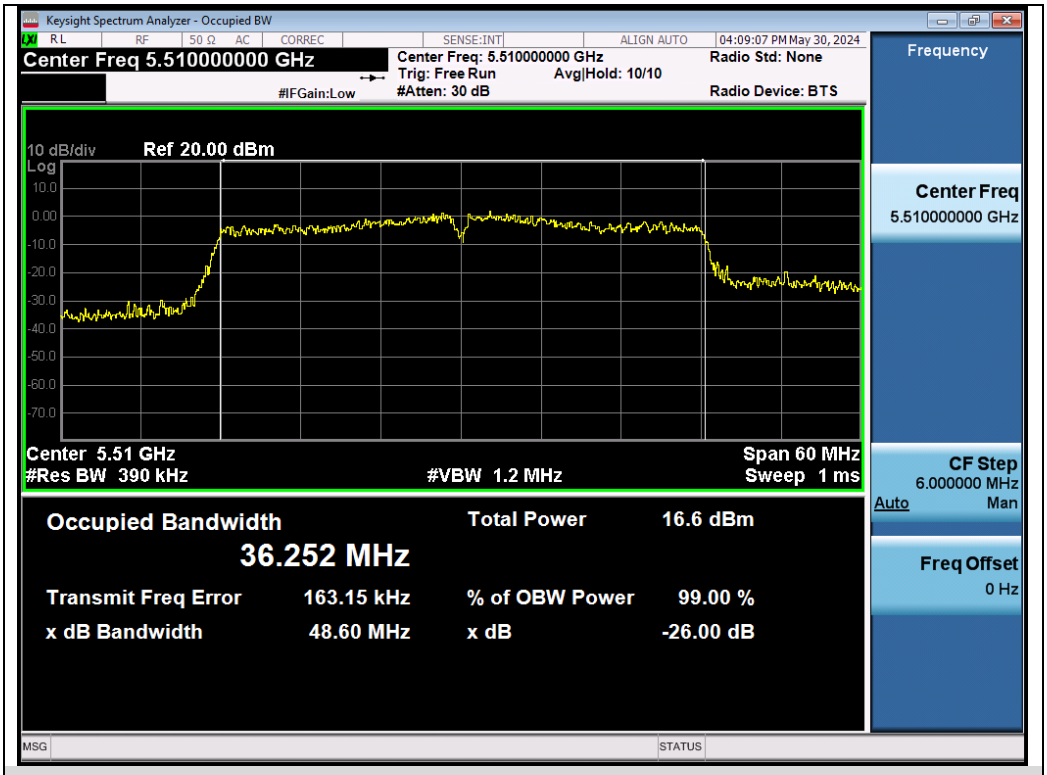
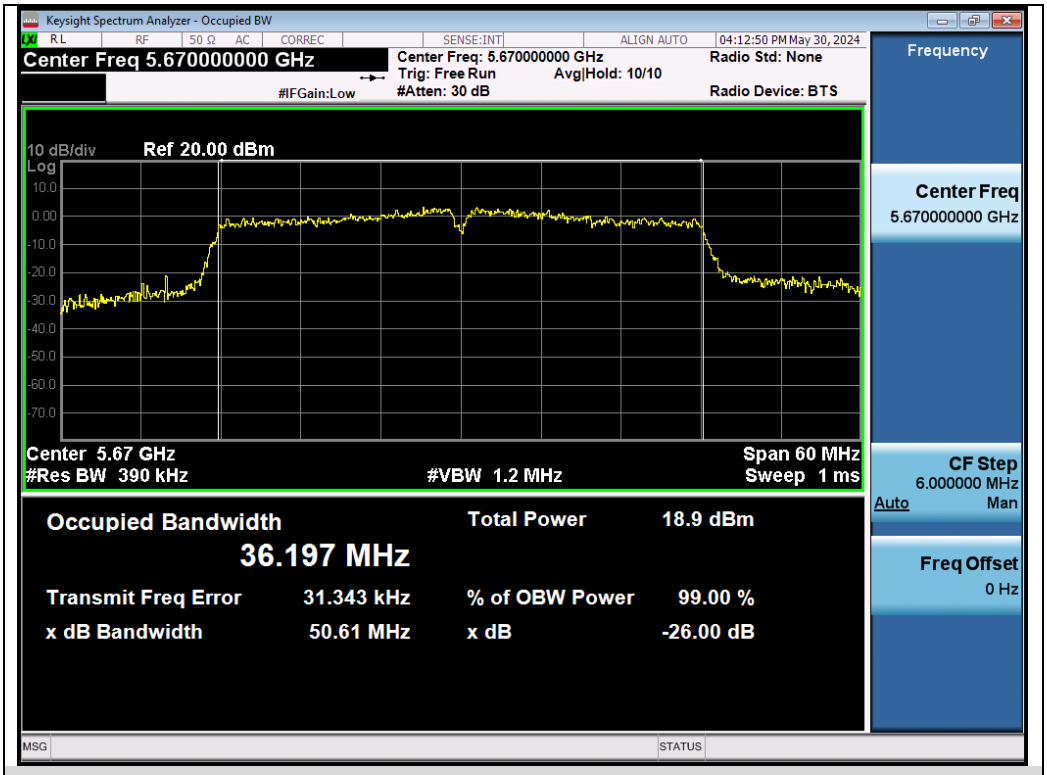
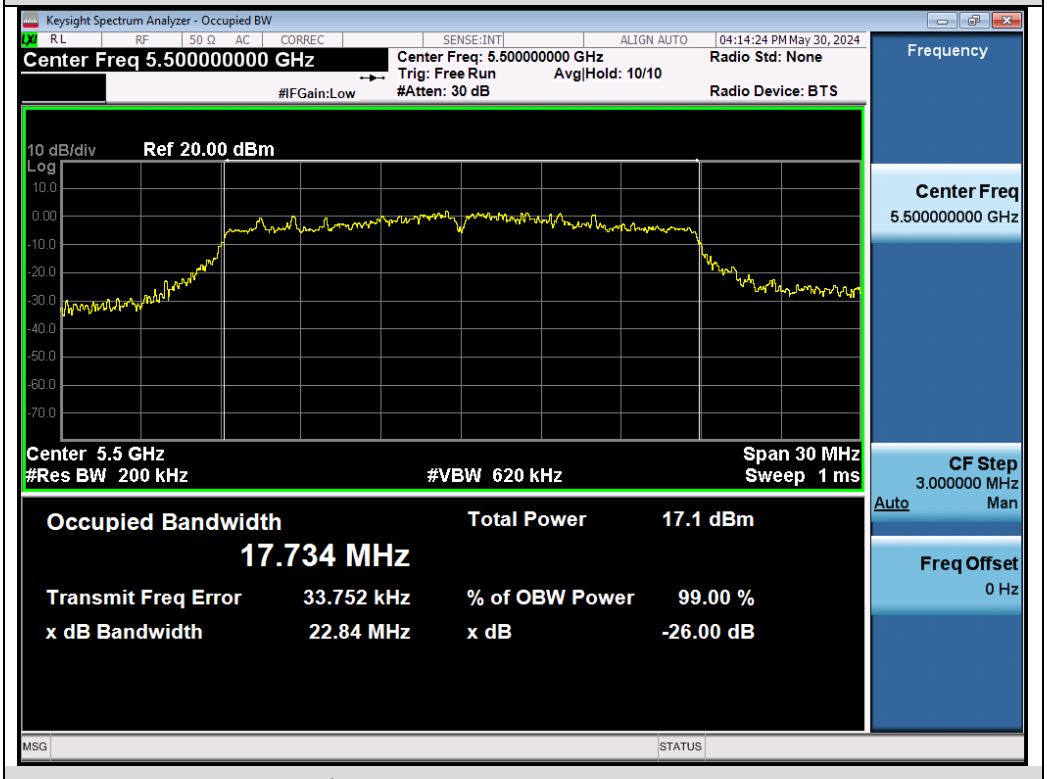


Test_Graph_802.11n40_ANT1_5510_MCS0_OBW

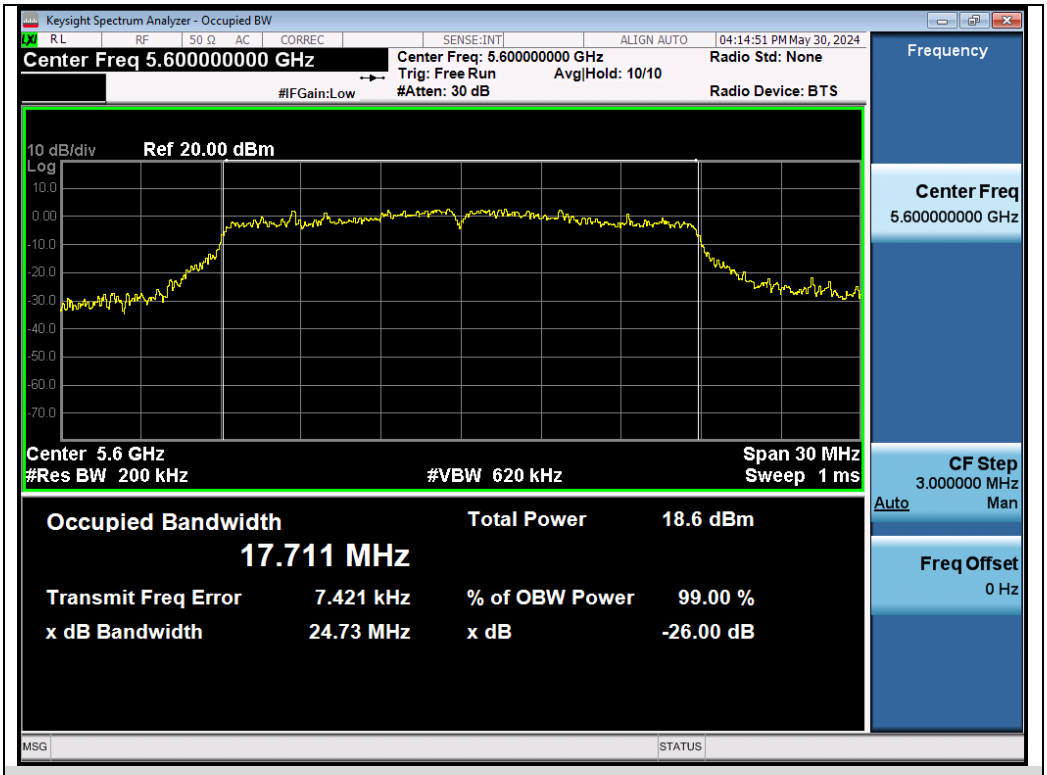
Test_Graph_802.11n40_ANT1_5590_MCS0_OBW



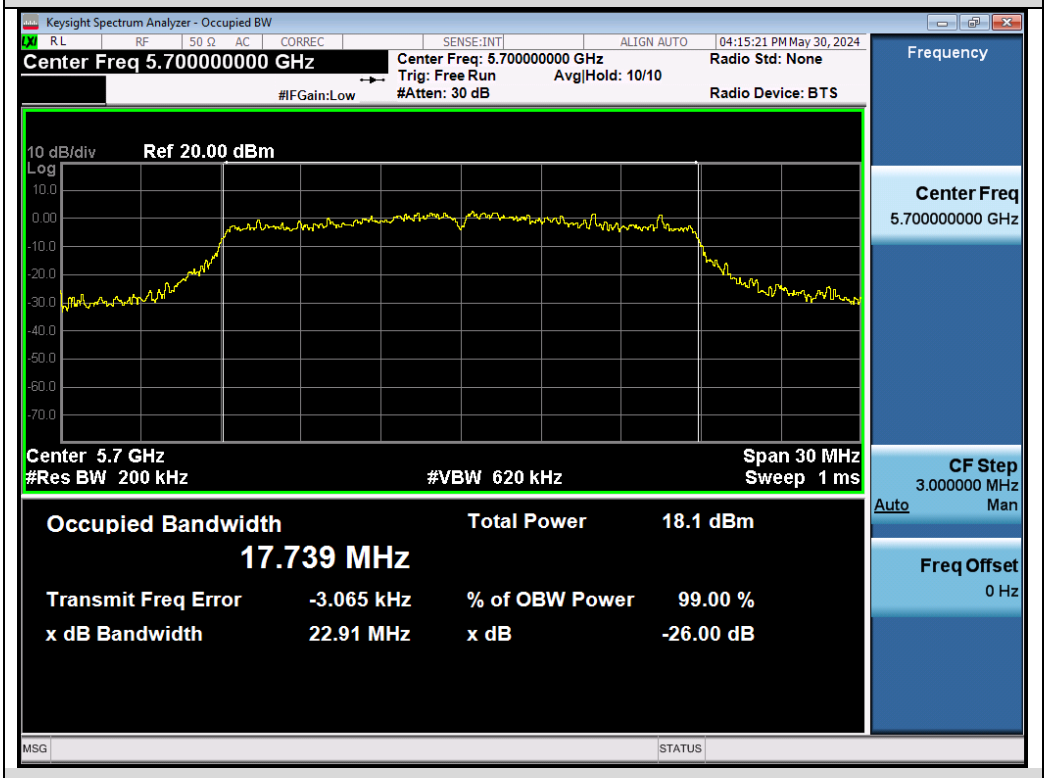
Test_Graph_802.11n40_ANT1_5670_MCS0_OBW



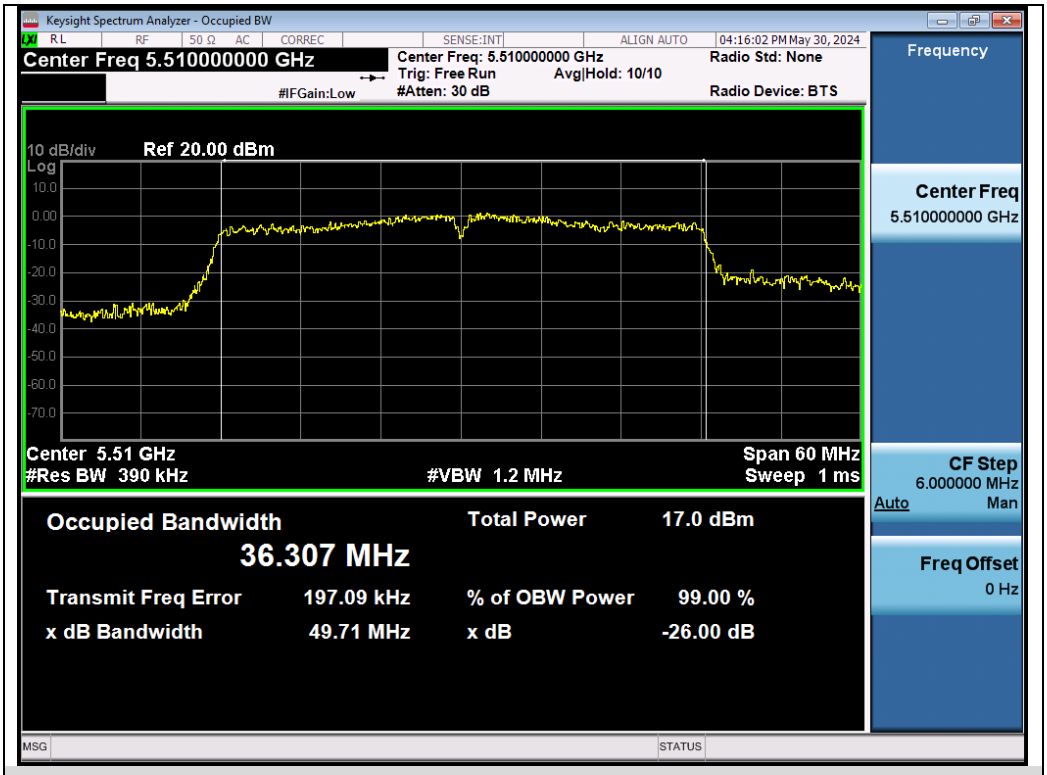
Test_Graph_802.11ac20_ANT1_5500_MCS0_OBW



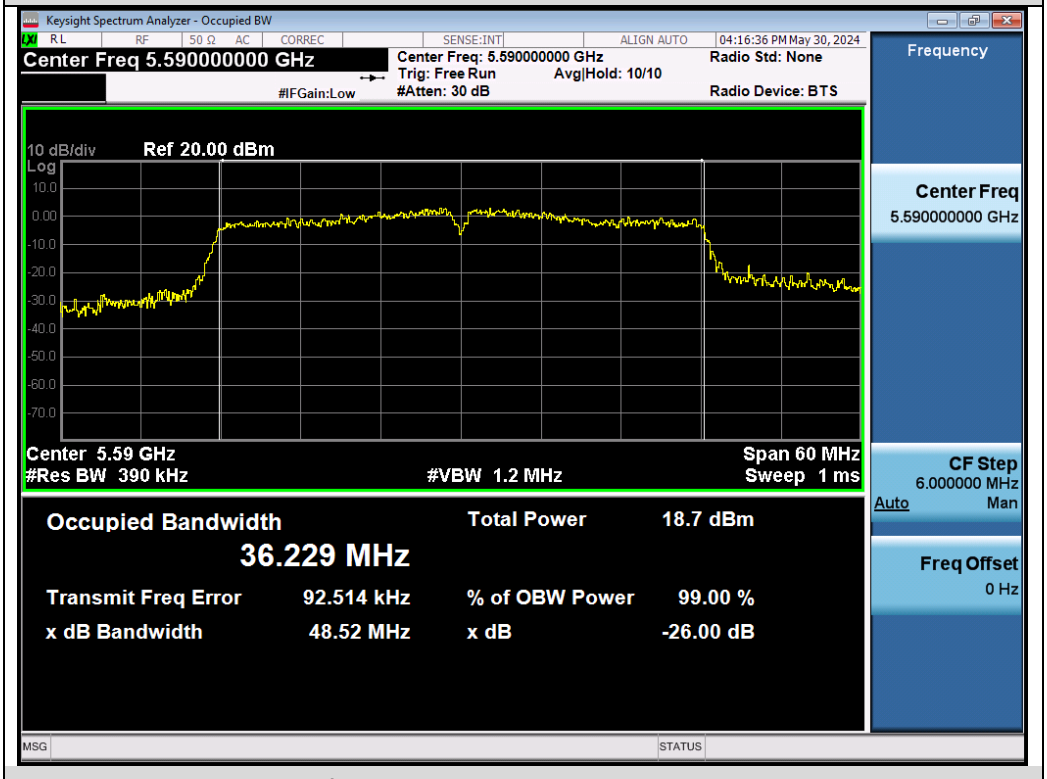
Test_Graph_802.11ac20_ANT1_5600_MCS0_OBW



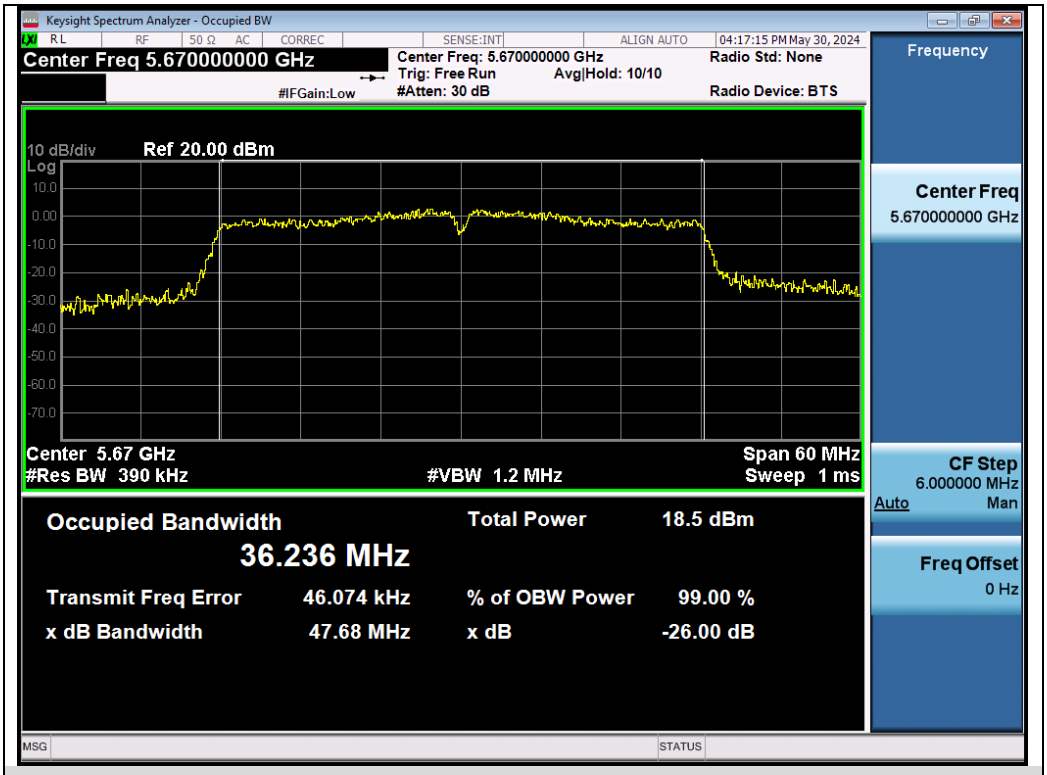
Test_Graph_802.11ac20_ANT1_5700_MCS9_OBW



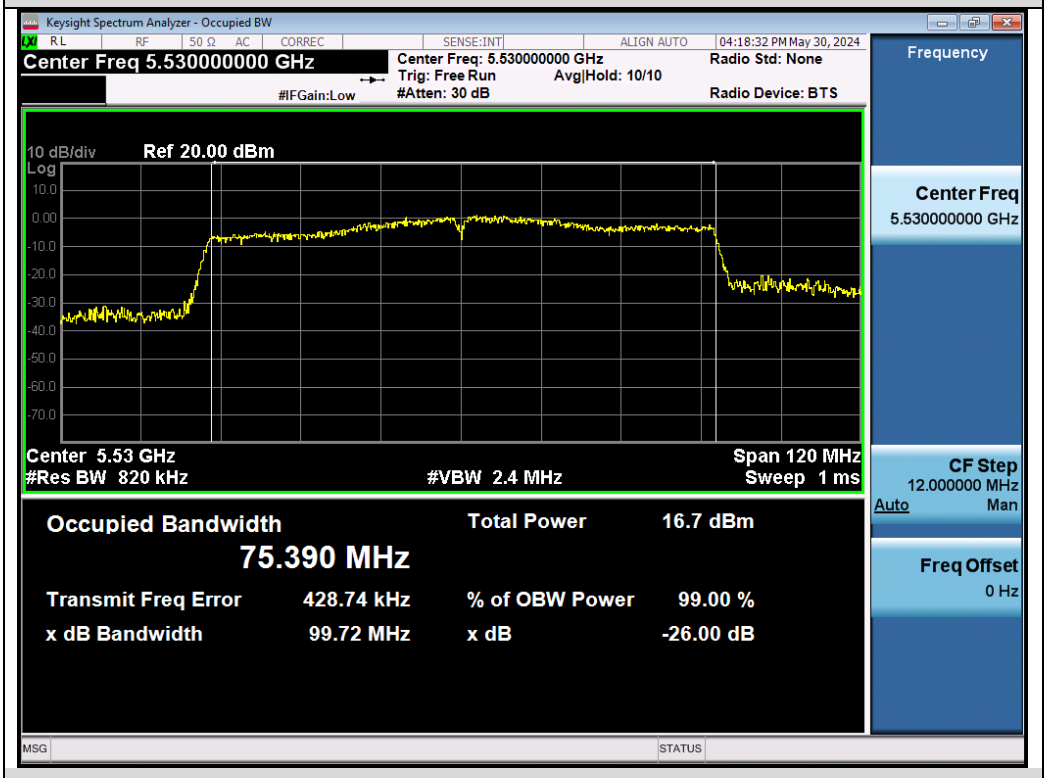
Test_Graph_802.11ac40_ANT1_5510_MCS9_OBW



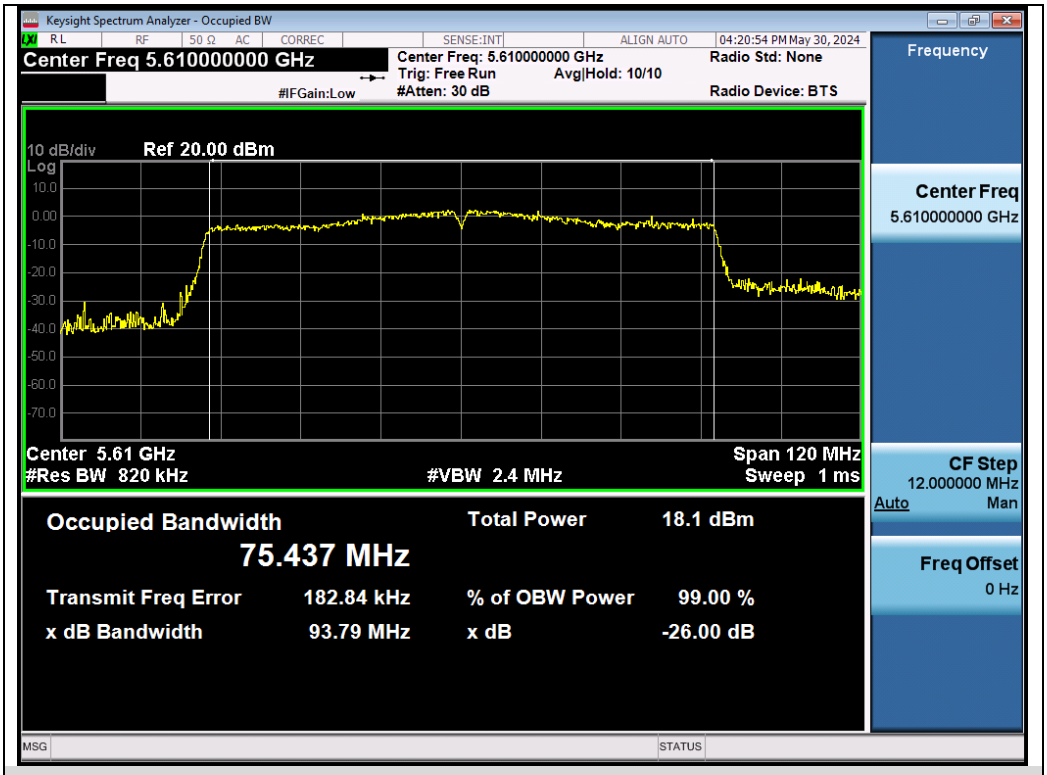
Test_Graph_802.11ac40_ANT1_5590_MCS9_OBW



Test_Graph_802.11ac40_ANT1_5670_MCS9_OBW

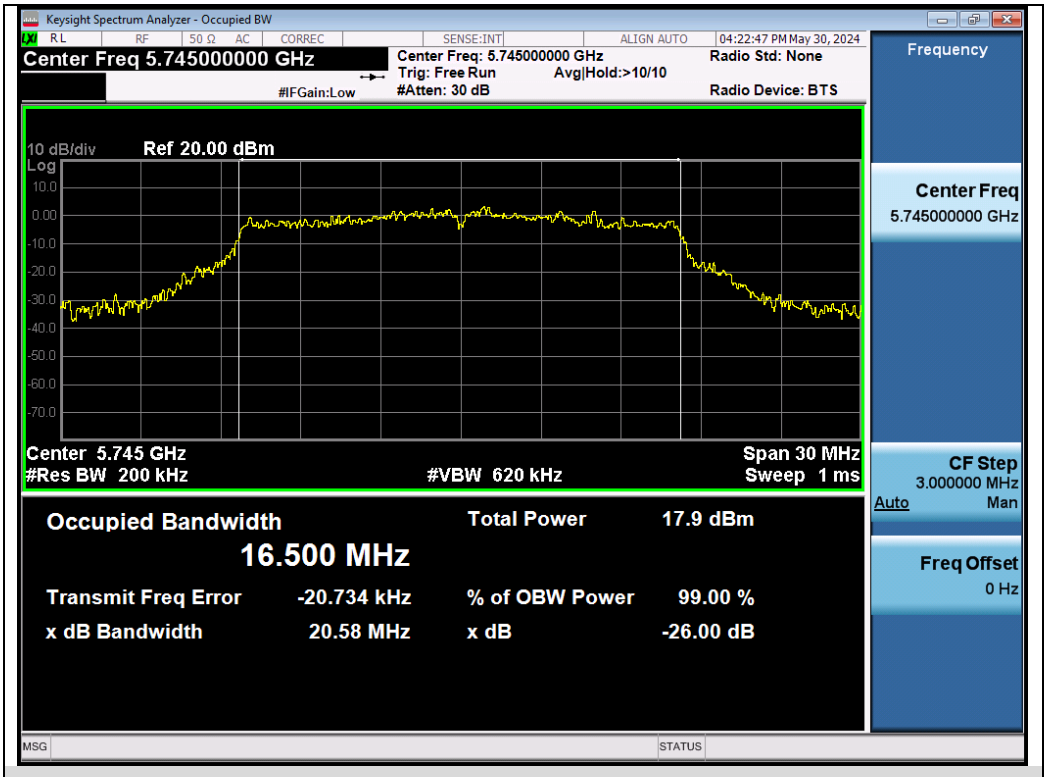


Test_Graph_802.11ac80_ANT1_5530_MCS9_OBW

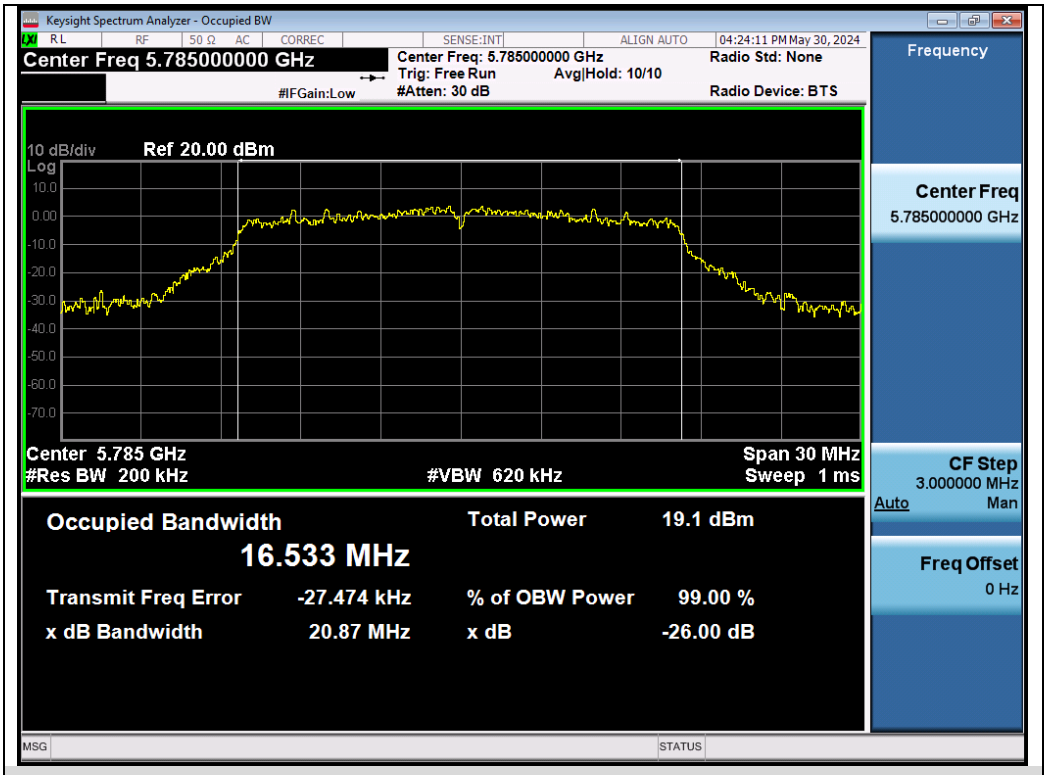


Test_Graph_802.11ac80_ANT1_5610_MCS9_OBW

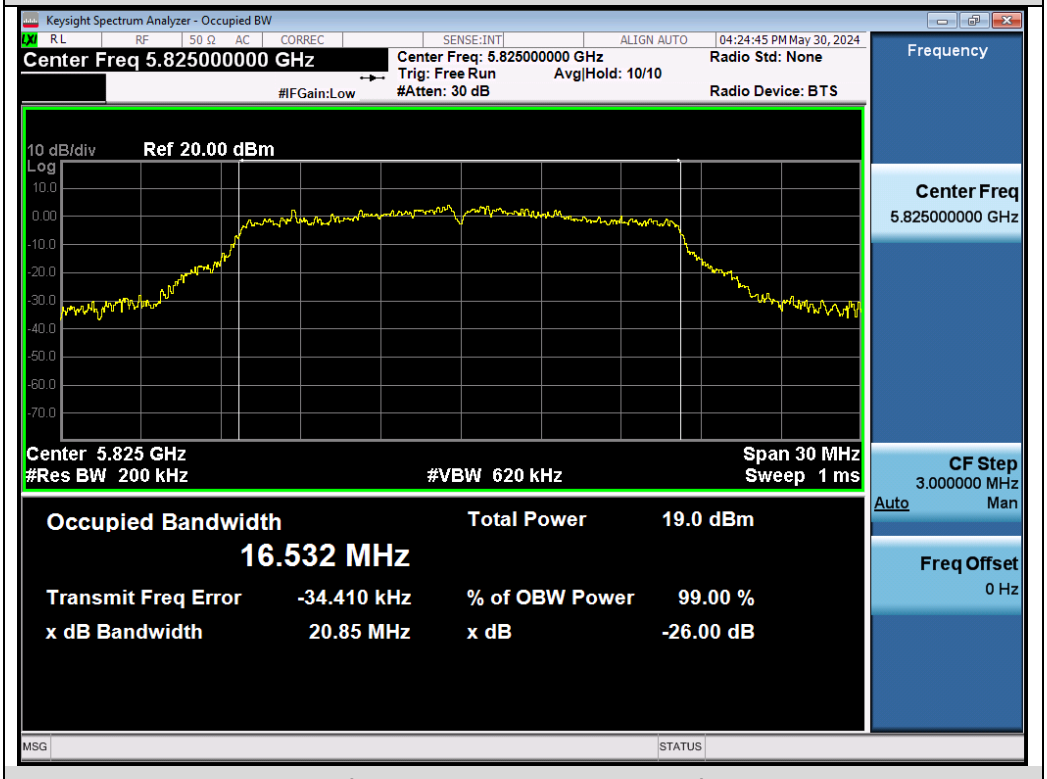
Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.745-5.825 GHz



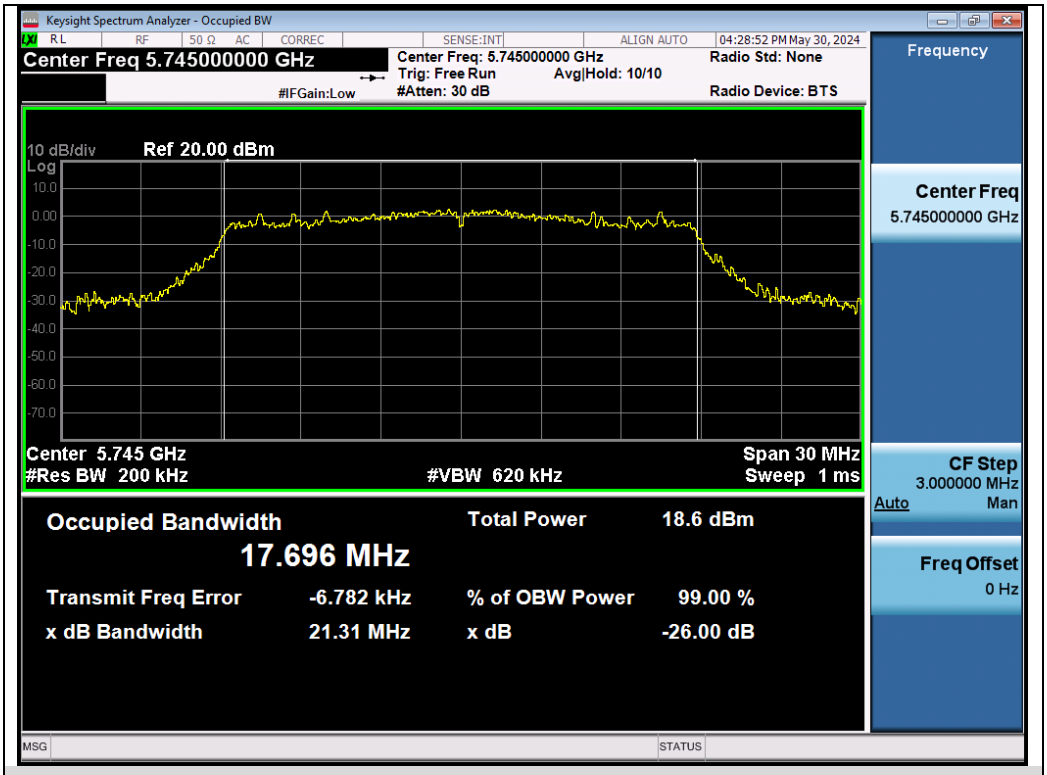
Test_Graph_802.11a_ANT1_5745_6Mbps_OBW



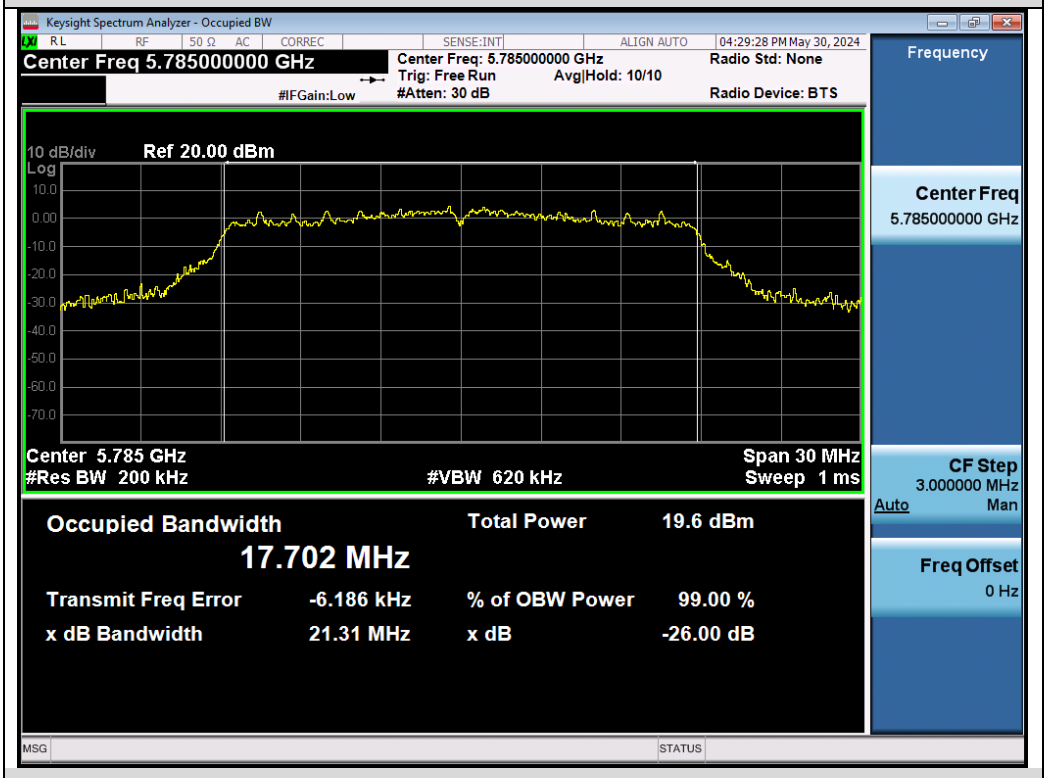
Test_Graph_802.11a_ANT1_5785_6Mbps_OBW



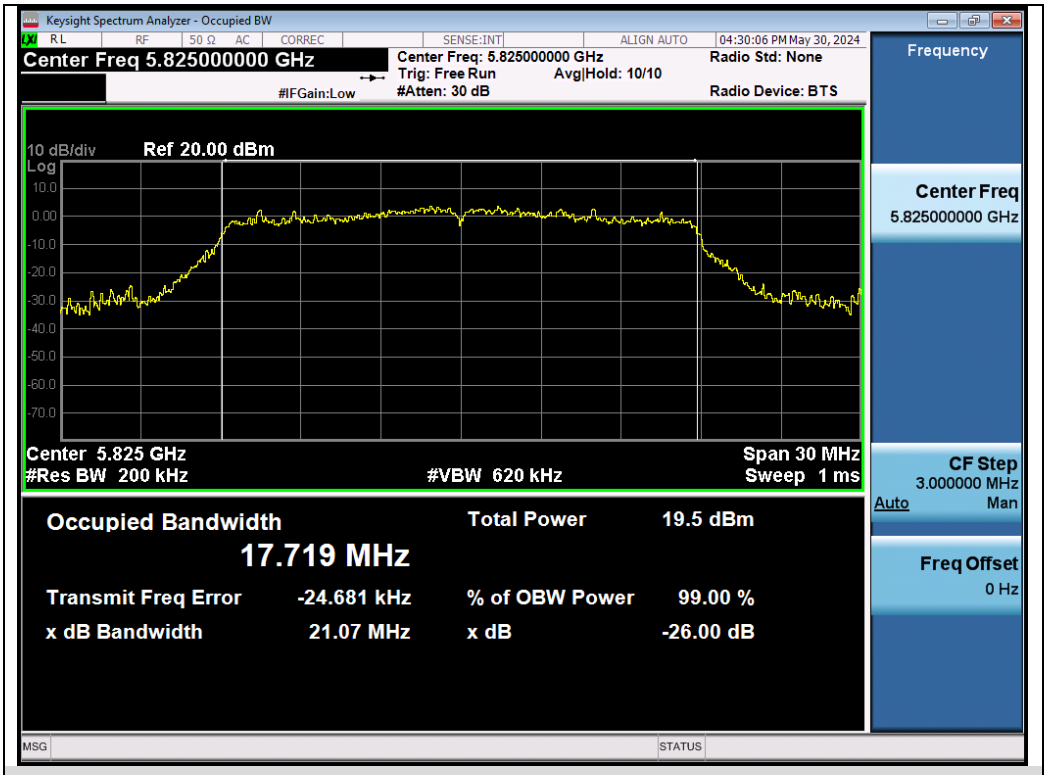
Test_Graph_802.11a_ANT1_5825_6Mbps_OBW



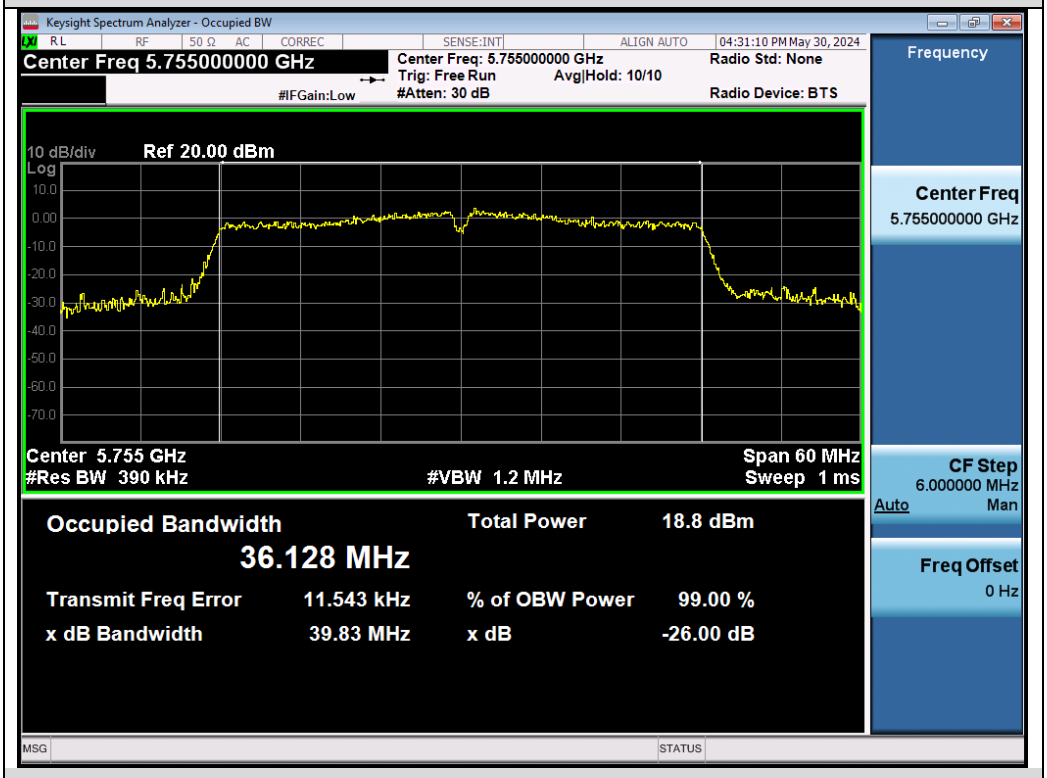
Test_Graph_802.11n20_ANT1_5745_MCS0_OBW



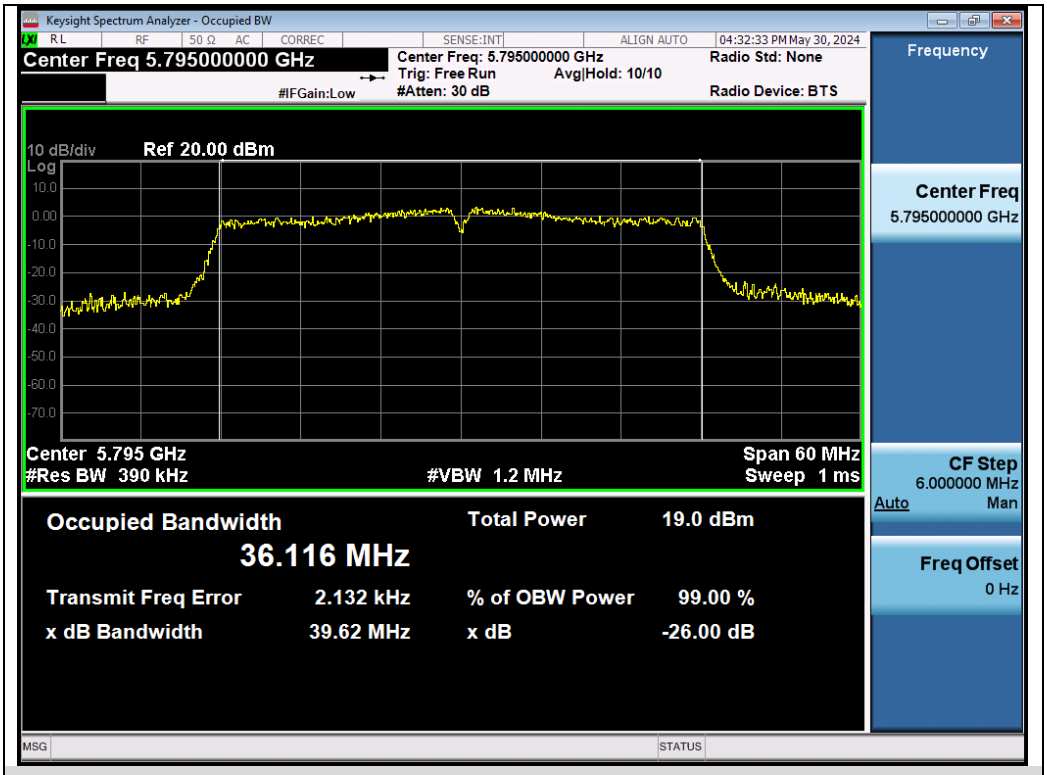
Test_Graph_802.11n20_ANT1_5785_MCS0_OBW



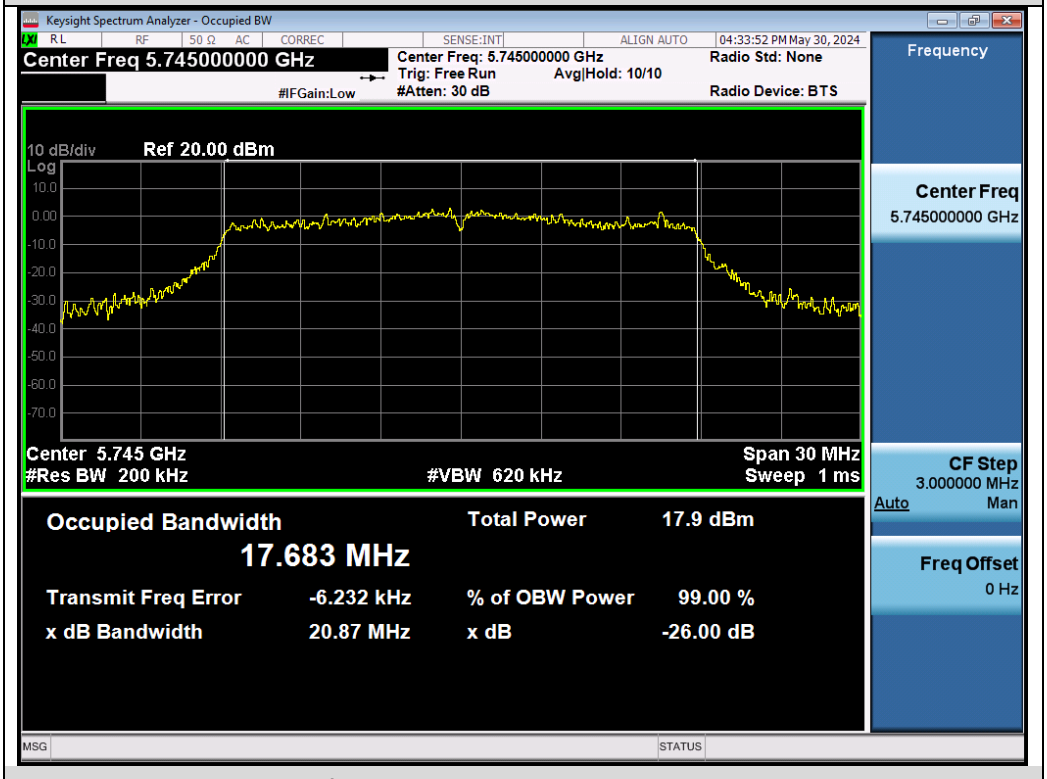
Test_Graph_802.11n20_ANT1_5825_MCS0_OBW



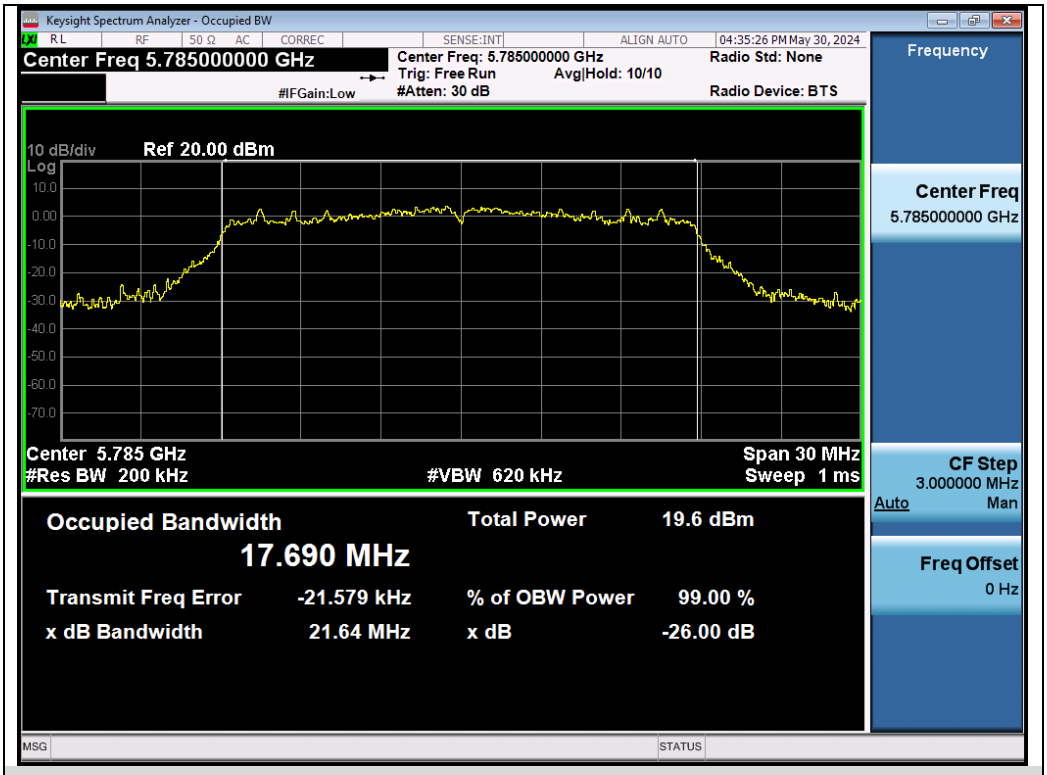
Test_Graph_802.11n40_ANT1_5755_MCS0_OBW



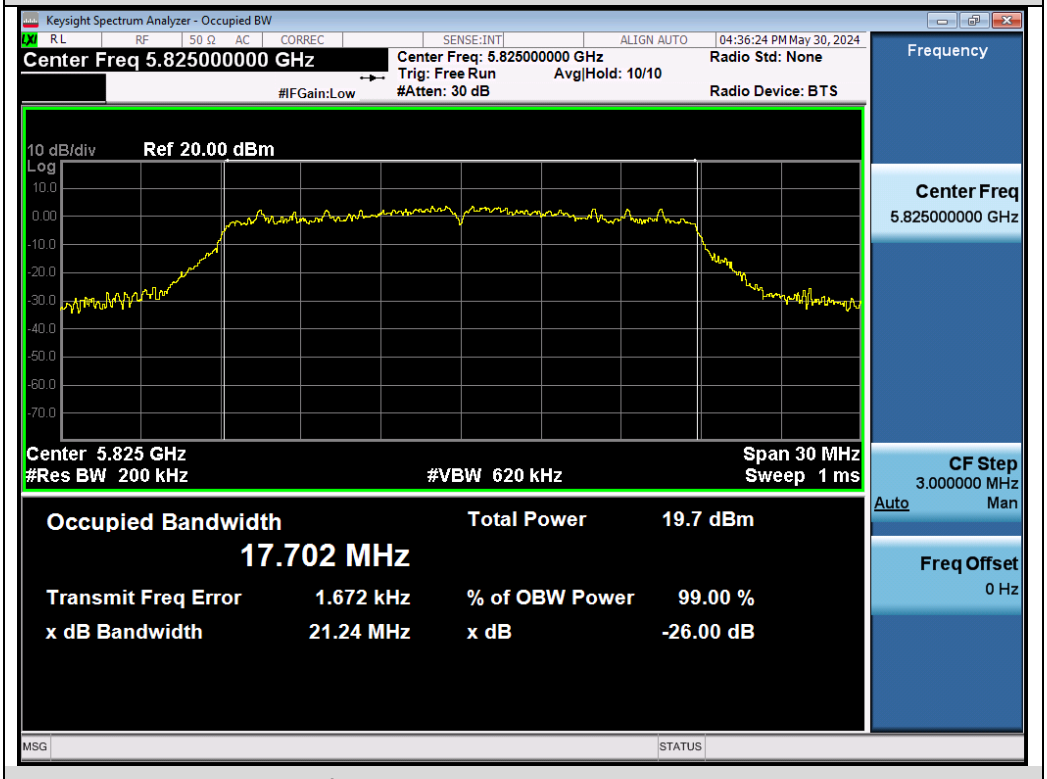
Test_Graph_802.11n40_ANT1_5795_MCS0_OBW



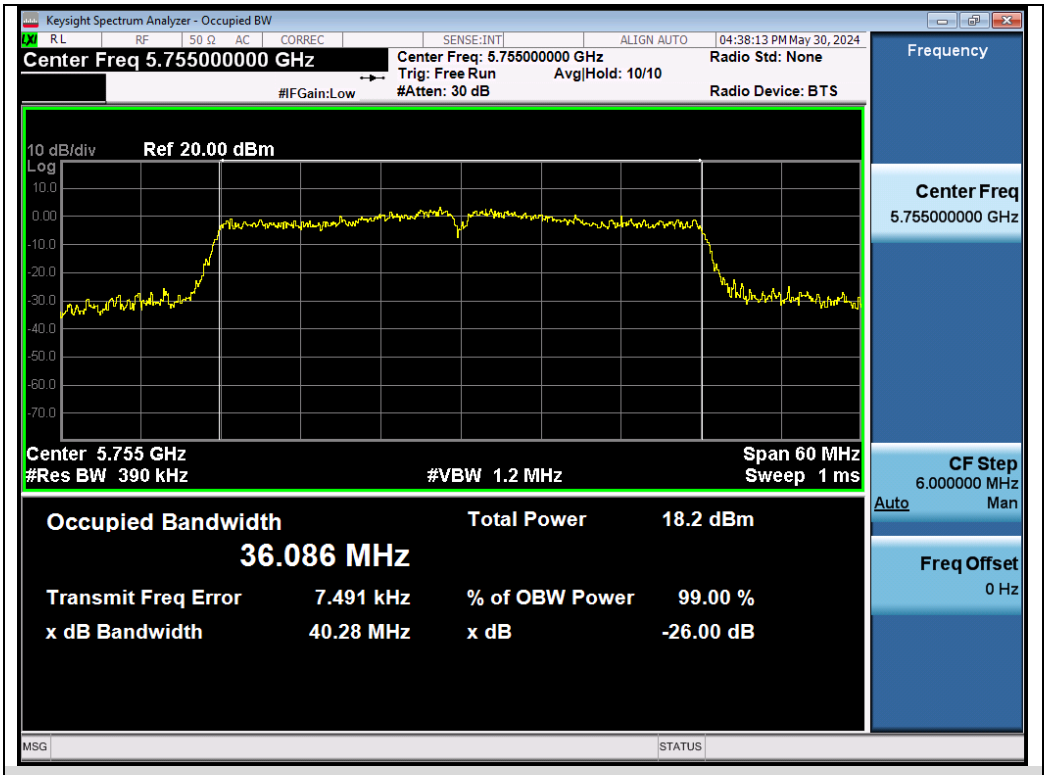
Test_Graph_802.11ac20_ANT1_5745_MCS0_OBW



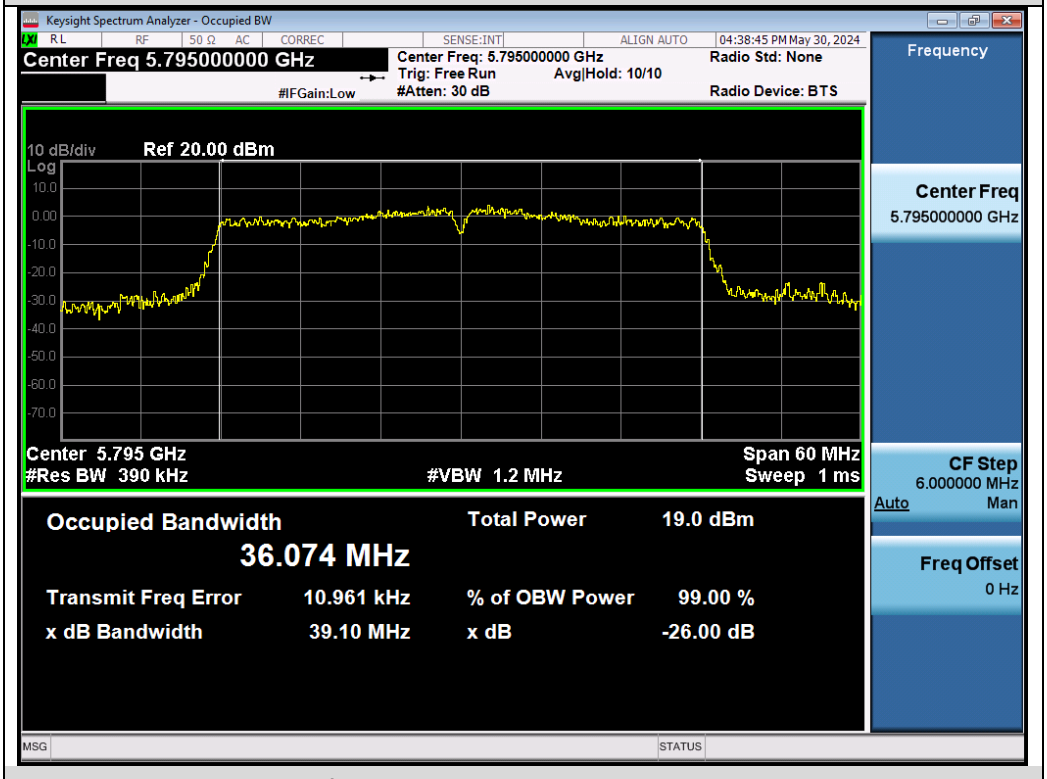
Test_Graph_802.11ac20_ANT1_5785_MCS0_OBW



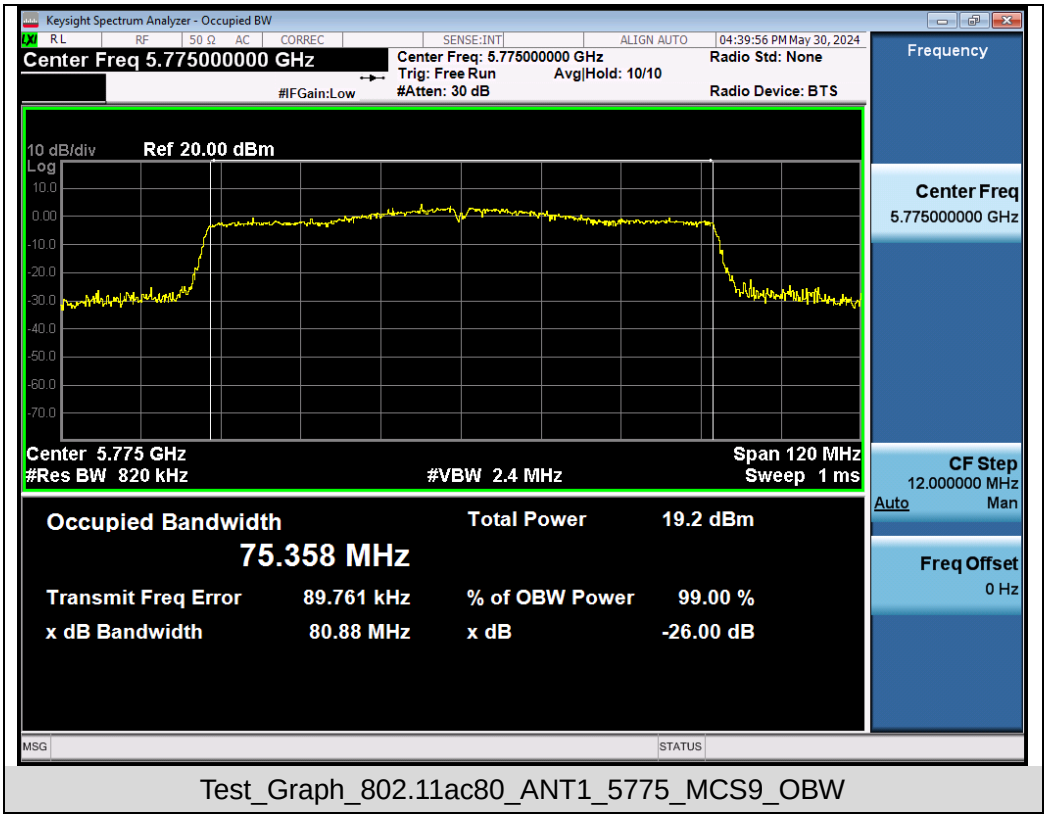
Test_Graph_802.11ac20_ANT1_5825_MCS9_OBW



Test_Graph_802.11ac40_ANT1_5755_MCS9_OBW

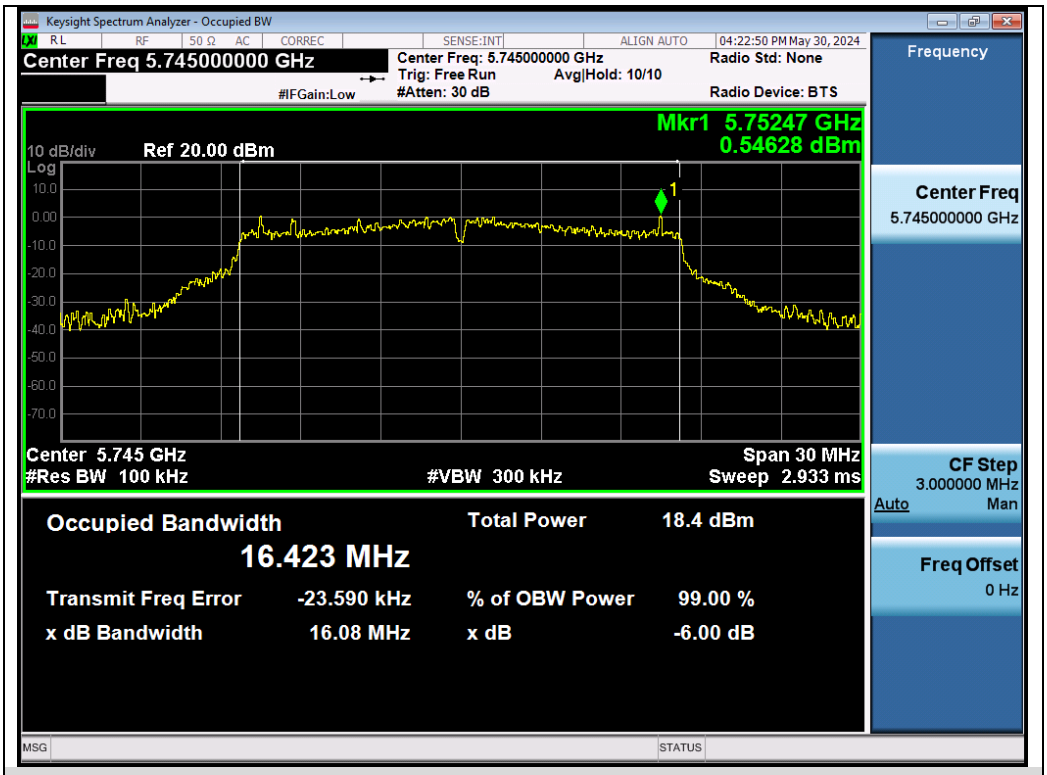


Test_Graph_802.11ac40_ANT1_5795_MCS9_OBW

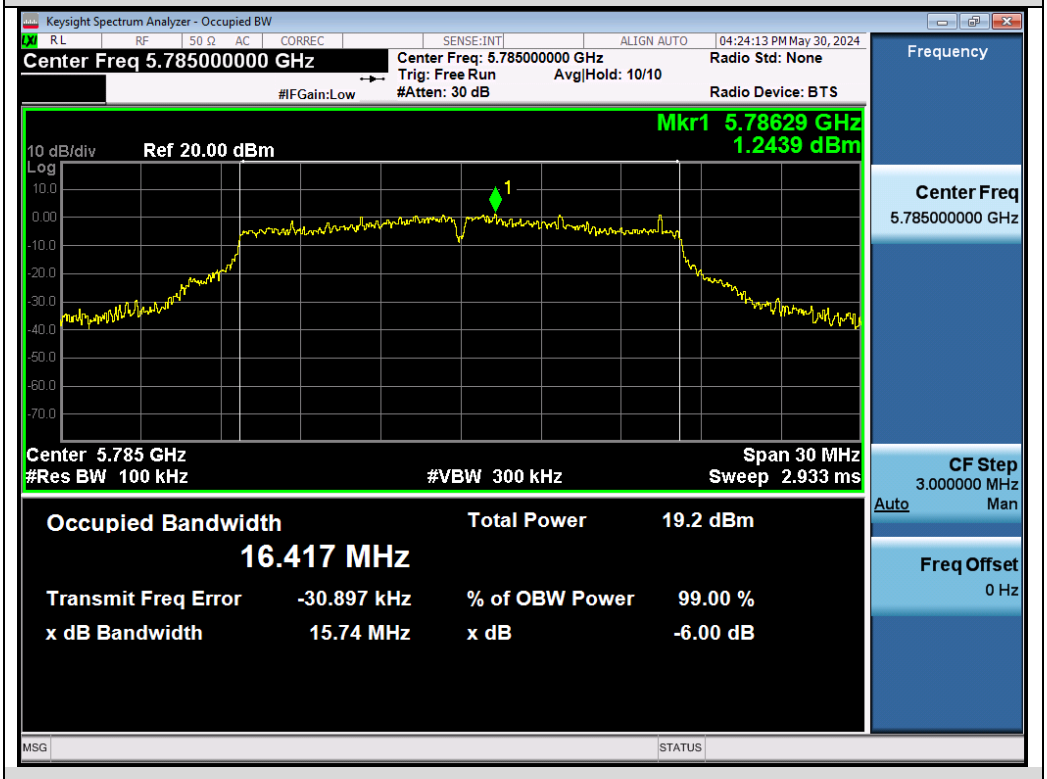


Test_Graph_802.11ac80_ANT1_5775_MCS9_OBW

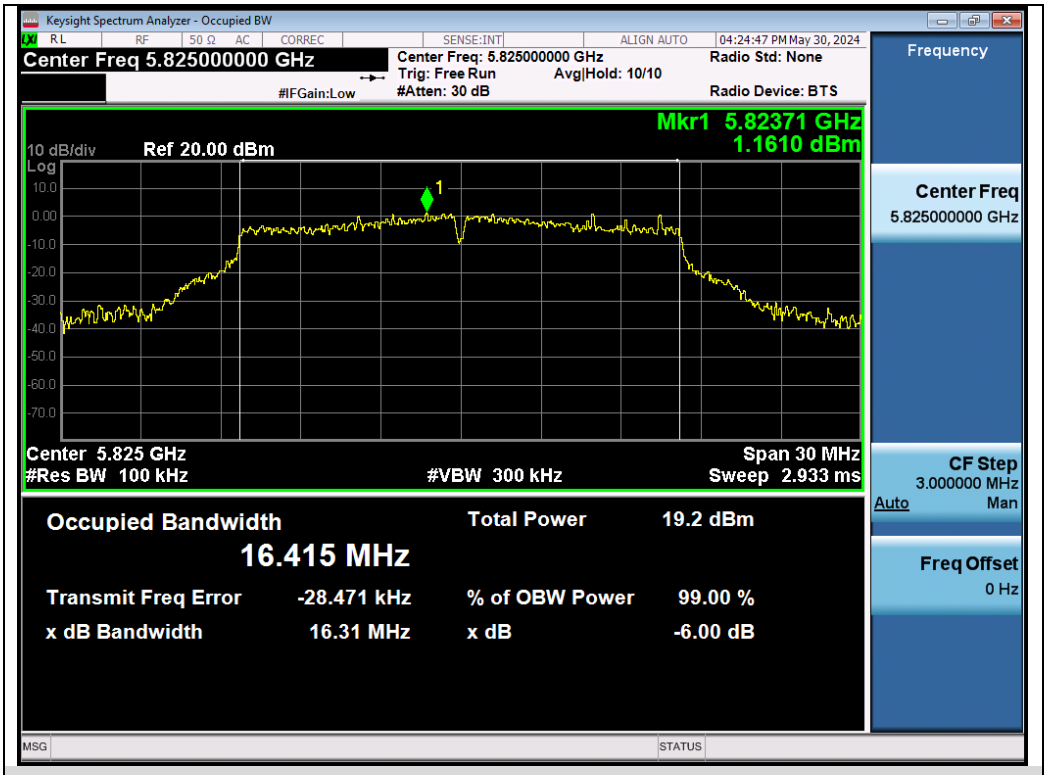
Test Graphs of DTS Bandwidth for band 5.725-5.85 GHz



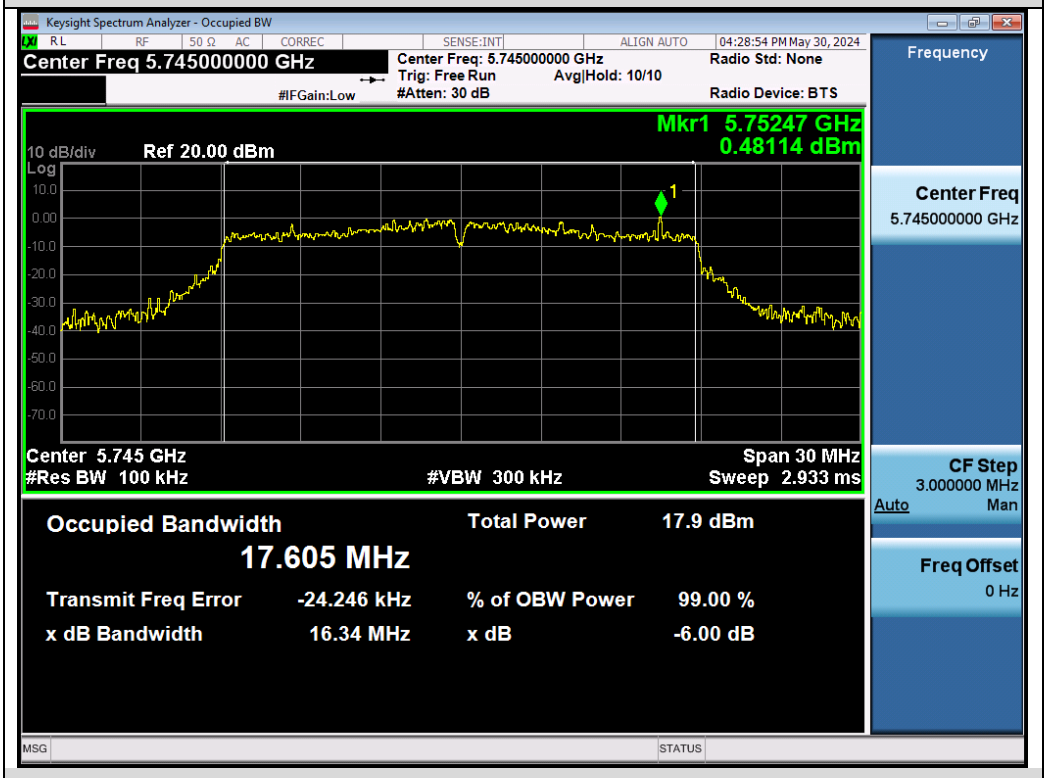
Test_Graph_802.11a_ANT1_5745_6Mbps_DTSBW



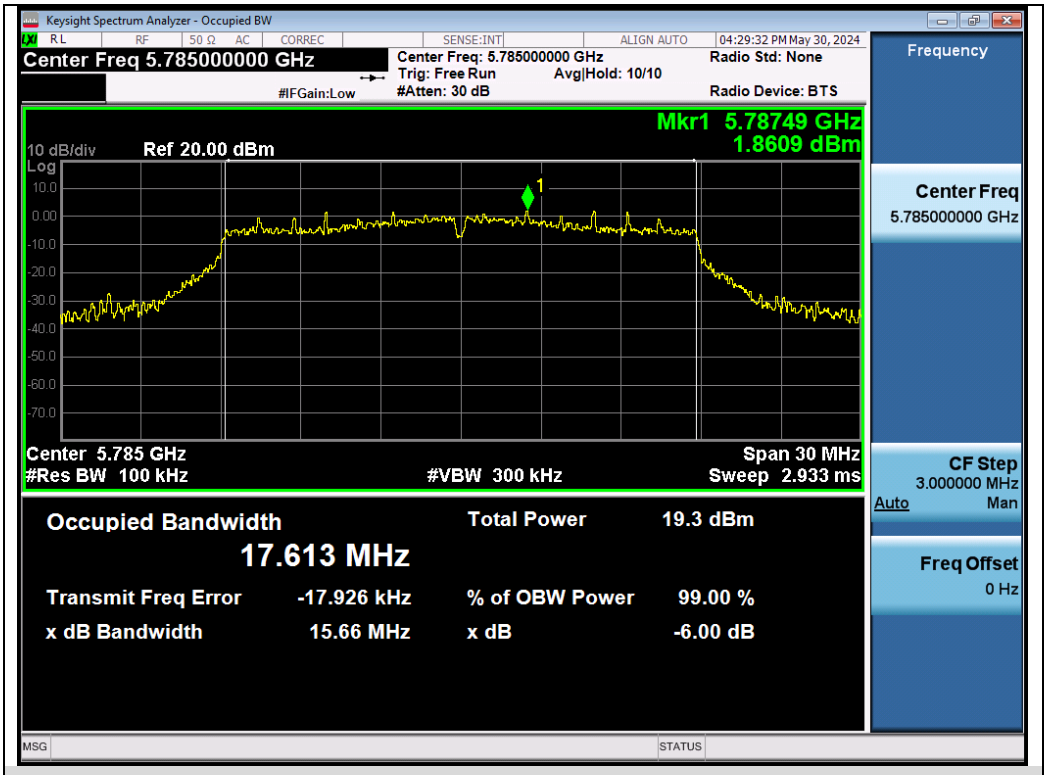
Test_Graph_802.11a_ANT1_5785_6Mbps_DTSBW



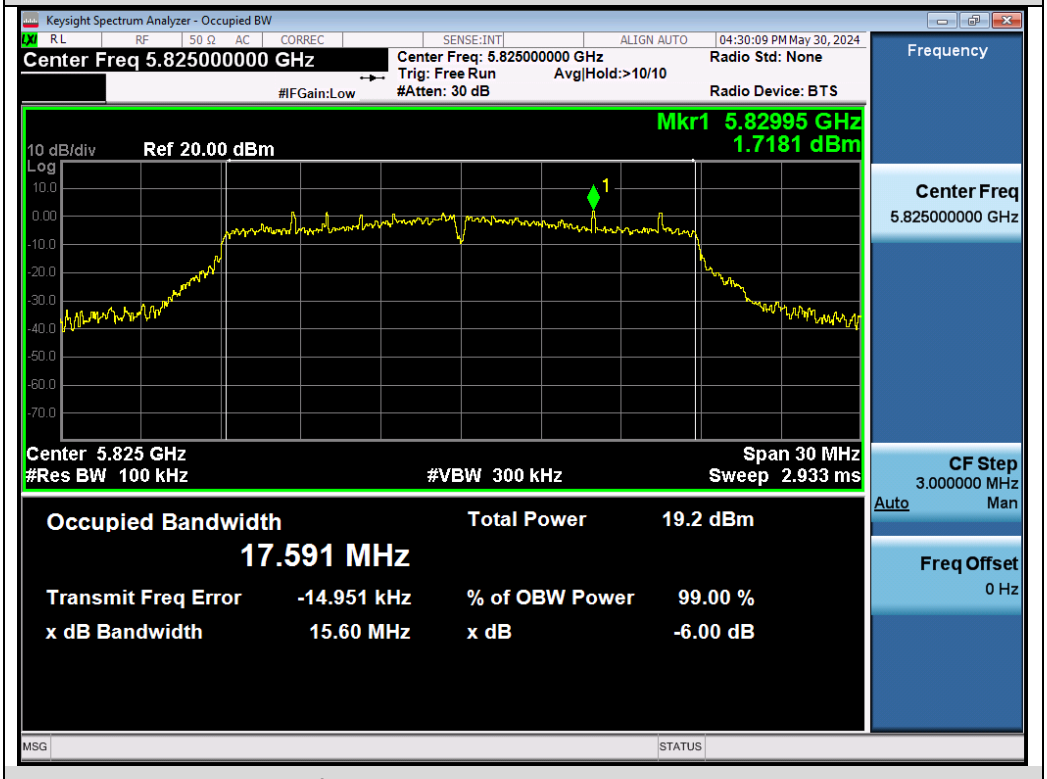
Test_Graph_802.11a_ANT1_5825_6Mbps_DTSBW



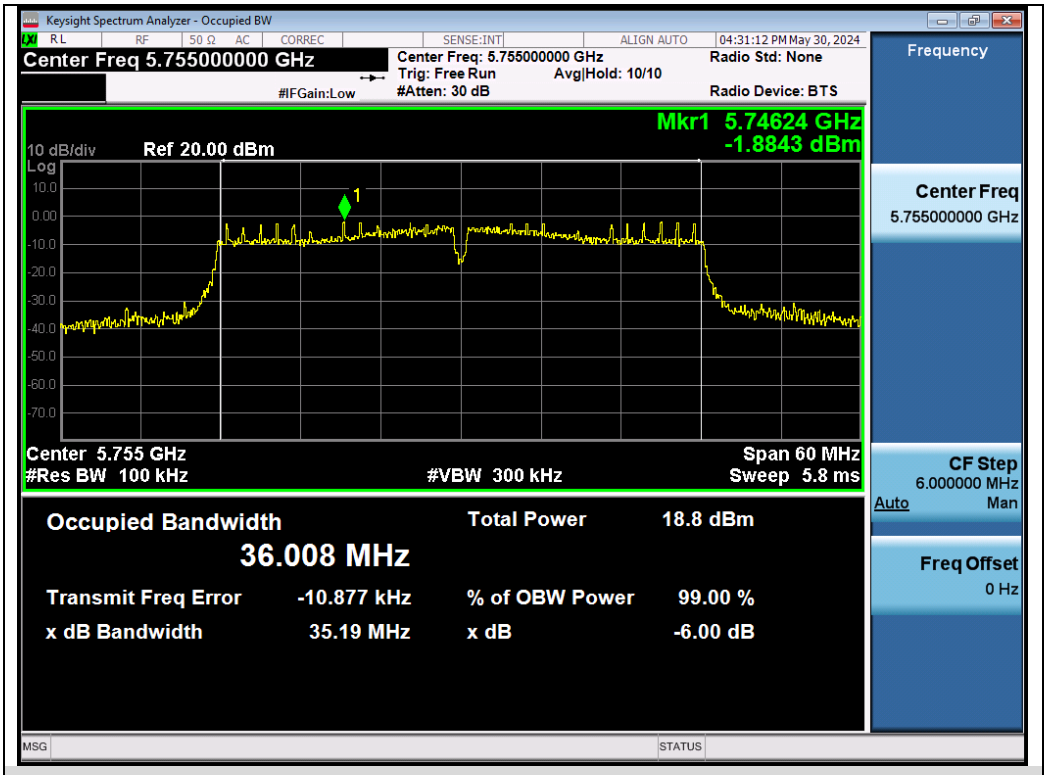
Test_Graph_802.11n20_ANT1_5745_MCS0_DTSBW



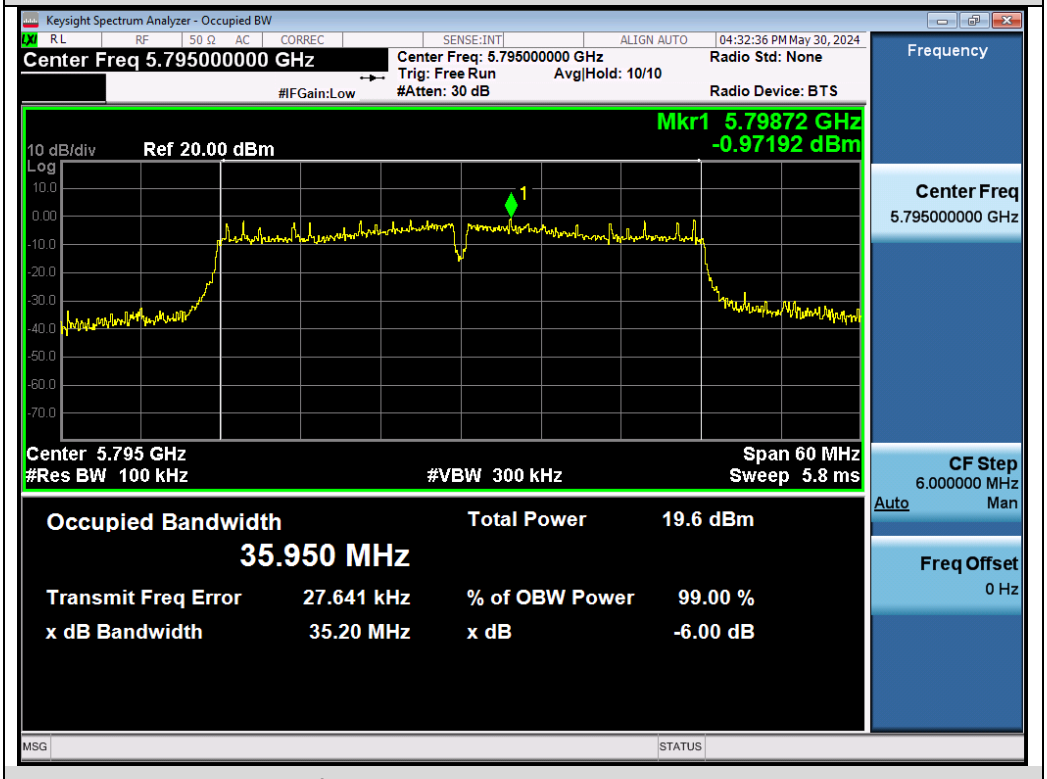
Test_Graph_802.11n20_ANT1_5785_MCS0_DTSBW



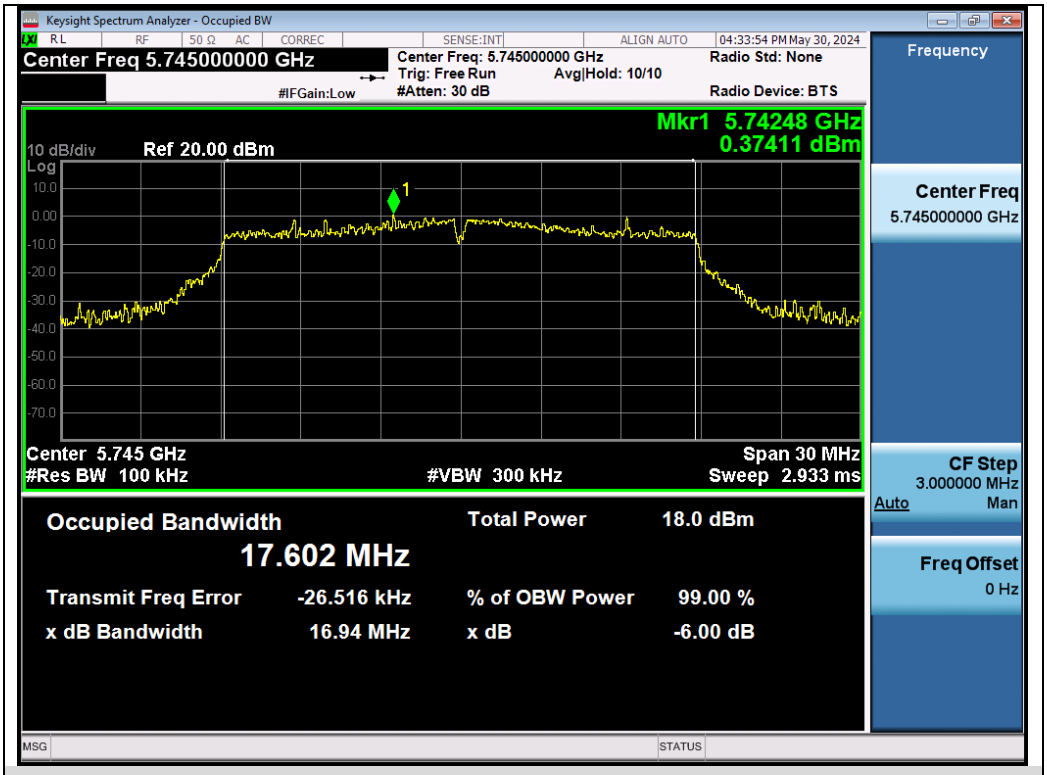
Test_Graph_802.11n20_ANT1_5825_MCS0_DTSBW



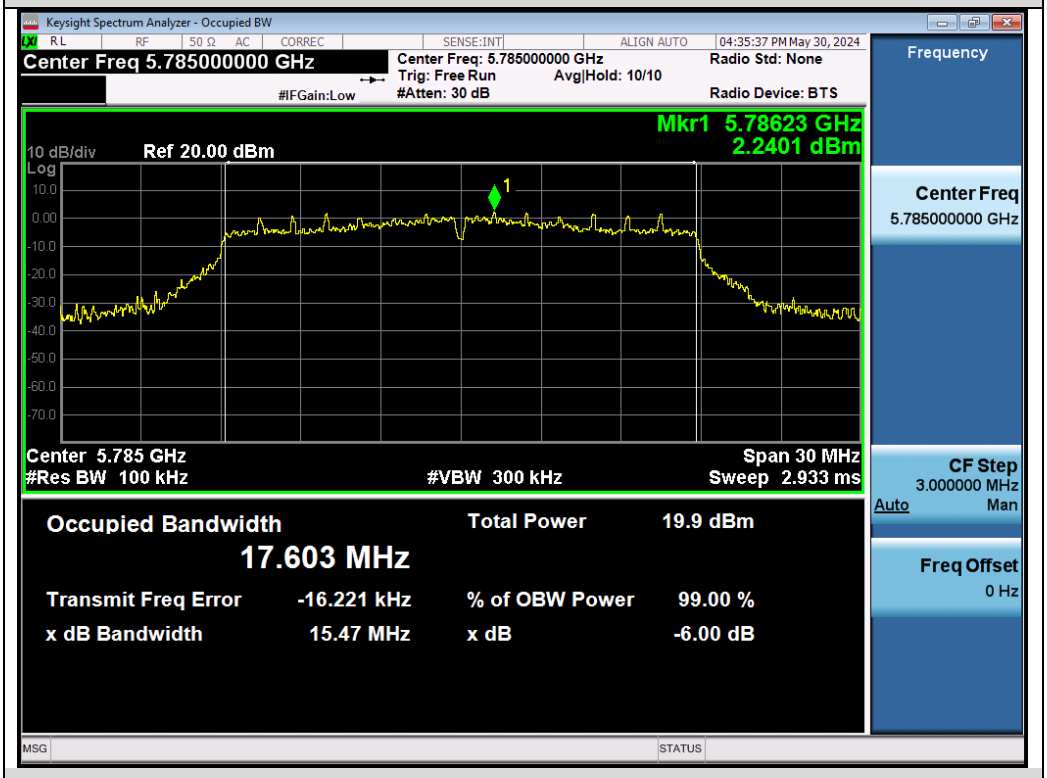
Test_Graph_802.11n40_ANT1_5755_MCS0_DTSBW



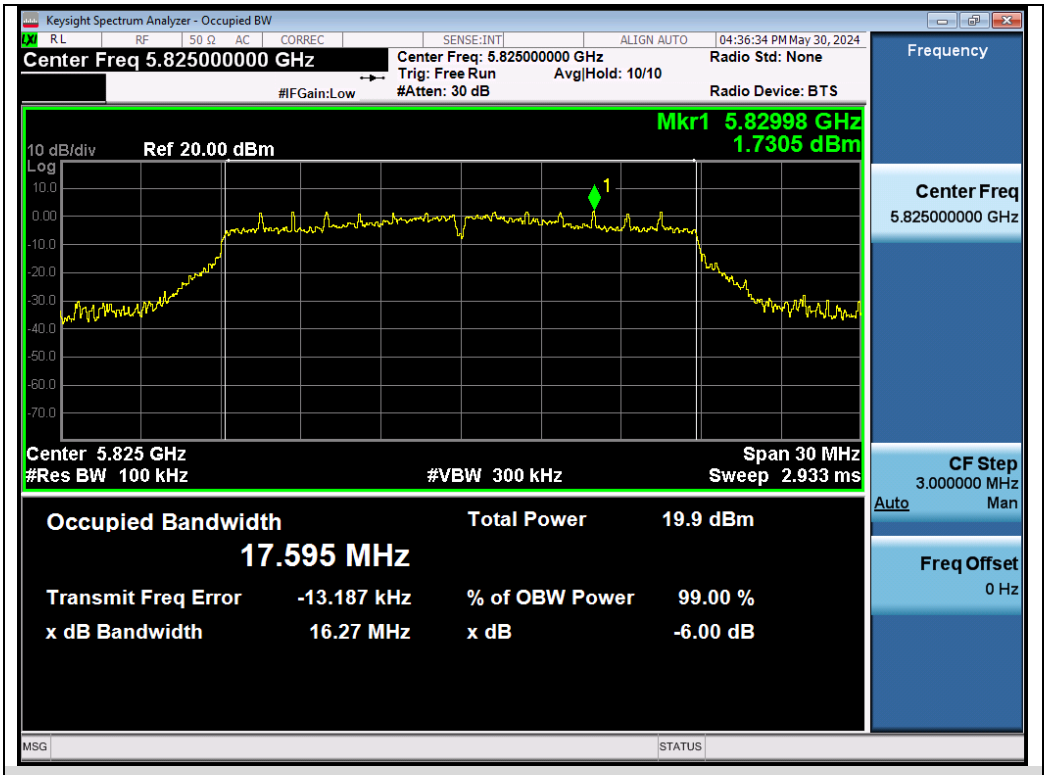
Test_Graph_802.11n40_ANT1_5795_MCS0_DTSBW



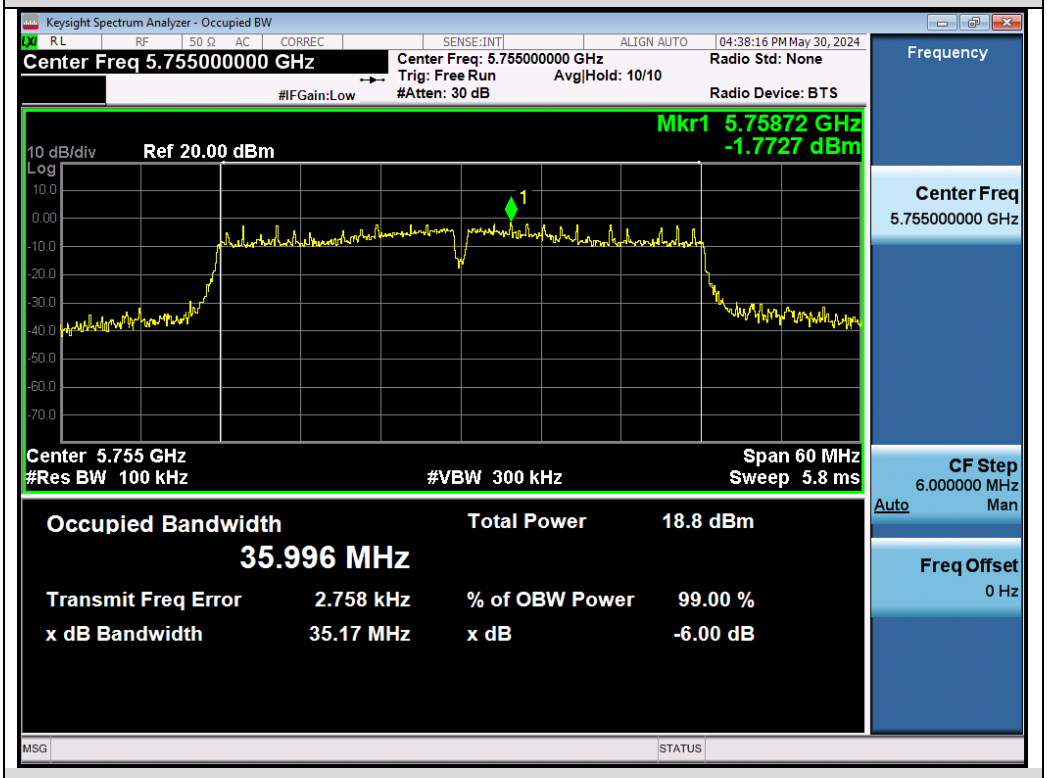
Test_Graph_802.11ac20_ANT1_5745_MCS0_DTSBW



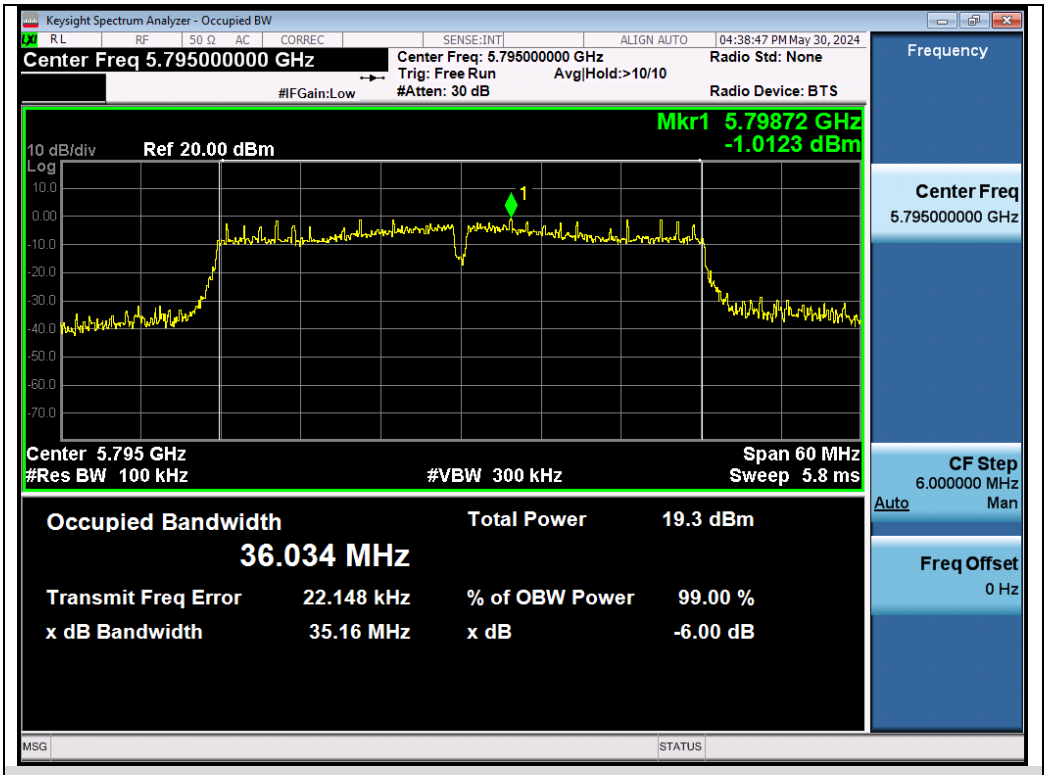
Test_Graph_802.11ac20_ANT1_5785_MCS0_DTSBW



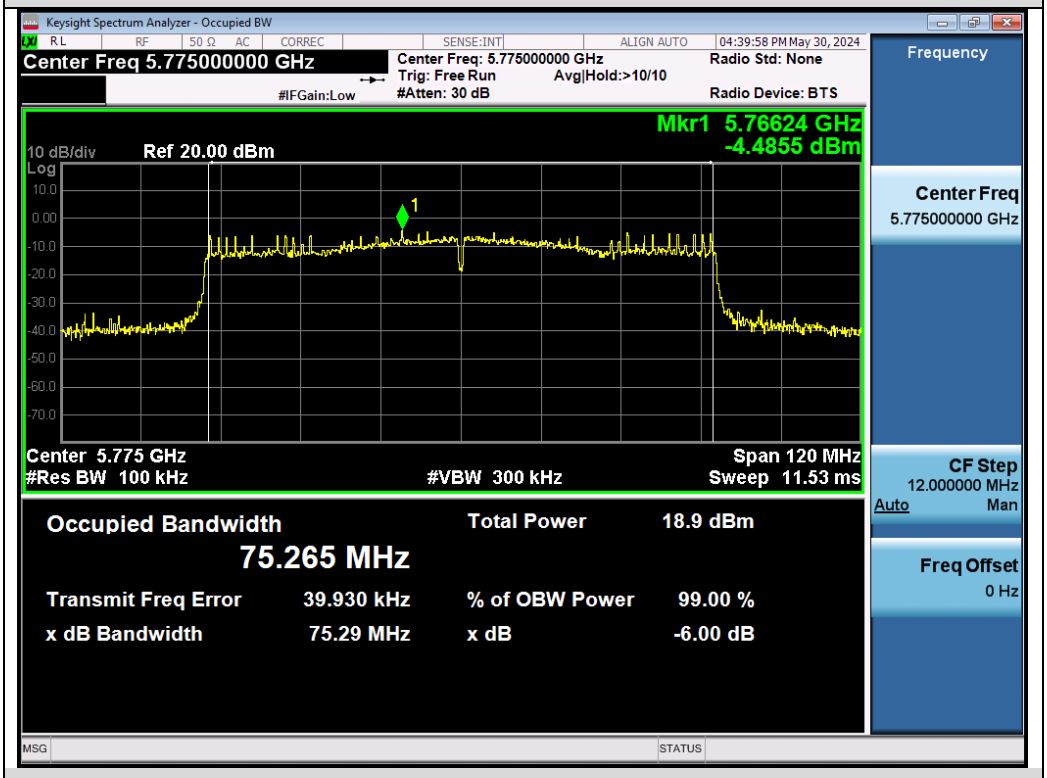
Test_Graph_802.11ac20_ANT1_5825_MCS9_DTSBW



Test_Graph_802.11ac40_ANT1_5755_MCS9_DTSBW



Test_Graph_802.11ac40_ANT1_5795_MCS9_DTSBW



Test_Graph_802.11ac80_ANT1_5775_MCS9_DTSBW

9. Power Spectral Density Measurement

9.1 Provisions Applicable

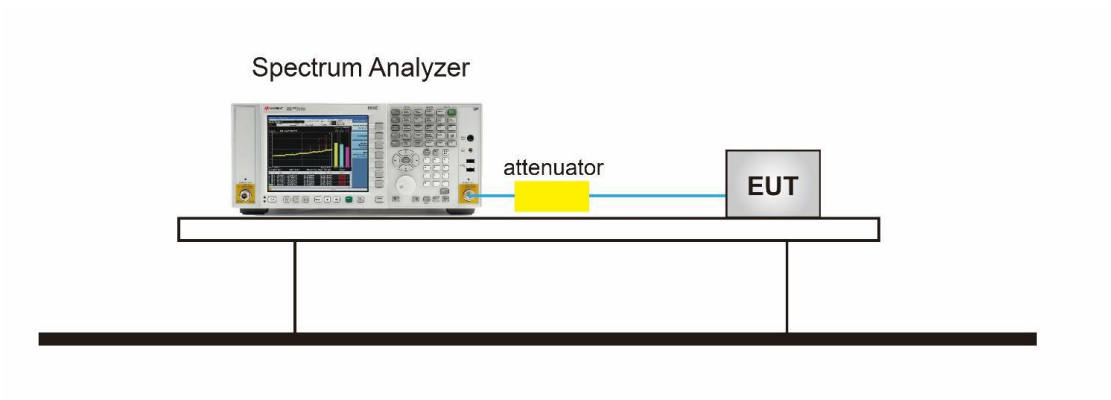
Operation Band	EUT Category		LIMIT
U-NII-1	☐	Outdoor Access Point	17dBm/ MHz
	☐	Fixed point-to-point Access Point	17dBm/ MHz
	☐	Indoor Access Point	17dBm/ MHz
	☒	Client devices	11dBm/ MHz
U-NII-2A	/		11dBm/ MHz
U-NII-2C	/		11dBm/ MHz
U-NII-3	/		30 dBm/500kHz

9.2 Measurement Procedure

☒For Average power spectral density test:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz.
4. If measurement bandwidth of Maximum PSD is specified in 500 kHz, RBW = 100KHz
5. Set VBW≥[3xRBW].
6. Sweep Time=Auto couple.
7. Detector function=RMS (i.e., power averaging).
8. Trace average at least 100 traces in power averaging (rms) mode.
9. When the measurement bandwidth of Maximum PSD is specified in 100 kHz, add a constant factor 10*log(500kHz/100kHz) = 6.99 dB to the measured result.
10. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
11. Add [10 log (1/D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is 25%.
12. The final test results have been increased by the duty cycle factor and recorded in the report

9.3 Measurement Setup (Block Diagram of Configuration)



9.4 Measurement Result

Test Data of Conducted Output Power Density for band 5.15-5.25 GHz				
Test Mode	Test Channel (MHz)	Average Power Density (dBm/MHz)	Limits (dBm/MHz)	Pass or Fail
802.11a	5180	4.683	11	Pass
	5200	4.514	11	Pass
	5240	3.918	11	Pass
802.11n20	5180	4.002	11	Pass
	5200	3.759	11	Pass
	5240	3.203	11	Pass
802.11n40	5190	1.028	11	Pass
	5230	0.237	11	Pass
802.11ac20	5180	4.080	11	Pass
	5200	3.999	11	Pass
	5240	3.317	11	Pass
802.11ac40	5190	1.140	11	Pass
	5230	0.078	11	Pass
802.11ac80	5210	-6.065	11	Pass

Test Data of Conducted Output Power Density for band 5.25-5.35 GHz				
Test Mode	Test Channel (MHz)	Average Power Density (dBm/MHz)	Limits (dBm/MHz)	Pass or Fail
802.11a	5260	3.409	11	Pass
	5300	2.688	11	Pass
	5320	2.440	11	Pass
802.11n20	5260	2.984	11	Pass
	5300	2.356	11	Pass
	5320	1.894	11	Pass
802.11n40	5270	-1.557	11	Pass
	5310	-2.291	11	Pass
802.11ac20	5260	1.692	11	Pass
	5300	1.016	11	Pass
	5320	0.945	11	Pass
802.11ac40	5270	-1.654	11	Pass
	5310	-2.262	11	Pass
802.11ac80	5290	-4.812	11	Pass

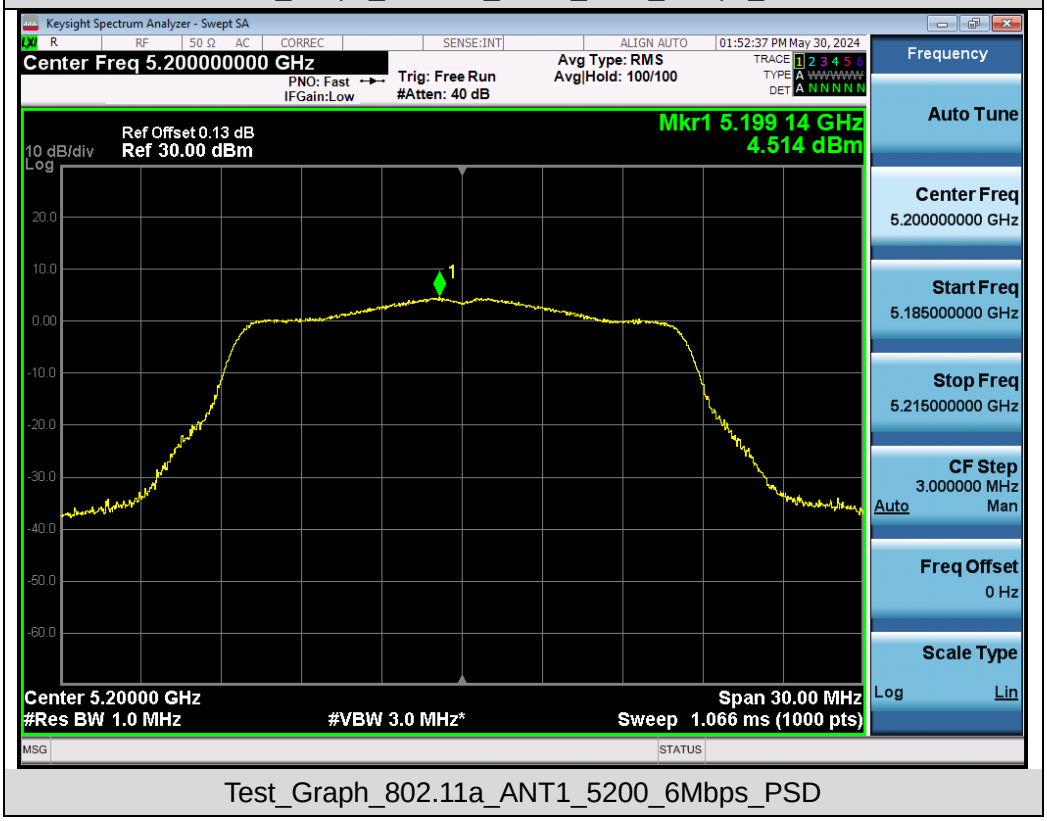
Test Data of Conducted Output Power Density for band 5.470-5.725 GHz				
Test Mode	Test Channel (MHz)	Average Power Density (dBm/MHz)	Limits (dBm/MHz)	Pass or Fail
802.11a	5500	1.985	11	Pass
	5600	3.741	11	Pass
	5700	3.103	11	Pass
802.11n20	5500	1.351	11	Pass
	5600	3.109	11	Pass
	5700	2.935	11	Pass
802.11n40	5510	-1.614	11	Pass
	5590	0.289	11	Pass
	5670	0.342	11	Pass
802.11ac20	5500	1.539	11	Pass
	5600	2.863	11	Pass
	5700	2.690	11	Pass
802.11ac40	5510	-1.548	11	Pass
	5590	0.089	11	Pass
	5670	-0.064	11	Pass
802.11ac80	5530	-5.083	11	Pass
	5610	-3.975	11	Pass

Test Data of Conducted Output Power Density for band 5.725-5.85 GHz					
Test Mode	Test Channel (MHz)	Average Power Density (dBm/100kHz)	Average Power Density (dBm/500kHz)	Limits (dBm/500kHz)	Pass or Fail
802.11a	5745	-5.542	1.448	30	Pass
	5785	-4.759	2.231	30	Pass
	5825	-4.72	2.270	30	Pass
802.11n20	5745	-6.145	0.845	30	Pass
	5785	-5.267	1.723	30	Pass
	5825	-5.5	1.490	30	Pass
802.11n40	5755	-9.453	-2.463	30	Pass
	5795	-8.729	-1.739	30	Pass
802.11ac20	5745	-6.211	0.779	30	Pass
	5785	-5.497	1.493	30	Pass
	5825	-5.335	1.655	30	Pass
802.11ac40	5755	-9.363	-2.373	30	Pass
	5795	-8.369	-1.379	30	Pass
802.11ac80	5775	-12.031	-5.041	30	Pass

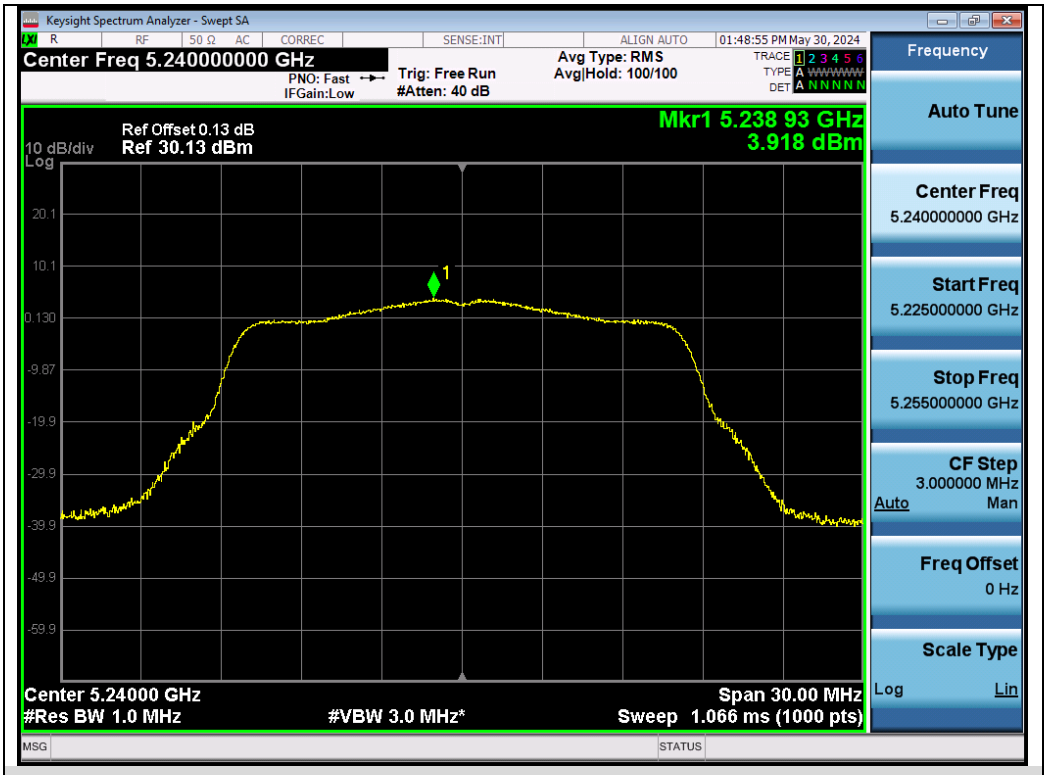
Note:1.Power density(dBm/500kHz) = Power density(dBm/100kHz)+10*log(500/100).

Test Graphs of Conducted Output Power Spectral Density for band 5.15-5.25 GHz

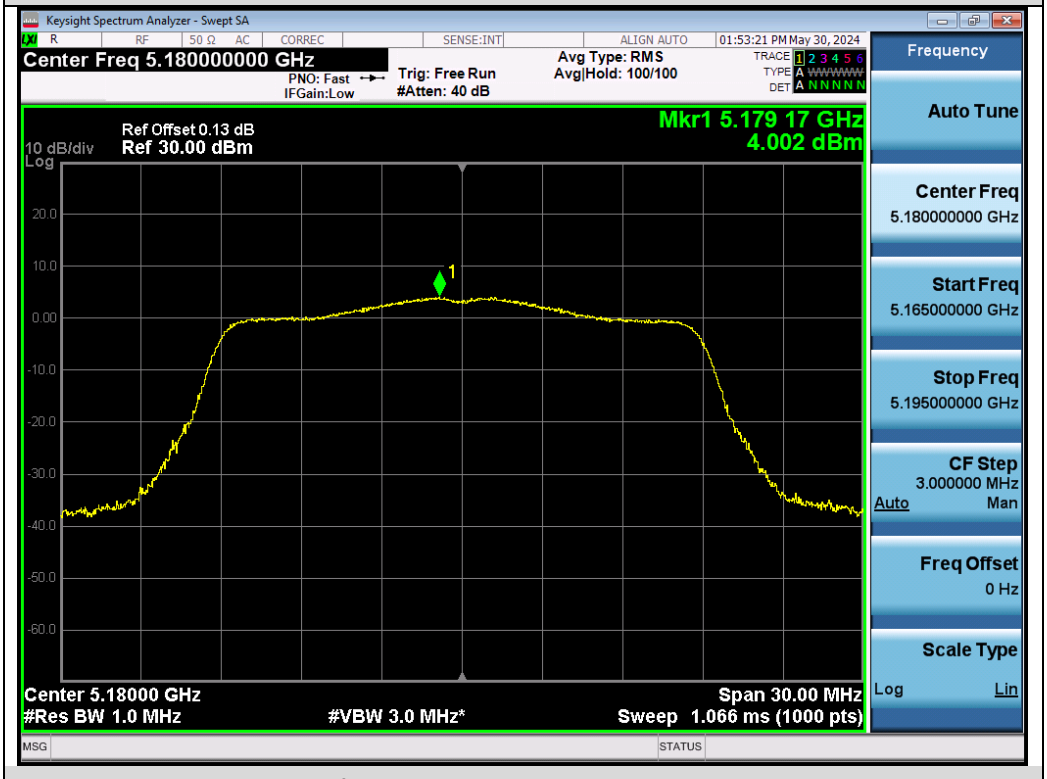
Test_Graph_802.11a_ANT1_5180_6Mbps_PSD



Test_Graph_802.11a_ANT1_5200_6Mbps_PSD

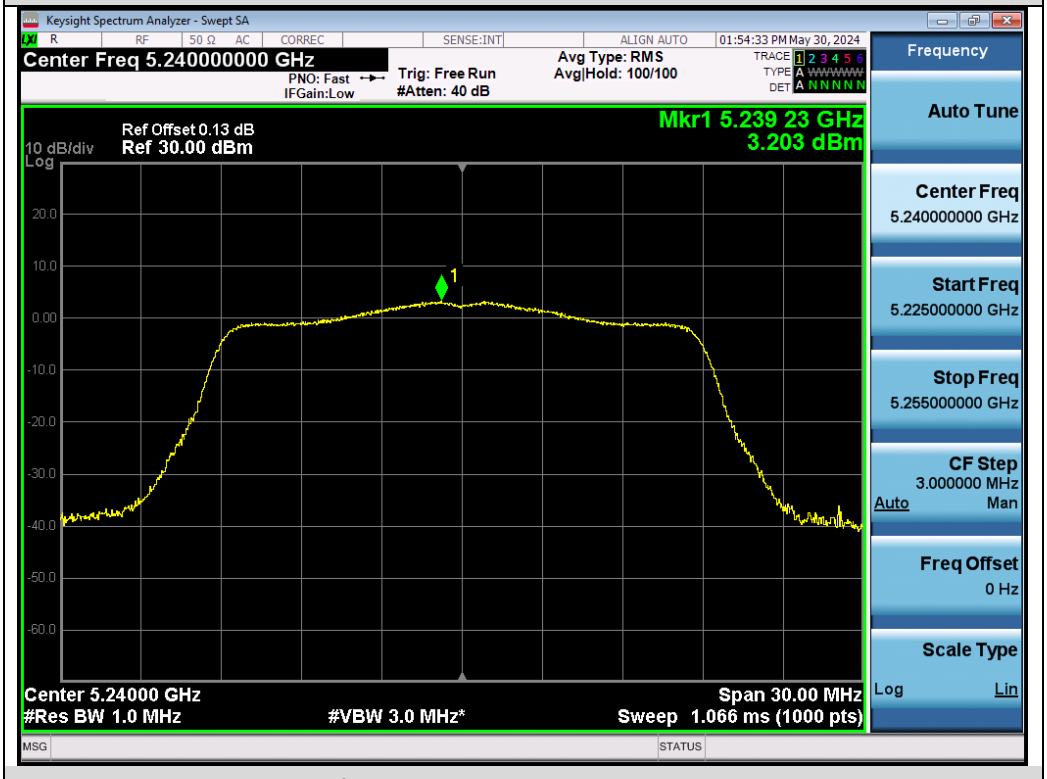


Test_Graph_802.11a_ANT1_5240_6Mbps_PSD



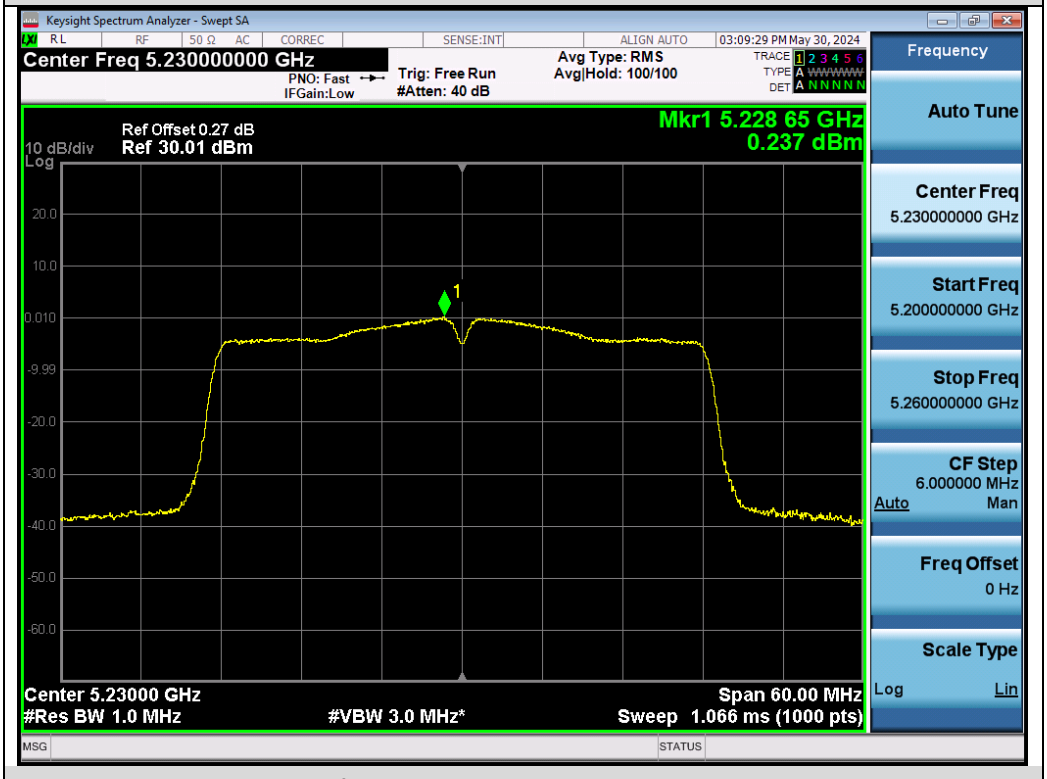
Test_Graph_802.11n20_ANT1_5180_MCS0_PSD

Test_Graph_802.11n20_ANT1_5200_MCS0_PSD



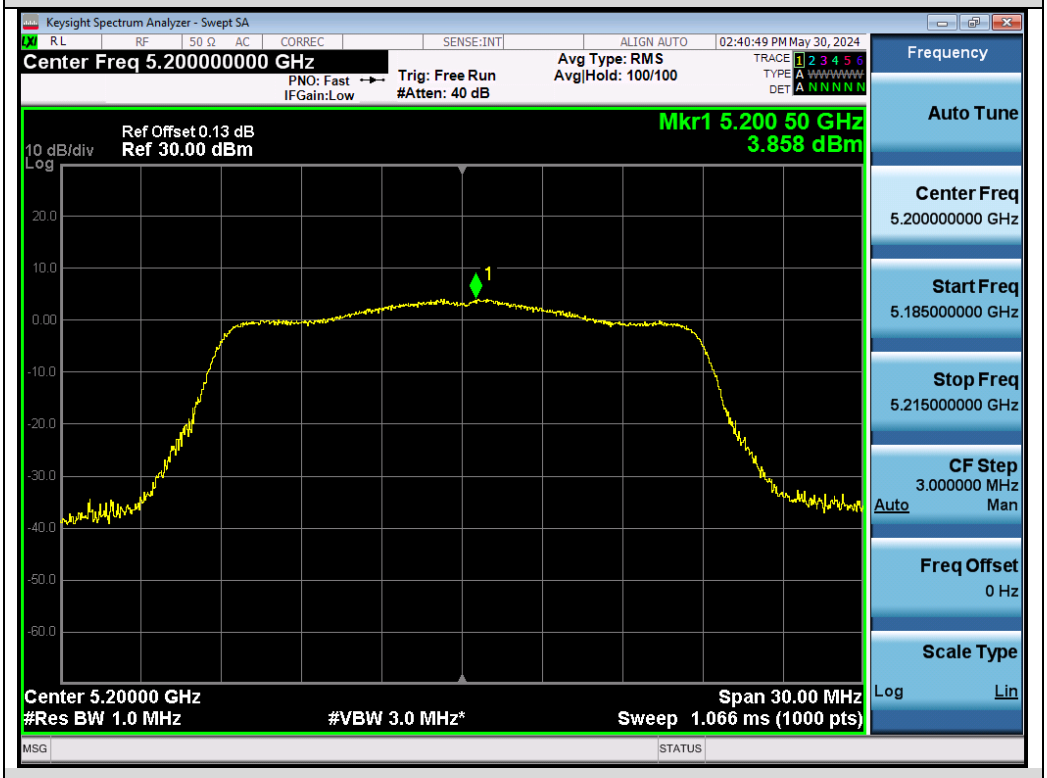
Test_Graph_802.11n20_ANT1_5240_MCS0_PSD

Test_Graph_802.11n40_ANT1_5190_MCS0_PSD



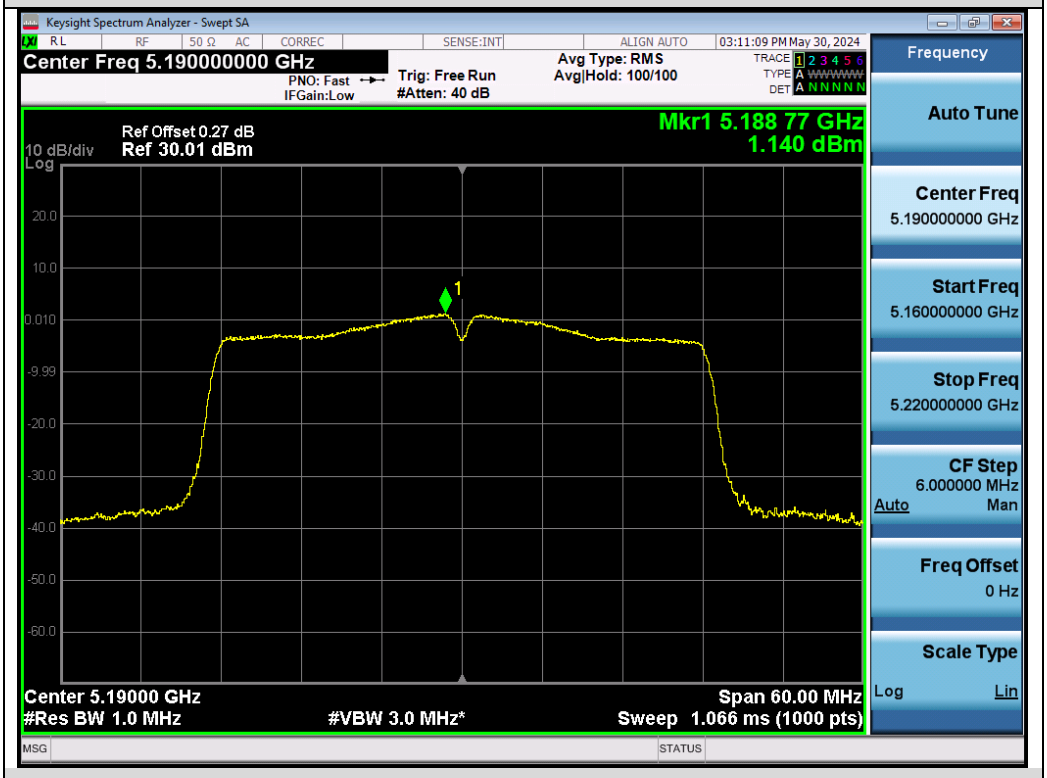
Test_Graph_802.11n40_ANT1_5230_MCS0_PSD

Test_Graph_802.11ac20_ANT1_5180_MCS0_PSD



Test_Graph_802.11ac20_ANT1_5200_MCS0_PSD

Test_Graph_802.11ac20_ANT1_5240_MCS0_PSD

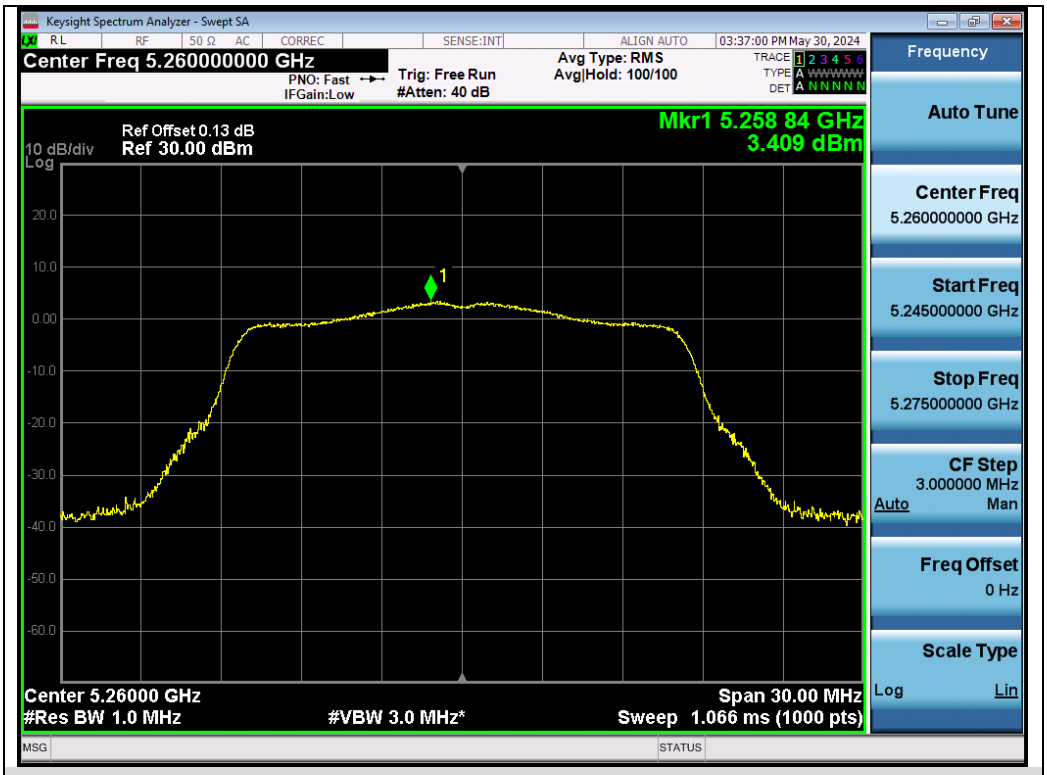


Test_Graph_802.11ac40_ANT1_5190_MCS0_PSD

Test_Graph_802.11ac40_ANT1_5230_MCS0_PSD

Test_Graph_802.11ac80_ANT1_5210_MCS0_PSD

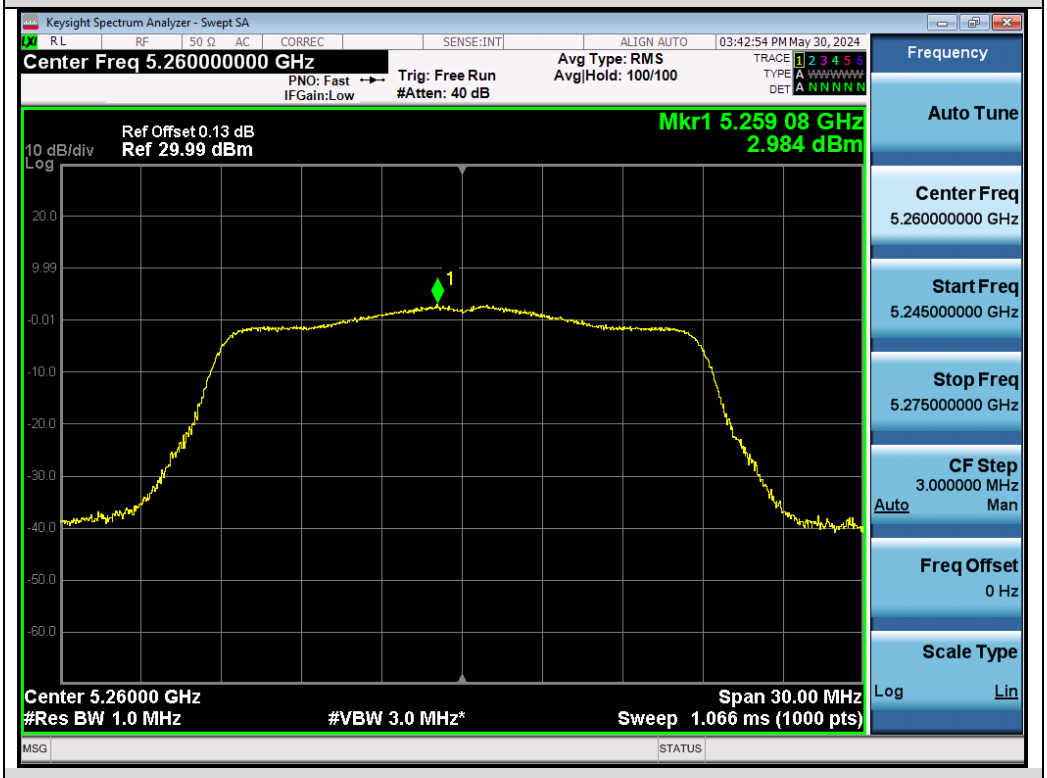
Test Graphs of Conducted Output Power Spectral Density for band 5.25-5.35 GHz



Test_Graph_802.11a_ANT1_5260_6Mbps_PSD

Test_Graph_802.11a_ANT1_5300_6Mbps_PSD

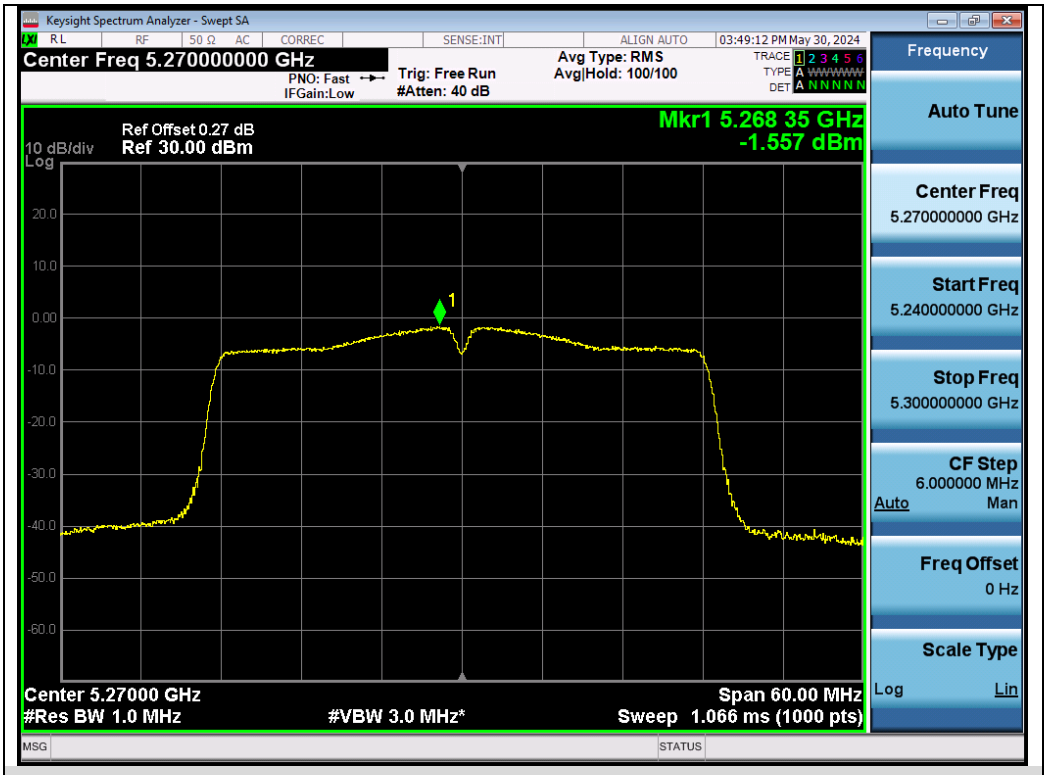
Test_Graph_802.11a_ANT1_5320_6Mbps_PSD



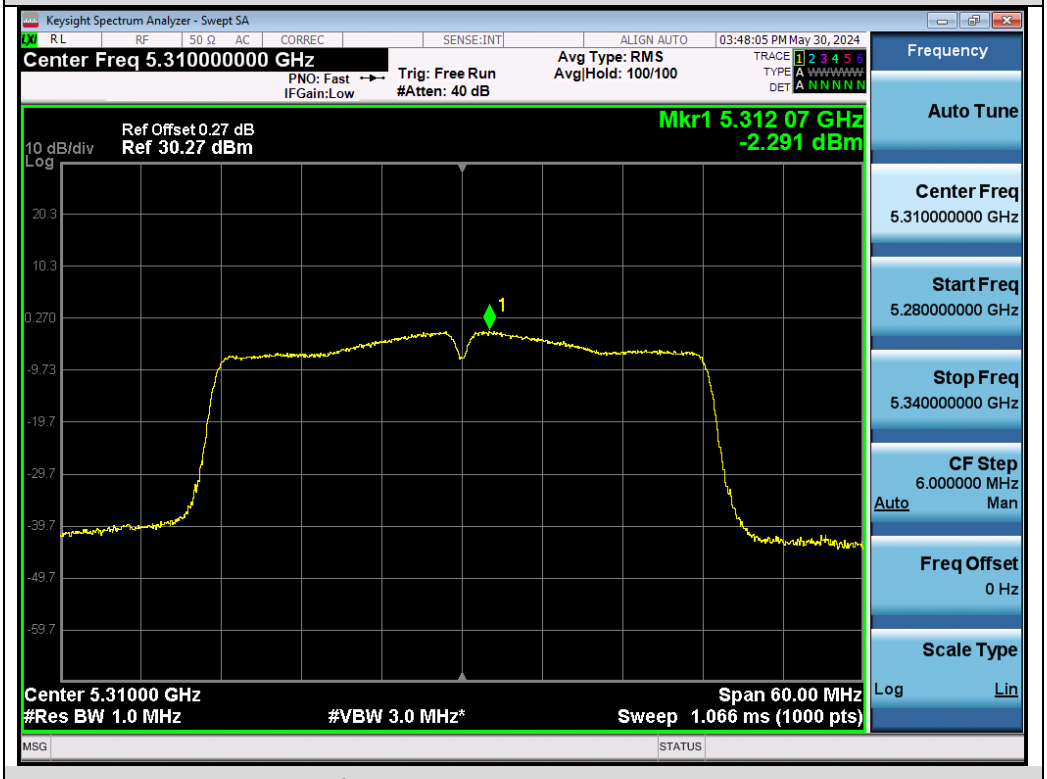
Test_Graph_802.11n20_ANT1_5260_MCS0_PSD

Test_Graph_802.11n20_ANT1_5300_MCS0_PSD

Test_Graph_802.11n20_ANT1_5320_MCS0_PSD



Test_Graph_802.11n40_ANT1_5270_MCS0_PSD

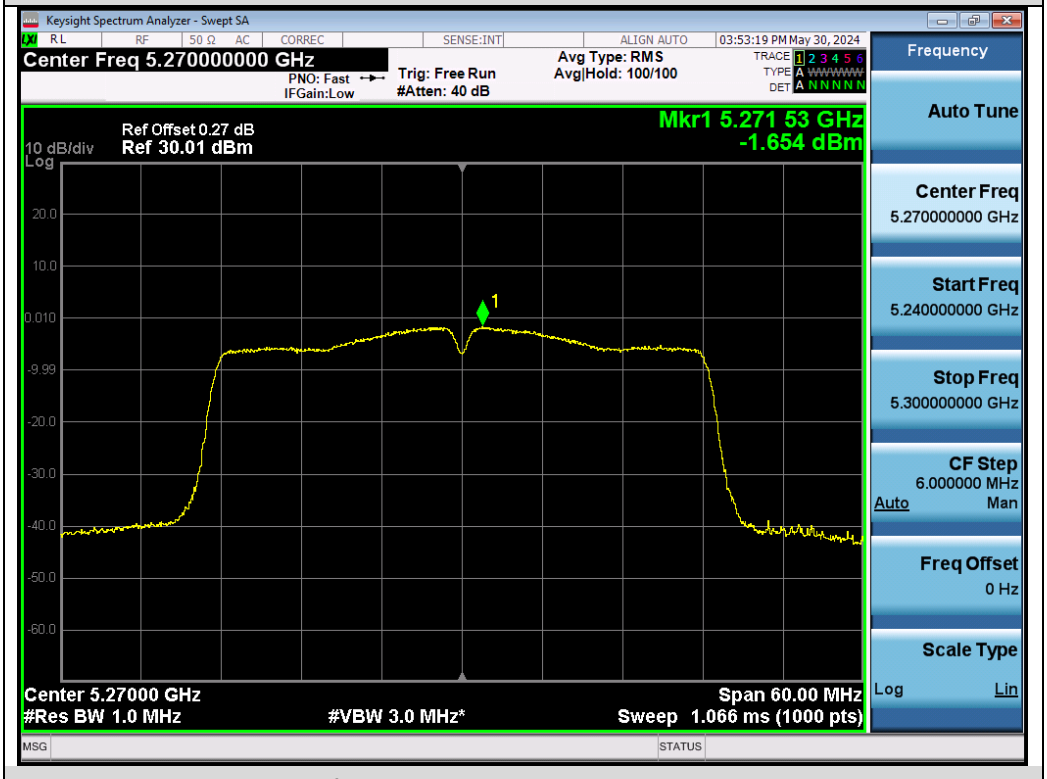


Test_Graph_802.11n40_ANT1_5310_MCS0_PSD

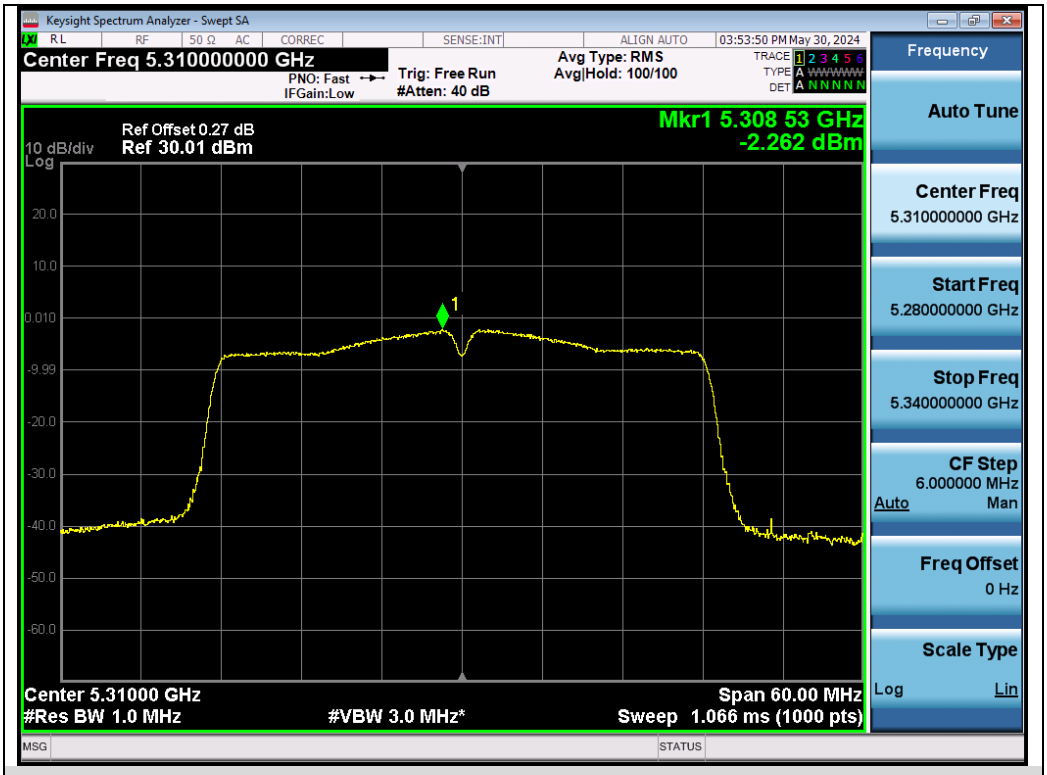
Test_Graph_802.11ac20_ANT1_5260_MCS0_PSD

Test_Graph_802.11ac20_ANT1_5300_MCS0_PSD

Test_Graph_802.11ac20_ANT1_5320_MCS0_PSD



Test_Graph_802.11ac40_ANT1_5270_MCS0_PSD

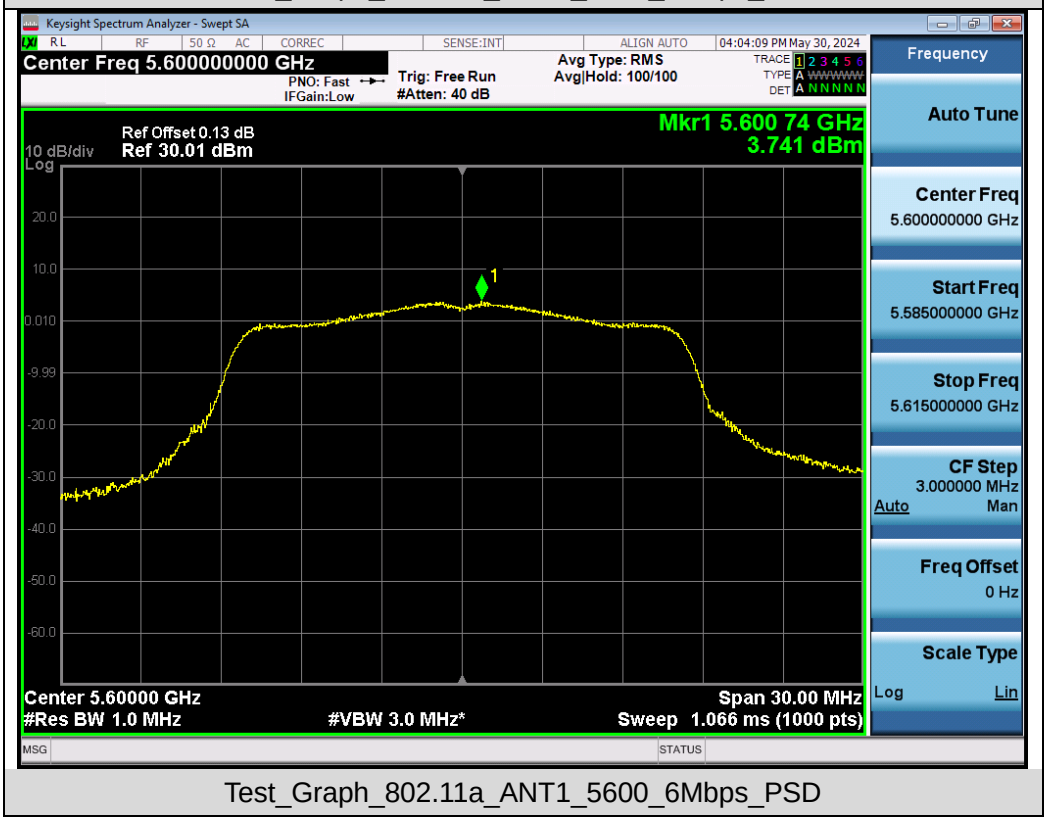


Test_Graph_802.11ac40_ANT1_5310_MCS0_PSD

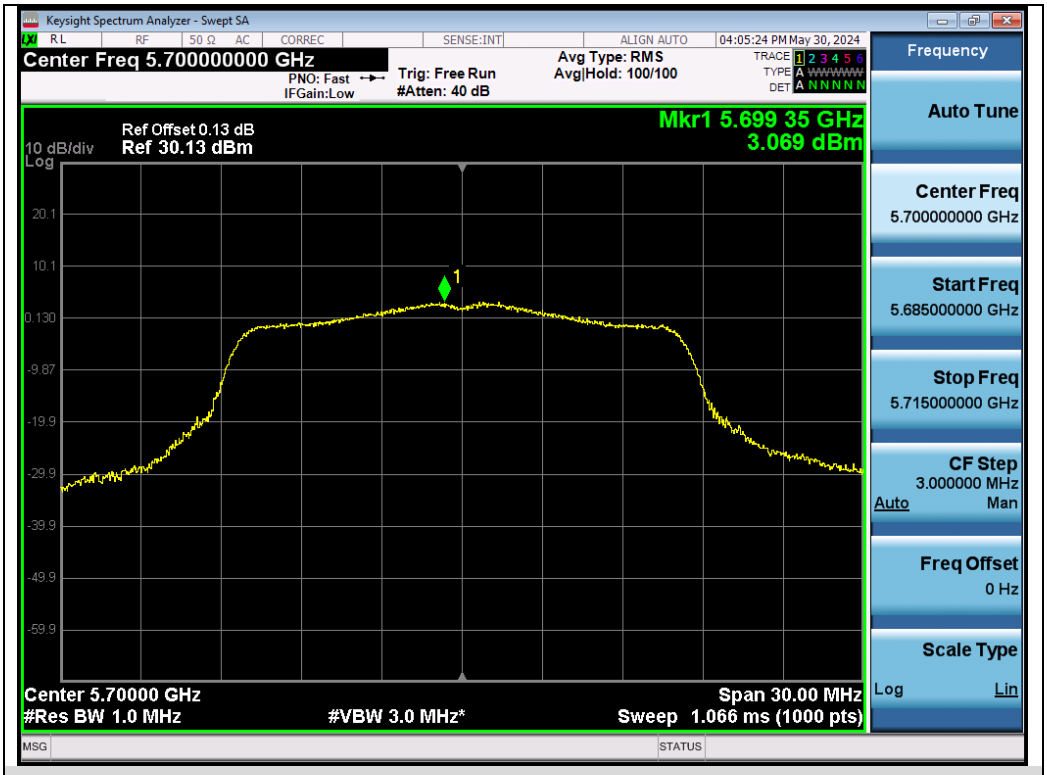
Test_Graph_802.11ac80_ANT1_5290_MCS0_PSD

Test Graphs of Conducted Output Power Spectral Density for band 5.470-5.725 GHz

Test_Graph_802.11a_ANT1_5500_6Mbps_PSD

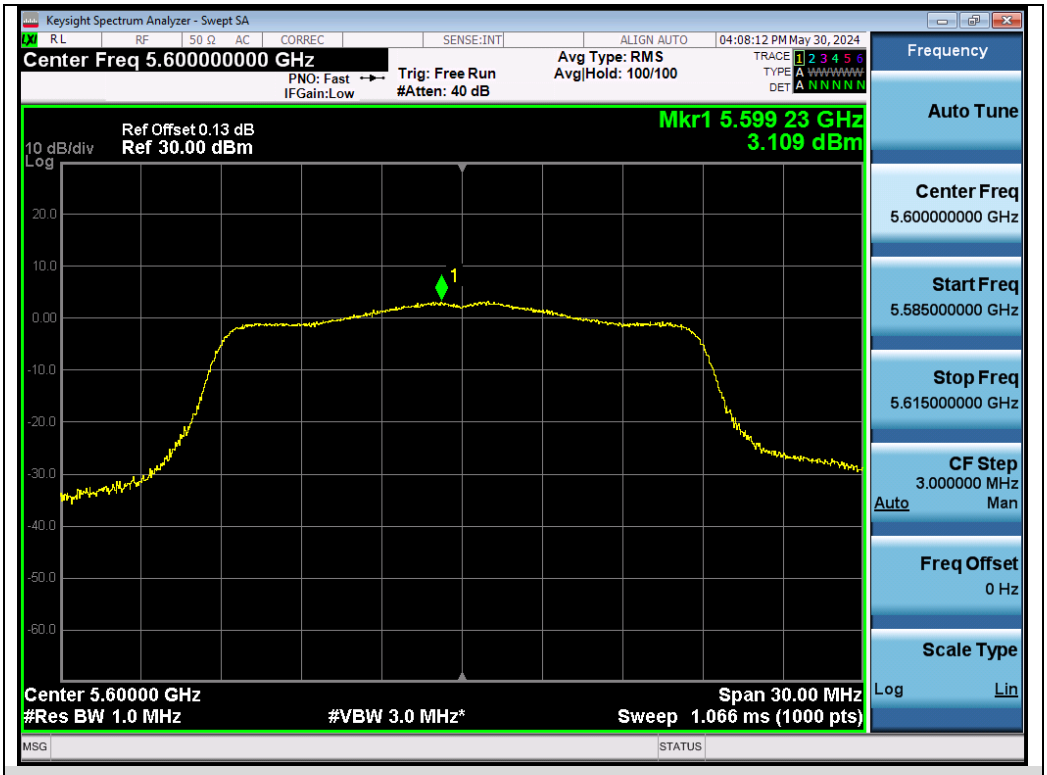


Test_Graph_802.11a_ANT1_5600_6Mbps_PSD

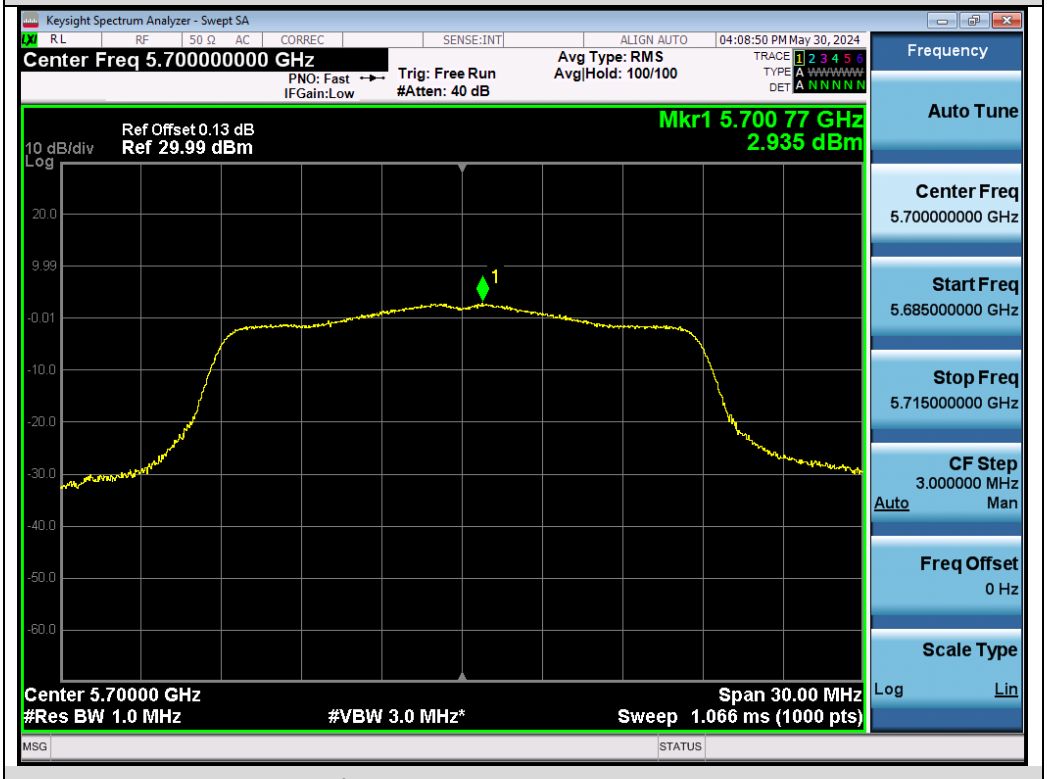


Test_Graph_802.11a_ANT1_5700_6Mbps_PSD

Test_Graph_802.11n20_ANT1_5500_MCS0_PSD



Test_Graph_802.11n20_ANT1_5600_MCS0_PSD



Test_Graph_802.11n20_ANT1_5700_MCS0_PSD

Test_Graph_802.11n40_ANT1_5510_MCS0_PSD

Test_Graph_802.11n40_ANT1_5590_MCS0_PSD

Test_Graph_802.11n40_ANT1_5670_MCS0_PSD

Test_Graph_802.11ac20_ANT1_5500_MCS0_PSD

Test_Graph_802.11ac20_ANT1_5600_MCS0_PSD

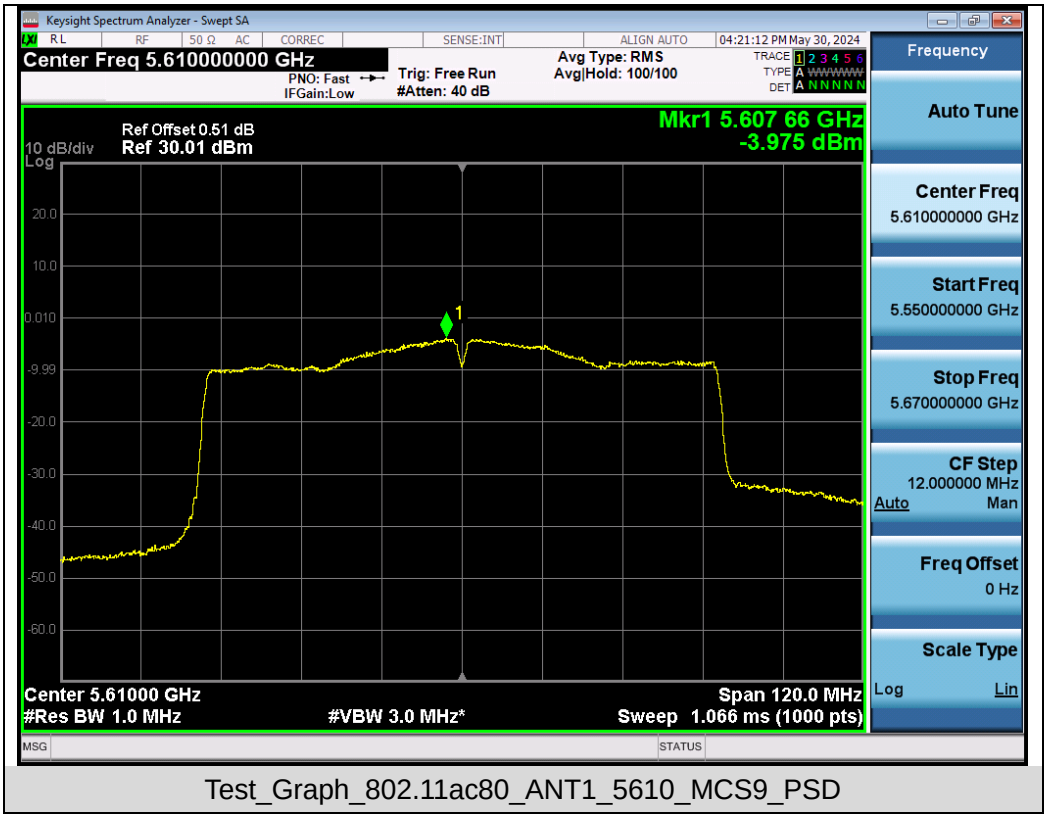
Test_Graph_802.11ac20_ANT1_5700_MCS9_PSD

Test_Graph_802.11ac40_ANT1_5510_MCS9_PSD

Test_Graph_802.11ac40_ANT1_5590_MCS9_PSD

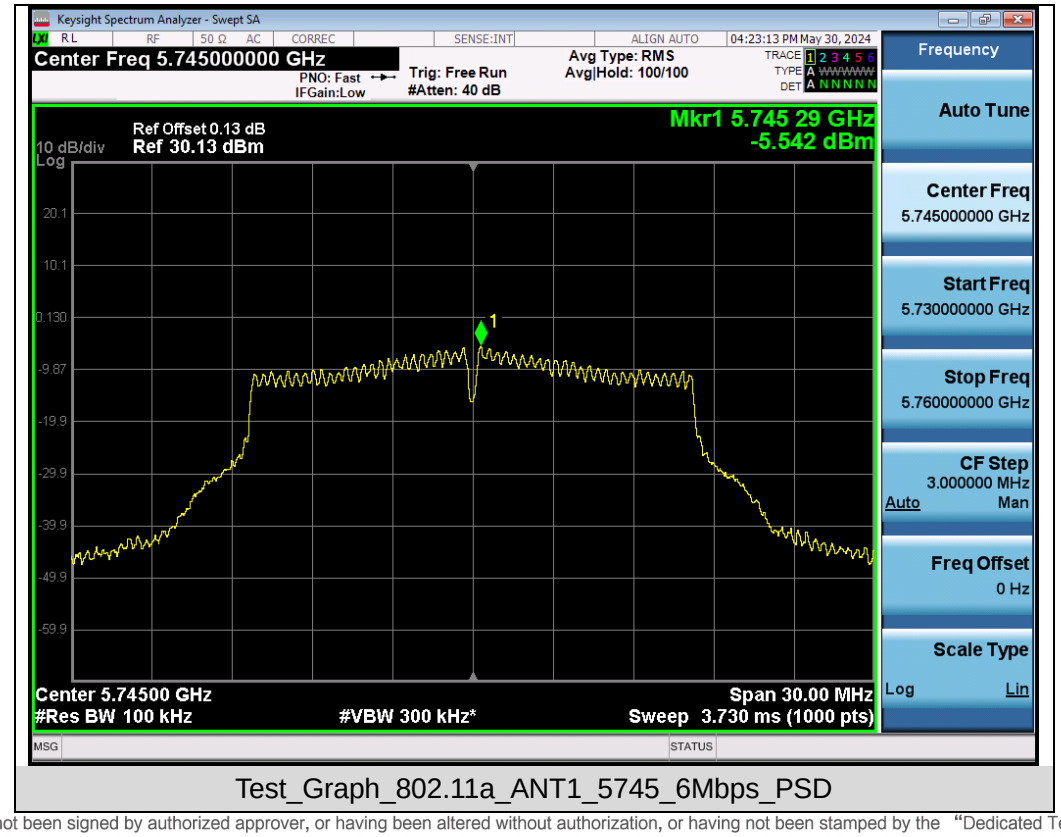
Test_Graph_802.11ac40_ANT1_5670_MCS9_PSD

Test_Graph_802.11ac80_ANT1_5530_MCS9_PSD

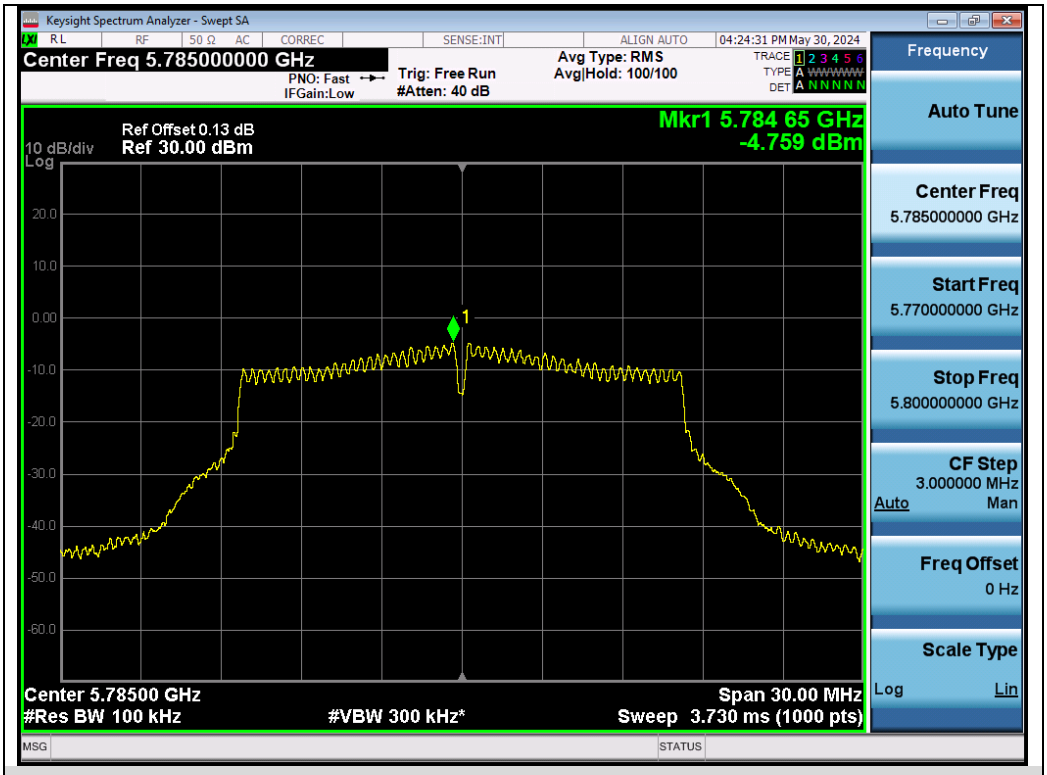


Test_Graph_802.11ac80_ANT1_5610_MCS9_PSD

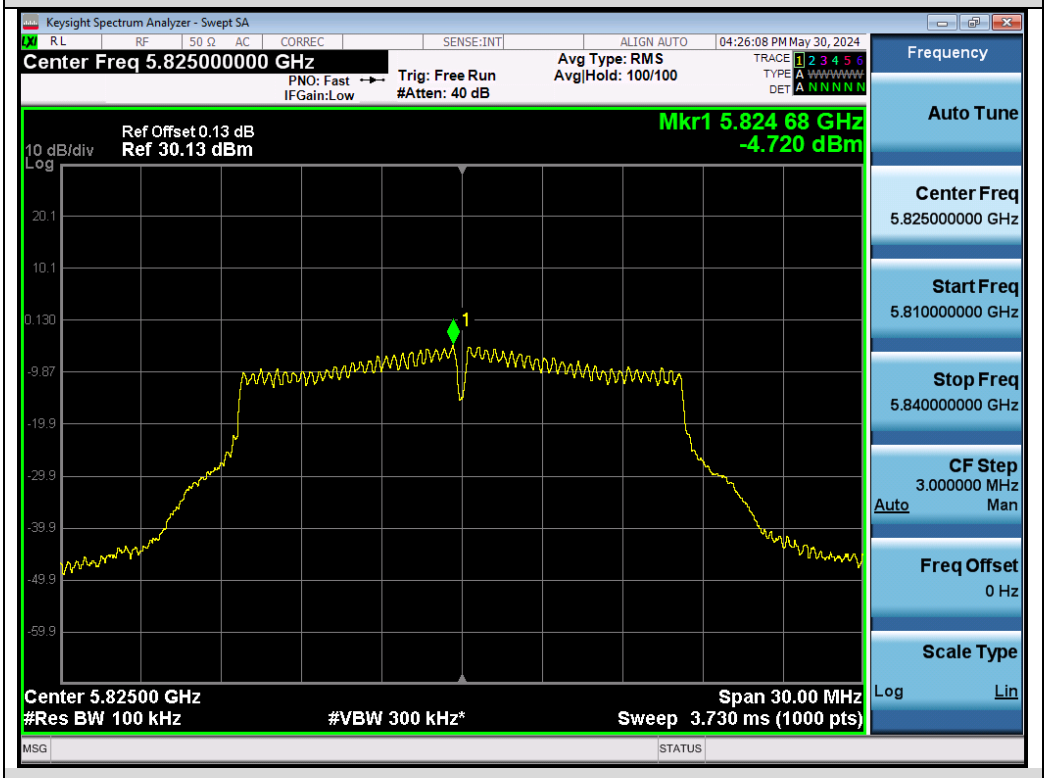
Test Graphs of Conducted Output Power Spectral Density for band 5.725-5.85 GHz



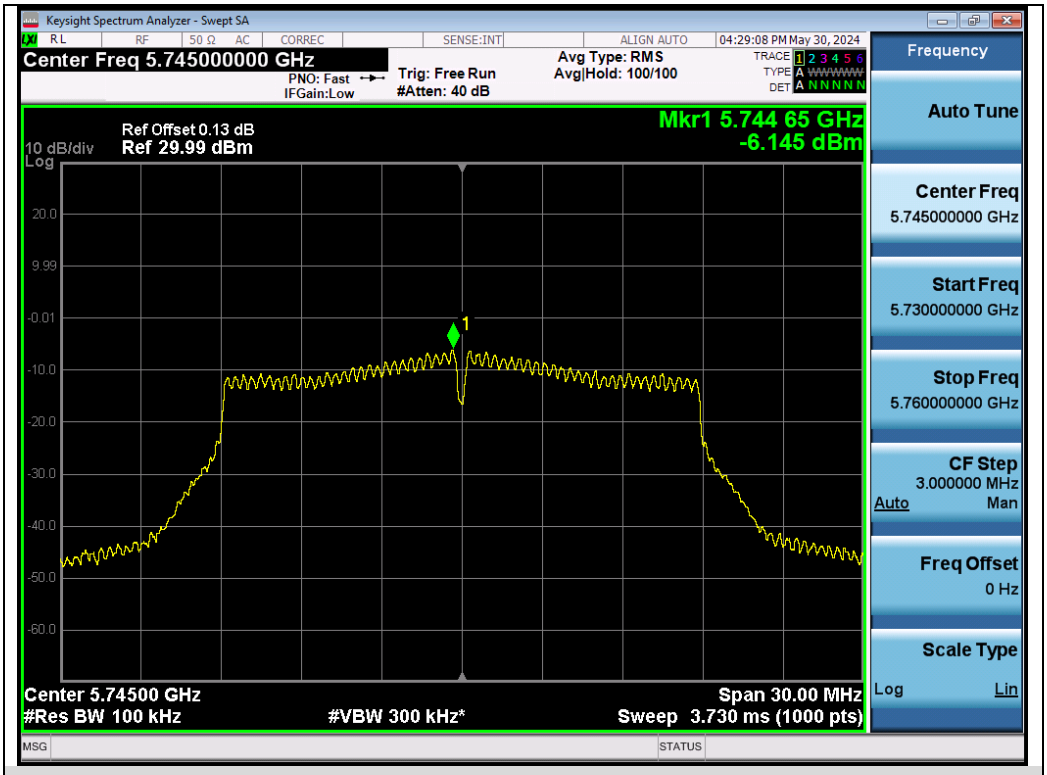
Test_Graph_802.11a_ANT1_5745_6Mbps_PSD



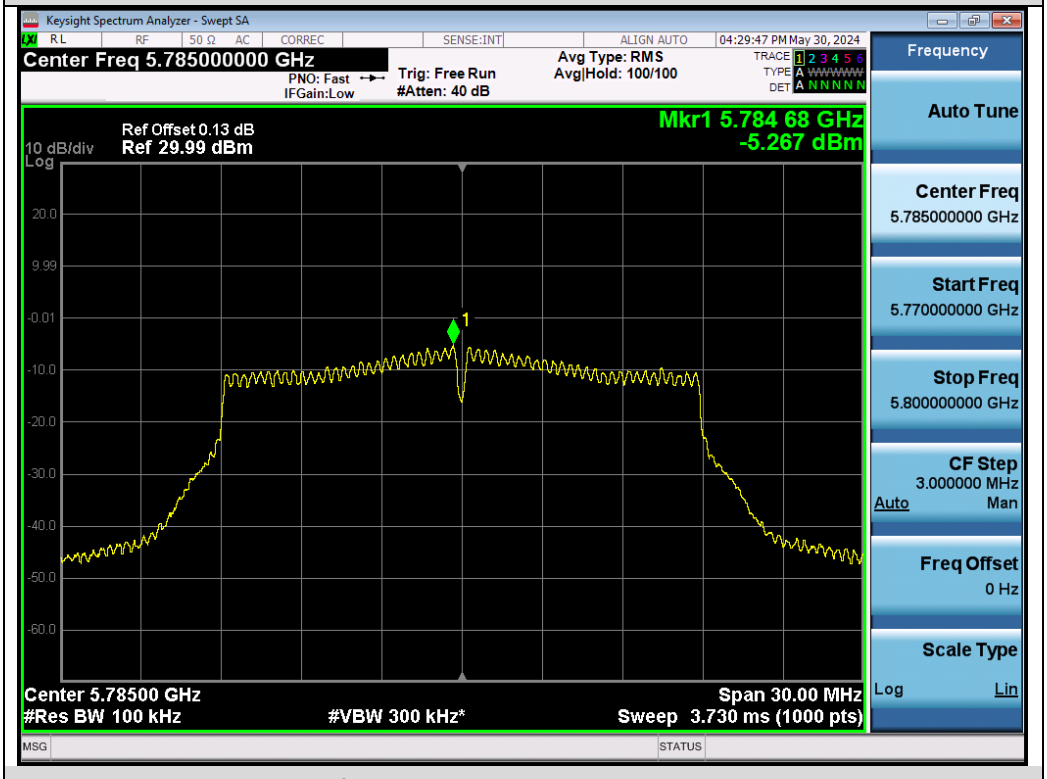
Test_Graph_802.11a_ANT1_5785_6Mbps_PSD



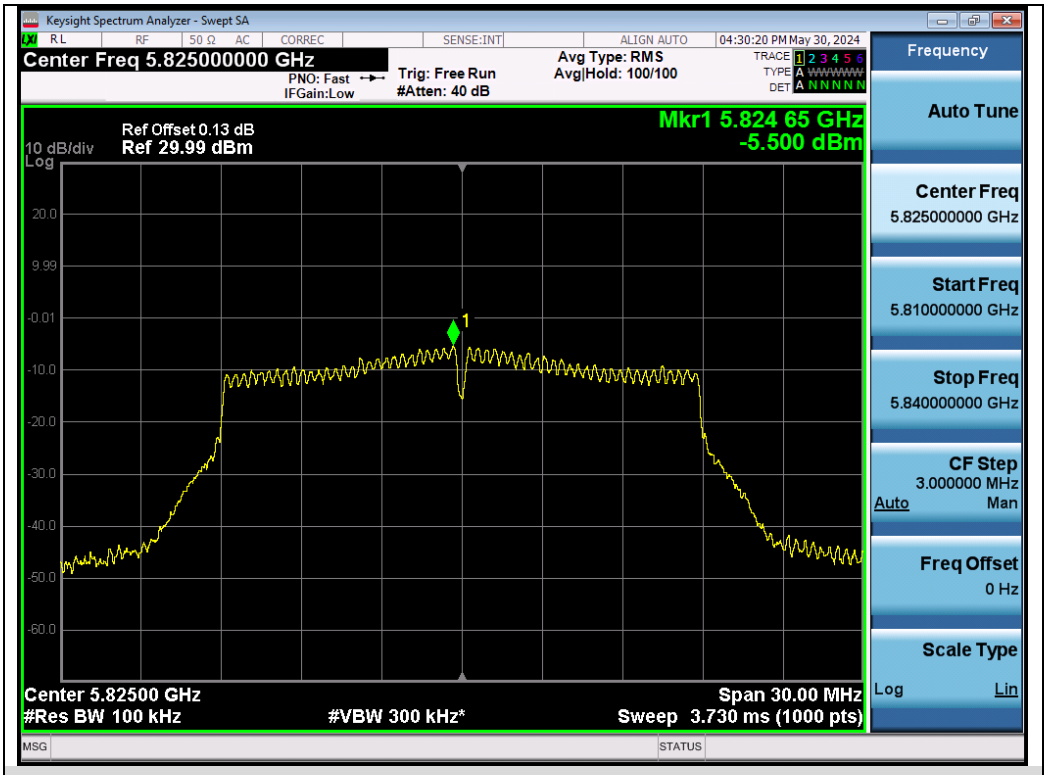
Test_Graph_802.11a_ANT1_5825_6Mbps_PSD



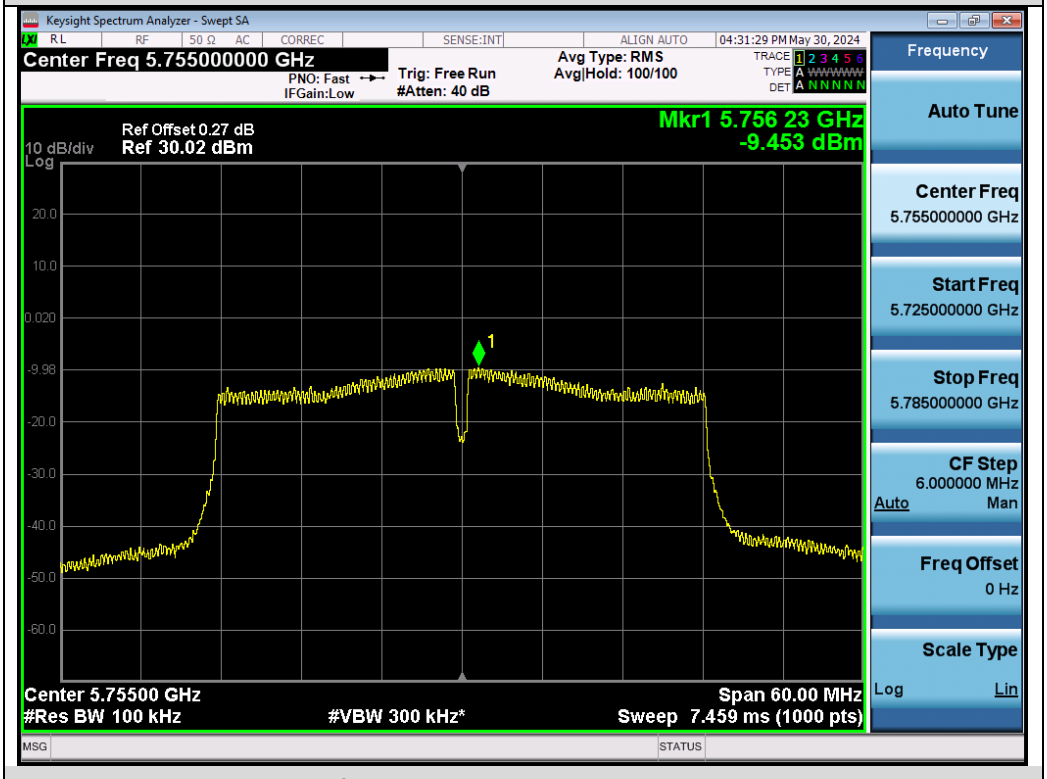
Test_Graph_802.11n20_ANT1_5745_MCS0_PSD



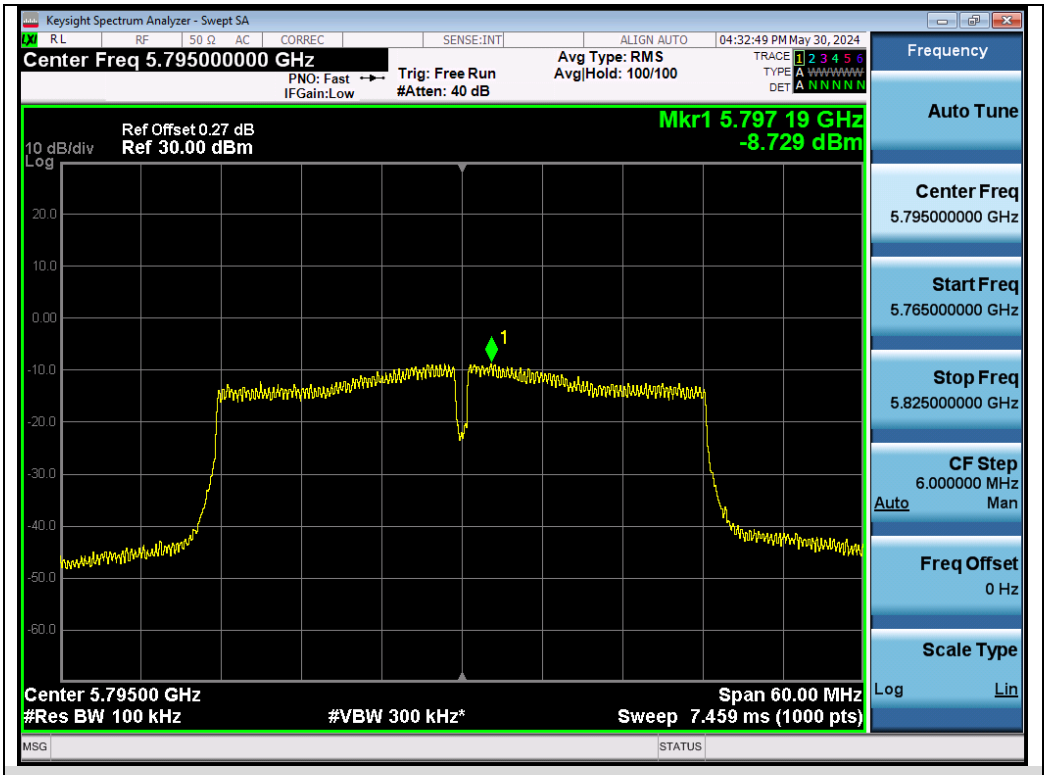
Test_Graph_802.11n20_ANT1_5785_MCS0_PSD



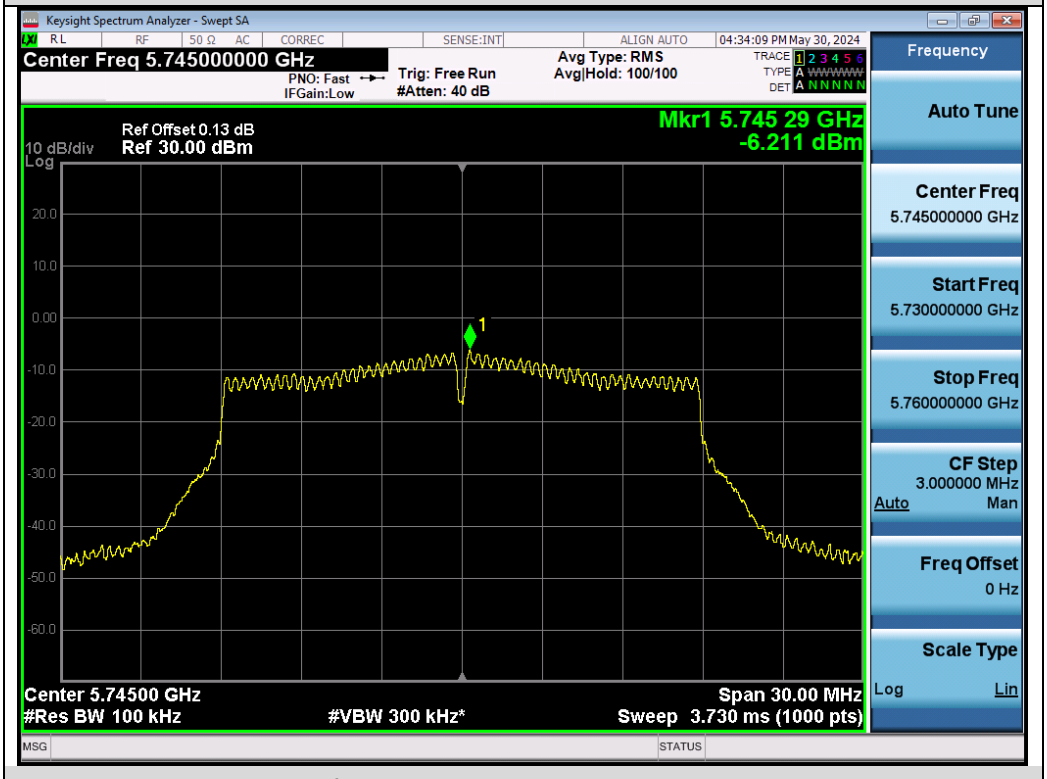
Test_Graph_802.11n20_ANT1_5825_MCS0_PSD



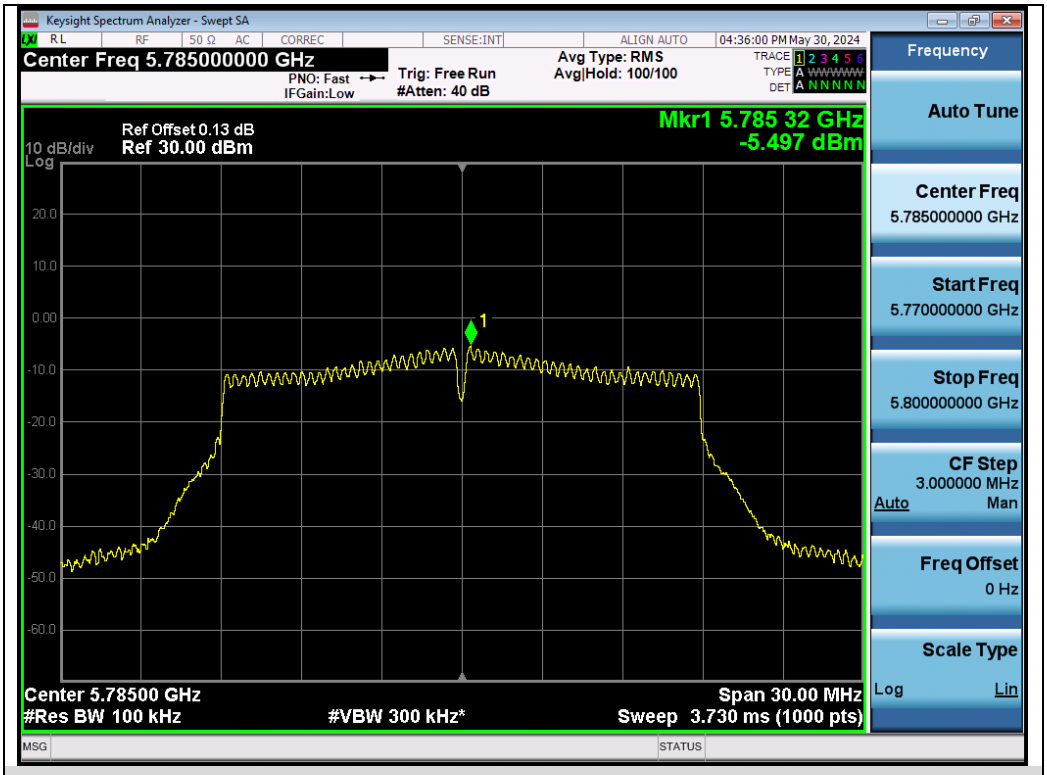
Test_Graph_802.11n40_ANT1_5755_MCS0_PSD



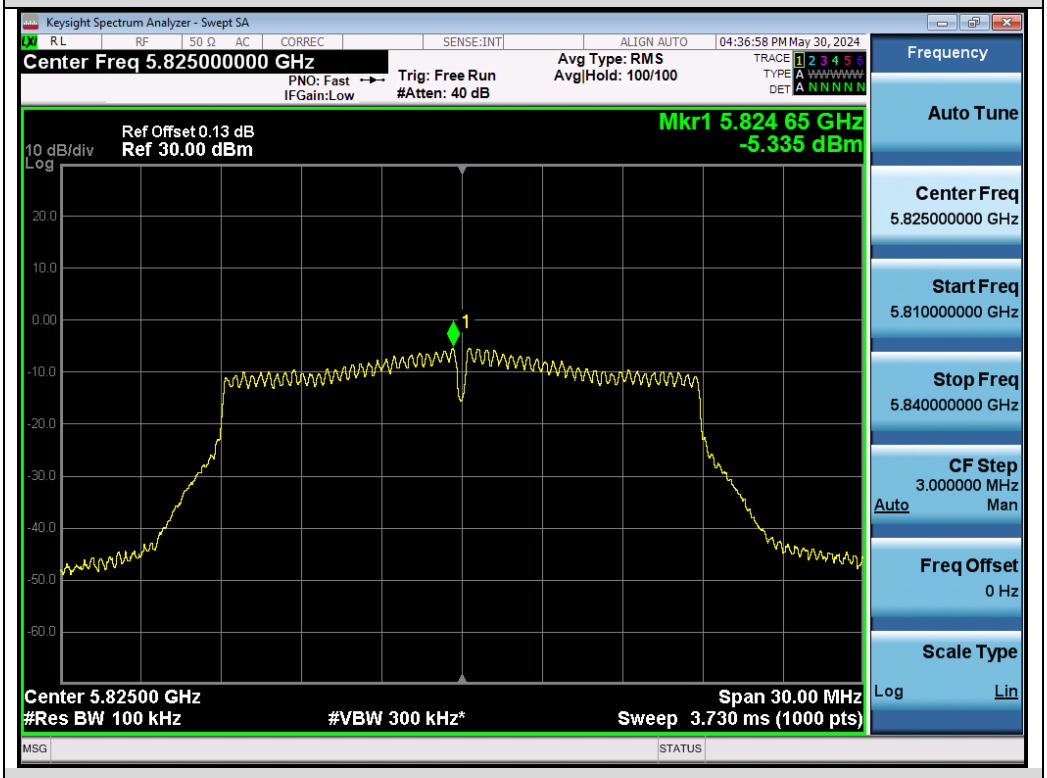
Test_Graph_802.11n40_ANT1_5795_MCS0_PSD



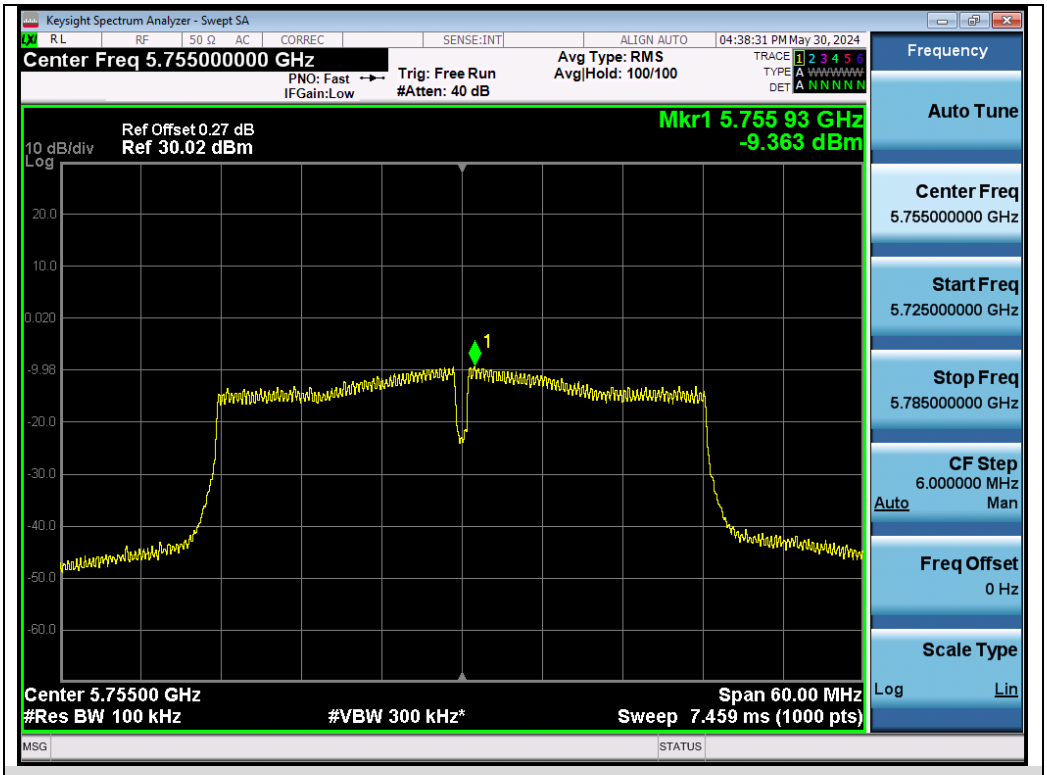
Test_Graph_802.11ac20_ANT1_5745_MCS0_PSD



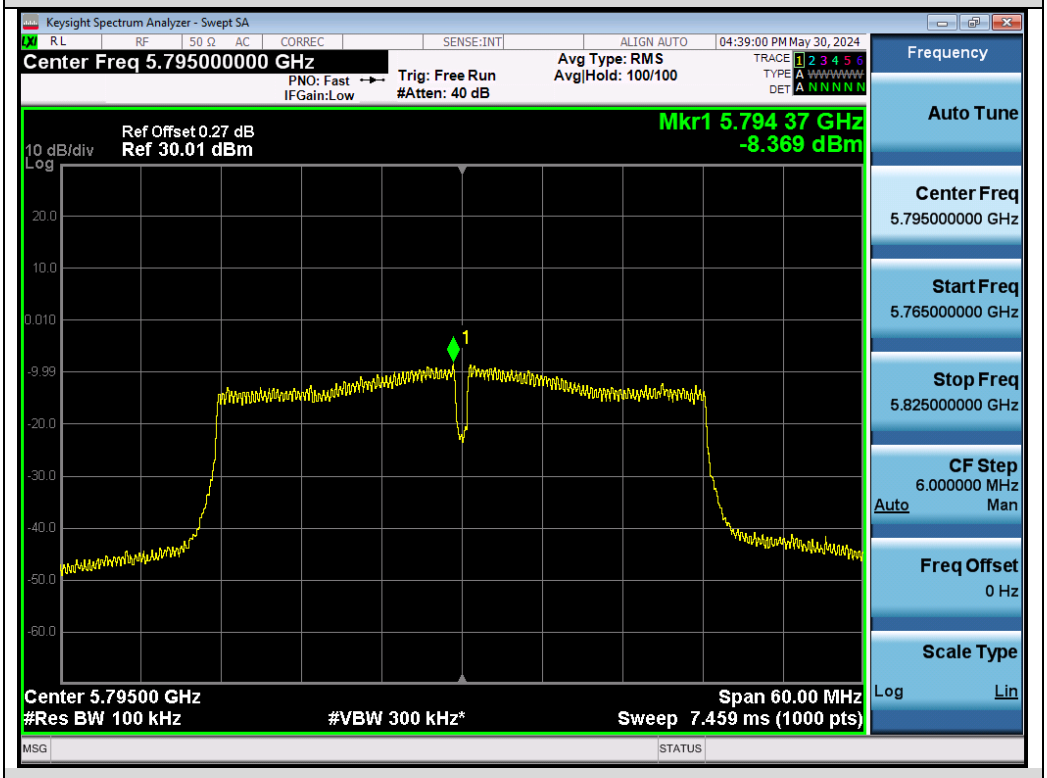
Test_Graph_802.11ac20_ANT1_5785_MCS0_PSD



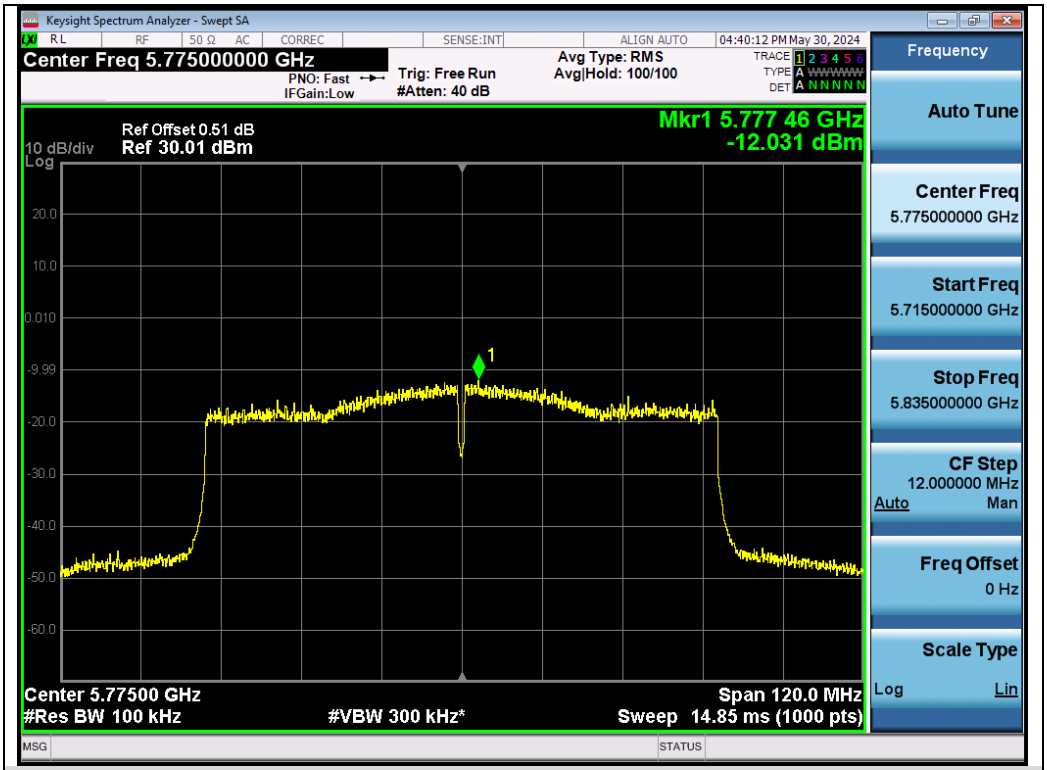
Test_Graph_802.11ac20_ANT1_5825_MCS9_PSD



Test_Graph_802.11ac40_ANT1_5755_MCS9_PSD



Test_Graph_802.11ac40_ANT1_5795_MCS9_PSD



Test_Graph_802.11ac80_ANT1_5775_MCS9_PSD

10. Conducted Band Edge and Out-of-Band Emissions

10.1 Provisions Applicable

Restricted bands	Applicable to	Limit	
	789033 D02 General UNII Test Procedures New Rules v02r01	Field strength at 3m (dBuV/m)	
		PK: 74	AV: 54
Out of the restricted bands	Applicable to	EIRP Limit (dBm/MHz)	Equivalent field Strength at 3m (dBuV/m)
	FCC 15.407(b)(1)	PK: -27	PK: 68.2
	15.407(b)(2)		
	15.407(b)(3)		
	15.407(b)(4)	See Note 2	

Note 1: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

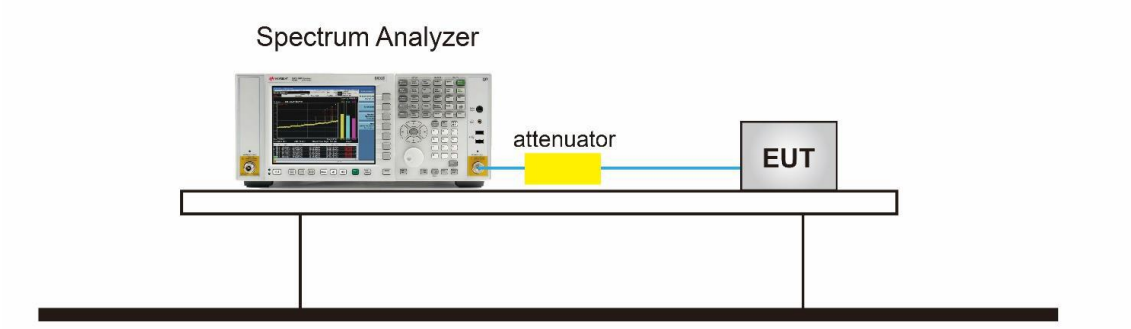
$$E = \frac{1000000 \quad \sqrt{30\ P}}{3}$$ μV/m, where P is the eirp (Watts).

Note 2: 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.

10.2 Measurement Procedure

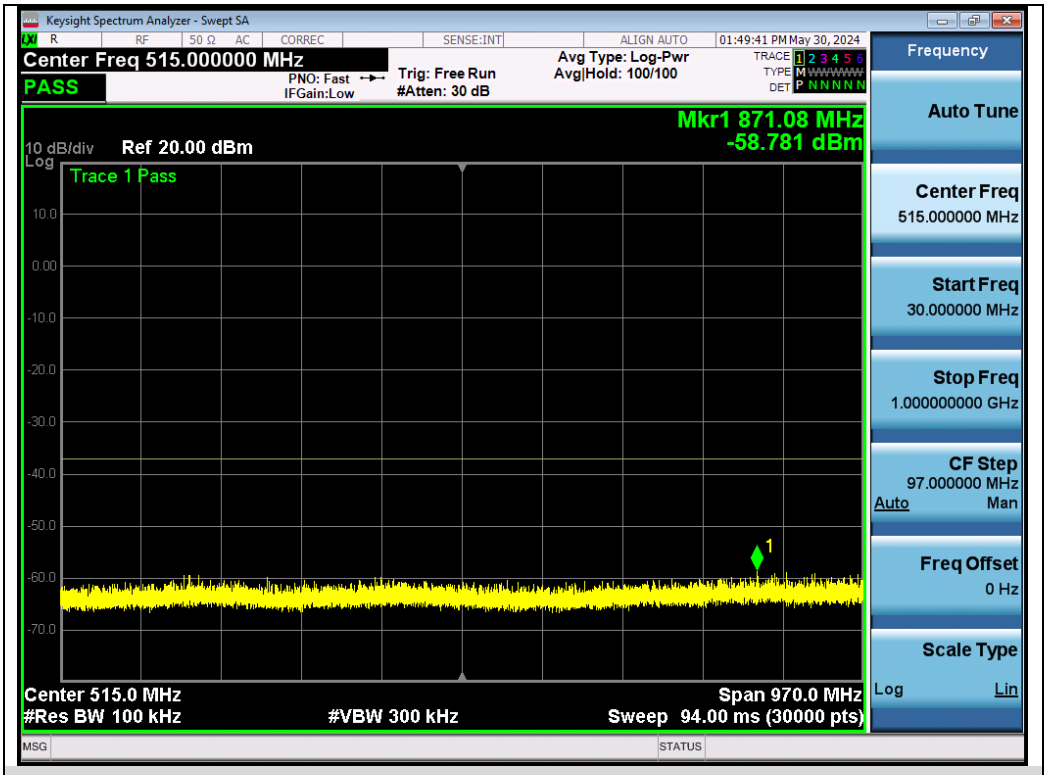
1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
3. RBW = 1MHz; VBW= 3MHz; Sweep = auto; Detector function = Peak. (Test frequency below 1GHz)
4. RBW = 1 MHz; VBW= 3 MHz; Sweep = auto; Detector function = Peak. (Test frequency Above 1GHz)
5. Set SPA Trace 1 Max hold, then View.
6. Antenna gain and path loss have been compensated to the Correction factor.
7. Mark the maximum useless stray point and compare it with the limit value to record the result.

10.3 Measurement Setup (Block Diagram of Configuration)

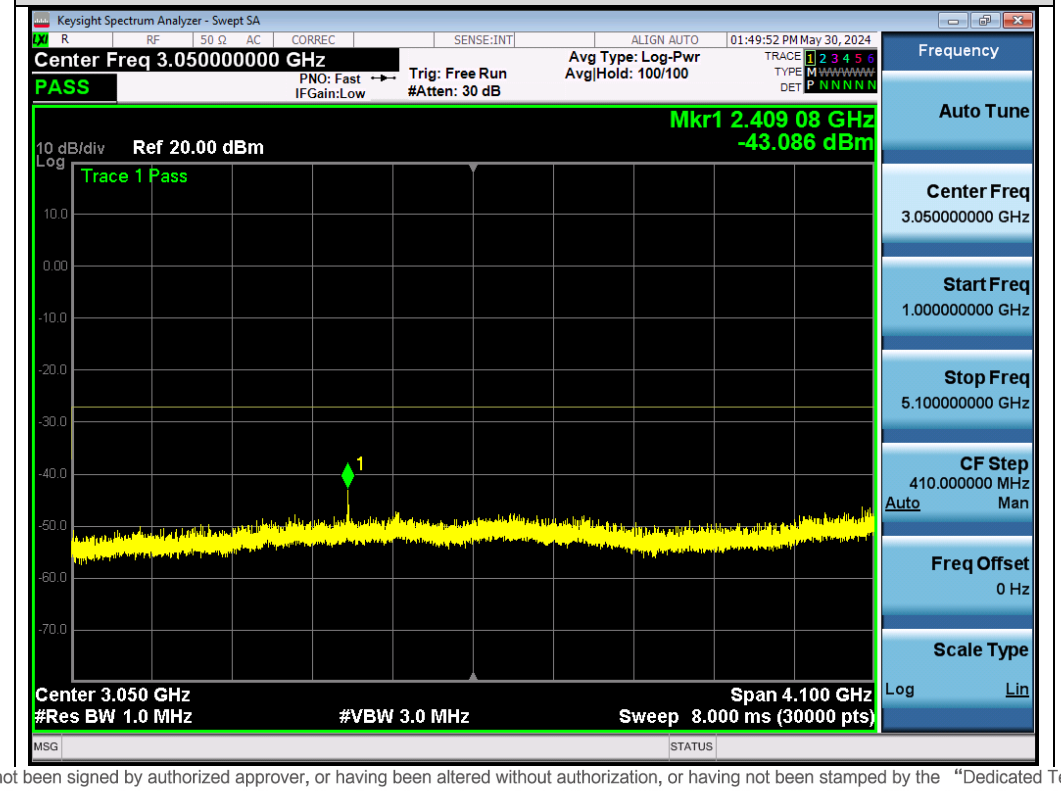


10.4 Measurement Results

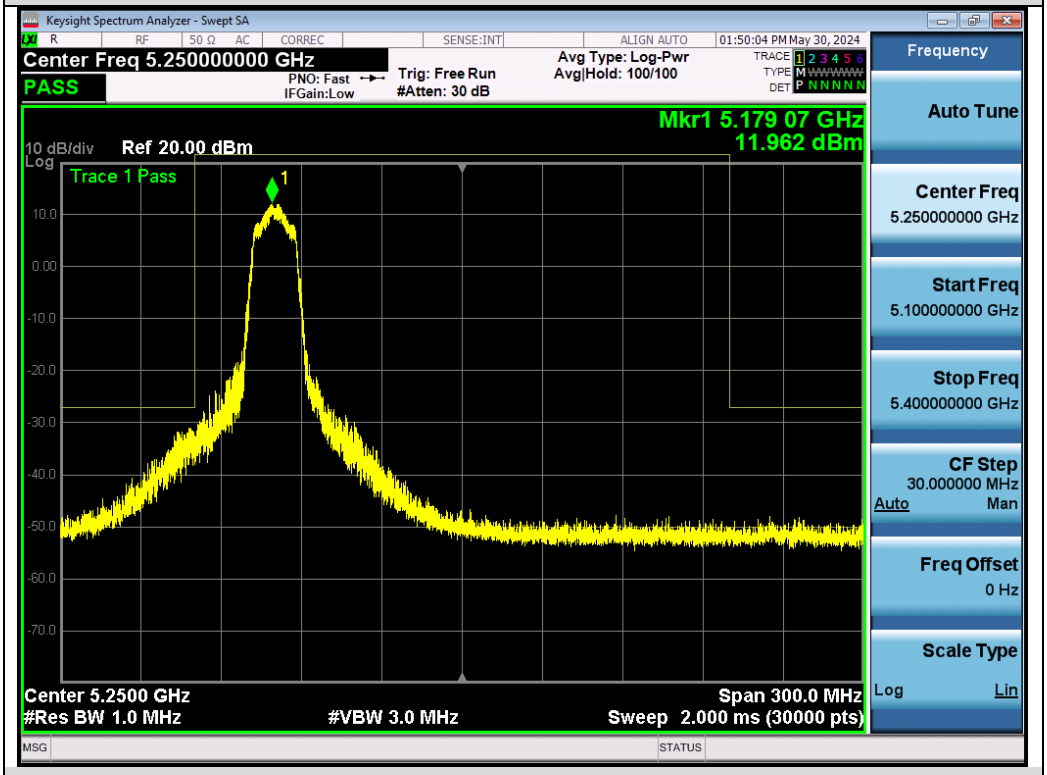
Test Graphs of Spurious Emissions outside of the 5.15-5.25 GHz band for transmitters operating in the 5.15-5.25 GHz band



Test_Graph_802.11a_ANT1_5180_6Mbps_Frequency Band 1

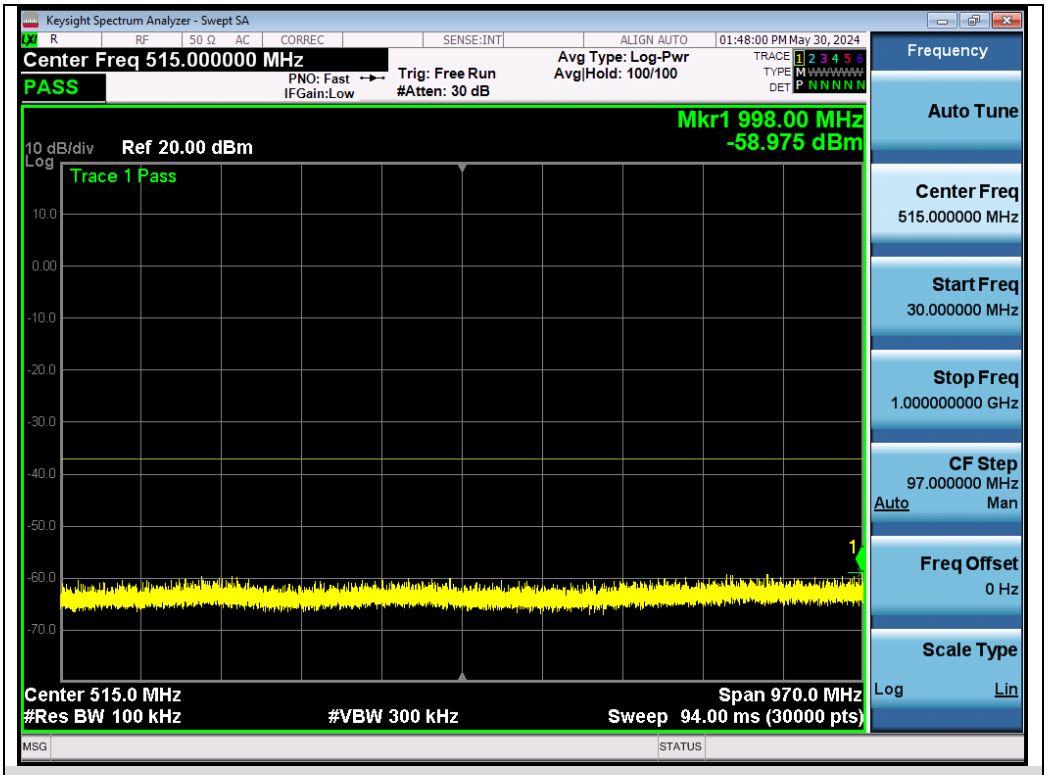


Test_Graph_802.11a_ANT1_5180_6Mbps_Frequency Band 2

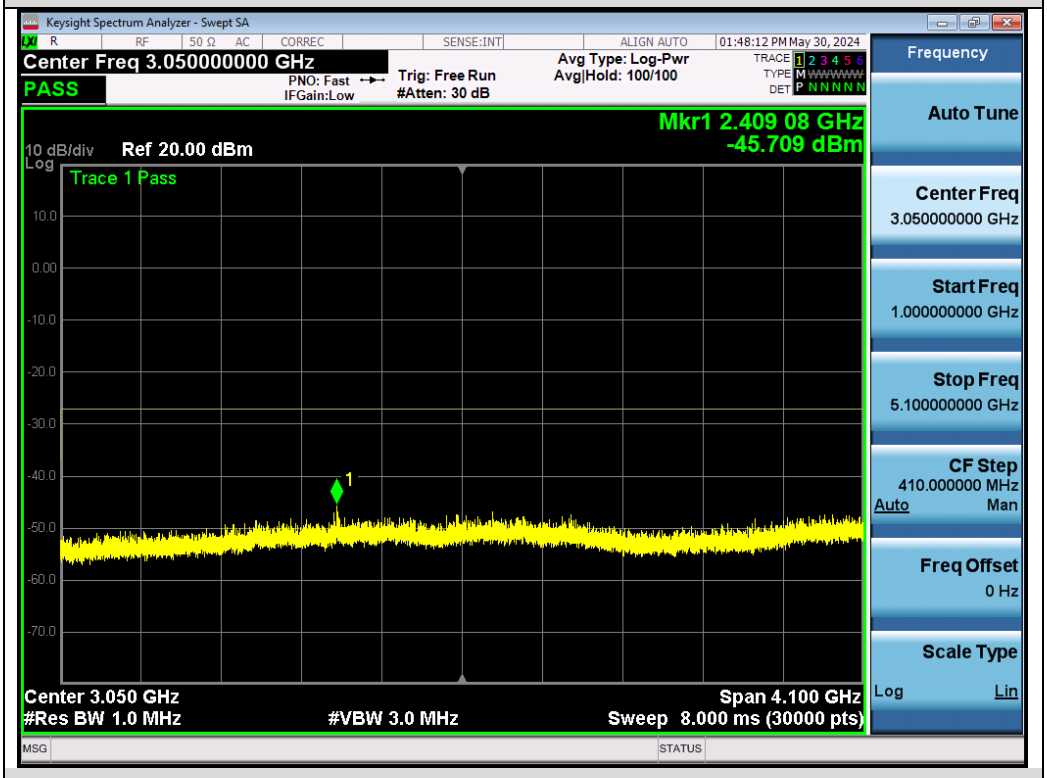


Test_Graph_802.11a_ANT1_5180_6Mbps_Frequency Band 3

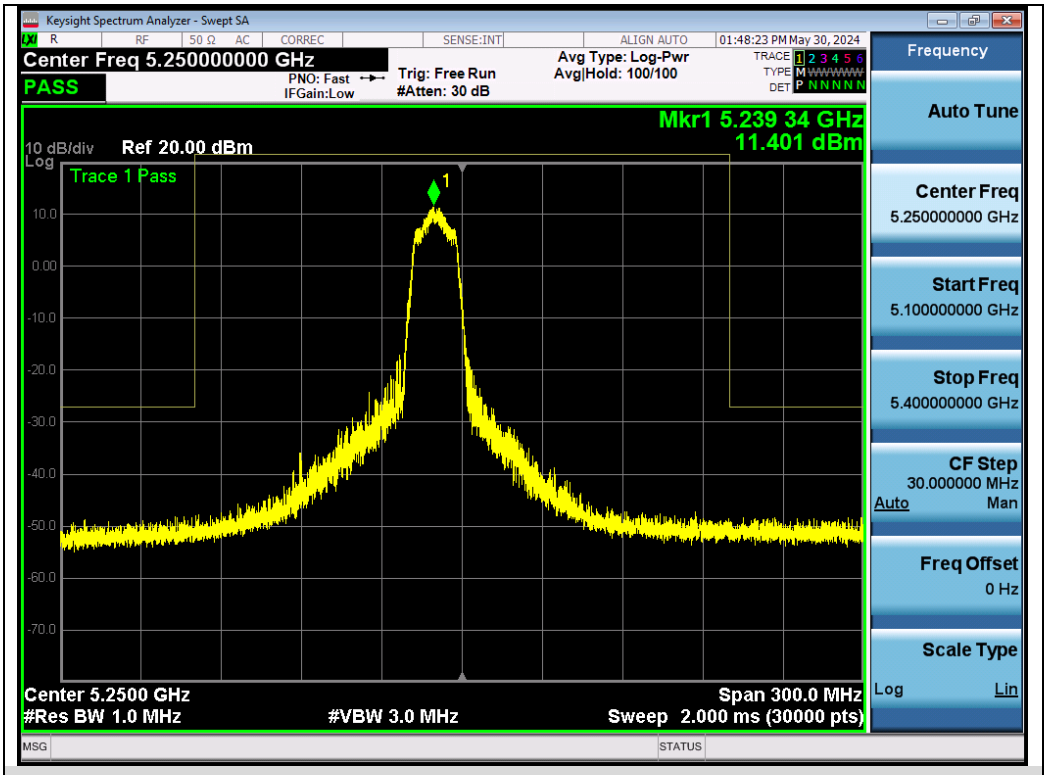
Test_Graph_802.11a_ANT1_5180_6Mbps_Frequency Band 4



Test_Graph_802.11a_ANT1_5240_6Mbps_Frequency Band 1

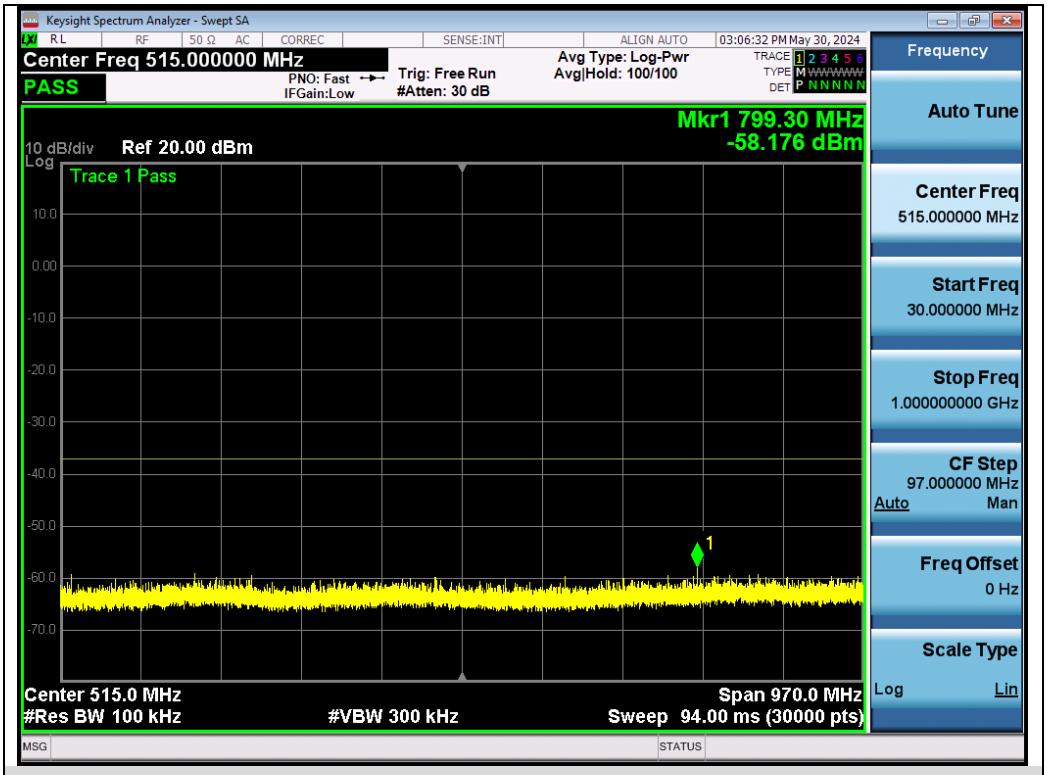


Test_Graph_802.11a_ANT1_5240_6Mbps_Frequency Band 2

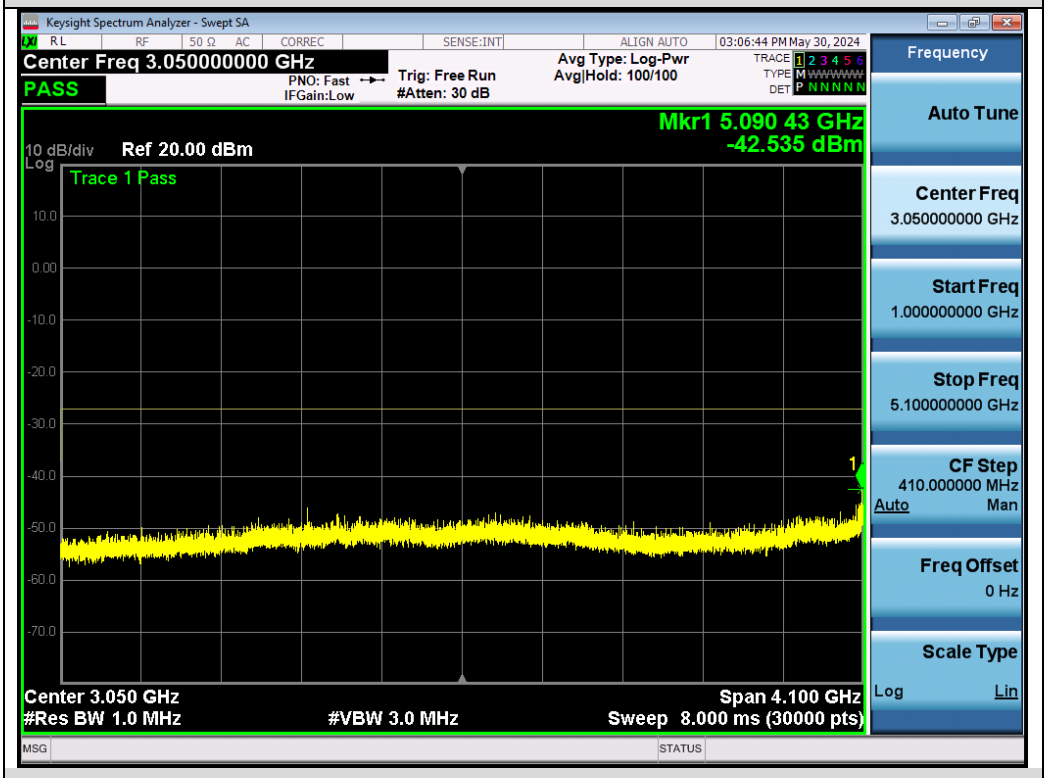


Test_Graph_802.11a_ANT1_5240_6Mbps_Frequency Band 3

Test_Graph_802.11a_ANT1_5240_6Mbps_Frequency Band 4



Test_Graph_802.11n40_ANT1_5190_MCS0_Frequency Band 1



Test_Graph_802.11n40_ANT1_5190_MCS0_Frequency Band 2