

MEASUREMENT REPORT

FCC PART 15.407 WLAN 802.11a/n/ac

FCC ID: 2APO3AA-B4

APPLICANT: TRIANGLE TECHNOLOGY(HK) CO., LIMITED

Application Type: Certification

Product: Acute Angle PC

Model No.: AA-B4

Brand Name: Acute Angle

FCC Classification: Unlicensed National Information Infrastructure (UNII)

FCC Rule Part(s): Part15 Subpart E (Section 15.407)

Test Procedure(s): ANSI C63.10-2013, KDB 789033 D02v02r01,
KDB 662911 D01v02r01

Test Date: March 22 ~ April 20, 2018

Reviewed By : Paddy Chen
(Paddy Chen)

Approved By : Chenz Ker
(Chenz Ker)



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 D02v02r01. 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 (Taiwan) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
1803TW0106-U4	Rev. 01	Initial report	05-02-2018	Valid

CONTENTS

Description	Page
§2.1033 General Information	6
1. INTRODUCTION	7
1.1. Scope	7
1.2. MRT Test Location	7
2. PRODUCT INFORMATION	8
2.1. Equipment Description.....	8
2.2. Product Specification Subjective to this Report.....	8
2.3. Working Frequencies for this Report.....	9
2.4. Description of Antennas	9
2.5. Test Mode	10
2.6. Description of Test Software	10
2.7. Device Capabilities	13
2.8. Test Configuration	15
2.9. EMI Suppression Device(s)/Modifications.....	15
2.10. Labeling Requirements.....	15
3. DESCRIPTION OF TEST	16
3.1. Evaluation Procedure	16
3.2. AC Line Conducted Emissions	16
3.3. Radiated Emissions.....	17
4. ANTENNA REQUIREMENTS.....	18
5. TEST EQUIPMENT CALIBRATION DATE	19
6. MEASUREMENT UNCERTAINTY.....	20
7. TEST RESULT	21
7.1. Summary	21
7.2. 26dB Bandwidth Measurement.....	22
7.2.1. Test Limit	22
7.2.2. Test Procedure Used	22
7.2.3. Test Setting.....	22
7.2.4. Test Setup	22
7.2.5. Test Result.....	23
7.3. 6dB Bandwidth Measurement.....	57
7.3.1. Test Limit	57
7.3.2. Test Procedure used.....	57

7.3.3. TestSetting.....	57
7.3.4. Test Setup	57
7.3.5. Test Result.....	58
7.4. Output Power Measurement.....	68
7.4.1. Test Limit	68
7.4.2. Test Procedure Used	68
7.4.3. Test Setting.....	68
7.4.4. Test Setup	68
7.4.5. Test Result.....	69
7.5. Transmit Power Control	73
7.5.1. Test Limit	73
7.5.2. Test Procedure Used	73
7.5.3. Test Setting.....	73
7.5.4. Test Setup	73
7.5.5. Test Result.....	73
7.6. Power Spectral Density Measurement.....	74
7.6.1. Test Limit	74
7.6.2. Test Procedure Used	74
7.6.3. Test Setting.....	74
7.6.4. Test Setup	75
7.6.5. Test Result.....	76
7.7. Frequency Stability Measurement.....	108
7.7.1. Test Limit	108
7.7.2. Test Procedure Used	108
7.7.3. Test Setup	109
7.7.4. Test Result.....	110
7.8. Radiated Spurious Emission Measurement	111
7.8.1. Test Limit	111
7.8.2. Test Procedure Used	111
7.8.3. Test Setting.....	111
7.8.4. Test Setup	113
7.8.5. Test Result.....	115
7.9. Radiated Restricted Band Edge Measurement	247
7.9.1. Test Limit	247
7.9.2. Test Procedure Used	248
7.9.3. Test Setting.....	249
7.9.4. Test Setup	249
7.9.5. Test Result.....	250
7.10. AC Conducted Emissions Measurement.....	488

7.10.1. Test Limit	488
7.10.2. Test Setup	488
7.10.3. Test Result.....	489
8. CONCLUSION.....	491

§2.1033 General Information

Applicant:	TRIANGLE TECHNOLOGY(HK) CO., LIMITED
Applicant Address:	FLAT/RM 1105, HUA QIN INTERNATIONAL BUILDING, 340 QUEEN'S ROAD CENTRAL, HK
Manufacturer:	TRIANGLE TECHNOLOGY(HK) CO., LIMITED
Manufacturer Address:	FLAT/RM 1105, HUA QIN INTERNATIONAL BUILDING, 340 QUEEN'S ROAD CENTRAL, HK
Test Site:	MRT Technology (Taiwan) Co., Ltd
Test Site Address:	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)
MRT Registration No.:	291082
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Fuxing Rd., Taoyuan, Taiwan
(R.O.C)

- MRT facility is a FCC registered (Reg. No. 153292) test facility with the site description report on file and is designated by the FCC as an Accredited Test Film.
- MRT facility is an IC registered (MRT Reg. No. 21723-1) test laboratory with the site description on file at Industry Canada.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (TAF) under the American Association for Laboratory Accreditation Program (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC, Industry Taiwan, EU and TELEC Rules.

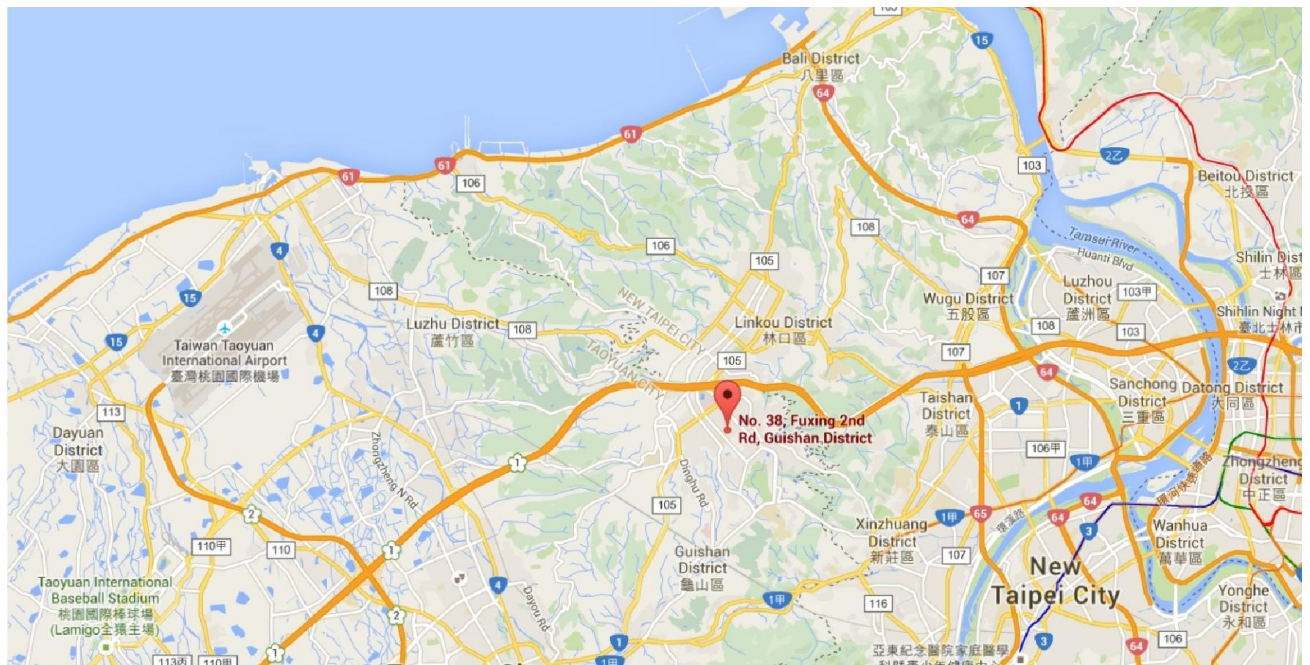
1. INTRODUCTION

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 Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	Acute Angle PC
Model No.	AA-B4
Brand Name:	Acute Angle
Wi-Fi Specification:	802.11a/b/g/n/ac
Bluetooth Specification:	v4.0 dual mode
Components	
Adapter	Brand Name: XinSPower Model No.: A241-1202000U Input Power: 100 - 240V ~ 50/60Hz, 0.8A Output Power: 12VDC 2000mA

2.2. Product Specification Subjective to this Report

Frequency Range	For 802.11a/n-HT20/ac-VHT20: 5180~5240MHz, 5260~5320MHz, 5500~5720MHz, 5745~5825MHz For 802.11n-HT40/ac-VHT40: 5190~5230MHz, 5270~5310MHz, 5510~5710MHz, 5755~5795MHz For 802.11ac-VHT80: 5210MHz, 5290MHz, 5530MHz, 5610MHz, 5690MHz, 5775MHz
Type of Modulation	802.11a/n/ac: OFDM
Data Rate	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps 802.11ac: up to 433.3Mbps

Note: For other features of this EUT, test report will be issued separately.

2.3. Working Frequencies for this Report

802.11a/n-HT20/ac-VHT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180 MHz	40	5200 MHz	44	5220 MHz
48	5240 MHz	52	5260 MHz	56	5280 MHz
60	5300 MHz	64	5320 MHz	100	5500 MHz
104	5520 MHz	108	5540 MHz	112	5560 MHz
116	5580 MHz	120	5600 MHz	124	5620 MHz
128	5640 MHz	132	5660 MHz	136	5680 MHz
140	5700 MHz	144	5720 MHz	149	5745 MHz
153	5765 MHz	157	5785 MHz	161	5805 MHz
165	5825 MHz	--	--	--	--

802.11n-HT40/ac-VHT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz	54	5270 MHz
62	5310 MHz	102	5510 MHz	110	5550 MHz
118	5590 MHz	126	5630 MHz	134	5670 MHz
142	5710 MHz	151	5755 MHz	159	5795 MHz

802.11ac-VHT80

Channel	Frequency	Channel	Frequency	Channel	Frequency
42	5210 MHz	58	5290 MHz	106	5530 MHz
122	5610 MHz	138	5690 MHz	155	5775 MHz

2.4. Description of Antennas

Antenna Type	Frequency Band (MHz)	Antenna Gain (dBi)	
		Main Antenna / Ant A (For Wi-Fi)	Aux Antenna / Ant B (For Wi-Fi & BT)
PIFA Antenna	2400 ~ 2483.5	0.81	0.46
	5150 ~ 5850	-0.09	-0.14

Note: Both Ant A and Ant B can transmit, but only one port is transmitting at the same time. They cannot transmit simultaneously.

2.5. Test Mode

Test Mode	Mode 1: Transmit by 802.11a (6Mbps)
	Mode 2: Transmit by 802.11n-HT20 (MCS0)
	Mode 3: Transmit by 802.11n-HT40 (MCS0)
	Mode 4: Transmit by 802.11ac-VHT20 (MCS0)
	Mode 5: Transmit by 802.11ac-VHT40 (MCS0)
	Mode 6: Transmit by 802.11ac-VHT80 (MCS0)

2.6. Description of Test Software

The test utility software used during testing was “DRTU”, and the version was 1.7.7-03376.

Power Parameter Value

Test Mode	Test Channel No.	Test Frequency (MHz)	Power Parameter Value	
			Ant A	Ant B
802.11a	36	5180	17.5	17.5
	44	5220	19.0	19.0
	48	5240	19.0	19.0
	52	5260	19.0	19.0
	60	5300	19.0	19.0
	64	5320	18.0	19.0
	100	5500	18.0	19.0
	120	5600	19.0	19.0
	140	5700	19.0	18.5
	144	5720	19.0	19.0
	149	5745	19.0	19.0
	157	5785	19.0	19.0
	165	5825	19.0	19.0

Test Mode	Test Channel No.	Test Frequency (MHz)	Power Parameter Value	
			Ant A	Ant B
802.11n-HT20	36	5180	17.0	16.5
	44	5220	19.0	19.0
	48	5240	19.0	19.0
	52	5260	19.0	19.0
	60	5300	19.0	19.0
	64	5320	18.0	19.0
	100	5500	17.5	19.0
	120	5600	19.0	19.0
	140	5700	17.0	17.5
	144	5720	19.0	19.0
	149	5745	19.0	19.0
	157	5785	19.0	19.0
	165	5825	19.0	19.0
802.11n-HT40	38	5190	15.0	13.5
	46	5230	19.0	19.0
	54	5270	19.0	19.0
	62	5310	16.5	15.0
	102	5510	16.0	15.5
	118	5590	19.0	19.0
	134	5670	19.0	19.0
	142	5710	19.0	19.0
	151	5755	19.0	19.0
	159	5795	19.0	19.0

Test Mode	Test Channel No.	Test Frequency (MHz)	Power Parameter Value	
			Ant A	Ant B
802.11ac-VHT20	36	5180	16.5	16.0
	44	5220	19.0	19.0
	48	5240	19.0	19.0
	52	5260	19.0	19.0
	60	5300	19.0	19.0
	64	5320	17.5	19.0
	100	5500	16.0	19.0
	120	5600	19.0	19.0
	140	5700	17.0	18.0
	144	5720	19.0	19.0
	149	5745	19.0	19.0
	157	5785	19.0	19.0
	165	5825	19.0	19.0
802.11ac-VHT40	38	5190	15.0	13.5
	46	5230	19.0	19.0
	54	5270	19.0	19.0
	62	5310	16.5	16.0
	102	5510	16.0	14.0
	118	5590	19.0	19.0
	134	5670	19.0	19.0
	142	5710	19.0	19.0
	151	5755	19.0	19.0
	159	5795	19.0	19.0
802.11ac-VHT80	42	5210	12.5	13.5
	58	5290	13.0	12.5
	106	5530	12.0	12.5
	122	5610	16.0	18.0
	138	5690	19.0	19.0
	155	5775	16.5	19.0

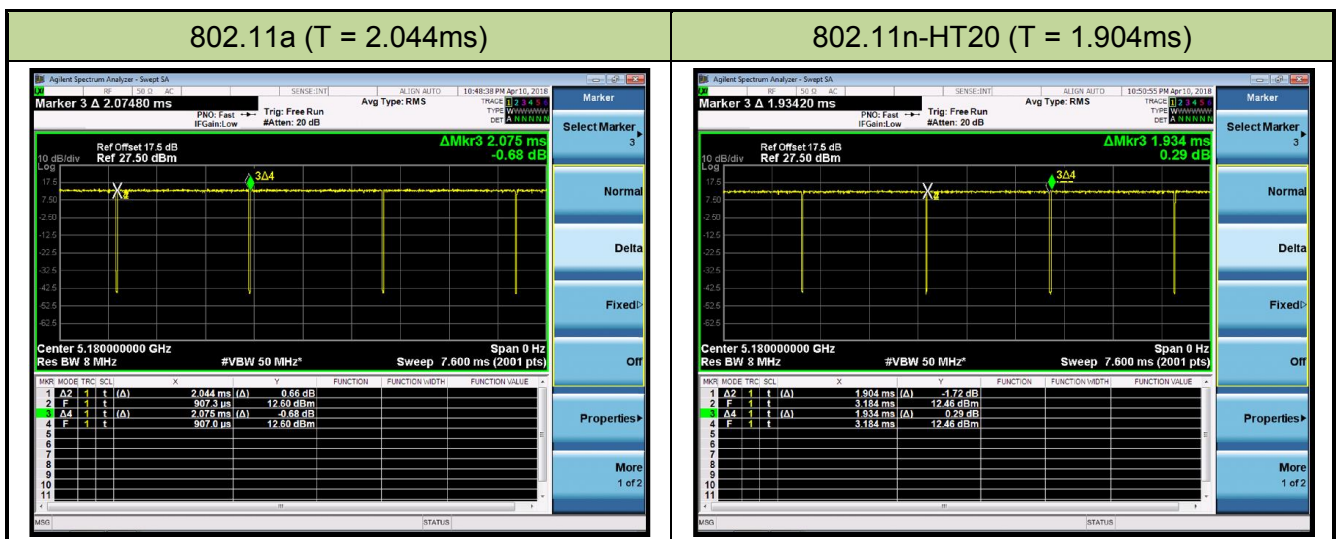
2.7. Device Capabilities

This device contains the following capabilities:

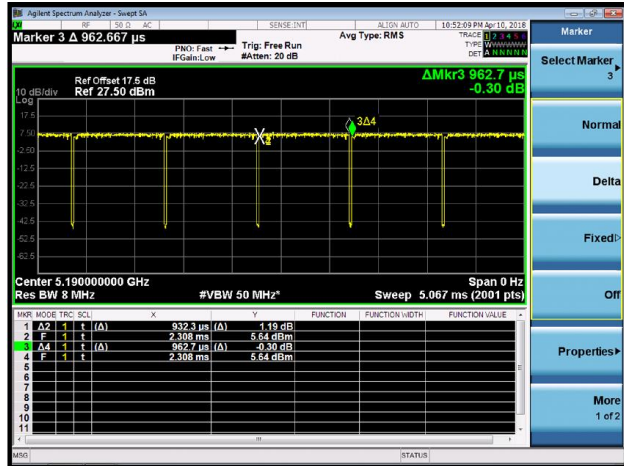
2.4GHz WLAN (DTS), 5GHz WLAN (UNII) and Bluetooth (v4.0 dual mode)

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. 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:

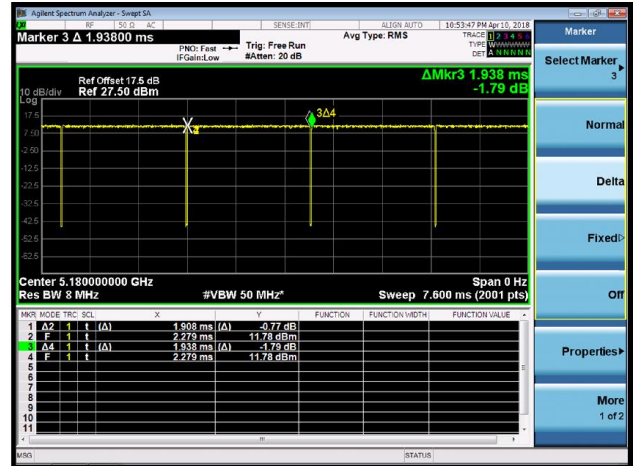
Test Mode	Duty Cycle
802.11a	98.51 %
802.11n-HT20	98.45 %
802.11n-HT40	96.98 %
802.11ac-VHT20	98.45 %
802.11ac-VHT40	97.27 %
802.11ac-VHT80	93.75 %



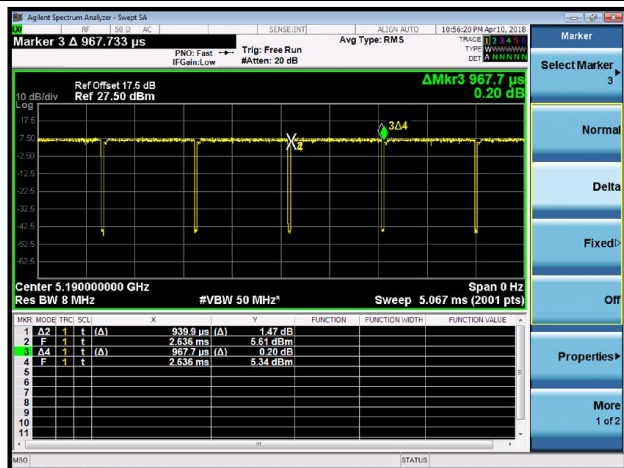
802.11n-HT40 (T = 0.932ms)



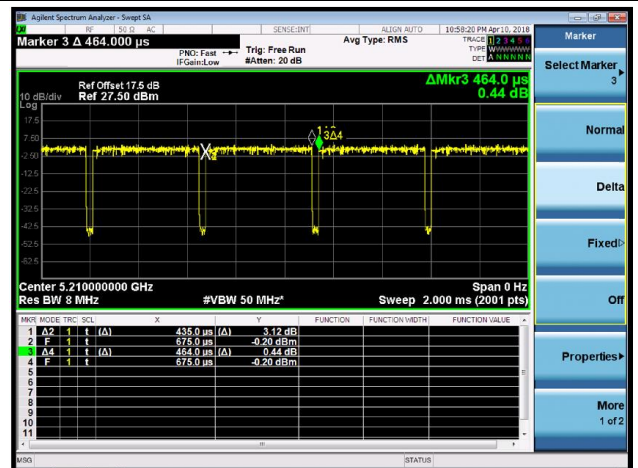
802.11ac-VHT20 (T = 1.908ms)



802.11ac-VHT40 (T = 0.940ms)



802.11ac-VHT80 (T = 0.435ms)



2.8. Test Configuration

The **Acute Angle PC** was tested per the guidance of KDB 789033 D02v02r01. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.9. EMI Suppression Device(s)/Modifications

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

2.10. 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 pamphlets 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 FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 789033 D02v02r01 were used in the measurement of the **Acute Angle PC**.

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 C63.10-2013.

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. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remotecontrolled, 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 for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 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 **Acute Angle PC** is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The **Acute Angle PC** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions – SR1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Two-Line V-Network	R&S	ENV216	MRTTWA00019	1 year	2019/03/20
Two-Line V-Network	R&S	ENV216	MRTTWA00020	1 year	2019/03/20
EMI Test Receiver	R&S	ESR3	MRTTWA00045	1 year	2018/05/09
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00033	1 year	2018/06/08

Radiated Emissions - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Signal Analyzer	R&S	FSV40	MRTTWA00007	1 year	2019/03/20
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2019/03/19
Broadband Preamplifier	SCHWARZBECK	BBV 9718	MRTTWA00005	1 year	2018/04/23
Broadband Amplifier	SCHWARZBECK	BBV 9721	MRTTWA00006	1 year	2018/04/23
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	MRTTWA00002	1 year	2018/04/24
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2018/05/14
Broadband Hornantenna	SCHWARZBECK	BBHA 9120D	MRTTWA00003	1 year	2018/04/24
Breitband Hornantenna	SCHWARZBECK	BBHA 9170	MRTTWA00004	1 year	2018/04/23
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00032	1 year	2018/06/08

Conducted Test Equipment - SR1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
X-Series USB Peak and Average Power Sensor	KEYSIGHT	U2021XA	MRTTWA00014	1 year	2019/04/24
X-Series USB Peak and Average Power Sensor	KEYSIGHT	U2021XA	MRTTWA00015	1 year	2019/03/20
Wideband Radio Communication Taster	R&S	CMW 500	MRTTWA00041	1 year	2018/12/13
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2018/07/24
Temperature & Humidity Chamber	TEN BILLION	TTH-B3UP	MRTTWA00036	1 year	2018/05/10
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00033	1 year	2018/06/08

Software	Version	Function
e3	9.160520a	EMI Test Software

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 - SR2
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 150kHz~30MHz: 3.46dB
Radiated Emission Measurement - AC1
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 40GHz: 4.76dB
Output Power - SR1
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 1.13dB
Power Spectrum Density - SR1
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 1.15dB
Occupied Bandwidth - SR1
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.28%

7. TEST RESULT

7.1. Summary

Product Name: Acute Angle PC
FCC ID: 2APO3AA-B4
FCC Classification: Unlicensed National Information Infrastructure (UNII)
Data Rate(s) Tested: 6Mbps (802.11a) & MCS0 (802.11n-HT20) & MCS0 (802.11n-HT40) & MCS0 (802.11ac-VHT20) & MCS0 (802.11ac-VHT40) & MCS0 (802.11ac-VHT80)

FCC Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407(a)	26dB Bandwidth	N/A	Conducted	Pass	Section 7.2
15.407(e)	6dB Bandwidth	$\geq 500\text{kHz}$		Pass	Section 7.3
15.407(a)(1)(iv), (2), (3)	Maximum Conducted Output Power	Refer to Section 7.4		Pass	Section 7.4
15.407(h)(1)	Transmit Power Control	$\leq 24\text{ dBm}$		Pass	Section 7.5
15.407(a)(1)(iv), (2), (5)	Power Spectral Density	Refer to Section 7.6		Pass	Section 7.6
15.407(g)	Frequency Stability	$\pm 20\text{ ppm}$		Pass	Section 7.7
15.407(b)(1), (2), (3), (4), (5)	Undesirable Emissions	$\leq -27\text{dBm/MHz EIRP}$	Radiated	Pass	Section 7.8 & 7.9
15.205, 15.209 15.407(b)(5), (6), (7)	General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		Pass	
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.10

Notes:

- 1) 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.
- 2) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.

7.2. 26dB Bandwidth Measurement

7.2.1. Test Limit

N/A

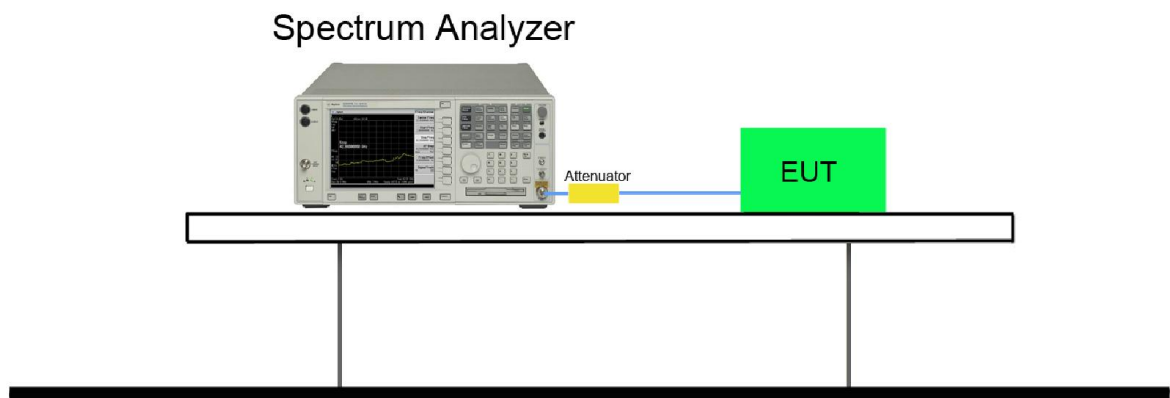
7.2.2. Test Procedure Used

KDB 789033 D02v02r01 - 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. $VBW \geq 3 \times RBW$.
4. Detector = Peak.
5. Trace mode = max hold.

7.2.4. Test Setup



7.2.5. Test Result

Product	Acute Angle PC	Temperature	24°C
Test Engineer	Kevin Ker	Relative Humidity	64%
Test Site	SR2	Test Date	2018/04/11

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant A					
802.11a	6Mbps	36	5180	28.90	17.38
802.11a	6Mbps	44	5220	33.04	19.10
802.11a	6Mbps	48	5240	32.97	19.01
802.11a	6Mbps	52	5260	32.31	18.54
802.11a	6Mbps	60	5300	32.64	18.67
802.11a	6Mbps	64	5320	30.67	17.81
802.11a	6Mbps	100	5500	31.30	18.23
802.11a	6Mbps	120	5600	30.59	18.11
802.11a	6Mbps	140	5700	30.03	18.30
802.11a	6Mbps	144	5720	30.41	18.20
802.11a	6Mbps	149	5745	30.11	17.92
802.11a	6Mbps	157	5785	30.35	17.93
802.11a	6Mbps	165	5825	32.18	17.86
802.11n-HT20	6Mbps	36	5180	22.87	17.67
802.11n-HT20	6Mbps	44	5220	26.38	17.93
802.11n-HT20	6Mbps	48	5240	29.86	18.10
802.11n-HT20	6Mbps	52	5260	31.18	18.42
802.11n-HT20	6Mbps	60	5300	33.75	18.57
802.11n-HT20	6Mbps	64	5320	30.24	18.23
802.11n-HT20	6Mbps	100	5500	28.94	18.22
802.11n-HT20	6Mbps	120	5600	30.82	18.39
802.11n-HT20	6Mbps	140	5700	23.92	17.68
802.11n-HT20	6Mbps	144	5720	29.74	18.25
802.11n-HT20	6Mbps	149	5745	33.94	19.06
802.11n-HT20	6Mbps	157	5785	31.22	18.42
802.11n-HT20	6Mbps	165	5825	30.16	18.40

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant A					
802.11n-HT40	MCS0	38	5190	41.96	36.16
802.11n-HT40	MCS0	46	5230	55.72	36.39
802.11n-HT40	MCS0	54	5270	68.99	36.92
802.11n-HT40	MCS0	62	5310	44.35	36.07
802.11n-HT40	MCS0	102	5510	42.72	36.09
802.11n-HT40	MCS0	118	5590	62.53	36.66
802.11n-HT40	MCS0	134	5670	62.32	36.64
802.11n-HT40	MCS0	142	5710	61.87	36.57
802.11n-HT40	MCS0	151	5755	62.73	36.68
802.11n-HT40	MCS0	159	5795	62.50	36.64
802.11ac-VHT20	MCS0	36	5180	22.45	17.66
802.11ac-VHT20	MCS0	44	5220	29.84	18.41
802.11ac-VHT20	MCS0	48	5240	30.35	18.19
802.11ac-VHT20	MCS0	52	5260	29.89	18.27
802.11ac-VHT20	MCS0	60	5300	33.59	19.02
802.11ac-VHT20	MCS0	64	5320	29.32	18.15
802.11ac-VHT20	MCS0	100	5500	23.87	17.68
802.11ac-VHT20	MCS0	120	5600	29.41	18.14
802.11ac-VHT20	MCS0	140	5700	23.73	17.72
802.11ac-VHT20	MCS0	144	5720	30.28	18.16
802.11ac-VHT20	MCS0	149	5745	29.67	18.33
802.11ac-VHT20	MCS0	157	5785	29.13	18.38
802.11ac-VHT20	MCS0	165	5825	29.80	18.30
802.11ac-VHT40	MCS0	38	5190	41.22	36.06
802.11ac-VHT40	MCS0	46	5230	49.79	36.34
802.11ac-VHT40	MCS0	54	5270	54.09	36.45
802.11ac-VHT40	MCS0	62	5310	44.63	36.18
802.11ac-VHT40	MCS0	102	5510	43.34	36.10
802.11ac-VHT40	MCS0	118	5590	61.94	36.73
802.11ac-VHT40	MCS0	134	5670	64.67	36.76
802.11ac-VHT40	MCS0	142	5710	68.55	36.99
802.11ac-VHT40	MCS0	151	5755	64.85	36.85
802.11ac-VHT40	MCS0	159	5795	67.57	36.75

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant A					
802.11ac-VHT80	MCS0	42	5210	81.22	75.26
802.11ac-VHT80	MCS0	58	5290	81.46	75.23
802.11ac-VHT80	MCS0	106	5530	81.51	75.24
802.11ac-VHT80	MCS0	122	5610	156.60	87.73
802.11ac-VHT80	MCS0	138	5690	158.80	79.50
802.11ac-VHT80	MCS0	155	5775	146.70	76.32

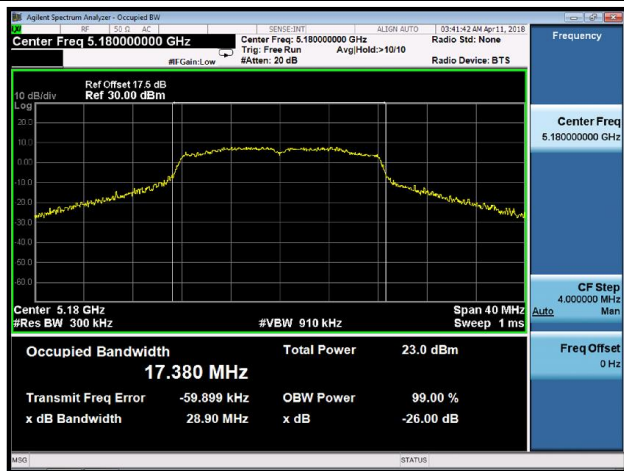
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant B					
802.11a	6Mbps	36	5180	28.42	17.18
802.11a	6Mbps	44	5220	30.93	17.83
802.11a	6Mbps	48	5240	29.99	17.59
802.11a	6Mbps	52	5260	29.88	17.85
802.11a	6Mbps	60	5300	30.96	17.90
802.11a	6Mbps	64	5320	33.45	18.50
802.11a	6Mbps	100	5500	30.85	17.85
802.11a	6Mbps	120	5600	30.67	17.67
802.11a	6Mbps	140	5700	30.14	17.47
802.11a	6Mbps	144	5720	29.61	17.68
802.11a	6Mbps	149	5745	30.05	17.87
802.11a	6Mbps	157	5785	29.73	17.60
802.11a	6Mbps	165	5825	28.86	17.34
802.11n-HT20	6Mbps	36	5180	23.57	17.67
802.11n-HT20	6Mbps	44	5220	30.72	18.40
802.11n-HT20	6Mbps	48	5240	33.04	18.45
802.11n-HT20	6Mbps	52	5260	34.07	19.11
802.11n-HT20	6Mbps	60	5300	33.95	19.35
802.11n-HT20	6Mbps	64	5320	33.21	18.98
802.11n-HT20	6Mbps	100	5500	31.45	18.85
802.11n-HT20	6Mbps	120	5600	30.86	18.64
802.11n-HT20	6Mbps	140	5700	28.81	18.19
802.11n-HT20	6Mbps	144	5720	30.81	18.35
802.11n-HT20	6Mbps	149	5745	32.75	18.91
802.11n-HT20	6Mbps	157	5785	31.34	18.52
802.11n-HT20	6Mbps	165	5825	31.27	18.54

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant B					
802.11n-HT40	MCS0	38	5190	42.08	36.06
802.11n-HT40	MCS0	46	5230	68.70	36.75
802.11n-HT40	MCS0	54	5270	72.27	37.08
802.11n-HT40	MCS0	62	5310	43.48	36.06
802.11n-HT40	MCS0	102	5510	44.07	36.15
802.11n-HT40	MCS0	118	5590	69.15	37.01
802.11n-HT40	MCS0	134	5670	67.26	36.89
802.11n-HT40	MCS0	142	5710	74.77	37.14
802.11n-HT40	MCS0	151	5755	69.26	36.87
802.11n-HT40	MCS0	159	5795	68.00	36.87
802.11ac-VHT20	MCS0	36	5180	22.62	17.67
802.11ac-VHT20	MCS0	44	5220	32.99	18.76
802.11ac-VHT20	MCS0	48	5240	35.53	19.48
802.11ac-VHT20	MCS0	52	5260	33.66	19.37
802.11ac-VHT20	MCS0	60	5300	32.54	19.13
802.11ac-VHT20	MCS0	64	5320	33.87	19.00
802.11ac-VHT20	MCS0	100	5500	31.30	18.69
802.11ac-VHT20	MCS0	120	5600	30.91	18.69
802.11ac-VHT20	MCS0	140	5700	30.62	18.30
802.11ac-VHT20	MCS0	144	5720	31.71	18.52
802.11ac-VHT20	MCS0	149	5745	30.21	18.74
802.11ac-VHT20	MCS0	157	5785	32.87	18.58
802.11ac-VHT20	MCS0	165	5825	29.32	18.44
802.11ac-VHT40	MCS0	38	5190	41.44	36.03
802.11ac-VHT40	MCS0	46	5230	69.04	36.91
802.11ac-VHT40	MCS0	54	5270	65.67	36.83
802.11ac-VHT40	MCS0	62	5310	43.23	36.14
802.11ac-VHT40	MCS0	102	5510	42.34	36.08
802.11ac-VHT40	MCS0	118	5590	67.25	36.81
802.11ac-VHT40	MCS0	134	5670	63.42	36.87
802.11ac-VHT40	MCS0	142	5710	69.43	36.92
802.11ac-VHT40	MCS0	151	5755	66.70	36.85
802.11ac-VHT40	MCS0	159	5795	68.36	36.86

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant B					
802.11ac-VHT80	MCS0	42	5210	81.35	75.25
802.11ac-VHT80	MCS0	58	5290	81.14	75.19
802.11ac-VHT80	MCS0	106	5530	81.29	75.23
802.11ac-VHT80	MCS0	122	5610	159.00	90.00
802.11ac-VHT80	MCS0	138	5690	159.70	95.16
802.11ac-VHT80	MCS0	155	5775	158.30	92.78

802.11a 26dB Bandwidth & 99% Bandwidth - Ant A

Channel 36 (5180MHz)



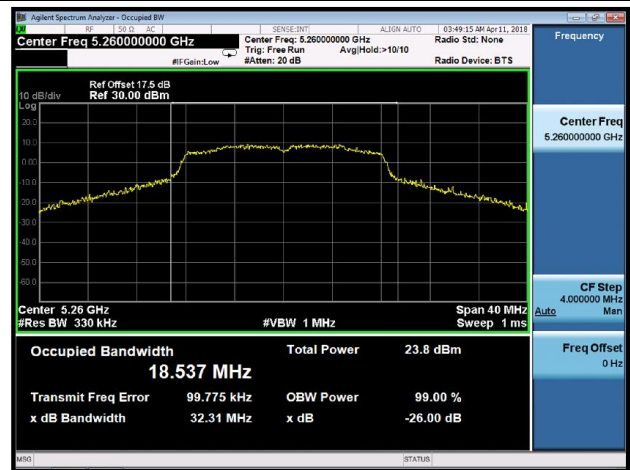
Channel 44 (5220MHz)



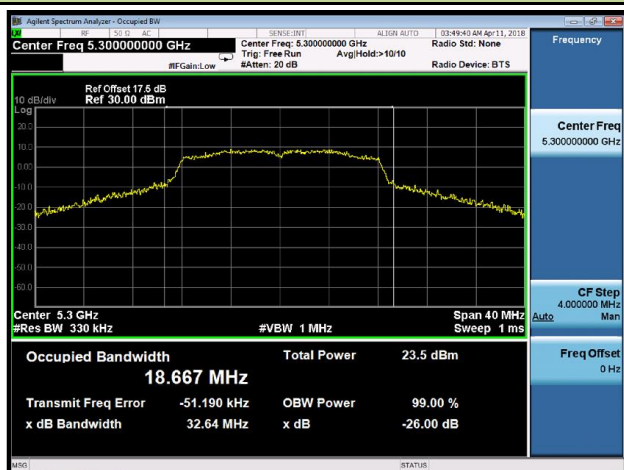
Channel 48 (5240MHz)



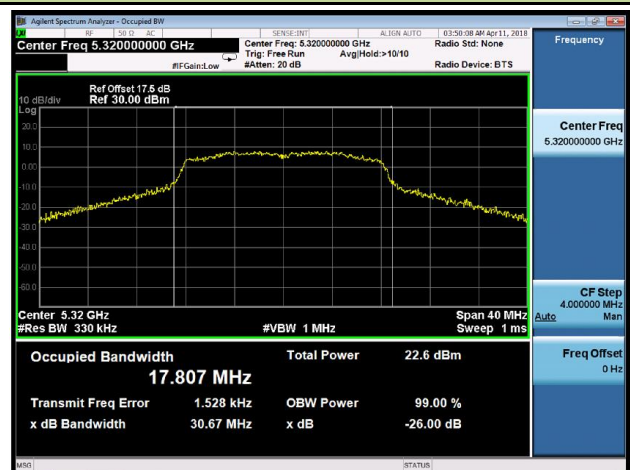
Channel 52 (5260MHz)



Channel 60 (5300MHz)

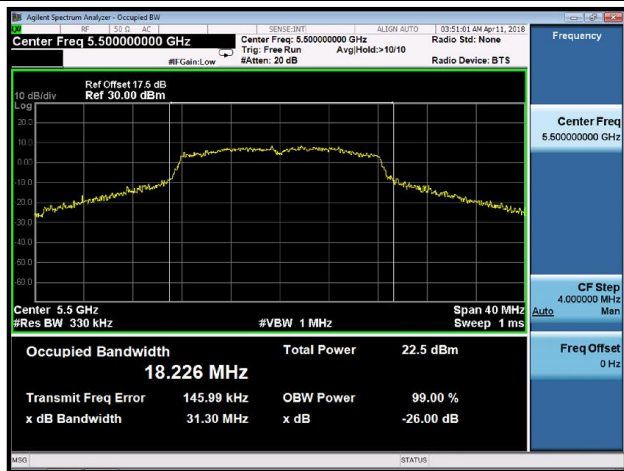


Channel 64 (5320MHz)

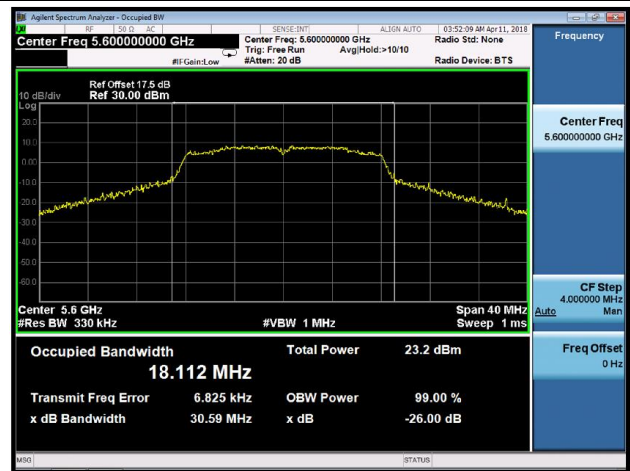


802.11a 26dB Bandwidth & 99% Bandwidth - Ant A

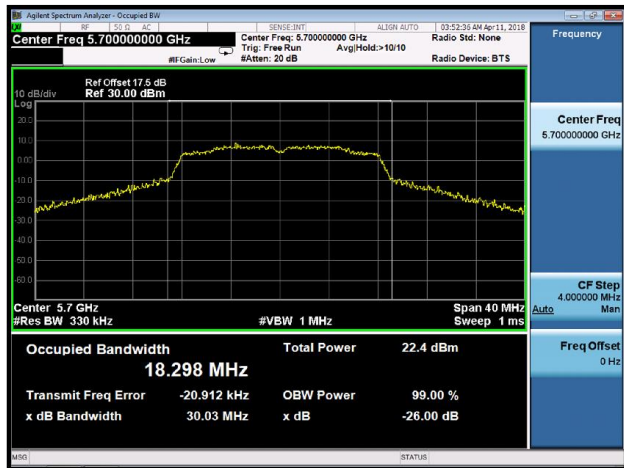
Channel 100 (5500MHz)



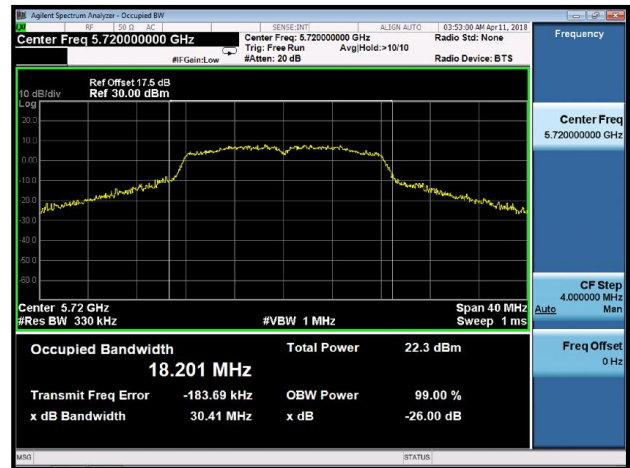
Channel 100 (5600MHz)



Channel 140 (5700MHz)



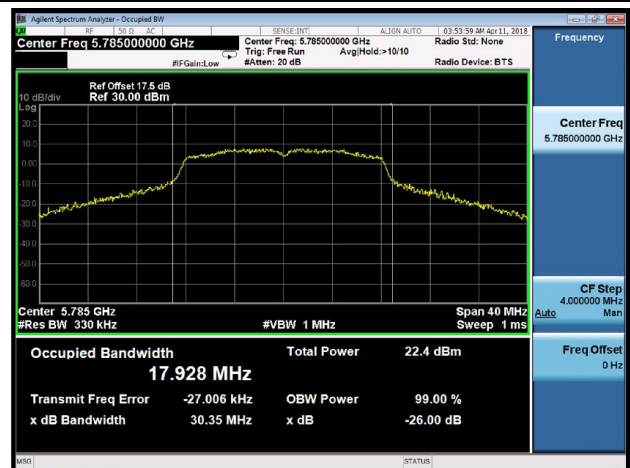
Channel 144 (5720MHz)



Channel 149 (5745MHz)

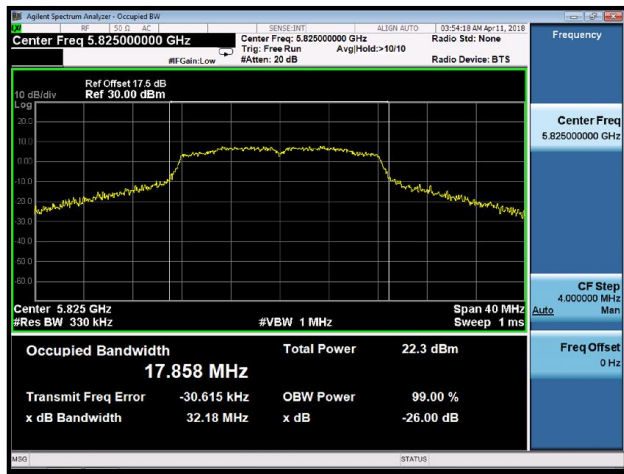


Channel 157 (5785MHz)



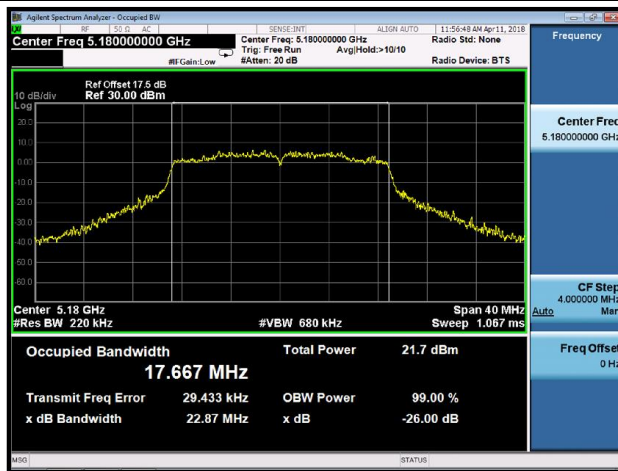
802.11a 26dB Bandwidth & 99% Bandwidth - Ant A

Channel 165 (5825MHz)



802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant A

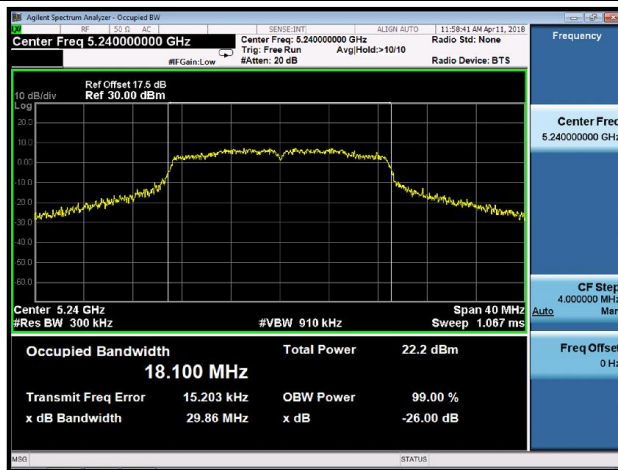
Channel 36 (5180MHz)



Channel 44 (5220MHz)



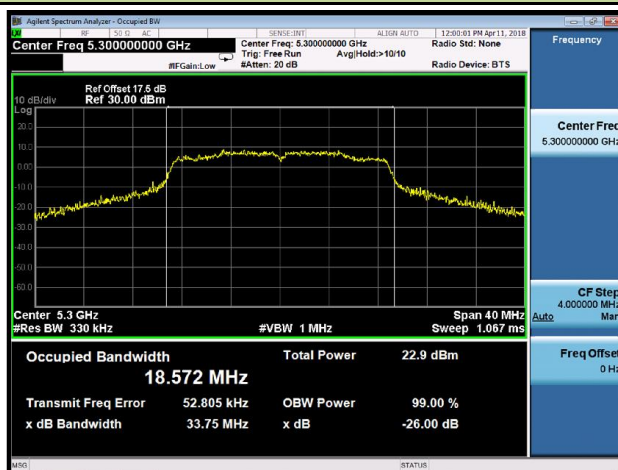
Channel 48 (5240MHz)



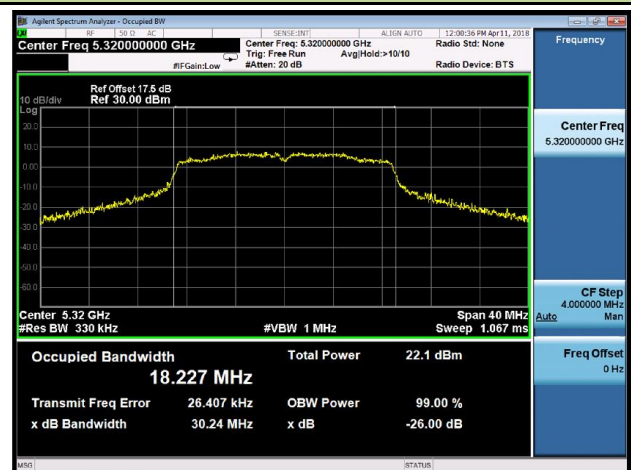
Channel 52 (5260MHz)



Channel 60 (5300MHz)

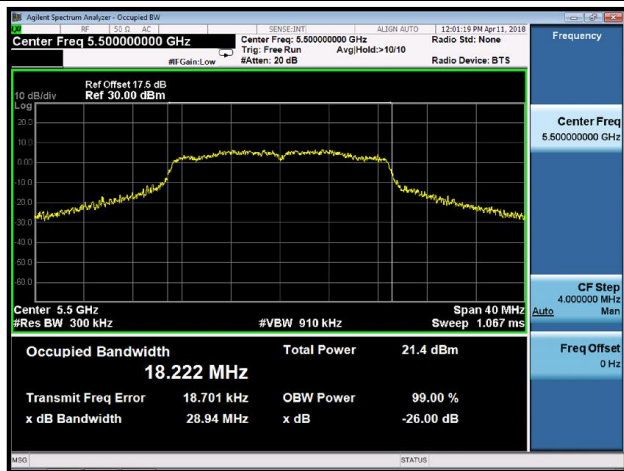


Channel 64 (5320MHz)

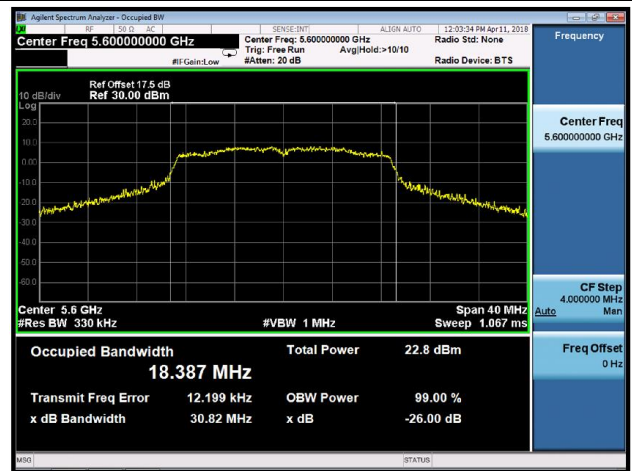


802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant A

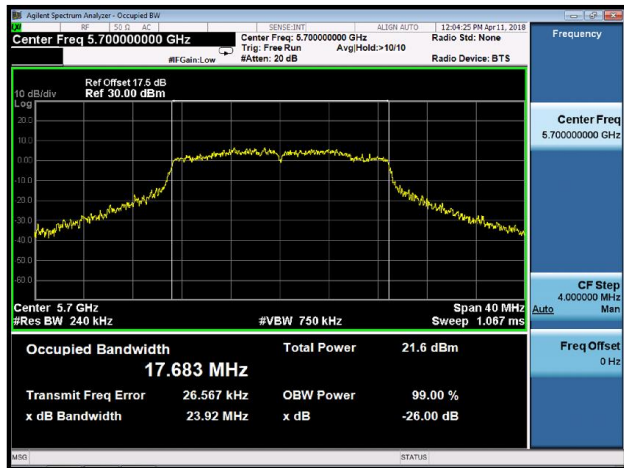
Channel 100 (5500MHz)



Channel 100 (5600MHz)



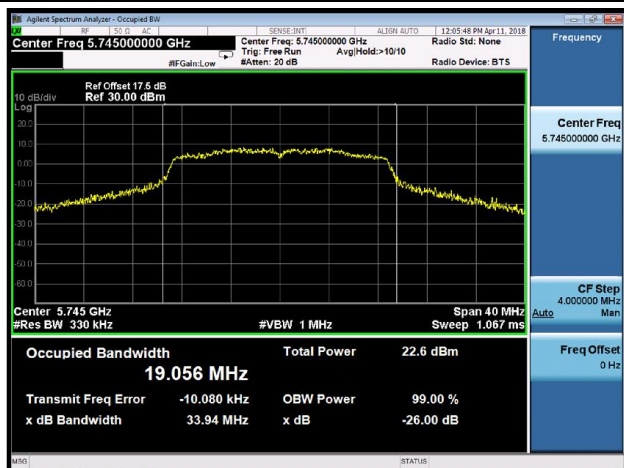
Channel 140 (5700MHz)



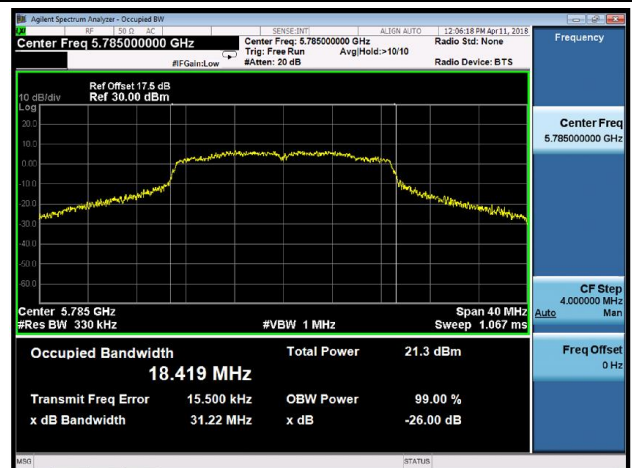
Channel 144 (5720MHz)



Channel 149 (5745MHz)

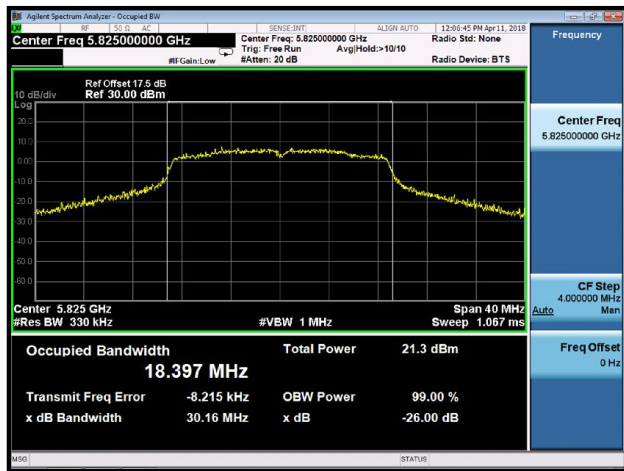


Channel 157 (5785MHz)



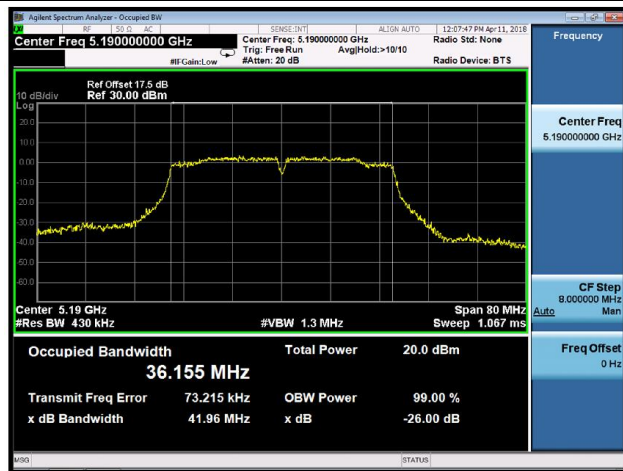
802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant A

Channel 165 (5825MHz)

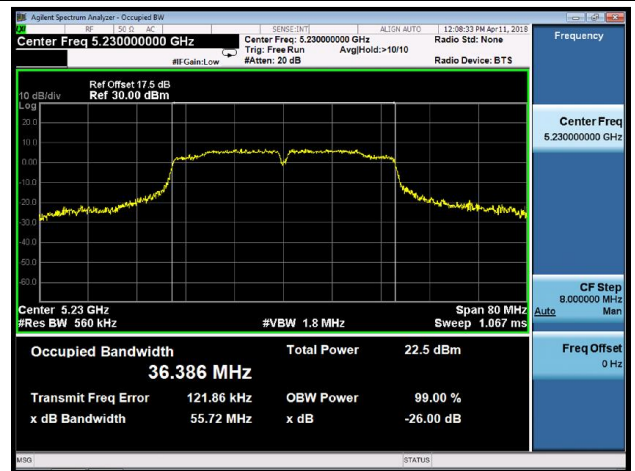


802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant A

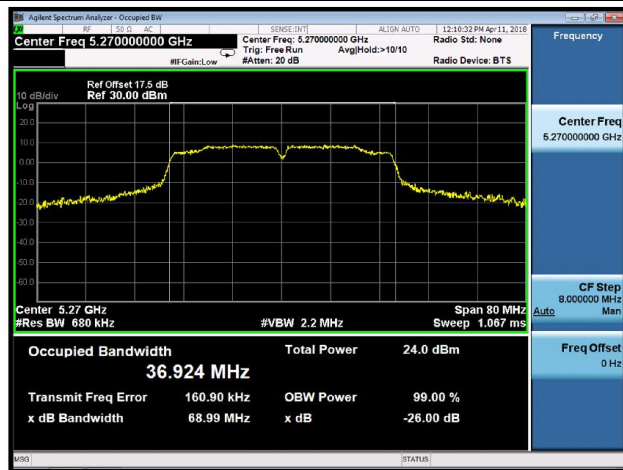
Channel 38 (5190MHz)



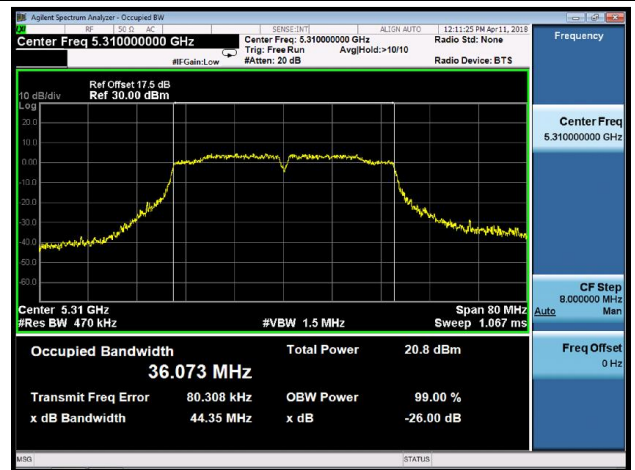
Channel 46 (5230MHz)



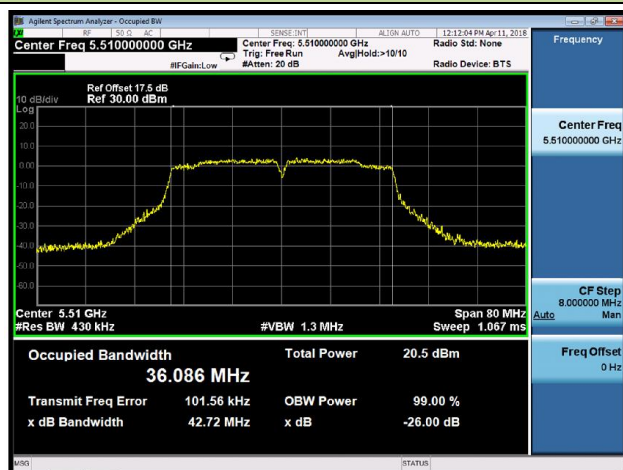
Channel 54 (5270MHz)



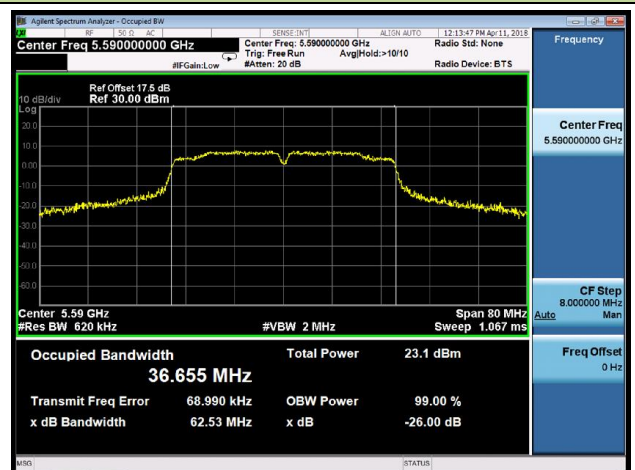
Channel 62 (5310MHz)



Channel 102 (5510MHz)

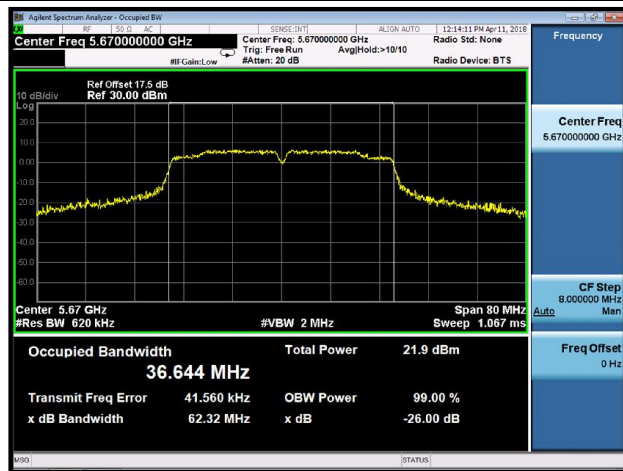


Channel 118 (5590MHz)

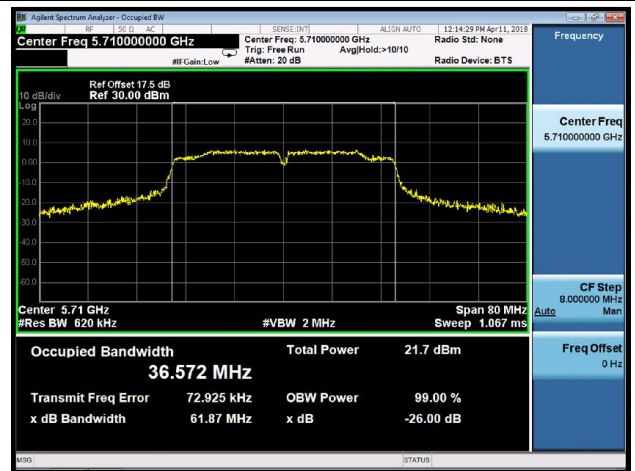


802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant A

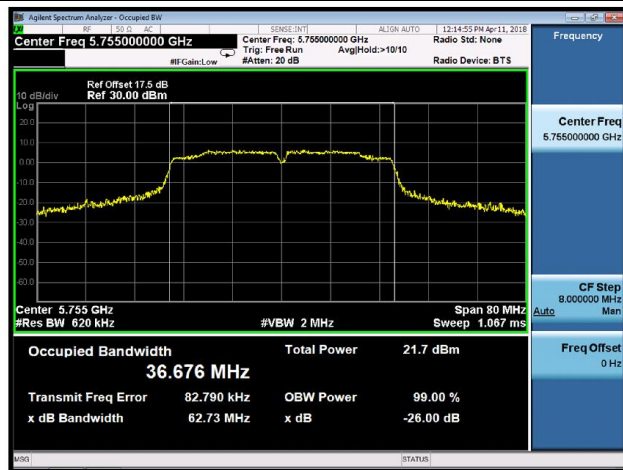
Channel 134 (5670MHz)



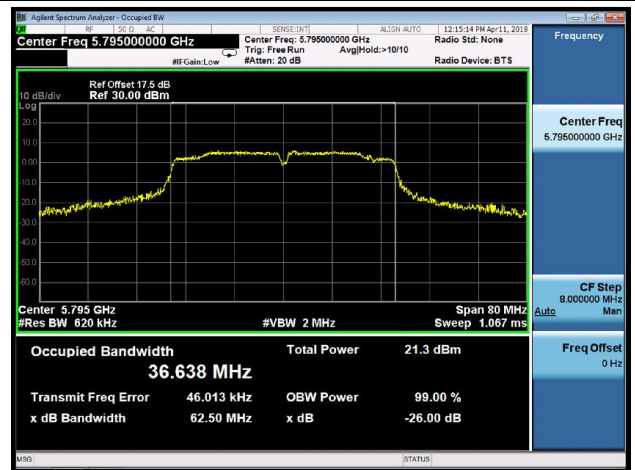
Channel 142 (5710MHz)



Channel 151 (5755MHz)

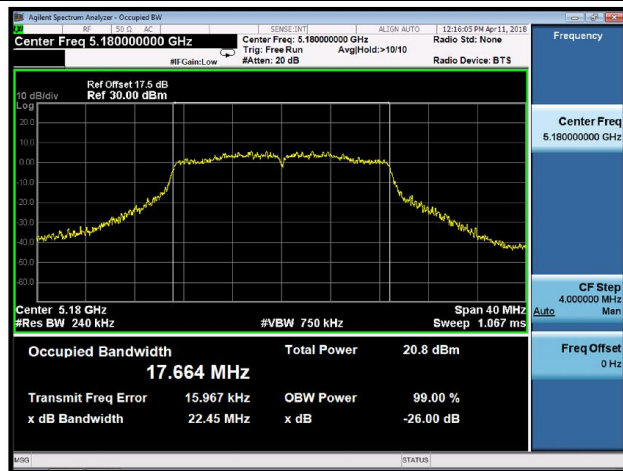


Channel 159 (5795MHz)

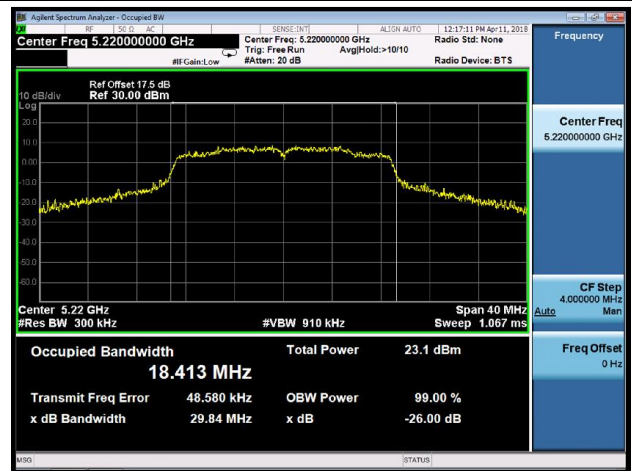


802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant A

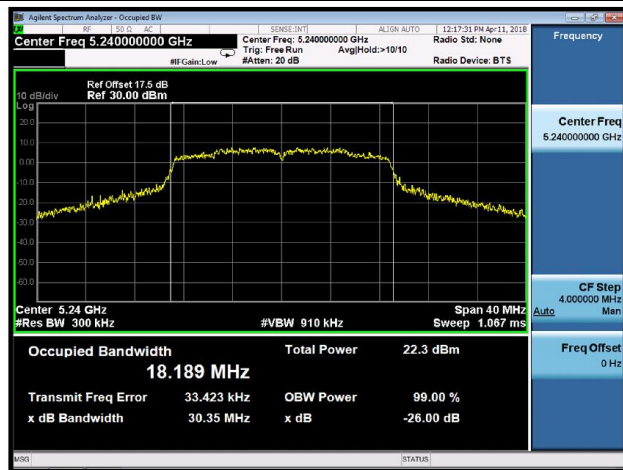
Channel 36 (5180MHz)



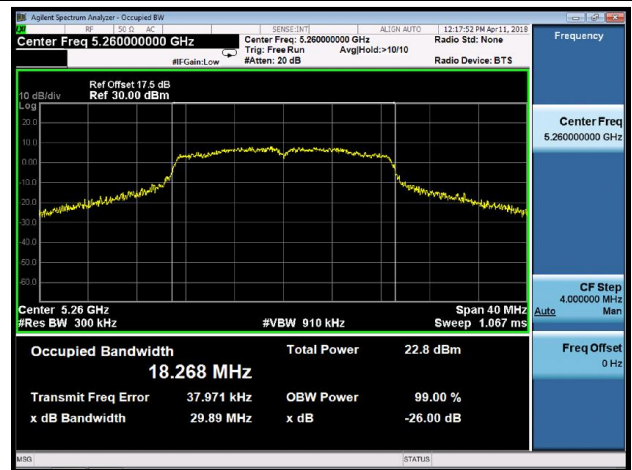
Channel 44 (5220MHz)



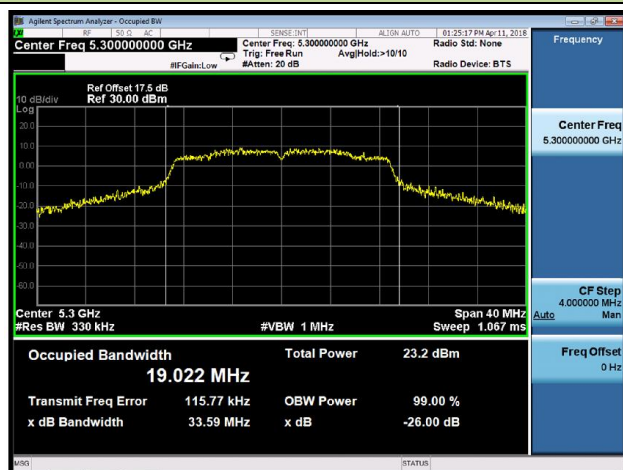
Channel 48 (5240MHz)



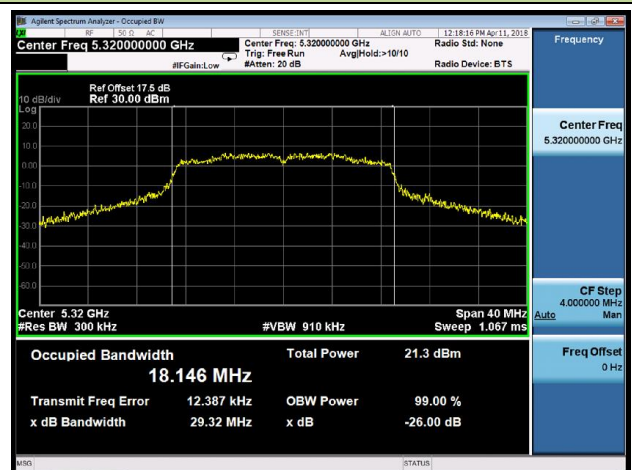
Channel 52 (5260MHz)



Channel 60 (5300MHz)

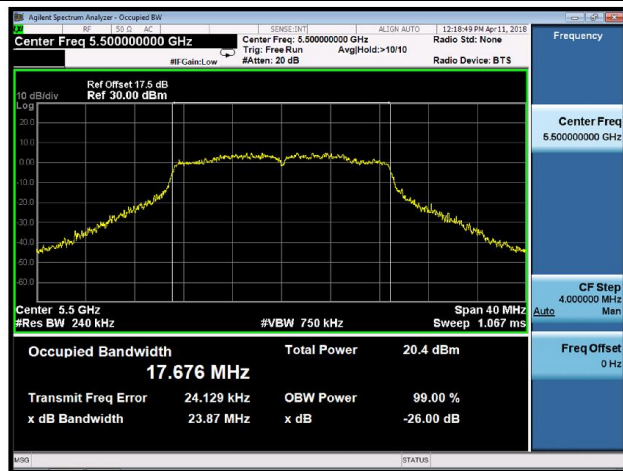


Channel 64 (5320MHz)

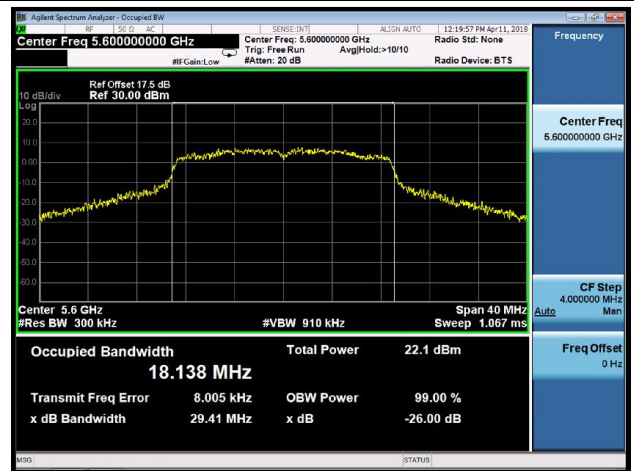


802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant A

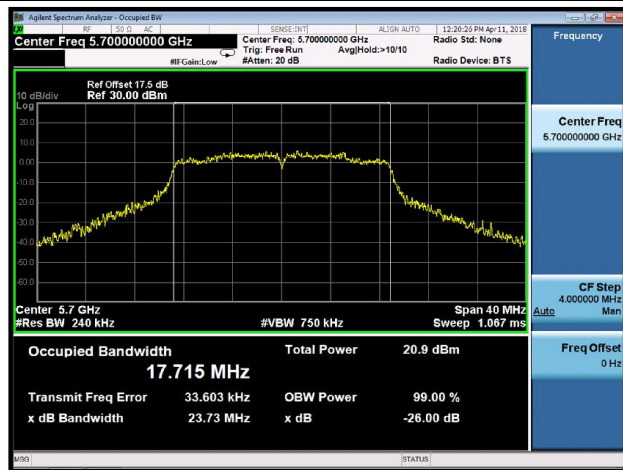
Channel 100 (5500MHz)



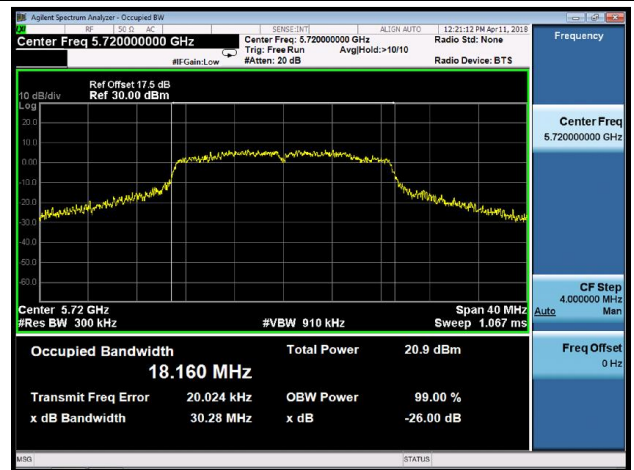
Channel 120 (5600MHz)



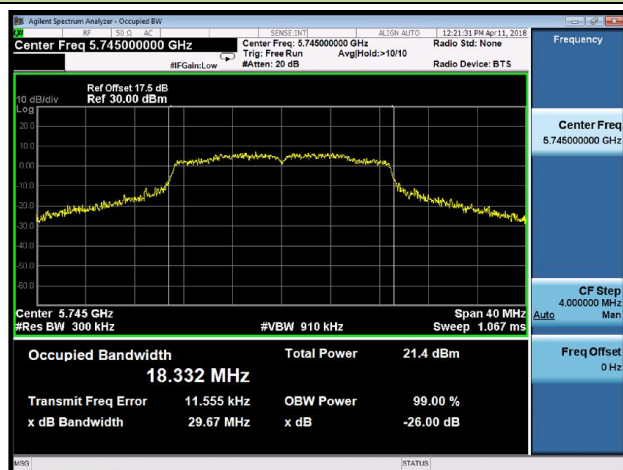
Channel 140 (5700MHz)



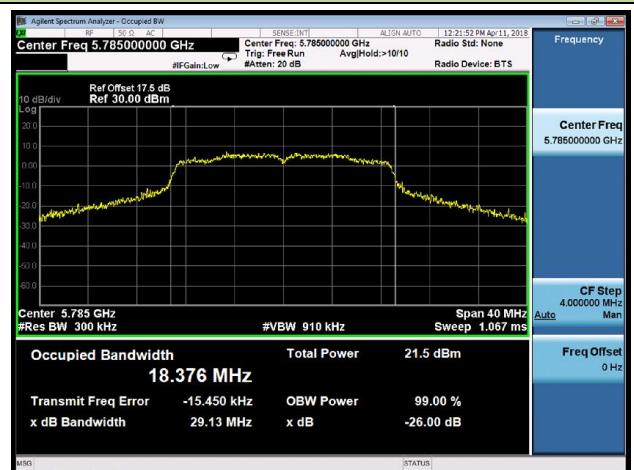
Channel 144 (5720MHz)



Channel 149 (5745MHz)

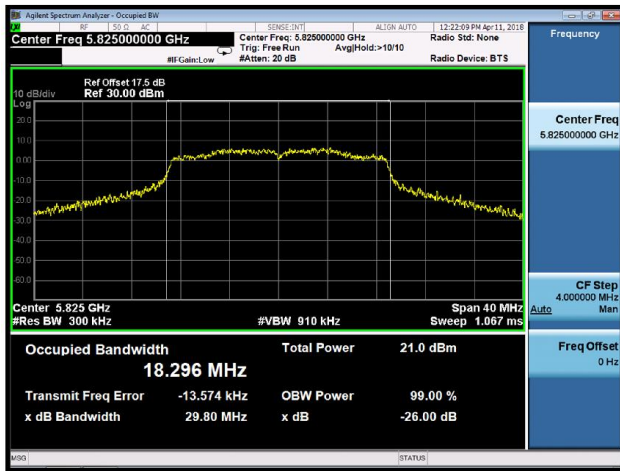


Channel 157 (5785MHz)



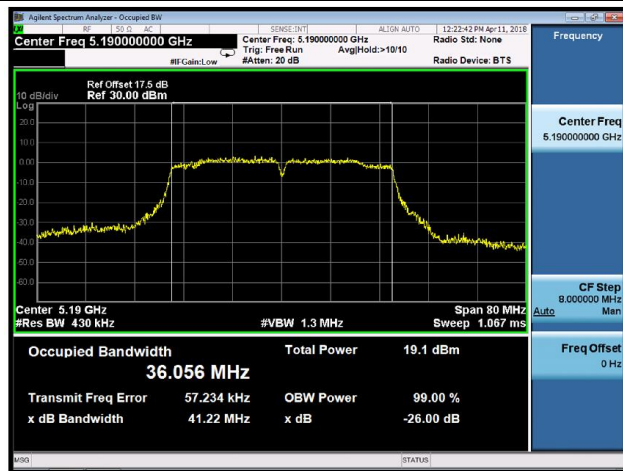
802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant A

Channel 165 (5825MHz)

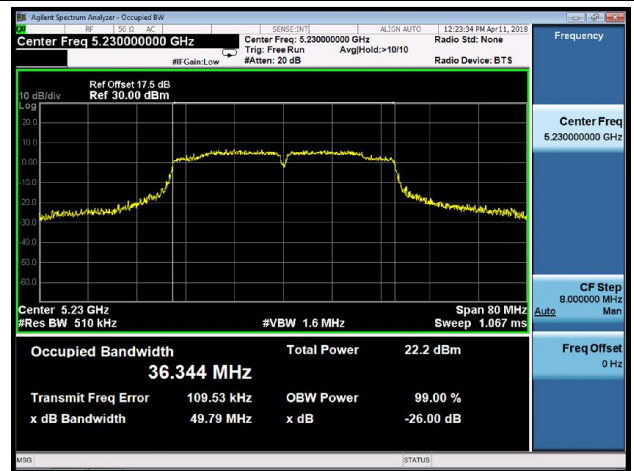


802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth - Ant A

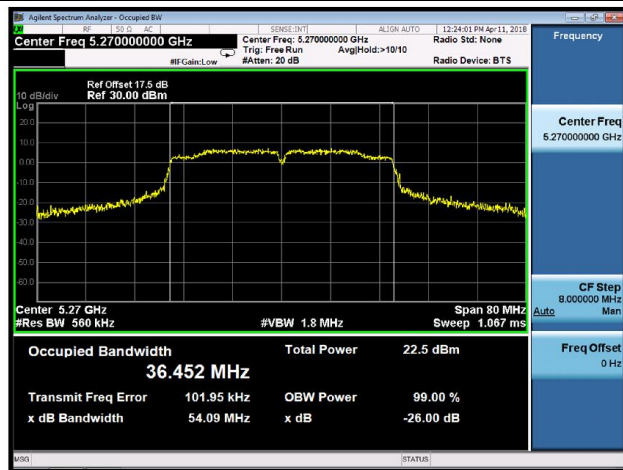
Channel 38 (5190MHz)



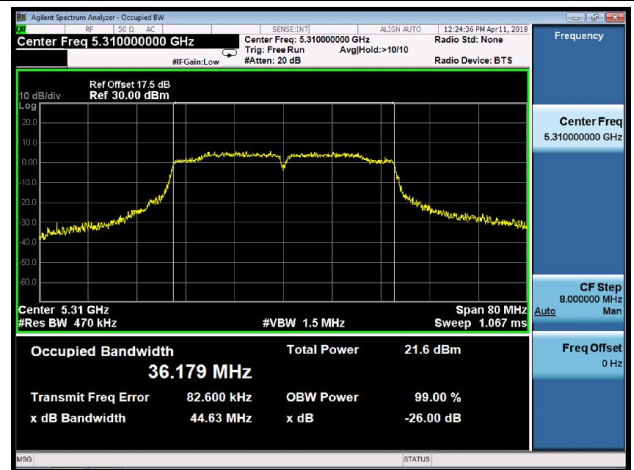
Channel 46 (5230MHz)



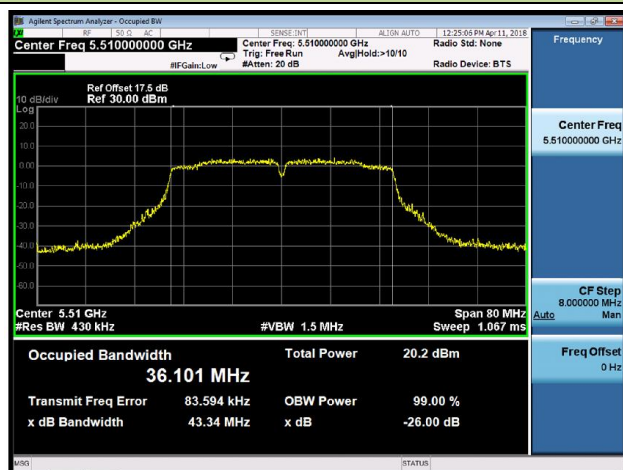
Channel 54 (5270MHz)



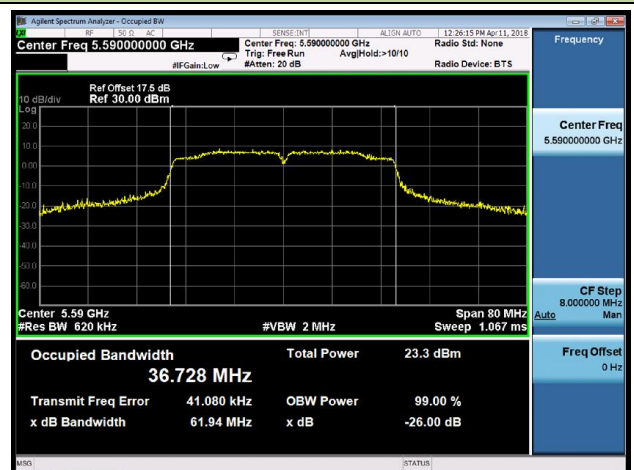
Channel 62 (5310MHz)



Channel 102 (5510MHz)

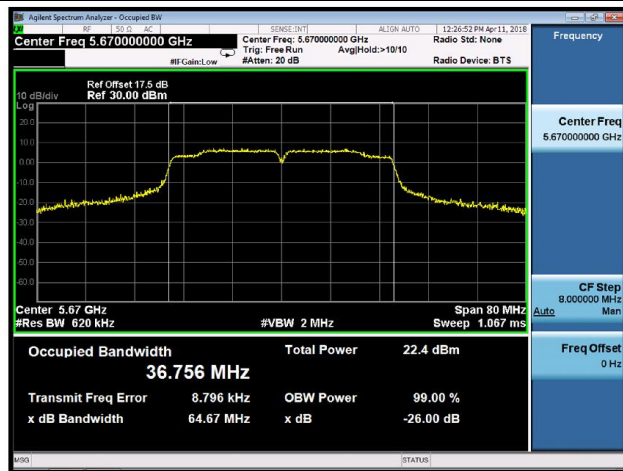


Channel 118 (5590MHz)

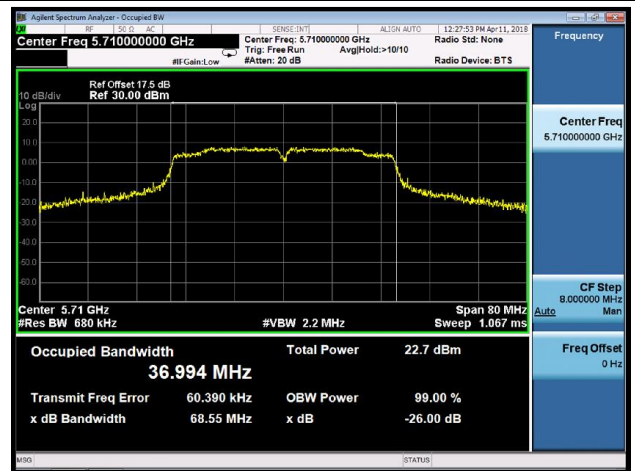


802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth - Ant A

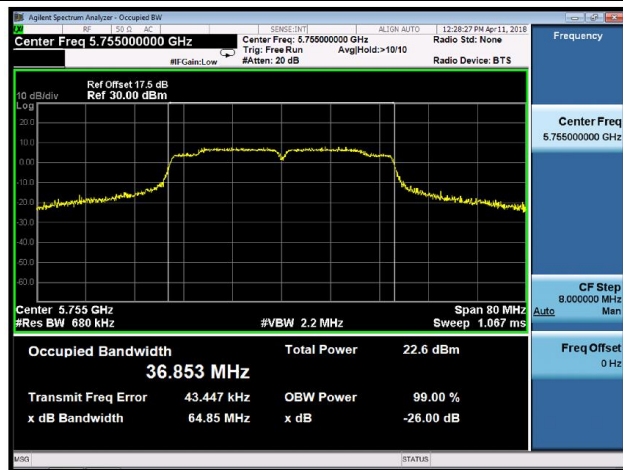
Channel 134 (5670MHz)



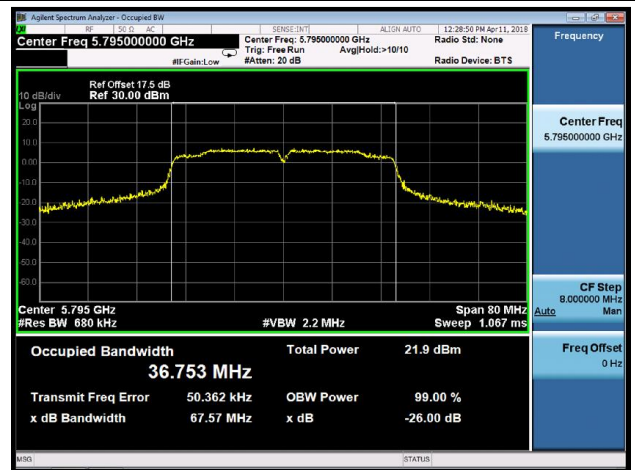
Channel 142 (5710MHz)



Channel 151 (5755MHz)

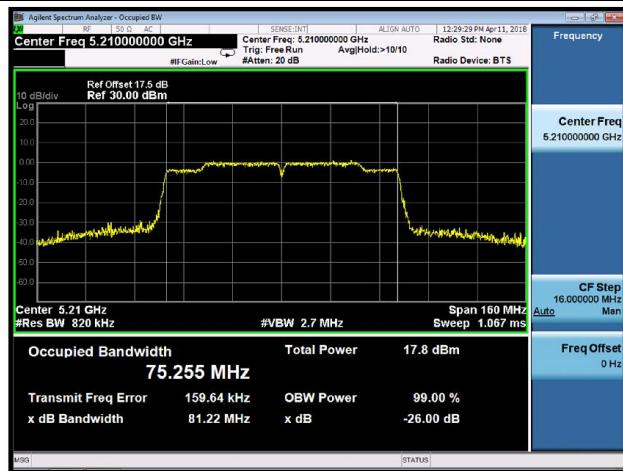


Channel 159 (5795MHz)

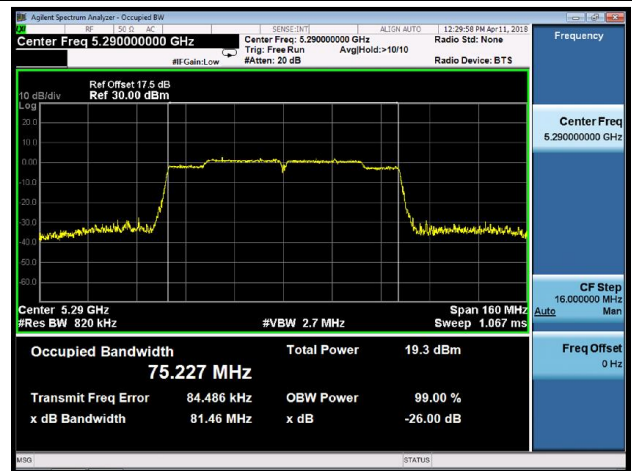


802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth - Ant A

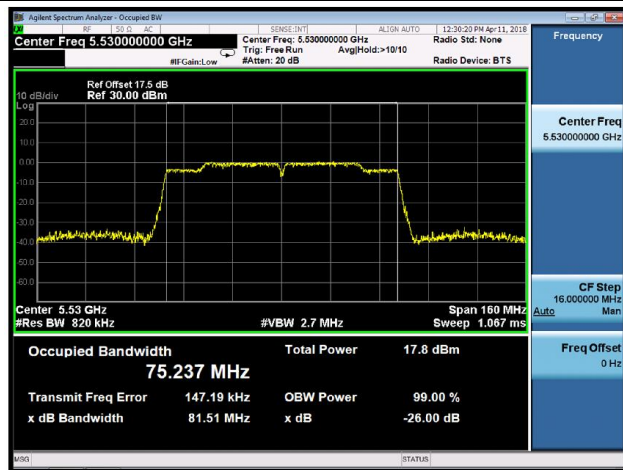
Channel 42 (5210MHz)



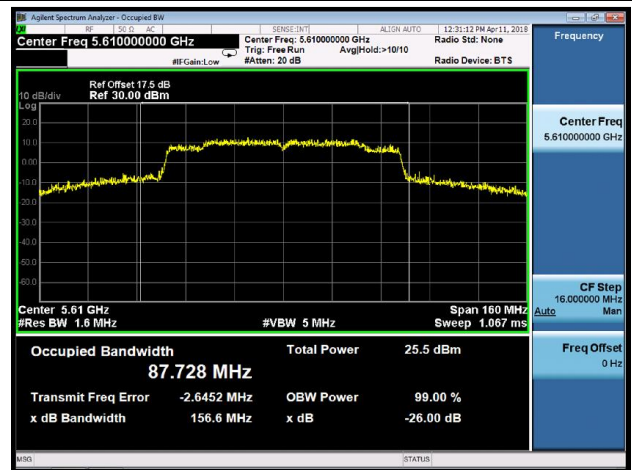
Channel 58 (5290MHz)



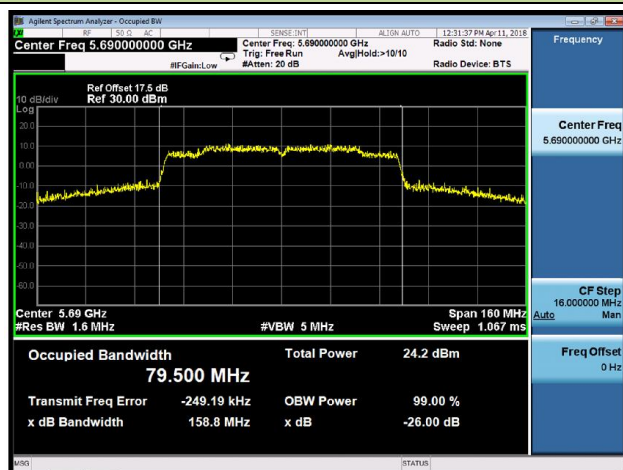
Channel 106 (5530MHz)



Channel 122 (5610MHz)



Channel 138 (5690MHz)



Channel 155 (5775MHz)

