6. 6dB&26dB Bandwidth Test

6.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	N9030A	MY51380221	Oct.29, 14	1Year
2.	Attenuator (20dB)	Agilent	8491B	MY39262165	Apr. 28,14	1 Year
3.	RF Cable	Hubersuhner	SUCOFLEX102	28620/2	Apr. 28,14	1 Year

6.2. Limit

6dB Bandwidth should be not less than 500kHz

6.3. Test Procedure

6dB Bandwidth:
The transmitter output was connected to a spectrum analyzer, The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 300 KHz VBW for signal width below 20MHz and 300KHz RBW ,1MHz VBW for Above 20MHz signal Bandwidth.

26dB Bandwidth:
The transmitter output was connected to a spectrum analyzer, The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 300 KHz VBW The 26dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 26dB.

6.4. Test Results

U-NII 5180-5240MHz Band:
6dB bandwidth

EUT: Complex Set-Top Box		
M/N: P2571		
Test date: 2014-12-20	Pressure: 101.1±1.0 kpa	Humidity: 49.7±3.0%
Tested by: Kobe_Huang	Test site: RF site	Temperature:22.4±0.6 ℃

Test Mode	CH	6dB bandwidth（MHz）		Limit (KHz)
		ANT1	ANT2	
11a	CH36	16.56	16.37	＞500kHz
	CH40	16.44	16.36	＞500kHz
	CH48	16.39	16.37	＞500kHz
11n HT20	CH36	17.60	17.61	＞500kHz
	CH40	17.59	17.60	＞500kHz
	CH48	17.62	17.60	＞500kHz
11n HT40	CH38	36.42	36.37	＞500kHz
	CH46	36.49	36.46	＞500kHz
11ac VHT20	CH36	17.59	17.60	＞500kHz
	CH40	17.60	17.61	＞500kHz
	CH48	17.60	17.61	＞500kHz
11ac VHT40	CH38	36.38	36.30	＞500kHz
	CH46	36.51	36.43	＞500kHz
11ac VHT80	CH42	76.09	75.91	＞500kHz
Conclusion：PASS				

26dB bandwidth

EUT: Complex Set-Top Box		
M/N: P2571		
Test date: 2014-12-20	Pressure: 101.4±1.0 kpa	Humidity: 50.5±3.0%
Tested by: Kobe_Huang	Test site: RF site	Temperature:22.3±0.6 ℃

Test Mode	CH	26dB bandwidth (MHz)		Limit (KHz)
		ANT1	ANT2	
11a	CH36	24.02	20.78	N/A
	CH40	20.58	20.54	N/A
	CH48	21.05	20.77	N/A
11n HT20	CH36	21.04	21.04	N/A
	CH40	20.83	20.78	N/A
	CH48	20.83	20.89	N/A
11n HT40	CH38	39.69	39.58	N/A
	CH46	39.80	39.81	N/A
11ac VHT20	CH36	21.00	20.60	N/A
	CH40	20.81	20.84	N/A
	CH48	20.95	20.81	N/A
11ac VHT40	CH38	39.13	39.28	N/A
	CH46	39.45	39.20	N/A
11ac VHT80	CH42	80.22	79.91	N/A
Conclusion：PASS				

U-NII 5745-5825MHz Band:
6dB bandwidth

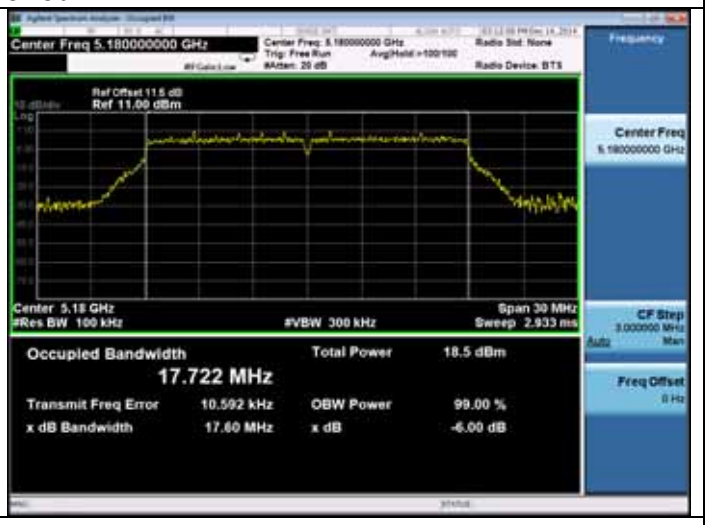
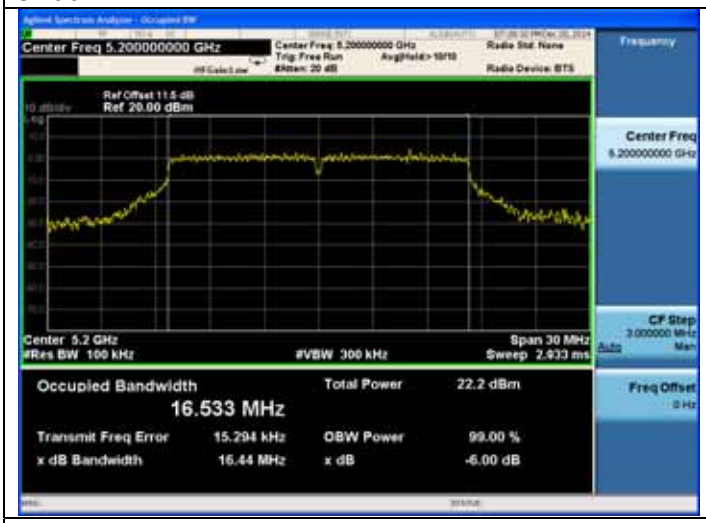
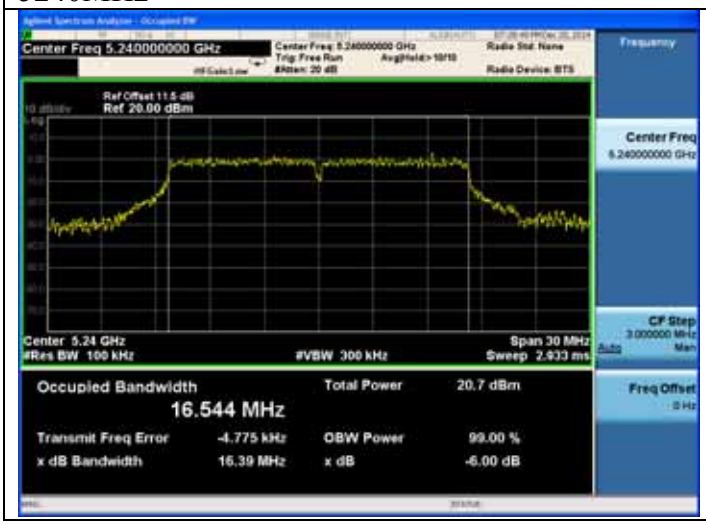
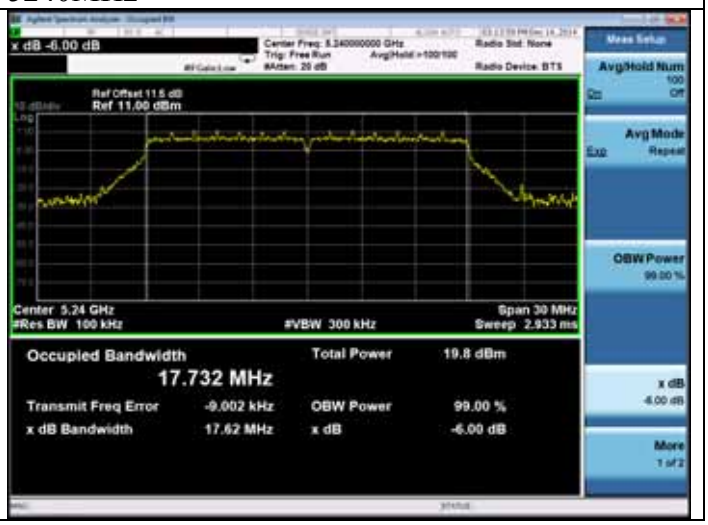
EUT: Complex Set-Top Box		
M/N: P2571		
Test date: 2014-12-20	Pressure: 101.1±1.0 kpa	Humidity: 49.7±3.0%
Tested by: Kobe_Huang	Test site: RF site	Temperature:22.3±0.6 ℃

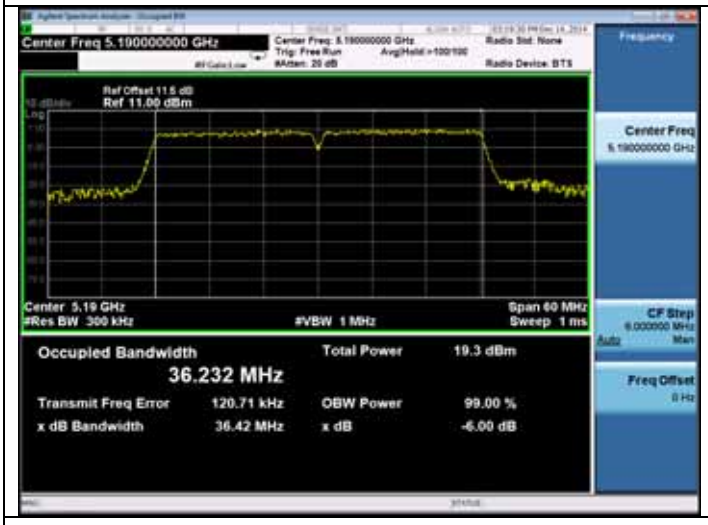
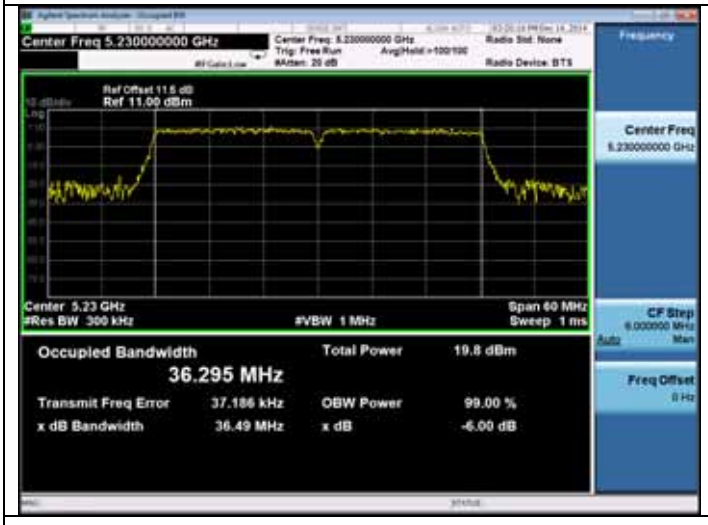
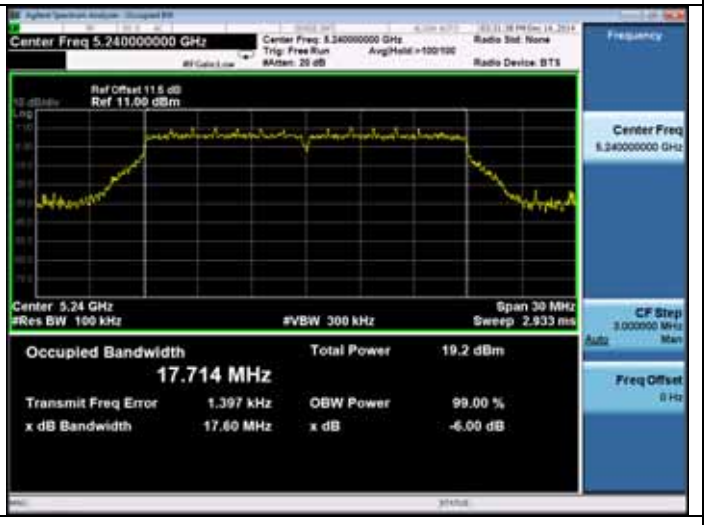
Test Mode	CH	6dB bandwidth（MHz）		Limit (KHz)
		ANT1	ANT2	
11a	CH149	16.42	16.36	＞500kHz
	CH157	16.54	16.35	＞500kHz
	CH165	17.67	16.36	＞500kHz
11n HT20	CH149	17.62	17.60	＞500kHz
	CH157	17.61	17.61	＞500kHz
	CH165	17.61	17.62	＞500kHz
11n HT40	CH151	36.42	36.59	＞500kHz
	CH159	36.40	36.54	＞500kHz
11ac VHT20	CH149	17.59	17.62	＞500kHz
	CH157	17.61	17.60	＞500kHz
	CH165	17.60	17.61	＞500kHz
11ac VHT40	CH151	36.34	36.59	＞500kHz
	CH159	36.42	36.54	＞500kHz
11ac VHT80	CH155	76.27	76.25	＞500kHz
Conclusion：PASS				

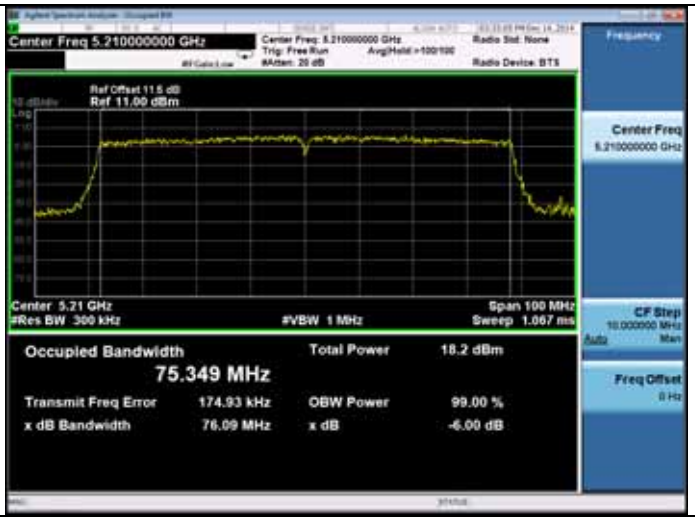
26dB bandwidth

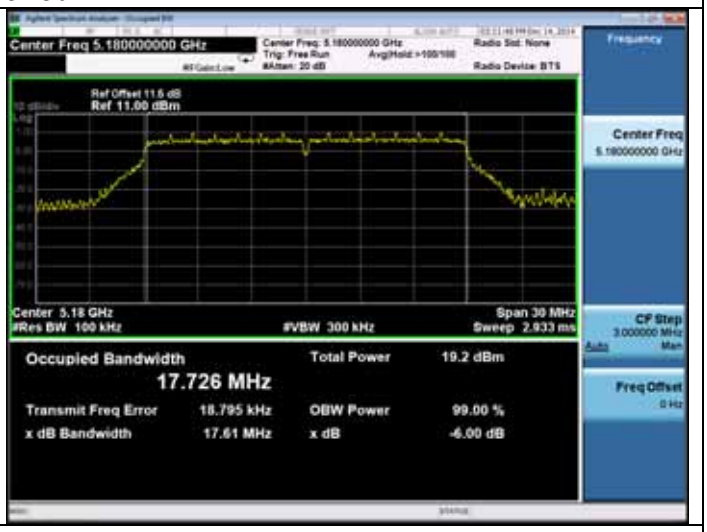
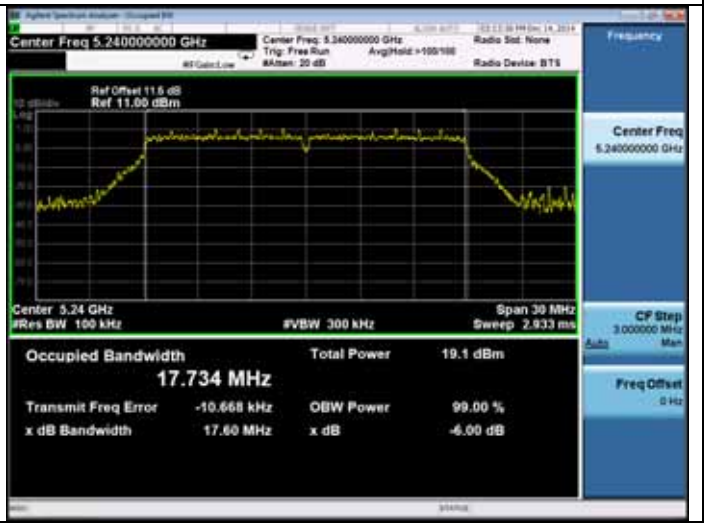
EUT: Complex Set-Top Box		
M/N: P2571		
Test date: 2014-12-14	Pressure: 101.9±1.0 kpa	Humidity: 51.5±3.0%
Tested by: Kobe_Huang	Test site: RF site	Temperature:22.8±0.6 ℃

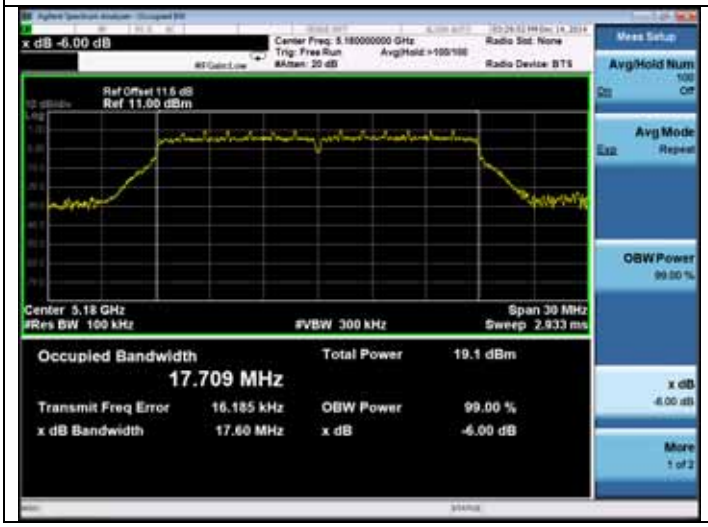
Test Mode	CH	26dB bandwidth（MHz）		Limit (KHz)
		ANT1	ANT2	
11a	CH149	21.98	20.80	N/A
	CH157	23.21	20.88	N/A
	CH165	20.63	20.74	N/A
11n HT20	CH149	21.41	21.60	N/A
	CH157	20.63	20.98	N/A
	CH165	21.06	21.34	N/A
11n HT40	CH151	55.09	54.69	N/A
	CH159	54.66	56.46	N/A
11ac VHT20	CH149	21.20	21.05	N/A
	CH157	20.76	20.79	N/A
	CH165	21.16	20.97	N/A
11ac VHT40	CH151	42.78	43.96	N/A
	CH159	39.48	39.56	N/A
11ac VHT80	CH155	80.56	79.93	N/A
Conclusion：PASS				

U-NII 5180-5240MHz Band:	
6dB bandwidth	
ANT 1	
11a	**11n HT20**
5180MHz	5180MHz
	
5200MHz	5200MHz
	
5240MHz	5240MHz
	

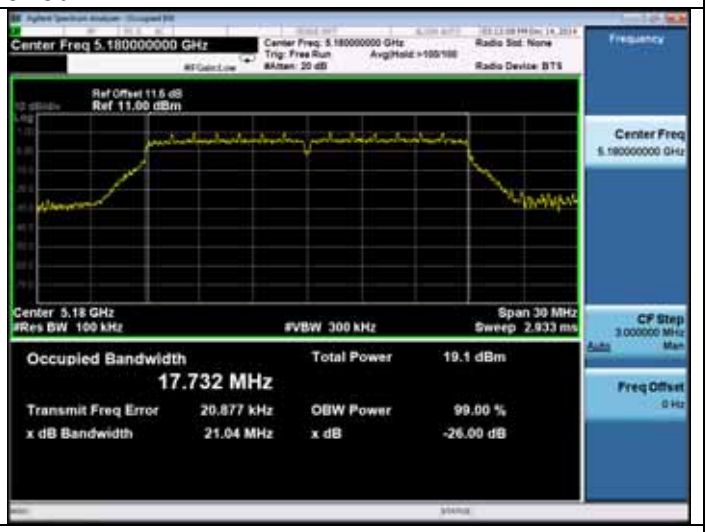
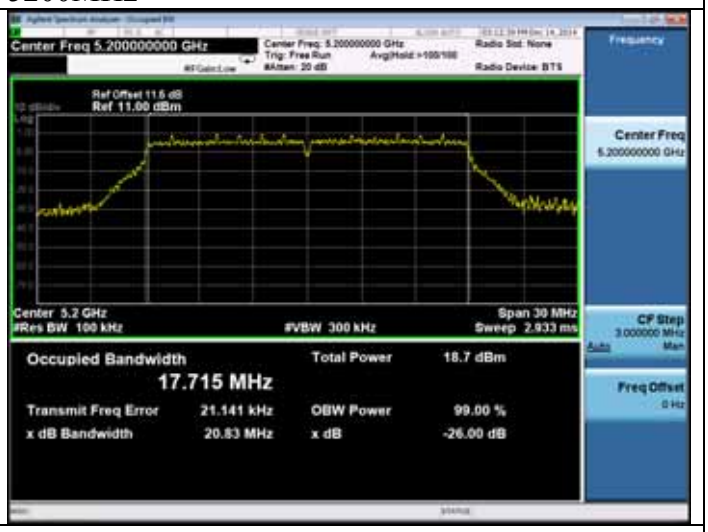
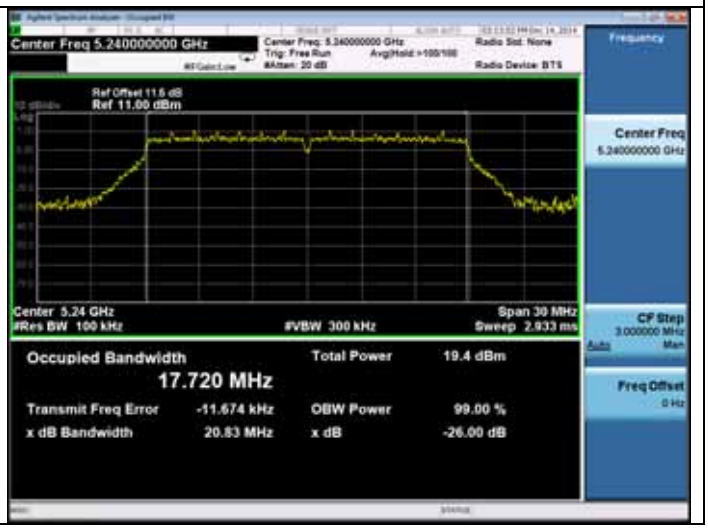
11n HT40	
5190MHz	5200MHz
	
5230MHz	5240MHz
	
11ac VHT20	**11ac VHT40**
5180MHz	5190MHz
	

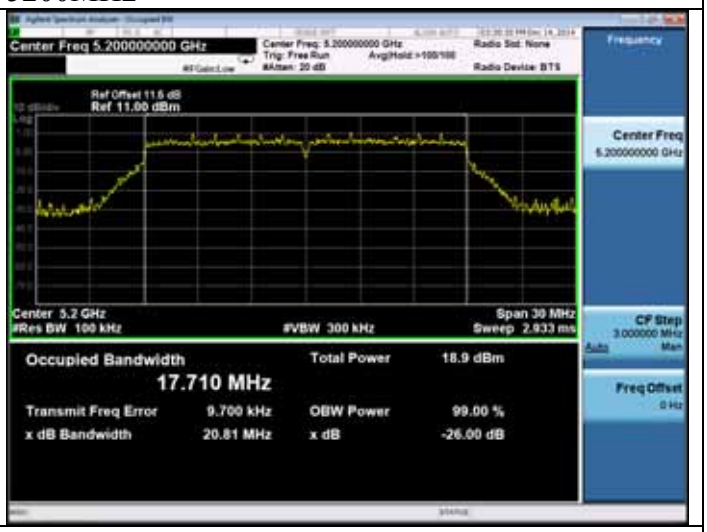
	11ac VHT80
5230MHz	5210MHz
	

U-NII 5180-5240MHz Band:	
6dB bandwidth	
ANT 2	
11a	**11n HT20**
5180MHz	5180MHz
	
5200MHz	5200MHz
	
5240MHz	5240MHz
	

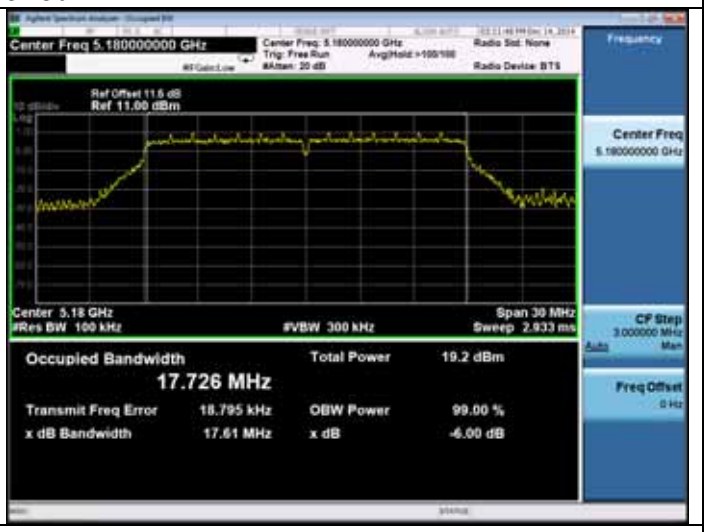
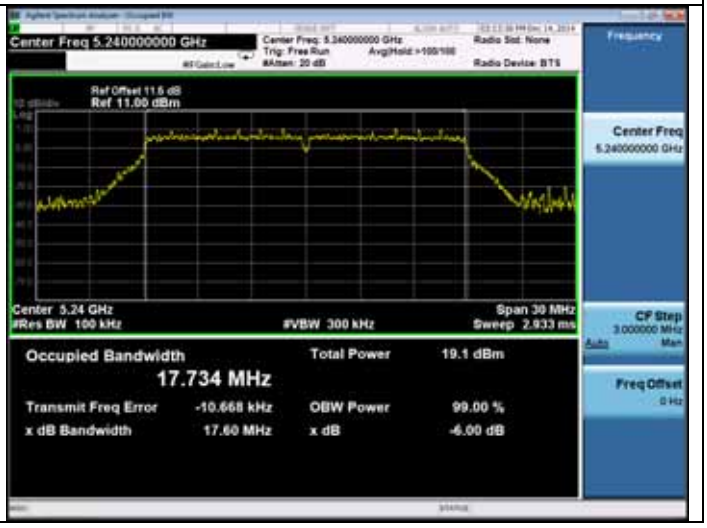
11n HT40	
5190MHz	5200MHz
	
5230MHz	5240MHz
	
11ac VHT20	**11ac VHT40**
5180MHz	5190MHz
	

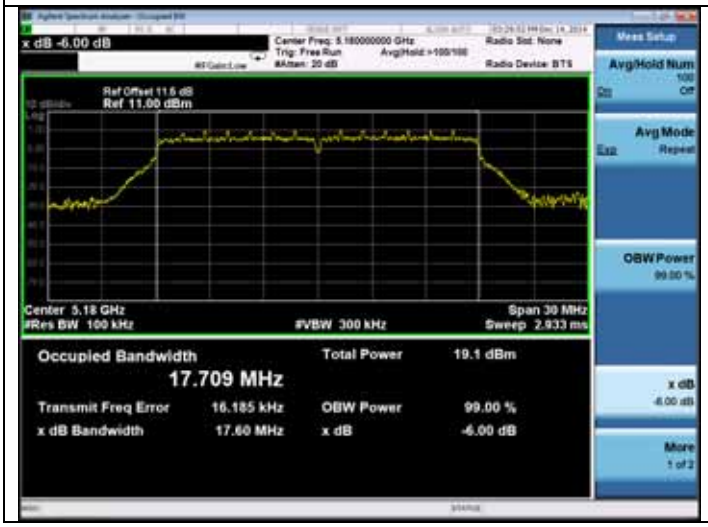
	11ac VHT80
5230MHz	5210MHz
	

U-NII 5180-5240MHz Band:	
26dB bandwidth	
ANT 1	
11a	**11n HT20**
5180MHz	5180MHz
	
5200MHz	5200MHz
	
5240MHz	5240MHz
	

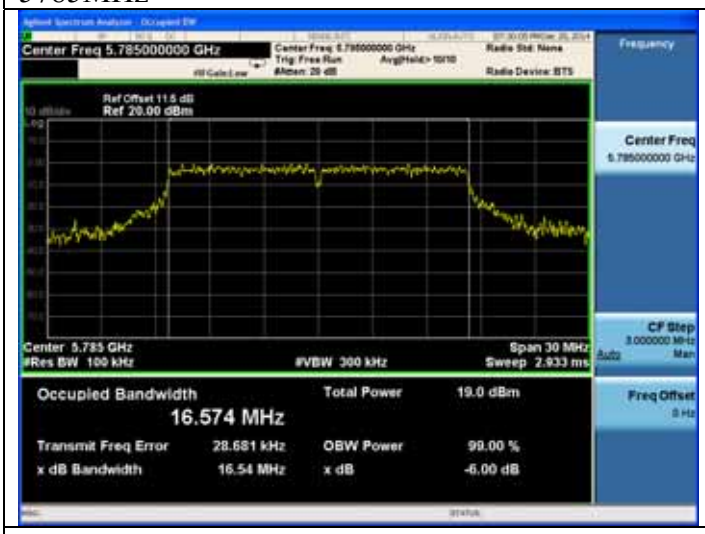
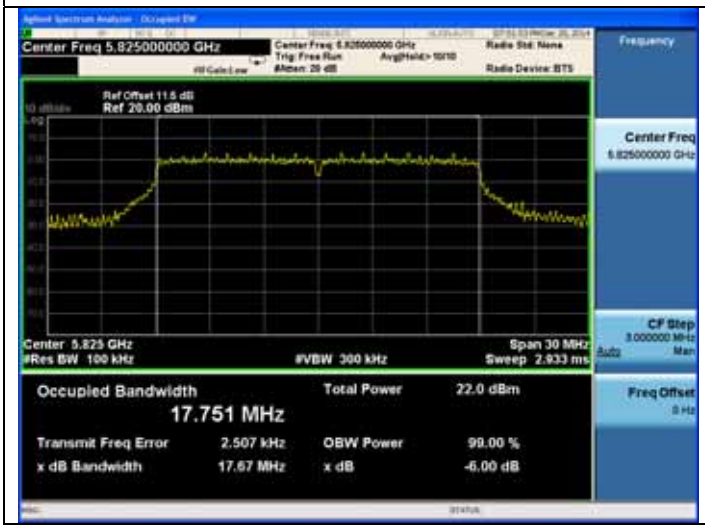
11n HT40	
5190MHz	5200MHz
	
5230MHz	5240MHz
	
11ac VHT20	**11ac VHT40**
5180MHz	5190MHz
	

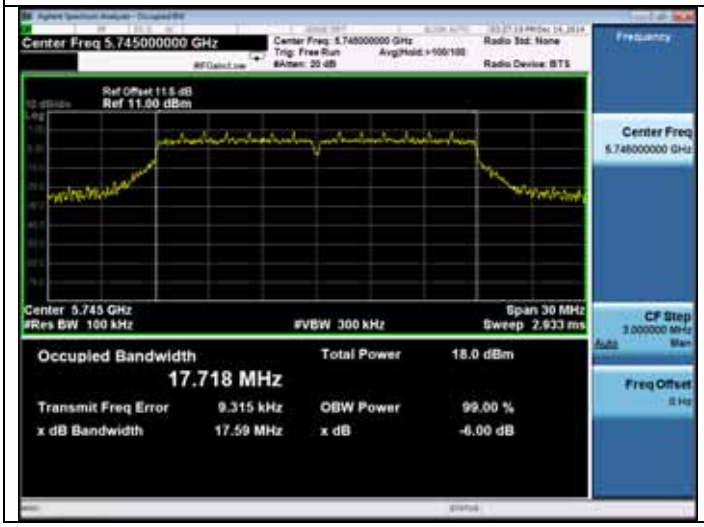
	11ac VHT80
5230MHz	5210MHz
	

U-NII 5180-5240MHz Band:	
26dB bandwidth	
ANT 2	
11a	**11n HT20**
5180MHz	5180MHz
	
5200MHz	5200MHz
	
5240MHz	5240MHz
	

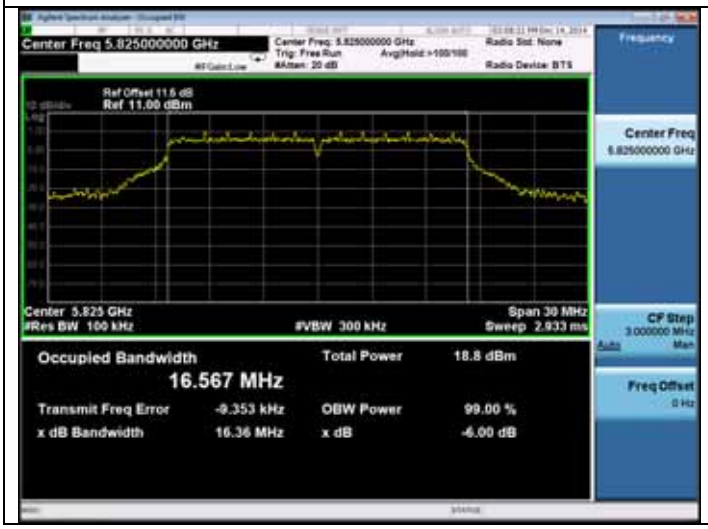
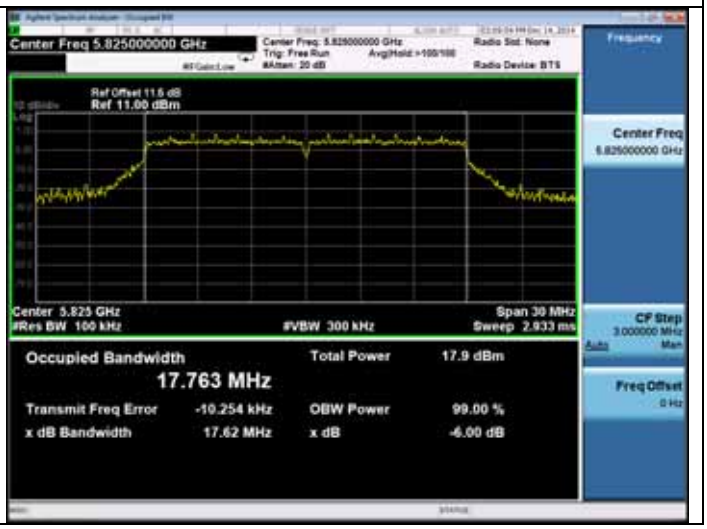
11n HT40	
5190MHz	5200MHz
	
5230MHz	5240MHz
	
11ac VHT20	**11ac VHT40**
5180MHz	5190MHz
	

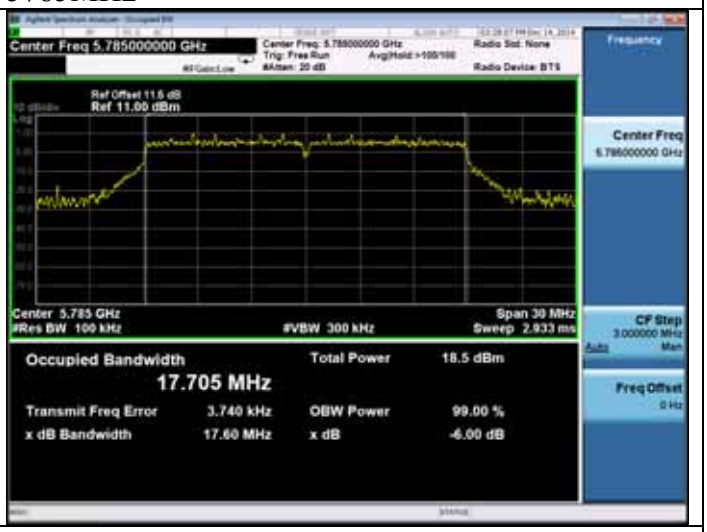
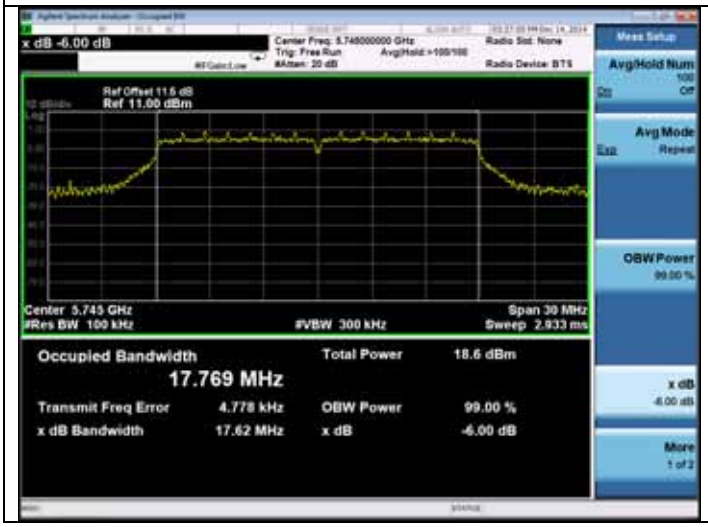
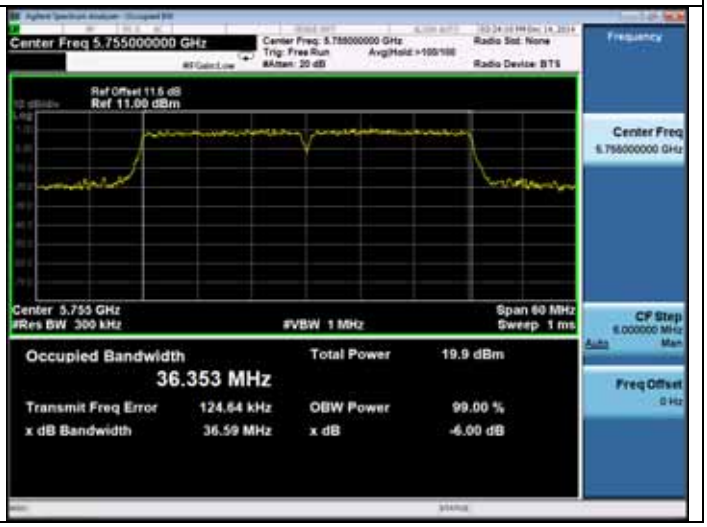
	11ac VHT80
5230MHz	5210MHz
	

U-NII 5745-5825MHz Band:	
6dB bandwidth	
ANT 1	
11a	**11n HT20**
5745MHz	5745MHz
	
5785MHz	5785MHz
	
5825MHz	5825MHz
	

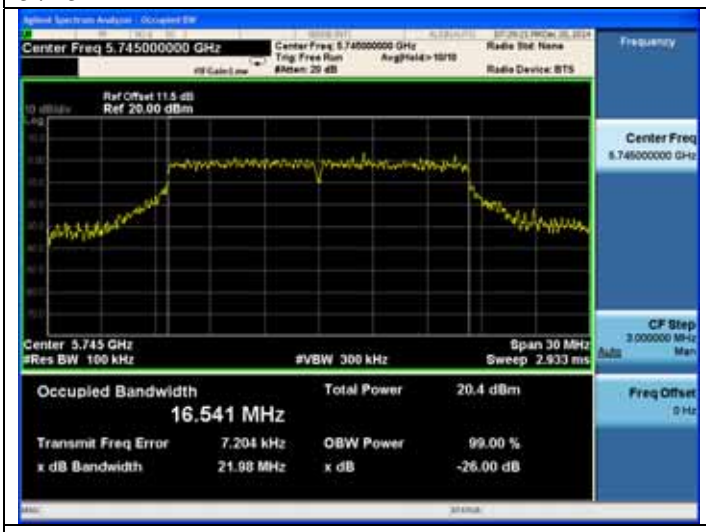
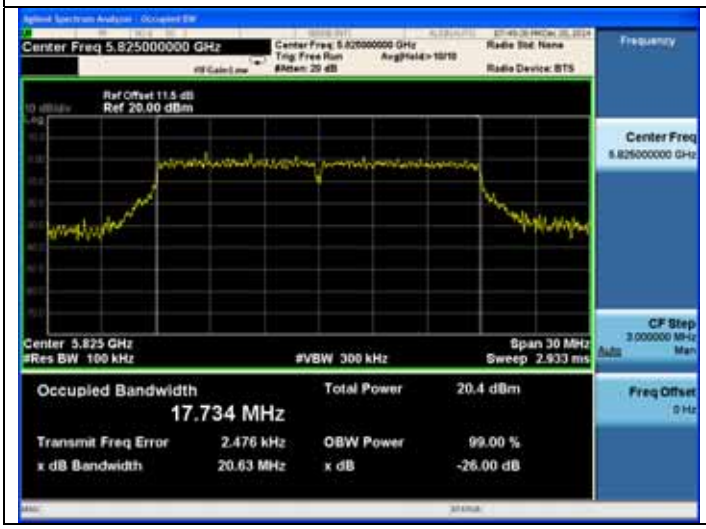
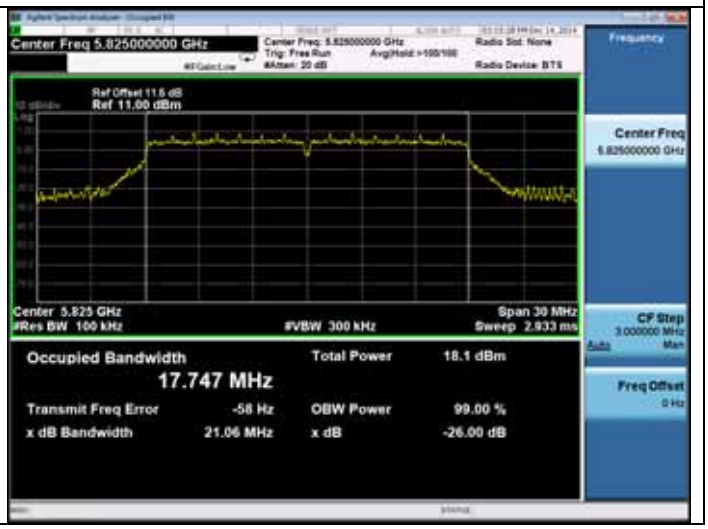
11n HT40	
5755MHz	5785MHz
	
5795MHz	5825MHz
	
11ac VHT20	**11ac VHT40**
5745MHz	5755MHz
	

	11ac VHT80
5795MHz	5775MHz
	

U-NII 5745-5825MHz Band:	
6dB bandwidth	
ANT 2	
11a	**11n HT20**
5745MHz	5745MHz
	
5785MHz	5785MHz
	
5825MHz	5825MHz
	

11n HT40	
5755MHz	5785MHz
	
5795MHz	5825MHz
	
11ac VHT20	**11ac VHT40**
5745MHz	5755MHz
	

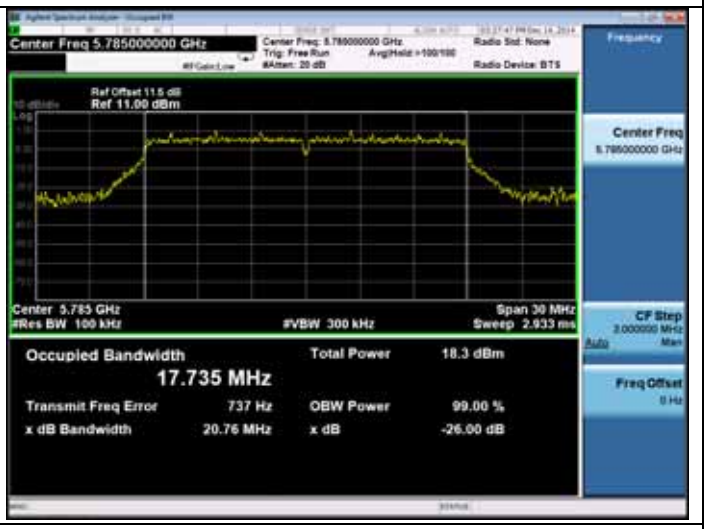
	11ac VHT80
5795MHz	5775MHz
	

U-NII 5745-5825MHz Band:	
26dB bandwidth	
ANT 1	
11a	**11n HT20**
5745MHz	5745MHz
	
5785MHz	5785MHz
	
5825MHz	5825MHz
	

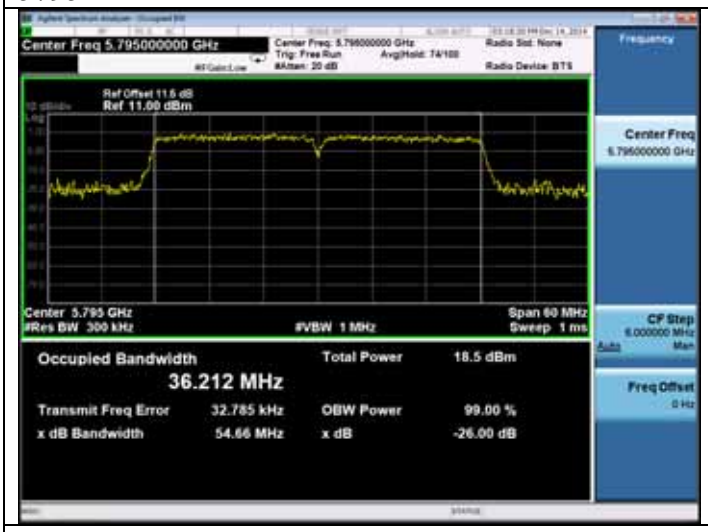
11n HT40

5755MHz

5785MHz



5795MHz



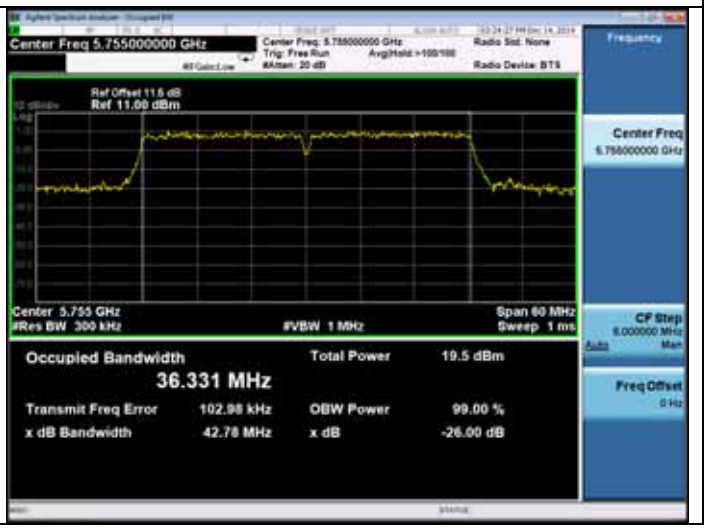
5825MHz

11ac VHT20

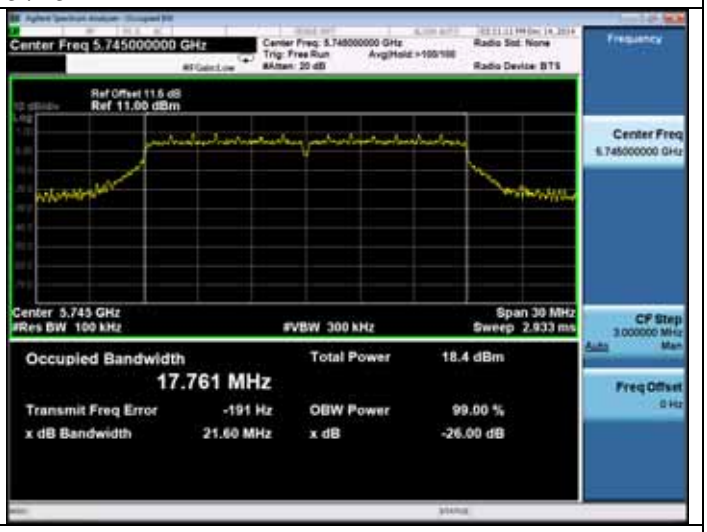
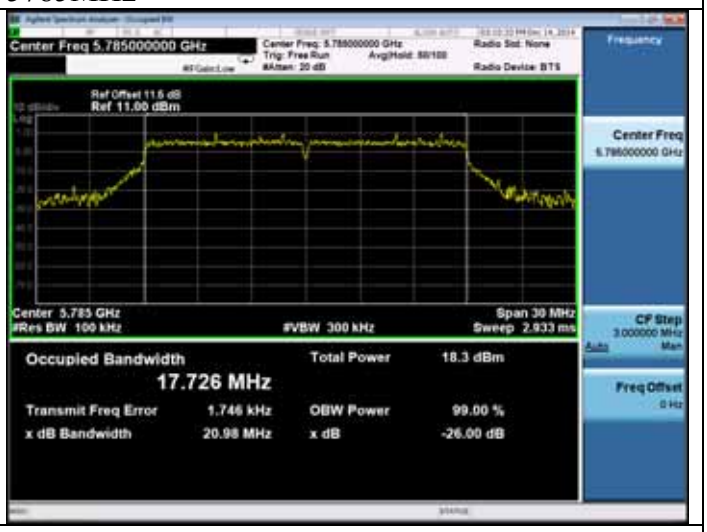
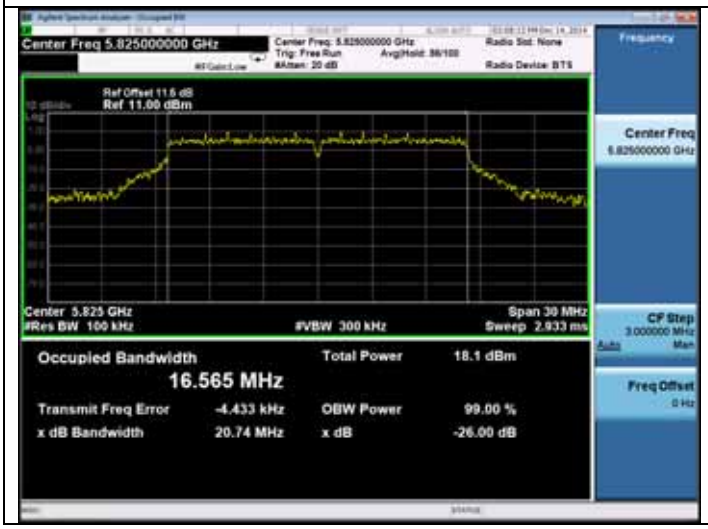
5745MHz

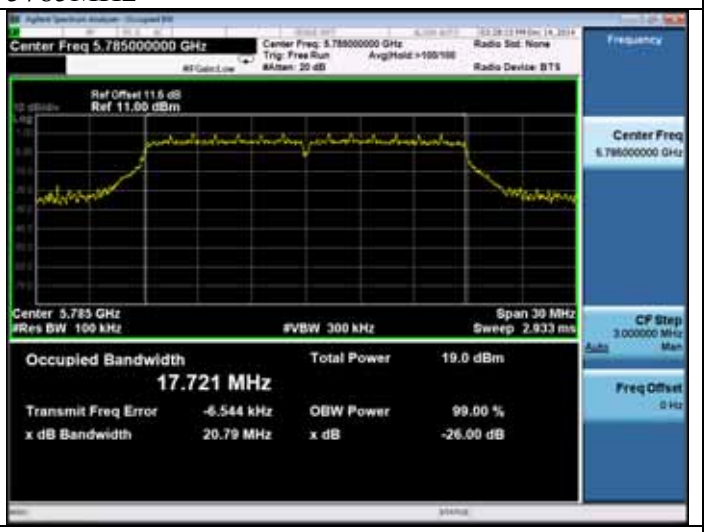
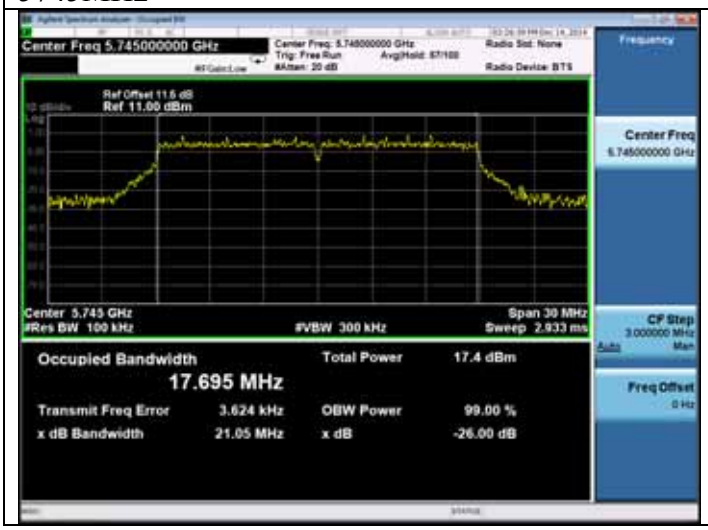
11ac VHT40

5755MHz



	11ac VHT80
5795MHz	5775MHz
	

U-NII 5745-5825MHz Band:	
26dB bandwidth	
ANT 2	
11a	**11n HT20**
5745MHz	5745MHz
	
5785MHz	5785MHz
	
5825MHz	5825MHz
	

11n HT40	
5755MHz	5785MHz
	
5795MHz	5825MHz
	
11ac VHT20	**11ac VHT40**
5745MHz	5755MHz
	

	11ac VHT80
5795MHz	5775MHz
	

7. OUTPUT POWER TEST

7.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	N9030A	MY51380221	Oct.29, 14	1Year
2.	Power meter	Anritsu	ML2487A	6K00002472	April 28,14	1Year
3.	Power sensor	Anritsu	MA2491A	0033005	April 28,14	1Year
4.	Attenuator (20dB)	Agilent	8491B	MY39262165	April 28,14	1 Year
5.	RF Cable	Hubersuhner	SUCOFLEX102	28620/2	April 28,14	1 Year

7.2. Limit

For an access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 250mW (24dBm)provided the maximum antenna gain does not exceed 6 dBi.
For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

7.3. Test Procedure

1. Connected the EUT's antenna port to measure device by 26dB attenuator.
2. For IEEE 802.11a and IEEE802.11n HT20 and 802.11ac VHT20 mode, use power meter which's bandwidth is 20MHz and above the bandwidth of signal to measure out each test mode's output power.
3. For IEEE802.11n HT40, 802.11ac VHT40 and 802.11ac VHT80 mode, since the signal's bandwidth is nearly 40MHz which is above 20MHz bandwidth of power sensor ML2491A. So use the test method described in KBD789033 clause E Method SA-1
   1) Connect the antenna port to the spectrum analyzer and Set span of the spectrum to encompass the entire emission bandwidth (EBW) of the signal.
   2) Set the RBW=1MHz and VBW =3MHz
   3) Number of points in sweep ≥ 2 Span / RBW
   4) Detector = RMS
   5) Sweep time = auto couple
   6) Allow the sweep to "free run" and set the Trace average at least 100 traces in power averaging (i.e., RMS) mode.
   7) Compute power by integrating the spectrum across the 26 dB EBW of the signal using the instrument's band power measurement function with band limits set equal to the EBW band edges.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

7.4.Test Results

U-NII 5180-5240MHz Band:

EUT: Complex Set-Top Box		
M/N: P2571		
Test date: 2015-01-12	Pressure: 101.2±1.0 kpa	Humidity: 50.3±3.0%
Tested by: Kobe_Huang	Test site: RF site	Temperature:22.4±0.6 ℃

Test Mode	Frequency （MHz）	Maximum Conducted Output Power （dBm）			Limit (dBm)	
		ANT1	ANT2	Total	ANT1	ANT2
11a	5180	14.06	14.37	N/A	23.91	23.07
	5200	13.80	13.87	N/A	23.91	23.07
	5240	14.20	14.42	N/A	23.91	23.07
11n HT20	5180	9.26	9.36	12.32	20.47/23.47	
	5200	9.13	9.39	12.27	20.47/23.47	
	5240	9.34	9.71	12.54	20.47/23.47	
11n HT40	5190	12.03	12.35	15.20	20.47/23.47	
	5230	12.71	12.88	15.81	20.47/23.47	
11ac VHT20	5180	11.79	12.04	14.93	20.47/23.47	
	5200	11.50	11.83	14.68	20.47/23.47	
	5240	11.21	11.47	14.35	20.47/23.47	
11ac VHT40	5190	12.71	13.13	15.94	20.47/23.47	
	5230	12.62	13.26	15.96	20.47/23.47	
11ac VHT80	5210	12.85	12.97	15.92	20.47/23.47	
Conclusion: PASS						

Note:

For 11n/ac Mode,

1.Correlated signal, Direction Gain=$10\log[(10^{G1/20}+10^{G2/20})^2/N_{ANT}]$=9.53dBi

The limit=24dBm-(9.53-6)dBi=20.47dBm

2.Uncorrelated Signal, Direction Gain=$10\log[(10^{G1/10}+10^{G2/10})/N_{ANT}]$=6.53dBi

The limit=24dBm-(6.53-6)dBi=23.47dBm

U-NII 5745-5825MHz Band:

EUT: Complex Set-Top Box		
M/N: P2571		
Test date: 2015-01-13	Pressure: 101.52±1.0 kpa	Humidity: 50.3±3.0%
Tested by: Kobe_Huang	Test site: RF site	Temperature:22.4±0.6 ℃

Test Mode	Frequency (MHz)	Maximum Conducted Output Power (dBm)			Limit (dBm)	
		ANT1	ANT2	Total	ANT1	ANT2
11a	5745	13.44	13.85	N/A	29.85	29.01
	5785	17.89	18.29	N/A	29.85	29.01
	5825	14.76	15.39	N/A	29.85	29.01
11n HT20	5745	11.41	11.90	14.67	26.41/29.41	
	5785	17.18	17.67	20.44	26.41/29.41	
	5825	14.86	15.25	18.07	26.41/29.41	
11n HT40	5755	8.60	9.00	11.81	26.41/29.41	
	5795	13.79	14.04	16.93	26.41/29.41	
11ac VHT20	5745	10.39	10.66	13.54	26.41/29.41	
	5785	17.84	17.91	20.89	26.41/29.41	
	5825	14.65	14.72	17.70	26.41/29.41	
11ac VHT40	5755	8.60	8.93	11.78	26.41/29.41	
	5795	13.78	14.00	16.90	26.41/29.41	
11ac VHT80	5775	10.01	10.31	13.17	26.41/29.41	
Conclusion: PASS						

Note:

For 11n/ac Mode,

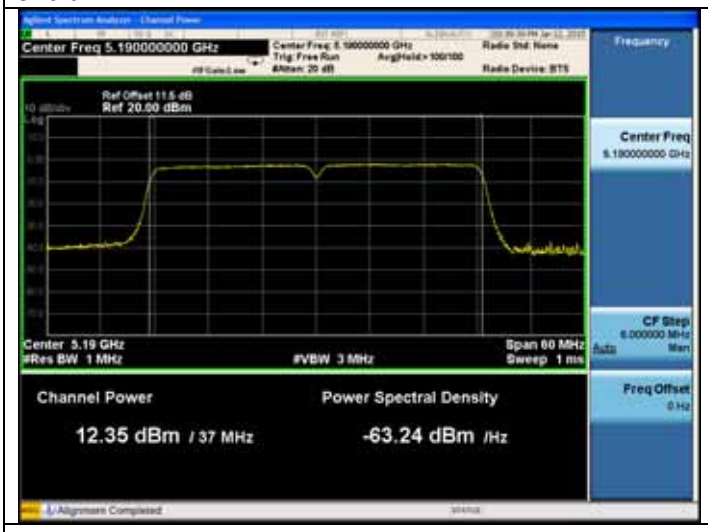
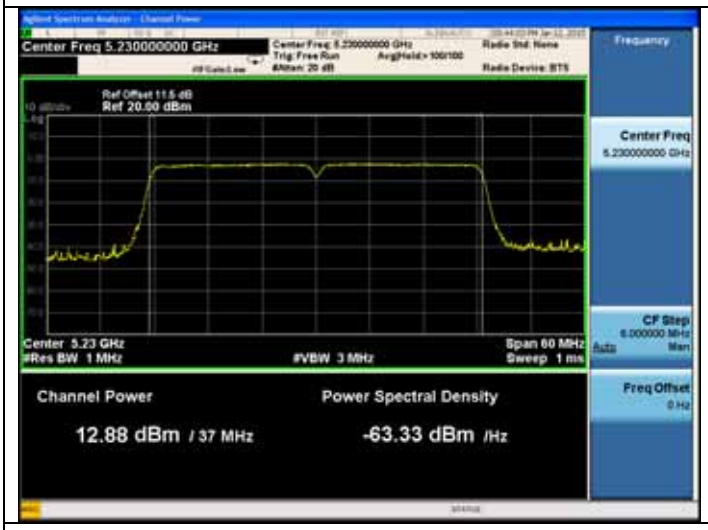
1.Correlated signal, Direction Gain=$10\log[(10^{G1/20}+10^{G2/20})^2/N_{ANT}]$=9.59dBi

The limit=30dBm-(9.59-6)dBi=26.41dBm

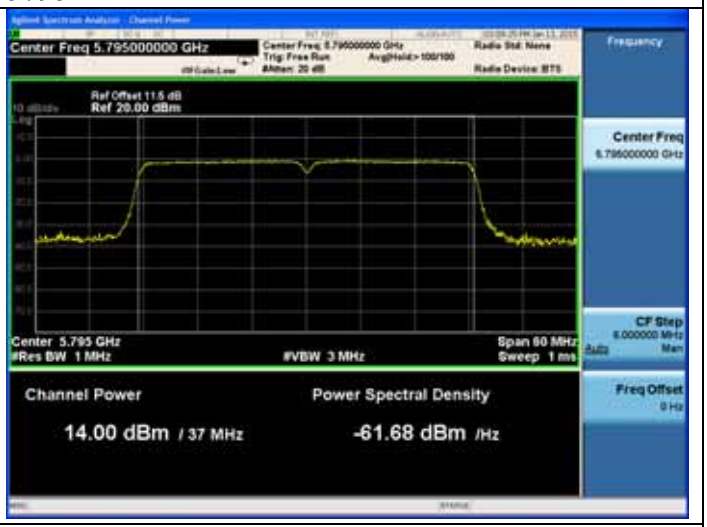
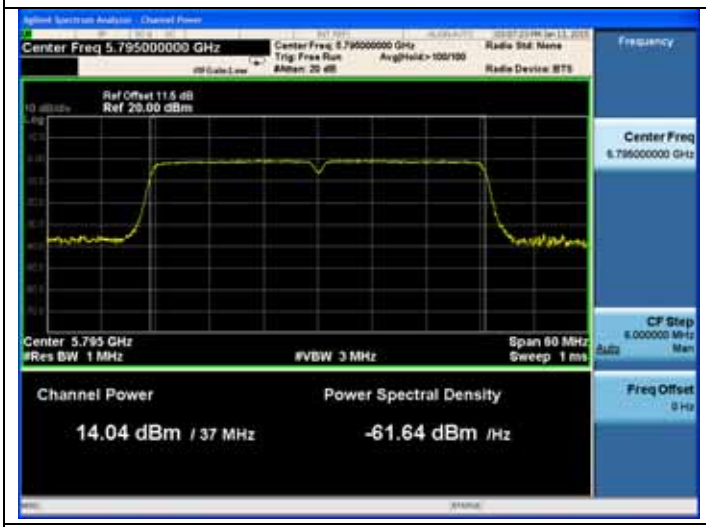
2.Uncorrelated Signal, Direction Gain=$10\log[(10^{G1/10}+10^{G2/10})/N_{ANT}]$=6.59dBi

The limit=30dBm-(6.59-6)dBi=29.41dBm

U-NII 5180-5240MHz Band:	
ANT 1	
11n HT40	
5190MHz	5230MHz
	
	11ac VHT80
5230MHz	5210MHz
	
11acVHT40	
5190MHz	
	

U-NII 5180-5240MHz Band:	
ANT 2	
11n HT40	
5190MHz	5230MHz
	
	11ac VHT80
5230MHz	5210MHz
	
11acVHT40	
5190MHz	
	

U-NII 5745-5825MHz Band:	
ANT 1	
11n HT40	
5755MHz	5795MHz
	
	11ac VHT80
5795MHz	5775MHz
	
11acVHT40	
5755MHz	
	

U-NII 5745-5825MHz Band:	
ANT 2	
11n HT40	
5755MHz	5795MHz
	
5795MHz	**11ac VHT80**
	5775MHz
	
11acVHT40	
5755MHz	
	

8. SPECTRAL DENSITY TEST

8.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	Apr. 28,14	1 Year
2.	Spectrum	Agilent	N9030A	MY51380221	Oct.29, 14	1Year
3.	Attenuator (20dB)	Agilent	8491B	MY39262165	Apr. 28,14	1 Year
4	RF Cable	Hubersuhner	SUCOFLEX102	28610/2	Apr. 28,14	1 Year

8.2. Limit

For an access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.
For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500kHz band.

8.3. Test Procedure

For the Band 5.15-5.25GHz:
The transmitter output was connected to a spectrum analyzer. Power density was measured by spectrum analyzer with 1MHz RBW and 3MHz VBW; Detector: RMS mode.

For the band 5.725-5.85 GHz:
The transmitter output was connected to a spectrum analyzer. Power density was measured by spectrum analyzer with 1MHz RBW and 3MHz VBW,RMS Detector.
So use the test method described in KDB789033 clause E

1) Set the RBW=100kHz and VBW =3MHz
2) Number of points in sweep ≥ 2 Span / RBW.(This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
3) Sweep time = auto
4) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
5) Use the “peak search” function of spectrum analyzer find the max value, then add 10log (500kHz/RBW) to the measured result.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

8.4.Test Results

U-NII 5180-5240MHz Band:

EUT: Complex Set-Top Box		
M/N: P2571		
Test date: 2015-01-12	Pressure: 101.1±1.0 kpa	Humidity:51.5±3.0%
Tested by: Kobe_Huang	Test site: RF site	Temperature:22.5±0.6 ℃

Test Mode	Frequency（MHz）	Power density (dBm/MHz)			Limit （dBm/MHz）	
		ANT1	ANT2	Total	ANT1	ANT2
11a	5180	2.738	3.002	N/A	10.91	10.07
	5200	2.755	3.055	N/A	10.91	10.07
	5240	2.740	2.914	N/A	10.91	10.07
11n HT20	5180	-0.046	0.372	3.18	7.47/10.47	
	5200	-0.020	0.143	3.07	7.47/10.47	
	5240	-0.036	0.132	3.06	7.47/10.47	
11n HT40	5190	-0.973	-0.841	2.10	7.47/10.47	
	5230	-1.731	-1.71	1.29	7.47/10.47	
11ac VHT20	5180	-0.051	0.387	3.18	7.47/10.47	
	5200	-0.139	-0.059	2.91	7.47/10.47	
	5240	-0.010	0.046	3.03	7.47/10.47	
11ac VHT40	5190	-0.54	-0.45	2.52	7.47/10.47	
	5230	-1.287	-0.972	1.88	7.47/10.47	
11ac VHT80	5210	-4.004	-3.403	-0.68	7.47/10.47	
Conclusion: PASS						

Note:

For 11n/ac Mode,

1.Correlated signal, Direction Gain=$10\log[(10^{G1/20}+10^{G2/20})^2/N_{ANT}]$=9.53dBi

The limit=11dBm/MHz-(9.53-6)dBi=7.47dBm/MHz

2.Uncorrelated Signal, Direction Gain=$10\log[(10^{G1/10}+10^{G2/10})/N_{ANT}]$=6.53dBi

The limit=11dBm/MHz-(6.53-6)dBi=10.47dBm/MHz

U-NII 5745-5825MHz Band:

EUT: Complex Set-Top Box		
M/N: P2571		
Test date: 2014-12-30	Pressure: 101.7±1.0 kpa	Humidity:51.6±3.0%
Tested by: Kobe_Huang	Test site: RF site	Temperature:22.4±0.6 ℃

Test Mode	Frequency（MHz）	Power density (dBm/500KHz)			Limit （dBm/500KHz）	
		ANT1	ANT2	Total	ANT1	ANT2
11a	5745	8.687	9.391	N/A	29.85	29.01
	5785	12.986	13.849	N/A	29.85	29.01
	5825	10.287	11.21	N/A	29.85	29.01
11n HT20	5745	3.515	6.196	8.07	26.41/29.41	
	5785	10.941	12.969	15.08	26.41/29.41	
	5825	8.426	10.565	12.64	26.41/29.41	
11n HT40	5755	-1.319	1.125	3.08	26.41/29.41	
	5795	5.096	7.415	9.42	26.41/29.41	
11ac VHT20	5745	3.651	6.181	8.11	26.41/29.41	
	5785	11.271	13.261	15.39	26.41/29.41	
	5825	7.76	10.566	12.40	26.41/29.41	
11ac VHT40	5755	-1.08	1.028	3.11	26.41/29.41	
	5795	5.559	7.672	9.75	26.41/29.41	
11ac VHT80	5775	-1.904	1.439	3.09	26.41/29.41	
Conclusion: PASS						

Note:

1. For 11n/ac Mode,

1.Correlated signal, Direction Gain=$10\log[(10^{G1/20}+10^{G2/20})^2/N_{ANT}]$=9.59dBi

The limit=30dBm/MHz-(9.59-6)dBi=26.41dBm

2.Uncorrelated Signal, Direction Gain=$10\log[(10^{G1/10}+10^{G2/10})/N_{ANT}]$=6.59dBi

The limit=30dBm/MHz-(6.59-6)dBi=29.41dBm

2. Correction factor =10log(500kHz/100kHz)=6.9897

U-NII 5180-5240MHz Band:	
ANT 1	
11a	**11n HT20**
5180MHz	5180MHz
	
5200MHz	5200MHz
	
5240MHz	5240MHz
	

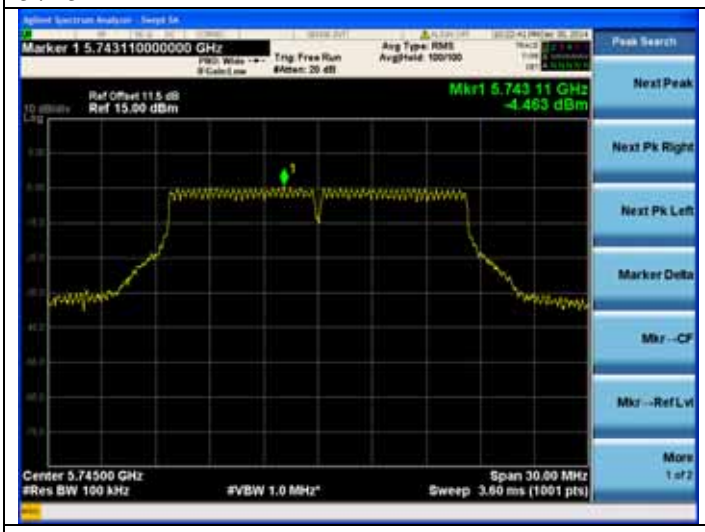
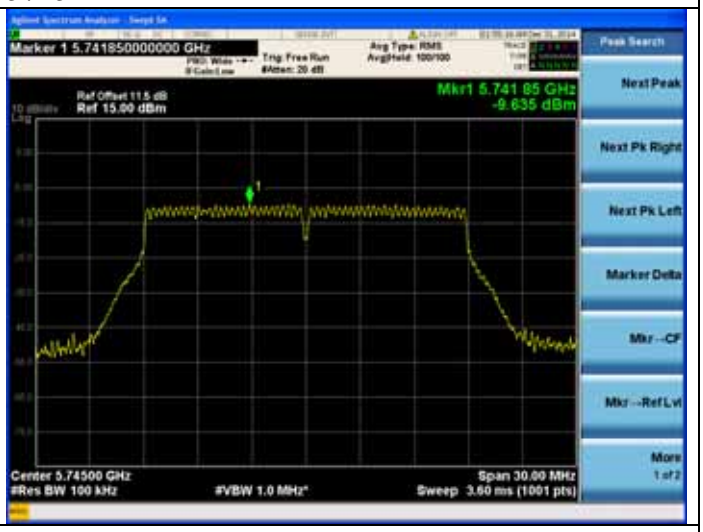
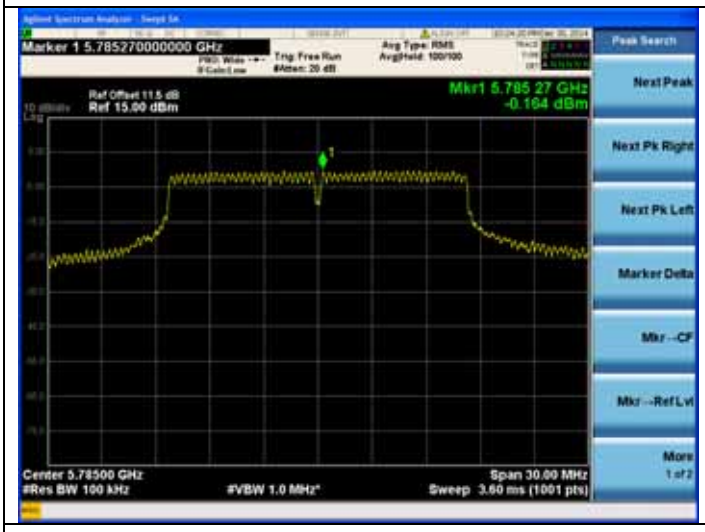
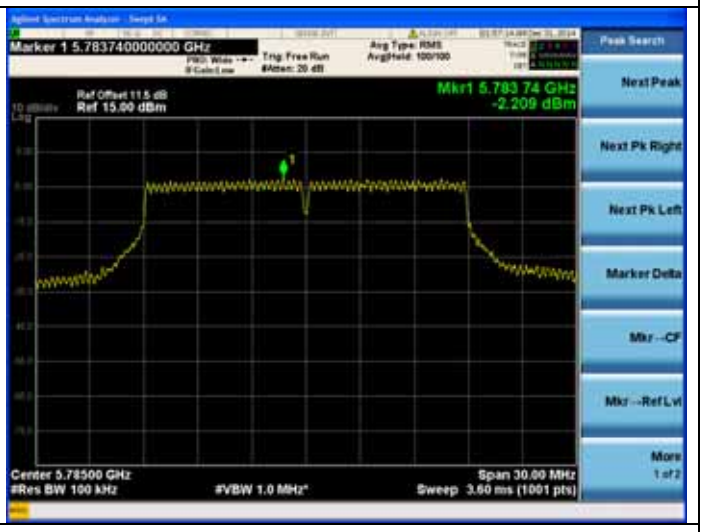
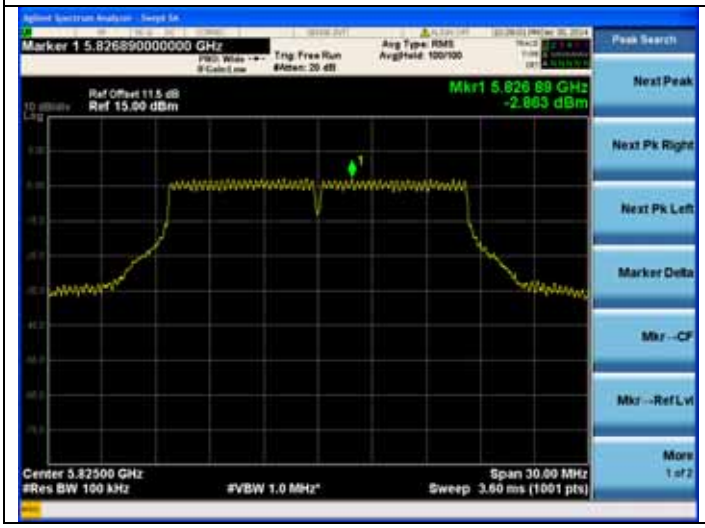
11n HT40	
5190MHz	5200MHz
	
5230MHz	5240MHz
	
11ac VHT20	**11ac VHT40**
5180MHz	5190MHz
	

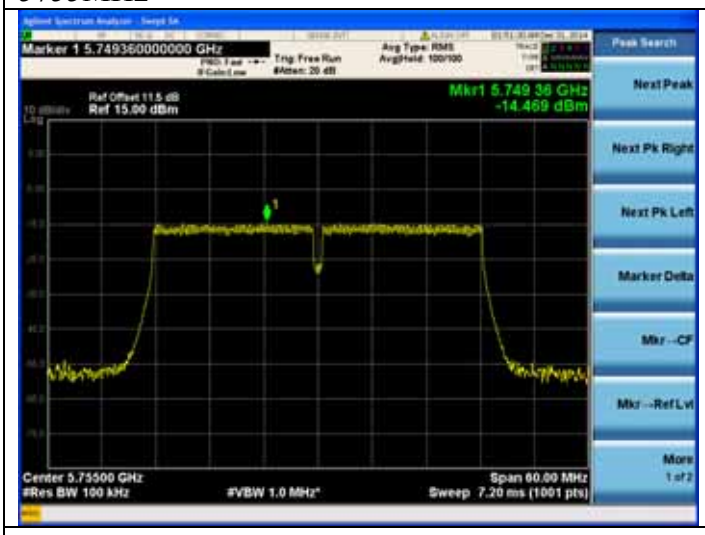
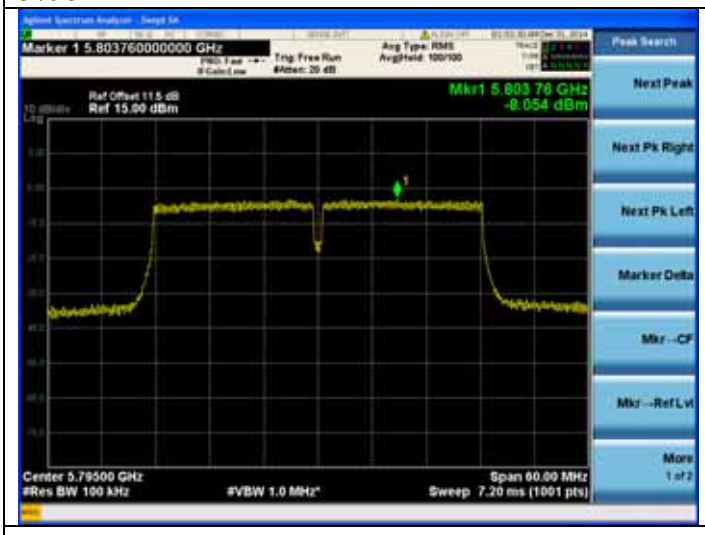
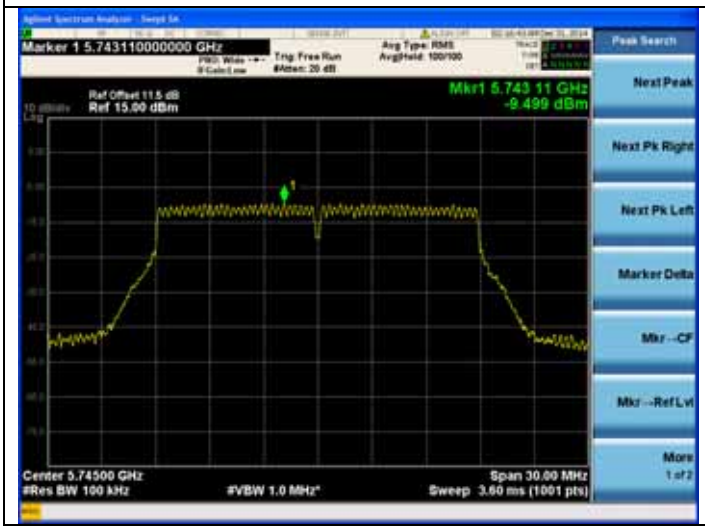
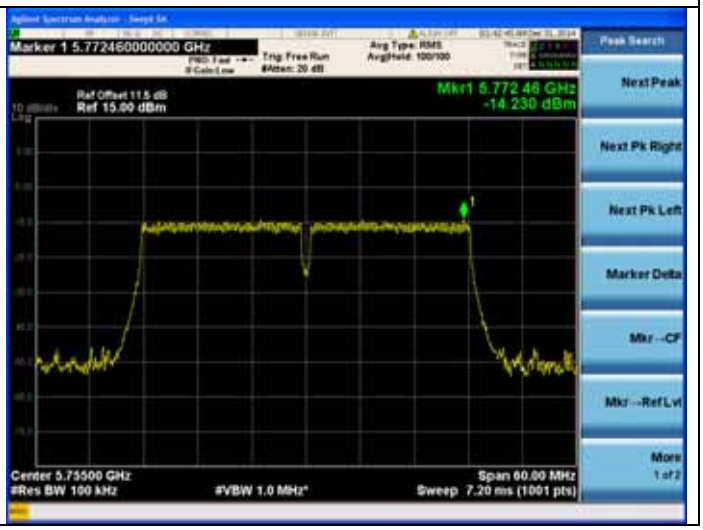
5230MHz	**11ac VHT80** 5210MHz
	

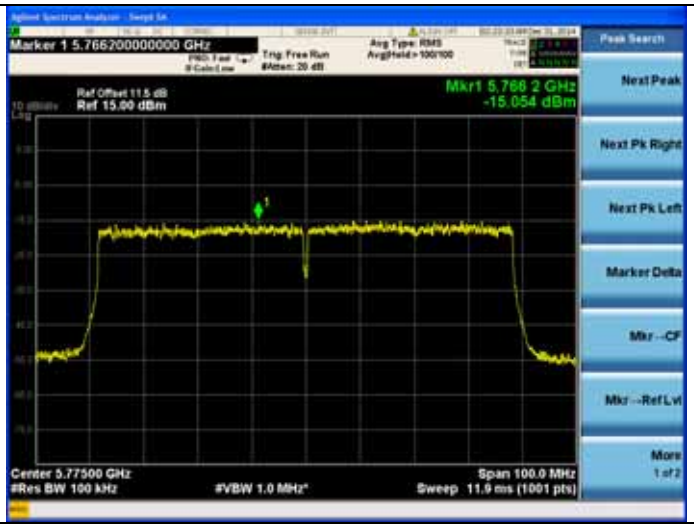
U-NII 5180-5240MHz Band:	
ANT 2	
11a	**11n HT20**
5180MHz	5180MHz
	
5200MHz	5200MHz
	
5240MHz	5240MHz
	

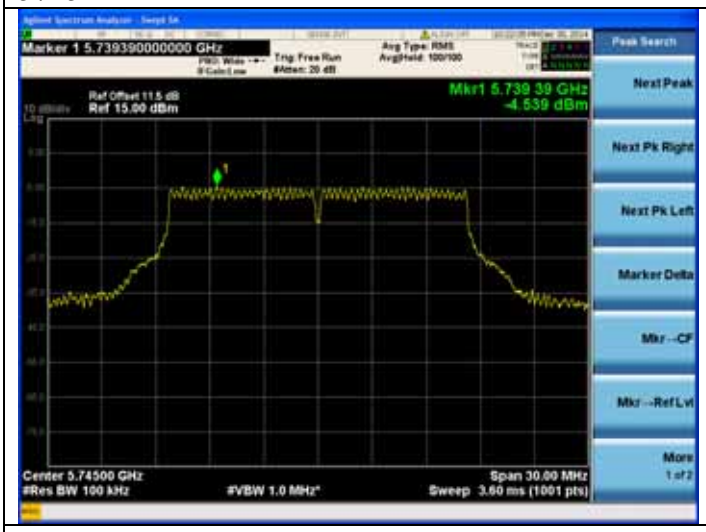
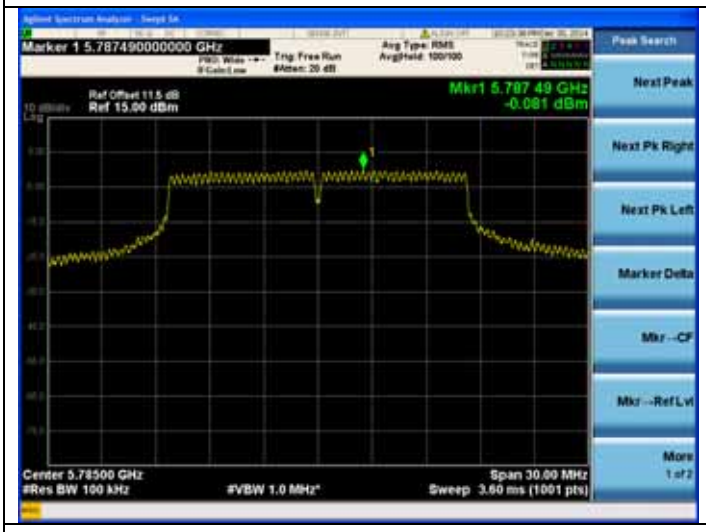
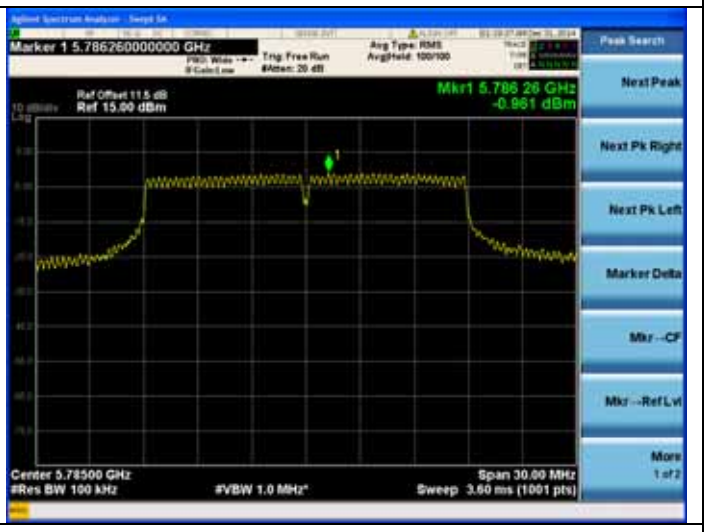
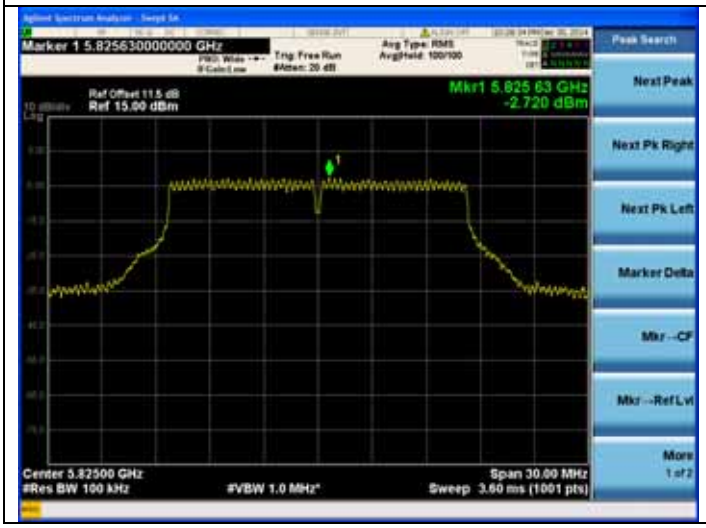
11n HT40	
5190MHz	5200MHz
	
5230MHz	5240MHz
	
11ac VHT20	**11ac VHT40**
5180MHz	5190MHz
	

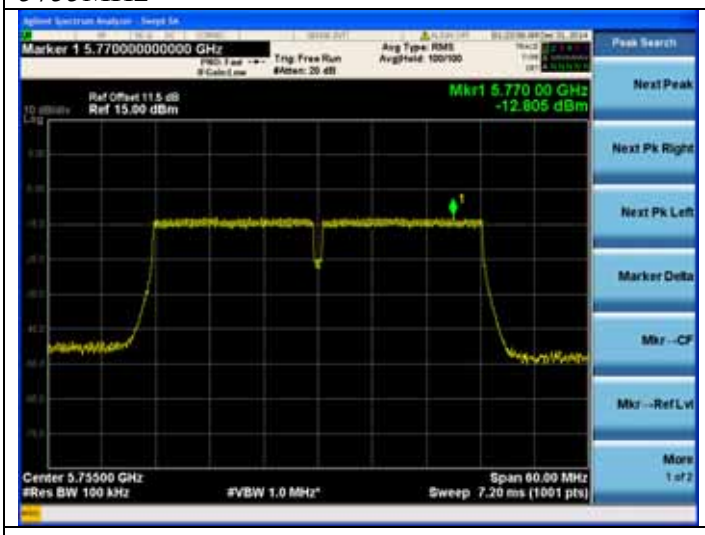
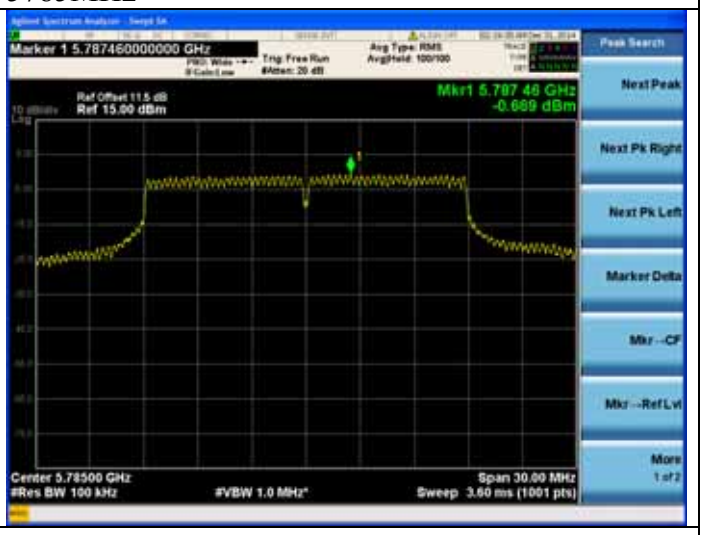
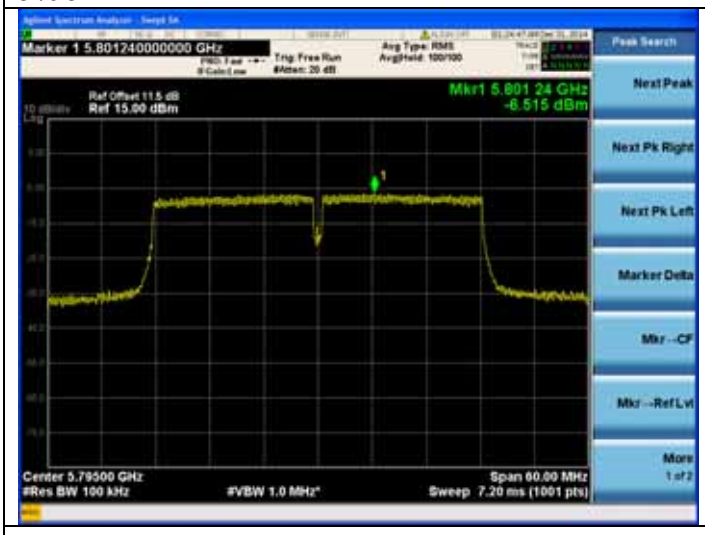
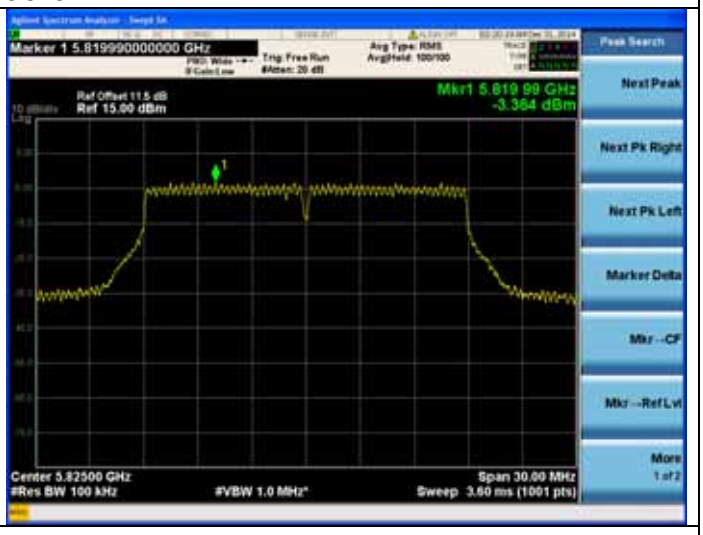
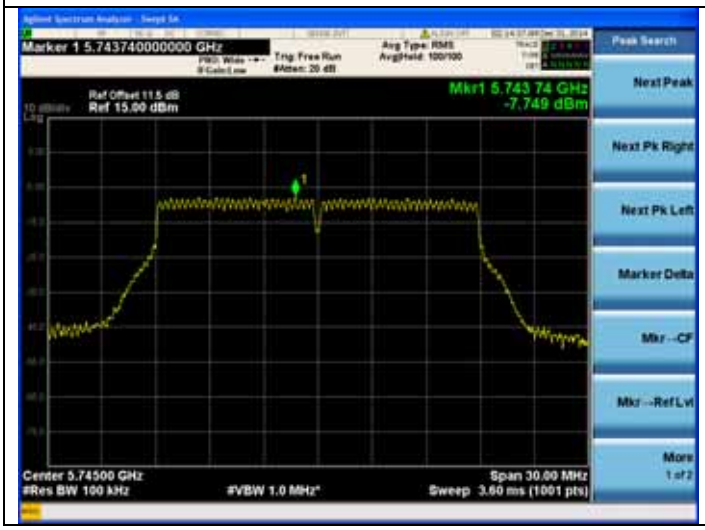
	11ac VHT80
5230MHz	5210MHz
	

U-NII 5745-5825MHz Band:	
ANT 1	
11a	**11n HT20**
5745MHz	5745MHz
	
5785MHz	5785MHz
	
5825MHz	5825MHz
	

11n HT40	
5755MHz	5785MHz
	
5795MHz	5825MHz
	
11ac VHT20	**11ac VHT40**
5745MHz	5755MHz
	

5795MHz	**11ac VHT80** 5775MHz
	

U-NII 5745-5825MHz Band:	
ANT 2	
11a	**11n HT20**
5745MHz	5745MHz
	
5785MHz	5785MHz
	
5825MHz	5825MHz
	

11n HT40	
5755MHz	5785MHz
	
5795MHz	5825MHz
	
11ac VHT20	**11ac VHT40**
5745MHz	5755MHz
	

	11ac VHT80
5795MHz	5775MHz
	

10. ANTENNA REQUIREMENT

10.1. STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

10.2. ANTENNA CONNECTED CONSTRUCTION

The antennas used for this product are dipole antenna that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 6.99dBi.

11. DEVIATION TO TEST SPECIFICATIONS

[NONE]