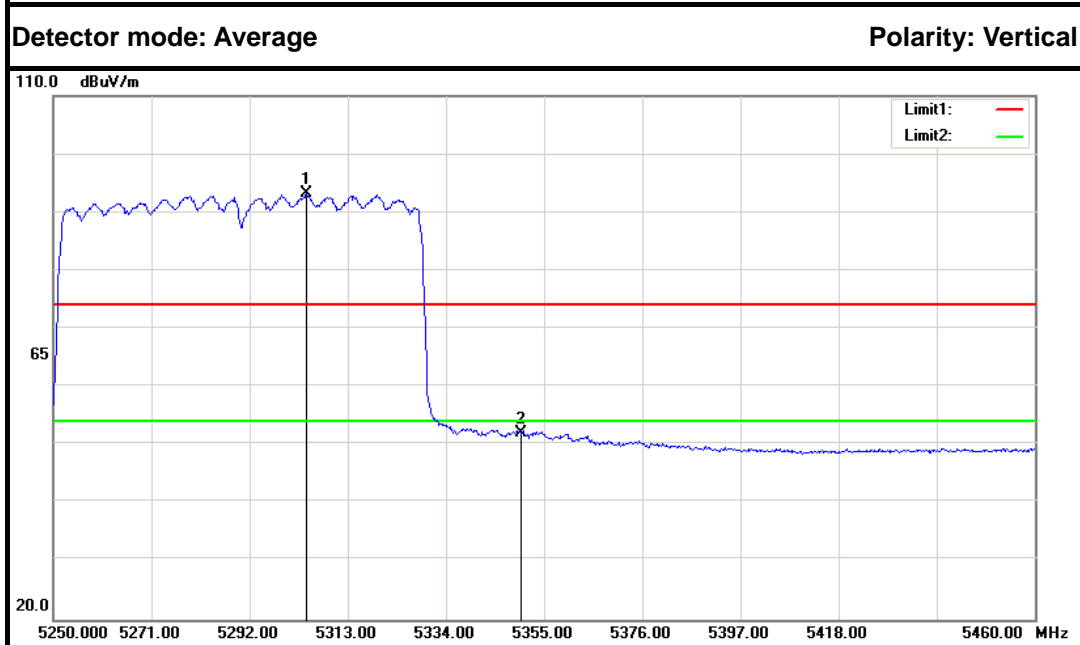
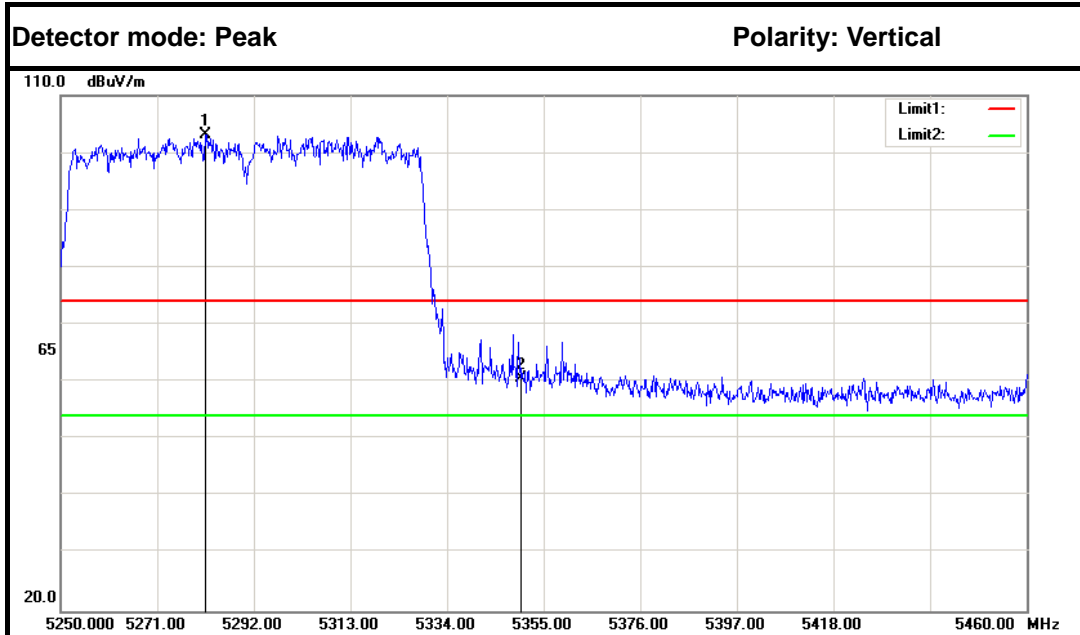
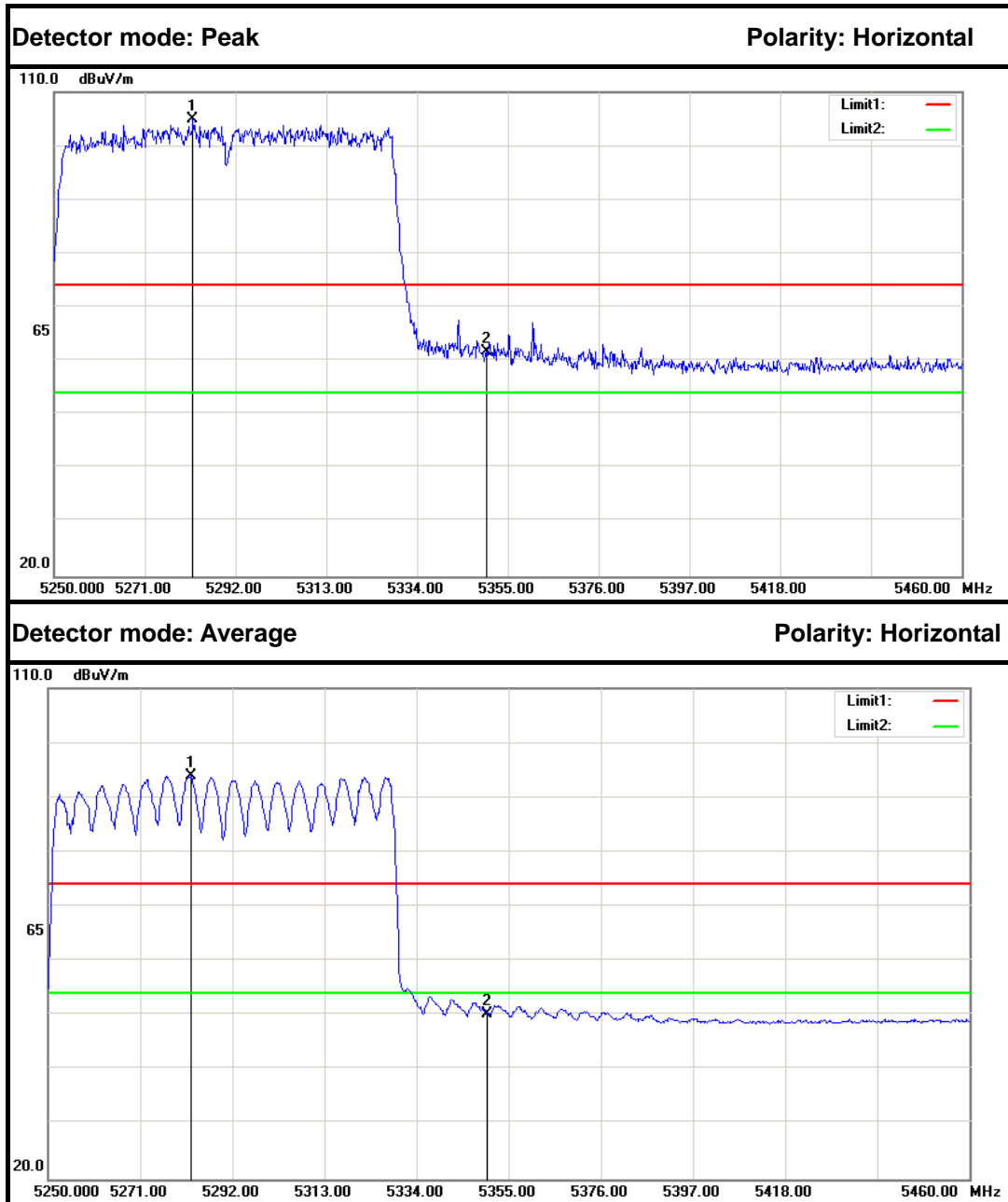




IEEE 802.11ac 80 mode / 5290 MHz



No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5281.500	97.61	5.48	103.09	---	---	Peak	Vertical
2	5350.000	55.05	5.60	60.65	74.00	-13.35	Peak	Vertical
1	5304.180	87.68	5.52	93.20	---	---	Average	Vertical
2	5350.000	46.44	5.60	52.04	54.00	-1.96	Average	Vertical



No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1	5282.130	99.56	5.48	105.04	---	---	Peak	Horizontal
2	5350.000	56.20	5.60	61.80	74.00	-12.20	Peak	Horizontal
1	5282.550	88.48	5.48	93.96	---	---	Average	Horizontal
2	5350.000	44.73	5.60	50.33	54.00	-3.67	Average	Horizontal



6.6 PEAK POWER SPECTRAL DENSITY

6.6.1 LIMIT

According to §15.407(a) & FCC R&O FCC 14-30

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 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.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 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 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. 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.

(iv) For mobile and portable 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.

(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.



(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.

Note to paragraph (a)(3): The Commission strongly recommends that parties employing U-NII devices to provide critical communications services should determine if there are any nearby Government radar systems that could affect their operation.

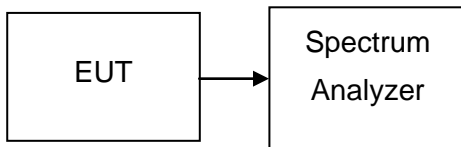
6.6.2 MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2017	02/20/2018

Remark: Each piece of equipment is scheduled for calibration once a year.



6.6.3 TEST CONFIGURATION



6.6.4 TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. For devices operating in the bands 5.15-5.25 GHz, Set the spectrum analyzer as RBW = 1MHz, VBW = 3MHz, Span > 26dB bandwidth, Sweep=1ms
3. For devices operating in the bands 5.725-5.85 GHz, Set the spectrum analyzer as RBW = 1MHz, VBW = 3MHz, Span > 26dB bandwidth, Sweep=1ms
4. Record the max. reading.
5. Repeat the above procedure until the measurements for all frequencies are completed



6.6.5 TEST RESULTS

Test Data

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	PPSD (dBm)			Limit (dBm)	Margin			Result
		Antenna 0	Antenna 1	Antenna 2		Antenna 0	Antenna 1	Antenna 2	
Low	5180	3.347	3.521	3.219	17.00	-13.653	-13.479	-13.781	PASS
Mid	5200	3.022	3.164	2.623		-13.978	-13.836	-14.377	PASS
High	5240	2.752	3.144	3.052		-14.248	-13.856	-13.948	PASS

Test mode: IEEE 802.11a mode / 5260~ 5320MHz

Channel	Frequency (MHz)	PPSD (dBm)			Limit (dBm)	Margin			Result
		Antenna 0	Antenna 1	Antenna 2		Antenna 0	Antenna 1	Antenna 2	
Low	5260	8.212	8.441	8.349	11.00	-2.788	-2.559	-2.651	PASS
Mid	5300	8.650	8.677	8.603		-2.350	-2.323	-2.397	PASS
High	5320	8.469	8.886	8.878		-2.531	-2.114	-2.122	PASS

Test mode: IEEE 802.11a mode / 5500 ~ 5700MHz

Channel	Frequency (MHz)	PPSD (dBm)			Limit (dBm)	Margin			Result
		Antenna 0	Antenna 1	Antenna 2		Antenna 0	Antenna 1	Antenna 2	
Low	5500	8.328	8.537	8.614	11.00	-2.672	-2.463	-2.386	PASS
Mid	5580	7.701	8.200	7.821		-3.299	-2.800	-3.179	PASS
High	5700	7.645	8.223	8.074		-3.355	-2.777	-2.926	PASS

Test mode: IEEE 802.11a mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	PPSD (dBm)			Limit (dBm)	Margin			Result
		Antenna 0	Antenna 1	Antenna 2		Antenna 0	Antenna 1	Antenna 2	
Low	5745	2.947	2.549	4.355	30.00	-27.053	-27.451	-25.645	PASS
Mid	5785	2.442	2.930	3.993		-27.558	-27.070	-26.007	PASS
High	5825	2.902	2.830	4.767		-27.098	-27.170	-25.233	PASS

Remark:

Directional Gain= $G_{ant} + 10\log(N_{ant})$ dBi

G_{ant} : Gain of Individual Antennas (Same for Each Antenna)

The RBW factor = $10\log_{10}(500/470)=0.269$ dB into test plots.



Test mode: IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	PPSD (dBm)			Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	Antenna 2				
Low	5180	-2.700	-2.911	-2.918	1.929	15.23	-13.301	PASS
Mid	5200	-2.950	-2.814	-2.955	1.865		-13.365	PASS
High	5240	-2.822	-2.953	-2.787	1.918		-13.312	PASS

Test mode: IEEE 802.11n HT 20 MHz mode / 5260~ 5320MHz

Channel	Frequency (MHz)	PPSD (dBm)			Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	Antenna 2				
Low	5260	2.779	2.796	3.220	7.708	9.23	-1.522	PASS
Mid	5300	3.422	3.076	3.374	8.065		-1.165	PASS
High	5320	3.507	3.331	3.238	8.131		-1.099	PASS

Test mode: IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz

Channel	Frequency (MHz)	PPSD (dBm)			Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	Antenna 2				
Low	5500	3.269	3.223	3.365	8.057	9.23	-1.173	PASS
Mid	5580	3.273	3.450	3.165	8.069		-1.161	PASS
High	5700	2.597	2.599	2.474	7.328		-1.902	PASS

Test mode: IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	PPSD (dBm)			Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	Antenna 2				
Low	5745	0.539	0.533	1.793	5.768	28.23	-22.462	PASS
Mid	5785	0.714	0.637	1.845	5.873		-22.357	PASS
High	5825	0.465	0.619	1.798	5.774		-22.456	PASS

Remark:

Directional Gain= $G_{ant} + 10\log(N_{ant})$ dBi

G_{ant} : Gain of Individual Antennas (Same for Each Antenna)

The RBW factor = $10\log_{10}(500/470)=0.269$ dB into test plots.



Test mode: IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz

Channel	Frequency (MHz)	PPSD (dBm)			Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	Antenna 2				
Low	5190	-2.750	-3.237	-2.988	1.784	15.23	-13.446	PASS
High	5230	-3.120	-2.918	-3.300	1.661		-13.569	PASS

Test mode: IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz

Channel	Frequency (MHz)	PPSD (dBm)			Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	Antenna 2				
Low	5270	1.441	1.655	1.055	6.162	9.23	-3.068	PASS
High	5310	1.679	1.976	2.120	6.700		-2.530	PASS

Test mode: IEEE 802.11n HT 40 MHz mode / 5510 ~ 5670MHz

Channel	Frequency (MHz)	PPSD (dBm)			Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	Antenna 2				
Low	5510	0.509	0.637	0.896	5.455	9.23	-3.775	PASS
Mid	5550	1.398	1.727	0.721	6.073		-3.157	PASS
High	5670	1.210	1.333	0.345	5.756		-3.474	PASS

Test mode: IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz

Channel	Frequency (MHz)	PPSD (dBm)			Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	Antenna 2				
Low	5755	-2.800	-3.845	-3.097	1.546	28.23	-26.684	PASS
High	5795	-3.132	-3.107	-3.157	1.639		-26.591	PASS

Remark:

Directional Gain= $G_{ant} + 10\log(N_{ant})$ dBi

G_{ant} : Gain of Individual Antennas (Same for Each Antenna)

The RBW factor = $10\log_{10}(500/470)=0.269$ dB into test plots.



Test mode: IEEE 802.11ac 80 mode / 5210MHz

Channel	Frequency (MHz)	PPSD (dBm)			Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	Antenna 2				
	5210	-2.951	-3.000	-3.244	1.708	9.23	-7.522	PASS

Test mode: IEEE 802.11ac 80 mode / 5290MHz

Channel	Frequency (MHz)	PPSD (dBm)			Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	Antenna 2				
	5290	-2.269	2.170	-2.016	4.579	9.23	-4.651	PASS

Test mode: IEEE 802.11ac 80 mode / 5530MHz

Channel	Frequency (MHz)	PPSD (dBm)			Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	Antenna 2				
	5530	-1.784	-1.784	-2.222	2.846	9.23	-6.384	PASS

Test mode: IEEE 802.11ac 80 mode / 5775MHz

Channel	Frequency (MHz)	PPSD (dBm)			Total (dBm)	Limit (dBm)	Margin	Result
		Antenna 0	Antenna 1	Antenna 2				
	5775	-6.417	-6.307	-6.377	-1.596	28.23	-29.826	PASS

Remark:

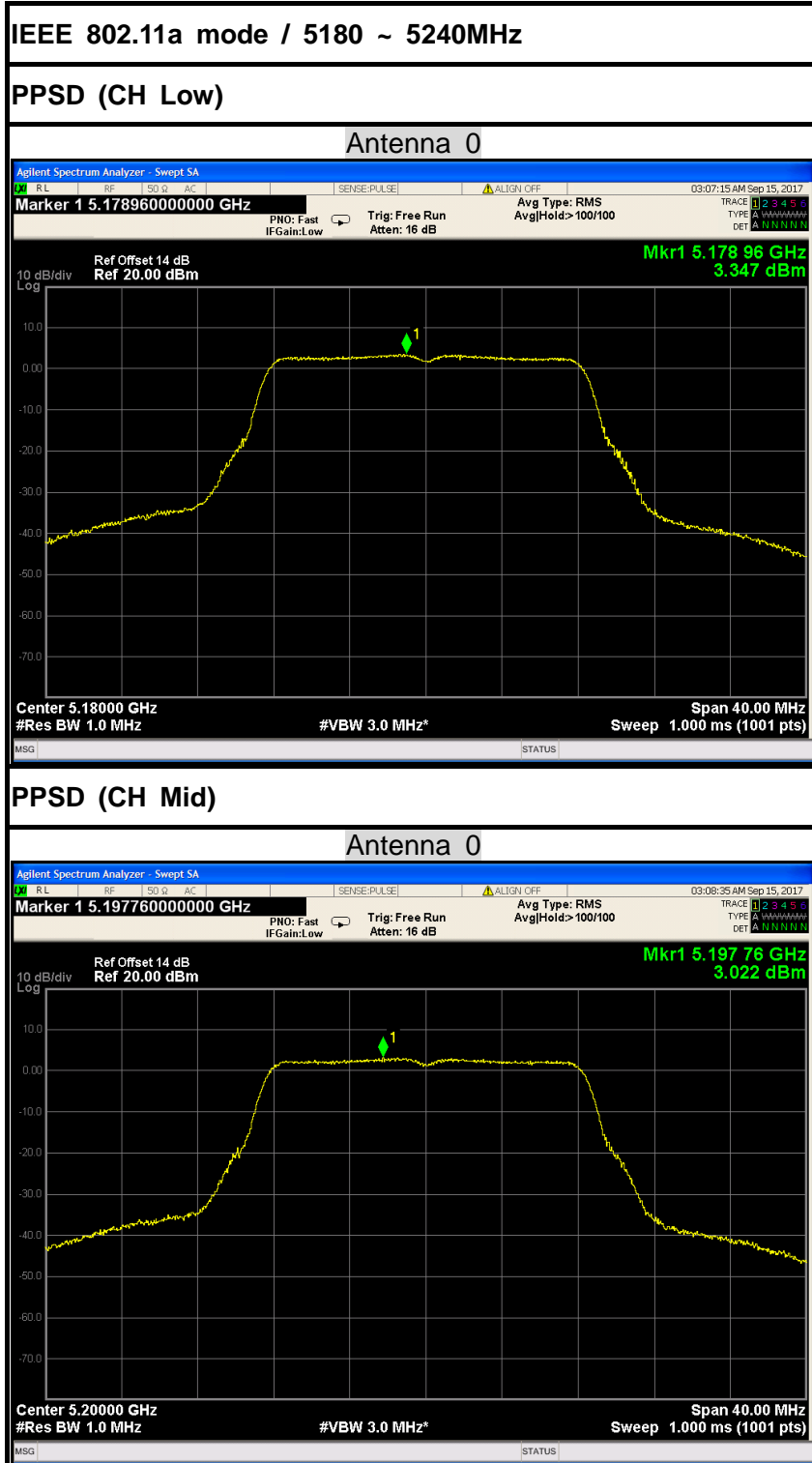
$$\text{Directional Gain} = G_{\text{ant}} + 10\log(N_{\text{ant}}) \text{ dBi}$$

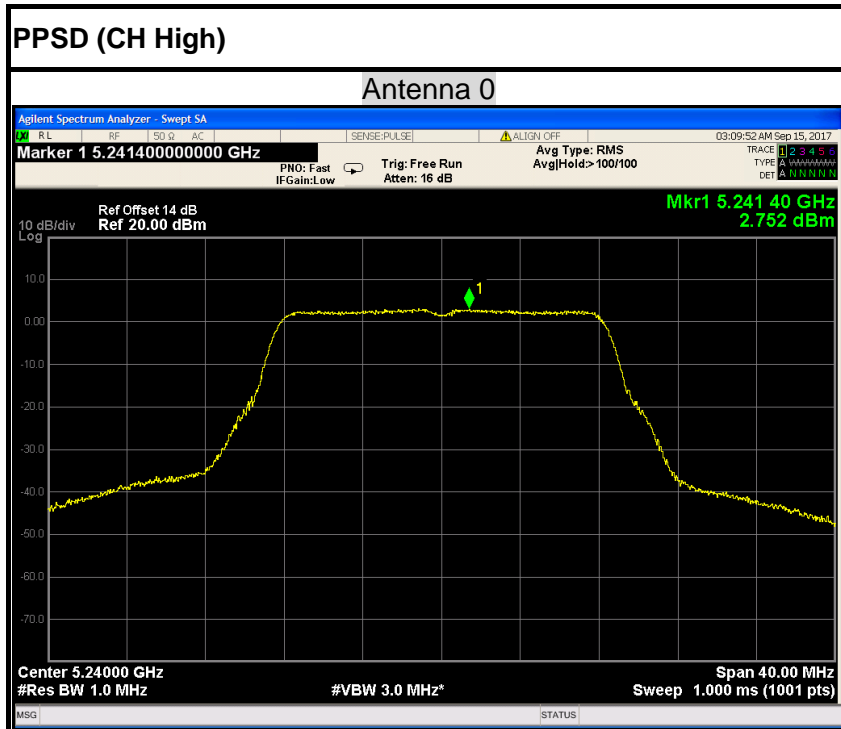
G_{ant} : Gain of Individual Antennas (Same for Each Antenna)

The RBW factor = $10\log_{10}(500/470) = 0.269$ dB into test plots.

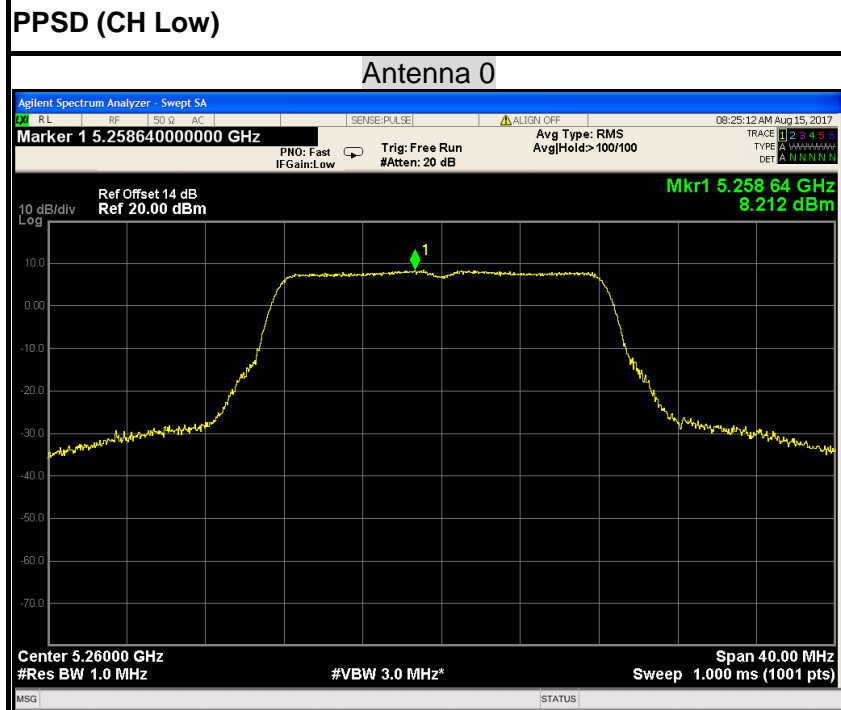


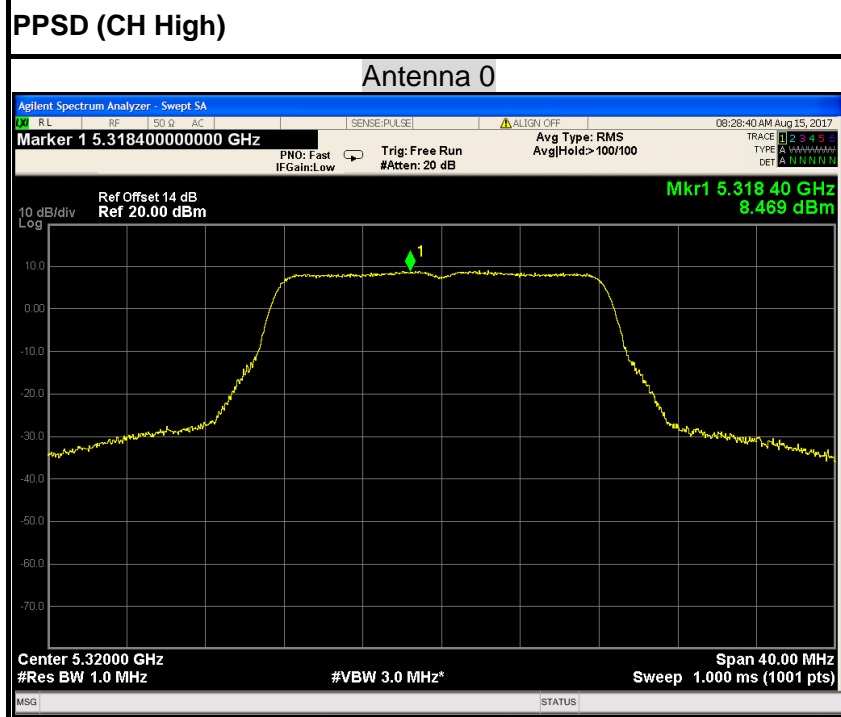
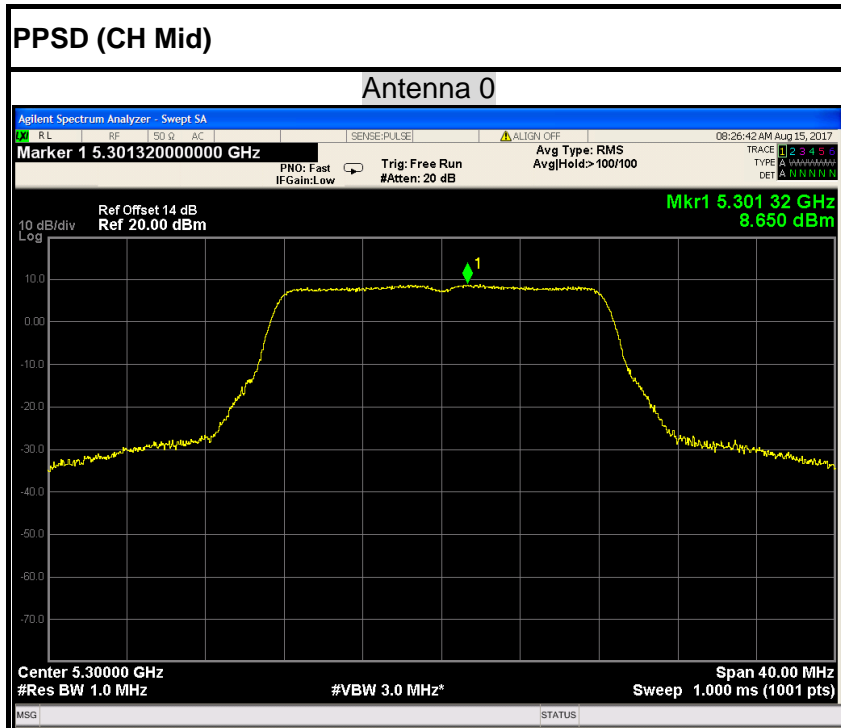
Test Plot

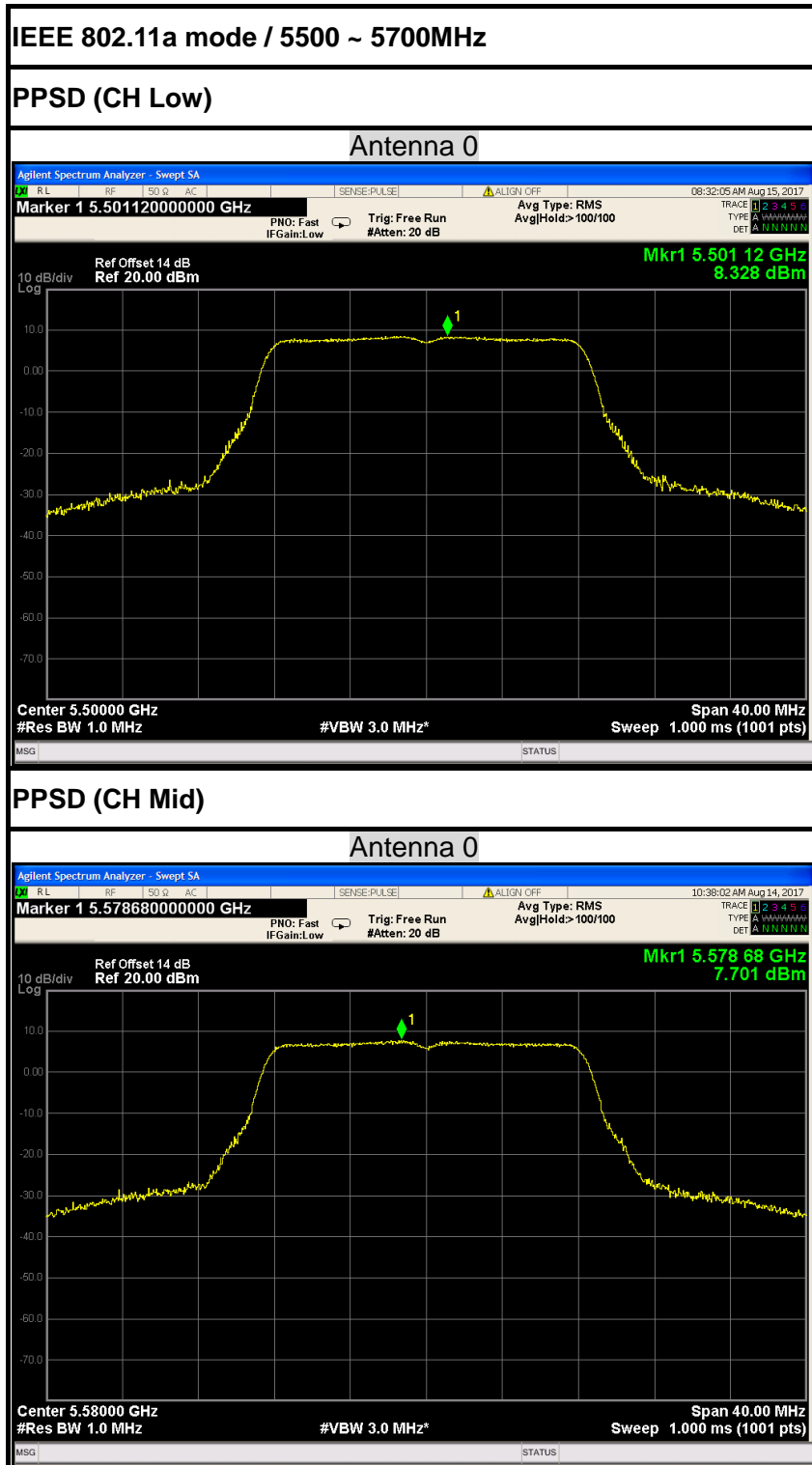


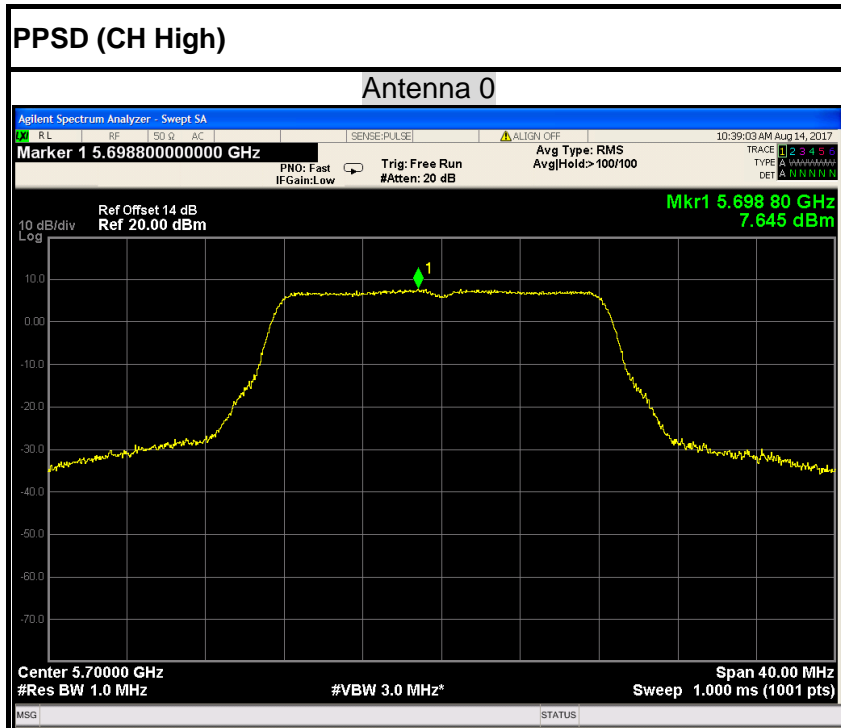


IEEE 802.11a mode / 5260~ 5320MHz

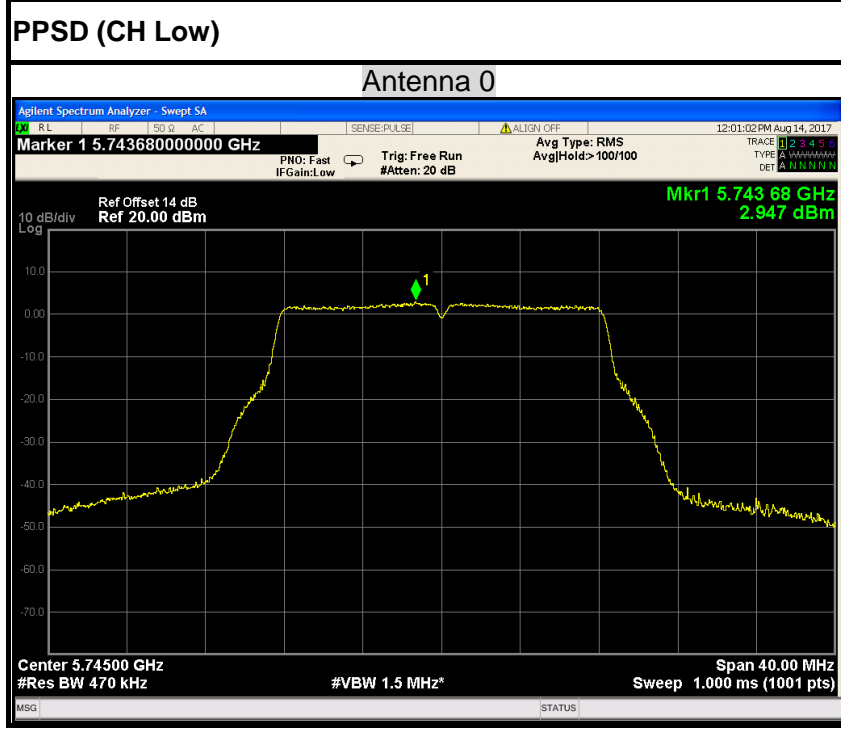


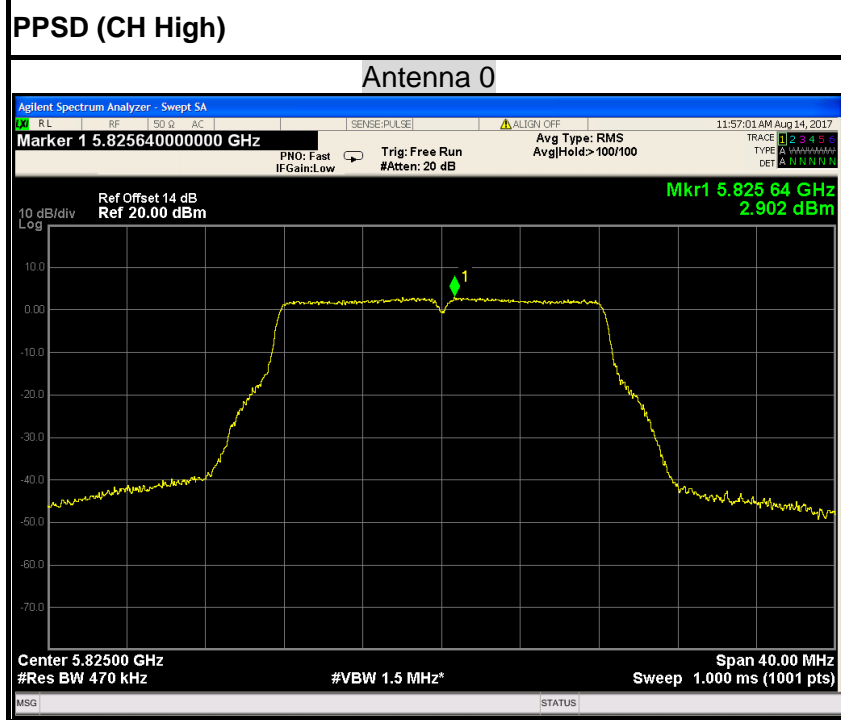
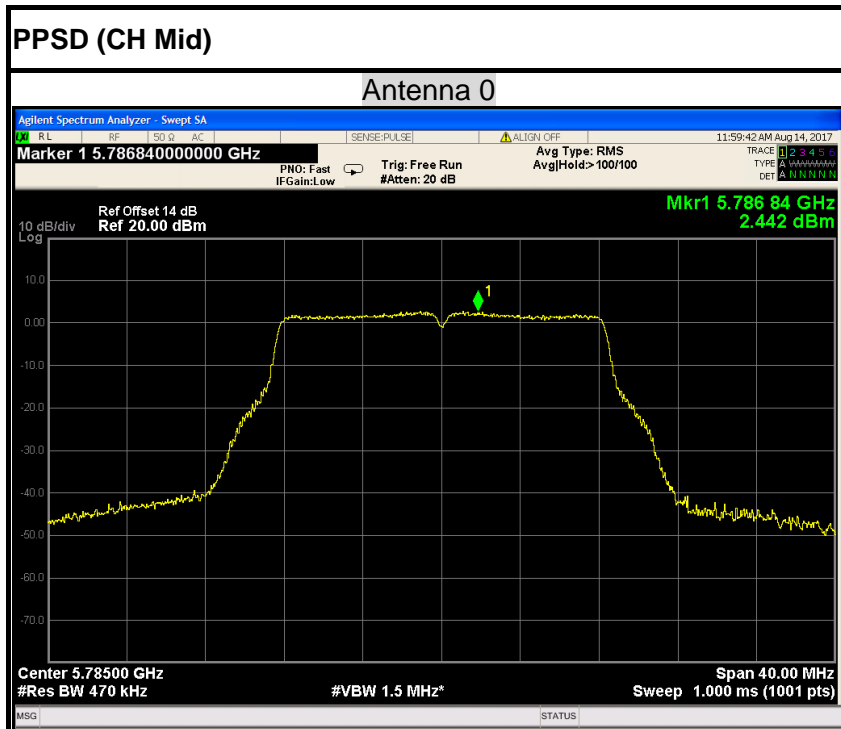


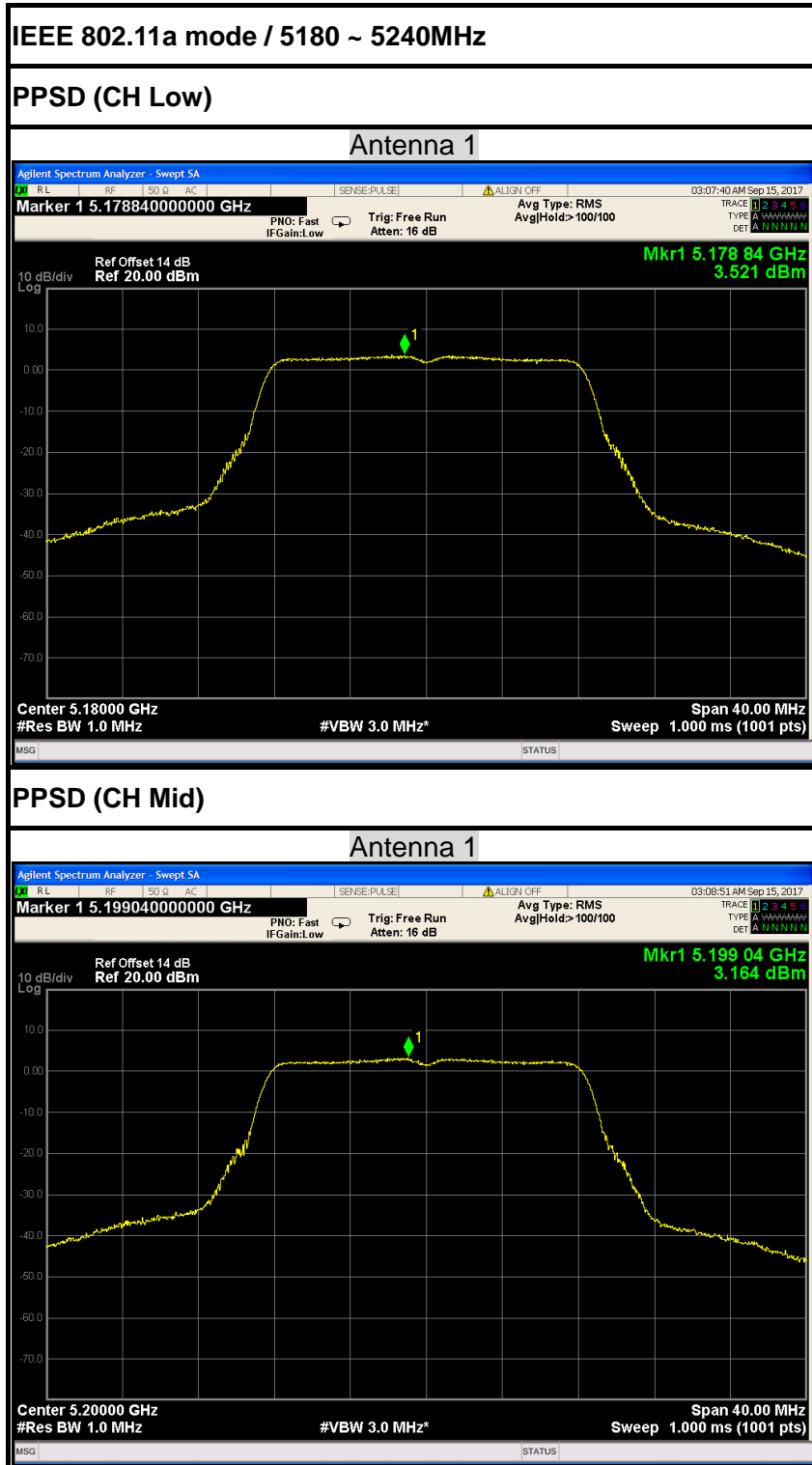


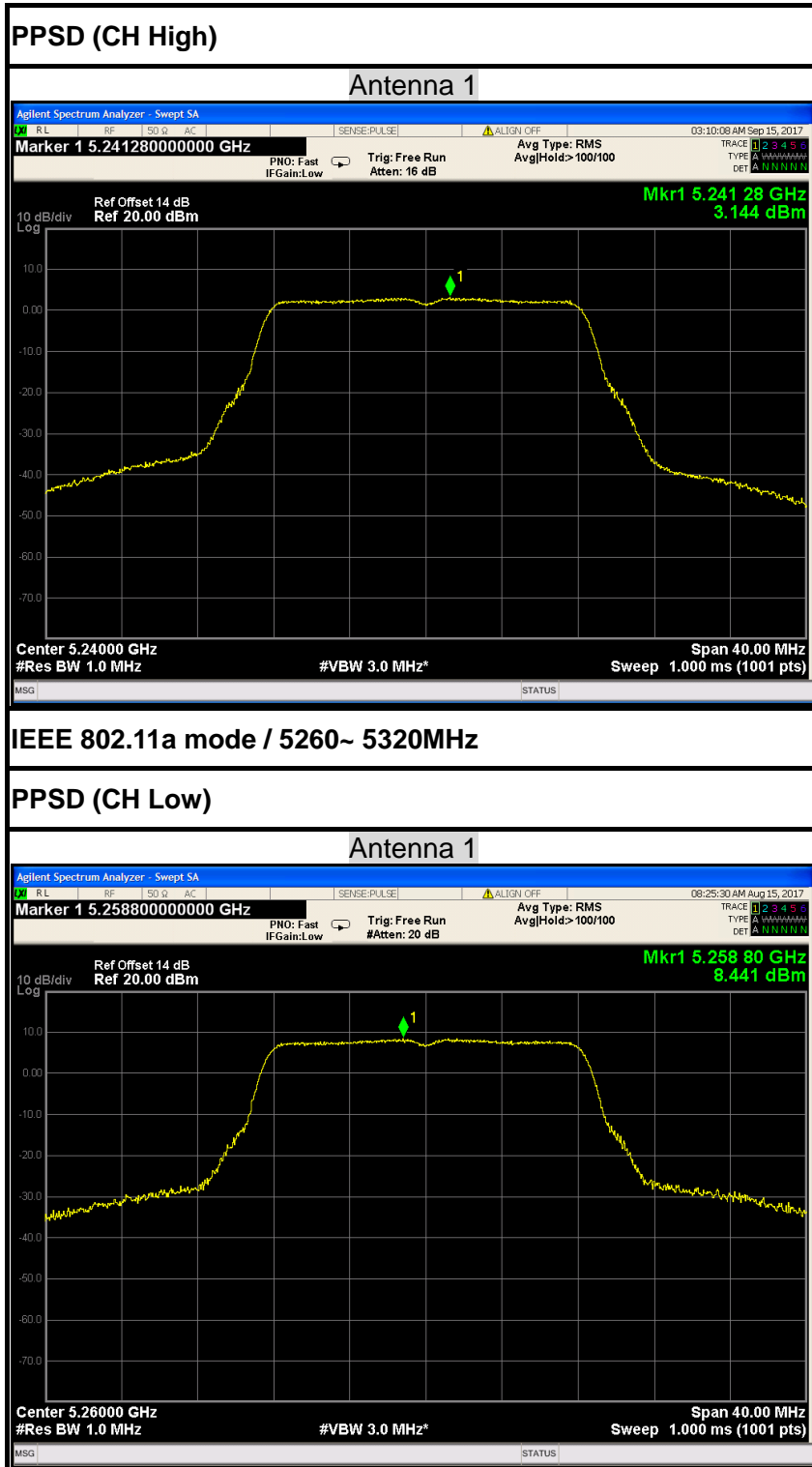


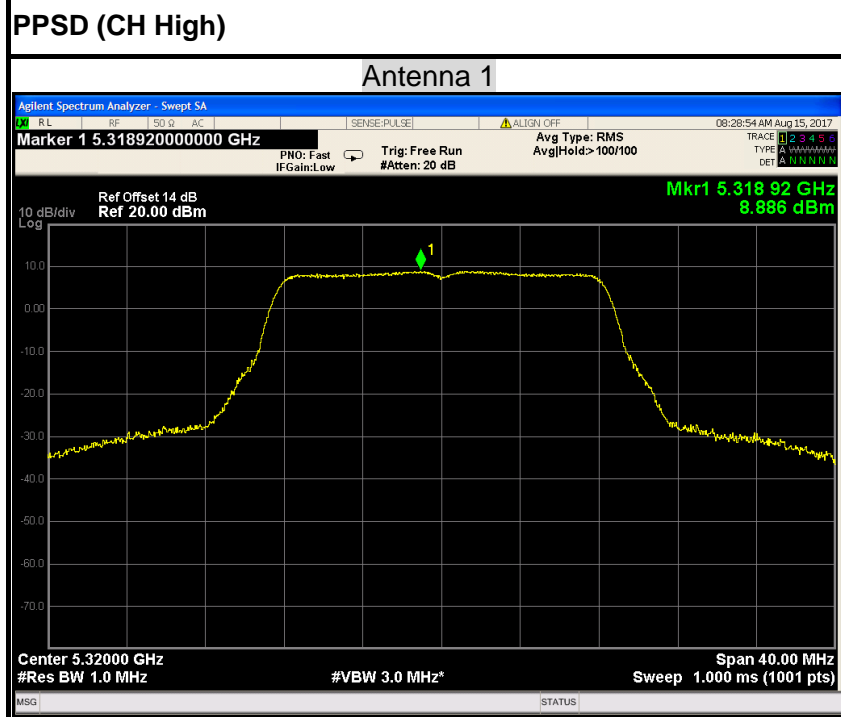
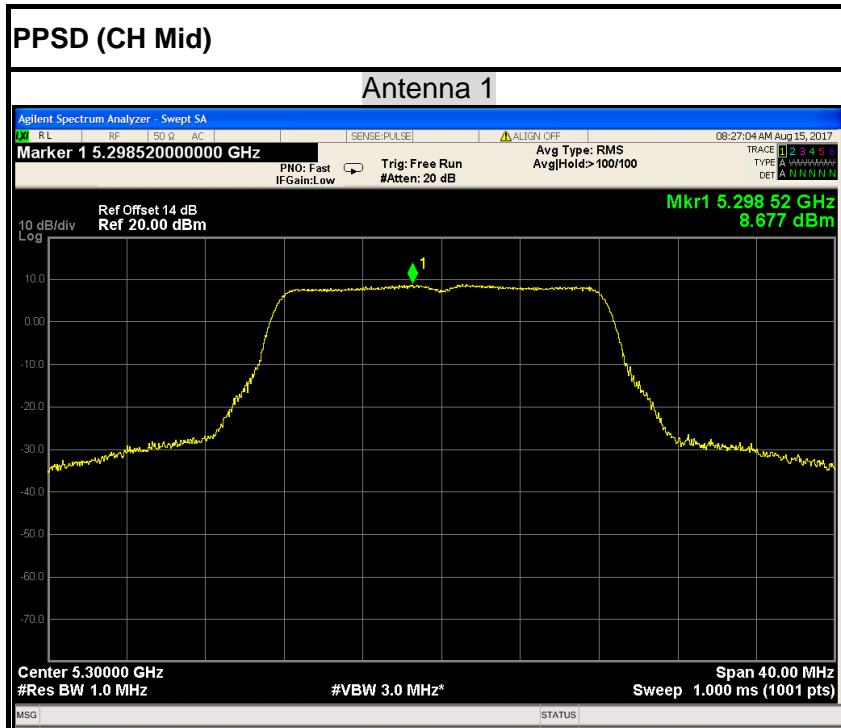
IEEE 802.11a mode / 5745 ~ 5825MHz

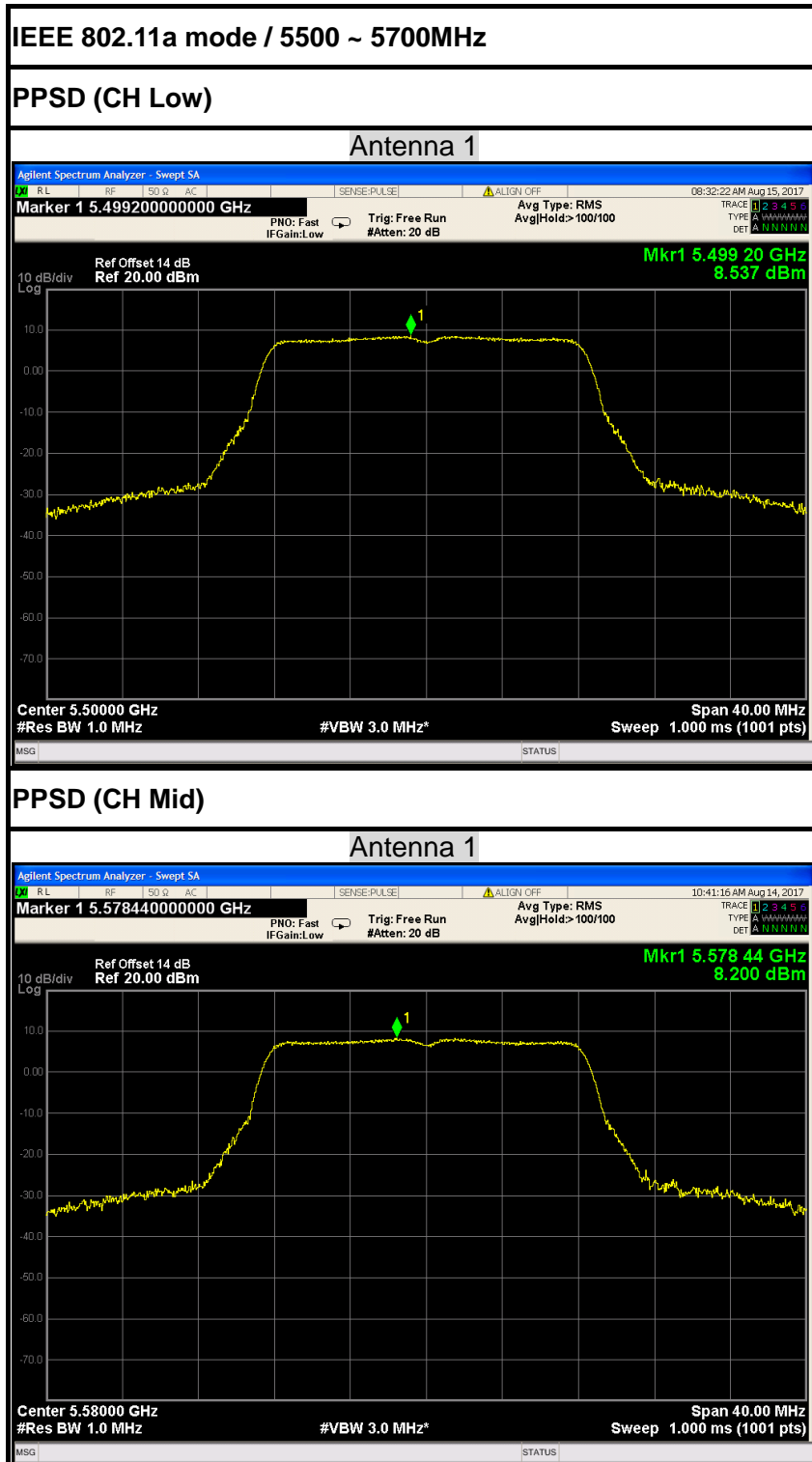


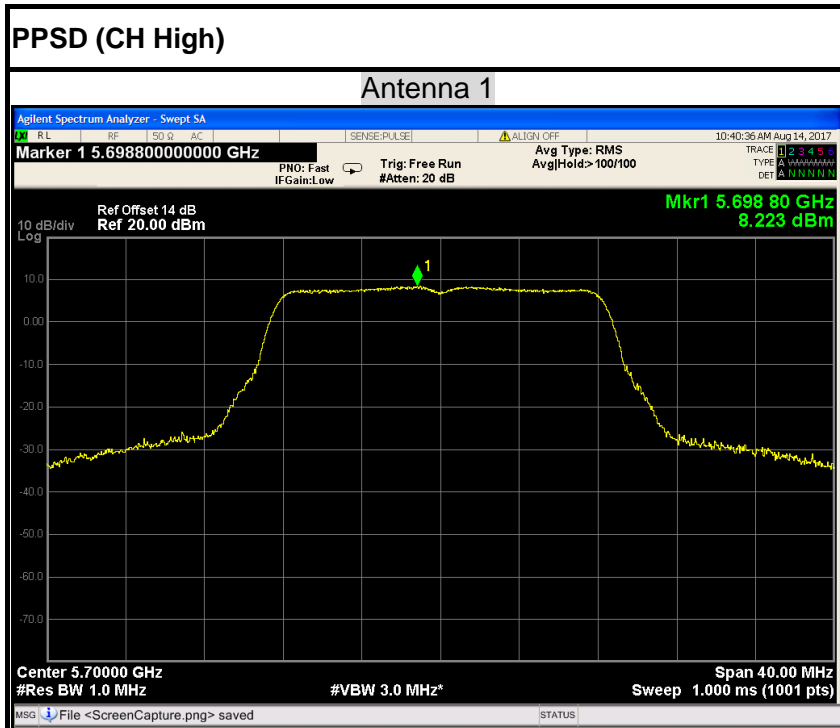




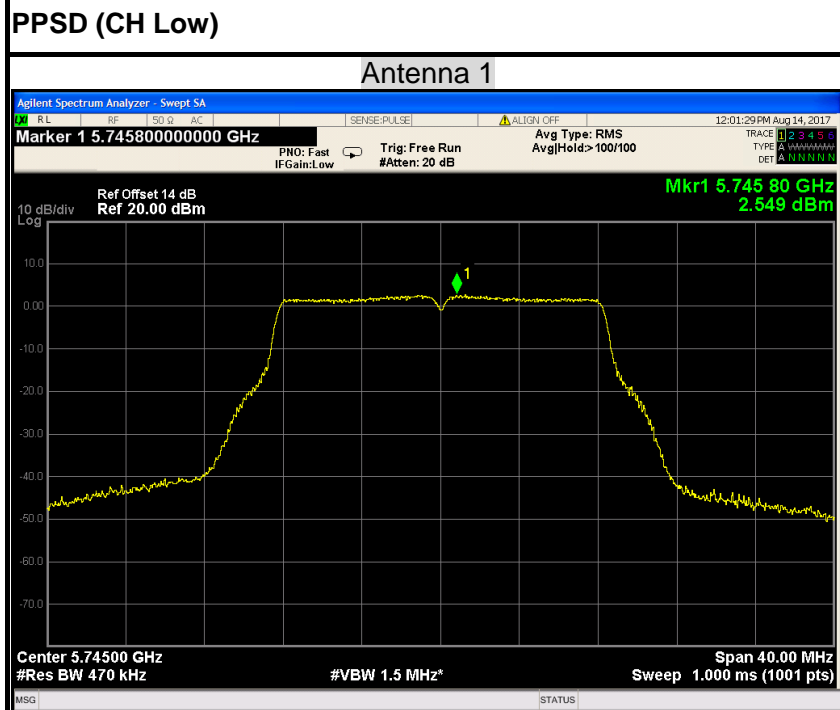


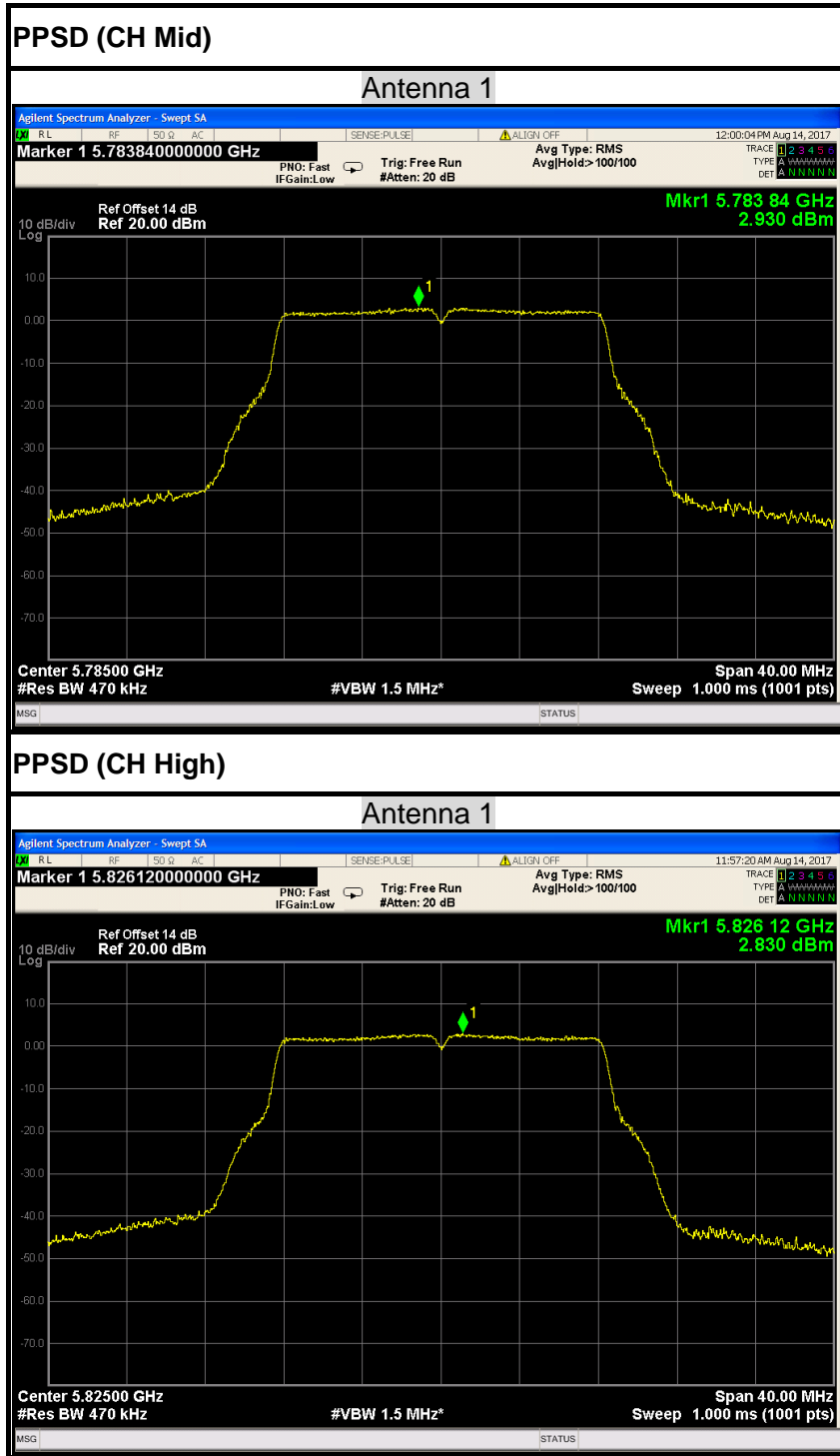


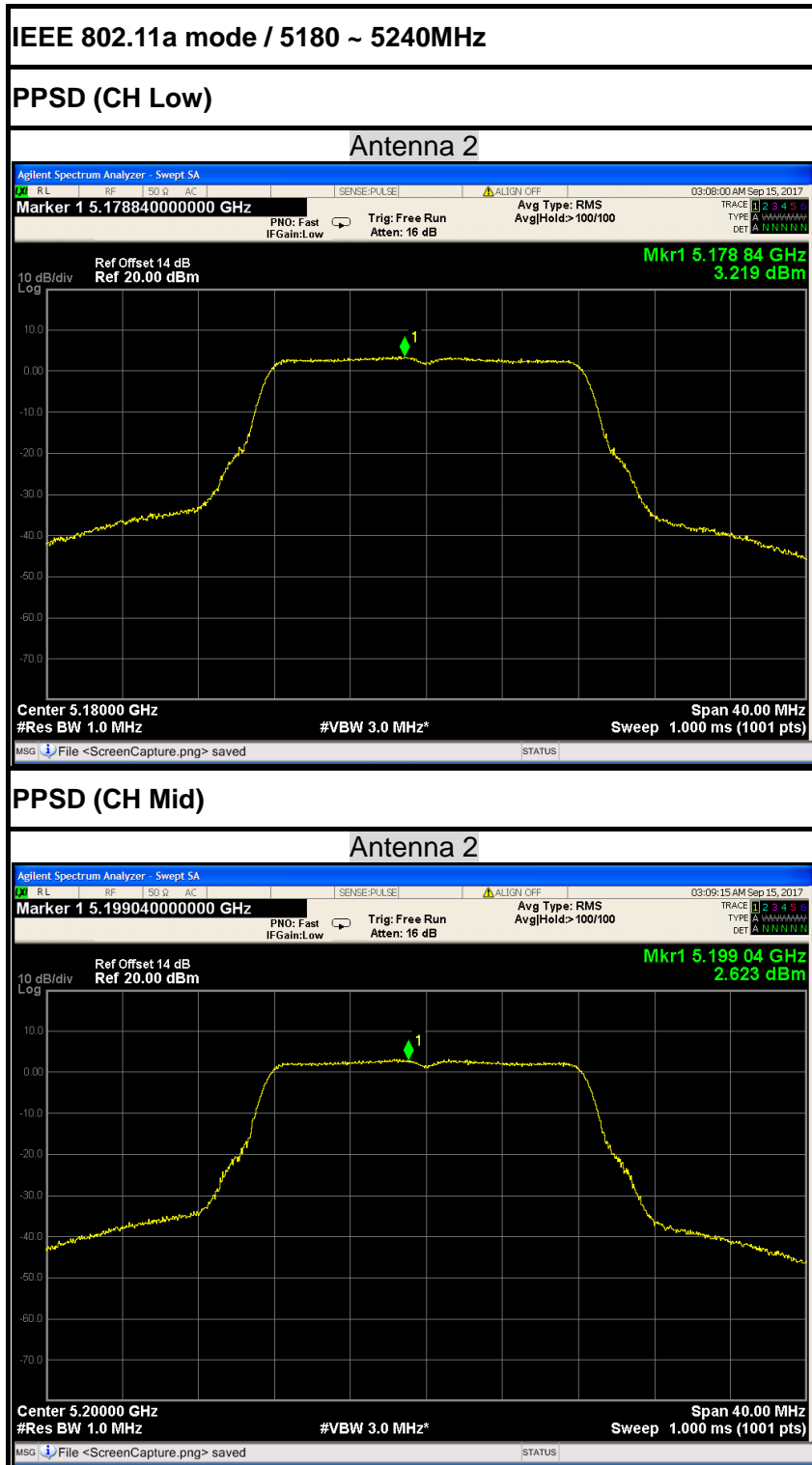


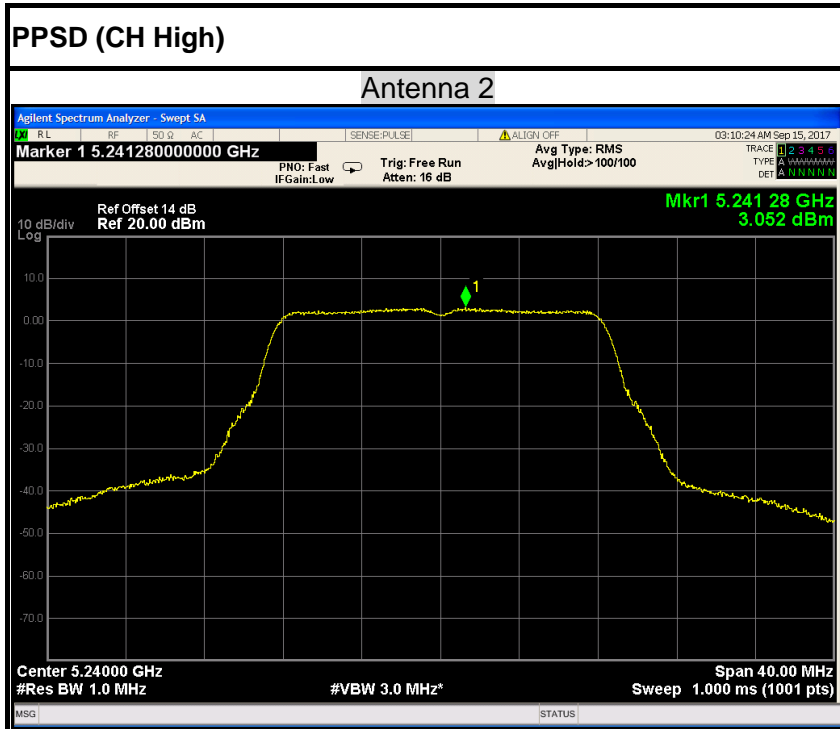


IEEE 802.11a mode / 5745 ~ 5825MHz

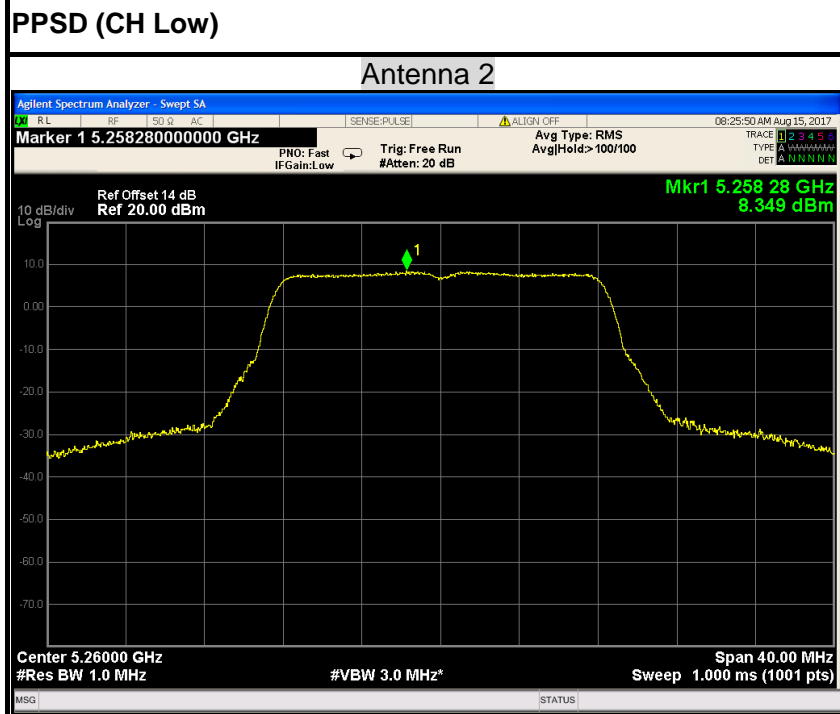


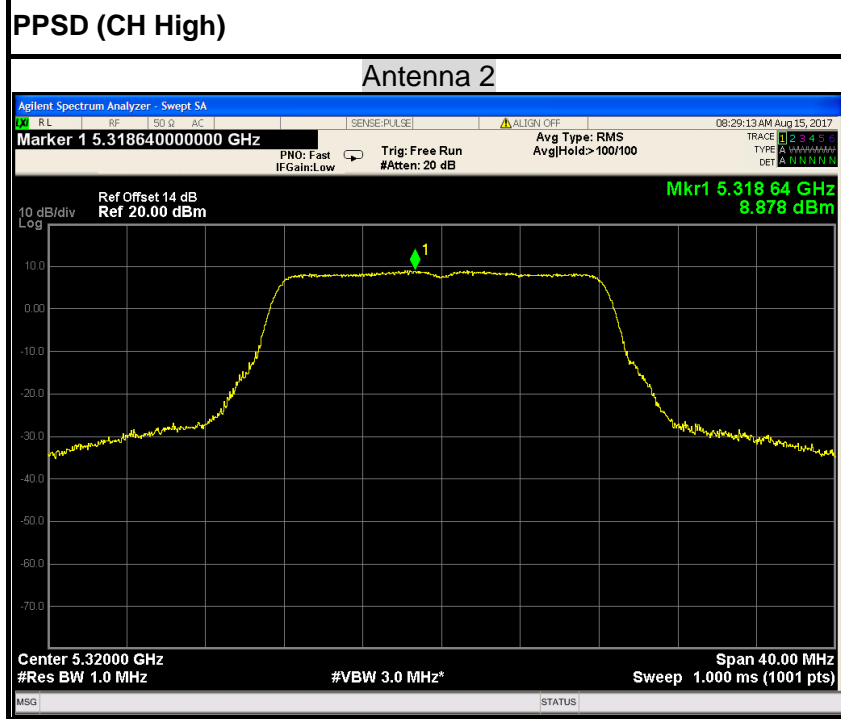
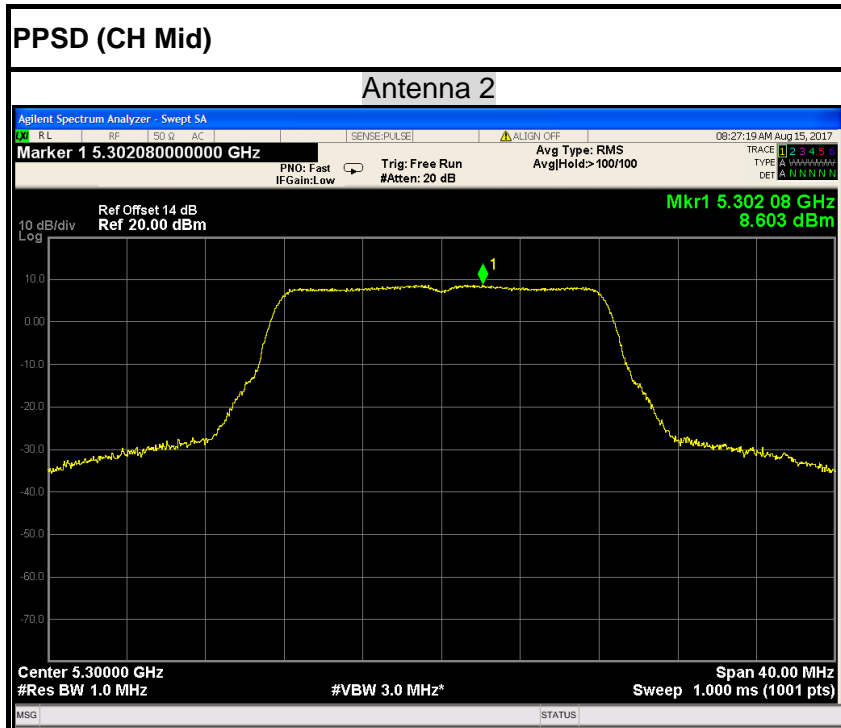


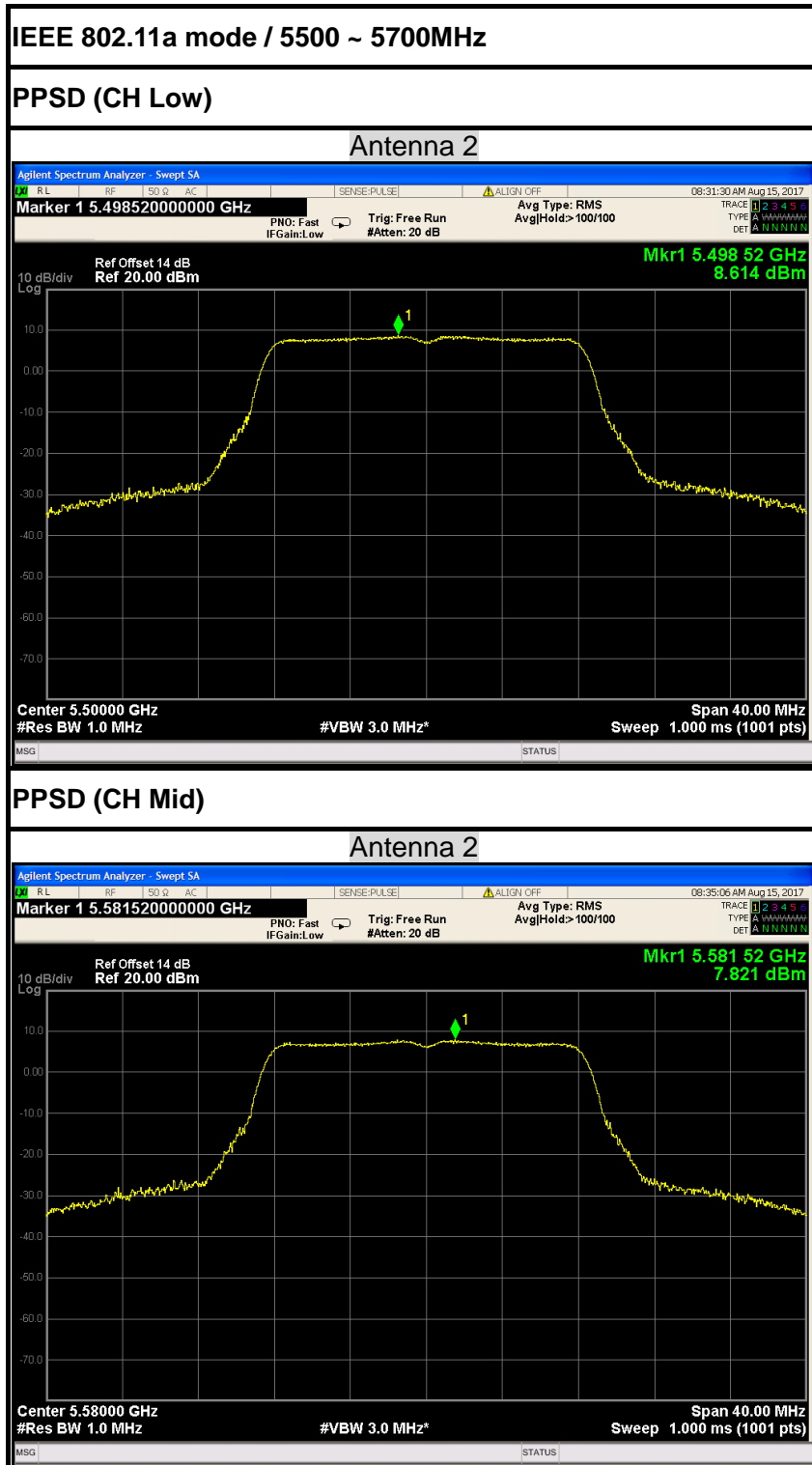


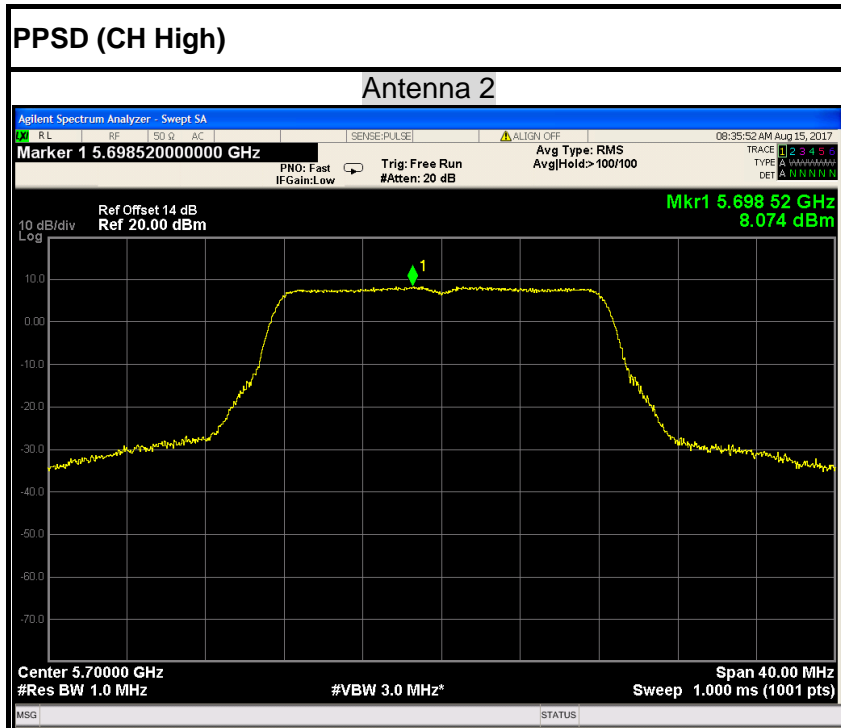


IEEE 802.11a mode / 5260~ 5320MHz

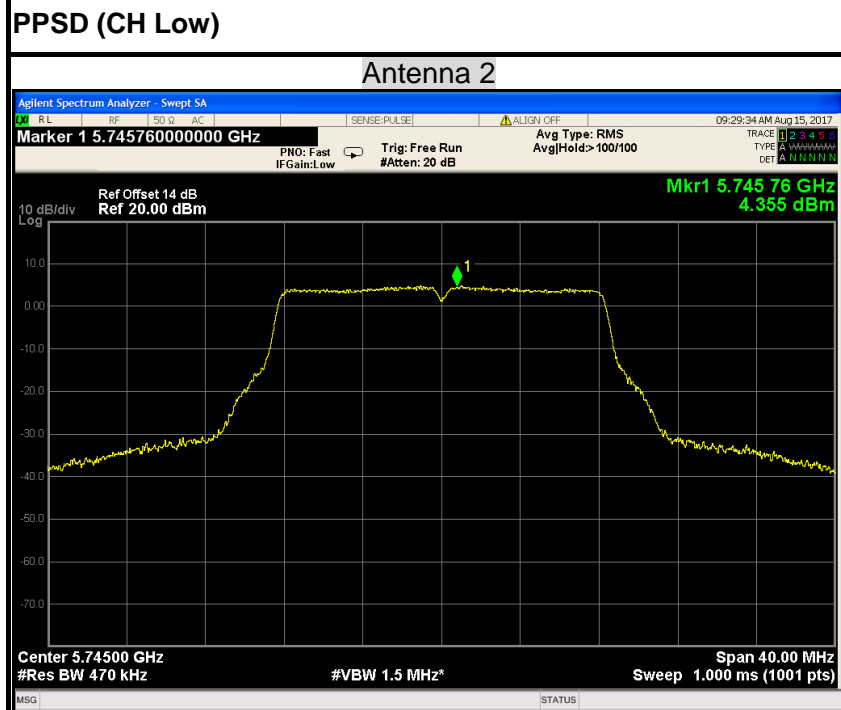


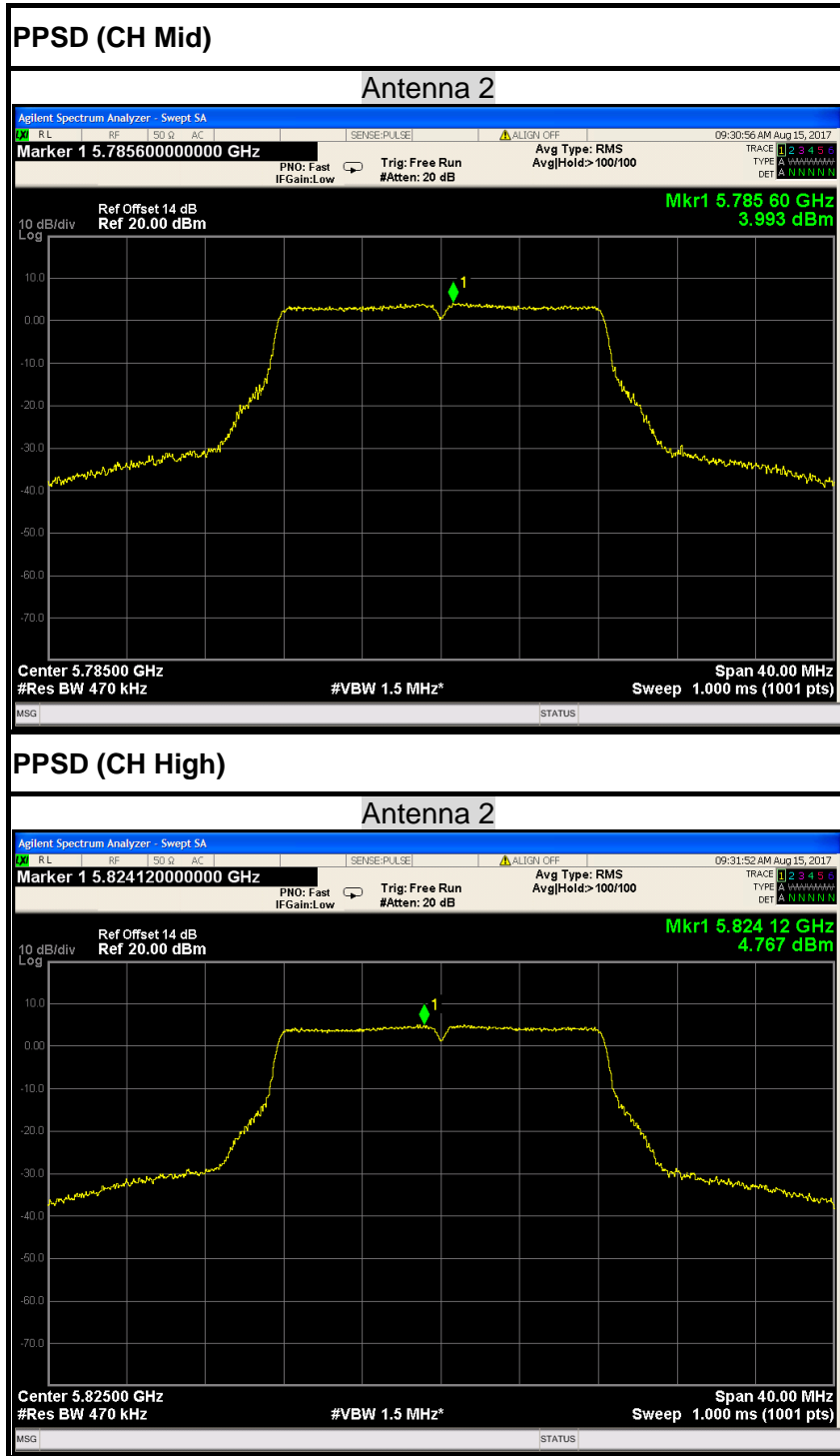


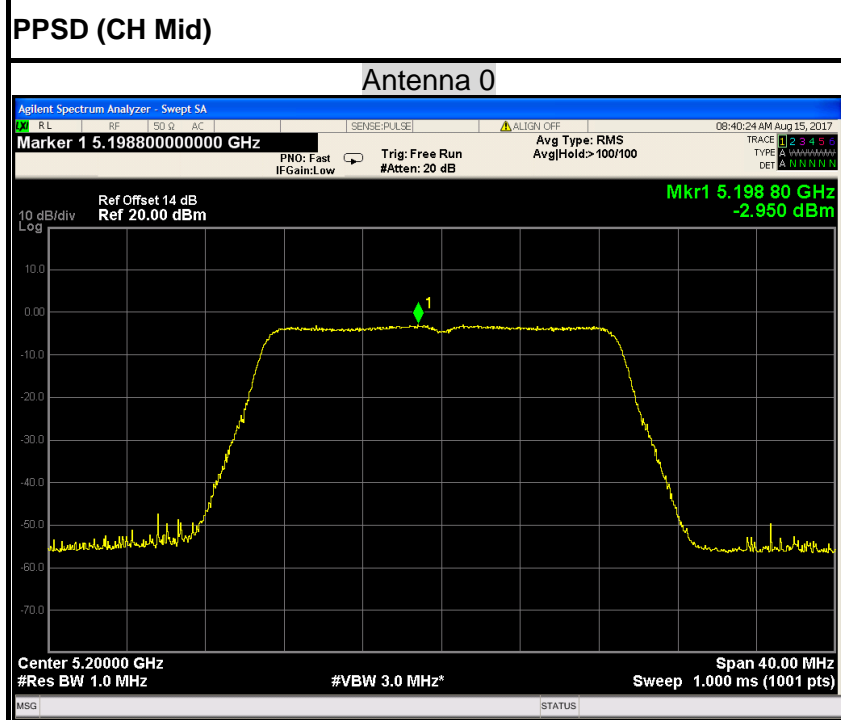
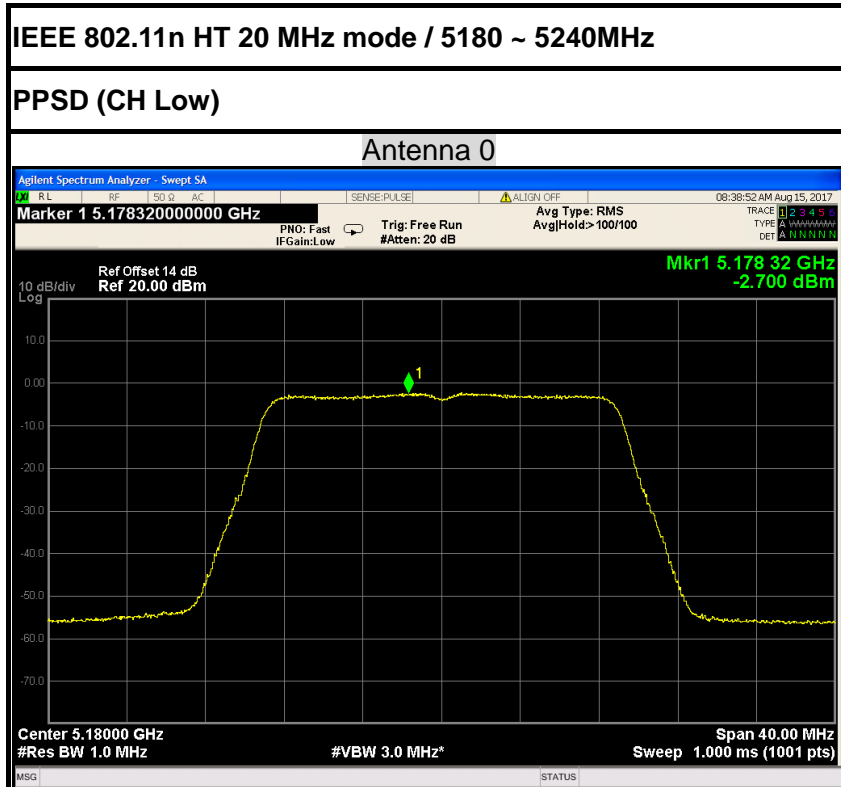


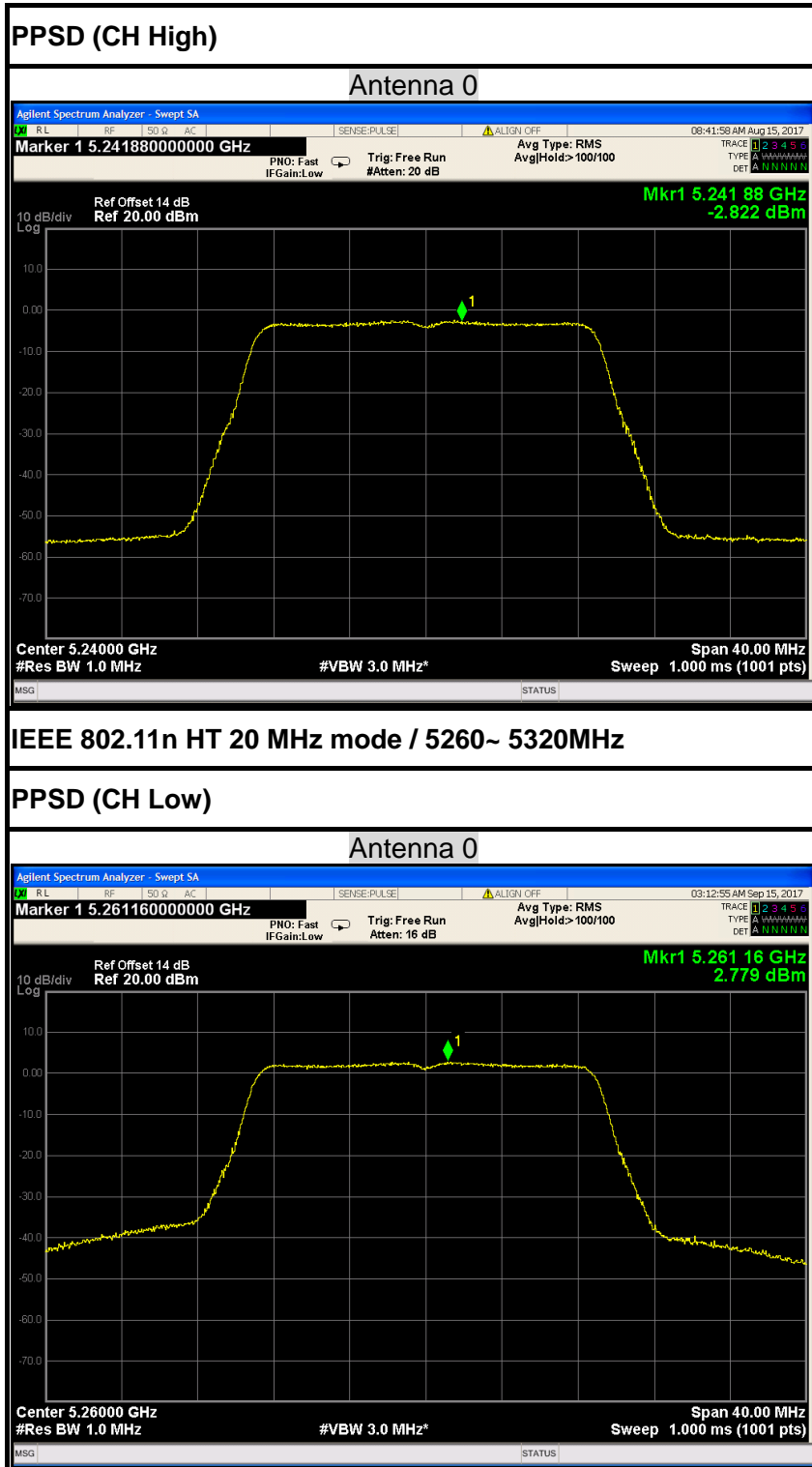


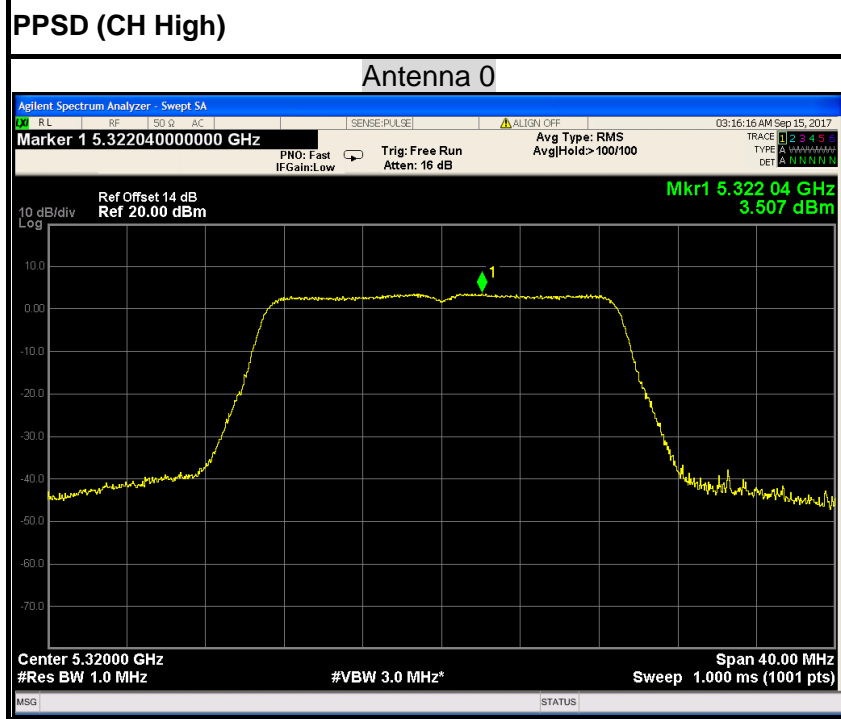
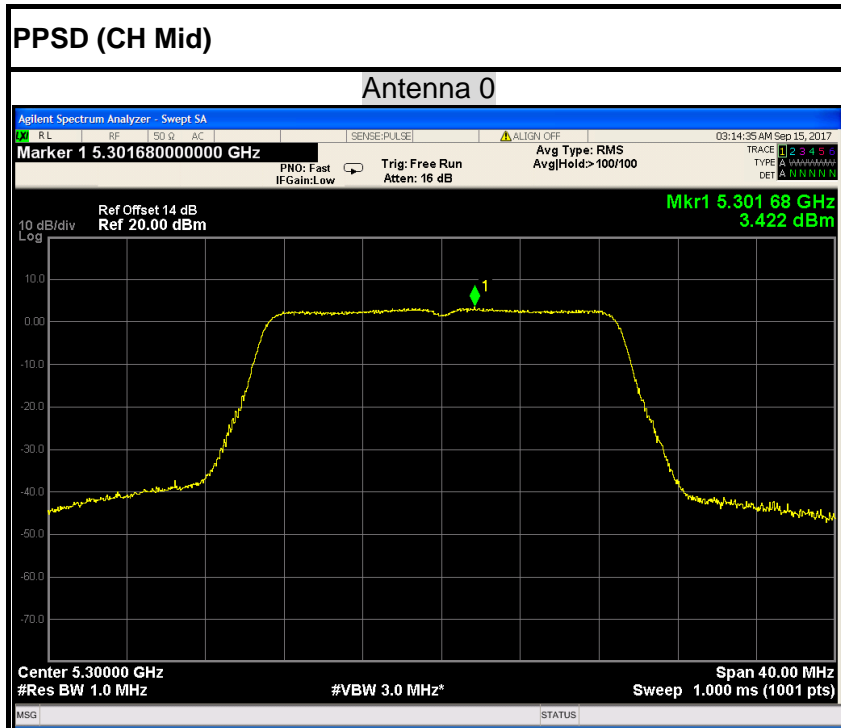
IEEE 802.11a mode / 5745 ~ 5825MHz









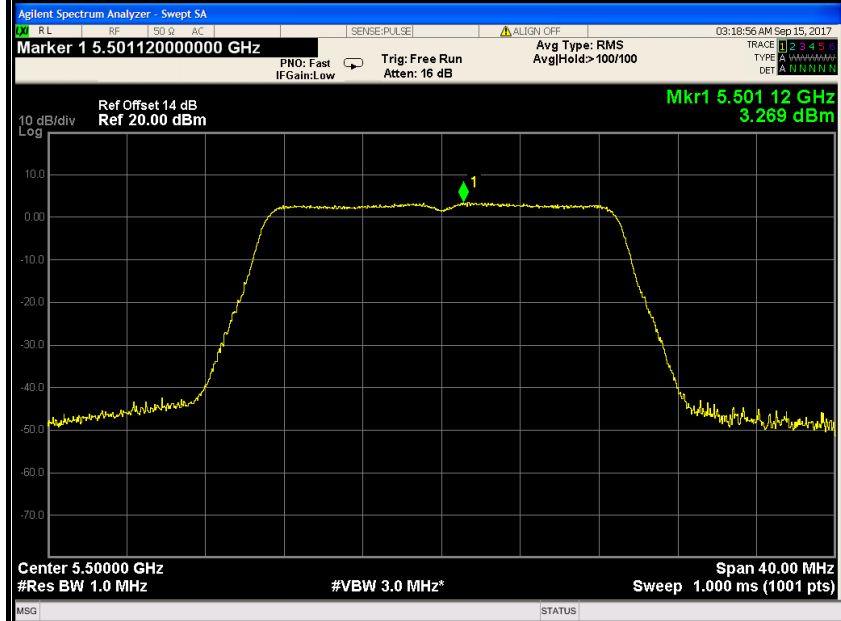




IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz

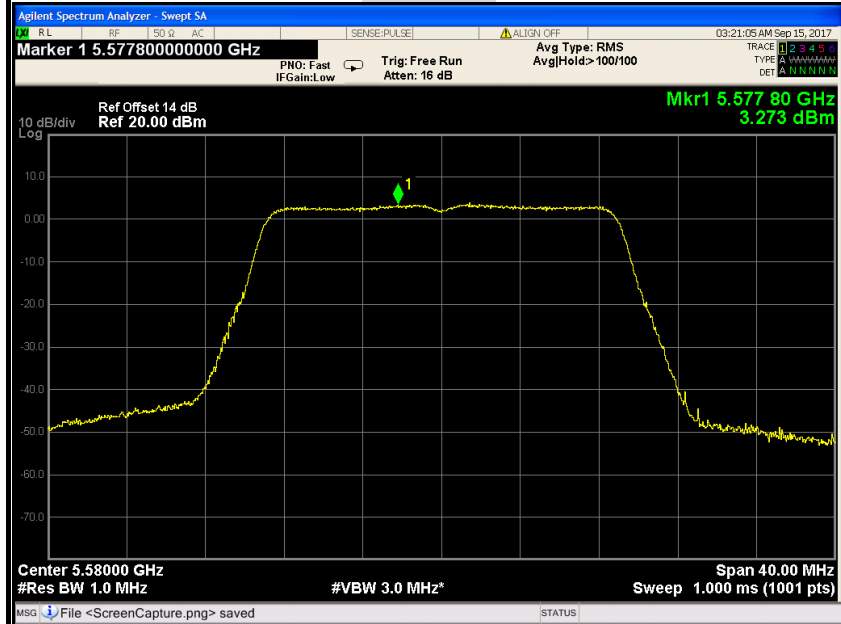
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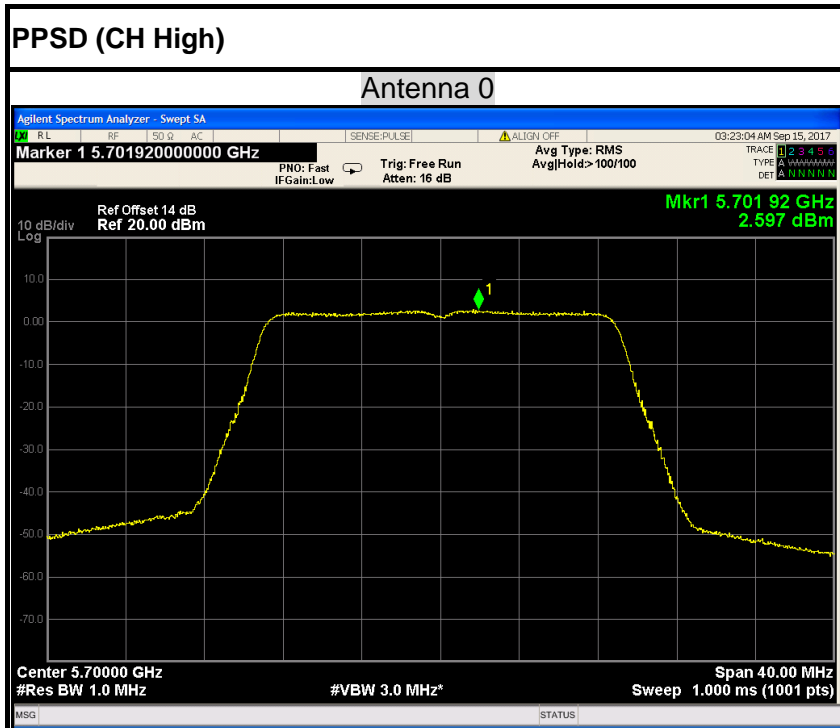
Antenna 0



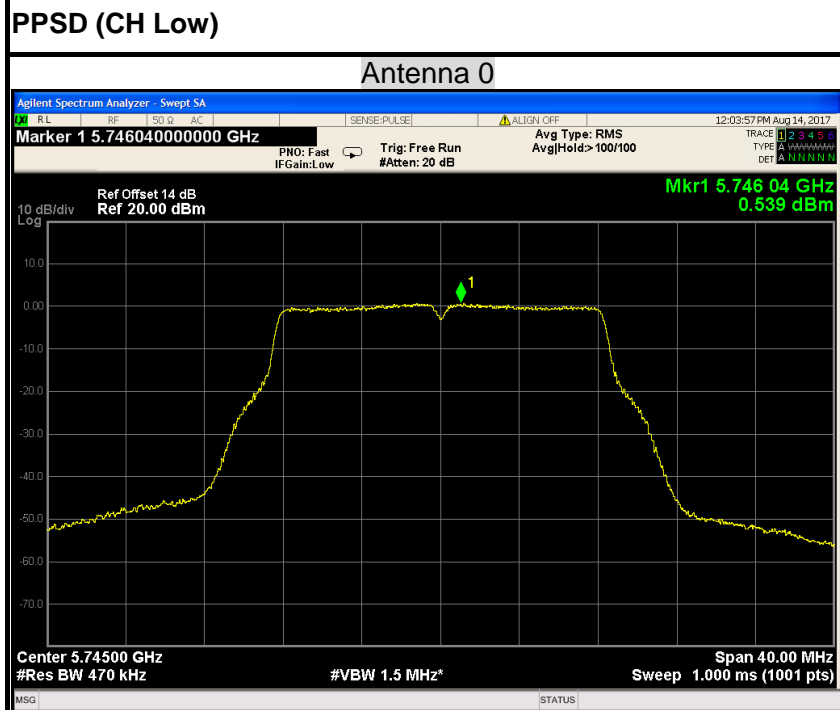
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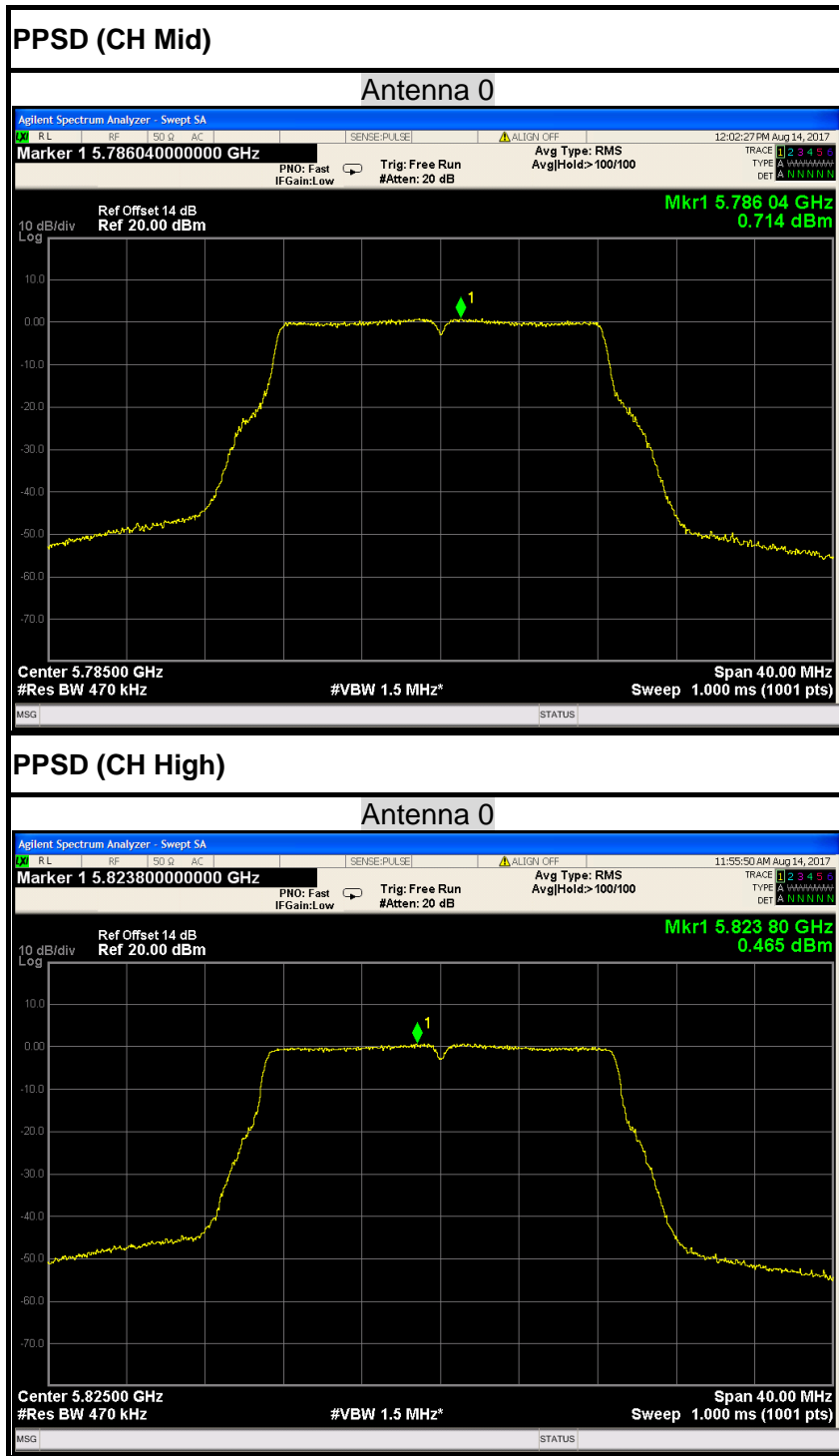
Antenna 0

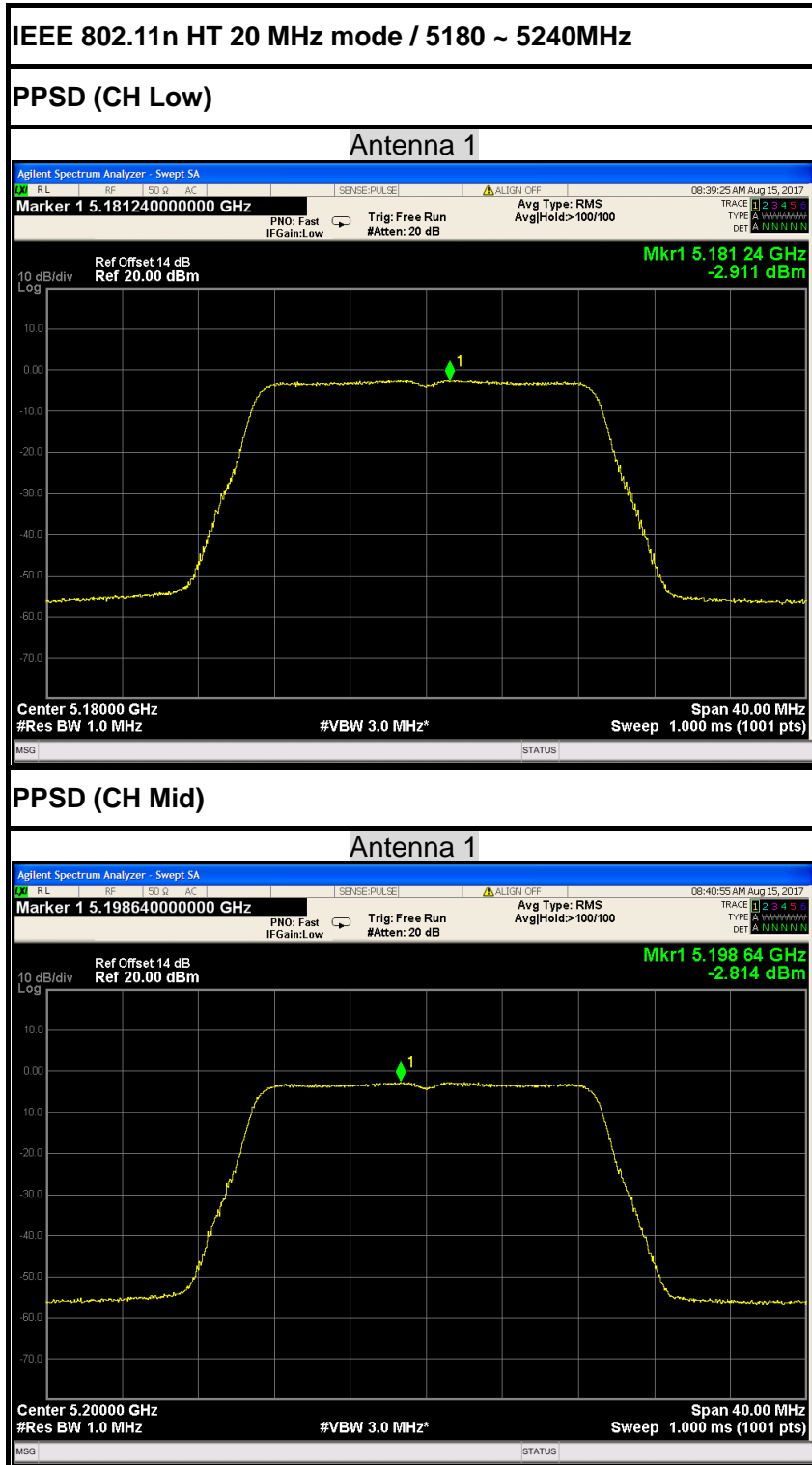


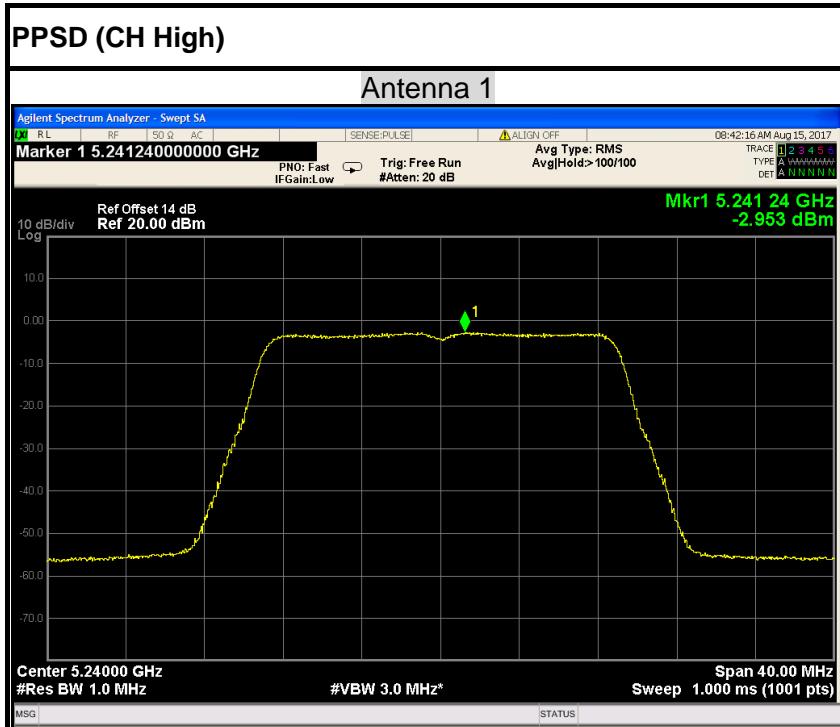


IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz

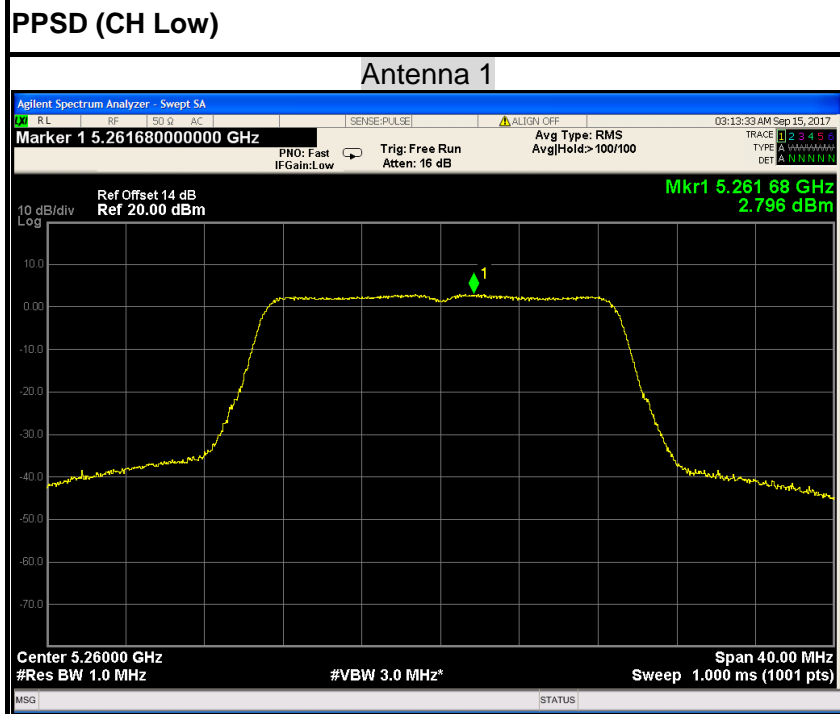


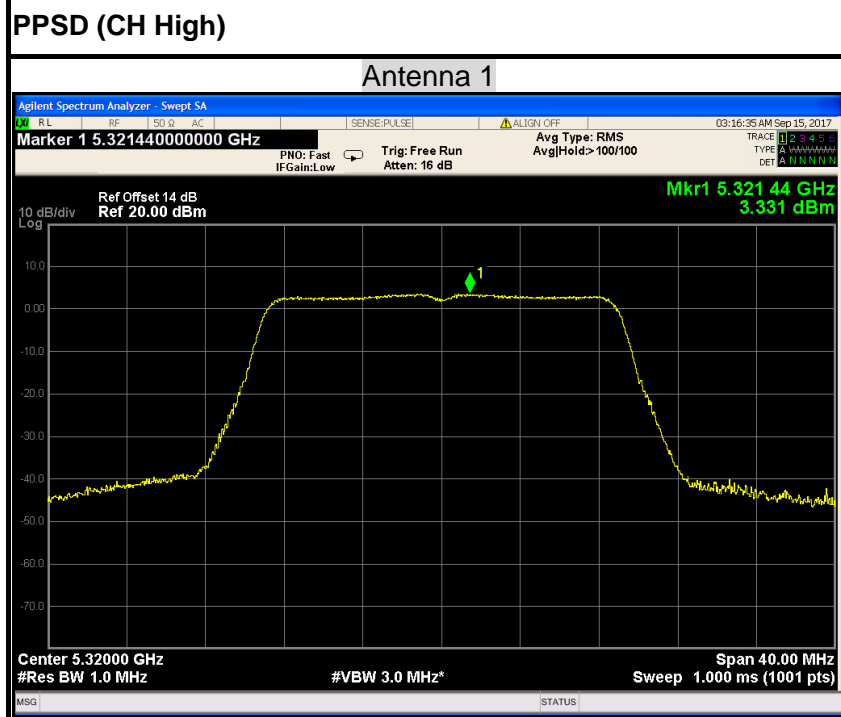
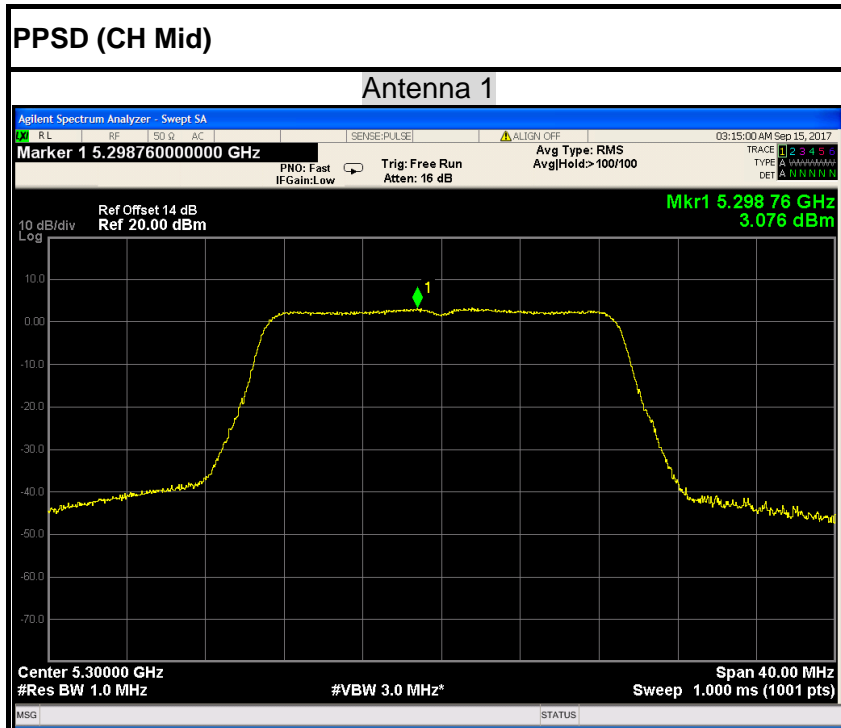






IEEE 802.11n HT 20 MHz mode / 5260~ 5320MHz

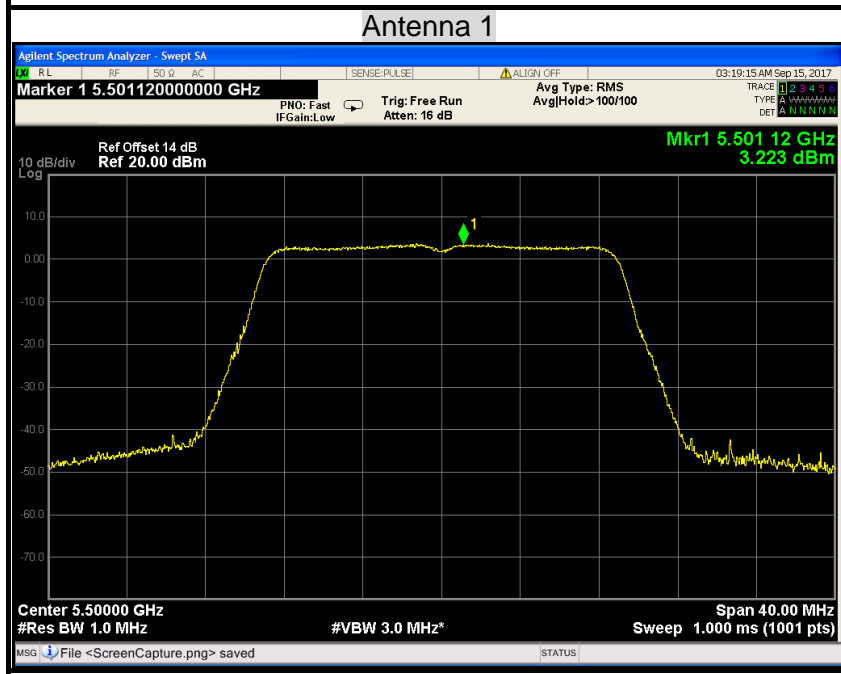




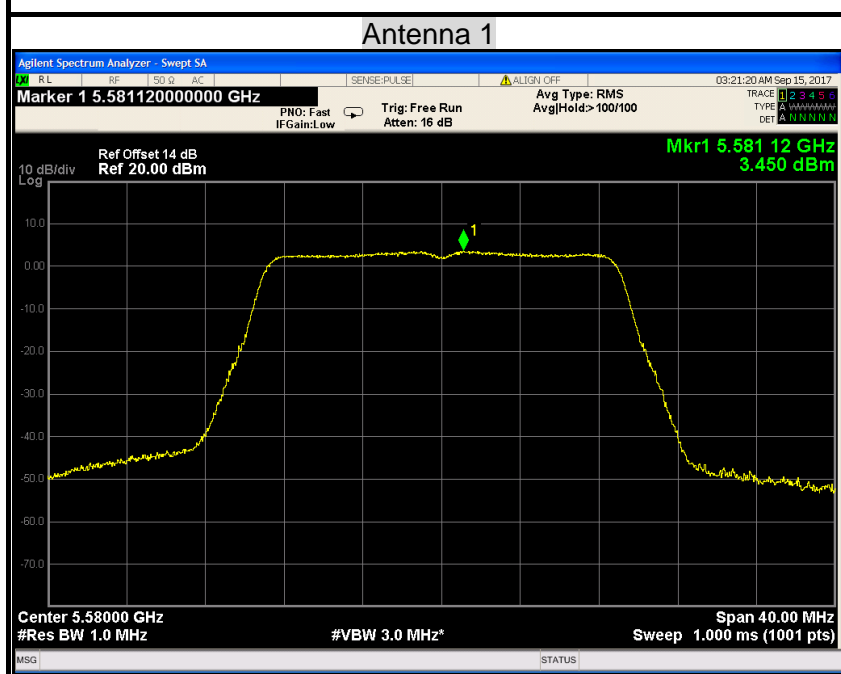


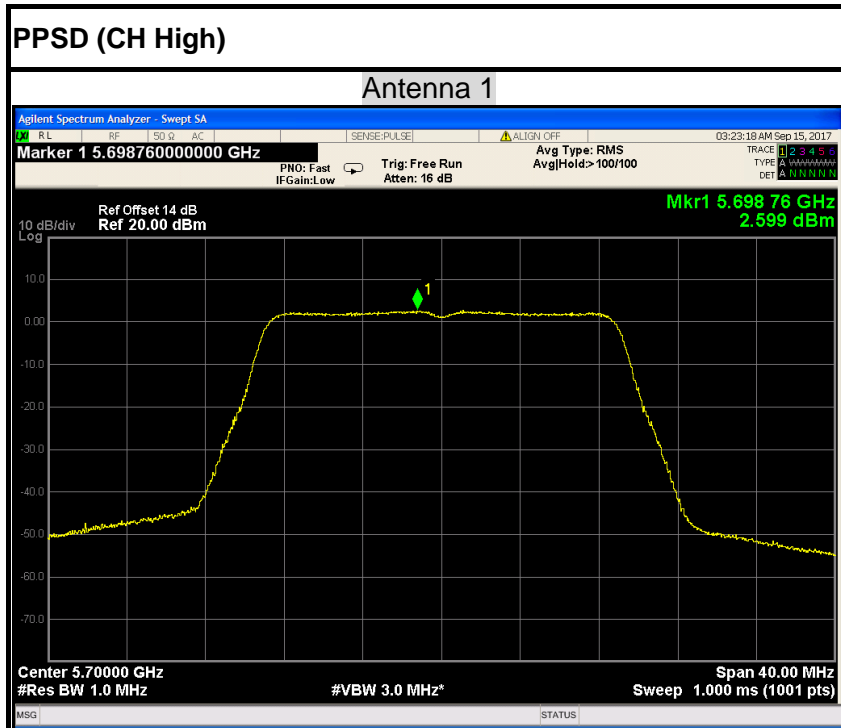
IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz

PPSD (CH Low)

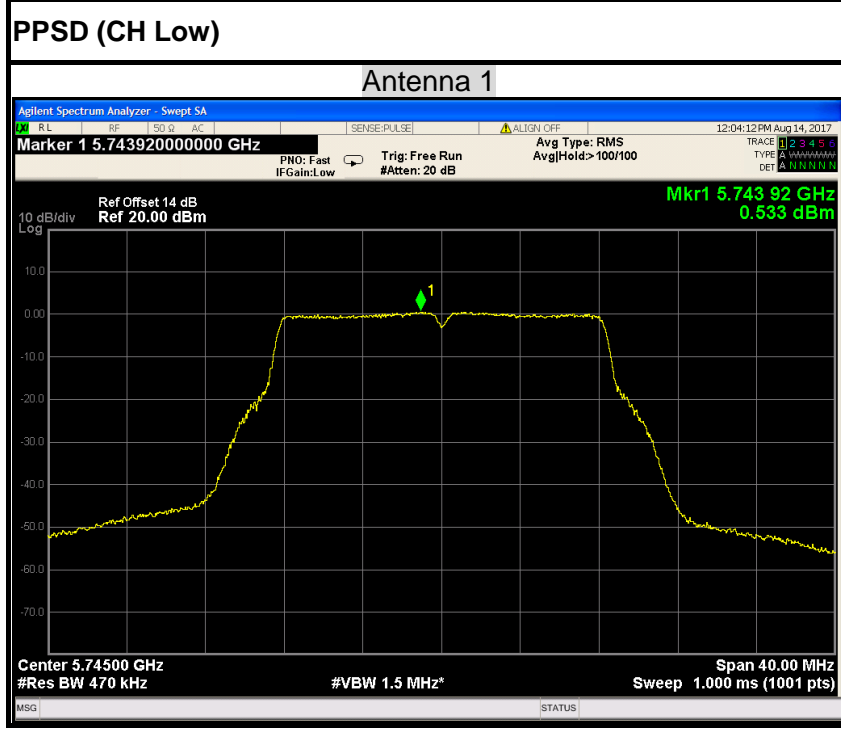


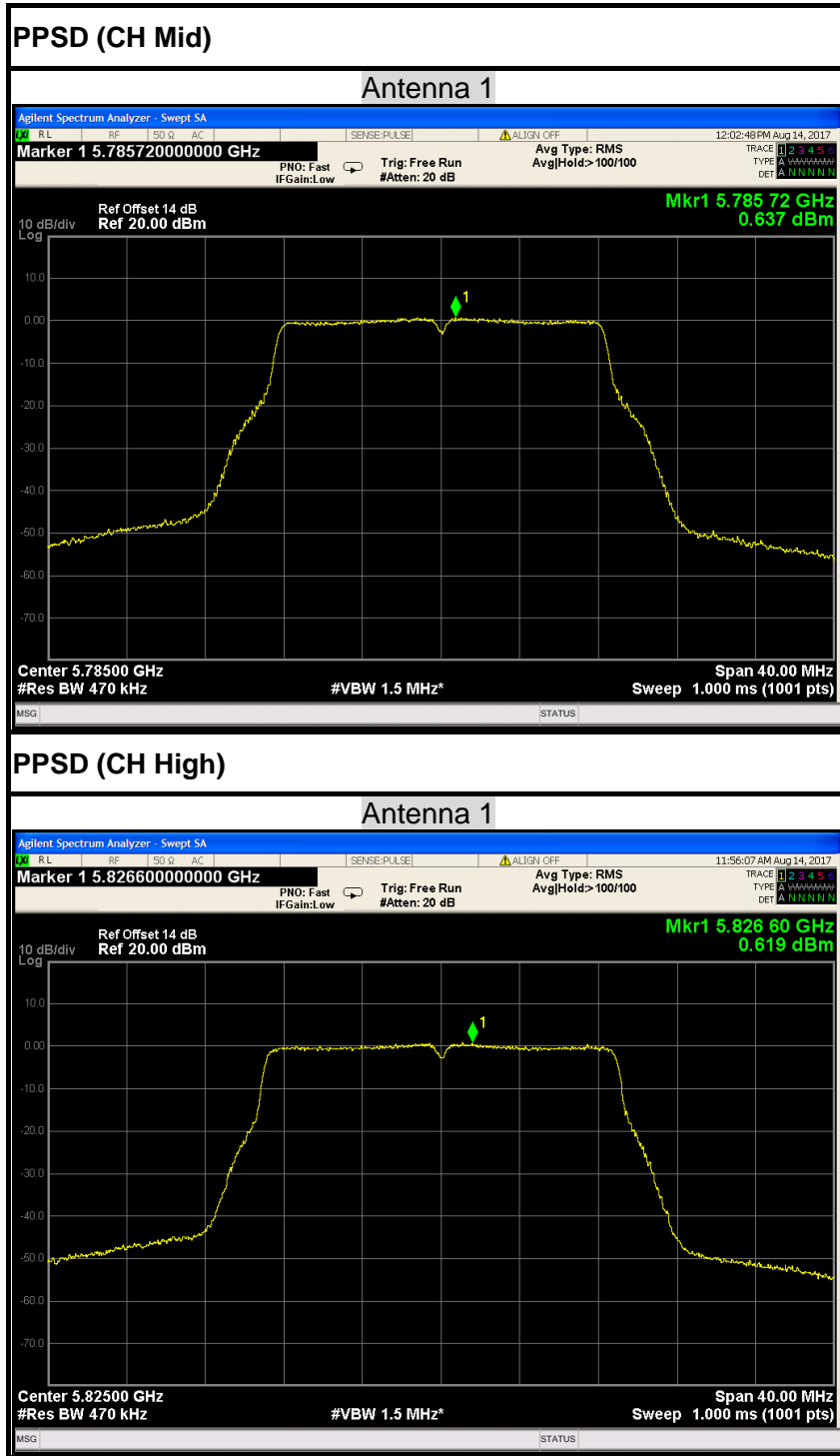
PPSD (CH Mid)





IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz



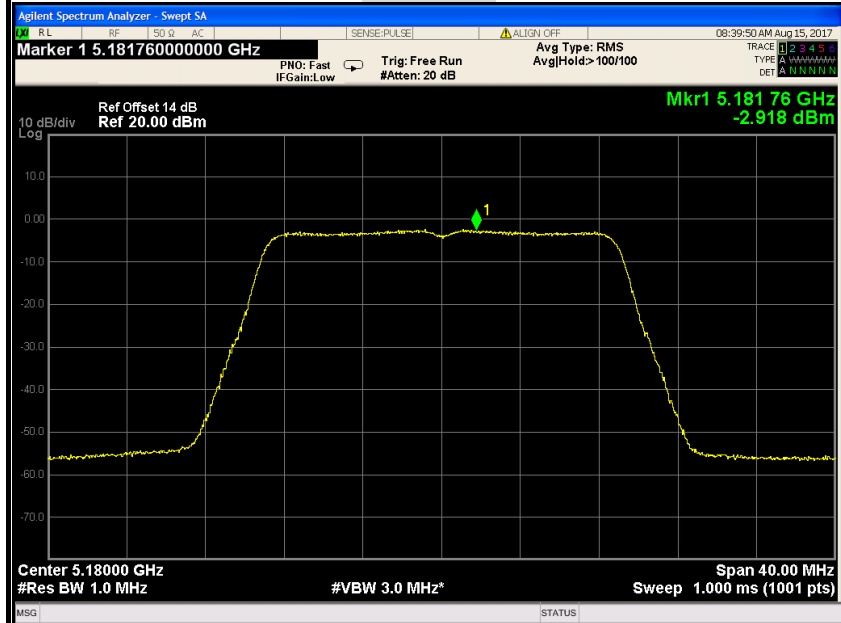




IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

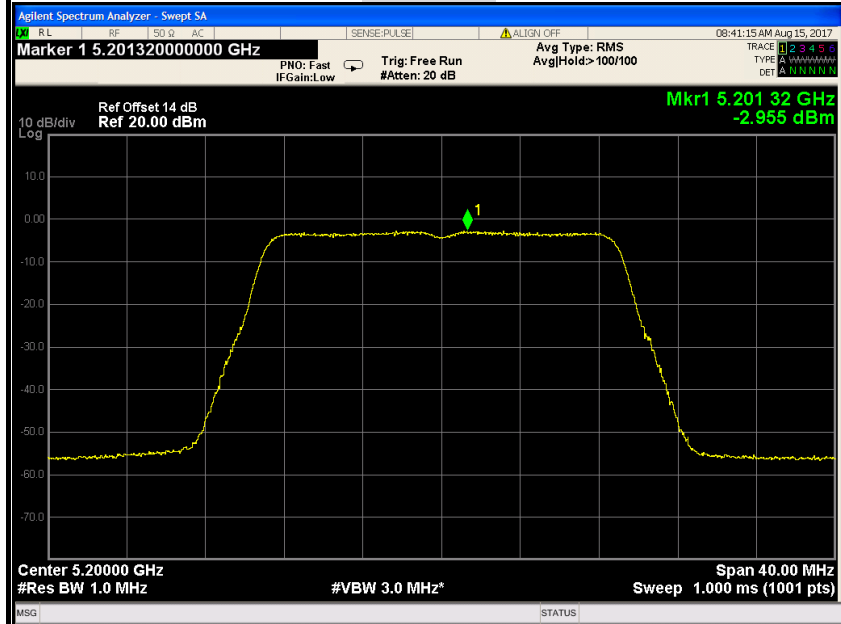
PPSD (CH Low)

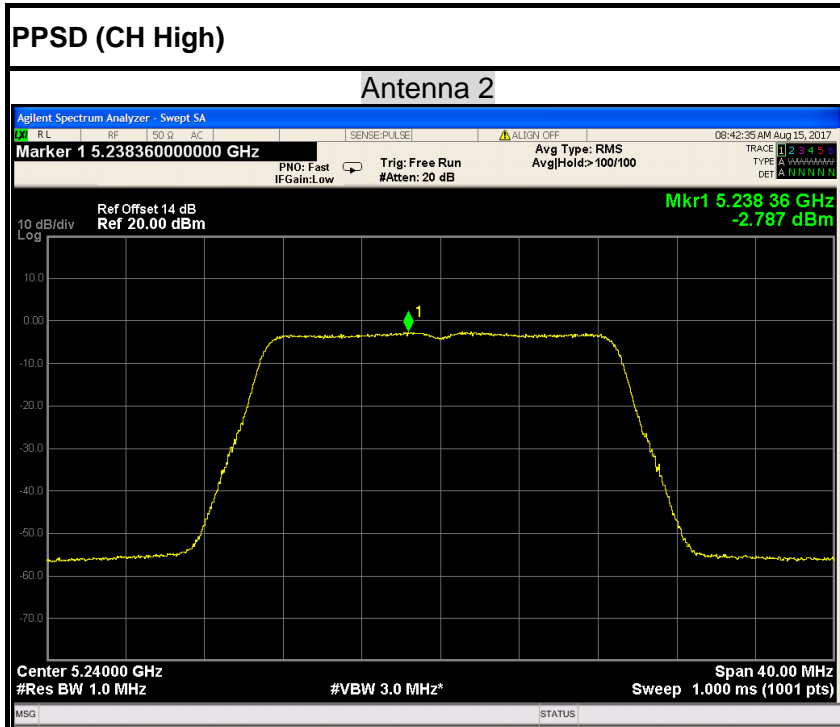
Antenna 2



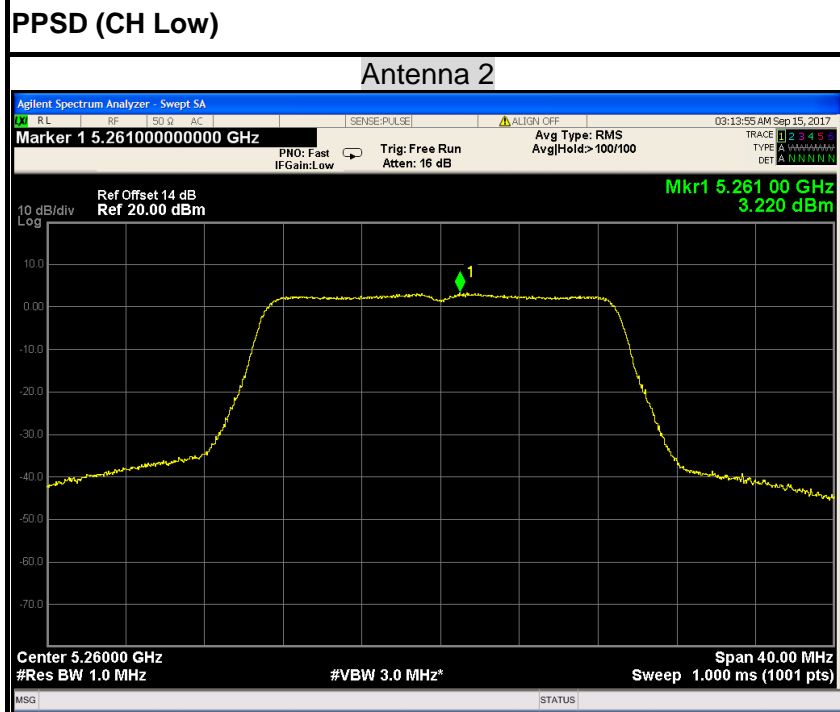
PPSD (CH Mid)

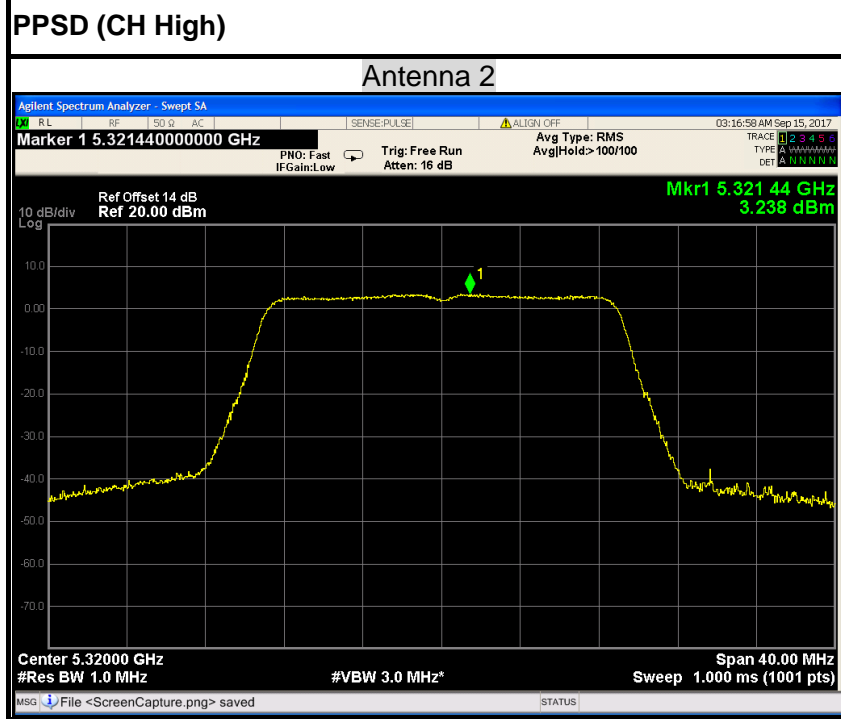
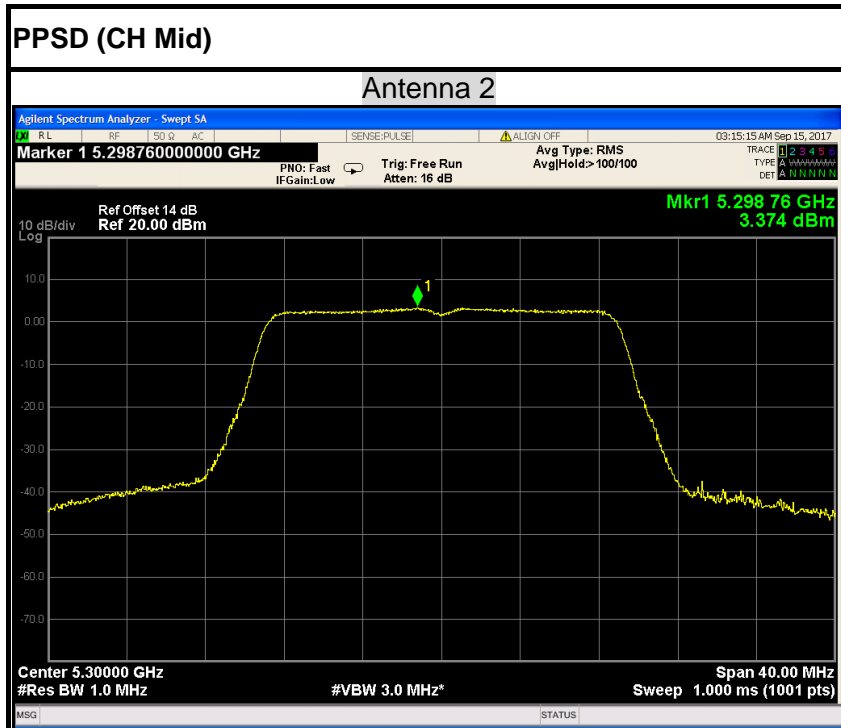
Antenna 2

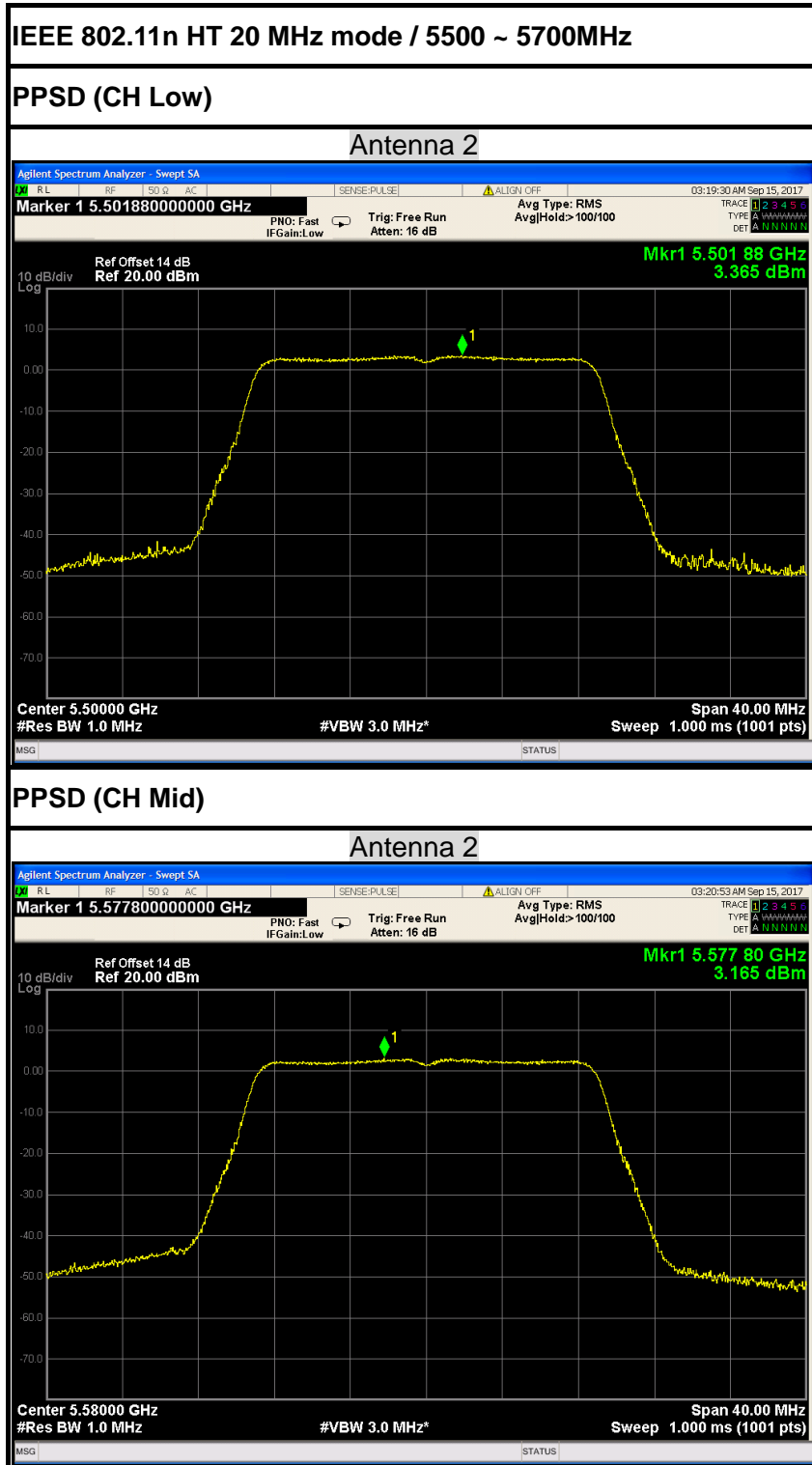


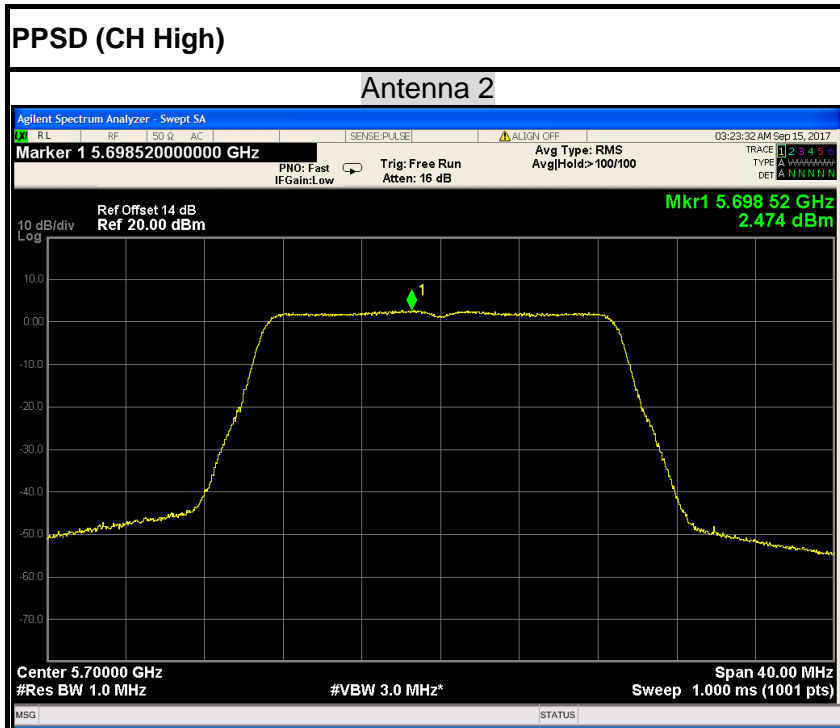


IEEE 802.11n HT 20 MHz mode / 5260~ 5320MHz

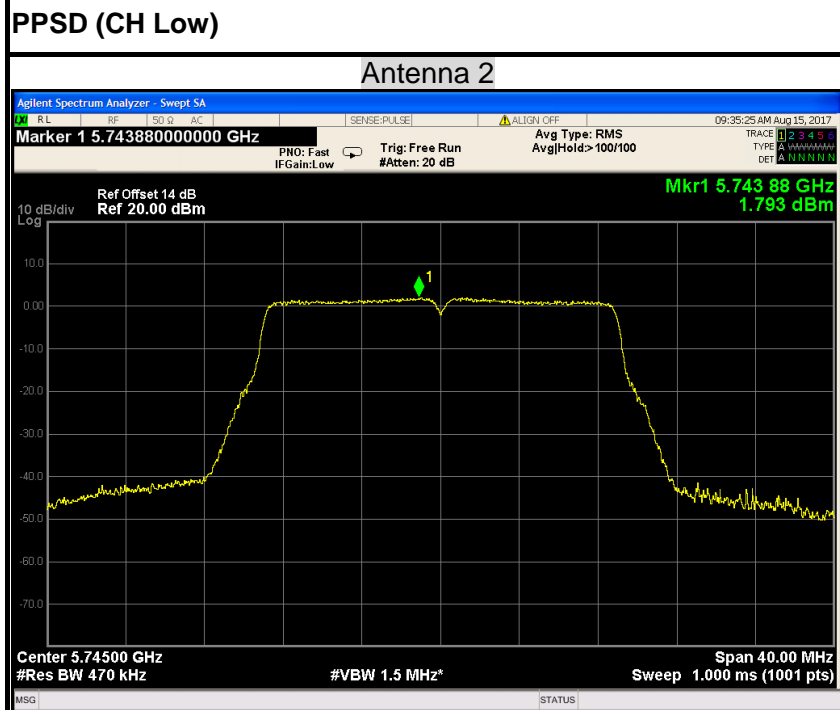


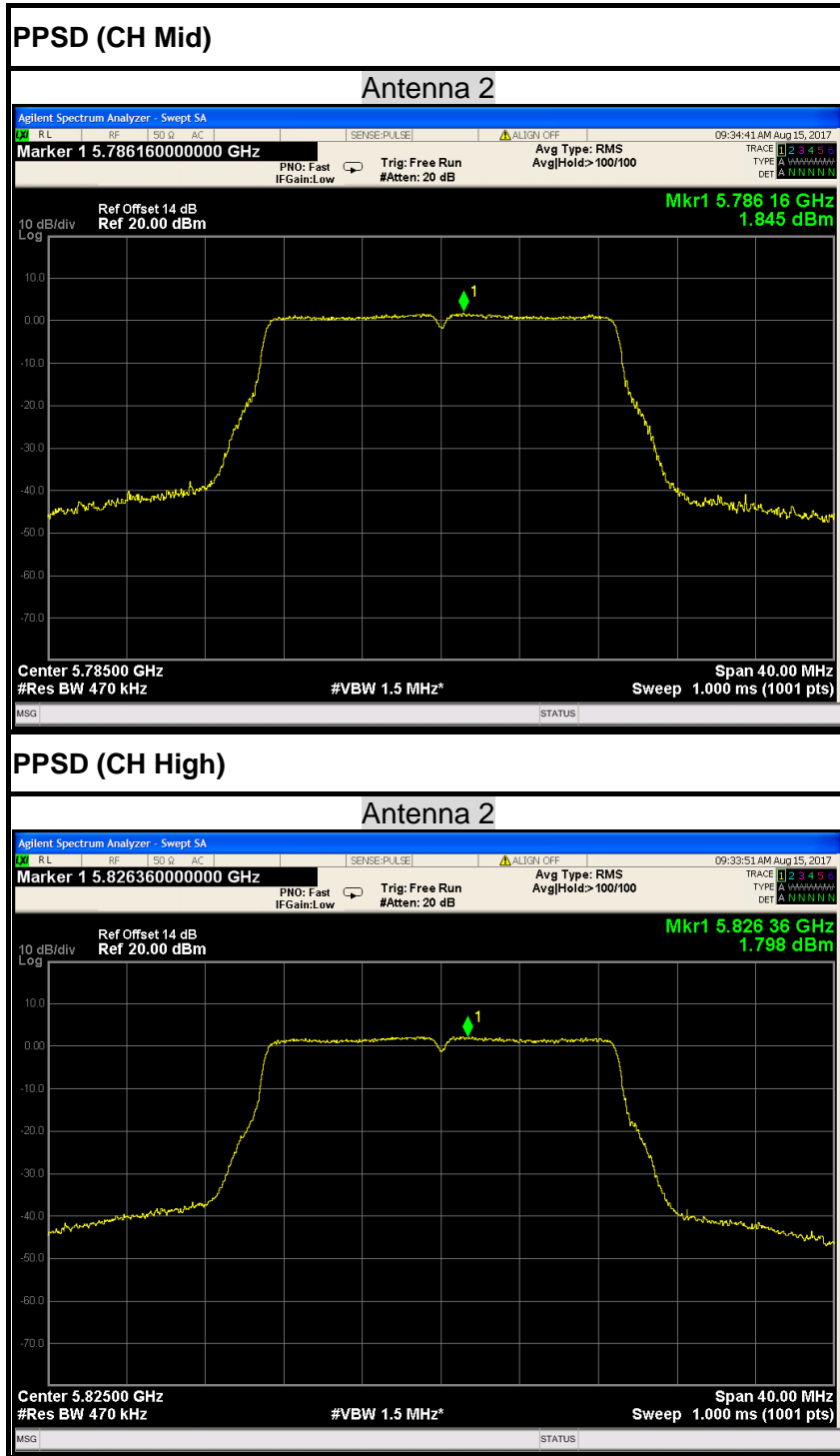






IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz



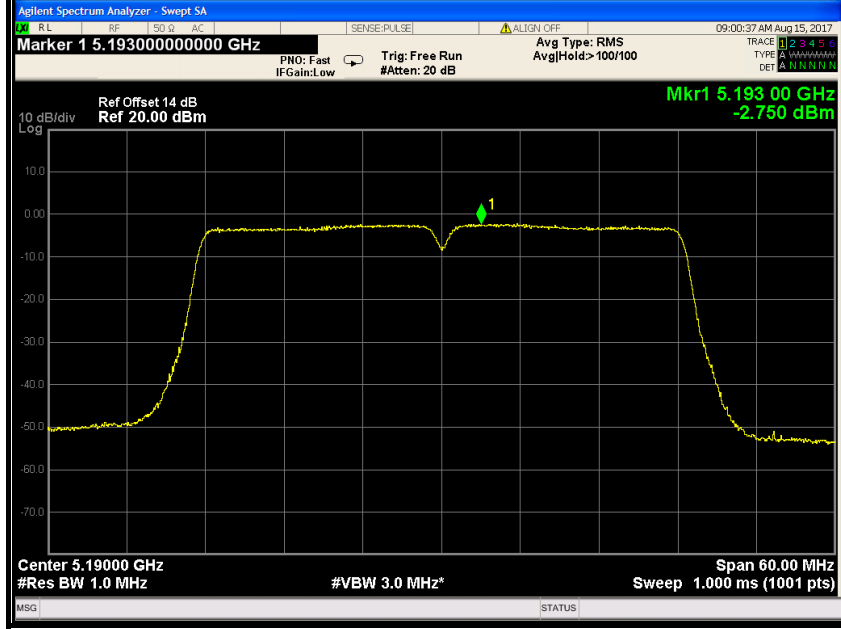




IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz

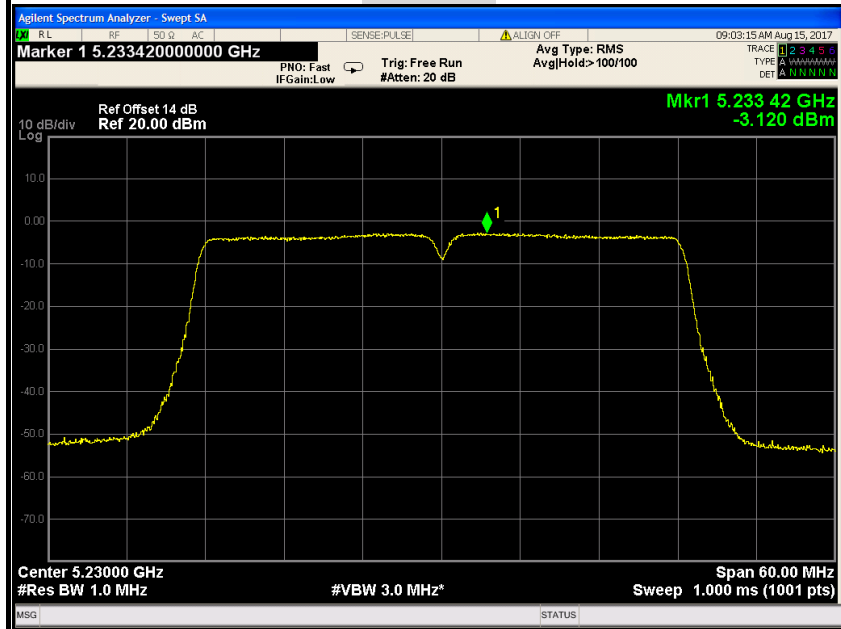
PPSD (CH Low)

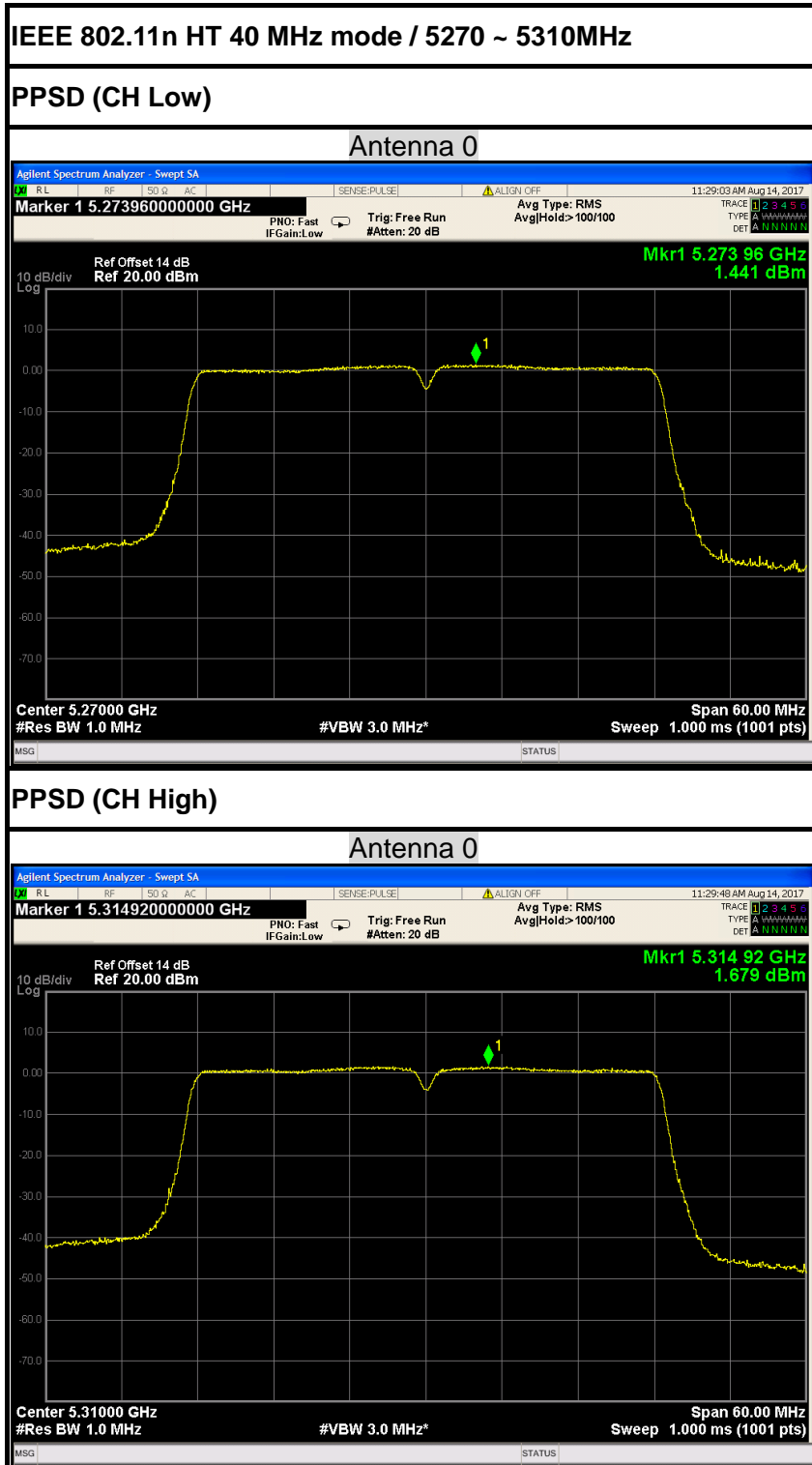
Antenna 0

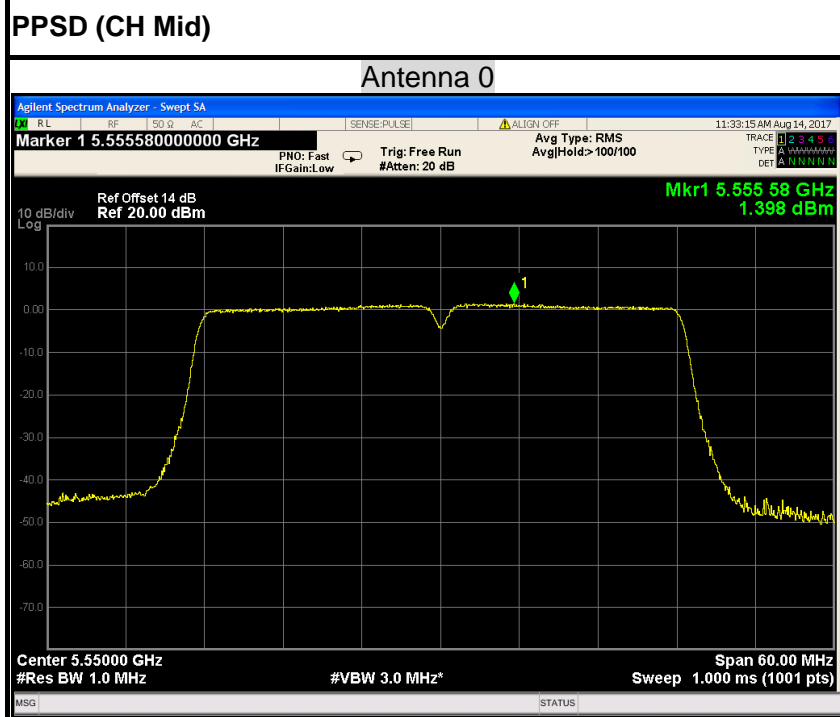
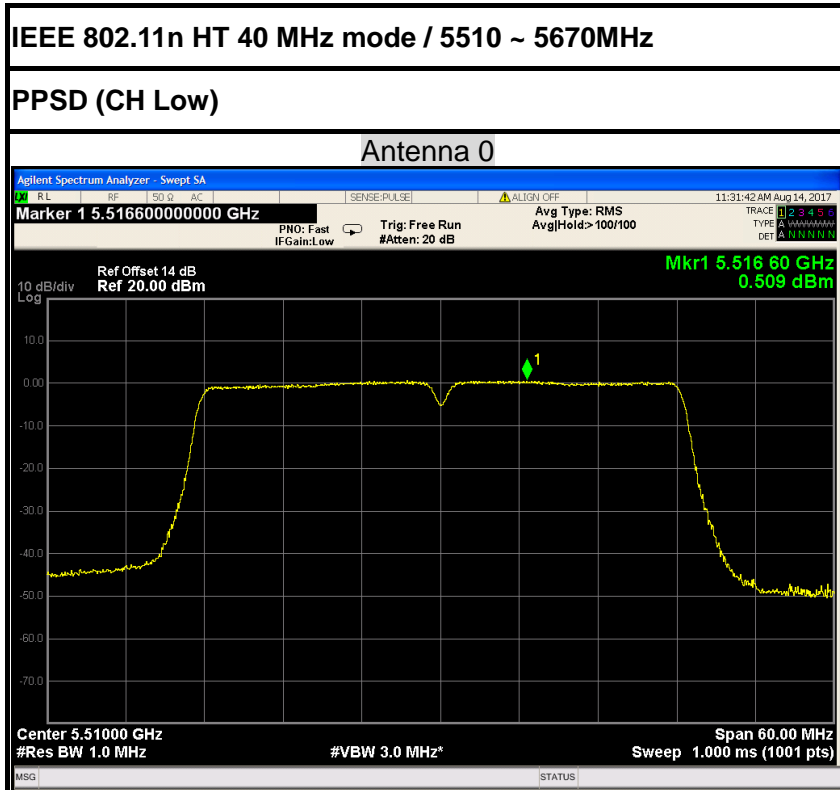


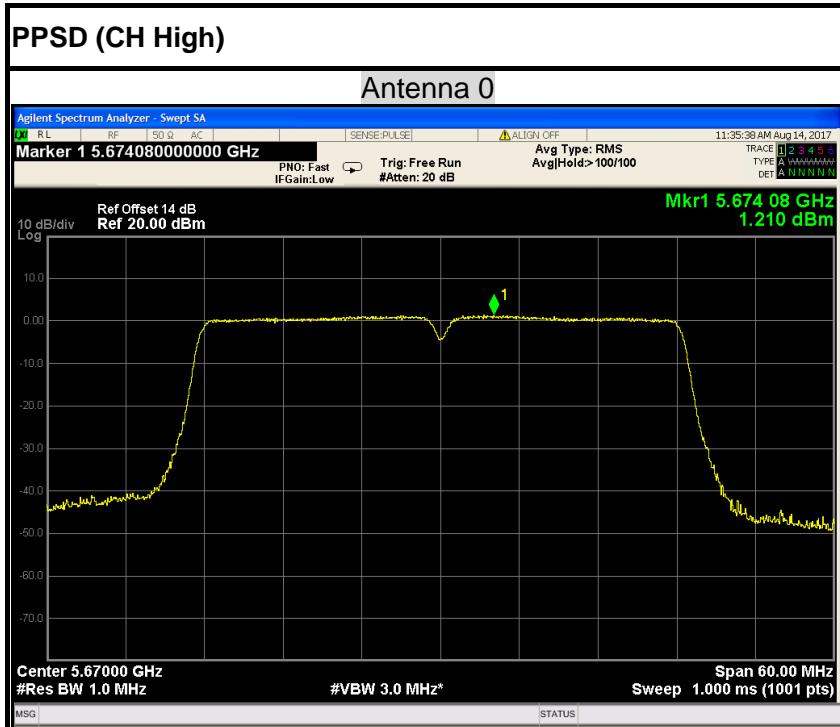
PPSD (CH High)

Antenna 0

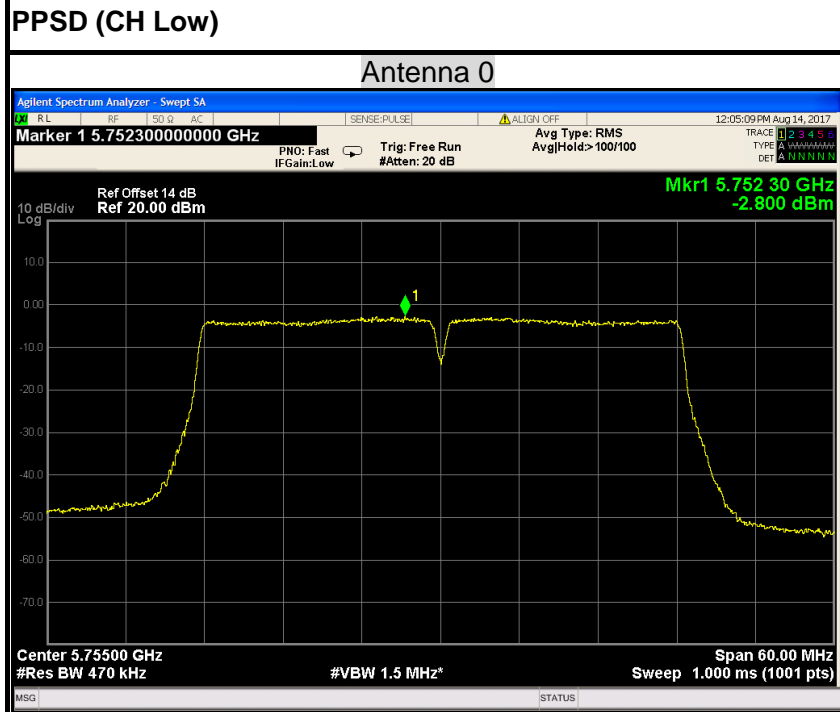


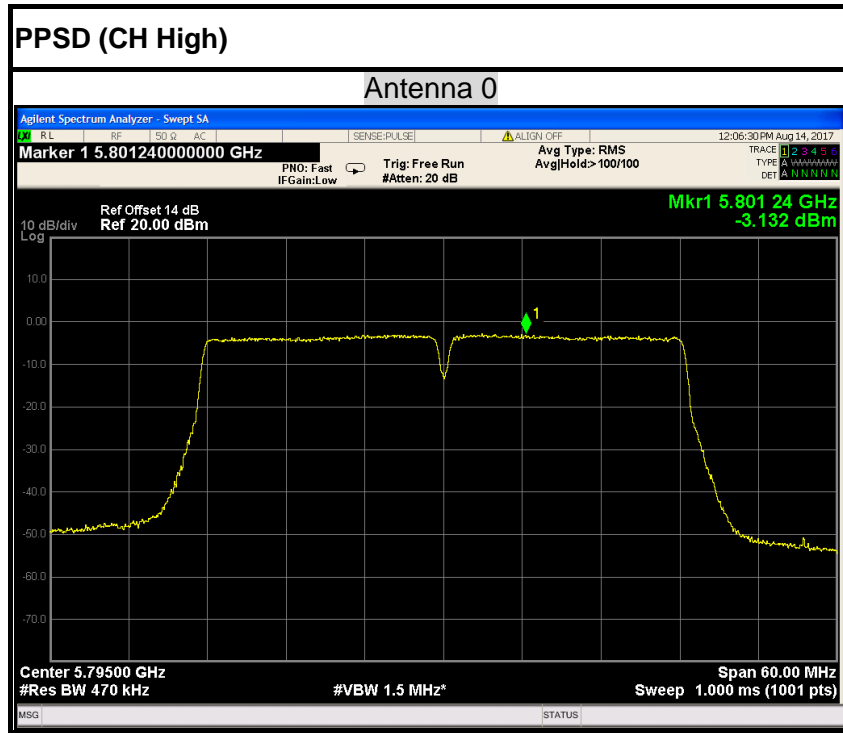


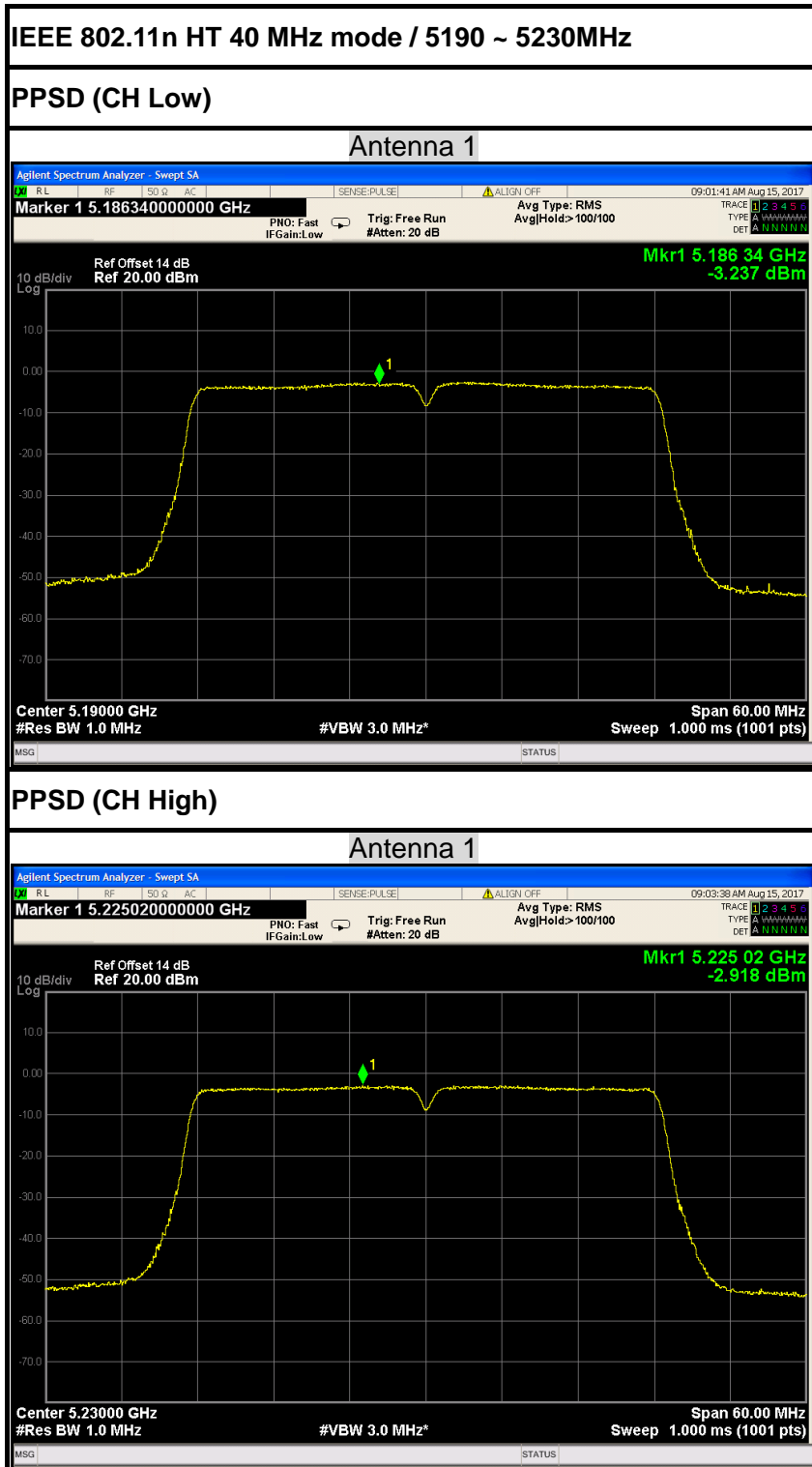


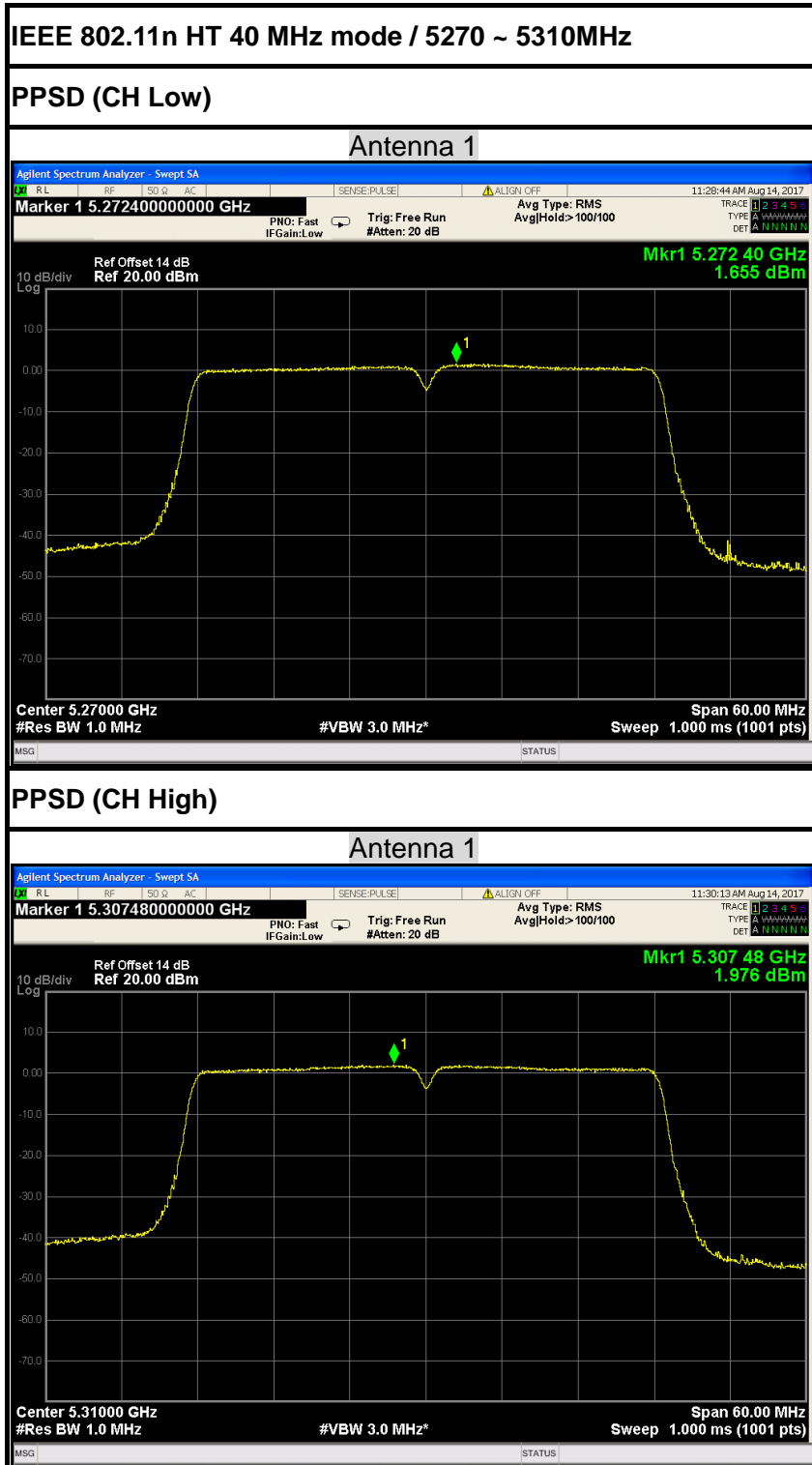


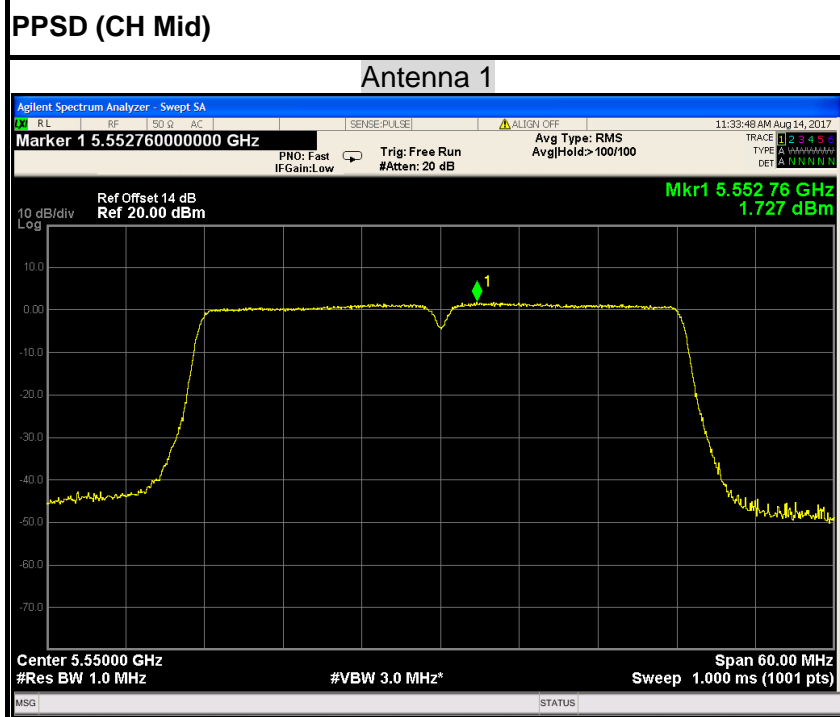
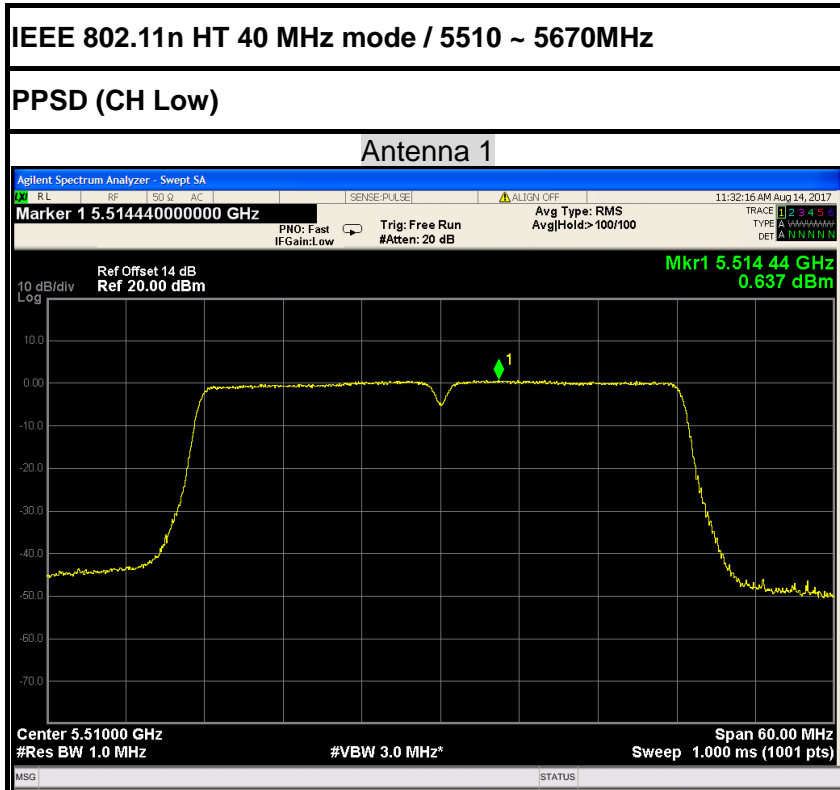
IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz

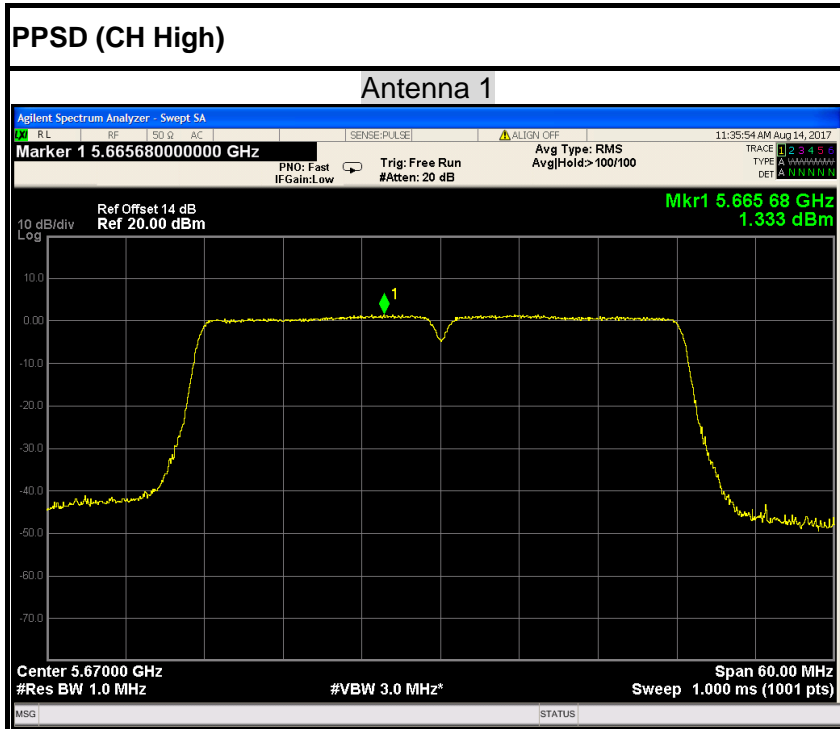




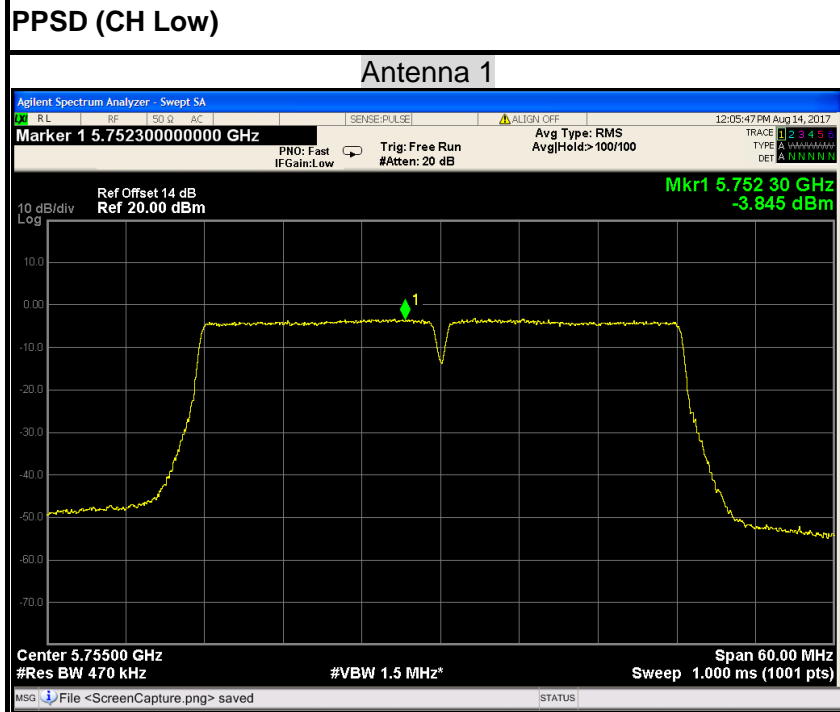


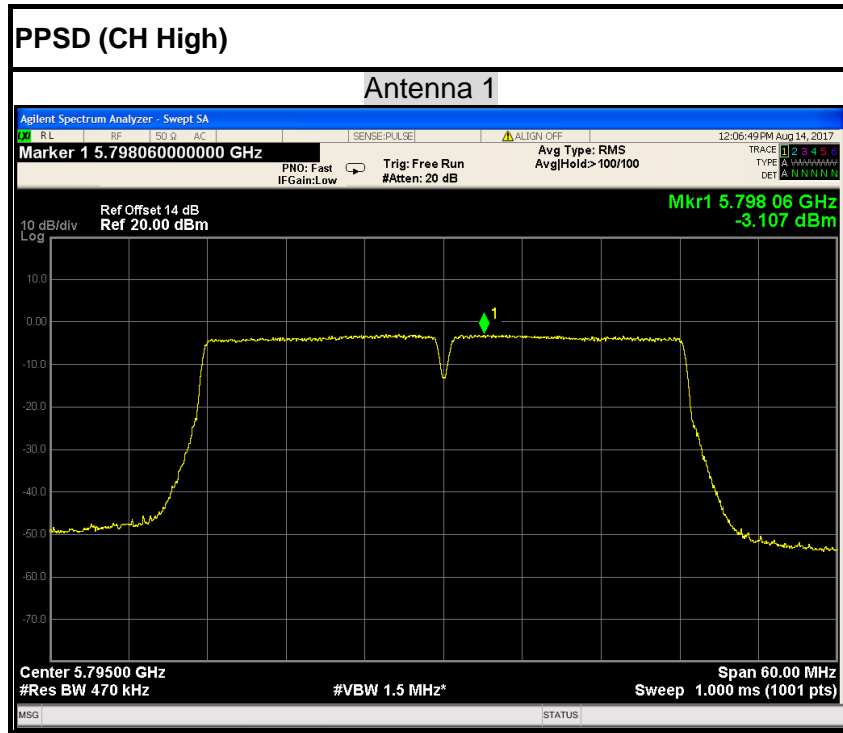


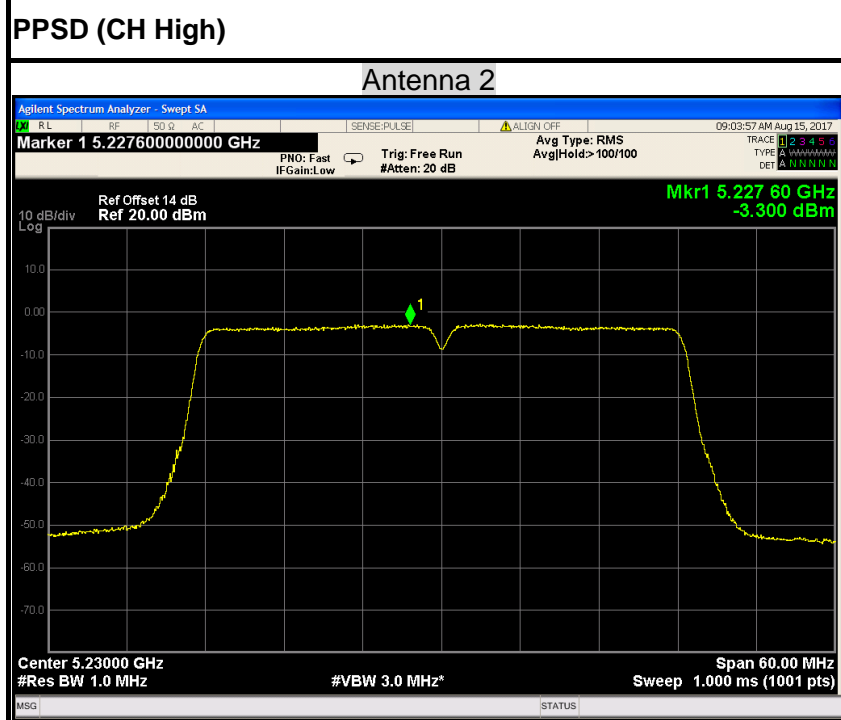
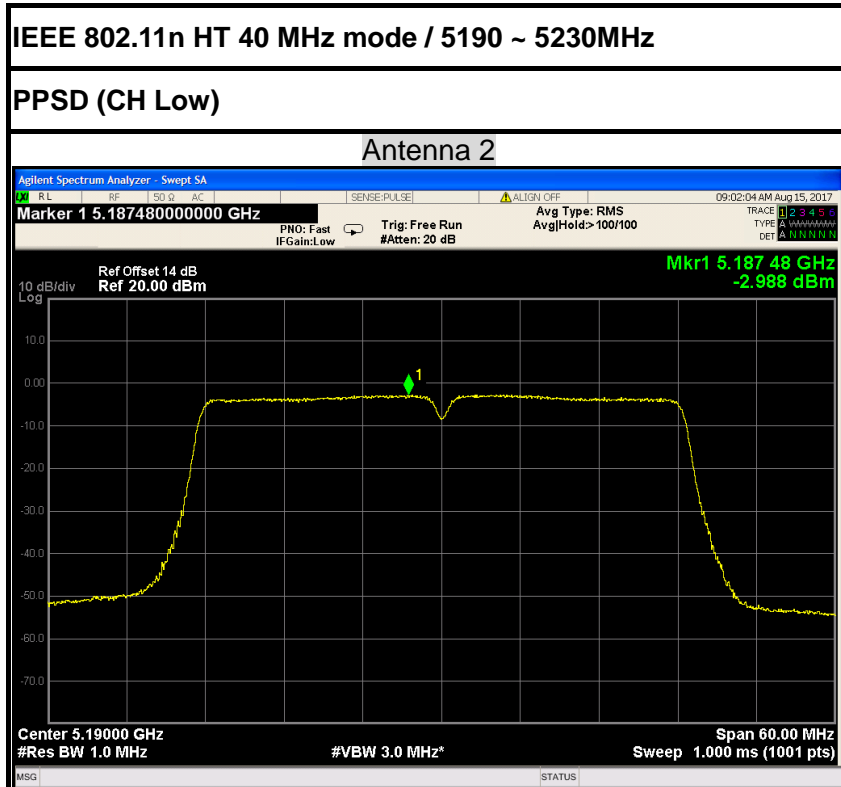


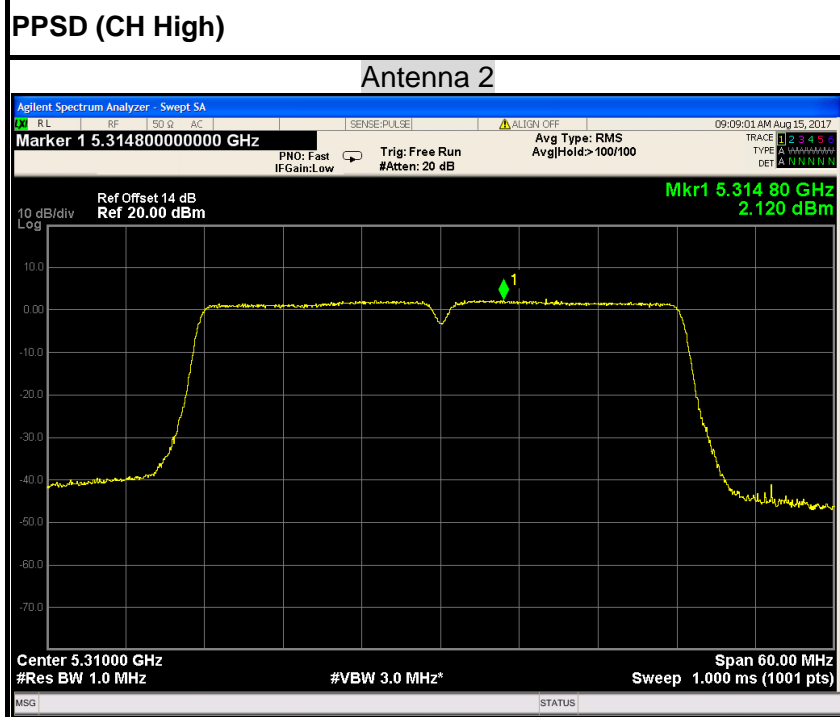
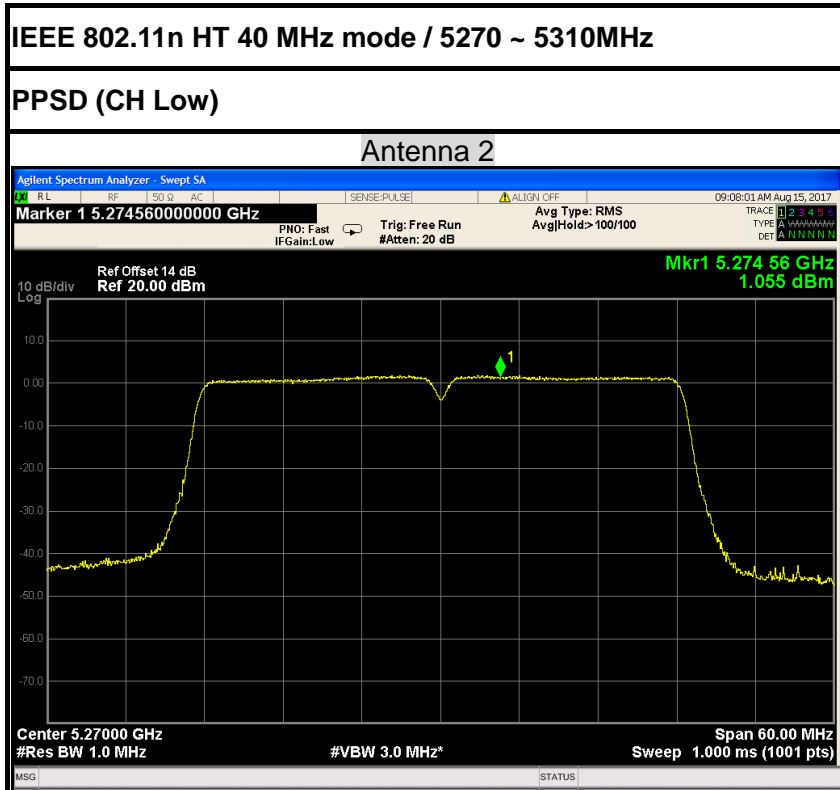


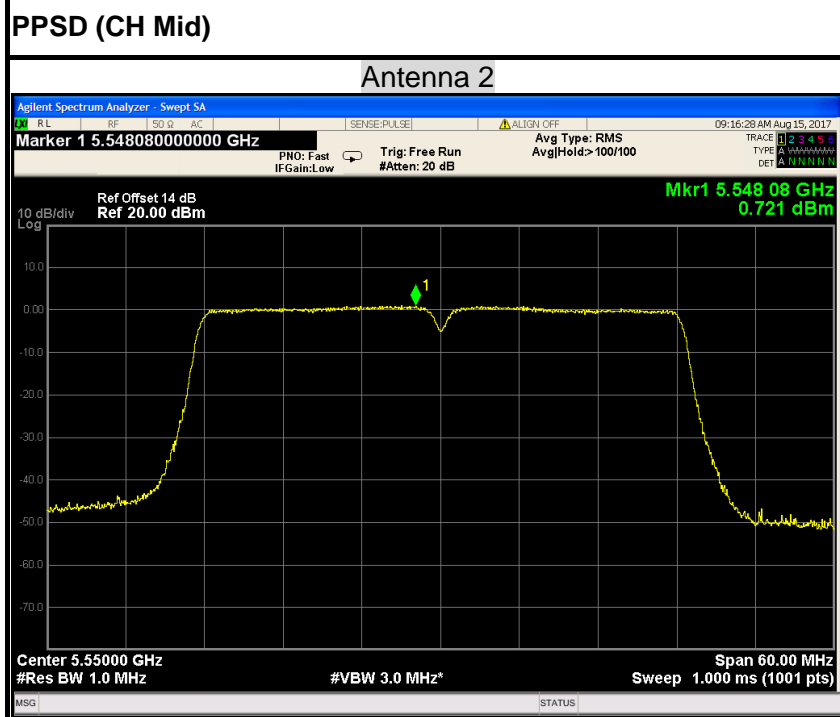
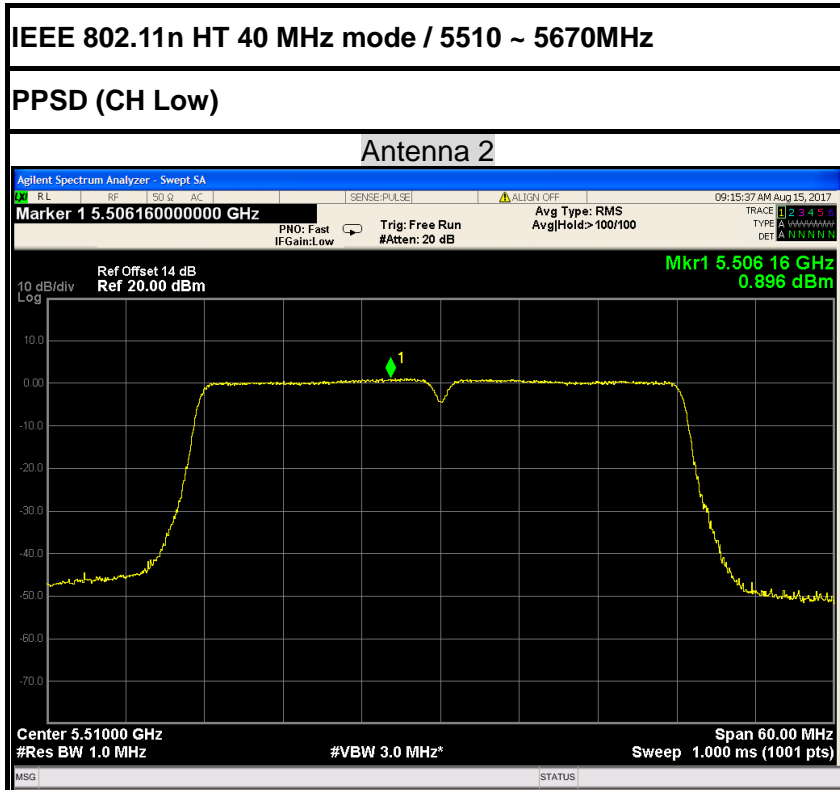
IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz

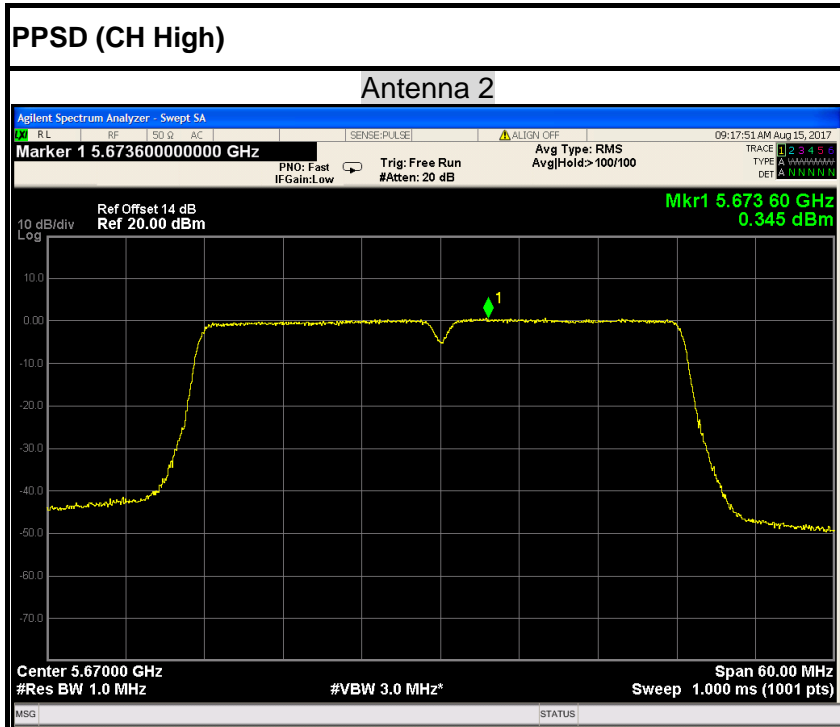












IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz

