RF MEASUREMENT REPORT

FCC ID:	Q9DAPIN0634
Applicant:	Hewlett Packard Enterprise Company
Product:	ACCESS POINT
Model No.:	APIN0634
Trademark:	Hewlett Packard Enterprise , HPE aruba networking
FCC Classification:	15E 6GHz Standard Power Access Point (6SD)
FCC Rule Part(s):	Part 15 Subpart E (Section 15.407)
Result:	Complies
Received Date:	2023-06-25
Test Date:	2023-07-01 ~ 2023-11-18

Reviewed By: Jame Yuan

Jame Yuan

Approved By: Robin Wu

Robin Wu

ilac-MRA

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. 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
2306RSU040-U7	V01	Initial Report	2024-04-28	Invalid
2306RSU040-U7	V02	Update two typo	2024-08-07	Valid

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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: 3261				
	FCC: 291082, TW3261		ISED: TW3261		

1.4. Product Information

Product Name	ACCESS POINT
Model No.	APIN0634
Serial No.	CNQJLZJ016
Software Version	20210105 spf.11.3.css
Wi-Fi Specification	802.11a/b/g/n/ac/ax
Bluetooth Specification	v5.0 single mode, BLE only
Zigbee Specification	802.15.4
GNSS Specification	GPS, Galileo
Working Voltage	AC/DC Adapter or PoE Injector input
Operating Temperature	0 ~ 50 °C
Operating Environment	Indoor Use
Note: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Radio Specification under Test

Frequency Range	For 802.11ax-HE20: 5955 ~ 6415MHz, 6535 ~ 6855MHz For 802.11ax-HE40: 5965 ~ 6405MHz, 6565 ~ 6845MHz For 802.11ax-HE80: 5985 ~ 6385MHz, 6625 ~ 6785MHz For 802.11ax-HE160: 6025 ~ 6345MHz, 6665MHz	
Type of Modulation	802.11ax: OFDMA	
Data Rate	802.11ax: up to 2402Mbps	
Channel Puncturing Function	☐ Supported	☒ Unsupported
Support RU	☒ Full RU	☐ Partial RU

1.6. Working Frequencies

802.11ax-HE20

Channel	Frequency	Channel	Frequency	Channel	Frequency
1	5955 MHz	5	5975 MHz	9	5995 MHz
13	6015 MHz	17	6035 MHz	21	6055 MHz
25	6075 MHz	29	6095 MHz	33	6115 MHz
37	6135 MHz	41	6155 MHz	45	6175 MHz
49	6195 MHz	53	6215 MHz	57	6235 MHz
61	6255 MHz	65	6275 MHz	69	6295 MHz
73	6315 MHz	77	6335 MHz	81	6355 MHz
85	6375 MHz	89	6395 MHz	93	6415 MHz
117	6535 MHz	121	6555 MHz	125	6575 MHz
129	6595 MHz	133	6615 MHz	137	6635 MHz
141	6655 MHz	145	6675 MHz	149	6695 MHz
153	6715 MHz	157	6735 MHz	161	6755 MHz
165	6775 MHz	169	6795 MHz	173	6815 MHz
177	6835 MHz	181	6855 MHz	--	--

802.11ax-HE40

Channel	Frequency	Channel	Frequency	Channel	Frequency
3	5965 MHz	11	6005 MHz	19	6045 MHz
27	6085 MHz	35	6125 MHz	43	6165 MHz
51	6205 MHz	59	6245 MHz	67	6285 MHz
75	6325 MHz	83	6365 MHz	91	6405 MHz
123	6565 MHz	131	6605 MHz	139	6645 MHz
147	6685 MHz	155	6725 MHz	163	6765 MHz
171	6805 MHz	179	6845 MHz	--	--

802.11ax-HE80

Channel	Frequency	Channel	Frequency	Channel	Frequency
7	5985 MHz	23	6065 MHz	39	6145 MHz
55	6225 MHz	71	6305 MHz	87	6385 MHz
135	6625 MHz	151	6705 MHz	167	6785 MHz

802.11ax-HE160

Channel	Frequency	Channel	Frequency	Channel	Frequency
15	6025 MHz	47	6185 MHz	79	6345 MHz
143	6665 MHz	--	--	--	--

1.7. Antenna Details

Polarization	Antenna Name	Frequency Band (GHz)	Max Peak Gain (dBi)	CDD Directional Gain (dBi)		BF Directional Gain (dBi)
				For Power	For PSD	
Wi-Fi External Antenna List (2*2 MIMO)						
Omni	AP-ANT-311	2.4 ~ 2.5	3.0	3.0	6.01	6.01
		5.15 ~ 5.9	6.0	6.0	9.01	9.01
		5.9 ~ 7.2	6.0	6.0	9.01	9.01
Omni	AP-ANT-312	2.4 ~ 2.5	3.3	3.3	6.31	6.31
		5.15 ~ 5.9	3.3	3.3	6.31	6.31
		5.9 ~ 7.2	4.1	4.1	7.11	7.11
Omni	AP-ANT-313	2.4 ~ 2.5	3.0	3.0	6.01	6.01
		5.15 ~ 5.9	6.0	6.0	9.01	9.01
		5.9 ~ 7.2	6.0	6.0	9.01	9.01
Omni	AP-ANT-320 AP-ANT-340	2.4 ~ 2.5	4.0	4.0	7.01	7.01
		5.15 ~ 5.9	5.0	5.0	8.01	8.01
		5.9 ~ 7.2	5.0	5.0	8.01	8.01
Directional (Note 4)	AP-ANT-325 AP-ANT-345	2.4 ~ 2.5	6.1	6.1	6.1	6.1
		5.15 ~ 5.9	6.1	6.1	6.1	6.1
		5.9 ~ 7.2	5.4	5.4	5.4	5.4
Directional (Note 4)	AP-ANT-328 AP-ANT-348	2.4 ~ 2.5	7.5	7.5	7.5	7.5
		5.15 ~ 5.9	8.0	8.0	8.0	8.0
		5.9 ~ 7.2	8.0	8.0	8.0	8.0

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 $N_{ANT} \leq 4$;

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

3, The antenna specification is provided by the applicant.

4, These antennas are cross polarized design and the detail refers to antenna specification.

5, AP-ANT-325 is a tri-band and 2-element antenna and AP-ANT-345 is a tri-band and 4-element antenna. AP-ANT-328 is a tri-band and 2-element antenna and AP-ANT-348 is a tri-band and 4-element antenna.

6. Low gain antenna (AP-ANT-312) was selected to perform all RF testing that can got maximum power setting, high gain different type antenna (AP-ANT-311 & AP-ANT-348) 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.

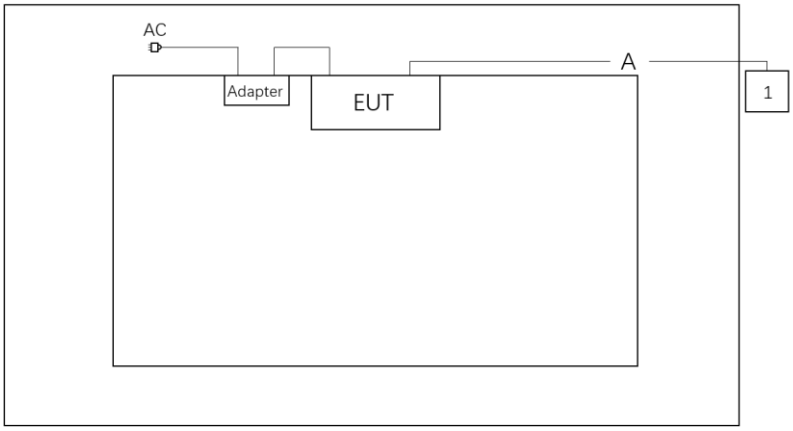
2. Test Configuration

2.1. Test Mode

Mode 1: Transmit by 802.11ax-HE20_N_{SS}=1 (MCS0)
Mode 2: Transmit by 802.11ax-HE40_N_{SS}=1 (MCS0)
Mode 3: Transmit by 802.11ax-HE80_N_{SS}=1 (MCS0)
Mode 4: Transmit by 802.11ax-HE160_N_{SS}=1 (MCS0)
Note: 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

The device was tested per the guidance ANSI C63.10: 2013 was used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.



Cable Type		Cable Spec.	Length
A	Ethernet Cable	Non-Shielding, Cat 5e	>10.0m
Product		Manufacturer	Model No.
1	Notebook	Dell	Latitude 5491

2.3. Test Software

The test utility software used during testing was “QSPR”, and the version was 5.0-00196.

2.4. Applied 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 987594 D02v02r01
- FCC KDB 987594 D04v02
- FCC KDB 662911 D01v02r01
- FCC KDB 414788 D01v01r01
- FCC KDB 412172 D01v01r01

2.5. Test Environment Condition

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

3. 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."

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.

4. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2024-06-09	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE11039	1 year	2023-11-01	WZ-AC1
				1 year	2024-10-25	WZ-AC1
Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2023-12-28	WZ-AC1
				1 year	2024-10-23	WZ-AC1
Preamplifier	Agilent	83017A	MRTSUE06076	1 year	2024-05-07	WZ-AC1
				1 year	2024-11-09	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2023-08-22	WZ-AC1
				1 year	2024-08-09	WZ-AC1
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2023-12-28	WZ-AC1
				1 year	2024-12-17	WZ-AC1
Anechoic Chamber	TDK	WZ-AC1	MRTSUE06212	1 year	2024-04-20	WZ-AC1
				1 year	2025-04-19	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2023-11-05	WZ-AC1
				1 year	2024-11-04	WZ-AC2
Preamplifier	EMCI	EMC184045SE	MRTSUE06640	1 year	2024-01-12	WZ-AC1
TRILOG Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2024-05-15	WZ-AC2
Thermohygrometer	testo	608-H1	MRTSUE11263	1 year	2024-11-07	WZ-AC2
Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2024-05-07	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2023-10-13	WZ-AC2
				1 year	2024-10-11	WZ-AC2
EMI Test Receiver	Agilent	N9038A	MRTSUE06125	1 year	2024-05-23	WZ-AC2
Anechoic Chamber	RIKEN	WZ-AC2	MRTSUE06213	1 year	2024-04-20	WZ-AC2
				1 year	2025-04-18	WZ-AC2
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2024-05-23	WZ-SR2
Thermohygrometer	testo	608-H1	MRTSUE06404	1 year	2024-05-31	WZ-SR2
Shielding Room	MIX-BEP	WZ-SR2	MRTSUE06215	5 years	2026-12-20	WZ-SR2
EMI Test Receiver	R&S	ESR3	MRTSUE06909	1 year	2023-10-27	WZ-SR2
				1 year	2024-09-27	WZ-SR2
USB Power Sensor	Agilent	U2021XA	MRTSUE06030	1 year	2023-10-08	WZ-SR5
				1 year	2024-09-27	WZ-SR5
Thermohygrometer	testo	608-H1	MRTSUE06402	1 year	2024-05-31	WZ-SR5
Signal Analyzer	Keysight	N9010B	MRTSUE06457	1 year	2024-05-23	WZ-SR5
Shielding Room	HUAMING	WZ-SR5	MRTSUE06442	N/A	N/A	WZ-SR5
Thermohygrometer	testo	608-H1	MRTSUE11268	1 year	2024-12-14	WZ-TR3

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
Temperature Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2023-10-08	WZ-TR3
				1 year	2024-09-27	WZ-TR3
Signal Analyzer	Keysight	N9010B	MRTSUE07027	1 year	2023-11-25	WZ-TR3
				1 year	2024-10-23	WZ-TR3

Software	Version	Function
EMI Software	V3.0.0	EMI Test Software
BenchVue Power Meter	2018.1	Power
Controller_MF 7802	2.03C	RE Antenna & Turntable
Controller_MF 7802	1.02	RE Antenna & Turntable

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
The maximum measurement uncertainty is evaluated as: 9kHz~150kHz: 3.58dB 150kHz~30MHz: 3.20dB
Radiated Emission Measurement
The maximum measurement uncertainty is evaluated as: Coaxial: 9kHz~30MHz: 2.61dB Coplanar: 9kHz~30MHz: 2.62dB Horizontal: 30MHz~200MHz: 3.79dB 200MHz~1GHz: 3.91dB 1GHz~40GHz: 4.99dB Vertical: 30MHz~200MHz: 4.06dB 200MHz~1GHz: 5.21dB 1GHz~40GHz: 4.90dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 2.2dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.4dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 2.2dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 2.7%

6. Test Result

6.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
15.407(a)(11)	Channel Bandwidth	Conducted	Pass
15.407(a)(4)	Maximum Equivalent Isotopically Radiated Power (EIRP)		Pass
15.407(a)(4)	Maximum Power Spectral Density (EIRP)		Pass
15.407(b)(7)	In-Band Emission		Pass
15.407(k)	Automated Frequency Coordination		Pass Note3
15.407(b)(6)	Unwanted Emissions		Pass
15.407(b)(8), (9), (10)	General Field Strength (Restricted Bands and Radiated Emission)	Radiated	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.
3. Automated Frequency Coordination refers to report “2306RSU040-U8”.

6.2. Channel Bandwidth Measurement

6.2.1. Test Limit

The maximum transmitter channel bandwidth for U–NII devices in the 5.925–7.125 GHz band is 320 megahertz.

6.2.2. Test Procedure

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

KDB 789033 D02v02r01- Section II)D) (99% Bandwidth)

6.2.3. Test Setting

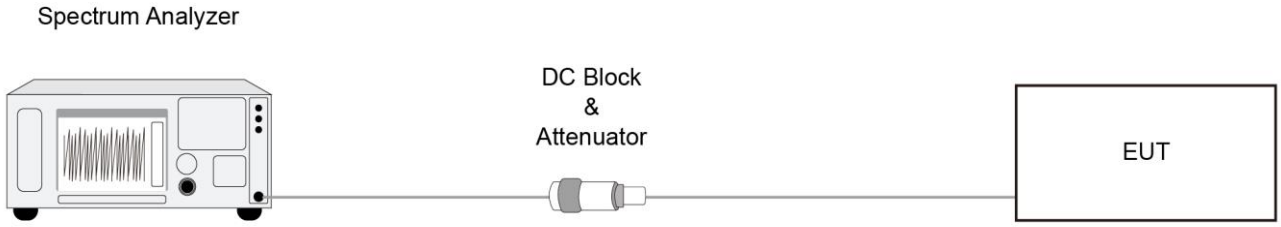
26dB Bandwidth

1. The analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth
2. RBW = approximately 1% of the emission bandwidth.
3. VBW > RBW
4. Detector = Peak.
5. Trace mode = max hold.
6. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

99% Bandwidth

1. Set center frequency to the nominal EUT channel center frequency.
2. RBW = 1% to 5% of the OBW
3. VBW ≥ 3 × RBW
4. Span = 1.5 times to 5 times the OBW
5. Detector = peak
6. Trace mode = max hold
7. Allow the trace to stabilize
8. 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. Output Power Measurement

6.3.1. Test Limit

For a standard access point operating in the 5.925-6.425 GHz band, the maximum e.i.r.p. over the frequency band of operation must not exceed 36 dBm.

6.3.2. Test Procedure

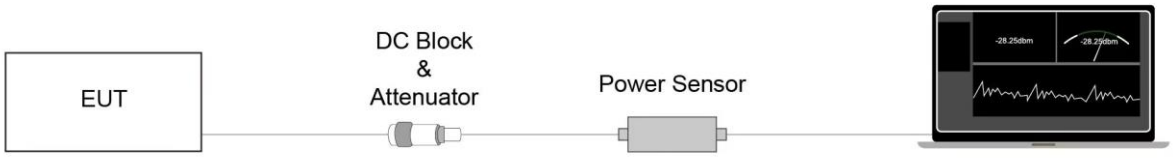
KDB 789033D02v02r01- Section II)E)3)b) Method PM-G

6.3.3. 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.

6.3.4. Test Setup



6.3.5. Test Result

Refer to Appendix A.3.

6.4. Power Spectral Density Measurement

6.4.1. Test Limit

For a standard access point operating in the 5.925-6.425 GHz band, the maximum power spectral density must not exceed 23 dBm e.i.r.p. in any 1-megahertz band.

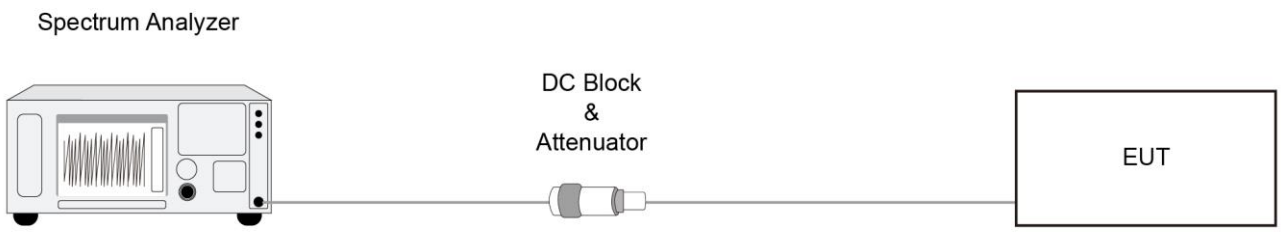
6.4.2. Test Procedure

KDB 789033 D02v02r01-Section II)F)

6.4.3. 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 = 3MHz
5. Number of sweep points ≥ 2 × (span / RBW)
6. Detector = power averaging (Average)
7. Sweep time = auto
8. Trigger = free run
9. Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.
10. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
11. 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.

6.4.4. Test Setup



6.4.5. Test Result

Refer to Appendix A.4.

6.5. In-Band Emission Measurement

6.5.1. Test Limit

Suppressed by 20 dB at 1 MHz outside of the channel edge.

(The channel edge is defined as the 26-dB point on either side of the carrier center frequency.)

Suppressed by 28 dB at one channel bandwidth from the channel center.

Suppressed by 40 dB at one- and one-half times the channel bandwidth from the channel center.

6.5.2. Test Procedure

KDB 987594 D02v01r01- Section II)J)

6.5.3. Test Setting

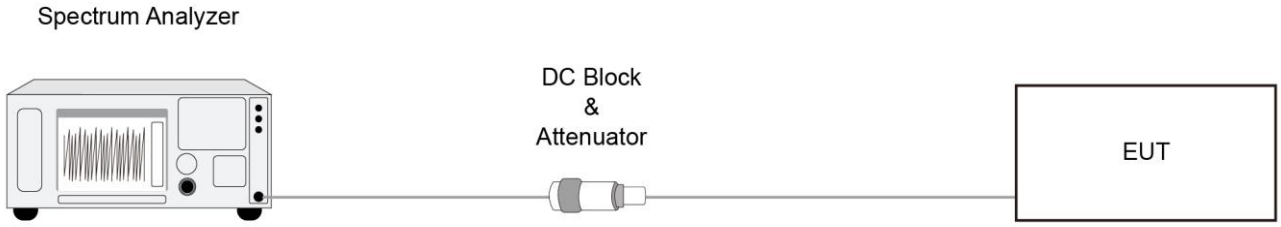
Emissions Mask Reference Level Measurement

1. Set the span to encompass the entire 26 dB EBW of the signal.
2. Set RBW = same RBW used for 26 dB EBW measurement.
3. Set VBW ≥ 3 X RBW.
4. Number of points in sweep ≥ [2 x span / RBW].
5. Sweep time = auto.
6. Detector = RMS.
7. Trace average at least 100 traces in power averaging (rms) mode.
8. Use the peak search function on the instrument to find the peak of the spectrum.

In-Band Emission

1. Using the measuring equipment limit line function, develop the emissions mask based on rule.
2. Adjust the span to encompass the entire mask as necessary.
3. Clear trace.
4. Trace average at least 100 traces in power averaging (rms) mode.
5. Adjust the reference level as necessary so that the crest of the channel touches the top of the emission mask.

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:

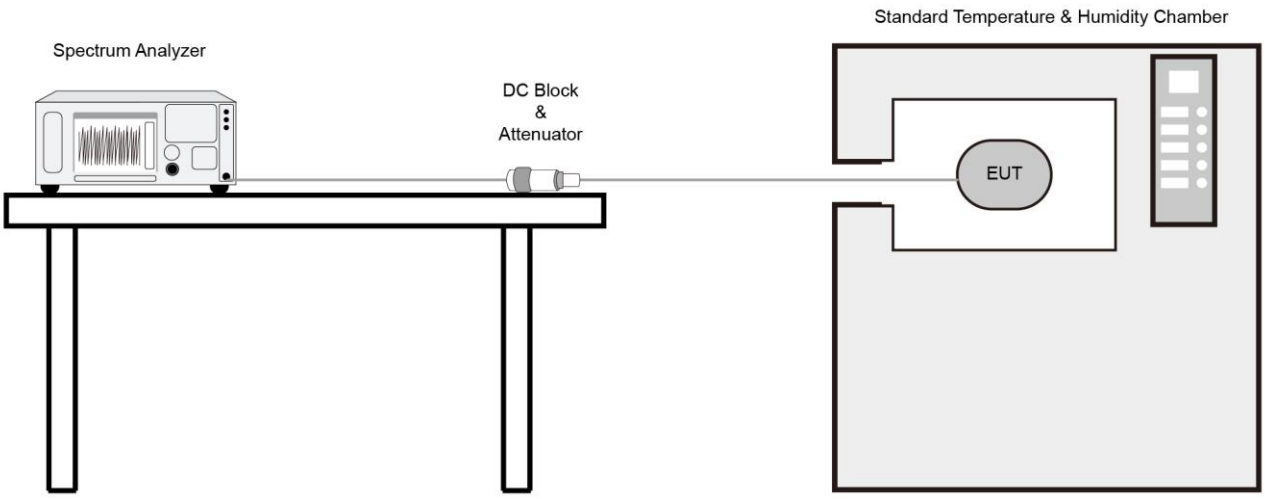
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain 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

For 15.407(b)(5) requirement

For transmitters operating within the 5.925-7.125 GHz band: Any emissions outside of the 5.925-7.125 GHz band must not exceed an e.i.r.p. of −27 dBm/MHz.

Refer to 987594 D02 U-NII 6GHz EMC Measurement v01 clause G

Use guidance in KDB 789033 for measurements below 1000 MHz and above 1000 MHz. Unwanted emissions outside of restricted bands are measured with a RMS detector. In addition, 15.35(b) applies where the peak emissions must be limited to no more than 20 dB above the average limit.

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 [μV/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

6.7.2. Test Procedure

KDB 789033 D02v02r01-Section II)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.

4. Detector = Peak

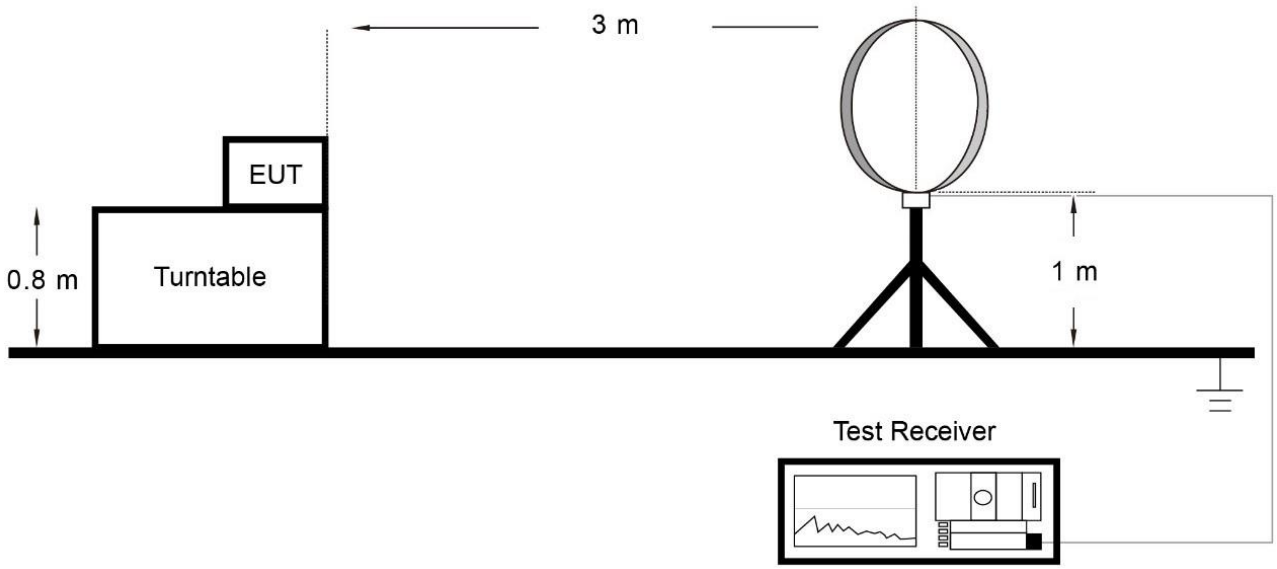
5. Sweep time = auto

6. Trace mode = max hold

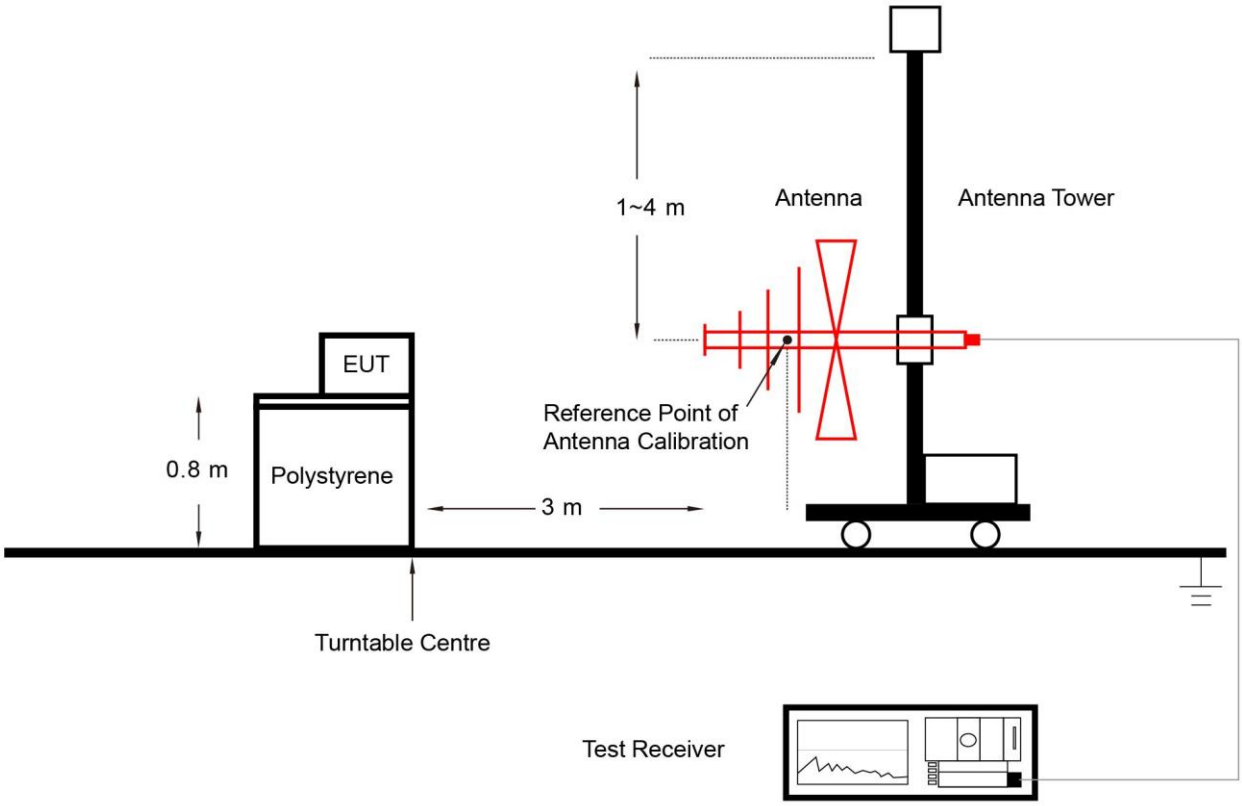
7. Trace was allowed to stabilize

6.7.4. Test Setup

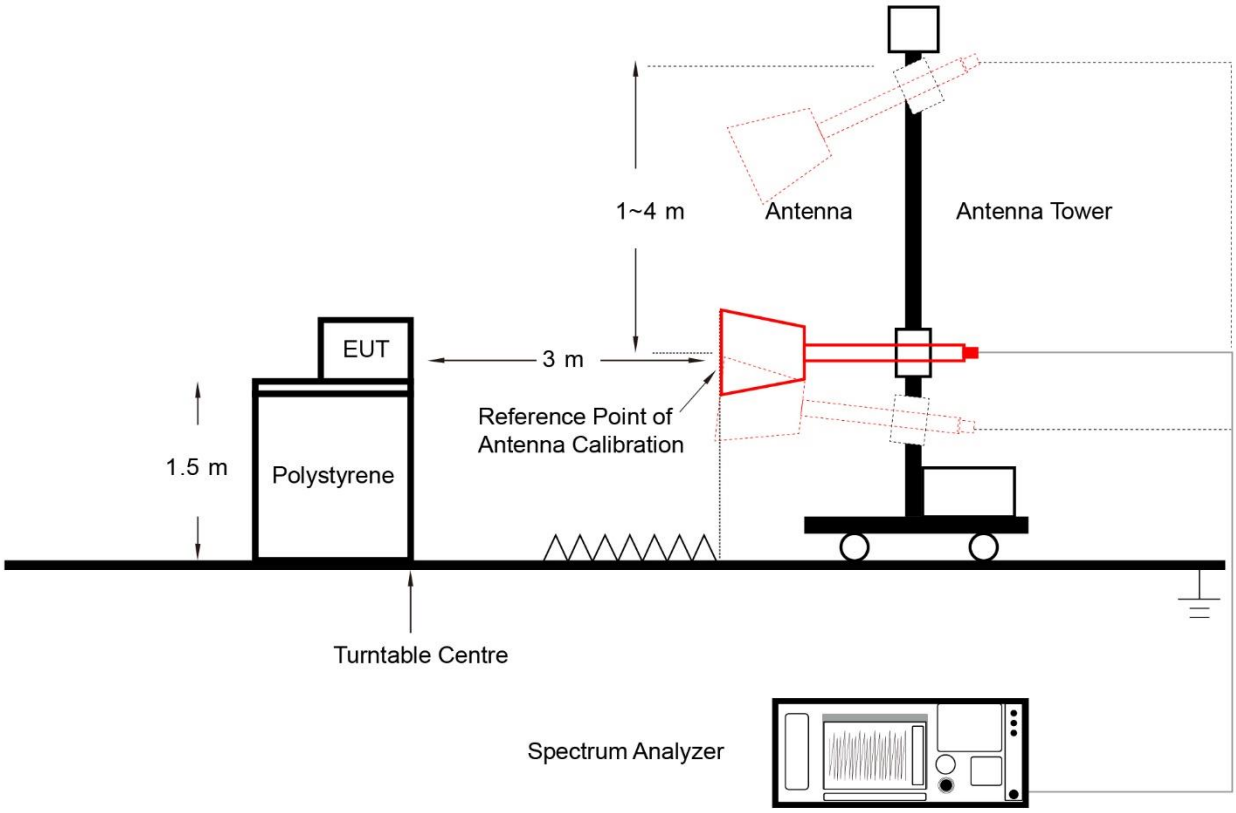
Below 30MHz Test Setup:



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 15.407(b)(6) requirement:

For transmitters operating within the 5.925-7.125 GHz band: Any emissions outside of the 5.925-7.125 GHz band must not exceed an e.i.r.p. of −27 dBm/MHz.

Refer to 987594 D02 U-NII 6GHz EMC Measurement v01 clause G - Unwanted Emission Measurement

Use guidance in KDB 789033 for measurements below 1000 MHz and above 1000 MHz. Unwanted emissions outside of restricted bands are measured with a RMS detector. In addition, 15.35(b) applies where the peak emissions must be limited to no more than 20 dB above the average limit.

6.8.2. Test Procedure

KDB 789033 D02v02r01-Section II)G)

6.8.3. Test Setting

Peak Measurements above 1GHz

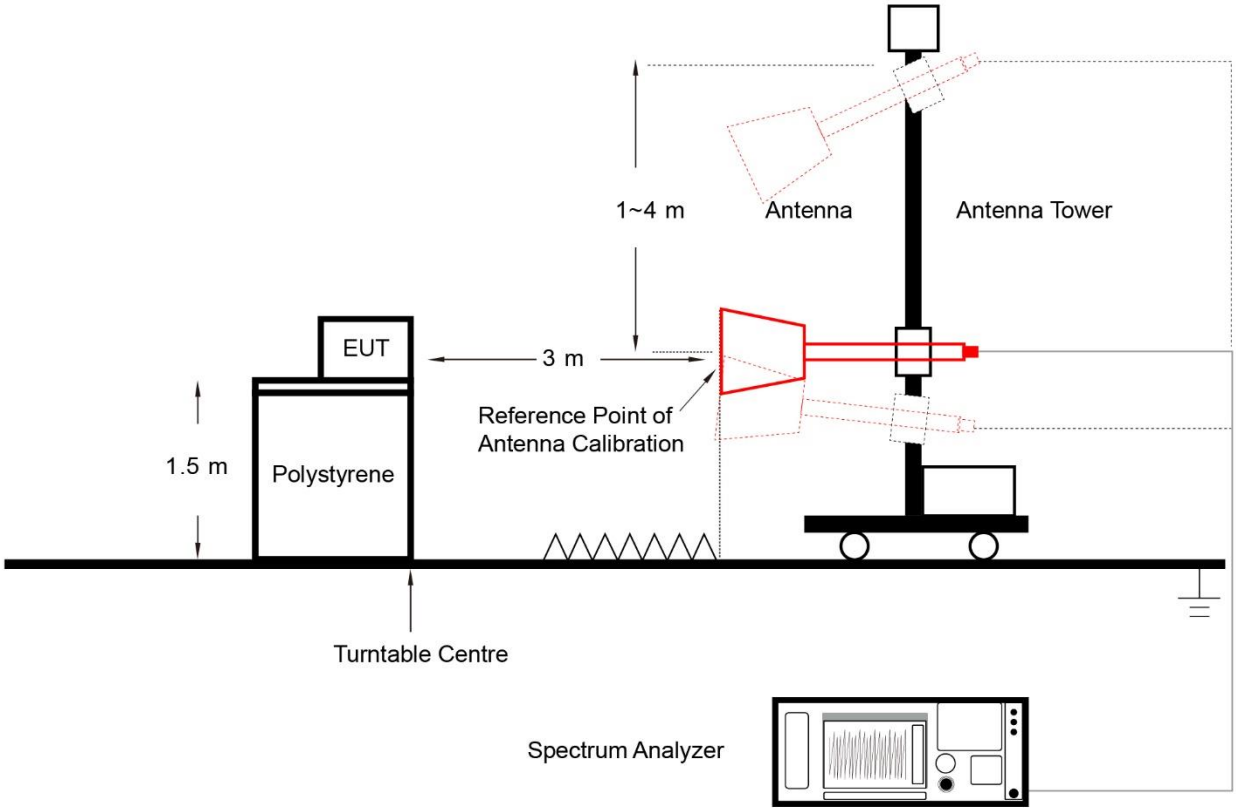
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = Peak
5. Sweep time = Auto couple
6. Trace mode = Max hold
7. Trace was allowed to stabilize

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

   If the EUT duty cycle is < 98%, set VBW ≥ 1/T. T is the minimum transmission duration.
4. Detector = Peak
5. Sweep time = Auto
6. Trace mode = Max hold
7. Trace was allowed to stabilize

6.8.4. Test Setup



6.8.5. Test Result

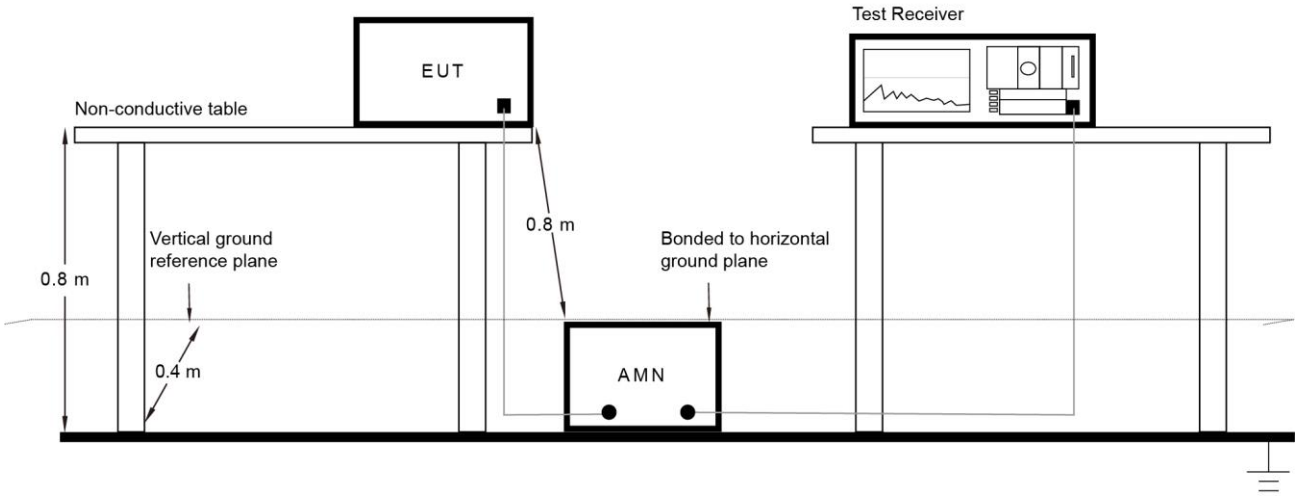
Refer to Appendix A.8.

6.9. AC Conducted Emissions Measurement

6.9.1. Test Limit

FCC Part 15.207 Limits		
Frequency (MHz)	QP (dBμV)	AV (dBμV)
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

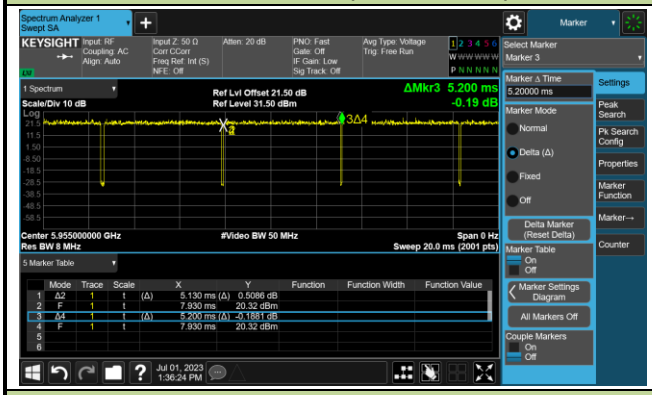
A.1 Duty Cycle Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-07-01~2023-07-03		

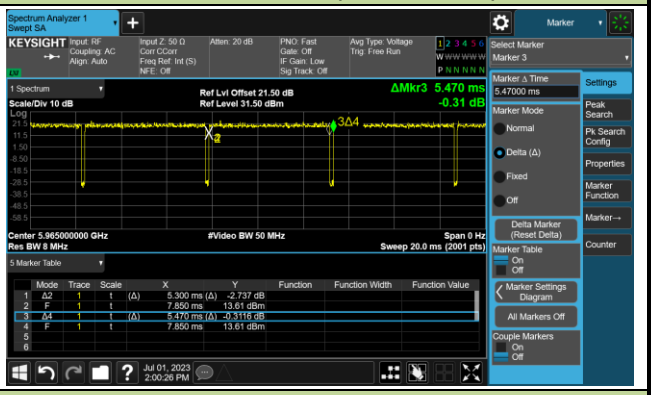
Test Mode	Duty Cycle
802.11ax-HE20	98.65%
802.11ax-HE40	96.89%
802.11ax-HE80	97.46%
802.11ax-HE160	96.75%

Duty Cycle (T = Transmission Duration)

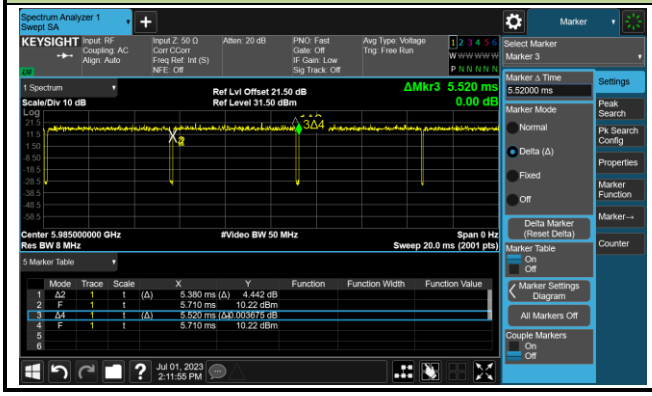
802.11ax-HE20 (T = 5.130ms)



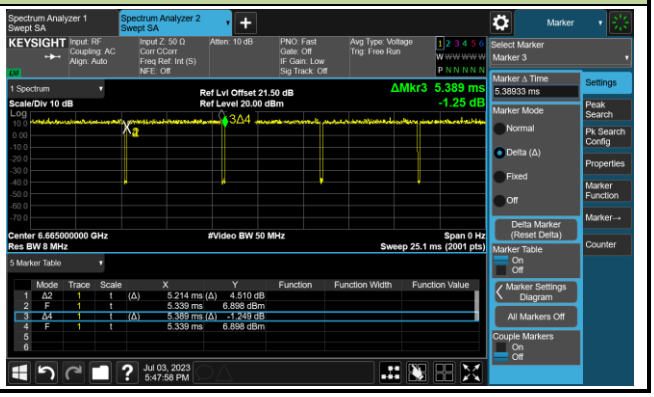
802.11ax-HE40 (T = 5.300ms)



802.11ax-HE80 (T = 5.380ms)



802.11ax-HE160 (T = 5.214ms)



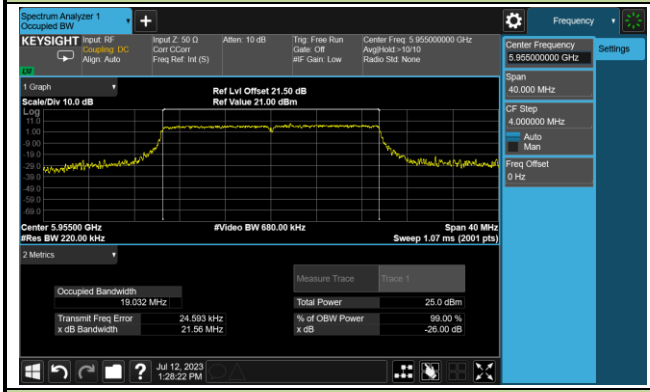
A.2 Channel Bandwidth Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2024-07-12~2024-10-27		

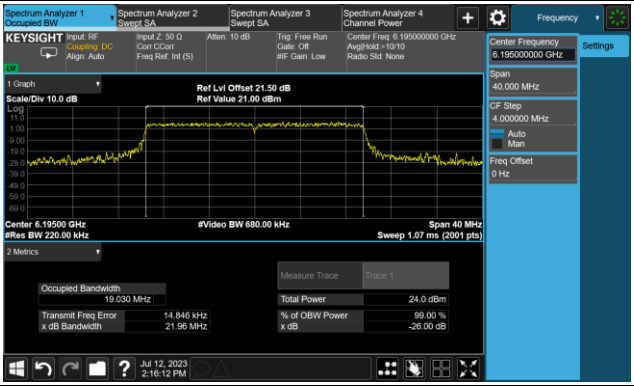
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Test Result
802.11ax-HE20	MCS0	1	5955	21.56	19.032	Pass
802.11ax-HE20	MCS0	49	6195	21.96	19.030	Pass
802.11ax-HE20	MCS0	93	6415	22.08	18.997	Pass
802.11ax-HE20	MCS0	117	6535	22.22	19.018	Pass
802.11ax-HE20	MCS0	153	6715	22.99	18.984	Pass
802.11ax-HE20	MCS0	181	6855	22.33	19.003	Pass
802.11ax-HE40	MCS0	3	5965	43.02	37.881	Pass
802.11ax-HE40	MCS0	51	6205	42.78	37.864	Pass
802.11ax-HE40	MCS0	91	6405	42.36	37.823	Pass
802.11ax-HE40	MCS0	123	6565	43.88	37.907	Pass
802.11ax-HE40	MCS0	147	6685	65.90	38.315	Pass
802.11ax-HE40	MCS0	179	6845	65.56	38.300	Pass
802.11ax-HE80	MCS0	7	5985	84.74	77.349	Pass
802.11ax-HE80	MCS0	55	6225	88.51	77.914	Pass
802.11ax-HE80	MCS0	87	6385	91.39	77.746	Pass
802.11ax-HE80	MCS0	135	6625	107.90	78.030	Pass
802.11ax-HE80	MCS0	151	6705	100.60	77.727	Pass
802.11ax-HE80	MCS0	167	6785	99.16	77.926	Pass
802.11ax-HE160	MCS0	15	6025	170.70	156.64	Pass
802.11ax-HE160	MCS0	47	6185	244.50	157.90	Pass
802.11ax-HE160	MCS0	79	6345	232.70	158.05	Pass
802.11ax-HE160	MCS0	143	6665	240.20	157.70	Pass

802.11ax-HE20 26dB Bandwidth

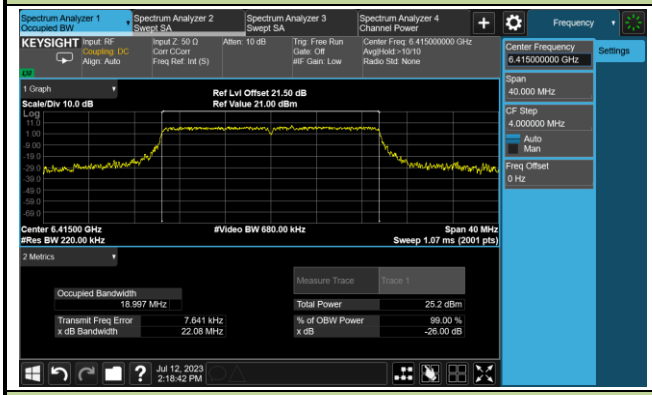
Channel 1 (5955MHz)



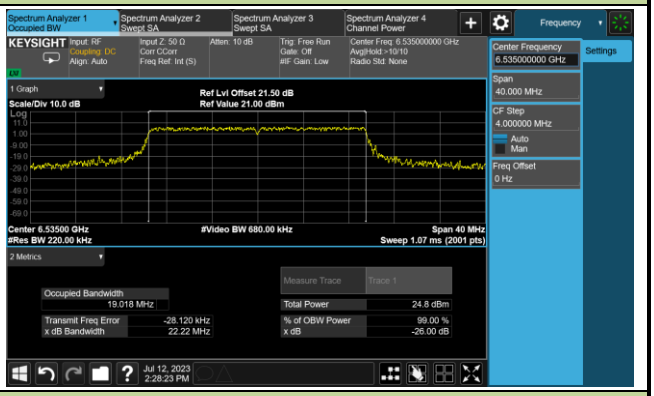
Channel 49 (6195MHz)



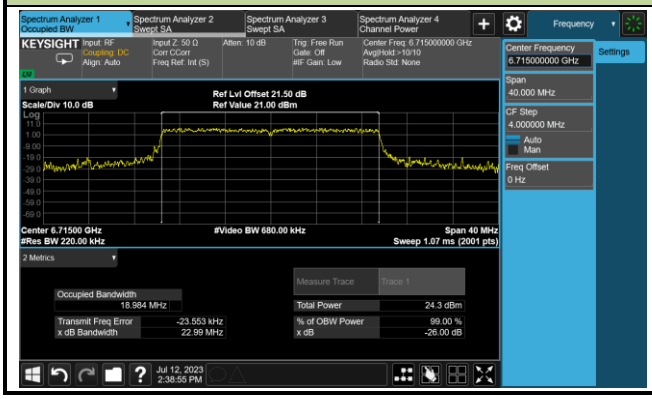
Channel 93 (6415MHz)



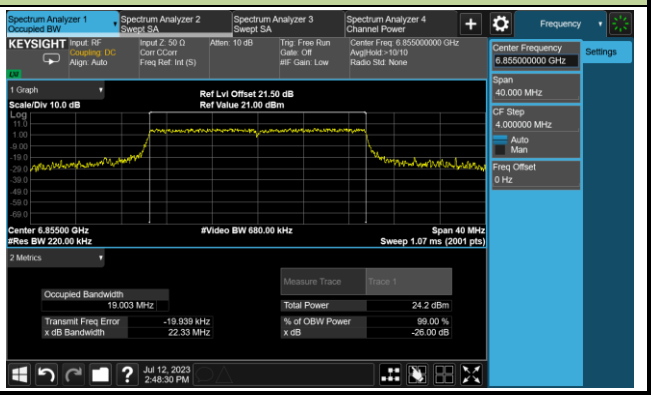
Channel 117 (6535MHz)

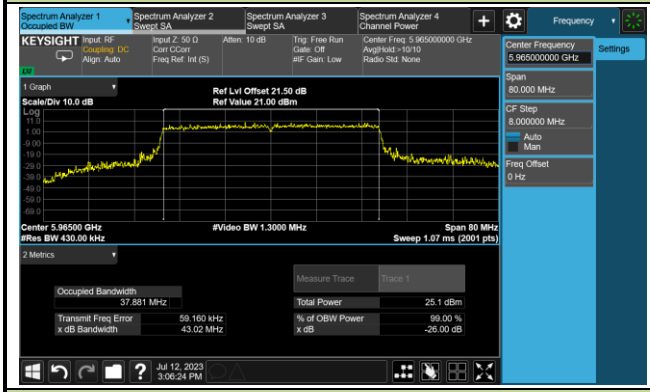
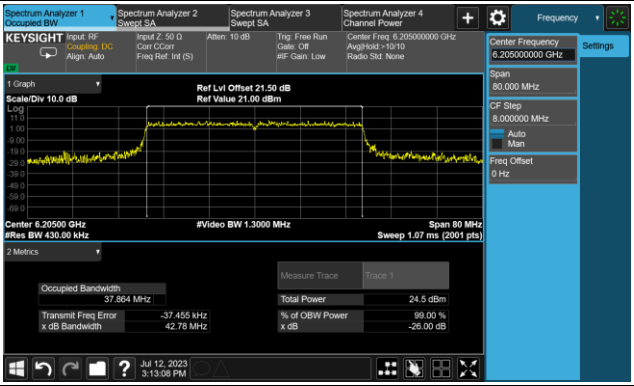
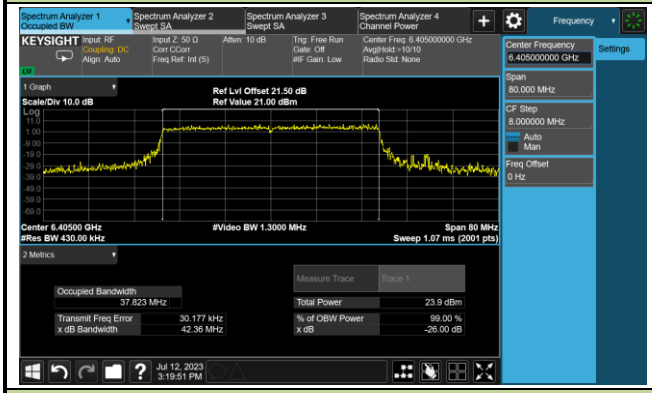
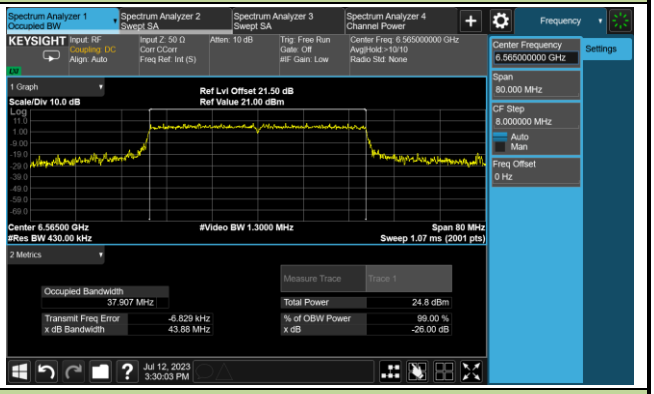
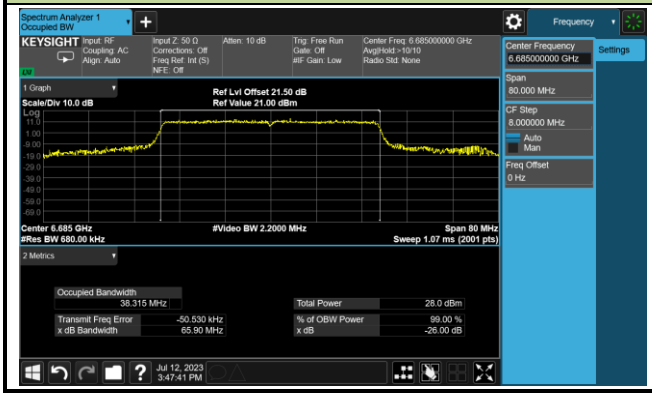
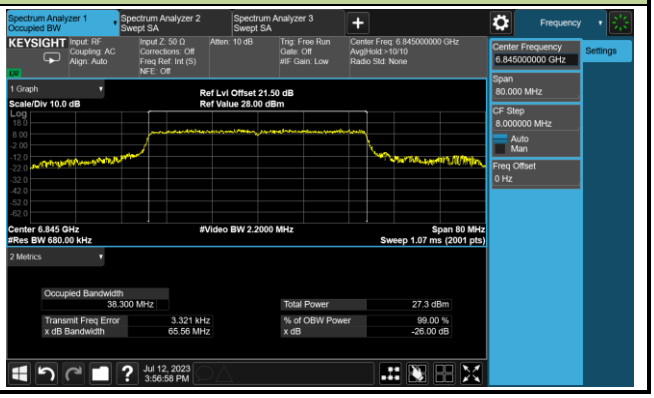


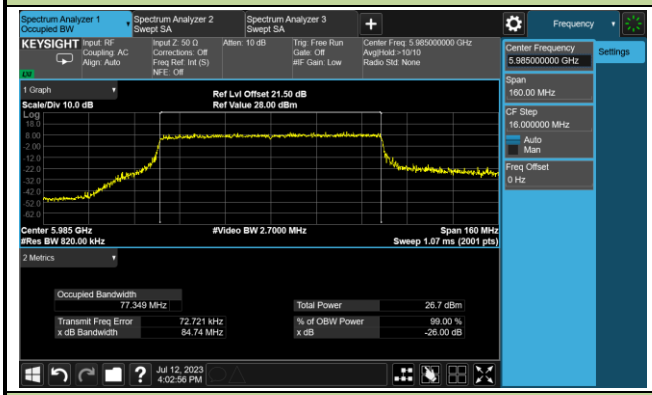
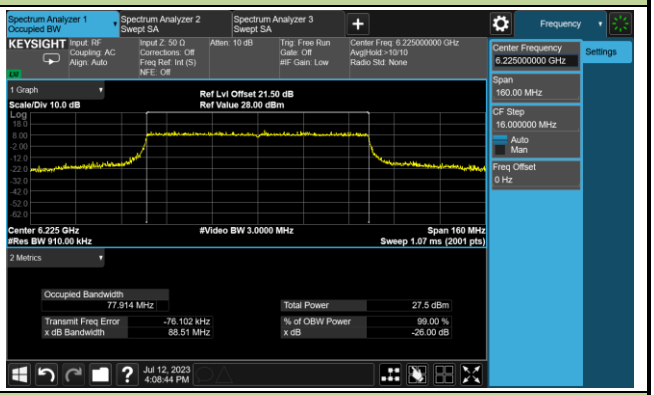
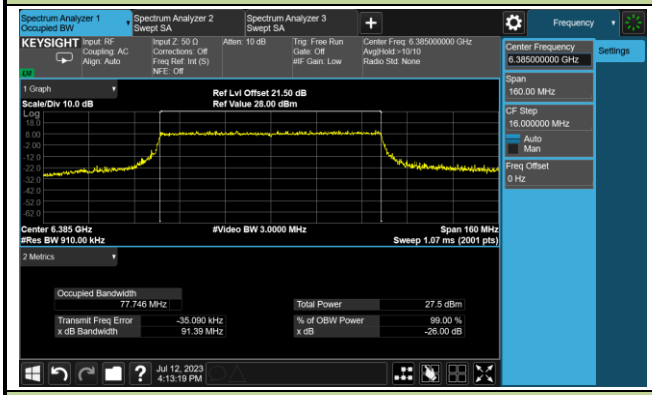
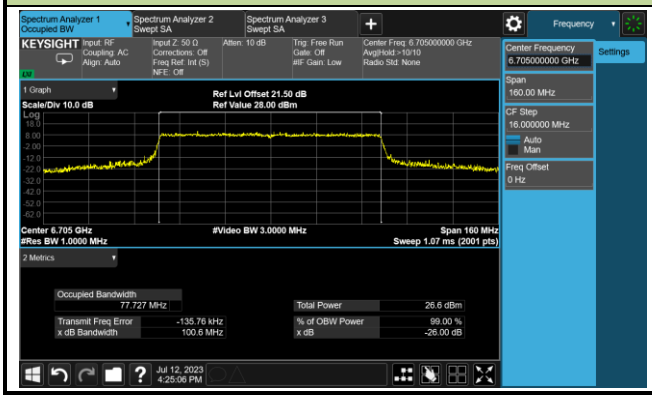
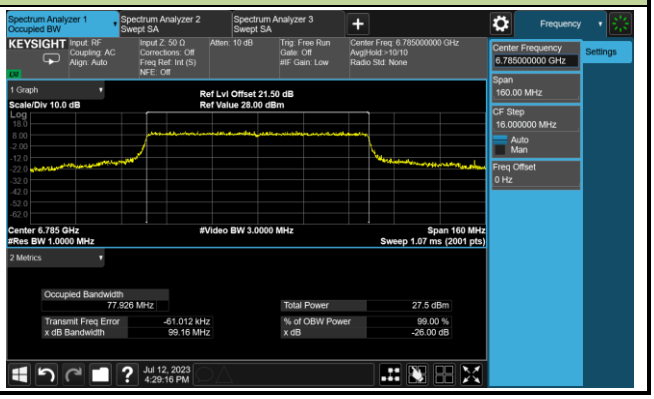
Channel 153 (6715MHz)

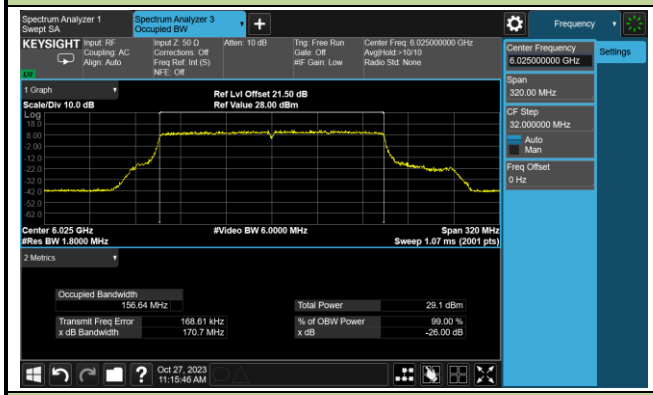
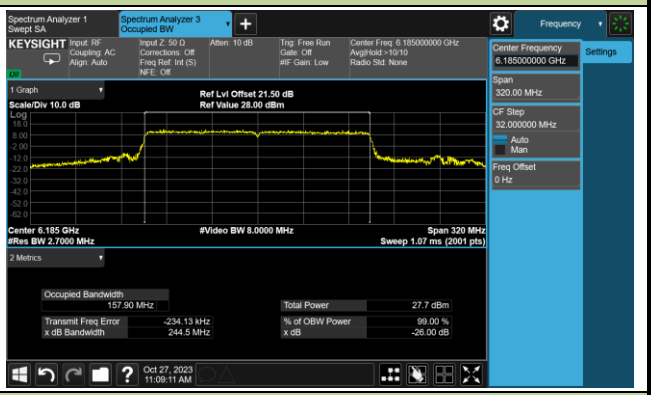
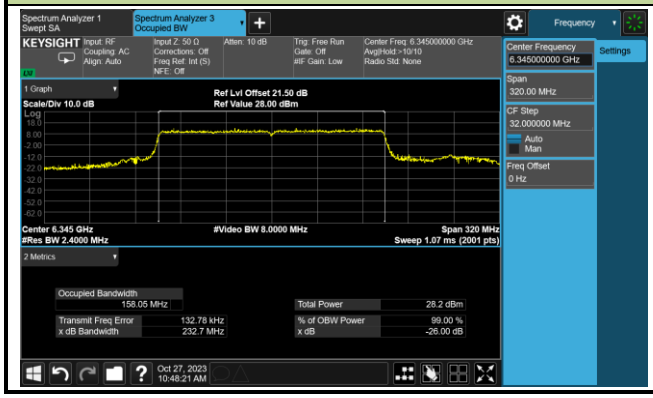
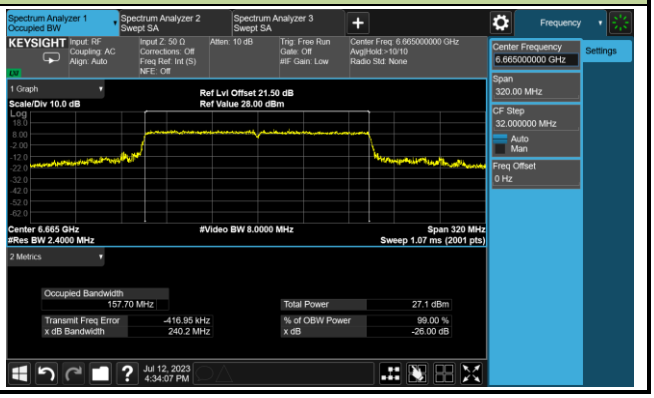


Channel 181 (6855MHz)



802.11ax-HE40 26dB Bandwidth	
Channel 3 (5965MHz)	Channel 51 (6205MHz)
	
Channel 91 (6405MHz)	Channel 123 (6565MHz)
	
Channel 147 (6685MHz)	Channel 179 (6845MHz)
	

802.11ax-HE80 26dB Bandwidth	
Channel 7 (5985MHz)	Channel 55 (6225MHz)
	
Channel 87 (6385MHz)	Channel 135 (6625MHz)
	
Channel 151 (6705MHz)	Channel 167 (6785MHz)
	

802.11ax-HE160 26dB Bandwidth	
Channel 15 (6025MHz)	Channel 47 (6185MHz)
	
Channel 79 (6345MHz)	Channel 143 (6665MHz)
	

A.3 Output Power Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-07-03~2023-10-27		

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Average Power (dBm)		Total Conducted Power (dBm)	EIRP (dBm)	Limit (dBm)
				Ant 0	Ant 1			
802.11ax-HE20	MCS0	1	5955	18.80	18.35	21.59	25.69	≤ 36.00
802.11ax-HE20	MCS0	49	6195	18.55	18.38	21.48	25.58	≤ 36.00
802.11ax-HE20	MCS0	93	6415	18.61	18.16	21.40	25.50	≤ 36.00
802.11ax-HE20	MCS0	117	6535	18.65	18.82	21.75	25.85	≤ 36.00
802.11ax-HE20	MCS0	153	6715	18.78	18.17	21.50	25.60	≤ 36.00
802.11ax-HE20	MCS0	181	6855	18.60	18.42	21.52	25.62	≤ 36.00
802.11ax-HE40	MCS0	3	5965	18.66	17.75	21.24	25.34	≤ 36.00
802.11ax-HE40	MCS0	51	6205	18.79	18.55	21.68	25.78	≤ 36.00
802.11ax-HE40	MCS0	91	6405	18.77	18.06	21.44	25.54	≤ 36.00
802.11ax-HE40	MCS0	123	6565	18.62	18.77	21.71	25.81	≤ 36.00
802.11ax-HE40	MCS0	147	6685	18.79	18.22	21.52	25.62	≤ 36.00
802.11ax-HE40	MCS0	179	6845	18.74	18.77	21.77	25.87	≤ 36.00
802.11ax-HE80	MCS0	7	5985	18.83	18.09	21.49	25.59	≤ 36.00
802.11ax-HE80	MCS0	55	6225	18.62	18.42	21.53	25.63	≤ 36.00
802.11ax-HE80	MCS0	87	6385	18.50	17.99	21.26	25.36	≤ 36.00
802.11ax-HE80	MCS0	135	6625	18.88	18.75	21.83	25.93	≤ 36.00
802.11ax-HE80	MCS0	151	6705	18.68	17.92	21.33	25.43	≤ 36.00
802.11ax-HE80	MCS0	167	6785	18.91	18.22	21.59	25.69	≤ 36.00
802.11ax-HE160	MCS0	15	6025	18.62	18.51	21.58	25.68	≤ 36.00
802.11ax-HE160	MCS0	47	6185	18.40	18.49	21.46	25.56	≤ 36.00
802.11ax-HE160	MCS0	79	6345	18.72	18.50	21.62	25.72	≤ 36.00
802.11ax-HE160	MCS0	143	6665	18.65	17.96	21.33	25.43	≤ 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 (dBm) = Total Average Power (dBm) + Directional Gain for Power (dBi).

A.4 Power Spectral Density Test Result

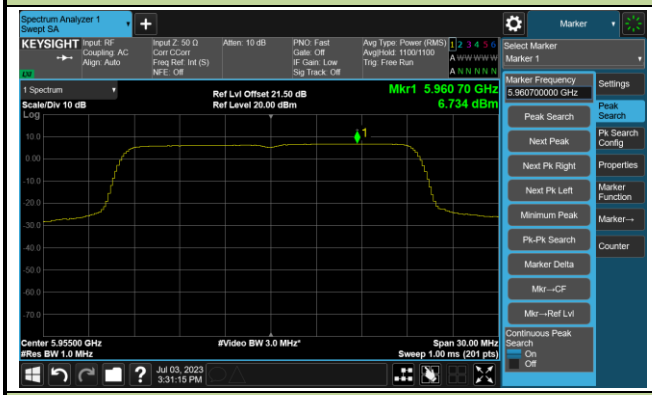
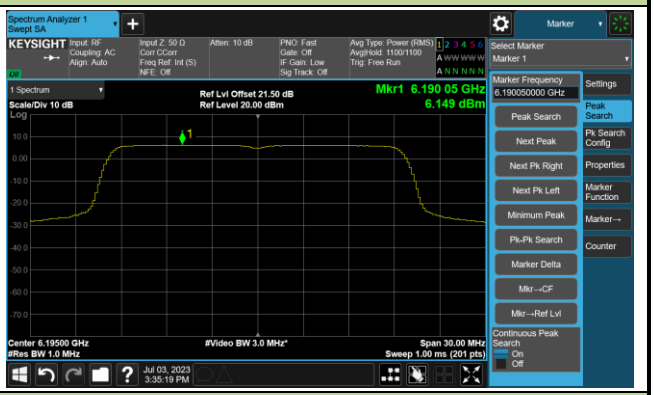
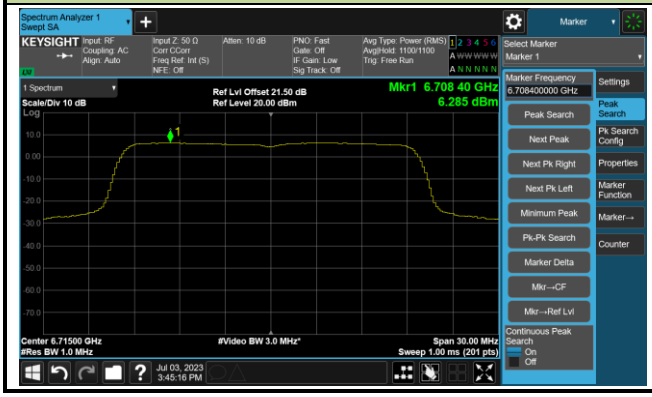
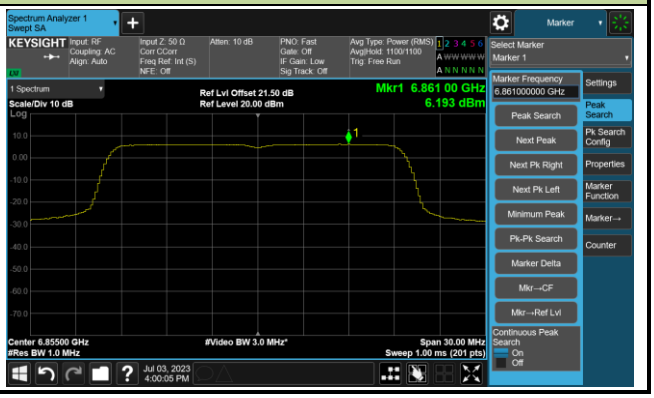
Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-07-03~2023-10-27		

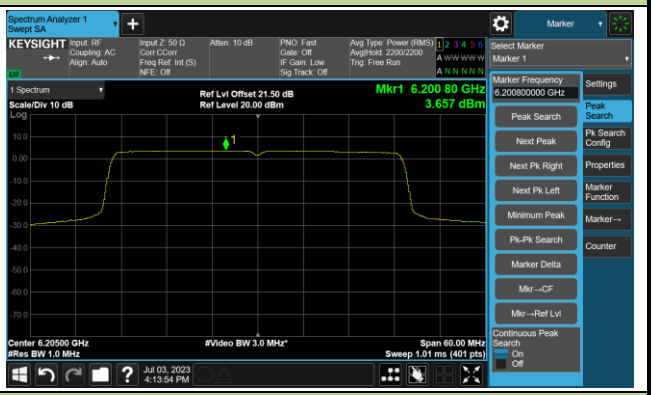
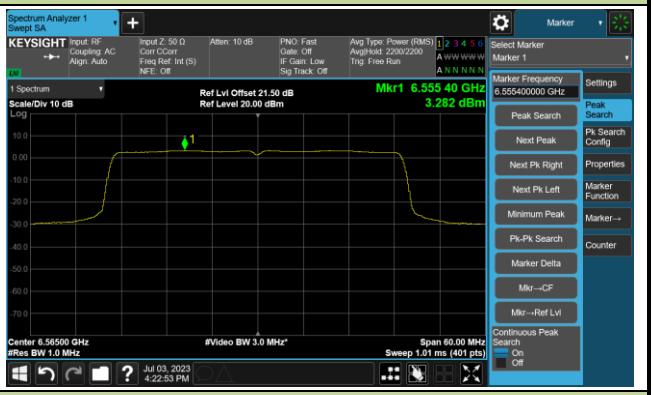
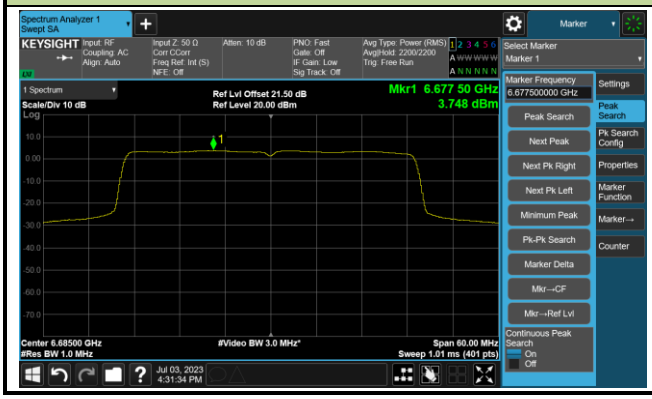
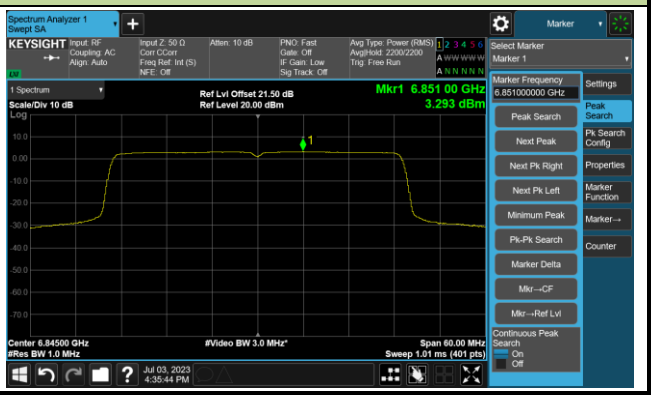
Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	PSD (dBm/MHz)		Duty Cycle (%)	EIRP PSD (dBm/MHz)	Limit (dBm/MHz)
				Ant 0	Ant 1			
802.11ax-HE20	MCS0	1	5955	6.734	6.082	98.65	16.54	≤ 23.00
802.11ax-HE20	MCS0	49	6195	6.149	5.902	98.65	16.15	≤ 23.00
802.11ax-HE20	MCS0	93	6415	6.145	5.784	98.65	16.09	≤ 23.00
802.11ax-HE20	MCS0	117	6535	5.858	6.109	98.65	16.11	≤ 23.00
802.11ax-HE20	MCS0	153	6715	6.285	5.547	98.65	16.05	≤ 23.00
802.11ax-HE20	MCS0	181	6855	6.193	6.123	98.65	16.28	≤ 23.00
802.11ax-HE40	MCS0	3	5965	3.407	2.375	96.89	13.18	≤ 23.00
802.11ax-HE40	MCS0	51	6205	3.657	3.598	96.89	13.89	≤ 23.00
802.11ax-HE40	MCS0	91	6405	3.496	2.927	96.89	13.48	≤ 23.00
802.11ax-HE40	MCS0	123	6565	3.282	3.372	96.89	13.58	≤ 23.00
802.11ax-HE40	MCS0	147	6685	3.748	2.826	96.89	13.57	≤ 23.00
802.11ax-HE40	MCS0	179	6845	3.293	3.354	96.89	13.58	≤ 23.00
802.11ax-HE80	MCS0	7	5985	0.685	-0.302	97.46	10.45	≤ 23.00
802.11ax-HE80	MCS0	55	6225	0.370	0.109	97.46	10.47	≤ 23.00
802.11ax-HE80	MCS0	87	6385	0.306	-0.264	97.46	10.26	≤ 23.00
802.11ax-HE80	MCS0	135	6625	0.424	0.305	97.46	10.60	≤ 23.00
802.11ax-HE80	MCS0	151	6705	0.445	-0.395	97.46	10.28	≤ 23.00
802.11ax-HE80	MCS0	167	6785	0.648	-0.037	97.46	10.55	≤ 23.00
802.11ax-HE160	MCS0	15	6025	-2.171	-2.652	96.75	7.86	≤ 23.00
802.11ax-HE160	MCS0	47	6185	-2.920	-3.147	96.75	7.23	≤ 23.00
802.11ax-HE160	MCS0	79	6345	-2.861	-3.012	96.75	7.33	≤ 23.00
802.11ax-HE160	MCS0	143	6665	-2.631	-3.405	96.75	7.26	≤ 23.00

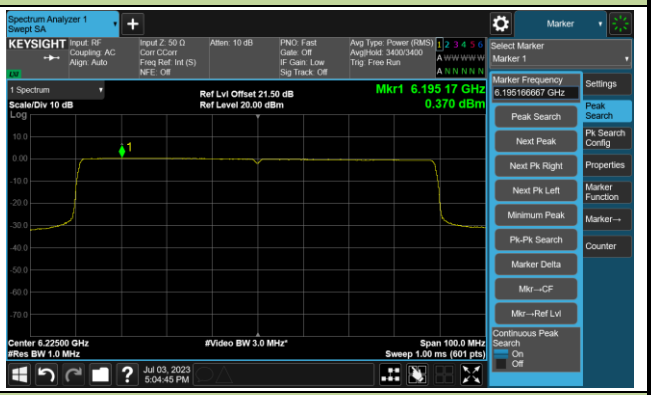
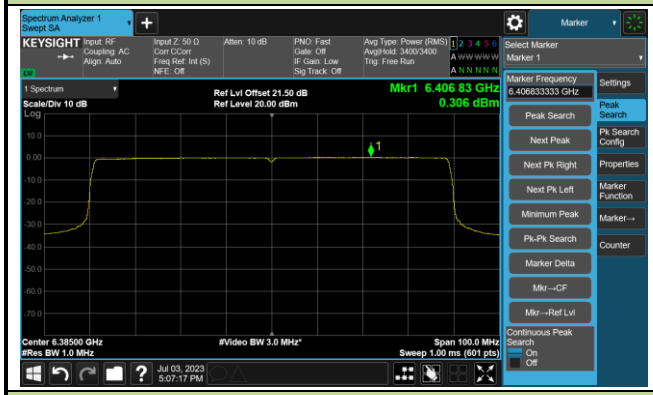
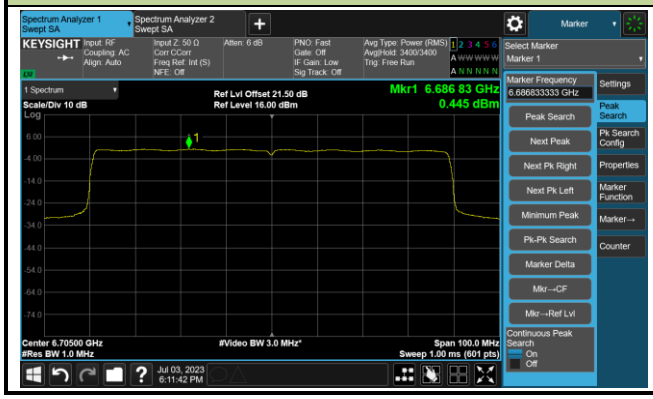
Note:

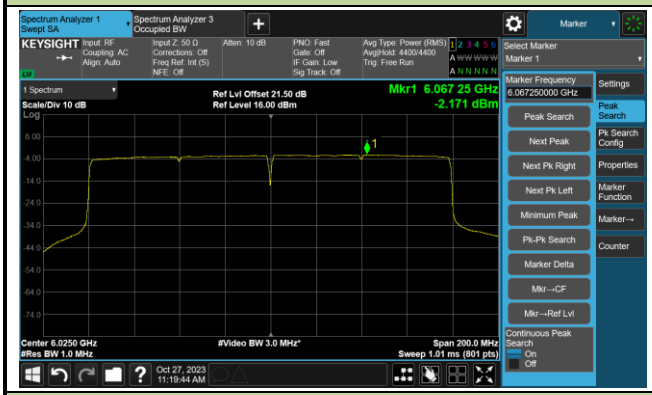
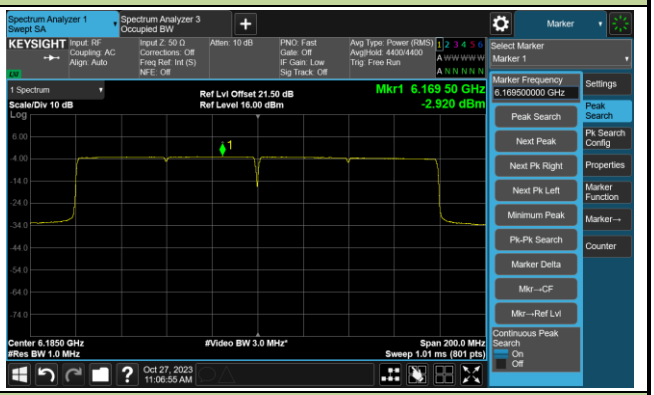
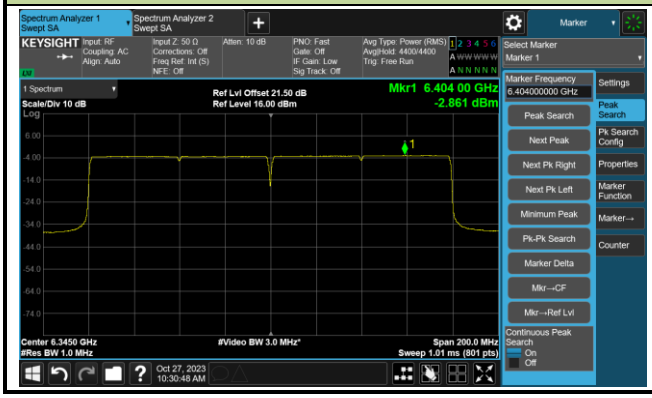
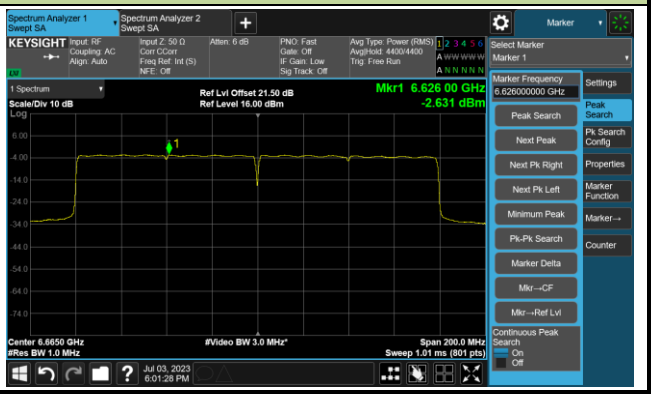
When EUT duty cycle < 98%, EIRP PSD (dBm/MHz) = 10*log {$10^{(\text{Ant 0 PSD}/10)}$ + $10^{(\text{Ant 1 PSD}/10)}$} (dBm/MHz) + 10*log (1/Duty Cycle) + Directional Gain for PSD (dBi).

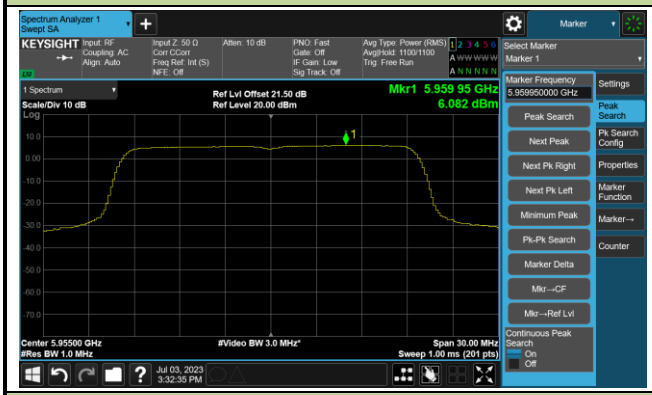
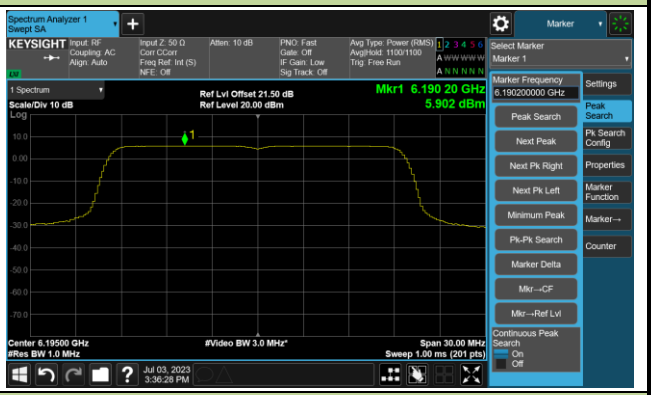
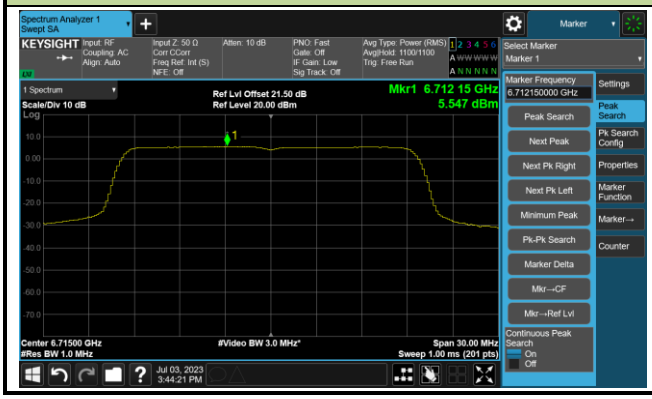
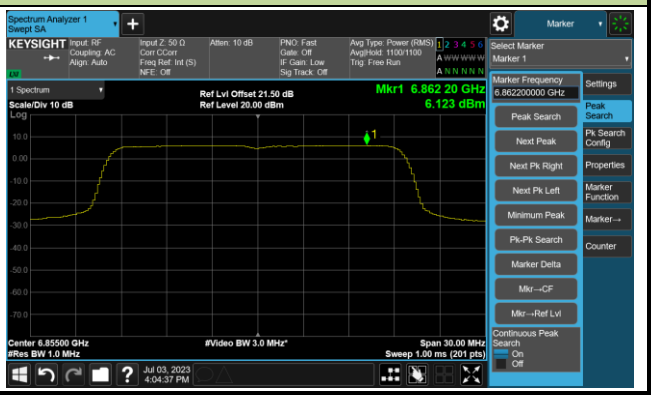
When EUT duty cycle ≥ 98%, EIRP PSD (dBm/MHz) = 10*log {$10^{(\text{Ant 0 PSD}/10)}$ + $10^{(\text{Ant 1 PSD}/10)}$} (dBm/MHz) + Directional Gain for PSD (dBi).

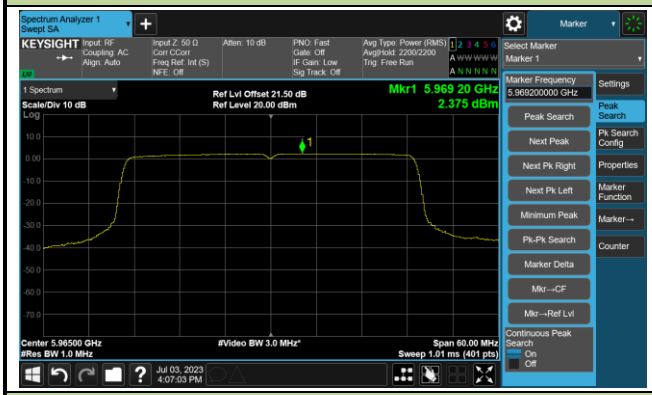
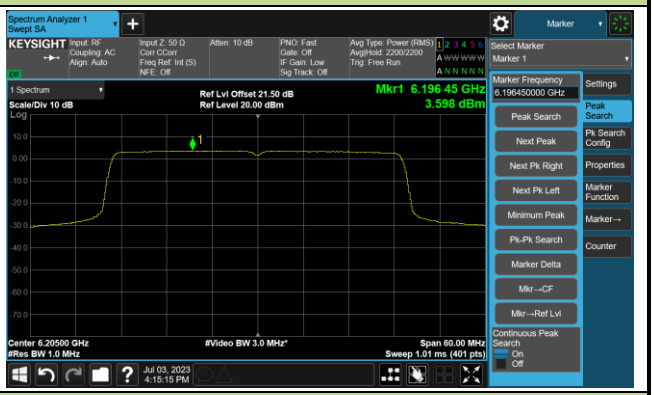
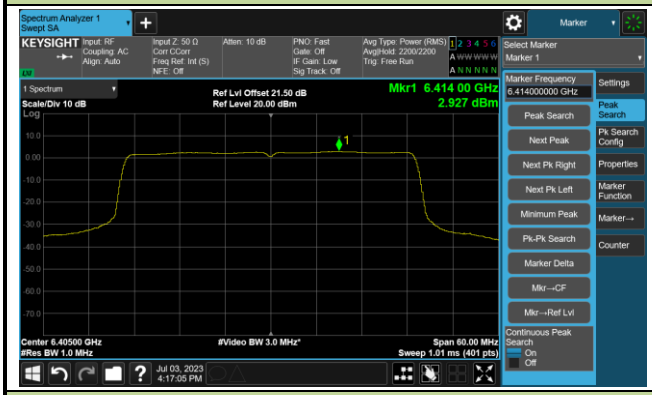
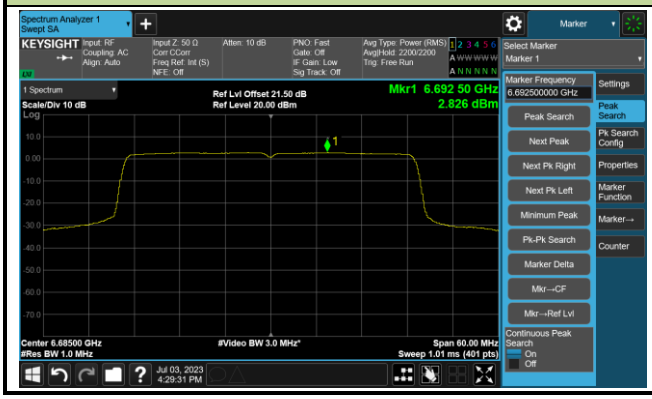
802.11ax-HE20 Power Spectral Density- Ant 0	
Channel 1 (5955MHz)	Channel 49 (6195MHz)
	
Channel 93 (6415MHz)	Channel 117 (6535MHz)
Channel 153 (6715MHz)	Channel 181 (6855MHz)
	

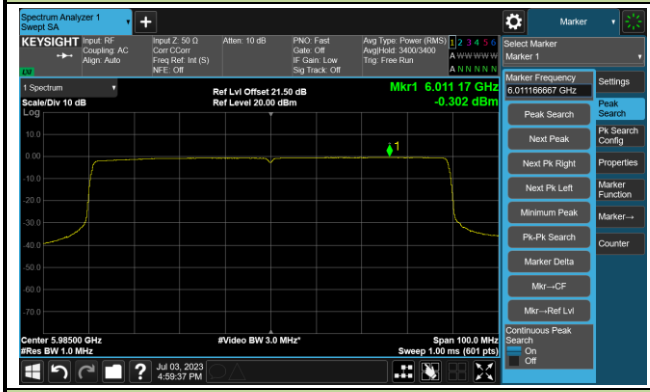
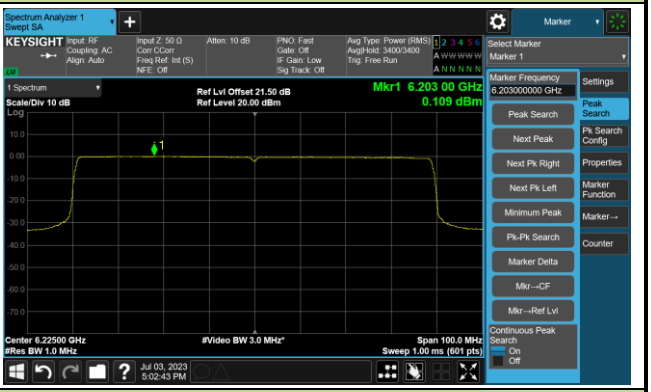
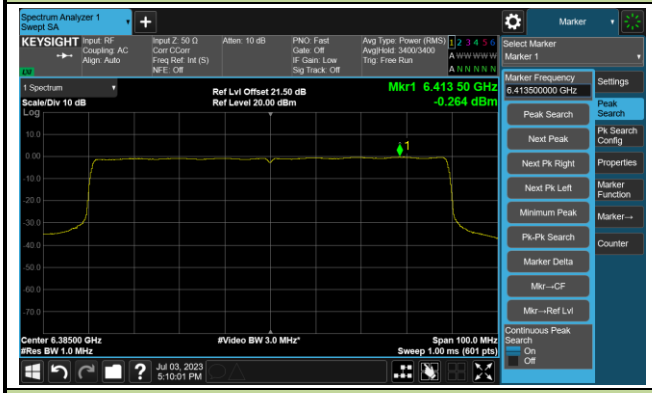
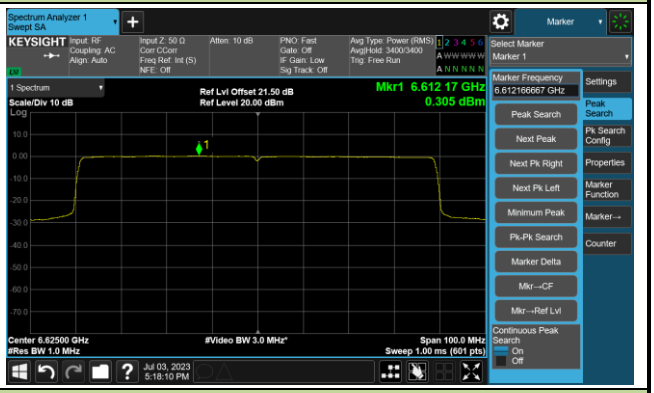
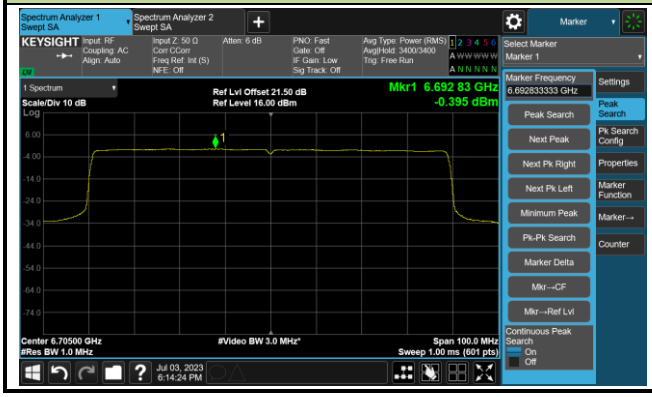
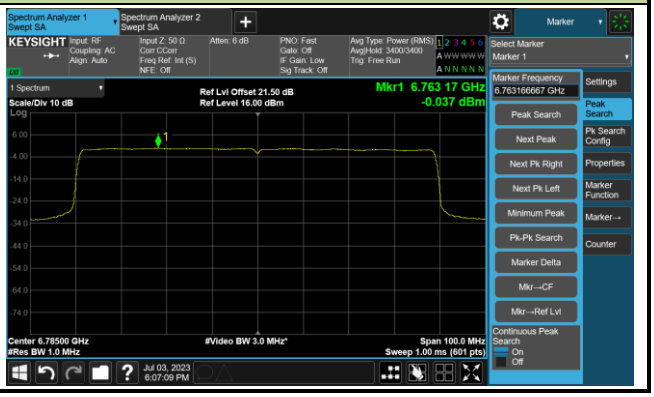
802.11ax-HE40 Power Spectral Density- Ant 0	
Channel 3 (5965MHz)	Channel 51 (6205MHz)
	
Channel 91 (6405MHz)	Channel 123 (6565MHz)
	
Channel 147 (6685MHz)	Channel 179 (6845MHz)
	

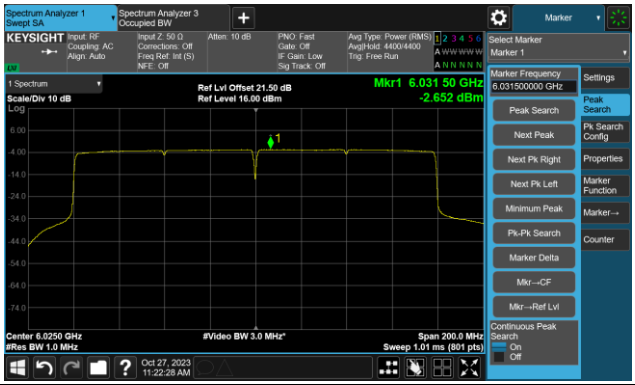
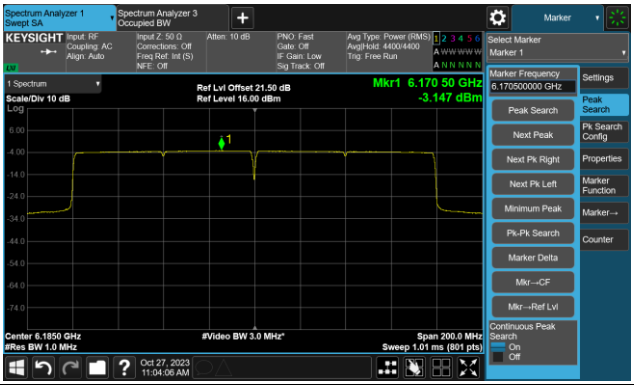
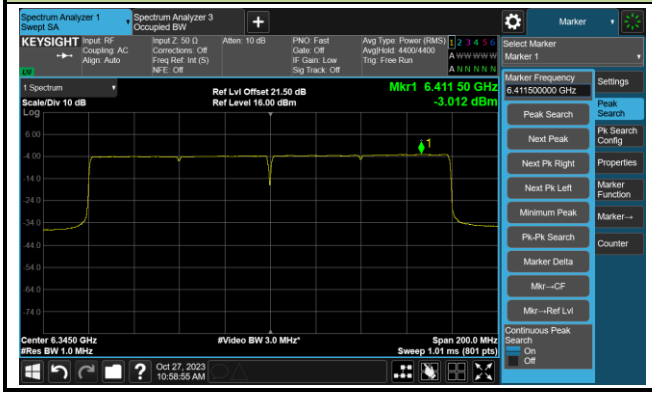
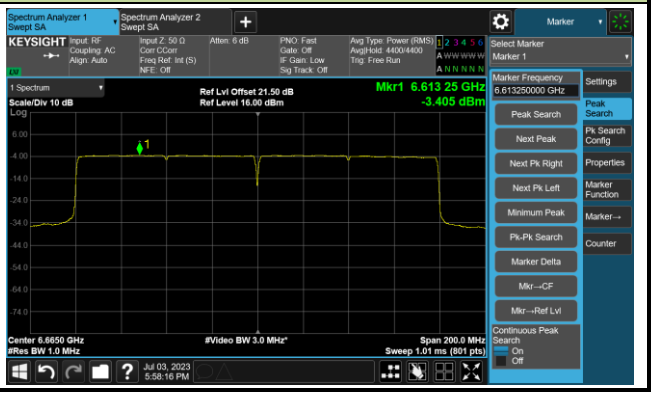
802.11ax-HE80 Power Spectral Density- Ant 0	
Channel 7 (5985MHz)	Channel 55 (6225MHz)
	
Channel 87 (6385MHz)	Channel 135 (6625MHz)
	
Channel 151 (6705MHz)	Channel 167 (6785MHz)
	

802.11ax-HE160 Power Spectral Density- Ant 0	
Channel 15 (6025MHz)	Channel 47 (6185MHz)
	
Channel 79 (6345MHz)	Channel 143 (6665MHz)
	

802.11ax-HE20 Power Spectral Density- Ant 1	
Channel 1 (5955MHz)	Channel 49 (6195MHz)
	
Channel 93 (6415MHz)	Channel 117 (6535MHz)
Channel 153 (6715MHz)	Channel 181 (6855MHz)
	

802.11ax-HE40 Power Spectral Density- Ant 1	
Channel 3 (5965MHz)	Channel 51 (6205MHz)
	
Channel 91 (6405MHz)	Channel 123 (6565MHz)
	
Channel 147 (6685MHz)	Channel 179 (6845MHz)
	

802.11ax-HE80 Power Spectral Density- Ant 1	
Channel 7 (5985MHz)	Channel 55 (6225MHz)
	
Channel 87 (6385MHz)	Channel 135 (6625MHz)
	
Channel 151 (6705MHz)	Channel 167 (6785MHz)
	

802.11ax-HE160 Power Spectral Density- Ant 1	
Channel 15 (6025MHz)	Channel 47 (6185MHz)
	
Channel 79 (6345MHz)	Channel 143 (6665MHz)