5. 26DB & 99% EMISSION BANDWIDTH

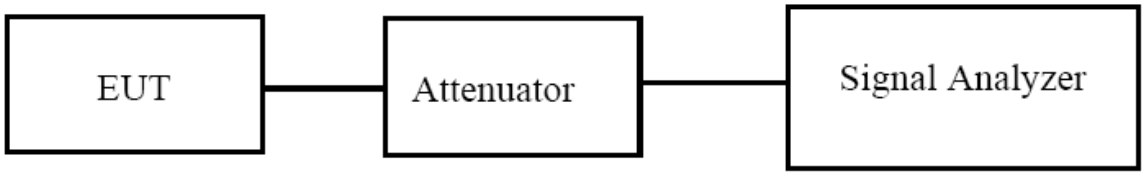
5.1 APPLIED PROCEDURES / LIMIT

The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

5.2 TEST PROCEDURE

a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 · RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.



5.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.4 TEST RESULTS

Antenna 0:

5150-5250MHz				
Test Mode	**Test Channel MHz**	**26 dB Bandwidth MHz**	**99% Bandwidth MHz**	**Limit MHz**
802.11a	5180	22.000	16.685	Pass
	5200	23.970	16.786	Pass
	5240	24.850	16.853	Pass
802.11n-HT20	5180	23.220	17.820	Pass
	5200	25.040	17.889	Pass
	5240	24.360	17.881	Pass
802.11n-HT40	5190	41.410	37.004	Pass
	5230	39.910	37.119	Pass

Antenna 0:

5725-5850MHz				
Test Mode	**Test Channel MHz**	**26 dB Bandwidth MHz**	**99% Bandwidth MHz**	**Limit MHz**
802.11a	5745	20.050	16.745	Pass
	5785	19.820	16.736	Pass
	5825	19.550	16.657	Pass
802.11n-HT20	5745	20.140	17.675	Pass
	5785	20.090	17.684	Pass
	5825	20.150	17.692	Pass
802.11n-HT40	5755	41.310	36.449	Pass
	5795	42.320	36.448	Pass

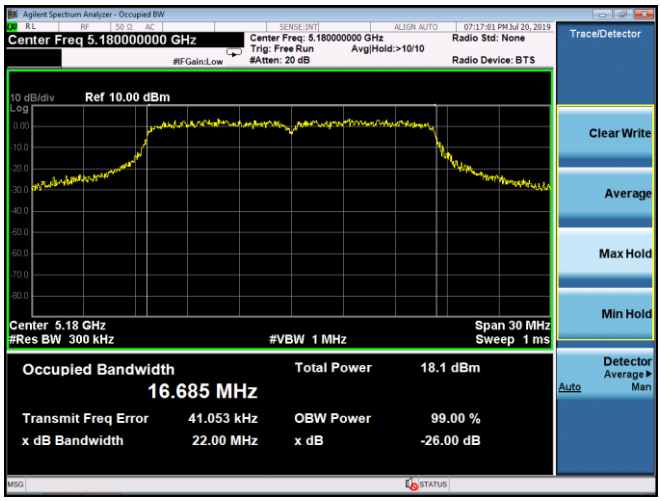
Antenna 1:

5150-5250MHz				
Test Mode	**Test Channel MHz**	**26 dB Bandwidth MHz**	**99% Bandwidth MHz**	**Limit MHz**
802.11a	5180	20.010	16.746	Pass
	5200	19.590	16.651	Pass
	5240	19.740	16.710	Pass
802.11n-HT20	5180	19.990	17.673	Pass
	5200	20.260	17.700	Pass
	5240	19.910	17.707	Pass
802.11n-HT40	5190	40.650	36.429	Pass
	5230	41.000	36.478	Pass

Antenna 1:

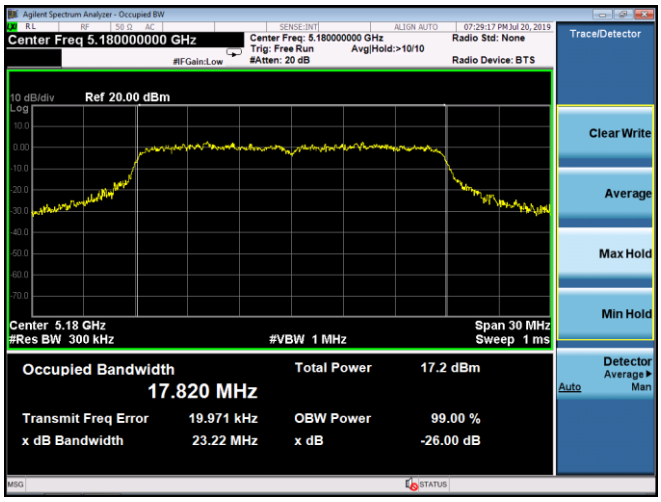
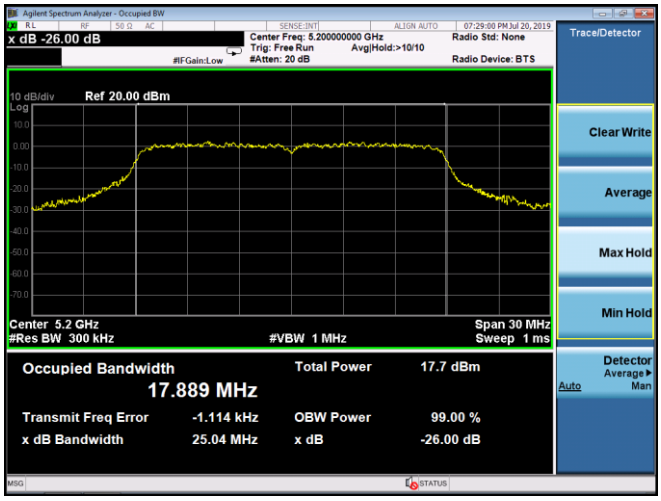
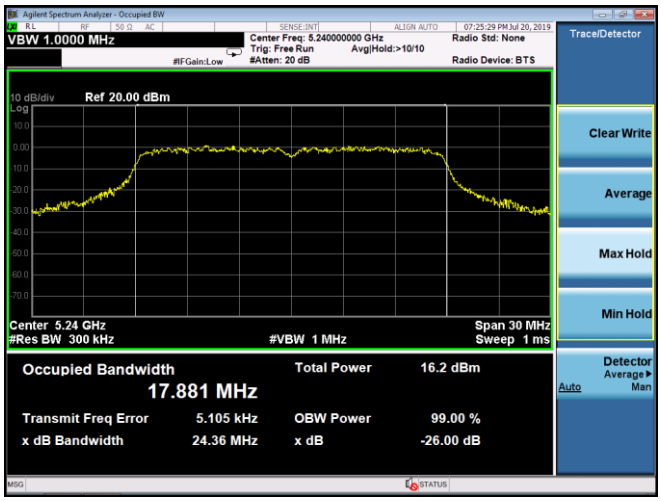
5725-5850MHz				
Test Mode	**Test Channel MHz**	**26 dB Bandwidth MHz**	**99% Bandwidth MHz**	**Limit MHz**
802.11a	5745	19.990	16.761	Pass
	5785	19.570	16.676	Pass
	5825	19.870	16.753	Pass
802.11n-HT20	5745	19.900	17.690	Pass
	5785	20.920	17.675	Pass
	5825	20.330	17.709	Pass
802.11n-HT40	5755	40.620	36.487	Pass
	5795	40.970	36.473	Pass

Antenna 0: 5150-5250MHz

Mode:	802.11a
5180MHz	
5200MHz	

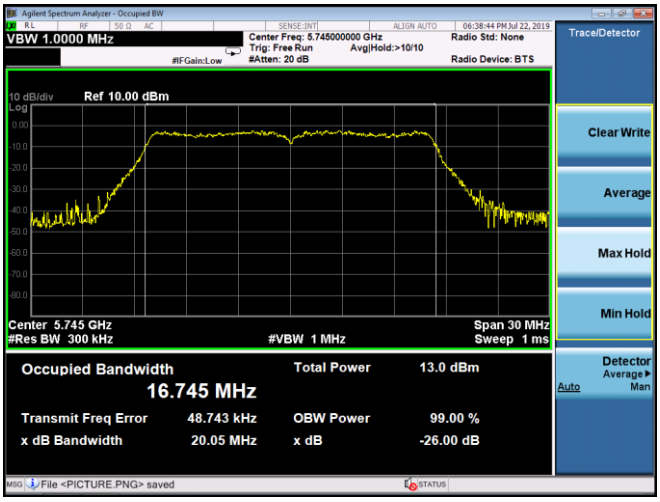
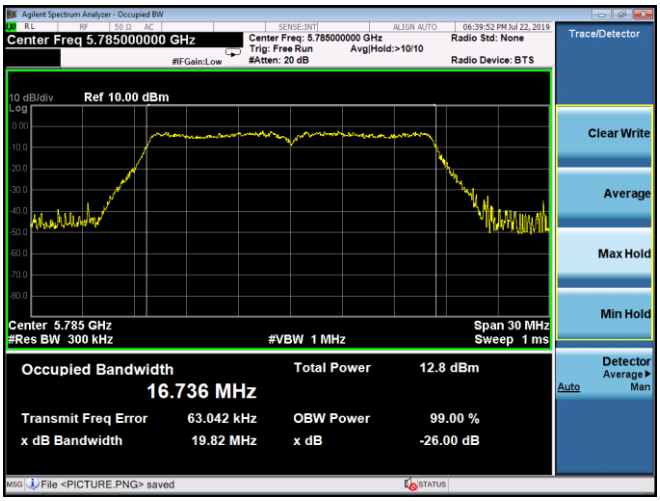
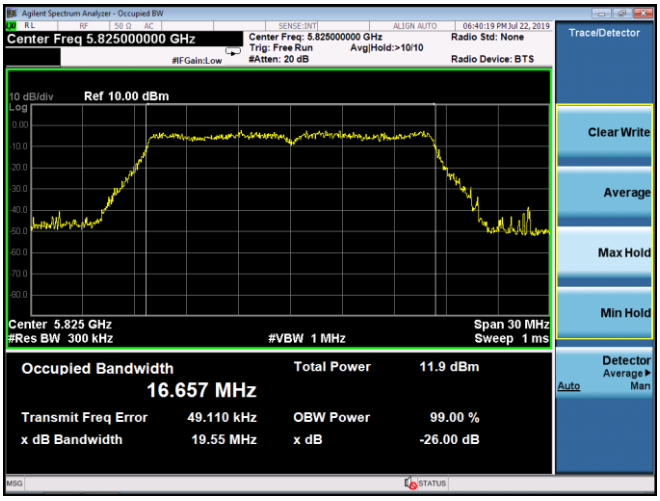
5240MHz	

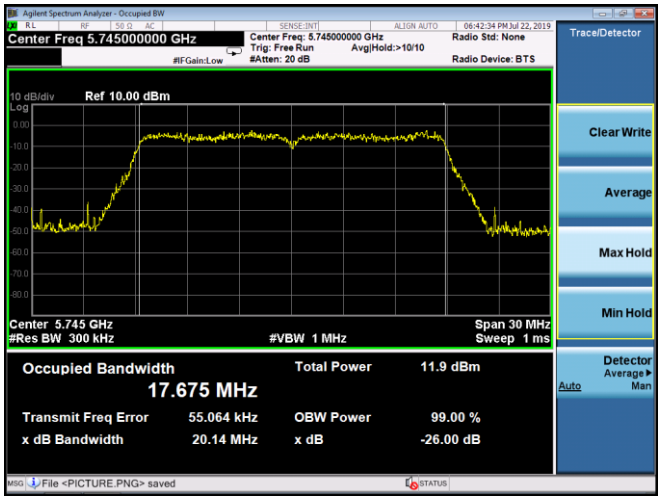
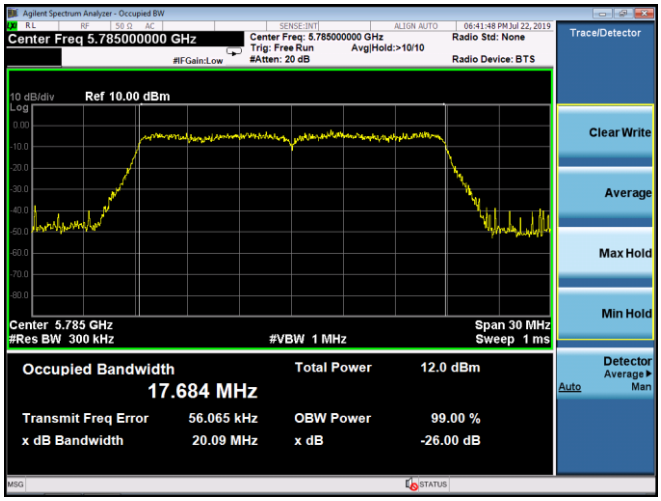
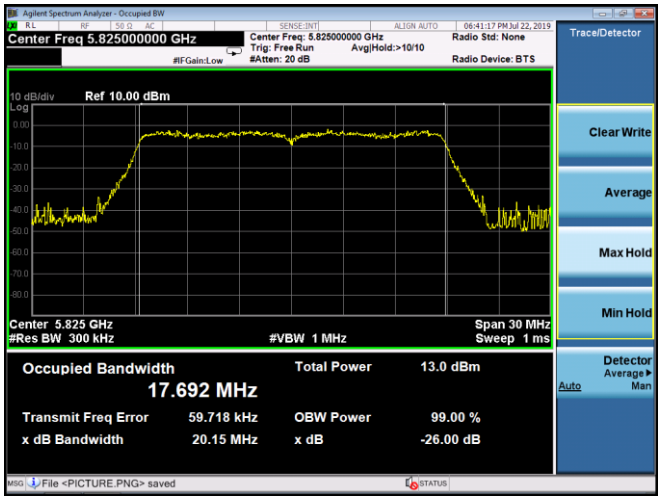
Agilent Spectrum Analyzer - Occupied BW
Center Freq: 5.240000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
07:15:35 PM Jul 20, 2019
#IFGain:Low
Trace/Detector
10 dB/div
Log
Ref 10.00 dBm
Clear Write
Average
Max Hold
Min Hold
Detector
Average
Man
Auto
Center 5.24 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 30 MHz
Sweep 1 ms
Occupied Bandwidth
16.853 MHz
Total Power
17.9 dBm
Transmit Freq Error
65.213 kHz
OBW Power
99.00 %
x dB Bandwidth
24.85 MHz
x dB
-26.00 dB
MSG
STATUS

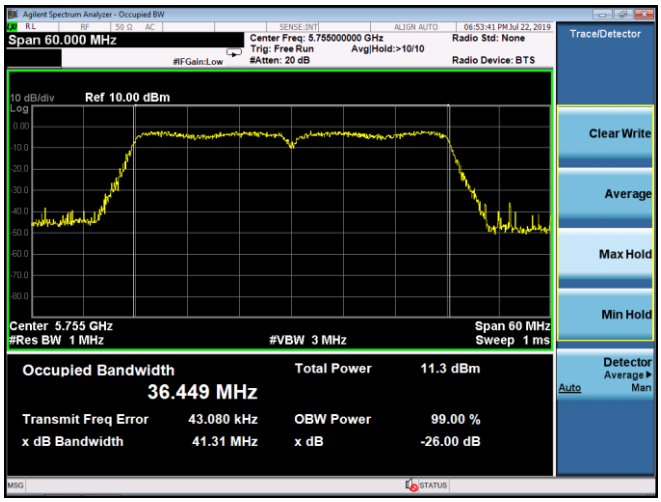
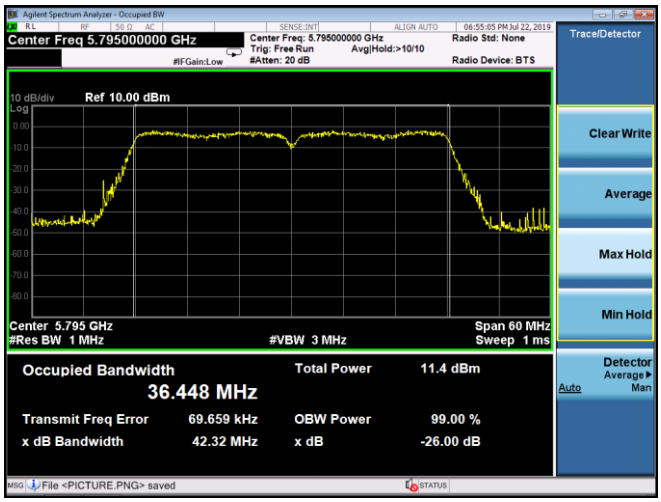
Mode:	802.11n-HT20
5180MHz	
5200MHz	
5240MHz	

Mode:	802.11n-HT40
5190 MHz	
5230 MHz	

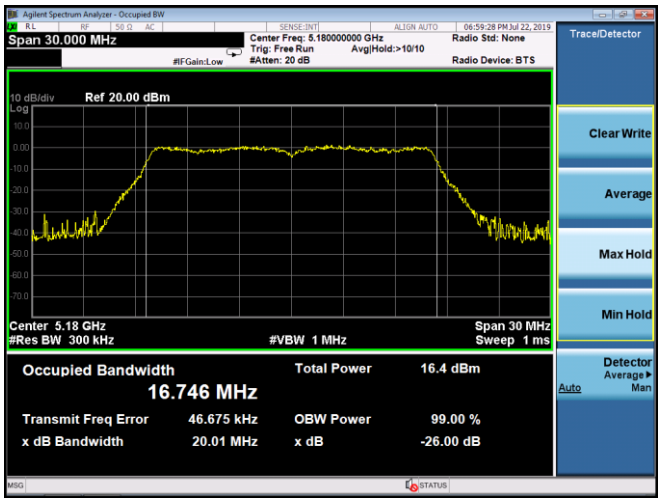
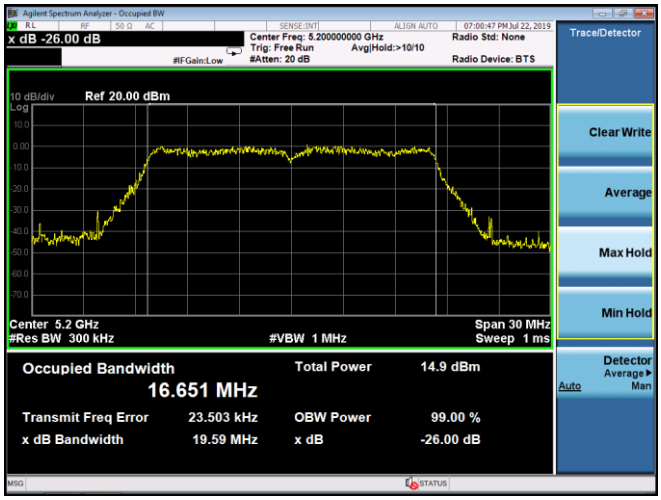
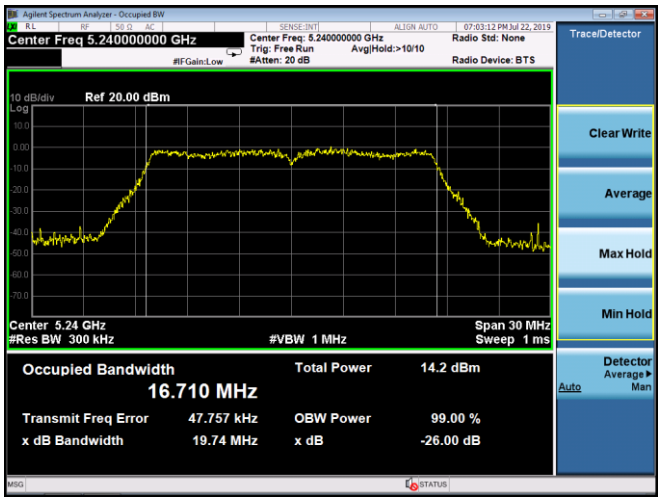
Antenna 0: 5725-5850MHz

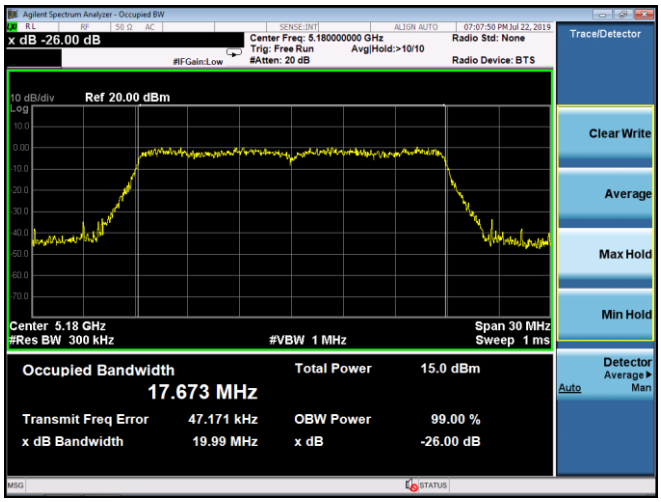
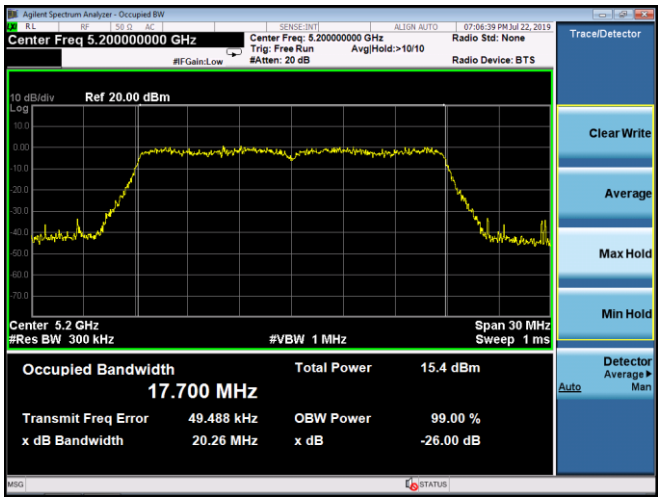
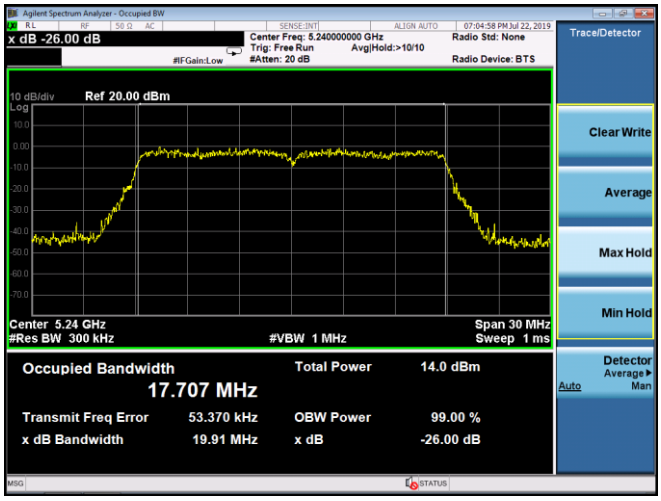
Mode:	802.11a
5745MHz	
5785MHz	
5825MHz	

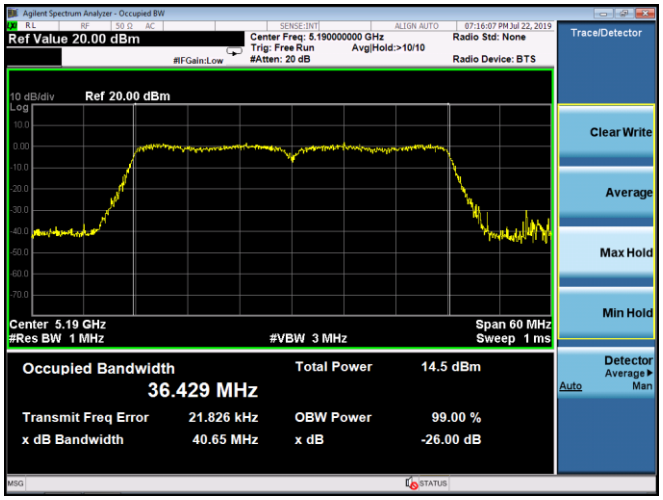
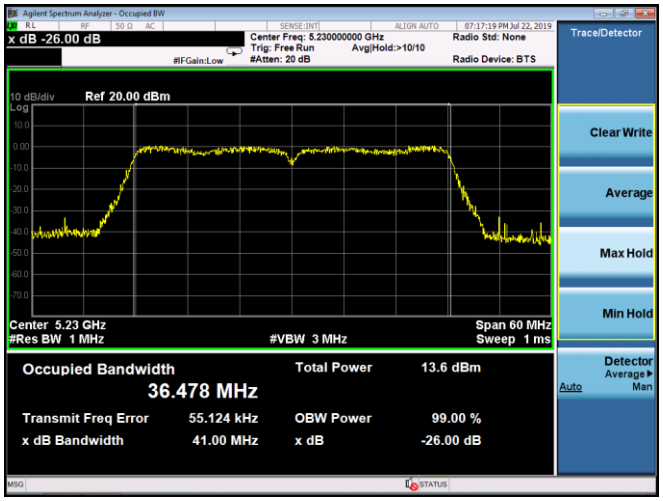
Mode:	802.11n-HT20
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11n-HT40
5755 MHz	
5795 MHz	

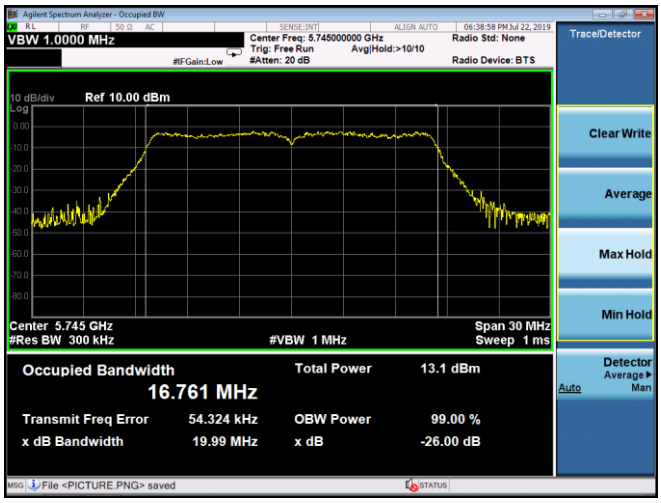
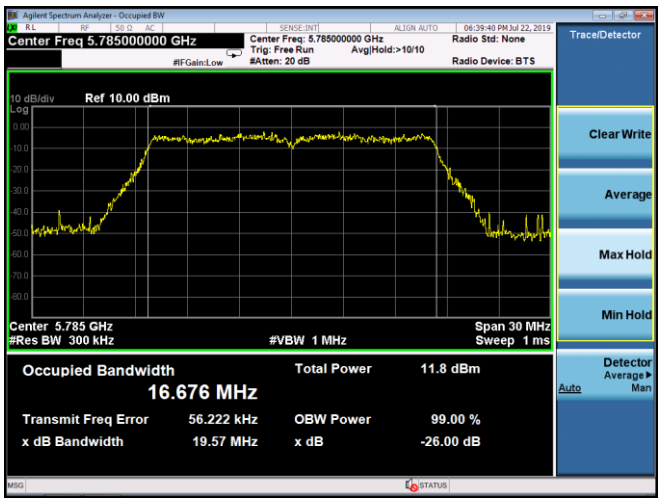
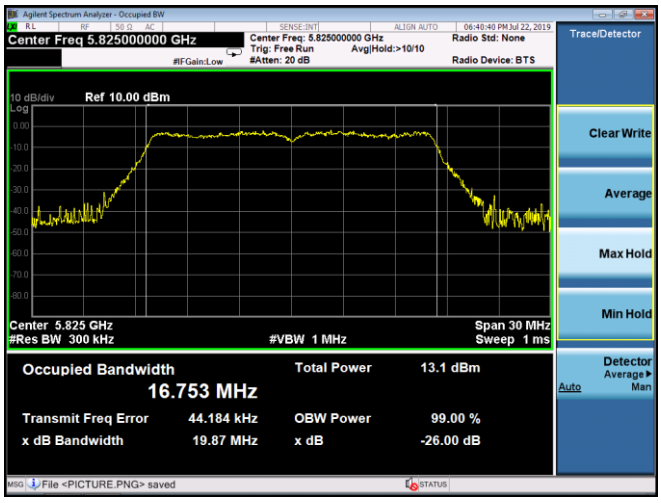
Antenna 1: 5150-5250MHz

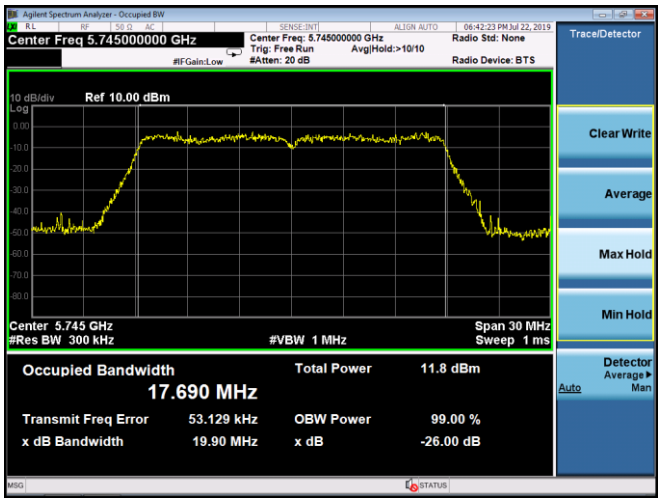
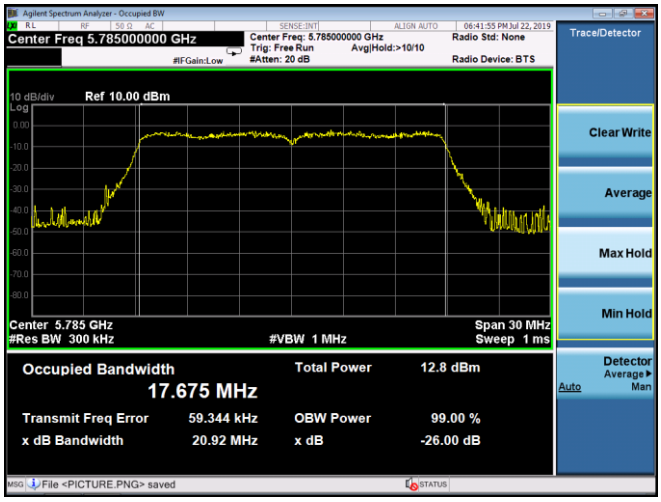
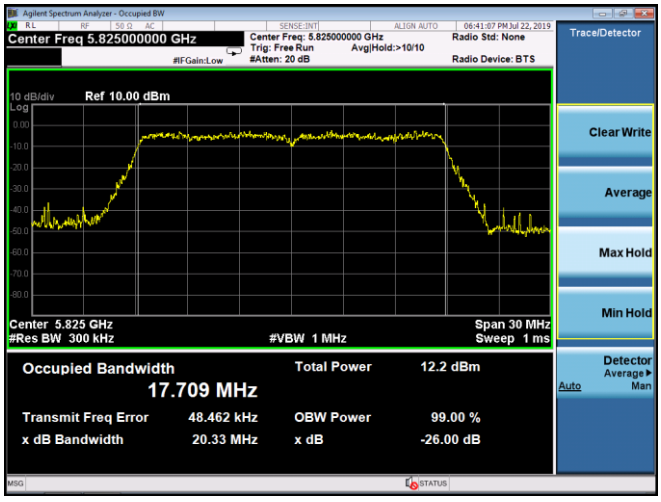
Mode:	802.11a
5180MHz	
5200MHz	
5240MHz	

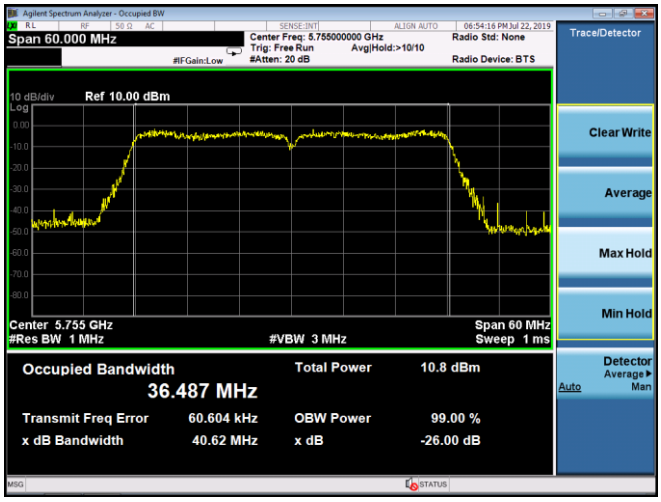
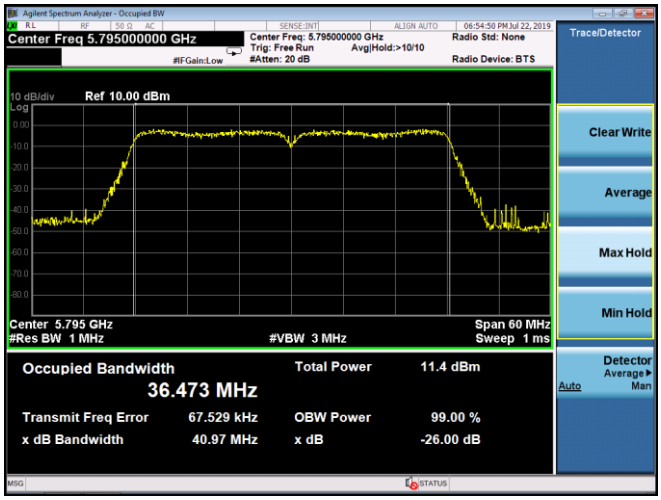
Mode:	802.11n-HT20
5180MHz	
5200MHz	
5240MHz	

Mode:	802.11n-HT40
5190 MHz	
5230 MHz	

Antenna 1: 5725-5850MHz

Mode:	802.11a
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11n-HT20
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11n-HT40
5755 MHz	
5795 MHz	

6. MAXIMUM CONDUCTED OUTPUT POWER

6.1 PPLIED PROCEDURES / LIMIT

According to FCC §15.407

The maximum conduced output power should not exceed:

Frequency Band(MHz)	Limit
5150~5250	250mW
5725~5850	1W

The maximum e.i.r.p should not exceed:

Frequency Band(MHz)	Limit
5150~5250	200mW or 10dBm +10logB whichever is less
5725~5850	N/A

Note: Where “B” is the 99% emission bandwidth in MHz

6.2 TEST PROCEDURE

. Maximum conducted output power may be measured using a spectrum analyzer/EMI receiver or an RF power meter.

1. Device Configuration

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).

a) The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

2. Measurement using a Spectrum Analyzer or EMI Receiver (SA)

Measurement of maximum conducted output power using a spectrum analyzer requires integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99-percent occupied bandwidth of the signal.1 However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with § 15.407(a).

a) The test method shall be selected as follows: (i) Method SA-1 or SA-1 Alternative (averaging with the EUT transmitting at full power throughout each sweep) shall be applied if either of the following conditions can be satisfied:

• The EUT transmits continuously (or with a duty cycle ≥ 98 percent).

• Sweep triggering or gating can be implemented in a way that the device transmits at the maximum power control level throughout the duration of each of the instrument sweeps to be averaged. This condition can generally be achieved by triggering the instrument's sweep if the duration of the sweep (with the analyzer configured as in Method SA-1, below) is equal to or shorter than the duration T of each transmission from the EUT and if those transmissions exhibit full power throughout their durations.

(ii) Method SA-2 or SA-2 Alternative (averaging across on and off times of the EUT transmissions, followed by duty cycle correction) shall be applied if the conditions of (i) cannot be achieved and the transmissions exhibit a constant duty cycle during the measurement duration. Duty cycle will be considered to be constant if variations are less than ± 2 percent.

(iii) Method SA-3 (RMS detection with max hold) or SA-3 Alternative (reduced VBW with max hold) shall be applied if the conditions of (i) and (ii) cannot be achieved.

b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(ii) Set RBW = 1 MHz.

(iii) Set VBW ≥ 3 MHz.

(iv) 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.)

(v) Sweep time = auto.

(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".

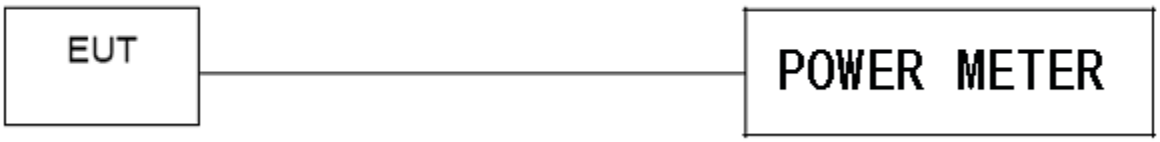
(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULTS

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101 kPa	Test Voltage ：	DC 24V form power supply

5150-5250MHz					
Operating mode	Test Channel MHz	Output Power			Limit (dBm)
		Chain 0(dBm)	Chain 1(dBm)	Total(dBm)	
802.11a	5180	16.647	15.780	/	19.98
	5200	16.498	15.796	/	19.98
	5240	16.660	15.426	/	19.98
802.11n-HT20	5180	11.067	11.435	14.27	16.98
	5200	11.047	11.464	14.27	16.98
	5240	11.225	11.151	14.20	16.98
802.11n-HT40	5190	10.186	10.063	13.14	16.98
	5230	10.314	10.179	13.26	16.98

*SISO: For 5180-5240MHz: Limit=23.98-(10-6)=19.98dBm

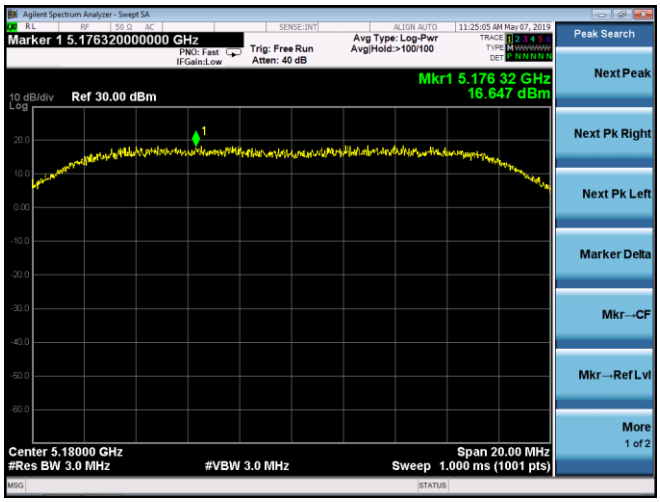
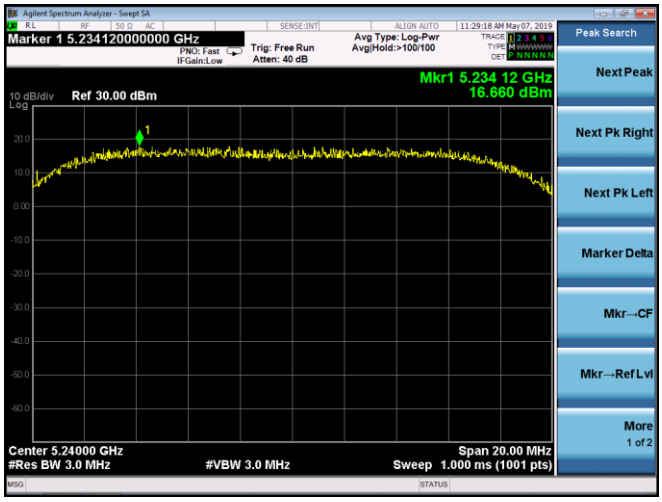
MIMO: For 5180-5240MHz, Limit=23.98-(13-6)=16.98dBm

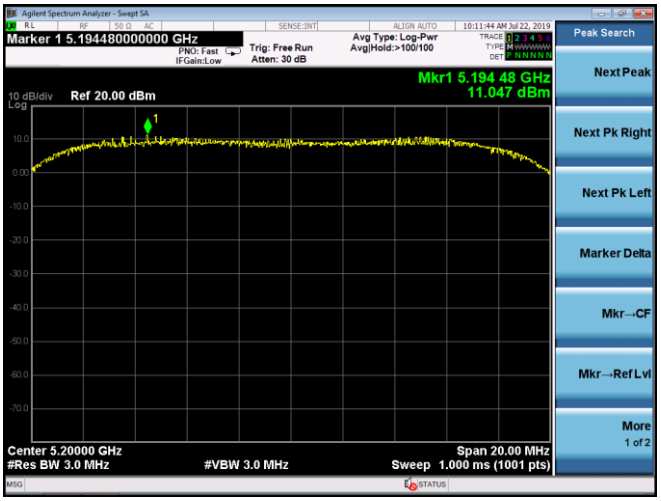
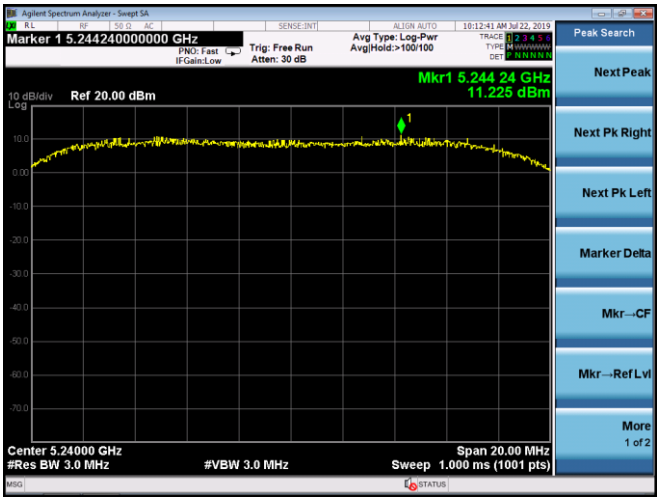
5725-5850MHz					
Operating mode	Test Channel MHz	Output Power			Limit (dBm)
		Chain 0(dBm)	Chain 1(dBm)	Total(dBm)	
802.11a	5745	20.890	19.431	/	26
	5785	19.798	18.827	/	26
	5825	19.154	18.516	/	26
802.11n-HT20	5745	19.612	20.131	22.89	23
	5785	19.794	18.738	22.31	23
	5825	19.739	18.010	21.97	23
802.11n-HT40	5755	17.838	16.879	20.40	23
	5795	17.579	16.078	19.90	23

*SISO: For 5745-5825MHz: Limit=30-(10-6)=26dBm

MIMO: For 5745-5825MHz, Limit=30-(13-6)=23dBm

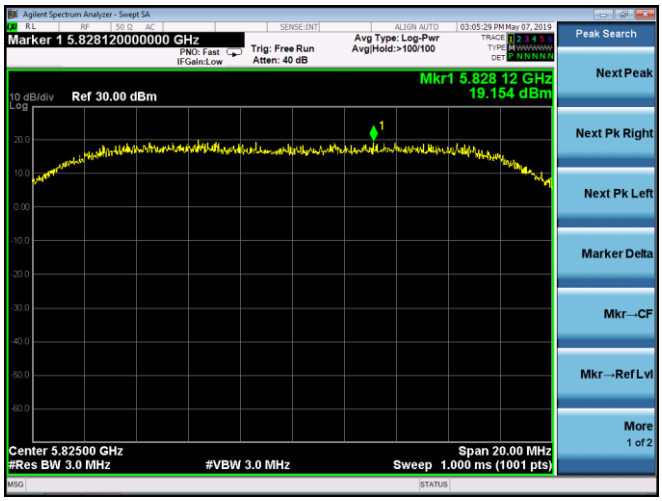
Antenna 0: 5150-5250MHz

Mode:	802.11a
5180MHz	
5200MHz	
5240MHz	

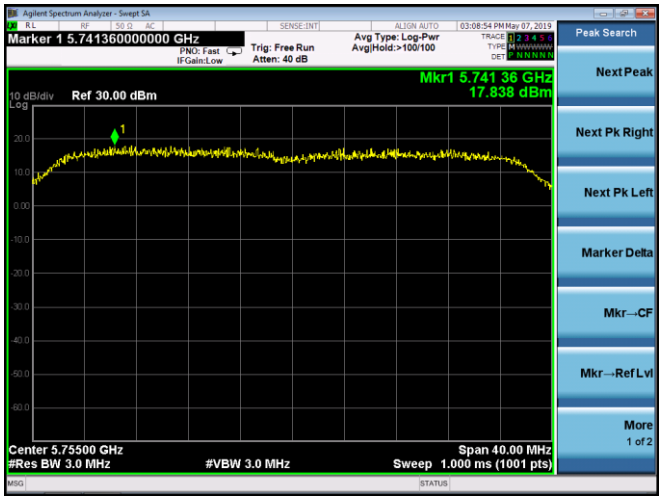
Mode:	802.11n-HT20
5180MHz	
5200MHz	
5240MHz	

Mode:	802.11n-HT40
5190 MHz	
5230 MHz	

Antenna 0: 5725-5850MHz

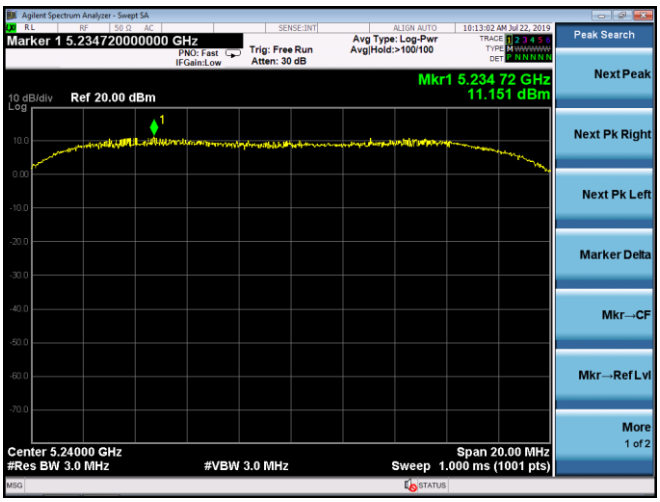
Mode:	802.11a
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11n-HT20
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11n-HT40
5755 MHz	
5795 MHz	

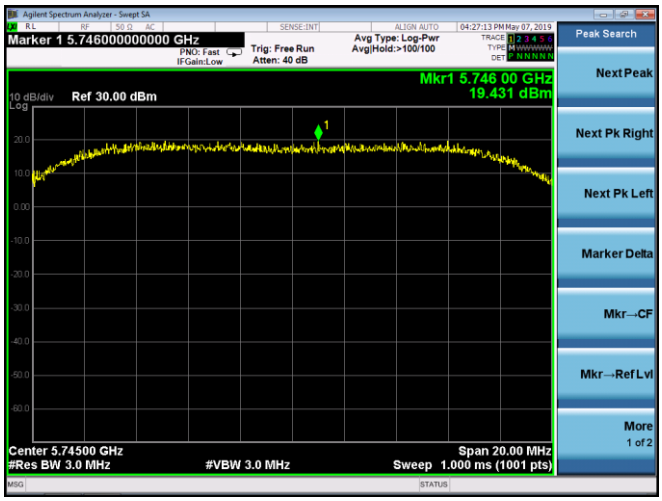
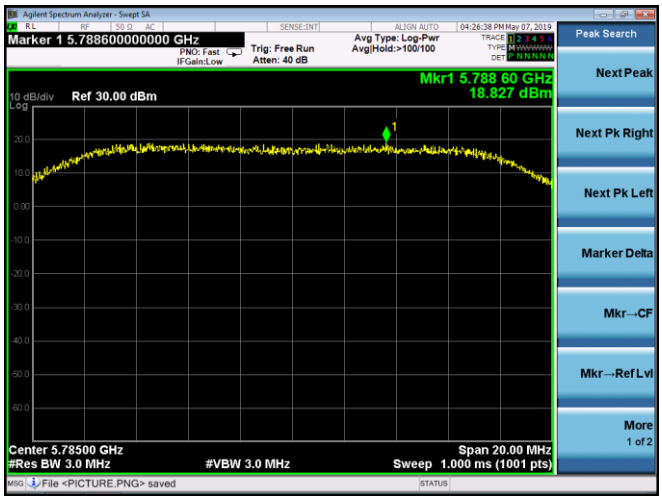
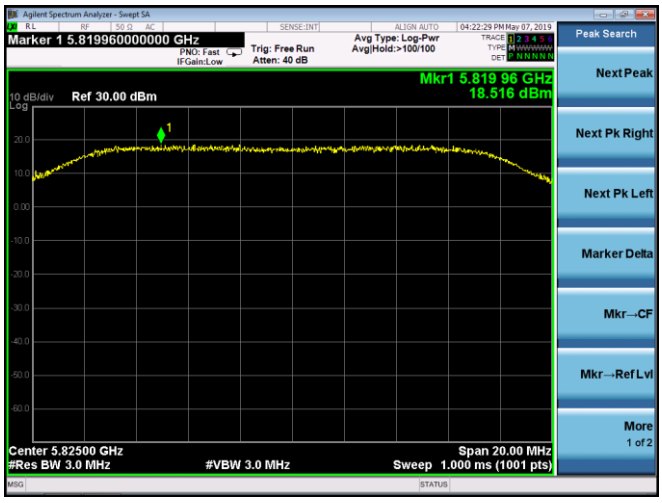
Antenna 1: 5150-5250MHz

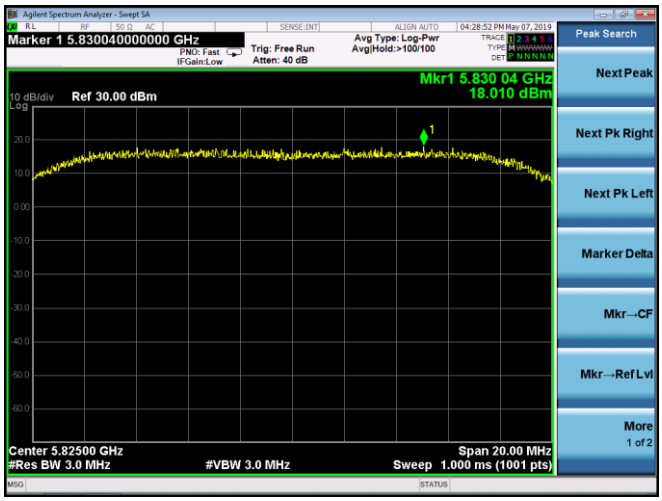
Mode:	802.11a
5180MHz	
5200MHz	
5240MHz	

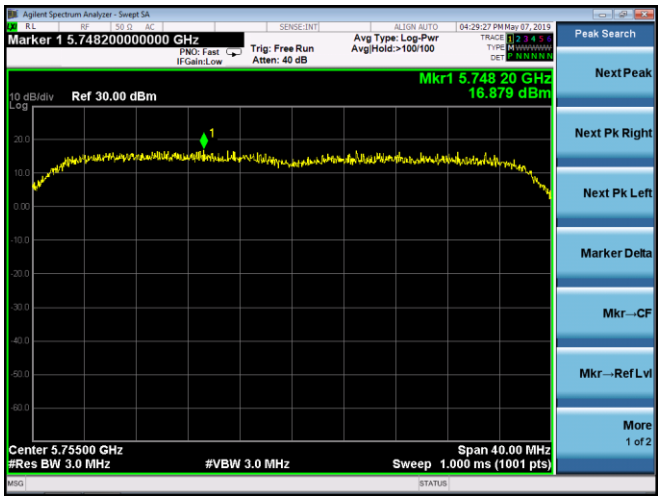
Mode:	802.11n-HT20
5180MHz	
5200MHz	
5240MHz	

Mode:	802.11n-HT40
5190 MHz	
5230 MHz	

Antenna 1: 5725-5850MHz

Mode:	802.11a
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11n-HT20
5745MHz	
5785MHz	
5825MHz	

Mode:	802.11n-HT40
5755 MHz	
5795 MHz