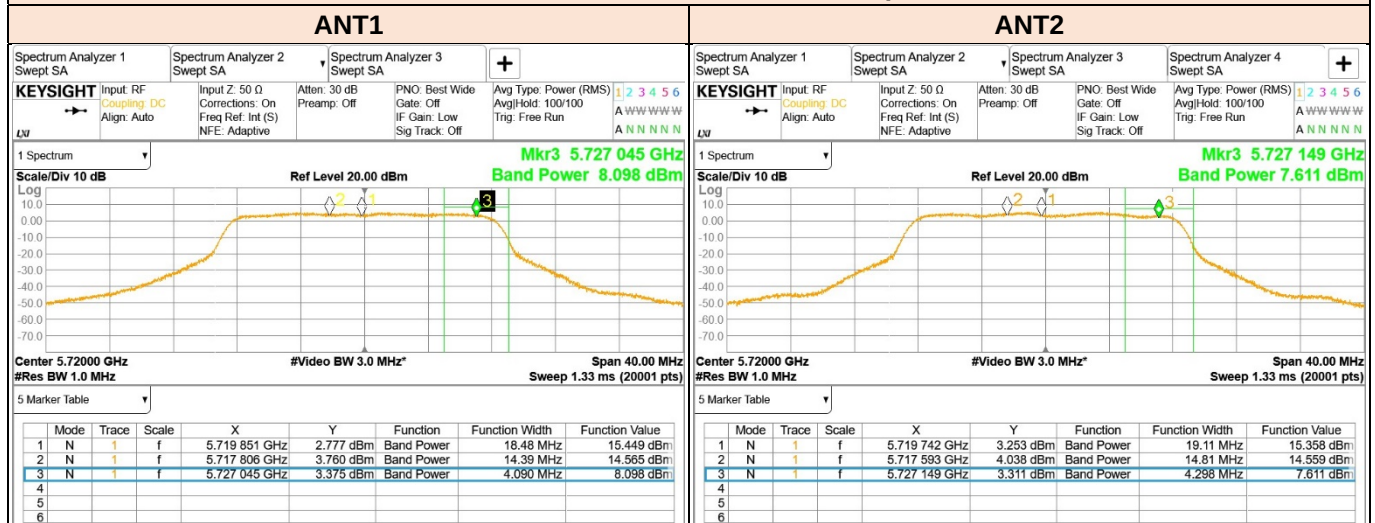




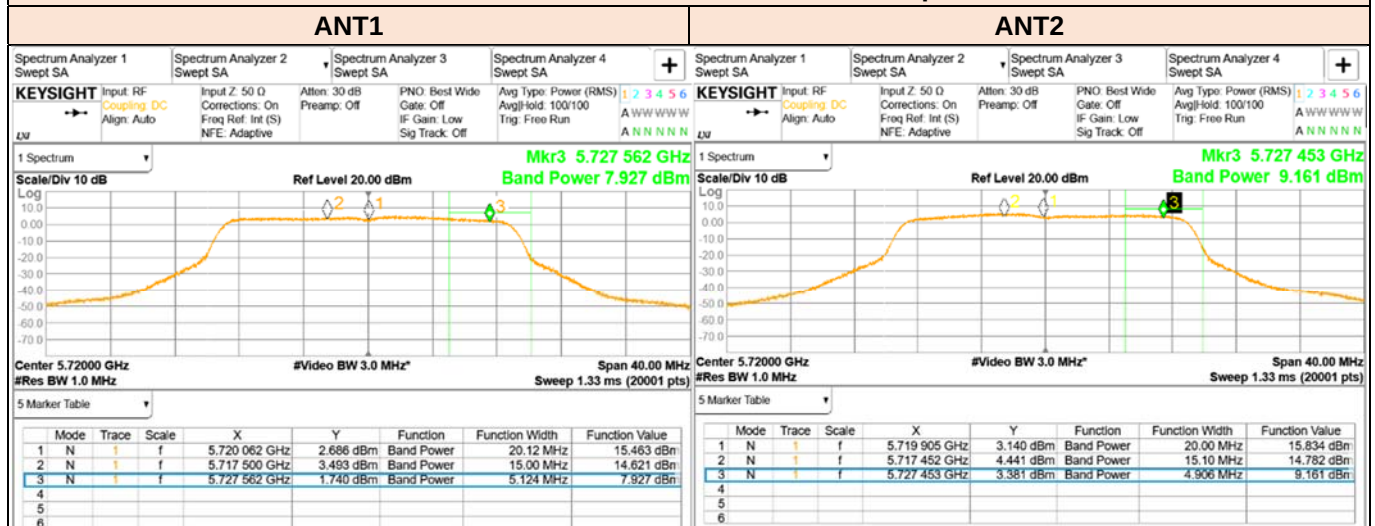
BUREAU
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[Test Plot of Straddle Channel Maximum Power]

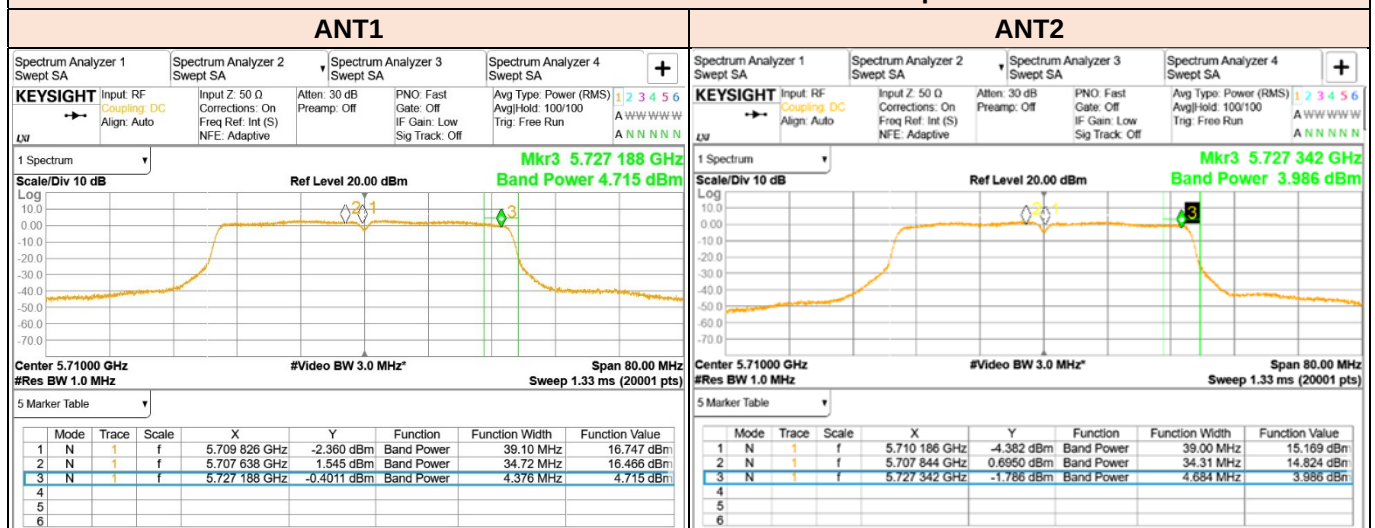
UNII Straddle Ch. IEEE 802.11a mode Output Power



UNII Straddle Ch. IEEE 802.11n HT20 mode Output Power



UNII Straddle Ch. IEEE 802.11n HT40 mode Output Power

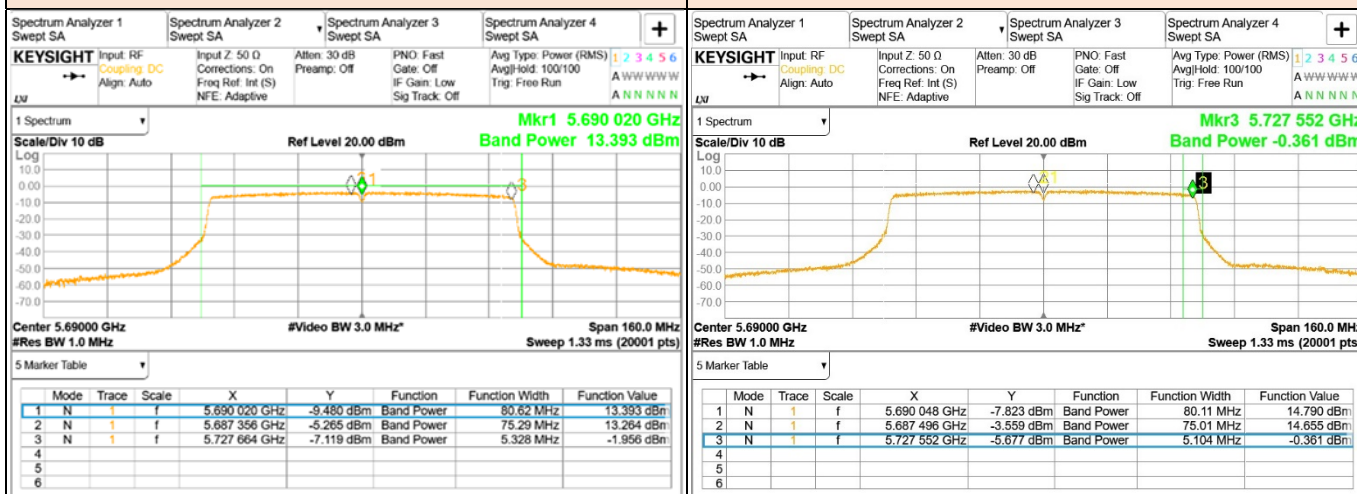




UNII Straddle Ch. IEEE 802.11n VHT80 mode Output Power

ANT1

ANT2



3.4 Maximum Power Spectral Density

3.4.1 Regulation

§15.407(a)(1)(iv) : For 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.

§15.407(a)(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.

§15.407(a)(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.

3.4.2 Test Procedure

Method SA-1 uses trace averaging with the EUT transmitting at full power throughout each sweep. The procedure for this method is as follows:

- a) Set span to encompass the entire 26 dB EBW or 99% OBW of the signal.
- b) Set RBW = 1 MHz.
- c) Set VBW $\geq$ 3 MHz.
- d) Number of points in sweep $\geq [2 \times \text{span} / \text{RBW}]$. (This gives bin-to-bin spacing $\leq \text{RBW} / 2$, so that narrowband signals are not lost between frequency bins.)
- e) Sweep time = auto.
- f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- g) If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full

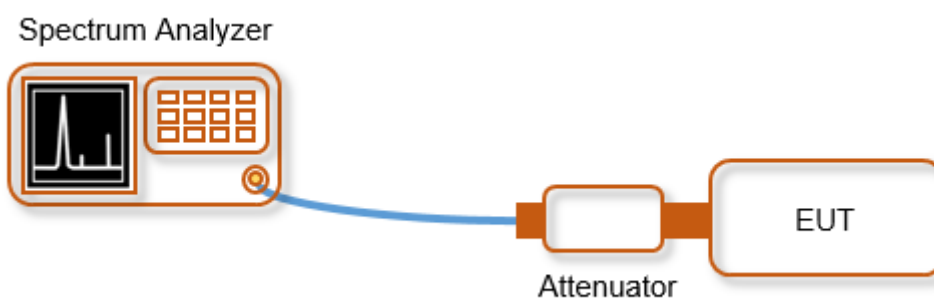
power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle $\geq 98\%$, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.”

- h) Trace average at least 100 traces in power averaging (rms) mode.
- i) Compute power by integrating the spectrum across the 26 dB EBW or 99% OBW of the signal using the instrument’s band power measurement function, with band limits set equal to the EBW or OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW or 99% OBW of the spectrum.

3.4.3 Deviation from Test Standard

No deviation.

3.4.4 Test Setup



3.4.5 Test Result

[Test Result of Power Spectral Density]

SISO Mode

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-1	802.11a	Lowest	5 180	18.88	-5.63	23.76	11.00
		Middle	5 220	18.85		23.75	
		Highest	5 240	19.35		23.87	
	802.11n (HT20)	Lowest	5 180	19.65		23.93	
		Middle	5 220	19.93		23.98	
		Highest	5 240	20.19		23.98	
	802.11ac (VHT40)	Lowest	5 190	38.69		23.98	
		Highest	5 230	38.77		23.98	
	802.11ac (VHT80)	Middle	5 210	80.53		23.98	

Band	Test Mode	Channel	Frequency [MHz]	Measured PSD [dBm/MHz]		Result [dBm/MHz]		PPSD Limit [dBm/MHz]
				ANT1	ANT2	ANT1	ANT2	
U-NII-1	802.11a	Lowest	5 180	6.77	6.78	6.77	6.78	11.00
		Middle	5 220	7.09	7.14	7.09	7.14	
		Highest	5 240	7.00	6.92	7.00	6.92	
	802.11n (HT20)	Lowest	5 180	6.38	6.13	6.38	6.13	
		Middle	5 220	5.88	5.76	5.88	5.76	
		Highest	5 240	5.90	5.91	5.90	5.91	
	802.11ac (VHT40)	Lowest	5 190	1.20	0.48	1.20	0.48	
		Highest	5 230	1.70	0.53	1.70	0.53	
	802.11ac (VHT80)	Middle	5 210	-2.60	-2.98	-2.60	-2.98	

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-2A	802.11a	Lowest	5 260	19.09	-4.14	23.81	11.00
		Middle	5 300	19.10		23.81	
		Highest	5 320	19.35		23.87	
	802.11n (HT20)	Lowest	5 260	19.90		23.98	
		Middle	5 300	19.83		23.97	
		Highest	5 320	19.72		23.95	
	802.11ac (VHT40)	Lowest	5 270	38.59		23.98	
		Highest	5 310	38.76		23.98	
	802.11ac (VHT80)	Middle	5 290	80.90		23.98	

Band	Test Mode	Channel	Frequency [MHz]	Measured PSD [dBm/MHz]		Result [dBm/MHz]		PPSD Limit [dBm/MHz]
				ANT1	ANT2	ANT1	ANT2	
U-NII-2A	802.11a	Lowest	5 260	7.35	6.71	7.35	6.71	11.00
		Middle	5 300	7.02	6.60	7.02	6.60	
		Highest	5 320	6.66	6.62	6.66	6.62	
	802.11n (HT20)	Lowest	5 260	5.90	5.60	5.90	5.60	
		Middle	5 300	5.35	5.47	5.35	5.47	
		Highest	5 320	5.32	5.43	5.32	5.43	
	802.11ac (VHT40)	Lowest	5 270	1.06	0.60	1.06	0.60	
		Highest	5 310	-0.02	0.17	-0.02	0.17	
	802.11ac (VHT80)	Middle	5 290	-2.87	-3.26	-2.87	-3.26	

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-2C	802.11a	Lowest	5 500	19.10	-4.12	23.81	11.00
		Middle	5 600	18.65		23.71	
		Highest	5 700	19.10		23.81	
	802.11n (HT20)	Lowest	5 500	20.10		23.98	
		Middle	5 600	20.00		23.98	
		Highest	5 700	19.97		23.98	
	802.11n (HT40)	Lowest	5 510	39.18		23.98	
		Middle	5 590	39.02		23.98	
		Highest	5 670	39.15		23.98	
	802.11ac (VHT80)	Lowest	5 530	80.33		23.98	
		Highest	5 610	80.48		23.98	

Band	Test Mode	Channel	Frequency [MHz]	Measured PPSP [dBm/MHz]		Result [dBm/MHz]		PPSP Limit [dBm/MHz]
				ANT1	ANT2	ANT1	ANT2	
U-NII-2C	802.11a	Lowest	5 500	5.33	5.90	5.33	5.90	11.00
		Middle	5 600	5.11	5.55	5.11	5.55	
		Highest	5 700	4.50	6.32	4.50	6.32	
	802.11n (HT20)	Lowest	5 500	5.84	5.50	5.84	5.50	
		Middle	5 600	5.41	5.20	5.41	5.20	
		Highest	5 700	4.76	5.93	4.76	5.93	
	802.11n (HT40)	Lowest	5 510	2.78	2.95	2.78	2.95	
		Middle	5 590	1.95	2.53	1.95	2.53	
		Highest	5 670	2.90	3.65	2.90	3.65	
	802.11ac (VHT80)	Lowest	5 530	-3.33	-3.29	-3.33	-3.29	
		Highest	5 610	-3.08	-3.11	-3.08	-3.11	

Band	Test Mode	Channel	Frequency [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSP Limit [dBm/MHz]
U-NII-3	802.11a	Lowest	5 745	-5.14	30.00	11.00
		Middle	5 805			
		Highest	5 825			
	802.11n (HT20)	Lowest	5 745			
		Middle	5 805			
		Highest	5 825			
	802.11n (HT40)	Lowest	5 755			
		Highest	5 795			
	802.11ac (VHT80)	Middle	5 775			

Band	Test Mode	Channel	Frequency [MHz]	Measured PPSP [dBm/MHz]		Result [dBm/MHz]		PPSP Limit [dBm/MHz]
				ANT1	ANT2	ANT1	ANT2	
U-NII-3	802.11a	Lowest	5 745	6.32	6.11	6.32	6.11	30.00
		Middle	5 805	5.33	6.08	5.33	6.08	
		Highest	5 825	5.62	5.84	5.62	5.84	
	802.11n (HT20)	Lowest	5 745	6.22	5.94	6.22	5.94	
		Middle	5 805	5.22	5.67	5.22	5.67	
		Highest	5 825	5.76	5.30	5.76	5.30	
	802.11n (HT40)	Lowest	5 755	3.09	3.54	3.09	3.54	
		Highest	5 795	2.38	3.18	2.38	3.18	
	802.11ac (VHT80)	Middle	5 775	-2.95	-2.83	-2.95	-2.83	

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-2C	802.11a	Straddle	5 720	14.39	-4.12	22.58	11.00
	802.11n(HT20)	Straddle	5 720	15.00		22.76	
	802.11n(HT40)	Straddle	5 710	34.31		23.98	
	802.11ac (VHT80)	Straddle	5 690	75.01		23.98	
U-NII-3	802.11a	Straddle	5 720	4.09		17.12	
	802.11n(HT20)	Straddle	5 720	4.91		17.91	
	802.11n(HT40)	Straddle	5 710	4.38		17.41	
	802.11ac (VHT80)	Straddle	5 690	5.10		18.08	

Band	Test Mode	Channel	Frequency [MHz]	Measured PPSP [dBm/MHz]		Result [dBm/MHz]		PPSP Limit [dBm/MHz]
				ANT1	ANT2	ANT1	ANT2	
U-NII-2C	802.11a	Straddle	5 720	4.73	4.66	4.73	4.66	11.00
	802.11n(HT20)	Straddle	5 720	5.32	5.16	5.32	5.16	
	802.11n(HT40)	Straddle	5 710	3.21	3.87	3.21	3.87	
	802.11ac (VHT80)	Straddle	5 690	-2.59	-2.56	-2.59	-2.56	
U-NII-3	802.11a	Straddle	5 720	3.92	3.74	3.92	3.74	
	802.11n(HT20)	Straddle	5 720	4.49	4.30	4.49	4.30	
	802.11n(HT40)	Straddle	5 710	0.83	1.67	0.83	1.67	
	802.11ac (VHT80)	Straddle	5 690	-5.72	-5.53	-5.72	-5.53	

MIMO Mode

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-1	802.11a	Lowest	5 180	18.88	-5.63	23.76	11.00
		Middle	5 220	18.85		23.75	
		Highest	5 240	19.35		23.87	
	802.11n (HT20)	Lowest	5 180	19.65		23.93	
		Middle	5 220	19.93		23.98	
		Highest	5 240	20.19		23.98	
	802.11ac (VHT40)	Lowest	5 190	38.69		23.98	
		Highest	5 230	38.77		23.98	
	802.11ac (VHT80)	Middle	5 210	80.53		23.98	

Band	Test Mode	Channel	Frequency [MHz]	Measured PPSP [dBm/MHz]		Result [dBm/MHz]	PPSP Limit [dBm/MHz]
				ANT1	ANT2		
U-NII-1	802.11a	Lowest	5 180	7.59	7.84	10.73	11.00
		Middle	5 220	7.22	7.51	10.38	
		Highest	5 240	7.43	7.86	10.66	
	802.11n (HT20)	Lowest	5 180	6.03	5.82	8.94	
		Middle	5 220	5.90	5.69	8.80	
		Highest	5 240	5.87	5.87	8.88	
	802.11ac (VHT40)	Lowest	5 190	1.84	0.97	4.44	
		Highest	5 230	2.23	0.87	4.61	
	802.11ac (VHT80)	Middle	5 210	-2.10	-2.53	0.70	

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSP Limit [dBm/MHz]
U-NII-2A	802.11a	Lowest	5 260	19.09	-4.14	23.81	11.00
		Middle	5 300	19.10		23.81	
		Highest	5 320	19.35		23.87	
	802.11n (HT20)	Lowest	5 260	19.90		23.98	
		Middle	5 300	19.83		23.97	
		Highest	5 320	19.72		23.95	
	802.11ac (VHT40)	Lowest	5 270	38.59		23.98	
		Highest	5 310	38.76		23.98	
	802.11ac (VHT80)	Middle	5 290	80.90		23.98	

Band	Test Mode	Channel	Frequency [MHz]	Measured PPSP [dBm/MHz]		Result [dBm/MHz]	PPSP Limit [dBm/MHz]
				ANT1	ANT2		
U-NII-2A	802.11a	Lowest	5 260	7.45	7.58	10.52	11.00
		Middle	5 300	7.14	7.70	10.44	
		Highest	5 320	6.85	7.81	10.37	
	802.11n (HT20)	Lowest	5 260	5.79	5.97	8.89	
		Middle	5 300	5.39	5.77	8.59	
		Highest	5 320	5.13	5.52	8.34	
	802.11ac (VHT40)	Lowest	5 270	2.20	0.97	4.64	
		Highest	5 310	1.01	0.43	3.74	
	802.11ac (VHT80)	Middle	5 290	-2.61	-2.73	0.34	

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-2C	802.11a	Lowest	5 500	19.10	-4.12	23.81	11.00
		Middle	5 600	18.65		23.71	
		Highest	5 700	19.10		23.81	
	802.11n (HT20)	Lowest	5 500	20.10		23.98	
		Middle	5 600	20.00		23.98	
		Highest	5 700	19.97		23.98	
	802.11n (HT40)	Lowest	5 510	39.18		23.98	
		Middle	5 590	39.02		23.98	
		Highest	5 670	39.15		23.98	
	802.11ac (VHT80)	Lowest	5 530	80.33		23.98	
		Highest	5 610	80.48		23.98	

Band	Test Mode	Channel	Frequency [MHz]	Measured PPSP [dBm/MHz]		Result [dBm/MHz]	PPSP Limit [dBm/MHz]
				ANT1	ANT2		
U-NII-2C	802.11a	Lowest	5 500	5.47	6.19	8.85	11.00
		Middle	5 600	5.26	6.01	8.66	
		Highest	5 700	4.71	6.13	8.49	
	802.11n (HT20)	Lowest	5 500	5.69	6.22	8.97	
		Middle	5 600	4.98	5.98	8.52	
		Highest	5 700	4.60	6.52	8.68	
	802.11n (HT40)	Lowest	5 510	2.19	2.39	5.30	
		Middle	5 590	2.95	3.71	6.36	
		Highest	5 670	3.50	4.05	6.80	
	802.11ac (VHT80)	Lowest	5 530	-3.20	-2.72	0.06	
		Highest	5 610	-3.58	-2.70	-0.11	

Band	Test Mode	Channel	Frequency [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSP Limit [dBm/MHz]
U-NII-3	802.11a	Lowest	5 745	-5.14	30.00	11.00
		Middle	5 805			
		Highest	5 825			
	802.11n (HT20)	Lowest	5 745			
		Middle	5 805			
		Highest	5 825			
	802.11n (HT40)	Lowest	5 755			
		Highest	5 795			
	802.11ac (VHT80)	Middle	5 775			

Band	Test Mode	Channel	Frequency [MHz]	Measured PPSP [dBm/MHz]		Result [dBm/MHz]	PPSP Limit [dBm/MHz]
				ANT1	ANT2		
U-NII-3	802.11a	Lowest	5 745	6.56	6.33	9.46	30.00
		Middle	5 805	5.04	5.91	8.50	
		Highest	5 825	5.14	5.91	8.55	
	802.11n (HT20)	Lowest	5 745	6.31	6.23	9.28	
		Middle	5 805	5.12	6.30	8.76	
		Highest	5 825	5.64	4.89	8.29	
	802.11n (HT40)	Lowest	5 755	4.43	4.69	7.57	
		Highest	5 795	3.37	4.53	7.00	
	802.11ac (VHT80)	Middle	5 775	-3.14	-2.38	0.27	

Band	Test Mode	Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Dir. Gain [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
U-NII-2C	802.11a	Straddle	5 720	14.39	-4.12	22.58	11.00
	802.11n(HT20)	Straddle	5 720	15.00		22.76	
	802.11n(HT40)	Straddle	5 710	34.31		23.98	
	802.11ac (VHT80)	Straddle	5 690	75.01		23.98	
U-NII-3	802.11a	Straddle	5 720	4.09		17.12	
	802.11n(HT20)	Straddle	5 720	4.91		17.91	
	802.11n(HT40)	Straddle	5 710	4.38		17.41	
	802.11ac (VHT80)	Straddle	5 690	5.10		18.08	

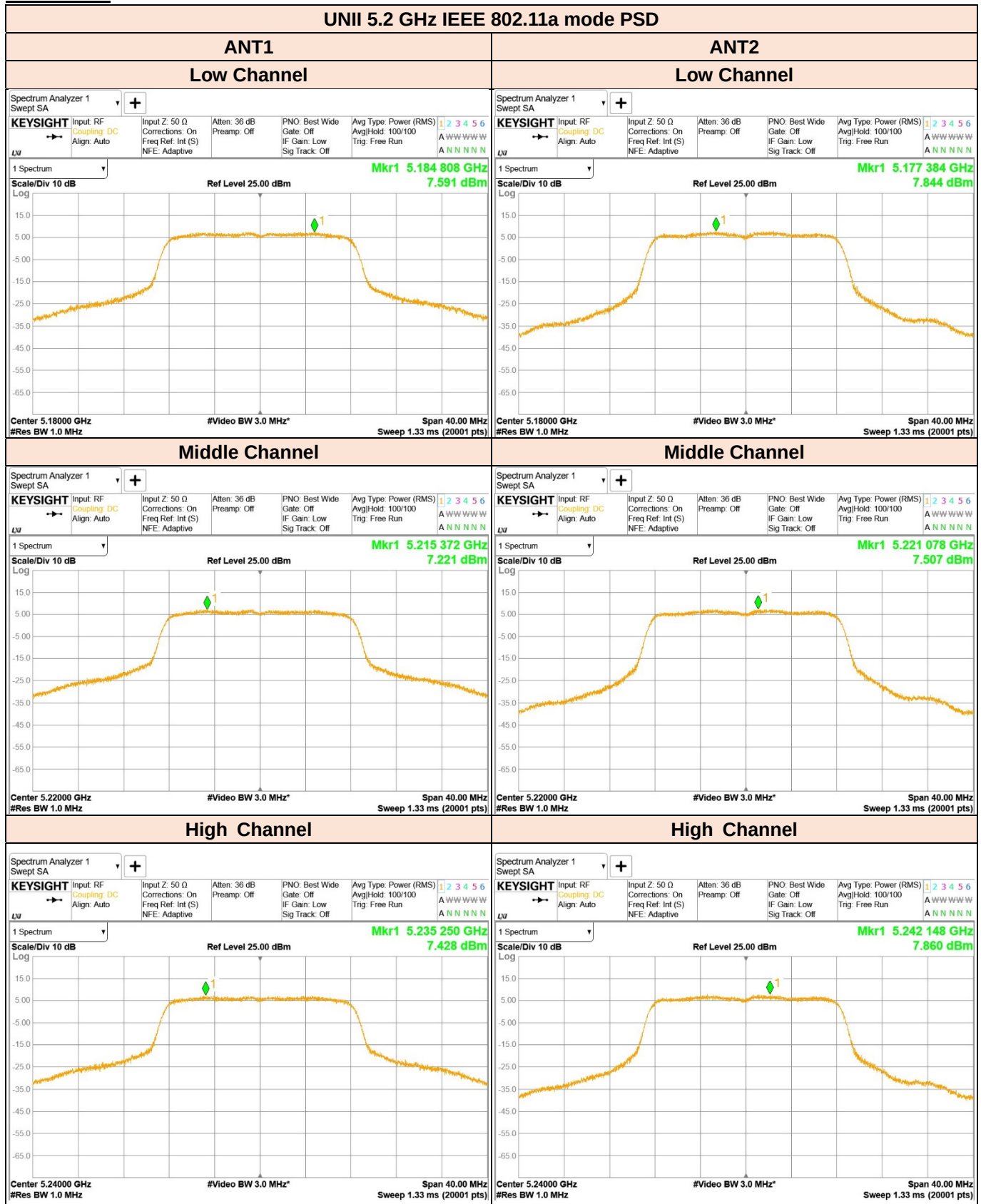
Band	Test Mode	Channel	Frequency [MHz]	Measured PPSP [dBm/MHz]		Result [dBm/MHz]	PPSP Limit [dBm/MHz]
				ANT1	ANT2		
U-NII-2C	802.11a	Straddle	5 720	5.49	5.43	8.47	11.00
	802.11n(HT20)	Straddle	5 720	5.59	6.09	8.86	
	802.11n(HT40)	Straddle	5 710	3.38	4.45	6.96	
	802.11ac (VHT80)	Straddle	5 690	-3.00	-1.65	0.74	
U-NII-3	802.11a	Straddle	5 720	4.21	3.55	6.90	
	802.11n(HT20)	Straddle	5 720	3.88	4.53	7.23	
	802.11n(HT40)	Straddle	5 710	0.35	1.58	4.02	
	802.11ac (VHT80)	Straddle	5 690	-6.62	-5.15	-2.81	



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[Test Plot of Power Spectral Density]

SISO Mode



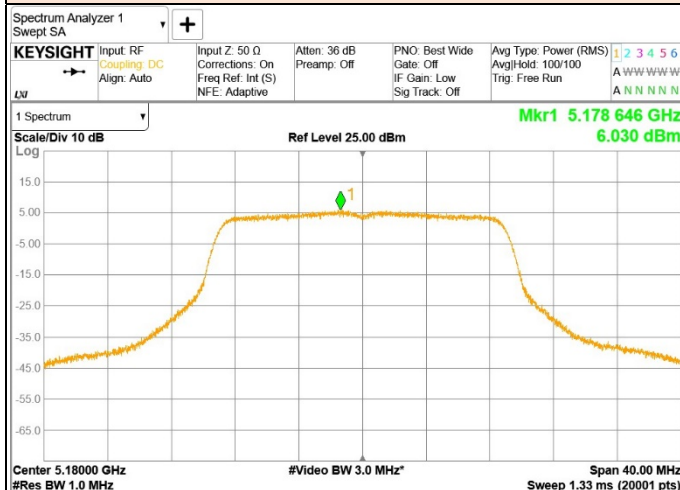


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UNII 5.2 GHz IEEE 802.11n HT20 mode PSD

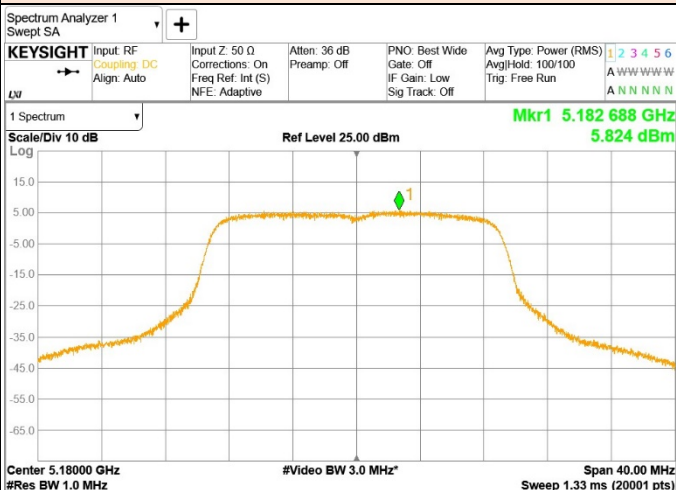
ANT1

Low Channel

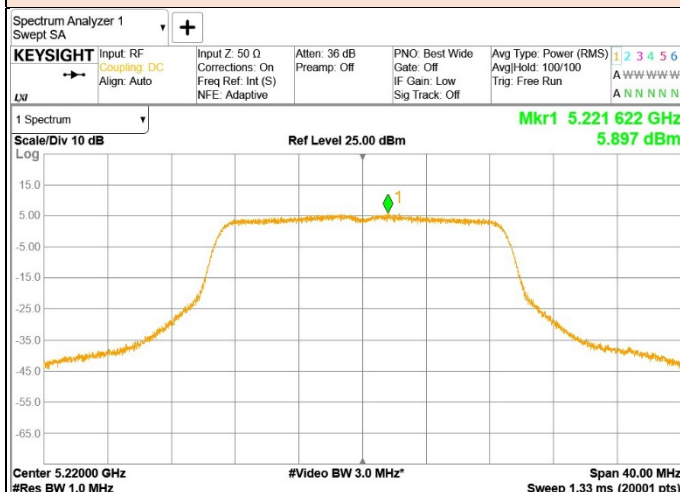


ANT2

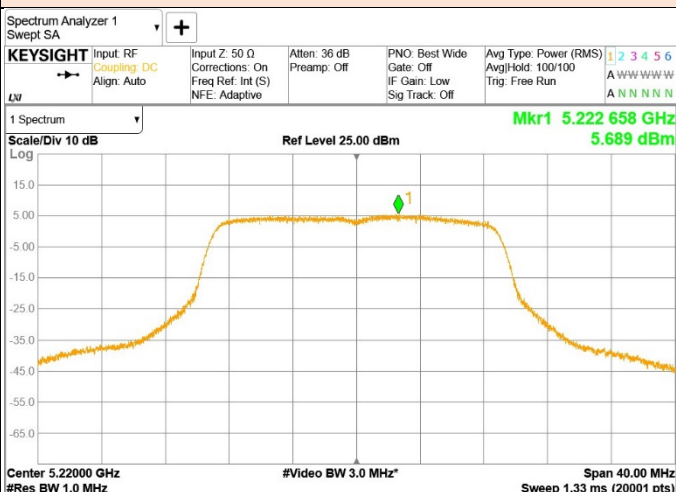
Low Channel



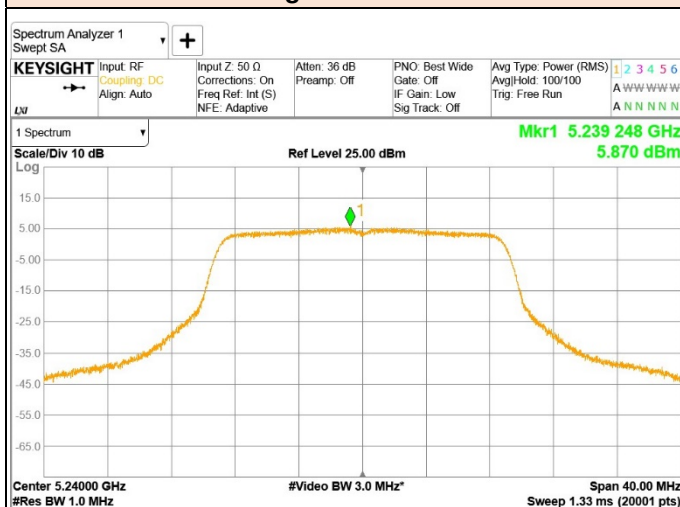
Middle Channel



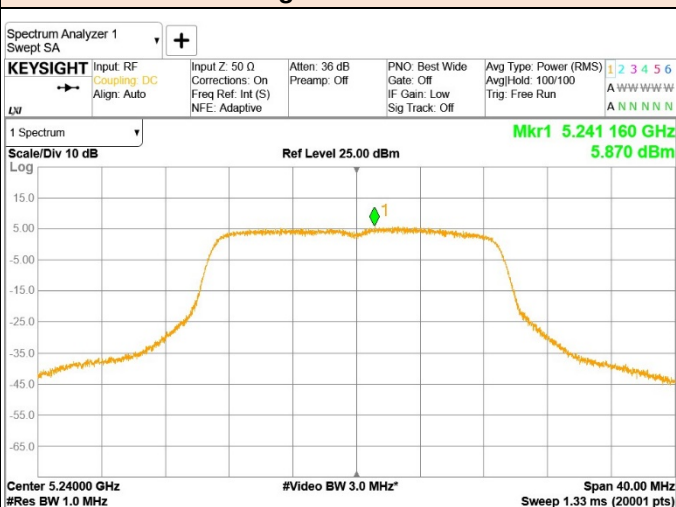
Middle Channel



High Channel



High Channel



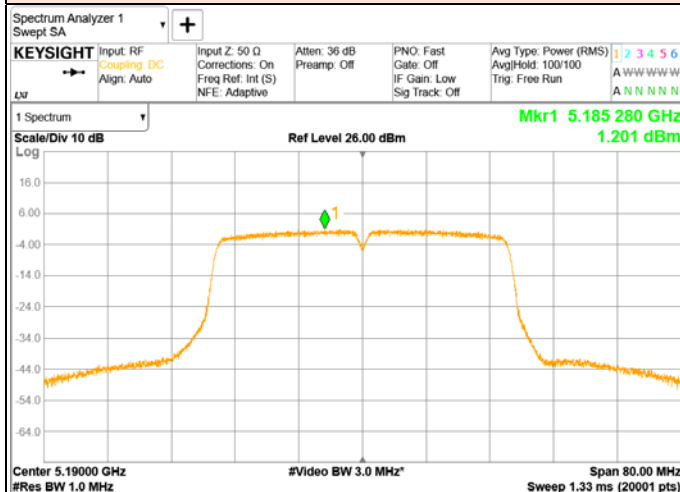


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VERITAS

UNII 5.2 GHz IEEE 802.11ac VHT40 mode PSD

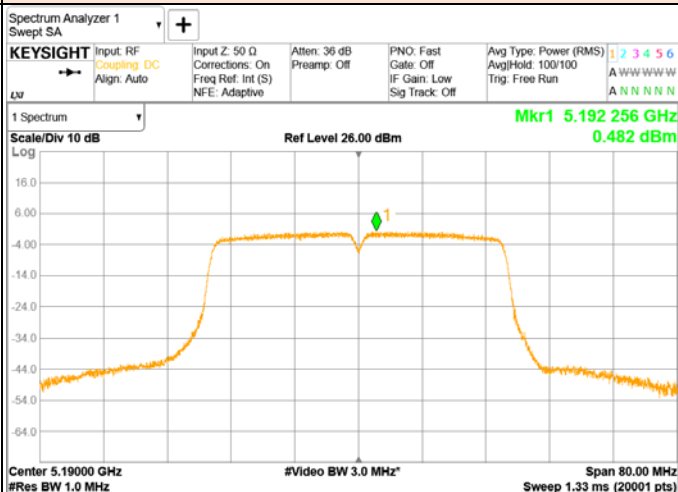
ANT1

Low Channel

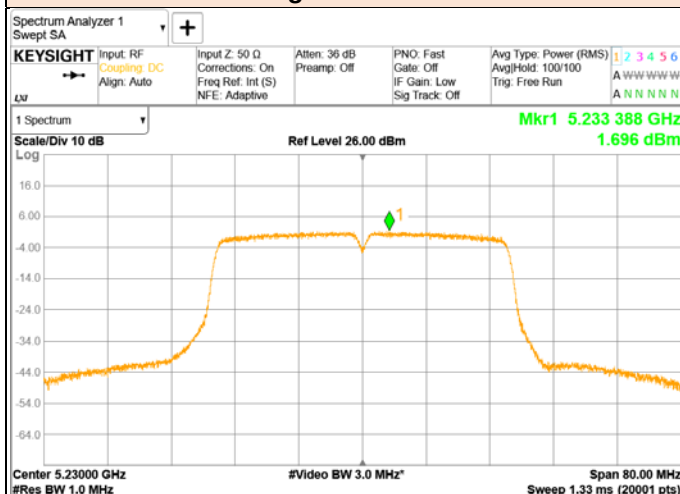


ANT2

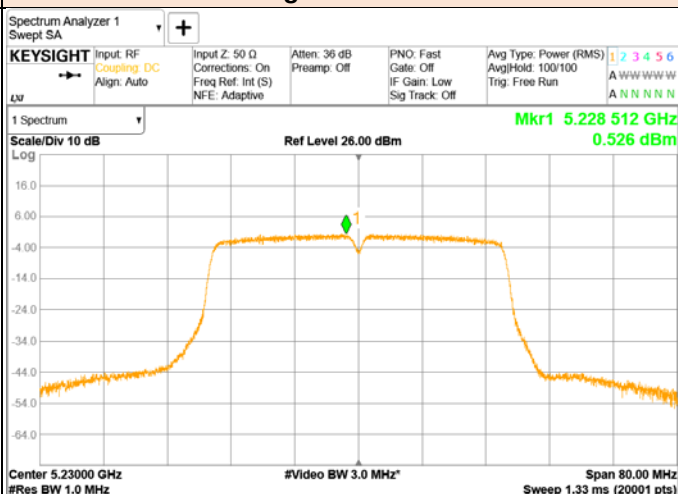
Low Channel



High Channel



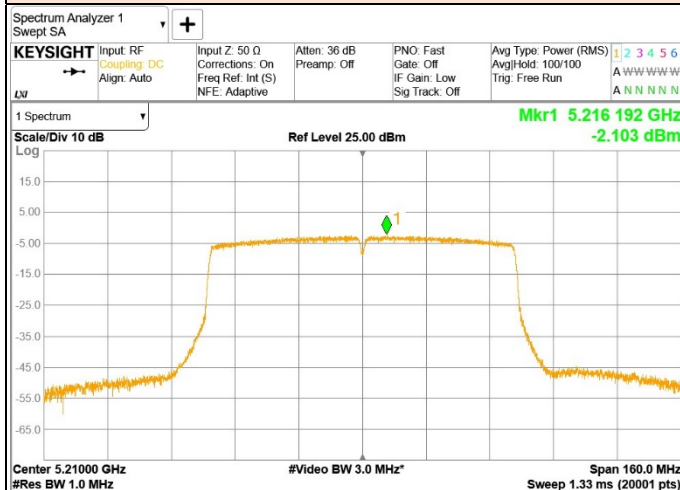
High Channel



UNII 5.2 GHz IEEE 802.11ac VHT80 mode PSD

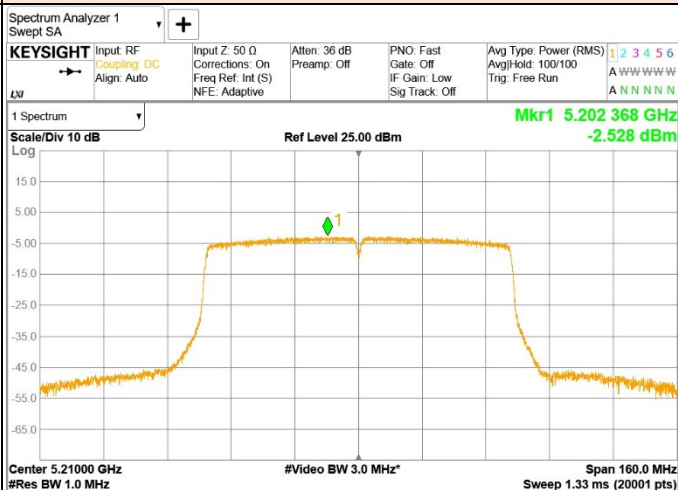
ANT1

Middle Channel



ANT2

Middle Channel



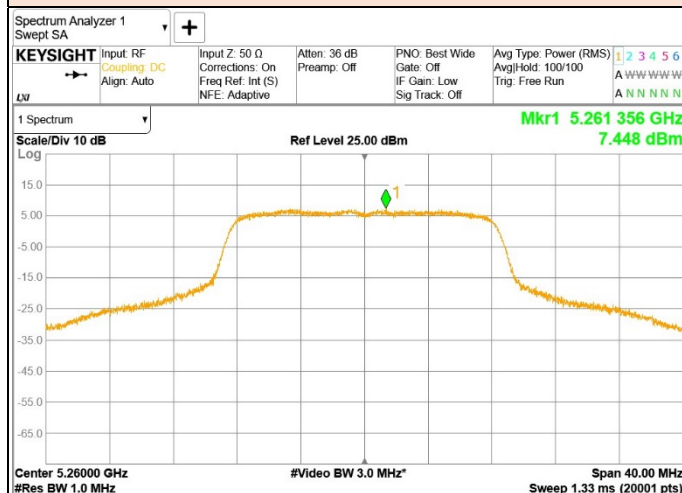


BUREAU
VERITAS

UNII 5.3 GHz IEEE 802.11a mode PSD

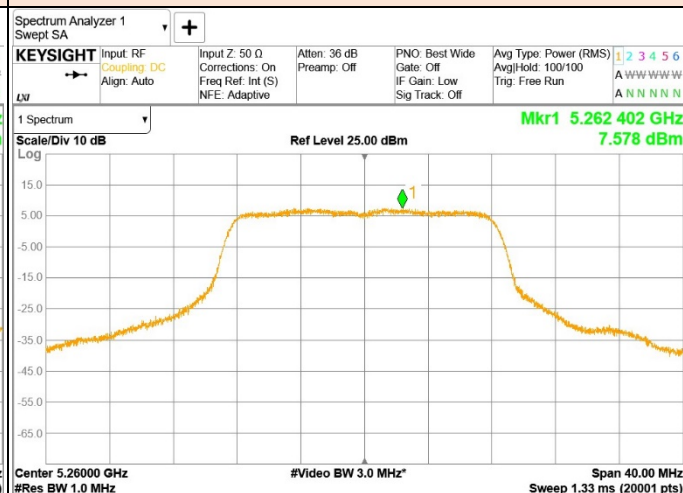
ANT1

Low Channel

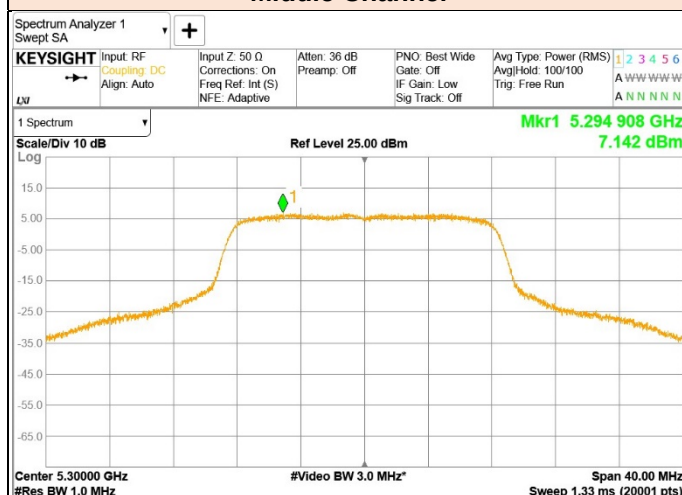


ANT2

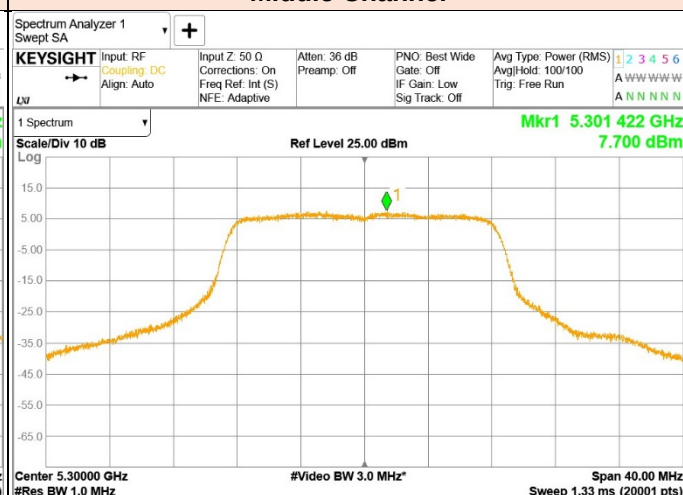
Low Channel



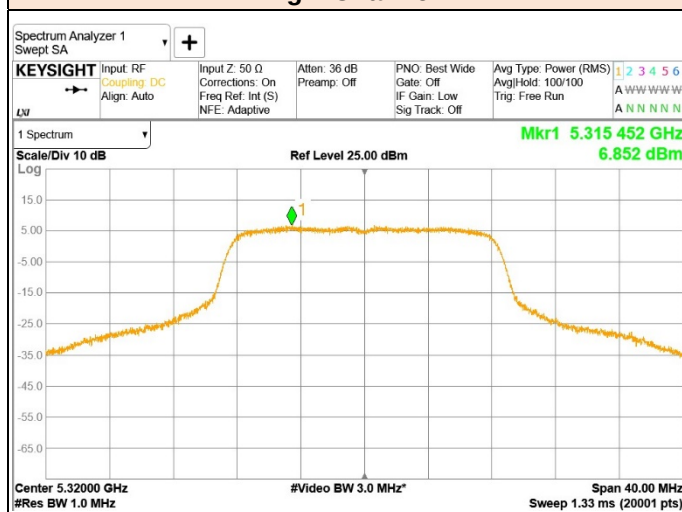
Middle Channel



Middle Channel



High Channel



High Channel

