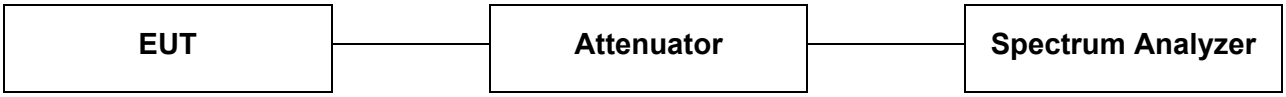
3. 26 ㏈ Bandwidth & 99 % Bandwidth

3.1. Test Setup



3.2. Limit

None; for reporting purpose only.

3.3. Test Procedure

All data rates and modes were investigated for this test. The full data for the worst case data rate are reported in this section.

3.3.1. 26 ㏈ Bandwidth

1. This measurement settings are specified in section C.1 of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set RBW: approximately 1 % of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Measure the maximum width of the emission that is 26 ㏈ down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

3.3.2. 99 % Bandwidth

3.3.2.1 FCC

1. This measurement settings are specified in section 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 ≥ 3 x 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 ㎒ ~ 5 250 ㎒.

3.3.2.2 IC

The following conditions shall be observed for measuring the occupied bandwidth and x ㏈ bandwidth:

● The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

● 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 ㏈ 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 ㏈ 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) ℃
Relative humidity : 47 % R.H.

Test mode: 11a

Band	Frequency (㎒)	Ch.	Data Rate (Mbps)	26 ㏈ Bandwidth (㎒)		99 % Bandwidth (㎒)	
				ANT 1	ANT 2	ANT 1	ANT 2
U-NII 1	5 180	36	6	21.129	21.129	17.019	17.019
	5 220	44		21.129	20.955	17.077	17.077
	5 240	48		21.071	21.303	17.077	17.077
U-NII 3	5 745	149		20.955	21.187	17.077	17.135
	5 785	157		21.071	20.839	17.135	17.135
	5 825	165		21.303	21.129	17.077	17.077

Test mode: 11n_HT20

Band	Frequency (㎒)	Ch.	Data Rate (Mbps)	26 ㏈ Bandwidth (㎒)		99 % Bandwidth (㎒)	
				ANT 1	ANT 2	ANT 1	ANT 2
U-NII 1	5 180	36	MCS8	21.476	21.418	18.119	17.887
	5 220	44		21.418	21.360	18.061	17.829
	5 240	48		21.650	21.303	18.119	17.829
U-NII 3	5 745	149		21.360	21.476	18.119	17.829
	5 785	157		21.360	21.245	18.119	17.829
	5 825	165		21.360	21.534	18.061	17.829

Test mode: 11n_HT40

Band	Frequency (㎒)	Ch.	Data Rate (Mbps)	26 ㏈ Bandwidth (㎒)		99 % Bandwidth (㎒)	
				ANT 1	ANT 2	ANT 1	ANT 2
U-NII 1	5 190	38	MCS8	40.174	39.479	36.237	36.237
	5 230	46		39.942	39.363	36.237	36.122
U-NII 3	5 755	151		40.058	39.595	36.237	36.122
	5 795	159		40.174	39.711	36.353	36.122

Test mode: 11ac_VHT80

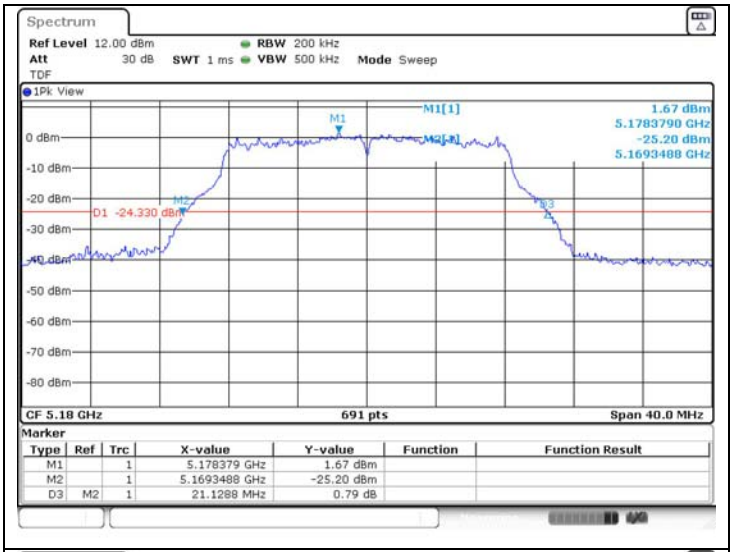
Band	Frequency (㎒)	Ch.	Data Rate (Mbps)	26 ㏈ Bandwidth (㎒)		99 % Bandwidth (㎒)	
				ANT 1	ANT 2	ANT 1	ANT 2
U-NII 1	5 210	42	MCS0	82.200	81.737	75.716	75.485
U-NII 3	5 775	155		81.968	81.968	75.716	75.485

- Test plots

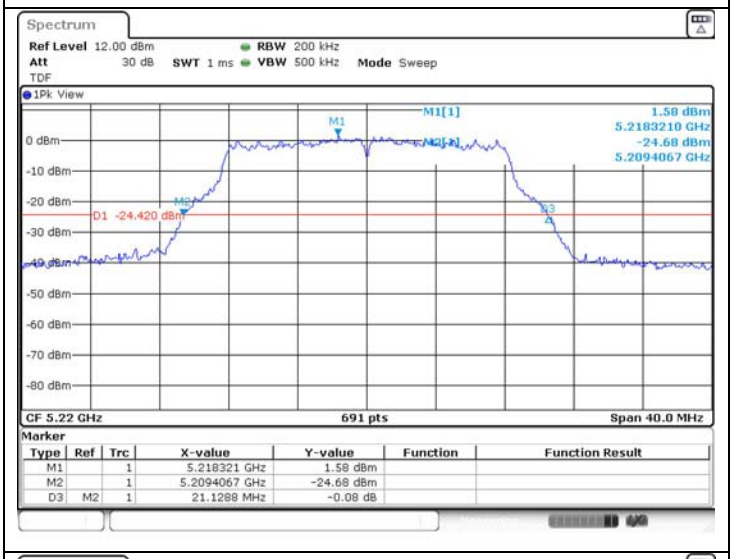
26 dB Bandwidth

802.11a (Band 1)_ANT 1

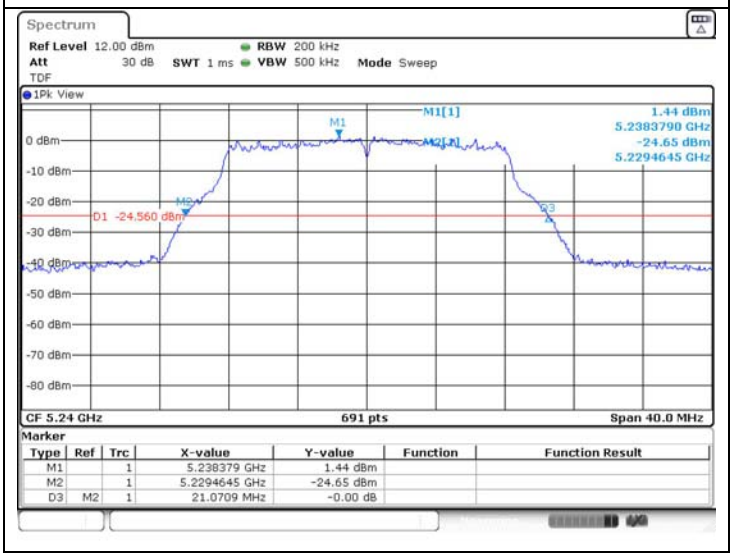
Low Channel
(5 180 ㎒)



Middle Channel
(5 220 ㎒)

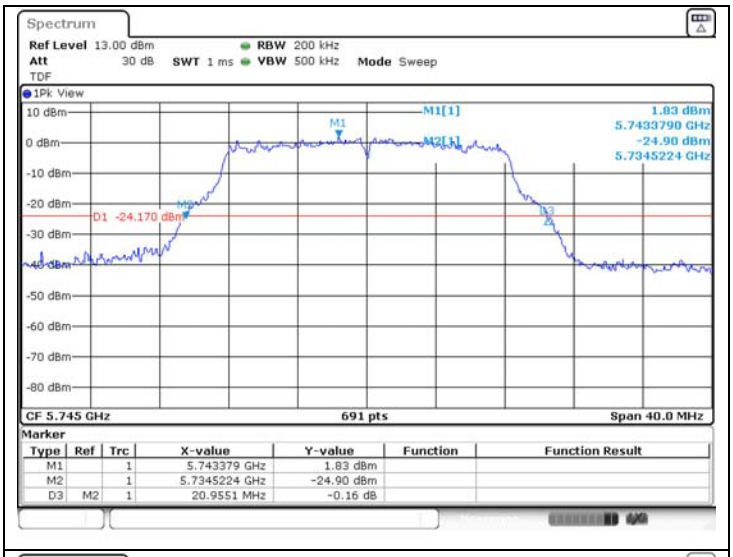


High Channel
(5 240 ㎒)

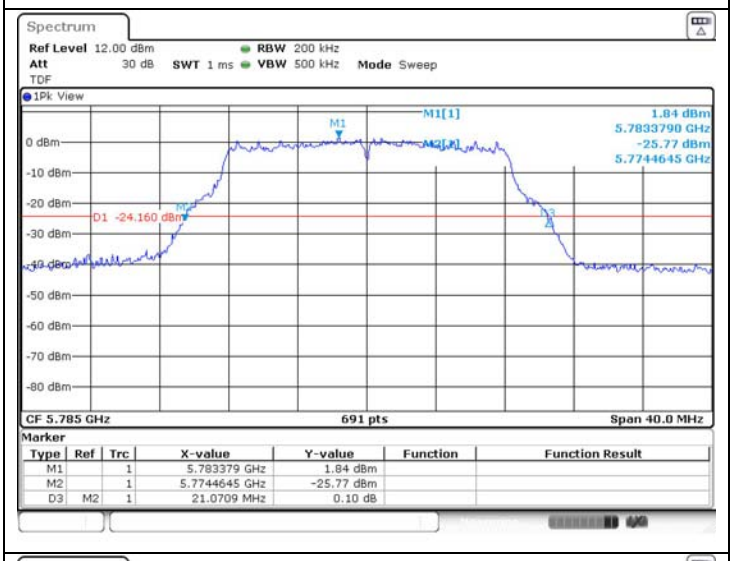


802.11a (Band 3)_ANT 1

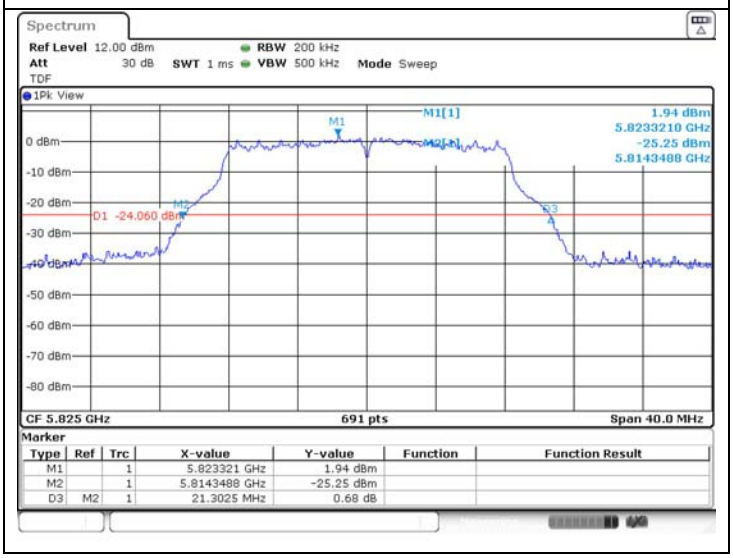
Low Channel
(5 745 ㎒)



Middle Channel
(5 785 ㎒)

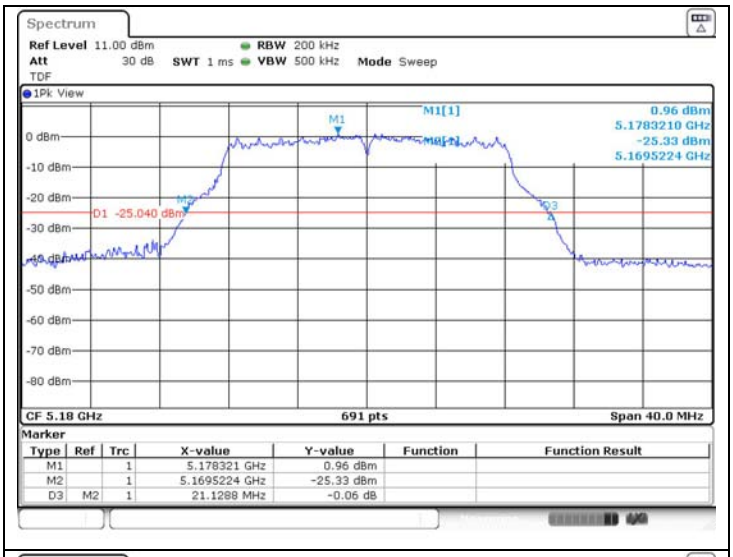


High Channel
(5 825 ㎒)

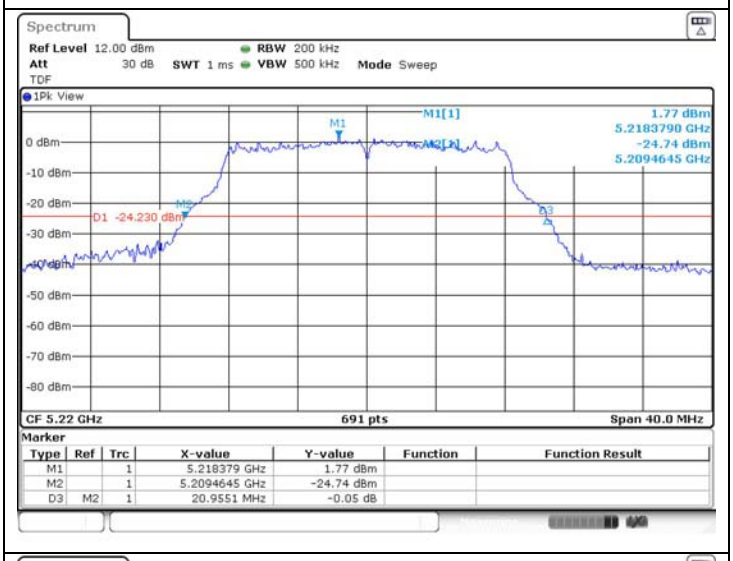


802.11a (Band 1)_ANT 2

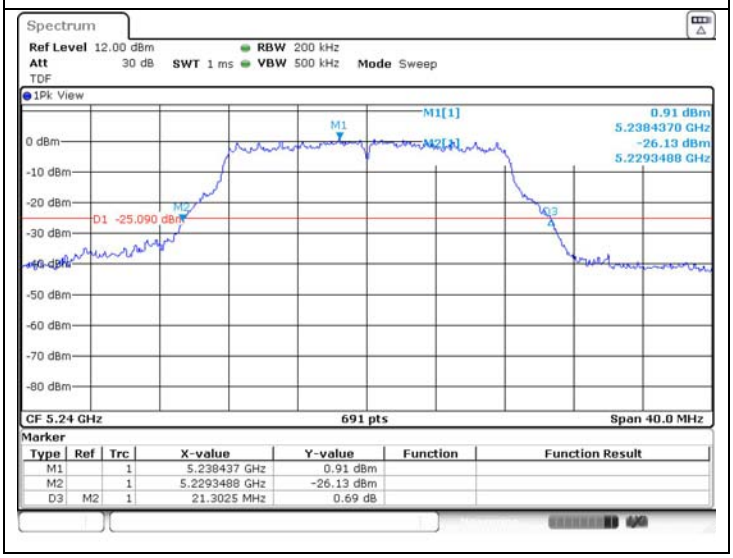
Low Channel
(5 180 ㎒)



Middle Channel
(5 220 ㎒)

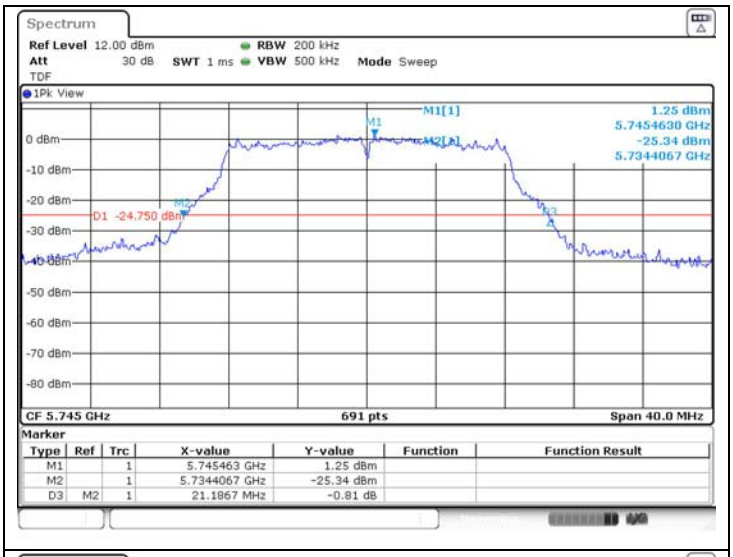


High Channel
(5 240 ㎒)

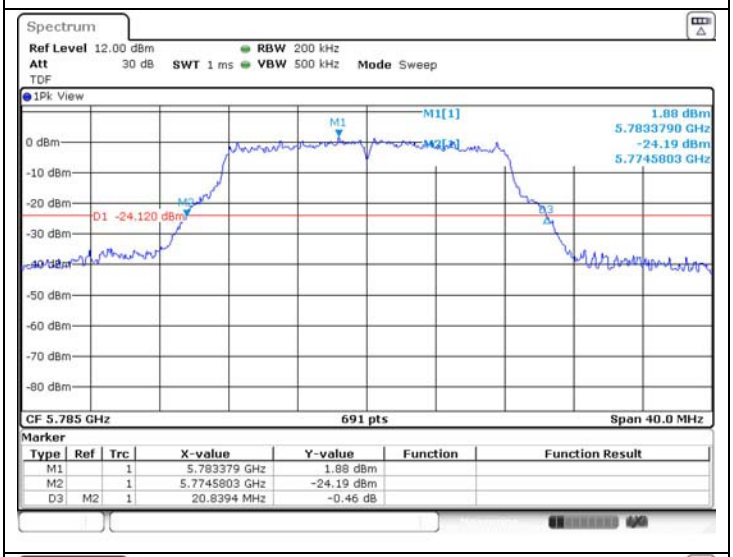


802.11a (Band 3)_ANT 2

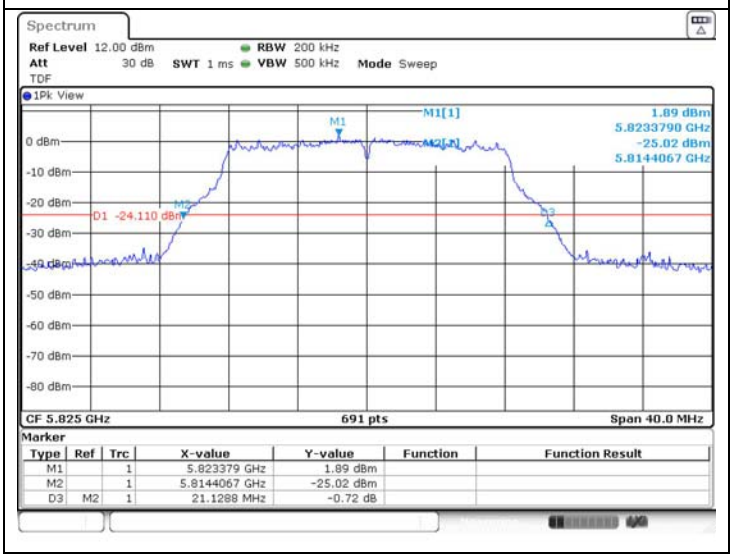
Low Channel
(5 745 ㎒)



Middle Channel
(5 785 ㎒)

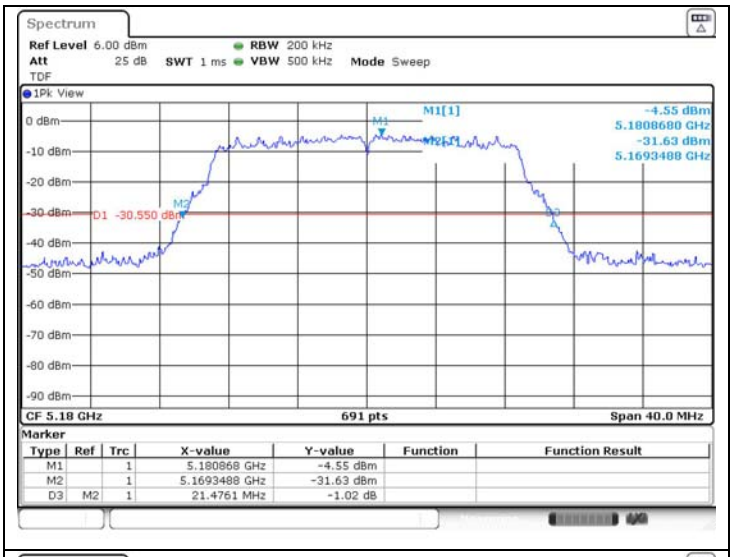


High Channel
(5 825 ㎒)

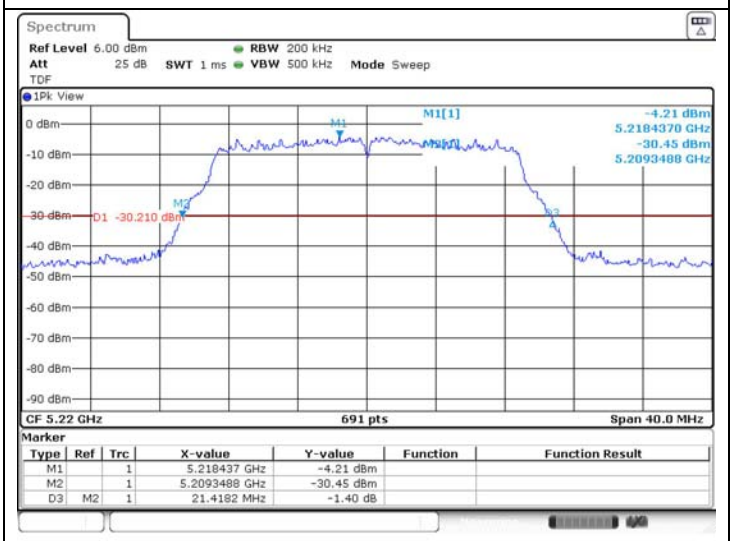


802.11n_HT20 (Band 1)_ANT 1

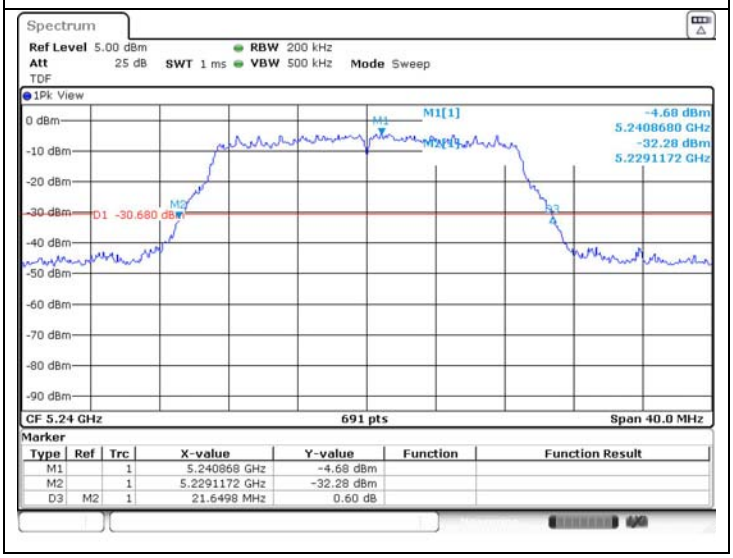
Low Channel
(5 180 ㎒)



Middle Channel
(5 220 ㎒)

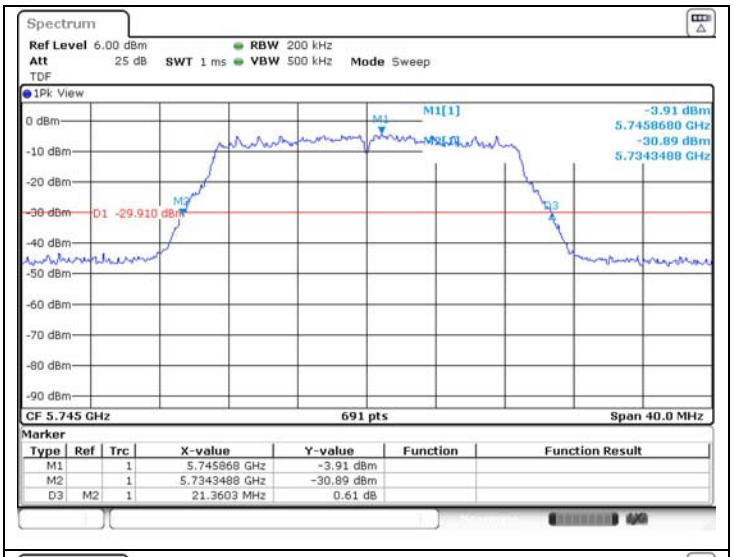


High Channel
(5 240 ㎒)

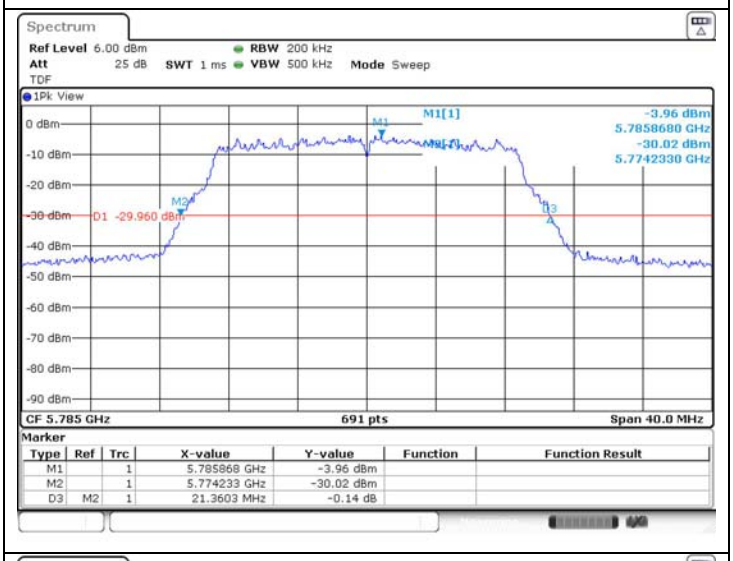


802.11n_HT20 (Band 3)_ANT 1

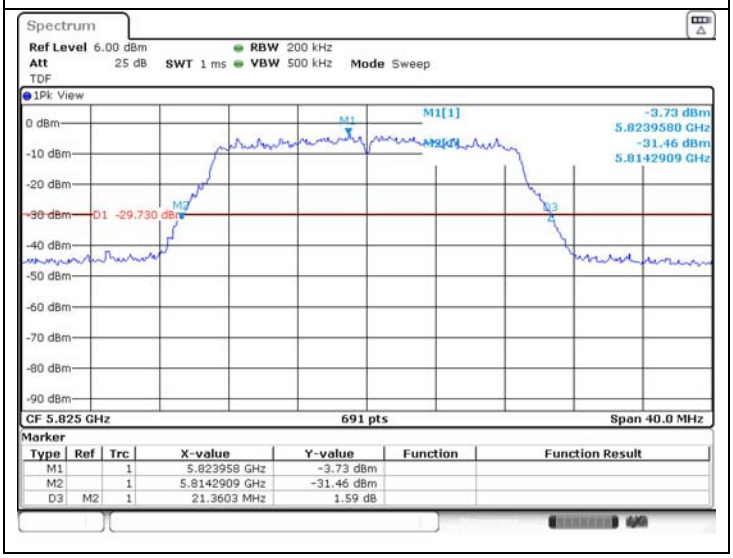
Low Channel
(5 745 ㎒)



Middle Channel
(5 785 ㎒)

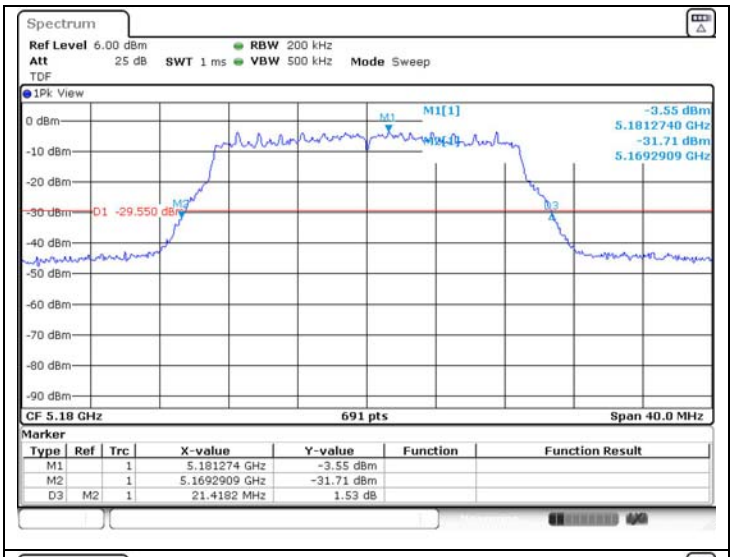


High Channel
(5 825 ㎒)

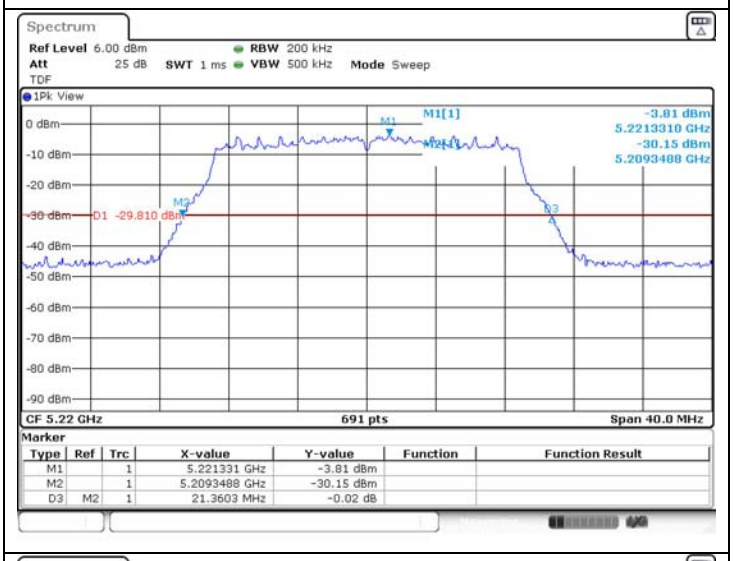


802.11n_HT20 (Band 1)_ANT 2

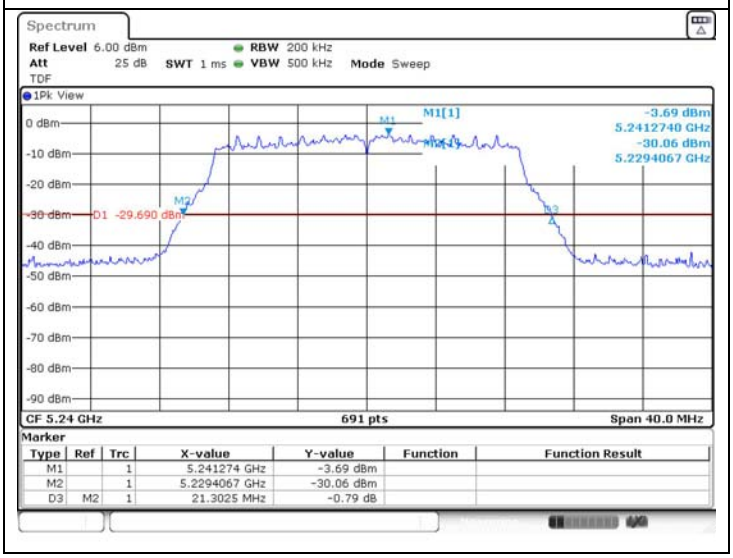
Low Channel
(5 180 ㎒)



Middle Channel
(5 220 ㎒)

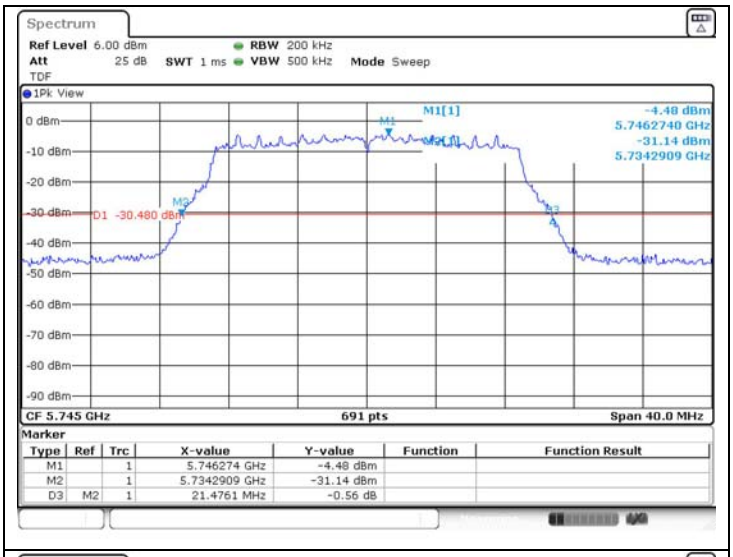


High Channel
(5 240 ㎒)

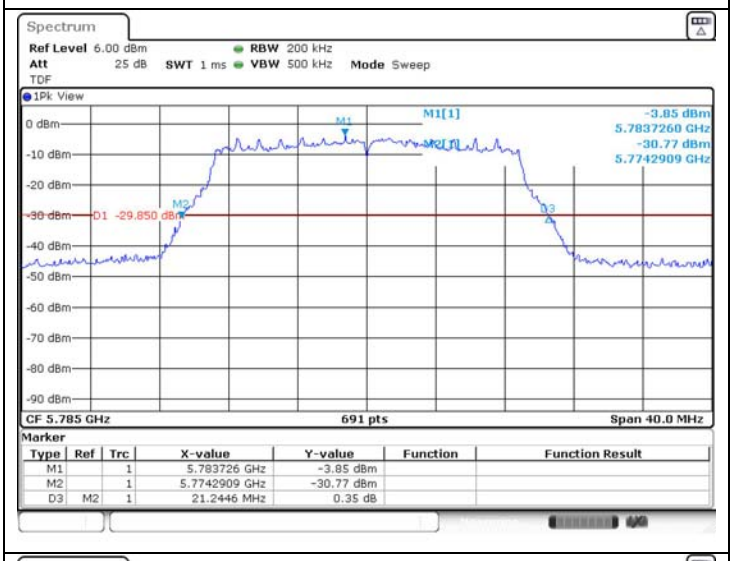


802.11n_HT20 (Band 3)_ANT 2

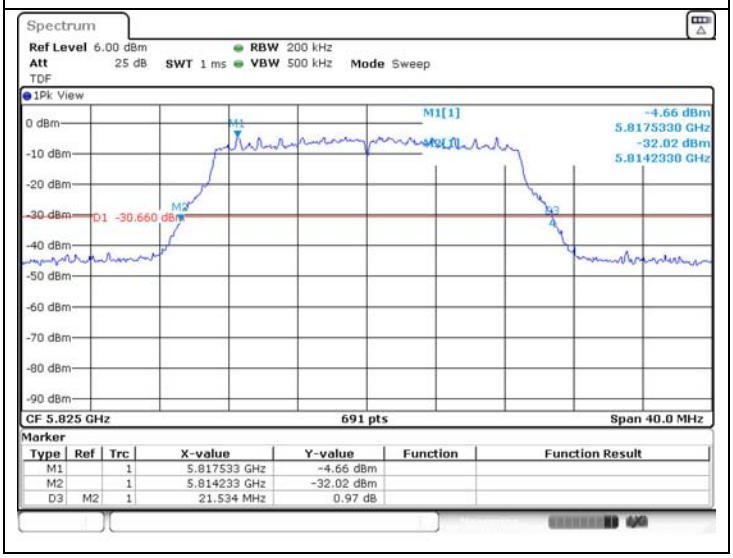
Low Channel
(5 745 ㎒)



Middle Channel
(5 785 ㎒)

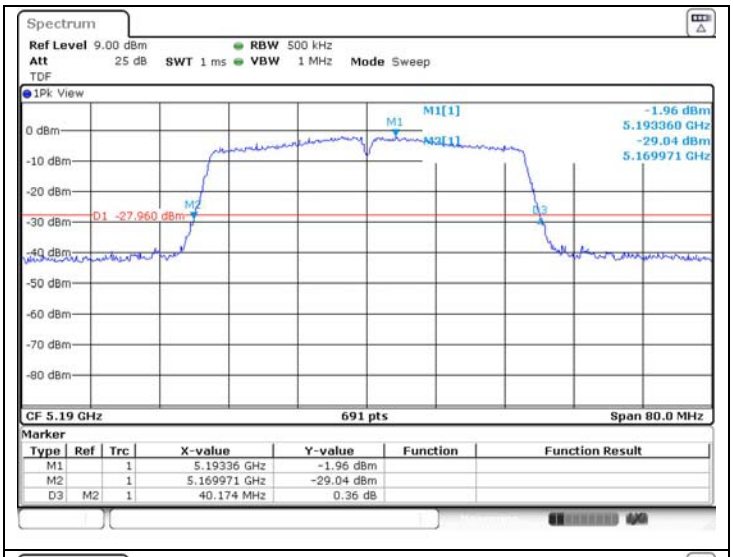


High Channel
(5 825 ㎒)

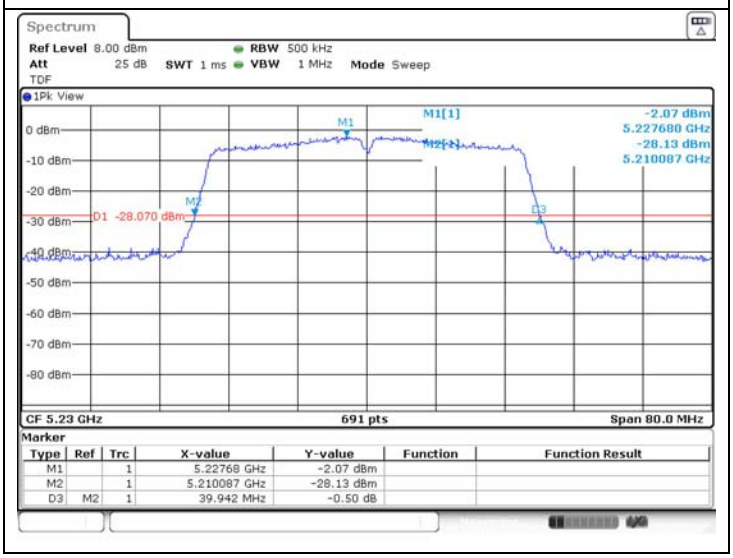


802.11n_HT40 (Band 1)_ANT 1

Low Channel
(5 190 ㎒)

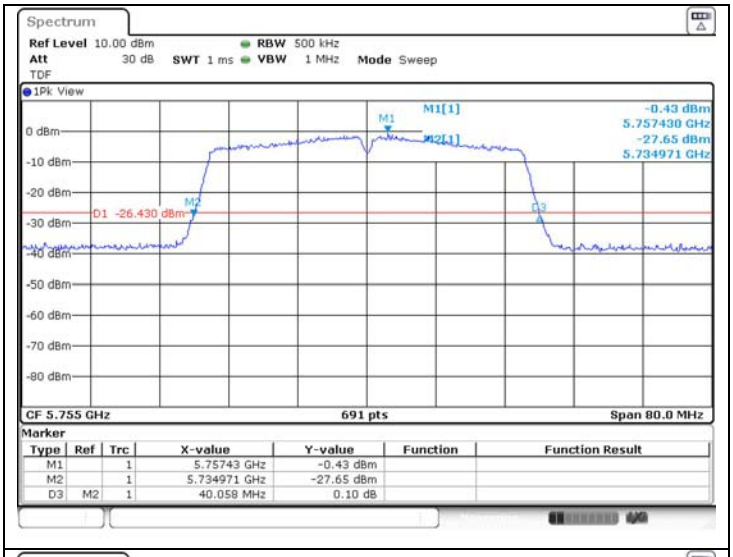


High Channel
(5 230 ㎒)

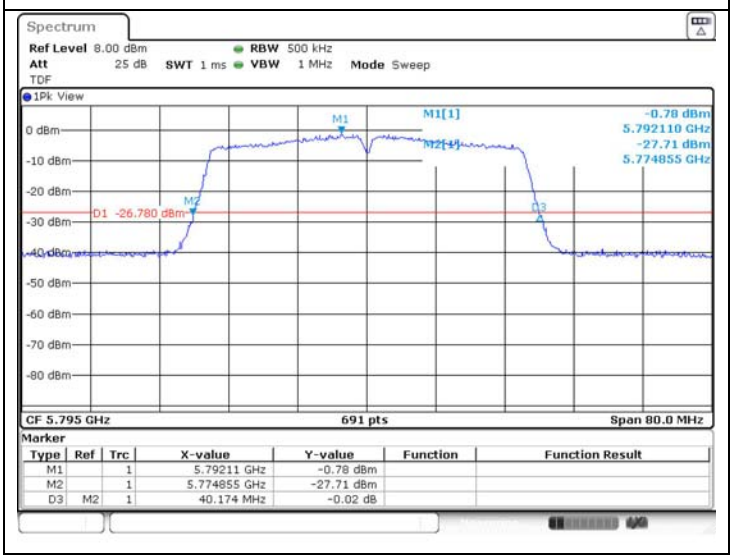


802.11n_HT40 (Band 3)_ANT 1

Low Channel
(5 755 ㎒)

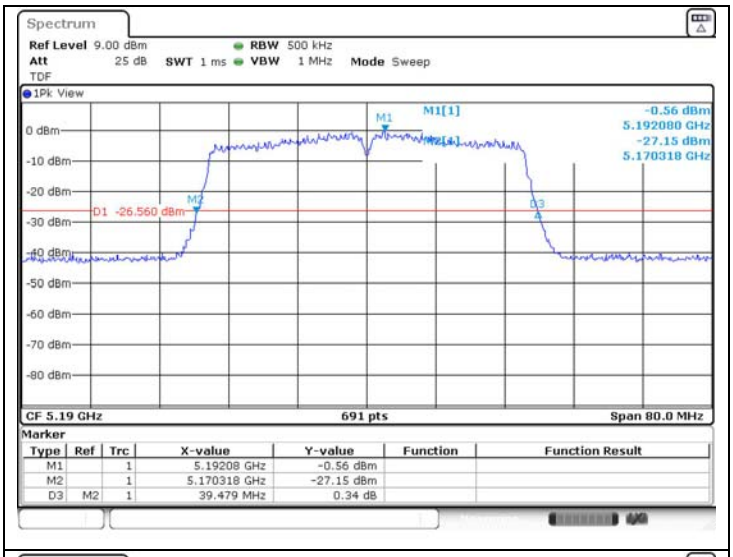


High Channel
(5 795 ㎒)

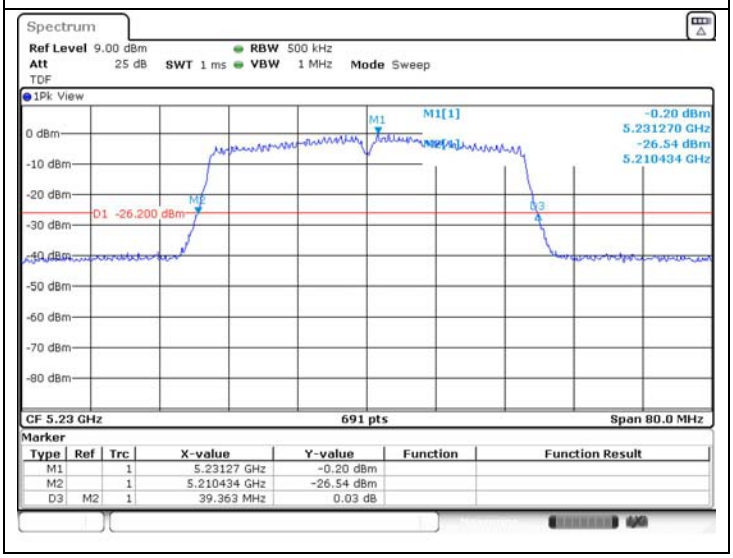


802.11n_HT40 (Band 1)_ANT 2

Low Channel
(5 190 ㎒)

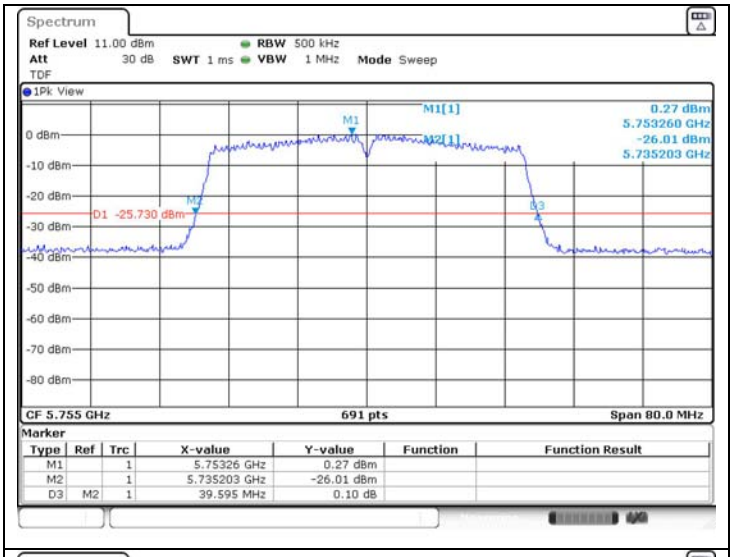


High Channel
(5 230 ㎒)

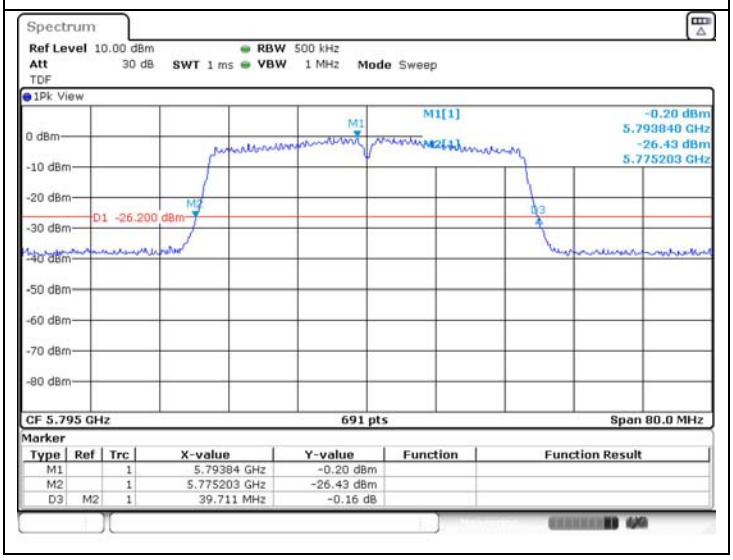


802.11n_HT40 (Band 3)_ANT 2

Low Channel
(5 755 ㎒)

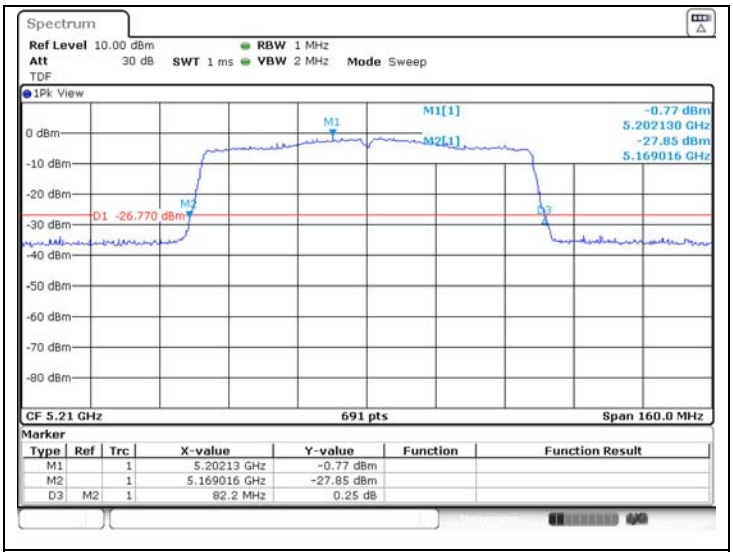


High Channel
(5 795 ㎒)



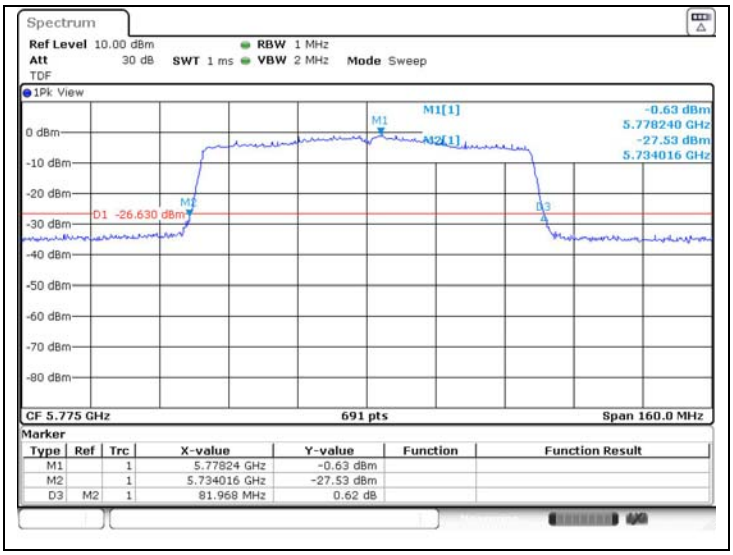
802.11ac_VHT80 (Band 1)_ANT 1

Middle Channel
(5 210 ㎒)



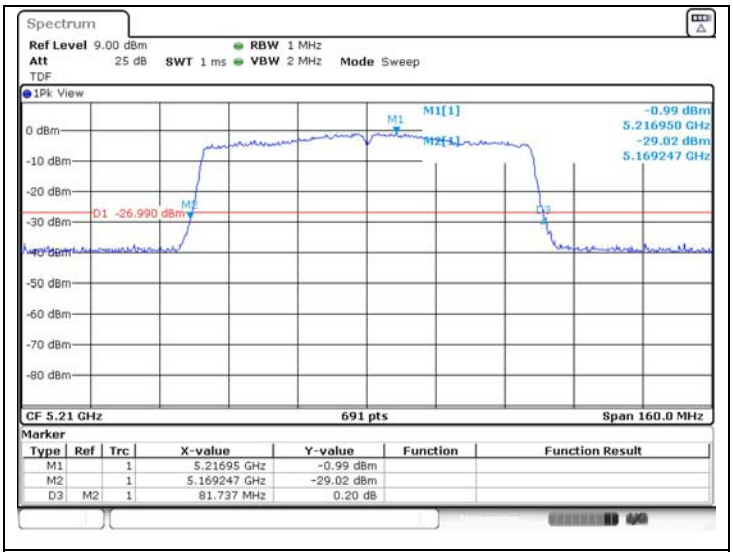
802.11ac_VHT80 (Band 3)_ANT 1

Middle Channel
(5 775 ㎒)



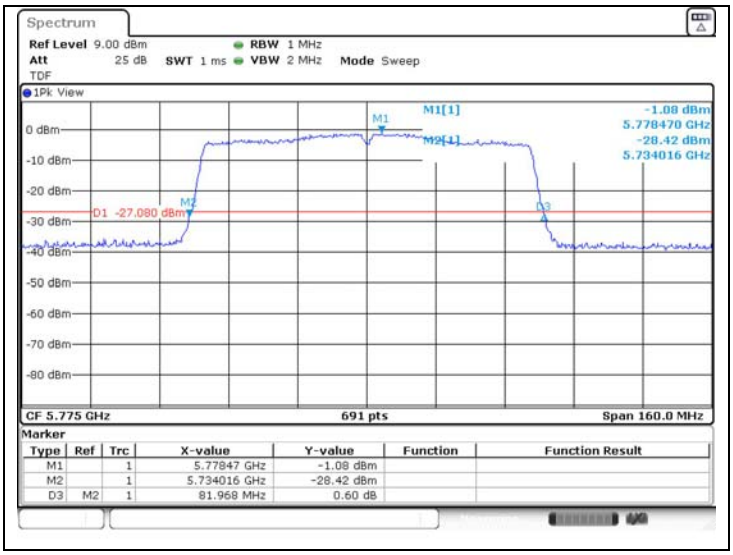
802.11ac_VHT80 (Band 1)_ANT 2

Middle Channel
(5 210 ㎒)



802.11ac_VHT80 (Band 3)_ANT 2

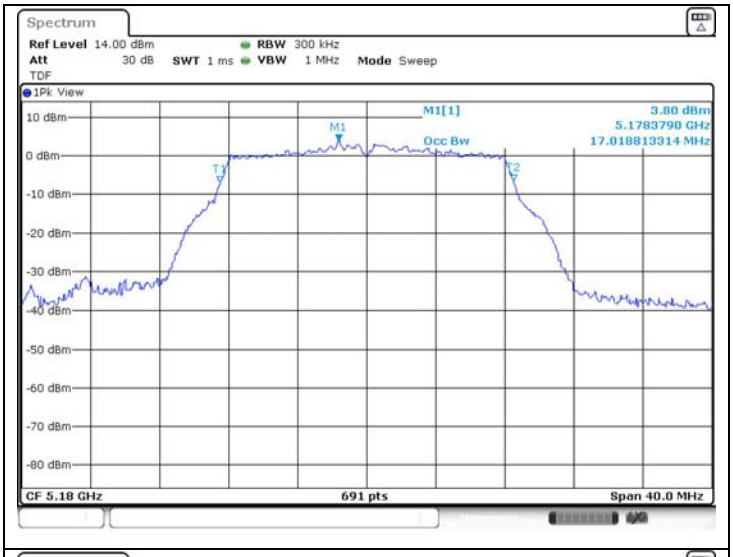
Middle Channel
(5 775 ㎒)



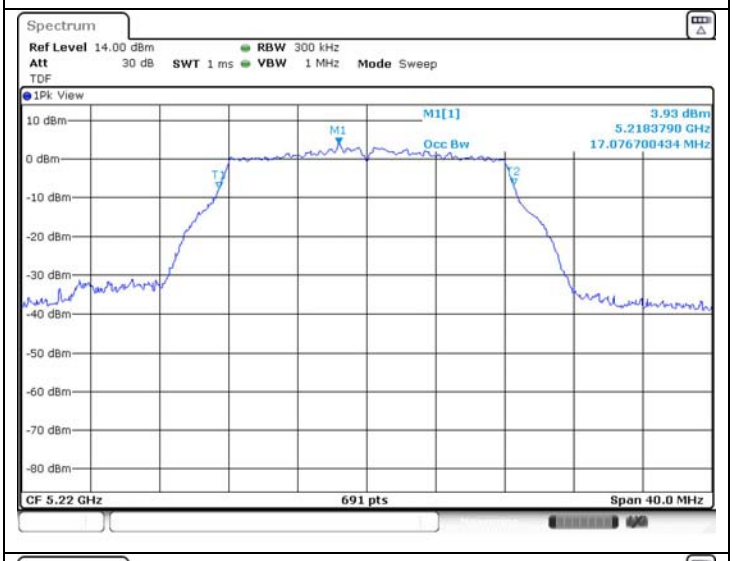
99 % Bandwidth

802.11a (Band 1)_ANT 1

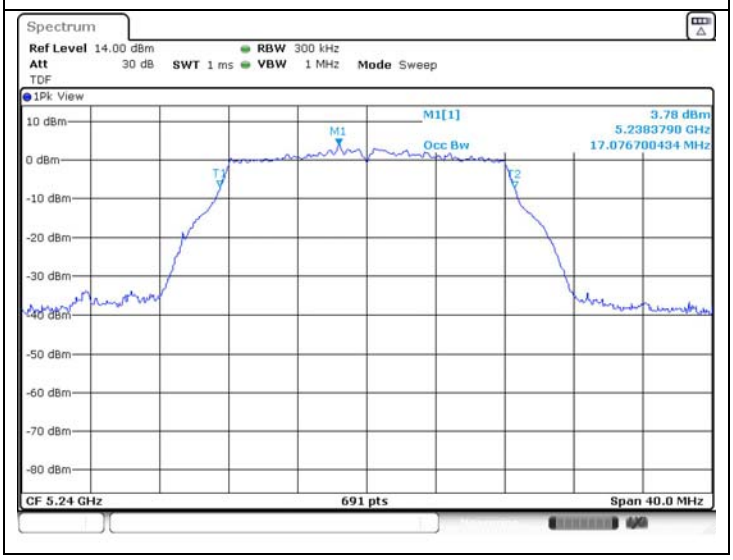
Low Channel
(5 180 ㎒)



Middle Channel
(5 220 ㎒)

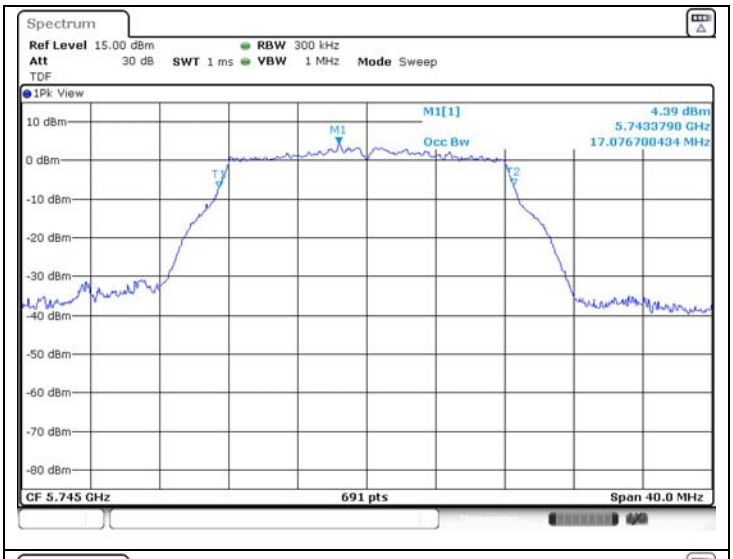


High Channel
(5 240 ㎒)

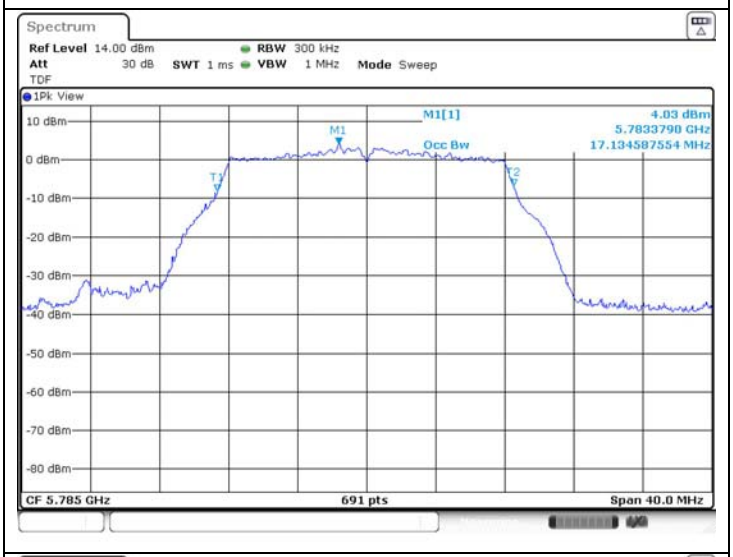


802.11a (Band 3)_ANT 1

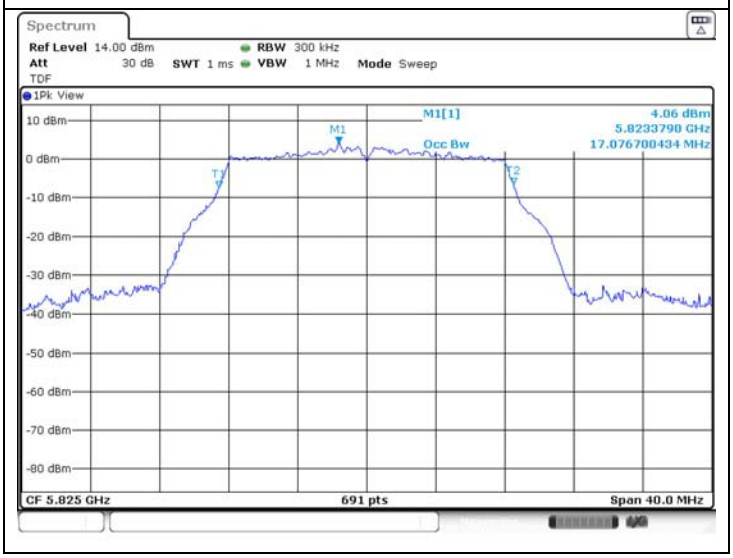
Low Channel
(5 745 ㎒)



Middle Channel
(5 785 ㎒)

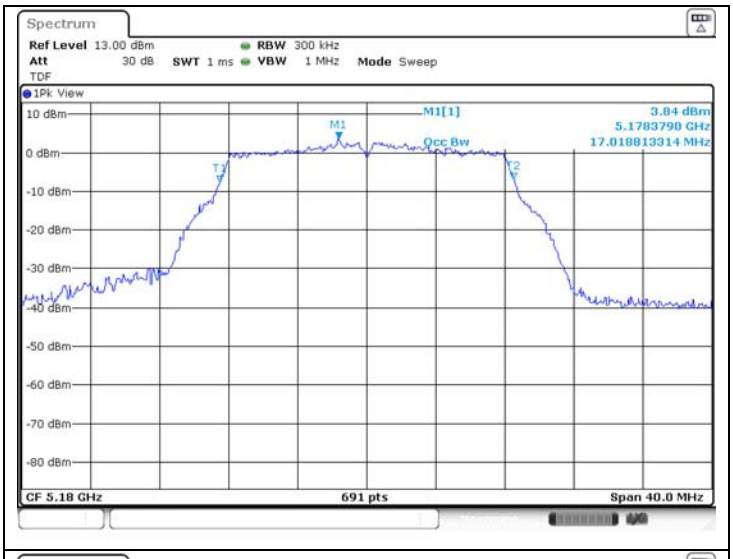


High Channel
(5 825 ㎒)

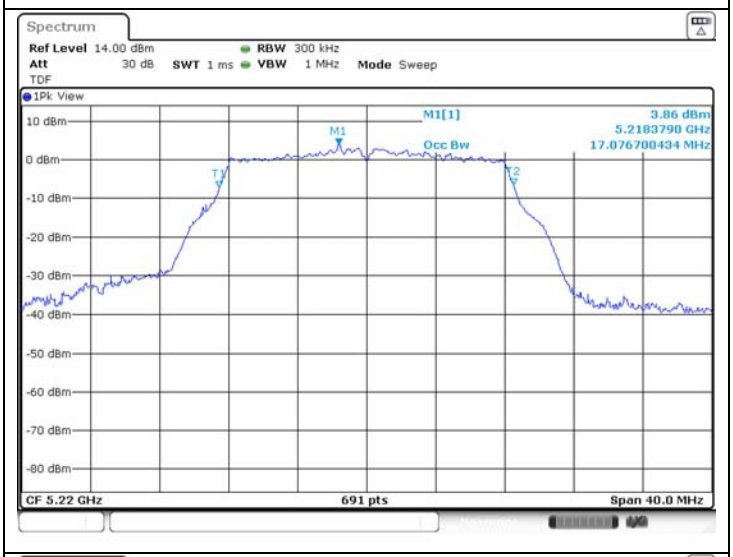


802.11a (Band 1)_ANT 2

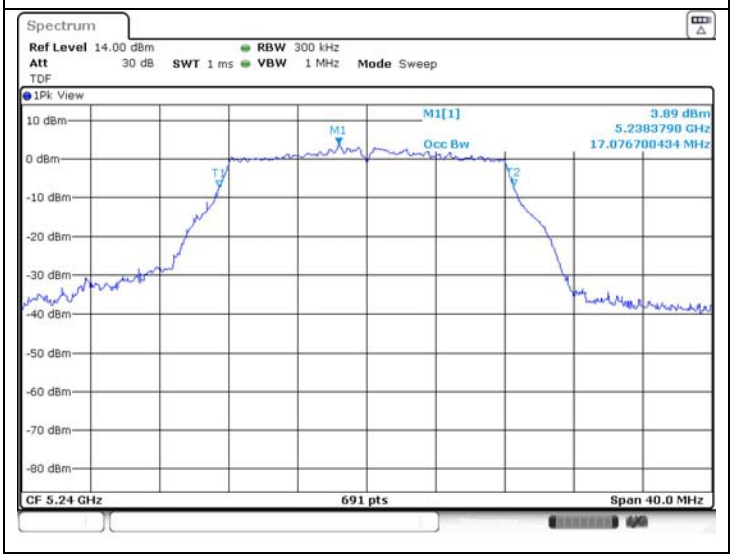
Low Channel
(5 180 ㎒)



Middle Channel
(5 220 ㎒)

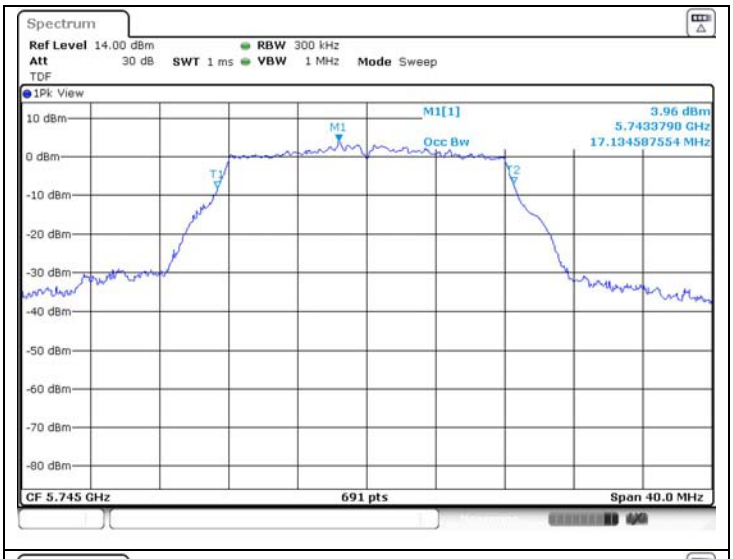


High Channel
(5 240 ㎒)

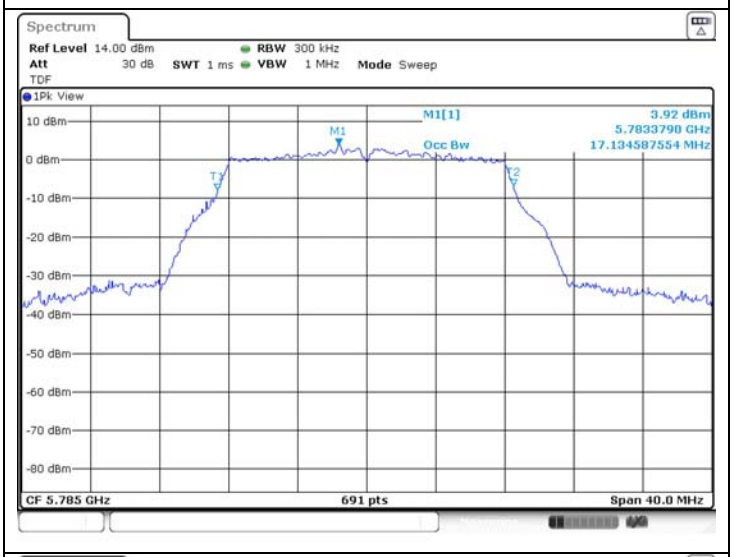


802.11a (Band 3)_ANT 2

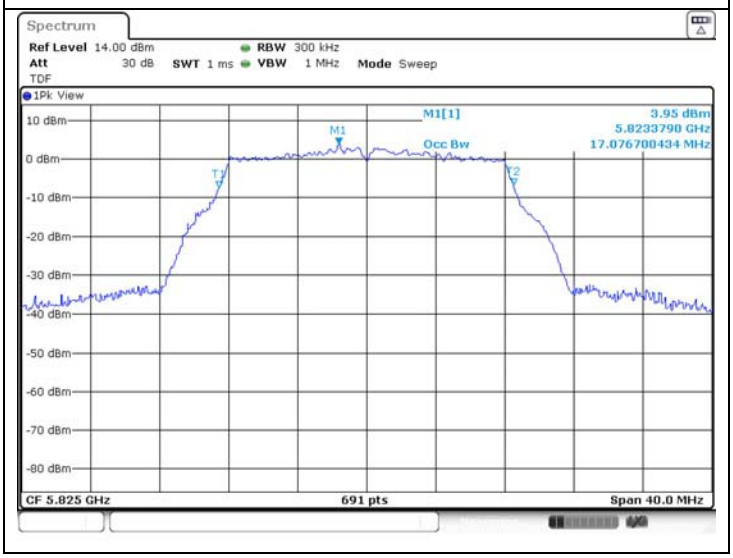
Low Channel
(5 745 ㎒)



Middle Channel
(5 785 ㎒)

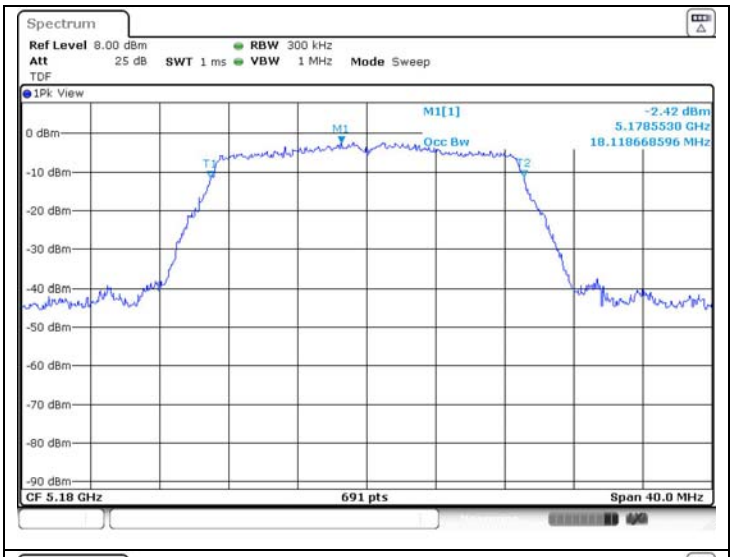


High Channel
(5 825 ㎒)

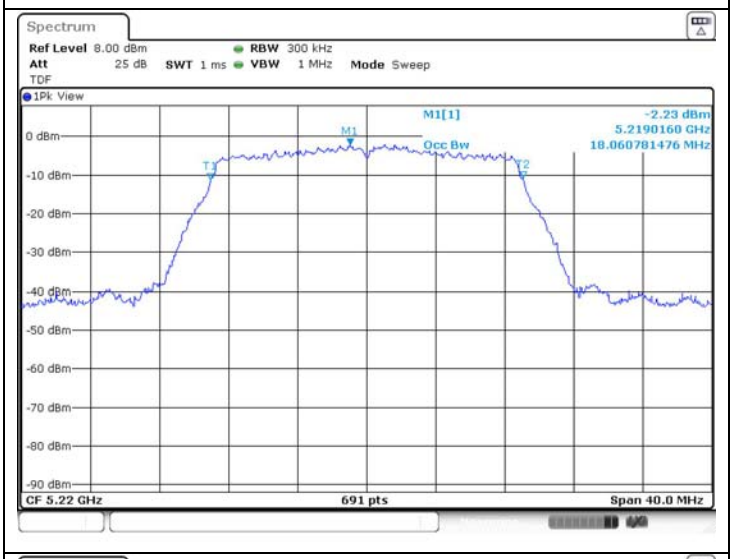


802.11n_HT20 (Band 1)_ANT 1

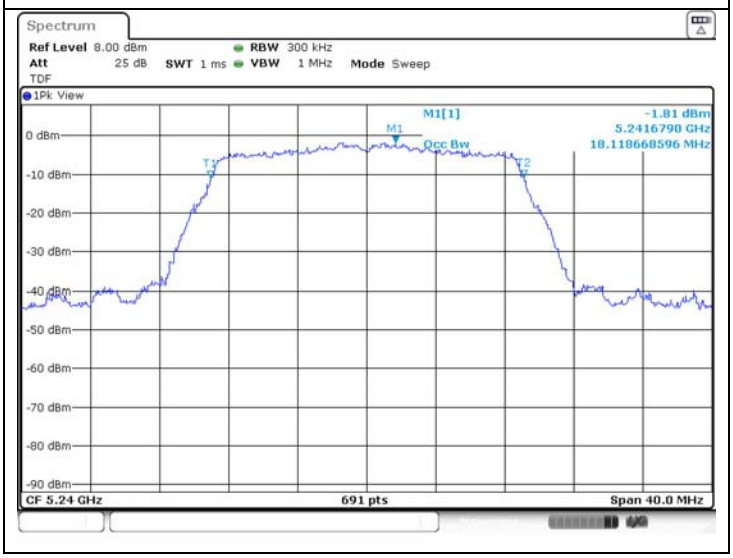
Low Channel
(5 180 ㎒)



Middle Channel
(5 220 ㎒)

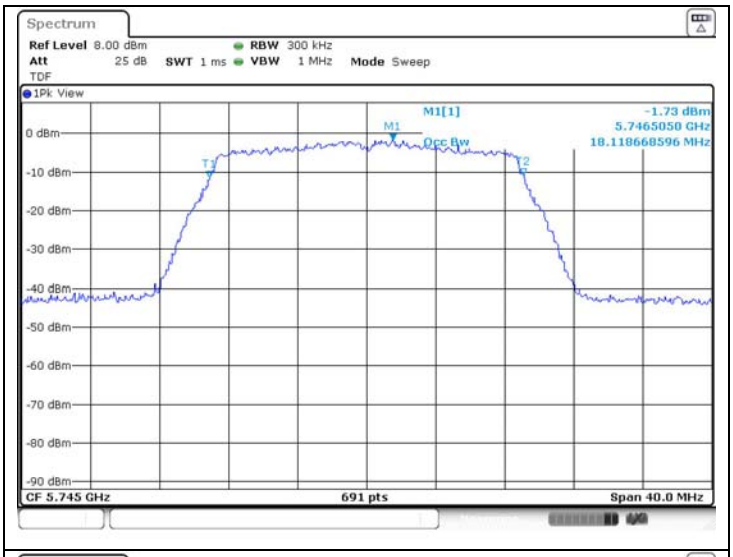


High Channel
(5 240 ㎒)

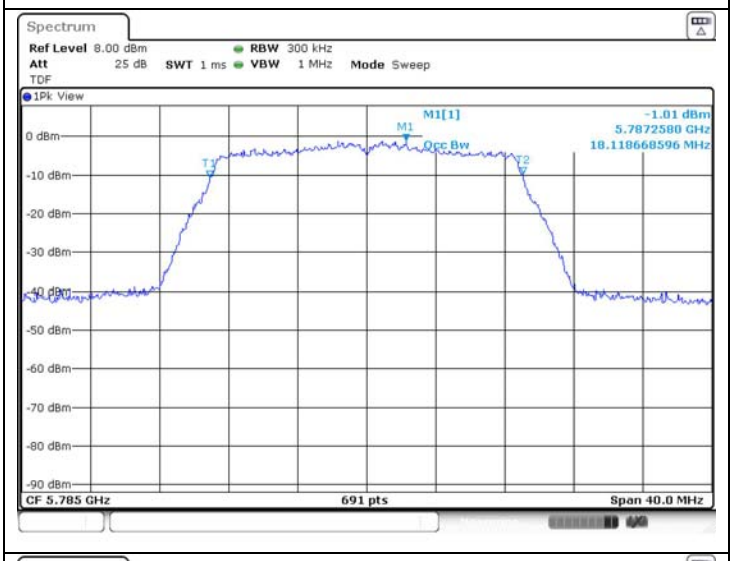


802.11n_HT20 (Band 3)_ANT 1

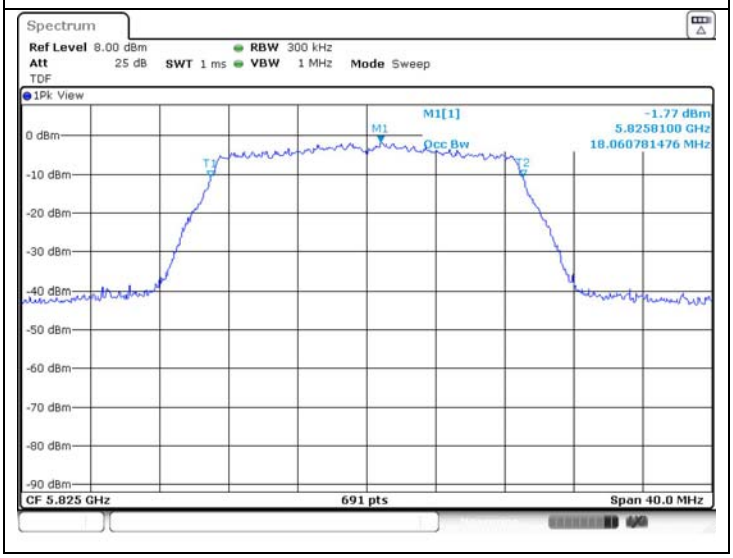
Low Channel
(5 745 ㎒)



Middle Channel
(5 785 ㎒)

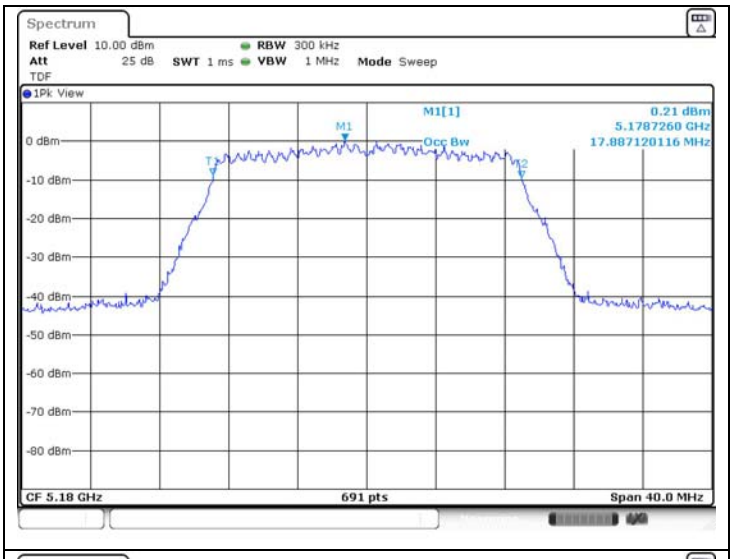


High Channel
(5 825 ㎒)

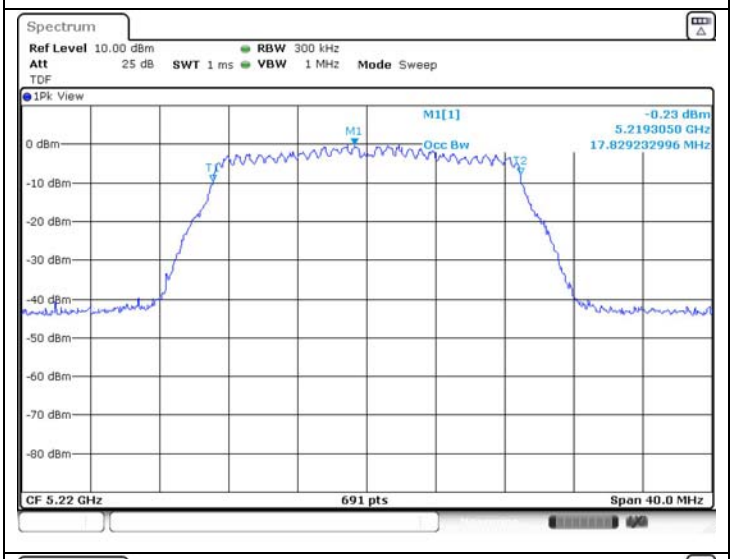


802.11n_HT20 (Band 1)_ANT 2

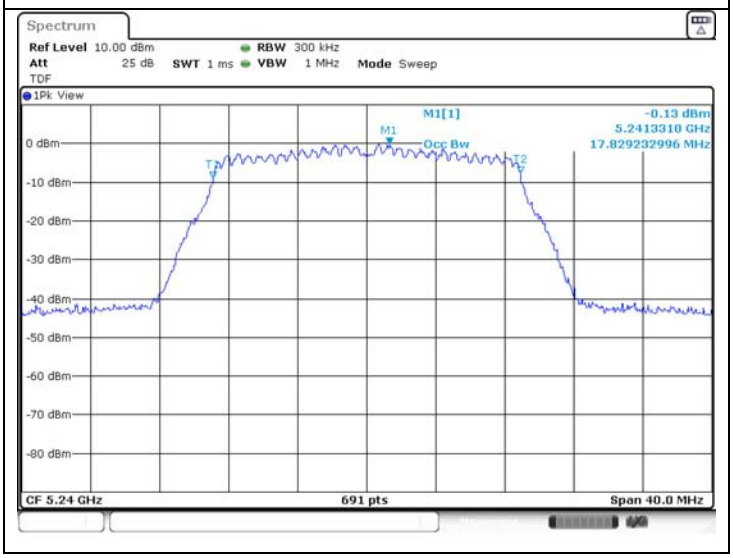
Low Channel
(5 180 ㎒)



Middle Channel
(5 220 ㎒)

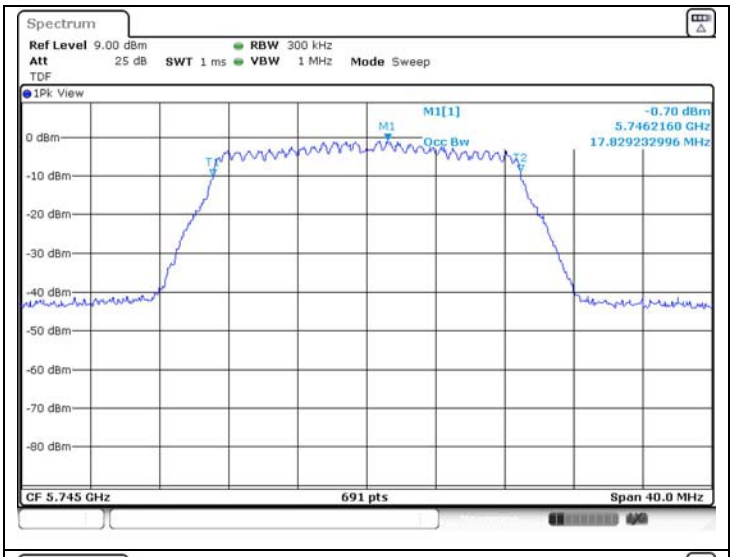


High Channel
(5 240 ㎒)

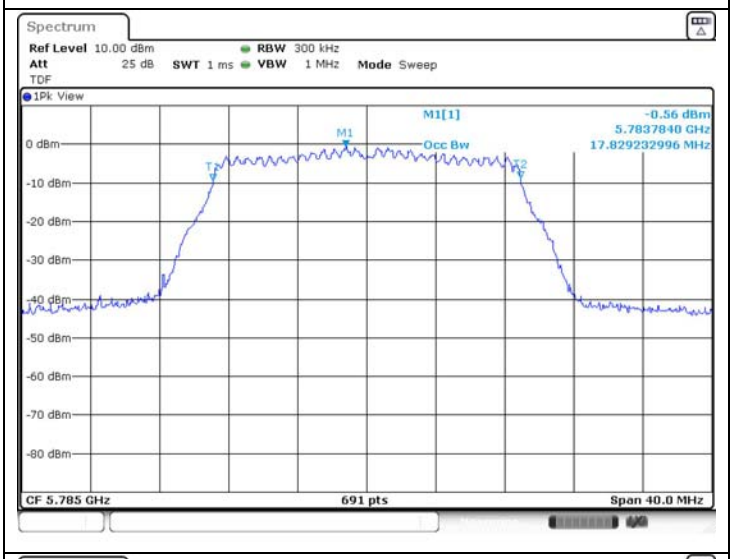


802.11n_HT20 (Band 3)_ANT 2

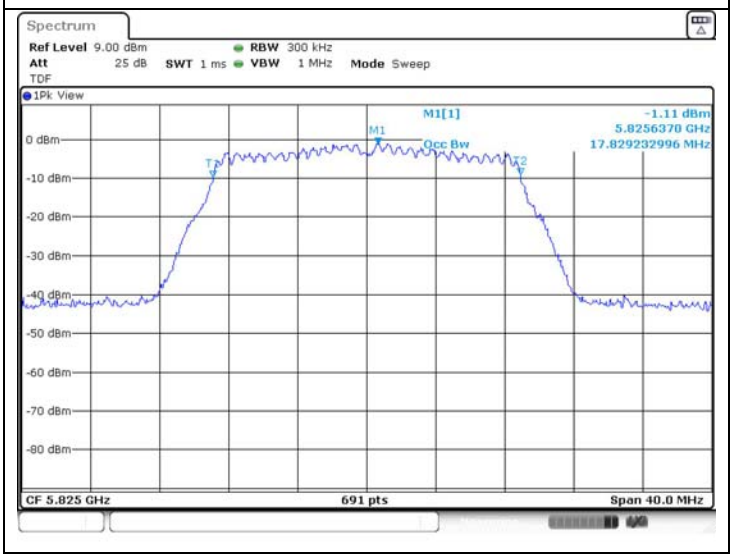
Low Channel
(5 745 ㎒)



Middle Channel
(5 785 ㎒)

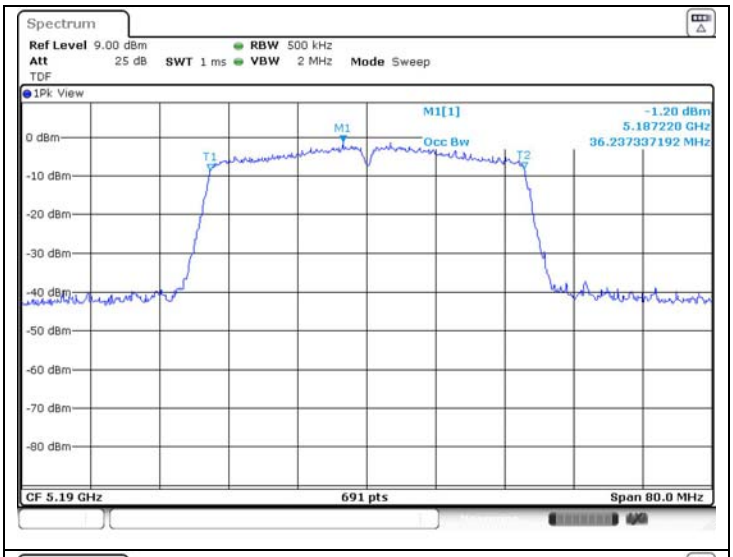


High Channel
(5 825 ㎒)

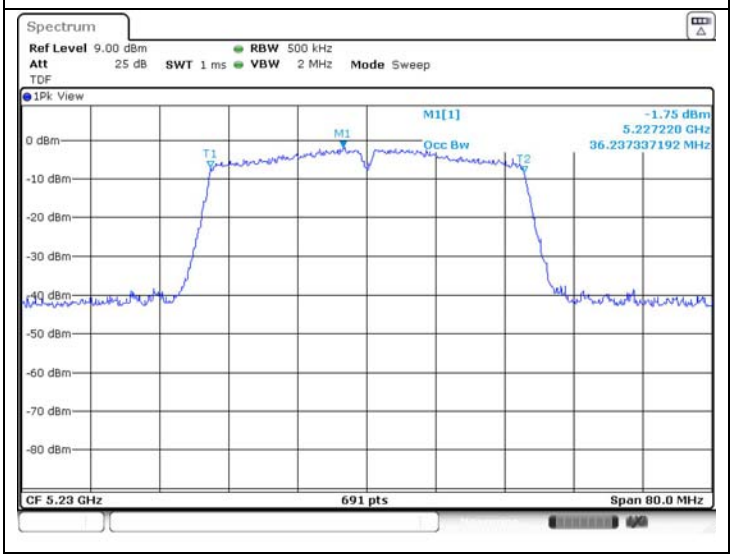


802.11n_HT40 (Band 1)_ANT 1

Low Channel
(5 190 ㎒)

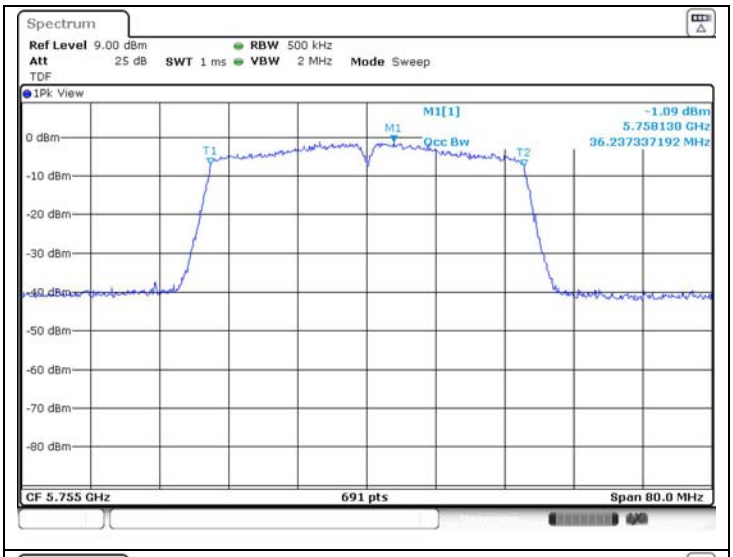


High Channel
(5 230 ㎒)

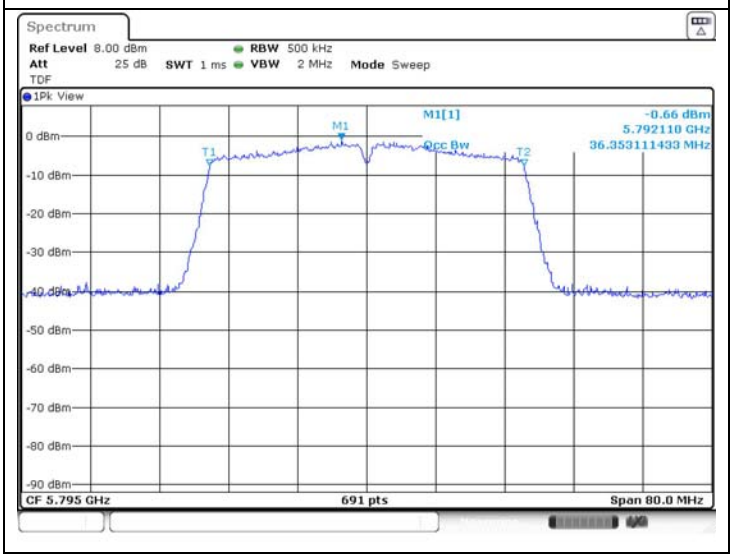


802.11n_HT40 (Band 3)_ANT 1

Low Channel
(5 755 ㎒)

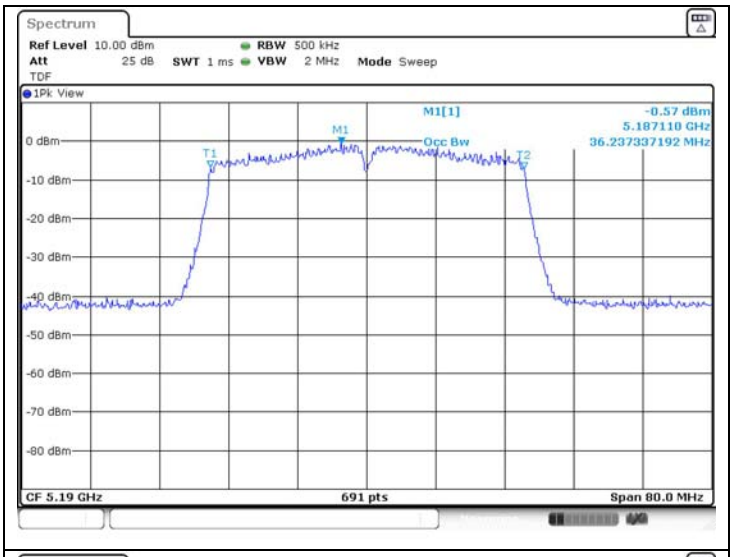


High Channel
(5 795 ㎒)

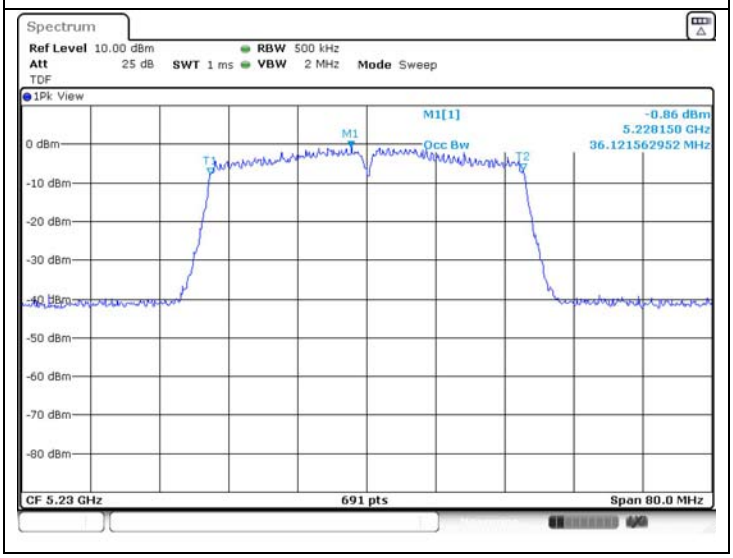


802.11n_HT40 (Band 1)_ANT 2

Low Channel
(5 190 ㎒)

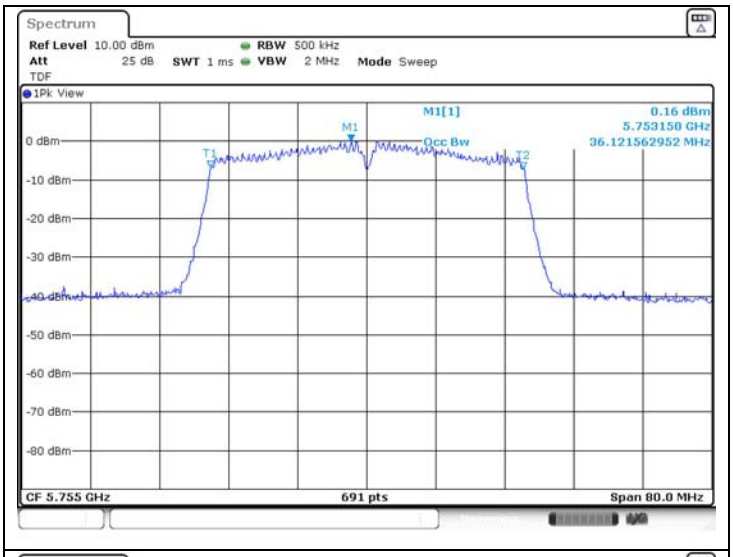


High Channel
(5 230 ㎒)

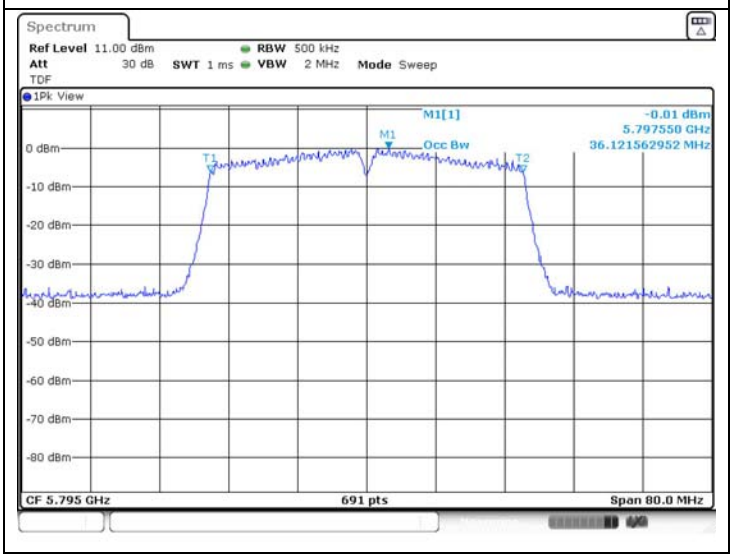


802.11n_HT40 (Band 3)_ANT 2

Low Channel
(5 755 ㎒)

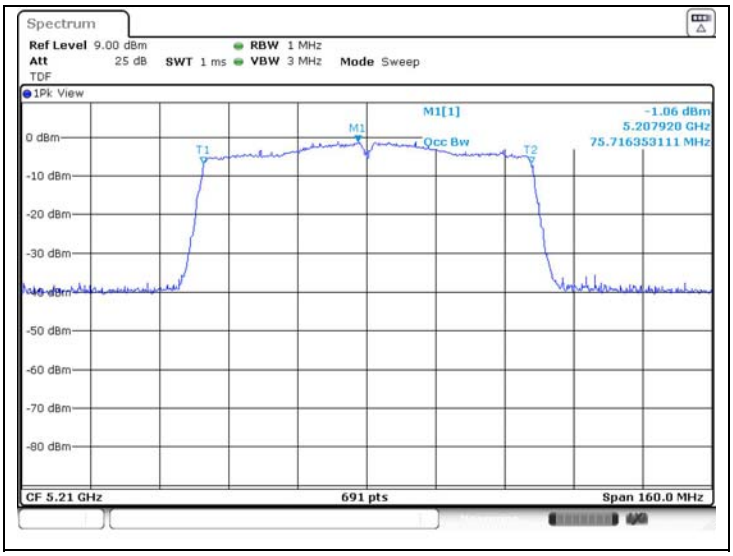


High Channel
(5 795 ㎒)



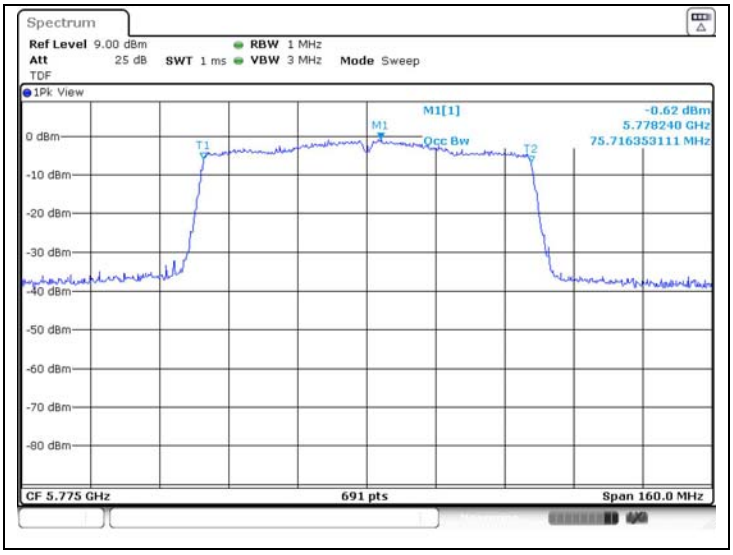
802.11ac_VHT80 (Band 1)_ANT 1

Middle Channel
(5 210 ㎒)



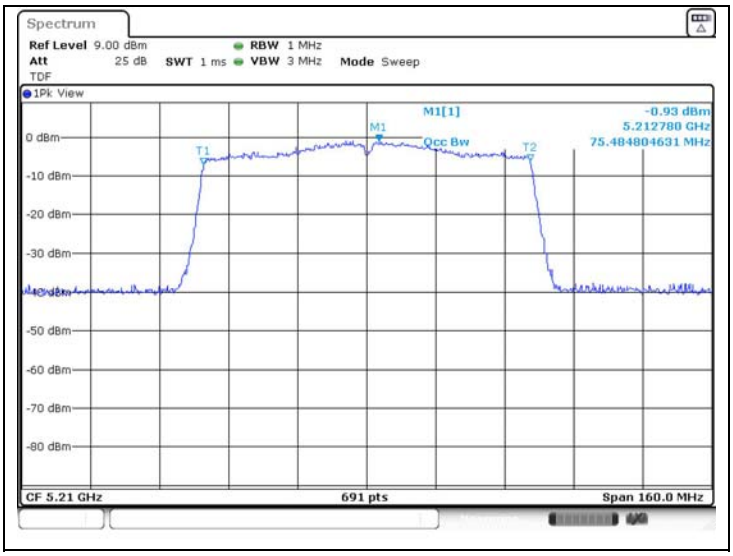
802.11ac_VHT80 (Band 3)_ANT 1

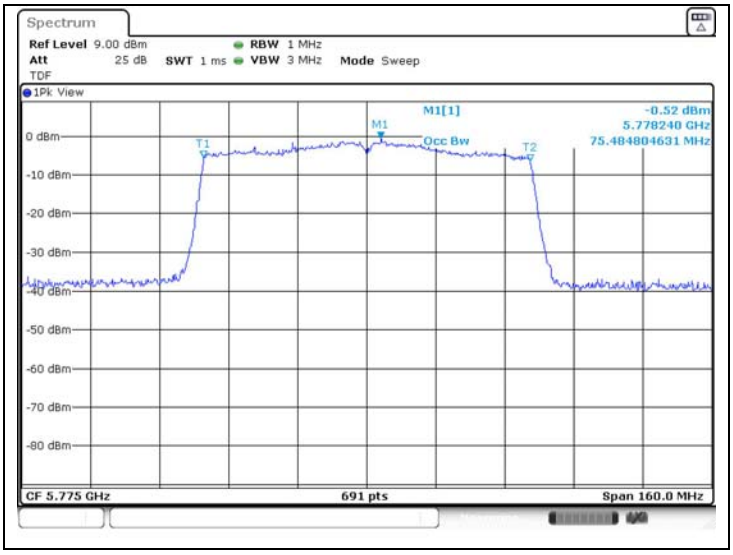
Middle Channel
(5 775 ㎒)



802.11ac_VHT80 (Band 1)_ANT 2

Middle Channel
(5 210 ㎒)



802.11ac_VHT80 (Band 3)_ANT 2

Middle Channel
(5 775 ㎒)