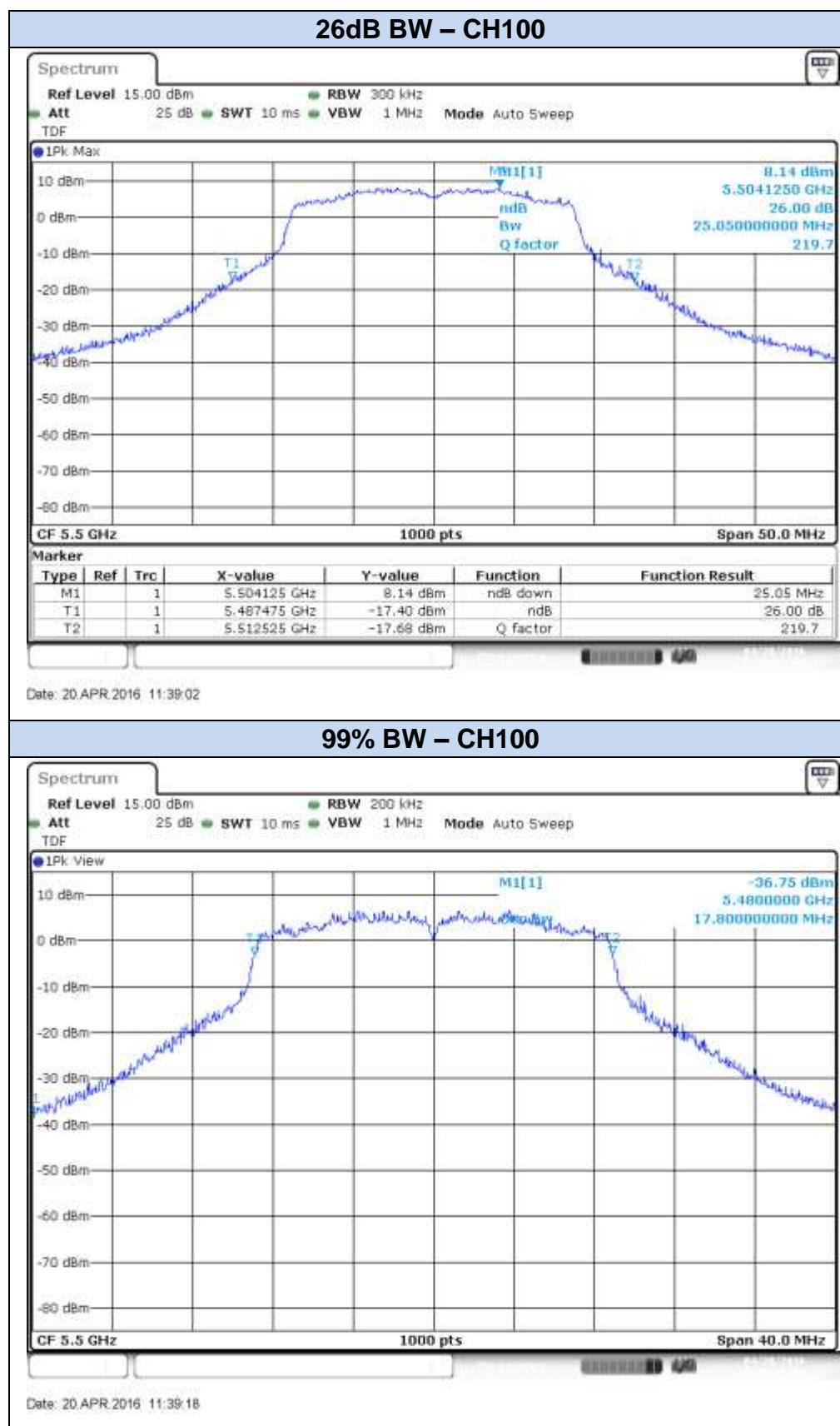
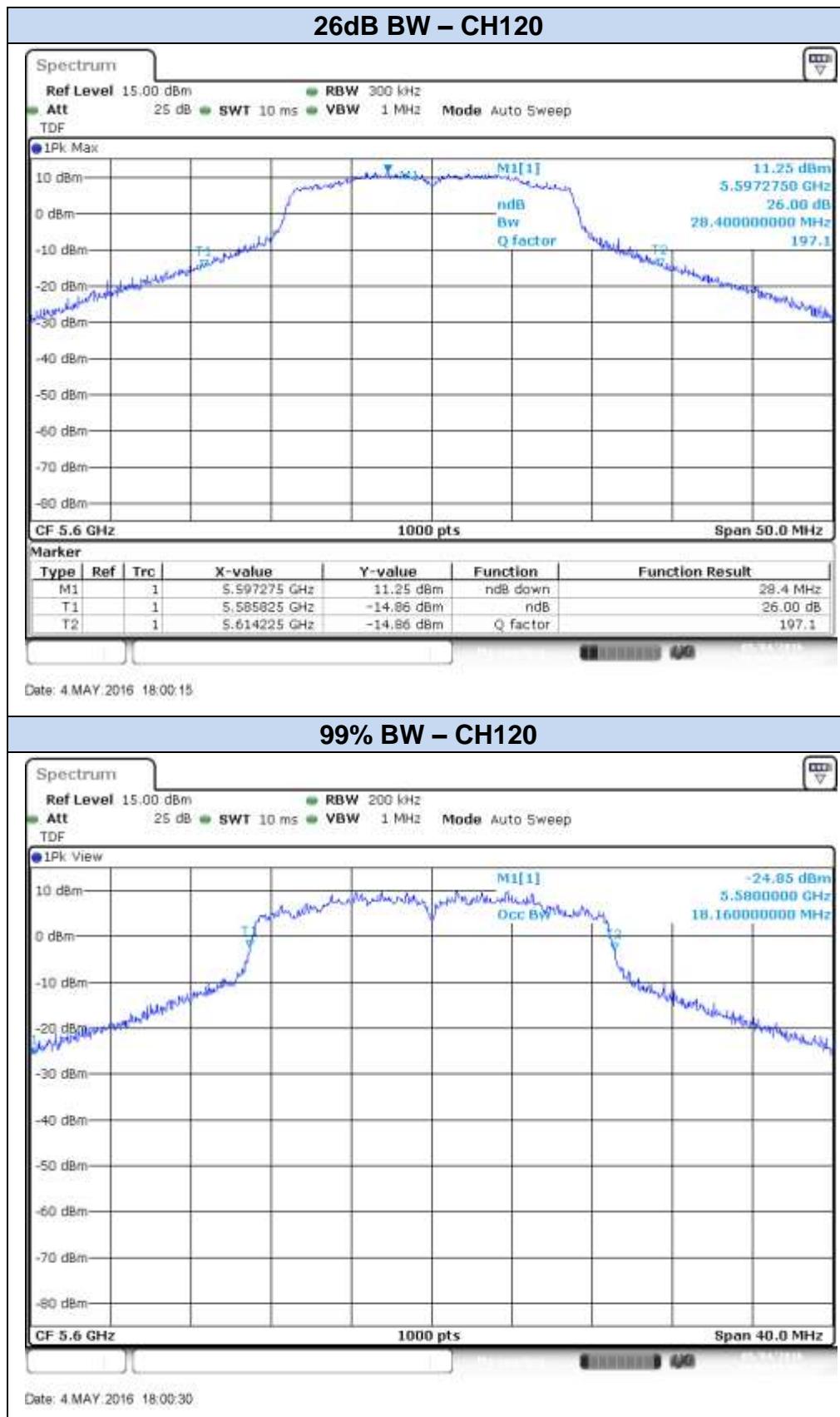
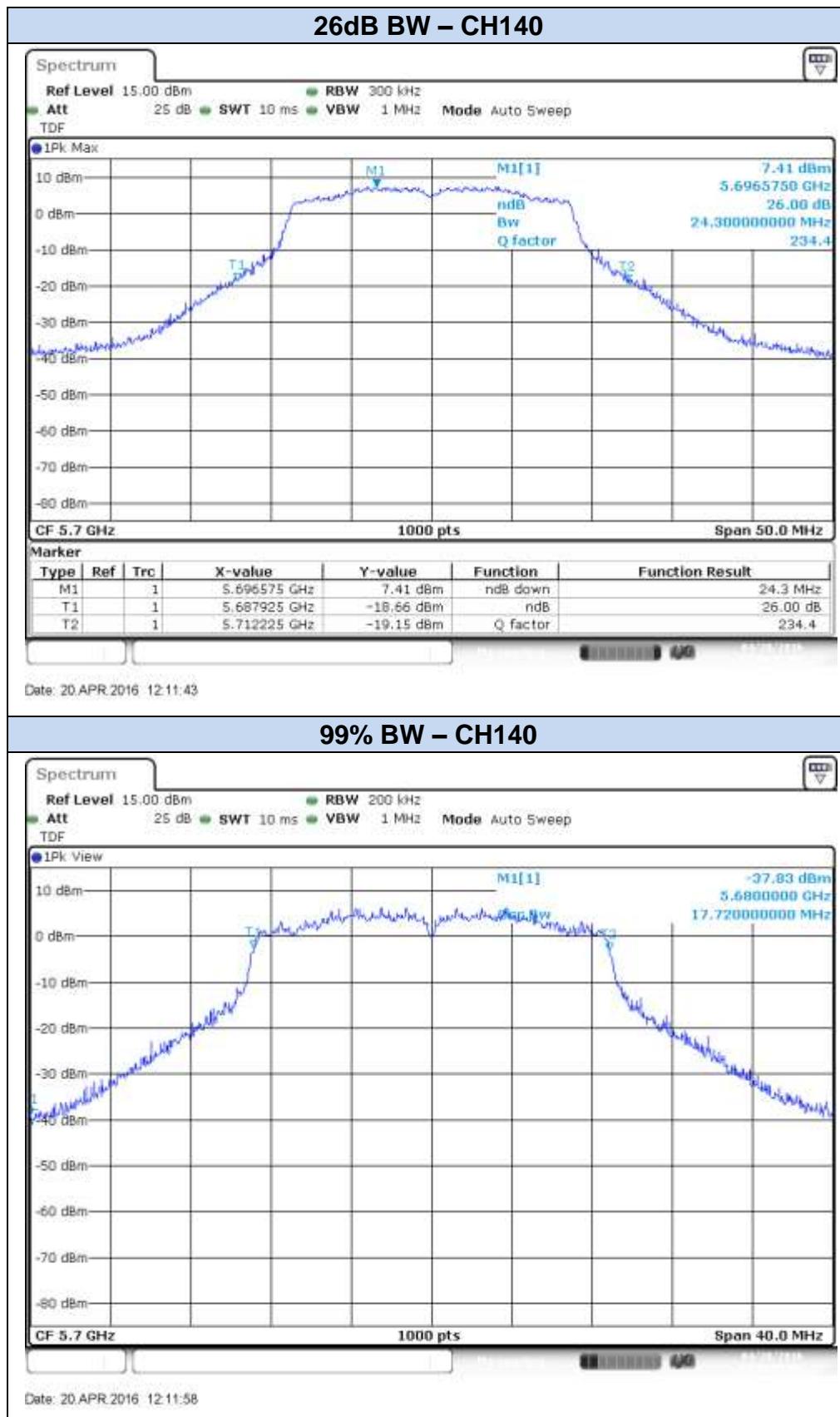
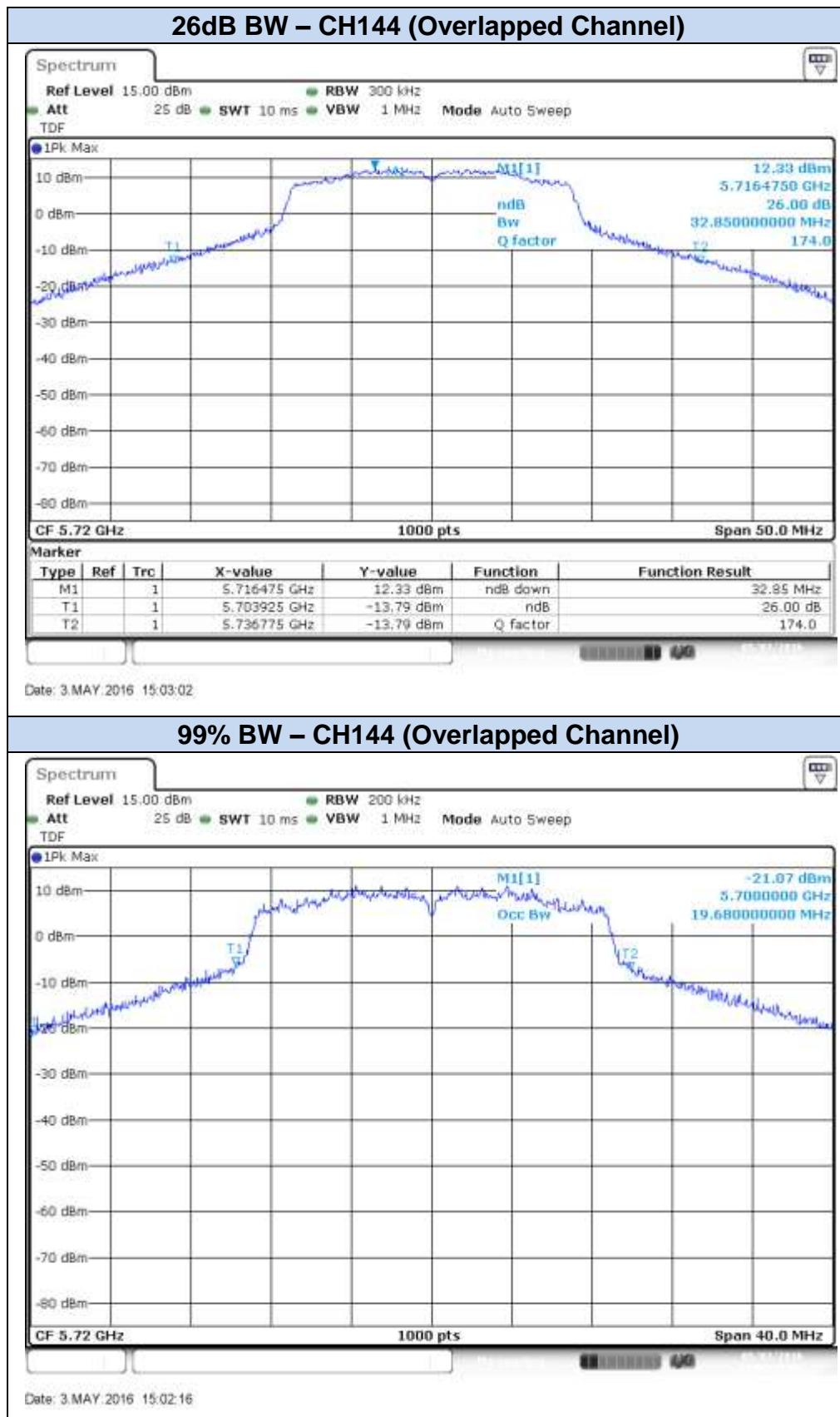


## 802.11n20, HT8 (MIMO) – Chain A

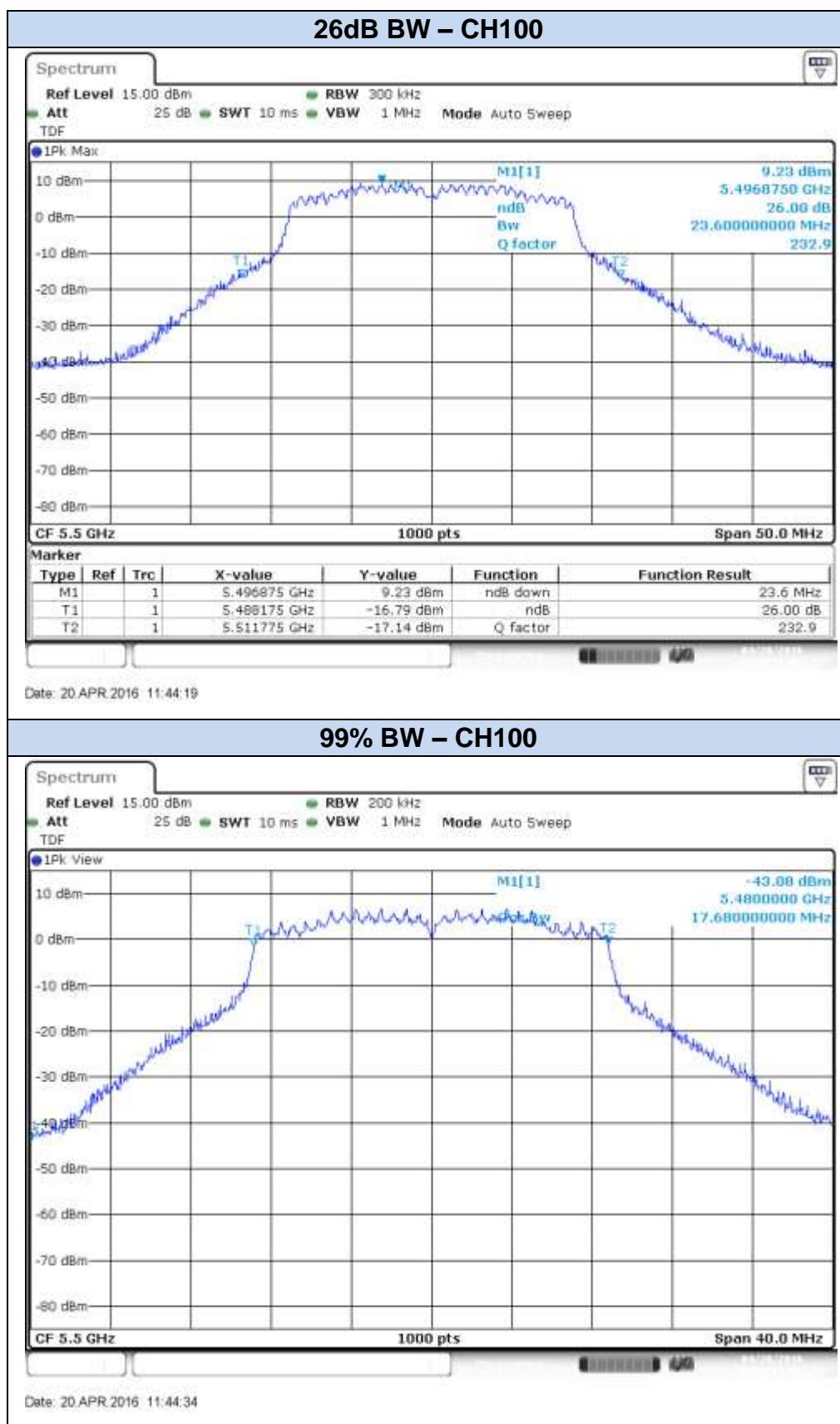


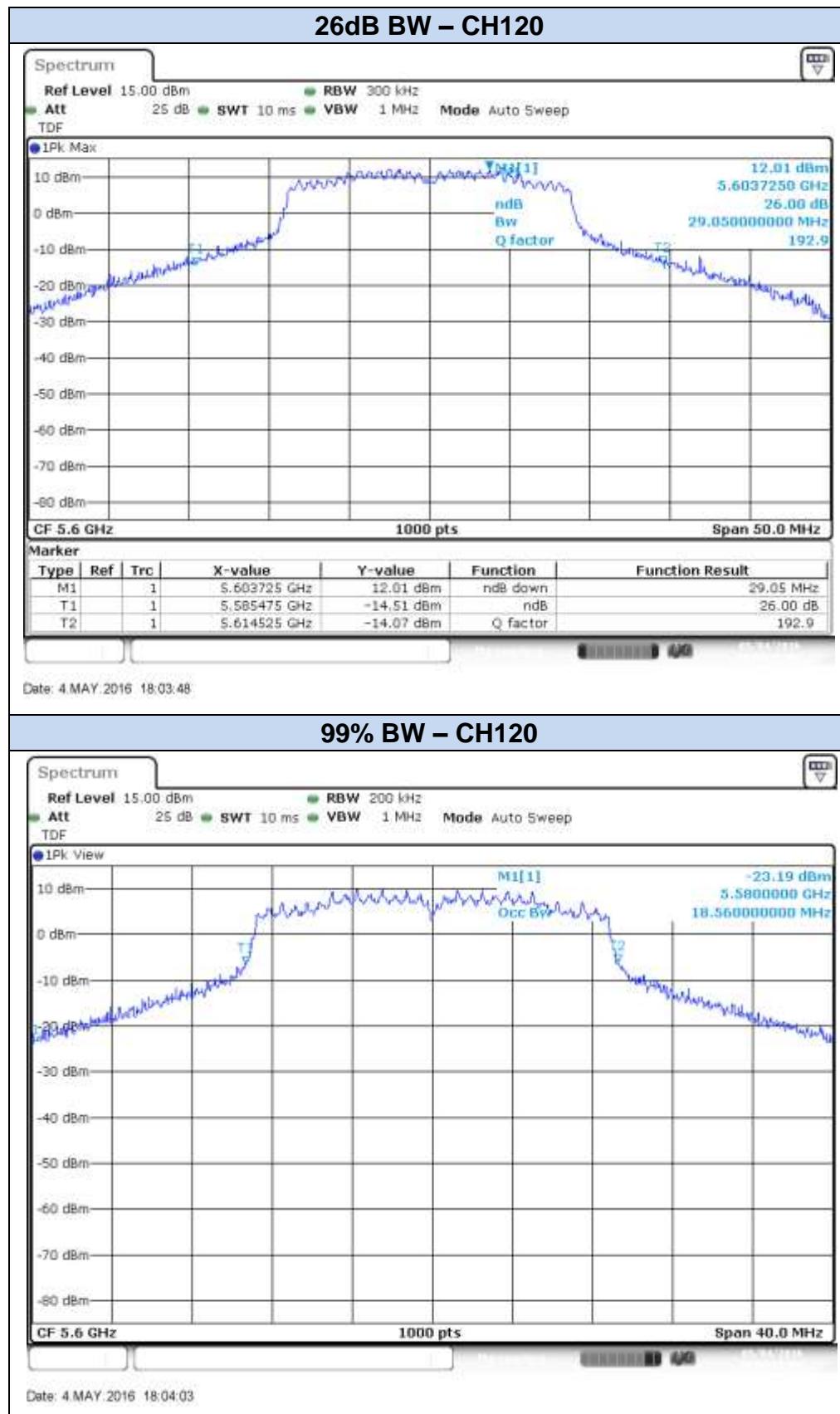


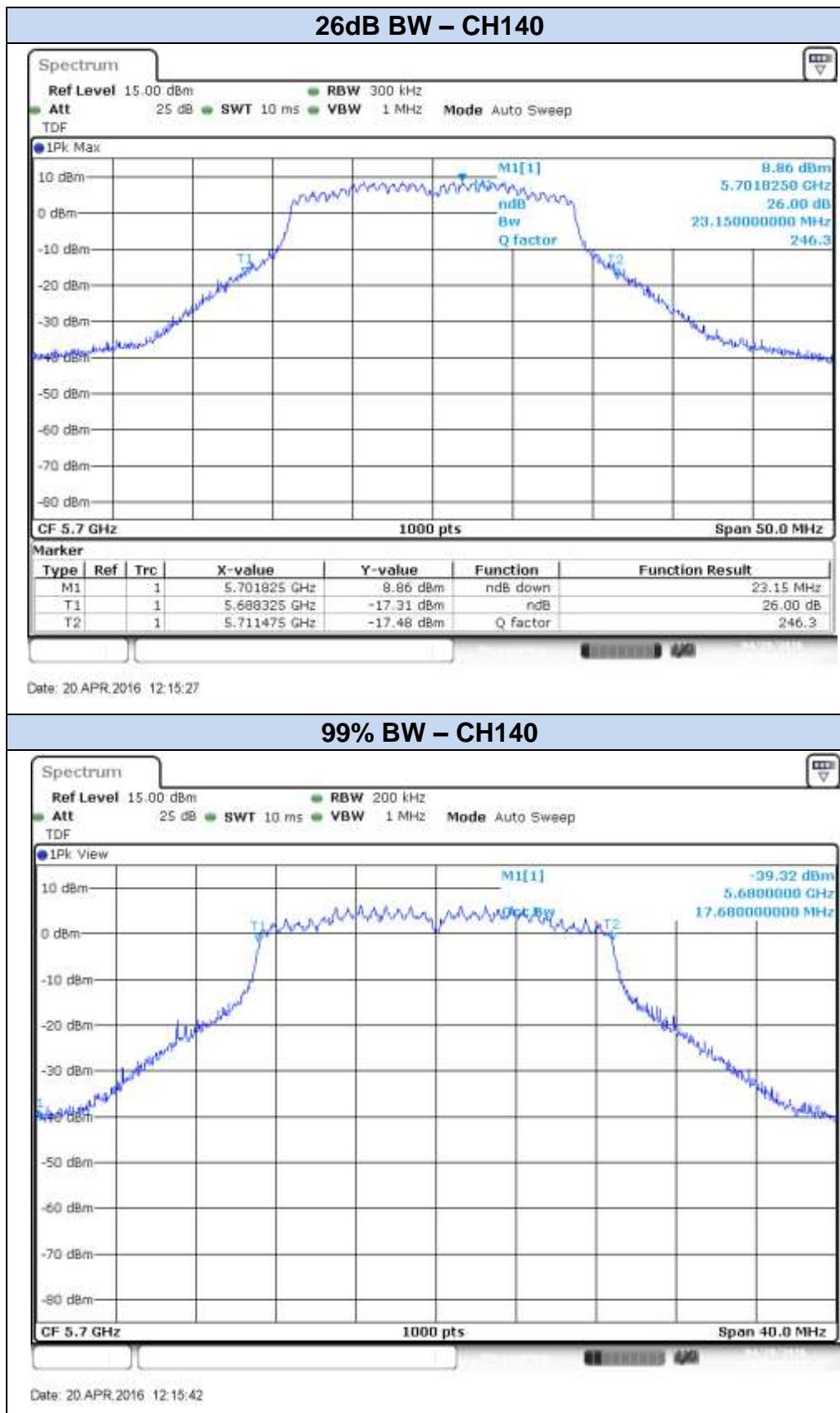


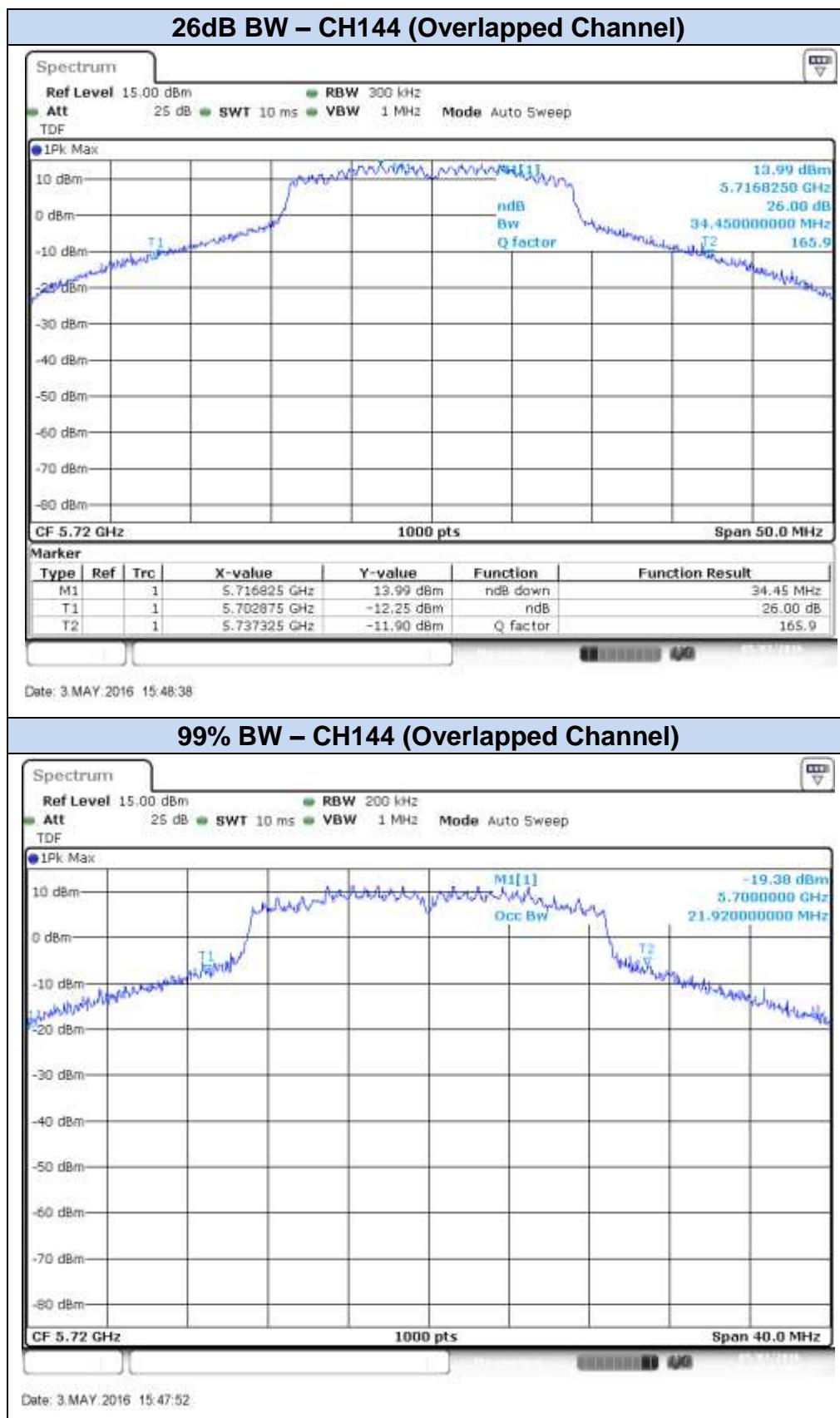


## 802.11n20, HT8 (MIMO) – Chain B

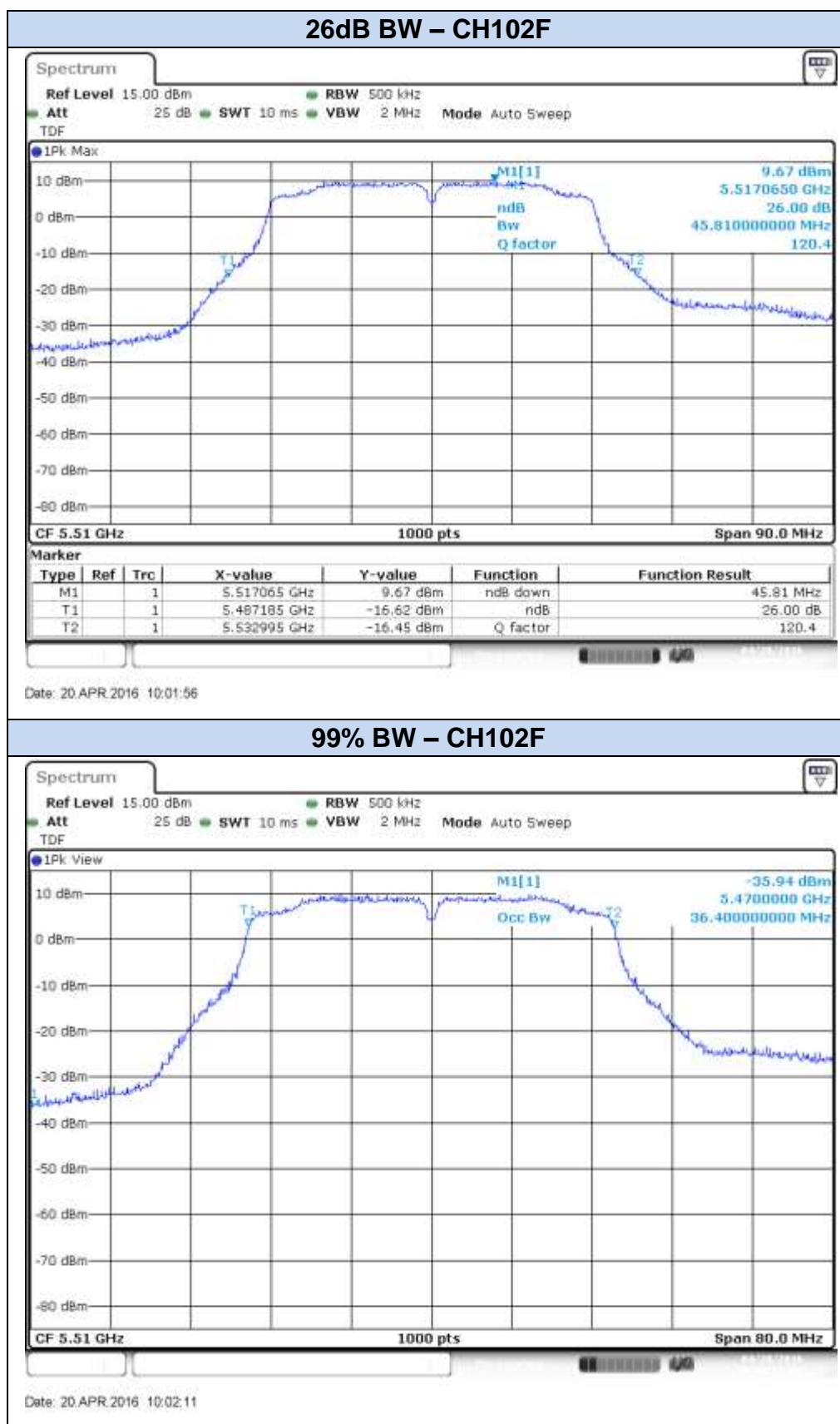


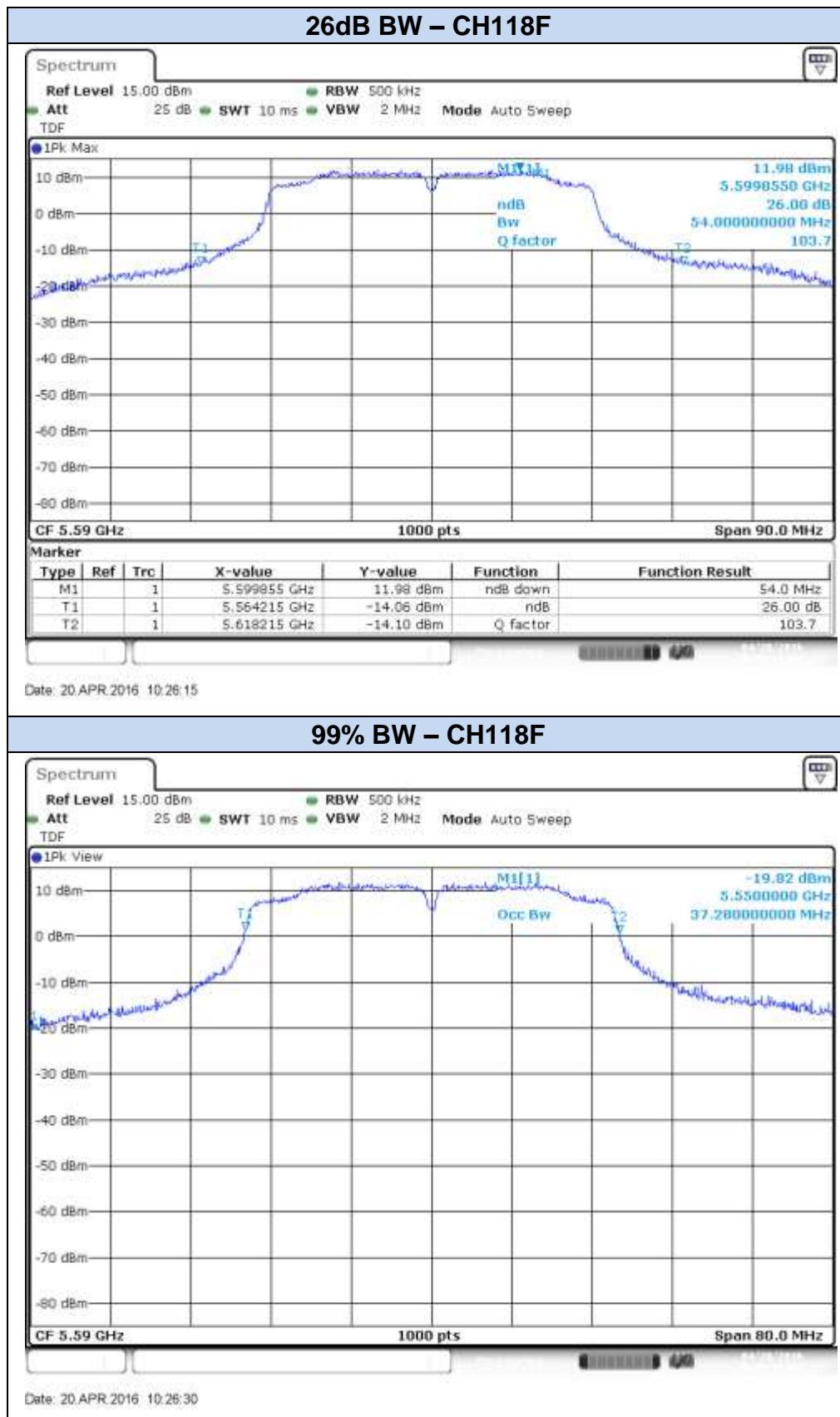


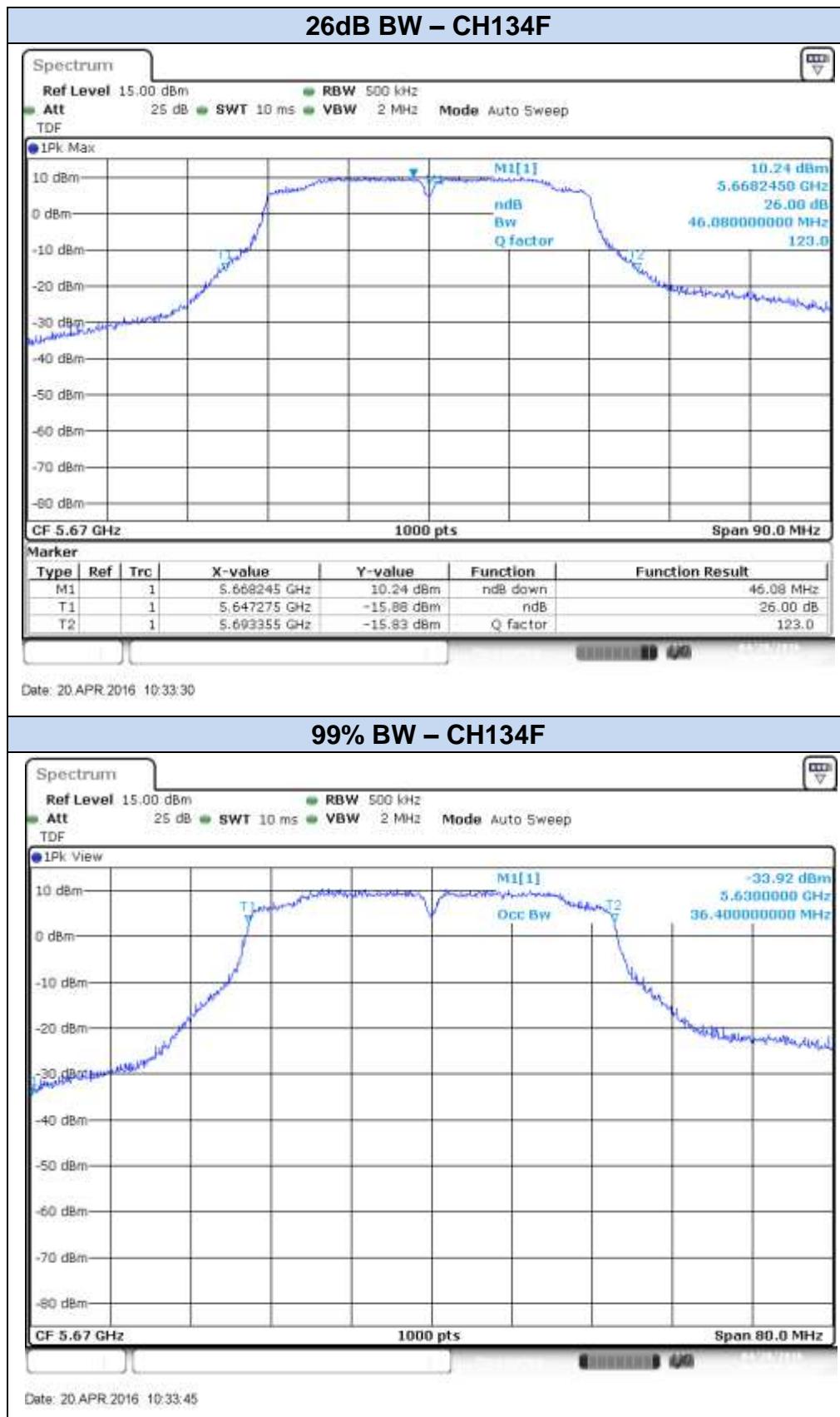


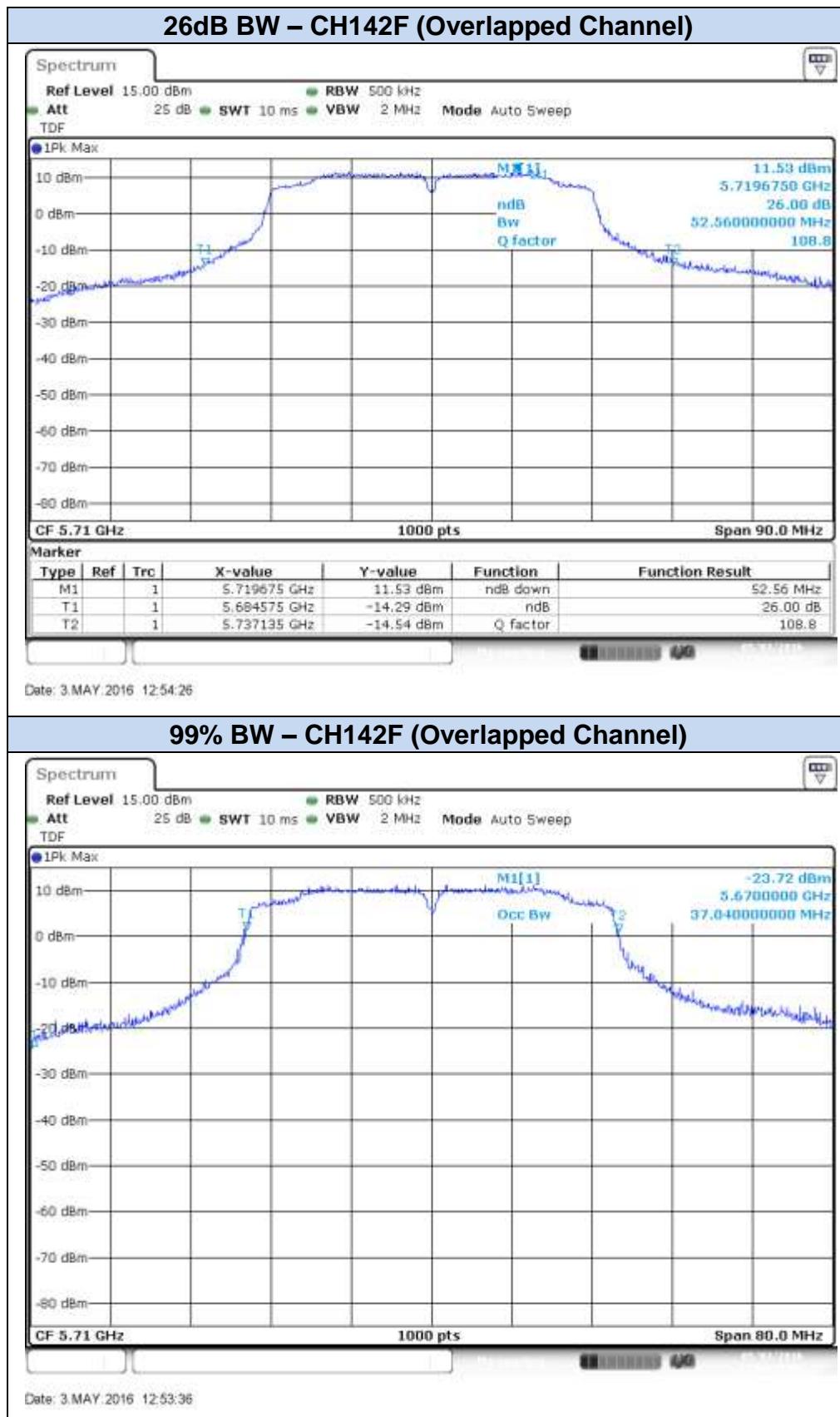


## 802.11n40, HT0 (SISO) – Chain A

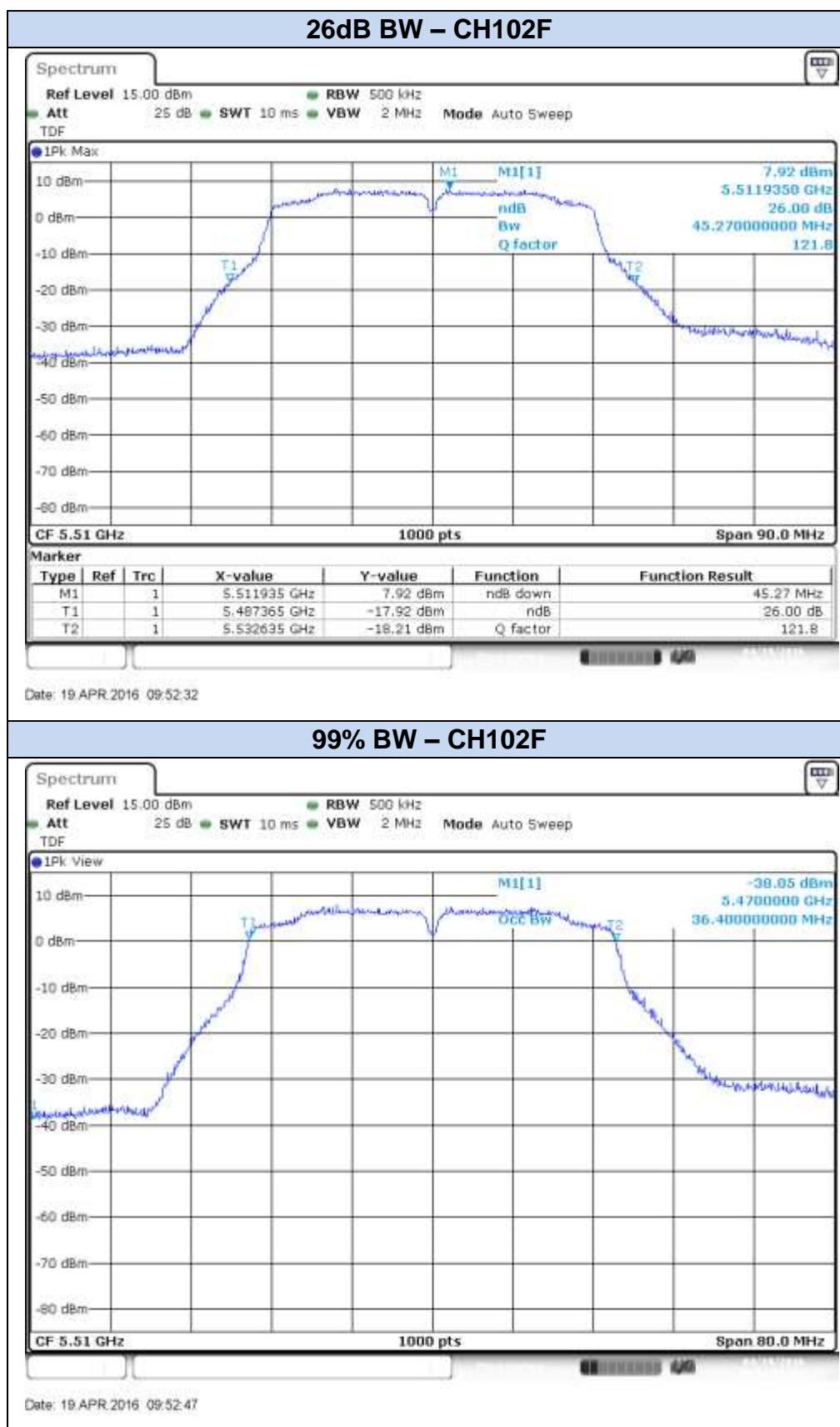


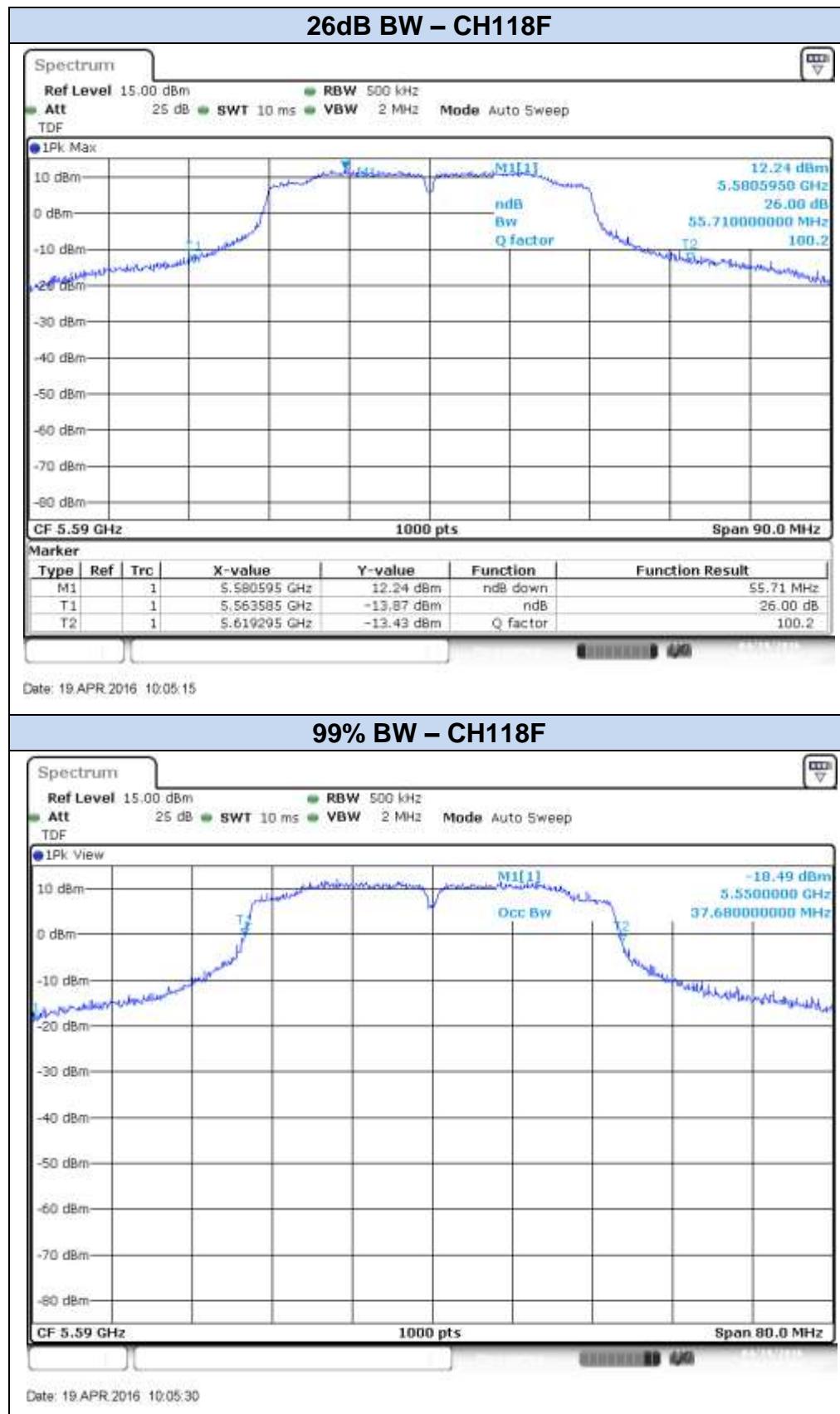


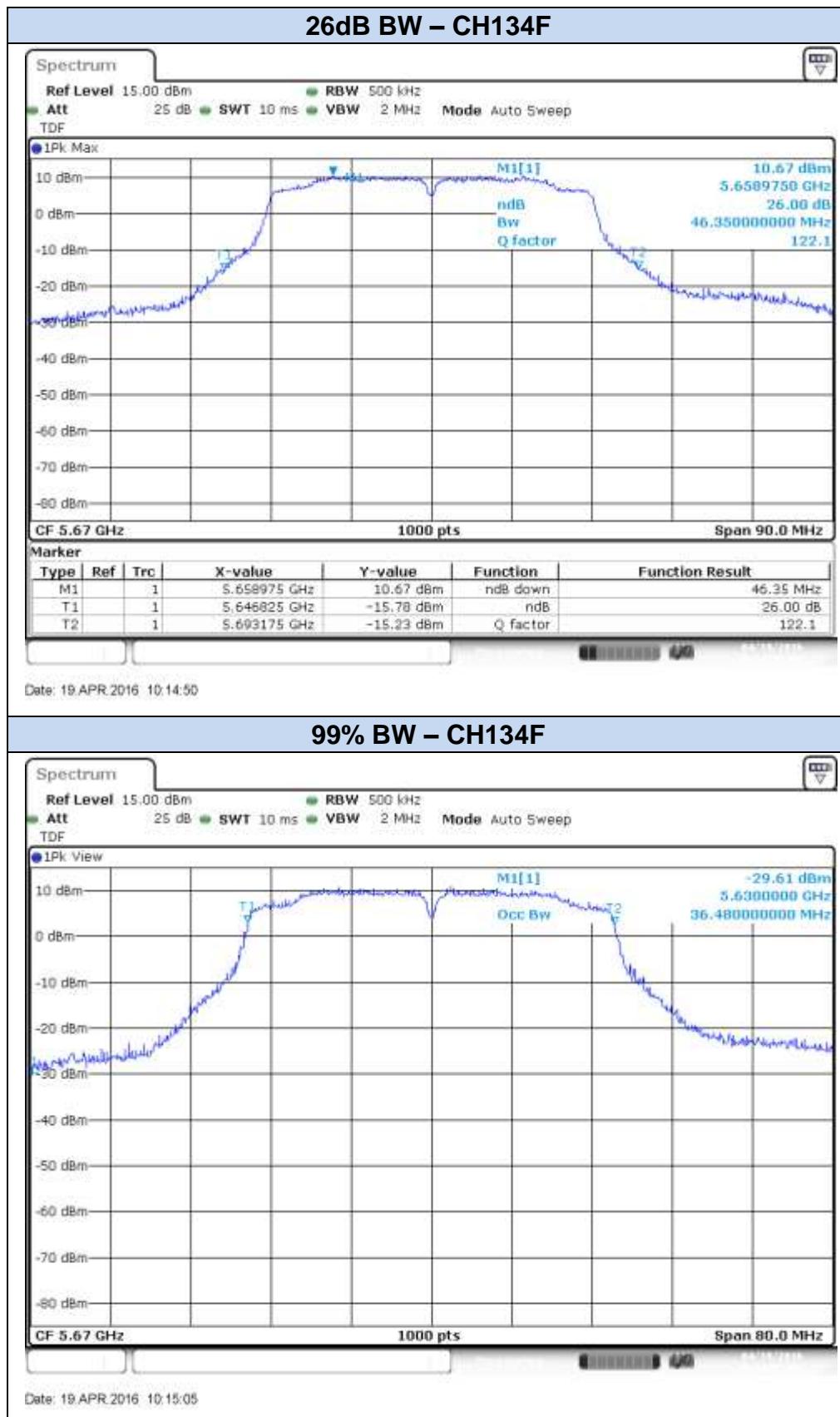


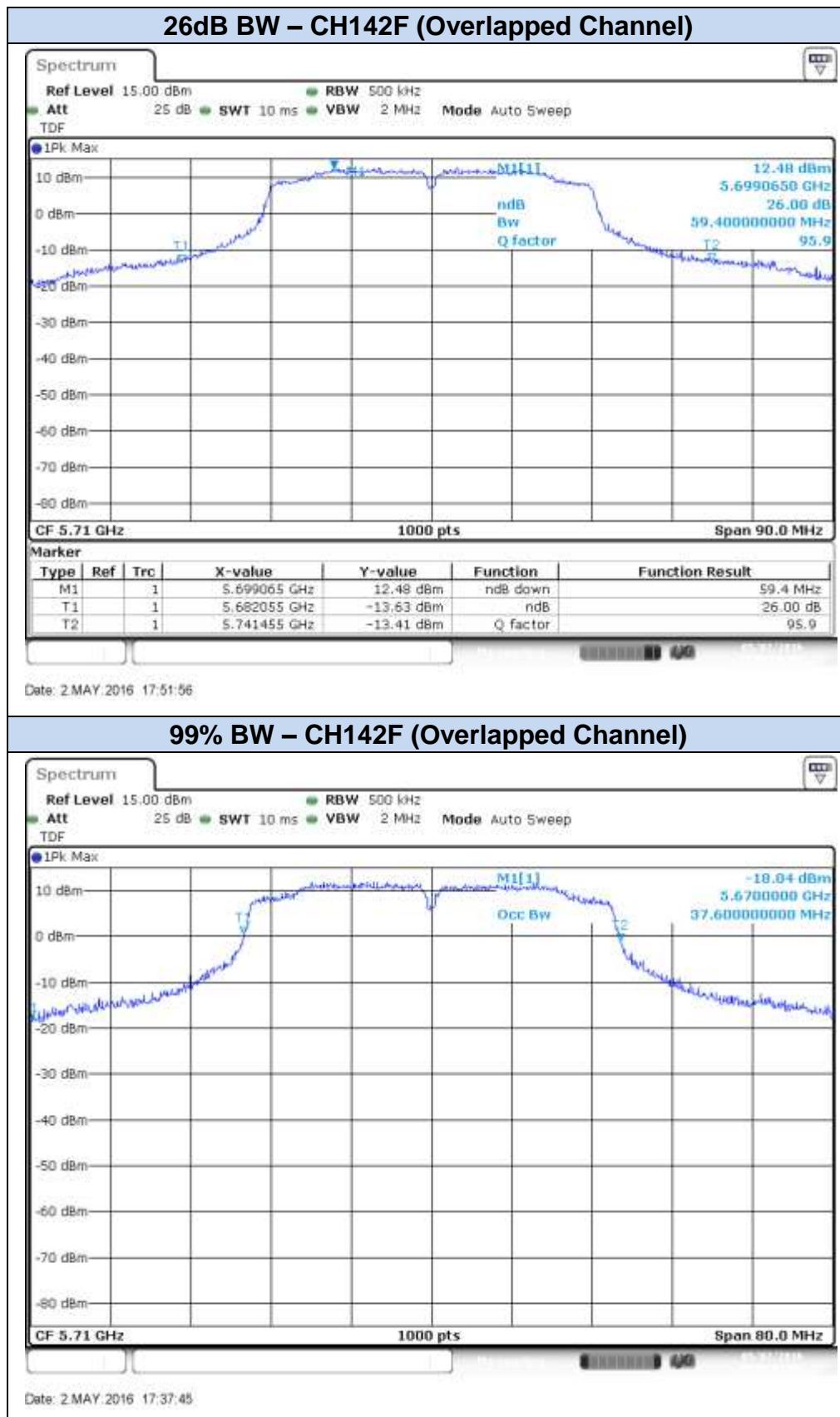


## 802.11n40, HT0 (SISO) – Chain B

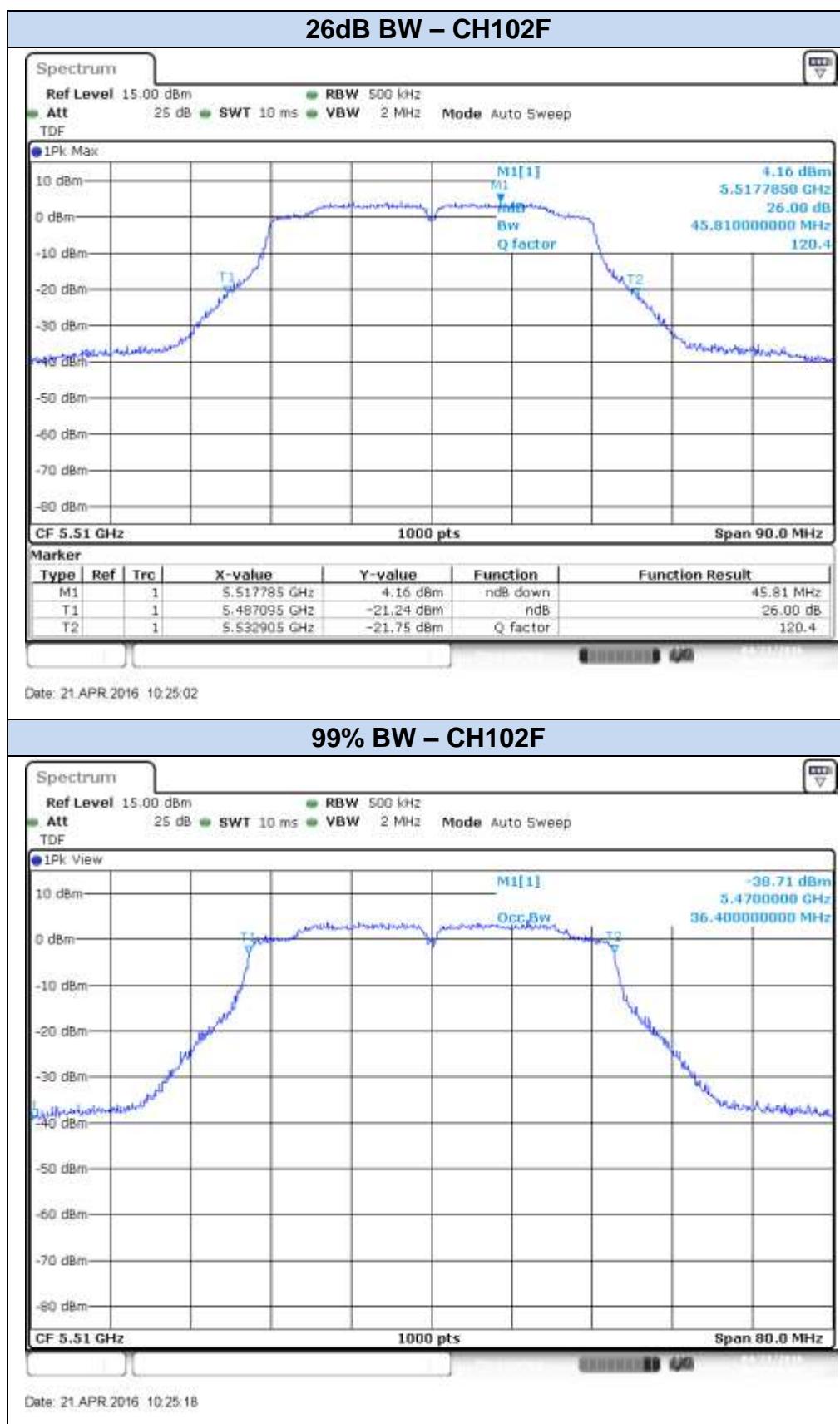






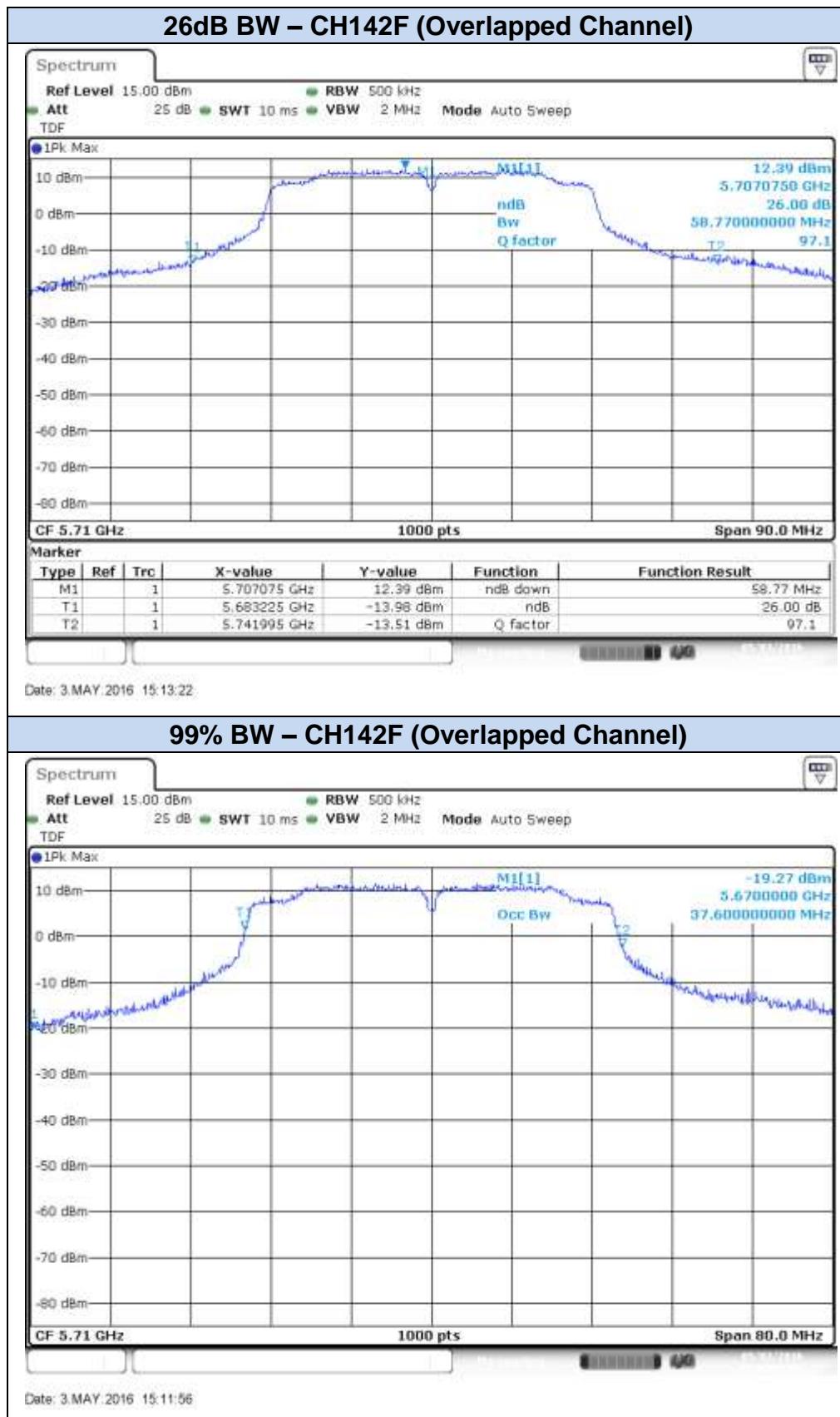


## 802.11n40, HT8 (MIMO) – Chain A

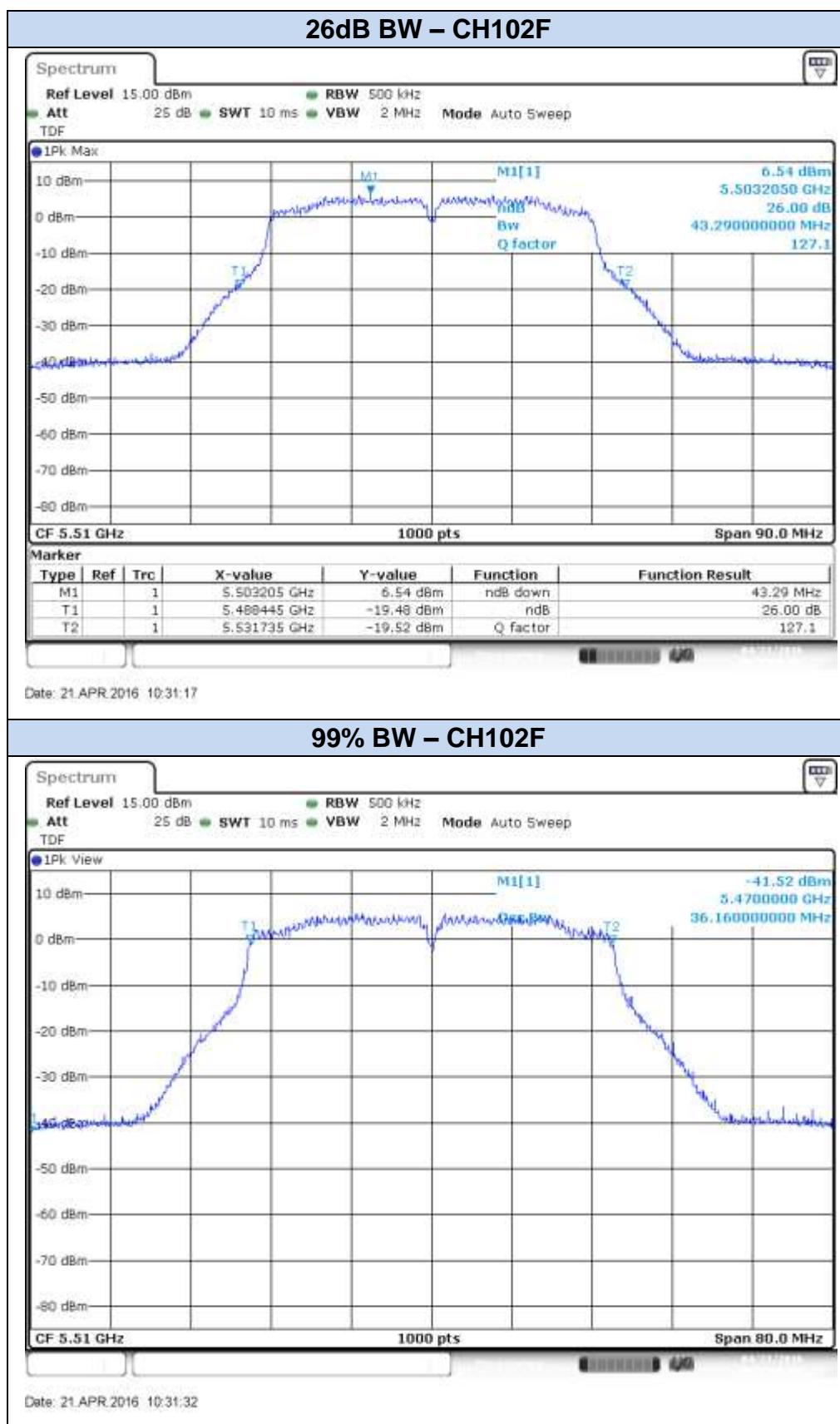




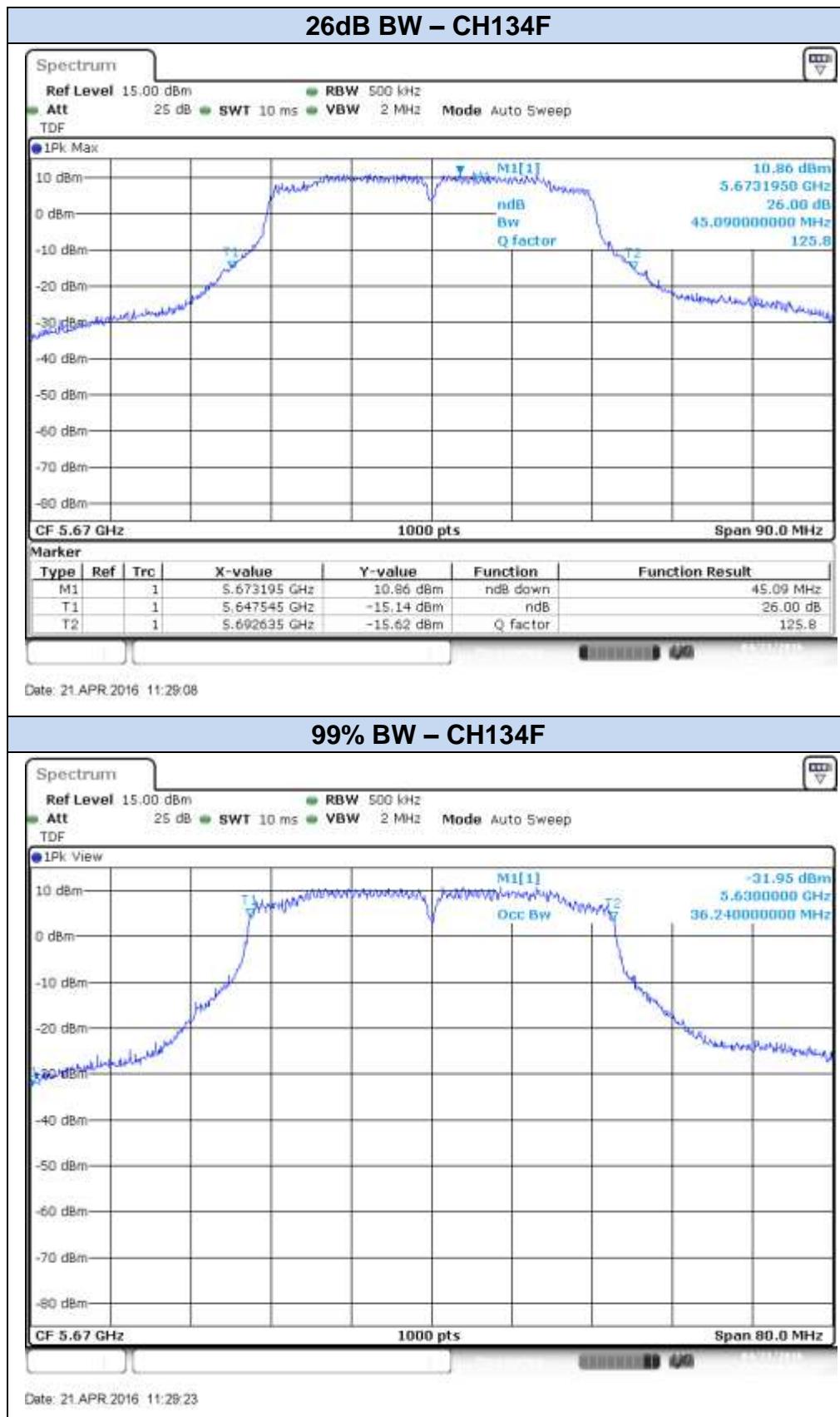


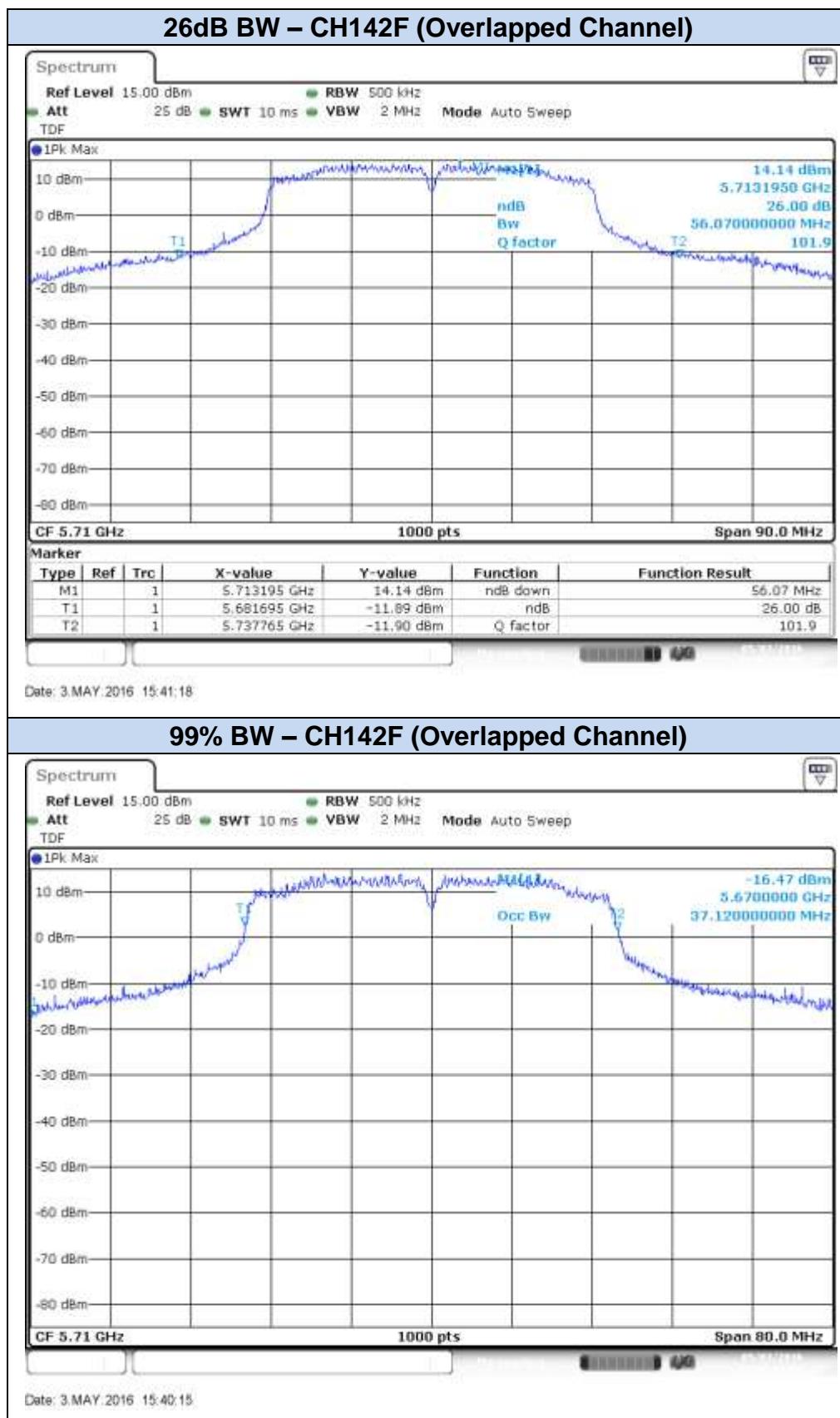


## 802.11n40, HT8 (MIMO) – Chain B

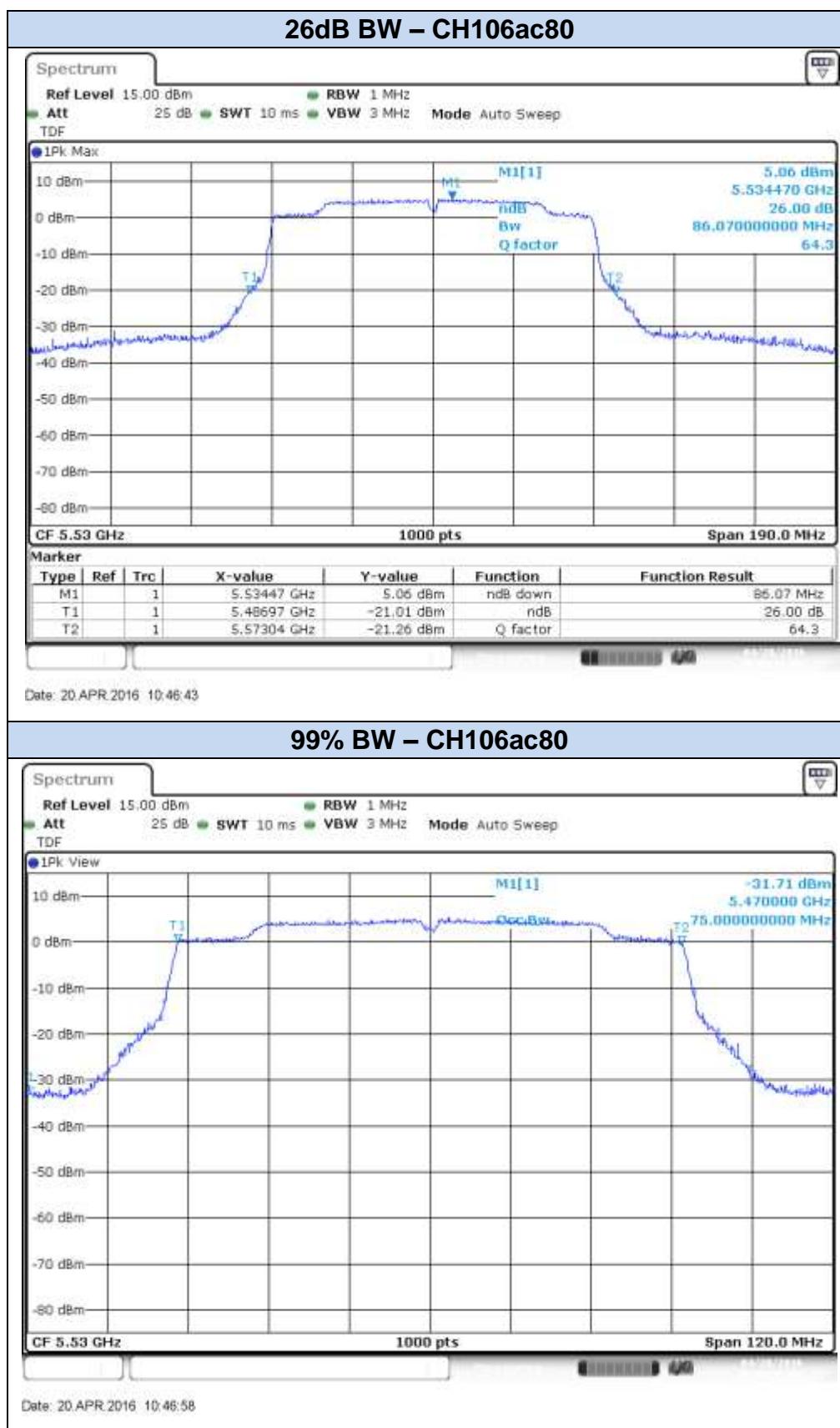


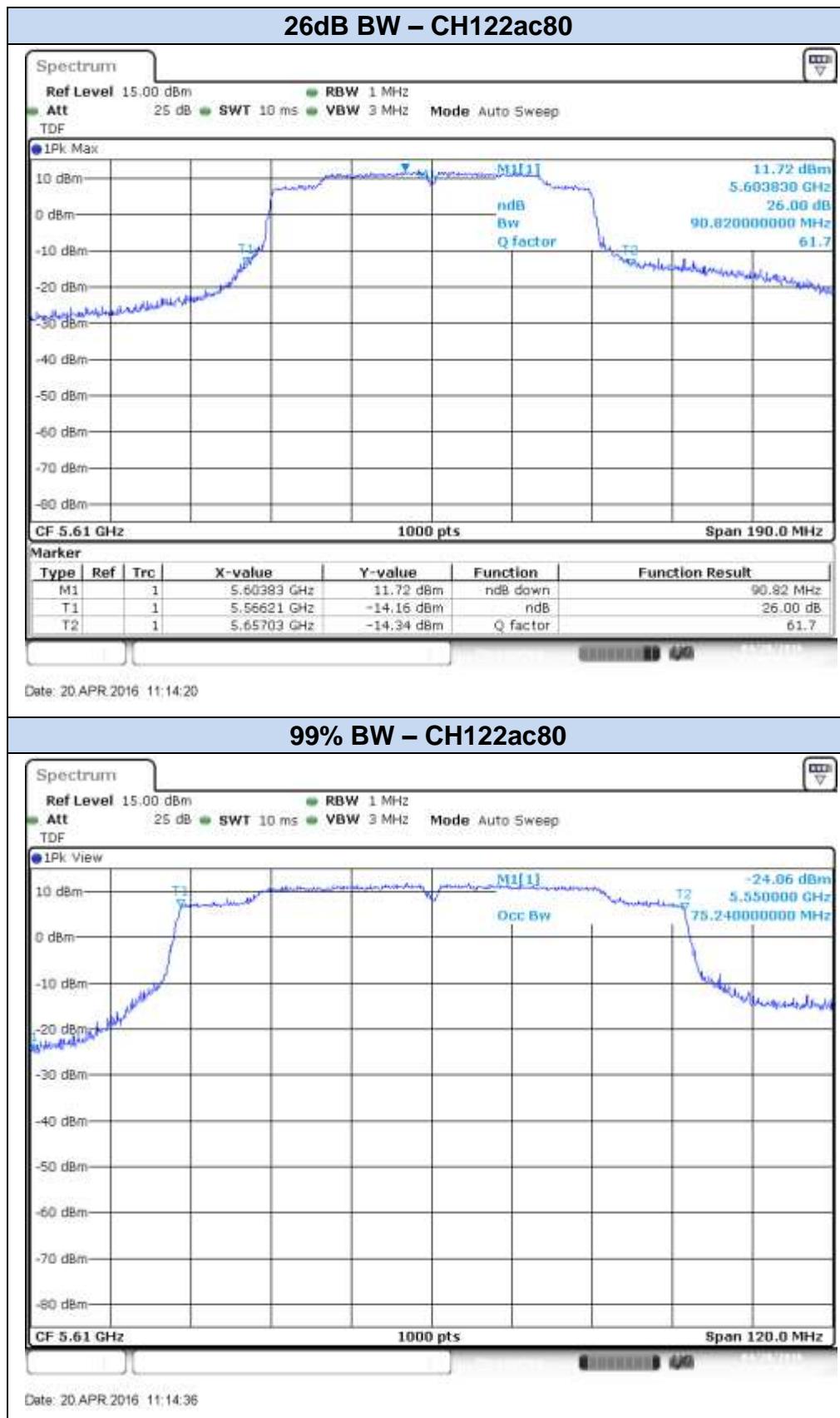


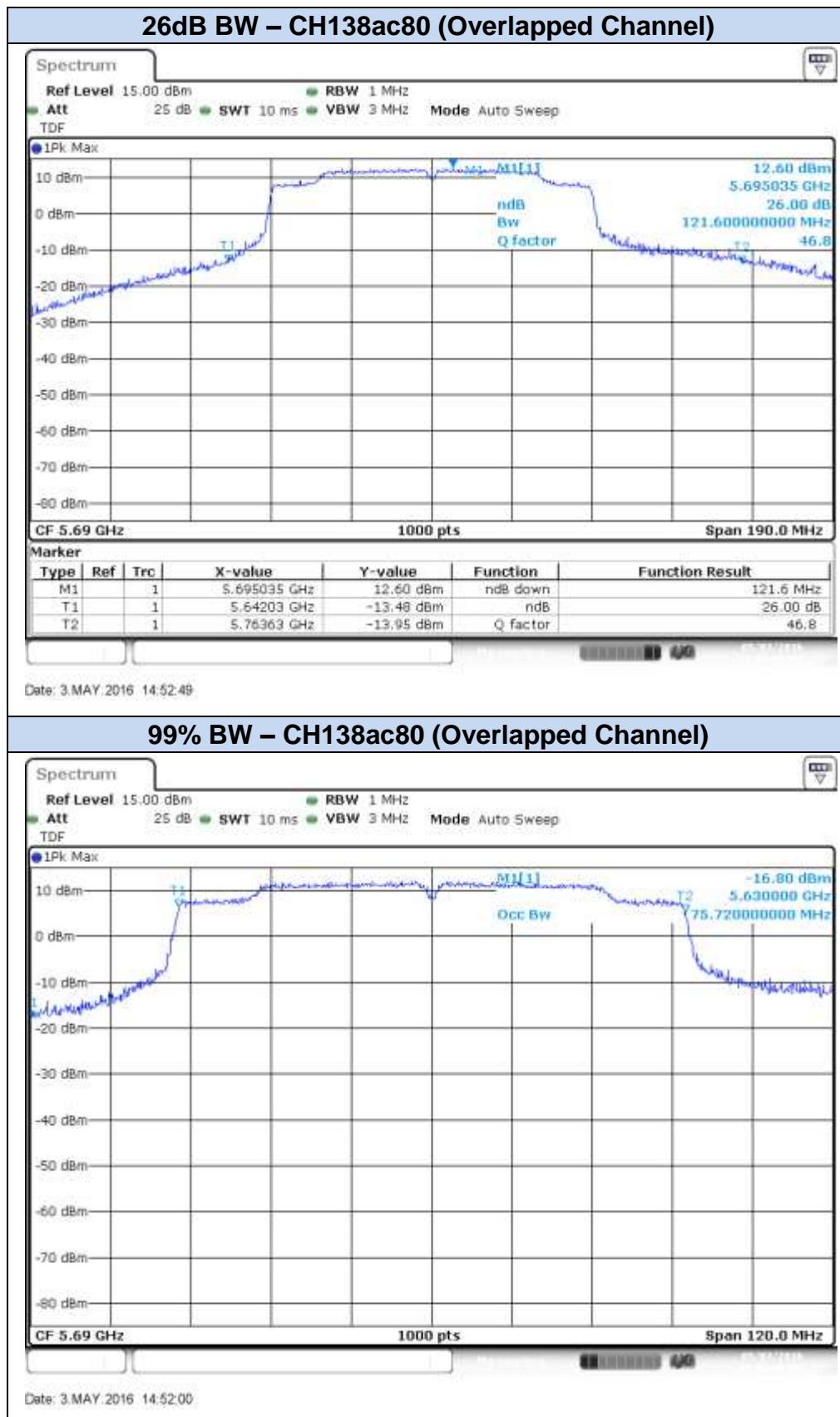




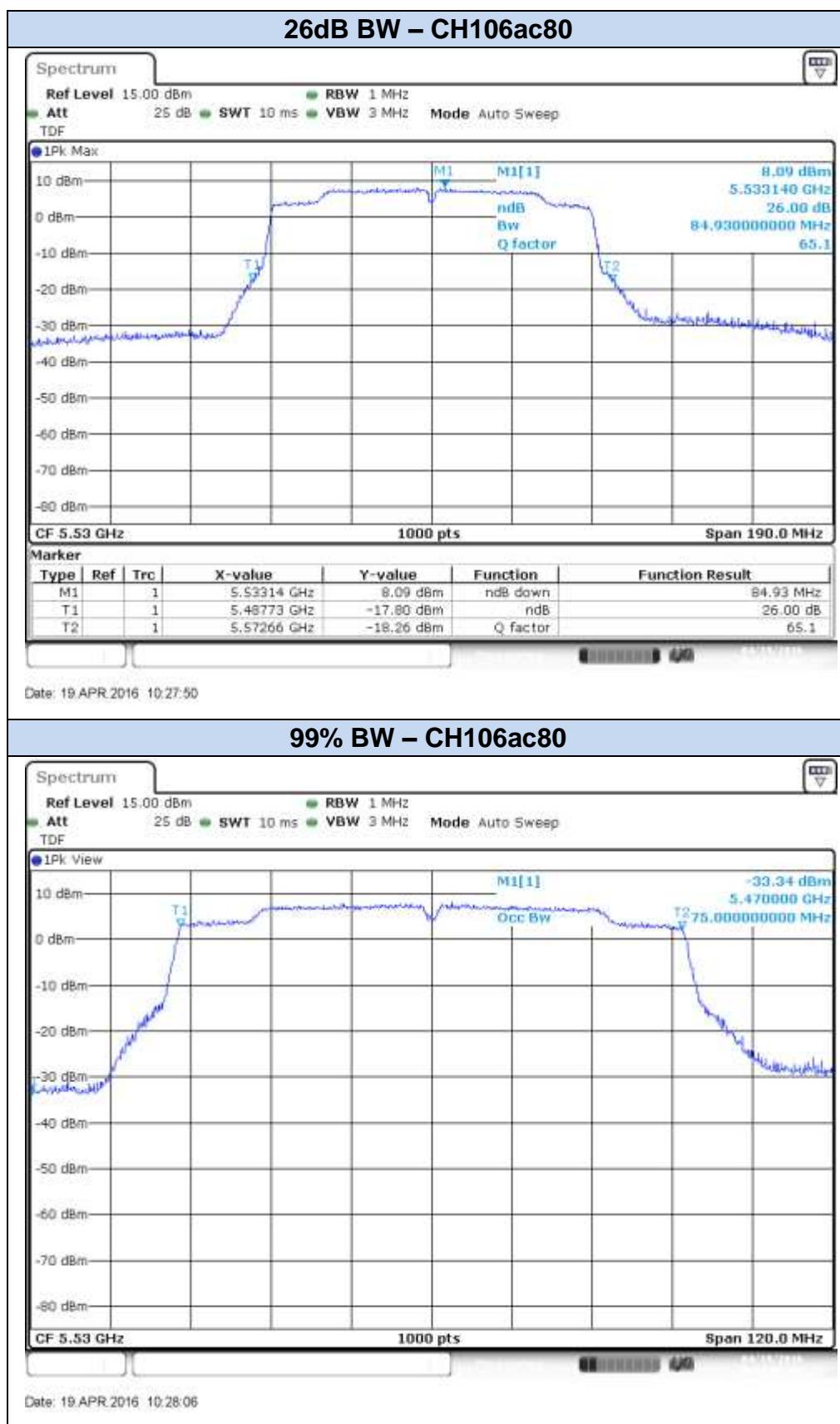
## 802.11ac80, VHT0 (SISO) – Chain A

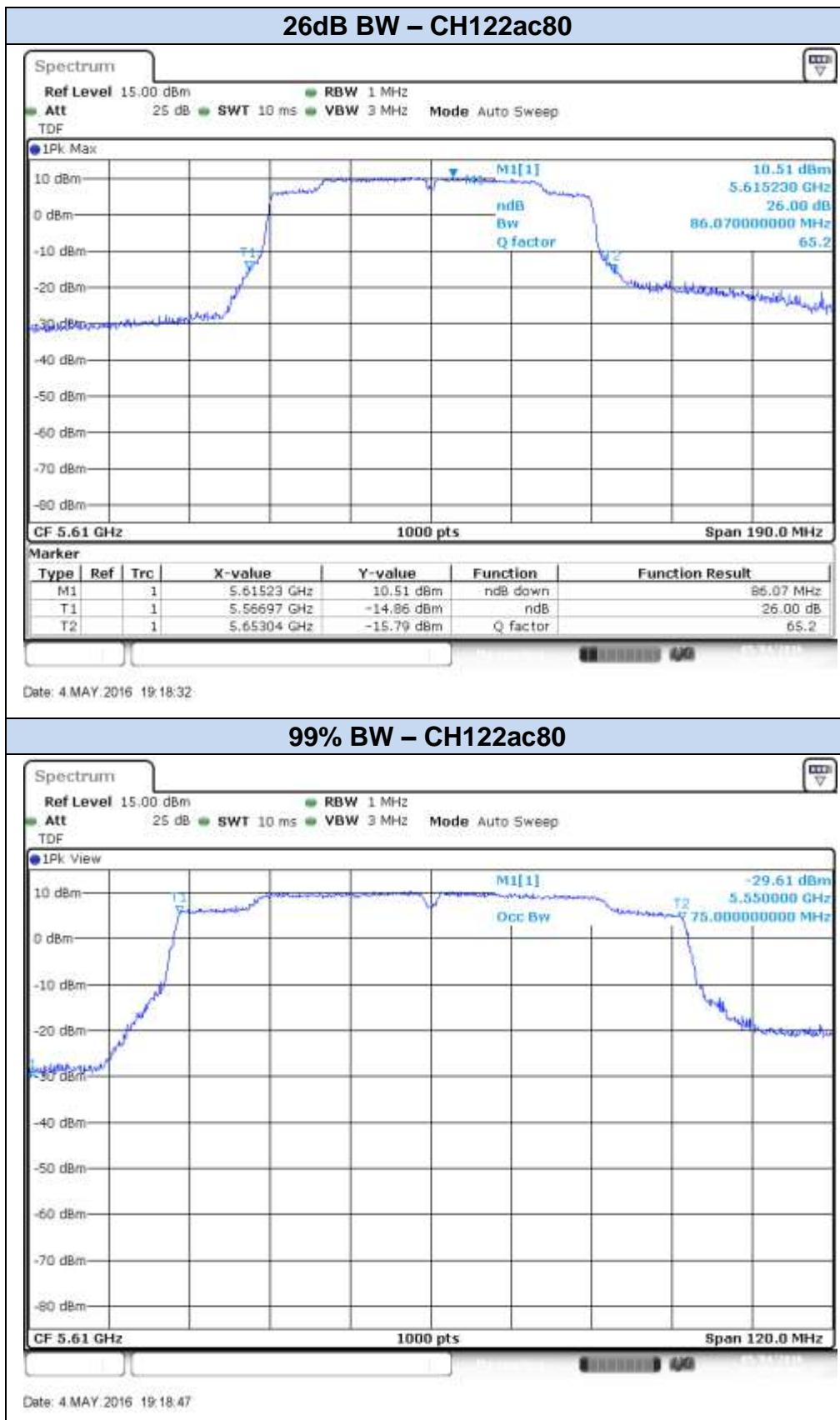


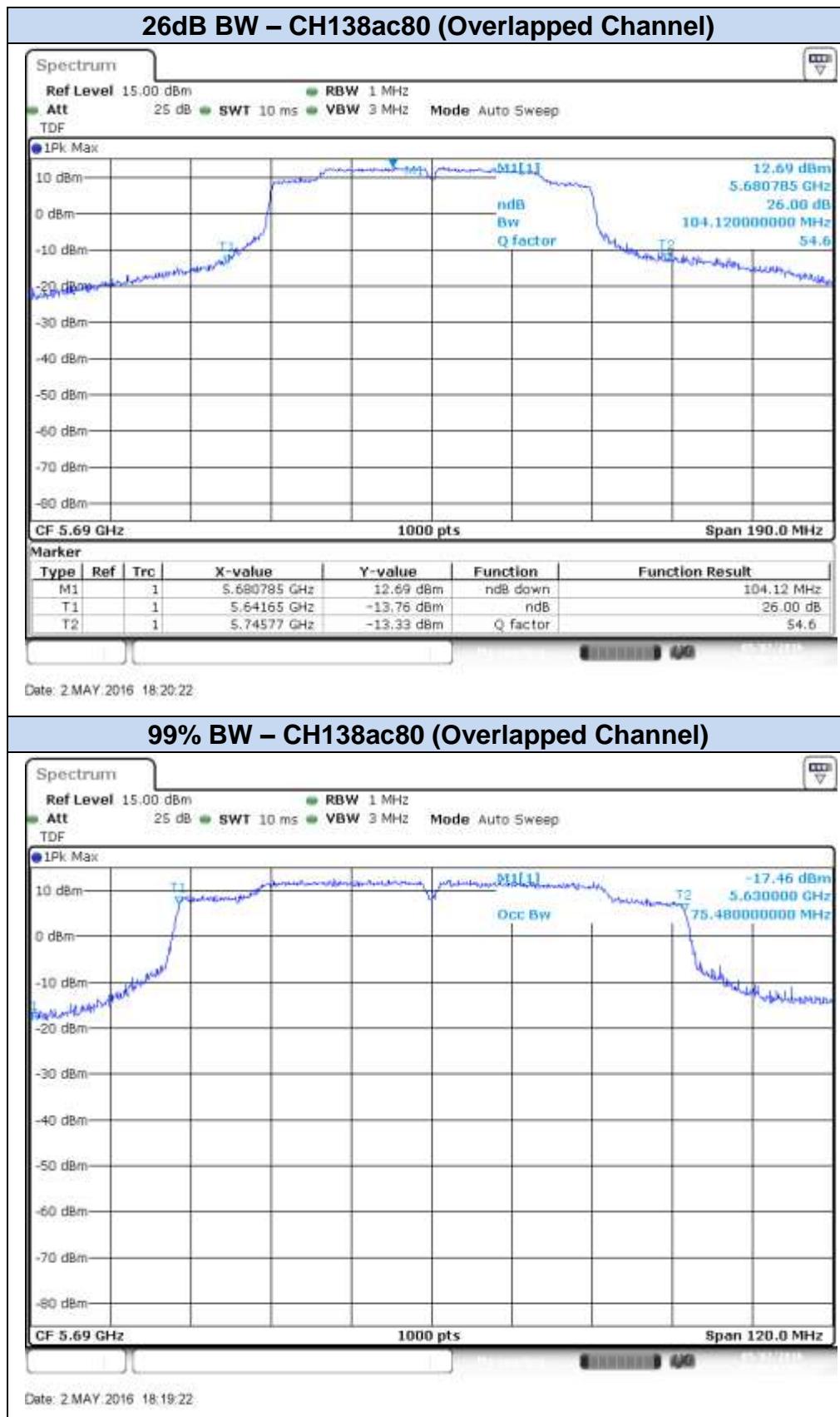




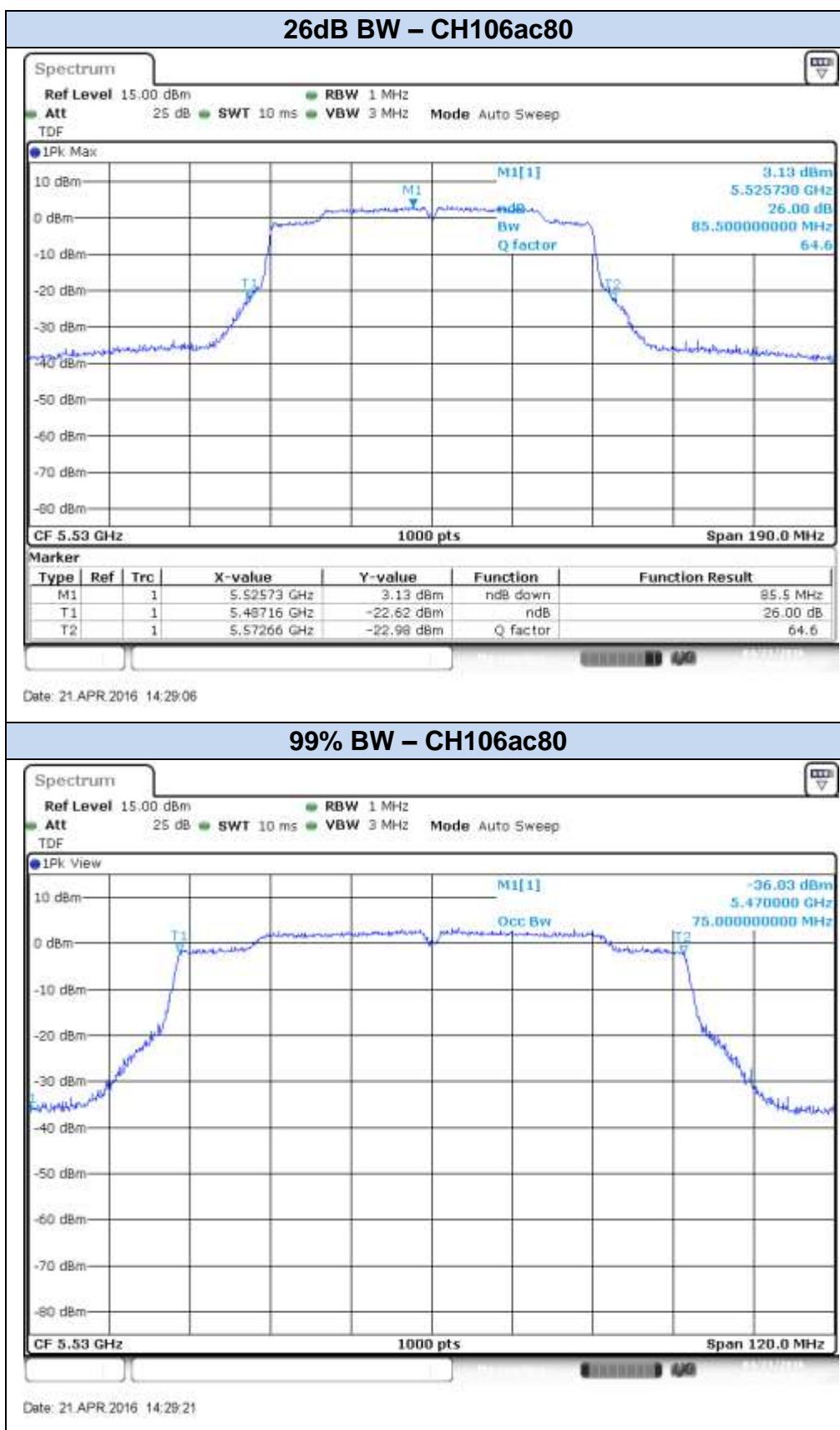
## 802.11ac80, VHT0 (SISO) – Chain B

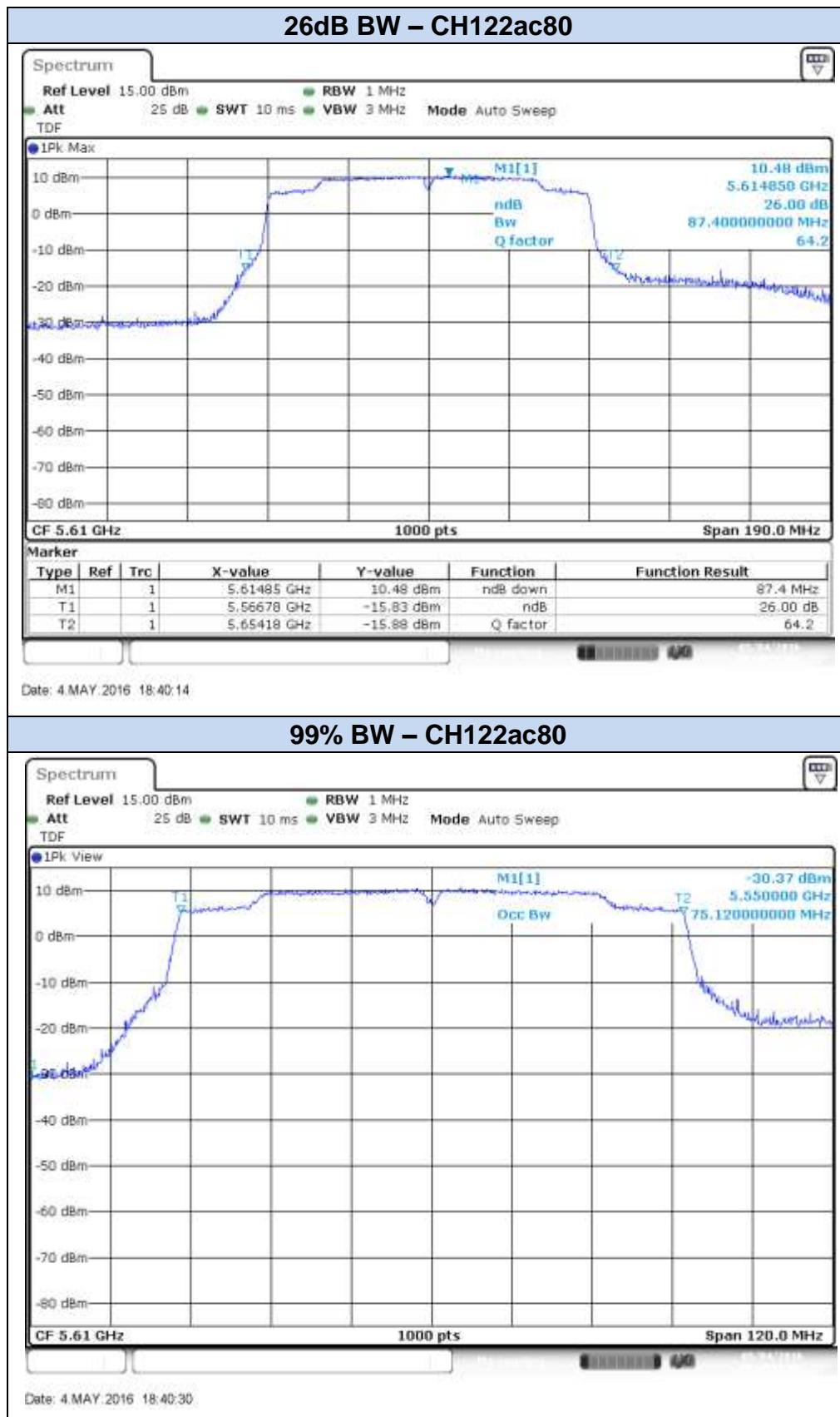


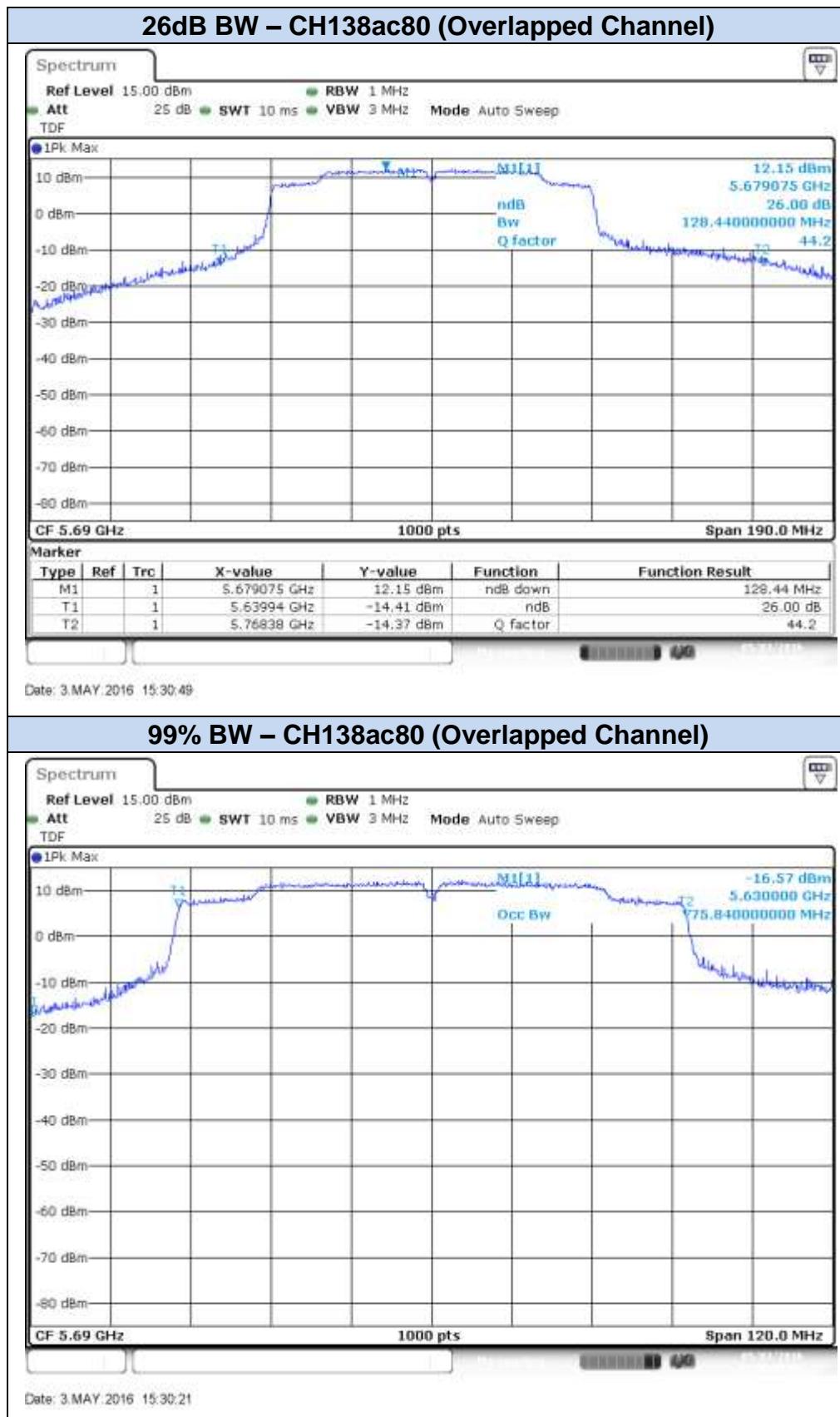




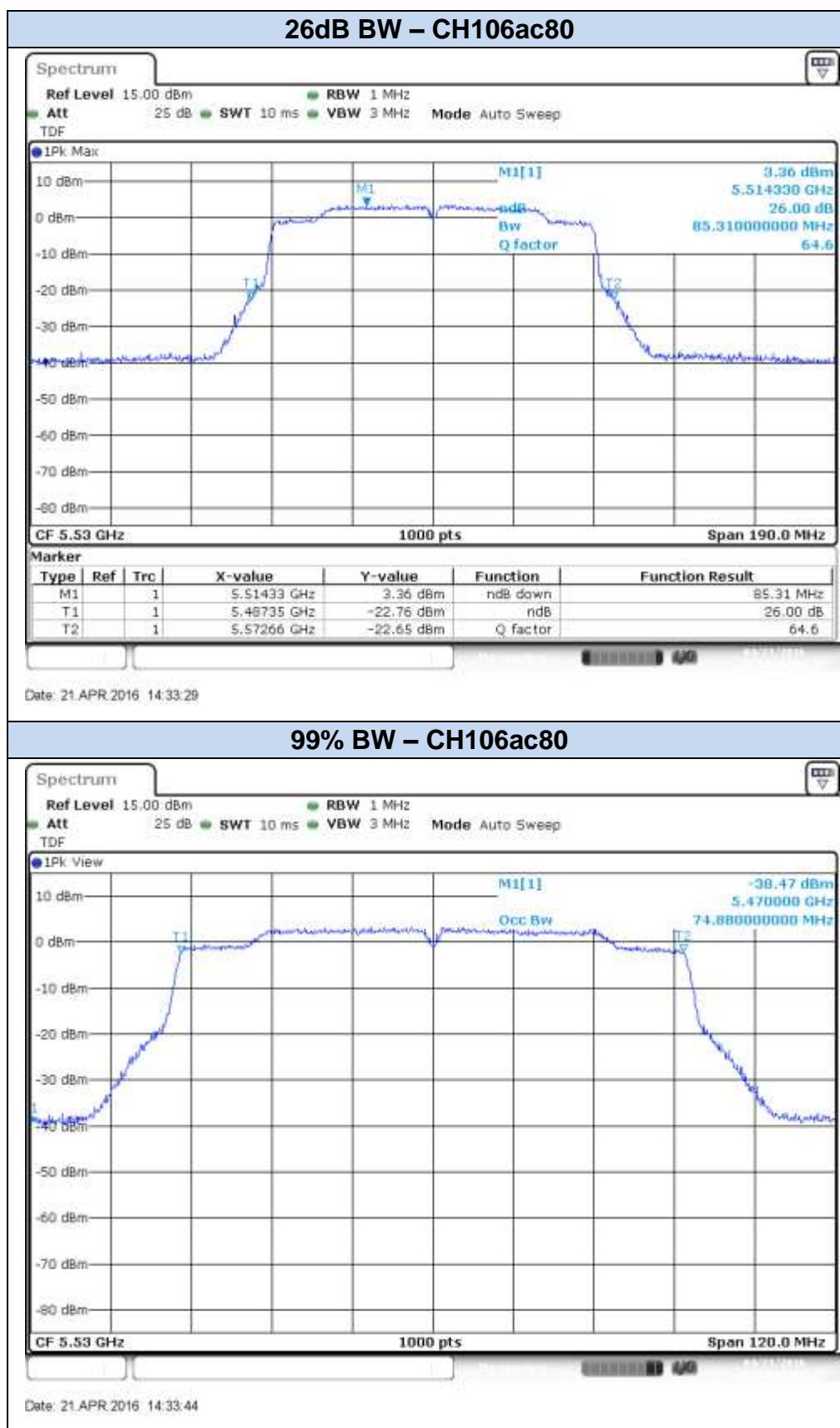
## 802.11ac80, VHT0 (MIMO) – Chain A

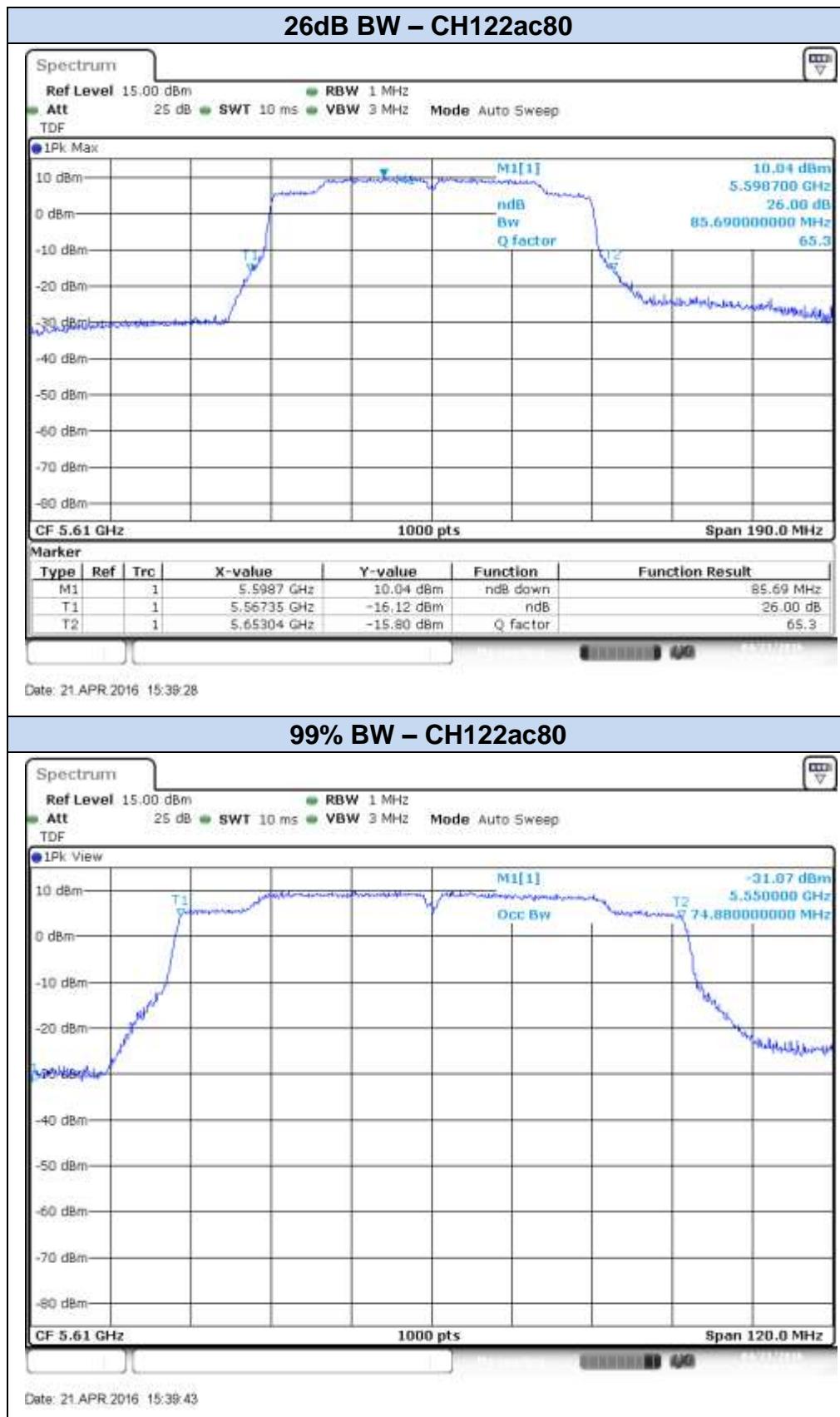


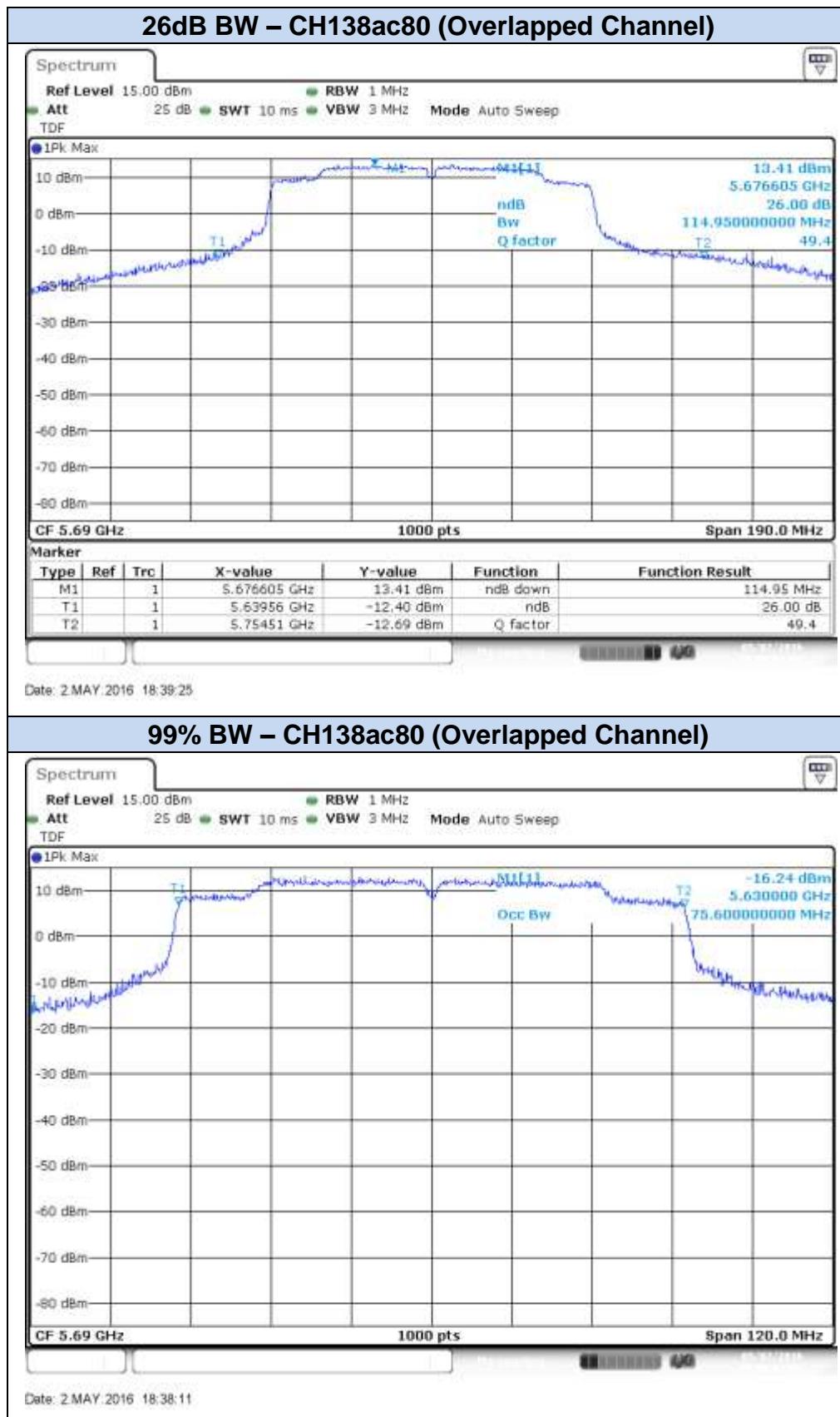




## 802.11ac80, VHT0 (MIMO) – Chain B







## D.2 Power Limits. Maximum Output power & Peak power spectral density

### Test limits:

FCC part	Limits
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 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band.

### Test procedure:

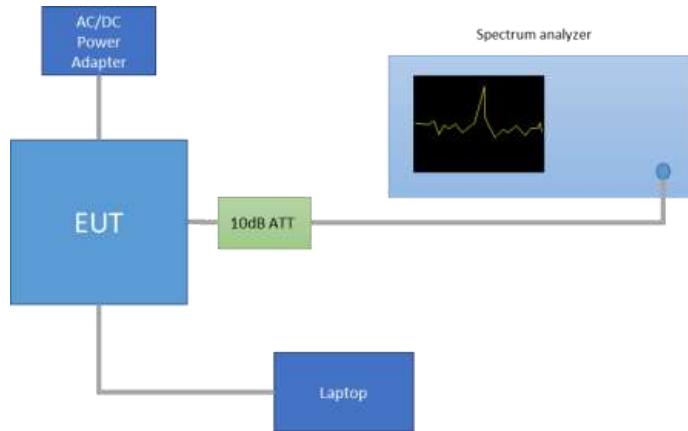
The Maximum Conducted Output Power was measured using the channel integration method according to point E) 2) e) (Method SA-2 Alternative) of KDB 789033 D02.

The maximum power spectral density (PSD) was measured using the method according to point F) (Method SA-2 Alternative) of KDB 789033 D02.

In the measure-and-sum approach for MIMO mode, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically in linear power units to determine the total emission level from the device.

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

The setup below was used to measure the maximum conducted output power and power spectral density. The antenna terminal of the EUT is connected to the spectrum analyzer through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



The declared maximum antenna gain is 5dBi.

For the overlapped channels between U-NII-2C and U-NII-3, and according to FCC KDB 644545 D03, the power is computed based on the portion of the emission bandwidth contained within that band. This rule is only applicable for those channels marked as overlapped.

**Results tables:**

Mode	Rate	Meas. Duty Cycle [%]	CH	Freq. [MHz]	Antenna	Power RMS [dBm]				Power RMS [mW]
						Meas. Cond RMS	Duty cycle Compensated	EIRP	PSD Duty cycle Compensated	
802.11a	6Mbps	98.0	100	5500	SISO CHAIN A	17.57	17.66	22.66	6.73	58.33
					SISO CHAIN B	18.00	18.09	23.09	7.21	64.40
			120	5600	SISO CHAIN A	20.17	20.26	25.26	9.31	106.14
					SISO CHAIN B	20.24	20.33	25.33	9.37	107.87
			140	5700	SISO CHAIN A	17.79	17.88	22.88	6.97	61.36
					SISO CHAIN B	18.28	18.37	23.37	7.51	68.69
	HT0	98.1	100	5500	SISO CHAIN A	17.52	17.60	22.60	6.51	57.59
					SISO CHAIN B	17.57	17.65	22.65	6.59	58.26
			120	5600	SISO CHAIN A	20.13	20.21	25.21	9.09	105.04
					SISO CHAIN B	20.21	20.29	25.29	9.20	106.99
			140	5700	SISO CHAIN A	17.26	17.34	22.34	6.27	54.24
					SISO CHAIN B	17.86	17.94	22.94	6.90	62.28
802.11n20	HT8	97.6	144*	5720	SISO CHAIN A	18.71	18.79	23.79	8.40	75.74
					SISO CHAIN B	19.31	19.39	24.39	8.99	86.97
			100	5500	MIMO CHAIN A	15.83	15.93	20.93	4.86	39.21
					MIMO CHAIN B	15.92	16.02	21.02	4.98	40.03
			120	5600	MIMO CHAIN A	18.89	18.99	23.99	7.91	79.31
					MIMO CHAIN B	18.92	19.02	24.02	7.90	79.86
			140	5700	MIMO CHAIN A	15.33	15.43	20.43	4.28	34.94
					MIMO CHAIN B	15.42	15.52	20.52	4.50	35.67
			144*	5720	MIMO CHAIN A	18.08	18.18	23.18	7.80	65.82
					MIMO CHAIN B	18.18	18.28	23.28	7.86	67.35
802.11n40	HT0	98.1	102F	5510	SISO CHAIN A	18.36	18.44	23.44	3.94	69.88
					SISO CHAIN B	16.06	16.14	21.14	1.71	41.15
			118F	5590	SISO CHAIN A	20.34	20.42	25.42	5.96	110.24
					SISO CHAIN B	20.17	20.25	25.25	5.84	106.01
			134F	5670	SISO CHAIN A	18.83	18.91	23.91	4.43	77.87
					SISO CHAIN B	18.99	19.07	24.07	4.69	80.79
			142F*	5710	SISO CHAIN A	19.57	19.65	24.65	5.42	92.33
					SISO CHAIN B	20.40	20.48	25.48	6.29	111.77
	HT8	97.6	102F	5510	MIMO CHAIN A	12.44	12.55	17.55	-2.02	17.97
					MIMO CHAIN B	12.69	12.80	17.80	-1.62	19.03
			118F	5590	MIMO CHAIN A	20.00	20.11	25.11	5.61	102.46
					MIMO CHAIN B	20.39	20.50	25.50	6.08	112.09
			134F	5670	MIMO CHAIN A	17.29	17.40	22.40	2.82	54.90
					MIMO CHAIN B	17.79	17.90	22.90	3.53	61.60
			142F*	5710	MIMO CHAIN A	19.31	19.42	24.42	5.16	87.41
					MIMO CHAIN B	20.48	20.59	25.59	6.42	114.43

\* Overlapped channels between U-NII-2C and U-NII-3

**Max Value**

**Min Value**

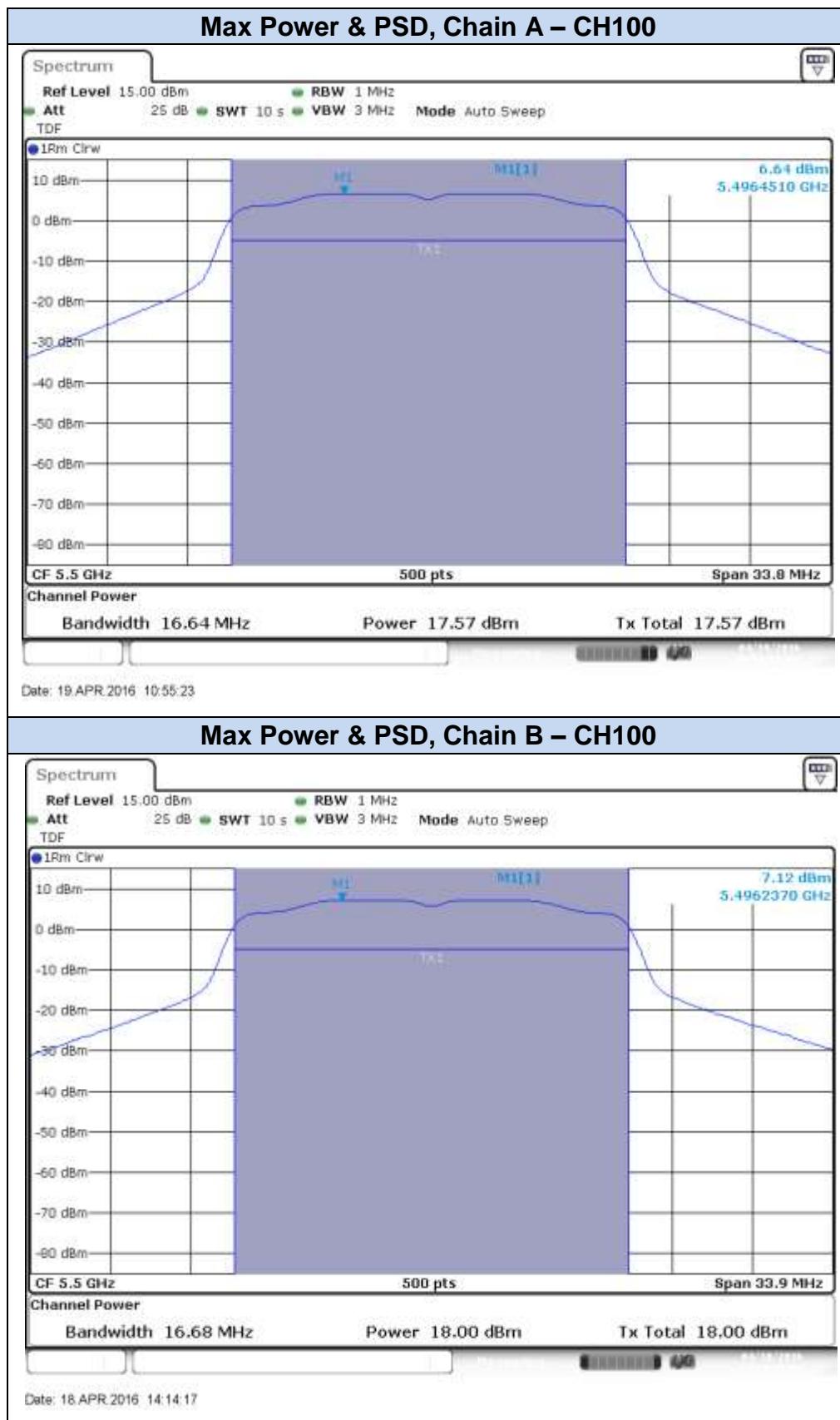
Mode	Rate	Meas. Duty Cycle [%]	CH	Freq. [MHz]	Antenna	Power RMS [dBm]				Power RMS [mW]
						Meas. Cond RMS	Duty cycle Compensated	EIRP	PSD Compensated	
802.11ac80	VHT0	98.1	106ac80	5530	SISO CHAIN A	12.71	12.79	17.79	-4.53	19.02
					SISO CHAIN B	15.46	15.54	20.54	-1.68	35.84
			122ac80	5610	SISO CHAIN A	19.34	19.42	24.42	2.09	87.56
					SISO CHAIN B	18.01	18.09	23.09	0.82	64.47
			138ac80*	5690	SISO CHAIN A	19.22	19.30	24.30	2.06	85.18
					SISO CHAIN B	20.09	20.17	25.17	2.96	104.07
	VHT0	97.5	106ac80	5530	MIMO CHAIN A	10.45	10.56	15.56	-6.76	11.37
					MIMO CHAIN B	10.48	10.59	15.59	-6.73	11.45
			122ac80	5610	MIMO CHAIN A	18.14	18.25	23.25	0.94	66.80
					MIMO CHAIN B	17.07	17.18	22.18	-0.08	52.21
			138ac80*	5690	MIMO CHAIN A	19.70	19.81	24.81	2.59	95.67
					MIMO CHAIN B	20.17	20.28	25.28	3.15	106.61

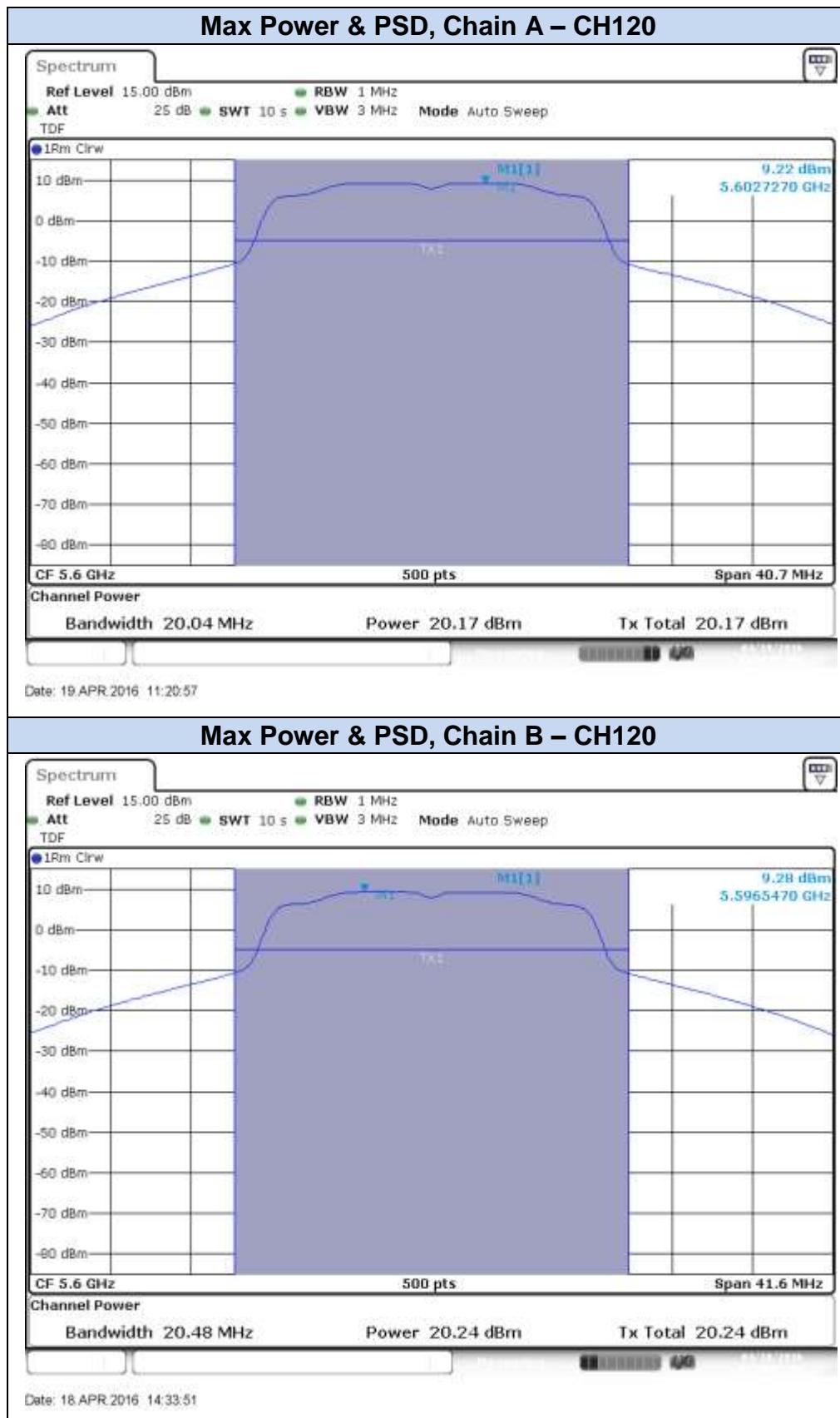
**Max Value****Min Value**

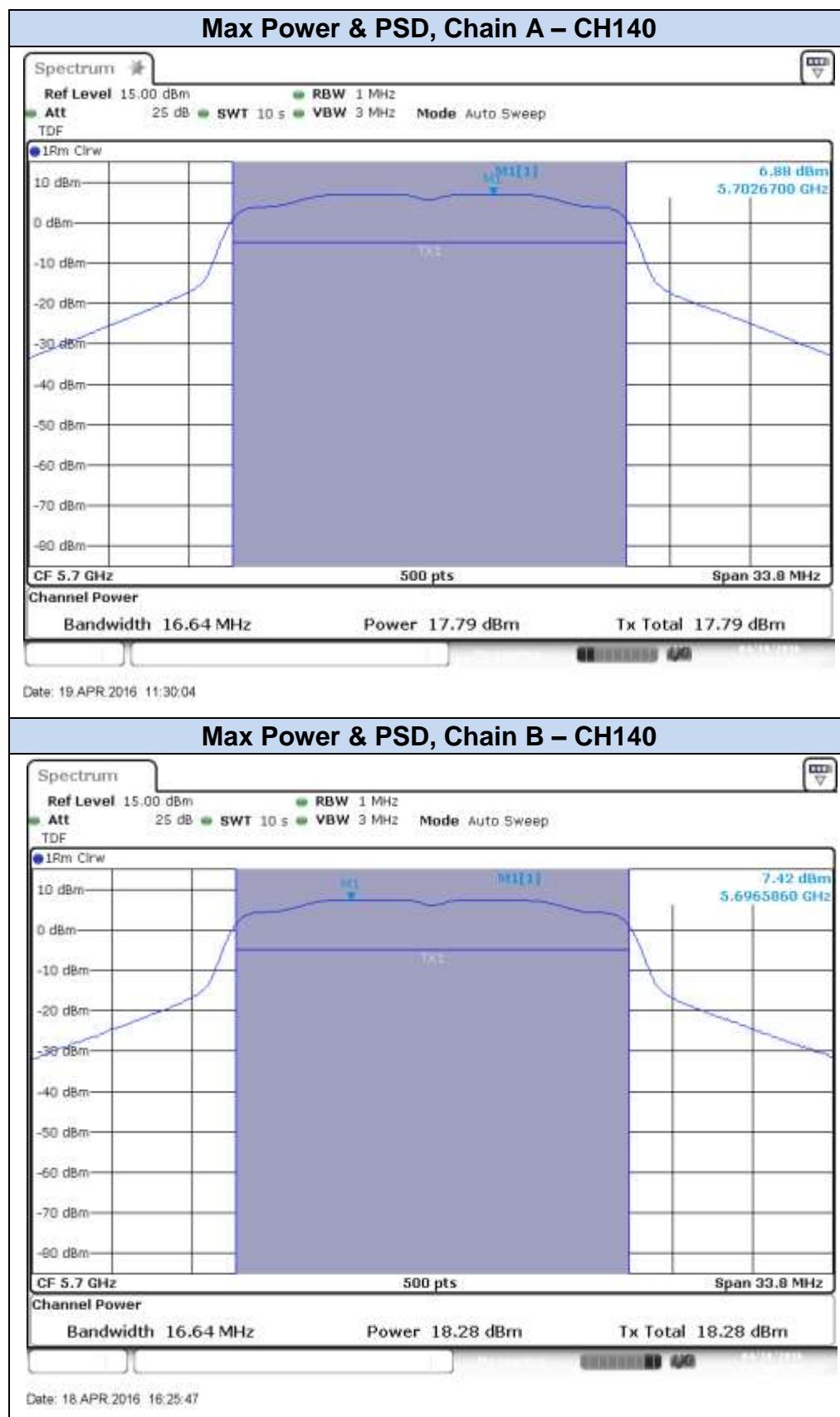
MIMO modes – Combined results					Power [dBm]			
Mode	Rate	Channel	Frequency (MHz)	Antenna	Combined, Duty Cycle compensated	EIRP	Combined PSD	Power Combined [mW]
802.11n20	HT8	100	5500	MIMO CHAIN A + CHAIN B	18.99	23.99	7.93	79.23
		120	5600		22.02	27.02	10.92	159.18
		140	5700		18.49	23.49	7.41	70.62
		144*	5720		21.24	26.24	10.84	133.17
802.11n40	HT8	102F	5510	MIMO CHAIN A + CHAIN B	15.68	20.68	1.19	37.01
		118F	5590		23.32	28.32	8.86	214.55
		134F	5670		20.66	25.66	6.20	116.49
		142F*	5710		23.05	28.05	8.84	201.84
802.11ac80	VHT0	106ac80	5530		13.58	18.58	-3.74	22.82
		122ac80	5610		20.76	25.76	3.47	119.02
		138ac80*	5690		23.06	28.06	5.89	202.28

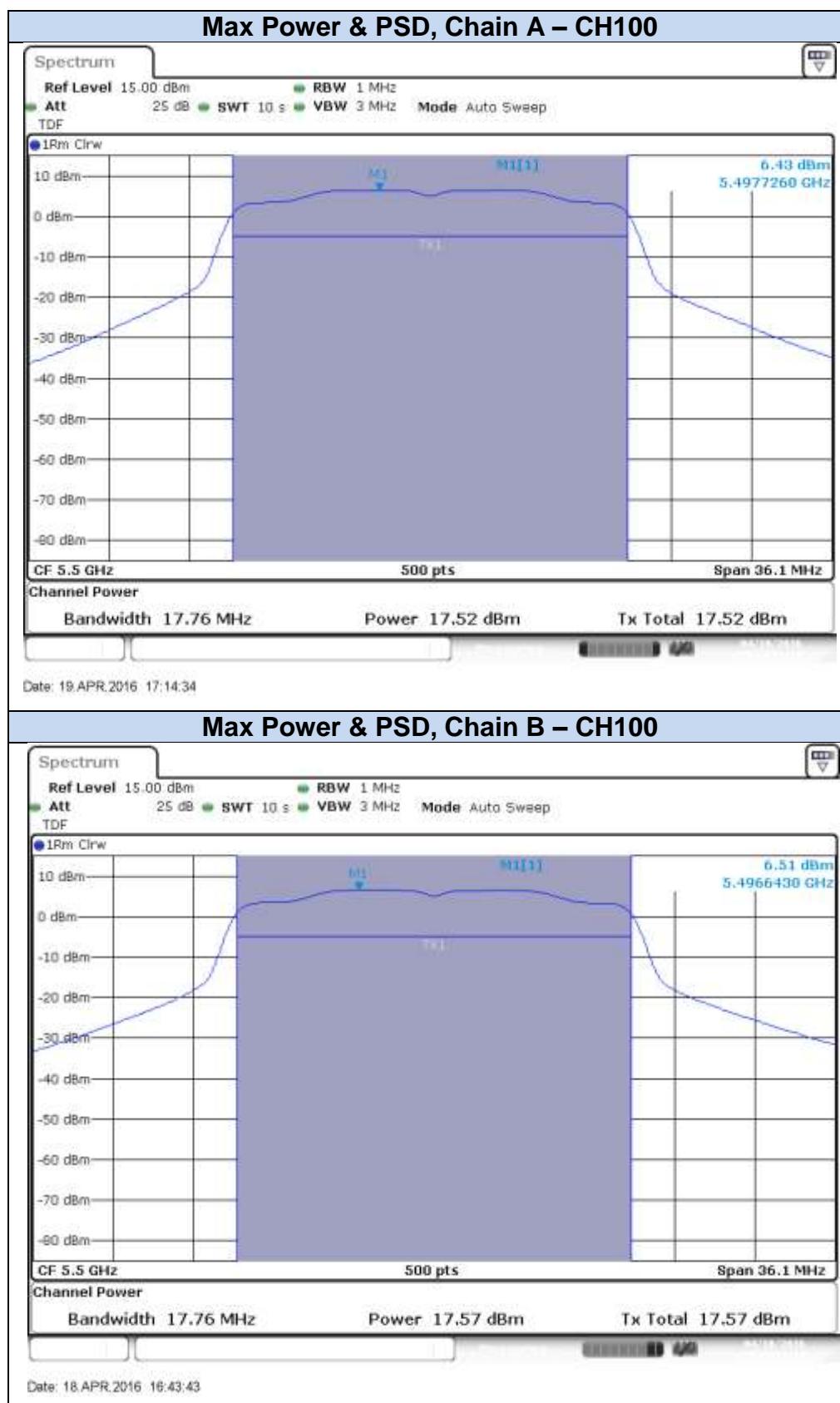
**Max Value****Min Value**

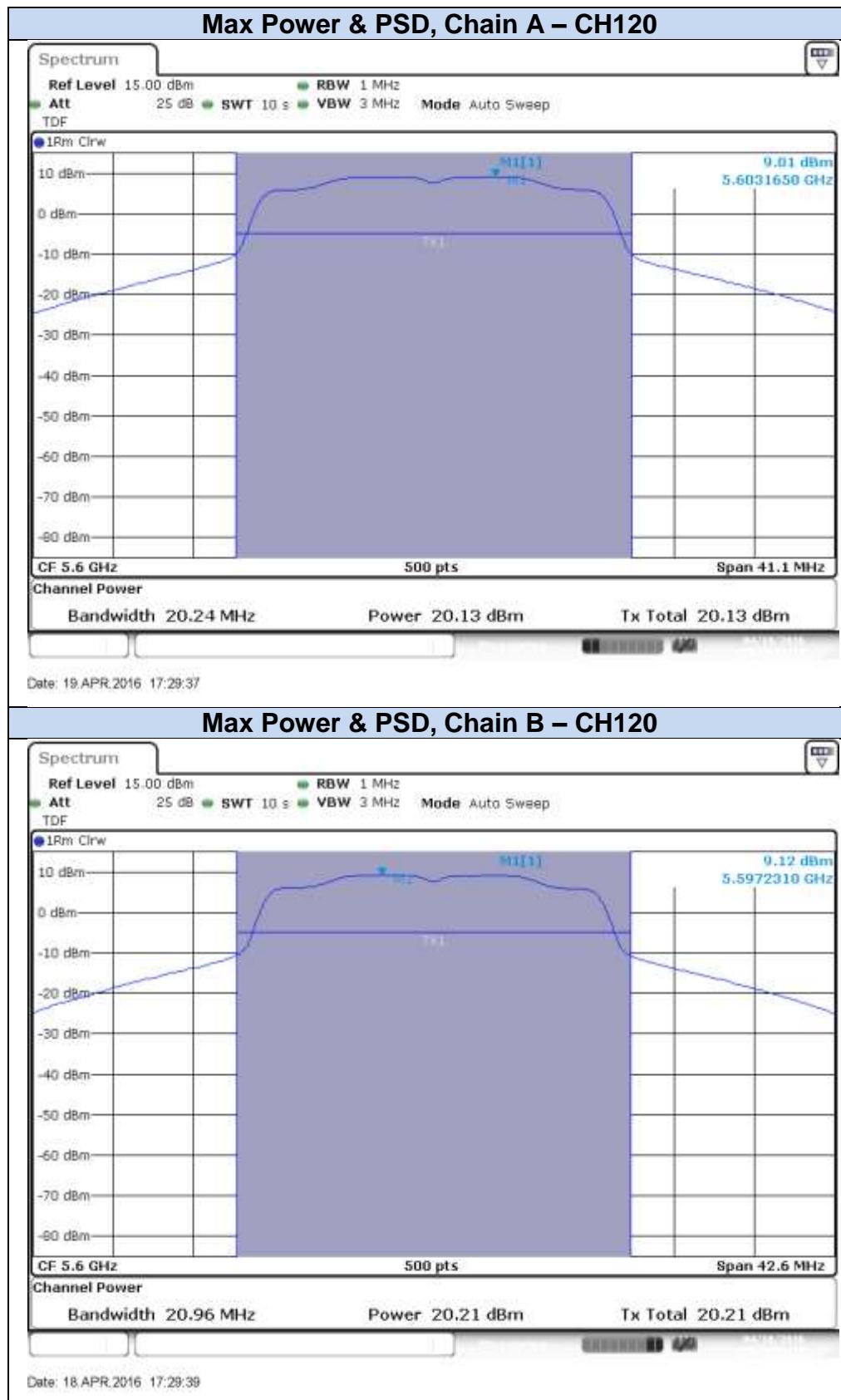
\* Overlapped channels between U-NII-2C and U-NII-3

**Results screenshot:****802.11a, 6Mbps**

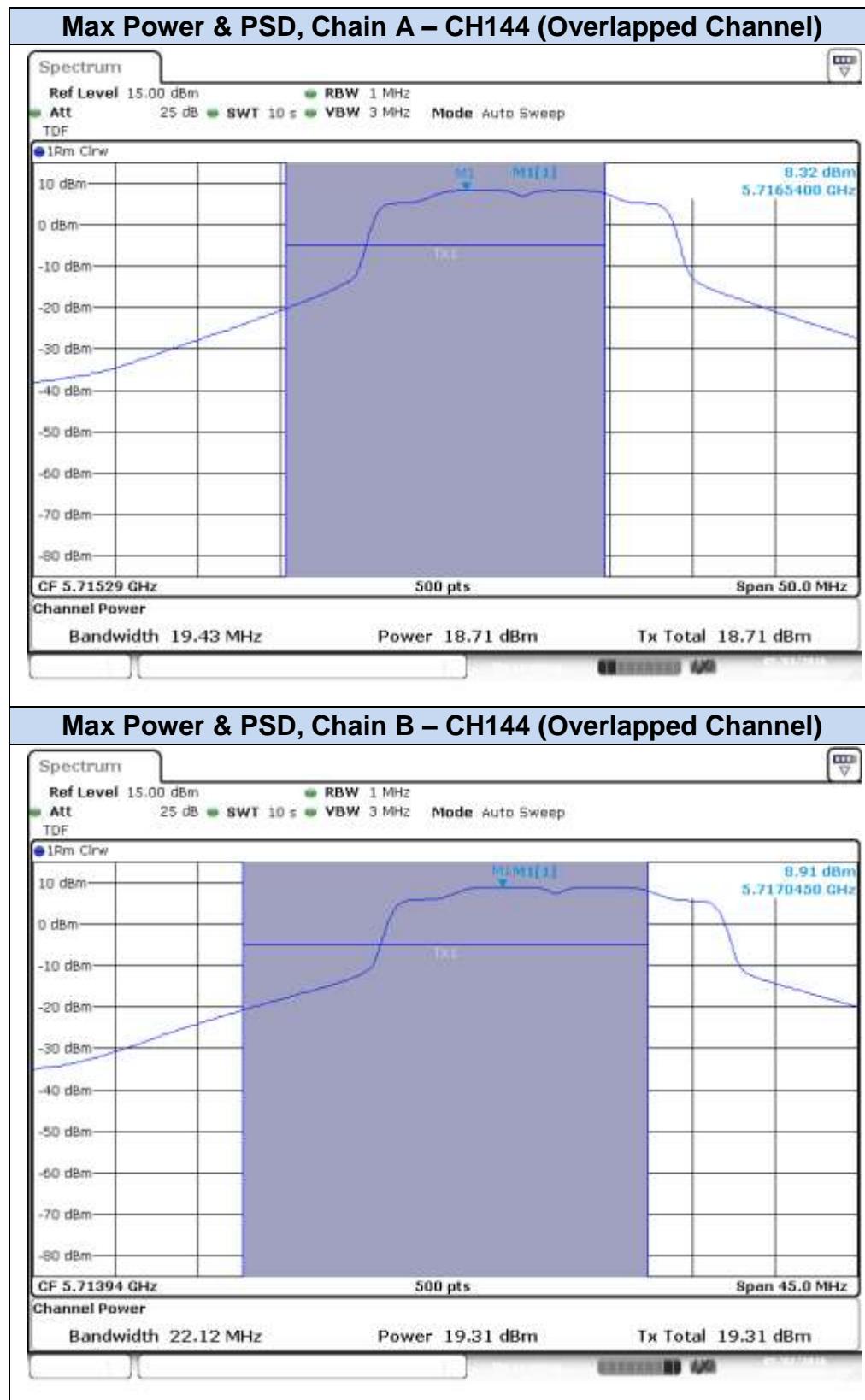




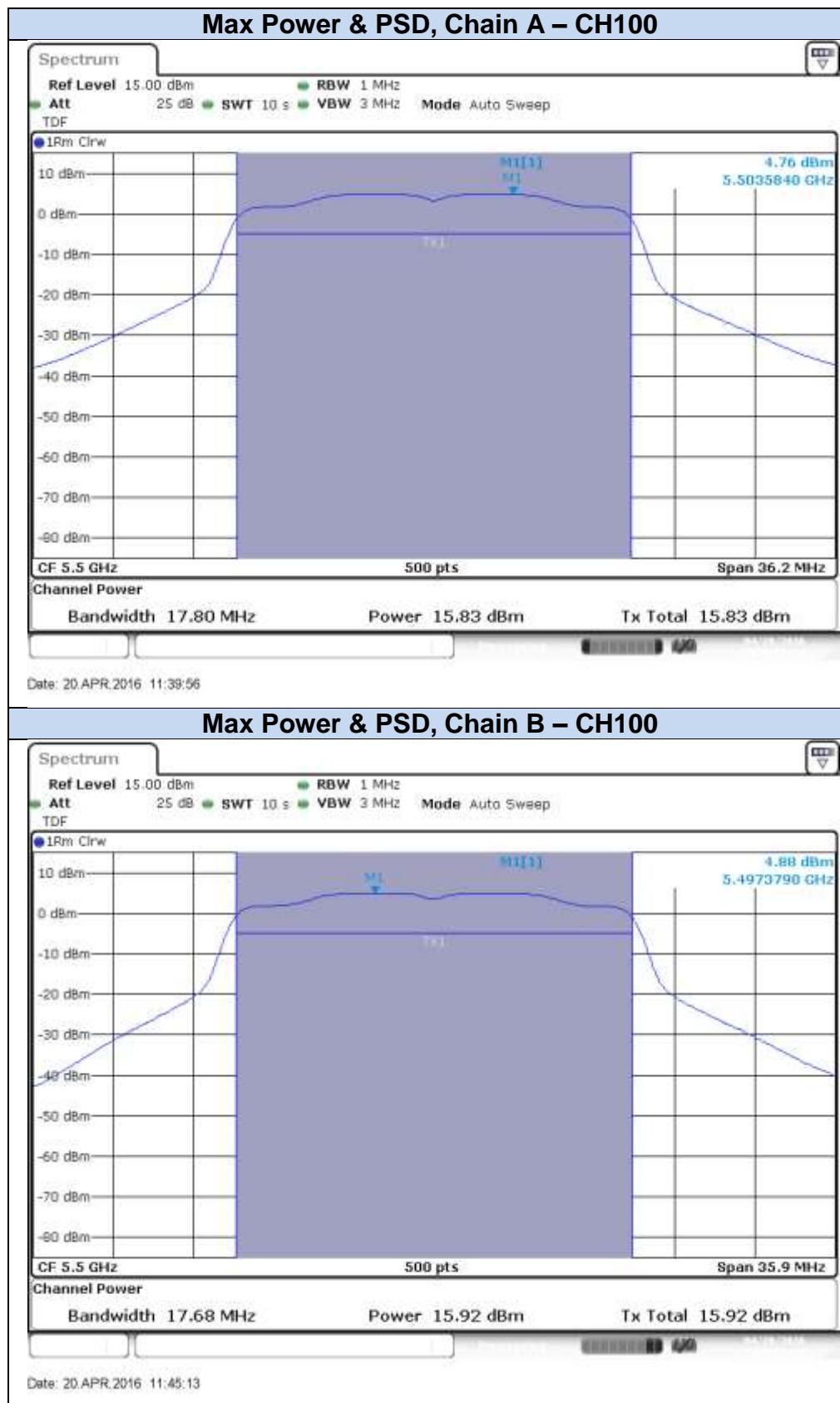
**802.11n20, HT0 (SISO)**





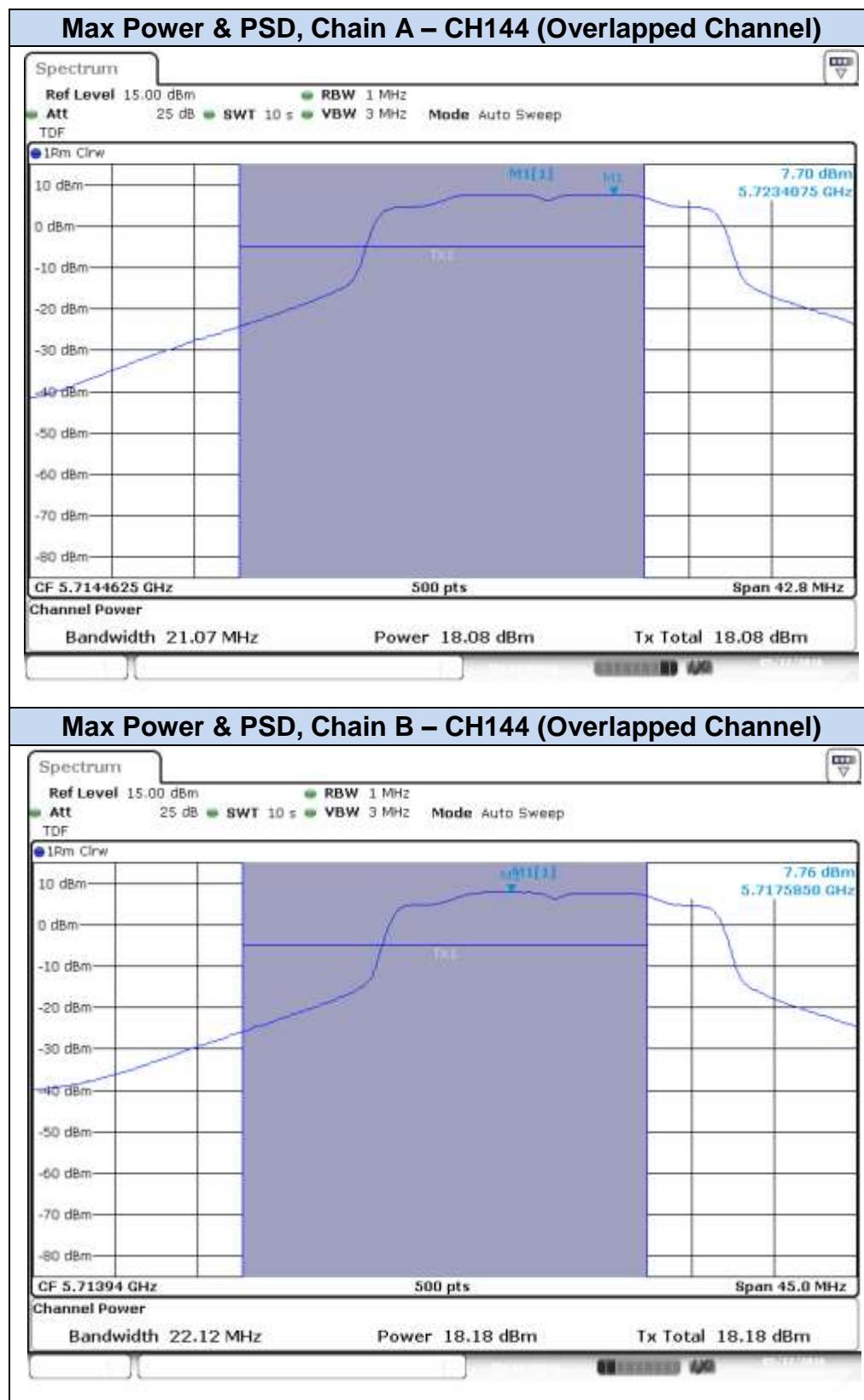


## 802.11n20, HT8 (MIMO)

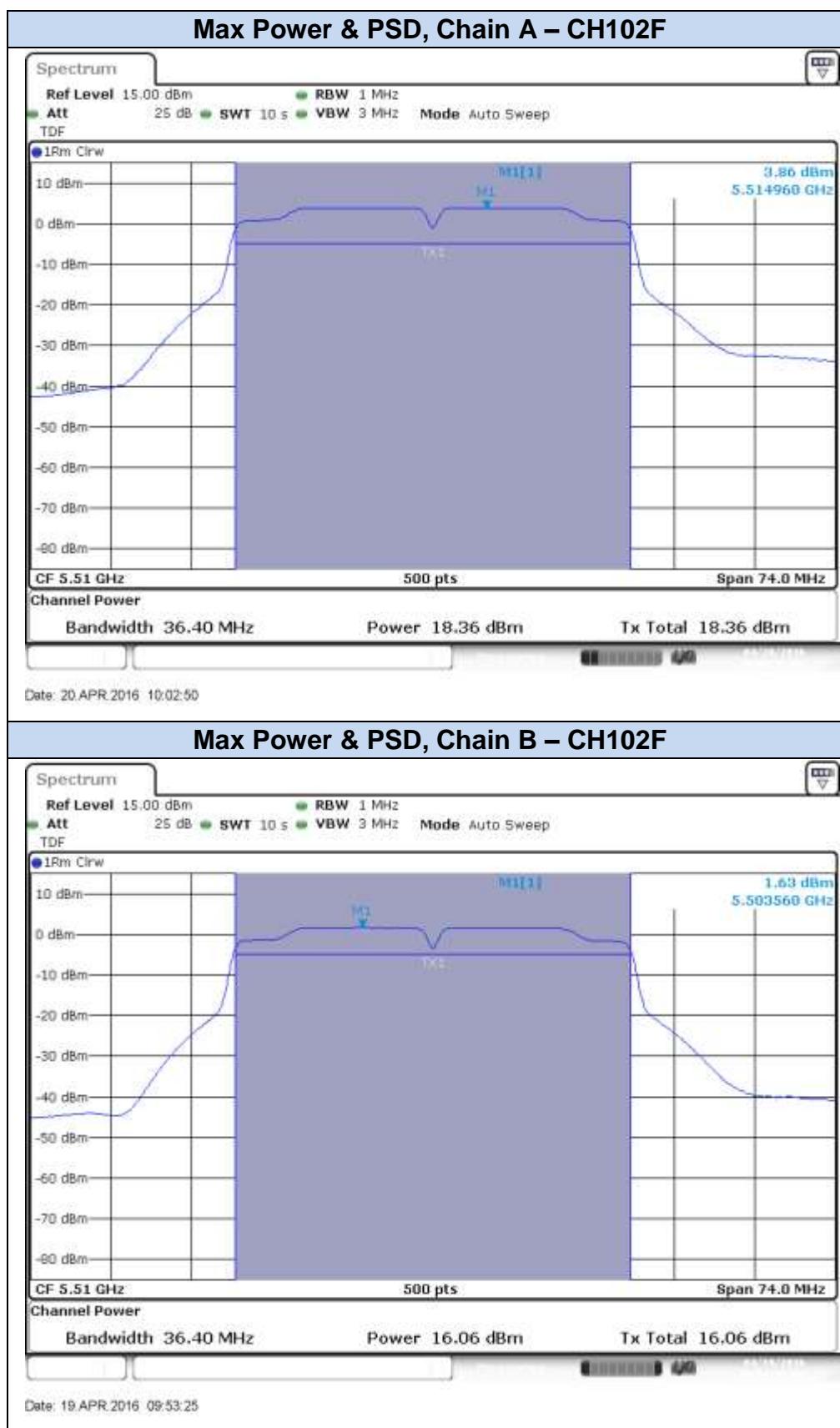


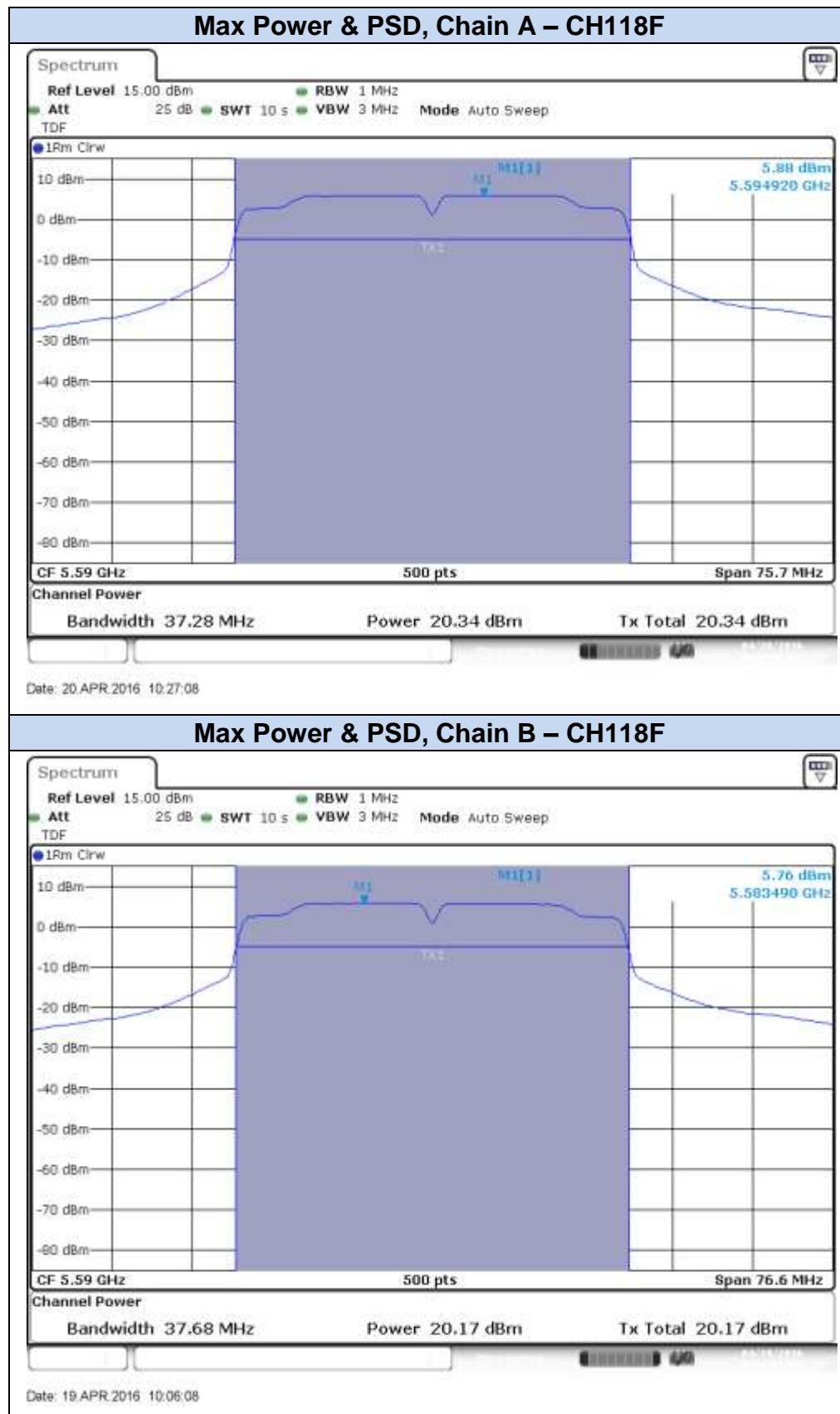


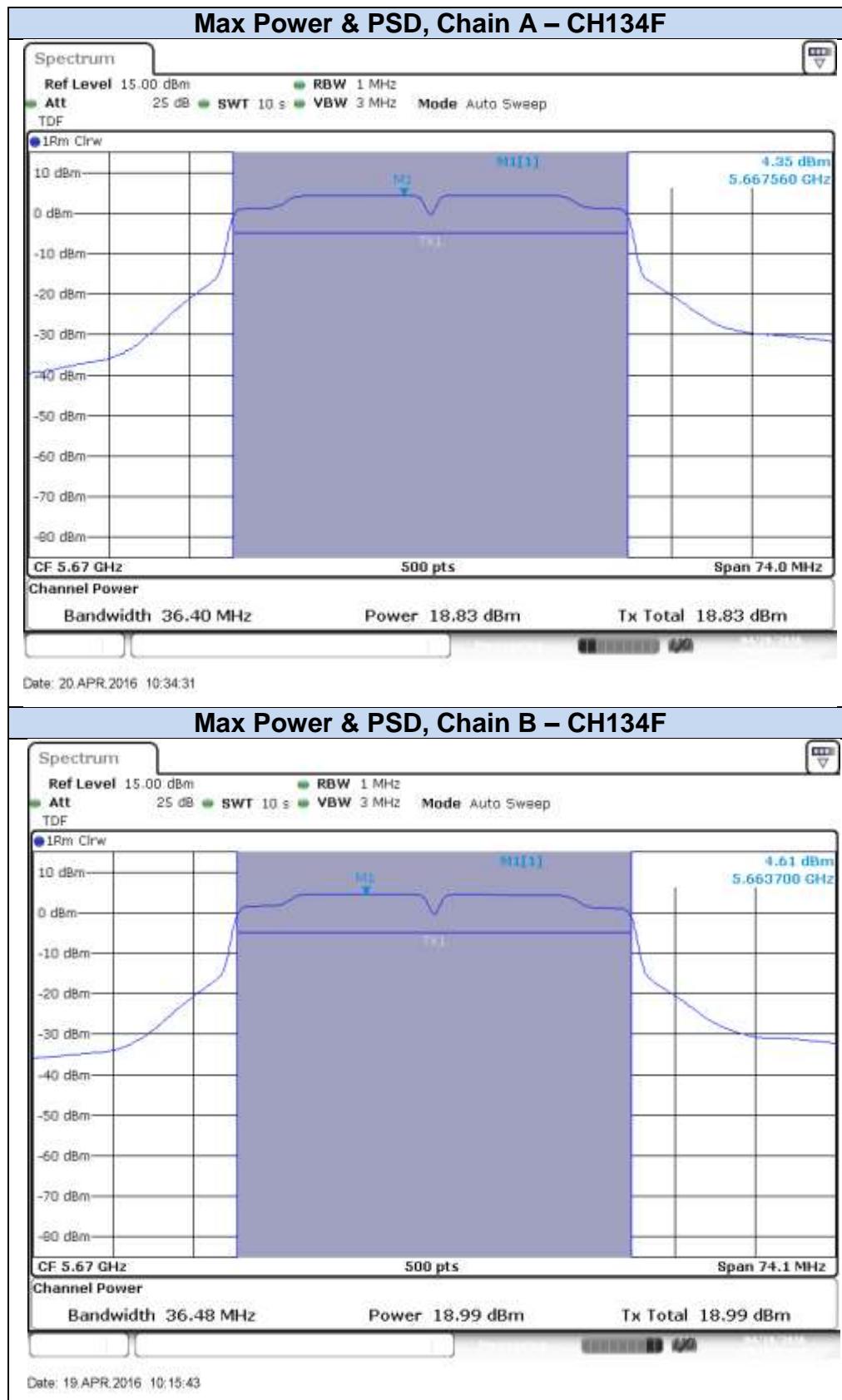


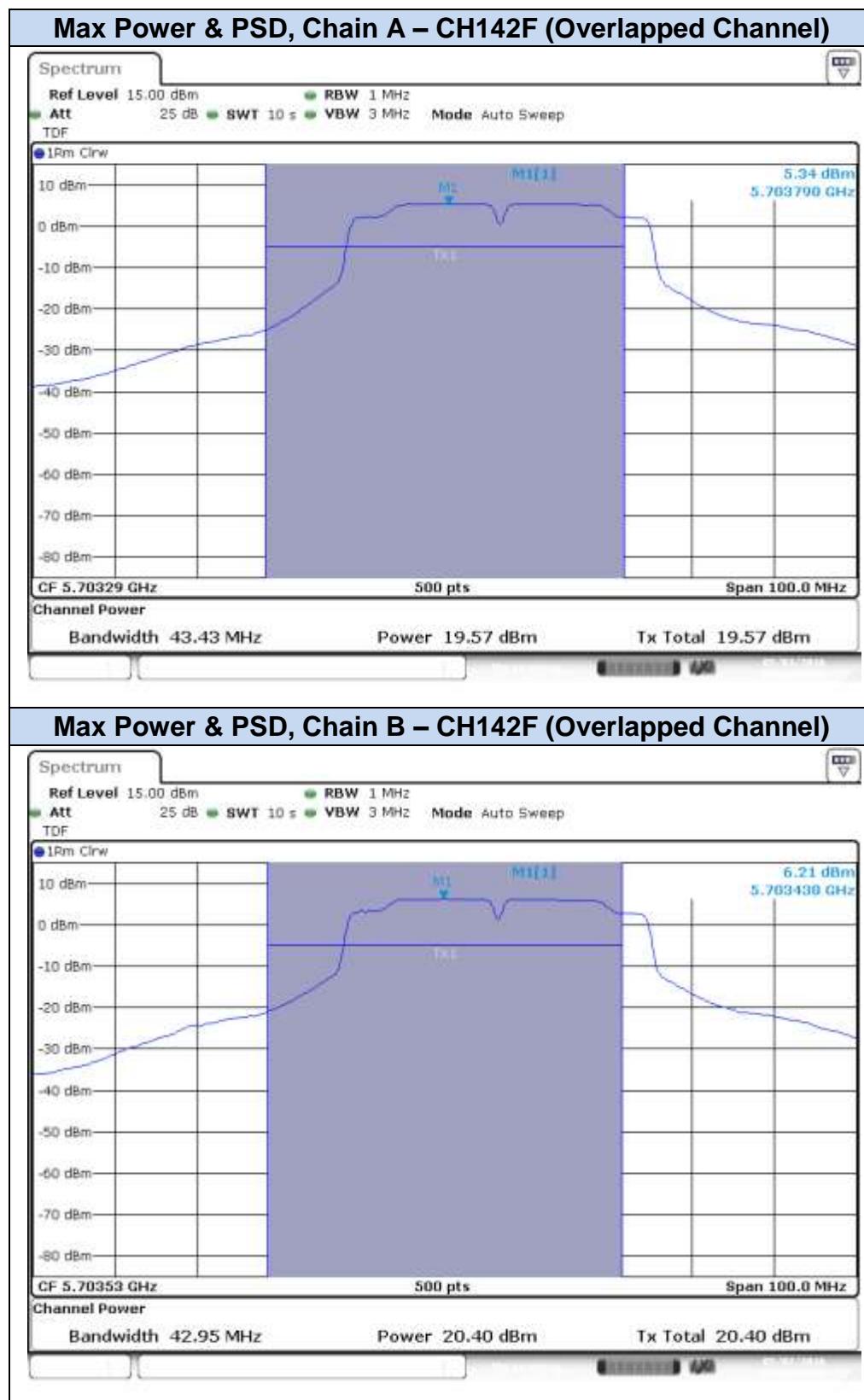


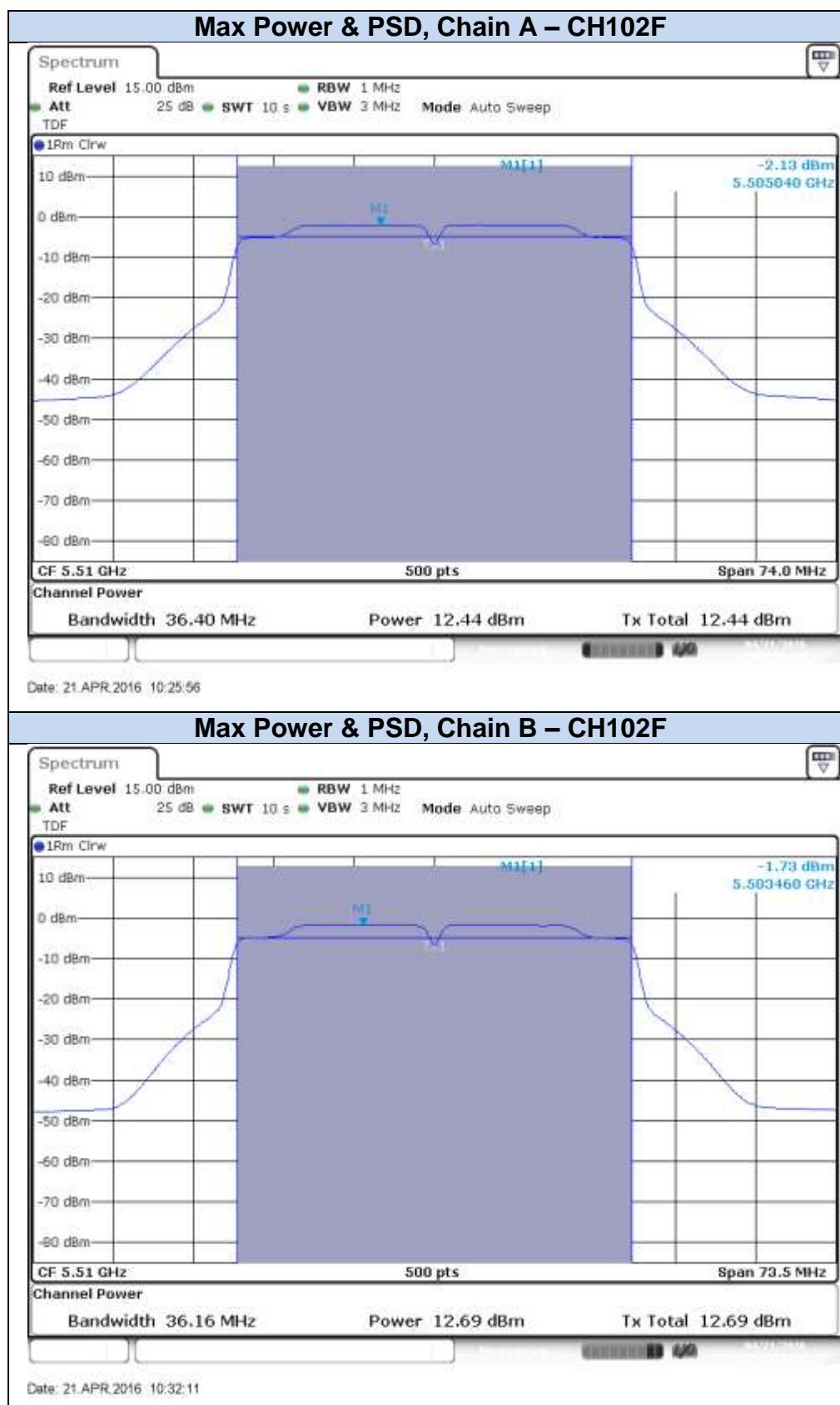
## 802.11n40, HT0 (SISO)

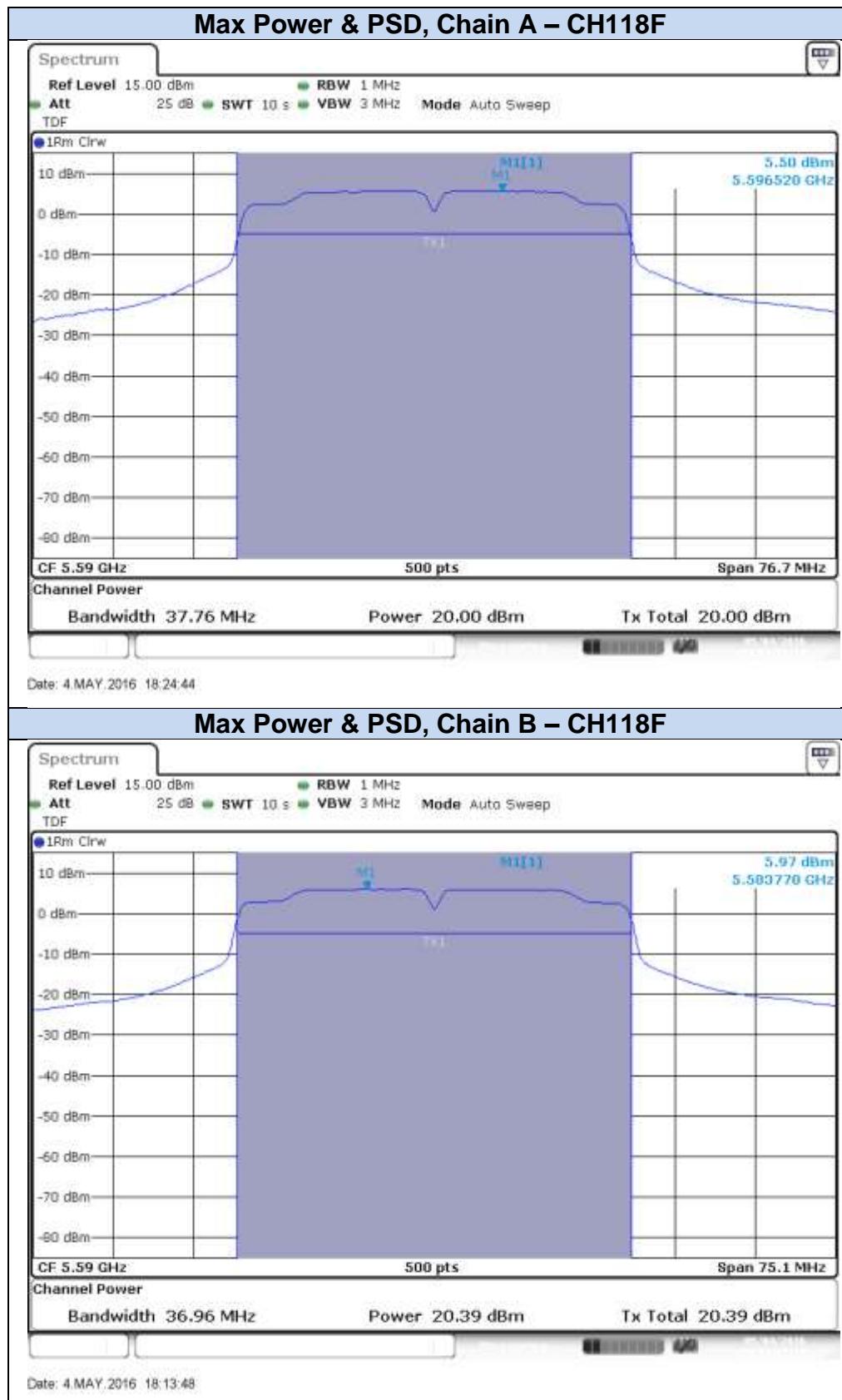


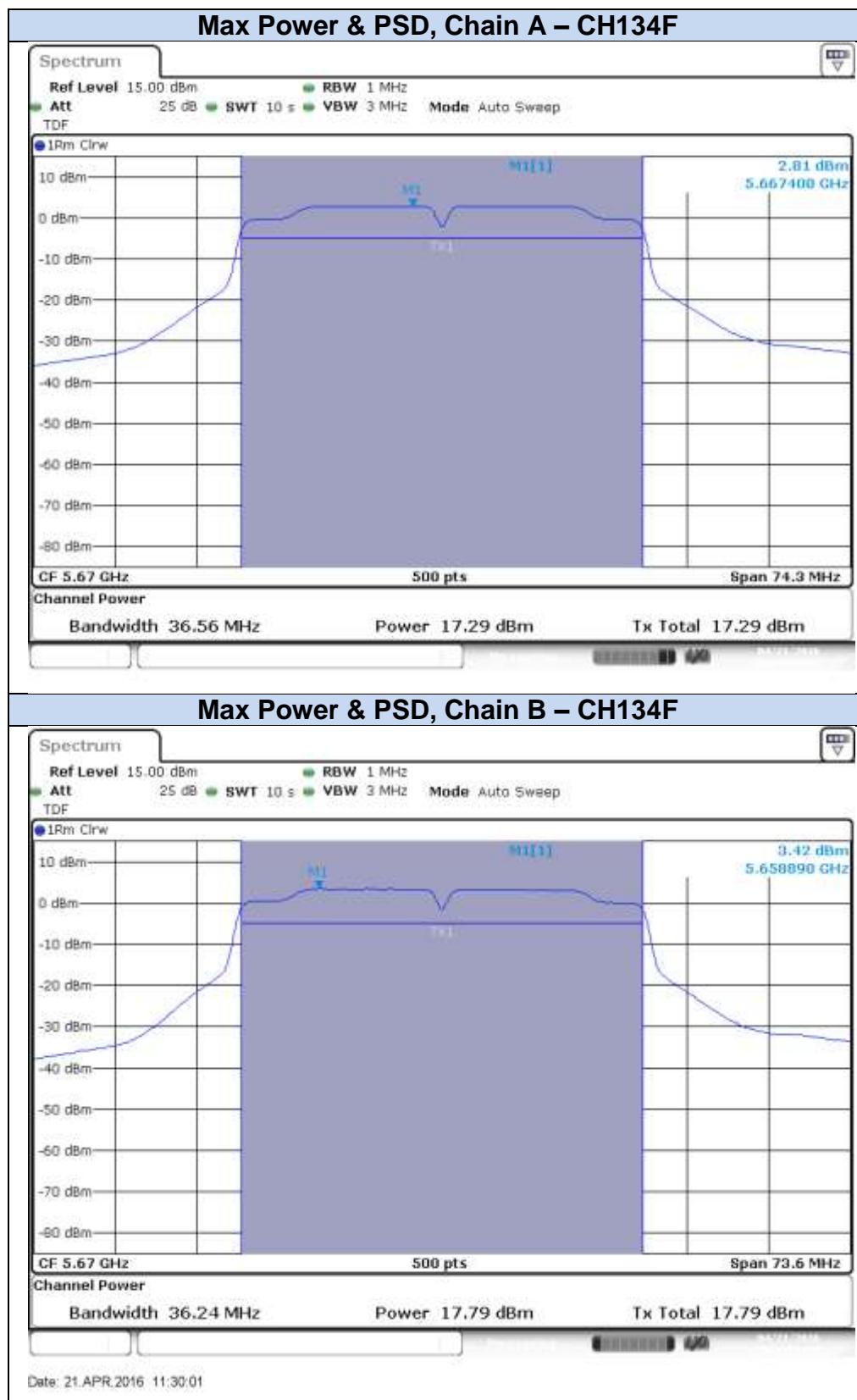


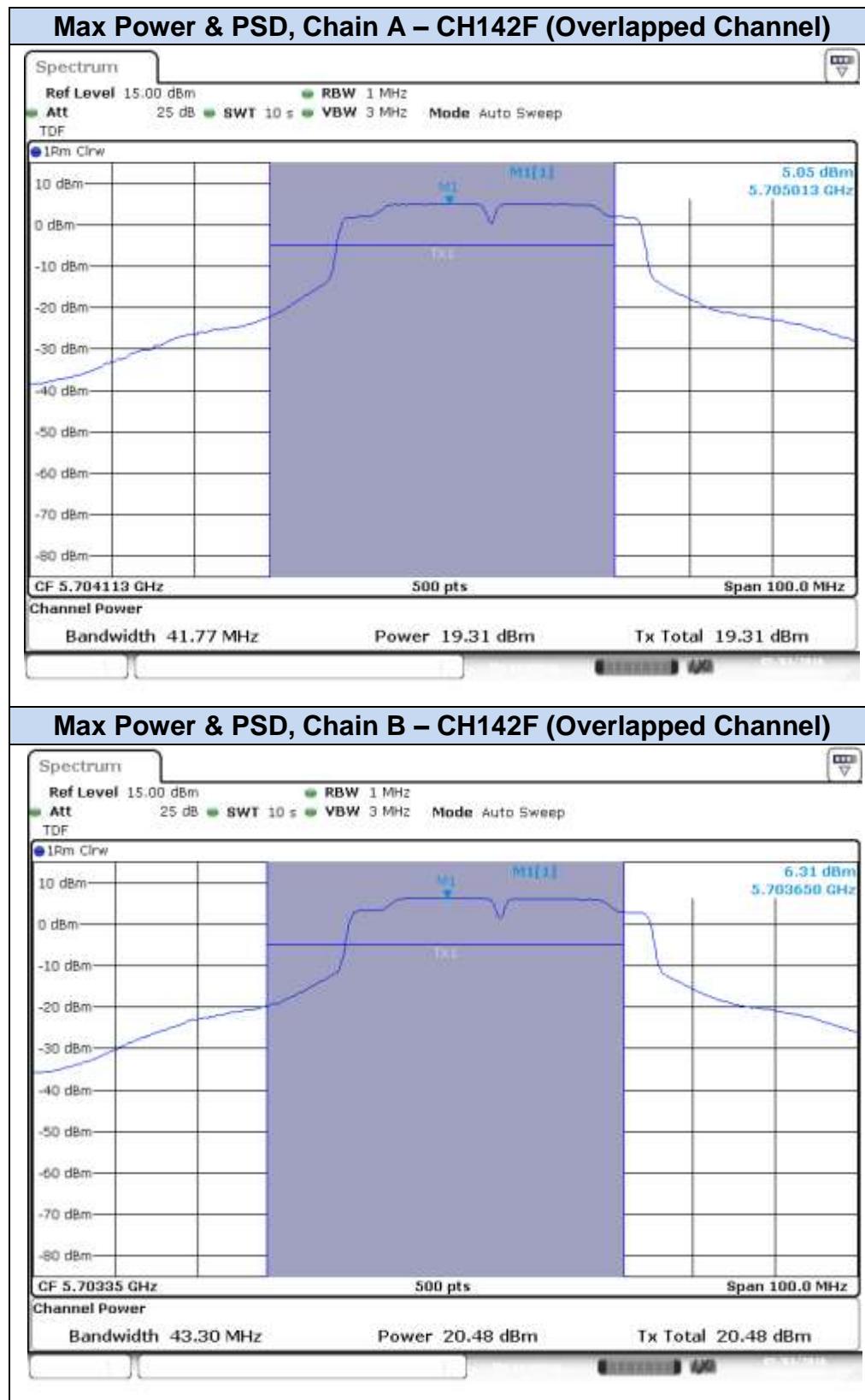




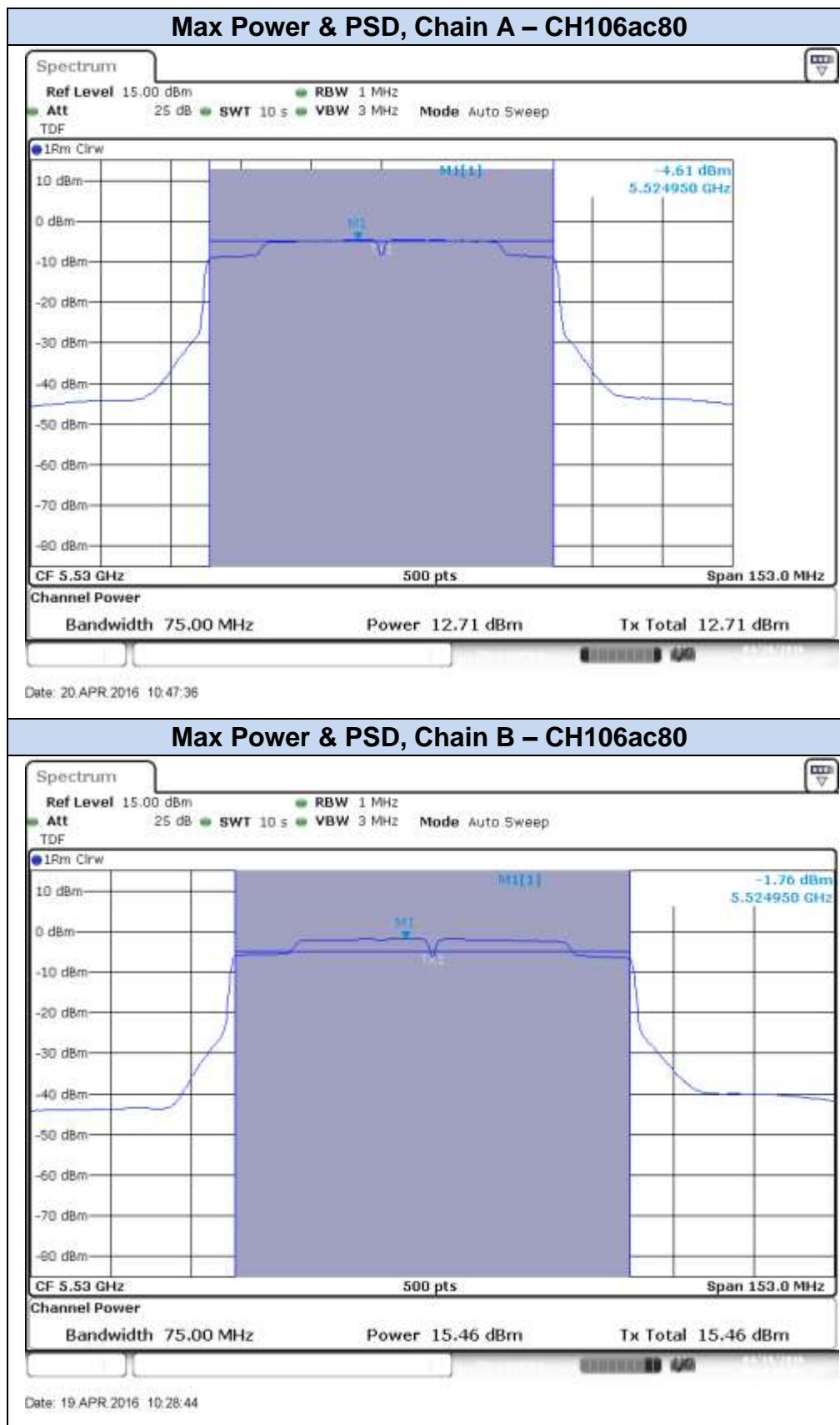
**802.11n40, HT8 (MIMO)**

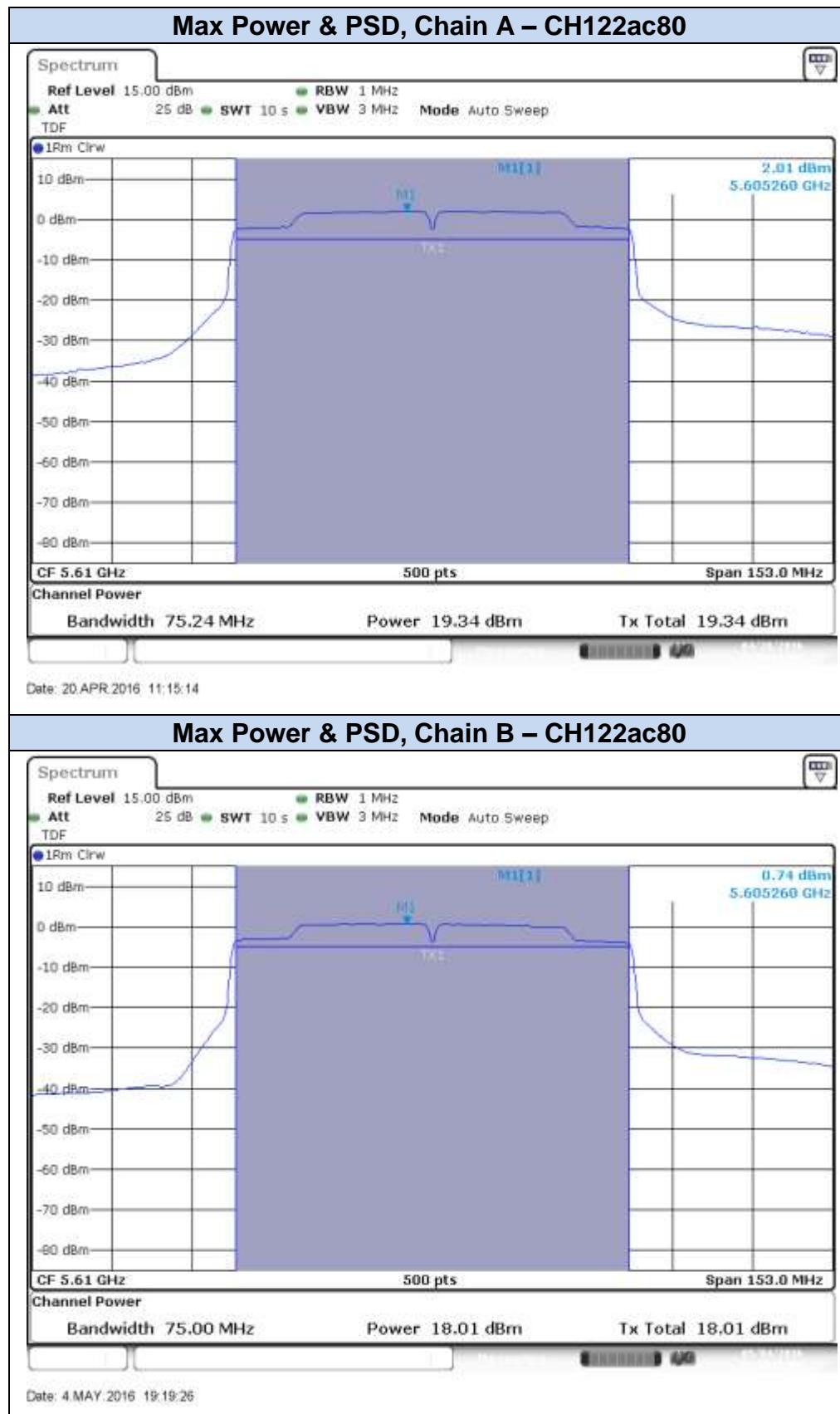


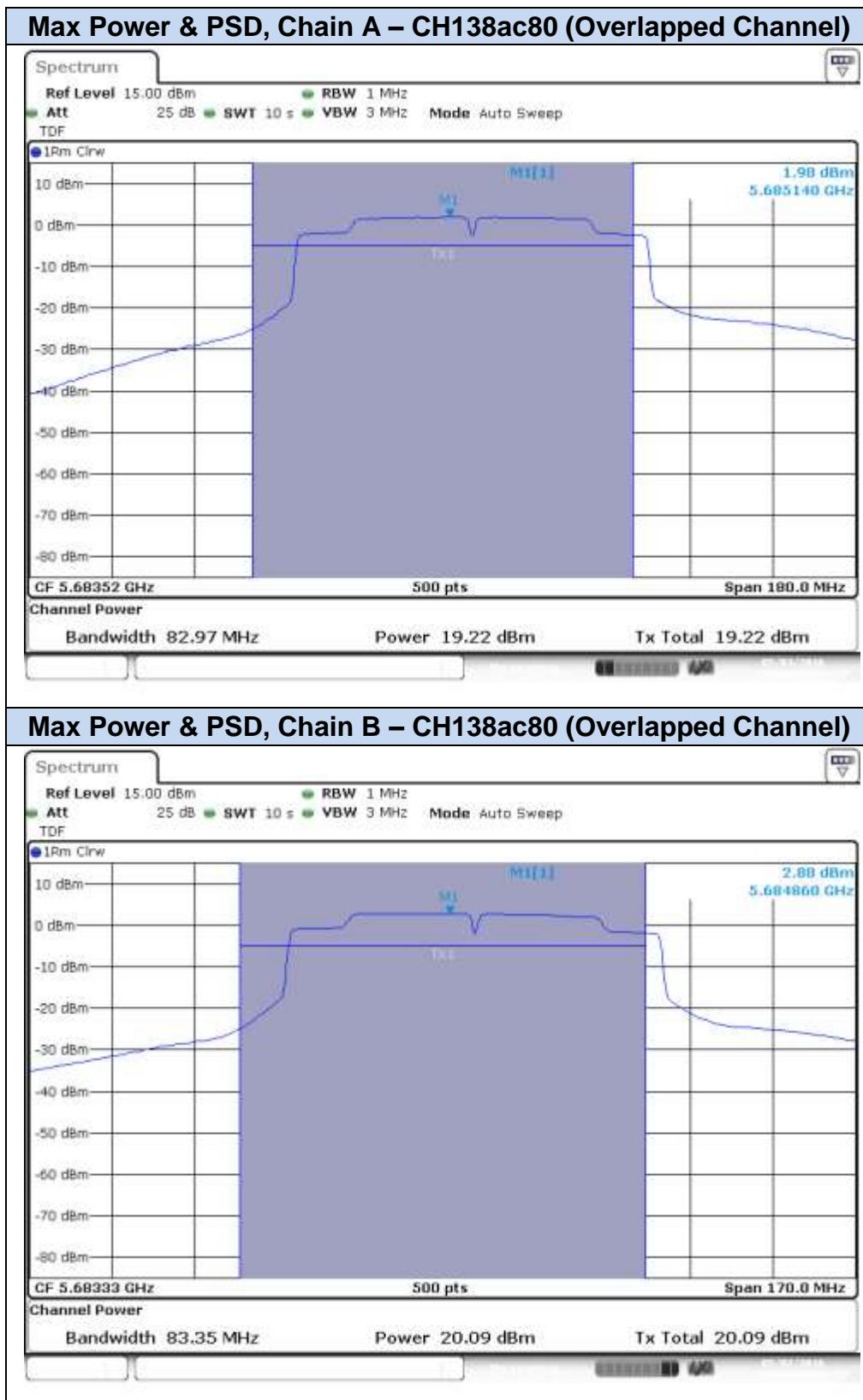




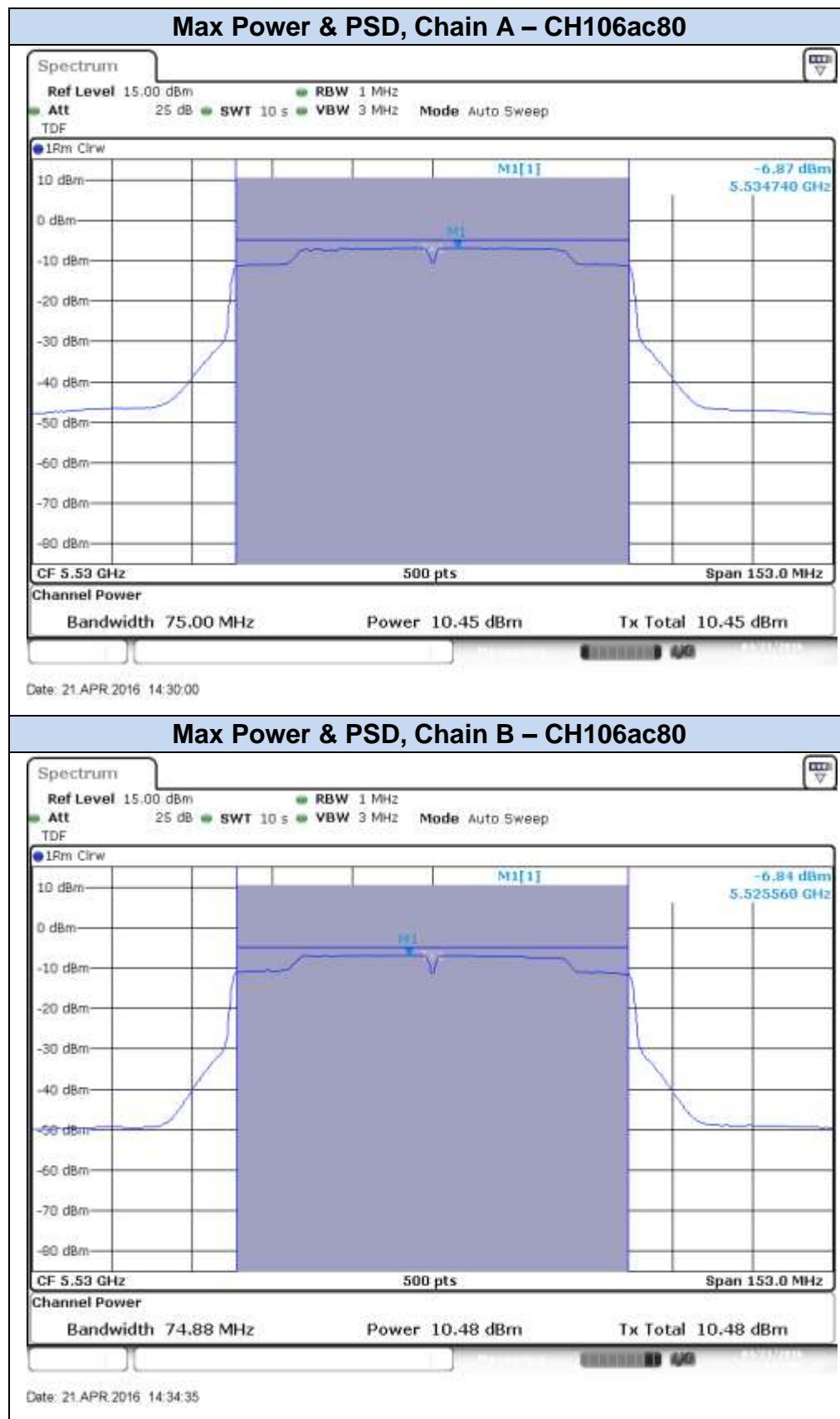
## 802.11ac80, VHT0 (SISO)

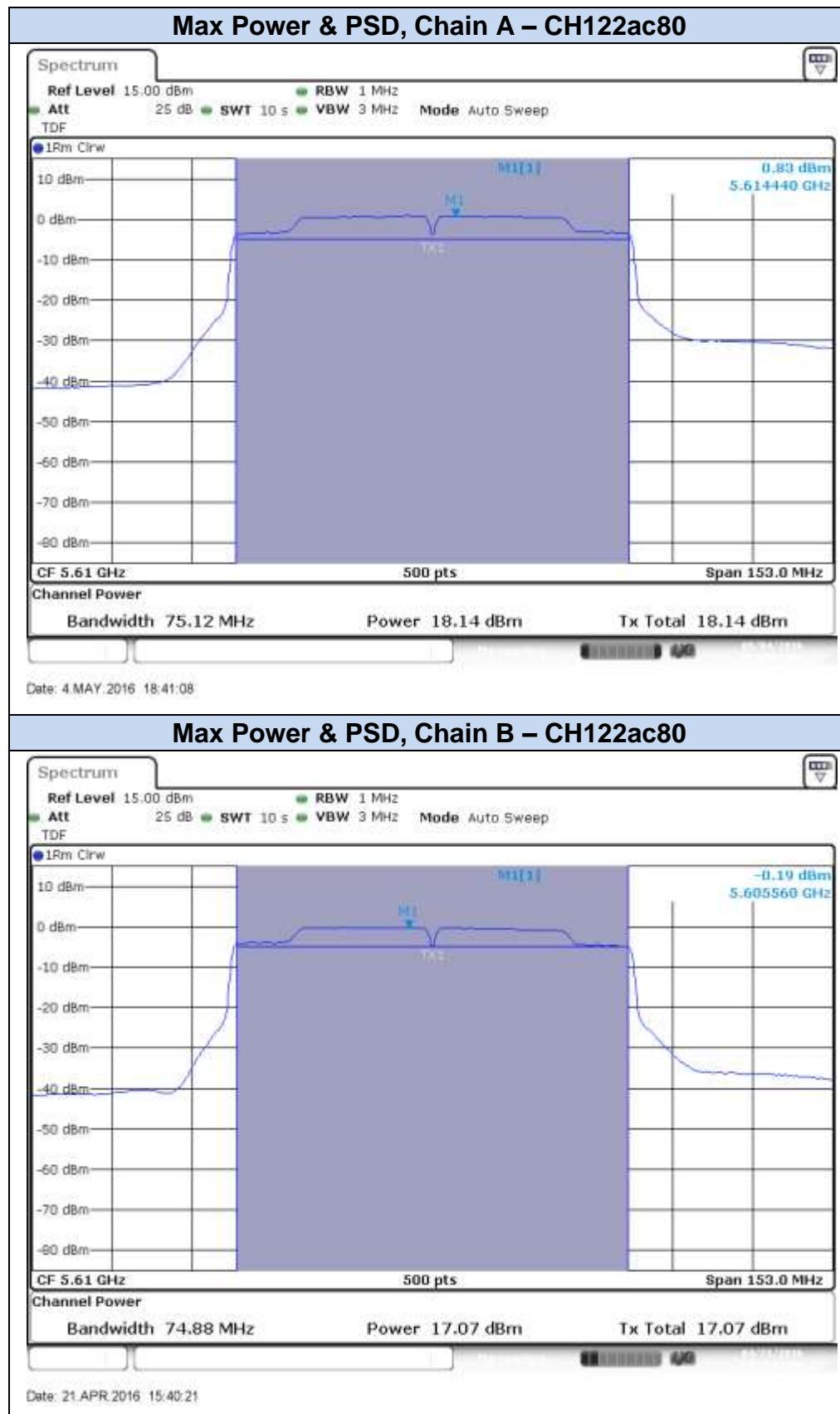


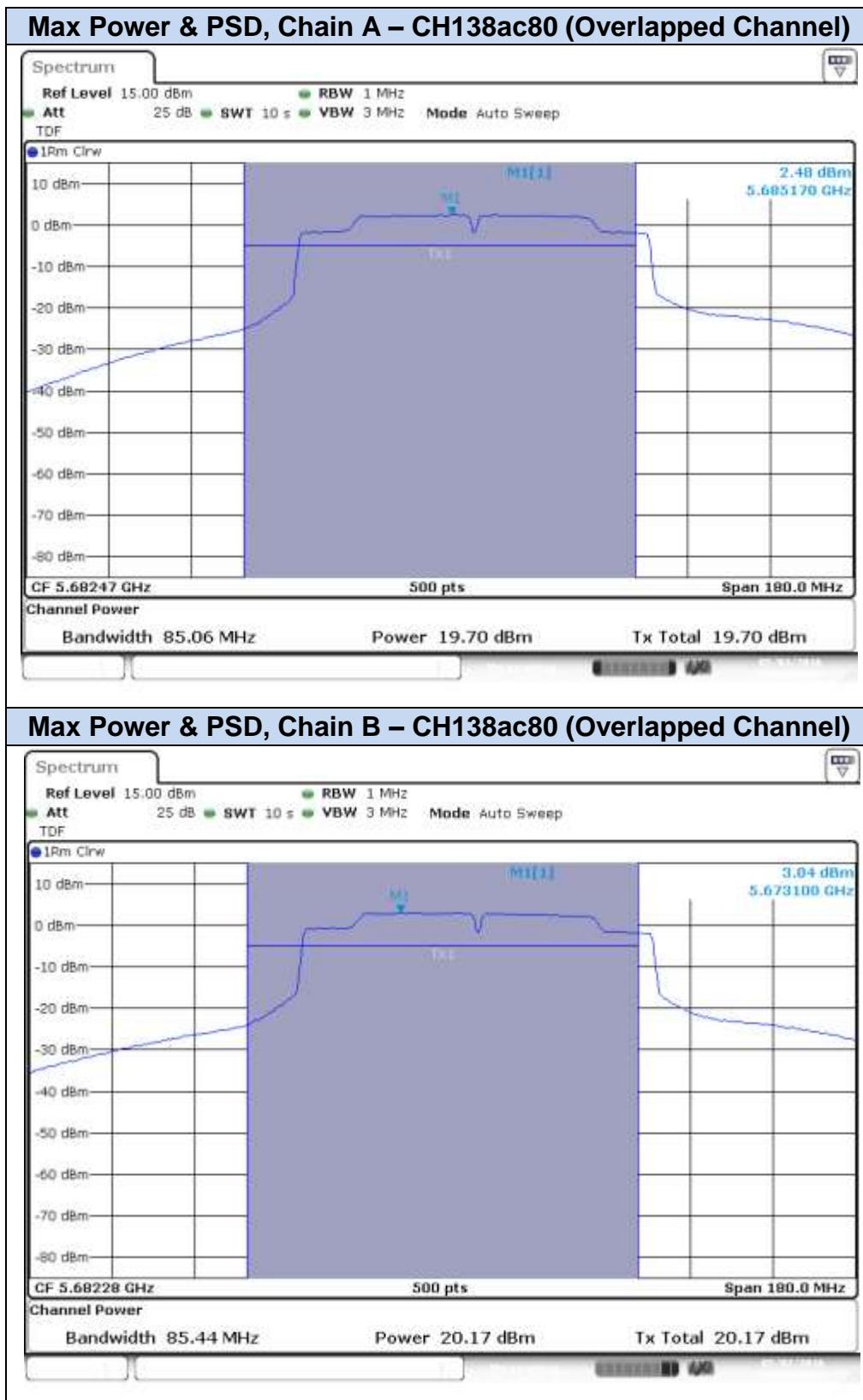




## 802.11ac80, VHT0 (MIMO)







### D.3 Undesirable emissions limits: Band Edge (conducted)

#### Test limits:

FCC part	Limits																																			
15.407 (b) (3)	For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.																																			
15.209	<p>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):</p> <table border="1"> <thead> <tr> <th>Freq Range (MHz)</th> <th>Field Strength (<math>\mu</math>V/m)</th> <th>Field Strength (<math>\text{dB}\mu\text{V}/\text{m}</math>)</th> <th>Meas. Distance (m)</th> </tr> </thead> <tbody> <tr> <td>0.009-0.490</td> <td>2400/f(kHz)</td> <td>-</td> <td>300</td> </tr> <tr> <td>0.490-1.705</td> <td>24000/f(kHz)</td> <td>-</td> <td>300</td> </tr> <tr> <td>1.705-30.0</td> <td>30</td> <td>-</td> <td>30</td> </tr> <tr> <td>30-88</td> <td>100</td> <td>40</td> <td>3</td> </tr> <tr> <td>88-216</td> <td>150</td> <td>43.5</td> <td>3</td> </tr> <tr> <td>216-960</td> <td>200</td> <td>46</td> <td>3</td> </tr> <tr> <td>960-25000</td> <td>500</td> <td>54</td> <td>3</td> </tr> </tbody> </table> <p>The emission limits shown in the table above are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</p>				Freq Range (MHz)	Field Strength ( $\mu$ V/m)	Field Strength ( $\text{dB}\mu\text{V}/\text{m}$ )	Meas. Distance (m)	0.009-0.490	2400/f(kHz)	-	300	0.490-1.705	24000/f(kHz)	-	300	1.705-30.0	30	-	30	30-88	100	40	3	88-216	150	43.5	3	216-960	200	46	3	960-25000	500	54	3
Freq Range (MHz)	Field Strength ( $\mu$ V/m)	Field Strength ( $\text{dB}\mu\text{V}/\text{m}$ )	Meas. Distance (m)																																	
0.009-0.490	2400/f(kHz)	-	300																																	
0.490-1.705	24000/f(kHz)	-	300																																	
1.705-30.0	30	-	30																																	
30-88	100	40	3																																	
88-216	150	43.5	3																																	
216-960	200	46	3																																	
960-25000	500	54	3																																	

#### Test procedure:

The setup below was used to measure undesirable emissions on the Band Edge domain. The antenna terminal of the EUT is connected to the spectrum analyzer through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss and the declared Antenna Gain.

For the BE low RMS, Video Bandwidth Method was used according to section G) 6) (KDB 789033 D02), with the following parameters:

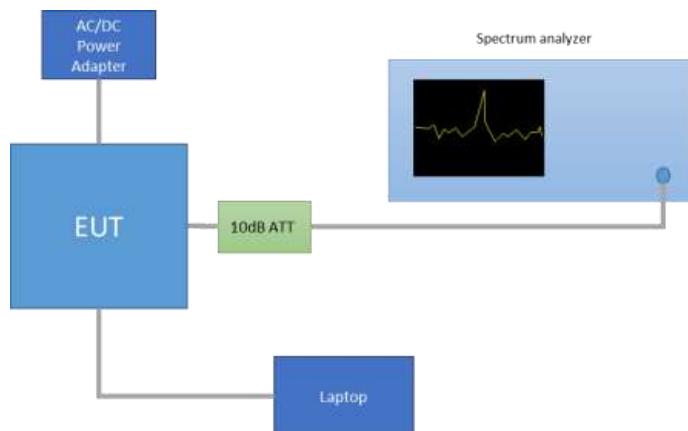
- When the duty cycle is > 98 %, VBW=10Hz

When the duty cycle is < 98 %,  $\text{VBW} > 1/T$ , where T is defined in section II.B.1.a

For the BE High, we use the integration method as defined in the band edge measurements section (paragraph II.G.3.d) of KDB 789033 D02.

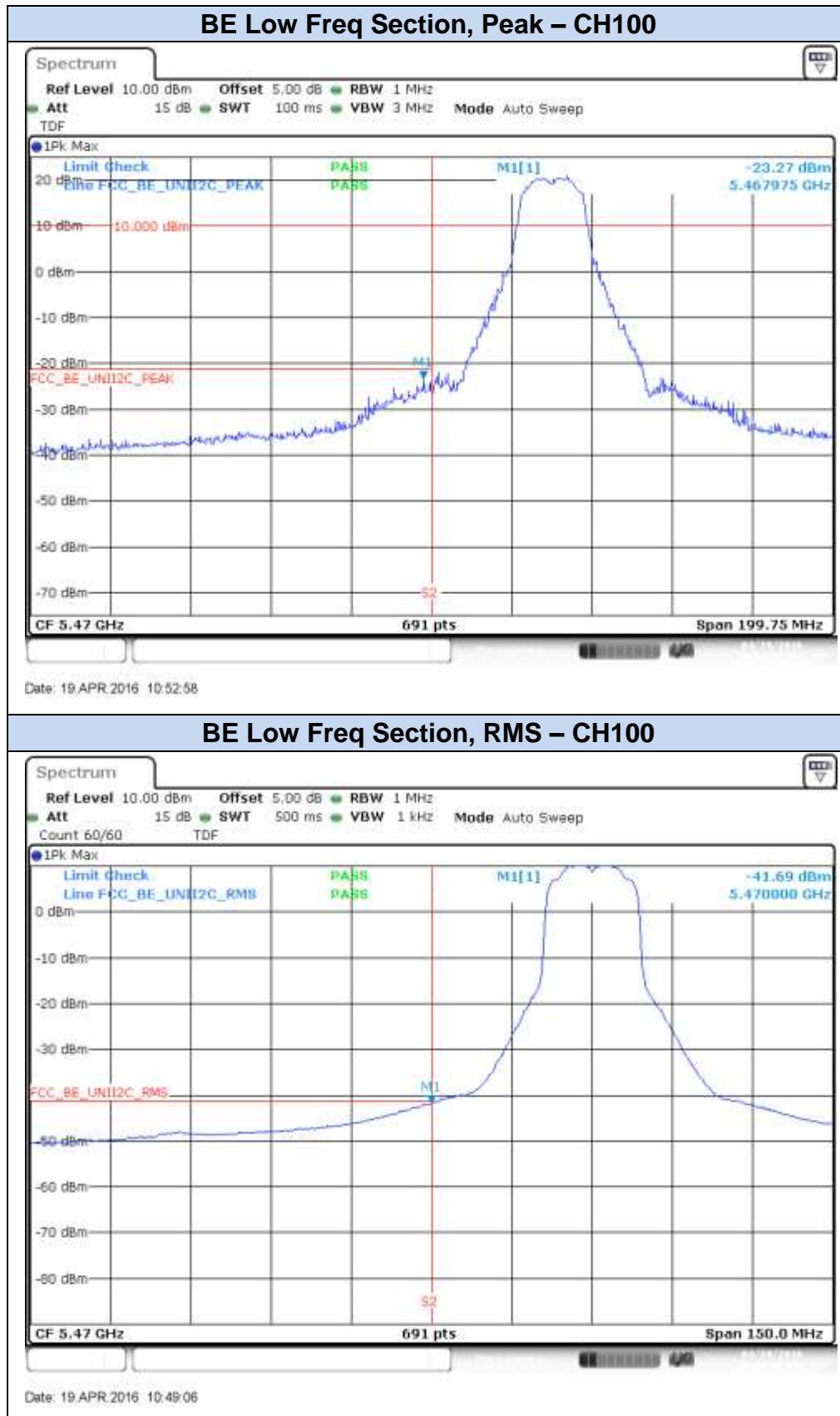
In case of Band Edge measurements falling in restricted bands, the declared Antenna Gain is also compensated in the graph.

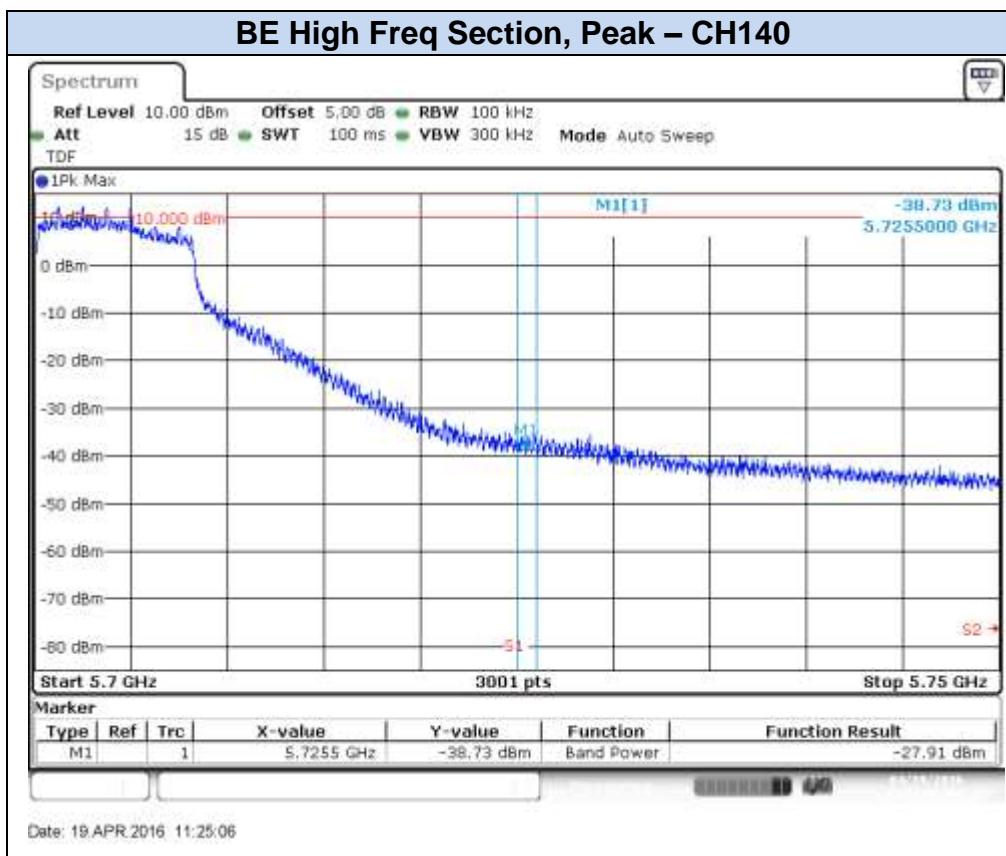
The declared maximum antenna gain is 5dBi.



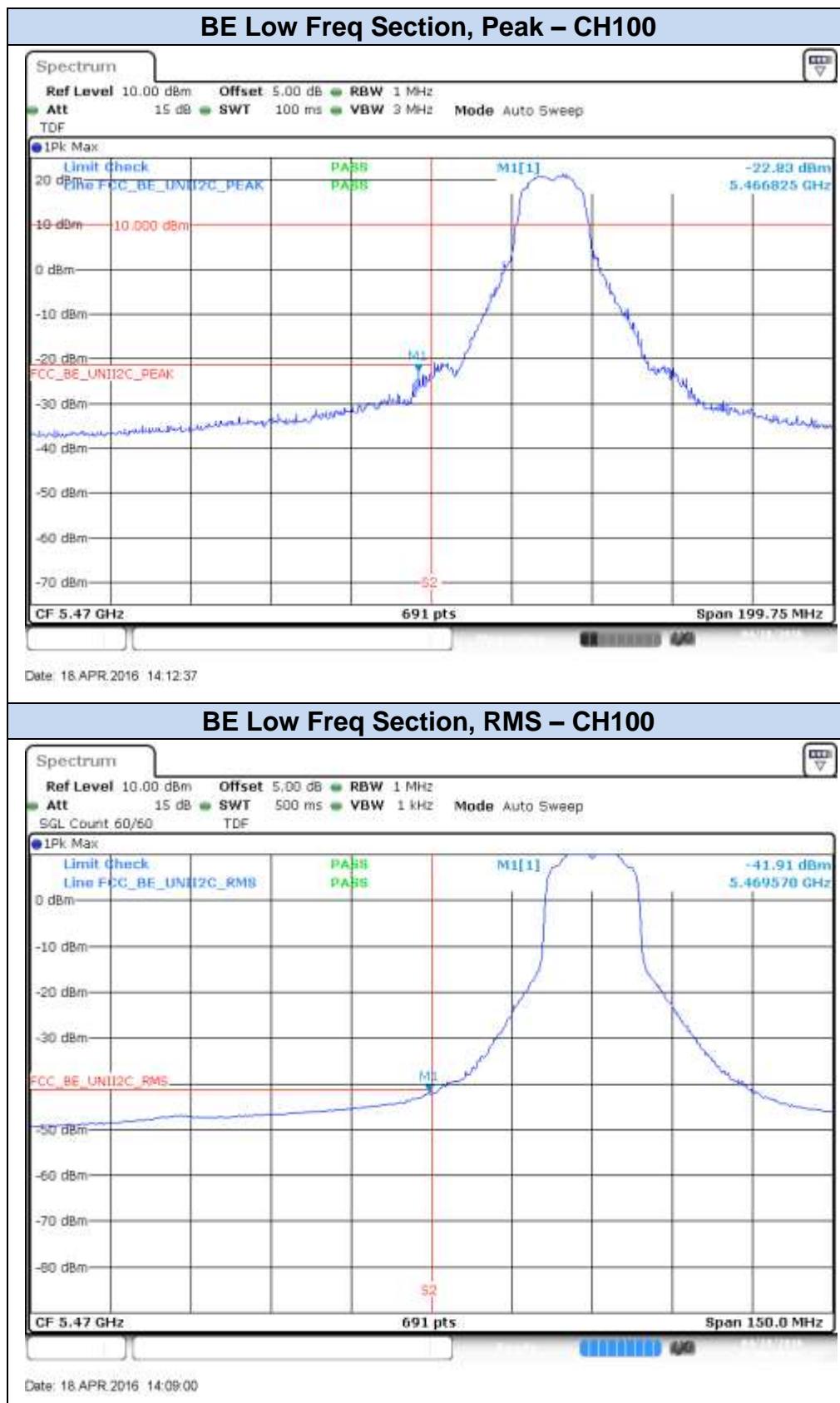
The following limits in dBm were applied for the average detector after the conversion from the limits detailed above in  $\text{dB}\mu\text{V/m}$ , according to FCC 47 CFR part 15 - Subpart C – §15.209(a). The limits in dBm for peak detector are 20dB above the indicated values in the table.

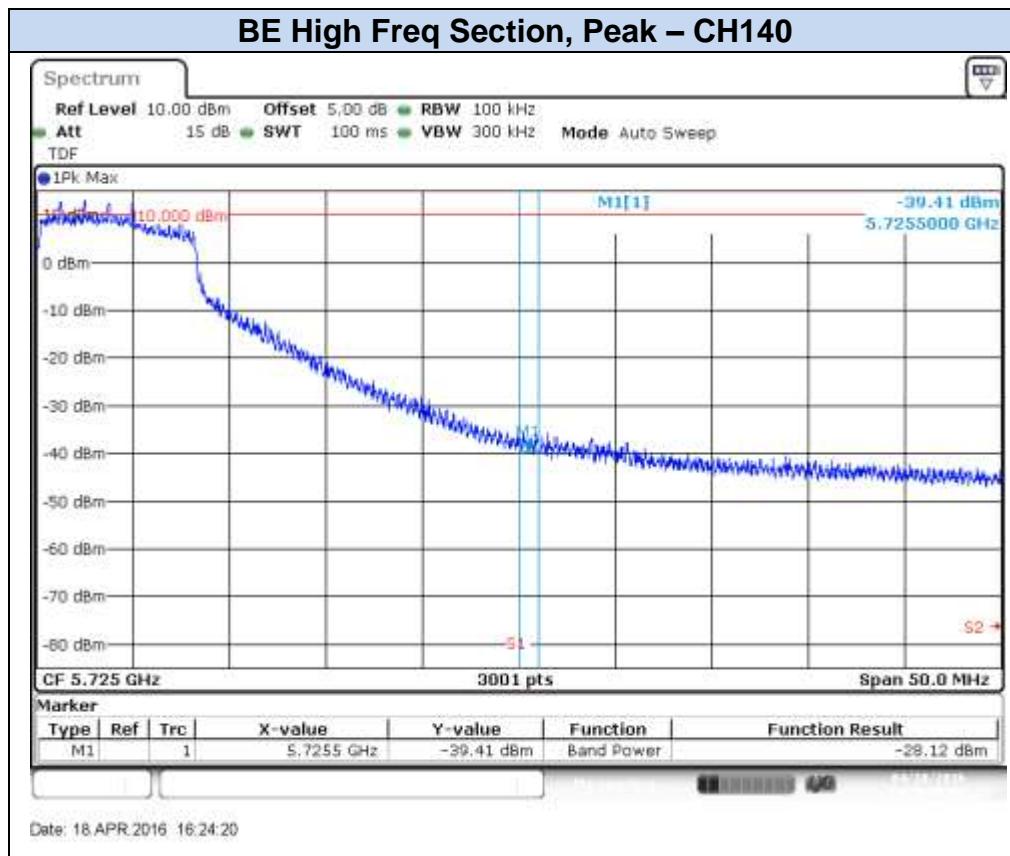
§15.209(a)			Converted values	
Freq Range (MHz)	Distance (m)	Field strength (microvolts/meter)	Field strength (dB microvolts/meter)	Power (dBm)
960-25000	3	500	53.98	-41.2

**Results Screenshot:****802.11a, 6Mbps – Chain A**

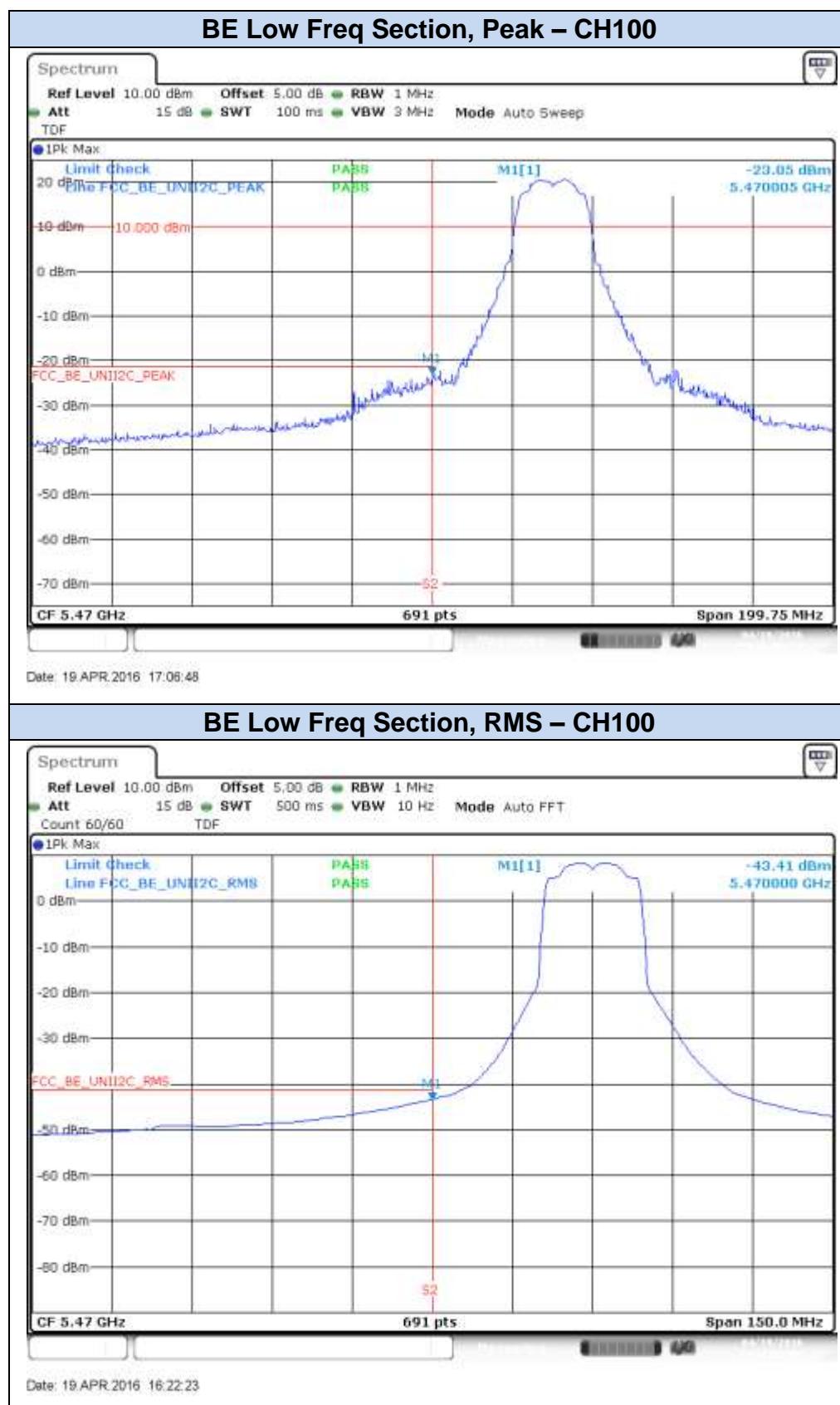


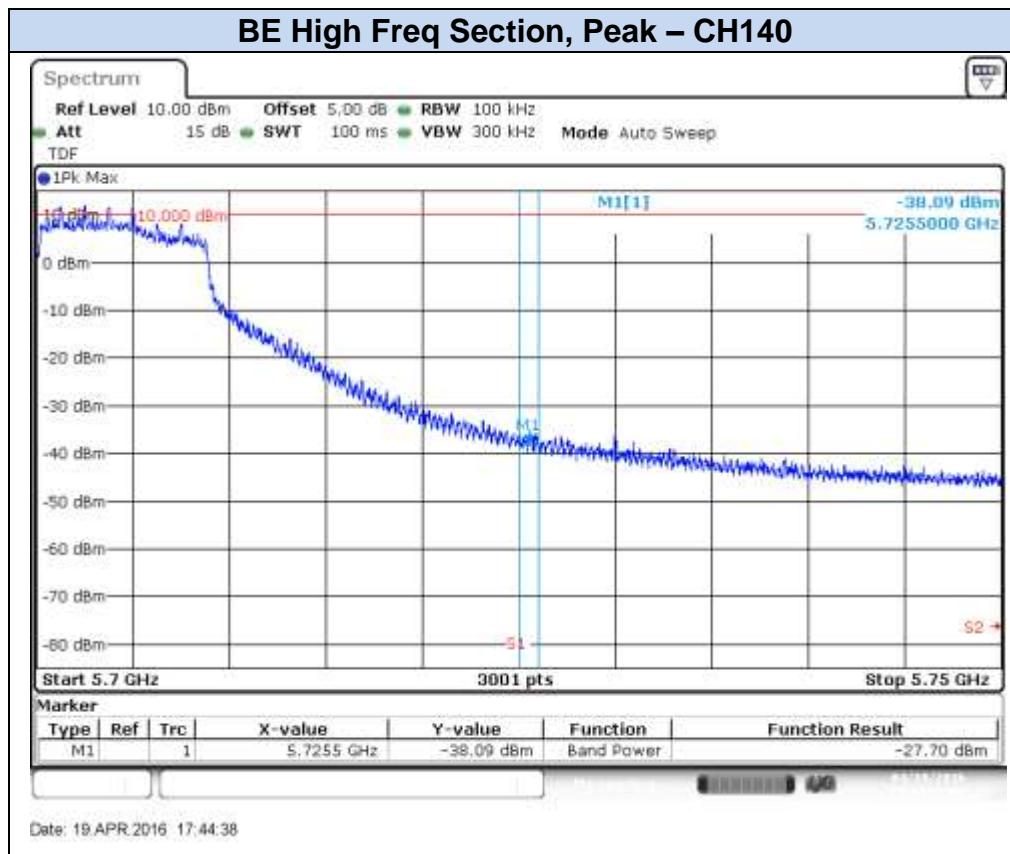
## 802.11a, 6Mbps – Chain B



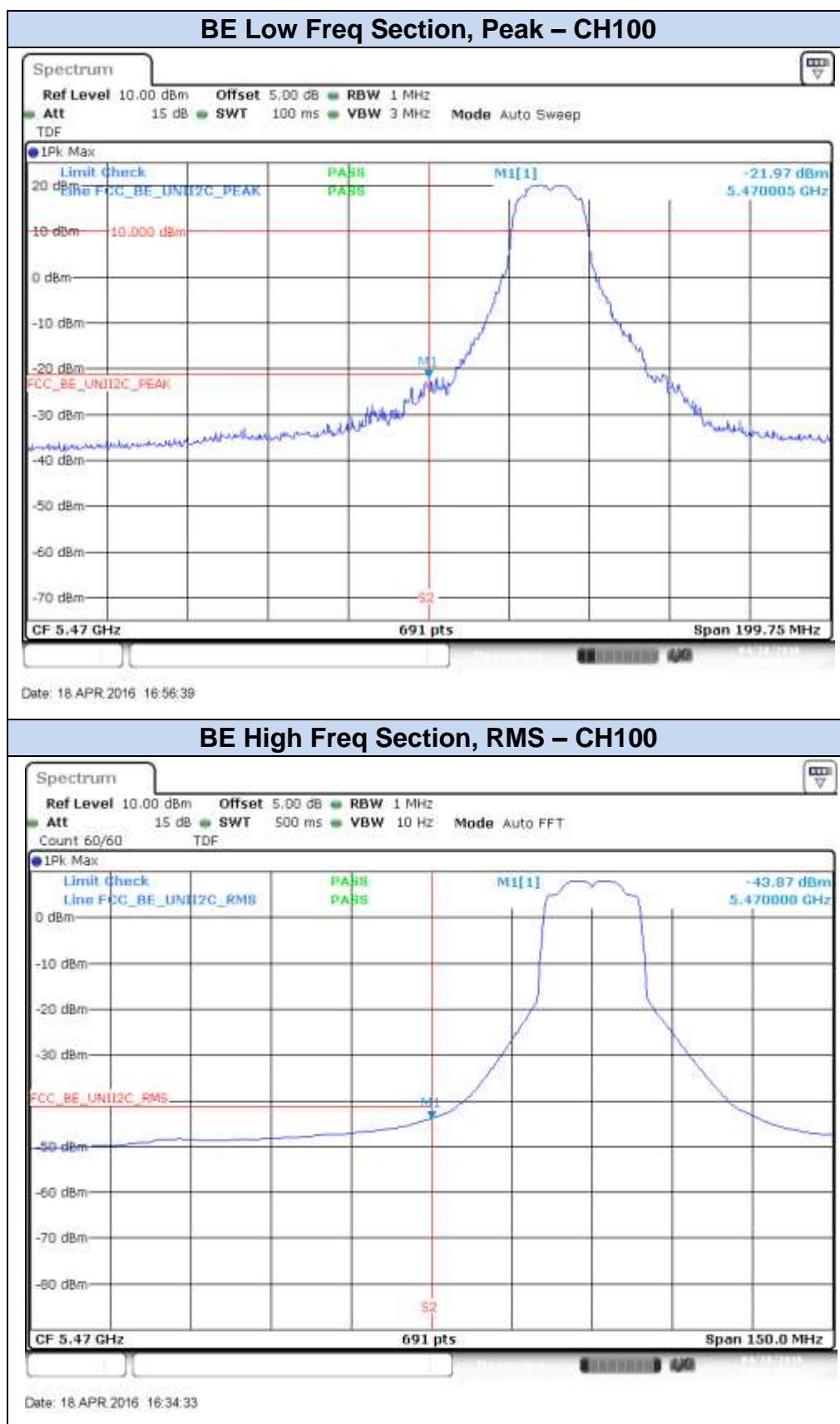


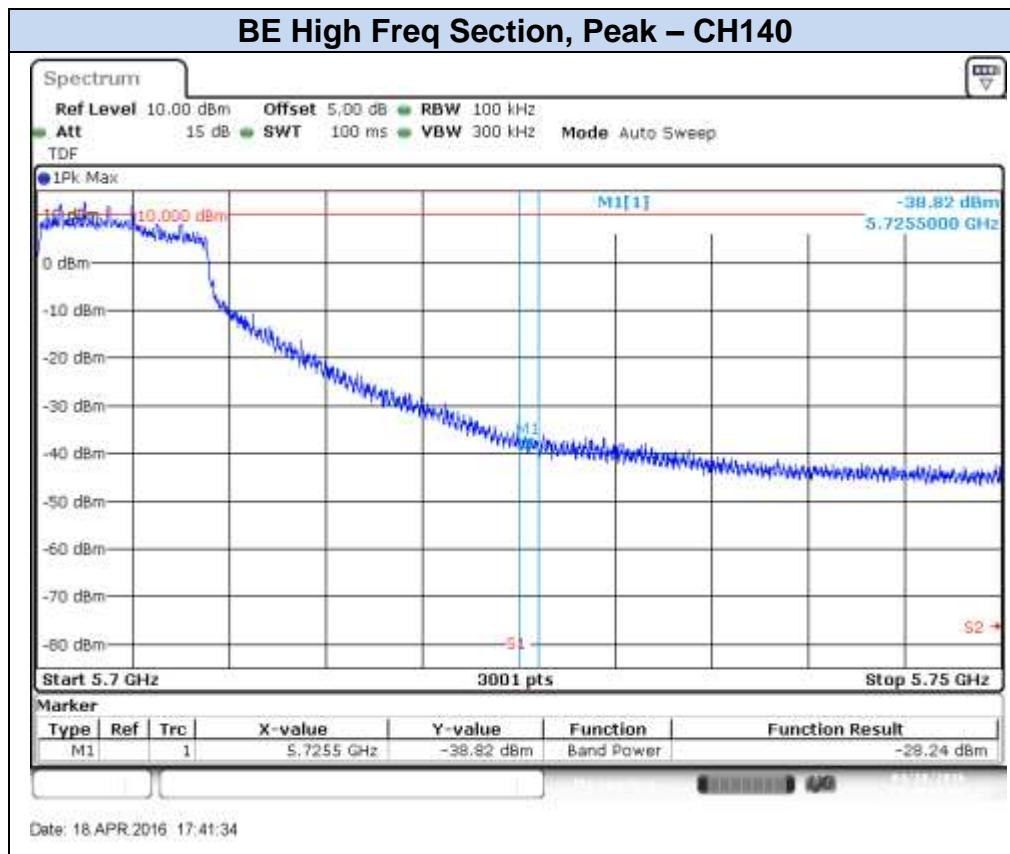
## 802.11n20, HT0 (SISO) – Chain A



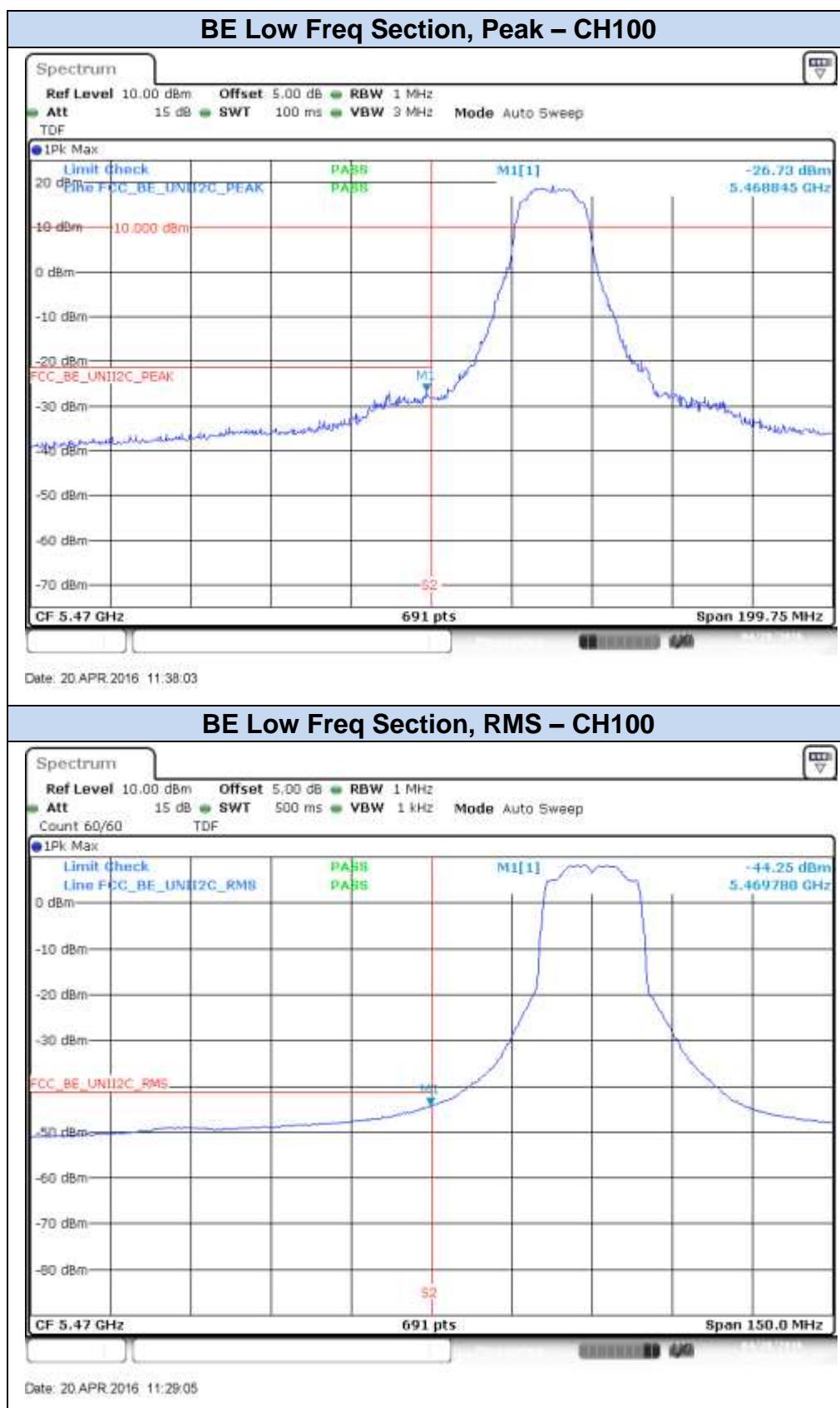


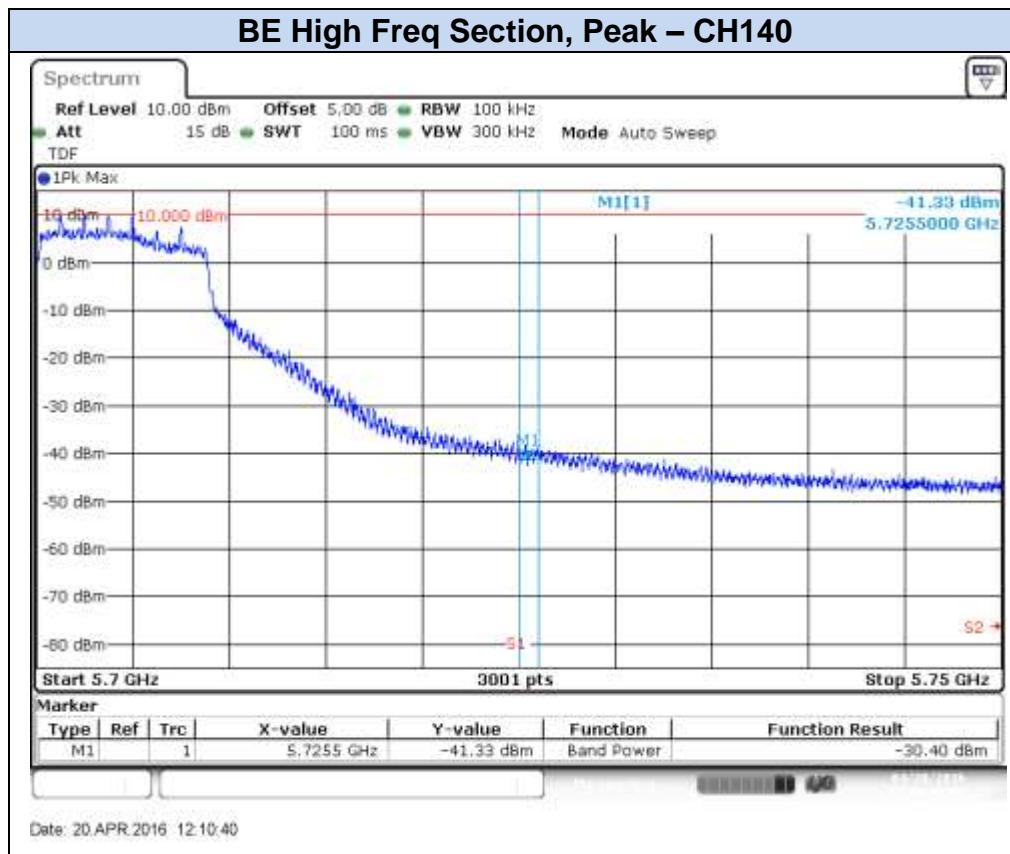
## 802.11n20, HT0 (SISO) – Chain B



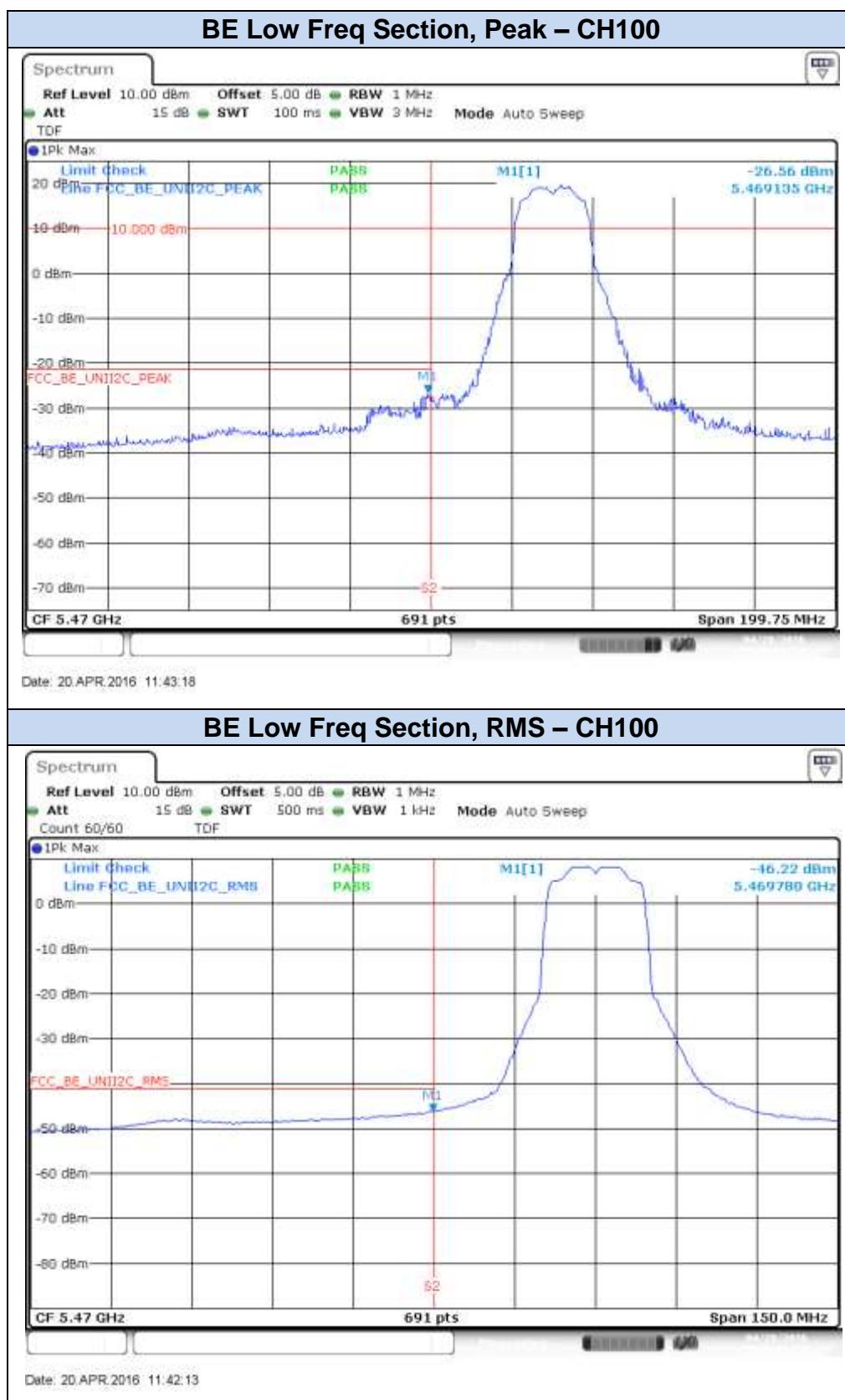


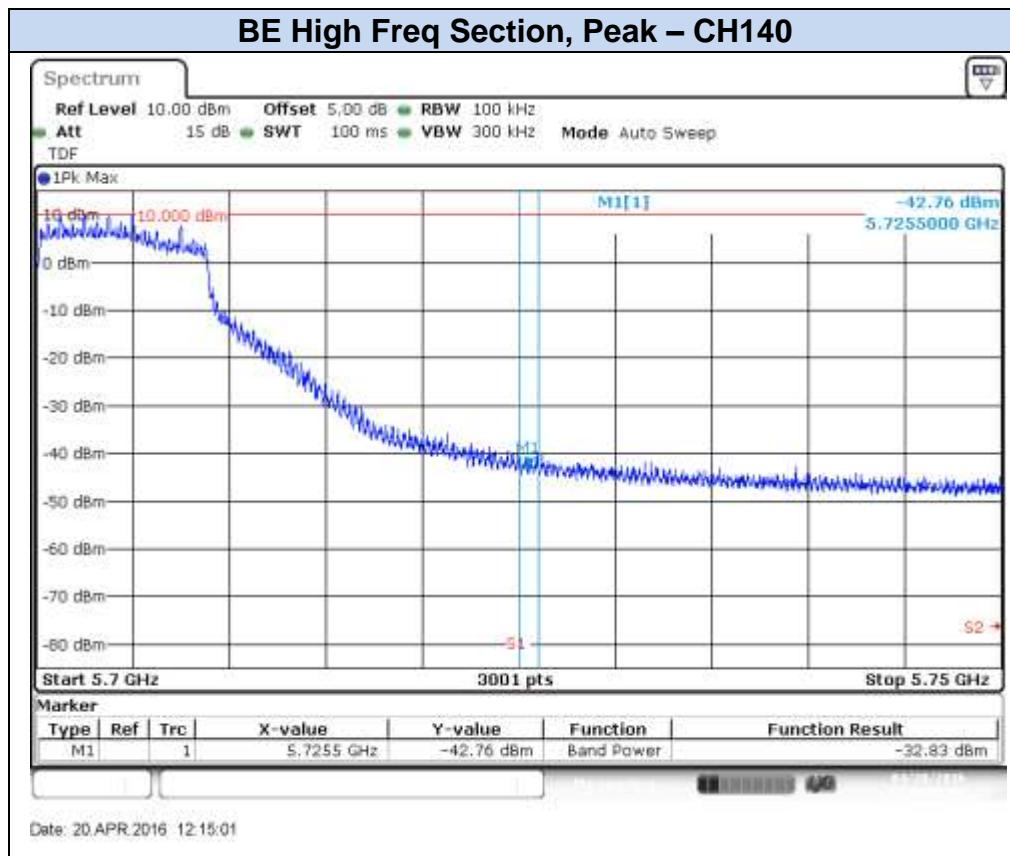
## 802.11n20, HT8 (MIMO) – Chain A



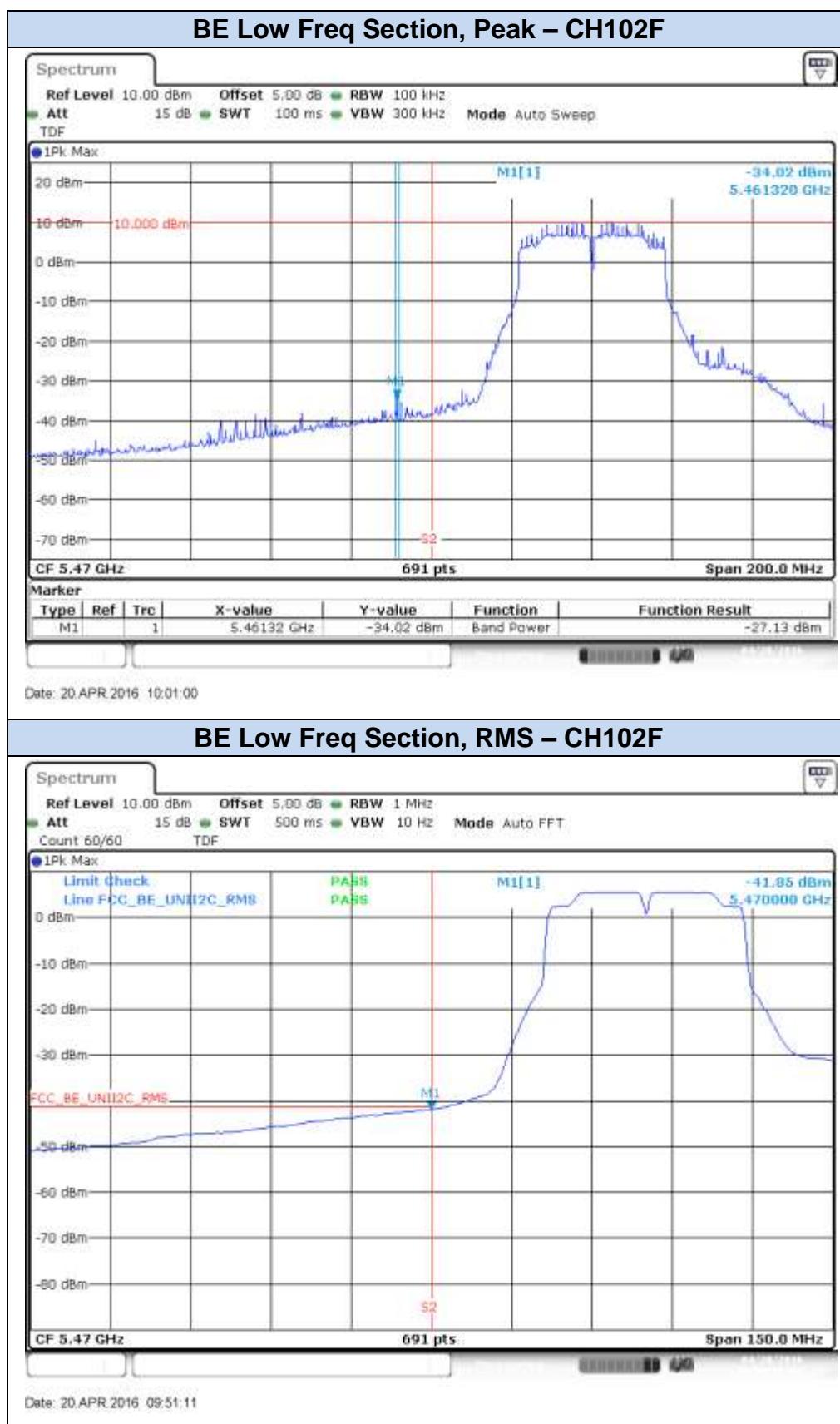


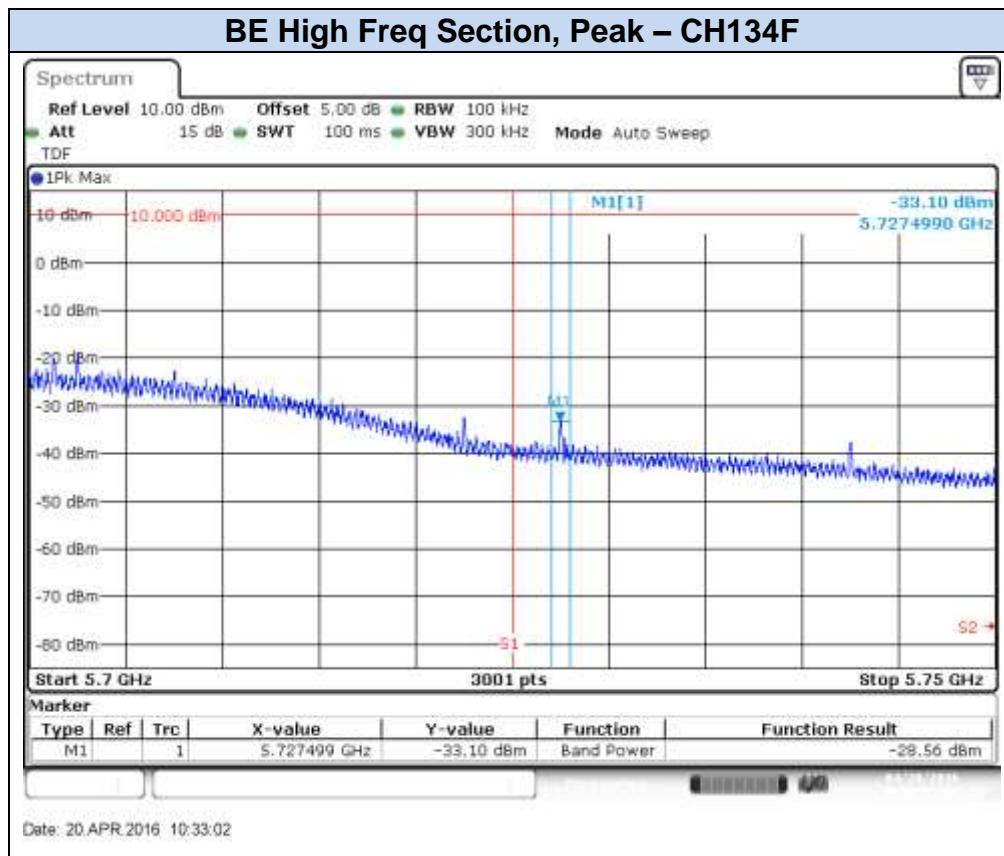
## 802.11n20, HT8 (MIMO) – Chain B



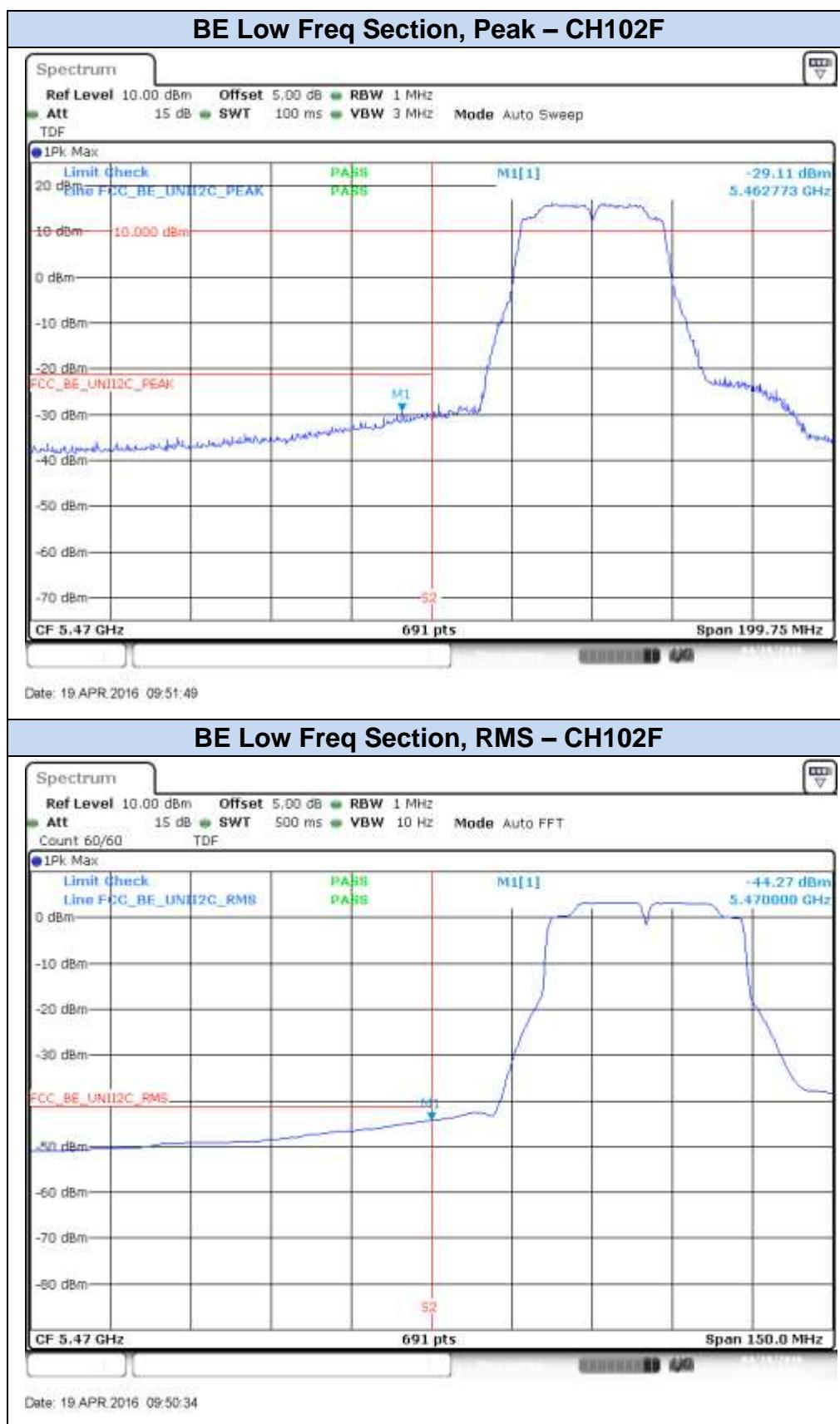


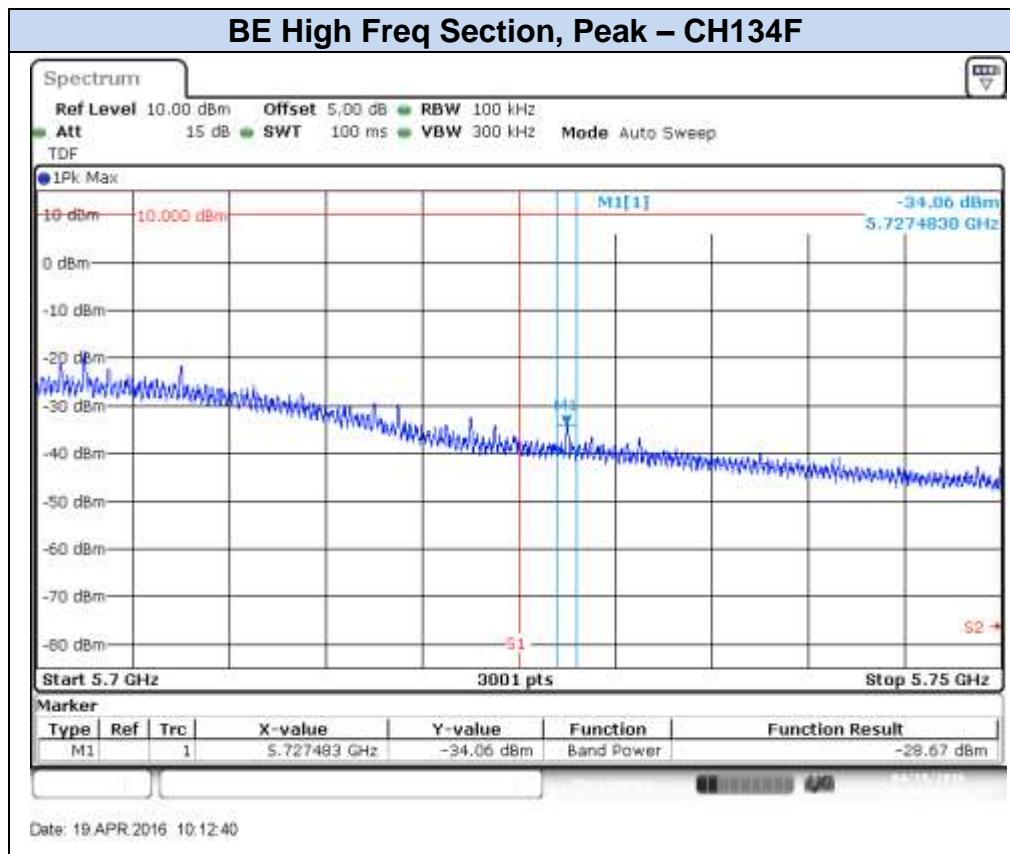
## 802.11n40, HT0 (SISO) – Chain A



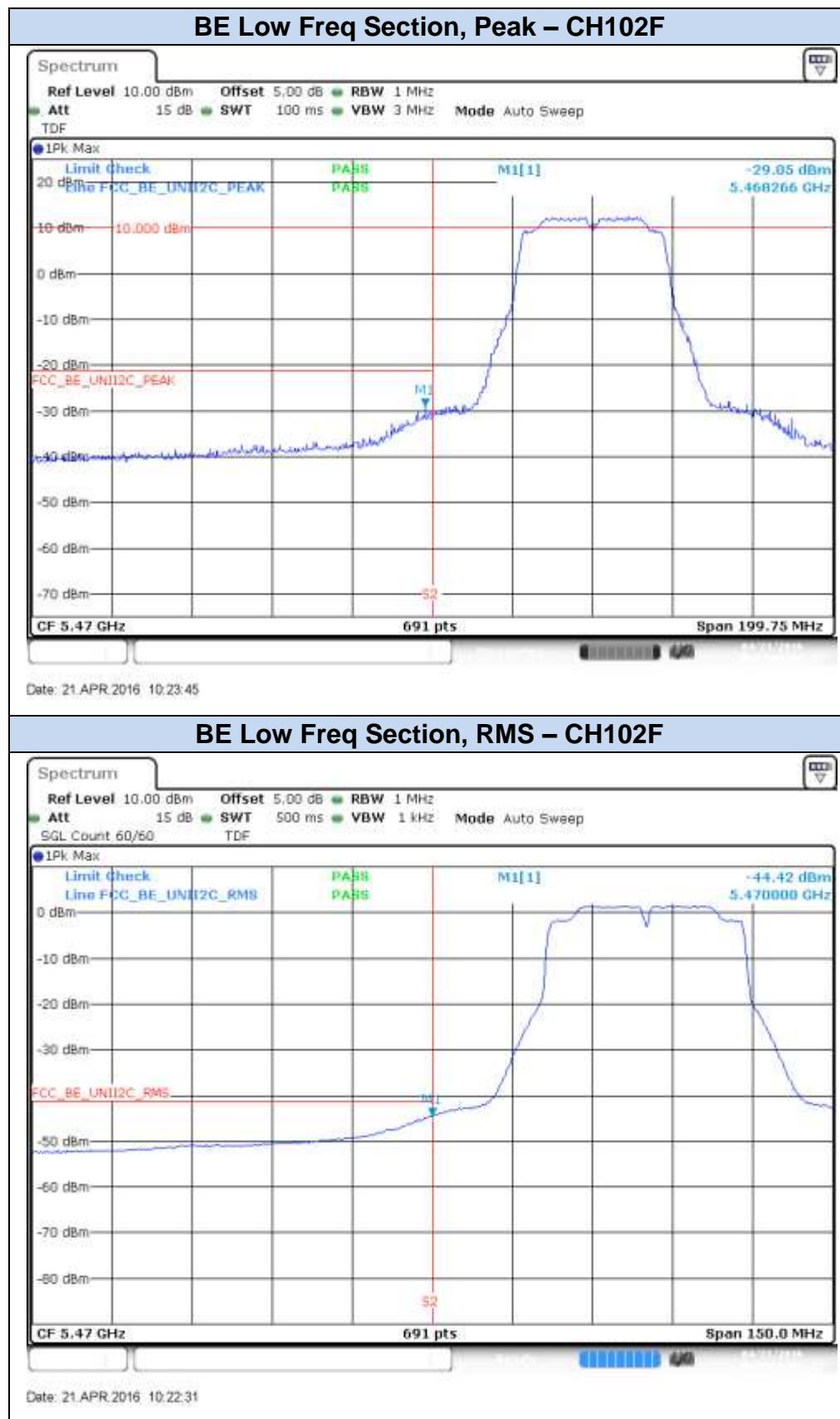


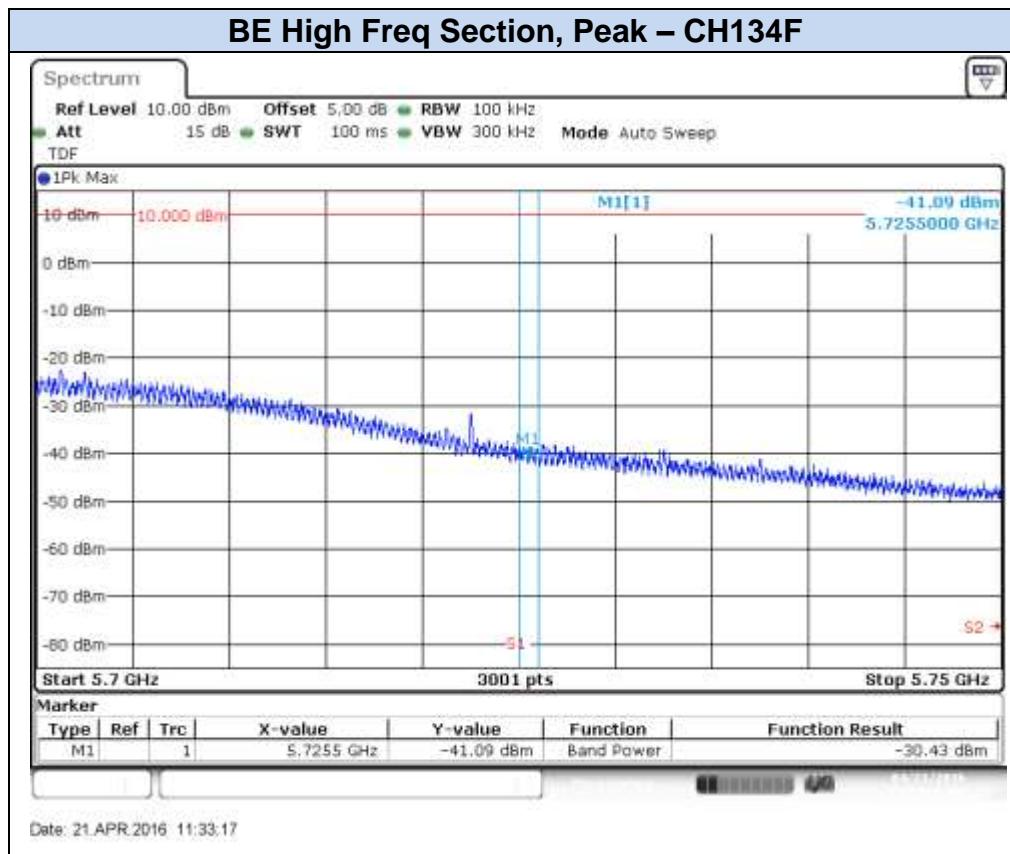
## 802.11n40, HT0 (SISO) – Chain B

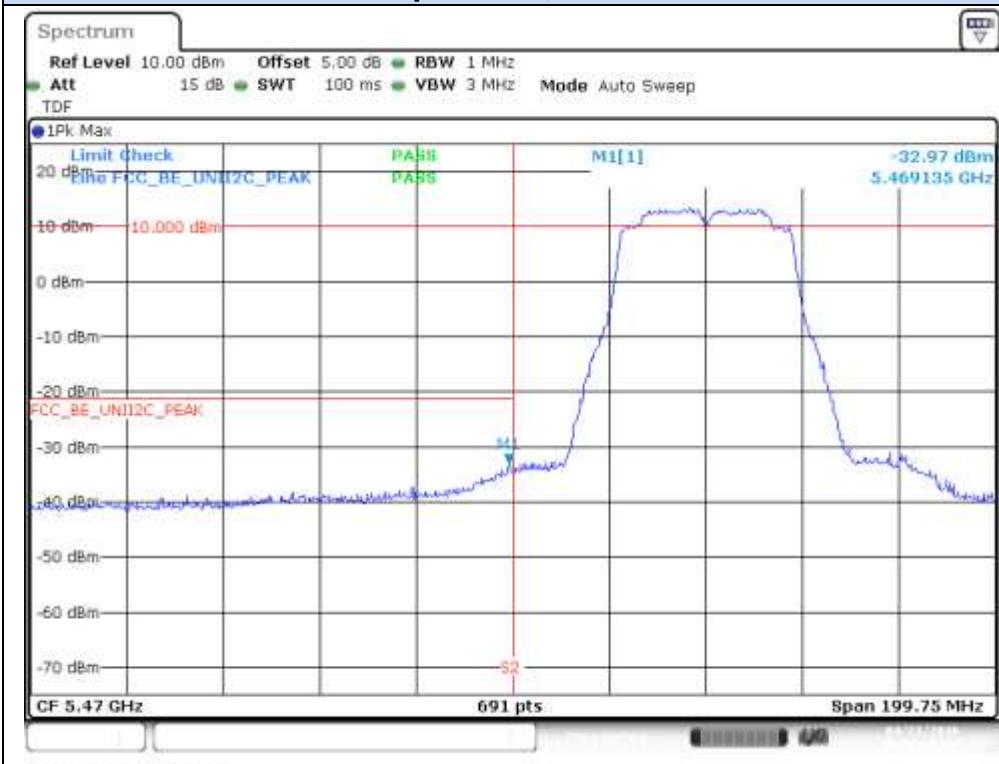


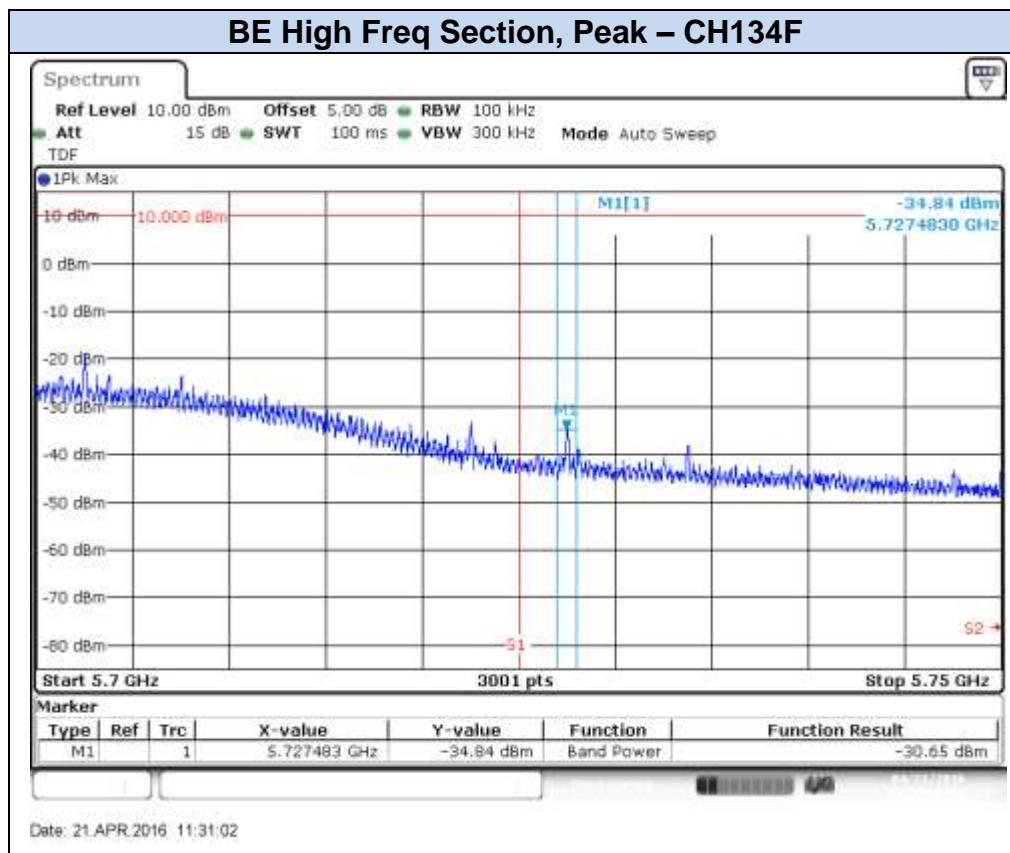


## 802.11n40, HT8 (MIMO) – Chain A

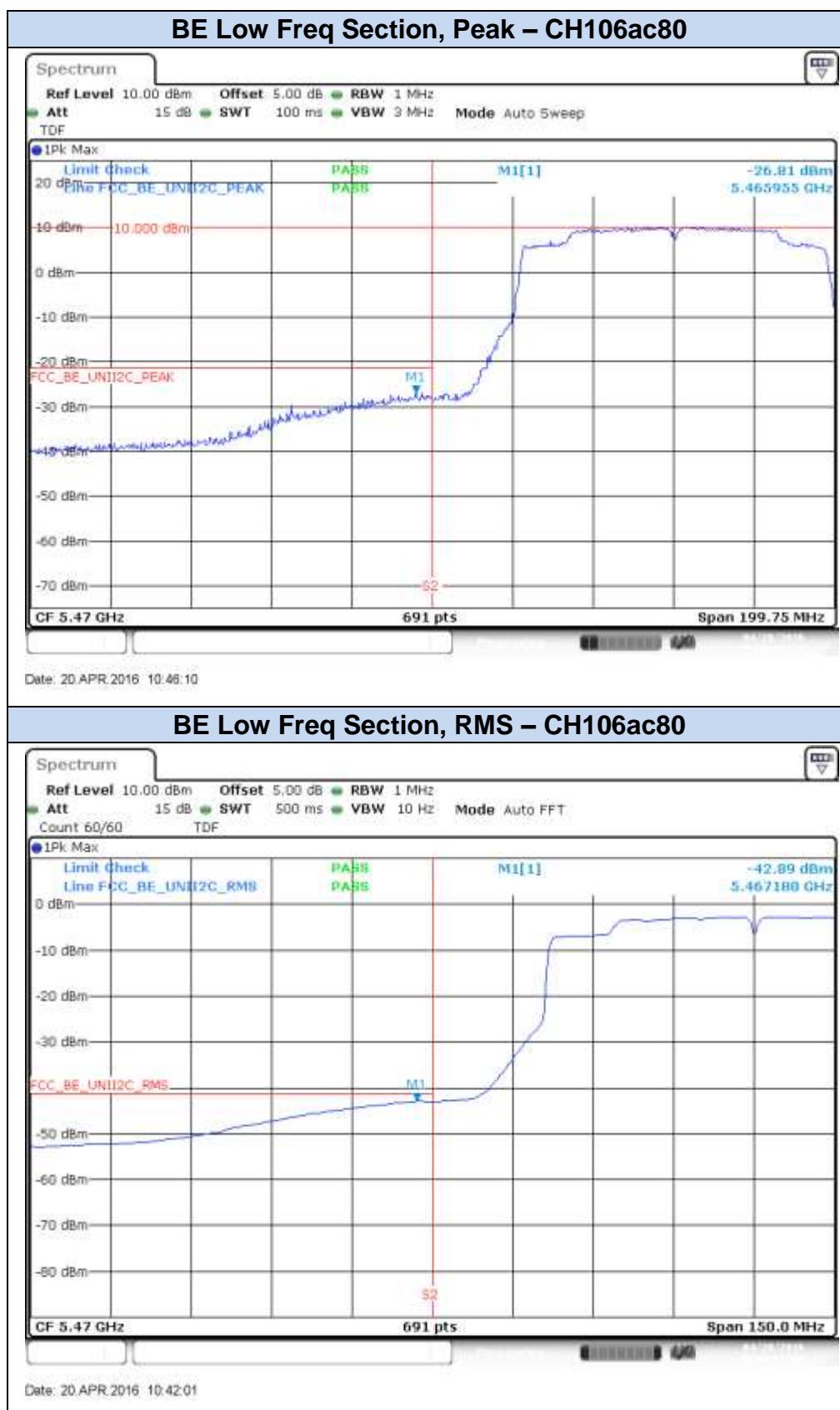




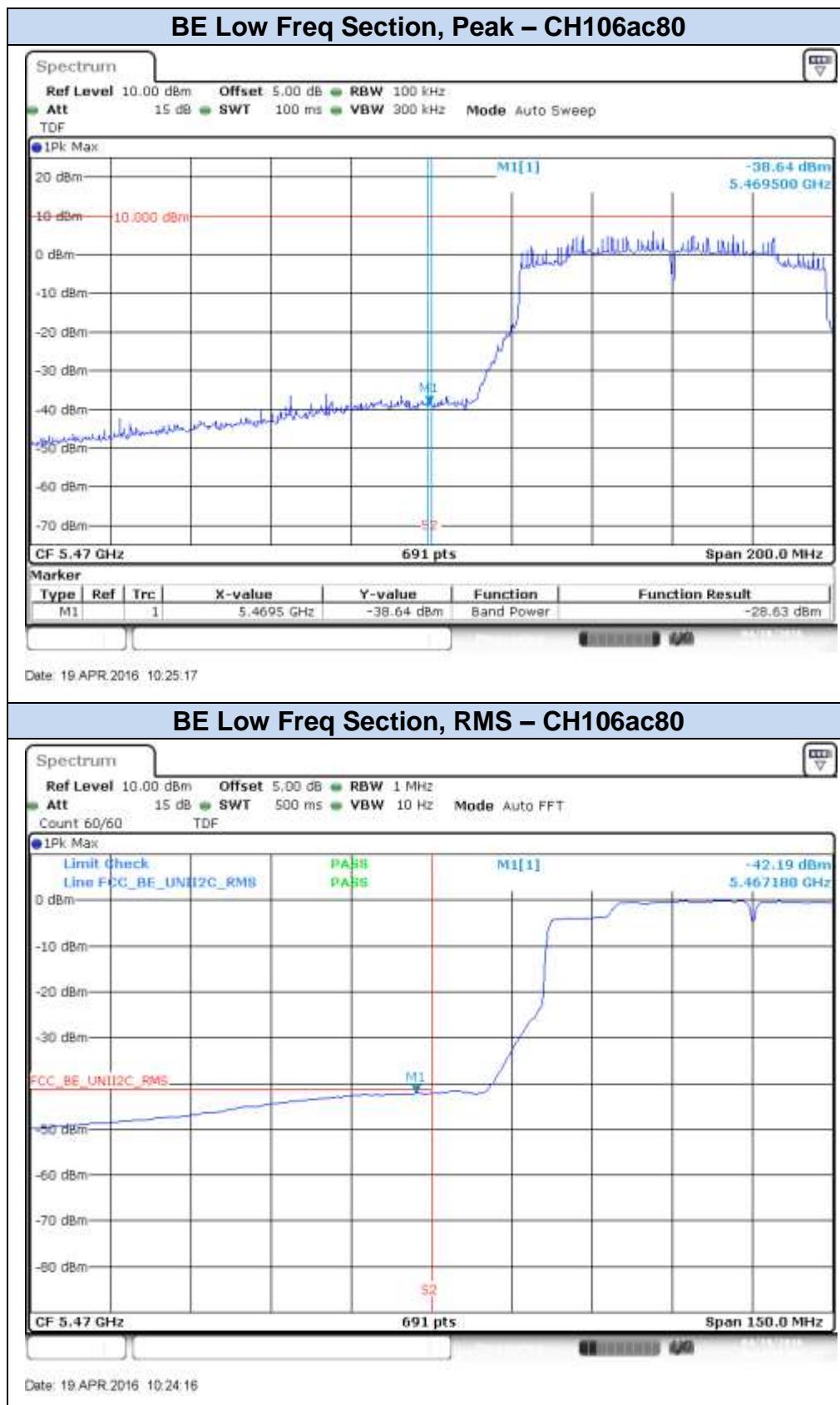
**802.11n40, HT8 (MIMO) – Chain B****BE Low Freq Section, Peak – CH102F****BE Low Freq Section, RMS – CH102F**



## 802.11ac80, VHT0 (SISO) – Chain A



## 802.11ac80, VHT0 (SISO) – Chain B



## 802.11ac80, VHT0 (MIMO)- Chain A



## 802.11ac80, VHT0 (MIMO)- Chain B



## D.4 Radiated spurious emission

### Standard references:

FCC part	Limits			
	Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):			
15.407 (b) (3) 15.209	Freq Range (MHz)	Field Strength ( $\mu\text{V/m}$ )	Field Strength ( $\text{dB}\mu\text{V/m}$ )	Meas. Distance (m)
	0.009-0.490	2400/f(kHz)	-	300
	0.490-1.705	24000/f(kHz)	-	300
	1.705-30.0	30	-	30
	30-88	100	40	3
	88-216	150	43.5	3
	216-960	200	46	3
	Above 960	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.

### Test procedure:

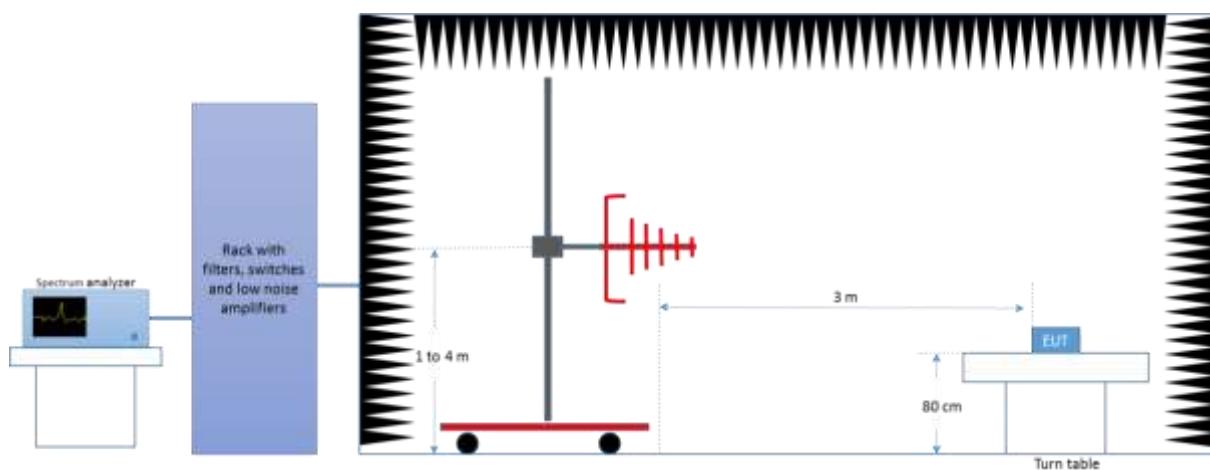
The below setups were used to measure the radiated spurious emissions.

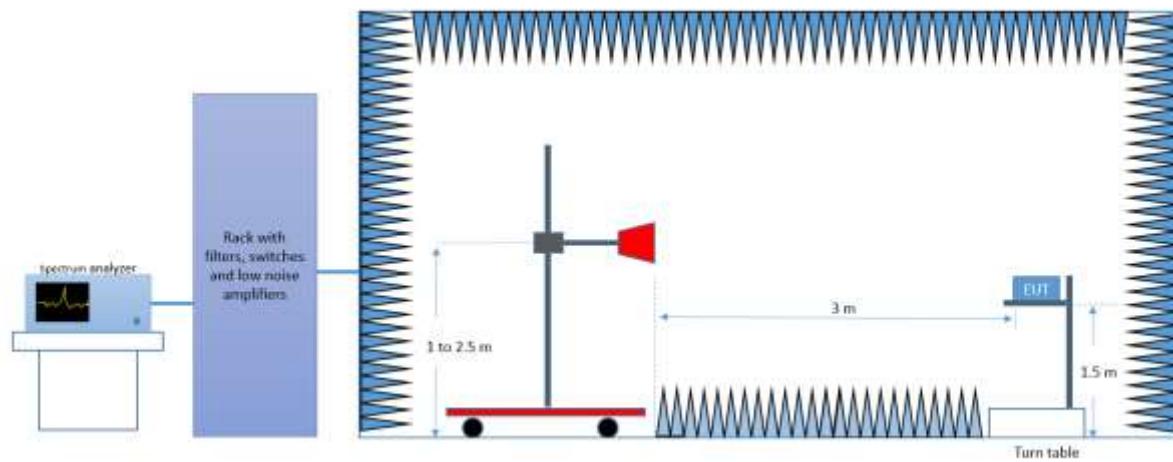
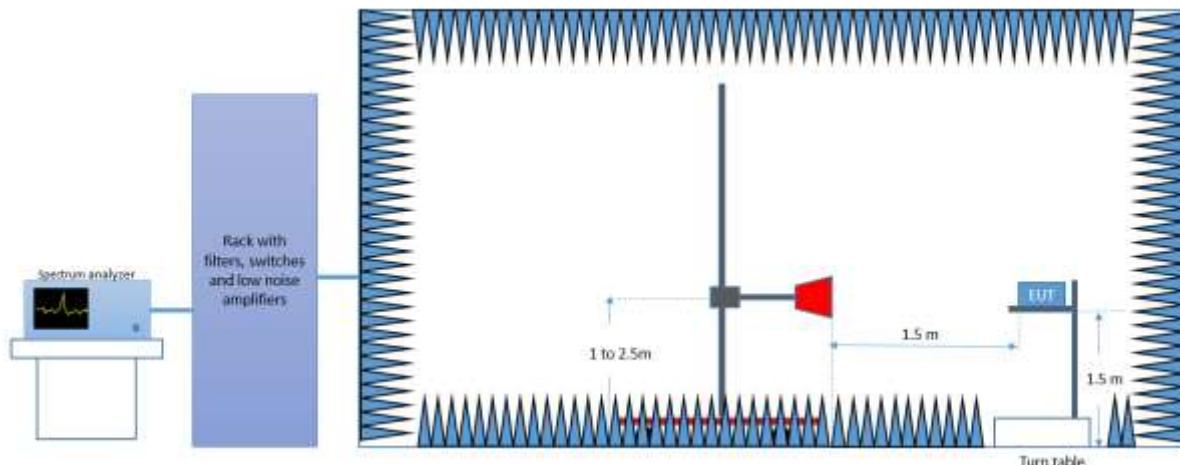
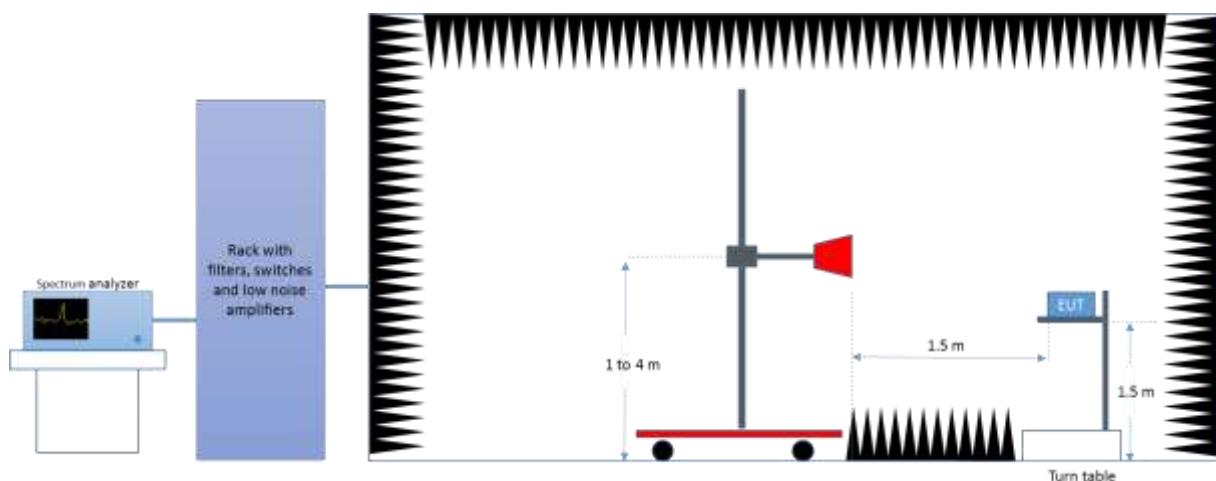
Depending of the frequency range and bands being tested, different antennas and filters were used.

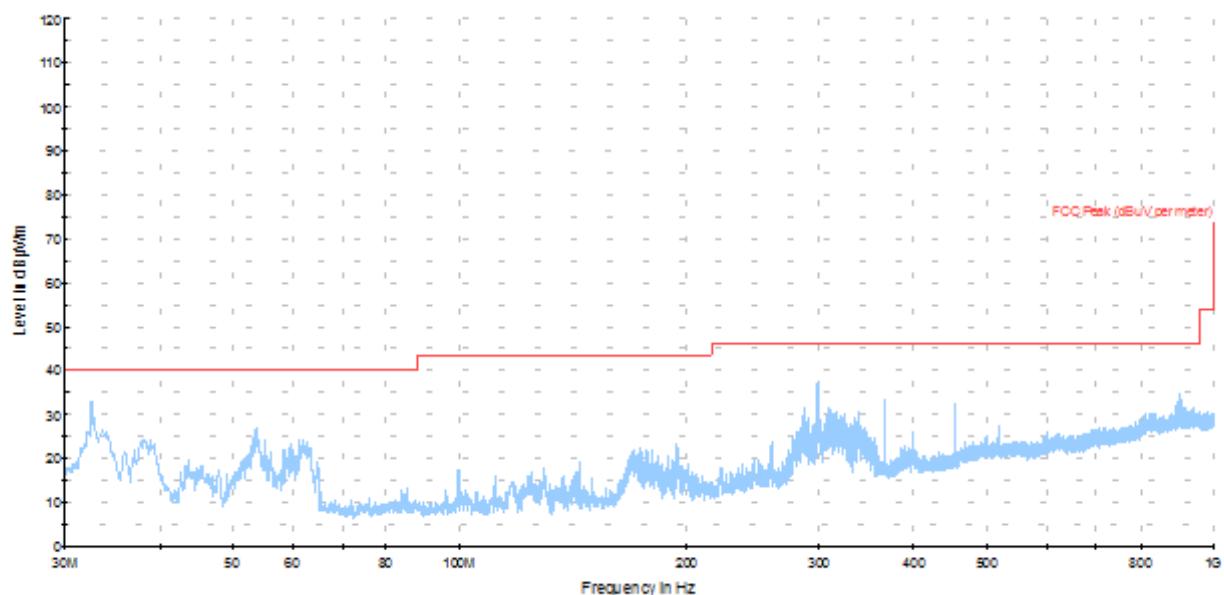
The final measurement is done by varying the antenna height from, the EUT azimuth over 360° and for both Vertical and Horizontal polarizations.

The radiated spurious emissions were measured on the worst case configuration selected from the chapter D.2 and using the lowest, middle and highest channels.

### Radiated Setup < 1GHz



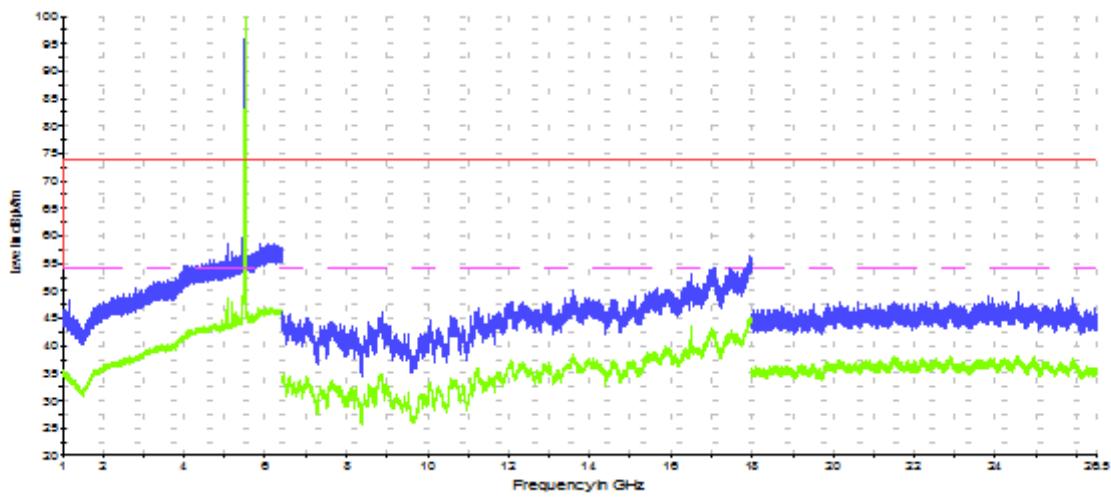
*Radiated Setup 1 GHz - 18 GHz**Radiated Setup 18 GHz - 26.5 GHz**Radiated Setup > 26.5 GHz*

**Test Results:****Radiated Spurious – 30MHz to 1GHz****Radiated Spurious – All modes**

— Peak measurements      — Limit FCC Peak

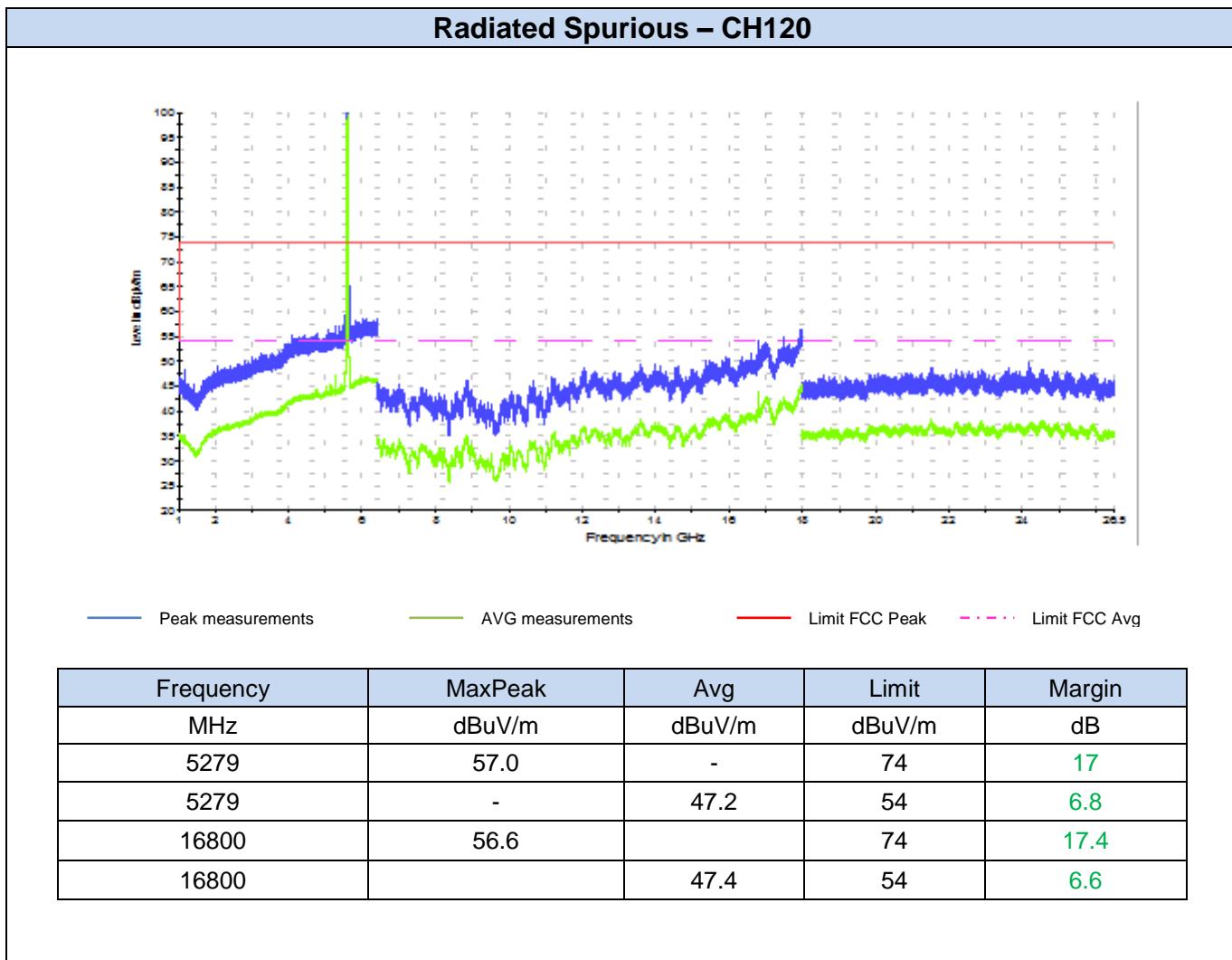
Frequency	MaxPeak	Limit	Margin
MHz	dBm	dBm	dB
299.90	36.92	46	9.08

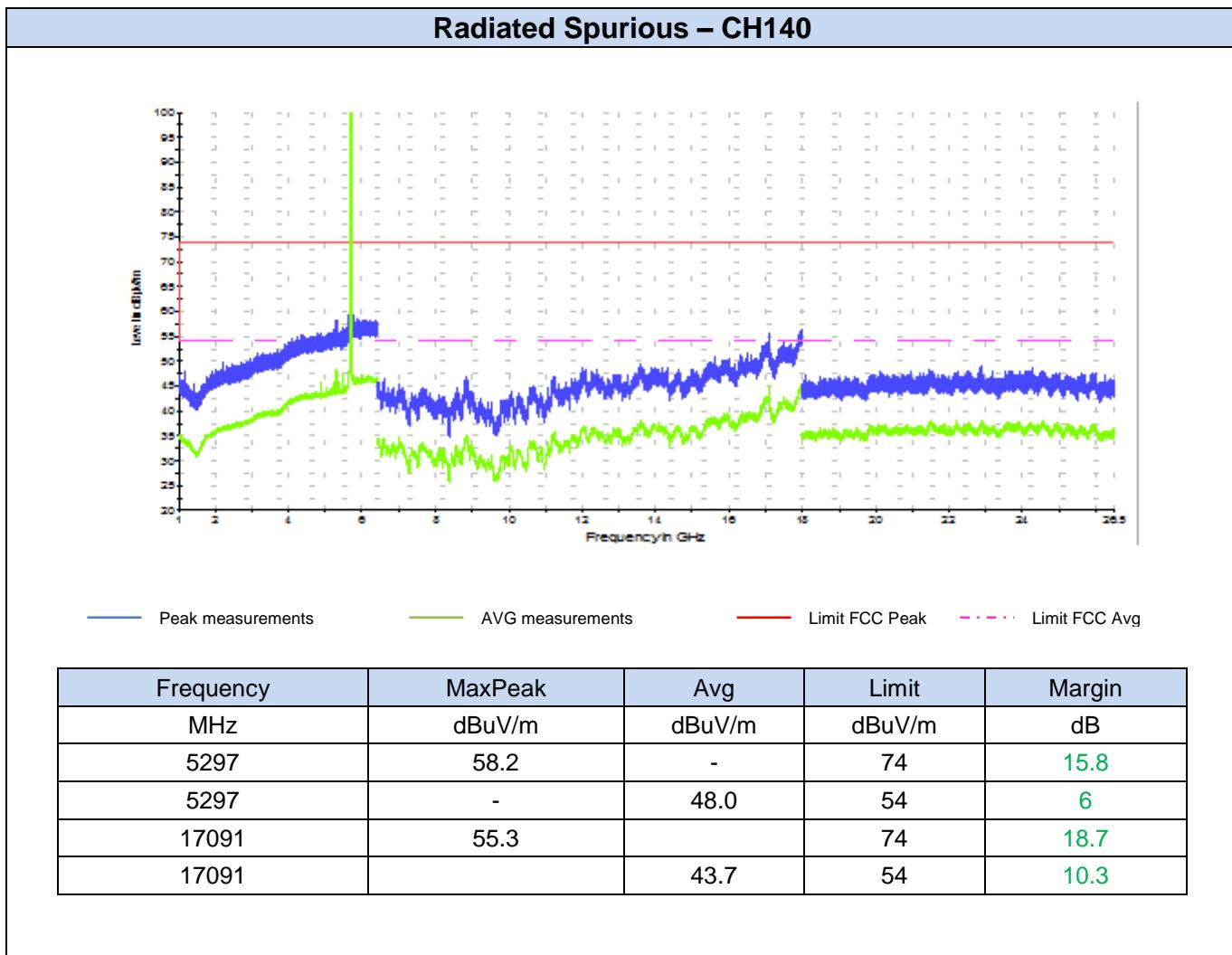
Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

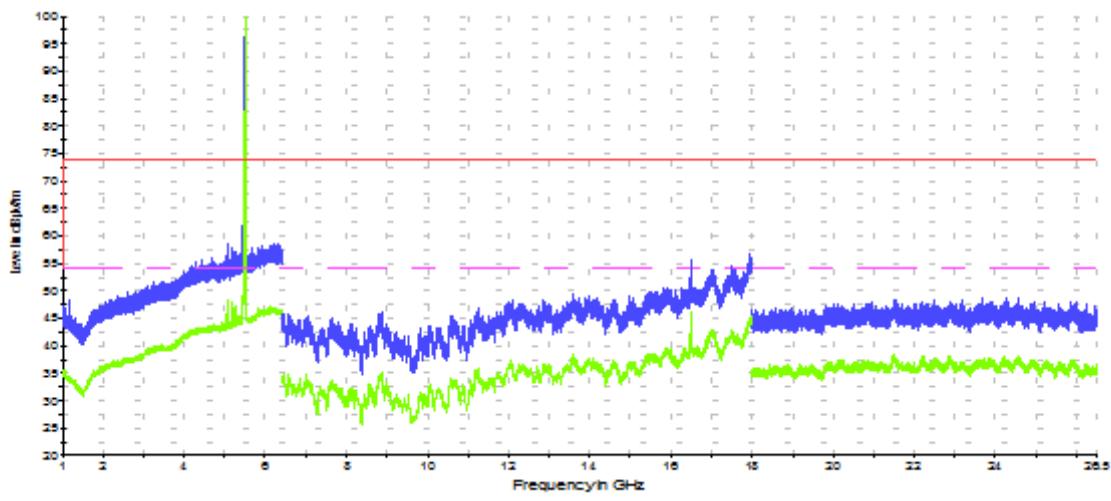
**1 GHz – 26.5GHz, 802.11a, Chain A****Radiated Spurious – CH100**

— Peak measurements — AVG measurements — Limit FCC Peak - - - Limit FCC Avg

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
5097	58.6	-	74	15.4
5097	-	48.7	54	5.3
16500	55.4	-	74	18.6
16500	-	43.9	54	10.1

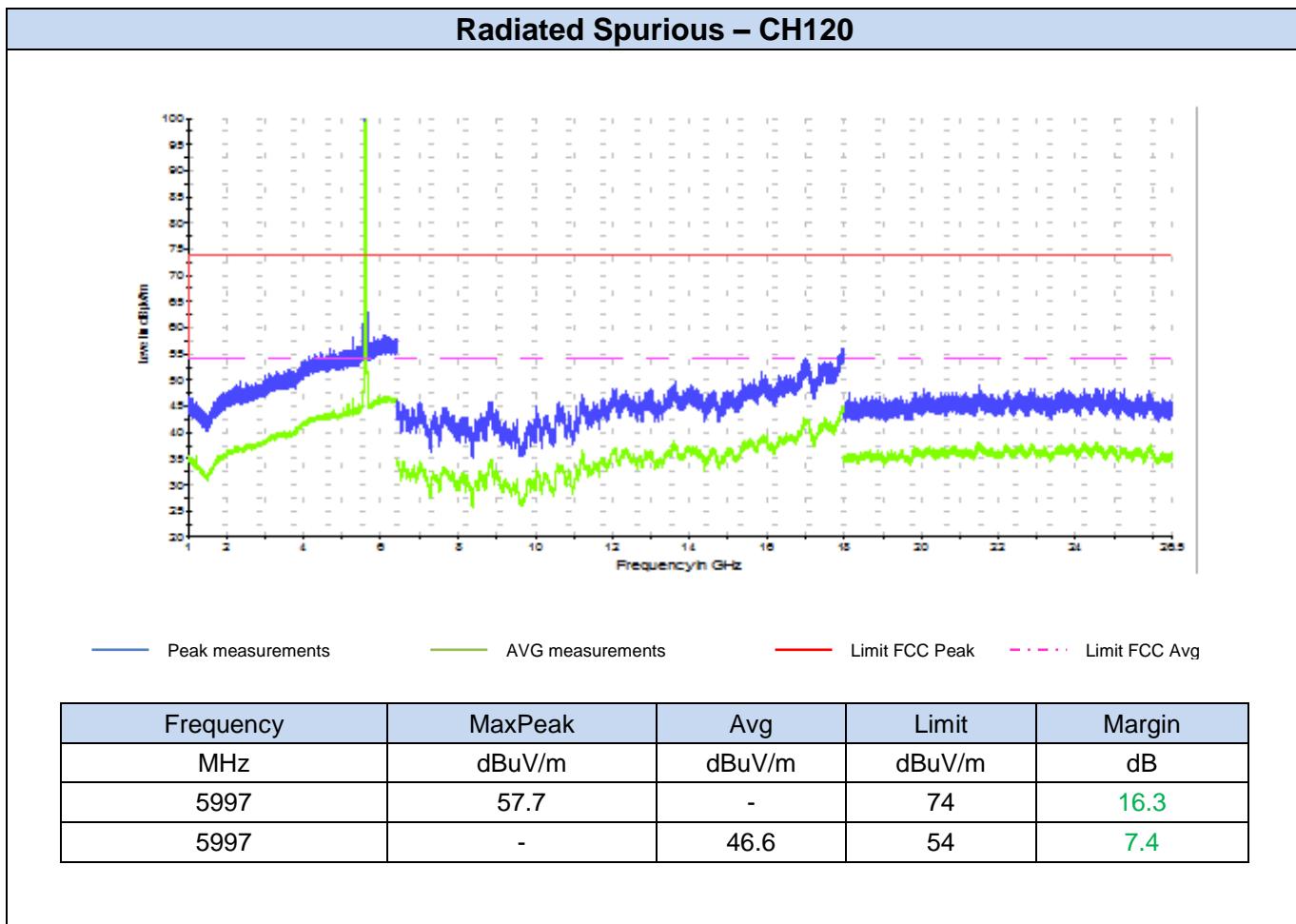


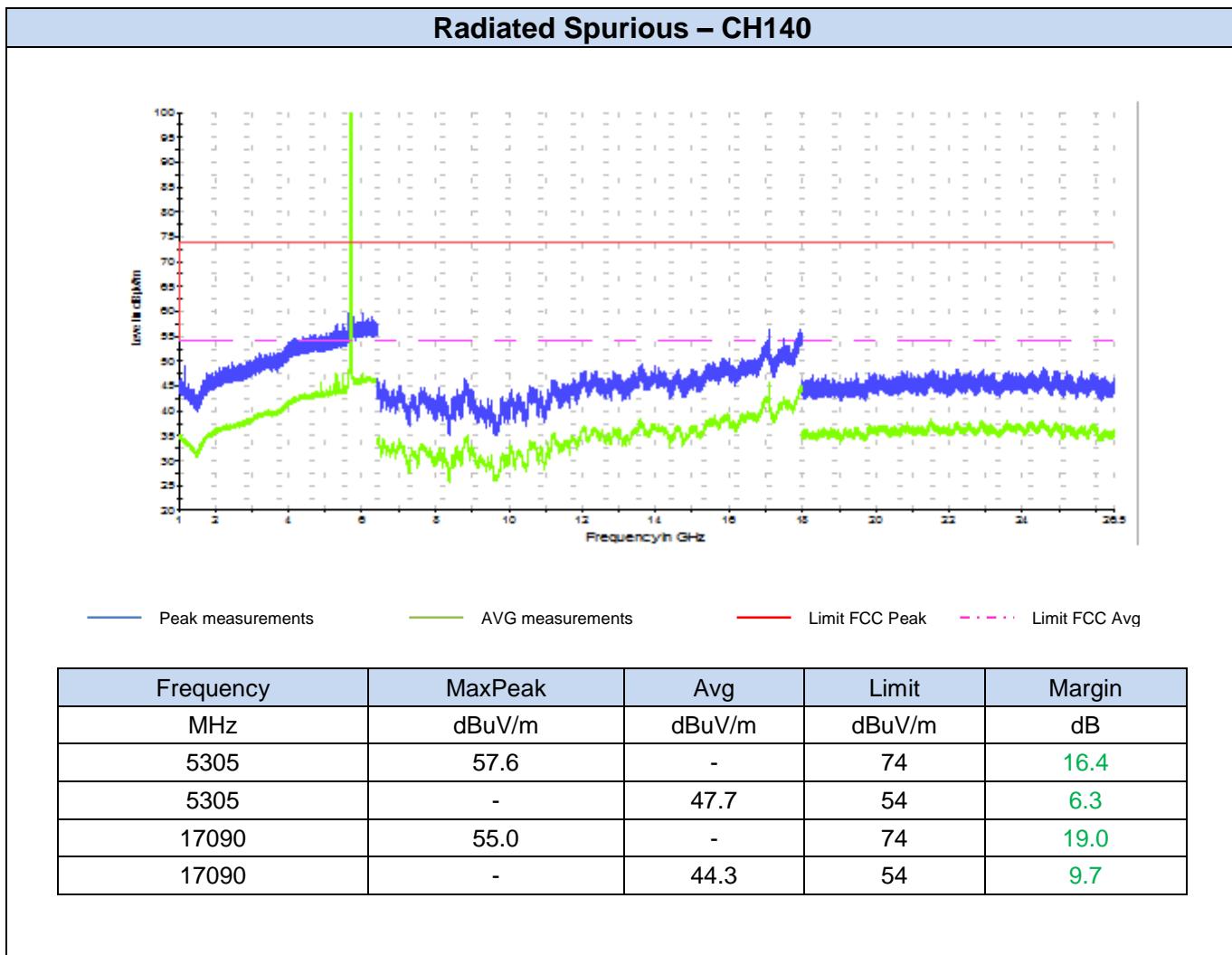


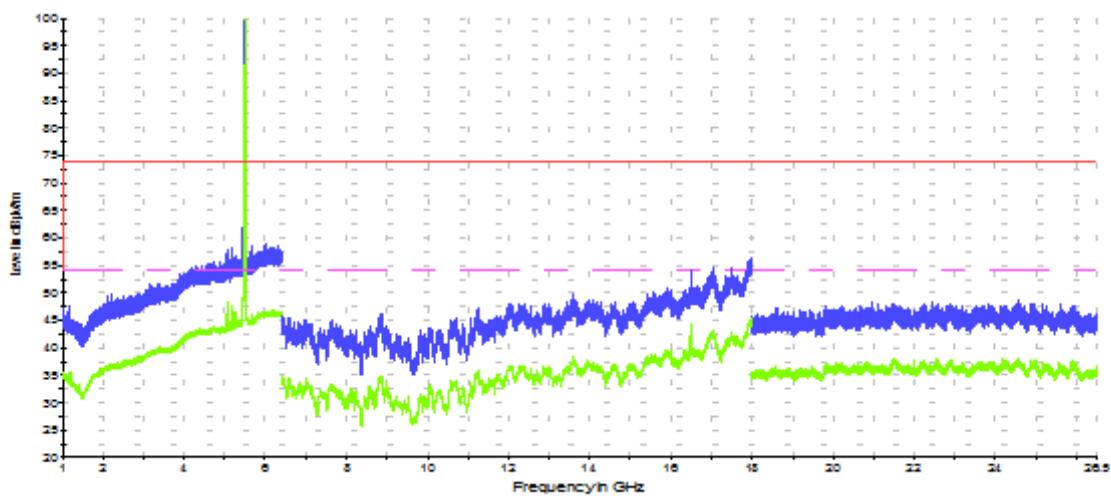
**1 GHz – 26.5GHz, 802.11a, Chain B****Radiated Spurious – CH100**

— Peak measurements — AVG measurements — Limit FCC Peak - - - Limit FCC Avg

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
5096	58.8	-	74	15.2
5096	-	48.2	54	5.8
16500	55.5	-	74	18.5
16500	-	40.4	54	13.5

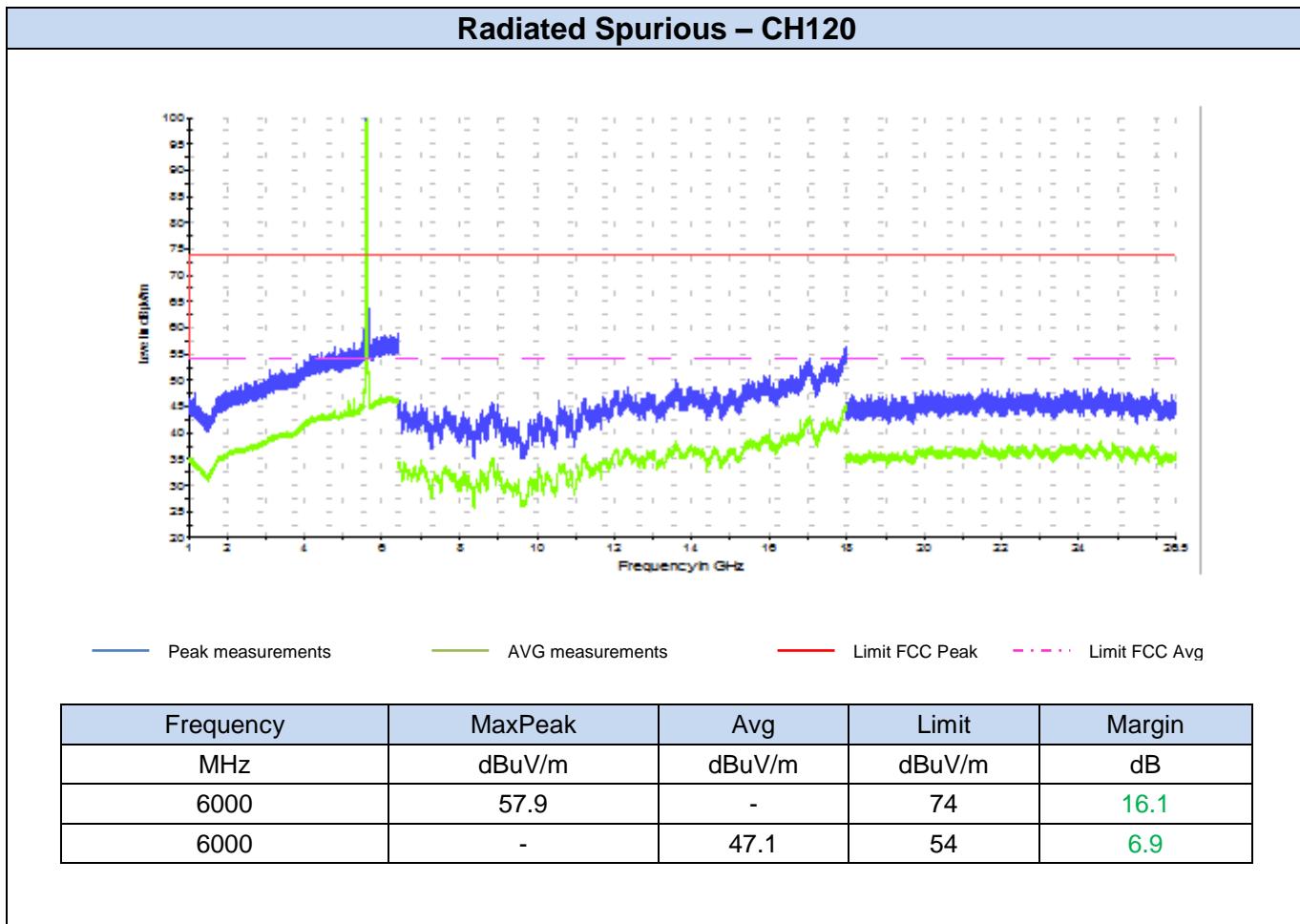


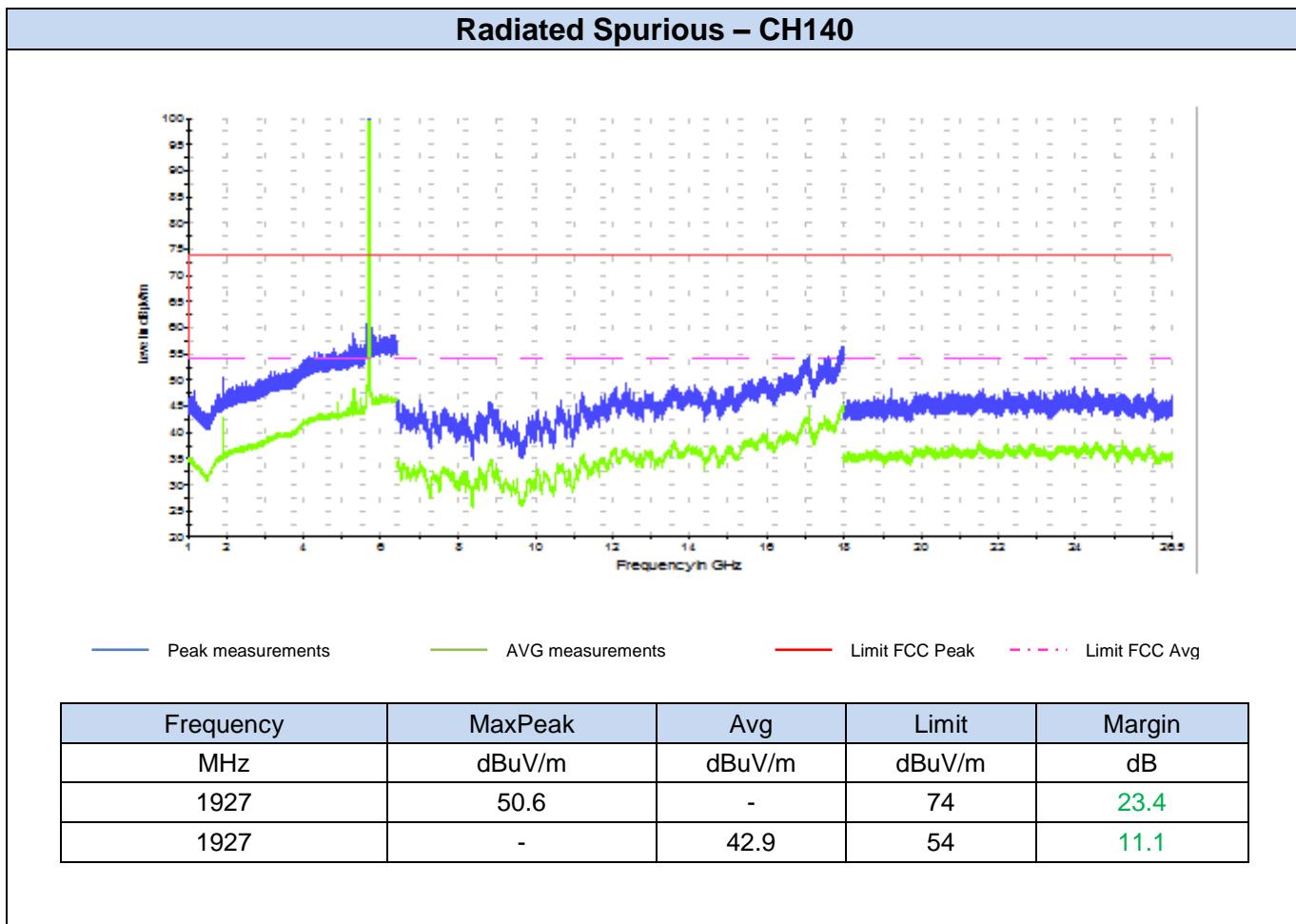


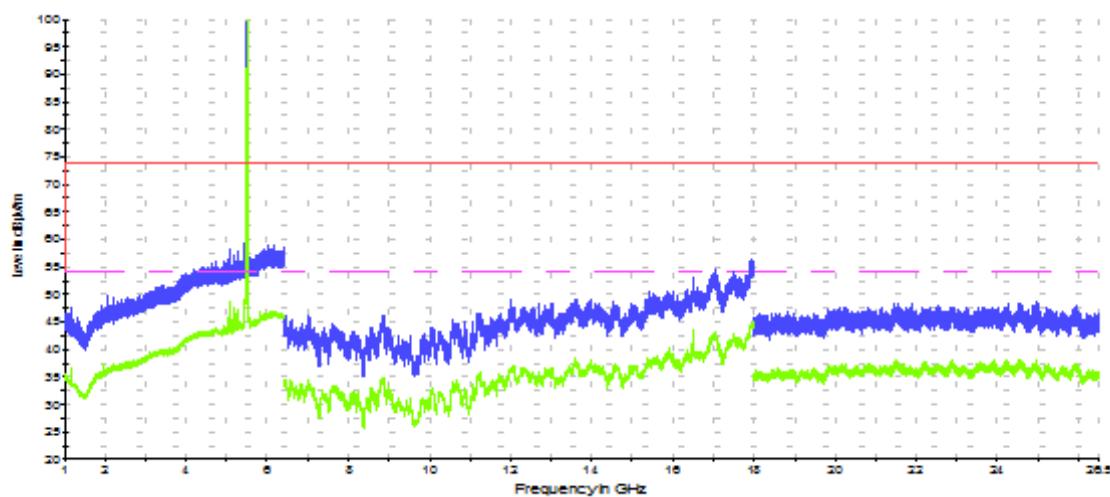
**1 GHz – 26.5GHz, 802.11n20, Chain A****Radiated Spurious – CH100**

— Peak measurements — AVG measurements — Limit FCC Peak - - - Limit FCC Avg

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
5100	58.0	-	74	16
5100	-	48.6	54	5.4
16504	54.1	-	74	19.9
16504	-	44.1	54	9.9





**1 GHz – 26.5GHz, 802.11n20, Chain B****Radiated Spurious – CH100**

— Peak measurements      — AVG measurements      — Limit FCC Peak      - - - Limit FCC Avg

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
5095	58.5	-	74	15.5
5095	-	48.7	54	5.3
16502	53.3	-	74	20.3
16502	-	42.9	54	11.1

