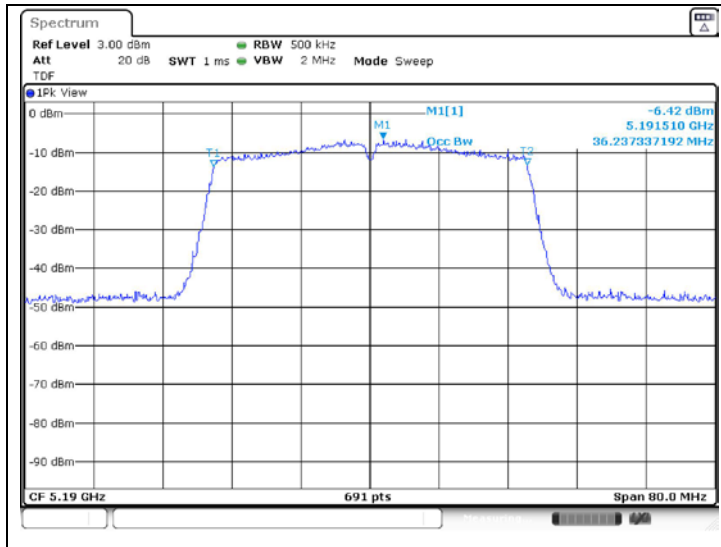
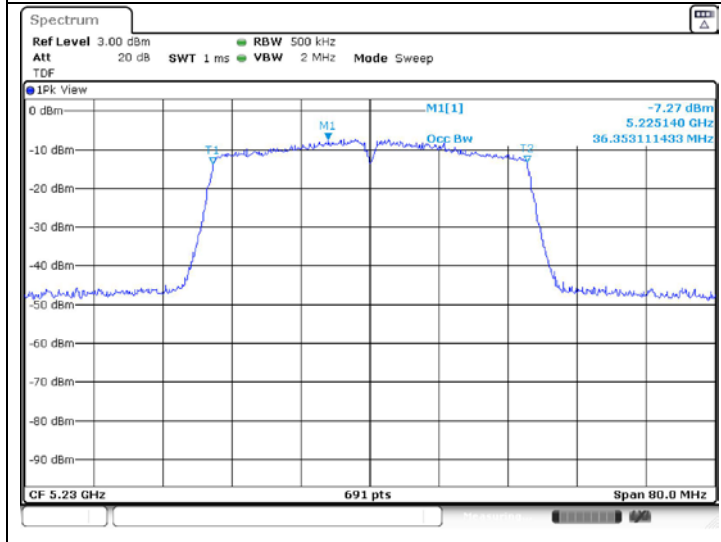


802.11n_HT40 (Band 1)

Low Channel
 (5 190 MHz)

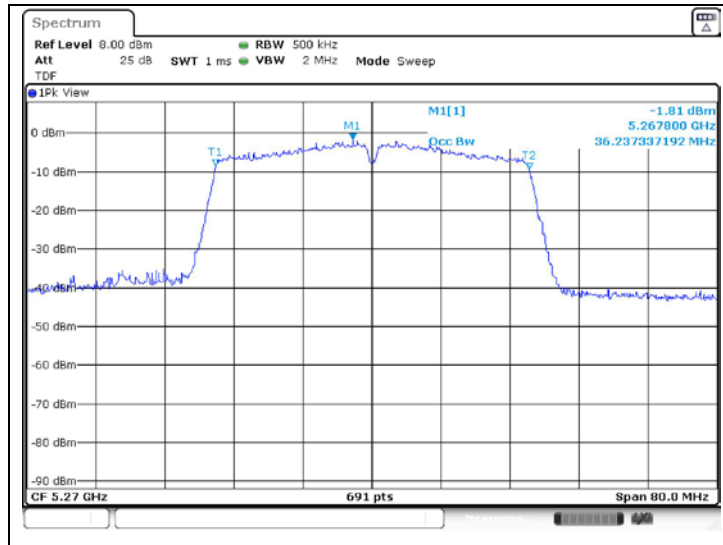


High Channel
 (5 230 MHz)

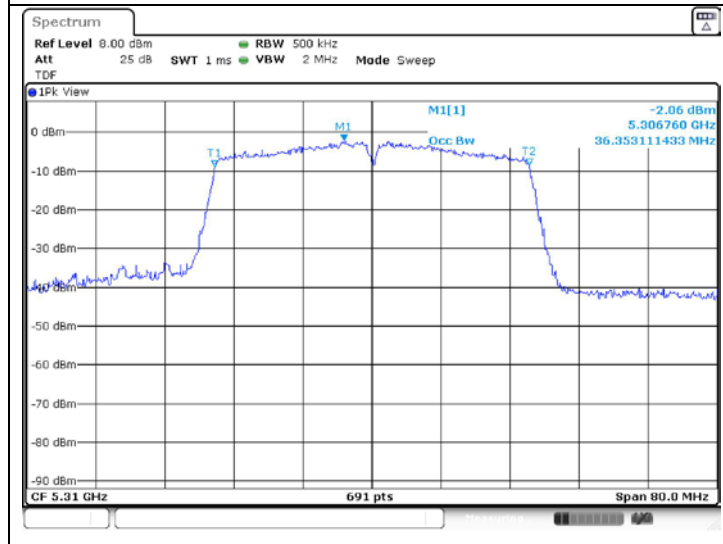


802.11n_HT40 (Band 2A)

Low Channel
 (5 270 MHz)

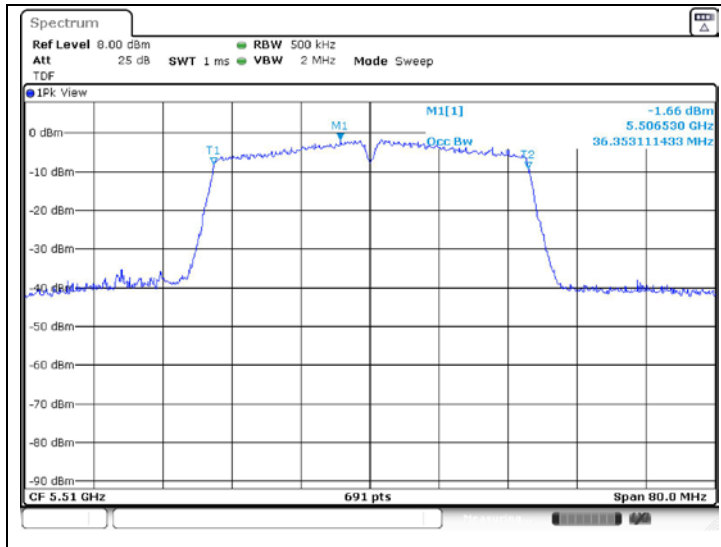


High Channel
 (5 310 MHz)

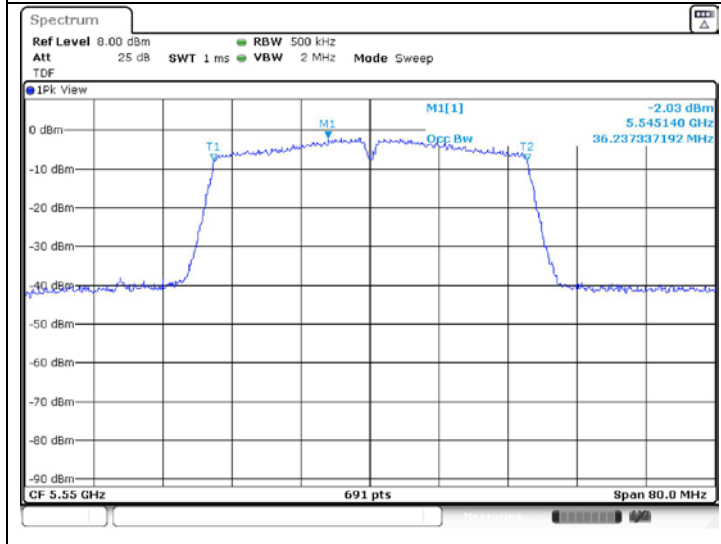


802.11n_HT40 (Band 2C)

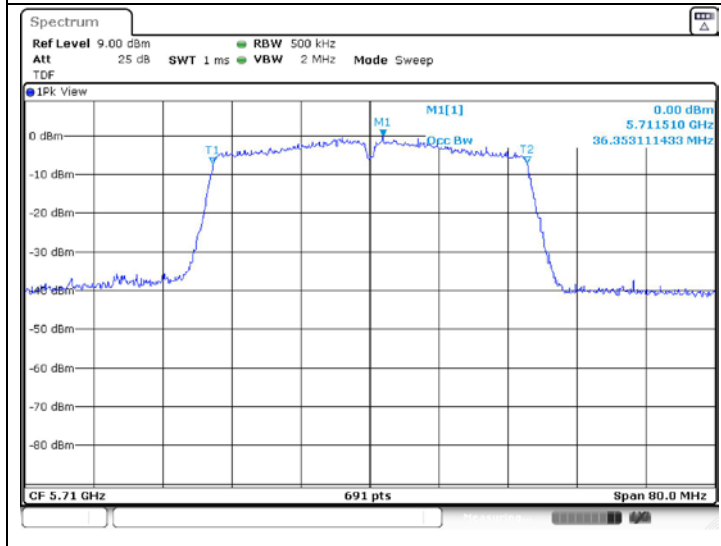
Low Channel
 (5 510 MHz)



Middle Channel
 (5 550 MHz)

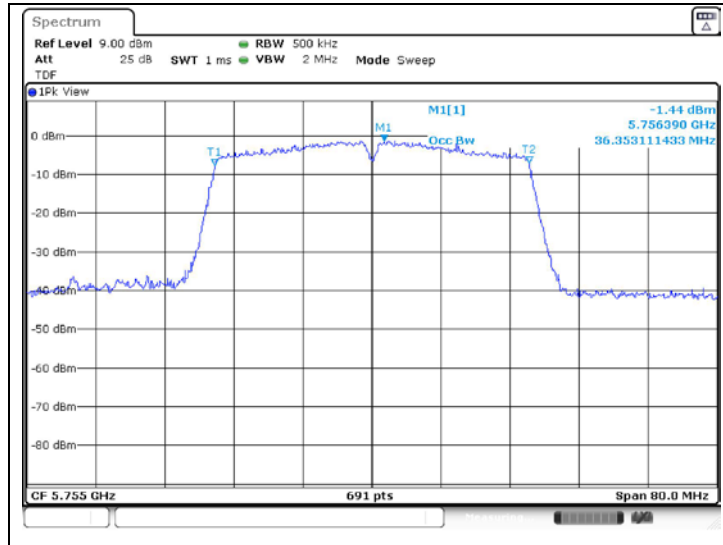


High Channel
 (5 710 MHz)

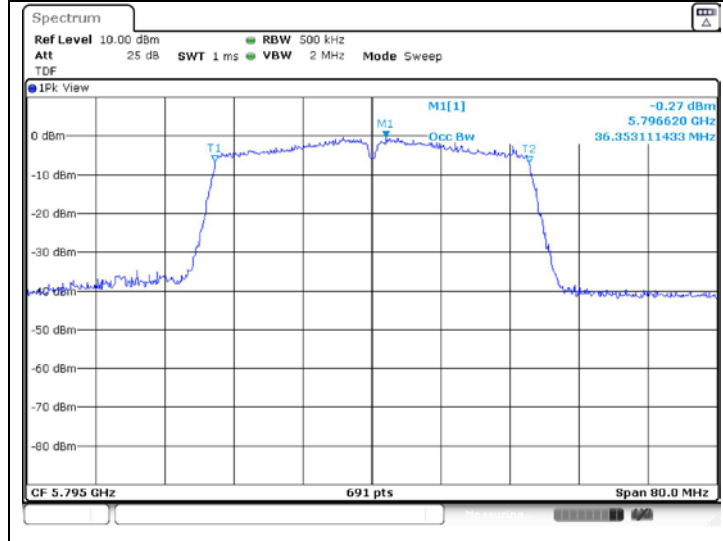


802.11n_HT40 (Band 3)

Low Channel
 (5 755 MHz)

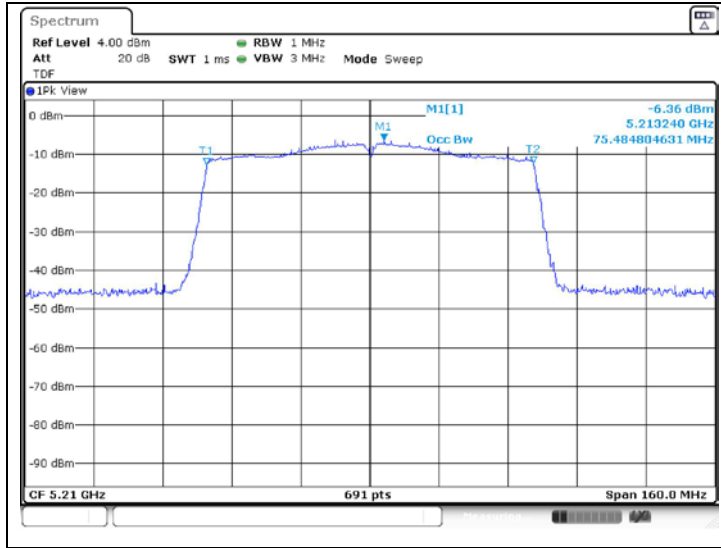


High Channel
 (5 795 MHz)



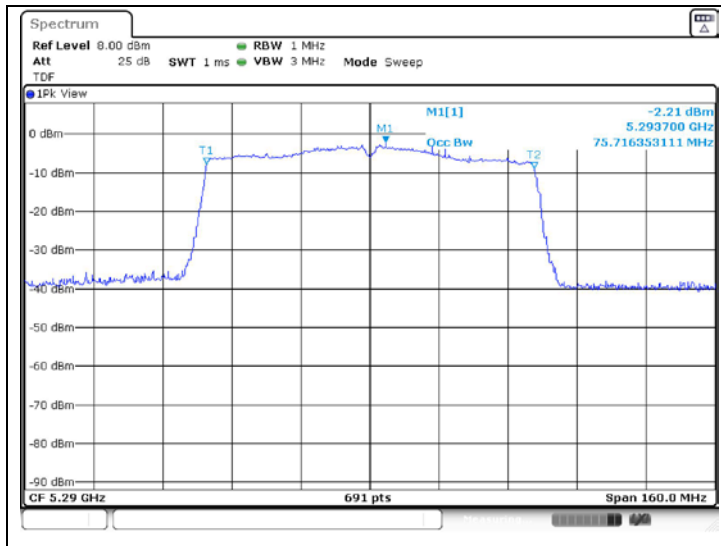
802.11ac_VHT80 (Band 1)

Middle Channel
 (5 210 MHz)



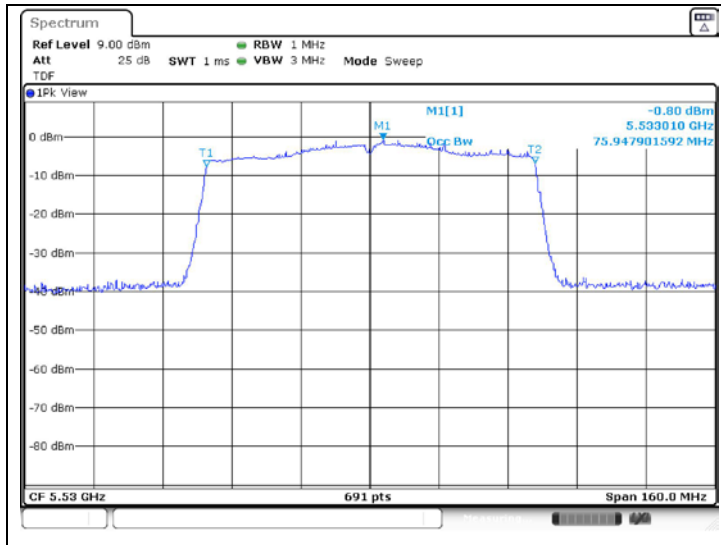
802.11ac_VHT80 (Band 2A)

Middle Channel
 (5 290 MHz)

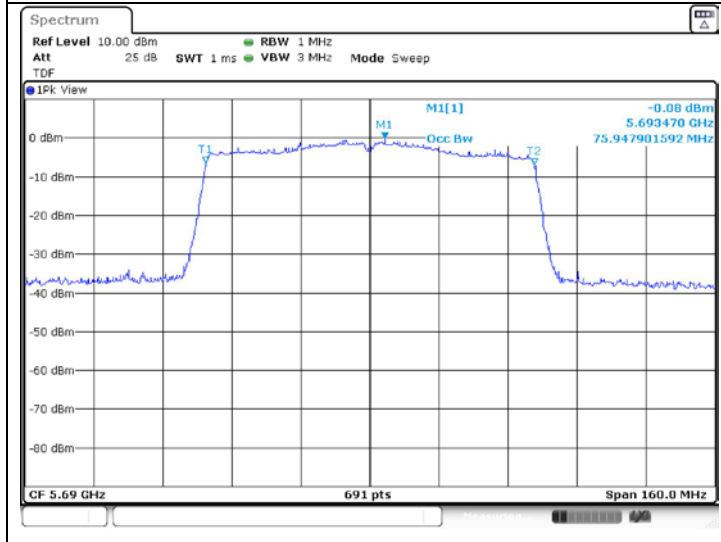


802.11ac_VHT80 (Band 2C)

Low Channel
 (5 530 MHz)

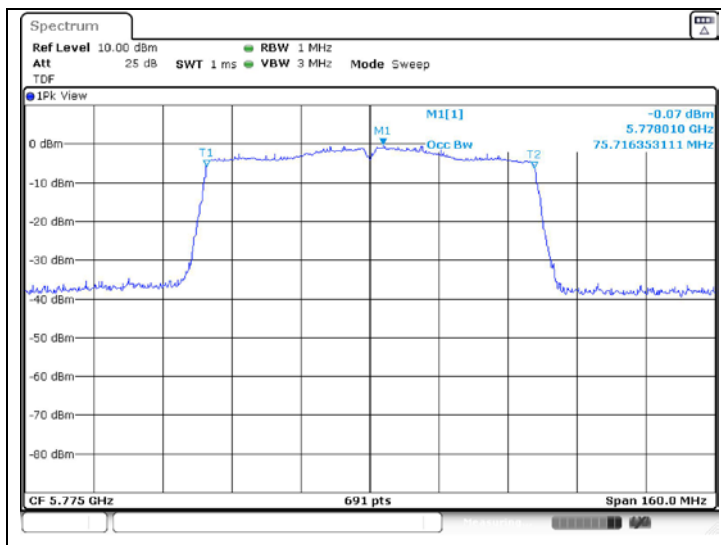


High Channel
 (5 690 MHz)



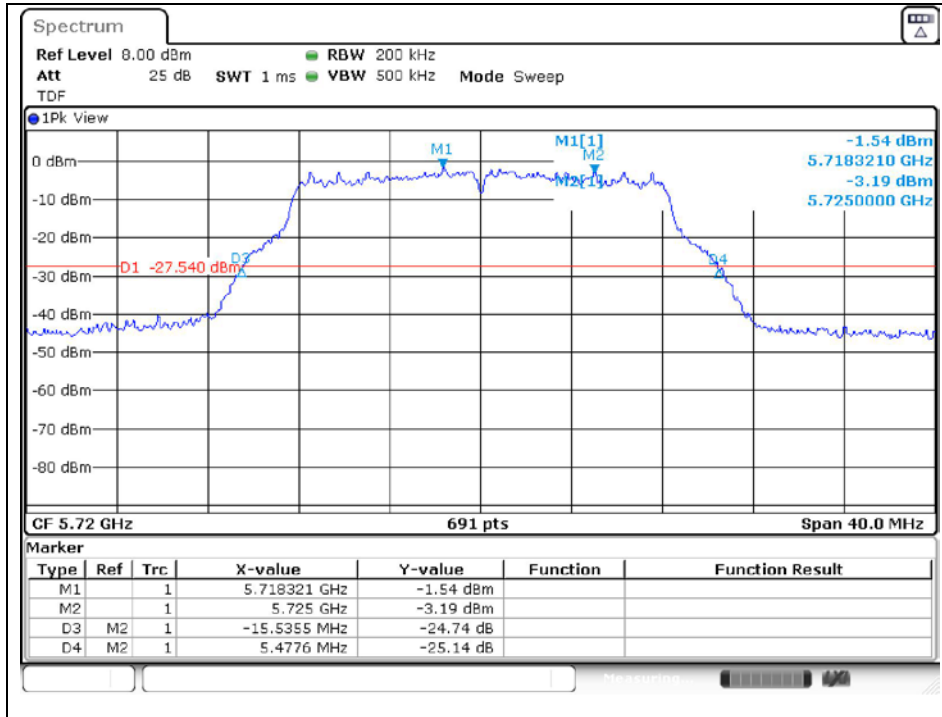
802.11ac_VHT80 (Band 3)

Middle Channel
 (5 775 MHz)

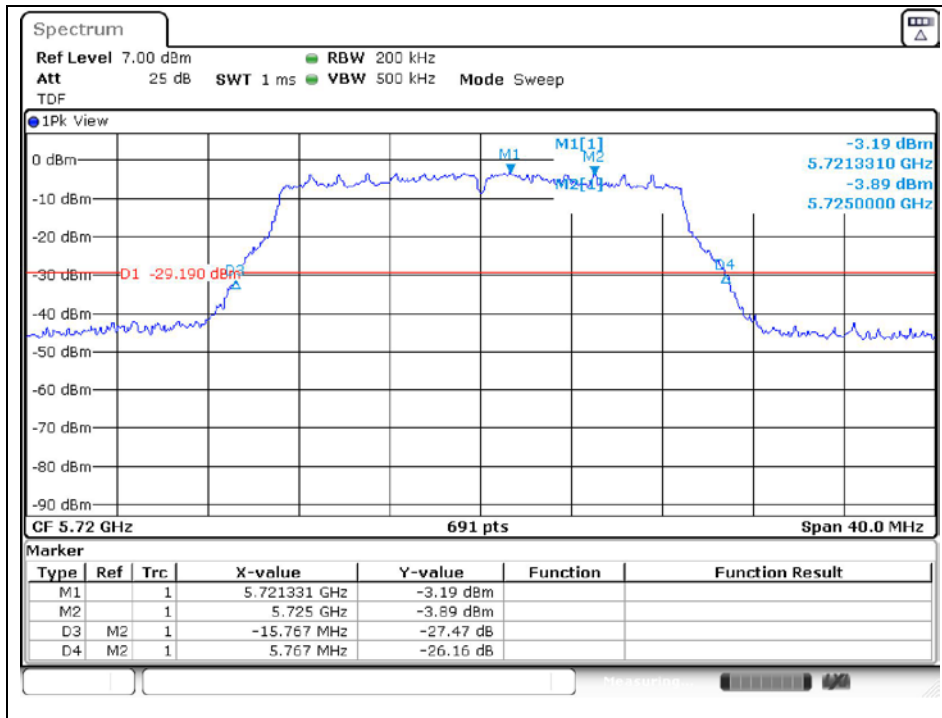


Band-crossing channels

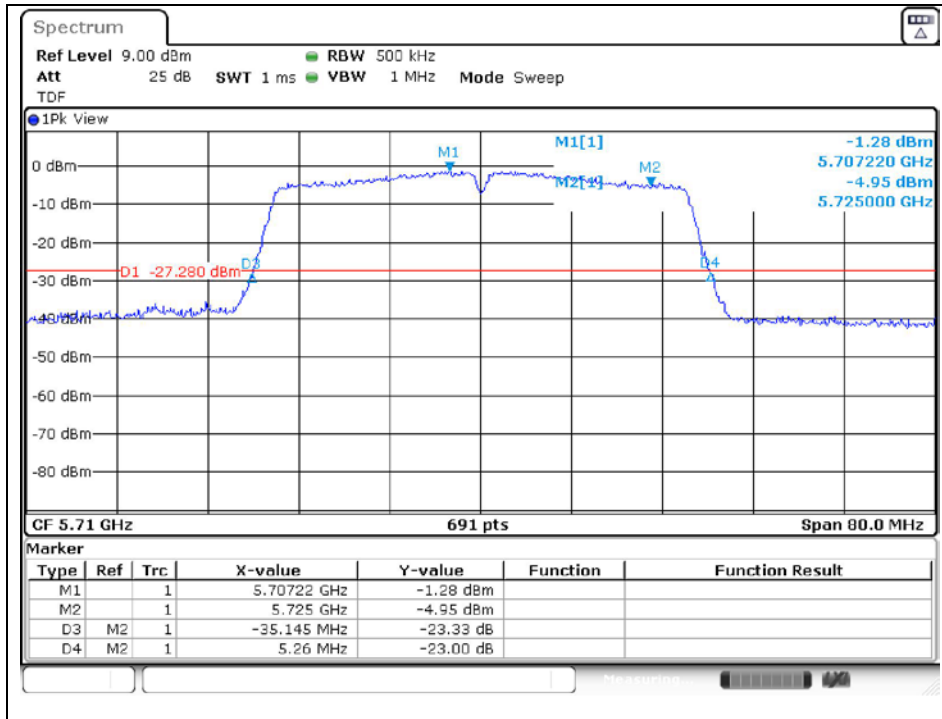
802.11a (5 720 MHz)



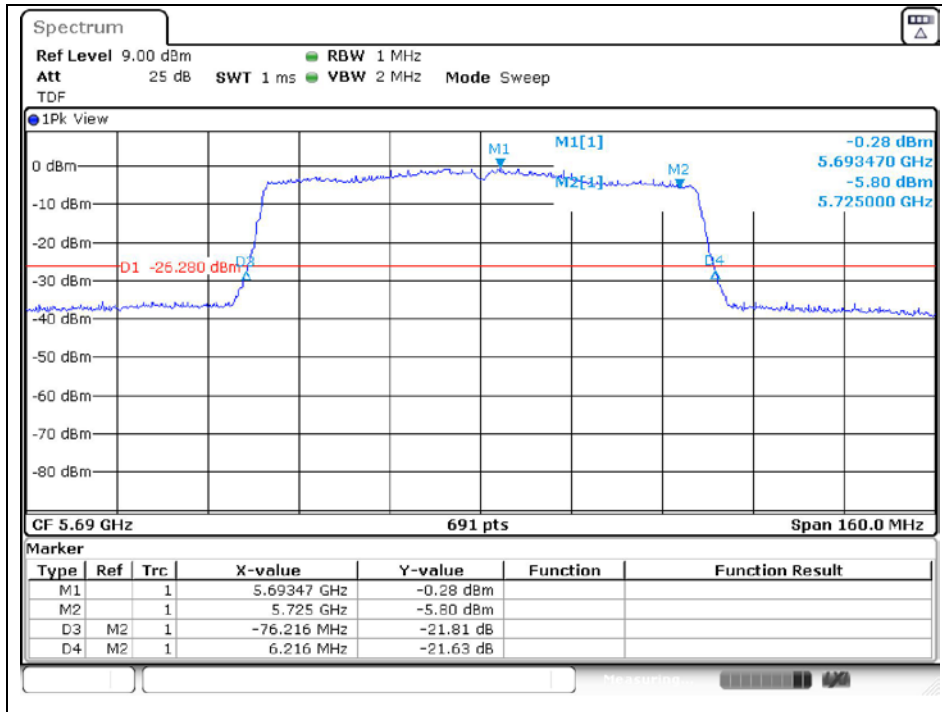
802.11n_HT20 (5 720 MHz)



802.11n_HT40 (5 710 MHz)



802.11ac_VHT80 (5 690 MHz)



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 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

4.2.2. IC

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

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 II.C.2 of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set RBW = 100 kHz.
3. Set the video bandwidth (VBW) $\geq 3 \times$ 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 General UNII Test Procedures New Rules v02r01.

4.4. Test Result

Ambient temperature : (23 ± 1) °C

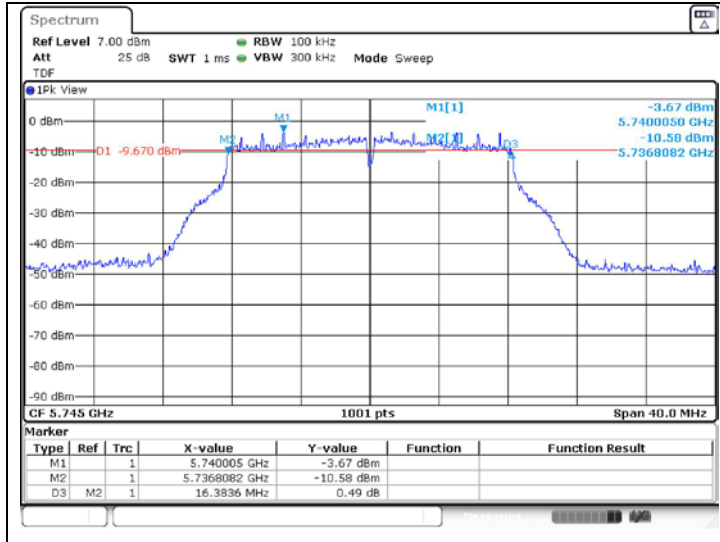
Relative humidity : 47 % R.H.

Band	Mode	Frequency (MHz)	Ch.	Data Rate (Mbps)	6 dB Bandwidth (MHz)	Minimum Bandwidth (kHz)
U-NII 3	11a	5 745	149	6	16.384	500
		5 785	157		16.384	
		5 825	165		16.384	
	11n_HT20	5 745	149	MCS2	17.423	
		5 785	157		17.622	
		5 825	165		17.702	
	11n_HT40	5 755	151	MCS0	35.964	
		5 795	159		35.964	
	11ac_VHT80	5 775	155	MCS0	75.764	
U-NII 3 (Band-crossing channels)	11a	5 720	144	6	3.220	
	11n_HT20	5 720	144	MCS2	3.509	
	11n_HT40	5 710	142	MCS0	3.061	
	11ac_VHT80	5 690	138	MCS0	2.974	

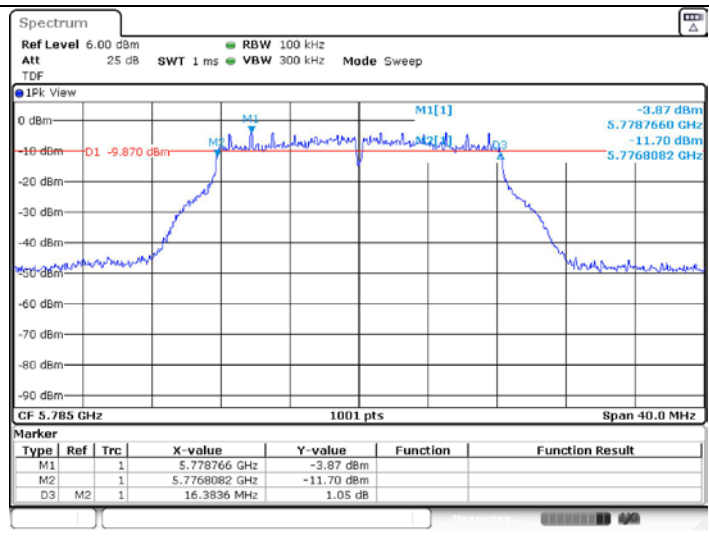
- Test plots

802.11a (Band 3)

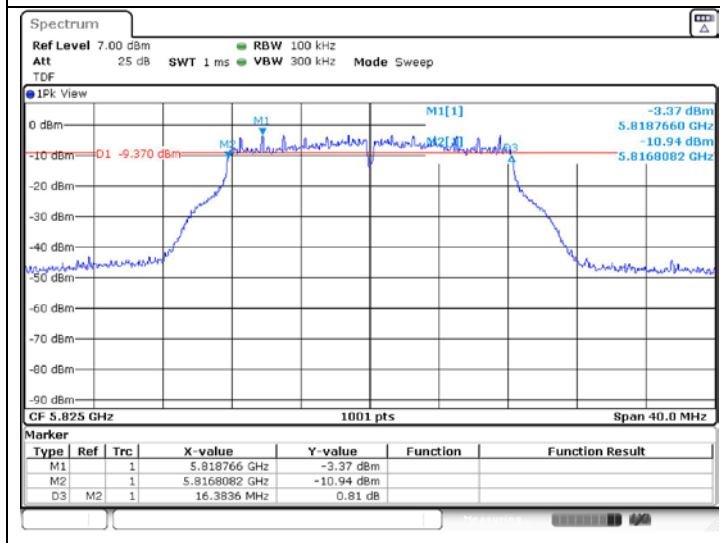
Low Channel
 (5 745 MHz)



Middle Channel
 (5 785 MHz)

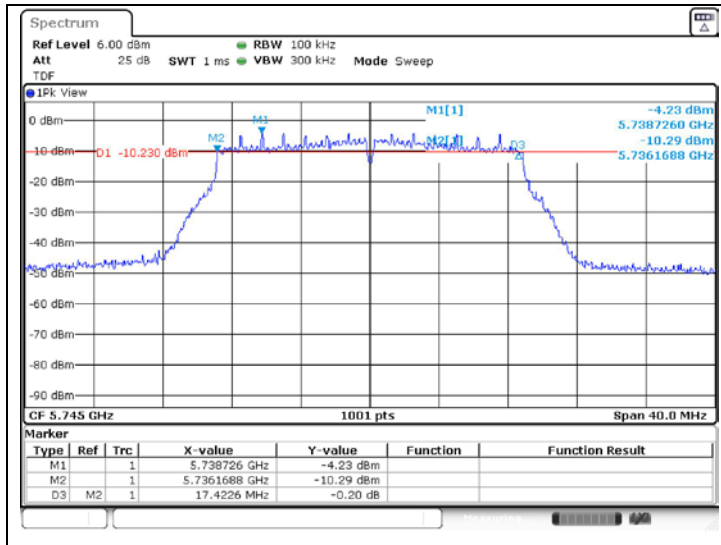


High Channel
 (5 825 MHz)

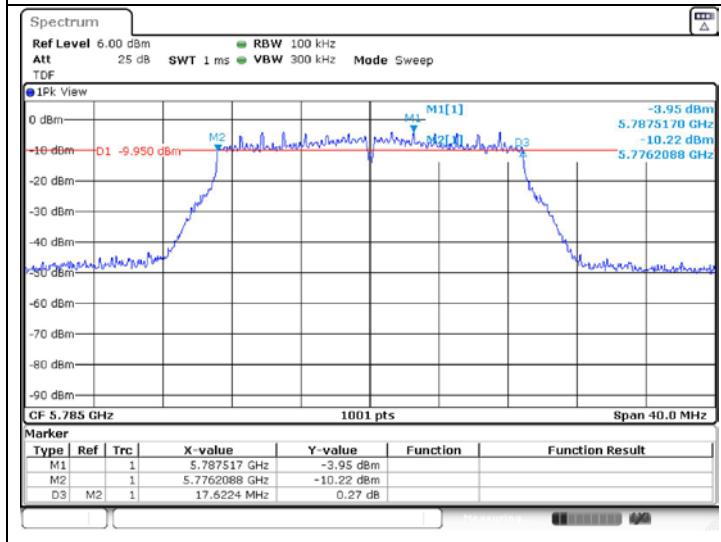


802.11n_HT20 (Band 3)

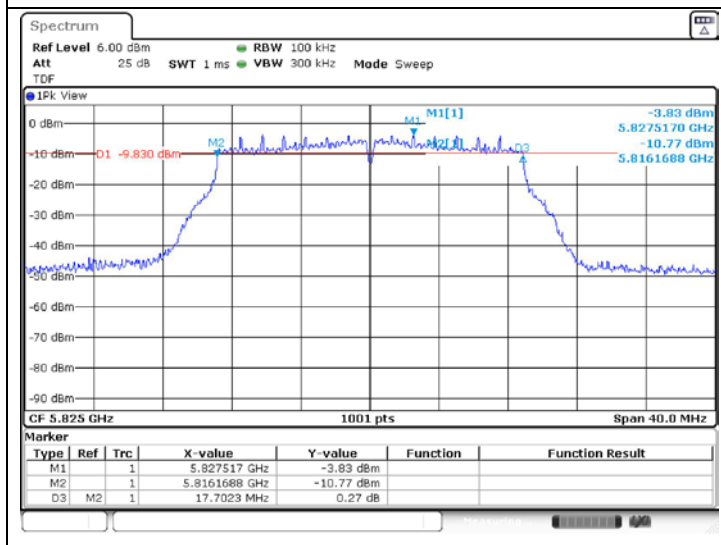
Low Channel
 (5 745 MHz)



Middle Channel
 (5 785 MHz)

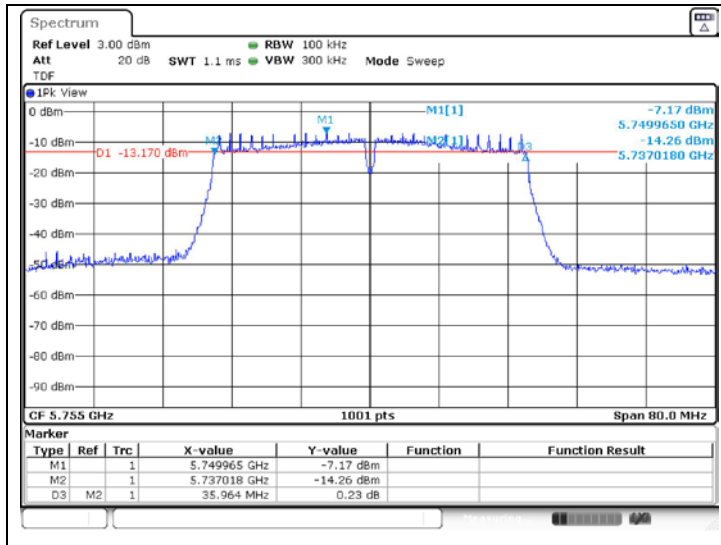


High Channel
 (5 825 MHz)

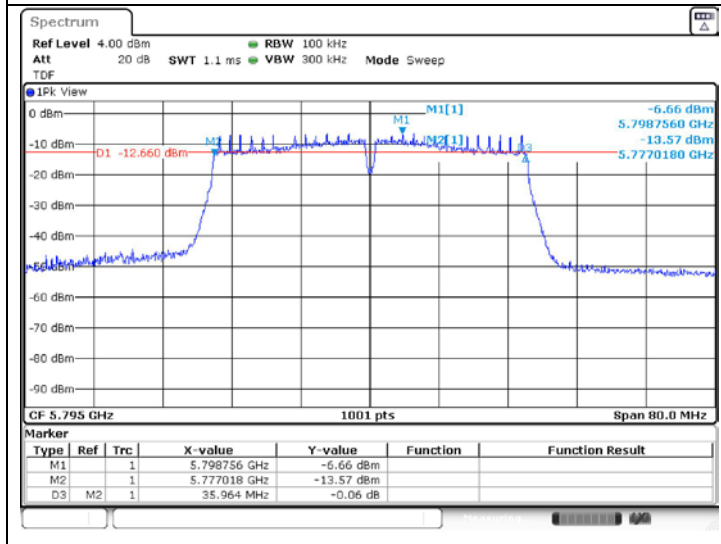


802.11n_HT40 (Band 3)

Low Channel
 (5 755 MHz)

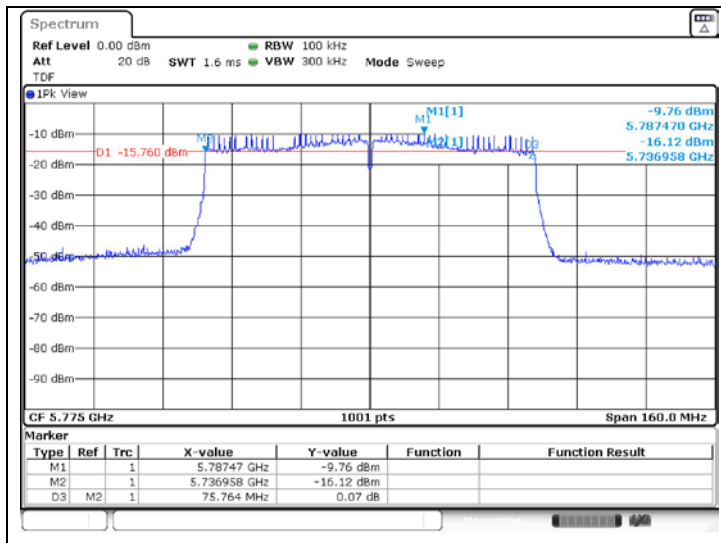


High Channel
 (5 795 MHz)



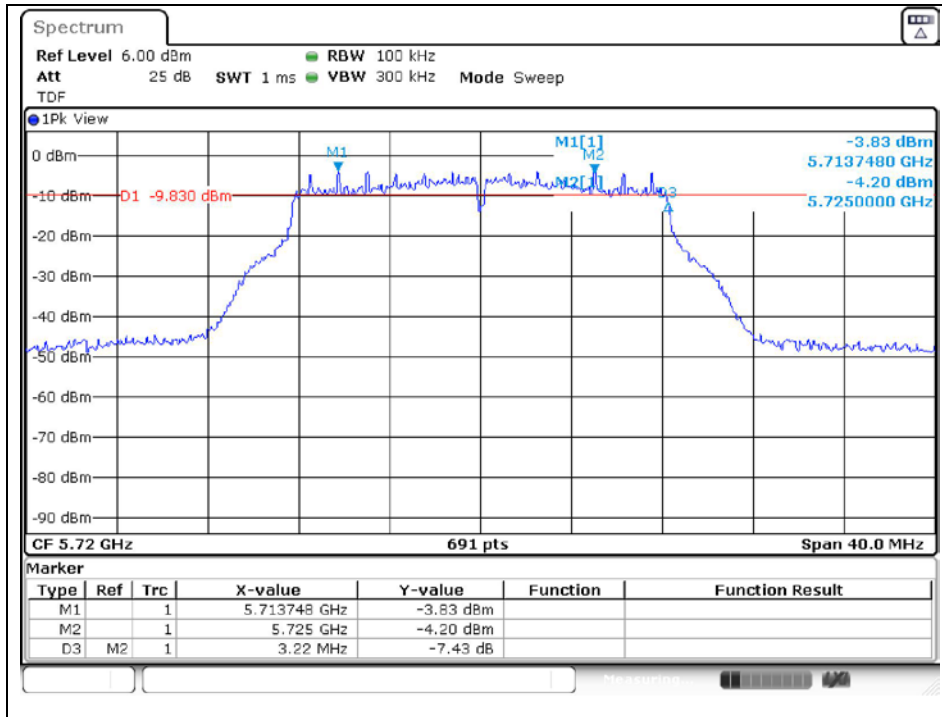
802.11ac_VHT80 (Band 3)

Middle Channel
 (5 775 MHz)

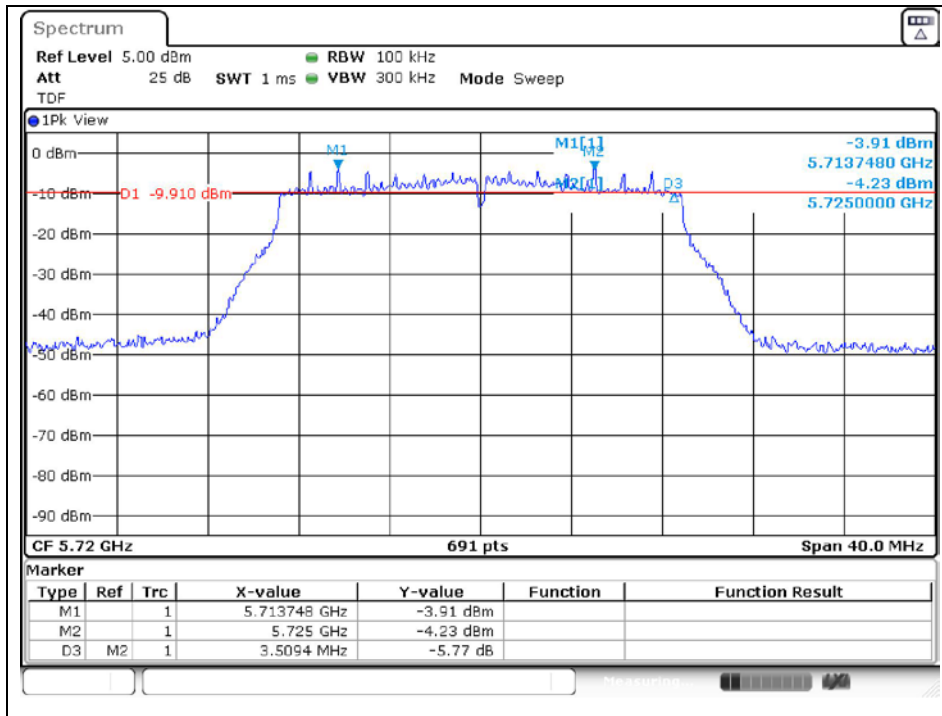


Band-crossing channels

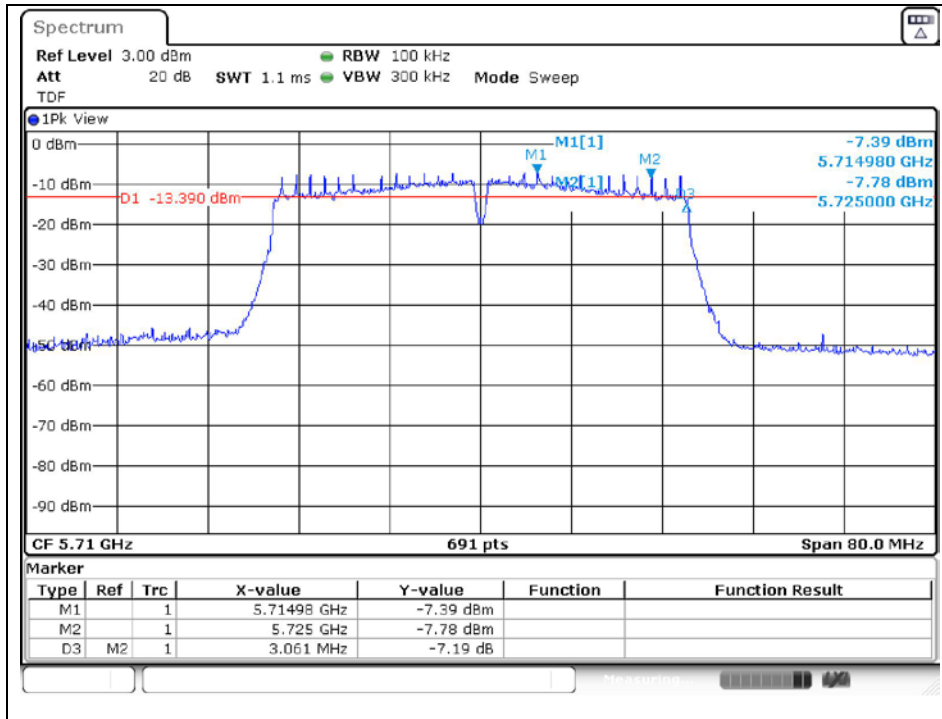
802.11a (5 720 MHz)



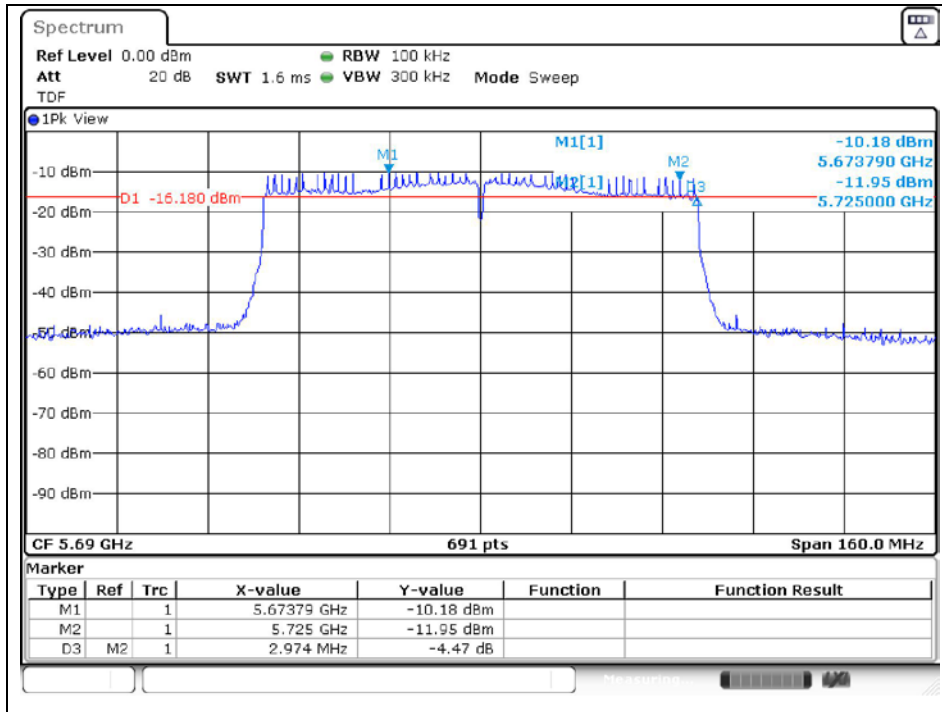
802.11n_HT20 (5 720 MHz)



802.11n_HT40 (5 710 MHz)

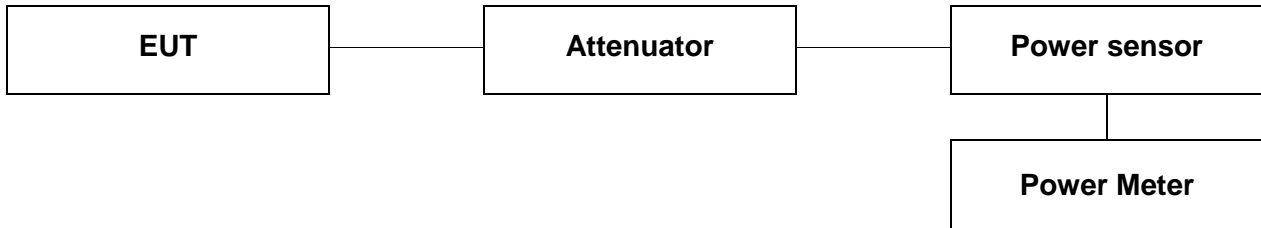


802.11ac_VHT80 (5 690 MHz)



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

According to 15.407(a)(2)

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

According to 15.407(a)(3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

5.2.2. IC

According to RSS-247 Issue 2,

6.2.1.1 Frequency band 5 150-5 250 MHz

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

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

6.2.2.1 Frequency band 5 250-5 350 MHz

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

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

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

b) The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dB 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 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

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

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

The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dB 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 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

6.2.4.1 Frequency band 5 725-5 850 MHz

For equipment operating in the band 5 725-5 850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz. The maximum conducted output power shall not exceed 1 W. The output power spectral density shall not exceed 30 dB m in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the output power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint³ systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

5.3. 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 II.E.3.a of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. 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.
3. If the transmitter does not transmit continuously, measure the duty cycle, x , of the transmitter output signal as described in section II.B.
4. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
5. 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 %).
6. In case of band crossing channels 138, 142 and 144, the measurement is complied with section III.A of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

5.4. Test Result

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

Test mode: 11a

Band	Frequency (MHz)	Data Rate (Mbps)	Average Power (dB m)	Duty Cycle Correction Factor (dB)	Average Power Result (dB m)
U-NII 1	5 180	6	8.37	0.29	8.66
	5 220		8.64		8.93
	5 240		8.57		8.86
U-NII 2A	5 260		8.58		8.87
	5 300		8.59		8.88
	5 320		8.73		9.02
U-NII 2C	5 500		8.05		8.34
	5 580		7.95		8.24
	5 720		7.36		7.65
U-NII 3	5 745		7.15		7.44
	5 785		7.75		8.04
	5 825		7.87		8.16

Band	Frequency (MHz)	Data Rate (Mbps)	Average Power Result (dB m)	Antenna Gain (dB i)	E.I.R.P. (dB m)
U-NII 1	5 180	6	8.66	2.75	11.41
	5 220		8.93		11.68
	5 240		8.86		11.61
U-NII 2A	5 260		8.87	2.75	11.62
	5 300		8.88		11.63
	5 320		9.02		11.77

Band	FCC Limit					
	Frequency (MHz)	Fixed Limit (dB m)	26 dB BW (MHz)	11+10LogB (dB m)	Antenna Gain (dB i)	Limit (dB m)
U-NII 1	5 180	23.98	/		2.75	23.98
	5 220					
	5 240					
U-NII 2A	5 260	23.98	21.013	24.22	2.75	23.98
	5 300		21.245	24.27		
	5 320		21.071	24.24		
U-NII 2C	5 500	23.98	21.187	24.26	-0.80	23.98
	5 580		21.013	24.22		
	5 720		21.187	24.26		
U-NII 3	5 745	30	/		-1.24	30
	5 785					
	5 825					

Band	IC Limit					
	Frequency (MHz)	Fixed Limit (dB m)	99 % BW (MHz)	1.76+10LogB (dB m)	Antenna Gain (dB i)	Limit (dB m)
U-NII 1	5 180	14.77	17.019	14.07	2.75	14.07
	5 220		17.019	14.07		14.07
	5 240		17.019	14.07		14.07
U-NII 2A	5 260	14.77	17.019	14.07	2.75	14.07
	5 300		17.019	14.07		14.07
	5 320		17.019	14.07		14.07

Band	IC Limit					
	Frequency (MHz)	Fixed Limit (dB m)	99 % BW (MHz)	11+10LogB (dB m)	Antenna Gain (dB i)	Limit (dB m)
U-NII 2C	5 500	23.98	17.019	23.31	-0.80	23.31
	5 580		17.077	23.32		23.32
	5 720		17.077	23.32		23.32
U-NII 3	5 745	30			-1.24	30
	5 785					
	5 825					

Remark;

1. Average Power Result (dB m) = Average Power (dB m) + Duty Cycle Correction Factor (dB)
2. E.I.R.P. (dB m) = Average Power Result (dB m) + Antenna Gain (dB i)

Test mode: 11n_HT20

Band	Frequency (MHz)	Data Rate (Mbps)	Average Power (dB m)	Duty Cycle Correction Factor (dB)	Average Power Result (dB m)
U-NII 1	5 180	MCS2	7.82	0.83	8.65
	5 220		7.92		8.75
	5 240		8.03		8.86
U-NII 2A	5 260		7.91		8.74
	5 300		8.01		8.84
	5 320		8.10		8.93
U-NII 2C	5 500		7.29		8.12
	5 580		7.27		8.10
	5 720		6.70		7.53
U-NII 3	5 745		6.53		7.36
	5 785		7.17		8.00
	5 825		7.06		7.89

Band	Frequency (MHz)	Data Rate (Mbps)	Average Power Result (dB m)	Antenna Gain (dB i)	E.I.R.P. (dB m)
U-NII 1	5 180	MCS2	8.65	2.75	11.40
	5 220		8.75		11.50
	5 240		8.86		11.61
U-NII 2A	5 260		8.74	2.75	11.49
	5 300		8.84		11.59
	5 320		8.93		11.68

Band	FCC Limit					
	Frequency (MHz)	Fixed Limit (dB m)	26 dB BW (MHz)	11+10LogB (dB m)	Antenna Gain (dB i)	Limit (dB m)
U-NII 1	5 180	23.98	/		2.75	23.98
	5 220					
	5 240					
U-NII 2A	5 260	23.98	21.418	24.31	2.75	23.98
	5 300		21.476	24.32		
	5 320		21.534	24.33		
U-NII 2C	5 500	23.98	21.418	24.31	-0.80	23.98
	5 580		21.418	24.31		
	5 720		21.360	24.30		
U-NII 3	5 745	30	/		-1.24	30
	5 785					
	5 825					

Band	IC Limit					
	Frequency (MHz)	Fixed Limit (dB m)	99 % BW (MHz)	1.76+10LogB (dB m)	Antenna Gain (dB i)	Limit (dB m)
U-NII 1	5 180	14.77	18.003	14.31	2.75	14.31
	5 220		17.945	14.30		14.30
	5 240		17.945	14.30		14.30
U-NII 2A	5 260	14.77	17.945	14.30	2.75	14.30
	5 300		17.945	14.30		14.30
	5 320		17.945	14.30		14.30

Band	IC Limit					
	Frequency (MHz)	Fixed Limit (dB m)	99 % BW (MHz)	11+10LogB (dB m)	Antenna Gain (dB i)	Limit (dB m)
U-NII 2C	5 500	23.98	18.003	23.55	-0.80	23.55
	5 580		17.945	23.54		23.54
	5 720		17.945	23.54		23.54
U-NII 3	5 745	30			-1.24	30
	5 785					
	5 825					

Remark;

1. Average Power Result (dB m) = Average Power (dB m) + Duty Cycle Correction Factor (dB)
2. E.I.R.P. (dB m) = Average Power Result (dB m) + Antenna Gain (dB i)

Test mode: 11n_HT40

Band	Frequency (MHz)	Data Rate (Mbps)	Average Power (dB m)	Duty Cycle Correction Factor (dB)	Average Power Result (dB m)
U-NII 1	5 190	MCS0	3.20	0.61	3.81
	5 230		3.37		3.98
U-NII 2A	5 270		7.91		8.52
	5 310		8.11		8.72
U-NII 2C	5 510		7.32		7.93
	5 550		7.51		8.12
	5 710		6.85		7.46
U-NII 3	5 755		6.40		7.01
	5 795		7.07		7.68

Band	Frequency (MHz)	Data Rate (Mbps)	Average Power Result (dB m)	Antenna Gain (dB i)	E.I.R.P. (dB m)
U-NII 1	5 190	MCS0	3.81	2.75	6.56
	5 230		3.98		6.73
U-NII 2A	5 270		8.52	2.75	11.27
	5 310		8.72		11.47

Band	FCC Limit					
	Frequency (MHz)	Fixed Limit (dB m)	26 dB BW (MHz)	11+10LogB (dB m)	Antenna Gain (dB i)	Limit (dB m)
U-NII 1	5 190	23.98			2.75	23.98
	5 230					
U-NII 2A	5 270	23.98	40.058	27.03	2.75	23.98
	5 310		40.521	27.08		
U-NII 2C	5 510	23.98	40.405	27.06	-0.80	23.98
	5 550		40.058	27.03		
	5 710		40.174	27.04		
U-NII 3	5 755	30			-1.24	30
	5 795					

Band	IC Limit					
	Frequency (MHz)	Fixed Limit (dB m)	99 % BW (MHz)	1.76+10LogB (dB m)	Antenna Gain (dB i)	Limit (dB m)
U-NII 1	5 190	14.77	36.237	17.35	2.75	14.77
	5 230		36.353	17.37		
U-NII 2A	5 270	14.77	36.237	17.35	2.75	14.77
	5 310		36.353	17.37		

Band	IC Limit					
	Frequency (MHz)	Fixed Limit (dB m)	99 % BW (MHz)	11+10LogB (dB m)	Antenna Gain (dB i)	Limit (dB m)
U-NII 2C	5 510	23.98	36.353	26.61	-0.80	23.98
	5 550		36.237	26.59		
	5 710		36.353	26.61		
U-NII 3	5 755	30			-1.24	30
	5 795					

Remark;

1. Average Power Result (dB m) = Average Power (dB m) + Duty Cycle Correction Factor (dB)
2. E.I.R.P. (dB m) = Average Power Result (dB m) + Antenna Gain (dB i)

Test mode: 11ac_VHT80

Band	Frequency (MHz)	Data Rate (Mbps)	Average Power (dB m)	Duty Cycle Correction Factor (dB)	Average Power Result (dB m)
U-NII 1	5 210	MCS0	2.39	1.17	3.56
U-NII 2A	5 290		6.33		7.50
U-NII 2C	5 530		6.87		8.04
	5 690		6.50		7.67
U-NII 3	5 775		6.22		7.39

Band	Frequency (MHz)	Data Rate (Mbps)	Average Power Result (dB m)	Antenna Gain (dB i)	E.I.R.P. (dB m)
U-NII 1	5 210	MCS0	3.56	2.75	6.31
U-NII 2A	5 290		7.50	2.75	10.25

Band	FCC Limit					
	Frequency (MHz)	Fixed Limit (dB m)	26 dB BW (MHz)	11+10LogB (dB m)	Antenna Gain (dB i)	Limit (dB m)
U-NII 1	5 210	23.98			2.75	23.98
U-NII 2A	5 290	23.98	82.431	30.16	2.75	23.98
U-NII 2C	5 530	23.98	81.968	30.14	-0.80	23.98
	5 690	23.98	82.431	30.16		
U-NII 3	5 775	30			-1.24	30

Band	IC Limit					
	Frequency (MHz)	Fixed Limit (dB m)	99 % BW (MHz)	1.76+10LogB (dB m)	Antenna Gain (dB i)	Limit (dB m)
U-NII 1	5 210	14.77	75.485	20.54	2.75	14.77
U-NII 2A	5 290	14.77	75.716	20.55	2.75	14.77

Band	IC Limit					
	Frequency (MHz)	Fixed Limit (dB m)	99 % BW (MHz)	11+10LogB (dB m)	Antenna Gain (dB i)	Limit (dB m)
U-NII 2C	5 530	23.98	75.948	29.81	-0.80	23.98
	5 690	23.98	75.948	29.81		
U-NII 3	5 775	30			-1.24	30

Remark;

1. Average Power Result (dB m) = Average Power (dB m) + Duty Cycle Correction Factor (dB)
2. E.I.R.P. (dB m) = Average Power Result (dB m) + Antenna Gain (dB i)

- Band-crossing channels

Mode	Band	Frequency (MHz)	Data Rate (Mbps)	Average Power (dB m)	Duty Cycle Correction Factor (dB)	Average Power Result (dB m)
11a	U-NII 2C	5 720	6	6.94	0.29	7.23
	U-NII 3			-0.36		-0.07
11n_HT20	U-NII 2C	5 720	MCS2	6.20	0.83	7.03
	U-NII 3			-0.32		0.51
11n_HT40	U-NII 2C	5 710	MCS0	6.60	0.61	7.21
	U-NII 3			-5.02		-4.41
11ac_VHT80	U-NII 2C	5 690	MCS0	6.37	1.17	7.54
	U-NII 3			-8.85		-7.68

Mode	Band	Limit					
		Frequency (MHz)	Fixed Limit (dB m)	26 dB BW (MHz)	11+10LogB (dB m)	Antenna Gain (dB i)	Limit (dB m)
11a	U-NII 2C	5 720	23.98	15.536	22.91	-0.80	22.91
	U-NII 3		30			-1.24	30
11n_HT20	U-NII 2C	5 720	23.98	15.767	22.98	-0.80	22.98
	U-NII 3		30			-1.24	30
11n_HT40	U-NII 2C	5 710	23.98	35.145	26.46	-0.80	23.98
	U-NII 3		30			-1.24	30
11ac_VHT80	U-NII 2C	5 690	23.98	76.216	29.82	-0.80	23.98
	U-NII 3		30			-1.24	30

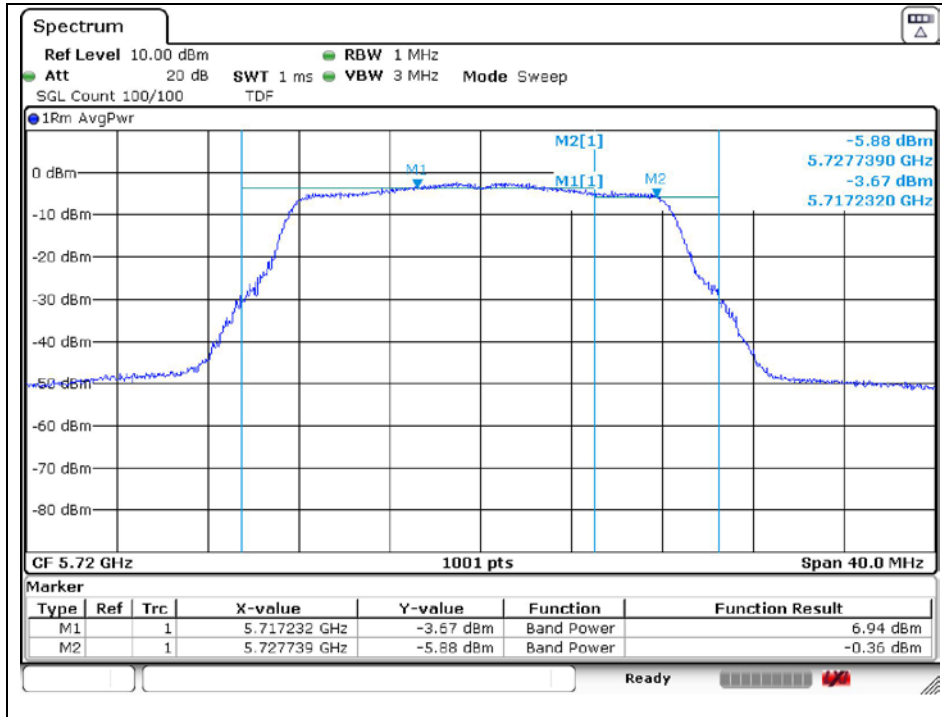
Remark;

1. Average Power Result (dB m) = Average Power (dB m) + Duty Cycle Correction Factor (dB)

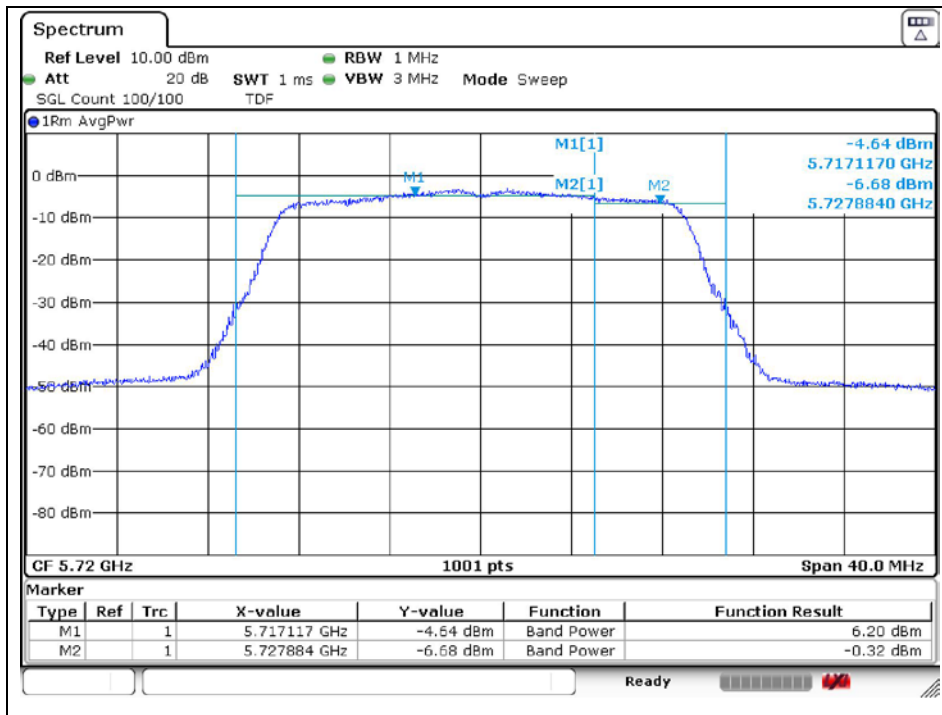
- Test plots

Band-crossing channels

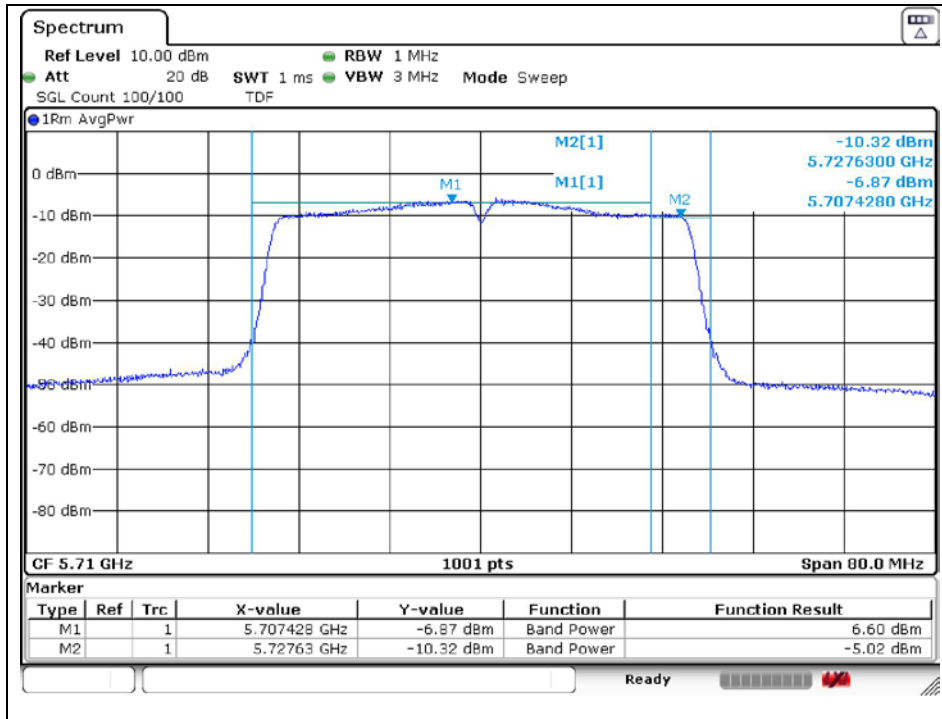
802.11a (5 720 MHz)



802.11n_HT20 (5 720 MHz)



802.11n_HT40 (5 710 MHz)



802.11ac_VHT80 (5 690 MHz)

