RF MEASUREMENT REPORT

FCC ID:	Q9DAPIN0735
Applicant:	Hewlett Packard Enterprise Company
Product:	ACCESS POINT
Model No.:	APIN0735
Trademark:	Hewlett Packard Enterprise , HPE aruba networking
FCC Classification:	Unlicensed National Information Infrastructure (NII)
FCC Rule Part(s):	Part 15 Subpart E (Section 15.407)
Result:	Complies
Received Date:	2023-11-09
Test Date:	2023-11-27 ~ 2024-03-16

Reviewed By: Jame Yuan

Approved By: Robin Wu

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB789033 and KDB 291074. Test results reported herein relate only to the item(s) tested.
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
2311RSU031-U5	V01	Initial Report	2024-04-17	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.	APIN0735
Serial No.	CNRJM52002
Software Version	V1.6
Wi-Fi Specification	802.11a/b/g/n/ac/ax/be
Bluetooth Specification	BLE only
ZigBee Specification	802.15.4
GNSS Specification	GPS, Galileo
Antenna Information	Refer to Section 1.8
Power Type	AC Adapter Input or PoE Input
Operating Environment	Indoor Use
Remark: 1. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer. 2. The co-location test data was shown in report “2311RSU031-U9”.	

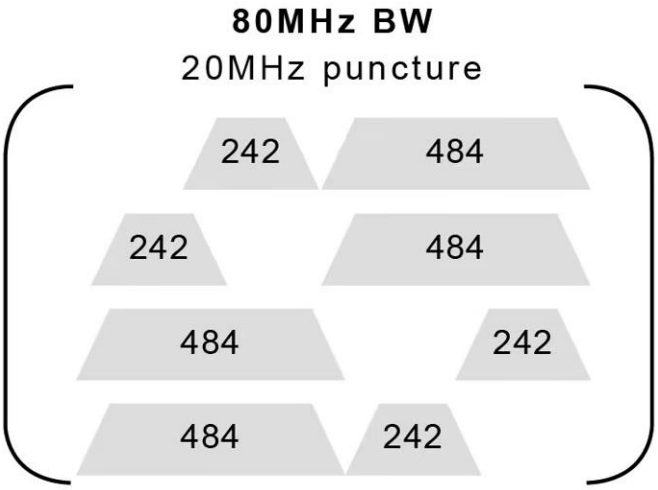
1.5. Radio Specification under Test

Frequency Range	For 802.11a/n-HT20/ac-VHT20/ax-HE20/be-EHT20: 5845MHz, 5865MHz, 5885MHz For 802.11n-HT40/ac-VHT40/ax-HE40/be-EHT40: 5835MHz, 5875MHz For 802.11ac-VHT80/ax-HE80/be-EHT80: 5855MHz For 802.11ac-VHT160/ax-HE160/be-EHT160: 5815MHz		
Type of Modulation	802.11a/n/ac: OFDM 802.11ax/be: OFDMA		
Data Rate	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps 802.11ac: up to 1732Mbps 802.11ax: up to 2402Mbps 802.11be: up to 2882Mbps		
Support RU	☒ Full RU	☒ Partial RU	☐ Single RU ☐ Multi RU ☒ Channel Puncturing

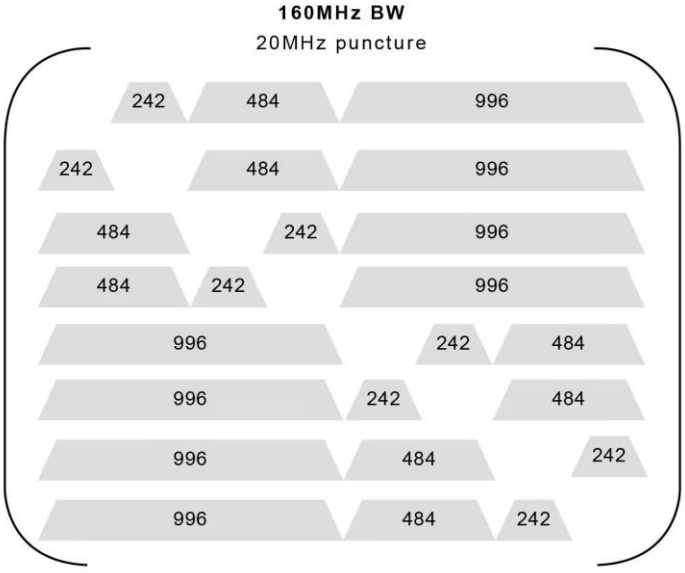
Note: Only 802.11be-EHT80 and 802.11be-EHT160 support channel puncturing function.

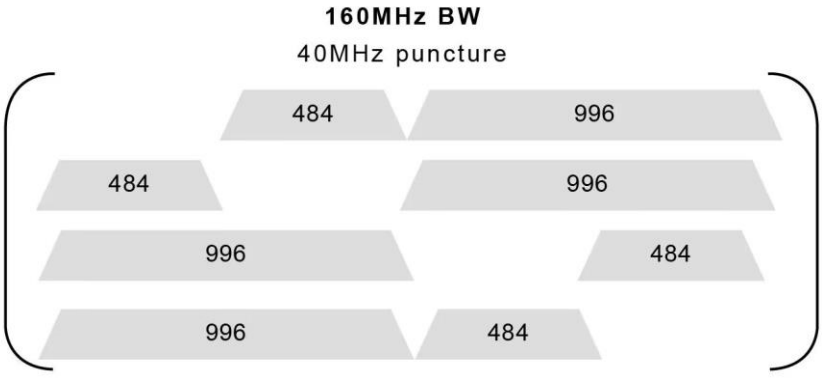
Punctured Transmission Details

80MHz bandwidth (20MHz / RU242 punctured)



160MHz bandwidth (20MHz / RU242 punctured and 40MHz / RU484 punctured)





1.6. Working Frequencies

802.11a/n-HT20/ac-VHT20/ax-HE20/be-EHT20

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

802.11n-HT40/ac-VHT40/ax-HE40/be-EHT40

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

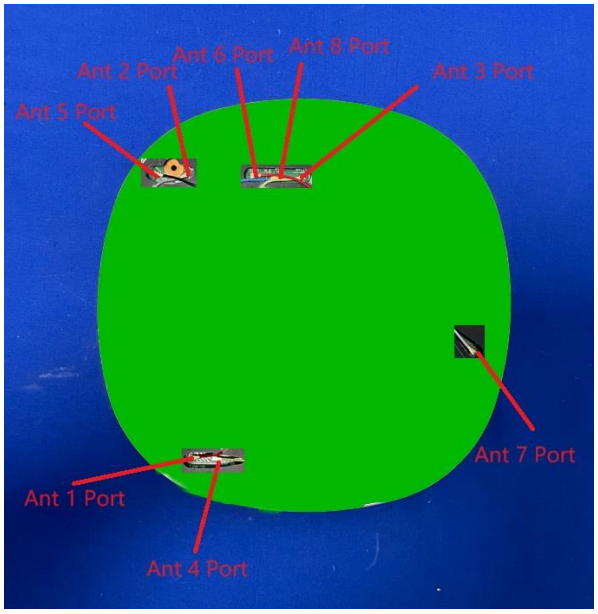
802.11ac-VHT80/ax-HE80/be-EHT80

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

802.11ac-VHT160/ax-HE160/be-EHT160

Channel	Frequency	Channel	Frequency	Channel	Frequency
163	5815 MHz	--	--	--	--

1.7. Description of Antenna RF Port



Antenna Port	RF Spec.			
	Wi-Fi 2.4G	Wi-Fi 5G	Wi-Fi 6G	BLE/ZigBee
Ant 1	--	--	● (Radio 2)	--
Ant 4	--	--	● (Radio 2)	--
Ant 2	● (Radio 0)	● (Radio 1)	--	--
Ant 5	● (Radio 0)	● (Radio 1)	--	--
Ant 3	--	--	--	● (Core 1)
Ant 6	--	--	--	● (Core 0)
Ant 8	--	--	--	● (Core 1)
Ant 7	GNSS			

1.8. Antenna Details

Antenna Type	Frequency Band (GHz)	T_X Paths	Directional Gain (dBi)	
			Uncorrelated	Correlated
Wi-Fi Antennas (Ant 2 & Ant 5)				
PIFA	5.15 ~ 5.9	2	4.08	4.08

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/be, not include 802.11a/b/g.

3, For beamforming operation, Aruba OS automatically backs power down based on CDD power.

4, The antennas are cross-polarized, so the correlated gain equals to the uncorrelated gain.

5, The detail calculation method of directional gain refers to antenna specification provided by the applicant.

2. Test Configuration

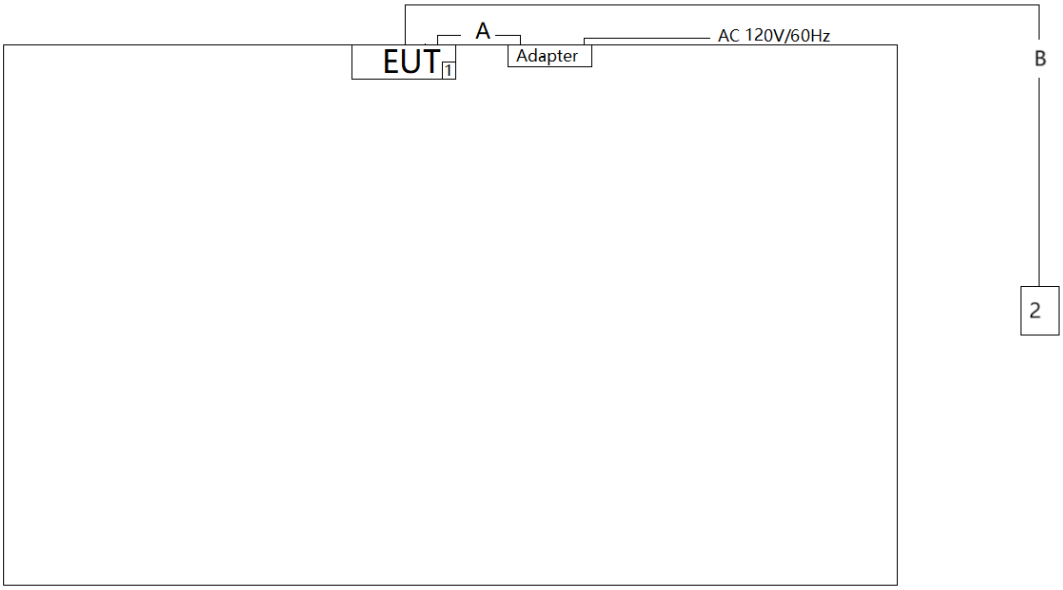
2.1. Test Mode

Mode 1: Transmit by 802.11a (6Mbps)
Mode 2: Transmit by 802.11ac-VHT20_N_{SS}=1 (MCS0)
Mode 3: Transmit by 802.11ac-VHT40_N_{SS}=1 (MCS0)
Mode 4: Transmit by 802.11ac-VHT80_N_{SS}=1 (MCS0)
Mode 5: Transmit by 802.11ac-VHT160_N_{SS}=1 (MCS0)
Mode 6: Transmit by 802.11ax-HE20_N_{SS}=1 (MCS0)
Mode 7: Transmit by 802.11ax-HE40_N_{SS}=1 (MCS0)
Mode 8: Transmit by 802.11ax-HE80_N_{SS}=1 (MCS0)
Mode 9: Transmit by 802.11ax-HE160_N_{SS}=1 (MCS0)
Mode 10: Transmit by 802.11be-EHT20_N_{SS}=1 (MCS0)
Mode 11: Transmit by 802.11be-EHT40_N_{SS}=1 (MCS0)
Mode 12: Transmit by 802.11be-EHT80_N_{SS}=1 (MCS0)
Mode 13: Transmit by 802.11be-EHT160_N_{SS}=1 (MCS0)
Note: 1. For Radiated emission, the modulation and the data rate picked for testing are determined by the Max. RF conducted power. 2. 802.11n and 802.11ac have same modulation type and same power value, so we only show 802.11ac test data in report. 3. For CDD mode, this device supports 2 N_{SS} and power level is the same of spatial multiplexing. The worst case is N_{SS}=1. 4. For beamforming operation, manufacturer automatically backs power down based on CDD power. Therefore, only the CDD mode was evaluated in this report. 5. For Puncturing operation, Aruba OS automatically backs power down based on a 10*log(Partial_RU / Full_RU) factor based on CDD power.

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



No.	Cable Type	Cable Spec.	Length
A	Power Cable	Non-Shielded	1.2m
B	LAN Cable	Non-Shielded, Cat 6	>10.0m
No.	Product	Manufacturer	Model No.
1	USB Flash	SanDisk	16G
2	Notebook	DELL	Latitude 5491

2.3. Test Software

The test utility software used during testing was “accessMTool”, and the version was 3.3.0.6.

Note: Final power setting please refer to operational description.

2.4. Applied Standards

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

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

2.5. Test Environment Condition

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

3. Antenna Requirements

KDB 291074 D01v01: An Indoor Access point in the U-NII-4 band (5.850-5.895 GHz) and U-NII -3 & -4 span channels must use an integrated antenna.

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

4. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
TRILOG Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2024-05-15	WZ-AC2
EMI Test Receiver	Agilent	N9038A	MRTSUE06125	1 year	2024-05-23	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2024-10-11	WZ-AC2
Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2024-05-07	WZ-AC2
Anechoic Chamber	RIKEN	WZ-AC2	MRTSUE06213	1 year	2024-04-20	WZ-AC2
Thermohygrometer	testo	608-H1	MRTSUE11263	1 year	2024-11-07	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2024-11-04	WZ-AC2
Preamplifier	EMCI	EMC184045SE	MRTSUE06640	1 year	2024-01-12	WZ-AC2
Preamplifier	EMCI	EMC184045SE	MRTSUE06640	1 year	2025-01-11	WZ-AC2
Active Loop Antenna	Schwarzbeck	FMZB 1519-60 D	MRTSUE07076	1 year	2024-12-04	WZ-AC2
Thermohygrometer	testo	608-H1	MRTSUE06402	1 year	2024-05-31	WZ-SR5
Shielding Room	HUAMING	WZ-SR5	MRTSUE06442	N/A	N/A	WZ-SR5
Signal Analyzer	Keysight	N9010B	MRTSUE06457	1 year	2024-05-23	WZ-SR5
USB Power Sensor	Keysight	U2021XA	MRTSUE06446	1 year	2024-05-23	WZ-SR5
Attenuator	MVE	MVE2213	MRTSUE11092	1 year	2024-06-08	WZ-SR5
Shielding Room	MIX-BEP	WZ-SR2	MRTSUE06215	5 years	2026-12-20	WZ-SR2
Thermohygrometer	testo	608-H1	MRTSUE06404	1 year	2024-05-31	WZ-SR2
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2024-05-23	WZ-SR2
Four-Line V-Network	R&S	ENV432	MRTSUE06615	1 year	2024-09-27	WZ-SR2
EMI Test Receiver	R&S	ESR3	MRTSUE06909	1 year	2024-09-27	WZ-SR2
Temperature Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2024-09-27	WZ-TR3
Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2024-05-31	WZ-TR3
Attenuator	MVE	MVE2213	MRTSUE11092	1 year	2024-06-08	WZ-TR3
Signal Analyzer	Keysight	N9010B	MRTSUE06457	1 year	2024-05-23	WZ-TR3

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

5. Decision Rules and Measurement Uncertainty

5.1. Decision Rules

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

5.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement
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)	26dB Bandwidth	Conducted	Pass
15.407(e)	6dB Bandwidth		Pass
15.407(a)(3)(ii)	Maximum Conducted Output Power		Pass
15.407(a)(3)(ii)(13)	Peak Power Spectral Density		Pass
15.407(b)(5)(i)	Undesirable Emissions	Radiated	Pass
15.205, 15.209 15.407(8), (9), (10)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)		Pass
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	Pass

Notes:

1. The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
2. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst-case emissions.
3. For Puncturing operation, Aruba OS automatically backs power down based on a 10*log(Partial_RU / Full_RU) factor based on normal power, we evaluated “Peak Power Spectral Density”, “Radiated Restricted Band Edge” and “Radiated Spurious Emission”.

6.2. 26dB & 99% 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

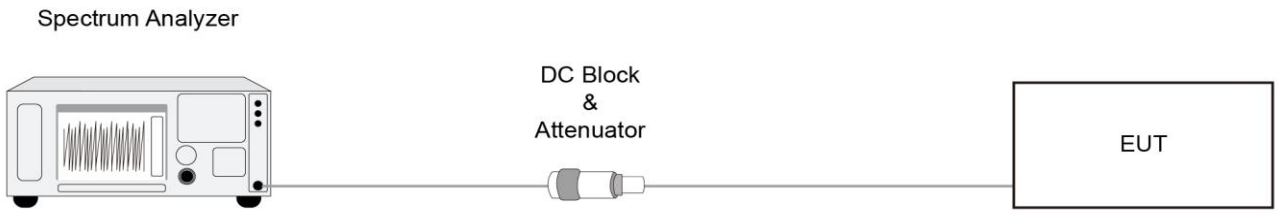
26dB Bandwidth

1. The analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth
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. 6dB Bandwidth Measurement

6.3.1. Test Limit

The minimum 6dBbandwidth shall be at least 500 kHz.

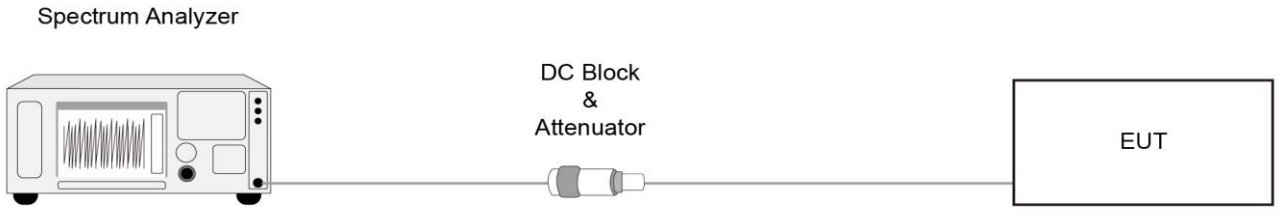
6.3.2. Test Procedure

KDB 789033 D02v02r01- Section II)C)2)

6.3.3. Test Setting

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

6.3.4. Test Setup



6.3.5. Test Result

Refer to Appendix A.3.

6.4. Output Power Measurement

6.4.1. Test Limit

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

6.4.2. Test Procedure

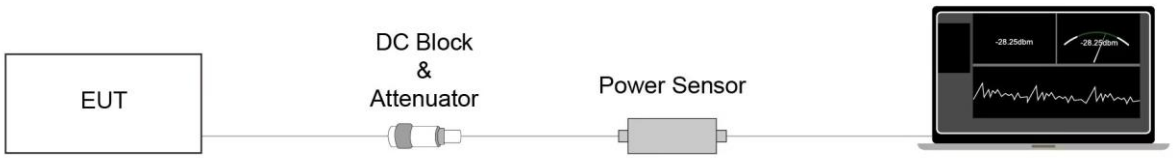
KDB 789033D02v02r01- Section II)E)3)b) Method PM-G

6.4.3. Test Setting

Average Power Measurement

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

6.4.4. Test Setup



6.4.5. Test Result

Refer to Appendix A.4.

6.5. Power Spectral Density Measurement

6.5.1. Test Limit

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

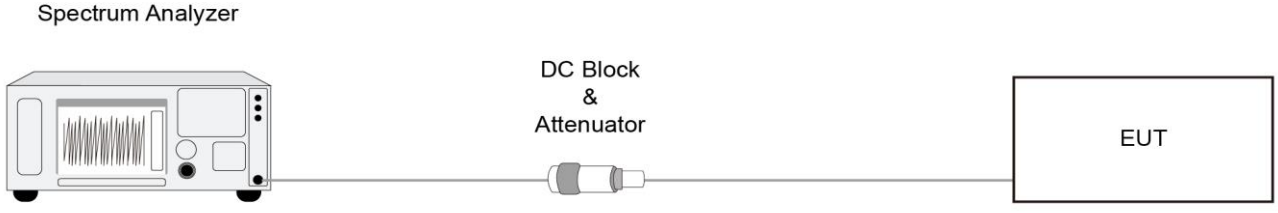
6.5.2. Test Procedure

KDB 789033 D02v02r01-Section II)F)

6.5.3. Test Setting

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz
4. VBW = 3 × RBW
5. Number of sweep points ≥ 2 × (span / RBW)
6. Detector = power averaging (Average)
7. Sweep time = auto
8. Trigger = free run
9. 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.

6.5.4. Test Setup



6.5.5. Test Result

Refer to Appendix A.5.

6.6. Frequency Stability Measurement

6.6.1. Test Limit

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

6.6.2. Test Procedure

Frequency Stability Under Temperature Variations:

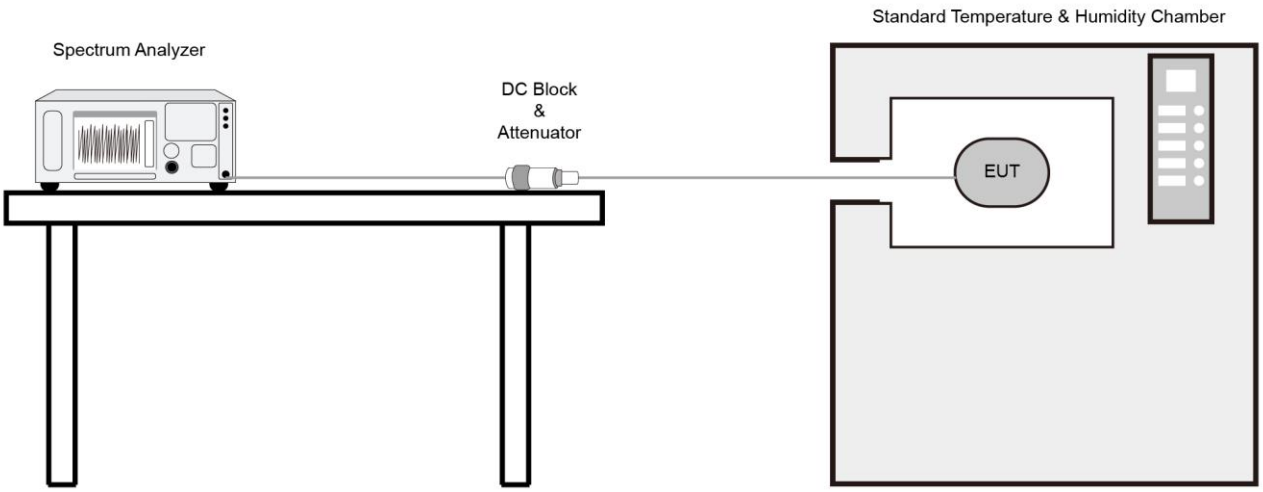
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain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

Frequency Stability Under Voltage Variations:

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

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

6.6.3. Test Setup



6.6.4. Test Result

Refer to Appendix A.6.

6.7. Radiated Spurious Emission Measurement

6.7.1. Test Limit

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

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [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 = 10Hz

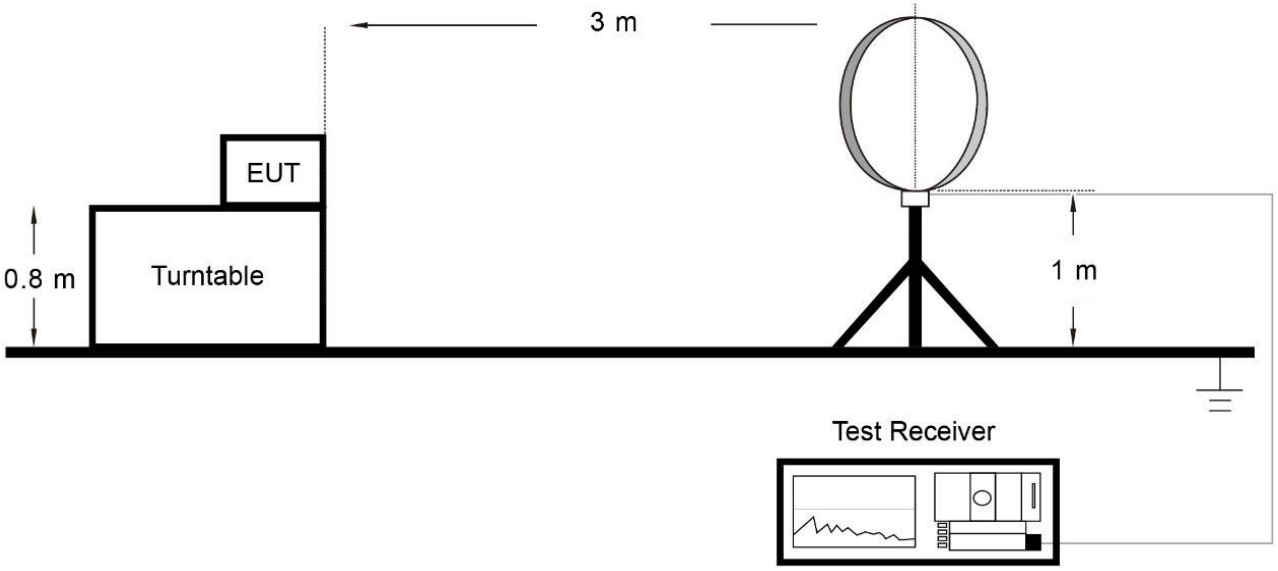
   If the EUT duty cycle is < 98%, set VBW ≥ 1/T. T is the minimum transmission duration.

802.11a	VBW = 510Hz	802.11ax-HE80	VBW = 2700Hz
802.11ac-VHT20	VBW = 560Hz	802.11ax-HE160	VBW = 4300Hz
802.11ac-VHT40	VBW = 1100Hz	802.11be-EHT20	VBW = 680Hz
802.11ac-VHT80	VBW = 2200Hz	802.11be-EHT40	VBW = 1300Hz
802.11ac-VHT160	VBW = 4300Hz	802.11be-EHT80	VBW = 2700Hz
802.11ax-HE20	VBW = 680Hz	802.11be-EHT160	VBW = 4300Hz
802.11ax-HE40	VBW = 1300Hz	--	--

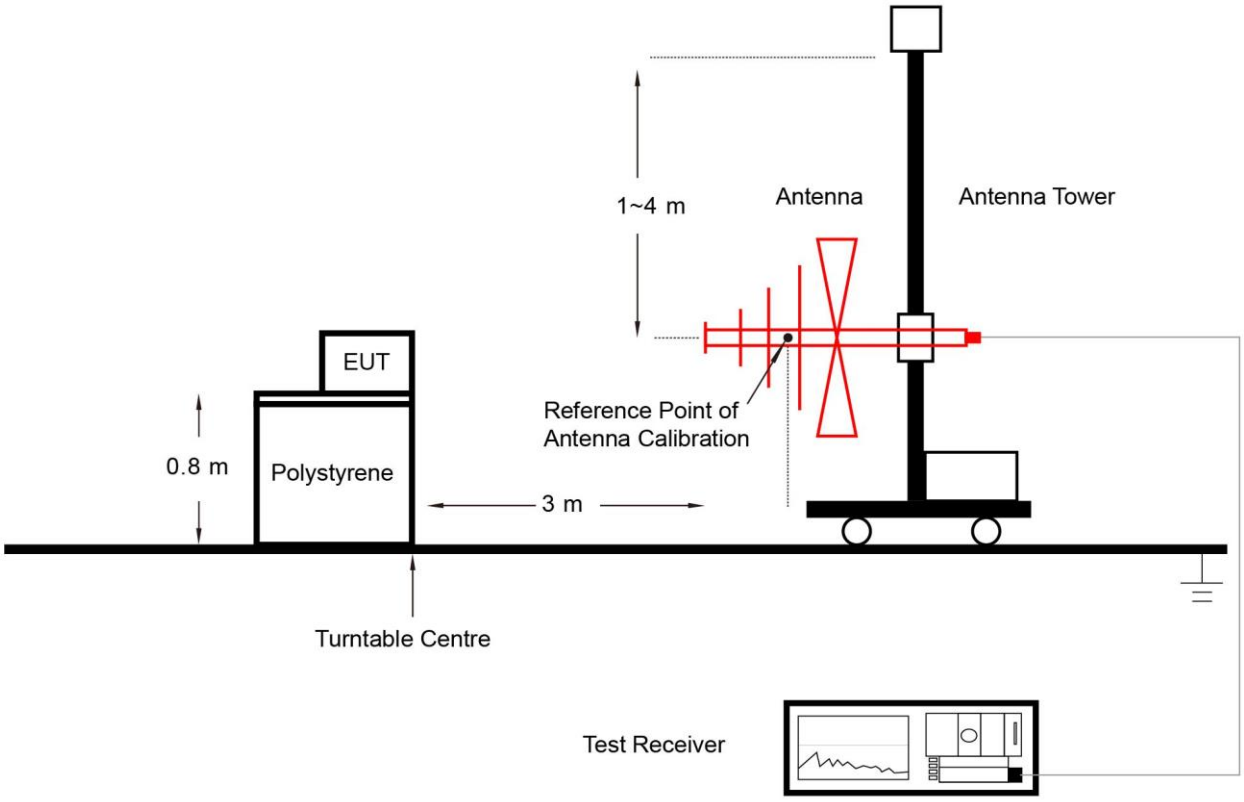
4. As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode
5. Detector = Peak
6. Sweep time = Auto
7. Trace mode = Max hold
8. Trace was allowed to stabilize

6.7.4. Test Setup

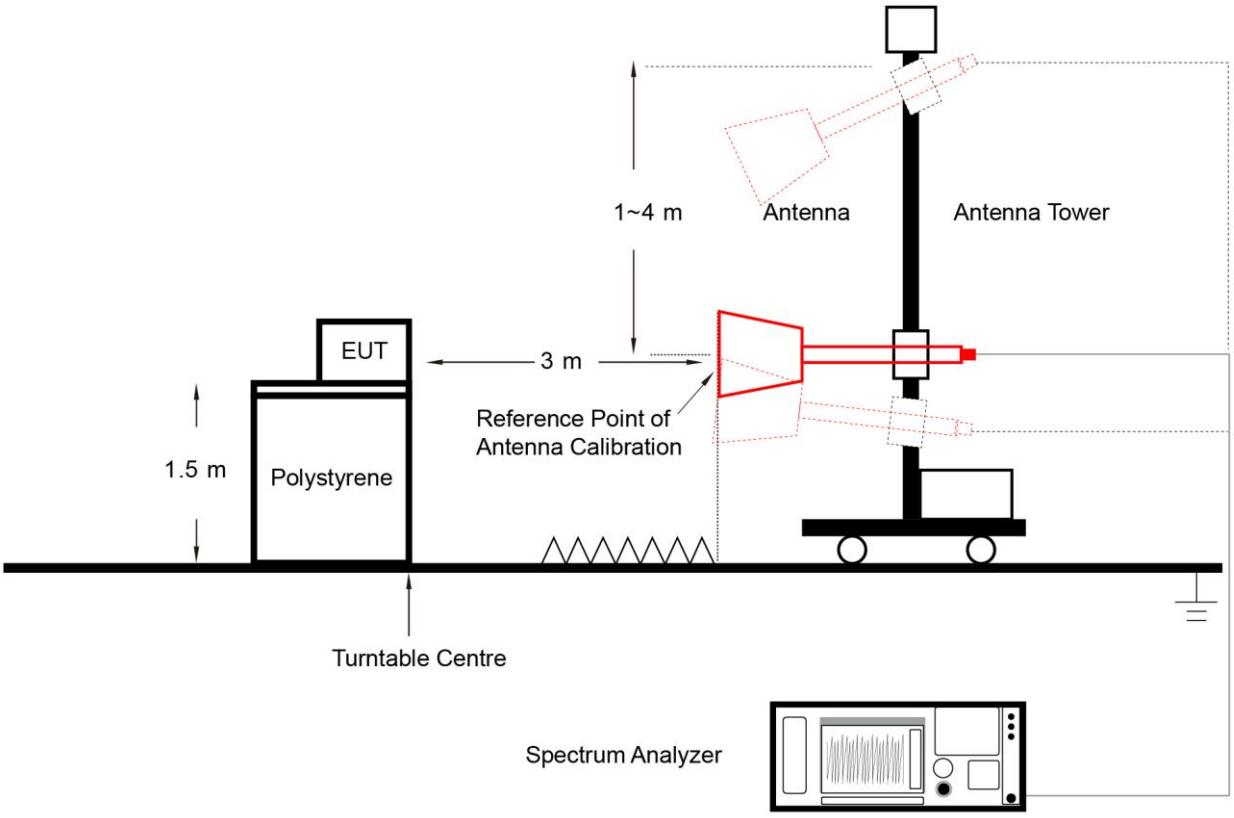
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.7.5. Test Result

Refer to Appendix A.7.

6.8. Radiated Band Edge Measurement

6.8.1. Test Limit

For 15.407(b) requirement:

For transmitters operating solely in the 5.850-5.895 GHz band or operating on a channel that spans across 5.725-5.895 GHz:

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

All emissions below 5.725 GHz shall not exceed an e.i.r.p. of −27 dBm/MHz at 5.65 GHz increasing linearly to 10 dBm/MHz at 5.7 GHz, and from 5.7 GHz increasing linearly to a level of 15.6 dBm/MHz at 5.72 GHz, and from 5.72 GHz increasing linearly to a level of 27 dBm/MHz at 5.725 GHz.

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

6.8.2. Test Procedure

KDB 789033 D02v02r01- Section G

6.8.3. Test Setting

Peak Measurements above 1GHz

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

Average Measurements above 1GHz (Method VB)

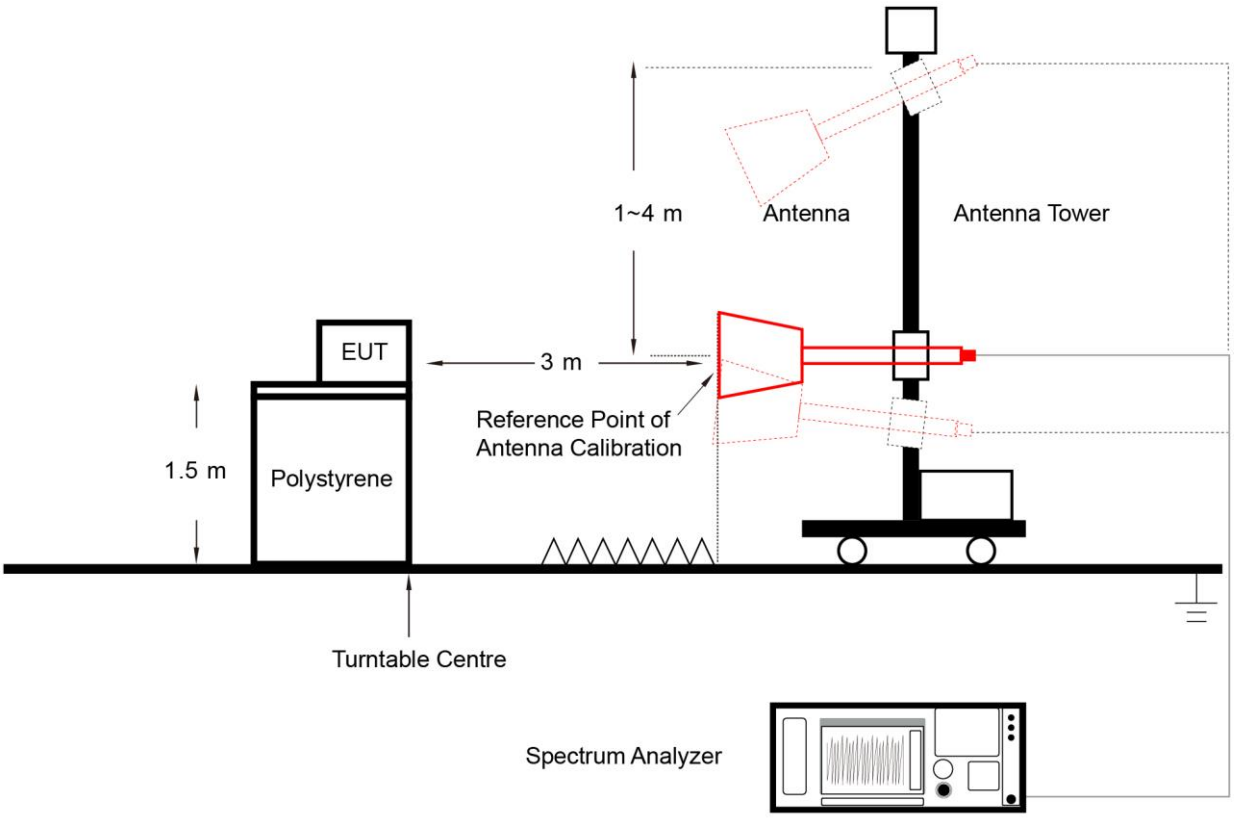
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; if the EUT is configured to transmit with duty cycle ≥ 98%, set VBW = 10Hz

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

802.11a	VBW = 510Hz	802.11ax-HE80	VBW = 2700Hz
802.11ac-VHT20	VBW = 560Hz	802.11ax-HE160	VBW = 4300Hz
802.11ac-VHT40	VBW = 1100Hz	802.11be-EHT20	VBW = 680Hz
802.11ac-VHT80	VBW = 2200Hz	802.11be-EHT40	VBW = 1300Hz
802.11ac-VHT160	VBW = 4300Hz	802.11be-EHT80	VBW = 2700Hz
802.11ax-HE20	VBW = 680Hz	802.11be-EHT160	VBW = 4300Hz
802.11ax-HE40	VBW = 1300Hz	--	--

4. As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode
5. Detector = Peak
6. Sweep time = Auto
7. Trace mode = Max hold
8. Trace was allowed to stabilize

6.8.4. Test Setup



6.8.5. Test Result

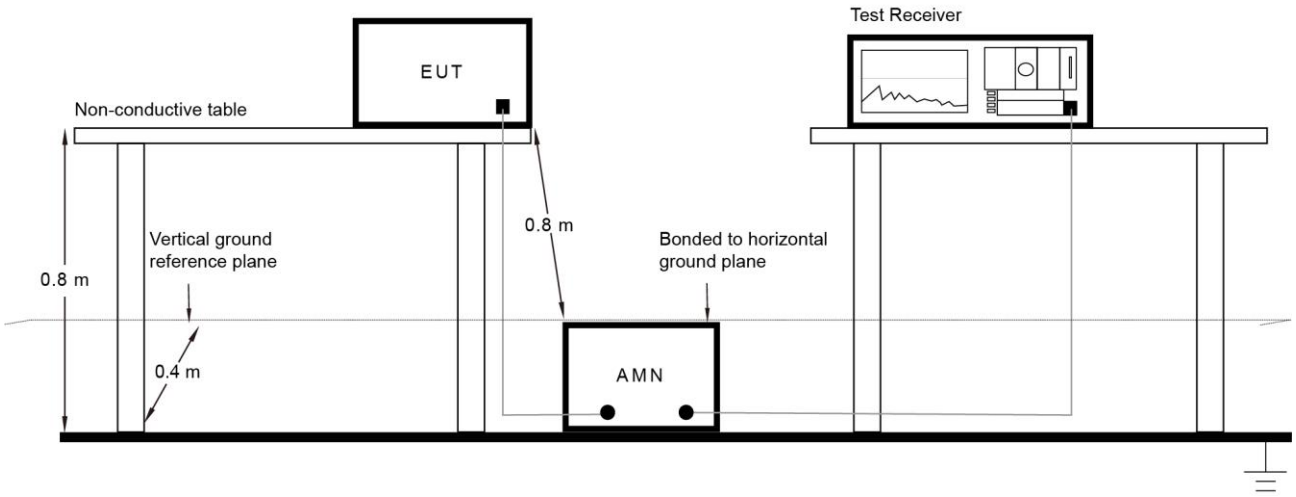
Refer to Appendix A.8.

6.9. AC Conducted Emissions Measurement

6.9.1. Test Limit

FCC Part 15.207 Limits		
Frequency (MHz)	QP (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

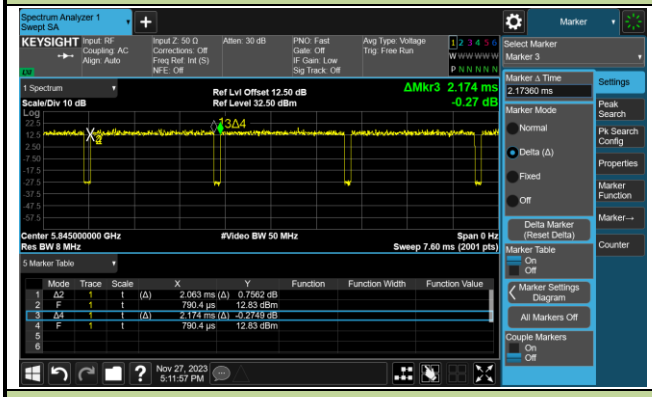
A.1 Duty Cycle Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-11-27~2023-11-28		

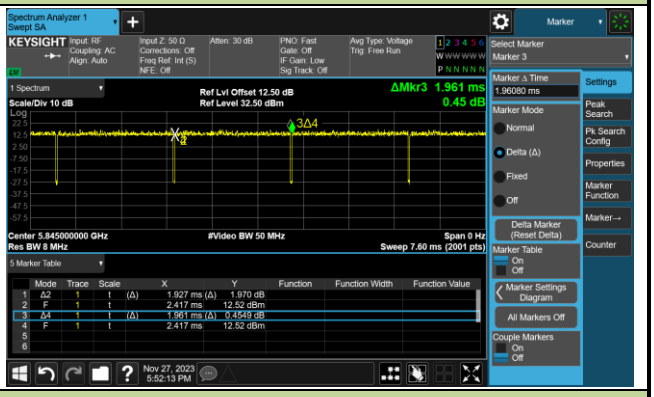
Test Mode	Duty Cycle	Test Mode	Duty Cycle
802.11a	94.89%	802.11ax-HE80	92.68%
802.11ac-VHT20	98.27%	802.11ax-HE160	88.05%
802.11ac-VHT40	96.65%	802.11be-EHT20	97.71%
802.11ac-VHT80	93.31%	802.11be-EHT40	95.95%
802.11ac-VHT160	88.48%	802.11be-EHT80	92.31%
802.11ax-HE20	97.71%	802.11be-EHT160	87.91%
802.11ax-HE40	96.06%	--	--

Duty Cycle (T = Transmission Duration)

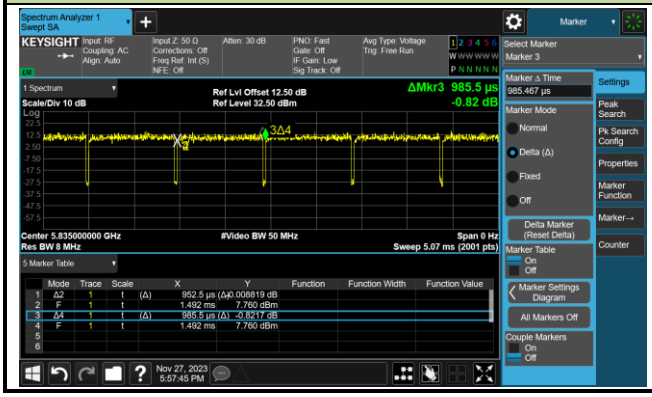
802.11a (T = 2.063ms)



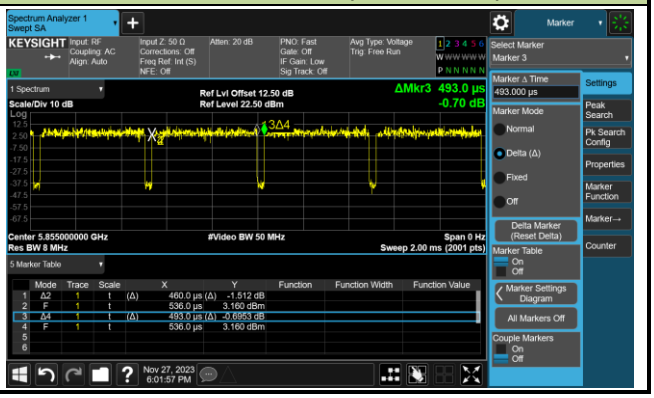
802.11ac-VHT20 (T = 1.927ms)

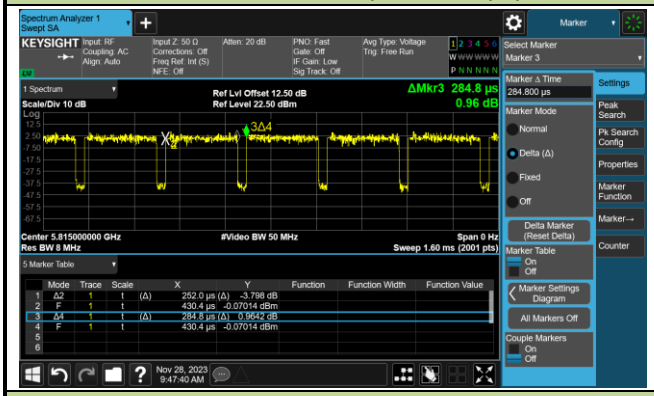
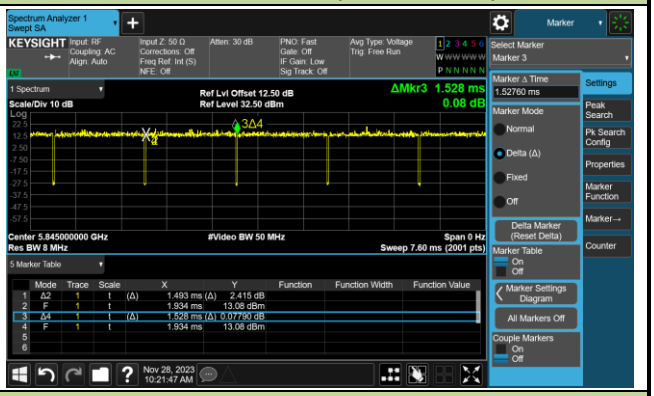
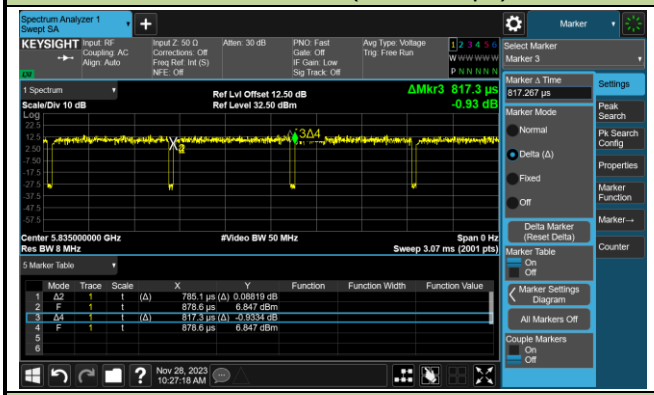
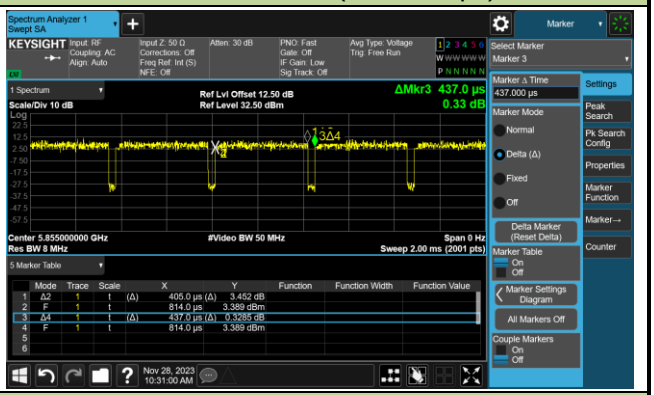
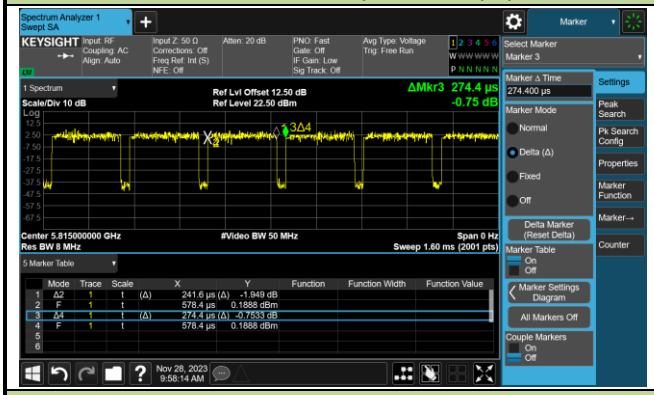
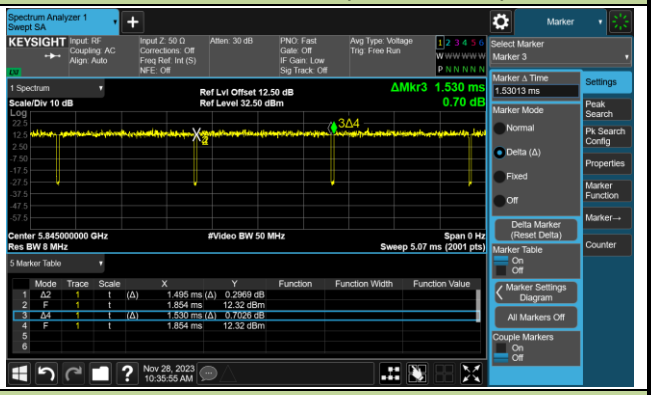
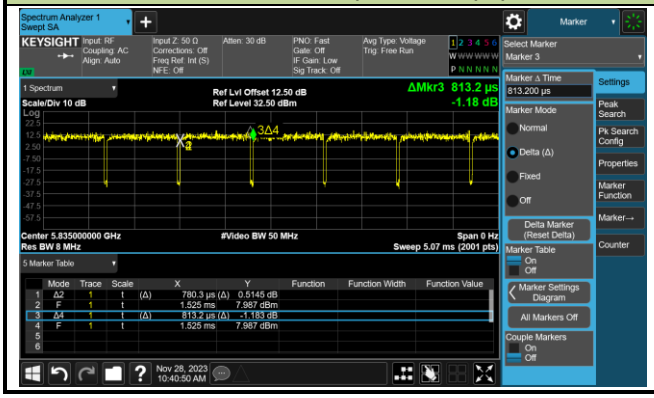
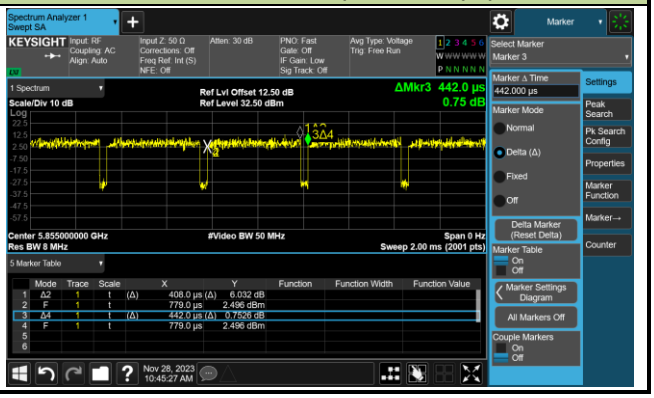


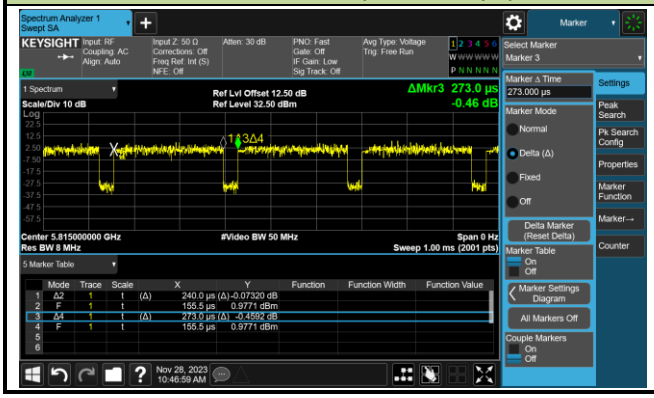
802.11ac-VHT40 (T = 952.5us)



802.11ac-VHT80 (T = 460.0us)



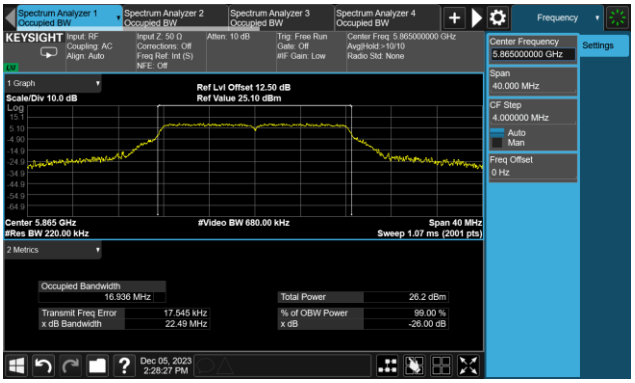
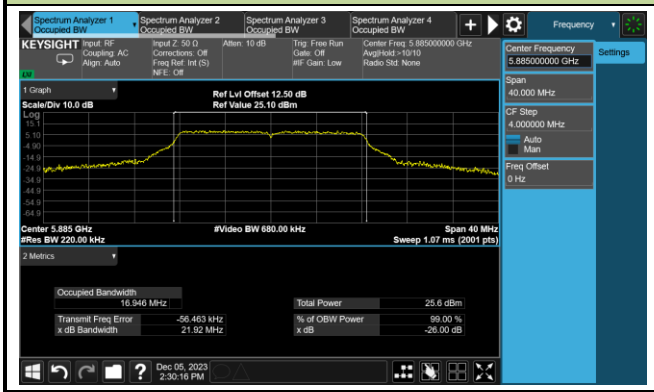
Duty Cycle (T = Transmission Duration)	
802.11ac-VHT160 (T = 252.0μs)	802.11ax-HE20 (T = 1.493ms)
	
802.11ax-HE40 (T = 785.1μs)	802.11ax-HE80 (T = 405.0μs)
	
802.11ax-HE160 (T = 241.6μs)	802.11be-EHT20 (T = 1.495ms)
	
802.11be-HE40 (T = 780.3μs)	802.11be-HE80 (T = 408.0μs)
	

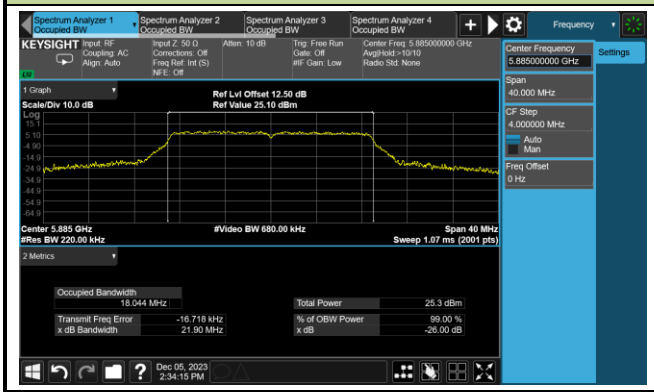
Duty Cycle (T = Transmission Duration)	
802.11be-HE160 (T = 240.0μs)	
	

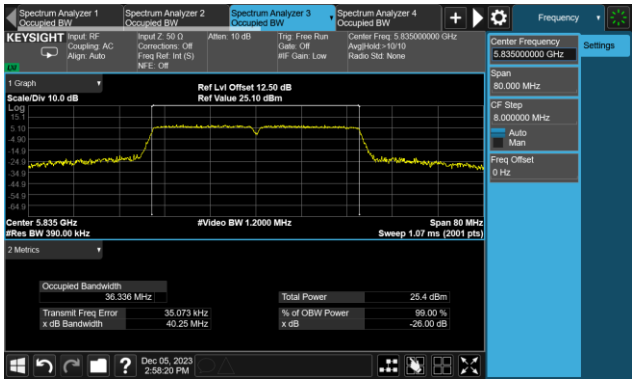
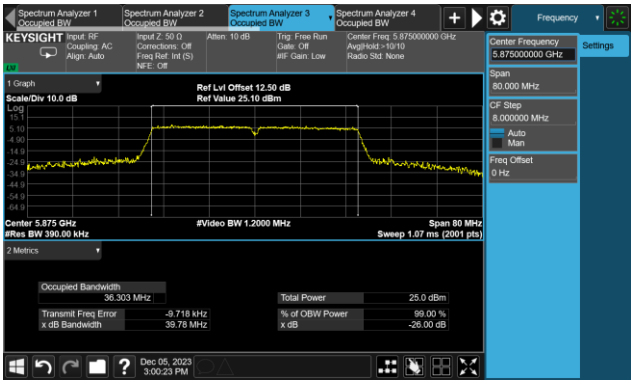
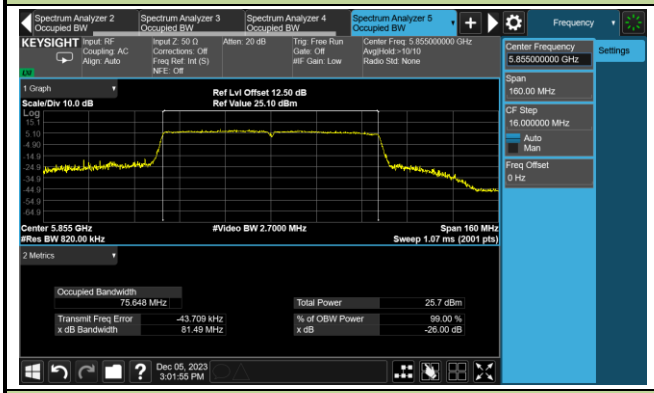
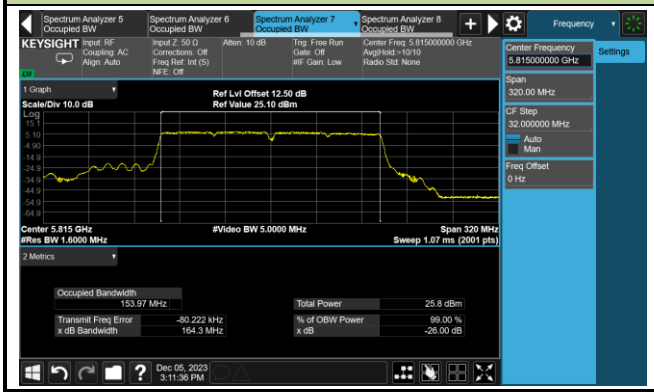
A.2 26dB & 99% Bandwidth Test Result

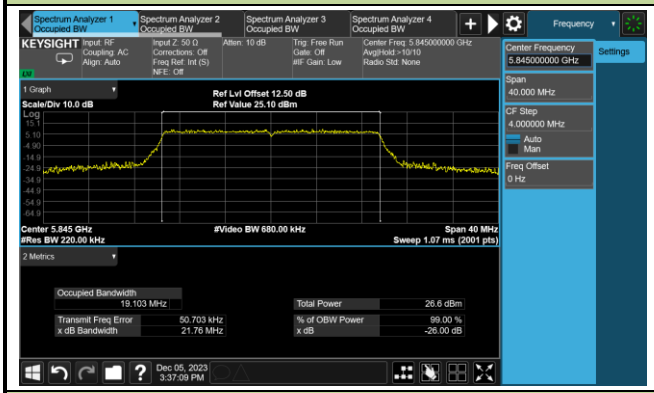
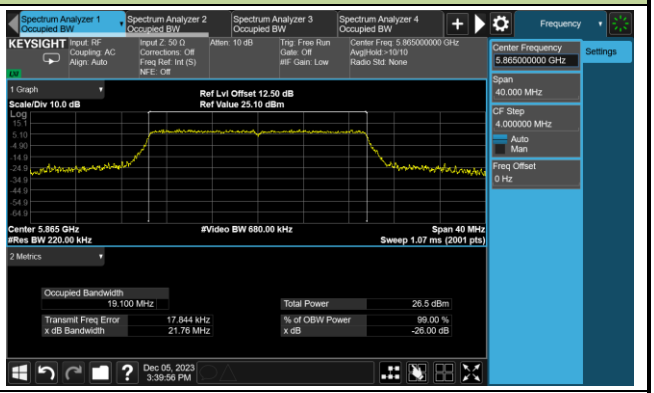
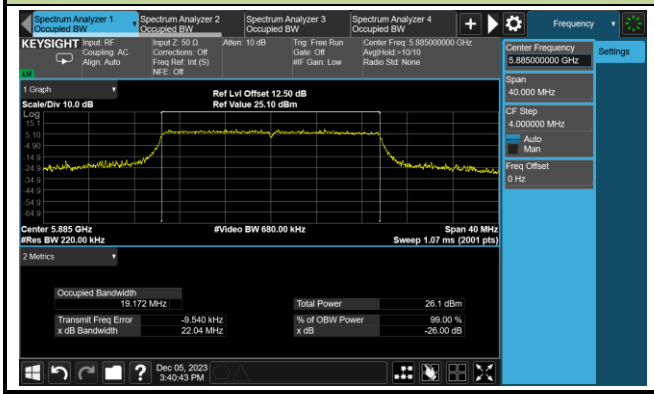
Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-12-05		

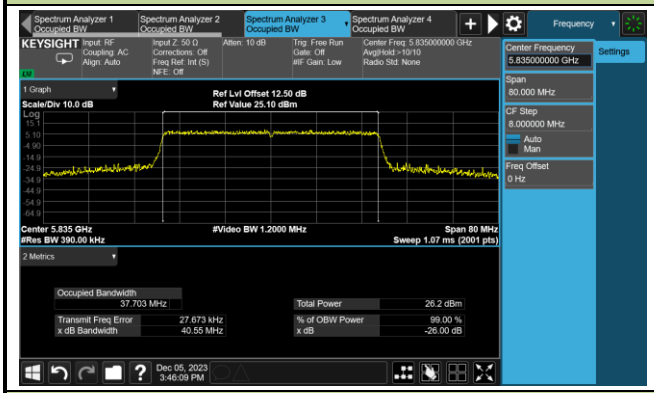
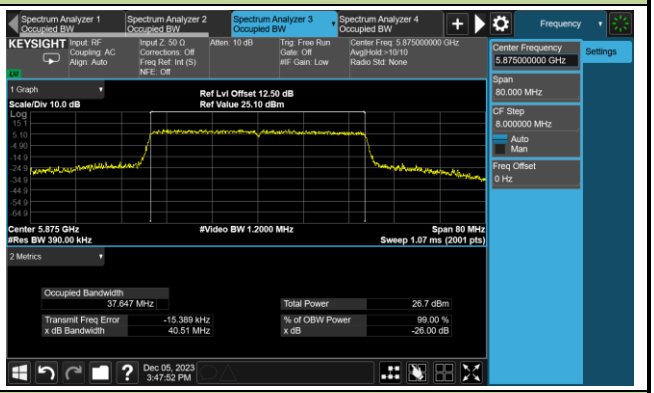
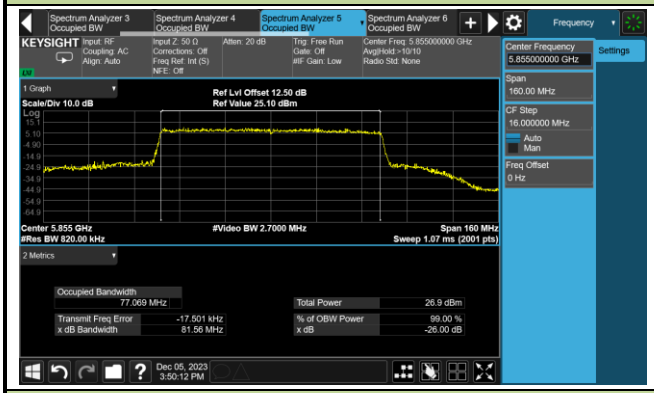
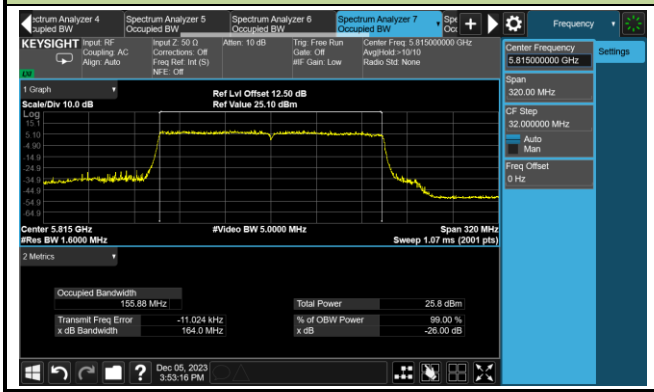
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
11a	6Mbps	169	5845	16.883	22.50
11a	6Mbps	173	5865	16.936	22.49
11a	6Mbps	177	5885	16.946	21.92
11ac-VHT20	MCS0	169	5845	18.192	22.57
11ac-VHT20	MCS0	173	5865	18.085	22.33
11ac-VHT20	MCS0	177	5885	18.044	21.90
11ac-VHT40	MCS0	167	5835	36.336	40.25
11ac-VHT40	MCS0	175	5875	36.303	39.78
11ac-VHT80	MCS0	171	5855	75.648	81.49
11ac-VHT160	MCS0	163	5815	153.97	164.3
11ax-HE20	MCS0	169	5845	19.103	21.76
11ax-HE20	MCS0	173	5865	19.100	21.76
11ax-HE20	MCS0	177	5885	19.172	22.04
11ax-HE40	MCS0	167	5835	37.703	40.55
11ax-HE40	MCS0	175	5875	37.647	40.51
11ax-HE80	MCS0	171	5855	77.069	81.56
11ax-HE160	MCS0	163	5815	155.88	164.0
11be-EHT20	MCS0	169	5845	19.127	21.58
11be-EHT20	MCS0	173	5865	19.100	21.76
11be-EHT20	MCS0	177	5885	19.109	21.62
11be-EHT40	MCS0	167	5835	37.730	40.79
11be-EHT40	MCS0	175	5875	37.737	40.43
11be-EHT80	MCS0	171	5855	77.230	82.28
11be-EHT160	MCS0	163	5815	155.89	163.2

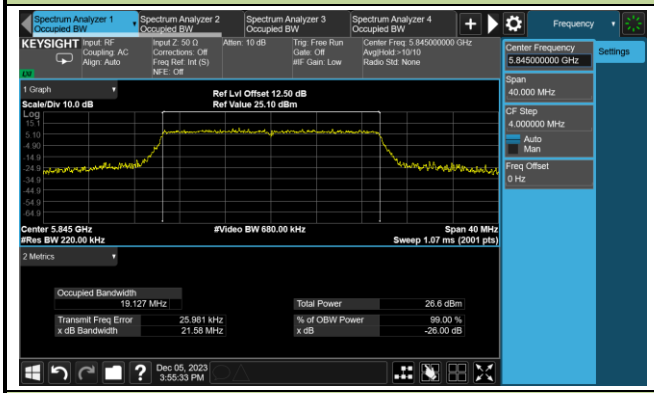
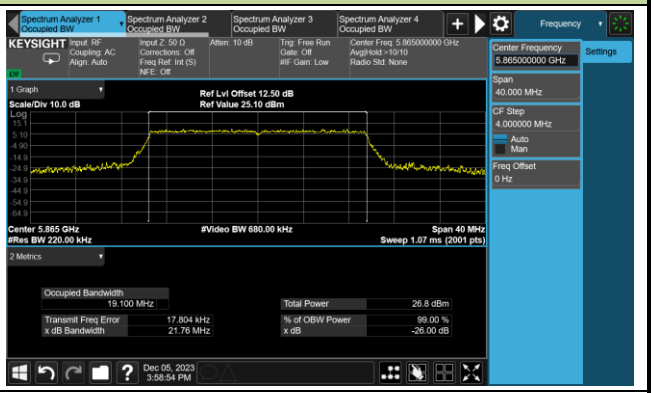
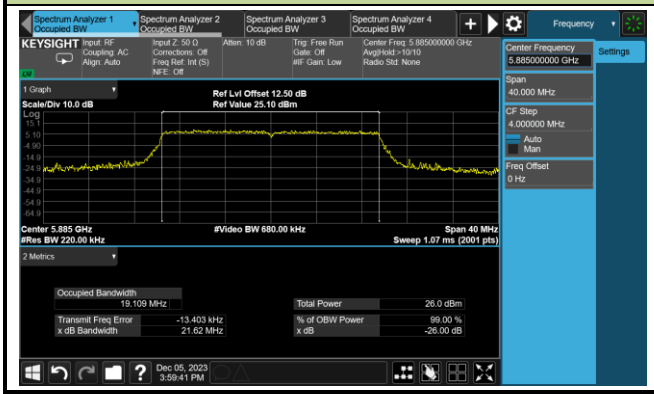
802.11a 26dB & 99% Bandwidth	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

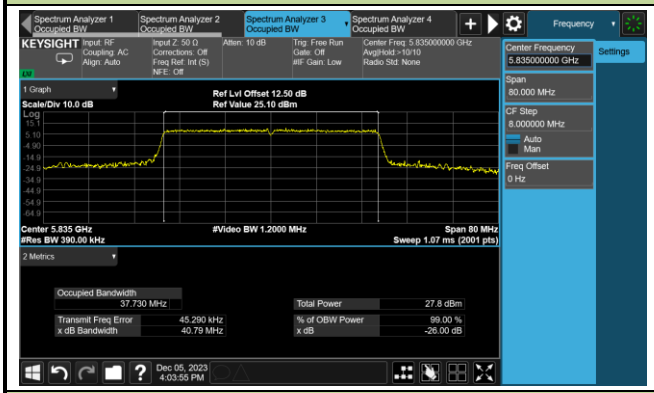
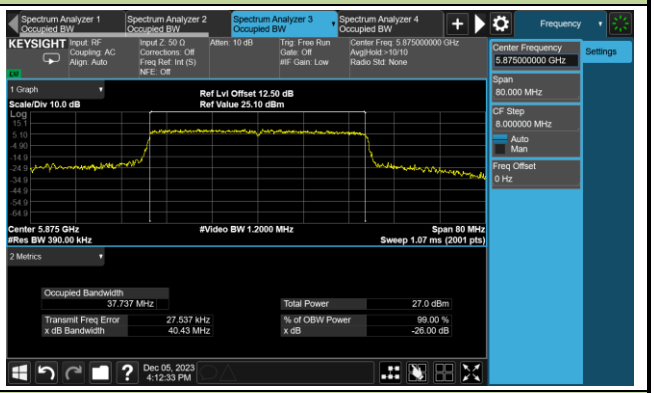
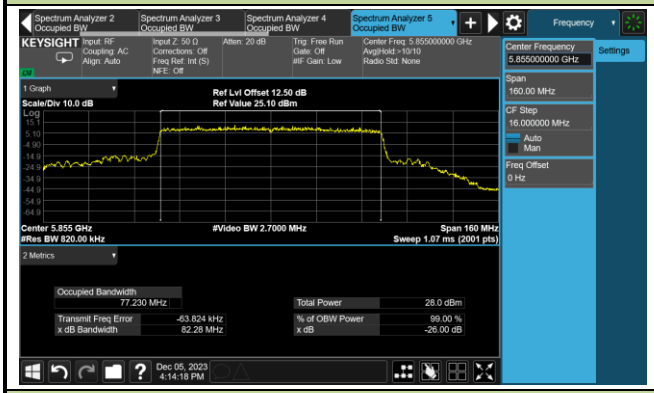
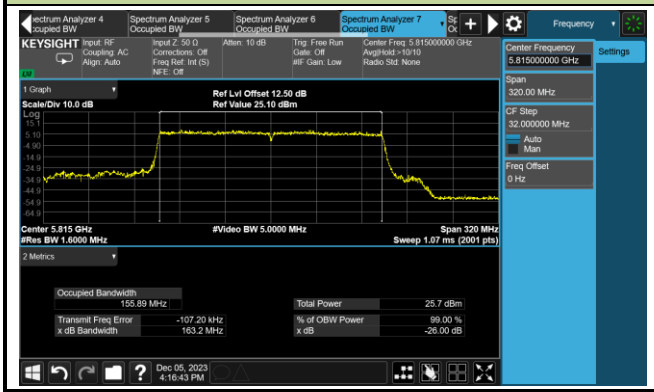
802.11ac-VHT20 26dB & 99% Bandwidth	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

802.11ac-VHT40 26dB & 99% Bandwidth	
Channel 167 (5835MHz)	Channel 175(5875MHz)
	
802.11ac-VHT80 26dB & 99% Bandwidth	
Channel 171 (5855MHz)	
	
802.11ac-VHT160 26dB & 99% Bandwidth	
Channel 163 (5815MHz)	
	

802.11ax-HE20 26dB & 99% Bandwidth	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

802.11ax-HE40 26dB & 99% Bandwidth	
Channel 167 (5835MHz)	Channel 175(5875MHz)
	
802.11ax-HE80 26dB & 99% Bandwidth	
Channel 171 (5855MHz)	
	
802.11ax-HE160 26dB & 99% Bandwidth	
Channel 163 (5815MHz)	
	

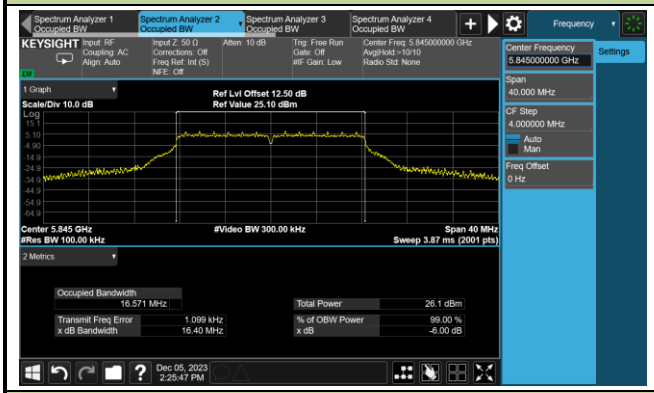
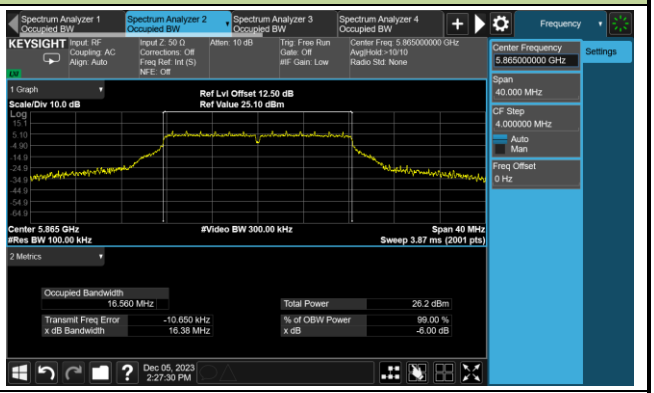
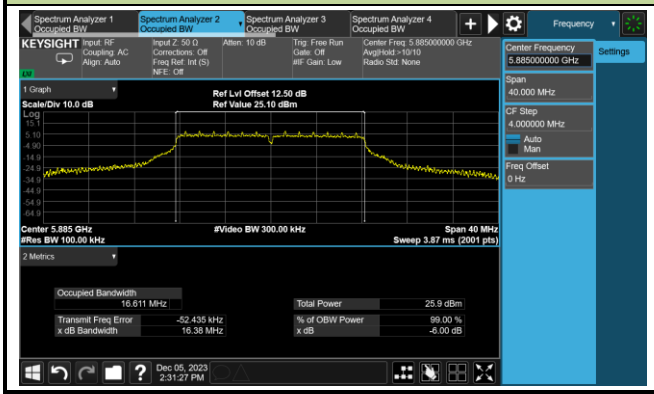
802.11be-EHT20 26dB & 99% Bandwidth	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

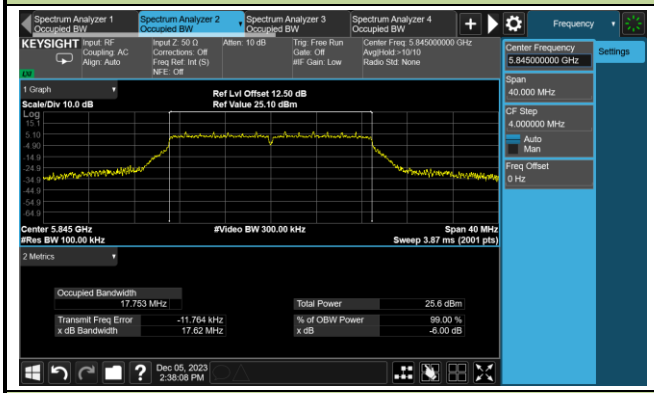
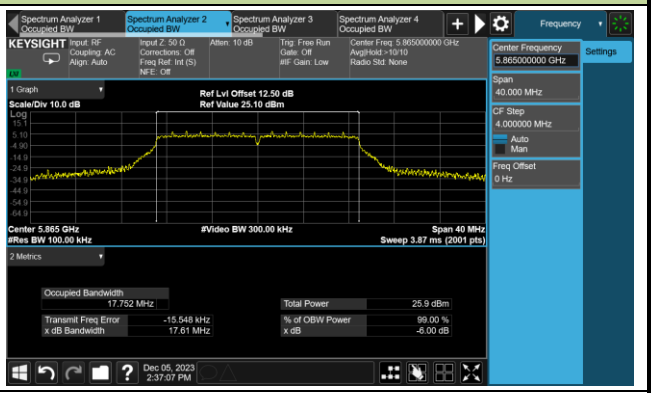
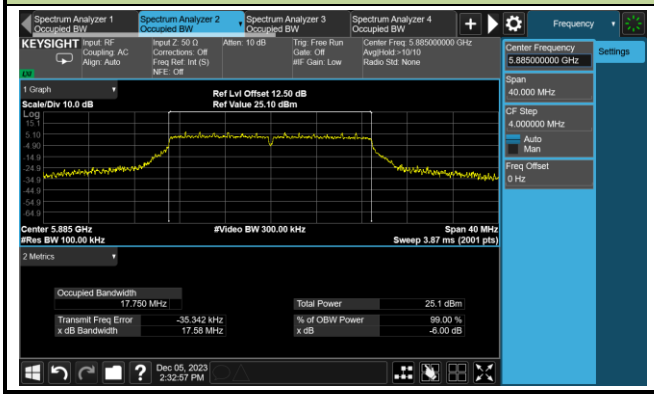
802.11be-EHT40 26dB & 99% Bandwidth	
Channel 167 (5835MHz)	Channel 175(5875MHz)
	
802.11be-EHT80 26dB & 99% Bandwidth	
Channel 171 (5855MHz)	
	
802.11be-EHT160 26dB & 99% Bandwidth	
Channel 163 (5815MHz)	
	

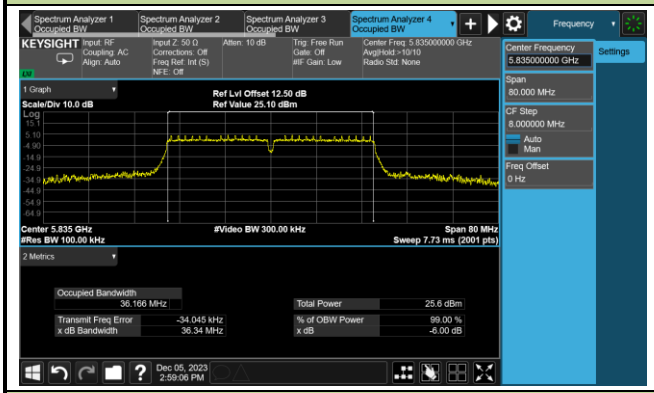
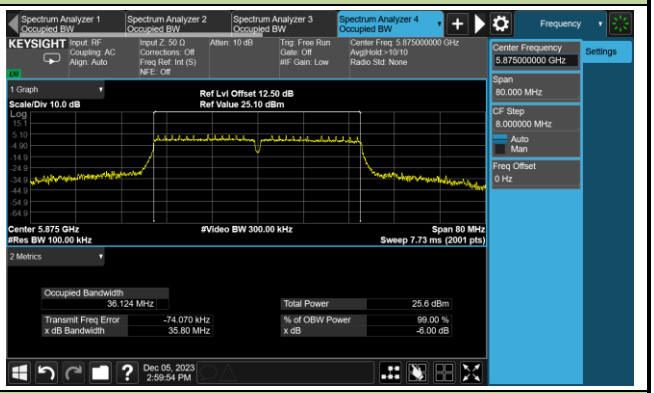
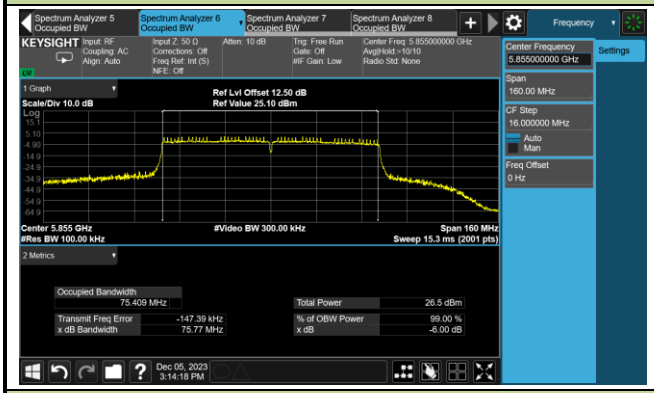
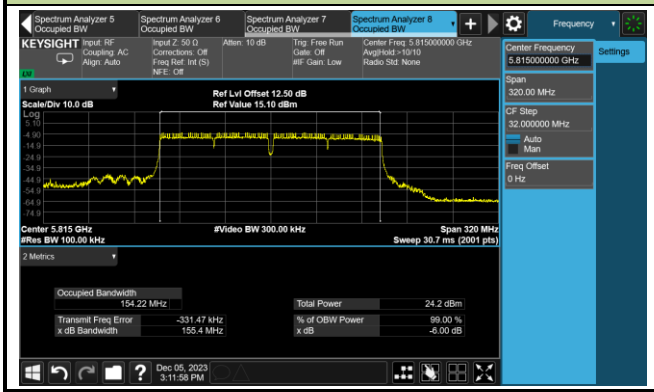
A.3 6dB Bandwidth Test Result

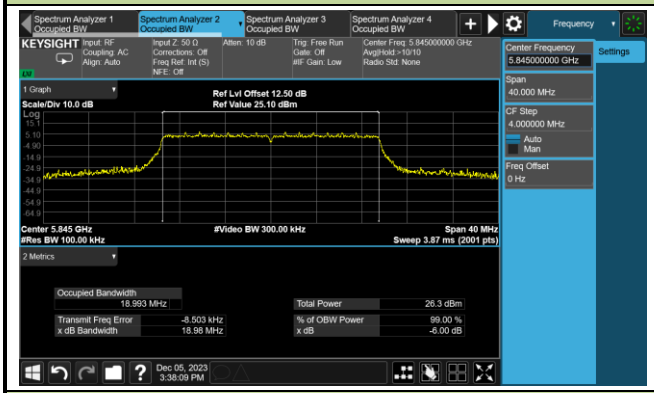
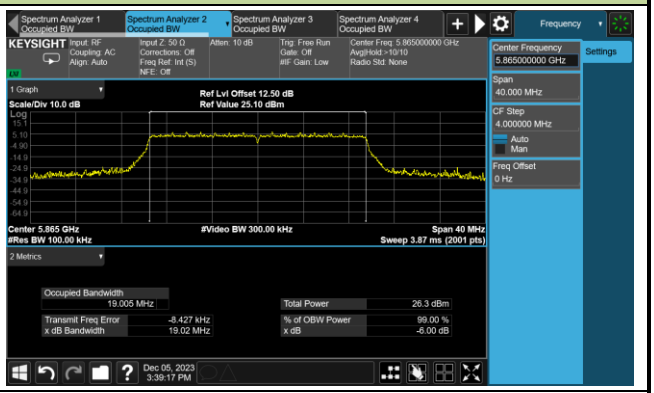
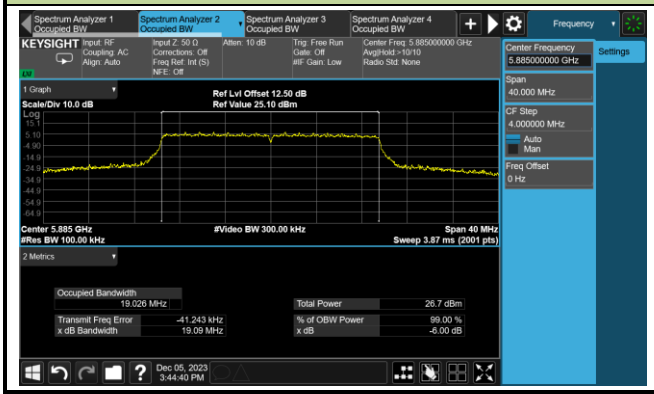
Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-12-05		

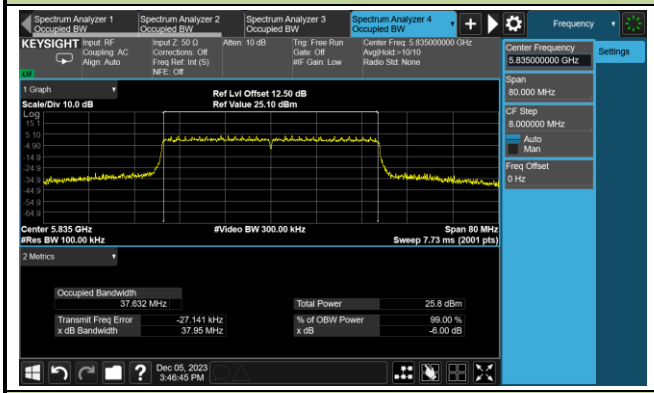
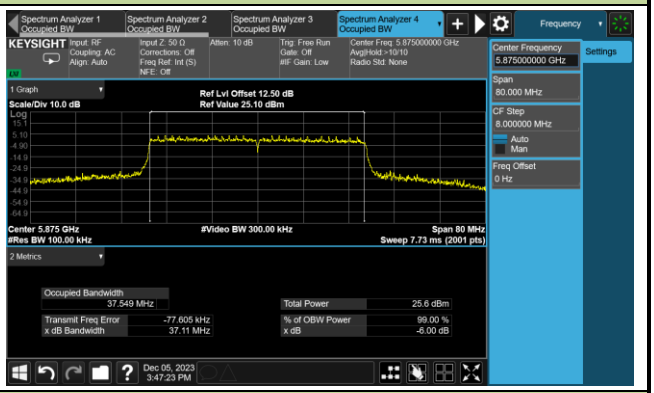
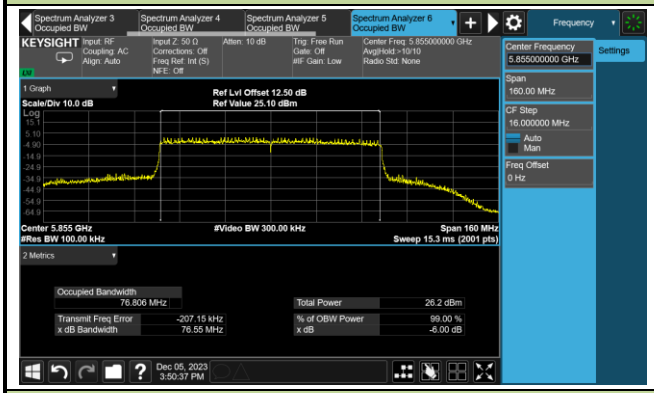
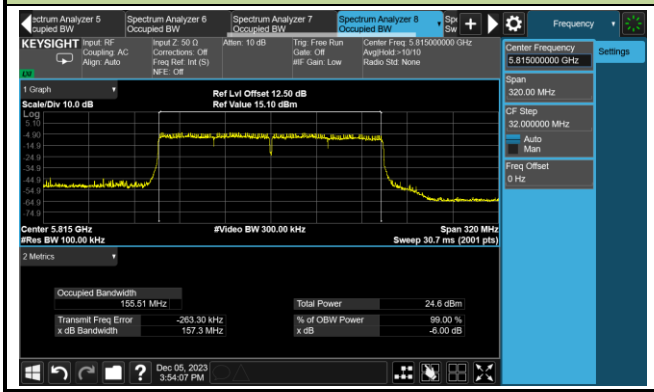
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
11a	6Mbps	169	5845	16.40	≥ 0.5
11a	6Mbps	173	5865	16.38	≥ 0.5
11a	6Mbps	177	5885	16.38	≥ 0.5
11ac-VHT20	MCS0	169	5845	17.62	≥ 0.5
11ac-VHT20	MCS0	173	5865	17.61	≥ 0.5
11ac-VHT20	MCS0	177	5885	17.58	≥ 0.5
11ac-VHT40	MCS0	167	5835	36.34	≥ 0.5
11ac-VHT40	MCS0	175	5875	35.80	≥ 0.5
11ac-VHT80	MCS0	171	5855	75.77	≥ 0.5
11ac-VHT160	MCS0	163	5815	155.4	≥ 0.5
11ax-HE20	MCS0	169	5845	18.98	≥ 0.5
11ax-HE20	MCS0	173	5865	19.02	≥ 0.5
11ax-HE20	MCS0	177	5885	19.09	≥ 0.5
11ax-HE40	MCS0	167	5835	37.95	≥ 0.5
11ax-HE40	MCS0	175	5875	37.11	≥ 0.5
11ax-HE80	MCS0	171	5855	76.55	≥ 0.5
11ax-HE160	MCS0	163	5815	157.3	≥ 0.5
11be-EHT20	MCS0	169	5845	19.00	≥ 0.5
11be-EHT20	MCS0	173	5865	19.02	≥ 0.5
11be-EHT20	MCS0	177	5885	19.07	≥ 0.5
11be-EHT40	MCS0	167	5835	38.06	≥ 0.5
11be-EHT40	MCS0	175	5875	37.55	≥ 0.5
11be-EHT80	MCS0	171	5855	77.51	≥ 0.5
11be-EHT160	MCS0	163	5815	156.5	≥ 0.5

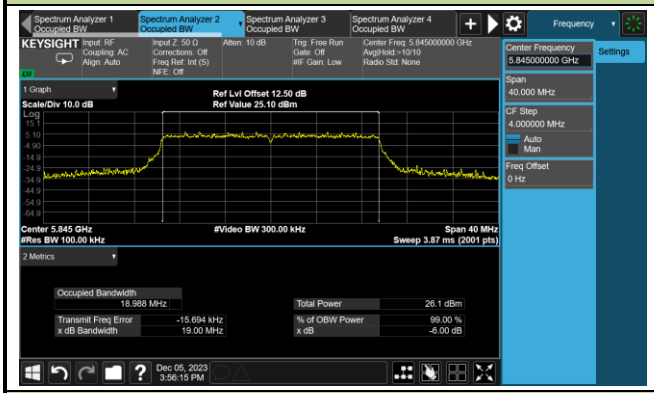
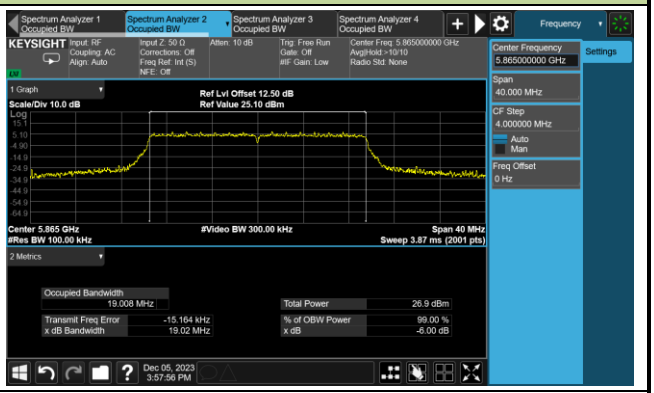
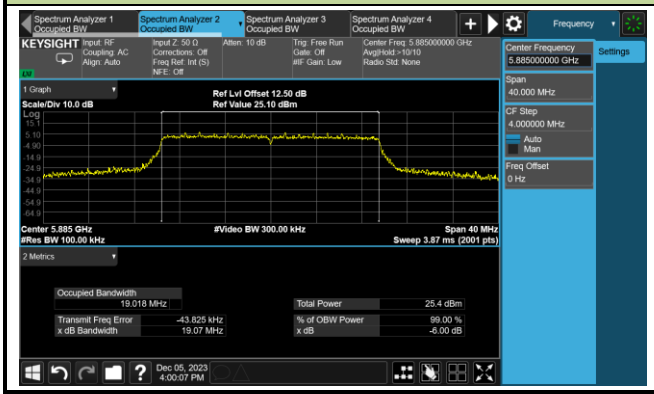
802.11a 6dB Bandwidth	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

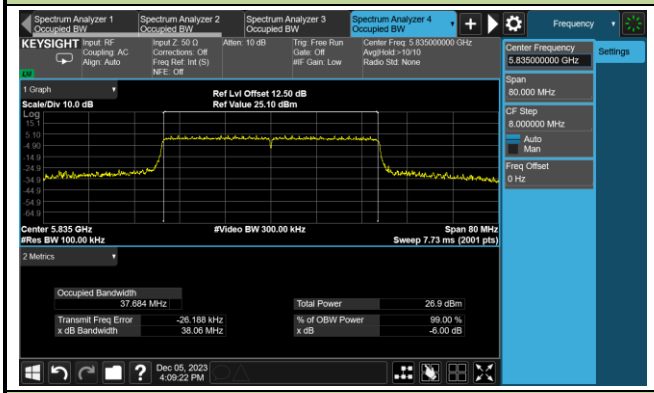
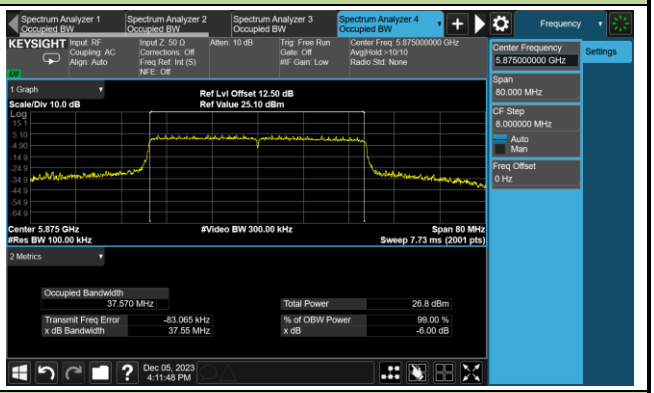
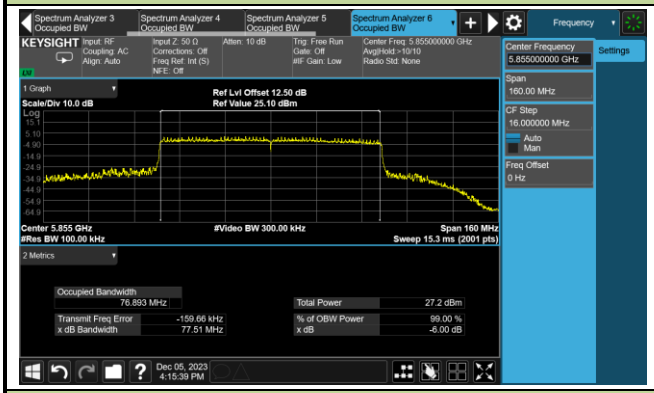
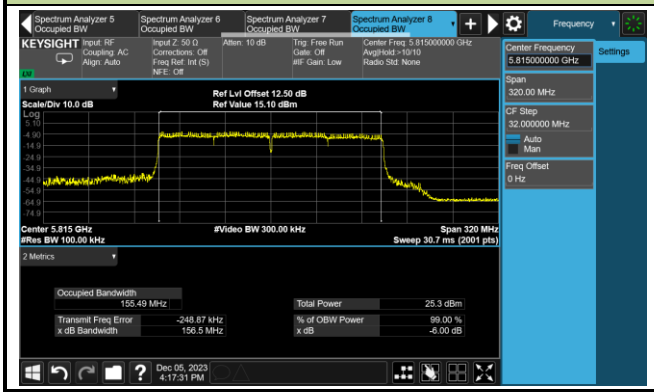
802.11ac-VHT20 6dB Bandwidth	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

802.11ac-VHT40 6dB Bandwidth	
Channel 167 (5835MHz)	Channel 175(5875MHz)
	
802.11ac-VHT80 6dB Bandwidth	
Channel 171 (5855MHz)	
	
802.11ac-VHT160 6dB Bandwidth	
Channel 163 (5815MHz)	
	

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

802.11ax-HE40 6dB Bandwidth	
Channel 167 (5835MHz)	Channel 175(5875MHz)
	
802.11ax-HE80 6dB Bandwidth	
Channel 171 (5855MHz)	
	
802.11ax-HE160 6dB Bandwidth	
Channel 163 (5815MHz)	
	

802.11be-EHT20 6dB Bandwidth	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)	
	

802.11be-EHT40 6dB Bandwidth	
Channel 167 (5835MHz)	Channel 175(5875MHz)
	
802.11be-EHT80 6dB Bandwidth	
Channel 171 (5855MHz)	
	
802.11be-EHT160 6dB Bandwidth	
Channel 163 (5815MHz)	
	

A.4 Output Power Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-11-29~2023-12-05		

Test Mode	Data Rate MCS	Channel No.	Freq. (MHz)	Average Power (dBm)		Total Average Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)
				Ant 5	Ant 2				
11a	6Mbps	169	5845	18.42	18.33	21.39	4.08	25.47	≤ 36.00
11a	6Mbps	173	5865	18.46	18.45	21.47	4.08	25.55	≤ 36.00
11a	6Mbps	177	5885	18.29	17.95	21.13	4.08	25.21	≤ 36.00
11ac-VHT20	MCS0	169	5845	18.33	18.19	21.27	4.08	25.35	≤ 36.00
11ac-VHT20	MCS0	173	5865	18.49	18.36	21.44	4.08	25.52	≤ 36.00
11ac-VHT20	MCS0	177	5885	18.29	18.08	21.20	4.08	25.28	≤ 36.00
11ac-VHT40	MCS0	167	5835	18.35	18.20	21.29	4.08	25.37	≤ 36.00
11ac-VHT40	MCS0	175	5875	18.33	17.93	21.14	4.08	25.22	≤ 36.00
11ac-VHT80	MCS0	171	5855	18.23	17.93	21.09	4.08	25.17	≤ 36.00
11ac-VHT160	MCS0	163	5815	15.62	15.71	18.68	4.08	22.76	≤ 36.00
11ax-HE20	MCS0	169	5845	18.43	18.20	21.33	4.08	25.41	≤ 36.00
11ax-HE20	MCS0	173	5865	18.46	17.98	21.24	4.08	25.32	≤ 36.00
11ax-HE20	MCS0	177	5885	18.28	17.83	21.07	4.08	25.15	≤ 36.00
11ax-HE40	MCS0	167	5835	18.37	18.05	21.22	4.08	25.30	≤ 36.00
11ax-HE40	MCS0	175	5875	18.35	17.99	21.18	4.08	25.26	≤ 36.00
11ax-HE80	MCS0	171	5855	18.12	17.80	20.97	4.08	25.05	≤ 36.00
11ax-HE160	MCS0	163	5815	15.43	15.69	18.57	4.08	22.65	≤ 36.00
11be-EHT20	MCS0	169	5845	18.41	18.25	21.34	4.08	25.42	≤ 36.00
11be-EHT20	MCS0	173	5865	18.43	18.19	21.32	4.08	25.40	≤ 36.00
11be-EHT20	MCS0	177	5885	18.13	17.76	20.96	4.08	25.04	≤ 36.00
11be-EHT40	MCS0	167	5835	18.43	17.91	21.19	4.08	25.27	≤ 36.00
11be-EHT40	MCS0	175	5875	18.28	17.86	21.09	4.08	25.17	≤ 36.00
11be-EHT80	MCS0	171	5855	18.47	17.90	21.20	4.08	25.28	≤ 36.00
11be-EHT160	MCS0	163	5815	15.82	16.03	18.94	4.08	23.02	≤ 36.00

Note 1: Total Average Power (dBm) = 10*log {$10^{(\text{Ant 5 Average Power /10})}$ + $10^{(\text{Ant 2 Average Power /10})}$}.

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

A.5 Power Spectral Density Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-11-29~2023-12-05		

Normal Mode

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	AVGPSD (dBm/MHz)		Duty Cycle (%)	Total PSD (dBm/ MHz)	EIRP PSD (dBm/ MHz)	EIRP PSD Limit (dBm/MHz)
				Ant 5	Ant 2				
11a	6Mbps	169	5845	7.189	6.722	94.89	10.20	14.28	≤ 20.00
11a	6Mbps	173	5865	7.233	7.106	94.89	10.41	14.49	≤ 20.00
11a	6Mbps	177	5885	7.007	6.748	94.89	10.12	14.20	≤ 20.00
11ac-VHT20	MCS0	169	5845	6.707	6.347	98.27	9.54	13.62	≤ 20.00
11ac-VHT20	MCS0	173	5865	6.993	6.646	98.27	9.83	13.91	≤ 20.00
11ac-VHT20	MCS0	177	5885	6.730	6.314	98.27	9.54	13.62	≤ 20.00
11ac-VHT40	MCS0	167	5835	4.093	3.514	96.65	6.97	11.05	≤ 20.00
11ac-VHT40	MCS0	175	5875	3.990	3.441	96.65	6.88	10.96	≤ 20.00
11ac-VHT80	MCS0	171	5855	0.842	0.262	93.31	3.87	7.95	≤ 20.00
11ac-VHT160	MCS0	163	5815	-5.059	-4.613	88.48	-1.29	2.79	≤ 20.00
11ax-HE20	MCS0	169	5845	6.480	6.137	97.71	9.42	13.50	≤ 20.00
11ax-HE20	MCS0	173	5865	6.572	6.021	97.71	9.42	13.50	≤ 20.00
11ax-HE20	MCS0	177	5885	6.545	6.216	97.71	9.49	13.57	≤ 20.00
11ax-HE40	MCS0	167	5835	3.641	3.343	96.06	6.68	10.76	≤ 20.00
11ax-HE40	MCS0	175	5875	4.003	3.462	96.06	6.93	11.01	≤ 20.00
11ax-HE80	MCS0	171	5855	0.798	0.437	92.68	3.96	8.04	≤ 20.00
11ax-HE160	MCS0	163	5815	-4.960	-4.470	88.05	-1.15	2.93	≤ 20.00
11be-EHT20	MCS0	169	5845	6.614	6.243	97.71	9.54	13.62	≤ 20.00
11be-EHT20	MCS0	173	5865	6.568	6.178	97.71	9.49	13.57	≤ 20.00
11be-EHT20	MCS0	177	5885	6.432	6.060	97.71	9.36	13.44	≤ 20.00
11be-EHT40	MCS0	167	5835	3.480	3.132	95.95	6.50	10.58	≤ 20.00
11be-EHT40	MCS0	175	5875	3.604	3.234	95.95	6.61	10.69	≤ 20.00
11be-EHT80	MCS0	171	5855	1.127	0.493	92.31	4.18	8.26	≤ 20.00
11be-EHT160	MCS0	163	5815	-4.430	-3.748	87.91	-0.51	3.57	≤ 20.00

Note 1: When EUT duty cycle < 98%, the total PSD (dBm/MHz) =10*log $\{10^{(\text{Ant 5 AVGPSD}/10)} + 10^{(\text{Ant 2 AVGPSD}/10)}\}$ +10*log (1/Duty cycle).

When EUT duty cycle ≥ 98%, the total PSD (dBm/MHz) =10*log $\{10^{(\text{Ant 5 AVGPSD}/10)} + 10^{(\text{Ant 2 AVGPSD}/10)}\}$.

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

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

802.11a Power Spectral Density - Ant 5	
Channel 169 (5845MHz)	Channel 173 (5865MHz)
	
Channel 177 (5885MHz)