MEASUREMENT REPORT

FCC PART 15.407 WLAN 802.11a/n/ac/ax

FCC ID:	Q9DAPEX058457
Applicant:	Hewlett Packard Enterprise Company
Application Type:	Certification
Product:	ACCESS POINT
Model No.:	APEX0587, APEX0584, APEX0585
TradeMark:	aruba a Hewlett Packard Enterprise company, Hewlett Packard Enterprise
FCC Classification:	Unlicensed National Information Infrastructure (NII)
FCC Rule Part(s):	Part15 Subpart E (Section 15.407)
Test Date:	July 25, 2021 ~ January 20, 2022

Reviewed By: Paddy Chen
(Paddy Chen)

Approved By: Chenz Ker
(Chenz Ker)

Testing Laboratory
3261

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
2105TW0005-U4	V1.0	Initial Report	01-21-2022	Valid

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Description Page

General Information

Applicant	Hewlett Packard Enterprise Company
Applicant Address	3333 Scott Blvd, Santa Clara, CA 95054, USA
Manufacturer	Hewlett Packard Enterprise Company
Manufacturer Address	3333 Scott Blvd, Santa Clara, CA 95054, USA
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 FCC Registration No.	291082
FCC Rule Part(s)	Part 15.407
Test Device Serial No.	APEX0585: CNM4L1M012 APEX0587: CNM7L1N00T APEX0584: CNM5L1L01S

Test Facility / Accreditations

1. MRT facility is a FCC registered (Reg. No. 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Firm.
2. MRT facility is an IC registered (MRT Reg. No. 21723) test laboratory with the site description on file at Industry Canada.
3. MRT Lab is accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC (Designation Number: TW3261), Industry Taiwan, EU and TELEC Rules.

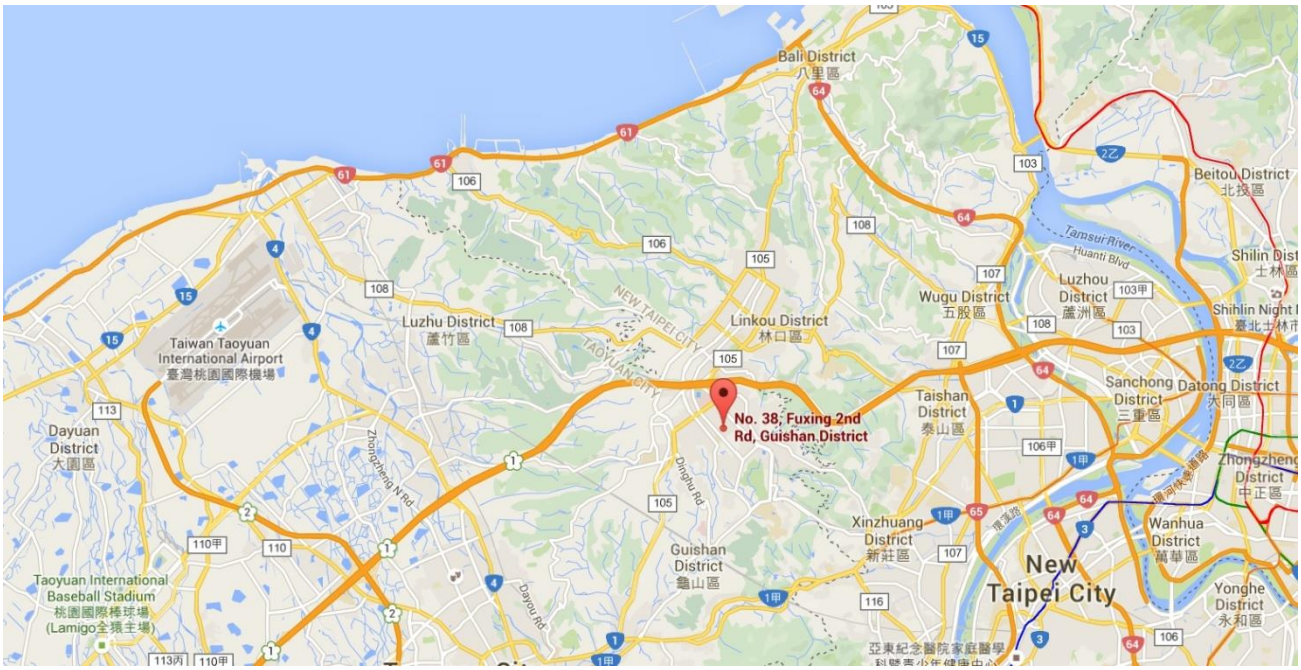
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices includingintentional and/or unintentional radiators for compliance with the technical rules and regulations of the FederalCommunications 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	ACCESS POINT
Model No.	APEX0587, APEX0584, APEX0585
Software Version	RAGQ-AB85 v1.00e02
Wi-Fi Specification	802.11a/b/g/n/ac/ax
Bluetooth Specification	v5.0 single mode, BLE only
Zigbee Specification	802.15.4
Operating Temperature	-40 ~ 65 °C
Power Type	AC Cable or PoE input
Operating Environment	Outdoor Use
Antenna Information	Refer to Section 2.5
Remark: 1. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer. 2. The difference between three models is that the EUT use different antenna and appearance, other hardware and software are the same. Each model has its own power parameter value.	

2.2. Product Specification Subjective to this Report

Frequency Range	For 802.11a/n-HT20/ac-VHT20/ax-HE20: 5180 ~ 5320MHz, 5500 ~ 5720MHz, 5745 ~ 5825MHz For 802.11n-HT40/ac-VHT40/ax-HE40: 5190 ~ 5310MHz, 5510 ~ 5710MHz, 5755 ~ 5795MHz For 802.11ac-VHT80/ax-HE80: 5210MHz, 5290MHz, 5530MHz, 5610MHz, 5690MHz, 5775MHz For 802.11ac-VHT80+80/ax-HE80+80: 5210+5290MHz, 5530+5610MHz
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 600Mbps 802.11ac: up to 1733.2Mbps 802.11ax: up to 4804Mbps

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/ax-HE20

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/ax-HE40

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

802.11ac-VHT80/ax-HE80

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

802.11ac-VHT80+80/ax-HE80+80

Channel	Frequency	Channel	Frequency	Channel	Frequency
42 + 58	5210 + 5290 MHz	106 + 122	5530 +5610 MHz	--	--

2.4. Description of Available Antennas

APEX0585

Polarization	Frequency Band (GHz)	Max Peak Gain (dBi)	30 Degree ANT Gain (dBi)	CDD Directional Gain (dBi)		BF Gain (dBi)
				For Power	For PSD	
Wi-Fi Internal Antenna (4*4 MIMO)						
Omni (Note 2)	2.4 ~ 2.5	3.0	N/A	3.00	6.01	6.01
	5.15 ~ 5.85	4.5	-5.00	4.50	7.51	7.51
Bluetooth / ZigBee Internal Antenna						
Omni	2.4 ~ 2.5	4.8				

APEX0584

Polarization	Frequency Band (GHz)	Model No.	Max Peak Gain (dBi)	30 Degree ANT Gain (dBi)	BF Gain (dBi)	CDD Directional Gain (dBi)	
						For Power	For PSD
Wi-Fi External Antenna List (4*4 MIMO)							
Omni (Note 2)	2.4 ~ 2.5	ANT-2x2-2005	5.0	N/A	8.01	5.0	8.01
Omni (Note 2)	5.15 ~ 5.85	ANT-2x2-5005	5.0	0	8.01	5.0	8.01
Omni (Note 2)	5.15 ~ 5.85	ANT-2x2-5010	10.0	0	13.01	10.0	13.01
Directional (Note 2)	2.4 ~ 2.5	ANT-2x2-2714	14.0	N/A	17.01	14.0	17.01
Directional (Note 2)	2.4 ~ 2.5	ANT-2x2-2314	14.0	N/A	14.00	14.0	14.00
Directional (Note 2)	5.15 ~ 5.85	ANT-3x3-5712	11.5	1.5	14.51	11.5	14.51
Directional (Note 2)	5.15 ~ 5.85	ANT-4x4-5314	14.0	6.0	17.01	14.0	17.01
Directional (Note 2)	2.4 ~ 2.5	ANT-4x4-D608	7.5	N/A	10.51	7.5	10.51
	5.15 ~ 5.85		7.5	4.5	10.51	7.5	10.51
Directional (Note 2)	2.4 ~ 2.5	ANT-4x4-D100	5.0	N/A	8.01	5.0	8.01
	5.15 ~ 5.85		5.0	4.0	8.01	5.0	8.01
Bluetooth / ZigBee Internal Antenna							
Omni	2.4 ~ 2.5		5.0				

APEX0587

Polarization	Frequency Band (GHz)	Max Peak Gain (dBi)	30 Degree ANT Gain (dBi)	CDD Directional Gain (dBi)		BF Gain (dBi)
				For Power	For PSD	
Wi-Fi Internal Antenna (4*4 MIMO)						
Omni (Note 2)	2.4 ~ 2.5	5.7	N/A	5.70	8.71	8.71
	5.15 ~ 5.85	5.2	5.2	5.20	8.21	8.21
Bluetooth / ZigBee Internal Antenna						
Omni	2.4 ~ 2.5	6.3				

Note:

1. The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

For CDD transmissions, directional gain is calculated as follows, N_{ANT} = 2, N_{SS} = 1.

If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,

  Array Gain = 10 log(N_{ANT}/ N_{SS}) dB = 3.01;

- For power measurements on IEEE 802.11 devices,

  Array Gain = 0 dB for N_{ANT} ≤ 4;

The EUT also supports Beam Forming mode, and the Beam Forming support 802.11n/ac/ax, not include 802.11a/b/g.

2. These antennas are cross polarized design, the detail refer to antenna specification. Directional gain calculation refer to KDB 662911 section F)2)c).

3. For APEX0584, low gain antenna (ANT-2x2-2005 & ANT-2x2-5005) was selected to perform all RF testing that can got maximum power setting, high gain different type antenna (ANT-2x2-2314 & ANT-4x4-5314) was selected to perform radiated spurious emission and band edge testing. High gain antenna power setting will be reduced according to difference value of antenna gain declared by applicant.

2.5. Test Mode

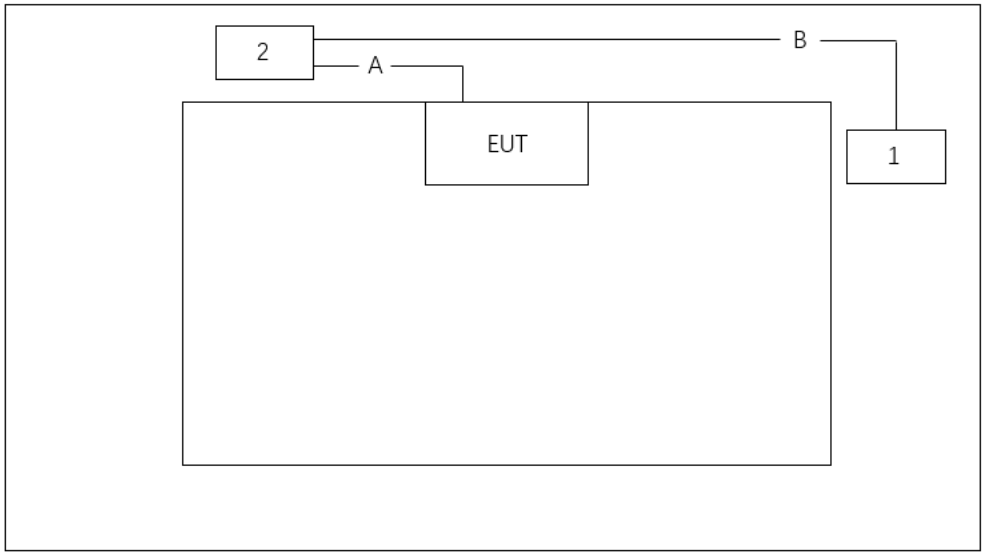
Mode 1: Transmit by 802.11a (6Mbps)
Mode 2: Transmit by 802.11ac-VHT20 (MCS0)
Mode 3: Transmit by 802.11ac-VHT40 (MCS0)
Mode 4: Transmit by 802.11ac-VHT80 (MCS0)
Mode 5: Transmit by 802.11ac-VHT80+80 (MCS0)
Mode 6: Transmit by 802.11ax-HE20 (MCS0)
Mode 7: Transmit by 802.11ax-HE40 (MCS0)
Mode 8: Transmit by 802.11ax-HE80 (MCS0)
Mode 9: Transmit by 802.11ax-HE80+80 (MCS0)

Note: 802.11n and 802.11ac have same modulation type and same power parameter, so we only show 802.11ac test data in report.

2.6. Configuration of Test System

The device was tested per the guidance ANSI C63.10-2013 was used to reference the appropriate EUT setup.

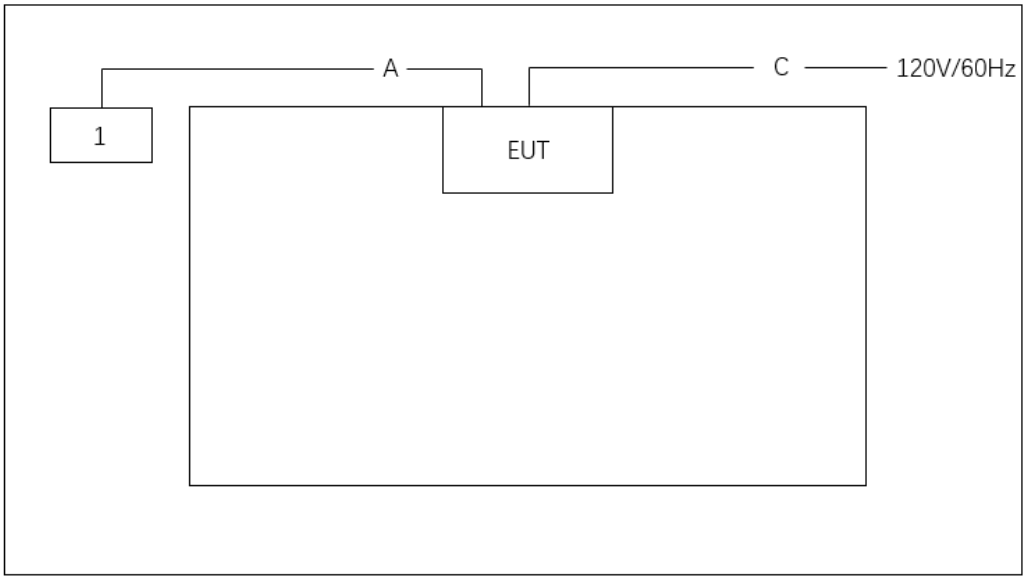
For radiated emissions testing



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

Product		Manufacturer	Model No.
1	Notebook	DELL	Precision 3510
2	PoE Injector	Microchip	PD-9501-10GCO-AC

For AC line conducted testing



Cable Type		Cable Description
A	LAN Cable	Non shielded, > 10m
C	Power Cable	Non shielded, 1.25m

Product		Manufacturer	Model No.
1	Notebook	DELL	Precision 3510

Note 1: The test utility software used during testing was “telnet.exe” and command was provided by the manufacturer.

Note 2: Detail power setting refer to operation description.

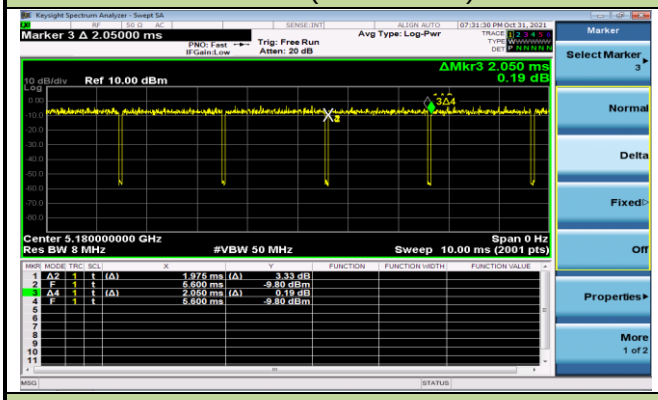
2.7. Duty Cycle

5GHz (NII) operation is possible in 20MHz, 40MHz, 80MHz and 80+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:

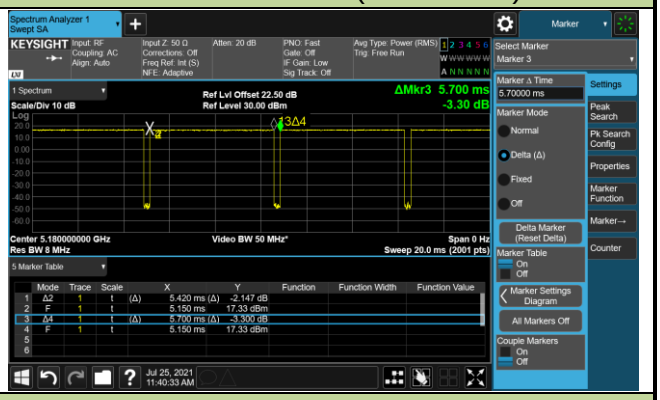
Test Mode	Duty Cycle
802.11a	96.34%
802.11ac-VHT20	95.09%
802.11ac-VHT40	86.35%
802.11ac-VHT80	89.29%
802.11ac-VHT80+80 5210MHz	86.60%
802.11ax-HE20	94.04%
802.11ax-HE40	93.77%
802.11ax-HE80	93.97%
802.11ax-HE80+80 5210MHz	94.78%

Duty Cycle (T = Transmission Duration)

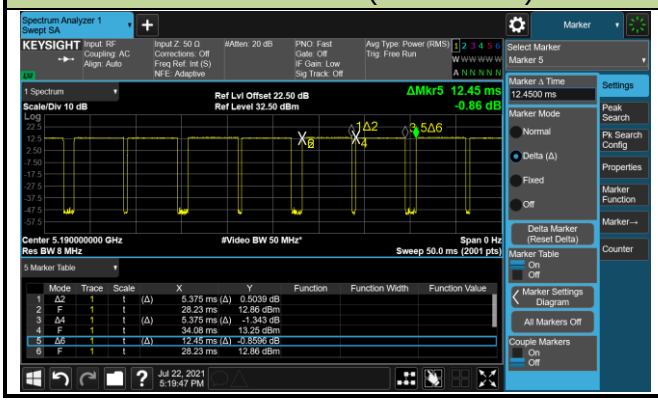
802.11a (T=1.975ms)



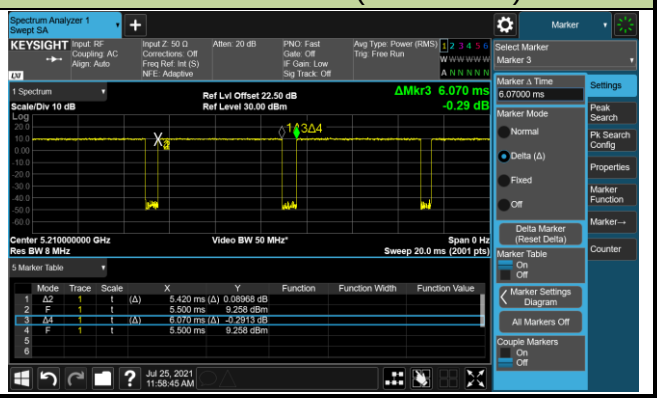
802.11ac-VHT20 (T=5.420ms)

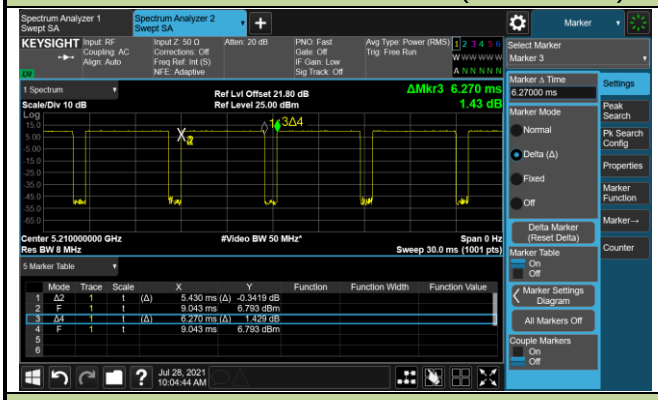
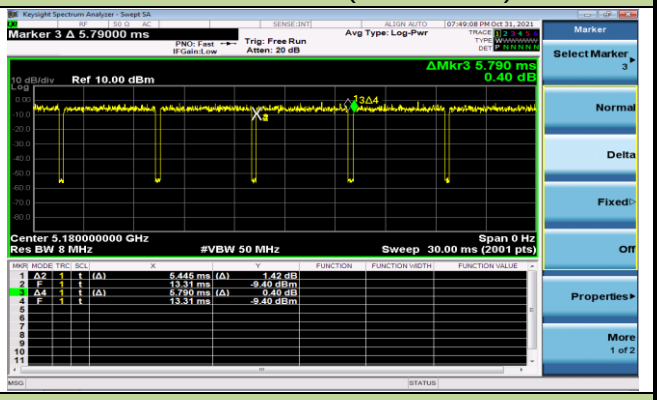
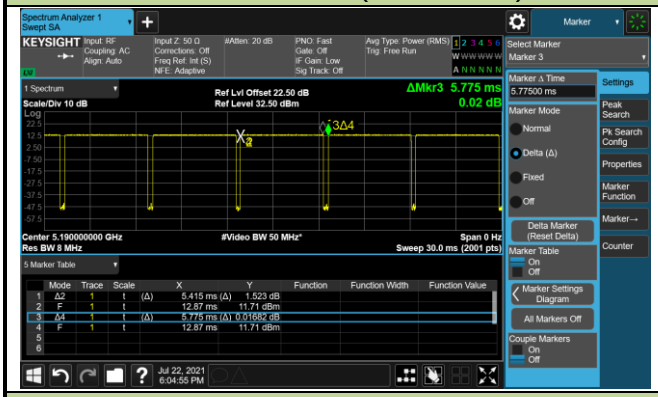
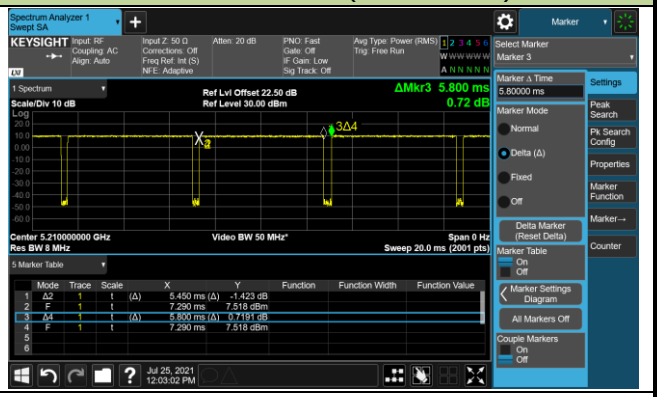
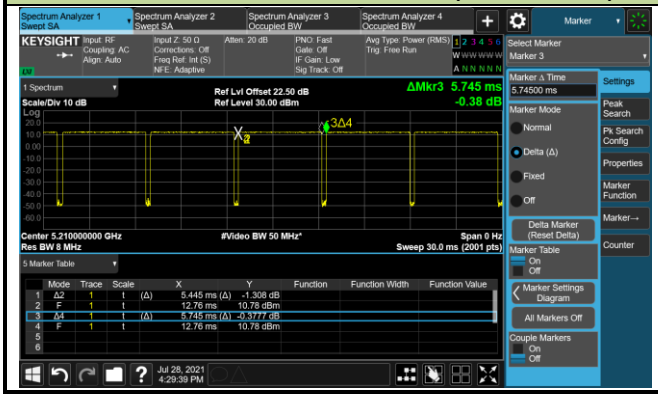


802.11ac-VHT40 (T=10.75ms)



802.11ac-VHT80 (T=5.420ms)



Duty Cycle (T = Transmission Duration)	
802.11ac-VHT80+80 5210MHz (T=5.430ms)	802.11ax-HE20 (T=5.445ms)
	
802.11ax-HE40 (T=5.415ms)	802.11ax-HE80 (T=5.450ms)
	
802.11ax-HE80+80 5210MHz (T=5.445ms)	
	

2.8. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ANSI C63.10-2013
- FCC KDB 789033 D02v02r01
- FCC KDB 662911 D01v02r01
- FCC KDB 414788 D01v01r01

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 pamphletsupplied to the user and be readily visible to the purchaser at the time of purchase. However, when the deviceis 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 andlabel location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

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

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an8'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. An80cm 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 tomaximize 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 theresponsible party can be used with the device. The use of a permanently attached antenna or of an antennathat uses a unique coupling to the intentional radiator shall be considered sufficient to comply with theprovisions of this section.”

Conclusion:

The product is defined as the professional installation of equipment by the manufacturer, there is no necessary to comply with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions -SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Two-Line V-Network	R&S	ENV 216	MRTTWA00019	1 year	2022/3/23
Two-Line V-Network	R&S	ENV 216	MRTTWA00020	1 year	2022/4/24
8-Wire ISN (T8)	R&S	ENY81	MRTTWA00018	1 year	2022/5/30
EMI Test Receiver	R&S	ESR3	MRTTWA00045	1 year	2022/5/25
Temperature/Humidity Meter	TFA	35.1083	MRTTWA00050	1 year	2022/6/3

Radiated Emissions – AC1/AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	MRTTWA00002	1 year	2022/4/27
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2022/10/4
Broadband Horn Antenna	SCHWARZBECK	BBHA 9120D	MRTTWA00003	1 year	2022/4/24
Broadband Horn Antenna	RFSPIN	DRH18-E	MRTTWA00087	1 year	2022/6/28
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	MRTTWA00004	1 year	2022/4/24
Broadband Preamplifier	SCHWARZBECK	BBV 9718	MRTTWA00005	1 year	2022/4/24
Broadband Preamplifier	EMC Instruments corporation	EMC118A45SE	MRTTWA00088	1 year	2022/6/28
Broadband Amplifier	SCHWARZBECK	BBV 9721	MRTTWA00006	1 year	2022/4/24
Signal Analyzer	R&S	FSV40	MRTTWA00007	1 year	2022/3/23
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2022/3/24
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2021/11/14
Antenna Cable	HUBERSUHNER	SF106	MRTTWE00010	1 year	2022/6/28
Cable	Rosnol	K1K50-UP0264-K1K50-4M	MRTTWE00012	1 year	2022/6/20
Antenna Cable	HUBERSUHNER	SF106	MRTTWE00034	1 year	2022/6/28
Cable	HUBERSUHNER	EMC105-NM-NM-3000	MRTTWE00035	1 year	2022/6/28
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00032	1 year	2022/6/6

Conducted Test Equipment – SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
X-Series USB Peak and Average Power Sensor	KEYSIGHT	U2021XA	MRTTWA00014	1 year	2022/4/21
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2021/11/14
EXA Signal Analyzer	KEYSIGHT	N9010B	MRTTWA00074	1 year	2022/7/19
Attenuator	WTI	218FS-20	MRTTWE00027	1 year	2022/6/16
Attenuator	WTI	218FS-10	MRTTWE00028	1 year	2022/6/16
Attenuator	WTI	218FS-06	MRTTWE00029	1 year	2022/6/16
Temperature/Humidity Meter	TFA	35.1083	MRTTWA00050	1 year	2022/6/3

Software	Version	Function
v3	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
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: 2.53dB
Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: 4.25dB 1GHz ~ 40GHz: 4.45dB
Conducted Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 0.84dB
Conducted Spurious Emission
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 2.65 dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 3.3%
Temp. / Humidity
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±0.82°C/ ±3%
Frequency Error
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±78.4Hz

7. TEST RESULT

7.1. Summary

FCC Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407(a)	26dB Bandwidth	N/A	Conducted	N/A	Section 7.2
15.407(e)	6dB Bandwidth	≥ 500kHz		Pass	Section 7.3
15.407(a)(1)(i), (2), (3)(i)	Maximum Conducted Output Power	≤ 30dBm (NII-1 & NII-3) ≤ 250mW (NII-2)		Pass	Section 7.4
15.407(a)(1)(i), (2), (3)(i), (12)	Peak Power Spectral Density	≤ 17dBm/MHz (NII-1) ≤ 11dBm/MHz (NII-2) ≤ 30dBm/500kHz (NII-3)		Pass	Section 7.5
15.407(b)(1), (2), (3), (4)(i)	Undesirable Emissions	Refer to Section 7.6	Radiated	Pass	Section 7.6 & 7.7
15.407(b)(8), (9), (10), (11)	General Field Strength (Restricted Bands and Radiated Emission)	Emissions in restricted bands must meet the radiated limits detailed in15.209		Pass	
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.8

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 ofthe system to connect the EUT to the analyzer at all frequencies of interest.
2) 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.
3) Determining compliance is based on the test results met the regulation limits or requirements declared by clients, and the test results don't take into account the value of measurement uncertainty.
4) 802.11ax only support full RU transmissions and not support channel puncturing.
5) For test Item “6dB Bandwidth” & “26dB Bandwidth”, we selected APEX0585 to perform testing due to its highest power setting.

7.2. 26dB Bandwidth Measurement

7.2.1.Test Limit

N/A

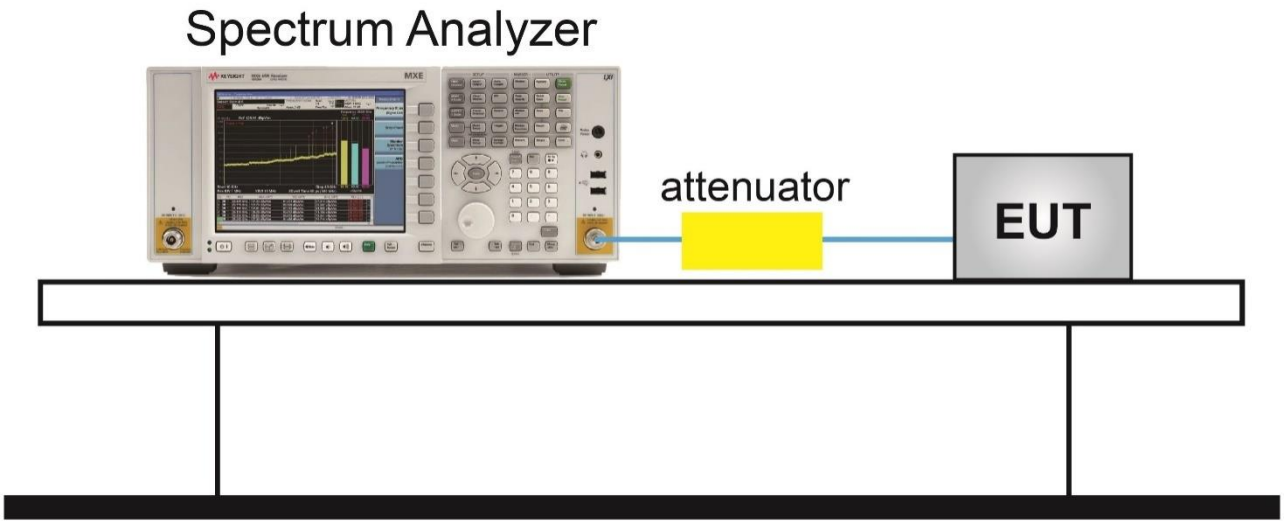
7.2.2.Test Procedure used

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 ≥ 3×RBW.
4. Detector = Peak.
5. Trace mode = max hold.

7.2.4.Test Setup



7.2.5.Test Result

Product	ASSESS POINT	Test Engineer	Eric Lin
Test Site	SR2	Test Date	2021/07/25 ~ 2021/11/18
Model No.	APEX0585		

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	6Mbps	36	5180	19.13	16.36
802.11a	6Mbps	44	5220	19.08	16.36
802.11a	6Mbps	48	5240	18.77	16.36
802.11a	6Mbps	52	5260	19.05	16.37
802.11a	6Mbps	60	5300	18.88	16.34
802.11a	6Mbps	64	5320	18.84	16.37
802.11a	6Mbps	100	5500	18.54	16.36
802.11a	6Mbps	116	5580	18.67	16.31
802.11a	6Mbps	140	5700	18.96	16.36
802.11a	6Mbps	144	5720	19.14	16.36
802.11a	6Mbps	149	5745	18.84	16.37
802.11a	6Mbps	157	5785	19.34	16.35
802.11a	6Mbps	165	5825	18.93	16.37
802.11ac-VHT20	MCS0	36	5180	20.00	17.56
802.11ac-VHT20	MCS0	44	5220	20.04	17.57
802.11ac-VHT20	MCS0	48	5240	19.79	17.54
802.11ac-VHT20	MCS0	52	5260	19.84	17.56
802.11ac-VHT20	MCS0	60	5300	19.93	17.56
802.11ac-VHT20	MCS0	64	5320	20.23	17.60
802.11ac-VHT20	MCS0	100	5500	20.07	17.58
802.11ac-VHT20	MCS0	116	5580	19.94	17.56
802.11ac-VHT20	MCS0	140	5700	19.87	17.59
802.11ac-VHT20	MCS0	144	5720	19.87	17.59
802.11ac-VHT20	MCS0	149	5745	20.11	17.57
802.11ac-VHT20	MCS0	157	5785	20.03	17.55
802.11ac-VHT20	MCS0	165	5825	20.13	17.59

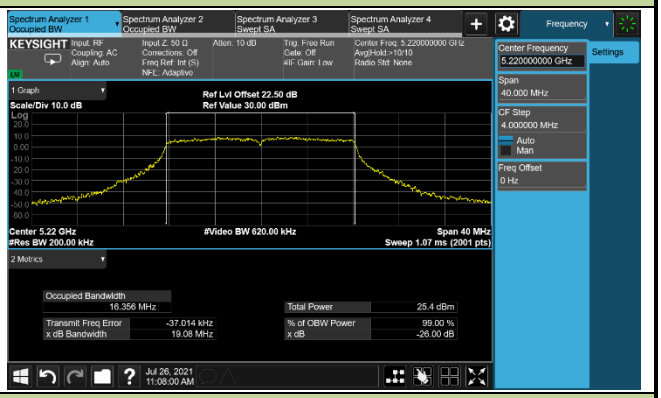
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11ac-VHT40	MCS0	38	5190	39.90	36.09
802.11ac-VHT40	MCS0	46	5230	39.92	36.13
802.11ac-VHT40	MCS0	54	5270	40.13	36.07
802.11ac-VHT40	MCS0	62	5310	40.02	36.08
802.11ac-VHT40	MCS0	102	5510	39.82	36.10
802.11ac-VHT40	MCS0	110	5550	39.02	36.12
802.11ac-VHT40	MCS0	134	5670	39.73	36.04
802.11ac-VHT40	MCS0	142	5710	39.64	36.09
802.11ac-VHT40	MCS0	151	5755	39.81	36.07
802.11ac-VHT40	MCS0	159	5795	39.26	36.14
802.11ac-VHT80	MCS0	42	5210	80.74	75.34
802.11ac-VHT80	MCS0	58	5290	80.90	75.29
802.11ac-VHT80	MCS0	106	5530	81.47	75.41
802.11ac-VHT80	MCS0	122	5610	80.85	75.42
802.11ac-VHT80	MCS0	138	5690	81.02	75.37
802.11ac-VHT80	MCS0	155	5775	81.87	75.38
802.11ac-VHT80+80	MCS0	42+58	5210 + 5290	161.70	154.09
802.11ac-VHT80+80	MCS0	106 + 122	5530 + 5610	161.80	154.33

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11ax-HE20	MCS0	36	5180	20.87	18.88
802.11ax-HE20	MCS0	44	5220	21.22	19.01
802.11ax-HE20	MCS0	48	5240	20.95	18.91
802.11ax-HE20	MCS0	52	5260	21.00	18.96
802.11ax-HE20	MCS0	60	5300	20.65	18.90
802.11ax-HE20	MCS0	64	5320	20.99	18.90
802.11ax-HE20	MCS0	100	5500	20.77	18.96
802.11ax-HE20	MCS0	116	5580	21.18	18.96
802.11ax-HE20	MCS0	140	5700	21.21	18.94
802.11ax-HE20	MCS0	144	5720	20.92	18.89
802.11ax-HE20	MCS0	149	5745	21.35	18.92
802.11ax-HE20	MCS0	157	5785	20.62	18.91
802.11ax-HE20	MCS0	165	5825	21.17	18.92
802.11ax-HE40	MCS0	38	5190	40.43	37.62
802.11ax-HE40	MCS0	46	5230	40.66	37.68
802.11ax-HE40	MCS0	54	5270	40.17	37.61
802.11ax-HE40	MCS0	62	5310	40.35	37.68
802.11ax-HE40	MCS0	102	5510	40.44	37.68
802.11ax-HE40	MCS0	110	5550	40.49	37.76
802.11ax-HE40	MCS0	134	5670	40.88	37.78
802.11ax-HE40	MCS0	142	5710	40.34	37.70
802.11ax-HE40	MCS0	151	5755	40.60	37.75
802.11ax-HE40	MCS0	159	5795	40.74	37.82
802.11ax-HE80	MCS0	42	5210	81.54	77.14
802.11ax-HE80	MCS0	58	5290	81.83	77.12
802.11ax-HE80	MCS0	106	5530	81.60	77.20
802.11ax-HE80	MCS0	122	5610	81.01	77.18
802.11ax-HE80	MCS0	138	5690	82.13	77.15
802.11ax-HE80	MCS0	155	5775	81.96	77.01
802.11ax-HE80+80	MCS0	42 + 58	5210 + 5290	162.70	155.87
802.11ax-HE80+80	MCS0	106 + 122	5530 + 5610	163.00	155.89

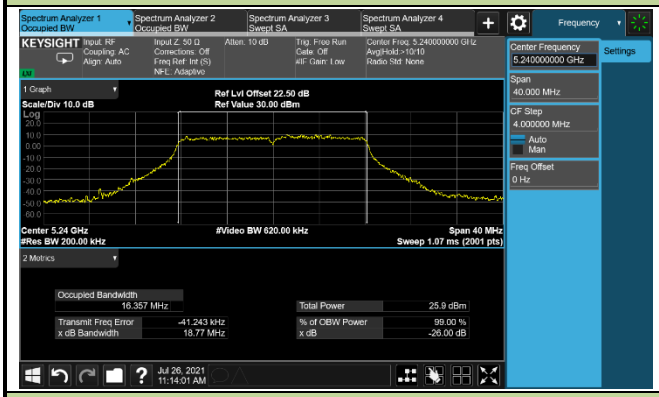
802.11a 26dB Bandwidth & 99% Bandwidth

Channel 36 (5180MHz)

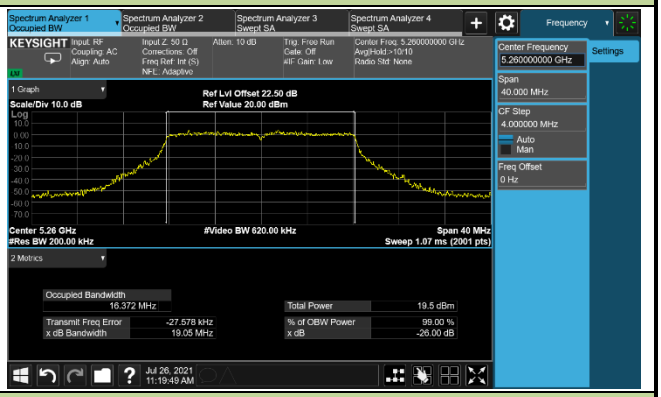
Channel 44 (5220MHz)



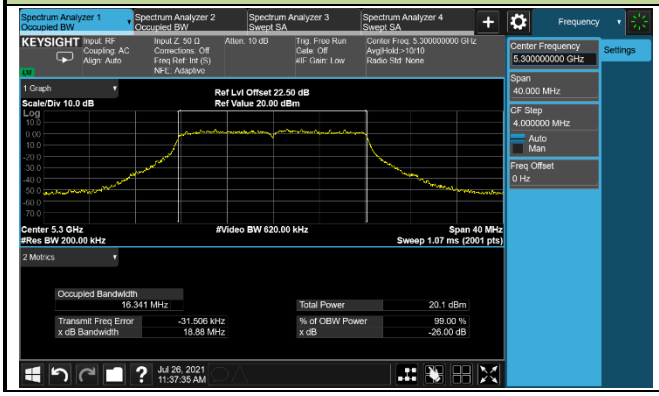
Channel 48 (5240MHz)



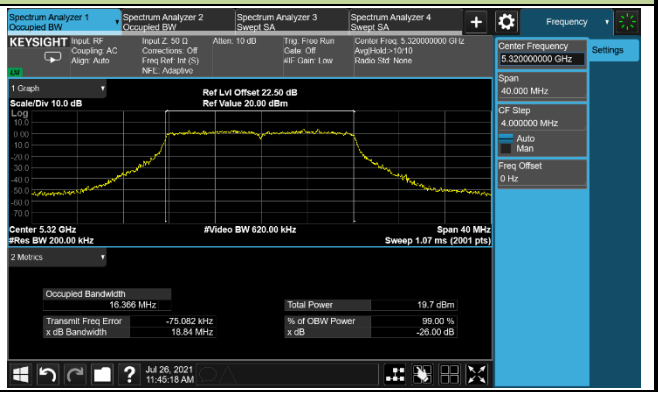
Channel 52 (5260MHz)



Channel 60 (5300MHz)

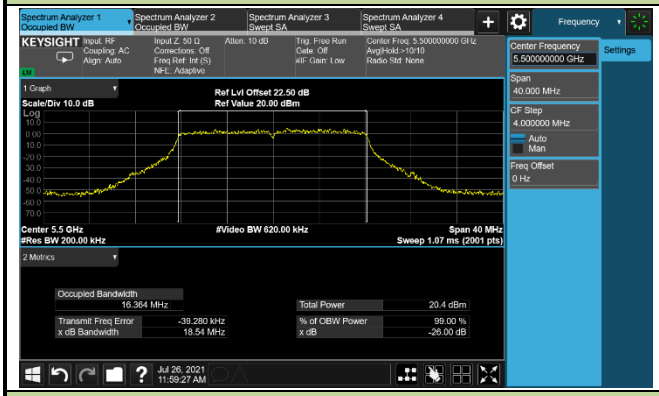


Channel 64 (5320MHz)



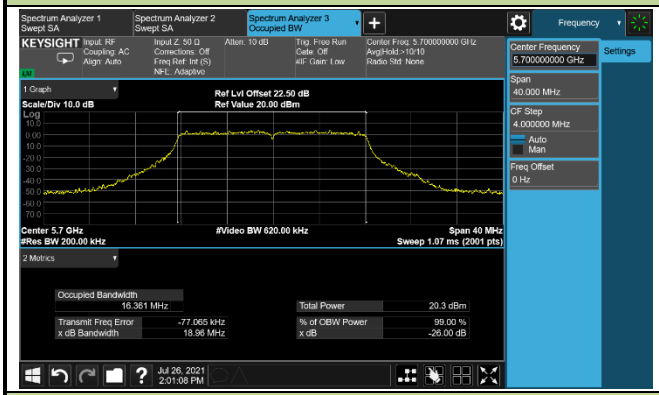
802.11a 26dB Bandwidth & 99% Bandwidth

Channel 100 (5500MHz)

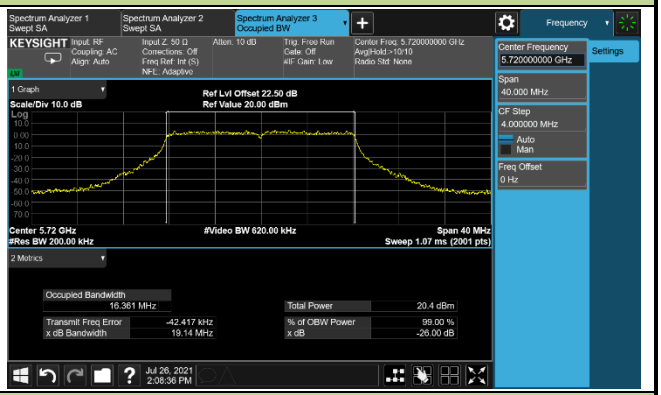


Channel 116 (5580MHz)

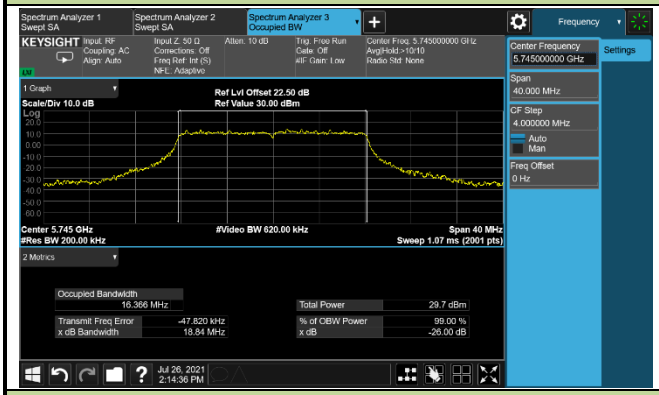
Channel 140 (5700MHz)



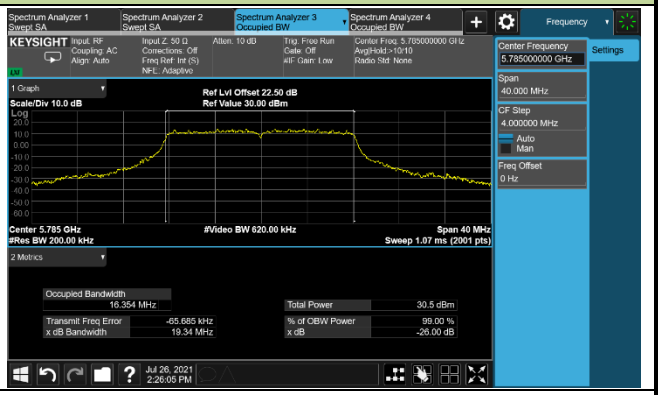
Channel 144 (5720MHz)



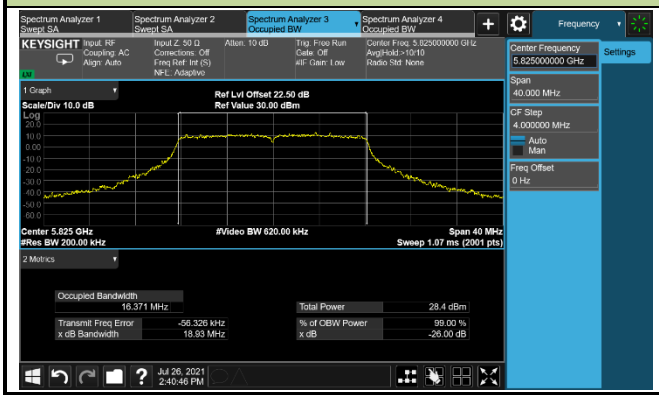
Channel 149 (5745MHz)



Channel 157 (5785MHz)

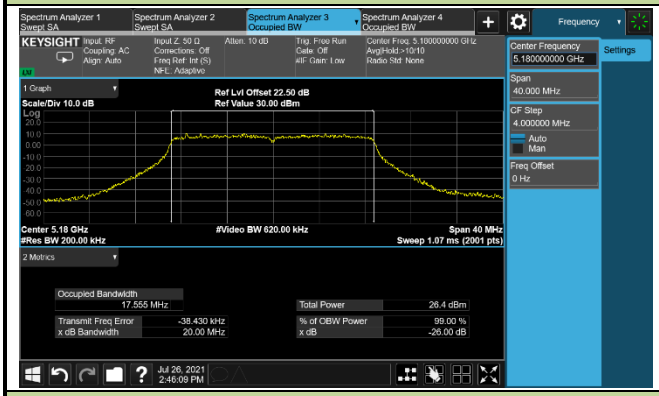


Channel 165 (5825MHz)

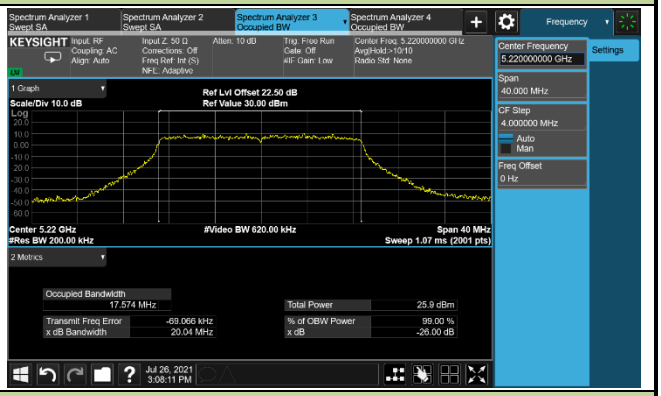


802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth

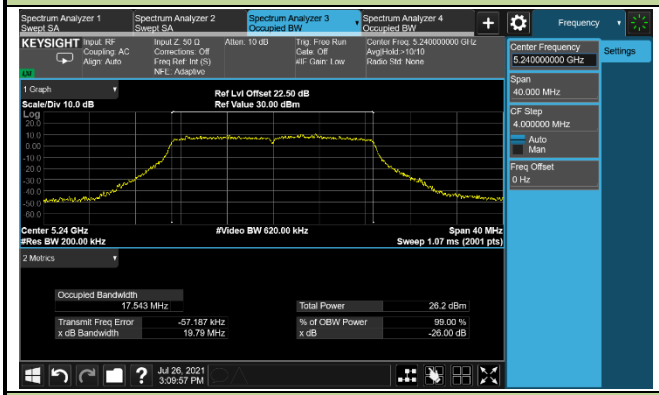
Channel 36 (5180MHz)



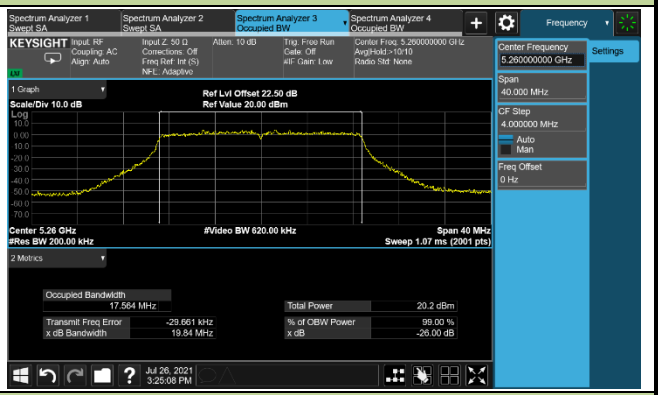
Channel 44 (5220MHz)



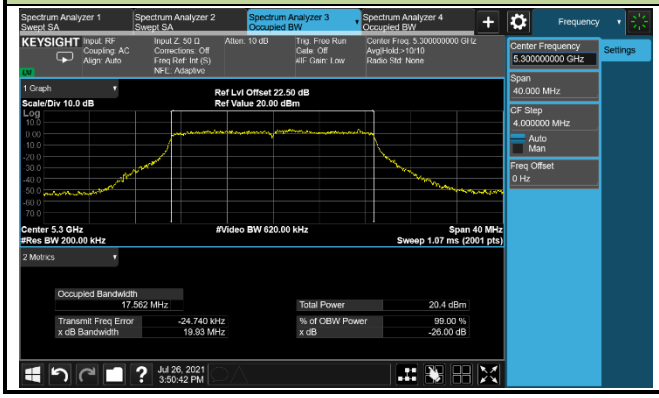
Channel 48 (5240MHz)



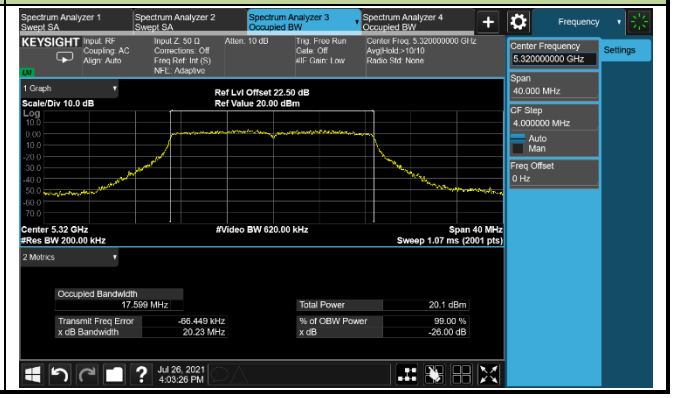
Channel 52 (5260MHz)



Channel 60 (5300MHz)

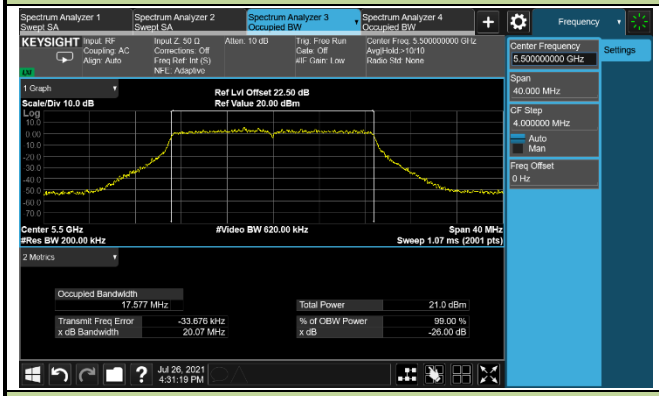


Channel 64 (5320MHz)

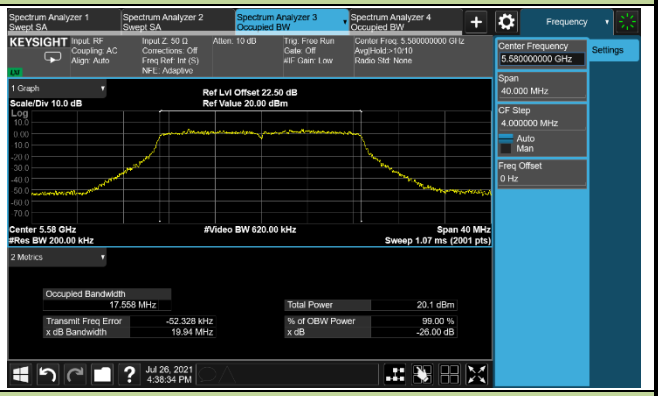


802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth

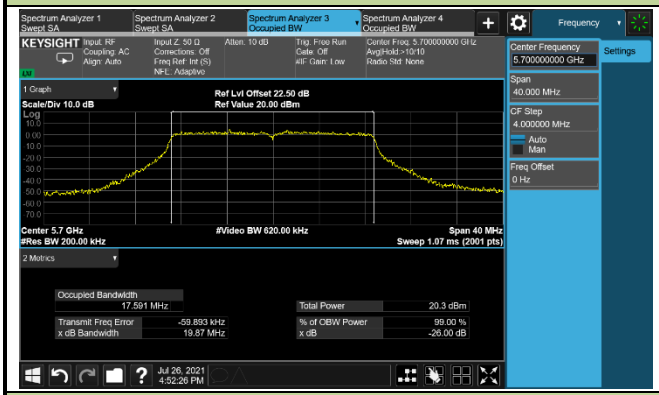
Channel 100 (5500MHz)



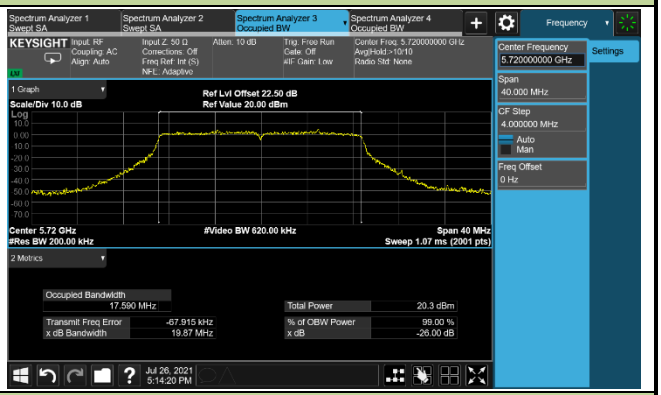
Channel 116 (5580MHz)



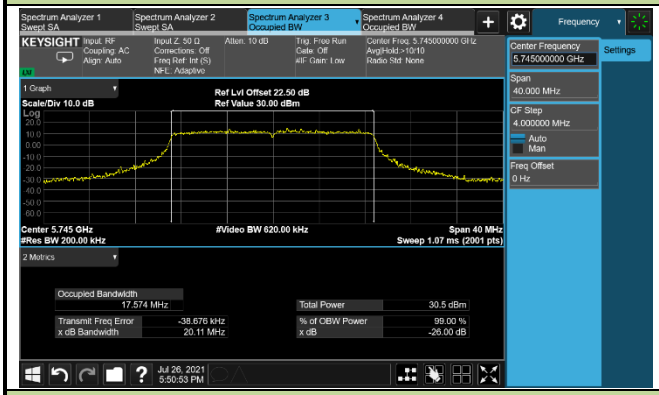
Channel 140 (5700MHz)



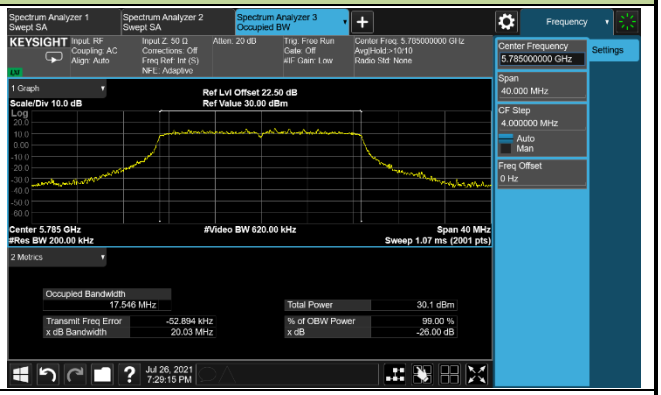
Channel 144 (5720MHz)



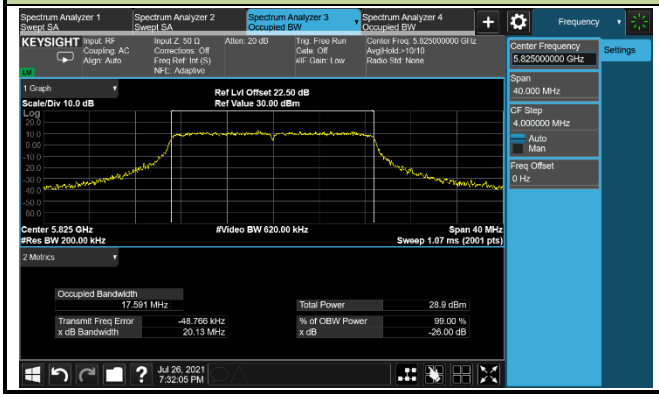
Channel 149 (5745MHz)



Channel 157 (5785MHz)

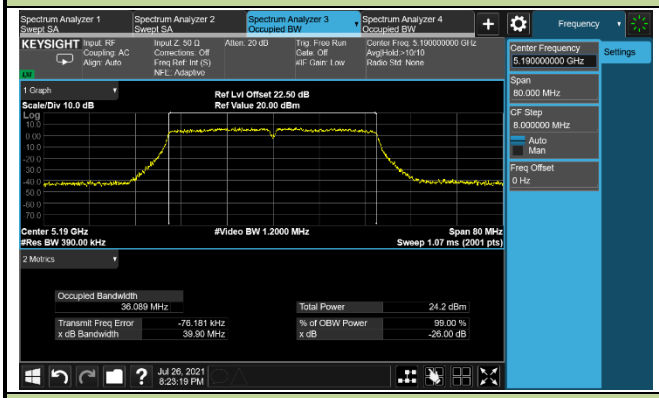


Channel 165 (5825MHz)

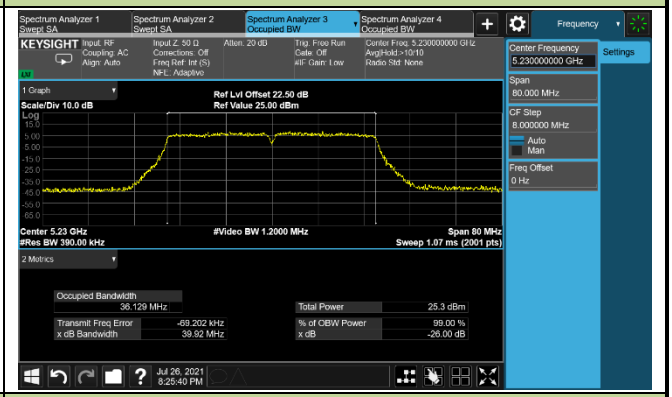


802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth

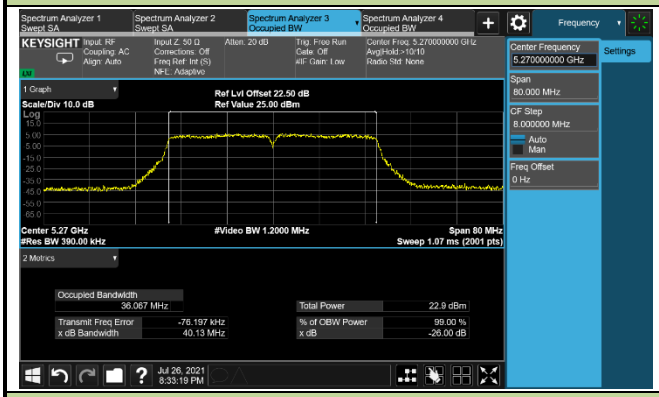
Channel 38 (5190MHz)



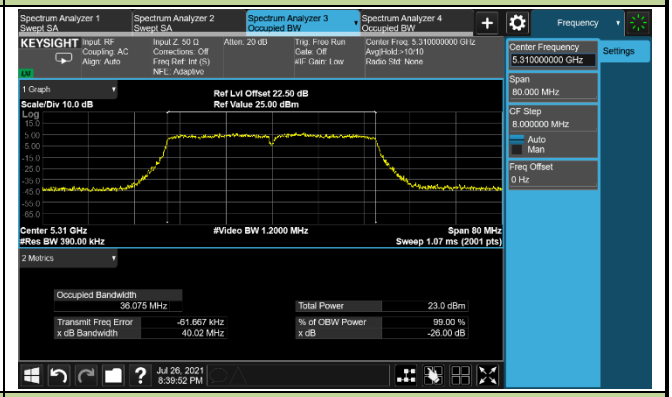
Channel 46 (5230MHz)



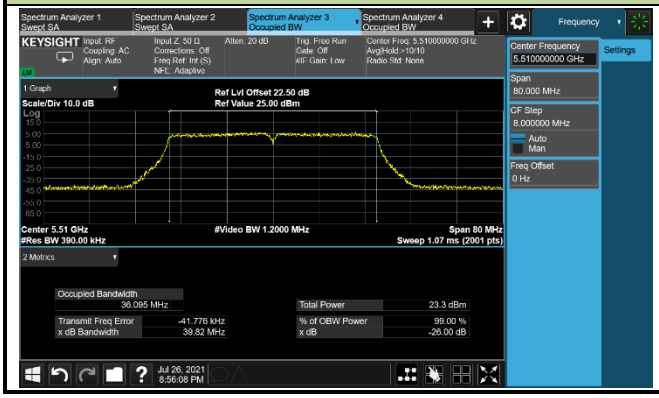
Channel 54 (5270MHz)



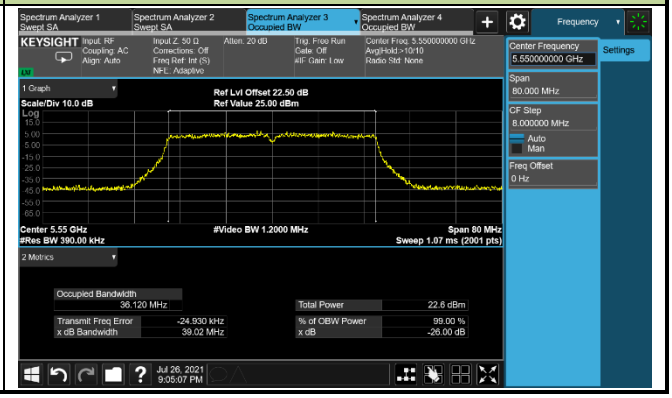
Channel 62 (5310MHz)

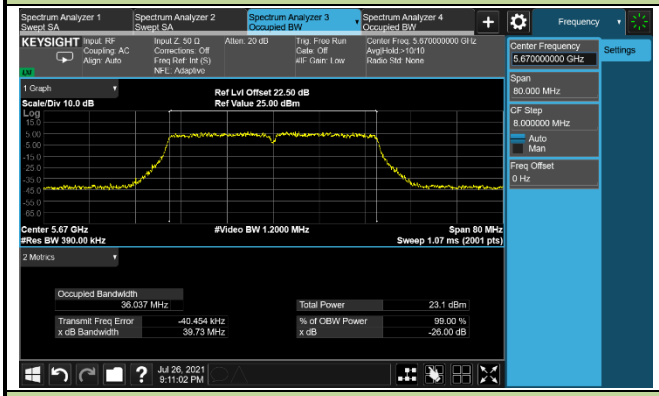
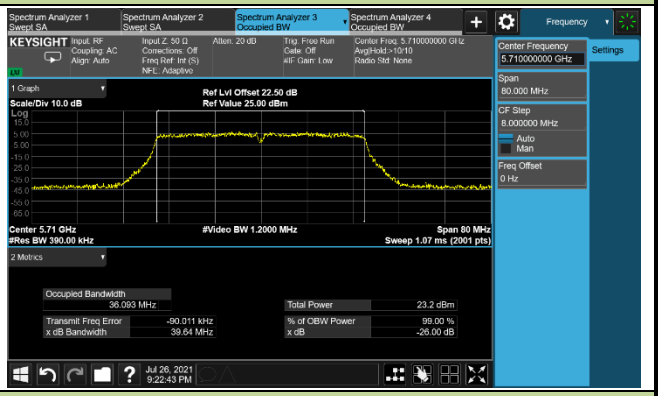
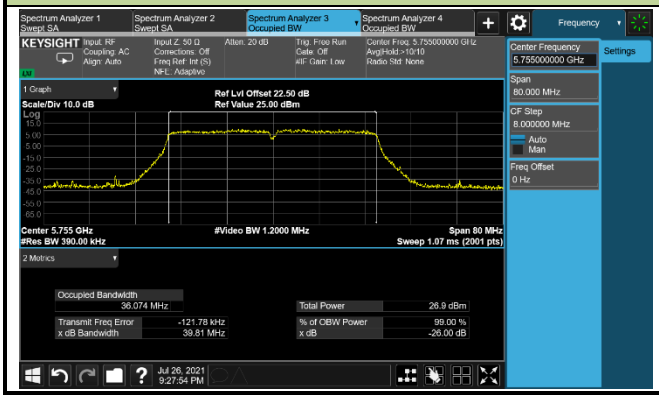
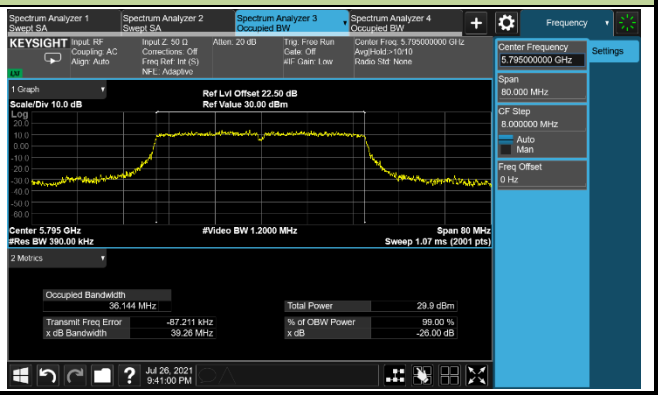


Channel 102 (5510MHz)



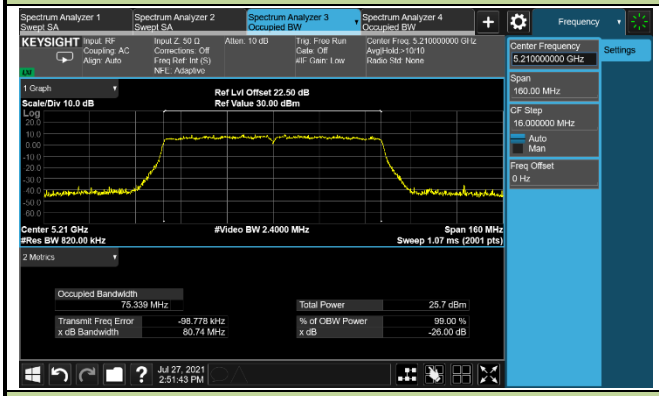
Channel 110 (5550MHz)



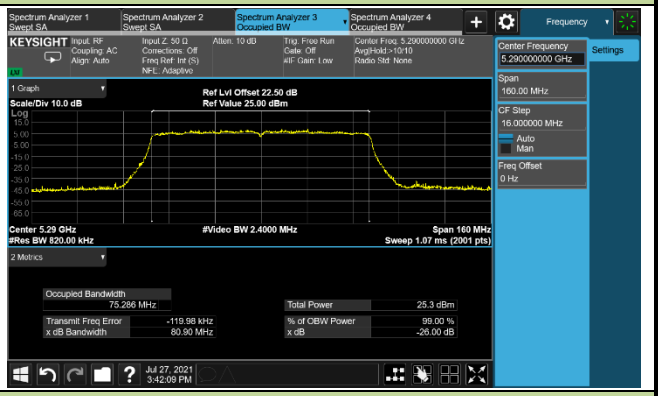
802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth	
Channel 134 (5670MHz)	Channel 142 (5710MHz)
	
Channel 151 (5755MHz)	Channel 159 (5795MHz)
	

802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth

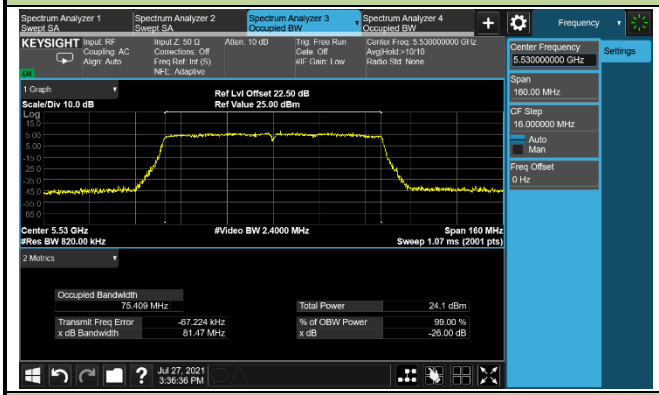
Channel 42 (5210MHz)



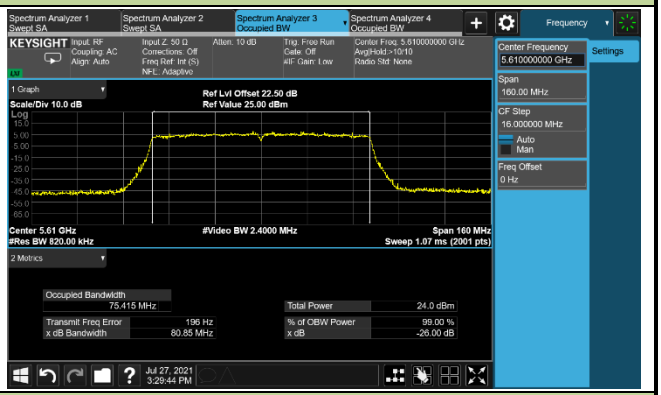
Channel 58 (5290MHz)



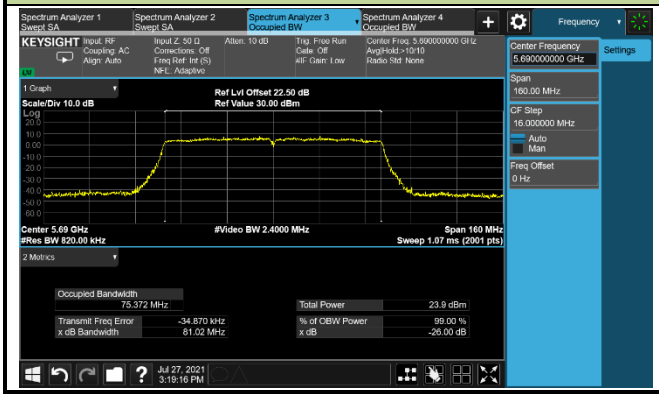
Channel 106 (5530MHz)



Channel 122 (5610MHz)



Channel 138 (5690MHz)



Channel 155 (5775MHz)