





# RF MEASUREMENT REPORT

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**FCC ID:** Q9DAPIN0615  
**Applicant:** Hewlett Packard Enterprise Company  
**Product:** ACCESS POINT  
**Model No.:** APIN0615  
**Brand Name:**    
**FCC Classification:** Unlicensed National Information Infrastructure (NII)  
**FCC Rule Part(s):** Part 15 Subpart E (Section 15.407)  
**Result:** Complies  
**Test Date:** 2021-09-10 ~ 2022-06-15

**Reviewed By:** \_\_\_\_\_  
Jame Yuan

**Approved By:** \_\_\_\_\_  
Robin Wu



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 D02v02r01 and KDB 291074 D02v01. Test results reported herein relate only to the  
The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

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### Revision History

Report No.	Version	Description	Issue Date	Note
2108RSU088-U1	Rev. 01	Initial Report	06-22-2022	Valid

CONTENTS

Description	Page
<b>1. General Information .....</b>	<b>6</b>
1.1. Applicant .....	6
1.2. Manufacturer .....	6
1.3. Testing Facility .....	6
1.4. Product Information.....	7
1.5. Radio Specification .....	7
1.6. Working Frequencies .....	8
1.7. Antenna Details.....	8
1.8. Description of Operating Paths.....	9
<b>2. Test Configuration .....</b>	<b>10</b>
2.1. Test Mode.....	10
2.2. Test System Connection Diagram.....	11
2.3. Applied Standards.....	11
2.4. Test Environment Condition .....	11
<b>3. Antenna Requirements .....</b>	<b>12</b>
<b>4. Measuring Instrument .....</b>	<b>13</b>
<b>5. Decision Rules and Measurement Uncertainty .....</b>	<b>14</b>
5.1. Decision Rules .....	14
5.2. Measurement Uncertainty.....	14
<b>6. Test Result.....</b>	<b>15</b>
6.1. Summary.....	15
6.2. 26dB & 99% Bandwidth Measurement.....	16
6.2.1. Test Limit.....	16
6.2.2. Test Procedure.....	16
6.2.3. Test Setting .....	16
6.2.4. Test Setup .....	17
6.2.5. Test Result .....	17
6.3. 6dB Bandwidth Measurement.....	18
6.3.1. Test Limit.....	18
6.3.2. Test Procedure.....	18
6.3.3. Test Setting .....	18
6.3.4. Test Setup .....	18
6.3.5. Test Result .....	18
6.4. Output Power Measurement.....	19
6.4.1. Test Limit.....	19

6.4.2.	Test Procedure .....	19
6.4.3.	Test Setting .....	19
6.4.4.	Test Setup .....	19
6.4.5.	Test Result .....	19
6.5.	Power Spectral Density Measurement .....	20
6.5.1.	Test Limit .....	20
6.5.2.	Test Procedure .....	20
6.5.3.	Test Setting .....	20
6.5.4.	Test Setup .....	20
6.5.5.	Test Result .....	20
6.6.	Frequency Stability Measurement .....	21
6.6.1.	Test Limit .....	21
6.6.2.	Test Procedure .....	21
6.6.3.	Test Setup .....	21
6.6.4.	Test Result .....	22
6.7.	Radiated Spurious Emission Measurement.....	23
6.7.1.	Test Limit .....	23
6.7.2.	Test Procedure .....	23
6.7.3.	Test Setting .....	23
6.7.4.	Test Setup .....	25
6.7.5.	Test Result .....	26
6.8.	Radiated Restricted Band Edge Measurement .....	27
6.8.1.	Test Limit .....	27
6.8.2.	Test Procedure .....	28
6.8.3.	Test Setting .....	28
6.8.4.	Test Setup .....	29
6.8.5.	Test Result .....	29
6.9.	AC Conducted Emissions Measurement .....	30
6.9.1.	Test Limit .....	30
6.9.2.	Test Setup .....	30
6.9.3.	Test Result .....	30
<b>Appendix A – Test Result .....</b>		<b>31</b>
A.1	Duty Cycle Test Result .....	31
A.2	26dB & 99% Bandwidth Test Result .....	33
A.3	6dB Bandwidth Test Result .....	38
A.4	Output Power Test Result .....	43
A.5	Power Spectral Density Test Result.....	44
A.6	Frequency Stability Test Result.....	53
A.7	Radiated Spurious Emission Test Result.....	54

A.8	Radiated Restricted Band Edge Test Result.....	108
A.9	AC Conducted Emissions Test Result .....	136
<b>Appendix B – Test Setup Photograph .....</b>		<b>138</b>
<b>Appendix C – EUT Photograph .....</b>		<b>139</b>

## 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

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#### 1.4. Product Information

Product Name	ACCESS POINT
Model No.	APIN0615
Serial No.	VNMFKZD00S
Software Version	V0.1.12
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 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

Frequency Range	For 802.11a/n-HT20/ac-VHT20/ax-HE20: 5845MHz, 5865MHz, 5885MHz For 802.11n-HT40/ac-VHT40/ax-HE40: 5835MHz, 5875MHz For 802.11ac-VHT80/ax-HE80: 5855MHz For 802.11ac-VHT160/ax-HE160: 5815MHz
Type of Modulation	802.11a/n/ac: OFDM 802.11ax: OFDMA
Data Rate	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps 802.11ac: up to 1733.3Mbps 802.11ax: up to 2402Mbps

Note: For other features of this EUT, test report will be issued separately.

### 1.6. Working Frequencies

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

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

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

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

802.11ac-VHT80/ax-HE80

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

802.11ac-VHT160/ax-HE160

Channel	Frequency	Channel	Frequency	Channel	Frequency
163	5815 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	5.15 ~ 5.9	3.8	3.8	6.8	6.8

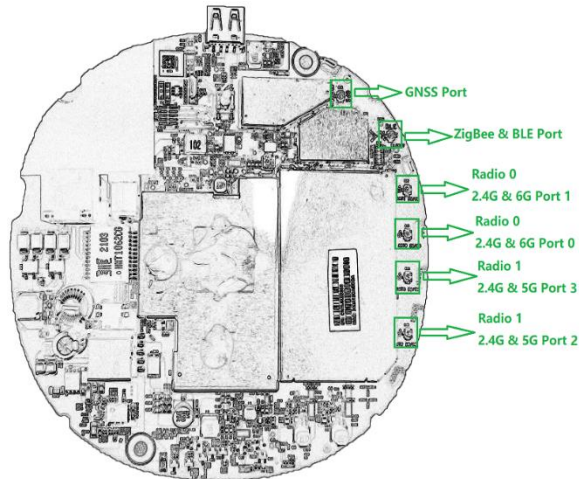
Note:

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  $10\log(N)$  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

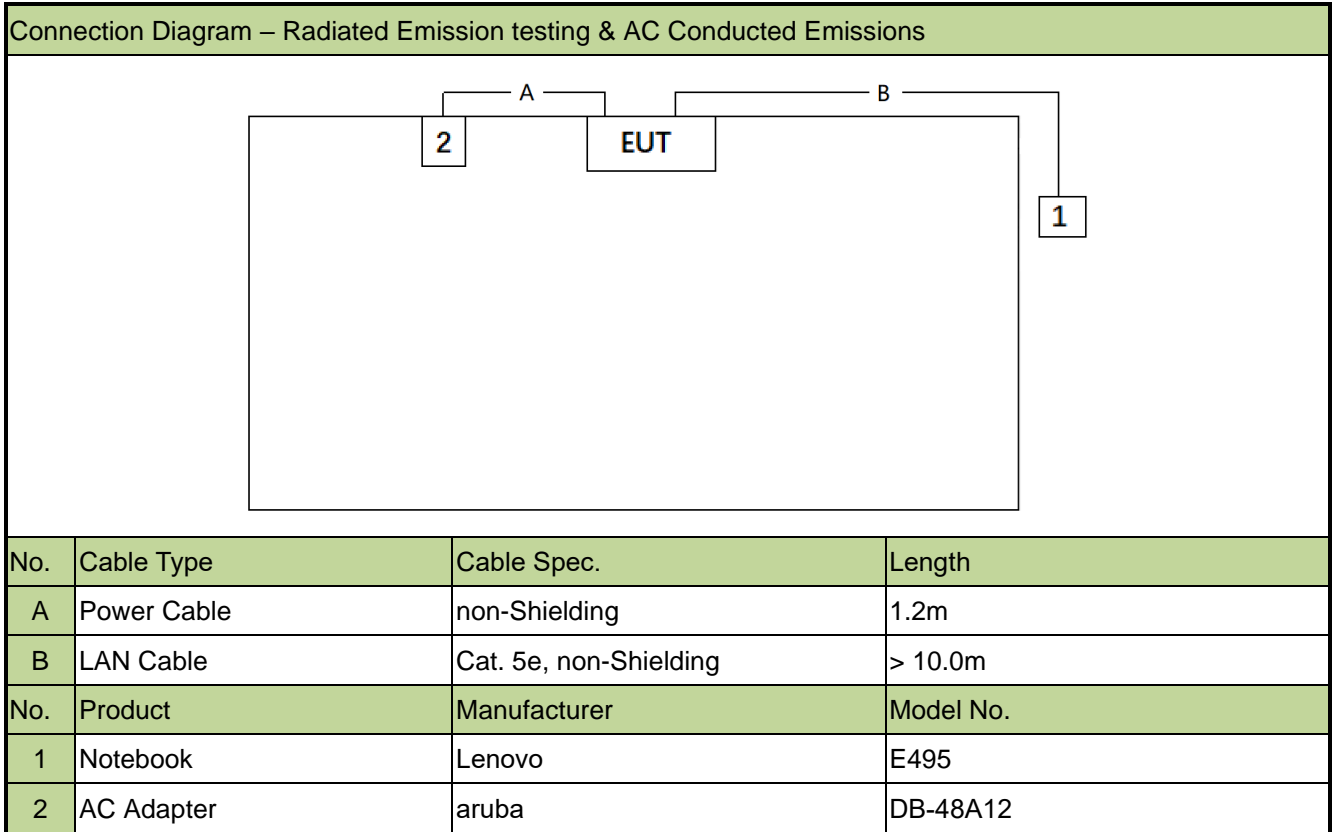
### 2.1. Test Mode

Mode 1: Transmit by 802.11a (6Mbps), CDD Mode
Mode 2: Transmit by 802.11ac-VHT20 (MCS0), CDD Mode
Mode 3: Transmit by 802.11ac-VHT40 (MCS0), CDD Mode
Mode 4: Transmit by 802.11ac-VHT80 (MCS0), CDD Mode
Mode 5: Transmit by 802.11ac-VHT160 (MCS0), CDD Mode
Mode 6: Transmit by 802.11ax-HE20 (MCS0), CDD Mode
Mode 7: Transmit by 802.11ax-HE40 (MCS0), CDD Mode
Mode 8: Transmit by 802.11ax-HE80 (MCS0), CDD Mode
Mode 9: Transmit by 802.11ax-HE160 (MCS0), CDD Mode

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

## 2.2. 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.



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:

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

## 2.4. Test Environment Condition

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

### 3. Antenna Requirements

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

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

#### 4. Measuring Instrument

No.	Instrument	Manufacturer	Model No.	Asset No.	Last Cali. Date	Cali. Due Date	Test Site
1	Thermohygrometer	testo	608-H1	MRTSUE06623	1 year	2022-11-28	SIP-AC2
2	Thermohygrometer	testo	608-H1	MRTSUE06624	1 year	2022-11-28	SIP-AC2
3	Preamplifier	EMCI	EMC051845SE	MRTSUE06644	1 year	2022-11-08	SIP-AC2
4	Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06648	1 year	2022-11-09	SIP-AC2
5	Anechoic Chamber	RIKEN	SIP-AC2	MRTSUE06781	1 year	2022-12-23	SIP-AC2
6	EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2022-12-29	SIP-AC3
7	Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06598	1 year	2022-11-09	SIP-AC3
8	Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2022-10-11	SIP-AC3
9	Horn Antenna	R&S	HF907	MRTSUE06611	1 year	2022-09-12	SIP-AC3
10	Thermohygrometer	testo	608-H1	MRTSUE06619	1 year	2022-11-02	SIP-AC3
11	Thermohygrometer	testo	608-H1	MRTSUE06622	1 year	2022-11-28	SIP-AC3
12	Preamplifier	EMCI	EMC012645SE	MRTSUE06642	1 year	2023-01-13	SIP-AC3
13	TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06646	1 year	2022-08-26	SIP-AC3
14	Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2022-12-23	SIP-AC3
15	Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2023-03-14	SIP-AC3
16	Signal Analyzer	Keysight	N9010B	MRTSUE07028	1 year	2022-12-09	SIP-AC3
17	Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2022-08-08	SIP-TR1
18	USB Power Sensor	Keysight	U2021XA	MRTSUE06595	1 year	2022-09-07	SIP-TR1
19	Temperature Chamber	BAOYT	BYG-408CS	MRTSUE06847	1 year	2023-02-22	SIP-TR1
20	Thermohygrometer	testo	Testo 608-H1	MRTSUE11022	1 year	2022-11-02	SIP-TR1
21	Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2023-06-01	SIP-SR2
22	EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2023-06-01	SIP-SR2
23	Four-Line V-Network	R&S	ENV432	MRTSUE06614	1 year	2022-10-10	SIP-SR2
24	Thermohygrometer	testo	608-H1	MRTSUE06621	1 year	2022-11-28	SIP-SR2
25	Shielding Room	MIX-BEP	SIP-SR2	MRTSUE06949	N/A	N/A	SIP-SR2
26	Attenuator	MVE	MVE2213	MRTSUE11060	1 year	2023-06-09	SIP
27	Attenuator	MVE	MVE2213	MRTSUE11061	1 year	2023-06-09	SIP

Software	Version	Function
e3	9.160520a	EMI Test Software
EMI V3	V 3.0.0	EMI Test Software
Controller_MF 7802BS	1.02	RE Antenna & turntable
Agilent Power Analyzer/Agilent Power Panel	V R03.09.00	Power

## 5. Decision Rules and Measurement Uncertainty

### 5.1. Decision Rules

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

### 5.2. Measurement Uncertainty

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

<b>AC Conducted Emission Measurement</b>
Measurement Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): 9kHz~150kHz: 3.74dB 150kHz~30MHz: 3.44dB
<b>Radiated Disturbance</b>
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
<b>Spurious Emissions, Conducted</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): 0.78dB
<b>Output Power</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): 1.13dB
<b>Power Spectrum Density</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): 1.15dB
<b>Occupied Bandwidth</b>
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(e)	6dB Bandwidth		Pass
15.407(a)(3)(ii)	Maximum Conducted Output Power		Pass
15.407(a)(3)(ii) (12)	Peak Power Spectral Density		Pass
15.407(b)(5)	Undesirable Emissions		Pass
15.205, 15.209 15.407(b)(5)(i), (8), (9)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Radiated	Pass
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	Pass

#### Remark:

- 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.
- 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.
- 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.
- EUT supports one configuration only in 802.11ax full RU mode.
- For “26dB & 99% Bandwidth” and “6dB Bandwidth” test item, only the worst port was performed in the report.

## 6.2. 26dB & 99% Bandwidth Measurement

### 6.2.1. Test Limit

N/A

### 6.2.2. Test Procedure

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

KDB 789033 D02v02r01- Section D (99% Bandwidth)

### 6.2.3. Test Setting

#### 26dB Bandwidth

1. The analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to  $X = 26$ . The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediated power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth.
3. VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold.

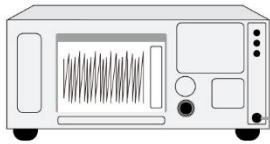
#### 99% Bandwidth

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



#### 6.2.4. Test Setup

Spectrum Analyzer



DC Block  
&  
Attenuator



#### 6.2.5. Test Result

Refer to Appendix A.2.

### 6.3. 6dB Bandwidth Measurement

#### 6.3.1. Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

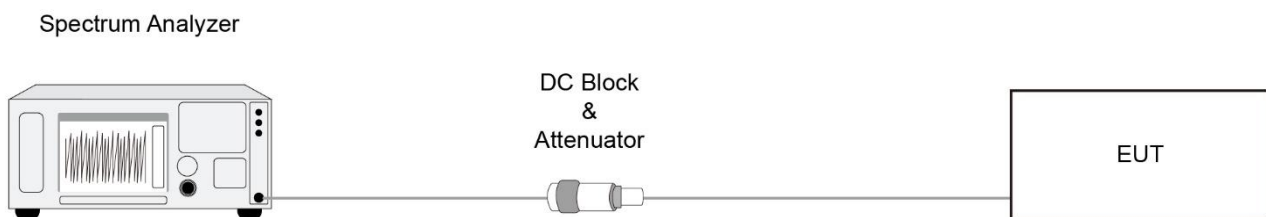
#### 6.3.2. Test Procedure

KDB 789033 D02v02r01- Section C.2

#### 6.3.3. Test Setting

1. Set center frequency to the nominal EUT channel center frequency.
2. RBW = 100 kHz.
3. VBW  $\geq 3 \times$  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 the band 5.85-5.895 GHz, the maximum e.i.r.p shall not exceed 36dBm.

### 6.4.2. Test Procedure

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

### 6.4.3. Test Setting

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 the band 5.85-5.895 GHz, the maximum e.i.r.p power spectral density shall not exceed 20dBm/MHz.

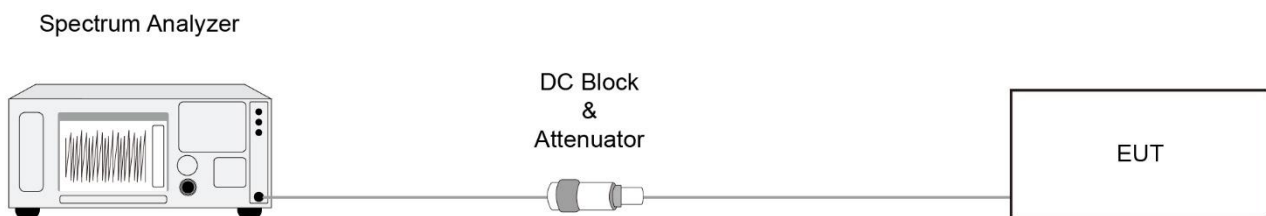
### 6.5.2. Test Procedure

KDB 789033 D02v02r01-SectionF

### 6.5.3. Test Setting

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz
4. VBW = 3 × RBW
5. Number of sweep points  $\geq 2 \times (\text{span} / \text{RBW})$
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  $10 \cdot \log(1/x)$ , 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  $10 \cdot \log(1/0.25) = 6 \text{ dB}$  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:

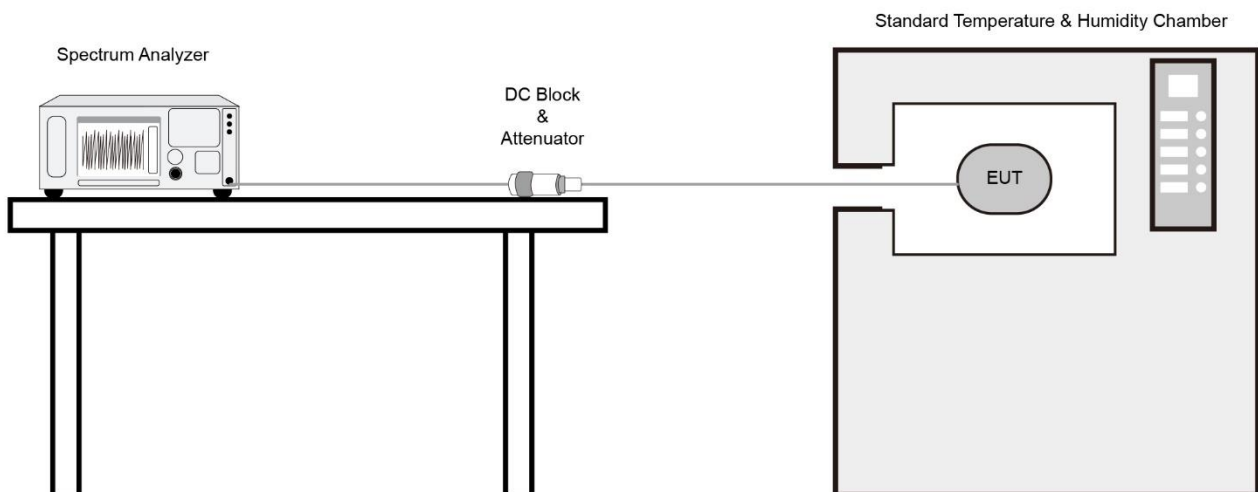
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain 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 ( $\pm 15\%$ ) 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 [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

### 6.7.2. Test Procedure

KDB 789033 D02v02r01- Section G

### 6.7.3. Test Setting

**Table 1 - RBW as a function of frequency**

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

### Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as specified in Table 1
4. Detector = CISPR quasi-peak

5. Sweep time = auto couple

6. Trace was allowed to stabilize

**Peak Measurements above 1GHz**

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

2. RBW = 1MHz

3. VBW = 3MHz

4. Detector = peak

5. Sweep time = auto couple

6. Trace mode = max hold

7. Trace was allowed to stabilize

**Average Measurements above 1GHz (Method VB)**

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

2. RBW = 1MHz

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

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

802.11a	VBW = 510Hz	802.11ax-HE20	VBW = 680Hz
802.11ac-VHT20	VBW = 560Hz	802.11ax-HE40	VBW = 1300Hz
802.11ac-VHT40	VBW = 1100Hz	802.11ax-HE80	VBW = 2700Hz
802.11ac-VHT80	VBW = 2200Hz	802.11ax-HE160	VBW = 4300Hz
802.11ac-VHT160	VBW = 4300Hz	N/A	N/A

4. Detector = Peak

5. Sweep time = auto

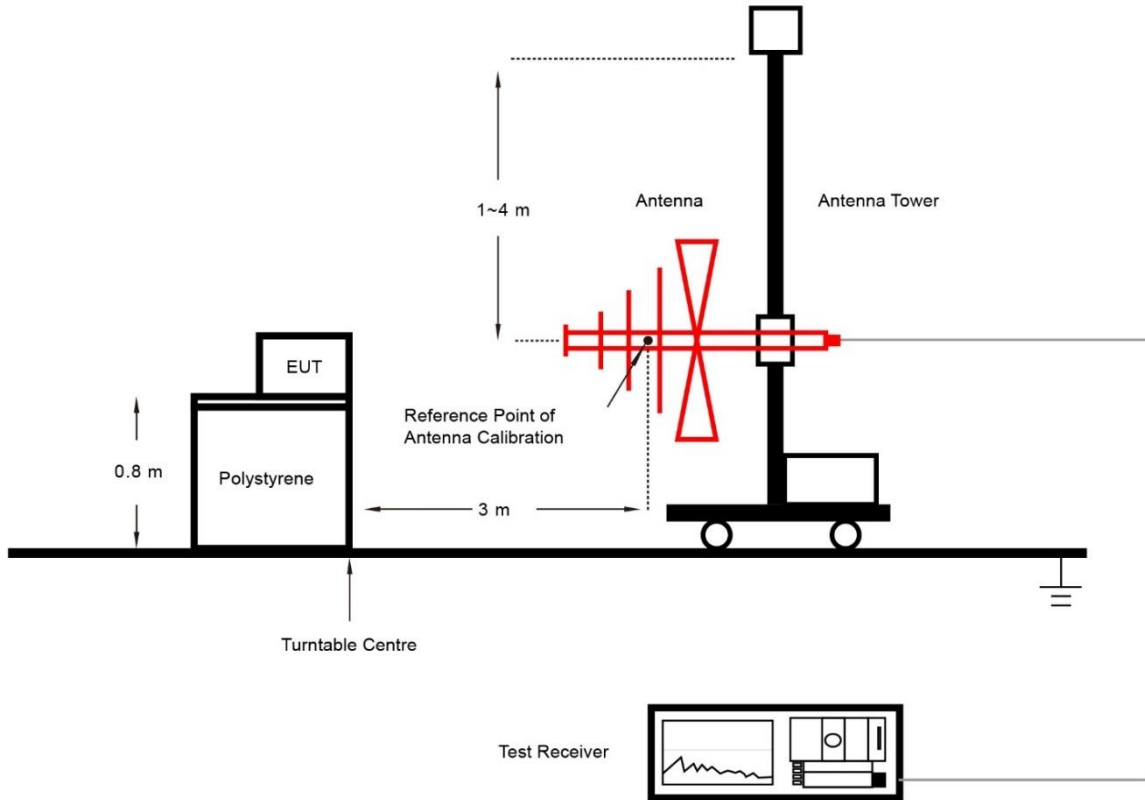
6. Trace mode = max hold

7. Trace was allowed to stabilize

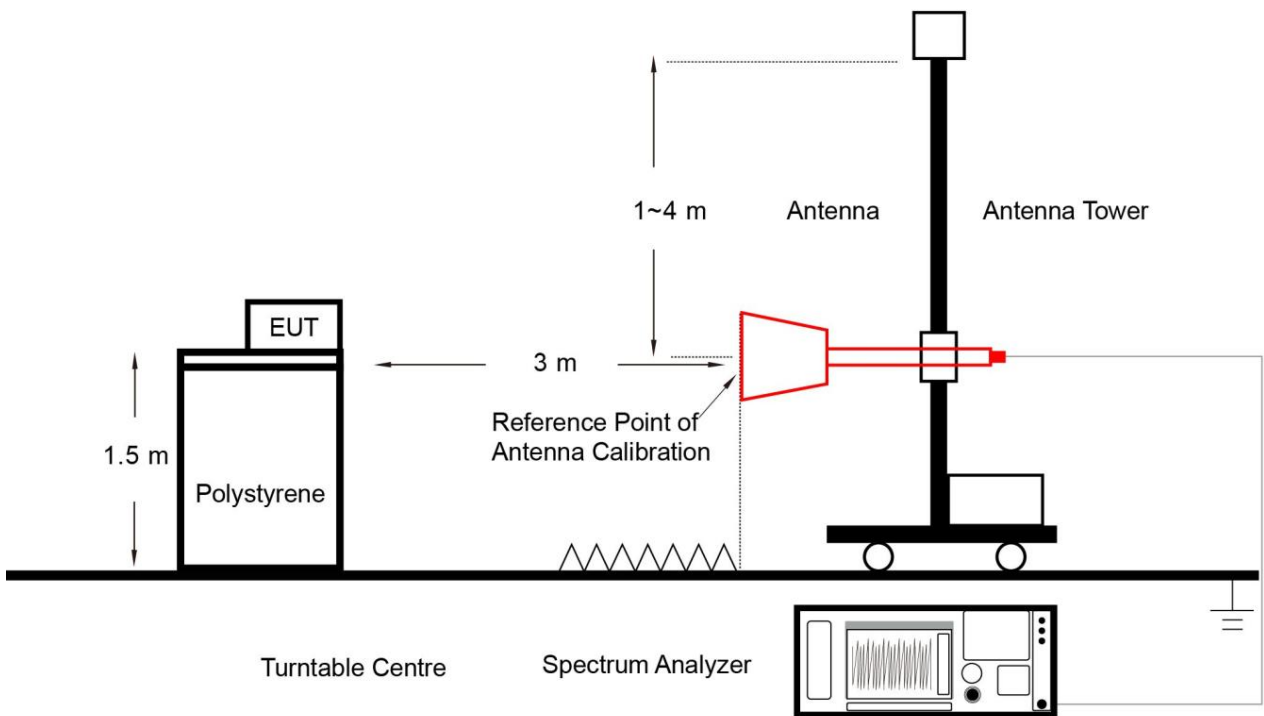


### 6.7.4. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



#### **6.7.5. Test Result**

Refer to Appendix A.7.

## 6.8. Radiated Restricted Band Edge Measurement

### 6.8.1. Test Limit

#### For 15.205 requirement:

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

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 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	( <sup>2</sup> )
13.36 - 13.41	--	--	--

For 15.407(b) requirement:

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

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

Refer to KDB 789033 D02v02r01 G)2)c), as specified in § 15.407(b), emissions above 1000 MHz that are

outside of the restricted bands are subject to a maximum emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in § 15.407(b)(4)). However, an out-of-band emission that complies with both the peak and average limits of § 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz maximum emission 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 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

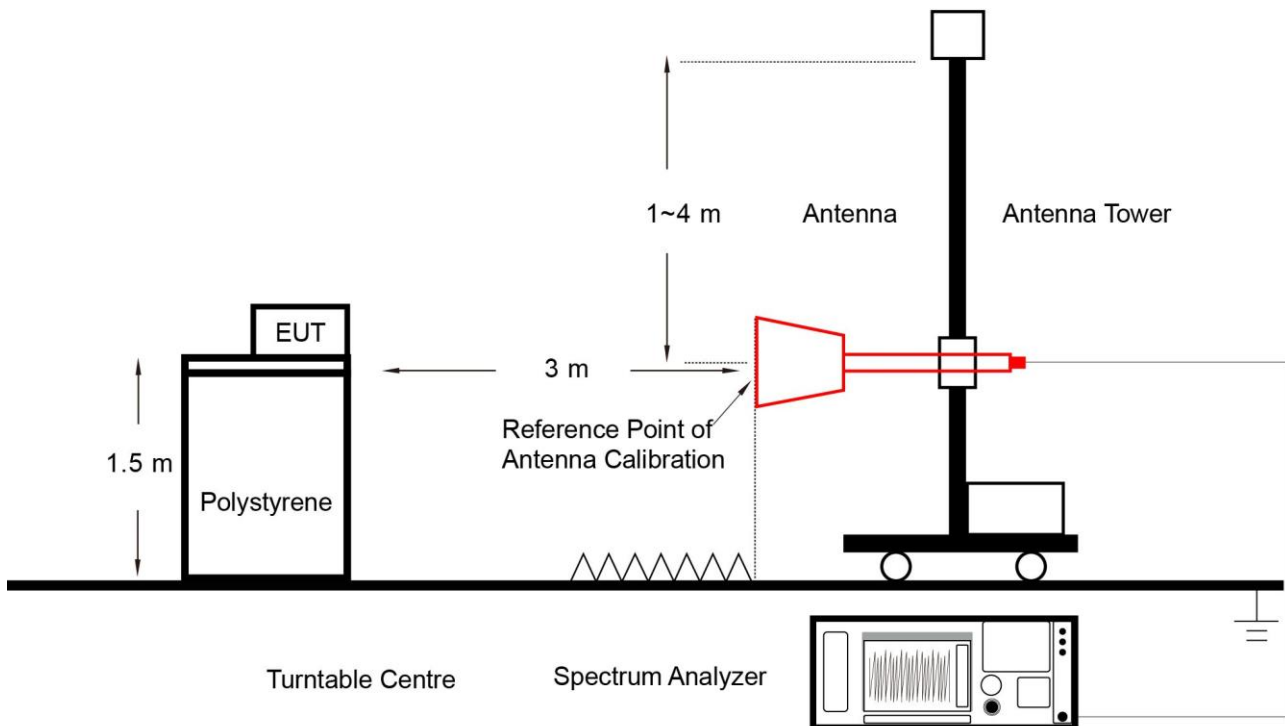
3. VBW; if the EUT is configured to transmit with duty cycle  $\geq 98\%$ , set VBW = 10Hz

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

802.11a	VBW = 510Hz	802.11ax-HE20	VBW = 680Hz
802.11ac-VHT20	VBW = 560Hz	802.11ax-HE40	VBW = 1300Hz
802.11ac-VHT40	VBW = 1100Hz	802.11ax-HE80	VBW = 2700Hz
802.11ac-VHT80	VBW = 2200Hz	802.11ax-HE160	VBW = 4300Hz
802.11ac-VHT160	VBW = 4300Hz	N/A	N/A

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

#### 6.8.4. Test Setup



#### 6.8.5. Test Result

Refer to Appendix A.8.

## 6.9. AC Conducted Emissions Measurement

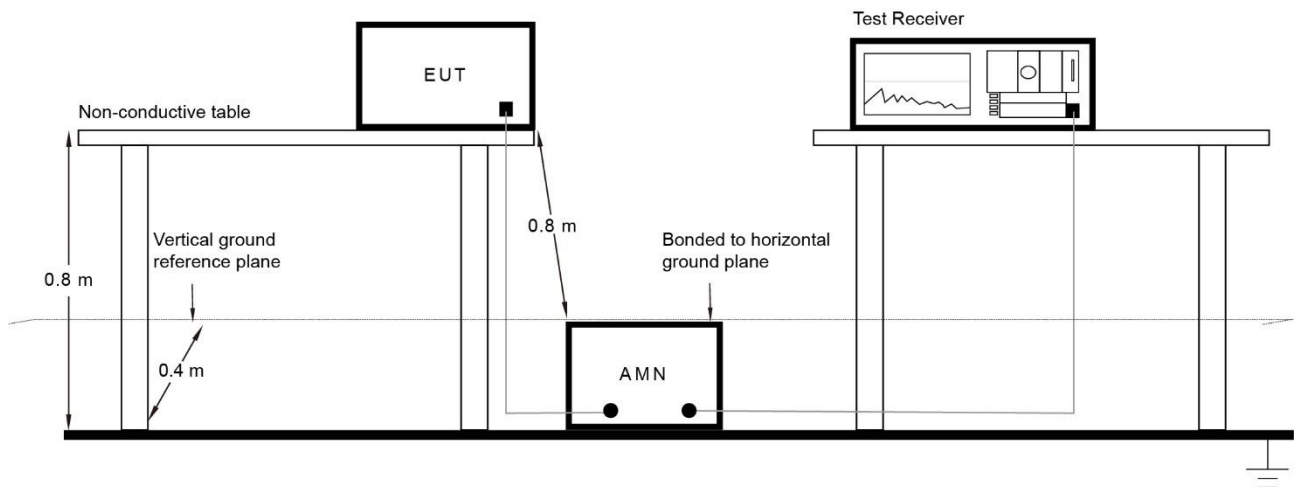
### 6.9.1. Test Limit

FCC Part 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

### 6.9.2. Test Setup



### 6.9.3. Test Result

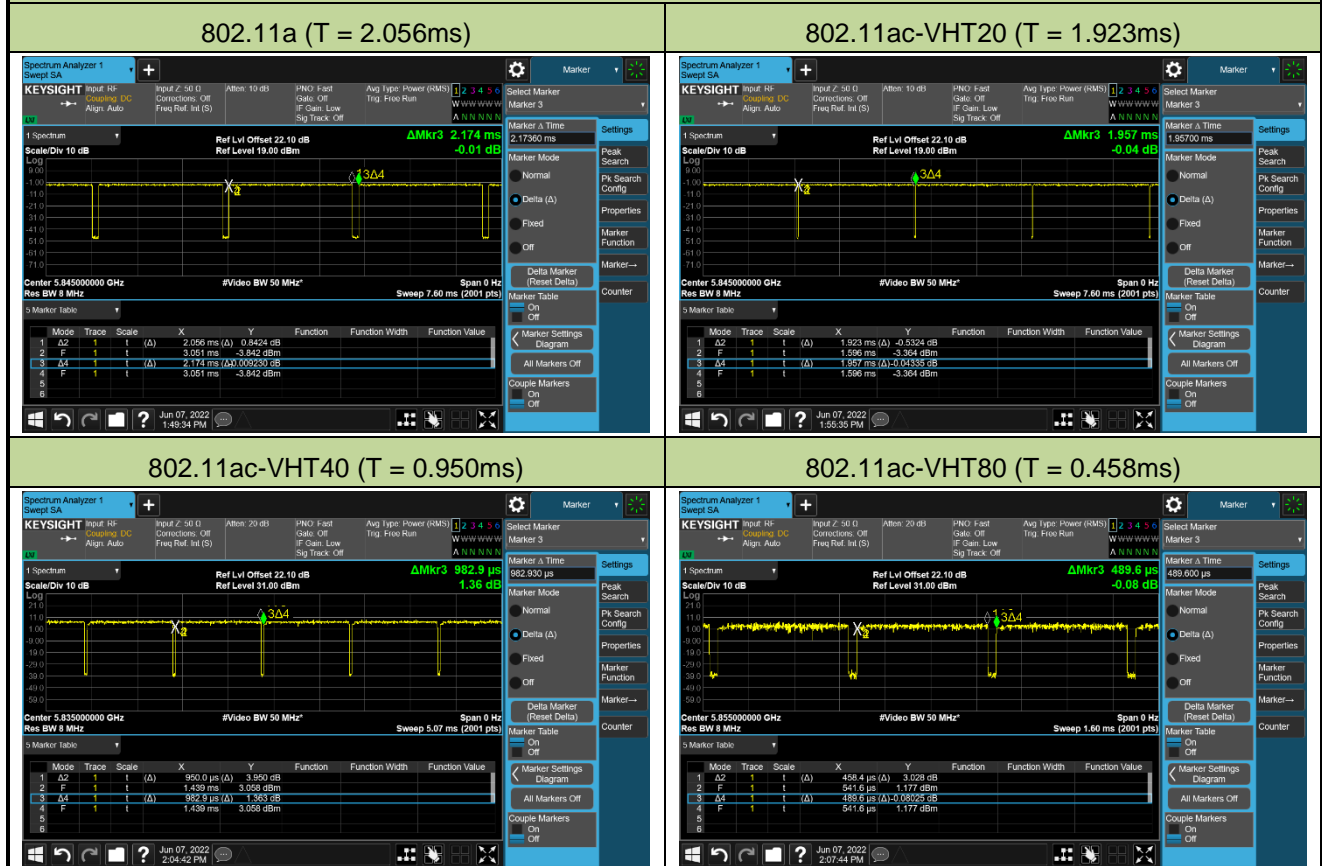
Refer to Appendix A.9.

## Appendix A – Test Result

### A.1 Duty Cycle Test Result

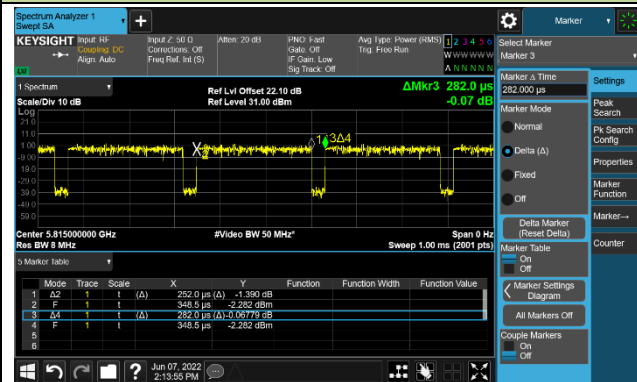
Test Mode	Duty Cycle
802.11a	94.57%
802.11ac-VHT20	98.26%
802.11ac-VHT40	96.65%
802.11ac-VHT80	93.63%
802.11ac-VHT160	89.36%
802.11ax-HE20	97.69%
802.11ax-HE40	95.84%
802.11ax-HE80	92.46%
802.11ax-HE160	88.04%

#### Duty Cycle (T = Transmission Duration)

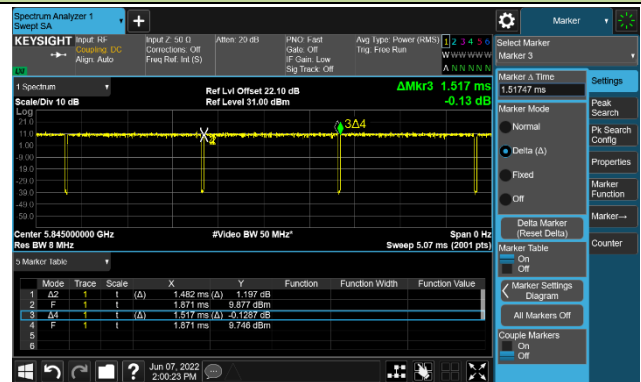


## Duty Cycle (T = Transmission Duration)

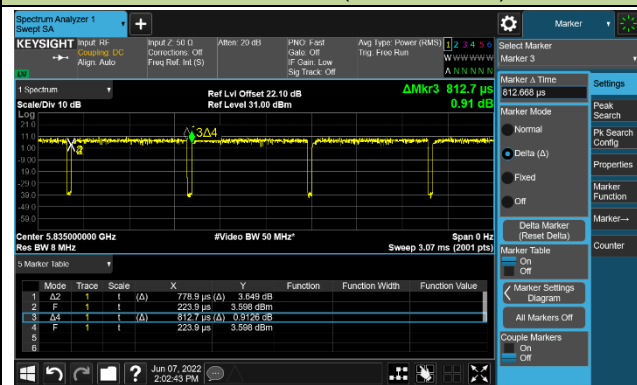
802.11ac-VHT160 (T = 0.252ms)



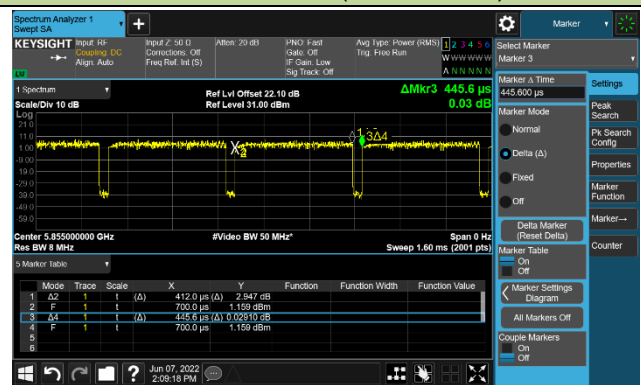
802.11ax-HE20 (T = 1.482ms)



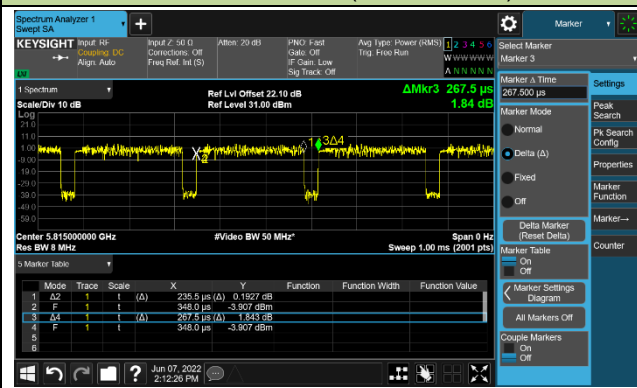
802.11ax-HE40 (T = 0.779ms)



802.11ax-HE80 (T = 0.412ms)



802.11ax-HE160 (T = 0.236ms)





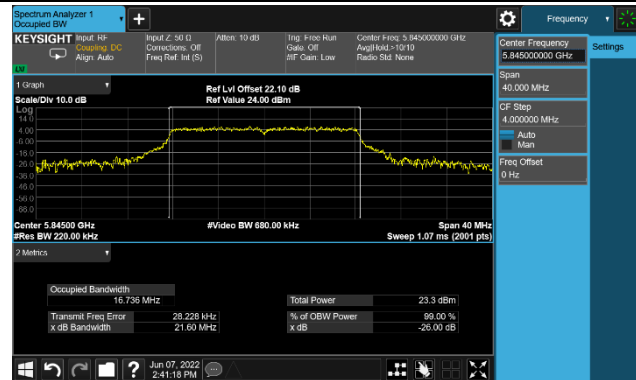
**A.2 26dB & 99% Bandwidth Test Result**

Test Site	SIP-TR1	Test Engineer	Nandy Zhang
Test Date	2022/06/07		

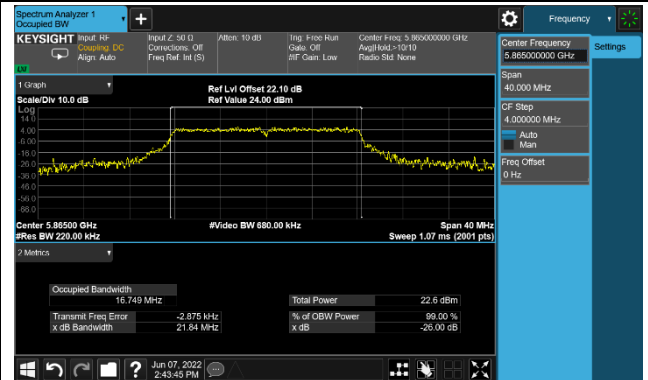
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
Ant 2					
11a	6Mbps	169	5845	16.74	21.60
11a	6Mbps	173	5865	16.75	21.84
11a	6Mbps	177	5885	16.72	21.72
11ac-VHT20	MCS0	169	5845	17.90	21.85
11ac-VHT20	MCS0	173	5865	17.85	21.90
11ac-VHT20	MCS0	177	5885	17.84	21.43
11ac-VHT40	MCS0	167	5835	36.31	41.04
11ac-VHT40	MCS0	175	5875	36.36	42.03
11ac-VHT80	MCS0	171	5855	75.76	80.60
11ac-VHT160	MCS0	163	5815	154.46	162.30
11ax-HE20	MCS0	169	5845	19.00	23.28
11ax-HE20	MCS0	173	5865	19.11	22.45
11ax-HE20	MCS0	177	5885	19.03	23.01
11ax-HE40	MCS0	167	5835	37.61	42.57
11ax-HE40	MCS0	175	5875	37.67	41.85
11ax-HE80	MCS0	171	5855	77.09	80.54
11ax-HE160	MCS0	163	5815	155.50	163.00

802.11a 26dB Bandwidth - Ant 2

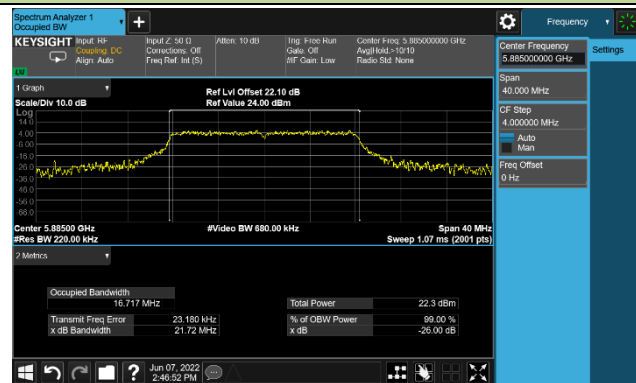
Channel 169 (5845MHz)



Channel 173 (5865MHz)

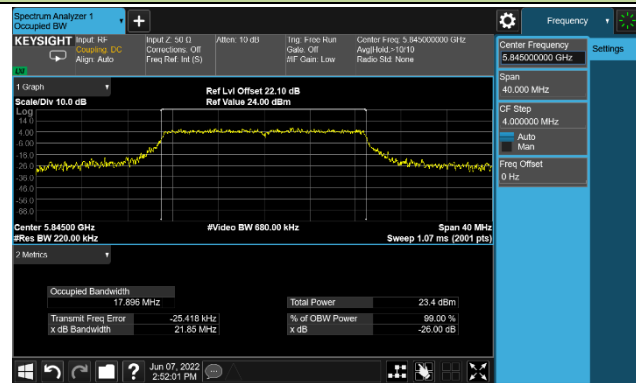


Channel 177 (5885MHz)

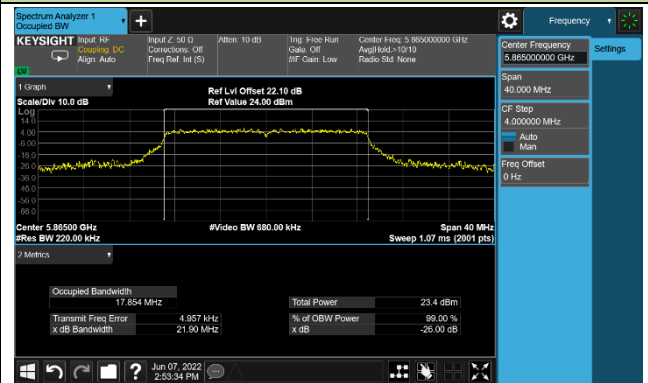


802.11ac-VHT20 26dB Bandwidth - Ant 2

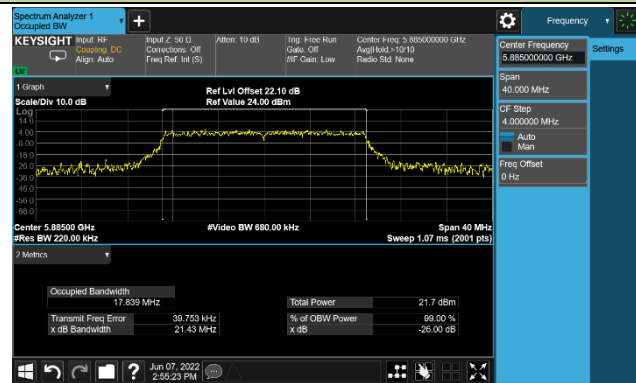
Channel 169 (5845MHz)



Channel 173 (5865MHz)

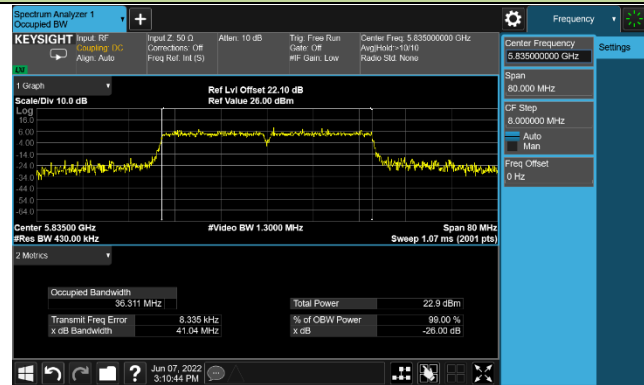


Channel 177 (5885MHz)

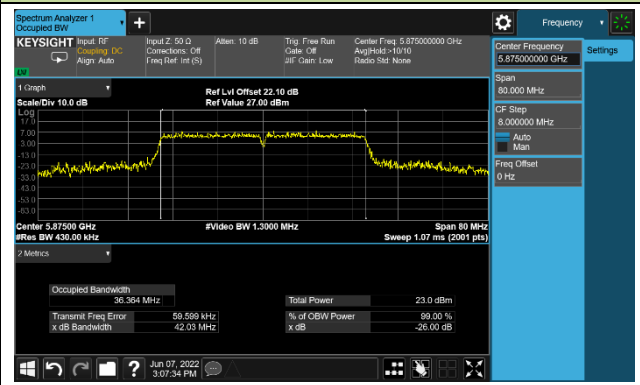


802.11ac-VHT40 26dB Bandwidth - Ant 2

Channel 167 (5835MHz)

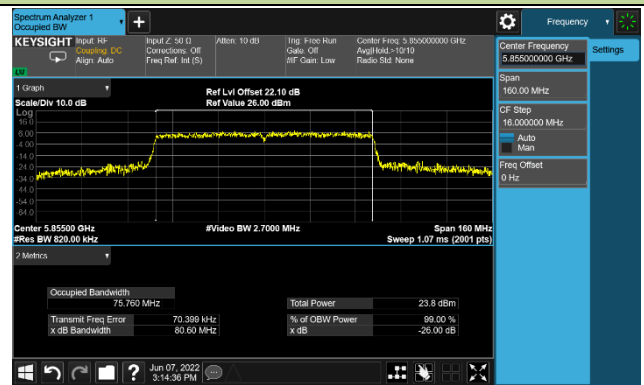


Channel 175(5875MHz)



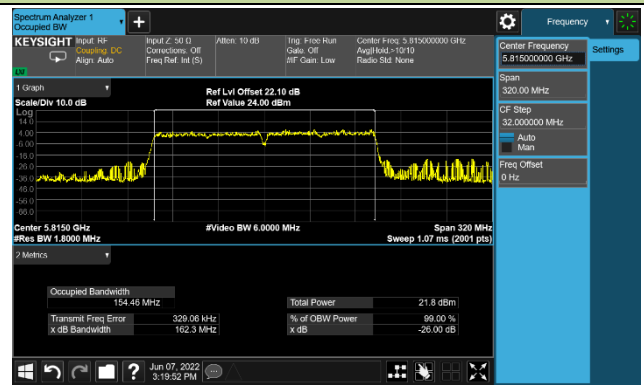
802.11ac-VHT80 26dB Bandwidth

Channel 171 (5855MHz)



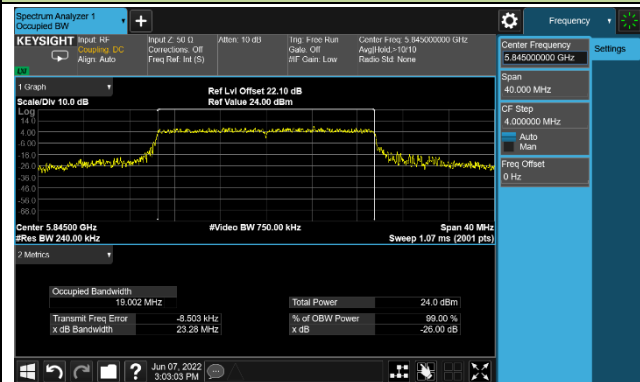
802.11ac-VHT160 26dB Bandwidth - Ant 2

Channel 163 (5815MHz)

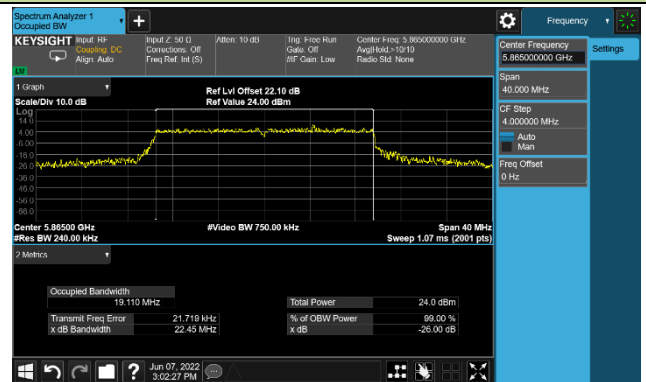


802.11ax-HE20 26dB Bandwidth - Ant 2

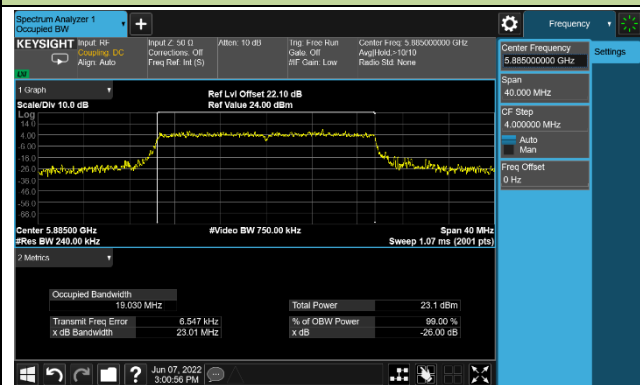
Channel 169 (5845MHz)



Channel 173 (5865MHz)

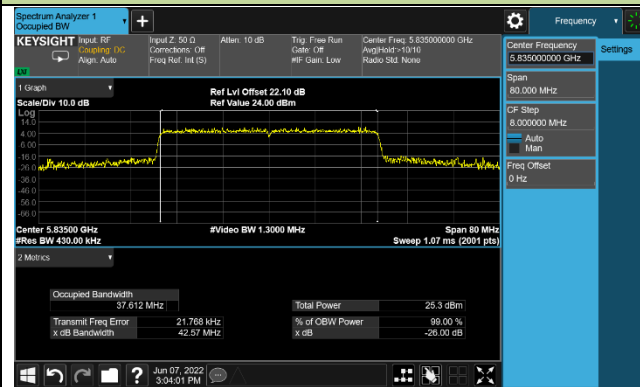


Channel 177 (5885MHz)

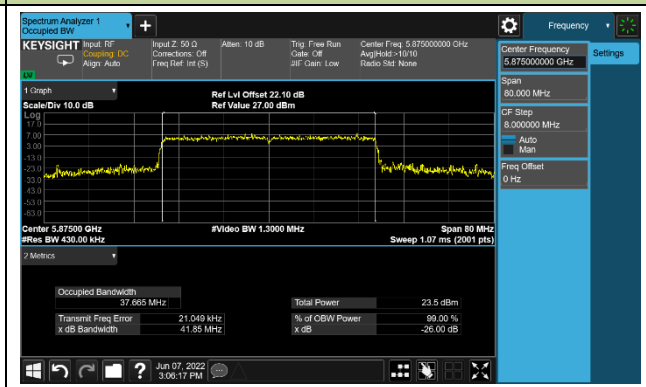


802.11ax-HE40 26dB Bandwidth - Ant 2

Channel 167 (5835MHz)



Channel 175(5875MHz)



**802.11ax-HE80 26dB Bandwidth - Ant 2**



**802.11ax-HE160 26dB Bandwidth - Ant 2**



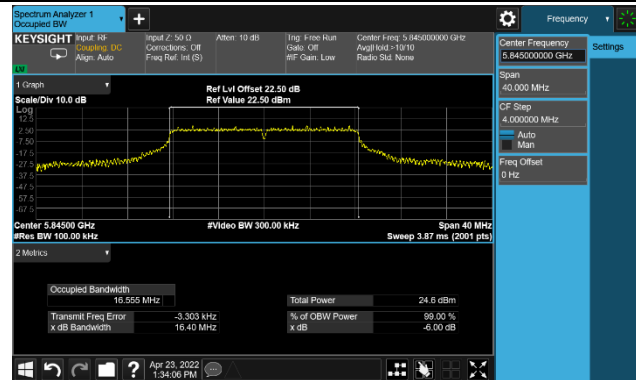
**A.3 6dB Bandwidth Test Result**

Test Site	SIP-TR1	Test Engineer	Alisa Deng
Test Date	2022/04/23		

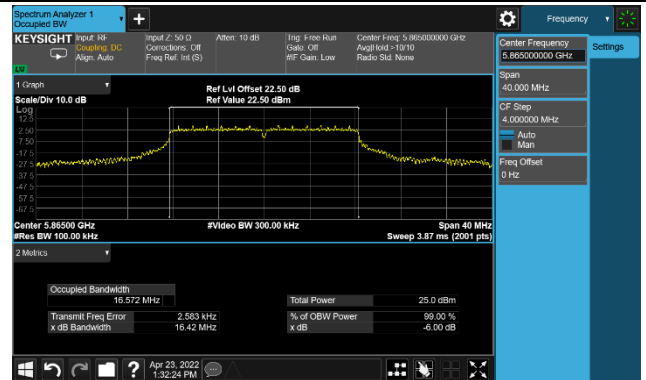
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
Ant 2					
11a	6Mbps	169	5845	16.40	≥0.5
11a	6Mbps	173	5865	16.42	≥0.5
11a	6Mbps	177	5885	16.39	≥0.5
11ac-VHT20	MCS0	169	5845	17.62	≥0.5
11ac-VHT20	MCS0	173	5865	17.67	≥0.5
11ac-VHT20	MCS0	177	5885	17.62	≥0.5
11ac-VHT40	MCS0	167	5835	36.38	≥0.5
11ac-VHT40	MCS0	175	5875	36.39	≥0.5
11ac-VHT80	MCS0	171	5855	75.99	≥0.5
11ac-VHT160	MCS0	163	5815	155.50	≥0.5
11ax-HE20	MCS0	169	5845	18.98	≥0.5
11ax-HE20	MCS0	173	5865	18.86	≥0.5
11ax-HE20	MCS0	177	5885	18.74	≥0.5
11ax-HE40	MCS0	167	5835	37.68	≥0.5
11ax-HE40	MCS0	175	5875	37.53	≥0.5
11ax-HE80	MCS0	171	5855	77.53	≥0.5
11ax-HE160	MCS0	163	5815	156.50	≥0.5

## 802.11a 6dB Bandwidth - Ant 2

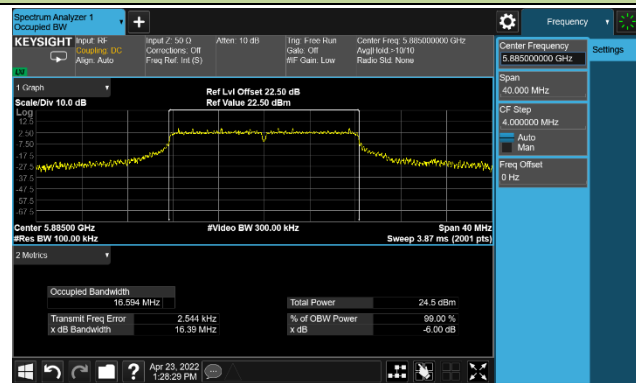
## Channel 169 (5845MHz)



## Channel 173 (5865MHz)

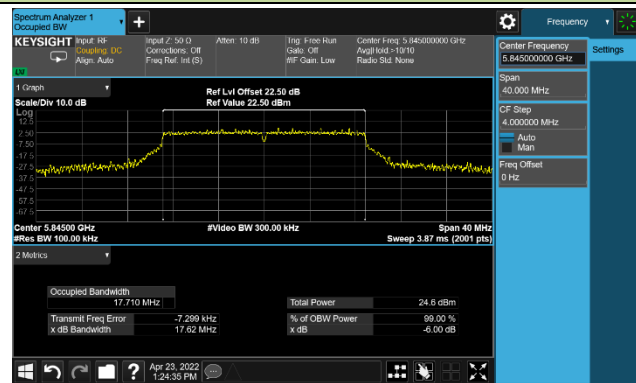


## Channel 177 (5885MHz)

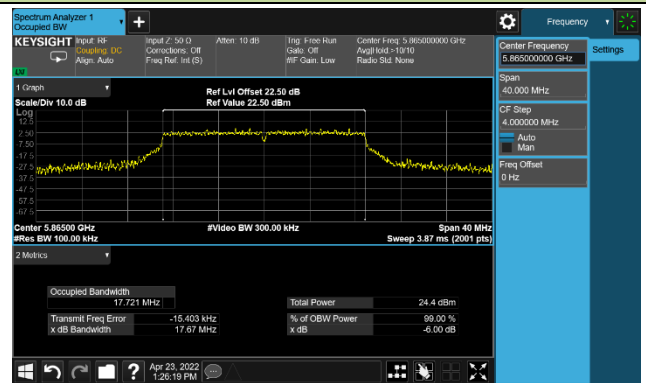


## 802.11ac-VHT20 6dB Bandwidth - Ant 2

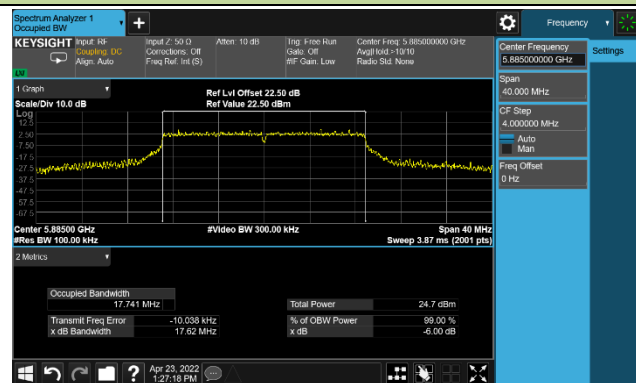
## Channel 169 (5845MHz)



## Channel 173 (5865MHz)

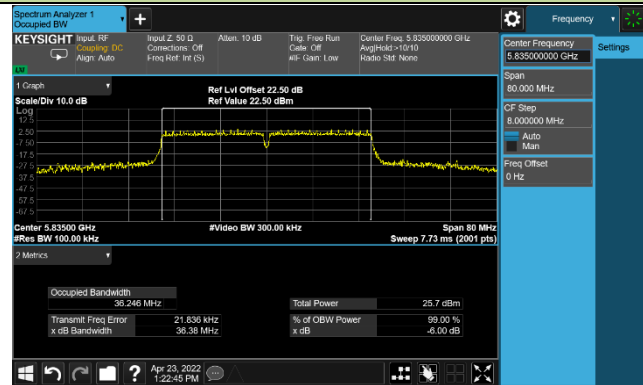


## Channel 177 (5885MHz)

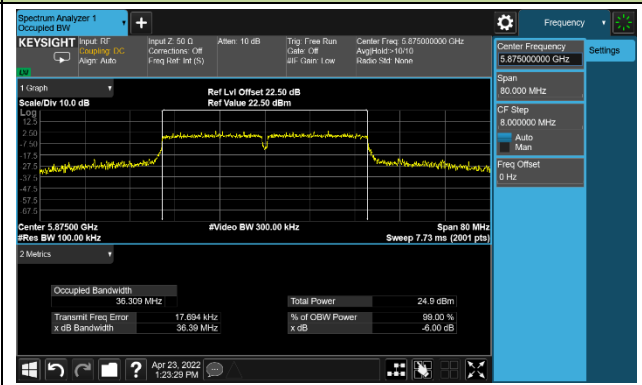


802.11ac-VHT40 6dB Bandwidth - Ant 2

Channel 167 (5835MHz)

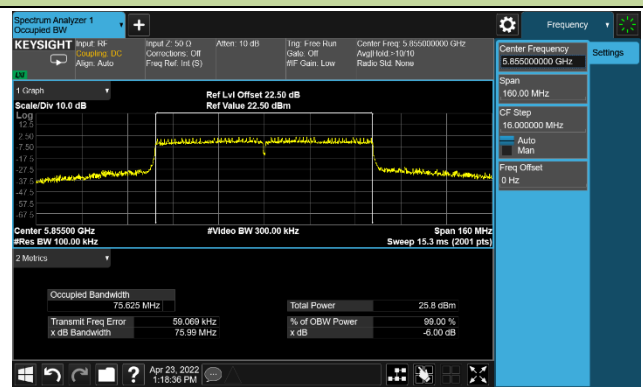


Channel 175(5875MHz)



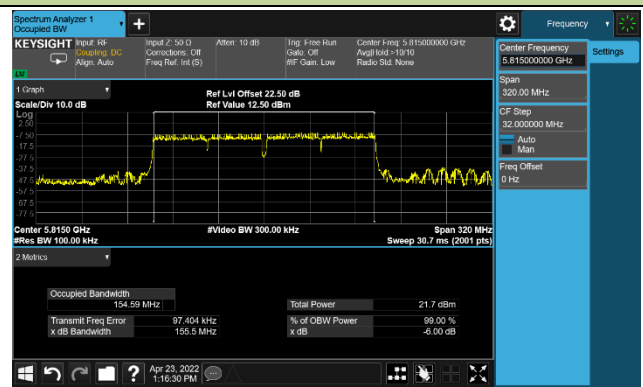
802.11ac-VHT80 6dB Bandwidth - Ant 2

Channel 171 (5855MHz)



802.11ac-VHT160 6dB Bandwidth - Ant 2

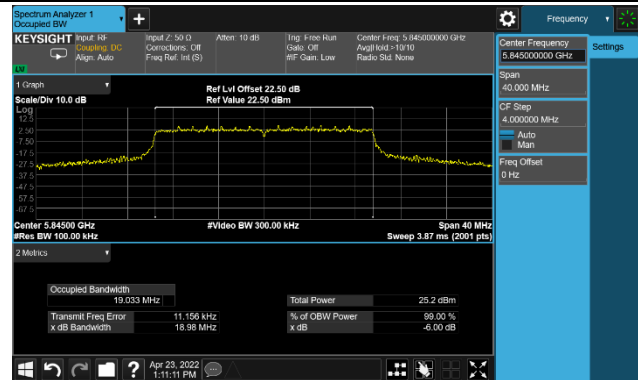
Channel 163 (5815MHz)



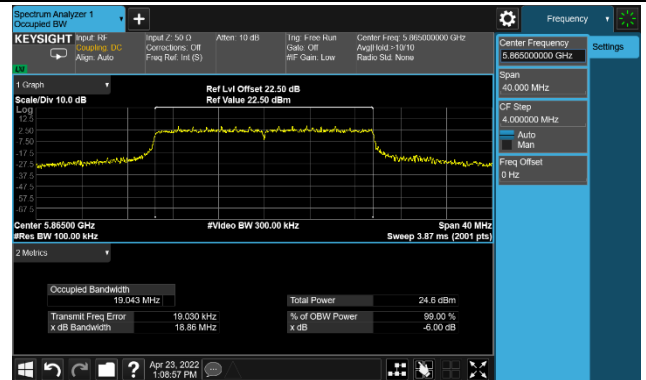


802.11ax-HE20 6dB Bandwidth - Ant 2

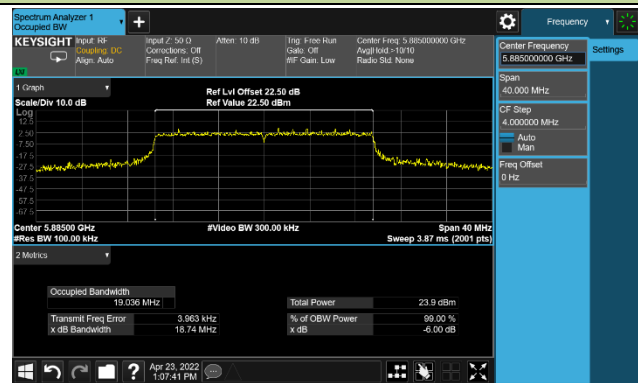
Channel 169 (5845MHz)



Channel 173 (5865MHz)

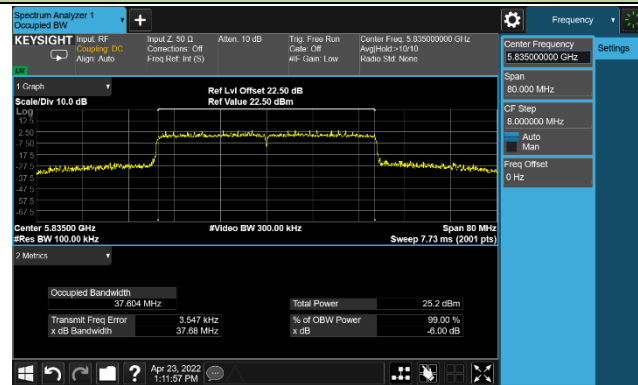


Channel 177 (5885MHz)

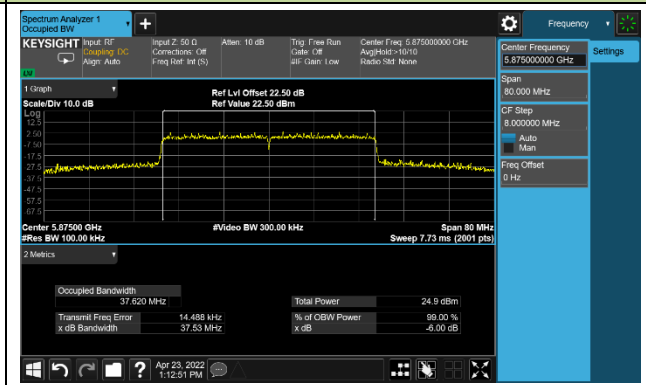


802.11ax-HE40 6dB Bandwidth - Ant 2

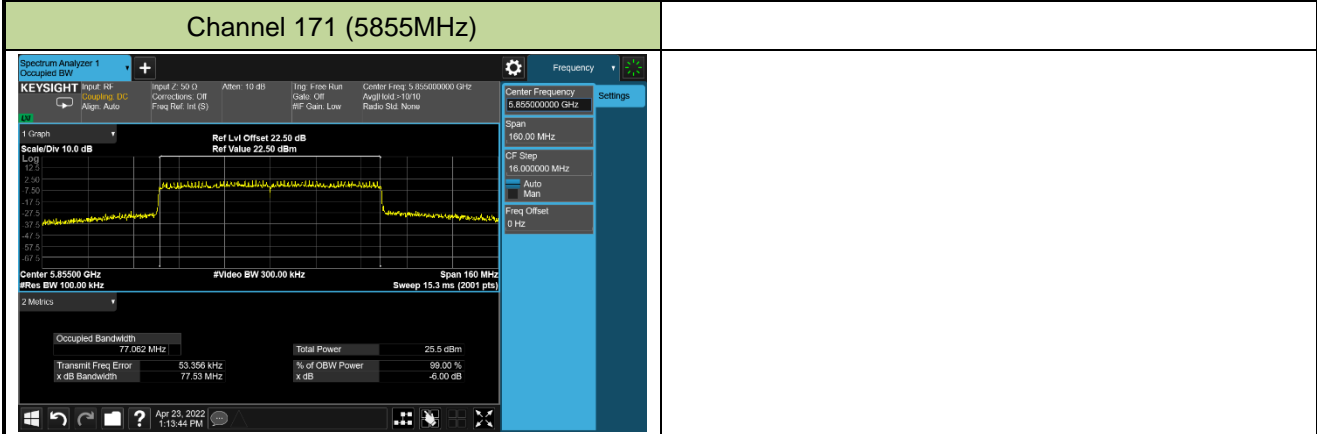
Channel 167 (5835MHz)



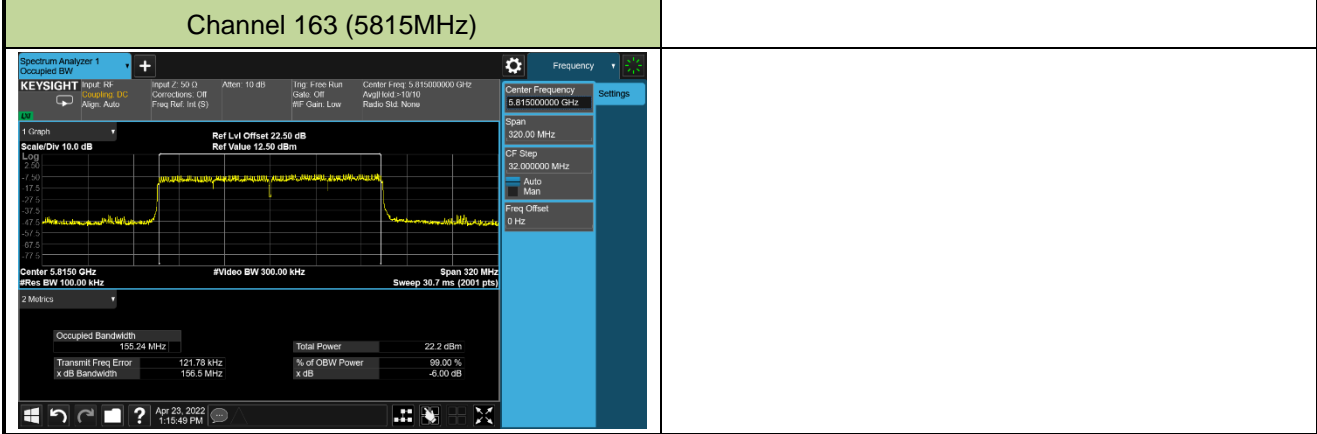
Channel 175(5875MHz)



**802.11ax-HE80 6dB Bandwidth - Ant 2**



**802.11ax-HE160 6dB Bandwidth - Ant 2**



**A.4 Output Power Test Result**

Test Site	SIP-TR1	Test Engineer	Nandy Zhang
Test Mode	Path A_ Full Path	Test Date	2021/11/02

Test Mode	Data Rate MCS	Channel No.	Freq. (MHz)	Average Power (dBm)		Total Average Power (dBm)	Antenna Gain (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)
				Ant 2	Ant 3				
11a	6Mbps	169	5845	18.26	18.61	21.45	3.80	25.25	≤ 36.00
11a	6Mbps	173	5865	18.28	18.67	21.49	3.80	25.29	≤ 36.00
11a	6Mbps	177	5885	18.31	18.71	21.52	3.80	25.32	≤ 36.00
11ac-VHT20	MCS0	169	5845	18.33	18.62	21.49	3.80	25.29	≤ 36.00
11ac-VHT20	MCS0	173	5865	18.28	18.68	21.49	3.80	25.29	≤ 36.00
11ac-VHT20	MCS0	177	5885	18.33	18.67	21.51	3.80	25.31	≤ 36.00
11ac-VHT40	MCS0	167	5835	18.53	18.59	21.57	3.80	25.37	≤ 36.00
11ac-VHT40	MCS0	175	5875	18.58	18.41	21.51	3.80	25.31	≤ 36.00
11ac-VHT80	MCS0	171	5855	18.74	18.29	21.53	3.80	25.33	≤ 36.00
11ac-VHT160	MCS0	163	5815	15.08	14.86	17.98	3.80	21.78	≤ 36.00
11ax-HE20	MCS0	169	5845	18.76	18.88	21.83	3.80	25.63	≤ 36.00
11ax-HE20	MCS0	173	5865	18.77	18.55	21.67	3.80	25.47	≤ 36.00
11ax-HE20	MCS0	177	5885	18.78	18.49	21.65	3.80	25.45	≤ 36.00
11ax-HE40	MCS0	167	5835	18.82	18.73	21.79	3.80	25.59	≤ 36.00
11ax-HE40	MCS0	175	5875	18.81	18.77	21.80	3.80	25.60	≤ 36.00
11ax-HE80	MCS0	171	5855	18.65	18.37	21.52	3.80	25.32	≤ 36.00
11ax-HE160	MCS0	163	5815	15.03	14.88	17.97	3.80	21.77	≤ 36.00

Note 1: Total Average Power (dBm) =  $10 \cdot \log \{ 10^{(\text{Ant 2 Average Power} / 10)} + 10^{(\text{Ant 3 Average Power} / 10)} \}$ .

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

**A.5 Power Spectral Density Test Result**

Test Site	SIP-TR1	Test Engineer	Nandy Zhang
Test Mode	Path A_ Full Path	Test Date	2021/10/27 ~ 2022/06/07

Test Mode	Data Rate/MCS	Channel No.	Freq. (MHz)	AVPSD (dBm/MHz)		Duty Cycle (%)	Total PSD (dBm/MHz)	Antenna Gain (dBi)	EIRP PSD (dBm/MHz)	EIRP PSD Limit (dBm/MHz)
				Ant 2	Ant 3					
11a	6Mbps	169	5845	6.89	6.63	94.57	10.01	6.80	16.81	≤ 20.00
11a	6Mbps	173	5865	7.00	6.34	94.57	9.93	6.80	16.73	≤ 20.00
11a	6Mbps	177	5885	6.64	6.22	94.57	9.69	6.80	16.49	≤ 20.00
11ac-VHT20	MCS0	169	5845	6.99	6.27	98.26	9.74	6.80	16.54	≤ 20.00
11ac-VHT20	MCS0	173	5865	6.79	6.67	98.26	9.82	6.80	16.62	≤ 20.00
11ac-VHT20	MCS0	177	5885	6.90	6.27	98.26	9.69	6.80	16.49	≤ 20.00
11ac-VHT40	MCS0	167	5835	4.62	3.76	96.65	7.37	6.80	14.17	≤ 20.00
11ac-VHT40	MCS0	175	5875	4.66	3.78	96.65	7.40	6.80	14.20	≤ 20.00
11ac-VHT80	MCS0	171	5855	1.18	0.53	93.63	4.17	6.80	10.97	≤ 20.00
11ac-VHT160	MCS0	163	5815	-6.27	-6.09	89.36	-2.68	6.80	4.12	≤ 20.00
11ax-HE20	MCS0	169	5845	6.56	6.30	97.69	9.54	6.80	16.34	≤ 20.00
11ax-HE20	MCS0	173	5865	6.45	6.23	97.69	9.45	6.80	16.25	≤ 20.00
11ax-HE20	MCS0	177	5885	6.57	6.22	97.69	9.51	6.80	16.31	≤ 20.00
11ax-HE40	MCS0	167	5835	4.43	3.73	95.84	7.28	6.80	14.08	≤ 20.00
11ax-HE40	MCS0	175	5875	4.22	3.62	95.84	7.12	6.80	13.92	≤ 20.00
11ax-HE80	MCS0	171	5855	1.49	0.56	92.46	4.40	6.80	11.20	≤ 20.00
11ax-HE160	MCS0	163	5815	-4.16	-3.89	88.04	-0.46	6.80	6.34	≤ 20.00

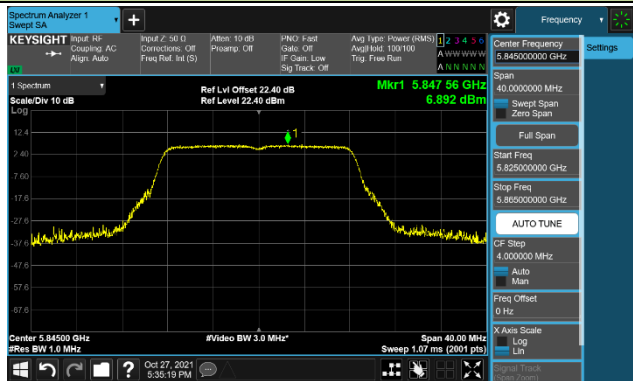
Note 1: When EUT duty cycle < 98%, the total PSD (dBm/MHz) =  $10 \cdot \log \{ 10^{(\text{Ant 2 AVGPSD}/10)} + 10^{(\text{Ant 3 AVGPSD}/10)} \} + 10 \cdot \log (1/\text{Duty cycle})$ .

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

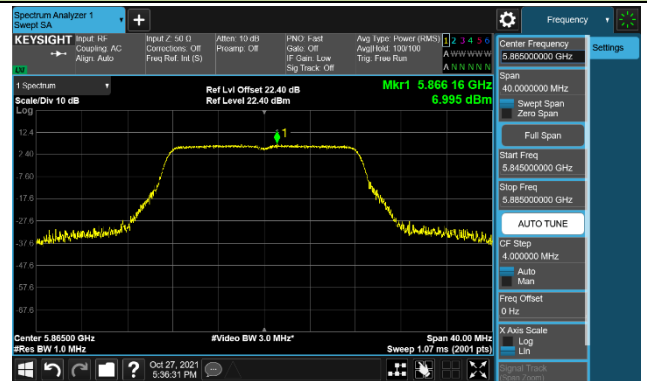
Note 3: For NII-4 channel that spans the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the power spectral density was measured in 1MHz RBW, it is the worst-case method.

### 802.11a Power Spectral Density- Ant 2

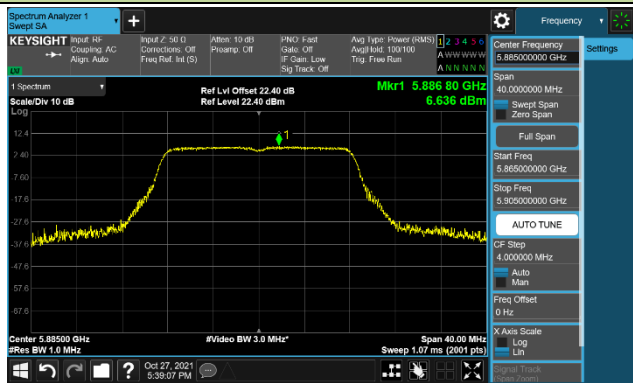
Channel 169 (5845MHz)



Channel 173 (5865MHz)

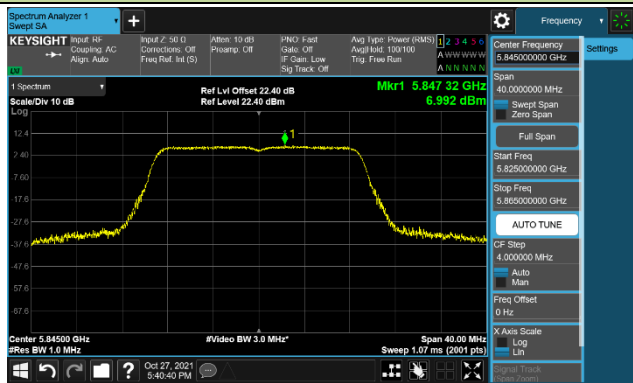


Channel 177 (5885MHz)

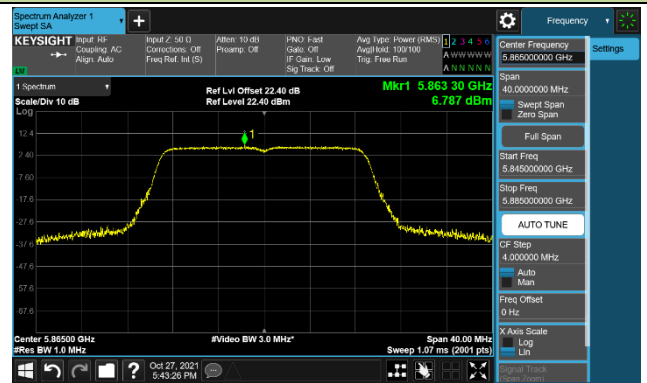


### 802.11ac-VHT20 Power Spectral Density- Ant 2

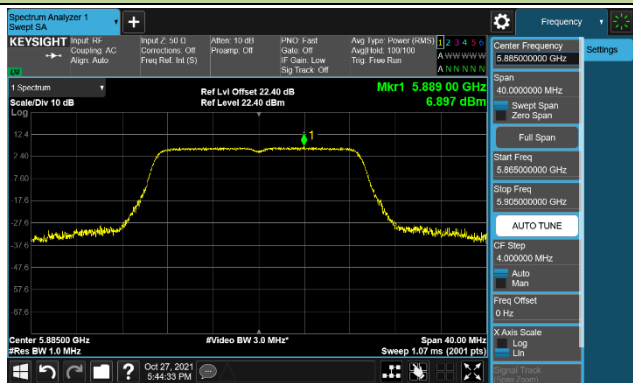
Channel 169 (5845MHz)



Channel 173 (5865MHz)

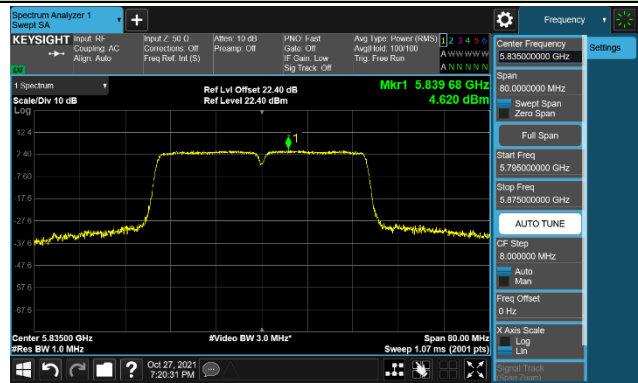


Channel 177 (5885MHz)

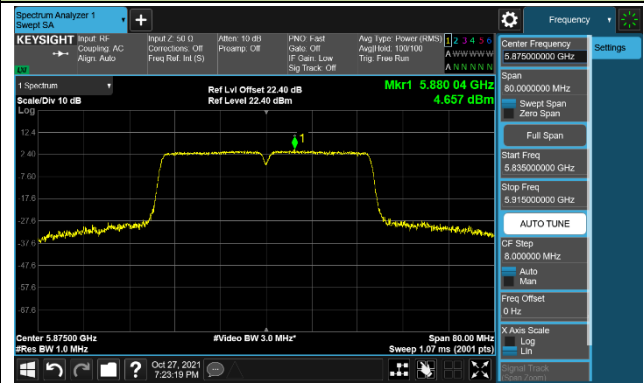


802.11ac-VHT40 Power Spectral Density- Ant 2

Channel 167 (5835MHz)

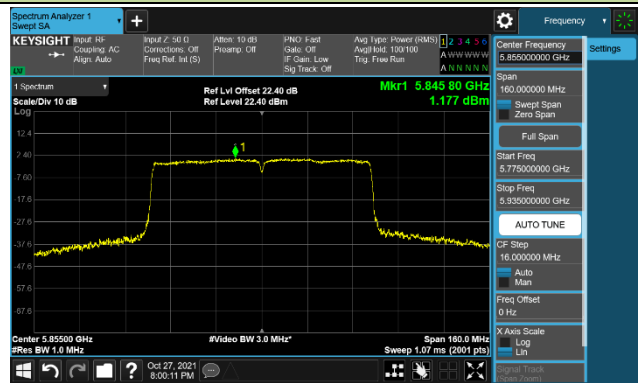


Channel 175 (5875MHz)



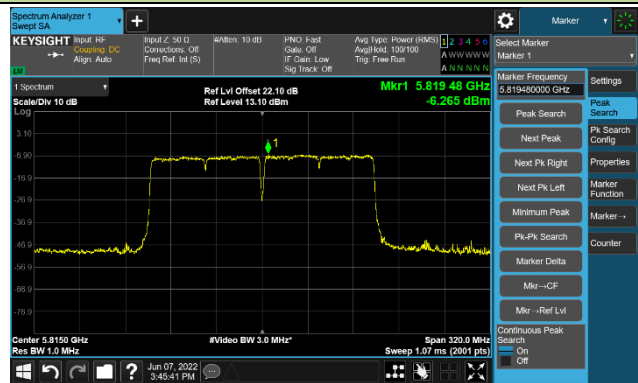
802.11ac-VHT80 Power Spectral Density- Ant 2

Channel 171 (5855MHz)



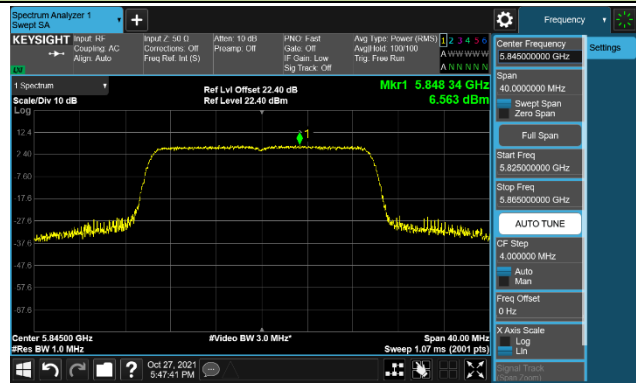
802.11ac-VHT160 Power Spectral Density- Ant 2

Channel 163 (5815MHz)

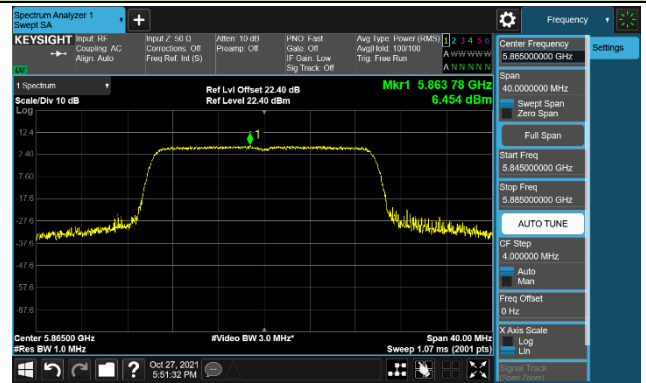


## 802.11ax-HE20 Power Spectral Density- Ant 2

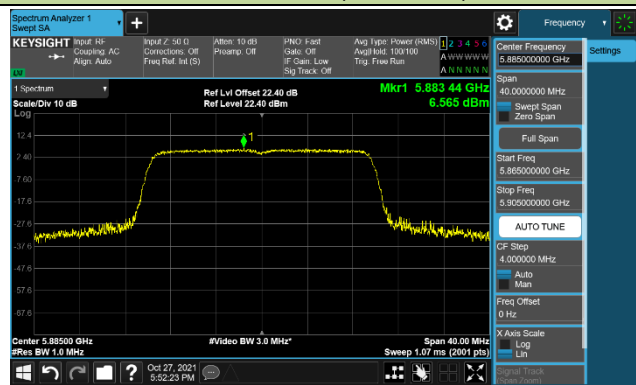
Channel 169 (5845MHz)



Channel 173 (5865MHz)

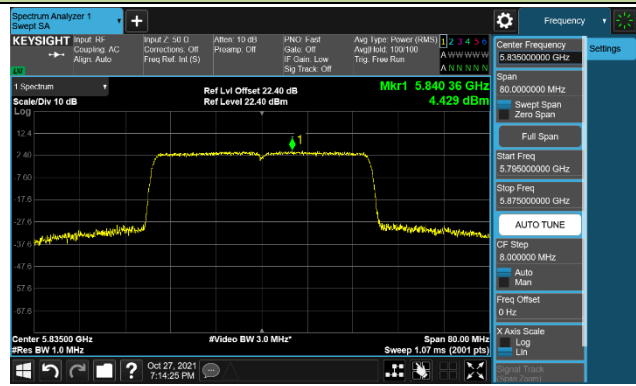


Channel 177 (5885MHz)



## 802.11 ax-HE40 Power Spectral Density- Ant 2

Channel 167 (5835MHz)



Channel 175 (5875MHz)

