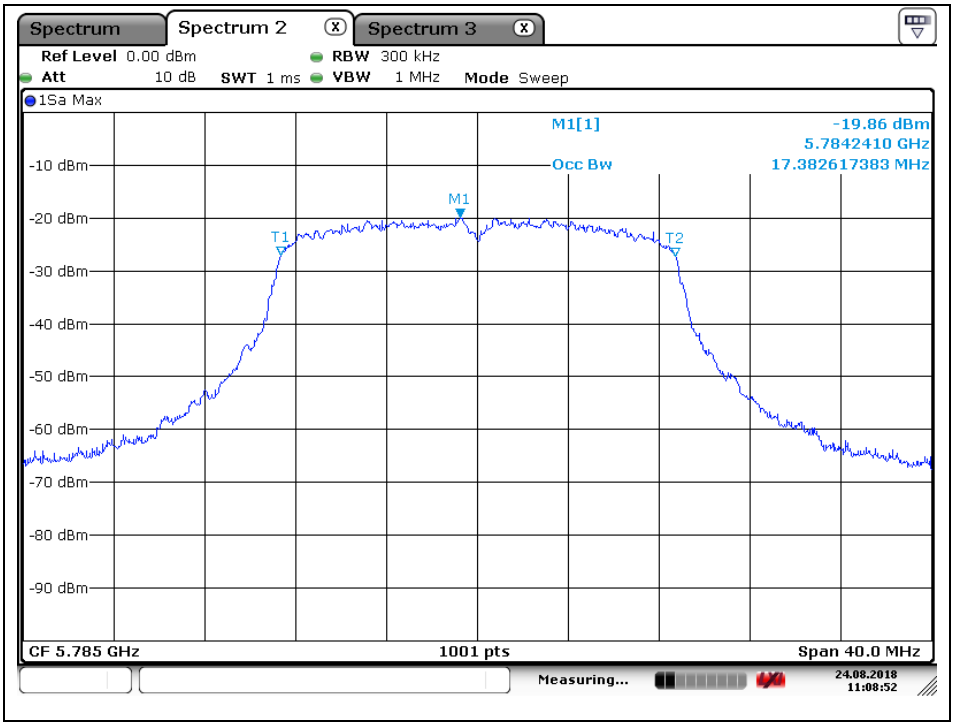
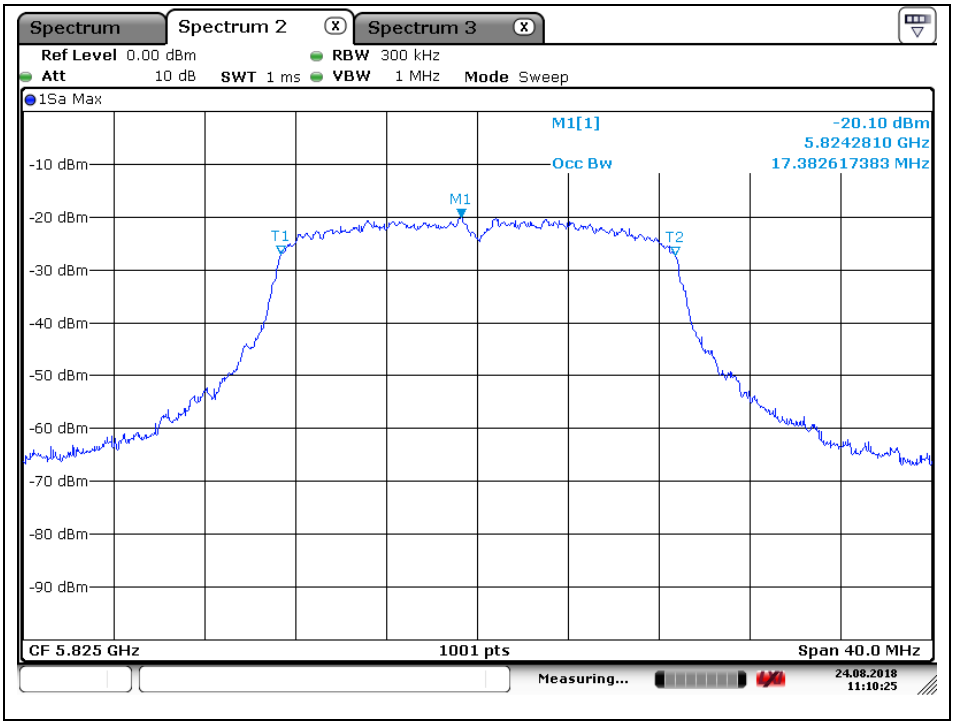
Middle Channel (5 785 ㎒)

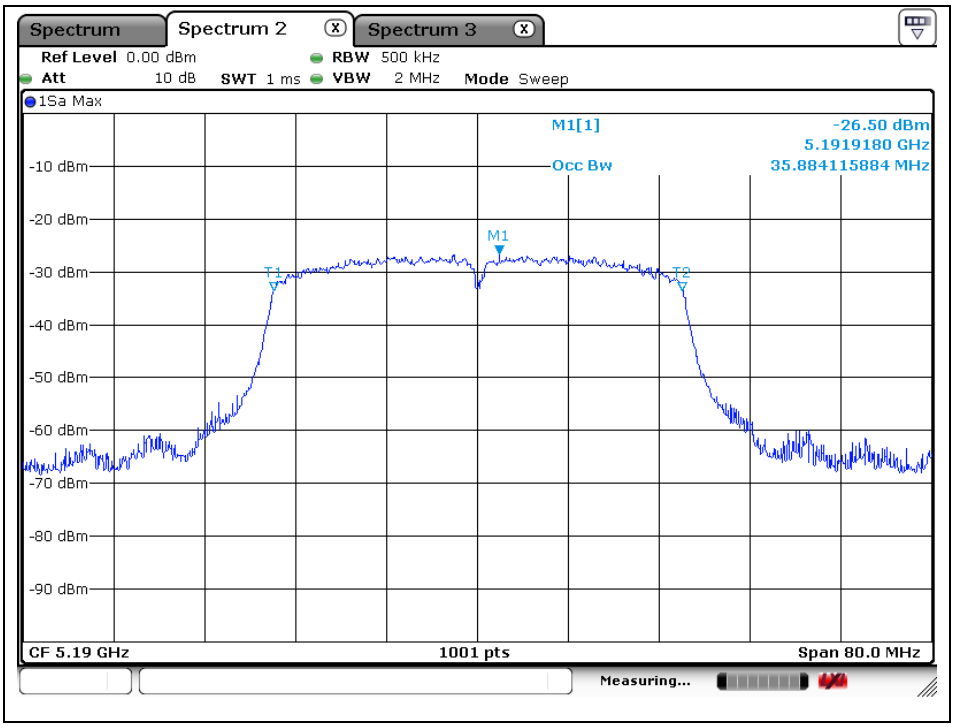


High Channel (5 825 ㎒)

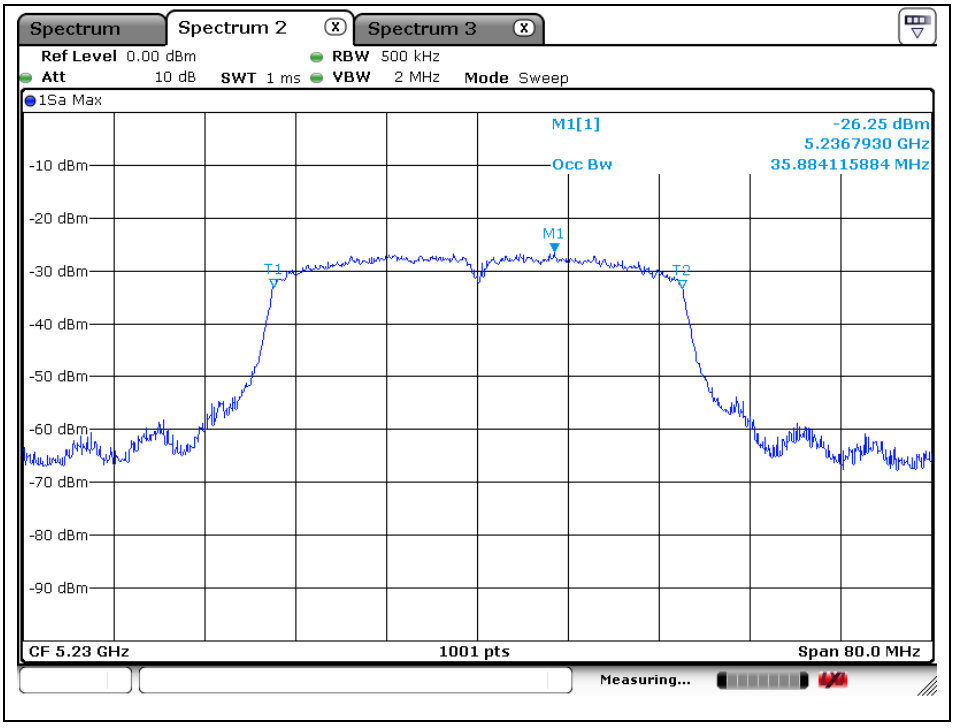


802.11n_HT40 (Band 1)

Low Channel (5 190 ㎒)

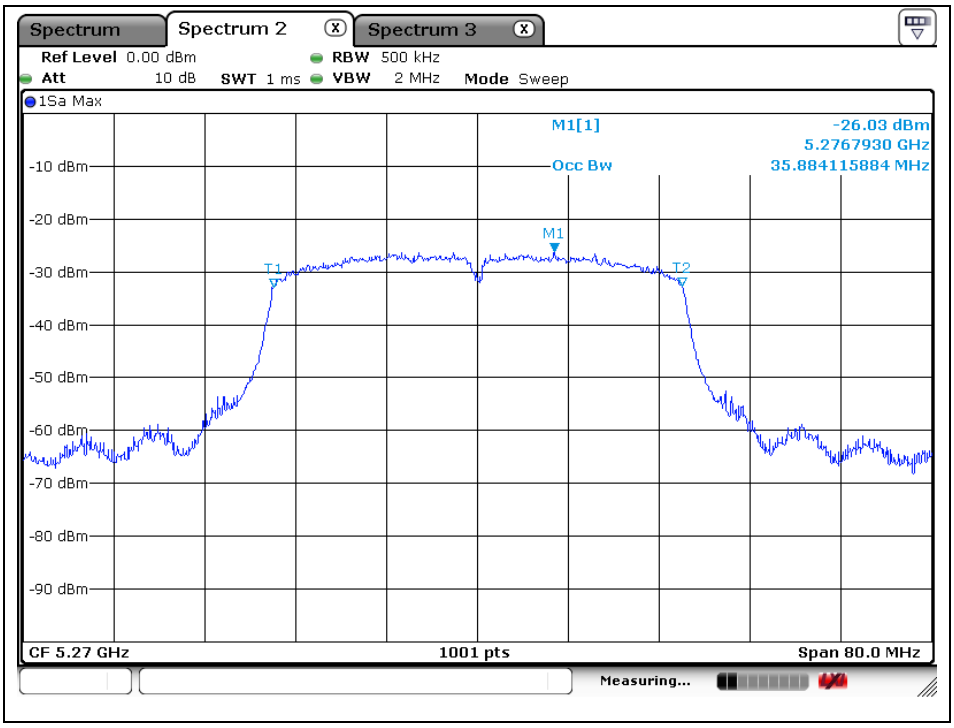


High Channel (5 230 ㎒)

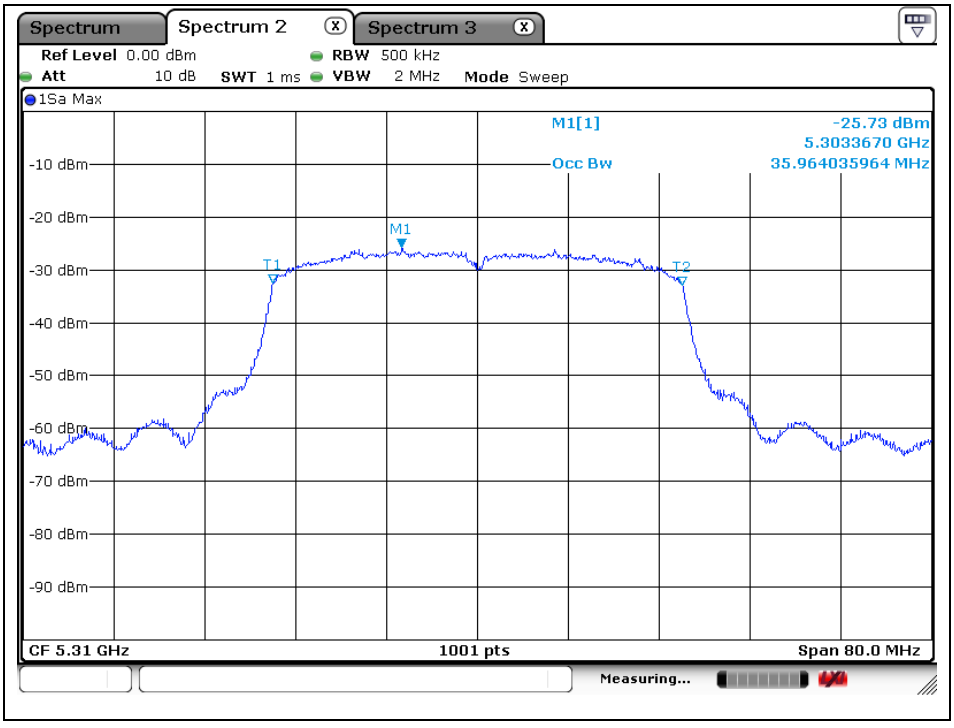


802.11n_HT40 (Band 2A)

Low Channel (5 270 ㎒)

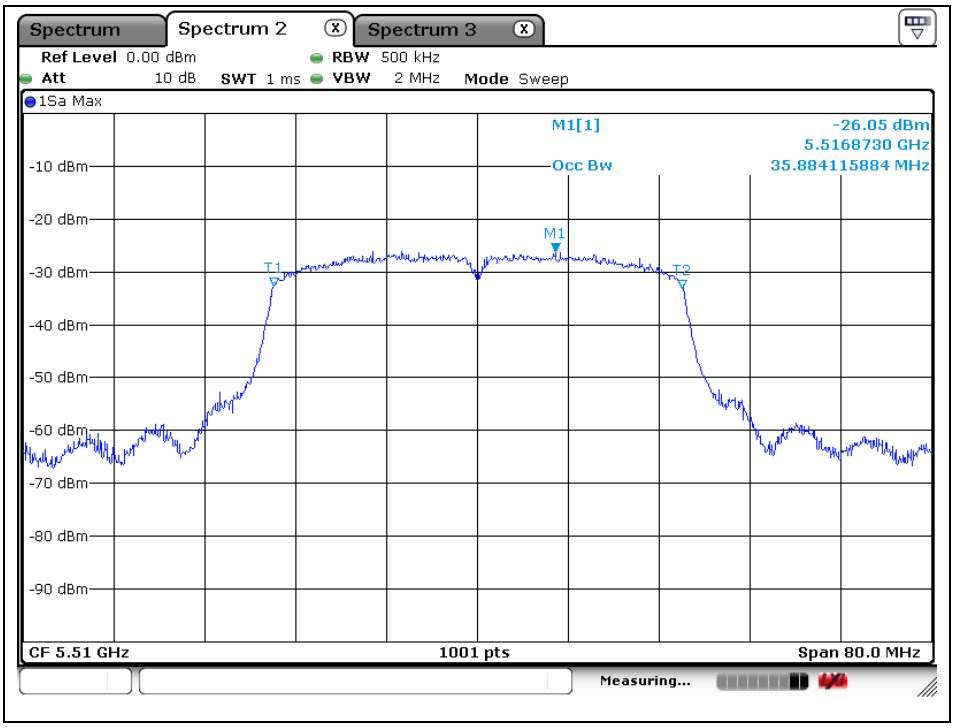


High Channel (5 310 ㎒)

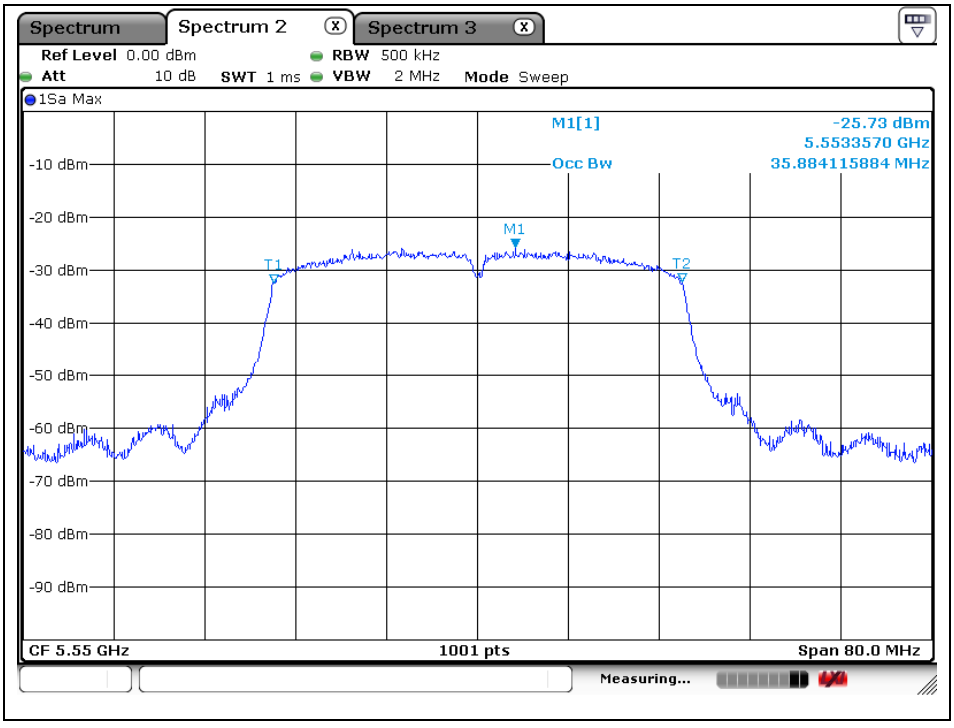


802.11n_HT40 (Band 2C)

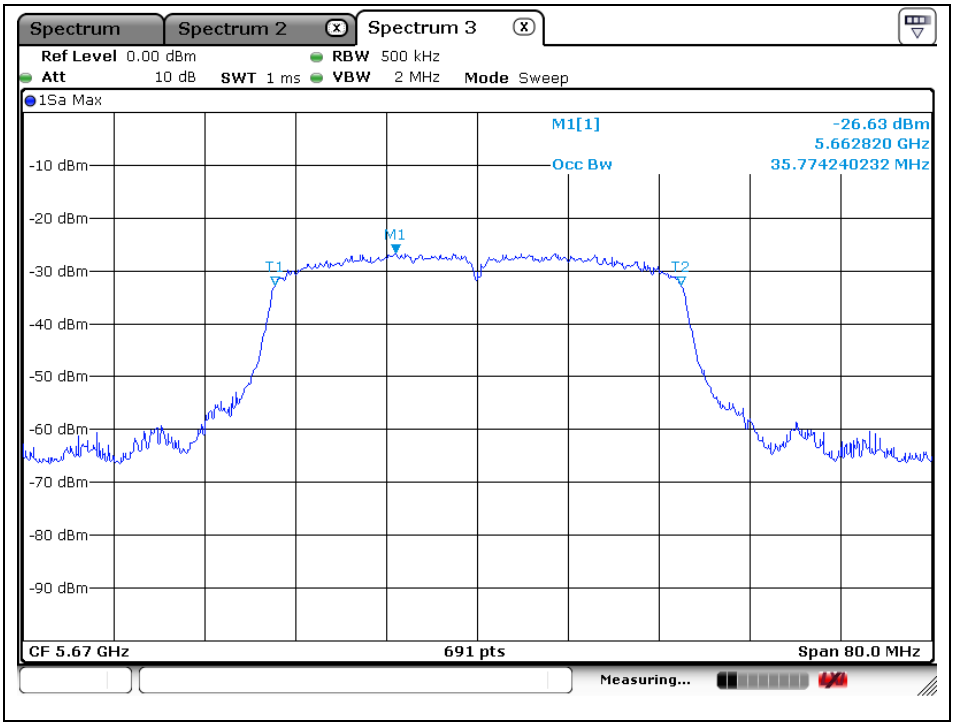
Low Channel (5 510 ㎒)



Middle Channel (5 550 ㎒)

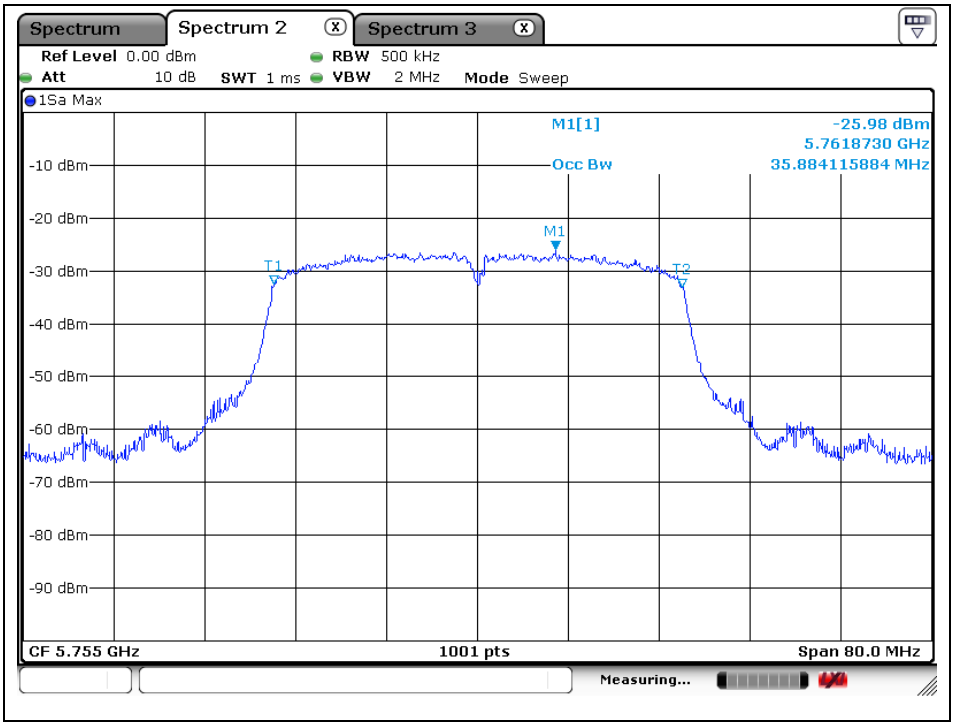


High Channel (5 670 ㎒)

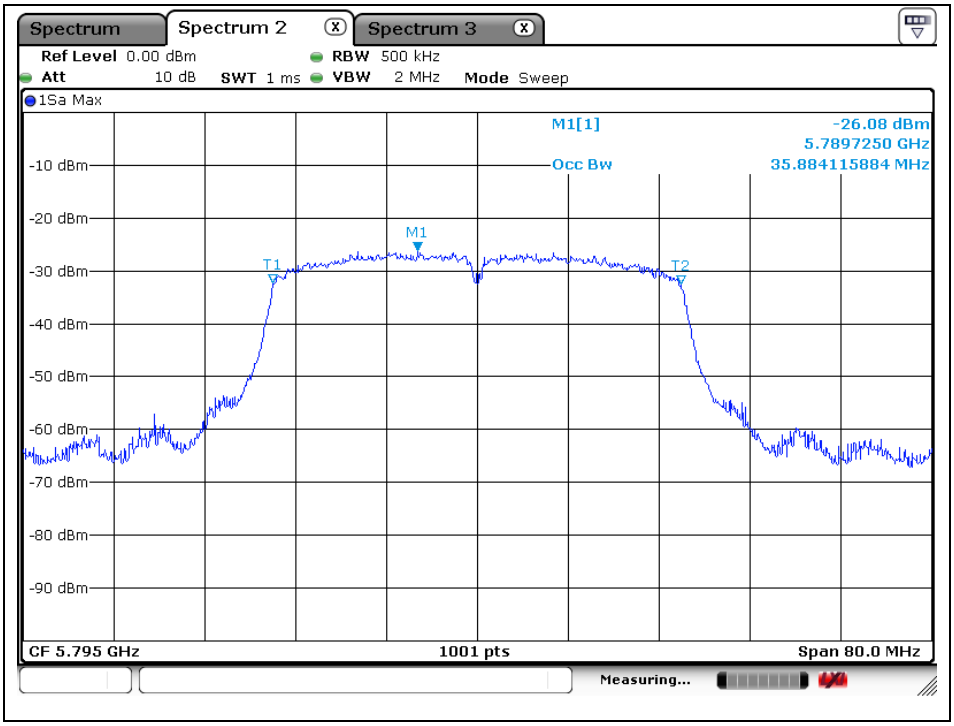


802.11n_HT40 (Band 3)

Low Channel (5 755 ㎒)

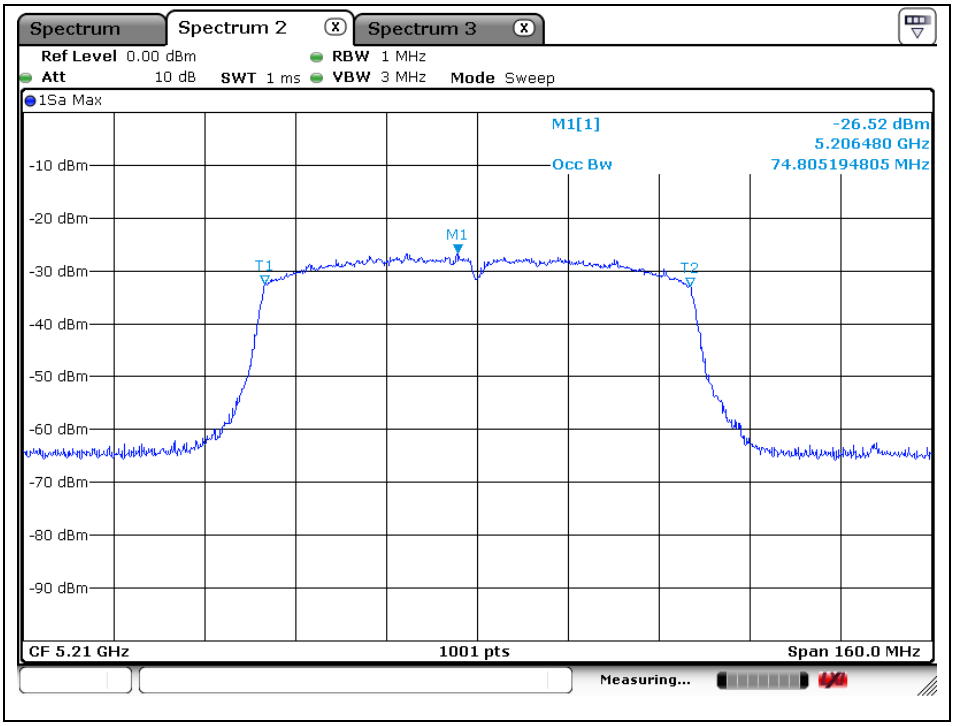


High Channel (5 795 ㎒)



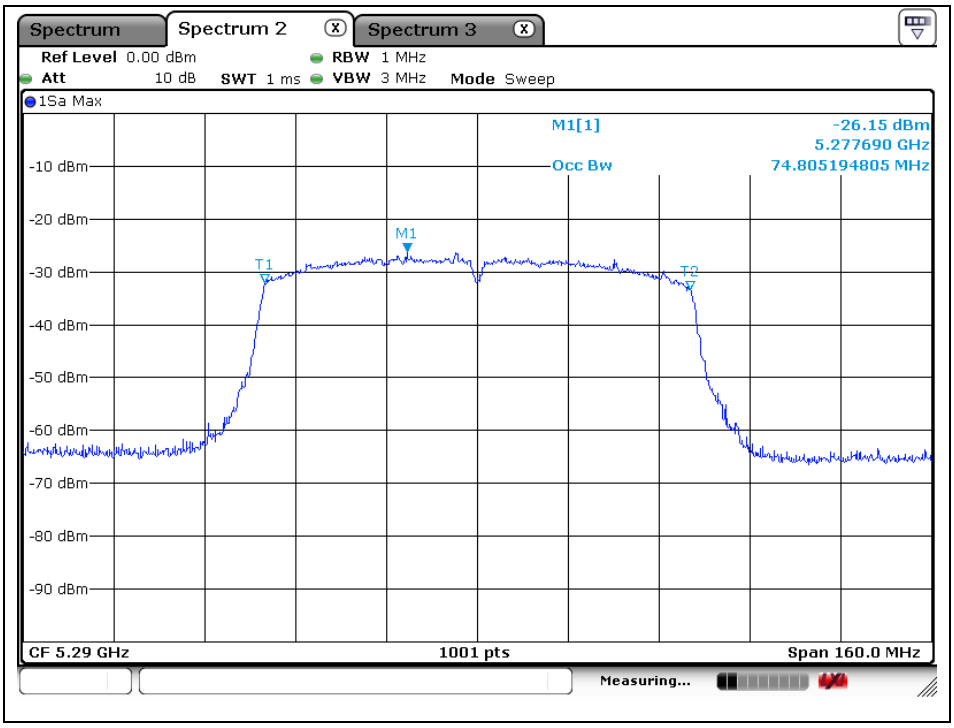
802.11ac_VHT80 (Band 1)

Middle Channel (5 210 ㎒)



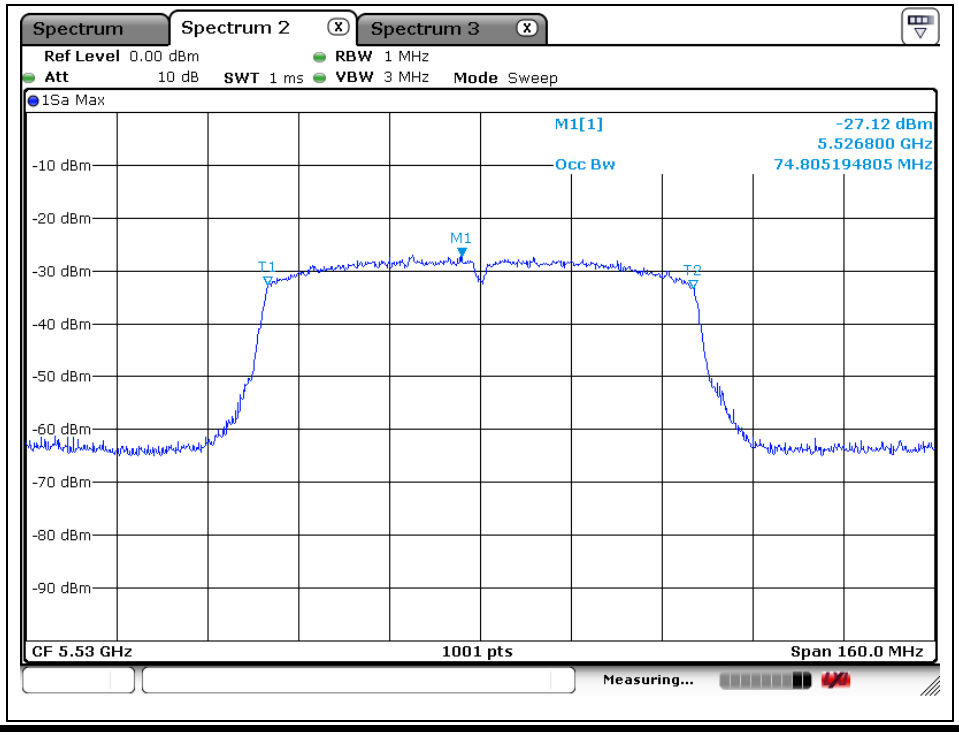
802.11ac_VHT80 (Band 2A)

Middle Channel (5 290 ㎒)

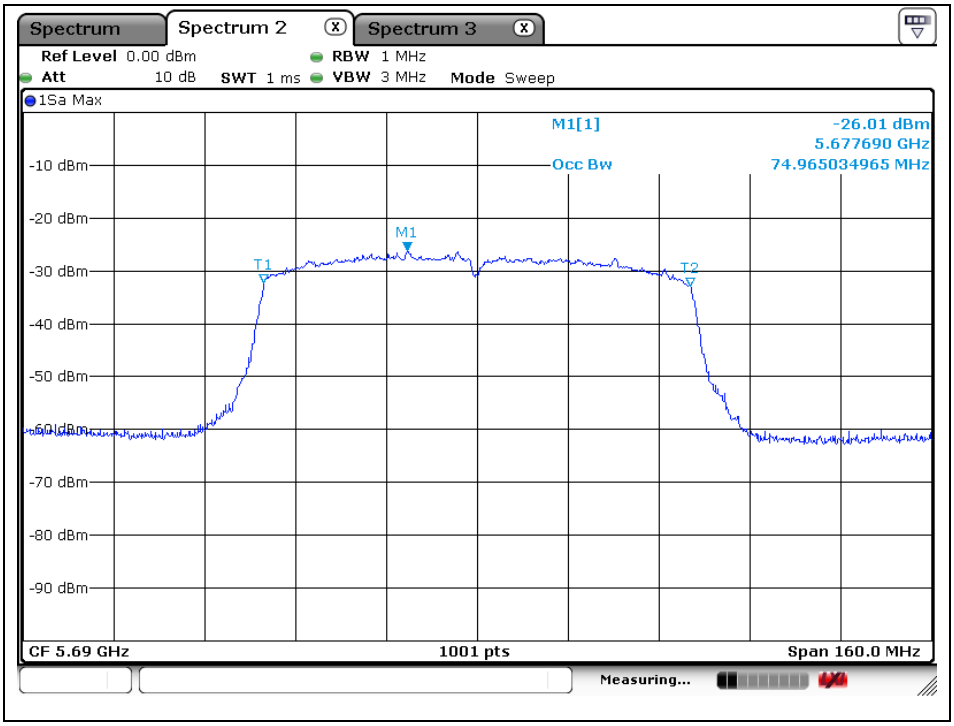


802.11ac_VHT80 (Band 2C)

Low Channel (5 530 ㎒)

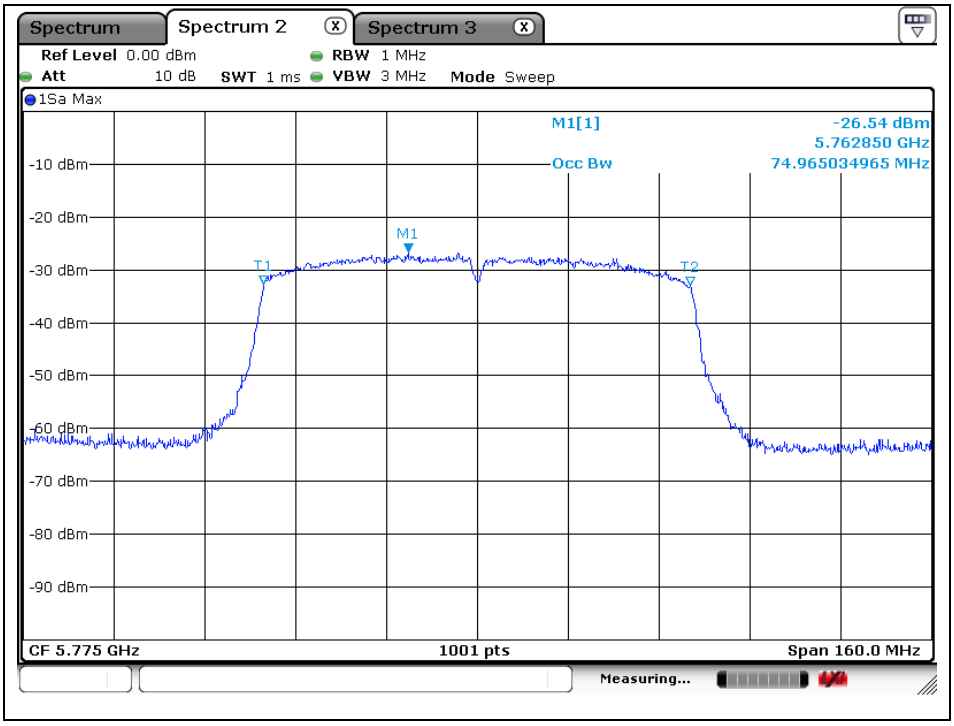


High Channel (5 690 ㎒)



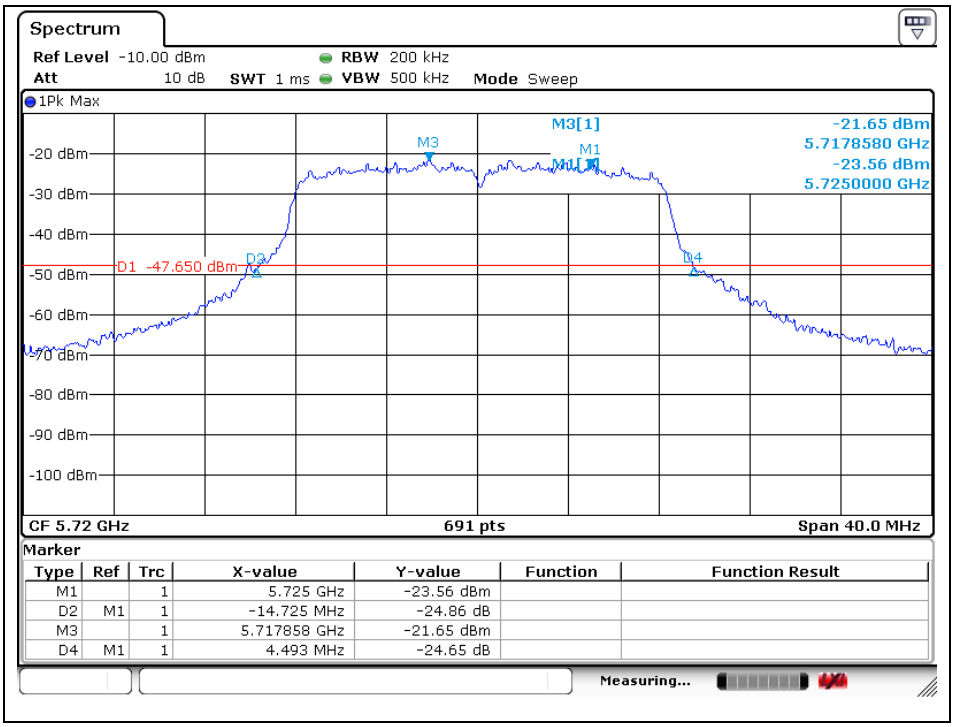
802. 11ac_VHT80 (Band 3)

Middle Channel (5 775 ㎒)

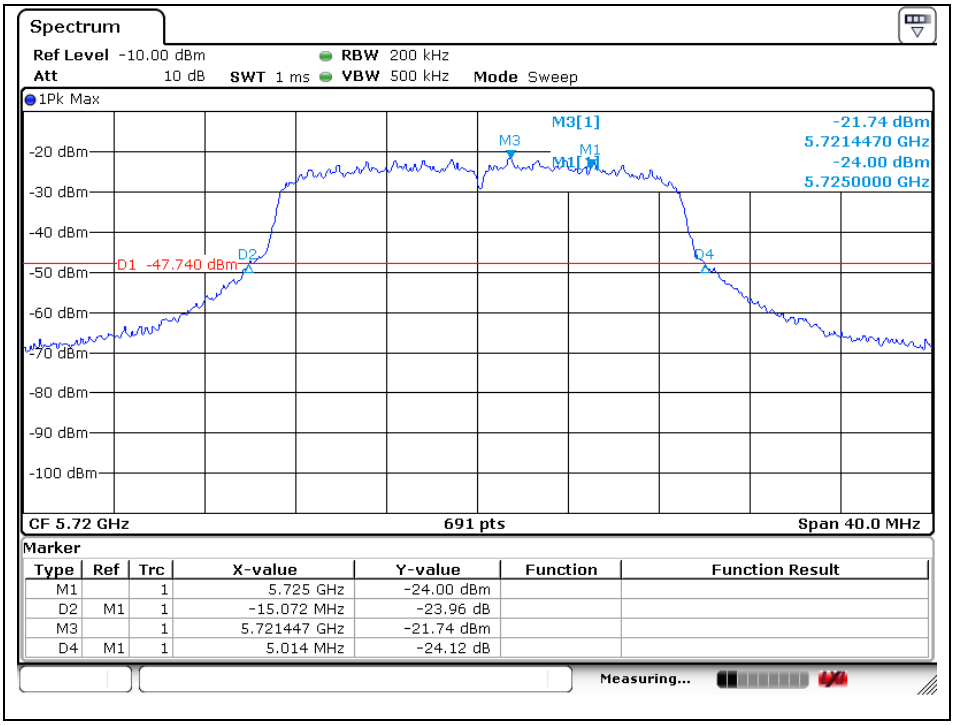


Band-crossing channels

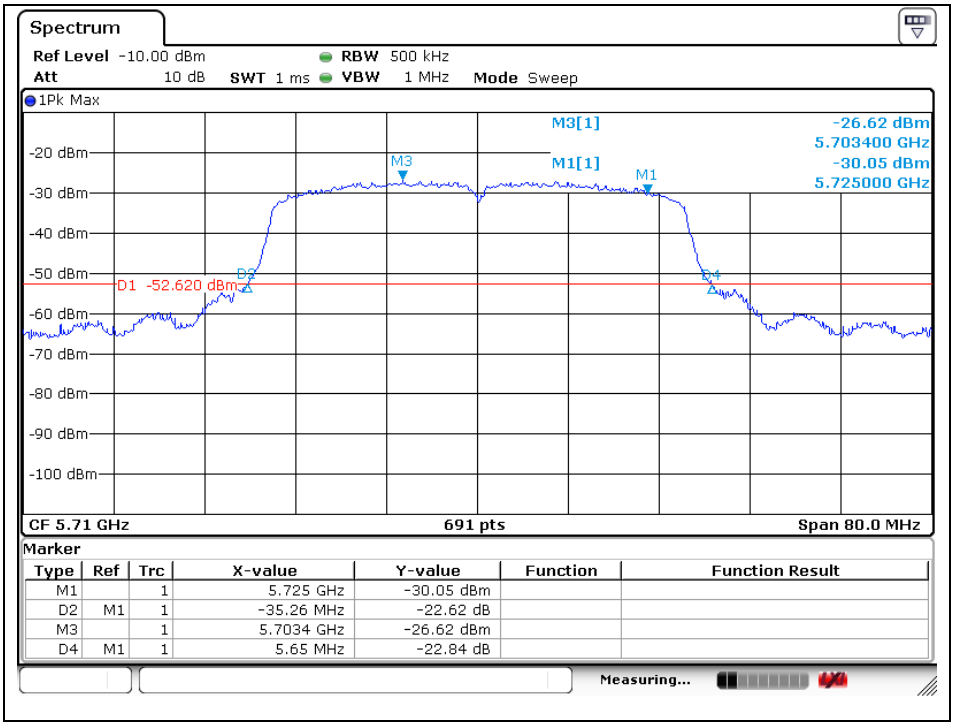
802.11a (5 720 ㎒)



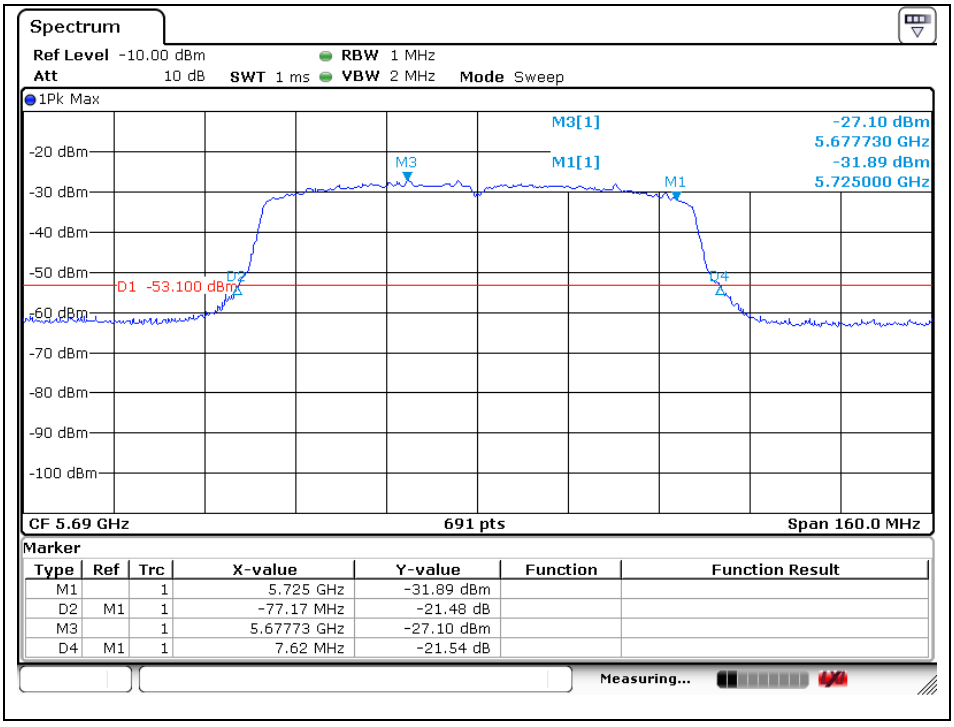
802.11n_HT20 (5 720 ㎒)



802.11n_HT40 (5 710 ㎒)

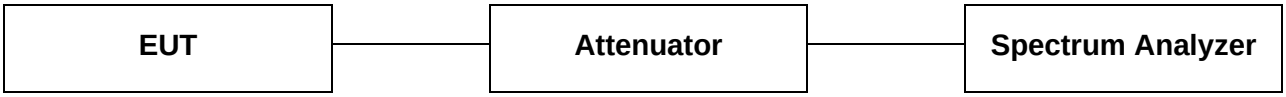


802.11ac_VHT80 (5 690 ㎒)



4. 6 dB Bandwidth

4.1. Test Setup



4.2. Limit

4.2.1. FCC

According to §15.407(e), within the 5.725-5.85 ㎓ band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 ㎑.

4.2.2. IC

According to RSS-247 Issue 2, 6.2.4.1, the minimum -6 dB Bandwidth shall be at least 500 ㎑.

4.3. 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.

1. This measurement settings are specified in section C.2 of KDB 789033 D02 v02r01.
2. Set RBW = 100 ㎑.
3. Set the video bandwidth (VBW) ≥ 3 x RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Remark;

In case of band crossing channels 138, 142 and 144, the measurement is complied with section Ⅲ.A of KDB 789033 D02 v02r01.

4.4. Test result

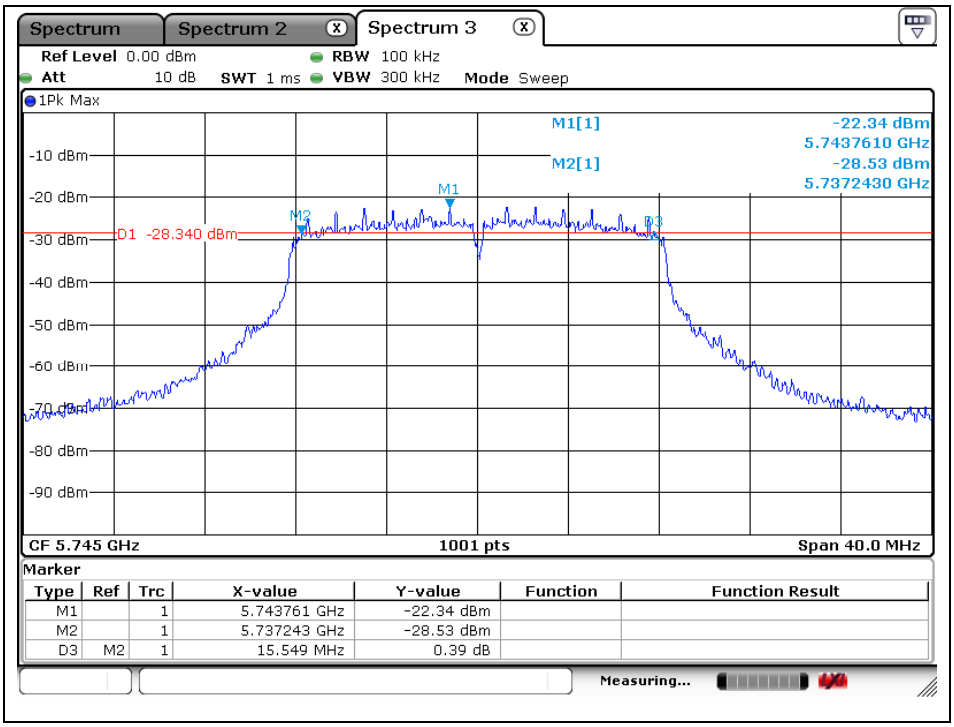
Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

Band	Mode	Frequency (㎒)	Ch.	Data Rate	6 ㏈ Bandwidth (㎒)	Minimum Bandwidth (㎑)
U-NII 3	11a	5 745	149	6 Mbps	15.549	500
		5 785	157		15.544	
		5 825	165		15.664	
	11n_HT20	5 745	149	MCS0	15.185	
		5 785	157		15.185	
		5 825	165		15.465	
	11n_HT40	5 755	151	MCS0	35.085	
		5 795	159		35.124	
	11ac_VHT80	5 775	155	MCS0	75.080	
U-NII 3 (Band-Crossing channels)	11a	5 720	144	6Mbps	2.757	
	11n_HT20	5 720	144	MCS0	2.642	
	11n_HT40	5 710	142	MCS0	2.642	
	11ac_VHT80	5 690	138	MCS0	2.560	

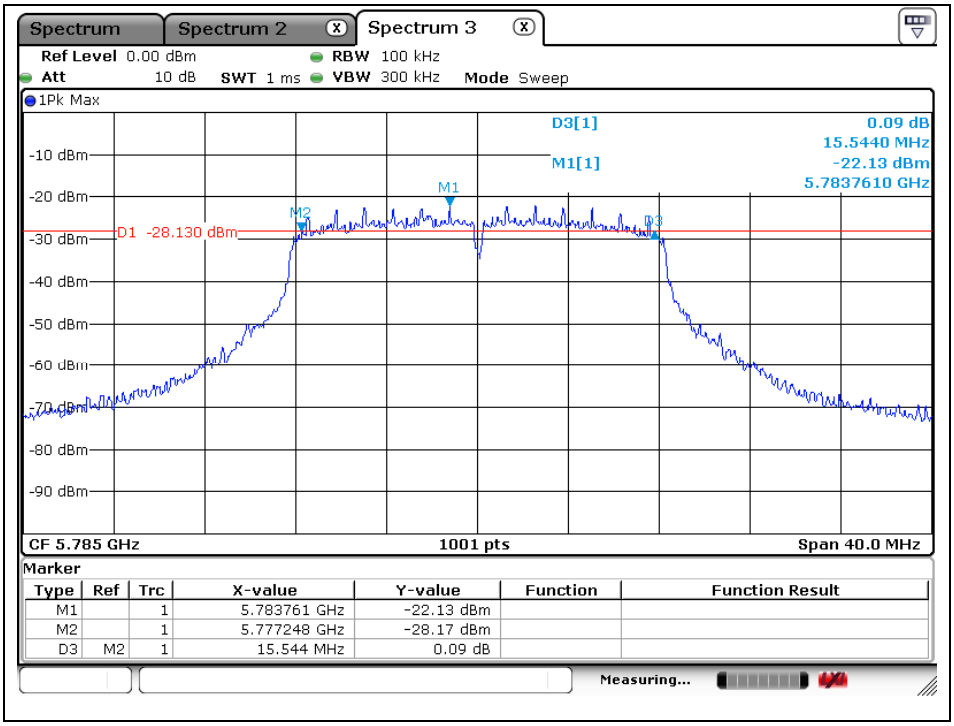
- Test plots

802.11a (Band 3)

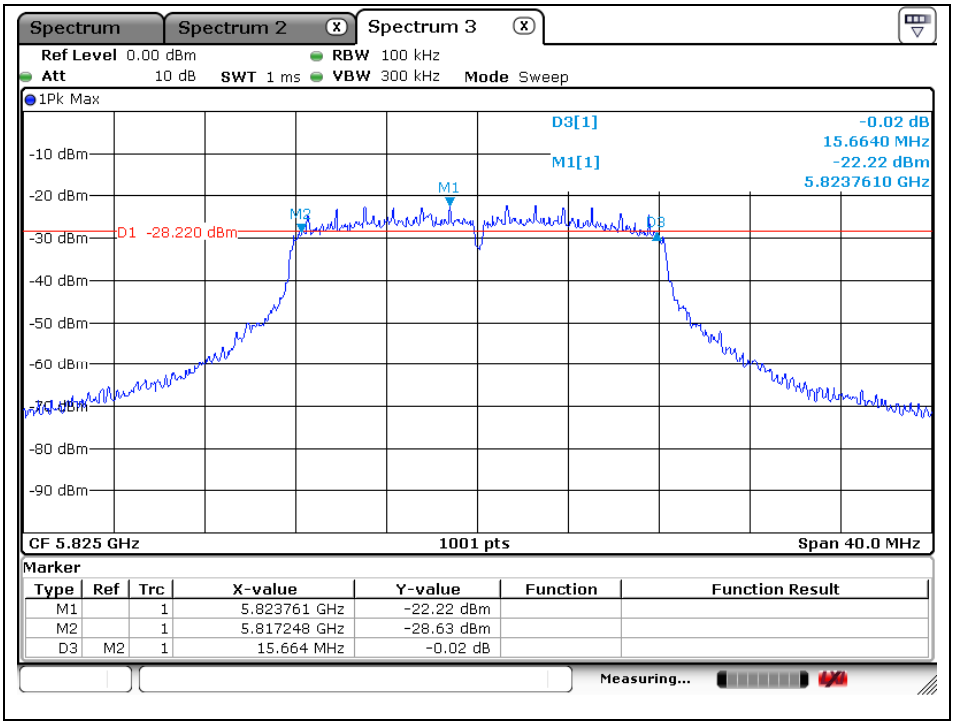
Low Channel (5 745 ㎒)



Middle Channel (5 785 ㎒)

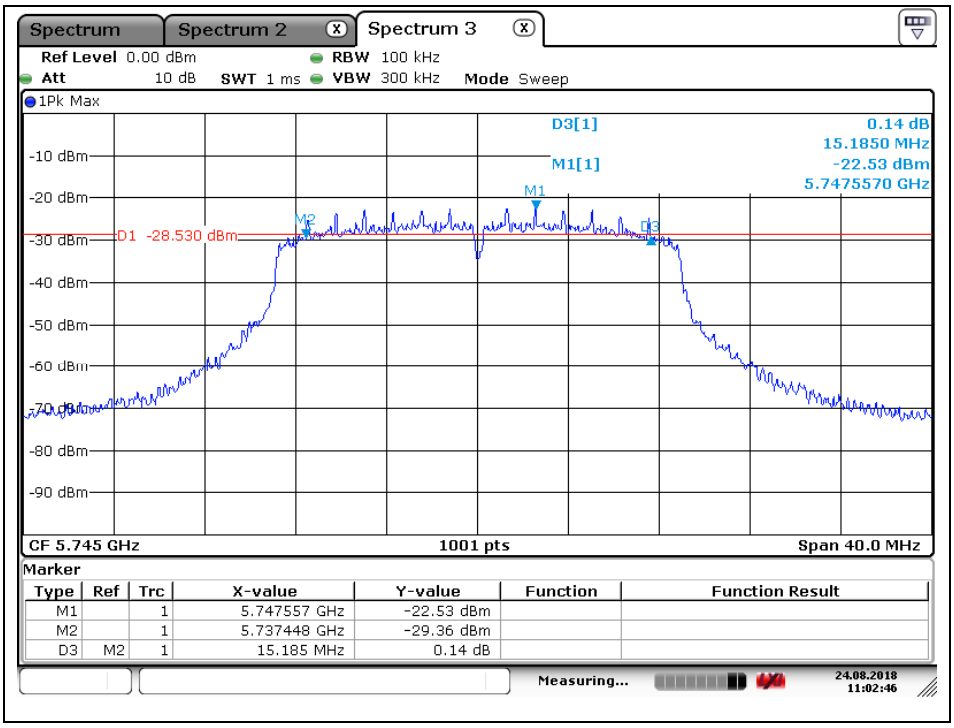


High Channel (5 825 ㎒)

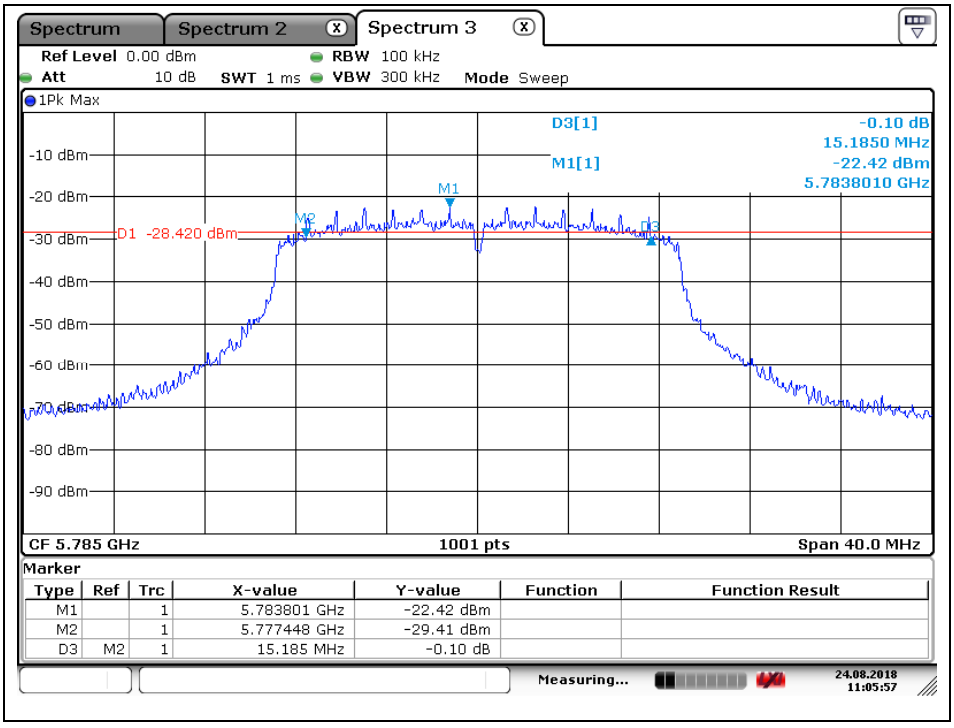


802.11n_HT20 (Band 3)

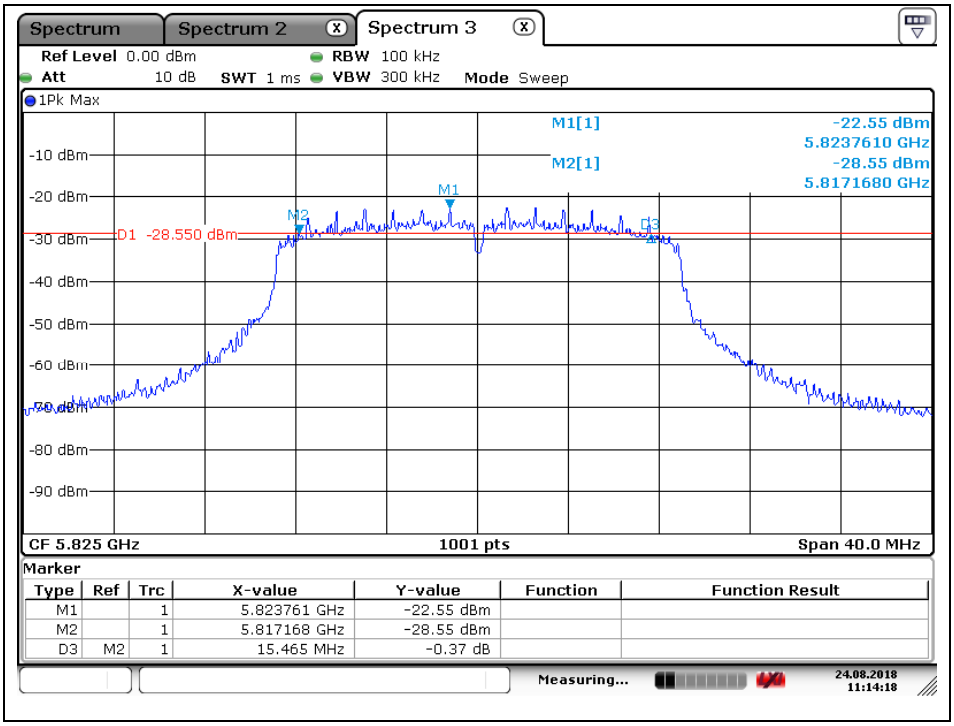
Low Channel (5 745 ㎒)



Middle Channel (5 785 ㎒)

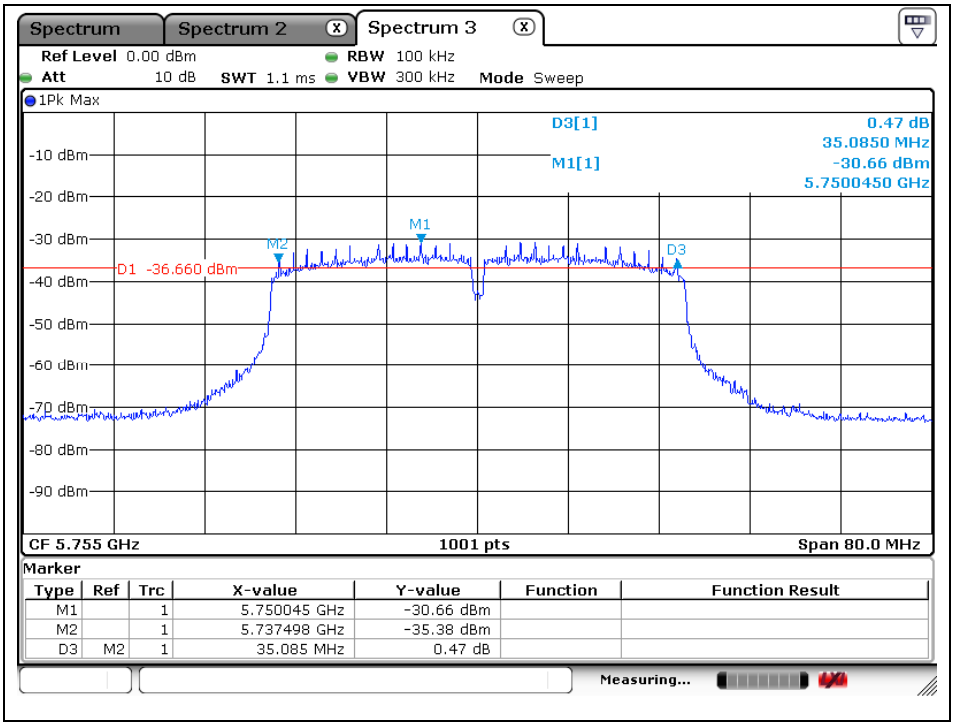


High Channel (5 825 ㎒)

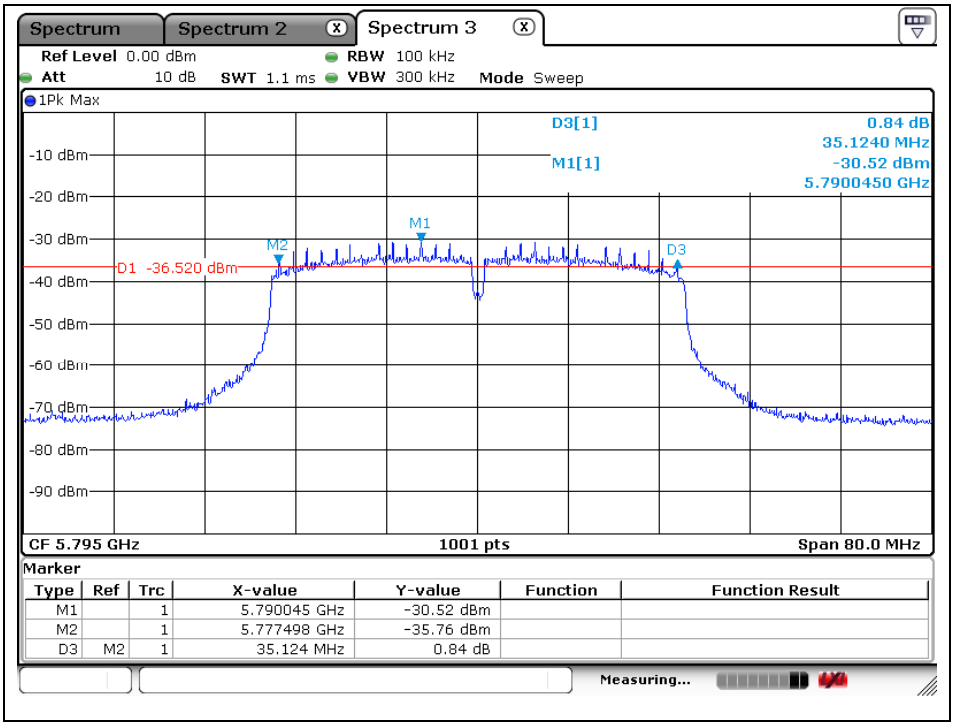


802.11n_HT40 (Band 3)

Low Channel (5 755 ㎒)

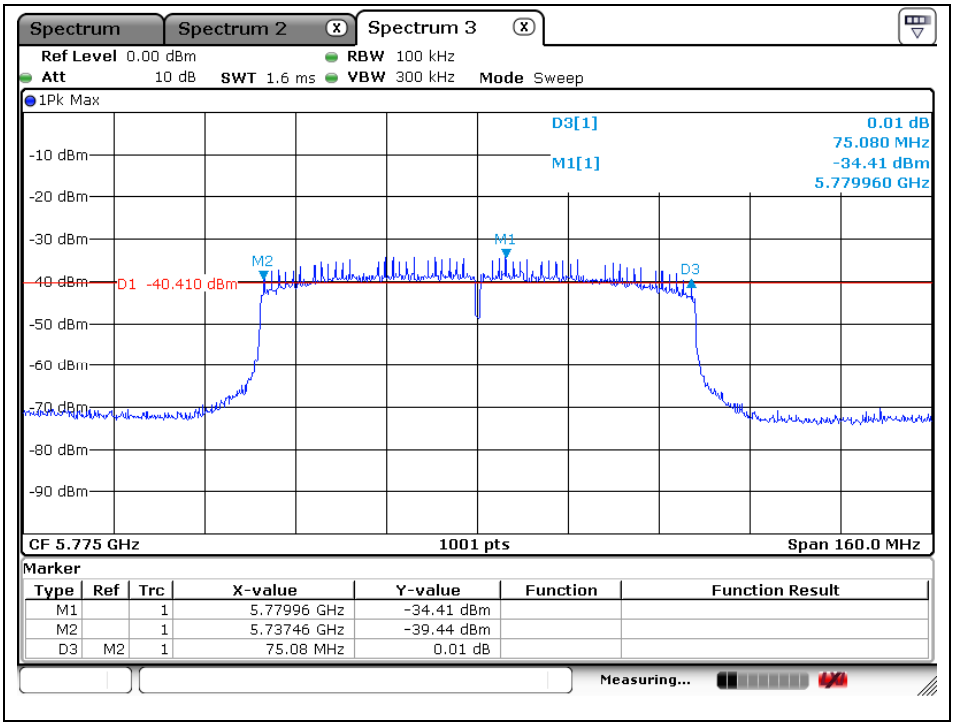


High Channel (5 795 ㎒)



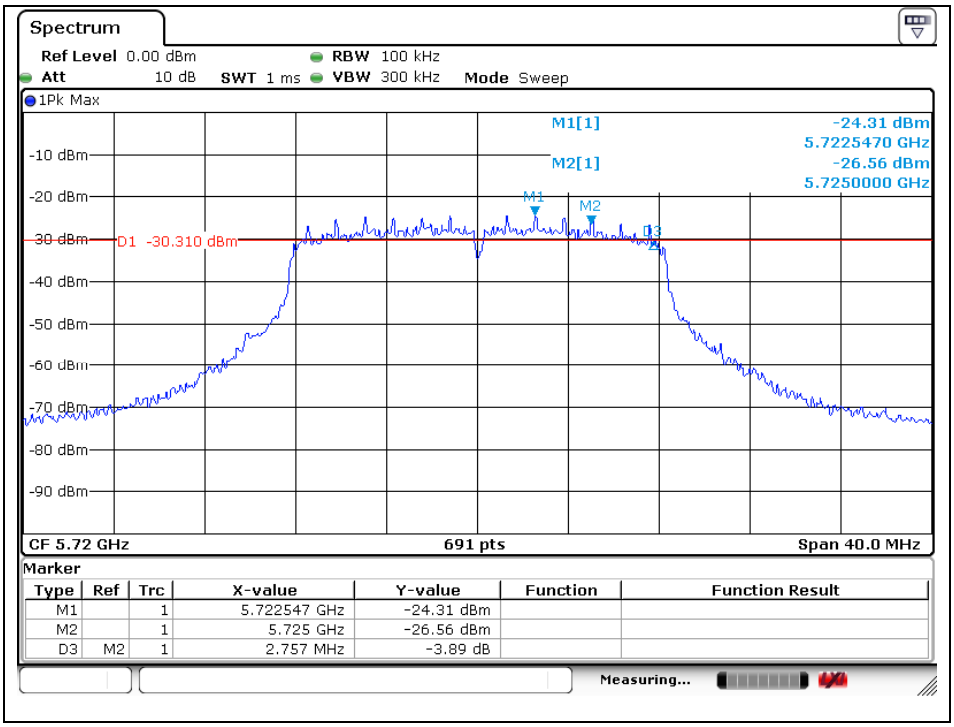
802.11ac_VHT80 (Band 3)

Middle Channel (5 775 ㎒)

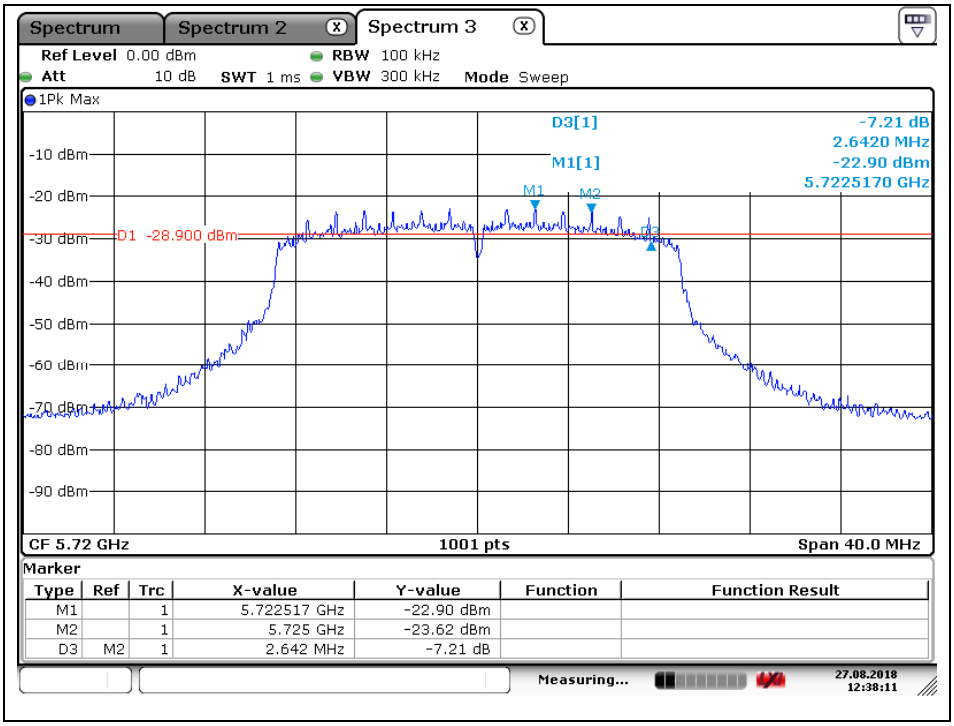


Band-crossing channels

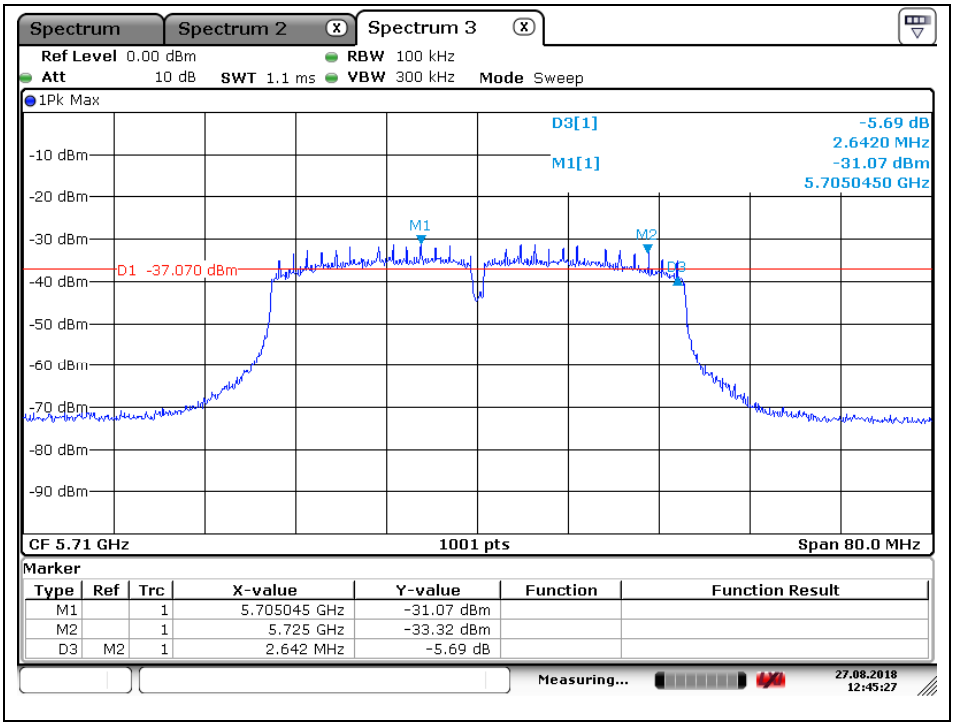
802.11a (5 720 ㎒)



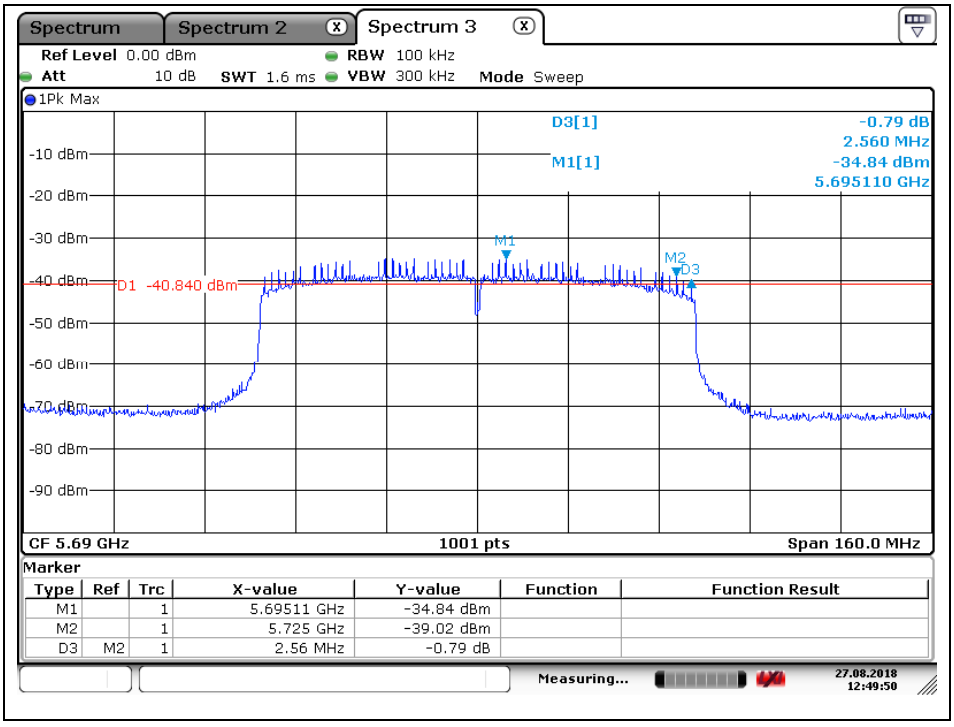
802.11n_HT20 (5 720 ㎒)



802.11n_HT40 (5 710 ㎒)

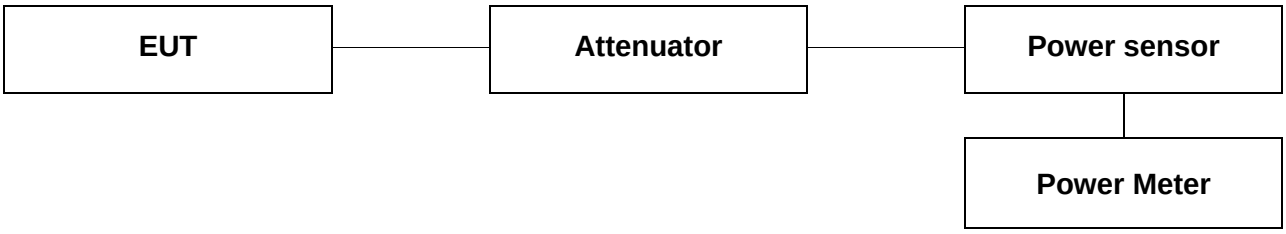


802.11ac_VHT80 (5 690 ㎒)



5. Maximum Conducted Output Power

5.1. Test Setup



5.2. Limit

5.2.1. FCC

According to 15.407 (a)(1)(iv)

For client devices in the 5.15-5.25 ㎓ band, the maximum conducted output power over the frequency band of operation shall not exceed 250 ㎽ provided the maximum antenna gain does not exceed 6 ㏈i. In addition, the maximum power spectral density shall not exceed 11 ㏈m in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 ㏈i are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in ㏈ that the directional gain of the antenna exceeds 6 ㏈i.

According to 15.407 (a)(2)

For the 5.25-5.35 ㎓ and 5.47-5.725 ㎓ bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 ㎽ or 11 ㏈m + 10 log B, where B is the 26 ㏈ emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 ㏈m in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 ㏈i are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in ㏈ that the directional gain of the antenna exceeds 6 ㏈i.

According to 15.407 (a)(3)

For the band 5.725-5.85 ㎓, 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 ㏈m in any 500-㎑ band. If transmitting antennas of directional gain greater than 6 ㏈i are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in ㏈ that the directional gain of the antenna exceeds 6 ㏈i. However, fixed point-to point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 ㏈ i 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.

5.2.2. IC

According to RSS-247 issue2,

6.2.1.1 Frequency band 5 150-5 250 ㎒

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 ㎽ or 1.76 + 10log$_{10}$B, ㏈m, whichever is less. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 ㏈ below the maximum permitted e.i.r.p. of 30 ㎽.

For other devices, the maximum e.i.r.p. shall not exceed 200 ㎽ or 10 + 10log$_{10}$B, ㏈m, whichever power is less. B is the 99 % emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 ㏈m in any 1.0 ㎒ band.

6.2.2.1 Frequency band 5 250-5 350 ㎒

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 ㎽ or 1.76 + 10log$_{10}$B, ㏈m, whichever is less. Devices shall implement TPC in order to have the capability to operate at least 3 ㏈ below the maximum permitted e.i.r.p. of 30 ㎽.

Devices, other than devices installed in vehicles, shall comply with the following:

a) The maximum conducted output power shall not exceed 250 ㎽ or 11 + 10log$_{10}$B, ㏈m, whichever is less. The power spectral density shall not exceed 11 ㏈m in any 1.0 ㎒ band;

b) The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10log$_{10}$B, ㏈m, whichever is less. B is the 99 % emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 ㎽ shall implement TPC in order to have the capability to operate at least 6 ㏈ below the maximum permitted e.i.r.p. of 1 W.

6.2.3.1 Frequency band 5 470-5 600 ㎒ and 5 650-5 725 ㎒

The maximum conducted output power shall not exceed 250 ㎽ or 11 + 10log$_{10}$B, ㏈m, whichever is less. The power spectral density shall not exceed 11 ㏈m in any 1.0 ㎒ band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10log$_{10}$B, ㏈m, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 ㎽ shall implement TPC in order to have the capability to operate at least 6 ㏈ below the maximum permitted e.i.r.p. of 1 W.

6.2.4.1 Frequency band 5 725-5 850 ㎒

For equipment operating in the band 5 725-5 850 ㎒, the minimum 6 ㏈ bandwidth shall be at least 500 ㎑. The maximum conducted output power shall not exceed 1 W. The output power spectral density shall not exceed 30 ㏈m in any 500 ㎑ band. If transmitting antennas of directional gain greater than 6 ㏈i are used, both the maximum conducted output power and the output power spectral density shall be reduced by the amount in ㏈ that the directional gain of the antenna exceeds 6 ㏈i. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 ㏈i without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint[3] systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

5.3. Test Procedure

1. All data rates and modes were investigated for this test. The full data for the worst case data rate are reported in this section.
2. This measurement settings are specified in section E.3.a of KDB 789033 D02 v02r01.
3. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied:
   - The EUT is configured to transmit continuously or to transmit with a consistent duty cycle.
   - At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
   - The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
4. If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section II.B.
5. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
6. Adjust the measurement in dBm by adding 10 log (1/x) where x is the duty cycle (e.g., 10 log(1/0.25) if the duty cycle is 25 %).
7. In case of band crossing channels 138, 142 and 144, the measurement is complied with section Ⅲ.A of KDB 789033 D02 v02r01.

5.4. Test result

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

Mode	Band	Frequency (㎒)	Data Rate	Average Power (㏈m)		
				ANT 1	ANT 2	ANT 1+ANT 2
11a	U-NII 1	5 180	6 Mbps	10.94	10.14	13.57
		5 220		10.43	10.14	13.30
		5 240		10.57	10.19	13.39
	U-NII 2A	5 260		10.57	10.04	13.32
		5 300		10.39	10.07	13.24
		5 320		10.18	10.18	13.19
	U-NII 2C	5 500		10.30	10.32	13.32
		5 580		10.30	10.32	13.32
		5 700		10.17	10.55	13.37
	U-NII 3	5 745		10.24	10.93	13.61
		5 785		10.42	11.05	13.76
		5 825		10.14	10.81	13.50

Band	FCC Limit					
	Frequency (㎒)	Fixed Limit (㏈m)	26 ㏈ BW (㎒)	11+10LogB (㏈m)	Antenna gain (㏈i)	Limit (㏈m)
U-NII 1	5 180	23.98			4.54	23.98
	5 220					
	5 240					
U-NII 2A	5 260	23.98	18.901	23.76	4.54	23.76
	5 300		18.941	23.77		
	5 320		18.941	23.77		
U-NII 2C	5 500	23.98	19.221	23.84	4.54	23.77
	5 580		18.941	23.77		
	5 700		19.522	23.91		
U-NII 3	5 745	30			4.54	30.00
	5 785					
	5 825					

Band	IC Limit					
	Frequency (㎒)	Fixed Limit (㏈m)	99 % BW (㎒)	10+10Log$_{10}$B (㏈m)	Antenna gain (㏈i)	Limit (㏈m)
U-NII 1	5 180	23.01	16.266	22.11	4.54	22.11
	5 220		16.266	22.11		22.11
	5 240		16.266	22.11		22.11

Band	IC Limit					
	Frequency (㎒)	Fixed Limit (㏈m)	99 % BW (㎒)	11+10Log$_{10}$B (㏈m)	Antenna gain (㏈i)	Limit (㏈m)
U-NII 2A	5 260	23.98	16.266	23.11	4.54	23.11
	5 300		16.208	23.10		23.10
	5 320		16.324	23.13		23.13
U-NII 2C	5 500	23.98	16.266	23.11	4.54	23.11
	5 580		16.266	23.11		23.11
	5 700		16.324	23.13		23.13
U-NII 3	5 745	30			4.54	30
	5 785					
	5 825					

Remark;

Attenuator and cable offset was compensated in test program (R&S Power Viewer) before measuring.

According to KDB 662911 D01 v02r01, average power of each port (ANT 1+ANT 2) and antenna gain was combined by using below calculation.

Average power: 10log{10^(ANT 1 power / 10)+10^(ANT 2 power / 10)}
Antenna gain: 10log[{10^(ANT 1 gain / 20)+10^(ANT 2 gain / 20)}^2 / 2]

Mode	Band	Frequency (㎒)	Data Rate	Average Power (dB m)		
				ANT 1	ANT 2	ANT 1+ANT 2
11n_HT20	U-NII 1	5 180	MCS0	10.56	10.03	13.31
		5 220		10.21	9.79	13.02
		5 240		10.40	10.16	13.29
	U-NII 2A	5 260		10.35	9.86	13.12
		5 300		10.16	10.02	13.10
		5 320		9.91	10.09	13.01
	U-NII 2C	5 500		10.20	10.27	13.25
		5 580		10.19	10.37	13.29
		5 700		10.00	10.43	13.23
	U-NII 3	5 745		10.12	10.85	13.51
		5 785		10.26	10.84	13.57
		5 825		10.02	10.67	13.37

Band	FCC Limit					
	Frequency (㎒)	Fixed Limit (dB m)	26 dB BW (㎒)	11+10LogB (dB m)	Antenna gain (dB i)	Limit (dB m)
U-NII 1	5 180	23.98			4.54	23.98
	5 220					
	5 240					
U-NII 2A	5 260	23.98	19.686	23.94	4.54	23.94
	5 300		19.740	23.95		
	5 320		19.960	24.00		
U-NII 2C	5 500	23.98	20.060	24.02	4.54	23.96
	5 580		19.780	23.96		
	5 700		20.043	24.02		
U-NII 3	5 745	30			4.54	30.00
	5 785					
	5 825					

Band	IC Limit					
	Frequency (㎒)	Fixed Limit (㏈m)	99 % BW (㎒)	10+10Log$_{10}$B (㏈m)	Antenna gain (㏈i)	Limit (㏈m)
U-NII 1	5 180	23.01	17.383	22.40	4.54	22.40
	5 220		17.383	22.40		22.40
	5 240		17.383	22.40		22.40

Band	IC Limit					
	Frequency (㎒)	Fixed Limit (㏈m)	99 % BW (㎒)	11+10Log$_{10}$B (㏈m)	Antenna gain (㏈i)	Limit (㏈m)
U-NII 2A	5 260	23.98	17.383	23.40	4.54	23.40
	5 300		17.343	23.39		23.39
	5 320		17.383	23.40		23.40
U-NII 2C	5 500	23.98	17.383	23.40	4.54	23.40
	5 580		17.383	23.40		23.40
	5 700		17.366	23.40		23.40
U-NII 3	5 745	30			4.54	30
	5 785					
	5 825					

Remark;

Attenuator and cable offset was compensated in test program (R&S Power Viewer) before measuring.

According to KDB 662911 D01 v02r01, average power of each port (ANT 1+ANT 2) and antenna gain was combined by using below calculation.

Average power: 10log{10^(ANT 1 power / 10)+10^(ANT 2 power / 10)}
Antenna gain: 10log[{10^(ANT 1 gain / 20)+10^(ANT 2 gain / 20)}^2 / 2]

Mode	Band	Frequency (㎒)	Data Rate	Average Power (dB m)		
				ANT 1	ANT 2	ANT 1+ANT 2
11n_HT40	U-NII 1	5 190	MCS0	4.57	4.31	7.45
		5 230		4.72	4.54	7.64
	U-NII 2A	5 270		4.93	4.53	7.74
		5 310		4.48	4.62	7.56
	U-NII 2C	5 510		4.80	4.80	7.81
		5 550		4.75	4.95	7.86
		5 670		4.72	4.49	7.62
	U-NII 3	5 755		4.66	4.66	7.67
		5 795		4.87	4.77	7.83

Band	FCC Limit					
	Frequency (㎒)	Fixed Limit (dB m)	26 dB BW (㎒)	11+10LogB (dB m)	Antenna gain (dB i)	Limit (dB m)
U-NII 1	5 190	23.98			4.54	23.98
	5 230					
U-NII 2A	5 270	23.98	40.779	27.10	4.54	23.98
	5 310		41.139	27.14		
U-NII 2C	5 510	23.98	41.798	27.21	4.54	23.98
	5 550		41.278	27.16		
	5 670		40.870	27.11		
U-NII 3	5 755	30			4.54	30.00
	5 795					

Band	IC Limit					
	Frequency (㎒)	Fixed Limit (dB m)	99 % BW (㎒)	10+10Log$_{10}$B (dB m)	Antenna gain (dB i)	Limit (dB m)
U-NII 1	5 190	23.01	35.884	25.55	4.54	23.01
	5 230		35.884	25.55		

Band	IC Limit					
	Frequency (㎒)	Fixed Limit (dB m)	99 % BW (㎒)	11+10Log$_{10}$B (dB m)	Antenna gain (dB i)	Limit (dB m)
U-NII 2A	5 270	23.98	35.884	26.55	4.54	23.98
	5 310		35.964	26.56		
U-NII 2C	5 510	23.98	35.884	26.55	4.54	23.98
	5 550		35.884	26.55		
	5 670		35.774	26.54		
U-NII 3	5 755	30			4.54	30
	5 795					

Remark;

Attenuator and cable offset was compensated in test program (R&S Power Viewer) before measuring.

According to KDB 662911 D01 v02r01, average power of each port (ANT 1+ANT 2) and antenna gain was combined by using below calculation.

Average power: 10log{10^(ANT 1 power / 10)+10^(ANT 2 power / 10)}
Antenna gain: 10log[{10^(ANT 1 gain / 20)+10^(ANT 2 gain / 20)}^2 / 2]

Mode	Band	Frequency (㎒)	Data Rate	Average Power (㏈m)		
				ANT 1	ANT 2	ANT 1+ANT 2
11ac_VHT80	U-NII 1	5 210	MCS0	3.47	3.45	6.47
	U-NII 2A	5 290		3.35	3.32	6.35
	U-NII 2C	5 530		3.45	3.93	6.71
	U-NII 3	5 775		3.49	3.99	6.76

Band	FCC Limit					
	Frequency (㎒)	Fixed Limit (㏈m)	26 ㏈ BW (㎒)	11+10LogB (㏈m)	Antenna gain (㏈i)	Limit (㏈m)
U-NII 1	5 210	23.98			4.54	23.98
U-NII 2A	5 290	23.98	82.780	30.18	4.54	23.98
U-NII 2C	5 530	23.98	83.760	30.23	4.54	23.98
U-NII 3	5 775	30			4.54	30.00

Band	IC Limit					
	Frequency (㎒)	Fixed Limit (㏈m)	99 % BW (㎒)	10+10Log$_{10}$B (㏈m)	Antenna gain (㏈i)	Limit (㏈m)
U-NII 1	5 210	23.01	74.805	28.74	4.54	23.01

Band	IC Limit					
	Frequency (㎒)	Fixed Limit (㏈m)	99 % BW (㎒)	11+10Log$_{10}$B (㏈m)	Antenna gain (㏈i)	Limit (㏈m)
U-NII 2A	5 290	23.98	74.805	29.74	4.54	23.98
U-NII 2C	5 530	23.98	74.805	29.74	4.54	23.98
U-NII 3	5 775	30			4.54	30

Remark;

Attenuator and cable offset was compensated in test program (R&S Power Viewer) before measuring.

According to KDB 662911 D01 v02r01, average power of each port (ANT 1+ANT 2) and antenna gain was combined by using below calculation.

Average power: 10log{10^(ANT 1 power / 10)+10^(ANT 2 power / 10)}
Antenna gain: 10log[{10^(ANT 1 gain / 20)+10^(ANT 2 gain / 20)}^2 / 2]

- Band-crossing channels

Mode	Band	Frequency (㎒)	Data Rate	Average Power (㏈m)		
				ANT 1	ANT 2	ANT 1+ANT 2
11a	U-NII 2C	5 720	6 Mbps	8.03	9.23	11.68
	U-NII 3			0.65	2.17	4.49
11n_HT20	U-NII 2C	5 720	MCS0	7.77	8.93	11.40
	U-NII 3			0.71	2.41	4.65
11n_HT40	U-NII 2C	5 710	MCS0	2.39	3.74	6.13
	U-NII 3			-9.81	-8.73	-6.23
11ac_VHT80	U-NII 2C	5 690	MCS0	0	1.29	3.70
	U-NII 3			-16.33	-15.89	-13.09

Mode	Band	Limit					
		Frequency (㎒)	Fixed Limit (㏈m)	26 ㏈ BW (㎒)	11+10LogB (㏈m)	Antenna gain (㏈i)	Limit (㏈m)
11a	U-NII 2C	5 720	23.98	14.725	22.68	4.54	22.68
	U-NII 3					4.54	30
11n_HT20	U-NII 2C	5 720	23.98	15.072	22.78	4.54	22.78
	U-NII 3					4.54	30
11n_HT40	U-NII 2C	5 710	23.98	35.260	26.47	4.54	23.98
	U-NII 3					4.54	30
11ac_VHT80	U-NII 2C	5 690	23.98	77.170	29.87	4.54	23.98
	U-NII 3					4.54	30

Remark;

Attenuator and cable offset was compensated in test program (R&S Power Viewer) before measuring.

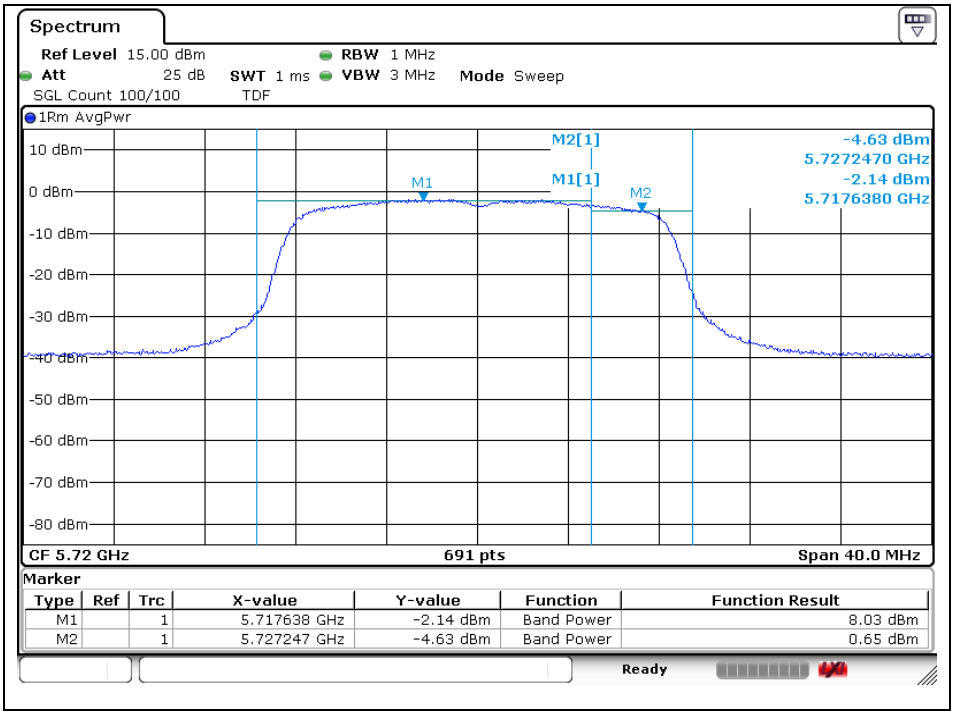
According to KDB 662911 D01 v02r01, average power of each port (ANT 1+ANT 2) and antenna gain was combined by using below calculation.

Average power: 10log{10^(ANT 1 power / 10)+10^(ANT 2 power / 10)}
Antenna gain: 10log[{10^(ANT 1 gain / 20)+10^(ANT 2 gain / 20)}^2 / 2]

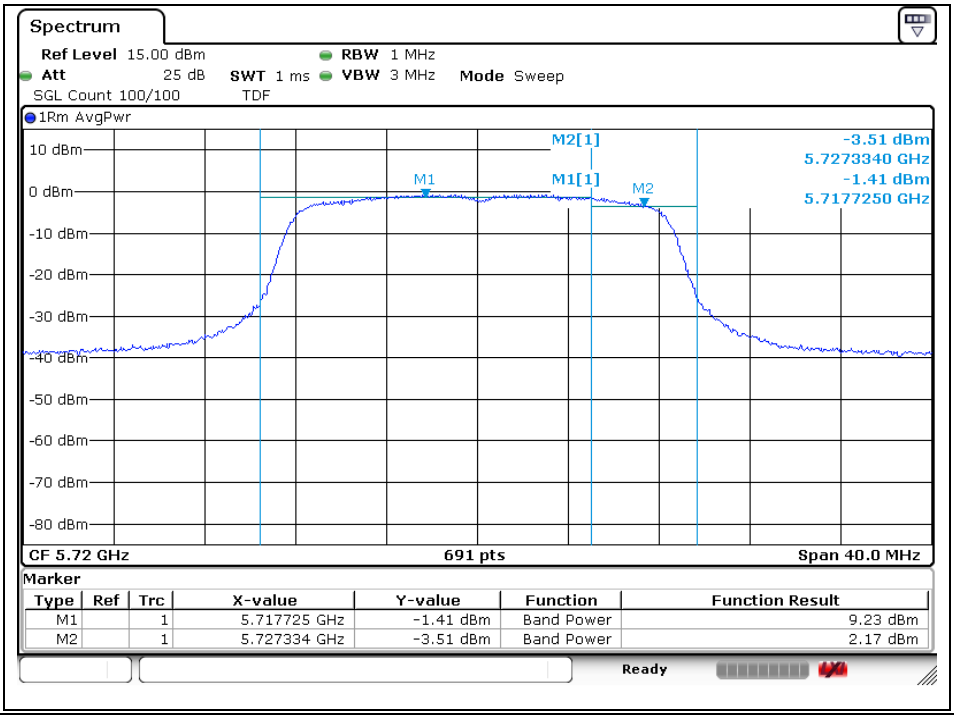
- Test plots

Band-crossing channels

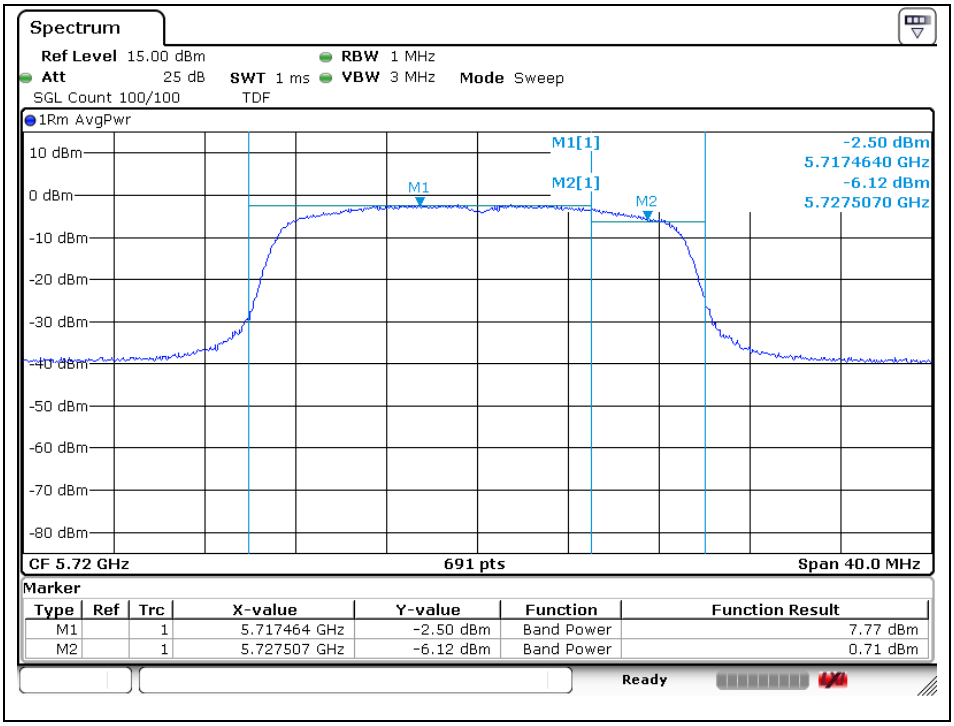
802.11a (5 720 ㎒)_ANT1



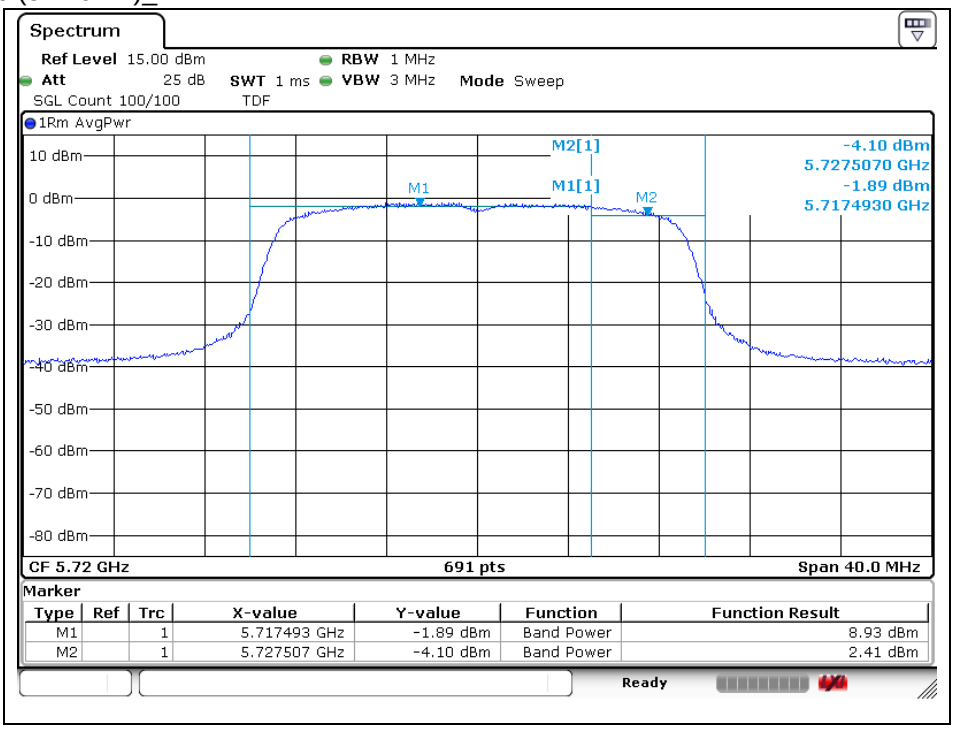
802.11a (5 720 ㎒)_ANT2



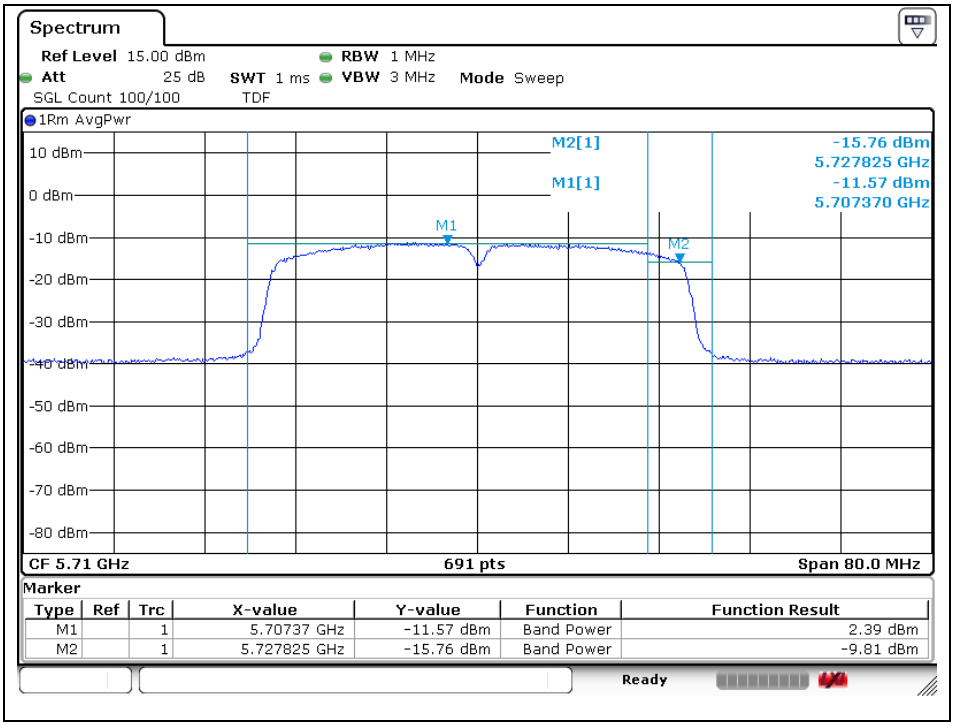
802.11n_HT20 (5 720 ㎒)_ANT1



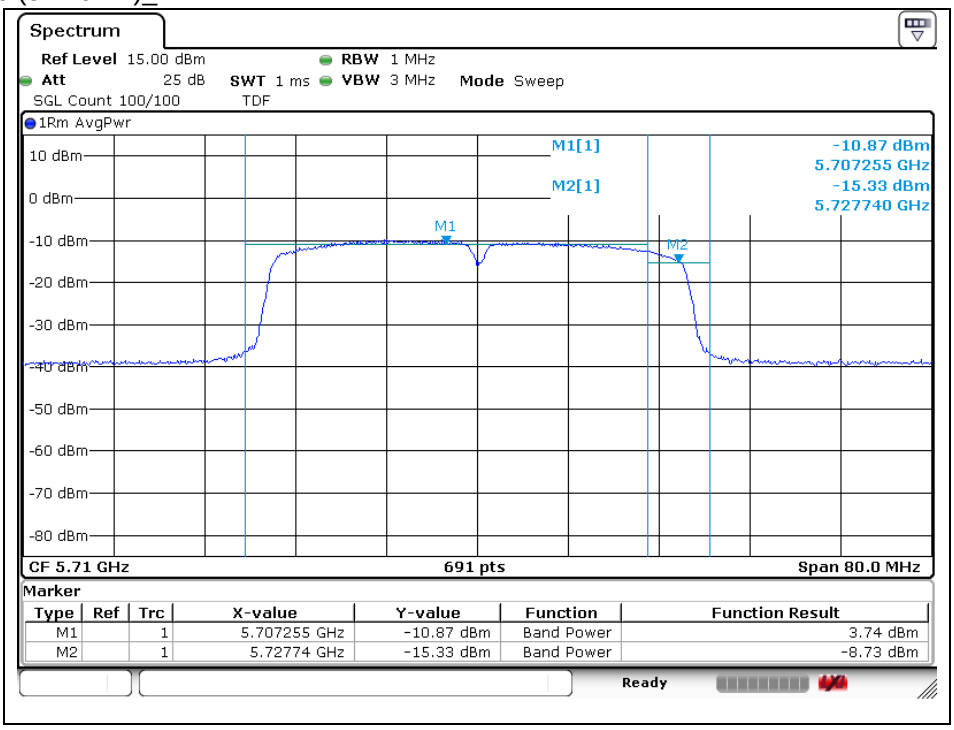
802.11n_HT20 (5 720 ㎒)_ANT2



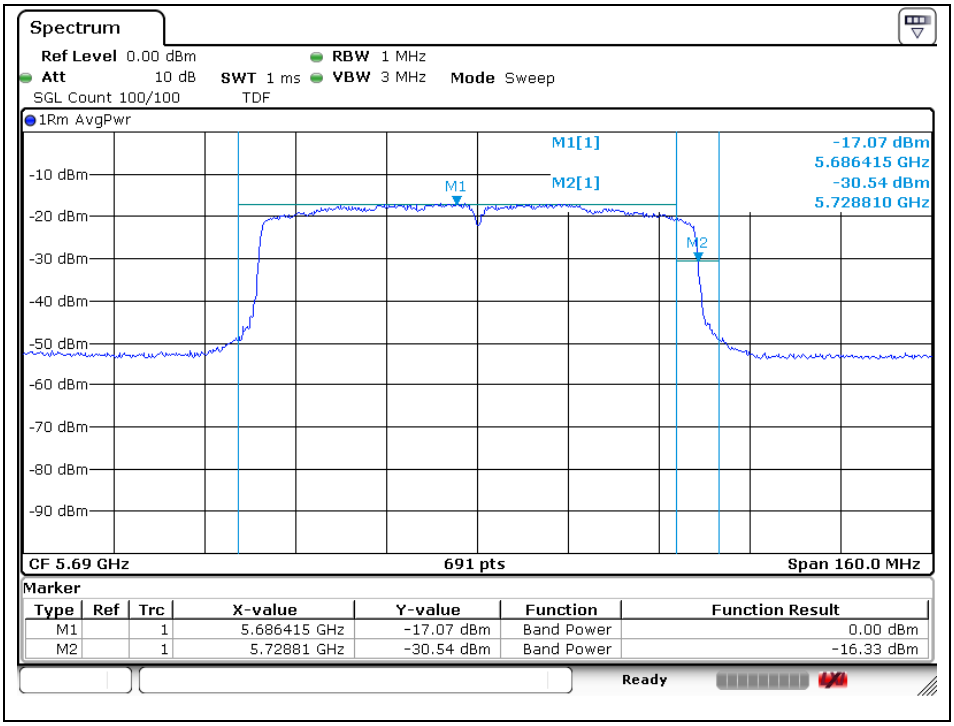
802.11n_HT40 (5 710 ㎒)_ANT1



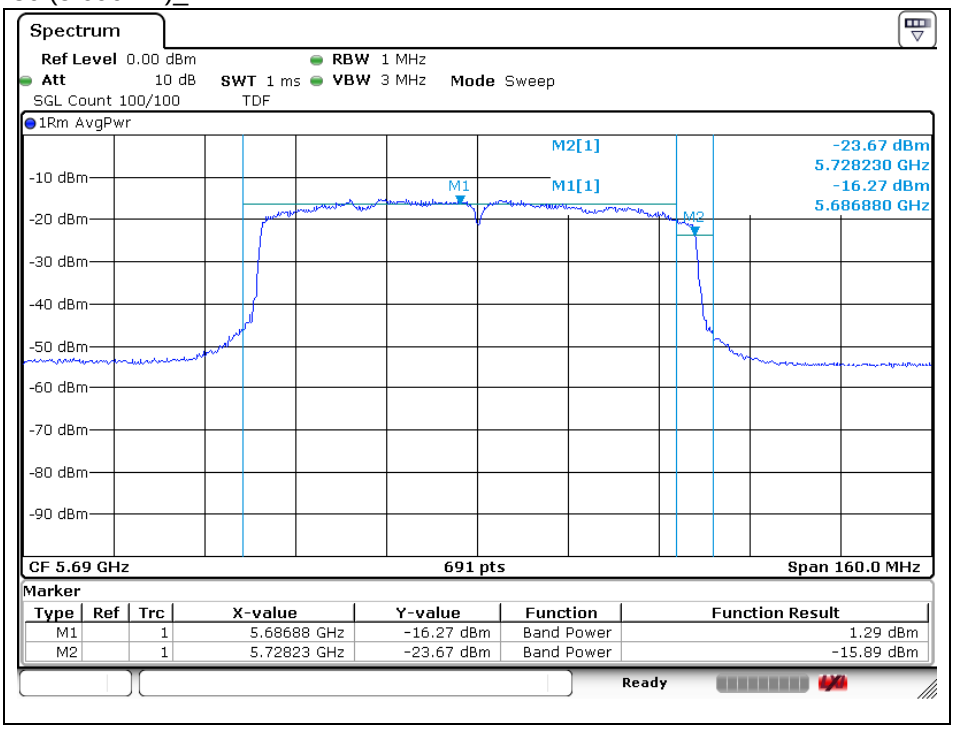
802.11n_HT40 (5 710 ㎒)_ANT2



802.11ac_VHT80 (5 690 ㎒)_ANT1

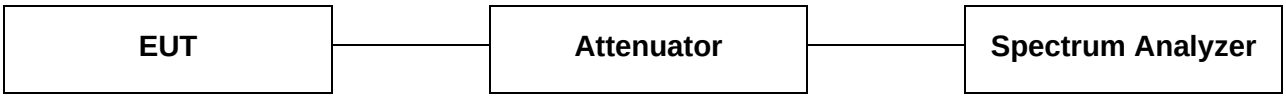


802.11ac_VHT80 (5 690 ㎒)_ANT2



6. Peak Power Spectral Density

6.1. Test Setup



6.2. Limit

6.2.1 FCC

According to 15.407 (a)(1)(iv)

For client devices in the 5.15-5.25 ㎓ band, the maximum conducted output power over the frequency band of operation shall not exceed 250 ㎽ provided the maximum antenna gain does not exceed 6 ㏈i. In addition, the maximum power spectral density shall not exceed 11 ㏈m in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 ㏈i are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in ㏈ that the directional gain of the antenna exceeds 6 ㏈i.

According to 15.407 (a)(2)

For the 5.25-5.35 ㎓ and 5.47-5.725 ㎓ bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 ㎽ or 11 ㏈m + 10 log B, where B is the 26 ㏈ emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 ㏈m in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 ㏈i are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in ㏈ that the directional gain of the antenna exceeds 6 ㏈i.

According to 15.407 (a)(3)

For the band 5.725-5.85 ㎓, 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 ㏈m in any 500-㎑ band. If transmitting antennas of directional gain greater than 6 ㏈i are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in ㏈ that the directional gain of the antenna exceeds 6 ㏈i. However, fixed point-to point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 ㏈ i 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.

6.2.2 IC

According to RSS-247 issue2,

6.2.1.1 Frequency band 5 150-5 250 ㎒

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 ㎽ or 1.76 + 10log$_{10}$B, ㏈m, whichever is less. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 ㏈ below the maximum permitted e.i.r.p. of 30 ㎽.

For other devices, the maximum e.i.r.p. shall not exceed 200 ㎽ or 10 + 10log$_{10}$B, ㏈m, whichever power is less. B is the 99 % emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 ㏈m in any 1.0 ㎒ band.

6.2.2.1 Frequency band 5 250-5 350 ㎒

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 ㎽ or 1.76 + 10log$_{10}$B, ㏈m, whichever is less. Devices shall implement TPC in order to have the capability to operate at least 3 ㏈ below the maximum permitted e.i.r.p. of 30 ㎽.

Devices, other than devices installed in vehicles, shall comply with the following:

a) The maximum conducted output power shall not exceed 250 ㎽ or 11 + 10log$_{10}$B, ㏈m, whichever is less. The power spectral density shall not exceed 11 ㏈m in any 1.0 ㎒ band;

b) The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10log$_{10}$B, ㏈m, whichever is less. B is the 99 % emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 ㎽ shall implement TPC in order to have the capability to operate at least 6 ㏈ below the maximum permitted e.i.r.p. of 1 W.

6.2.3.1 Frequency band 5 470-5 600 ㎒ and 5 650-5 725 ㎒

The maximum conducted output power shall not exceed 250 ㎽ or 11 + 10log$_{10}$B, ㏈m, whichever is less. The power spectral density shall not exceed 11 ㏈m in any 1.0 ㎒ band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10log$_{10}$B, ㏈m, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 ㎽ shall implement TPC in order to have the capability to operate at least 6 ㏈ below the maximum permitted e.i.r.p. of 1 W.

6.2.4.1 Frequency band 5 725-5 850 ㎒

For equipment operating in the band 5 725-5 850 ㎒, the minimum 6 ㏈ bandwidth shall be at least 500 ㎑. The maximum conducted output power shall not exceed 1 W. The output power spectral density shall not exceed 30 ㏈m in any 500 ㎑ band. If transmitting antennas of directional gain greater than 6 ㏈i are used, both the maximum conducted output power and the output power spectral density shall be reduced by the amount in ㏈ that the directional gain of the antenna exceeds 6 ㏈i. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 ㏈i without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint[3] systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

6.3. 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.

1. This measurement settings are specified in section F of KDB 789033 D02 v02r01.

2. Create an average power spectrum for the EUT operating mode being tested by following the instructions in section 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.)

3. Use the peak search function on the instrument to find the peak of the spectrum and record its value.

4. Make the following 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 measured power in order to compute the average power during the actual transmission times.**
   b) If Method SA-3 Alternative was used and the linear mode was used in step II.E.2.g)(viii), add 1 ㏈ to the final result to compensate for the difference between linear averaging and power averaging.

5. The result is the Maximum PSD over 1 ㎒ reference bandwidth.

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

   a) Set RBW ≥ 1/*T*, where *T* is defined in section II.B.1.a).
   b) Set VBW ≥ 3 RBW.
   c) If measurement bandwidth of Maximum PSD is specified in 500 ㎑, add 10log(500 ㎑/RBW) to the measured result, whereas RBW (< 500 ㎑) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
   d) If measurement bandwidth of Maximum PSD is specified in 1 ㎒, add 10log(1 ㎒/RBW) to the measured result, whereas RBW (< 1 ㎒) 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.

7. In case of band crossing channels 138, 142 and 144, the measurement is complied with section Ⅲ.A of KDB 789033 D02 v02r01.

6.4. Test result

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

Mode	Band	Frequency (㎒)	Ch.	Data Rate	Measured PPSD (dB m)			Limit (dB m/1 ㎒)
					ANT 1	ANT 2	ANT 1+ANT 2	
11a	U-NII 1	5 180	36	6 Mbps	-0.53	-1.17	2.17	10
		5 220	44		-1.22	-1.16	1.82	
		5 240	48		-0.96	-0.77	2.15	
	U-NII 2A	5 260	52		-0.84	-1.14	2.02	11
		5 300	60		-1.08	-1.06	1.94	
		5 320	64		-1.62	-1.16	1.63	
	U-NII 2C	5 500	100		-1.41	-0.97	1.83	
		5 580	116		-1.49	-1.14	1.70	
		5 700	140		-1.38	-0.68	1.99	
	Band	**Frequency (㎒)**	**Ch.**	**Data Rate**	**ANT 1**	**ANT 2**	**ANT 1+ANT 2**	**Limit (dB m/500 ㎑)**
	U-NII 3	5 745	149	6 Mbps	-4.42	-3.69	-1.03	30
		5 785	157		-4.30	-3.63	-0.94	
		5 825	165		-4.62	-3.55	-1.04	

Mode	Band	Frequency (㎒)	Ch.	Data Rate	Measured PPSD (dB m)			Limit (dB m/1 ㎒)
					ANT 1	ANT 2	ANT 1+ANT 2	
11n_HT20	U-NII 1	5 180	36	MCS0	-1.18	-1.32	1.76	10
		5 220	44		-1.31	-1.33	1.69	
		5 240	48		-1.23	-1.06	1.87	
	U-NII 2A	5 260	52		-1.35	-1.39	1.64	11
		5 300	60		-1.52	-1.31	1.60	
		5 320	64		-1.63	-1.59	1.40	
	U-NII 2C	5 500	100		-1.75	-1.23	1.53	
		5 580	116		-1.87	-1.43	1.37	
		5 700	140		-1.80	-1.20	1.52	
	Band	**Frequency (㎒)**	**Ch.**	**Data Rate**	**ANT 1**	**ANT 2**	**ANT 1+ANT 2**	**Limit (dB m/500 ㎑)**
	U-NII 3	5 745	149	MCS0	-4.65	-3.67	-1.12	30
		5 785	157		-4.61	-3.96	-1.26	
		5 825	165		-5.20	-4.21	-1.67	

Mode	Band	Frequency (㎒)	Ch.	Data Rate	Measured PPSD (dB m)			Limit (dB m/1 ㎒)
					ANT 1	ANT 2	ANT 1+ANT 2	
11n_HT40	U-NII 1	5 190	38	MCS0	-9.89	-11.02	-7.41	10
		5 230	40		-10.50	-11.06	-7.76	
	U-NII 2A	5 270	54		-10.06	-11.00	-7.49	11
		5 310	62		-10.77	-11.14	-7.94	
	U-NII 2C	5 510	102		-10.40	-10.94	-7.65	
		5 550	110		-10.65	-11.06	-7.84	
		5 670	134		-10.47	-10.27	-7.36	
	Band	Frequency (㎒)	Ch.	Data Rate	ANT 1	ANT 2	ANT 1+ANT 2	Limit (dB m/500 ㎑)
	U-NII 3	5 755	151	MCS0	-13.77	-13.43	-10.59	30
		5 795	159		-13.80	-13.28	-10.52	

Mode	Band	Frequency (㎒)	Ch.	Data Rate	Measured PPSD (dB m)			Limit (dB m/1 ㎒)
					ANT 1	ANT 2	ANT 1+ANT 2	
11ac_VHT80	U-NII 1	5 210	42	MCS0	-15.80	-16.54	-13.14	10
	U-NII 2A	5 290	58		-16.10	-16.33	-13.20	11
	U-NII 2C	5 530	106		-16.63	-16.11	-13.35	
	Band	Frequency (㎒)	Ch.	Data Rate	ANT 1	ANT 2	ANT 1+ANT 2	Limit (dB m/500 ㎑)
	U-NII 3	5 775	155	MCS0	-18.99	-18.79	-15.88	30

Band-crossing channels

Mode	Band	Frequency (㎒)	Ch.	Data Rate	Measured PPSD (dB m)			Limit (dB m/1 ㎒ or dB m/500 ㎑)
					ANT 1	ANT 2	ANT 1+ANT 2	
11a	U-NII 2C	5 720	144	6 Mbps	-1.66	-1.14	1.62	11
	U-NII 3	5 720	144		-5.71	-4.47	-2.04	30
11n_HT20	U-NII 2C	5 720	144	MCS0	-2.16	-1.34	1.28	11
	U-NII 3	5 720	144		-5.81	-5.28	-2.53	30
11n_HT40	U-NII 2C	5 710	142	MCS0	-10.92	-10.59	-7.74	11
	U-NII 3	5 710	142		-16.34	-15.88	-13.09	30
11ac_VHT80	U-NII 2C	5 690	138	MCS0	-16.17	-16.47	-13.31	11
	U-NII 3	5 690	138		-22.89	-23.03	-19.95	30

Remark;

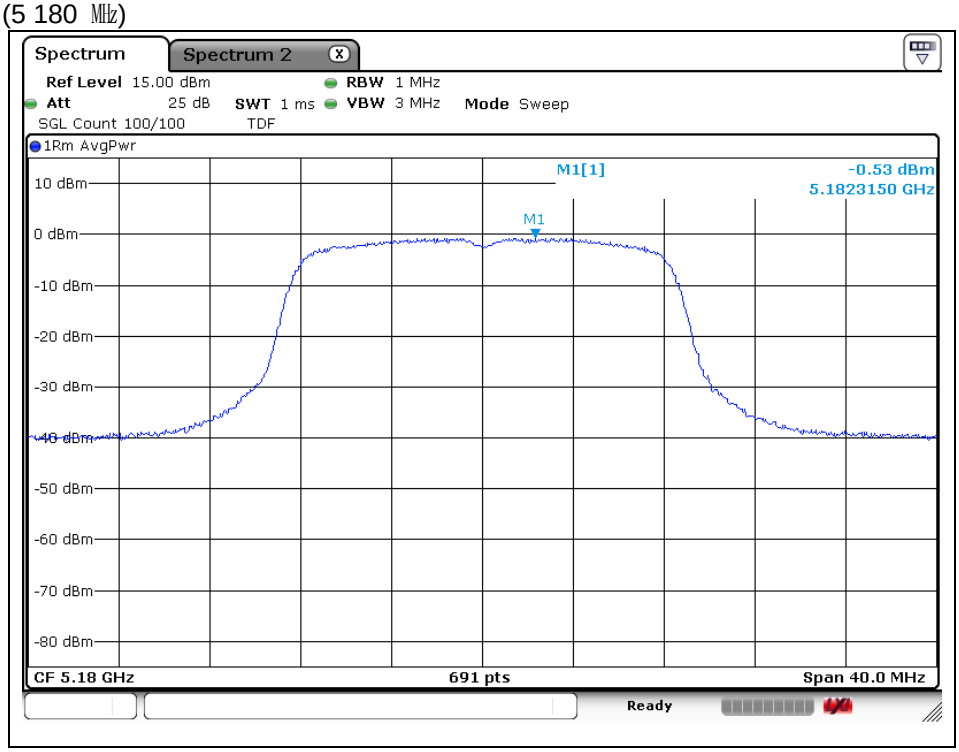
According to KDB 662911 D01 v02r01, power spectral density of each port (ANT 1+ANT 2) was combined by using below calculation.

Total PPSD: 10log{10^(ANT 1 PSD / 10)+10^(ANT 2 PSD / 10)}

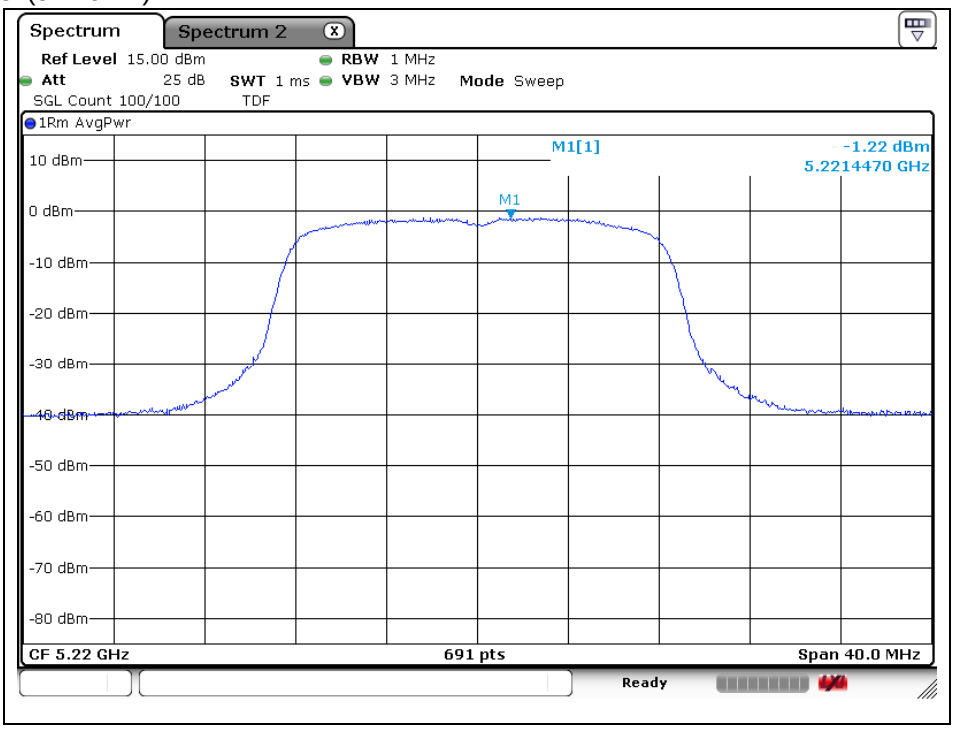
- Test plots

OFDM: 802.11a (Band 1) _ANT 1

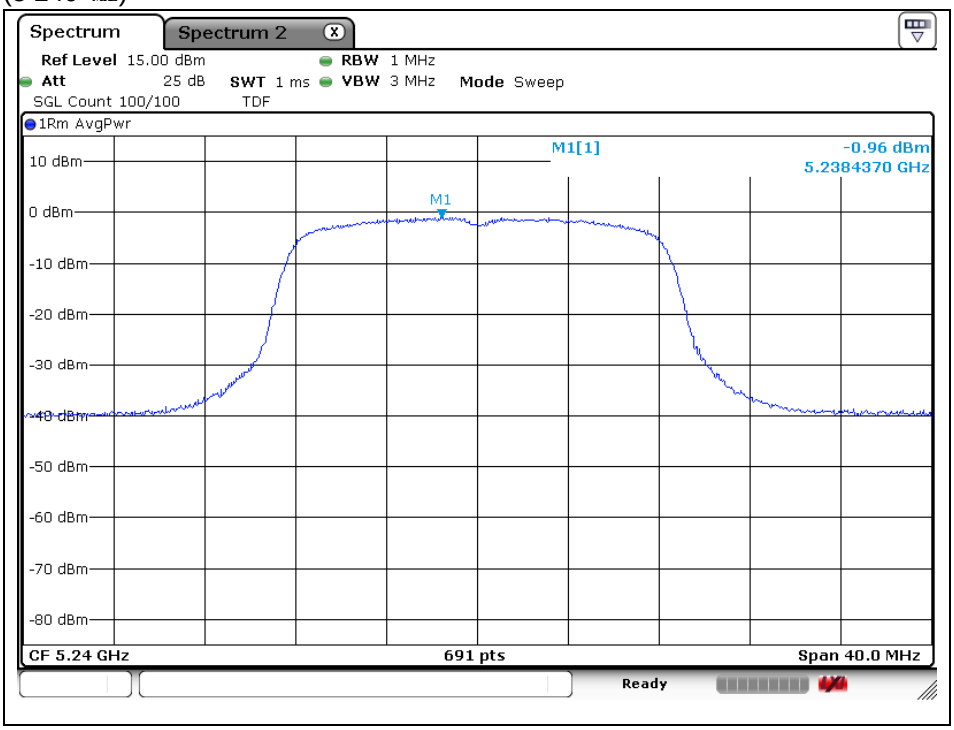
Low Channel (5 180 ㎒)



Middle Channel (5 220 ㎒)

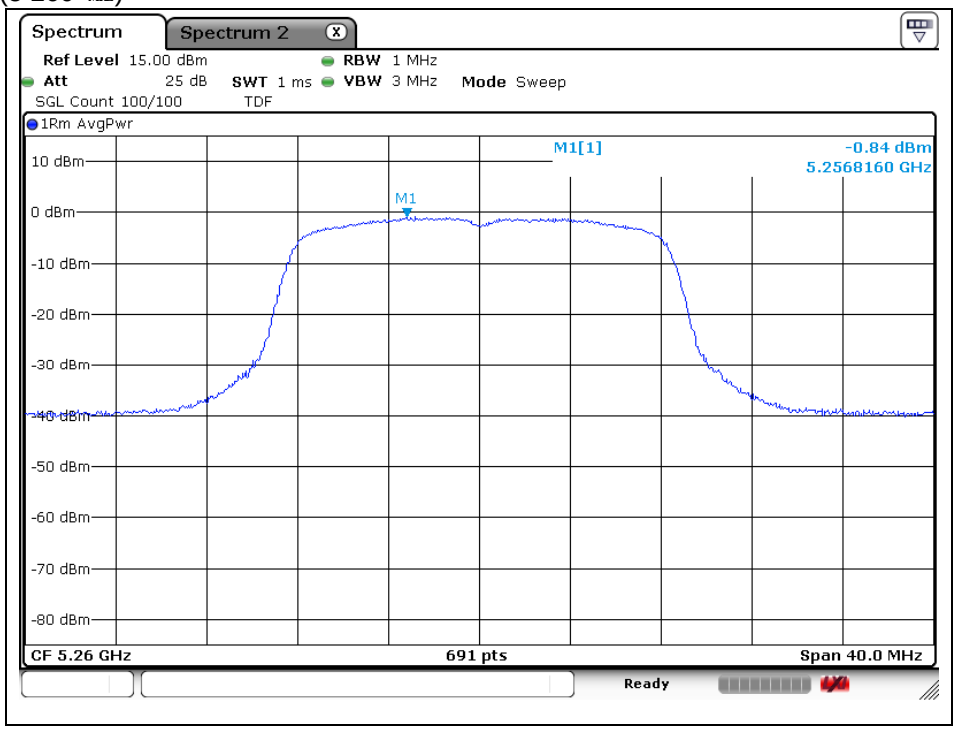


High Channel (5 240 ㎒)

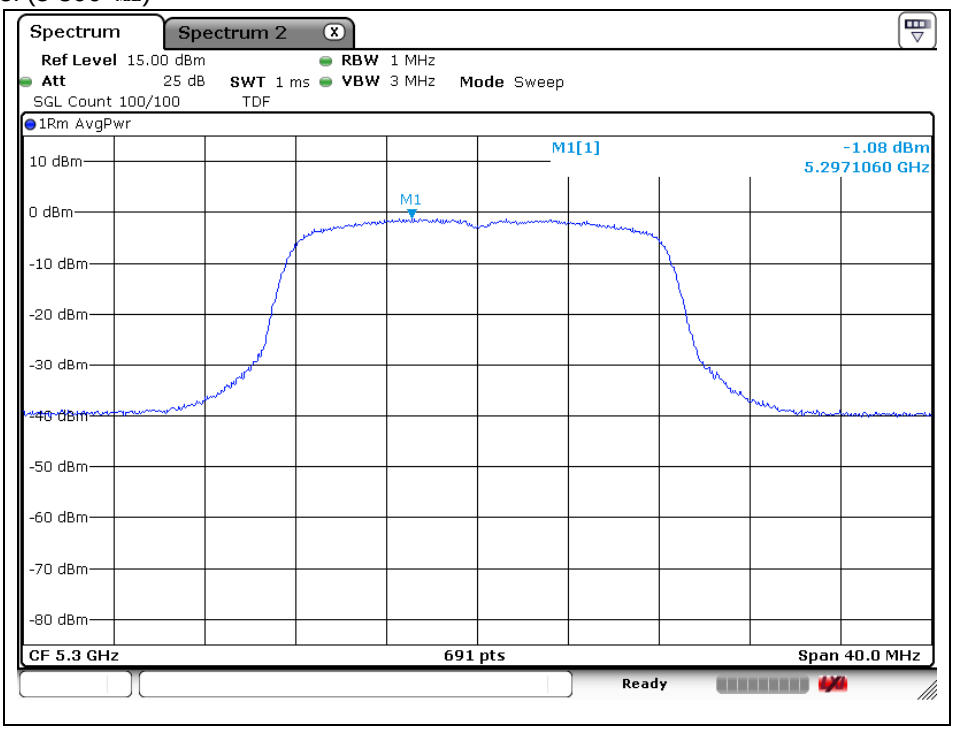


OFDM: 802.11a (Band 2A) _ANT 1

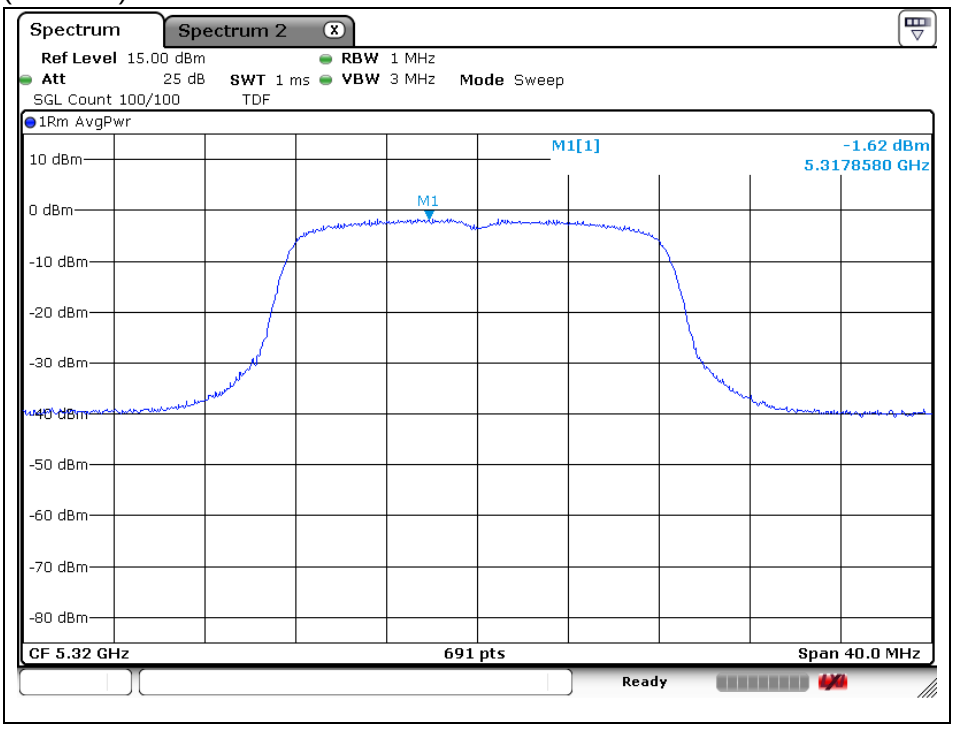
Low Channel (5 260 ㎒)



Middle Channel (5 300 ㎒)

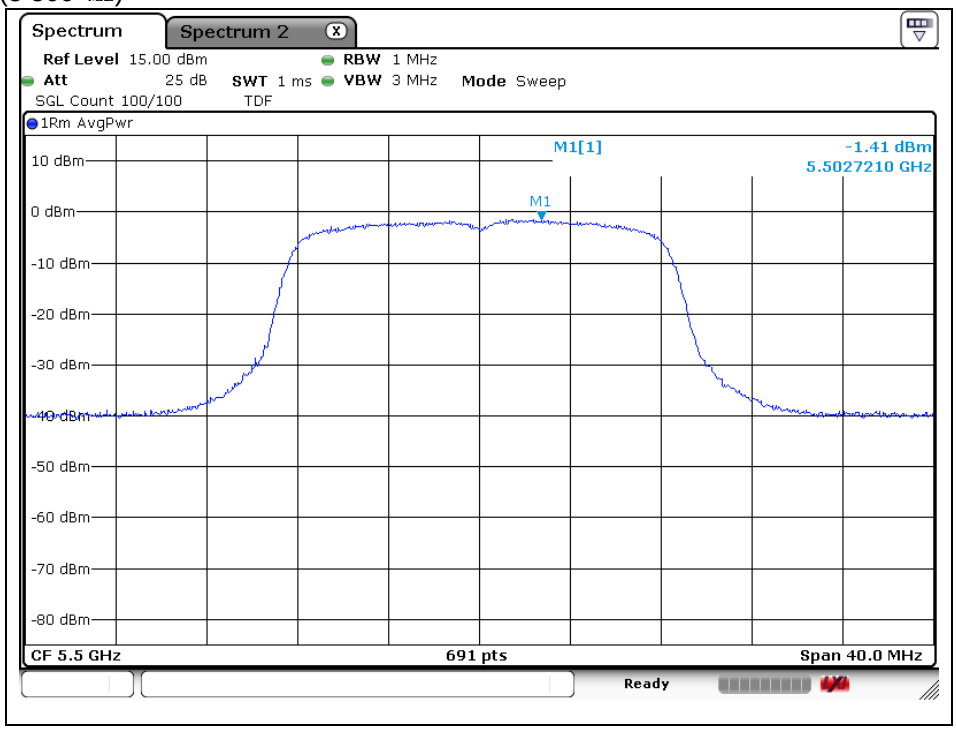


High Channel (5 320 ㎒)

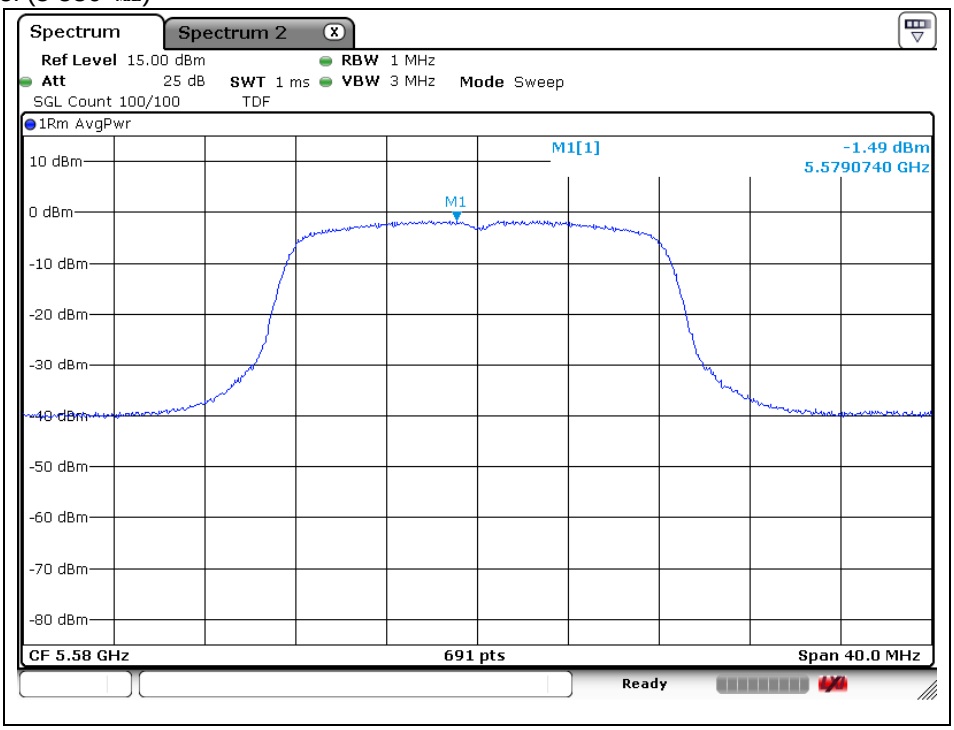


OFDM: 802.11a (Band 2C) _ANT 1

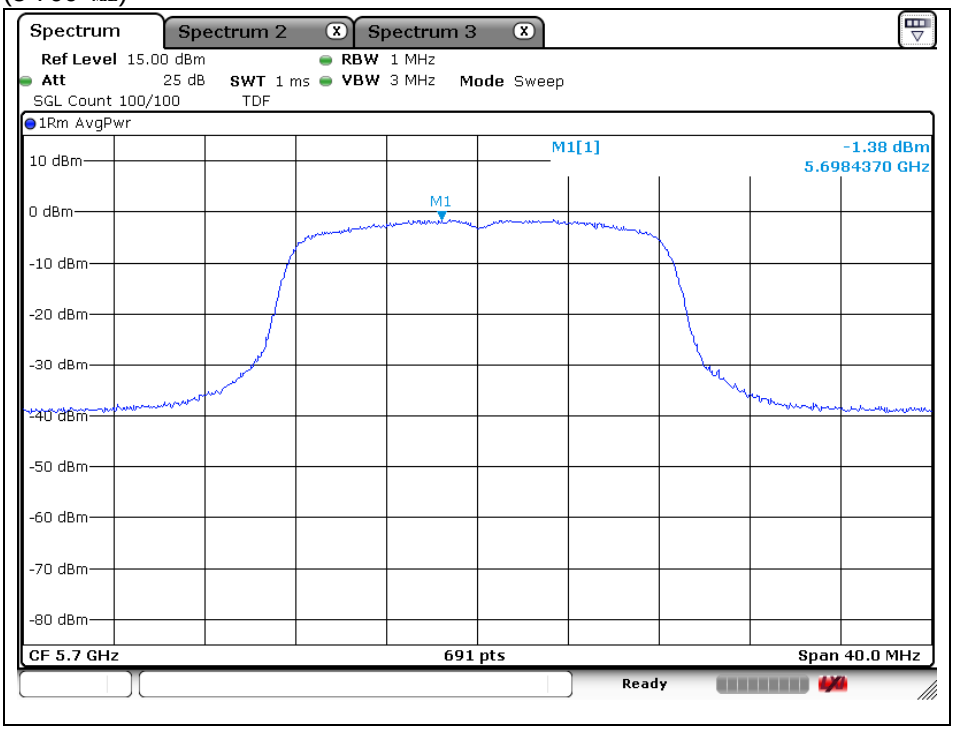
Low Channel (5 500 ㎒)



Middle Channel (5 580 ㎒)

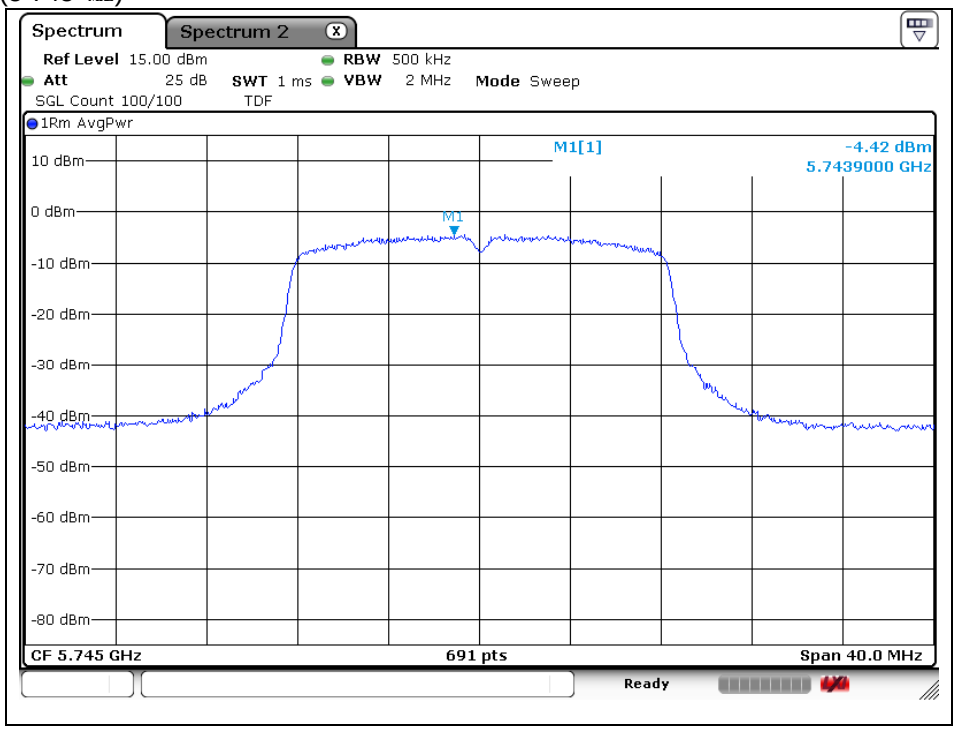


High Channel (5 700 ㎒)

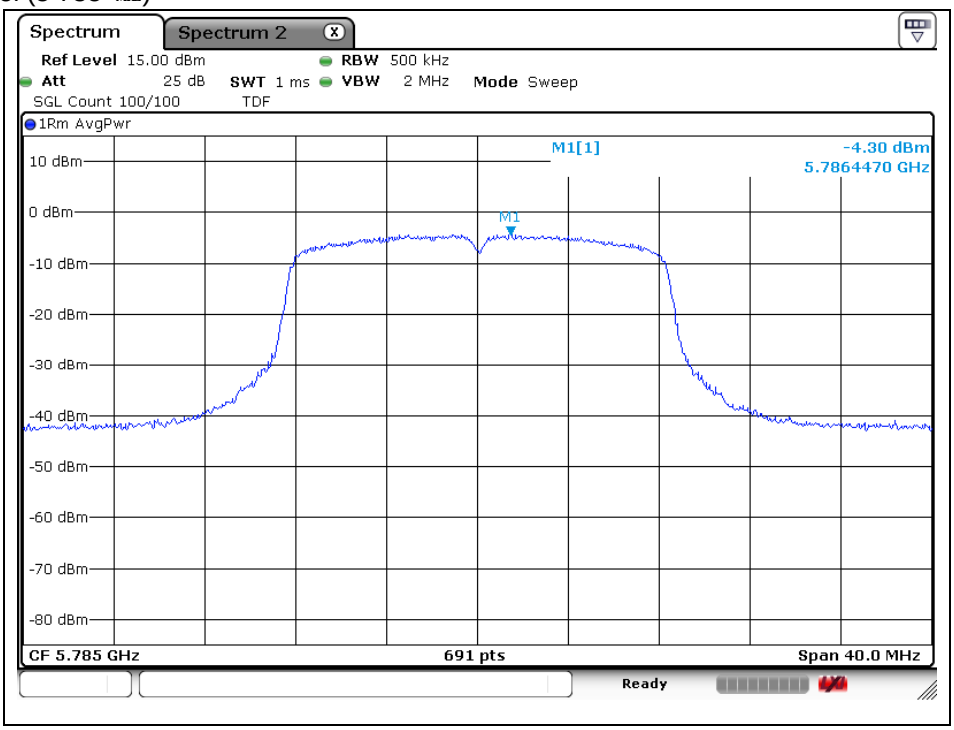


OFDM: 802.11a (Band 3) _ANT 1

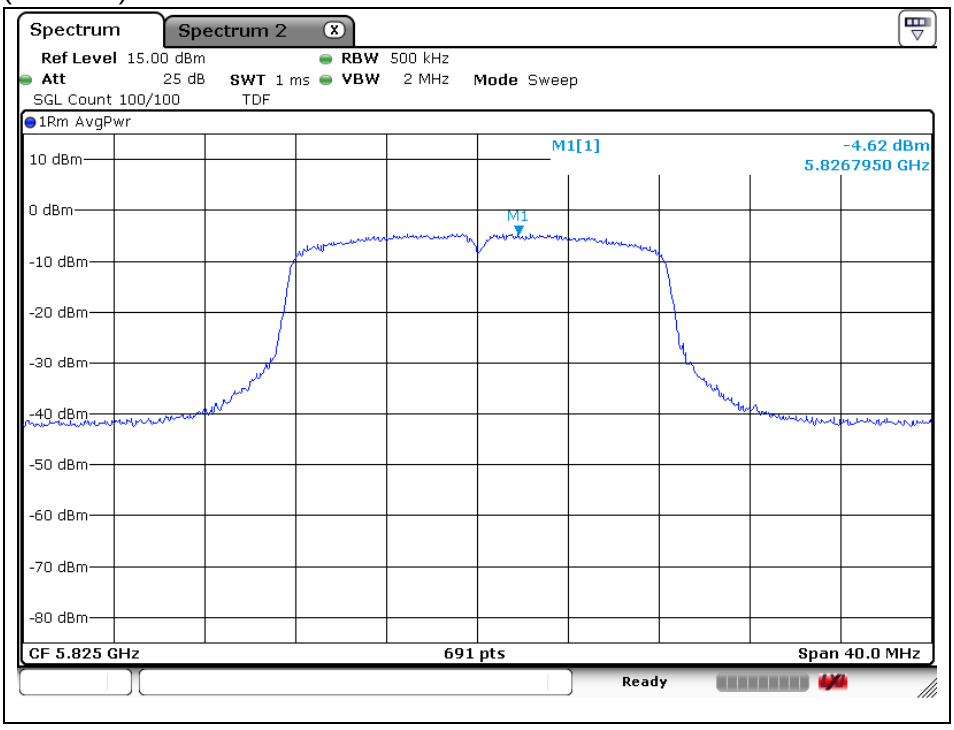
Low Channel (5 745 ㎒)



Middle Channel (5 785 ㎒)

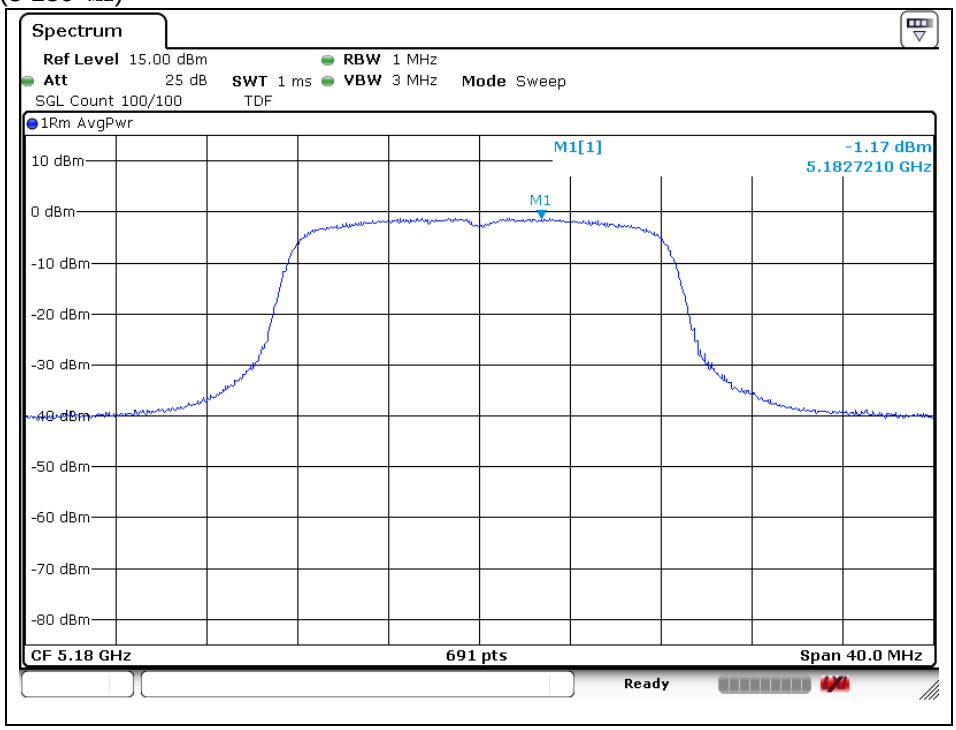


High Channel (5 825 ㎒)

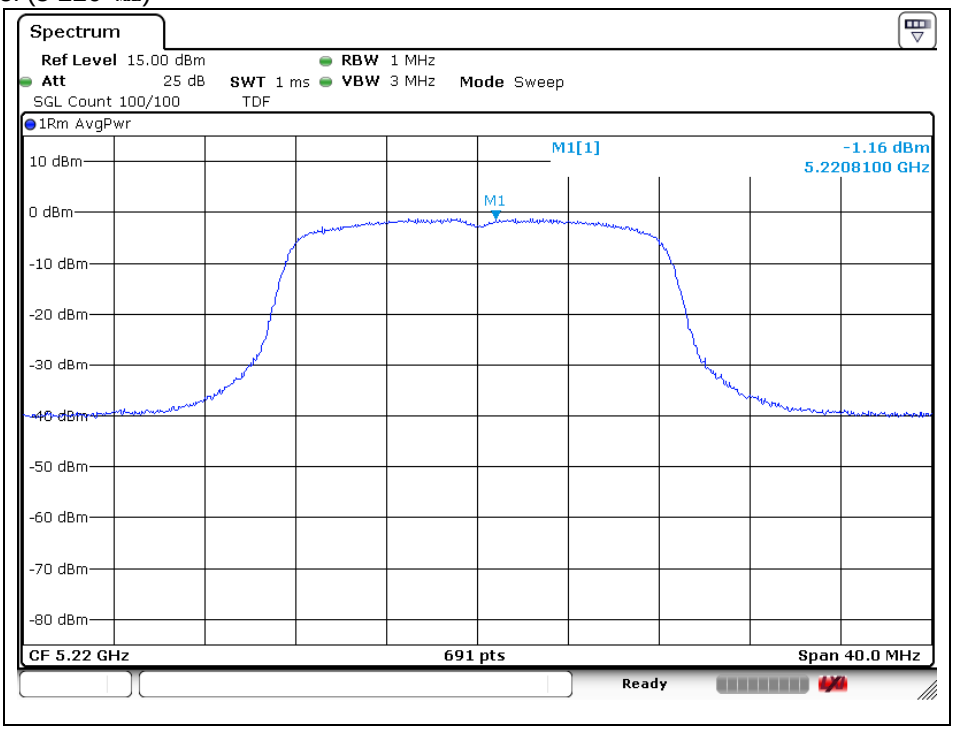


OFDM: 802.11a (Band 1) _ANT 2

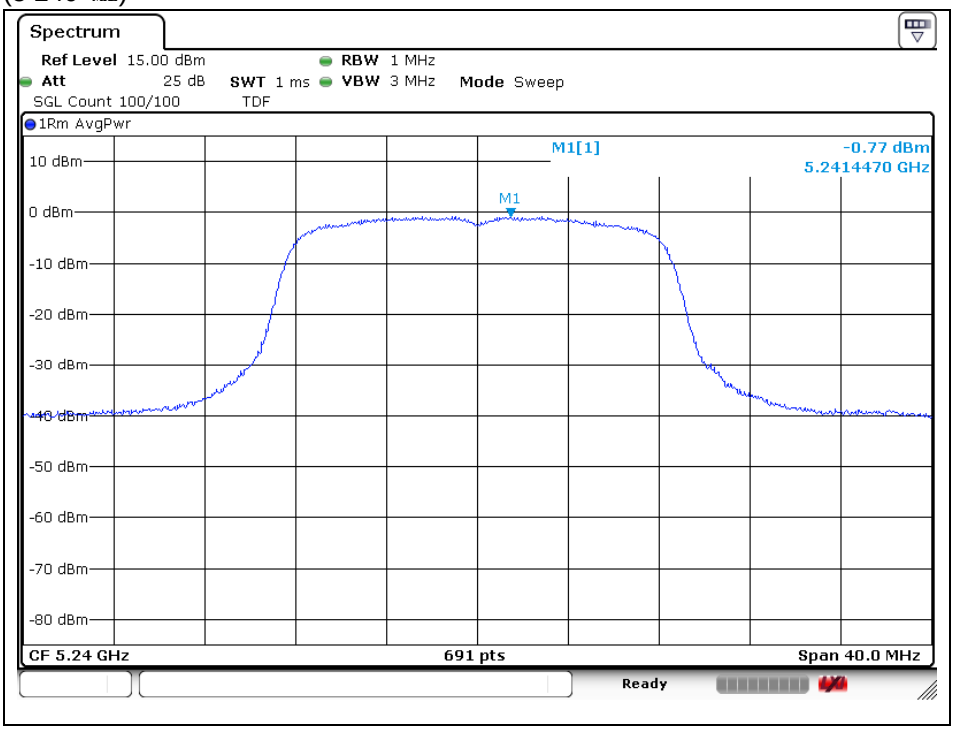
Low Channel (5 180 ㎒)



Middle Channel (5 220 ㎒)

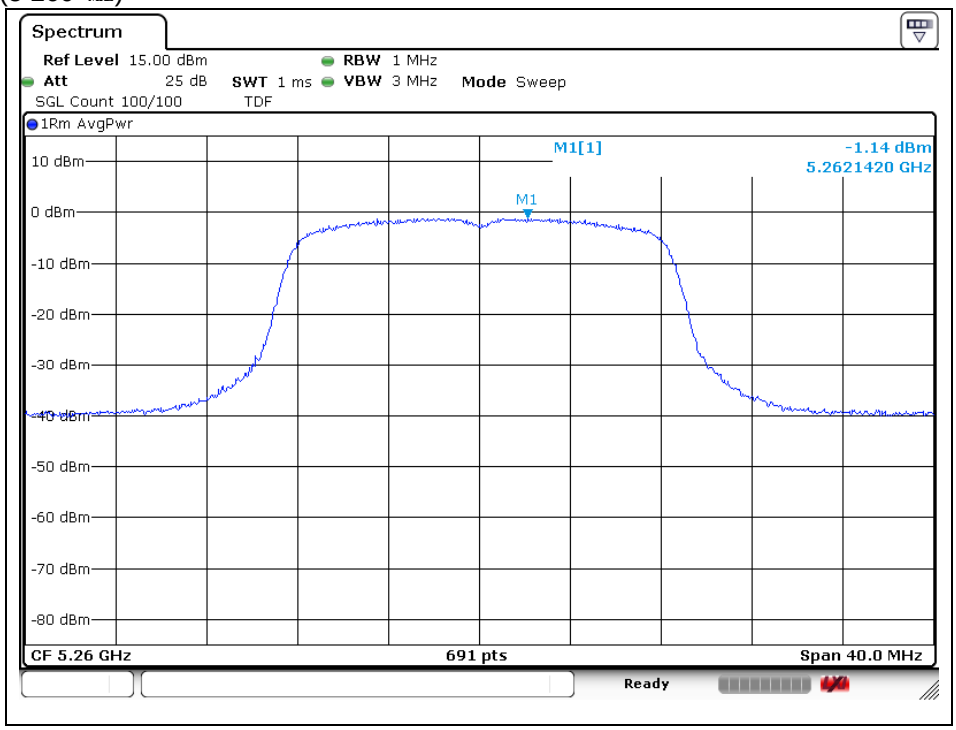


High Channel (5 240 ㎒)

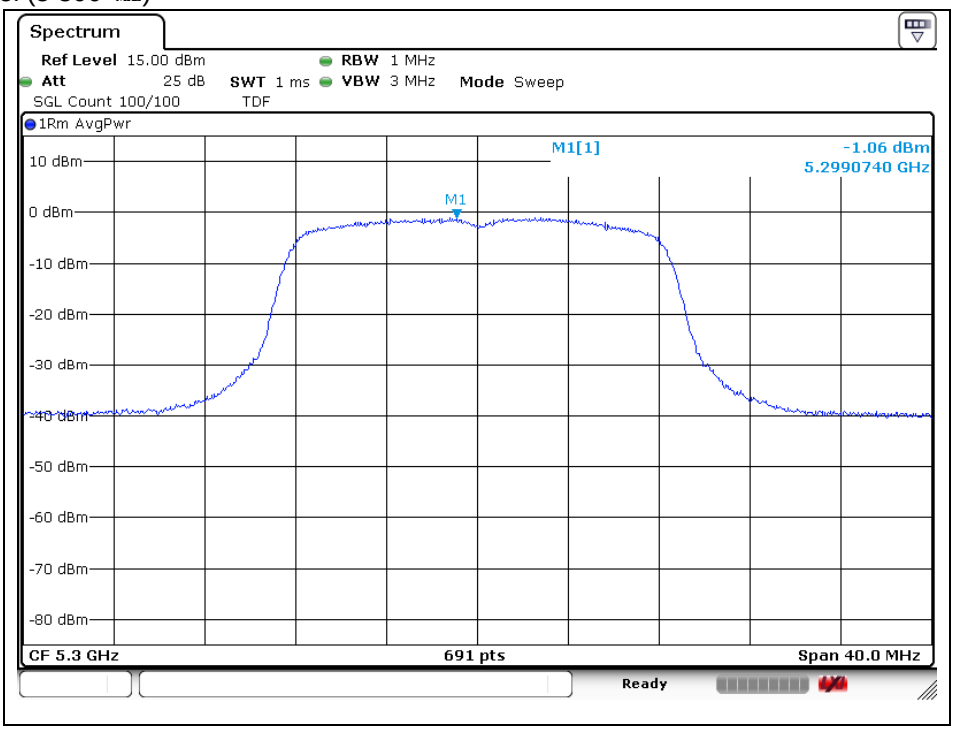


OFDM: 802.11a (Band 2A) _ANT 2

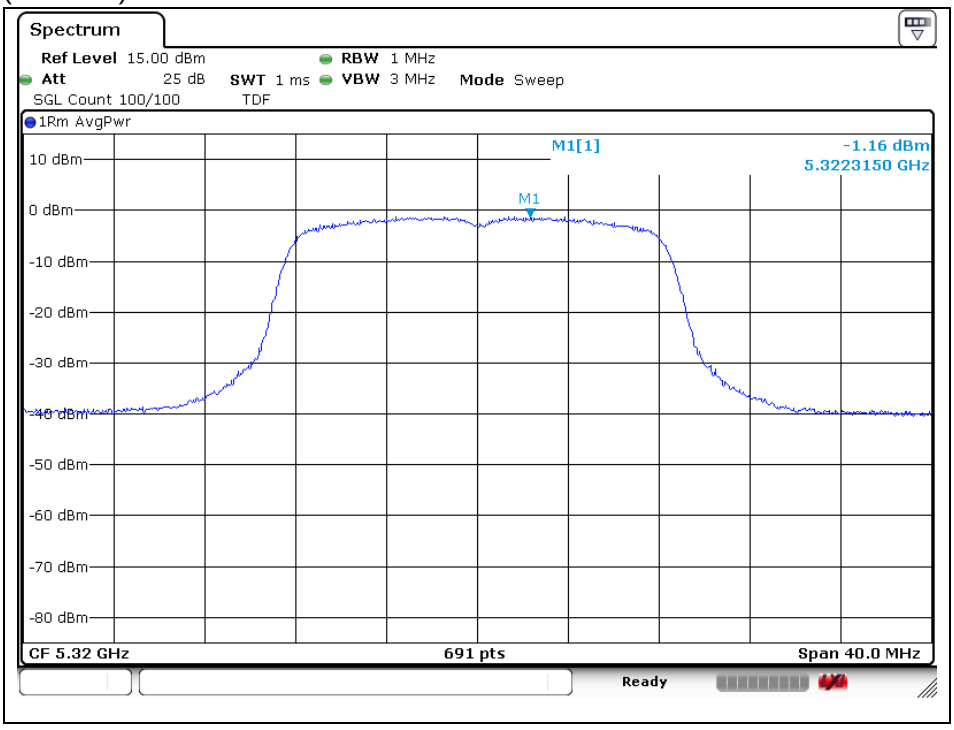
Low Channel (5 260 ㎒)



Middle Channel (5 300 ㎒)

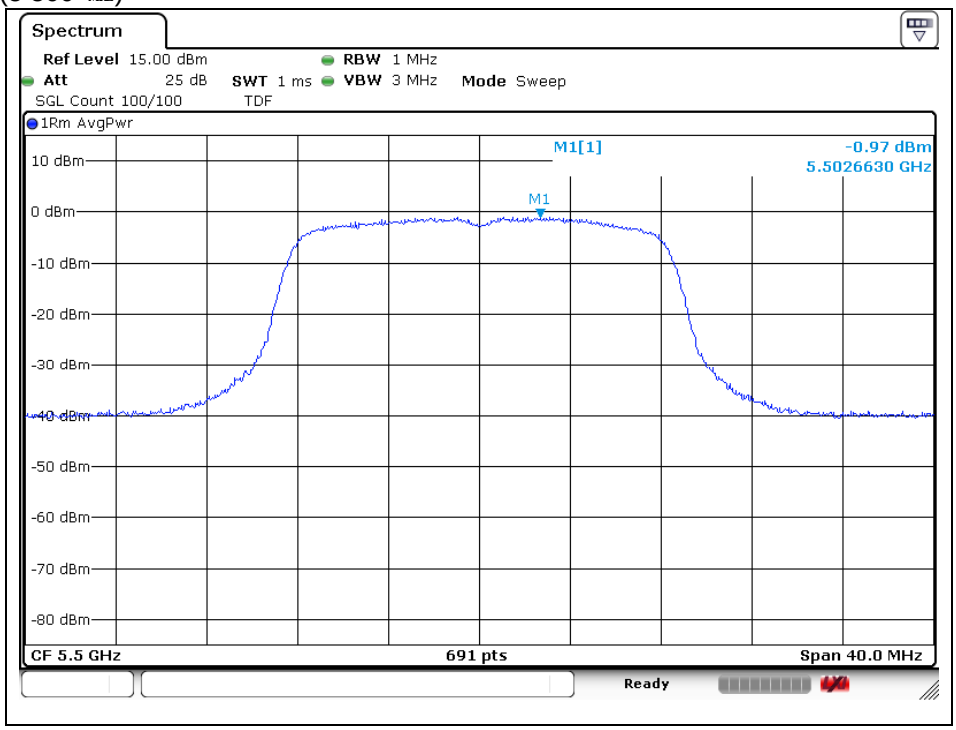


High Channel (5 320 ㎒)

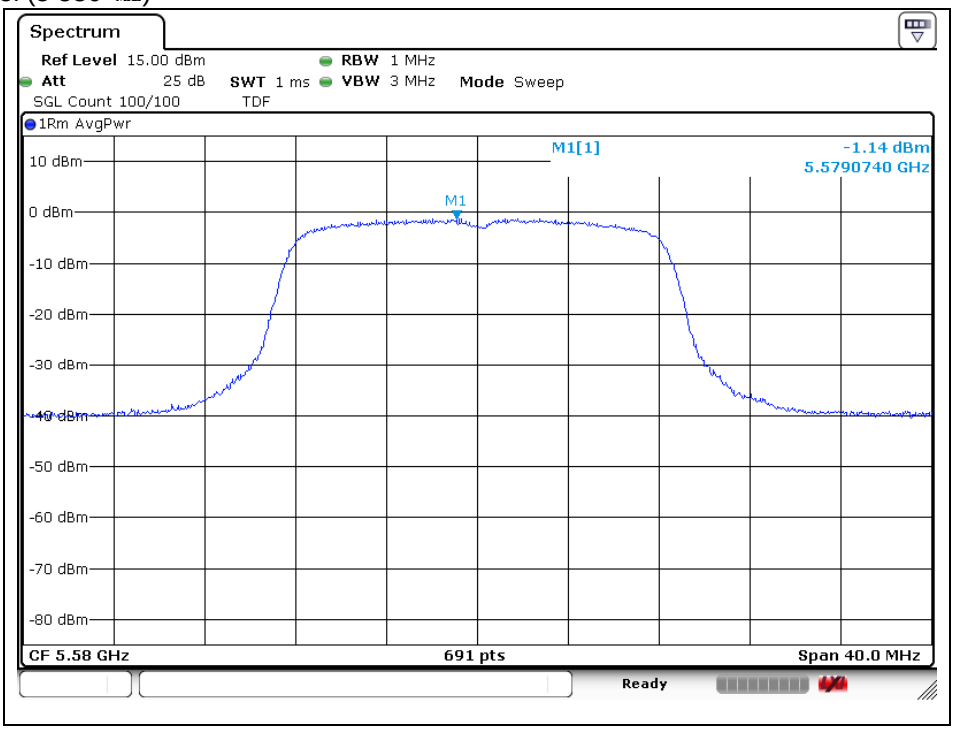


OFDM: 802.11a (Band 2C) _ANT 2

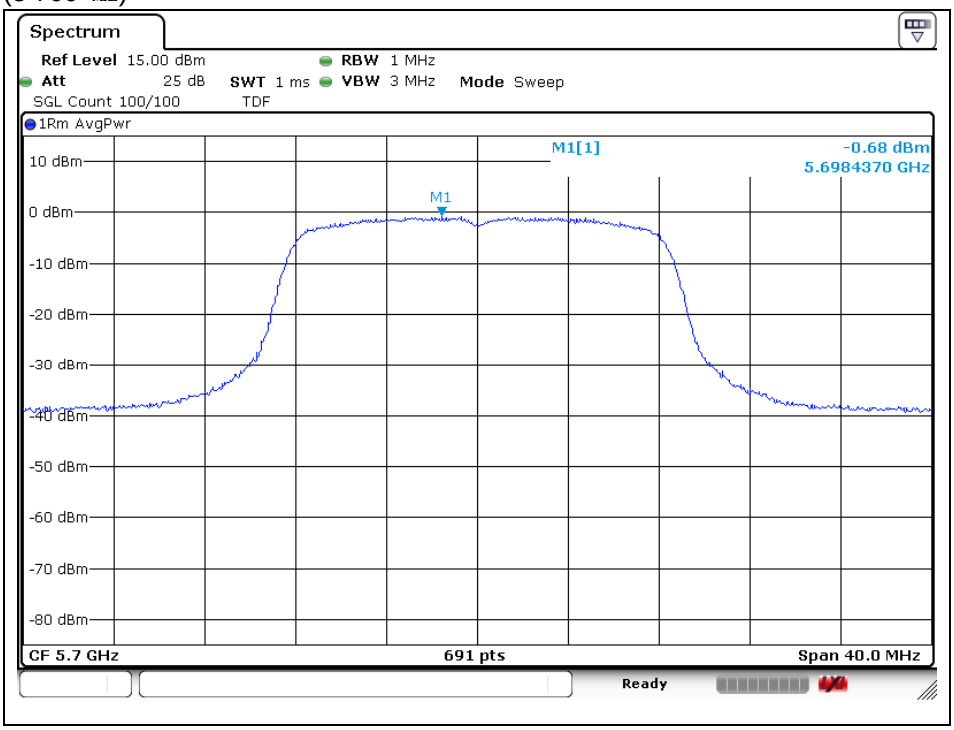
Low Channel (5 500 ㎒)



Middle Channel (5 580 ㎒)

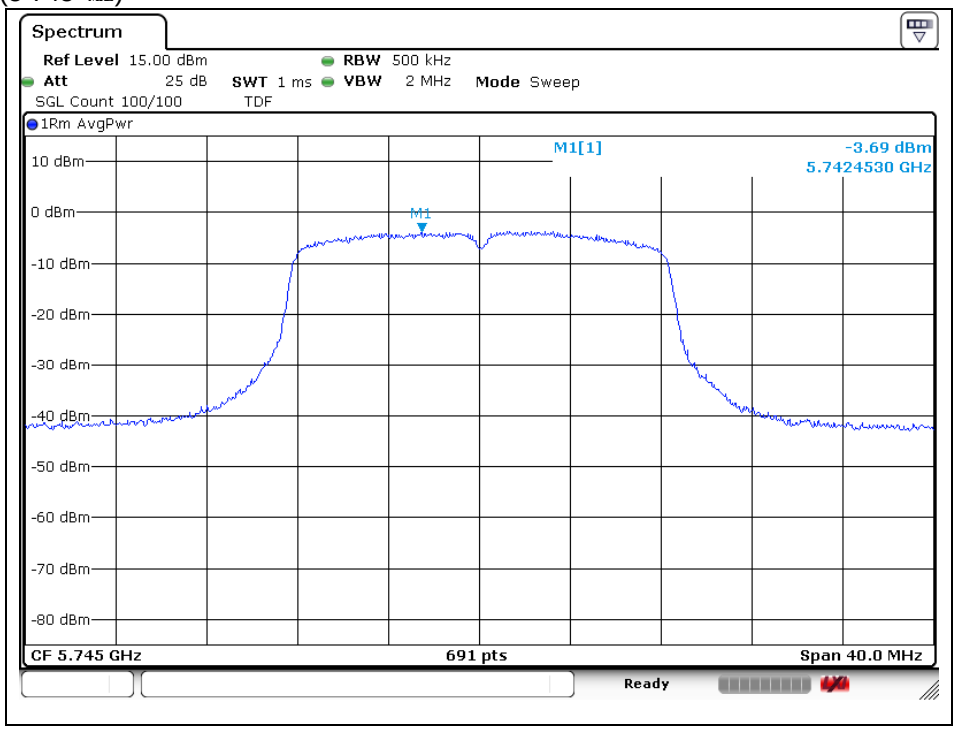


High Channel (5 700 ㎒)

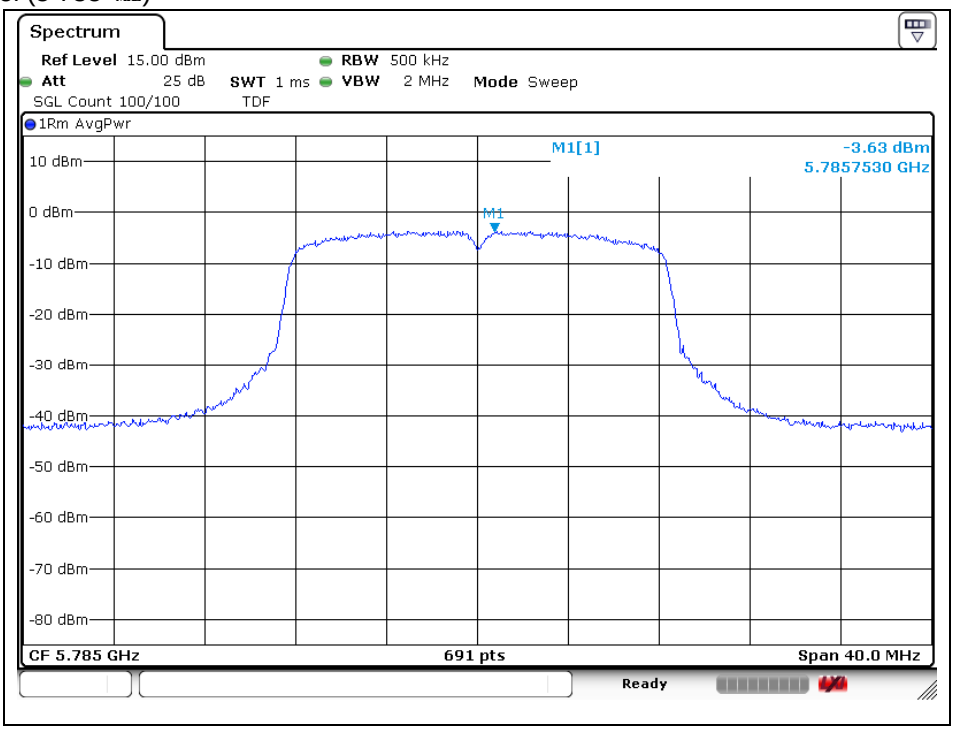


OFDM: 802.11a (Band 3) _ANT 2

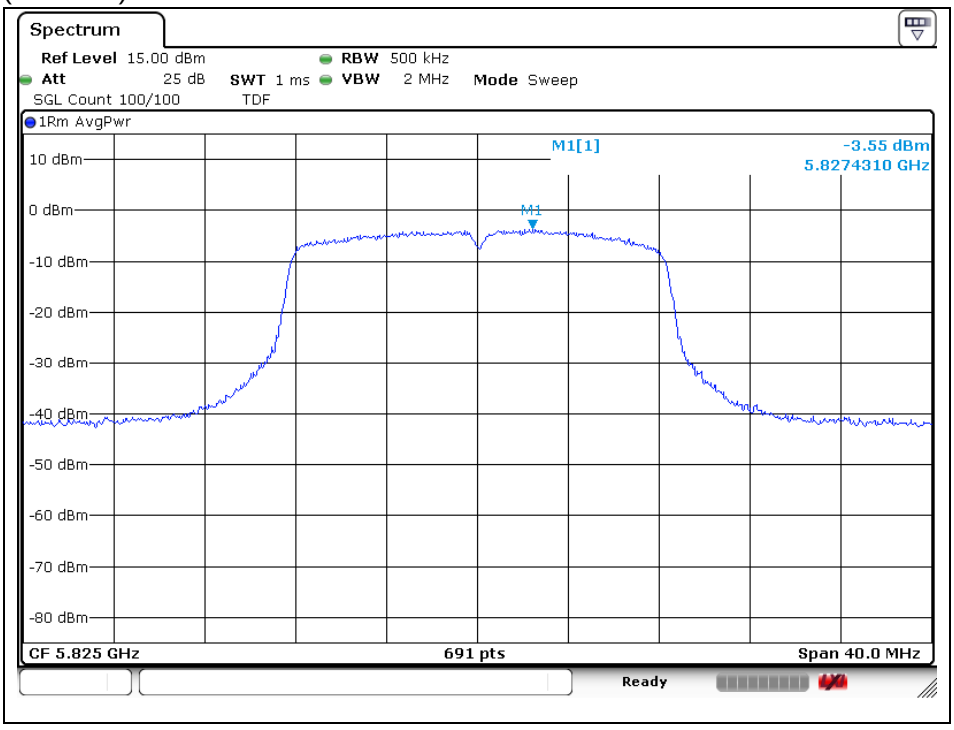
Low Channel (5 745 ㎒)



Middle Channel (5 785 ㎒)

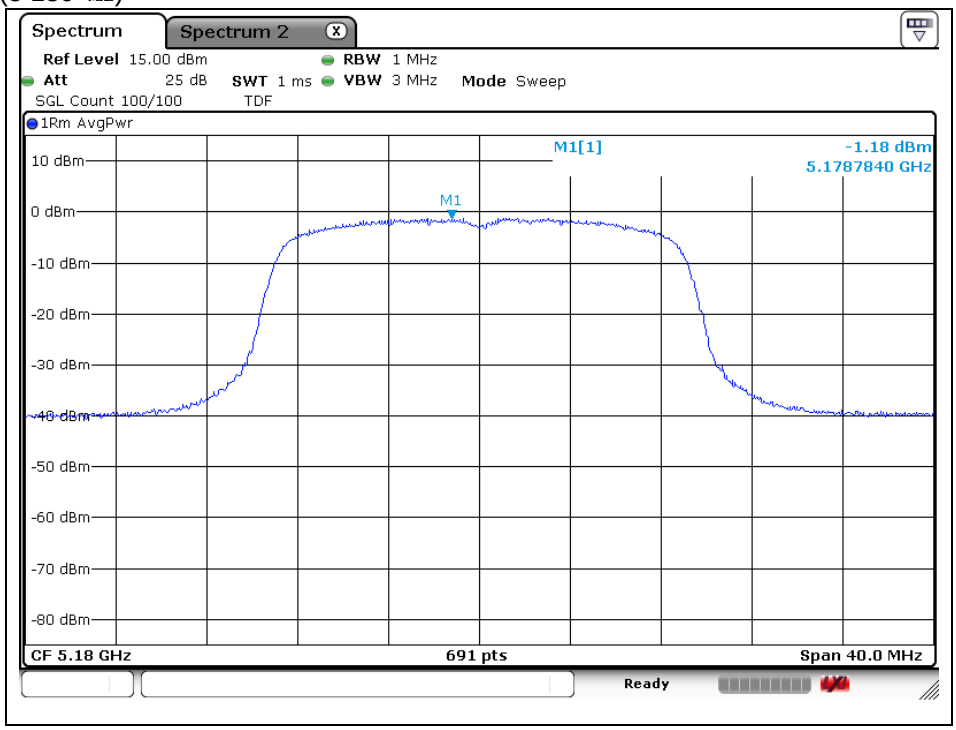


High Channel (5 825 ㎒)

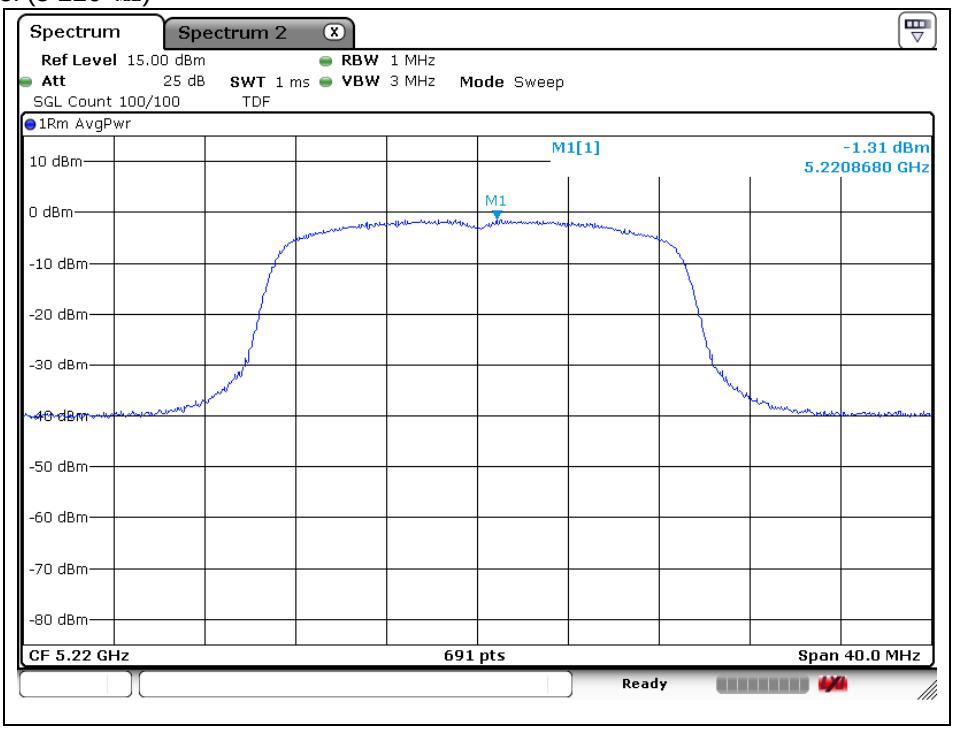


OFDM: 802.11n_HT20 (Band 1)_ANT 1

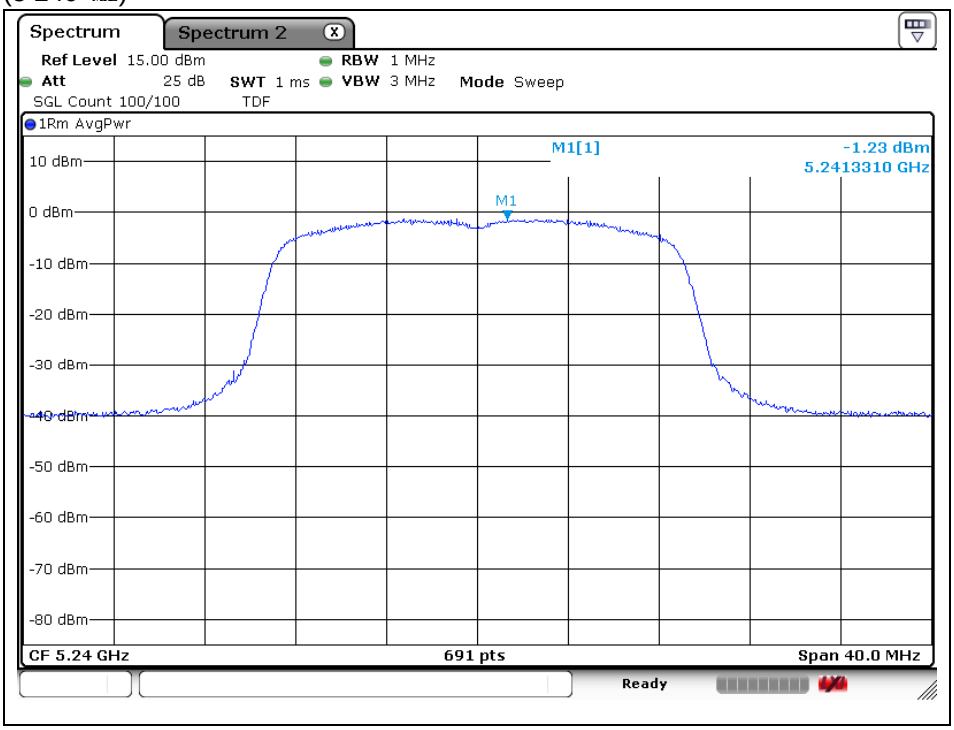
Low Channel (5 180 ㎒)



Middle Channel (5 220 ㎒)

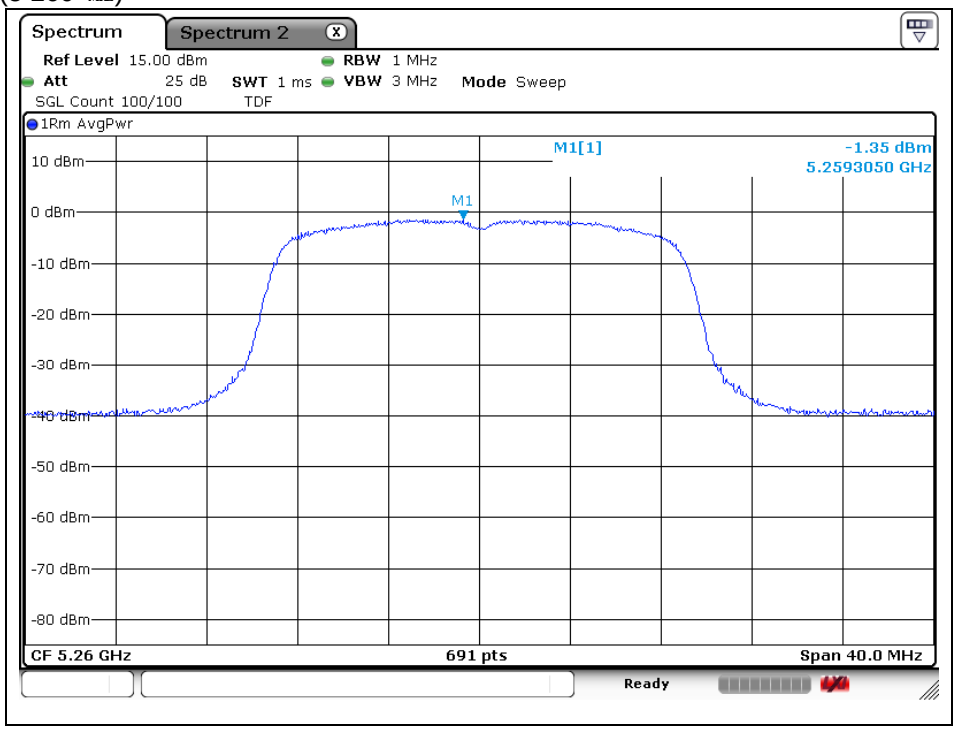


High Channel (5 240 ㎒)

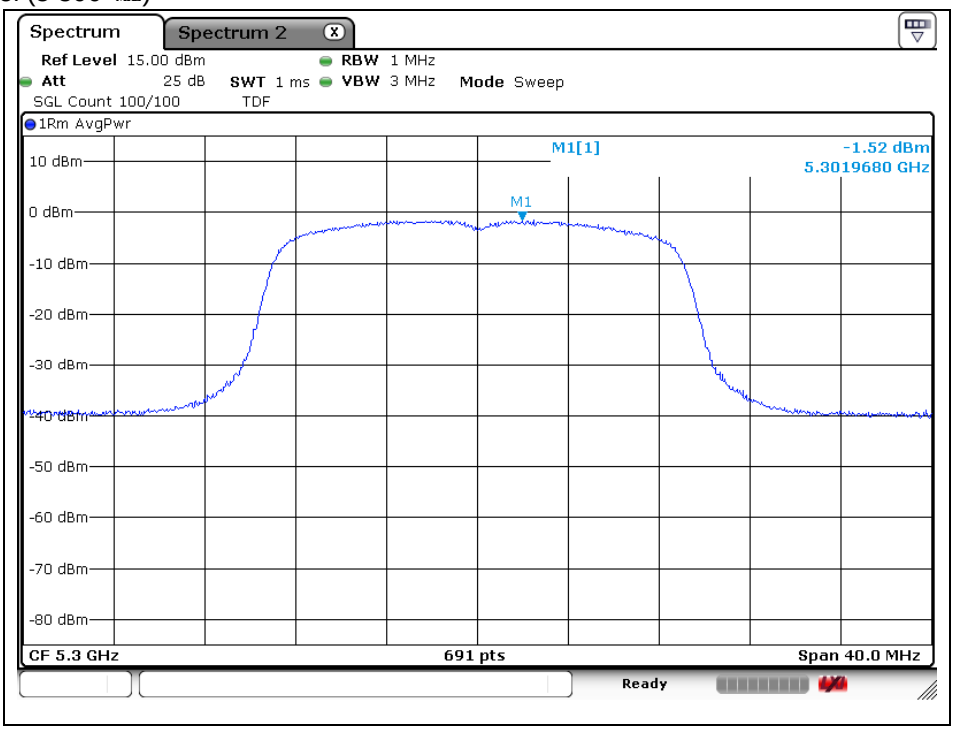


OFDM: 802.11n_HT20 (Band 2A)_ANT 1

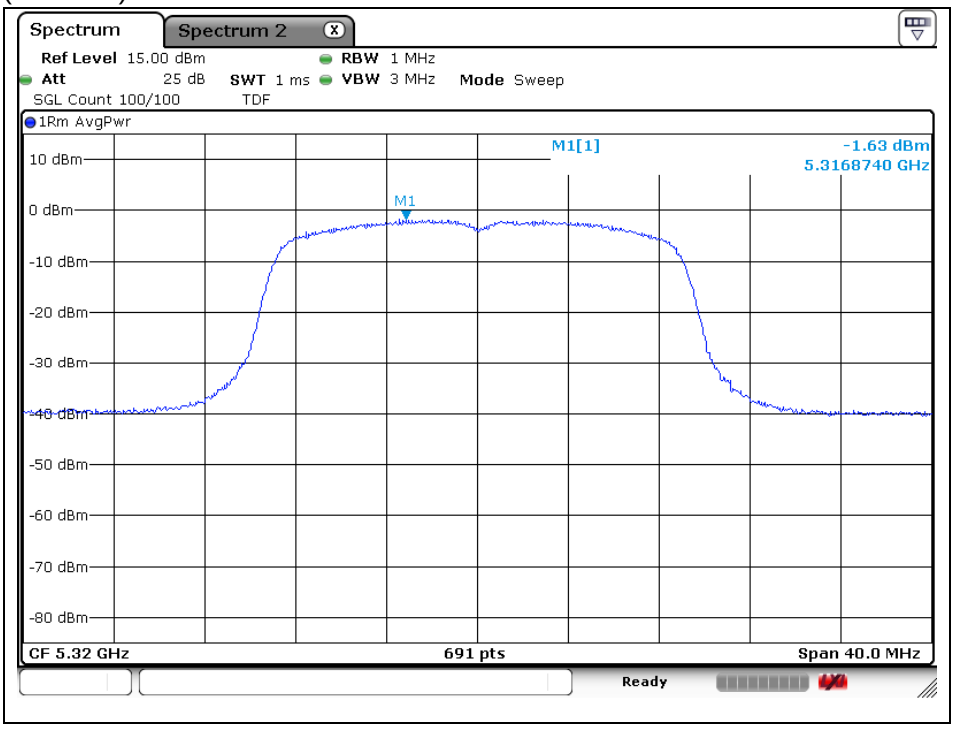
Low Channel (5 260 ㎒)



Middle Channel (5 300 ㎒)

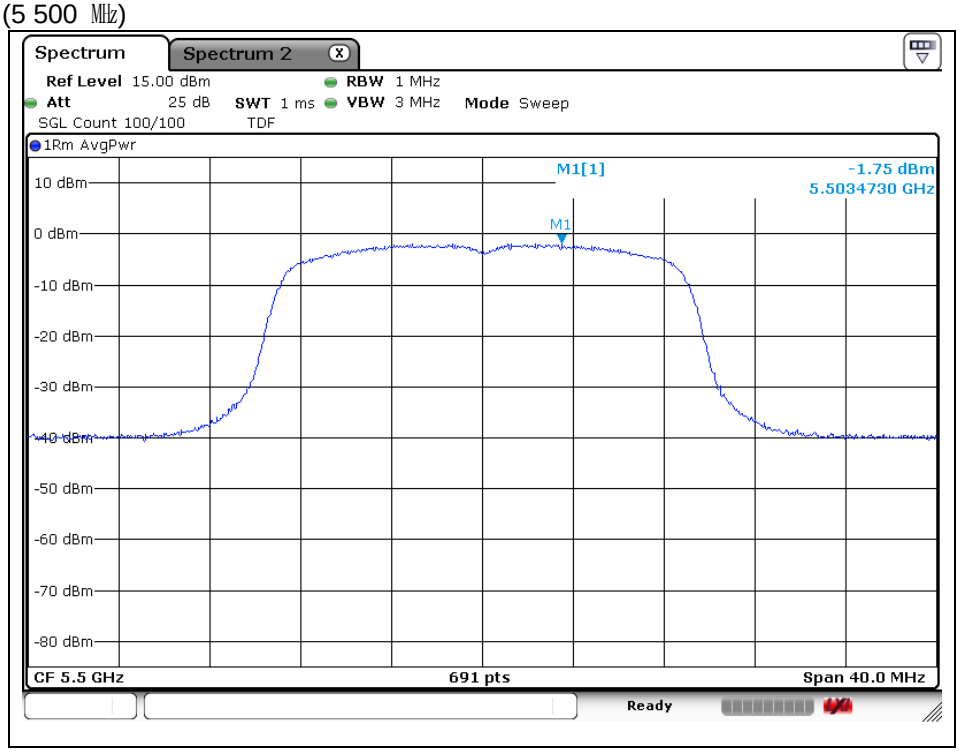


High Channel (5 320 ㎒)

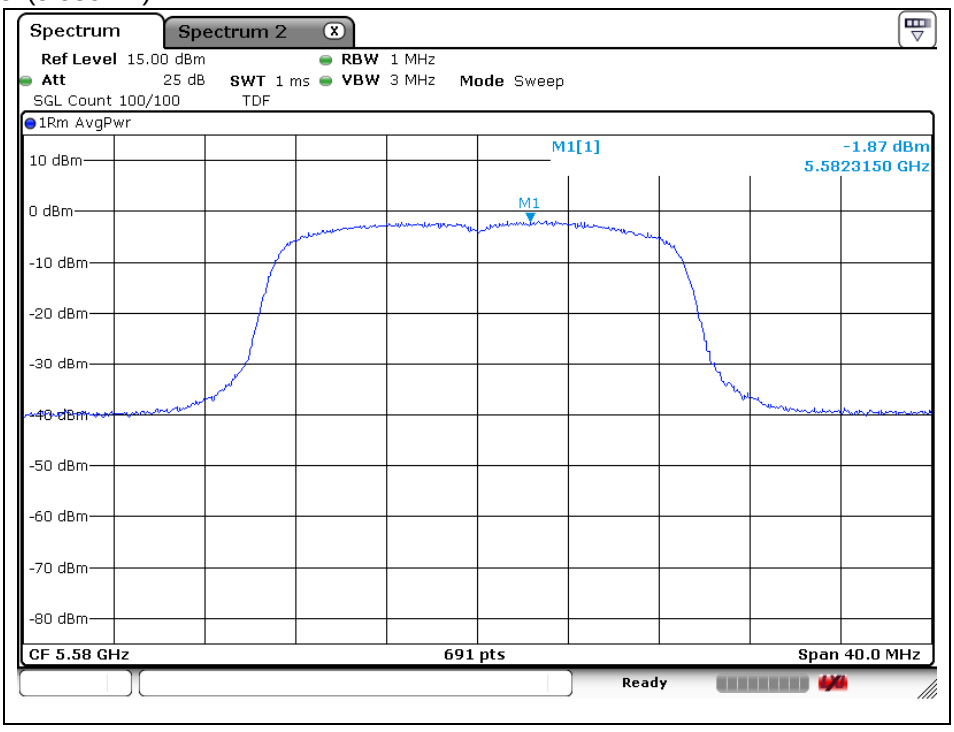


OFDM: 802.11n_HT20 (Band 2C)_ANT 1

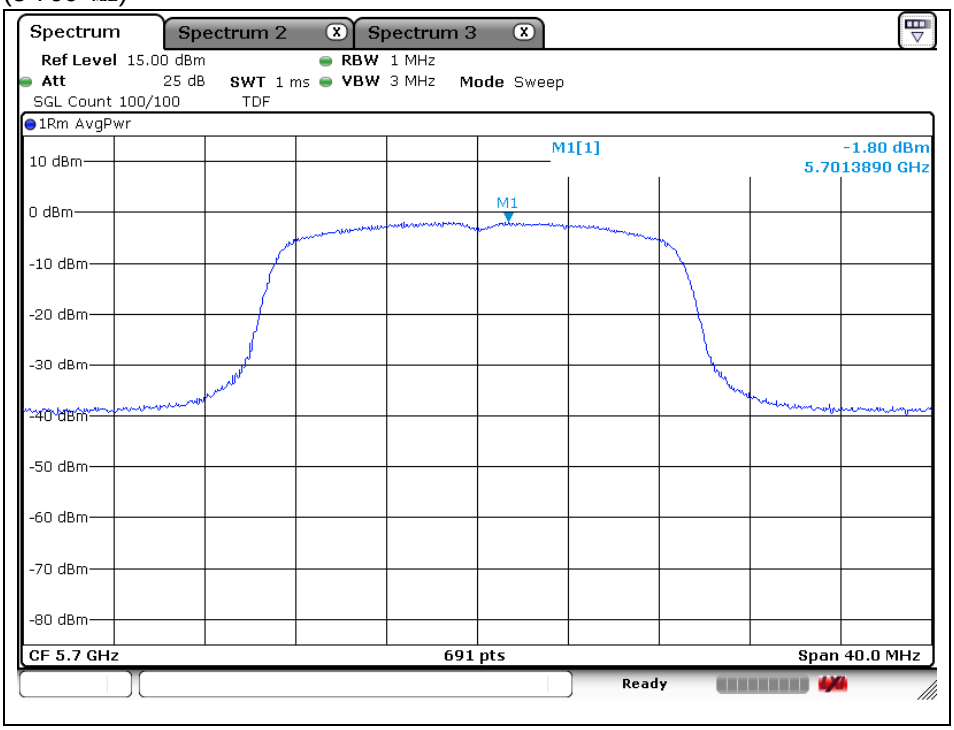
Low Channel (5 500 ㎒)



Middle Channel (5 580 ㎒)

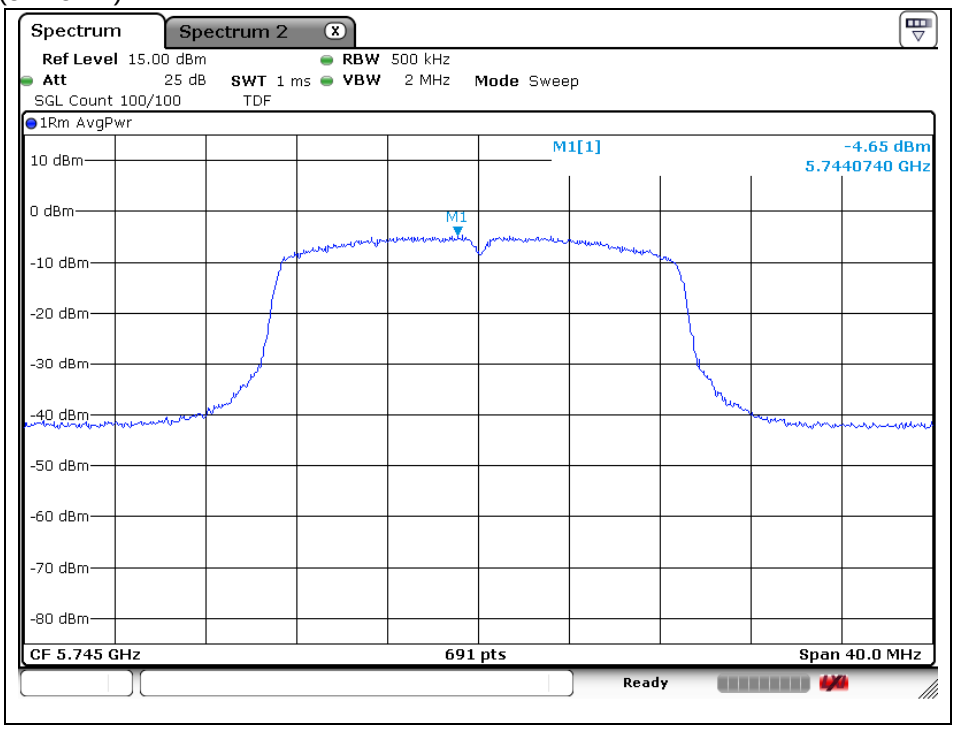


High Channel (5 700 ㎒)

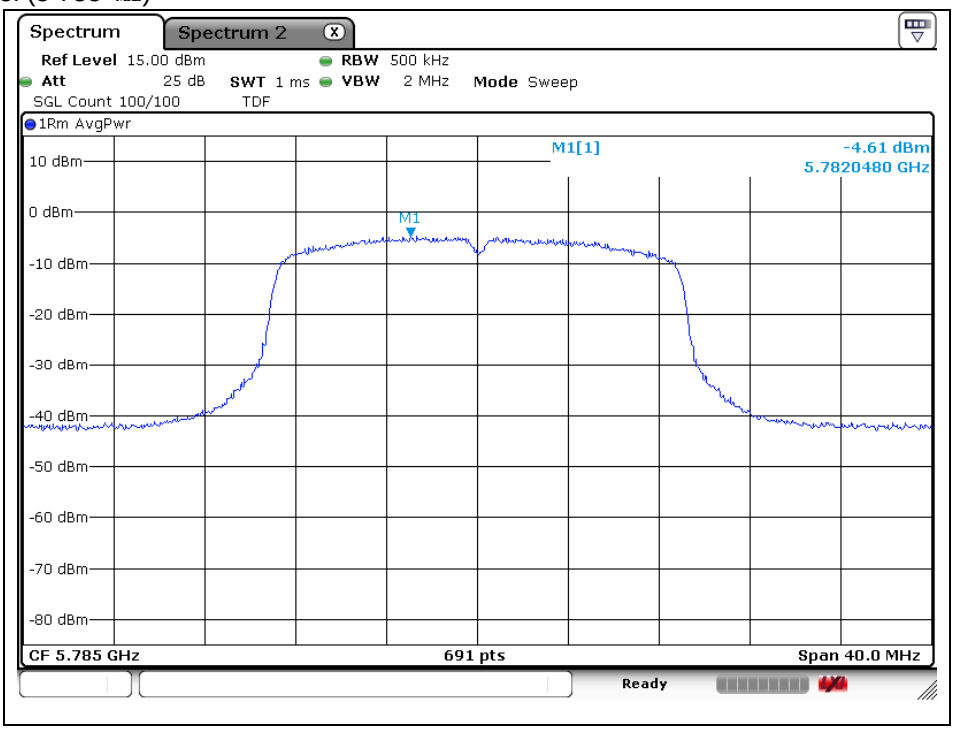


OFDM: 802.11n_HT20 (Band 3)_ANT 1

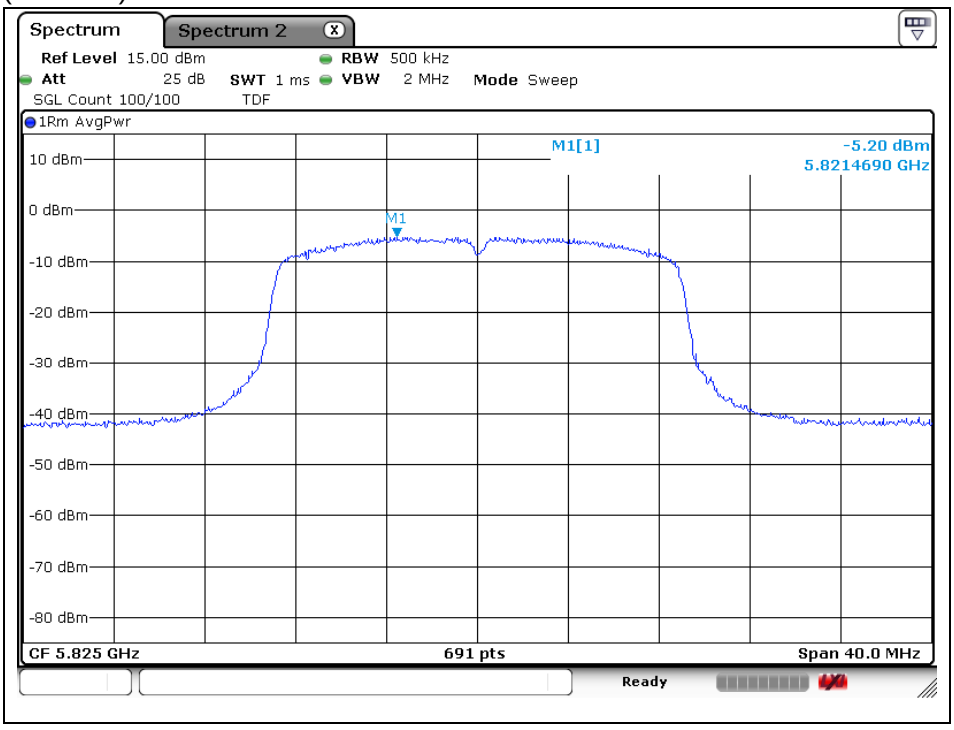
Low Channel (5 745 ㎒)



Middle Channel (5 785 ㎒)

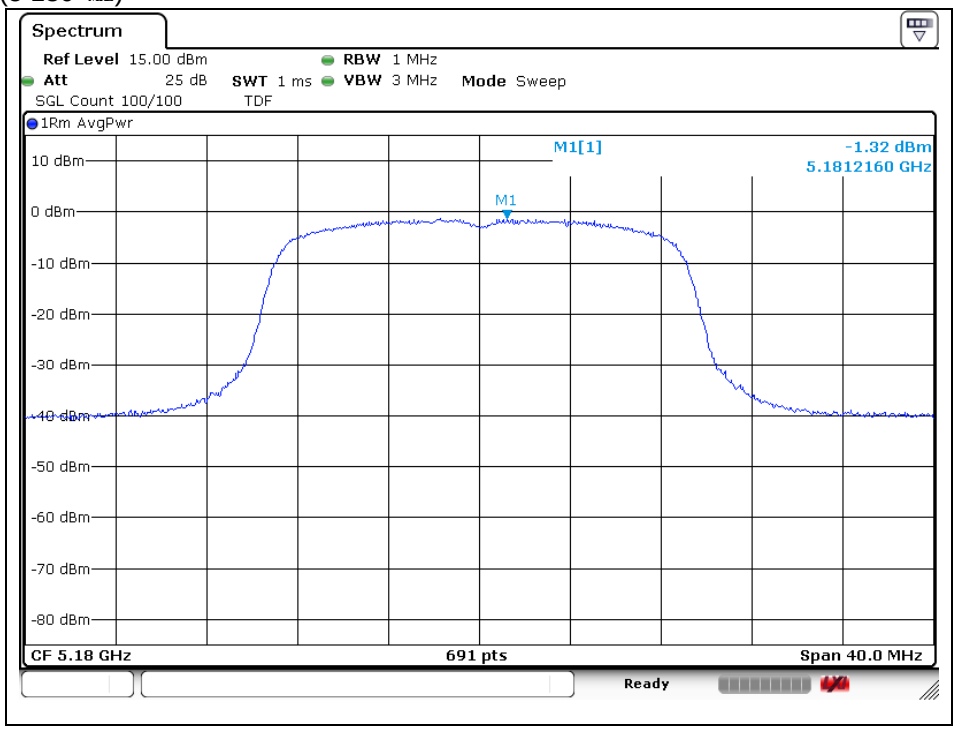


High Channel (5 825 ㎒)

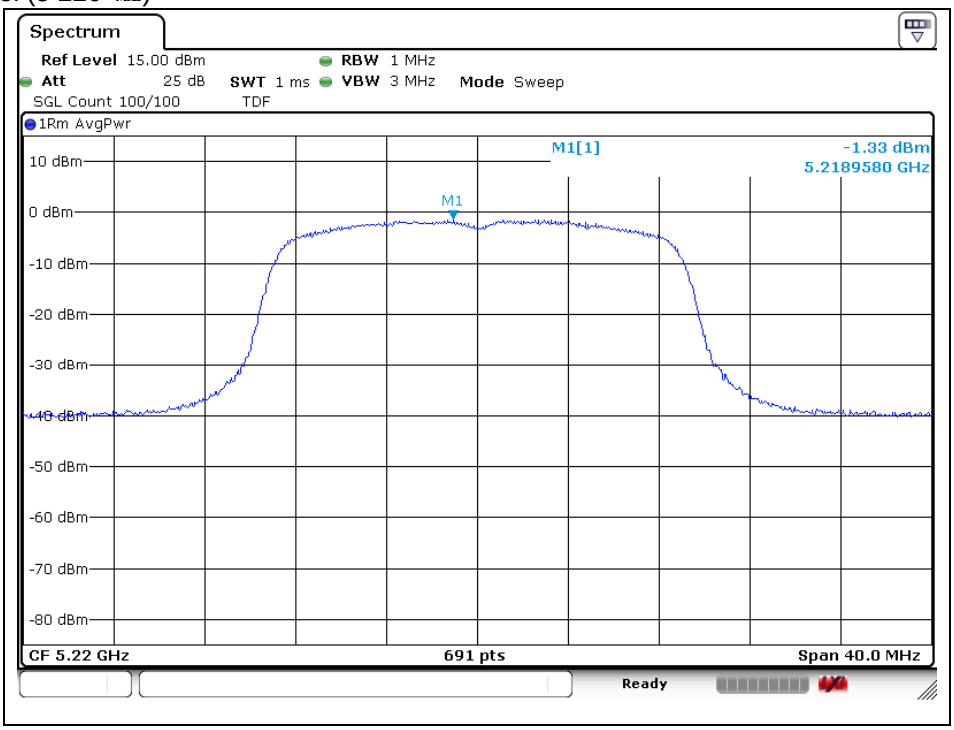


OFDM: 802.11n_HT20 (Band 1)_ANT 2

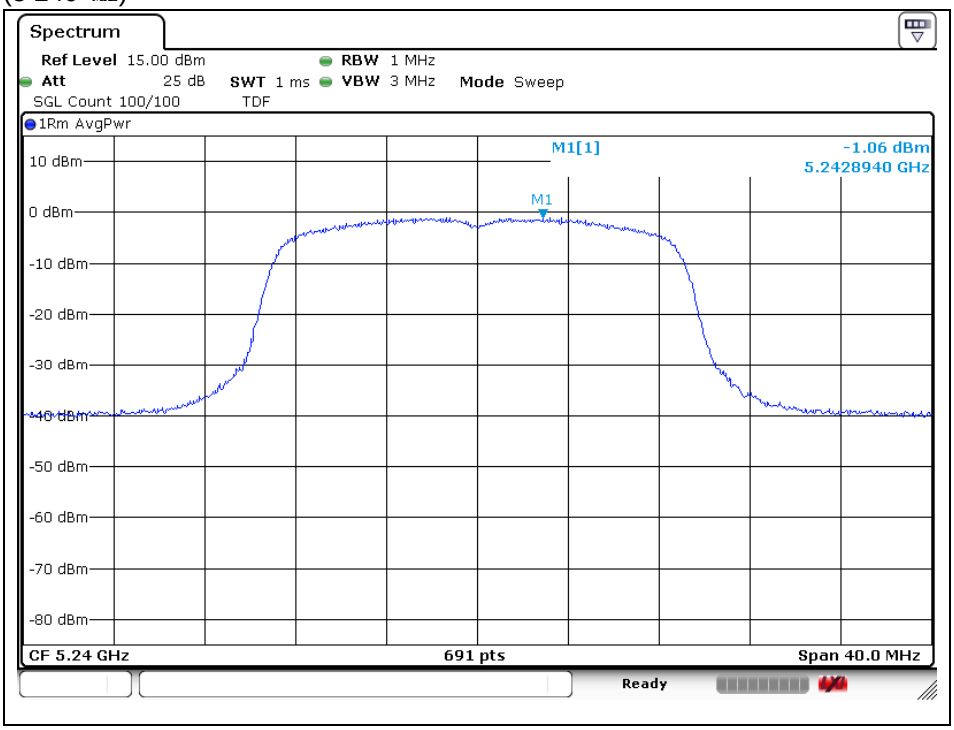
Low Channel (5 180 ㎒)



Middle Channel (5 220 ㎒)

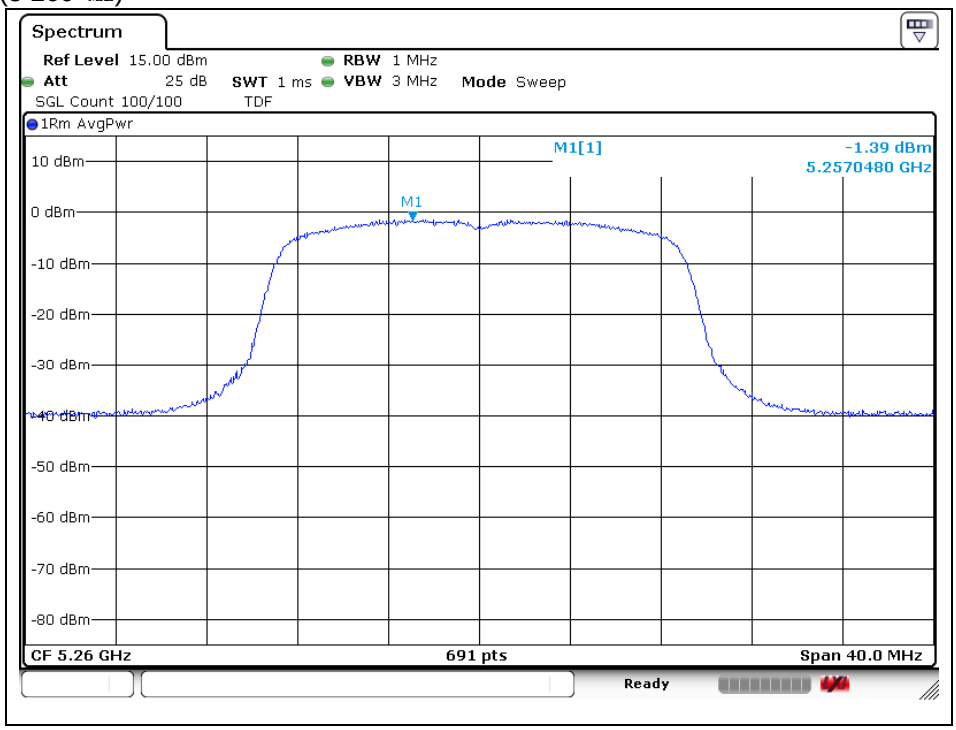


High Channel (5 240 ㎒)

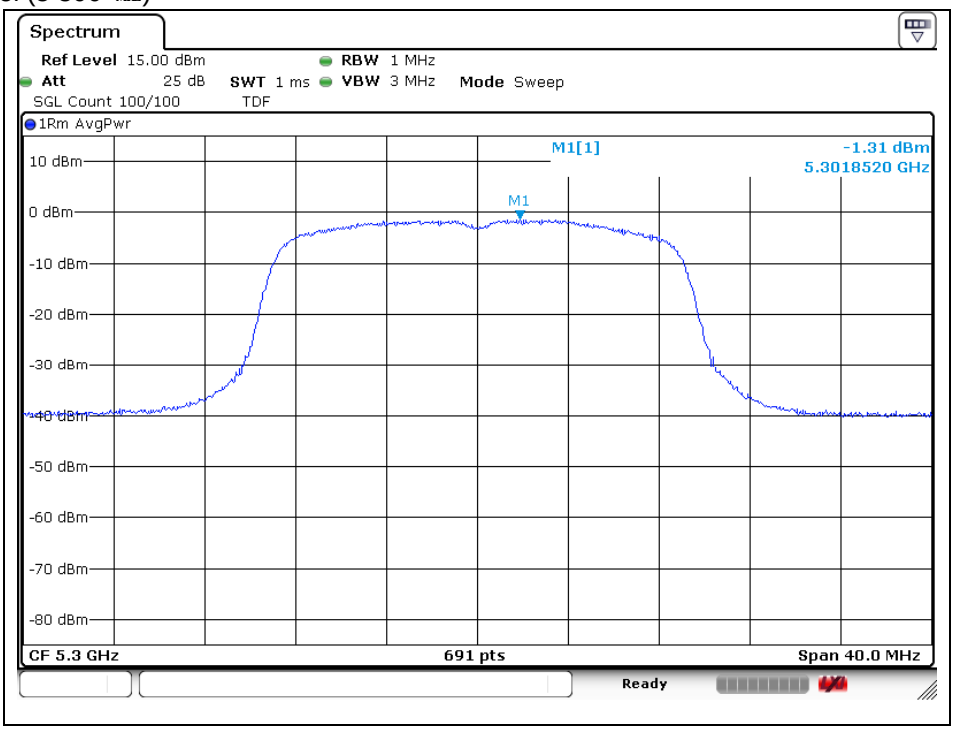


OFDM: 802.11n_HT20 (Band 2A)_ANT 2

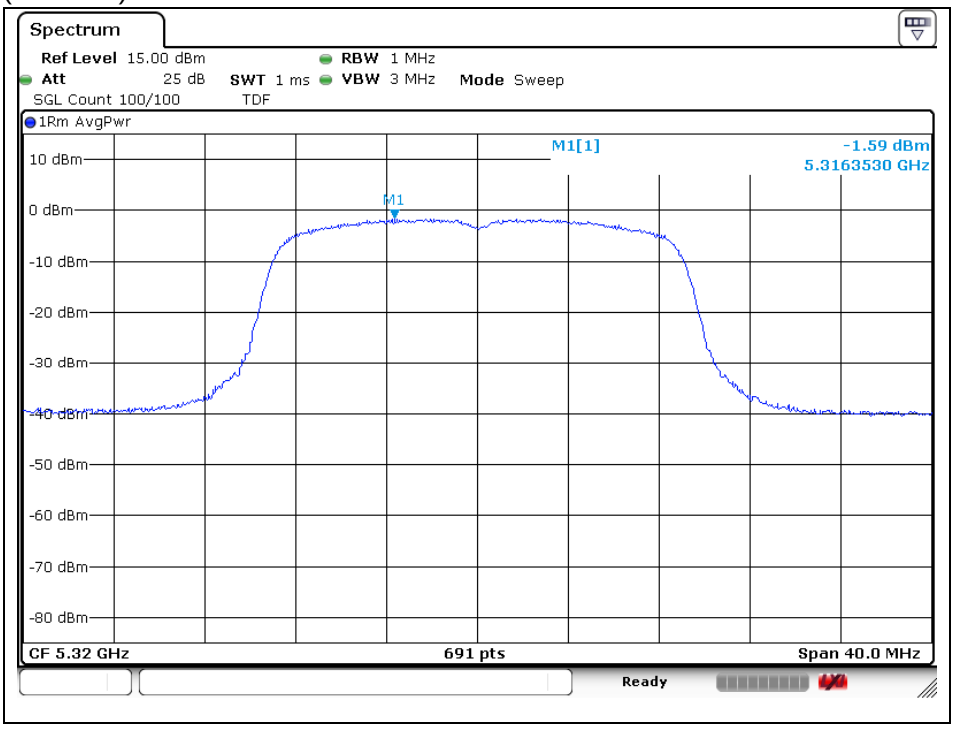
Low Channel (5 260 ㎒)



Middle Channel (5 300 ㎒)

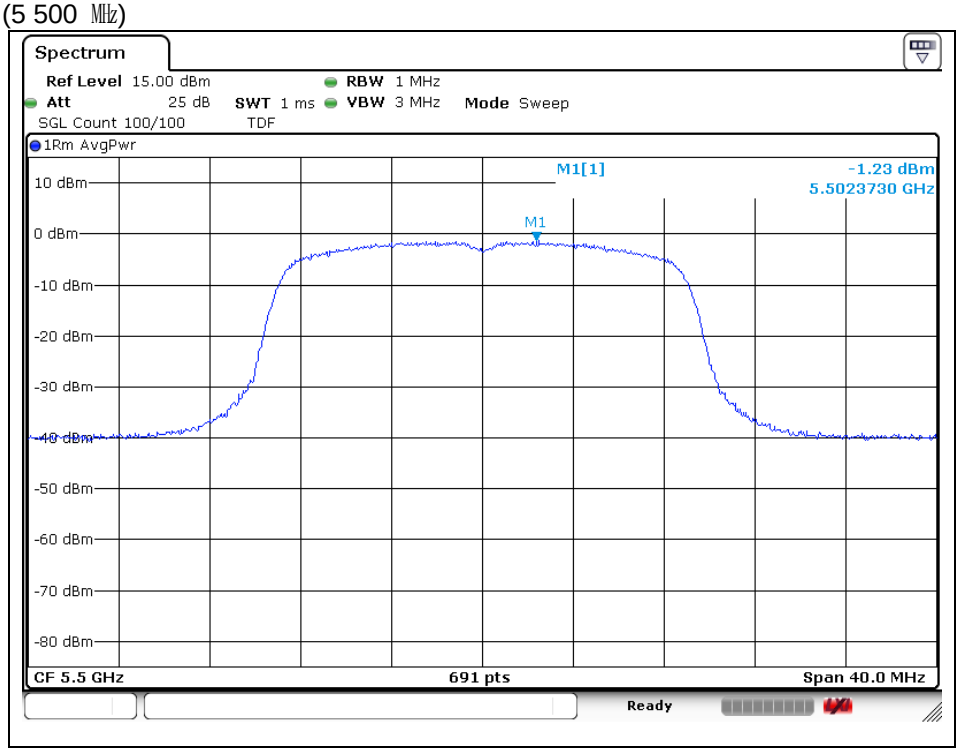


High Channel (5 320 ㎒)

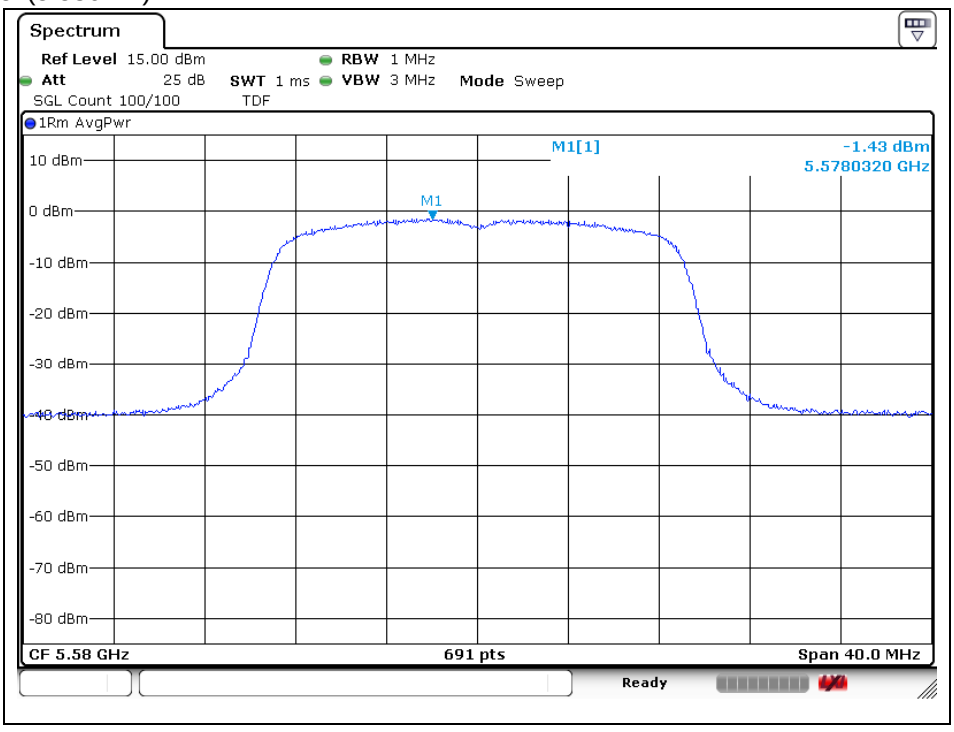


OFDM: 802.11n_HT20 (Band 2C)_ANT 2

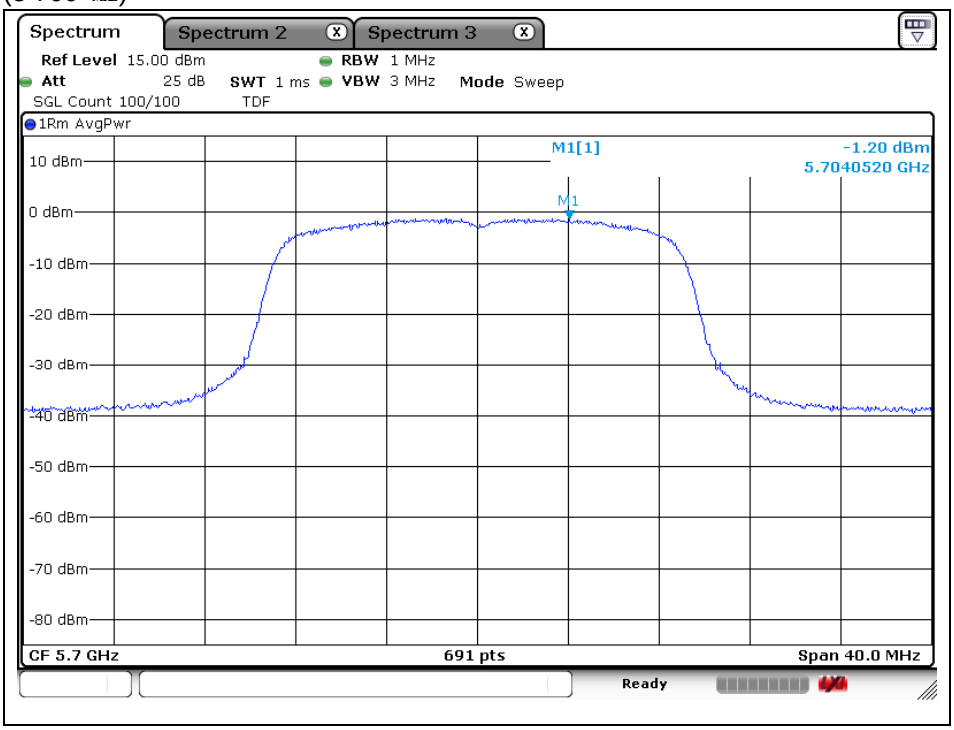
Low Channel (5 500 ㎒)



Middle Channel (5 580 ㎒)

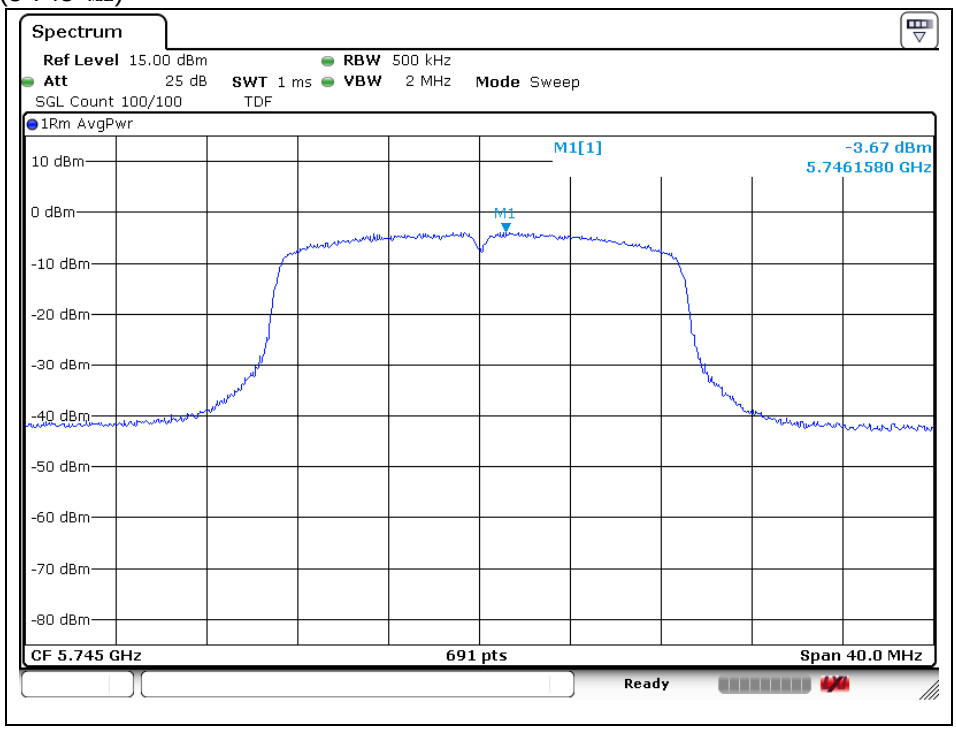


High Channel (5 700 ㎒)

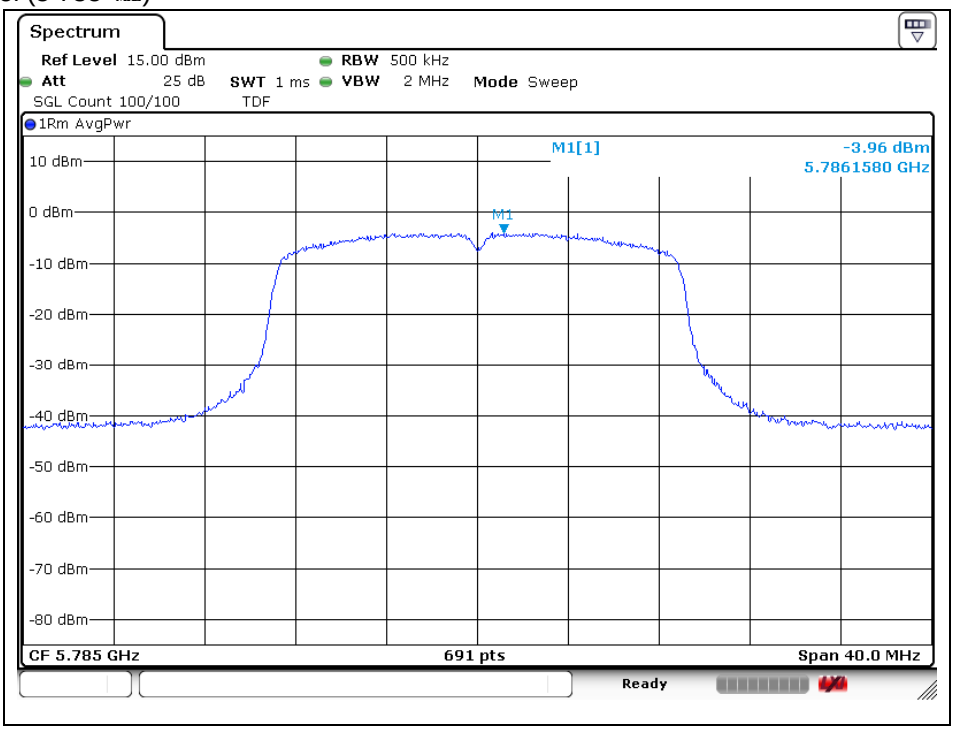


OFDM: 802.11n_HT20 (Band 3)_ANT 2

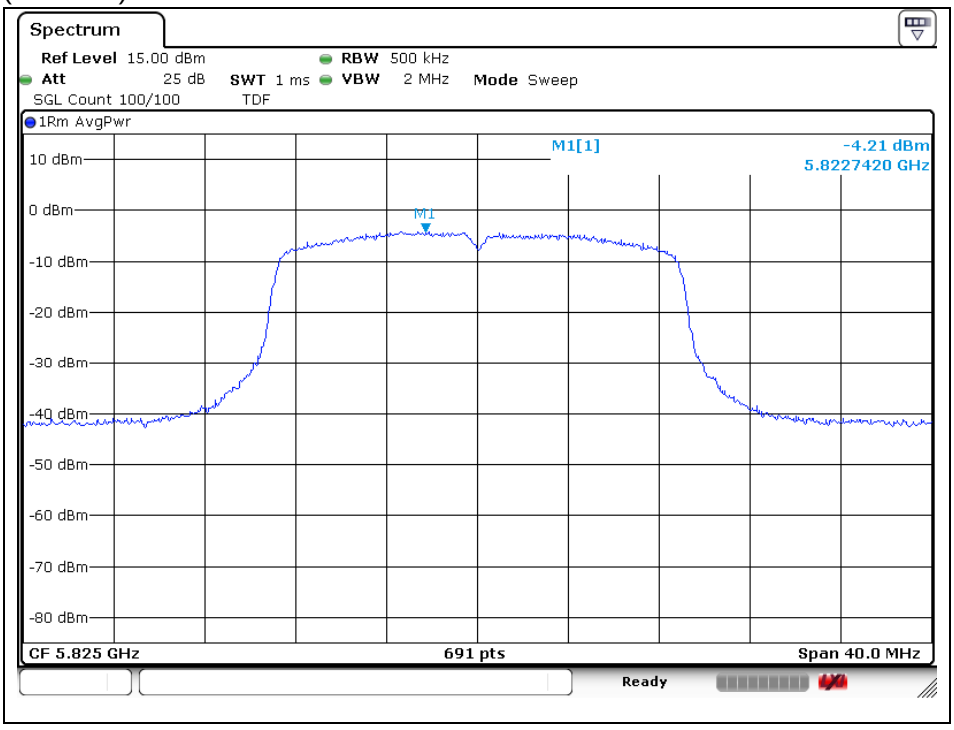
Low Channel (5 745 ㎒)



Middle Channel (5 785 ㎒)

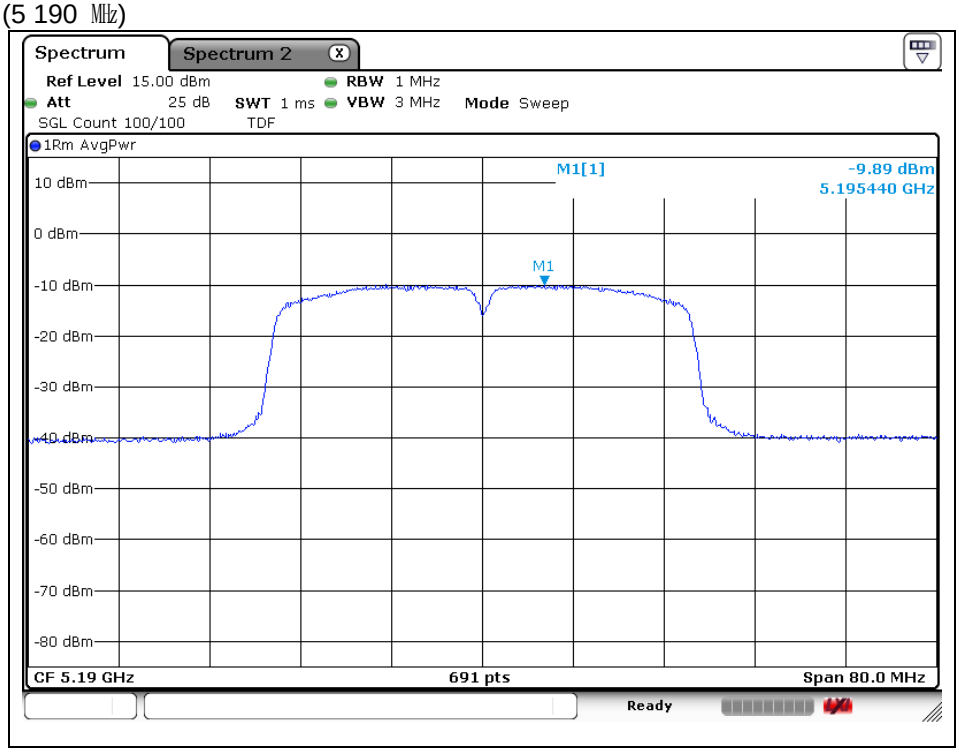


High Channel (5 825 ㎒)

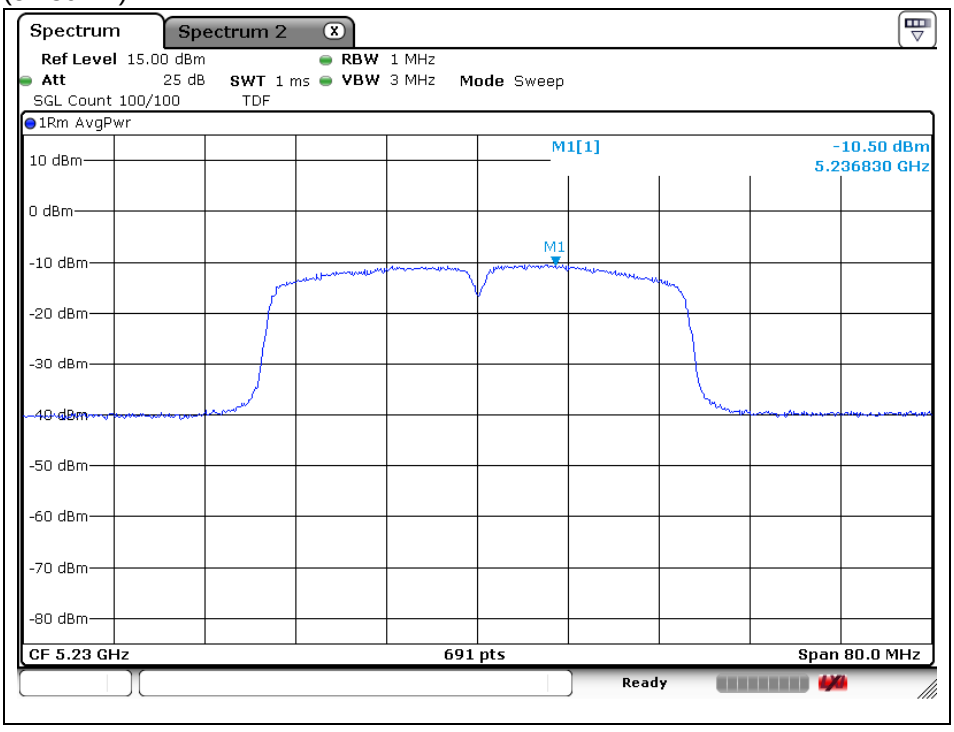


OFDM: 802.11n_HT40 (Band 1)_ANT 1

Low Channel (5 190 ㎒)

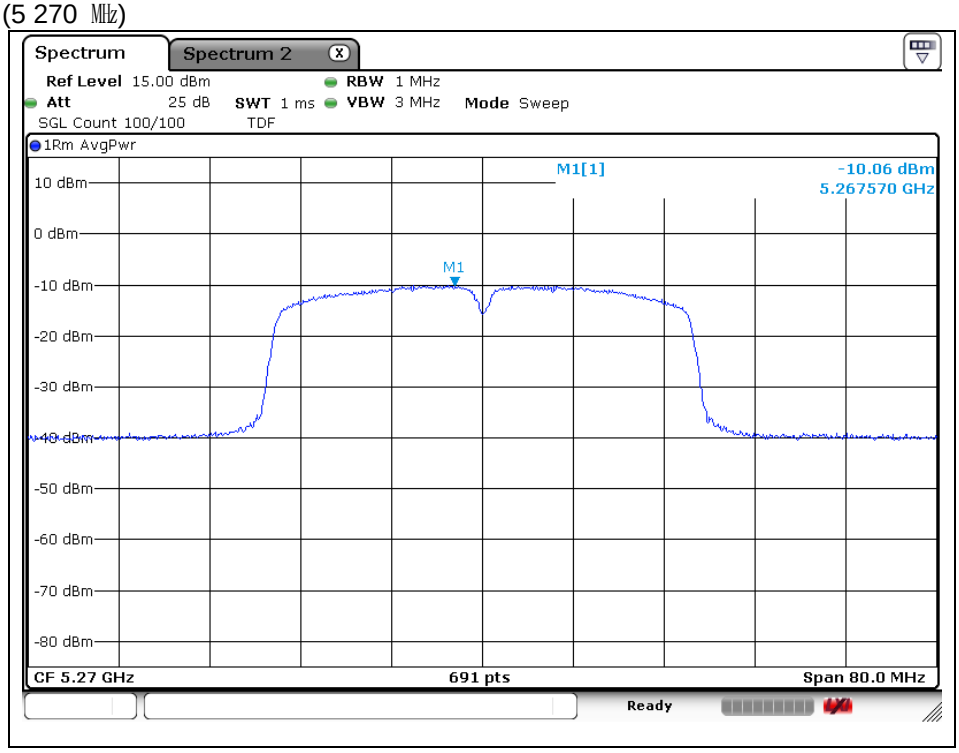


High Channel (5 230 ㎒)

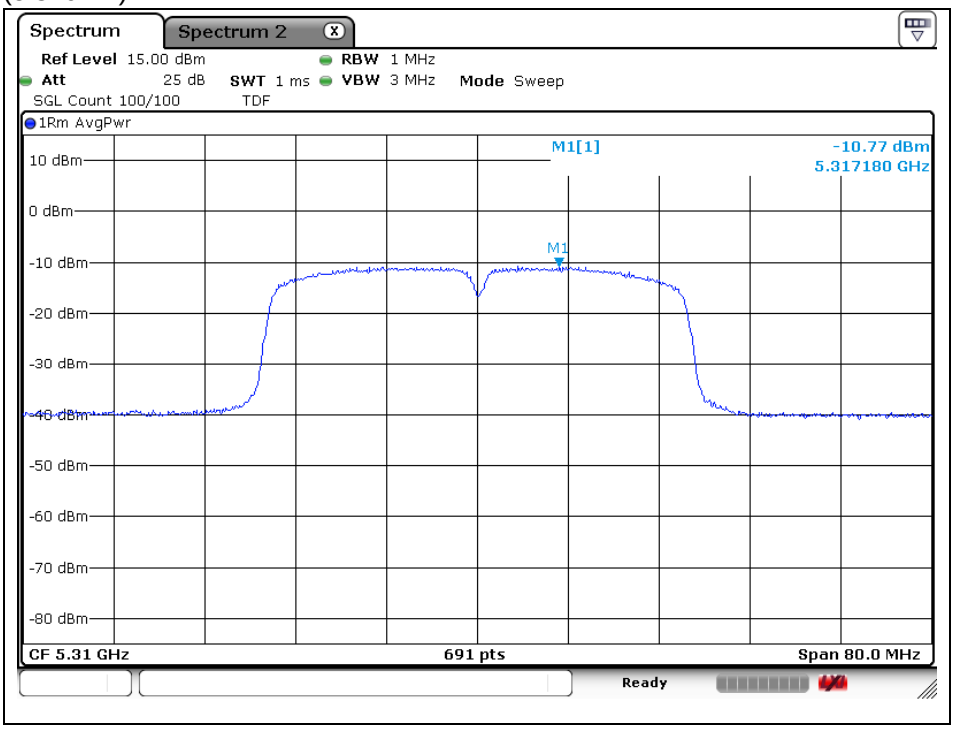


OFDM: 802.11n_HT40 (Band 2A)_ANT 1

Low Channel (5 270 ㎒)

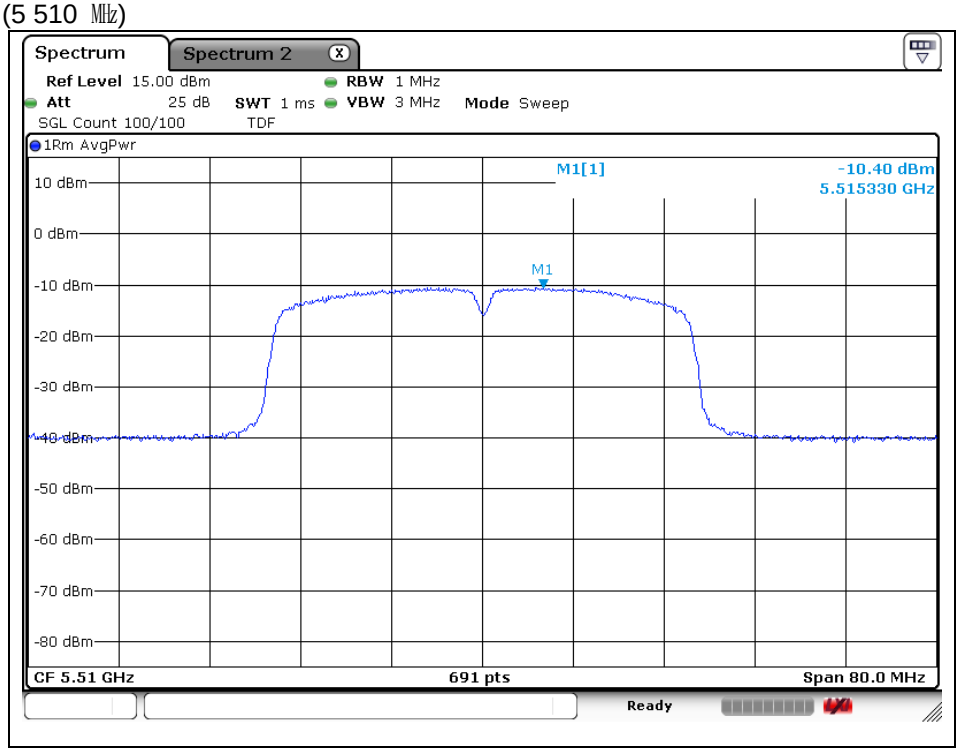


High Channel (5 310 ㎒)

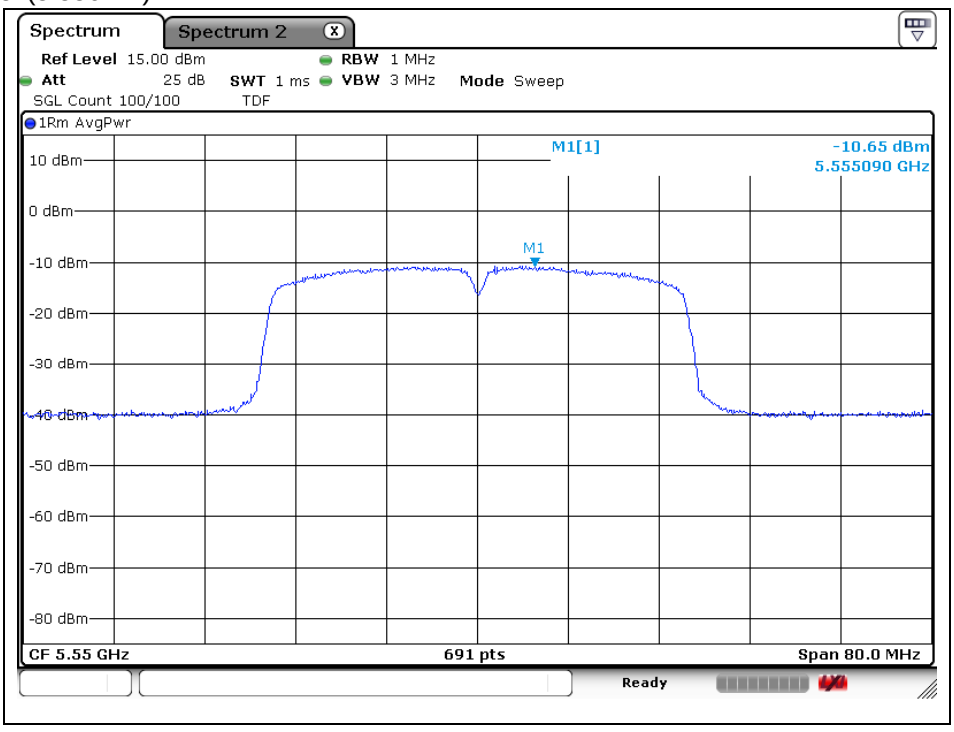


OFDM: 802.11n_HT40 (Band 2C)_ANT 1

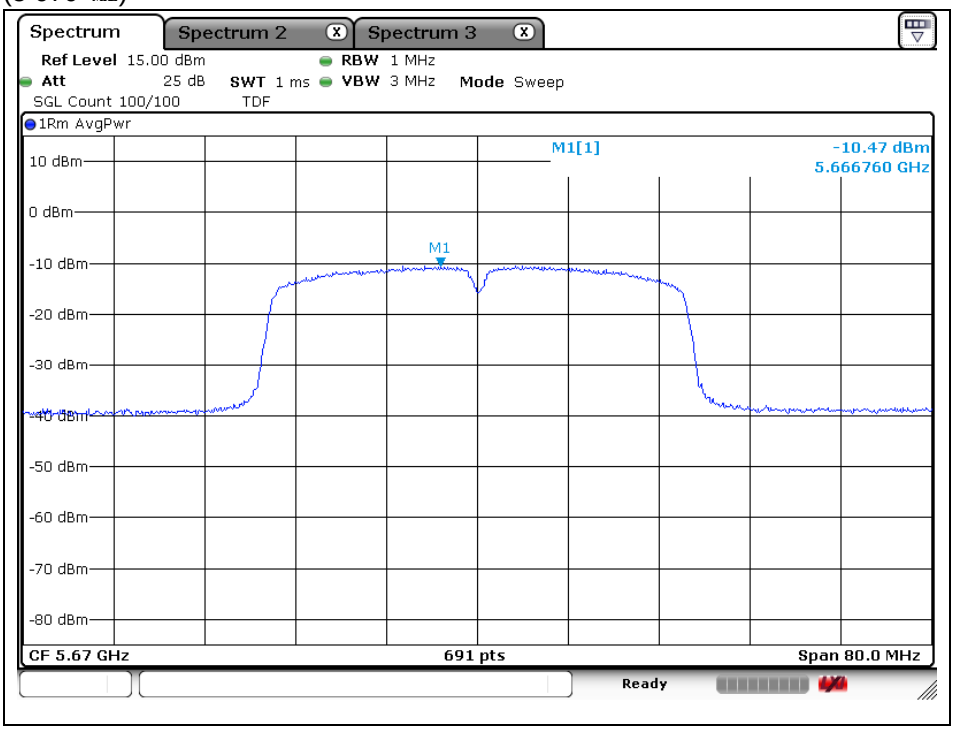
Low Channel (5 510 ㎒)



Middle Channel (5 550 ㎒)

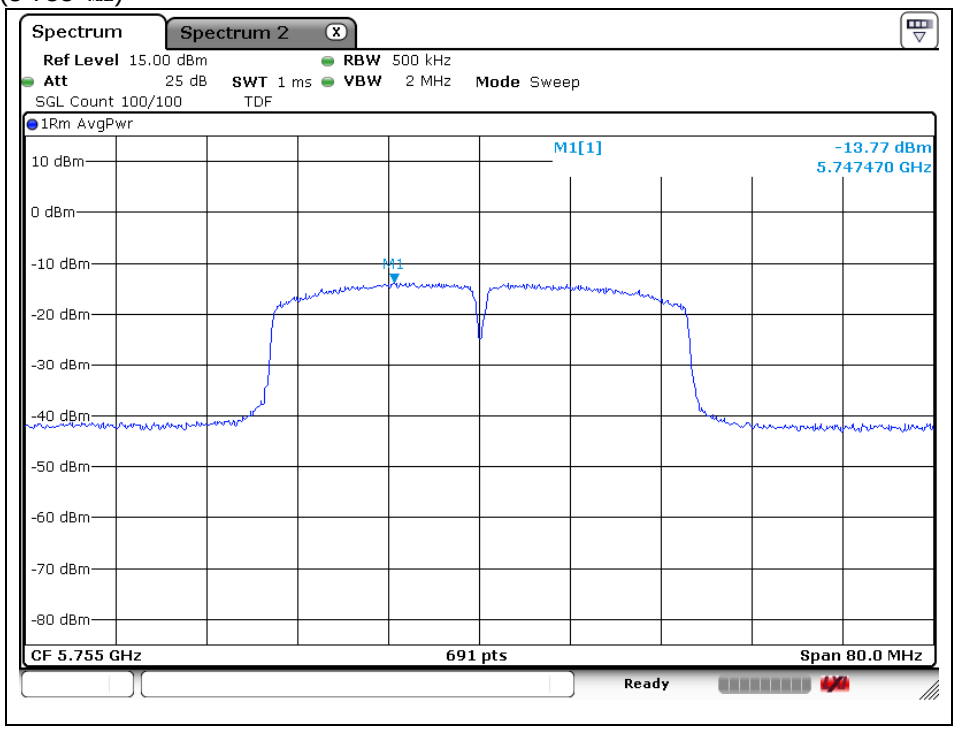


High Channel (5 670 ㎒)

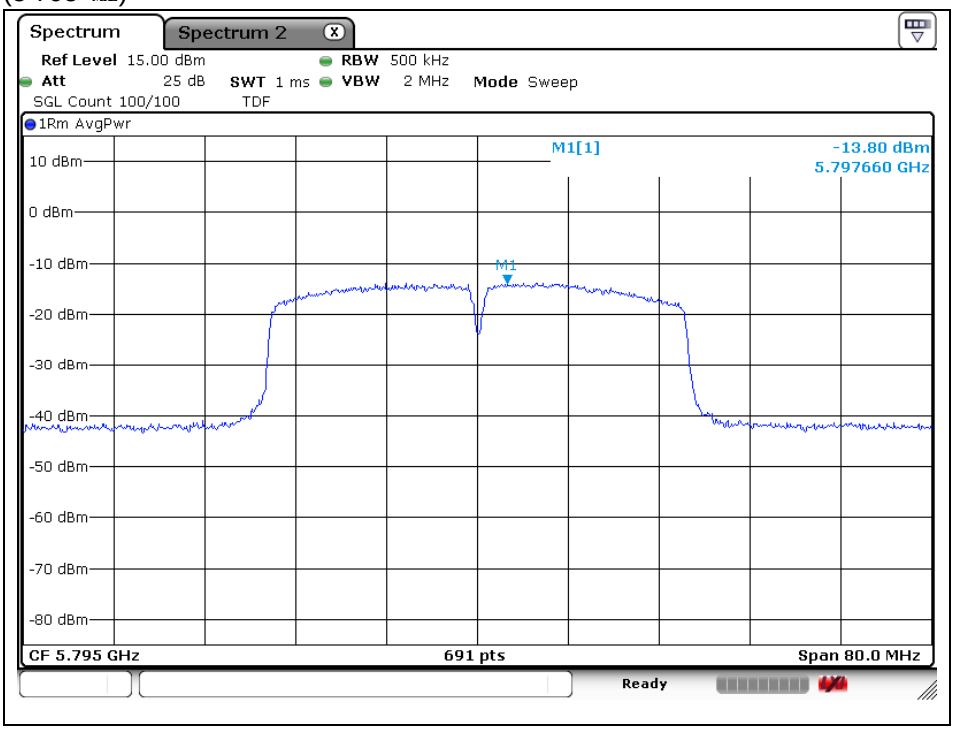


OFDM: 802.11n_HT40 (Band 3)_ANT 1

Low Channel (5 755 ㎒)

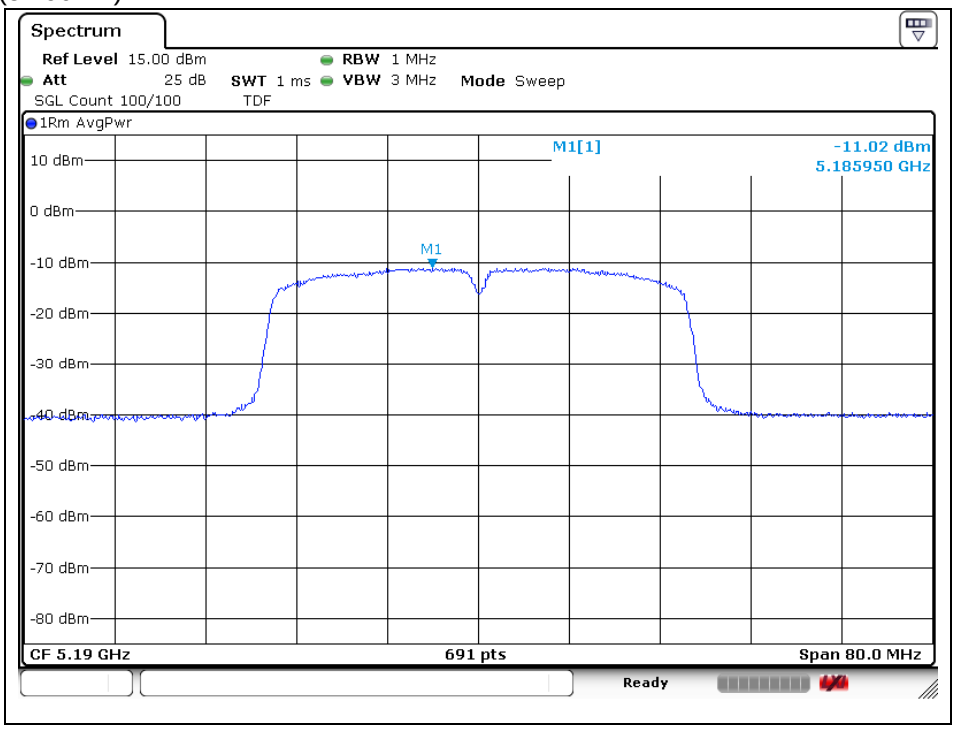


High Channel (5 795 ㎒)

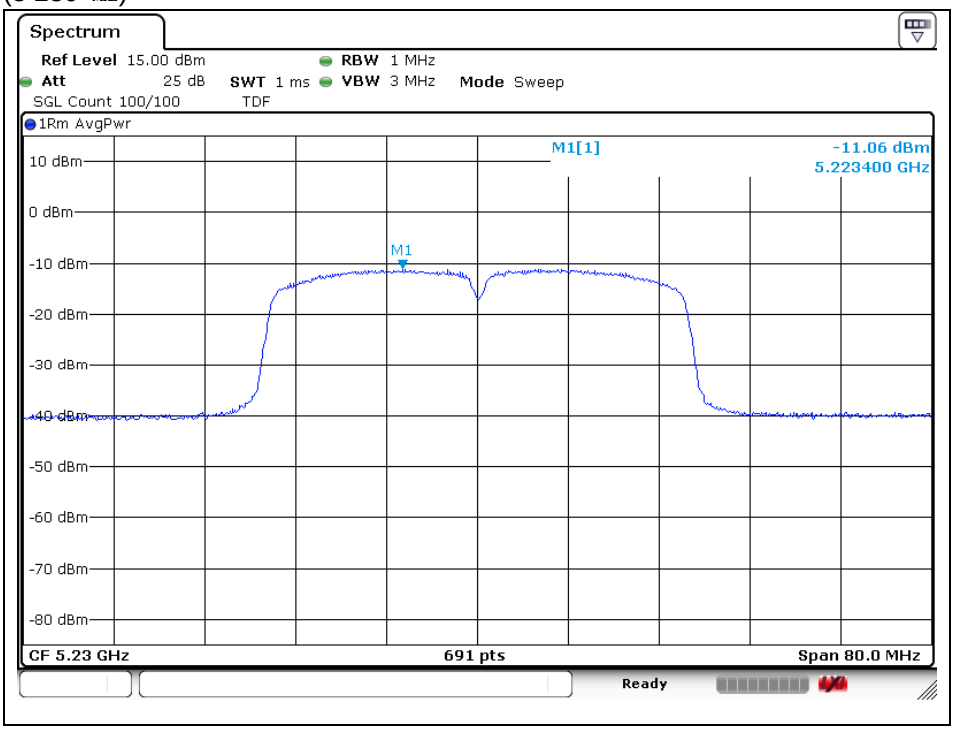


OFDM: 802.11n_HT40 (Band 1)_ANT 2

Low Channel (5 190 ㎒)

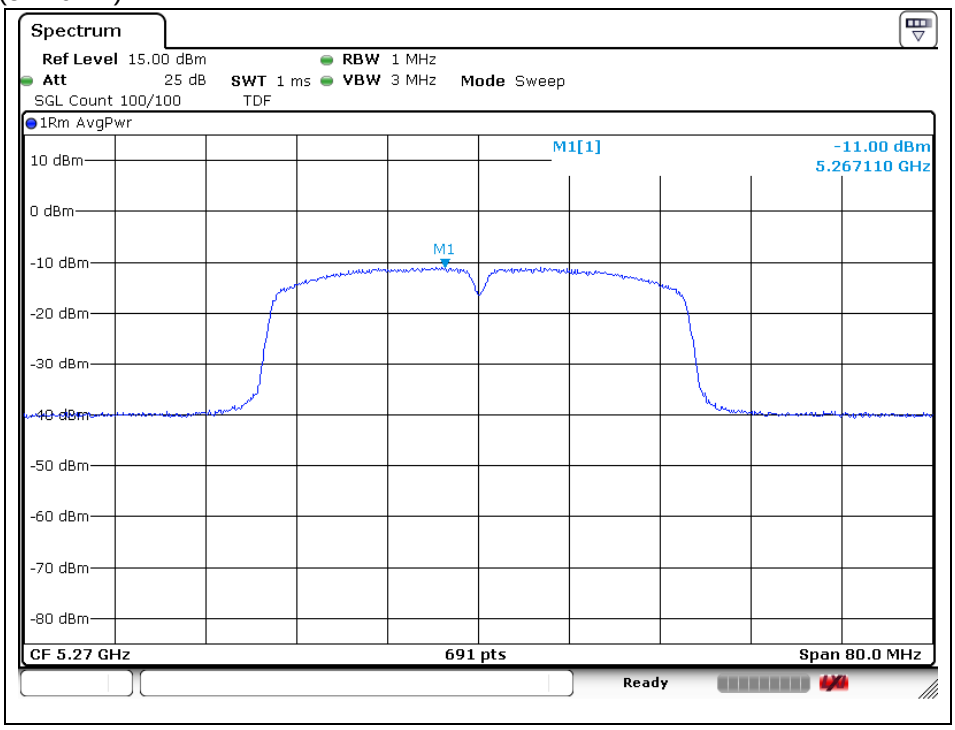


High Channel (5 230 ㎒)

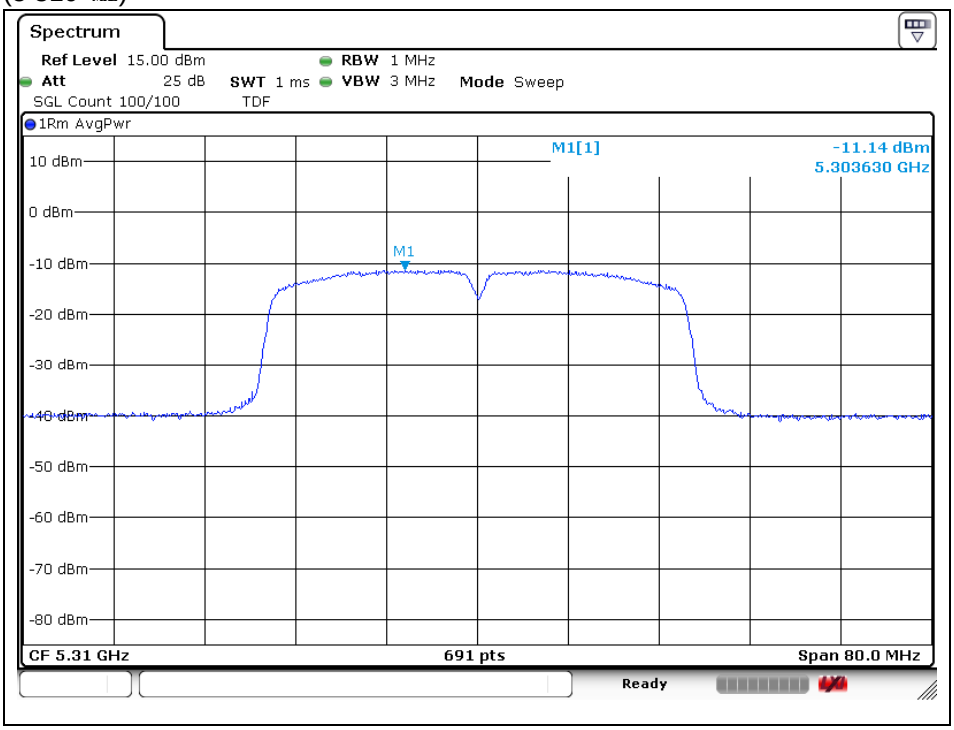


OFDM: 802.11n_HT40 (Band 2A)_ANT 2

Low Channel (5 270 ㎒)

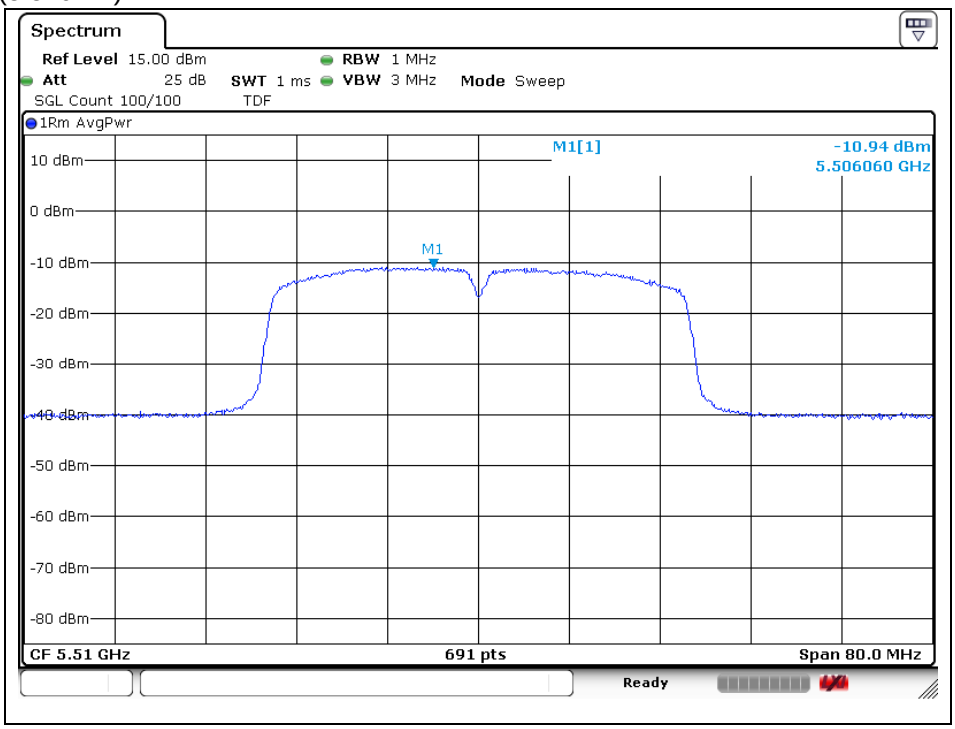


High Channel (5 310 ㎒)

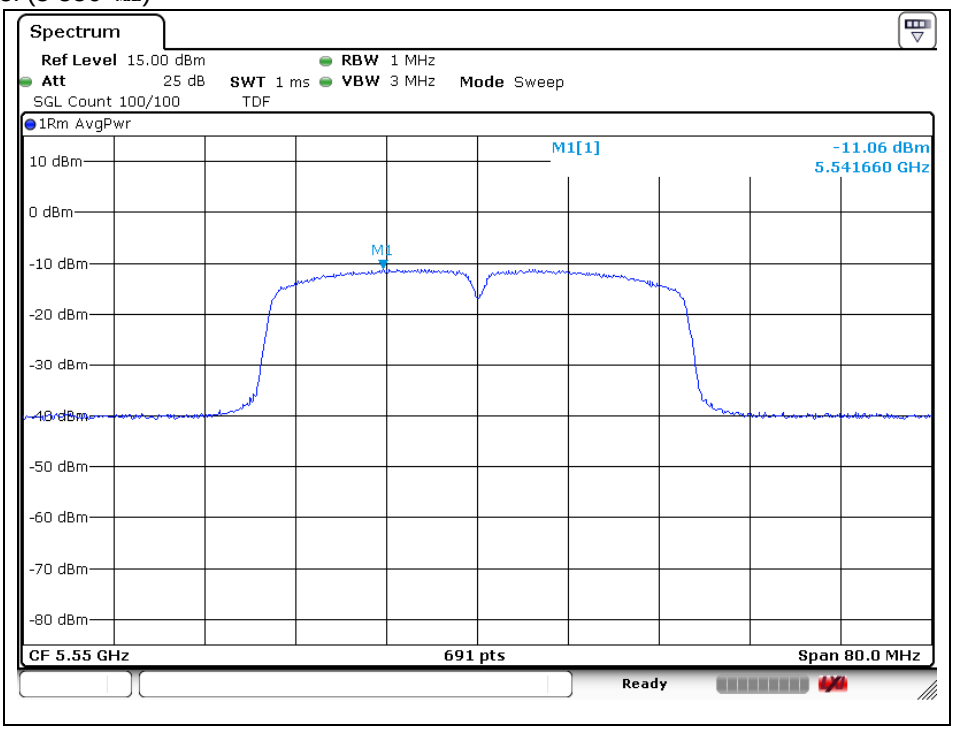


OFDM: 802.11n_HT40 (Band 2C)_ANT 2

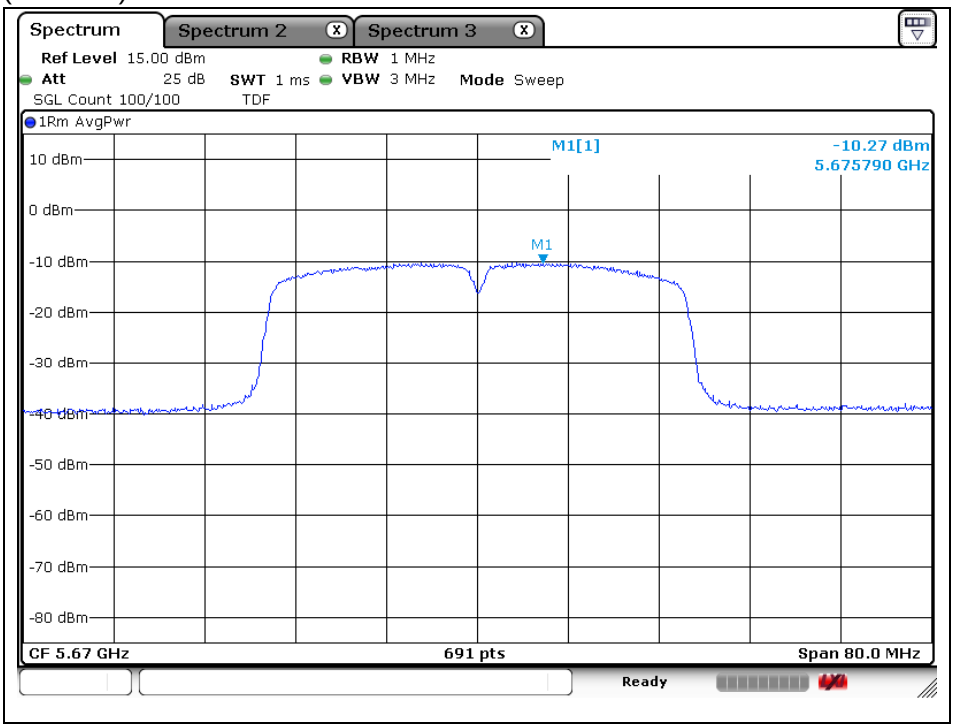
Low Channel (5 510 ㎒)



Middle Channel (5 550 ㎒)

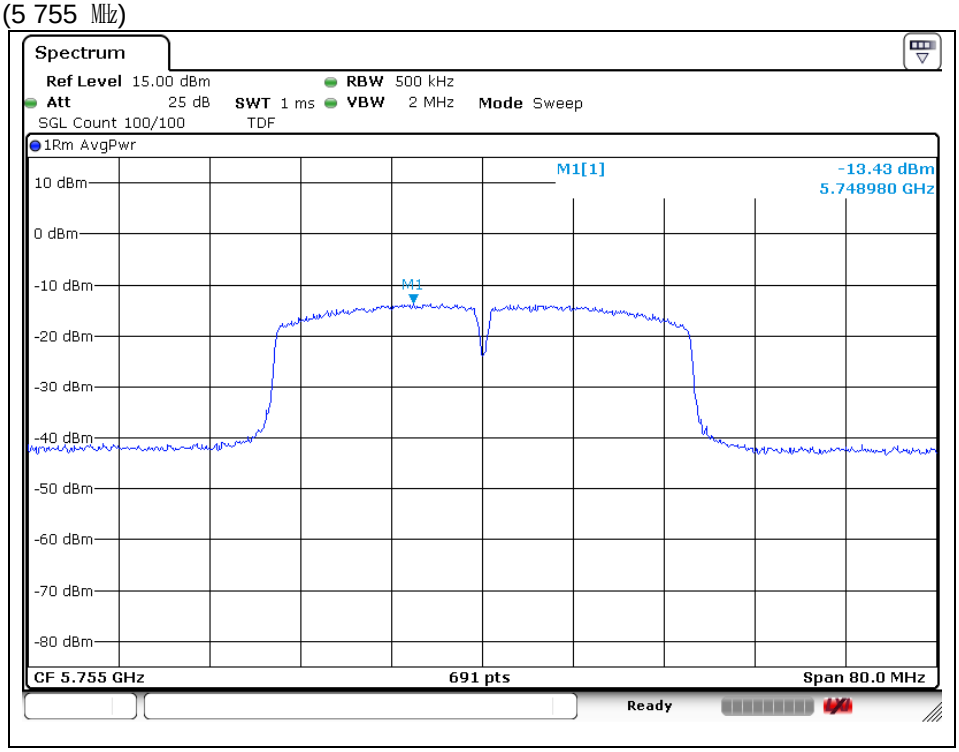


High Channel (5 670 ㎒)

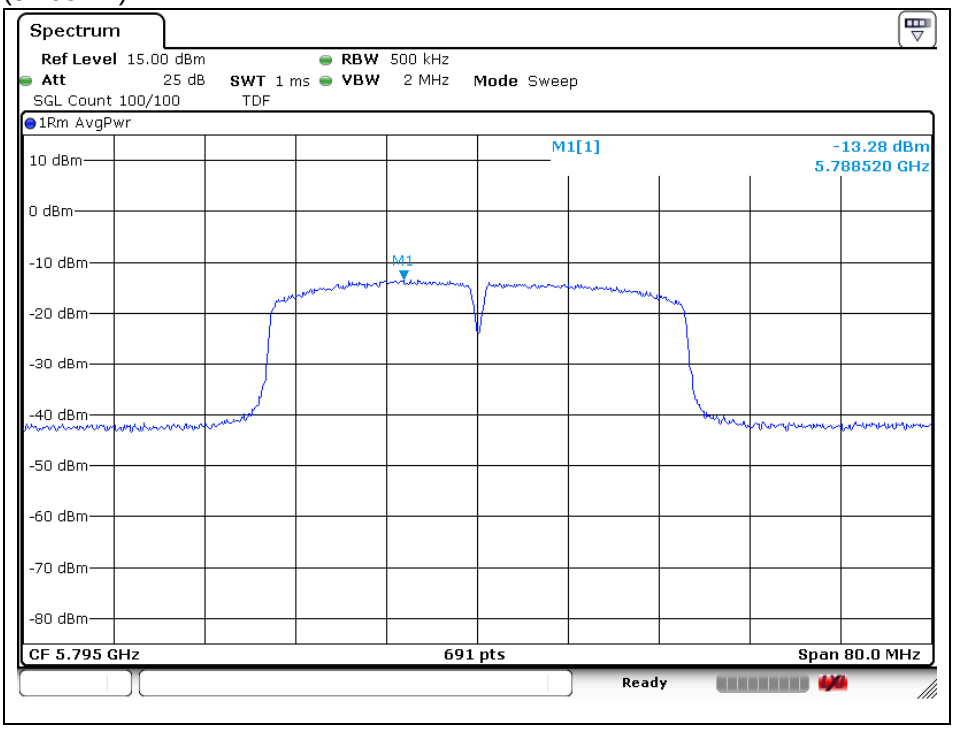


OFDM: 802.11n_HT40 (Band 3)_ANT 2

Low Channel (5 755 ㎒)

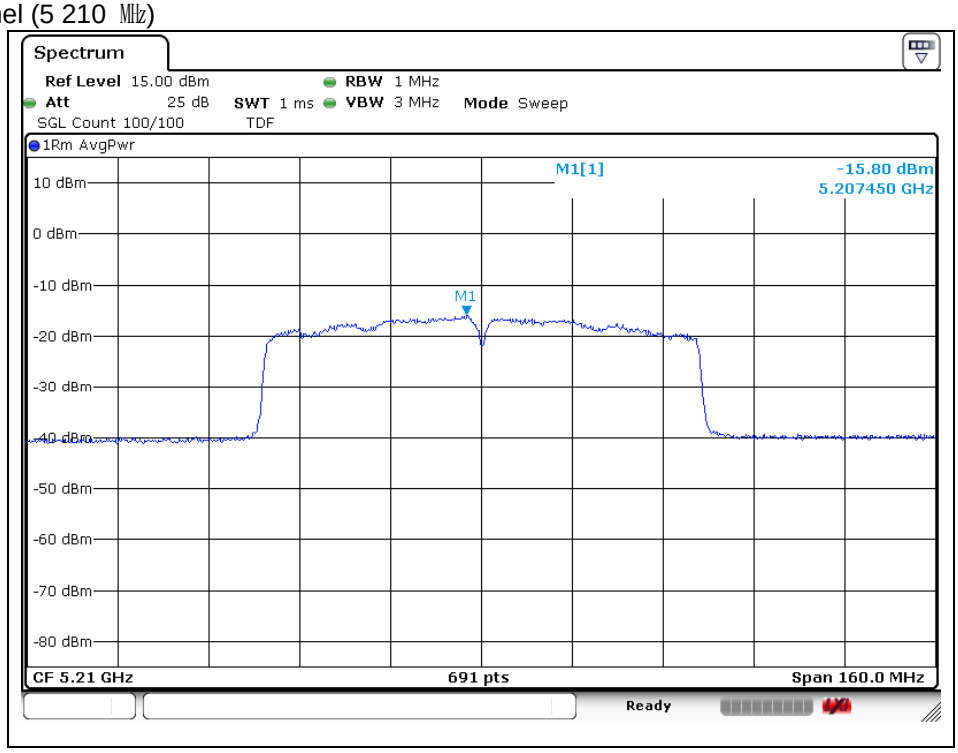


High Channel (5 795 ㎒)



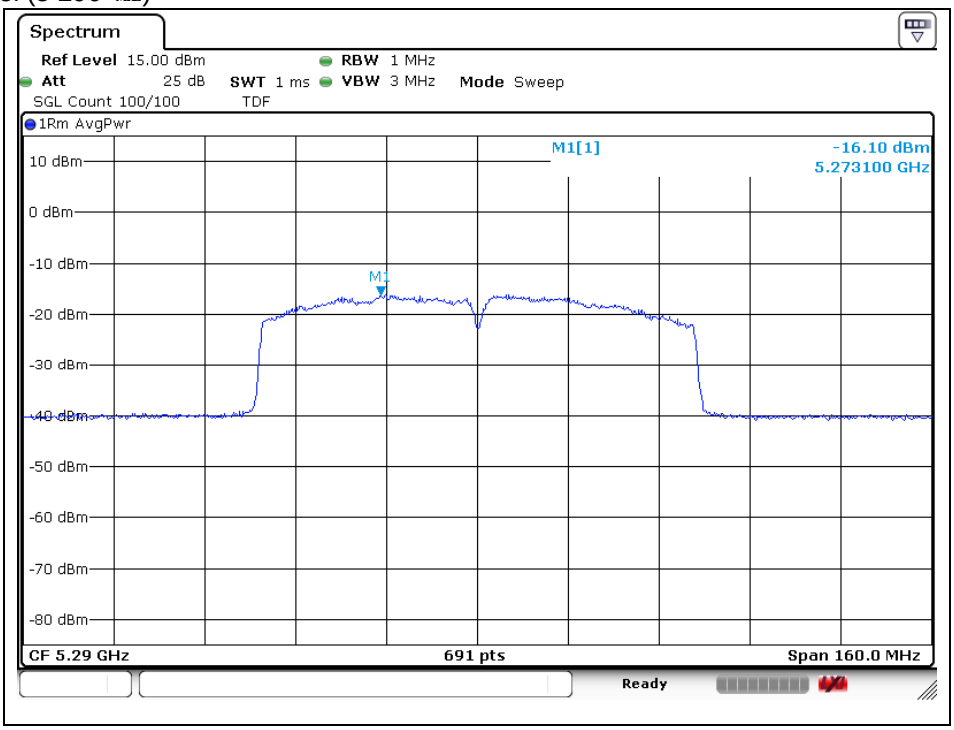
OFDM: 802.11ac_VHT80 (Band 1)_ANT 1

Middle Channel (5 210 ㎒)



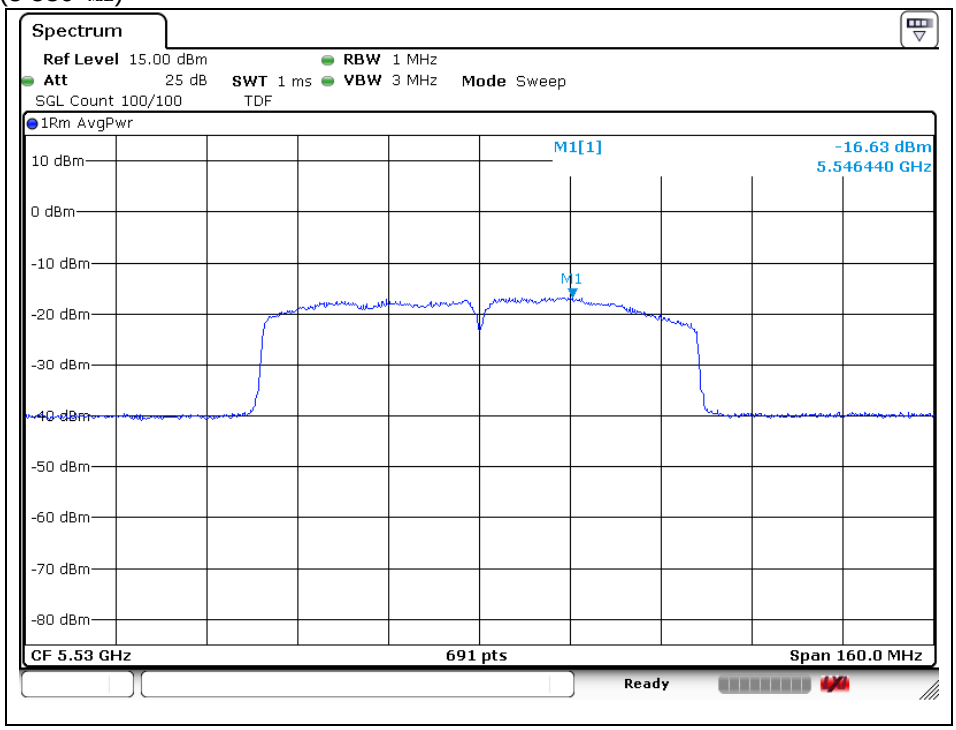
OFDM: 802.11ac_VHT80 (Band 2A)_ANT 1

Middle Channel (5 290 ㎒)



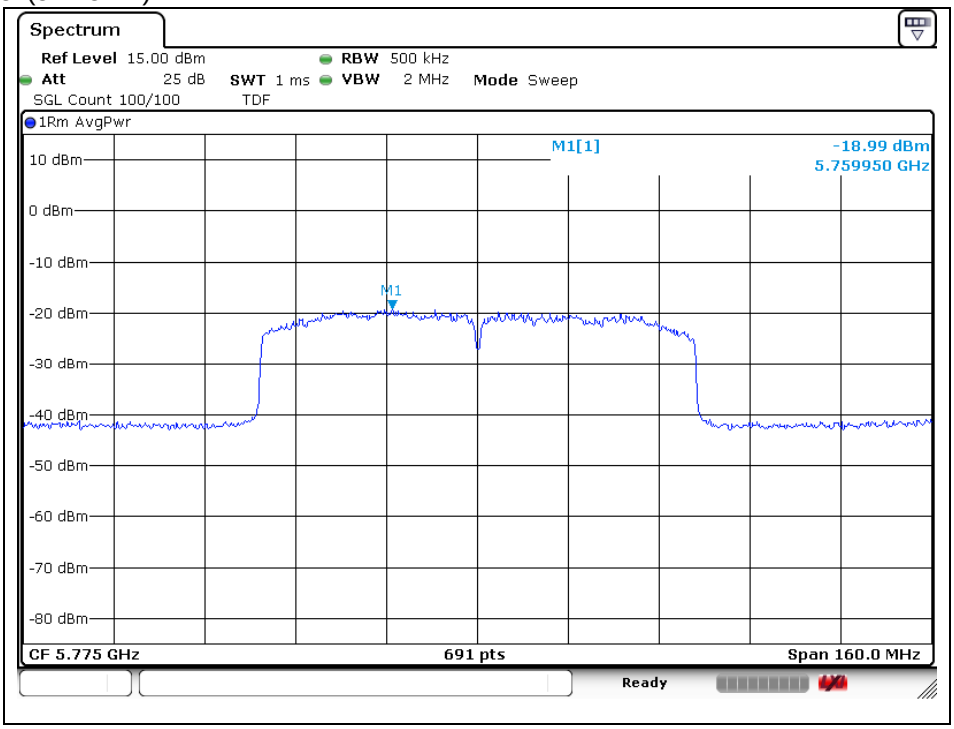
OFDM: 802.11ac_VHT80 (Band 2C)_ANT 1

Low Channel (5 530 ㎒)



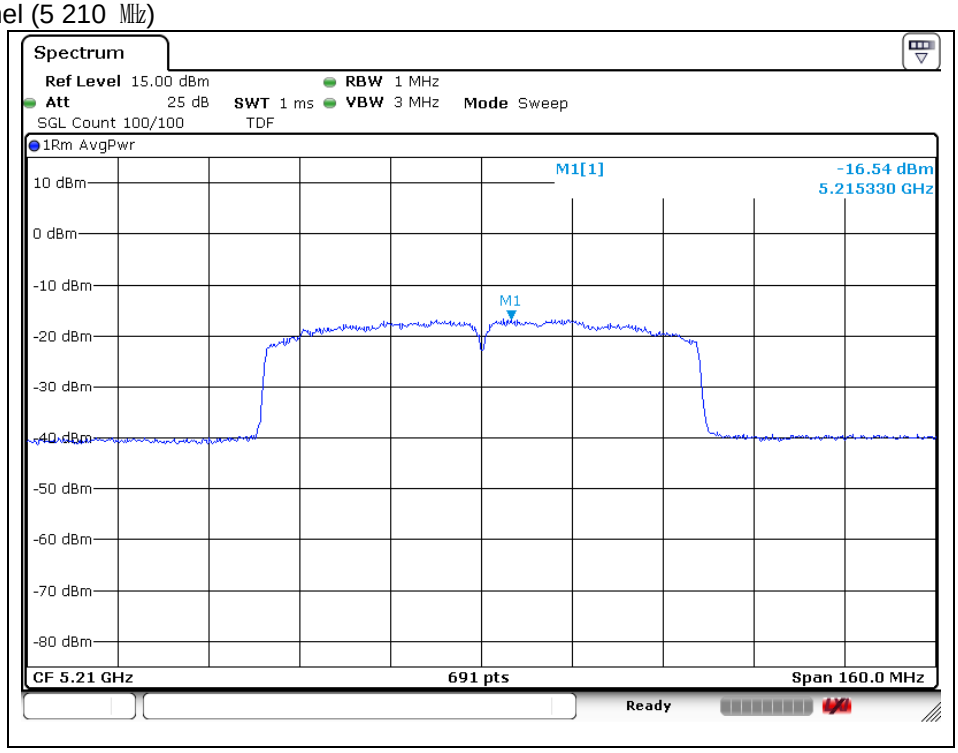
OFDM: 802.11ac_VHT80 (Band 3)_ANT 1

Middle Channel (5 775 ㎒)



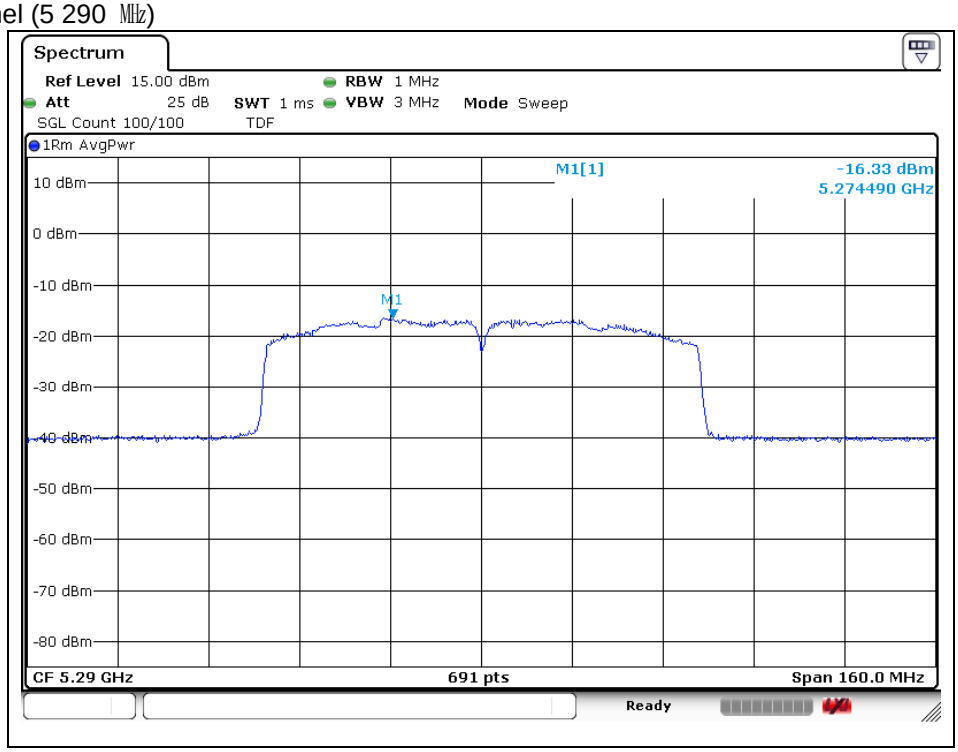
OFDM: 802.11ac_VHT80 (Band 1)_ANT 2

Middle Channel (5 210 ㎒)



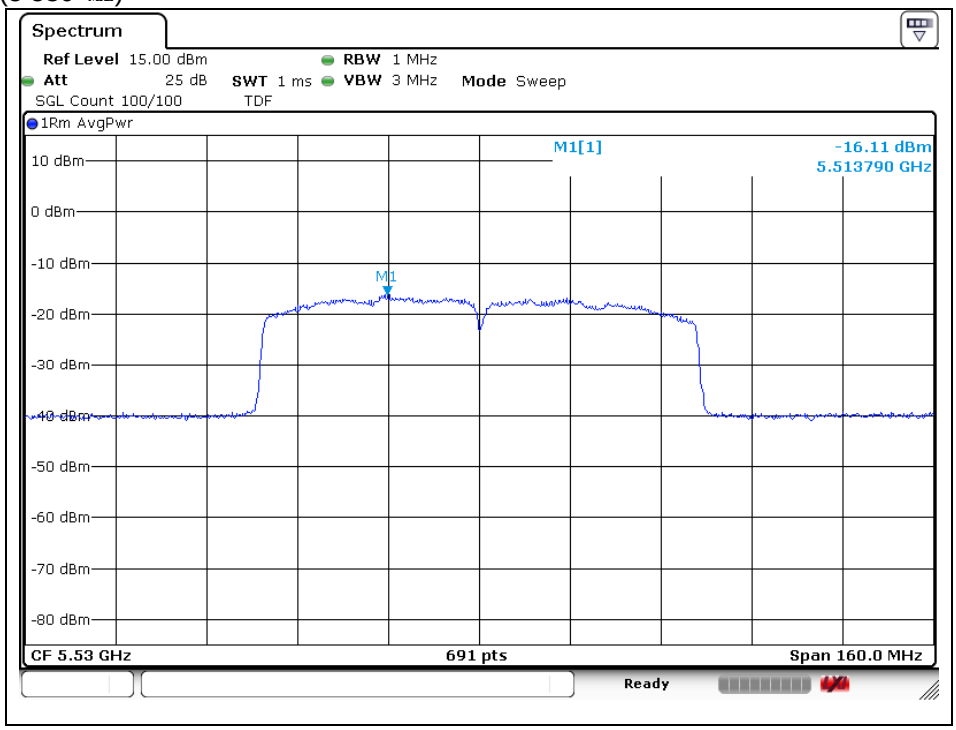
OFDM: 802.11ac_VHT80 (Band 2A)_ANT 2

Middle Channel (5 290 ㎒)



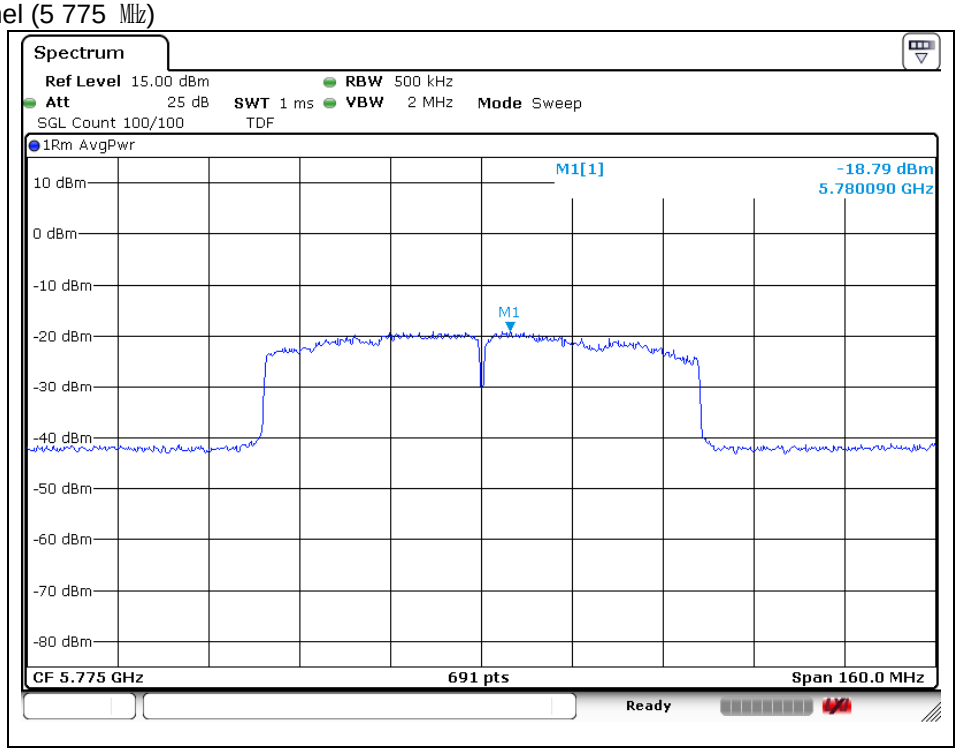
OFDM: 802.11ac_VHT80 (Band 2C)_ANT 2

Low Channel (5 530 ㎒)



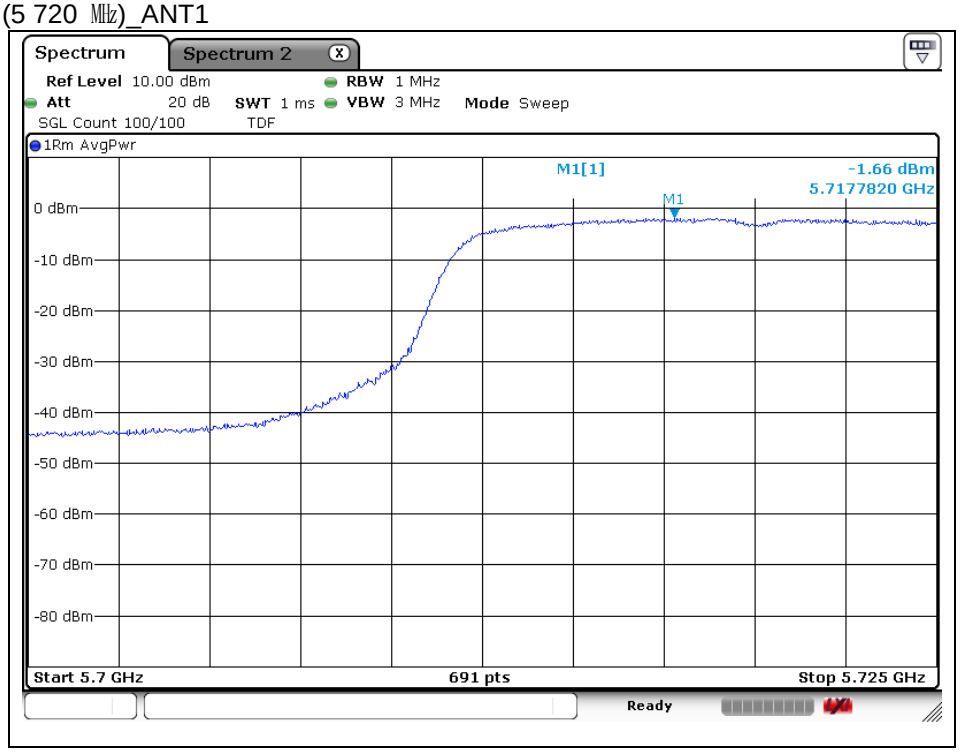
OFDM: 802.11ac_VHT80 (Band 3)_ANT 2

Middle Channel (5 775 ㎒)

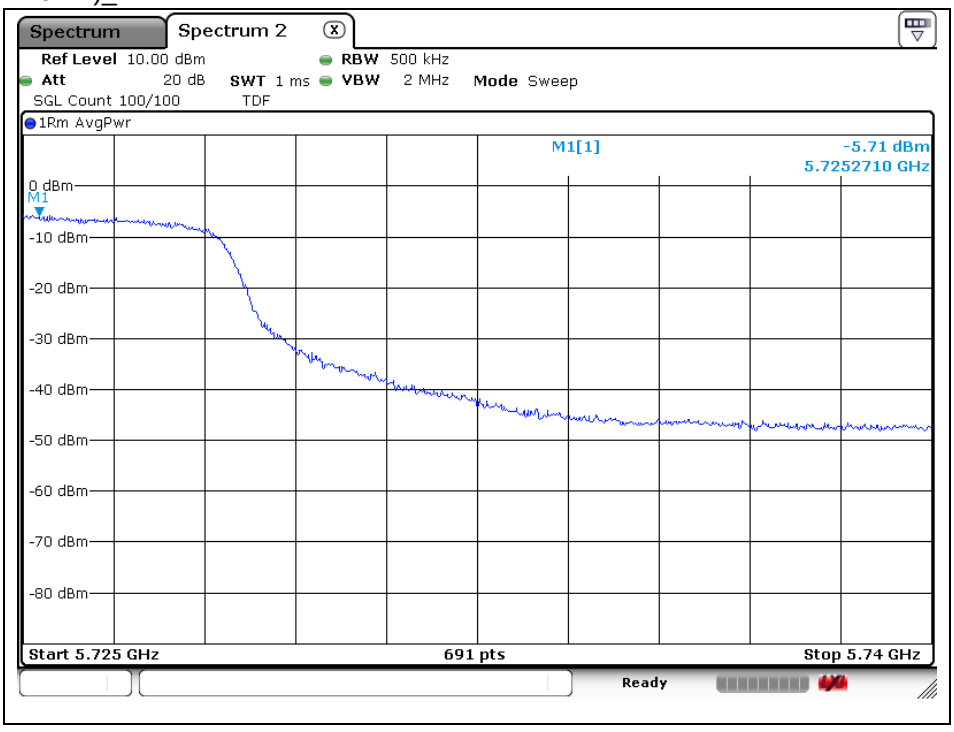


Band-crossing channels

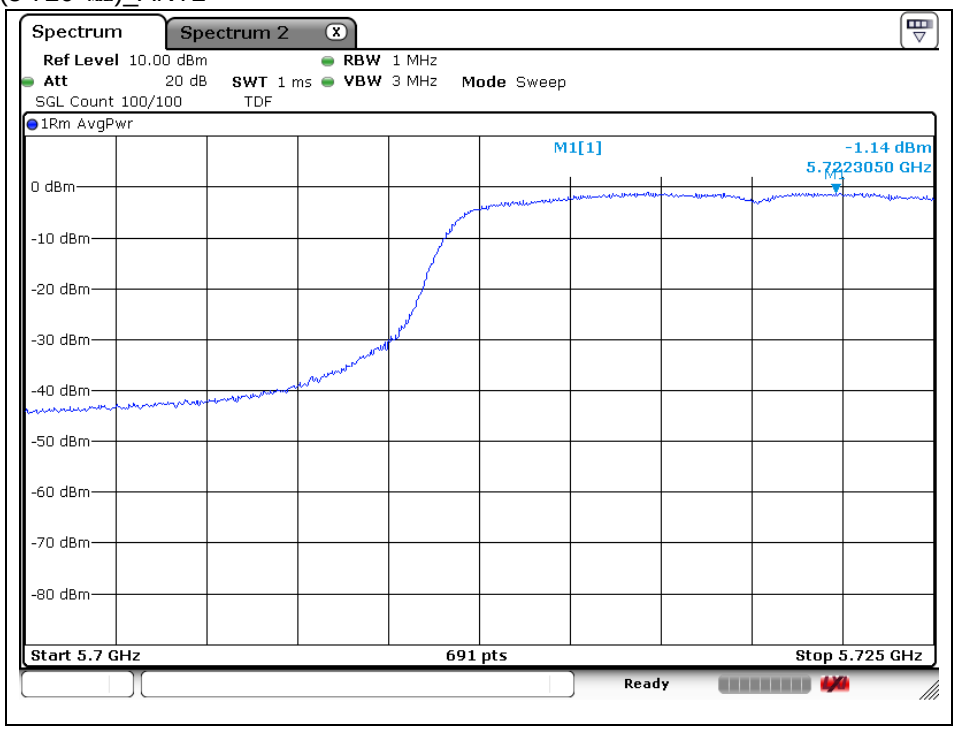
U-NII 2C 11a (5 720 ㎒)_ANT1



U-NII 3 11a (5 720 ㎒)_ANT1



U-NII 2C 11a (5 720 ㎒)_ANT2



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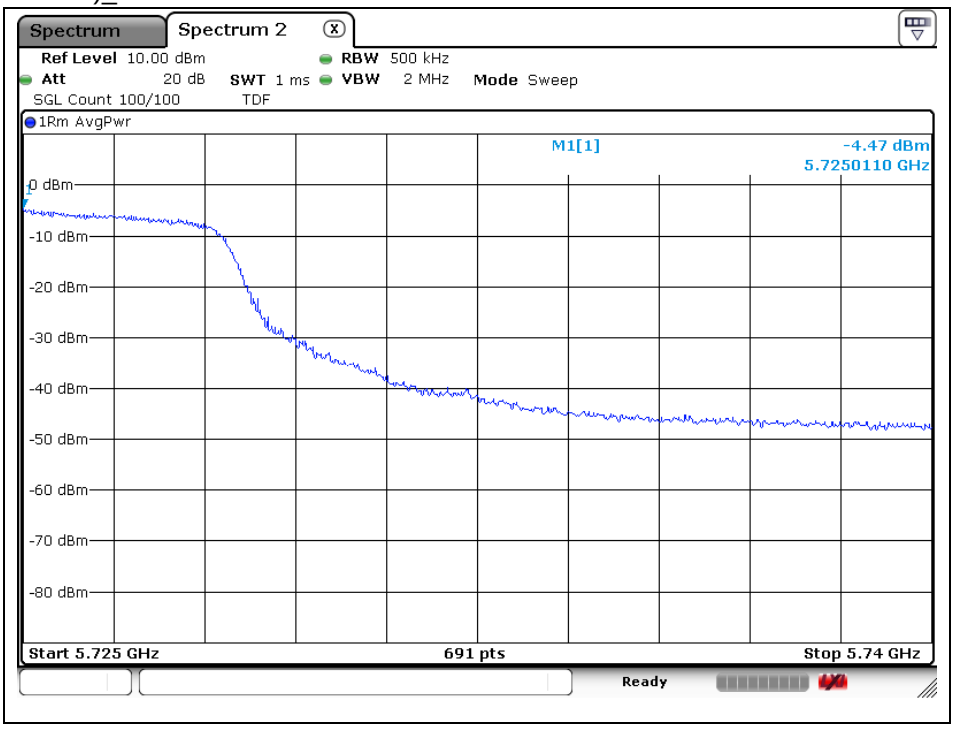
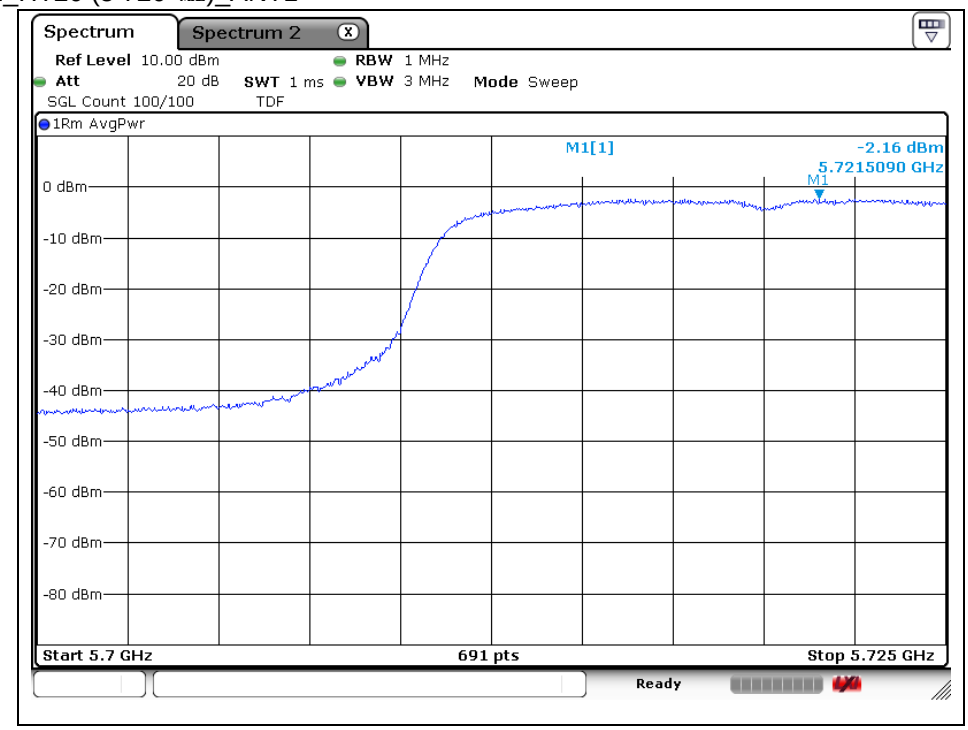


U-NII 2C 11n_HT20 (5 720 ㎒)_ANT1



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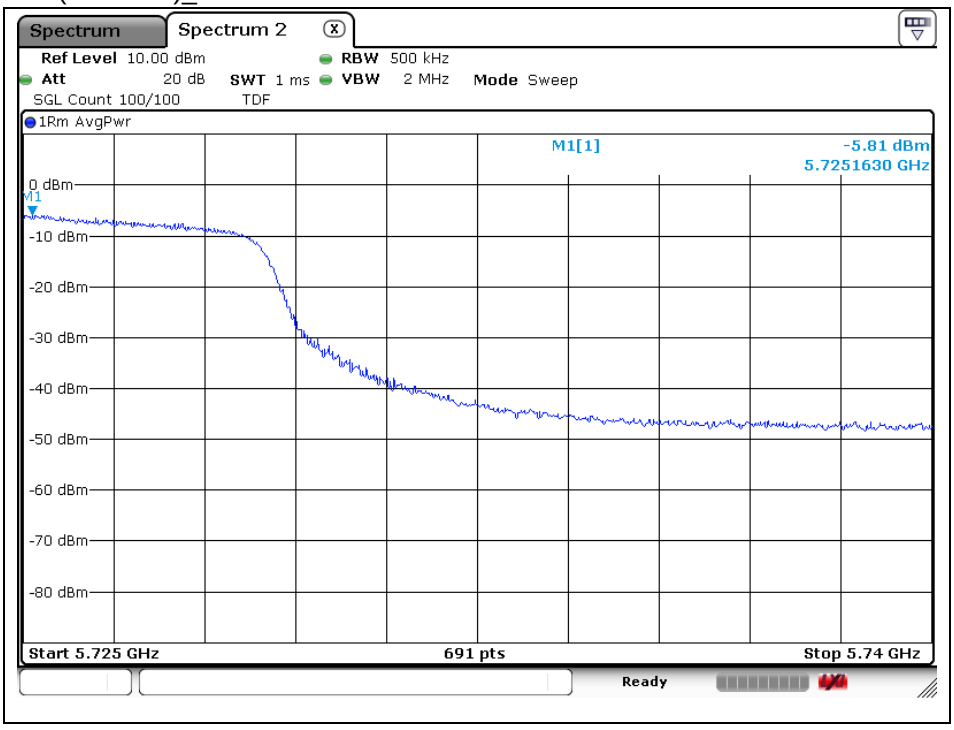
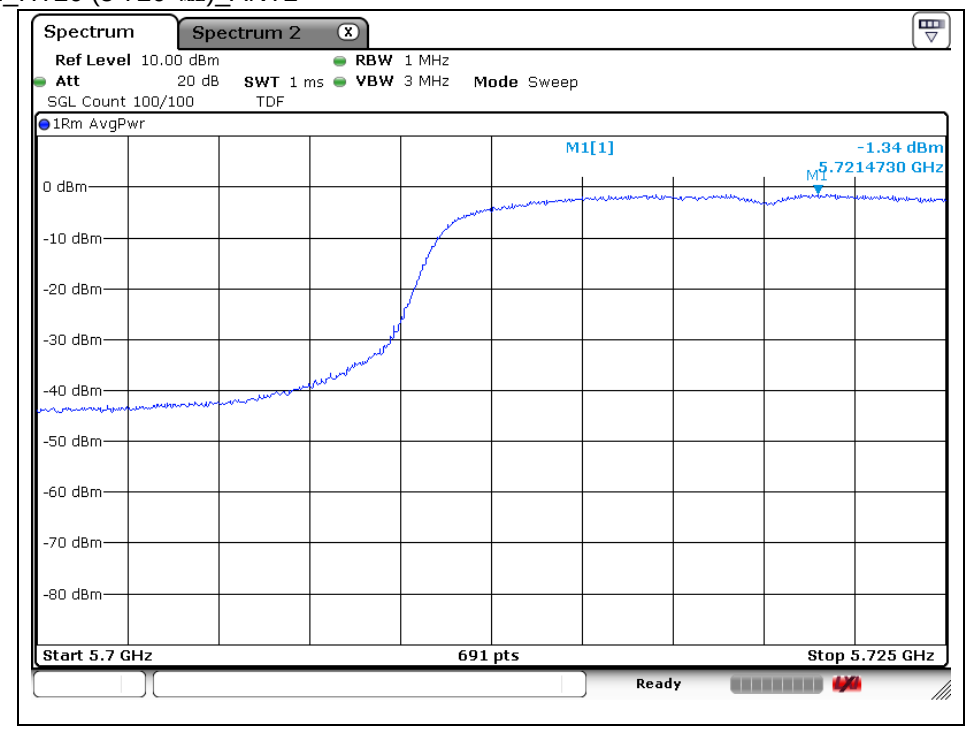


U-NII 2C 11n_HT20 (5 720 ㎒)_ANT2



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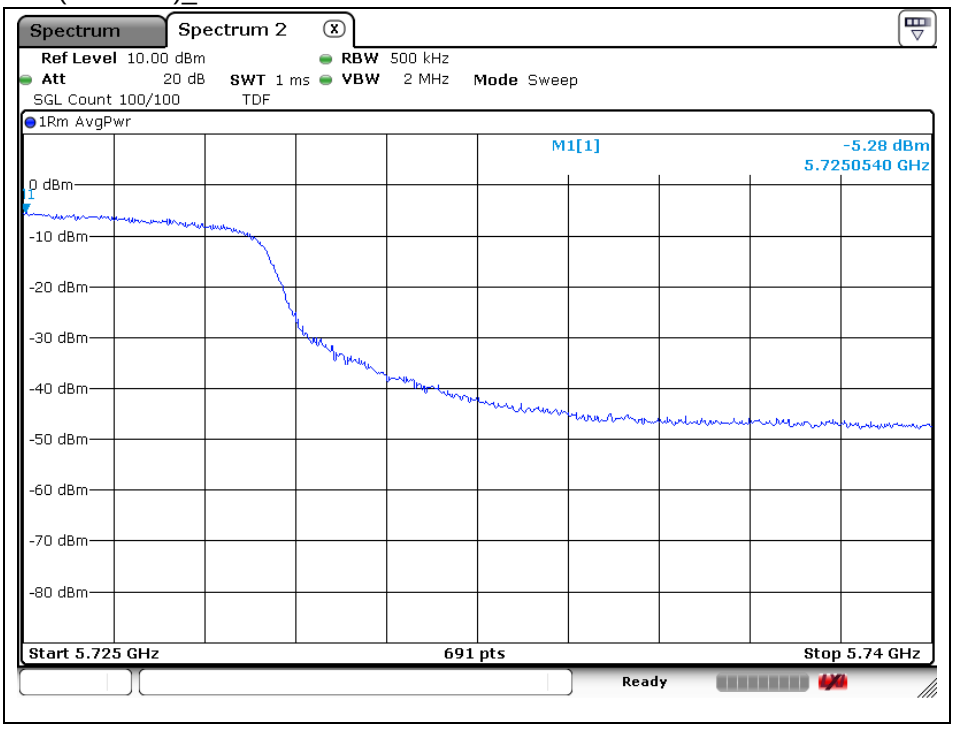
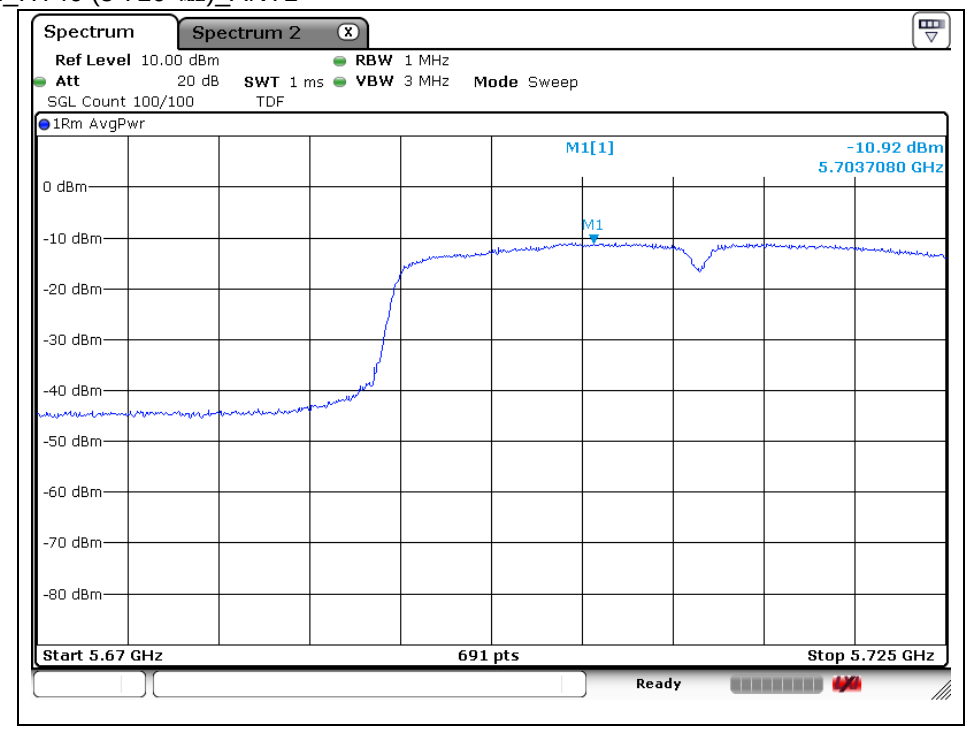
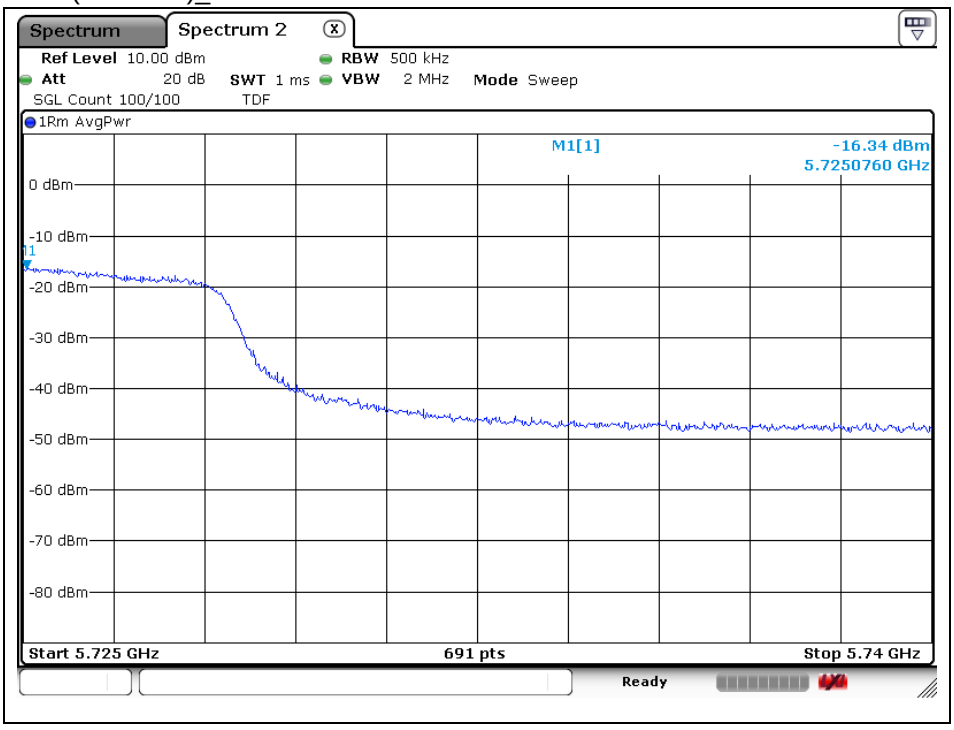


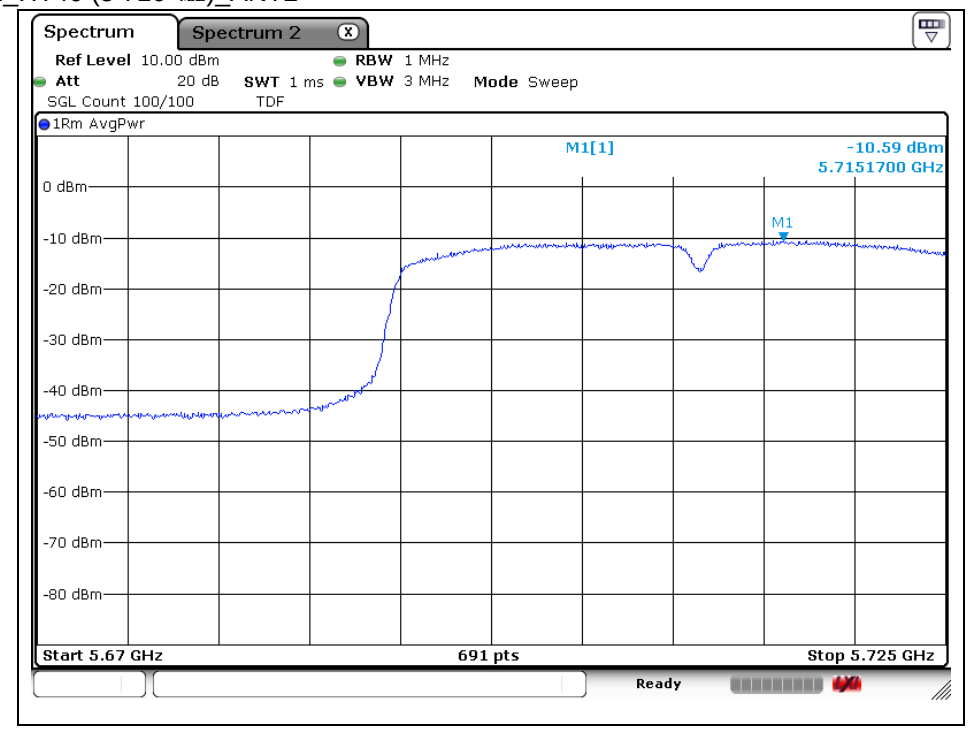
U-NII 2C 11n_HT40 (5 710 ㎒)_ANT1



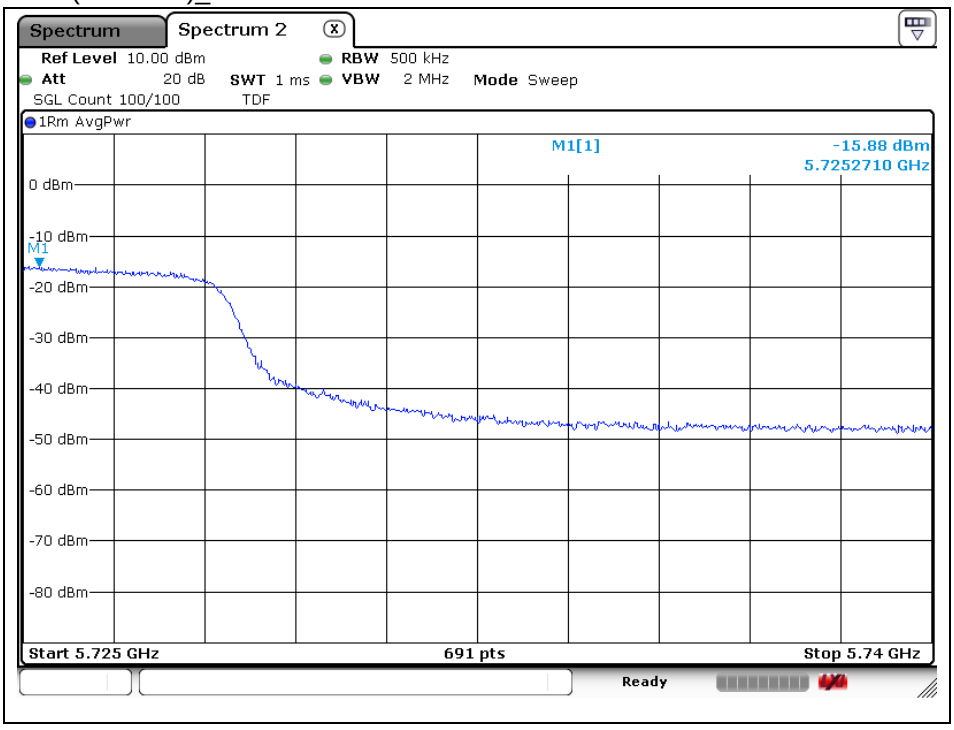
U-NII 3 11n_HT40 (5 710 ㎒)_ANT1



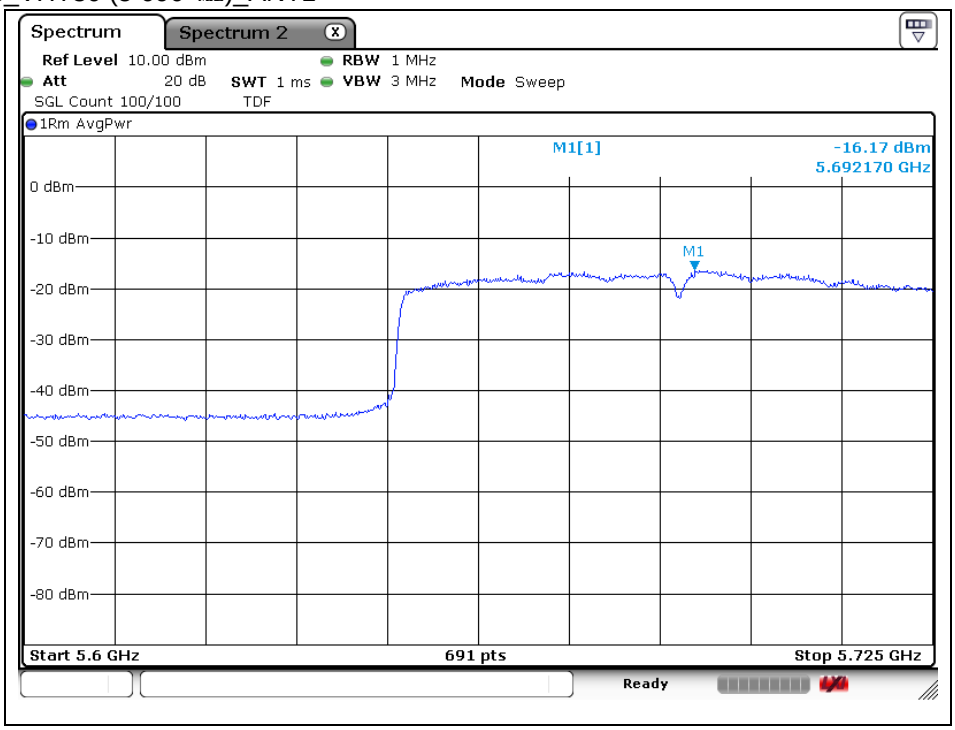
U-NII 2C 11n_HT40 (5 710 ㎒)_ANT2



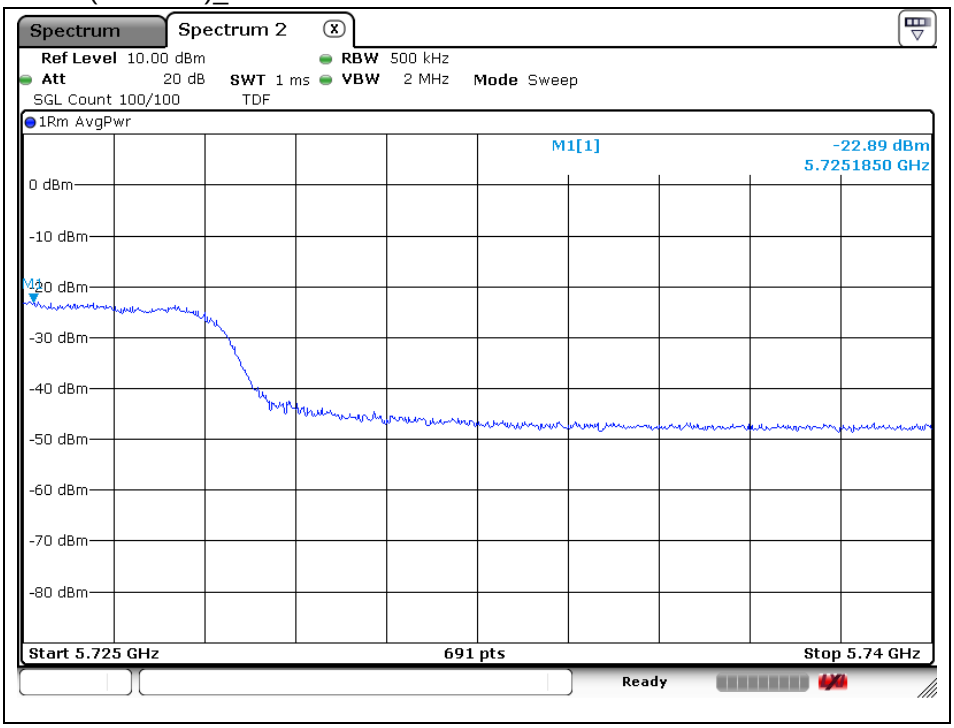
U-NII 3 11n_HT40 (5 710 ㎒)_ANT2



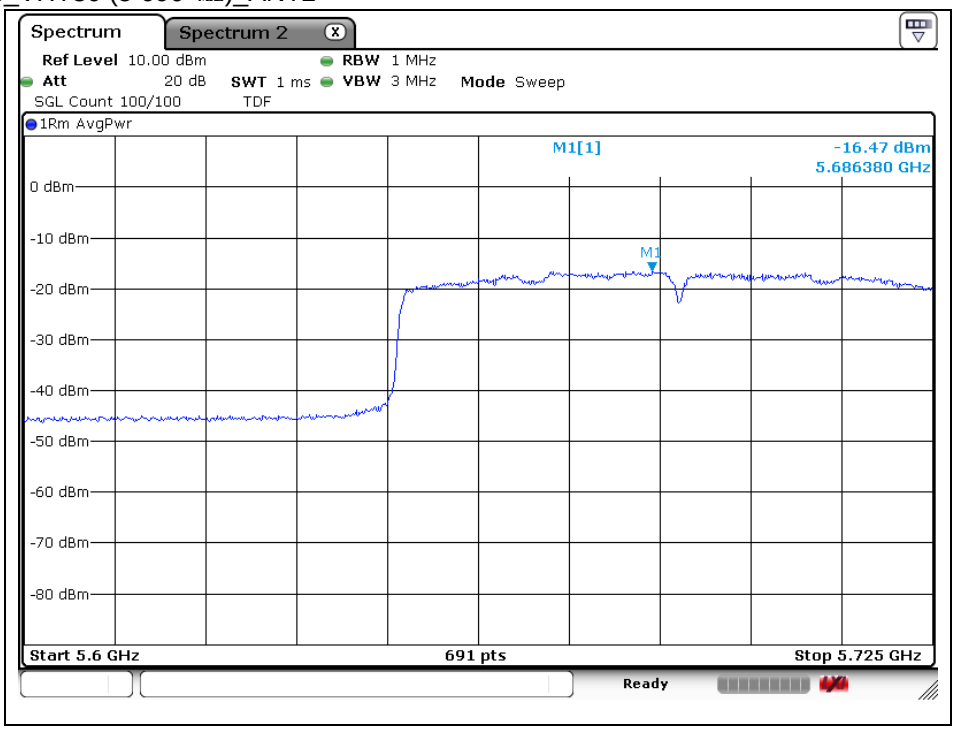
U-NII 2C 11ac_VHT80 (5 690 ㎒)_ANT1



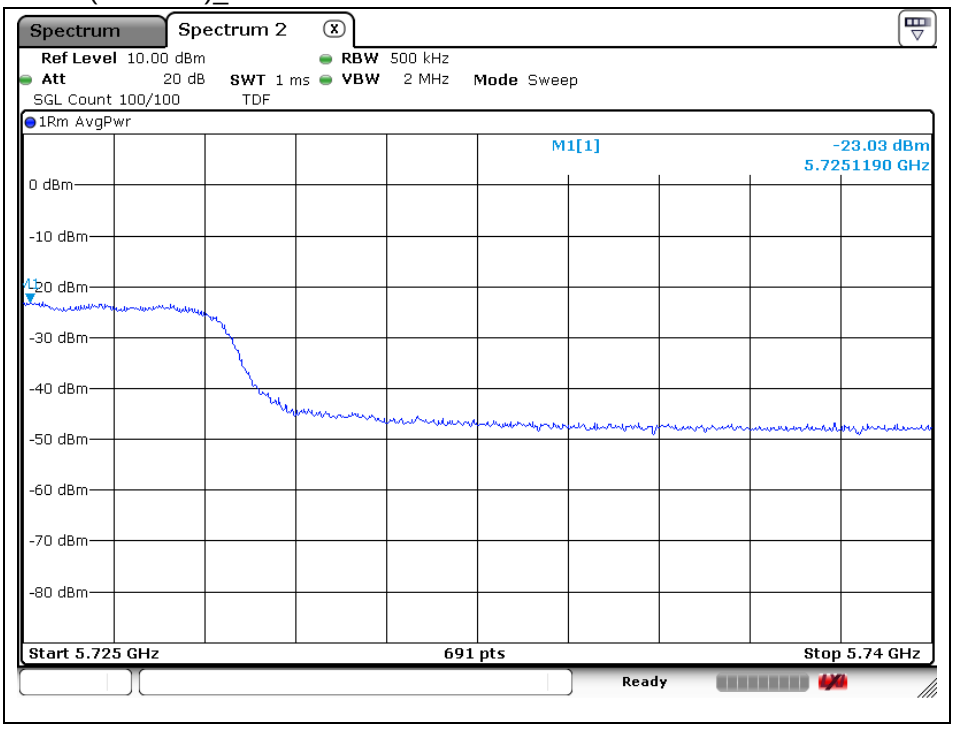
U-NII 3 11ac_VHT80 (5 690 ㎒)_ANT1



U-NII 2C 11ac_VHT80 (5 690 ㎒)_ANT2

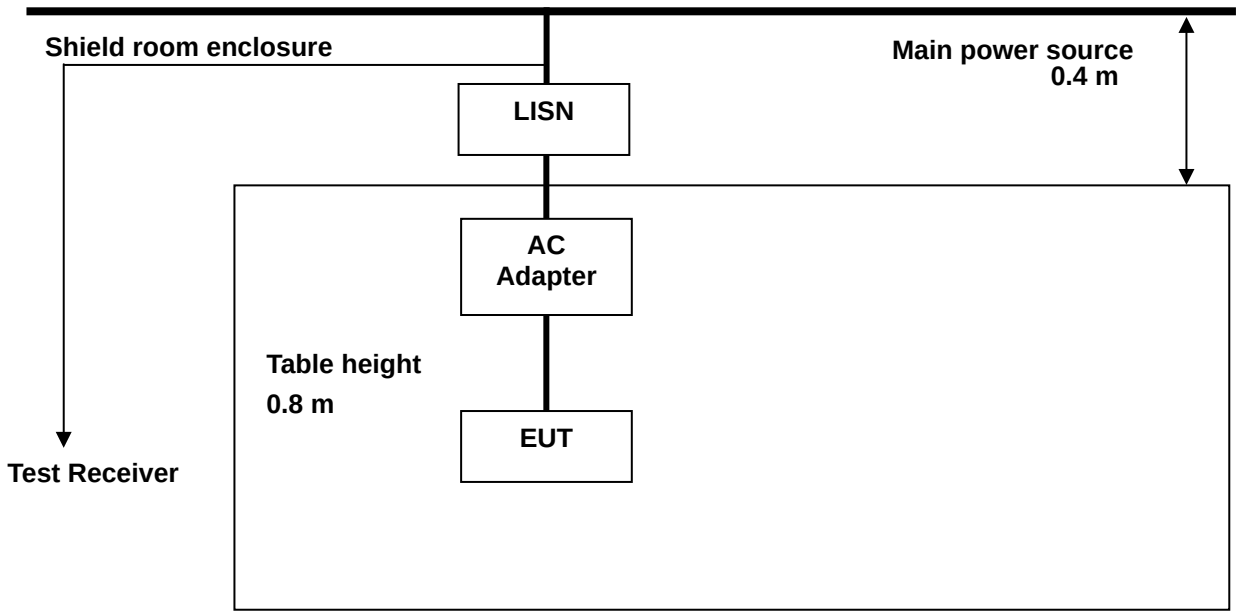


U-NII 3 11ac_VHT80 (5 690 ㎒)_ANT2



7. Transmitter AC Power Line Conducted Emission

7.1. Test Setup



7.2. Limit

7.2.1 FCC

According to §15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50 ㎕H /50 ohms line impedance stabilization network (LISN).

Compliance with the provision of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (㎒)	Conducted limit (dB㎶)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

7.2.2 IC

RSS-Gen Issue 5, 8.8, Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 ㎑ to 30 ㎒ shall not exceed the limits in table 4, as measured using a 50 ㎌ / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in table 4 shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

Table 4 - AC power-line conducted emissions limits

Frequency (㎒)	Conducted limit (㏈㎶)	
	Quasi-peak	Average
0.15-0.5	66 to 56[1]	56 to 46[1]
0.5-5	56	46
5-30	60	50

Note 1: The level decreases linearly with the logarithm of the frequency.

For an EUT with a permanent or detachable antenna operating between 150 ㎑ and 30 ㎒, the AC power-line conducted emissions must be measured using the following configurations:

(a) Perform the AC power-line conducted emissions test with the antenna connected to determine compliance with the limits of table 4 outside the transmitter's fundamental emission band.

(b) Retest with a dummy load instead of the antenna to determine compliance with the limits of table 4 within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network that simulates the antenna in the fundamental frequency band.

7.3. Test Procedures

AC conducted emissions from the EUT were measured according to the dictates of ANSI C63.10-2013

1. The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

7.4. Test Results

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line.

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

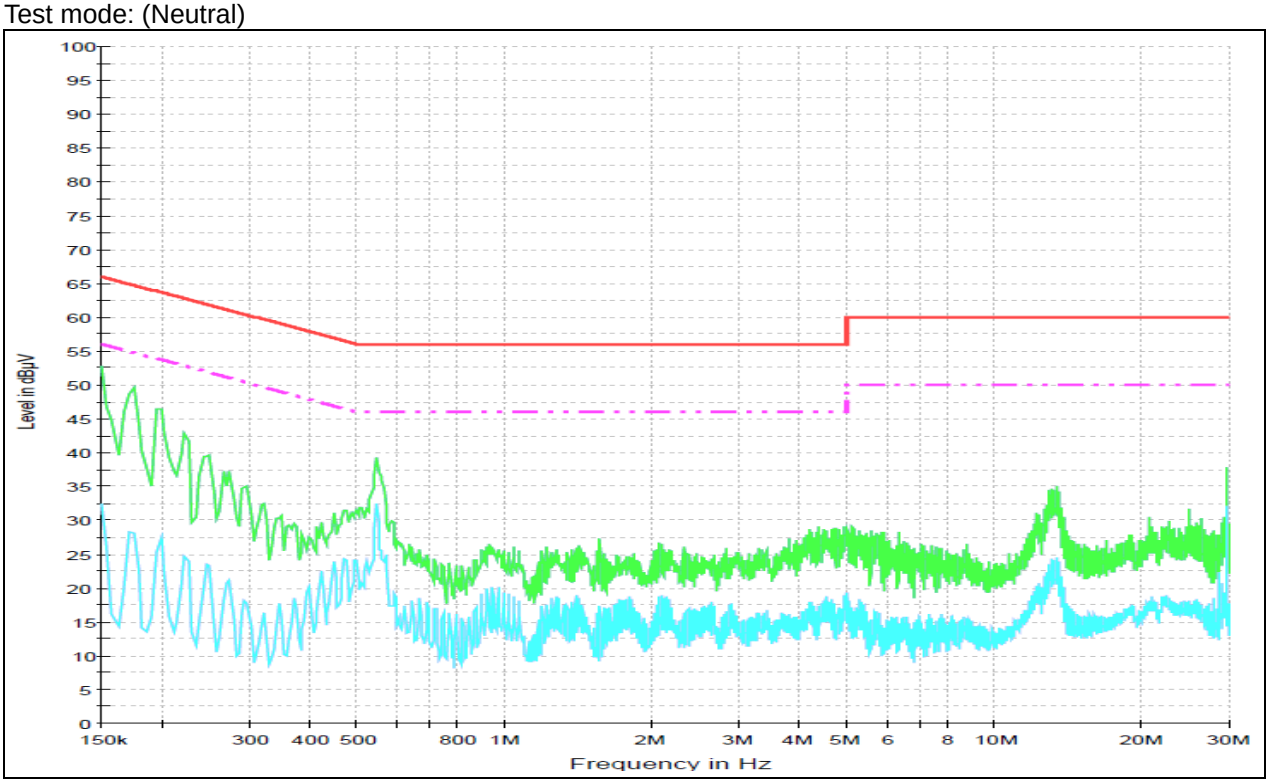
Frequency range : 0.15 ㎒ - 30 ㎒
Measured Bandwidth : 9 ㎑

FREQ.	LEVEL (dBμV)		LINE	LIMIT (dBμV)		MARGIN (dB)	
(㎒)	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.55	37.90	32.60	N	56.00	46.00	18.10	13.40
0.93	22.30	14.00	N	56.00	46.00	33.70	32.00
1.56	23.40	17.20	N	56.00	46.00	32.60	28.80
4.92	24.70	18.50	N	56.00	46.00	31.30	27.50
13.27	28.80	22.00	N	60.00	50.00	31.20	28.00
29.57	28.30	20.40	N	60.00	50.00	31.70	29.60
0.55	39.10	28.80	H	56.00	46.00	16.90	17.20
1.07	23.60	19.10	H	56.00	46.00	32.40	26.90
1.36	24.80	19.50	H	56.00	46.00	31.20	26.50
5.76	23.80	17.10	H	60.00	50.00	36.20	32.90
13.01	28.80	22.60	H	60.00	50.00	31.20	27.40
26.85	23.70	17.90	H	60.00	50.00	36.30	32.10

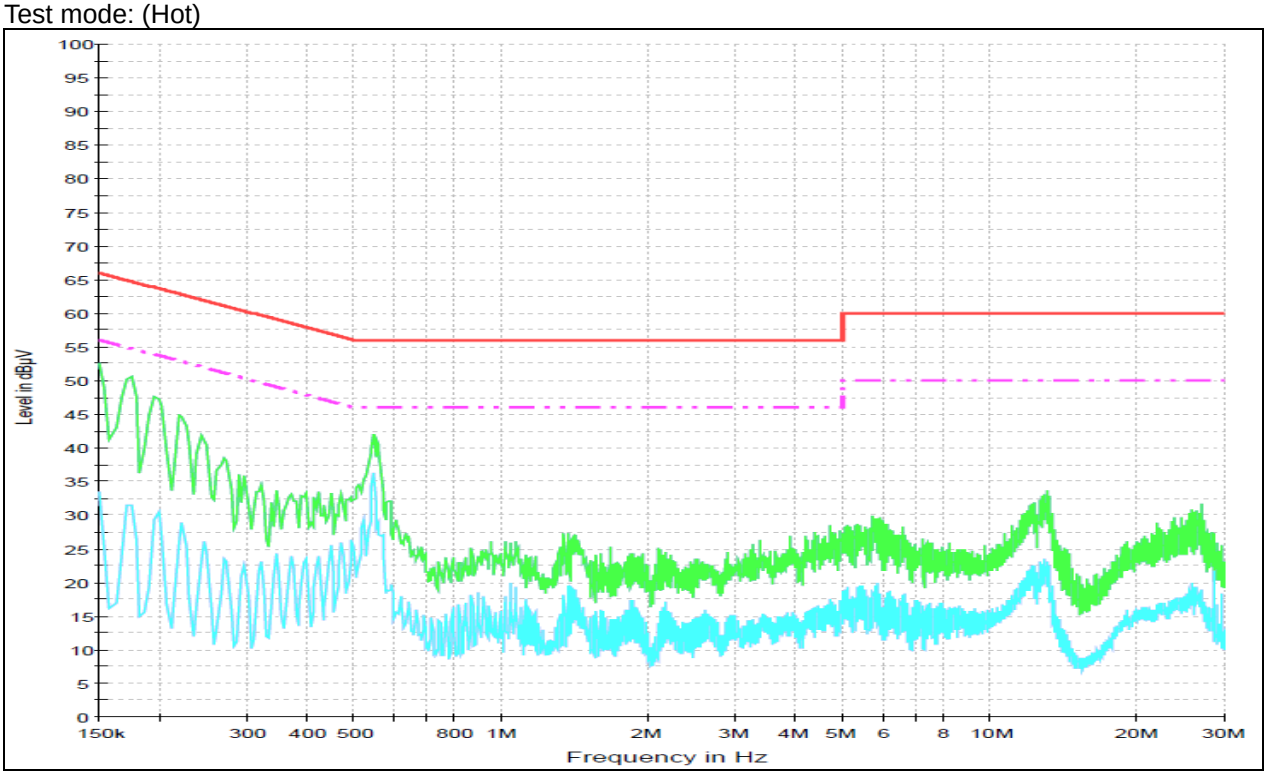
Remark;

1. Line (H): Hot, Line (N): Neutral.
2. All modes of operation were investigated and the worst-case emissions were reported using **11a (Band 3) / 6Mbps / Middle channel.**
3. The limit for Class B device(s) from 150 ㎑ to 30 ㎒ are specified in Section of the Title 47 CFR.
4. Traces shown in plot were made by using a peak detector and average detector.
5. Deviations to the Specifications: None.

Test mode: (Neutral)



Test mode: (Hot)



8. Antenna Requirement

8.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section §15.407 (a) if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the gain of the antenna exceeds 6 dBi.

8.2. Antenna Connected Construction

Antenna used in this product is Pattern Embadded Antenna and peak max gain of antenna as below.

Band	5 180 ㎒ – 5 825 ㎒
Mode	11a/n_HT20, HT40, 11ac_VHT20, VHT40, VHT80
ANT1 Gain	0.72 dBi
ANT2 Gain	2.27 dBi

Unequal antenna gains, with equal transmit powers. For antenna gains given by G_1, G_2, …, G_N dBi
(i) If transmit signals are correlated, then
Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2/N_{ANT}$] dBi [Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

Directional Gain = 4.54 dBi

- End of the Test Report -