

3.3.2. 99 % Bandwidth

3.3.2.1 FCC

1. This measurement settings are specified in section II.D of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set center frequency to the nominal EUT channel center frequency.
3. Set span = 1.5 times to 5.0 times the OBW.
4. Set RBW = 1 % to 5 % of the OBW.
5. Set VBW $\geq 3 \times$ RBW.
6. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
7. Use the 99 % power bandwidth function of the instrument (if available).
8. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99 % occupied bandwidth is the difference between these two frequencies.

In the result,

- DFS requirements are not applicable in the 5 150 MHz ~ 5 250 MHz.

3.3.2.2 IC

- The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.
- The detector of the spectrum analyzer shall be set to "Sample". However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or "Max Hold") may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.
- The resolution bandwidth (RBW) shall be in the range of 1 % to 5 % of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99 % emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99 % emission bandwidth).

3.4. Test Result

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

- SISO_Ant.1

Test mode: 11a

Band	Frequency (MHz)	Ch.	Data Rate (Mbps)	26 dB Bandwidth (MHz)	99 % Bandwidth (MHz)
U-NII 1	5 180	36	6	21.059	17.019
	5 220	44		21.059	17.019
	5 240	48		21.179	17.077
U-NII 3	5 745	149		21.019	17.077
	5 785	157		21.139	17.077
	5 825	165		21.179	17.077

Test mode: 11ac_VHT20

Band	Frequency (MHz)	Ch.	Data Rate (Mbps)	26 dB Bandwidth (MHz)	99 % Bandwidth (MHz)
U-NII 1	5 180	36	MCS0	21.539	18.119
	5 220	44		21.578	18.119
	5 240	48		21.499	18.119
U-NII 3	5 745	149		21.658	18.177
	5 785	157		21.259	18.119
	5 825	165		21.299	18.119

Test mode: 11ac_VHT40

Band	Frequency (MHz)	Ch.	Data Rate (Mbps)	26 dB Bandwidth (MHz)	99 % Bandwidth (MHz)
U-NII 1	5 190	38	MCS0	40.200	36.353
	5 230	46		40.280	36.237
U-NII 3	5 755	151		40.440	36.353
	5 795	159		40.120	36.353

Test mode: 11ac_VHT80

Band	Frequency (MHz)	Ch.	Data Rate (Mbps)	26 dB Bandwidth (MHz)	99 % Bandwidth (MHz)
U-NII 1	5 210	42	MCS0	81.678	75.716
U-NII 3	5 775	155		82.318	75.716

- SISO_Ant.2

Test mode: 11a

Band	Frequency (MHz)	Ch.	Data Rate (Mbps)	26 dB Bandwidth (MHz)	99 % Bandwidth (MHz)
U-NII 1	5 180	36	6	20.859	16.961
	5 220	44		20.939	17.019
	5 240	48		20.859	17.019
U-NII 3	5 745	149		20.859	17.019
	5 785	157		21.019	16.961
	5 825	165		20.939	16.961

Test mode: 11ac_VHT20

Band	Frequency (MHz)	Ch.	Data Rate (Mbps)	26 dB Bandwidth (MHz)	99 % Bandwidth (MHz)
U-NII 1	5 180	36	MCS0	21.339	18.061
	5 220	44		21.299	18.003
	5 240	48		21.299	18.061
U-NII 3	5 745	149		21.179	18.003
	5 785	157		21.179	18.061
	5 825	165		21.219	18.003

Test mode: 11ac_VHT40

Band	Frequency (MHz)	Ch.	Data Rate (Mbps)	26 dB Bandwidth (MHz)	99 % Bandwidth (MHz)
U-NII 1	5 190	38	MCS0	39.960	36.237
	5 230	46		40.120	36.353
U-NII 3	5 755	151		40.200	36.237
	5 795	159		40.200	36.353

Test mode: 11ac_VHT80

Band	Frequency (MHz)	Ch.	Data Rate (Mbps)	26 dB Bandwidth (MHz)	99 % Bandwidth (MHz)
U-NII 1	5 210	42	MCS0	82.637	75.716
U-NII 3	5 775	155		82.158	75.716

- MIMO

Test mode: 11a

Band	Frequency (MHz)	Ch.	Data Rate (Mbps)	26 dB Bandwidth (MHz)		99 % Bandwidth (MHz)	
				ANT 1	ANT 2	ANT 1	ANT 2
U-NII 1	5 180	36	6	20.979	21.379	17.019	17.019
	5 220	44		20.939	21.379	17.077	16.961
	5 240	48		20.979	21.299	17.077	17.019
U-NII 3	5 745	149		20.739	21.459	17.019	17.019
	5 785	157		21.099	21.339	17.077	16.961
	5 825	165		20.979	21.339	17.077	17.019

Test mode: 11ac_VHT20

Band	Frequency (MHz)	Ch.	Data Rate (Mbps)	26 dB Bandwidth (MHz)		99 % Bandwidth (MHz)	
				ANT 1	ANT 2	ANT 1	ANT 2
U-NII 1	5 180	36	MCS0	21.339	21.419	18.119	17.887
	5 220	44		21.379	21.259	18.119	17.829
	5 240	48		21.379	21.259	18.119	17.887
U-NII 3	5 745	149		21.299	21.339	18.119	17.887
	5 785	157		21.419	21.139	18.177	17.829
	5 825	165		21.539	21.459	18.119	17.829

Test mode: 11ac_VHT40

Band	Frequency (MHz)	Ch.	Data Rate (Mbps)	26 dB Bandwidth (MHz)		99 % Bandwidth (MHz)	
				ANT 1	ANT 2	ANT 1	ANT 2
U-NII 1	5 190	38	MCS0	40.040	39.640	36.237	36.122
	5 230	46		40.200	39.640	36.237	36.122
U-NII 3	5 755	151		40.280	39.560	36.353	36.237
	5 795	159		40.120	39.560	36.353	36.237

Test mode: 11ac_VHT80

Band	Frequency (MHz)	Ch.	Data Rate (Mbps)	26 dB Bandwidth (MHz)		99 % Bandwidth (MHz)	
				ANT 1	ANT 2	ANT 1	ANT 2
U-NII 1	5 210	42	MCS0	81.518	82.158	75.948	75.485
U-NII 3	5 775	155		82.158	81.998	75.716	75.485

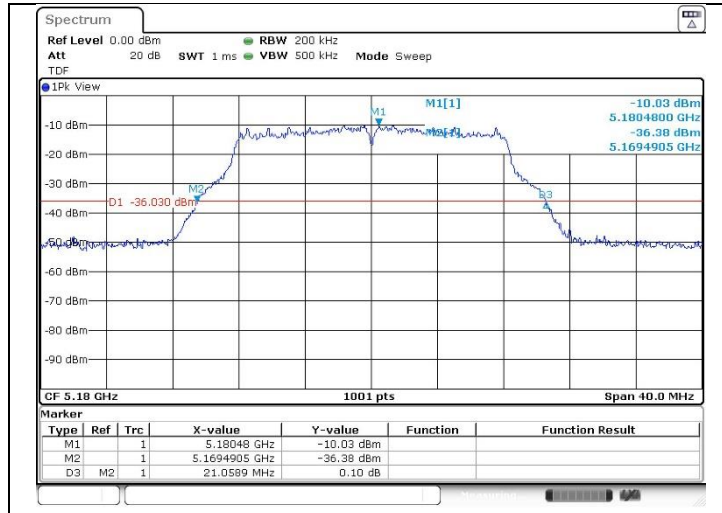
- Test plots

- SISO_Ant.1

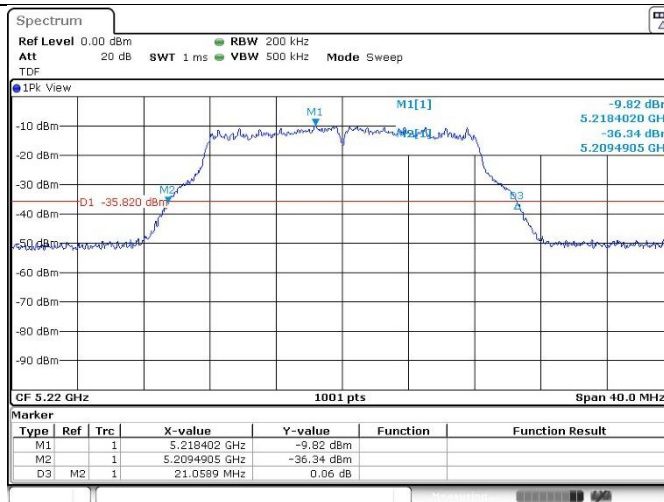
26 dB Bandwidth

802.11a (Band 1)

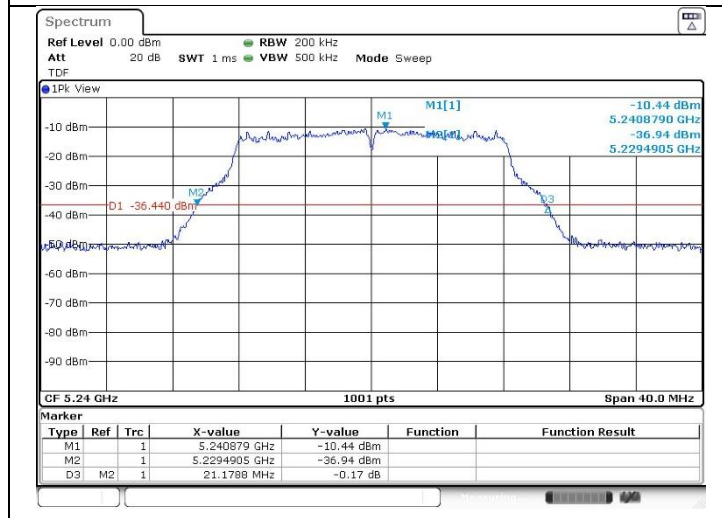
Low Channel
(5 180 MHz)



Middle Channel
(5 220 MHz)

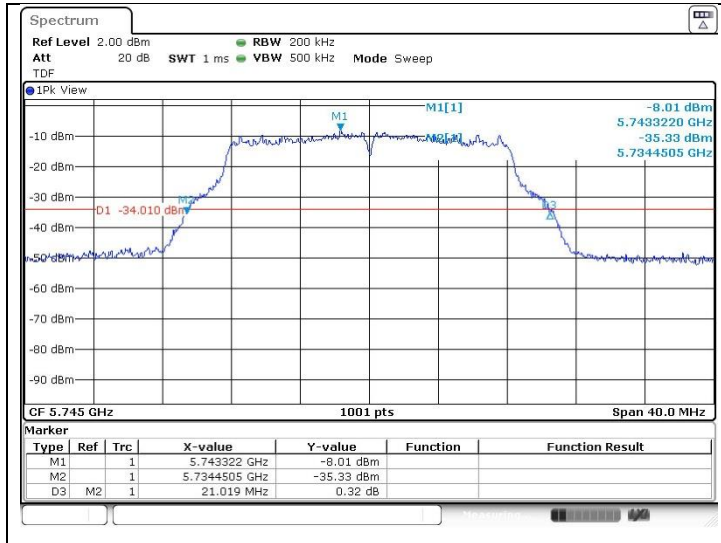


High Channel
(5 240 MHz)

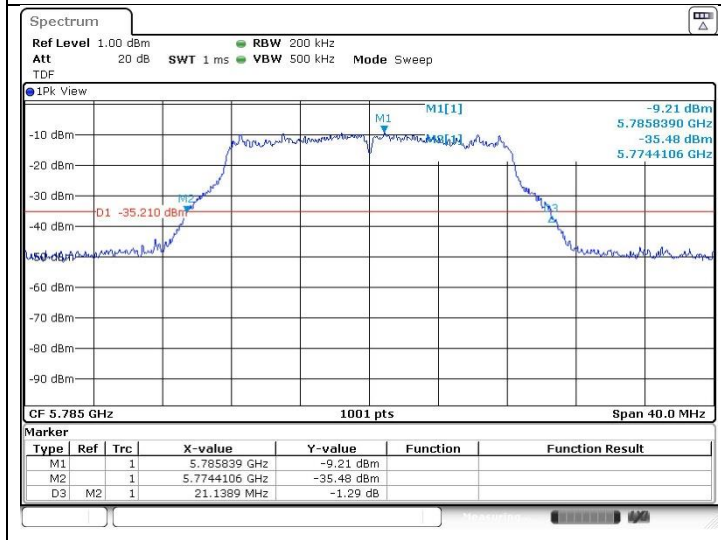


802.11a (Band 3)

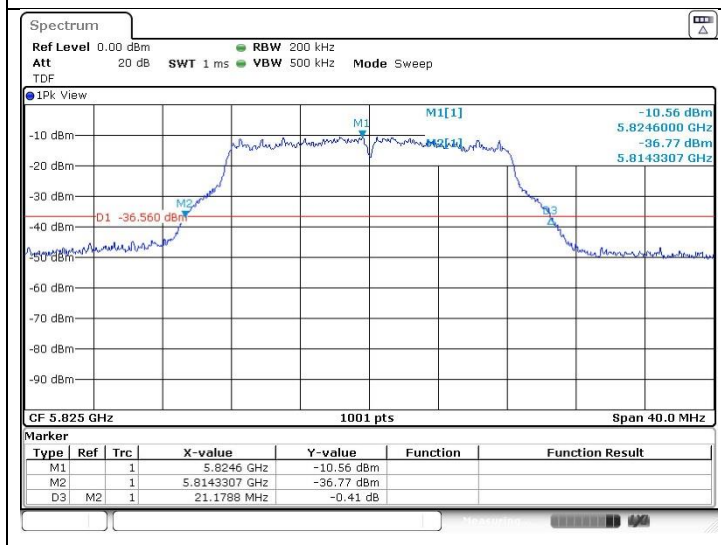
Low Channel
(5 745 MHz)



Middle Channel
(5 785 MHz)

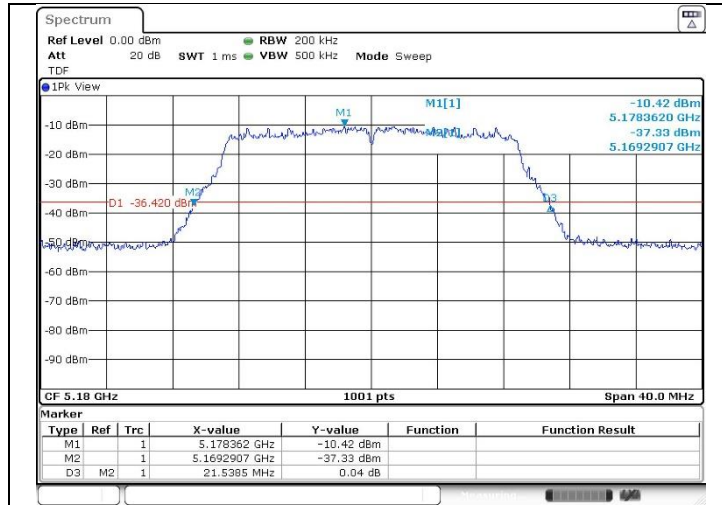


High Channel
(5 825 MHz)

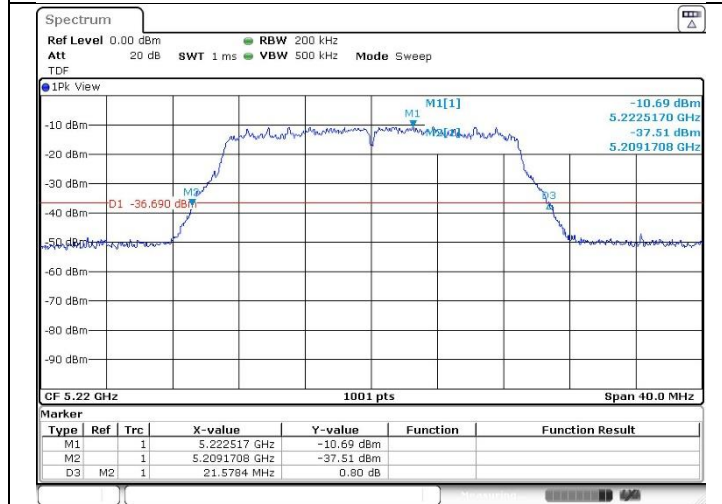


802.11ac_VHT20 (Band 1)

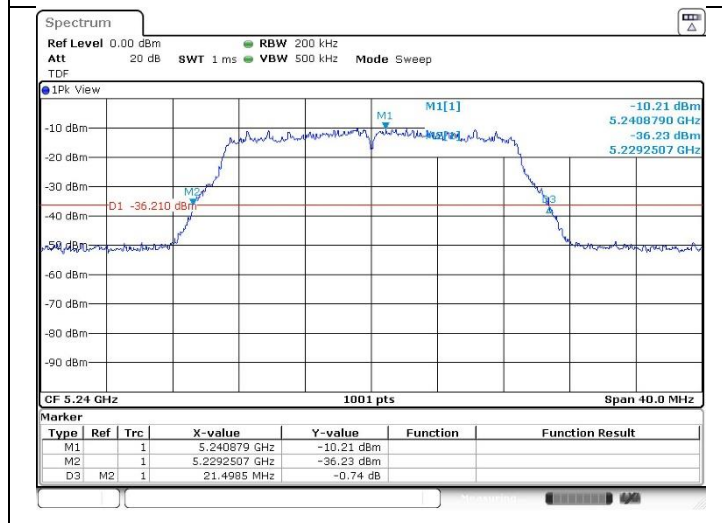
Low Channel
(5 180 MHz)



Middle Channel
(5 220 MHz)

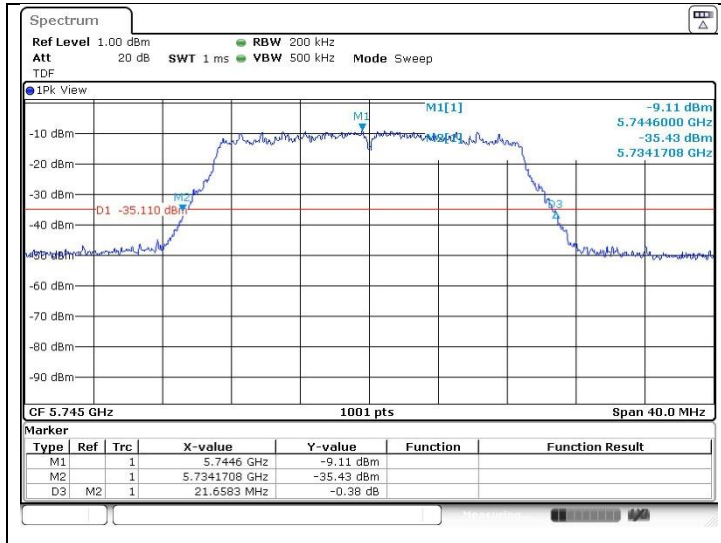


High Channel
(5 240 MHz)

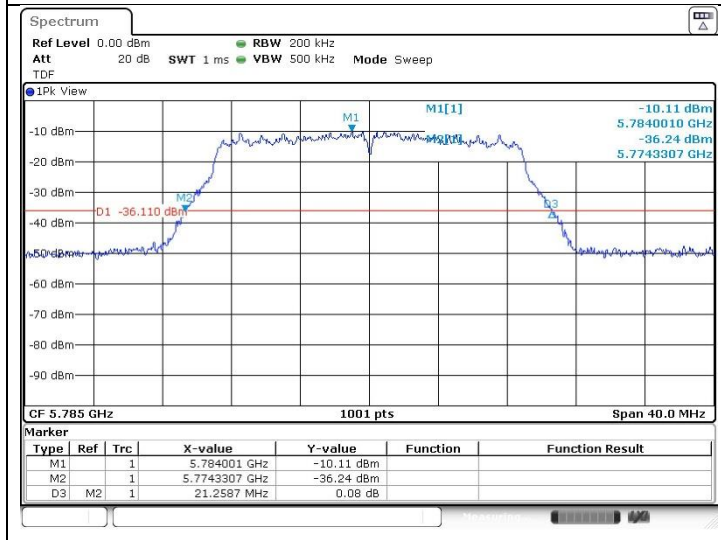


802.11ac_VHT20 (Band 3)

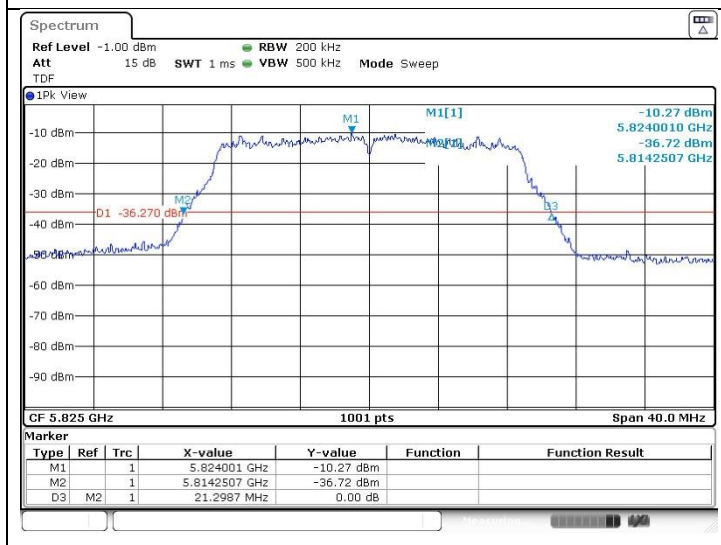
Low Channel
(5 745 MHz)



Middle Channel
(5 785 MHz)

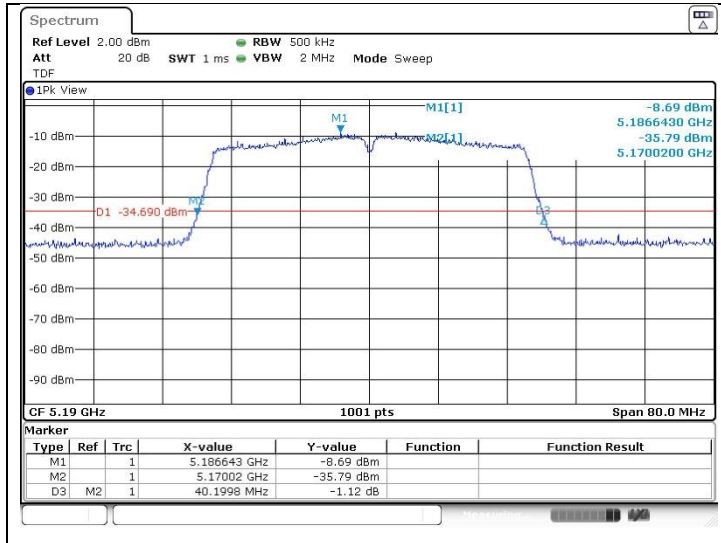


High Channel
(5 825 MHz)

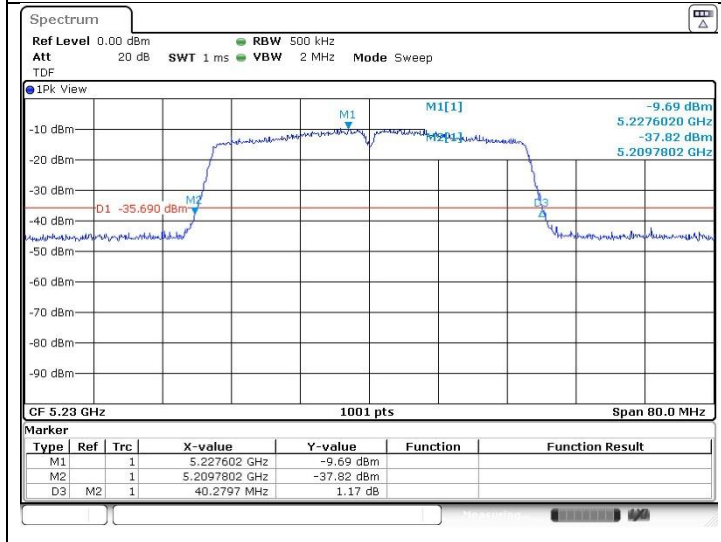


802.11ac_VHT40 (Band 1)

Low Channel
(5 190 MHz)

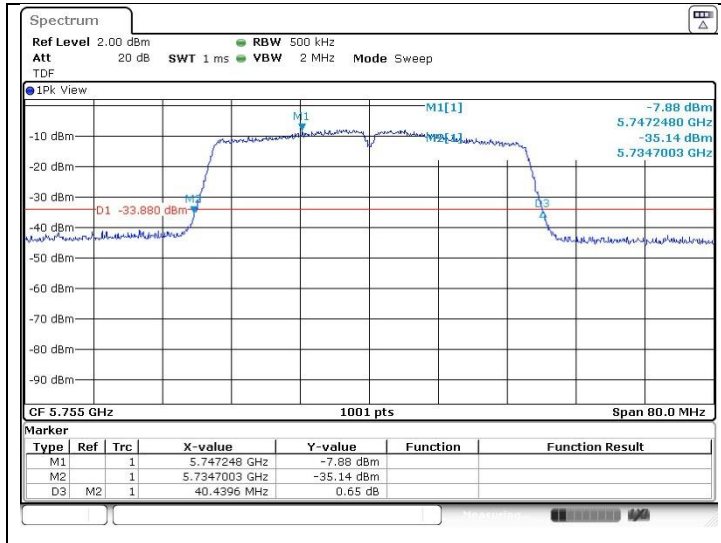


High Channel
(5 230 MHz)

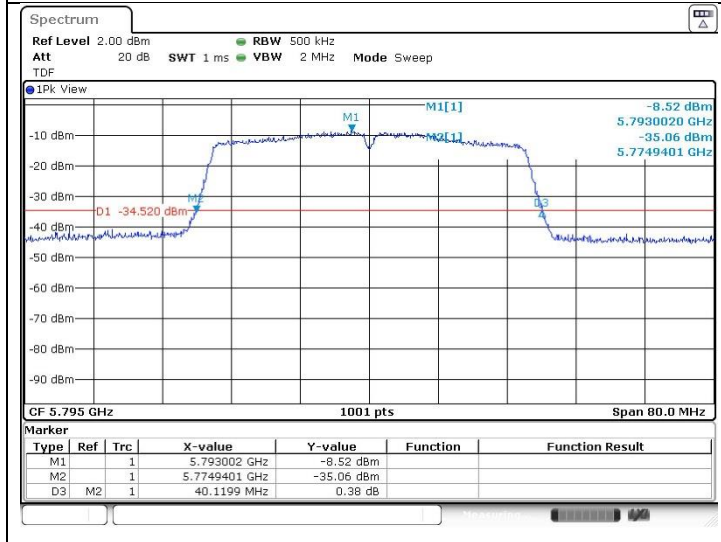


802.11ac_VHT40 (Band 3)

Low Channel
(5 755 MHz)

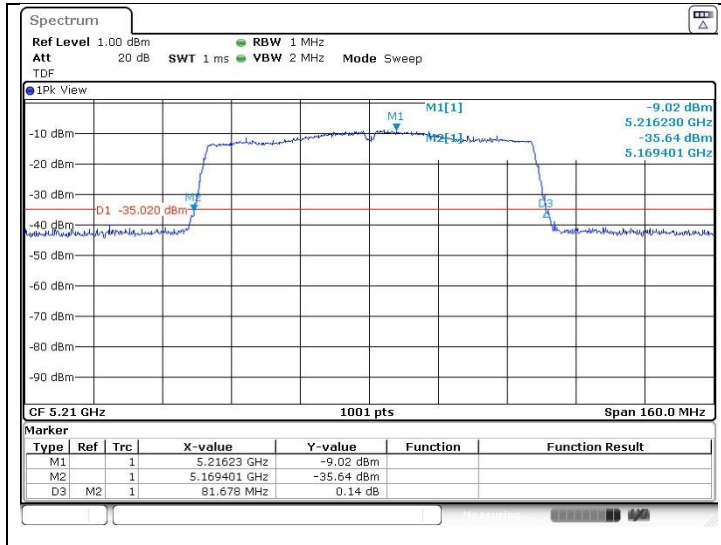


High Channel
(5 795 MHz)



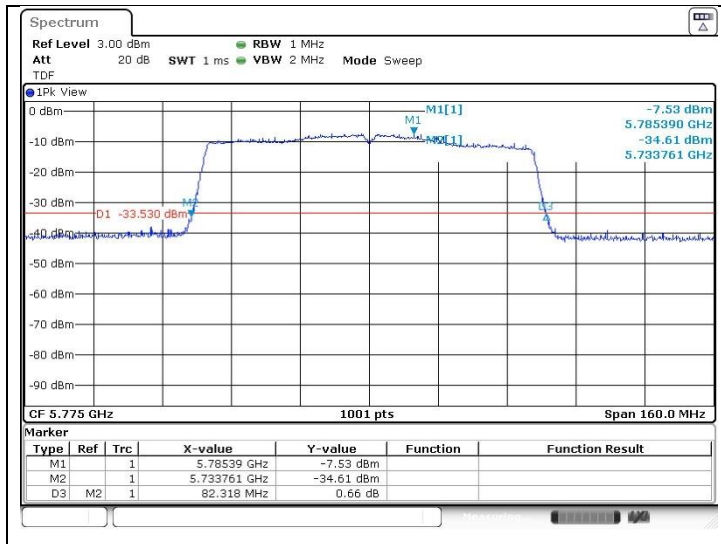
802.11ac_VHT80 (Band 1)

Middle Channel
(5 210 MHz)



802.11ac_VHT80 (Band 3)

Middle Channel
(5 775 MHz)

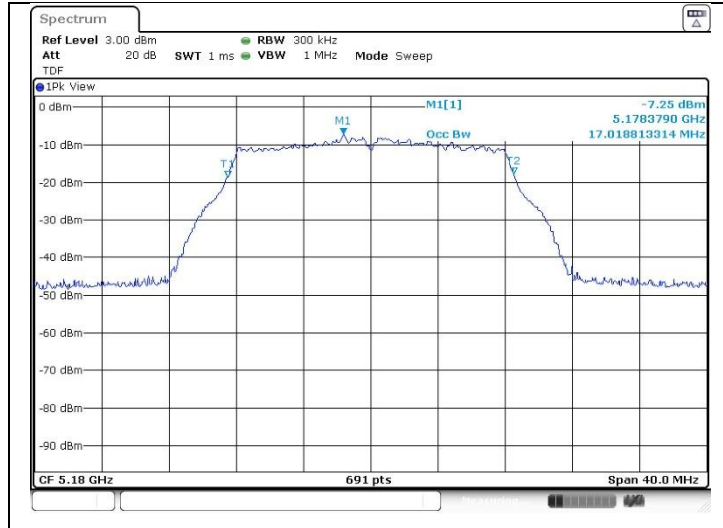


- SISO_Ant.1

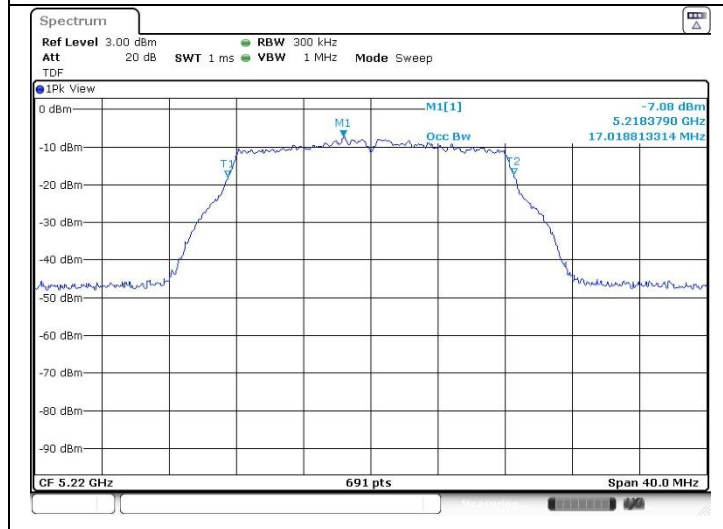
99 % Bandwidth

802.11a (Band 1)

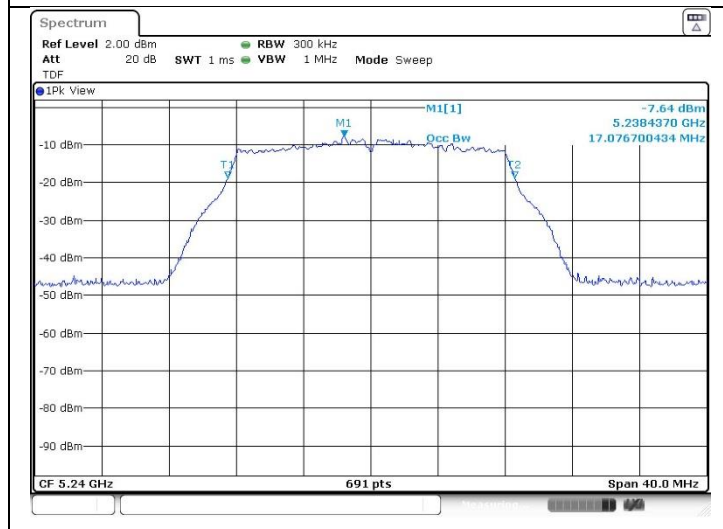
Low Channel
(5 180 MHz)



Middle Channel
(5 220 MHz)

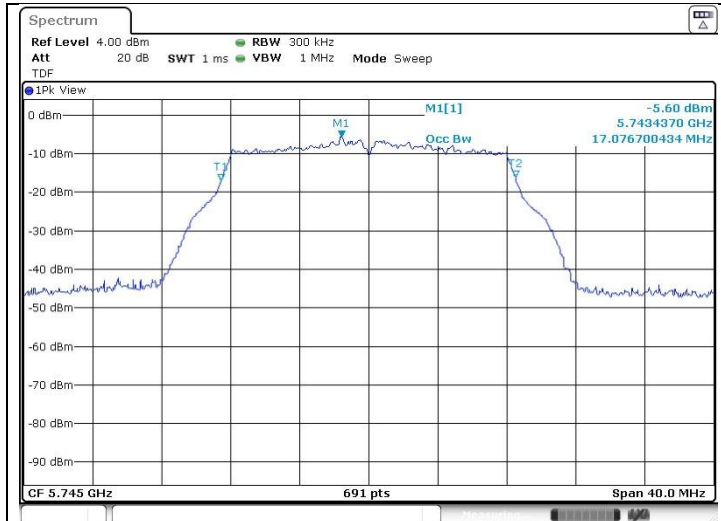


High Channel
(5 240 MHz)

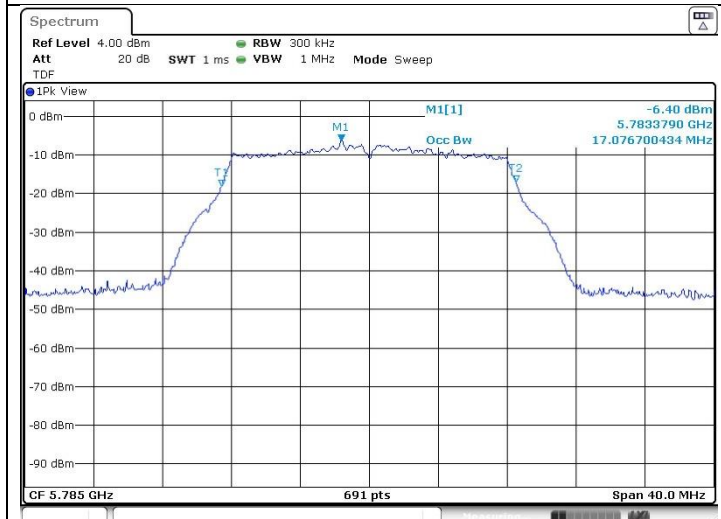


802.11a (Band 3)

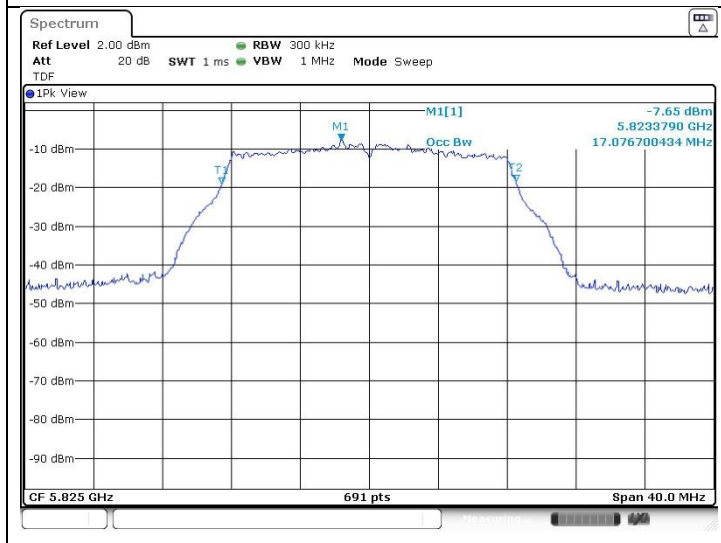
Low Channel
(5 745 MHz)



Middle Channel
(5 785 MHz)

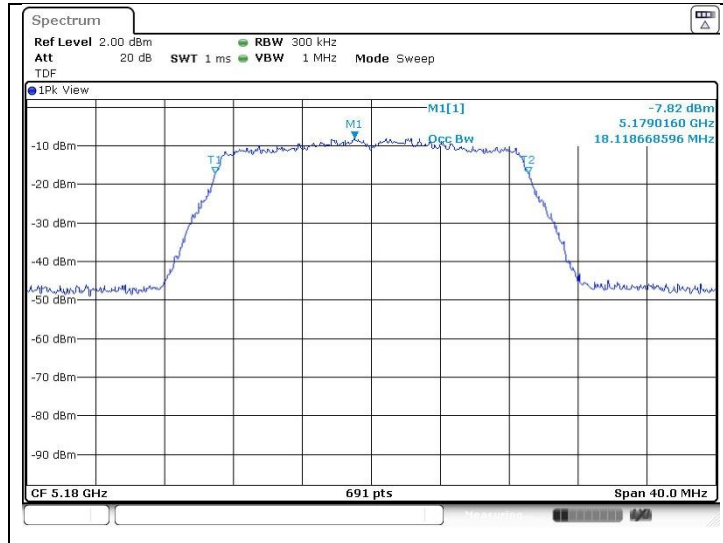


High Channel
(5 825 MHz)

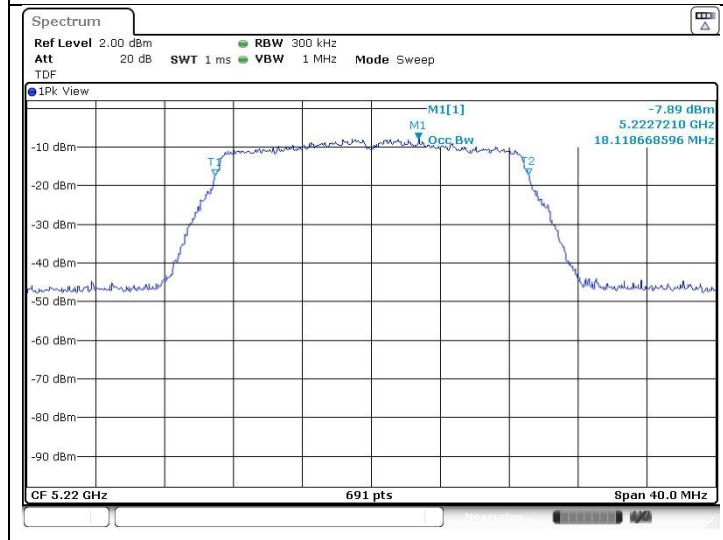


802.11ac_VHT20 (Band 1)

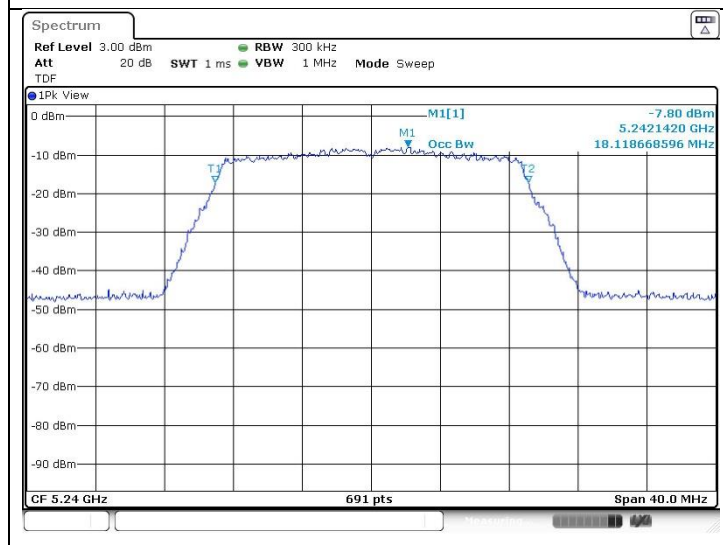
Low Channel
 (5 180 MHz)



Middle Channel
 (5 220 MHz)

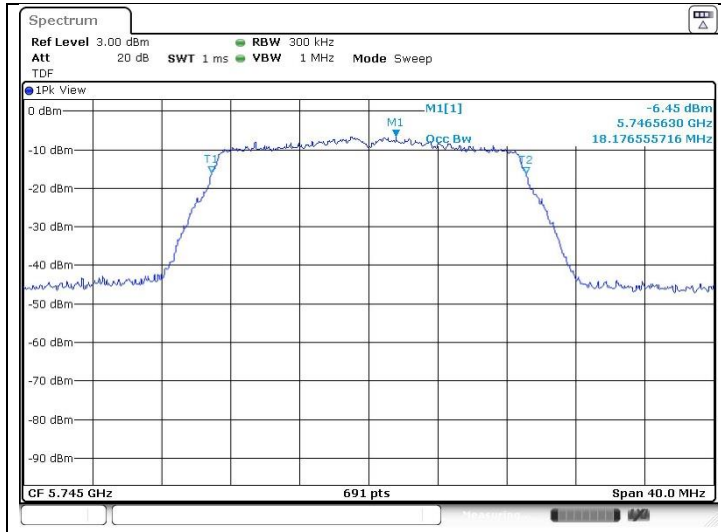


High Channel
 (5 240 MHz)

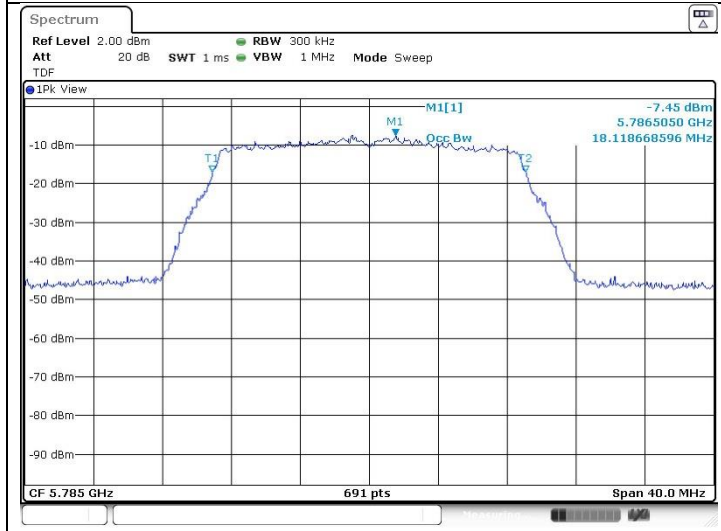


802.11ac_VHT20 (Band 3)

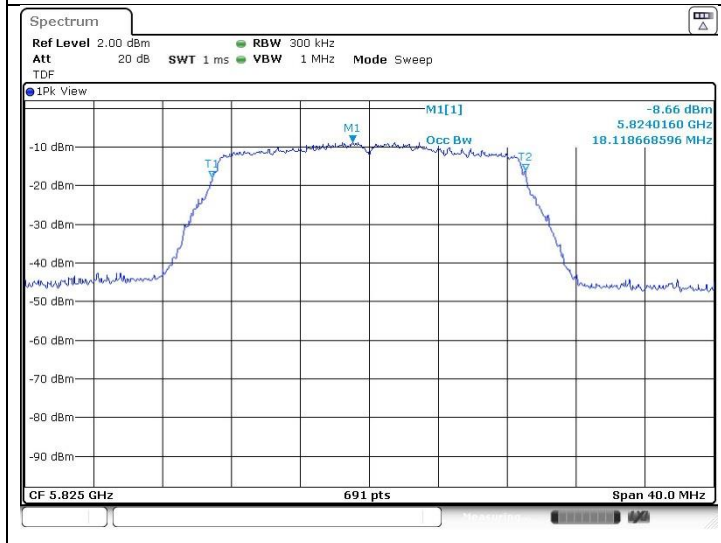
Low Channel
(5 745 MHz)



Middle Channel
(5 785 MHz)

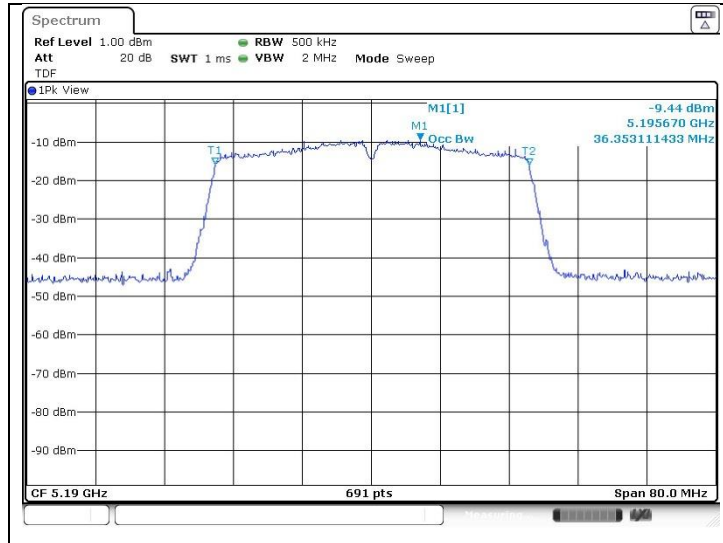


High Channel
(5 825 MHz)

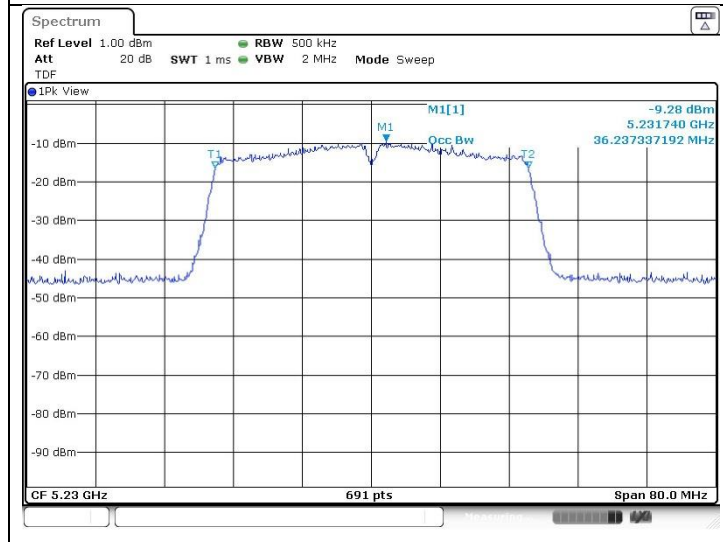


802.11ac_VHT40 (Band 1)

Low Channel
(5 190 MHz)

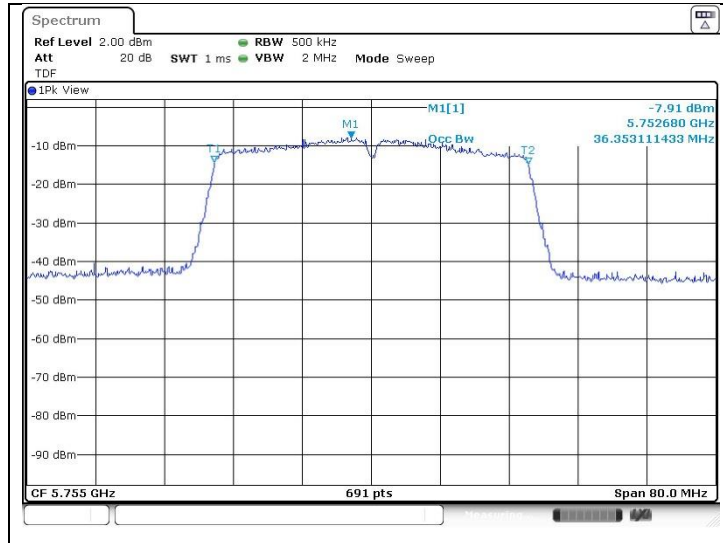


High Channel
(5 230 MHz)

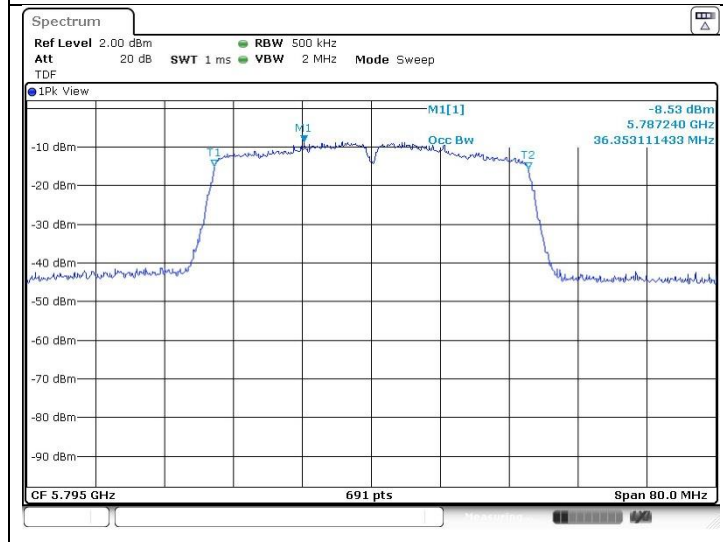


802.11ac_VHT40 (Band 3)

Low Channel
(5 755 MHz)

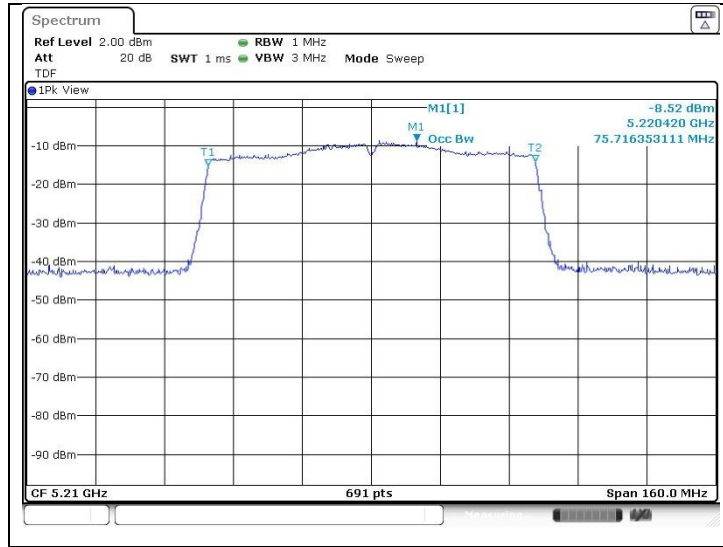


High Channel
(5 795 MHz)



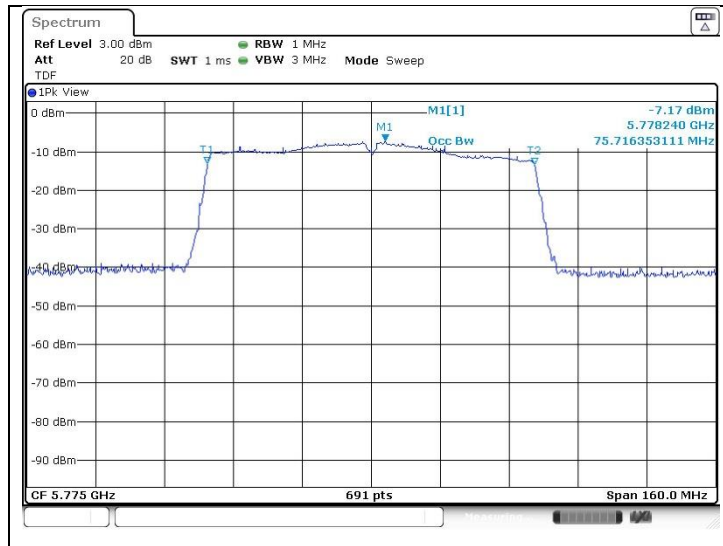
802.11ac_VHT80 (Band 1)

Middle Channel
(5 210 MHz)



802.11ac_VHT80 (Band 3)

Middle Channel
(5 775 MHz)



- SISO_Ant.2

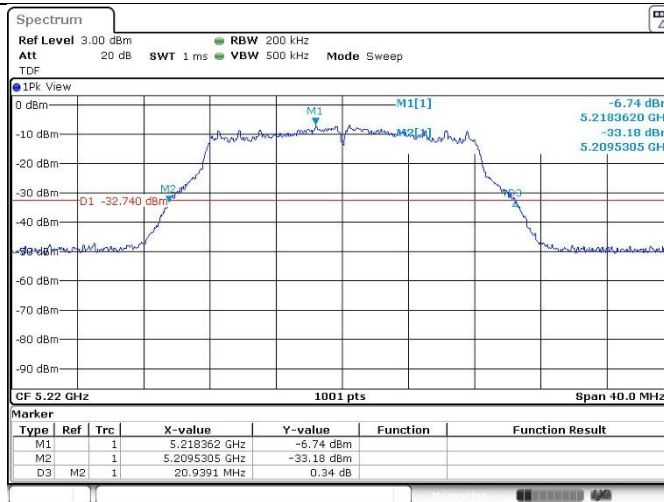
26 dB Bandwidth

802.11a (Band 1)

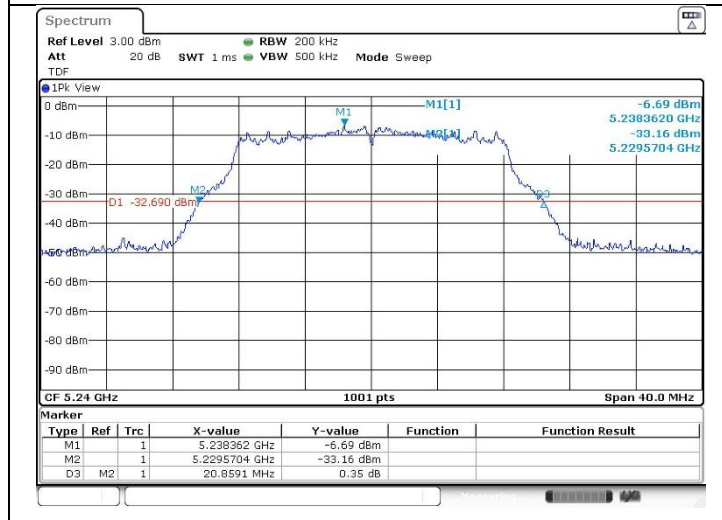
Low Channel
(5 180 MHz)



Middle Channel
(5 220 MHz)

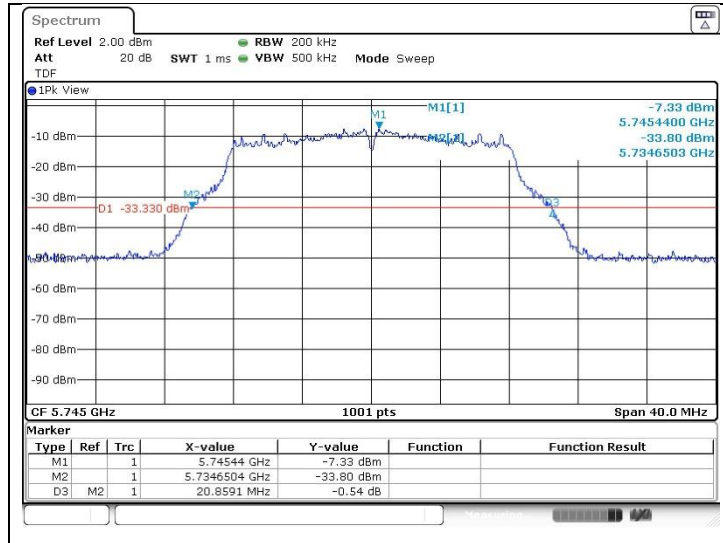


High Channel
(5 240 MHz)

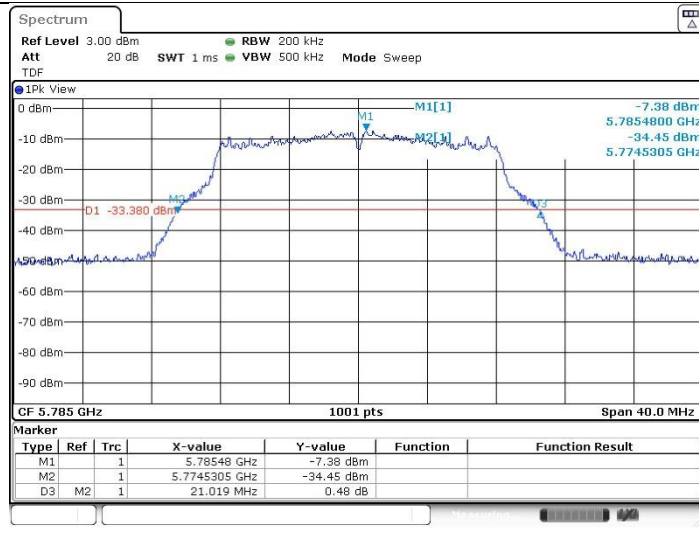


802.11a (Band 3)

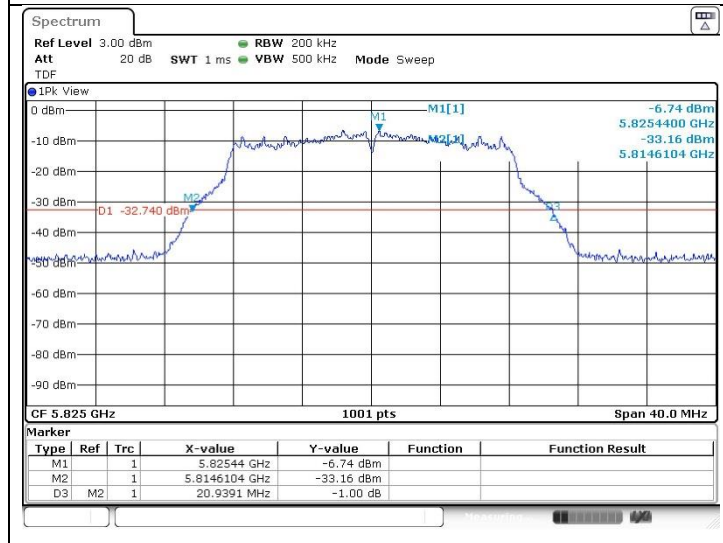
Low Channel
(5 745 MHz)



Middle Channel
(5 785 MHz)

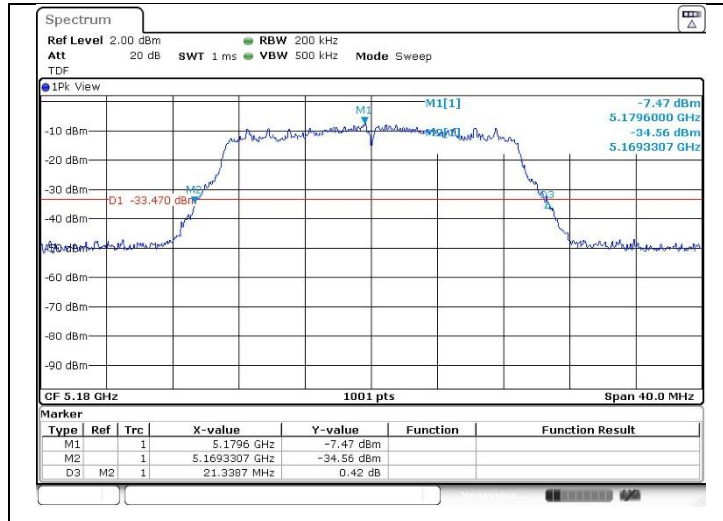


High Channel
(5 825 MHz)

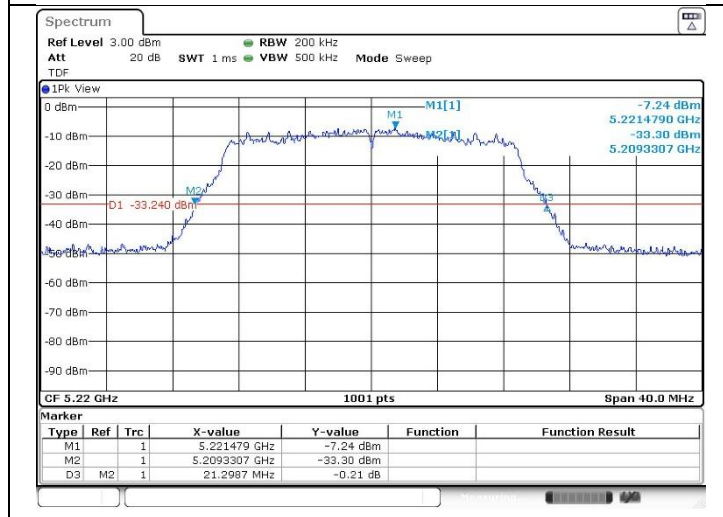


802.11ac_VHT20 (Band 1)

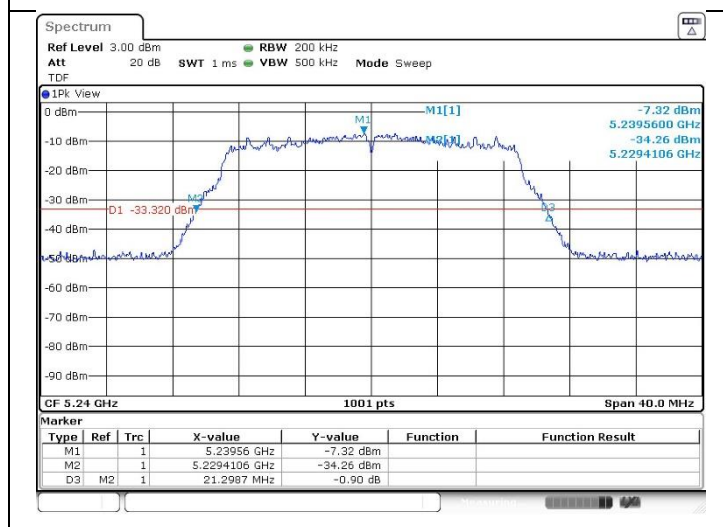
Low Channel
(5 180 MHz)



Middle Channel
(5 220 MHz)

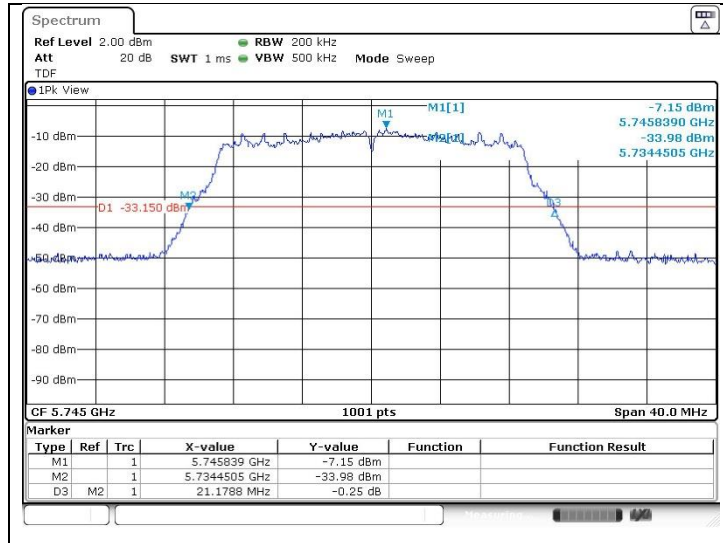


High Channel
(5 240 MHz)

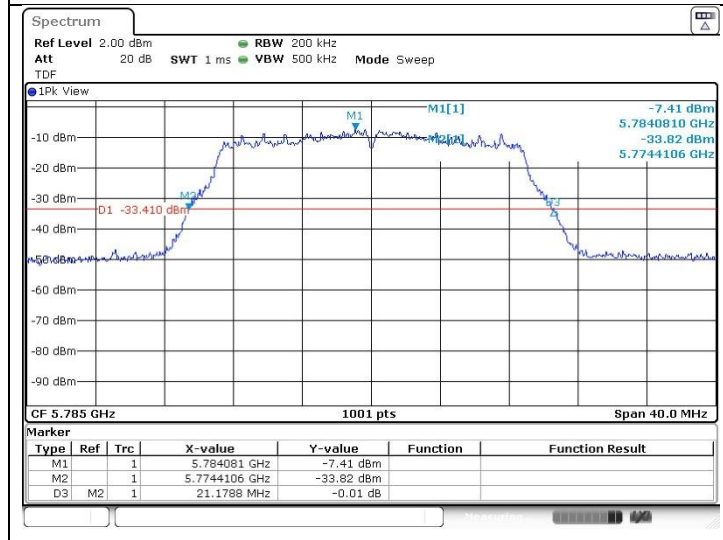


802.11ac_VHT20 (Band 3)

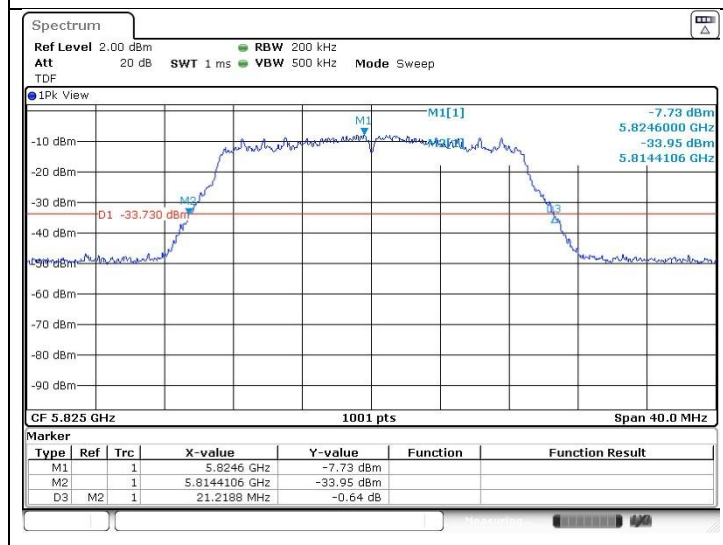
Low Channel
(5 745 MHz)



Middle Channel
(5 785 MHz)

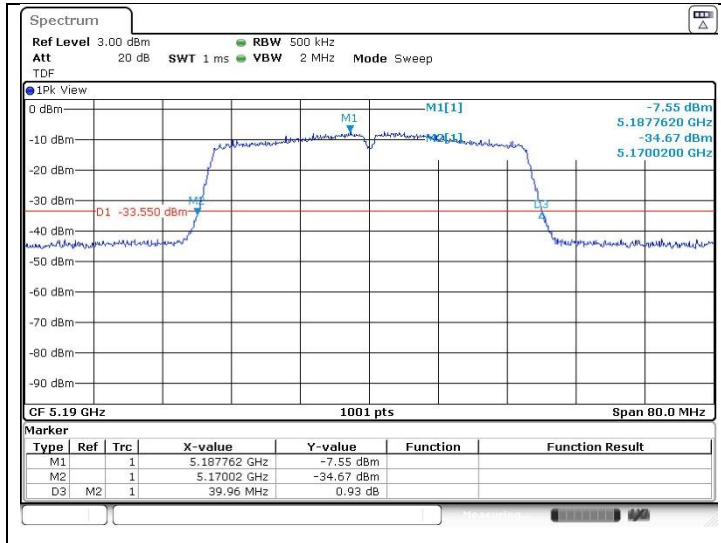


High Channel
(5 825 MHz)

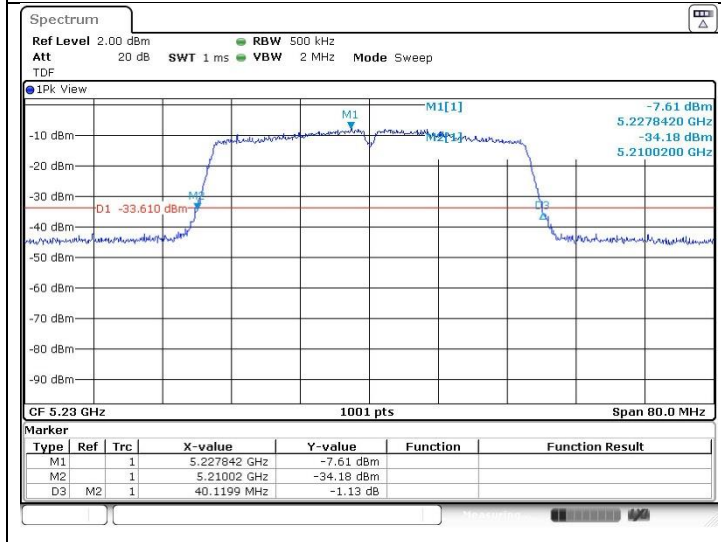


802.11ac_VHT40 (Band 1)

Low Channel
(5 190 MHz)

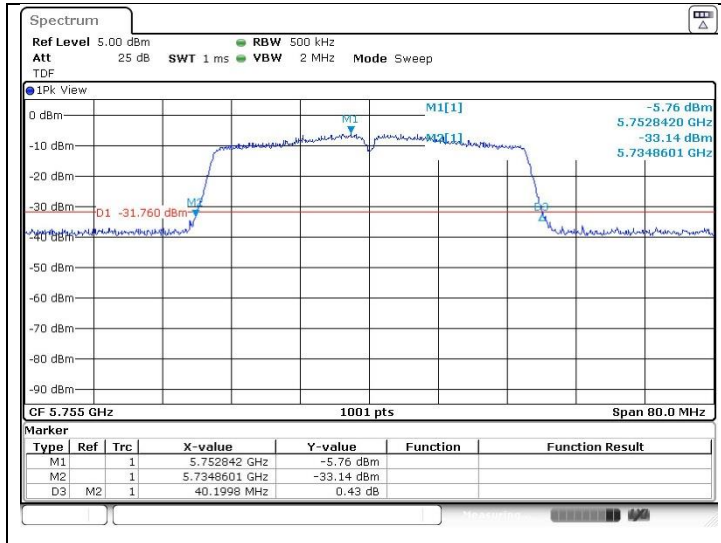


High Channel
(5 230 MHz)

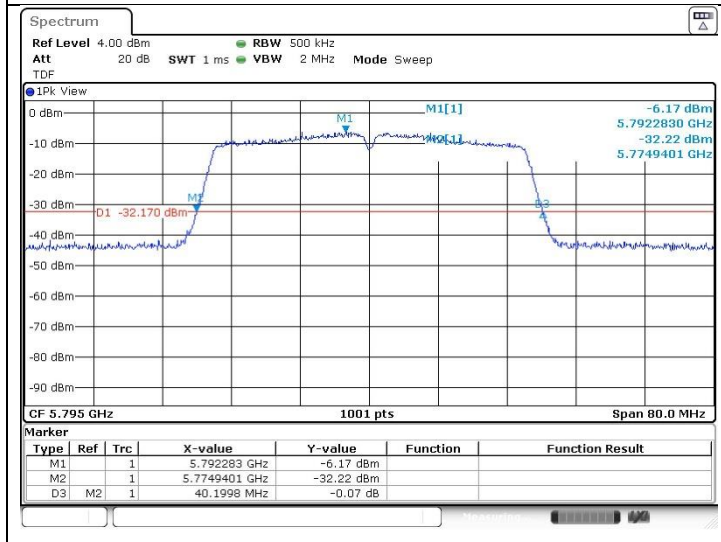


802.11ac_VHT40 (Band 3)

Low Channel
(5 755 MHz)

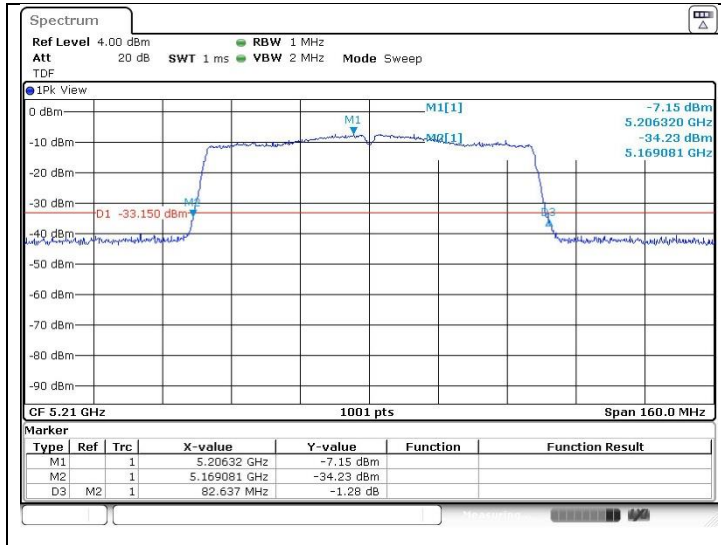


High Channel
(5 795 MHz)



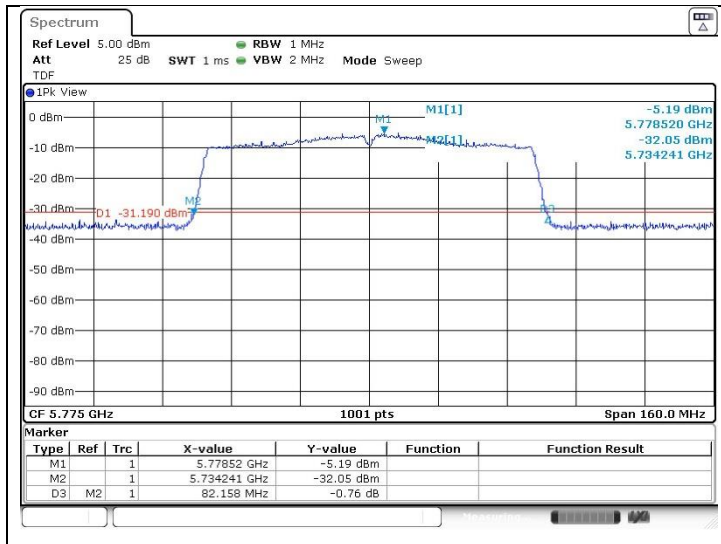
802.11ac_VHT80 (Band 1)

Middle Channel
(5 210 MHz)



802.11ac_VHT80 (Band 3)

Middle Channel
(5 775 MHz)

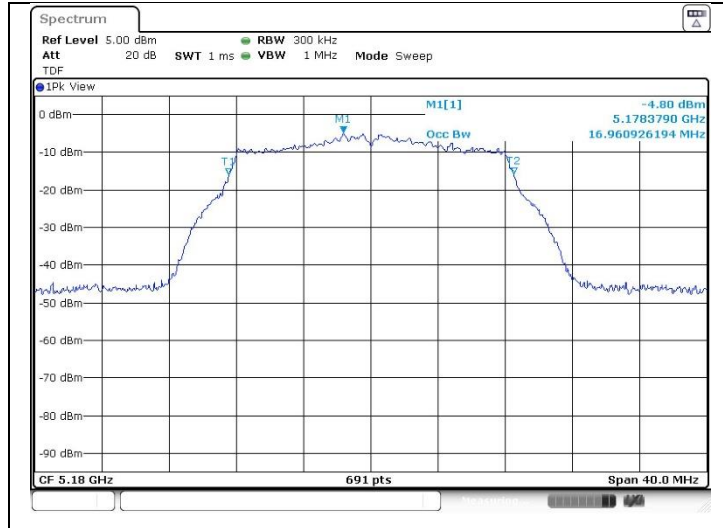


- SISO_Ant.2

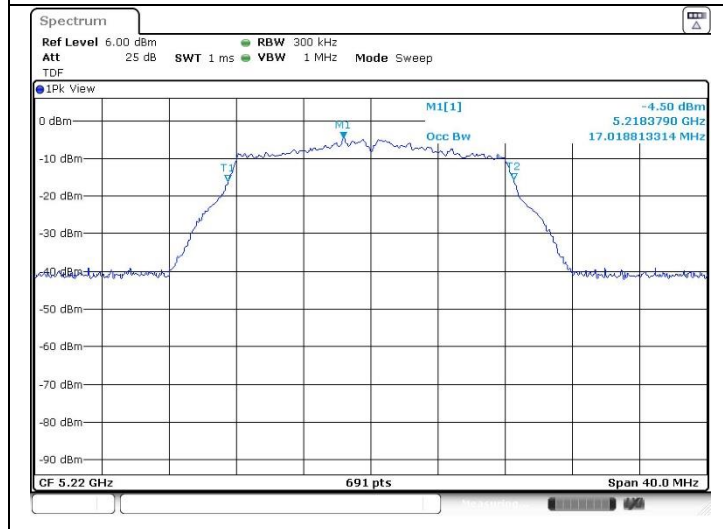
99 % Bandwidth

802.11a (Band 1)

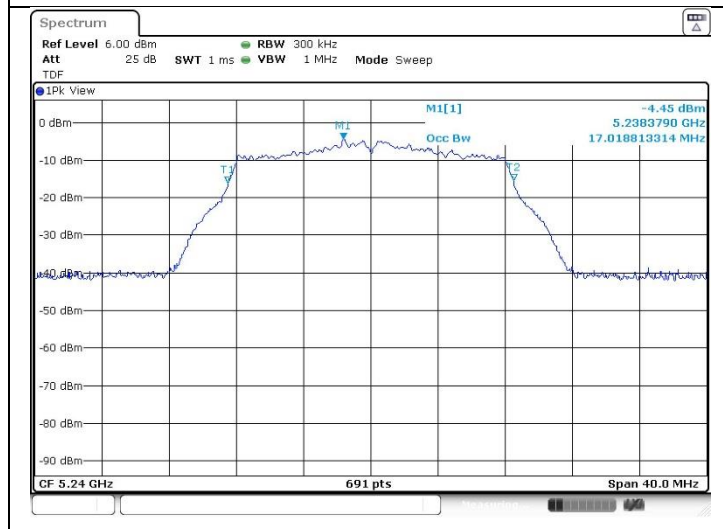
Low Channel
(5 180 MHz)



Middle Channel
(5 220 MHz)

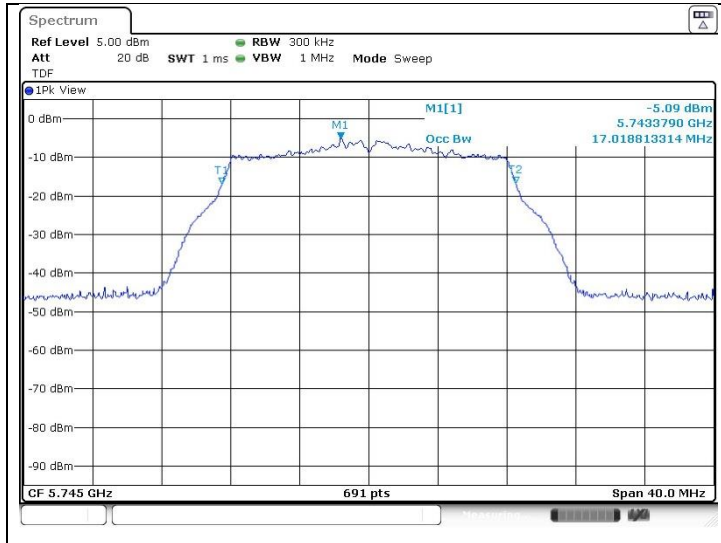


High Channel
(5 240 MHz)

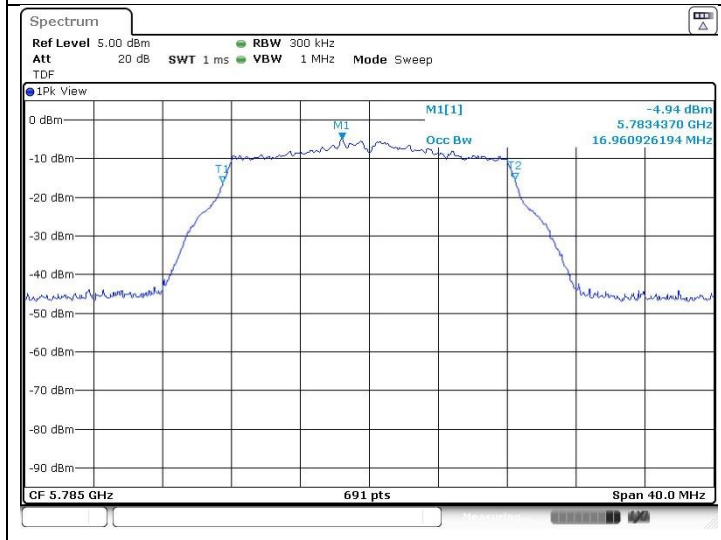


802.11a (Band 3)

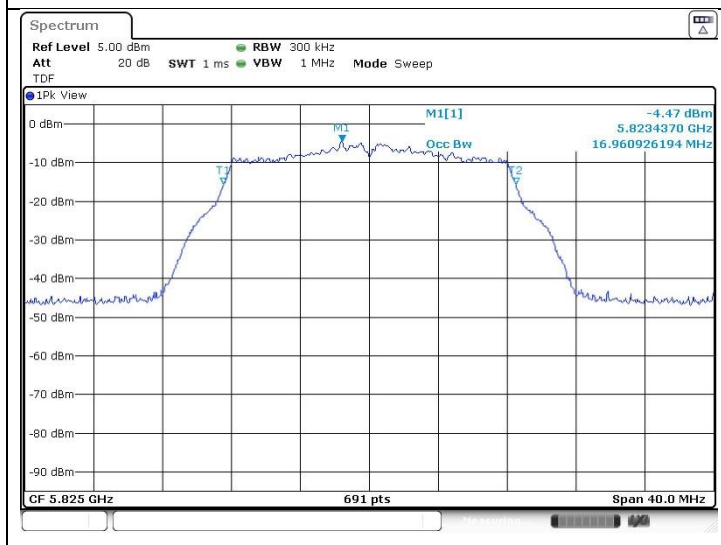
Low Channel
(5 745 MHz)



Middle Channel
(5 785 MHz)

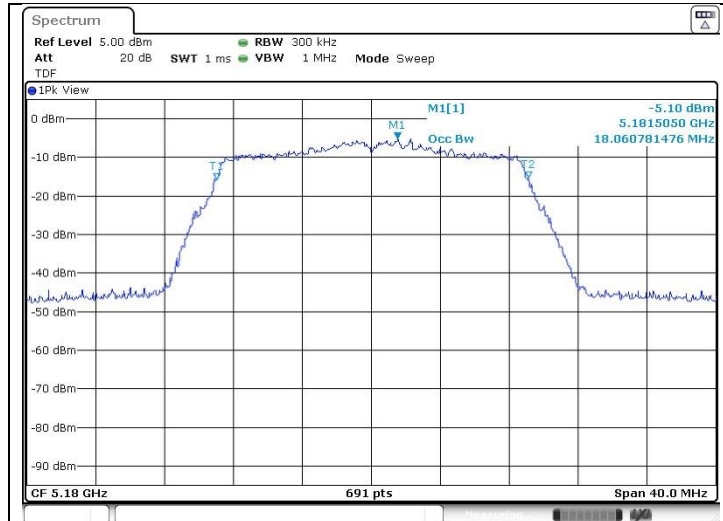


High Channel
(5 825 MHz)

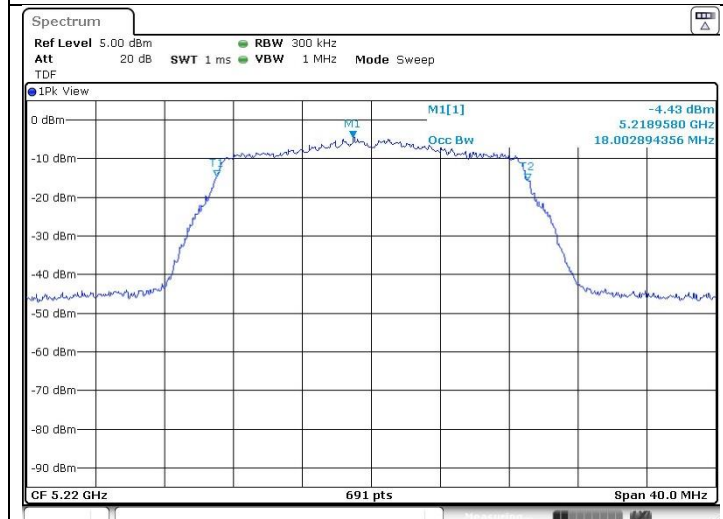


802.11ac_VHT20 (Band 1)

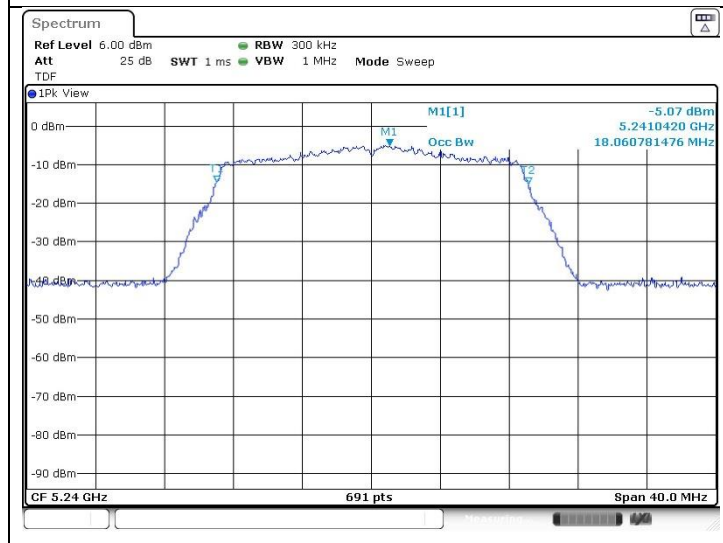
Low Channel
(5 180 MHz)



Middle Channel
(5 220 MHz)

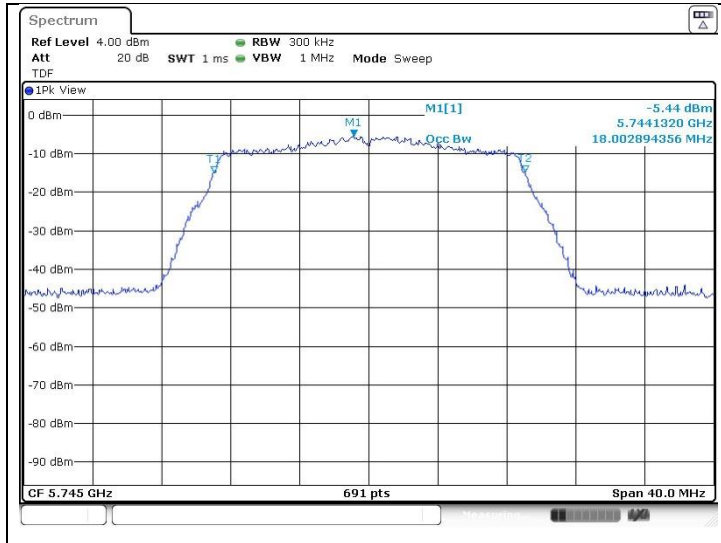


High Channel
(5 240 MHz)

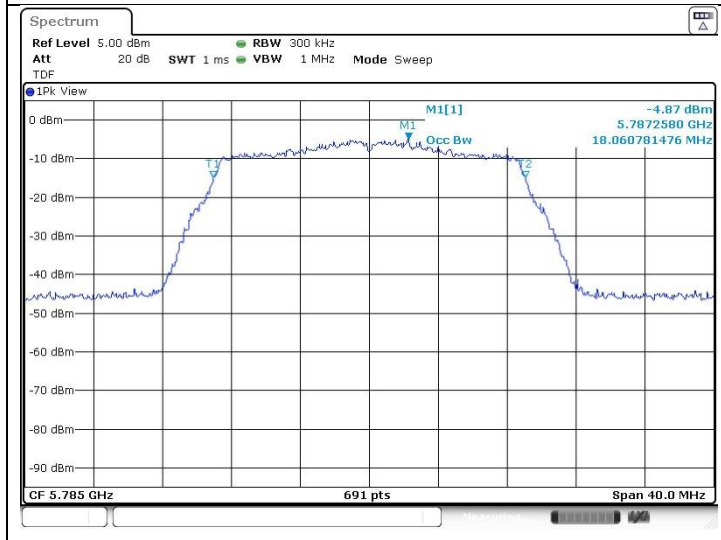


802.11ac_VHT20 (Band 3)

Low Channel
(5 745 MHz)



Middle Channel
(5 785 MHz)



High Channel
(5 825 MHz)

