

MEASUREMENT REPORT

FCC 15.407 WLAN 802.11a/n/ac/ax

FCC ID: 2ABLK-U4X

APPLICANT: Calix Inc.

Application Type: Certification

Product: GigaSpire BLAST

Model No.: u4 GS2028E, u4-2 GS2028E-2,
u4m GM1028, u4m-2 GM1028-2

Brand Name: 

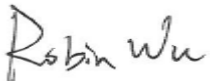
FCC Classification: Unlicensed National Information Infrastructure (NII)

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: July 01 ~ August 21, 2020

Reviewed By: 
Kevin Guo

Approved By: 
Robin Wu



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 (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2105RSU028-U3	Rev. 01	Initial report	05-21-2021	Valid

Note: This is a copy report based on the MRT original report (Report No.: 2006RSU066-U5) to change the FCC ID / Product name / Model name and add an adapter.

CONTENTS

Description	Page
1. General Information	5
1.1. Applicant	5
1.2. Manufacturer	5
1.3. Testing Facility	5
1.4. Product Information	6
1.5. Models Difference	6
1.6. Radio Specification	7
1.7. Working Frequencies	7
1.8. Antenna Details	8
1.9. Antenna RF Port	8
1.10. Test Mode	9
1.11. Configuration of Test System	10
1.12. Test System Details	11
1.13. Test Software	11
1.14. Test Environment Condition	11
1.15. Duty Cycle	12
1.16. EMI Suppression Device(s)/Modifications	14
1.17. Labeling Requirements	14
2. Antenna Requirements	15
3. Test Equipment Calibration Date	16
4. Measurement Uncertainty	18
5. Test Result	19
5.1. Summary	19
5.2. 26dB Bandwidth Measurement	20
5.2.1. Test Limit	20
5.2.2. Test Procedure used	20
5.2.3. Test Setting	20
5.2.4. Test Setup	20
5.2.5. Test Result	21
5.3. Output Power Measurement	36
5.3.1. Test Limit	36
5.3.2. Test Procedure Used	36
5.3.3. Test Setting	36
5.3.4. Test Setup	36
5.3.5. Test Result	37
5.4. Transmit Power Control	41
5.4.1. Test Limit	41

5.4.2. Test Procedure Used	41
5.4.3. Test Setting	41
5.4.4. Test Setup.....	41
5.4.5. Test Result.....	41
5.5. Power Spectral Density Measurement	42
5.5.1. Test Limit	42
5.5.2. Test Procedure Used	42
5.5.3. Test Setting	42
5.5.4. Test Setup.....	43
5.5.5. Test Result.....	44
5.6. Frequency Stability Measurement	64
5.6.1. Test Limit	64
5.6.2. Test Procedure Used	64
5.6.3. Test Setup.....	64
5.6.4. Test Result.....	65
5.7. Radiated Spurious Emission Measurement.....	66
5.7.1. Test Limit	66
5.7.2. Test Procedure Used	66
5.7.3. Test Setting	66
5.7.4. Test Setup.....	68
5.7.5. Test Result.....	69
5.8. Radiated Restricted Band Edge Measurement.....	159
5.8.1. Test Limit	159
5.8.2. Test Procedure Used	160
5.8.3. Test Setting	160
5.8.4. Test Setup.....	161
5.8.5. Test Result.....	162
5.9. AC Conducted Emissions Measurement.....	312
5.9.1. Test Limit	312
5.9.2. Test Setup.....	312
5.9.3. Test Result.....	313
6. Conclusion	315
Appendix A - Test Setup Photograph	316
Appendix B - EUT Photograph.....	317

1. General Information

1.1. Applicant

Calix Inc.

1035 N. McDowell Blvd Petaluma, CA94954 U.S.A

1.2. Manufacturer

Calix Inc.

1035 N. McDowell Blvd Petaluma, CA94954 U.S.A

1.3. Testing Facility

☒	Test Site – MRT Suzhou Laboratory
	Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
	Laboratory Location (Suzhou - SIP) 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China
	Laboratory Accreditations
	A2LA: 3628.01 FCC: CN1166 VCCI: R-20025, G-20034, C-20020, T-20020
☐	Test Site – MRT Shenzhen Laboratory
	Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China
	Laboratory Accreditations
	A2LA: 3628.02 FCC: CN1284
☐	Test Site – MRT Taiwan Laboratory
	Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
	Laboratory Accreditations
	TAF: L3261-190725 FCC: 291082, TW3261

1.4. Product Information

Product Name	GigaSpire BLAST
Model No.	u4 GS2028E, u4-2 GS2028E-2, u4m GM1028, u4m-2 GM1028-2
Brand Name	
Wi-Fi Specification	802.11a/b/g/n/ac/ax/VHT
Serial No.	262007039756 (Radiated Emission & AC Line Conducted Emission) 262007039695 (Conducted)
Accessory	
Adapter #1	MODEL: F24L9-120200SPAU INPUT: 100-240V~50/60Hz 0.6A OUTPUT: 12V=2A
Adapter #2	Model No.: WY-24A12R Input Power: 100 - 240V ~ 50-60Hz, 0.6A Max Output Power: 12.0VDC 2.0A, 24.0W
Remark:	
1. Between the models, there are the same schematics design, same PCB layout and the same RF parameters except the difference as below (Section 1.5), and only u4 GS2028E with adapter #1 was selected for test in this report.	

1.5. Models Difference

Model name	Difference
u4 GS2028E, u4-2 GS2028E-2	2 LAN ports, 1 WAN port, 1 USB, 2.4G/5G Wi-Fi, external PSU
u4m GM1028, u4m-2 GM1028-2	1 WAN port, 2.4G/5G Wi-Fi, external PSU

1.6. Radio Specification

Frequency Range	For 802.11a/n-HT20/ac-VHT20/ax-HE20: 5260~5320MHz, 5500~5720MHz For 802.11n-HT40/ac-VHT40/ax-HE40: 5270~5310MHz, 5510~5710MHz For 802.11ac-VHT80/ax-HE80: 5290MHz, 5530MHz, 5610 MHz, 5690MHz
Type of Modulation	802.11a/n/ac: OFDM 802.11ax: OFDMA
Data Rate	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.6Mbps 802.11ax: up to 1201Mbps

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

1.7. Working Frequencies

802.11a/n-HT20/ac-VHT20/ax-HE20

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	116	5580 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/ac-VHT40/ax-HE40

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/ax-HE80

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

1.8. Antenna Details

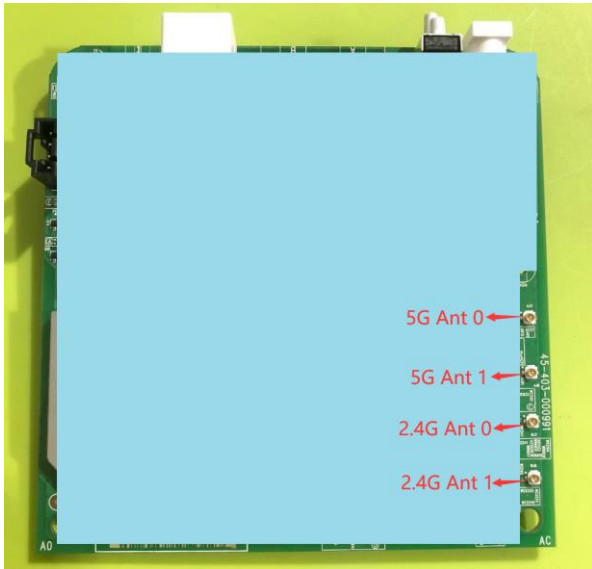
Model name	Manufacturer	Tx Port	Frequency Band (MHz)	Cable length (mm)
2.4G-2_PCB-LY70FC1	CHANGSHU HONGBO TELECOMMUNICATION TECHNOLOGY CO., LTD.	2.4G Ant 0	2412~2462	70
2.4G-1_PCB-LE160FC3		2.4G Ant 1	2412~2462	160
RFPCA252302IM5B301	WALSIN TECHNOLOGY CORPORATION	5G Ant 0	5150~5850	30
RFPCA252312IM5B301		5G Ant 1	5150~5850	125

Antenna Type	Frequency Band (MHz)	Tx Paths	Directional Gain (dBi)
			CDD & Beamforming
PCB Antenna	2412 ~ 2462	2	5.84
	5150 ~ 5350	2	5.81
	5470 ~ 5725	2	5.93
	5725 ~ 5850	2	5.95

Note 1: The EUT supports Cyclic Delay Diversity (CDD) and Beamforming technology, and the Beamforming mode support 802.11ac/ax, not include 802.11a/b/g. It transmits signals that are correlated, then Directional gain = $10 \log [(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ 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].

Note 2: All the messages as above are provided by manufacturer.

1.9. Antenna RF Port

Antenna RF Port				
Software Control Port	2.4GHz RF Port		5GHz RF Port	
	Ant 0	Ant 1	Ant 0	Ant 1
				

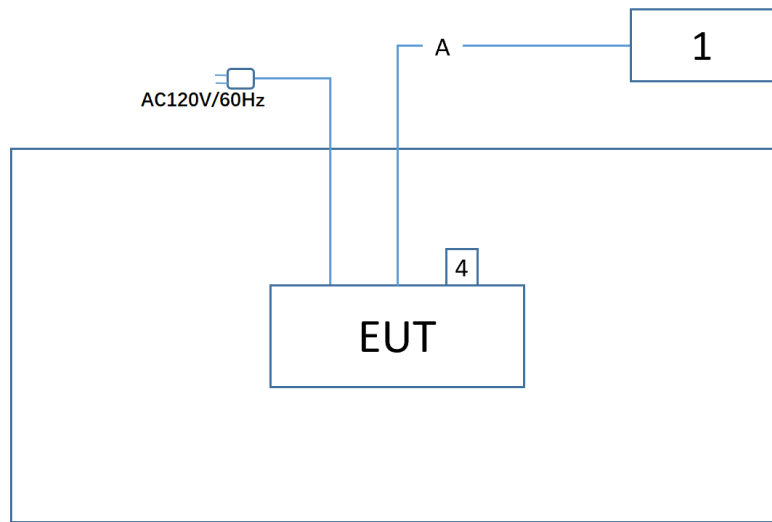
1.10. Test Mode

Test Mode	Mode 1: Transmit by 802.11a (6Mbps) (CDD Mode)
	Mode 2: Transmit by 802.11n-HT20 (MCS0) (CDD Mode)
	Mode 3: Transmit by 802.11n-HT40 (MCS0) (CDD Mode)
	Mode 4: Transmit by 802.11ac-VHT20 (MCS0) (CDD Mode)
	Mode 5: Transmit by 802.11ac-VHT40 (MCS0) (CDD Mode)
	Mode 6: Transmit by 802.11ac-VHT80 (MCS0) (CDD Mode)
	Mode 7: Transmit by 802.11ax-HE20 (MCS0) (CDD Mode)
	Mode 8: Transmit by 802.11ax-HE40 (MCS0) (CDD Mode)
	Mode 9: Transmit by 802.11ax-HE80 (MCS0) (CDD Mode)
	Mode 10: Transmit by 802.11ac-VHT20 (MCS0) (Beamforming Mode)
	Mode 11: Transmit by 802.11ac-VHT40 (MCS0) (Beamforming Mode)
	Mode 12: Transmit by 802.11ac-VHT80 (MCS0) (Beamforming Mode)
	Mode 13: Transmit by 802.11ax-HE20 (MCS0) (Beamforming Mode)
	Mode 14: Transmit by 802.11 ax-HE40 (MCS0) (Beamforming Mode)
	Mode 15: Transmit by 802.11ax-HE80 (MCS0) (Beamforming Mode)

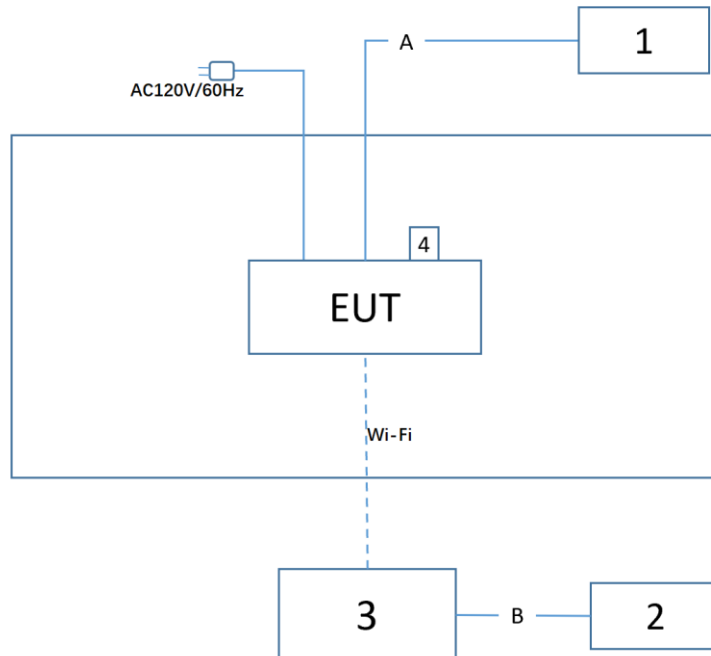
1.11. Configuration of Test System

The measurement procedures and appropriate EUT setup described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and KDB 789033 were used in the measurement.

Connection Diagram – Radiated Emission testing (CDD mode) & AC Conducted Emissions



Connection Diagram – Radiated Emission testing (Beamforming mode)



Cable Type		Cable Description
A	LAN Cable	Non shielded, > 10m
B	LAN Cable	Non shielded, 3.0m

1.12. Test System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook	Lenovo	E431	PF-10ZRN 13/12	Non-Shielded, 1.8m
2	Notebook	Lenovo	X230i	N/A	Non-Shielded, 1.8m
3	Station Device	Calix	GigaSpire BLAST	N/A	N/A
4	USB flash disk	SanDisk	CZ48	N/A	N/A

1.13. Test Software

For CDD mode:

The test utility software used during testing was “Qualcomm Radio Control Tool”, and the version was “4.0.00132.0”.

For Beamforming mode:

Conducted measurement

The test utility software used during testing was “Qualcomm Radio Control Tool”, and the version was “4.0.00132.0”.

Radiated measurement

- 1) Configure EUT and station device to under the normal operation.
- 2) Set and fix EUT's mode, channel, and power by telnet.
- 3) Connect EUT with station device, run “*lperf.exe*” to transmit and receive packet continuously by station device.

Note: Final power setting please refer to operational description.

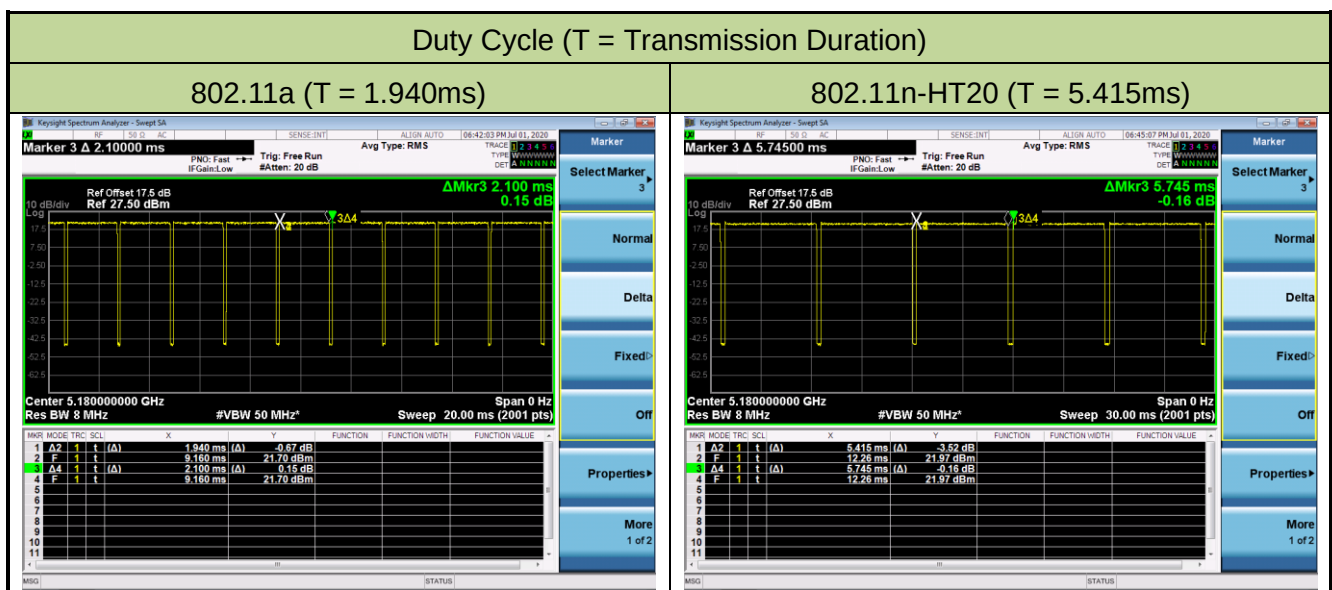
1.14. Test Environment Condition

Ambient Temperature	15°C~35°C
Relative Humidity	20%RH ~75%RH

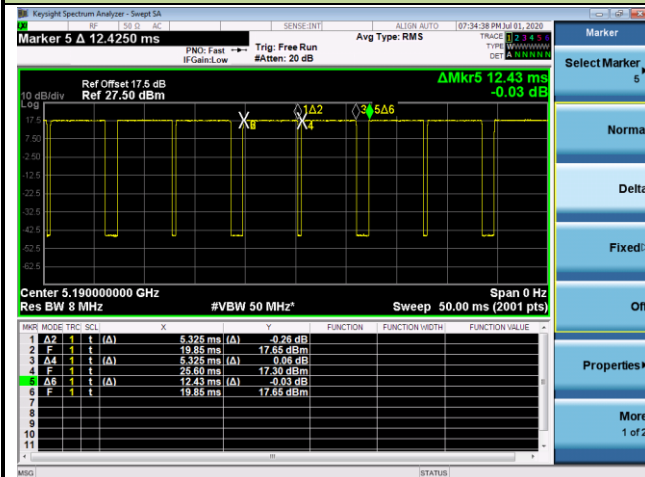
1.15. Duty Cycle

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:

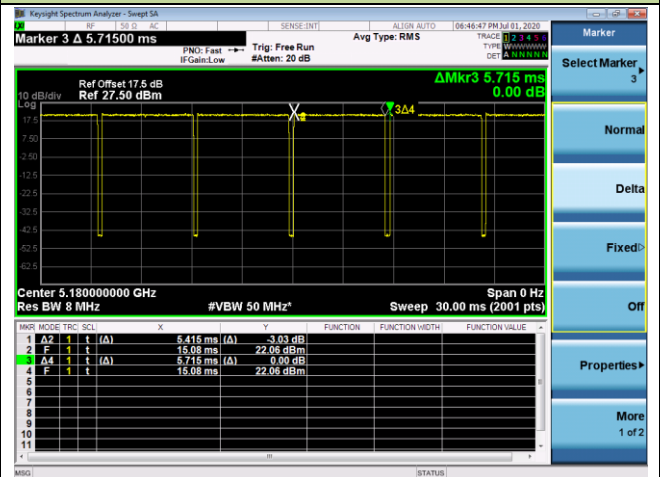
Test Mode	Duty Cycle
802.11a	92.38%
802.11n-HT20	94.26%
802.11n-HT40	85.68%
802.11ac-VHT20	94.75%
802.11ac-VHT40	85.08%
802.11ac-VHT80	94.50%
802.11ax-HE20	94.50%
802.11ax-HE40	95.50%
802.11ax-HE80	91.45%



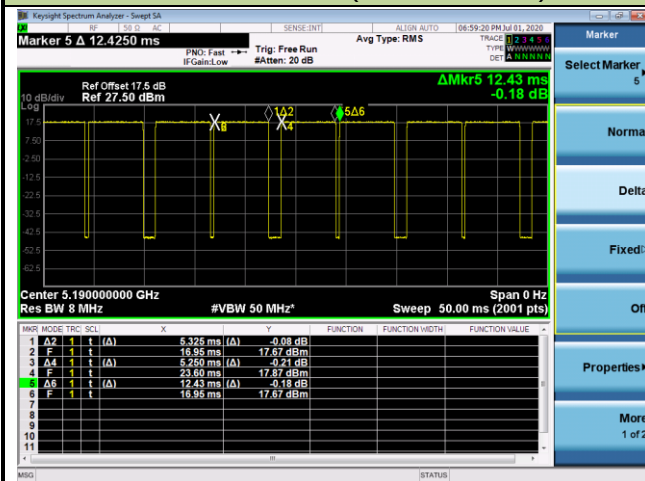
802.11n-HT40 (T = 10.650ms)



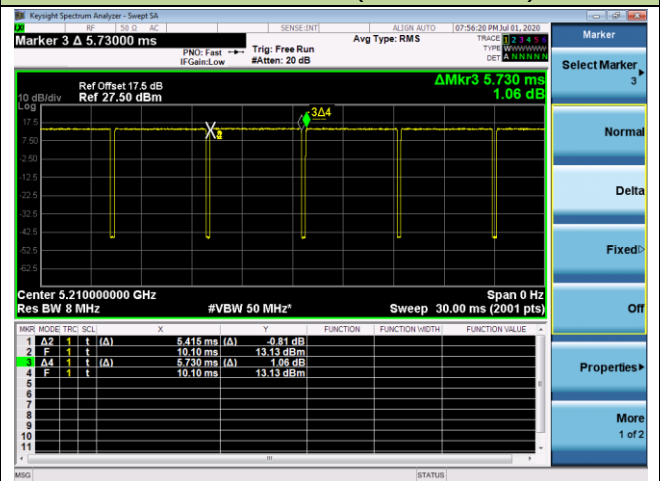
802.11ac-VHT20 (T = 5.415ms)



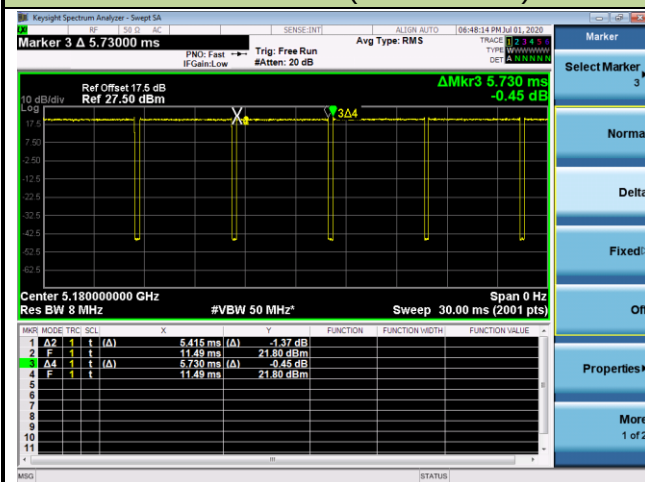
802.11ac-VHT40 (T = 10.575ms)



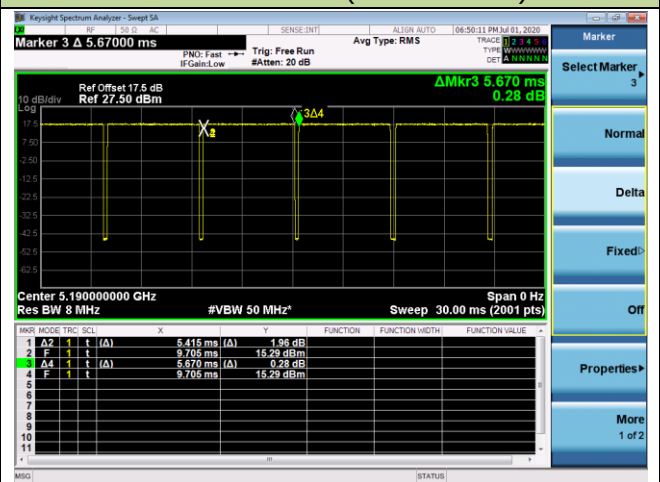
802.11ac-VHT80 (T = 5.415ms)

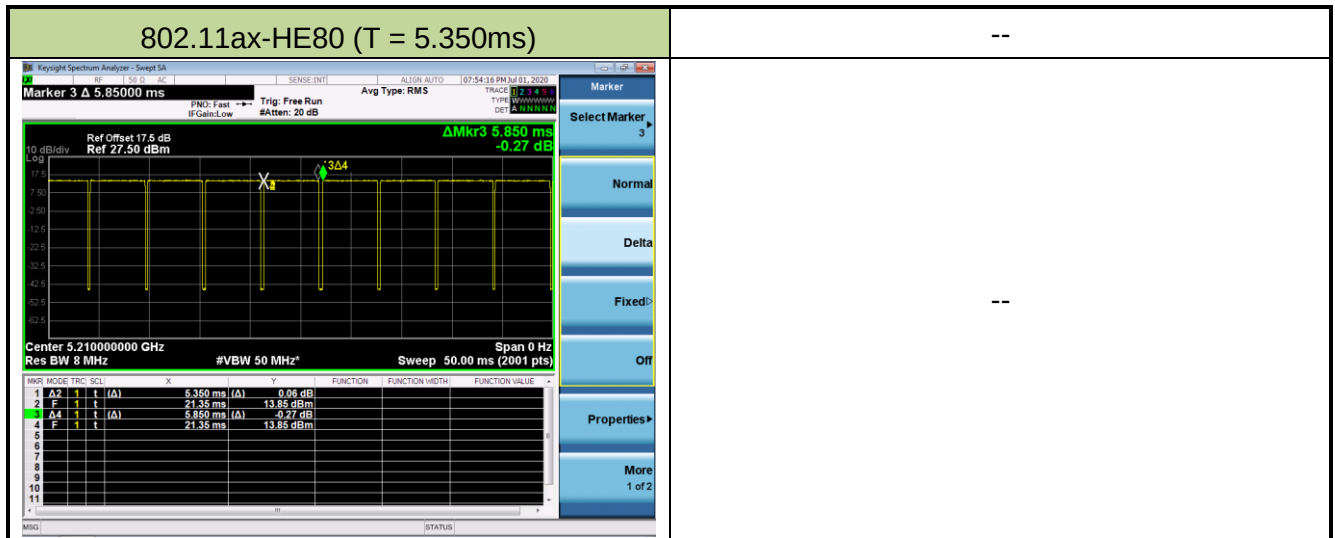


802.11ax-HE20 (T = 5.415ms)



802.11ax-HE40 (T = 5.415ms)





1.16. EMI Suppression Device(s)/Modifications

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

1.17. 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.

2. 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 device is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

3. Test Equipment Calibration Date

Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2021/01/18
Two-Line V-Network	R&S	ENV 216	MRTSUE06002	1 year	2021/06/11
Two-Line V-Network	R&S	ENV 216	MRTSUE06003	1 year	2021/06/11
Thermal Hygrometer	testo	608-H1	MRTSUE06404	1 year	2021/07/26

Radiated Emissions - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2021/01/18
PXA Signal Analyzer	Keysight	9030B	MRTSUE06395	1 year	2020/09/03
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/13
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2021/04/03
Broad Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2020/10/13
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2020/12/17
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermal Hygrometer	testo	608-H1	MRTSUE06403	1 year	2021/07/26
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2021/04/30

Radiated Emission - AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
MXE EMI Receiver	Keysight	N9038A	MRTSUE06125	1 year	2021/07/02
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/13
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2020/10/13
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2020/10/27
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2020/12/17
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Temperature/Humidity Meter	Minggao	ETH529	MRTSUE06170	1 year	2020/12/15
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2021/04/30

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2021/04/14
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06452	1 year	2021/01/08
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/14
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2020/11/18
USB wideband power sensor	Keysight	U2021XA	MRTSUE06446	1 year	2021/06/11
USB wideband power sensor	Keysight	U2021XA	MRTSUE06447	1 year	2021/06/11
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2021/06/11
Audio Analyzer	Agilent	U8903B	MRTSUE06143	1 year	2021/06/11
Modulation Analyzer	HP	8901A	MRTSUE06098	1 year	2020/10/10
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2020/11/07
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
Attenuator	MVE	6dB	MRTSUE06534	1 year	2020/12/12
Attenuator	MVE	10dB	MRTSUE06543	1 year	2020/12/12
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2020/11/07
Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2021/07/26

Software	Version	Function
EMI Software	V3	EMI Test Software

4. 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 $k = 2$.

Conducted Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 9kHz~150kHz: 3.74dB 150kHz~30MHz: 3.44dB
Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): Horizontal: 9KHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~6GHz: 6.40dB Vertical: 9KHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 1.13dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 1.15dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 0.28%

5. Test Result

5.1. Summary

FCC Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407(a)	26dB Bandwidth	N/A	Conducted	Pass	Section 5.2
15.407(a)(2)	Maximum Conducted Output Power	Refer to Section 5.4		Pass	Section 5.3
15.407(h)(1)	Transmit Power Control	≤ 24 dBm		Pass	Section 5.4
15.407(a)(2)	Peak Power Spectral Density	Refer to Section 5.5		Pass	Section 5.5
15.407(g)	Frequency Stability	± 20 ppm		Pass	Section 5.6
15.407(b)(2), (3)	Undesirable Emissions	Refer to Section 5.7	Radiated	Pass	Section 5.7 & 5.8
15.205, 15.209 15.407(b)(7), (8), (9)	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 5.9

Notes:

- 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.
- Output power test was verified over all data rates of each mode (data refers to operational description), and then choose the maximum power output (low data rate) for final test of each channel.
- 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.
- Test Items "26dB Bandwidth" showed the worst test data in this report.
- EUT supports one configuration only in 802.11ax full RU mode, i.e. 242 tone in 11ax-HE20, 484 tone in 11ax-HE40 and 996 tone in 11ax-HE80.

5.2. 26dB Bandwidth Measurement

5.2.1. Test Limit

N/A

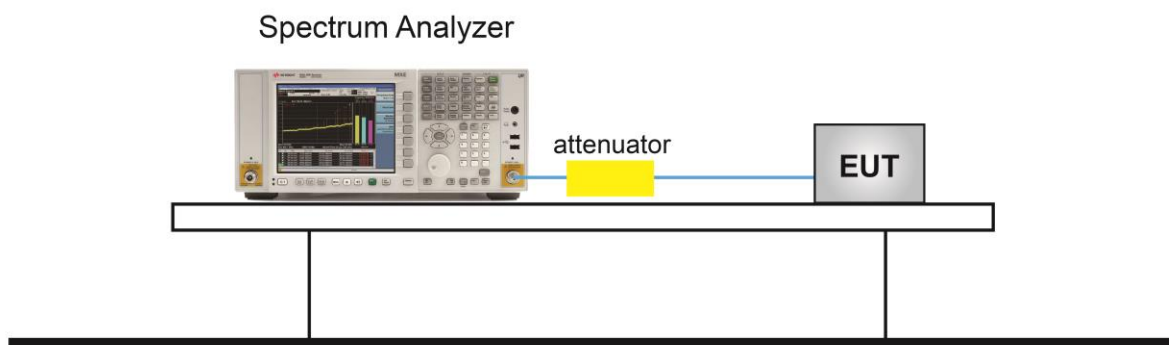
5.2.2. Test Procedure used

KDB 789033 D02v02r01 - Section C.1

5.2.3. 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.

5.2.4. Test Setup



5.2.5. Test Result

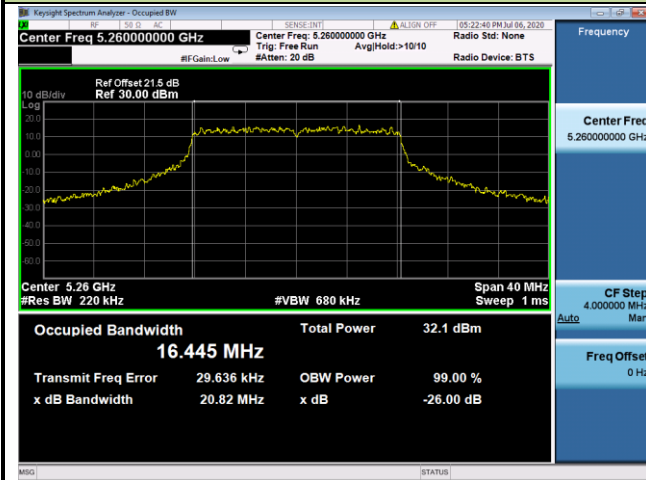
Product	GigaSpire BLAST	Test Engineer	Yuri Li
Test Date	2020/07/06~2020/07/08	Test Site	TR3

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant 0 / Ant 0 + 1					
802.11a	6Mbps	52	5260	20.82	16.45
802.11a	6Mbps	60	5300	20.54	16.42
802.11a	6Mbps	64	5320	20.83	16.42
802.11a	6Mbps	100	5500	20.73	16.38
802.11a	6Mbps	116	5580	20.38	16.39
802.11a	6Mbps	140	5700	20.43	16.39
802.11a	6Mbps	144	5720	20.42	16.37
802.11n-HT20	MCS0	52	5260	19.85	17.48
802.11n-HT20	MCS0	60	5300	19.83	17.45
802.11n-HT20	MCS0	64	5320	20.31	17.47
802.11n-HT20	MCS0	100	5500	19.94	17.47
802.11n-HT20	MCS0	116	5580	19.87	17.44
802.11n-HT20	MCS0	140	5700	19.93	17.42
802.11n-HT20	MCS0	144	5720	19.73	17.41
802.11n-HT40	MCS0	54	5270	40.36	36.09
802.11n-HT40	MCS0	62	5310	40.28	36.08
802.11n-HT40	MCS0	102	5510	40.57	36.10
802.11n-HT40	MCS0	110	5550	40.55	36.07
802.11n-HT40	MCS0	134	5670	40.43	36.10
802.11n-HT40	MCS0	142	5710	40.47	36.10
802.11ac-VHT20	MCS0	52	5260	20.92	17.55
802.11ac-VHT20	MCS0	60	5300	20.45	17.57
802.11ac-VHT20	MCS0	64	5320	20.55	17.57
802.11ac-VHT20	MCS0	100	5500	19.94	17.37
802.11ac-VHT20	MCS0	116	5580	19.78	17.38
802.11ac-VHT20	MCS0	140	5700	20.14	17.43
802.11ac-VHT20	MCS0	144	5720	19.53	17.42

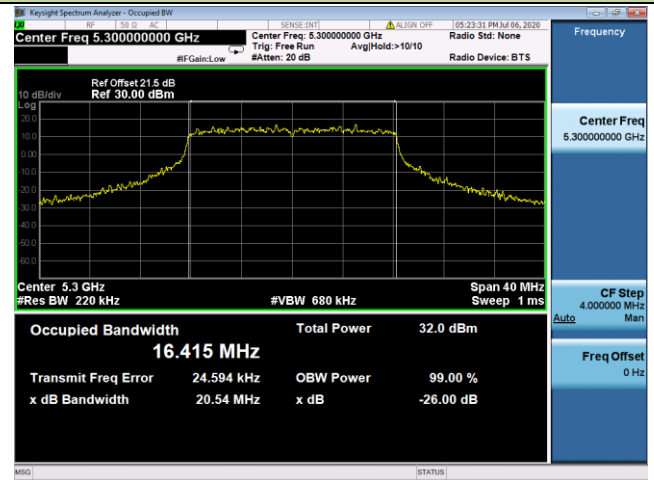
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant 0 / Ant 0 + 1					
802.11ac-VHT40	MCS0	54	5270	40.49	36.11
802.11ac-VHT40	MCS0	62	5310	40.47	36.05
802.11ac-VHT40	MCS0	102	5510	41.01	36.07
802.11ac-VHT40	MCS0	110	5550	40.48	36.08
802.11ac-VHT40	MCS0	134	5670	39.93	36.05
802.11ac-VHT40	MCS0	142	5710	40.36	36.11
802.11ac-VHT80	MCS0	58	5290	81.56	75.36
802.11ac-VHT80	MCS0	106	5530	81.35	75.31
802.11ac-VHT80	MCS0	122	5610	81.58	75.35
802.11ac-VHT80	MCS0	138	5690	82.23	75.38
802.11ax-HE20	MCS0	52	5260	20.83	18.92
802.11ax-HE20	MCS0	60	5300	20.99	18.92
802.11ax-HE20	MCS0	64	5320	21.65	18.89
802.11ax-HE20	MCS0	100	5500	21.01	18.96
802.11ax-HE20	MCS0	116	5580	21.77	18.94
802.11ax-HE20	MCS0	140	5700	20.94	18.92
802.11ax-HE20	MCS0	144	5720	20.96	18.95
802.11ax-HE40	MCS0	54	5270	40.71	37.73
802.11ax-HE40	MCS0	62	5310	40.38	37.70
802.11ax-HE40	MCS0	102	5510	40.58	37.70
802.11ax-HE40	MCS0	110	5550	40.68	37.67
802.11ax-HE40	MCS0	134	5670	40.51	37.71
802.11ax-HE40	MCS0	142	5710	40.55	37.76
802.11ax-HE80	MCS0	58	5290	81.82	77.11
802.11ax-HE80	MCS0	106	5530	81.44	77.22
802.11ax-HE80	MCS0	122	5610	81.53	77.28
802.11ax-HE80	MCS0	138	5690	81.14	77.09

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

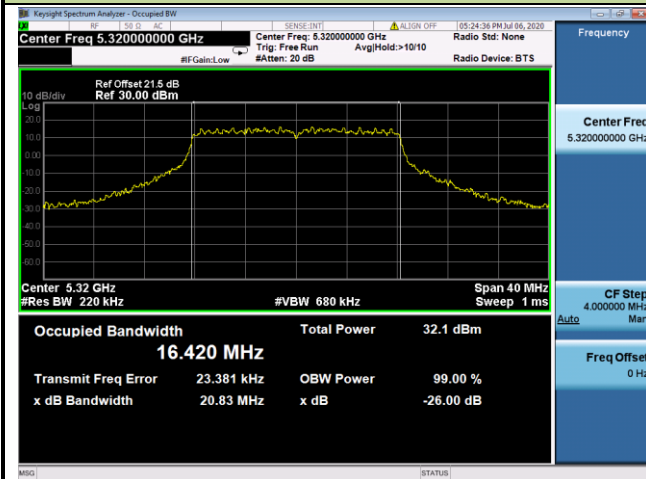
Channel 52 (5260MHz)



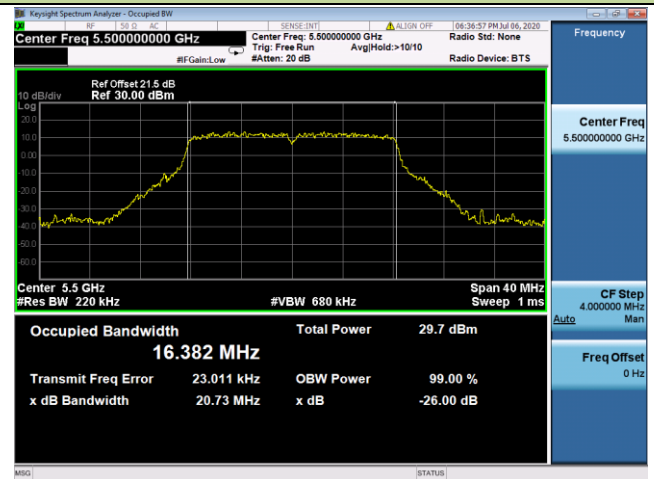
Channel 60 (5300MHz)



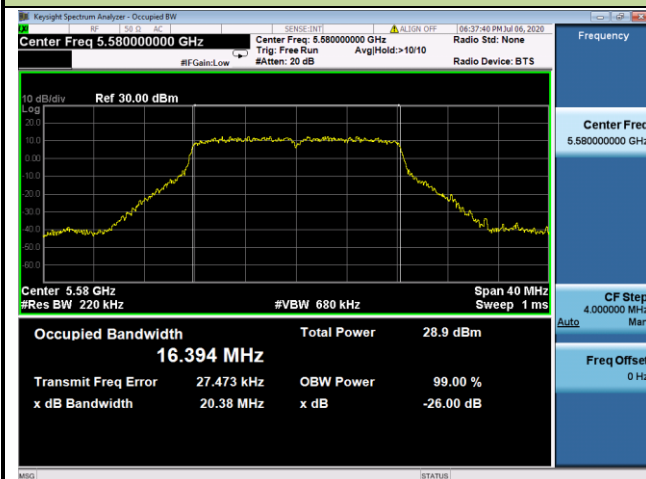
Channel 64 (5320MHz)



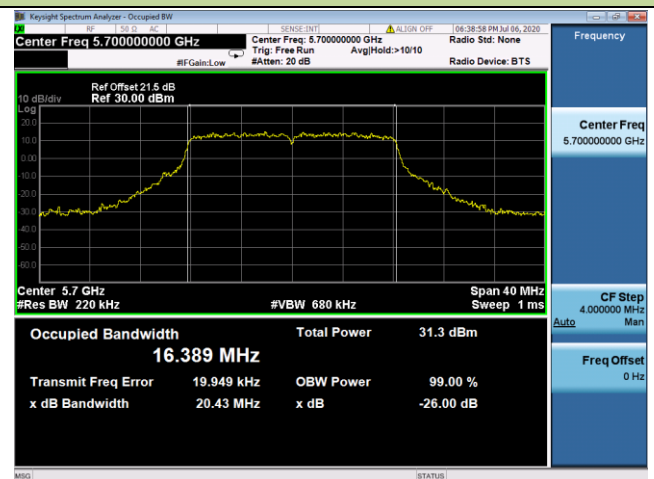
Channel 100 (5500MHz)



Channel 116 (5580MHz)

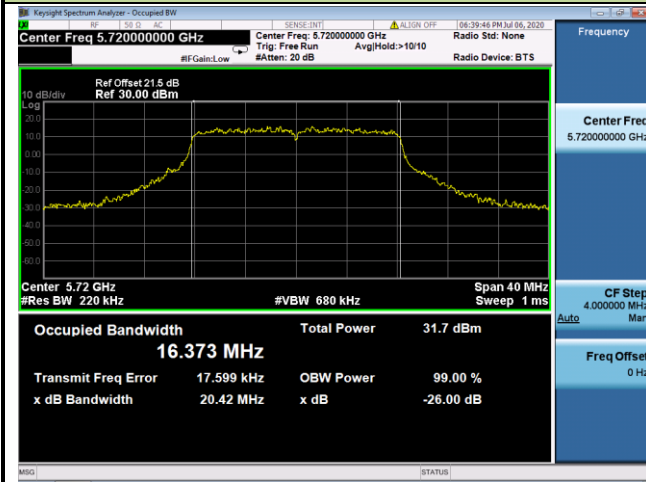


Channel 140 (5700MHz)



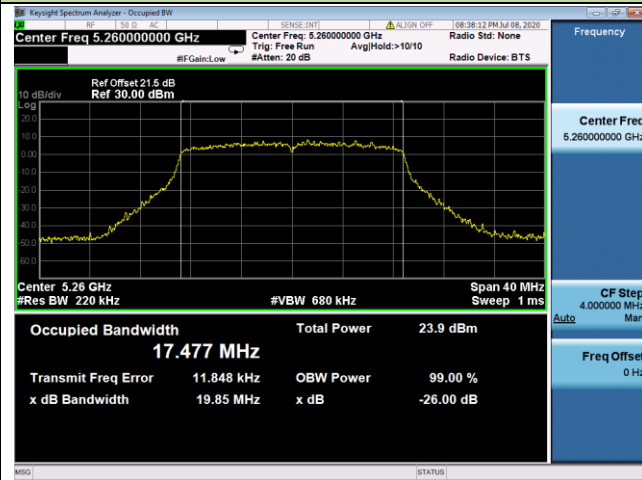
802.11a 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

Channel 144 (5720MHz)

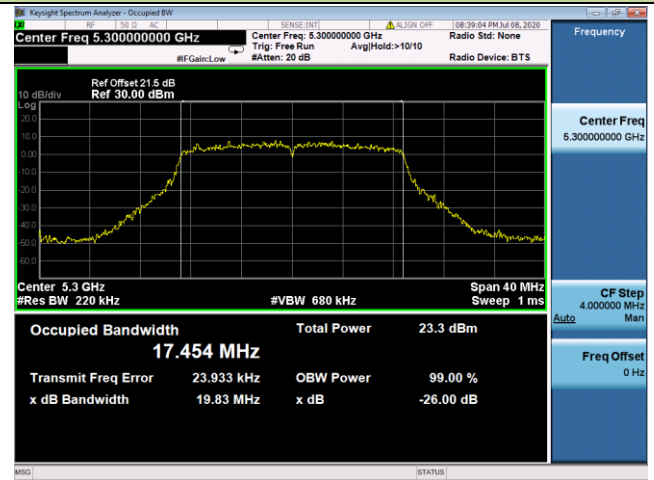


802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

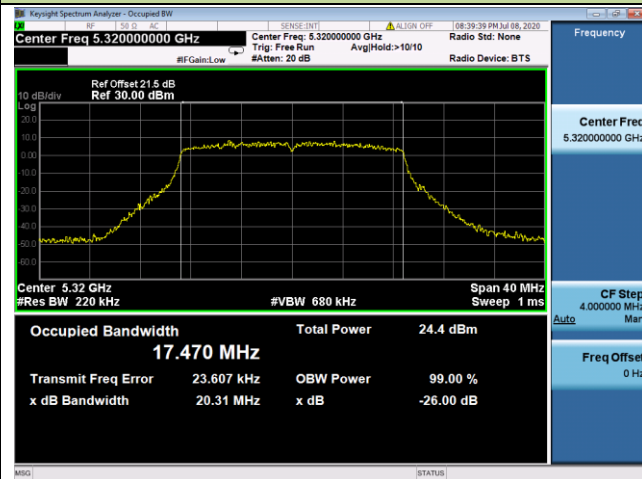
Channel 52 (5260MHz)



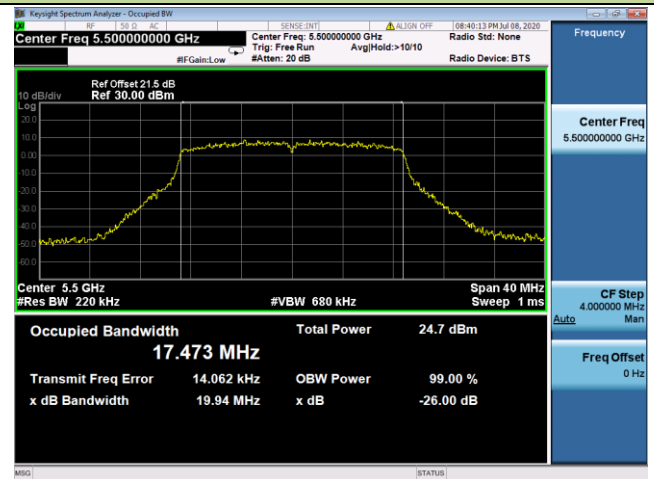
Channel 60 (5300MHz)



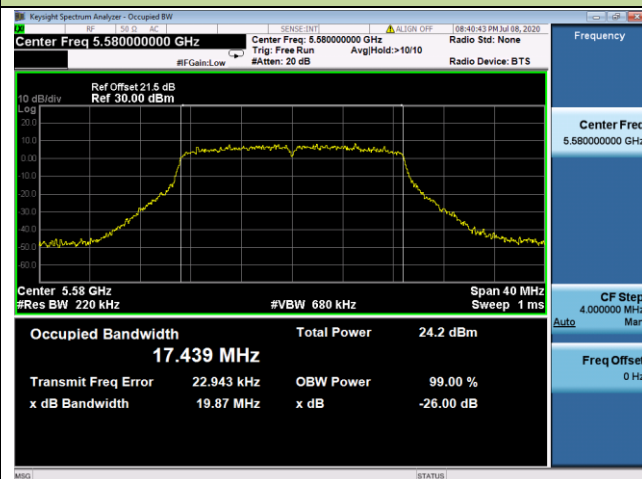
Channel 64 (5320MHz)



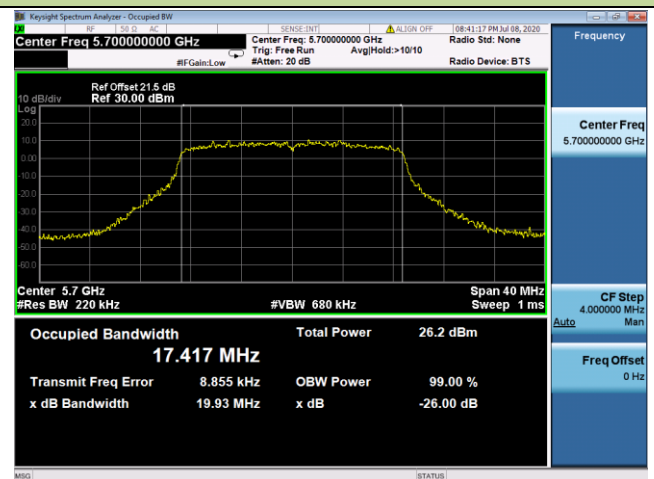
Channel 100 (5500MHz)



Channel 116 (5580MHz)

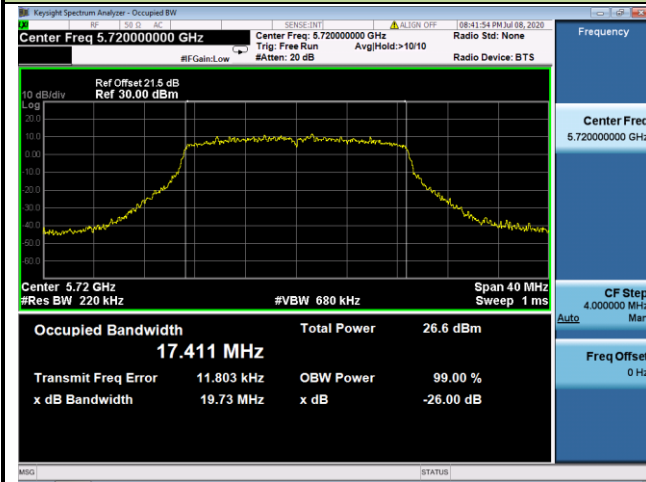


Channel 140 (5700MHz)



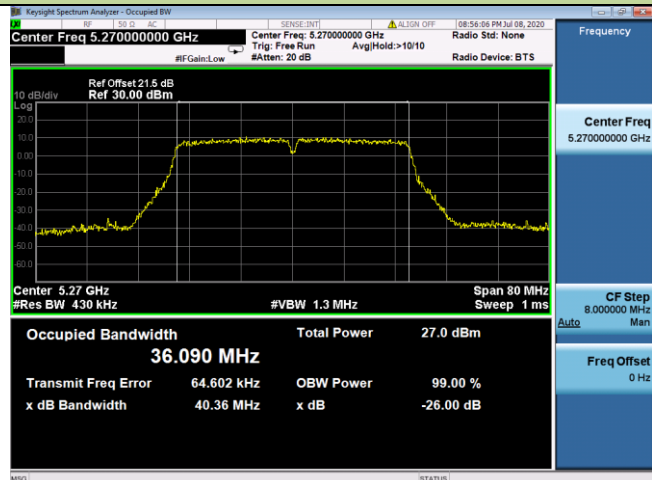
802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

Channel 144 (5720MHz)

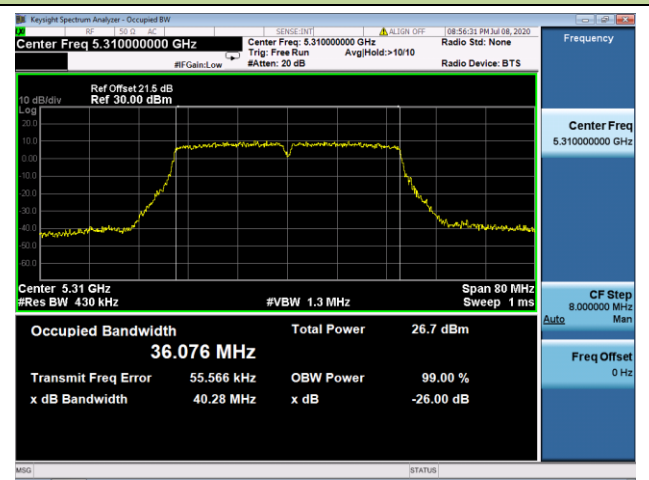


802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

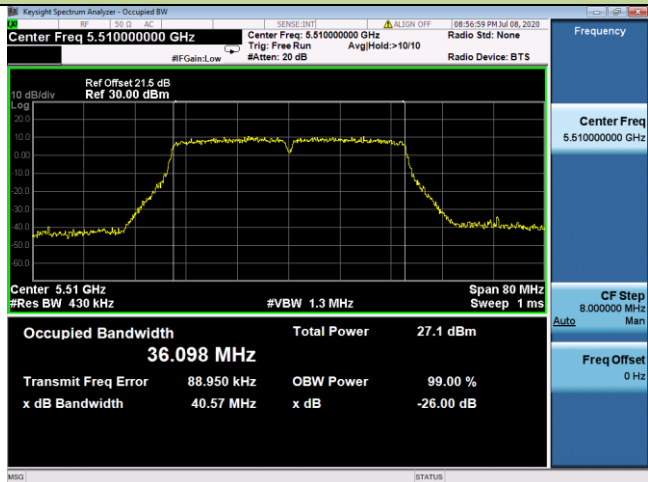
Channel 54 (5270MHz)



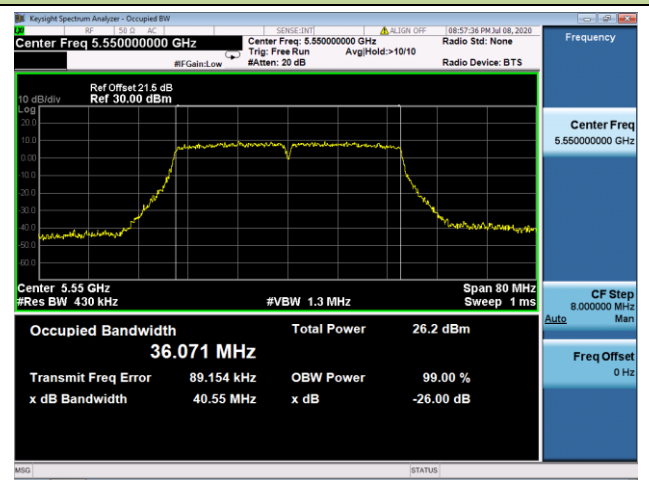
Channel 62 (5310MHz)



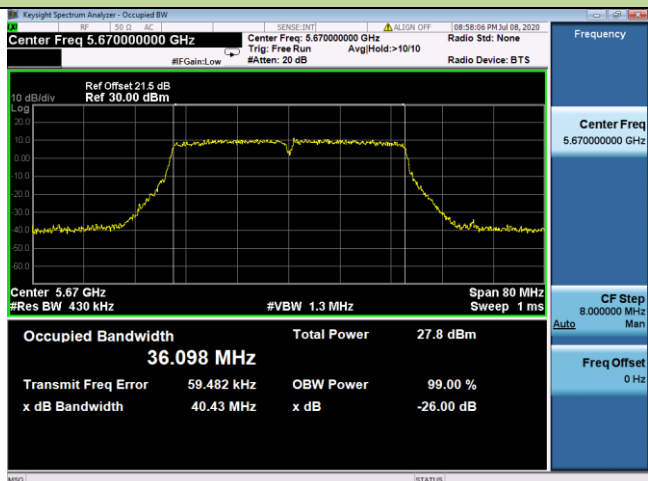
Channel 102 (5510MHz)



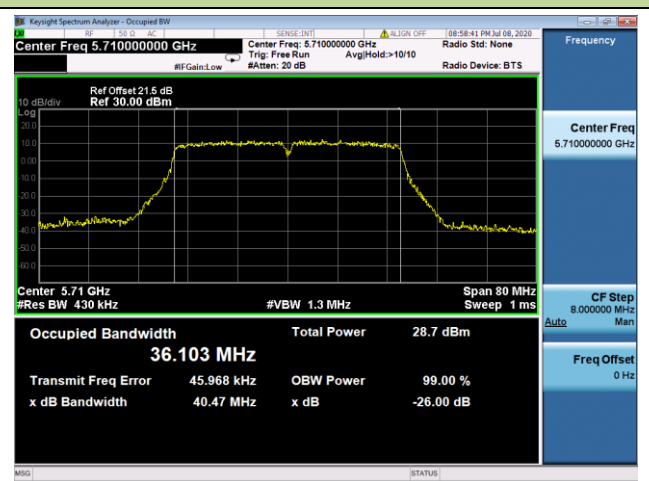
Channel 110 (5550MHz)



Channel 134 (5670MHz)

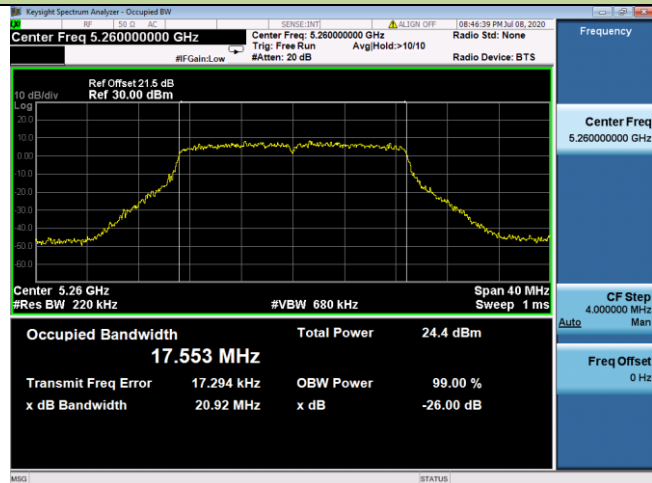


Channel 142 (5710MHz)

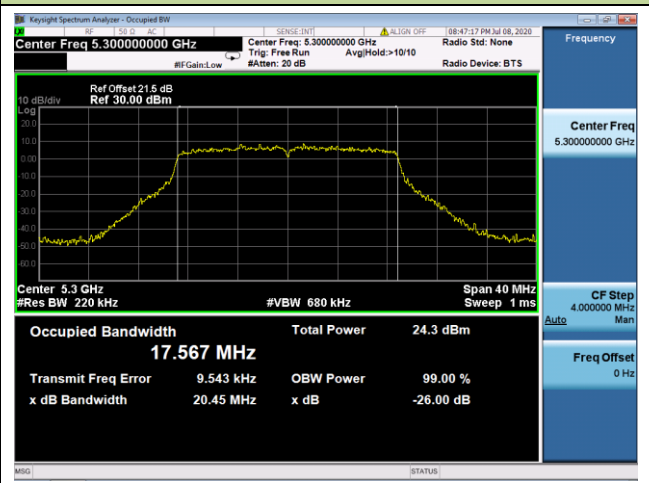


802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

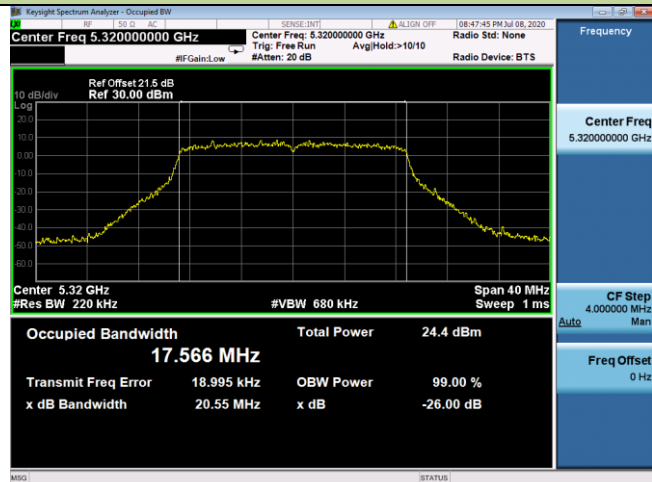
Channel 52 (5260MHz)



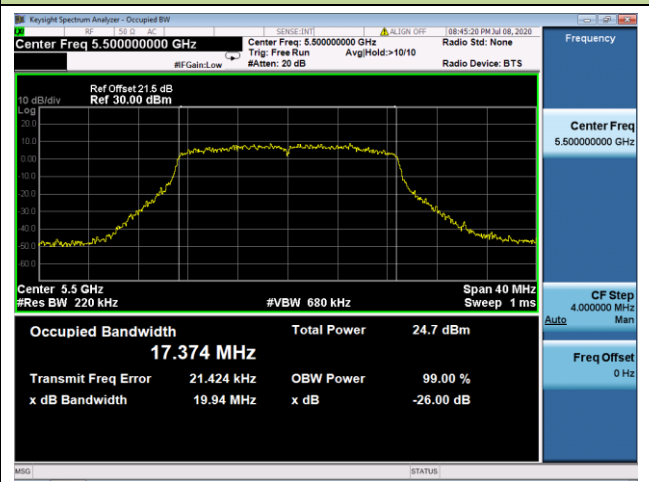
Channel 60 (5300MHz)



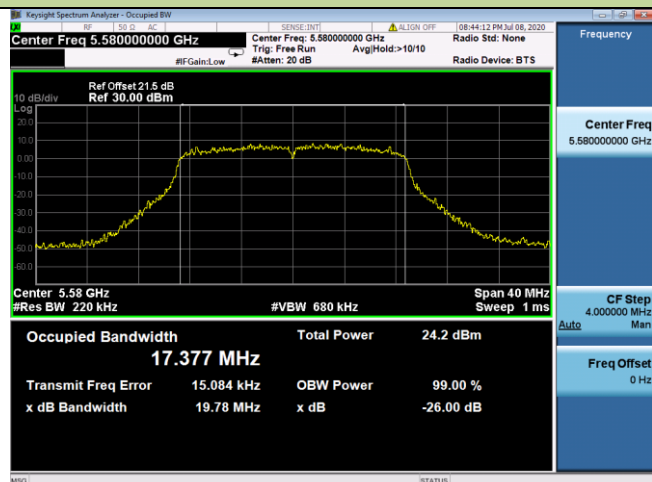
Channel 64 (5320MHz)



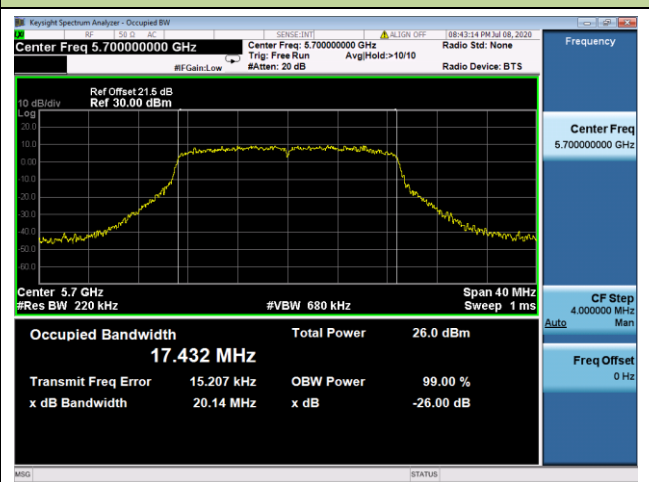
Channel 100 (5500MHz)



Channel 116 (5580MHz)

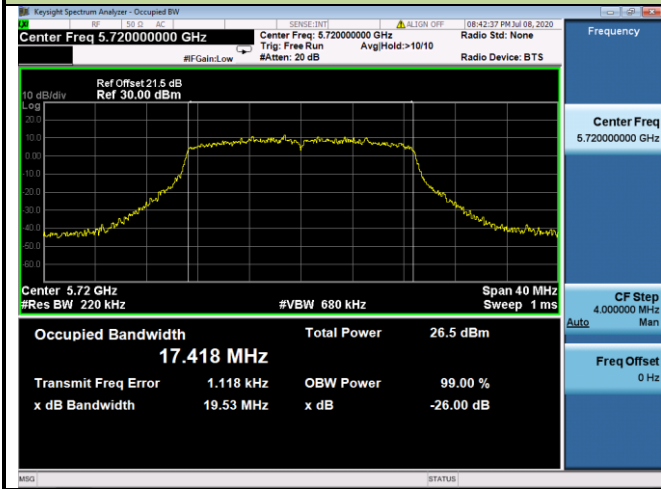


Channel 140 (5700MHz)



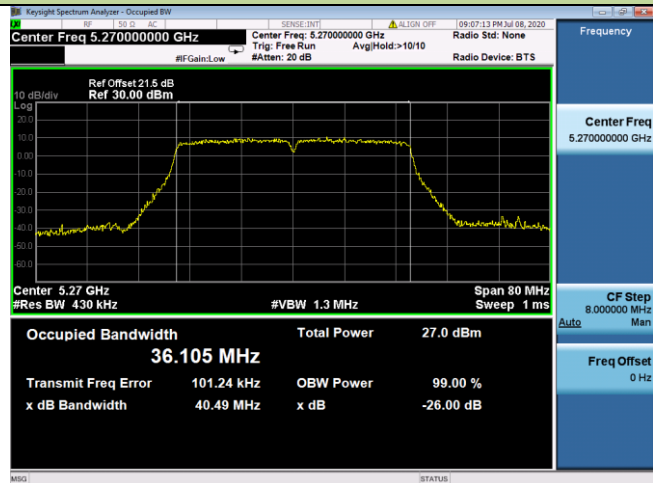
802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

Channel 144 (5720MHz)

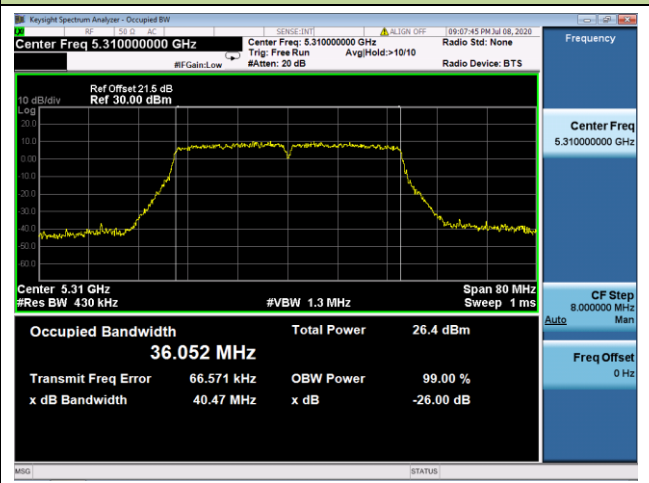


802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

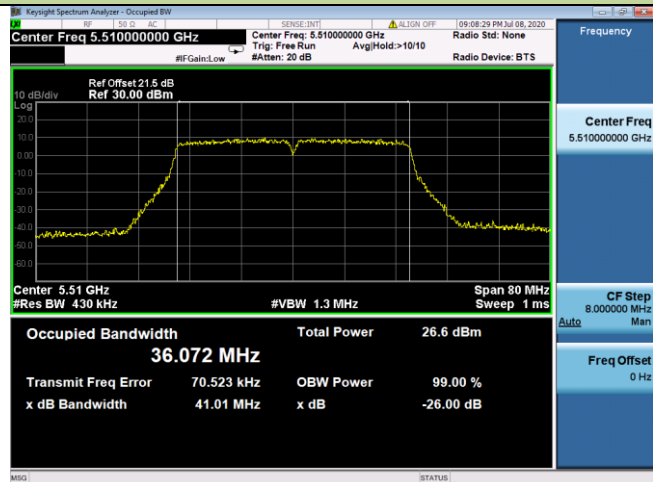
Channel 54 (5270MHz)



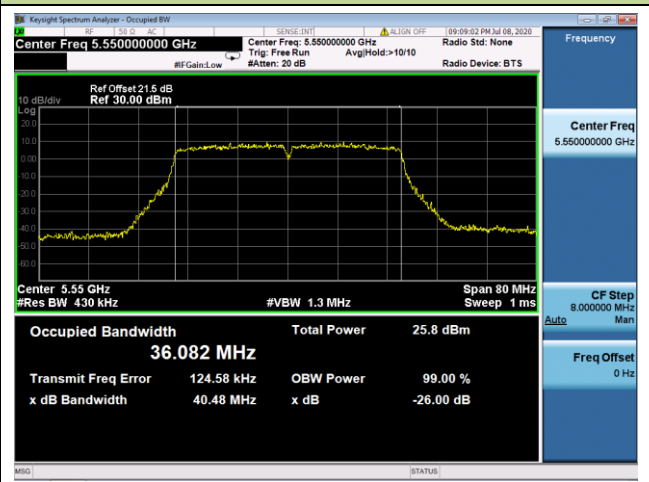
Channel 62 (5310MHz)



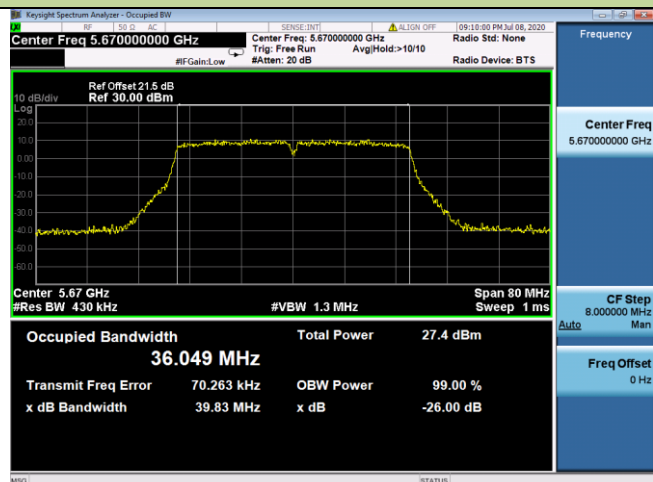
Channel 102 (5510MHz)



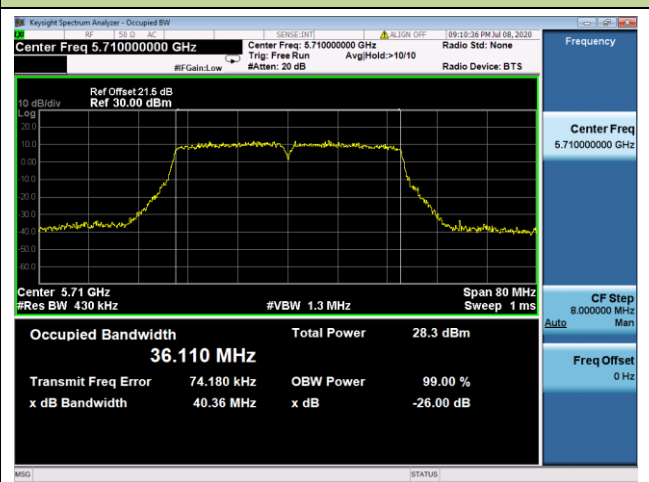
Channel 110 (5550MHz)



Channel 134 (5670MHz)

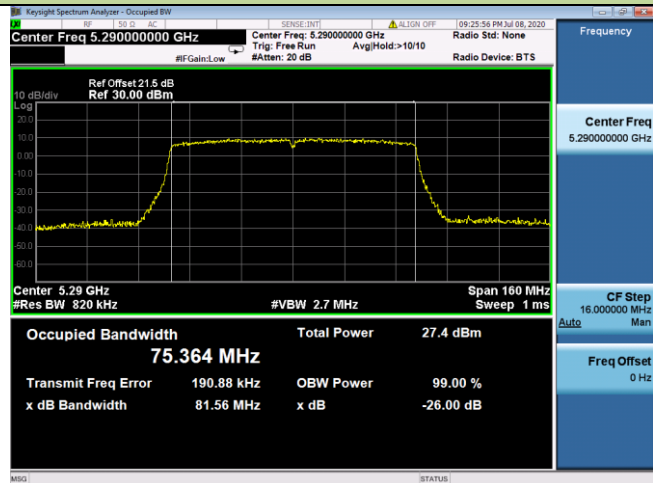


Channel 142 (5710MHz)

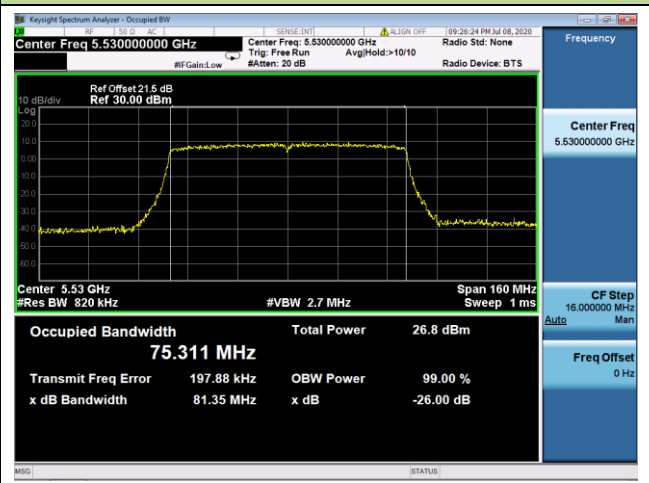


802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

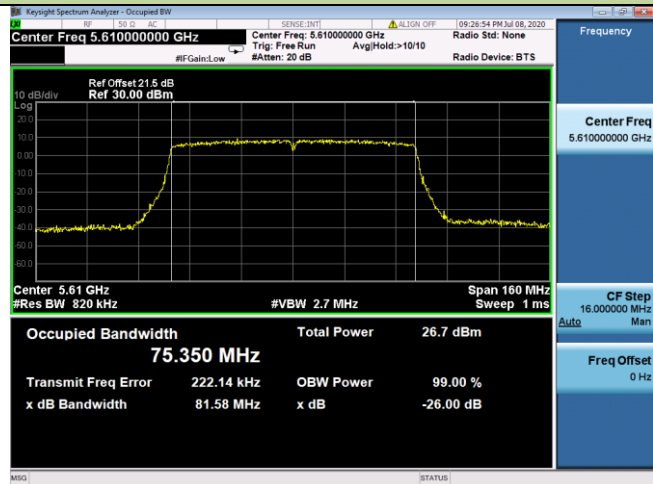
Channel 58 (5290MHz)



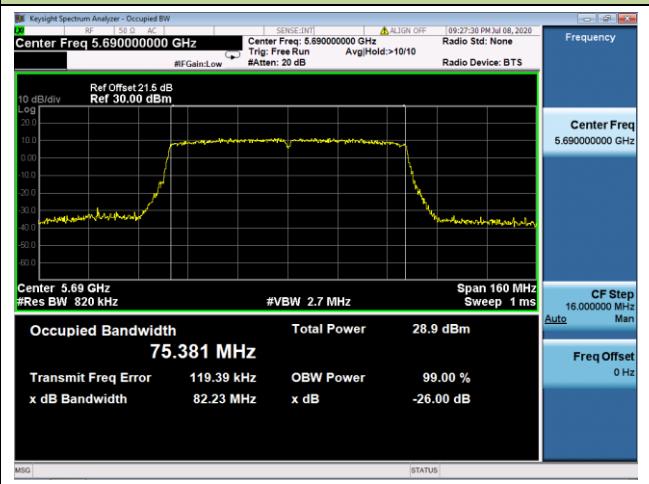
Channel 106 (5530MHz)



Channel 122 (5610MHz)

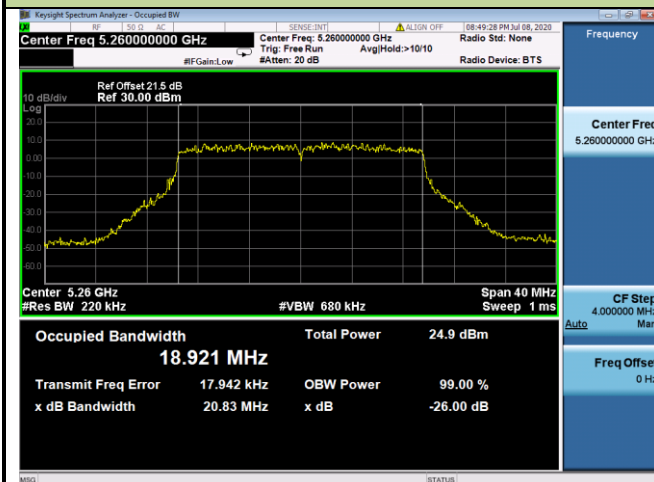


Channel 138 (5690MHz)

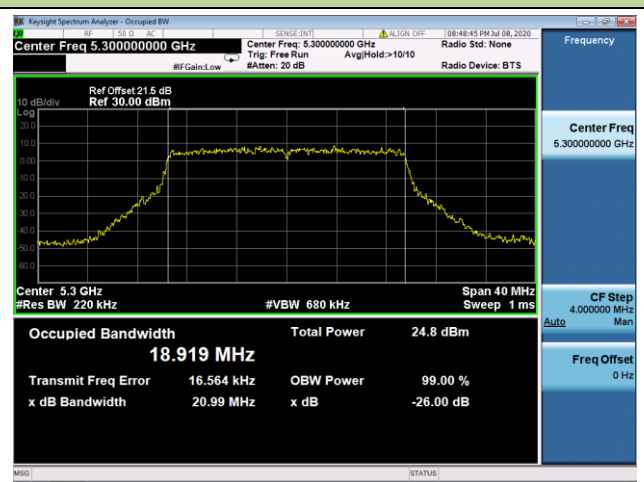


802.11ax-HE20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

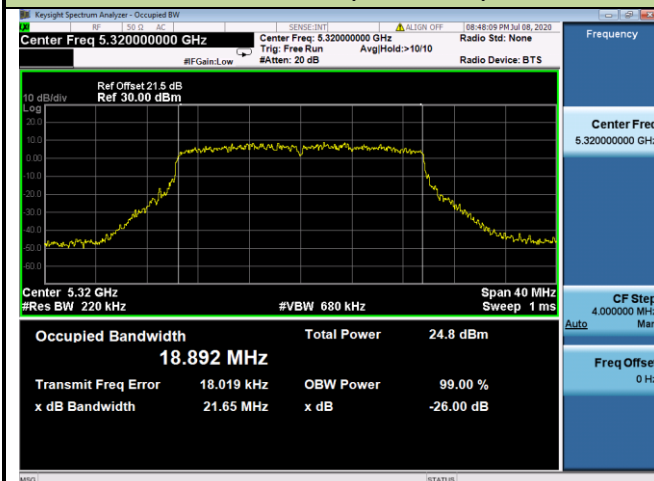
Channel 52 (5260MHz)



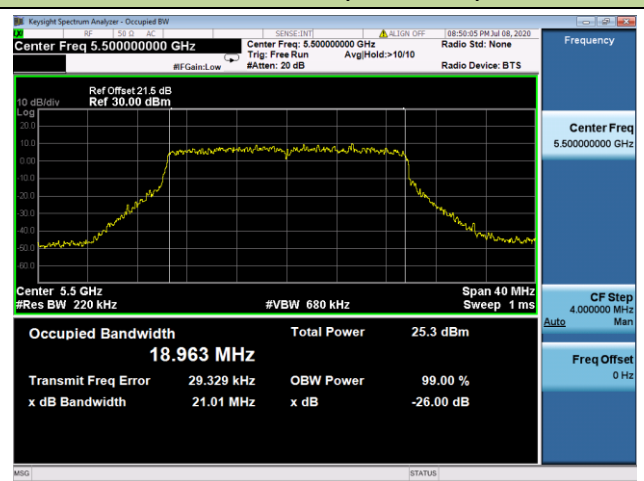
Channel 60 (5300MHz)



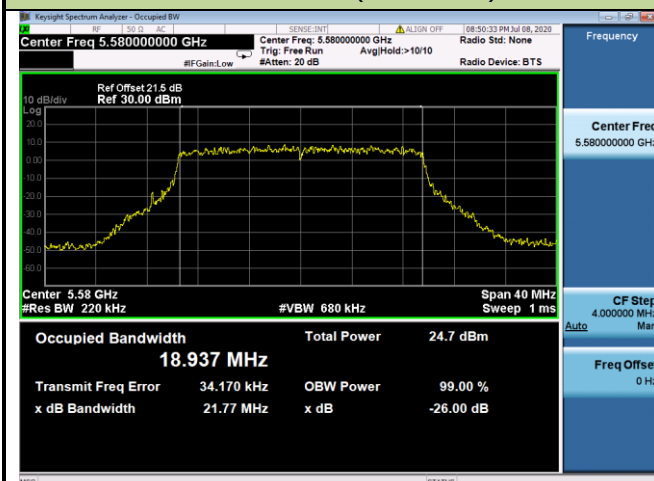
Channel 64 (5320MHz)



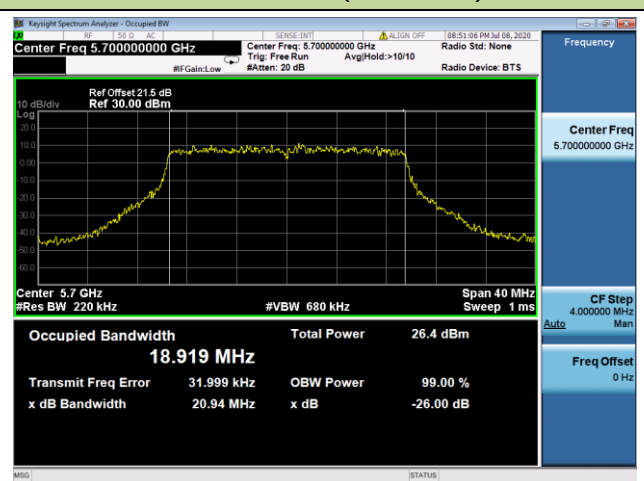
Channel 100 (5500MHz)



Channel 116 (5580MHz)



Channel 140 (5700MHz)



802.11ax-HE20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

Channel 144 (5720MHz)

