RF MEASUREMENT REPORT

FCC ID:	Q9DAPIN0503
Applicant:	Hewlett Packard Enterprise Company
Product:	ACCESS POINT
Model No.:	APIN0503
Trademark:	aruba a Hewlett Packard Enterprise company, Hewlett Packard Enterprise
FCC Classification:	Unlicensed National Information Infrastructure (NII)
FCC Rule Part(s):	Part 15 Subpart E (Section 15.407)
Result:	Complies
Received Date:	2022-12-19
Test Date:	2022-12-19 ~ 2023-04-03

Reviewed By: Jame Yuan

Approved By: Robin Wu

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

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 KDB789033 and KDB 291074. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date	Note
2212RSU034-U3	V01	Initial Report	2023-04-03	Valid

CONTENTS

1. General Information

1.1. Applicant

Hewlett Packard Enterprise Company

6280 America Center Drive, San Jose CA 95002, United States

1.2. Manufacturer

Hewlett Packard Enterprise Company

6280 America Center Drive, San Jose CA 95002, United States

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		CNAS: L10551		
	FCC: CN1166		ISED: CN0001		
	VCCI:	☐R-20025	☐G-20034	☐C-20020	☐T-20020
		☐R-20141	☐G-20134	☐C-20103	☐T-20104
☐	**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		CNAS: L10551		
	FCC: CN1284		ISED: CN0105		
☐	**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		ISED: TW3261		

1.4. Product Information

Product Name	ACCESS POINT
Model No.	APIN0503
Serial No.	CNPMLGQ02T
Software Version	v0.1.8
Wi-Fi Specification	802.11a/b/g/n/ac/ax
Antenna Information	Refer to Clause 1.7
Working Voltage	PoE Input
Operating Temp.	0 ~ 40 °C
Operating Environment	Indoor Use
Accessory	
PoE Injector	Model: ADH-15CR BA Input: 100-240V ~ 0.6A 50/60Hz Output: 55.0V==0.28A 15.4W
Note 1: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer. Note 2: PoE Injector are not sold with the product.	

1.5. Radio Specification under Test

Frequency Range	For 802.11a/n-HT20/ac-VHT20/ax-HE20: 5845MHz, 5865MHz, 5885MHz For 802.11n-HT40/ac-VHT40/ax-HE40: 5835MHz, 5875MHz For 802.11ac-VHT80/ax-HE80: 5855MHz	
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 866.7Mbps 802.11ax: up to 1201Mbps	
Channel Puncturing Function	☐ Supported	☒ Unsupported
Support RU	☒ Full RU	☐ Partial RU

1.6. Working Frequencies

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

Channel	Frequency	Channel	Frequency	Channel	Frequency
169	5845 MHz	173	5865 MHz	177	5885 MHz

802.11n-HT40/ac-VHT40/ax-HE40

Channel	Frequency	Channel	Frequency	Channel	Frequency
167	5835 MHz	175	5875 MHz	--	--

802.11ac-VHT80/ax-HE80

Channel	Frequency	Channel	Frequency	Channel	Frequency
171	5855 MHz	--	--	--	--

1.7. Antenna Details

Antenna Type	Frequency Band (MHz)	T_X Paths	Max Antenna Gain (dBi)	CDD Directional Gain (dBi)	
				For Power	For PSD
PIFA Antenna	2412 ~ 2462	2	1.5	1.5	4.5
	5150 ~ 5895	2	3.9	3.9	6.9

Note:

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

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

3. For beamforming operation, Aruba OS automatically backs power down based on a 10log(N) factor based on CDD power.

4. Refer to antenna specification for the detail calculation method of directional gain.

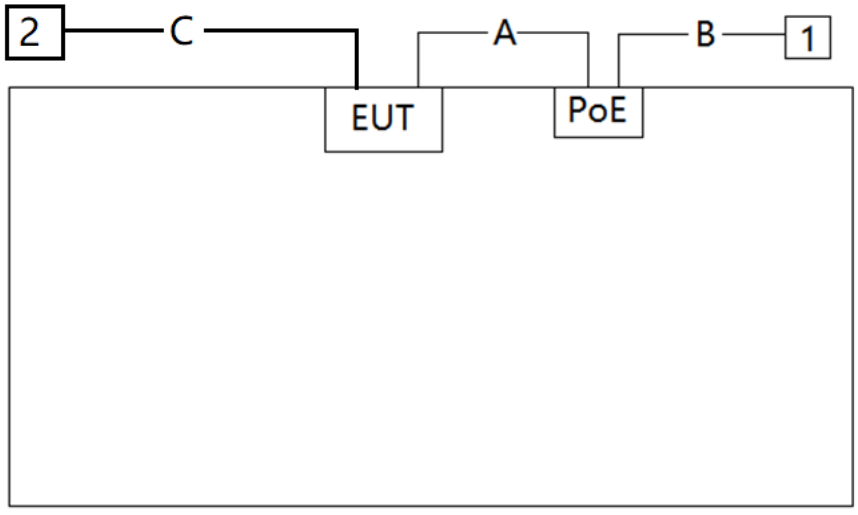
2. Test Configuration

2.1. Test Mode

Mode 1: Transmit by 802.11a_N_{ss}=1 (6Mbps)
Mode 2: Transmit by 802.11ac-VHT20_N_{ss}=1 (MCS0)
Mode 3: Transmit by 802.11ac-VHT40_N_{ss}=1 (MCS0)
Mode 4: Transmit by 802.11ac-VHT80_N_{ss}=1 (MCS0)
Mode 5: Transmit by 802.11ax-HE20_N_{ss}=1 (MCS0)
Mode 6: Transmit by 802.11ax-HE40_N_{ss}=1 (MCS0)
Mode 7: Transmit by 802.11ax-HE80_N_{ss}=1 (MCS0)
1. All modes of operation and data rates were investigated, so all RF test requirements shall be executed at the worst data rate. 2. For beamforming operation, manufacturer automatically backs power down based on a 10log(N_{ANT}) factor based on CDD power. Therefore, only the CDD mode was evaluated in this report.

2.2. Test System Connection Diagram

Connection Diagram



Cable Type			Cable Description
A	LAN Cable – Cat. 5e		Non shielded, 3.0m
B	LAN Cable – Cat. 5e		Non shielded, 3.0m
C	USB Cable		Shielded, 10.0m
Product		Manufacturer	Model No.
1	Notebook	Lenovo	E495
2	Notebook	Lenovo	E495

Note 1: The test utility software used during testing was “accessMTool.exe”, and the version was 3.2.1.4.

Note 2: Detail power setting refer to operation description.

2.3. Applied Standards

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

- FCC Part 15.407
- KDB 789033 D02v02r01
- KDB 291074 D02v01
- KDB 662911 D01v02r01
- ANSI C63.10-2013

2.4. Test Environment Condition

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

3. Antenna Requirements

KDB 291074 DR01: An Indoor Access point in the U-NII-4 band (5.850-5.895 GHz) and U-NII -3 & -4 span channels must use an integrated antenna

- The antenna of the device is built in and locked inside the enclosure.

4. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2023-12-28	SIP-AC2
Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2023-10-10	SIP-AC2
Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2023-03-14	SIP-AC2
				1 year	2024-02-26	SIP-AC2
Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2023-06-01	SIP-AC2
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06598	1 year	2023-11-05	SIP-AC2
Thermohygrometer	testo	608-H1	MRTSUE06623	1 year	2023-11-27	SIP-AC2
Thermohygrometer	testo	608-H1	MRTSUE06624	1 year	2023-11-27	SIP-AC2
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06647	1 year	2023-07-13	SIP-AC2
Anechoic Chamber	RIKEN	SIP-AC2	MRTSUE06781	1 year	2023-12-22	SIP-AC2
Signal Analyzer	Keysight	N9010B	MRTSUE06603	1 year	2023-10-25	SIP-AC3
Horn Antenna	R&S	HF907	MRTSUE06611	1 year	2023-07-30	SIP-AC3
Thermohygrometer	testo	608-H1	MRTSUE06619	1 year	2023-11-01	SIP-AC3
Thermohygrometer	testo	608-H1	MRTSUE06622	1 year	2023-11-27	SIP-AC3
Preamplifier	EMCI	EMC012645SE	MRTSUE06642	1 year	2023-01-13	SIP-AC3
Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2023-12-22	SIP-AC3
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2023-06-01	SIP-SR2
EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2023-06-01	SIP-SR2
Thermohygrometer	testo	608-H1	MRTSUE06621	1 year	2023-11-27	SIP-SR2
Shielding Room	MIX-BEP	SIP-SR2	MRTSUE06949	5 years	2024-10-23	SIP-SR2
Signal Analyzer	Keysight	N9010B	MRTSUE06558	1 year	2023-06-01	SIP-TR1
Thermohygrometer	testo	608-H1	MRTSUE11022	1 year	2023-11-01	SIP-TR1
USB Power Sensor	Keysight	U2021XA	MRTSUE06596	1 year	2023-08-23	SIP-TR1

Software	Version	Function
EMI V3	V3.0.0	EMI Test Software
Controller_MF 7802BS	1.02	RE Antenna & Turntable
Agilent Power Analyzer/Agilent Power Panel	V R03.09.00	Power

5. Decision Rules and Measurement Uncertainty

5.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.2. 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
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz~150kHz: 3.58dB 150kHz~30MHz: 3.20dB
Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Coaxial: 9kHz~30MHz: 2.59dB Coplanar: 9kHz~30MHz: 2.60dB Horizontal: 30MHz~300MHz: 3.85dB 300MHz~1GHz: 4.36dB 1GHz~40GHz: 4.98dB Vertical: 30MHz~300MHz: 4.06dB 300MHz~1GHz: 5.28dB 1GHz~40GHz: 4.91dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 2.3dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.5dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 2.3dB
Occupied Bandwidth

Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 3.2%

6. Test Result

6.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
15.407(a)	26dB Bandwidth	Conducted	Pass
15.407(e)	6dB Bandwidth		Pass
15.407(a)(3)(ii)	Maximum Conducted Output Power		Pass
15.407(a)(3)(ii)(12)	Peak Power Spectral Density		Pass
15.407(b)(5)	Undesirable Emissions	Radiated	Pass
15.205, 15.209 15.407(b)(5)(i), (8), (9)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)		Pass
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	Pass

Notes:

1. The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
2. 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.

6.2. 26dB & 99% Bandwidth Measurement

6.2.1. Test Limit

N/A

6.2.2. Test Procedure

KDB 789033 D02v02r01- Section C.1 (26dB Bandwidth)

KDB 789033 D02v02r01- Section D (99% Bandwidth)

6.2.3. Test Setting

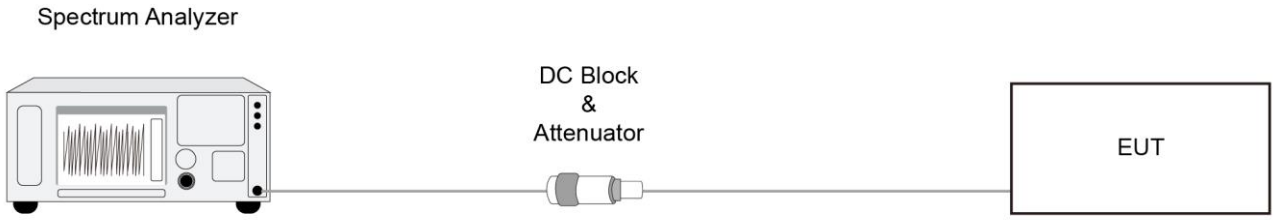
26dB Bandwidth

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 > RBW.
4. Detector = Peak.
5. Trace mode = max hold.

99% Bandwidth

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1% to 5% of the OBW
4. Set VBW ≥ 3×RBW
5. Detector = Peak.
6. Use the 99% power bandwidth function of the instrument.

6.2.4. Test Setup



6.2.5. Test Result

Refer to Appendix A.2.

6.3. 6dB Bandwidth Measurement

6.3.1. Test Limit

The minimum 6dBbandwidth shall be at least 500 kHz.

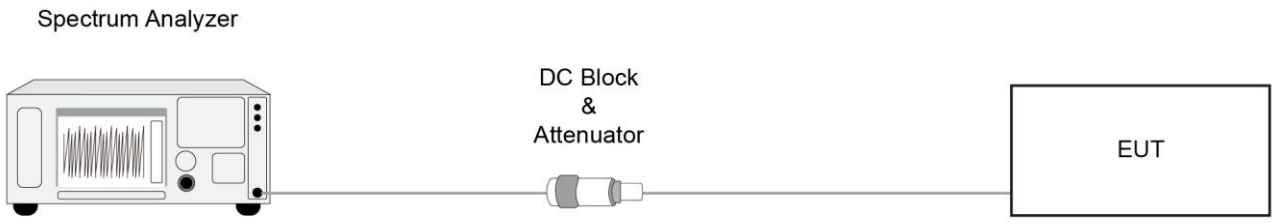
6.3.2. Test Procedure

KDB 789033 D02v02r01- Section C.2

6.3.3. Test Setting

1. Set center frequency to the nominal EUT channel center frequency.
2. RBW = 100 kHz.
3. VBW ≥ 3 × RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3.4. Test Setup



6.3.5. Test Result

Refer to Appendix A.3.

6.4. Output Power Measurement

6.4.1. Test Limit

For an indoor access point operating in the 5.850-5.895 GHz band, the maximum e.i.r.p. over the frequency band of operation must not exceed 36 dBm. Indoor access points operating on a channel that spans the 5.725-5.850 GHz and 5.850-5.895 GHz bands must not exceed an e.i.r.p. of 36 dBm.

6.4.2. Test Procedure

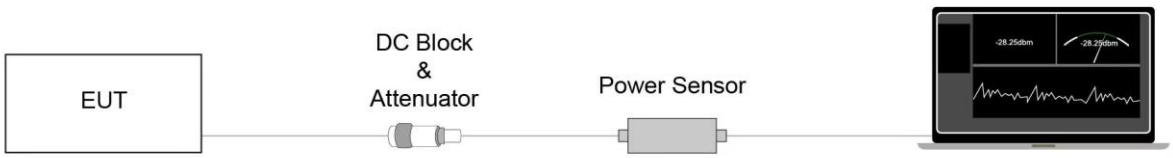
KDB 789033D02v02r01- Section E)3)b) Method PM-G

6.4.3. Test Setting

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

6.4.4. Test Setup



6.4.5. Test Result

Refer to Appendix A.4.

6.5. Power Spectral Density Measurement

6.5.1. Test Limit

For an indoor access point operating in the 5.850-5.895 GHz band, the maximum power spectral density must not exceed 20 dBm e.i.r.p. in any 1-megahertz band.

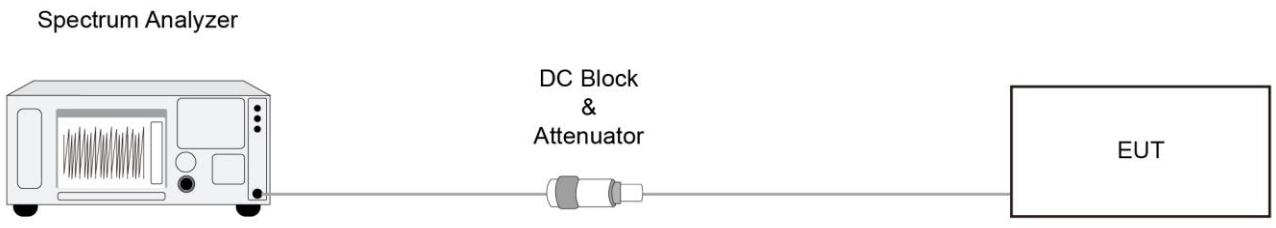
6.5.2. Test Procedure

KDB 789033 D02v02r01-SectionF

6.5.3. Test Setting

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

6.5.4. Test Setup



6.5.5. Test Result

Refer to Appendix A.5.

6.6. Frequency Stability Measurement

6.6.1. Test Limit

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

6.6.2. Test Procedure

Frequency Stability Under Temperature Variations:

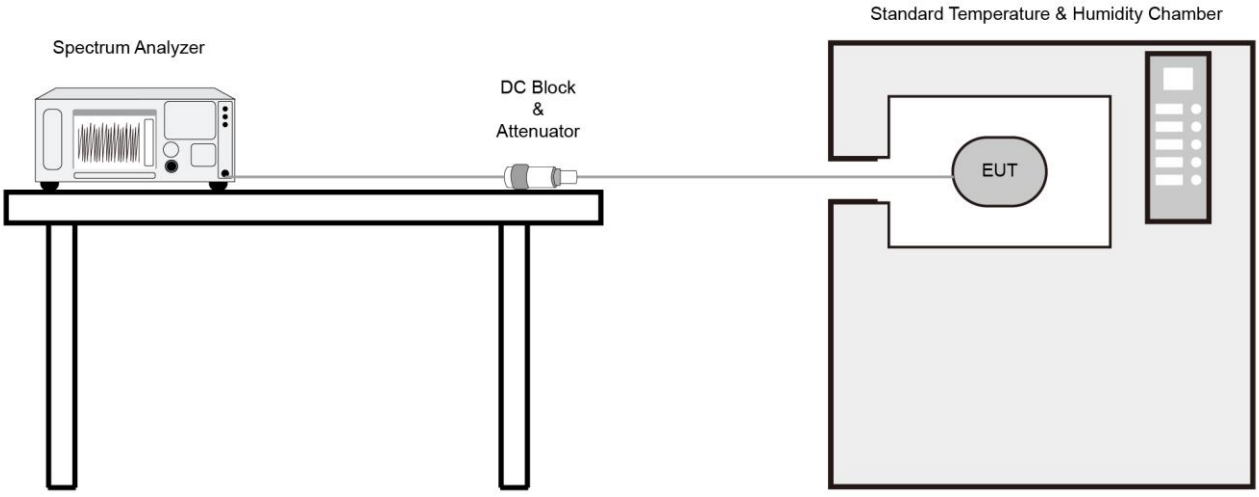
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

6.6.3. Test Setup



6.6.4. Test Result

Refer to Appendix A.6.

6.7. Radiated Spurious Emission Measurement

6.7.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency	Field Strength	Measured Distance
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

6.7.2. Test Procedure

KDB 789033 D02v02r01- Section G.

6.7.3. Test Setting

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000MHz	1MHz

Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. Span was set greater than 1MHz

3. RBW = as specified in Table 1

4. Detector = CISPR quasi-peak

5. Sweep time = auto couple

6. Trace was allowed to stabilize

Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. RBW = 1MHz

3. VBW = 3MHz

4. Detector = peak

5. Sweep time = auto couple

6. Trace mode = max hold

7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. RBW = 1MHz

3. VBW; If the EUT is configured to transmit with duty cycle ≥ 98%, set VBW = 10 Hz.

If the EUT duty cycle is < 98%, set VBW ≥ 1/T. T is the minimum transmission duration.

802.11a	VBW = 470Hz	802.11ax-HE20	VBW = 680Hz
802.11ac-VHT20	VBW = 510Hz	802.11ax-HE40	VBW = 1.2kHz
802.11ac-VHT40	VBW = 1kHz	802.11ax-HE80	VBW = 2.2Hz
802.11ac-VHT80	VBW = 2kHz		

4. Detector = Peak

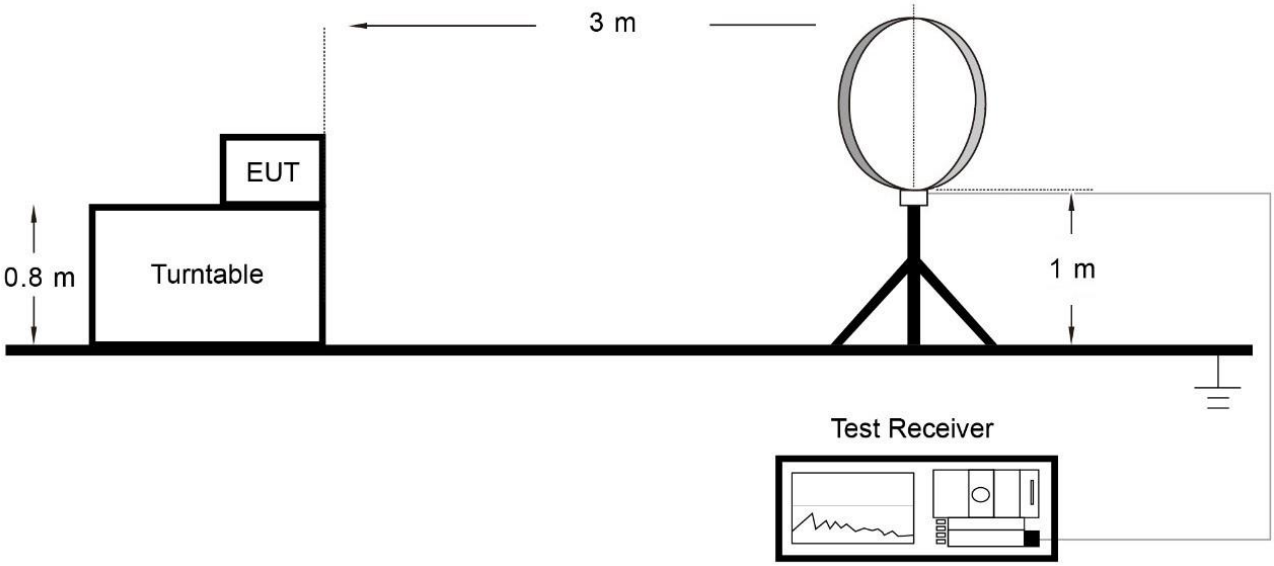
5. Sweep time = auto

6. Trace mode = max hold

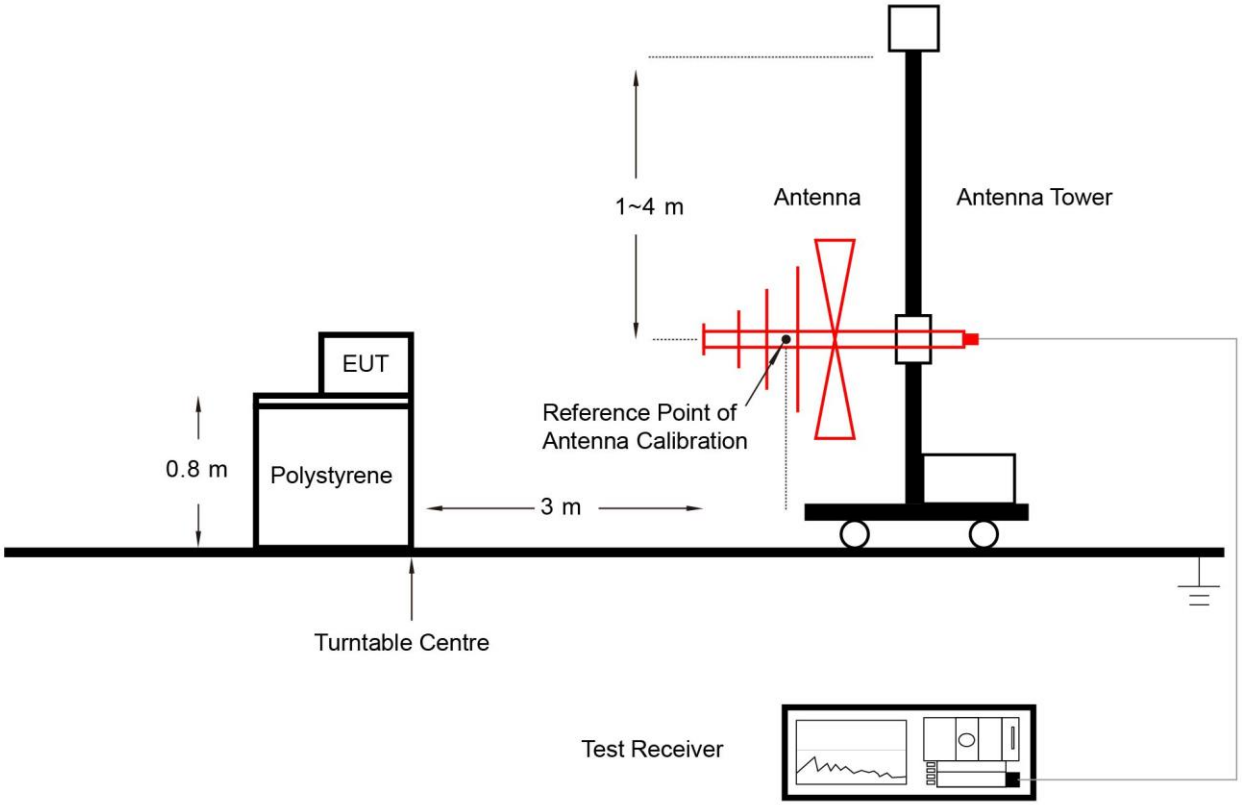
7. Trace was allowed to stabilize

6.7.4. Test Setup

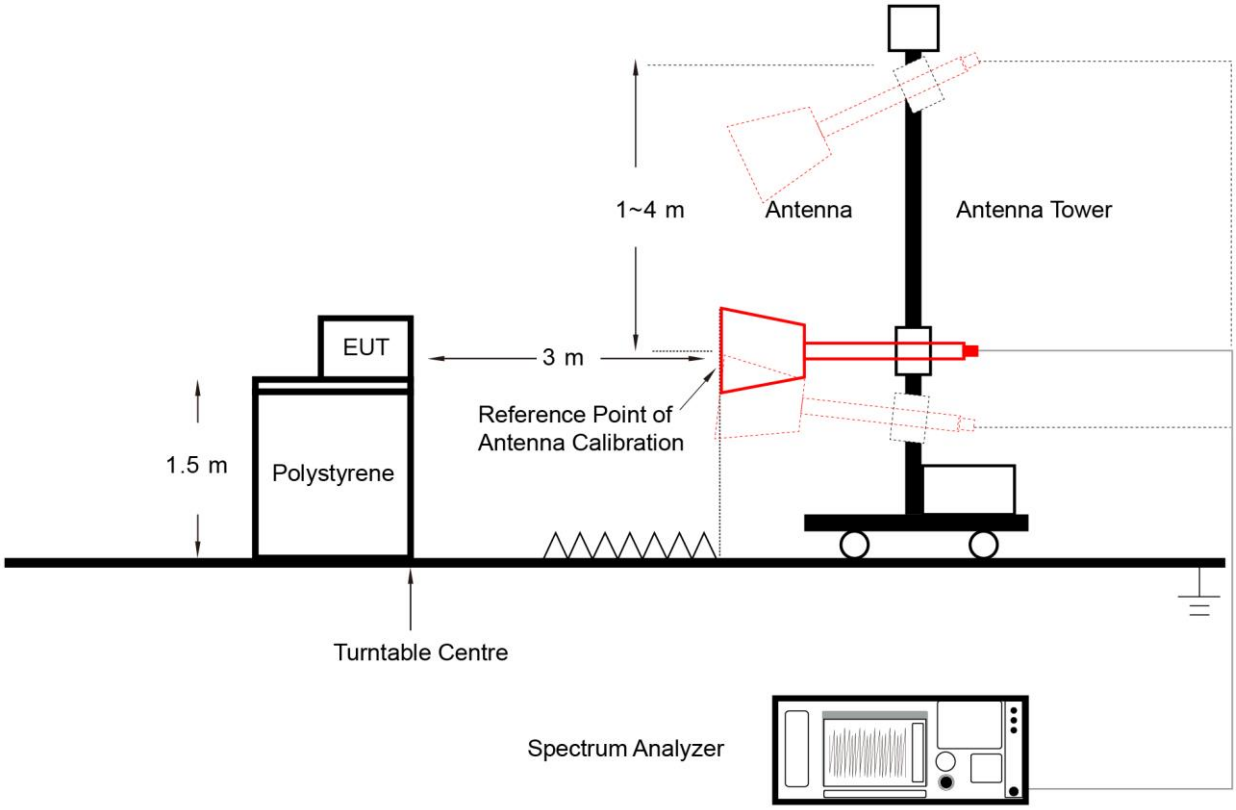
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.7.5. Test Result

Refer to Appendix A.7.

6.8. Radiated Restricted Band Edge Measurement

6.8.1. Test Limit

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1] 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41	--	--	--

For 15.407(b) requirement:

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

For an indoor access point, all emissions at or above 5.895GHz shall not exceed an e.i.r.p. of 15 dBm/MHz and shall decrease linearly to an e.i.r.p. of -7 dBm/MHz at or above 5.925GHz.

For indoor access point or subordinate device, all emissions below 5.725 GHz shall not exceed an e.i.r.p. of −27 dBm/MHz at 5.65 GHz increasing linearly to 10 dBm/MHz at 5.7 GHz, and from 5.7 GHz increasing linearly to a level of 15.6 dBm/MHz at 5.72 GHz, and from 5.72 GHz increasing linearly to a level of 27 dBm/MHz at 5.725 GHz.

E [dBµV/m] = EIRP [dBm] + 95.2, for example, -27 dBm/MHz = 68.2 dBµV/m

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

6.8.2. Test Procedure

KDB 789033 D02v02r01- Section G

6.8.3. Test Setting

Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = Peak
5. Sweep time = Auto couple
6. Trace mode = Max hold
7. Trace was allowed to stabilize

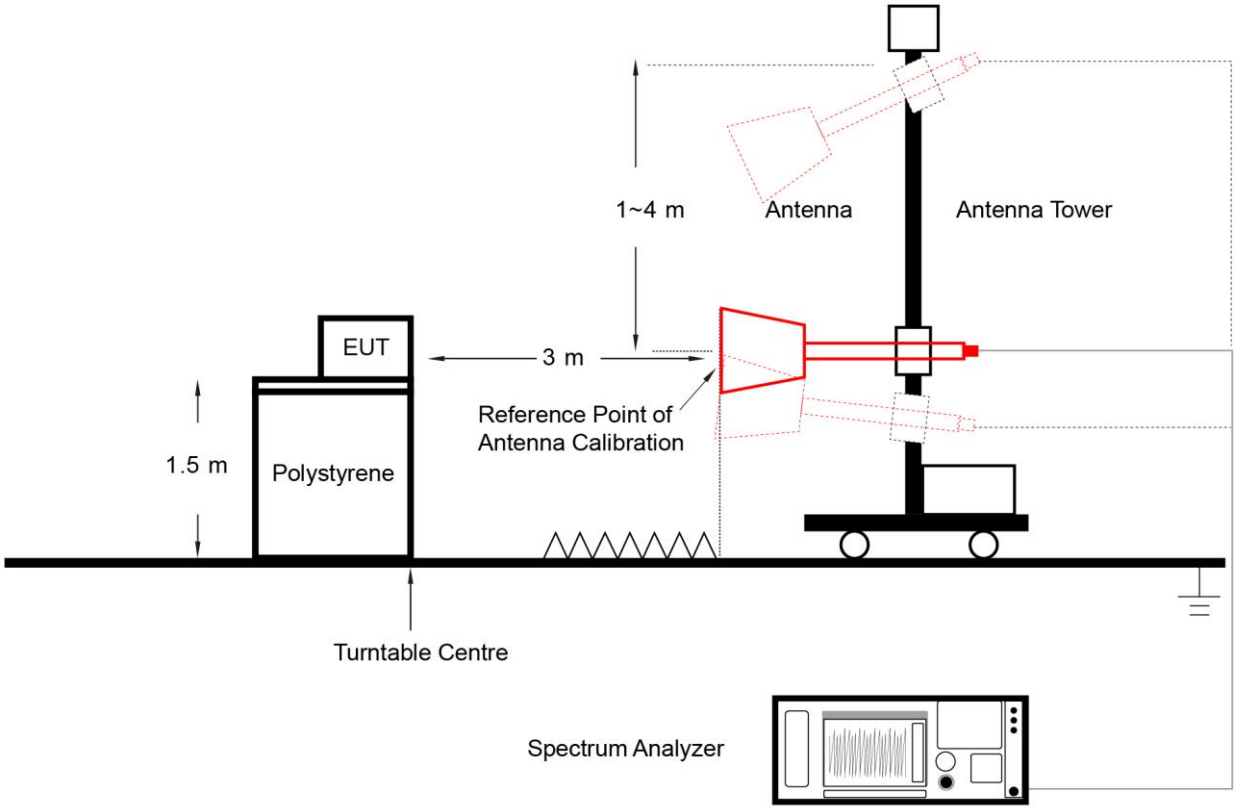
Average Measurements above 1GHz (Method VB)

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; if the EUT is configured to transmit with duty cycle ≥ 98%, set VBW = 10Hz
4. If the EUT duty cycle is < 98%, set VBW ≥ 1/T. T is the minimum transmission duration

802.11a	VBW = 470Hz	802.11ax-HE20	VBW = 680Hz
802.11ac-VHT20	VBW = 510Hz	802.11ax-HE40	VBW = 1.2kHz
802.11ac-VHT40	VBW = 1kHz	802.11ax-HE80	VBW = 2.2Hz
802.11ac-VHT80	VBW = 2kHz		

5. Detector = Peak
6. Sweep time = Auto
7. Trace mode = Max hold
8. Trace was allowed to stabilize

6.8.4. Test Setup



6.8.5. Test Result

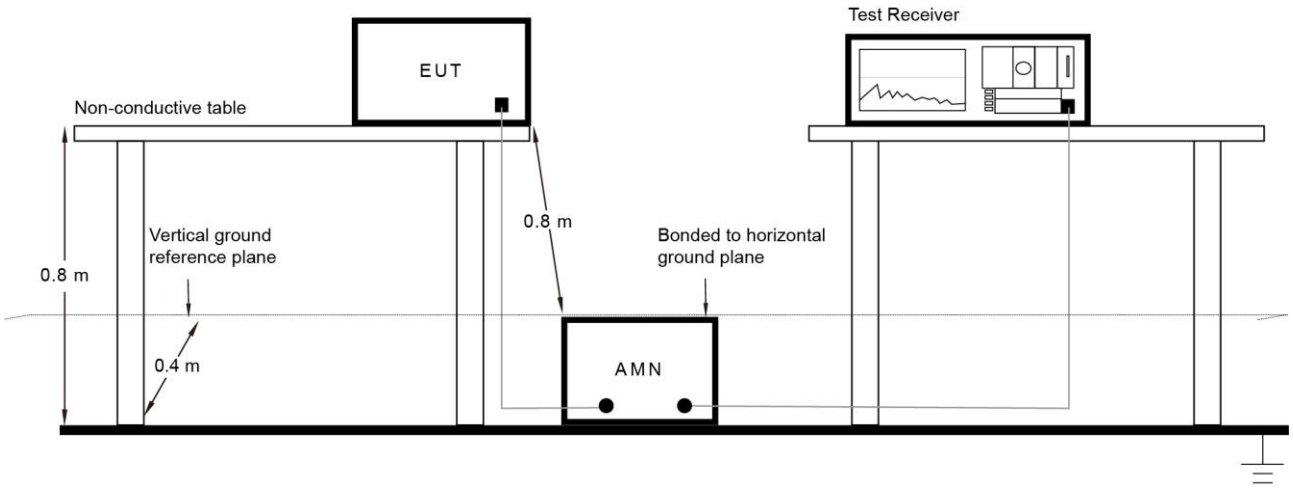
Refer to Appendix A.8.

6.9. AC Conducted Emissions Measurement

6.9.1. Test Limit

FCC Part 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50
Note 1: The lower limit shall apply at the transition frequencies. Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.		

6.9.2. Test Setup



6.9.3. Test Result

Refer to Appendix A.9.

Appendix A – Test Result

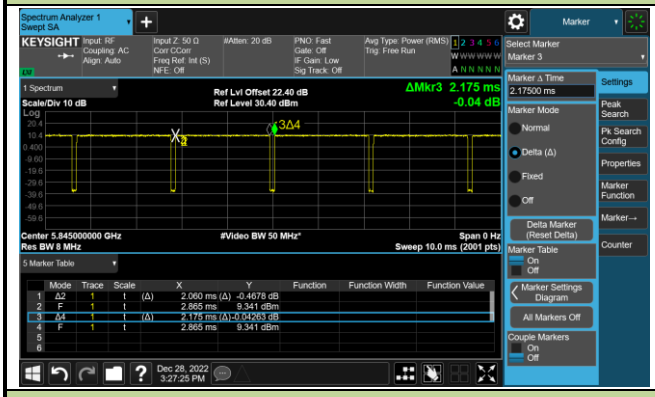
A.1 Duty Cycle Test Result

Test Site	SIP-TR1	Test Engineer	Alisa Deng
Test Date	2022-12-28		

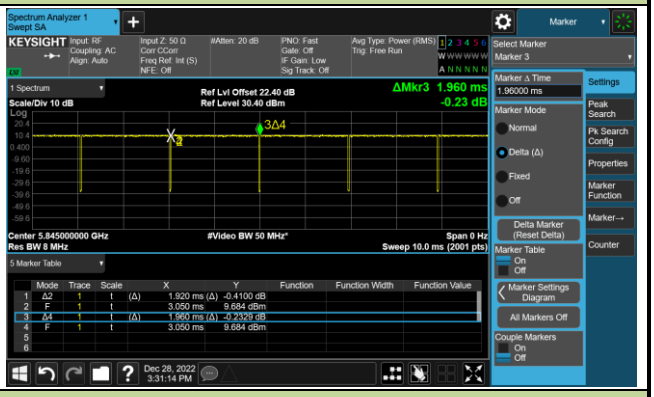
Test Mode	Duty Cycle
802.11a	94.71%
802.11ac-VHT20	97.96%
802.11ac-VHT40	96.66%
802.11ac-VHT80	93.70%
802.11ax-HE20	97.24%
802.11ax-HE40	95.85%
802.11ax-HE80	92.25%

Duty Cycle (T = Transmission Duration)

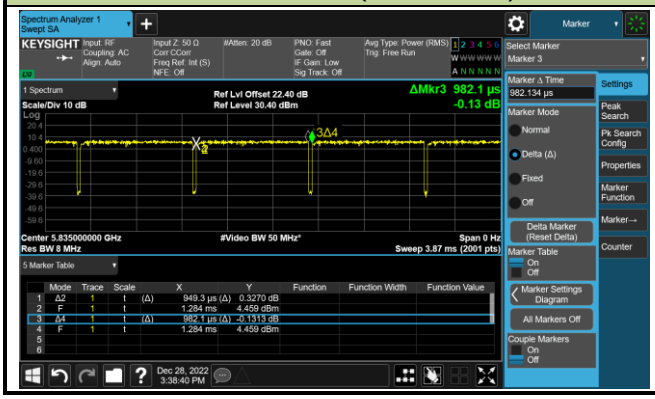
802.11a (T = 2.060ms)



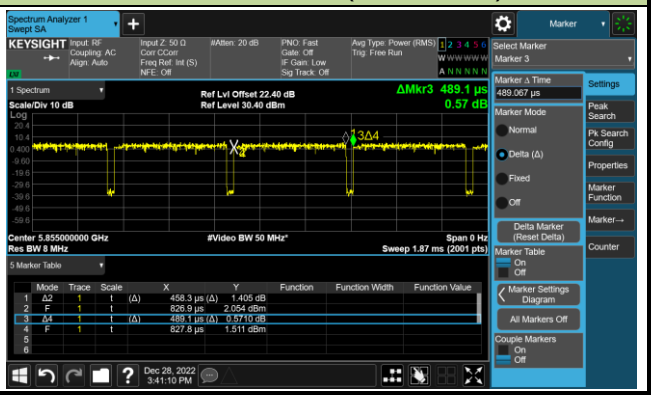
802.11ac-VHT20 (T = 1.920ms)

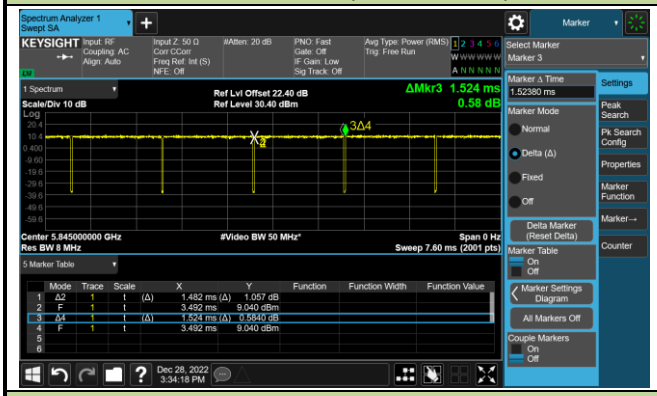
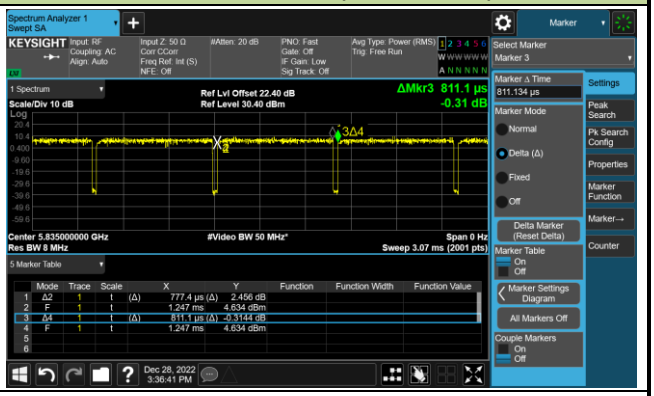
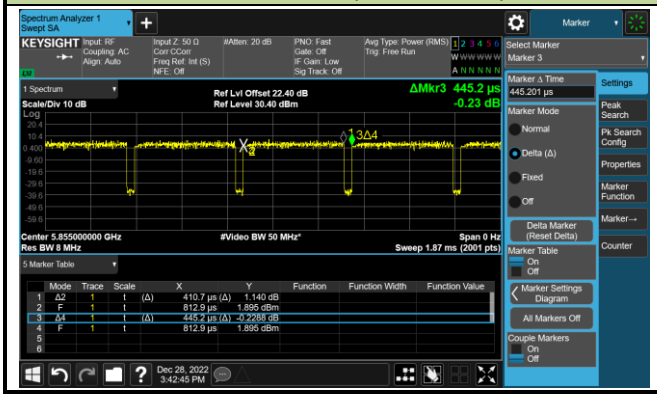


802.11ac-VHT40 (T = 949.3us)



802.11ac-VHT80 (T = 458.3us)

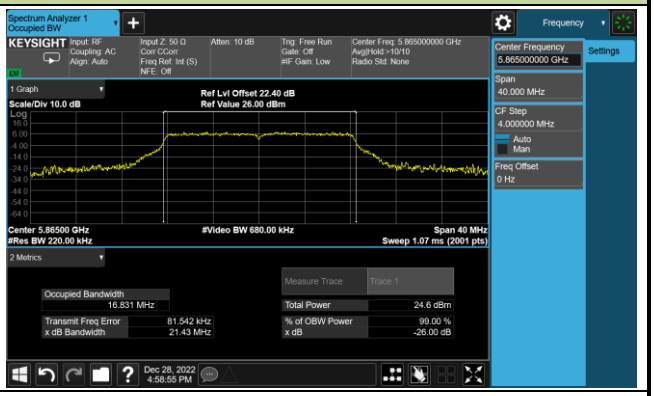
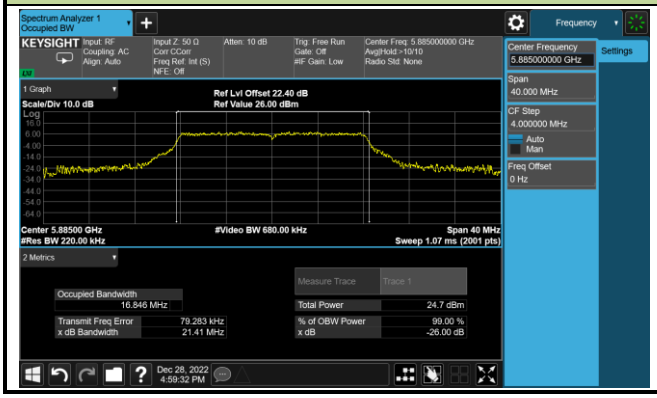


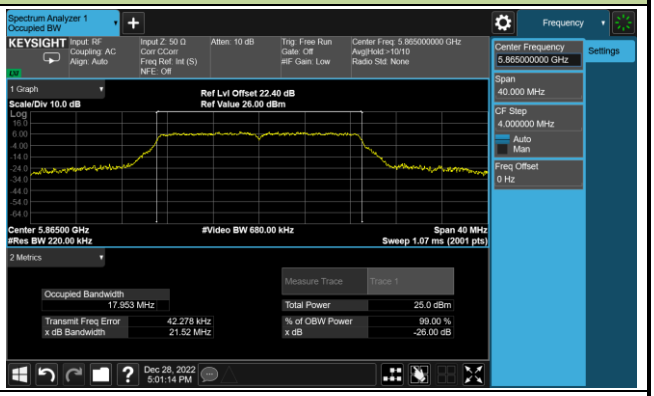
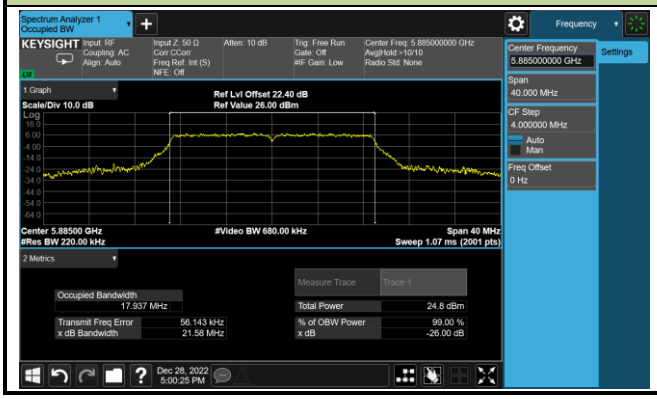
Duty Cycle (T = Transmission Duration)	
802.11ax-HE20 (T = 1.482ms)	802.11ax-HE40 (T = 777.4us)
	
802.11ax-HE80 (T = 410.7us)	
	

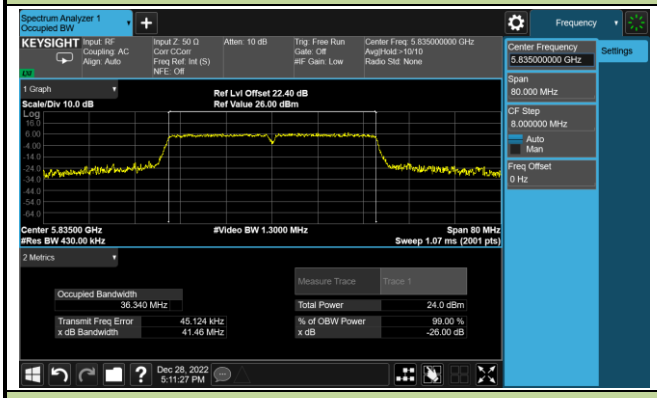
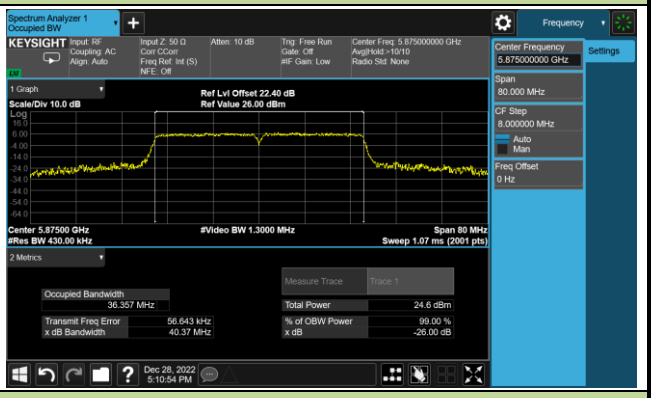
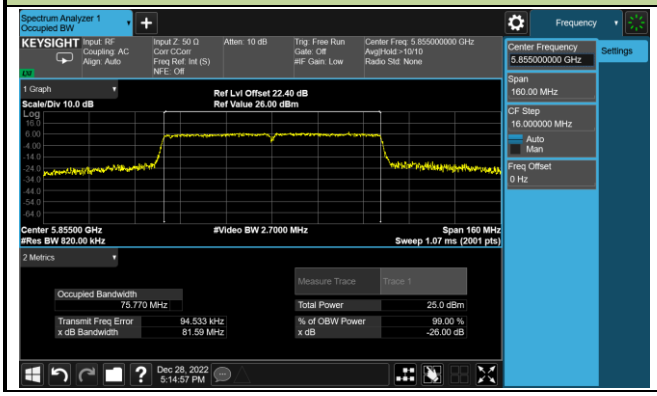
A.2 26dB & 99% Bandwidth Test Result

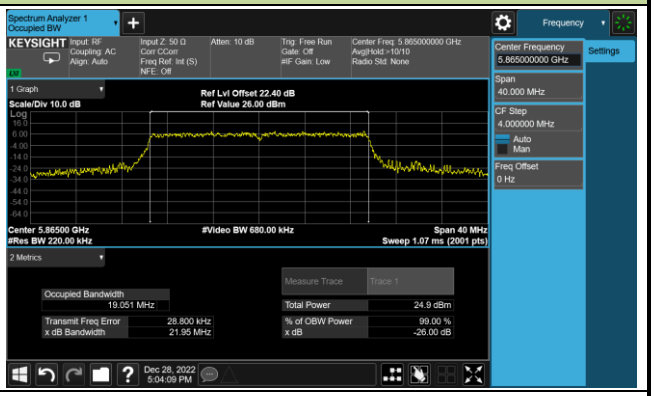
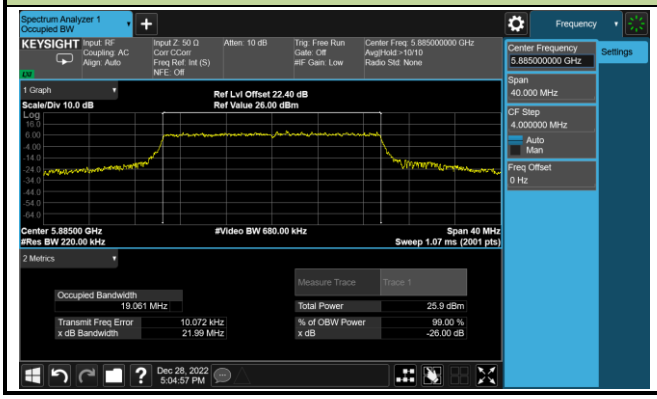
Test Site	SIP-TR1	Test Engineer	Alisa Deng
Test Date	2022-12-28		

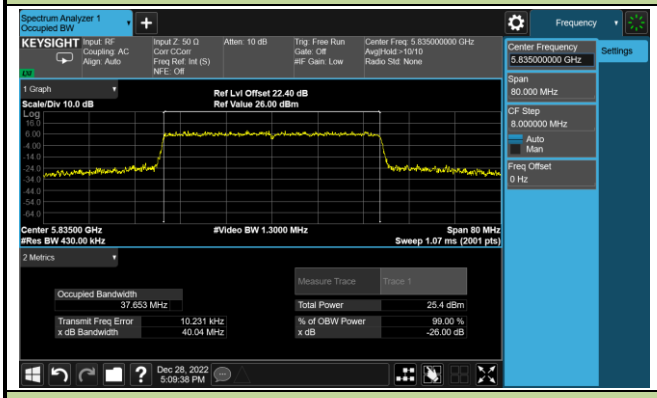
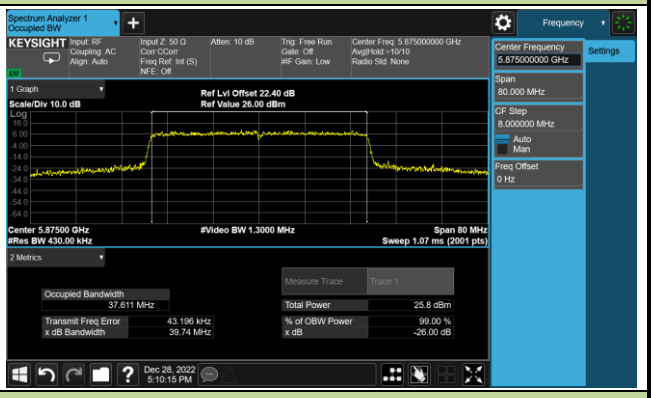
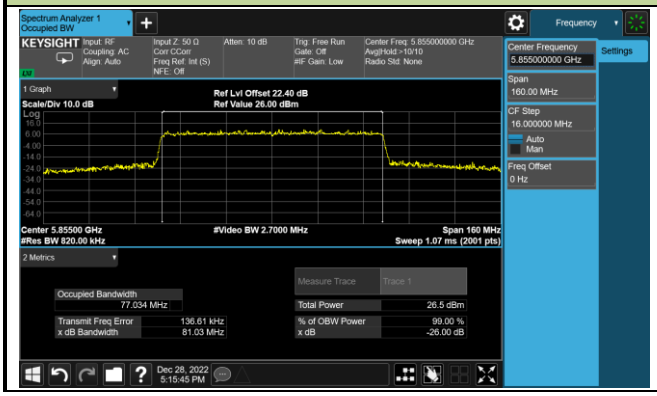
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
11a	6Mbps	169	5845	16.815	21.51
11a	6Mbps	173	5865	16.831	21.43
11a	6Mbps	177	5885	16.846	21.41
11ac-VHT20	MCS0	169	5845	17.932	21.67
11ac-VHT20	MCS0	173	5865	17.953	21.52
11ac-VHT20	MCS0	177	5885	17.937	21.58
11ac-VHT40	MCS0	167	5835	36.340	41.46
11ac-VHT40	MCS0	175	5875	36.357	40.37
11ac-VHT80	MCS0	171	5855	75.770	81.59
11ax-HE20	MCS0	169	5845	19.047	21.61
11ax-HE20	MCS0	173	5865	19.051	21.95
11ax-HE20	MCS0	177	5885	19.061	21.99
11ax-HE40	MCS0	167	5835	37.653	40.04
11ax-HE40	MCS0	175	5875	37.611	39.74
11ax-HE80	MCS0	171	5855	77.034	81.03

802.11a 26dB Bandwidth	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

802.11ac-VHT20 26dB Bandwidth	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

802.11ac-VHT40 26dB Bandwidth	
Channel 167 (5835MHz)	Channel 175(5875MHz)
	
802.11ac-VHT80 26dB Bandwidth	
Channel 171 (5855MHz)	
	

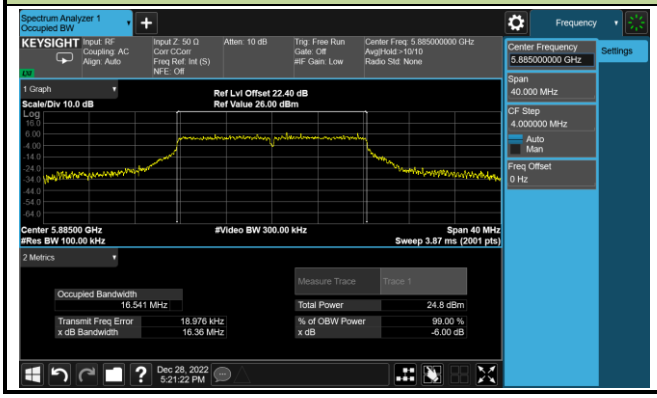
802.11ax-HE20 26dB Bandwidth	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

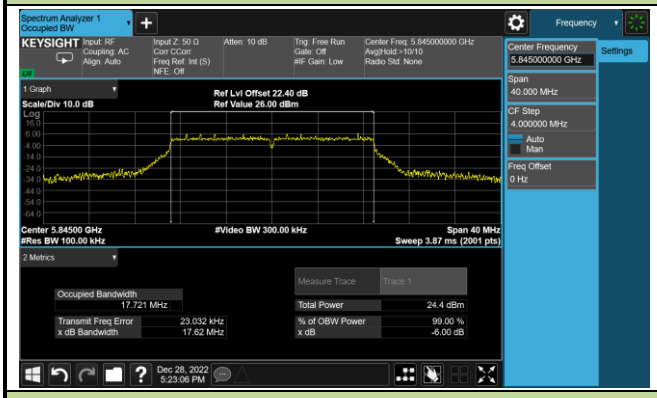
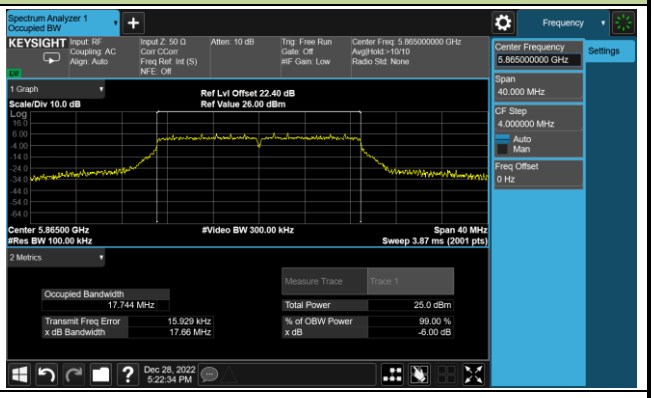
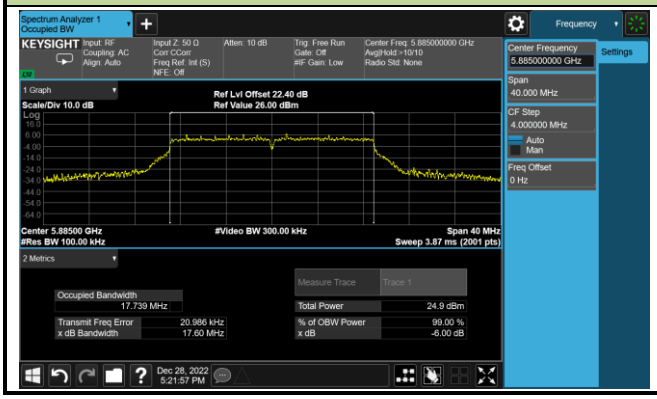
802.11ax-HE40 26dB Bandwidth	
Channel 167 (5835MHz)	Channel 175(5875MHz)
	
802.11ax-HE80 26dB Bandwidth	
Channel 171 (5855MHz)	
	

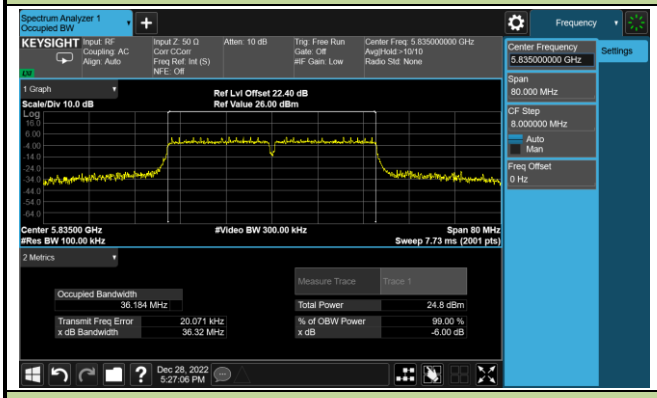
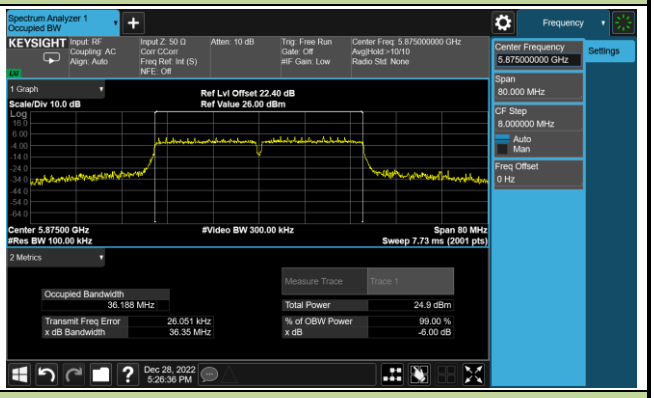
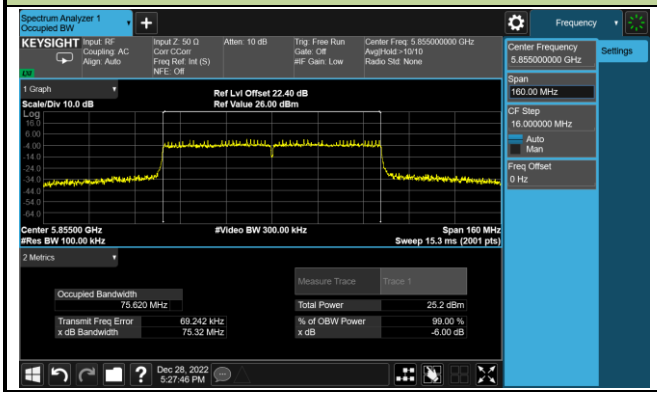
A.3 6dB Bandwidth Test Result

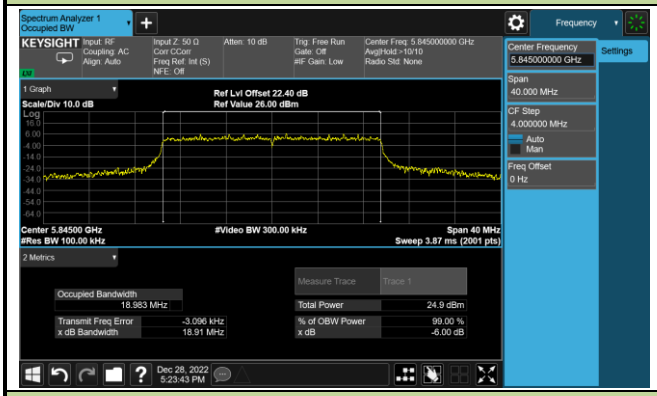
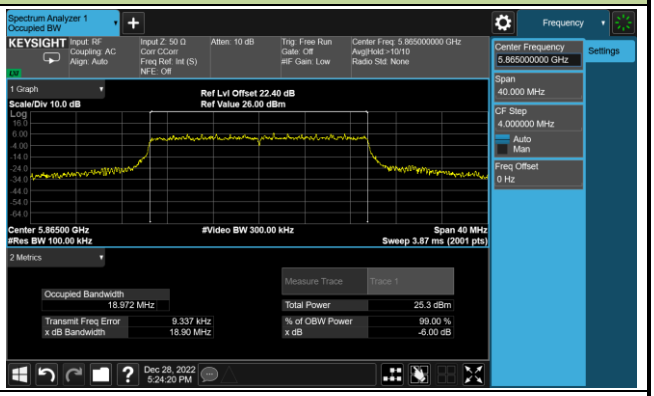
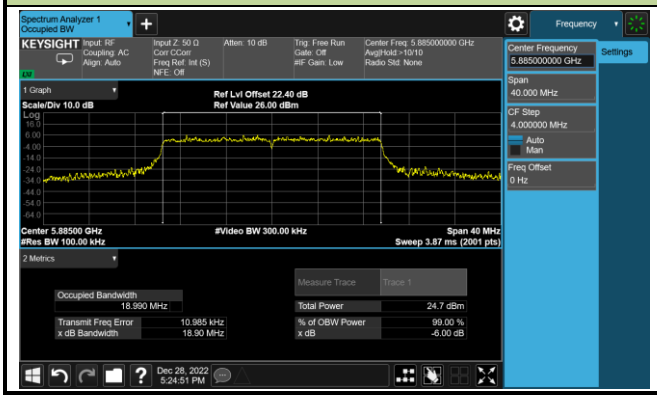
Test Site	SIP-TR1	Test Engineer	Alisa Deng
Test Date	2022-12-28		

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
11a	6Mbps	169	5845	16.38	≥ 0.5
11a	6Mbps	173	5865	16.36	≥ 0.5
11a	6Mbps	177	5885	16.36	≥ 0.5
11ac-VHT20	MCS0	169	5845	17.62	≥ 0.5
11ac-VHT20	MCS0	173	5865	17.66	≥ 0.5
11ac-VHT20	MCS0	177	5885	17.60	≥ 0.5
11ac-VHT40	MCS0	167	5835	36.32	≥ 0.5
11ac-VHT40	MCS0	175	5875	36.35	≥ 0.5
11ac-VHT80	MCS0	171	5855	75.32	≥ 0.5
11ax-HE20	MCS0	169	5845	18.91	≥ 0.5
11ax-HE20	MCS0	173	5865	18.90	≥ 0.5
11ax-HE20	MCS0	177	5885	18.90	≥ 0.5
11ax-HE40	MCS0	167	5835	37.39	≥ 0.5
11ax-HE40	MCS0	175	5875	37.46	≥ 0.5
11ax-HE80	MCS0	171	5855	77.52	≥ 0.5

802.11a 6dB Bandwidth	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

802.11ac-VHT20 6dB Bandwidth	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

802.11ac-VHT40 6dB Bandwidth	
Channel 167 (5835MHz)	Channel 175(5875MHz)
	
802.11ac-VHT80 6dB Bandwidth	
Channel 171 (5855MHz)	
	

802.11ax-HE20 6dB Bandwidth	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

802.11ax-HE40 6dB Bandwidth	
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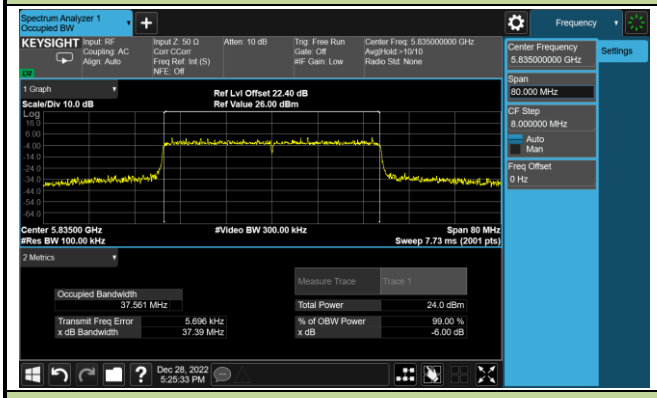
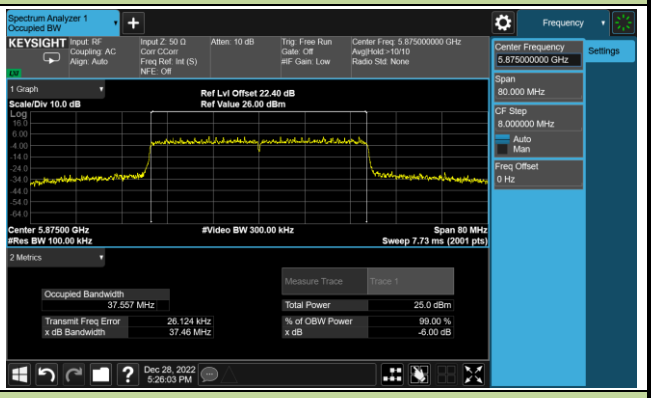
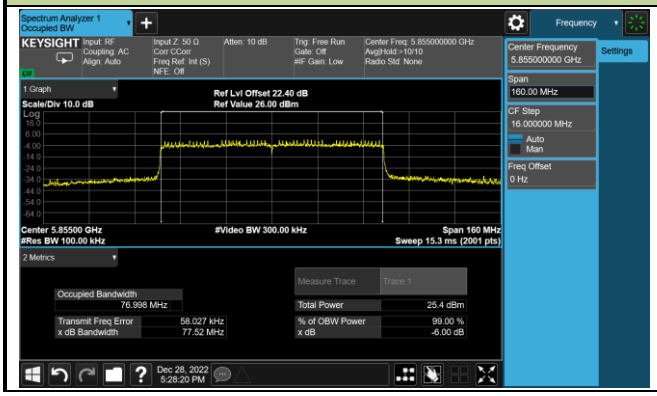
	
802.11ax-HE80 6dB Bandwidth	
Channel 171 (5855MHz)	
	

A.4 Output Power Test Result

Test Site	SIP-TR1	Test Engineer	Nandy Zhang
Test Date	2022-12-28		

Test Mode	Data Rate MCS	Channel No.	Freq. (MHz)	Average Power (dBm)		Total Average Power (dBm)	Antenna Gain (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)
				Ant 0	Ant 1				
11a	6Mbps	169	5845	18.45	17.98	21.23	3.90	25.13	≤ 36.00
11a	6Mbps	173	5865	18.31	18.03	21.18	3.90	25.08	≤ 36.00
11a	6Mbps	177	5885	18.38	17.82	21.12	3.90	25.02	≤ 36.00
11ac-VHT20	MCS0	169	5845	18.33	18.22	21.29	3.90	25.19	≤ 36.00
11ac-VHT20	MCS0	173	5865	18.37	18.07	21.23	3.90	25.13	≤ 36.00
11ac-VHT20	MCS0	177	5885	18.32	18.02	21.18	3.90	25.08	≤ 36.00
11ac-VHT40	MCS0	167	5835	18.32	17.85	21.10	3.90	25.00	≤ 36.00
11ac-VHT40	MCS0	175	5875	18.22	17.69	20.97	3.90	24.87	≤ 36.00
11ac-VHT80	MCS0	171	5855	18.36	17.92	21.16	3.90	25.06	≤ 36.00
11ax-HE20	MCS0	169	5845	18.34	17.98	21.17	3.90	25.07	≤ 36.00
11ax-HE20	MCS0	173	5865	18.28	17.84	21.08	3.90	24.98	≤ 36.00
11ax-HE20	MCS0	177	5885	18.24	17.60	20.94	3.90	24.84	≤ 36.00
11ax-HE40	MCS0	167	5835	18.14	17.74	20.95	3.90	24.85	≤ 36.00
11ax-HE40	MCS0	175	5875	18.12	17.56	20.86	3.90	24.76	≤ 36.00
11ax-HE80	MCS0	171	5855	18.43	17.68	21.08	3.90	24.98	≤ 36.00

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

Note 2: EIRP Power (dBm) = Total Average Power (dBm) + Antenna Gain (dBi).

A.5 Power Spectral Density Test Result

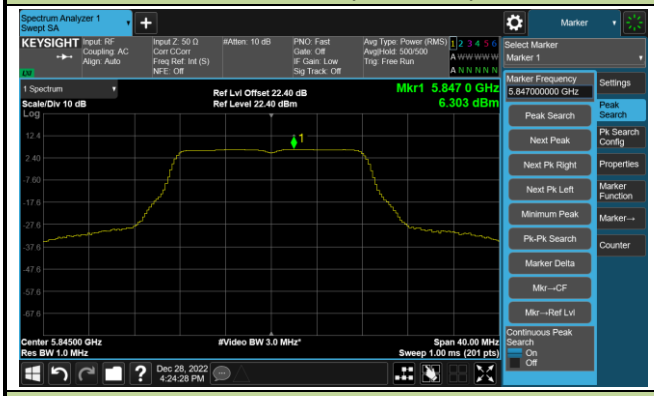
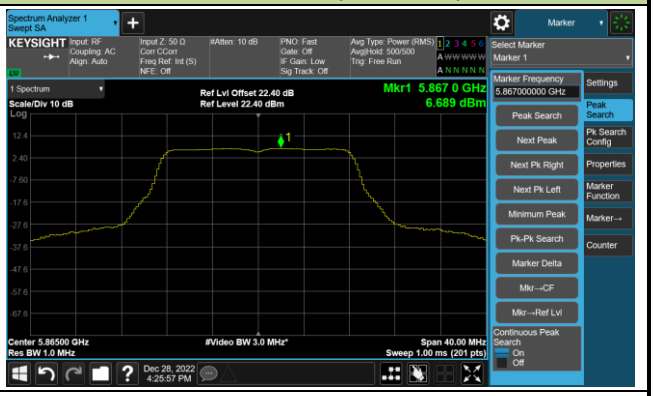
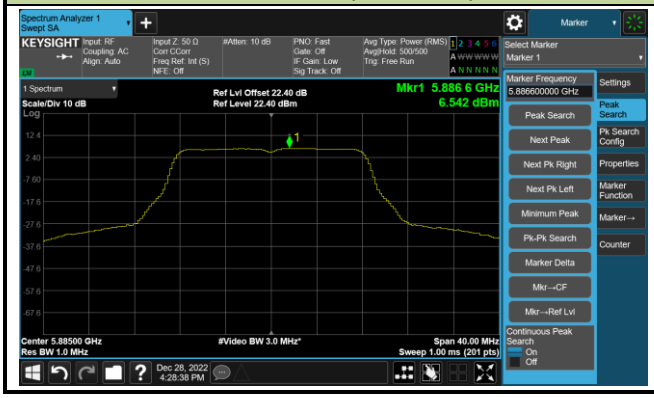
Test Site	SIP-TR1	Test Engineer	Nandy Zhang
Test Date	2022-12-28		

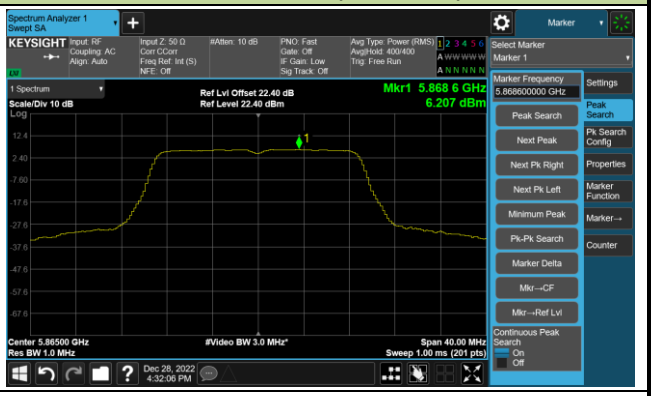
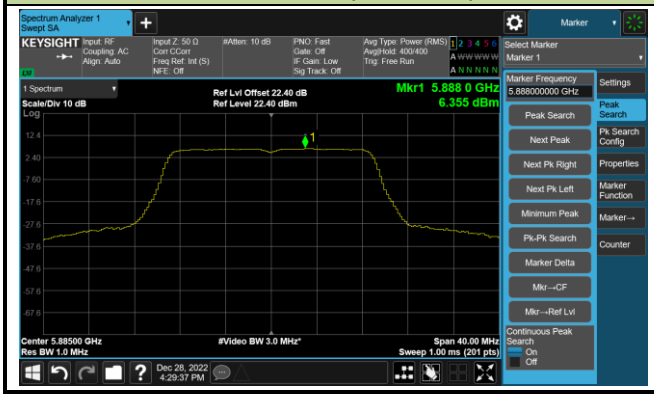
Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	AVPSD (dBm/MHz)		Duty Cycle (%)	Total PSD (dBm/ MHz)	ANT Gain (dBi)	EIRP PSD (dBm/ MHz)	EIRP PSD Limit (dBm/MHz)
				Ant 0	Ant 1					
11a	6Mbps	169	5845	6.303	6.047	94.71	9.19	6.90	16.32	≤ 20.00
11a	6Mbps	173	5865	6.689	5.915	94.71	9.33	6.90	16.47	≤ 20.00
11a	6Mbps	177	5885	6.542	6.164	94.71	9.37	6.90	16.50	≤ 20.00
11ac-VHT20	MCS0	169	5845	6.048	5.410	97.96	8.75	6.90	15.74	≤ 20.00
11ac-VHT20	MCS0	173	5865	6.207	5.844	97.96	9.04	6.90	16.03	≤ 20.00
11ac-VHT20	MCS0	177	5885	6.355	5.799	97.96	9.10	6.90	16.09	≤ 20.00
11ac-VHT40	MCS0	167	5835	2.814	2.772	96.66	5.80	6.90	12.85	≤ 20.00
11ac-VHT40	MCS0	175	5875	3.318	2.683	96.66	6.02	6.90	13.07	≤ 20.00
11ac-VHT80	MCS0	171	5855	0.247	-0.384	93.70	2.95	6.90	10.14	≤ 20.00
11ax-HE20	MCS0	169	5845	5.796	5.313	97.24	8.57	6.90	15.59	≤ 20.00
11ax-HE20	MCS0	173	5865	6.010	5.436	97.24	8.74	6.90	15.76	≤ 20.00
11ax-HE20	MCS0	177	5885	5.856	5.708	97.24	8.79	6.90	15.81	≤ 20.00
11ax-HE40	MCS0	167	5835	2.734	2.200	95.85	5.49	6.90	12.57	≤ 20.00
11ax-HE40	MCS0	175	5875	2.897	2.475	95.85	5.70	6.90	12.79	≤ 20.00
11ax-HE80	MCS0	171	5855	0.160	-0.349	92.25	2.92	6.90	10.17	≤ 20.00

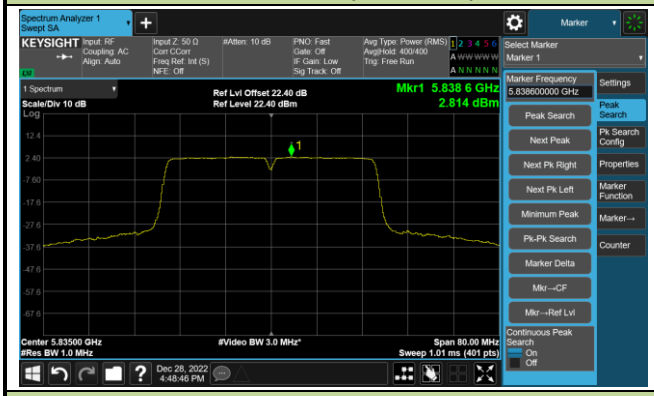
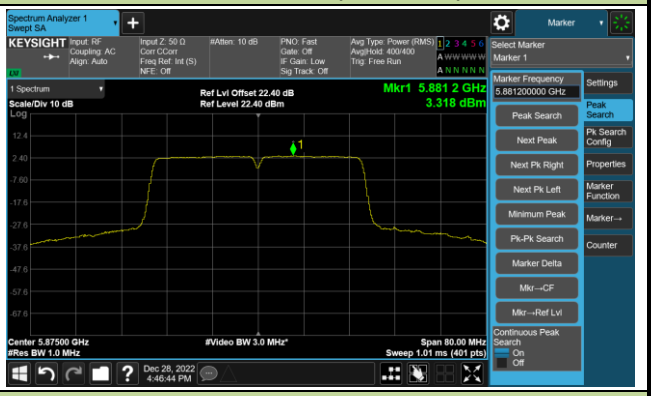
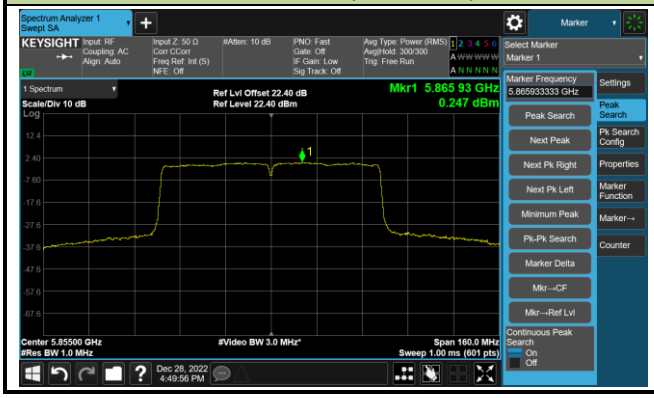
Note 1: When EUT duty cycle < 98%, the total PSD (dBm/MHz) =10*log {$10^{(\text{Ant 0 AVGPSD}/10)}$ + $10^{(\text{Ant 1 AVGPSD}/10)}$} +10*log (1/Duty cycle).

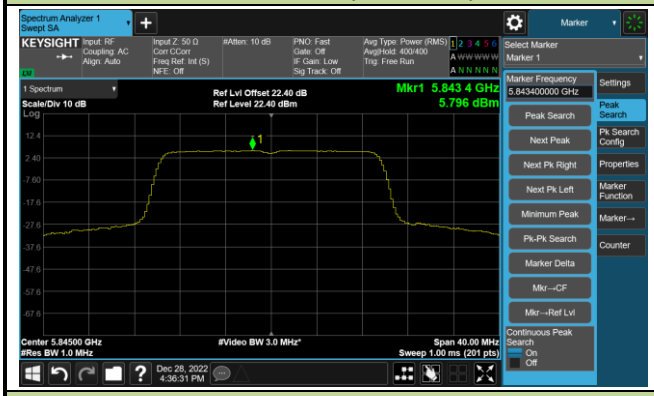
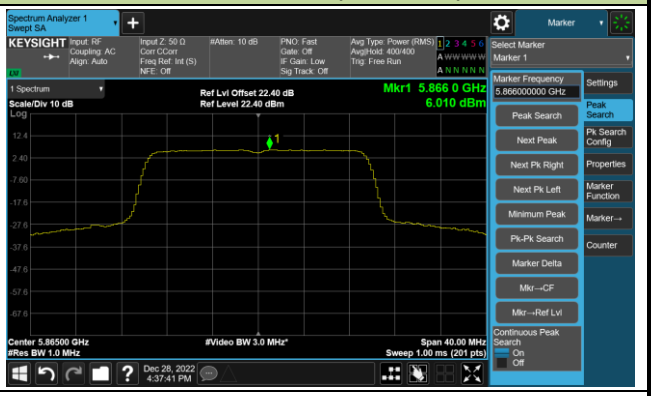
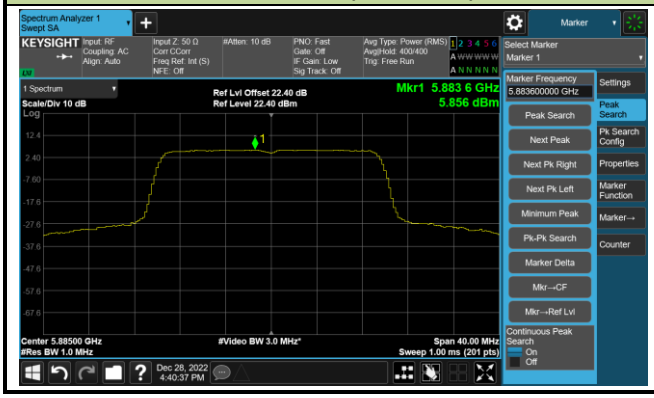
Note 2: EIRP PSD (dBm/MHz) = Total PSD (dBm/MHz) + Antenna Gain (dBi).

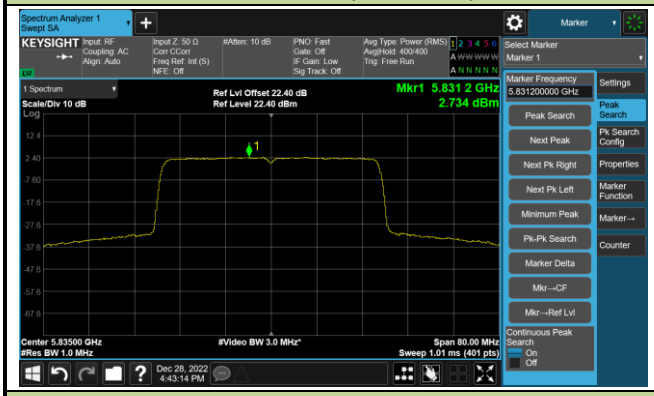
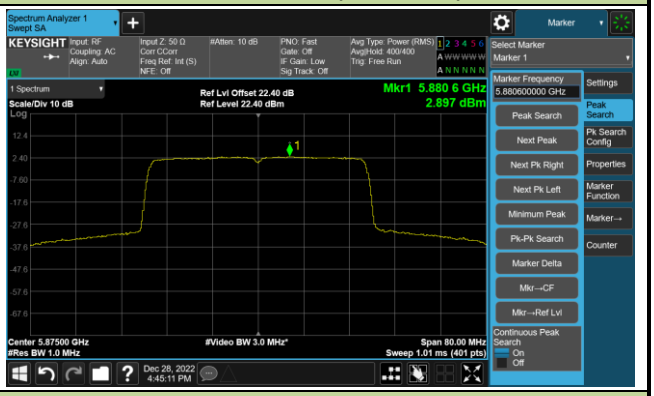
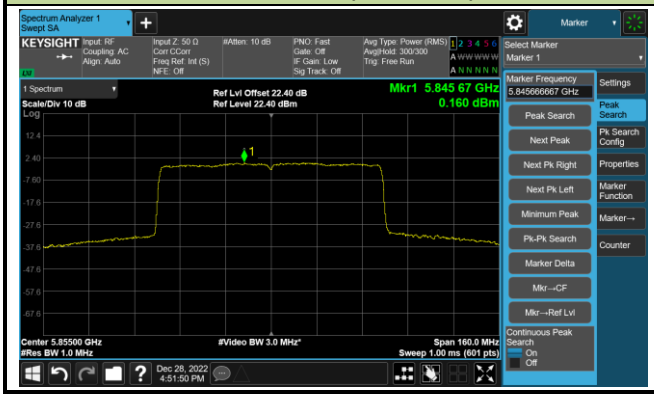
Note 3: For Channels span the 5.725-5.850 GHz and 5.850-5.895 GHz bands, we record the maximum level of 5.725-5.850 GHz and 5.850-5.895 GHz with RBW=1MHz, and the level complied with the 5.850-5.895 GHz EIRP PSD Limit.

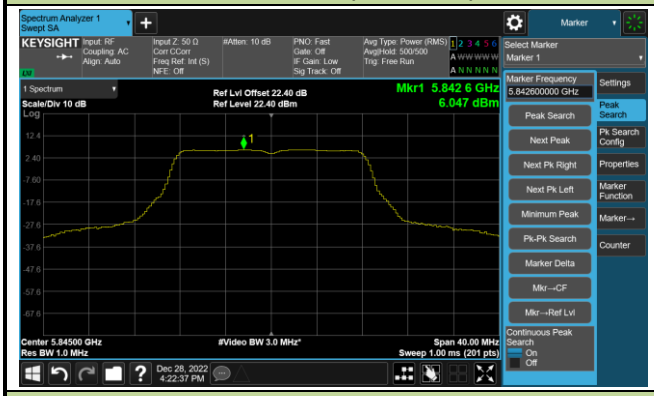
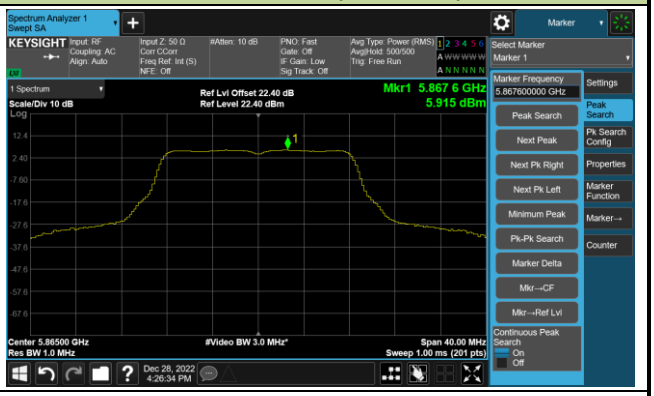
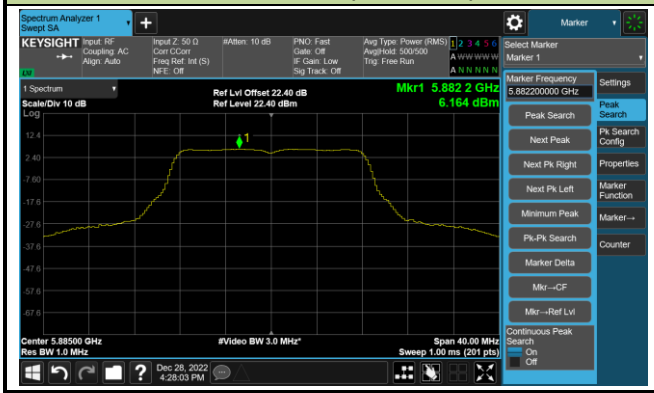
802.11a Power Spectral Density - Ant 0	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

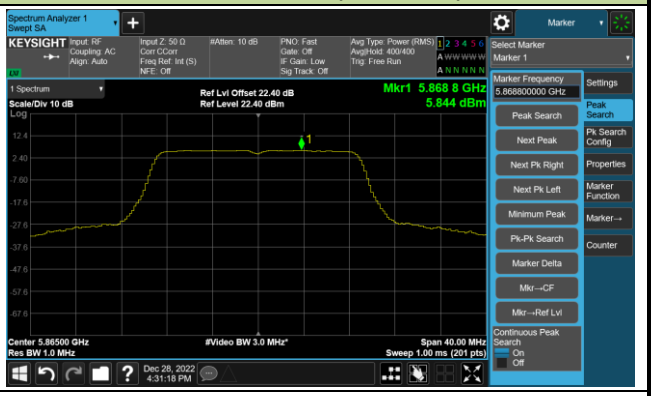
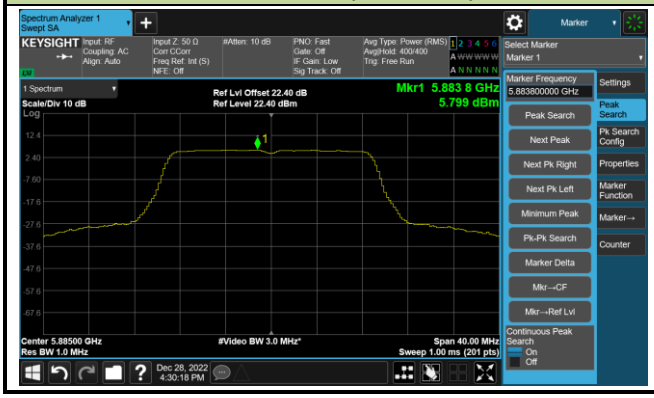
802.11ac-VHT20 Power Spectral Density - Ant 0	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

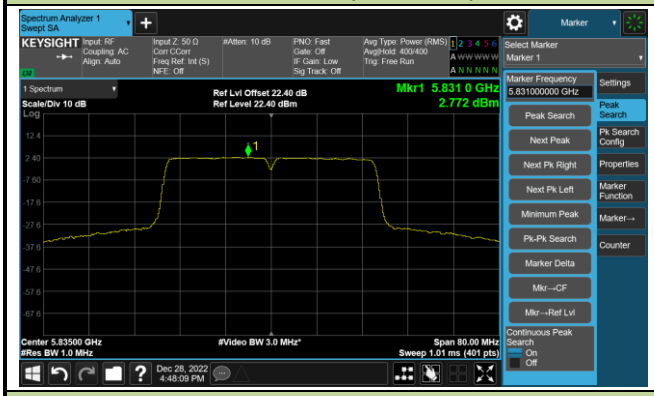
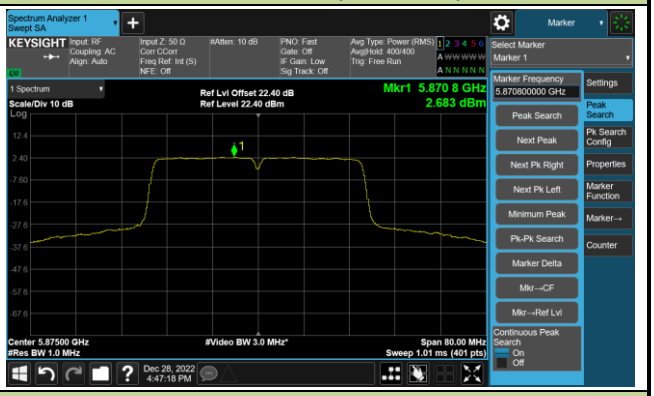
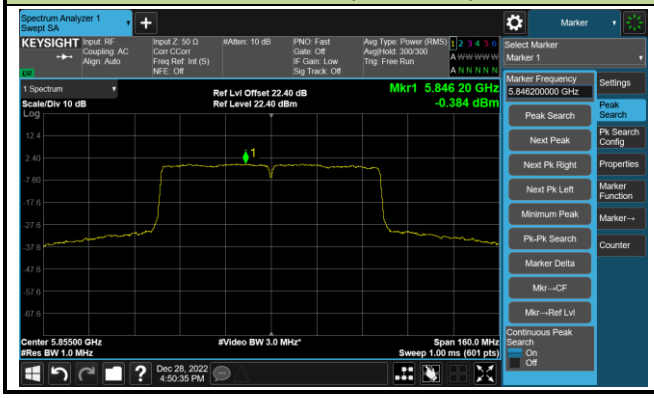
802.11ac-VHT40 Power Spectral Density - Ant 0	
Channel 167 (5835MHz)	Channel 175 (5875MHz)
	
802.11ac-VHT80 Power Spectral Density - Ant 0	
Channel 171 (5855MHz)	
	

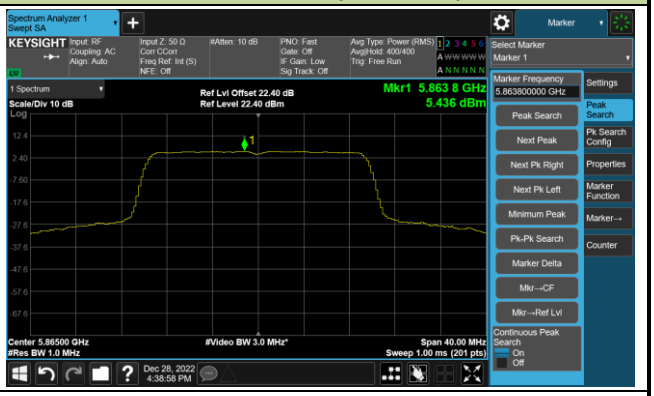
802.11ax-HE20 Power Spectral Density - Ant 0	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

802.11 ax-HE40 Power Spectral Density - Ant 0	
Channel 167 (5835MHz)	Channel 175 (5875MHz)
	
802.11 ax-HE80 Power Spectral Density - Ant 0	
Channel 171 (5855MHz)	
	

802.11a Power Spectral Density - Ant 1	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

802.11ac-VHT20 Power Spectral Density - Ant 1	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

802.11ac-VHT40 Power Spectral Density - Ant 1	
Channel 167 (5835MHz)	Channel 175 (5875MHz)
	
802.11ac-VHT80 Power Spectral Density - Ant 1	
Channel 171 (5855MHz)	
	

802.11ax-HE20 Power Spectral Density - Ant 1	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)