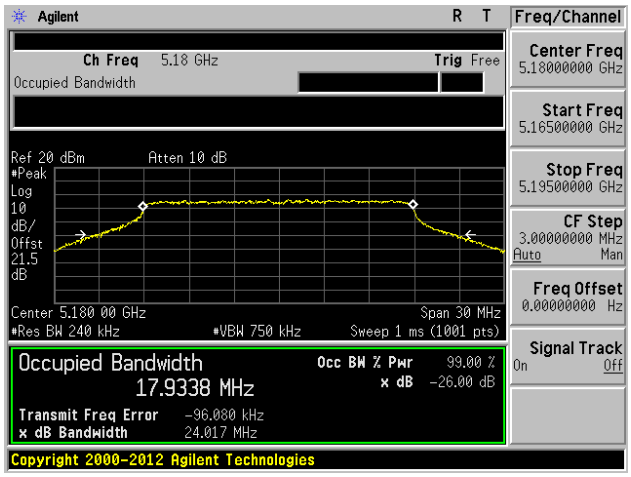
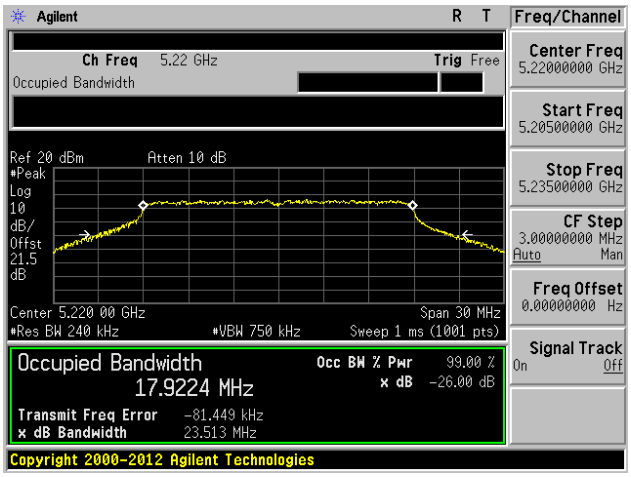
Channel 36 (5180MHz)

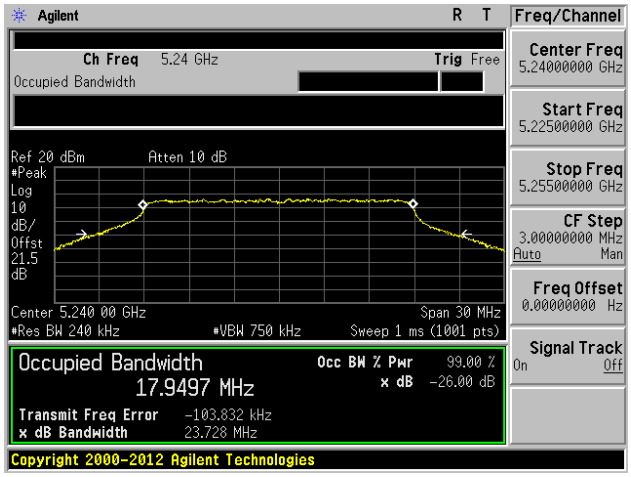


Channel 44 (5220MHz)



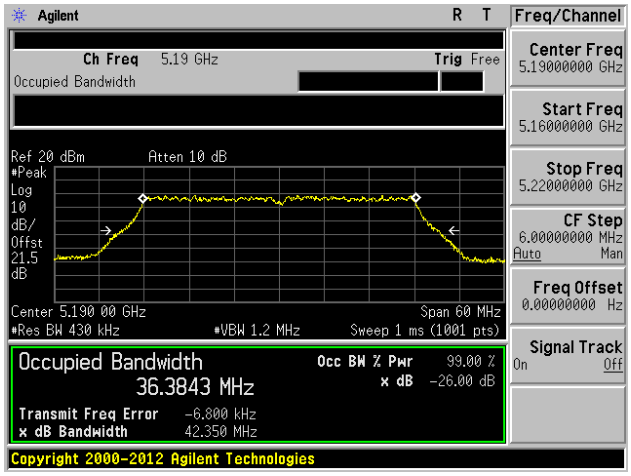
Channel 48 (5240MHz)	
	

802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant 2 / Ant 0 + 1 + 2 + 3	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	

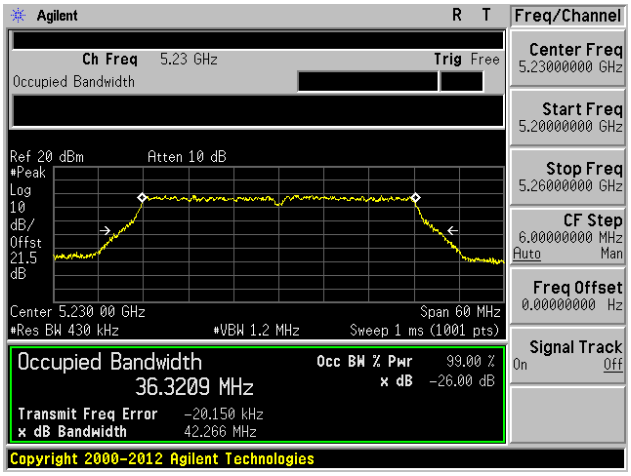
Channel 48 (5240MHz)	
	

802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 2 / Ant 0 + 1 + 2 + 3

Channel 38 (5190MHz)

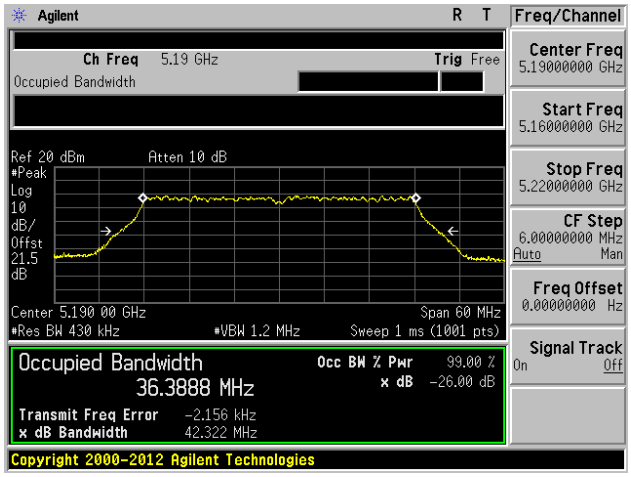


Channel 46 (5230MHz)

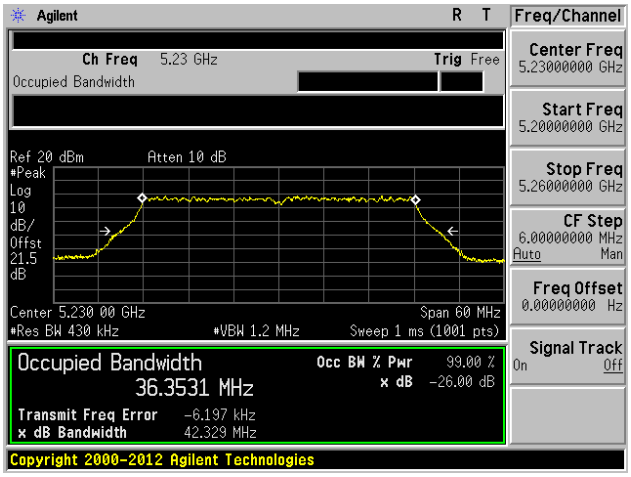


802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth - Ant 2 / Ant 0 + 1 + 2 + 3

Channel 38 (5190MHz)

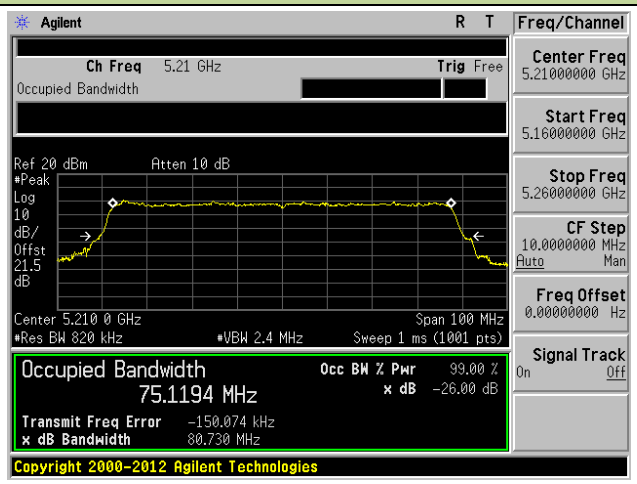


Channel 46 (5230MHz)



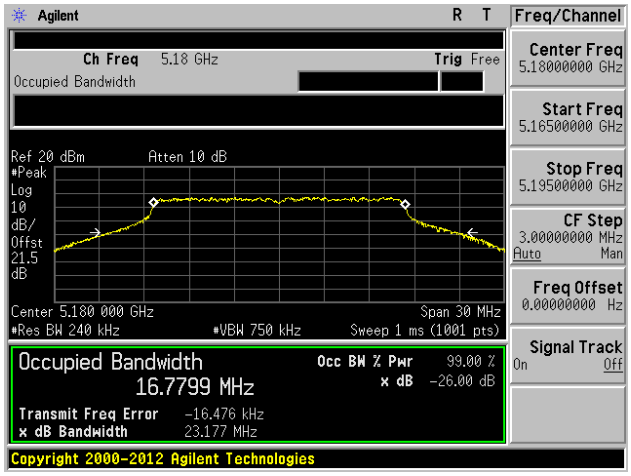
802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth - Ant 2 / Ant 0 + 1 + 2 + 3

Channel 52 (5210MHz)

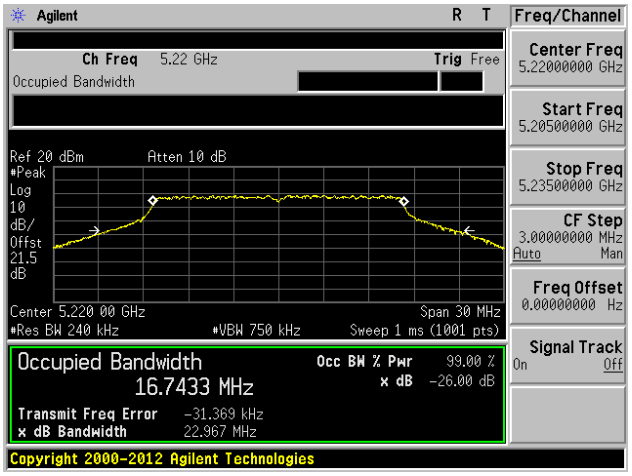


802.11a 26dB Bandwidth & 99% Bandwidth - Ant 3 / Ant 0 + 1 + 2 + 3

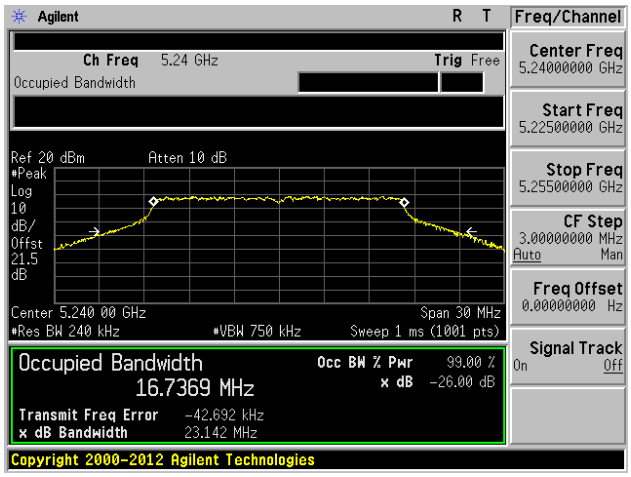
Channel 36 (5180MHz)



Channel 44 (5220MHz)

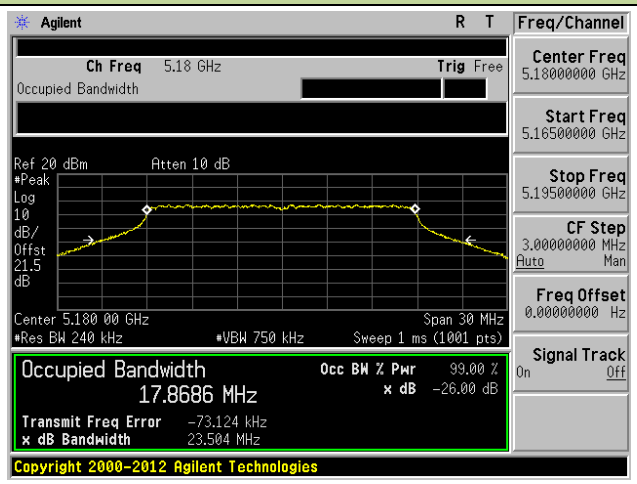


Channel 48 (5240MHz)

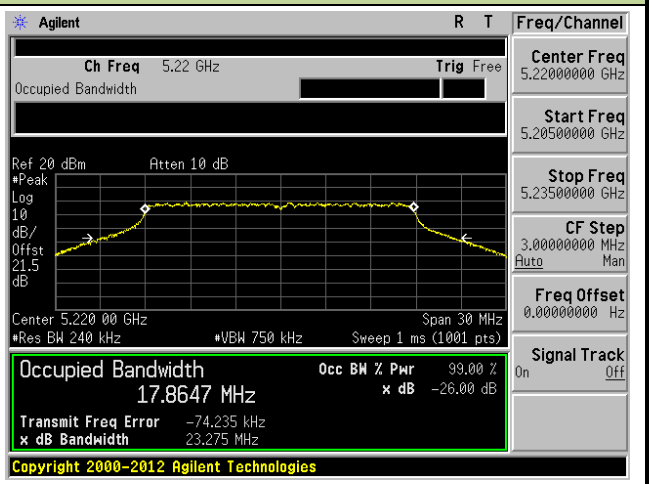


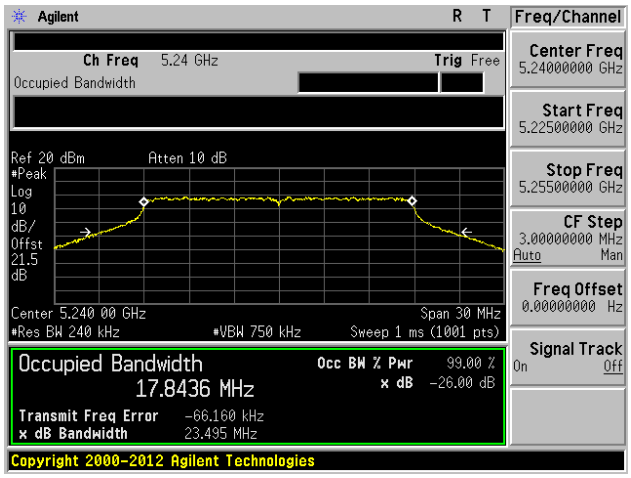
802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 3 / Ant 0 + 1 + 2 + 3

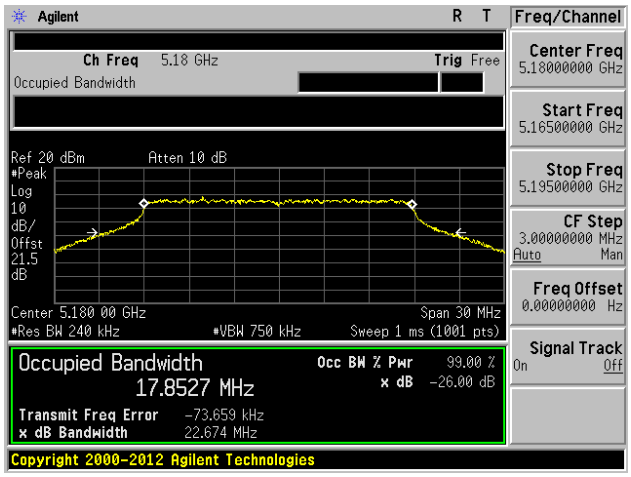
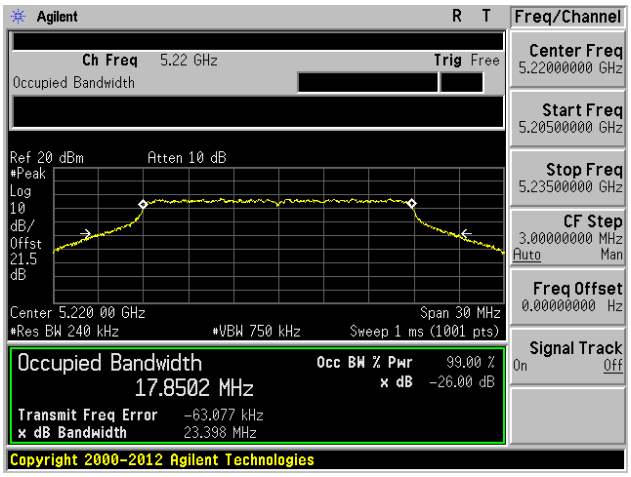
Channel 36 (5180MHz)

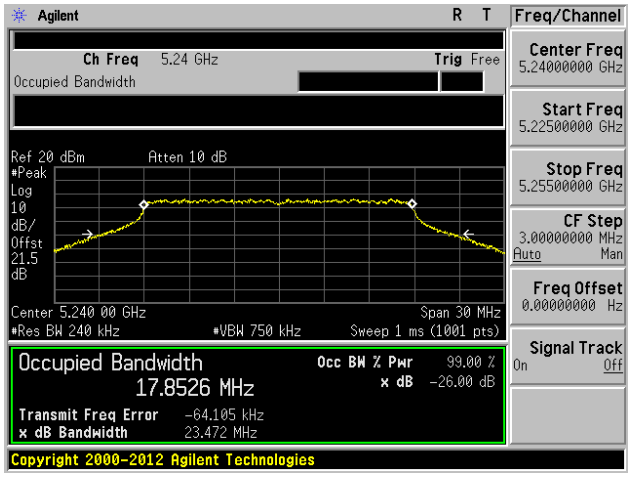


Channel 44 (5220MHz)



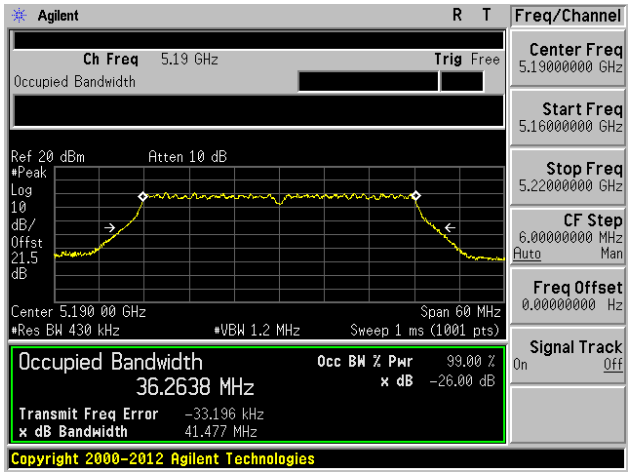
Channel 48 (5240MHz)	
	

802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant 3 / Ant 0 + 1 + 2 + 3	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	

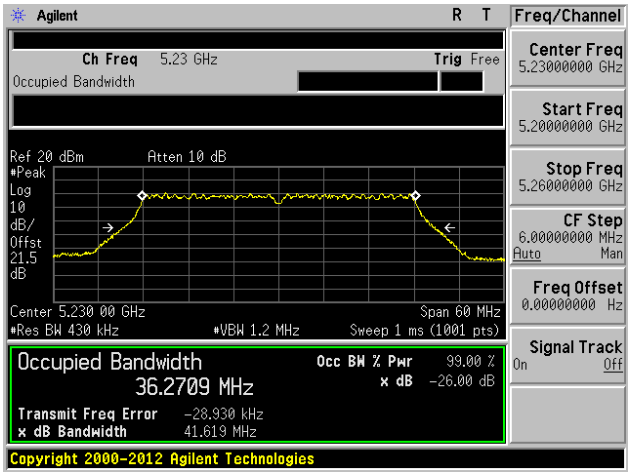
Channel 48 (5240MHz)	
	

802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 3 / Ant 0 + 1 + 2 + 3

Channel 38 (5190MHz)

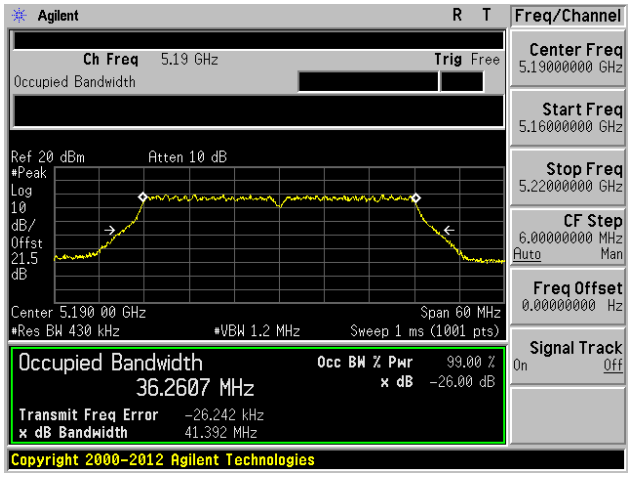


Channel 46 (5230MHz)

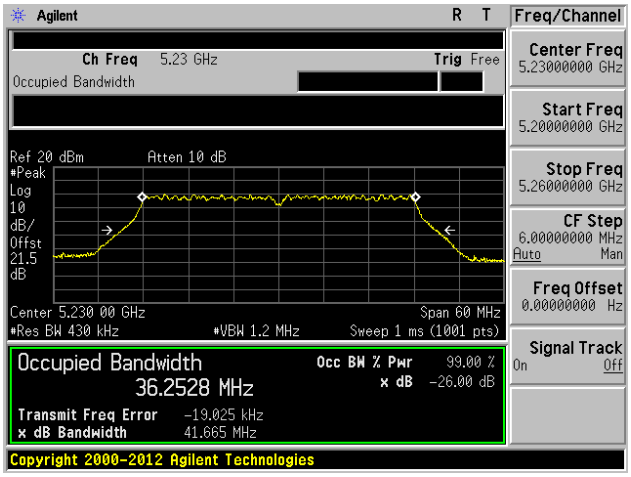


802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth - Ant 3 / Ant 0 + 1 + 2 + 3

Channel 38 (5190MHz)

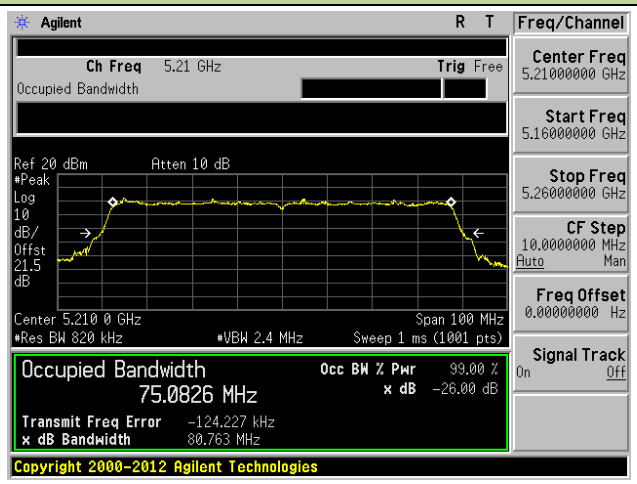


Channel 46 (5230MHz)



802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth - Ant 3 / Ant 0 + 1 + 2 + 3

Channel 52 (5210MHz)



7.3. Output Power Measurement *§15.407(a)(1)(2); RSS-210[A9.2]*

7.3.1. Test Limit

For FCC

For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW (16.99dBm) or 4 dBm + 10 log(26BW).

If transmitting Antennas of directional gain greater than 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

For IC

For the band 5.15-5.25 GHz, the maximum e.i.r.p. shall not exceed 200 mW (23.01dBm) or 10 + 10 $\log_{10}$ B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

Limit for Non-Beam Forming:

Max Conducted Output Power for FCC Limit Calculation as below:

For 5150 ~ 5250MHz

802.11a: 4 + 10$\log_{10}$(22.17MHz) = 17.46dBm > 16.99dBm;

802.11n-HT20: 4 + 10$\log_{10}$(23.28MHz) = 17.67dBm > 16.99dBm;

802.11ac-HT20: 4 + 10$\log_{10}$(22.67MHz) = 17.55dBm > 16.99dBm;

802.11n-HT40/ac-HT40/ac-HT80: 4 + 10$\log_{10}$(26BW) > 16.99dBm;

e.r.i.p Limit Calculation as below:

For 5150 ~ 5250MHz

802.11a: 10 + 10$\log_{10}$(16.68MHz) = 22.22dBm < 23.01dBm;

802.11n-HT20: 10 + 10$\log_{10}$(17.84MHz) = 22.51dBm < 23.01dBm;

802.11ac-HT20: 10 + 10$\log_{10}$(17.02MHz) = 22.31dBm < 23.01dBm;

802.11n-HT40/ac-HT40/ac-HT80: 10 + 10$\log_{10}$(26BW) > 23.01dBm;

Limit for Beam Forming:

- 5.15-5.25GHz: Limit (dBm) = 16.99dBm - (8.04dBi - 6dBi) = 14.95dBm

Max Conducted Output Power Limit Calculation as below:

For 5150 ~ 5250MHz

802.11n-HT20: 4 + $10\log_{10}$(23.28MHz) = 17.67dBm > 14.95dBm;

802.11ac-HT20: 4 + $10\log_{10}$(22.67MHz) = 17.55dBm > 14.95dBm;

802.11n-HT40/ac-HT40/ac-HT80: 4 + $10\log_{10}$(26BW) > 14.95dBm;

e.r.i.p Limit Calculation as below:

For 5150 ~ 5250MHz

802.11n-HT20: 10 + $10\log_{10}$(17.84MHz) = 22.51dBm < 23.01dBm;

802.11ac-HT20: 10 + $10\log_{10}$(17.02MHz) = 22.31dBm < 23.01dBm;

802.11n-HT40/ac-HT40/ac-HT80: 10 + $10\log_{10}$(26BW) > 23.01dBm;

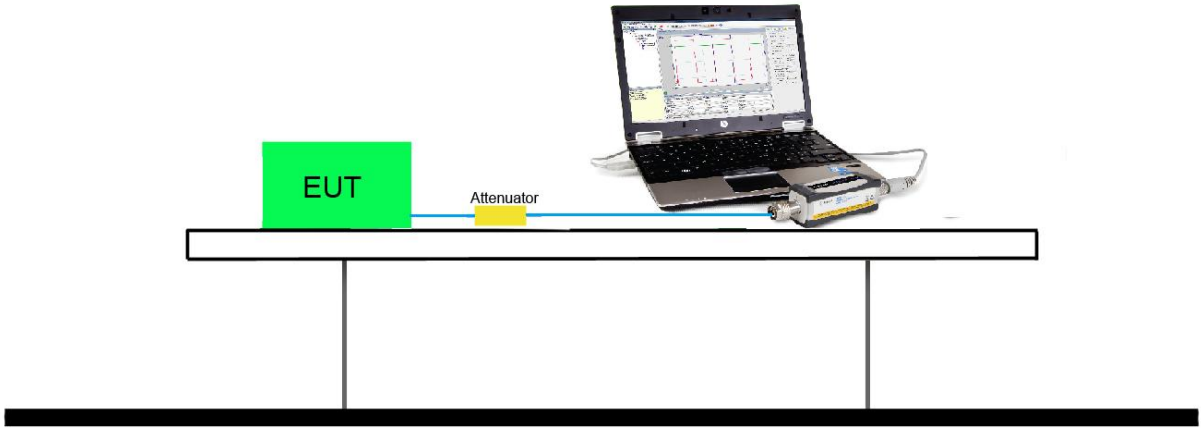
7.3.2. Test Procedure Used

KDB 789033 D01v01r04 - Section E) 3) b) Method PM-G

7.3.3. Test Setting

Average power measurements were perform 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.

7.3.4. Test Setup



7.3.5. Test Result

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (yellow marker) for final test of each channel.

MCS Index for 802.11n	N_{Tx}	Data Rate (Mbps)					
		802.11b	802.11g	20MHz Bandwidth		40MHz Bandwidth	
				800ns GI	400ns GI	800ns GI	400ns GI
0	1	1	6	6.5	7.2	13.5	15.0
1	1	2	9	13.0	14.4	27.0	30.0
2	1	5.5	12	19.5	21.7	40.5	45.0
3	1	11	18	26.0	28.9	54.0	60.0
4	1	--	24	39.0	43.3	81.0	90.0
5	1	--	36	52.0	57.8	108.0	120.0
6	1	--	48	58.5	65.0	121.5	135.0
7	1	--	54	65.0	72.2	135.0	150.0
8	2	--	--	13.0	14.4	27.0	30.0
9	2	--	--	26.0	28.9	54.0	60.0
10	2	--	--	39.0	43.3	81.0	90.0
11	2	--	--	52.0	57.8	108.0	120.0
12	2	--	--	78.0	86.7	162.0	180.0
13	2	--	--	104.0	115.6	216.0	240.0
14	2	--	--	117.0	130.0	243.0	270.0
15	2	--	--	130.0	144.0	270.0	300.0

MCS Index for 802.11n	N_{Tx}	Data Rate (Mbps)				
		802.11a	20MHz Bandwidth		40MHz Bandwidth	
			800ns GI	400ns GI	800ns GI	400ns GI
24	4	6	26.0	28.8	54.0	60.0
25	4	9	52.0	57.6	108.0	120.0
26	4	12	78.0	86.8	162.0	180.0
27	4	18	104.0	115.6	216.0	240.0
28	4	24	156.0	173.2	324.0	360.0
29	4	36	208.0	231.2	342.0	480.0
30	4	48	234.0	260.0	486.0	540.0
31	4	54	260.0	288.8	540.0	600.0

MCS Index for 802.11ac	N_{SS}	Data Rate (Mbps)					
		20MHz Bandwidth		40MHz Bandwidth		80MHz Bandwidth	
		800ns GI	400ns GI	800ns GI	400ns GI	800ns GI	400ns GI
0	1	6.5	7.2	13.5	15.0	29.3	32.5
1	1	13.0	14.4	27.0	30.0	58.5	65.0
2	1	19.5	21.7	40.5	45.0	87.8	97.5
3	1	26.0	28.9	54.0	60.0	117.0	130.0
4	1	39.0	43.3	81.0	90.0	175.5	195.0
5	1	52.0	57.8	108.0	120.0	234.0	260.0
6	1	58.5	65.0	121.5	135.0	263.0	292.5
7	1	65.0	72.2	135.0	150.0	292.5	325.0
8	1	78.0	86.7	162.0	180.0	351.0	390.0
9	1	--	--	180.0	200.0	390.0	433.3
0	4	26.0	28.9	54.0	60.0	117.0	130.0
1	4	52.0	57.8	108.0	120.0	234.0	260.0
2	4	78.0	86.7	162.0	180.0	351.0	390.0
3	4	104.0	115.6	216.0	240.0	468.0	520.0
4	4	156.0	173.3	324.0	360.0	702.0	780.0
5	4	208.0	231.1	432.0	480.0	936.0	1040.0
6	4	234.0	260.0	486.0	540.0	1053.0	1170.0
7	4	260.0	288.9	540.0	600.0	1170.0	1300.0
8	4	312.0	246.7	648.0	720.0	1404.0	1560.0
9	4	--	--	720.0	800.0	1560.0	1733.3

Note: Power output test was verified over all data rates of each mode shown as above, and then choose the maximum power output (yellow marker) for final test of each channel.

Output power at various data rates for Ant 0 / Ant 0 + 1 + 2 + 3:

Test Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate (Mbps)	RMS Power (dBm)
802.11a	20	44	5220	6	10.32
				36	10.02
				54	9.87
802.11n	20	44	5220	6.5	10.40
				130	9.96
				260	9.71
802.11ac	20	44	5220	6.5	10.36
				78	9.92
				312	9.68
802.11n	40	46	5230	13.5	11.18
				270	10.66
				540	10.11
802.11ac	40	46	5230	13.5	10.63
				162	9.94
				720	9.61
802.11ac	80	42	5210	29.3	10.57
				390	9.84
				1560	9.56

Test Result of Average Output Power

Test Mode	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 RMS Power (dBm)	Ant 1 RMS Power (dBm)	Ant 2 RMS Power (dBm)	Ant 3 RMS Power (dBm)	Total RMS Power (dBm)	Limit (dBm)	Max EIRP (dBm)	EIRP Limit (dBm)	Result
Ant 0 + 1 + 2 + 3, Non-Beam Forming												
11a	6	36	5180	8.87	7.60	7.07	8.01	13.96	≤16.99	16.13	≤22.22	Pass
11a	6	44	5220	10.32	9.58	8.74	9.56	15.61	≤16.99	17.78	≤22.22	Pass
11a	6	48	5240	10.26	9.63	8.92	9.63	15.66	≤16.99	17.83	≤22.22	Pass
11n-HT20	6.5	36	5180	10.65	9.69	9.17	9.98	15.93	≤16.99	18.10	≤22.51	Pass
11n-HT20	6.5	44	5220	10.40	9.62	8.83	9.12	15.55	≤16.99	17.72	≤22.51	Pass
11n-HT20	6.5	48	5240	10.52	9.59	8.96	8.77	15.54	≤16.99	17.71	≤22.51	Pass
11ac-VHT20	6.5	36	5180	10.19	9.47	9.11	9.49	15.60	≤16.99	17.77	≤22.31	Pass
11ac-VHT20	6.5	44	5220	10.36	9.54	8.63	10.13	15.74	≤16.99	17.91	≤22.31	Pass
11ac-VHT20	6.5	48	5240	10.49	9.64	8.86	10.30	15.89	≤16.99	18.06	≤22.31	Pass
11n-HT40	13.5	38	5190	10.79	10.24	9.45	10.30	16.24	≤16.99	18.41	≤23.01	Pass
11n-HT40	13.5	46	5230	11.18	10.42	9.50	10.34	16.42	≤16.99	18.59	≤23.01	Pass
11ac-VHT40	13.5	38	5190	10.54	9.98	9.43	10.20	16.08	≤16.99	18.25	≤23.01	Pass
11ac-VHT40	13.5	46	5230	10.63	9.91	9.05	9.81	15.91	≤16.99	18.08	≤23.01	Pass
11ac-VHT80	29.3	42	5210	10.57	9.83	9.17	9.70	15.87	≤16.99	18.04	≤23.01	Pass

Note:

1. The Total Average Power (dBm) = $10*\log\{10^{(\text{Ant 0 Average Power }/10)} + 10^{(\text{Ant 1 Average Power }/10)} + 10^{(\text{Ant 2 Average Power }/10)} + 10^{(\text{Ant 3 Average Power }/10)}\}$.

2. Max EIRP Power (dBm) = Total Average Power (dBm) + Antenna Gain.

Test Mode	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 RMS Power (dBm)	Ant 1 RMS Power (dBm)	Ant 2 RMS Power (dBm)	Ant 3 RMS Power (dBm)	Total RMS Power (dBm)	Limit (dBm)	Max EIRP (dBm)	EIRP Limit (dBm)	Result
Ant 0 + 1 + 2 + 3, Beam Forming												
11n-HT20	6.5	36	5180	9.07	7.51	6.98	8.07	14.00	≤14.95	22.04	≤22.51	Pass
11n-HT20	6.5	44	5220	9.25	7.97	6.69	8.20	14.14	≤14.95	22.18	≤22.51	Pass
11n-HT20	6.5	48	5240	8.89	8.04	7.15	8.35	14.17	≤14.95	22.21	≤22.51	Pass
11ac-VHT20	6.5	36	5180	9.03	7.92	7.13	8.19	14.14	≤14.95	22.18	≤22.31	Pass
11ac-VHT20	6.5	44	5220	9.42	8.03	7.15	8.12	14.28	≤14.95	22.32	≤22.31	Pass
11ac-VHT20	6.5	48	5240	9.06	7.85	7.25	8.38	14.21	≤14.95	22.25	≤22.31	Pass
11n-HT40	13.5	38	5190	9.83	7.64	7.61	8.46	14.50	≤14.95	22.54	≤23.01	Pass
11n-HT40	13.5	46	5230	9.34	7.97	7.49	8.27	14.34	≤14.95	22.38	≤23.01	Pass
11ac-VHT40	13.5	38	5190	9.82	8.08	7.26	8.30	14.49	≤14.95	22.53	≤23.01	Pass
11ac-VHT40	13.5	46	5230	9.31	8.03	7.04	7.92	14.17	≤14.95	22.21	≤23.01	Pass
11ac-VHT80	29.3	42	5210	9.65	7.96	7.34	8.28	14.41	≤14.95	22.45	≤23.01	Pass

Note: The Total Average Power (dBm) = $10*\log\{10^{(\text{Ant 0 Average Power }/10)} + 10^{(\text{Ant 1 Average Power }/10)} + 10^{(\text{Ant 2 Average Power }/10)} + 10^{(\text{Ant 3 Average Power }/10)}\}$.

7.4. Transmit Power Control *§15.407(h)(1); RSS-210[A9.2]*

7.4.1. Test Limit

The devices with a maximum e.i.r.p. greater than 500 mW (27dBm) shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W (30dBm).

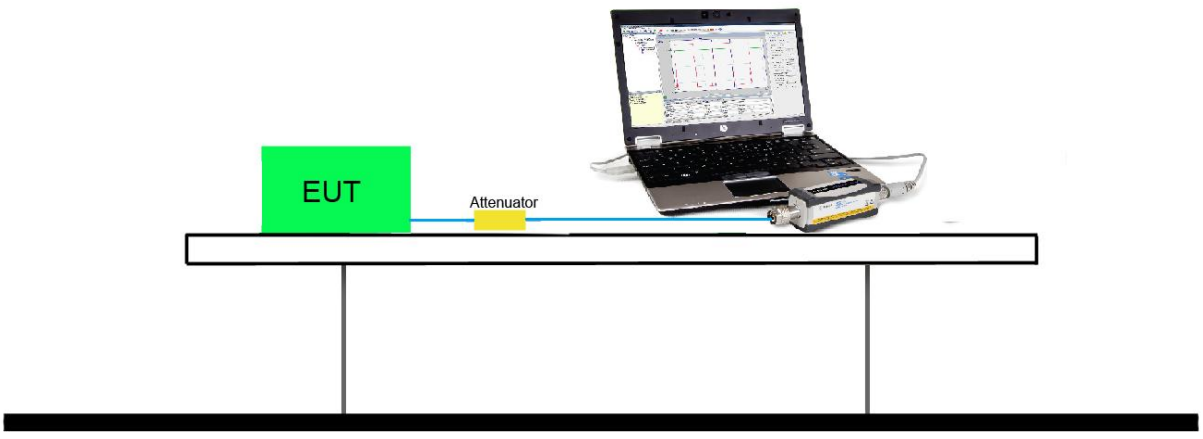
7.4.2. Test Procedure Used

KDB 789033 D01v01r04 - Section E) 3) b) Method PM-G

7.4.3. Test Setting

Average power measurements were perform 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.

7.4.4. Test Setup



7.4.5. Test Result

The device maximum e.i.r.p power less than 500mW (27dBm), not assessed this test.

7.5. Power Spectral Density Measurement *§15.407(a)(1)(2)(5); RSS-210[A9.2]*

7.5.1. Test Limit

For FCC

For the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 4 dBm in any 1 megahertz band.

If transmitting Antennas of directional gain greater than 6dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

Limit for Non-Beam Forming:

- *5.15-5.25GHz: Limit (dBm / MHz) = 4dBm / MHz*

Limit for Beam Forming:

- *5.15-5.25GHz: Limit (dBm / MHz) = 4 dBm / MHz – (8.04dBi - 6dBi) = 1.96dBm*

For IC

For the band 5.15-5.25 GHz, the e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

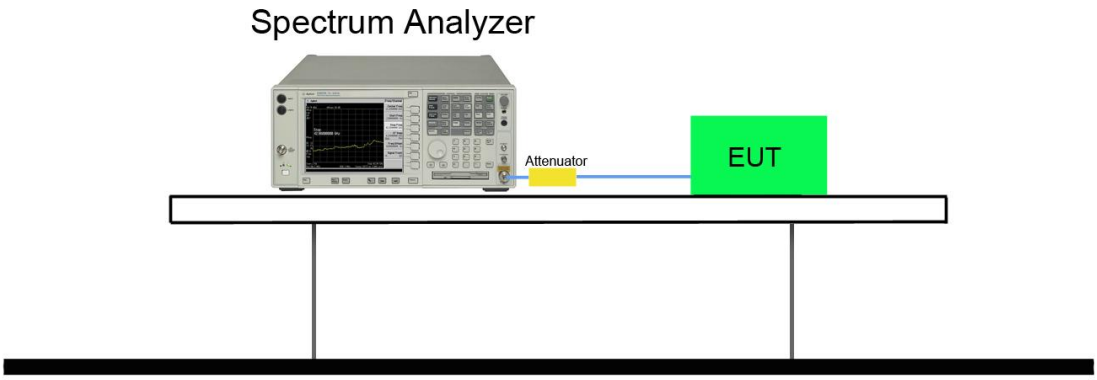
7.5.2. Test Procedure Used

KDB 789033 D01v01r04 - Section F

7.5.3. Test Setting

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz, if measurement bandwidth of Maximum PSD is specified in 500 kHz, RBW = 100 kHz
4. VBW = 3MHz
5. Number of sweep points ≥ 2 × (span / RBW)
6. Detector = power averaging (RMS)
7. Sweep time = auto
8. Trigger = free run
9. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
10. Add 10*log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10*log(1/0.25) = 6 dB if the duty cycle is 25 percent.
11. When the measurement bandwidth of Maximum PSD is specified in 500 kHz, add a constAnt factor 10*log(500kHz/100kHz) = 7 dB to the measured result

7.5.4. Test Setup



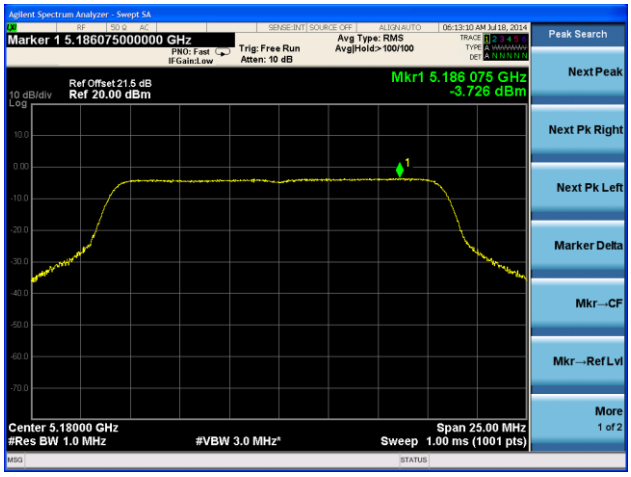
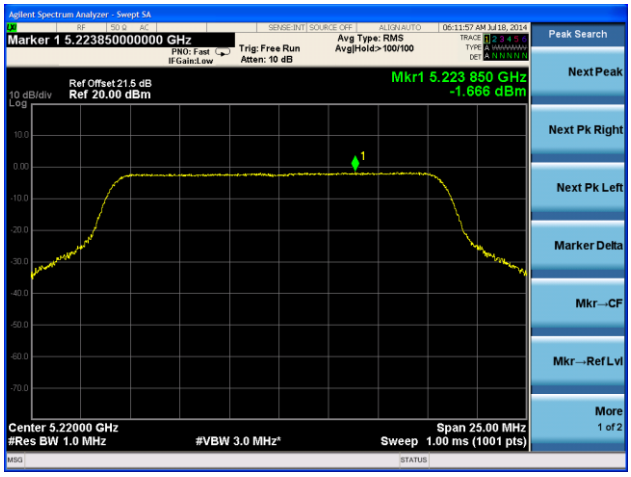
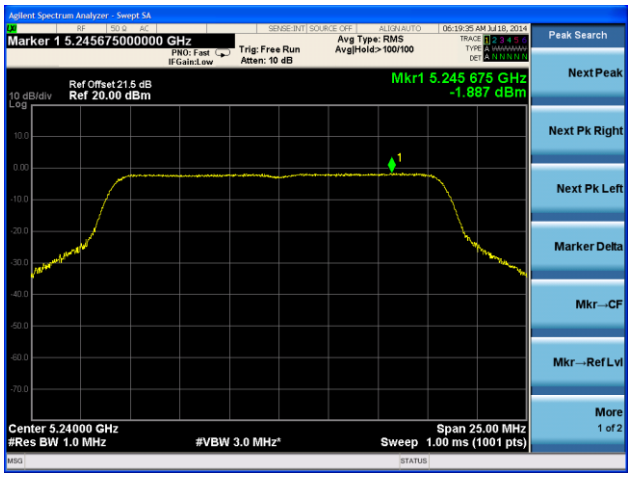
7.5.5. Test Result

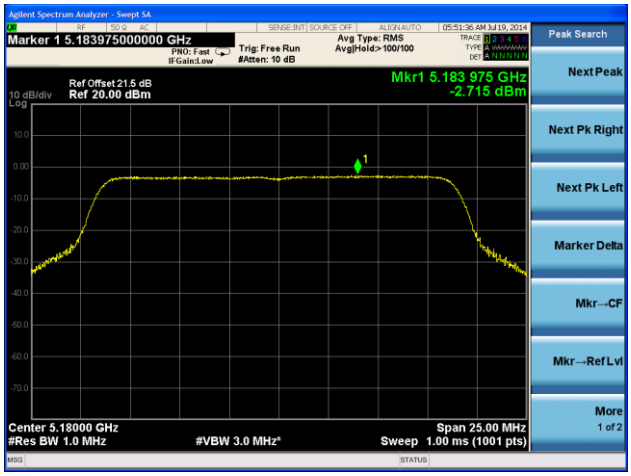
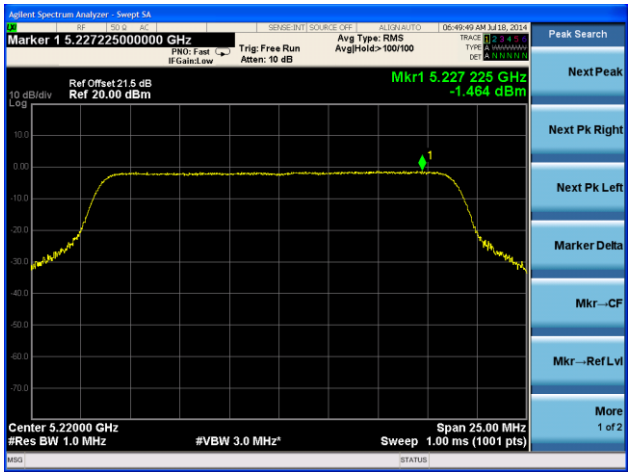
Test Mode	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/ MHz)	Ant 1 PSD (dBm/ MHz)	Ant 2 PSD (dBm/ MHz)	Ant 3 PSD (dBm/ MHz)	Duty Cycle (%)	Total PSD (dBm/ MHz)	Limit (dBm/ MHz)	Result
Ant 0 + 1 + 2 + 3, Non-Beam Forming											
11a	6	36	5180	-3.73	-3.53	-4.62	-3.90	98.89%	2.10	≤4.0	Pass
11a	6	44	5220	-1.67	-2.27	-2.58	-2.53	98.89%	3.77	≤4.0	Pass
11a	6	48	5240	-1.89	-2.59	-2.87	-2.33	98.89%	3.62	≤4.0	Pass
11n-HT20	6.5	36	5180	-2.72	-3.92	-4.19	-4.08	98.81%	2.34	≤4.0	Pass
11n-HT20	6.5	44	5220	-1.46	-2.45	-2.85	-2.44	98.81%	3.75	≤4.0	Pass
11n-HT20	6.5	48	5240	-2.06	-2.41	-2.55	-1.86	98.81%	3.81	≤4.0	Pass
11ac-VHT20	6.5	36	5180	-3.56	-3.51	-4.34	-3.46	98.57%	2.32	≤4.0	Pass
11ac-VHT20	6.5	44	5220	-2.63	-4.23	-4.51	-3.62	98.57%	2.34	≤4.0	Pass
11ac-VHT20	6.5	48	5240	-3.10	-4.38	-4.49	-3.52	98.57%	2.19	≤4.0	Pass
11n-HT40	13.5	38	5190	-4.22	-4.59	-5.44	-4.60	97.57%	1.44	≤4.0	Pass
11n-HT40	13.5	46	5230	-4.70	-5.04	-5.48	-4.83	97.57%	1.13	≤4.0	Pass
11ac-VHT40	13.5	38	5190	-4.63	-5.02	-5.31	-4.78	97.86%	1.19	≤4.0	Pass
11ac-VHT40	13.5	46	5230	-4.40	-5.45	-5.64	-5.21	97.86%	0.96	≤4.0	Pass
11ac-VHT80	29.3	42	5210	-6.95	-7.48	-8.34	-7.77	94.53%	-1.34	≤4.0	Pass

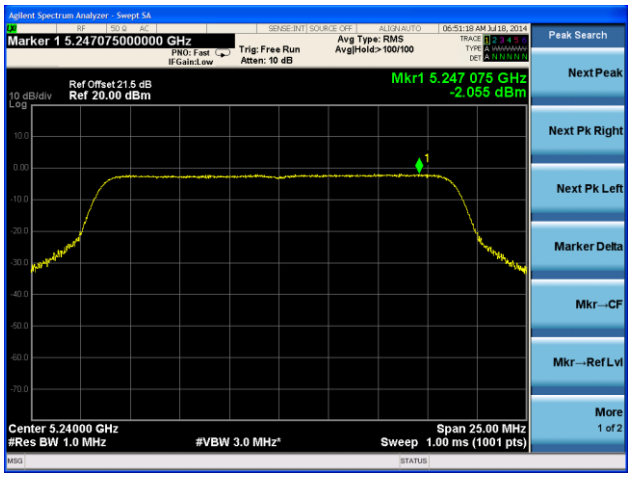
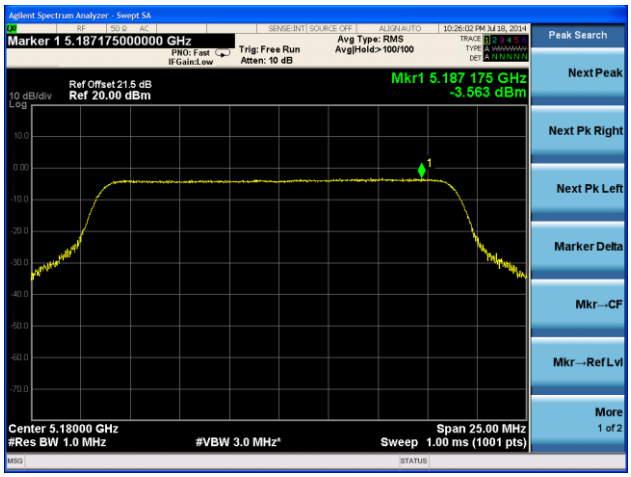
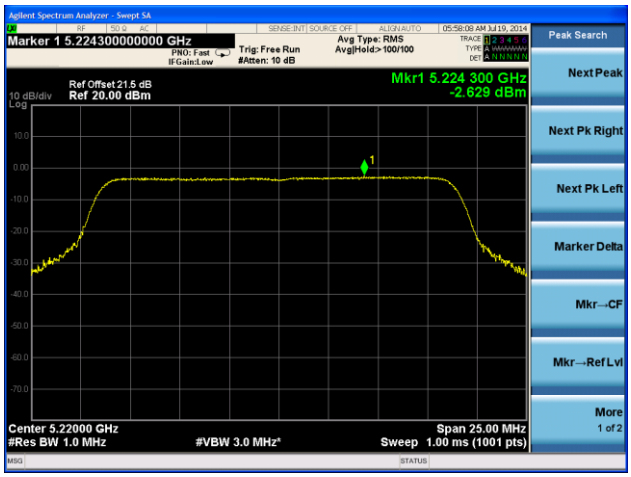
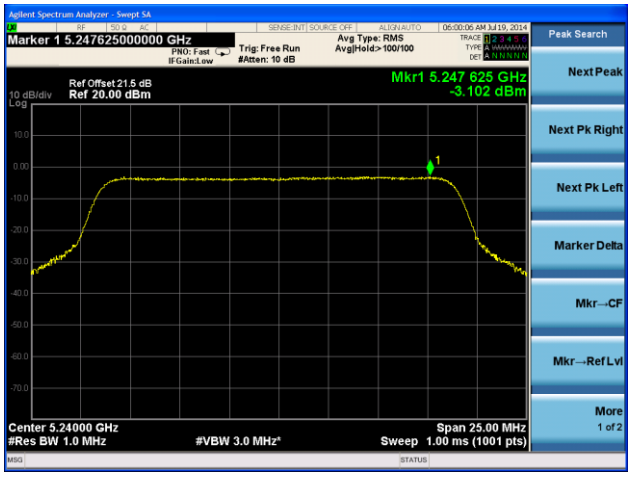
Ant 0 + 1 + 2 + 3, Beam Forming											
11n-HT20	6.5	36	5180	-4.77	-6.24	-6.46	-5.39	98.81%	0.36	≤1.96	Pass
11n-HT20	6.5	44	5220	-5.10	-6.20	-6.91	-5.71	98.81%	0.09	≤1.96	Pass
11n-HT20	6.5	48	5240	-5.18	-6.13	-6.62	-6.07	98.81%	0.05	≤1.96	Pass
11ac-VHT20	6.5	36	5180	-4.01	-5.56	-5.94	-5.10	98.57%	0.93	≤1.96	Pass
11ac-VHT20	6.5	44	5220	-4.89	-6.13	-6.61	-5.58	98.57%	0.27	≤1.96	Pass
11ac-VHT20	6.5	48	5240	-4.39	-6.18	-6.89	-5.80	98.57%	0.31	≤1.96	Pass
11n-HT40	13.5	38	5190	-7.38	-8.51	-8.97	-8.03	97.57%	-1.94	≤1.96	Pass
11n-HT40	13.5	46	5230	-7.78	-9.46	-9.37	-9.21	97.57%	-2.66	≤1.96	Pass
11ac-VHT40	13.5	38	5190	-7.06	-8.11	-8.95	-8.29	97.86%	-1.85	≤1.96	Pass
11ac-VHT40	13.5	46	5230	-7.80	-9.13	-9.62	-8.74	97.86%	-2.57	≤1.96	Pass
11ac-VHT80	29.3	42	5210	-9.23	-10.68	-11.82	-10.88	94.53%	-4.05	≤1.96	Pass

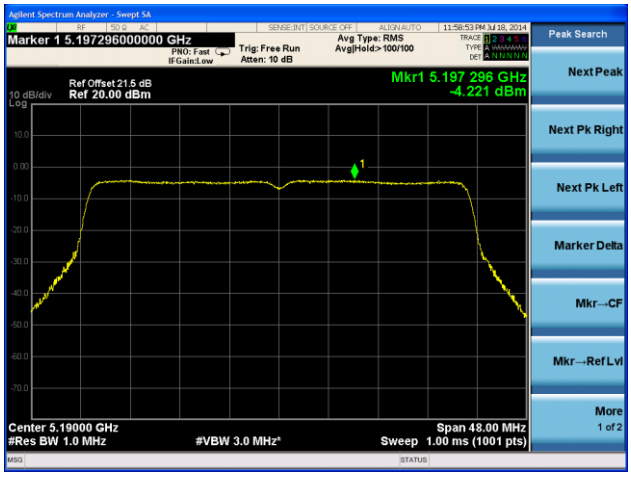
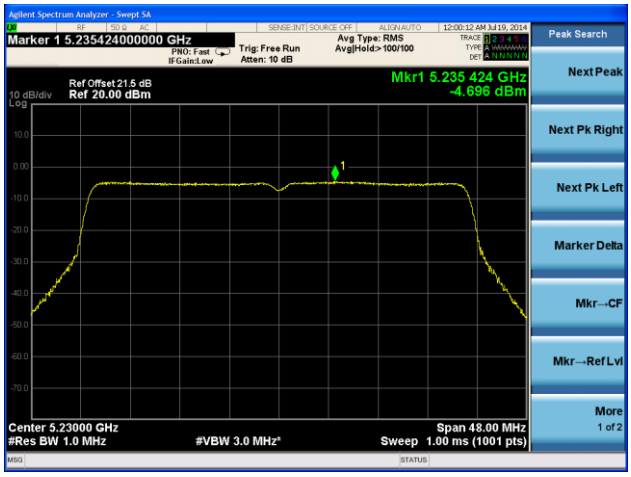
Note:

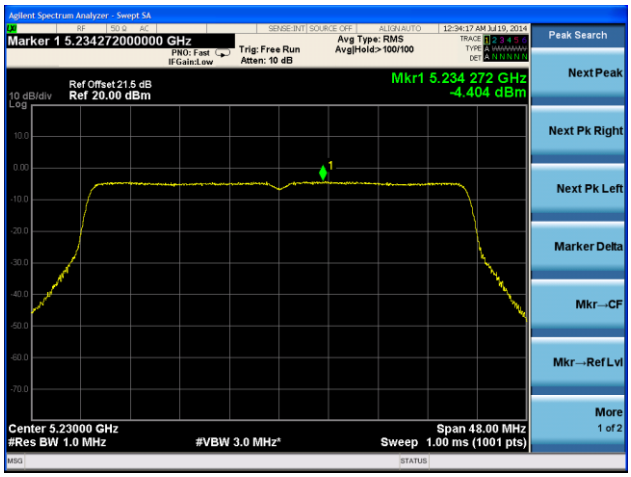
1. When EUT duty cycle < 98%, the total PSD = $10*\log\{10^{(\text{Ant 0 PSD}/10)} + 10^{(\text{Ant 1 PSD}/10)} + 10^{(\text{Ant 2 PSD}/10)} + 10^{(\text{Ant 3 PSD}/10)}\} + 10*\log(1/\text{duty cycle})$.
2. For 5.15 ~ 5.25GHz, the the Max e.i.r.p. spectral density = Max Total PSD (dBm/MHz) + Antenna Gain = 3.77 dBm/MHz + 2.17dBi = 5.94 dBm/MHz, and the Max e.i.r.p spectral density less than 10 dBm in any 1.0 MHz band

802.11a PSD - Ant 0 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	

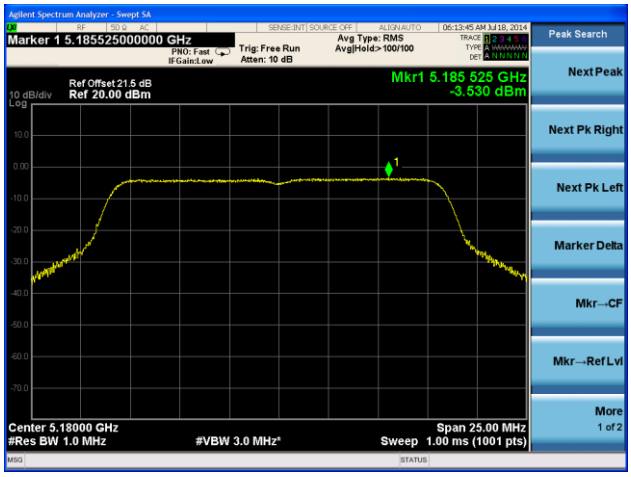
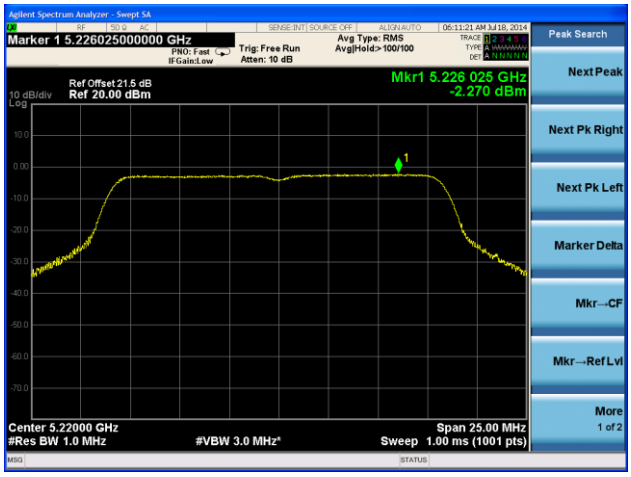
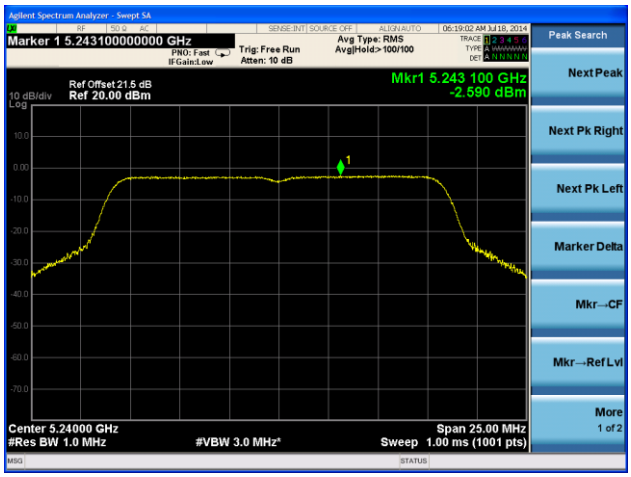
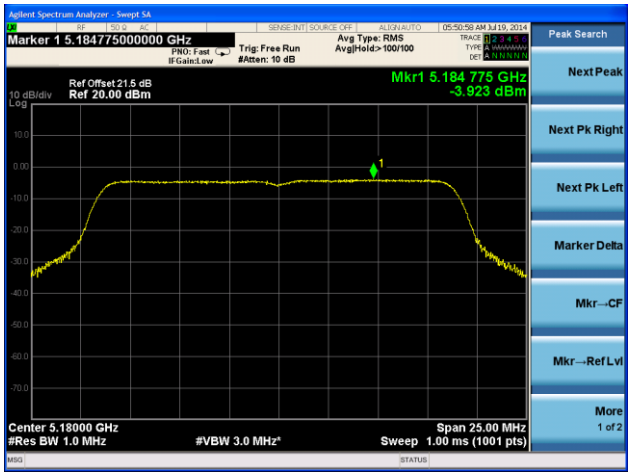
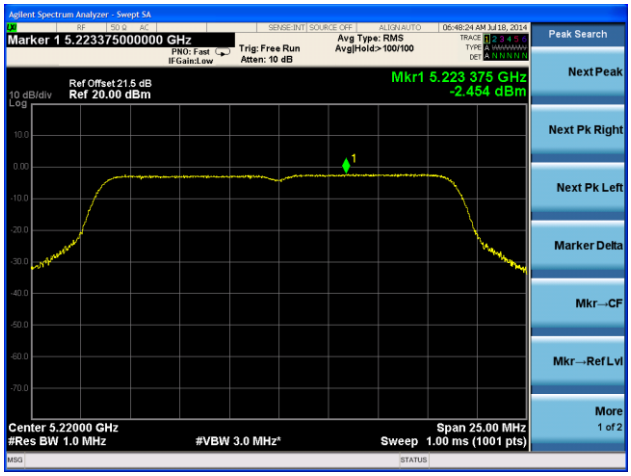
802.11n-HT20 PSD - Ant 0 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	

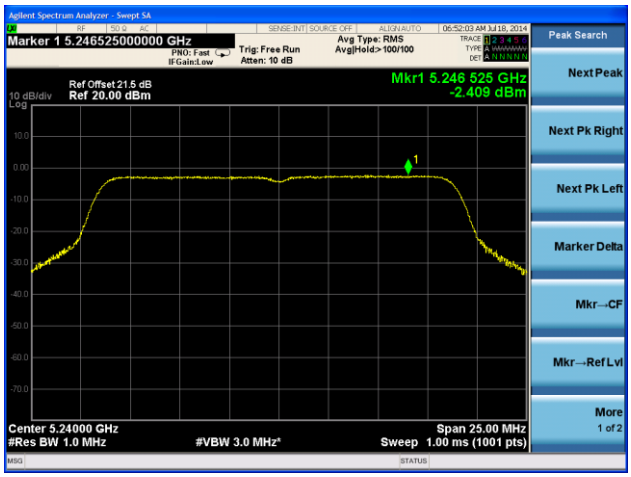
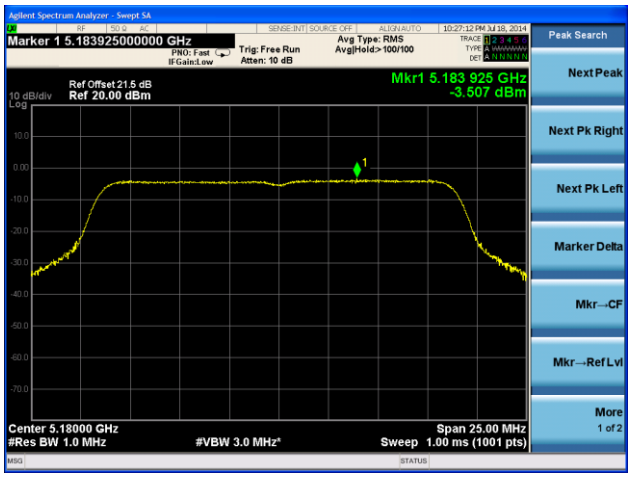
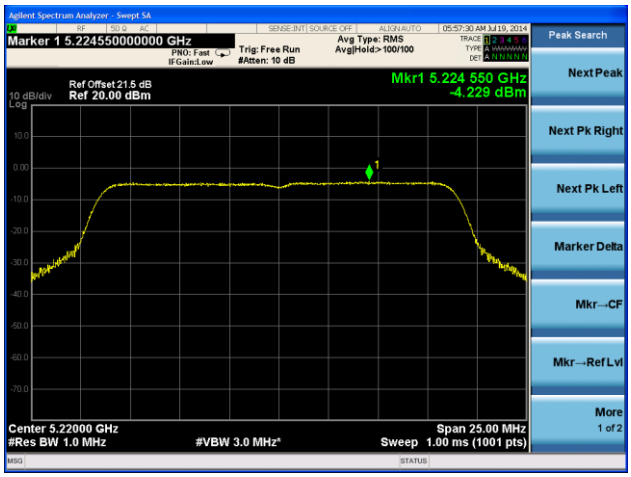
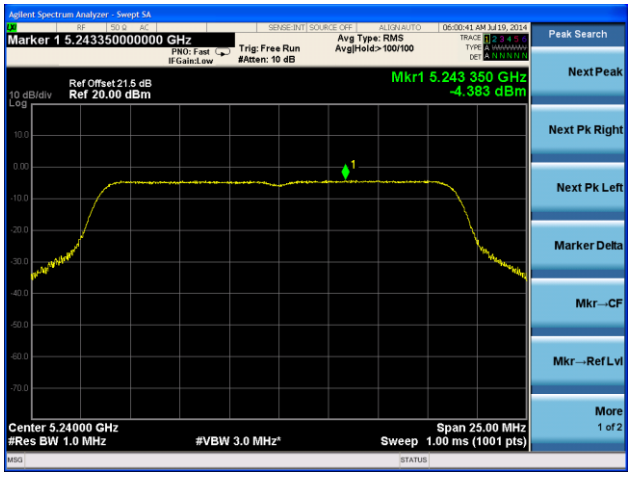
Channel 48 (5240MHz)	
	
802.11ac-VHT20 PSD - Ant 0 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	

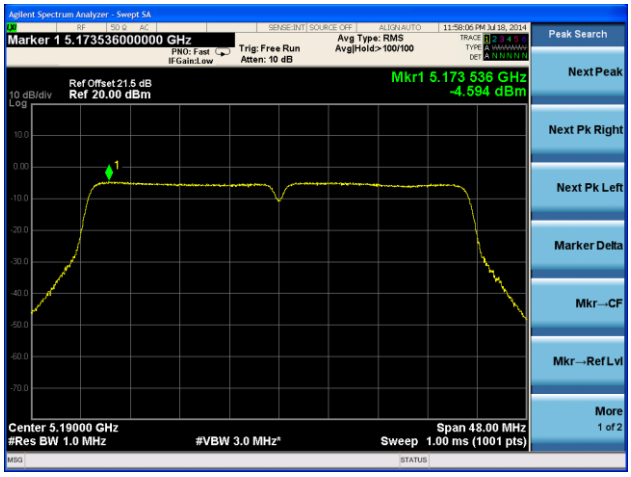
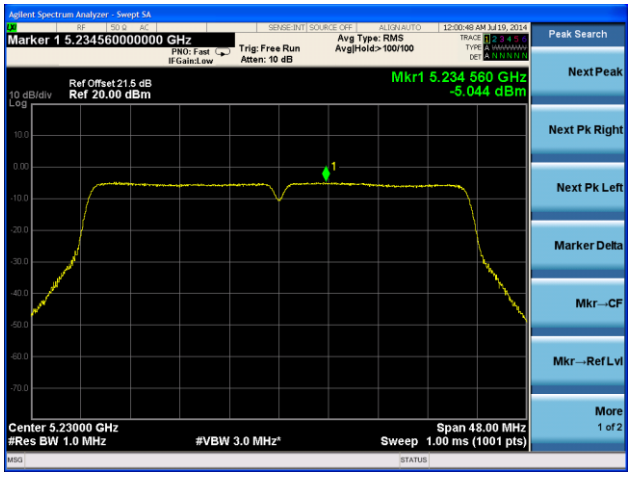
802.11n-HT40 PSD - Ant 0 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

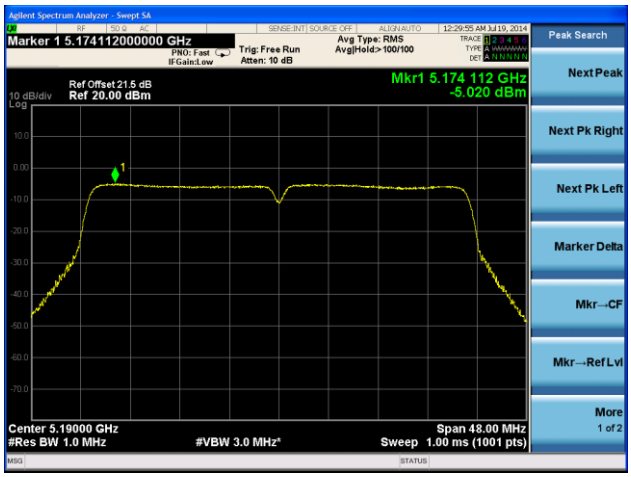
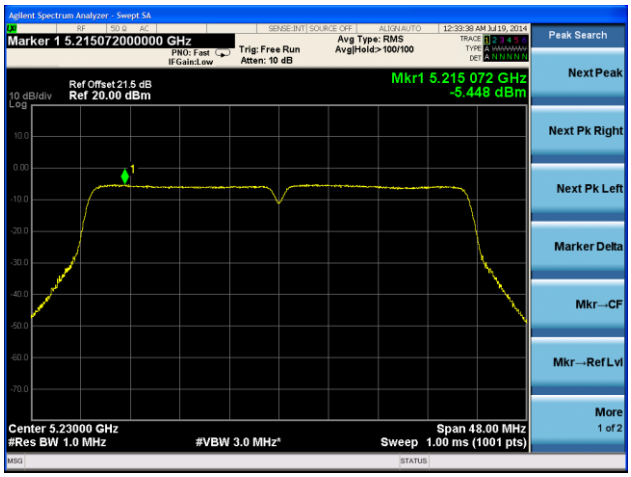
802.11ac-VHT40 PSD - Ant 0 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

802.11ac-VHT80 PSD - Ant 0 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 42 (5210MHz)	

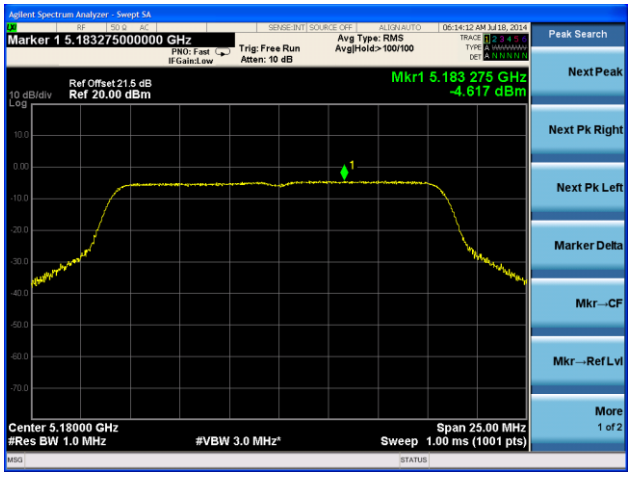
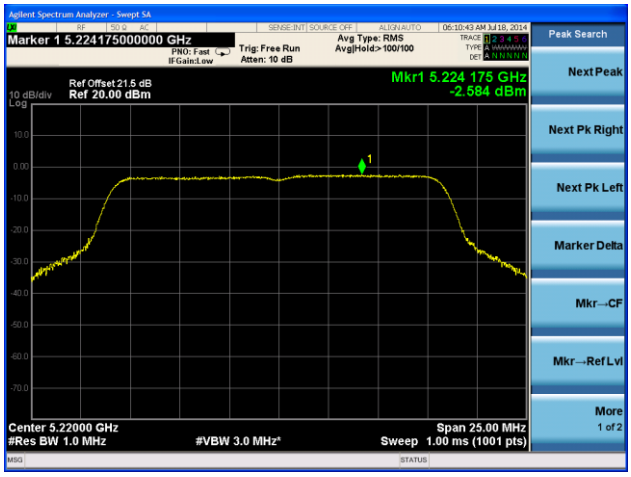
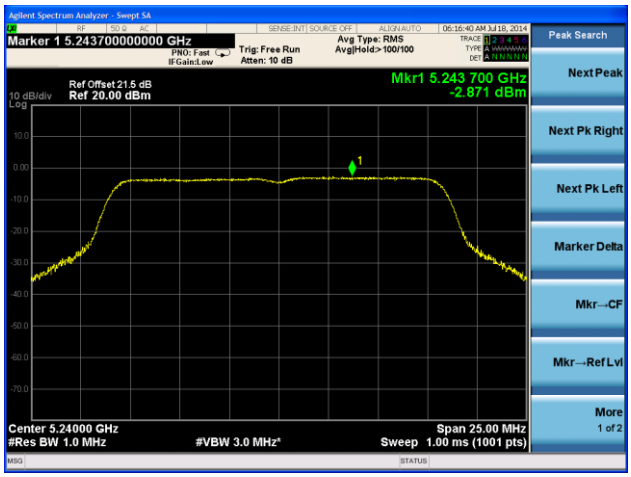
802.11a PSD - Ant 1 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	
802.11n-HT20 PSD - Ant 1 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	

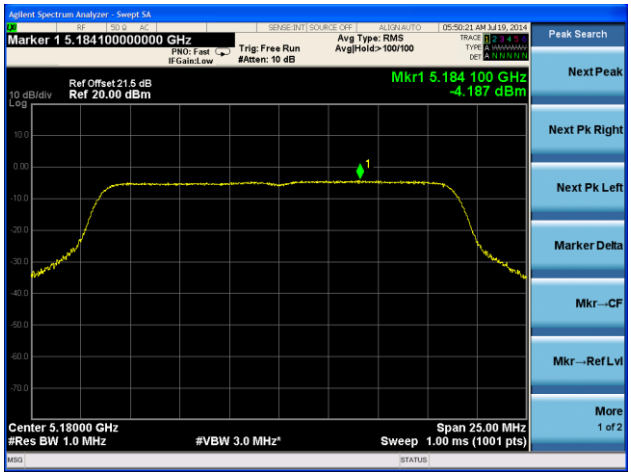
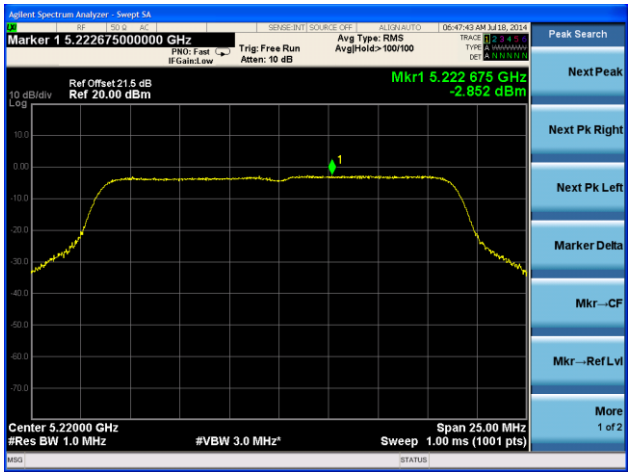
Channel 48 (5240MHz)	
	
802.11ac-VHT20 PSD - Ant 1 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	

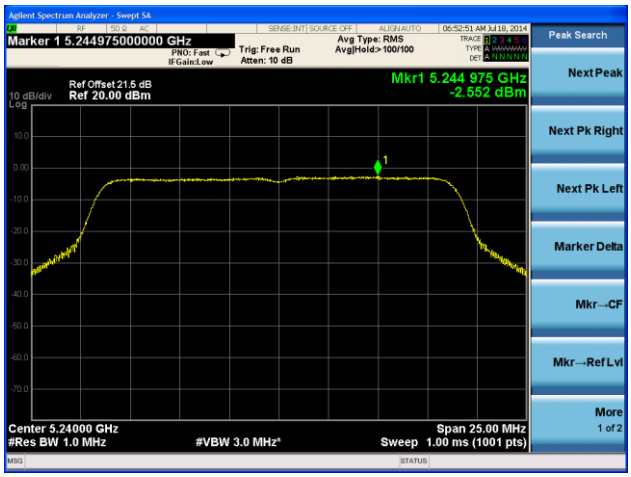
802.11n-HT40 PSD - Ant 1 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

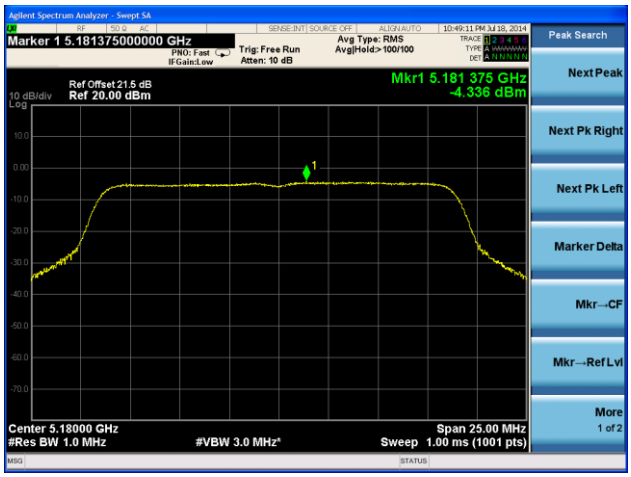
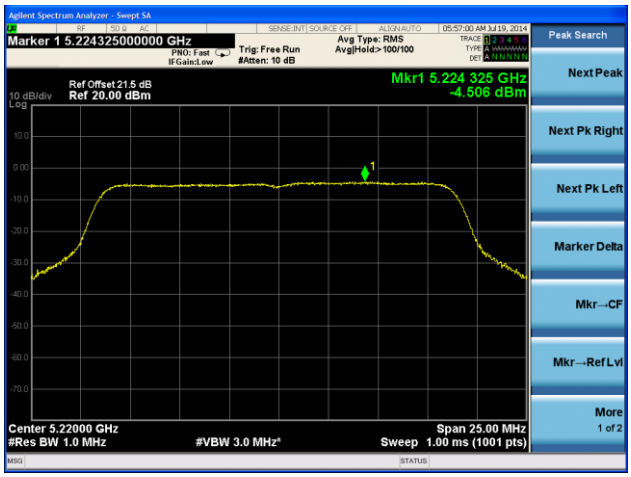
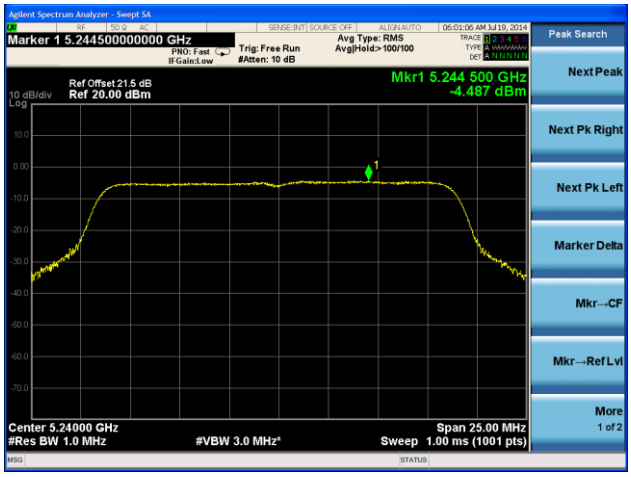
802.11ac-VHT40 PSD - Ant 1 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

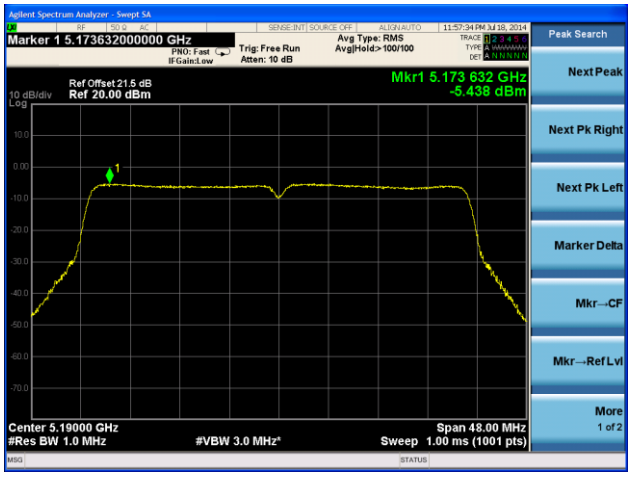
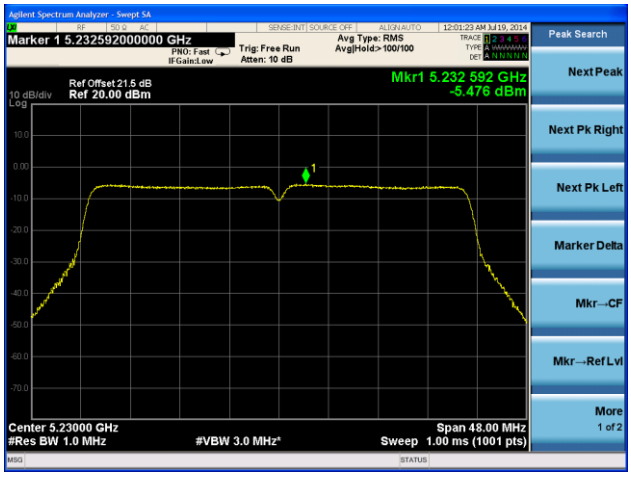
802.11ac-VHT80 PSD - Ant 1 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 42 (5210MHz)	

802.11a PSD - Ant 2 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	

802.11n-HT20 PSD - Ant 2 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	

Channel 48 (5240MHz)	
	

802.11ac-VHT20 PSD - Ant 2 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	

802.11n-HT40 PSD - Ant 2 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

802.11ac-VHT40 PSD - Ant 2 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)

802.11ac-VHT80 PSD - Ant 2 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 42 (5210MHz)	