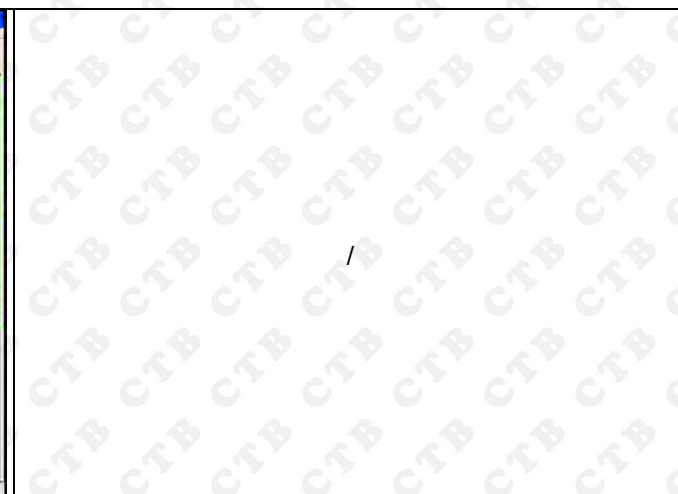
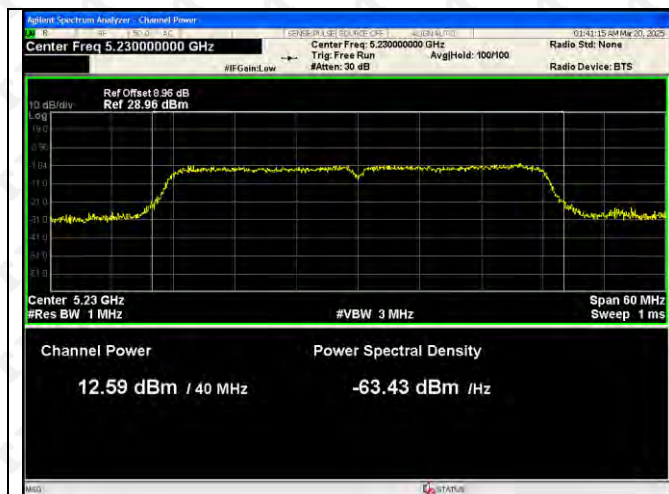




ANT2

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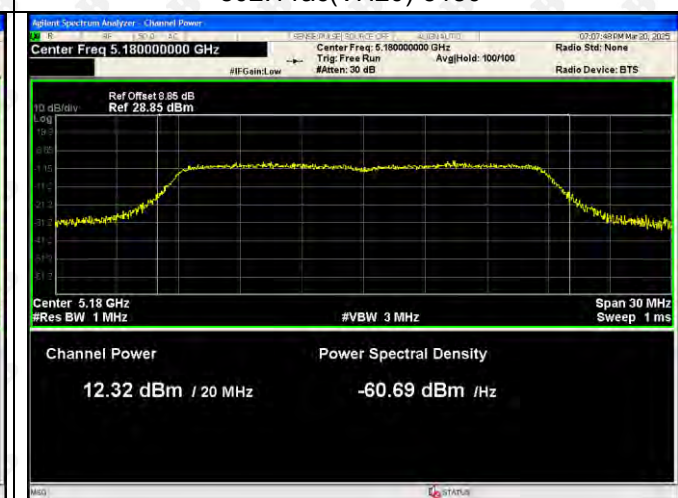
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802.11a-5240



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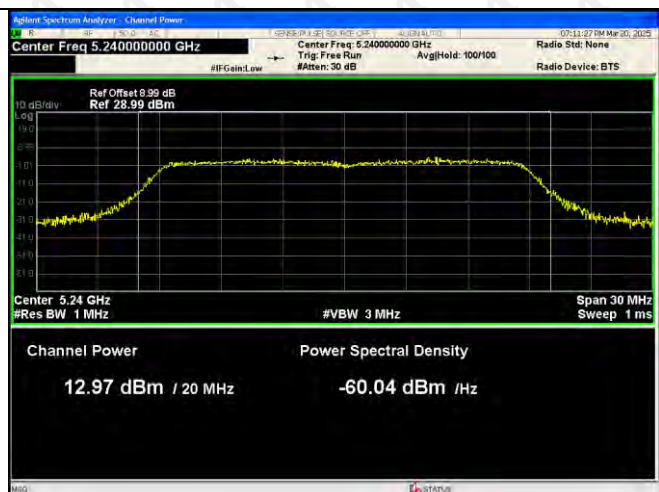


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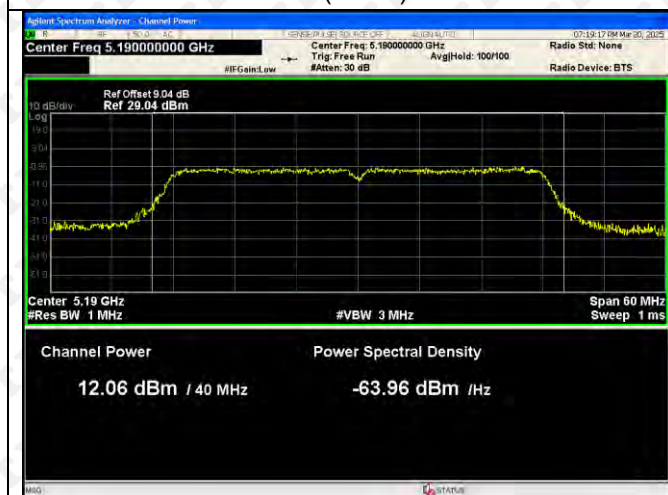
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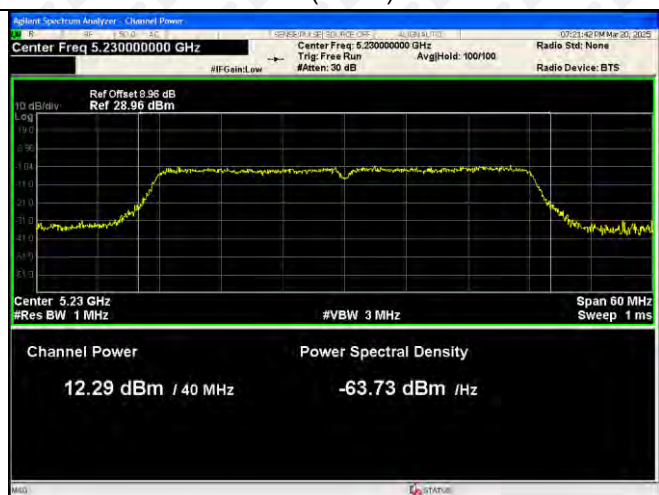
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802.11ac(VH40)-5230



802.11n(HT20)-5180



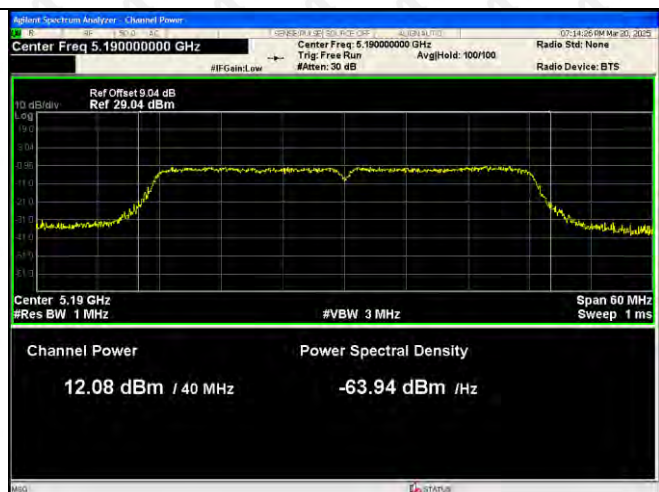
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802.11n(HT20)-5240

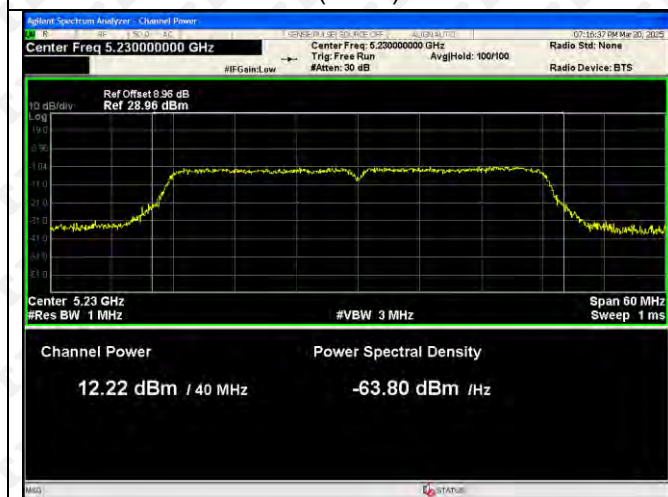


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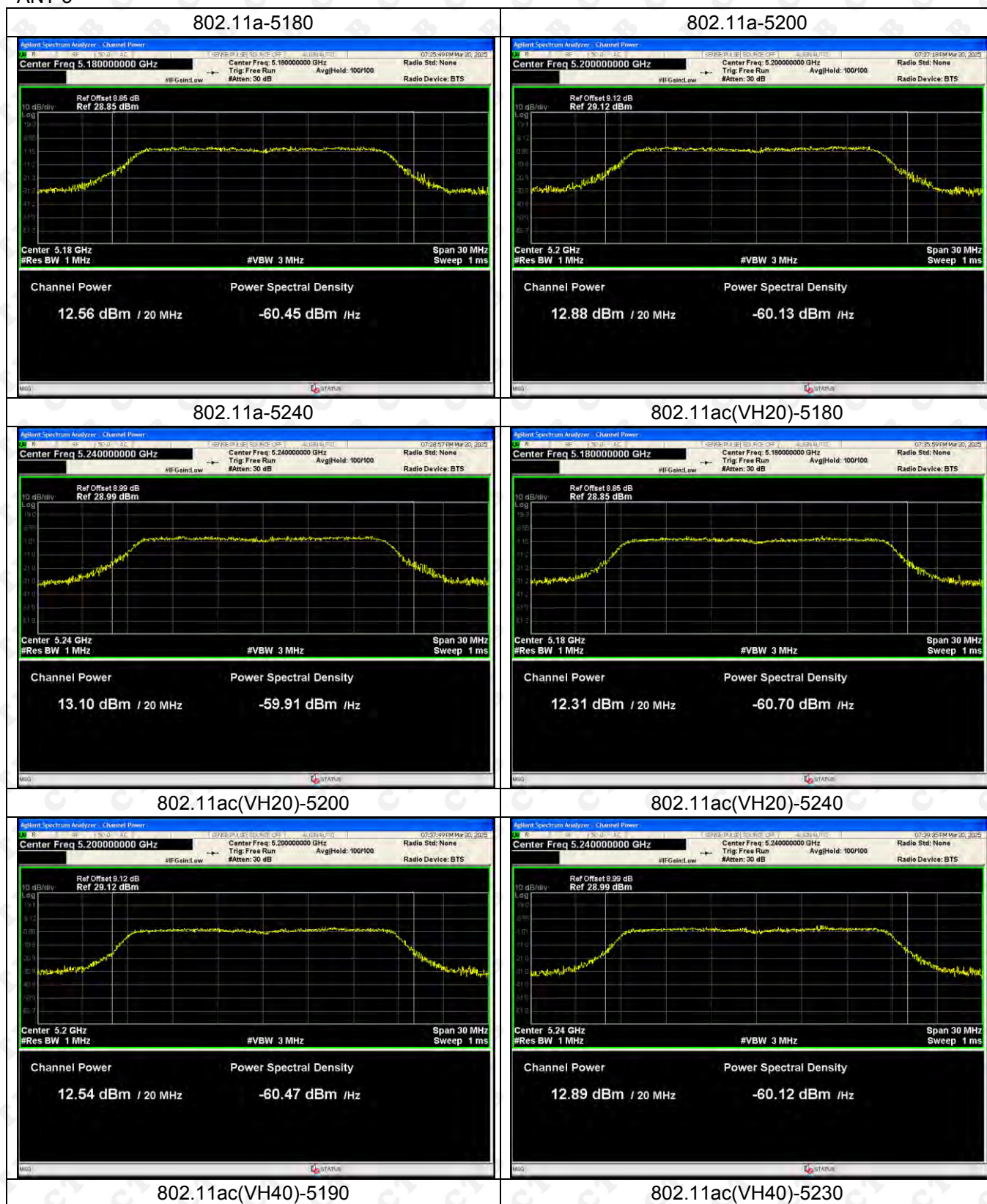
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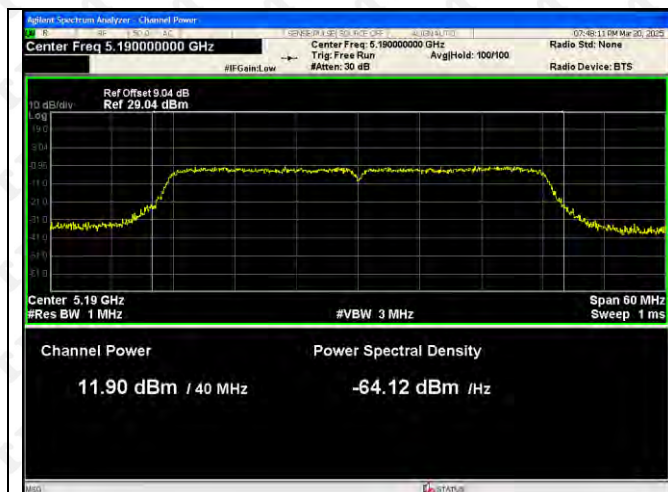
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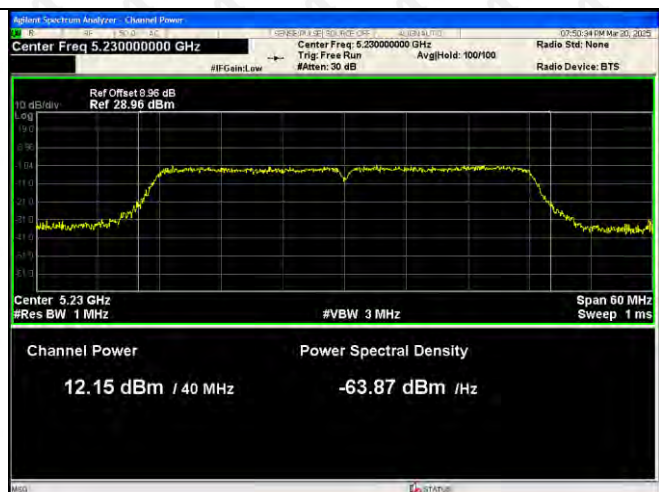
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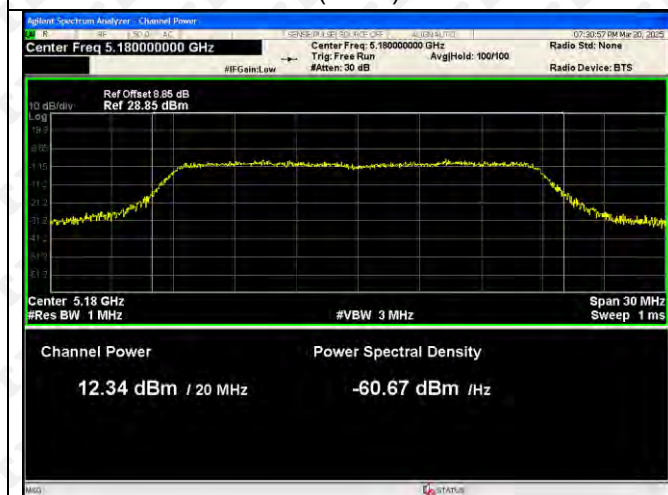




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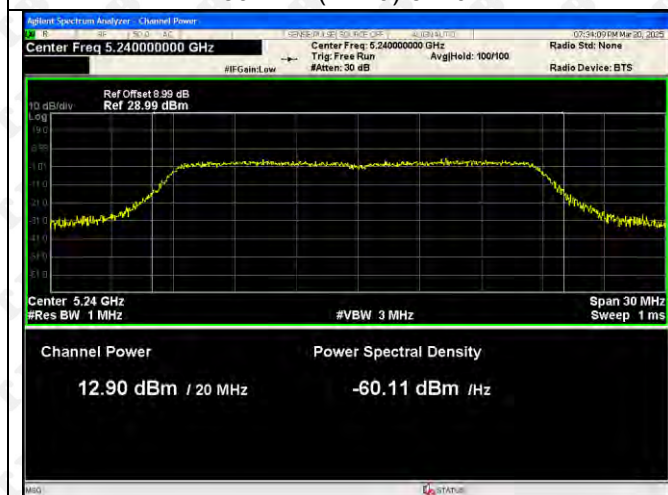
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802.11n(HT20)-5240



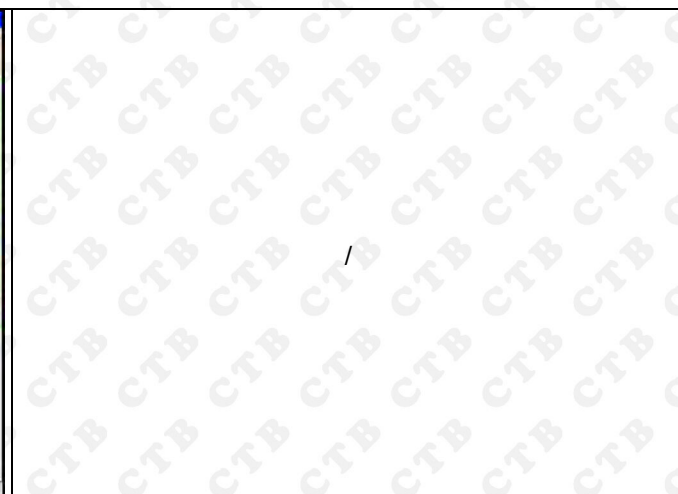
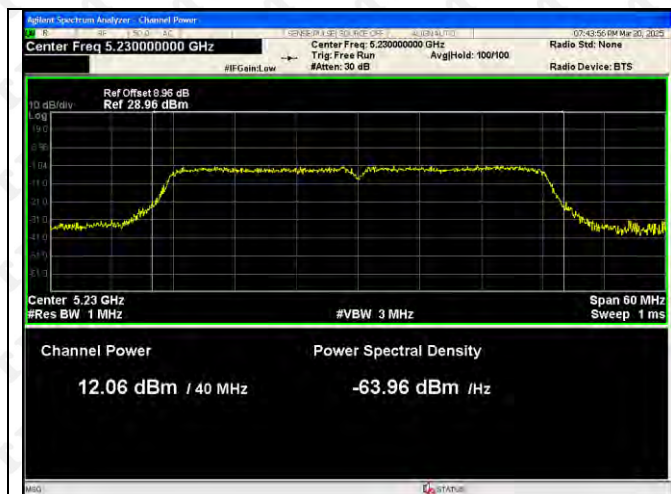
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802.11n(HT40)-5230

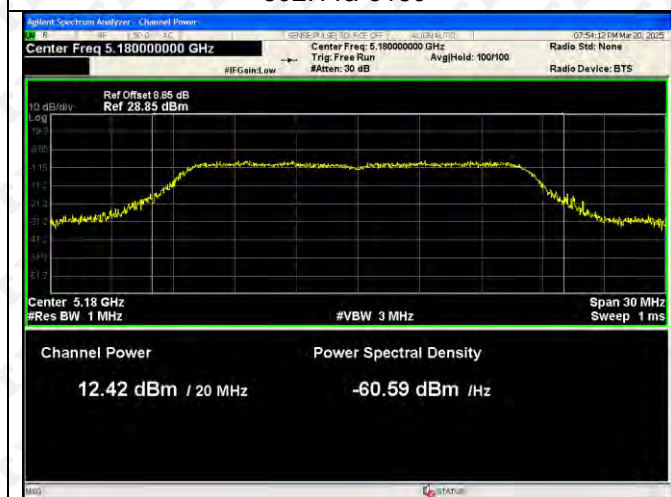


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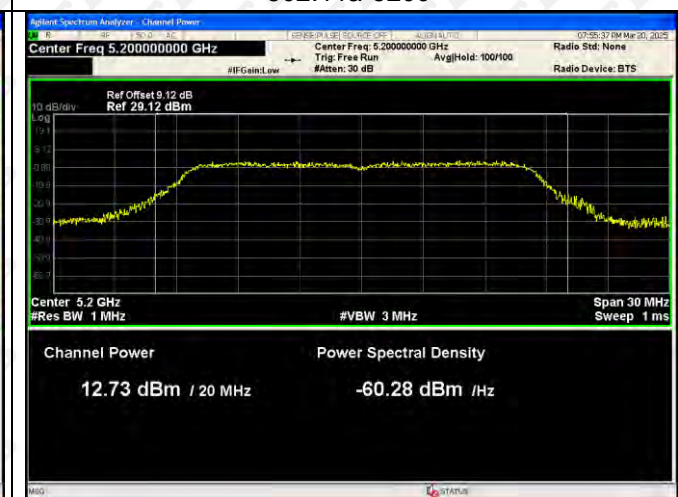


ANT4

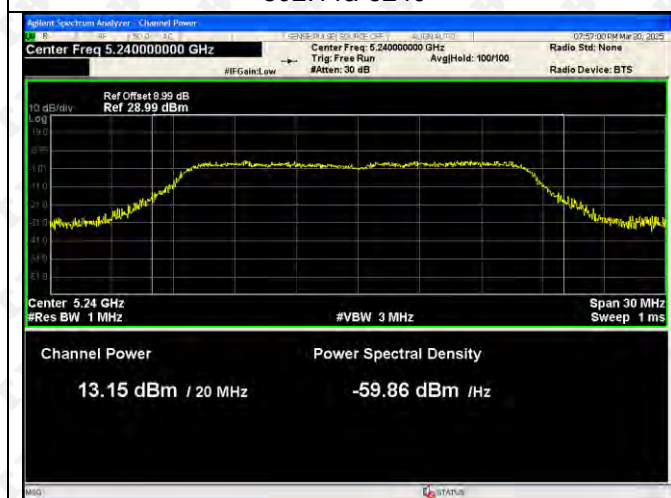
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802.11a-5200



802.11a-5240



802.11ac(VH20)-5180



802.11ac(VH20)-5200

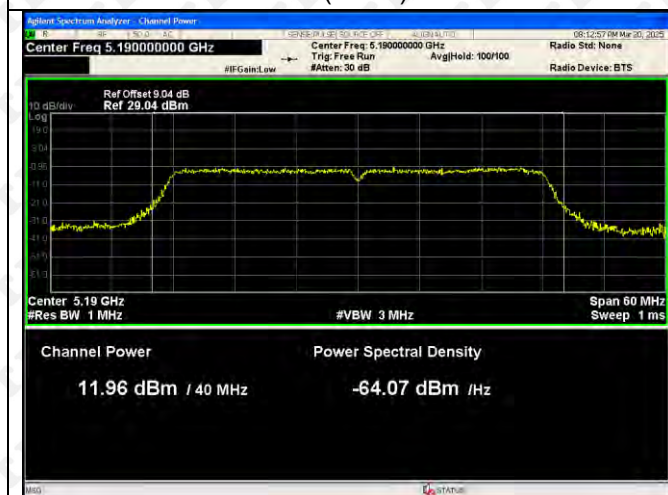
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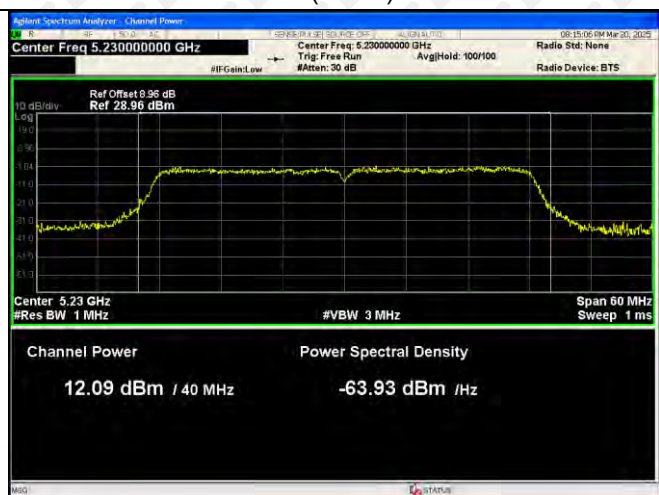
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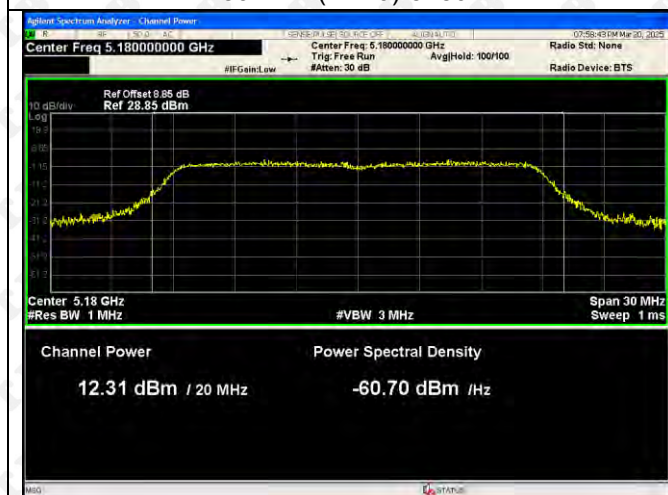
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802.11n(HT20)-5180



802.11n(HT20)-5200



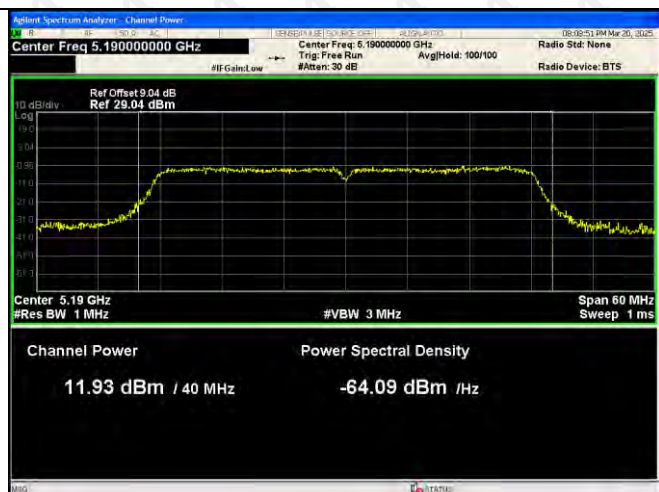
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802.11n(HT40)-5190



802.11n(HT40)-5230



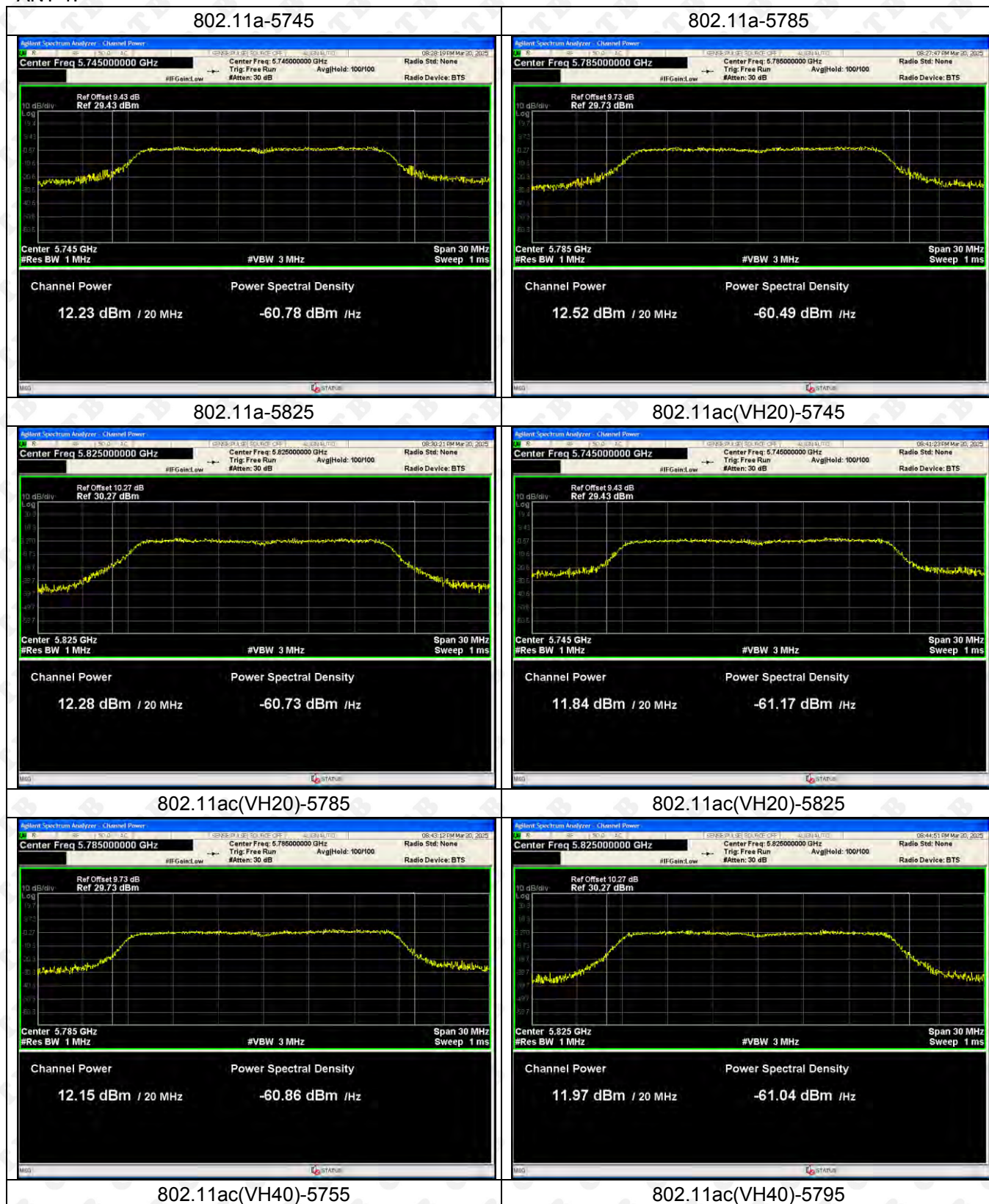
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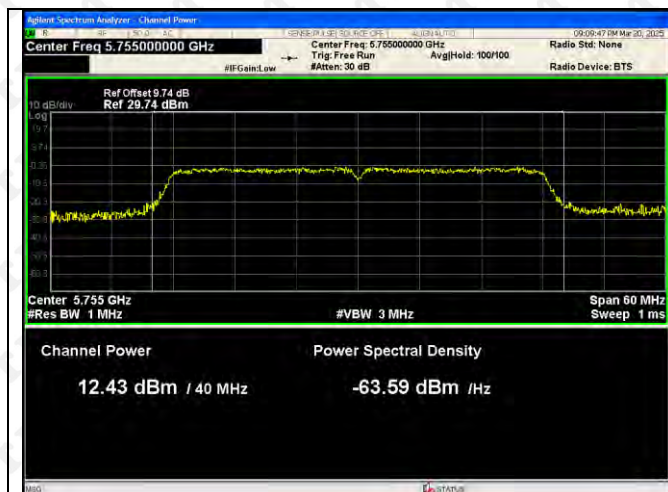


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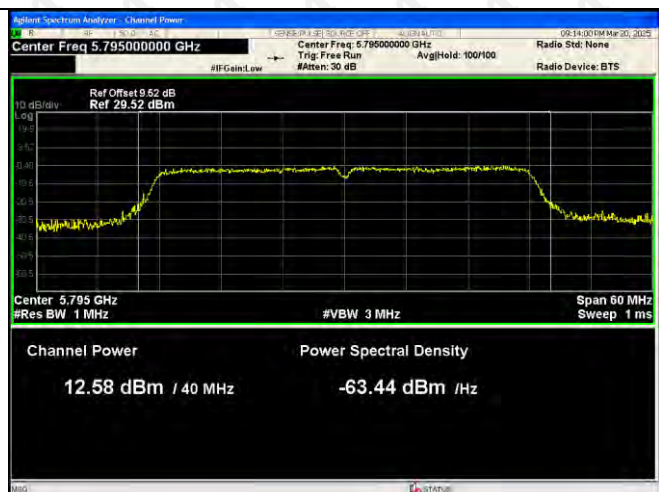
5745-5825MHz

ANT 1:





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802.11n(HT20)-5785



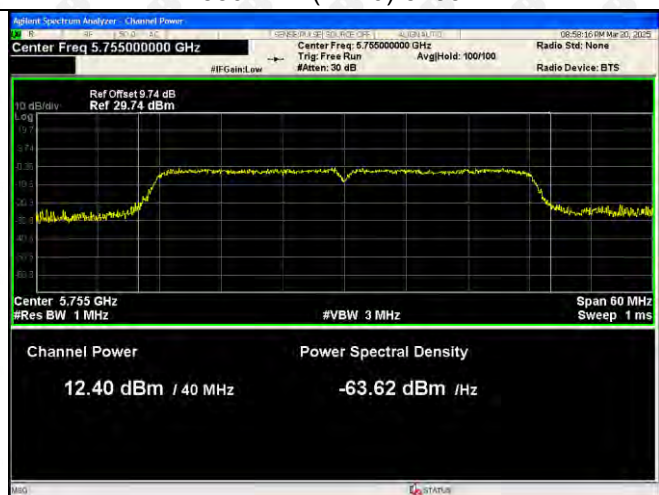
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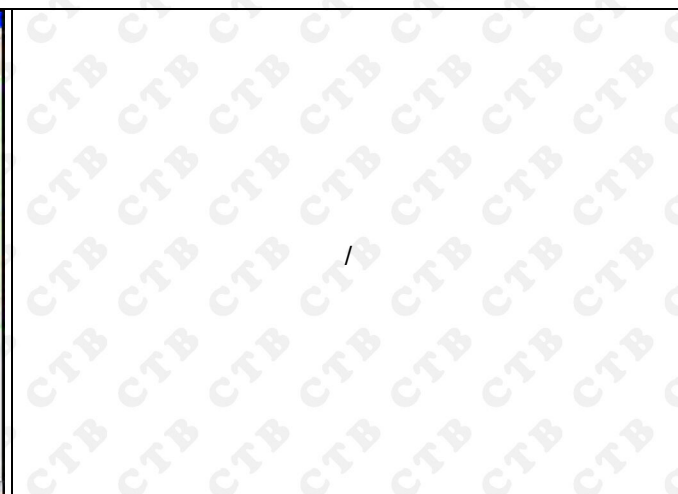
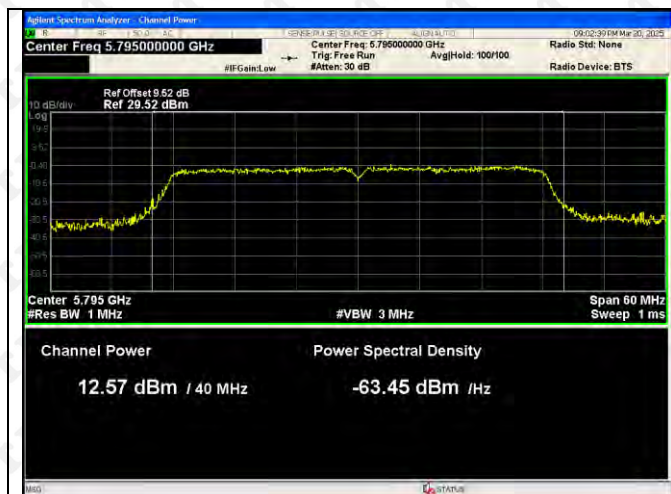
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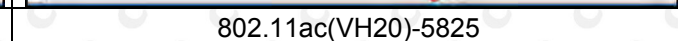
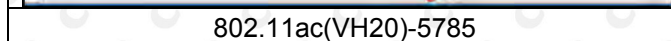
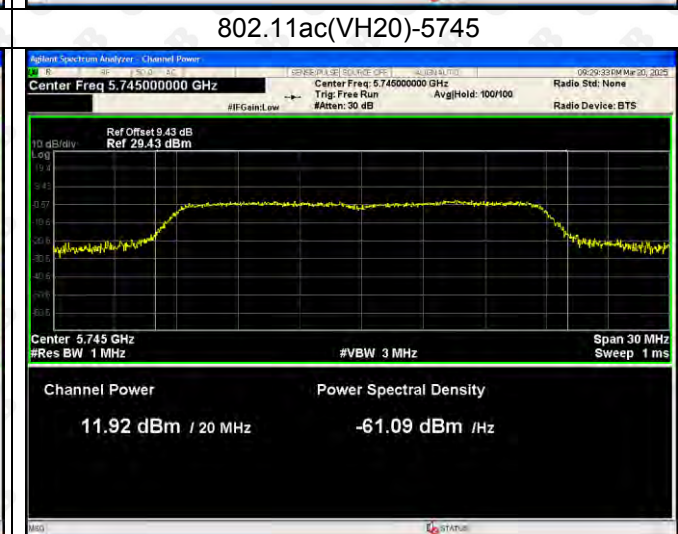
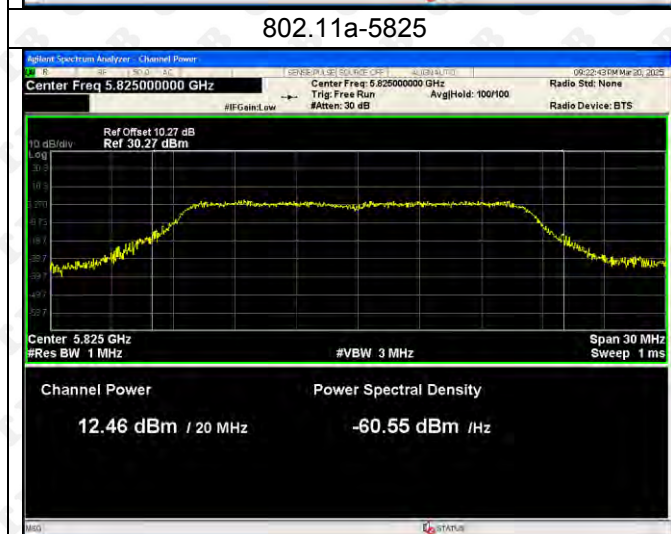
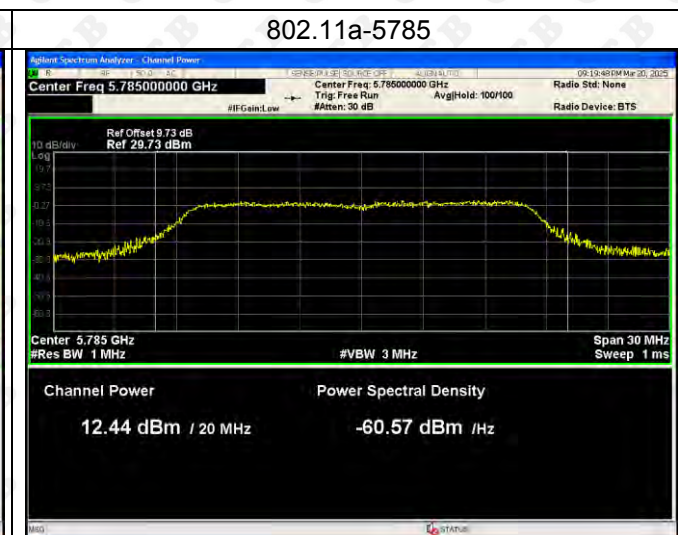
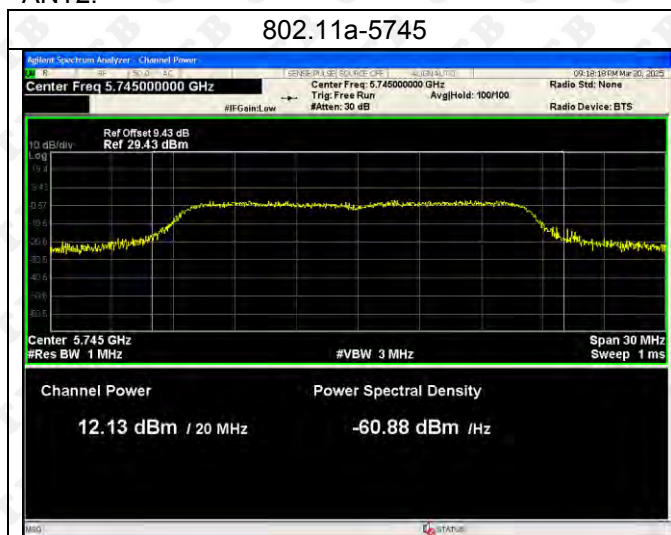
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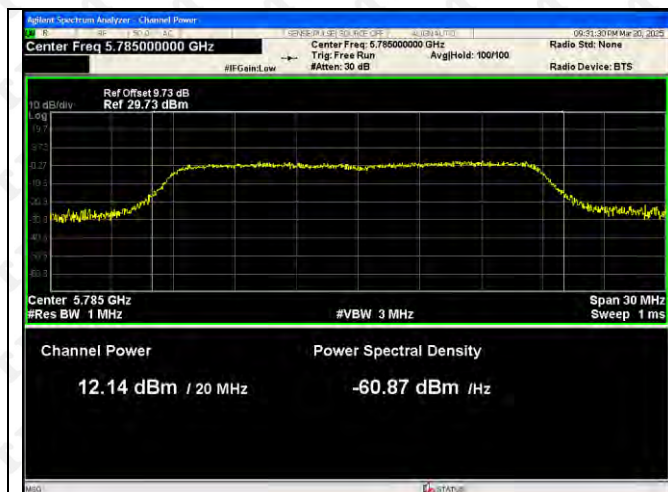


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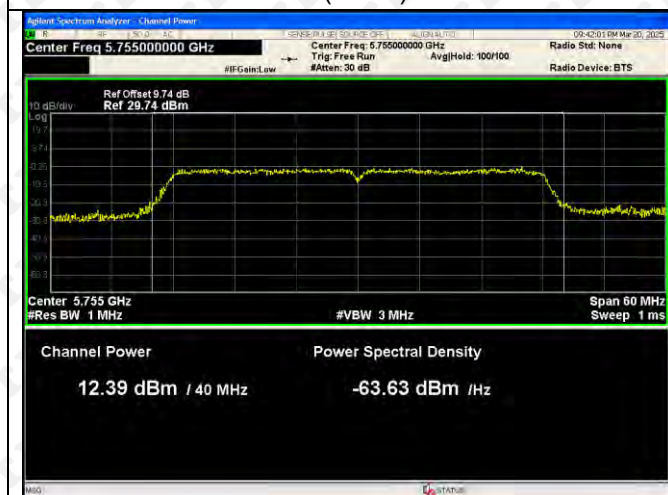




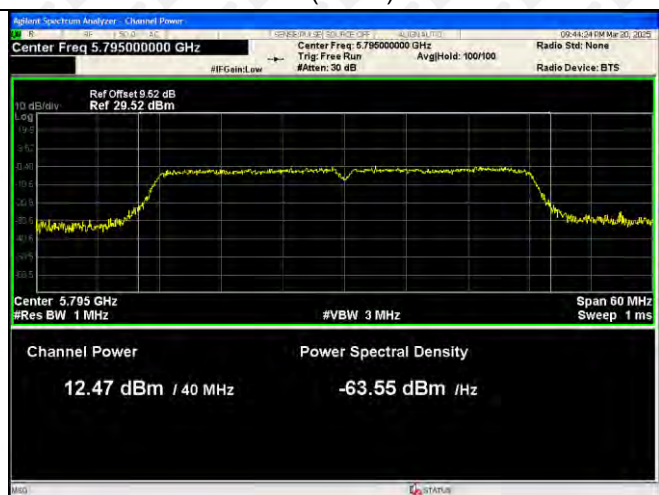
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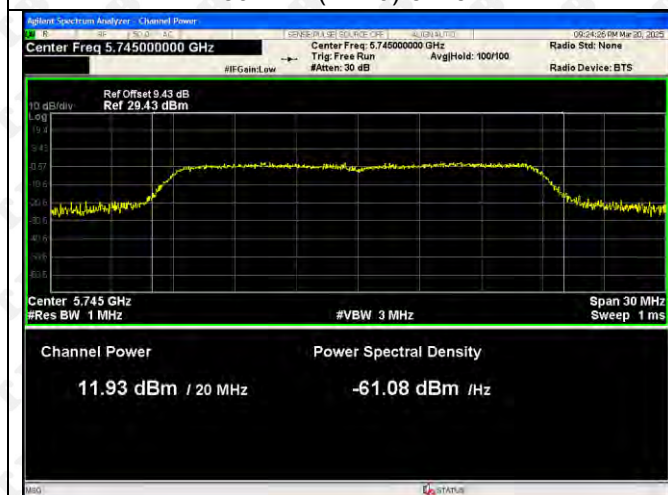
802.11ac(VH40)-5795



802.11n(HT20)-5745



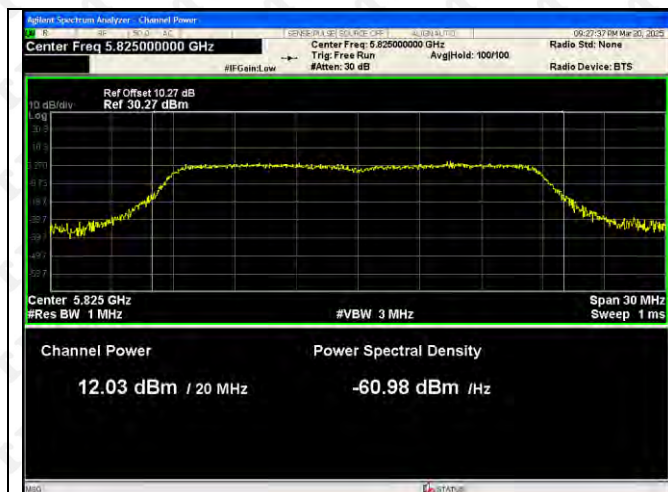
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802.11n(HT20)-5825

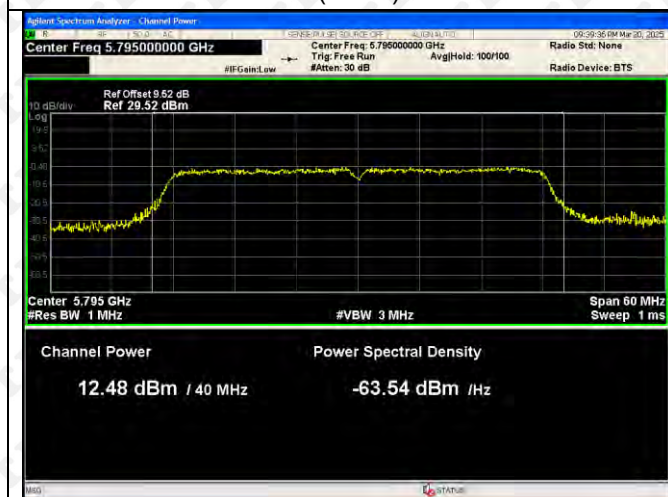


5802.11n(HT40)-5755



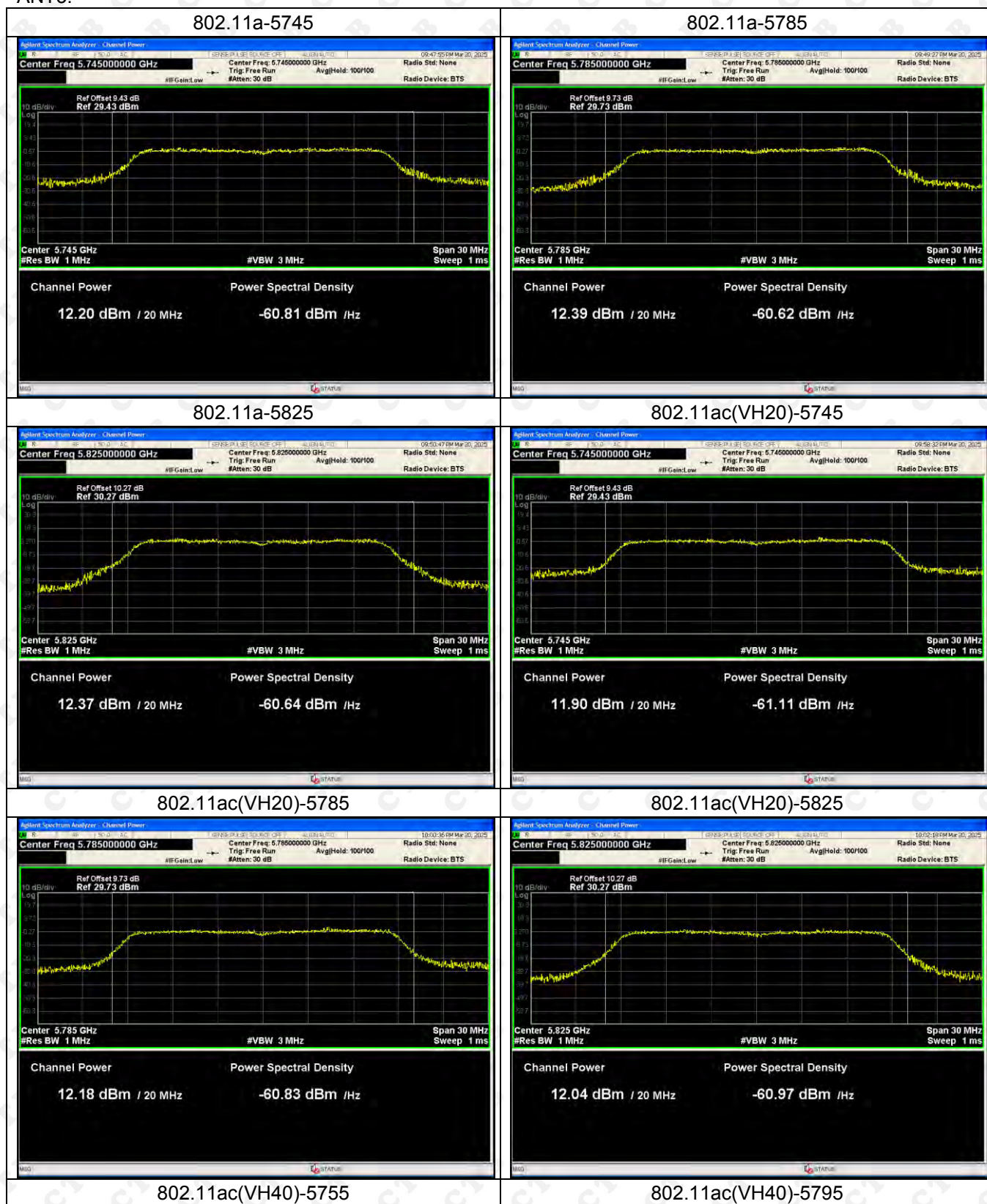
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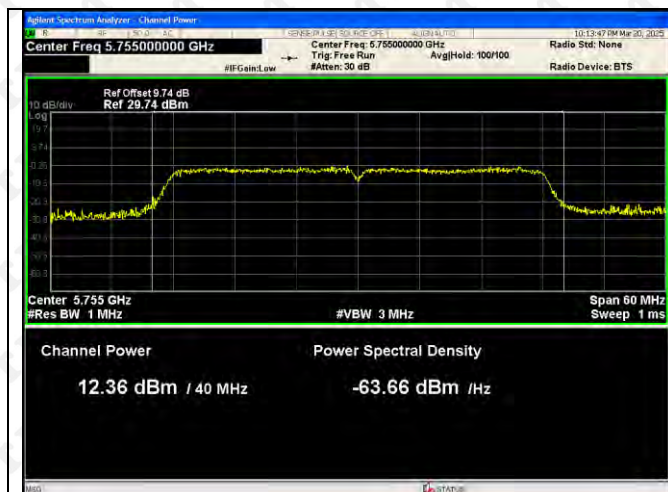
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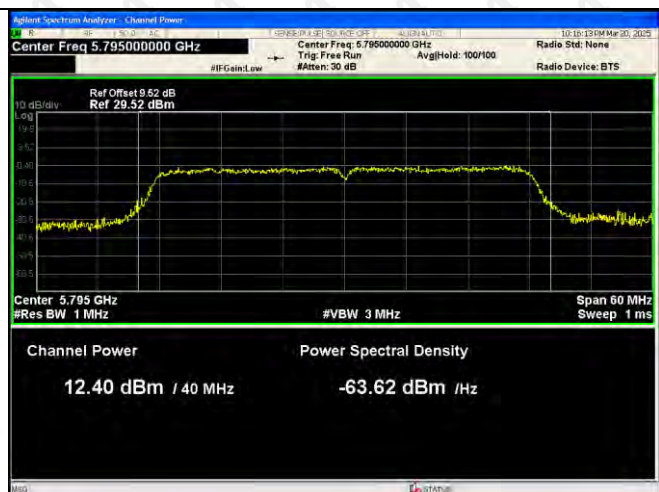
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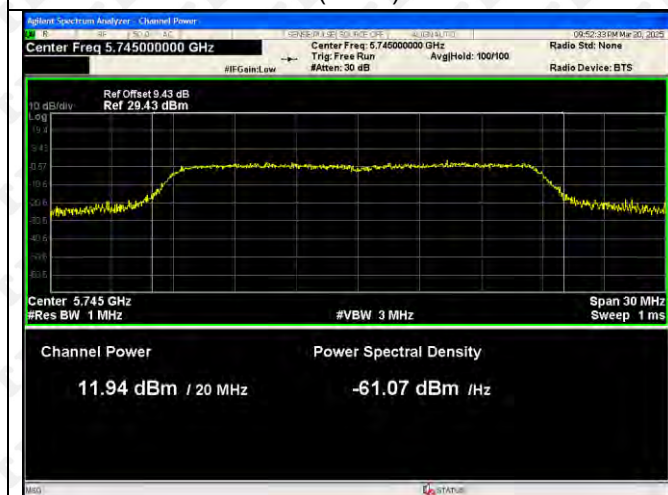




802.11n(HT20)-5745



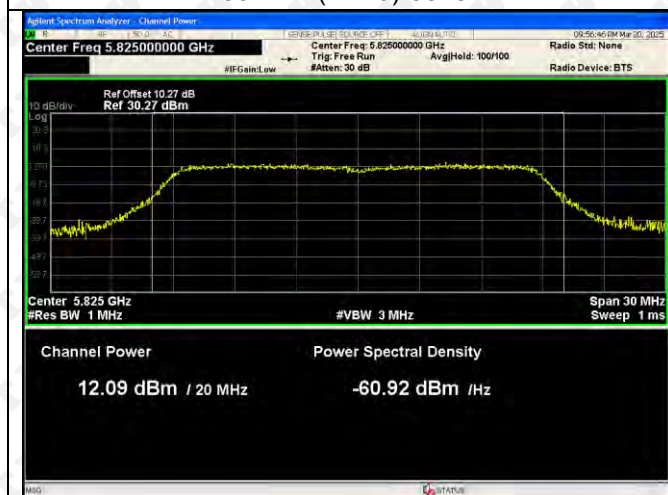
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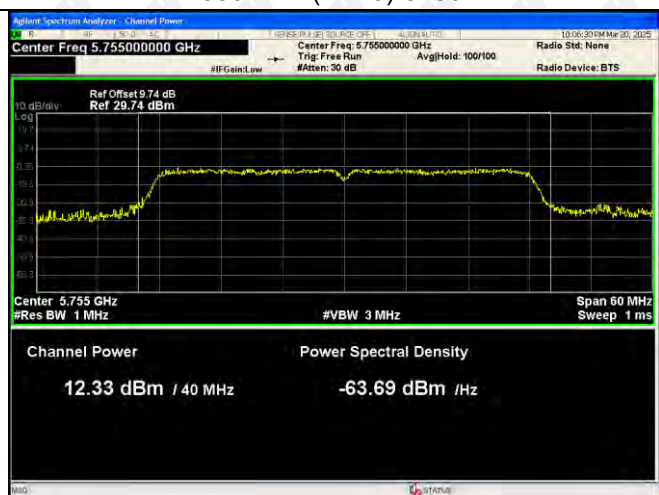
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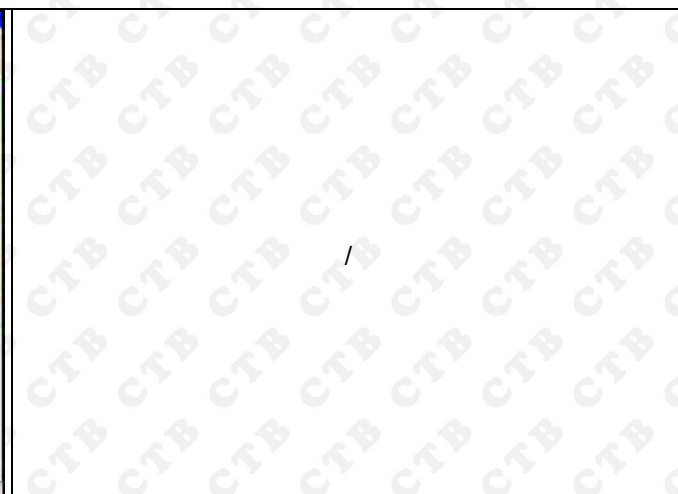
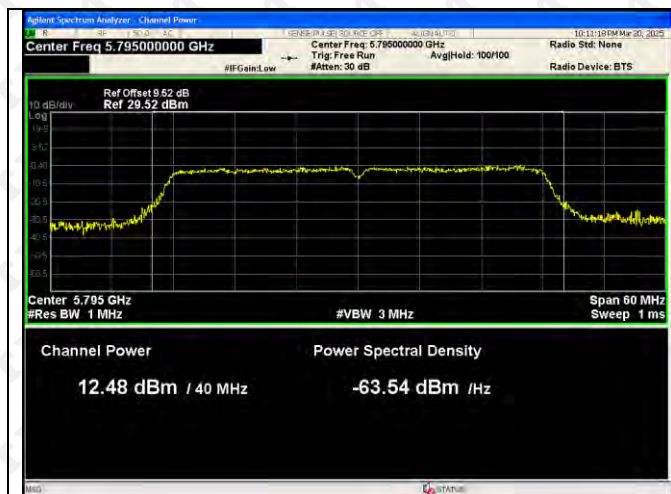
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802.11n(HT40)-5795

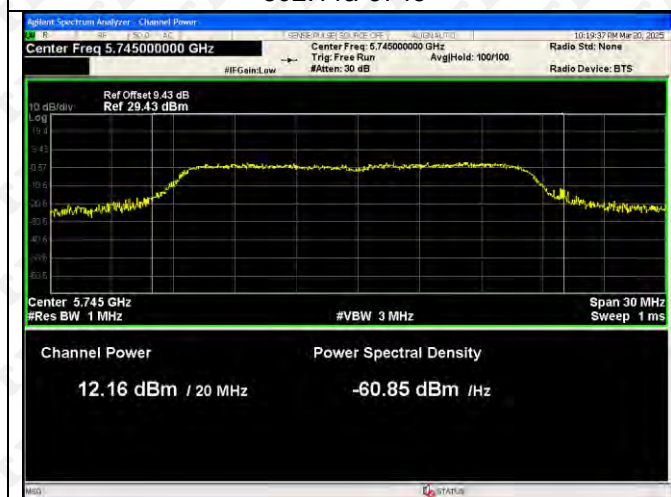


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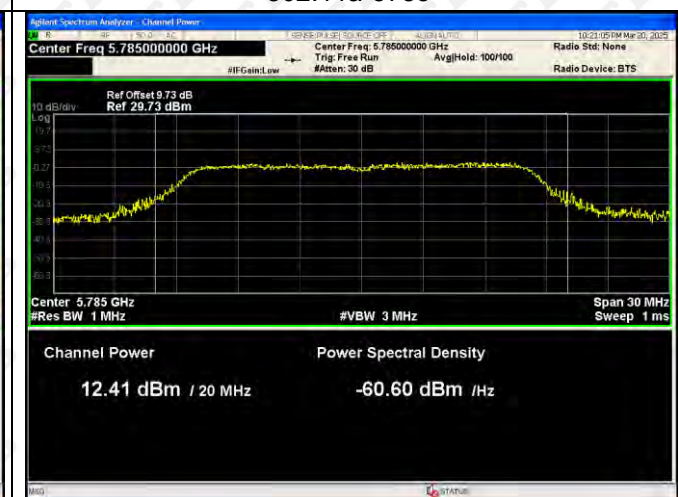


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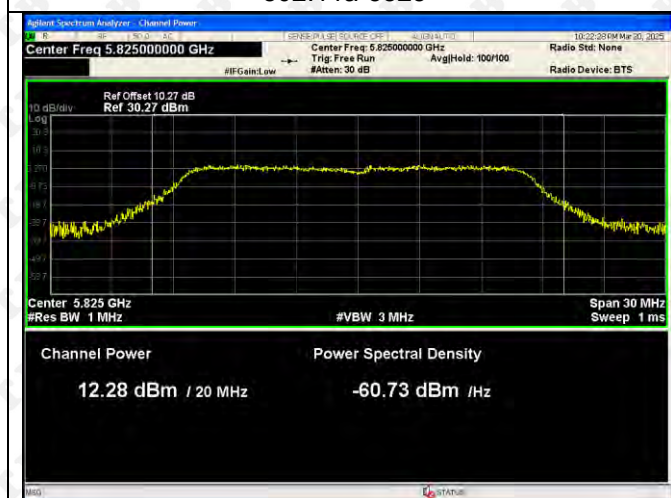
802.11a-5745



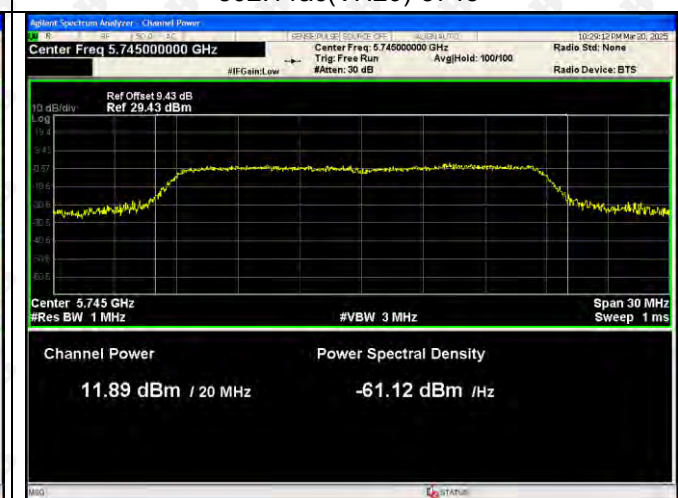
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802.11a-5825

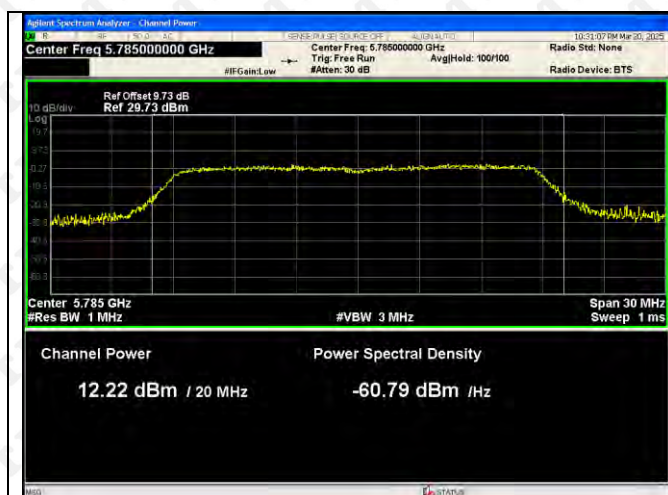


802.11ac(VH20)-5745



802.11ac(VH20)-5785

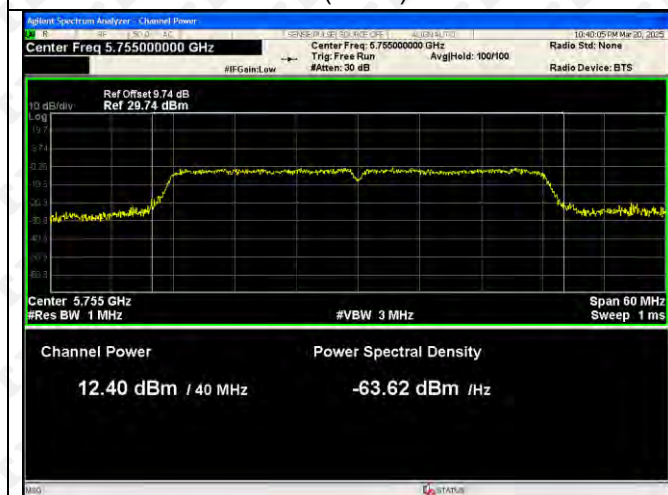
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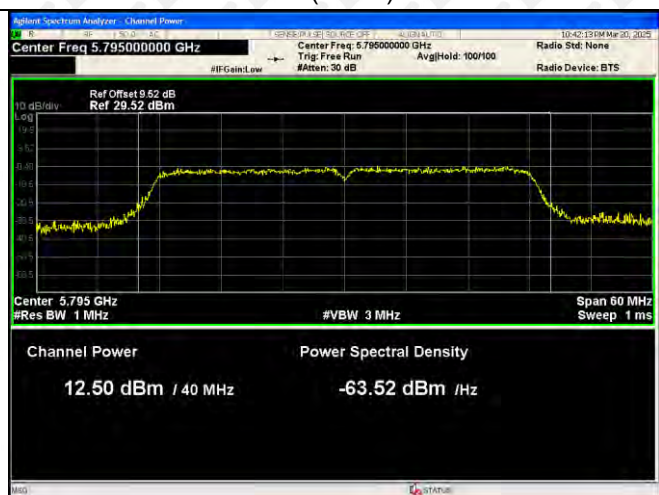
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802.11ac(VH40)-5795



802.11n(HT20)-5745



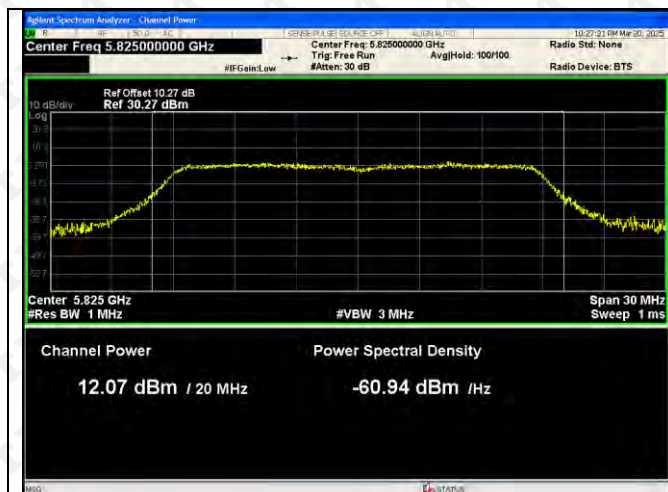
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802.11n(HT20)-5825

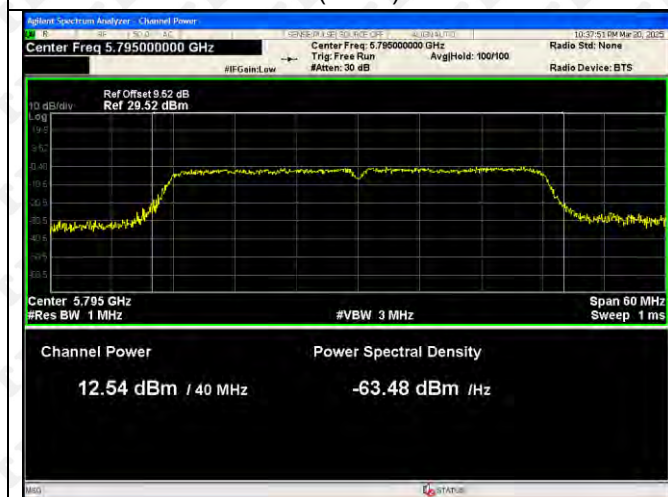


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802.11n(HT40)-5795

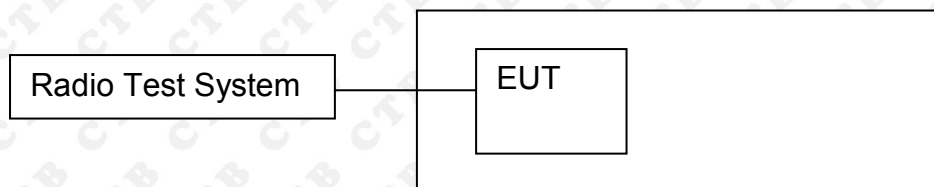
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10. EMISSION BANDWIDTH& OCCUPIED BANDWIDTH

10.1 Block Diagram Of Test Setup



10.2 Limits

(1) For the band 5.15-5.25 GHz.

(iv) 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 maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) 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 $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, 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. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

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

10.3 Test Procedure

According to KDB789033 D02v02r01 sectionE, the following is the measurement procedure.

1. Emission Bandwidth (EBW)

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%.

2. Minimum Emission Bandwidth for the band 5.725–5.85 GHz

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) $\geq 3 * \text{RBW}$.

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.

D. 99% Occupied Bandwidth

The 99% 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. Measurement of the 99% occupied bandwidth is *required* only as a condition for using the optional band-edge measurement techniques described in II.G.3.d). Measurements of 99% occupied bandwidth may also optionally be used in lieu of the EBW to define the minimum frequency range over which the 789033 D02 General UNII Test Procedures New Rules v02r01 Page 4 spectrum is integrated when measuring maximum conducted output power as described in II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with Section 15.407(a).

The following procedure shall be used for measuring (99%) power 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. 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.
6. Use the 99% power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99% power bandwidth function, the trace data points are recovered and directly summed in power units. 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% occupied bandwidth is the difference between these two frequencies.

10.4 Test Results

Test mode ANT 1	Test Channel (MHz)	26dB Bandwidth (MHz)
802.11a	5180	21.484
	5200	21.514
	5240	21.585
802.11ac20	5180	23.330
	5200	22.349
	5240	21.976
802.11ac40	5190	48.394
	5230	41.573
802.11n(HT20)	5180	23.832
	5200	23.937
	5240	21.265
802.11n(HT40)	5190	46.313
	5230	47.873

Test mode ANT 2	Test Channel (MHz)	26dB Bandwidth (MHz)
802.11a	5180	21.365
	5200	21.313
	5240	20.947
802.11ac20	5180	21.339
	5200	21.221
	5240	21.169
802.11ac40	5190	40.789
	5230	41.110
802.11n(HT20)	5180	20.843
	5200	21.231
	5240	20.770
802.11n(HT40)	5190	40.708
	5230	40.409

Test mode ANT 3	Test Channel (MHz)	26dB Bandwidth (MHz)
802.11a	5180	21.186
	5200	21.279
	5240	21.254
802.11ac20	5180	21.181
	5200	21.245
	5240	20.906
802.11ac40	5190	41.537
	5230	40.704
802.11n(HT20)	5180	20.977
	5200	21.204
	5240	20.906
802.11n(HT40)	5190	40.542
	5230	40.469

Test mode ANT 4	Test Channel (MHz)	26dB Bandwidth (MHz)
802.11a	5180	21.047
	5200	21.184
	5240	21.433
802.11ac20	5180	21.292
	5200	20.849
	5240	21.035
802.11ac40	5190	40.312
	5230	40.826
802.11n(HT20)	5180	21.285
	5200	21.049
	5240	21.068
802.11n(HT40)	5190	41.521
	5230	40.117

5725-5850 MHz

Test mode Ant 1	Test Channel (MHz)	6dB Bandwidth (MHz)	Result
802.11a	5745	16.513	Pass
	5785	16.458	Pass
	5825	16.541	Pass
802.11ac(VH20)	5745	17.758	Pass
	5785	17.747	Pass
	5825	17.778	Pass
802.11ac(VH40)	5755	36.483	Pass
	5795	36.398	Pass
802.11n(VH20)	5745	17.786	Pass
	5785	17.747	Pass
	5825	17.754	Pass
802.11n(VH40)	5755	36.480	Pass
	5795	36.429	Pass

Test mode Ant 2	Test Channel (MHz)	6dB Bandwidth (MHz)	Result
802.11a	5745	16.548	Pass
	5785	16.516	Pass
	5825	16.463	Pass
802.11ac(VH20)	5745	17.775	Pass
	5785	17.778	Pass
	5825	17.768	Pass
802.11ac(VH40)	5755	36.488	Pass
	5795	36.465	Pass
802.11n(VH20)	5745	17.783	Pass
	5785	17.768	Pass
	5825	17.770	Pass
802.11n(VH40)	5755	36.461	Pass
	5795	36.466	Pass

Test mode Ant 3	Test Channel (MHz)	6dB Bandwidth (MHz)	Result
802.11a	5745	16.486	Pass
	5785	16.507	Pass
	5825	16.529	Pass
802.11ac(VH20)	5745	17.735	Pass
	5785	17.771	Pass
	5825	17.764	Pass
802.11ac(VH40)	5755	36.483	Pass
	5795	36.417	Pass
802.11n(VH20)	5745	17.759	Pass
	5785	17.762	Pass
	5825	17.796	Pass
802.11n(VH40)	5755	36.479	Pass
	5795	36.420	Pass

Test mode Ant 4	Test Channel (MHz)	6dB Bandwidth (MHz)	Result
802.11a	5745	16.513	Pass
	5785	16.479	Pass
	5825	16.541	Pass
802.11ac(VH20)	5745	17.784	Pass
	5785	17.712	Pass
	5825	17.785	Pass
802.11ac(VH40)	5755	36.449	Pass
	5795	36.474	Pass
802.11n(VH20)	5745	17.794	Pass
	5785	17.748	Pass
	5825	17.767	Pass
802.11n(VH40)	5755	36.440	Pass
	5795	36.421	Pass

5180-5240MHz

ANT 1

802.11a-5180



802.11a-5200



802.11a-5240



802.11ac(VH20)-5180



802.11ac(VH20)-5200



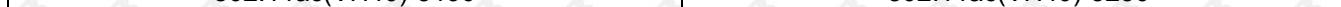
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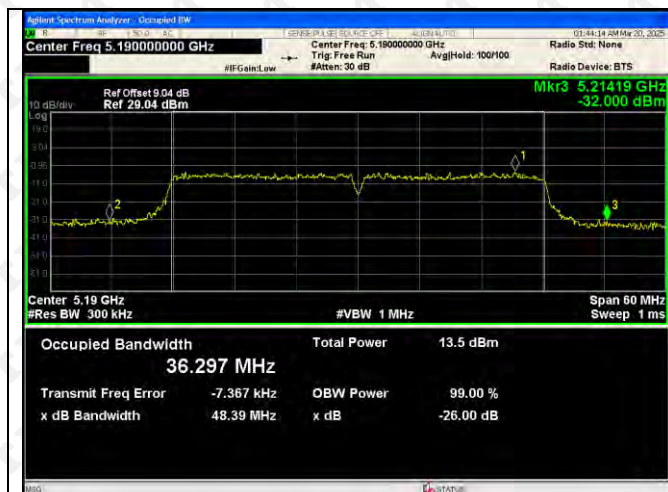


802.11ac(VH40)-5190



802.11ac(VH40)-5230





802.11n(HT20)-5180



802.11n(HT20)-5200



802.11n(HT20)-5240



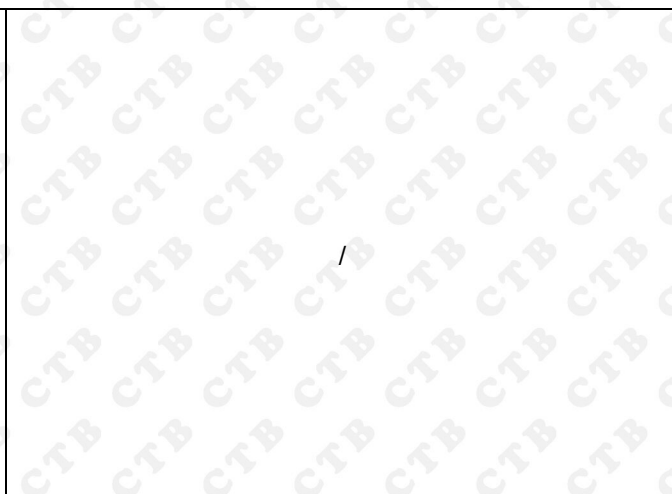
802.11n(HT20)-5200



802.11n(HT40)-5230



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ANT2

802.11a-5180



802.11a-5200



802.11a-5240



802.11ac(VH20)-5180



802.11ac(VH20)-5200

802.11ac(VH20)-5240



802.11ac(VH40)-5190



802.11ac(VH40)-5230



802.11n(HT20)-5180



802.11n(HT20)-5200



802.11n(HT20)-5240



802.11n(HT40)-5190



802.11n(HT40)-5230

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ANT 3





802.11n(HT20)-5180



802.11n(HT20)-5200



802.11n(HT20)-5240



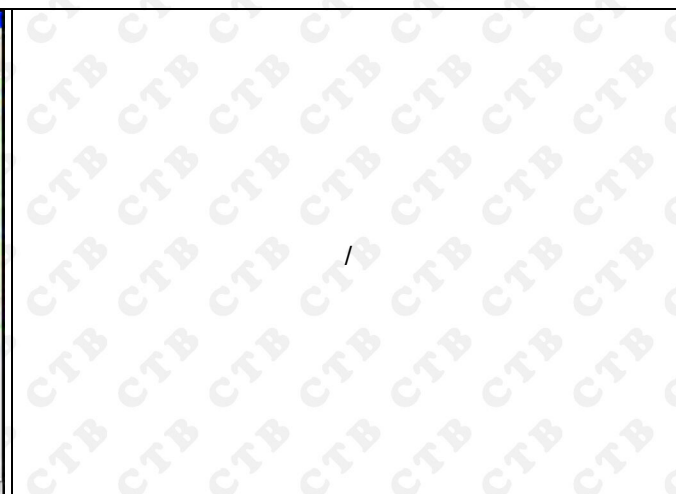
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802.11n(HT40)-5230



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ANT4

802.11a-5180



802.11a-5200



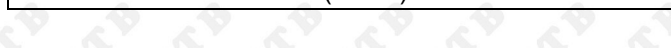
802.11a-5240



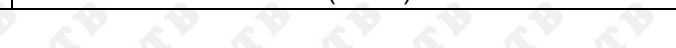
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802.11ac(VH20)-5200



802.11ac(VH20)-5240





802.11ac(VH40)-5190



802.11ac(VH40)-5230



802.11n(HT20)-5180



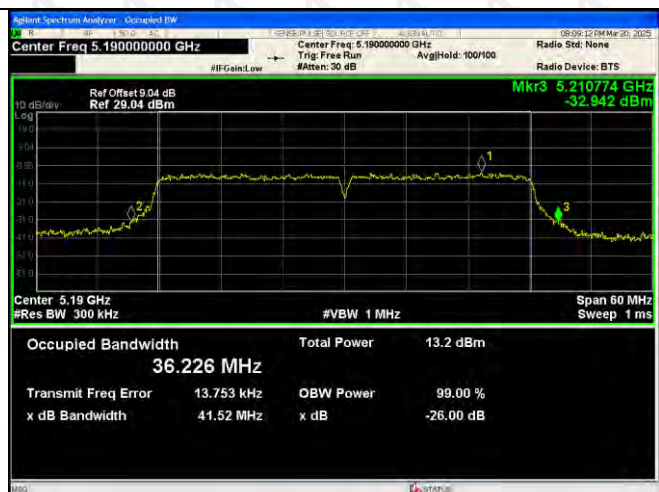
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802.11n(HT20)-5240



802.11n(HT40)-5190



802.11n(HT40)-5230

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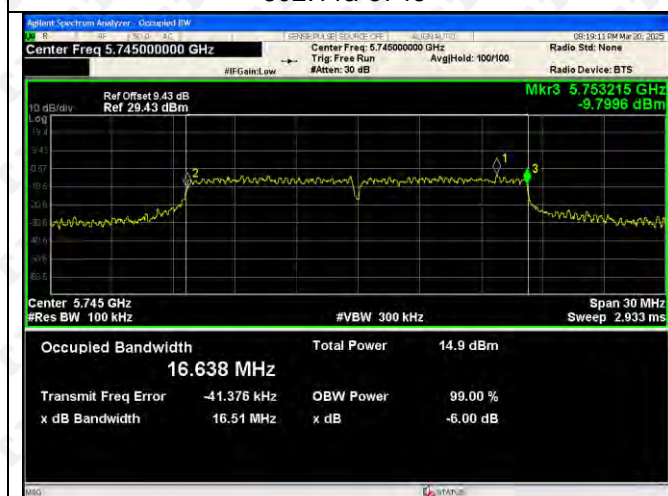


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5745-5825MHz

ANT 1:

802.11a-5745



802.11a-5785



802.11a-5825



802.11ac(VH20)-5745



802.11ac(VH20)-5785



802.11ac(VH20)-5825



802.11ac(VH40)-5755

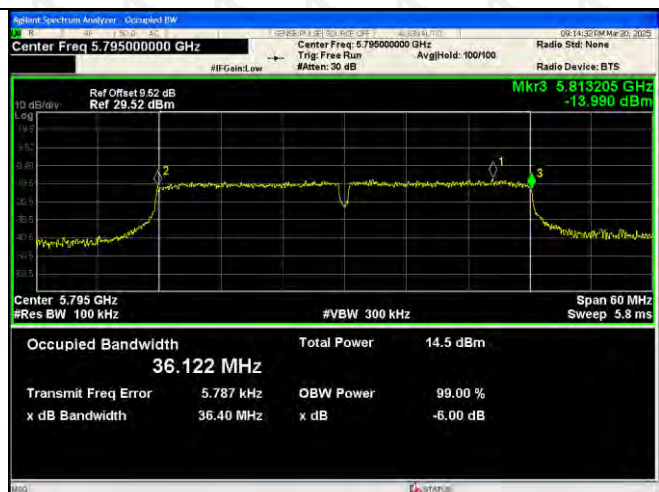


802.11ac(VH40)-5795





802.11n(HT20)-5745



802.11n(HT20)-5785



802.11n(HT20)-5825



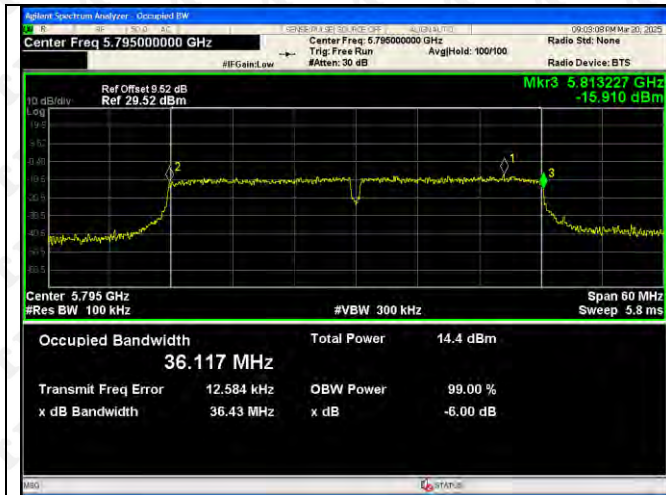
5802.11n(HT40)-5755



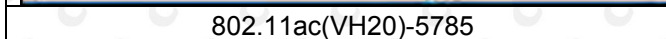
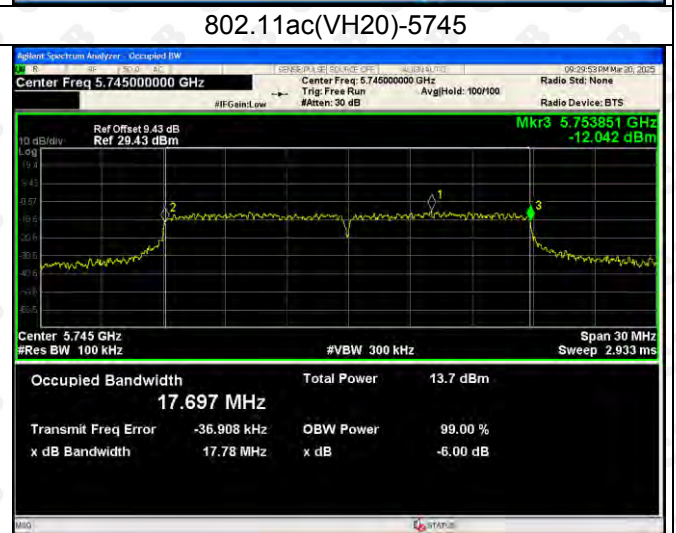
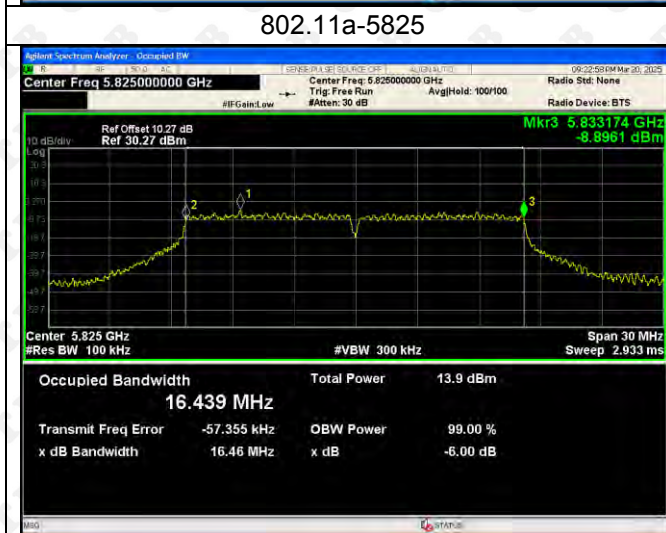
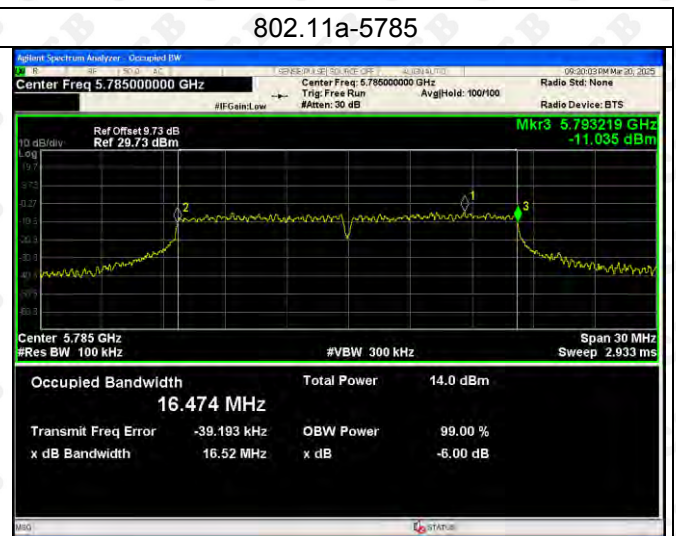
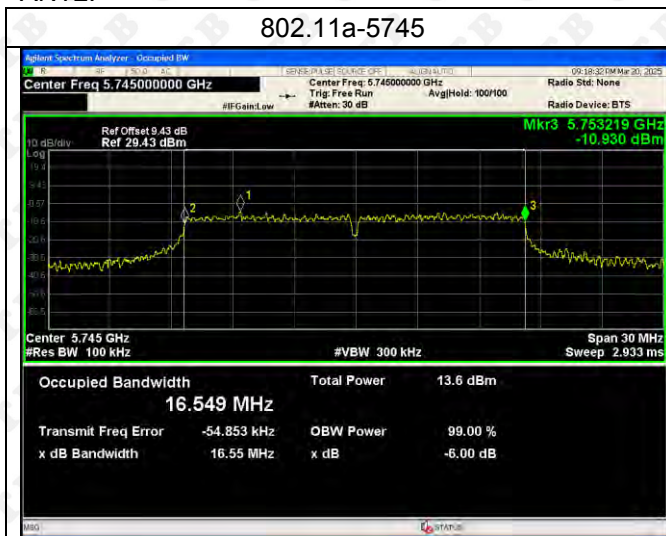
802.11n(HT40)-5795



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ANT2:





802.11ac(VH40)-5755



802.11ac(VH40)-5795



802.11n(HT20)-5745



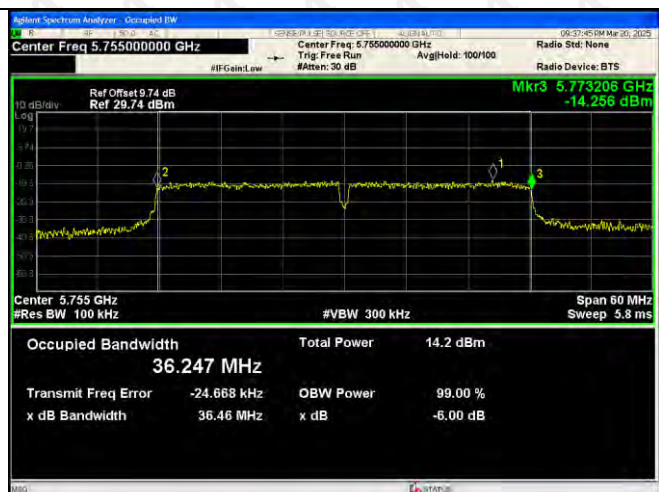
802.11n(HT20)-5785



802.11n(HT20)-5825



5802.11n(HT40)-5755



802.11n(HT40)-5795

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