802.11n(HT40) _Low_5755

802.11n(HT40) _High_5795

4.3 Maximum Conducted Average Output Power

Limit

For the band 5.15-5.25 GHz.
(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

(iv) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

Test Configuration

Test Results

U-NII 1

Type	Channel	Output power (dBm)	Limit (dBm)	Result
802.11a	36	3.17	24.0	Pass
	44	2.61		
	48	2.72		
802.11n(HT20)	36	2.90	24.0	Pass
	44	2.98		
	48	3.09		
802.11n(HT40)	38	-0.16	24.0	Pass
	46	-0.23		

U-NII 3

Type	Channel	Output power (dBm)	Limit (dBm)	Result
802.11a	149	-1.53	30.00	Pass
	157	-2.67		
	165	-2.73		
802.11n(HT20)	149	-1.31	30.00	Pass
	157	-2.28		
	165	-2.40		
802.11n(HT40)	151	-2.85	30.00	Pass
	159	-3.48		

4.4 Power Spectral Density

Limit

(1) For the band 5.15 - 5.25 GHz.

(i) For an outdoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band.[note1]

(ii) For an indoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band.[note1]

(iii) For fixed point-to-point access points operating in the band 5.15 - 5.25 GHz, transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

(iv) For mobile and portable client devices in the 5.15 - 5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band. [note1]

(2) For the 5.25 - 5.35 GHz and 5.47 - 5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. [note1]

(3) For the band 5.725 - 5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band. [note1, note2]

Note1: If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note2: Fixed point - to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 1MHz for U-NII 1, U-NII 2A, U-NII C band and 510KHz for U-NII 3 band.
3. Set the VBW ≥ 3× RBW.
4. Set the span to encompass the entire EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.

Test Configuration

Test Results

U-NII 1

Type	Bands	Channel	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	U-NII 1	36	-3.04	11.0	Pass
		44	-3.54		
		48	-3.20		
802.11n (HT20)	U-NII 1	36	-2.97		
		44	-3.90		
		48	-4.43		
802.11n (HT40)	U-NII 1	38	-7.19		
		46	-8.11		

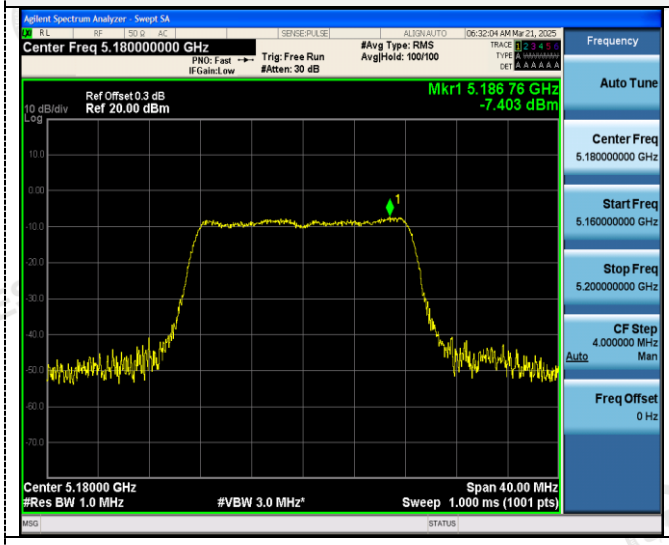
U-NII 3

Type	Bands	Channel	Power Spectral Density (dBm/300KHz)	Power Spectral Density (dBm/500KHz)	Limit (dBm/500KHz)	Result
802.11a	U-NII 3	149	-10.46	-8.24	30.0	Pass
		157	-11.30	-9.08		
		165	-12.12	-9.90		
802.11n (HT20)	U-NII 3	149	-9.59	-7.37		
		157	-10.05	-7.83		
		165	-10.38	-8.16		
802.11n (HT40)	U-NII 3	151	-11.61	-9.39		
		159	-12.58	-10.36		

Test plot as follows

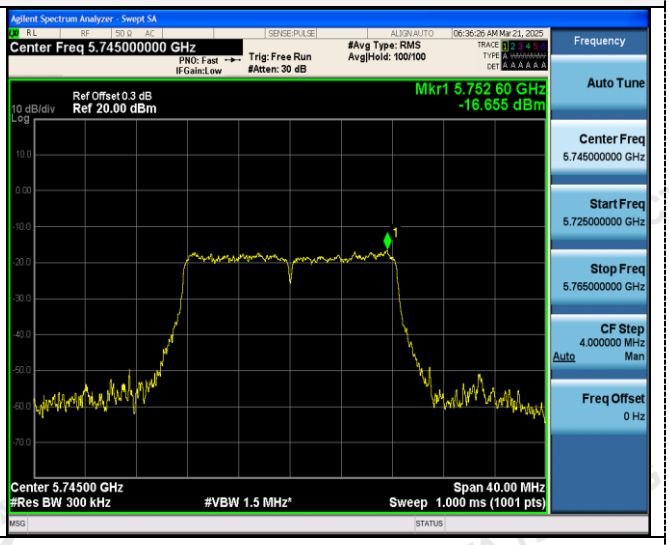
802.11a

U-NII 1

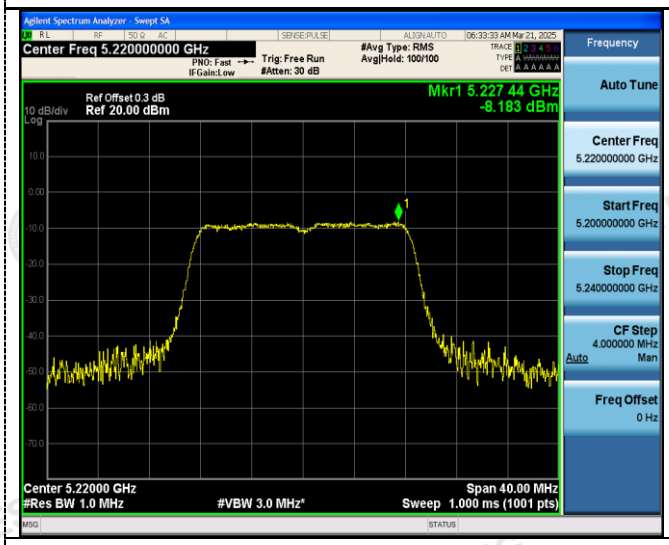


CH36

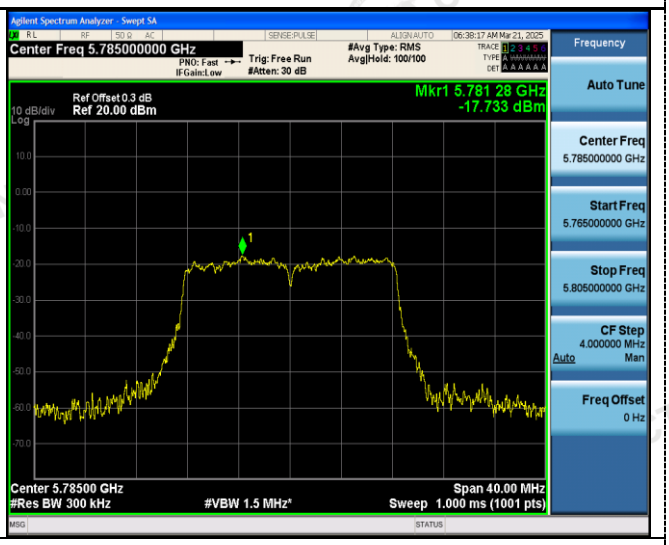
U-NII 3



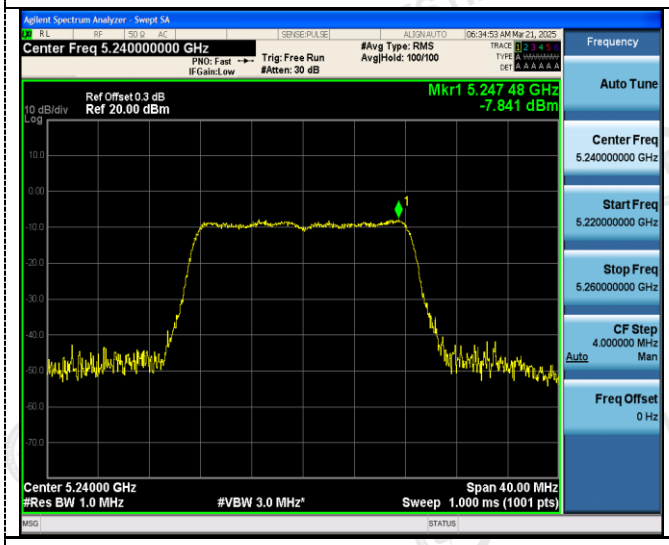
CH149



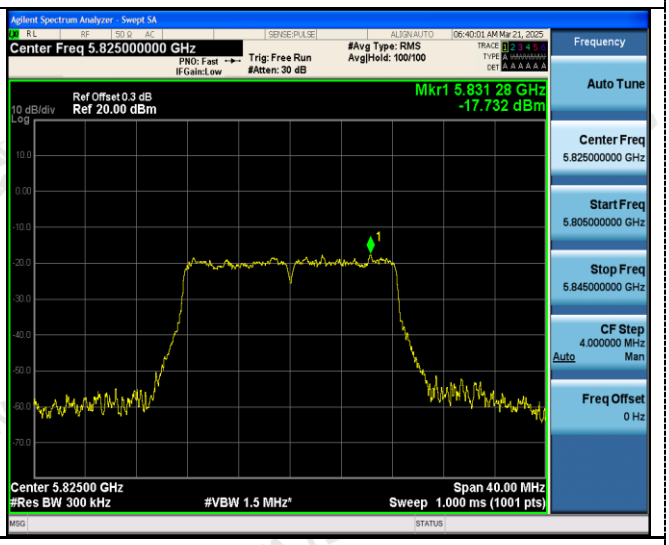
CH40



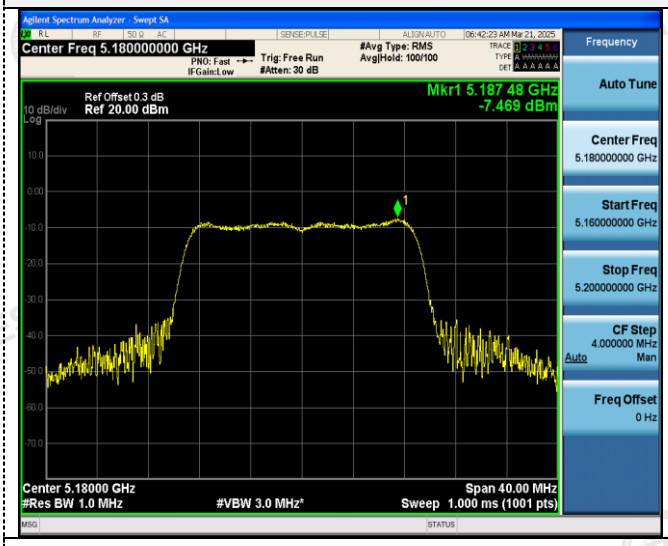
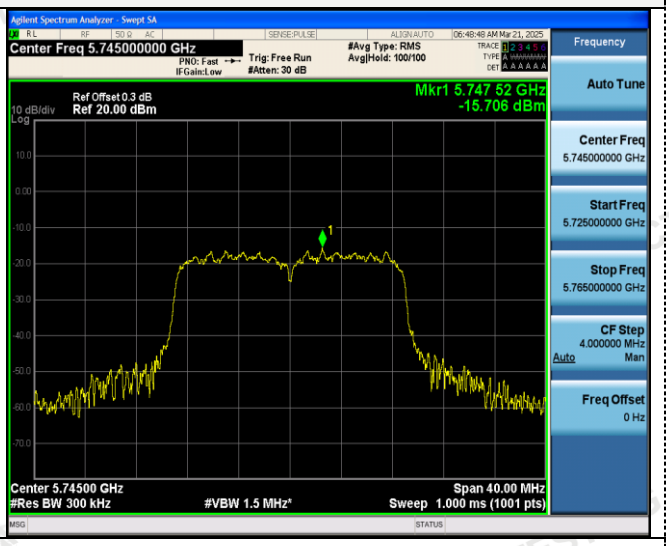
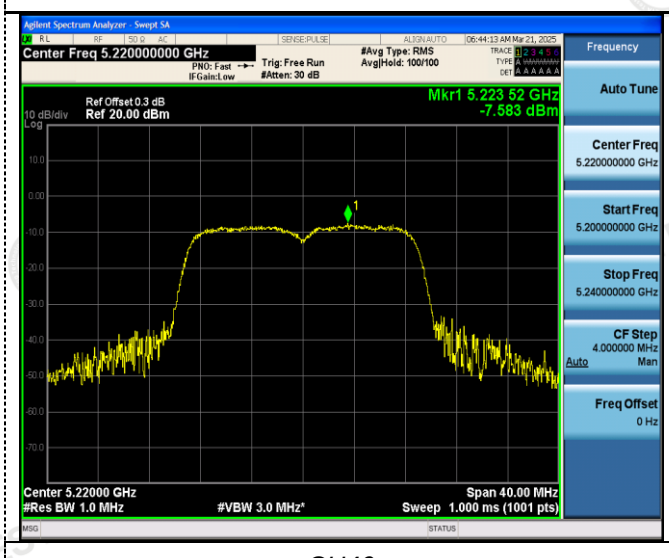
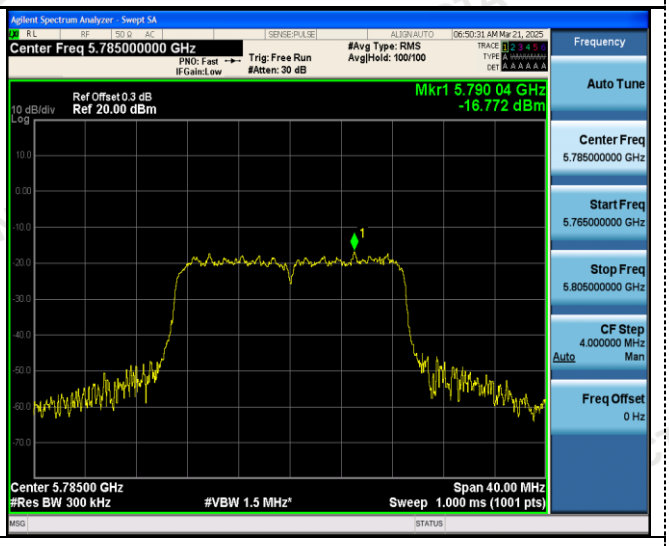
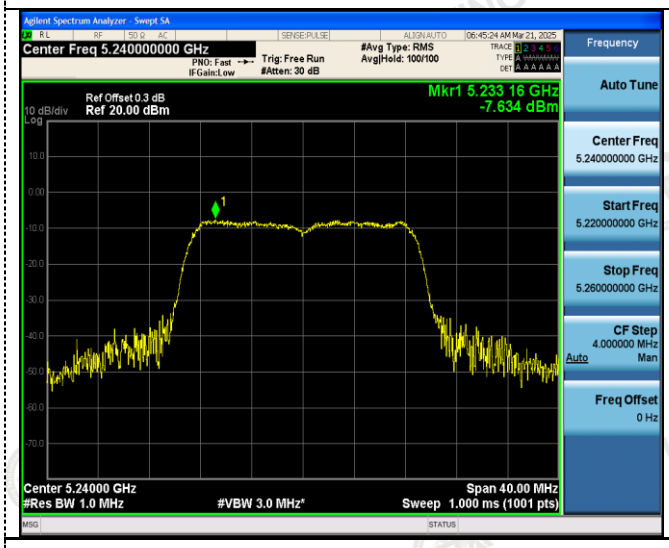
CH157

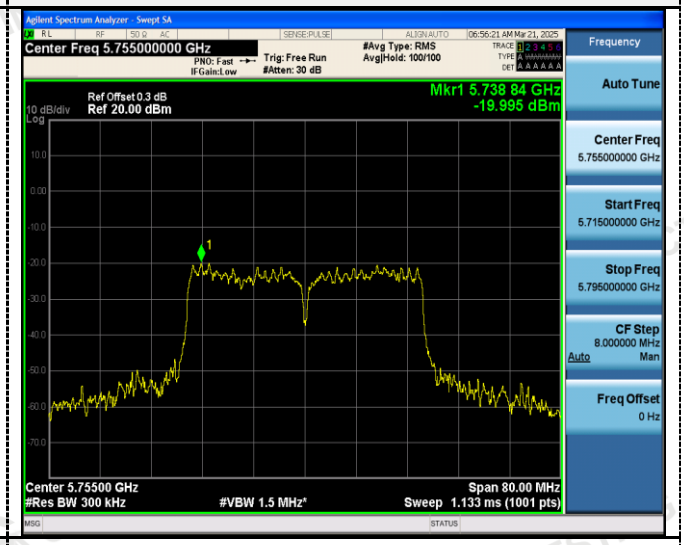


CH48



CH165

802.11n(HT20)	
U-NII 1	U-NII 3
	
CH36	CH149
	
CH40	CH157
	
CH48	CH165

802.11n(HT40)	
U-NII 1	U-NII 3
	
CH38	CH151
CH46	CH159

4.5 Emission Bandwidth (26dB Bandwidth)

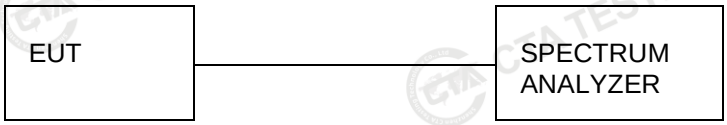
Limit

N/A

Test Procedure

1. Set resolution bandwidth (RBW) = approximately 1 % of the EBW.
2. Set the video bandwidth (VBW) > RBW.
3. Detector = Peak.
4. Trace mode = Max hold.
5. Measure the maximum width of the emission that is 26 dB down from the peak 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 %.

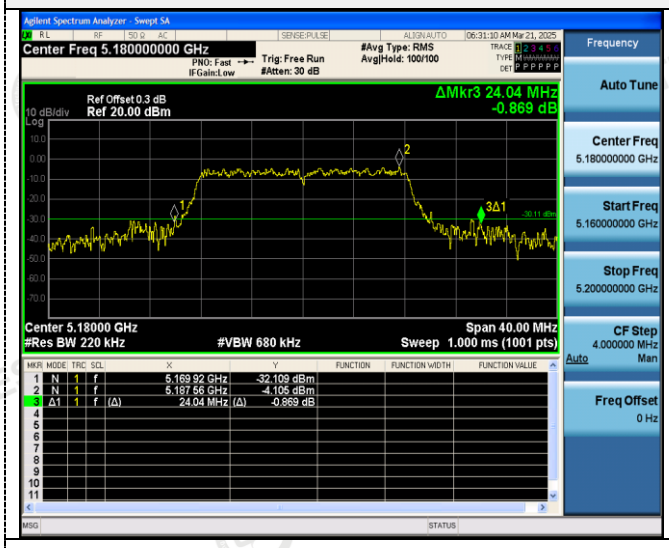
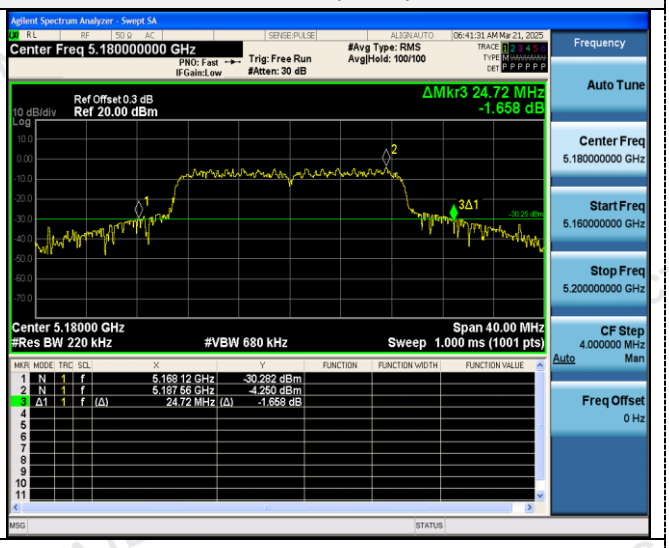
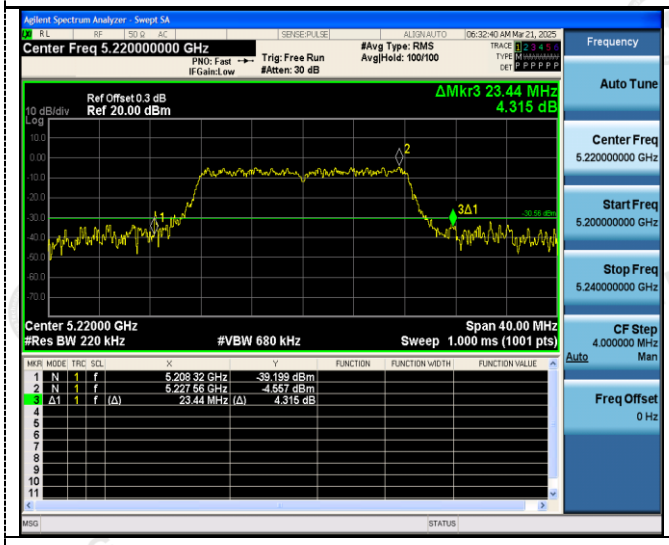
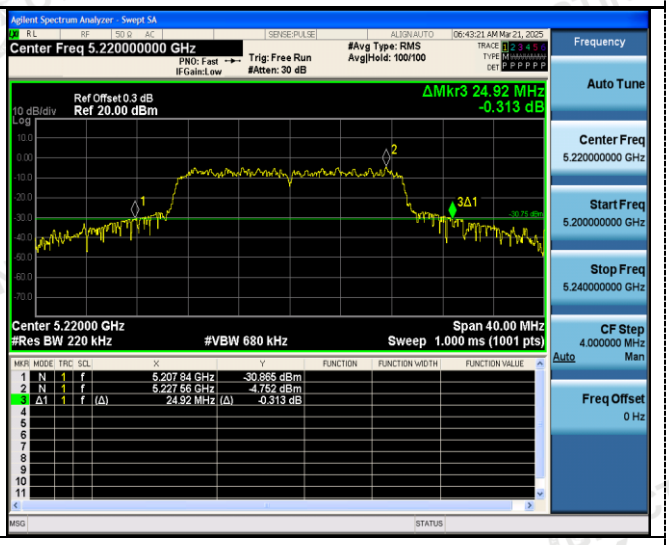
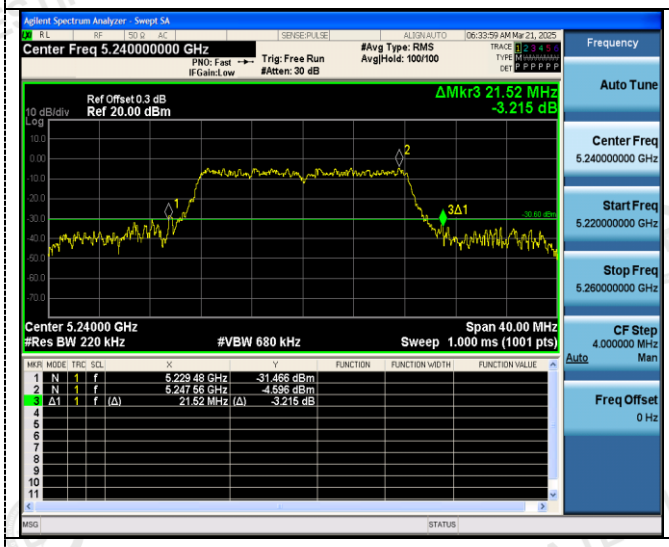
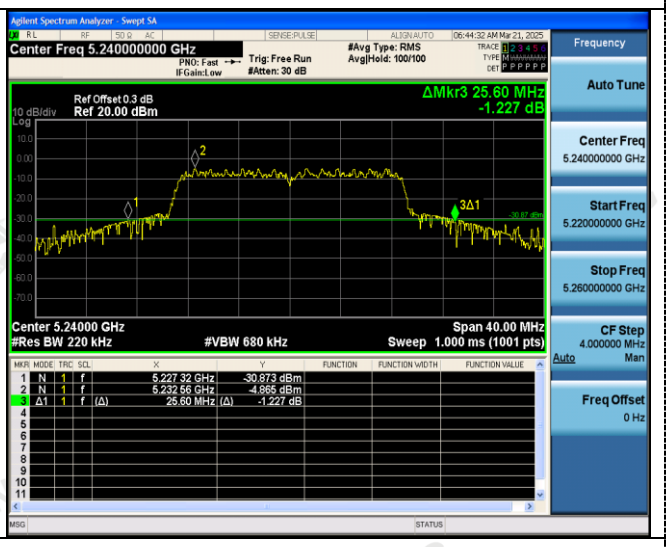
Test Configuration

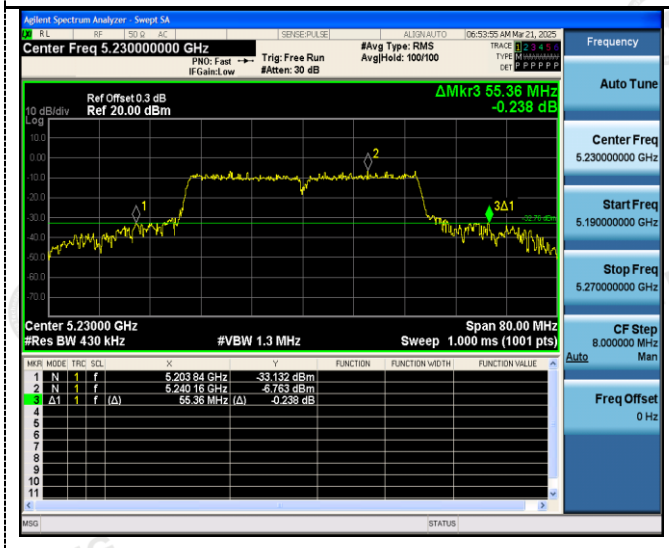


Test Results

Type	Bands	Channel	26dB Bandwidth (MHz)	Limit (MHz)	Result
802.11a	U-NII 1	36	24.040	N/A	Pass
		40	23.440		
		48	21.520		
802.11n(HT20)	U-NII 1	36	24.720		
		40	24.920		
		48	25.600		
802.11n(HT40)	U-NII 1	38	48.400		
		46	55.360		

Test plot as follows:

802.11a	802.11n(HT20)
	
CH36	CH36
	
CH40	CH40
	
CH48	CH48

802.11n(HT40)	/
CH38	/
	
CH46	/

4.6 Minimum Emission Bandwidth (6dB Bandwidth)

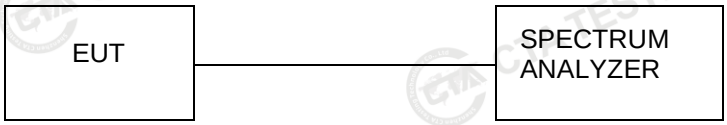
Limit

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Procedure

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth 3 x RBW.
3. Detector = Peak.
4. Trace mode = Max hold.
5. 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.

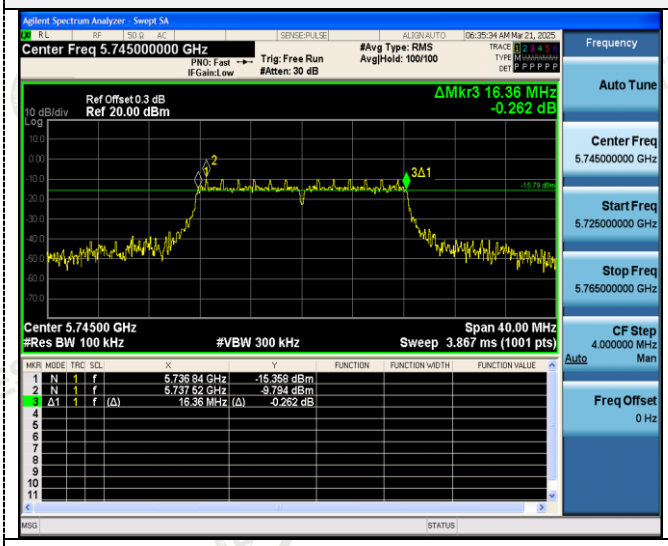
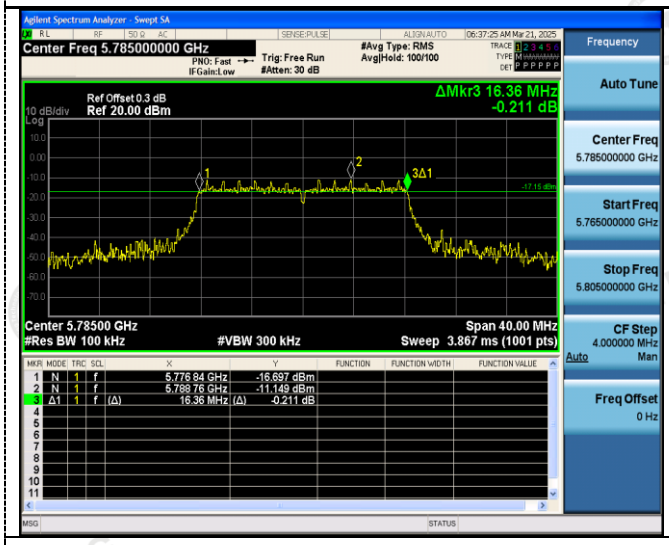
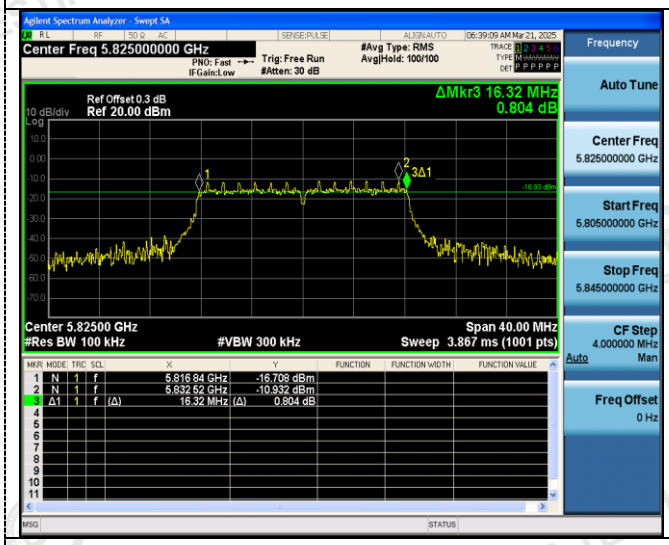
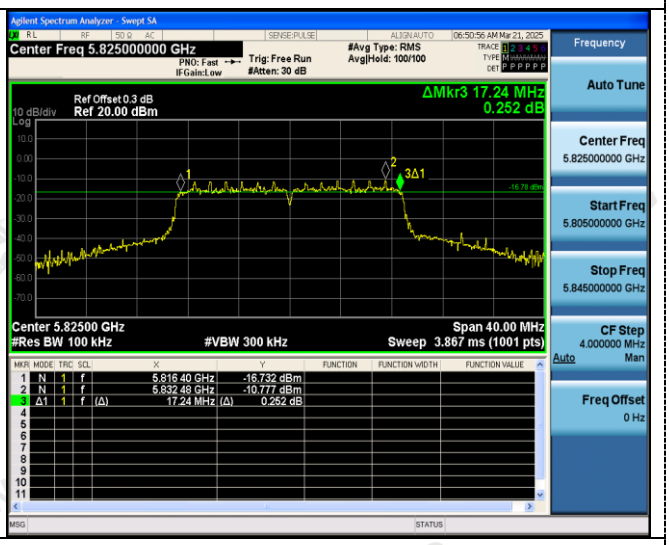
Test Configuration

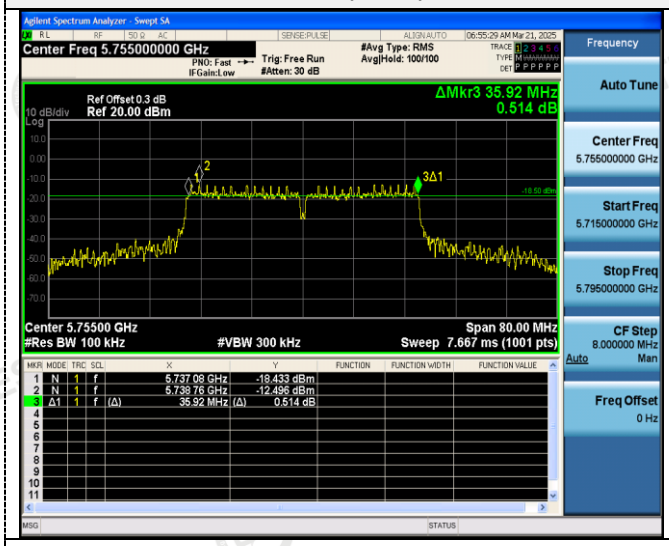
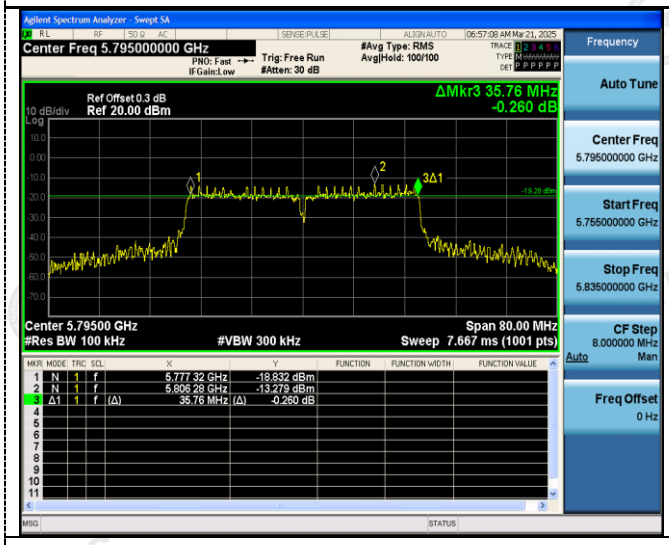


Test Results

Type	Bands	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11a	U-NII 3	149	16.360	≥500KHz	Pass
		157	16.360		
		165	16.320		
802.11n(HT20)	U-NII 3	149	17.120		
		157	17.280		
		165	17.240		
802.11n(HT40)	U-NII 3	151	35.920		
		159	35.760		

Test plot as follows:

802.11a	802.11n(HT20)
	
CH149	CH149
	
CH157	CH157
	
CH165	CH165

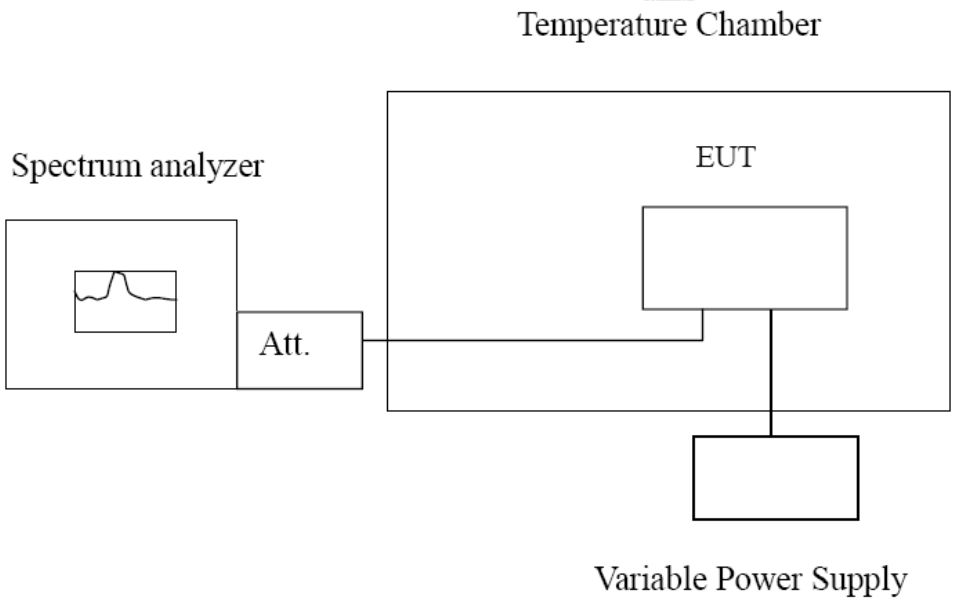
802.11n(HT40)	/
	
CH151	/
	
CH159	/

4.7 Frequency Stability

LIMIT

Manufacturers 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 users manual.

TEST CONFIGURATION



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℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

Frequency Stability under Voltage Variations:
Set chamber temperature to 20℃. 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.

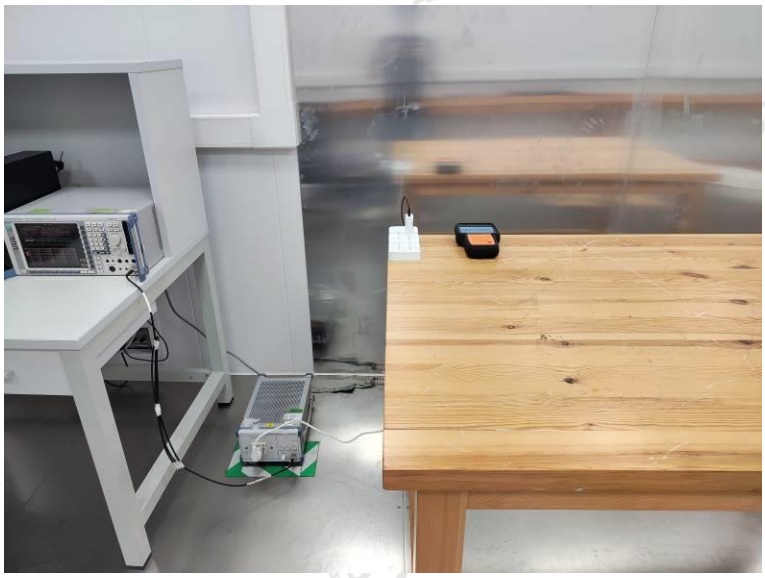
TEST RESULTS

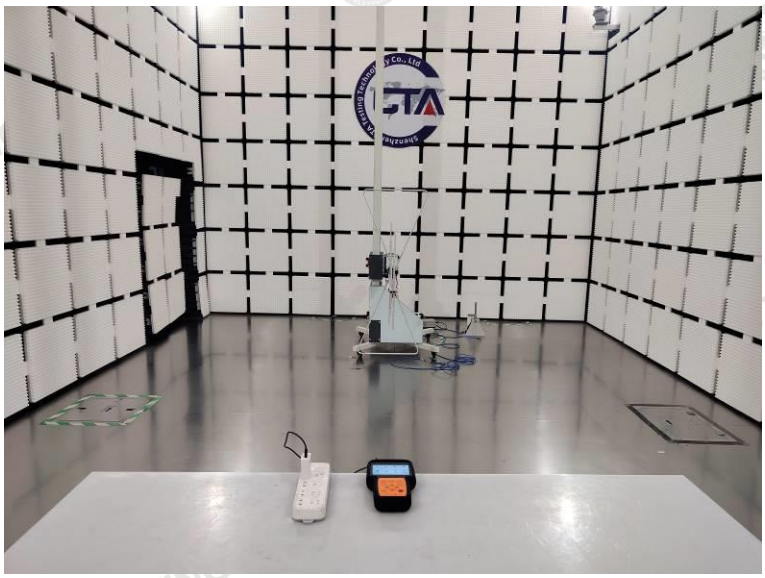
Record worst case as below:

Reference Frequency: 802.11ac channel=36 frequency=5180MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
AC 120	-30	110.80	0.021390	Within the band of operation	Pass
	-20	174.83	0.033751		
	-10	145.39	0.028068		
	0	146.30	0.028243		
	10	146.14	0.028212		
	20	99.81	0.019268		
	30	167.42	0.032320		
	40	129.60	0.025019		
	50	128.73	0.024851		
AC 132	25	195.70	0.037780		
AC 108	25	118.55	0.022886		

Reference Frequency: 802.11ac channel=149 frequency=5745MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
AC 120	-30	135.74	0.023628	Within the band of operation	Pass
	-20	129.42	0.022527		
	-10	167.48	0.029152		
	0	169.98	0.029587		
	10	136.34	0.023732		
	20	144.84	0.025211		
	30	116.82	0.020334		
	40	168.64	0.029354		
	50	160.55	0.027946		
AC 132	25	150.87	0.026261		
AC 108	25	129.67	0.022571		

5 Test Setup Photos of the EUT





6 Photos of the EUT

Reference to the test report No. **CTA25031300501.**

**********End of Report**********