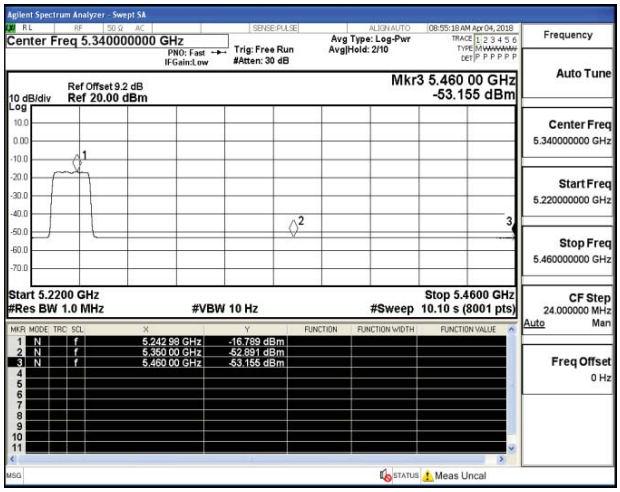
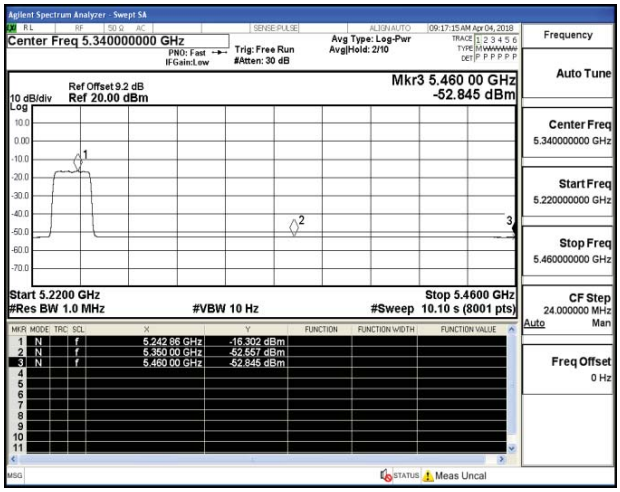
Undesirable emission-ant 1

IEEE 802.11a



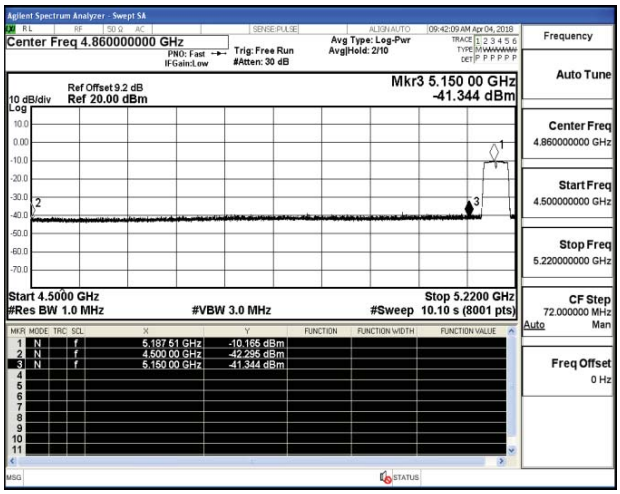
Channel 48 / 5240 MHz – Average

IEEE 802.11n HT20



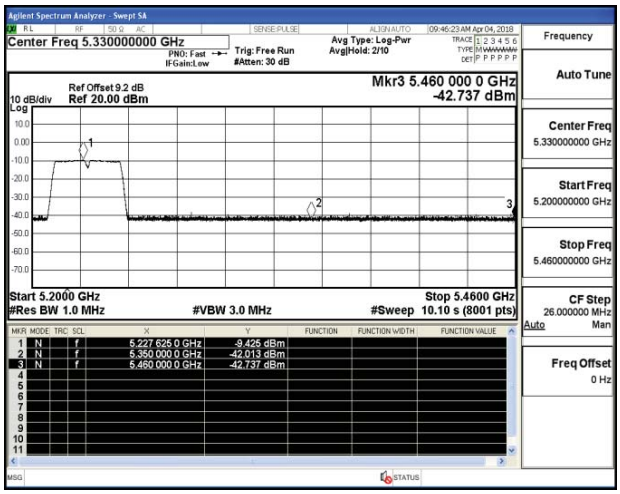
Channel 48 / 5240 MHz – Average

IEEE 802.11n HT40

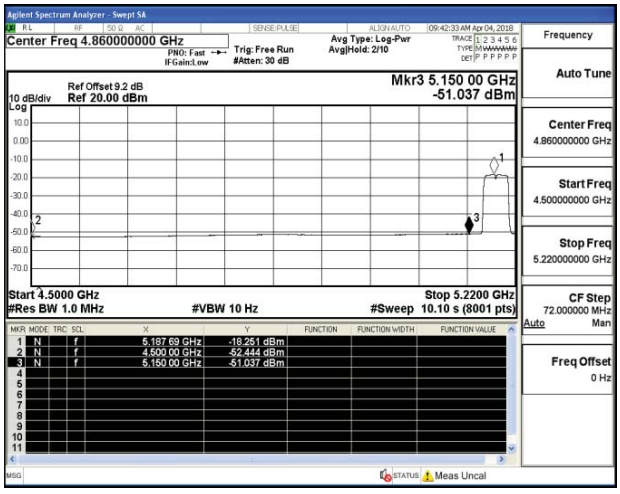


Channel 38 / 5190 MHz – Peak

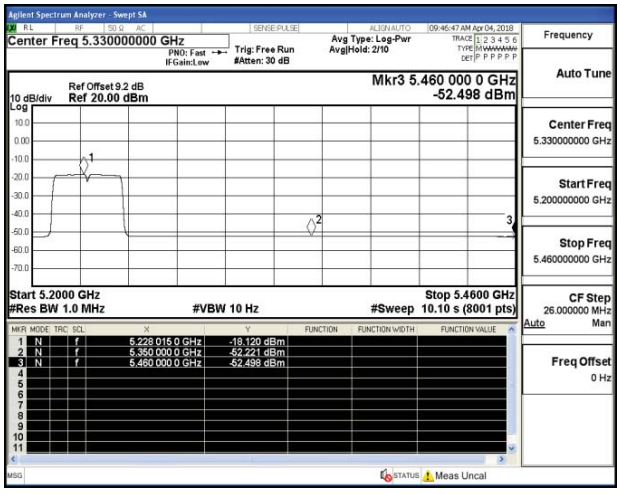
IEEE 802.11n HT40



Channel 46 / 5230 MHz – Peak



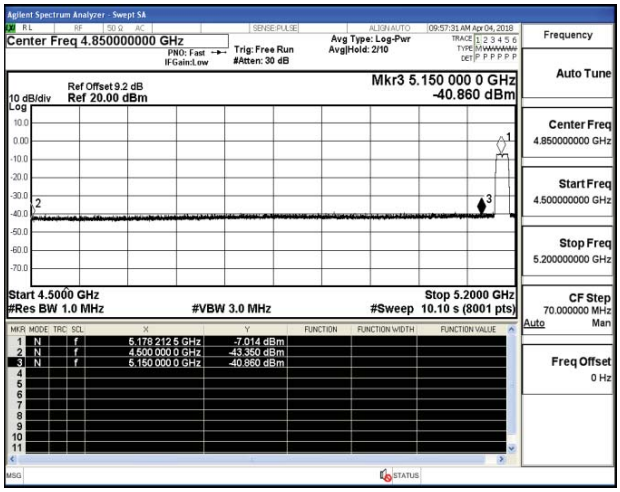
Channel 38 / 5190 MHz – Average



Channel 46 / 5230 MHz – Average

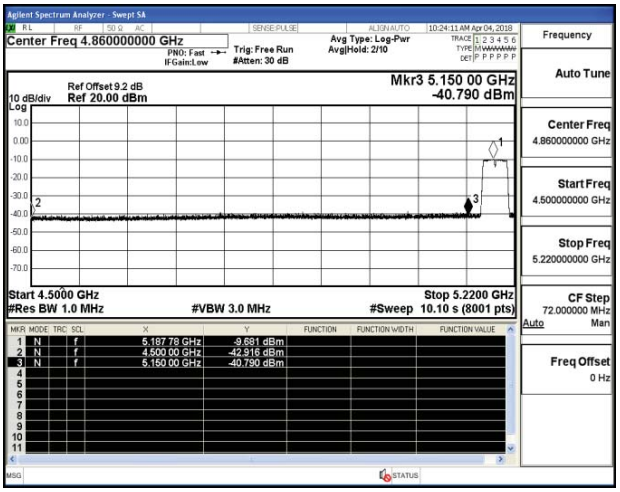
Undesirable emission-ant 1

IEEE 802.11ac VHT20

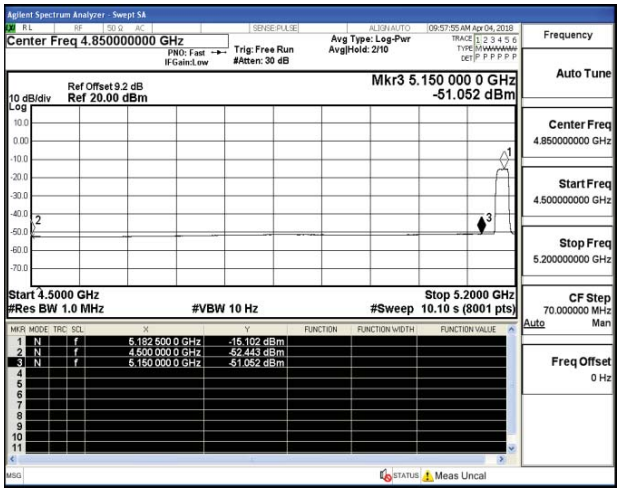


Channel 36 / 5180 MHz – Peak

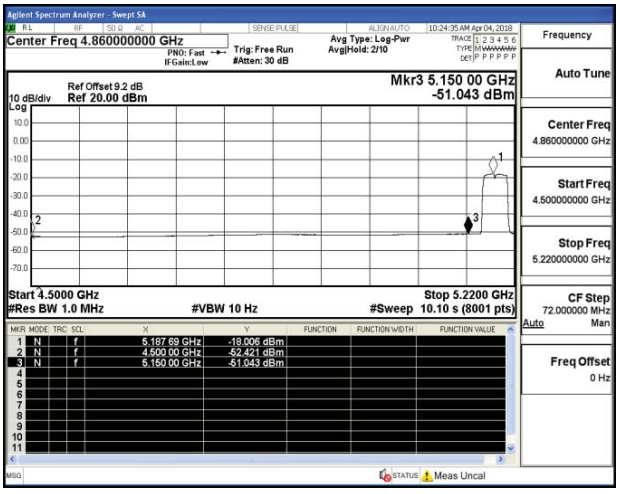
IEEE 802.11ac VHT40



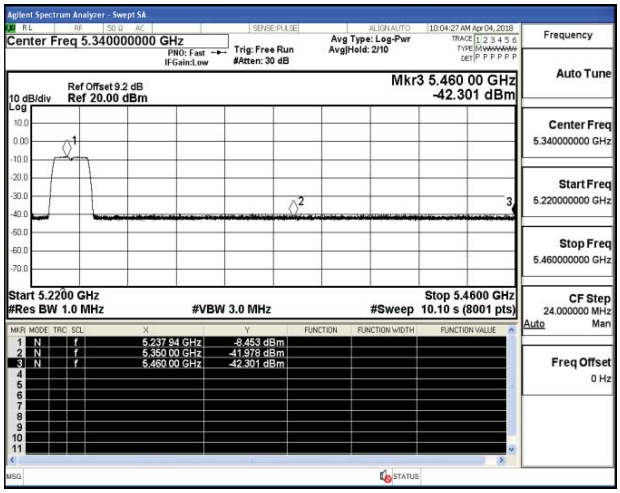
Channel 38 / 5190 MHz – Peak



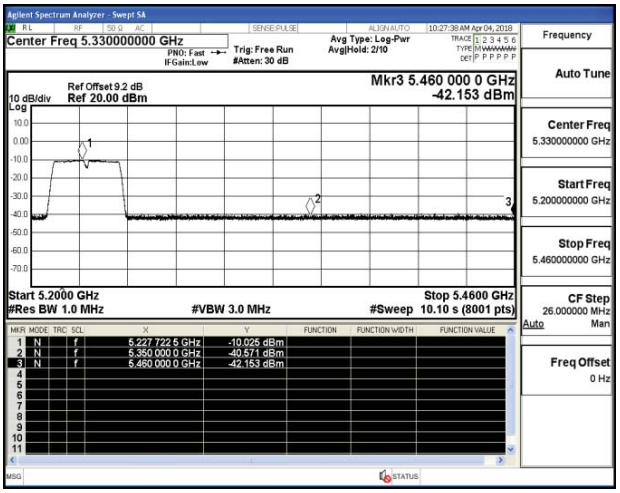
Channel 36 / 5180 MHz – Average



Channel 38 / 5190 MHz – Average



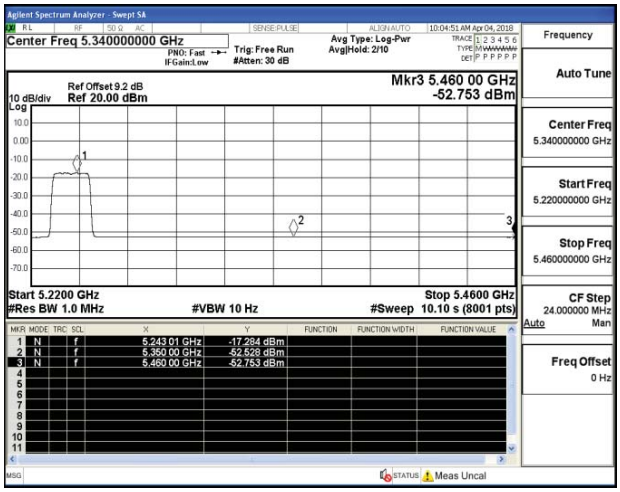
Channel 48 / 5240 MHz – Peak



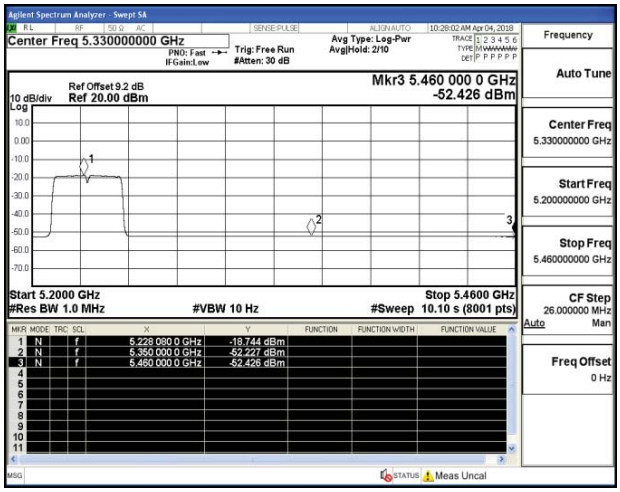
Channel 46 / 5230 MHz – Peak

Undesirable emission-ant 1

IEEE 802.11ac VHT20



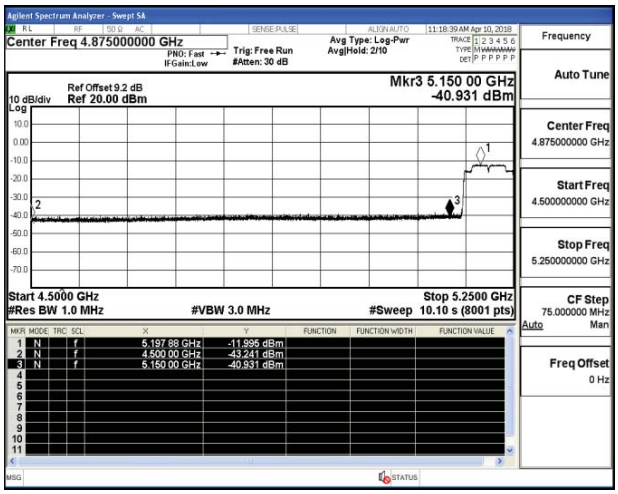
IEEE 802.11ac VHT40



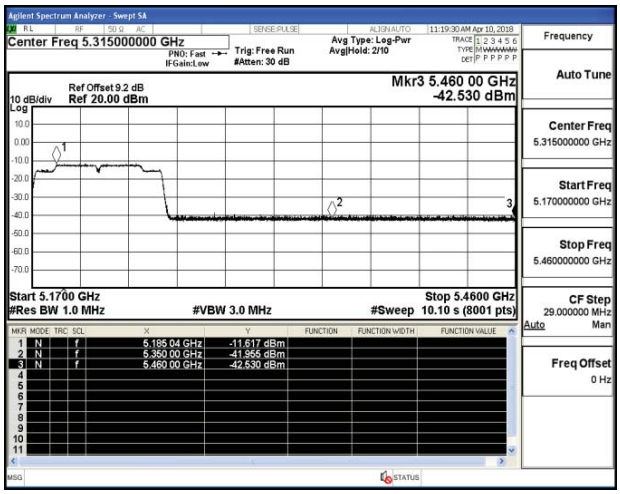
Channel 48 / 5240 MHz – Average

Channel 46 / 5230 MHz – Average

IEEE 802.11ac VHT80

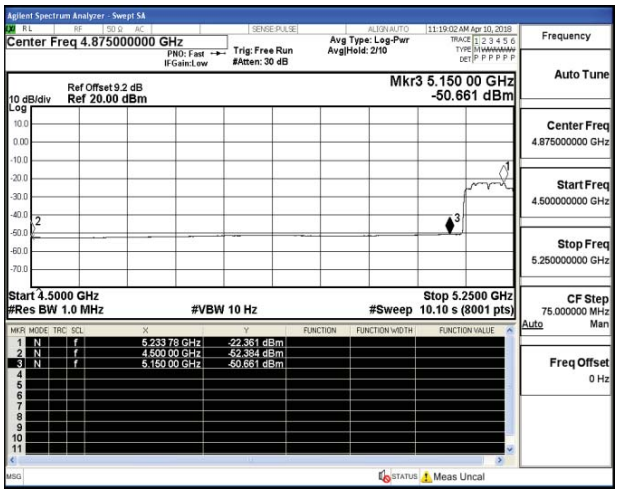


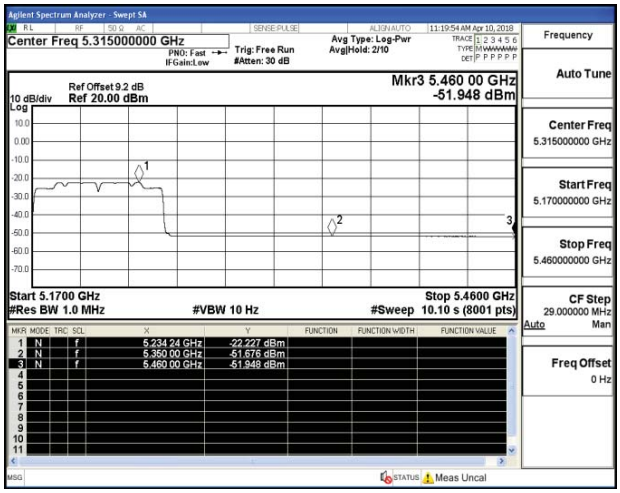
IEEE 802.11ac VHT80



Channel 42 / 5210 MHz – Peak(left)

Channel 46 / 5230 MHz – Peak(right)





Channel 42 / 5210 MHz – Average(left)

Channel 46 / 5230 MHz – Average(right)

5.8.4.2 UNII Band 3

IEEE 802.11a										
Frequency (MHz)	Conducted Power (dBm)			Antenna Gain(dBi)	EIRP (converted) (dBm/1MHz)			Detector	Limit (dBm/1MHz)	Verdict
	chain 0	chain 1	Sum		chain 0	chain 1	Sum			
5650.00	-42.39	-41.74	/	2.00	-40.39	-39.74	/	Peak	-27.000	PASS
5700.00	-43.01	-43.09	/	2.00	-41.01	-41.09	/	Peak	10.000	PASS
5720.00	-42.18	-42.67	/	2.00	-40.18	-40.67	/	Peak	15.600	PASS
5725.00	-41.68	-43.21	/	2.00	-39.68	-41.21	/	Peak	27.000	PASS
5850.00	-41.19	-42.41	/	2.00	-39.19	-40.41	/	Peak	27.000	PASS
5855.00	-42.36	-42.04	/	2.00	-40.36	-40.04	/	Peak	15.600	PASS
5875.00	-41.37	-42.02	/	2.00	-39.37	-40.02	/	Peak	10.000	PASS
5925.00	-42.76	-42.16	/	2.00	-40.76	-40.16	/	Peak	-27.000	PASS

IEEE 802.11n HT20											
Frequency (MHz)	Conducted Power (dBm)			Antenna Gain (dBi)	Directional Gain (dBi)	EIRP (converted) (dBm/1MHz)			Detector	Limit (dBm/1MHz)	Verdict
	chain 0	chain 1	Sum			chain 0	chain 1	Sum			
5650.00	-42.20	-42.99	-39.19	2.00	5.01	-40.20	-40.99	-34.18	Peak	-27.000	PASS
5700.00	-42.87	-42.85	-39.86	2.00	5.01	-40.87	-40.85	-34.85	Peak	10.000	PASS
5720.00	-42.24	-41.83	-39.23	2.00	5.01	-40.24	-39.83	-34.22	Peak	15.600	PASS
5725.00	-42.72	-41.86	-39.71	2.00	5.01	-40.72	-39.86	-34.70	Peak	27.000	PASS
5850.00	-41.89	-41.22	-38.88	2.00	5.01	-39.89	-39.22	-33.87	Peak	27.000	PASS
5855.00	-42.82	-41.04	-39.81	2.00	5.01	-40.82	-39.04	-34.80	Peak	15.600	PASS
5875.00	-42.56	-42.43	-39.55	2.00	5.01	-40.56	-40.43	-34.54	Peak	10.000	PASS
5925.00	-42.35	-41.85	-39.34	2.00	5.01	-40.35	-39.85	-34.33	Peak	-27.000	PASS

IEEE 802.11n HT40											
Frequency (MHz)	Conducted Power (dBm)			Antenna Gain (dBi)	Directional Gain(dBi)	EIRP (converted) (dBm/1MHz)			Detector	Limit (dBm/1MHz)	Verdict
	chain 0	chain 1	Sum			chain 0	chain 1	Sum			
5650.00	-41.72	-40.76	-38.71	2.00	5.01	-39.72	-38.76	-33.70	Peak	-27.00	PASS
5700.00	-43.15	-43.23	-40.14	2.00	5.01	-41.15	-41.23	-35.13	Peak	10.00	PASS
5720.00	-42.31	-42.30	-39.30	2.00	5.01	-40.31	-40.30	-34.29	Peak	15.60	PASS
5725.00	-42.74	-41.81	-39.73	2.00	5.01	-40.74	-39.81	-34.72	Peak	27.00	PASS
5850.00	-42.30	-41.38	-39.29	2.00	5.01	-40.30	-39.38	-34.28	Peak	27.00	PASS
5855.00	-42.64	-42.73	-39.63	2.00	5.01	-40.64	-40.73	-34.62	Peak	15.60	PASS
5875.00	-42.06	-42.32	-39.05	2.00	5.01	-40.06	-40.32	-34.04	Peak	10.00	PASS
5925.00	-42.65	-41.04	-39.64	2.00	5.01	-40.65	-39.04	-34.63	Peak	-27.00	PASS

IEEE 802.11ac VHT20											
Frequency (MHz)	Conducted Power (dBm)			Antenna Gain (dBi)	Directional Gain(dBi)	EIRP (converted) (dBm/1MHz)			Detector	Limit (dBm/1MHz)	Verdict
	chain 0	chain 1	Sum			chain 0	chain 1	Sum			
5650.00	-42.39	-43.00	-39.38	2.00	5.01	-40.39	-41.00	-34.37	Peak	-27.00	PASS
5700.00	-41.92	-42.25	-38.91	2.00	5.01	-39.92	-40.25	-33.90	Peak	10.00	PASS
5720.00	-41.48	-42.39	-38.47	2.00	5.01	-39.48	-40.39	-33.46	Peak	15.60	PASS
5725.00	-41.73	-41.41	-38.72	2.00	5.01	-39.73	-39.41	-33.71	Peak	27.00	PASS
5850.00	-41.74	-42.11	-38.73	2.00	5.01	-39.74	-40.11	-33.72	Peak	27.00	PASS
5855.00	-40.69	-42.29	-37.68	2.00	5.01	-38.69	-40.29	-32.67	Peak	15.60	PASS
5875.00	-42.88	-42.28	-39.87	2.00	5.01	-40.88	-40.28	-34.86	Peak	10.00	PASS
5925.00	-42.48	-41.30	-39.47	2.00	5.01	-40.48	-39.30	-34.46	Peak	-27.00	PASS

IEEE 802.11ac VHT40											
Frequency (MHz)	Conducted Power (dBm)			Antenna Gain (dBi)	Directional Gain(dBi)	EIRP (converted) (dBm/1MHz)			Detector	Limit (dBm/1MHz)	Verdict
	chain 0	chain 1	Sum			chain 0	chain 1	Sum			
5650.00	-42.41	-42.25	-39.40	2.00	5.01	-40.41	-40.25	-34.39	Peak	-27.00	PASS
5700.00	-42.86	-42.40	-39.85	2.00	5.01	-40.86	-40.40	-34.84	Peak	10.00	PASS
5720.00	-42.34	-42.66	-39.33	2.00	5.01	-40.34	-40.66	-34.32	Peak	15.60	PASS
5725.00	-43.06	-43.04	-40.05	2.00	5.01	-41.06	-41.04	-35.04	Peak	27.00	PASS
5850.00	-42.44	-42.22	-39.43	2.00	5.01	-40.44	-40.22	-34.42	Peak	27.00	PASS
5855.00	-42.41	-42.01	-39.40	2.00	5.01	-40.41	-40.01	-34.39	Peak	15.60	PASS
5875.00	-42.53	-43.09	-39.52	2.00	5.01	-40.53	-41.09	-34.51	Peak	10.00	PASS
5925.00	-42.87	-43.05	-39.86	2.00	5.01	-40.87	-41.05	-34.85	Peak	-27.00	PASS

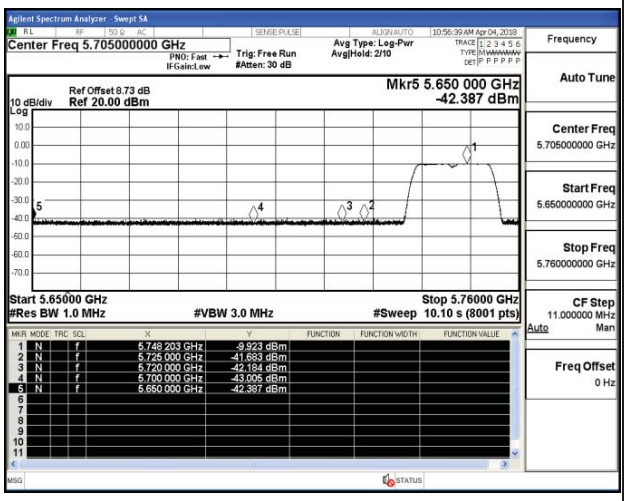
IEEE 802.11ac VHT80											
Frequency (MHz)	Conducted Power (dBm)			Antenna Gain (dBi)	Directional Gain(dBi)	EIRP (converted) (dBm/1MHz)			Detector	Limit (dBm/1MHz)	Verdict
	chain 0	chain 1	Sum			chain 0	chain 1	Sum			
5650.00	-40.38	-42.41	-37.37	2.00	5.01	-38.38	-40.41	-32.36	Peak	-27.00	PASS
5700.00	-42.25	-42.04	-39.24	2.00	5.01	-40.25	-40.04	-34.23	Peak	10.00	PASS
5720.00	-41.64	-41.29	-38.63	2.00	5.01	-39.64	-39.29	-33.62	Peak	15.60	PASS
5725.00	-42.26	-42.07	-39.25	2.00	5.01	-40.26	-40.07	-34.24	Peak	27.00	PASS
5850.00	-40.38	-42.41	-37.37	2.00	5.01	-38.38	-40.41	-32.36	Peak	27.00	PASS
5855.00	-42.25	-42.04	-39.24	2.00	5.01	-40.25	-40.04	-34.23	Peak	15.60	PASS
5875.00	-41.64	-41.29	-38.63	2.00	5.01	-39.64	-39.29	-33.62	Peak	10.00	PASS
5925.00	-42.26	-42.07	-39.25	2.00	5.01	-40.26	-40.07	-34.24	Peak	-27.00	PASS

Remark:

1. *Measured unwanted emission at difference data rate for each mode and recorded worst case for each mode.*
2. *Test results including cable loss;*
3. *Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11ac VHT20, IEEE 802.11ac VHT40, IEEE 802.11ac VHT80;*
4. *EIRP = Conducted power + Directional Gain*
5. *EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater.3 However, for devices that operate in multiple bands using the same transmit antenna, the highest gain of the antenna within the operating band nearest to the out-of-band frequency being measured may be used in lieu of the overall highest gain when measuring emissions at frequencies within 20% of the absolute frequency at the nearest edge of that band, but in no case shall a value less than 2 dBi be selected.*
6. *Over limit = EIRP - Limit*
7. *Please refer to following test plots;*

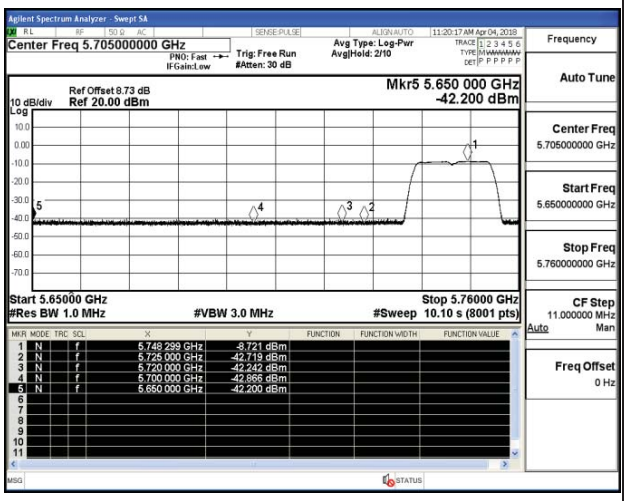
Unwanted emission-ant 0

IEEE 802.11a

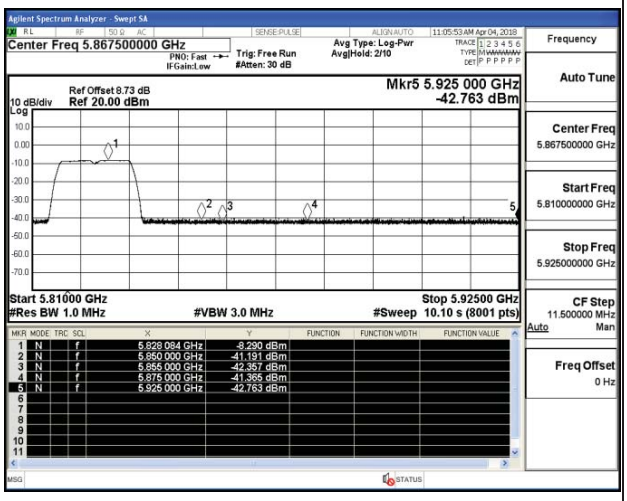


Channel 149 / 5745 MHz – Peak

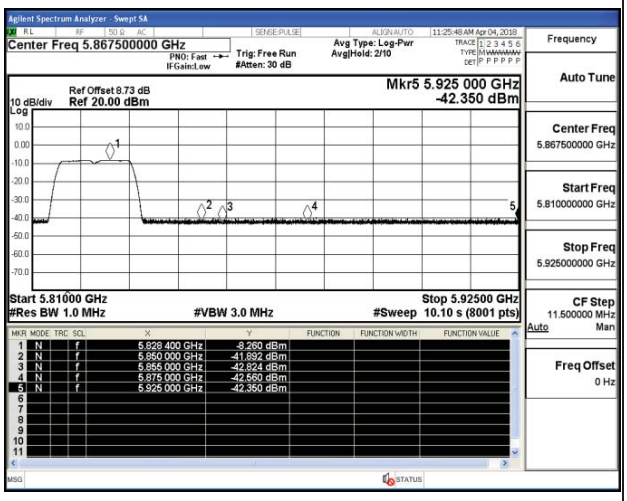
IEEE 802.11n HT20



Channel 149 / 5745 MHz – Peak

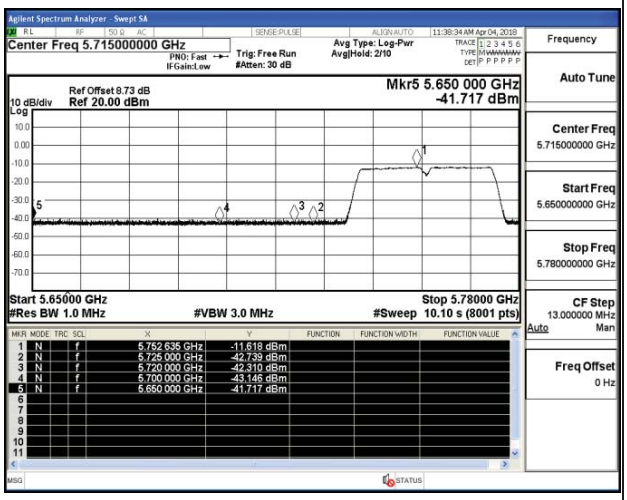


Channel 165 / 5825 MHz – Peak

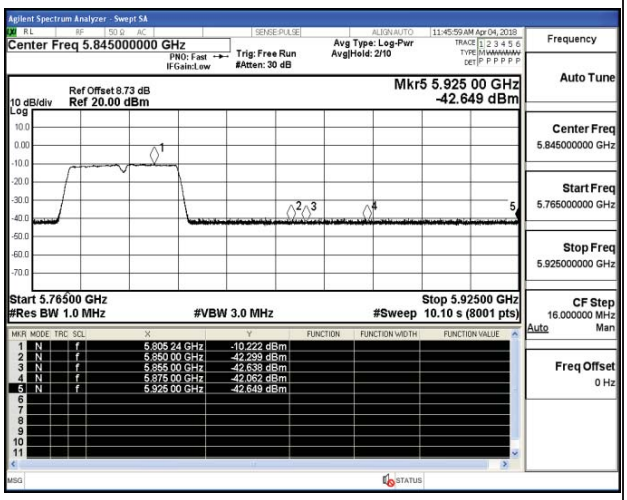


Channel 165 / 5825 MHz – Peak

IEEE 802.11n HT40



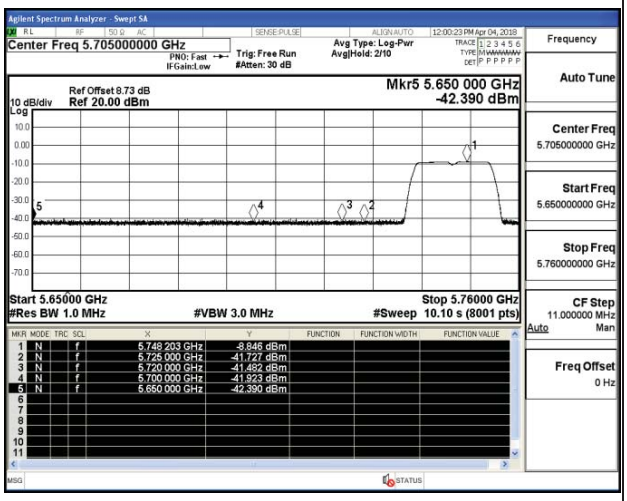
Channel 151 / 5755 MHz – Peak



Channel 159 / 5795 MHz – Peak

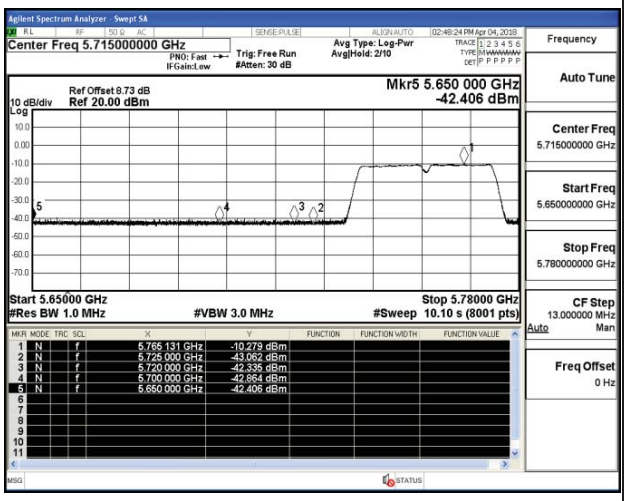
Unwanted emission-ant 0

IEEE 802.11ac VHT20

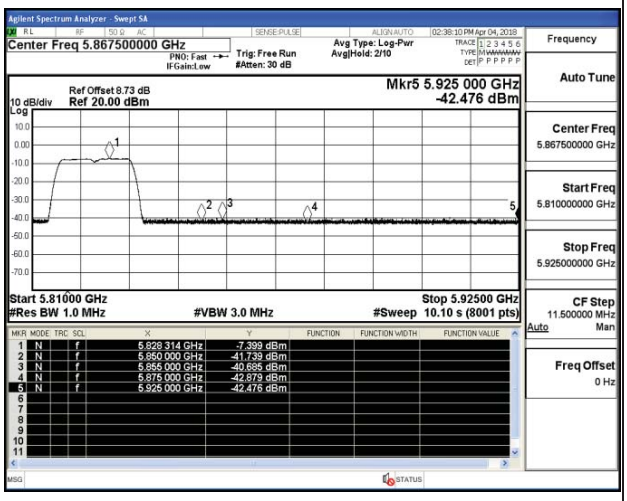


Channel 149 / 5745 MHz – Peak

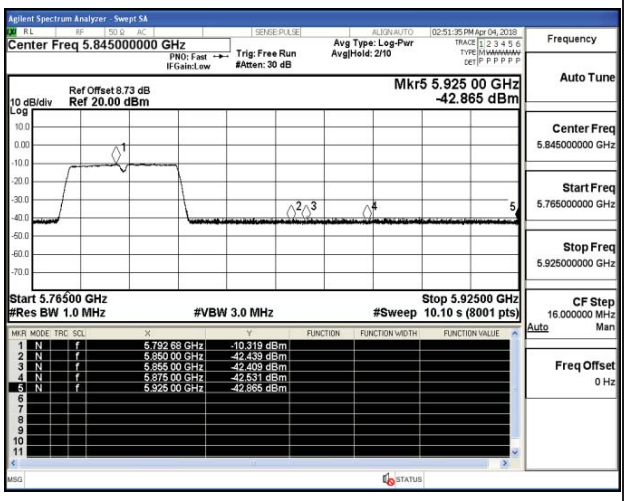
IEEE 802.11ac VHT40



Channel 149 / 5745 MHz – Peak

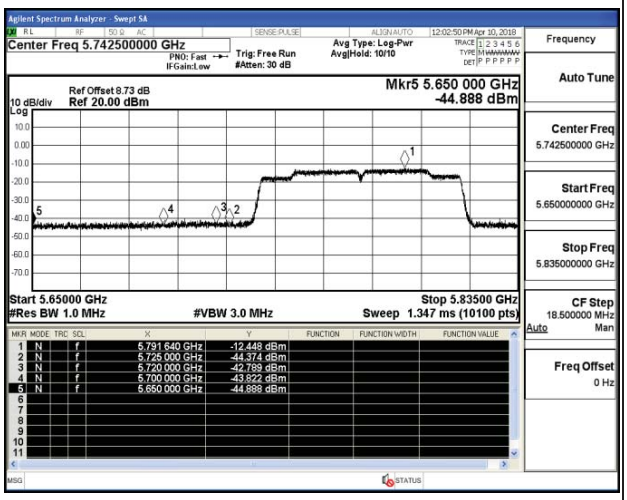


Channel 165 / 5825 MHz – Peak



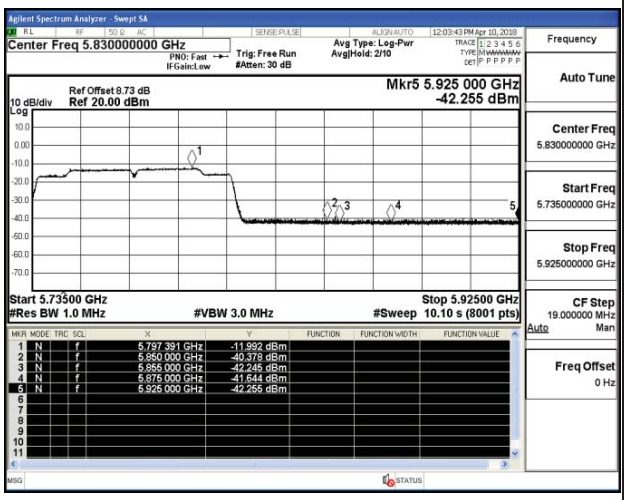
Channel 165 / 5825 MHz – Peak

IEEE 802.11ac VHT80



Channel 155 / 5775 MHz – Peak(left)

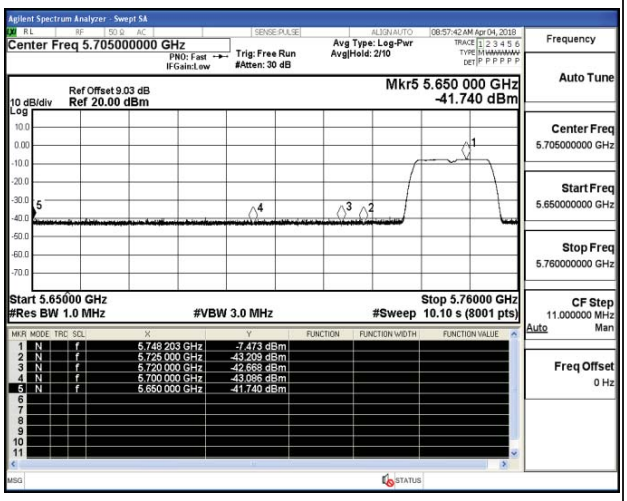
IEEE 802.11ac VHT80



Channel 155 / 5775 MHz – Peak(right)

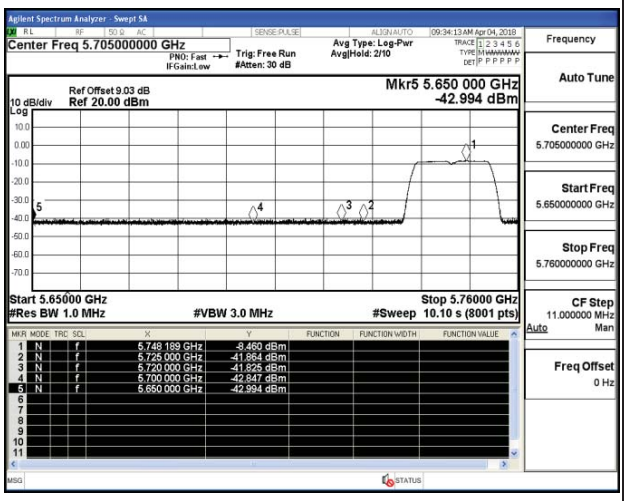
Unwanted emission-ant 1

IEEE 802.11a

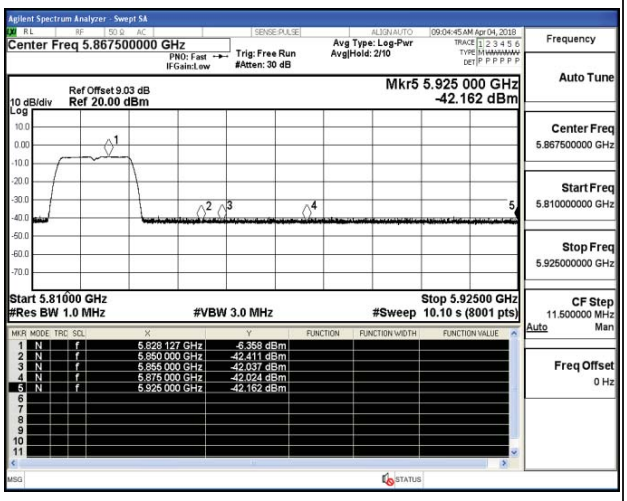


Channel 149 / 5745 MHz – Peak

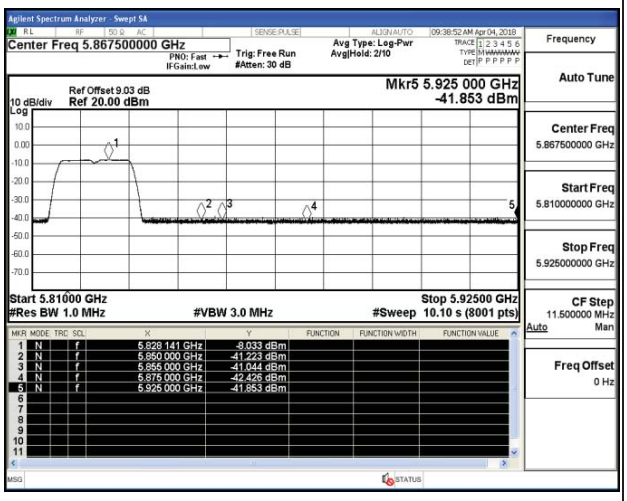
IEEE 802.11n HT20



Channel 149 / 5745 MHz – Peak

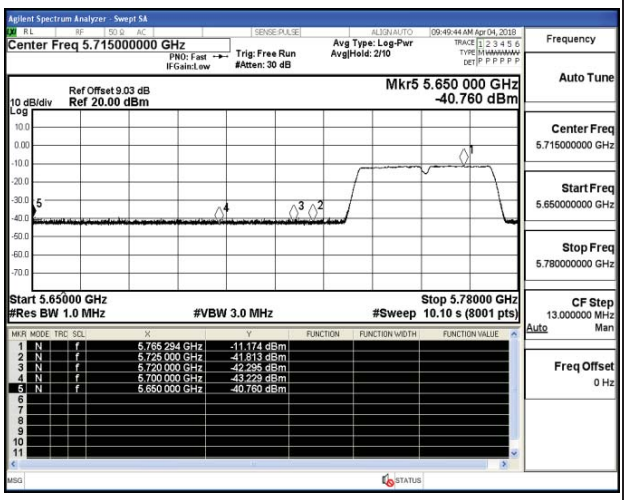


Channel 165 / 5825 MHz – Peak

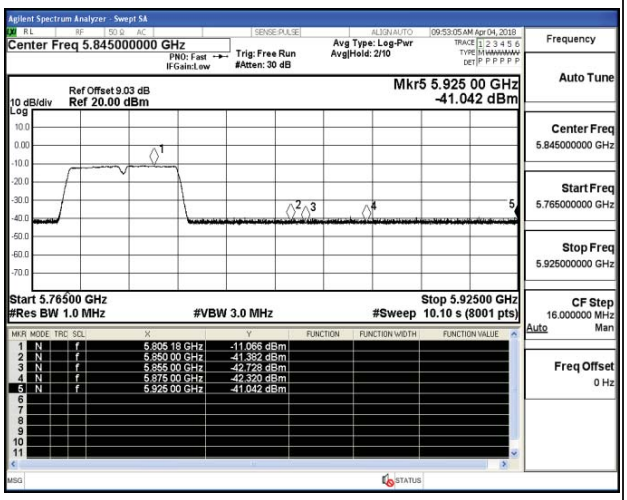


Channel 165 / 5825 MHz – Peak

IEEE 802.11n HT40



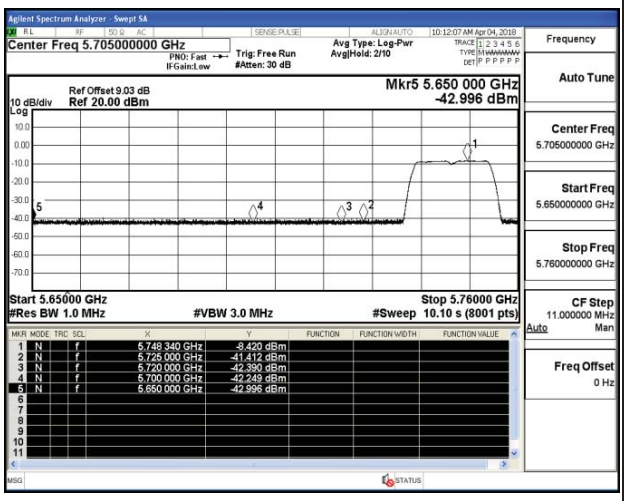
Channel 151 / 5755 MHz – Peak



Channel 159 / 5795 MHz – Peak

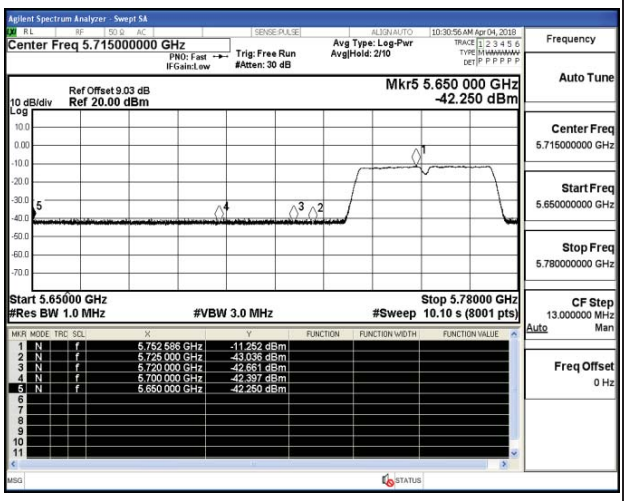
Unwanted emission-ant 1

IEEE 802.11ac VHT20

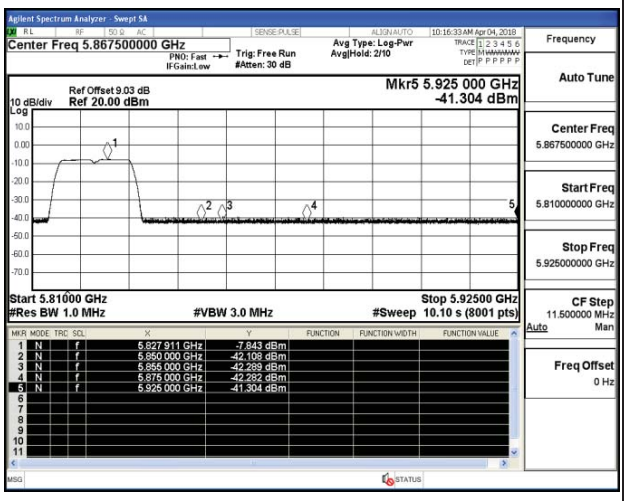


Channel 149 / 5745 MHz – Peak

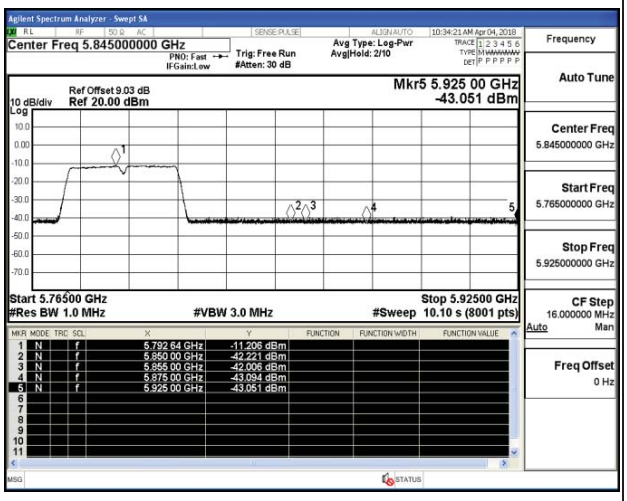
IEEE 802.11ac VHT40



Channel 149 / 5745 MHz – Peak

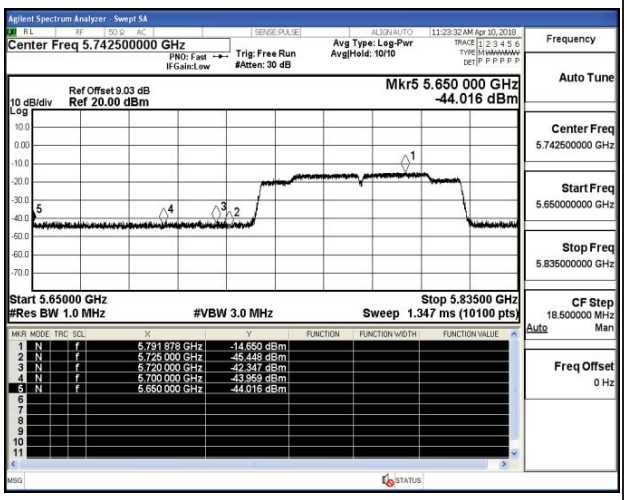


Channel 165 / 5825 MHz – Peak



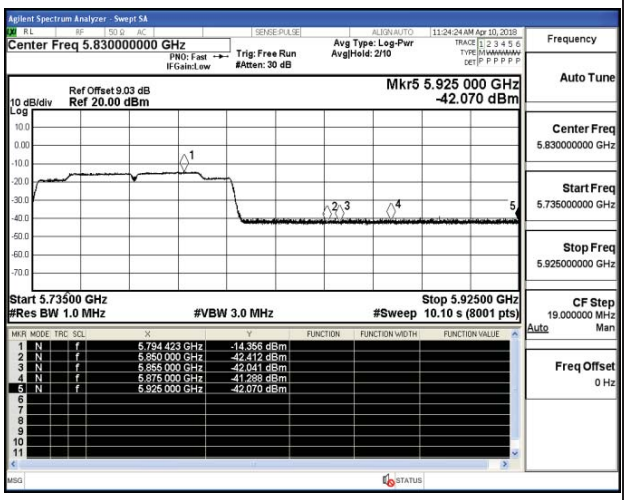
Channel 165 / 5825 MHz – Peak

IEEE 802.11ac VHT80



Channel 155 / 5775 MHz – Peak(left)

IEEE 802.11ac VHT80



Channel 155 / 5775 MHz – Peak(right)

5.9. Antenna Requirements

5.9.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.9.2 Antenna Connected Construction

5.9.2.1. Standard Applicable

According to § 15.203 & RSS-Gen, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

5.9.2.2. Antenna Connector Construction

The antenna gain used for transmitting is 2.0dBi for each antenna, the directional gain is 5.01dBi, and the antennas are two PIFA antennas connect to PCB board and no consideration of replacement. Please see EUT photo for details.

The sample support 2 antennas, antenna 0 can transmit WLAN while antenna 1 can also transmit WLAN.

5.9.2.3. Results: Compliance.

Measurement

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.
Conducted power refers ANSI C63.10:2013 Output power test procedure for NII devices.
Radiated power refers to ANSI C63.10:2013 Radiated emissions tests.

Measurement parameters

Measurement parameter	
Detector:	Peak
Sweep Time:	Auto
Resolution bandwidth:	1MHz
Video bandwidth:	3MHz
Trace-Mode:	Max hold

Limits

FCC	ISED
Antenna Gain	
6 dBi	

Note: The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For WLAN devices, the OFDM (IEEE 802.11a) mode is used;

Ant 0

T_{nom}	V_{nom}	Lowest Channel 5180 MHz	Middle Channel 5200 MHz	Highest Channel 5240 MHz
Conducted power [dBm] Measured with DSSS modulation		4.36	4.46	4.37
Radiated power [dBm] Measured with DSSS modulation		5.74	5.99	5.93
Gain [dBi] Calculated		1.38	1.53	1.56
Measurement uncertainty			± 1.6 dB (cond.) / ± 3.8 dB (rad.)	

T_{nom}	V_{nom}	Lowest Channel 5745 MHz	Middle Channel 5785 MHz	Highest Channel 5825 MHz
Conducted power [dBm] Measured with DSSS modulation		3.37	3.22	3.24
Radiated power [dBm] Measured with DSSS modulation		4.95	4.97	4.87
Gain [dBi] Calculated		1.62	1.75	1.63
Measurement uncertainty			± 1.6 dB (cond.) / ± 3.8 dB (rad.)	

Ant 1

T_{nom}	V_{nom}	Lowest Channel 5180 MHz	Middle Channel 5200 MHz	Highest Channel 5240 MHz
Conducted power [dBm] Measured with DSSS modulation		4.32	4.42	3.94
Radiated power [dBm] Measured with DSSS modulation		6.07	5.91	5.57
Gain [dBi] Calculated		1.75	1.49	1.63
Measurement uncertainty			± 1.6 dB (cond.) / ± 3.8 dB (rad.)	

T_{nom}	V_{nom}	Lowest Channel 5745 MHz	Middle Channel 5785 MHz	Highest Channel 5825 MHz
Conducted power [dBm] Measured with DSSS modulation		3.03	3.53	3.05
Radiated power [dBm] Measured with DSSS modulation		4.84	5.11	4.89
Gain [dBi] Calculated		1.81	1.58	1.84
Measurement uncertainty			± 1.6 dB (cond.) / ± 3.8 dB (rad.)	

6. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separate file for Test setup photos.

7. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separate file for exterior photographs of eut.

8. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separate file for interior photographs of eut.

----------THE END OF REPORT----------