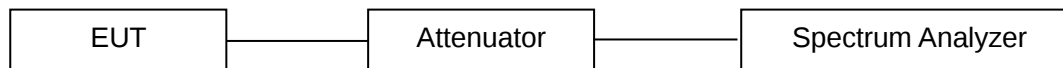


14.5 Power Spectral Density

LIMITS

Operation Band		Limit
☒ 5180~5240MHz	☐ Outdoor access point	17 dBm/MHz
	☐ Indoor access point	17 dBm/MHz
	☐ Fixed point-to-point access points	17 dBm/MHz
	☒ Client devices	11 dBm/MHz
☒ 5260~5320MHz	-	11 dBm/MHz
☒ 5500~5700MHz	-	11 dBm/MHz
☒ 5745~5825MHz	-	30 dBm/500kHz

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

The antenna port of the EUT was connected to the input of a spectrum analyzer.

Analyzer was set as below according to FCC KDB789033 (v02r01):

- Set analyzer center frequency to center frequency
- Set the RBW to: 1MHz
- Set the VBW to: 3MHz
- Detector = RMS
- Sweep time = auto couple
- Trace Average = 100 times
- If measured bandwidth of Maximum PSD is specified in 500kHz, add $10\log(500\text{kHz}/\text{RBW})$ to the measured result, whereas RBW (<500kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement. Allow trace to fully stabilize.

TEST RESULTS

PASS

Please refer to the following test plots.

U-NII-1						
Frequency MHz	Data Rate Mbps	Duty Cycle Factor (dB)	PSD dBm/MHz		Total PSD with duty cycle factor	Limit dBm/ MHz
IEEE 802.11a Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5180	6	0.41	7.865		8.275	11
Channel: 5200	6		8.699		9.109	11
Channel: 5240	6		7.567		7.977	11
IEEE 802.11n(HT20)Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5180	MCS 8	0.49	ANT_1	ANT_2	Total	---
			4.299	1.679	6.68	11
Channel: 5200	MCS 8		4.747	2.263	7.18	11
Channel: 5240	MCS 8		4.131	2.020	6.70	11
IEEE 802.11n(HT40) Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5190	MCS 8	0.74	5.752	3.349	8.46	11
Channel: 5230	MCS 8		4.527	4.846	8.44	11
IEEE 802.11ac(VHT20) Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5180	MCS 8	0.35	3.898	1.064	6.07	11
Channel: 5200	MCS 8		4.687	1.898	6.87	11
Channel: 5240	MCS 8		4.455	3.239	7.25	11
IEEE 802.11ac(VHT40) Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5190	MCS 8	0.51	5.216	4.078	8.20	11
Channel: 5230	MCS 8		5.020	4.315	8.20	11
IEEE 802.11ac(VHT80) Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5210	MCS 8	1.32	2.669	1.859	6.61	11
Note: 1. As for IEEE 802.11a mode, both of antennas have considered during pre-test, but only the worst case (ANT_1) was recorded. 2. As for IEEE 802.11n/ac mode, EUT working in MIMO mode. 3. Please refer to section 13 for duty cycle factor 4. Directional gain = $10 \log [(10^{2.12/20} + 10^{0.19/20})^2 / 2]$ = 4.22dBi < 6 dBi						

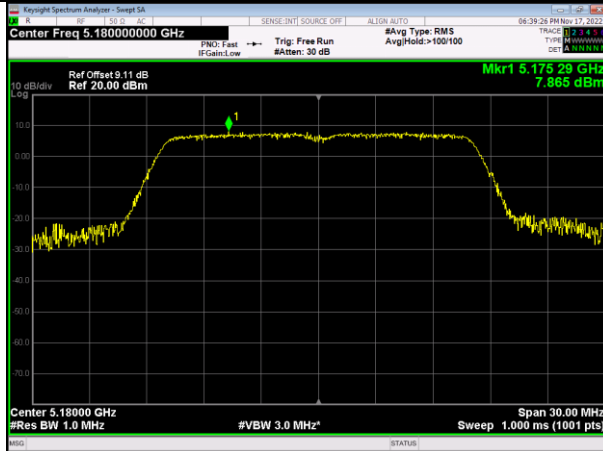
U-NII-2A						
Frequency MHz	Data Rate Mbps	Duty Cycle Factor (dB)	PSD dBm/MHz		Total PSD with duty cycle factor	Limit dBm/ MHz
IEEE 802.11a Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5260	6	0.39	7.974		8.364	11
Channel: 5300	6		8.323		8.713	11
Channel: 5320	6		7.738		8.128	11
IEEE 802.11n(HT20)Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5260	MCS 8	0.94	ANT_1	ANT_2	Total	---
			4.644	2.747	7.75	11
Channel: 5300	MCS 8		4.941	2.369	7.79	11
Channel: 5320	MCS 8		5.329	2.399	8.06	11
IEEE 802.11n(HT40) Mode (OFDM, Antenna Gain=2.04Bi)						
Channel: 5270	MCS 8	0.53	4.193	3.876	7.58	11
Channel: 5310	MCS 8		3.386	2.490	5.50	11
IEEE 802.11ac(VHT20) Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5260	MCS 8	0.35	4.532	2.728	7.08	11
Channel: 5300	MCS 8		4.060	3.221	7.02	11
Channel: 5320	MCS 8		4.900	2.644	7.28	11
IEEE 802.11ac(VHT40) Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5297	MCS 8	0.96	4.227	3.271	7.75	11
Channel: 5310	MCS 8		3.510	2.444	6.98	11
IEEE 802.11ac(VHT80) Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5290	MCS 8	1.26	3.168	2.608	7.17	11
Note: 1. As for IEEE 802.11a mode, both of antennas have considered during pre-test, but only the worst case (ANT_1) was recorded. 2. As for IEEE 802.11n/ac mode, EUT working in MIMO mode. 3. Please refer to section 13 for duty cycle factor 4. Directional gain = $10 \log [(10^{2.12/20} + 10^{0.19/20})^2 / 2]$ = 4.22dBi < 6 dBi						

U-NII-2C						
Frequency MHz	Data Rate Mbps	Duty Cycle Factor (dB)	PSD dBm/MHz		Total PSD with duty cycle factor	Limit dBm/ MHz
IEEE 802.11a Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5500	6	0.48	7.910		8.390	11
Channel: 5580	6		7.984		8.464	11
Channel: 5700	6		8.538		9.018	11
IEEE 802.11n(HT20)Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5500	MCS 8	0.52	ANT_1	ANT_2	Total	---
			4.045	2.963	7.07	11
Channel: 5580	MCS 8		3.030	2.892	6.49	11
Channel: 5700	MCS 8		4.406	3.518	7.51	11
IEEE 802.11n(HT40) Mode (OFDM, Antenna Gain=2.04Bi)						
Channel: 5510	MCS 8	0.53	5.102	3.922	8.09	11
Channel: 5670	MCS 8		4.139	4.142	7.68	11
IEEE 802.11ac(VHT20) Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5500	MCS 8	0.52	4.759	3.547	7.73	11
Channel: 5580	MCS 8		3.495	3.057	6.81	11
Channel: 5700	MCS 8		4.760	3.624	7.76	11
IEEE 802.11ac(VHT40) Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5510	MCS 8	0.55	4.668	4.620	8.20	11
Channel: 5670	MCS 8		4.319	3.161	7.34	11
IEEE 802.11ac(VHT80) Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5610	MCS 8	1.19	1.105	1.120	5.31	11
Note: 1. As for IEEE 802.11a mode, both of antennas have considered during pre-test, but only the worst case (ANT_1) was recorded. 2. As for IEEE 802.11n/ac mode, EUT working in MIMO mode. 3. Please refer to section 13 for duty cycle factor 4. Directional gain = $10 \log [(10^{2.12/20} + 10^{0.19/20})^2 / 2]$ = 4.22dBi < 6 dBi						

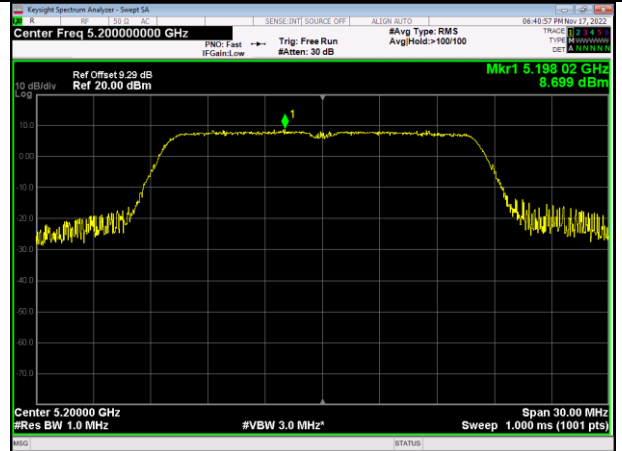
U-NII-3						
Frequency MHz	Data Rate Mbps	Duty Cycle Factor (dB)	PSD dBm/MHz		Total PSD with duty cycle factor	Limit dBm/ 500KHz
IEEE 802.11a Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5745	6	0.27	7.117		7.387	30
Channel: 5785	6		7.079		7.349	30
Channel: 5825	6		7.562		7.832	30
IEEE 802.11n(HT20)Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5745	MCS 8	0.42	ANT_1	ANT_2	Total	---
			7.042	5.500	9.77	30
Channel: 5785	MCS 8		5.046	5.514	8.72	30
Channel: 5825	MCS 8		6.148	5.280	9.17	30
IEEE 802.11n(HT40) Mode (OFDM, Antenna Gain=2.04Bi)						
Channel: 5755	MCS 8	0.49	5.236	4.158	8.23	30
Channel: 5795	MCS 8		3.273	3.508	6.89	30
IEEE 802.11ac(VHT20) Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5745	MCS 8	0.27	6.451	4.901	9.03	30
Channel: 5785	MCS 8		5.951	5.677	9.10	30
Channel: 5825	MCS 8		6.470	5.437	9.26	30
IEEE 802.11ac(VHT40) Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5755	MCS 8	1.02	3.723	2.740	7.29	30
Channel: 5795	MCS 8		3.523	2.530	7.09	30
IEEE 802.11ac(VHT80) Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5775	MCS 8	1.32	2.217	1.562	6.23	30
Note: 1. As for IEEE 802.11a mode, both of antennas have considered during pre-test, but only the worst case (ANT_1) was recorded. 2. As for IEEE 802.11n/ac mode, EUT working in MIMO mode. 3. Please refer to section 13 for duty cycle factor 4. Directional gain = 10 log [(10 ^{2.12/20} + 10 ^{0.19/20}) ² / 2]= 4.22dBi < 6 dBi						

U-NII-1

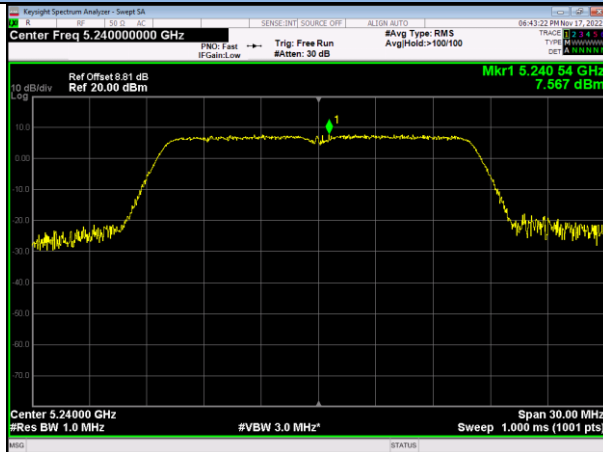
IEEE 802.11a Low Channel



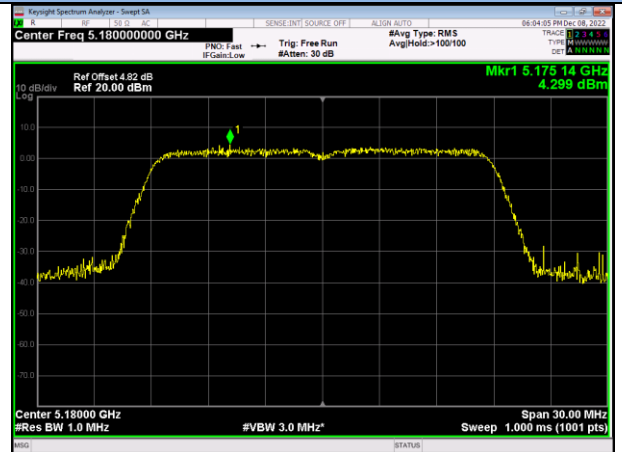
IEEE 802.11a Middle Channel



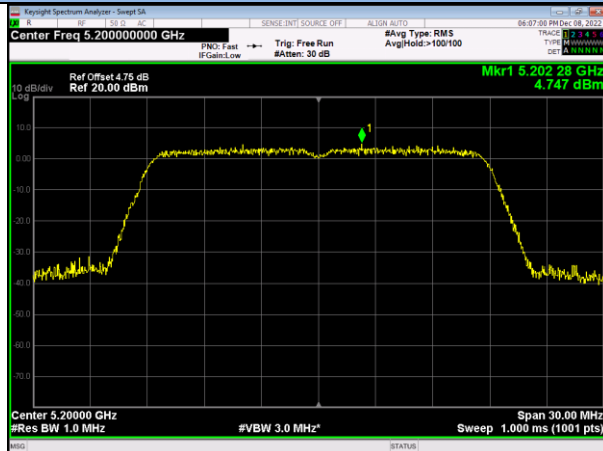
IEEE 802.11a High Channel



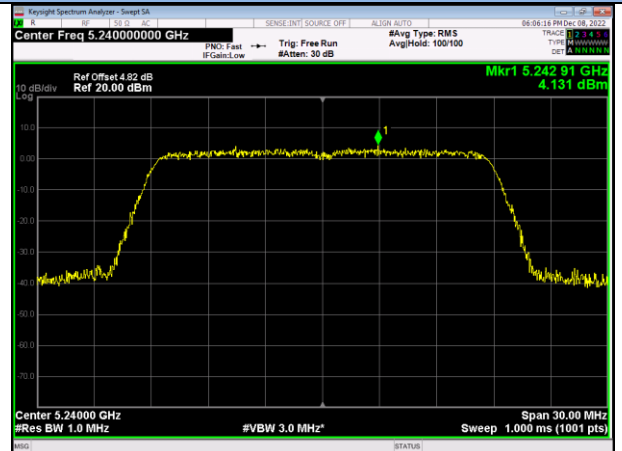
IEEE 802.11n(HT20) Low Channel_ANT 1



IEEE 802.11n(HT20) Middle Channel_ANT 1

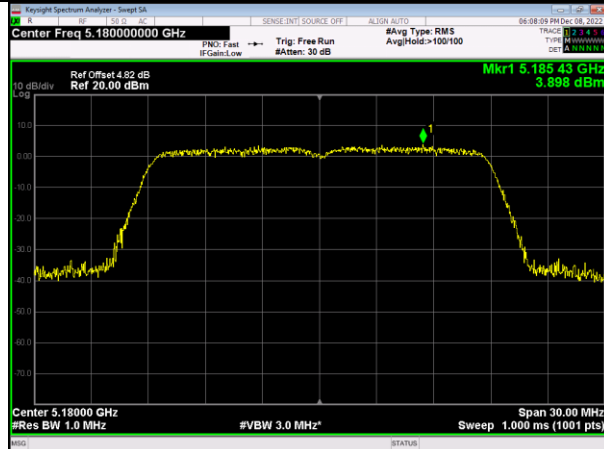


IEEE 802.11n(HT20) High Channel_ANT 1

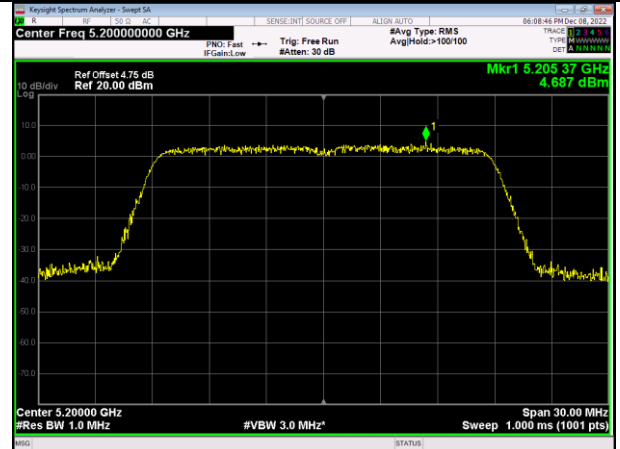


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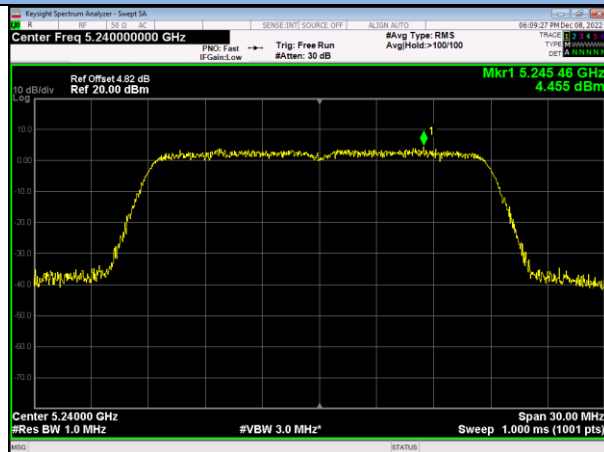
IEEE 802.11ac(VHT20) Low Channel_ANT 1



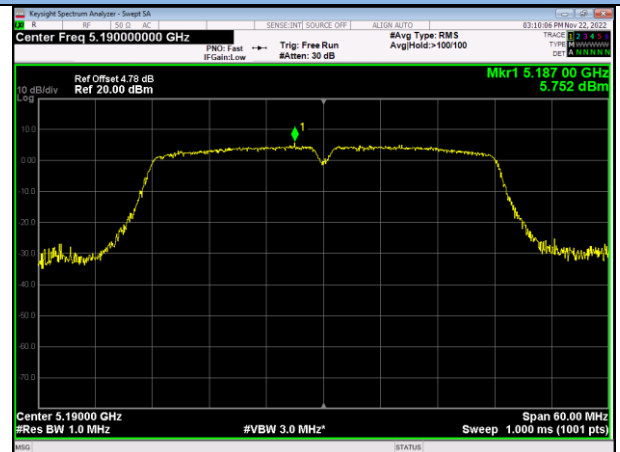
IEEE 802.11ac(VHT20) Middle Channel_ANT 1



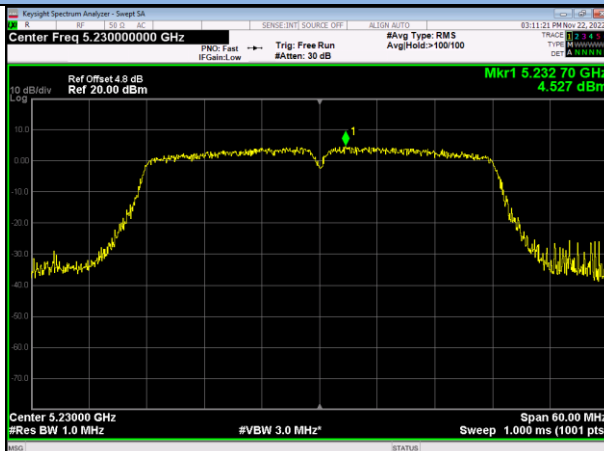
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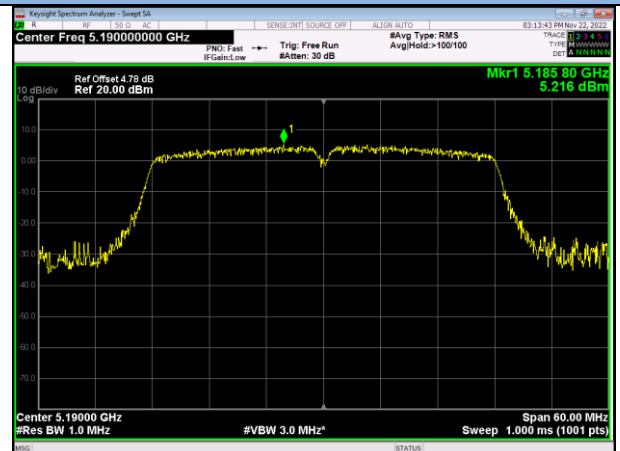
IEEE 802.11n(HT40) Low Channel_ANT 1



IEEE 802.11n(HT40) High Channel_ANT 1

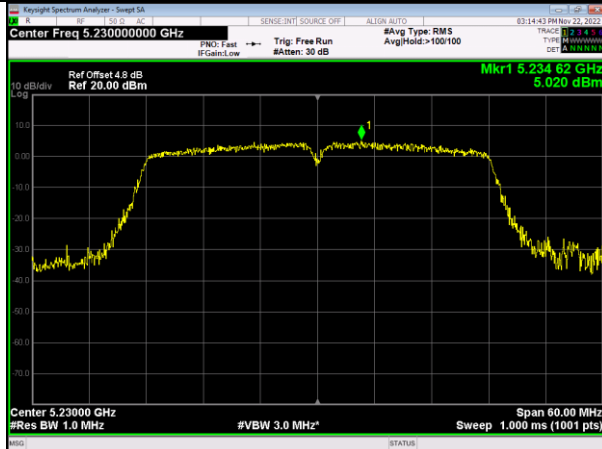


IEEE 802.11ac(VHT40) Low Channel_ANT 1

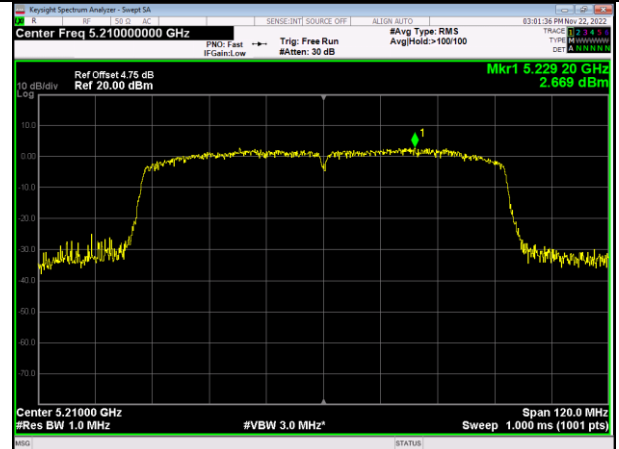


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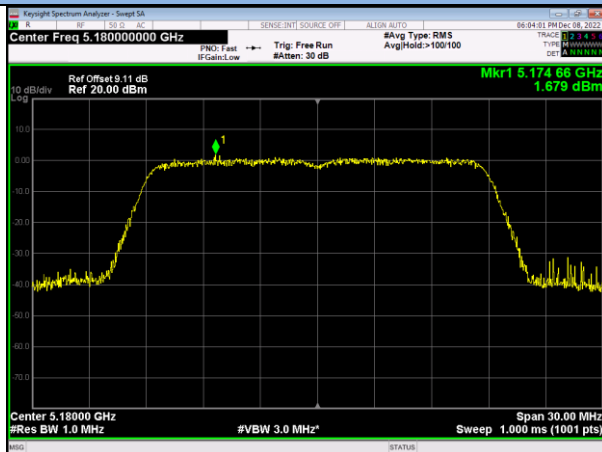
IEEE 802.11ac(VHT40) High Channel_ANT 1



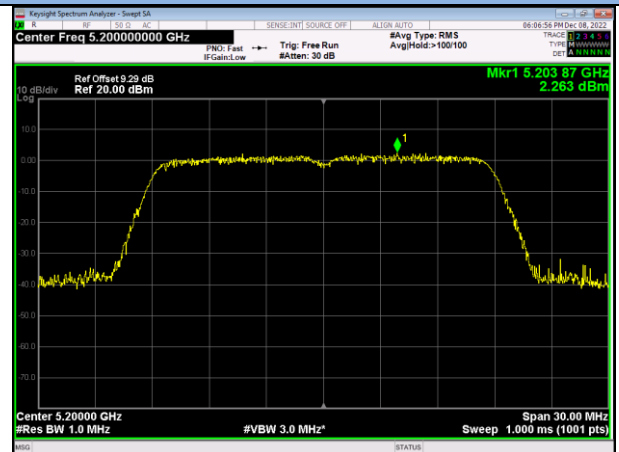
IEEE 802.11ac(VHT80) _ANT 1



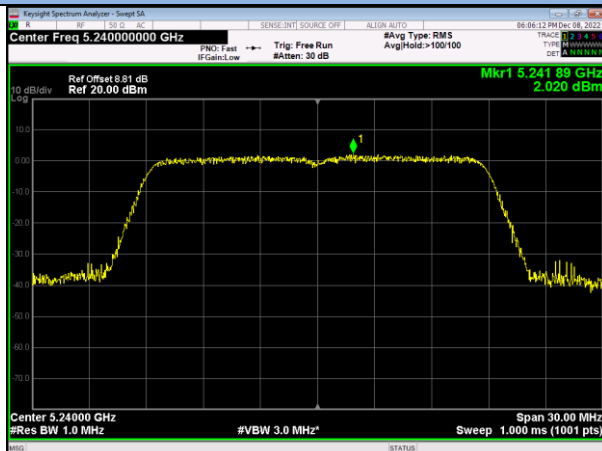
IEEE 802.11n(HT20) Low Channel_ANT 2



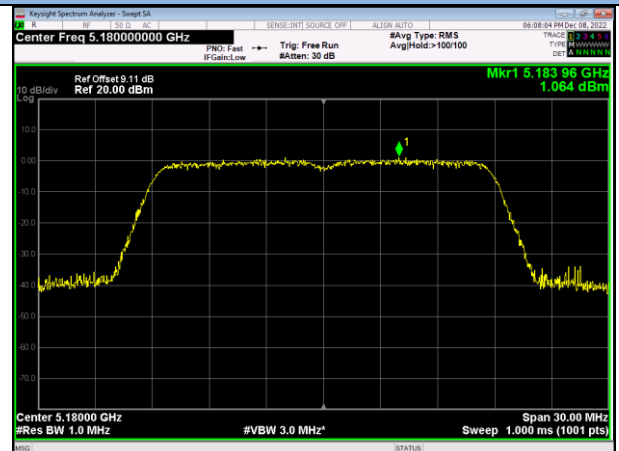
IEEE 802.11n(HT20) Middle Channel_ANT 2



IEEE 802.11n(HT20) High Channel_ANT 2

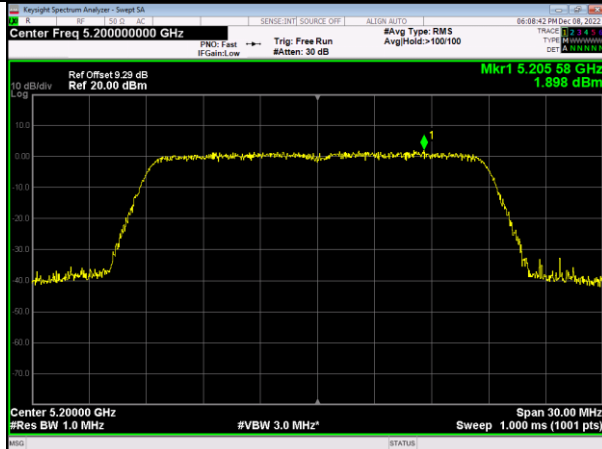


IEEE 802.11ac(VHT20) Low Channel_ANT 2

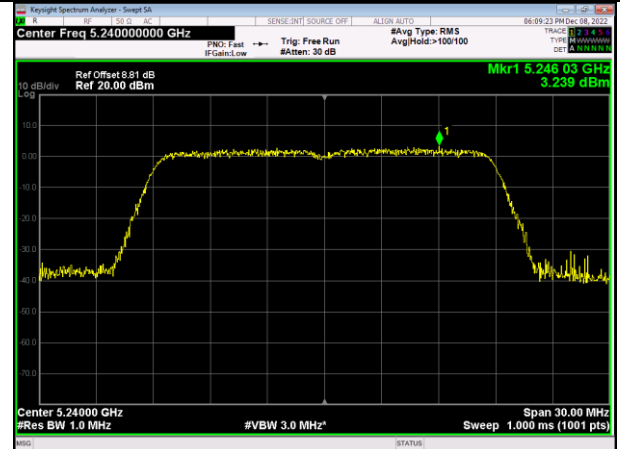


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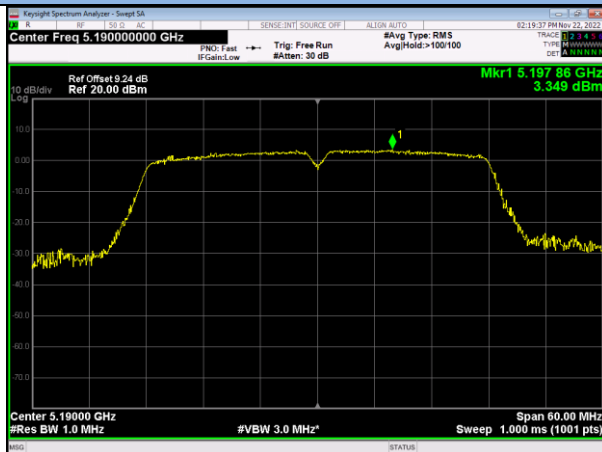
IEEE 802.11ac(VHT20) Middle Channel_ANT 2



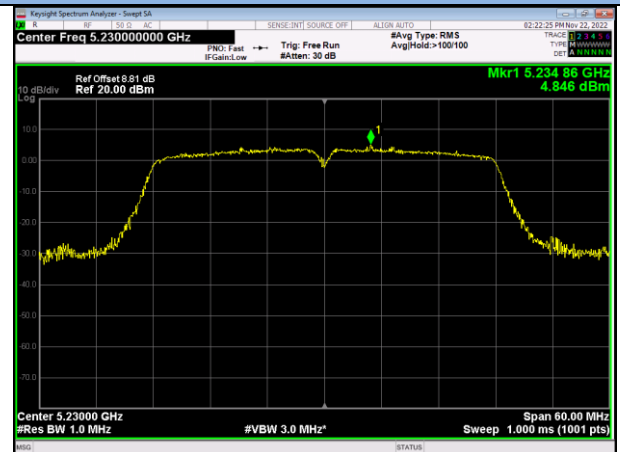
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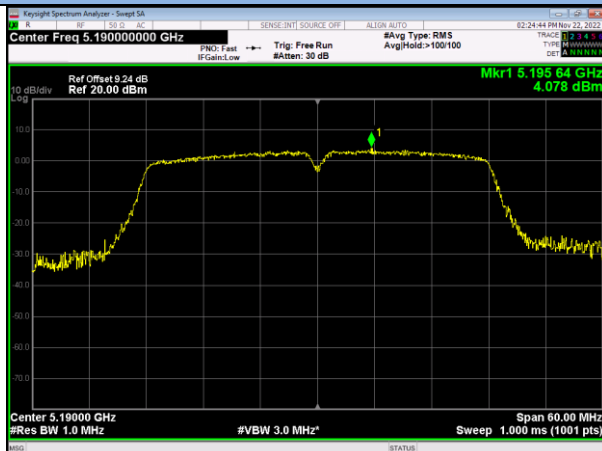
IEEE 802.11n(HT40) Low Channel_ANT 2



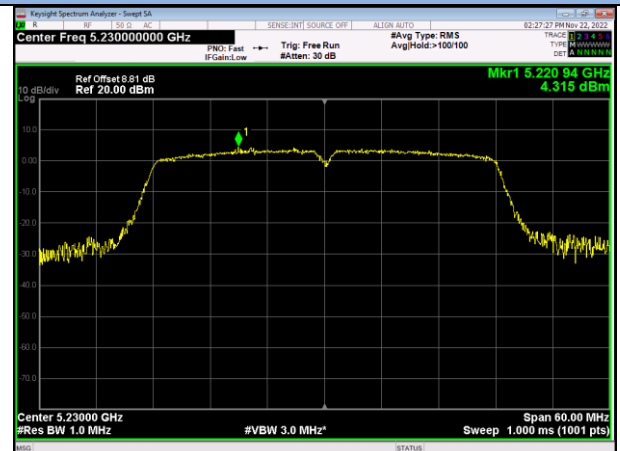
IEEE 802.11n(HT40) High Channel_ANT 2



IEEE 802.11ac(VHT40) Low Channel_ANT 2



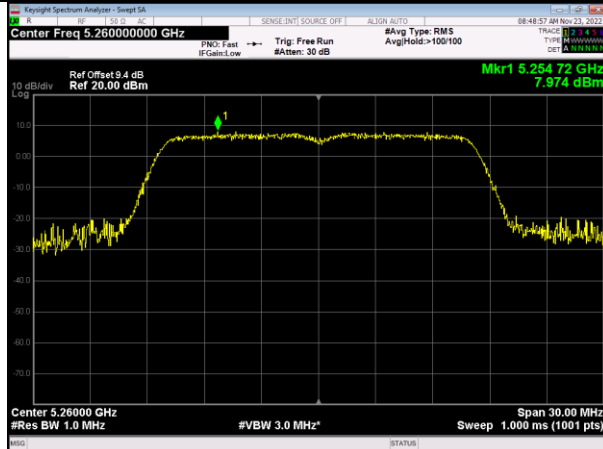
IEEE 802.11ac(VHT40) High Channel_ANT 2



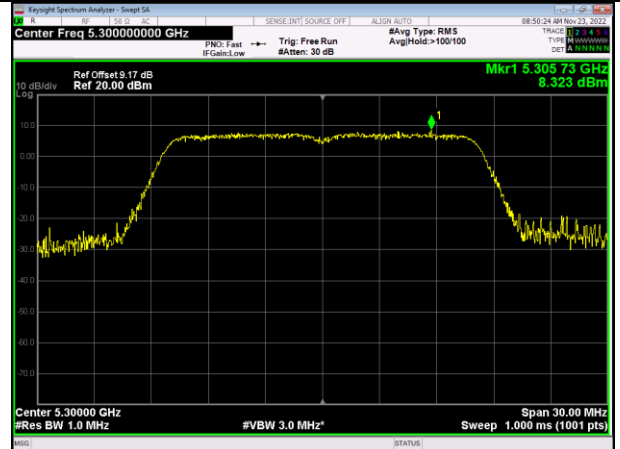
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IEEE 802.11ac(VHT80)_ANT 2	---
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U-NII-2A

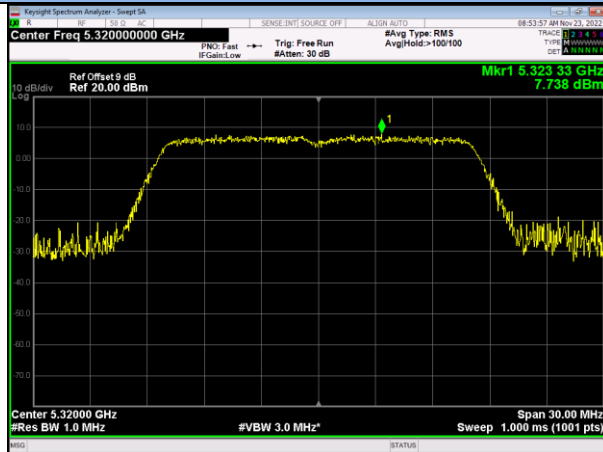
IEEE 802.11a Low Channel



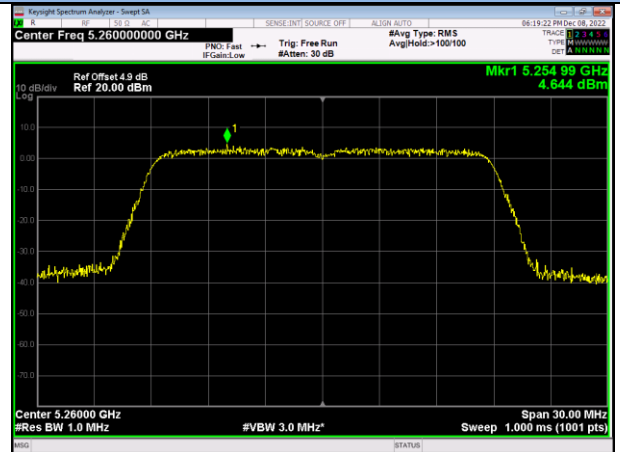
IEEE 802.11a Middle Channel



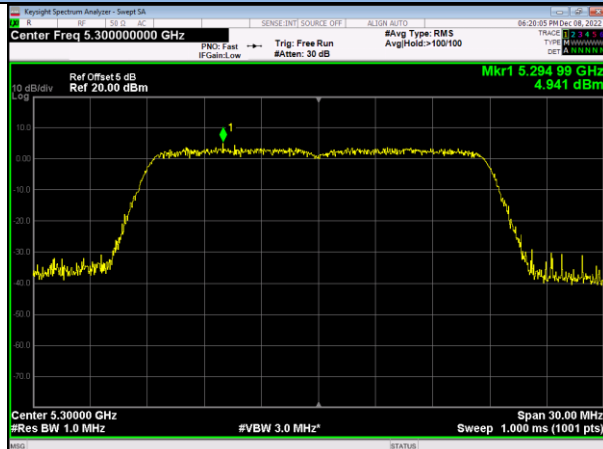
IEEE 802.11a High Channel



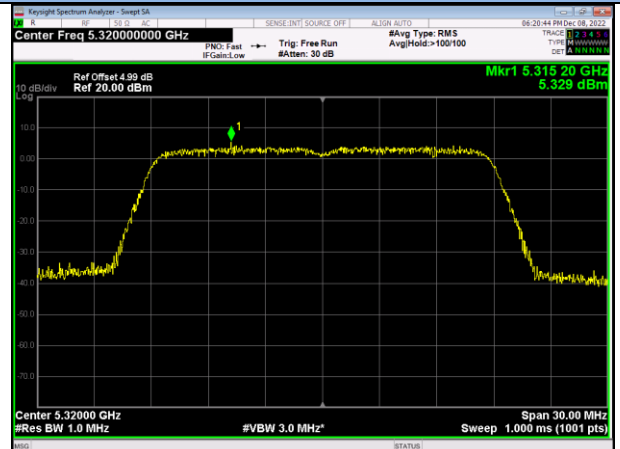
IEEE 802.11n(HT20) Low Channel_ANT 1



IEEE 802.11n(HT20) Middle Channel_ANT 1

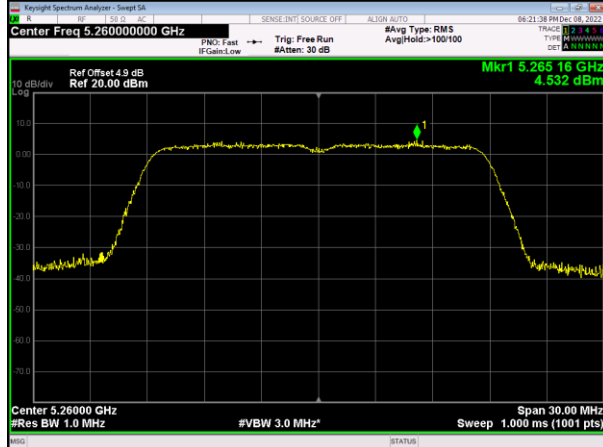


IEEE 802.11n(HT20) High Channel_ANT 1

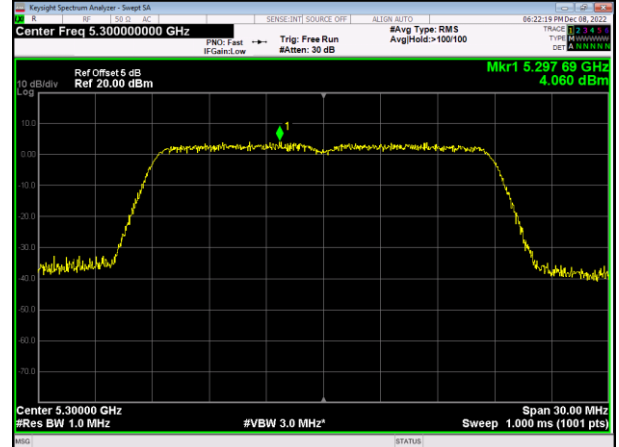


U-NII-2A

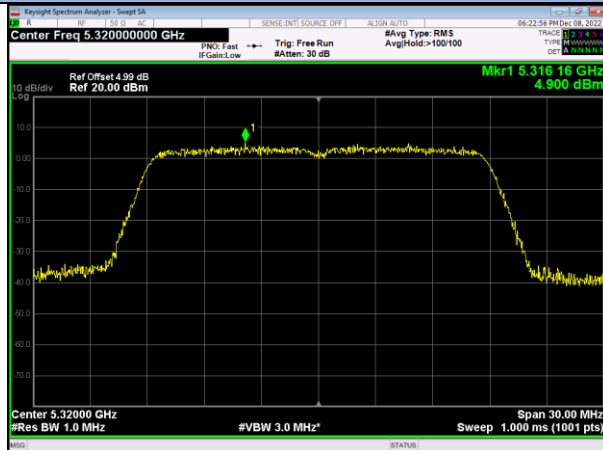
IEEE 802.11ac(VHT20) Low Channel_ANT 1



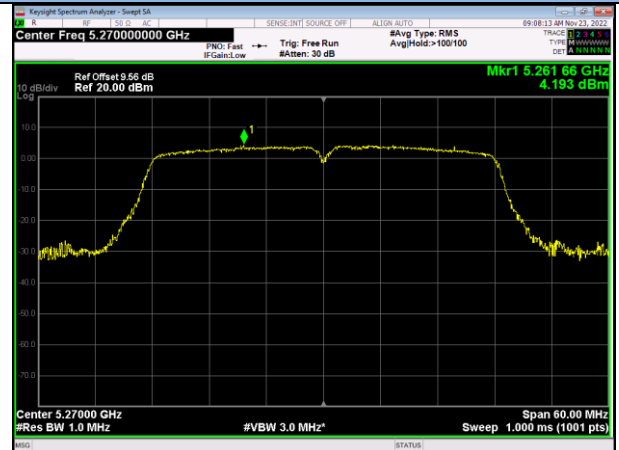
IEEE 802.11ac(VHT20) Middle Channel_ANT 1



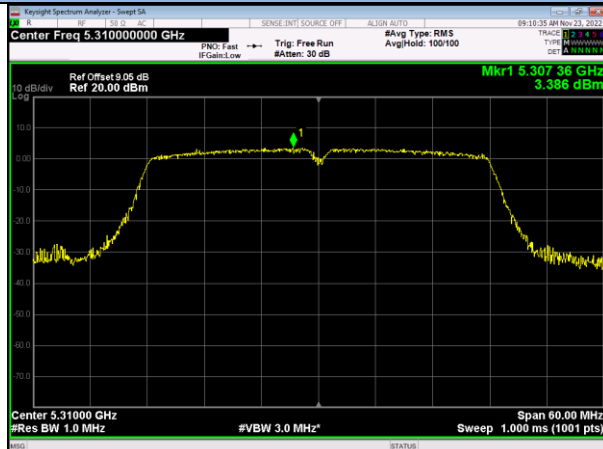
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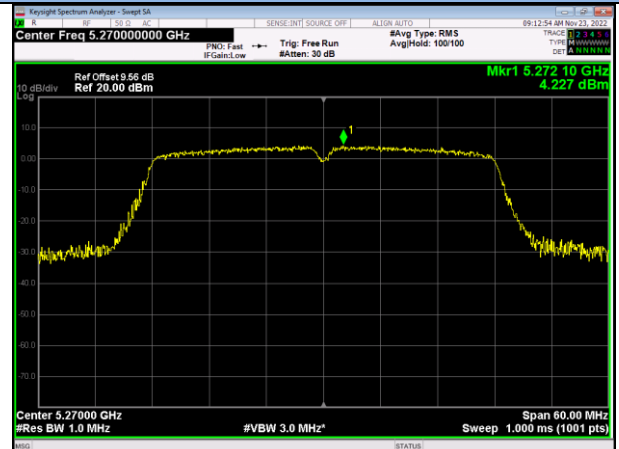
IEEE 802.11n(HT40) Low Channel_ANT 1



IEEE 802.11n(HT40) High Channel_ANT 1

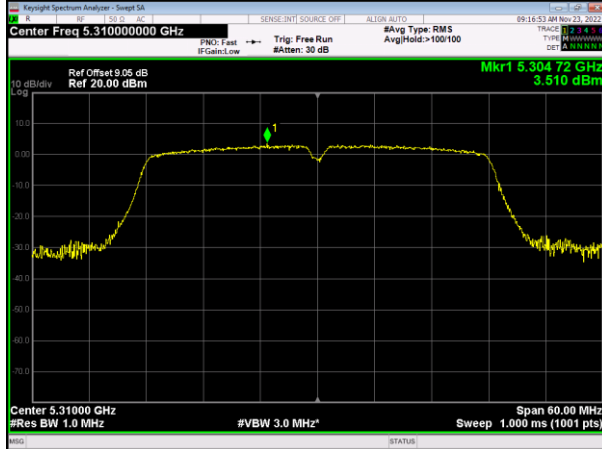


IEEE 802.11ac(VHT40) Low Channel_ANT 1

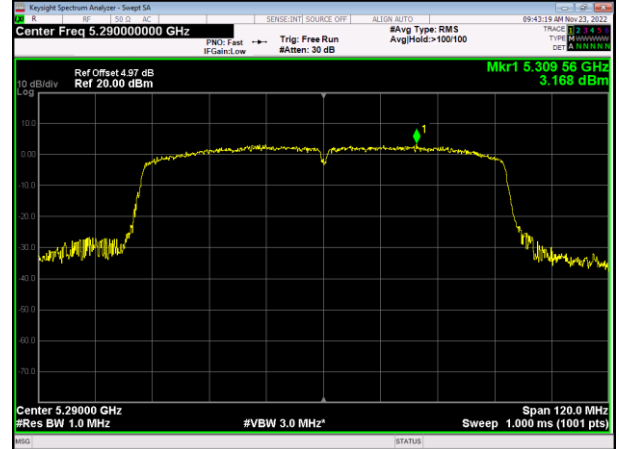


U-NII-2A

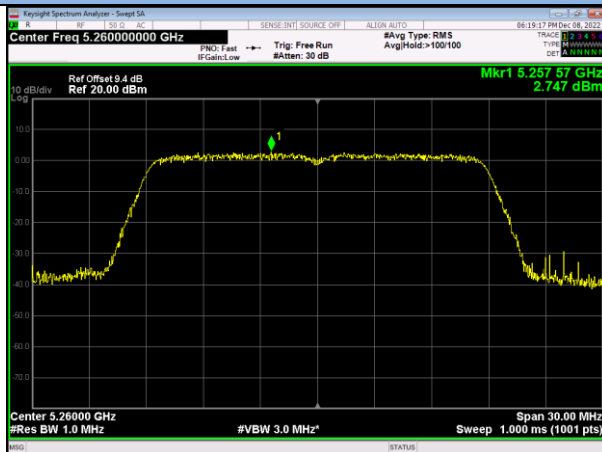
IEEE 802.11ac(VHT40) High Channel_ANT 1



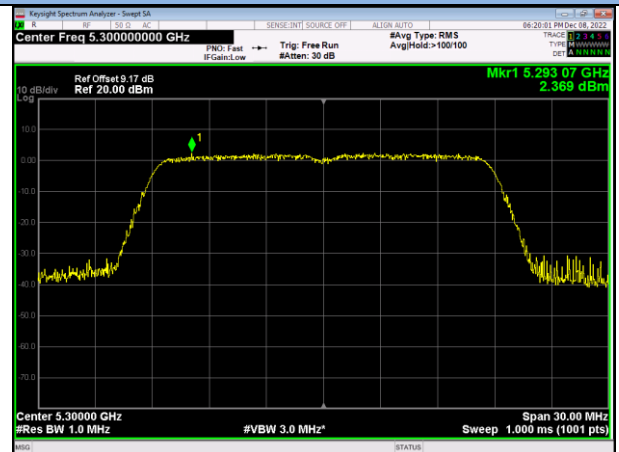
IEEE 802.11ac(VHT80) _ANT 1



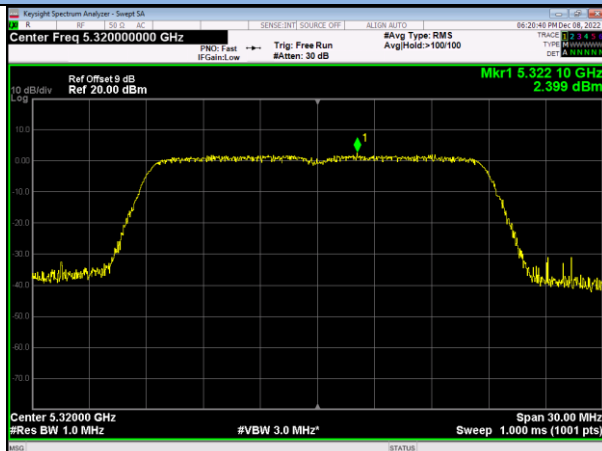
IEEE 802.11n(HT20) Low Channel_ANT 2



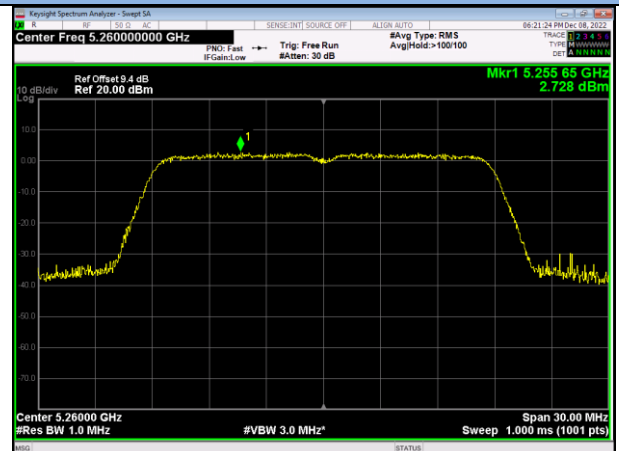
IEEE 802.11n(HT20) Middle Channel_ANT 2



IEEE 802.11n(HT20) High Channel_ANT 2

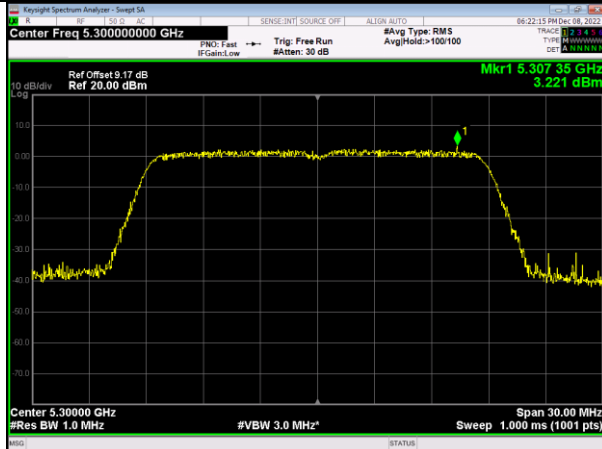


IEEE 802.11ac(VHT20) Low Channel_ANT 2

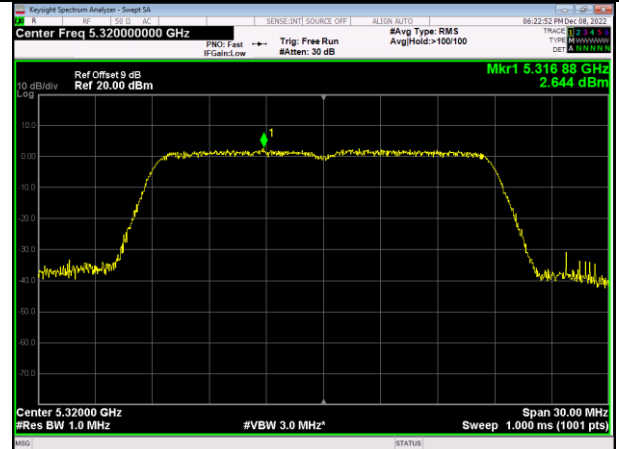


U-NII-2A

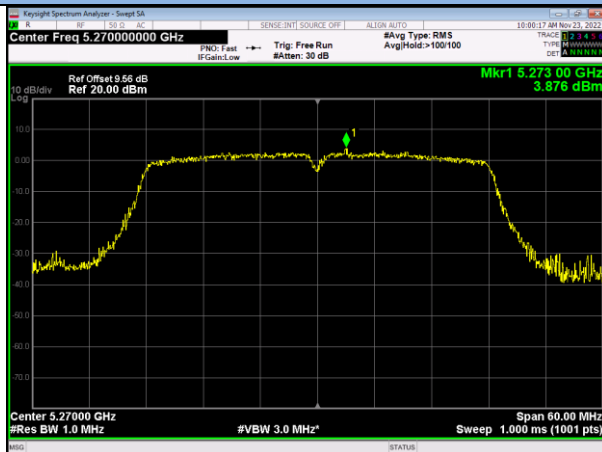
IEEE 802.11ac(VHT20) Middle Channel_ANT 2



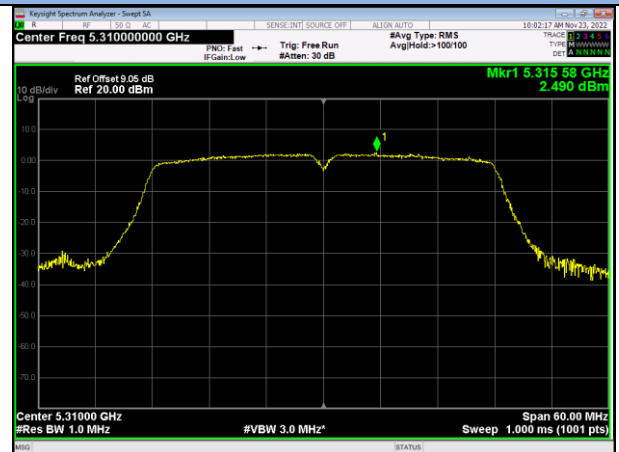
IEEE 802.11ac(VHT20) High Channel_ANT 2



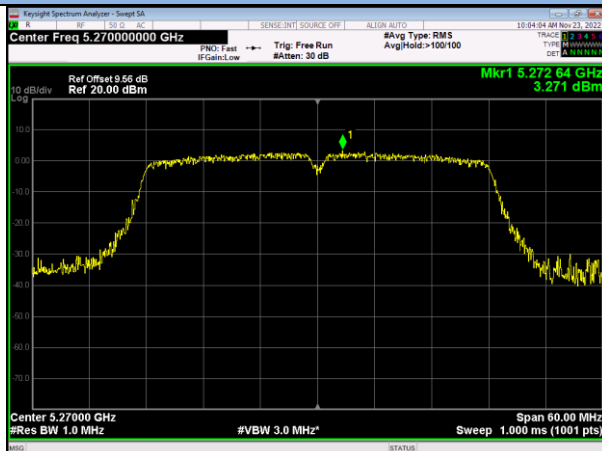
IEEE 802.11n(HT40) Low Channel_ANT 2



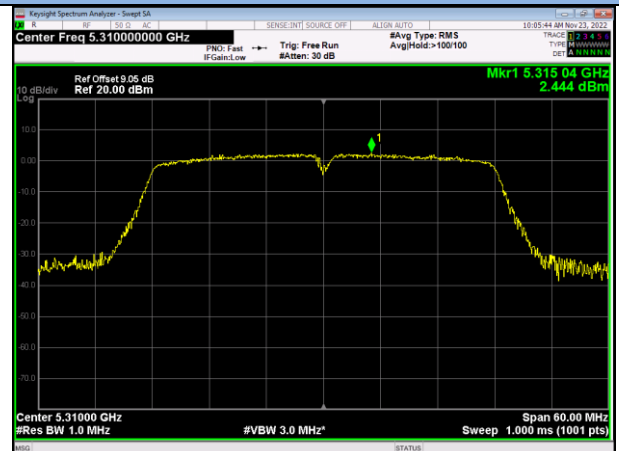
IEEE 802.11n(HT40) High Channel_ANT 2



IEEE 802.11ac(VHT40) Low Channel_ANT 2

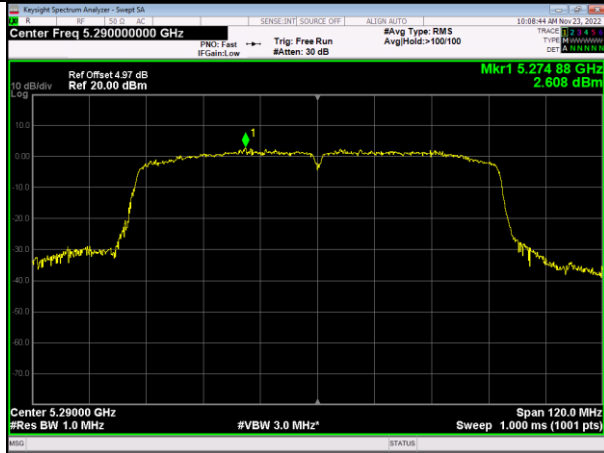


IEEE 802.11ac(VHT40) High Channel_ANT 2



U-NII-2A

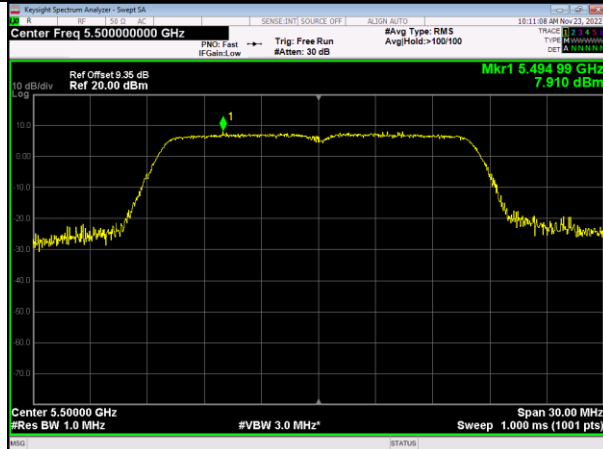
IEEE 802.11ac(VHT80)_ANT 2



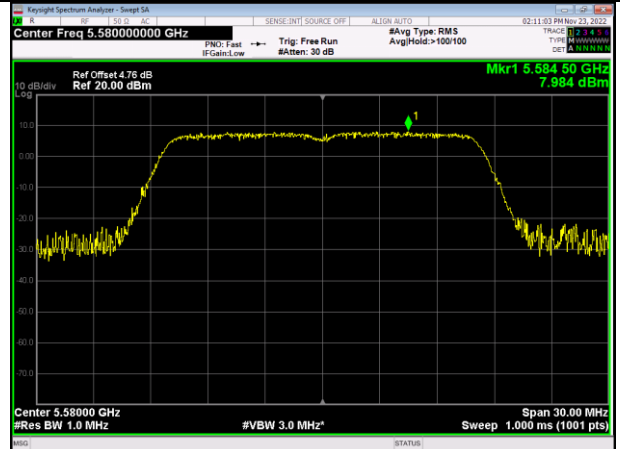
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U-NII-2C

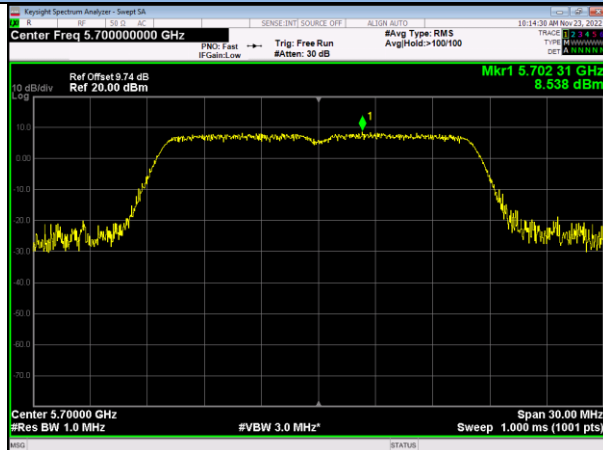
IEEE 802.11a Low Channel



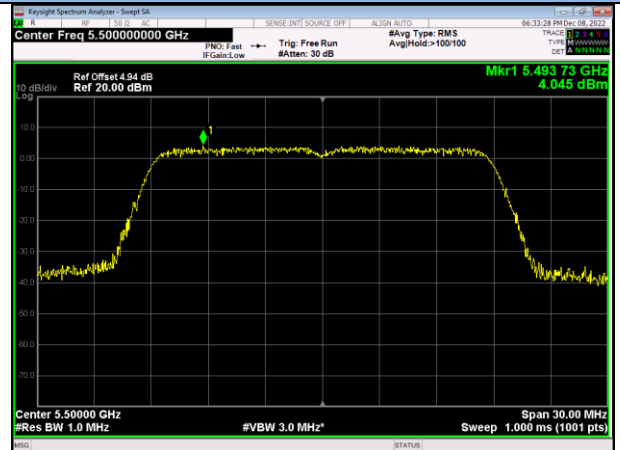
IEEE 802.11a Middle Channel



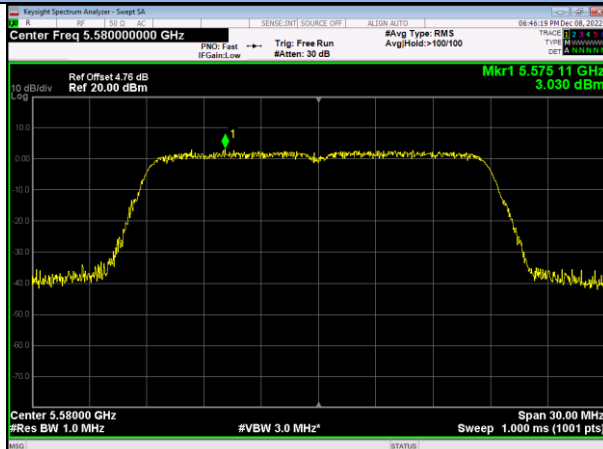
IEEE 802.11a High Channel



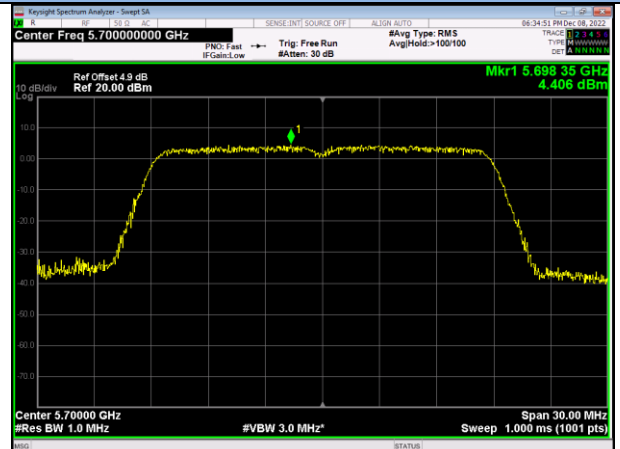
IEEE 802.11n(HT20) Low Channel_ANT 1



IEEE 802.11n(HT20) Middle Channel_ANT 1

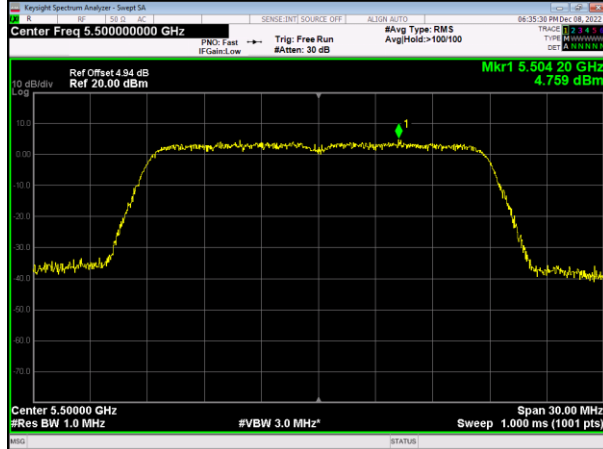


IEEE 802.11n(HT20) High Channel_ANT 1

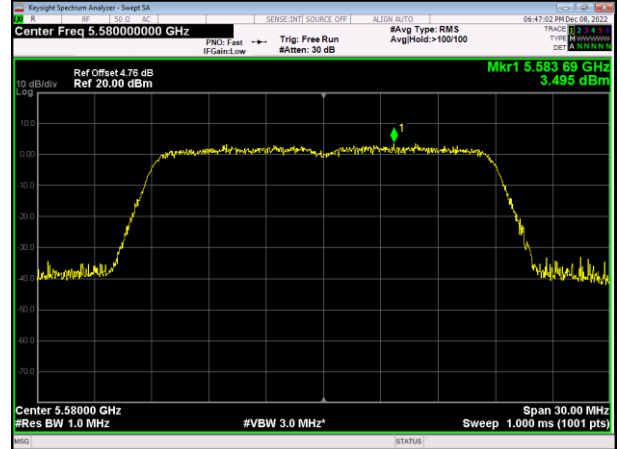


U-NII-2C

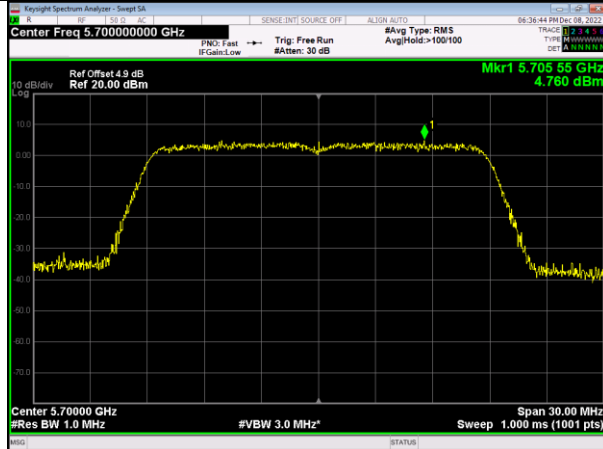
IEEE 802.11ac(VHT20) Low Channel_ANT 1



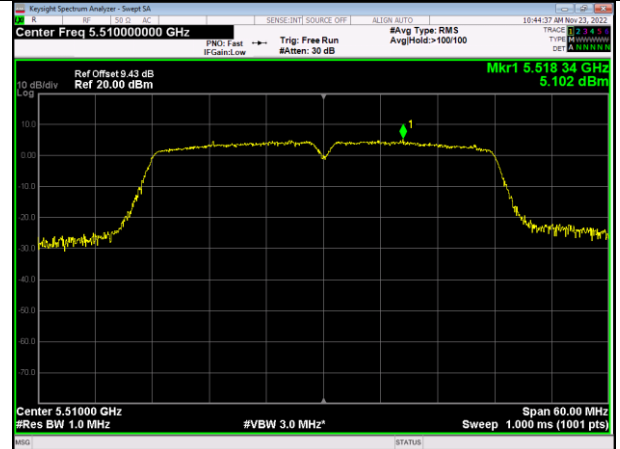
IEEE 802.11ac(VHT20) Middle Channel_ANT 1



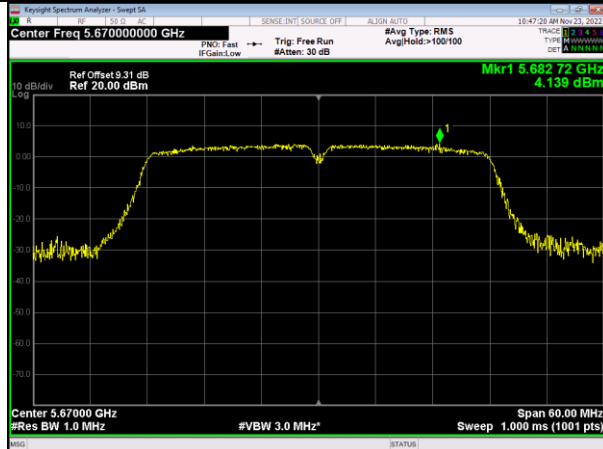
IEEE 802.11ac(VHT20) High Channel_ANT 1



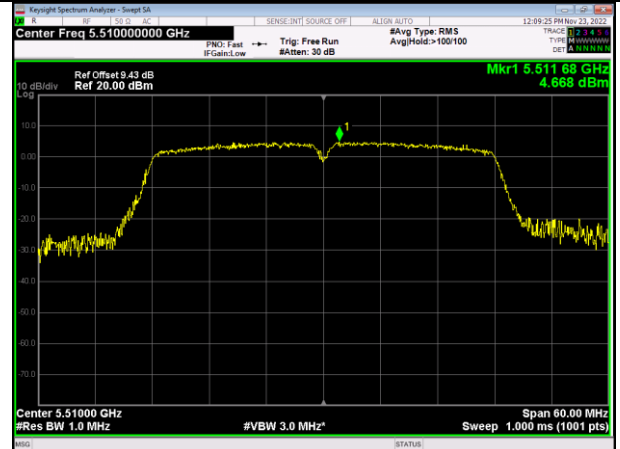
IEEE 802.11n(HT40) Low Channel_ANT 1



IEEE 802.11n(HT40) High Channel_ANT 1

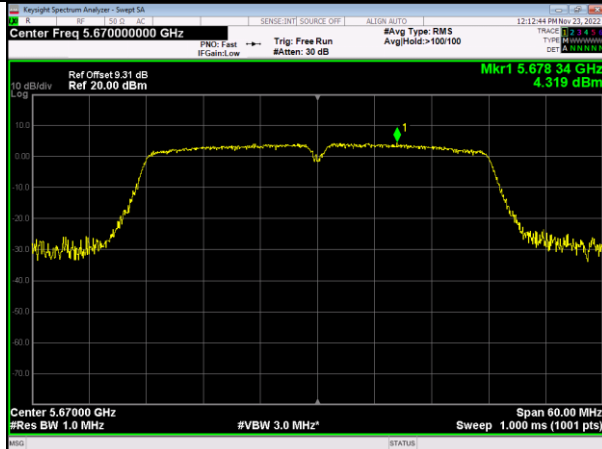


IEEE 802.11ac(VHT40) Low Channel_ANT 1

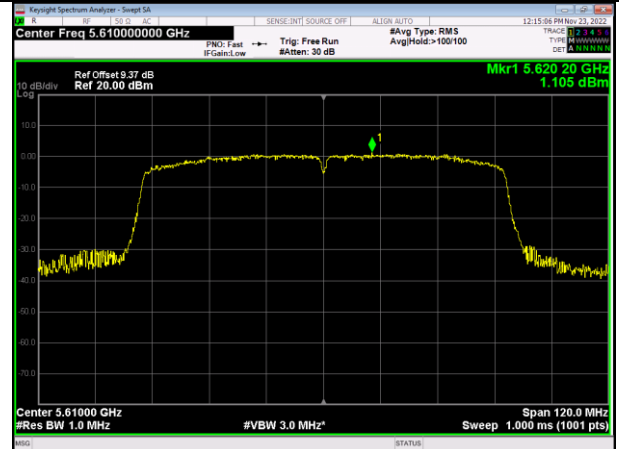


U-NII-2C

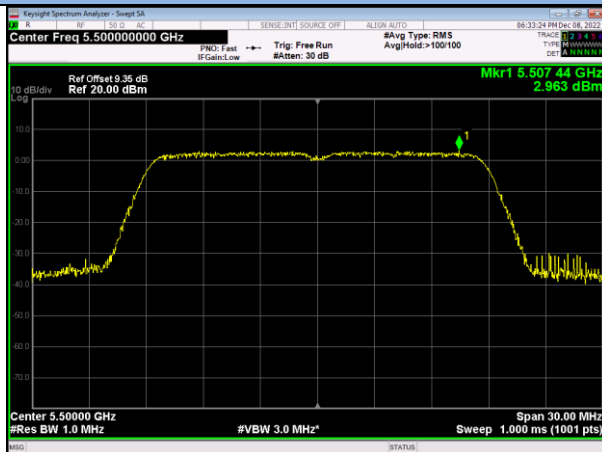
IEEE 802.11ac(VHT40) High Channel_ANT 1



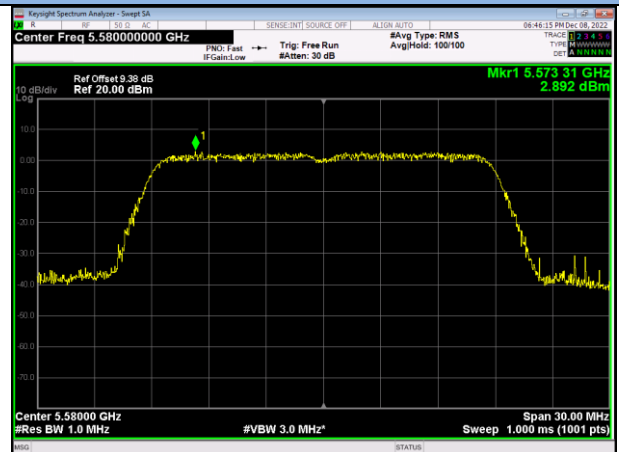
IEEE 802.11ac(VHT80) _ANT 1



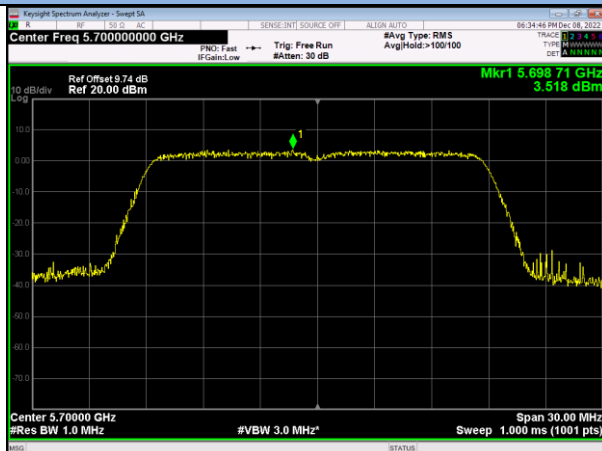
IEEE 802.11n(HT20) Low Channel_ANT 2



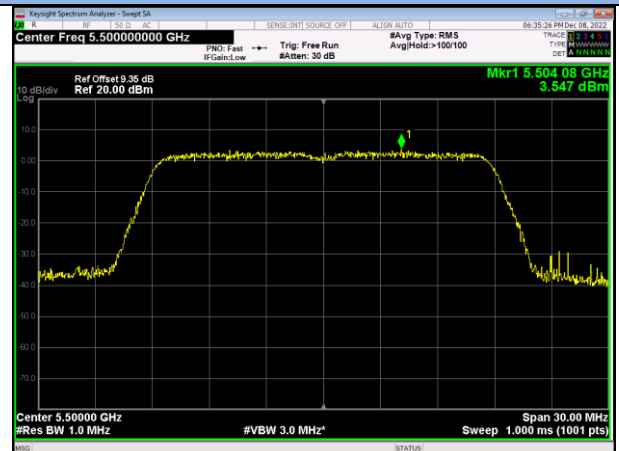
IEEE 802.11n(HT20) Middle Channel_ANT 2



IEEE 802.11n(HT20) High Channel_ANT 2

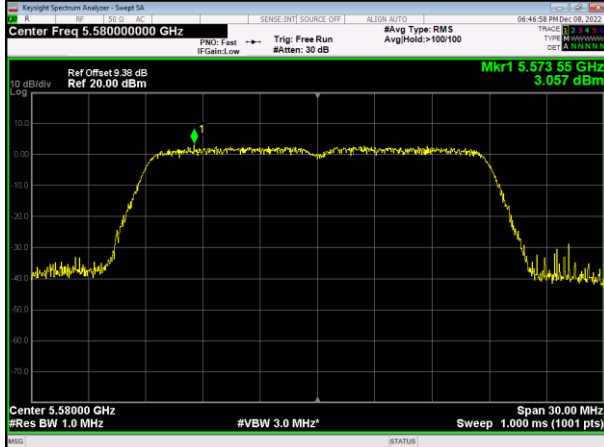


IEEE 802.11ac(VHT20) Low Channel_ANT 2

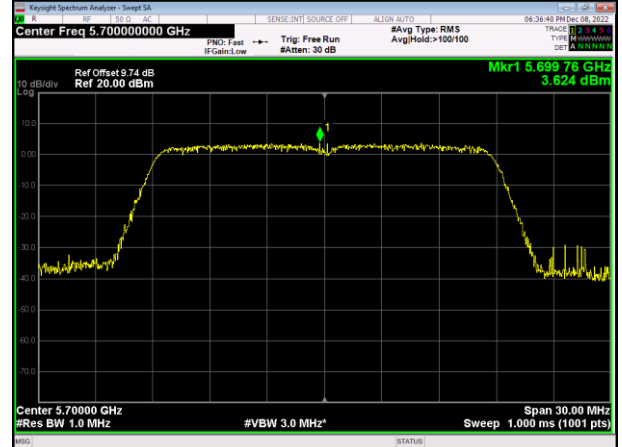


U-NII-2C

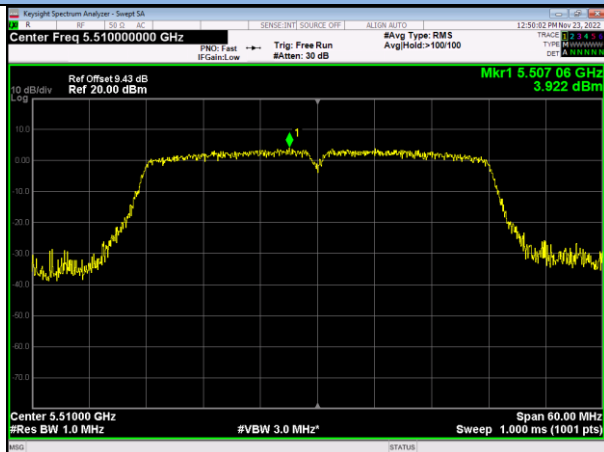
IEEE 802.11ac(VHT20) Middle Channel_ANT 2



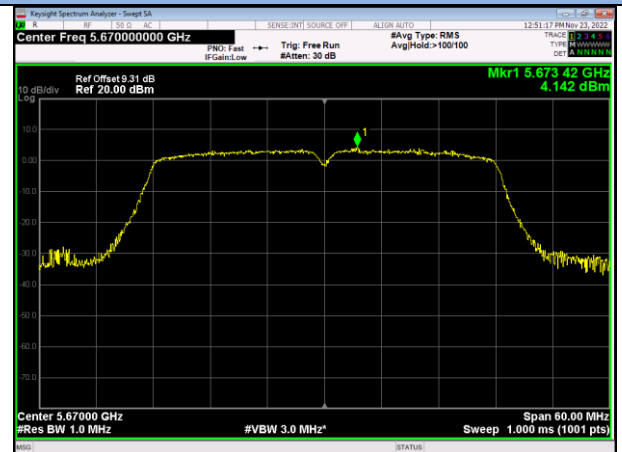
IEEE 802.11ac(VHT20) High Channel_ANT 2



IEEE 802.11n(HT40) Low Channel_ANT 2



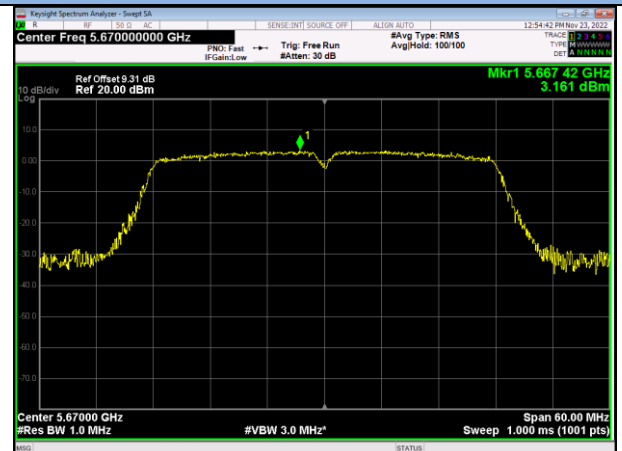
IEEE 802.11n(HT40) High Channel_ANT 2

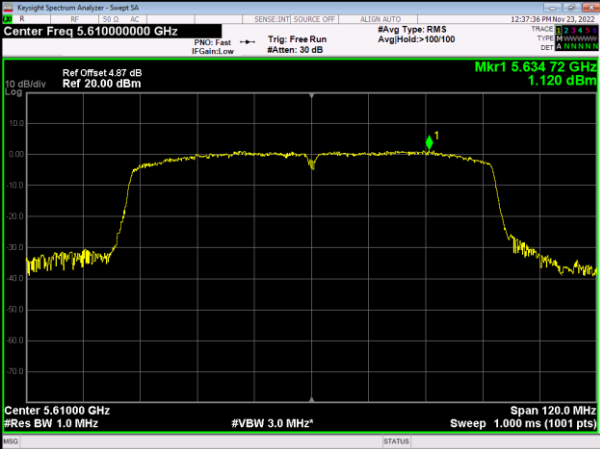


IEEE 802.11ac(VHT40) Low Channel_ANT 2



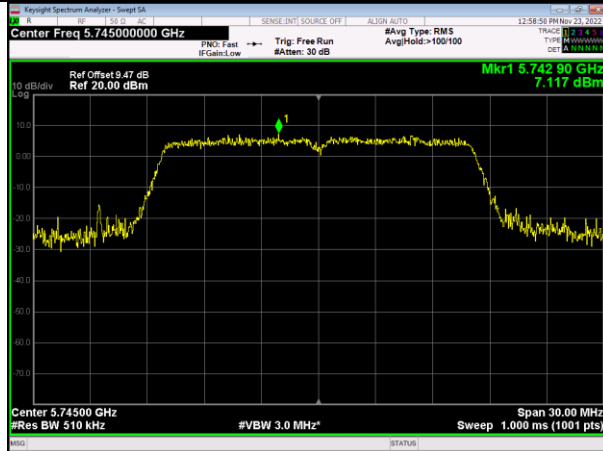
IEEE 802.11ac(VHT40) High Channel_ANT 2



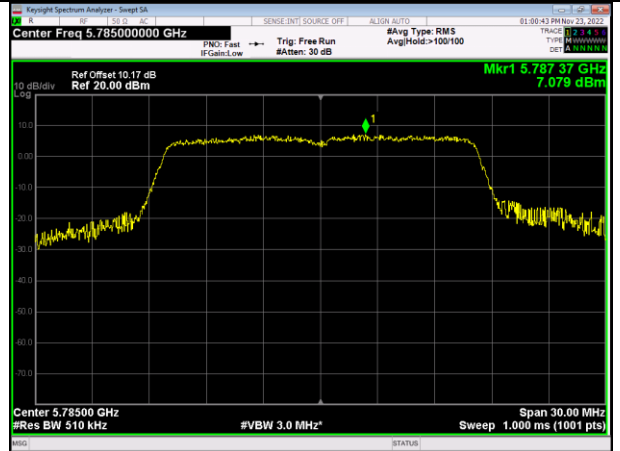
U-NII-2C	
IEEE 802.11ac(VHT80)_ANT 2	---
 Center Freq 5.610000000 GHz Ref Offset 4.67 dB Ref 20.00 dBm Mkr1 5.634 72 GHz 1.120 dBm Center 5.61000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz* Span 120.0 MHz Sweep 1.000 ms (1001 pts)	Blank

U-NII-3

IEEE 802.11a Low Channel



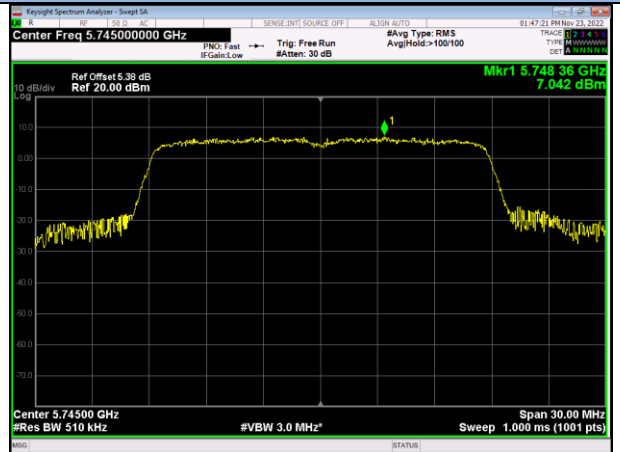
IEEE 802.11a Middle Channel



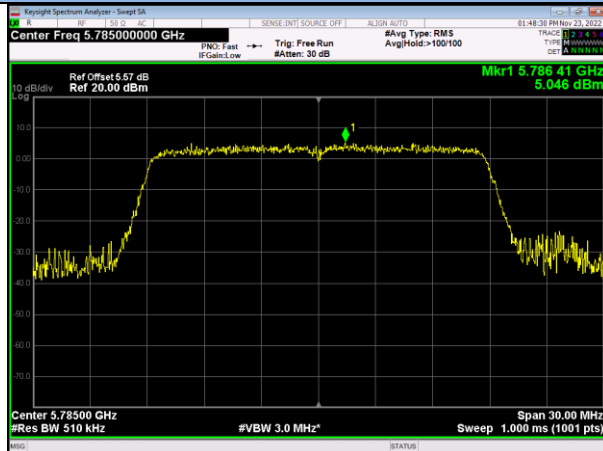
IEEE 802.11a High Channel



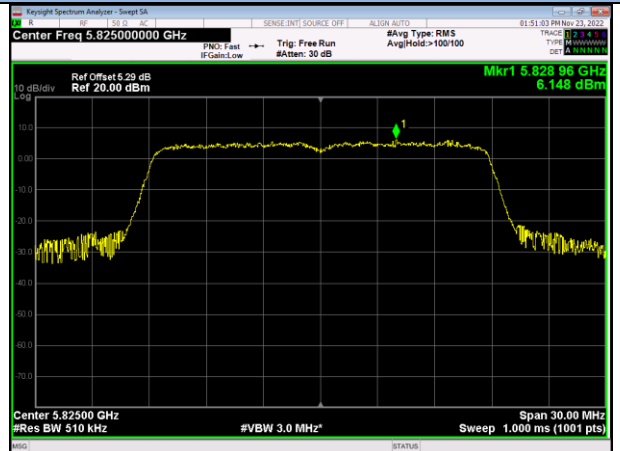
IEEE 802.11n(HT20) Low Channel_ANT 1



IEEE 802.11n(HT20) Middle Channel_ANT 1

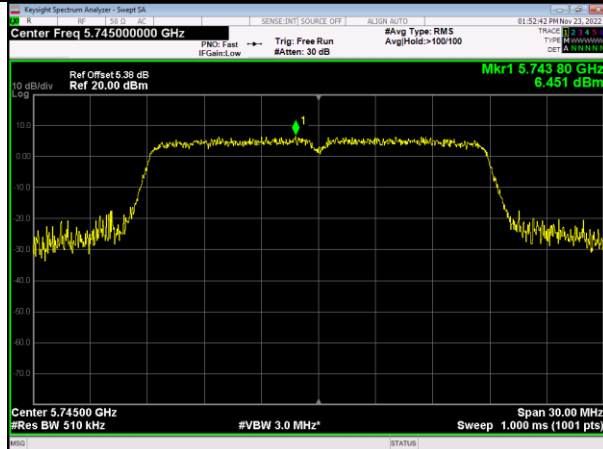


IEEE 802.11n(HT20) High Channel_ANT 1

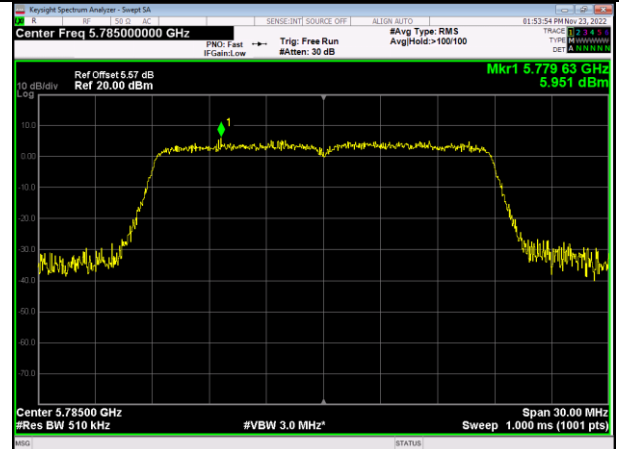


U-NII-3

IEEE 802.11ac(VHT20) Low Channel_ANT 1



IEEE 802.11ac(VHT20) Middle Channel_ANT 1



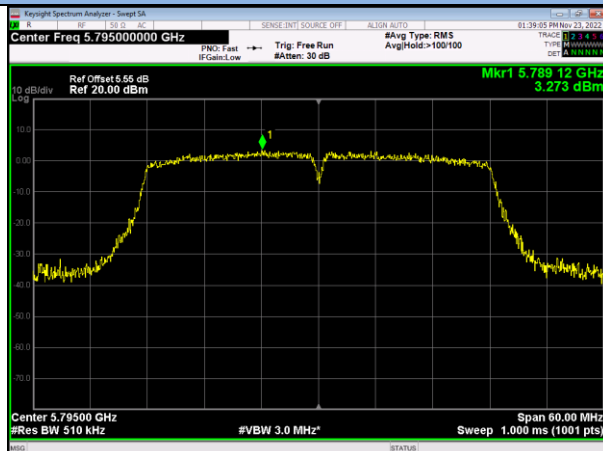
IEEE 802.11ac(VHT20) High Channel_ANT 1



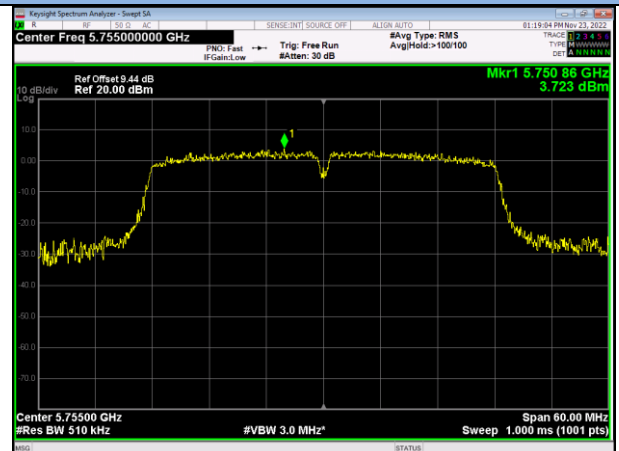
IEEE 802.11n(HT40) Low Channel_ANT 1



IEEE 802.11n(HT40) High Channel_ANT 1

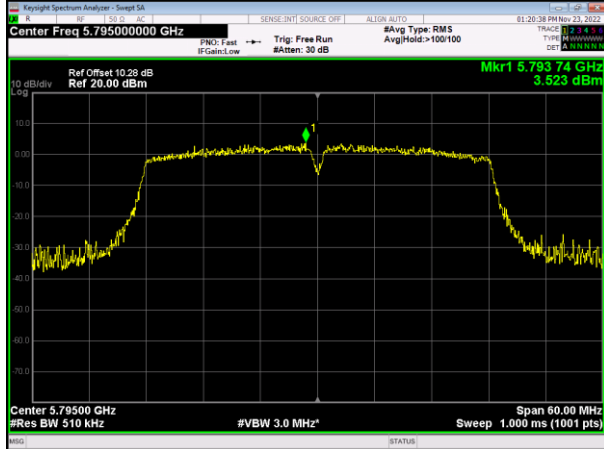


IEEE 802.11ac(VHT40) Low Channel_ANT 1

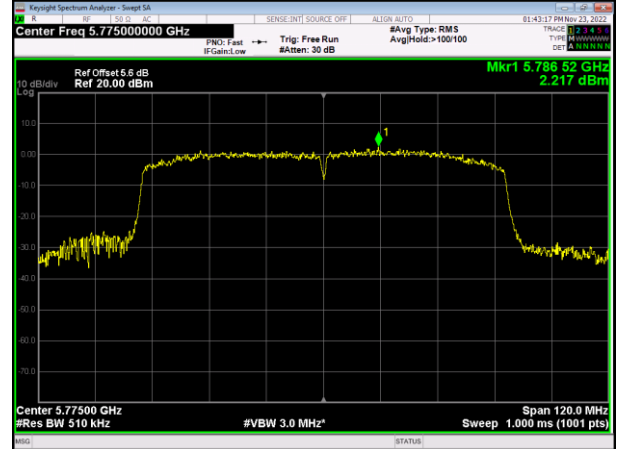


U-NII-3

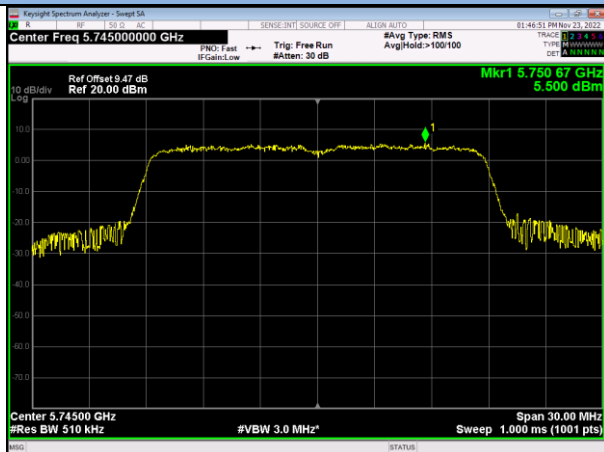
IEEE 802.11ac(VHT40) High Channel_ANT 1



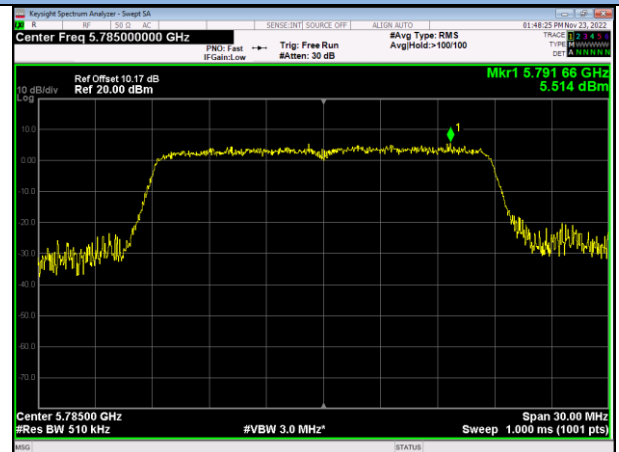
IEEE 802.11ac(VHT80) _ANT 1



IEEE 802.11n(HT20) Low Channel_ANT 2



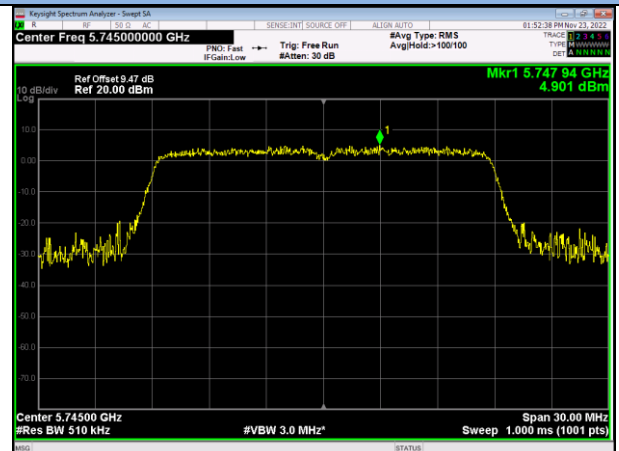
IEEE 802.11n(HT20) Middle Channel_ANT 2



IEEE 802.11n(HT20) High Channel_ANT 2

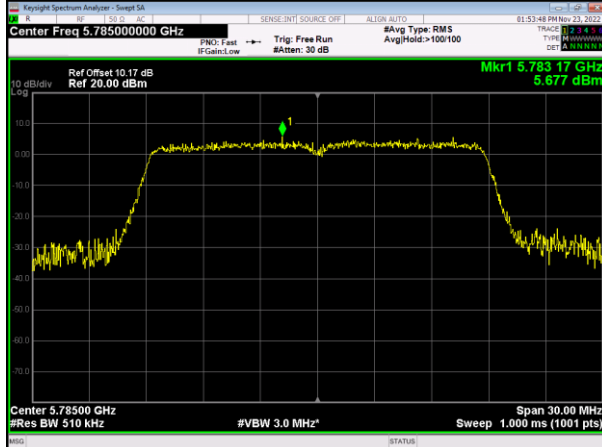


IEEE 802.11ac(VHT20) Low Channel_ANT 2

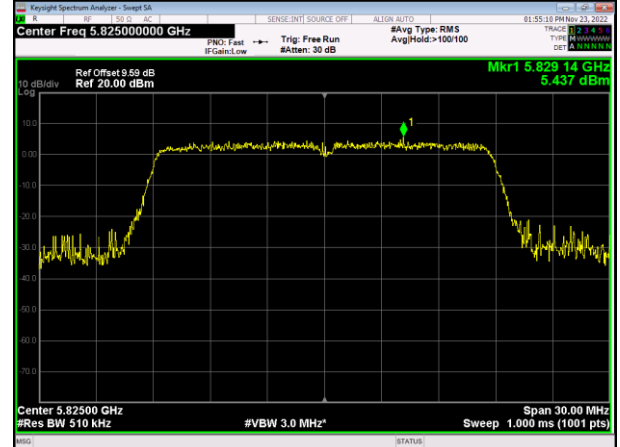


U-NII-3

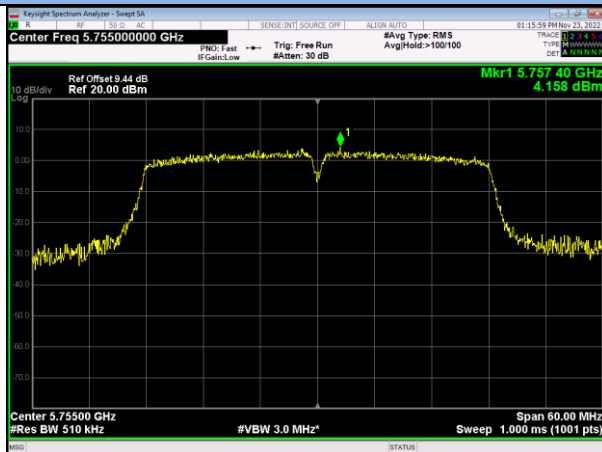
IEEE 802.11ac(VHT20) Middle Channel_ANT 2



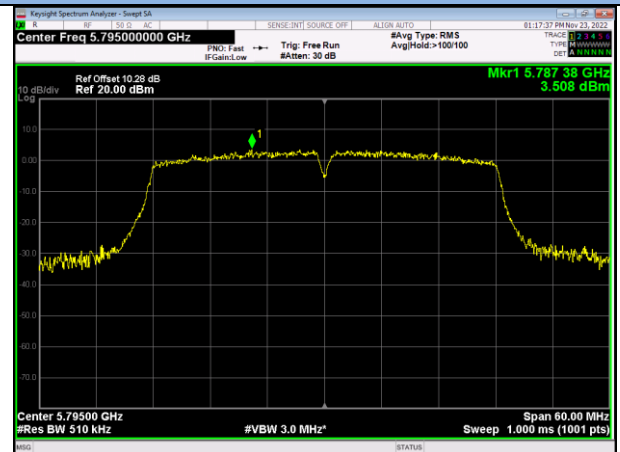
IEEE 802.11ac(VHT20) High Channel_ANT 2



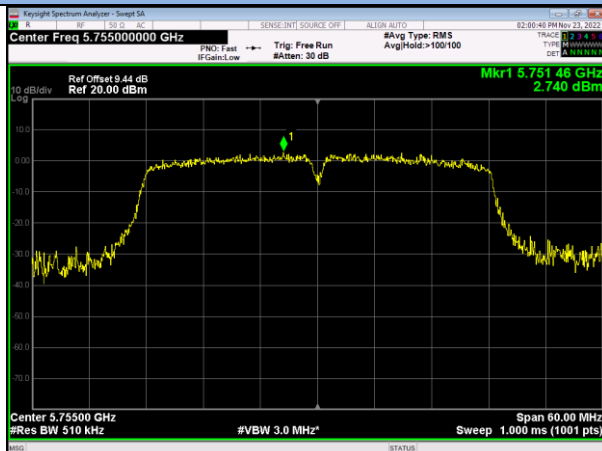
IEEE 802.11n(HT40) Low Channel_ANT 2



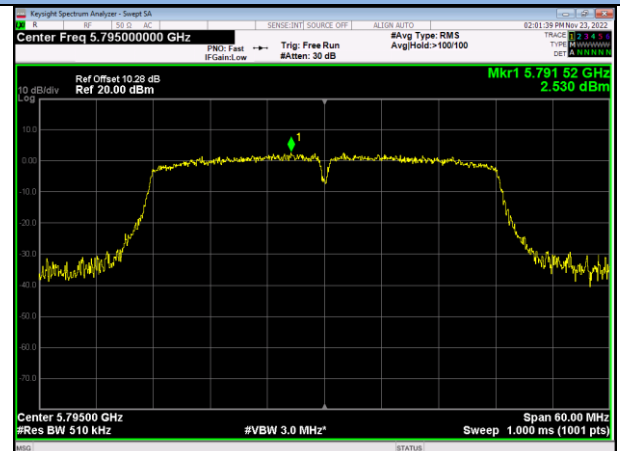
IEEE 802.11n(HT40) High Channel_ANT 2

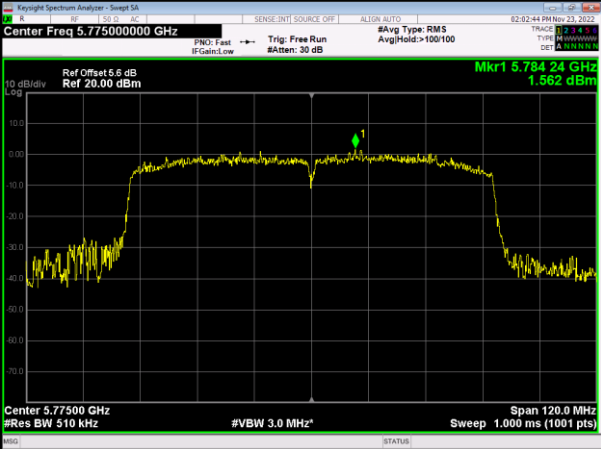


IEEE 802.11ac(VHT40) Low Channel_ANT 2



IEEE 802.11ac(VHT40) High Channel_ANT 2



U-NII-3	
IEEE 802.11ac(VHT80)_ANT 2	---
 The screenshot shows a Keysight Spectrum Analyzer interface. The main display is a log-scale plot of power spectral density (dBm) versus frequency (GHz). The center frequency is set to 5.775000000 GHz. The span is 120.0 MHz, and the resolution bandwidth (RBW) is 510 kHz. A significant signal is visible, with a peak marked at 5.78424 GHz and 1.562 dBm. The signal appears to be a channel of IEEE 802.11ac VHT80. The plot shows a flat top with some noise and a sharp drop-off at the edges of the span.	Blank