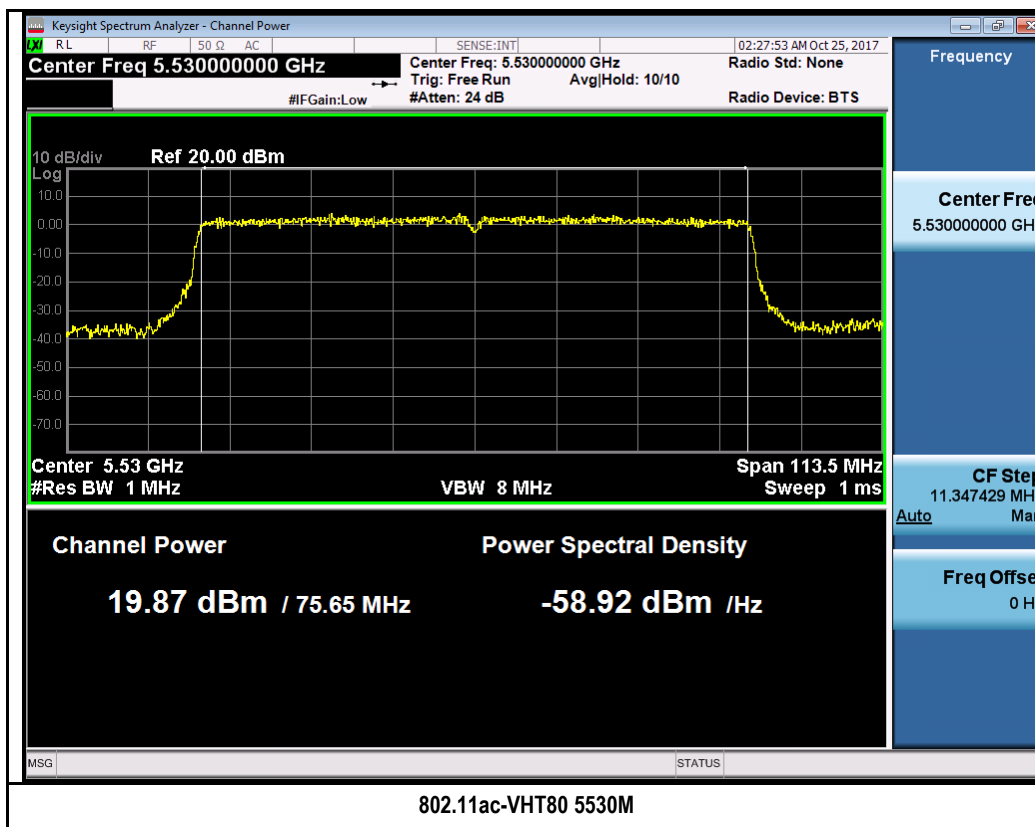
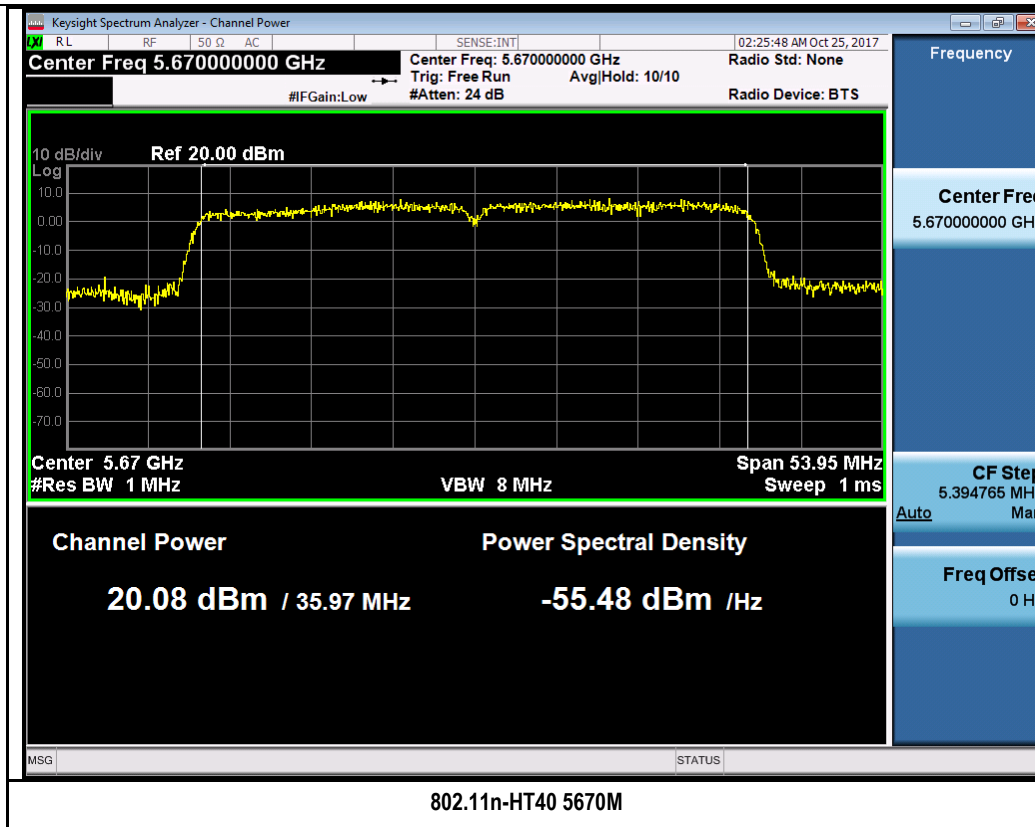
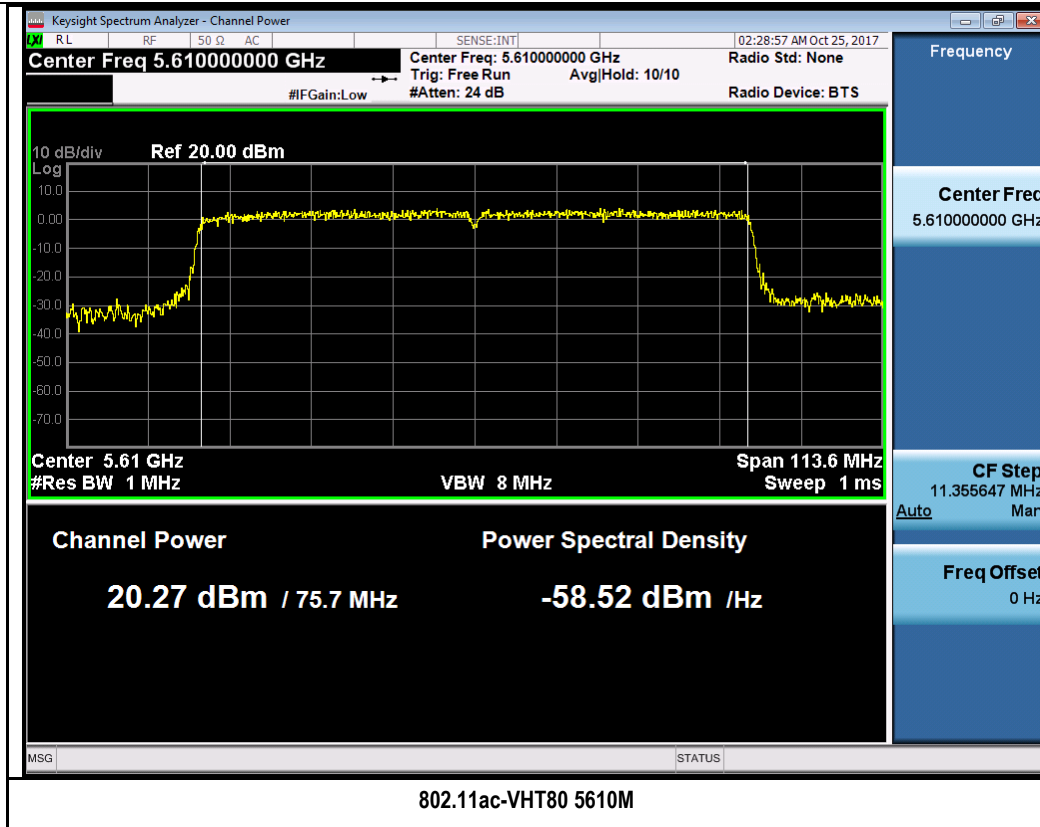




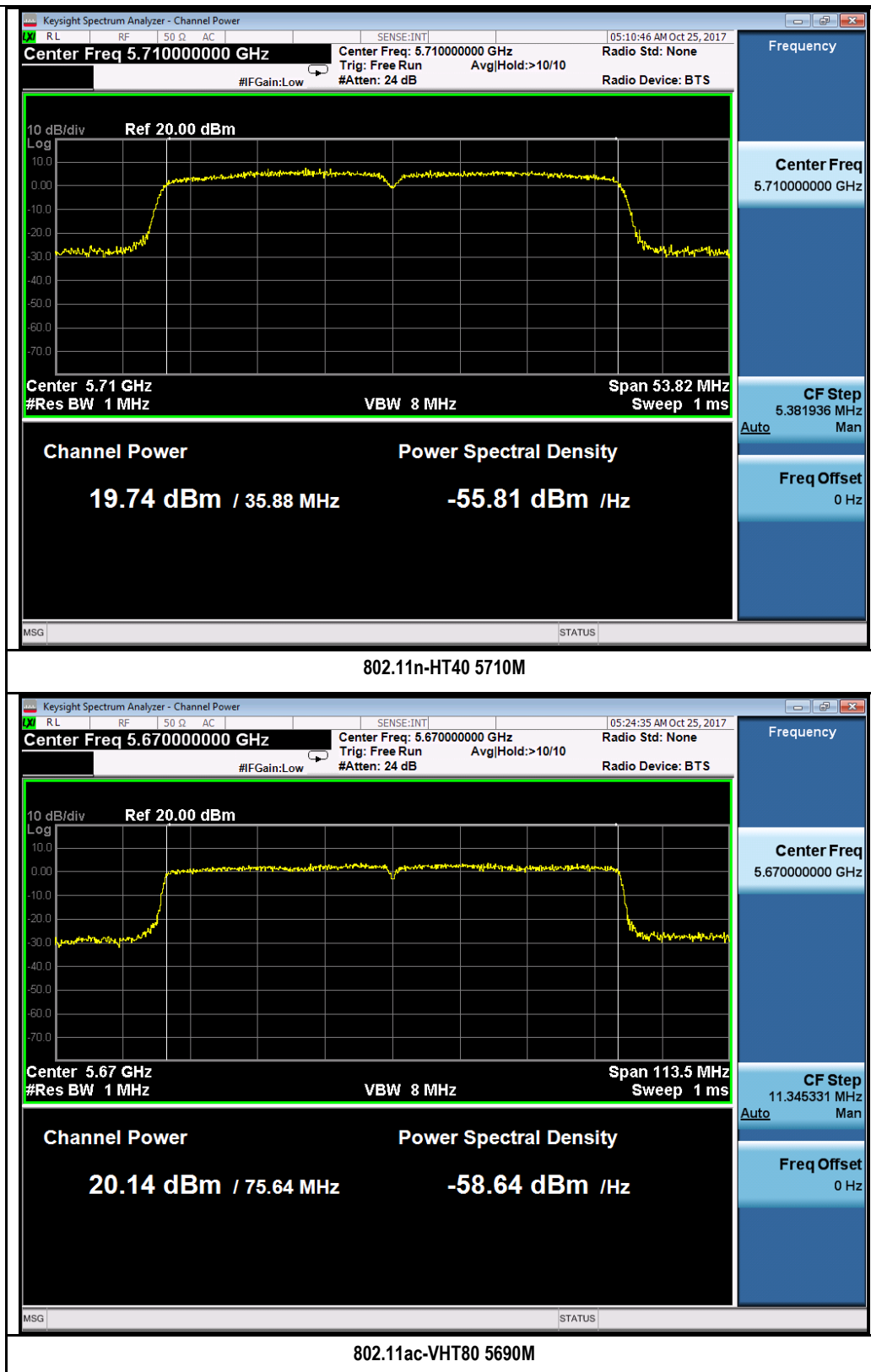




Test Plot for Crossband:

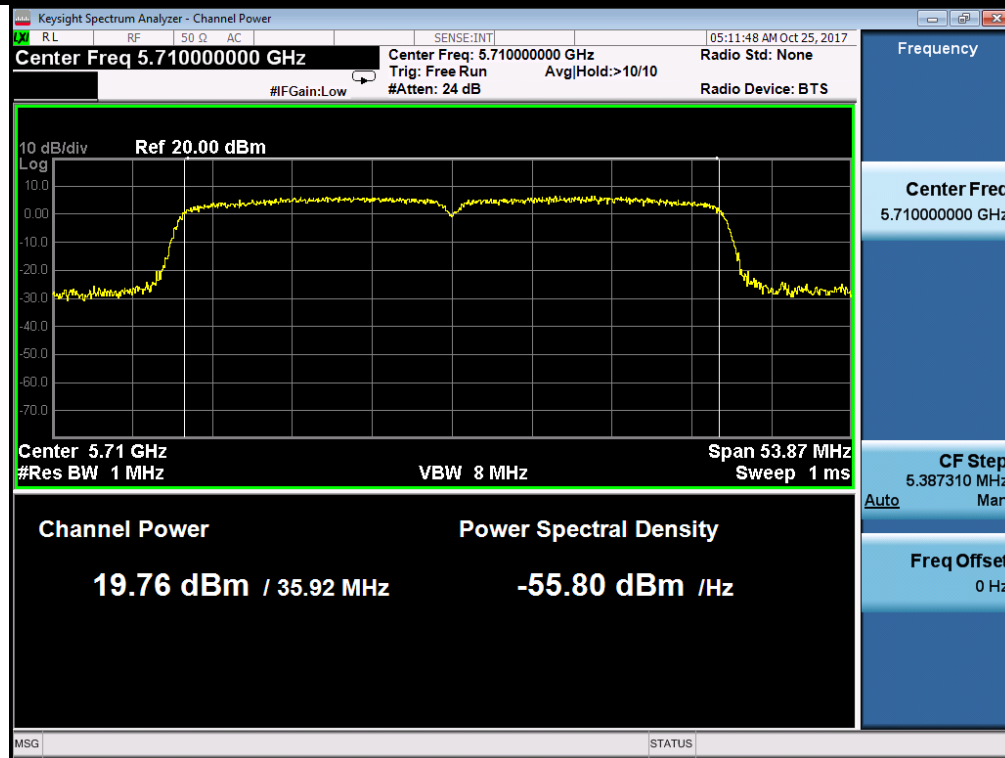
Chain 0:



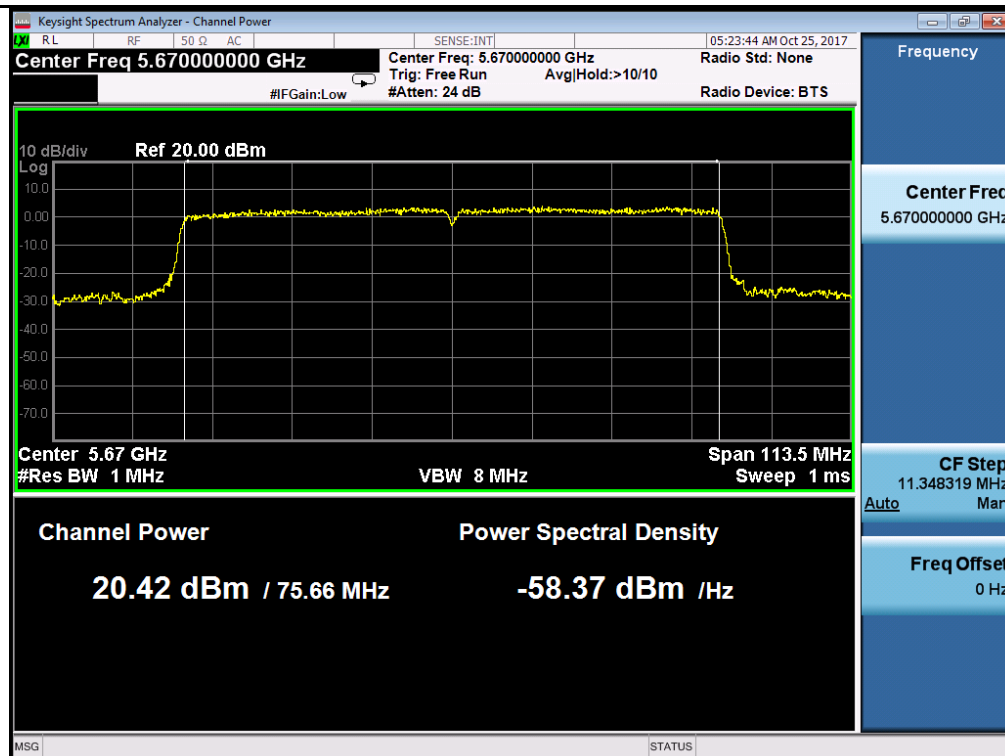


Chain 1:





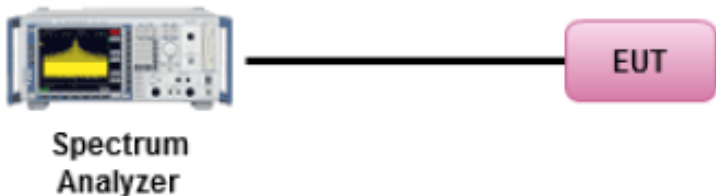
802.11n-HT40 5710M



802.11ac-VHT80 5690M

10.4 Peak Power Spectral Density

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	a)(1)(i)	For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.	☐
	a)(1)(ii)	For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.	☐
	a)(2)	For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.	☒
	a)(3)	For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.	☒
Test Setup			
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01, II.F. Method SA-1 <u>Maximum spectral density measurement procedure</u> - Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal. - Set RBW = 1 MHz - Set VBW $\geq$ 3 MHz - Detector = RMS. - Sweep time = auto couple. - Trace mode = max hold. - Trace average at least 100 traces in power averaging - Use the peak marker function to determine the maximum amplitude level within the RBW. Apply correction to the result if different RBW is used.		
Test Date	10/24/2017	Environmental condition	Temperature 22°C Relative Humidity 46% Atmospheric Pressure 1020mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at RF test site.

PSD measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5260	Low	7.613	7.541	10.587	11	Pass
	802.11a	5280	Mid	7.960	7.850	10.916	11	Pass
	802.11a	5320	High	7.892	7.906	10.909	11	Pass
	802.11n-20M	5260	Low	7.668	7.678	10.683	11	Pass
	802.11n-20M	5280	Mid	7.596	7.675	10.646	11	Pass
	802.11n-20M	5320	High	7.892	7.808	10.861	11	Pass
	802.11n-40M	5270	Low	5.408	5.384	8.406	11	Pass
	802.11n-40M	5310	Mid	3.843	3.809	6.836	11	Pass
	802.11ac-80M	5290	High	-0.087	-0.081	2.926	11	Pass

PSD measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5500	Low	7.340	7.307	10.334	11	Pass
	802.11a	5580	Mid	7.784	7.837	10.821	11	Pass
	802.11a	5700	High	7.944	7.914	10.939	11	Pass
	802.11n-20M	5500	Low	7.236	7.229	10.243	11	Pass
	802.11n-20M	5580	Mid	7.598	7.648	10.633	11	Pass
	802.11n-20M	5700	High	7.313	7.423	10.379	11	Pass
	802.11n-40M	5510	Low	5.433	5.676	8.566	11	Pass
	802.11n-40M	5550	Mid	5.856	5.665	8.772	11	Pass
	802.11n-40M	5670	High	5.565	5.189	8.391	11	Pass
	802.11ac-80M	5530	Low	0.385	0.684	3.547	11	Pass
	802.11ac-80M	5610	High	0.855	1.123	4.001	11	Pass

Note: Two chains are cross-polarized, additional gain is $10 \log_{10}(\text{NANT})=0\text{dB}$, max directional gain of the EUT is 3.5dBi. No limit adjustment is needed. All the mode transmission is MIMO.

PSD measurement result for cross channels (in band 5470-5725MHz)

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5720	CROSS	7.76	7.47	10.63	11	Pass
	802.11n-20M	5720	CROSS	6.59	6.62	9.62	11	Pass
	802.11n-40M	5710	CROSS	4.80	4.64	7.73	11	Pass
	802.11ac-80M	5690	CROSS	1.64	1.65	4.66	11	Pass

PSD measurement result for cross channels (in band 5725-5850MHz)

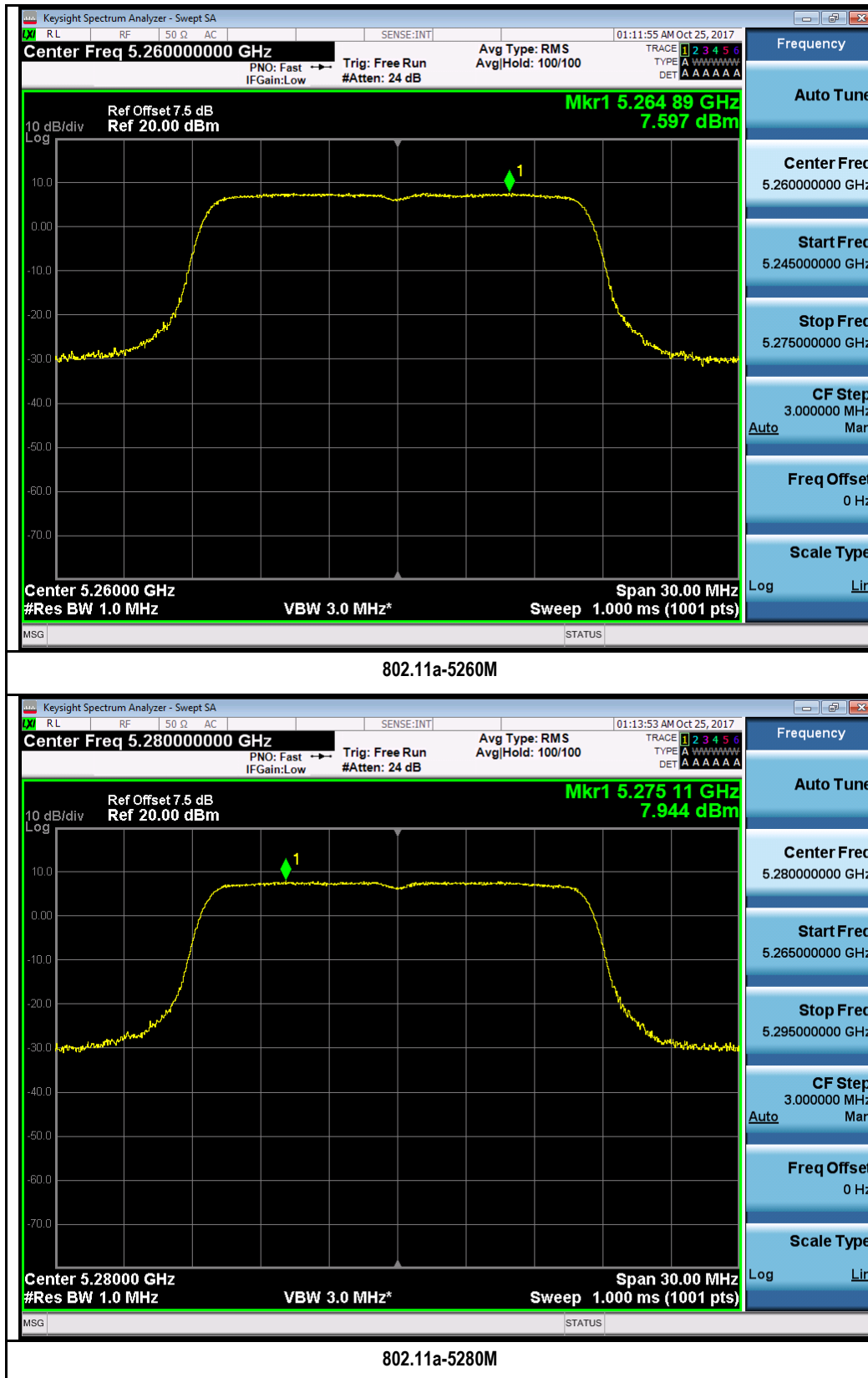
Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Corrected Level (dBm/500kHz)	Limit (dBm/500kHz)	Result
			Chain0	Chain1	Combined PSD			
802.11a	5720	CROSS	-0.36	-0.67	2.50	9.49	30	Pass
802.11n-20M	5720	CROSS	-0.41	-0.80	2.41	9.40	30	Pass
802.11n-40M	5710	CROSS	-3.25	-3.47	-0.35	6.64	30	Pass
802.11ac-80M	5690	CROSS	-6.49	-6.52	-3.49	3.50	30	Pass

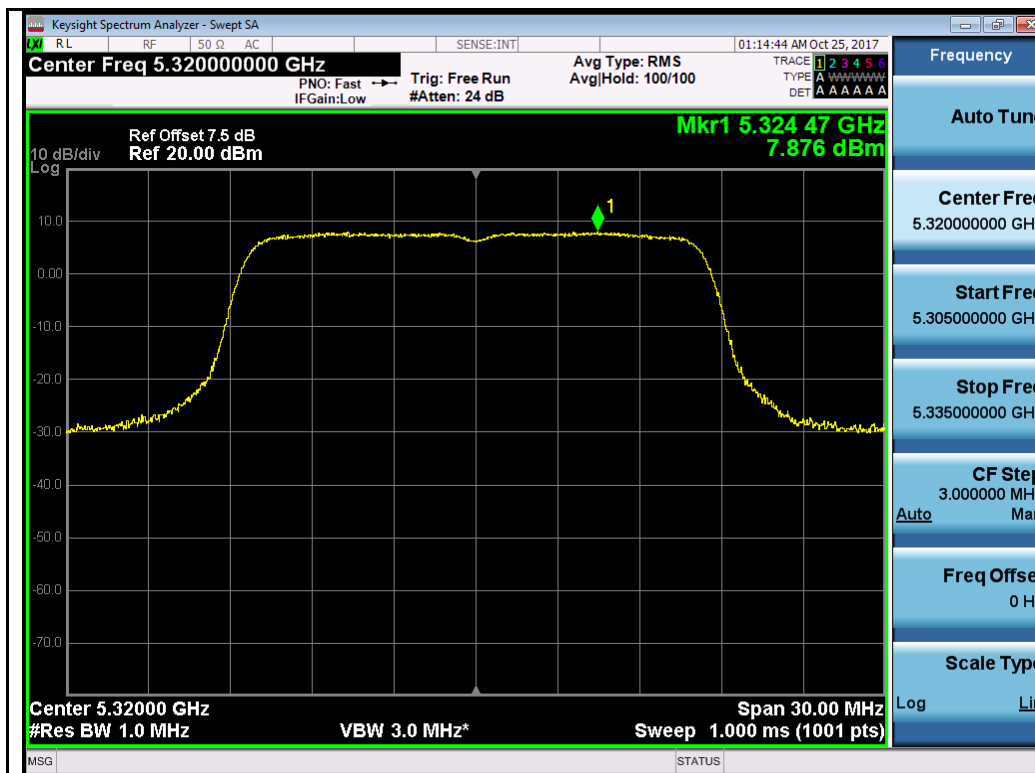
Correction factor=10*log(500/100)=6.99

Note: Two chains are cross-polarized, additional gain is 10 log₁₀(NANT)=0dB, max directional gain of the EUT is 3.5dBi. No limit adjustment is needed. All the mode transmission is MIMO.

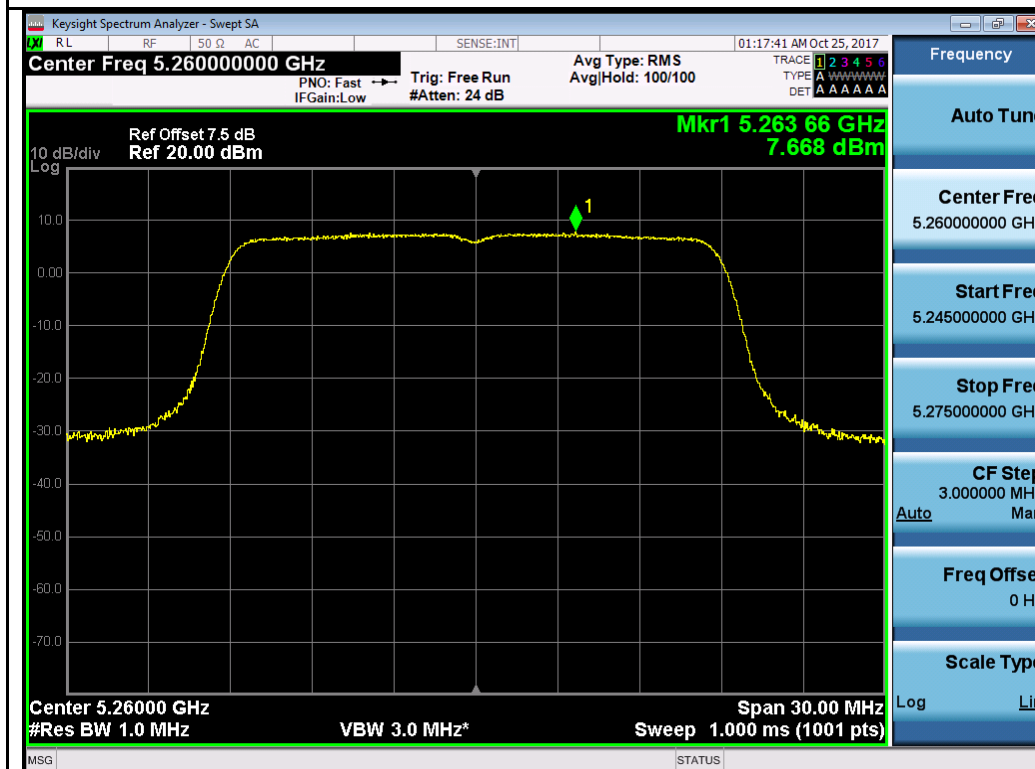
Test Plot for W53:

Chain 0:





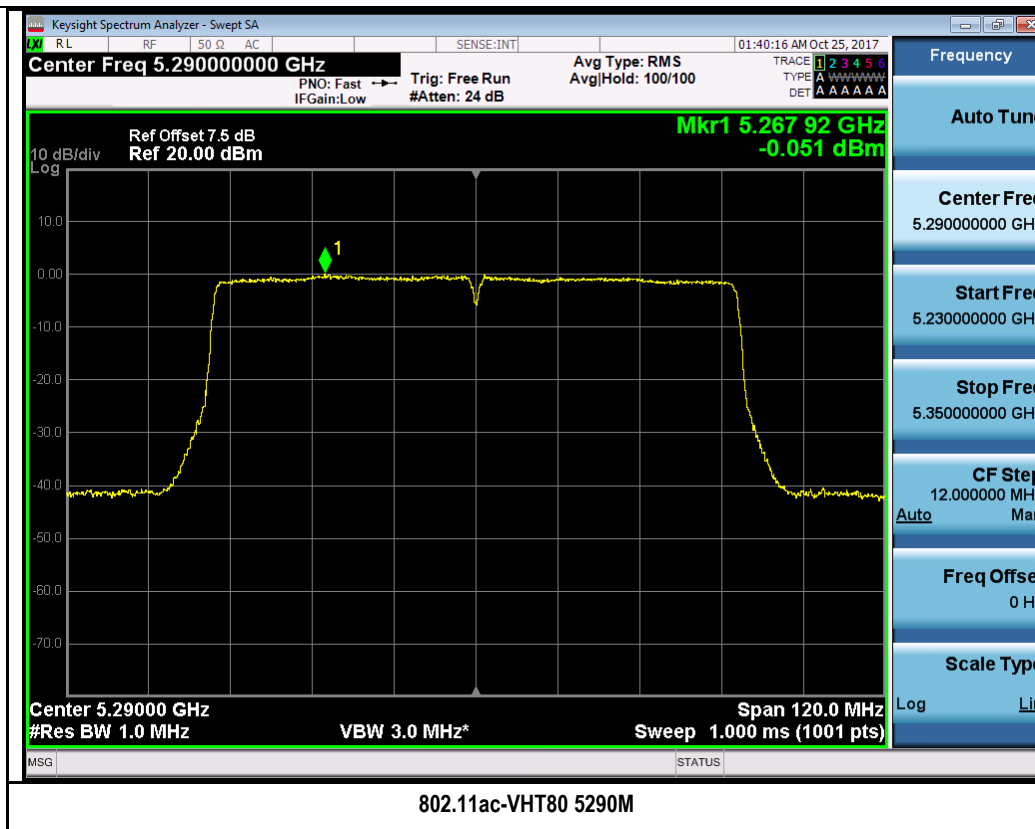
802.11a-5320M



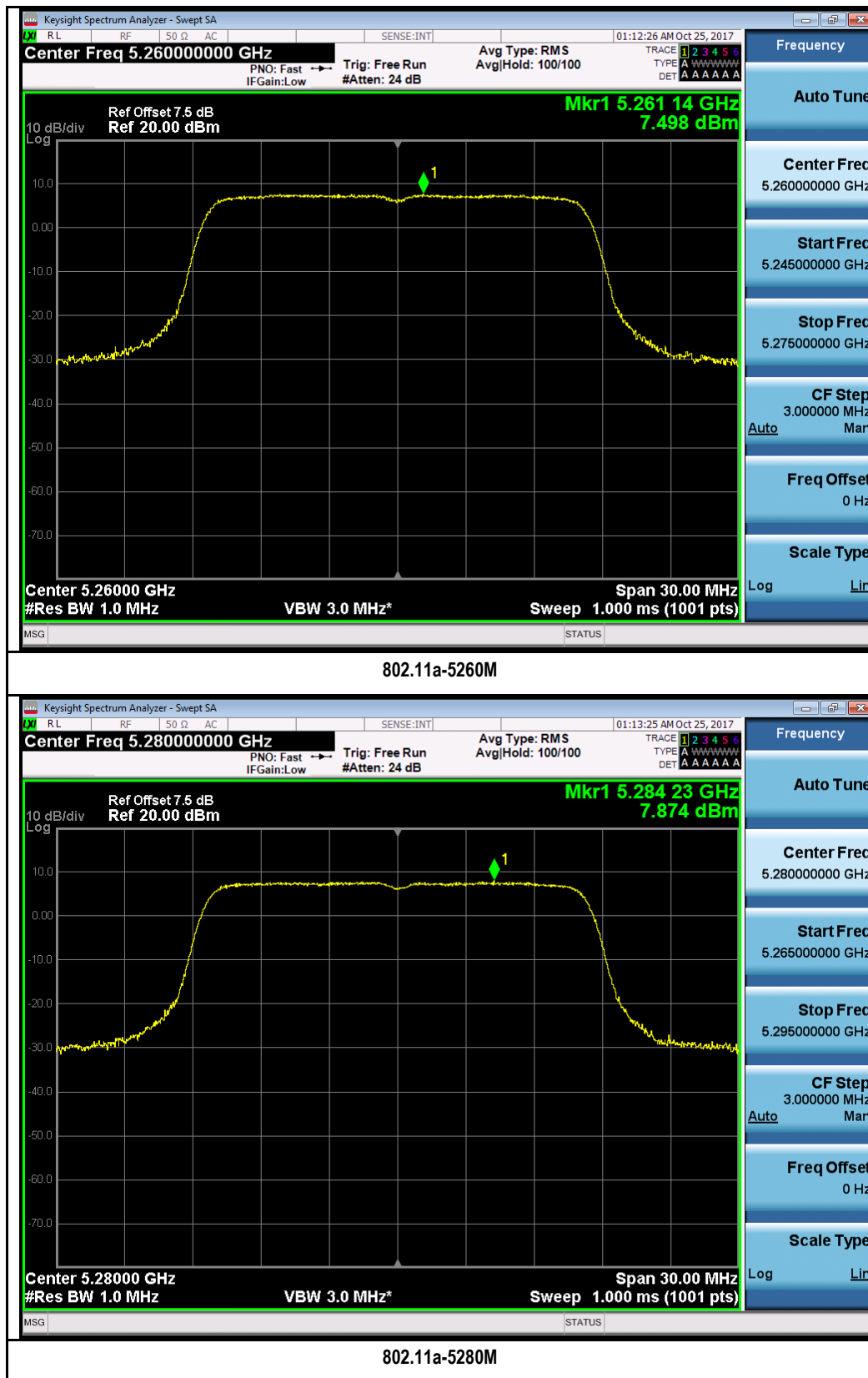
802.11n-HT20 5260M

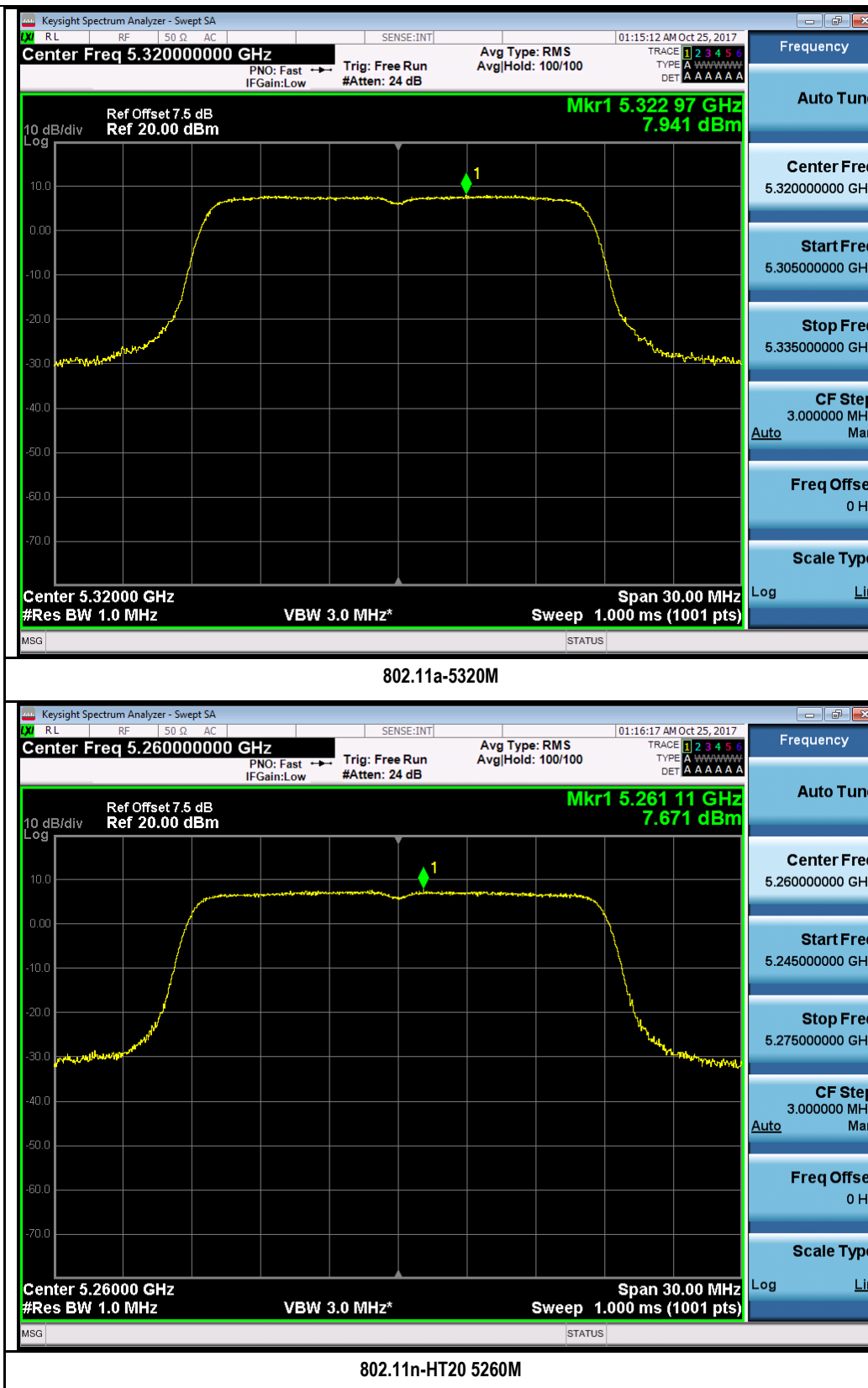


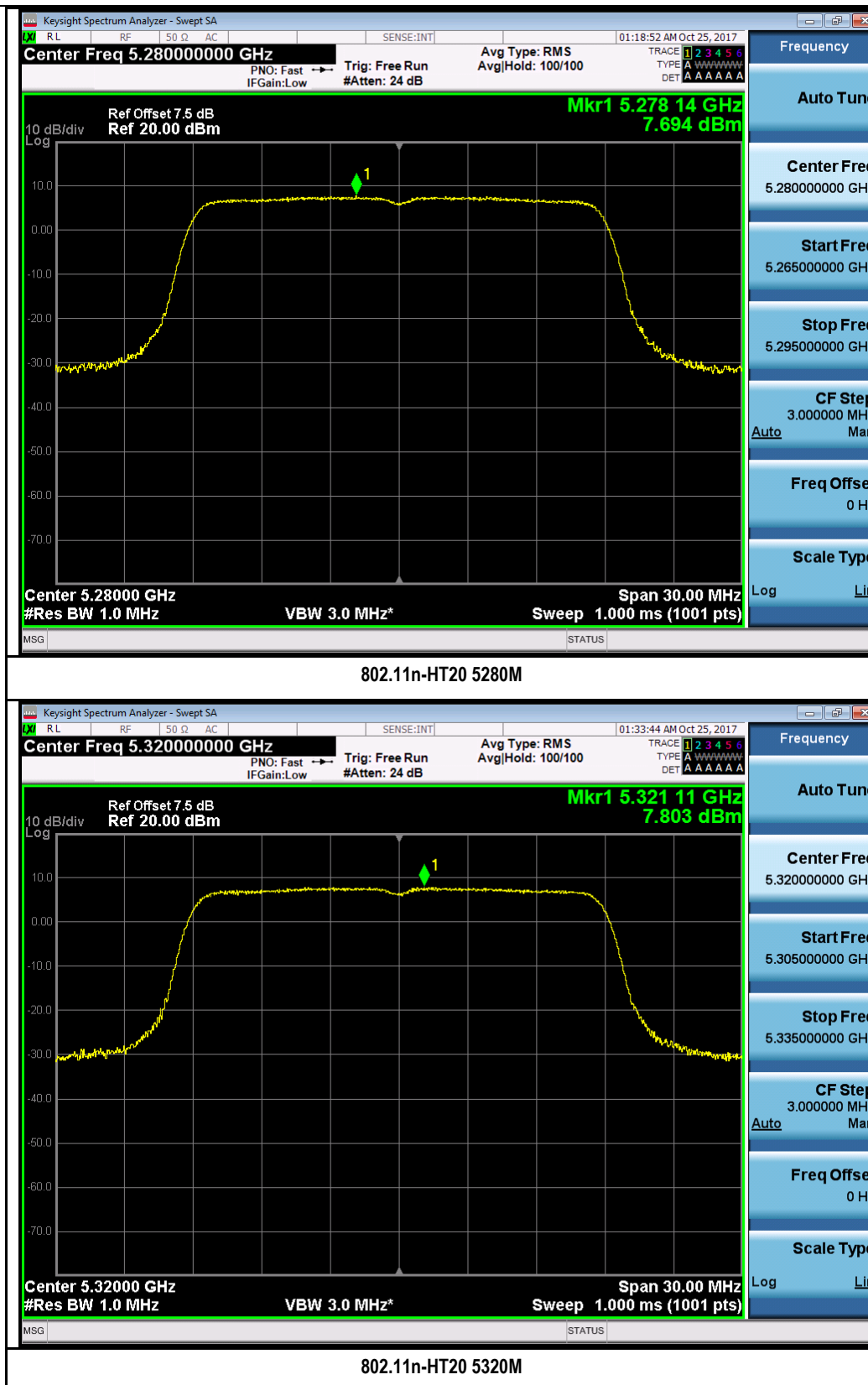




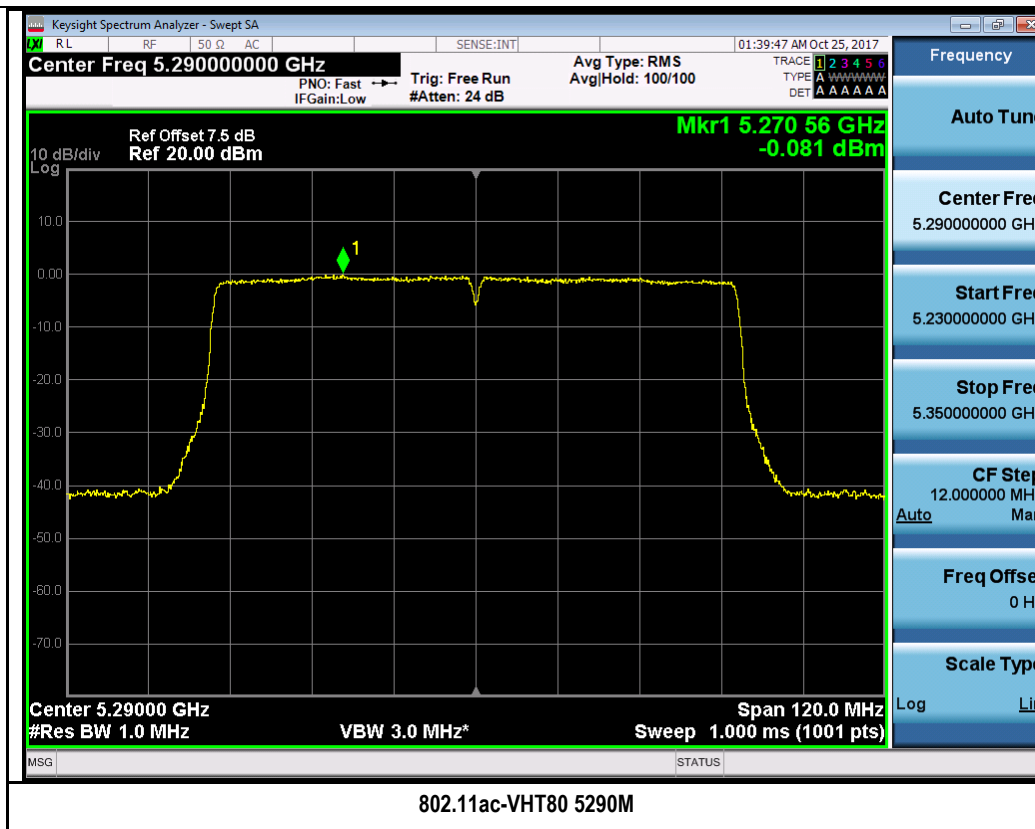
Chain 1:





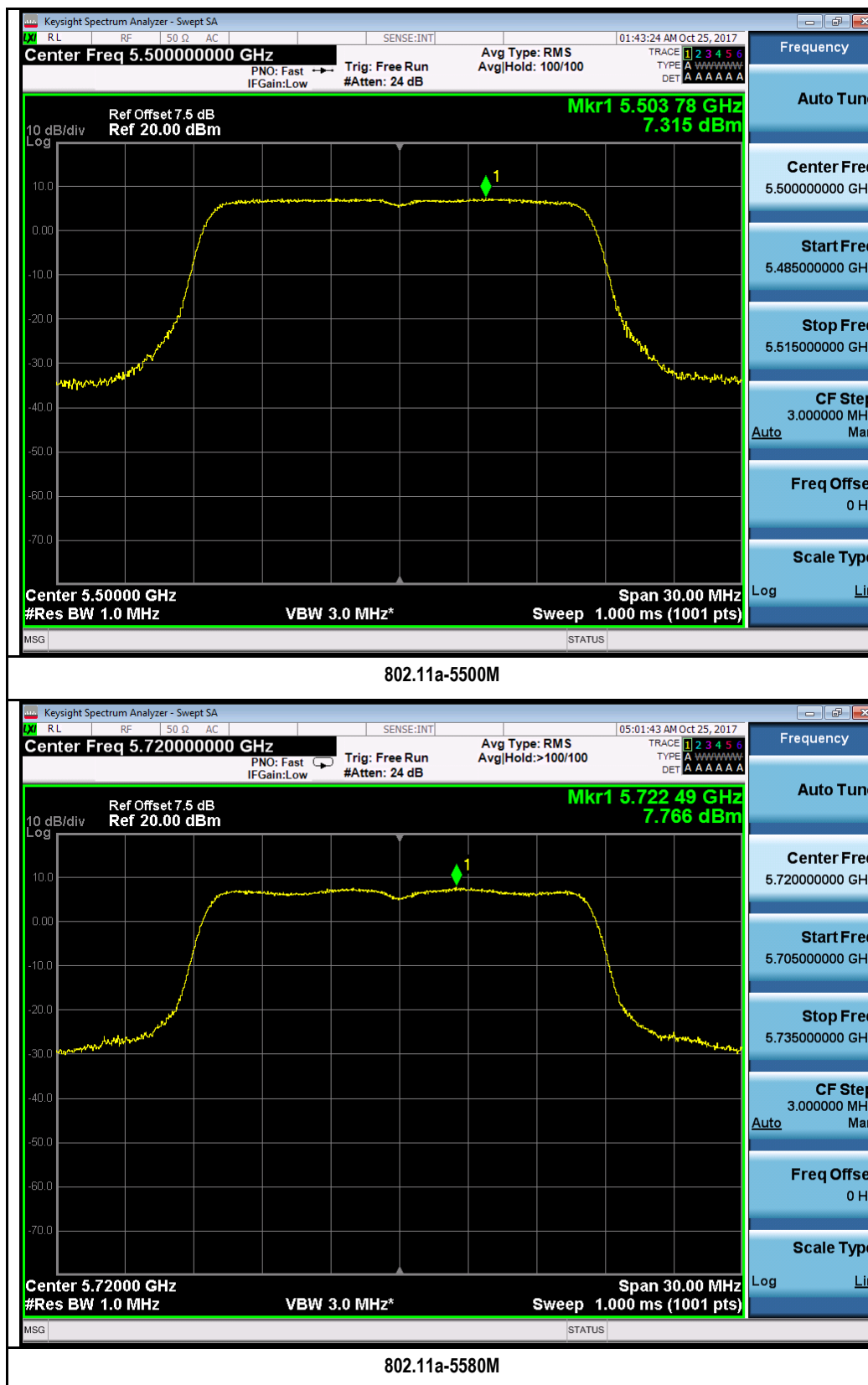


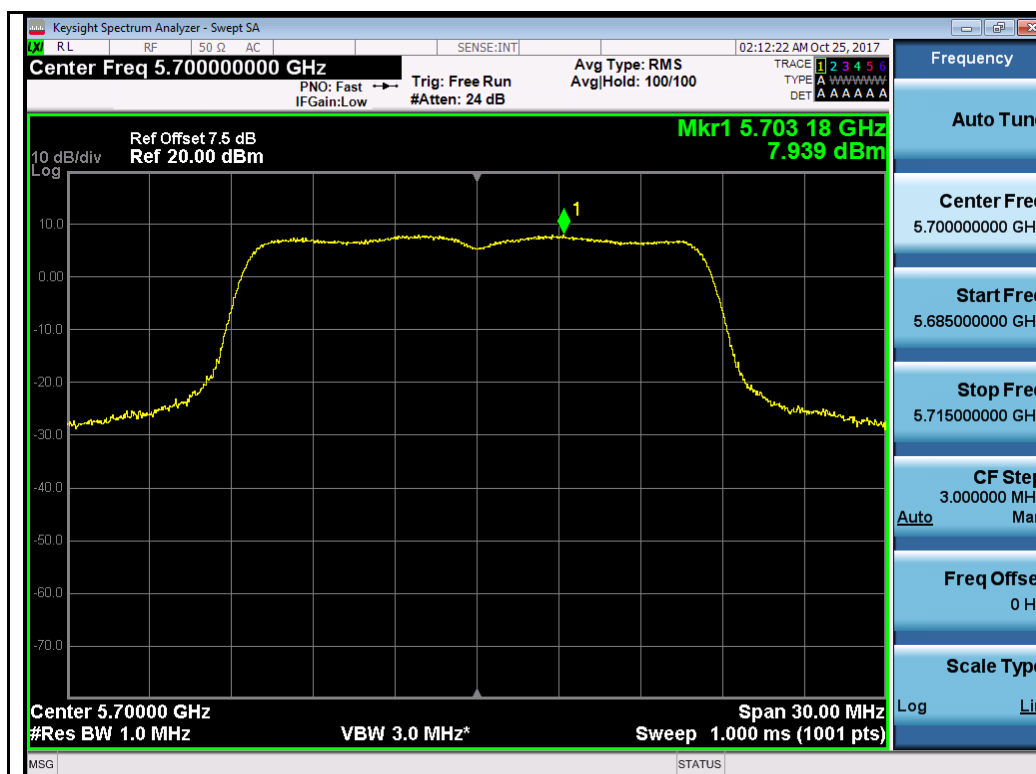




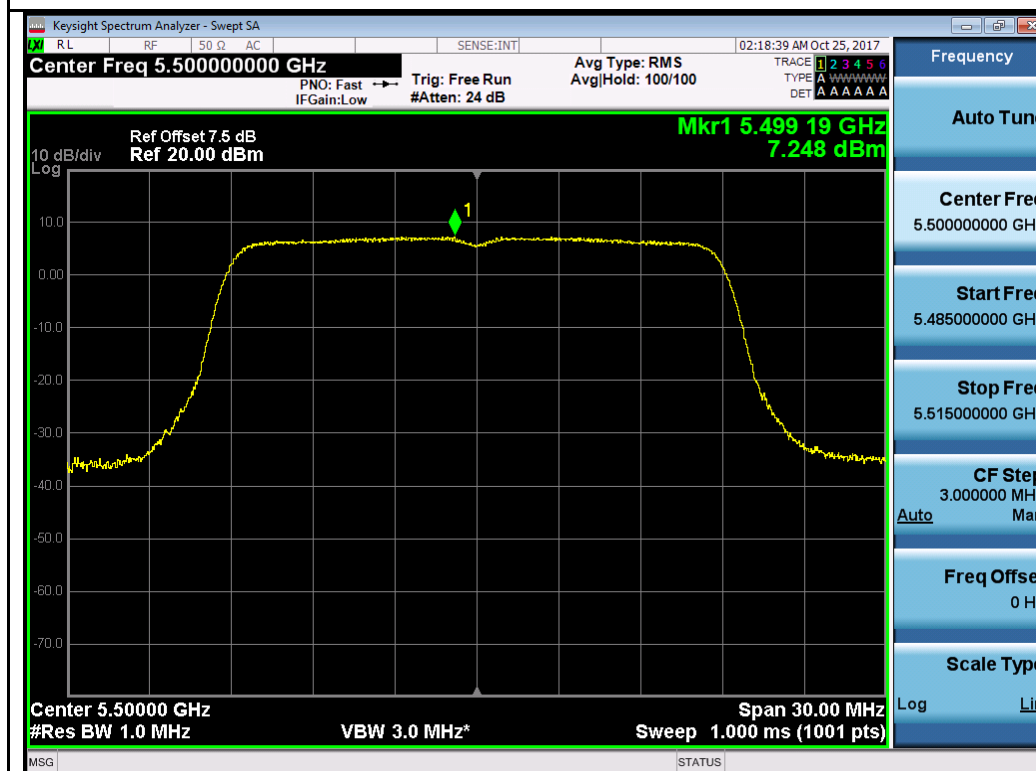
Test Plot for W56:

Chain 0:

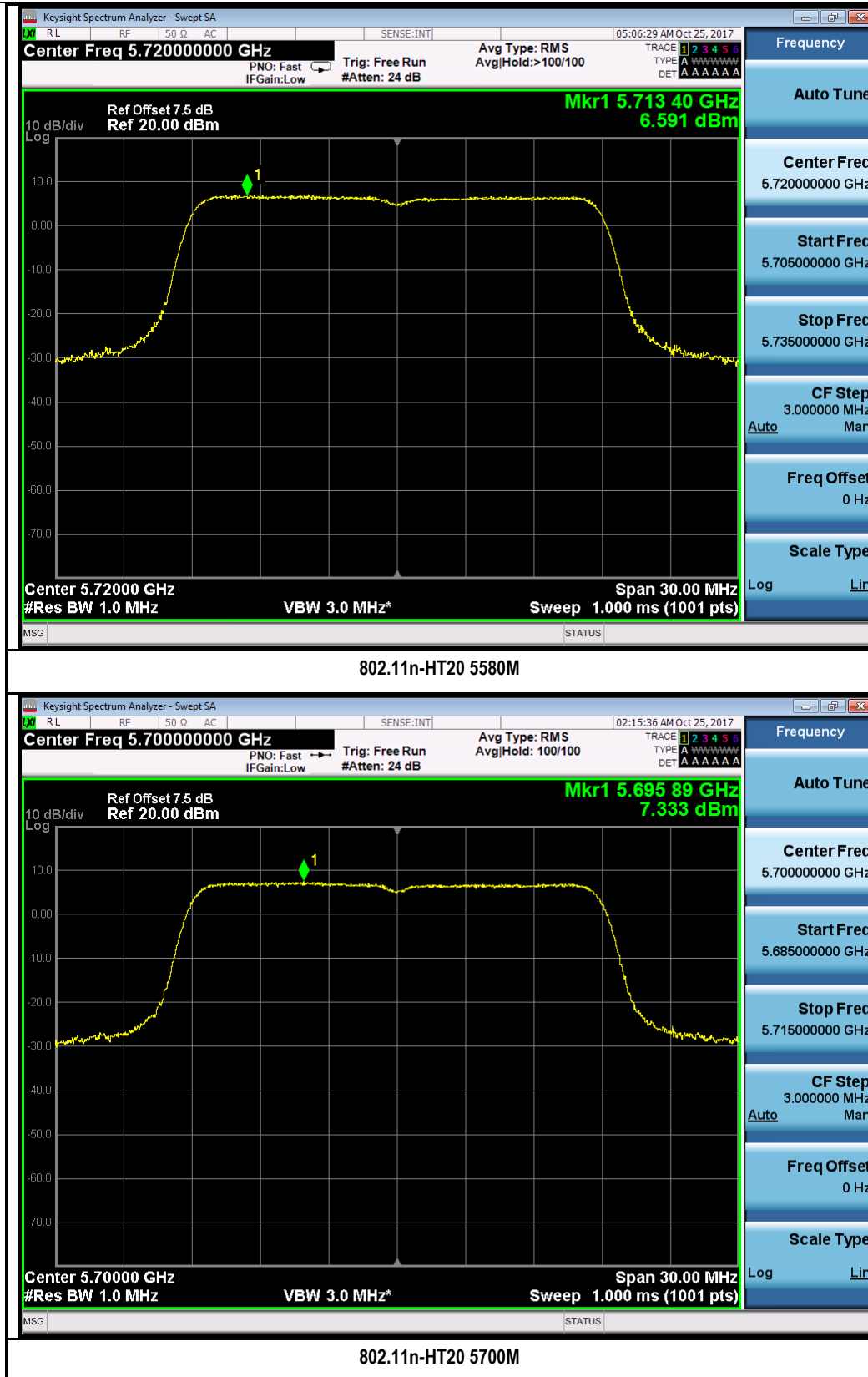




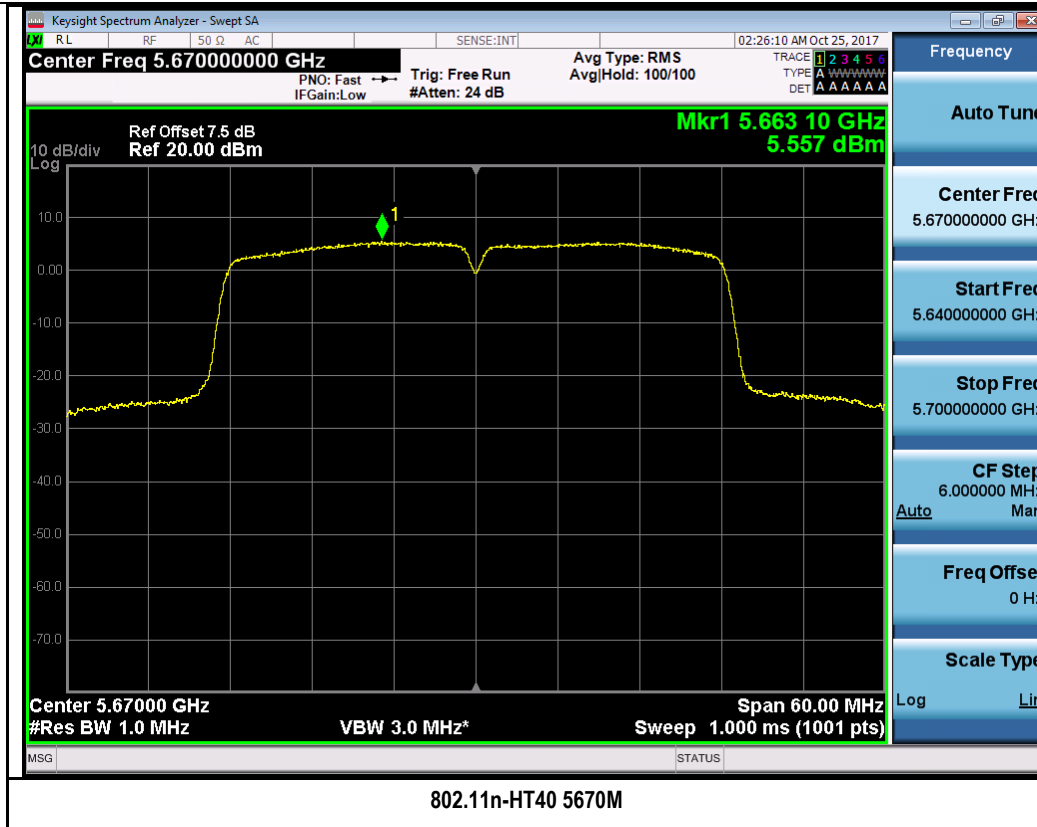
802.11a-5700M

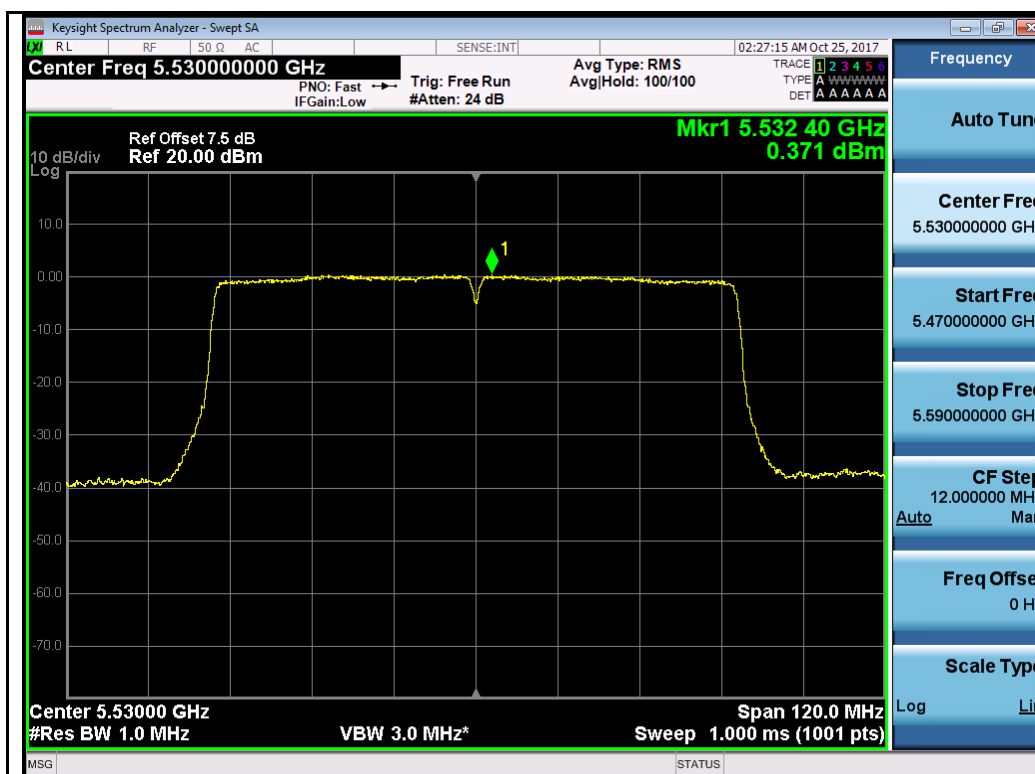


802.11n-HT20 5500M

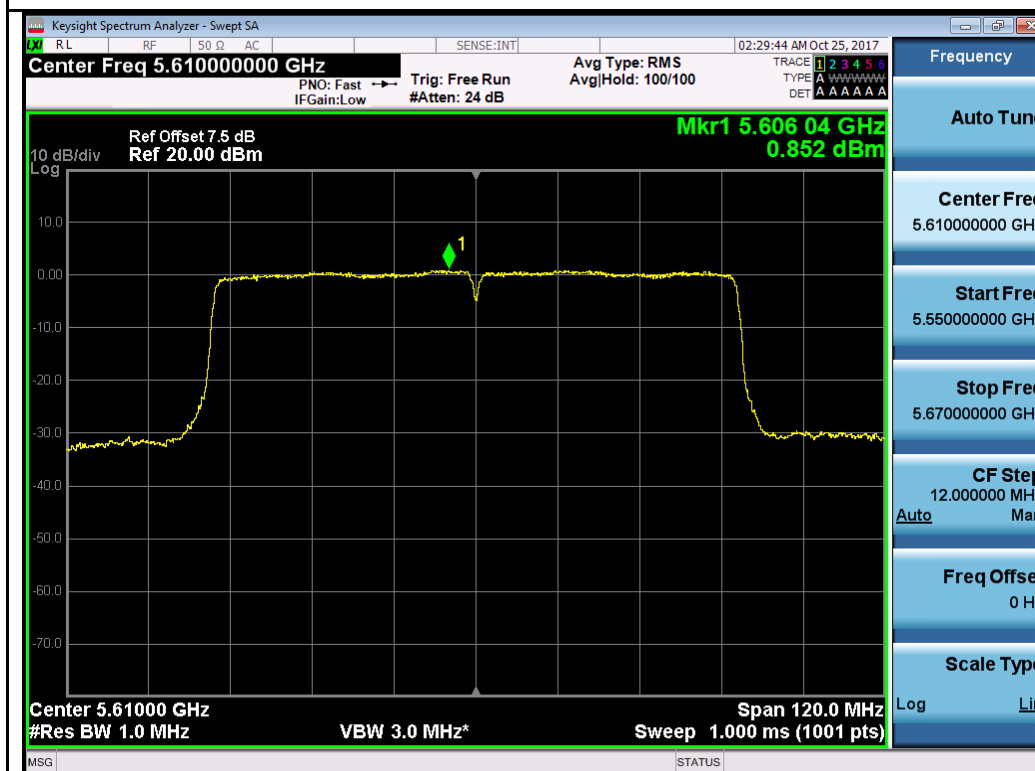






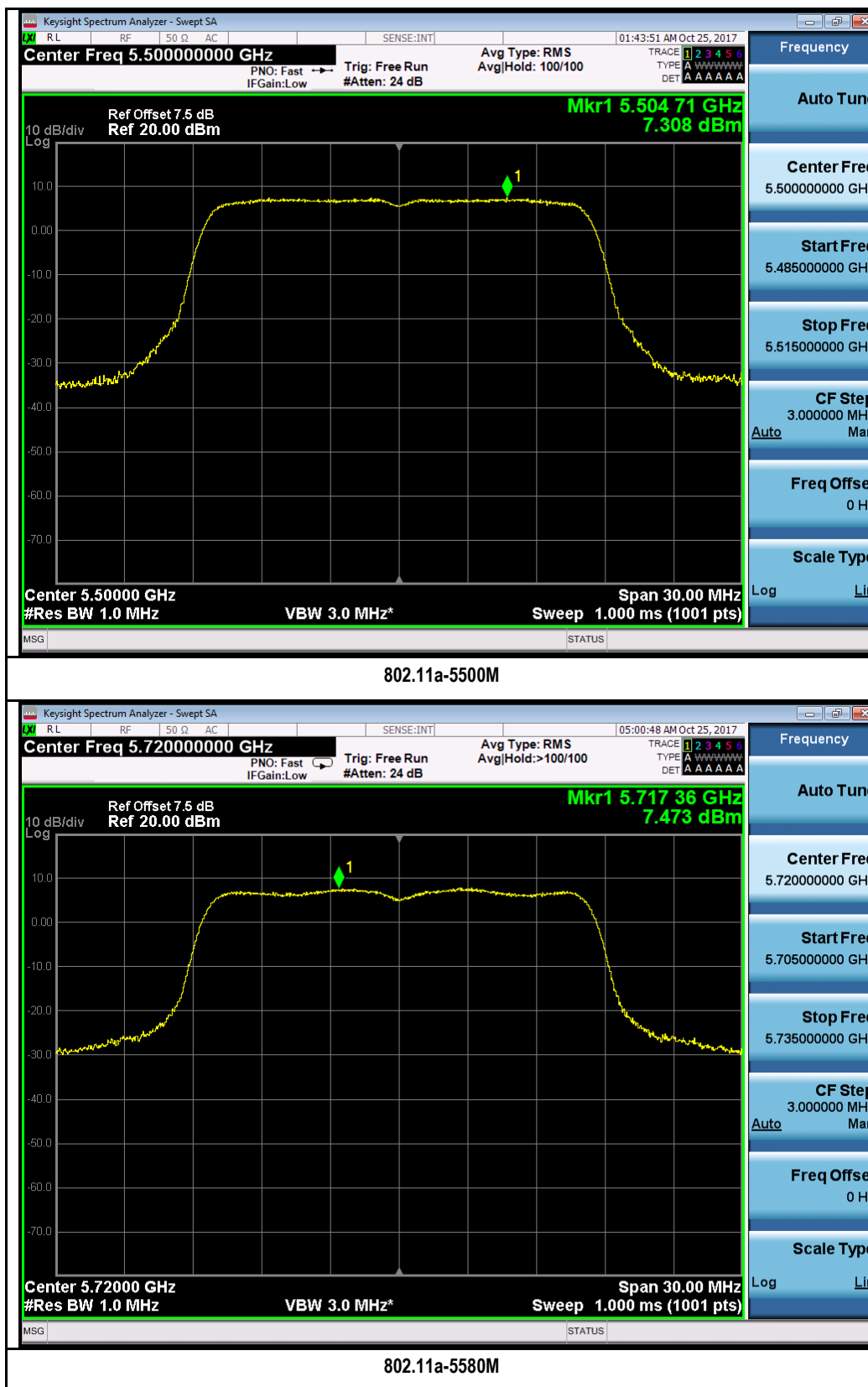


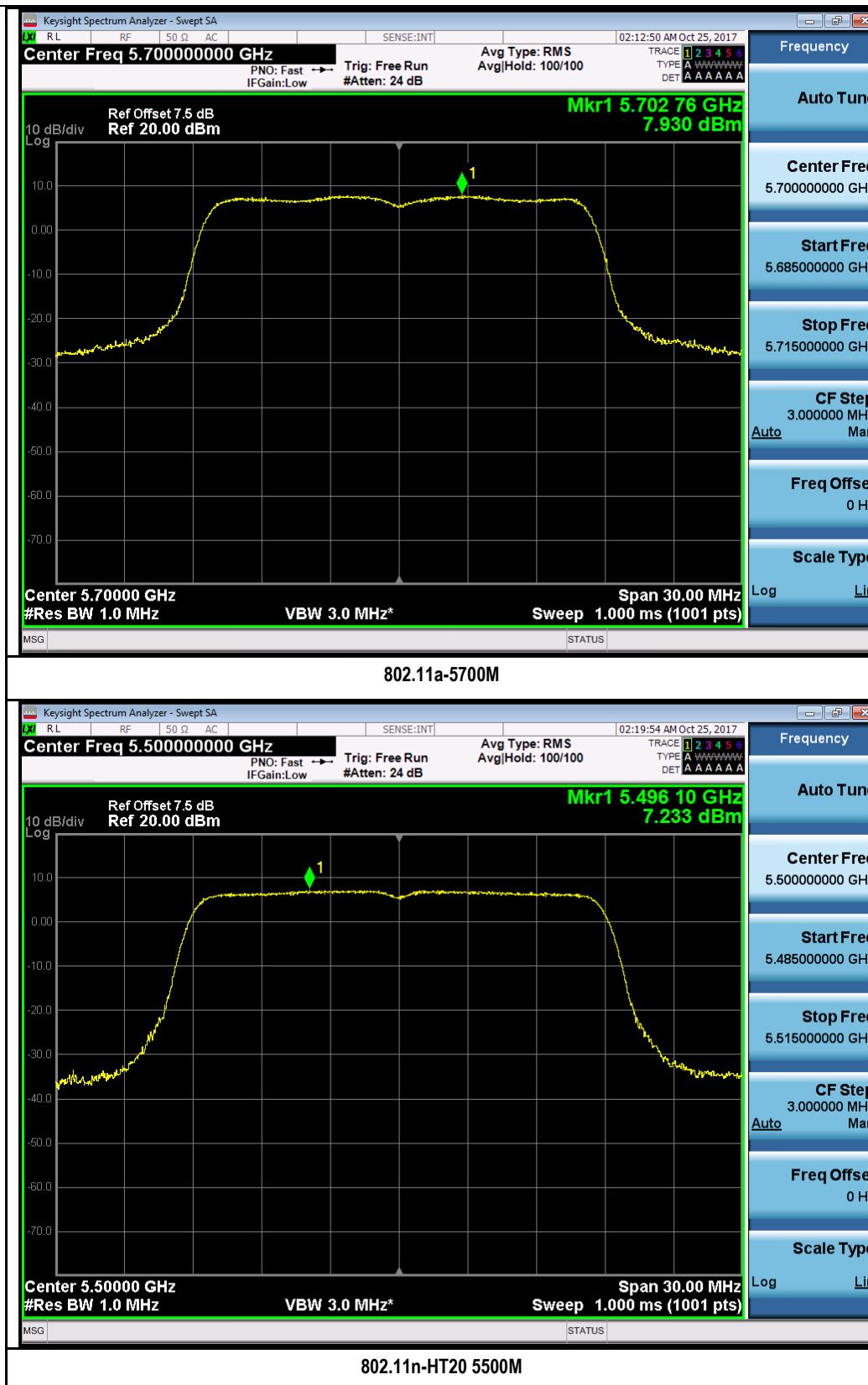
802.11ac-VHT80 5530M

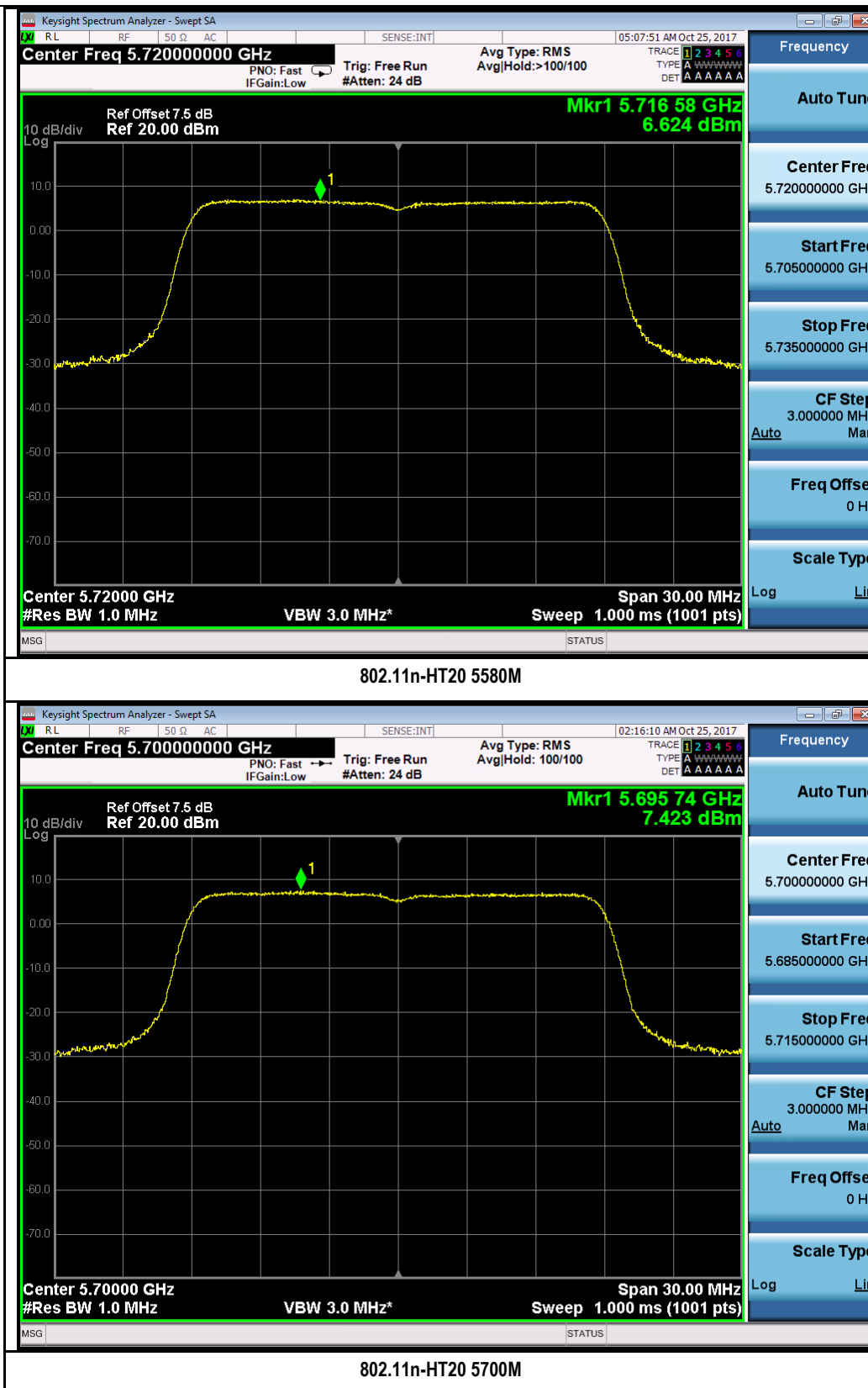


802.11ac-VHT80 5610M

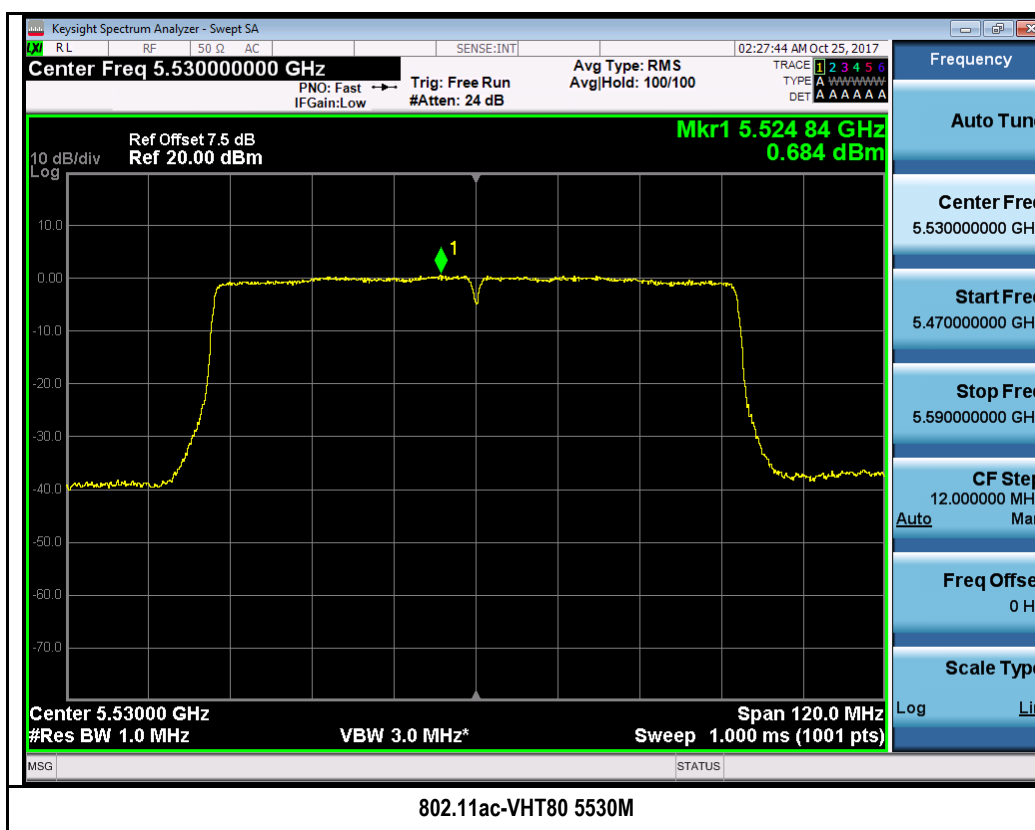
Chain 1:

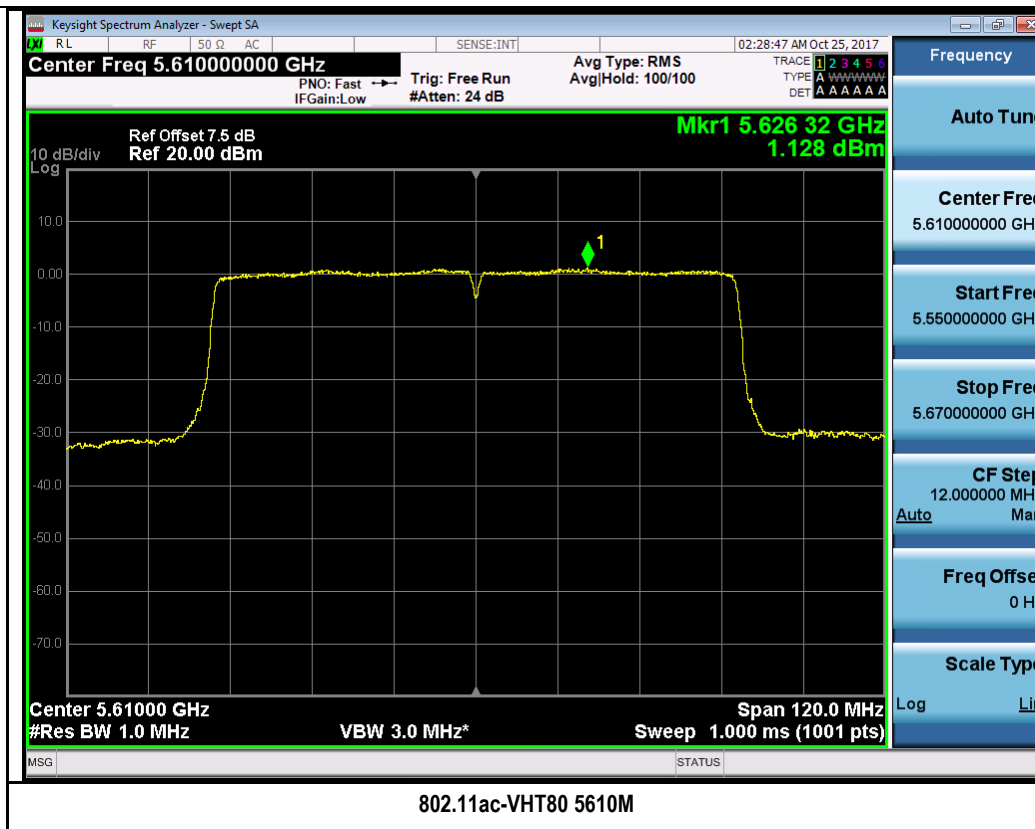






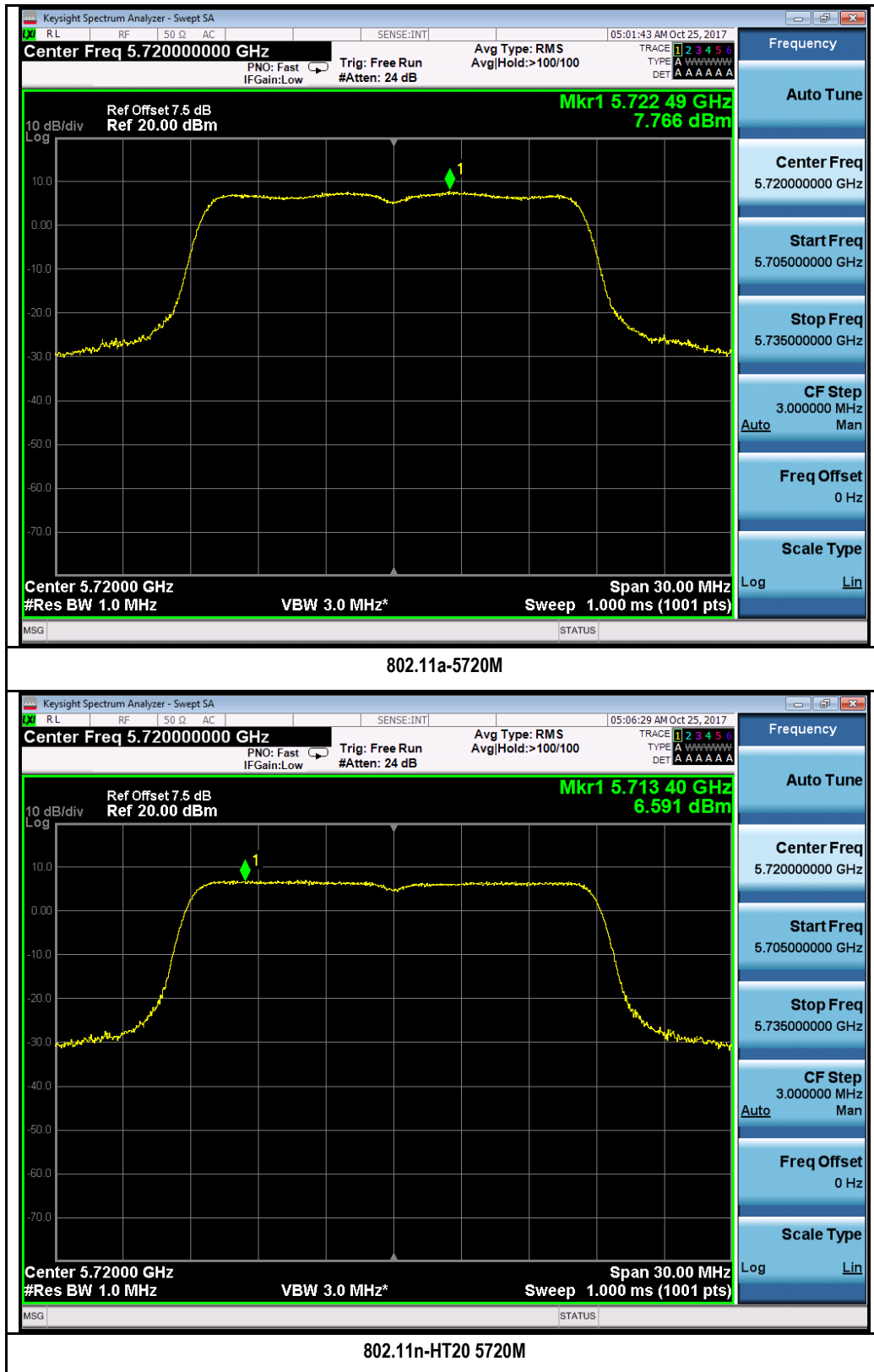


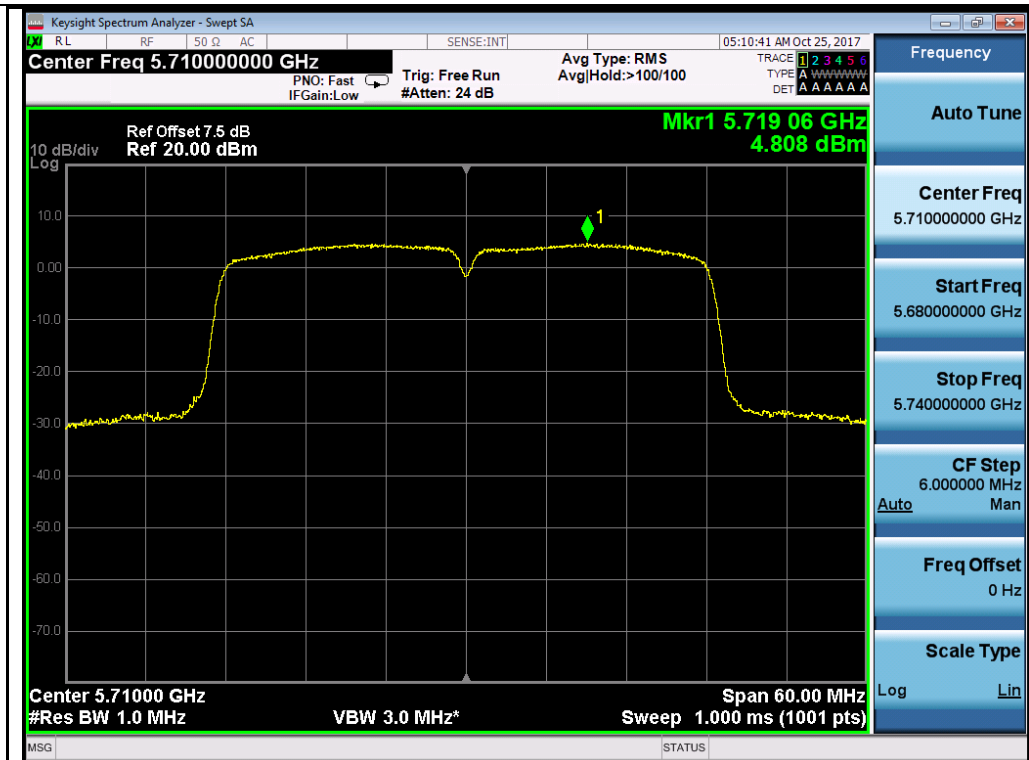




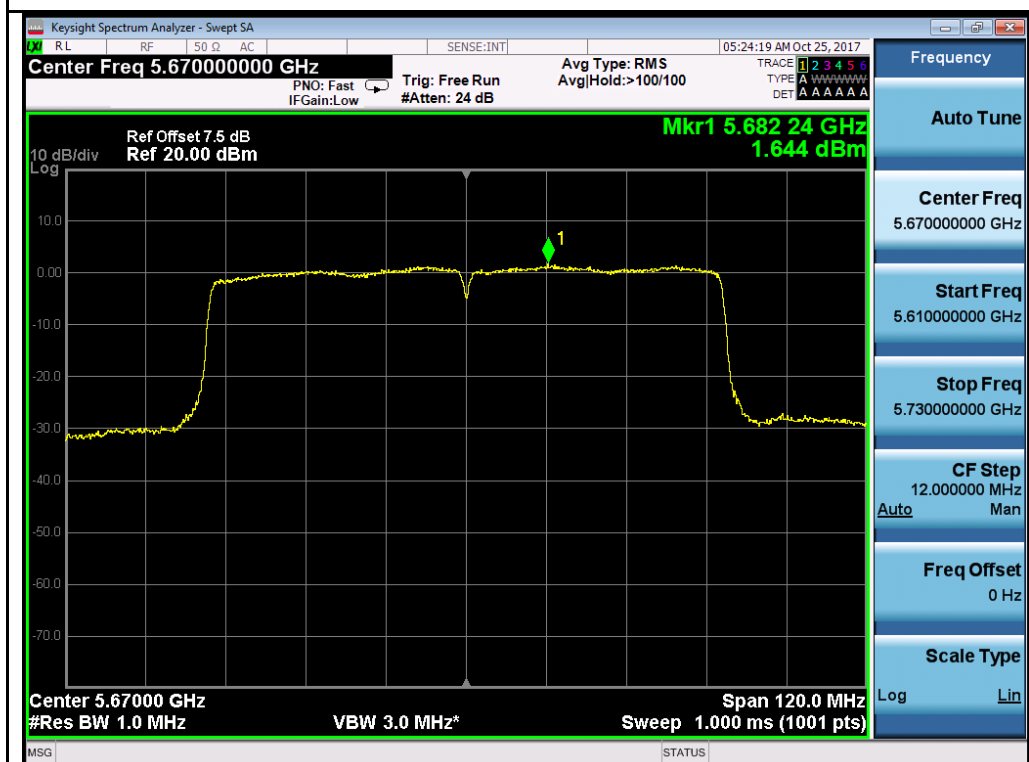
Test Plot for Crossband (W56 procedure):

Chain 0:



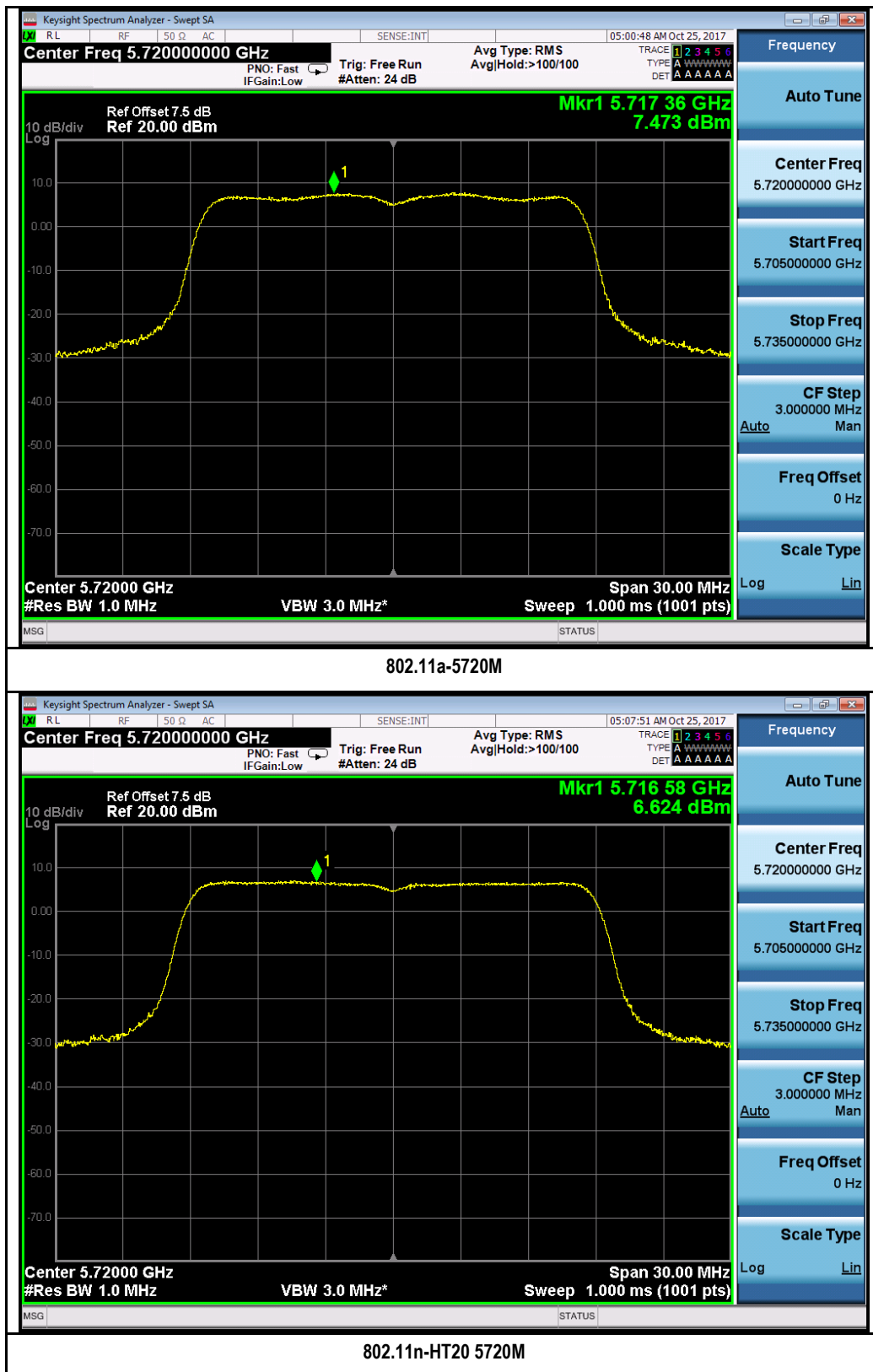


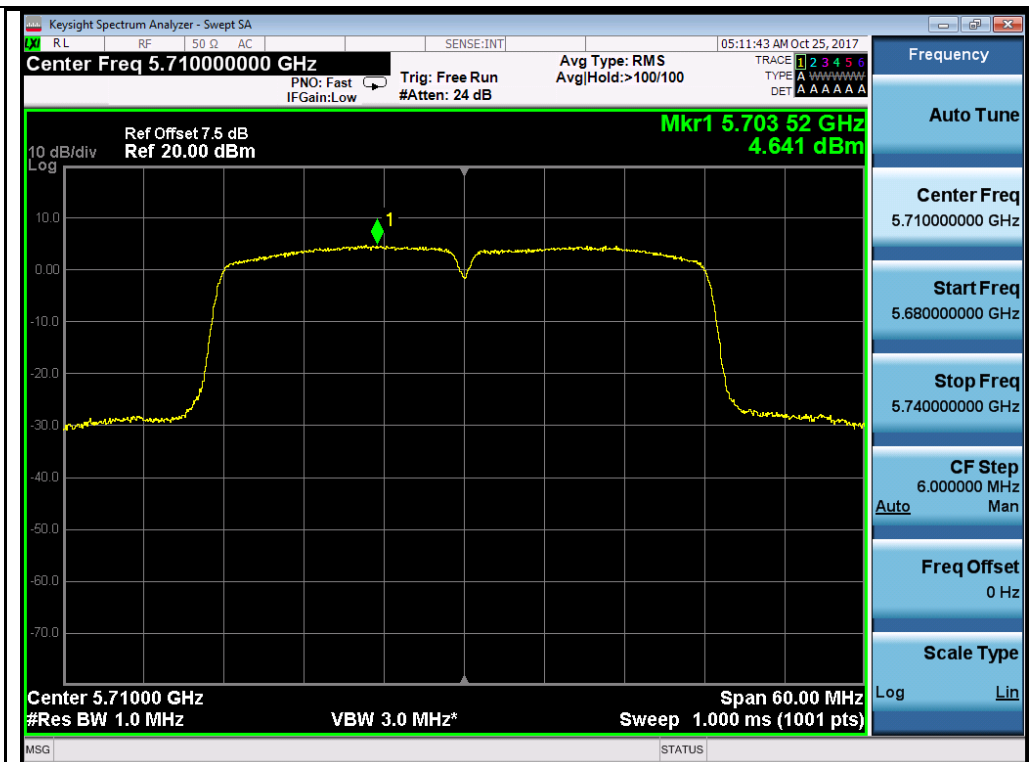
802.11n-HT40 5710M



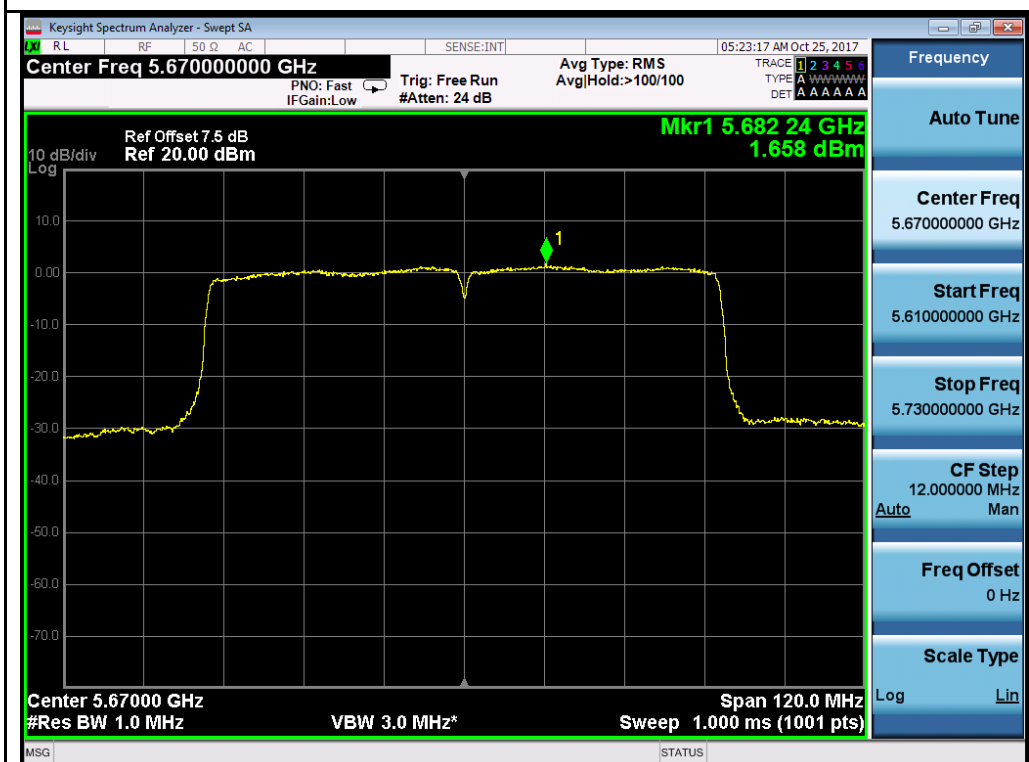
802.11ac-VHT80 5690M

Chain 1:





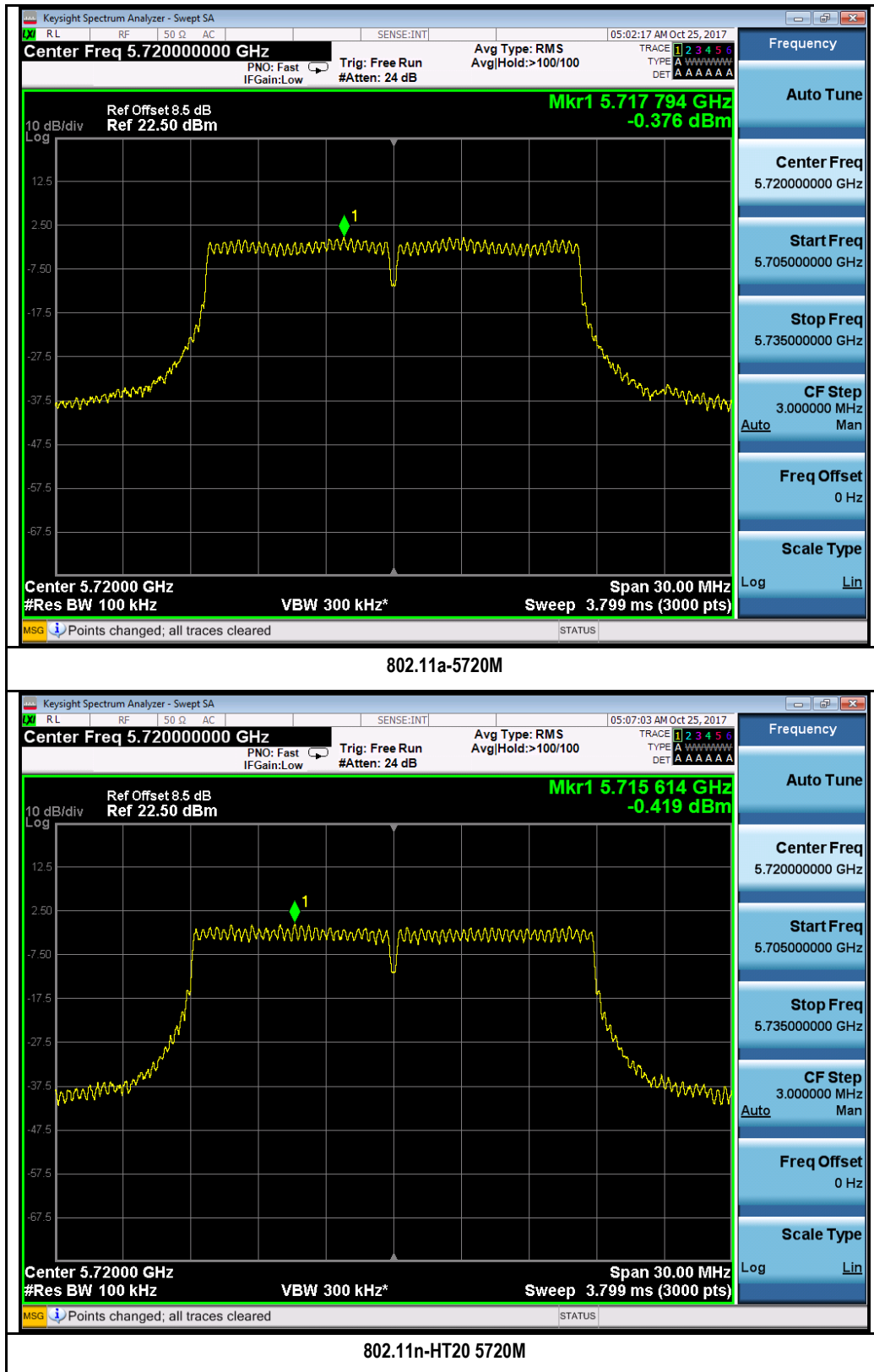
802.11n-HT40 5710M



802.11ac-VHT80 5690M

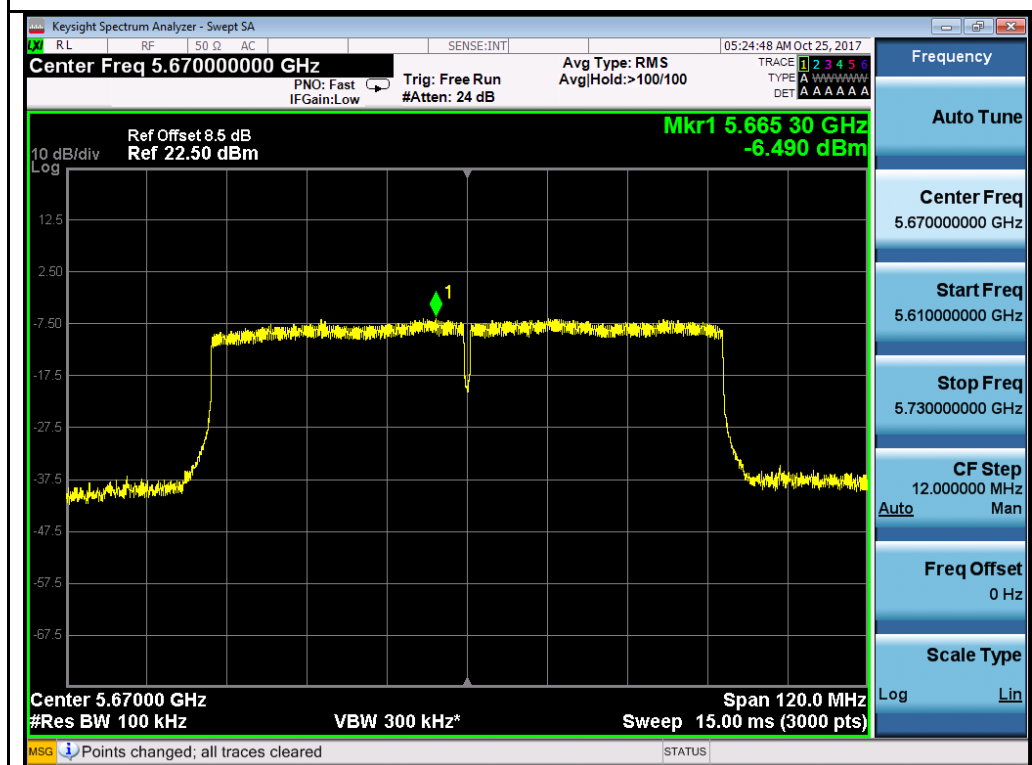
Test Plot for Crossband (W58 procedure):

Chain 0:



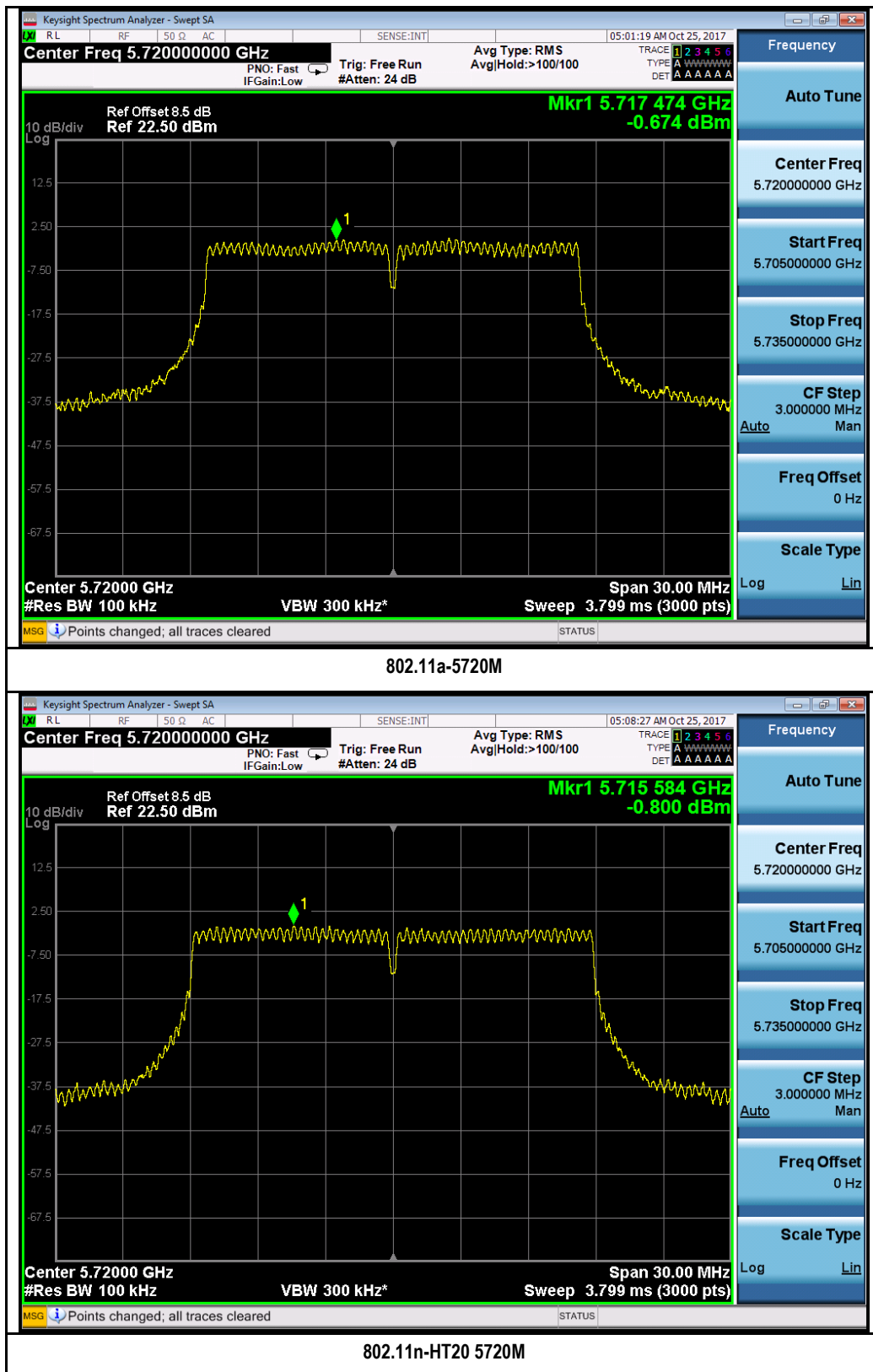


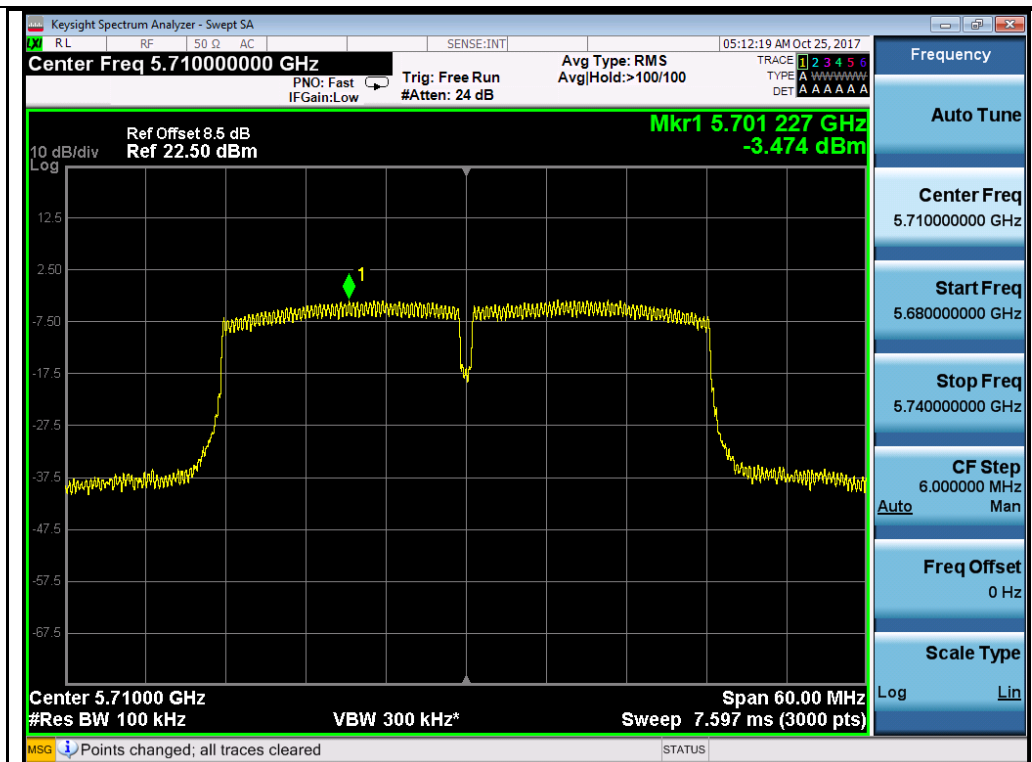
802.11n-HT40 5710M



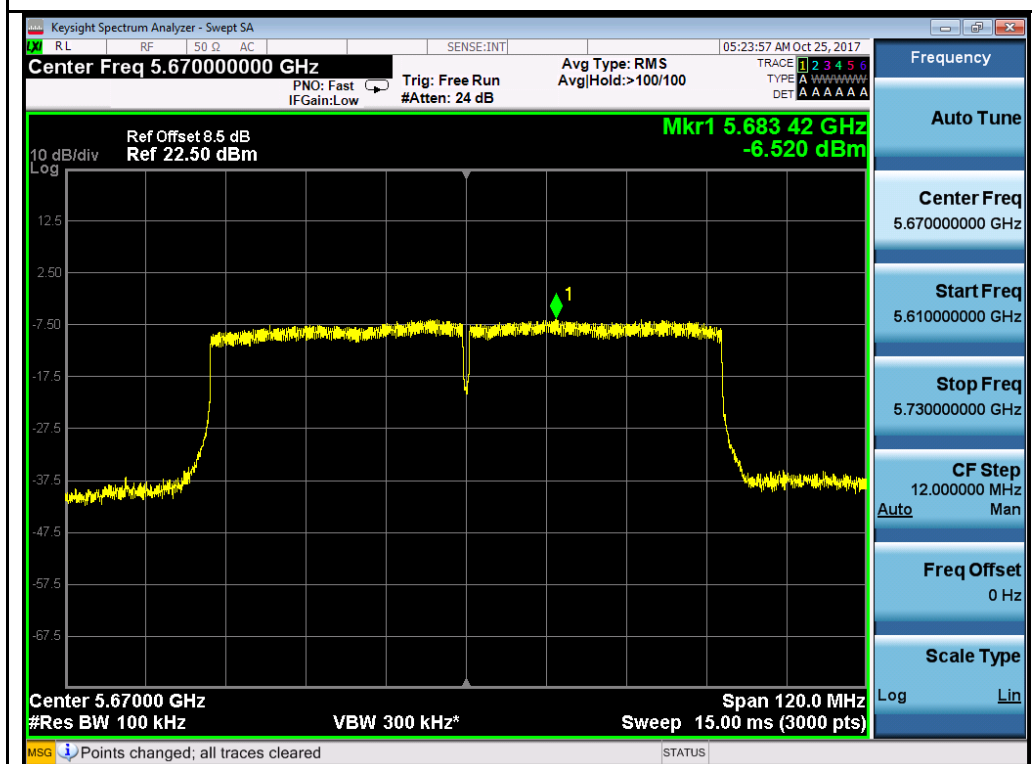
802.11ac-VHT80 5690M

Chain 1:





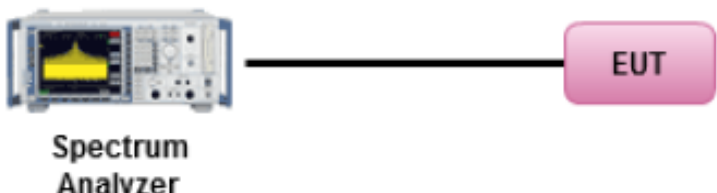
802.11n-HT40 5710M



802.11ac-VHT80 5690M

10.5 Band Edge Measurement

Requirement(s):

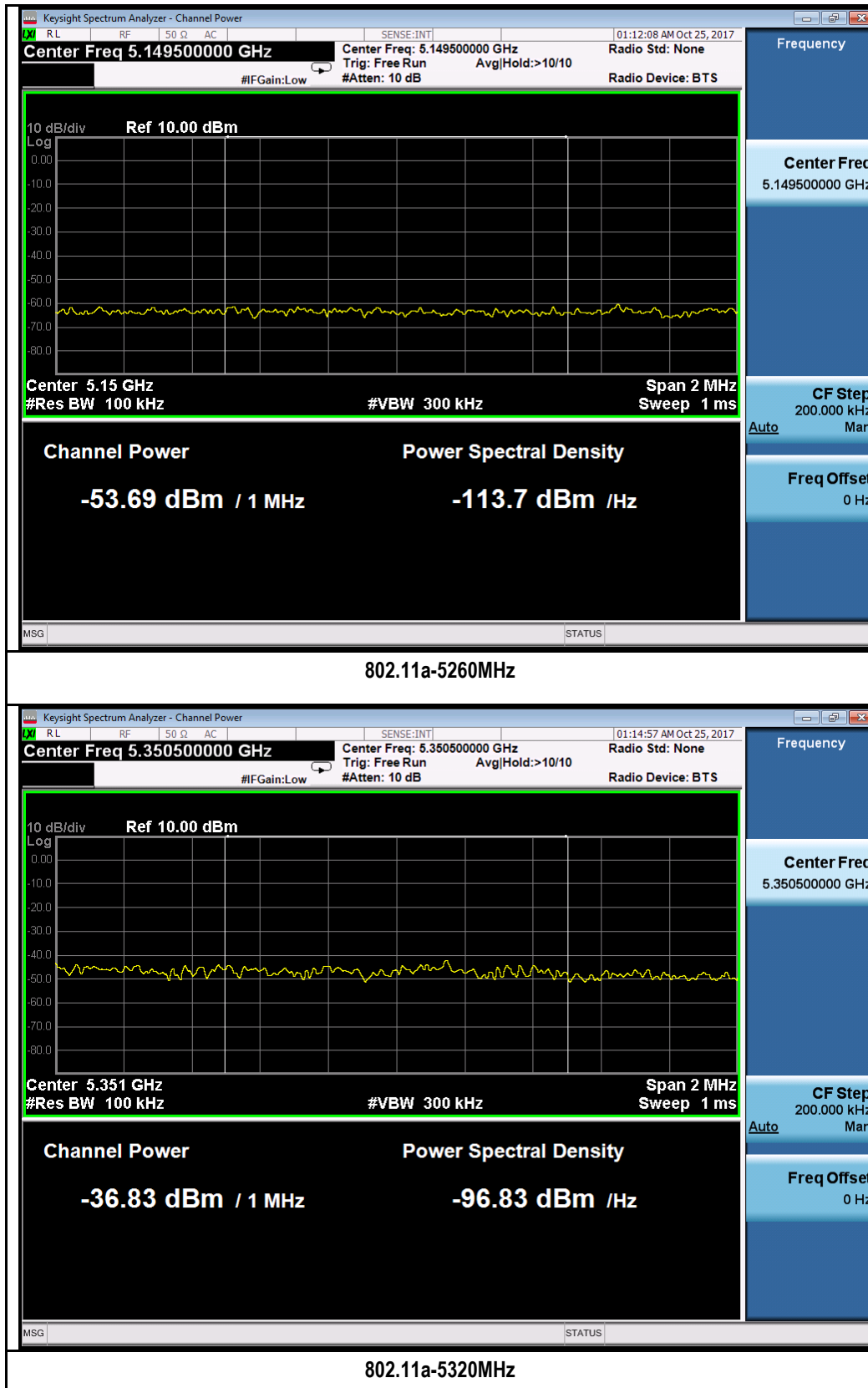
Spec	Item	Requirement	Applicable
47CFR§ 15.407(b)(2), 15.407(b)(6)	(1)	For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.	☐
	(2)	For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.	☒
	(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.	☒
	(4)	For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.	☐
Test Setup	 Spectrum Analyzer		
Procedure	789033 D02 General UNII Test Procedures New Rules v01, II.F. Method SA-1 <u>Band Edge measurement:</u> - For average emissions measurements, follow the procedures described in section II.G.6., "Procedures for Average Unwanted Emissions Measurements above 1000 MHz", except for the following changes: - Set RBW=100kHz - Set VBW=300kHz - Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured.		
Remark	Antenna gain was added to the offset.		
Result	☒ Pass ☐ Fail		

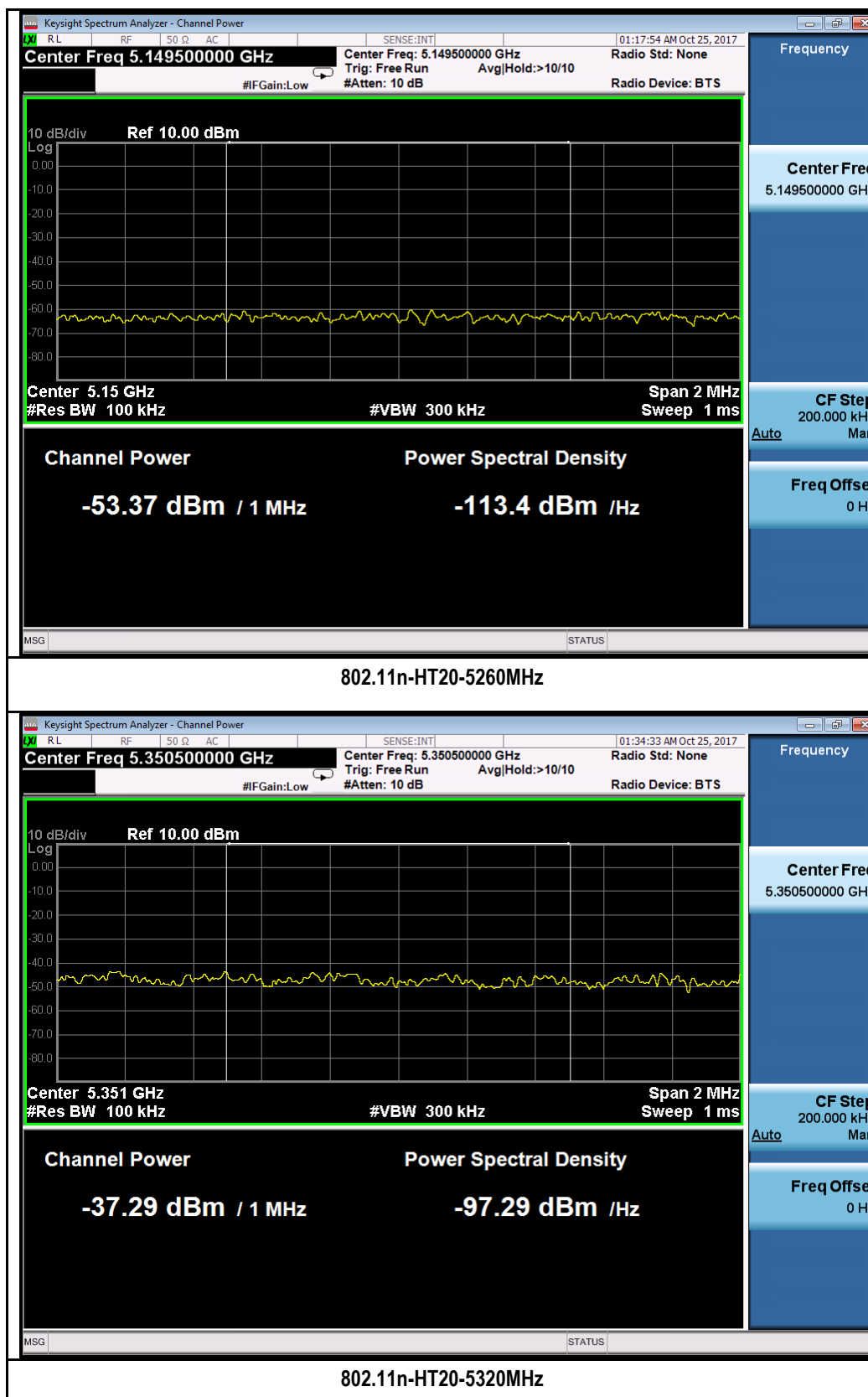
Test Data ☐ Yes (See below) ☒ N/A

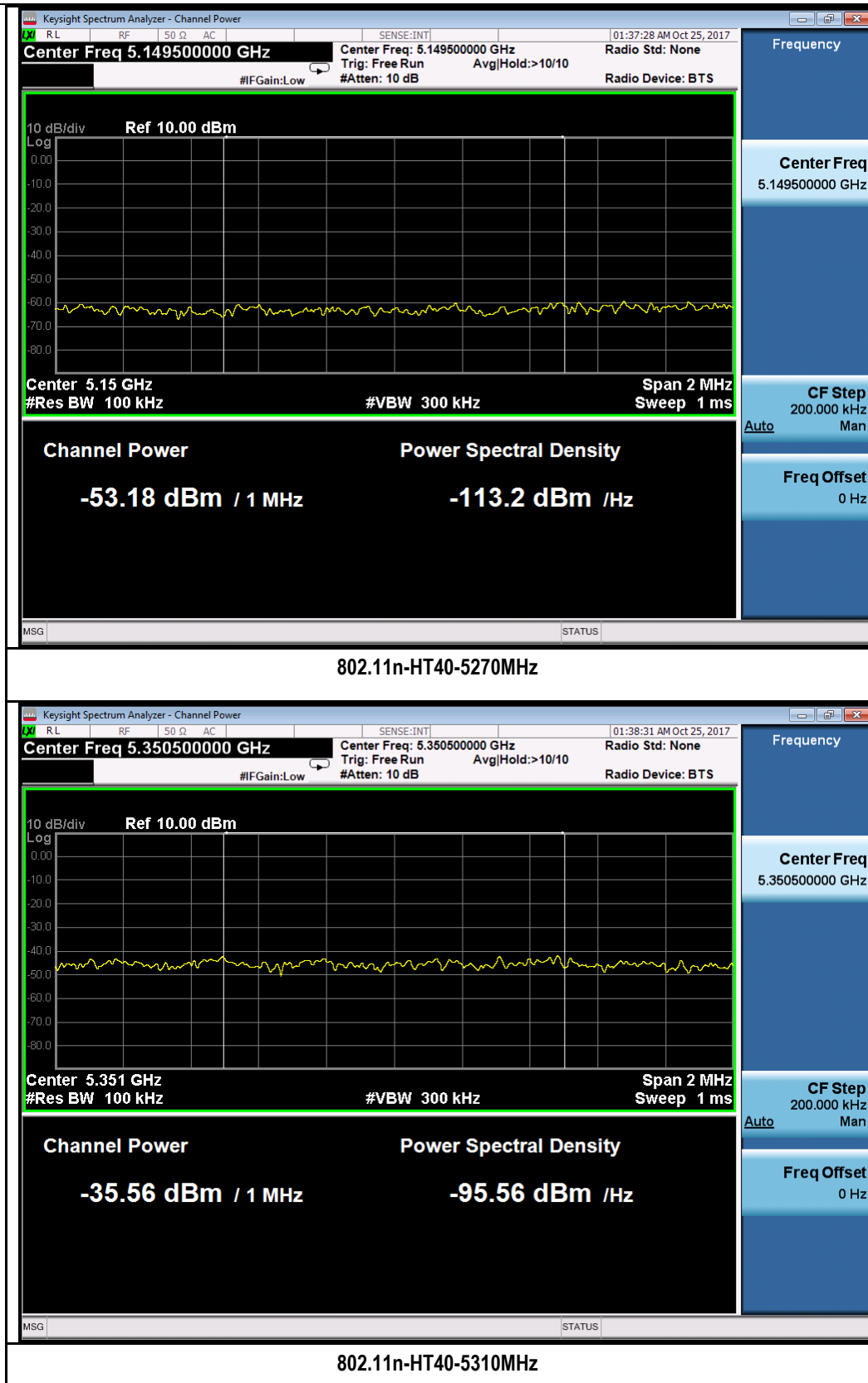
Test Plot ☒ Yes (See below) ☐ N/A

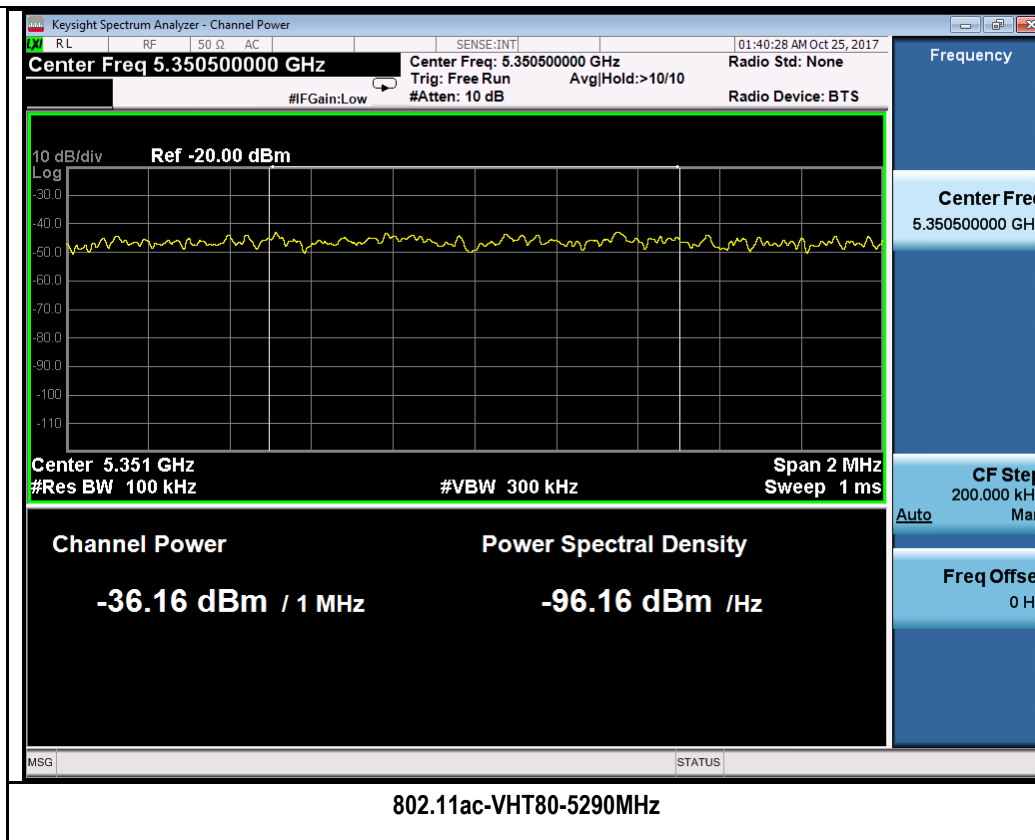
Test was done by Chen Ge **at** RF test site.

**Test Plots for W53:
Chain 0:**

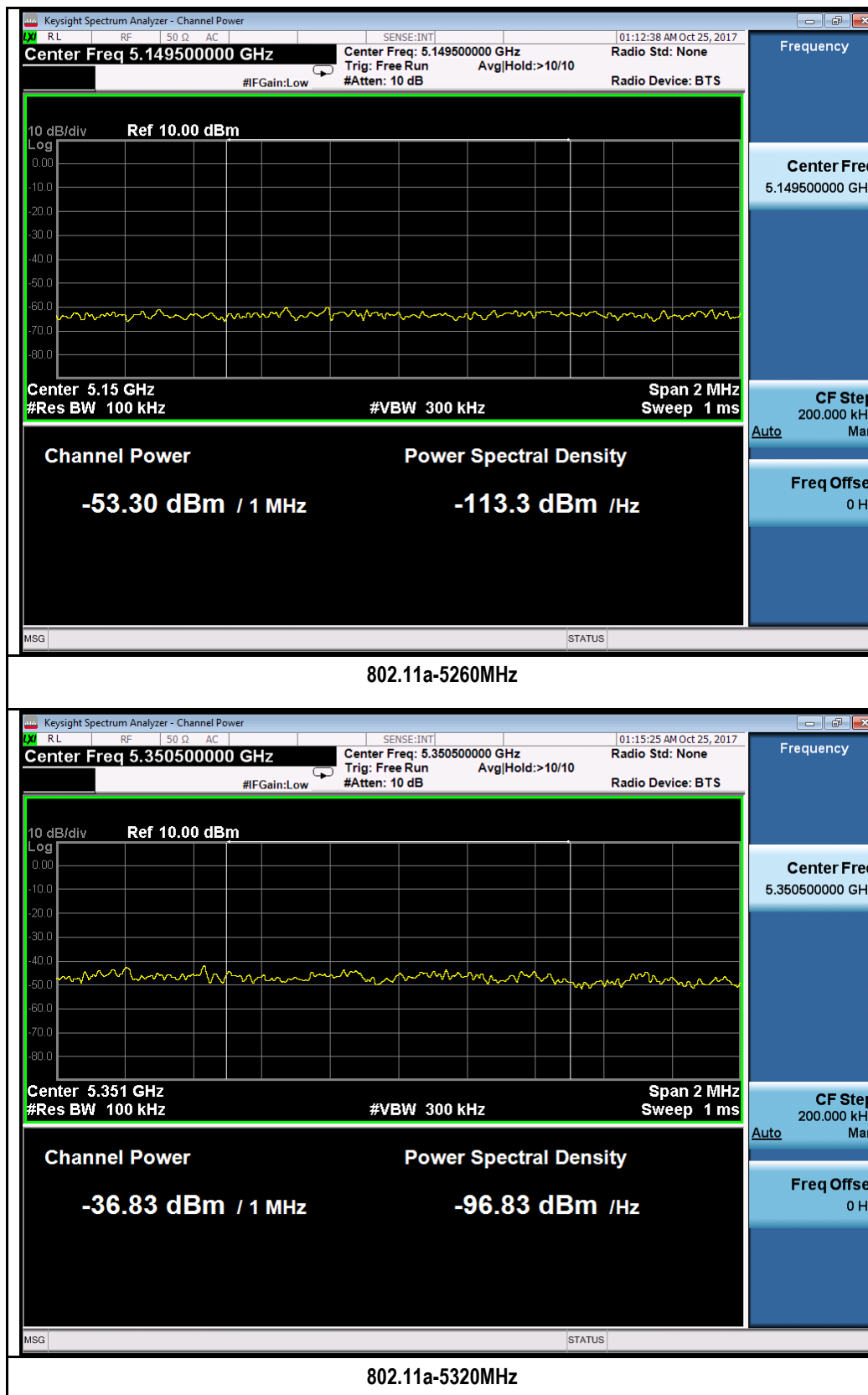




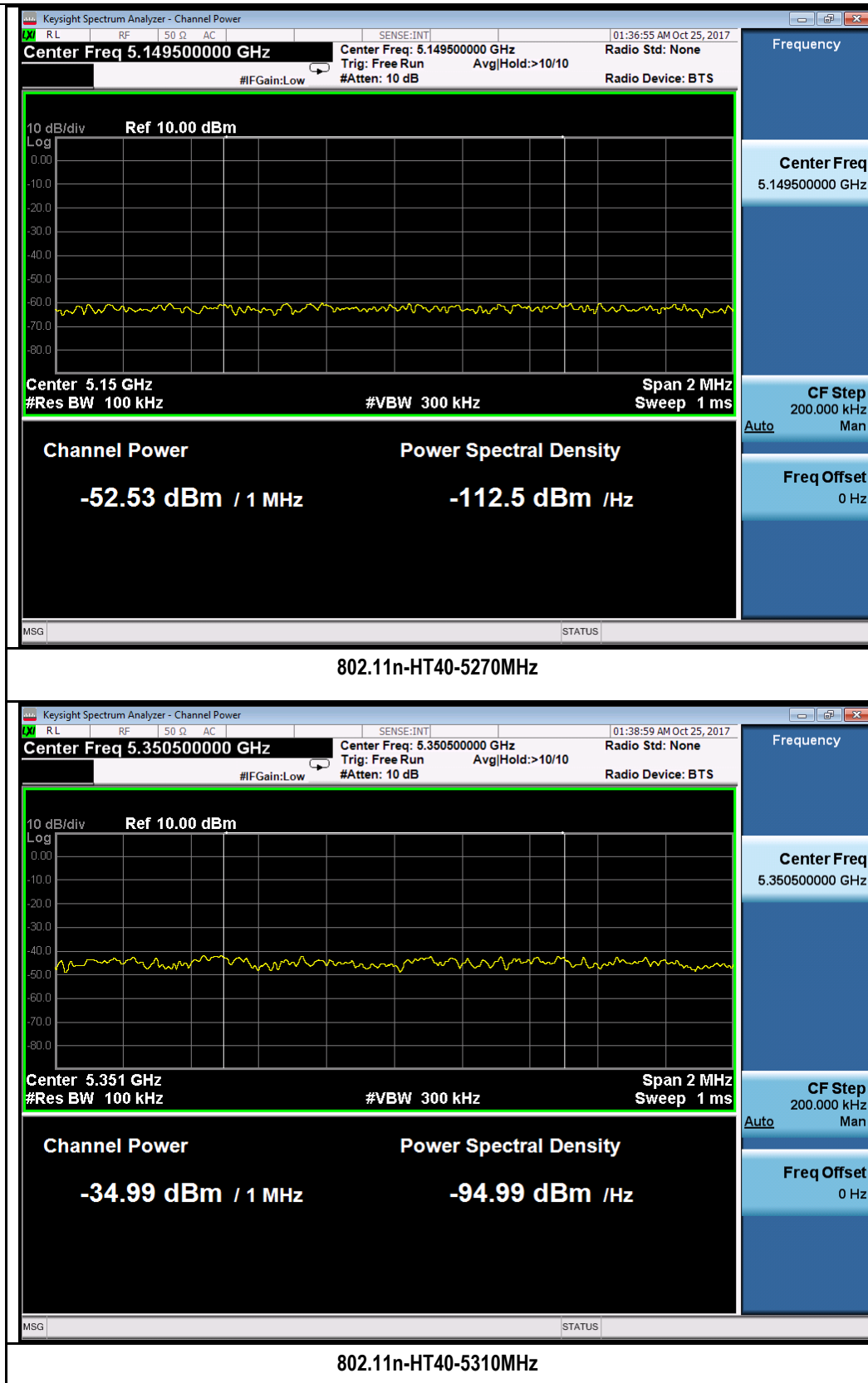


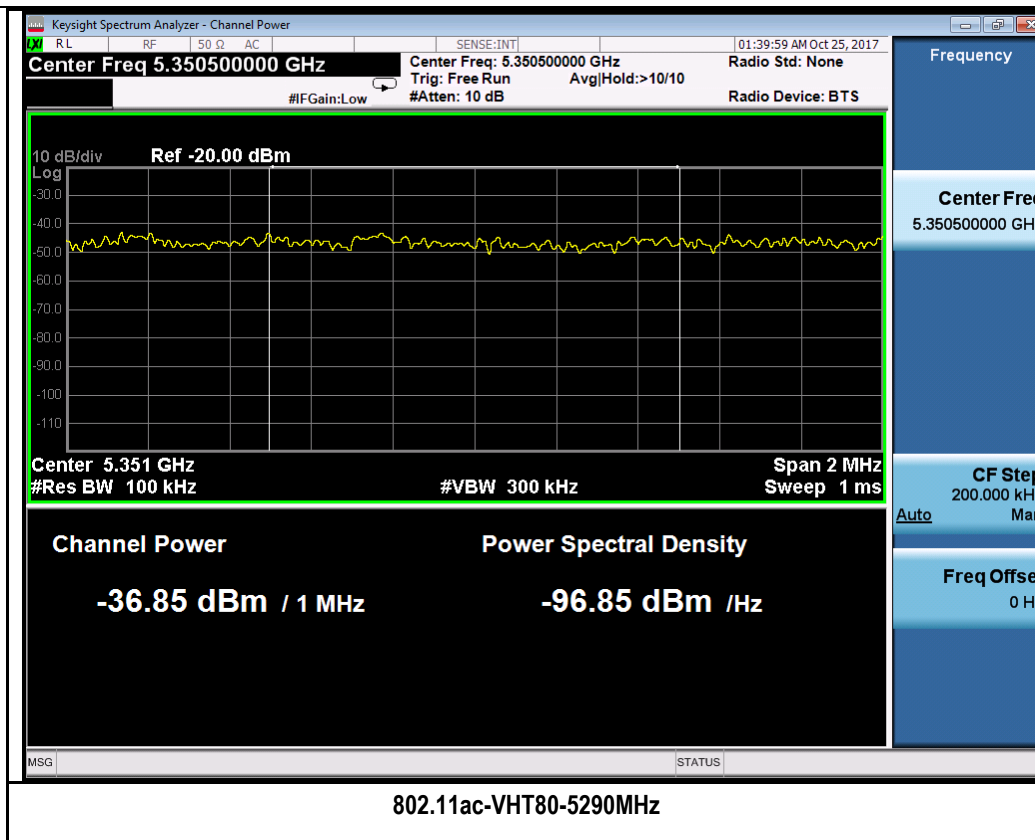


Chain 1:

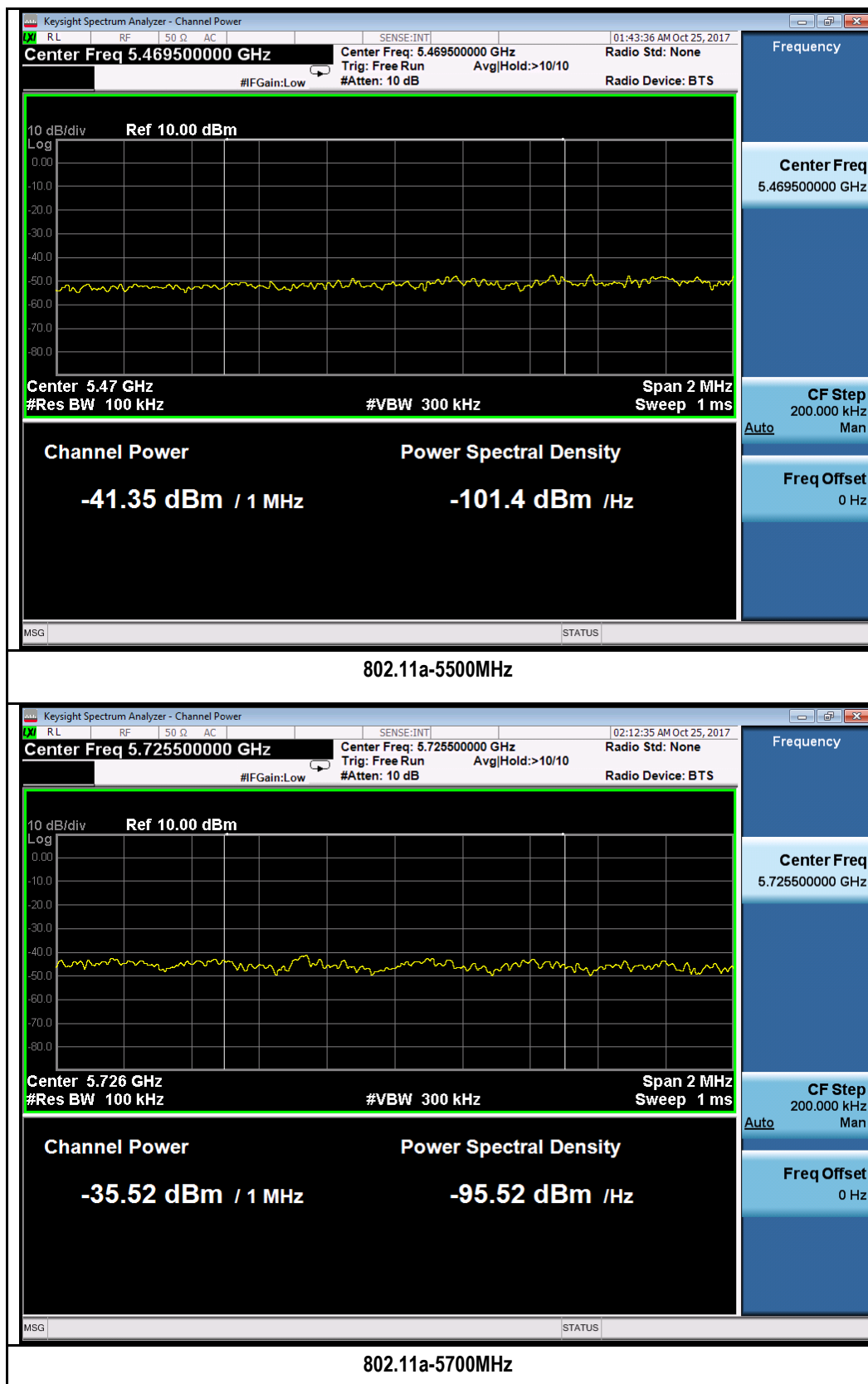


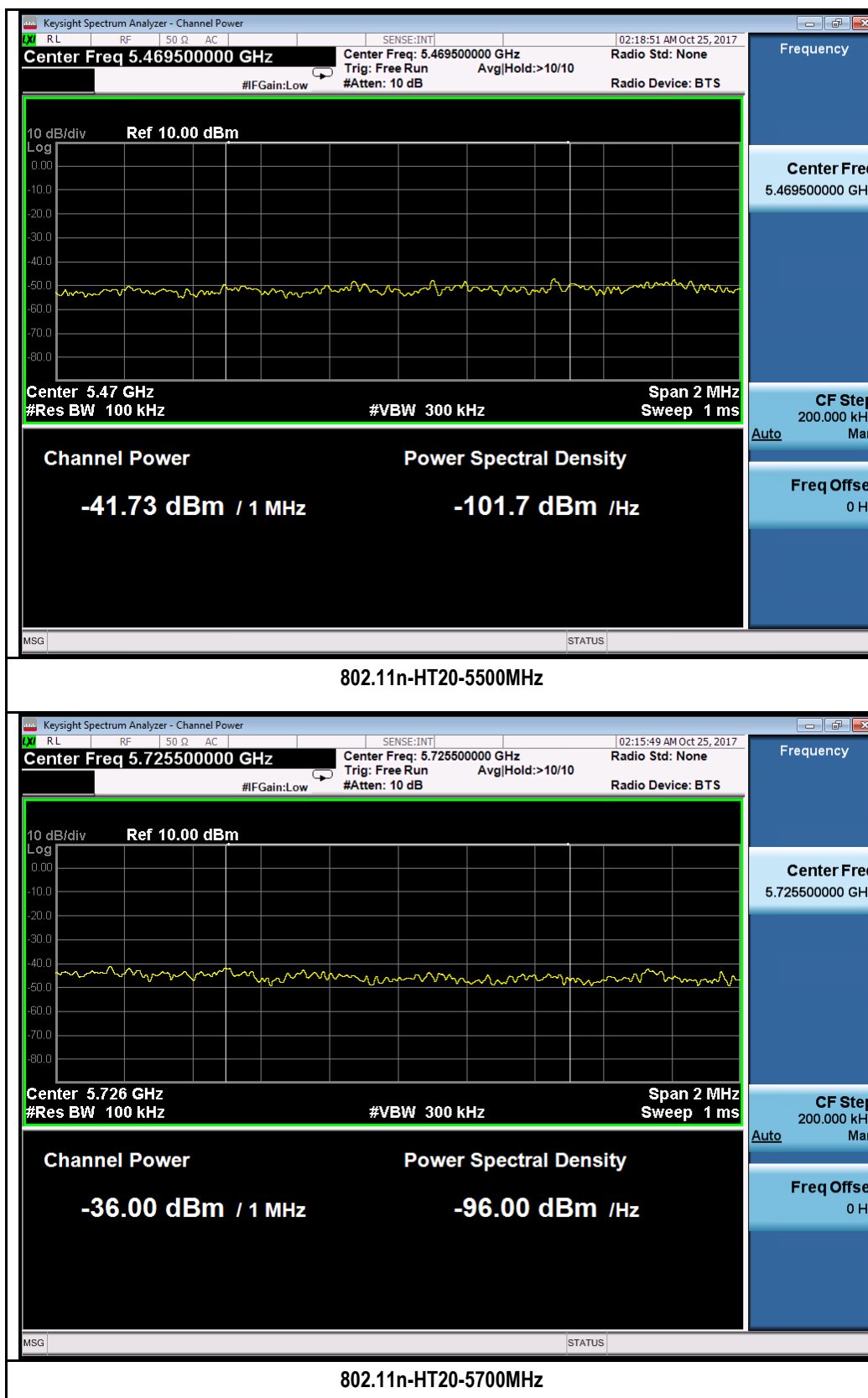


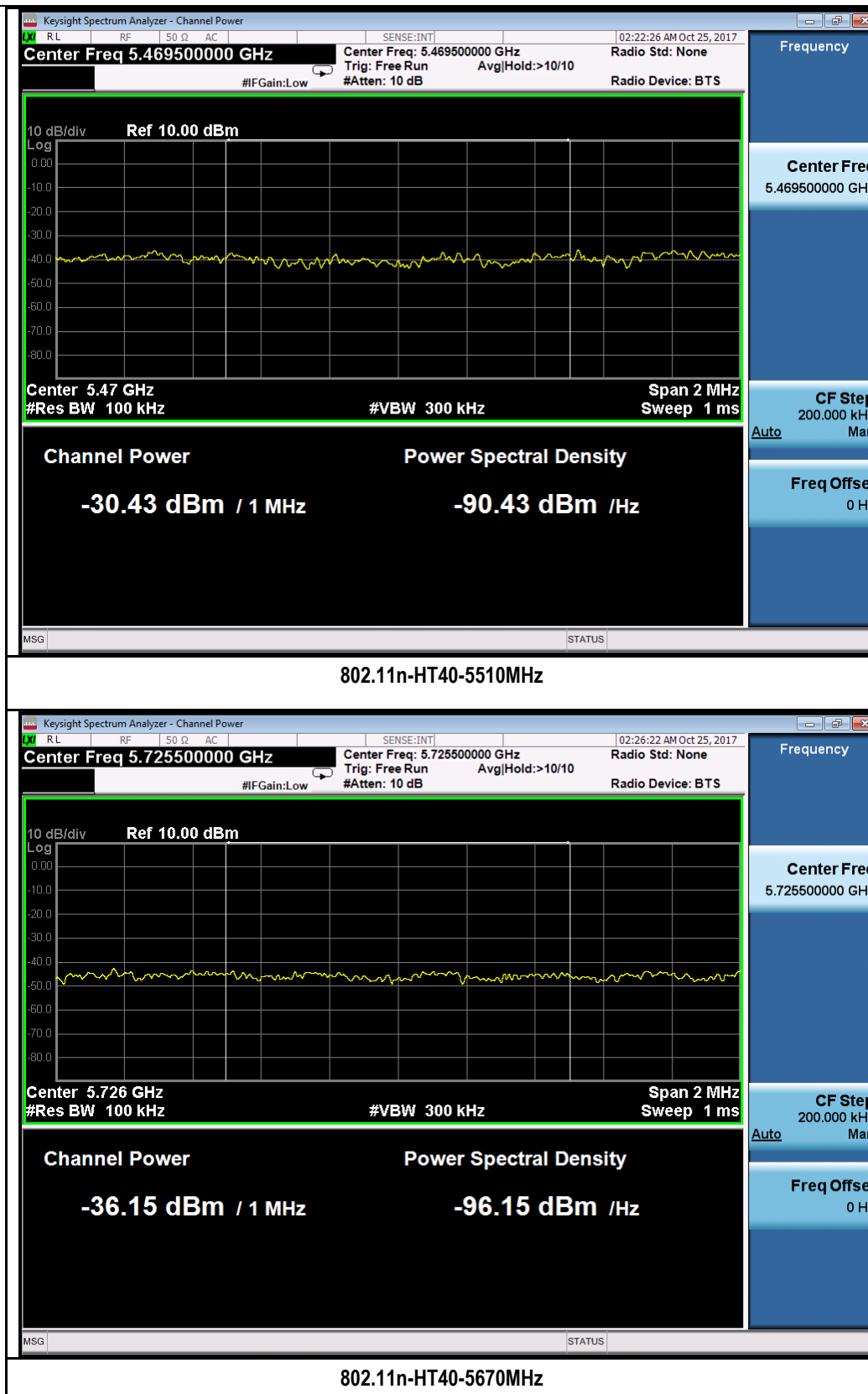


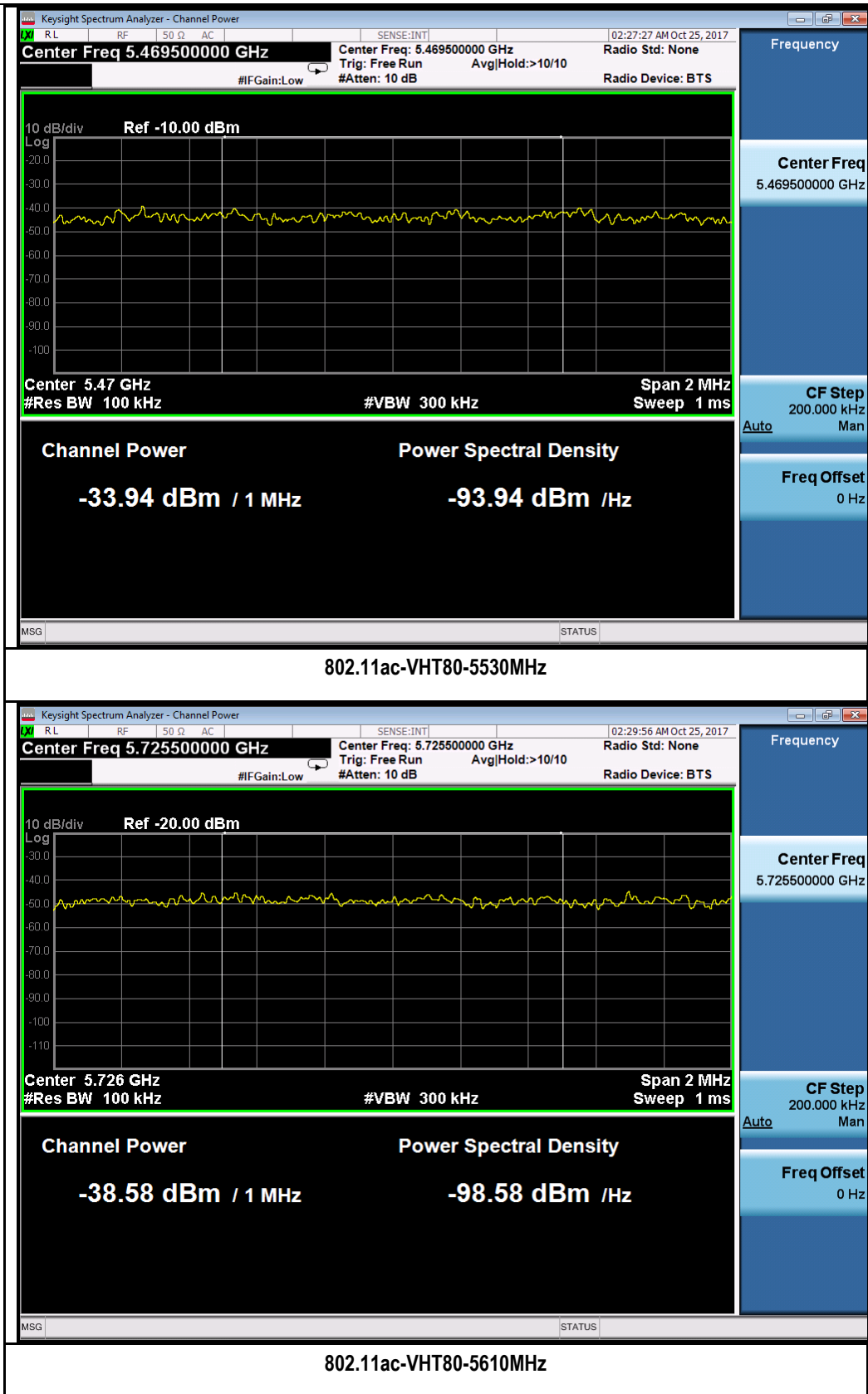


**Test Plots for W56:
Chain 0:**

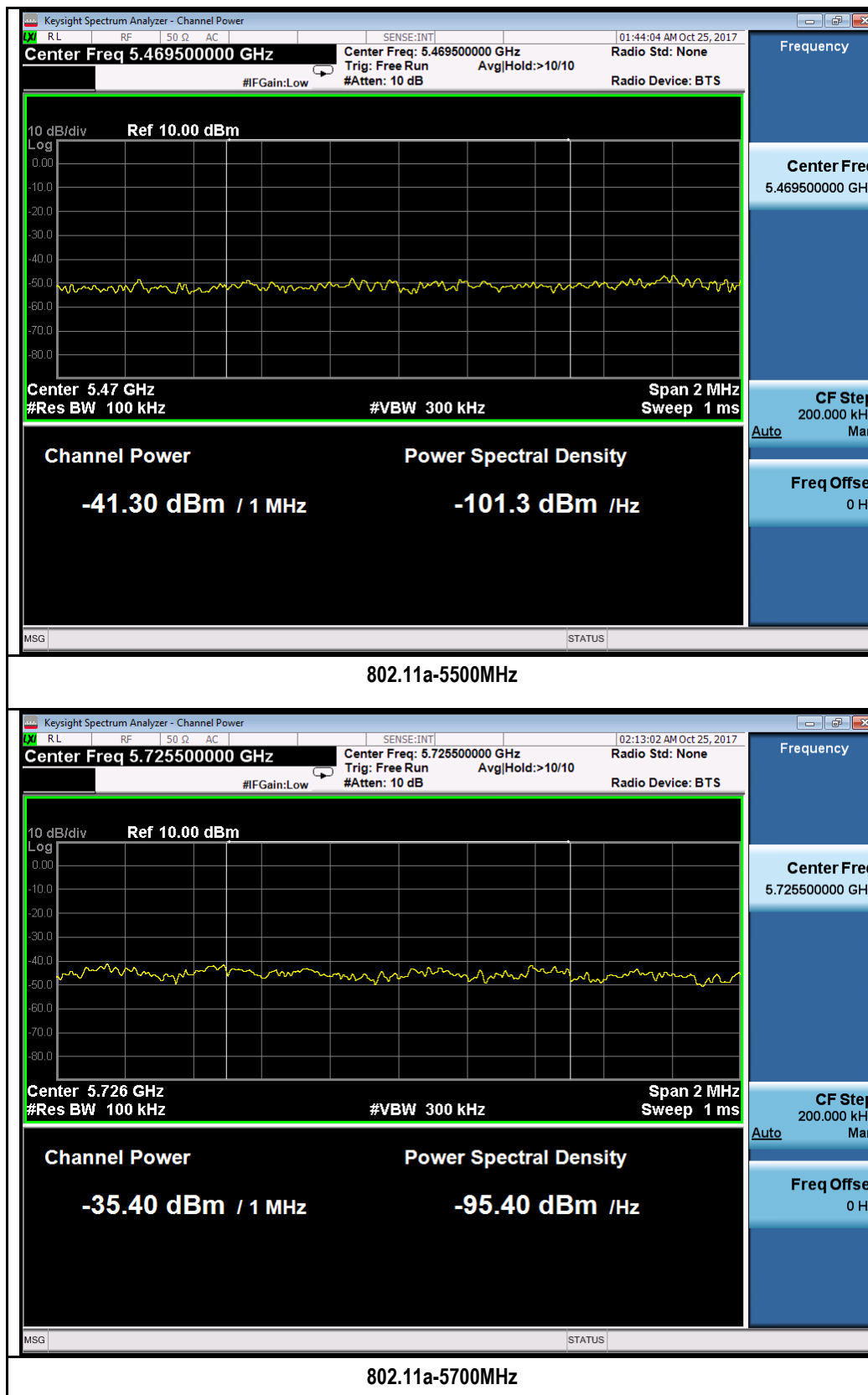


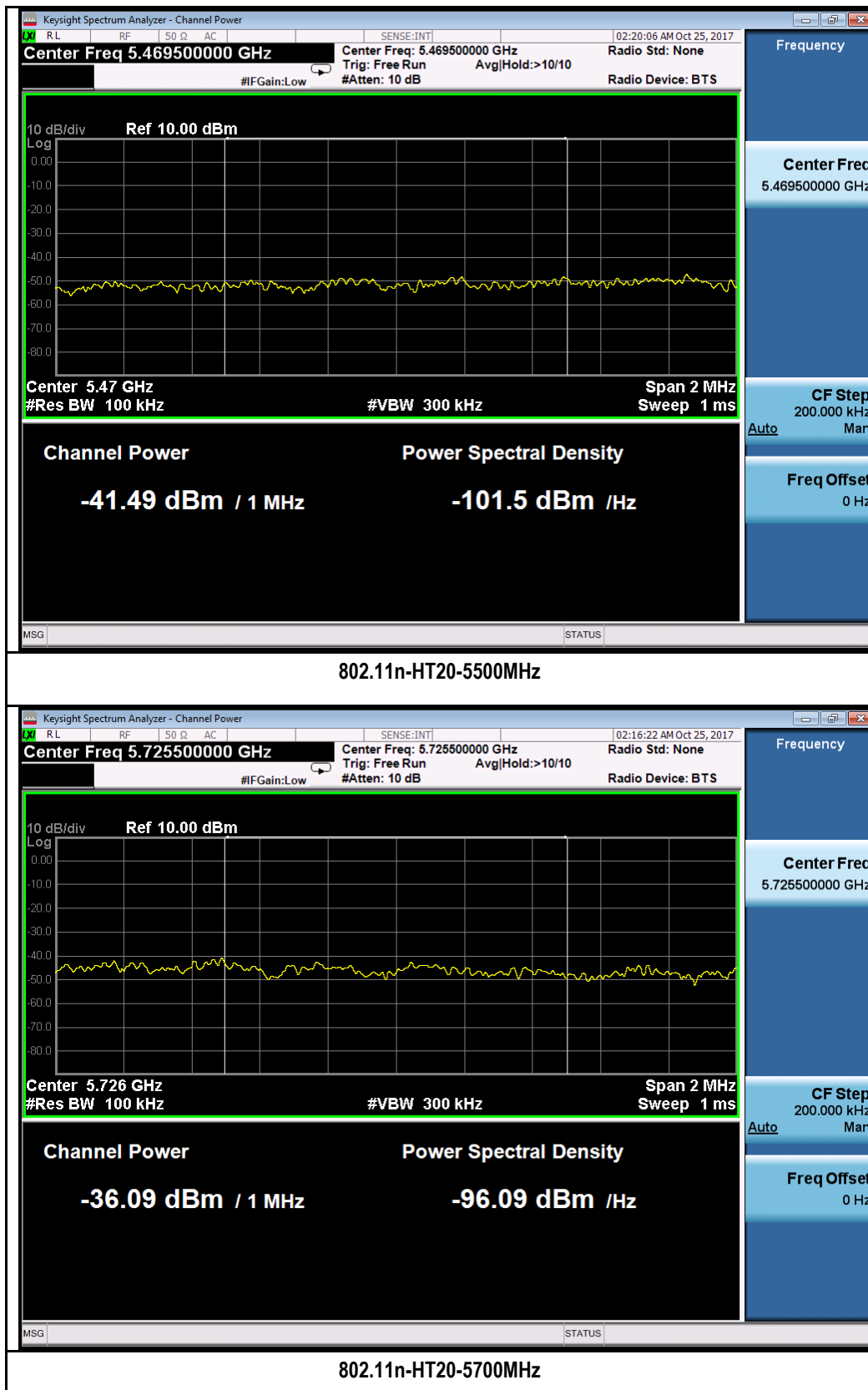


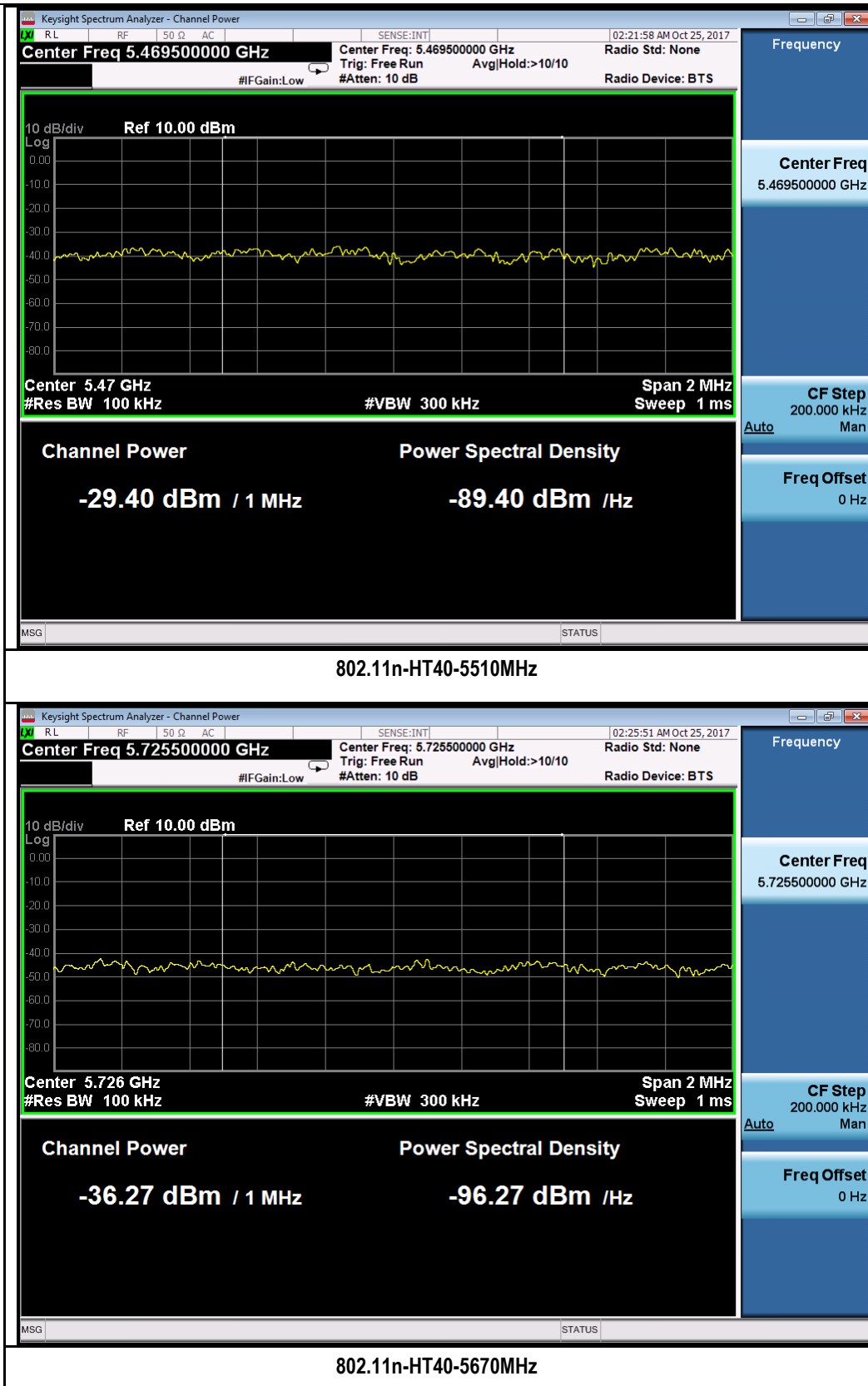




Chain 1:









10.6 Radiated Spurious Emissions below 1GHz

Requirement(s):

Spec	Requirement	Applicable										
47CFR§ 15.407(b) 15.209 (a)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges <table><thead><tr><th>Frequency range (MHz)</th><th>Field Strength (uV/m)</th></tr></thead><tbody><tr><td>30 – 88</td><td>100</td></tr><tr><td>88 – 216</td><td>150</td></tr><tr><td>216 960</td><td>200</td></tr><tr><td>Above 960</td><td>500</td></tr></tbody></table>	Frequency range (MHz)	Field Strength (uV/m)	30 – 88	100	88 – 216	150	216 960	200	Above 960	500	☒
Frequency range (MHz)	Field Strength (uV/m)											
30 – 88	100											
88 – 216	150											
216 960	200											
Above 960	500											
Test Setup	Semi Anechoic Chamber Radio Absorbing Material EUT 0.8m 3m Antenna 1-4m Spectrum Analyzer											
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. A Quasi-peak measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.											
Remark	The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.											
Result	☒ Pass ☐ Fail											

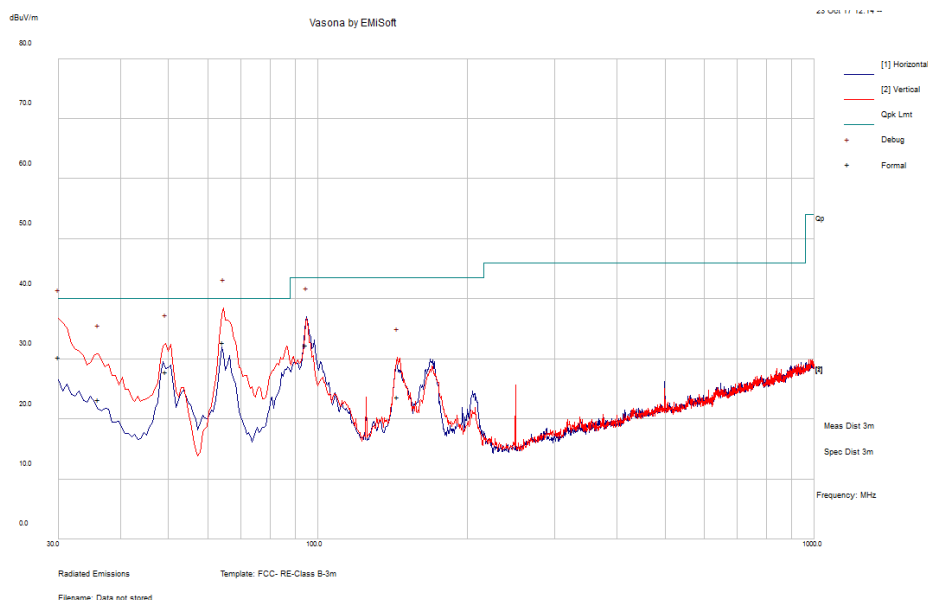
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Shuo Zhang at 10m chamber.

Radiated Emission Test Results (Below 1GHz)

Test specification	below 1GHz			
Environmental Conditions:	Temp (°C):	23	Result	Pass
	Humidity (%)	46		
	Atmospheric (mbar):	1017		
Mains Power:	120VAC, 60Hz			
Tested by:	Shuo Zhang			
Test Date:	10/23/2017			
Remarks:	802.11a – 5320MHz			

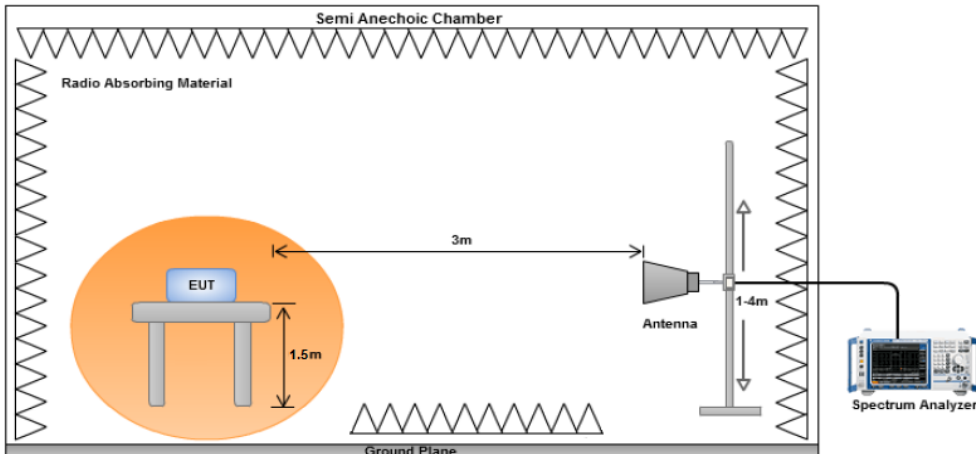


Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Po l	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
64.39	49.54	11.68	-28.47	32.75	Quasi Max	V	100	300	40	-7.25	Pass
30.01	32.87	11.29	-13.88	30.28	Quasi Max	V	114	196	40	-9.72	Pass
94.77	47.57	11.99	-27.3	32.27	Quasi Max	H	172	199	43.5	-11.23	Pass
49.33	42.89	11.57	-26.66	27.8	Quasi Max	V	102	23	40	-12.2	Pass
36.07	30.86	11.39	-18.95	23.29	Quasi Max	V	111	173	40	-16.71	Pass
144.46	35.18	12.39	-23.84	23.74	Quasi Max	V	117	195	43.5	-19.76	Pass

Note: Both horizontal and vertical polarities were investigated. The results above show only the worst case.

10.7 Radiated Spurious Emissions above 1GHz

Requirement(s):

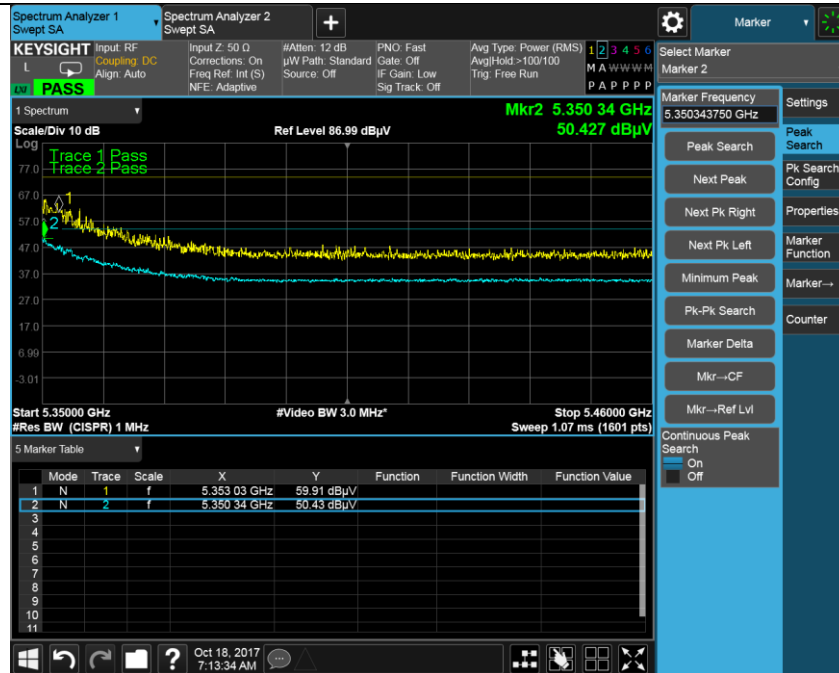
Spec	Item	Requirement	Applicable
47CFR§ 15.407(b)(2), 15.407(b)(6)	(1)	For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.	☐
	(2)	For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.	☒
	(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.	☒
	(4)	For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.	☐
	(5)	Restricted band, emission must also comply with the radiated emission limits specified in 15.209	☒
Test Setup			
Procedure	- The EUT was switched on and allowed to warm up to its normal operating condition. - The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: - Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. - The EUT was then rotated to the direction that gave the maximum emission. - Finally, the antenna height was adjusted to the height that gave the maximum emission. - An average measurement was then made for that frequency point. - Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Remark	The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.		
Result	☒ Pass ☐ Fail		

Test Data ☐ Yes (See below) ☒ N/A

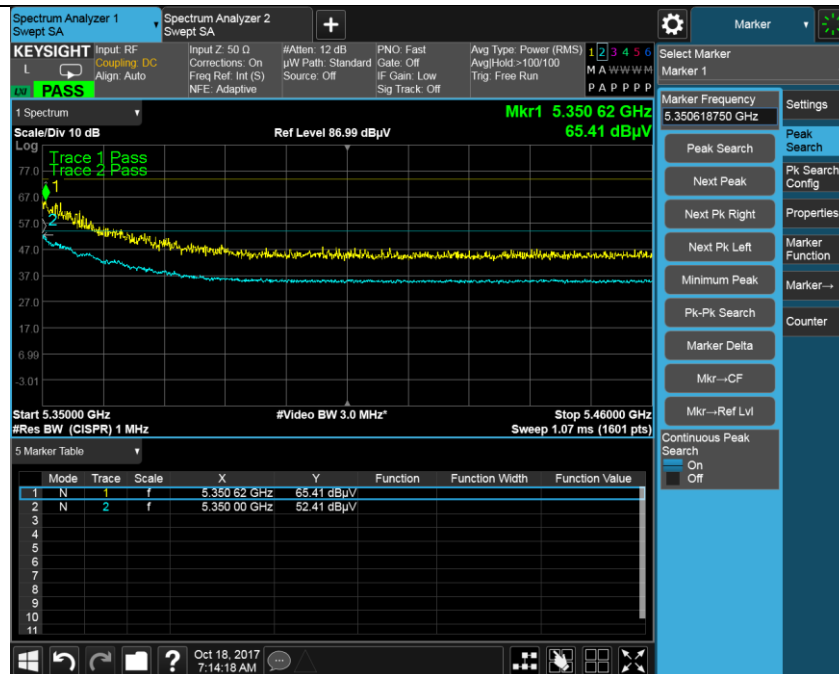
Test Plot ☒ Yes (See below) ☐ N/A

Test was done by **Chen Ge** at 10m chamber.

Radiated Restricted band and Band Edge Measurement Plots:



802.11a 5320M(5350-5460MHz)



802.11n-HT20 5320M(5350-5460MHz)