RF MEASUREMENT REPORT

FCC ID:	Q9DAPIN0615
Applicant:	Hewlett Packard Enterprise Company
Product:	ACCESS POINT
Model No.:	APIN0615
Trademark:	aruba a Hewlett Packard Enterprise company , Hewlett Packard Enterprise
FCC Classification:	15E 6GHz Low Power Indoor Access Point (6ID)
FCC Rule Part(s):	Part 15 Subpart E (Section 15.407)
Result:	Complies
Test Date:	2021-09-10 ~ 2022-06-12

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 KDB 987594 D02v01. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date	Note
2108RSU088-U2	Rev. 01	Initial Report	06-22-2022	Valid

CONTENTS

1. General Information

1.1. Applicant

Hewlett Packard Enterprise Company

3333 Scott Blvd, Santa Clara, CA 95054, USA

1.2. Manufacturer

Hewlett Packard Enterprise Company

3333 Scott Blvd, Santa Clara, CA 95054, USA

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.	APIN0615
Serial No.	VNMFKZD00S for Akoustic Filter CNMJKZD005 for Sunyear Filter
Software Version	V0.1.12 ArubaOS_70xx_8.11.0.0_83876 for CBP testing
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, GLONASS, Galileo
Operating Temperature	0 ~ 50 °C
Antenna Information	Refer to Section 1.7
Power Type	AC/DC Adapter or PoE input
Operating Environment	Indoor Use
Remark: 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 ~ 7095MHz For 802.11ax-HE40: 5965 ~ 7085MHz For 802.11ax-HE80: 5985 ~ 7025MHz For 802.11ax-HE160: 6025 ~ 6985MHz
Type of Modulation	802.11ax: OFDMA
Data Rate	802.11ax: up to 2402Mbps

1.6. Working Frequencies

802.11ax-HE20

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	5955 MHz	05	5975 MHz	09	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
97	6435 MHz	101	6455 MHz	105	6475 MHz
109	5495 MHz	113	6515 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	185	6875 MHz	189	6895 MHz
193	6915 MHz	197	6935 MHz	201	6955 MHz
205	6975 MHz	209	6995 MHz	213	7015 MHz
217	7035 MHz	221	7055 MHz	225	7075 MHz
229	7095 MHz	--	--	--	--

802.11ax-HE40

Channel	Frequency	Channel	Frequency	Channel	Frequency
03	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
99	6445 MHz	107	6485 MHz	115	6525 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	187	6885 MHz
195	6925 MHz	203	6965 MHz	211	7005 MHz
219	7045 MHz	227	7085 MHz	--	--

802.11ax-HE80

Channel	Frequency	Channel	Frequency	Channel	Frequency
07	5985 MHz	23	6065 MHz	39	6145 MHz
55	6225 MHz	71	6305 MHz	87	6385 MHz
103	6465 MHz	119	6545 MHz	135	6625 MHz
151	6705 MHz	167	6785 MHz	183	6865 MHz
199	6945 MHz	215	7025 MHz	--	--

802.11ax-HE160

Channel	Frequency	Channel	Frequency	Channel	Frequency
15	6025 MHz	47	6185 MHz	79	6345 MHz
111	6505 MHz	143	6665 MHz	175	6825 MHz
207	6985 MHz	--	--	--	--

1.7. Antenna Details

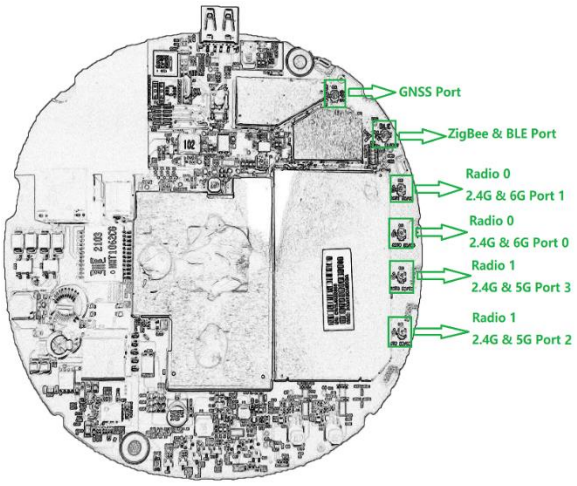
Antenna Type	Frequency Band (GHz)	Max Peak Gain (dBi)	CDD Directional Gain (dBi)		BF Directional Gain (dBi)
			For Power	For PSD	
Wi-Fi Internal Antenna (2*2 MIMO)					
PIFA	5.9 ~ 7.2	3.5	3.5	6.4	6.4

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. The antenna gain and directional gain refer to the manufacturer’s antenna specification.

1.8. Description of Operating Paths

Frequency Band (GHz)	Radio 0	Radio 1
2.4 ~ 2.5	Y	Y
5.15 ~ 5.9	N	Y
5.9 ~ 7.2	Y	N



Note:

1, Both 2.4GHz radios can't operate at the same time.

2, The device has three path combinations.

a, Radio 0# 2.4GHz and Radio 1# 5GHz (Full Band, 5150-5895MHz)

b, Radio 0# 6GHz and Radio 1# 2.4GHz

c, Radio 0# 6GHz and Radio 1# 5GHz (Partial Band, 5150-5850MHz)

3, For Radio 0# 6GHz path and Radio 1# 5GHz path C, there are two types of filter configurations, Akoustic and Sunyear.

2. Test Configuration

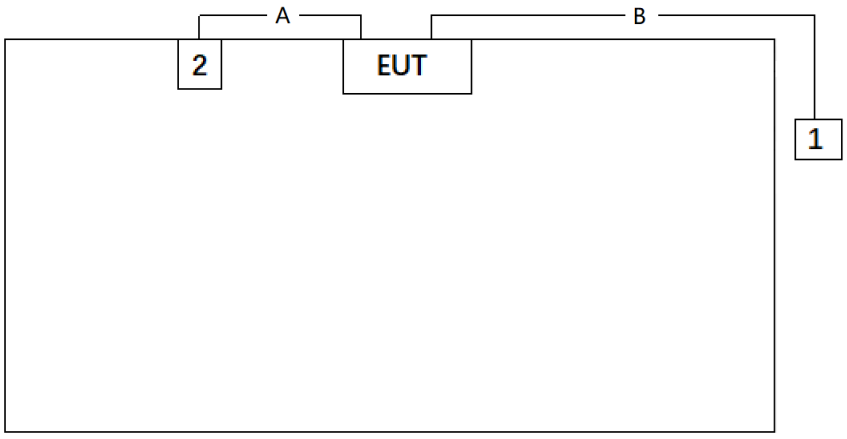
2.1. Test Mode

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

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.

Connection Diagram - Radiated Emission testing & AC Conducted Emissions



No.	Cable Type	Cable Spec.	Length
A	Power Cable	non-Shielding	1.2m
B	LAN Cable	Cat. 5e, non-Shielding	> 10.0m
No.	**Product**	**Manufacturer**	**Model No.**
1	Notebook	Lenovo	E495
2	AC Adapter	aruba	DB-48A12

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

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:

- ANSI C63.10-2013
- FCC KDB 789033 D02v02r01
- FCC KDB 987594 D02v01r01
- FCC KDB 987594 D03 U-NII 6GHz Q&A v01
- FCC KDB 662911 D01v02r01
- FCC KDB 414788 D01v01r01
- FCC KDB 412172 D01v01r01

2.4. Test Environment Condition

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

3. Antenna Requirements

Excerpt from §15.407(a)(9) of the FCC Rules/Regulations:

Access points operating under the provisions of paragraphs (a)(5) and (a)(6) of this section must employ a permanently attached integrated antenna.

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

Conclusion:

The device complies with the requirement of §15.407(a)(9).

4. Measuring Instrument

No.	Instrument	Manufacturer	Model No.	Asset No.	Last Cali. Date	Cali. Due Date	Test Site
1	EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2022-12-29	SIP-AC3
2	Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06598	1 year	2022-11-09	SIP-AC3
3	Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2022-10-11	SIP-AC3
4	Horn Antenna	R&S	HF907	MRTSUE06611	1 year	2022-09-12	SIP-AC3
5	Thermohygrometer	testo	608-H1	MRTSUE06619	1 year	2022-11-02	SIP-AC3
6	Thermohygrometer	testo	608-H1	MRTSUE06622	1 year	2022-11-28	SIP-AC3
7	Preamplifier	EMCI	EMC012645SE	MRTSUE06642	1 year	2023-01-13	SIP-AC3
8	TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06646	1 year	2022-08-26	SIP-AC3
9	Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2022-12-23	SIP-AC3
10	Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2023-03-14	SIP-AC3
11	Signal Analyzer	Keysight	N9010B	MRTSUE07028	1 year	2022-12-09	SIP-AC3
12	Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2022-08-08	SIP-TR1
13	USB Power Sensor	Keysight	U2021XA	MRTSUE06595	1 year	2022-09-07	SIP-TR1
14	Temperature Chamber	BAOYT	BYG-408CS	MRTSUE06847	1 year	2023-02-22	SIP-TR1
15	Thermohygrometer	testo	Testo 608-H1	MRTSUE11022	1 year	2022-11-02	SIP-TR1
16	Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2023-06-01	SIP-SR2
17	EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2023-06-01	SIP-SR2
18	Four-Line V-Network	R&S	ENV432	MRTSUE06614	1 year	2022-10-10	SIP-SR2
19	Thermohygrometer	testo	608-H1	MRTSUE06621	1 year	2022-11-28	SIP-SR2
20	Shielding Room	MIX-BEP	SIP-SR2	MRTSUE06949	N/A	N/A	SIP-SR2
21	Directional Coupler	narda	4226-10	MRTSUE06564	1 year	2022-10-11	SIP
22	Attenuator	MVE	MVE2213	MRTSUE11060	1 year	2023-06-09	SIP
23	Attenuator	MVE	MVE2213	MRTSUE11061	1 year	2023-06-09	SIP

Software	Version	Function
e3	9.160520a	EMI Test Software
Controller_MF 7802BS	1.02	RE Antenna & turntable
Agilent Power Analyzer	V R03.09.00	Power Test Software

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 measurement uncertainty levels have been estimated for tests performed on the apparatus. 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: 3.74dB 150kHz~30MHz: 3.44dB
Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Horizontal: 30MHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~40GHz: 6.40dB Vertical: 30MHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.15dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%

6. Test Result

6.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
15.407(a)	26dB Bandwidth	Conducted	Pass
15.407(a)(5)	Maximum Equivalent Isotopically Radiated Power (E.I.R.P)	Radiated	Pass
15.407(a)(5)	Peak Power Spectral Density (E.I.R.P)		Pass
15.407(b)(7)	In-Band Emission	Conducted	Pass
15.407(d)(6)	Contention-Based Protocol	Conducted	Pass
15.407(b)(6)	Unwanted Emissions	Radiated	Pass
15.407(b)(8), (9)	General Field Strength (Restricted Bands and Radiated Emission)		Pass
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	Pass

Remark:

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. Output power test was verified over all data rates of each mode (data refers to operational description), and then choose the maximum power output (low data rate) for final test of each channel.
3. 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.
4. EUT supports one configuration only in 802.11ax full RU mode.
5. For radio 0# 6GHz, this path has two filter configurations (Akoustic and Sunyear) and RF output power is within the tolerance of the device for the same setting. We choose Akoustic filter to perform all RF testing and choose Sunyear filter to perform partial testing (Output power & Power Density & In-Band Emission & Radiated spurious emission).
6. For “26dB Bandwidth Measurement” and “In-Band Emission” test item, only the worst port was performed in the report.

6.2. 26dB Bandwidth Measurement

6.2.1. Test Limit

N/A

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

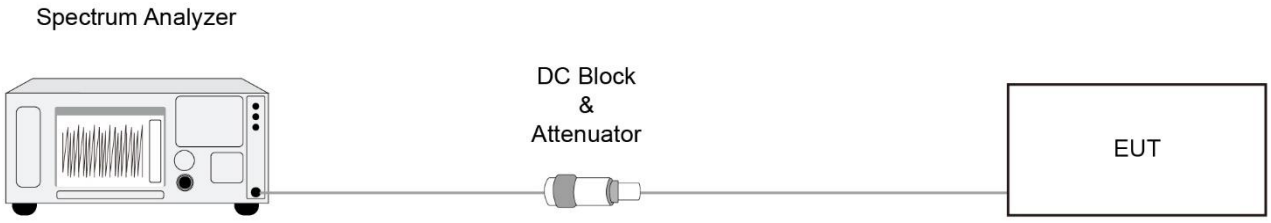
26dB Bandwidth

1. The analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediated power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth.
3. VBW ≥ 3×RBW.
4. Detector = Peak.
5. Trace mode = max hold.
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. 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. 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 an indoor access point operating in the 5.925-7.125 GHz band, the maximum e.i.r.p. over the frequency band of operation must not exceed 30 dBm.

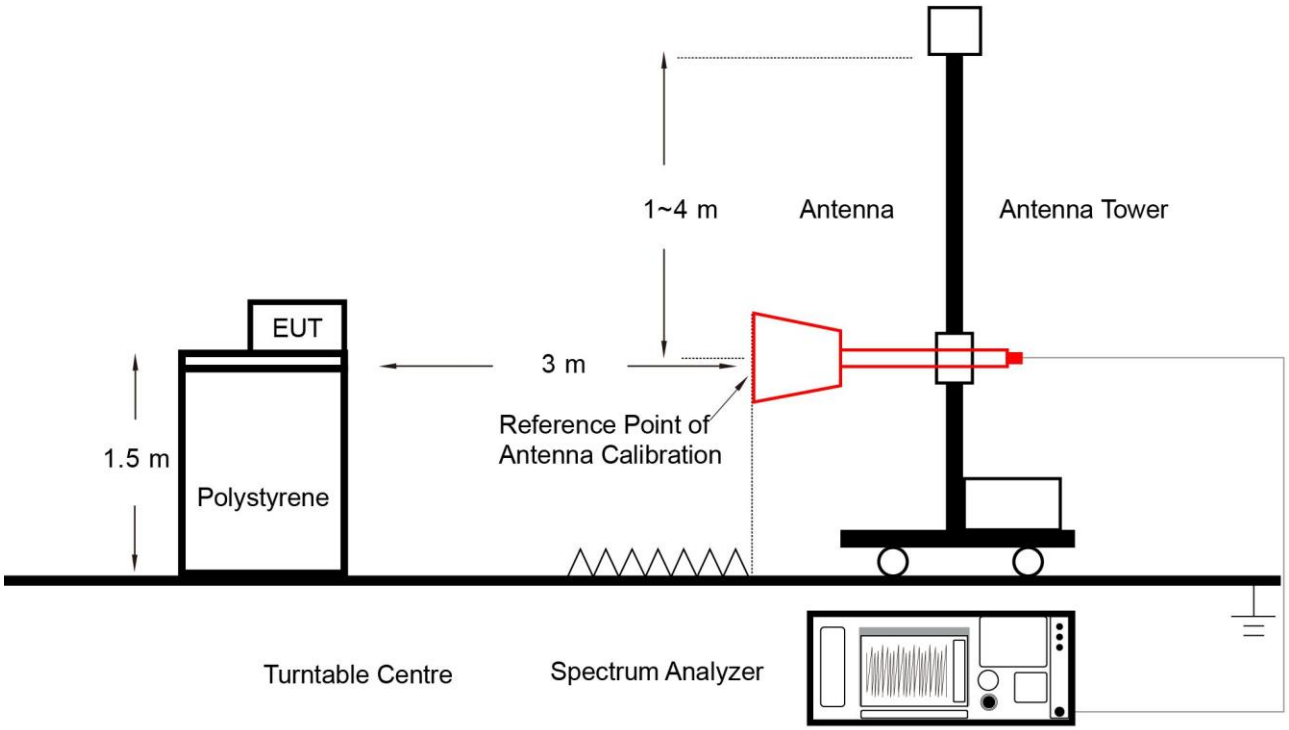
6.3.2. Test Procedure

KDB 789033D02v02r01- Section E)2)d) Method SA-2

6.3.3. Test Setting

1. Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal
2. Set RBW = 1 MHz
3. Set VBW ≥ 3 MHz
4. Number of points in sweep ≥ 2 × span / RBW
5. Sweep time = auto
6. Detector = power averaging (rms)
7. Allow the sweep to “free run”
8. 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.
9. Use the Channel Power function of the instrument.
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

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 an indoor access point operating in the 5.925-7.125 GHz band, the maximum power spectral density must not exceed 5 dBm e.i.r.p. in any 1-megahertz band.

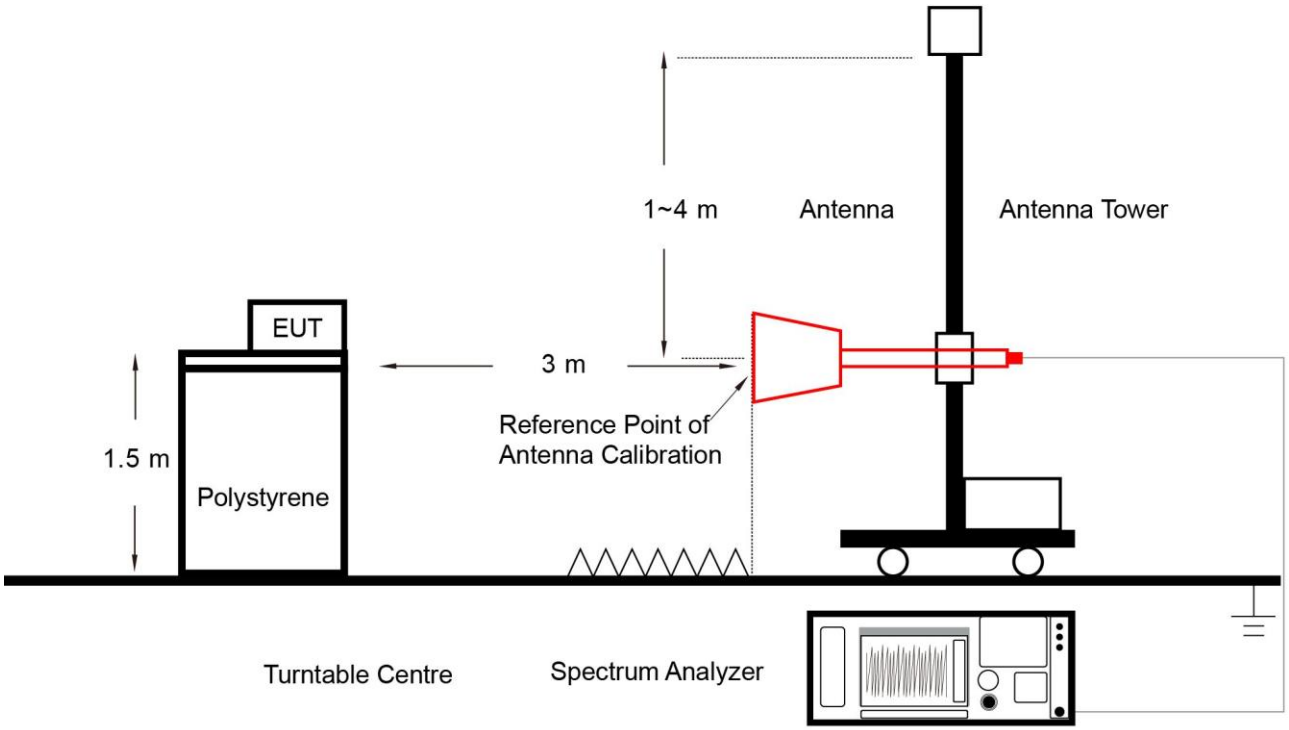
6.4.2. Test Procedure

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. 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.

6.4.4. 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 J

6.5.3. Test Setting

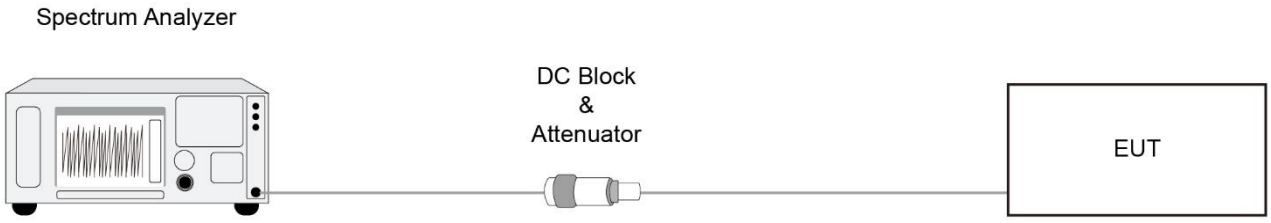
Emissions Mask Reference Level Measurement

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:

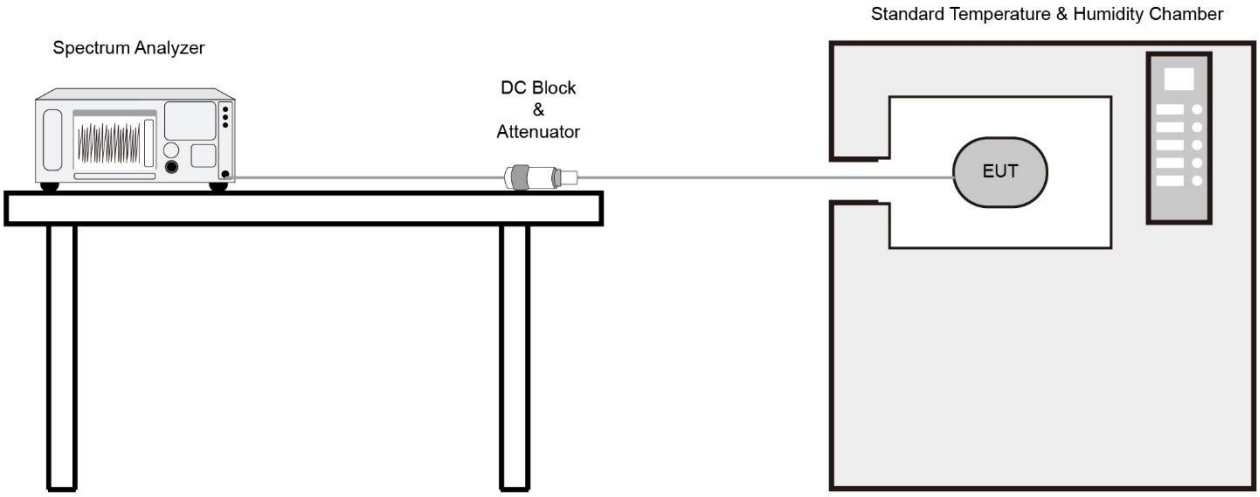
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain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

6.6.3. Test Setup



6.6.4. Test Result

Refer to Appendix A.6.

6.7. Contention Based Protocol Measurement

6.7.1. Test Limit

Unlicensed indoor low power device must detect co-channel radio frequency power that is at least -62dBm (The threshold is referenced to a 0dBi antenna gain.) or low.

Indoor low power device must detect an AWGN signal with 90% (or better) level of certainty.

6.7.2. Test Procedure

KDB 987594 D02v01- Section I

6.7.3. Test Setting

1. Configure the EUT to transmit with a constant duty cycle.

2. Set the operating parameters of the EUT including power level, operating frequency, modulation and bandwidth.

3. Set the signal analyzer center frequency to the nominal EUT channel center frequency. The span range of the signal analyzer shall be between two times and five times the OBW of the EUT.

Connect the output port of the EUT to the signal analyzer. Ensure that the attenuator provides enough attenuation to not overload the signal analyzer receiver.

4. Monitoring the signal analyzer, verify the EUT is operating and transmitting with the parameters set at step two.

5. Using an AWGN signal source, generate a 10 MHz-wide AWGN signal. Use Table 1 of KDB 987594 to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency. PS. Use three separate 10 MHz AWGN signals when testing a 160 MHz channel.

6. Set the AWGN signal power to an extremely low level. Connect the AWGN signal source, via a 3-dB splitter, to the signal analyzer and the EUT as shown in below figure.

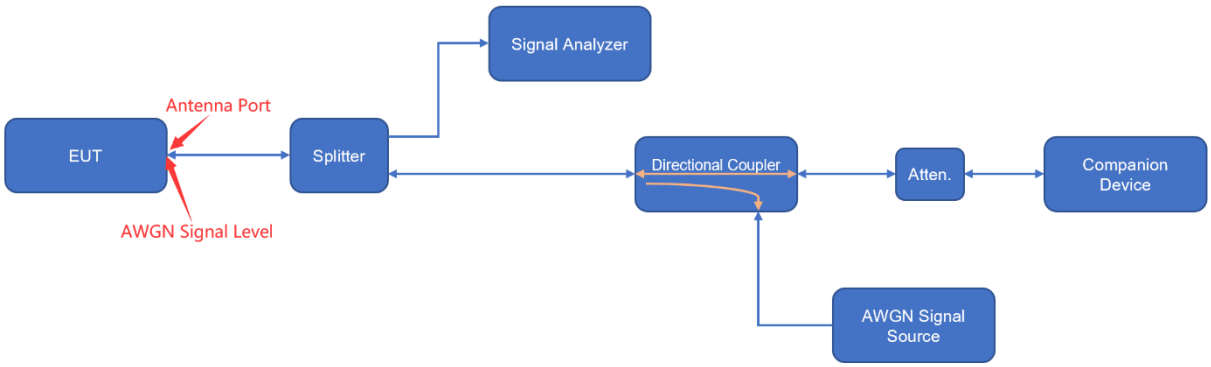
7. Transmit the AWGN signal (RF ON) and verify its characteristics on the signal analyzer.

8. Monitor the signal analyzer to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.

9. Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.

10. Refer to Table 1 to determine number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step 5, choose a different center frequency for the AWGN signal and repeat the process.

6.7.4. Test Setup



6.7.5. Test Result

Refer to Appendix A.7.

6.8. Radiated Spurious Emission Measurement

6.8.1. 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 [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 II)G)

6.8.3. 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.

802.11ax-HE20	VBW = 680Hz	802.11ax-HE80	VBW = 2700Hz
802.11ax-HE40	VBW = 1300Hz	802.11 ax-HE160	VBW = 4300Hz

4. Detector = Peak

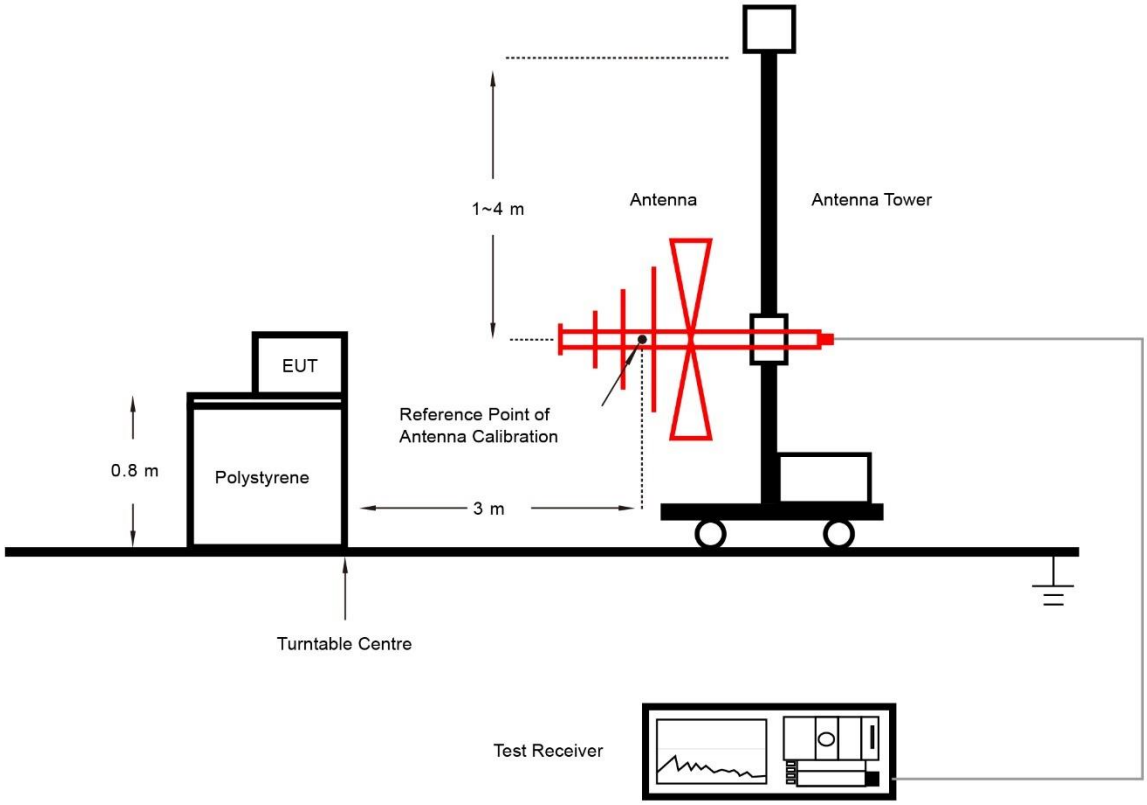
5. Sweep time = auto

6. Trace mode = max hold

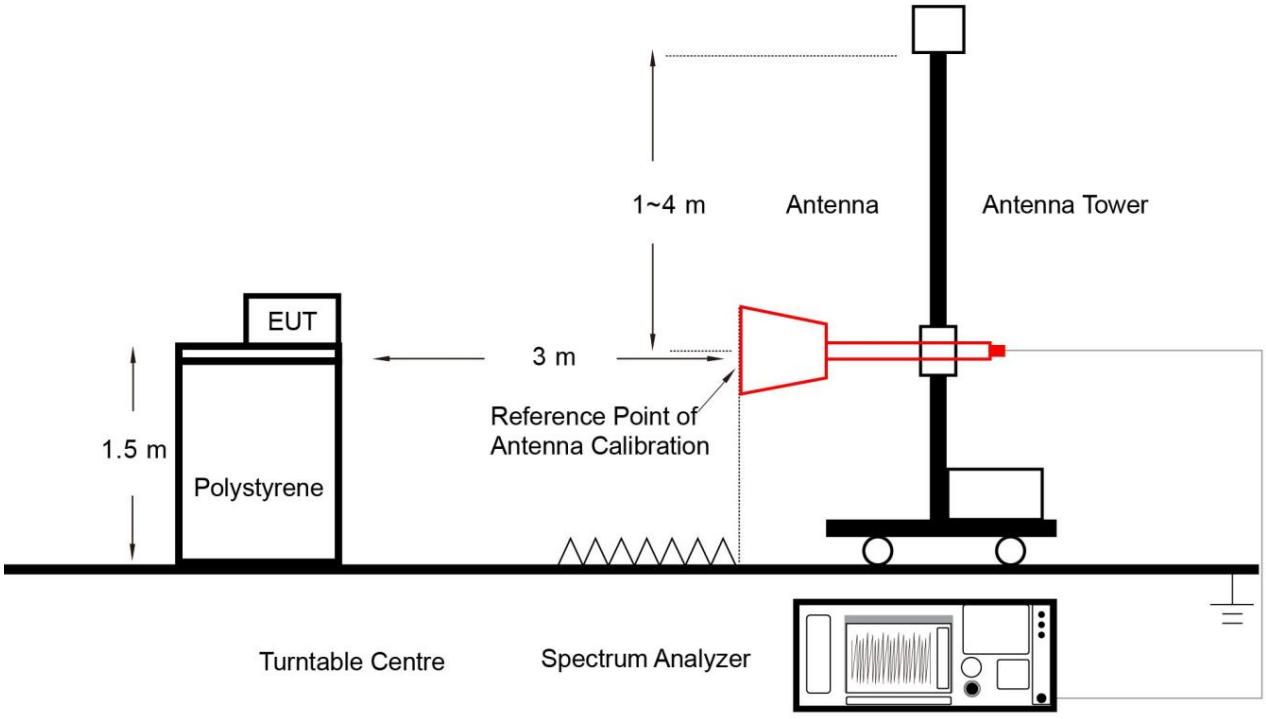
7. Trace was allowed to stabilize

6.8.4. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.8.5. Test Result

Refer to Appendix A.8.

6.9. Radiated Restricted Band Edge Measurement

6.9.1. 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)(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 - 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.

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

6.9.2. Test Procedure

KDB 789033 D02v02r01-Section II)G)

6.9.3. 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

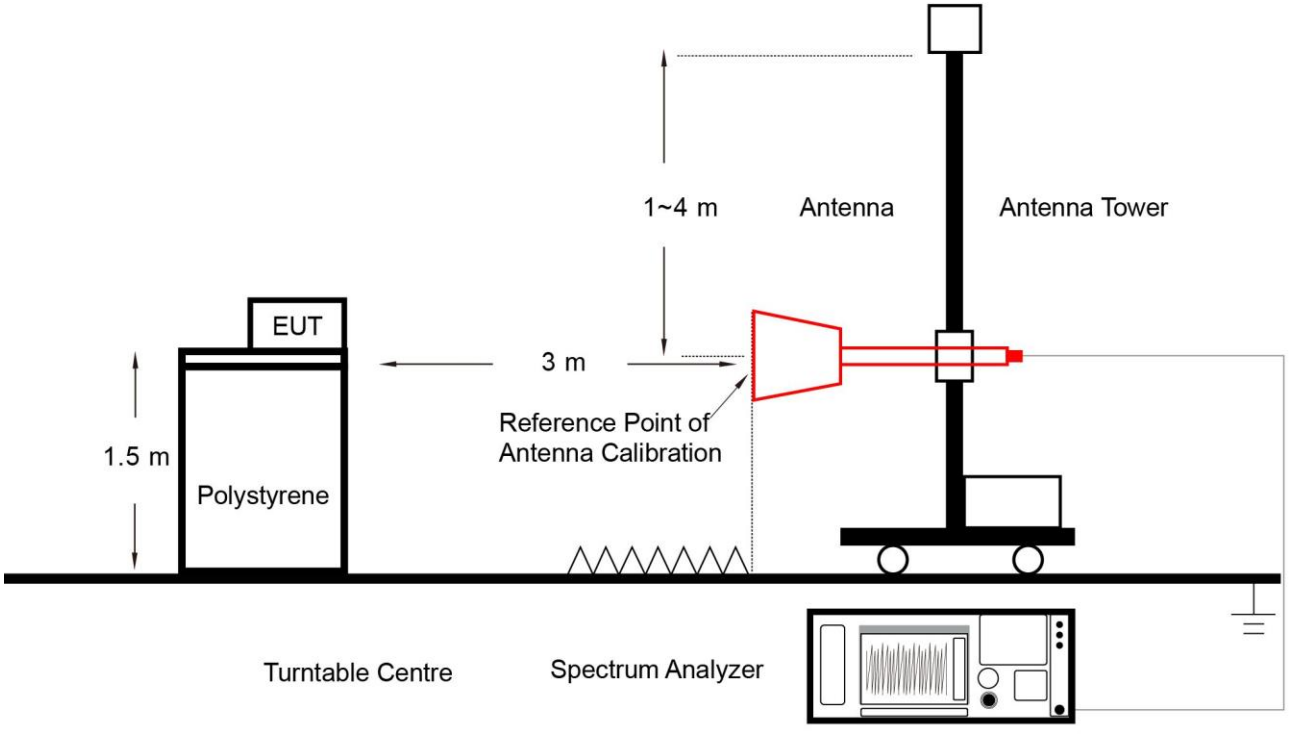
Average Measurements above 1GHz (Method VB)

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

802.11ax-HE20	VBW = 680Hz	802.11ax-HE80	VBW = 2700Hz
802.11ax-HE40	VBW = 1300Hz	802.11 ax-HE160	VBW = 4300Hz

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

6.9.4. Test Setup



6.9.5. Test Result

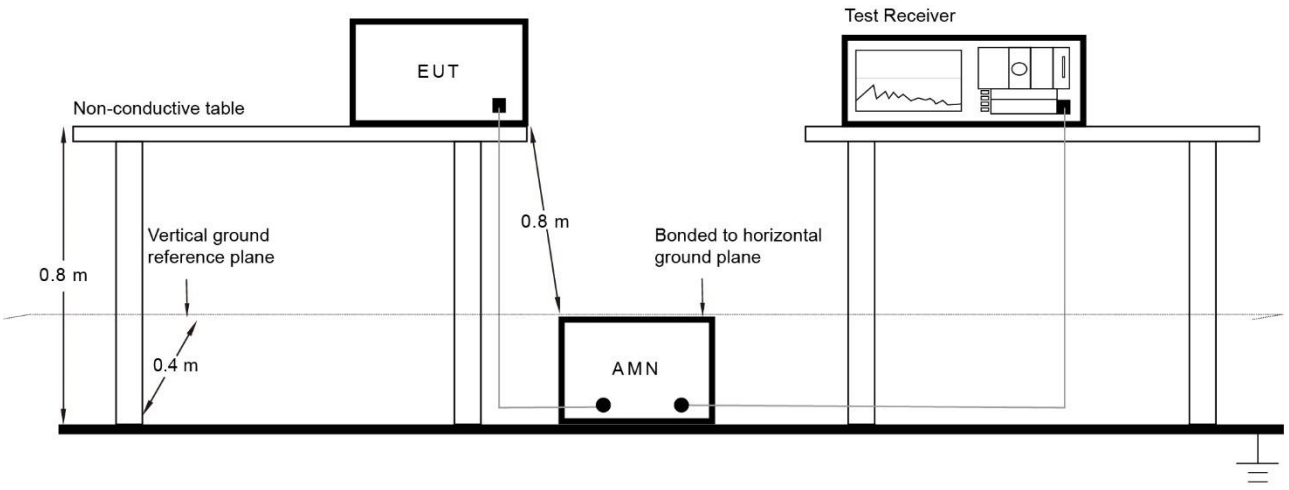
Refer to Appendix A.9.

6.10. AC Conducted Emissions Measurement

6.10.1. 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.		

6.10.2. Test Setup



6.10.3. Test Result

Refer to Appendix A.10.

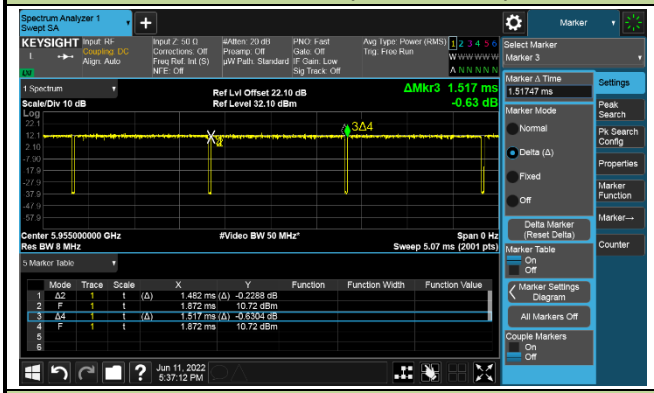
Appendix A - Test Result

A.1 Duty Cycle Test Result

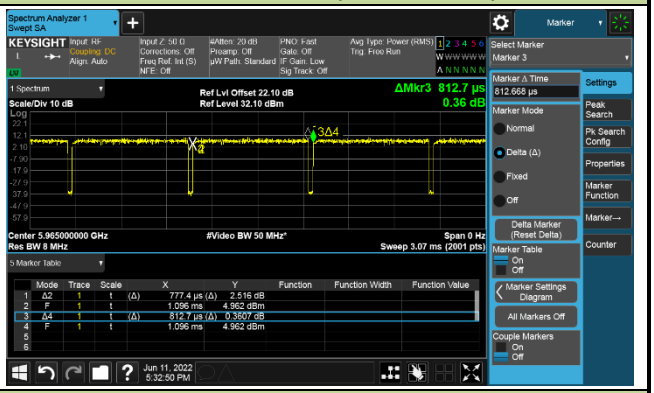
Test Mode	Duty Cycle	
	N_{SS}=1	N_{SS}=2
802.11ax-HE20	97.69%	95.86%
802.11ax-HE40	95.66%	92.29%
802.11ax-HE80	92.29%	88.14%
802.11ax-HE160	88.04%	82.81%

Duty Cycle _ N_{SS}=1 (T = Transmission Duration)

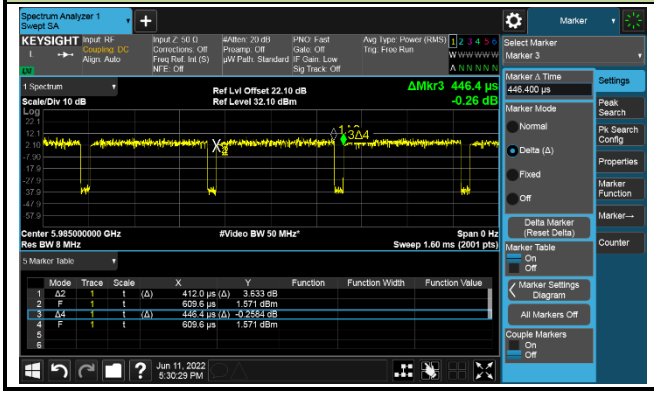
802.11ax-HE20 (T = 1.482ms)



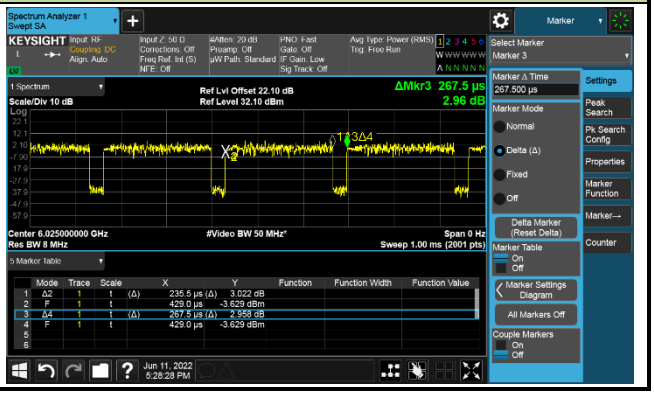
802.11ax-HE40 (T = 0.777ms)

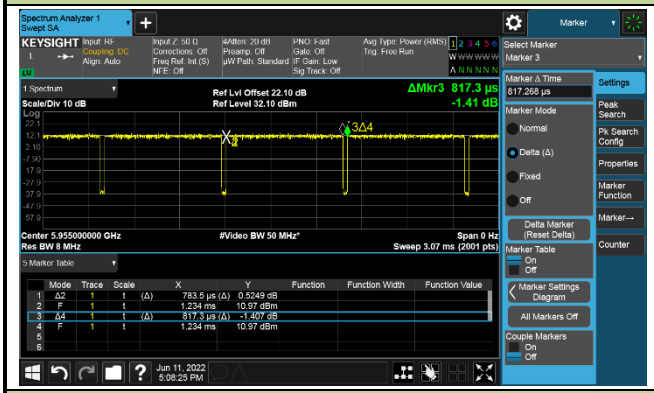
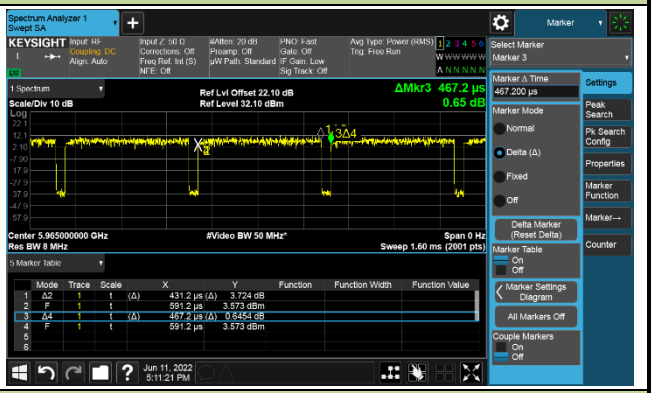
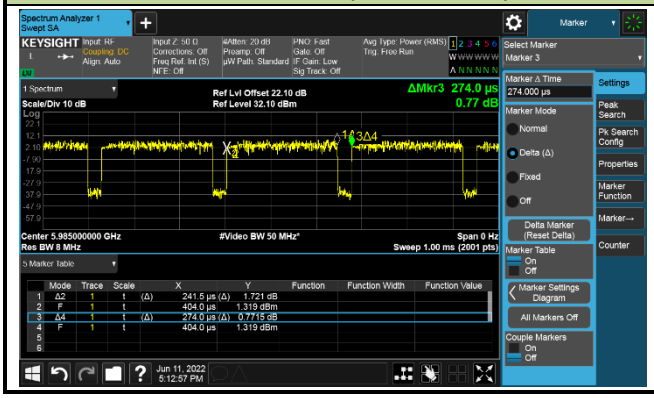
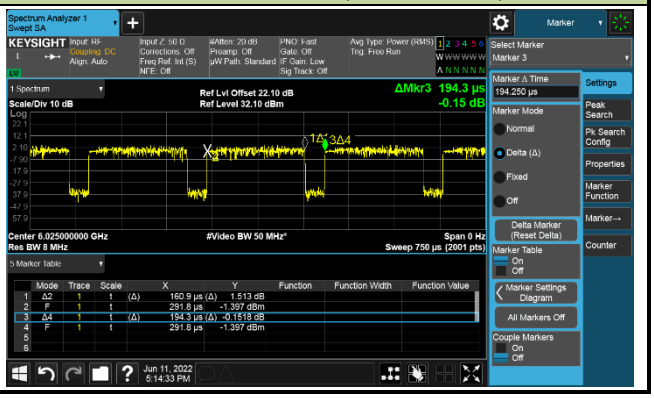


802.11ax-HE80 (T = 0.412ms)



802.11ax-HE160 (T = 0.236ms)



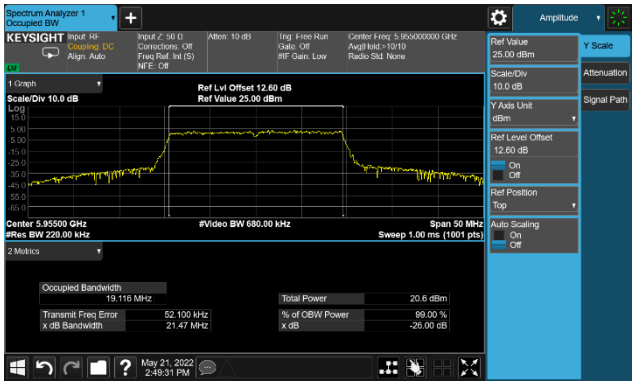
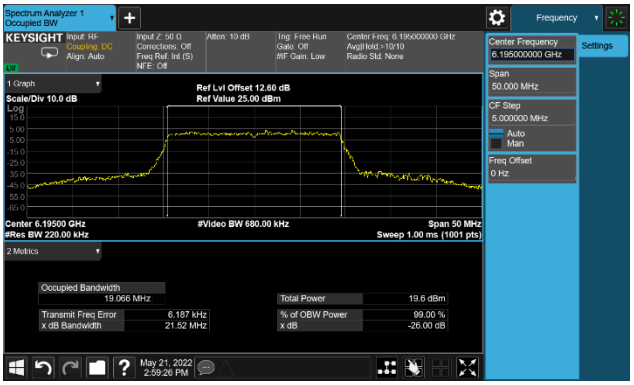
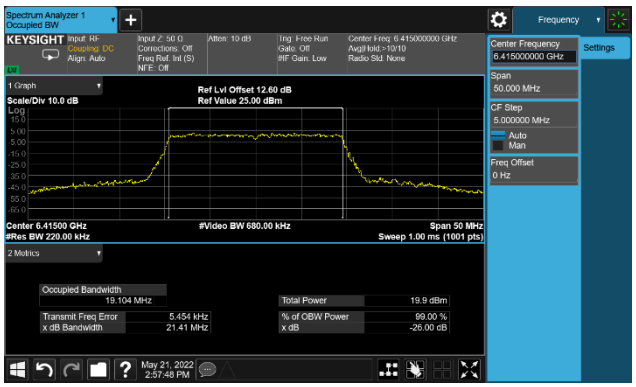
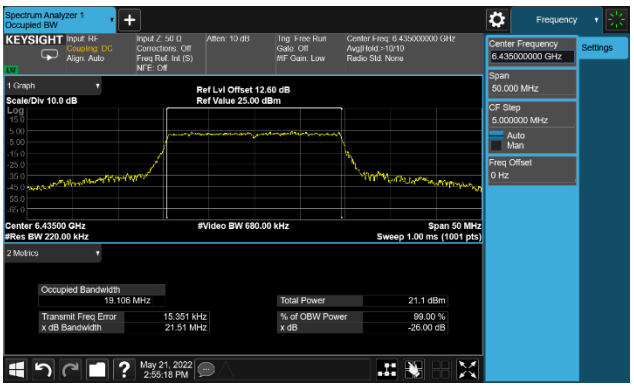
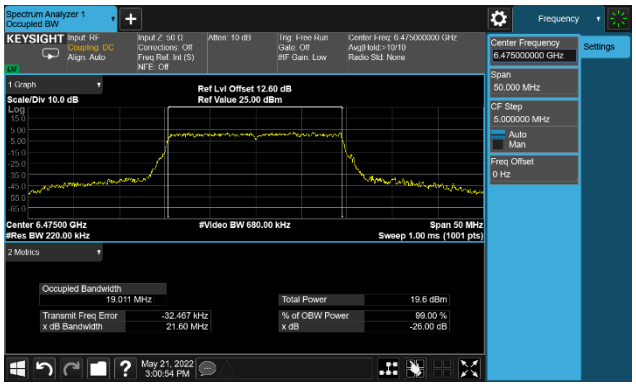
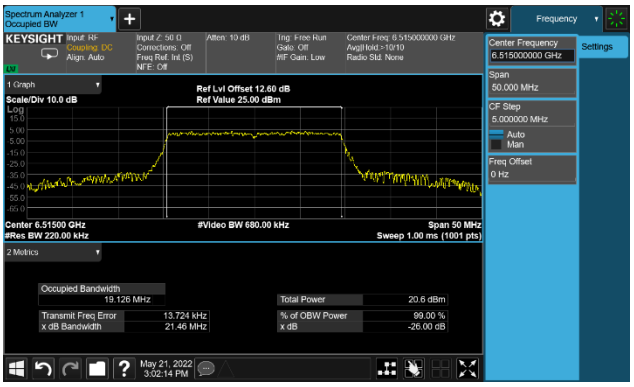
Duty Cycle _ N_{SS}=2 (T = Transmission Duration)	
802.11ax-HE20 (T = 0.784ms)	802.11ax-HE40 (T = 0.431ms)
	
802.11ax-HE80 (T = 0.242ms)	802.11ax-HE160 (T = 0.161ms)
	

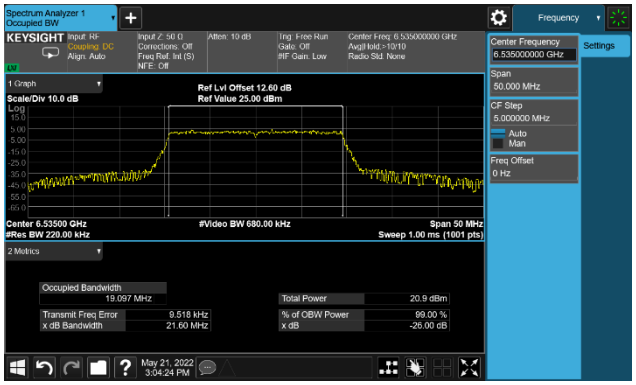
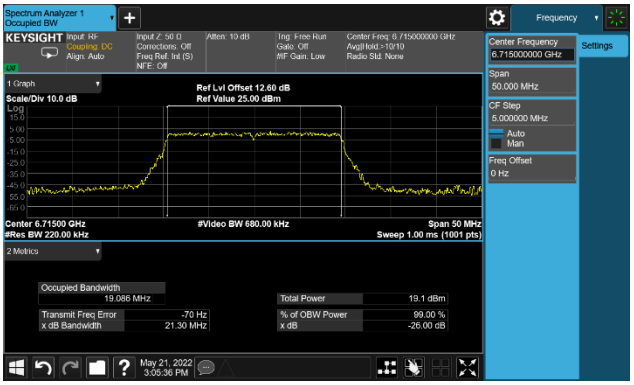
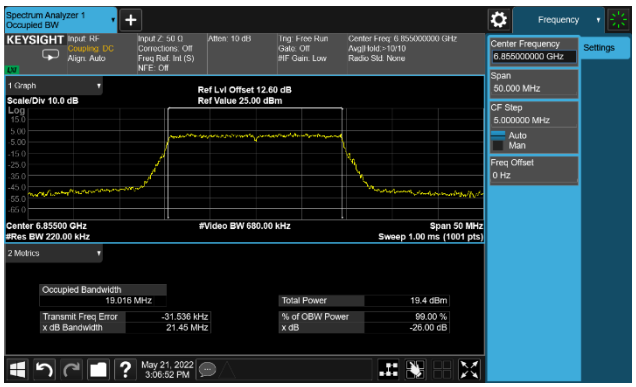
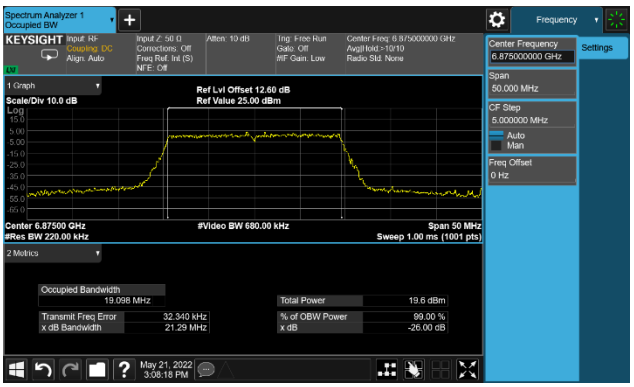
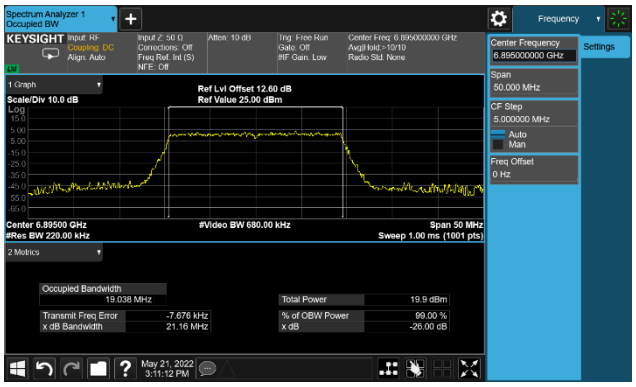
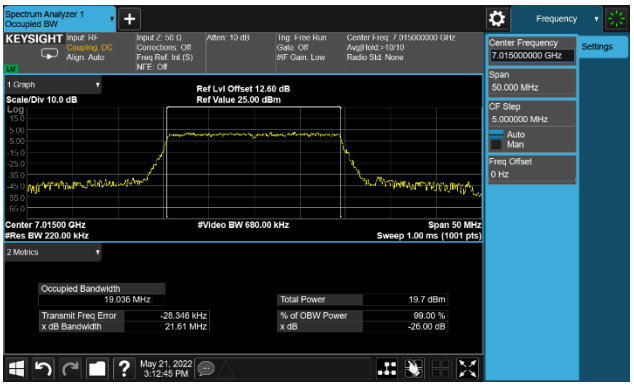
A.2 26dB Bandwidth Test Result

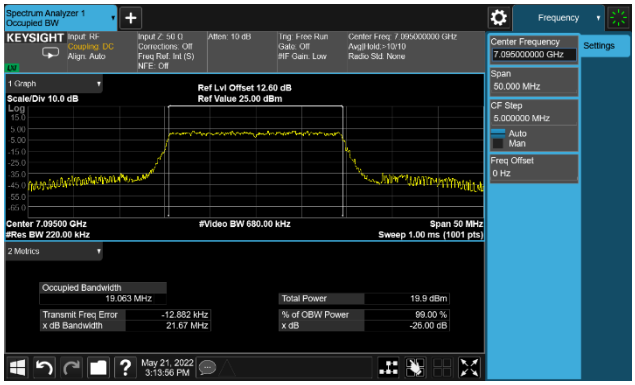
Test Site	SIP-TR1	Test Engineer	Nandy Zhang
Test Date	2022/05/21	Test Mode	N_{SS}=1

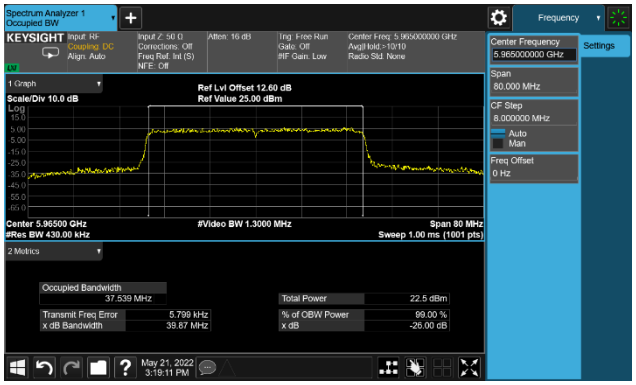
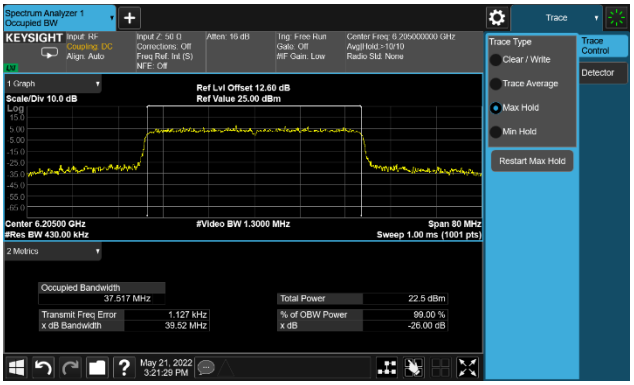
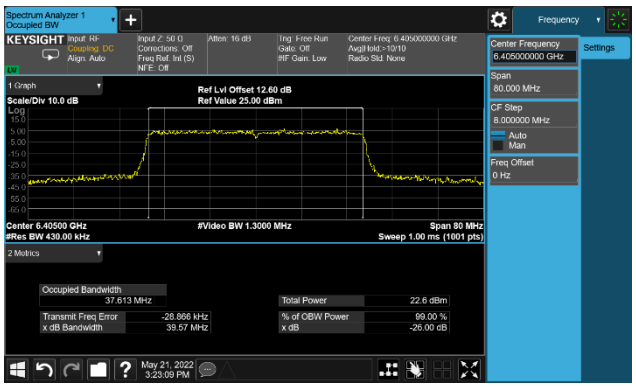
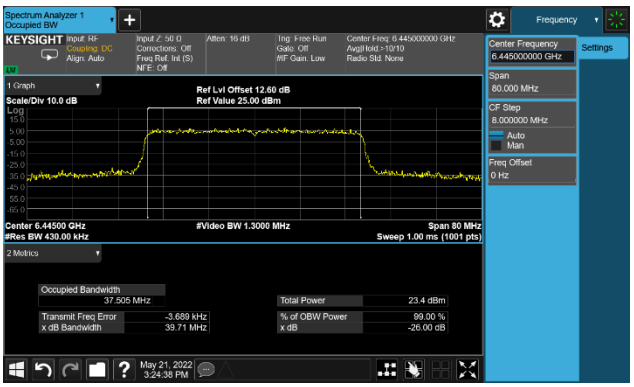
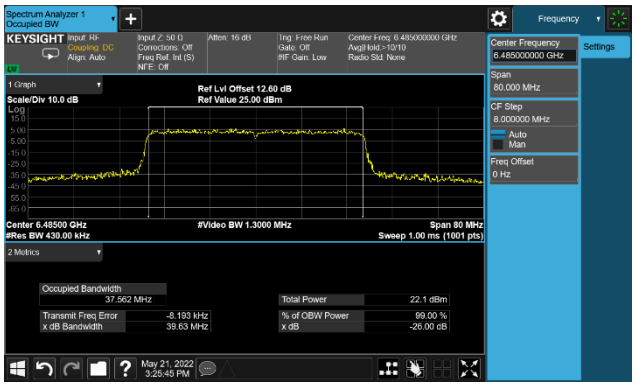
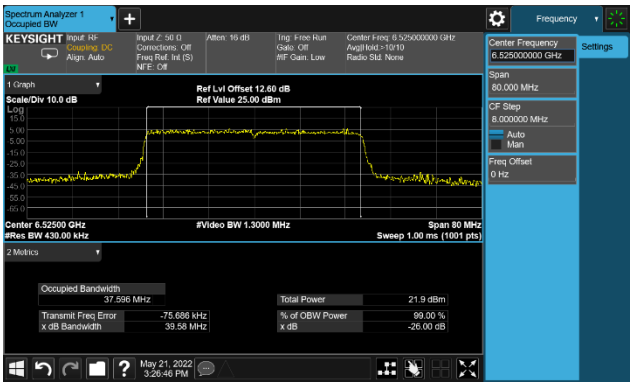
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant 0					
802.11ax-HE20	MCS0	01	5955	21.47	19.116
802.11ax-HE20	MCS0	49	6195	21.52	19.066
802.11ax-HE20	MCS0	93	6415	21.41	19.104
802.11ax-HE20	MCS0	97	6435	21.51	19.106
802.11ax-HE20	MCS0	105	6475	21.60	19.011
802.11ax-HE20	MCS0	113	6515	21.46	19.126
802.11ax-HE20	MCS0	117	6535	21.60	19.097
802.11ax-HE20	MCS0	153	6715	21.30	19.086
802.11ax-HE20	MCS0	181	6855	21.45	19.016
802.11ax-HE20	MCS0	185	6875	21.29	19.098
802.11ax-HE20	MCS0	189	6895	21.16	19.038
802.11ax-HE20	MCS0	213	7015	21.61	19.036
802.11ax-HE20	MCS0	229	7095	21.67	19.063
802.11ax-HE40	MCS0	03	5965	39.87	37.539
802.11ax-HE40	MCS0	51	6205	39.52	37.512
802.11ax-HE40	MCS0	91	6405	39.57	37.613
802.11ax-HE40	MCS0	99	6445	39.71	37.505
802.11ax-HE40	MCS0	107	6485	39.63	37.562
802.11ax-HE40	MCS0	115	6525	39.58	37.596
802.11ax-HE40	MCS0	123	6565	39.61	37.605
802.11ax-HE40	MCS0	147	6685	39.49	37.492
802.11ax-HE40	MCS0	179	6845	39.42	37.531
802.11ax-HE40	MCS0	187	6885	39.69	37.484
802.11ax-HE40	MCS0	195	6925	39.50	37.615
802.11ax-HE40	MCS0	211	7005	39.80	37.575
802.11ax-HE40	MCS0	227	7085	39.61	37.526

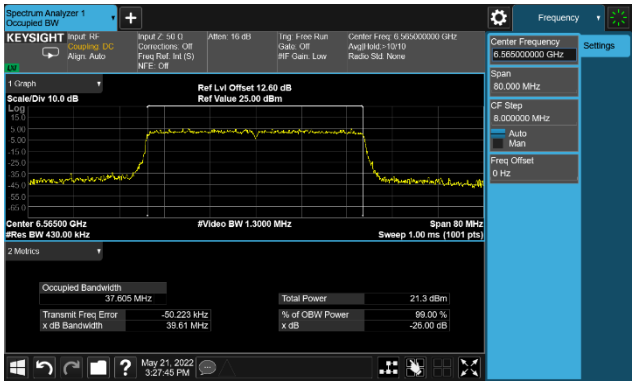
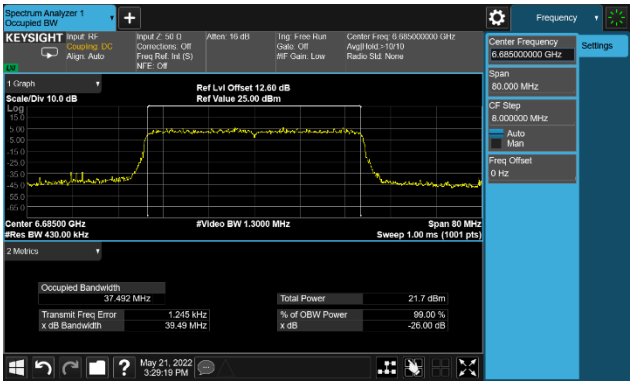
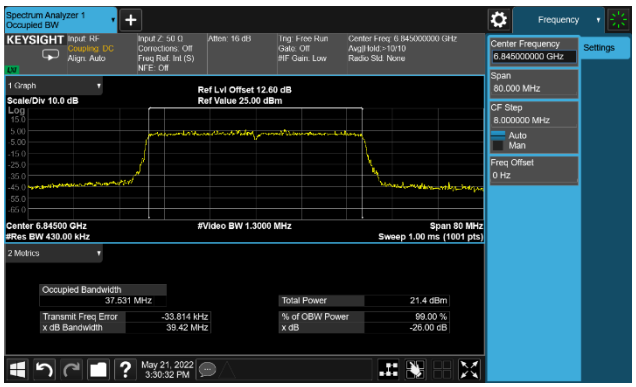
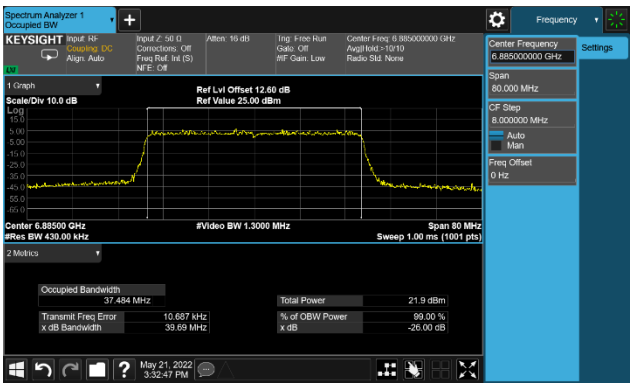
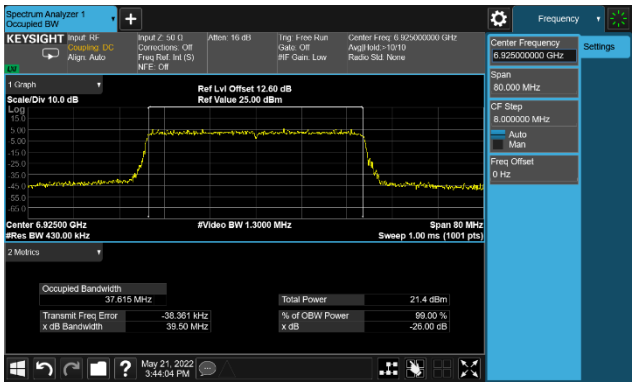
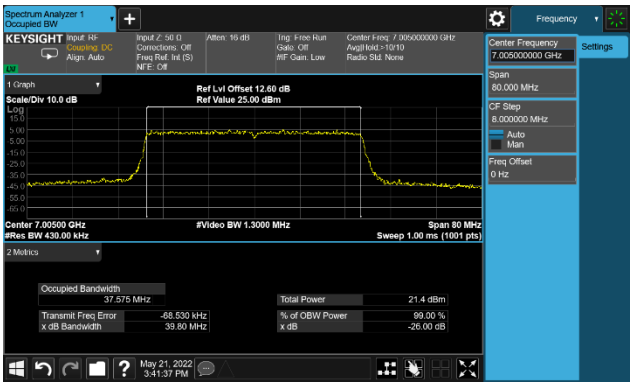
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant 0					
802.11ax-HE80	MCS0	07	5985	80.32	76.835
802.11ax-HE80	MCS0	55	6225	80.73	76.812
802.11ax-HE80	MCS0	87	6385	80.79	76.832
802.11ax-HE80	MCS0	103	6465	80.43	76.889
802.11ax-HE80	MCS0	119	6545	80.37	76.854
802.11ax-HE80	MCS0	135	6625	80.43	76.952
802.11ax-HE80	MCS0	151	6705	80.23	76.851
802.11ax-HE80	MCS0	183	6865	80.40	76.902
802.11ax-HE80	MCS0	199	6945	80.24	77.019
802.11ax-HE80	MCS0	215	7025	80.11	76.888
802.11ax-HE160	MCS0	15	6025	163.8	154.82
802.11ax-HE160	MCS0	47	6185	163.9	155.38
802.11ax-HE160	MCS0	79	6345	163.5	155.13
802.11ax-HE160	MCS0	111	6505	163.4	155.31
802.11ax-HE160	MCS0	143	6665	163.2	155.44
802.11ax-HE160	MCS0	175	6825	162.7	155.44
802.11ax-HE160	MCS0	207	6985	162.0	155.23

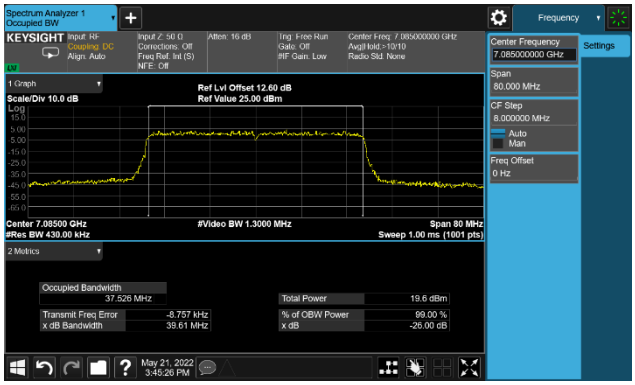
802.11ax-HE20 26dB Bandwidth - Ant 0	
Channel 01 (5955MHz)	Channel 49 (6195MHz)
	
Channel 93 (6415MHz)	Channel 97 (6435MHz)
	
Channel 105 (6475MHz)	Channel 113 (6515MHz)
	

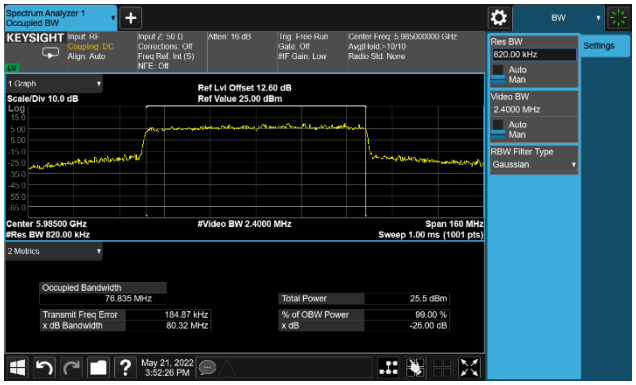
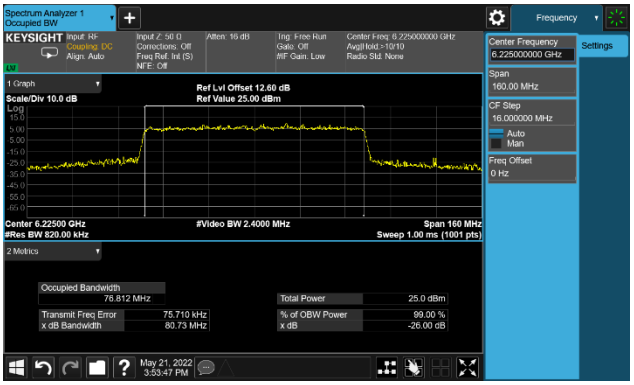
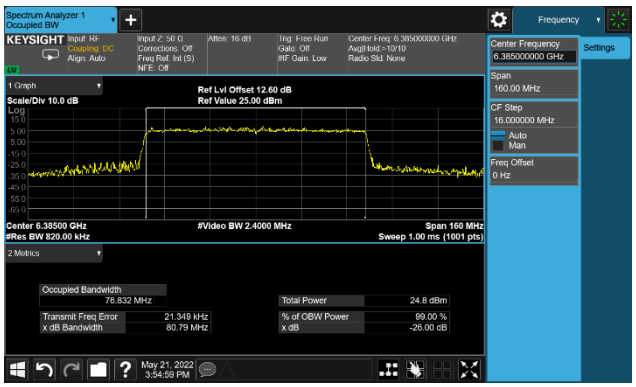
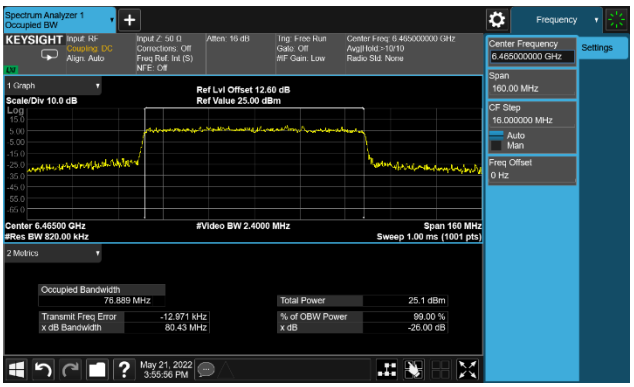
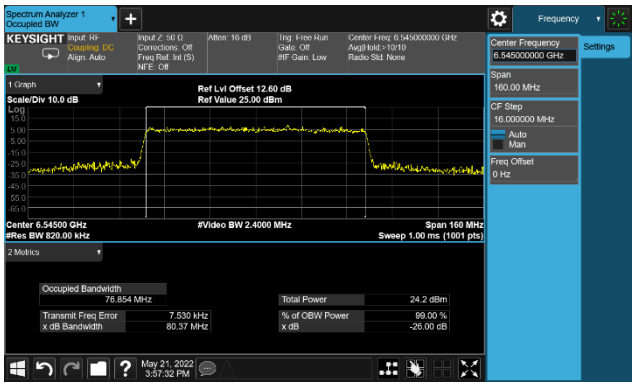
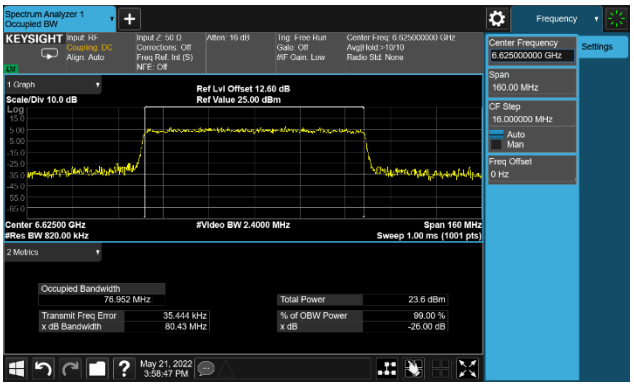
802.11ax-HE20 26dB Bandwidth - Ant 0	
Channel 117 (6535MHz)	Channel 153 (6715MHz)
	
Channel 181 (6855MHz)	Channel 185 (6875MHz)
	
Channel 189 (6895MHz)	Channel 213 (7015MHz)
	

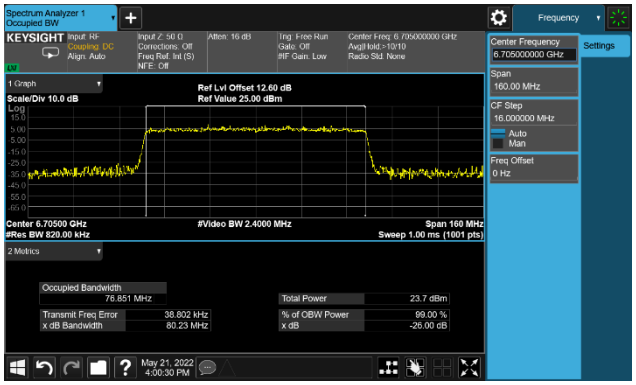
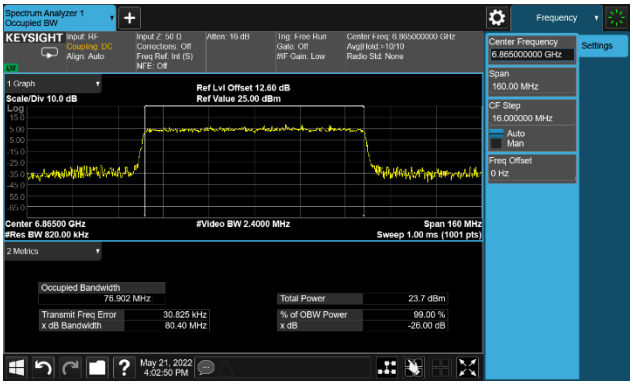
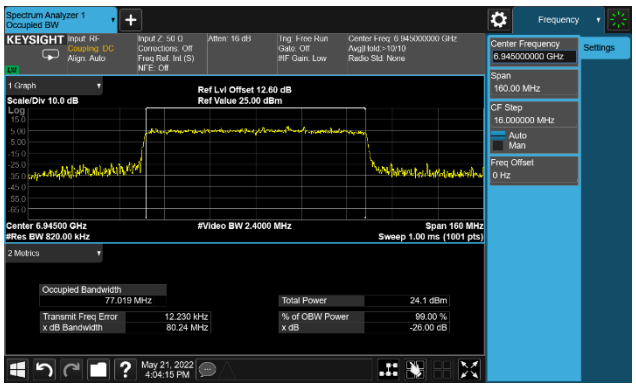
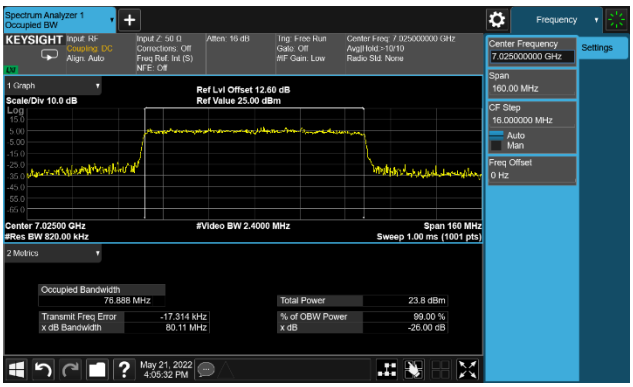
802.11ax-HE20 26dB Bandwidth - Ant 0	
Channel 229 (7095MHz)	
	

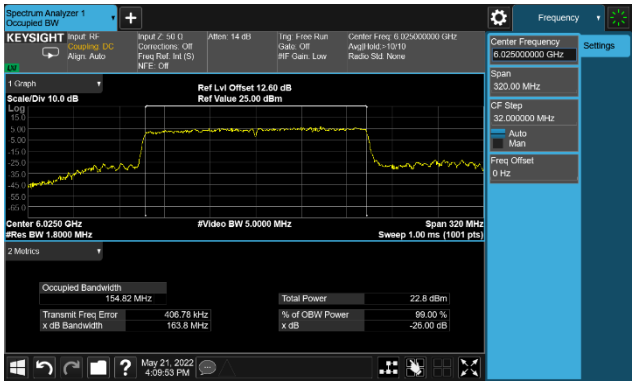
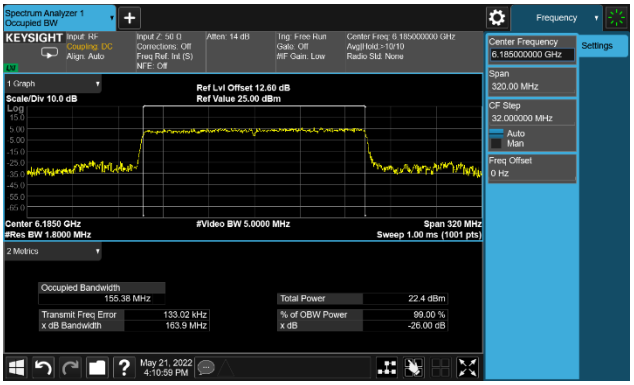
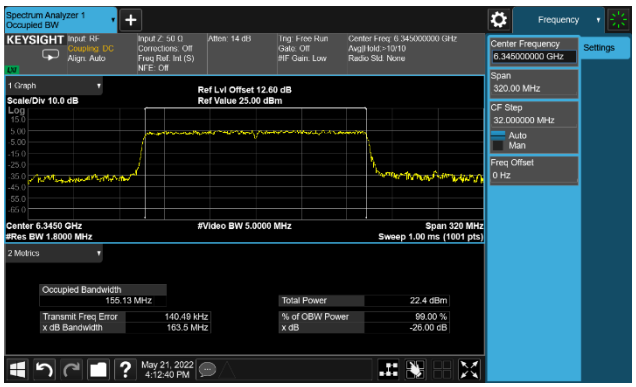
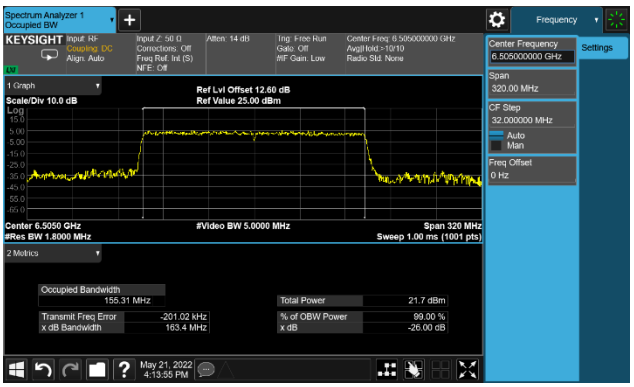
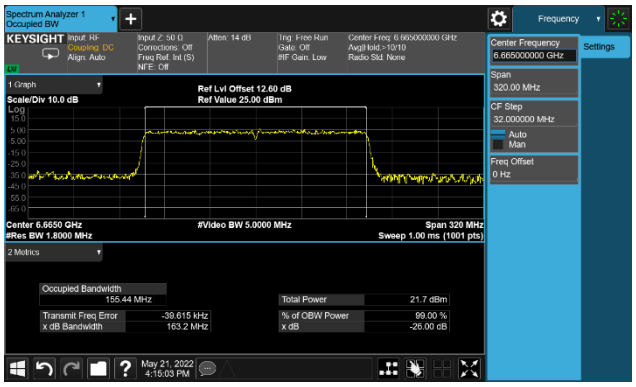
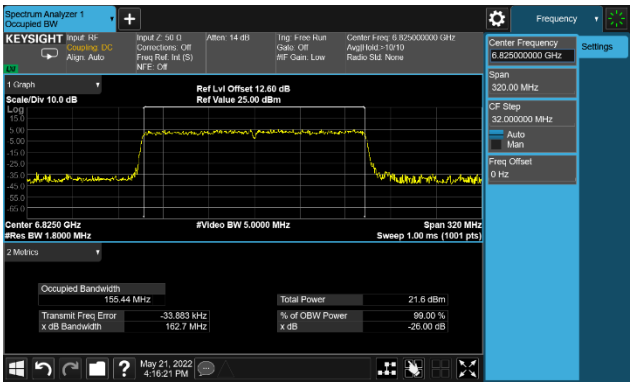
802.11ax-HE40 26dB Bandwidth - Ant 0	
Channel 03 (5965MHz)	Channel 51 (6205MHz)
	
Channel 91 (6405MHz)	Channel 99 (6445MHz)
	
Channel 107 (6485MHz)	Channel 115 (6525MHz)
	

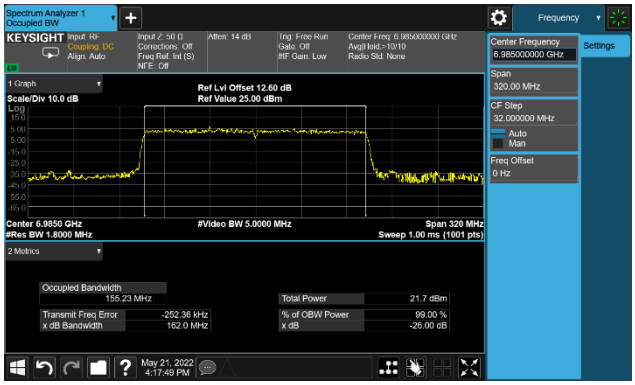
802.11ax-HE40 26dB Bandwidth - Ant 0	
Channel 123 (6565MHz)	Channel 147 (6685MHz)
	
Channel 179 (6845MHz)	Channel 187 (6885MHz)
	
Channel 195 (6925MHz)	Channel 211 (7005MHz)
	

802.11ax-HE40 26dB Bandwidth - Ant 0	
Channel 123 (7085MHz)	
	

802.11ax-HE80 26dB Bandwidth - Ant 0	
Channel 07 (5985MHz)	Channel 55 (6225MHz)
	
Channel 87 (6385MHz)	Channel 103 (6465MHz)
	
Channel 119 (6545MHz)	Channel 135 (6625MHz)
	

802.11ax-HE80 26dB Bandwidth - Ant 0	
Channel 151 (6705MHz)	Channel 183 (6865MHz)
	
Channel 199 (6945MHz)	Channel 215 (7025MHz)
	

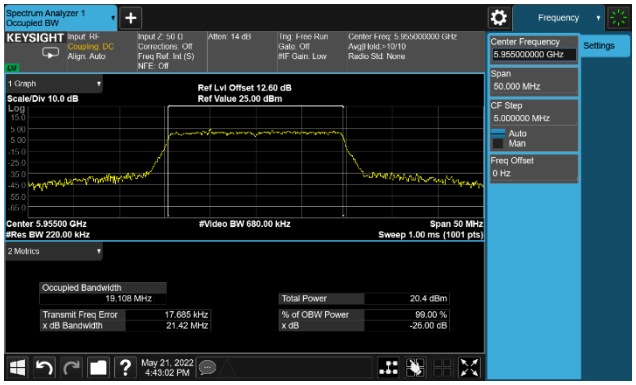
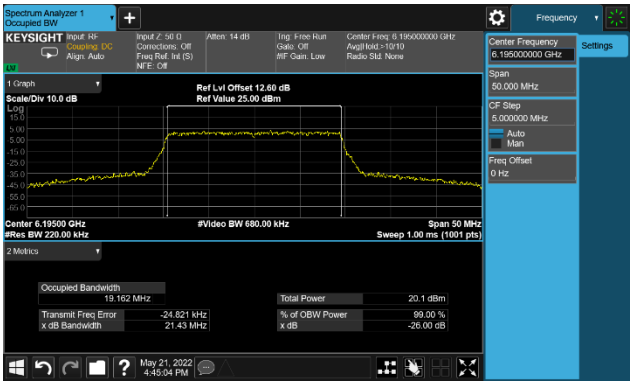
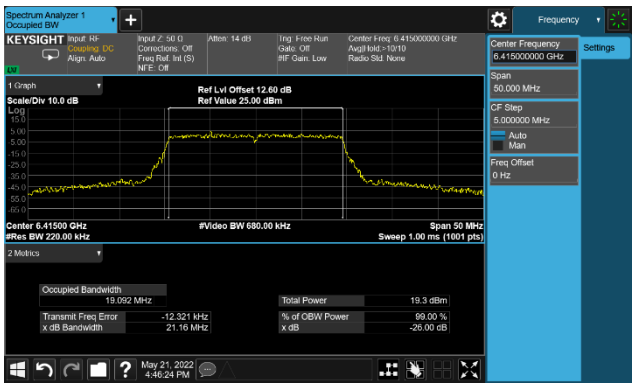
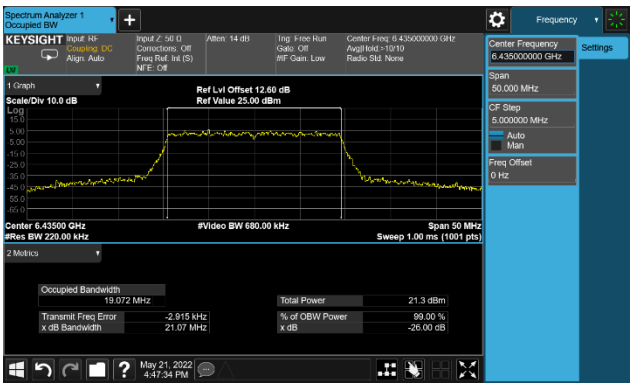
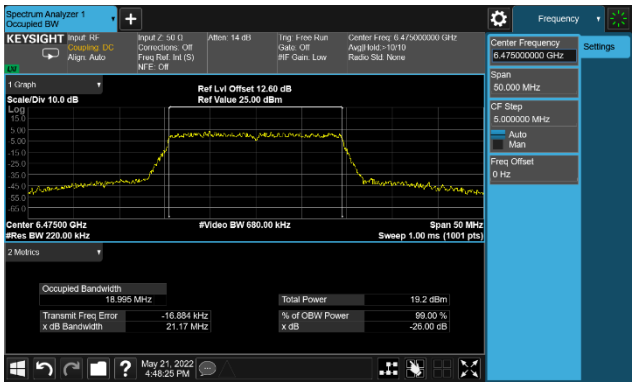
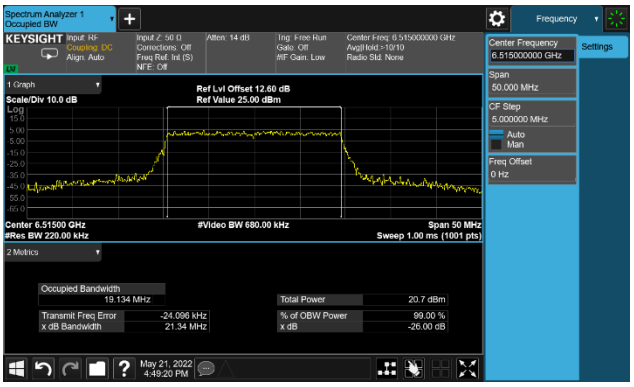
802.11ax-HE160 26dB Bandwidth - Ant 0	
Channel 15 (6025MHz)	Channel 47 (6185MHz)
	
Channel 79 (6345MHz)	Channel 111 (6505MHz)
	
Channel 143 (6665MHz)	Channel 175 (6825MHz)
	

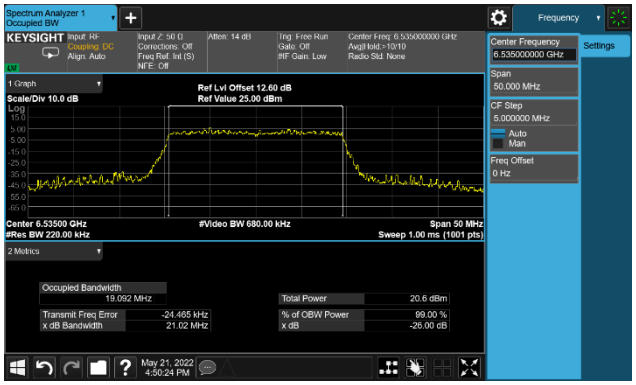
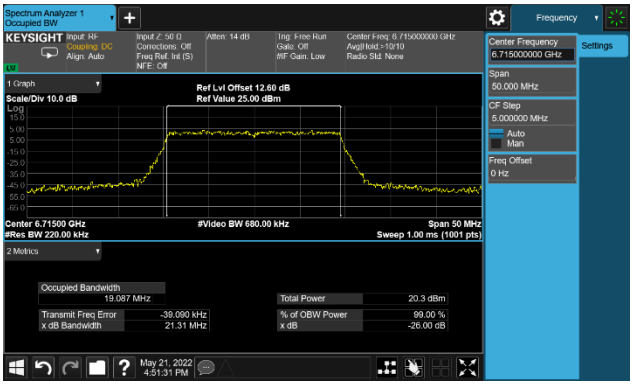
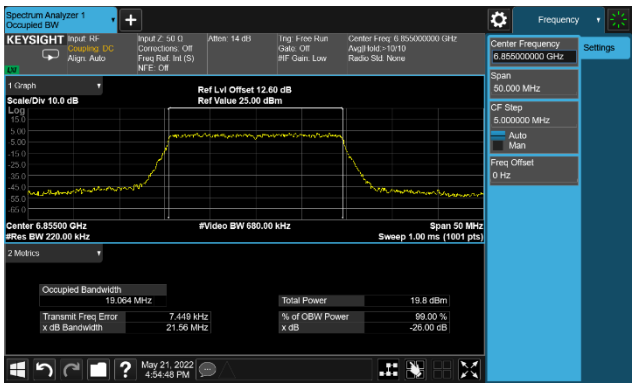
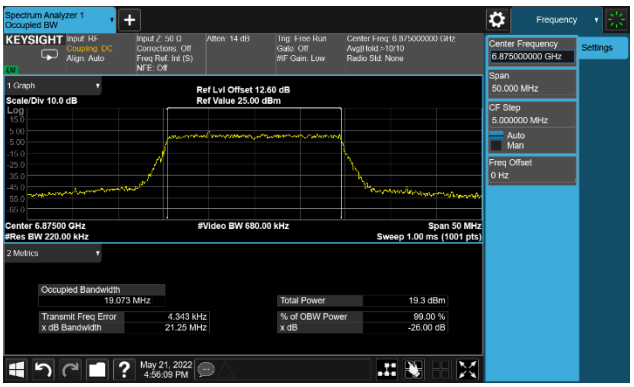
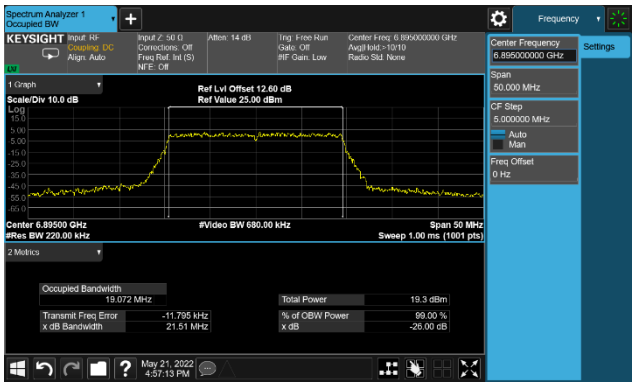
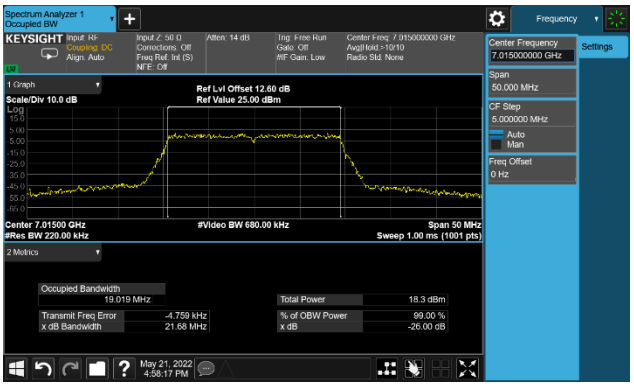
802.11ax-HE160 26dB Bandwidth - Ant 0	
Channel 207 (6985MHz)	
	

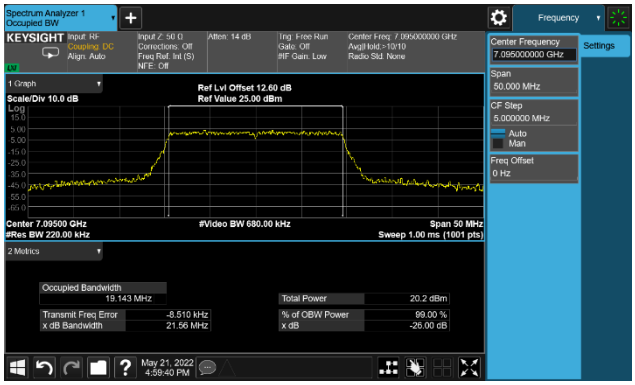
Test Site	SIP-TR1	Test Engineer	Nandy Zhang
Test Date	2022/05/21	Test Mode	N_{SS}=2

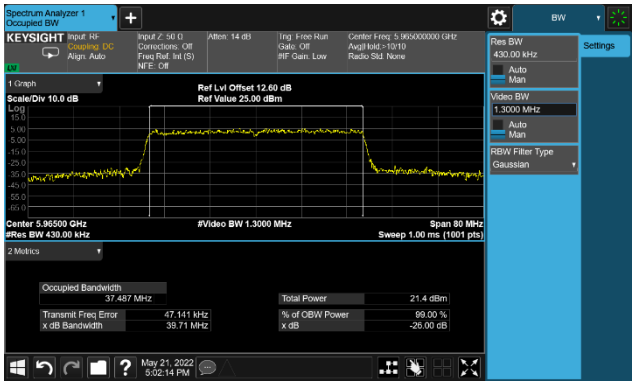
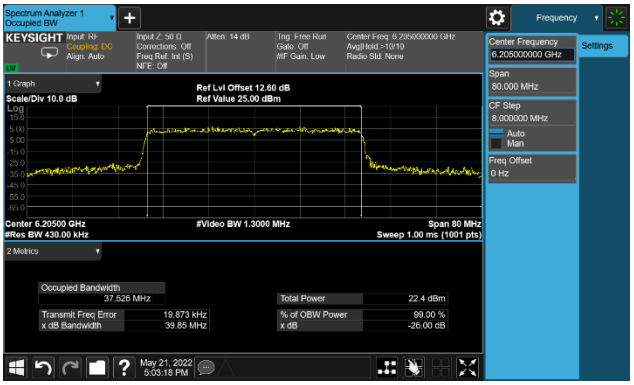
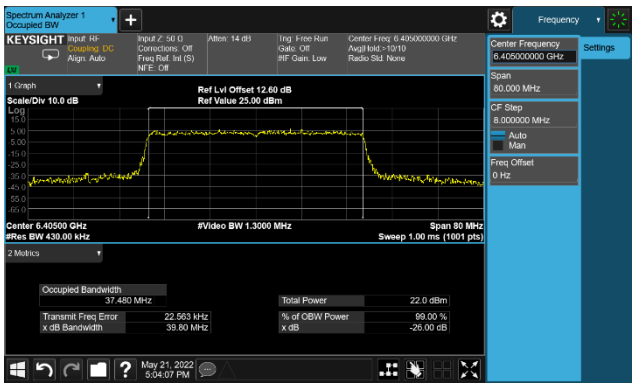
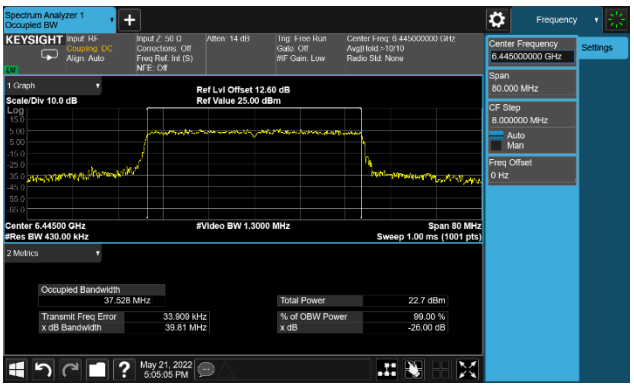
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant 0					
802.11ax-HE20	MCS0	01	5955	21.42	19.108
802.11ax-HE20	MCS0	49	6195	21.43	19.162
802.11ax-HE20	MCS0	93	6415	21.16	19.092
802.11ax-HE20	MCS0	97	6435	21.07	19.072
802.11ax-HE20	MCS0	105	6475	21.17	18.995
802.11ax-HE20	MCS0	113	6515	21.34	19.134
802.11ax-HE20	MCS0	117	6535	21.02	19.092
802.11ax-HE20	MCS0	153	6715	21.31	19.087
802.11ax-HE20	MCS0	181	6855	21.56	19.064
802.11ax-HE20	MCS0	185	6875	21.25	19.073
802.11ax-HE20	MCS0	189	6895	21.51	19.072
802.11ax-HE20	MCS0	213	7015	21.68	19.019
802.11ax-HE20	MCS0	229	7095	21.56	19.143
802.11ax-HE40	MCS0	03	5965	39.71	37.487
802.11ax-HE40	MCS0	51	6205	39.85	37.526
802.11ax-HE40	MCS0	91	6405	39.80	37.480
802.11ax-HE40	MCS0	99	6445	39.81	37.528
802.11ax-HE40	MCS0	107	6485	39.48	37.516
802.11ax-HE40	MCS0	115	6525	39.78	37.512
802.11ax-HE40	MCS0	123	6565	39.67	37.516
802.11ax-HE40	MCS0	147	6685	39.65	37.455
802.11ax-HE40	MCS0	179	6845	39.58	37.541
802.11ax-HE40	MCS0	187	6885	39.83	37.510
802.11ax-HE40	MCS0	195	6925	39.76	37.524
802.11ax-HE40	MCS0	211	7005	39.78	37.530
802.11ax-HE40	MCS0	175	7085	39.56	37.559

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant 0					
802.11ax-HE80	MCS0	07	5985	80.83	77.117
802.11ax-HE80	MCS0	55	6225	81.43	77.122
802.11ax-HE80	MCS0	87	6385	80.54	77.053
802.11ax-HE80	MCS0	103	6465	80.76	77.051
802.11ax-HE80	MCS0	119	6545	80.74	77.139
802.11ax-HE80	MCS0	135	6625	81.00	77.084
802.11ax-HE80	MCS0	151	6705	80.94	77.123
802.11ax-HE80	MCS0	183	6865	80.55	76.921
802.11ax-HE80	MCS0	199	6945	80.84	77.070
802.11ax-HE80	MCS0	215	7025	80.50	77.073
802.11ax-HE160	MCS0	15	6025	162.5	155.16
802.11ax-HE160	MCS0	47	6185	163.2	155.77
802.11ax-HE160	MCS0	79	6345	163.4	155.38
802.11ax-HE160	MCS0	111	6505	163.0	155.51
802.11ax-HE160	MCS0	143	6665	163.2	155.70
802.11ax-HE160	MCS0	175	6825	163.3	155.54
802.11ax-HE160	MCS0	207	6985	162.8	155.39

802.11ax-HE20 26dB Bandwidth - Ant 0	
Channel 01 (5955MHz)	Channel 49 (6195MHz)
	
Channel 93 (6415MHz)	Channel 97 (6435MHz)
	
Channel 105 (6475MHz)	Channel 113 (6515MHz)
	

802.11ax-HE20 26dB Bandwidth - Ant 0	
Channel 117 (6535MHz)	Channel 153 (6715MHz)
	
Channel 181 (6855MHz)	Channel 185 (6875MHz)
	
Channel 189 (6895MHz)	Channel 213 (7015MHz)
	

802.11ax-HE20 26dB Bandwidth - Ant 0	
Channel 229 (7095MHz)	
	

802.11ax-HE40 26dB Bandwidth - Ant 0	
Channel 03 (5965MHz)	Channel 51 (6205MHz)
	
Channel 91 (6405MHz)	Channel 99 (6445MHz)
	
Channel 107 (6485MHz)	Channel 115 (6525MHz)