

8.3 MAXIMUM PEAK POWER DENSITY

8.3.1 Applicable Standard

According to FCC Part 15.407(a)(1) for UNII Band I

According to FCC Part 15.407(a)(2) for UNII Band II-A and UNII Band II-C

According to FCC Part 15.407(a)(3) for UNII Band III

According to 789033 D02 Section II(F)

8.3.2 Conformance Limit

■ For the band 5.15-5.25 GHz,

(a) (1) (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. 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).

(a) (1) (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. 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.

(a) (1) (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. 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.

(a) (1) (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. 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.

■ For the 5.25-5.35 GHz and 5.47-5.725 GHz bands

(b) (2) 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.

■ For the band 5.725-5.85 GHz

(a) (3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.3.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.3.4 Test Procedure

Methods refer to FCC KDB 789033

1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power...".

2) Use the peak search function on the instrument to find the peak of the spectrum.

3) The result is the PPSD.

4) The above procedures make use of 500kHz resolution bandwidth to satisfy the 500kHz measurement bandwidth specified in the 15.407(a)(5). That rule section also permits use of resolution bandwidths less than 1 MHz "provided that the measured power is integrated to show the total power over the measurement bandwidth" (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 500kHz bandwidth

Note: As a practical matter, it is recommended to use reduced RBW of 500 kHz for the sections 5.c) and 5.d) above, since RBW=500 kHz is available on nearly all spectrum analyzers.

8.3.5 Test Results

☒ 802.11a mode						
Temperature :	28	Test Date :	March 31, 2017			
Humidity :	65 %	Test By:	King Kong			
Band	Channel Number	Channel Freq. (MHz)	Power Spectral Density		Limit	Verdict
			Ant0	Ant1		
UNII Band I	CH36	5180	-0.703	-1.188	≤11dBm/1MHz	Pass
	CH40	5200	-0.387	-0.404	≤11dBm/1MHz	Pass
	CH48	5240	-0.953	0.989	≤11dBm/1MHz	Pass
UNII Band II-A	CH52	5260	0.292	0.585	≤11dBm/1MHz	Pass
	CH56	5280	-0.002	0.688	≤11dBm/1MHz	Pass
	CH64	5320	0.644	1.169	≤11dBm/1MHz	Pass
UNII Band II-C	CH100	5500	1.359	1.565	≤11dBm/1MHz	Pass
	CH120	5600	2.509	2.241	≤11dBm/1MHz	Pass
	CH140	5700	1.405	1.335	≤11dBm/1MHz	Pass
UNII Band III	CH149	5745	-2.546	-2.406	≤30dBm/500KHz	Pass
	CH157	5785	-2.753	-2.579	≤30dBm/500KHz	Pass
	CH165	5825	-4.879	-4.550	≤30dBm/500KHz	Pass
Note: N/A (Not Applicable)						

☒ 802.11n(VHT20) mode						
Temperature :	28	Test Date :	March 31, 2017			
Humidity :	65 %	Test By:	King Kong			
Band	Channel Number	Channel Freq. (MHz)	Power Spectral Density		Limit	Verdict
			Ant0	Ant1		
UNII Band I	CH36	5180	-3.941	-3.923	≤11dBm/1MHz	Pass
	CH40	5200	-3.290	-2.929	≤11dBm/1MHz	Pass
	CH48	5240	-2.049	-1.875	≤11dBm/1MHz	Pass
UNII Band II-A	CH52	5260	-2.465	-1.899	≤11dBm/1MHz	Pass
	CH56	5280	-1.718	-1.725	≤11dBm/1MHz	Pass
	CH64	5320	-0.829	-0.833	≤11dBm/1MHz	Pass
UNII Band II-C	CH100	5500	-0.098	0.063	≤11dBm/1MHz	Pass
	CH120	5600	1.321	1.245	≤11dBm/1MHz	Pass
	CH140	5700	0.082	0.439	≤11dBm/1MHz	Pass
UNII Band III	CH149	5745	-3.554	-4.022	≤30dBm/500KHz	Pass
	CH157	5785	-4.319	-3.957	≤30dBm/500KHz	Pass
	CH165	5825	-6.281	-5.822	≤30dBm/500KHz	Pass

☒ 802.11ac(VHT20) mode			
Temperature :	28	Test Date :	March 31, 2017
Humidity :	65 %	Test By:	King Kong

Band	Channel Number	Channel Freq. (MHz)	Power Spectral Density		Limit	Verdict
			Ant0	Ant1		
UNII Band I	CH36	5180	-4.094	-3.923	≤11dBm/1MHz	Pass
	CH40	5200	-3.434	-3.088	≤11dBm/1MHz	Pass
	CH48	5240	-1.961	-1.473	≤11dBm/1MHz	Pass
UNII Band II-A	CH52	5260	-2.148	-2.258	≤11dBm/1MHz	Pass
	CH56	5280	-2.304	-2.020	≤11dBm/1MHz	Pass
	CH64	5320	-0.070	-0.744	≤11dBm/1MHz	Pass
UNII Band II-C	CH100	5500	-0.146	0.064	≤11dBm/1MHz	Pass
	CH120	5600	0.545	0.986	≤11dBm/1MHz	Pass
	CH140	5700	0.100	0.046	≤11dBm/1MHz	Pass
UNII Band III	CH149	5745	-3.816	-3.661	≤30dBm/500KHz	Pass
	CH157	5785	-4.535	-4.241	≤30dBm/500KHz	Pass
	CH165	5825	-6.100	-5.685	≤30dBm/500KHz	Pass

☒ 802.11n(VHT40) mode			
Temperature :	28	Test Date :	March 31, 2017
Humidity :	65 %	Test By:	King Kong

Band	Channel Number	Channel Freq. (MHz)	Power Spectral Density		Limit	Verdict
			Ant0	Ant1		
UNII Band I	CH38	5190	-7.449	-7.345	≤11dBm/1MHz	Pass
	CH46	5230	-5.780	-5.579	≤11dBm/1MHz	Pass
UNII Band II-A	CH54	5270	-5.477	-5.572	≤11dBm/1MHz	Pass
	CH62	5310	-4.155	-4.345	≤11dBm/1MHz	Pass
UNII Band II-C	CH102	5510	-2.895	-2.863	≤11dBm/1MHz	Pass
	CH118	5590	-2.939	-2.180	≤11dBm/1MHz	Pass
	CH134	5670	-2.716	-2.908	≤11dBm/1MHz	Pass
UNII Band III	CH151	5755	-7.240	-7.120	≤30dBm/500KHz	Pass
	CH159	5795	-8.123	-7.696	≤30dBm/500KHz	Pass

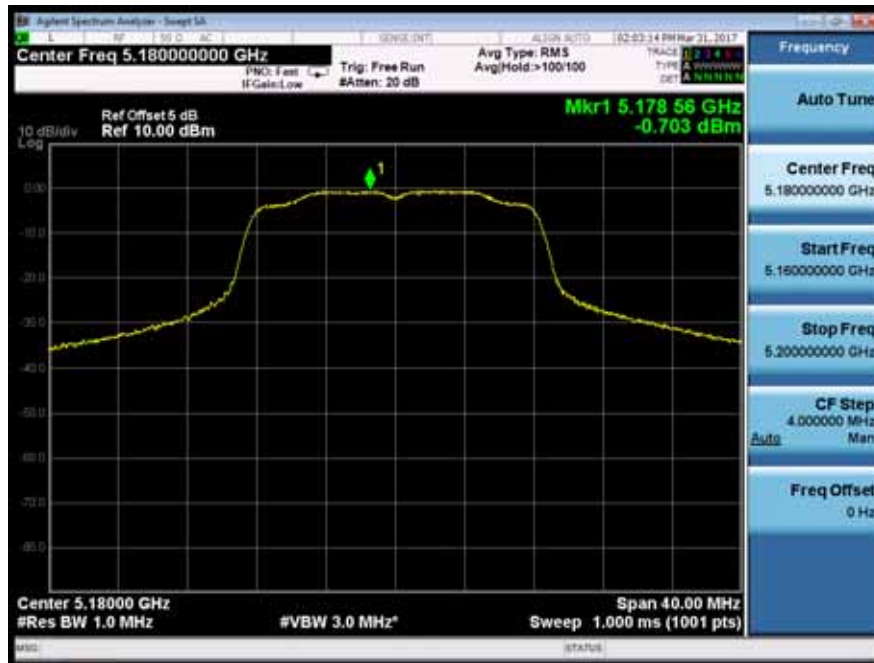
☒ 802.11ac(VHT40) mode			
Temperature :	28	Test Date :	March 31, 2017
Humidity :	65 %	Test By:	King Kong

Band	Channel Number	Channel Freq. (MHz)	Power Spectral Density		Limit	Verdict
			Ant0	Ant1		
UNII Band I	CH38	5190	-6.925	-6.955	≤11dBm/1MHz	Pass
	CH46	5230	-5.494	-5.645	≤11dBm/1MHz	Pass
UNII Band II-A	CH54	5270	-5.795	-5.445	≤11dBm/1MHz	Pass
	CH62	5310	-4.179	-4.156	≤11dBm/1MHz	Pass
UNII Band II-C	CH102	5510	-2.982	-2.939	≤11dBm/1MHz	Pass
	CH118	5590	-2.569	-2.541	≤11dBm/1MHz	Pass
	CH134	5670	-2.818	-2.572	≤11dBm/1MHz	Pass
UNII Band III	CH151	5755	-7.095	-7.150	≤30dBm/500KHz	Pass
	CH159	5795	-7.638	-7.304	≤30dBm/500KHz	Pass

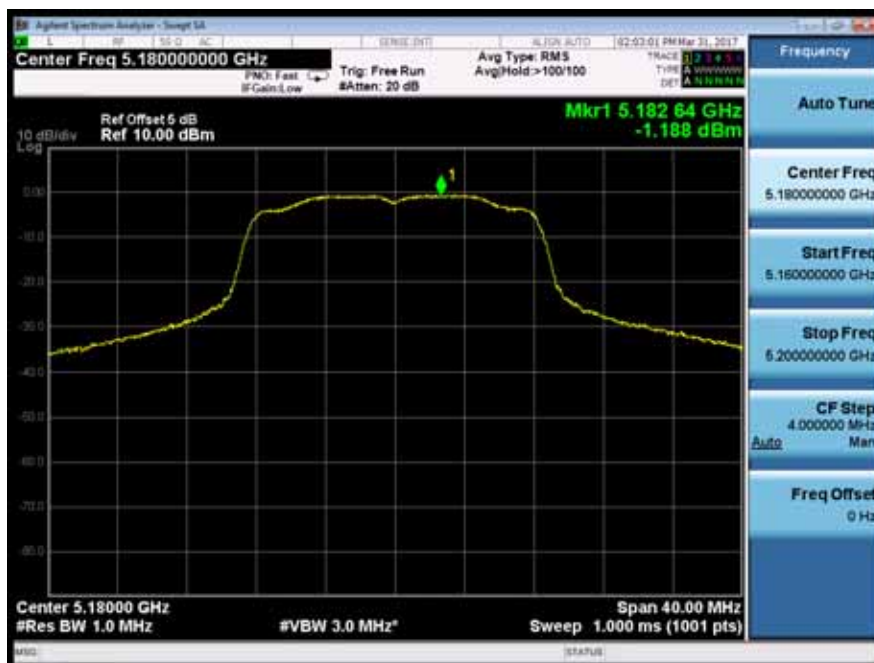
☒ 802.11ac(VHT80) mode			
Temperature :	28	Test Date :	March 31, 2017
Humidity :	65 %	Test By:	King Kong

Band	Channel Number	Channel Freq. (MHz)	Power Spectral Density		Limit	Verdict
			Ant0	Ant1		
UNII Band I	CH42	5210	-5.829	-8.814	≤11dBm/1MHz	Pass
UNII Band II-A	CH58	5290	-5.535	-8.966	≤11dBm/1MHz	Pass
UNII Band II-C	CH106	5530	-5.868	-7.840	≤11dBm/1MHz	Pass
	CH122	5610	-10.196	-7.861	≤11dBm/1MHz	Pass
UNII Band III	CH155	5775	-10.197	-5.566	≤30dBm/500KHz	Pass

Power Spectral Density	UNII Band I	
Test Model	802.11a	Frequency(MHz)
Ant0		5180



Ant1



Power Spectral Density	UNII Band I	
Test Model	802.11a	Frequency(MHz)
Ant0		5200



Ant1



Power Spectral Density	UNII Band I	
Test Model	802.11a	Frequency(MHz)
Ant0		5240



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Power Spectral Density	UNII Band II-A	
Test Model	802.11a	Frequency(MHz)
Ant0		5260



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Power Spectral Density	UNII Band II-A
Test Model 802.11a	Frequency(MHz) 5280
Ant0	



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Power Spectral Density	UNII Band II-A
Test Model 802.11a	Frequency(MHz) 5320
Ant0	



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Power Spectral Density	UNII Band II-C
Test Model 802.11a	Frequency(MHz) 5500
Ant0	



Ant1



Power Spectral Density	UNII Band II-C
Test Model 802.11a	Frequency(MHz) 5600
Ant0	



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Power Spectral Density	UNII Band II-C
Test Model 802.11a	Frequency(MHz) 5700
Ant0	



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Power Spectral Density	UNII Band III	
Test Model	802.11a	Frequency(MHz)
Ant0		5745



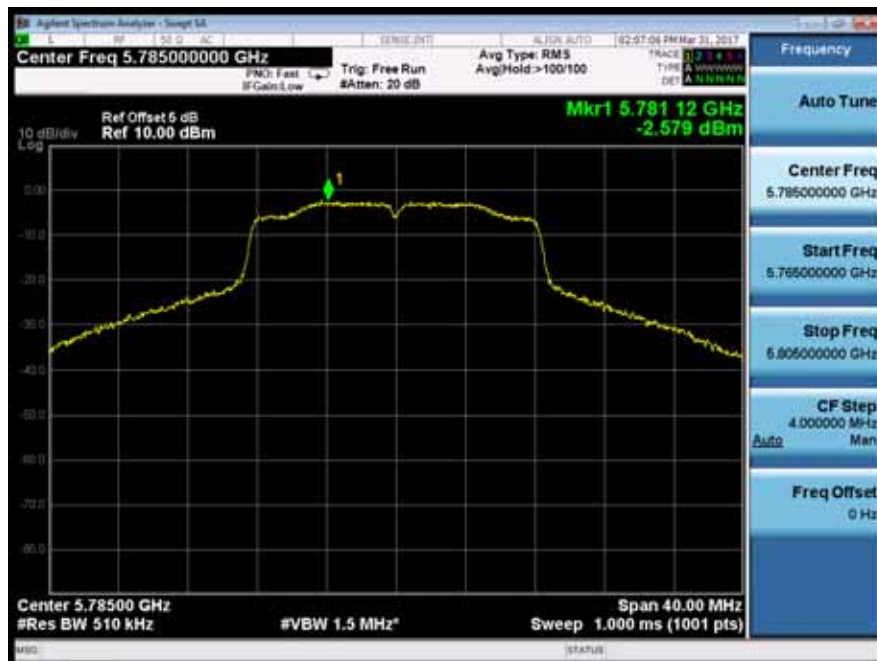
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Power Spectral Density	UNII Band III
Test Model 802.11a	Frequency(MHz) 5785
Ant0	



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Power Spectral Density	UNII Band III
Test Model 802.11a	Frequency(MHz) 5825
Ant0	



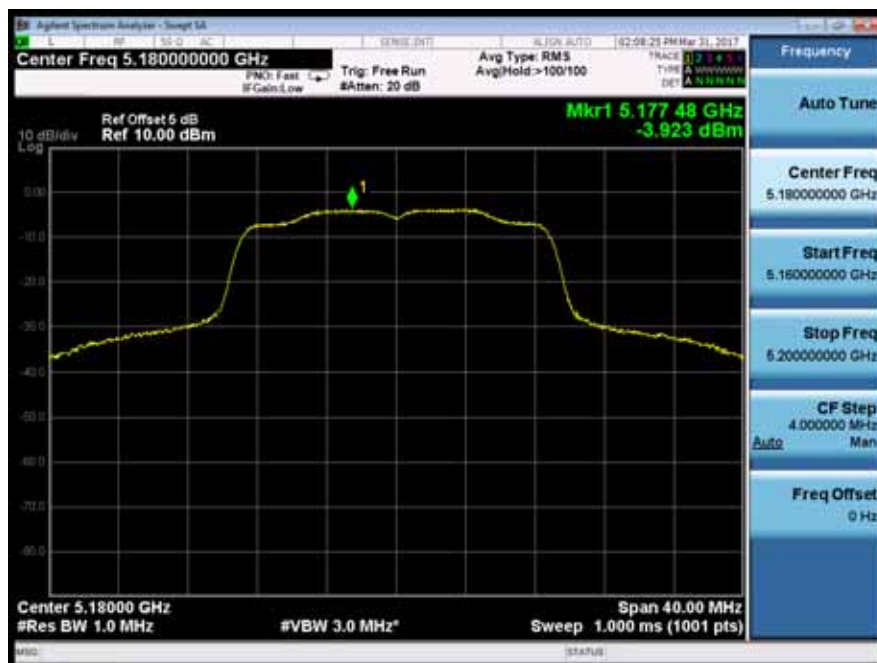
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Power Spectral Density		UNII Band I	
Test Model	802.11n(VHT20) mode	Frequency(MHz)	5180
Ant0			



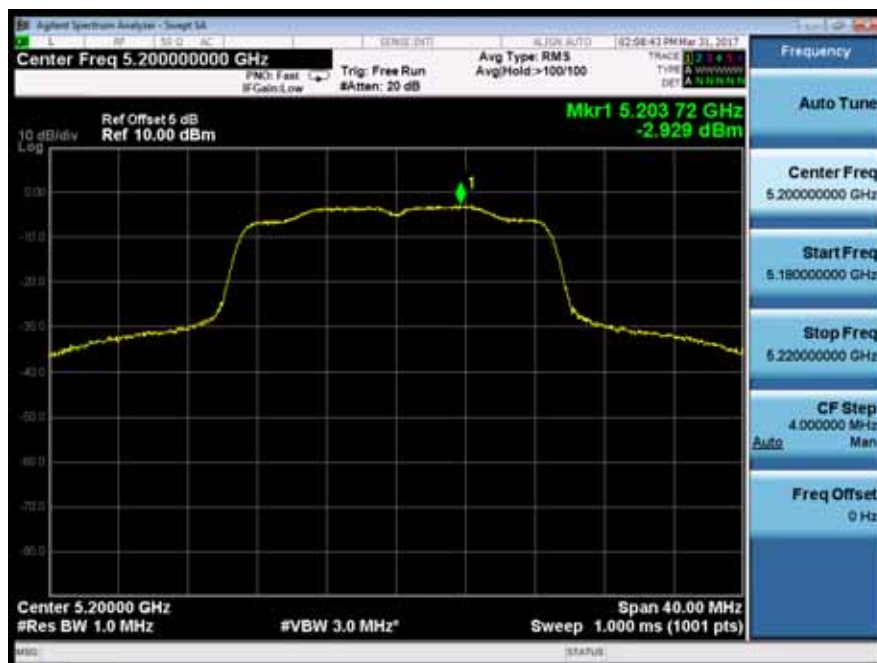
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Power Spectral Density		UNII Band I	
Test Model	802.11n(VHT20) mode	Frequency(MHz)	5200
Ant0			



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Power Spectral Density	UNII Band I
Test Model 802.11n(VHT20) mode	Frequency(MHz) 5240
Ant0	



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Power Spectral Density		UNII Band II-A	
Test Model	802.11n(VHT20) mode	Frequency(MHz)	5260
Ant0			



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Power Spectral Density		UNII Band II-A	
Test Model	802.11n(VHT20) mode	Frequency(MHz)	5280
Ant0			



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Power Spectral Density		UNII Band II-A	
Test Model	802.11n(VHT20) mode	Frequency(MHz)	5320
Ant0			



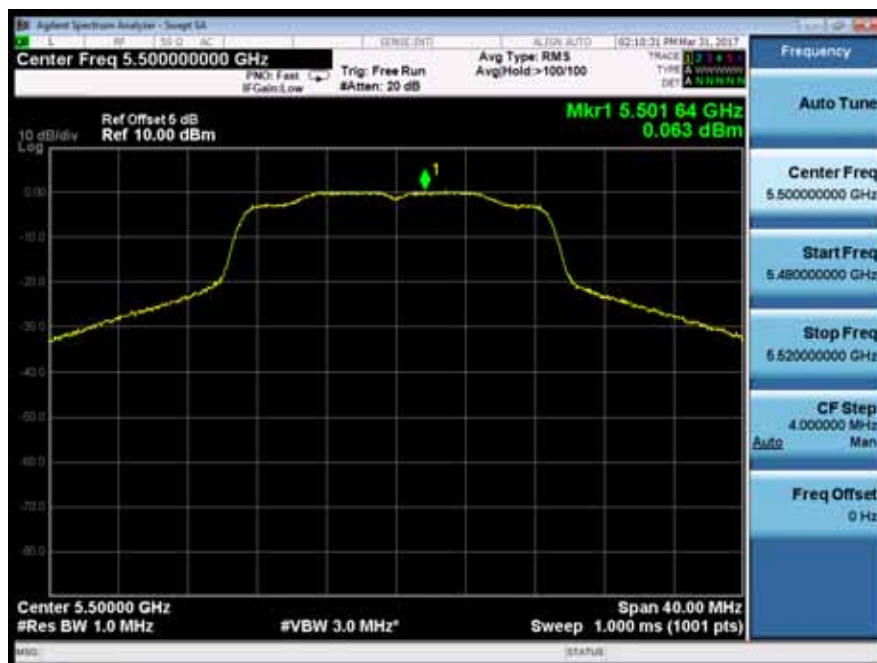
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Power Spectral Density		UNII Band II-C	
Test Model	802.11n(VHT20) mode	Frequency(MHz)	5500
Ant0			



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Power Spectral Density	UNII Band II-C		
Test Model	802.11n(VHT20) mode	Frequency(MHz)	5600
Ant0			



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Power Spectral Density		UNII Band II-C	
Test Model	802.11n(VHT20) mode	Frequency(MHz)	5700
Ant0			



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Power Spectral Density	UNII Band III
Test Model 802.11n(VHT20) mode	Frequency(MHz) 5745
Ant0	



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Power Spectral Density	UNII Band III
Test Model	802.11n(VHT20) mode
Frequency(MHz)	5785
Ant0	



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Power Spectral Density	UNII Band III
Test Model 802.11n(VHT20) mode	Frequency(MHz) 5825
Ant0	



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Power Spectral Density	UNII Band I	
Test Model	802.11ac(VHT20) mode	Frequency(MHz)
Ant0		5180



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Power Spectral Density	UNII Band I	
Test Model	802.11ac(VHT20) mode	Frequency(MHz)
Ant0		5200



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Power Spectral Density	UNII Band I
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5240
Ant0	



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Power Spectral Density	UNII Band II-A
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5260
Ant0	



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Power Spectral Density		UNII Band II-A	
Test Model	802.11ac(VHT20) mode	Frequency(MHz)	5280
Ant0			



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Power Spectral Density		UNII Band II-A	
Test Model	802.11ac(VHT20) mode	Frequency(MHz)	5320
Ant0			



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Power Spectral Density		UNII Band II-C	
Test Model	802.11ac(VHT20) mode	Frequency(MHz)	5500
Ant0			



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Power Spectral Density		UNII Band II-C	
Test Model	802.11ac(VHT20) mode	Frequency(MHz)	5600
Ant0			



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Power Spectral Density		UNII Band II-C	
Test Model	802.11ac(VHT20) mode	Frequency(MHz)	5700
Ant0			



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Power Spectral Density	UNII Band III
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5745
Ant0	



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Power Spectral Density	UNII Band III
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5785
Ant0	



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Power Spectral Density	UNII Band III
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5825
Ant0	



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Power Spectral Density	UNII Band I	
Test Model	802.11n(VHT40) mode	Frequency(MHz)
Ant0		5190



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Power Spectral Density	UNII Band I
Test Model 802.11n(VHT40) mode	Frequency(MHz) 5230
Ant0	



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Power Spectral Density	UNII Band II-A		
Test Model	802.11n(VHT40) mode	Frequency(MHz)	5270
Ant0			



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Power Spectral Density		UNII Band II-A	
Test Model	802.11n(VHT40) mode	Frequency(MHz)	5310
Ant0			



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Power Spectral Density		UNII Band II-C	
Test Model	802.11n(VHT40) mode	Frequency(MHz)	5510
Ant0			



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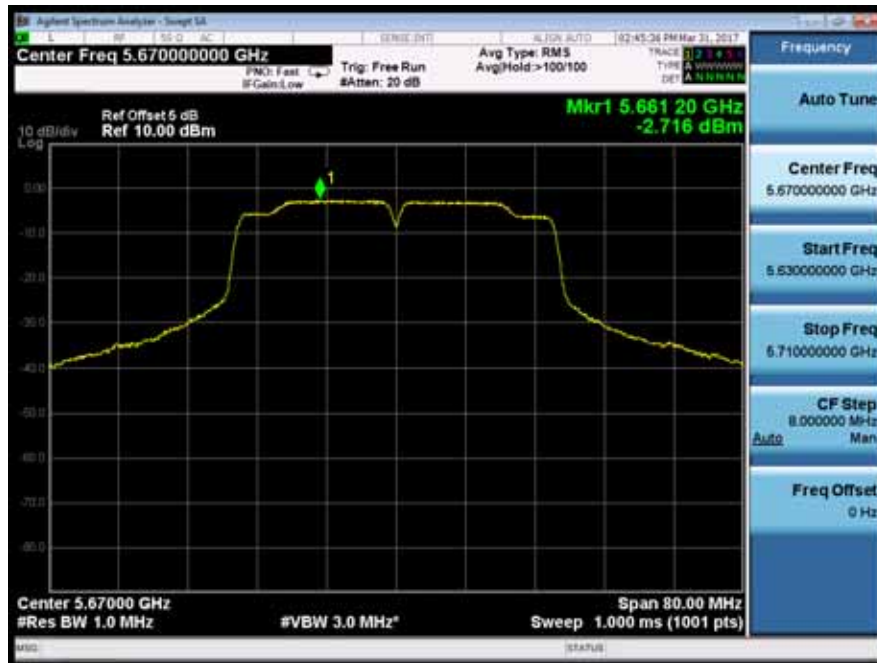
Power Spectral Density	UNII Band II-C		
Test Model	802.11n(VHT40) mode	Frequency(MHz)	5590
Ant0			



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Power Spectral Density		UNII Band II-C	
Test Model	802.11n(VHT40) mode	Frequency(MHz)	5670
Ant0			



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Power Spectral Density	UNII Band III
Test Model 802.11n(VHT40) mode	Frequency(MHz) 5755
Ant0	



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Power Spectral Density	UNII Band III
Test Model 802.11n(VHT40) mode	Frequency(MHz) 5795
Ant0	



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