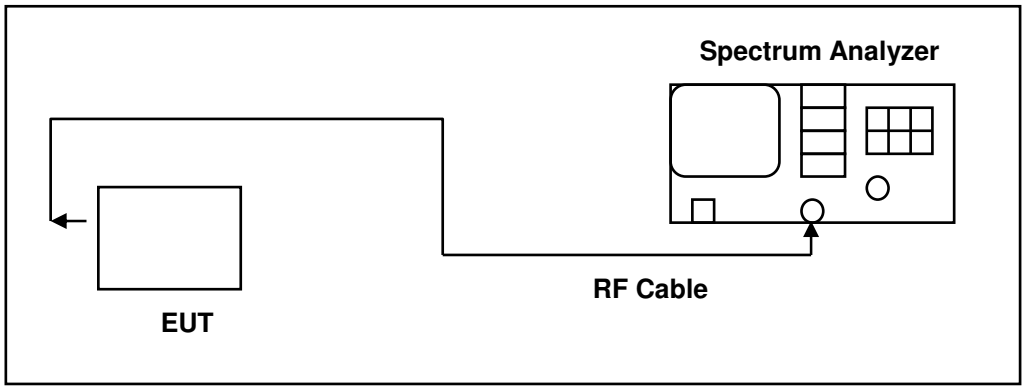
4.6. 6dB RF Bandwidth Measurement

■ **Limit**

6dB RF Bandwidth

Systems using digital modulation techniques may operate in the 5725~5850MHz bands. The minimum 6 dB band-width shall be at least 500 kHz.

■ **Test Setup**



■ **Test Instruments**

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/15/2015	1 year
Test Site	ATL	TE05	TE05	N.C.R.	-----

Note: N.C.R. = No Calibration Request.

■ **Test Procedure**

6dB RF Bandwidth

The EUT tested to UNII test procedure of KDB789033 D02 for compliance to FCC 47CFR 15.407 requirements.

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A peak output reading was taken, a DISPLAY line was drawn 6 dB lower than peak level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line.

The test was performed at 3 channels.

■ **Test Result**

Module : QCA9984 (EW-7955MAC)

Test Mode	Mode 2: IEEE 802.11a Link Mode				
Frequency (MHz)	6dB Bandwidth (kHz)				Limit (kHz)
	ANT-0	ANT-1	ANT-2	ANT-3	
5745	**13850**	**16070**	**15920**	**16350**	> 500
5785	**16320**	**16340**	**14640**	**16360**	> 500
5825	**15080**	**16370**	**14490**	**16370**	> 500

Test Mode	Mode 3: IEEE 802.11ac 20MHz Link Mode				
Frequency (MHz)	6dB Bandwidth (kHz)				Limit (kHz)
	ANT-0	ANT-1	ANT-2	ANT-3	
5745	**13780**	**17690**	**13170**	**17580**	> 500
5785	**16090**	**17310**	**15720**	**17590**	> 500
5825	**17200**	**17570**	**15710**	**17570**	> 500

Test Mode	Mode 4: IEEE 802.11ac 40MHz Link Mode				
Frequency (MHz)	6dB Bandwidth (kHz)				Limit (kHz)
	ANT-0	ANT-1	ANT-2	ANT-3	
5755	**30090**	**36360**	**36380**	**35760**	> 500
5795	**35140**	**36330**	**36390**	**33290**	> 500

Test Mode	Mode 5: IEEE 802.11ac 80MHz Link Mode				
Frequency (MHz)	6dB Bandwidth (kHz)				Limit (kHz)
	ANT-0	ANT-1	ANT-2	ANT-3	
5775	**75800**	**75830**	**76370**	**75760**	> 500

Module : QCA9990 (EW-7944MAC)_Master

Test Mode	Mode 2: IEEE 802.11a Link Mode				
Frequency (MHz)	6dB Bandwidth (kHz)				Limit (kHz)
	ANT-0	ANT-1	ANT-2	ANT-3	
5745	**15330**	**16380**	**15740**	**15120**	> 500
5785	**16390**	**16400**	**16400**	**15110**	> 500
5825	**15110**	**16430**	**16400**	**15130**	> 500

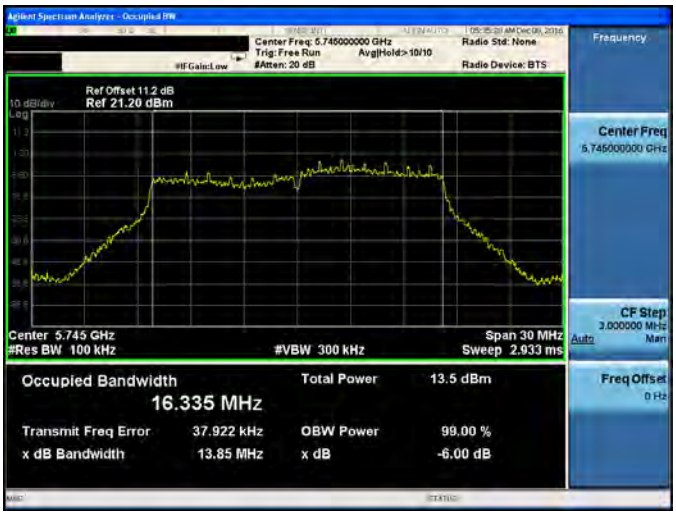
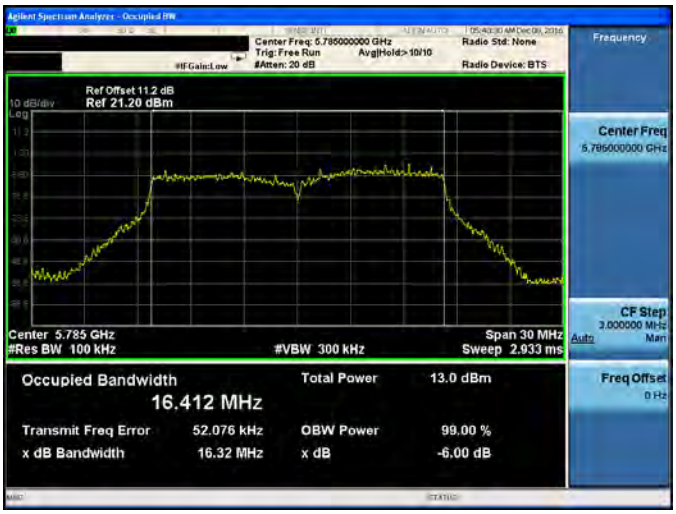
Test Mode	Mode 3: IEEE 802.11ac 20MHz Link Mode				
Frequency (MHz)	6dB Bandwidth (kHz)				Limit (kHz)
	ANT-0	ANT-1	ANT-2	ANT-3	
5745	**16320**	**17590**	**13500**	**15900**	> 500
5785	**14060**	**17590**	**17610**	**15150**	> 500
5825	**17600**	**17610**	**17660**	**16540**	> 500

Test Mode	Mode 4: IEEE 802.11ac 40MHz Link Mode				
Frequency (MHz)	6dB Bandwidth (kHz)				Limit (kHz)
	ANT-0	ANT-1	ANT-2	ANT-3	
5755	**31320**	**35070**	**32620**	**33820**	> 500
5795	**33840**	**33810**	**34170**	**35110**	> 500

Test Mode	Mode 5: IEEE 802.11ac 80MHz Link Mode				
Frequency (MHz)	6dB Bandwidth (kHz)				Limit (kHz)
	ANT-0	ANT-1	ANT-2	ANT-3	
5775	**70340**	**75190**	**73240**	**75270**	> 500

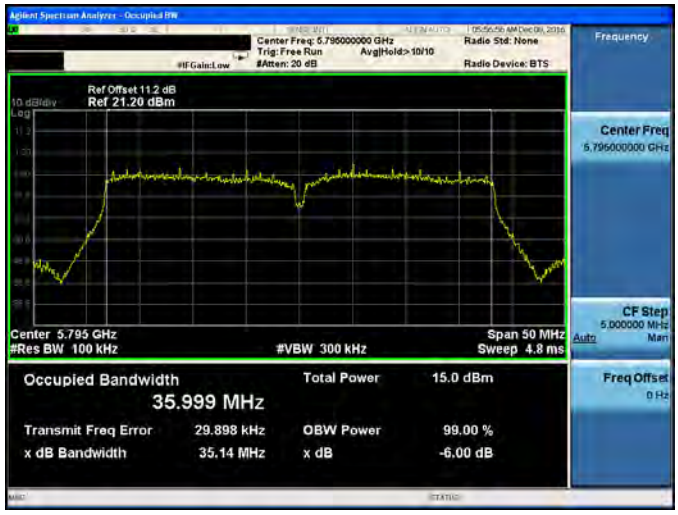
■ **Test Graphs**

Module : QCA9984 (EW-7955MAC)

Mode 2: IEEE 802.11a Link Mode	
ANT-0	
5745 MHz	
5785 MHz	

Mode 2: IEEE 802.11a Link Mode	
ANT-0	
5825 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-0	
5745 MHz	
5785 MHz	
5825 MHz	

Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-0	
5755 MHz	
5795 MHz	

Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-0	
5775 MHz	

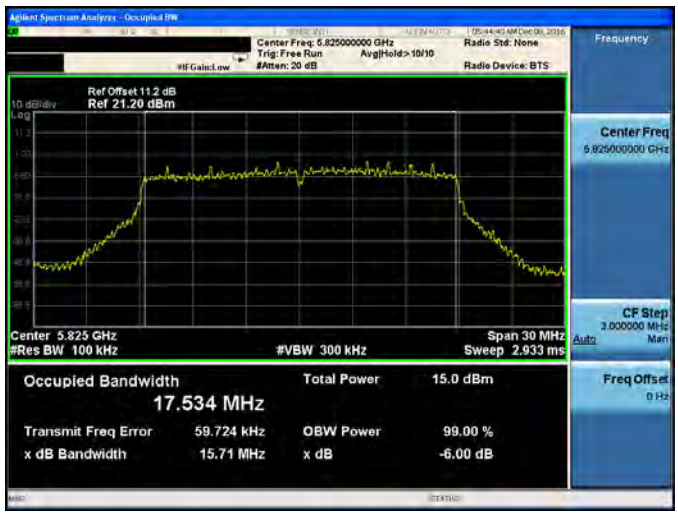
Mode 2: IEEE 802.11a Link Mode	
ANT-1	
5745 MHz	
5785 MHz	
5825 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-1	
5745 MHz	
5785 MHz	
5825 MHz	

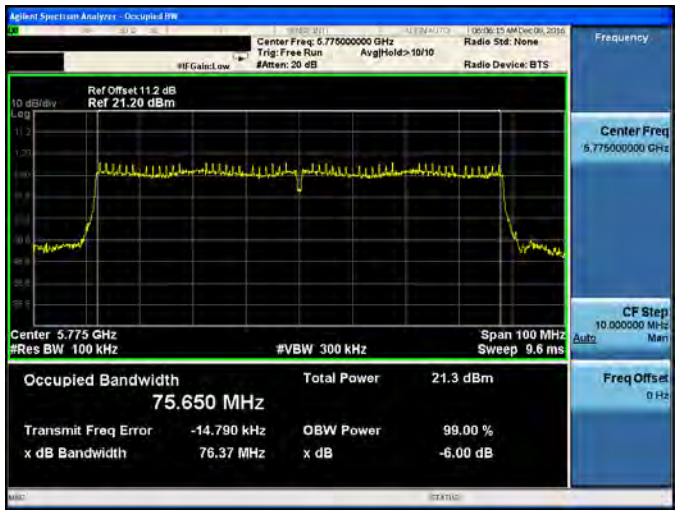
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-1	
5755 MHz	
5795 MHz	

Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-1	
5775 MHz	

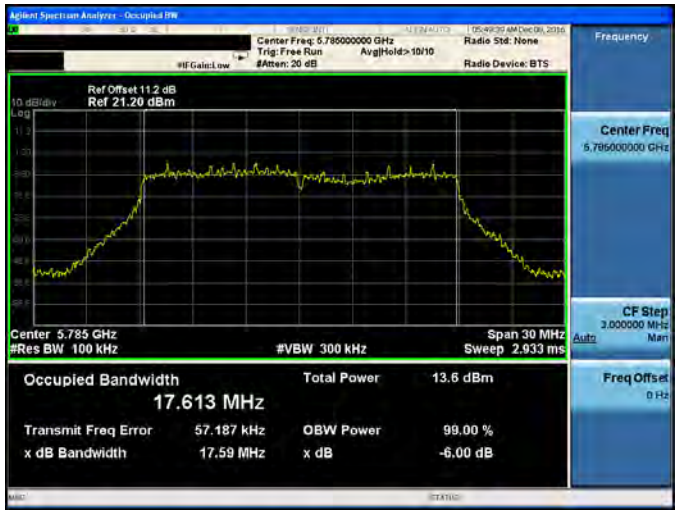
Mode 2: IEEE 802.11a Link Mode	
ANT-2	
5745 MHz	
5785 MHz	
5825 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-2	
5745 MHz	
5785 MHz	
5825 MHz	

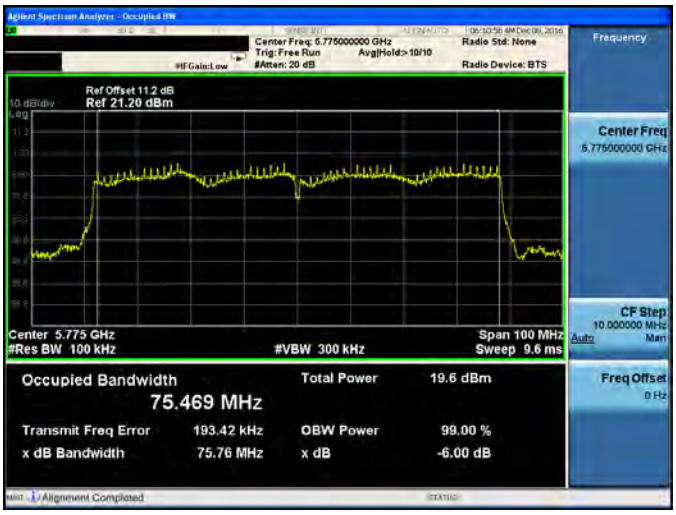
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-2	
5755 MHz	
5795 MHz	

Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-2	
5775 MHz	

Mode 2: IEEE 802.11a Link Mode	
ANT-3	
5745 MHz	
5785 MHz	
5825 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-3	
5745 MHz	
5785 MHz	
5825 MHz	

Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-3	
5755 MHz	
5795 MHz	

Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-3	
5775 MHz	

4.7. Peak Power Spectral Density Measurement

■ **Limit**

Conducted power spectral density

Frequency Range (MHz)	FCC Limit	
	Master	Client
5.150 ~ 5.250 GHz	17 dBm/MHz	11 dBm/MHz
5.725 ~ 5.850 GHz	30 dBm/500KHz	30 dBm/500KHz

According FCC KDB 662911 D01 v02r01 – for power spectral density measurements on IEEE802.11 devices,

Module : QCA9984 (EW-7955MAC)

Master mode

∗ CDD mode：Directional Gain = 10*log{[10^(G1/20)+10^(G2/20)+…+10^(Gn/20)]^2/NANT} = 13.02 dBi > 6dBi

CDD mode power spectral density limit shall be reduced = 17 - 7.02 = 9.98 dBm/MHz (5.150 ~ 5.250 GHz)

CDD mode power spectral density limit shall be reduced = 30 - 7.02 = 22.98 dBm/500KHz (5.725 ~ 5.850 GHz)

∗ MIMO mode：Directional Gain = 10*log{[10^(G1/20)+10^(G2/20)+…+10^(Gn/20)]^2/NANT} = 13.02 dBi > 6dBi

MIMO mode power spectral density limit shall be reduced = 17 - 7.02 = 9.98 dBm/MHz (5.150 ~ 5.250 GHz)

MIMO mode power spectral density limit shall be reduced = 30 - 7.02 = 22.98 dBm/500KHz (5.725 ~ 5.850 GHz)

Module : QCA9990 (EW-7944MAC)

Master mode

∗ CDD mode：Directional Gain = 10*log{[10^(G1/20)+10^(G2/20)+…+10^(Gn/20)]^2/NANT} = 12.02 dBi > 6dBi

CDD mode power spectral density limit shall be reduced = 17 - 6.02 = 10.98 dBm/MHz (5.150 ~ 5.250 GHz)

CDD mode power spectral density limit shall be reduced = 30 - 6.02 = 23.98 dBm/500KHz (5.725 ~ 5.850 GHz)

∗ MIMO mode：Directional Gain = 10*log{[10^(G1/20)+10^(G2/20)+…+10^(Gn/20)]^2/NANT} = 12.02 dBi > 6dBi

MIMO mode power spectral density limit shall be reduced = 17 - 6.02 = 10.98 dBm/MHz (5.150 ~ 5.250 GHz)

MIMO mode power spectral density limit shall be reduced = 30 - 6.02 = 23.98 dBm/500KHz (5.725 ~ 5.850 GHz)

Client mode

∗ CDD mode：Directional Gain = 10*log{[10^(G1/20)+10^(G2/20)+…+10^(Gn/20)]^2/NANT} = 12.02 dBi > 6dBi

CDD mode power spectral density limit shall be reduced = 11 - 6.02 = 4.98 dBm/MHz (5.150 ~ 5.250 GHz)

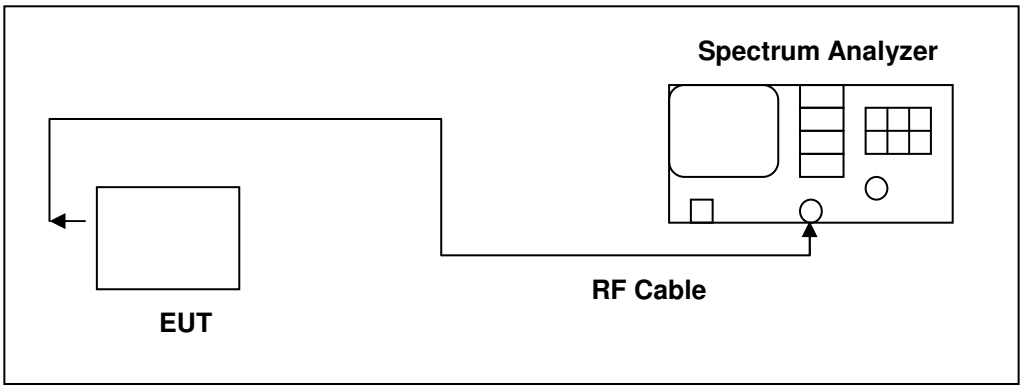
CDD mode power spectral density limit shall be reduced = 30 - 6.02 = 23.98 dBm/500KHz (5.725 ~ 5.850 GHz)

∗ MIMO mode：Directional Gain = 10*log{[10^(G1/20)+10^(G2/20)+…+10^(Gn/20)]^2/NANT} = 12.02 dBi > 6dBi

MIMO mode power spectral density limit shall be reduced = 11 - 6.02 = 4.98 dBm/MHz (5.150 ~ 5.250 GHz)

MIMO mode power spectral density limit shall be reduced = 30 - 6.02 = 23.98 dBm/500KHz (5.725 ~ 5.850 GHz)

■ **Test Setup**



■ **Test Instruments**

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/15/2015	1 year
Test Site	ATL	TE05	TE05	N.C.R.	-----

Note: N.C.R. = No Calibration Request.

■ **Test Procedure**

The test is performed in accordance with KDB789033: D02 General UNII Test Procedures New Rules v01r02, Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RBW	1 MHz (5725 ~ 5850MHz use 100 kHz)
VBW	3 MHz (5725 ~ 5850MHz use 300 kHz)
Detector	RMS
Trace	AVERAGE
Sweep Time	Auto
Trace Average	100 times
Note: If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/100kHz) to the measured result.	

■ **Test Result**

Module : QCA9984 (EW-7955MAC)

Test Mode	Mode 2: IEEE 802.11a link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	2.146	0.103	2.249	< 9.98
5200	2.105	0.103	2.208	
5240	2.667	0.103	2.770	
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	3.401	0.103	3.504	< 9.98
5200	3.294	0.103	3.397	
5240	4.503	0.103	4.606	
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	3.234	0.103	3.337	< 9.98
5200	3.278	0.103	3.381	
5240	3.948	0.103	4.051	
Frequency (MHz)	ANT-3			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	3.055	0.103	3.158	< 9.98
5200	2.560	0.103	2.663	
5240	3.460	0.103	3.563	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/MHz)			Limit (dBm/MHz)
5180	9.109			< 9.98
5200	8.962			
5240	9.820			

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Test Mode	Mode 2: IEEE 802.11a link mode			
Frequency (MHz)	ANT-0			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-11.12	0.103	-4.02	< 22.98
5785	-12.00	0.103	-4.91	
5825	-11.91	0.103	-4.81	
Frequency (MHz)	ANT-1			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-11.41	0.103	-4.31	< 22.98
5785	-11.69	0.103	-4.59	
5825	-12.70	0.103	-5.61	
Frequency (MHz)	ANT-2			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-11.24	0.103	-4.15	< 22.98
5785	-11.17	0.103	-4.08	
5825	-11.13	0.103	-4.04	
Frequency (MHz)	ANT-3			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-10.29	0.103	-3.19	< 22.98
5785	-12.79	0.103	-5.70	
5825	-12.39	0.103	-5.29	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/500KHz)			Limit (dBm/500KHz)
5745	2.12			< 22.98
5785	1.24			
5825	1.12			

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10*Log(500k/100k)

Test Mode	Mode 3: IEEE 802.11ac 20MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	2.653	0.026	2.679	< 9.98
5200	1.897	0.026	1.923	
5240	1.487	0.026	1.513	
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	3.859	0.026	3.885	< 9.98
5200	3.628	0.026	3.654	
5240	3.432	0.026	3.458	
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	4.042	0.026	4.068	< 9.98
5200	3.611	0.026	3.637	
5240	3.057	0.026	3.083	
Frequency (MHz)	ANT-3			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	3.855	0.026	3.881	< 9.98
5200	3.142	0.026	3.168	
5240	2.443	0.026	2.469	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/MHz)			Limit (dBm/MHz)
5180	9.682			< 9.98
5200	9.170			
5240	8.712			

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Test Mode	Mode 3: IEEE 802.11ac 20MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-11.11	0.026	-4.09	< 22.98
5785	-11.34	0.026	-4.32	
5825	-12.17	0.026	-5.15	
Frequency (MHz)	ANT-1			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-11.72	0.026	-4.70	< 22.98
5785	-12.10	0.026	-5.08	
5825	-12.25	0.026	-5.24	
Frequency (MHz)	ANT-2			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-11.36	0.026	-4.35	< 22.98
5785	-10.77	0.026	-3.76	
5825	-11.14	0.026	-4.12	
Frequency (MHz)	ANT-3			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-10.58	0.026	-3.57	< 22.98
5785	-12.65	0.026	-5.64	
5825	-12.23	0.026	-5.21	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/500KHz)			Limit (dBm/500KHz)
5745	1.86			< 22.98
5785	1.38			
5825	1.12			

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10*Log(500k/100k)

Test Mode	Mode 4: IEEE 802.11ac 40MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	-3.610	0.084	-3.526	< 9.98
5230	0.860	0.084	0.944	
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	-2.897	0.084	-2.813	< 9.98
5230	2.321	0.084	2.405	
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	-2.578	0.084	-2.494	< 9.98
5230	2.132	0.084	2.216	
Frequency (MHz)	ANT-3			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	-3.545	0.084	-3.461	< 9.98
5230	1.159	0.084	1.243	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/MHz)			Limit (dBm/MHz)
5190	2.969			< 9.98
5230	7.767			

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Test Mode	Mode 4: IEEE 802.11ac 40MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5755	-13.42	0.084	-6.34	< 22.98
5795	-13.03	0.084	-5.96	
Frequency (MHz)	ANT-1			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5755	-13.86	0.084	-6.78	< 22.98
5795	-13.38	0.084	-6.31	
Frequency (MHz)	ANT-2			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5755	-13.17	0.084	-6.10	< 22.98
5795	-11.95	0.084	-4.88	
Frequency (MHz)	ANT-3			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5755	-12.89	0.084	-5.82	< 22.98
5795	-13.64	0.084	-6.57	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/500KHz)			Limit (dBm/500KHz)
5755	-0.23			< 22.98
5795	0.14			

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10*Log(500k/100k)

Test Mode	Mode 5: IEEE 802.11ac 80MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	-10.183	0.201	-9.982	< 9.98
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	-9.551	0.201	-9.350	< 9.98
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	-9.311	0.201	-9.110	< 9.98
Frequency (MHz)	ANT-3			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	-9.693	0.201	-9.492	< 9.98
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/MHz)			Limit (dBm/MHz)
5210	-3.451			< 9.98

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Test Mode	Mode 5: IEEE 802.11ac 80MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5775	-14.19	0.201	-7.00	< 22.98
Frequency (MHz)	ANT-1			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5775	-13.28	0.201	-6.08	< 22.98
Frequency (MHz)	ANT-2			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5775	-13.02	0.201	-5.83	< 22.98
Frequency (MHz)	ANT-3			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5775	-12.14	0.201	-4.95	< 22.98
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/500KHz)			Limit (dBm/500KHz)
5775	0.12			< 22.98

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10*Log(500k/100k)

Module : QCA9990 (EW-7944MAC)_Master

Test Mode	Mode 2: IEEE 802.11a link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	3.583	0.124	3.707	< 10.98
5200	3.817	0.124	3.941	
5240	3.730	0.124	3.854	
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	4.894	0.124	5.018	< 10.98
5200	4.930	0.124	5.054	
5240	4.998	0.124	5.122	
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	4.688	0.124	4.812	< 10.98
5200	4.415	0.124	4.539	
5240	4.397	0.124	4.521	
Frequency (MHz)	ANT-3			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	4.343	0.124	4.467	< 10.98
5200	4.072	0.124	4.196	
5240	4.263	0.124	4.387	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/MHz)			Limit (dBm/MHz)
5180	10.549			< 10.98
5200	10.473			
5240	10.515			

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Test Mode	Mode 2: IEEE 802.11a link mode			
Frequency (MHz)	ANT-0			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-9.79	0.124	-2.68	< 23.98
5785	-9.80	0.124	-2.69	
5825	-9.02	0.124	-1.91	
Frequency (MHz)	ANT-1			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-10.11	0.124	-3.00	< 23.98
5785	-10.10	0.124	-2.99	
5825	-9.98	0.124	-2.86	
Frequency (MHz)	ANT-2			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-9.11	0.124	-1.99	< 23.98
5785	-9.84	0.124	-2.73	
5825	-10.07	0.124	-2.95	
Frequency (MHz)	ANT-3			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-9.40	0.124	-2.28	< 23.98
5785	-9.26	0.124	-2.15	
5825	-9.31	0.124	-2.19	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/500KHz)			Limit (dBm/500KHz)
5745	3.55			< 23.98
5785	3.39			
5825	3.56			

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10*Log(500k/100k)

Test Mode	Mode 3: IEEE 802.11ac 20MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	4.279	0.041	4.320	< 10.98
5200	4.182	0.041	4.223	
5240	4.130	0.041	4.171	
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	5.009	0.041	5.050	< 10.98
5200	5.089	0.041	5.130	
5240	5.338	0.041	5.379	
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	5.020	0.041	5.061	< 10.98
5200	4.493	0.041	4.534	
5240	4.641	0.041	4.682	
Frequency (MHz)	ANT-3			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	4.489	0.041	4.530	< 10.98
5200	4.546	0.041	4.587	
5240	4.337	0.041	4.378	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/MHz)			Limit (dBm/MHz)
5180	10.773			< 10.98
5200	10.652			
5240	10.698			

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Test Mode	Mode 3: IEEE 802.11ac 20MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-10.05	0.041	-3.02	< 23.98
5785	-9.27	0.041	-2.24	
5825	-8.64	0.041	-1.61	
Frequency (MHz)	ANT-1			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-10.18	0.041	-3.15	< 23.98
5785	-9.73	0.041	-2.70	
5825	-9.37	0.041	-2.34	
Frequency (MHz)	ANT-2			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-8.88	0.041	-1.85	< 23.98
5785	-9.51	0.041	-2.48	
5825	-9.85	0.041	-2.82	
Frequency (MHz)	ANT-3			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	-9.85	0.041	-2.82	< 23.98
5785	-9.43	0.041	-2.40	
5825	-8.84	0.041	-1.81	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/500KHz)			Limit (dBm/500KHz)
5745	3.34			< 23.98
5785	3.57			
5825	3.90			

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10*Log(500k/100k)

Test Mode	Mode 4: IEEE 802.11ac 40MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	0.959	0.098	1.057	< 10.98
5230	3.699	0.098	3.797	
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	1.606	0.098	1.704	< 10.98
5230	4.511	0.098	4.609	
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	1.388	0.098	1.486	< 10.98
5230	4.328	0.098	4.426	
Frequency (MHz)	ANT-3			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	1.415	0.098	1.513	< 10.98
5230	4.007	0.098	4.105	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/MHz)			Limit (dBm/MHz)
5190	7.467			< 10.98
5230	10.266			

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Test Mode	Mode 4: IEEE 802.11ac 40MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5755	-12.55	0.098	-5.46	< 23.98
5795	-9.50	0.098	-2.41	
Frequency (MHz)	ANT-1			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5755	-12.70	0.098	-5.61	< 23.98
5795	-10.67	0.098	-3.58	
Frequency (MHz)	ANT-2			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5755	-11.87	0.098	-4.78	< 23.98
5795	-10.14	0.098	-3.05	
Frequency (MHz)	ANT-3			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5755	-12.58	0.098	-5.50	< 23.98
5795	-9.19	0.098	-2.10	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/500KHz)			Limit (dBm/500KHz)
5755	0.70			< 23.98
5795	3.27			

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10*Log(500k/100k)

Test Mode	Mode 5: IEEE 802.11ac 80MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	0.916	0.231	0.542	< 10.98
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	0.916	0.231	1.147	< 10.98
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	0.706	0.231	0.937	< 10.98
Frequency (MHz)	ANT-3			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	0.105	0.231	0.336	< 10.98
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/MHz)			Limit (dBm/MHz)
5210	6.772			< 10.98

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Test Mode	Mode 5: IEEE 802.11ac 80MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5775	-12.26	0.231	-5.04	< 23.98
Frequency (MHz)	ANT-1			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5775	-13.64	0.231	-6.42	< 23.98
Frequency (MHz)	ANT-2			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5775	-12.63	0.231	-5.40	< 23.98
Frequency (MHz)	ANT-3			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5775	-13.10	0.231	-5.87	< 23.98
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/500KHz)			Limit (dBm/500KHz)
5775	0.37			< 23.98

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Conversion ratio = 10*Log(500k/100k)

Module : QCA9990 (EW-7944MAC)_Client

Test Mode	Mode 2: IEEE 802.11a link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	-1.554	0.124	-1.430	< 4.98
5200	-1.569	0.124	-1.445	
5240	-1.429	0.124	-1.305	
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	-0.885	0.124	-0.761	< 4.98
5200	-1.032	0.124	-0.908	
5240	-0.903	0.124	-0.779	
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	-1.192	0.124	-1.068	< 4.98
5200	-1.358	0.124	-1.234	
5240	-1.716	0.124	-1.592	
Frequency (MHz)	ANT-3			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	-1.913	0.124	-1.789	< 4.98
5200	-1.446	0.124	-1.322	
5240	-1.738	0.124	-1.614	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/MHz)			Limit (dBm/MHz)
5180	4.775			< 4.98
5200	4.798			
5240	4.711			

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Test Mode	Mode 3: IEEE 802.11ac 20MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	-1.957	0.041	-1.916	< 4.98
5200	-1.635	0.041	-1.594	
5240	-1.482	0.041	-1.441	
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	-1.086	0.041	-1.045	< 4.98
5200	-0.921	0.041	-0.880	
5240	-0.834	0.041	-0.793	
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	-1.224	0.041	-1.183	< 4.98
5200	-1.471	0.041	-1.430	
5240	-1.892	0.041	-1.851	
Frequency (MHz)	ANT-3			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	-1.647	0.041	-1.606	< 4.98
5200	-1.797	0.041	-1.756	
5240	-1.648	0.041	-1.607	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/MHz)			Limit (dBm/MHz)
5180	4.597			< 4.98
5200	4.619			
5240	4.616			

Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

Test Mode	Mode 4: IEEE 802.11ac 40MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	-2.050	0.098	-1.952	< 4.98
5230	-1.914	0.098	-1.816	
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	-1.037	0.098	-0.939	< 4.98
5230	-1.317	0.098	-1.219	
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	-1.270	0.098	-1.172	< 4.98
5230	-1.614	0.098	-1.516	
Frequency (MHz)	ANT-3			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	-1.803	0.098	-1.705	< 4.98
5230	-1.659	0.098	-1.561	
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/MHz)			Limit (dBm/MHz)
5190	4.597			< 4.98
5230	4.498			

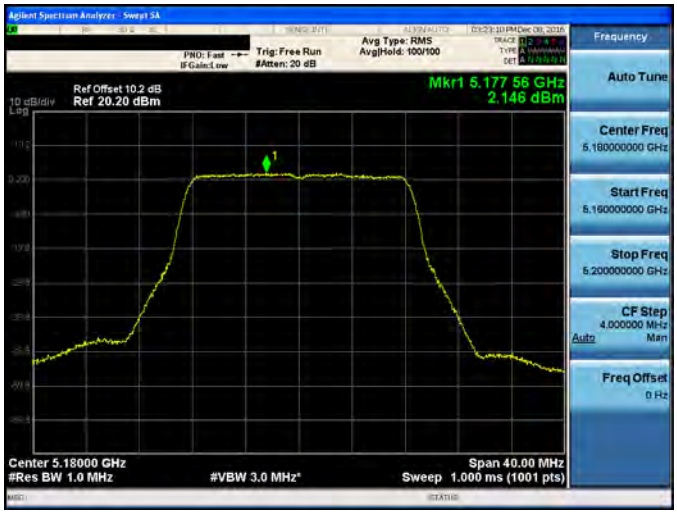
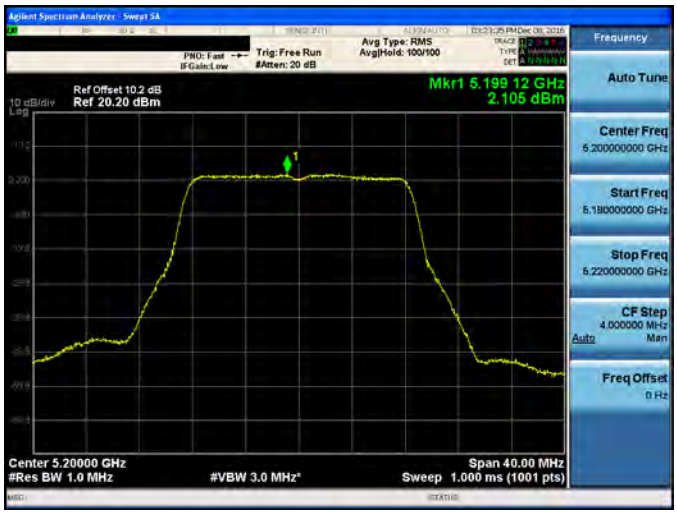
Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

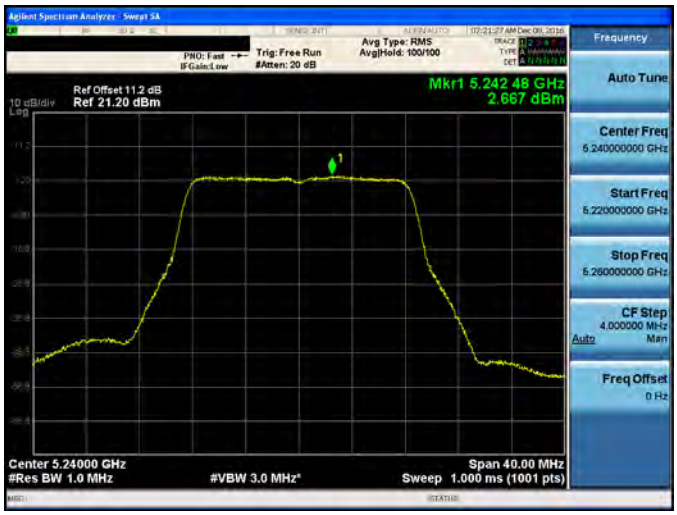
Test Mode	Mode 5: IEEE 802.11ac 80MHz link mode			
Frequency (MHz)	Conducted power spectral density			
	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	-6.351	0.231	-6.120	< 4.98
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	-5.357	0.231	-5.126	< 4.98
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	-5.461	0.231	-5.230	< 4.98
Frequency (MHz)	ANT-3			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	-5.645	0.231	-5.414	< 4.98
Frequency (MHz)	ANT-0+1+2+3			
	Calculated (dBm/MHz)			Limit (dBm/MHz)
5210	0.565			< 4.98

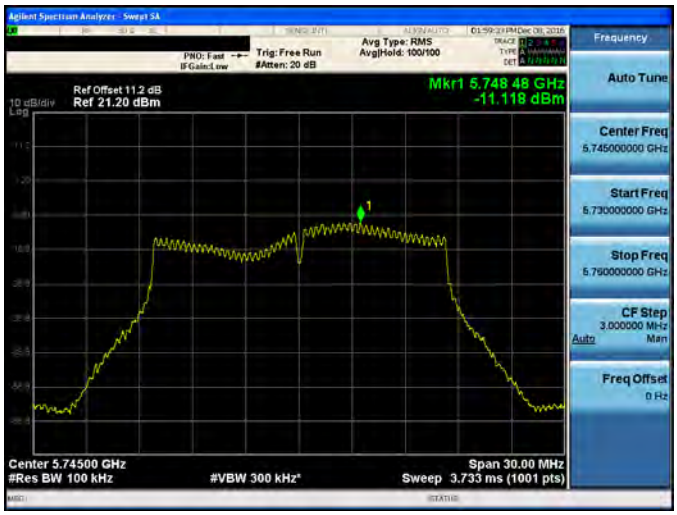
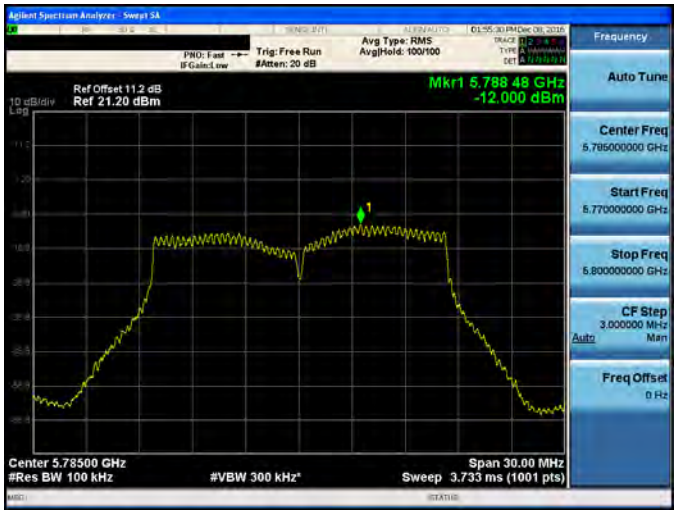
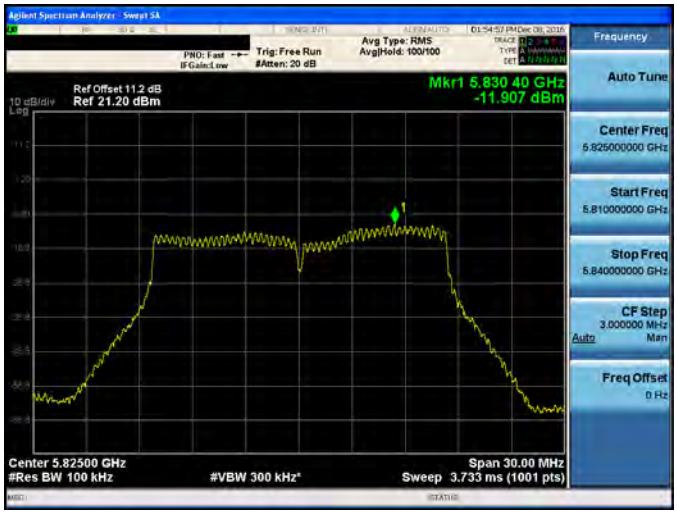
Note: Method SA-2, Power density = measured result + 10log(1/duty cycle) + Conversion ratio = measured result + duty factor.

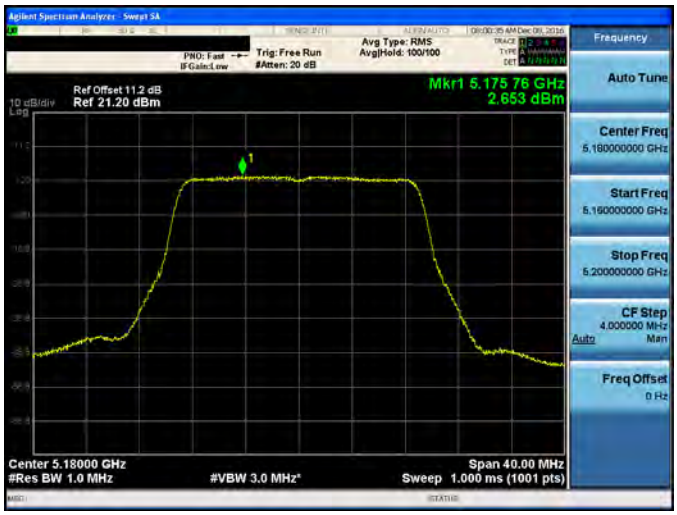
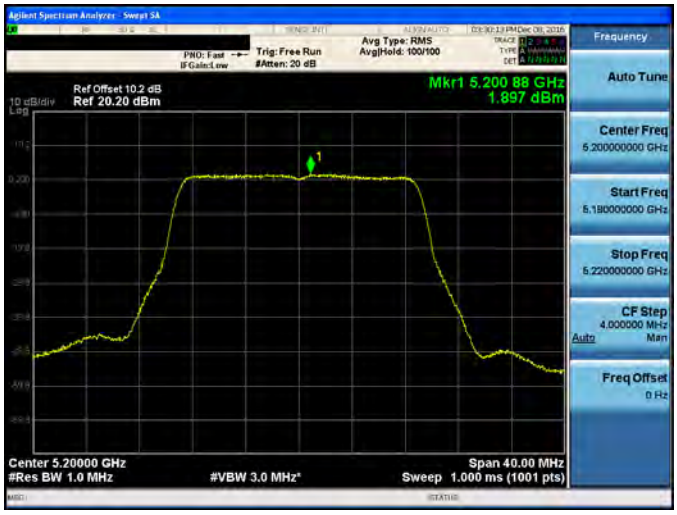
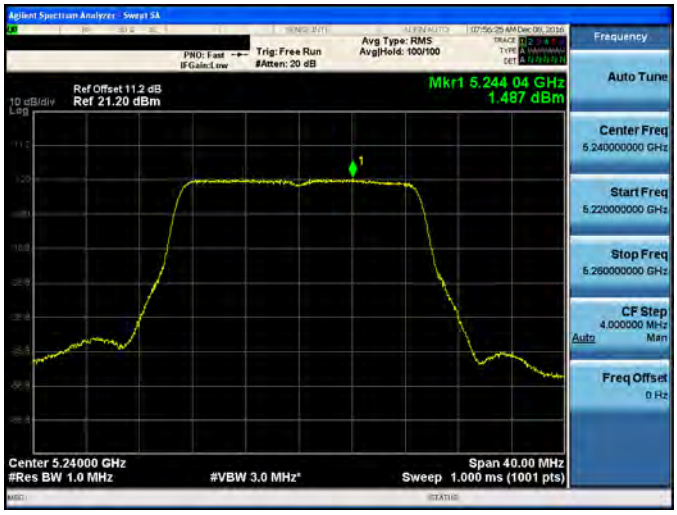
■ **Test Graphs**

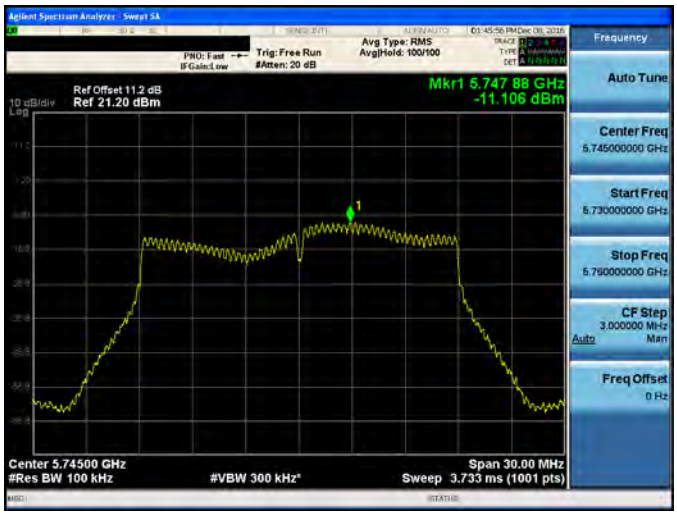
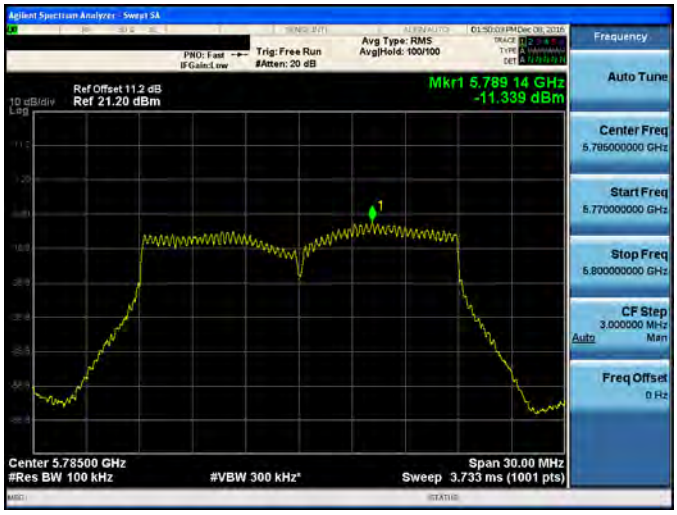
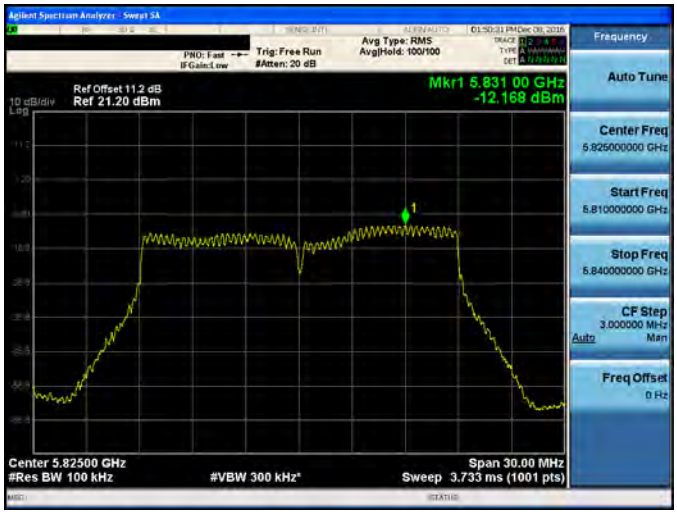
Module : QCA9984 (EW-7955MAC)

Mode 2: IEEE 802.11a Link Mode	
ANT-0	
5180 MHz	
5200 MHz	

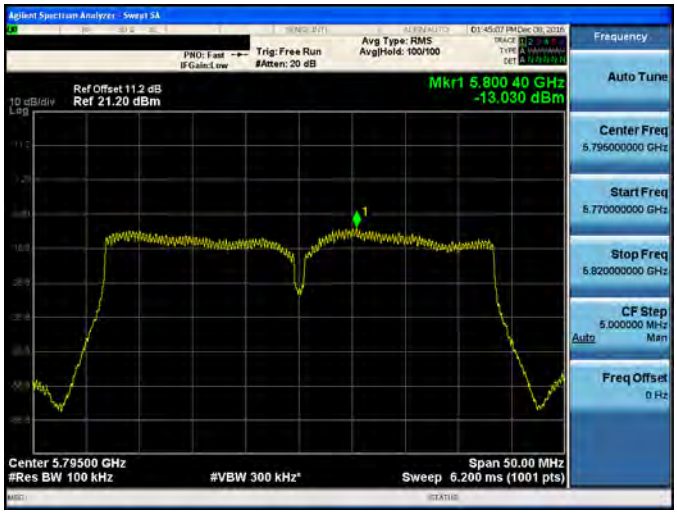
Mode 2: IEEE 802.11a Link Mode	
ANT-0	
5240 MHz	

Mode 2: IEEE 802.11a Link Mode	
ANT-0	
5745 MHz	
5785 MHz	
5825 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-0	
5180 MHz	
5200 MHz	
5240 MHz	

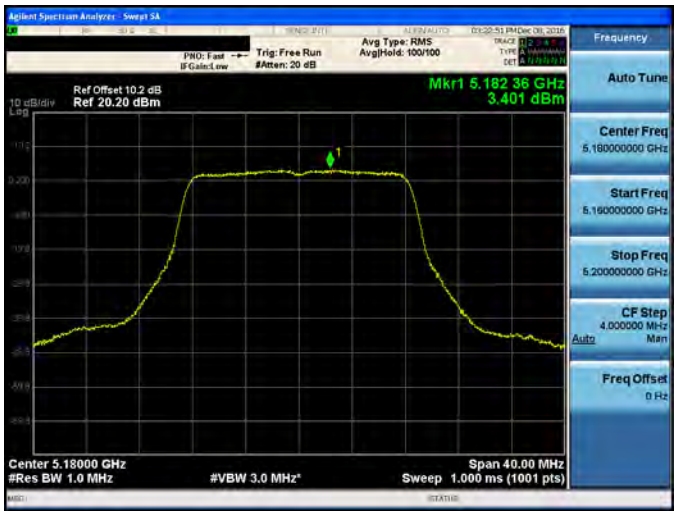
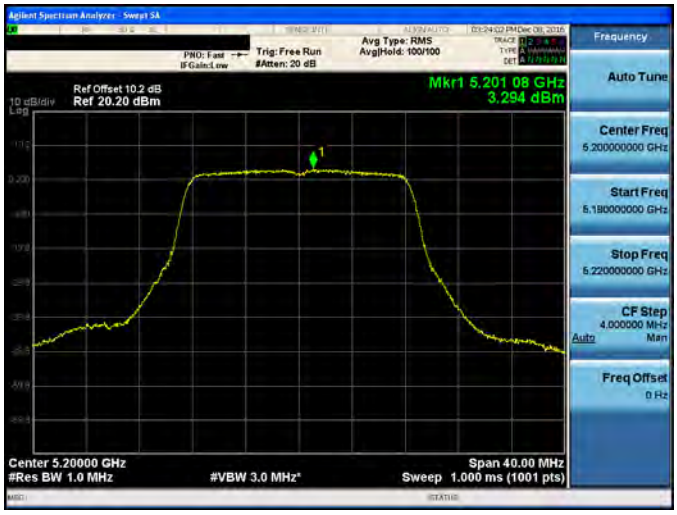
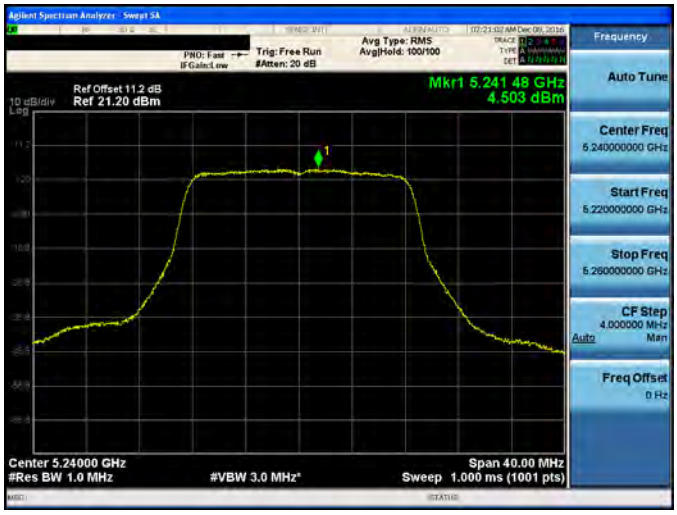
Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-0	
5745 MHz	
5785 MHz	
5825 MHz	

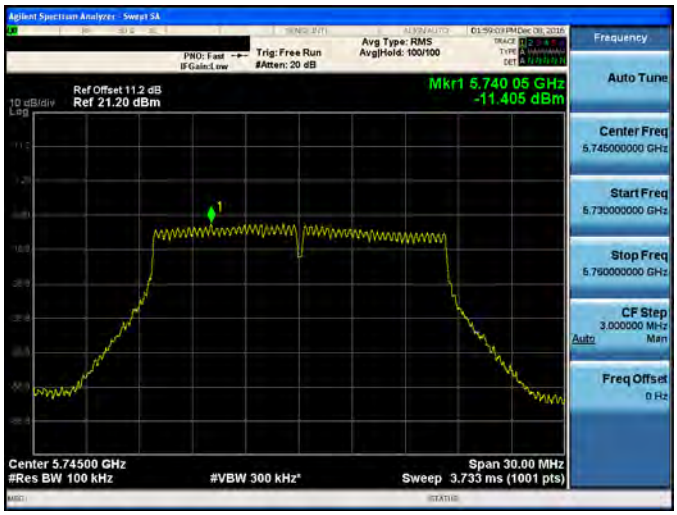
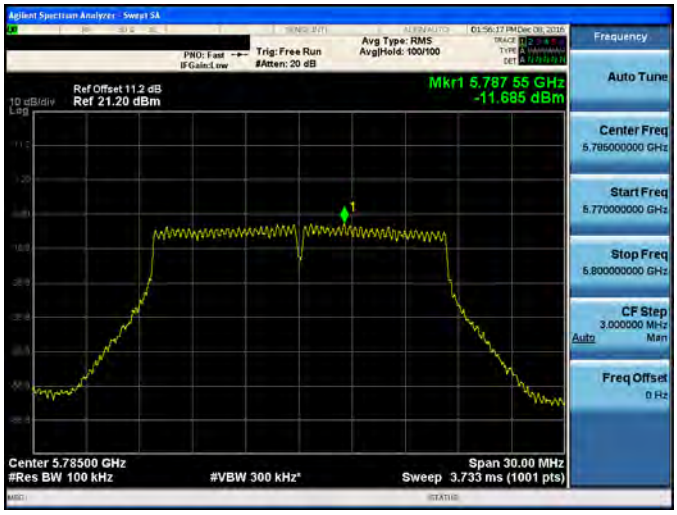
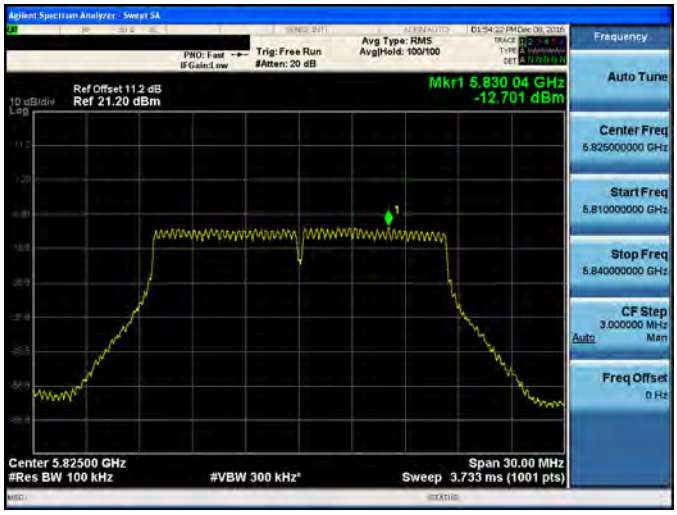
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-0	
5190 MHz	
5230 MHz	

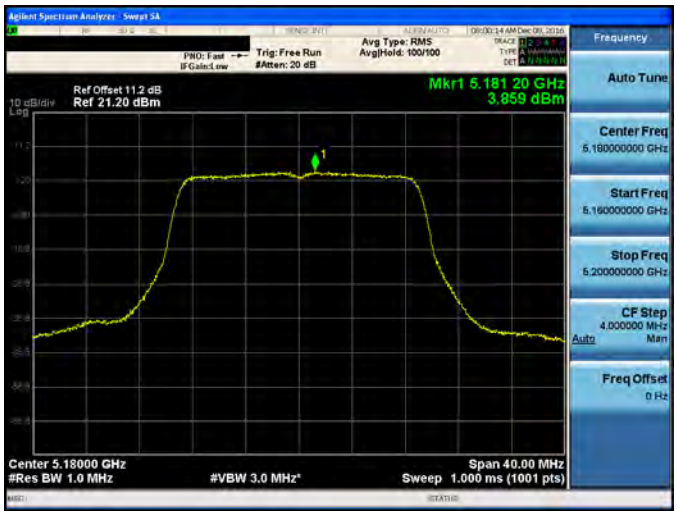
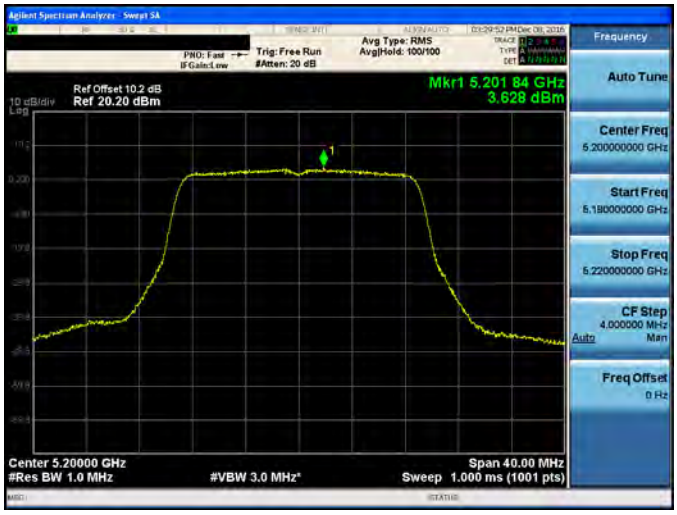
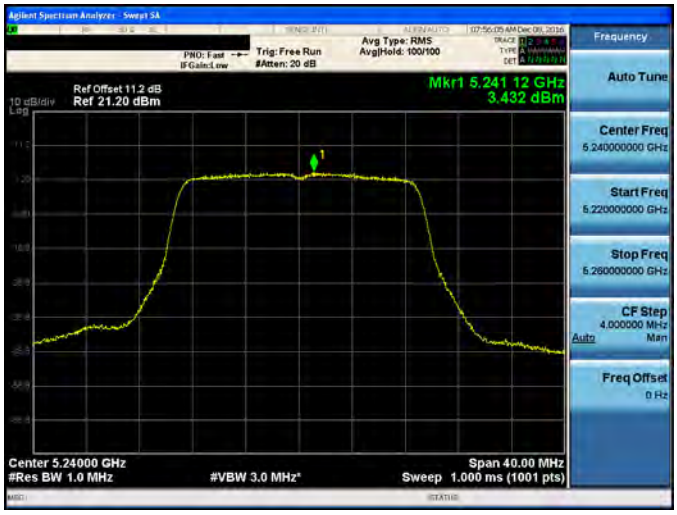
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-0	
5755 MHz	
5795 MHz	

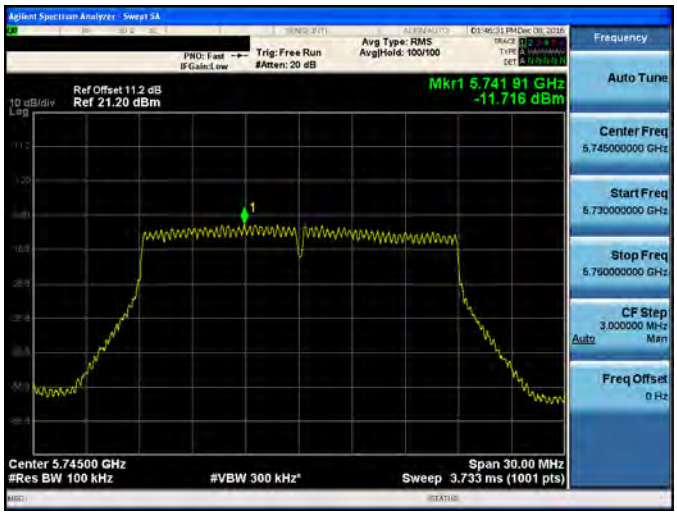
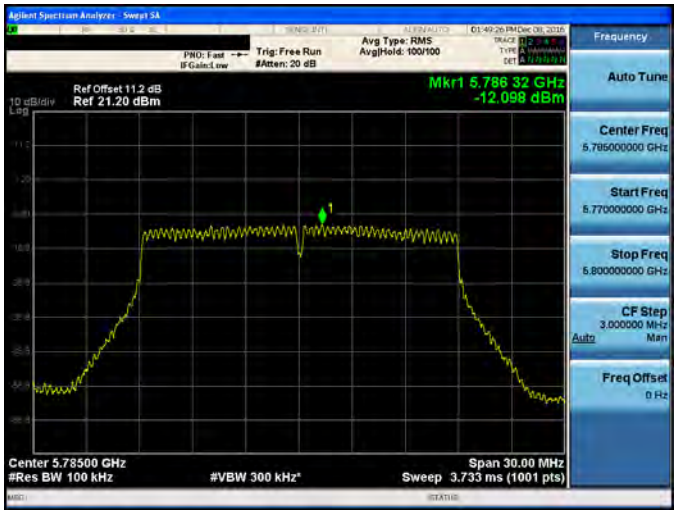
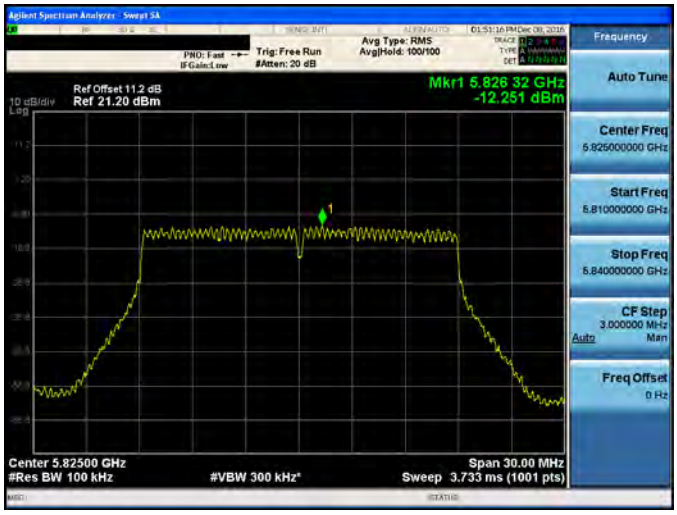
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-0	
5210 MHz	

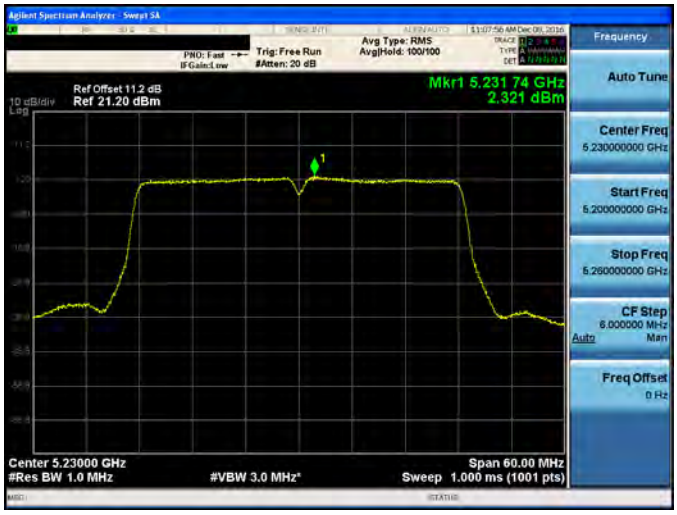
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-0	
5775 MHz	

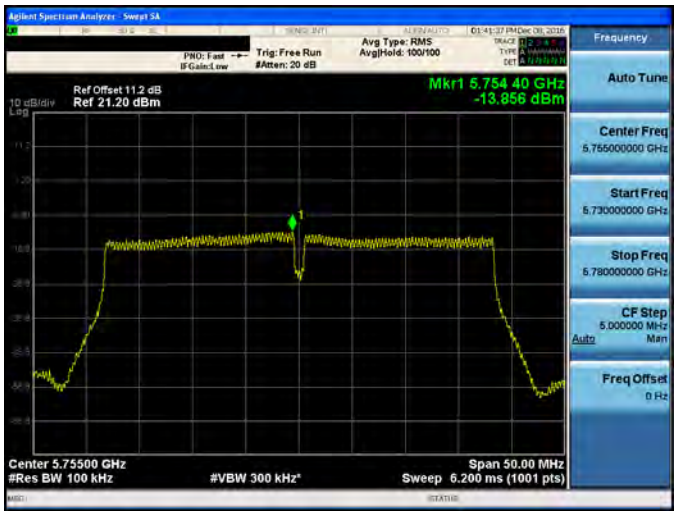
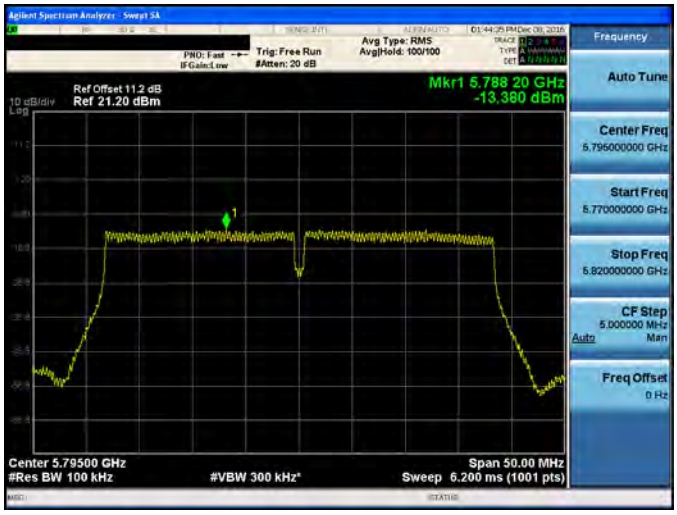
Mode 2: IEEE 802.11a Link Mode	
ANT-1	
5180 MHz	
5200 MHz	
5240 MHz	

Mode 2: IEEE 802.11a Link Mode	
ANT-1	
5745 MHz	
5785 MHz	
5825 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-1	
5180 MHz	
5200 MHz	
5240 MHz	

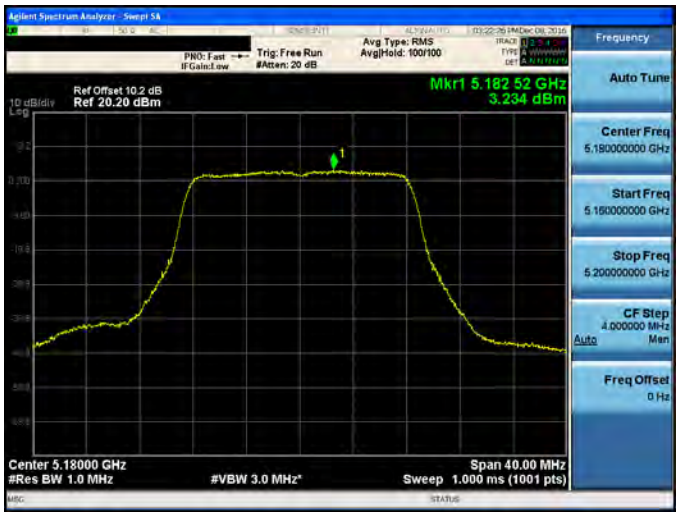
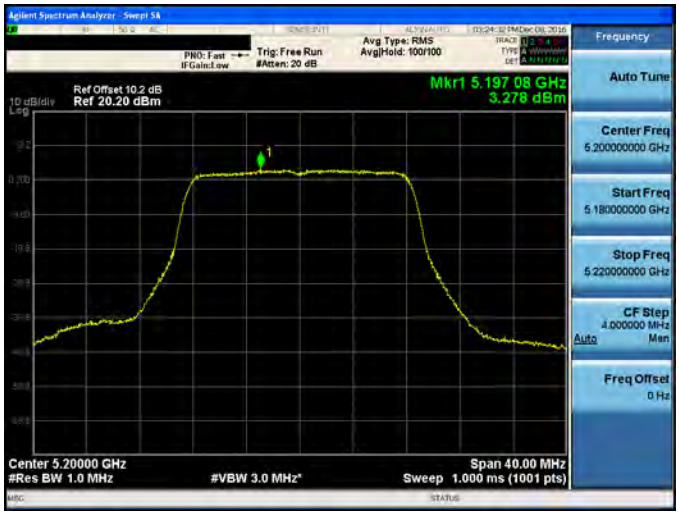
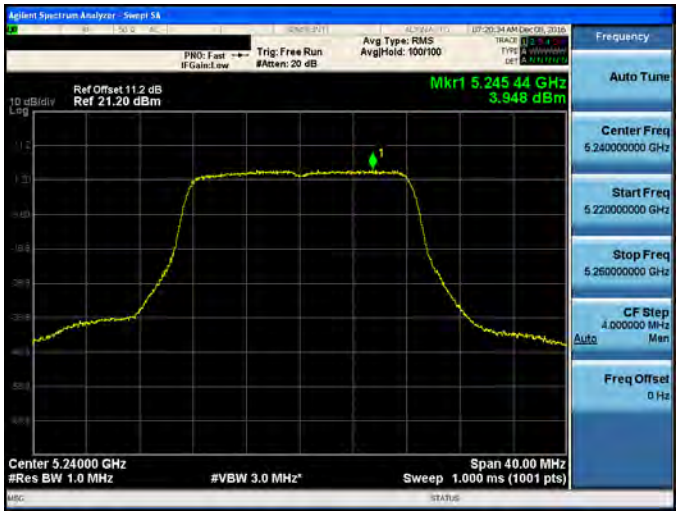
Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-1	
5745 MHz	
5785 MHz	
5825 MHz	

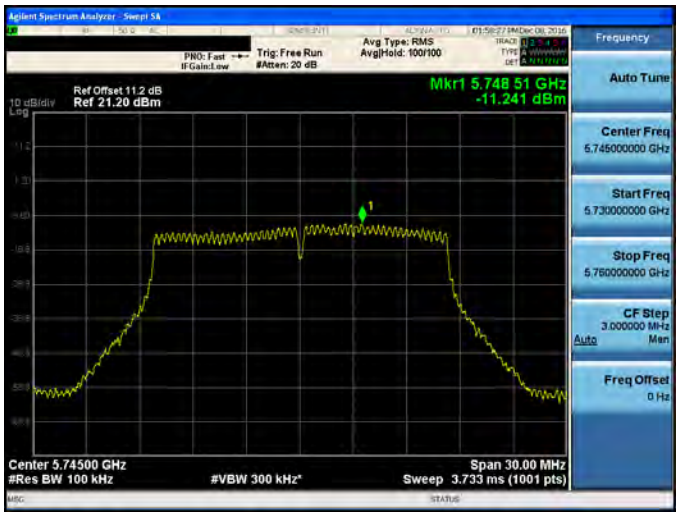
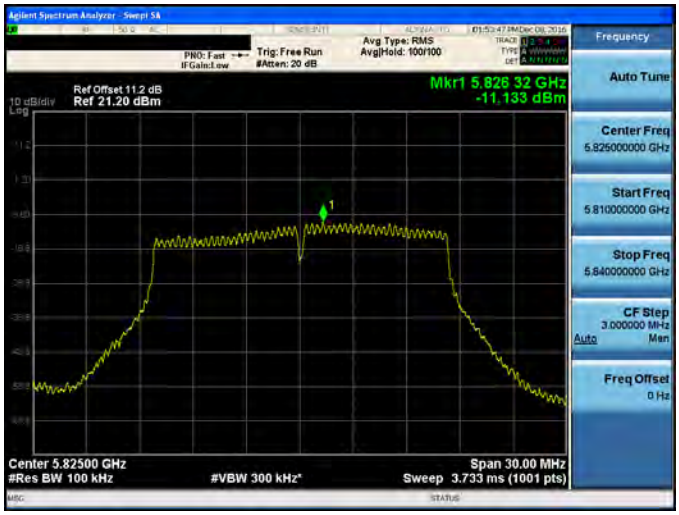
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-1	
5190 MHz	
5230 MHz	

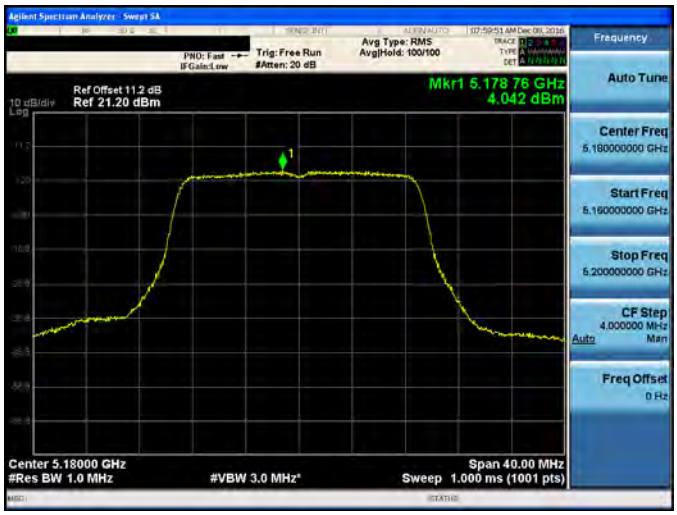
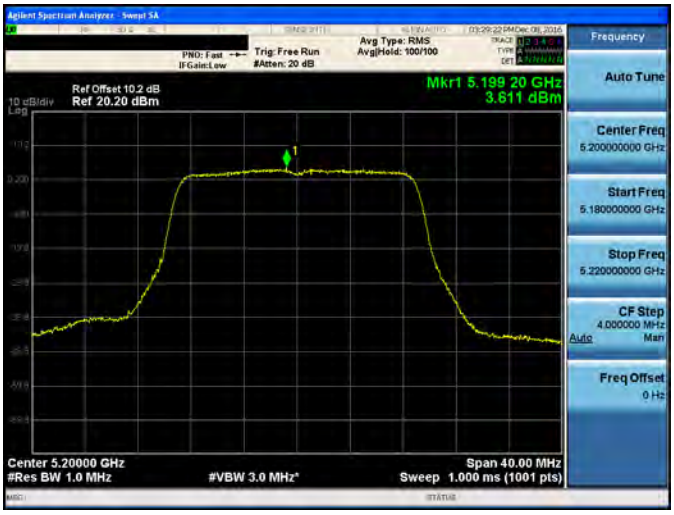
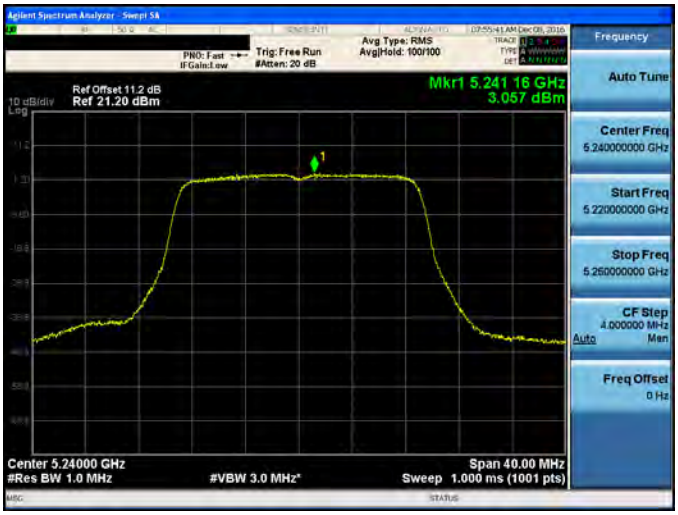
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-1	
5755 MHz	
5795 MHz	

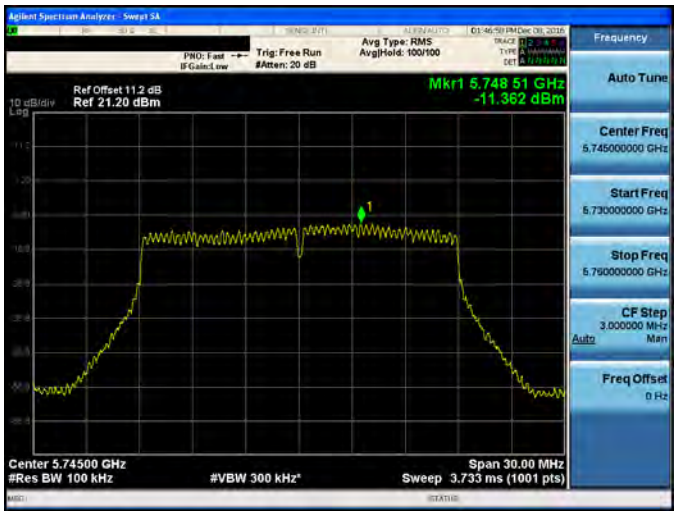
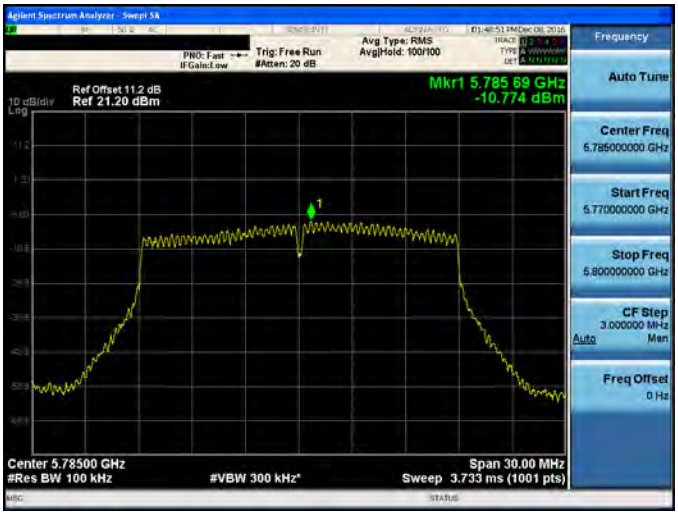
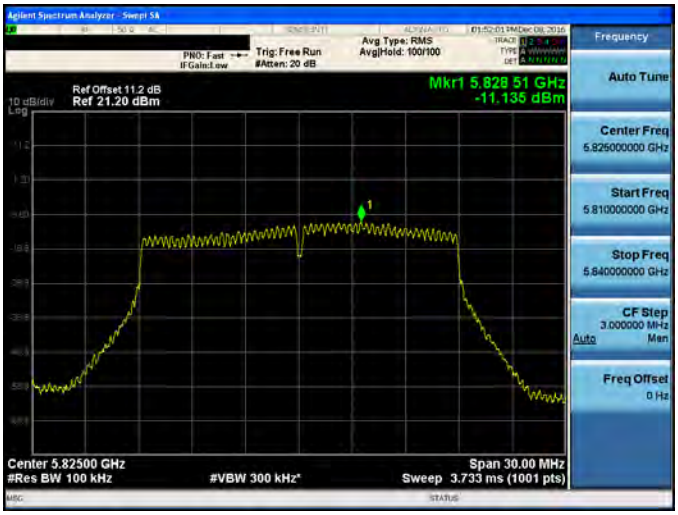
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-1	
5210 MHz	

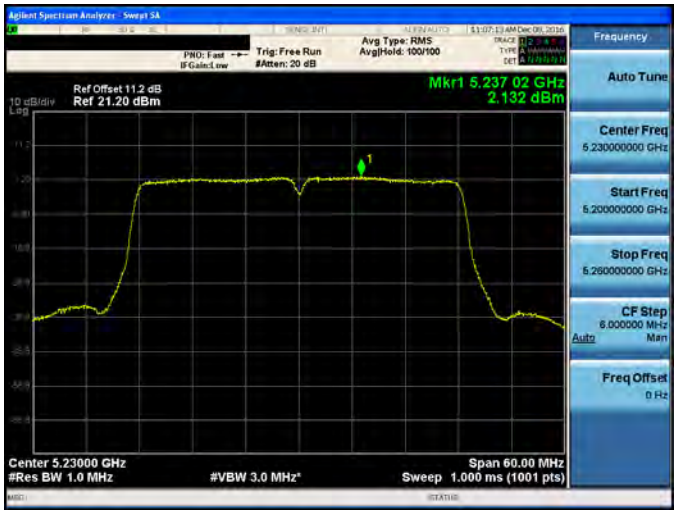
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-1	
5775 MHz	

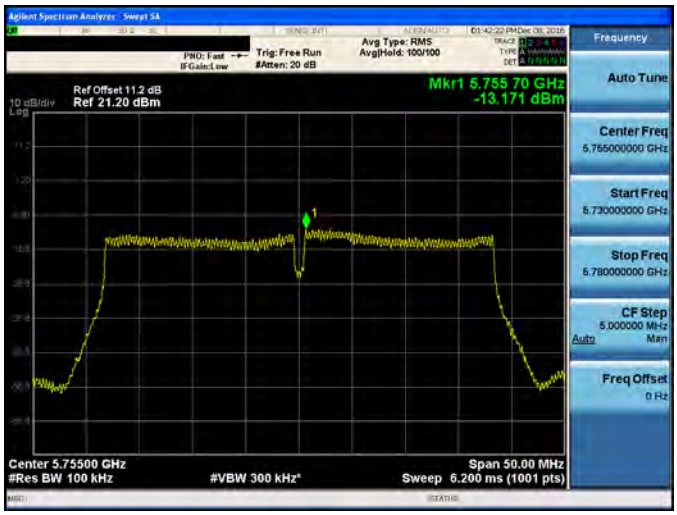
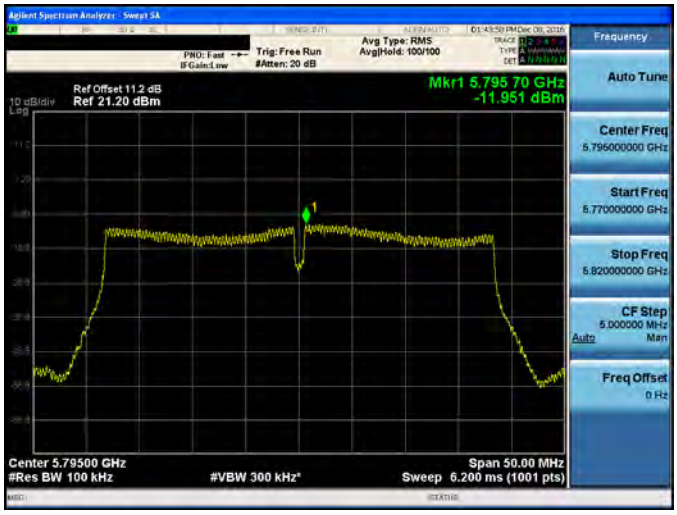
Mode 2: IEEE 802.11a Link Mode	
ANT-2	
5180 MHz	
5200 MHz	
5240 MHz	

Mode 2: IEEE 802.11a Link Mode	
ANT-2	
5745 MHz	
5785 MHz	
5825 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-2	
5180 MHz	
5200 MHz	
5240 MHz	

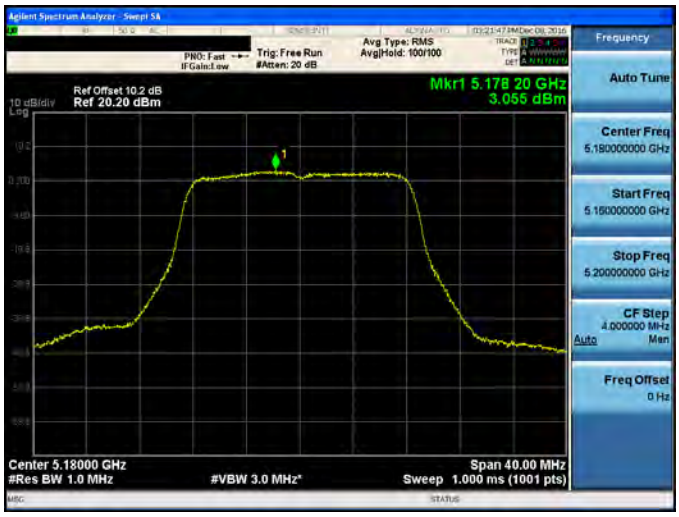
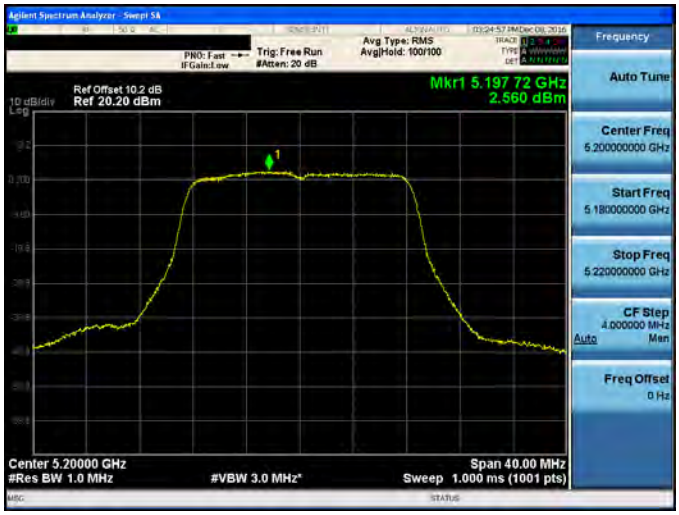
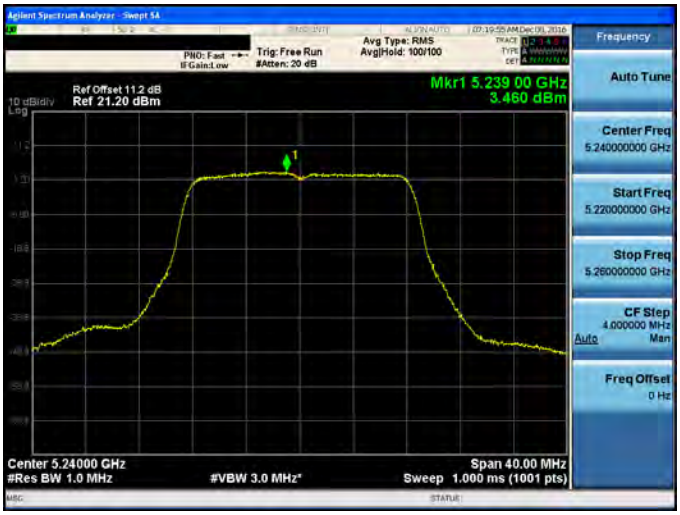
Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-2	
5745 MHz	
5785 MHz	
5825 MHz	

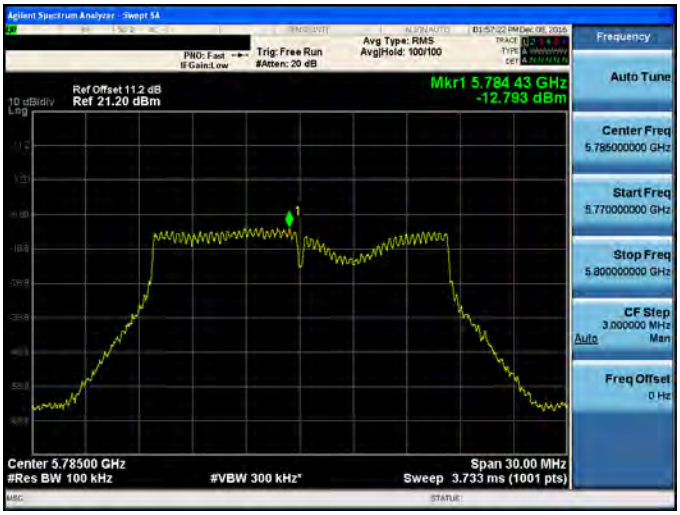
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-2	
5190 MHz	
5230 MHz	

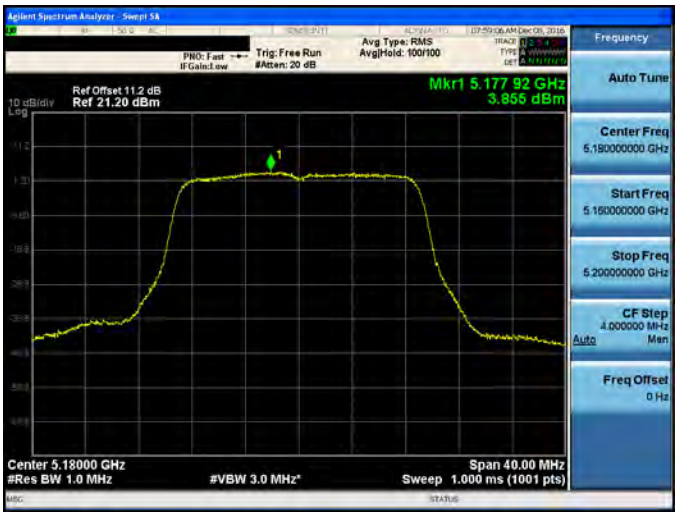
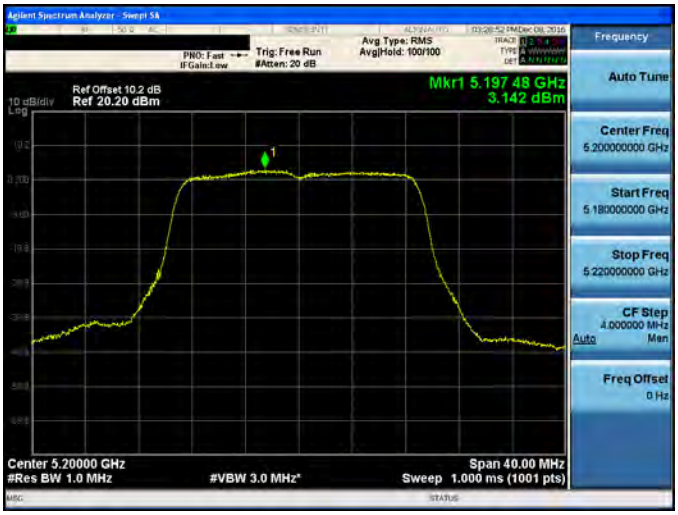
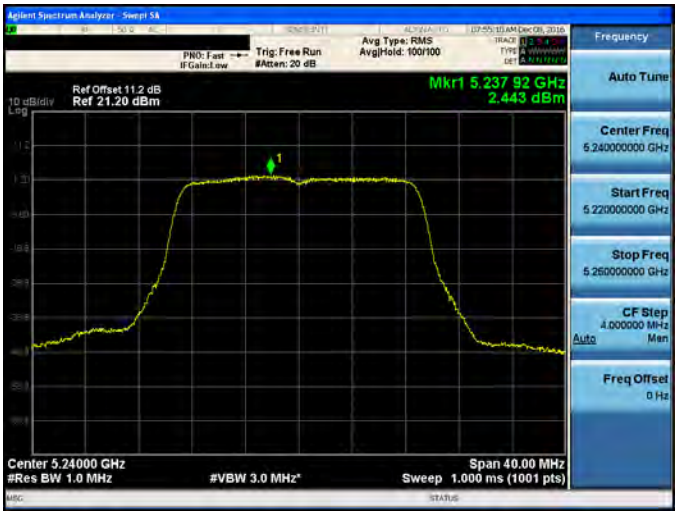
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-2	
5755 MHz	
5795 MHz	

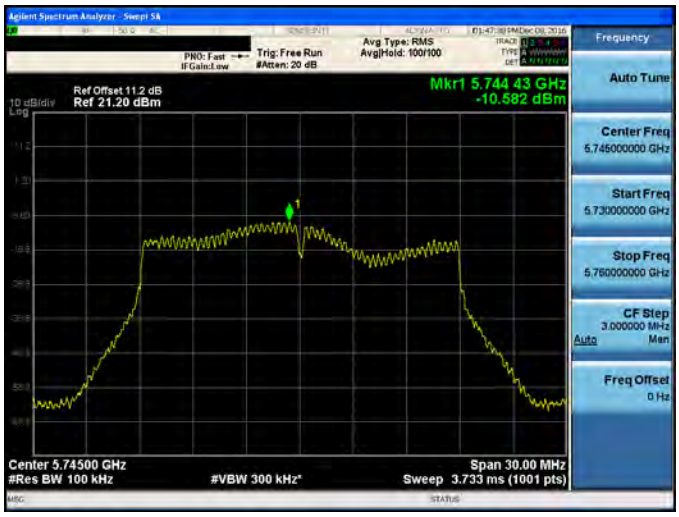
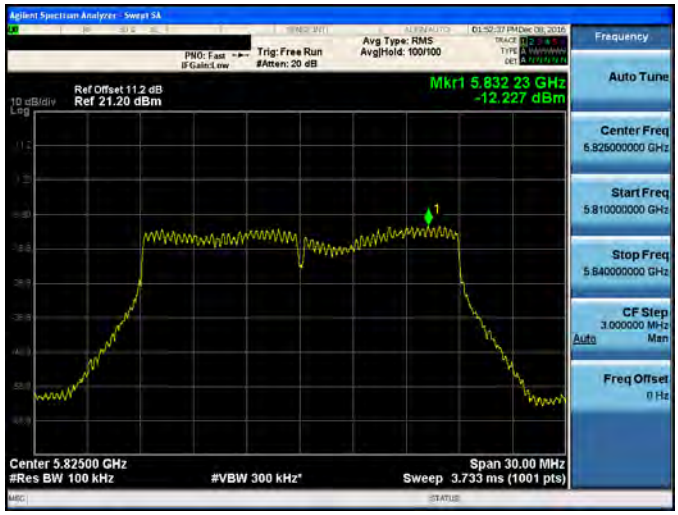
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-2	
5210 MHz	

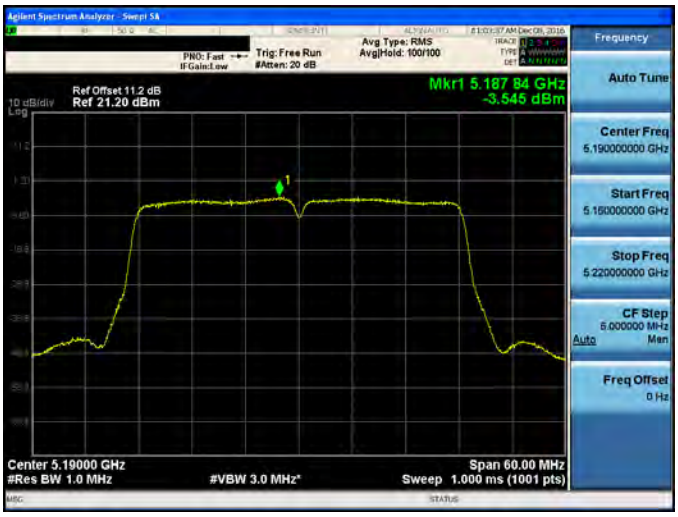
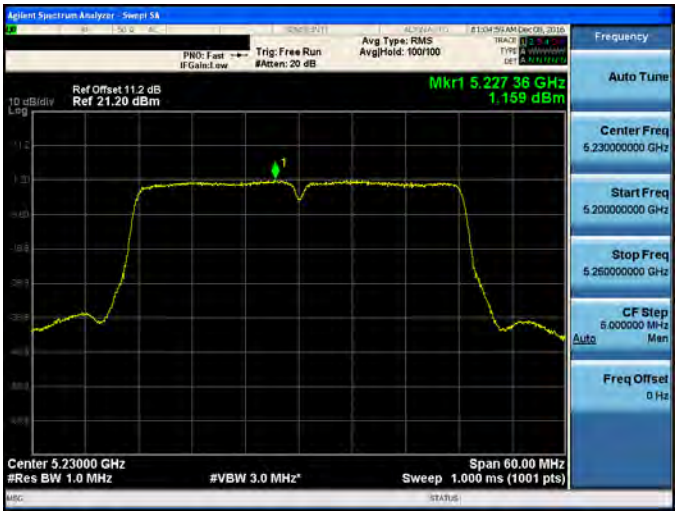
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-2	
5775 MHz	

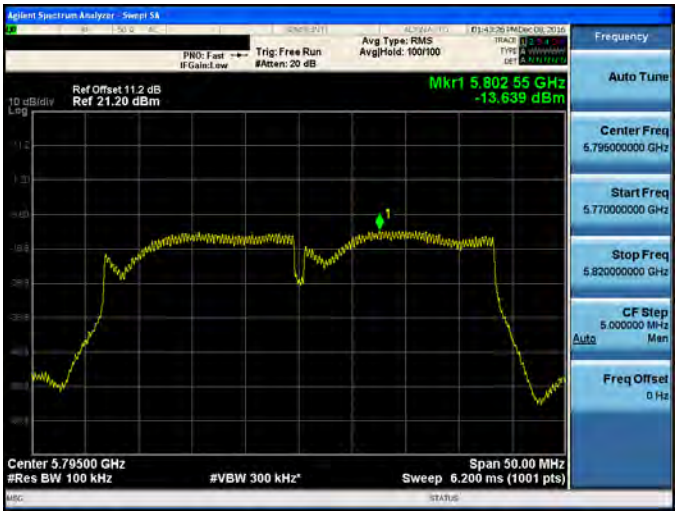
Mode 2: IEEE 802.11a Link Mode	
ANT-3	
5180 MHz	
5200 MHz	
5240 MHz	

Mode 2: IEEE 802.11a Link Mode	
ANT-3	
5745 MHz	
5785 MHz	
5825 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-3	
5180 MHz	
5200 MHz	
5240 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-3	
5745 MHz	
5785 MHz	
5825 MHz	

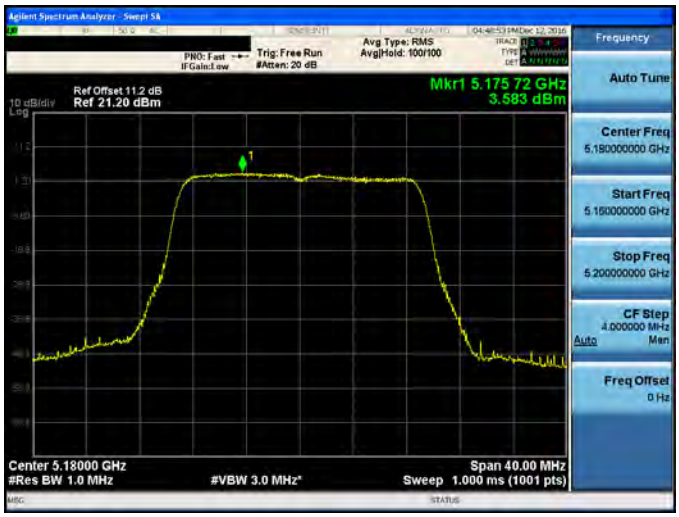
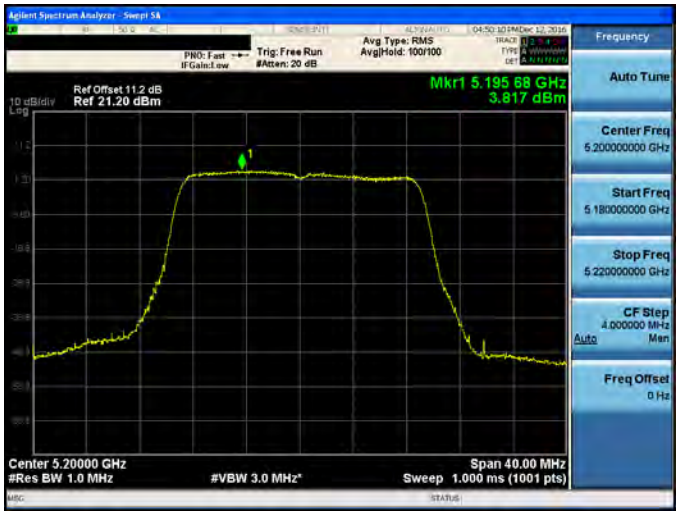
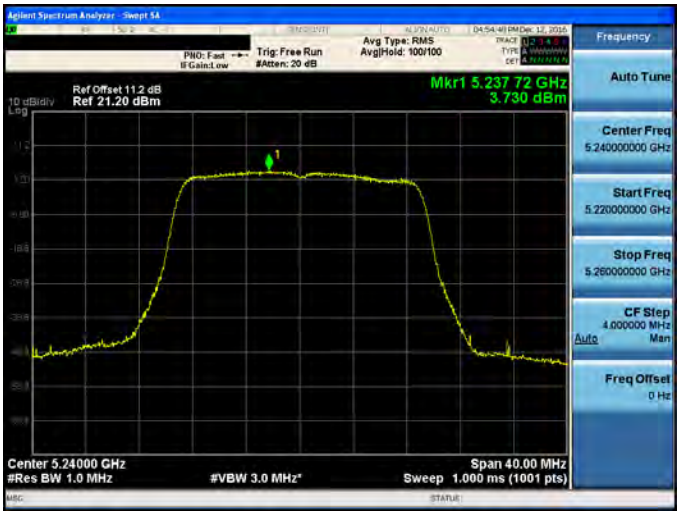
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-3	
5190 MHz	
5230 MHz	

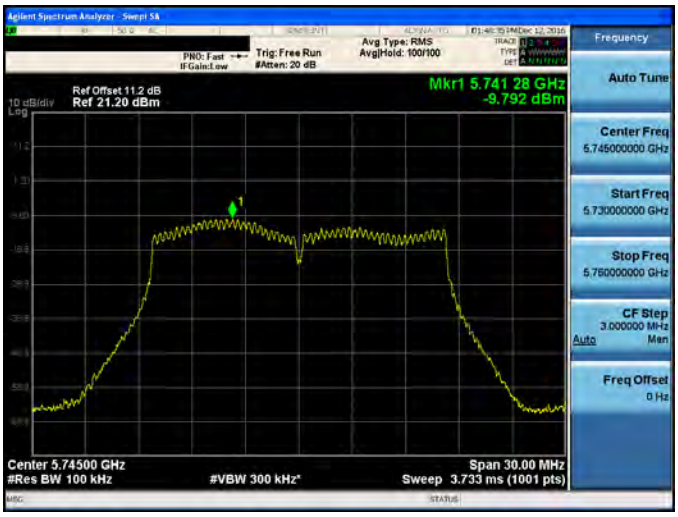
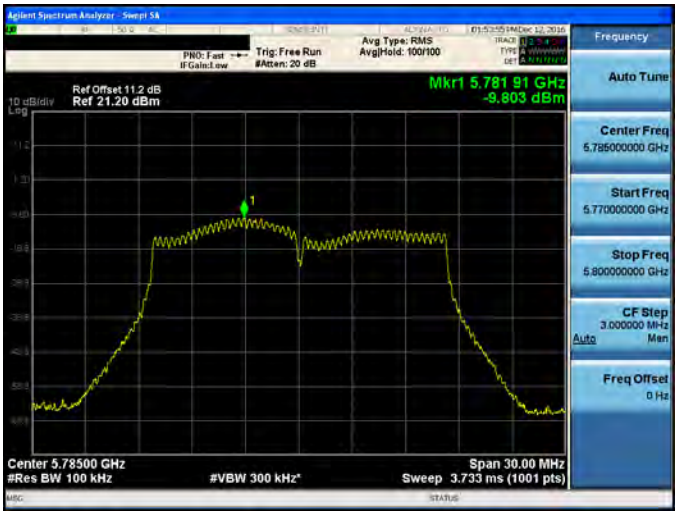
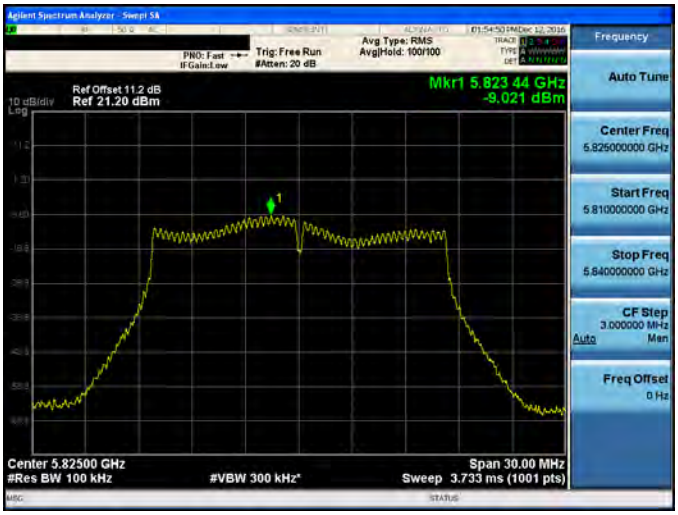
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-3	
5755 MHz	
5795 MHz	

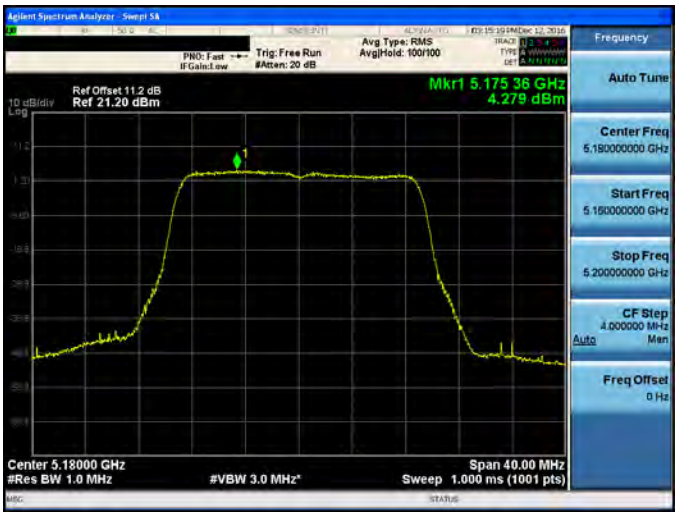
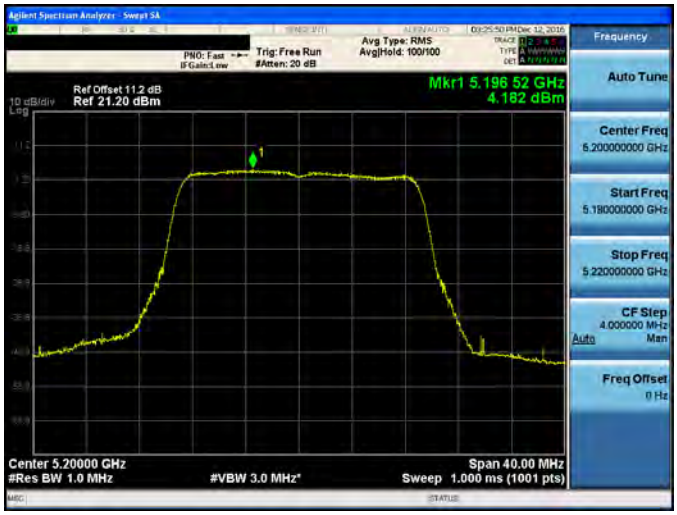
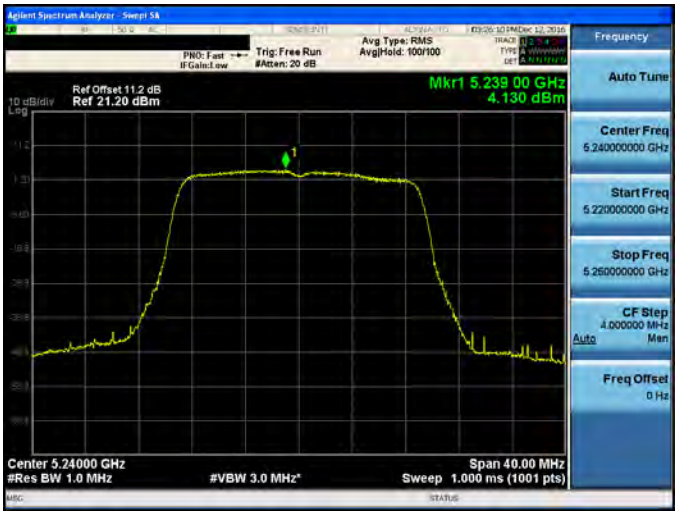
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-3	
5210 MHz	

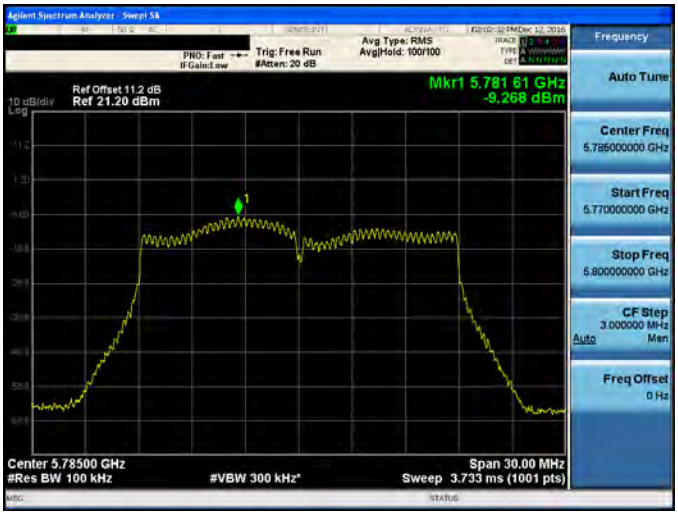
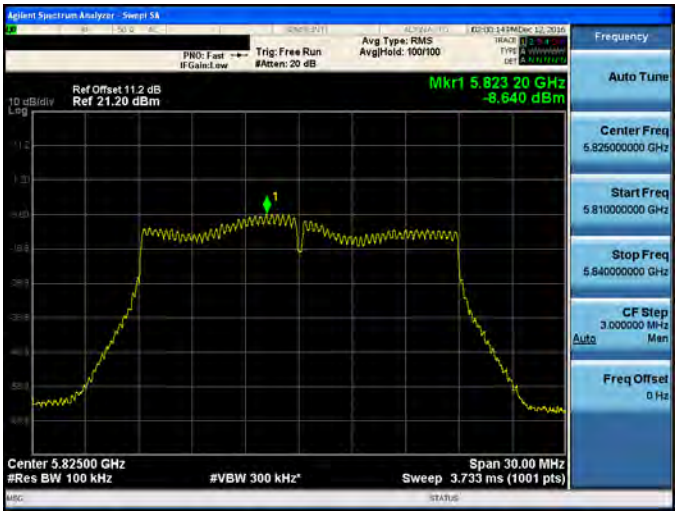
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-3	
5775 MHz	

Module : QCA9990 (EW-7944MAC)_Master

Mode 2: IEEE 802.11a Link Mode	
ANT-0	
5180 MHz	
5200 MHz	
5240 MHz	

Mode 2: IEEE 802.11a Link Mode	
ANT-0	
5745 MHz	
5785 MHz	
5825 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-0	
5180 MHz	
5200 MHz	
5240 MHz	

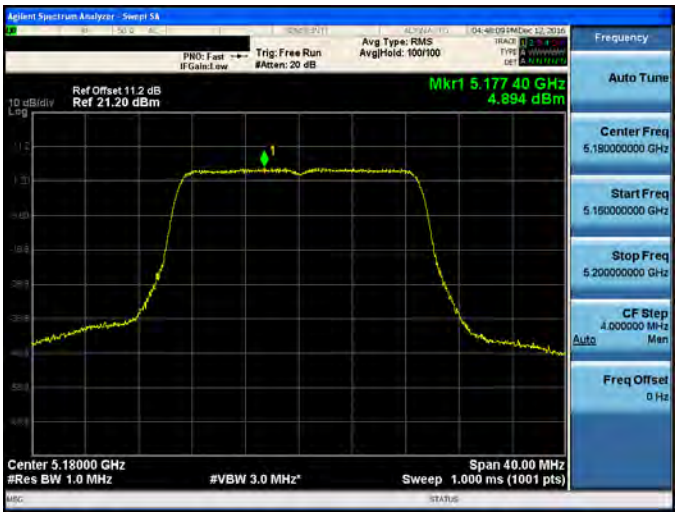
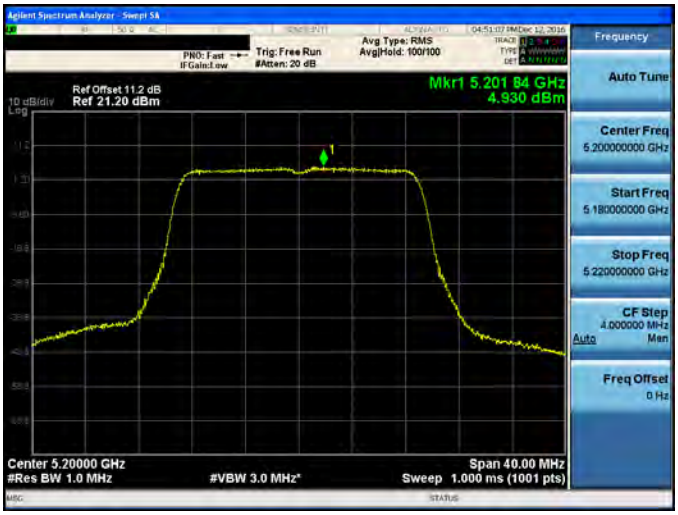
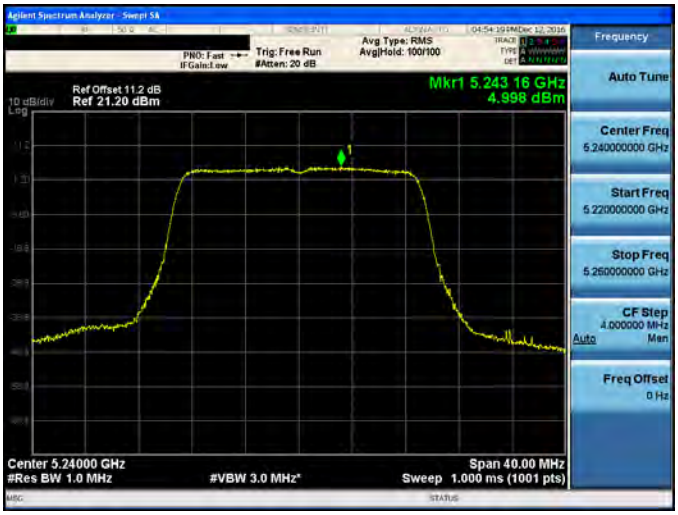
Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-0	
5745 MHz	
5785 MHz	
5825 MHz	

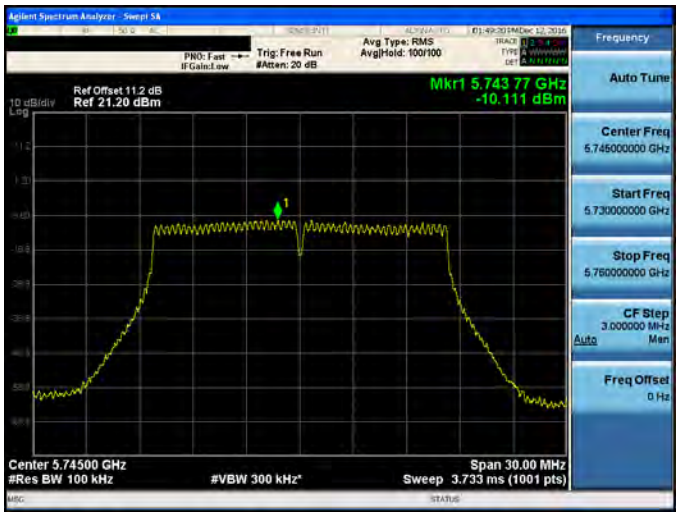
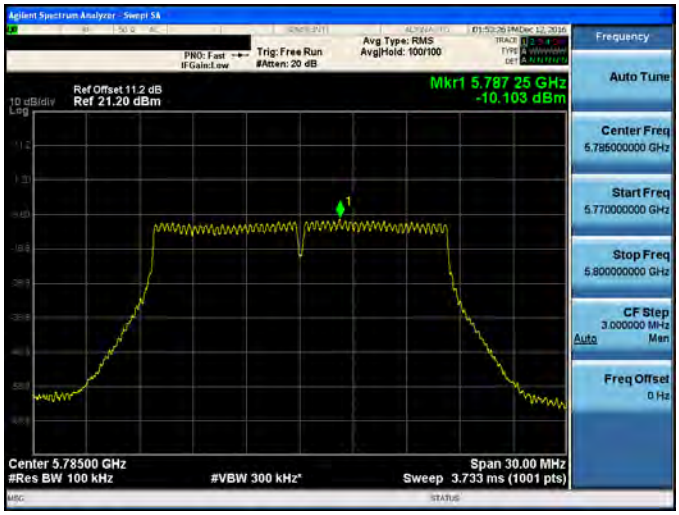
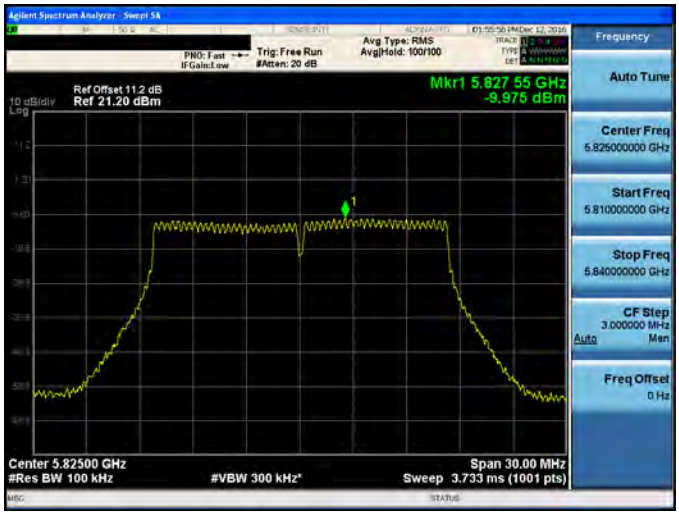
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-0	
5190 MHz	
5230 MHz	

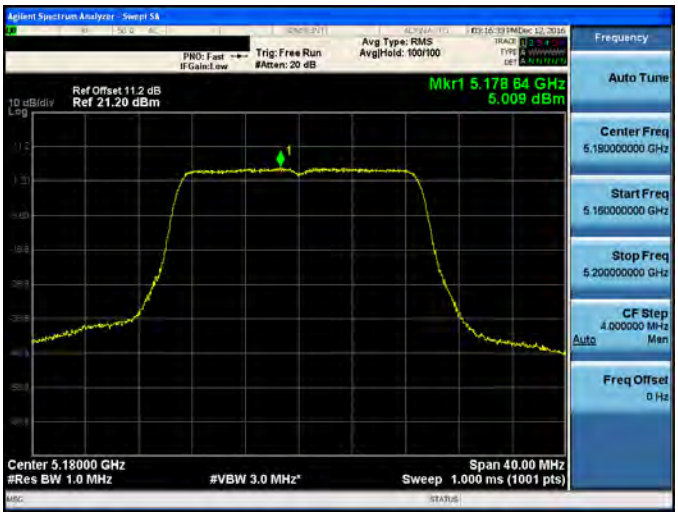
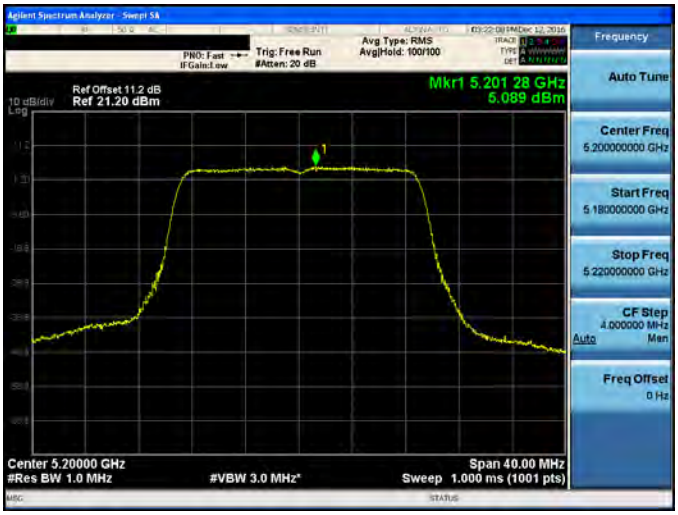
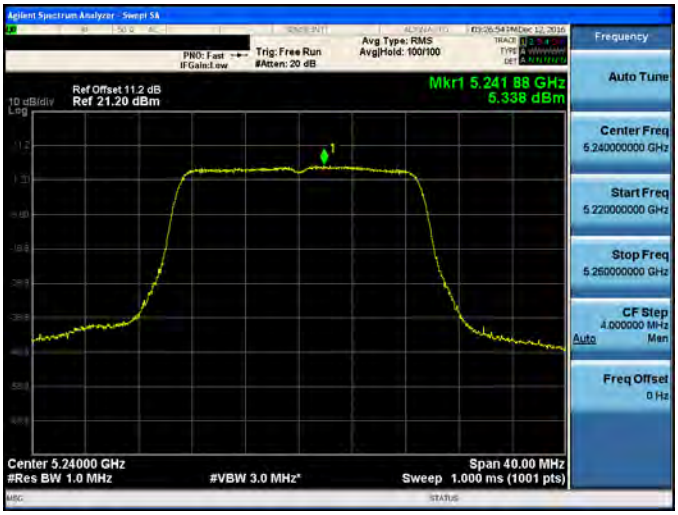
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-0	
5755 MHz	
5795 MHz	

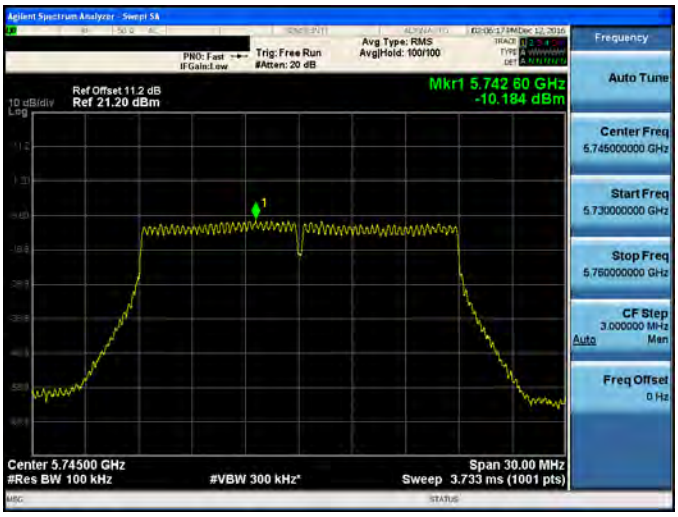
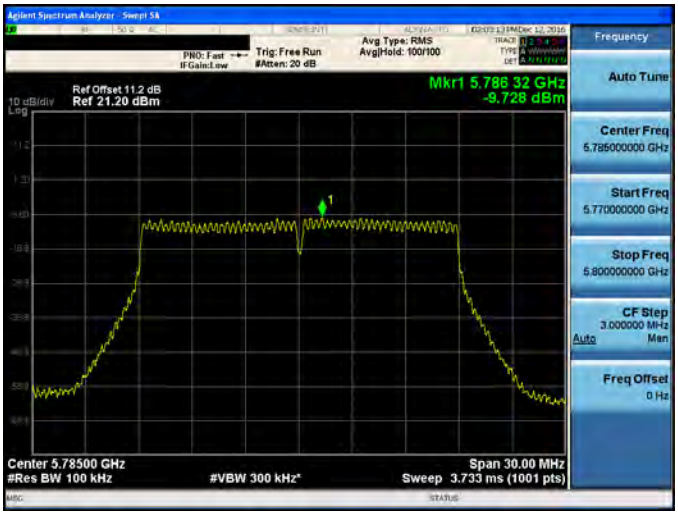
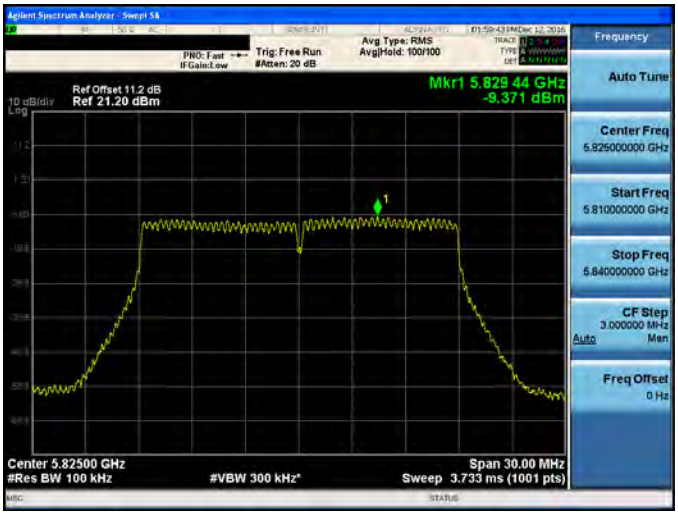
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-0	
5210 MHz	

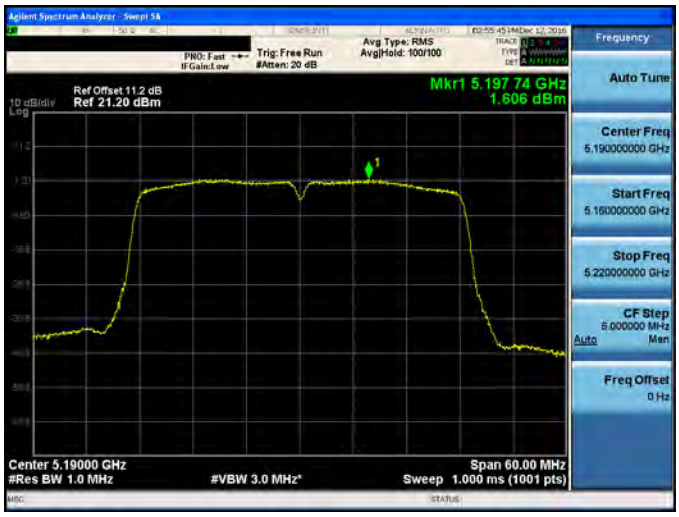
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-0	
5775 MHz	

Mode 2: IEEE 802.11a Link Mode	
ANT-1	
5180 MHz	
5200 MHz	
5240 MHz	

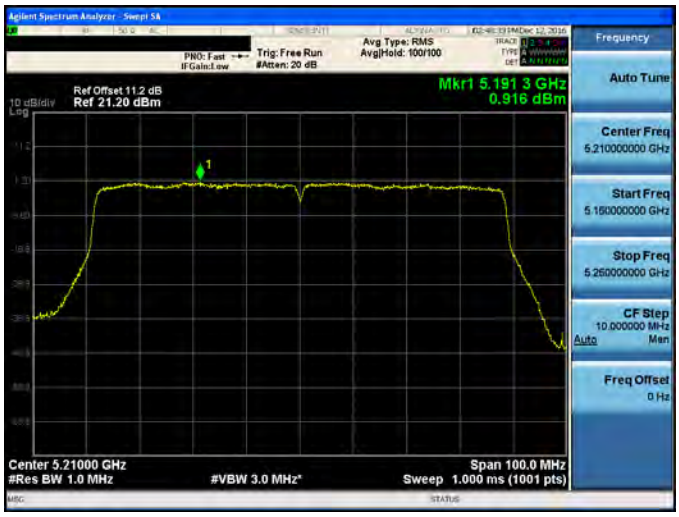
Mode 2: IEEE 802.11a Link Mode	
ANT-1	
5745 MHz	
5785 MHz	
5825 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-1	
5180 MHz	
5200 MHz	
5240 MHz	

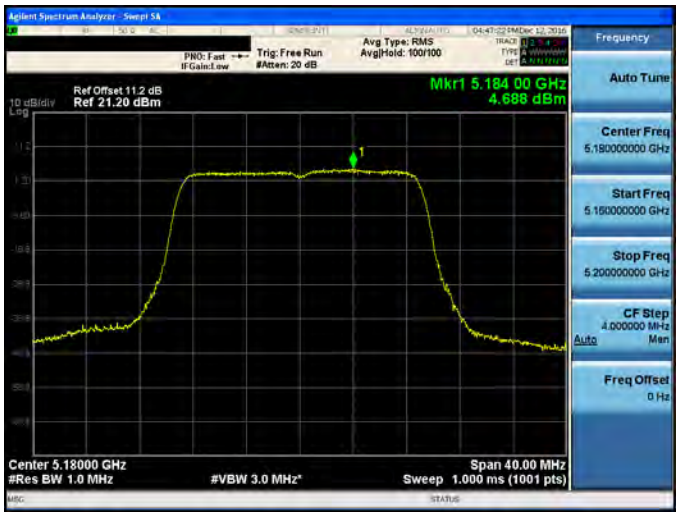
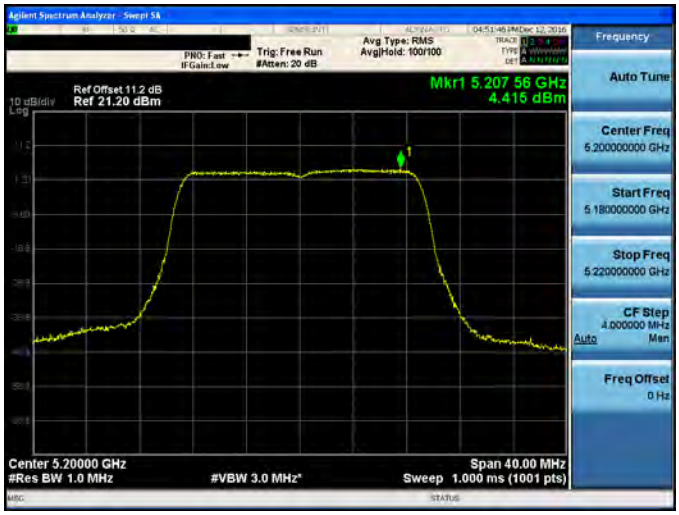
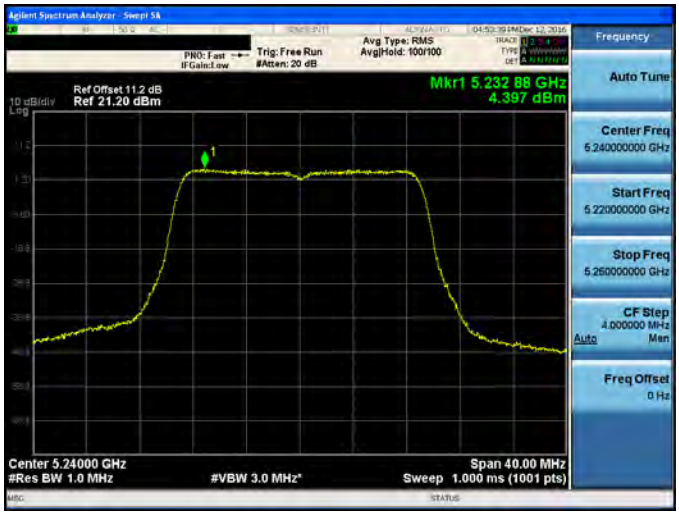
Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-1	
5745 MHz	
5785 MHz	
5825 MHz	

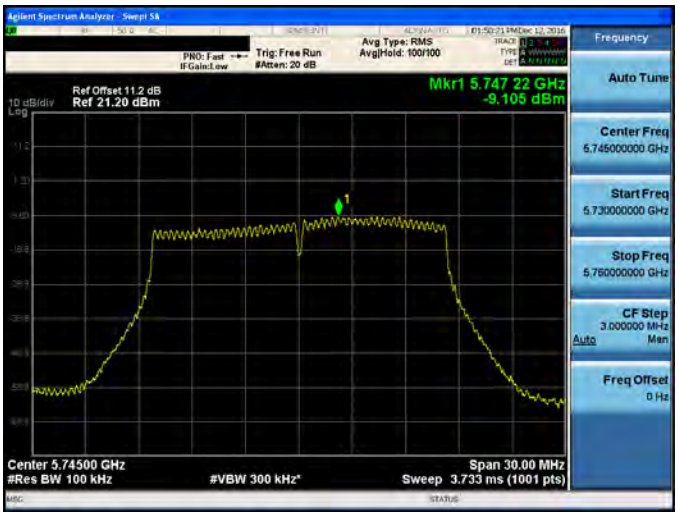
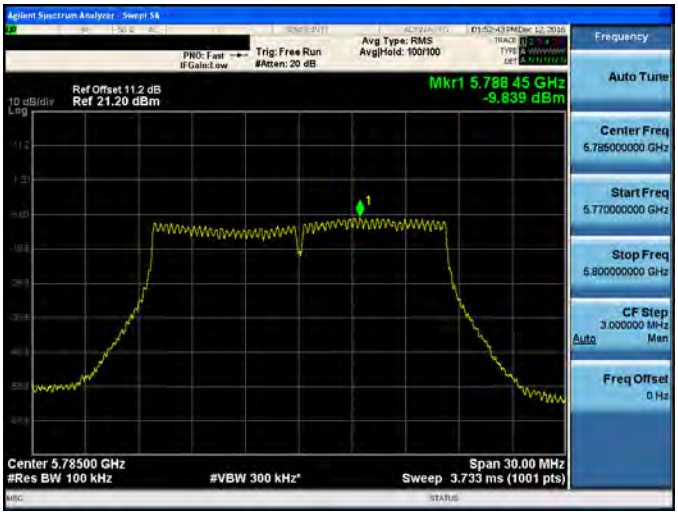
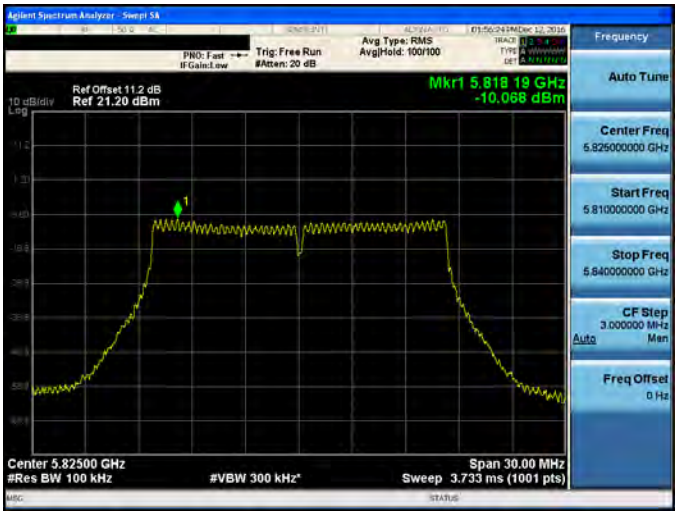
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-1	
5190 MHz	
5230 MHz	

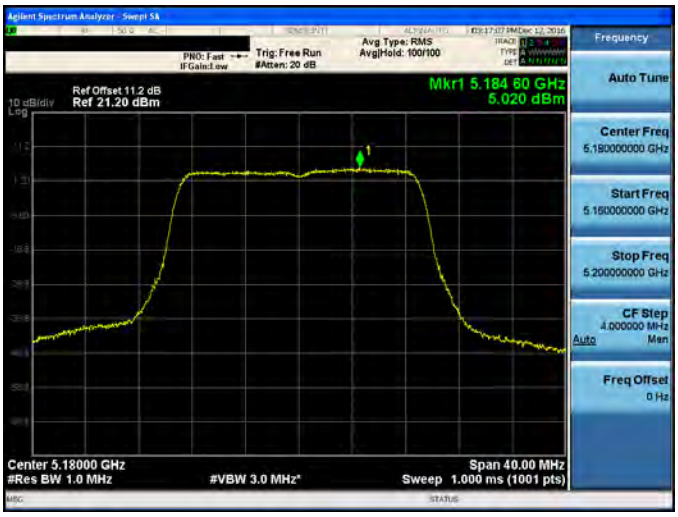
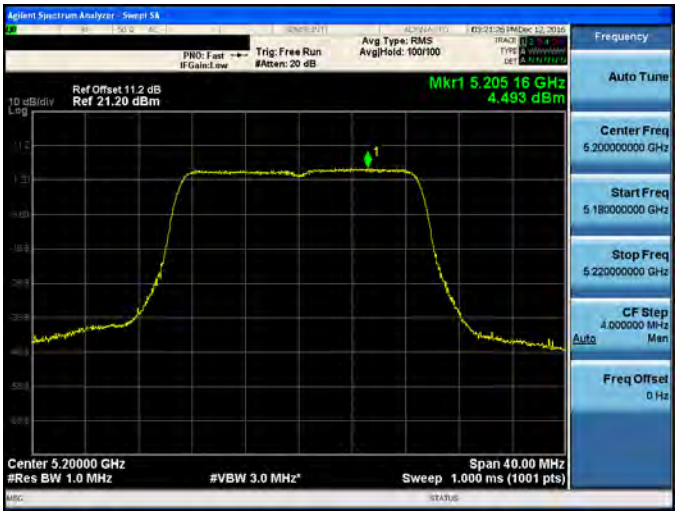
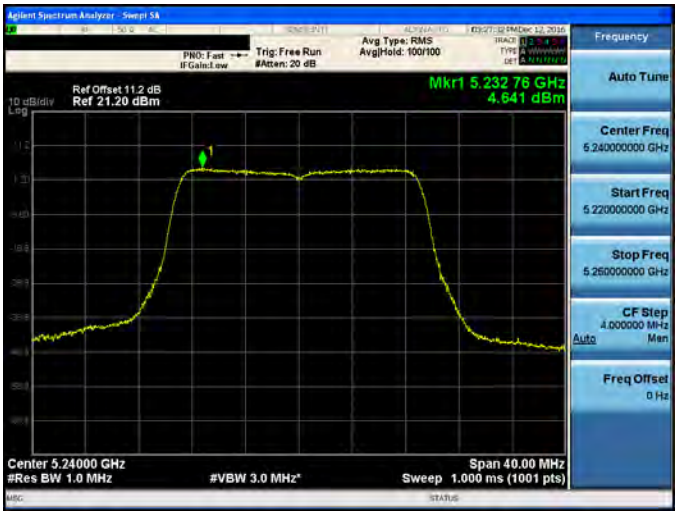
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-1	
5755 MHz	
5795 MHz	

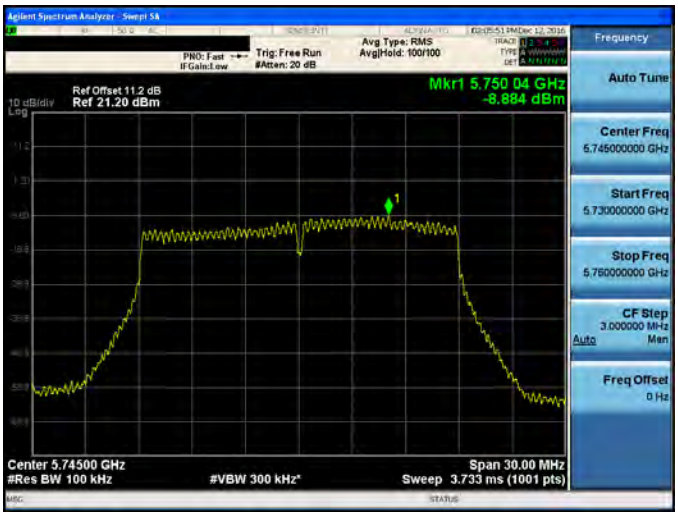
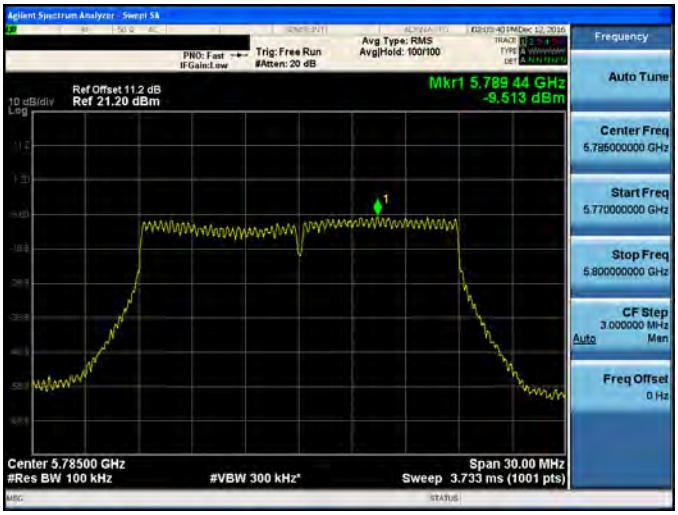
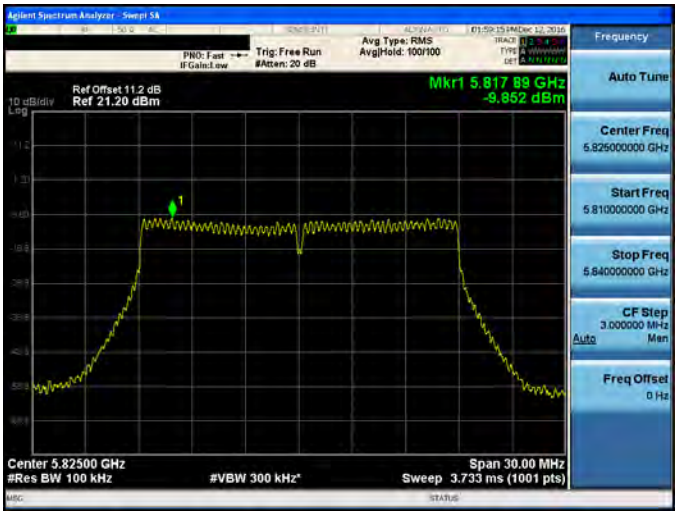
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-1	
5210 MHz	

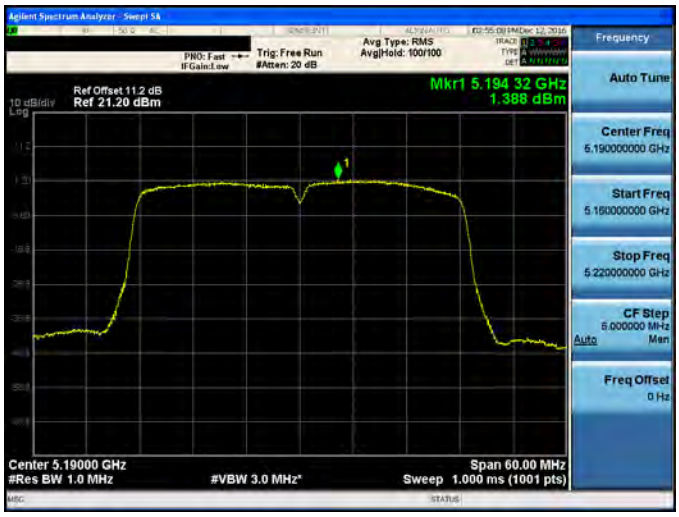
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-1	
5775 MHz	

Mode 2: IEEE 802.11a Link Mode	
ANT-2	
5180 MHz	
5200 MHz	
5240 MHz	

Mode 2: IEEE 802.11a Link Mode	
ANT-2	
5745 MHz	
5785 MHz	
5825 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-2	
5180 MHz	
5200 MHz	
5240 MHz	

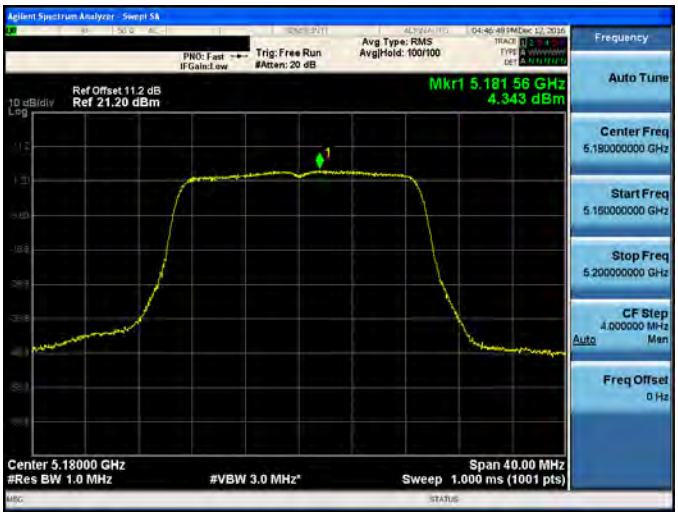
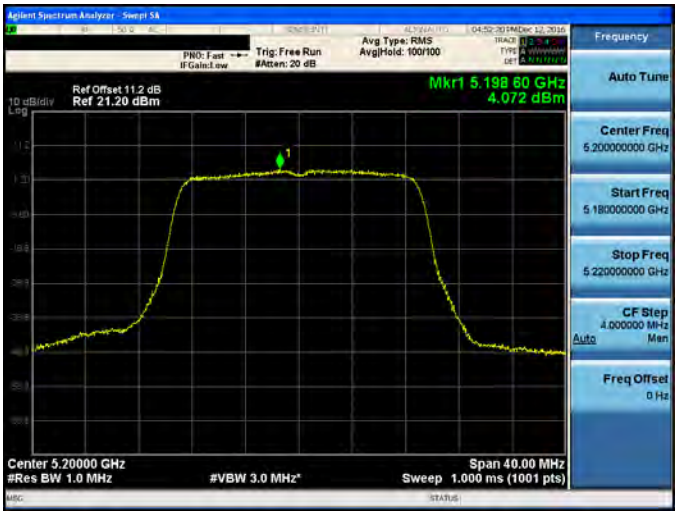
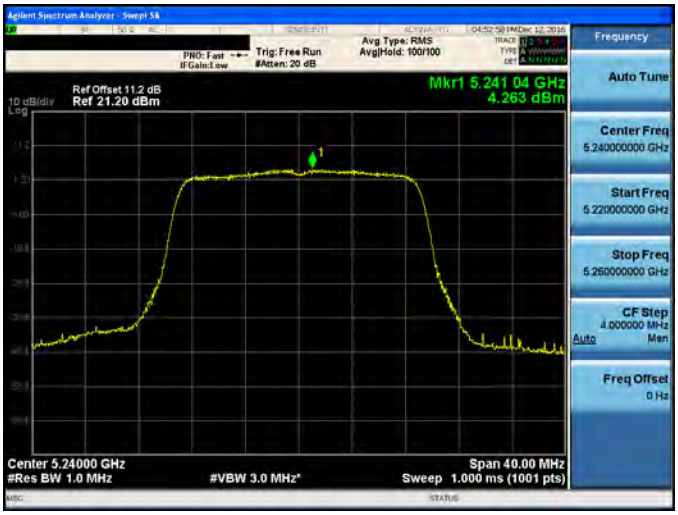
Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-2	
5745 MHz	
5785 MHz	
5825 MHz	

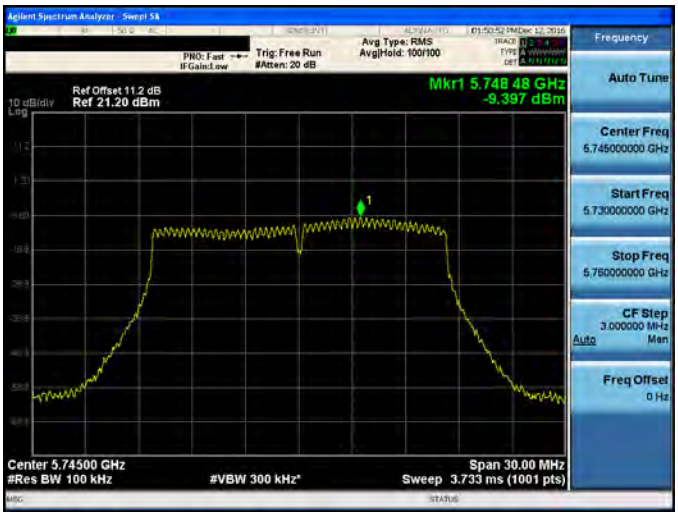
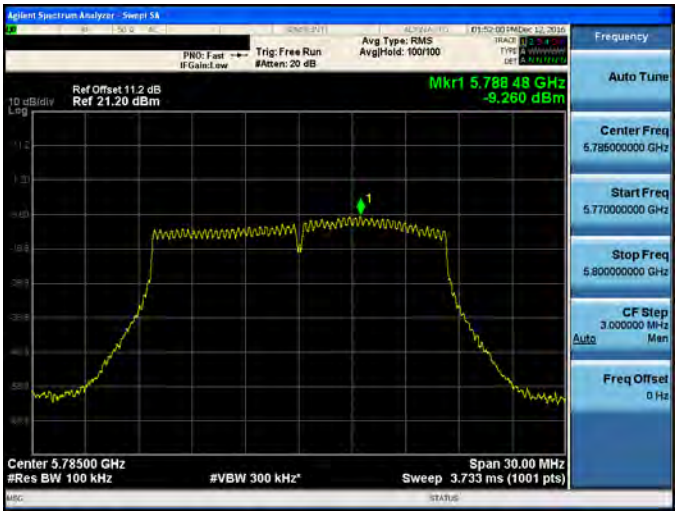
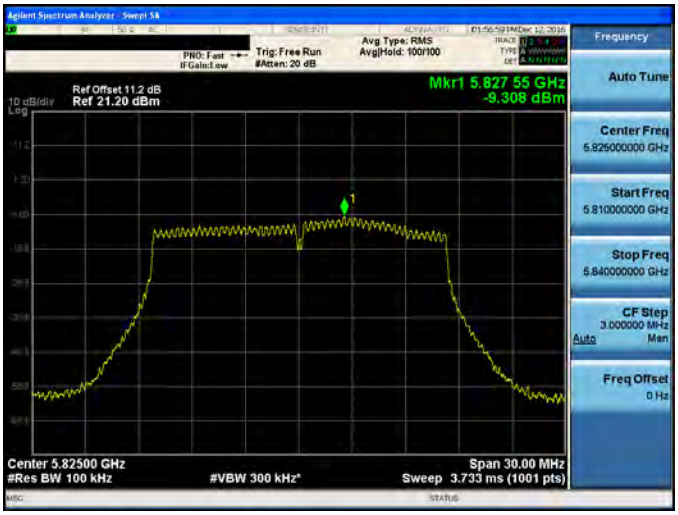
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-2	
5190 MHz	
5230 MHz	

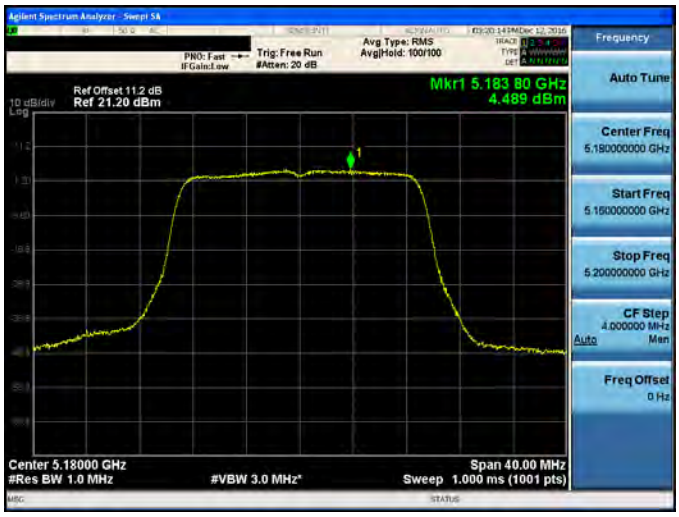
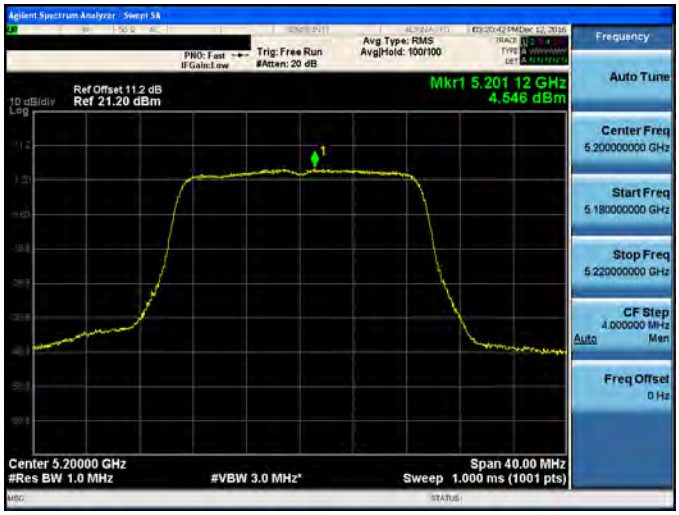
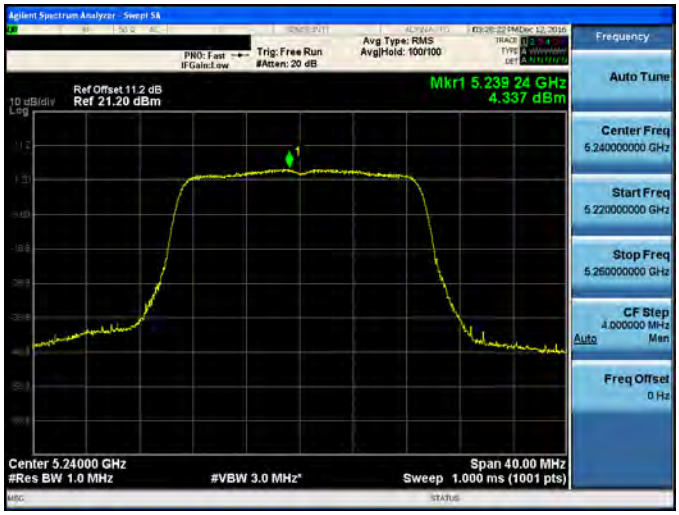
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-2	
5755 MHz	
5795 MHz	

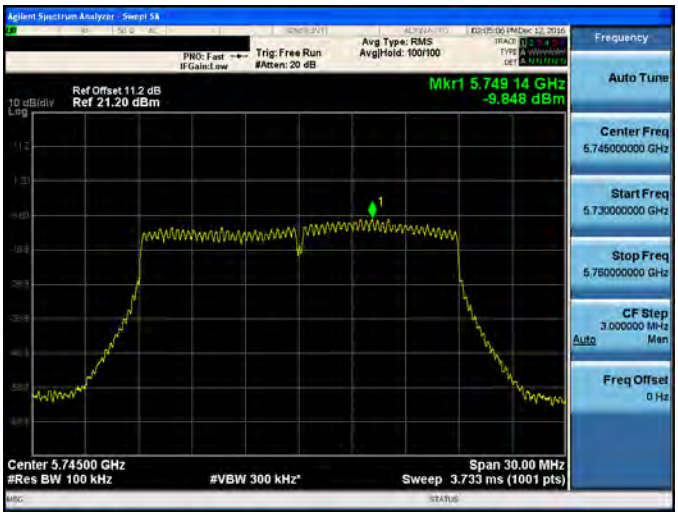
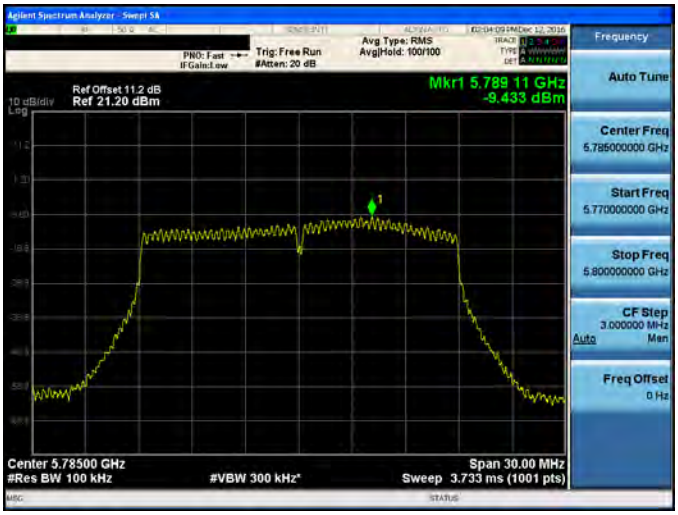
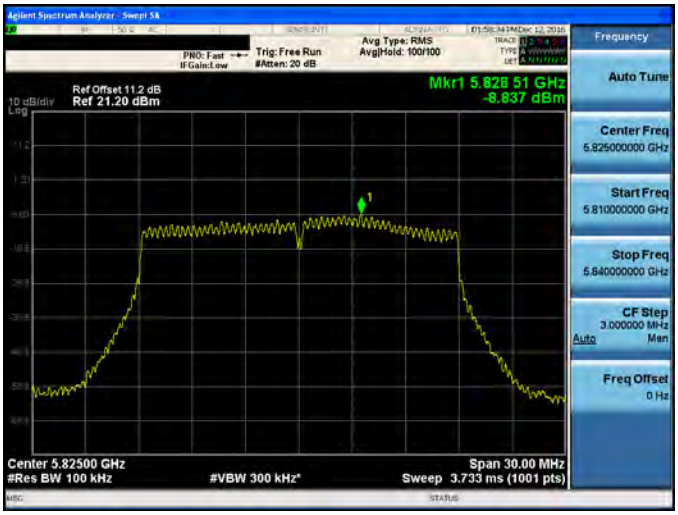
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-2	
5210 MHz	

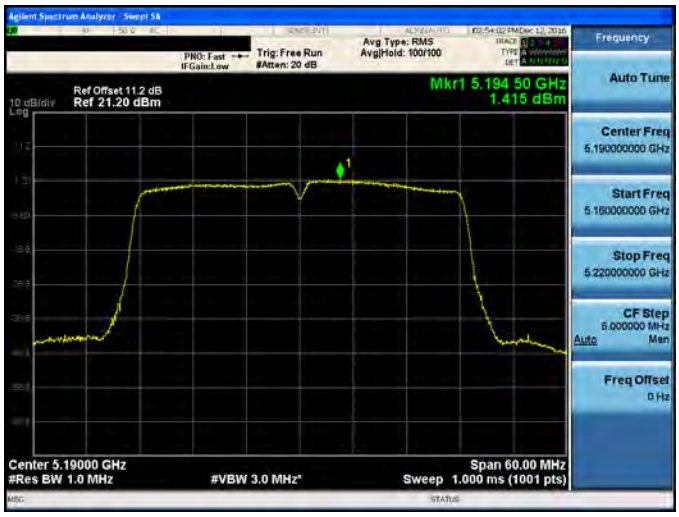
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-2	
5775 MHz	

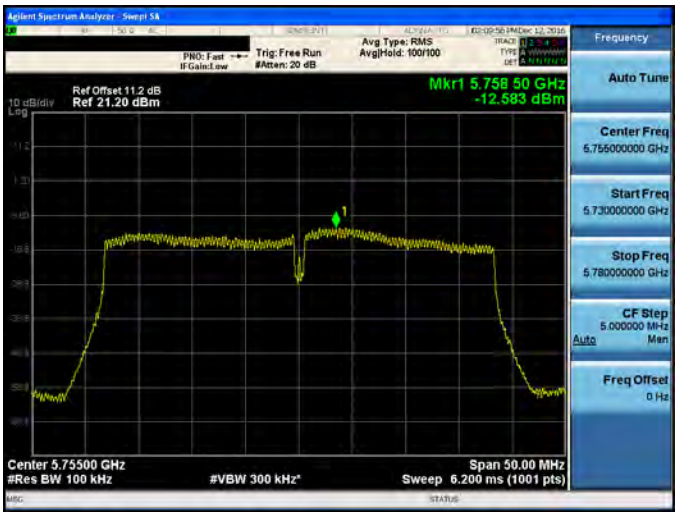
Mode 2: IEEE 802.11a Link Mode	
ANT-3	
5180 MHz	
5200 MHz	
5240 MHz	

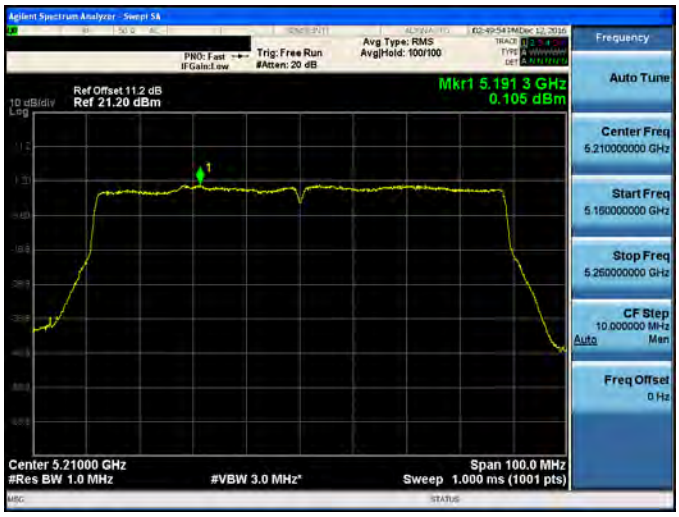
Mode 2: IEEE 802.11a Link Mode	
ANT-3	
5745 MHz	
5785 MHz	
5825 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-3	
5180 MHz	
5200 MHz	
5240 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-3	
5745 MHz	
5785 MHz	
5825 MHz	

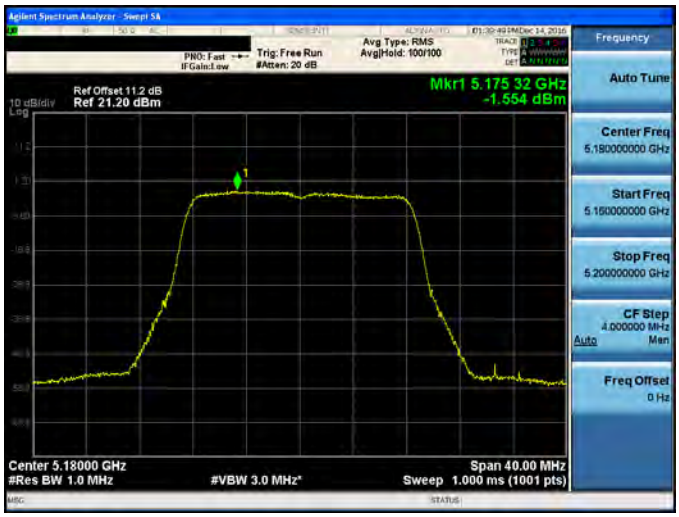
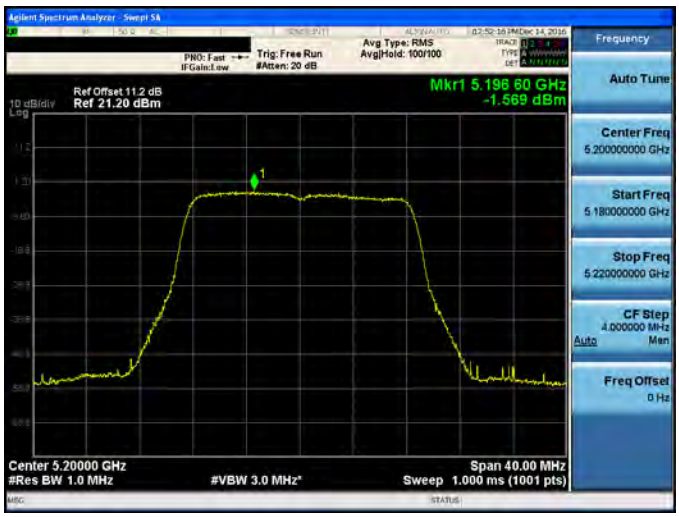
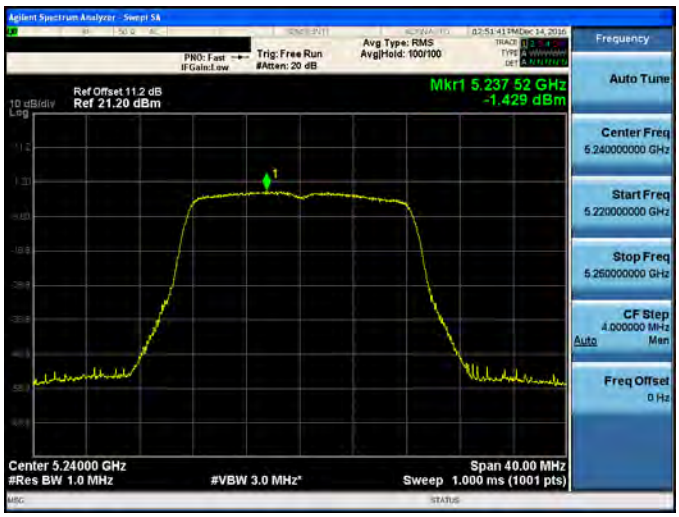
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-3	
5190 MHz	
5230 MHz	

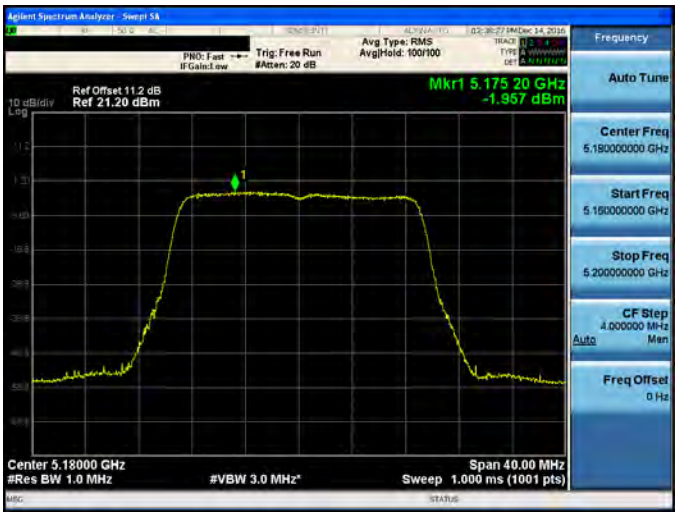
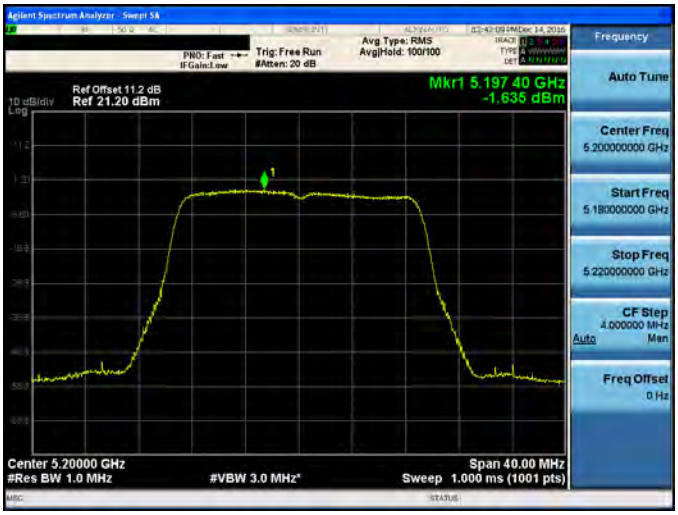
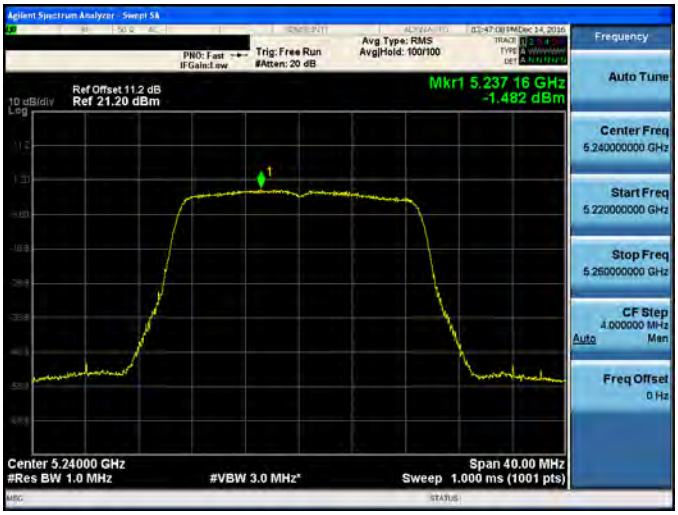
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-3	
5755 MHz	
5795 MHz	

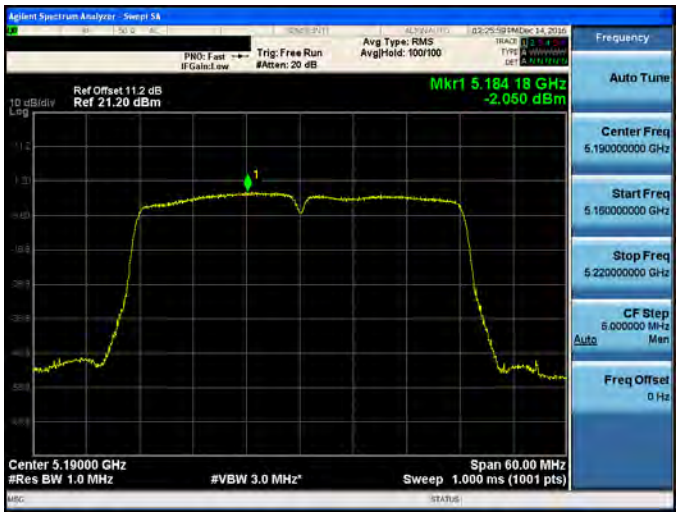
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-3	
5210 MHz	

Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-3	
5775 MHz	

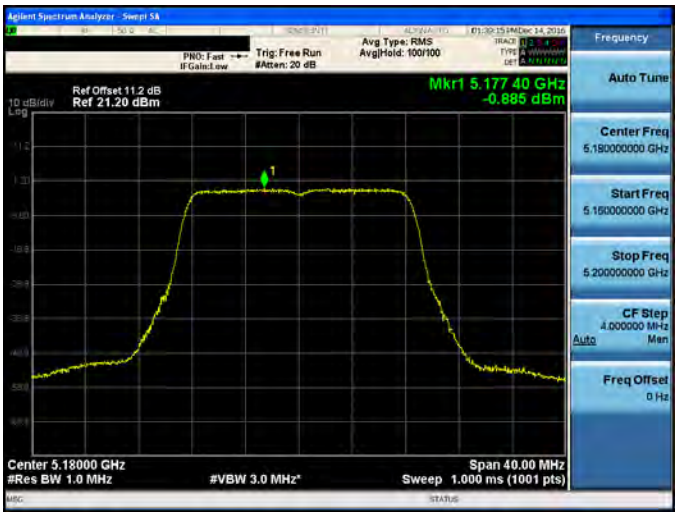
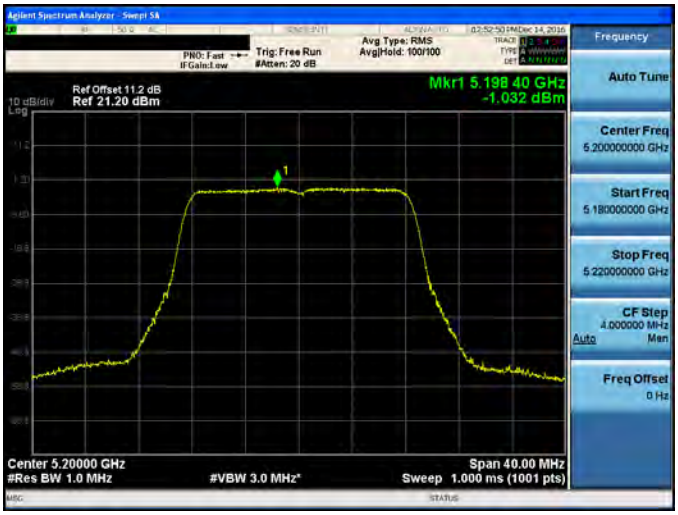
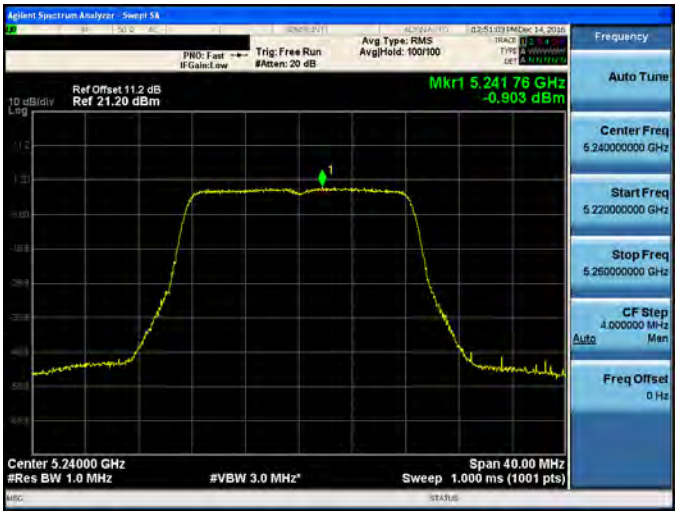
Module : QCA9990 (EW-7944MAC)_Client

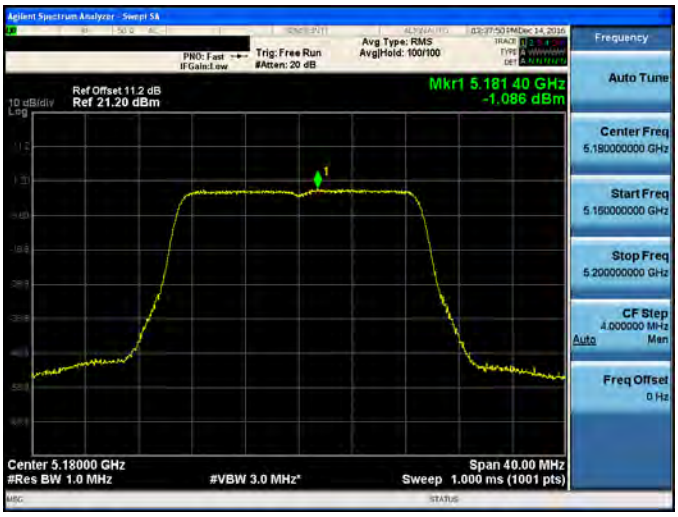
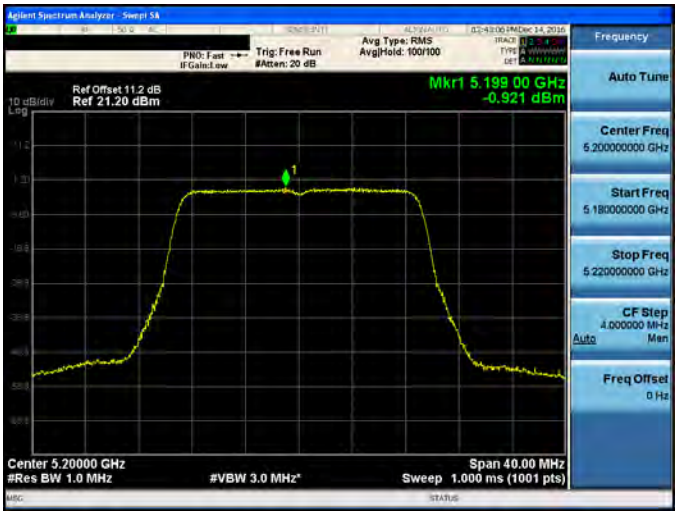
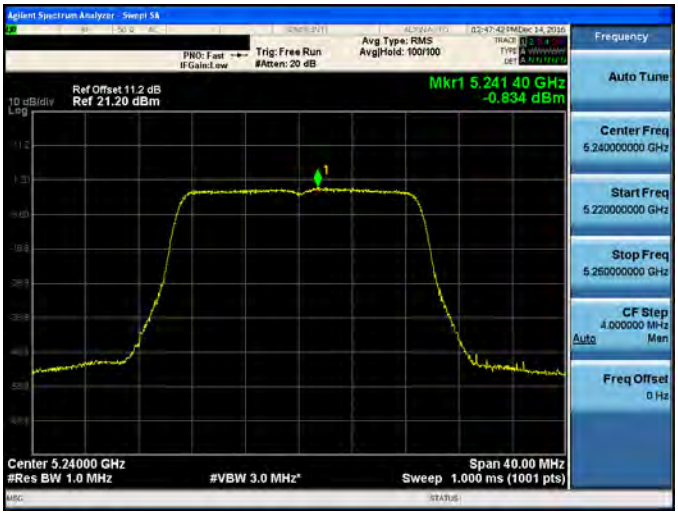
Mode 2: IEEE 802.11a Link Mode	
ANT-0	
5180 MHz	
5200 MHz	
5240 MHz	

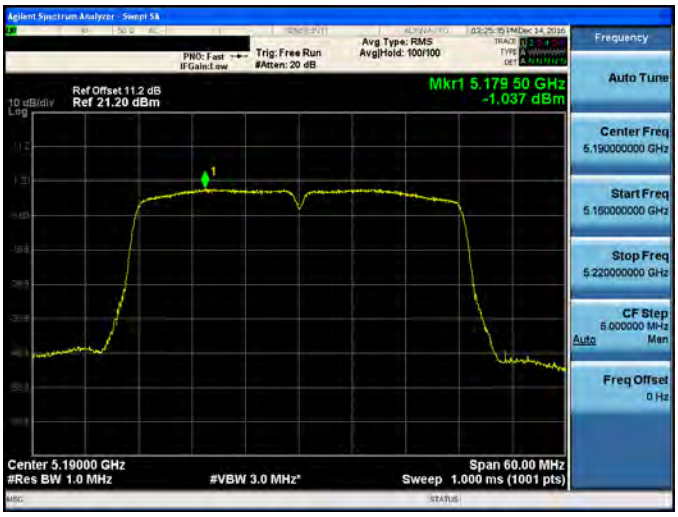
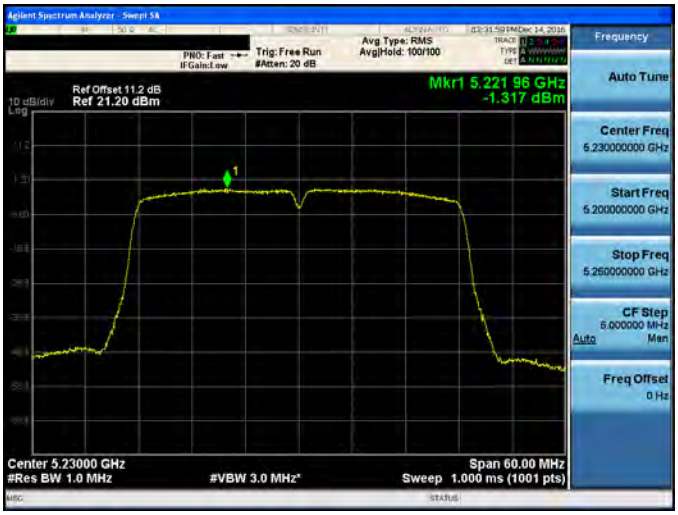
Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-0	
5180 MHz	
5200 MHz	
5240 MHz	

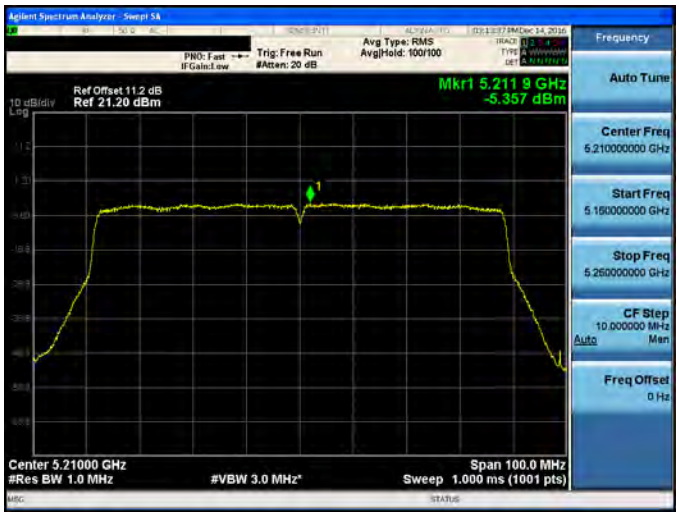
Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-0	
5190 MHz	
5230 MHz	

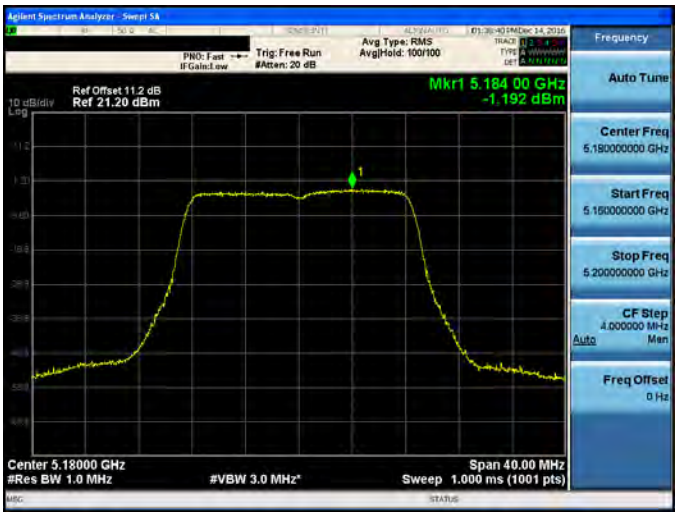
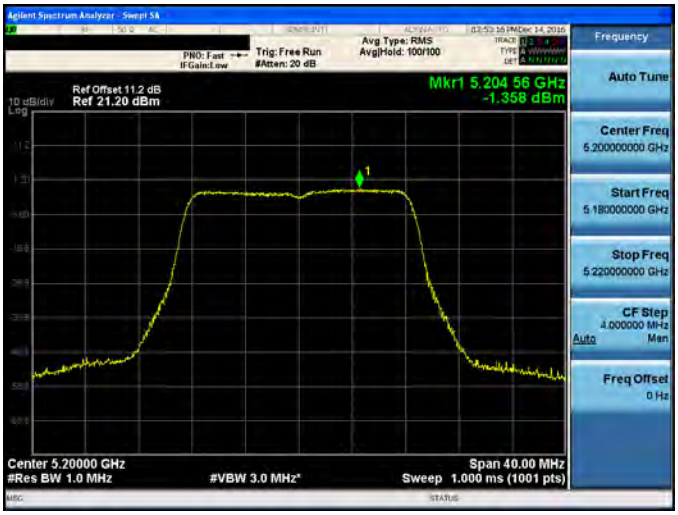
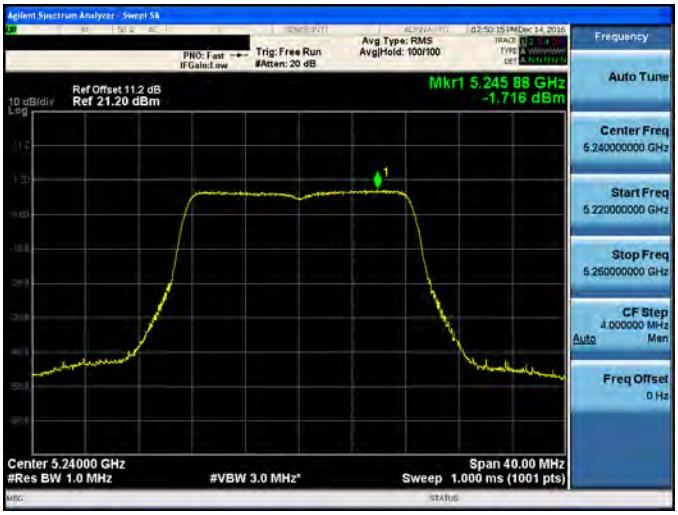
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-0	
5210 MHz	

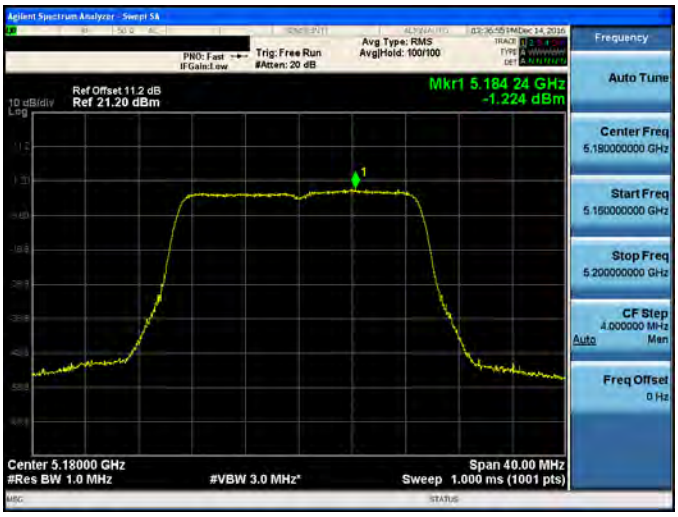
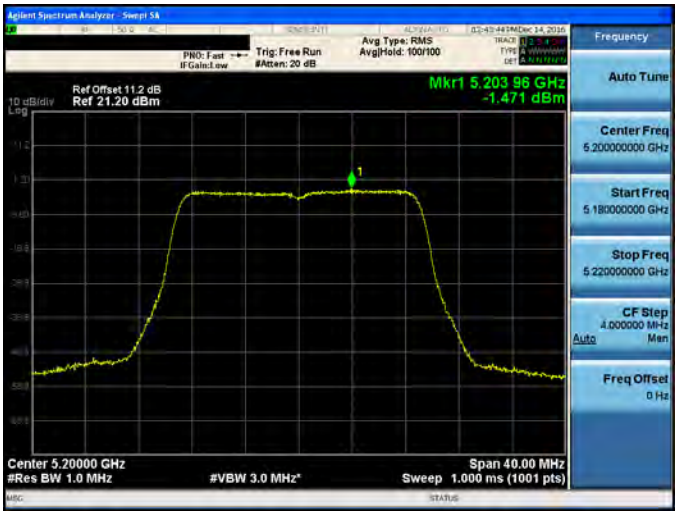
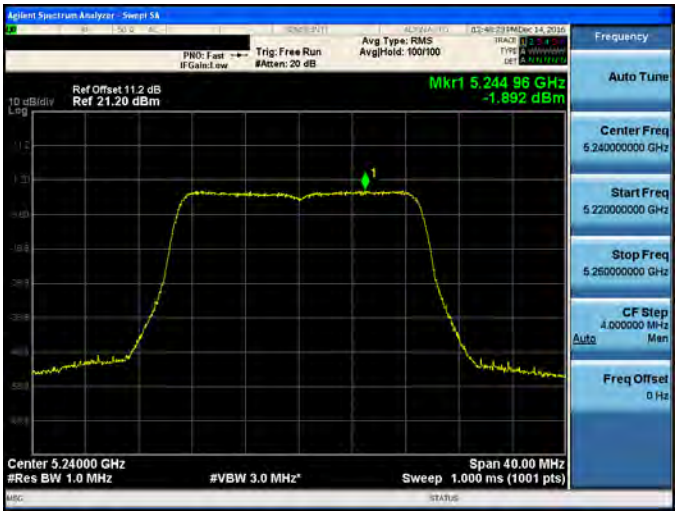
Mode 2: IEEE 802.11a Link Mode	
ANT-1	
5180 MHz	
5200 MHz	
5240 MHz	

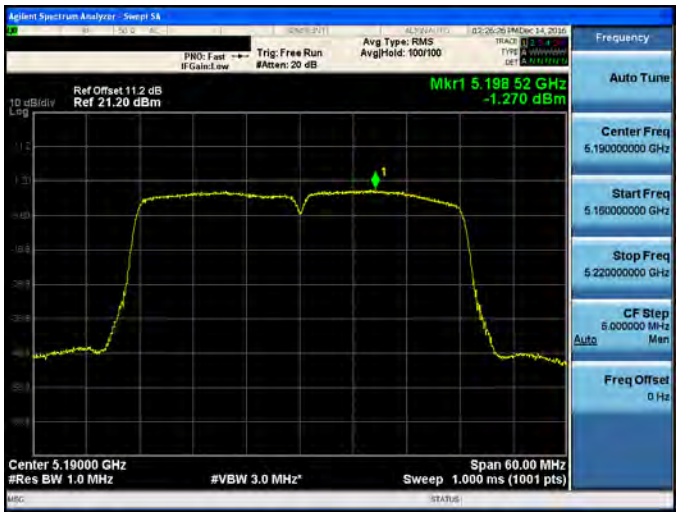
Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-1	
5180 MHz	
5200 MHz	
5240 MHz	

Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-1	
5190 MHz	
5230 MHz	

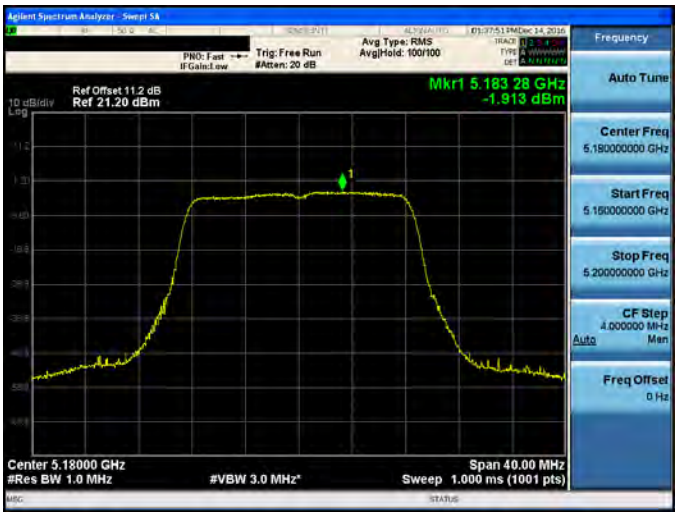
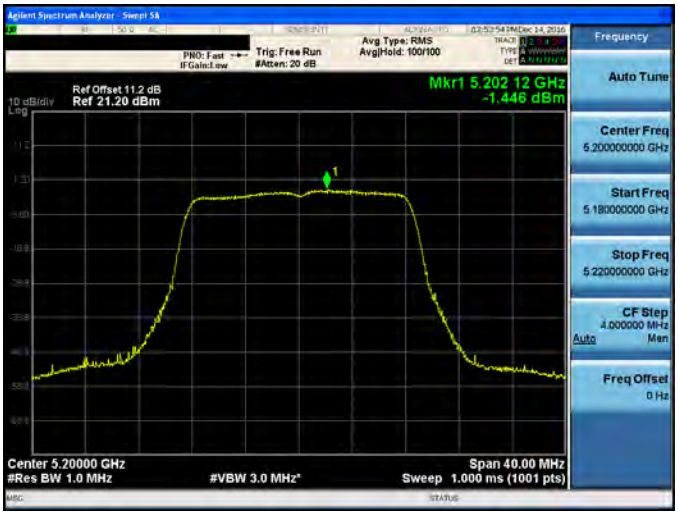
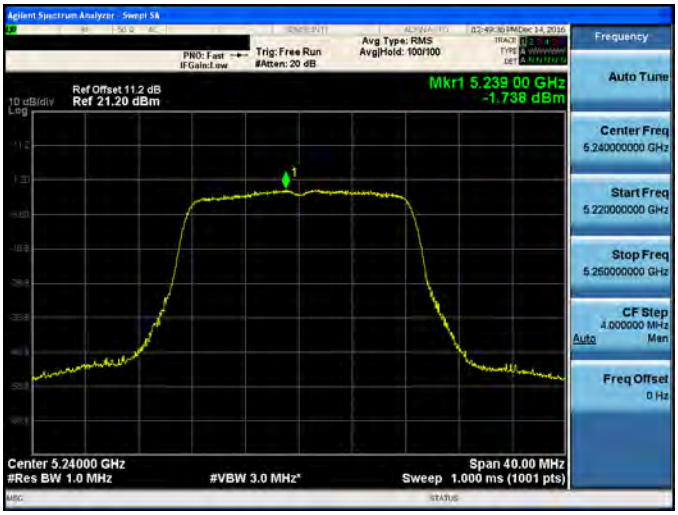
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-1	
5210 MHz	

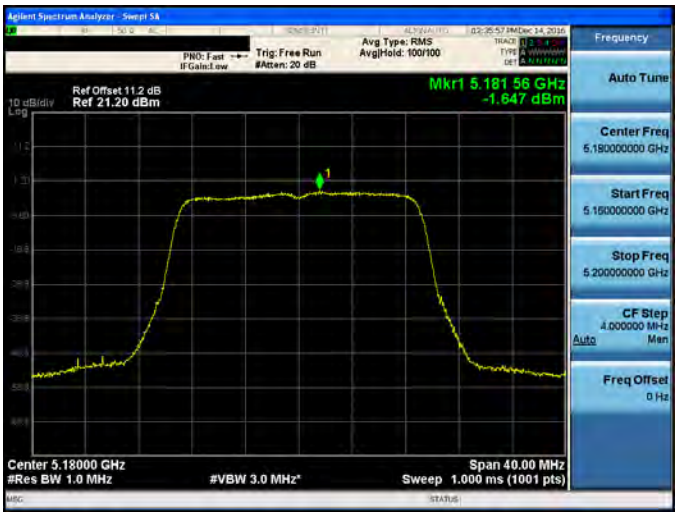
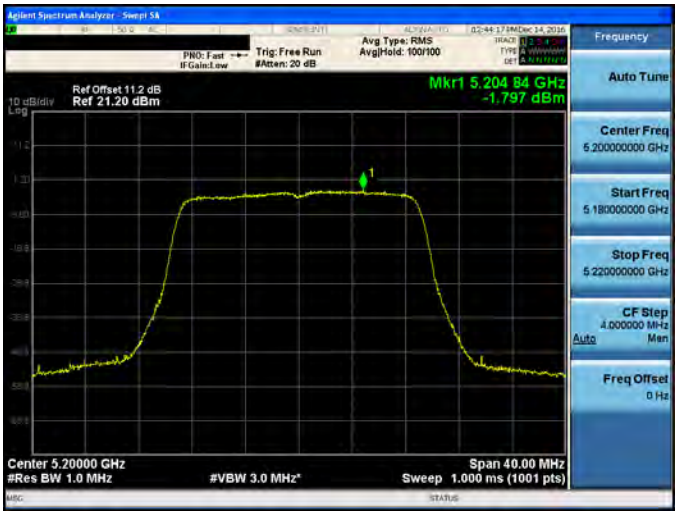
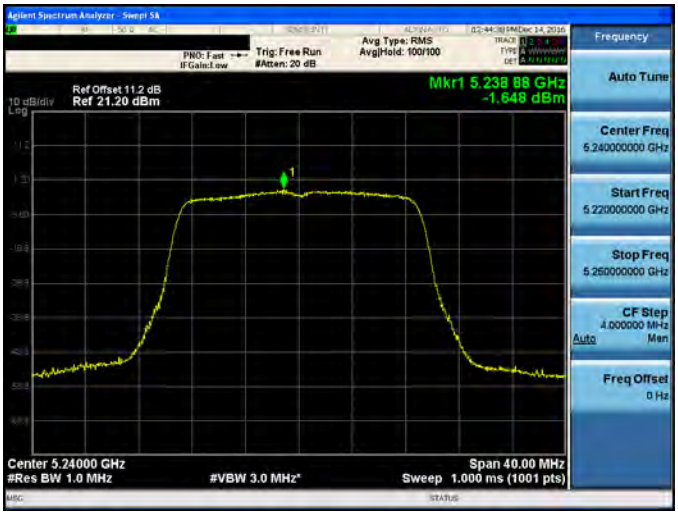
Mode 2: IEEE 802.11a Link Mode	
ANT-2	
5180 MHz	
5200 MHz	
5240 MHz	

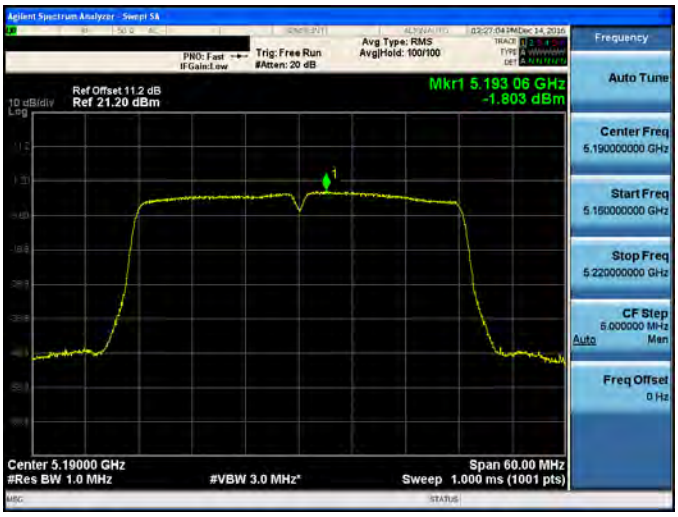
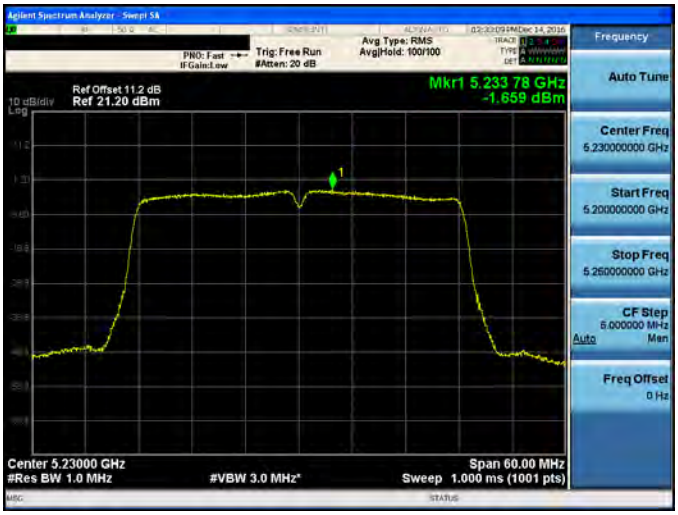
Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-2	
5180 MHz	
5200 MHz	
5240 MHz	

Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-2	
5190 MHz	
5230 MHz	

Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-2	
5210 MHz	

Mode 2: IEEE 802.11a Link Mode	
ANT-3	
5180 MHz	
5200 MHz	
5240 MHz	

Mode 3: IEEE 802.11ac 20MHz Link Mode	
ANT-3	
5180 MHz	
5200 MHz	
5240 MHz	

Mode 4: IEEE 802.11ac 40MHz Link Mode	
ANT-3	
5190 MHz	
5230 MHz	

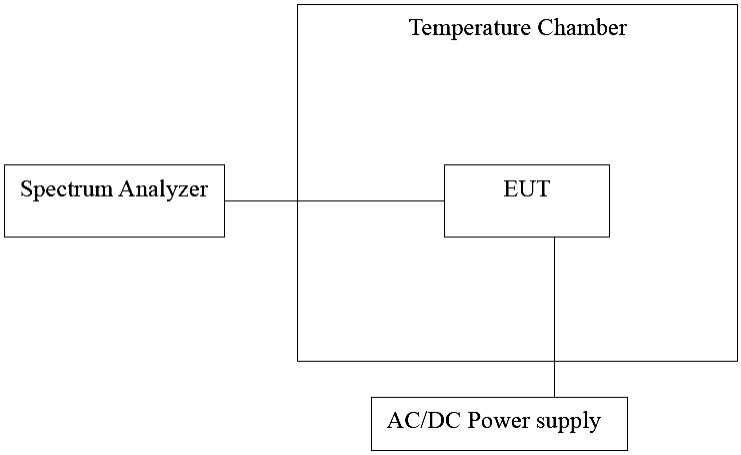
Mode 5: IEEE 802.11ac 80MHz Link Mode	
ANT-3	
5210 MHz	

4.8. Frequency Stability Measurement

■ **Limit**

Manufacturers 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 users manual.

■ **Test Setup**



■ **Test Instruments**

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4408B	MY45107753	08/08/2016	1 year
Temperature & Humidity Chamber	TAICHY	MHU-225LA	980729	04/18/2016	1 year
Test Site	ATL	TE05	TE05	N.C.R.	-----

Note: N.C.R. = No Calibration Request.

■ **Test Procedure**

1. The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

■ **Test Result**

Module : QCA9984 (EW-7955MAC)

Temperature Variations

Frequency	Temp. (°C)	Voltage (Vac)	Measured Freq. (MHz)	Delta Freq. (Hz)	Tolerance (ppm)	Result (Pass/Fail)
5200 MHz	-30	120	5200.0436	43600	8.385	Pass
	-20		5200.0419	41900	8.058	Pass
	-10		5200.0449	44900	8.635	Pass
	0		5200.0459	45900	8.827	Pass
	10		5200.04	40000	7.692	Pass
	20		5200.0465	46500	8.942	Pass
	30		5200.0565	56500	10.865	Pass
	40		5200.0513	51300	9.865	Pass
	50		5200.0471	47100	9.058	Pass
5785 MHz	-30	120	5785.0436	43600	7.537	Pass
	-20		5785.0436	43600	7.537	Pass
	-10		5785.0436	43600	7.537	Pass
	0		5785.0436	43600	7.537	Pass
	10		5785.0436	43600	7.537	Pass
	20		5785.0498	49800	8.608	Pass
	30		5785.0525	52500	9.075	Pass
	40		5785.0574	57400	9.922	Pass
	50		5785.0517	51700	8.937	Pass

Voltage Variations

Frequency	Temp. (°C)	Voltage (Vac)	Measured Freq. (MHz)	Delta Freq. (Hz)	Tolerance (ppm)	Result (Pass/Fail)
5200 MHz	20	138.00	5200.0453	45300	8.712	Pass
		120.00	5200.0465	46500	8.942	Pass
		102.00	5200.0557	55700	10.712	Pass
5785 MHz	20	138.00	5785.0486	48600	8.401	Pass
		120.00	5785.0498	49800	8.608	Pass
		102.00	5785.0565	56500	9.767	Pass

Note: The manufacturer's frequency stability specification is better then 20ppm.

Module : QCA9990 (EW-7944MAC)_Master

Temperature Variations

Frequency	Temp. (°C)	Voltage (Vac)	Measured Freq. (MHz)	Delta Freq. (Hz)	Tolerance (ppm)	Result (Pass/Fail)
5200 MHz	-30	120	5200.0412	41200	7.923	Pass
	-20		5200.0392	39200	7.538	Pass
	-10		5200.0432	43200	8.308	Pass
	0		5200.0402	40200	7.731	Pass
	10		5200.0392	39200	7.538	Pass
	20		5200.0432	43200	8.308	Pass
	30		5200.0502	50200	9.654	Pass
	40		5200.0492	49200	9.462	Pass
	50		5200.0452	45200	8.692	Pass
5785 MHz	-30	120	5785.042	42000	7.260	Pass
	-20		5785.037	37000	6.396	Pass
	-10		5785.039	39000	6.742	Pass
	0		5785.034	34000	5.877	Pass
	10		5785.038	38000	6.569	Pass
	20		5785.042	42000	7.260	Pass
	30		5785.043	43000	7.433	Pass
	40		5785.051	51000	8.816	Pass
	50		5785.047	47000	8.124	Pass

Voltage Variations

Frequency	Temp. (°C)	Voltage (Vac)	Measured Freq. (MHz)	Delta Freq. (Hz)	Tolerance (ppm)	Result (Pass/Fail)
5200 MHz	20	138.00	5200.0372	37200	7.154	Pass
		120.00	5200.0432	43200	8.308	Pass
		102.00	5200.0472	47200	9.077	Pass
5785 MHz	20	138.00	5785.041	41000	7.087	Pass
		120.00	5785.042	42000	7.260	Pass
		102.00	5785.046	46000	7.952	Pass

Note: The manufacturer's frequency stability specification is better then 20ppm.

Module : QCA9990 (EW-7944MAC)_Client

Temperature Variations

Frequency	Temp. (°C)	Voltage (Vac)	Measured Freq. (MHz)	Delta Freq. (Hz)	Tolerance (ppm)	Result (Pass/Fail)
5200 MHz	-30	120	5200.0412	41200	7.923	Pass
	-20		5200.0392	39200	7.538	Pass
	-10		5200.0432	43200	8.308	Pass
	0		5200.0402	40200	7.731	Pass
	10		5200.0392	39200	7.538	Pass
	20		5200.0432	43200	8.308	Pass
	30		5200.0502	50200	9.654	Pass
	40		5200.0492	49200	9.462	Pass
	50		5200.0452	45200	8.692	Pass

Voltage Variations

Frequency	Temp. (°C)	Voltage (Vac)	Measured Freq. (MHz)	Delta Freq. (Hz)	Tolerance (ppm)	Result (Pass/Fail)
5200 MHz	20	138.00	5200.0372	37200	7.154	Pass
		120.00	5200.0432	43200	8.308	Pass
		102.00	5200.0472	47200	9.077	Pass

Note: The manufacturer's frequency stability specification is better then 20ppm.

4.9. Antenna Requirement

■ **Limit**

For intentional device, according to 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.

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

■ **Antenna Connector Construction**

See section 2 – antenna information.

■ **Directional Gain Calculated**

For Maximum Conducted Output Power

Directional Gain = 10*log{[10^(G1/20)+10^(G2/20)+…+10^(Gn/20)]^2/NANT}

Module : QCA9984 (EW-7955MAC)		
Operate Freq. Band		Directional Gain (dBi)
IEEE 802.11ac 20MHz	U-NII Band I	13.02
	U-NII Band III	13.02
IEEE 802.11ac 40MHz	U-NII Band I	13.02
	U-NII Band III	13.02
IEEE 802.11ac 80MHz	U-NII Band I	13.02
	U-NII Band III	13.02
Module : QCA9990 (EW-7944MAC)		
Operate Freq. Band		Directional Gain (dBi)
IEEE 802.11ac 20MHz	U-NII Band I	12.02
	U-NII Band III	12.02
IEEE 802.11ac 40MHz	U-NII Band I	12.02
	U-NII Band III	12.02
IEEE 802.11ac 80MHz	U-NII Band I	12.02
	U-NII Band III	12.02

For Peak Power Spectral Density

Directional Gain = 10*log{[10^(G1/20)+10^(G2/20)+…+10^(Gn/20)]^2/NANT}

Module : QCA9984 (EW-7955MAC)		
Operate Freq. Band		Directional Gain (dBi)
IEEE 802.11a	U-NII Band I	13.02
	U-NII Band III	13.02
IEEE 802.11ac 20MHz	U-NII Band I	13.02
	U-NII Band III	13.02
IEEE 802.11ac 40MHz	U-NII Band I	13.02
	U-NII Band III	13.02
IEEE 802.11ac 80MHz	U-NII Band I	13.02
	U-NII Band III	13.02
Module : QCA9984 (EW-7955MAC)		
Operate Freq. Band		Directional Gain (dBi)
IEEE 802.11a	U-NII Band I	12.02
	U-NII Band III	12.02
IEEE 802.11ac 20MHz	U-NII Band I	12.02
	U-NII Band III	12.02
IEEE 802.11ac 40MHz	U-NII Band I	12.02
	U-NII Band III	12.02
IEEE 802.11ac 80MHz	U-NII Band I	12.02
	U-NII Band III	12.02