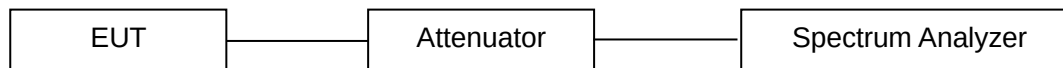


14.5 Power Spectral Density

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						

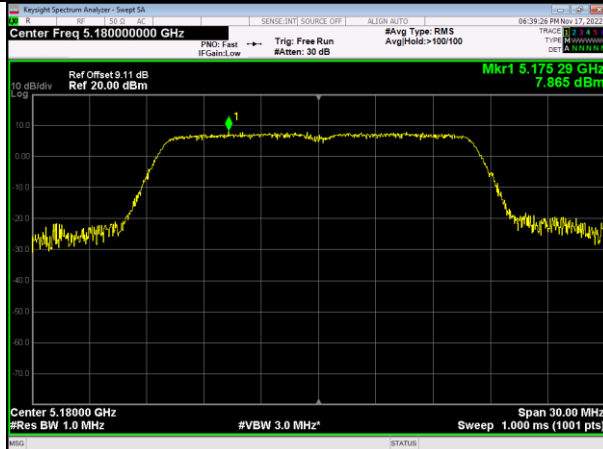
U-NII-2A						
Frequency MHz	Data Rate Mbps	Duty Cycle Factor (dB)	PSD dBm/MHz		Total PSD with duty cycle factor	Limit dBm/ MHz
IEEE 802.11a Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5260	6	0.39	7.974		8.364	11
Channel: 5300	6		8.323		8.713	11
Channel: 5320	6		7.738		8.128	11
IEEE 802.11n(HT20)Mode (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						

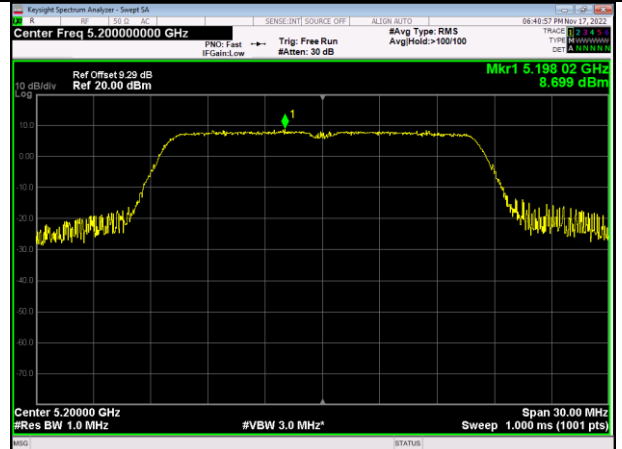
U-NII-3						
Frequency MHz	Data Rate Mbps	Duty Cycle Factor (dB)	PSD dBm/MHz		Total PSD with duty cycle factor	Limit dBm/ 500KHz
IEEE 802.11a Mode (OFDM, Antenna Gain=2.12dBi)						
Channel: 5745	6	0.27	7.117		7.387	30
Channel: 5785	6		7.079		7.349	30
Channel: 5825	6		7.562		7.832	30
IEEE 802.11n(HT20)Mode (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

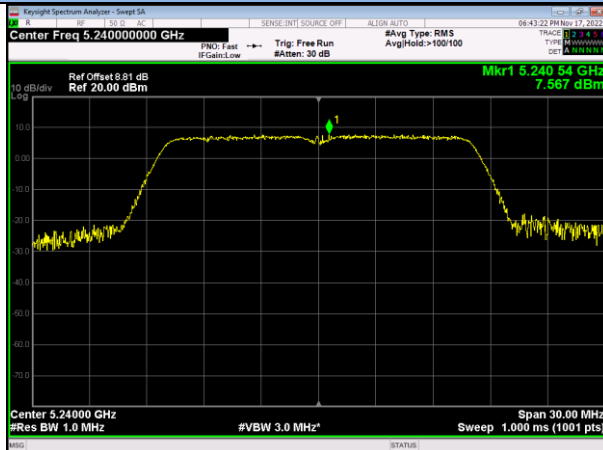
IEEE 802.11a Low Channel



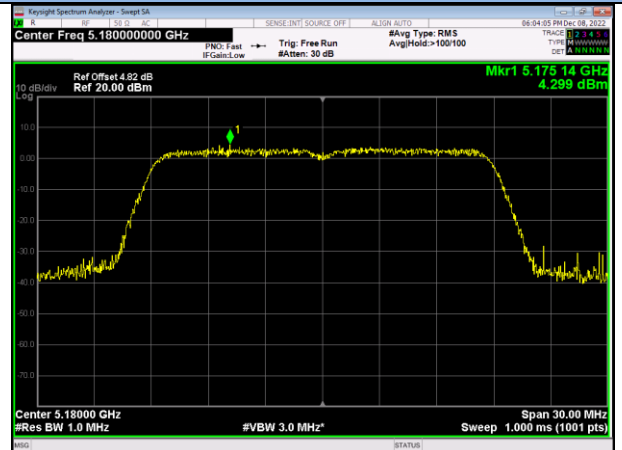
IEEE 802.11a Middle Channel



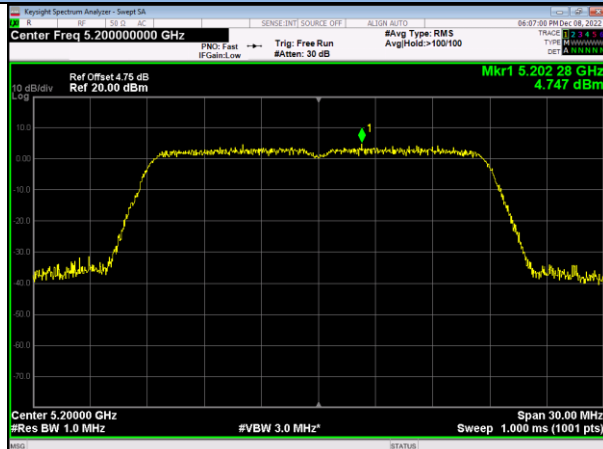
IEEE 802.11a High Channel



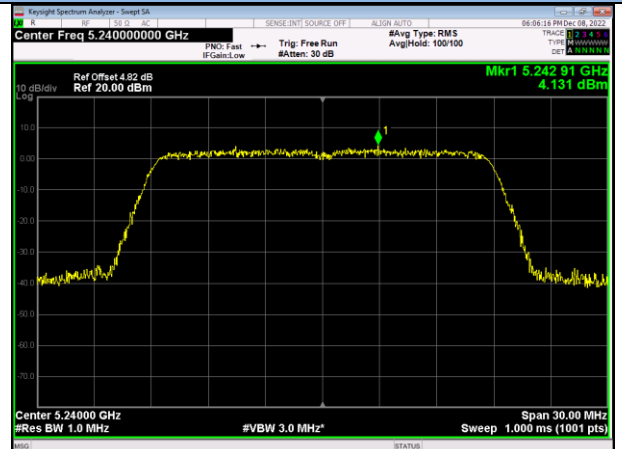
IEEE 802.11n(HT20) Low Channel_ANT 1



IEEE 802.11n(HT20) Middle Channel_ANT 1

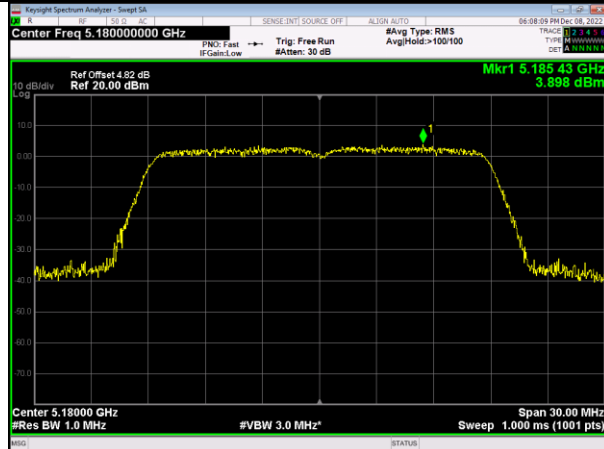


IEEE 802.11n(HT20) High Channel_ANT 1

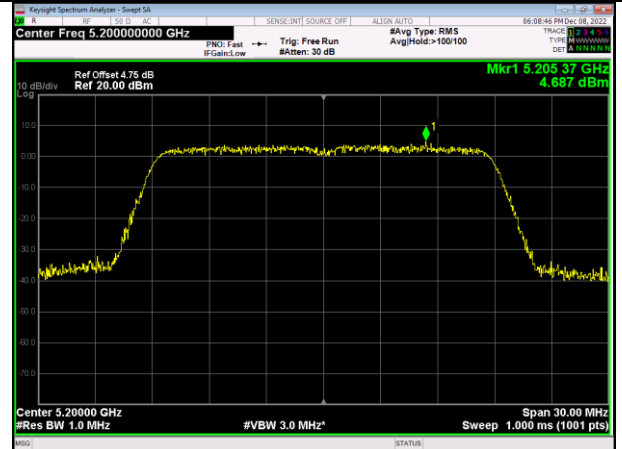


U-NII-1

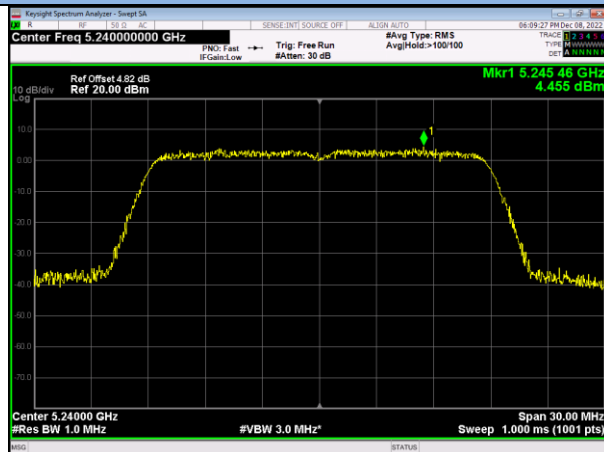
IEEE 802.11ac(VHT20) Low Channel_ANT 1



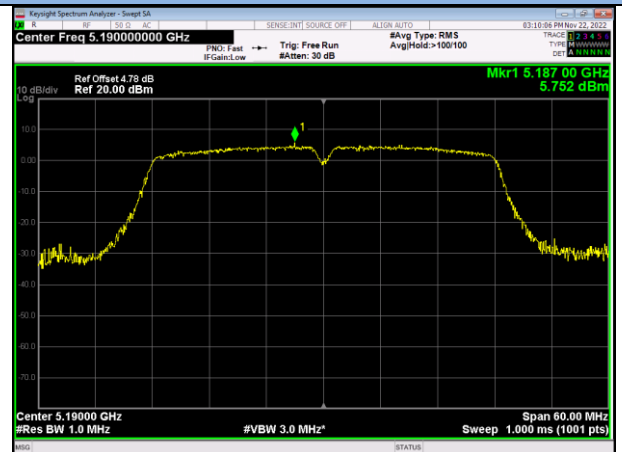
IEEE 802.11ac(VHT20) Middle Channel_ANT 1



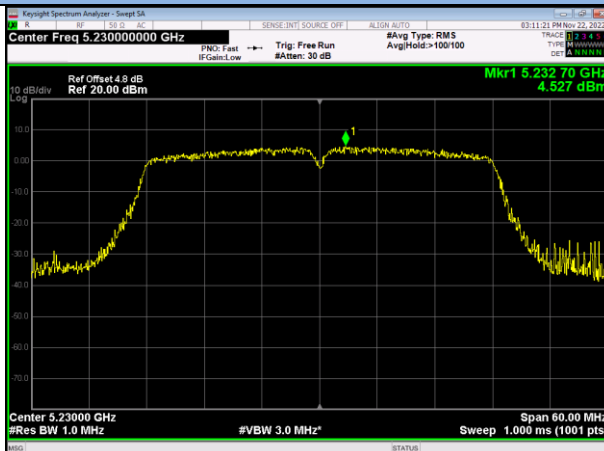
IEEE 802.11ac(VHT20) High Channel_ANT 1



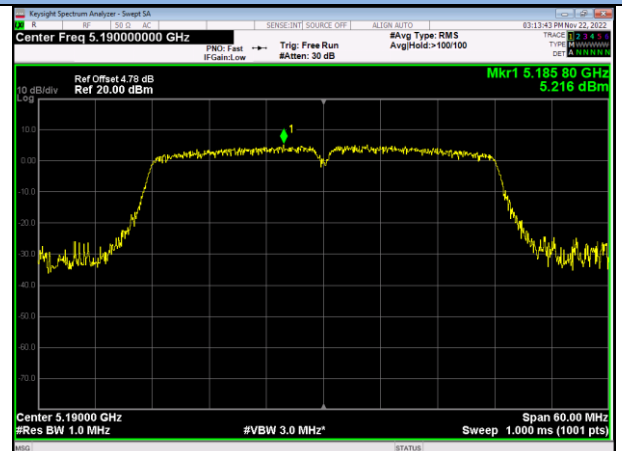
IEEE 802.11n(HT40) Low Channel_ANT 1



IEEE 802.11n(HT40) High Channel_ANT 1

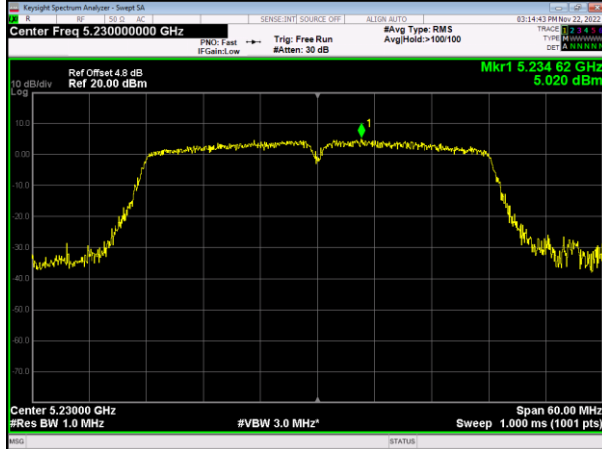


IEEE 802.11ac(VHT40) Low Channel_ANT 1

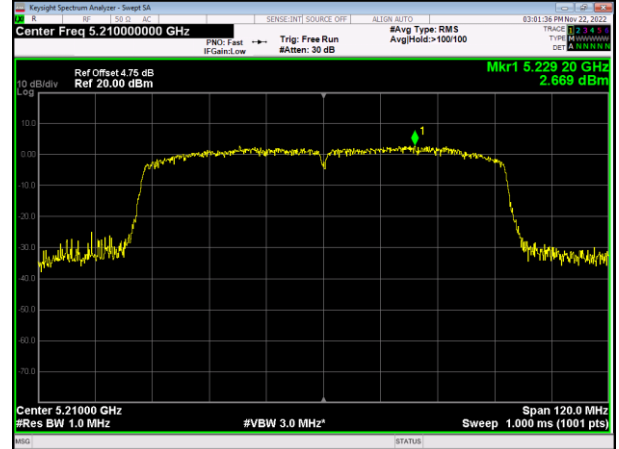


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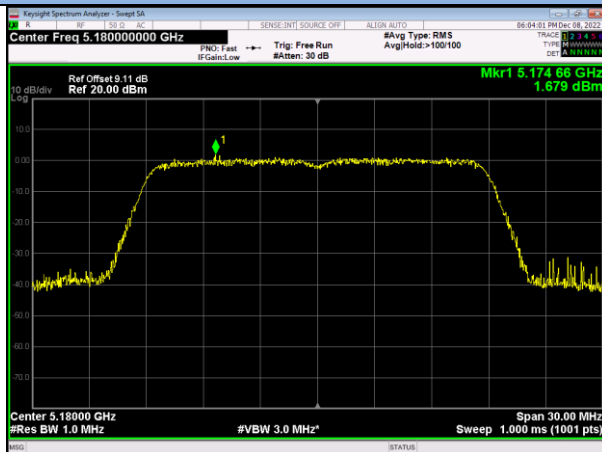
IEEE 802.11ac(VHT40) High Channel_ANT 1



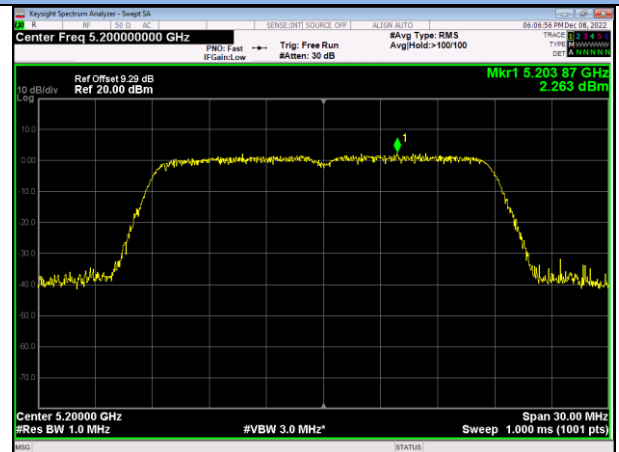
IEEE 802.11ac(VHT80) _ANT 1



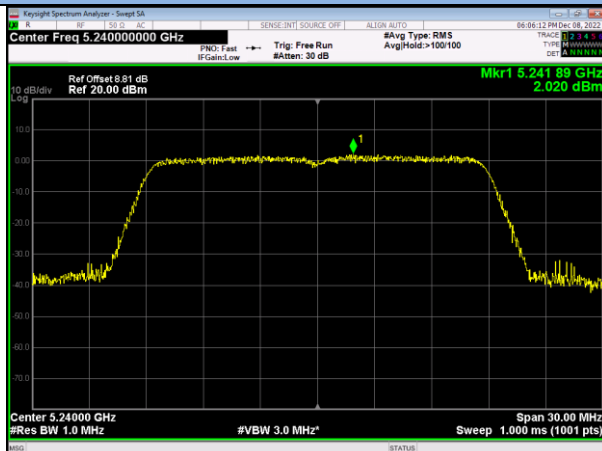
IEEE 802.11n(HT20) Low Channel_ANT 2



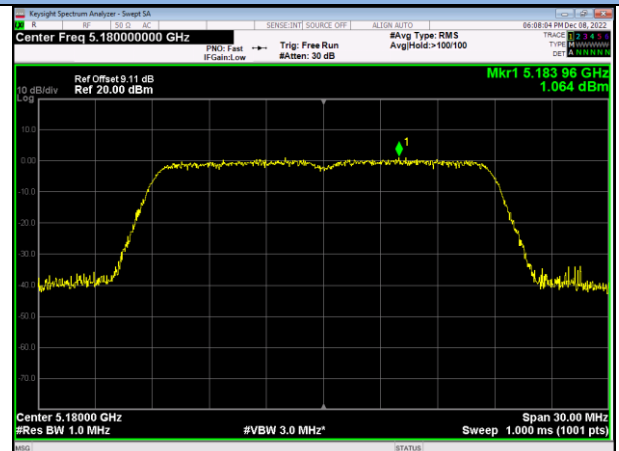
IEEE 802.11n(HT20) Middle Channel_ANT 2



IEEE 802.11n(HT20) High Channel_ANT 2

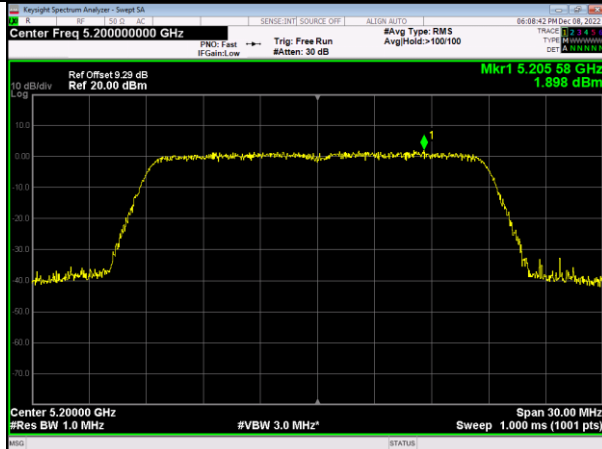


IEEE 802.11ac(VHT20) Low Channel_ANT 2

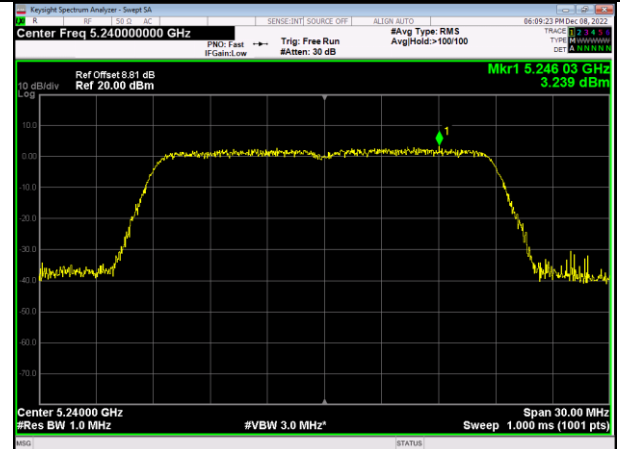


U-NII-1

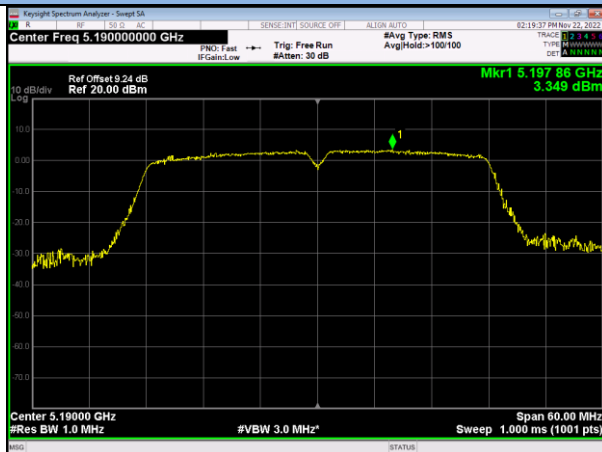
IEEE 802.11ac(VHT20) Middle Channel_ANT 2



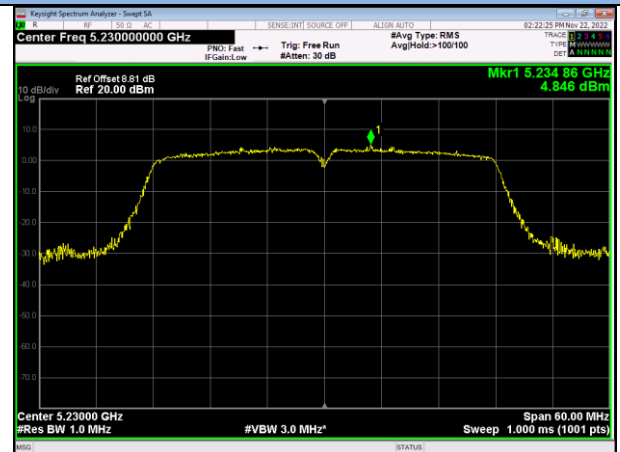
IEEE 802.11ac(VHT20) High Channel_ANT 2



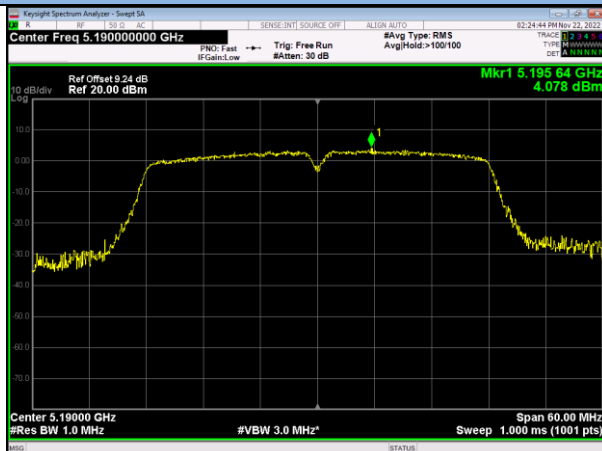
IEEE 802.11n(HT40) Low Channel_ANT 2



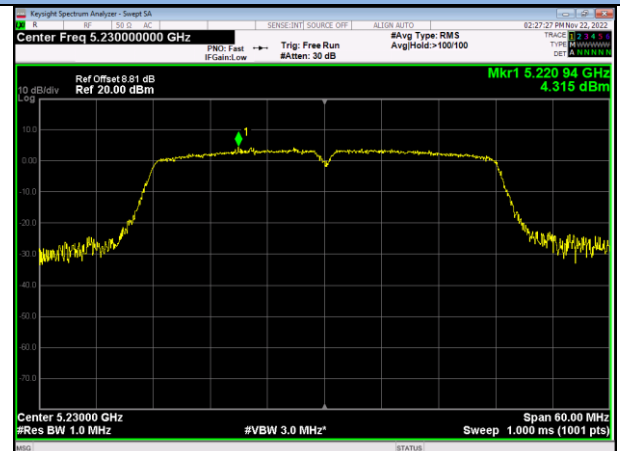
IEEE 802.11n(HT40) High Channel_ANT 2



IEEE 802.11ac(VHT40) Low Channel_ANT 2



IEEE 802.11ac(VHT40) High Channel_ANT 2



U-NII-1

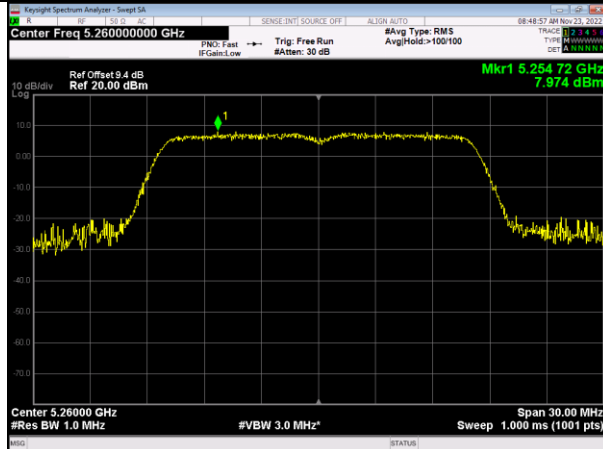
IEEE 802.11ac(VHT80)_ANT 2



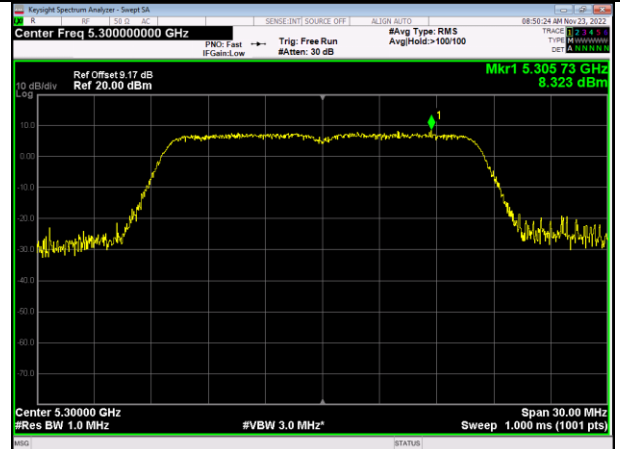
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U-NII-2A

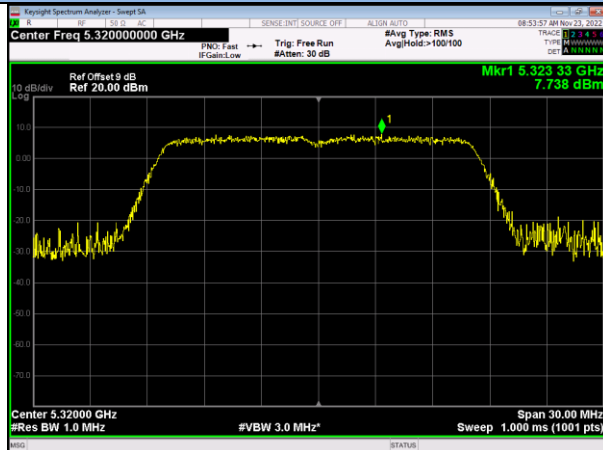
IEEE 802.11a Low Channel



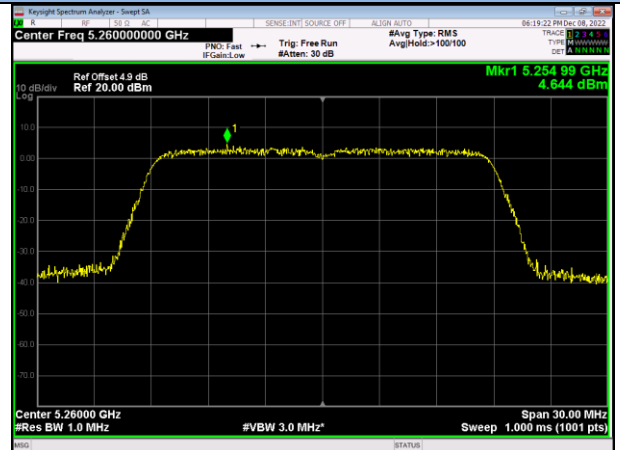
IEEE 802.11a Middle Channel



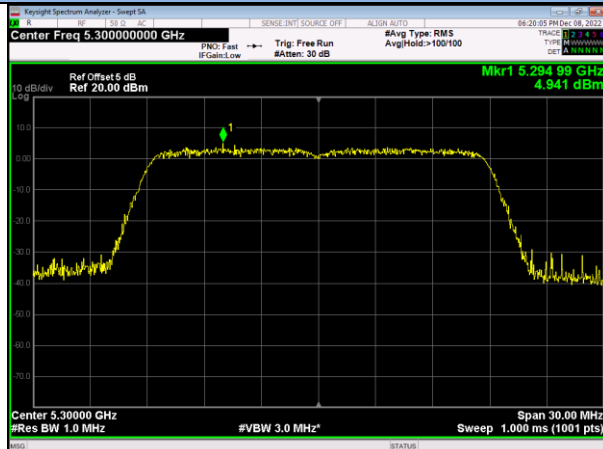
IEEE 802.11a High Channel



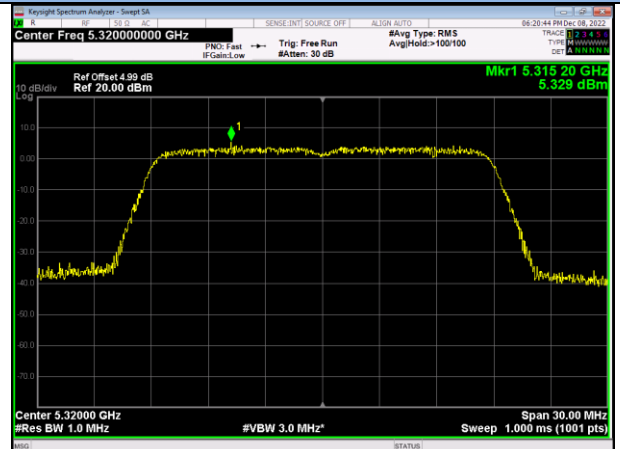
IEEE 802.11n(HT20) Low Channel_ANT 1



IEEE 802.11n(HT20) Middle Channel_ANT 1

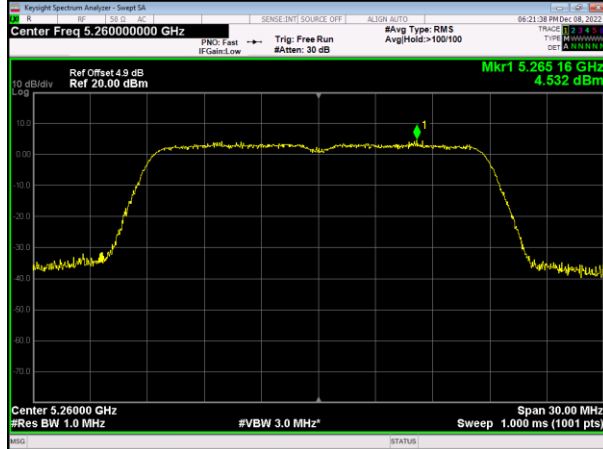


IEEE 802.11n(HT20) High Channel_ANT 1

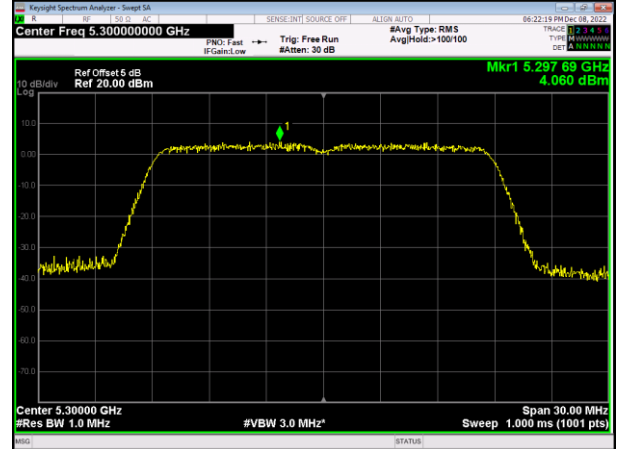


U-NII-2A

IEEE 802.11ac(VHT20) Low Channel_ANT 1



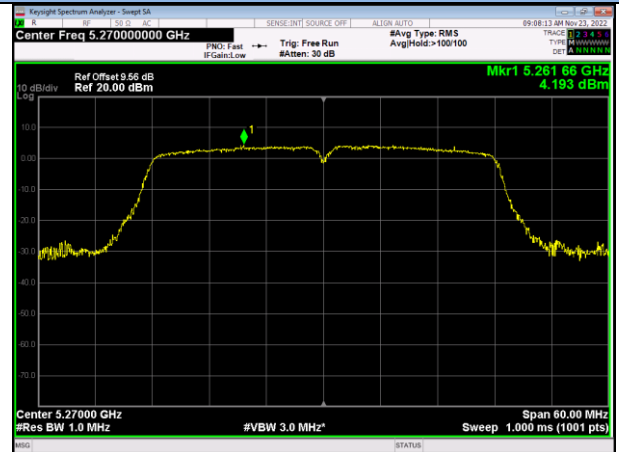
IEEE 802.11ac(VHT20) Middle Channel_ANT 1



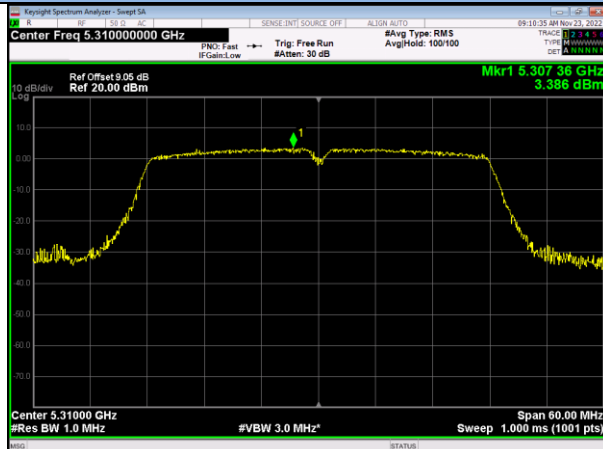
IEEE 802.11ac(VHT20) High Channel_ANT 1



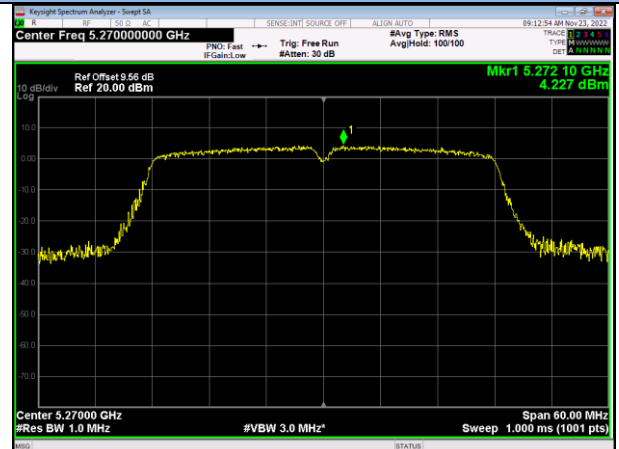
IEEE 802.11n(HT40) Low Channel_ANT 1



IEEE 802.11n(HT40) High Channel_ANT 1

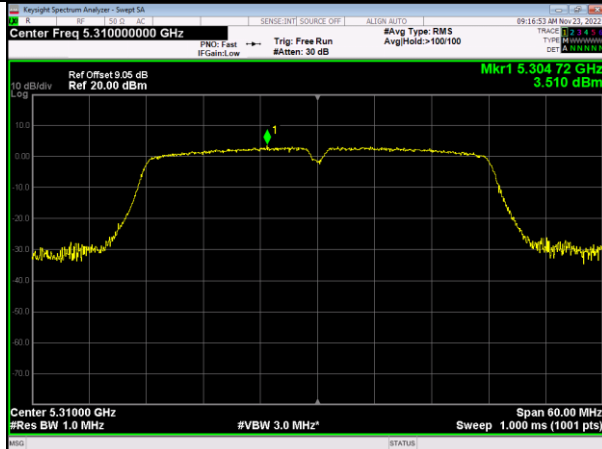


IEEE 802.11ac(VHT40) Low Channel_ANT 1

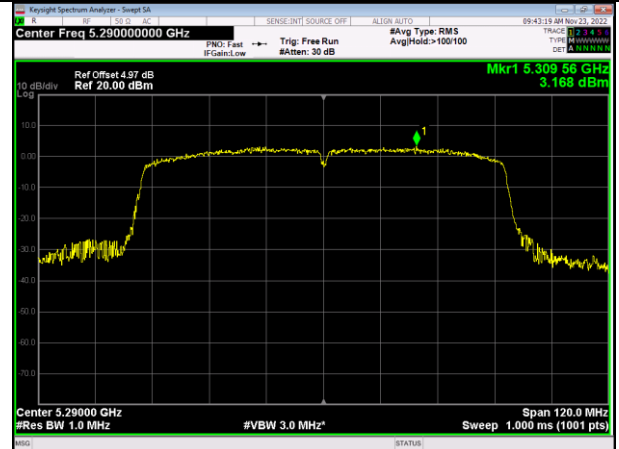


U-NII-2A

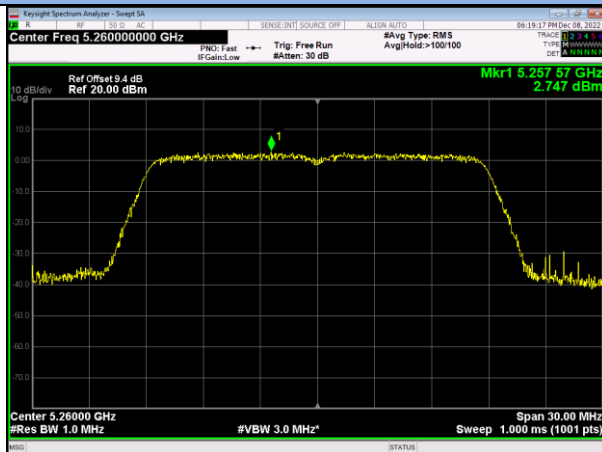
IEEE 802.11ac(VHT40) High Channel_ANT 1



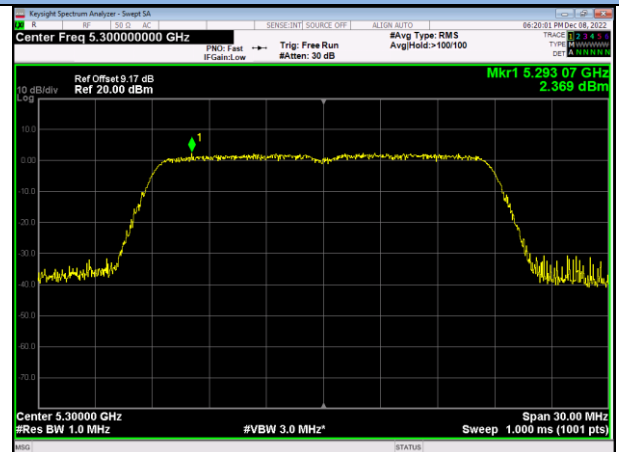
IEEE 802.11ac(VHT80) _ANT 1



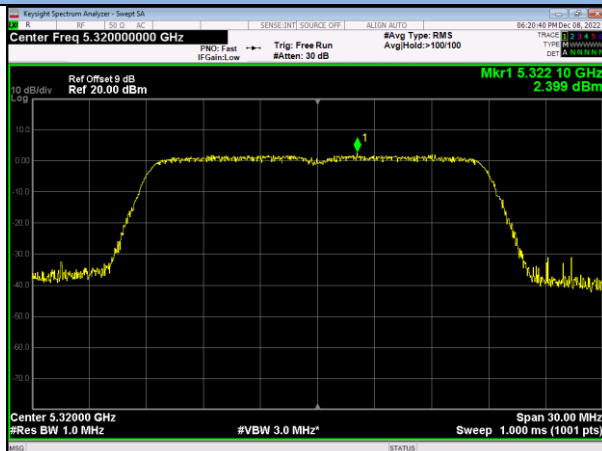
IEEE 802.11n(HT20) Low Channel_ANT 2



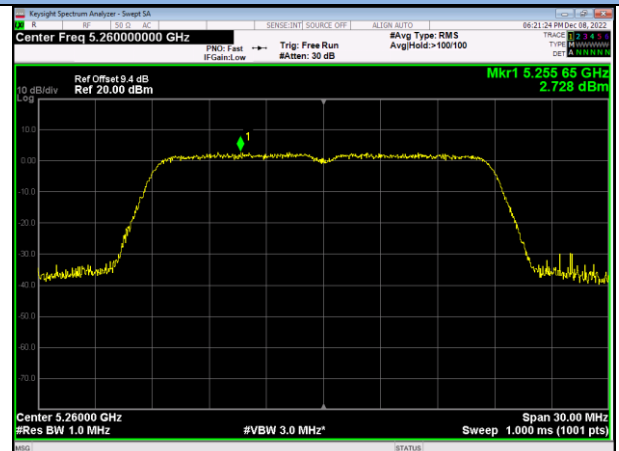
IEEE 802.11n(HT20) Middle Channel_ANT 2



IEEE 802.11n(HT20) High Channel_ANT 2

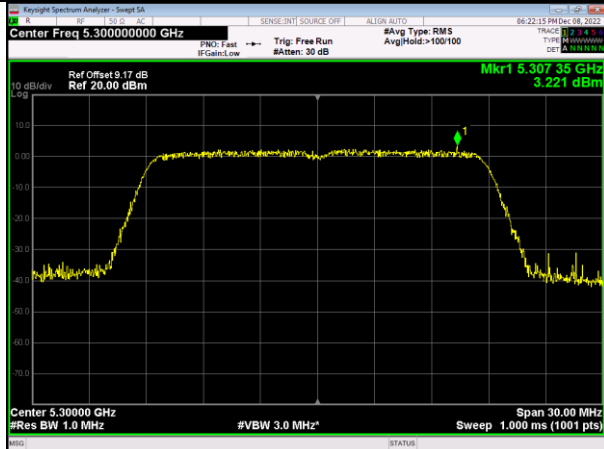


IEEE 802.11ac(VHT20) Low Channel_ANT 2

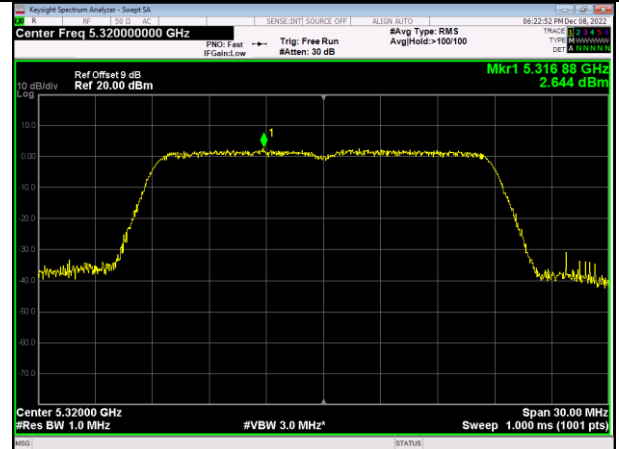


U-NII-2A

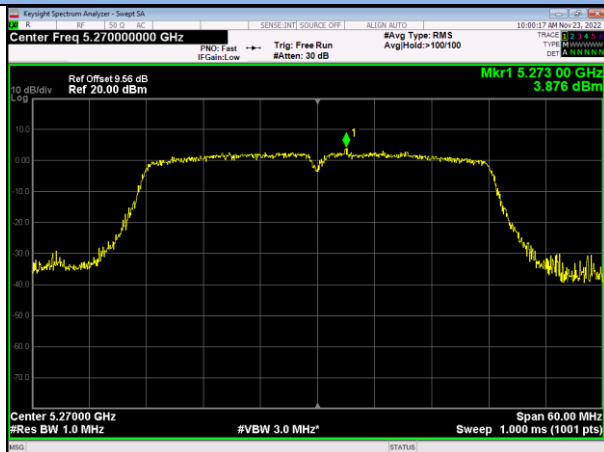
IEEE 802.11ac(VHT20) Middle Channel_ANT 2



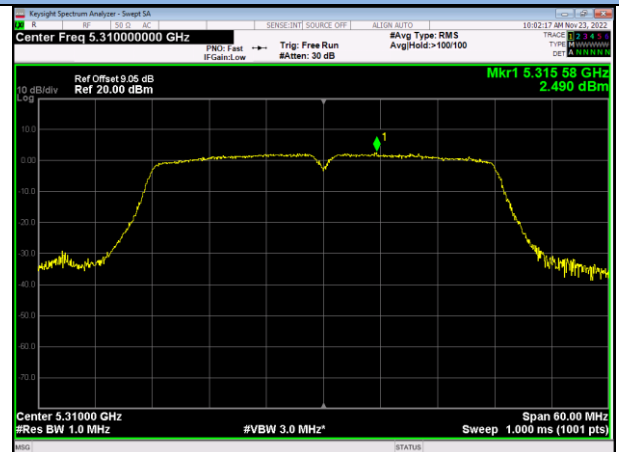
IEEE 802.11ac(VHT20) High Channel_ANT 2



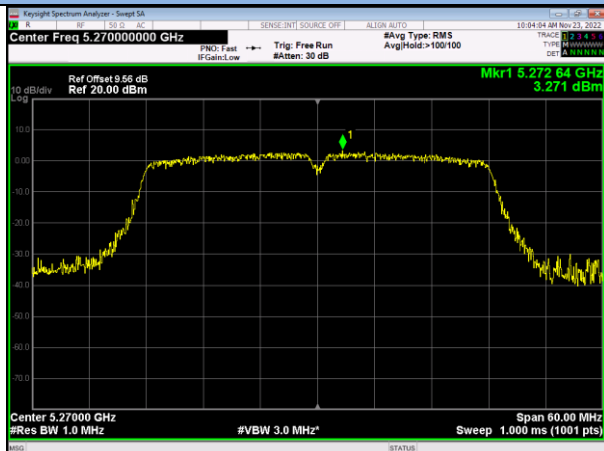
IEEE 802.11n(HT40) Low Channel_ANT 2



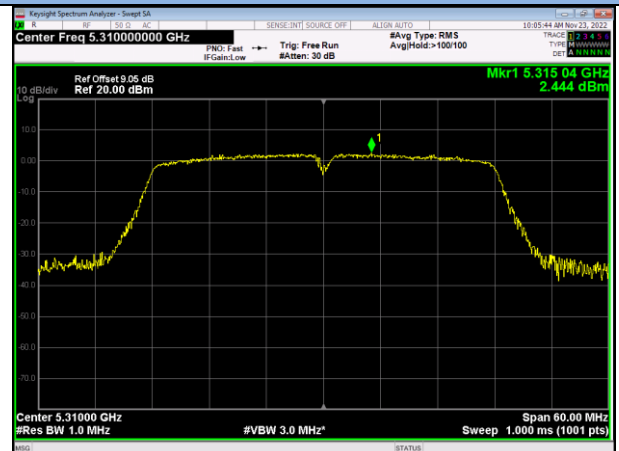
IEEE 802.11n(HT40) High Channel_ANT 2

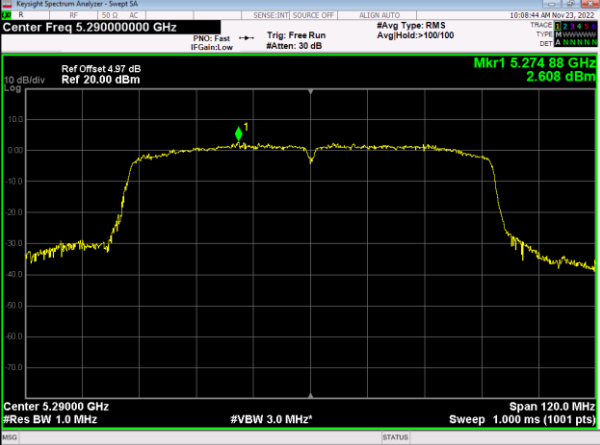


IEEE 802.11ac(VHT40) Low Channel_ANT 2



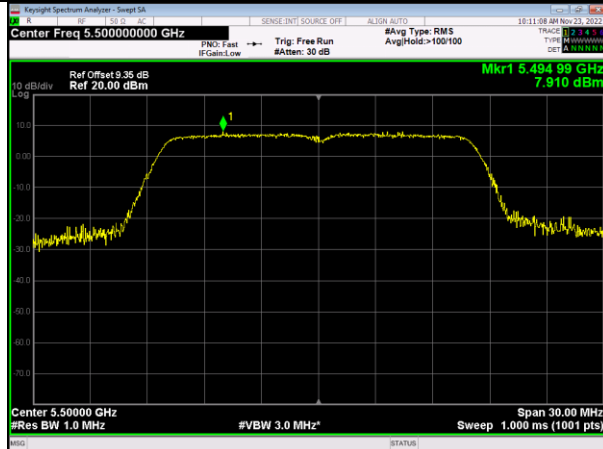
IEEE 802.11ac(VHT40) High Channel_ANT 2



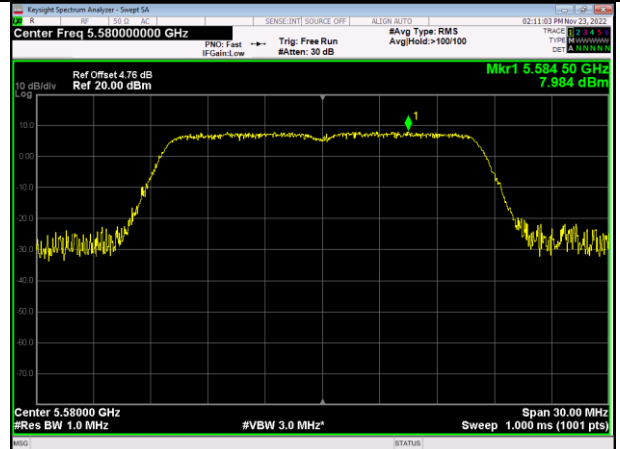
U-NII-2A	
IEEE 802.11ac(VHT80)_ANT 2	---
	Blank

U-NII-2C

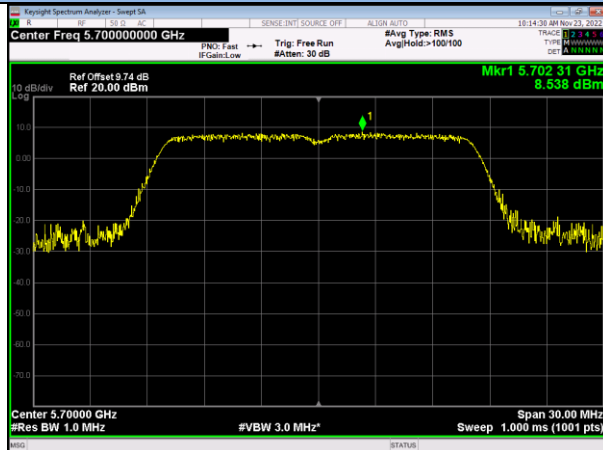
IEEE 802.11a Low Channel



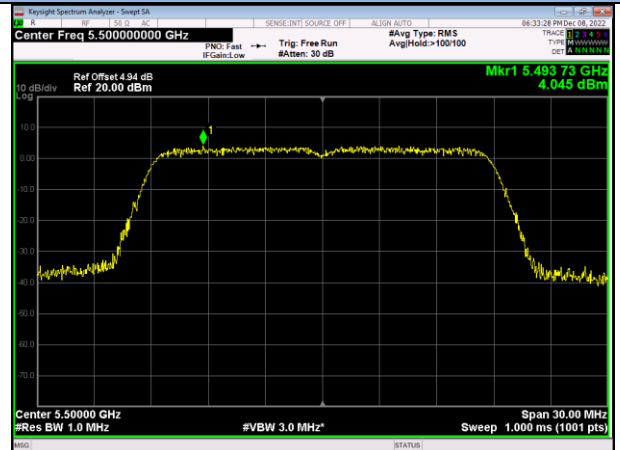
IEEE 802.11a Middle Channel



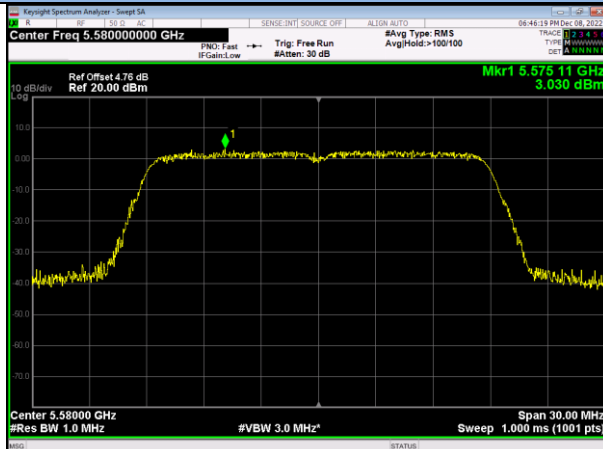
IEEE 802.11a High Channel



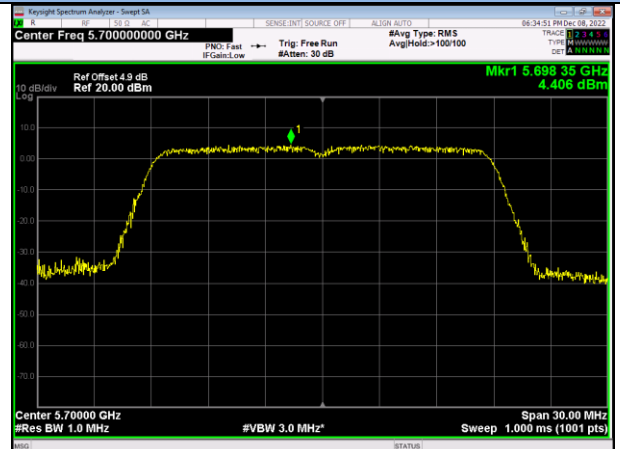
IEEE 802.11n(HT20) Low Channel_ANT 1



IEEE 802.11n(HT20) Middle Channel_ANT 1

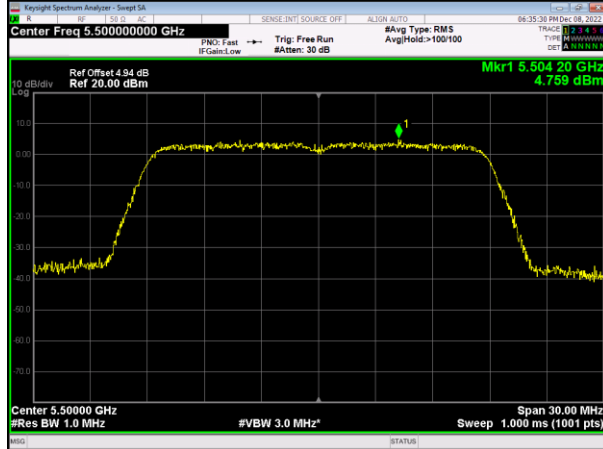


IEEE 802.11n(HT20) High Channel_ANT 1

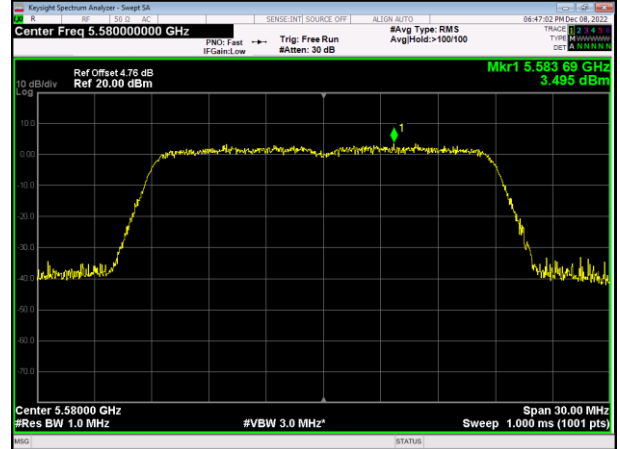


U-NII-2C

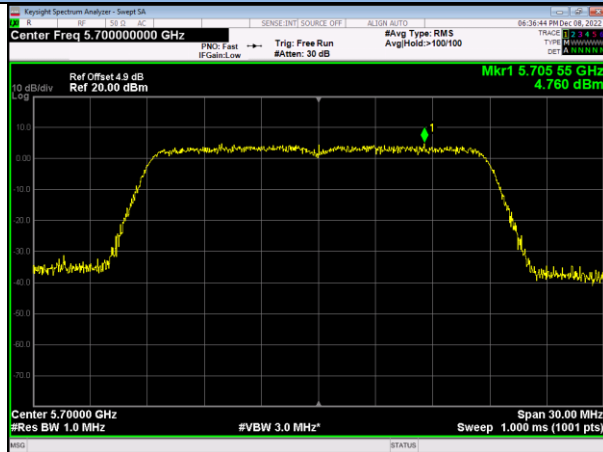
IEEE 802.11ac(VHT20) Low Channel_ANT 1



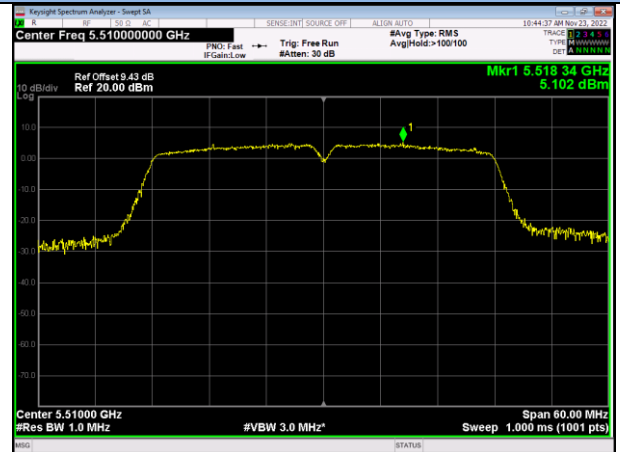
IEEE 802.11ac(VHT20) Middle Channel_ANT 1



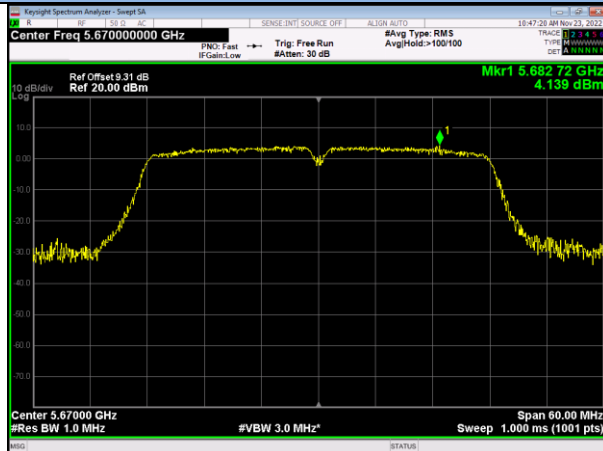
IEEE 802.11ac(VHT20) High Channel_ANT 1



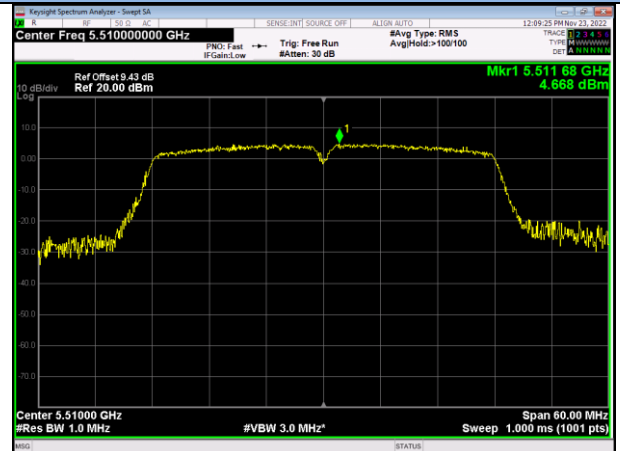
IEEE 802.11n(HT40) Low Channel_ANT 1



IEEE 802.11n(HT40) High Channel_ANT 1

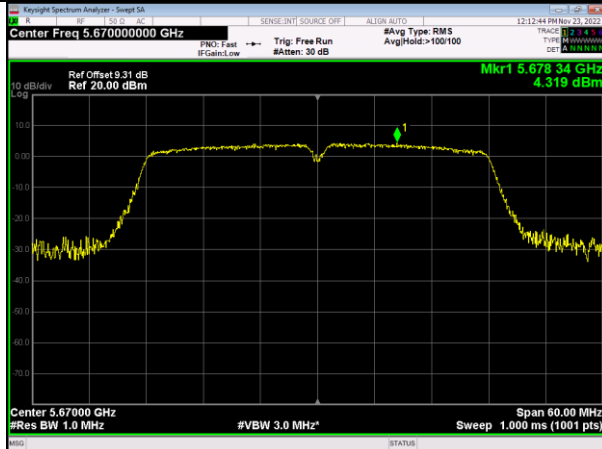


IEEE 802.11ac(VHT40) Low Channel_ANT 1

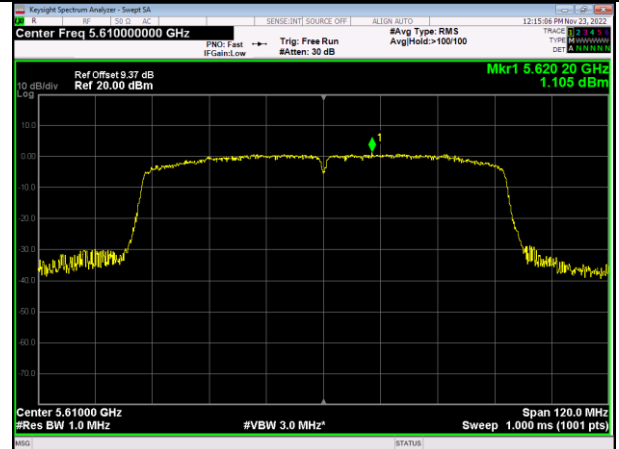


U-NII-2C

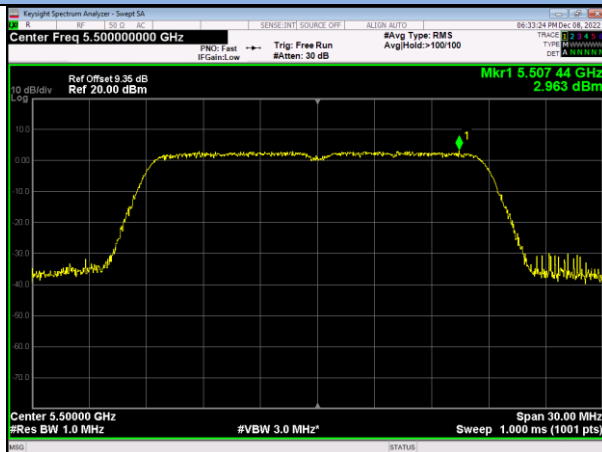
IEEE 802.11ac(VHT40) High Channel_ANT 1



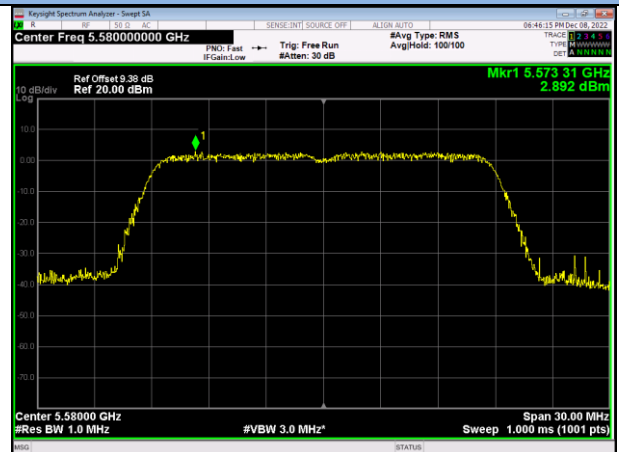
IEEE 802.11ac(VHT80) _ANT 1



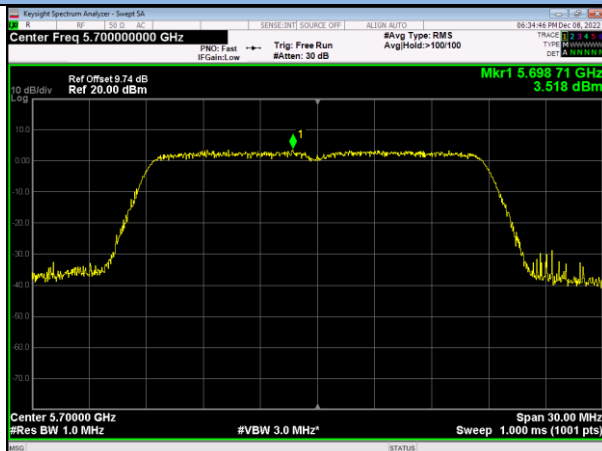
IEEE 802.11n(HT20) Low Channel_ANT 2



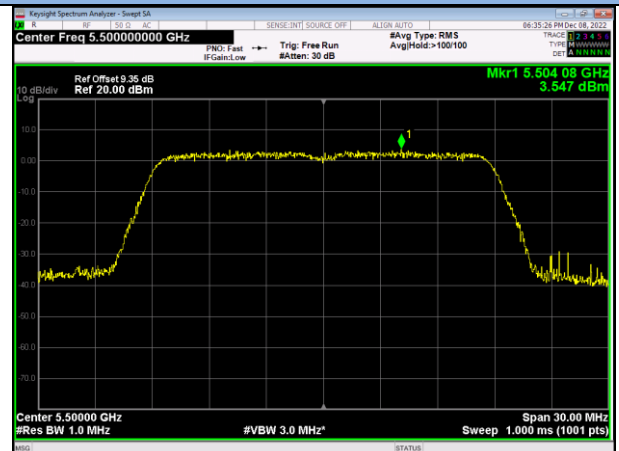
IEEE 802.11n(HT20) Middle Channel_ANT 2



IEEE 802.11n(HT20) High Channel_ANT 2

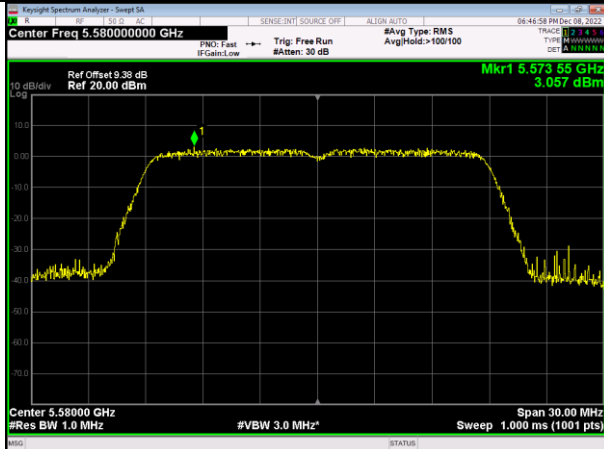


IEEE 802.11ac(VHT20) Low Channel_ANT 2

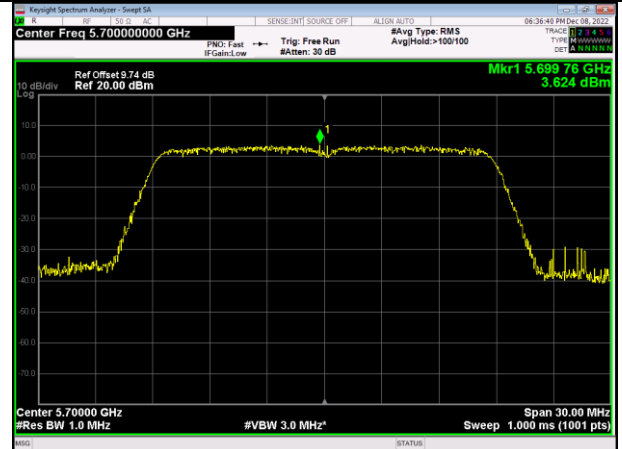


U-NII-2C

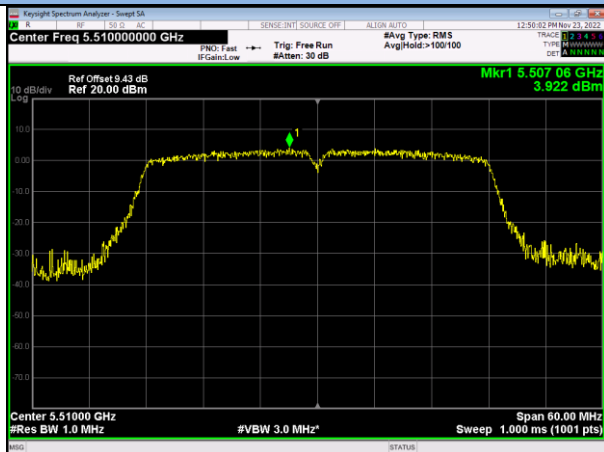
IEEE 802.11ac(VHT20) Middle Channel_ANT 2



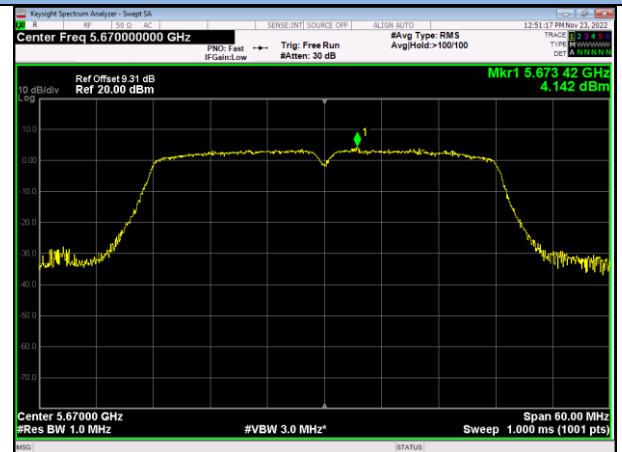
IEEE 802.11ac(VHT20) High Channel_ANT 2



IEEE 802.11n(HT40) Low Channel_ANT 2



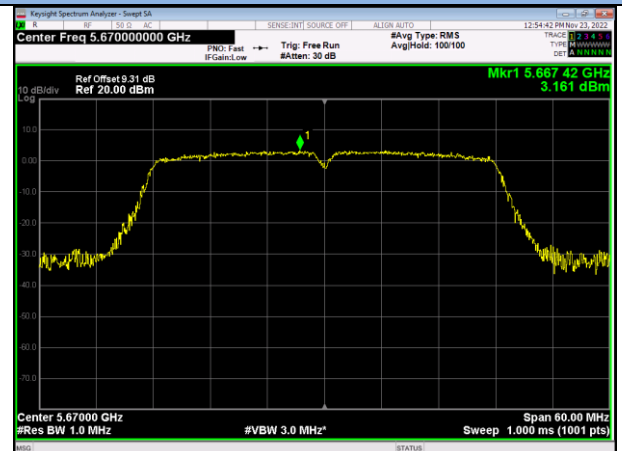
IEEE 802.11n(HT40) High Channel_ANT 2

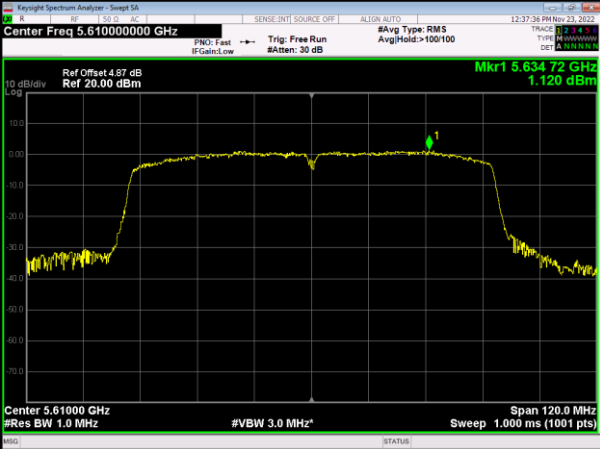


IEEE 802.11ac(VHT40) Low Channel_ANT 2



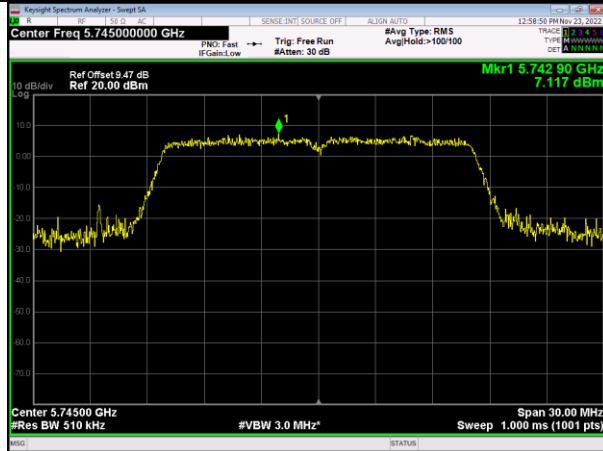
IEEE 802.11ac(VHT40) High Channel_ANT 2



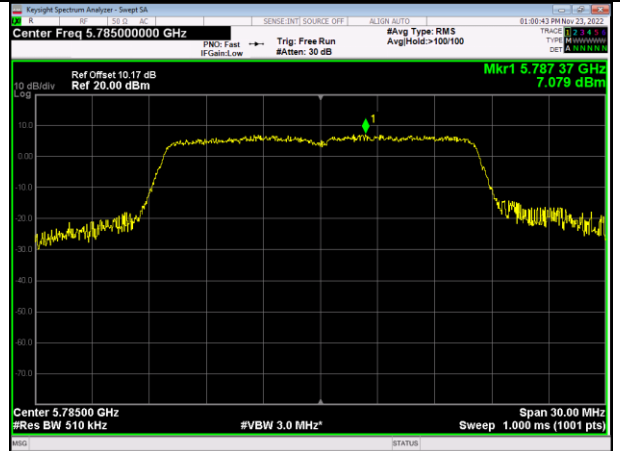
U-NII-2C	
IEEE 802.11ac(VHT80)_ANT 2	---
 Center Freq 5.610000000 GHz Ref Offset 4.67 dB Ref 20.00 dBm Mkr1 5.634 72 GHz 1.120 dBm Center 5.61000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz* Span 120.0 MHz Sweep 1.000 ms (1001 pts)	Blank

U-NII-3

IEEE 802.11a Low Channel



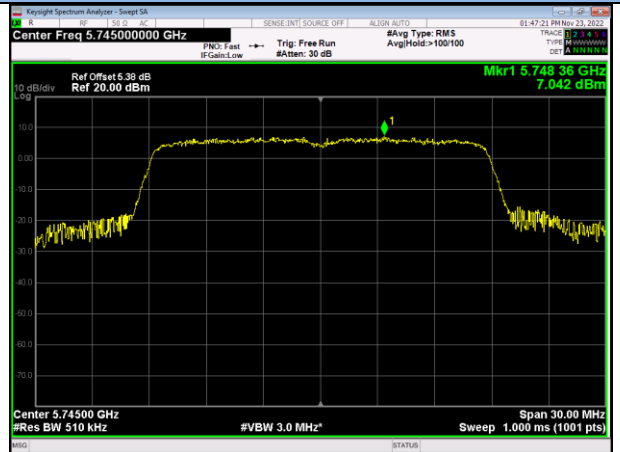
IEEE 802.11a Middle Channel



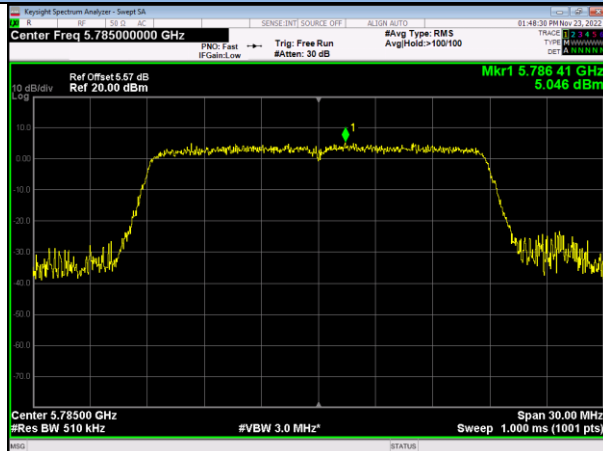
IEEE 802.11a High Channel



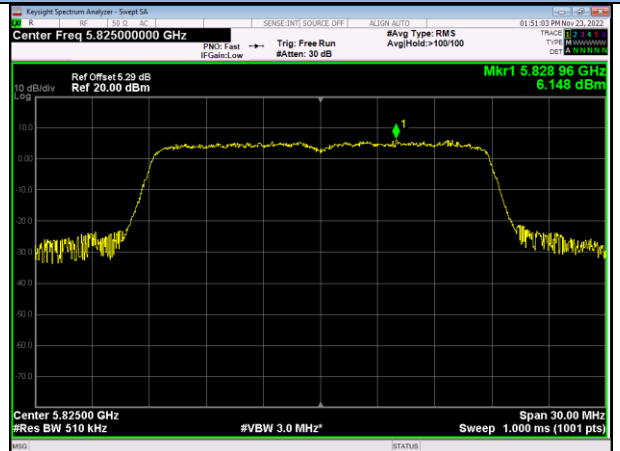
IEEE 802.11n(HT20) Low Channel_ANT 1



IEEE 802.11n(HT20) Middle Channel_ANT 1

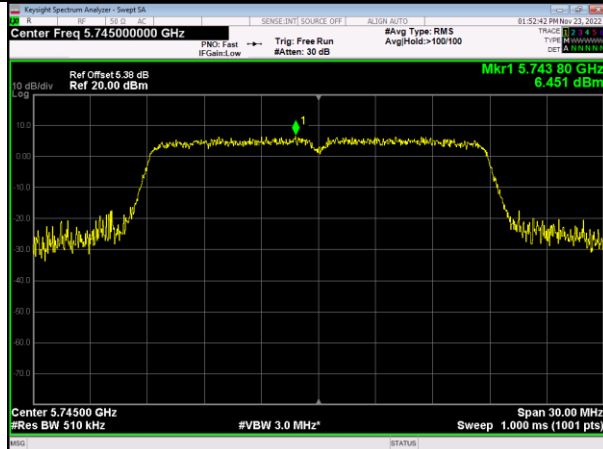


IEEE 802.11n(HT20) High Channel_ANT 1

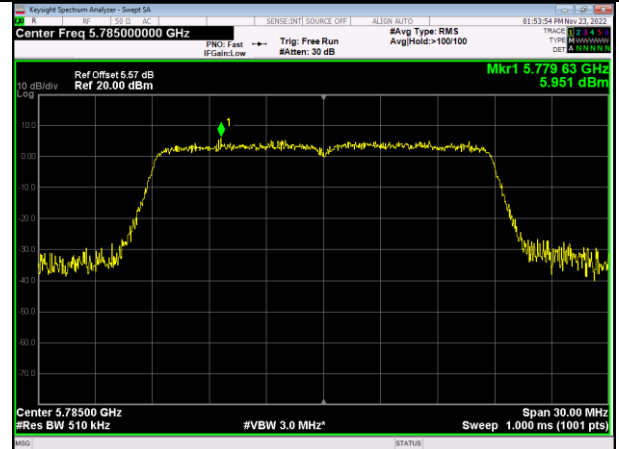


U-NII-3

IEEE 802.11ac(VHT20) Low Channel_ANT 1



IEEE 802.11ac(VHT20) Middle Channel_ANT 1



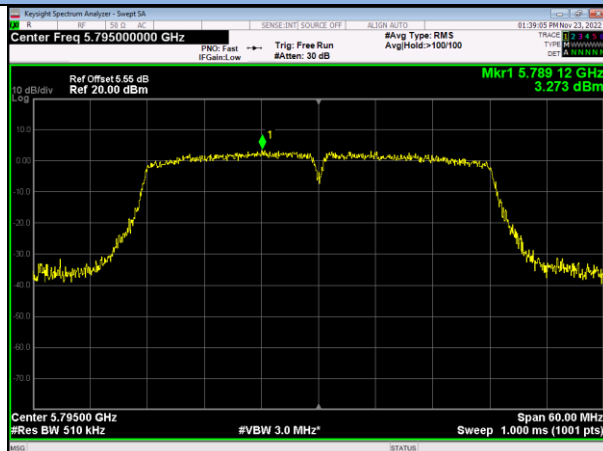
IEEE 802.11ac(VHT20) High Channel_ANT 1



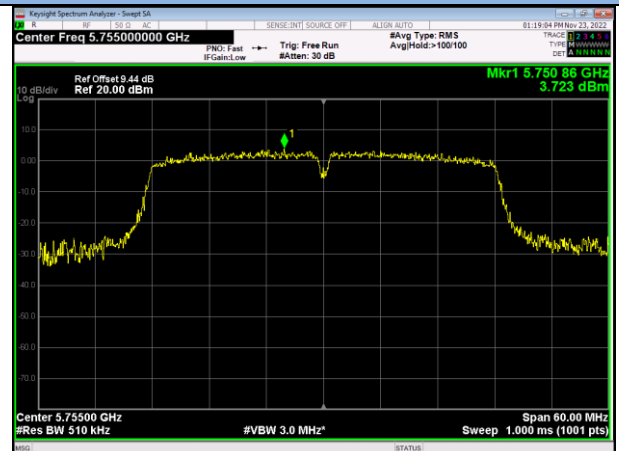
IEEE 802.11n(HT40) Low Channel_ANT 1



IEEE 802.11n(HT40) High Channel_ANT 1

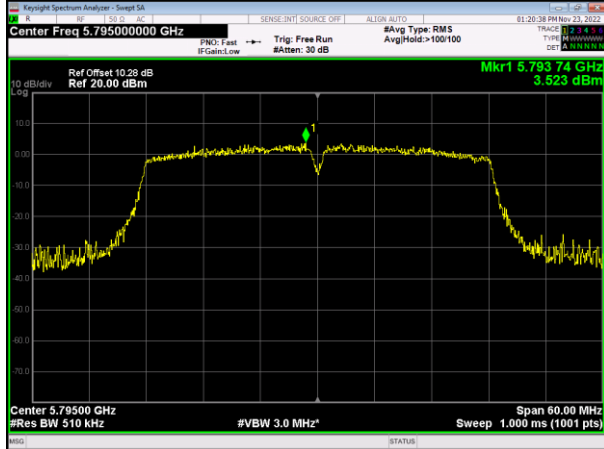


IEEE 802.11ac(VHT40) Low Channel_ANT 1

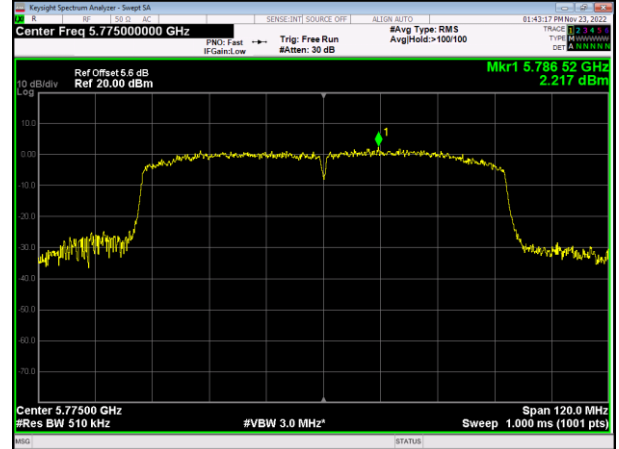


U-NII-3

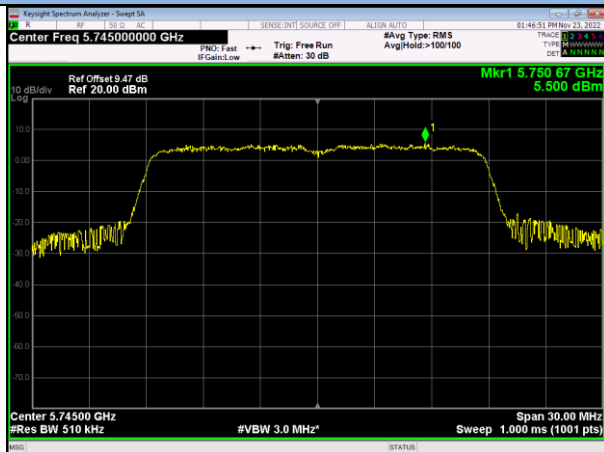
IEEE 802.11ac(VHT40) High Channel_ANT 1



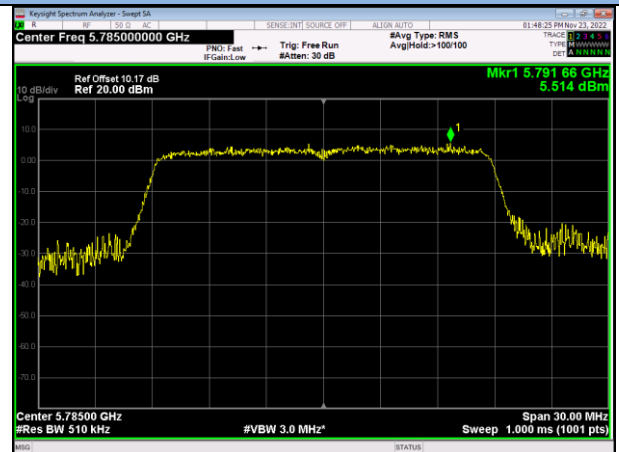
IEEE 802.11ac(VHT80) _ANT 1



IEEE 802.11n(HT20) Low Channel_ANT 2



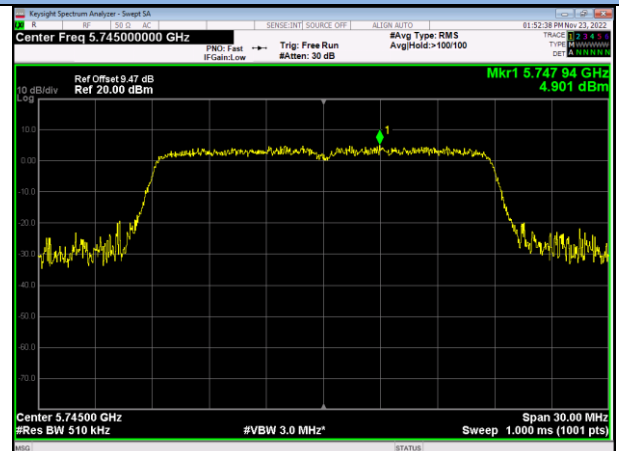
IEEE 802.11n(HT20) Middle Channel_ANT 2



IEEE 802.11n(HT20) High Channel_ANT 2

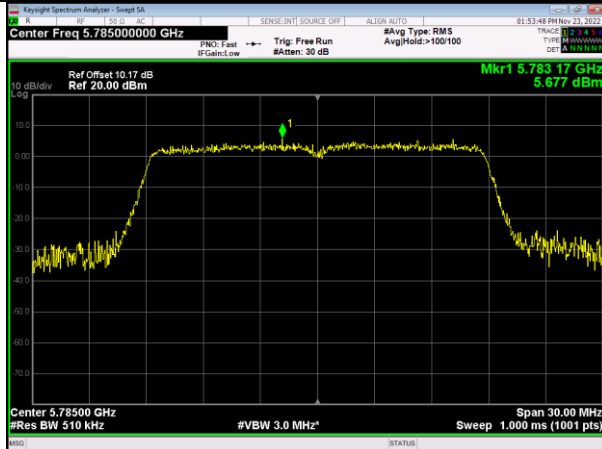


IEEE 802.11ac(VHT20) Low Channel_ANT 2

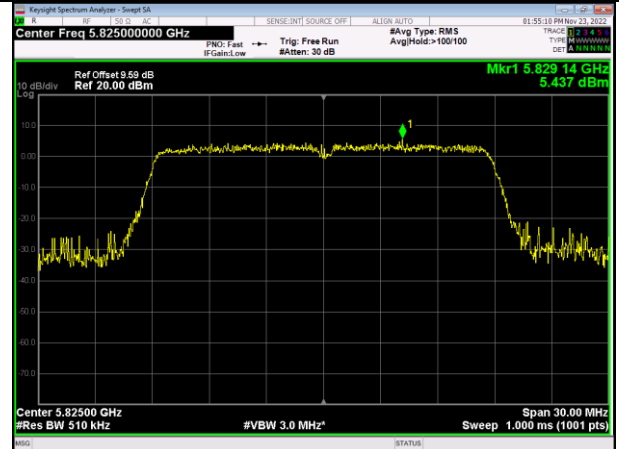


U-NII-3

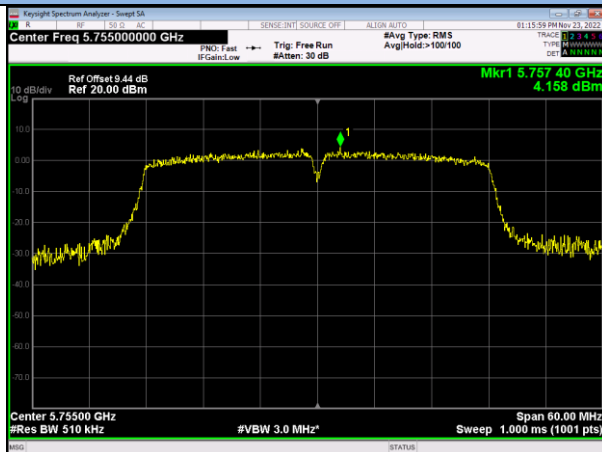
IEEE 802.11ac(VHT20) Middle Channel_ANT 2



IEEE 802.11ac(VHT20) High Channel_ANT 2



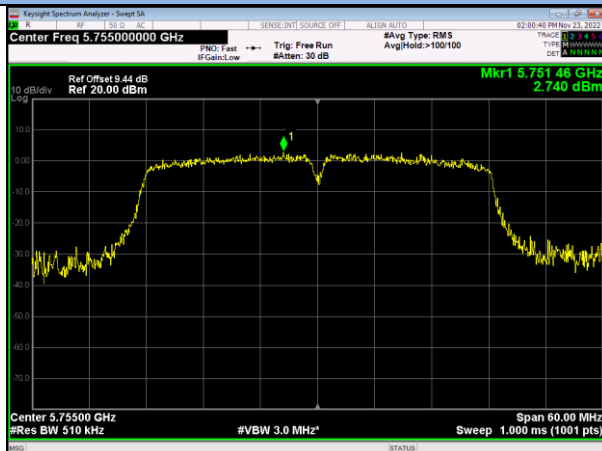
IEEE 802.11n(HT40) Low Channel_ANT 2



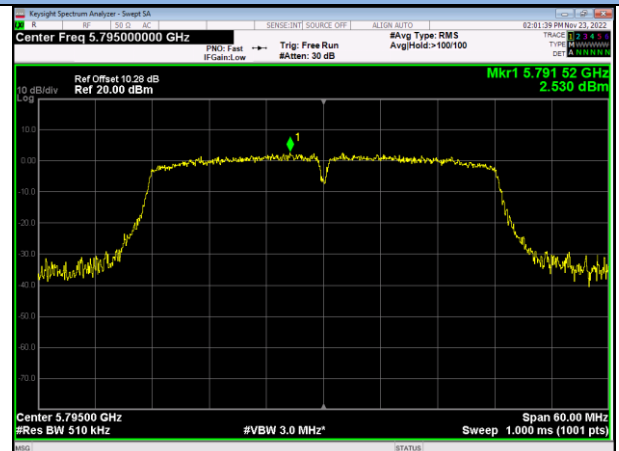
IEEE 802.11n(HT40) High Channel_ANT 2

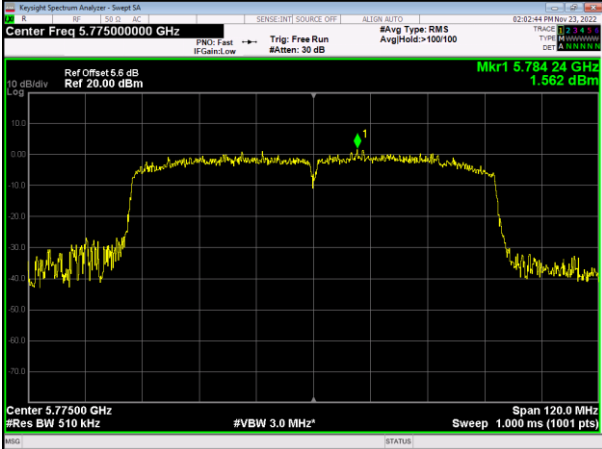


IEEE 802.11ac(VHT40) Low Channel_ANT 2



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 center frequency is 5.775000000 GHz. The signal is a rectangular pulse centered at 5.78424 GHz with a power of 1.562 dBm. The span is 120.0 MHz, and the resolution bandwidth is 510 kHz. The vertical axis is in dBm, ranging from -70.0 to 10.0. The horizontal axis is in MHz, ranging from 5.760 to 5.790.	Blank