5.8 Power spectral density

5.8.1 Limit

For the band 5.15-5.25 GHz

For client devices in the 5.15-5.25 GHz band, 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, 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 5.25-5.35 GHz and 5.47-5.725 GHz

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, 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

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, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.8.2 Test procedure

For U-NII-1/ U-NII-2A/ U-NII-2C

1. Set analyzer center frequency to NII channel center frequency.
2. Set the RBW ≥ 1MHz.
3. Set the VBW ≥ 3 x RBW.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

For U-NII-3

1. Set analyzer center frequency to NII channel center frequency.
2. Set the RBW ≥ 510kHz.
3. Set the VBW ≥ 3 x RBW.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

5.8.3 Test setup

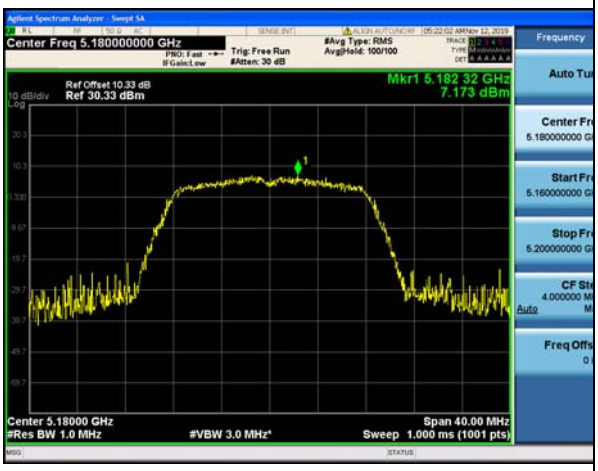
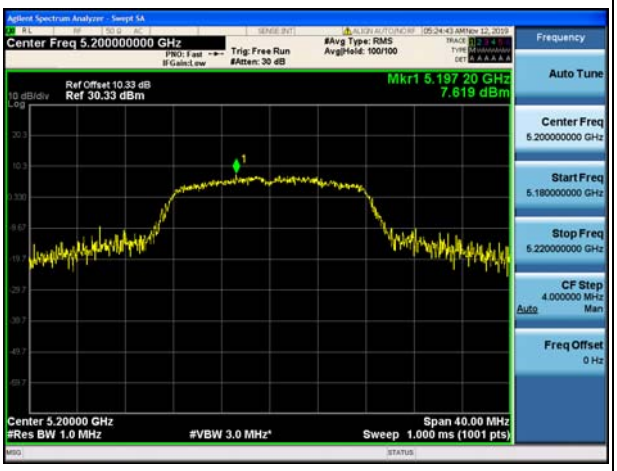
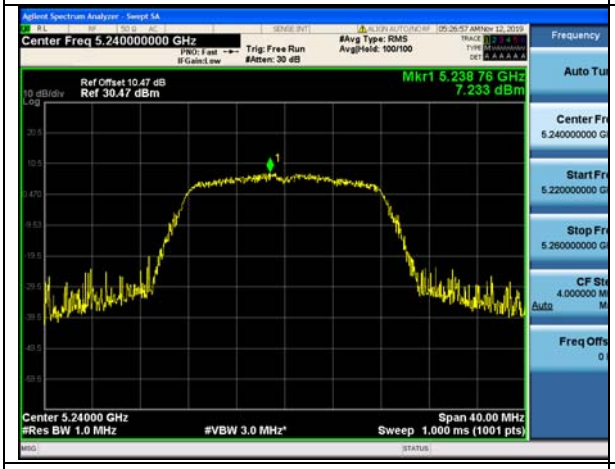
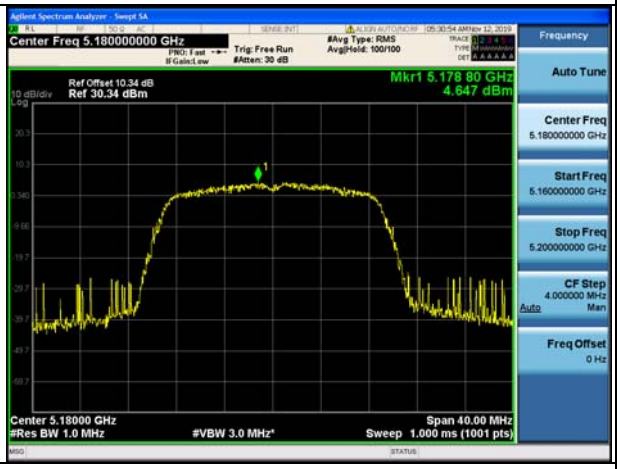
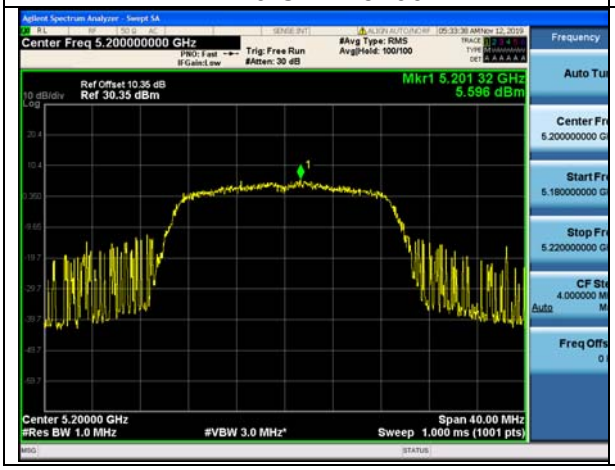
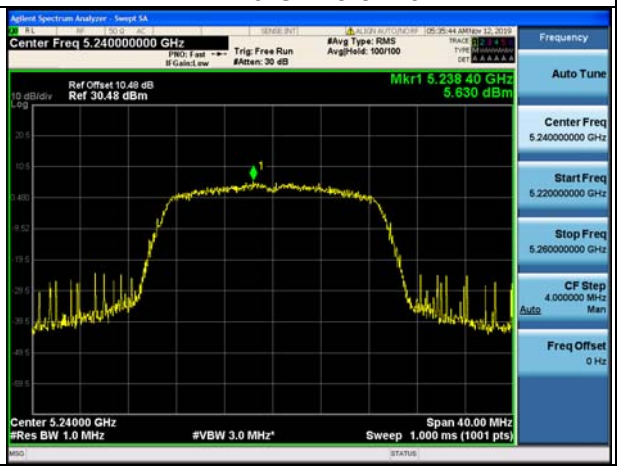
5.8.4 Test results

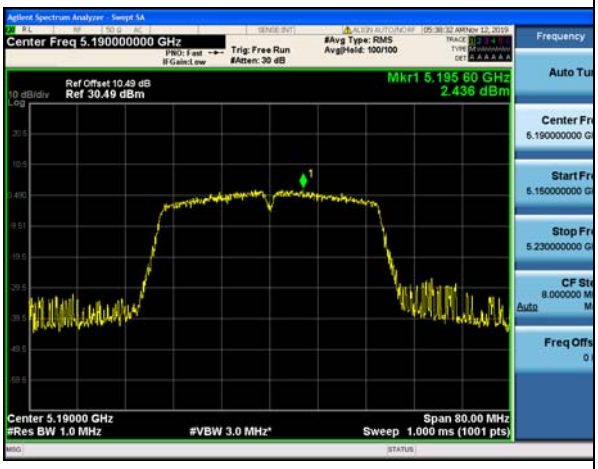
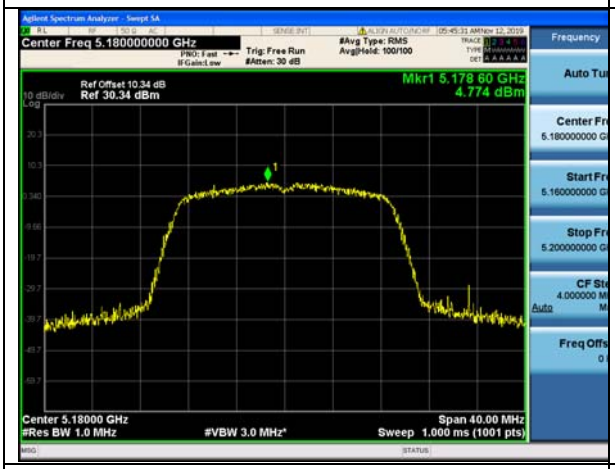
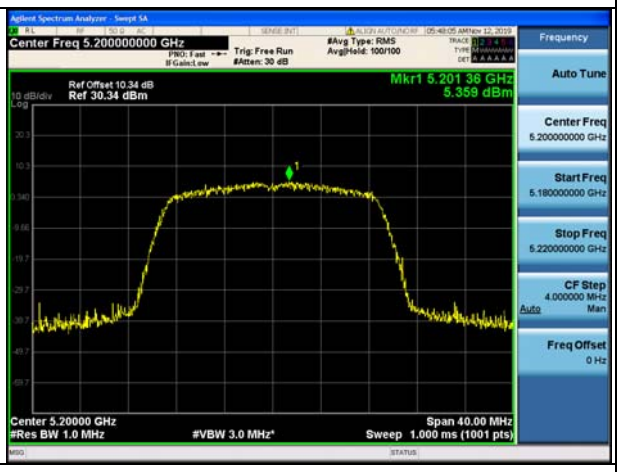
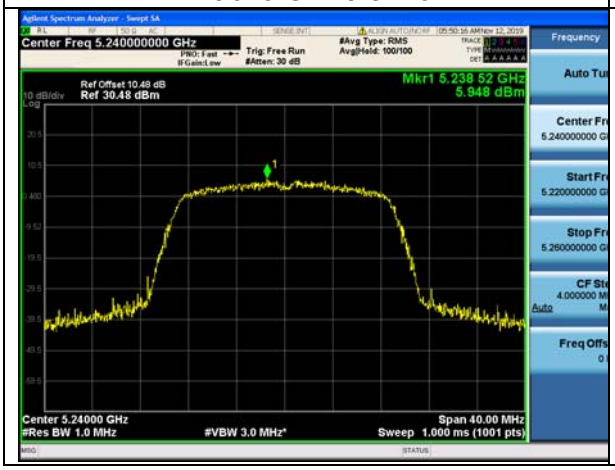
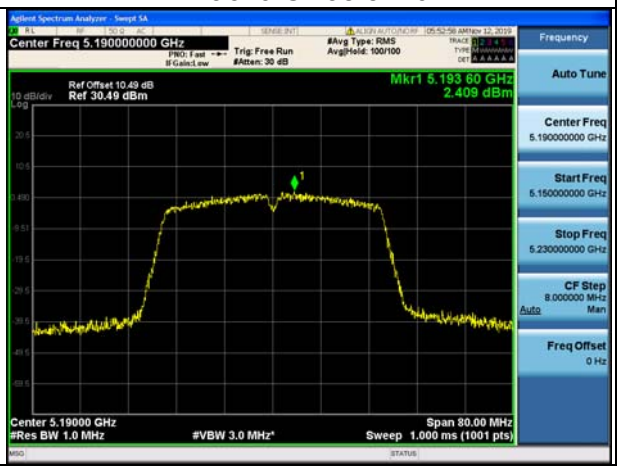
For U-NII-1

Mode	Channel	Frequency(MHz)	Measurement PSD (dBm/MHz)	Limit (dBm/MHz)	Result
11a	CH36	5180	7.17	11	Pass
11a	CH44	5220	7.62	11	Pass
11a	CH48	5240	7.23	11	Pass
11n(HT20)	CH36	5180	4.65	11	Pass
11n(HT20)	CH44	5220	5.6	11	Pass
11n(HT20)	CH48	5240	5.63	11	Pass
11n(HT40)	CH38	5190	2.44	11	Pass
11n(HT40)	CH46	5230	3.36	11	Pass
11ac (VHT20)	CH36	5180	4.77	11	Pass
11ac (VHT20)	CH40	5200	5.36	11	Pass
11ac (VHT20)	CH48	5240	5.95	11	Pass
11ac (VHT40)	CH38	5190	2.41	11	Pass
11ac (VHT40)	CH46	5230	3.42	11	Pass
11ac (VHT80)	CH42	5210	0.12	11	Pass

Test plots

For U-NII-1

11a CH36 5180	11a CH44 5200
	
11a CH48 5240	**11n20 CH36 5180**
	
11n20 CH44 5200	**11n20 CH48 5240**
	

11n40 CH38 5190	11n40 CH46 5230
	
11ac20 CH36 5180	**11ac20 CH40 5200**
	
11ac20 CH48 5240	**11ac40 CH38 5210**
	

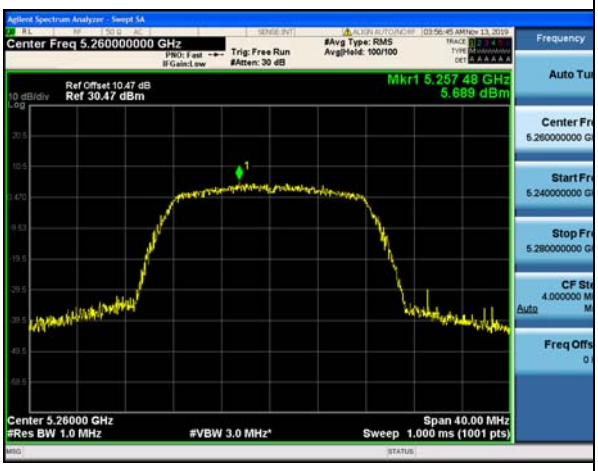
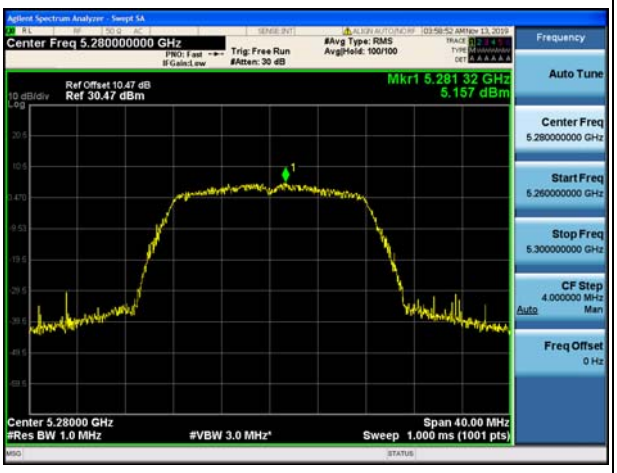
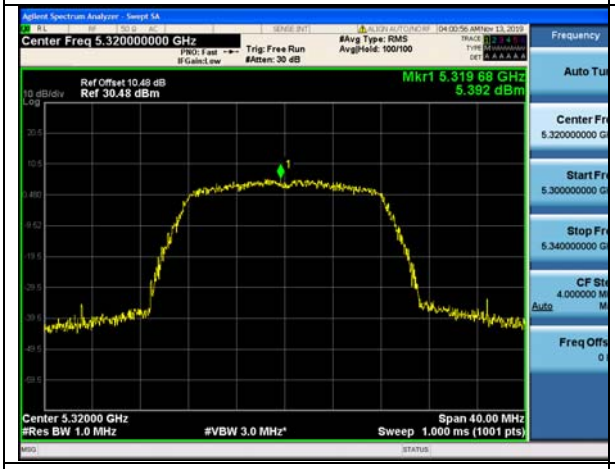
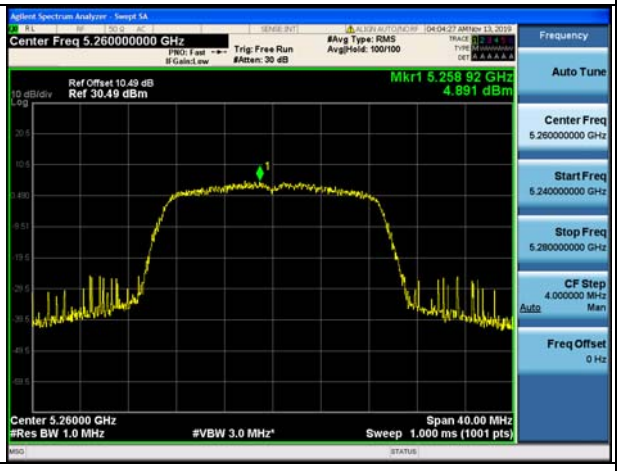
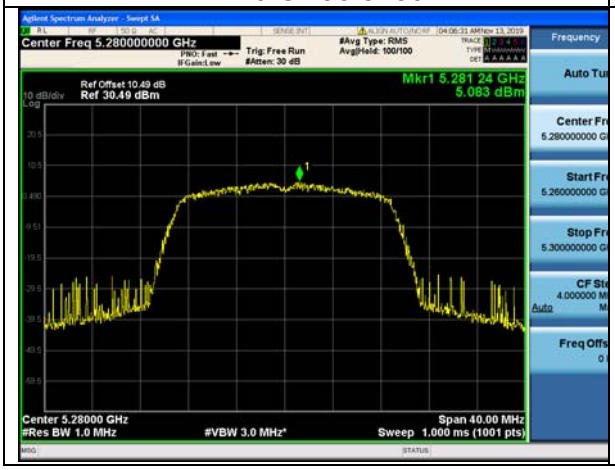
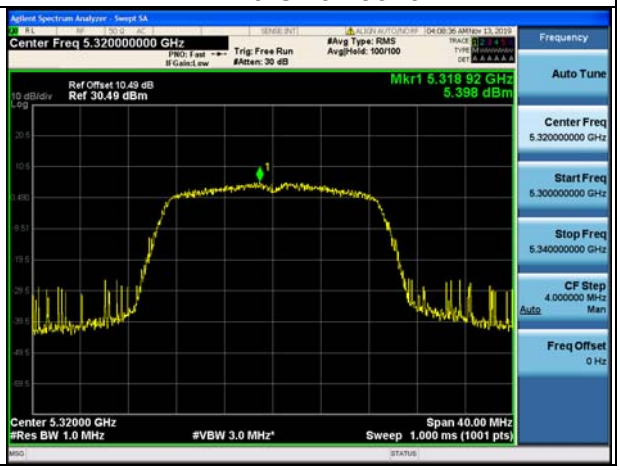
11ac40 CH46 5230	11ac80 CH42 5210
	

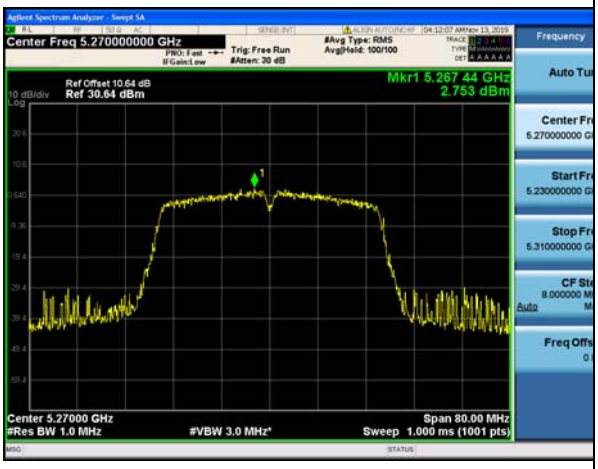
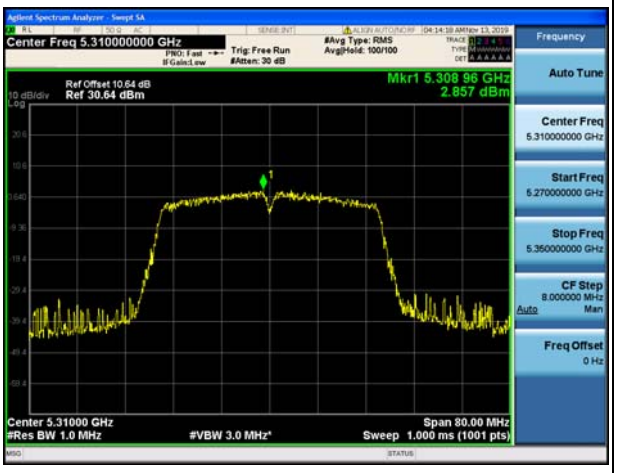
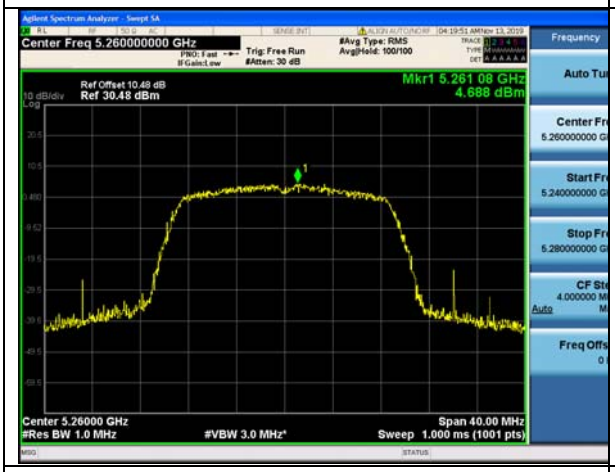
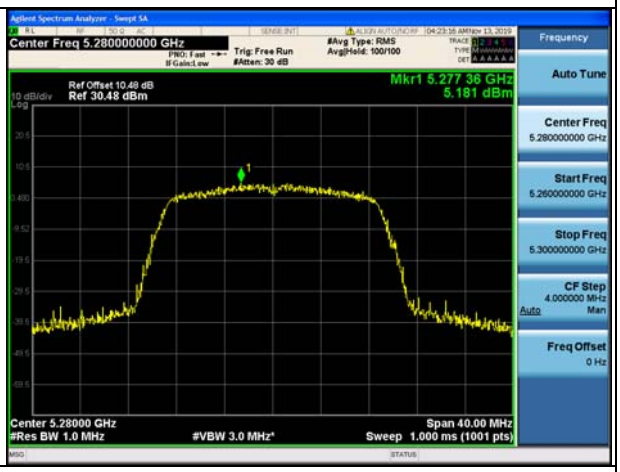
For U-NII-2A

Mode	Channel	Frequency(MHz)	Measurement PSD (dBm/MHz)	Limit (dBm/MHz)	Result
11a	CH52	5260	5.69	11	Pass
11a	CH56	5280	5.16	11	Pass
11a	CH64	5320	5.39	11	Pass
11n(HT20)	CH52	5260	4.89	11	Pass
11n(HT20)	CH56	5280	5.08	11	Pass
11n(HT20)	CH64	5320	5.4	11	Pass
11n(HT40)	CH54	5270	2.75	11	Pass
11n(HT40)	CH62	5310	2.86	11	Pass
11ac (VHT20)	CH52	5260	4.69	11	Pass
11ac (VHT20)	CH56	5280	5.18	11	Pass
11ac (VHT20)	CH64	5320	5.63	11	Pass
11ac (VHT40)	CH54	5270	2.35	11	Pass
11ac (VHT40)	CH62	5310	2.69	11	Pass
11ac (VHT80)	CH58	5290	0.57	11	Pass

Test plots

For U-NII-2A

11a CH52 5260	11a CH56 5280
	
11a CH64 5320	**11n20 CH52 5260**
	
11n20 CH56 5280	**11n20 CH64 5320**
	

11n40 CH54 5270	11n40 CH62 5310
	
11ac20 CH52 5260	11ac20 CH60 5300
	
11ac20 CH64 5320	11ac40 CH54 5270
	

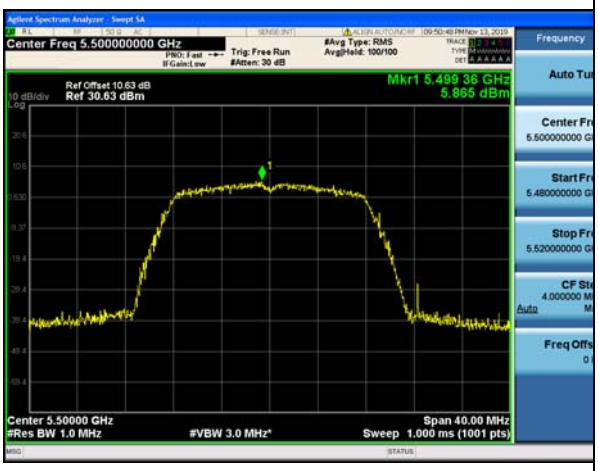
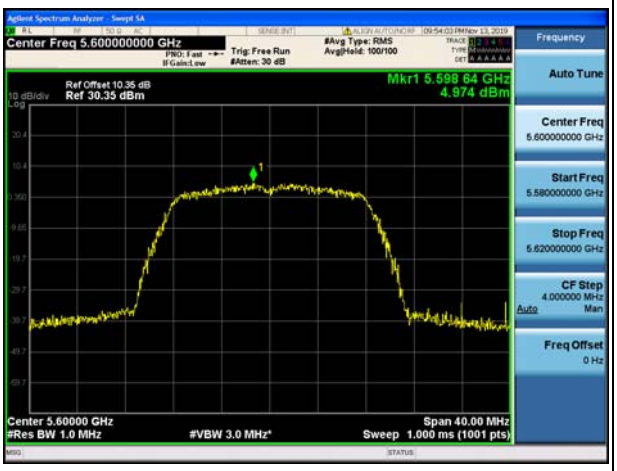
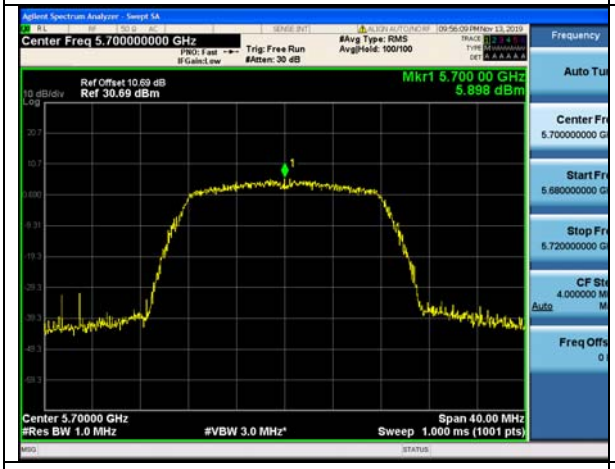
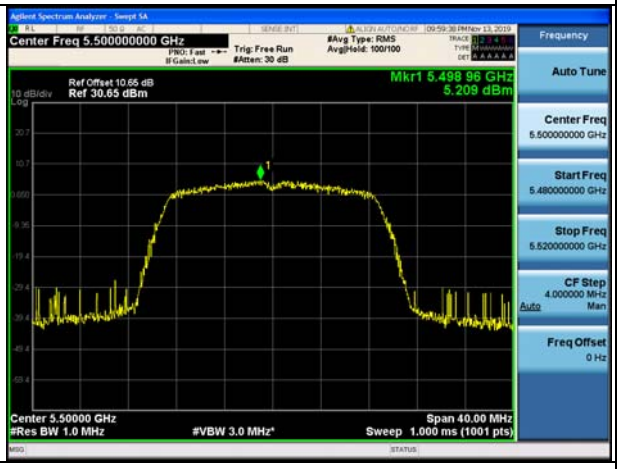
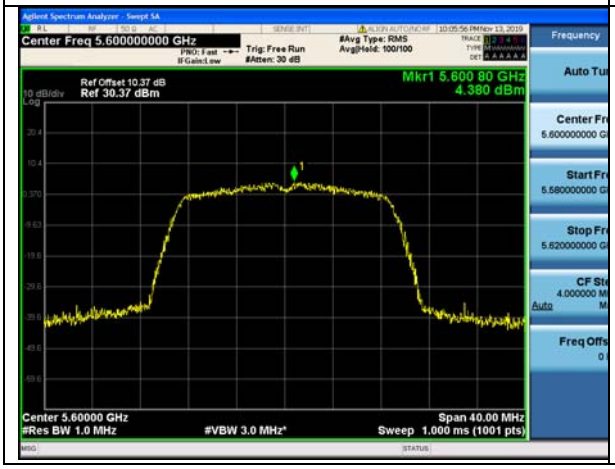
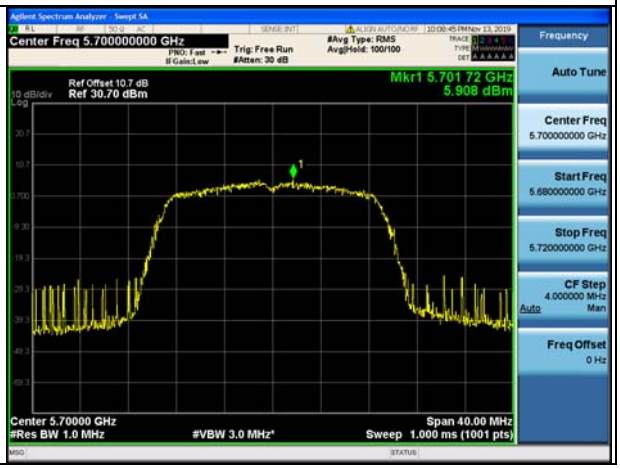
11ac40 CH62 5310	11ac80 CH58 5290
	

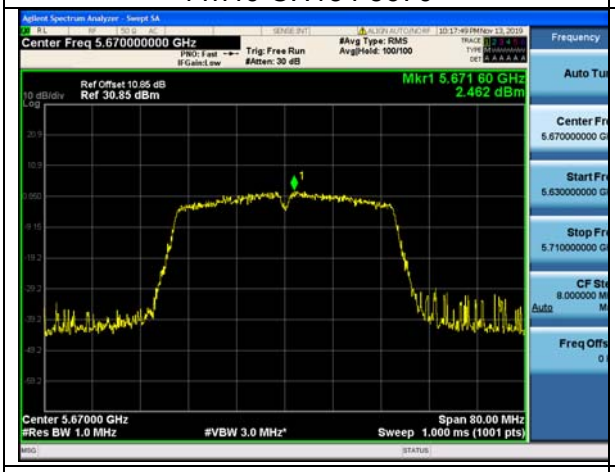
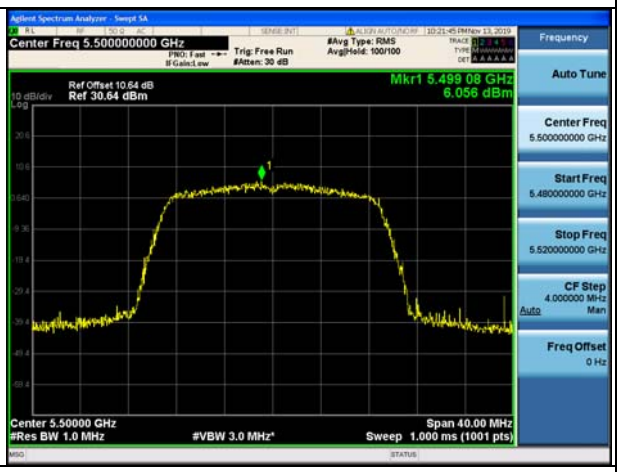
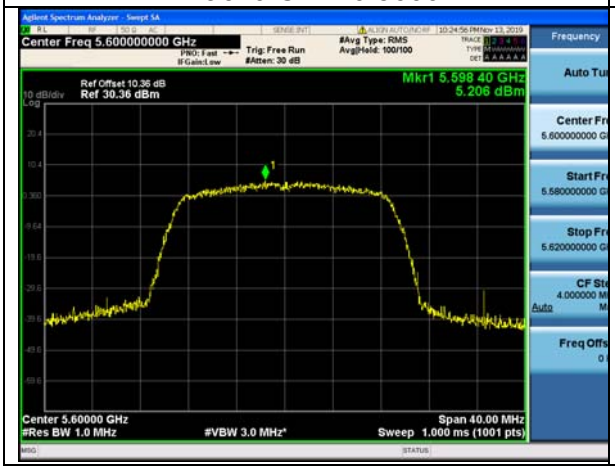
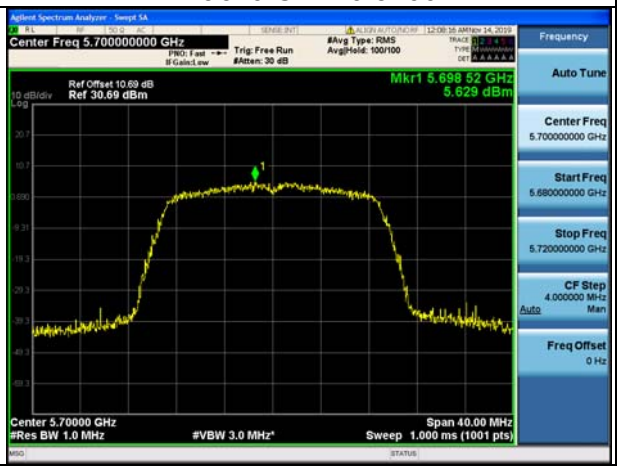
For U-NII-2C

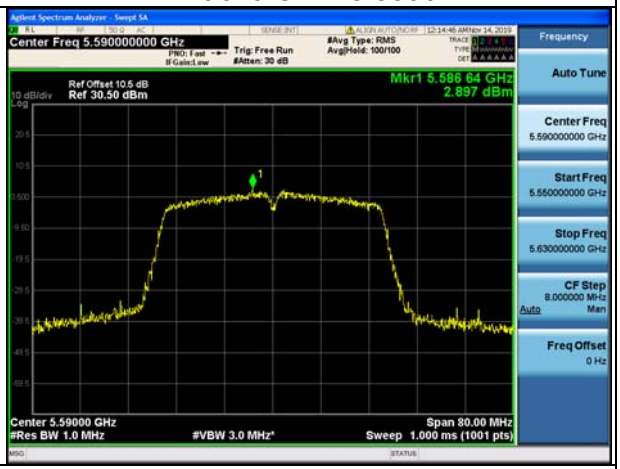
Mode	Channel	Frequency(MHz)	Measurement PSD (dBm/MHz)	Limit (dBm/MHz)	Result
11a	CH100	5500	5.87	11	Pass
11a	CH120	5600	4.97	11	Pass
11a	CH140	5700	5.90	11	Pass
11n (HT20)	CH100	5500	5.21	11	Pass
11n (HT20)	CH120	5600	4.38	11	Pass
11n (HT20)	CH140	5700	5.91	11	Pass
11n (HT40)	CH102	5510	2.74	11	Pass
11n (HT40)	CH118	5590	1.97	11	Pass
11n (HT40)	CH134	5670	2.46	11	Pass
11ac (VHT20)	CH100	5500	6.06	11	Pass
11ac (VHT20)	CH120	5600	5.21	11	Pass
11ac (VHT20)	CH140	5700	5.63	11	Pass
11n (VHT40)	CH102	5510	2.84	11	Pass
11n (VHT40)	CH118	5590	2.9	11	Pass
11n (VHT40)	CH134	5670	2.3	11	Pass
11ac (VHT80)	CH106	5530	-0.49	11	Pass

Test plots

For U-NII-2C

11a CH100 5500	11a CH120 5600
	
11a CH140 5700	**11n20 CH100 5500**
	
11n20 CH120 5600	**11n20 CH140 5700**
	

11n40 CH102 5510	11n40 CH118 5590
	
11n40 CH134 5670	11ac20 CH100 5500
	
11ac20 CH120 5600	11ac20 CH140 5700
	

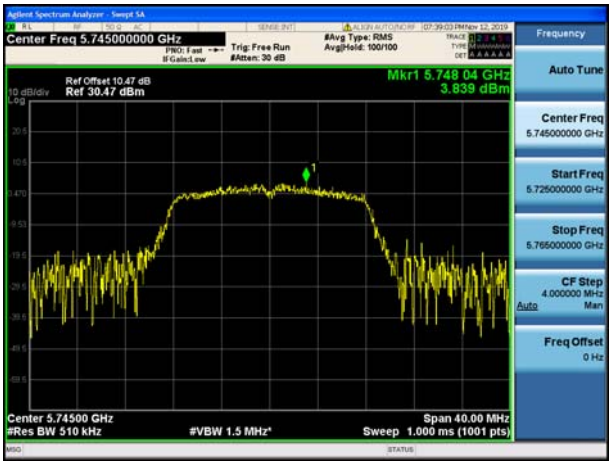
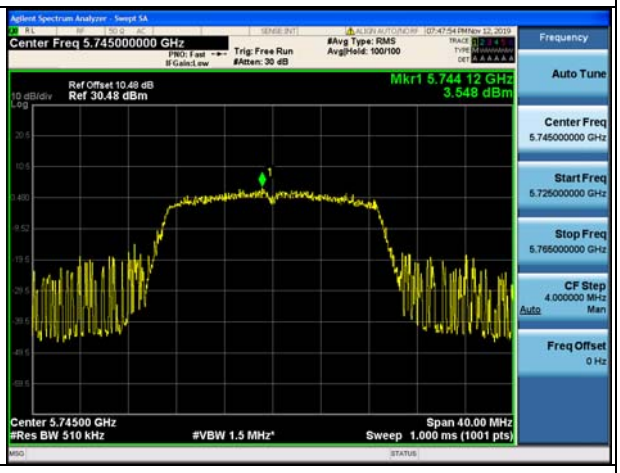
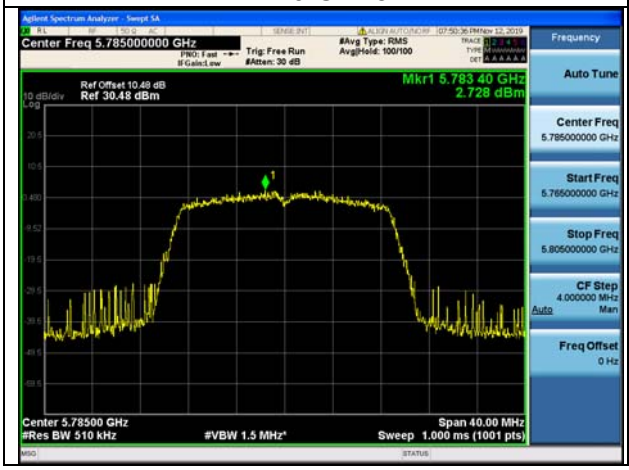
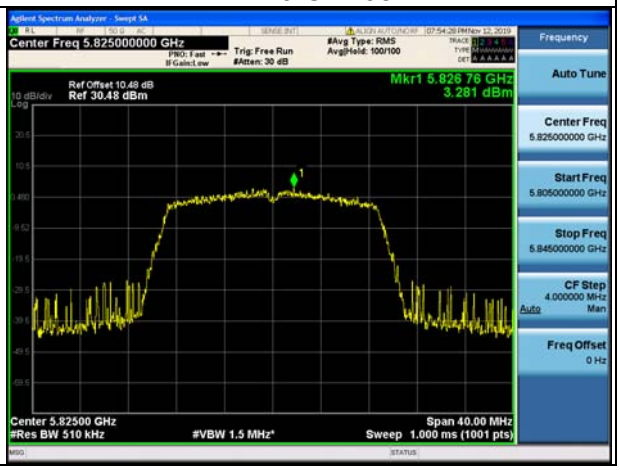
11ac40 CH102 5510	11ac40 CH118 5590
	
11ac40 CH134 5670	**11ac80 CH106 5530**
	

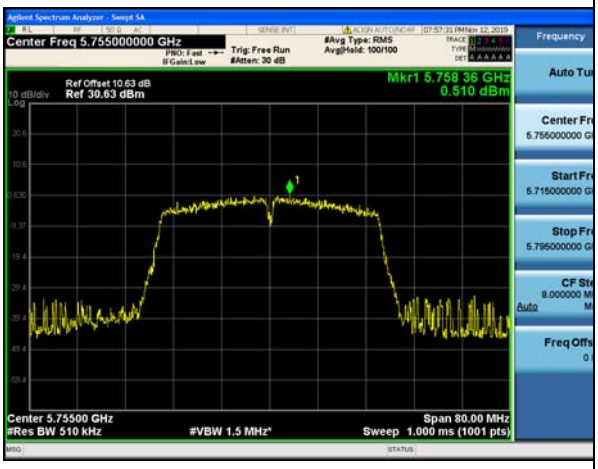
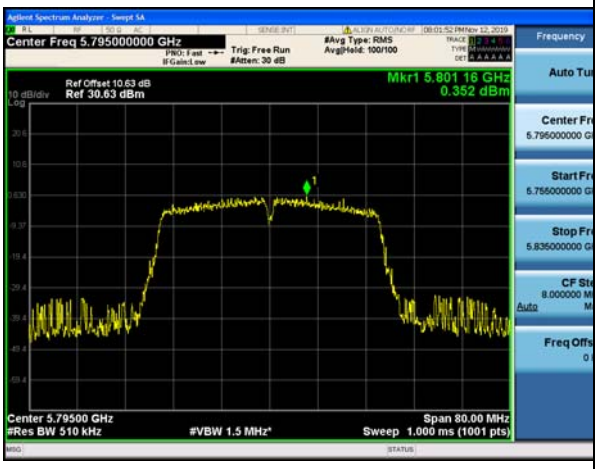
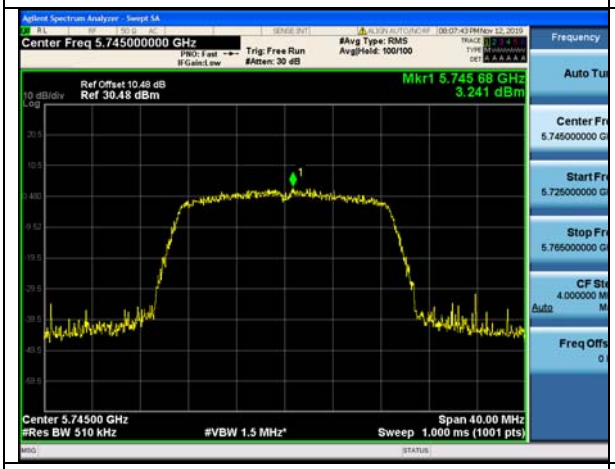
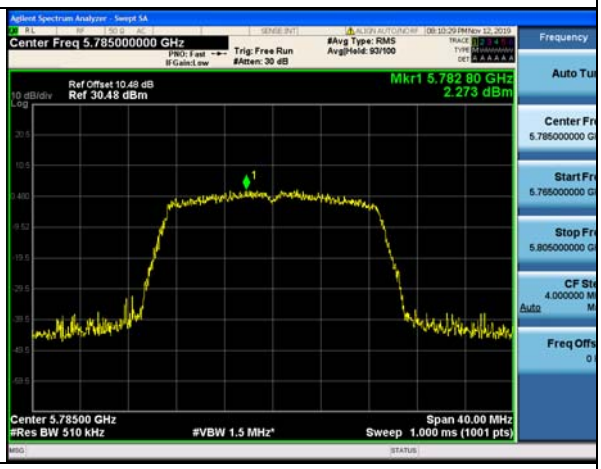
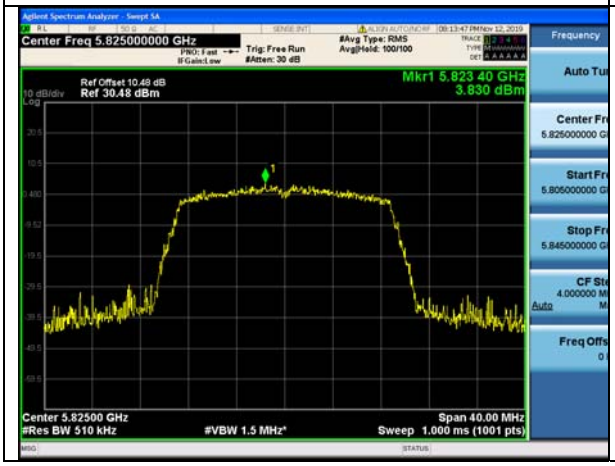
For U-NII-3

Mode	Channel	Frequency(MHz)	PSD (dBm/510kHz)	PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
11a	CH149	5745	3.84	2.374	30	Pass
11a	CH157	5785	3.68	2.288	30	Pass
11a	CH165	5825	3.89	2.401	30	Pass
11n20	CH149	5745	3.55	2.220	30	Pass
11n20	CH157	5785	2.73	1.838	30	Pass
11n20	CH165	5825	3.28	2.086	30	Pass
11n40	CH151	5755	0.51	1.103	30	Pass
11n40	CH159	5795	0.35	1.063	30	Pass
11ac20	CH149	5745	3.24	2.067	30	Pass
11ac20	CH157	5785	2.27	1.653	30	Pass
11ac20	CH165	5825	3.83	2.368	30	Pass
11ac40	CH151	5755	1.56	1.404	30	Pass
11ac40	CH159	5795	1.07	1.254	30	Pass
11ac80	CH155	5775	-1.5	0.694	30	Pass
Note: If the measurement is X dBm/510kHz, thus X dBm/510kHz = $(10^{X/10})$*(500 / 510) dBm/500kHz						

Test plots

For U-NII-3

11a CH149	11a CH157
	
11a CH165	**11n20 CH149**
	
11n20 CH157	**11n20 CH165**
	

11n40 CH151	11n40 CH159
	
11ac20 CH149	11ac20 CH157
	
11ac20 CH165	11ac40 CH151
	

11ac40 CH159	11ac80 CH155
	

5.9 Frequency Stability Measurement

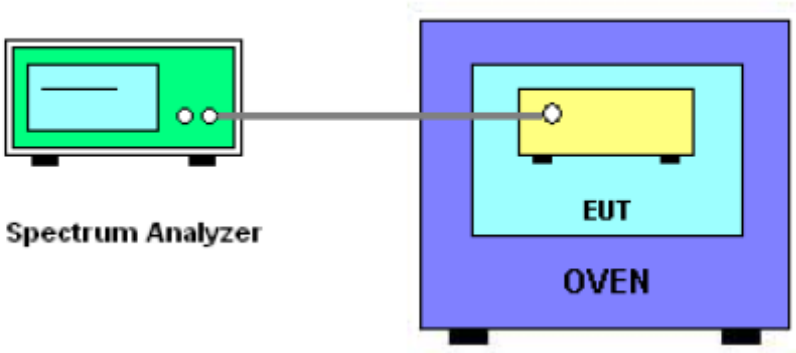
5.9.1 Limit

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

5.9.2 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and max hold settings.
5. Fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 106 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is -20°C~70°C.

5.9.3 Test Setup Layout



5.9.4 EUT Operation during Test

The EUT was programmed to be in continuously un-modulation transmitting mode.

5.9.5 TEST RESULTS

For U-NII-1

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5180.0142	5180	0.0142	-2.7413
		V max (V)	5.75	5180.0196	5180	0.0196	-3.7838
		V min (V)	4.25	5180.0113	5180	0.0113	-2.1815
Limits				within 5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5180.0126	5180	0.0126	-2.4344
		T (°C)	-10	5180.0142	5180	0.0142	-2.7413
		T (°C)	0	5180.0116	5180	0.0116	-2.2394
		T (°C)	10	5180.0132	5180	0.0132	-2.5483
		T (°C)	20	5180.0126	5180	0.0126	-2.4324
		T (°C)	30	5180.0137	5180	0.0137	-2.6448
		T (°C)	40	5180.0120	5180	0.0120	-2.3166
		T (°C)	50	5180.0124	5180	0.0124	-2.3938
		T (°C)	60	5180.0141	5180	0.0141	-2.7220
		T (°C)	70	5180.0145	5180	0.0145	-2.7992
Limits				within 5150-5250MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.70	5200.0124	5200	0.0124	-2.3846
		V max (V)	4.26	5200.0113	5200	0.0113	-2.1731
		V min (V)	3.15	5200.0124	5200	0.0124	-2.3846
Limits				within 5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5200.0110	5200	0.0110	-2.1154
		T (°C)	-10	5200.0125	5200	0.0125	-2.4038
		T (°C)	0	5200.0134	5200	0.0134	-2.5769
		T (°C)	10	5200.0132	5200	0.0132	-2.5385
		T (°C)	20	5200.0147	5200	0.0147	-2.8269
		T (°C)	30	5200.0141	5200	0.0141	-2.7115
		T (°C)	40	5200.0140	5200	0.0140	-2.6923
		T (°C)	50	5200.0132	5200	0.0132	-2.5385
		T (°C)	60	5200.0129	5200	0.0129	-2.4808
		T (°C)	70	5200.0119	5200	0.0119	-2.2885
Limits				within 5150-5250MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.70	5240.0124	5240	0.0124	-2.3664
		V max (V)	4.26	5240.0119	5240	0.0119	-2.2710
		V min (V)	3.15	5240.0134	5240	0.0134	-2.5573
Limits				within 5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5240.0133	5240	0.0133	-2.5382
		T (°C)	-10	5240.0134	5240	0.0134	-2.5573
		T (°C)	0	5240.0117	5240	0.0117	-2.2328
		T (°C)	10	5240.0124	5240	0.0124	-2.3664
		T (°C)	20	5240.0142	5240	0.0142	-2.7099
		T (°C)	30	5240.0147	5240	0.0147	-2.8053
		T (°C)	40	5240.0121	5240	0.0121	-2.3092
		T (°C)	50	5240.0116	5240	0.0116	-2.2137
		T (°C)	60	5240.0131	5240	0.0131	-2.5000
		T (°C)	70	5240.0129	5240	0.0129	-2.4618
Limits				within 5150-5250MHz			
Result				Complies			

For U-NII-2A

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5260MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5260.0142	5260	0.0142	-2.6996
		V max (V)	5.75	5260.0195	5260	0.0195	-3.7072
		V min (V)	4.25	5260.0113	5260	0.0113	-2.1483
Limits				within 5250-5350MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5260MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5260.0126	5260	0.0126	-2.3973
		T (°C)	-10	5260.0142	5260	0.0142	-2.6996
		T (°C)	0	5260.0116	5260	0.0116	-2.2053
		T (°C)	10	5260.0132	5260	0.0132	-2.5095
		T (°C)	20	5260.0126	5260	0.0126	-2.3954
		T (°C)	30	5260.0137	5260	0.0137	-2.6046
		T (°C)	40	5260.0120	5260	0.0120	-2.2814
		T (°C)	50	5260.0124	5260	0.0124	-2.3574
		T (°C)	60	5260.0141	5260	0.0141	-2.6806
		T (°C)	70	5260.0145	5260	0.0145	-2.7567
Limits				within 5250-5350MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5280MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.70	5280.0124	5280	0.0124	-2.3485
		V max (V)	4.26	5280.0113	5280	0.0113	-2.1402
		V min (V)	3.15	5280.0124	5280	0.0124	-2.3485
Limits				within 5250-5350MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5280MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5280.0110	5280	0.0110	-2.0833
		T (°C)	-10	5280.0125	5280	0.0125	-2.3674
		T (°C)	0	5280.0134	5280	0.0134	-2.5379
		T (°C)	10	5280.0132	5280	0.0132	-2.5000
		T (°C)	20	5280.0147	5280	0.0147	-2.7841
		T (°C)	30	5280.0141	5280	0.0141	-2.6705
		T (°C)	40	5280.0140	5280	0.0140	-2.6515
		T (°C)	50	5280.0132	5280	0.0132	-2.5000
		T (°C)	60	5280.0129	5280	0.0129	-2.4432
		T (°C)	70	5280.0119	5280	0.0119	-2.2538
Limits				within 5250-5350MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5320MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (° C)	20	V nom (V)	3.70	5320.0124	5320	0.0124	-2.3308
		V max (V)	4.26	5320.0119	5320	0.0119	-2.2368
		V min (V)	3.15	5320.0134	5320	0.0134	-2.5188
Limits				within 5250-5350MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5320MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5320.0133	5320	0.0133	-2.5000
		T (°C)	-10	5320.0134	5320	0.0134	-2.5188
		T (°C)	0	5320.0117	5320	0.0117	-2.1992
		T (°C)	10	5320.0124	5320	0.0124	-2.3308
		T (°C)	20	5320.0142	5320	0.0142	-2.6692
		T (°C)	30	5320.0147	5320	0.0147	-2.7632
		T (°C)	40	5320.0121	5320	0.0121	-2.2744
		T (°C)	50	5320.0116	5320	0.0116	-2.1805
		T (°C)	60	5320.0131	5320	0.0131	-2.4624
		T (°C)	70	5320.0129	5320	0.0129	-2.4248
Limits				within 5250-5350MHz			
Result				Complies			

For U-NII-2C

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5500MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (° C)	20	V nom (V)	5.00	5500.0132	5500	0.0132	-2.4000
		V max (V)	5.75	5500.0183	5500	0.0183	-3.3273
		V min (V)	4.25	5500.0133	5500	0.0133	-2.4182
Limits				within 5470-5725MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5500MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5500.0126	5500	0.0126	-2.2927
		T (°C)	-10	5500.0142	5500	0.0142	-2.5818
		T (°C)	0	5500.0142	5500	0.0142	-2.5818
		T (°C)	10	5500.0112	5500	0.0112	-2.0364
		T (°C)	20	5500.0162	5500	0.0162	-2.9455
		T (°C)	30	5500.0137	5500	0.0137	-2.4909
		T (°C)	40	5500.0120	5500	0.0120	-2.1818
		T (°C)	50	5500.0124	5500	0.0124	-2.2545
		T (°C)	60	5500.0141	5500	0.0141	-2.5636
		T (°C)	70	5500.0145	5500	0.0145	-2.6364
Limits				within 5470-5725MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5600MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (° C)	20	V nom (V)	3.70	5600.0145	5600	0.0145	-2.5893
		V max (V)	4.26	5600.0123	5600	0.0123	-2.1964
		V min (V)	3.15	5600.0134	5600	0.0134	-2.3929
Limits				within 5470-5725MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5600MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5600.0121	5600	0.0121	-2.1607
		T (°C)	-10	5600.0125	5600	0.0125	-2.2321
		T (°C)	0	5600.0134	5600	0.0134	-2.3929
		T (°C)	10	5600.0132	5600	0.0132	-2.3571
		T (°C)	20	5600.0147	5600	0.0147	-2.6250
		T (°C)	30	5600.0141	5600	0.0141	-2.5179
		T (°C)	40	5600.0140	5600	0.0140	-2.5000
		T (°C)	50	5600.0132	5600	0.0132	-2.3571
		T (°C)	60	5600.0144	5600	0.0144	-2.5714
		T (°C)	70	5600.0153	5600	0.0153	-2.7321
Limits				within 5470-5725MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5700MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.70	5700.0133	5700	0.0133	-2.3333
		V max (V)	4.26	5700.0119	5700	0.0119	-2.0877
		V min (V)	3.15	5700.0134	5700	0.0134	-2.3509
Limits				within 5470-5725MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5700MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5700.0144	5700	0.0144	-2.5263
		T (°C)	-10	5700.0121	5700	0.0121	-2.1228
		T (°C)	0	5700.0117	5700	0.0117	-2.0526
		T (°C)	10	5700.0124	5700	0.0124	-2.1754
		T (°C)	20	5700.0142	5700	0.0142	-2.4912
		T (°C)	30	5700.0147	5700	0.0147	-2.5789
		T (°C)	40	5700.0121	5700	0.0121	-2.1228
		T (°C)	50	5700.0116	5700	0.0116	-2.0351
		T (°C)	60	5700.0131	5700	0.0131	-2.2982
		T (°C)	70	5700.0183	5700	0.0183	-3.2105
Limits				within 5470-5725MHz			
Result				Complies			

For U-NII-3
Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.70	5745.01064	5745	0.01064	-1.8523
		V max (V)	4.26	5745.00407	5745	0.00407	-0.7085
		V min (V)	3.15	5745.00704	5745	0.00704	-1.2257
Limits				within 5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5745.00910	5745	0.00910	-1.5835
		T (°C)	-10	5745.00763	5745	0.00763	-1.3286
		T (°C)	0	5745.01132	5745	0.01132	-1.9697
		T (°C)	10	5745.01082	5745	0.01082	-1.8826
		T (°C)	20	5745.00575	5745	0.00575	-1.0016
		T (°C)	30	5745.01158	5745	0.01158	-2.0149
		T (°C)	40	5745.00973	5745	0.00973	-1.6938
		T (°C)	50	5745.01041	5745	0.01041	-1.8123
		T (°C)	60	5745.00807	5745	0.00807	-1.4040
		T (°C)	70	5745.01223	5745	0.01223	-2.1296
Limits				within 5725-5850MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.70	5785.01299	5785	0.01299	-2.2450
		V max (V)	4.26	5785.00911	5785	0.00911	-1.5749
		V min (V)	3.15	5785.00445	5785	0.00445	-0.7686
Limits				within 5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5785.00556	5785	0.00556	-0.9613
		T (°C)	-10	5785.01265	5785	0.01265	-2.1860
		T (°C)	0	5785.00863	5785	0.00863	-1.4917
		T (°C)	10	5785.00709	5785	0.00709	-1.2257
		T (°C)	20	5785.01242	5785	0.01242	-2.1474
		T (°C)	30	5785.00785	5785	0.00785	-1.3573
		T (°C)	40	5785.01342	5785	0.01342	-2.3201
		T (°C)	50	5785.01339	5785	0.01339	-2.3147
		T (°C)	60	5785.00369	5785	0.00369	-0.6379
		T (°C)	70	5785.00738	5785	0.00738	-1.2757
Limits				within 5725-5850MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.70	5825.00402	5825	0.00402	-0.6908
		V max (V)	4.26	5825.01013	5825	0.01013	-1.7390
		V min (V)	3.15	5825.00412	5825	0.00412	-0.7081
Limits				within 5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.7	T (°C)	-20	5825.01091	5825	0.01091	-1.8721
		T (°C)	-10	5825.00266	5825	0.00266	-0.4565
		T (°C)	0	5825.00049	5825	0.00049	-0.0834
		T (°C)	10	5825.00737	5825	0.00737	-1.2659
		T (°C)	20	5825.00668	5825	0.00668	-1.1475
		T (°C)	30	5825.00098	5825	0.00098	-0.1686
		T (°C)	40	5825.01111	5825	0.01111	-1.9065
		T (°C)	50	5825.01216	5825	0.01216	-2.0870
		T (°C)	60	5825.00286	5825	0.00286	-0.4906
		T (°C)	70	5825.00822	5825	0.00822	-1.4113
Limits				within 5725-5850MHz			
Result				Complies			

5.10 Dynamic frequency selection

5.10.1 Standard requirement

KDB905462 D02 v02(04/08/2016) the following are the requirements for Client Devices:
a) A Client Device will not transmit before having received appropriate control signals from a Master Device.
b) A Client Device will stop all its transmissions whenever instructed by a Master Device to which it is associated and will meet the Channel Move Time and Channel Closing Transmission Time requirements.
The Client Device will not resume any transmissions until it has again received control signals from a Master Device.
c) If a Client Device is performing In-Service Monitoring and detects a Radar Waveform above the DFS Detection Threshold, it will inform the Master Device. This is equivalent to the Master Device detecting the Radar Waveform and d) through f) of section 5.1.1(KDB905462 D02 v02) apply.
d) Irrespective of Client Device or Master Device detection the Channel Move Time and Channel Closing Transmission Time requirements remain the same.

5.10.2 Limit

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.
Note 1: *Channel Move Time* and the *Channel Closing Transmission Time* should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. **Note 2:** The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate a *Channel* move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions. **Note 3:** During the *U-NII Detection Bandwidth* detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	

5.10.3 DFS detection threshold values

The DFS detection thresholds are defined for Master devices and Client Devices with In-service monitoring. These detection thresholds are listed in the following table.

Maximum Transmit Power	**Value (See Notes 1, 2, and 3)**
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. **Note 2:** Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. **Note3:** EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

5.10.4 DFS test signals

As the EUT is a Client Device with no Radar Detection only one type radar pulse is required for the testing. Radar Pulse type 0 was used in the evaluation of the Client device for the purpose of measuring the Channel Move Time and the Channel Closing Transmission Time.

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{\text{PRI}_{\mu\text{sec}}}\right)\right\}$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.					

5.10.5 Test and measurement system

General Test Setup Procedure:

1. Connect FCC approved Master AP to a network, via wired Ethernet, that allows connection to an FTP server.
2. Associate the EUT with the Master AP.
3. Launch the FTP application on the EUT.
4. Connect to the FTP server application to the FTP server hosting the file
5. Initiate an FTP download of the file from the host.
6. Monitor the channel loading during transfer.
7. Reduce the maximum allowed data rate for the Master AP, using the AP's GUI interface.
8. Repeat steps 4-6 until the channel loading is as close to 20 % as possible.
9. Record the data rate setting on the Master AP and the channel loading.
10. While the system is performing an FTP transfer using the settings form item 8 above, perform the Channel Closing Transmission Time and Channel Move Time Measurements as required by KDB905462 D02 v02 using a conducted test.

System calibrations

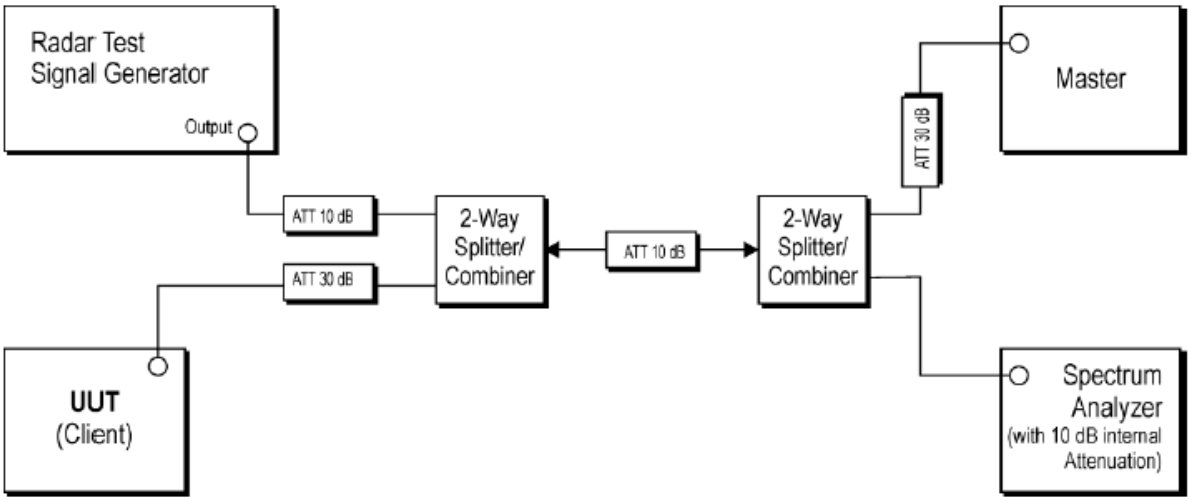
A-50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a coaxial cable. The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of - 62 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the common port of the spectrum analyzer combiner or divider.

The spectrum analyzer displays the level of the signal generator higher than the client TX level. Because we can not search the signal generator in the spectrum analyzer when the signal generator level is - 62 dBm.
The spectrum analyzer will still indicate the level higher than the client TX level.

Procedure

The KDB905462 D02 v02 describes a radiated test setup and a conducted test setup. A radiated test setup was used for this testing. Below figure shows the typical test setup. Each one channel selected between UNII-2A, UNII-2C is chosen for the testing.



1. The radar pulse generator is setup to provide a pulse at the frequency that the Master and Client are operating. A Type 0 radar pulse with a 1 μs pulse width and a 1428 μs PRI is used for the testing.

2. The vector signal generator is adjusted to provide the radar burst (18 pulses) at a level of approximately -62 dBm at the antenna of the Master device.

3. The Client Device (EUT) is set up per the diagram in Figure 3-1 and communications between the Master device and the Client is established.

4. The MPEG file specified by the FCC (”6½ Magic Hours”) is streamed from the “file computer” through the Master to the Slave Device and played in full motion video using Media Player Classic Ver.6.4.8.6 in order to properly load the network.

5. The spectrum analyzer is set to record about 15 sec window to any transmissions occurring up to and after 10 sec.

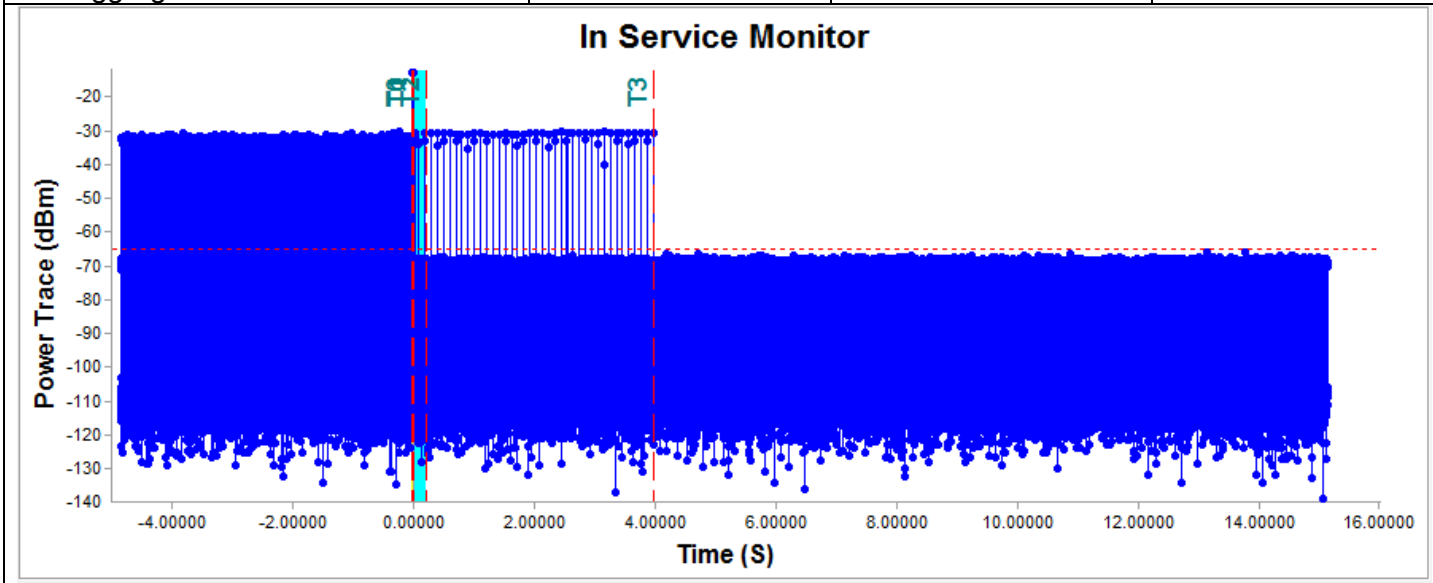
6. The system is again setup and the monitoring time is shortened in order to capture the Channel Closing Transmission Time. This time is measured to insure that the Client ceases transmission within 200 ms and the aggregate of emissions occurring after 200 ms up to 10 sec. do not exceed 60 ms. (Note: the channel may be different since the Master and Client have changed channels due to the detection of the initial radar pulse.)

7. After the initial radar burst the channel is monitored for 30 minutes to insure no transmissions or beacons occur. A second monitoring setup is used to verify that the Master and Client have both moved to different channels.

5.10.6 Test results

In Service Monitor

802.11ac(VHT80) CH106 5530MHz			
Test item	Measure	Limit	Result
Channel Move Time:	3.96943s	10 s	PASS
Channel Closing Transmission Time, Aggregate Time After 200 ms:	0.0285031s	60 ms	PASS



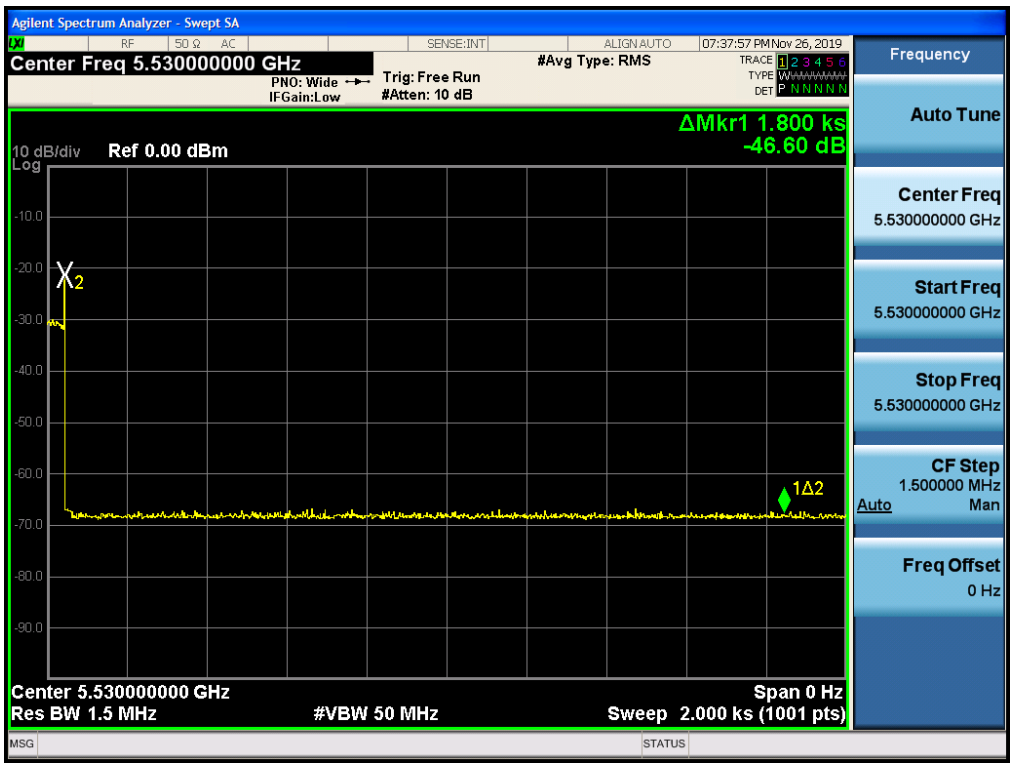
Note:

1. TPC is not required since the maximum EIRP is less than 500mW(27dBm).
2. WLAN traffic that meets or exceeds the minimum required loading was generated by transferring a data stream from the controller/server PC to the EUT using Streaming Video.
3. Overview of Master Device:

The Master Device is a SAMSUNG Access Point, FCC ID: A3LWEA453E.
The rated output power of the Master unit is < 23dBm (EIRP), power spectral density < 10 dBm/MHz.
Therefore the required interference threshold level is –62 dBm.
The calibrated radiated DFS Detection Threshold level is set to –62 dBm.
The tested level is lower than the required level hence it provides a margin to the limit.

Non-occupancy Period – Monitoring live time spectrum analyzer – Elapse time 30 minutes

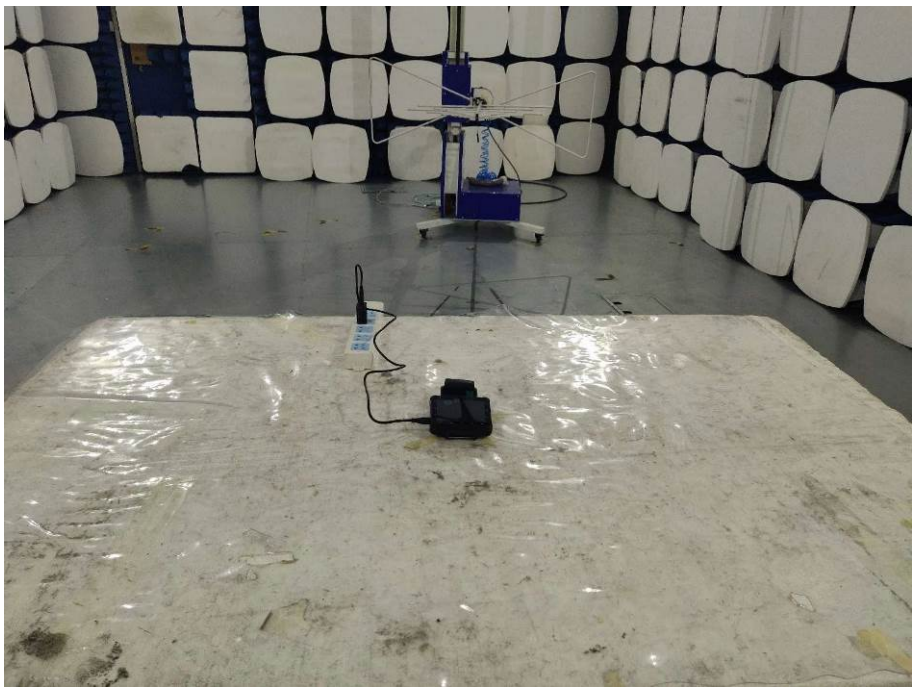
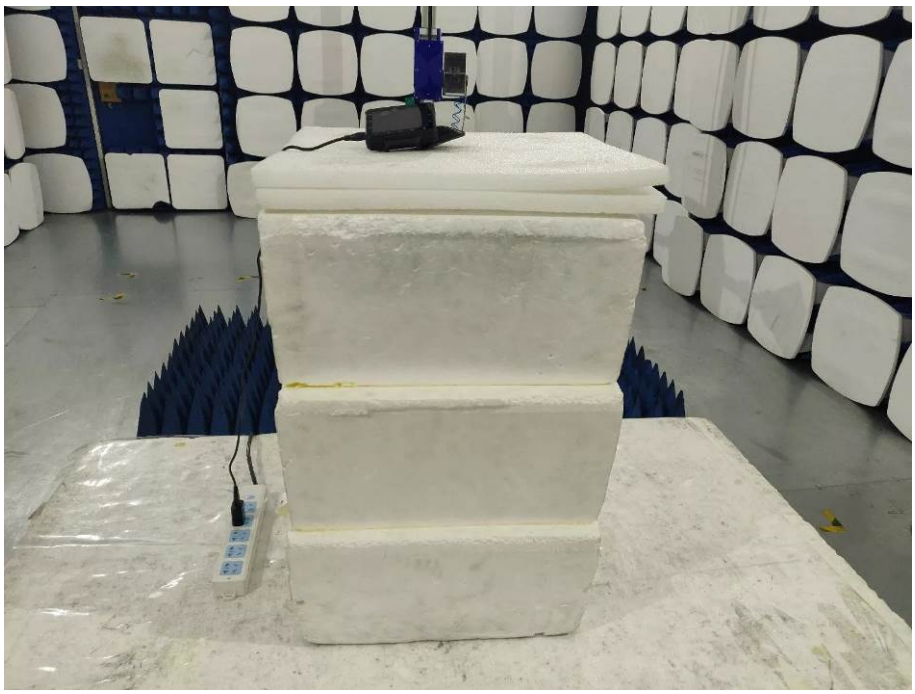
802.11ac(VHT80) CH106 5530MHz		
Test item	Limit	Result
Non-occupancy Period:	No WLAN traffic for elapse time 30 minutes	PASS

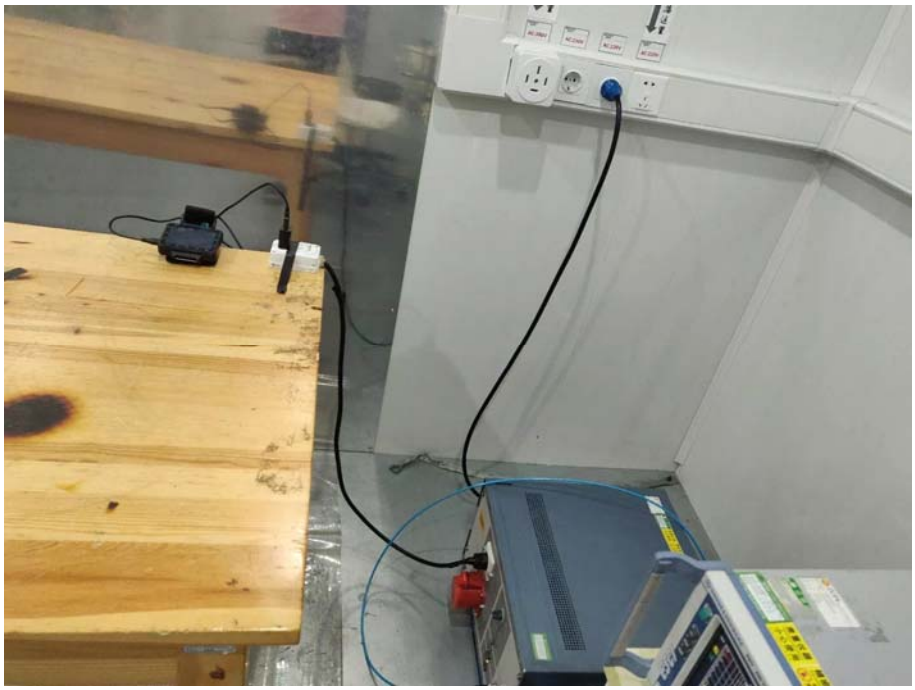


Note:
1. TPC is not required since the maximum EIRP is less than 500mW(27dBm).
2. WLAN traffic that meets or exceeds the minimum required loading was generated by transferring a data stream from the controller/server PC to the EUT using Streaming Video.
3. Overview of Master Device:

The Master Device is a SAMSUNG Access Point, FCC ID: A3LWEA453E.
The rated output power of the Master unit is < 23dBm (EIRP), power spectral density < 10 dBm/MHz.
Therefore the required interference threshold level is –62 dBm.
The calibrated radiated DFS Detection Threshold level is set to –62 dBm.
The tested level is lower than the required level hence it provides a margin to the limit.

Photographs of the Test Setup

Radiated emission



Conducted emission


Photographs of the EUT

See the APPENDIX 1: EUT PHOTO in the report No.: MTi19110301-5E1-1.

----END OF REPORT----