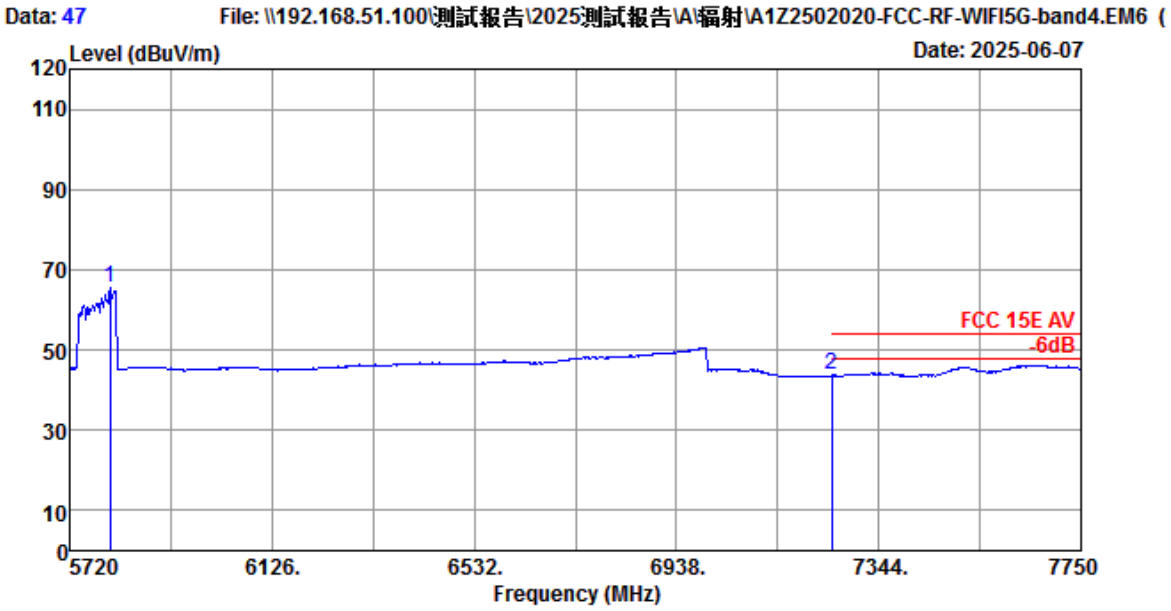
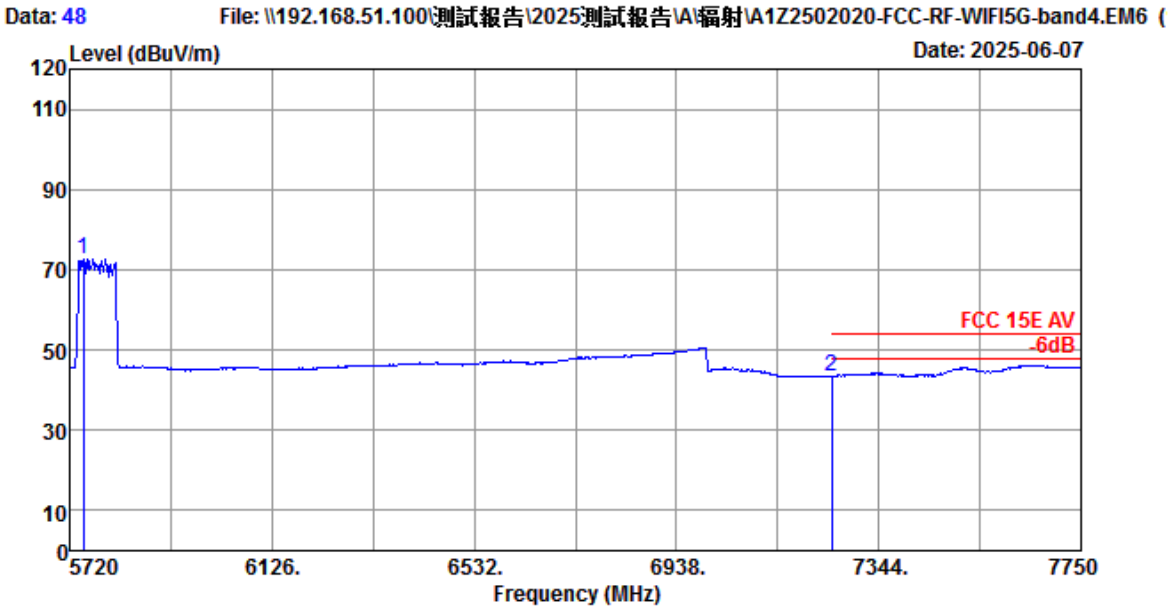


Site no. : RF Chamber Data no. : 47
Dis. / Ant. : 3m 2024 MCTD1209-3007 Ant. pol. : HORIZONTAL
Limit : FCC 15E AV Engineer : Epoch
Env. / Ins. : 23.4*C/51%
Test Mode : WIFI5G 11ac80 5775MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5801.200	33.41	7.36	48.60	73.18	65.35	------	------	Average
2	7250.000	36.10	8.10	48.25	47.70	43.65	54.00	10.35	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official
limit are not reported.



Site no. : RF Chamber Data no. : 48
Dis. / Ant. : 3m 2024 MCTD1209-3007 Ant. pol. : VERTICAL
Limit : FCC 15E AV Engineer : Epoch
Env. / Ins. : 23.4*C/51%
Test Mode : WIFI5G 11ac80 5775MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5748.420	33.51	7.35	48.57	80.33	72.62	------	------	Average
2	7250.000	36.10	8.10	48.25	47.40	43.35	54.00	10.65	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp Factor
2. The emission levels that are 20dB below the official
limit are not reported.

6. 6dB & 26dB & 99% Occupied Bandwidth Test

6.1.Limit

6dB Bandwidth should be not less than 500kHz

6.2.Test Procedure

26dB Bandwidth:

Use the test method descried in ANSI C63.10 clause 12.4.1:

(a) Set RBW = approximately 1% of the emission bandwidth.
(b) Set the VBW > RBW.
(c) Detector = Peak.
(d) Trace mode = max hold.
(e) 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%.

6dB Bandwidth:

Use the test method descried in 789033 D02 v02r01:

(f) Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 kHz for the band 5.725−5.85 GHz. The following procedure shall be used for measuring this bandwidth:
(a) Set RBW = 100 kHz.
(b) Set the video bandwidth (VBW) ≥ 3 RBW.
(c) Detector = Peak.
(d) Trace mode = max hold
(e) Sweep = auto couple
(f) Allow the trace to stabilize
(g) 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

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described in this section. For devices that use channel aggregation refer to III.A and III.C for determining emission bandwidth.

99% Occupied bandwidth:

Use the test method descried in ANSI C63.10 Section 6.9.2:

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

d) Step a) through step c) might require iteration to adjust within the specified range.

e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

6.3.Test Results

EUT: Desktop 3D Printer		
M/N: Phrozen Sonic CS+ 3D Printer		
Test date: 2025-05-15~16	Pressure: 102.5±1.0 kpa	Humidity: 53.6±3.0%
Tested by: Carl	Test site: RF site	Temperature: 22.4±0.6℃

U-NII-1 Band:

Test Mode	Frequency (MHz)	99%Bandwidth (MHz)	26dB Bandwidth (MHz)	Limit (MHz)
11a	5180	16.601	20.63	N/A
	5200	16.553	20.12	
	5240	16.543	20.20	
11n HT20	5180	17.624	20.92	N/A
	5200	17.628	21.20	
	5240	17.650	20.69	
11n HT40	5190	35.981	40.04	N/A
	5230	36.185	41.86	
11ac VHT20	5180	17.669	20.60	N/A
	5200	17.621	20.49	
	5240	17.682	21.03	
11ac VHT40	5190	36.108	40.87	N/A
	5230	36.154	40.81	
11ac VHT80	5210	75.008	80.33	N/A
Conclusion: Pass				

U-NII3 Band:

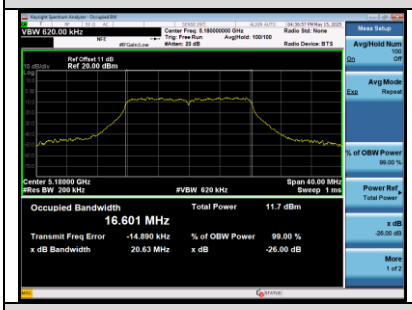
Test Mode	Frequency (MHz)	99%Bandwidth (MHz)	26dB Bandwidth (MHz)	Limit (MHz)
11a	5745	16.510	21.02	N/A
	5785	16.624	20.56	
	5825	16.599	21.62	
11n HT20	5745	17.639	20.61	N/A
	5785	17.653	20.55	
	5825	17.684	21.56	
11n HT40	5755	36.172	41.63	N/A
	5795	36.162	41.69	
11ac VHT20	5745	17.630	20.87	N/A
	5785	17.647	21.45	
	5825	17.705	21.73	
11ac VHT40	5755	36.262	41.89	N/A
	5795	36.247	41.96	
11ac VHT80	5775	75.186	81.39	N/A
Conclusion: Pass				

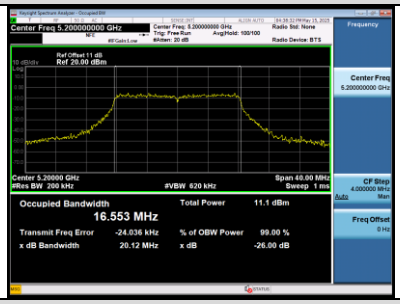
Test Mode	Frequency (MHz)	6dBBandwidth (MHz)	Limit (KHz)
11a	5745	16.36	≥500
	5785	16.40	
	5825	16.35	
11n HT20	5745	16.71	≥500
	5785	16.99	
	5825	17.31	
11n HT40	5755	35.23	≥500
	5795	35.42	
11ac VHT20	5745	17.61	≥500
	5785	16.47	
	5825	16.88	
11ac VHT40	5755	35.57	≥500
	5795	35.28	
11ac VHT80	5775	75.34	≥500
Conclusion: Pass			

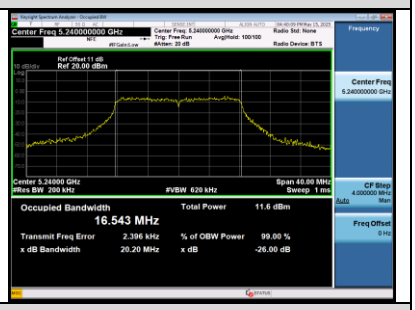
26dB bandwidth & 99% Occupied bandwidth

U-NII-1 Band

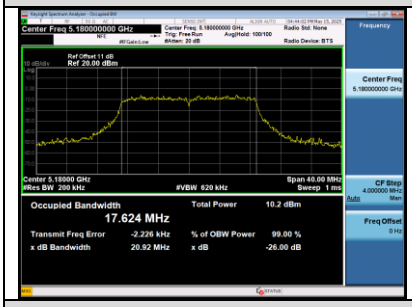
IEEE 802.11a

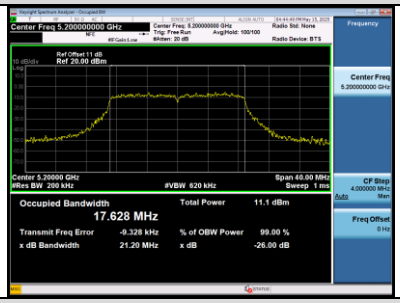


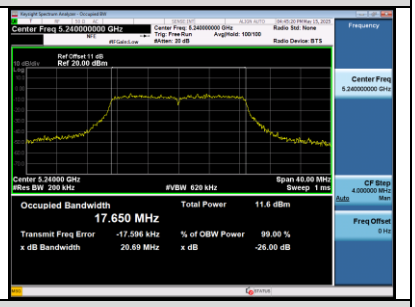




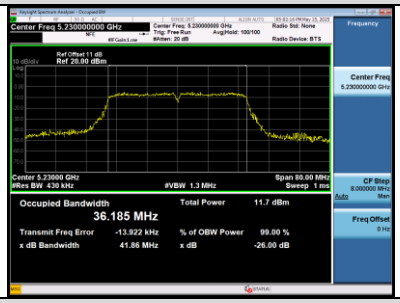
IEEE 802.11n HT20



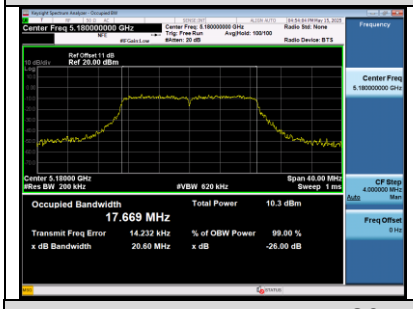


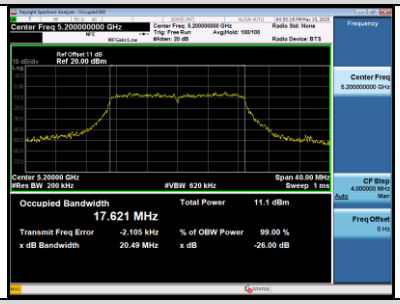


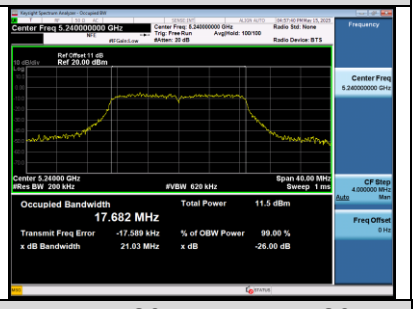
IEEE 802.11n HT40	---



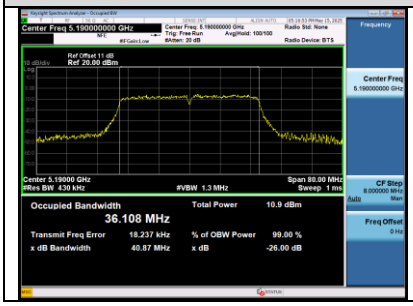
IEEE 802.11ac VHT20

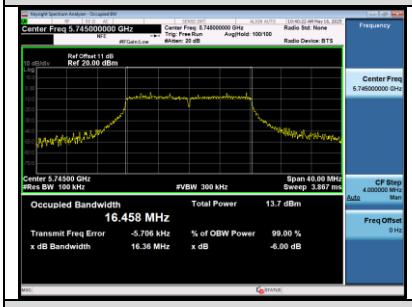
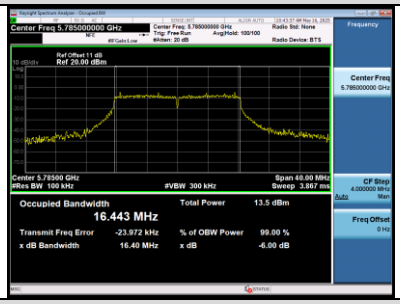






IEEE 802.11ac VHT40	IEEE 802.11ac VHT80



6dB bandwidth		
U-NII-3 Band		
IEEE 802.11a		
		
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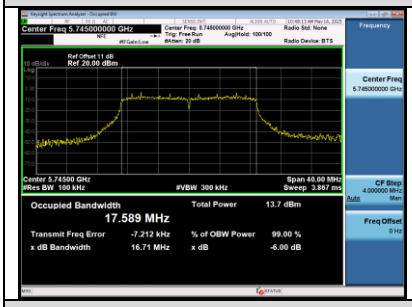	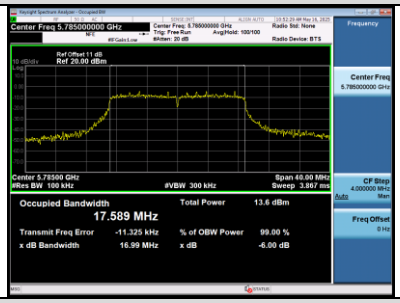	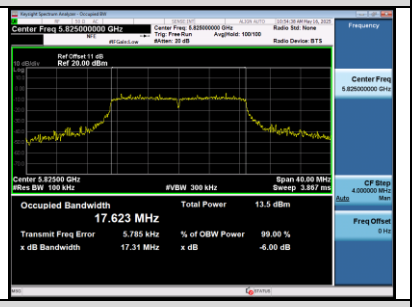
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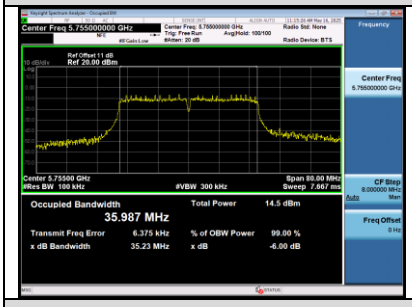	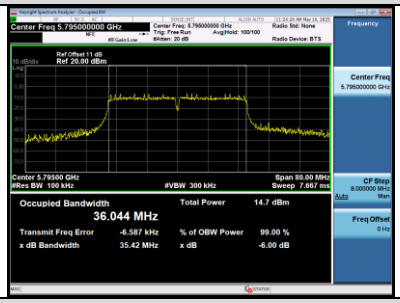	---
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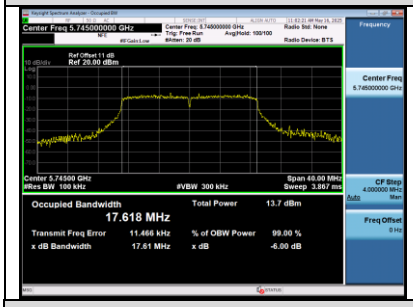	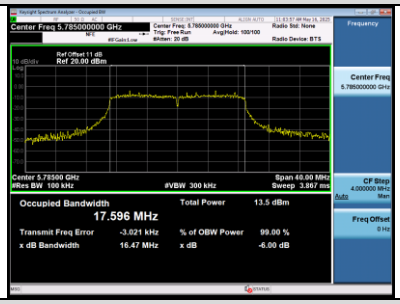	
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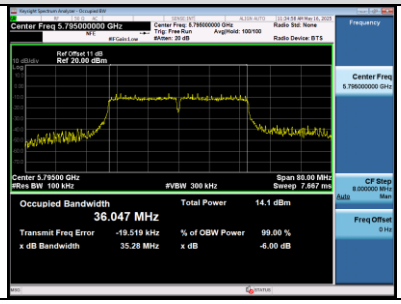
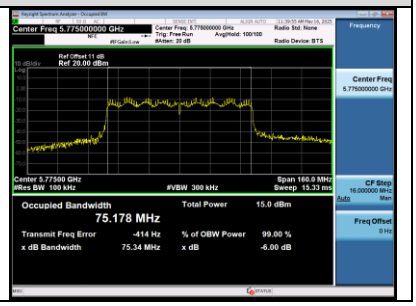
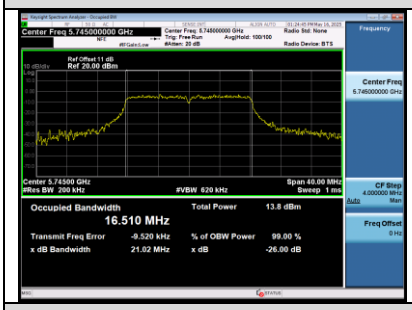
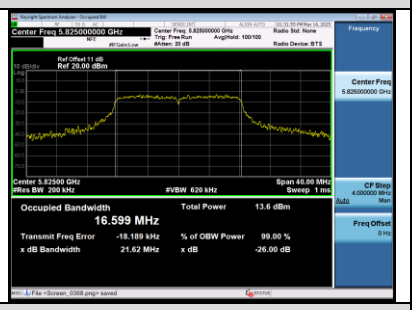
		

26dB bandwidth & 99% Occupied bandwidth

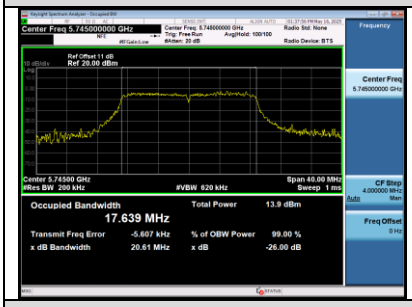
U-NII-3 Band

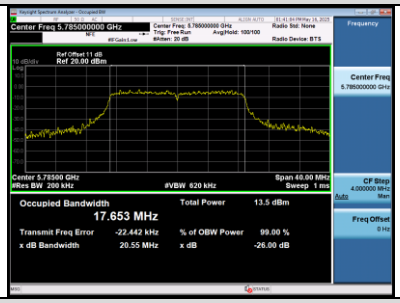
IEEE 802.11a

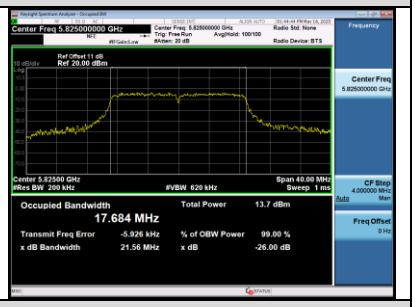




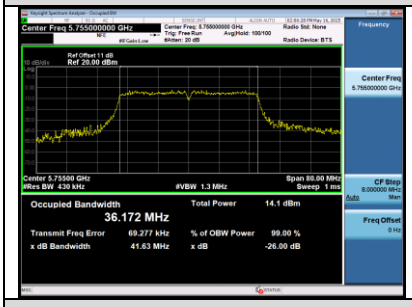
IEEE 802.11n HT20

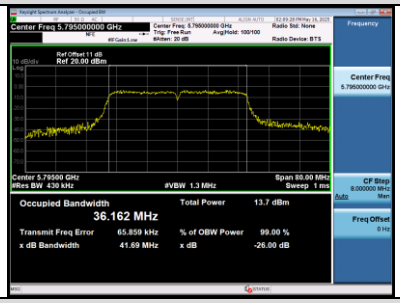




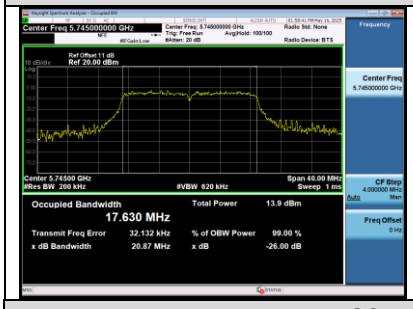


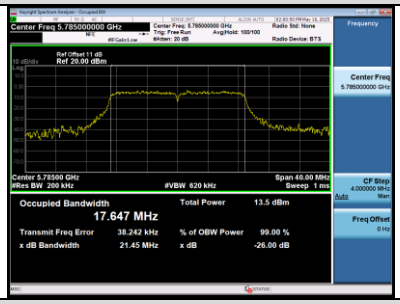
IEEE 802.11n HT40	---

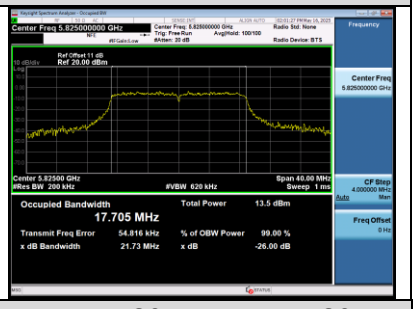




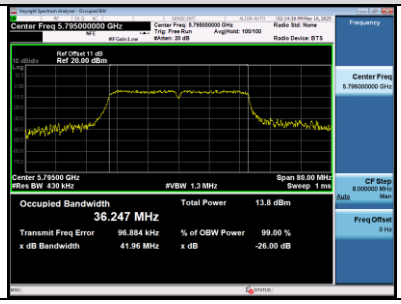
IEEE 802.11ac VHT20

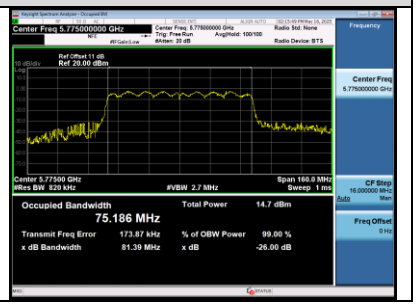






IEEE 802.11ac VHT40	IEEE 802.11ac VHT80





7. OUTPUT POWER TEST

7.1.Limit

For the band 5.15–5.25 GHz.
For mobile and portable 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 max-imum 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.

7.2.Test Procedure

1. Connected the EUT's antenna port to measure device by 20dB attenuator.
2. Use the test method described in ANSI C63.10 clause 12.3 Method SA-1
   1) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
   2) Set RBW = 1 MHz.
   3) Set VBW ≥ 3 MHz.
   4) Number of points in sweep ≥ 2 × span / RBW.
   5) Sweep time = auto.
   6) Detector = power averaging (rms), if available. Otherwise, use sample detector mode.
   7) If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run."
   8) Trace average at least 100 traces in power averaging (rms) mode.
   9) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

7.3. Test Results

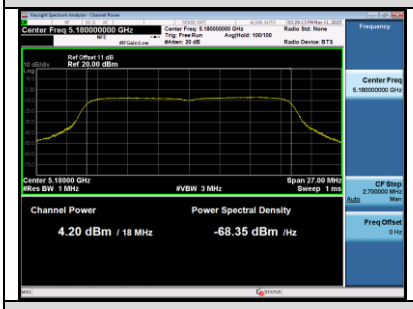
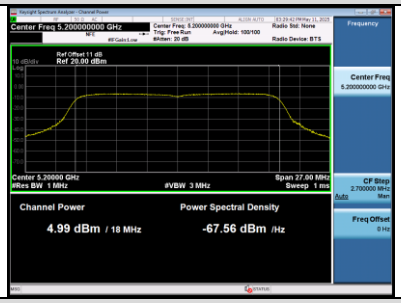
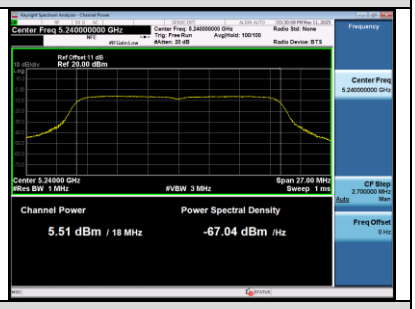
EUT: Desktop 3D Printer		
M/N: Phrozen Sonic CS+ 3D Printer		
Test date: 2025-05-11	Pressure: 102.1±1.0 kpa	Humidity: 53.2±3.0%
Tested by: Carl	Test site: RF site	Temperature: 22.3±0.6℃

U-NII-1 Band

Test Mode	Frequency (MHz)	Power Setting	Output Power (dBm)	Limit (dBm)
11a	5180	Default	4.62	30
	5200	Default	5.40	
	5240	Default	5.93	
11n HT20	5180	Default	4.54	30
	5200	Default	5.33	
	5240	Default	5.85	
11n HT40	5190	Default	5.32	30
	5230	Default	6.09	
11ac VHT20	5180	Default	4.58	30
	5200	Default	5.32	
	5240	Default	5.82	
11ac VHT40	5190	Default	5.15	30
	5230	Default	6.07	
11ac VHT80	5210	Default	5.66	30
Conclusion: Pass				

U-NII-3 Band:

Test Mode	Frequency (MHz)	Power Setting	Output Power (dBm)	Limit (dBm)
11a	5475	Default	8.07	30
	5485	Default	7.76	
	5825	Default	7.73	
11n HT20	5475	Default	7.95	30
	5485	Default	7.61	
	5825	Default	7.63	
11n HT40	5755	Default	8.31	30
	5795	Default	7.97	
11ac VHT20	5475	Default	7.95	30
	5485	Default	7.70	
	5825	Default	7.68	
11ac VHT40	5755	Default	8.26	30
	5795	Default	7.94	
11ac VHT80	5775	Default	8.02	30
Conclusion: Pass				

U-NII-1 Band		
IEEE 802.11a		
IEEE 802.11n HT20		
		
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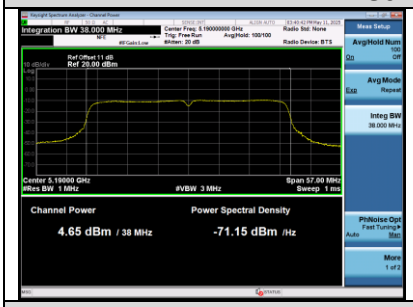	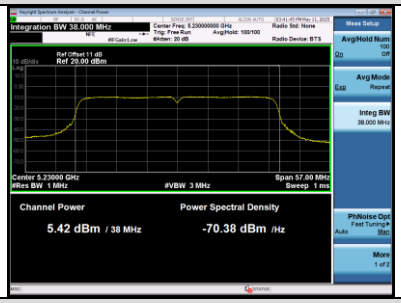	---
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	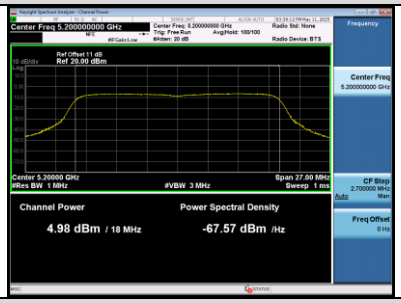	
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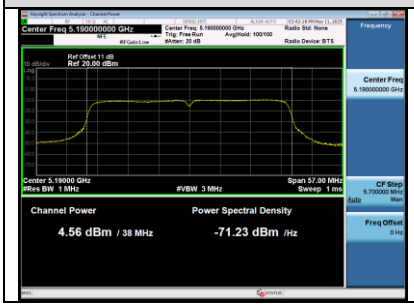	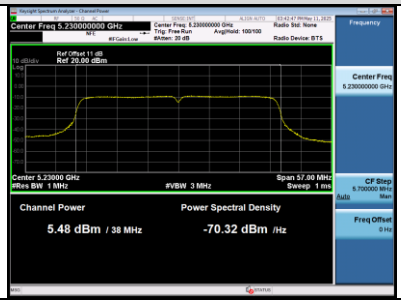	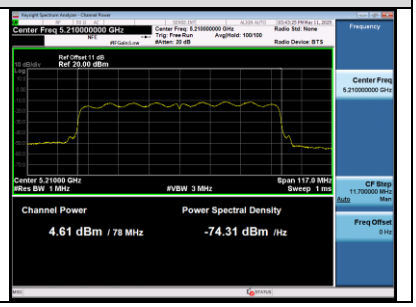

U-NII-3 Band		
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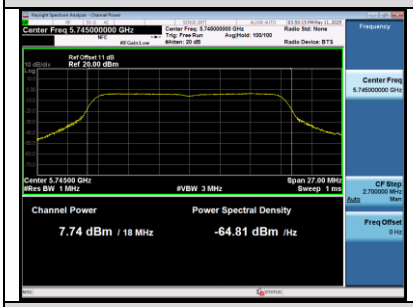		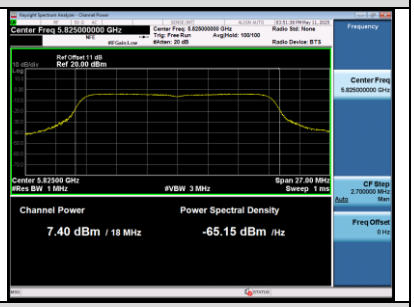
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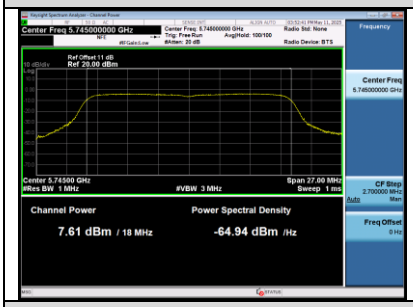	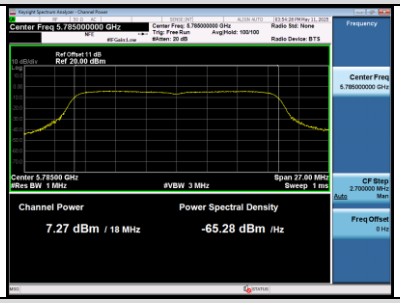	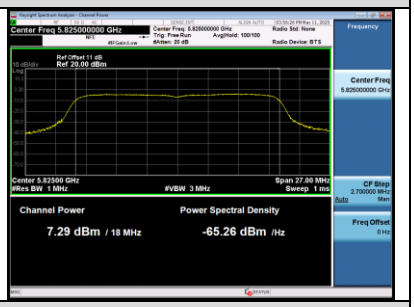
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	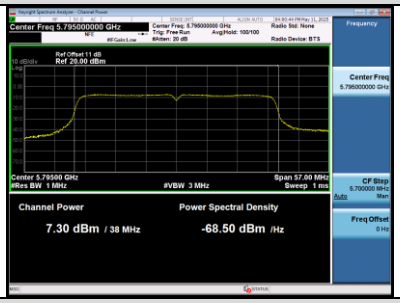	---
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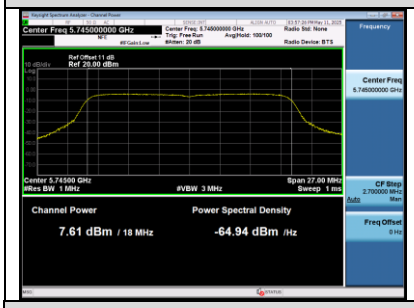
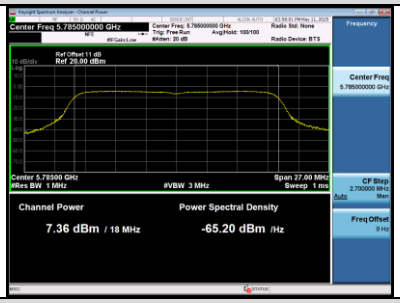
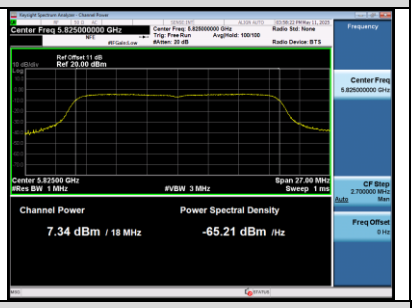
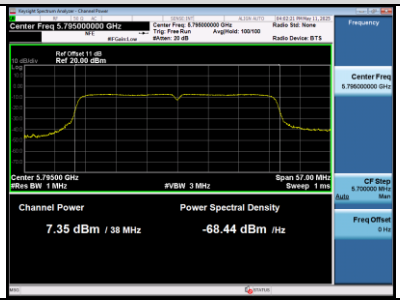
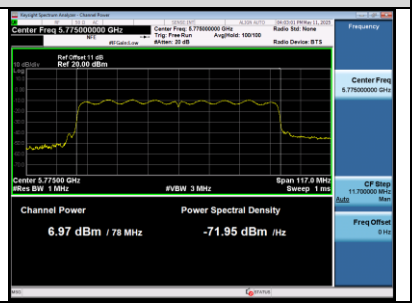
		
IEEE 802.11ac VHT40		IEEE 802.11ac VHT80
		

8. SPECTRAL DENSITY TEST

8.1.Limit

Band 5150-5250 MHz:
The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
Band 5250-5350 MHz:
The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
Band 5470-5725 MHz:
The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
Band 5725-5850 MHz:
The power spectral density shall not exceed 30 dBm in any 500 KHz band.

8.2.Test Procedure

Use the test method described in ANSI C63.10 clause 12.5:
For the Band 5.15-5.35GHz; 5.47-5.725 GHz:
The transmitter output was connected to a spectrum analyzer. Power density was measured by spectrum analyzer with 1MHz RBW and 3MHz VBW; Detector: RMS mode.

For the band 5.725-5.85 GHz:
The transmitter output was connected to a spectrum analyzer. Power density was measured by spectrum analyzer with 1MHz RBW and 3MHz VBW,RMS Detector.
So use the test method described in KDB789033 clause E

1) Set the RBW=100kHz and VBW =300kHz
2) Number of points in sweep ≥ 2 Span / RBW.(This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
3) Sweep time = auto
4) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
5) Use the “peak search” function of spectrum analyzer find the max value, then add 10log (500kHz/RBW) to the measured result.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

8.3.Test Results

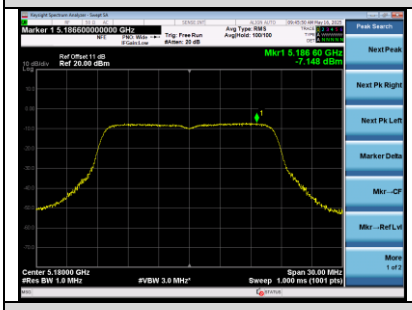
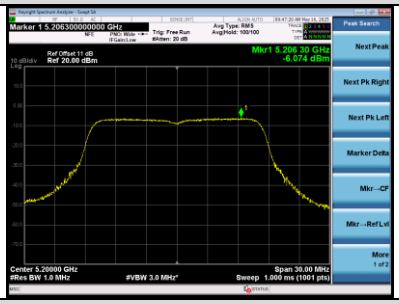
EUT: Desktop 3D Printer		
M/N: Phrozen Sonic CS+ 3D Printer		
Test date: 2025-05-16	Pressure: 102.5±1.0 kpa	Humidity: 53.6±3.0%
Tested by: Carl	Test site: RF site	Temperature: 22.4±0.6℃

U-NII-1 Band:

Test Mode	Frequency (MHz)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)
11a	5180	-7.148	17
	5200	-6.074	
	5240	-5.293	
11n HT20	5180	-6.798	17
	5200	-6.392	
	5240	-5.732	
11n HT40	5190	-9.754	17
	5230	-9.142	
11ac VHT20	5180	-7.162	17
	5200	-6.546	
	5240	-5.922	
11ac VHT40	5190	-9.878	17
	5230	-9.003	
11ac VHT80	5210	-11.742	17
Conclusion: Pass			

U-NII-3 Band:

Test Mode	Frequency (MHz)	Power Spectral Density (dBm/500KHz)	Limit (dBm/500KHz)
11a	5745	-5.661	30
	5785	-5.599	
	5825	-5.943	
11n HT20	5745	-5.659	30
	5785	-6.152	
	5825	-6.236	
11n HT40	5755	-8.513	30
	5795	-9.148	
11ac VHT20	5745	-5.612	30
	5785	-5.561	
	5825	-6.222	
11ac VHT40	5755	-8.753	30
	5795	-9.29	
11ac VHT80	5775	-10.84	30
Conclusion: Pass			

U-NII-1 Band		
IEEE 802.11a		
		
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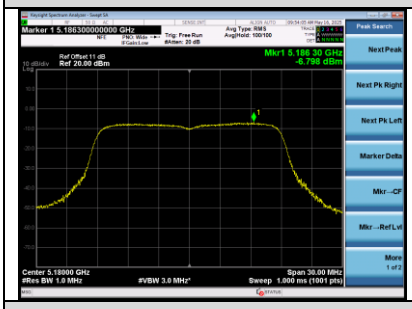	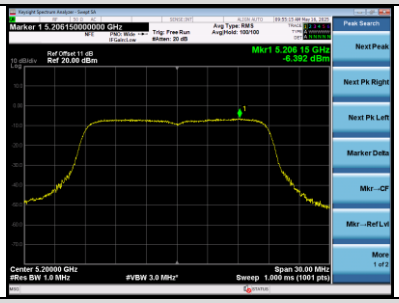	
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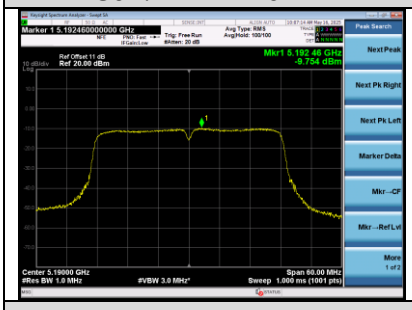	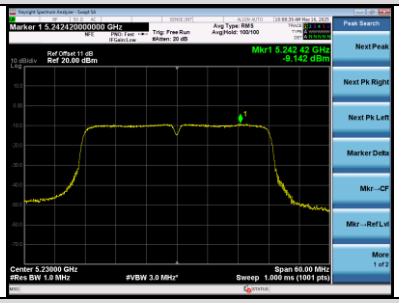	---
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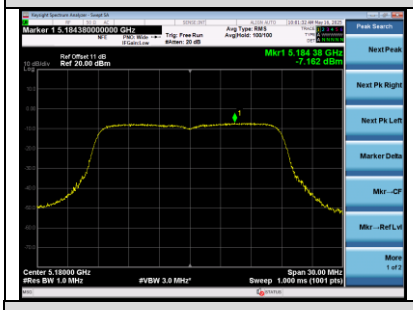	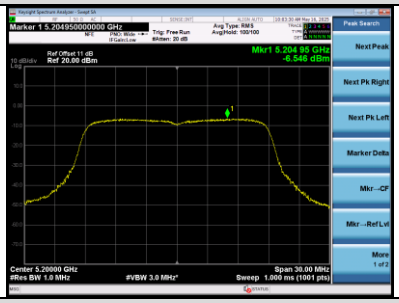	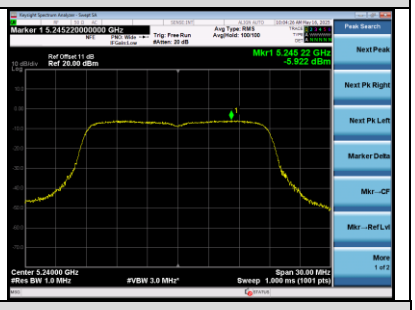
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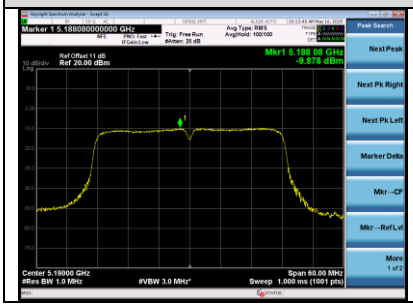	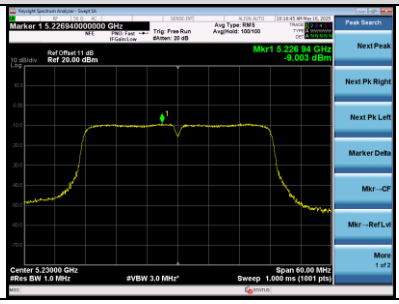	

U-NII-3 Band		
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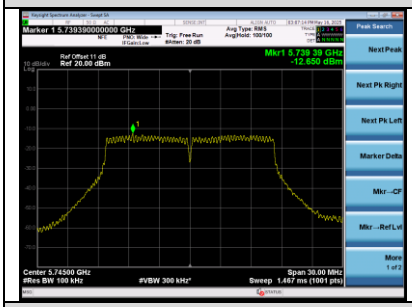	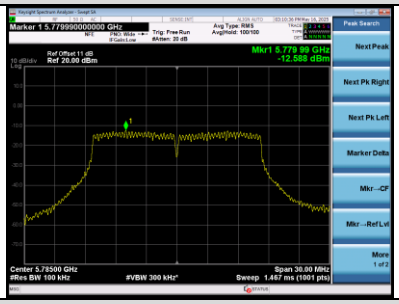	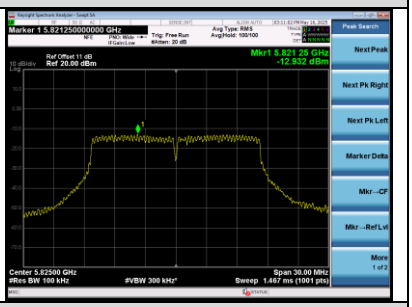
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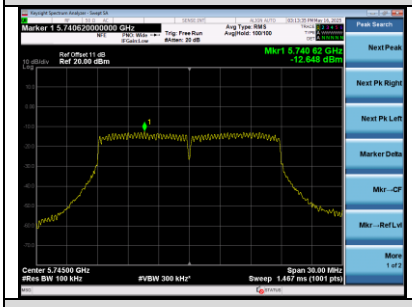	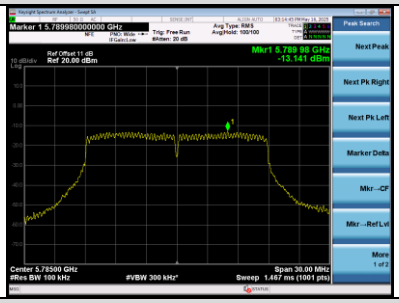	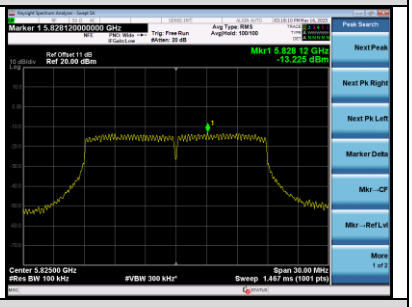
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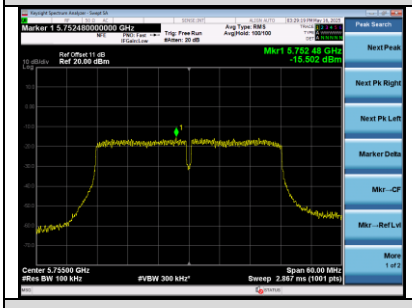	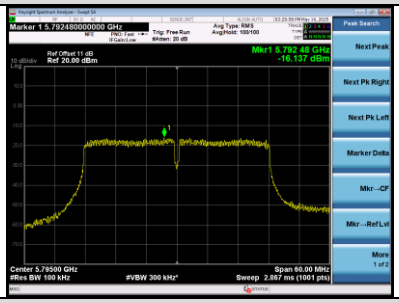	---
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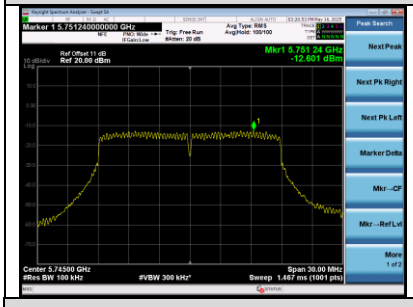
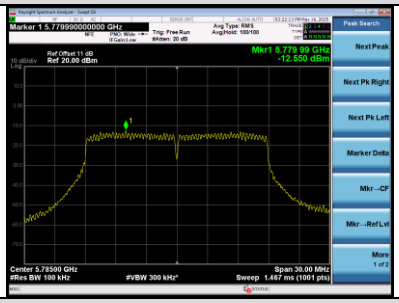
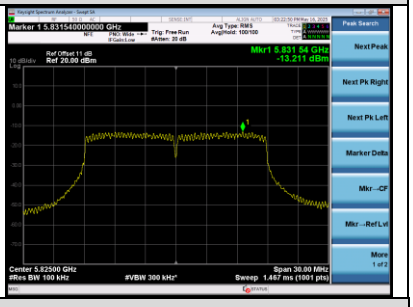
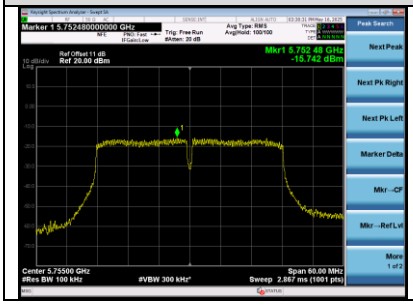
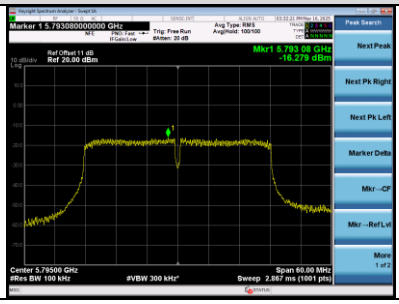
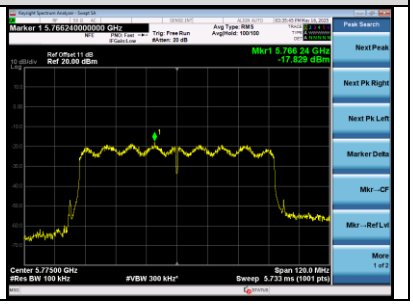
		
IEEE 802.11ac VHT40		IEEE 802.11ac VHT80
		

9. FREQUENCY STABILITY MEASUREMENT

9.1.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 user's manual.

9.2.Test Procedure

Use the test method described in ANSI C63.10 clause 6.8:

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
   EUT have transmitted absence of modulation signal and fixed channelise. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings. fc is declaring of channel frequency. Then the frequency error formula is $(fc-f)/f \times 10^{-6}$ppm. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.
2. Extreme temperature is 5℃~40℃.

9.3.Test Result

EUT: Desktop 3D Printer		
M/N: Phrozen Sonic CS+ 3D Printer		
Test date: 2025-05-16	Pressure: 102.5±1.0 kpa	Humidity: 53.6±3.0%
Tested by: Carl	Test site: RF site	Temperature: 22.4±0.6℃

Frequency Stability vs. Voltage:

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 230V	25℃	CH36	5180.0095	5180	1.83
		CH38	5190.0320	5190	6.17
		CH40	5200.0310	5200	5.96
		CH42	5210.0355	5210	6.81
		CH46	5230.0335	5230	6.41
		CH48	5240.0260	5240	4.96
		CH149	5745.0185	5745	3.22
		CH151	5755.0255	5755	4.43
		CH155	5775.0215	5775	3.72
		CH157	5785.0225	5785	3.89
		CH159	5795.0240	5795	4.14
		CH165	5825.0220	5825	3.78

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 230V	0℃	CH36	5180.0097	5180	1.87
		CH38	5190.0328	5190	6.32
		CH40	5200.0305	5200	5.87
		CH42	5210.0340	5210	6.53
		CH46	5230.0340	5230	6.50
		CH48	5240.0268	5240	5.11
		CH149	5745.0179	5745	3.12
		CH151	5755.0241	5755	4.19
		CH155	5775.0205	5775	3.55
		CH157	5785.0221	5785	3.82
		CH159	5795.0258	5795	4.45
		CH165	5825.0221	5825	3.79

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 230V	70℃	CH36	5180.0109	5180	2.10
		CH38	5190.0328	5190	6.32
		CH40	5200.0326	5200	6.27
		CH42	5210.0354	5210	6.79
		CH46	5230.0343	5230	6.56
		CH48	5240.0259	5240	4.94
		CH149	5745.0193	5745	3.36
		CH151	5755.0255	5755	4.43
		CH155	5775.0208	5775	3.60
		CH157	5785.0240	5785	4.15
		CH159	5795.0244	5795	4.21
		CH165	5825.0221	5825	3.79

Frequency Stability vs. Temperature:

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 265V	25℃	CH36	5180.0078	5180	1.51
		CH38	5190.0316	5190	6.09
		CH40	5200.0323	5200	6.21
		CH42	5210.0337	5210	6.47
		CH46	5230.0344	5230	6.58
		CH48	5240.0252	5240	4.81
		CH149	5745.0176	5745	3.06
		CH151	5755.0273	5755	4.74
		CH155	5775.0229	5775	3.97
		CH157	5785.0239	5785	4.13
		CH159	5795.0258	5795	4.45
		CH165	5825.0201	5825	3.45

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 265V	0℃	CH36	5180.0084	5180	1.62
		CH38	5190.0328	5190	6.32
		CH40	5200.0311	5200	5.98
		CH42	5210.0366	5210	7.02
		CH46	5230.0341	5230	6.52
		CH48	5240.0253	5240	4.83
		CH149	5745.0167	5745	2.91
		CH151	5755.0239	5755	4.15
		CH155	5775.0205	5775	3.55
		CH157	5785.0244	5785	4.22
		CH159	5795.0248	5795	4.28
		CH165	5825.0208	5825	3.57

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 265V	70℃	CH36	5180.0085	5180	1.64
		CH38	5190.0315	5190	6.07
		CH40	5200.0324	5200	6.23
		CH42	5210.0336	5210	6.45
		CH46	5230.0341	5230	6.52
		CH48	5240.0268	5240	5.11
		CH149	5745.0191	5745	3.32
		CH151	5755.0270	5755	4.69
		CH155	5775.0231	5775	4.00
		CH157	5785.0226	5785	3.91
		CH159	5795.0246	5795	4.25
		CH165	5825.0208	5825	3.57

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 196V	25℃	CH36	5180.0102	5180	1.97
		CH38	5190.0312	5190	6.01
		CH40	5200.0329	5200	6.33
		CH42	5210.0369	5210	7.08
		CH46	5230.0323	5230	6.18
		CH48	5240.0269	5240	5.13
		CH149	5745.0166	5745	2.89
		CH151	5755.0244	5755	4.24
		CH155	5775.0209	5775	3.62
		CH157	5785.0242	5785	4.18
		CH159	5795.0226	5795	3.90
		CH165	5825.0215	5825	3.69

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 196V	0℃	CH36	5180.0099	5180	1.91
		CH38	5190.0328	5190	6.32
		CH40	5200.0325	5200	6.25
		CH42	5210.0349	5210	6.70
		CH46	5230.0337	5230	6.44
		CH48	5240.0262	5240	5.00
		CH149	5745.0177	5745	3.08
		CH151	5755.0258	5755	4.48
		CH155	5775.0222	5775	3.84
		CH157	5785.0227	5785	3.92
		CH159	5795.0237	5795	4.09
		CH165	5825.0232	5825	3.98

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 196V	70℃	CH36	5180.0079	5180	1.53
		CH38	5190.0327	5190	6.30
		CH40	5200.0297	5200	5.71
		CH42	5210.0362	5210	6.95
		CH46	5230.0335	5230	6.41
		CH48	5240.0274	5240	5.23
		CH149	5745.0177	5745	3.08
		CH151	5755.0257	5755	4.47
		CH155	5775.0199	5775	3.45
		CH157	5785.0243	5785	4.20
		CH159	5795.0233	5795	4.02
		CH165	5825.0215	5825	3.69

10. ANTENNA REQUIREMENT

10.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

10.2. Antenna Connected Construction

The antennas used for this product are PIFA Antenna that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is U-NII Band Peak Gain: 2.38dBi

11. DEVIATION TO TEST SPECIFICATIONS

[NONE]

THE END