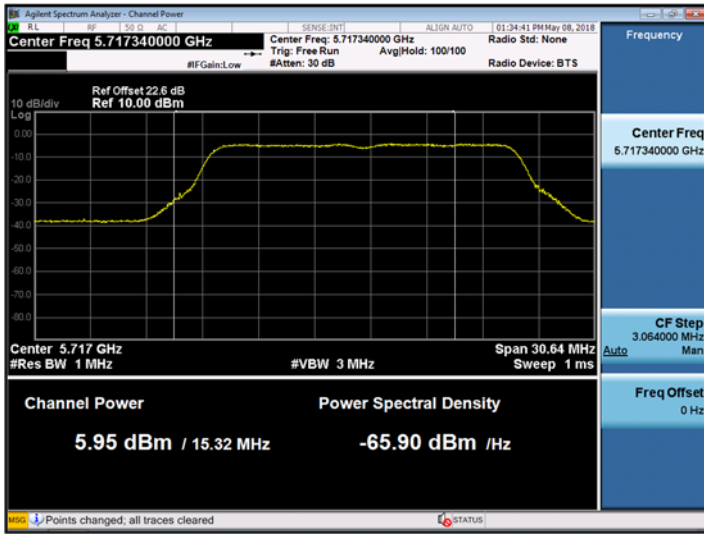


Straddle channels TEST Plot for 802.11a/n_HT20_Ant 3

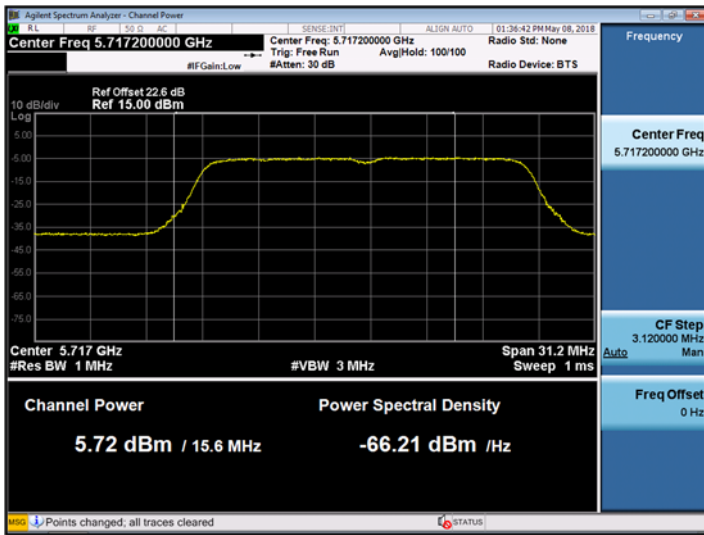
802.11a UNII 2C Band Average Power CH.144



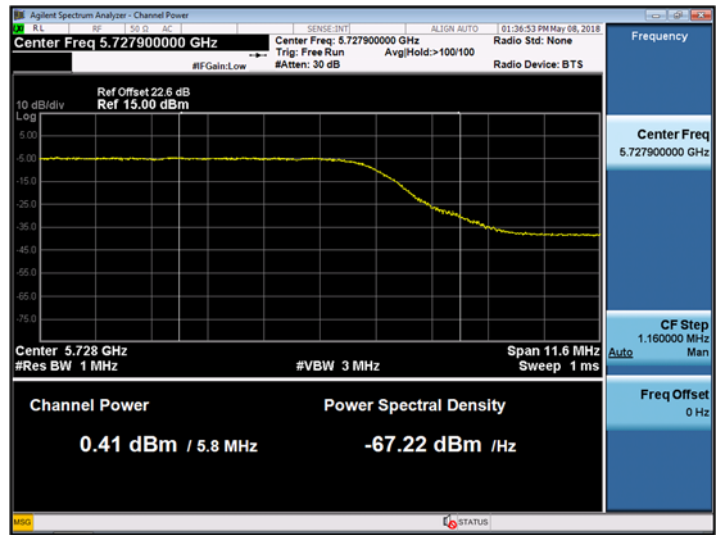
802.11a UNII 3 Band Average Power CH.144



802.11n_HT20 UNII 2C Band Average Power CH.144

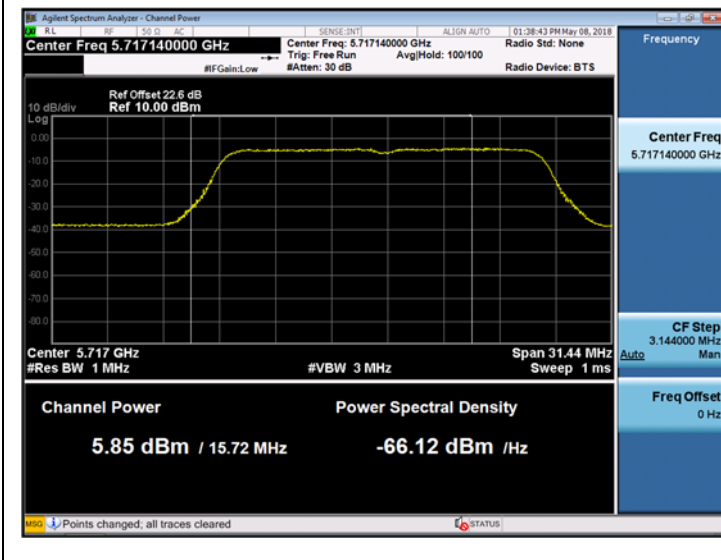


802.11n_HT20 UNII 3 Band Average Power CH.144

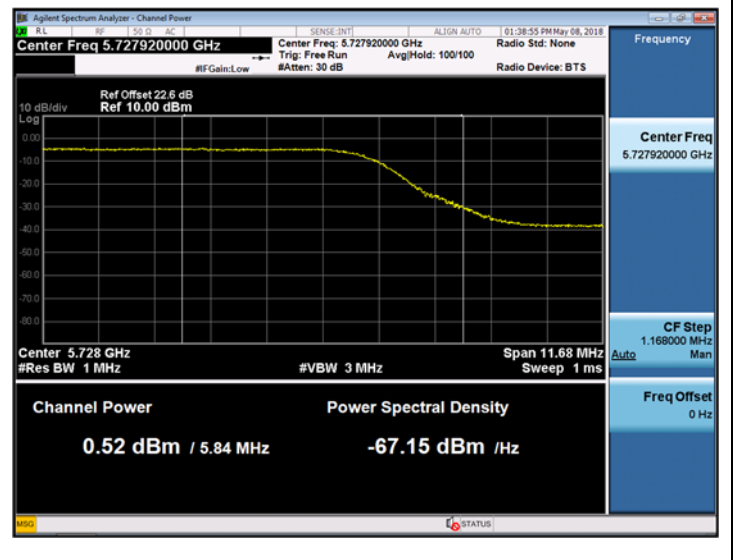


Straddle channels TEST Plot for 802.11ac_VHT20_Ant 3

802.11ac_VHT20 UNII 2C Band Average Power CH.144



802.11ac_VHT20 UNII 3 Band Average Power CH.144



▣ Straddle channels TEST RESULTS_ Sum Data of Ant.0 and Ant.1 and Ant.2 and Ant.3

Conducted Output Power Measurements (802.11a/n_HT20/ac_VHT20 Mode: UNII 2C Band 5720MHz)

Mode (MIMO)	Frequency [MHz]	Channel No.	Sum Power of Ant.0 & 1 & 2 & 3	Limit (dBm)
802.11a	5720	144	12.50	22.21
802.11n			12.44	22.15
802.11ac			12.72	22.13

Conducted Output Power Measurements (802.11a/n_HT20/ac_VHT20 Mode: UNII 3 Band 5720MHz)

Mode (MIMO)	Frequency [MHz]	Channel No.	Sum Power of Ant.0 & 1 & 2 & 3	Limit (dBm)
802.11a	5720	144	6.72	23.60
802.11n			7.09	23.78
802.11ac			7.31	23.84

Note : The limit on maximum conducted output power in each U-NII band is computed based on the portion of the emission bandwidth contained within that band.

▣ Straddle channels TEST RESULTS_Ant 0

Conducted Output Power Measurements (802.11n_HT40/ac_VHT40 Mode: UNII 2C Band 5710MHz)

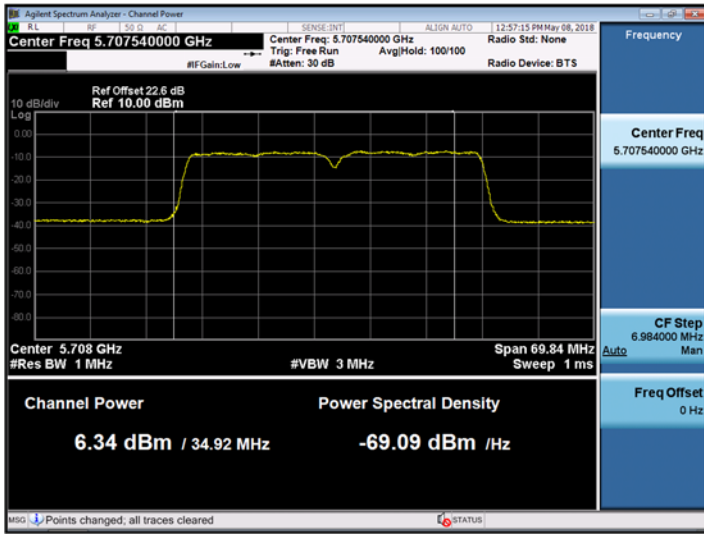
Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11n	5710	142	6.34	0.719	7.06	22.92
802.11ac			6.55	0.939	7.49	22.91

Conducted Output Power Measurements (802.11n_HT40/ac_VHT40 Mode: UNII 3 Band 5710MHz)

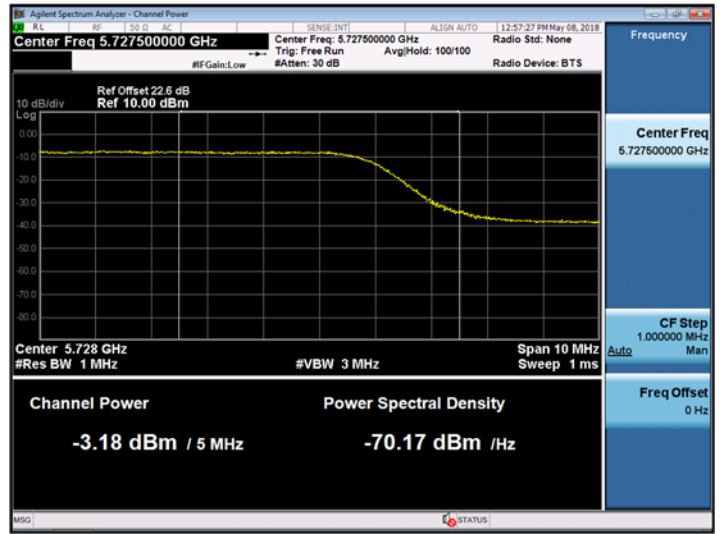
Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11n	5710	142	-3.18	0.719	-2.46	20.49
802.11ac			-2.86	0.939	-1.92	20.51

Straddle channels TEST Plot for 802.11n_HT40/ac_VHT40_Ant 0

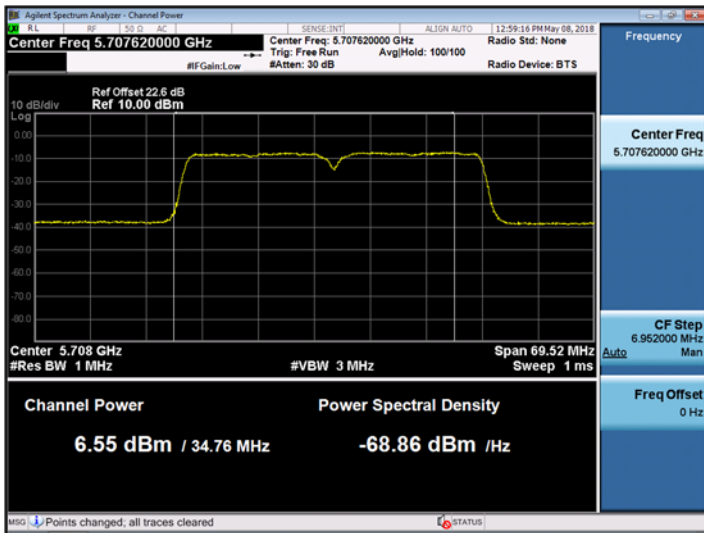
802.11n_HT40 UNII 2C Band Average Power CH.142



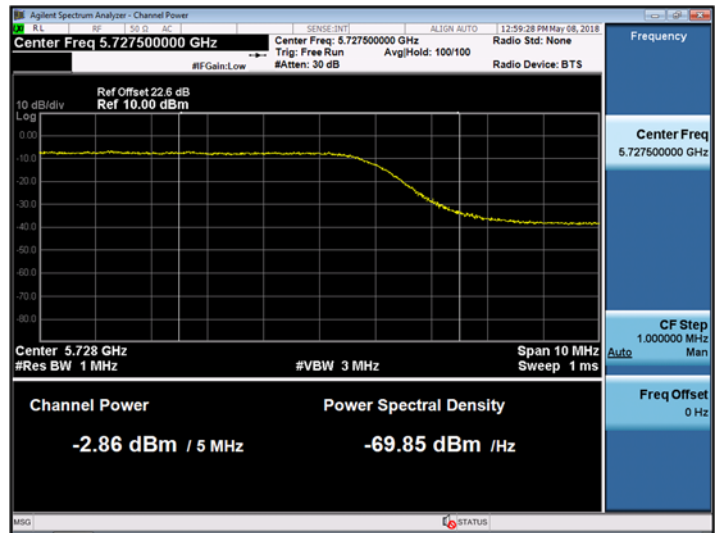
802.11n_HT40 UNII 3 Band Average Power CH.142



802.11ac_VHT40 UNII 2C Band Average Power CH.142



802.11ac_VHT40 UNII 3 Band Average Power CH.142



▣ Straddle channels TEST RESULTS_Ant 1

Conducted Output Power Measurements (802.11n_HT40/ac_VHT40 Mode: UNII 2C Band 5710MHz)

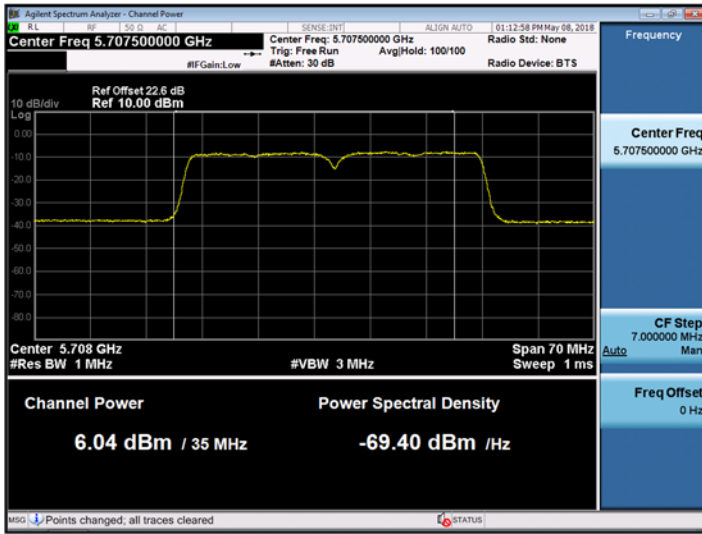
Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11n	5710	142	6.04	0.719	6.76	22.90
802.11ac			6.23	0.939	7.17	22.88

Conducted Output Power Measurements (802.11n_HT40/ac_VHT40 Mode: UNII 3 Band 5710MHz)

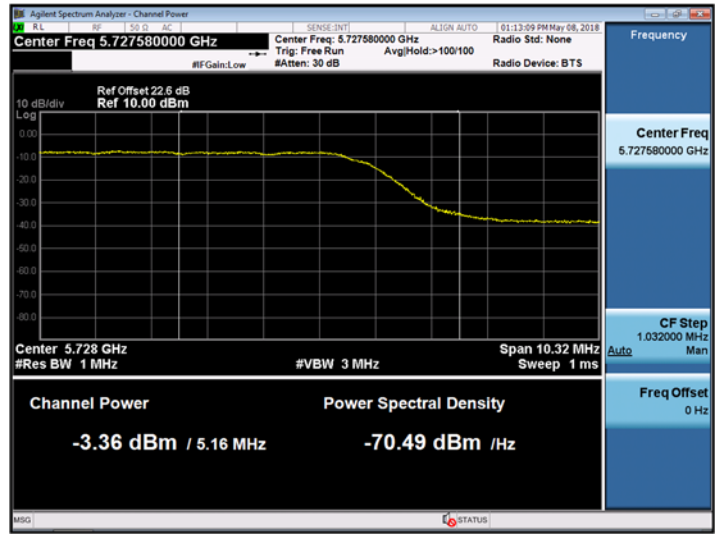
Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11n	5710	142	-3.36	0.719	-2.64	20.60
802.11ac			-3.24	0.939	-2.30	20.73

▣ Straddle channels TEST Plot for 802.11n_HT40/ac_VHT40_Ant 1

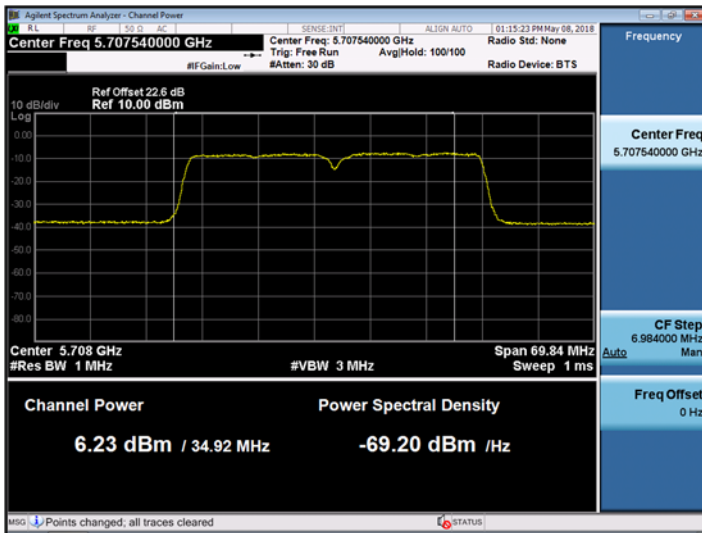
802.11n_HT40 UNII 2C Band Average Power CH.142



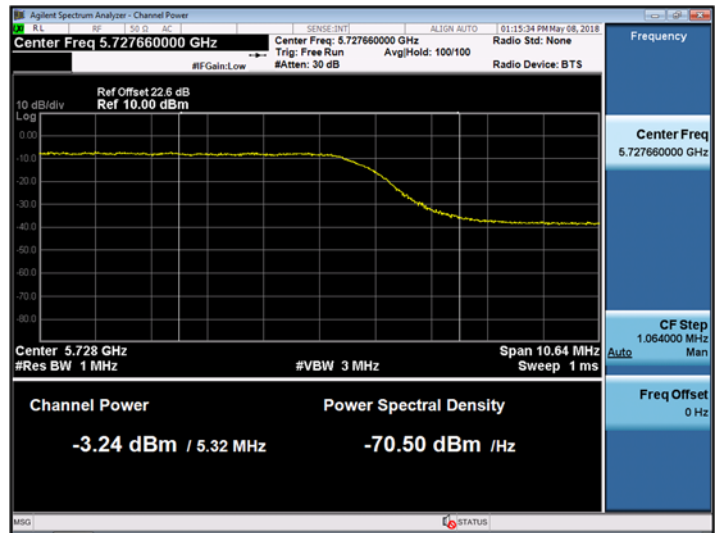
802.11n_HT40 UNII 3 Band Average Power CH.142



802.11ac_VHT40 UNII 2C Band Average Power CH.142



802.11ac_VHT40 UNII 3 Band Average Power CH.142



▣ Straddle channels TEST RESULTS_Ant 2

Conducted Output Power Measurements (802.11n_HT40/ac_VHT40 Mode: UNII 2C Band 5710MHz)

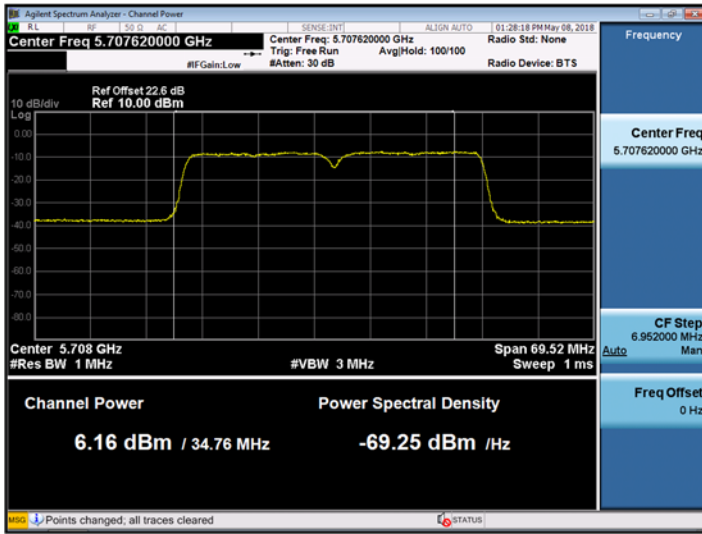
Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11n	5710	142	6.16	0.719	6.88	22.86
802.11ac			6.42	0.939	7.36	22.88

Conducted Output Power Measurements (802.11n_HT40/ac_VHT40 Mode: UNII 3 Band 5710MHz)

Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11n	5710	142	-3.26	0.719	-2.54	20.86
802.11ac			-2.97	0.939	-2.03	20.71

Straddle channels TEST Plot for 802.11n_HT40/ac_VHT40_Ant 2

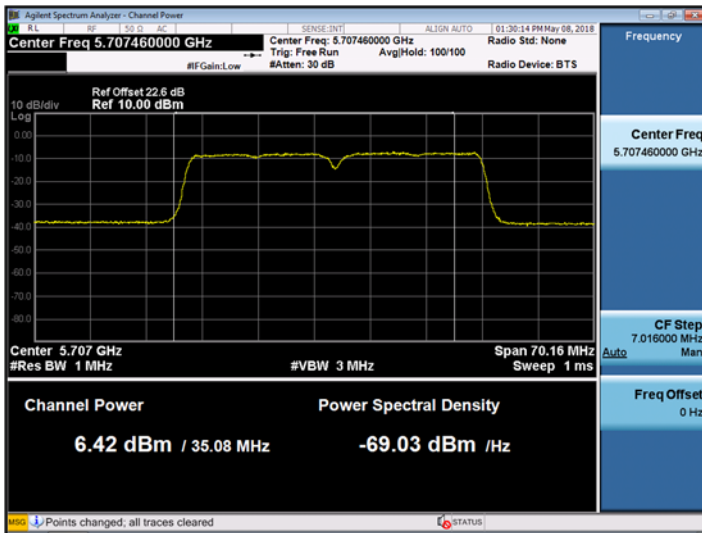
802.11n_HT40 UNII 2C Band Average Power CH.142



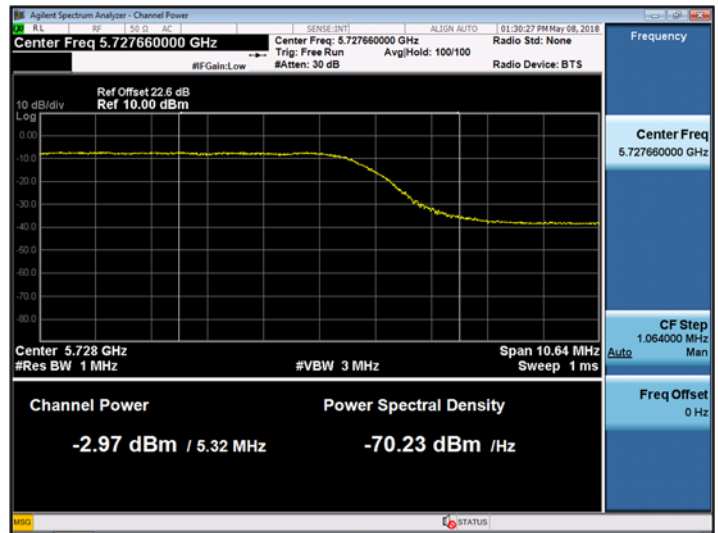
802.11n_HT40 UNII 3 Band Average Power CH.142



802.11ac_VHT40 UNII 2C Band Average Power CH.142



802.11ac_VHT40 UNII 3 Band Average Power CH.142



▣ Straddle channels TEST RESULTS_Ant 3

Conducted Output Power Measurements (802.11n_HT40/ac_VHT40 Mode: UNII 2C Band 5710MHz)

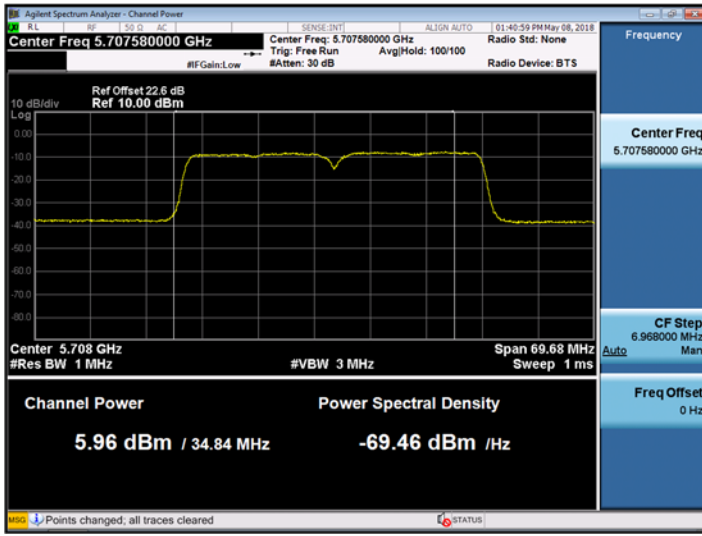
Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11n	5710	142	5.96	0.719	6.68	22.90
802.11ac			6.13	0.835	6.97	22.87

Conducted Output Power Measurements (802.11n_HT40/ac_VHT40 Mode: UNII 3 Band 5710MHz)

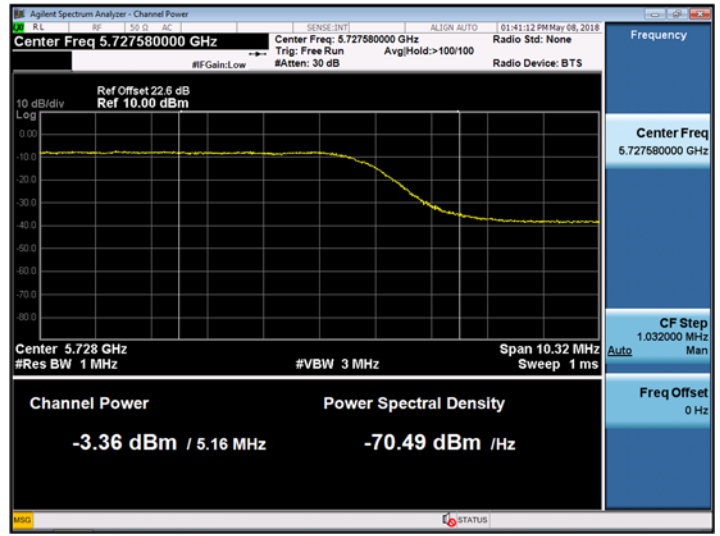
Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11n	5710	142	-3.36	0.719	-2.64	20.62
802.11ac			-3.15	0.835	-2.31	20.75

Straddle channels TEST Plot for 802.11n_HT40/ac_VHT40_Ant 3

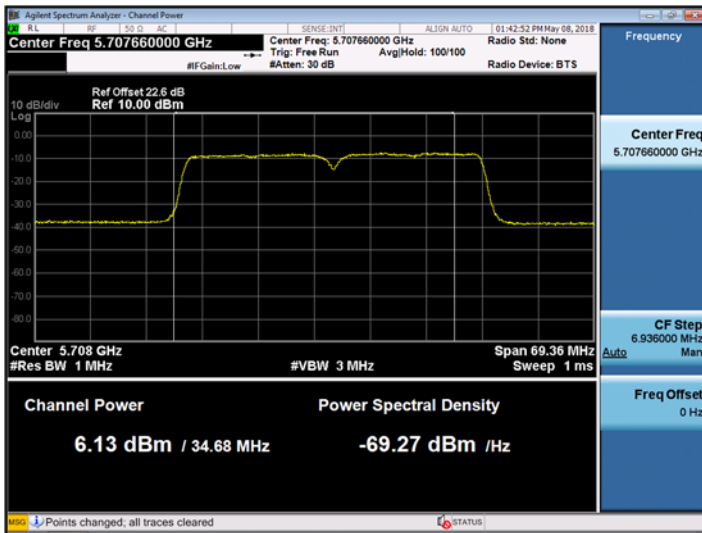
802.11n_HT40 UNII 2C Band Average Power CH.142



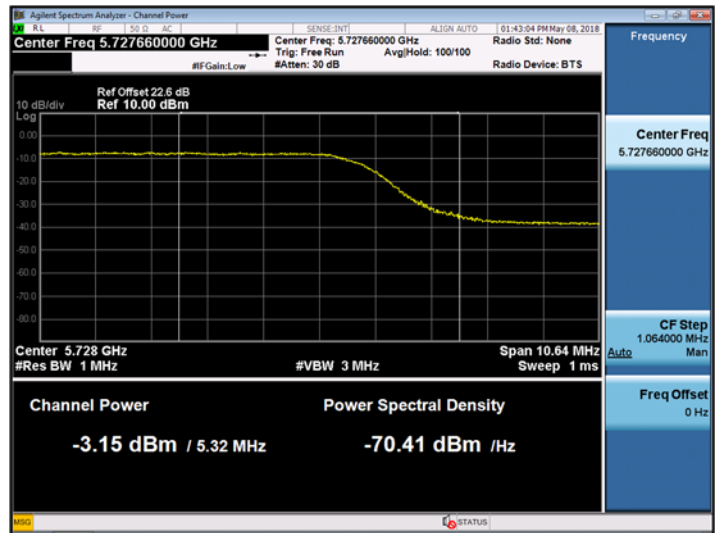
802.11n_HT40 UNII 3 Band Average Power CH.142



802.11ac_VHT40 UNII 2C Band Average Power CH.142



802.11ac_VHT40 UNII 3 Band Average Power CH.142



▣ Straddle channels TEST RESULTS_ Sum Data of Ant.0 and Ant.1 and Ant.2 and Ant.3

Conducted Output Power Measurements (802.11n_HT40/ac_VHT40 Mode: UNII 2C Band 5710MHz)

Mode (MIMO)	Frequency [MHz]	Channel No.	Sum Power of Ant.0 & 1 & 2 & 3	Limit (dBm)
802.11n	5710	142	12.87	22.86
802.11ac			13.27	22.87

Conducted Output Power Measurements (802.11n_HT40/ac_VHT40 Mode: UNII 3 Band 5710MHz)

Mode (MIMO)	Frequency [MHz]	Channel No.	Sum Power of Ant.0 & 1	Limit (dBm)
802.11n	5710	142	3.45	20.49
802.11ac			3.88	20.51

Note : The limit on maximum conducted output power in each U-NII band is computed based on the portion of the emission bandwidth contained within that band.

Straddle channels TEST RESULTS_Ant 0

Conducted Output Power Measurements (802.11ac_VHT80 Mode: UNII 2C Band 5690MHz)

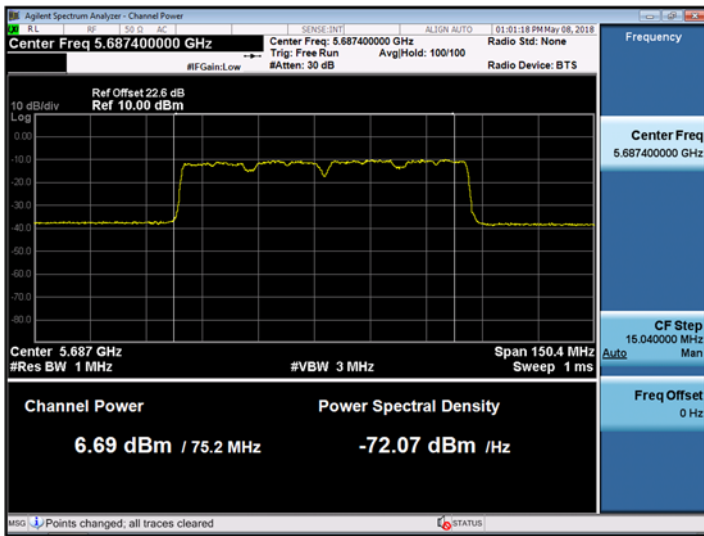
Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11ac	5690	138	6.69	1.362	8.05	23.16

Conducted Output Power Measurements (802.11ac_VHT80 Mode: UNII 3 Band 5690MHz)

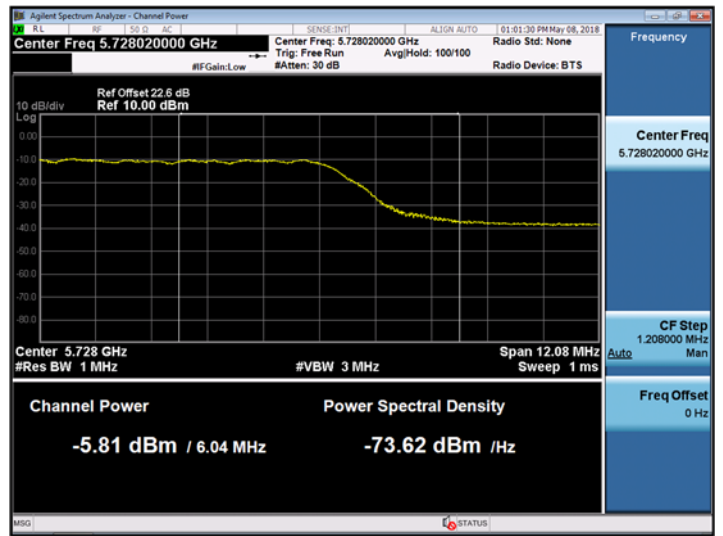
Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11ac	5690	138	-5.81	1.362	-4.45	18.23

Straddle channels TEST Plot for 802.11ac_VHT80_Ant 0

802.11ac_VHT80 UNII 2C Band Average Power CH.138



802.11ac_VHT80 UNII 3 Band Average Power CH.138



Straddle channels TEST RESULTS_Ant 1

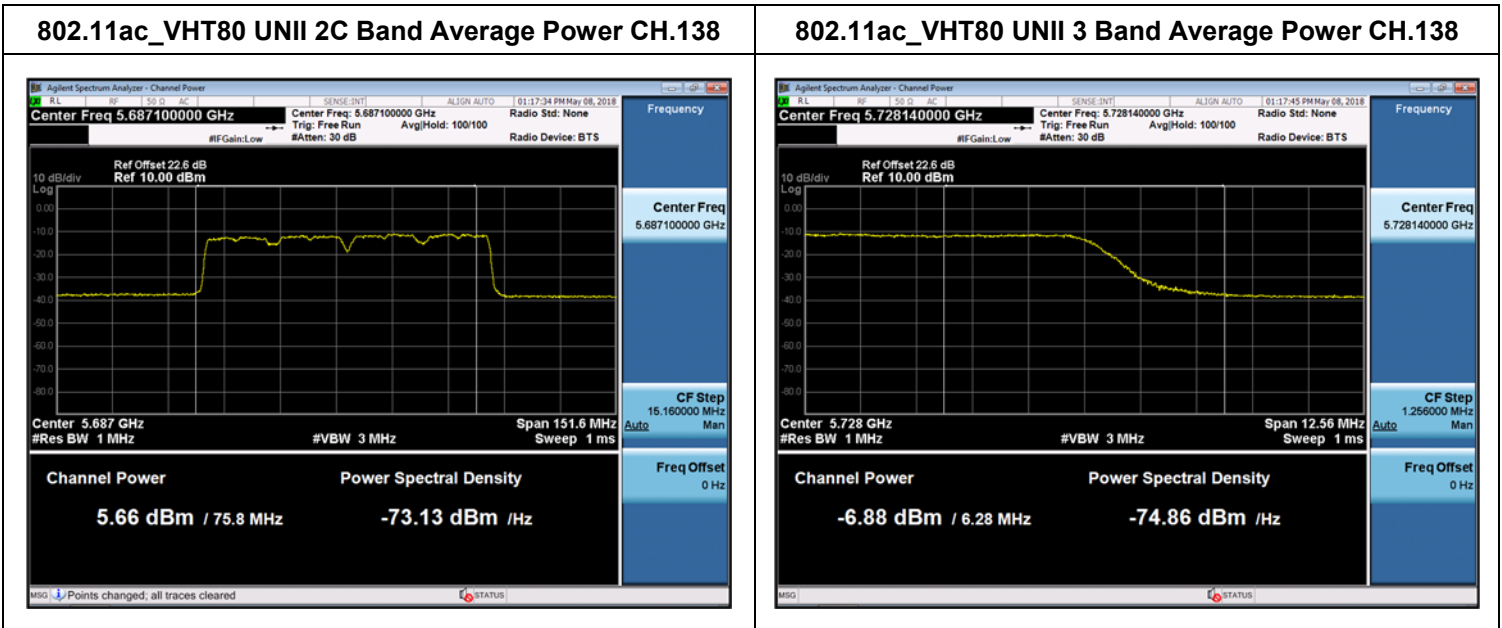
Conducted Output Power Measurements (802.11ac_VHT80 Mode: UNII 2C Band 5690MHz)

Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11ac	5690	138	5.66	1.427	7.09	23.15

Conducted Output Power Measurements (802.11ac_VHT80 Mode: UNII 3 Band 5690MHz)

Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11ac	5690	138	-6.88	1.427	-5.45	18.35

Straddle channels TEST Plot for 802.11ac_VHT80_Ant 1



Straddle channels TEST RESULTS_Ant 2

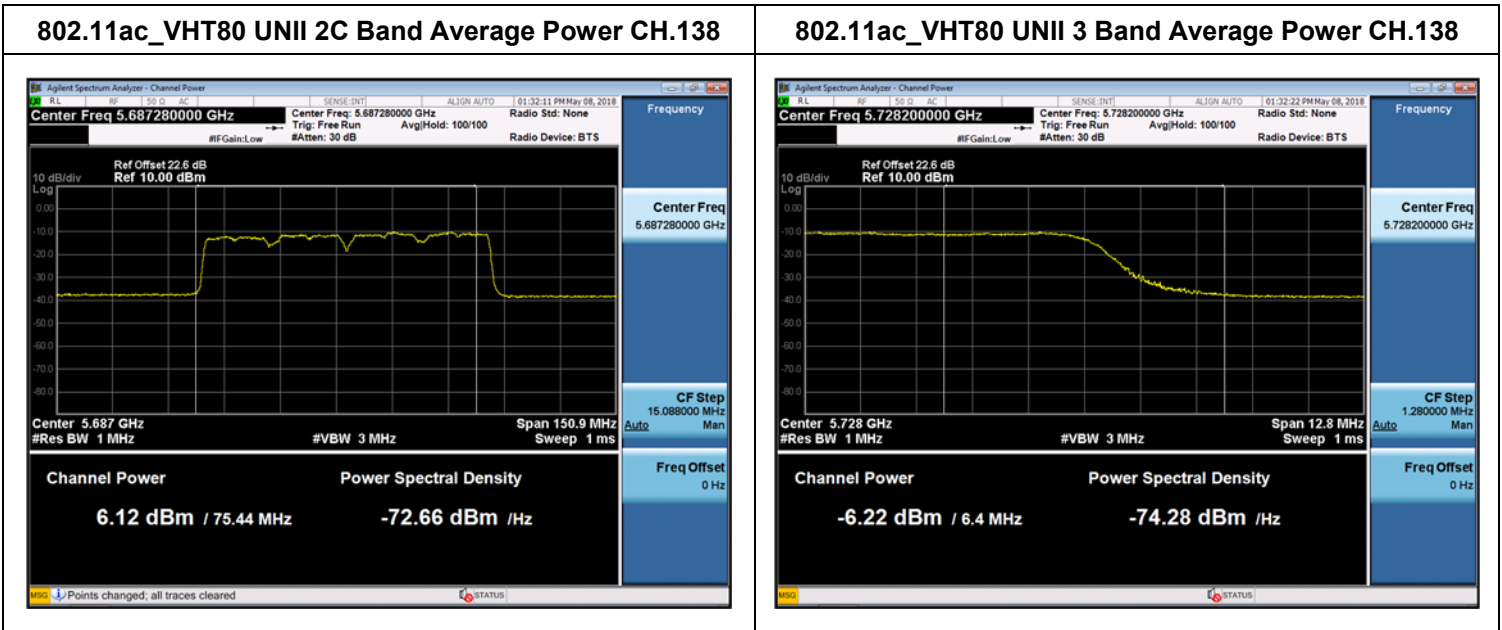
Conducted Output Power Measurements (802.11ac_VHT80 Mode: UNII 2C Band 5690MHz)

Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11ac	5690	138	6.12	1.427	7.55	23.14

Conducted Output Power Measurements (802.11ac_VHT80 Mode: UNII 3 Band 5690MHz)

Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11ac	5690	138	-6.22	1.427	-4.79	18.45

Straddle channels TEST Plot for 802.11ac_VHT80_Ant 2



Straddle channels TEST RESULTS_Ant 3

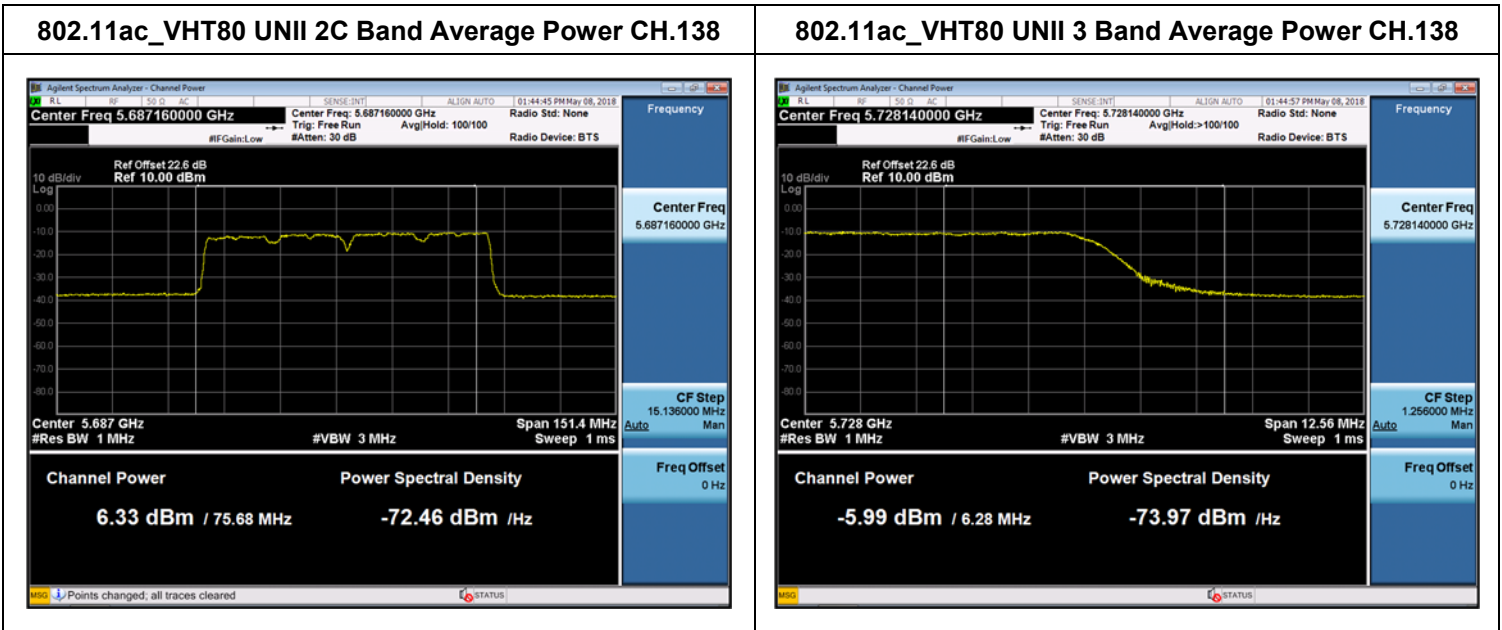
Conducted Output Power Measurements (802.11ac_VHT80 Mode: UNII 2C Band 5690MHz)

Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11ac	5690	138	6.33	1.249	7.58	23.15

Conducted Output Power Measurements (802.11ac_VHT80 Mode: UNII 3 Band 5690MHz)

Mode	Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
802.11ac	5690	138	-5.99	1.249	-4.74	18.36

Straddle channels TEST Plot for 802.11ac_VHT80_Ant 3



▣ Straddle channels TEST RESULTS_ Sum Data of Ant.0 and Ant.1 and Ant.2 and Ant.3**Conducted Output Power Measurements (802.11ac_VHT80 Mode: UNII 3 Band 5690MHz)**

Mode (MIMO)	Frequency [MHz]	Channel No.	Sum Power of Ant.0 & 1	Limit (dBm)
802.11ac	5690	138	13.59	23.14

Conducted Output Power Measurements (802.11ac_VHT80 Mode: UNII 3 Band 5690MHz)

Mode (MIMO)	Frequency [MHz]	Channel No.	Sum Power of Ant.0 & 1	Limit (dBm)
802.11ac	5690	138	1.17	18.23

Note : The limit on maximum conducted output power in each U-NII band is computed based on the portion of the emission bandwidth contained within that band.

9.4 POWER SPECTRAL DENSITY

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

▣ **Limit**

Power Spectral Density

Band	Mode	Limit
UNII 1	802.11a,n,ac	17 dBm/MHz
UNII 2A	802.11a,n,ac	11 dBm/MHz
UNII 2C	802.11a,n,ac	11 dBm/MHz
UNII 3	802.11a,n,ac	30 dBm/500 kHz

Note : Note : According to KDB789033 D02 v02r01, emission for straddle channels in each band shall comply with the PSD limits applicable to that band under the appropriate rule section.

Power Spectral Density

Operating Mode	Band	Mode	Operating Ant.	Ant. Gain (dBi)	Limit (dBm)
SISO	UNII 1	802.11a/n/ac	Ant 0	6.486	16.51
			Ant 1		16.51
			Ant 2		16.51
			Ant 3		16.51
	UNII 2A		Ant 0	6.800	10.20
			Ant 1		10.20
			Ant 2		10.20
			Ant 3		10.20
	UNII 2C		Ant 0	6.482	10.52
			Ant 1		10.52
			Ant 2		10.52
			Ant 3		10.52
UNII 3	Ant 0	6.478	29.52		
	Ant 1		29.52		
	Ant 2		29.52		
	Ant 3		29.52		
MIMO	UNII 1	802.11a/n/ac	Ant 0 & 1 & 2 & 3	12.51	10.49
	UNII 2A			12.82	4.18
	UNII 2C			12.50	4.50
	UNII 3			12.50	23.50

Note : 1. If all antennas have the same gain, G_{ANT}

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

• For power spectral density (PSD) measurements on all devices.

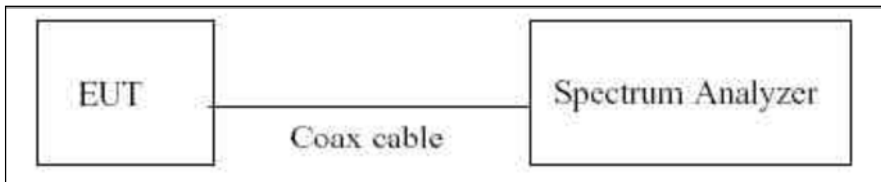
Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB.

(according to KDB662911 D01 v02r01)

2. Limit is calculated by antenna gain.

3. The limits of maximum conducted power were applied the antenna gain. Therefore, if conducted power is pass, e.i.r.p. is also pass. So, we attached only conducted power table.

■ TEST CONFIGURATION



■ TEST PROCEDURE

We tested according to Method in KDB 789033 D02 v02r01.

The spectrum analyzer is set to :

1. Set span to encompass the entire emission bandwidth(EBW) of the signal.
2. RBW = 1 MHz(510 kHz for UNII 3)
3. VBW \geq 3 MHz
4. Number of points in sweep \geq 2*span/RBW.
5. Sweep time = auto.
6. Detector = RMS(i.e., power averaging), if available. Otherwise, use sample detector mode.
7. Do not use sweep triggering. Allow the sweep to "free run".
8. Trace average at least 100 traces in power averaging(RMS) mode
9. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
10. If Method SA-2 was used, add $10 \log(1/x)$, where x is the duty cycle, to the peak of the spectrum.

■ Sample Calculation

ANT.0

PSD = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor

Ex) PSD = 10 dBm + 20 dB + 1.17 dB + 0.2 dB = 31.0 dBm

ANT.1

PSD = Reading Value + ATT loss + Cable loss(2 ea) + Duty Cycle Factor

Ex) PSD = 10 dBm + 20 dB + 2.05 dB + 0.2 dB = 31.7 dBm

Note :

1. Spectrum reading values are not plot data. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.

2. Spectrum offset = Attenuator loss + Cable loss

3. We apply the offset of 5 GHz band is 21.5dB.

(Actual value of loss for the attenuator and cable combination)

4. MIMO output power results are calculated by each antenna output power on MIMO operating mode.

So, in case of MIMO output power, we attached only MIMO output power except each antenna power result.

Ant.0

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a (SISO)	1.770	0.203	1.973	16.51	Pass
5200	40		1.526	0.358	1.884		Pass
5240	48		1.512	0.220	1.732		Pass
5260	52		-2.178	0.358	-1.820	10.20	Pass
5300	60		-2.113	0.212	-1.901		Pass
5320	64		-2.407	0.358	-2.049		Pass
5500	100		-3.165	0.220	-2.945	10.52	Pass
5600	120		-3.699	0.358	-3.341		Pass
5720	144		-2.856	0.220	-2.636		Pass
5745	149		1.359	0.358	1.717	29.52	Pass
5785	157		0.239	0.203	0.442		Pass
5825	165		0.265	0.358	0.623		Pass

Ant.1
■ TEST RESULTS
Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a (SISO)	1.113	0.388	1.501	16.51	Pass
5200	40		0.495	0.358	0.853		Pass
5240	48		0.909	0.388	1.297		Pass
5260	52		-3.246	0.358	-2.888	10.20	Pass
5300	60		-3.243	0.358	-2.885		Pass
5320	64		-3.333	0.358	-2.975		Pass
5500	100		-4.157	0.388	-3.769	10.52	Pass
5600	120		-4.443	0.212	-4.231		Pass
5720	144		-3.239	0.388	-2.851		Pass
5745	149		-0.103	0.358	0.255	29.52	Pass
5785	157		0.092	0.358	0.450		Pass
5825	165		-0.405	0.358	-0.047		Pass

Ant.2
■ TEST RESULTS
Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a (SISO)	1.322	0.358	1.680	16.51	Pass
5200	40		1.067	0.212	1.279		Pass
5240	48		1.389	0.358	1.747		Pass
5260	52		-2.944	0.388	-2.556	10.20	Pass
5300	60		-2.410	0.212	-2.198		Pass
5320	64		-2.604	0.215	-2.389		Pass
5500	100		-3.218	0.215	-3.003	10.52	Pass
5600	120		-3.654	0.212	-3.442		Pass
5720	144		-3.181	0.358	-2.823		Pass
5745	149		0.535	0.215	0.750	29.52	Pass
5785	157		0.411	0.212	0.623		Pass
5825	165		0.038	0.212	0.250		Pass

Ant.3

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a (SISO)	1.616	0.388	2.004	16.51	Pass
5200	40		1.323	0.203	1.526		Pass
5240	48		2.029	0.212	2.241		Pass
5260	52		-2.121	0.358	-1.763	10.20	Pass
5300	60		-2.342	0.358	-1.984		Pass
5320	64		-2.418	0.388	-2.030		Pass
5500	100		-3.416	0.388	-3.028	10.52	Pass
5600	120		-4.231	0.212	-4.019		Pass
5720	144		-3.562	0.388	-3.174		Pass
5745	149		0.582	0.212	0.794	29.52	Pass
5785	157		0.205	0.212	0.417		Pass
5825	165		0.473	0.203	0.676		Pass

■ Sum Data of Ant.0 and Ant.1 and Ant.2 and Ant.3

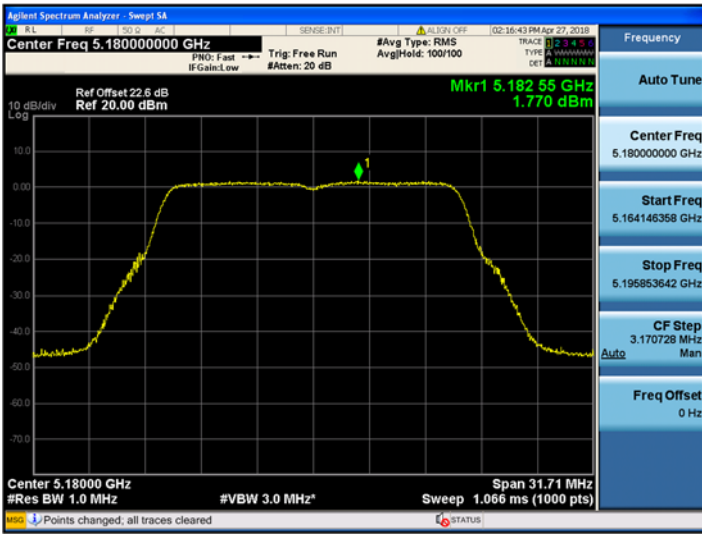
■ TEST RESULTS

Conducted Power Density Measurements

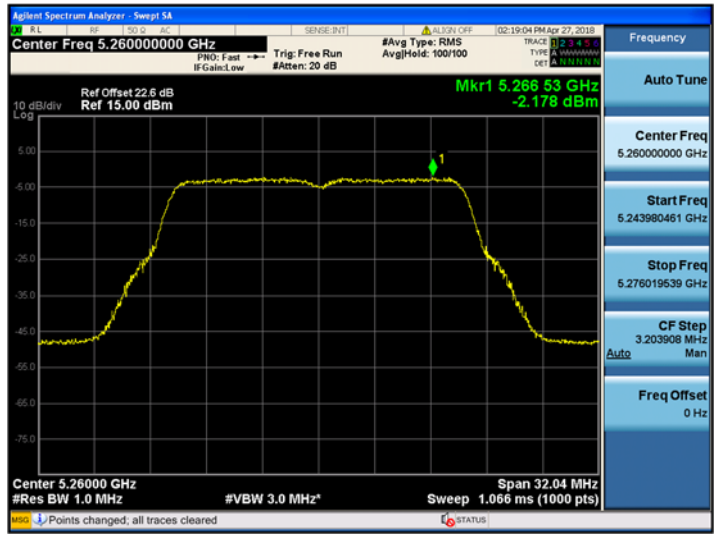
Frequency (MHz)	Channel No.	Mode	Test Result		
			Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5180	36	802.11a (MIMO)	7.81	10.49	Pass
5200	40		7.41		Pass
5240	48		7.78		Pass
5260	52		3.78	4.18	Pass
5300	60		3.79		Pass
5320	64		3.67		Pass
5500	100		2.84	4.50	Pass
5600	120		2.27		Pass
5720	144		3.15		Pass
5745	149		6.92	23.50	Pass
5785	157		6.50		Pass
5825	165		6.40		Pass

TEST Plot for 802.11a 20MHz BW_Ant.0

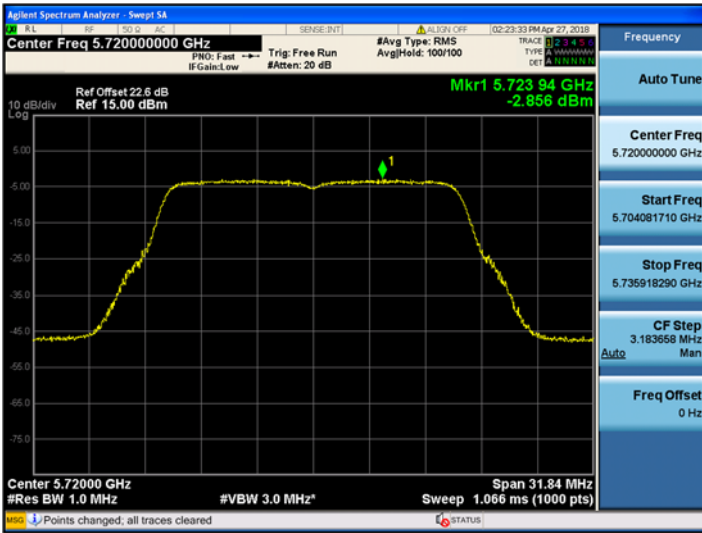
802.11a UNII 1 BAND PSD CH 36



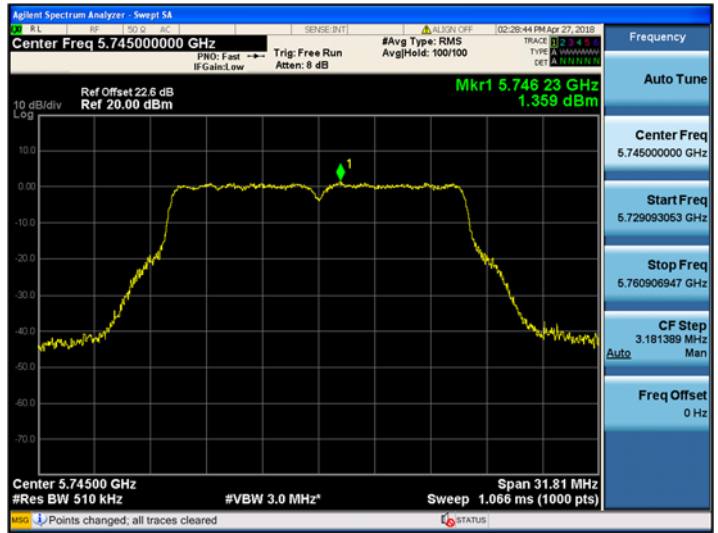
802.11a UNII 2A BAND PSD CH 52



802.11a UNII 2C BAND PSD CH 144

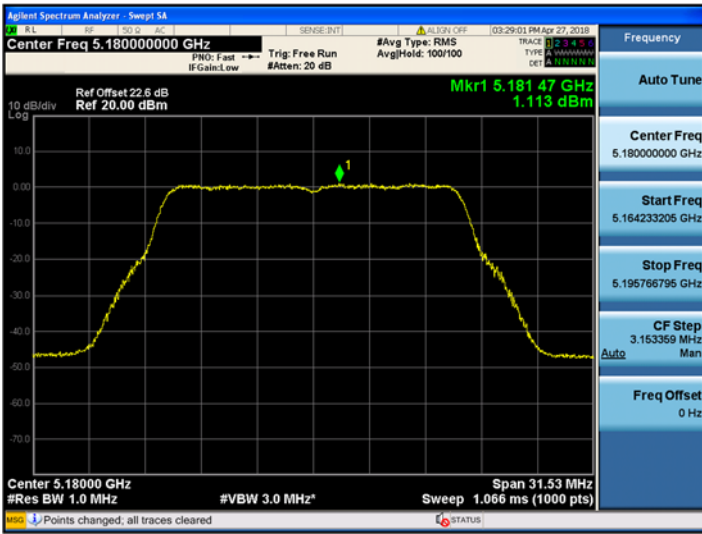


802.11a UNII 3 BAND PSD CH 149

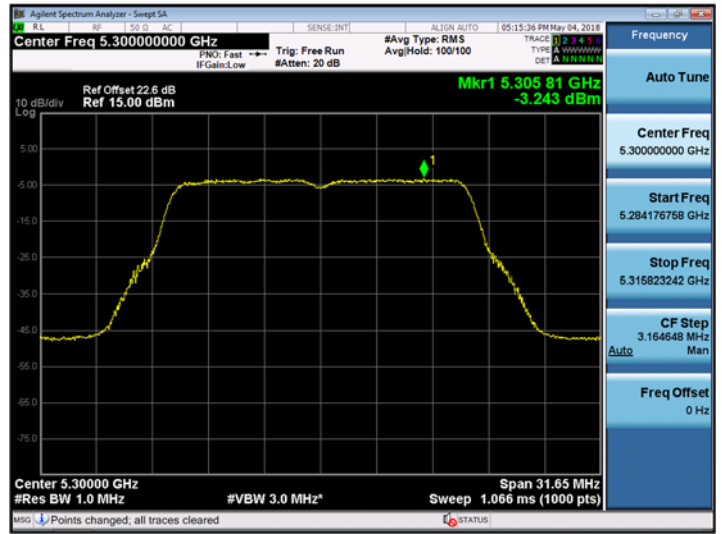


TEST Plot for 802.11a 20MHz BW_Ant.1

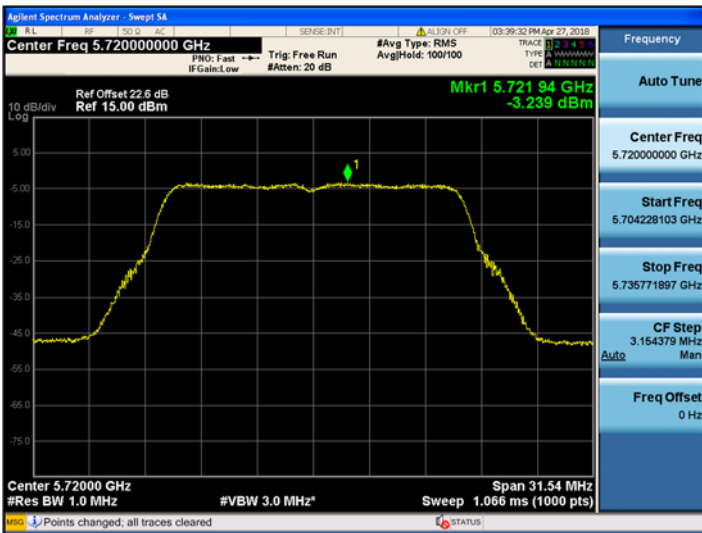
802.11a UNII 1 BAND PSD CH 36



802.11a UNII 2A BAND PSD CH 60



802.11a UNII 2C BAND PSD CH 144



802.11a UNII 3 BAND PSD CH 157

