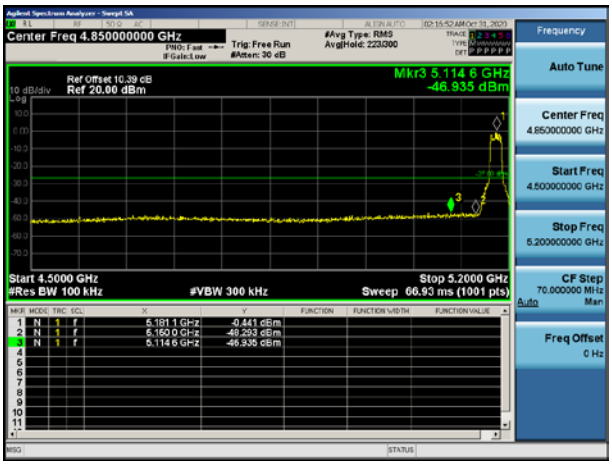
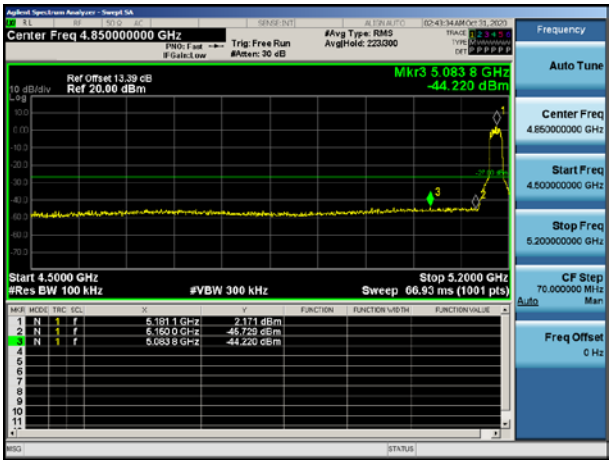
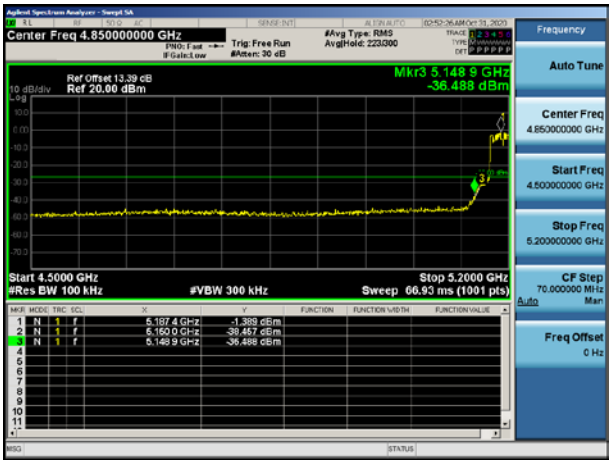
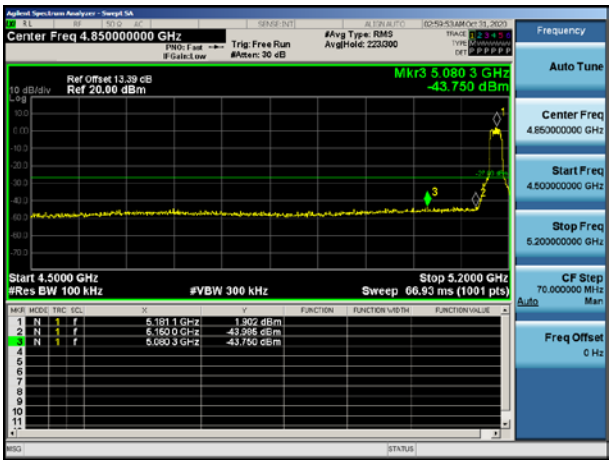
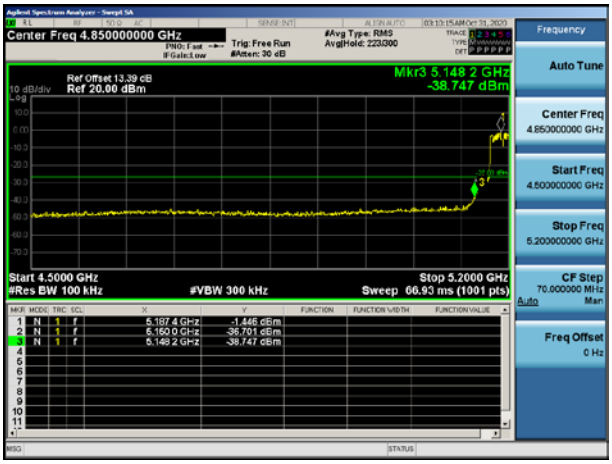
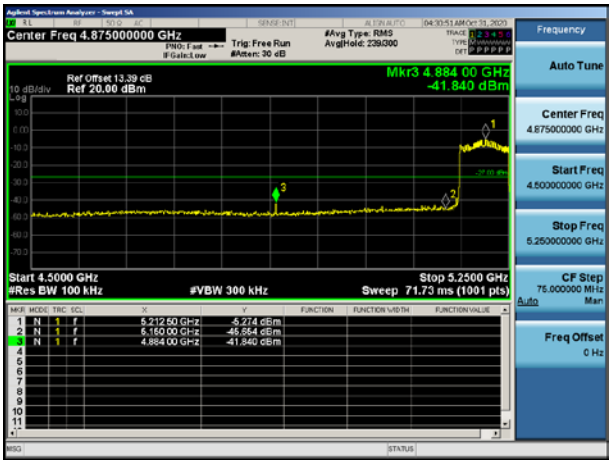
5.7.5 Conduction Band edge

For U-NII-1 test plot

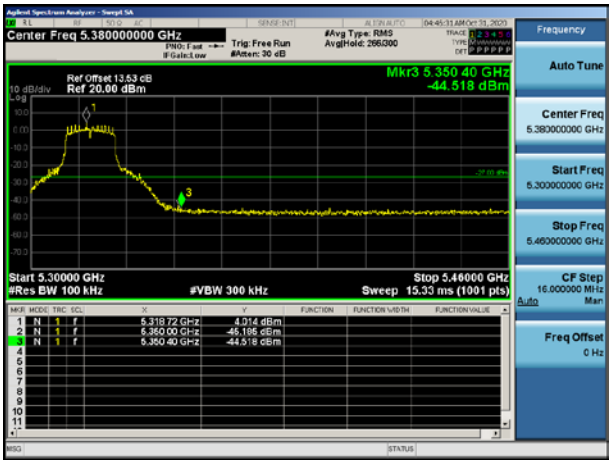
11a	
Band edge-Left	Band edge-Right
	/
11n20	
Band edge-Left	Band edge-Right
	/
11n40	
Band edge-Left	Band edge-Right
	/

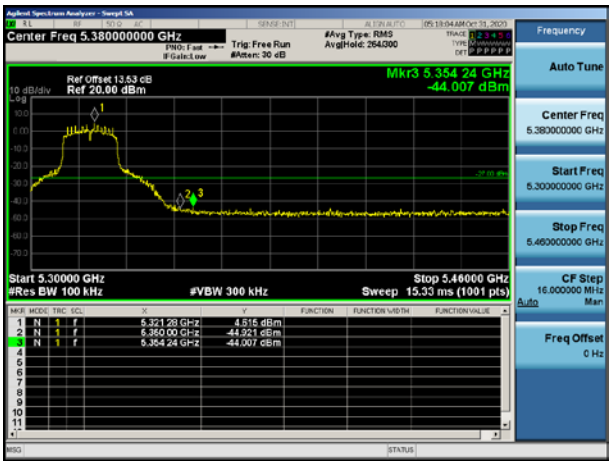
11ac20	
Band edge-Left	Band edge-Right
	/

11ac40	
Band edge-Left	Band edge-Right
	/

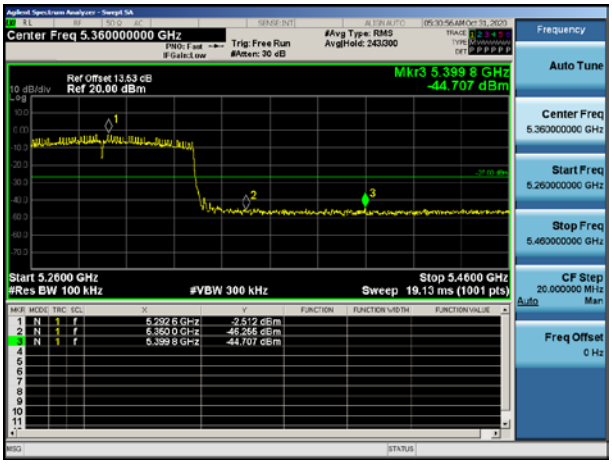
11ac80	
Band edge-Left	Band edge-Right
	/

For U-NII-2A test plot

11a	
Band edge-Left	Band edge-Right
/	
11n20	
Band edge-Left	Band edge-Right
/	
11n40	
Band edge-Left	Band edge-Right
/	

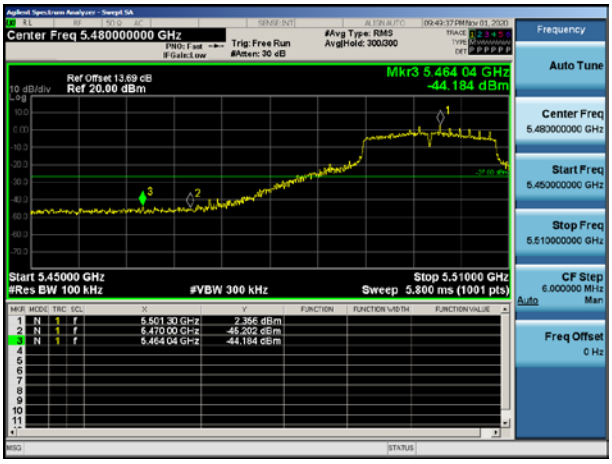
11ac20	
Band edge-Left	Band edge-Right
/	

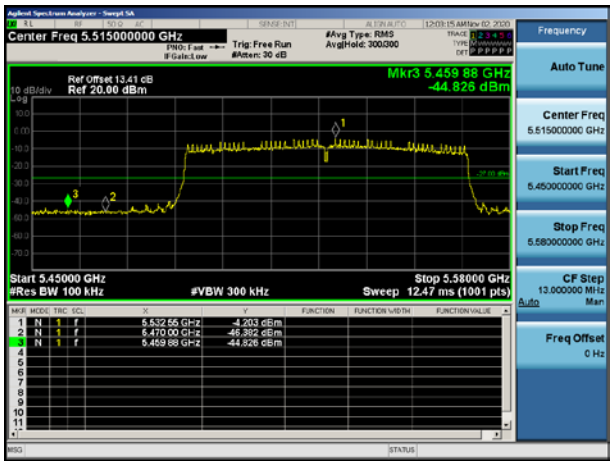
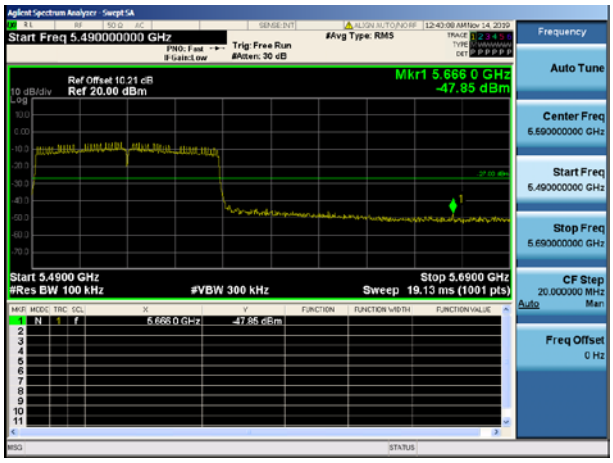
11ac40	
Band edge-Left	Band edge-Right
/	

11ac80	
Band edge-Left	Band edge-Right
/	

Conduction Band edge

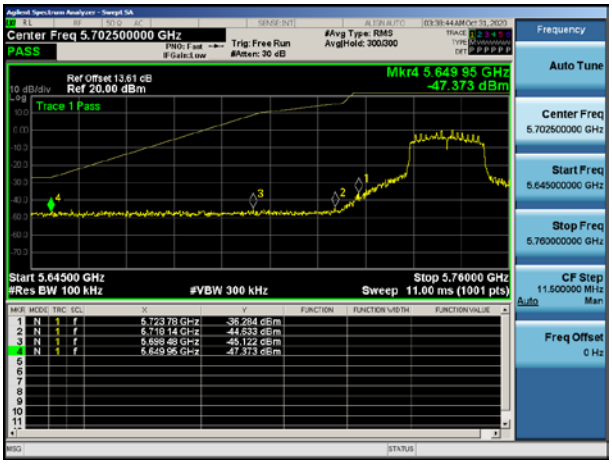
For U-NII-2C test plot

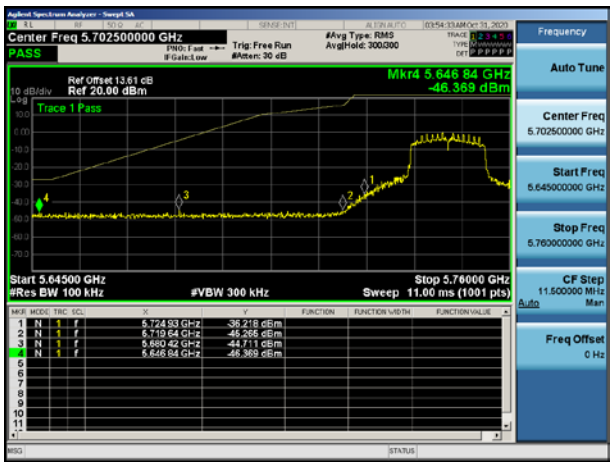
11a	
Band edge-Left	Band edge-Right
	
11n20	
Band edge-Left	Band edge-Right
11n40	
Band edge-Left	Band edge-Right

11ac20	
Band edge-Left	Band edge-Right
11ac40	
Band edge-Left	Band edge-Right
11ac80	
Band edge-Left	Band edge-Right
	

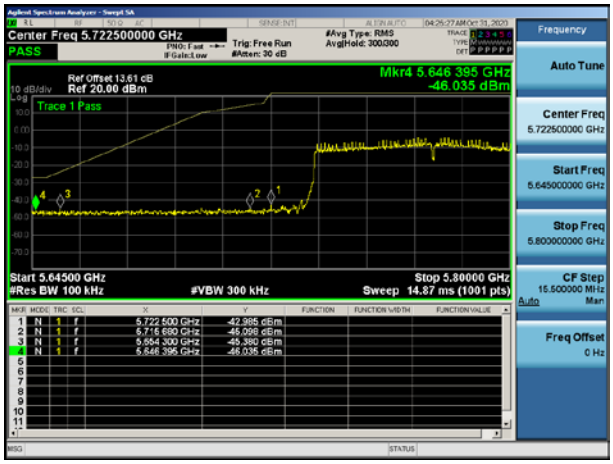
Conduction Band edge

For U-NII-3 test plot

11a	
Band edge-Left	Band edge-Right
11n20	
Band edge-Left	Band edge-Right
	
11n40	
Band edge-Left	Band edge-Right

11ac20	
Band edge-Left	Band edge-Right
	

11ac40	
Band edge-Left	Band edge-Right

11ac80	
Band edge-Left	Band edge-Right
	

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

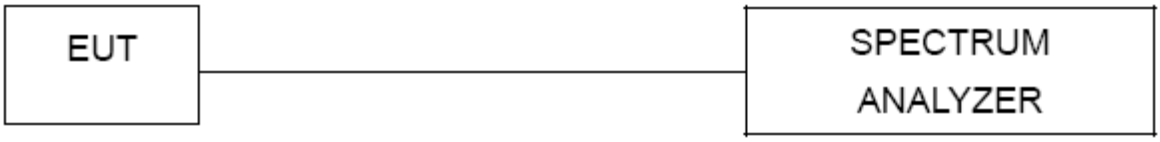
For U-NII-1

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



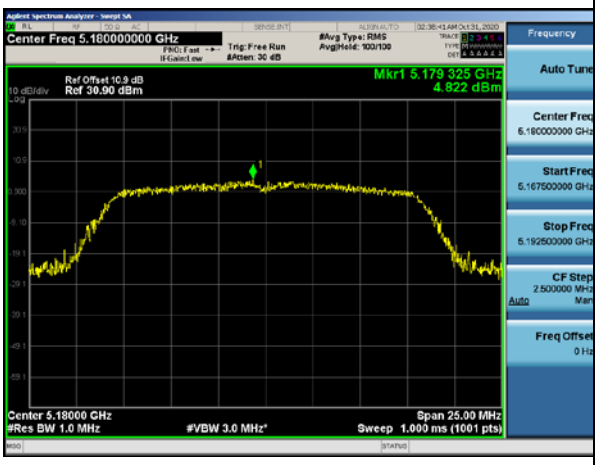
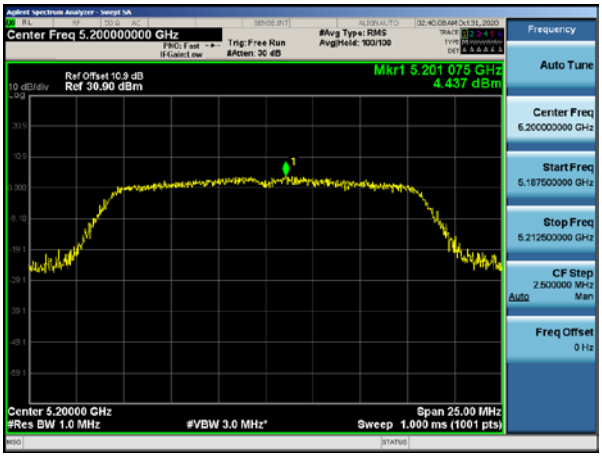
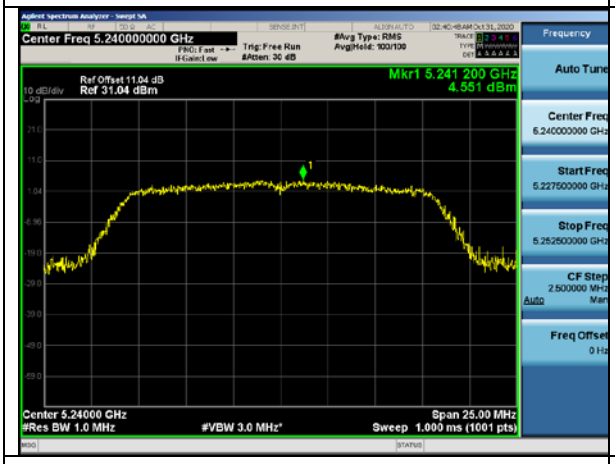
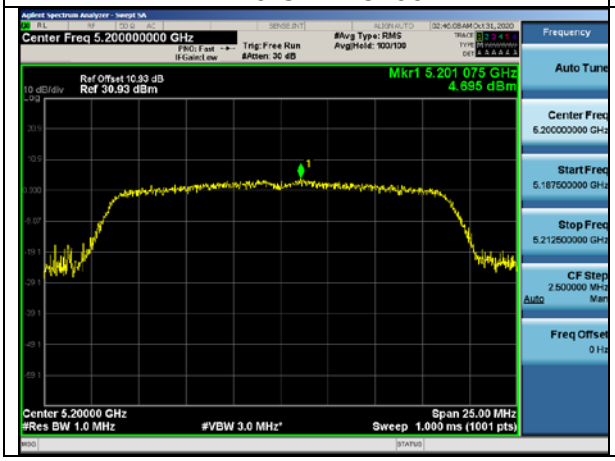
5.8.4 Test results

For U-NII-1

Mode	Channel	Frequency(MHz)	Measurement PSD (dBm/MHz)	Limit (dBm/MHz)	Result
11a	CH36	5180	4.822	11	Pass
11a	CH44	5220	4.437	11	Pass
11a	CH48	5240	4.551	11	Pass
11n(HT20)	CH36	5180	4.326	11	Pass
11n(HT20)	CH44	5220	4.695	11	Pass
11n(HT20)	CH48	5240	4.421	11	Pass
11n(HT40)	CH38	5190	1.757	11	Pass
11n(HT40)	CH46	5230	1.734	11	Pass
11ac (VHT20)	CH36	5180	4.866	11	Pass
11ac (VHT20)	CH40	5200	4.635	11	Pass
11ac (VHT20)	CH48	5240	4.667	11	Pass
11ac (VHT40)	CH38	5190	1.608	11	Pass
11ac (VHT40)	CH46	5230	1.907	11	Pass
11ac (VHT80)	CH42	5210	-1.352	11	Pass

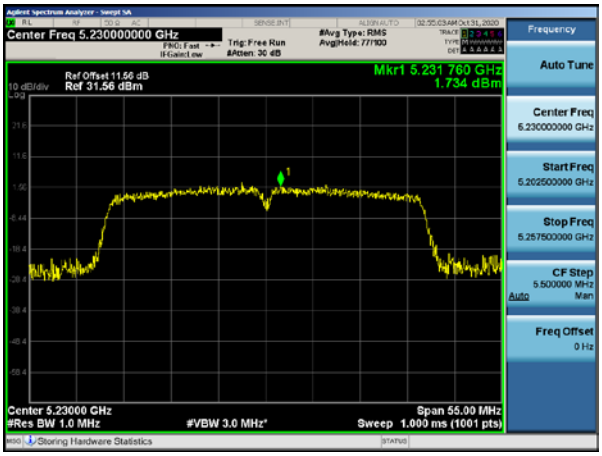
Test plots

For U-NII-1

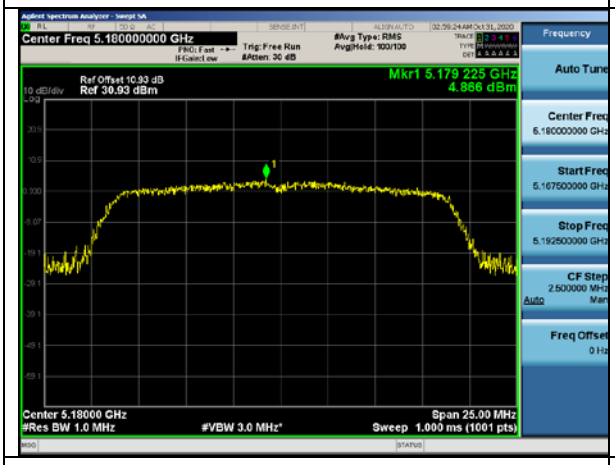
11a CH36 5180	11a CH44 5200
	
11a CH48 5240	**11n20 CH36 5180**
	
11n20 CH44 5200	**11n20 CH48 5240**
	

11n40 CH38 5190

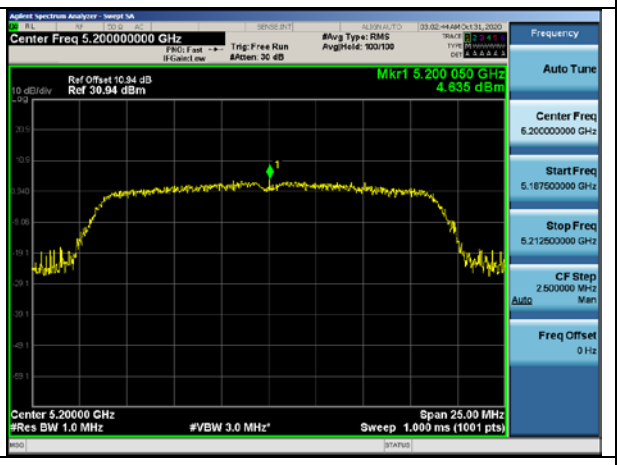
11n40 CH46 5230



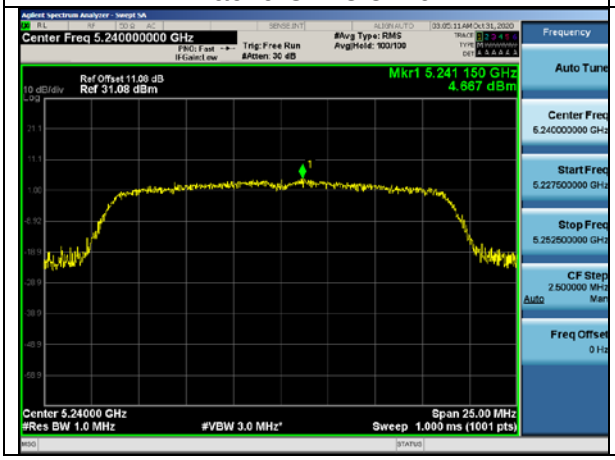
11ac20 CH36 5180



11ac20 CH40 5200



11ac20 CH48 5240



11ac40 CH38 5210

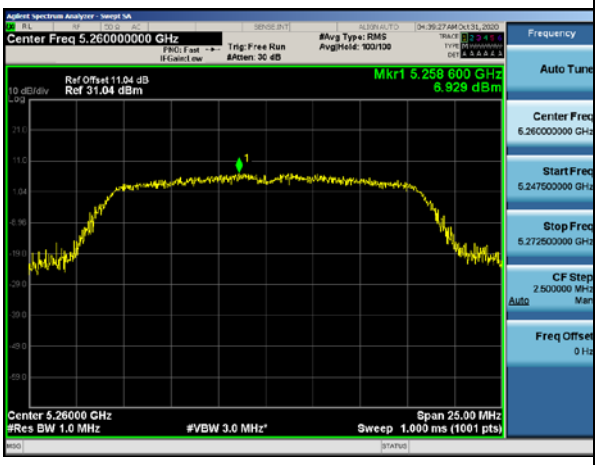
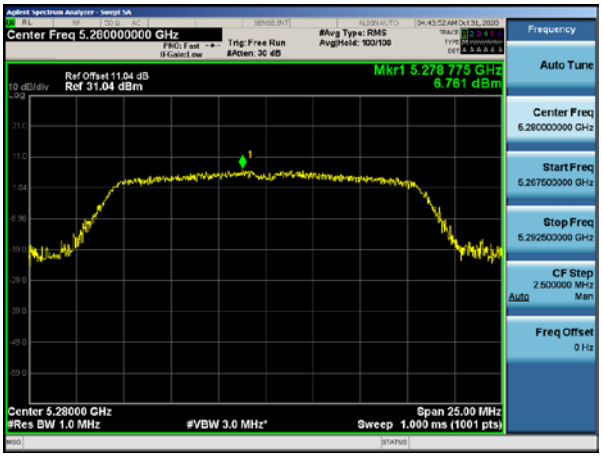
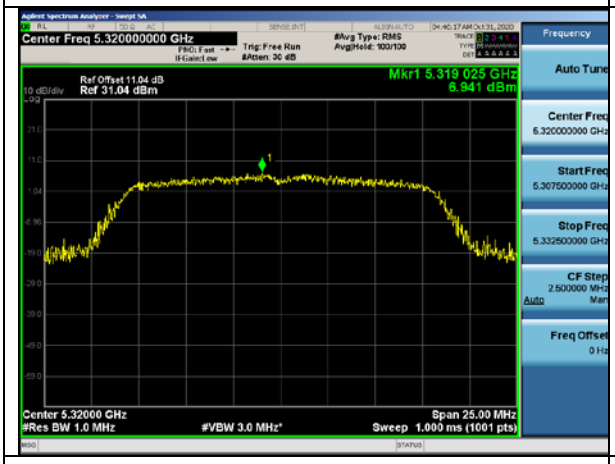
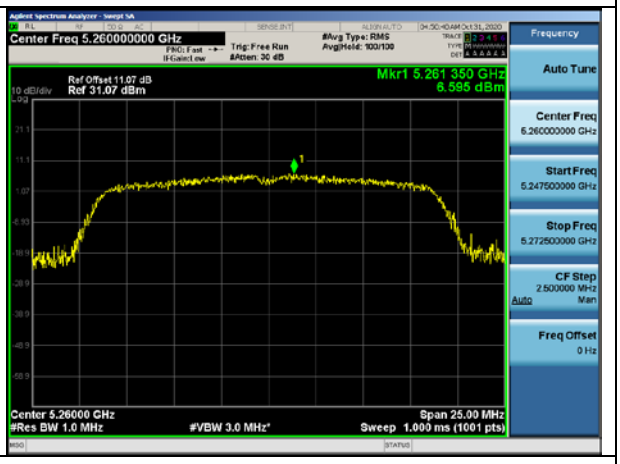
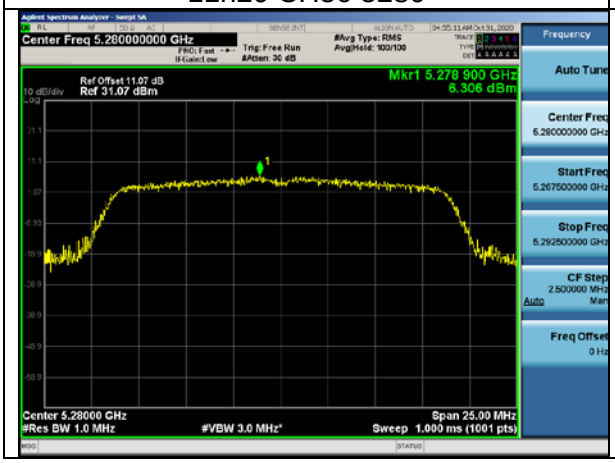
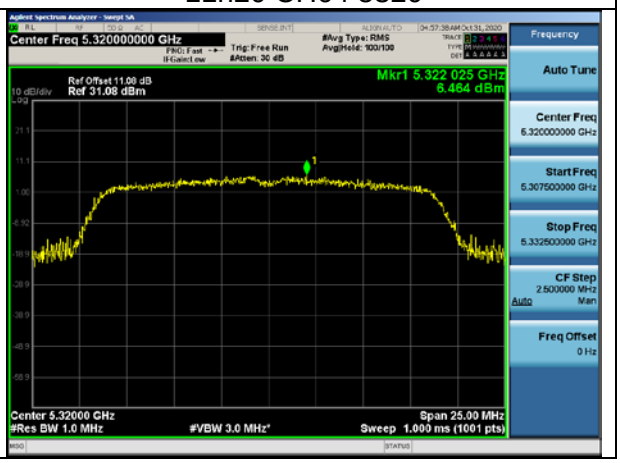
11ac40 CH46 5230	11ac80 CH42 5210

For U-NII-2A

Mode	Channel	Frequency(MHz)	Measurement PSD (dBm/MHz)	Limit (dBm/MHz)	Result
11a	CH52	5260	6.929	11	Pass
11a	CH56	5280	6.761	11	Pass
11a	CH64	5320	6.941	11	Pass
11n(HT20)	CH52	5260	6.595	11	Pass
11n(HT20)	CH56	5280	6.306	11	Pass
11n(HT20)	CH64	5320	6.464	11	Pass
11n(HT40)	CH54	5270	4.317	11	Pass
11n(HT40)	CH62	5310	3.758	11	Pass
11ac (VHT20)	CH52	5260	6.898	11	Pass
11ac (VHT20)	CH56	5280	6.461	11	Pass
11ac (VHT20)	CH64	5320	5.683	11	Pass
11ac (VHT40)	CH54	5270	3.990	11	Pass
11ac (VHT40)	CH62	5310	4.234	11	Pass
11ac (VHT80)	CH58	5290	1.396	11	Pass

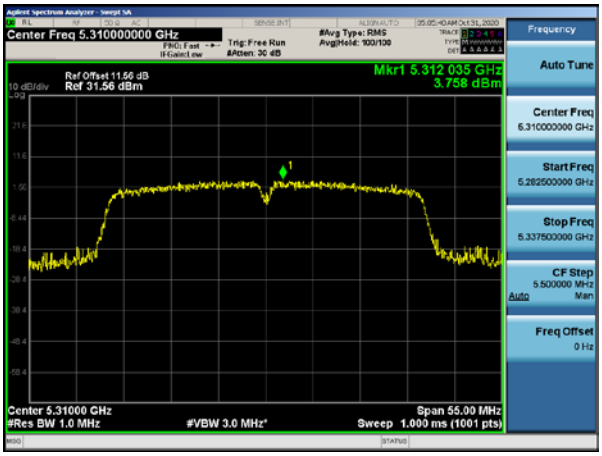
Test plots

For U-NII-2A

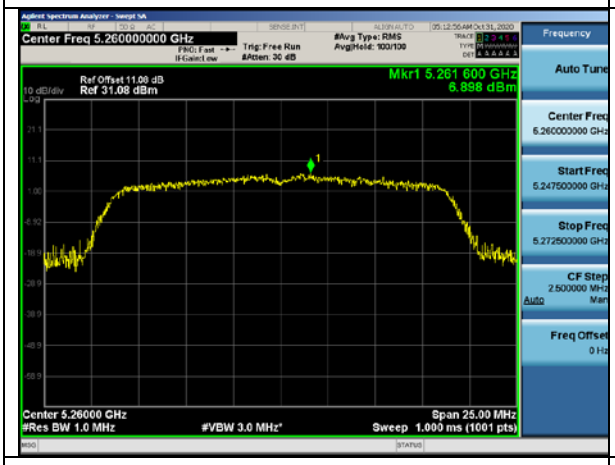
11a CH52 5260	11a CH56 5280
	
11a CH64 5320	**11n20 CH52 5260**
	
11n20 CH56 5280	**11n20 CH64 5320**
	

11n40 CH54 5270

11n40 CH62 5310

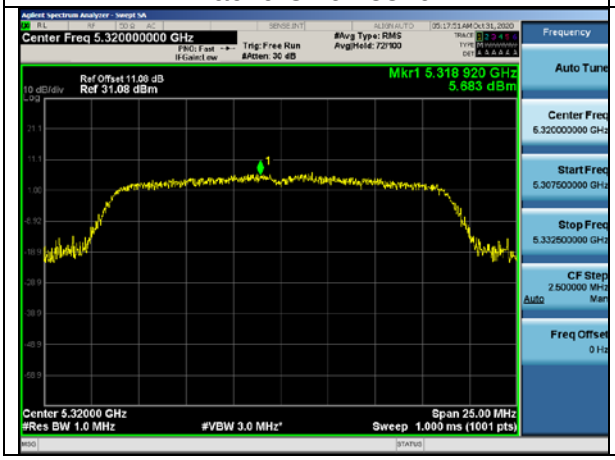


11ac20 CH52 5260

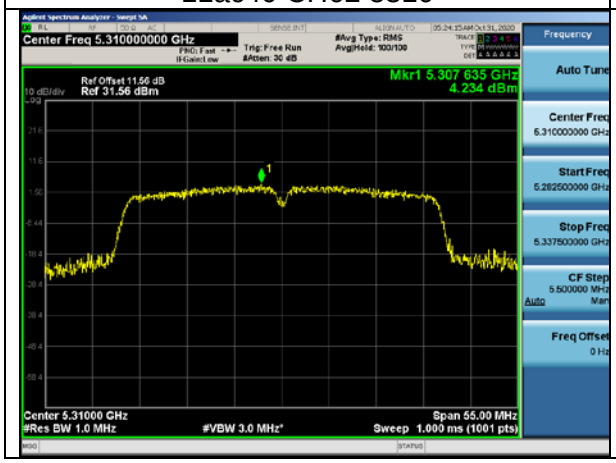


11ac20 CH60 5300

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	3.564	11	Pass
11a	CH120	5600	1.212	11	Pass
11a	CH140	5700	-0.182	11	Pass
11n (HT20)	CH100	5500	3.439	11	Pass
11n (HT20)	CH120	5600	1.526	11	Pass
11n (HT20)	CH140	5700	-0.172	11	Pass
11n (HT40)	CH102	5510	1.165	11	Pass
11n (HT40)	CH118	5590	-0.830	11	Pass
11n (HT40)	CH134	5670	-2.109	11	Pass
11ac (VHT20)	CH100	5500	3.517	11	Pass
11ac (VHT20)	CH120	5600	1.270	11	Pass
11ac (VHT20)	CH140	5700	0.395	11	Pass
11n (VHT40)	CH102	5510	1.249	11	Pass
11n (VHT40)	CH118	5590	-0.708	11	Pass
11n (VHT40)	CH134	5670	-1.566	11	Pass
11ac (VHT80)	CH106	5530	-1.231	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

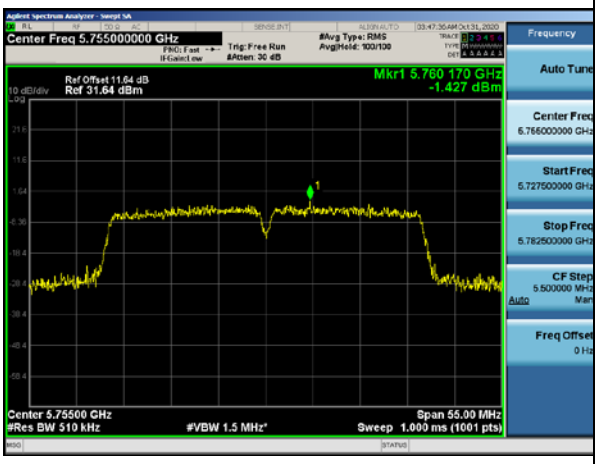
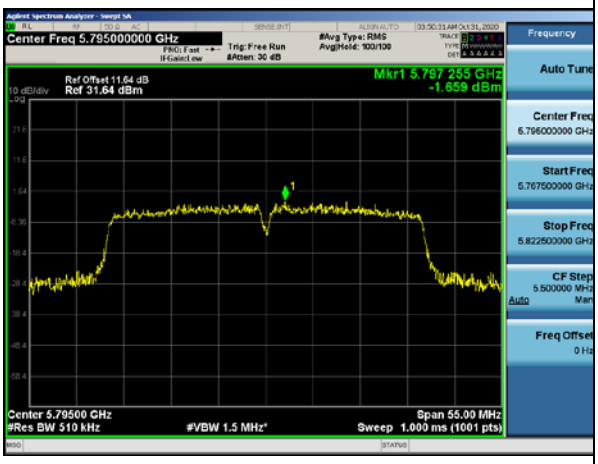
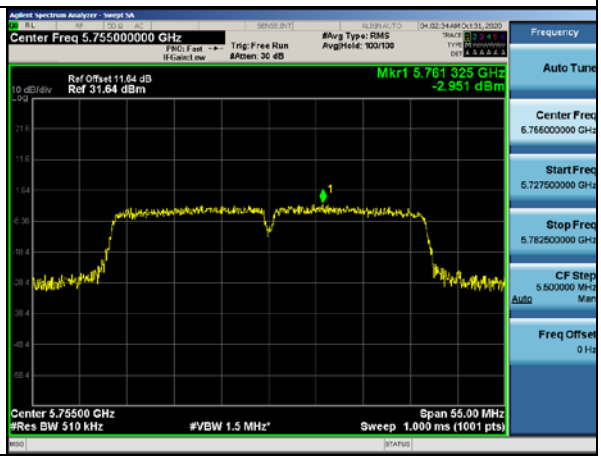
For U-NII-3

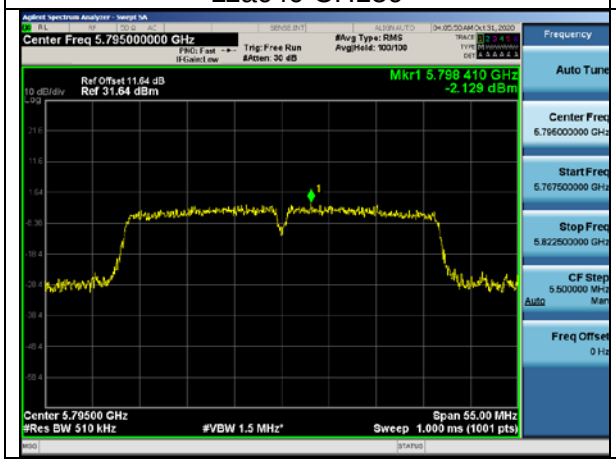
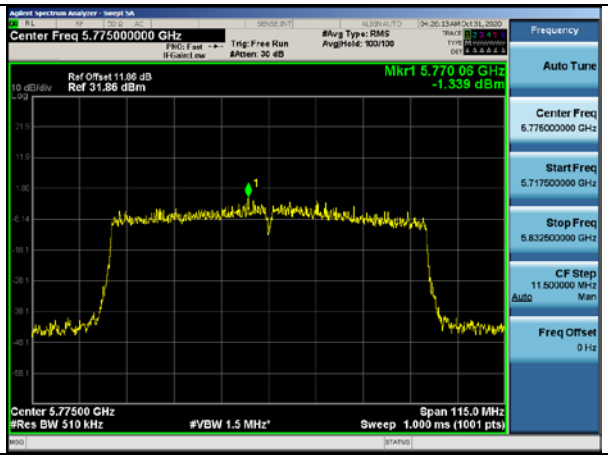
Mode	Channel	Frequency(MHz)	PSD (dBm/510kHz)	PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
11a	CH149	5745	0.207	1.028	30	Pass
11a	CH157	5785	0.658	1.141	30	Pass
11a	CH165	5825	1.133	1.273	30	Pass
11n20	CH149	5745	0.559	1.115	30	Pass
11n20	CH157	5785	0.785	1.175	30	Pass
11n20	CH165	5825	1.281	1.317	30	Pass
11n40	CH151	5755	-1.427	0.706	30	Pass
11n40	CH159	5795	-1.659	0.669	30	Pass
11ac20	CH149	5745	0.526	1.107	30	Pass
11ac20	CH157	5785	0.467	1.092	30	Pass
11ac20	CH165	5825	1.128	1.271	30	Pass
11ac40	CH151	5755	-2.951	0.497	30	Pass
11ac40	CH159	5795	-2.129	0.600	30	Pass
11ac80	CH155	5775	-1.339	0.720	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

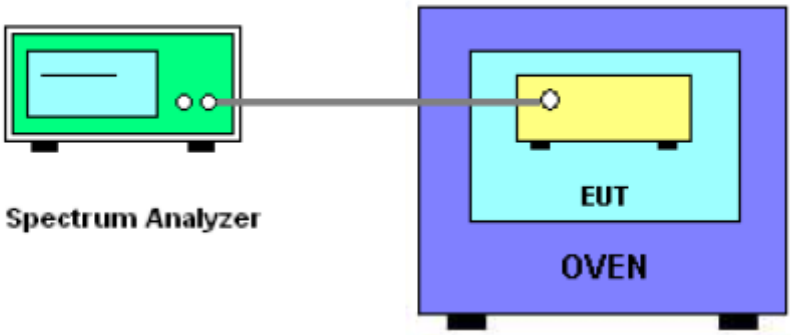
5.9.1 Limit

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	5180.0140	5180	0.0140	-2.7027
		V max (V)	5.75	5180.0197	5180	0.0197	-3.7992
		V min (V)	4.25	5180.0112	5180	0.0112	-2.1622
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)	5	T (°C)	-20	5180.0136	5180	0.0136	-2.6274
		T (°C)	-10	5180.0102	5180	0.0102	-1.9691
		T (°C)	0	5180.0126	5180	0.0126	-2.4324
		T (°C)	10	5180.0130	5180	0.0130	-2.5097
		T (°C)	20	5180.0123	5180	0.0123	-2.3745
		T (°C)	30	5180.0134	5180	0.0134	-2.5869
		T (°C)	40	5180.0110	5180	0.0110	-2.1236
		T (°C)	50	5180.0123	5180	0.0123	-2.3745
		T (°C)	60	5180.0140	5180	0.0140	-2.7027
		T (°C)	70	5180.0143	5180	0.0143	-2.7606
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	5200.0121	5200	0.0121	-2.3269
		V max (V)	4.26	5200.0119	5200	0.0119	-2.2885
		V min (V)	3.15	5200.0134	5200	0.0134	-2.5769
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)	5	T (°C)	-20	5200.0190	5200	0.0190	-3.6538
		T (°C)	-10	5200.0135	5200	0.0135	-2.5962
		T (°C)	0	5200.0124	5200	0.0124	-2.3846
		T (°C)	10	5200.0113	5200	0.0113	-2.1731
		T (°C)	20	5200.0121	5200	0.0121	-2.3269
		T (°C)	30	5200.0131	5200	0.0131	-2.5192
		T (°C)	40	5200.0110	5200	0.0110	-2.1154
		T (°C)	50	5200.0112	5200	0.0112	-2.1538
		T (°C)	60	5200.0119	5200	0.0119	-2.2885
		T (°C)	70	5200.0129	5200	0.0129	-2.4808
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	5240.0154	5240	0.0154	-2.9389
		V max (V)	4.26	5240.0189	5240	0.0189	-3.6069
		V min (V)	3.15	5240.0144	5240	0.0144	-2.7481
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)	5	T (°C)	-20	5240.0233	5240	0.0233	-4.4466
		T (°C)	-10	5240.0124	5240	0.0124	-2.3664
		T (°C)	0	5240.0137	5240	0.0137	-2.6145
		T (°C)	10	5240.0164	5240	0.0164	-3.1298
		T (°C)	20	5240.0140	5240	0.0140	-2.6718
		T (°C)	30	5240.0130	5240	0.0130	-2.4809
		T (°C)	40	5240.0120	5240	0.0120	-2.2901
		T (°C)	50	5240.0119	5240	0.0119	-2.2710
		T (°C)	60	5240.0110	5240	0.0110	-2.0992
		T (°C)	70	5240.0120	5240	0.0120	-2.2901
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	5260.0130	5260	0.0130	-2.4715
		V max (V)	5.75	5260.0121	5260	0.0121	-2.3004
		V min (V)	4.25	5260.0130	5260	0.0130	-2.4715
Limits				within 5250-5350MHz			
Result				Complies			

Temperature vs. Frequency Stability

V nom (V)	5	T (°C)	-20	5260.0136	5260	0.0136	-2.5875
		T (°C)	-10	5260.0242	5260	0.0242	-4.6008
		T (°C)	0	5260.0236	5260	0.0236	-4.4867
		T (°C)	10	5260.0412	5260	0.0412	-7.8327
		T (°C)	20	5260.0321	5260	0.0321	-6.1027
		T (°C)	30	5260.0130	5260	0.0130	-2.4715
		T (°C)	40	5260.0222	5260	0.0222	-4.2205
		T (°C)	50	5260.0120	5260	0.0120	-2.2814
		T (°C)	60	5260.0141	5260	0.0141	-2.6806
		T (°C)	70	5260.0140	5260	0.0140	-2.6616
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	5280.0120	5280	0.0120	-2.2727
		V max (V)	4.26	5280.0112	5280	0.0112	-2.1212
		V min (V)	3.15	5280.0120	5280	0.0120	-2.2727
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)	5	T (°C)	-20	5280.0112	5280	0.0112	-2.1212
		T (°C)	-10	5280.0120	5280	0.0120	-2.2727
		T (°C)	0	5280.0130	5280	0.0130	-2.4621
		T (°C)	10	5280.0131	5280	0.0131	-2.4811
		T (°C)	20	5280.0102	5280	0.0102	-1.9318
		T (°C)	30	5280.0136	5280	0.0136	-2.5758
		T (°C)	40	5280.0137	5280	0.0137	-2.5947
		T (°C)	50	5280.0103	5280	0.0103	-1.9508
		T (°C)	60	5280.0107	5280	0.0107	-2.0265
		T (°C)	70	5280.0104	5280	0.0104	-1.9697
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	5320.0123	5320	0.0123	-2.3120
		V max (V)	4.26	5320.0117	5320	0.0117	-2.1992
		V min (V)	3.15	5320.0114	5320	0.0114	-2.1429
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)	5	T (°C)	-20	5320.0233	5320	0.0233	-4.3797
		T (°C)	-10	5320.0104	5320	0.0104	-1.9549
		T (°C)	0	5320.0112	5320	0.0112	-2.1053
		T (°C)	10	5320.0120	5320	0.0120	-2.2556
		T (°C)	20	5320.0102	5320	0.0102	-1.9173
		T (°C)	30	5320.0150	5320	0.0150	-2.8195
		T (°C)	40	5320.0101	5320	0.0101	-1.8985
		T (°C)	50	5320.0111	5320	0.0111	-2.0865
		T (°C)	60	5320.0133	5320	0.0133	-2.5000
		T (°C)	70	5320.0139	5320	0.0139	-2.6128
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	5500.0131	5500	0.0131	-2.3818
		V max (V)	5.75	5500.0103	5500	0.0103	-1.8727
		V min (V)	4.25	5500.0130	5500	0.0130	-2.3636
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)	5	T (°C)	-20	5500.0126	5500	0.0126	-2.2945
		T (°C)	-10	5500.0141	5500	0.0141	-2.5636
		T (°C)	0	5500.0140	5500	0.0140	-2.5455
		T (°C)	10	5500.0119	5500	0.0119	-2.1636
		T (°C)	20	5500.0102	5500	0.0102	-1.8545
		T (°C)	30	5500.0137	5500	0.0137	-2.4909
		T (°C)	40	5500.0128	5500	0.0128	-2.3273
		T (°C)	50	5500.0164	5500	0.0164	-2.9818
		T (°C)	60	5500.0143	5500	0.0143	-2.6000
		T (°C)	70	5500.0147	5500	0.0147	-2.6727
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	5600.0147	5600	0.0147	-2.6250
		V max (V)	4.26	5600.0124	5600	0.0124	-2.2143
		V min (V)	3.15	5600.0104	5600	0.0104	-1.8571
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)	5	T (°C)	-20	5600.0127	5600	0.0127	-2.2679
		T (°C)	-10	5600.0120	5600	0.0120	-2.1429
		T (°C)	0	5600.0131	5600	0.0131	-2.3393
		T (°C)	10	5600.0130	5600	0.0130	-2.3214
		T (°C)	20	5600.0146	5600	0.0146	-2.6071
		T (°C)	30	5600.0143	5600	0.0143	-2.5536
		T (°C)	40	5600.0142	5600	0.0142	-2.5357
		T (°C)	50	5600.0172	5600	0.0172	-3.0714
		T (°C)	60	5600.0141	5600	0.0141	-2.5179
		T (°C)	70	5600.0154	5600	0.0154	-2.7500
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	5700.0131	5700	0.0131	-2.2982
		V max (V)	4.26	5700.0117	5700	0.0117	-2.0526
		V min (V)	3.15	5700.0131	5700	0.0131	-2.2982
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)	5	T (°C)	-20	5700.0141	5700	0.0141	-2.4737
		T (°C)	-10	5700.0101	5700	0.0101	-1.7719
		T (°C)	0	5700.0115	5700	0.0115	-2.0175
		T (°C)	10	5700.0128	5700	0.0128	-2.2456
		T (°C)	20	5700.0102	5700	0.0102	-1.7895
		T (°C)	30	5700.0141	5700	0.0141	-2.4737
		T (°C)	40	5700.0120	5700	0.0120	-2.1053
		T (°C)	50	5700.0166	5700	0.0166	-2.9123
		T (°C)	60	5700.0131	5700	0.0131	-2.2982
		T (°C)	70	5700.0180	5700	0.0180	-3.1579
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	5745.00921	5745	0.00921	-1.6024
		V max (V)	4.26	5745.00549	5745	0.00549	-0.9554
		V min (V)	3.15	5745.00607	5745	0.00607	-1.0560
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)	5	T (°C)	-20	5745.01161	5745	0.01161	-2.0203
		T (°C)	-10	5745.00274	5745	0.00274	-0.4775
		T (°C)	0	5745.01242	5745	0.01242	-2.1627
		T (°C)	10	5745.01258	5745	0.01258	-2.1899
		T (°C)	20	5745.00203	5745	0.00203	-0.3532
		T (°C)	30	5745.00909	5745	0.00909	-1.5824
		T (°C)	40	5745.00264	5745	0.00264	-0.4587
		T (°C)	50	5745.00965	5745	0.00965	-1.6800
		T (°C)	60	5745.00251	5745	0.00251	-0.4374
		T (°C)	70	5745.00129	5745	0.00129	-0.2248
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	5785.01074	5785	0.01074	-1.8559
		V max (V)	4.26	5785.00675	5785	0.00675	-1.1677
		V min (V)	3.15	5785.01065	5785	0.01065	-1.8403
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)	5	T (°C)	-20	5785.00509	5785	0.00509	-0.8795
		T (°C)	-10	5785.01172	5785	0.01172	-2.0254
		T (°C)	0	5785.00986	5785	0.00986	-1.7049
		T (°C)	10	5785.00834	5785	0.00834	-1.4410
		T (°C)	20	5785.00750	5785	0.00750	-1.2963
		T (°C)	30	5785.00474	5785	0.00474	-0.8188
		T (°C)	40	5785.00623	5785	0.00623	-1.0763
		T (°C)	50	5785.00087	5785	0.00087	-0.1501
		T (°C)	60	5785.01067	5785	0.01067	-1.8447
		T (°C)	70	5785.00436	5785	0.00436	-0.7545
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	5825.00599	5825	0.00599	-1.0281
		V max (V)	4.26	5825.01298	5825	0.01298	-2.2276
		V min (V)	3.15	5825.00779	5825	0.00779	-1.3380
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)	5	T (°C)	-20	5825.00034	5825	0.00034	-0.0589
		T (°C)	-10	5825.00170	5825	0.00170	-0.2918
		T (°C)	0	5825.00448	5825	0.00448	-0.7690
		T (°C)	10	5825.00146	5825	0.00146	-0.2507
		T (°C)	20	5825.00389	5825	0.00389	-0.6670
		T (°C)	30	5825.01254	5825	0.01254	-2.1523
		T (°C)	40	5825.01175	5825	0.01175	-2.0175
		T (°C)	50	5825.01079	5825	0.01079	-1.8523
		T (°C)	60	5825.00688	5825	0.00688	-1.1804
		T (°C)	70	5825.00807	5825	0.00807	-1.3856
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	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{\text{PRI}_{\mu sec}}\right)\right\}$	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

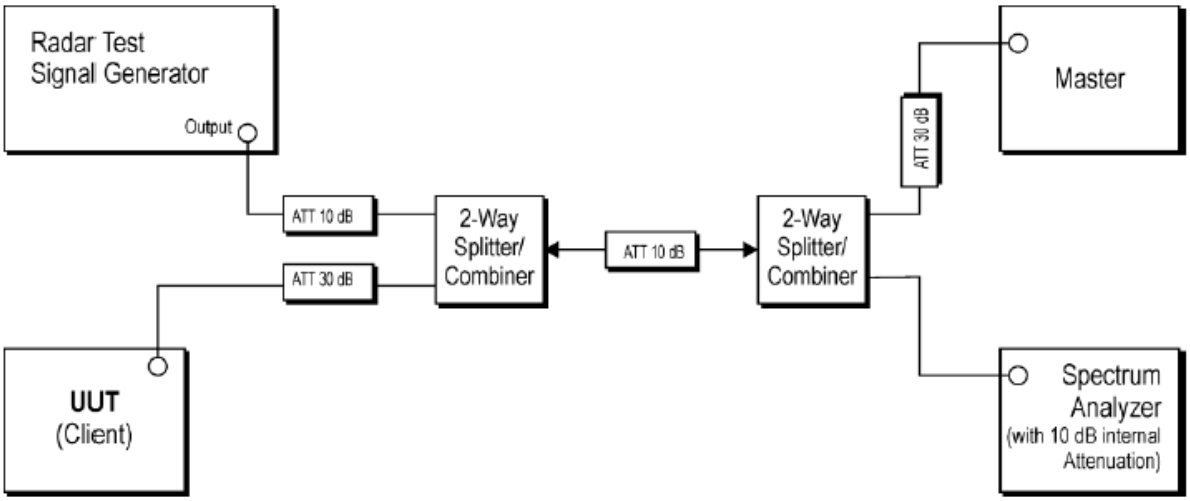
A-50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a coaxial cable. The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of - 62 dBm as measured on the spectrum analyzer.

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.

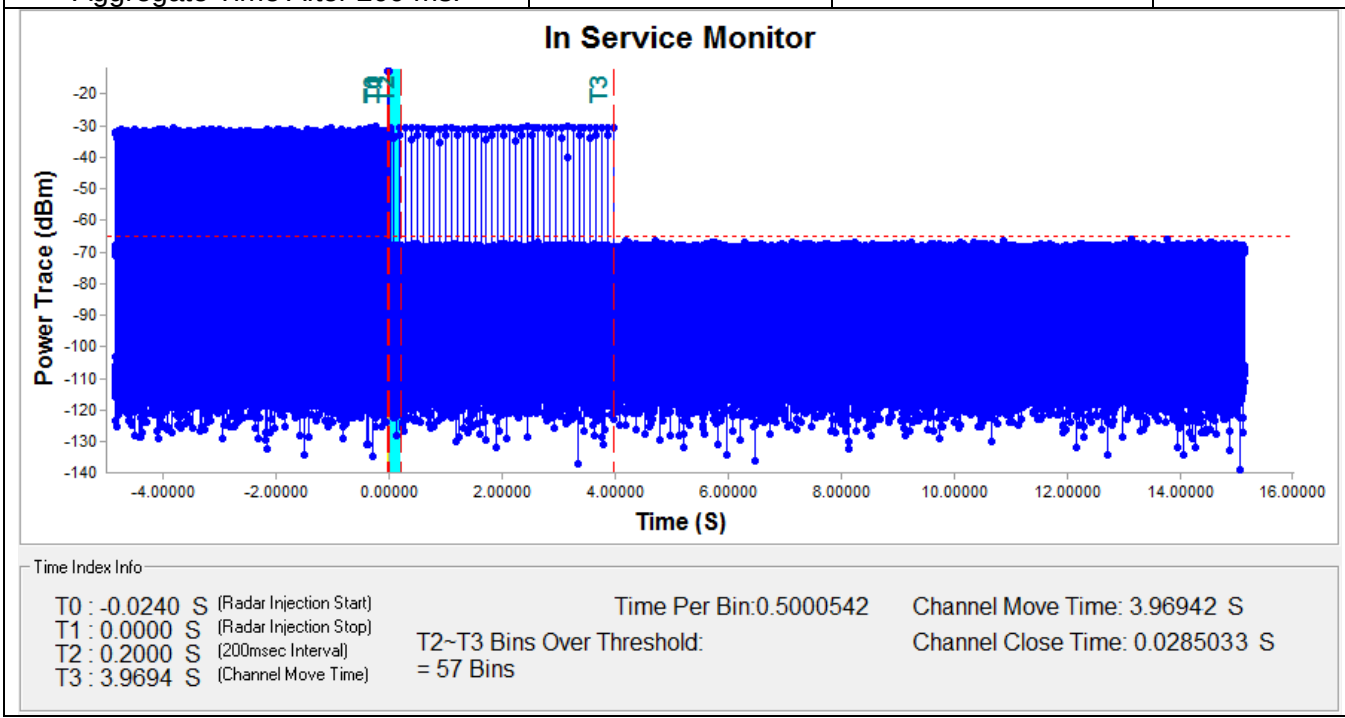
6. The system is again setup and the monitoring time is shortened in order to capture the Channel Closing Transmission Time. This time is measured to insure that the Client ceases transmission within 200 ms and the aggregate of emissions occurring after 200 ms up to 10 sec. do not exceed 60 ms. (Note: 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:	3.96942s	10 s	PASS
Channel Closing Transmission Time, Aggregate Time After 200 ms:	0.0285033s	60 ms	PASS



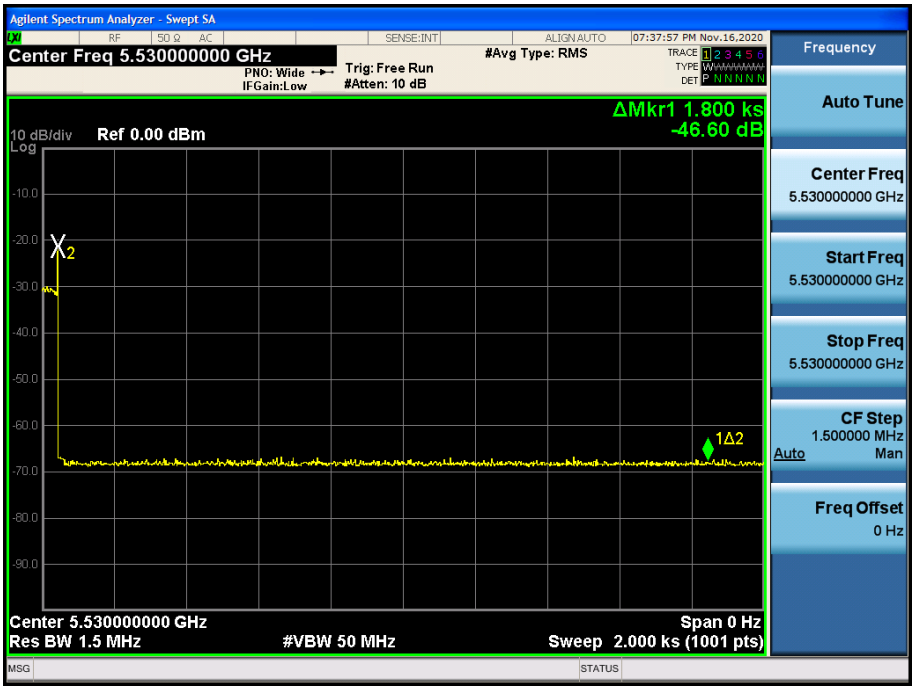
Note:

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.
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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.: MTi20091506-6E1-1.

----END OF REPORT----