MEASUREMENT REPORT
FCC PART 15.407 WLAN 802.11a/n/ac

FCC ID:	I88C424G
APPLICANT:	Zyxel Communications Corporation
Application Type:	Certification
Product:	Indoor GPON HGU
Model No.:	PMG5717-B10A, C424G
Brand Name:	ZYXEL, ADTRAN
Part Number:	1287781F1C
FCC Classification:	Unlicensed National Information Infrastructure (UNII)
FCC Rule Part(s):	Part 15.407
Test Procedure(s):	ANSI C63.10-2013, KDB 789033 D02v01r03, KDB 662911 D01v02r01, KDB 644545 D03v01
Test Date:	November 25, 2016 ~ March 07, 2017

Reviewed By : Robin Wu
(Robin Wu)

Approved By : Marlin Chen
(Marlin Chen)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

Revision History

Report No.	Version	Description	Issue Date	Note
1611RSU04005	Rev. 01	Initial Report	05-01-2017	Valid

CONTENTS

Description Page

§2.1033 General Information

Applicant:	Zyxel Communications Corporation
Applicant Address:	No.2 Industry East RD. IX, Hsinchu Science Park, Hsinchu, Taiwan, R.O.C
Manufacturer:	Zyxel Communications Corporation
Manufacturer Address:	No.2 Industry East RD. IX, Hsinchu Science Park, Hsinchu, Taiwan, R.O.C
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
FCC Registration No.:	809388
FCC Rule Part(s):	Part 15.407
FCC ID:	I88C424G
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	Unlicensed National Information Infrastructure (UNII)

Test Facility / Accreditations

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

- **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.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-4179, G-814, C-4664, T-2206) test laboratory with the site description on file at VCCI Council.**
- **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.**

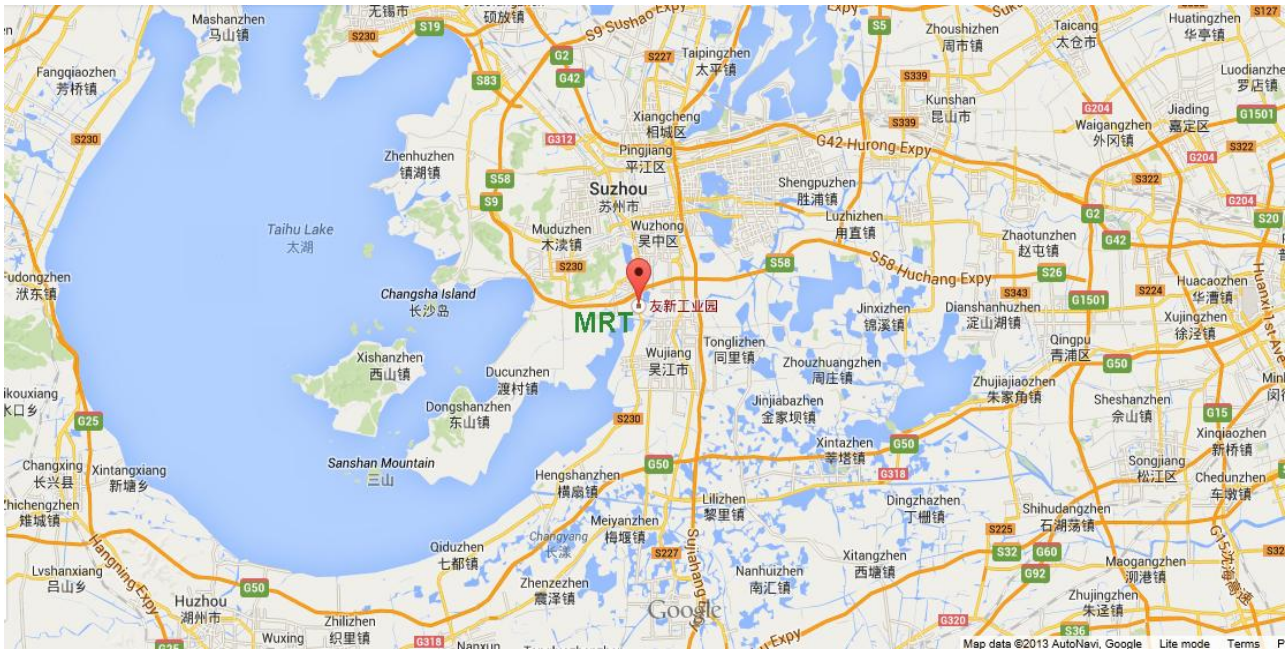
1. INTRODUCTION

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	Indoor GPON HGU
Model No.	PMG5717-B10A, C424G
Brand Name	ZYXEL, ADTRAN
Wi-Fi Specification	802.11a/b/g/n/ac
Frequency Range	**2.4GHz:** For 802.11b/g/n-HT20: 2412 ~ 2462 MHz For 802.11n-HT40: 2422 ~ 2452 MHz **5GHz:** For 802.11a/n-HT20: 5180~5320MHz, 5500~5700MHz, 5745~5825MHz For 802.11ac-VHT20: 5180~5320MHz, 5500~5720MHz, 5745~5825MHz For 802.11n-HT40: 5190~5310MHz, 5510~5670MHz, 5755~5795MHz For 802.11ac-VHT40: 5190~5310MHz, 5510~5710MHz, 5755~5795MHz For 802.11ac-VHT80: 5210MHz, 5290MHz, 5530MHz, 5610MHz, 5690MHz, 5775MHz
5GHz Maximum Average Output Power	802.11a: 25.73dBm 802.11n-HT20: 25.86dBm 802.11n-HT40: 25.40dBm 802.11ac-VHT20: 25.51 802.11ac-VHT40: 25.56 802.11ac-VHT80: 25.06dBm
Type of Modulation	802.11a/n/ac: OFDM

2.2. Working Frequencies for this Report

802.11a/n-HT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
52	5260 MHz	56	5280 MHz	60	5300 MHz
64	5320 MHz	100	5500 MHz	104	5520 MHz
108	5540 MHz	112	5560 MHz	120	5600 MHz
124	5620 MHz	128	5640 MHz	132	5660 MHz
136	5680 MHz	140	5700 MHz	--	--

802.11ac-VHT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
52	5260 MHz	56	5280 MHz	60	5300 MHz
64	5320 MHz	100	5500 MHz	104	5520 MHz
108	5540 MHz	112	5560 MHz	120	5600 MHz
124	5620 MHz	128	5640 MHz	132	5660 MHz
136	5680 MHz	140	5700 MHz	144	5720 MHz

802.11n-HT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz	102	5510 MHz
110	5550 MHz	118	5590 MHz	126	5630 MHz
134	5670 MHz	--	--	--	--

802.11ac-VHT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz	102	5510 MHz
110	5550 MHz	118	5590 MHz	126	5630 MHz
134	5670 MHz	142	5710 MHz	--	--

802.11ac-VHT80

Channel	Frequency	Channel	Frequency	Channel	Frequency
58	5290 MHz	106	5530 MHz	122	5610 MHz
138	5690 MHz	--	--	--	--

2.3. Description of Available Antennas

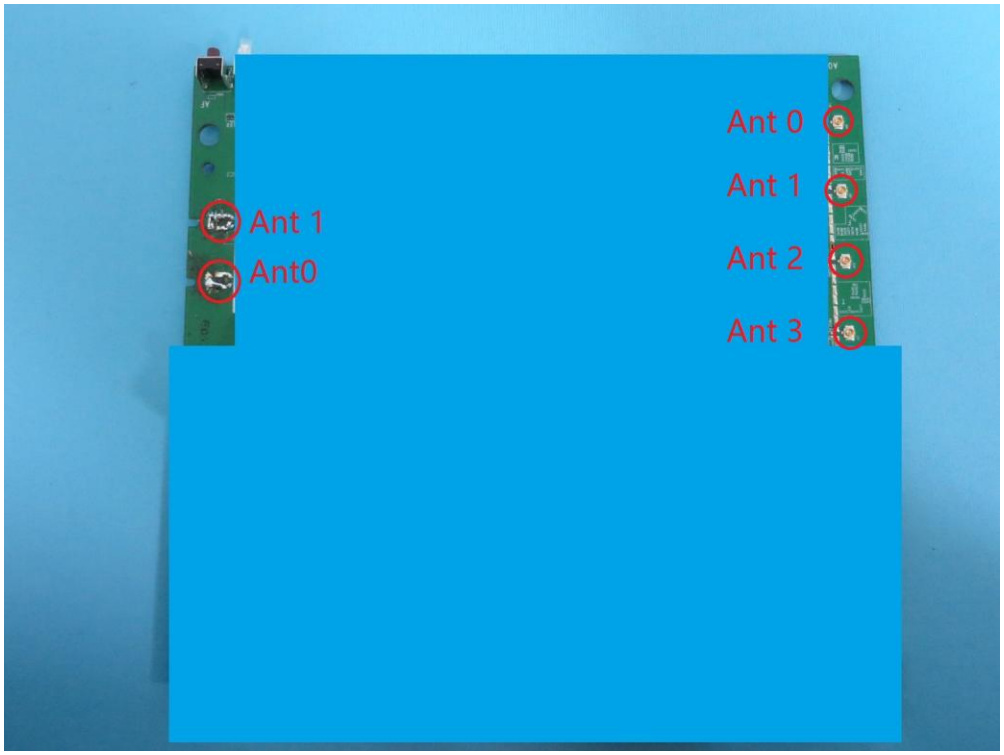
Antenna Type	Frequency Band (MHz)	T_X Paths	Directional Gain (dBi)	
			Beam Forming	CDD
PCB Antenna	5150 ~ 5250	4	9.91	9.91
	5250 ~ 5350	4	6.90	6.90
	5470 ~ 5725	4	7.11	7.11
	5745 ~ 5850	4	10.13	10.13

Note:

1. The EUT support Beam Forming technology at 802.11n/ac mode, and support CDD technology at 802.11a mode.
2. Correlated signals include, but are not limited to, signals transmitted in any of the following modes:
   - Any transmit Beam Forming mode, whether fixed or adaptive (e.g., phased array modes, closed loop MIMO modes, Transmitter Adaptive Antenna modes, Maximum Ratio Transmission (MRT) modes, and Statistical Eigen Beam Forming (EBF) modes).
   - CDD signals are correlated and create unintended array gain that varies with signal bandwidth, antenna geometry, and cyclic delay values. Consequently, depending on system parameters, it may be appropriate to use different values of array gain for compliance with power limits versus compliance with powerspectral density limits.
3. Unequal antenna gains, with equal transmit powers. For antenna gains given by G_1, G_2, …, G_N dBi
   - transmit signals are correlated, then
   - Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2/N_{ANT}$] dBi [Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

2.4. Description of Antenna RF Port

Antenna RF Port						
---	2.4GHz RF Port		5GHz RF Port			
Software Control Port	Ant 0	Ant 1	Ant 0	Ant 1	Ant 2	Ant 3



2.5. Test Mode

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

2.6. Test Software

The test utility software used during testing was console command.

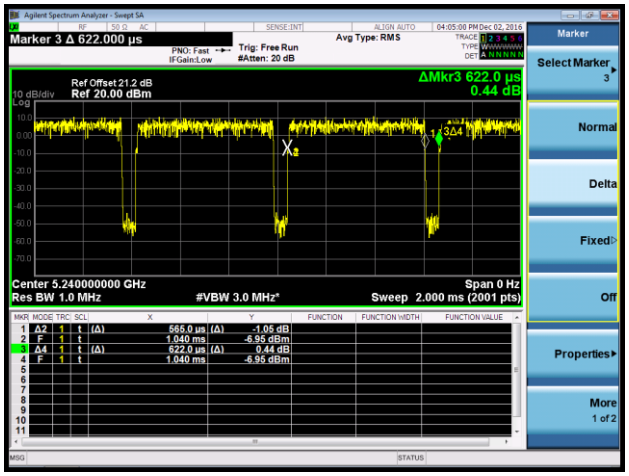
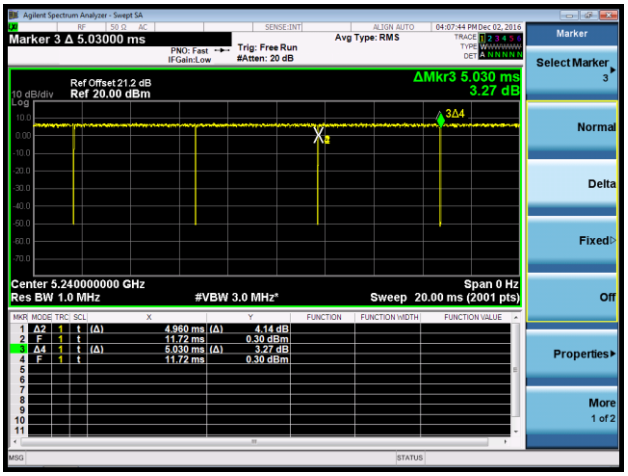
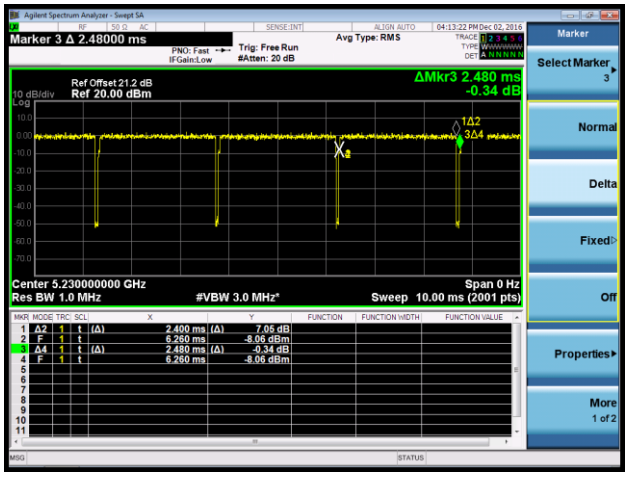
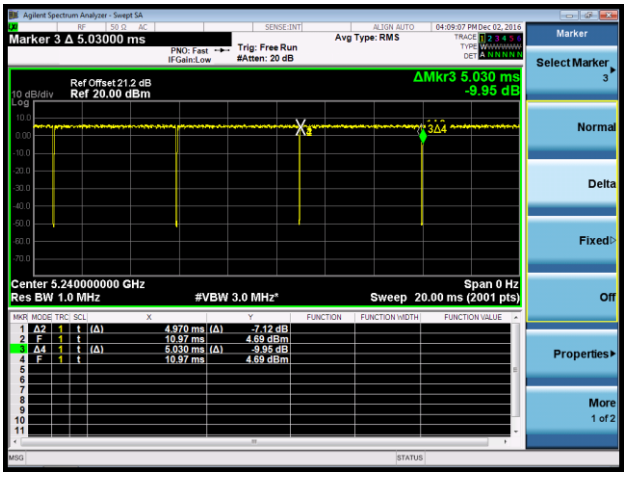
2.7. Device Capabilities

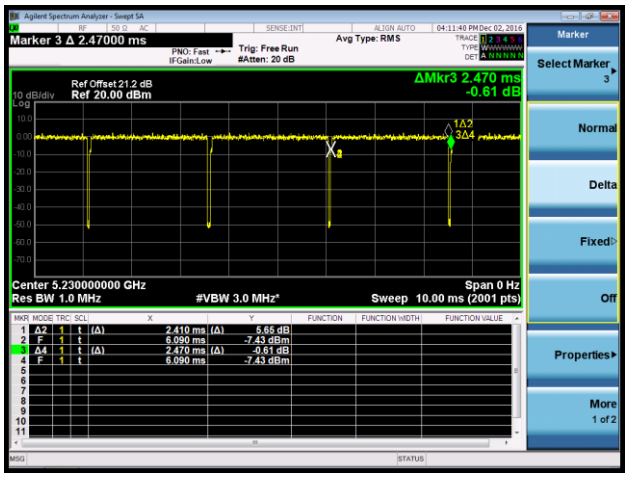
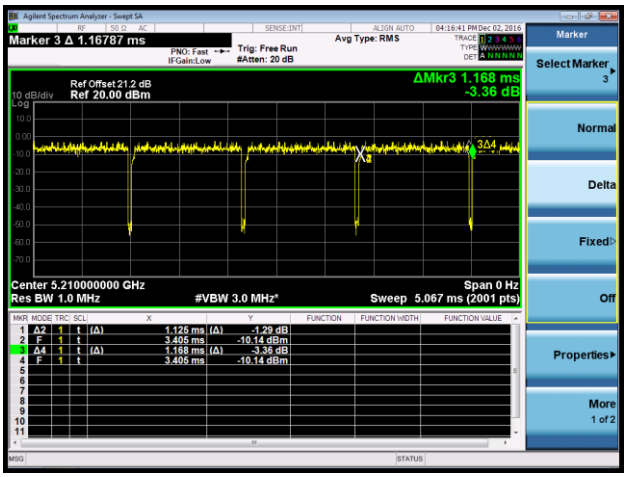
This device contains the following capabilities:

2.4GHz WLAN (DTS) and 5GHz WLAN (UNII).

Note: 5GHz (UNII) 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 = 1MHz, VBW = 3MHz, and detector = average per the guidance of Section B)2)b) of KDB 789033 D02v01r03. 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	Test Mode	Duty Cycle
802.11a	90.84%	802.11ac-VHT20	98.81%
802.11n-HT20	98.61%	802.11ac-VHT40	97.57%
802.11n-HT40	96.77%	802.11ac-VHT80	96.32%

802.11a	802.11n-HT20
	
802.11n-HT40	802.11ac-VHT20
	

802.11ac-VHT40	802.11ac-VHT80
	

2.8. Test Configuration

The **Indoor GPON HGU FCC ID: I88C424G** was tested per the guidance of KDB 789033 D02v01r03. 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 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 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 D02v01r03 were used in the measurement of the **Indoor GPON HGU FCC ID: I88C424G.**

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.

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. A 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 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 **Indoor GPON HGU** is **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The **Indoor GPON HGU FCC ID: I88C424G** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	101209	1 year	2017/06/20
Two-Line V-Network	R&S	ENV216	101683	1 year	2017/06/20
Two-Line V-Network	R&S	ENV216	101684	1 year	2017/06/20
Temperature/Humidity Meter	Yuhuaze	N/A	N/A	1 year	2017/12/20
Shielding Anechoic Chamber	MIX-BEP	Chamber-SR2	N/A	1 year	2017/05/10

Radiated Emission - AC1

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
MXE EMI Receiver	Agilent	N9038A	MY51210182	1 year	2017/08/03
Preamplifier	Agilent	83017A	MY52090106	1 year	2018/03/28
Loop Antenna	Schwarzbeck	FMZB1519	1519-041	1 year	2017/11/20
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2017/10/22
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	1 year	2017/10/22
Digital Thermometer & Hygrometer	Yuhuaze	HTC-2	N/A	1 year	2017/12/20
RF Cable	HUBER+ SUHNER	Cable 01	MRTSUE06055-1	1 year	2018/03/29
RF Cable	HUBER+ SUHNER	Cable 02	MRTSUE06055-2	1 year	2018/03/29
Anechoic Chamber	TDK	Chamber-AC1	N/A	1 year	2017/05/10

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MY52090106	1 year	2017/05/08
USB Wideband Power Sensor	Boonton	55006	MRTSUE06109	1 year	2017/05/08
RF Cable	HUBER+ SUHNER	Cable 03	MRTSUE06055-3	1 year	2018/03/29
Attenuator	Woken	WATT-218FS-15	MRTSUE06220	1 year	2018/03/29
DC Block	Woken	00900A1A2A101A	MRTSUE06221	1 year	2018/03/29
Programmable Temperature & Humidity Chamber	BAOYT	BYH-1500L	MRTSUE06051	1 year	2017/12/08
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2017/12/20

Software	Version	Function
e3	V8.3.5	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 ~ 25GHz: 4.76dB
Frequency Stability - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.21%
Output Power - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Power Spectrum Density - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.15dB
Occupied Bandwidth - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%

7. TEST RESULT

7.1. Summary

Company Name: **Zyxel Communications Corporation**

FCC ID: **I88C424G**

Data Rate(s) Tested: **6Mbps ~ 54Mbps (a);**
26/28.8Mbps ~ 260/288.8Mbps (n-HT20);
54/60Mbps ~ 540/600Mbps (n-HT40);
26/28.9Mbps ~ 312/346.7Mbps (ac-VHT20MHz);
54/60Mbps ~ 720/800Mbps (ac-VHT40MHz);
117.2/130Mbps ~ 1560/1733.2Mbps (ac-VHT80MHz)

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	≥ 500kHz		Pass	Section 7.3
15.407(a)(1)(ii), (2), (3)	Maximum Conducted Output Power	Refer to Section 7.4		Pass	Section 7.4
15.407(h)(1)	Transmit Power Control	≤ 24 dBm		N/A	Section 7.5
15.407(a)(1)(ii), (2), (3), (5)	Peak Power Spectral Density	Refer to Section 7.6		Pass	Section 7.6
15.407(g)	Frequency Stability	N/A		Pass	Section 7.7
15.407(b)(1), (2), (3), (4)	Undesirable Emissions	≤ -27dBm/MHz EIRP ≤ -17dBm/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 limaits detailed in 15.209		Pass	
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 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.

4) For 26dB Bandwidth Measurement & 6dB Bandwidth Measurement, we have showed the worst test result in test report.

7.2. 26dB Bandwidth Measurement

7.2.1.Test Limit

N/A

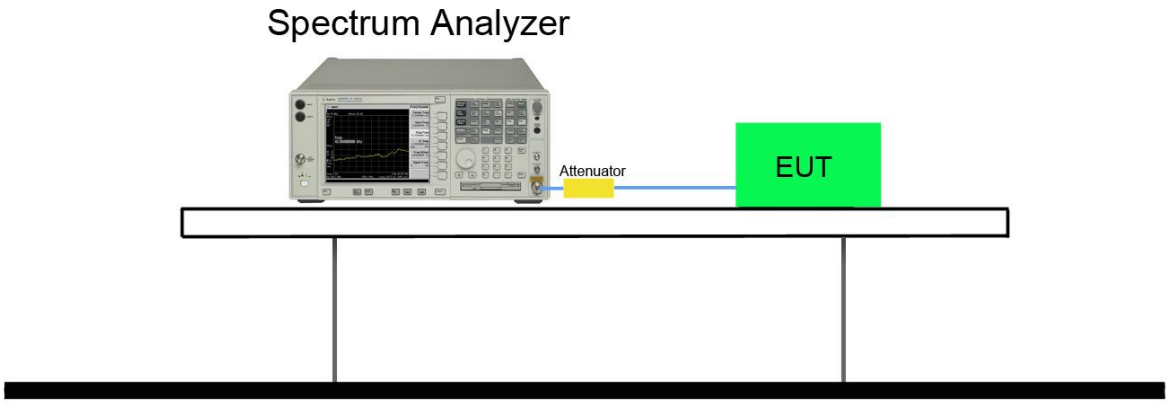
7.2.2.Test Procedure used

KDB 789033 D02v01r03 - 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



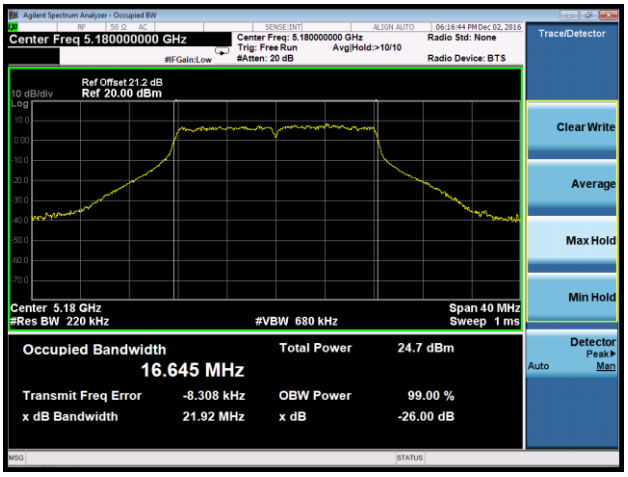
7.2.5.Test Result

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	21.92	16.65	Pass
802.11a	6	44	5220	21.85	16.65	Pass
802.11a	6	48	5240	21.92	16.68	Pass
802.11a	6	52	5260	23.20	16.75	Pass
802.11a	6	60	5300	23.29	16.76	Pass
802.11a	6	64	5320	23.23	16.76	Pass
802.11a	6	100	5500	23.12	16.74	Pass
802.11a	6	120	5600	23.05	16.74	Pass
802.11a	6	140	5700	23.08	16.75	Pass
802.11a	6	149	5745	22.19	16.68	Pass
802.11a	6	157	5785	22.41	16.70	Pass
802.11a	6	165	5825	21.89	16.64	Pass
802.11n-HT20	26	36	5180	23.91	17.97	Pass
802.11n-HT20	26	44	5220	23.76	17.96	Pass
802.11n-HT20	26	48	5240	23.79	17.97	Pass
802.11n-HT20	26	52	5260	23.88	18.00	Pass
802.11n-HT20	26	60	5300	23.89	17.98	Pass
802.11n-HT20	26	64	5320	23.76	17.99	Pass
802.11n-HT20	26	100	5500	24.12	18.01	Pass
802.11n-HT20	26	120	5600	23.76	18.01	Pass
802.11n-HT20	26	140	5700	23.94	17.98	Pass
802.11n-HT20	26	149	5745	22.83	17.93	Pass
802.11n-HT20	26	157	5785	23.63	17.96	Pass
802.11n-HT20	26	165	5825	23.49	17.95	Pass
802.11n-HT40	54	38	5190	42.17	36.45	Pass
802.11n-HT40	54	46	5230	42.07	36.45	Pass
802.11n-HT40	54	54	5270	42.63	36.46	Pass
802.11n-HT40	54	62	5310	42.30	36.43	Pass
802.11n-HT40	54	102	5510	42.27	36.39	Pass
802.11n-HT40	54	118	5590	42.46	36.45	Pass
802.11n-HT40	54	134	5670	42.22	36.45	Pass
802.11n-HT40	54	151	5755	42.14	36.39	Pass
802.11n-HT40	54	159	5795	42.22	36.40	Pass

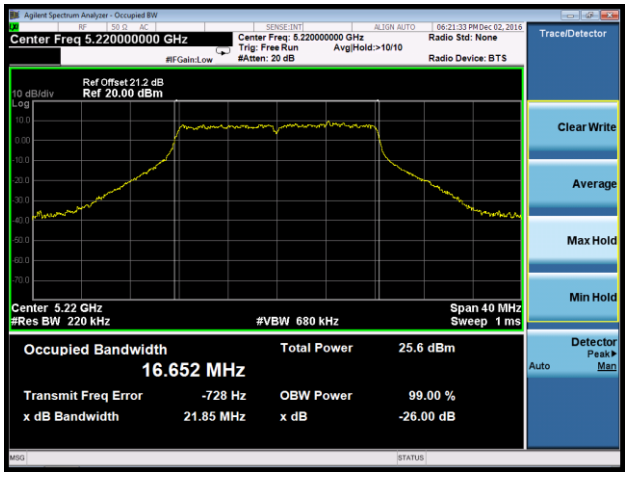
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
802.11ac-VHT20	26	36	5180	23.40	17.96	Pass
802.11ac-VHT20	26	44	5220	23.54	18.02	Pass
802.11ac-VHT20	26	48	5240	23.41	17.96	Pass
802.11ac-VHT20	26	52	5260	23.63	17.96	Pass
802.11ac-VHT20	26	60	5300	23.78	17.98	Pass
802.11ac-VHT20	26	64	5320	23.51	17.97	Pass
802.11ac-VHT20	26	100	5500	23.73	18.01	Pass
802.11ac-VHT20	26	120	5600	23.57	17.97	Pass
802.11ac-VHT20	26	140	5700	23.46	17.99	Pass
802.11ac-VHT20	26	144	5720	23.51	18.00	Pass
802.11ac-VHT20	26	149	5745	23.94	17.97	Pass
802.11ac-VHT20	26	157	5785	23.93	18.01	Pass
802.11ac-VHT20	26	165	5825	23.42	17.97	Pass
802.11ac-VHT40	54	38	5190	42.53	36.46	Pass
802.11ac-VHT40	54	46	5230	42.51	36.47	Pass
802.11ac-VHT40	54	54	5270	42.86	36.51	Pass
802.11ac-VHT40	54	62	5310	42.51	36.49	Pass
802.11ac-VHT40	54	102	5510	42.89	36.51	Pass
802.11ac-VHT40	54	118	5590	42.25	36.47	Pass
802.11ac-VHT40	54	134	5670	42.75	36.47	Pass
802.11ac-VHT40	54	142	5710	42.35	36.48	Pass
802.11ac-VHT40	54	151	5755	42.33	36.45	Pass
802.11ac-VHT40	54	159	5795	42.28	36.43	Pass
802.11ac-VHT80	117.2	42	5210	83.50	75.47	Pass
802.11ac-VHT80	117.2	58	5290	83.70	75.48	Pass
802.11ac-VHT80	117.2	106	5530	83.26	75.40	Pass
802.11ac-VHT80	117.2	122	5610	83.56	75.46	Pass
802.11ac-VHT80	117.2	138	5690	83.34	75.55	Pass
802.11ac-VHT80	117.2	155	5775	83.59	75.46	Pass

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

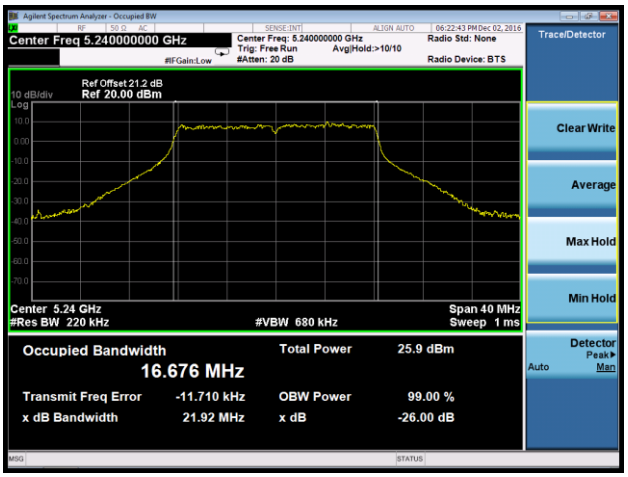
Channel 36 (5180MHz)



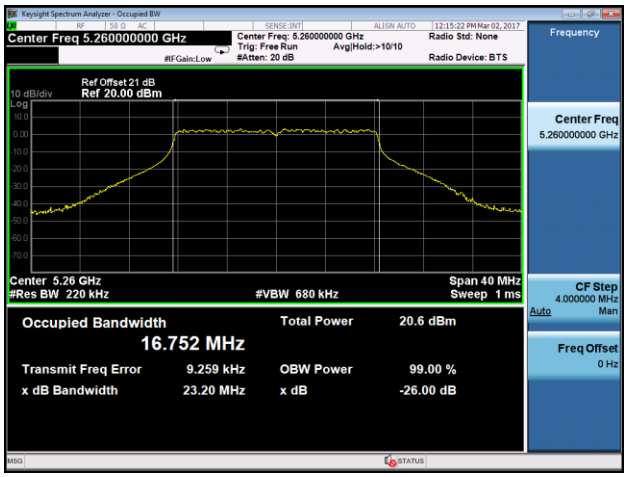
Channel 44 (5220MHz)



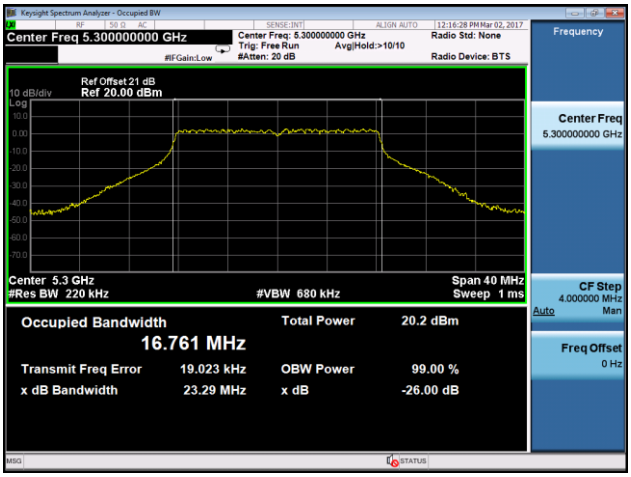
Channel 48 (5240MHz)



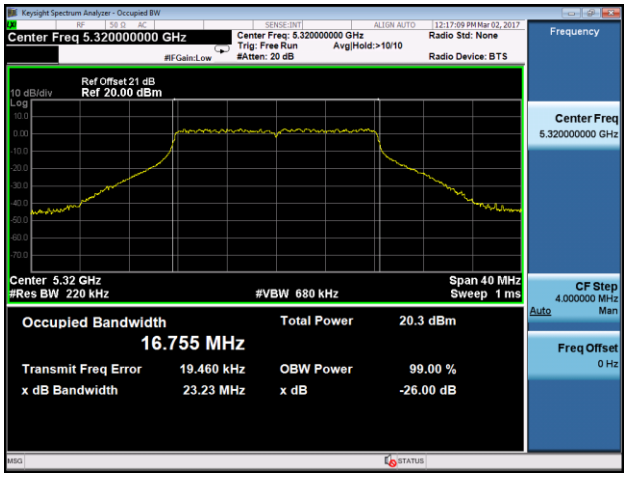
Channel 52 (5260MHz)

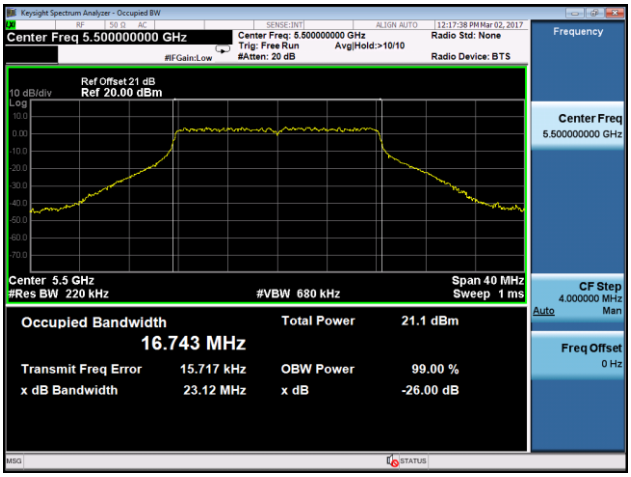
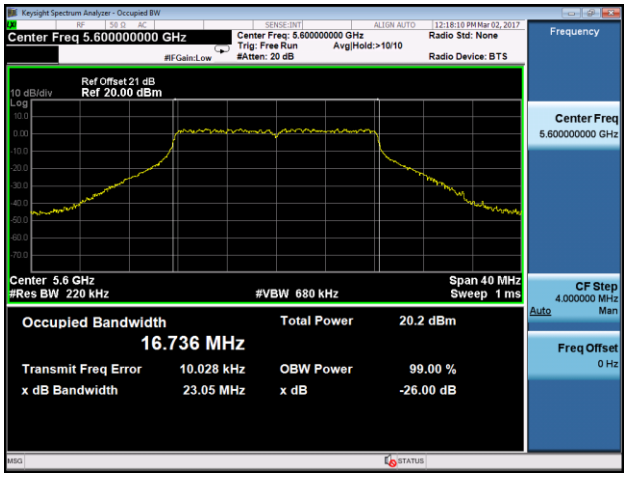
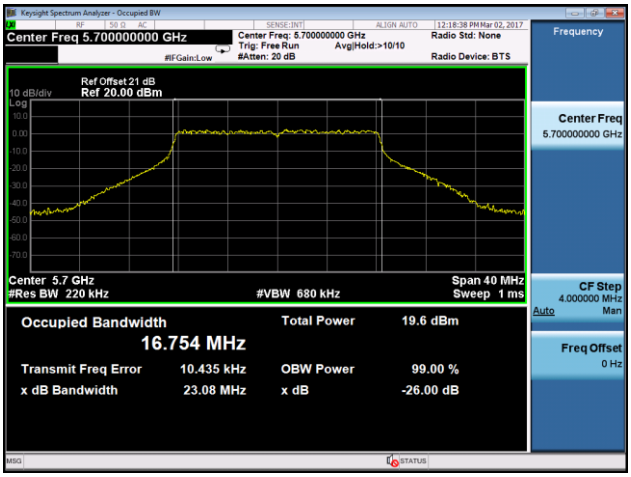
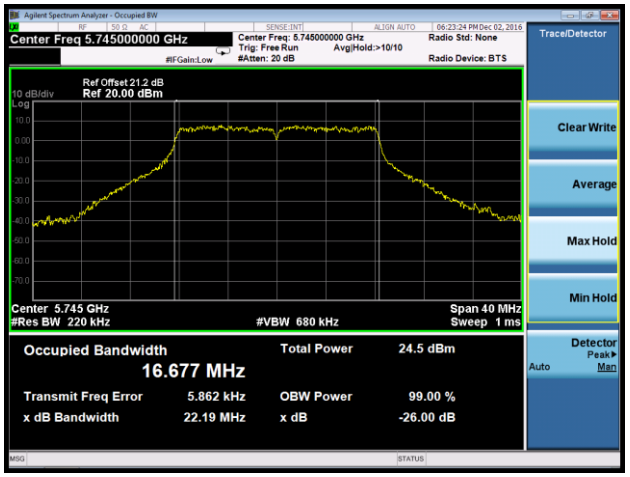
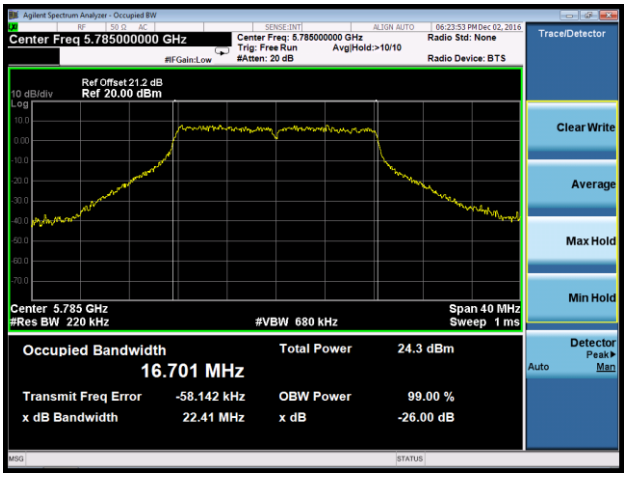
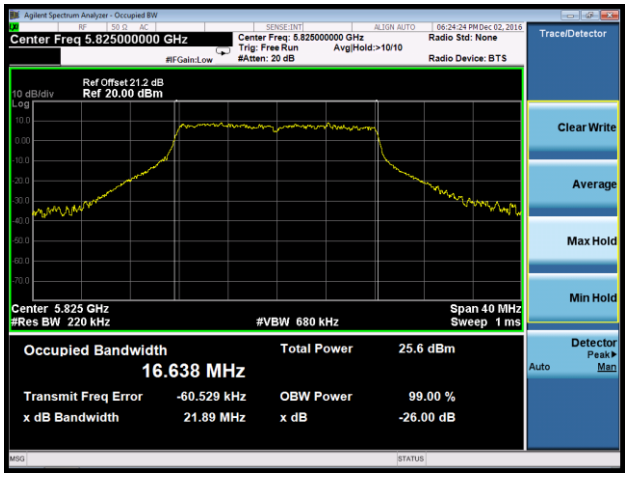


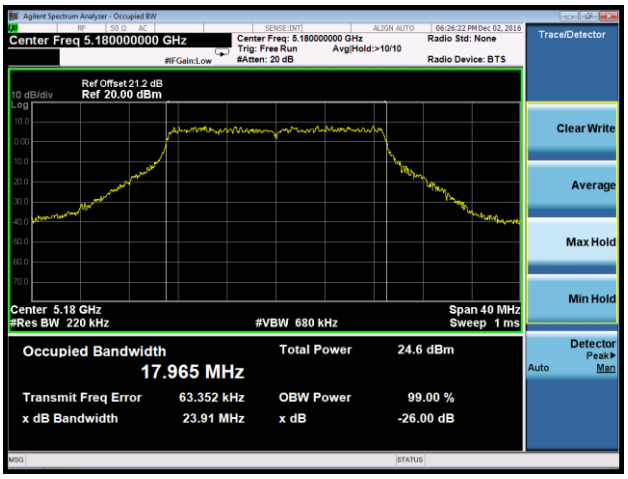
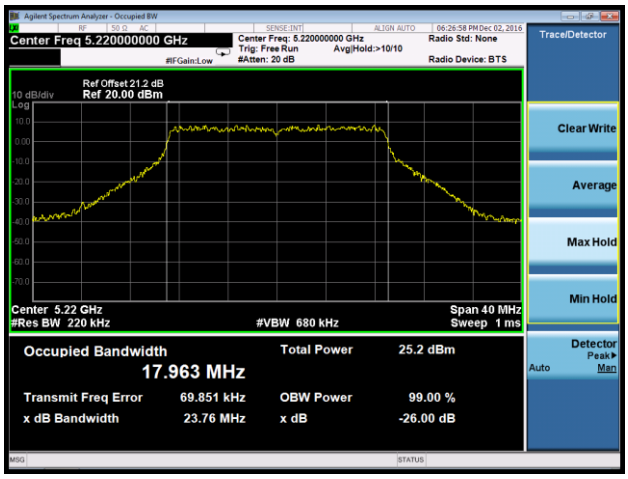
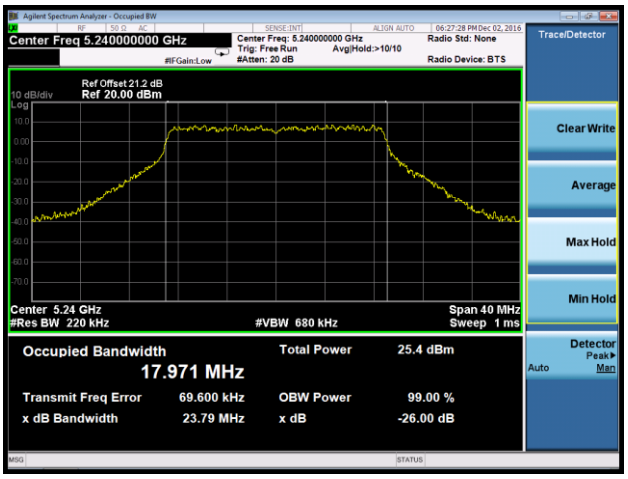
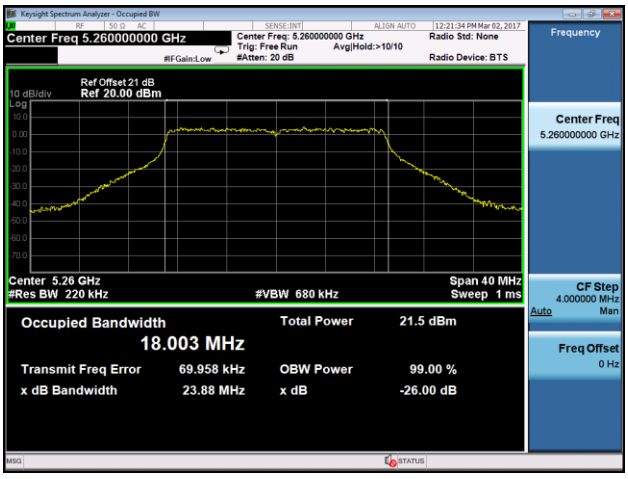
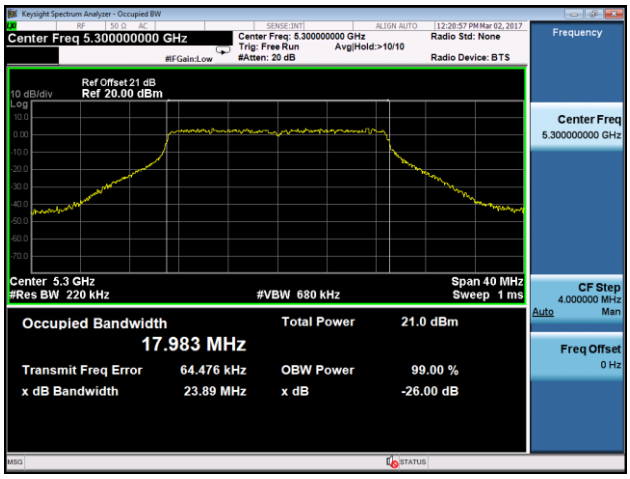
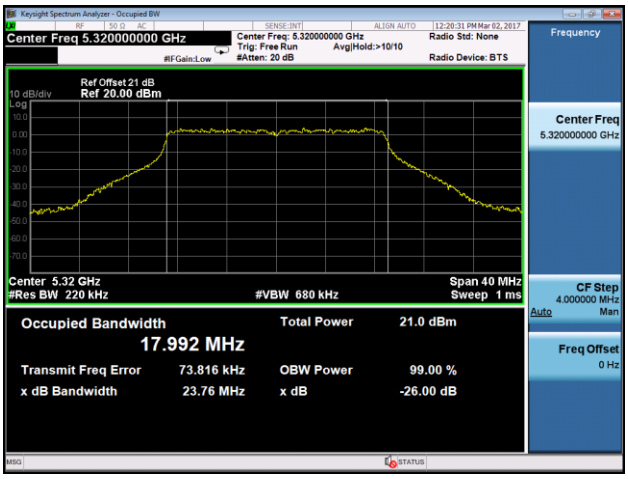
Channel 60 (5300MHz)

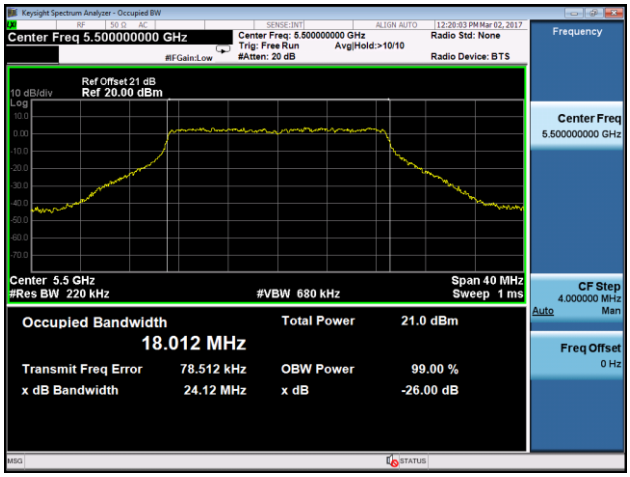
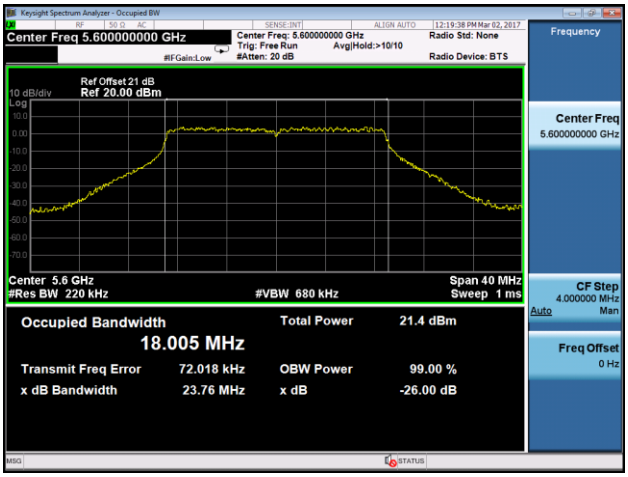
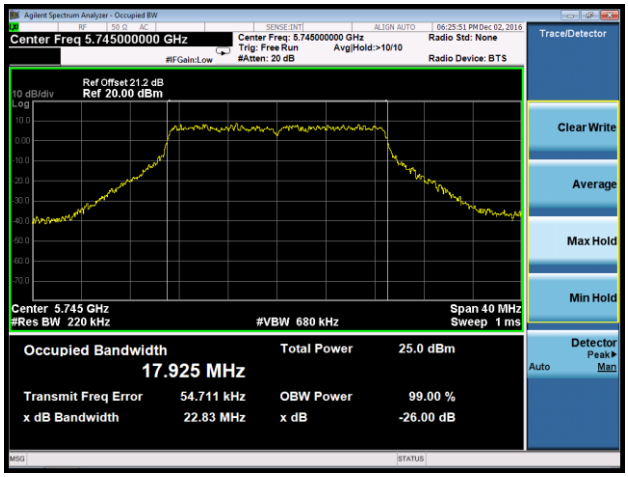
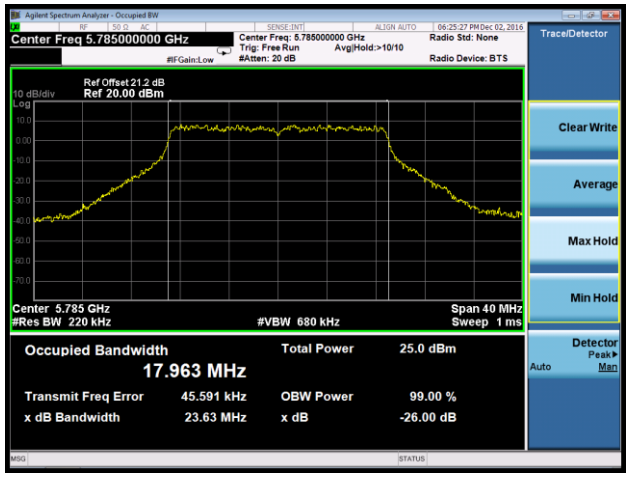
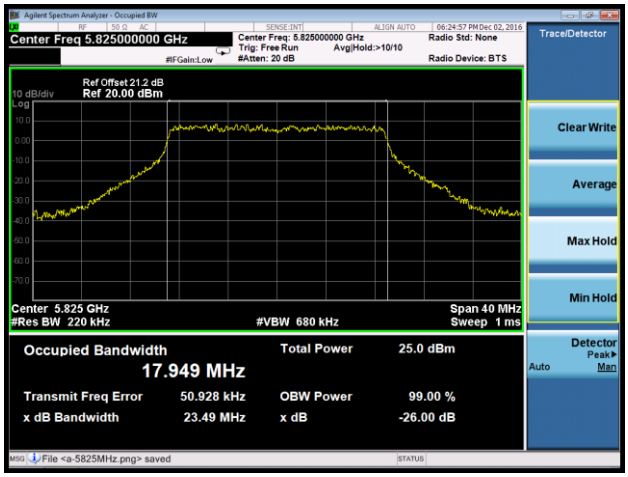


Channel 64 (5320MHz)



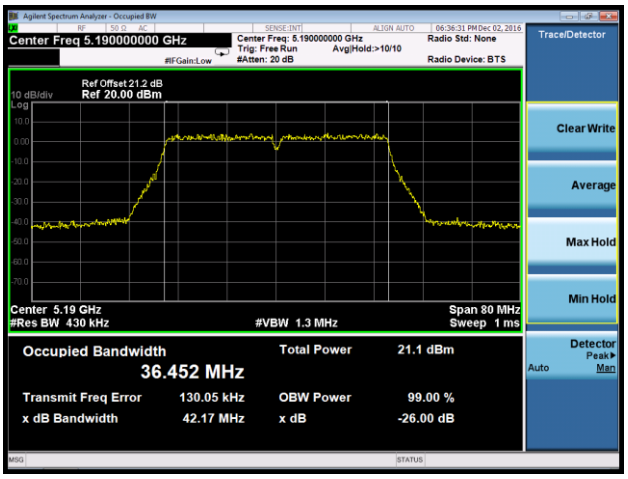
Channel 100 (5500MHz)	Channel 120 (5600MHz)
	
Channel 140 (5700MHz)	**Channel 149 (5745MHz)**
	
Channel 157 (5785MHz)	**Channel 165 (5825MHz)**
	

802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1 + 2 + 3	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	**Channel 52 (5260MHz)**
	
Channel 60 (5300MHz)	**Channel 64 (5320MHz)**
	

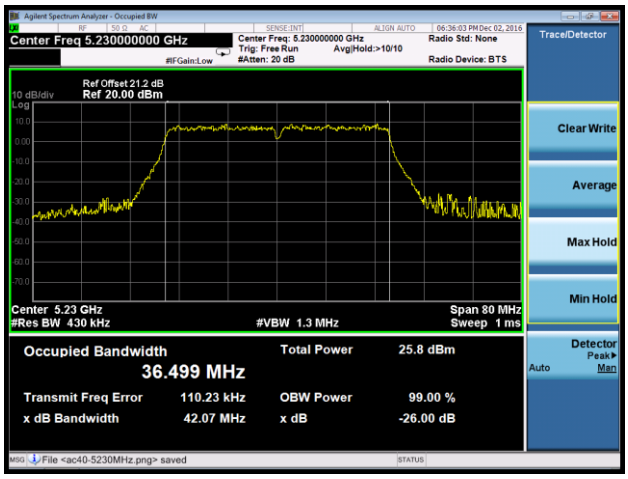
Channel 100 (5500MHz)	Channel 120 (5600MHz)
	
Channel 140 (5700MHz)	**Channel 149 (5745MHz)**
	
Channel 157 (5785MHz)	**Channel 165 (5825MHz)**
	

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

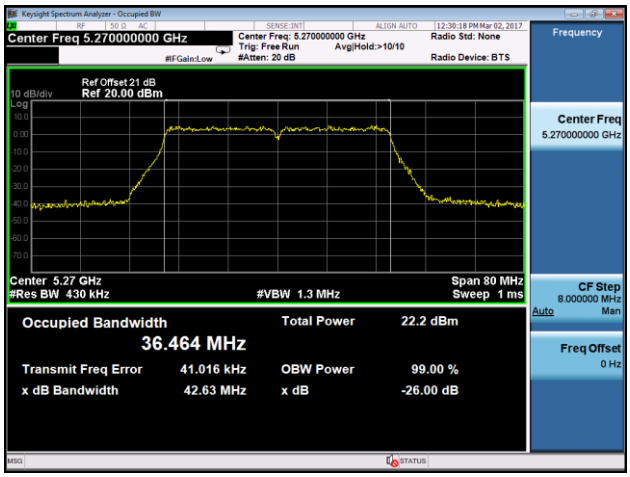
Channel 38 (5190MHz)



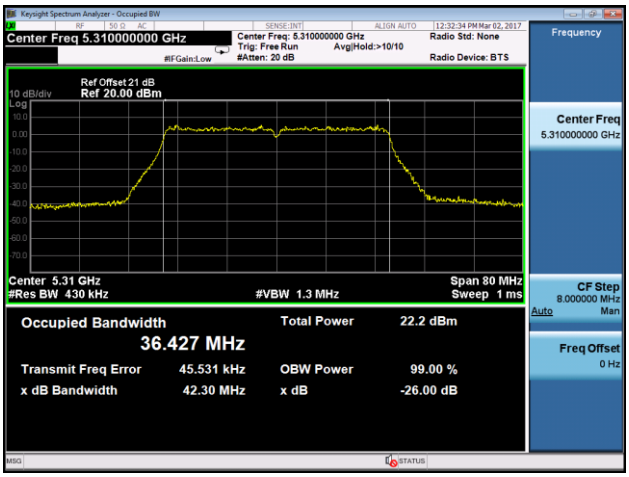
Channel 46 (5230MHz)



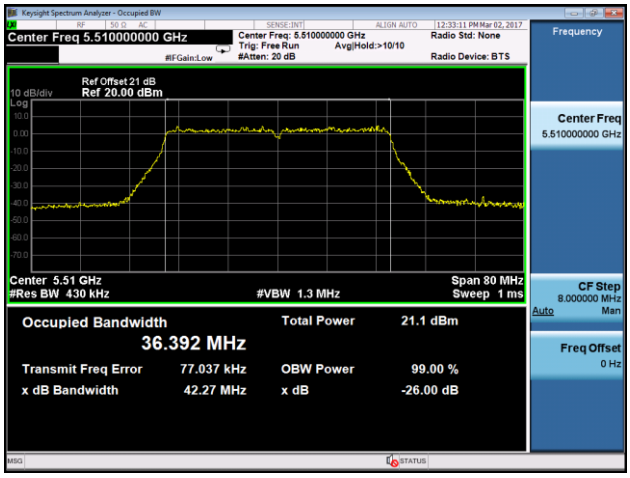
Channel 54 (5270MHz)



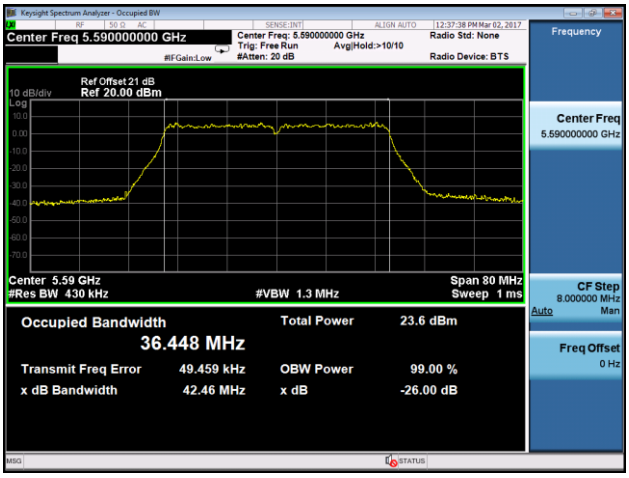
Channel 62 (5310MHz)

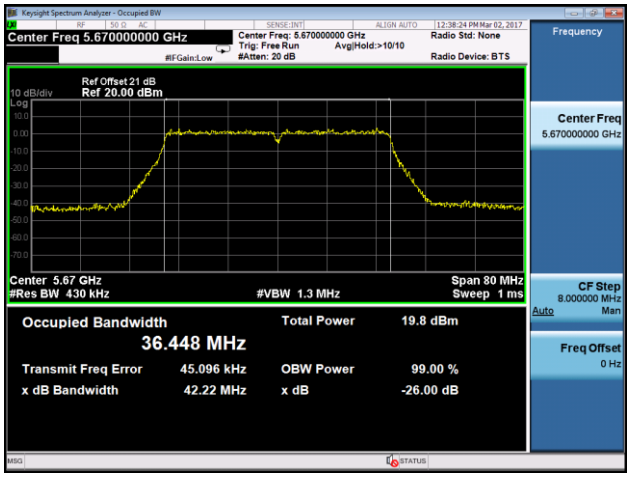
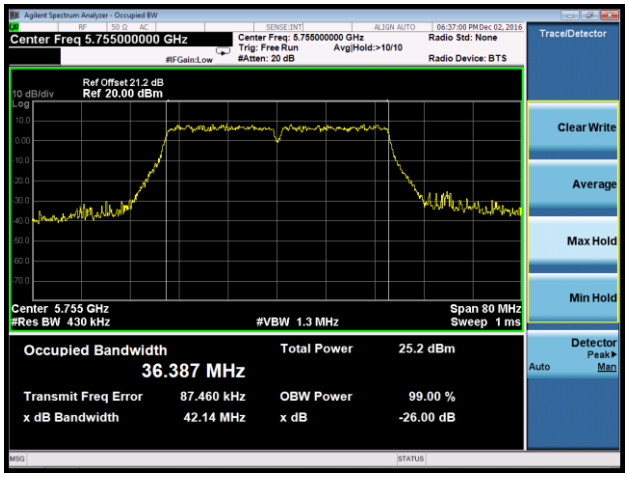
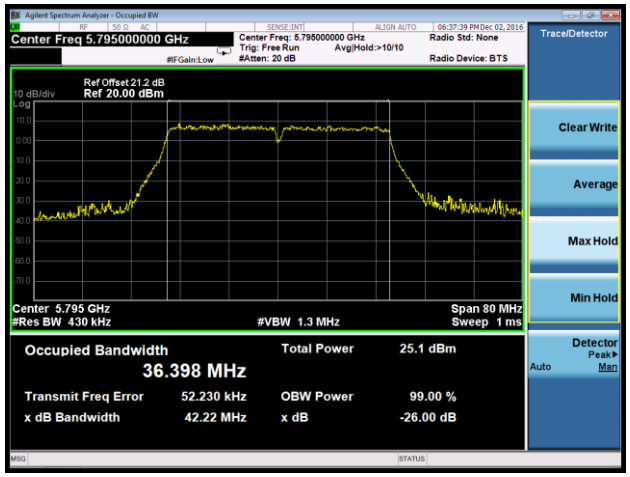


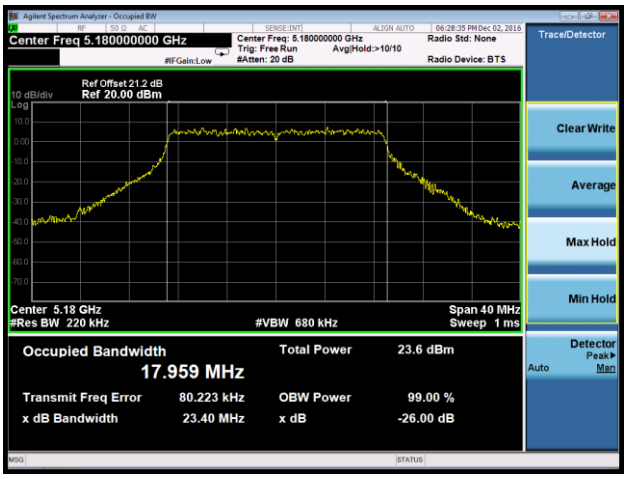
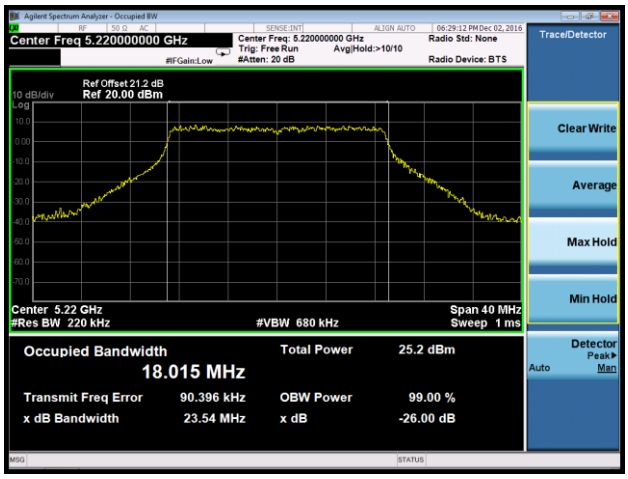
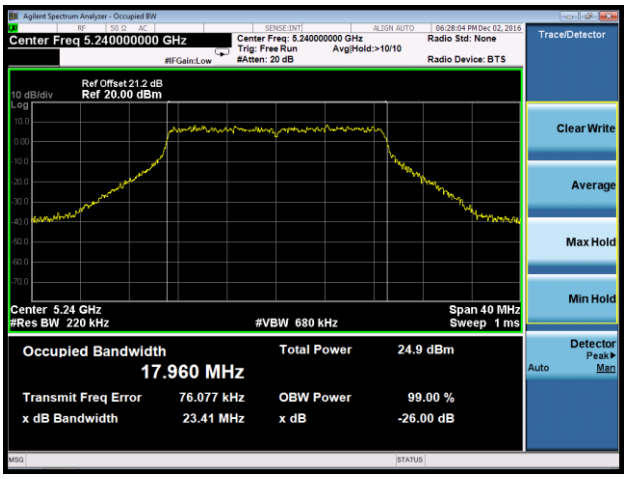
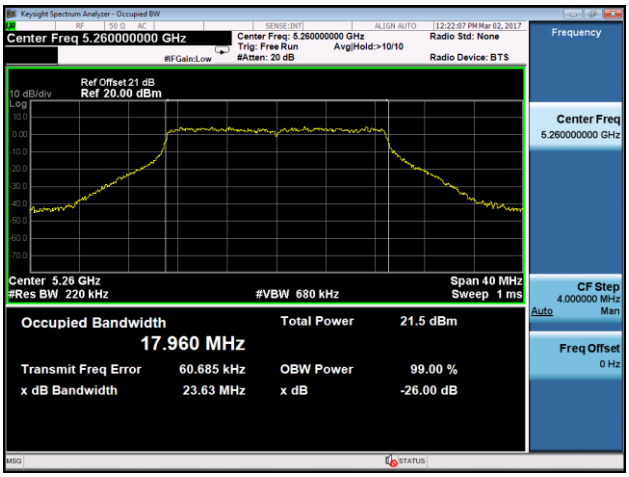
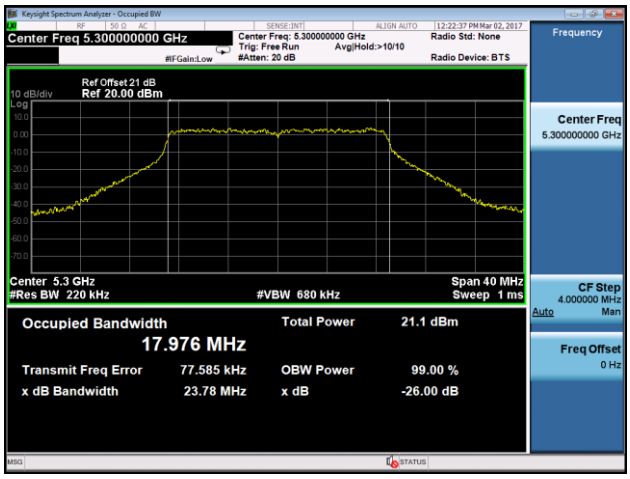
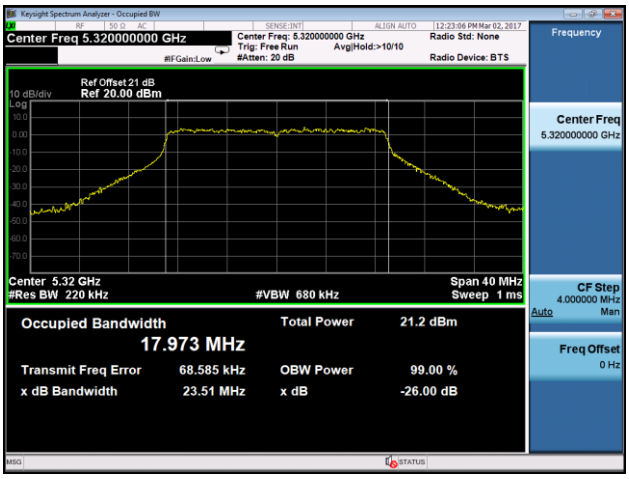
Channel 102 (5510MHz)

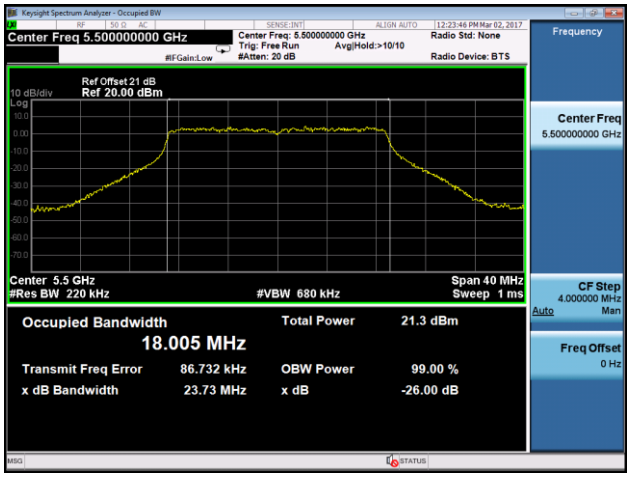
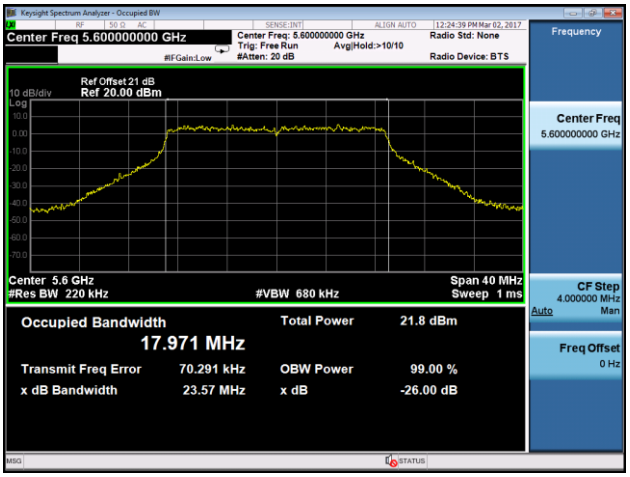
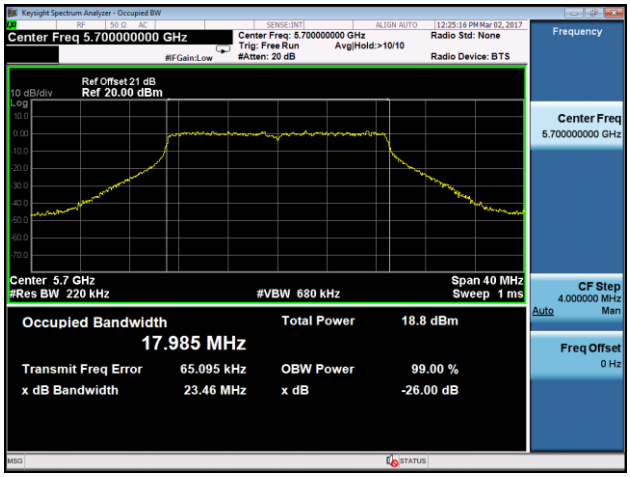
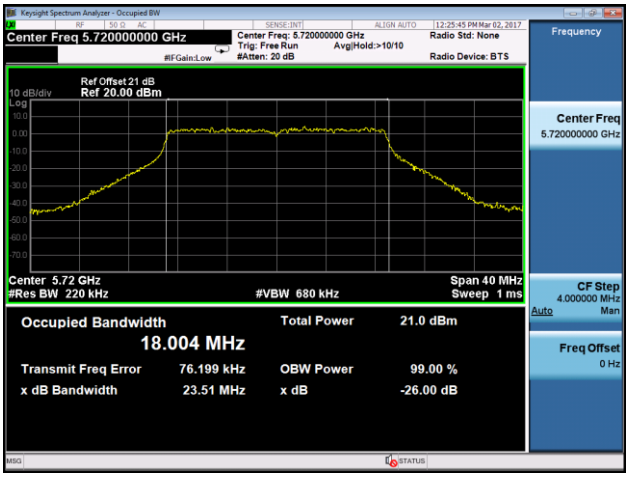
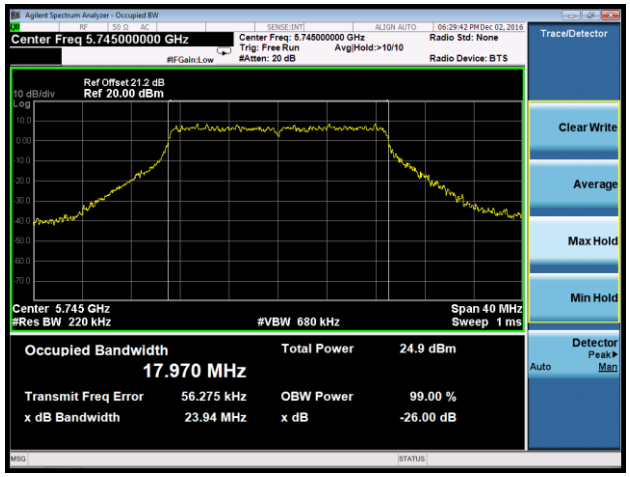
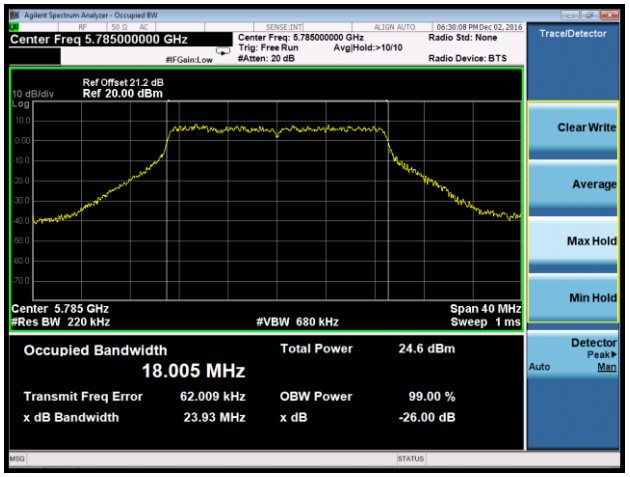


Channel 110 (5590MHz)



Channel 134 (5670MHz)	Channel 151 (5755 MHz)
	
Channel 159 (5795 MHz)	
	

802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1 + 2 + 3	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	**Channel 52 (5260MHz)**
	
Channel 60 (5300MHz)	**Channel 64 (5320MHz)**
	

Channel 100 (5500MHz)	Channel 120 (5600MHz)
	
Channel 140 (5700MHz)	**Channel 144 (5720MHz)**
	
Channel 149 (5745MHz)	**Channel 157 (5785MHz)**
	

Channel 165 (5825MHz)