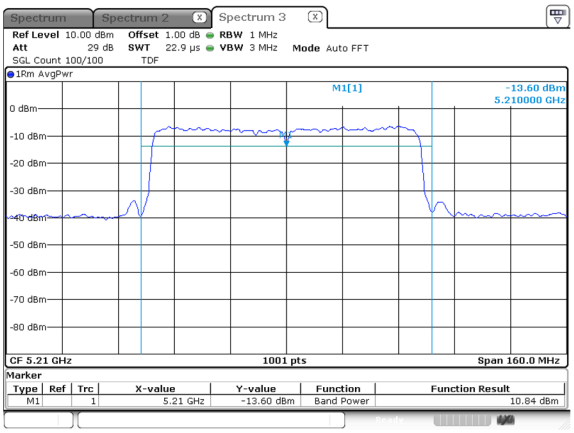
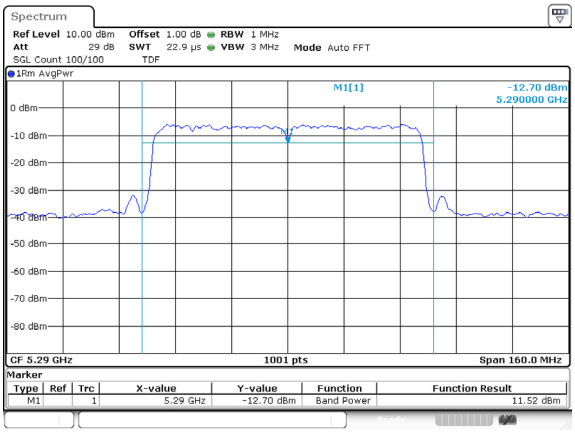
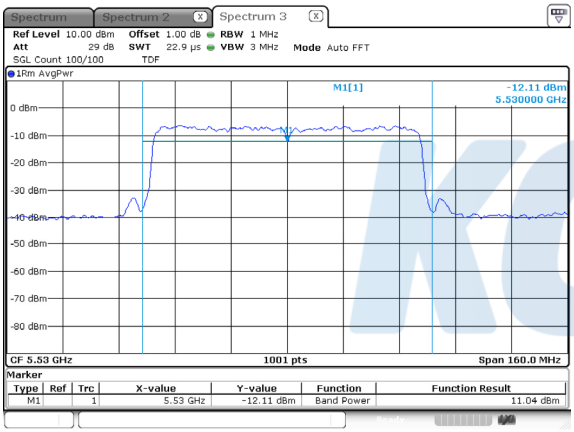
UNII-1 / 802.11ac VHT80 / Low ch.



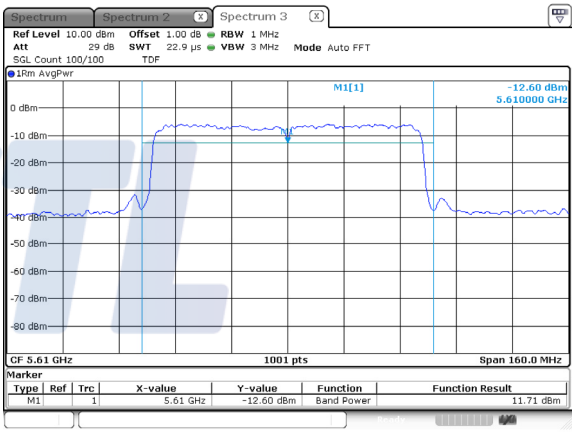
UNII-2A / 802.11ac VHT80 / Low ch.



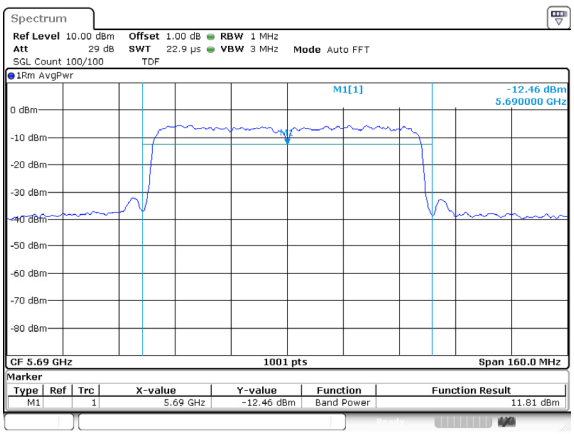
UNII-2C / 802.11ac VHT80 / Low ch.



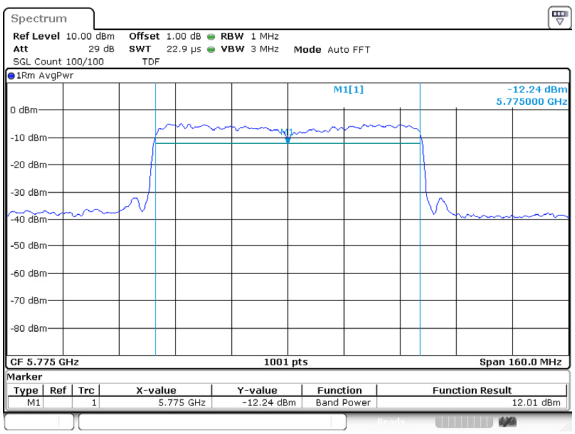
UNII-2C / 802.11ac VHT80 / Mid ch.



UNII-2C / 802.11ac VHT80 / High ch.



UNII-3 / 802.11ac VHT80 / Low ch.



7.2. Maximum Power Spectral Density

Test setup

EUT	—	Attenuator	—	Spectrum analyzer

Limit

According to §15.407(a), RSS-247(6.2)

Band	EUT category		Limit
UNII-1		Outdoor access point	17dBm/MHz
		Indoor access point	
		Fixed point-to-point access point	
	√	Client device	11 dBm /MHz
UNII-2A	√		11 dBm /MHz
UNII-2C	√		11 dBm /MHz
UNII-3	√		30 dBm /500 kHz

Notes:

If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain if the antenna exceed 6 dBi.

Test procedure

ANSI C63.10-2013 Section 12.3.2.2, 14.3.2.2
KDB 789033 D02 v02r01 - Section F
KDB 662911 D01 v02r01 - Section E). 2)

Test settings

Section F

The rules requires "maximum power spectral density" measurements where the intent is to measure the maximum value of the time average of the power spectral density measured during a period of continuous transmission. Refer to III.A for additional guidance for devices that use channel aggregation.

1. Create an average power spectrum for the EUT operating mode being tested by following the instructions in II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power…." (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
2. Search function on the instrument to find the peak of the spectrum and record its value.
3. Adjustments to the peak value of the spectrum, if applicable:

   a) If Method SA-2 or SA-2 Alternative was used, add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum.
   b) If Method SA-3 Alternative was used and the linear mode was used in II.E.2.g) (viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
4. The result is the Maximum PSD over 1MHz reference bandwidth

5. For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the preceding procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in Section 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of RBWs less than 1MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth(i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

   a) Set RBW≥1/T, where T is defined in II.B.I.a).
   b) Set VBW≥3 RBW.
   c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz /RBW) to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
   d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
   e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the II.F.5.c) and II.F.5.d), since RBW=100 kHz is available on nearly all spectrum analyzers.

Test results

Test mode	Band	Frequency (MHz)	Measured PSD (dB m/MHz)	DCCF (dB)	Maximum PSD (dB m/MHz)	Limit (dB m/MHz)
802.11a	UNII-1	5 180	4.55	0.44	4.99	11
		5 200	4.28	0.44	4.72	
		5 240	3.99	0.44	4.43	
	UNII-2A	5 260	4.26	0.44	4.70	11
		5 280	4.37	0.44	4.81	
		5 320	4.12	0.44	4.56	
	UNII-2C	5 500	4.50	0.44	4.94	11
		5 600	4.50	0.44	4.94	
		5 720	4.19	0.44	4.63	
802.11n HT20	UNII-1	5 180	3.41	0.45	3.86	11
		5 200	3.56	0.45	4.01	
		5 240	3.01	0.45	3.46	
	UNII-2A	5 260	3.11	0.45	3.56	11
		5 280	3.07	0.45	3.52	
		5 320	2.96	0.45	3.41	
	UNII-2C	5 500	3.32	0.45	3.77	11
		5 600	3.23	0.45	3.68	
		5 720	3.02	0.45	3.47	
802.11n HT40	UNII-1	5 190	-1.51	0.89	-0.62	11
		5 230	-0.64	0.89	0.25	
	UNII-2A	5 270	-0.81	0.89	0.08	11
		5 310	-2.47	0.89	-1.58	
	UNII-2C	5 510	-1.34	0.89	-0.45	11
		5 590	-0.88	0.89	0.01	
		5 710	-0.83	0.89	0.06	

This test report shall not be reproduced, except in full, without the written approval

Test mode	Band	Frequency (MHz)	Measured PSD (dB m/MHz)	DCCF (dB)	Maximum PSD (dB m/MHz)	Limit (dB m/MHz)
802.11ac VHT20	UNII-1	5 180	3.51	0.44	3.95	11
		5 200	3.48	0.44	3.92	
		5 240	3.12	0.44	3.56	
	UNII-2A	5 260	3.11	0.44	3.55	11
		5 280	3.23	0.44	3.67	
		5 320	3.09	0.44	3.53	
	UNII-2C	5 500	3.61	0.44	4.05	11
		5 600	3.54	0.44	3.98	
		5 720	3.15	0.44	3.59	
802.11ac VHT40	UNII-1	5 190	-1.61	0.81	-0.80	11
		5 230	-0.67	0.81	0.14	
	UNII-2A	5 270	-0.52	0.81	0.29	11
		5 310	-1.95	0.81	-1.14	
	UNII-2C	5 510	-1.17	0.81	-0.36	11
		5 590	-1.08	0.81	-0.27	
		5 710	-0.84	0.81	-0.03	
802.11ac VHT80	UNII-1	5 210	-6.70	1.41	-5.29	11
	UNII-2A	5 290	-5.85	1.41	-4.44	11
	UNII-2C	5 530	-5.87	1.41	-4.46	11
		5 610	-5.79	1.41	-4.38	
		5 690	-5.41	1.41	-4.00	

This test report shall not be reproduced, except in full, without the written approval

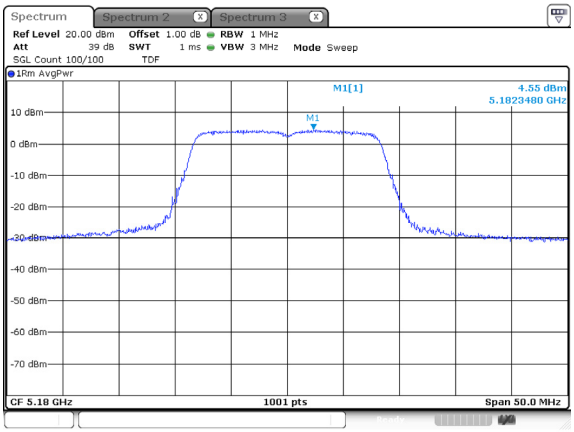
Test mode	Band	Frequency (MHz)	Measured PSD (dBm)	Duty Factor (dB)	Maximum PSD (dBm /500 kHz)	Limit (dBm /500 kHz)
802.11a	UNII-3	5 745	1.44	0.44	1.88	30
		5 785	1.98	0.44	2.42	
		5 825	1.73	0.44	2.17	
802.11n HT20		5 745	0.32	0.45	0.77	
		5 785	0.76	0.45	1.21	
		5 825	0.64	0.45	1.09	
802.11n HT40		5 755	-3.57	0.89	-2.68	
		5 795	-3.51	0.89	-2.62	
802.11ac VHT20		5 745	0.37	0.44	0.81	
		5 785	0.81	0.44	1.25	
		5 825	0.53	0.44	0.97	
802.11ac VHT40		5 755	-3.58	0.81	-2.77	
		5 795	-3.53	0.81	-2.72	
802.11ac VHT80		5 775	-7.18	1.41	-5.77	

Notes:

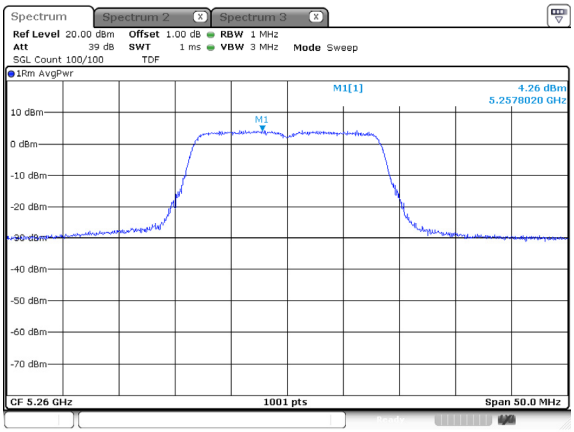
1. Maximum PSD calculation

- Maximum PSD = Measured PSD + DCCF

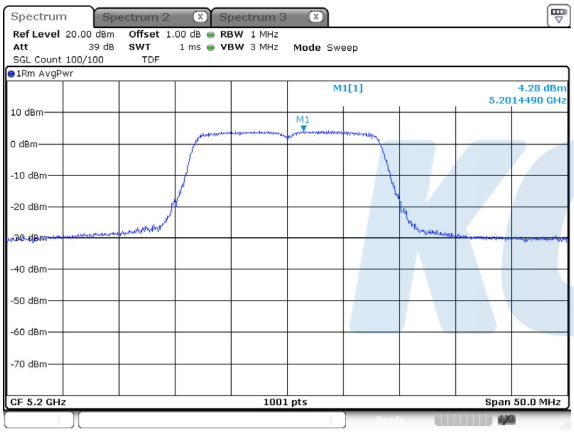
UNII-1 / 802.11a / Low ch.



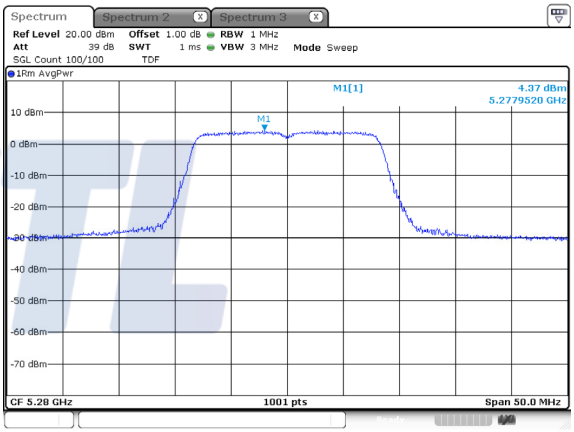
UNII-2A / 802.11a / Low ch.



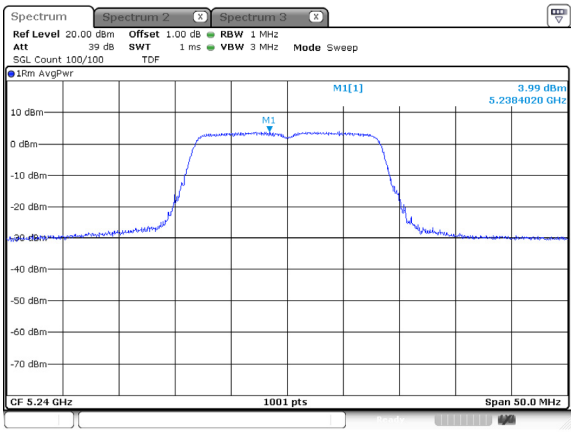
UNII-1 / 802.11a / Mid ch.



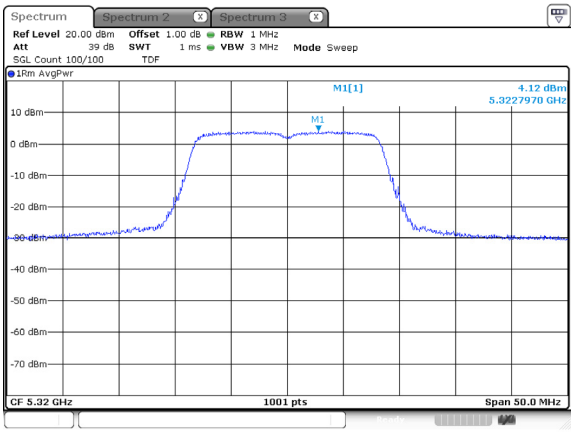
UNII-2A / 802.11a / Mid ch.



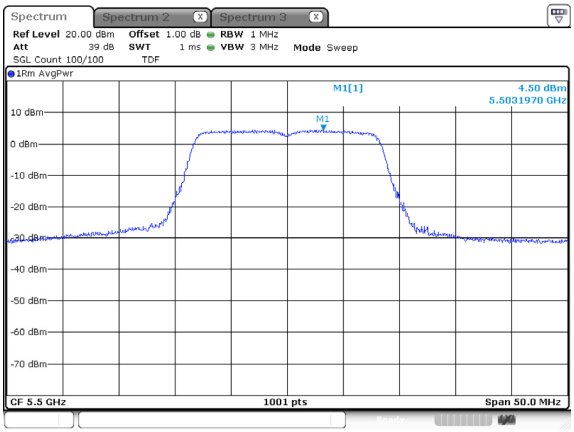
UNII-1 / 802.11a / High ch.



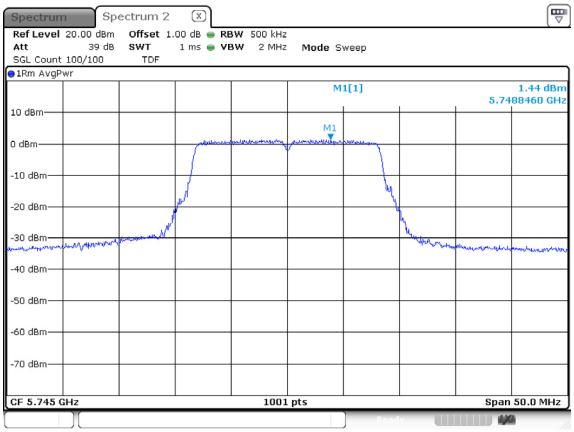
UNII-2A / 802.11a / High ch.



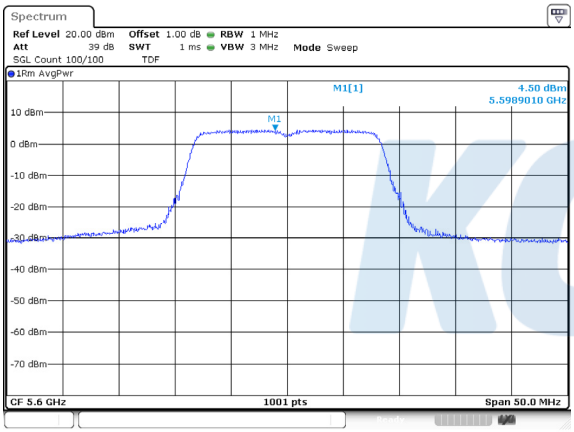
UNII-2C / 802.11a / Low ch.



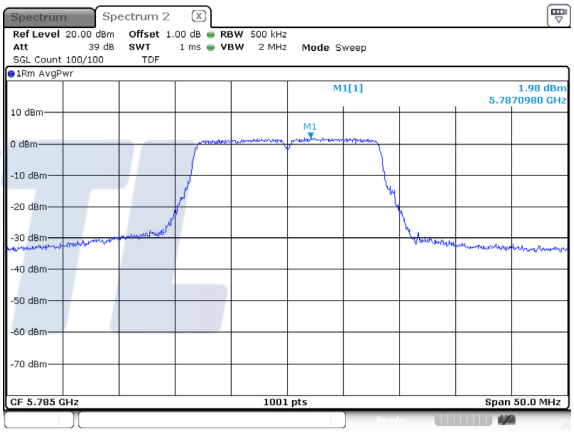
UNII-3 / 802.11a / Low ch.



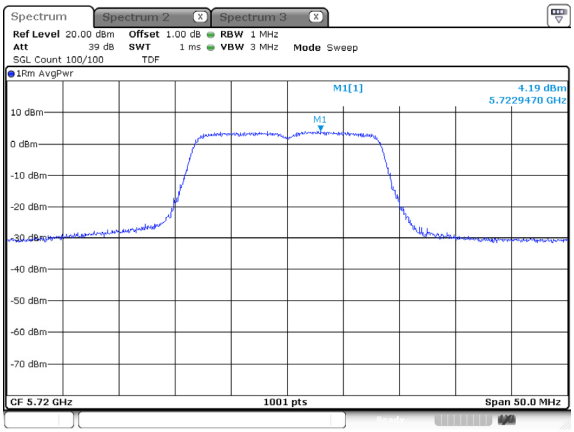
UNII-2C / 802.11a / Mid ch.



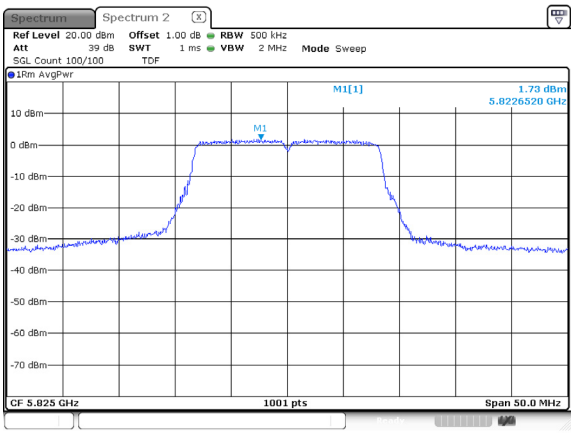
UNII-3 / 802.11a / Mid ch.



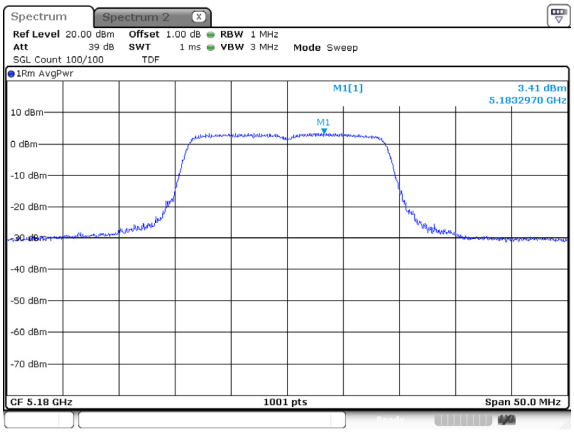
UNII-2C / 802.11a / High ch.



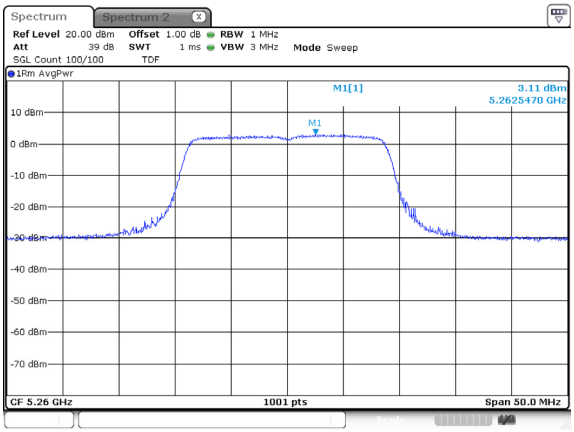
UNII-3 / 802.11a / High ch.



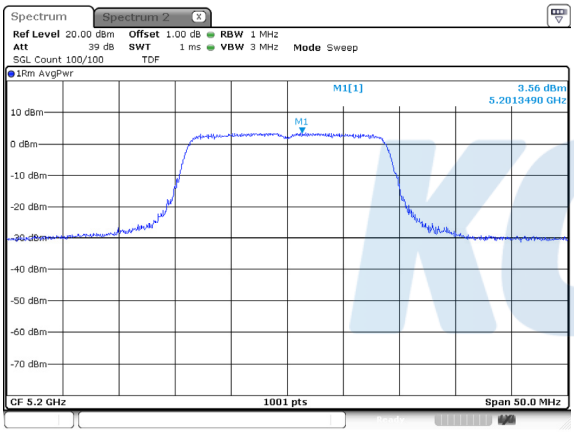
UNII-1 / 802.11n HT20 / Low ch.



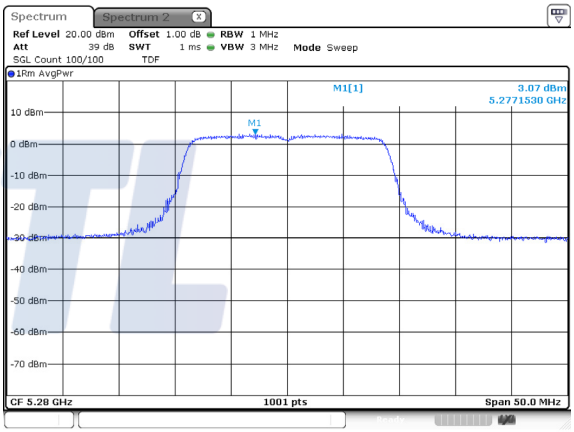
UNII-2A / 802.11n HT20 / Low ch.



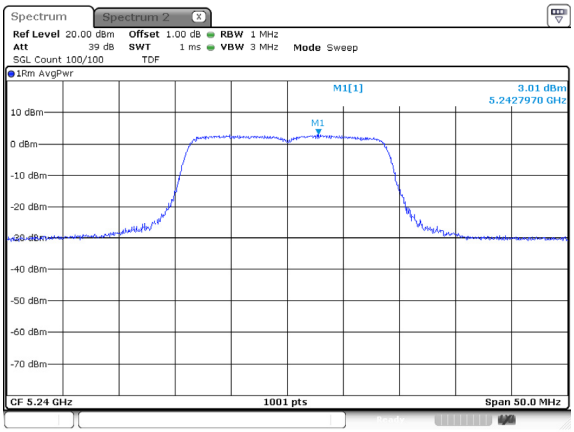
UNII-1 / 802.11n HT20 / Mid ch.



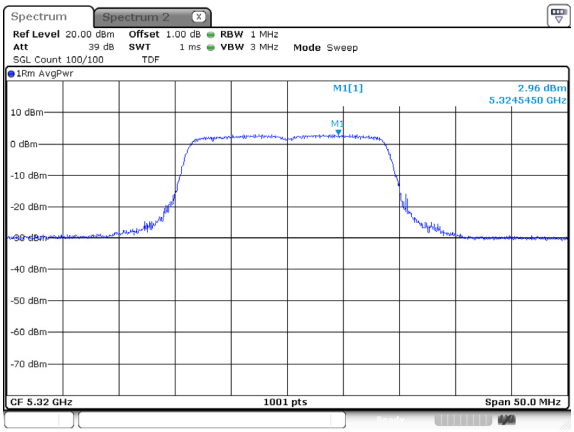
UNII-2A / 802.11n HT20 / Mid ch.



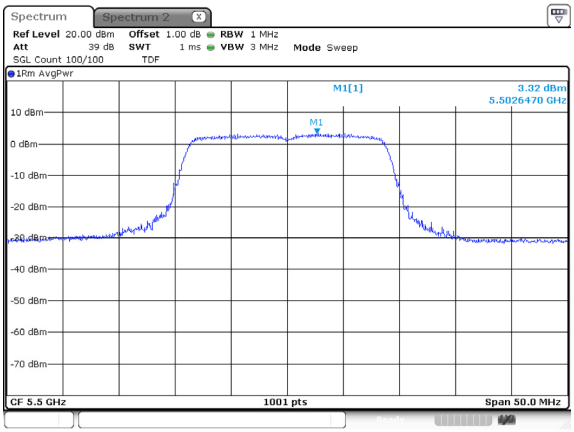
UNII-1 / 802.11n HT20 / High ch.



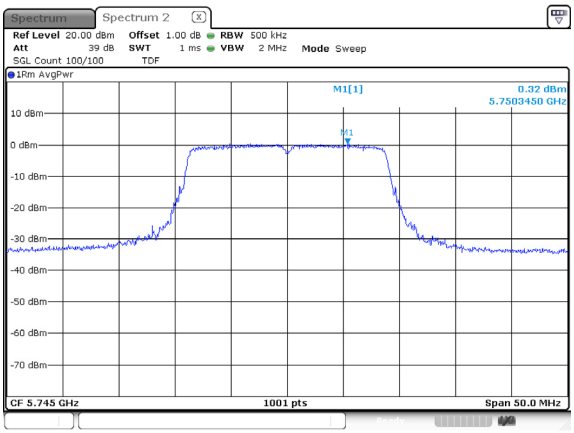
UNII-2A / 802.11n HT20 / High ch.



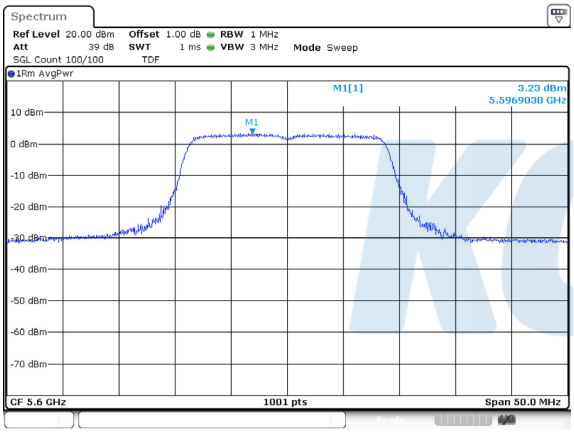
UNII-2C / 802.11n HT20 / Low ch.



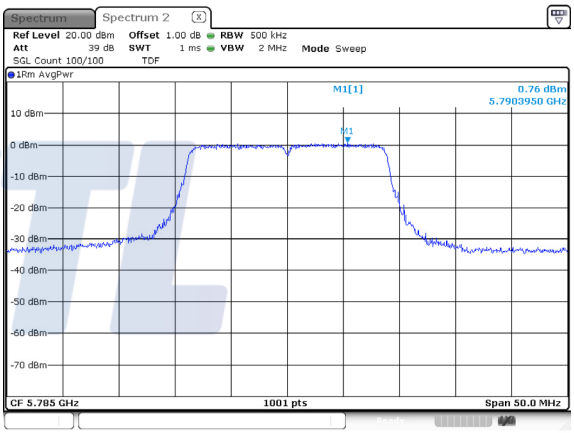
UNII-3 / 802.11n HT20 / Low ch.



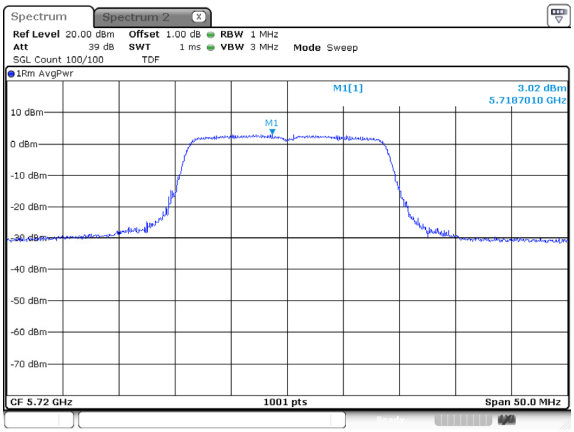
UNII-2C / 802.11n HT20 / Mid ch.



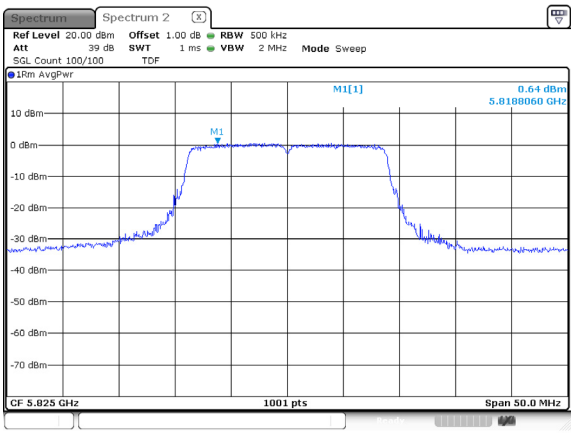
UNII-3 / 802.11n HT20 / Mid ch.

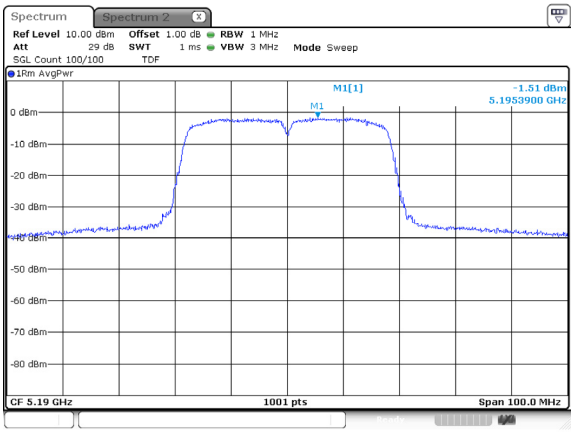
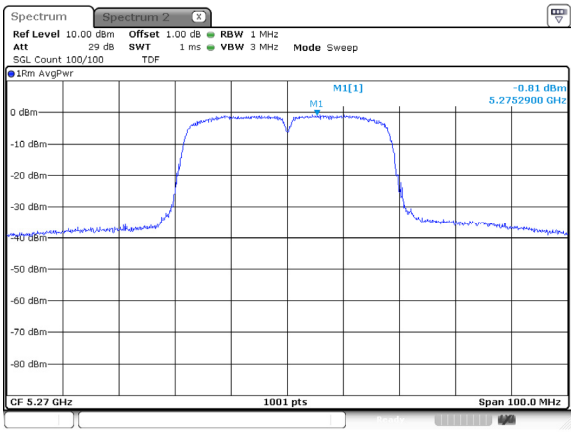
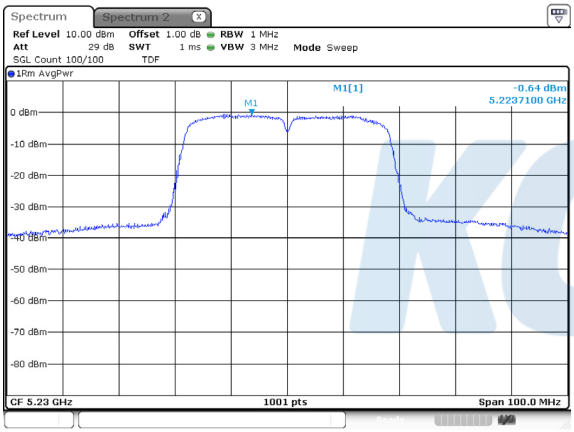
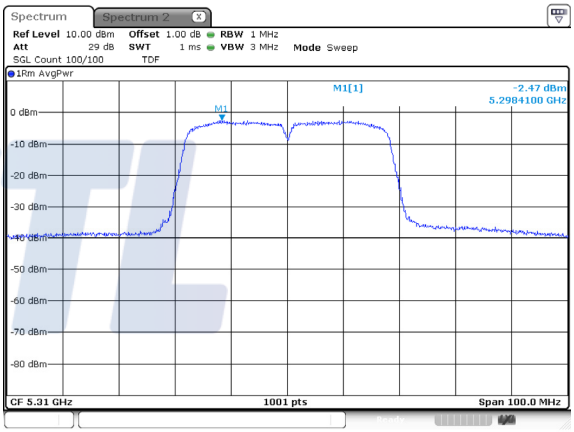


UNII-2C / 802.11n HT20 / High ch.

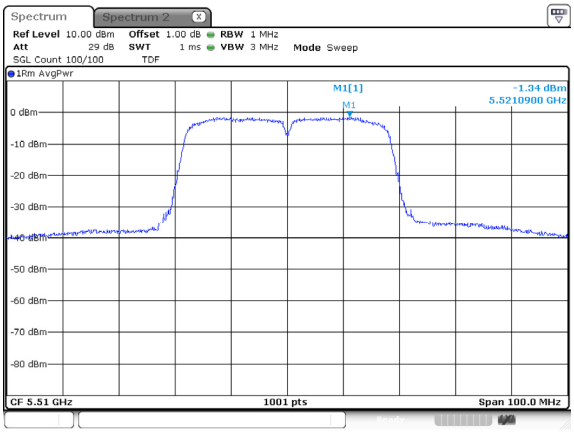


UNII-3 / 802.11n HT20 / High ch.

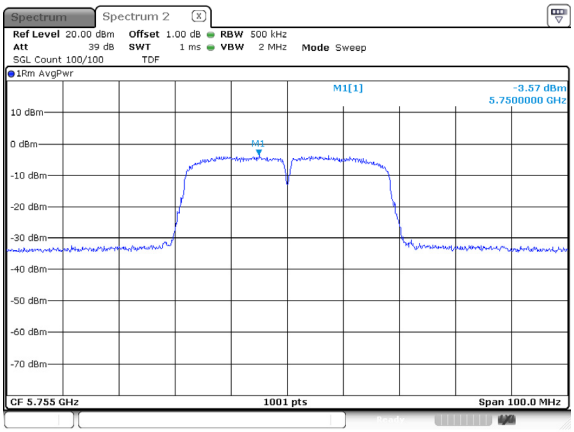


UNII-1 / 802.11n HT40 / Low ch.	UNII-2A / 802.11n HT40 / Low ch.
	
UNII-1 / 802.11n HT40 / High ch.	**UNII-2A / 802.11n HT40 / High ch.**
	

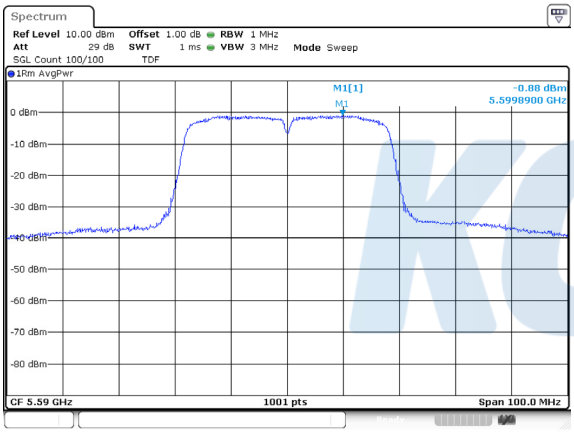
UNII-2C / 802.11n HT40 / Low ch.



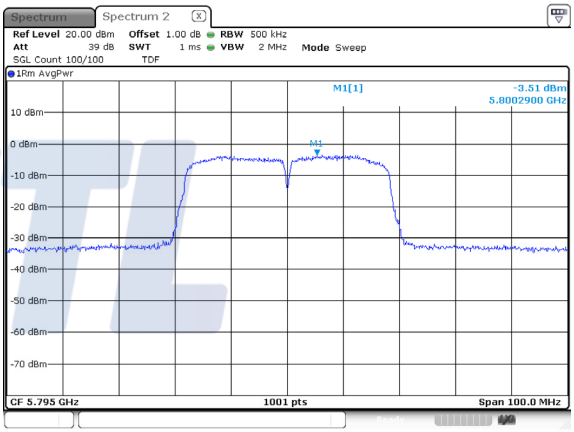
UNII-3 / 802.11n HT40 / Low ch.



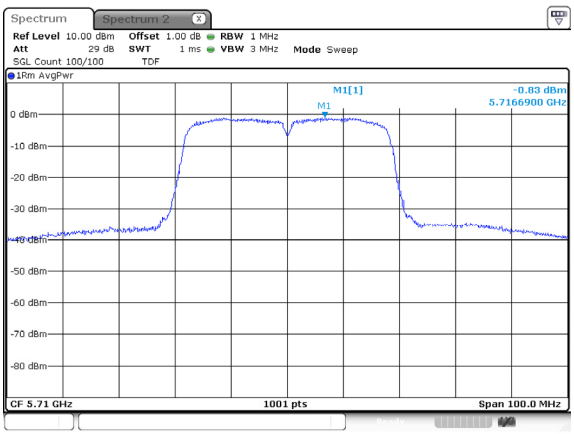
UNII-2C / 802.11n HT40 / Mid ch.



UNII-3 / 802.11n HT40 / High ch.

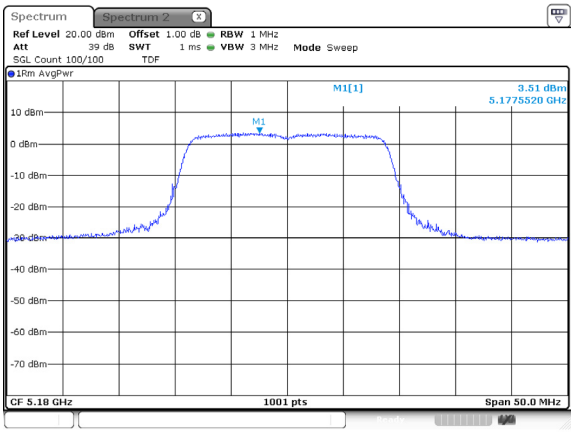


UNII-2C / 802.11n HT40 / High ch.

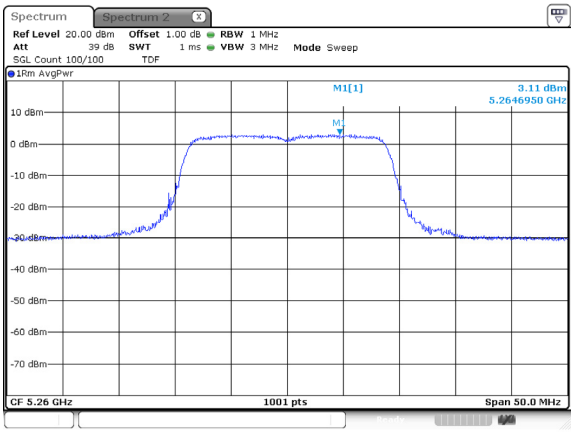


Blank

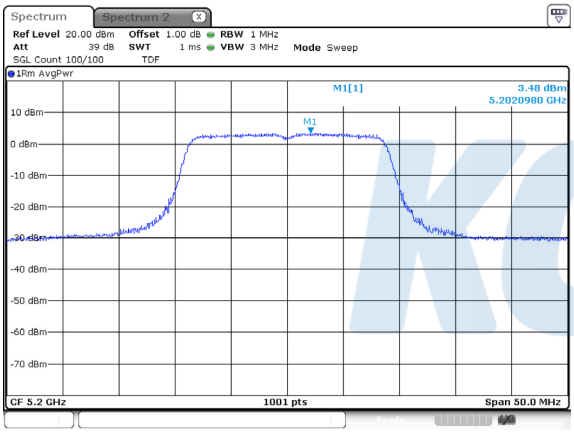
UNII-1 / 802.11ac VHT20 / Low ch.



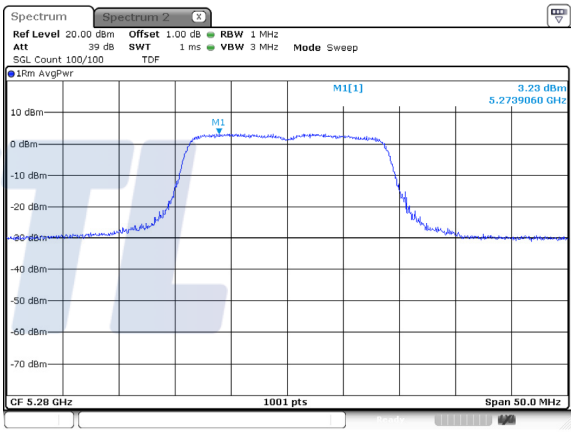
UNII-2A / 802. 11ac VHT20 / Low ch.



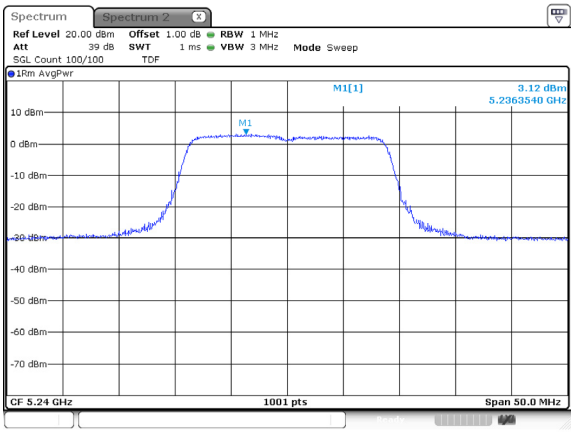
UNII-1 / 802. 11ac VHT20 / Mid ch.



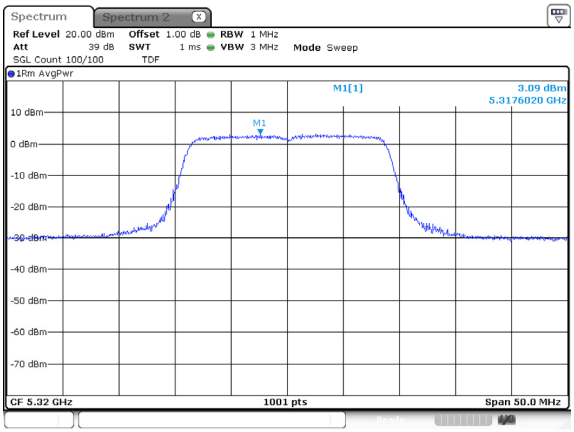
UNII-2A / 802. 11ac VHT20 / Mid ch.



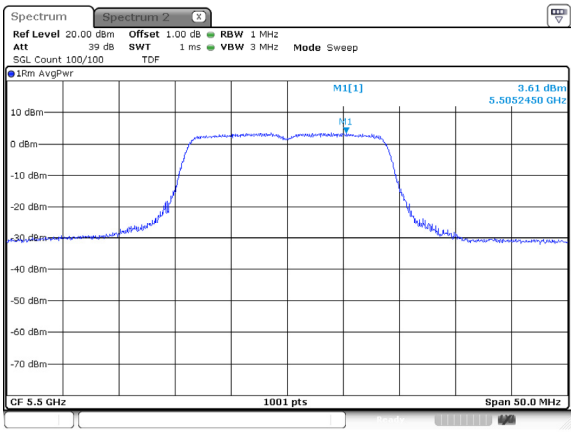
UNII-1 / 802. 11ac VHT20 / High ch.



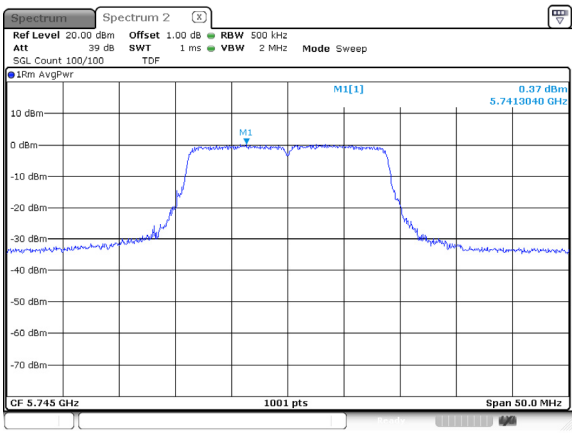
UNII-2A / 802. 11ac VHT20 / High ch.



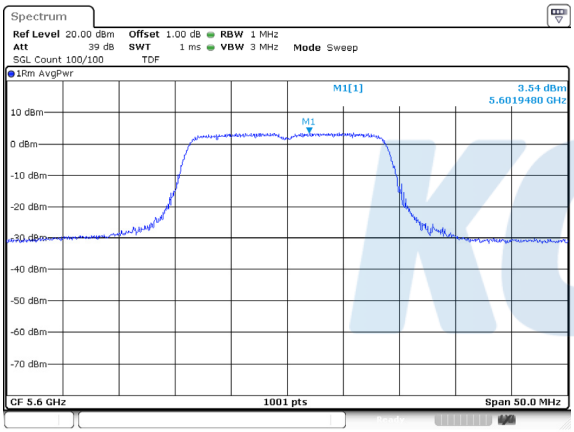
UNII-2C / 802.11ac VHT20 / Low ch.



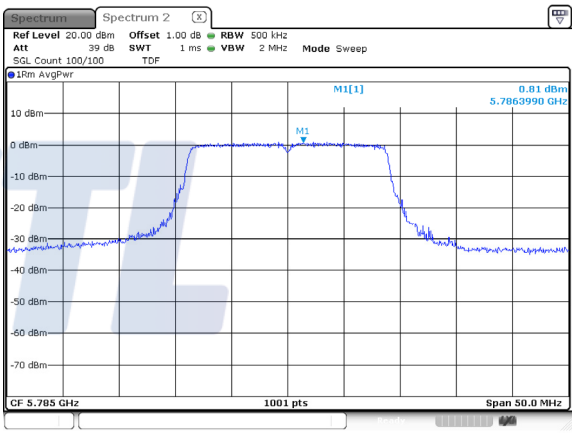
UNII-3 / 802.11ac VHT20 / Low ch.



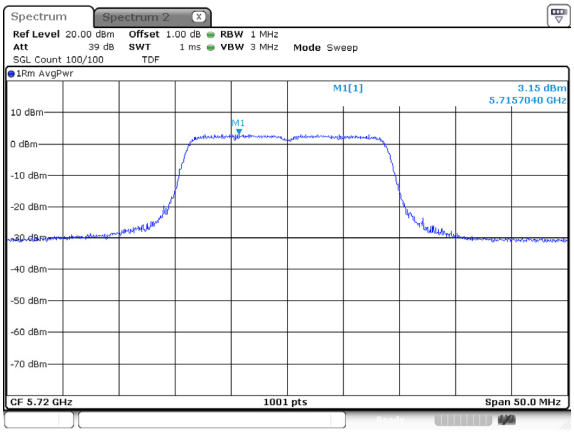
UNII-2C / 802.11ac VHT20 / Mid ch.



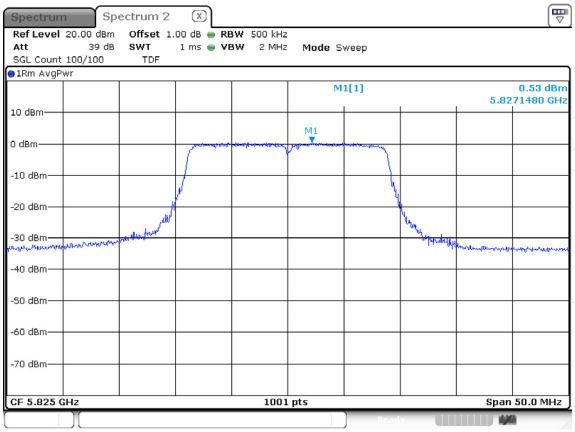
UNII-3 / 802.11ac VHT20 / Mid ch.

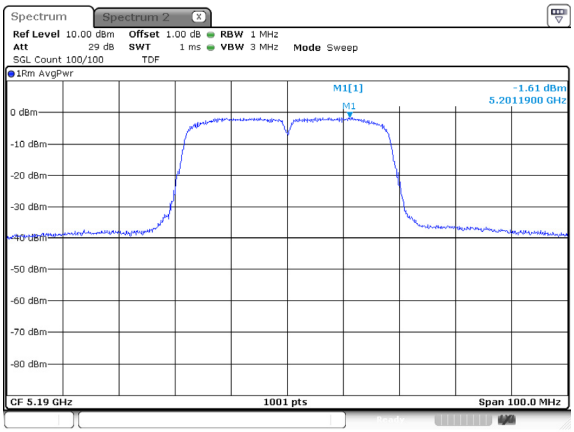
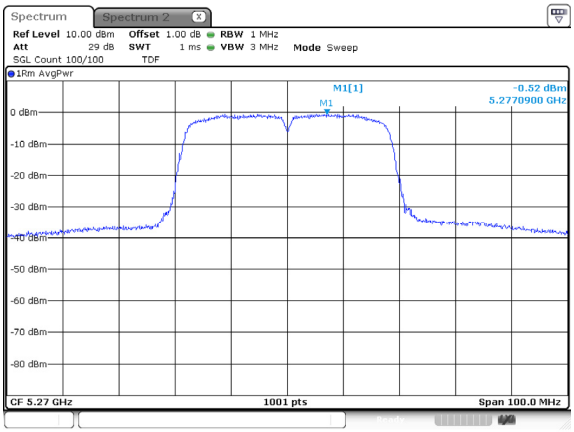
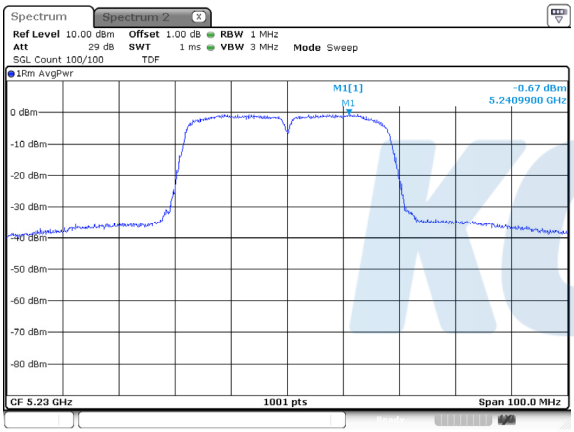
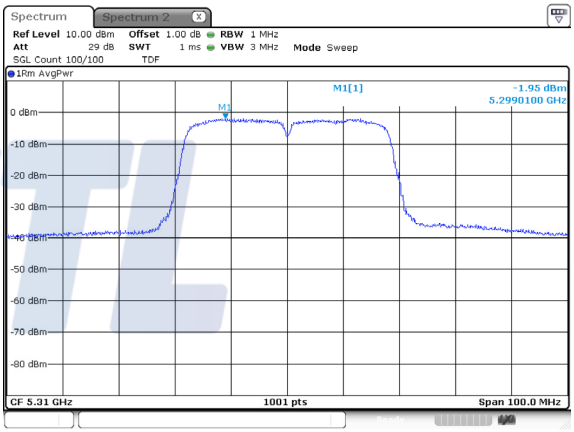


UNII-2C / 802.11ac VHT20 / High ch.



UNII-3 / 802.11ac VHT20 / High ch.



UNII-1 / 802.11ac VHT40 / Low ch.	UNII-2A / 802.11ac VHT40 / Low ch.
	
UNII-1 / 802.11ac VHT40 / High ch.	**UNII-2A / 802.11ac VHT40 / High ch.**