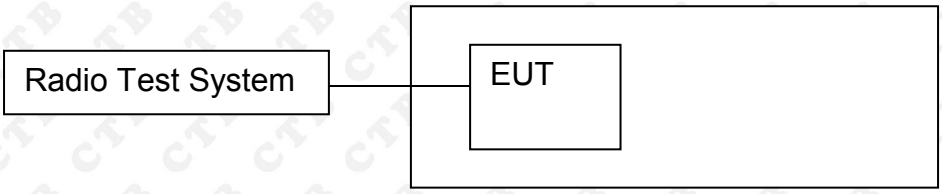
10. EMISSION BANDWIDTH& OCCUPIED BANDWIDTH

10.1 Block Diagram Of Test Setup



10.2 Limits

(1) For the band 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

10.3 Test Procedure

According to KDB789033 D02v02r01 sectionE, the following is the measurement procedure.

1. Emission Bandwidth (EBW)
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%.
2. Minimum Emission Bandwidth for the band 5.725−5.85 GHz
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 kHz for the band 5.725−5.85 GHz. The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 * RBW.
c) Detector = Peak.

d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described in this section. For devices that use channel aggregation refer to III.A and III.C for determining emission bandwidth.

D. 99% Occupied Bandwidth

The 99% occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. Measurement of the 99% occupied bandwidth is *required* only as a condition for using the optional band-edge measurement techniques described in II.G.3.d). Measurements of 99% occupied bandwidth may also optionally be used in lieu of the EBW to define the minimum frequency range over which the 789033 D02 General UNII Test Procedures New Rules v02r01 Page 4 spectrum is integrated when measuring maximum conducted output power as described in II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with Section 15.407(a).
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.

10.4 Test Results

Test mode ANT 0	Test Channel (MHz)	26dB Bandwidth (MHz)	Limit (MHz)
802.11a	5180	30	≥0.5
	5200	30	≥0.5
	5240	30	≥0.5
802.11a20	5180	30	≥0.5
	5200	30	≥0.5
	5240	30	≥0.5
802.11a40	5190	60	≥0.5
	5230	60	≥0.5
802.11a80	5210	119.3	≥0.5
802.11n(HT20)	5180	30	≥0.5
	5200	30	≥0.5
	5240	30	≥0.5
802.11n(HT40)	5190	60	≥0.5
	5230	60	≥0.5

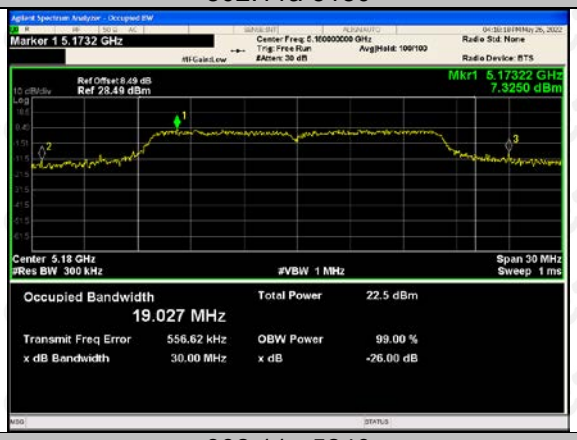
Test mode ANT 0	Test Channel (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
802.11a	5745	16.339	≥0.5
	5785	16.081	≥0.5
	5825	16.149	≥0.5
802.11a20	5745	17.533	≥0.5
	5785	17.332	≥0.5
	5825	16.875	≥0.5
802.11a40	5755	35.356	≥0.5
	5795	35.725	≥0.5
802.11a80	5775	75.092	≥0.5
802.11n(HT20)	5745	17.044	≥0.5
	5785	16.025	≥0.5
	5825	16.756	≥0.5
802.11n(HT40)	5755	35.89	≥0.5
	5795	35.791	≥0.5

Test mode ANT 1	Test Channel (MHz)	26dB Bandwidth (MHz)	Limit (MHz)
802.11a	5180	30	≥0.5
	5200	30	≥0.5
	5240	30	≥0.5
802.11a20	5180	30	≥0.5
	5200	30	≥0.5
	5240	30	≥0.5
802.11a40	5190	60	≥0.5
	5230	60	≥0.5
802.11a80	5210	119.3	≥0.5
802.11n(HT20)	5180	30	≥0.5
	5200	30	≥0.5
	5240	30	≥0.5
802.11n(HT40)	5190	60	≥0.5
	5230	60	≥0.5

Test mode ANT 1	Test Channel (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
802.11a	5745	16.31	≥0.5
	5785	16.3	≥0.5
	5825	16.304	≥0.5
802.11a20	5745	17.009	≥0.5
	5785	16.174	≥0.5
	5825	17.172	≥0.5
802.11a40	5755	35.292	≥0.5
	5795	35.837	≥0.5
802.11a80	5775	75.236	≥0.5
802.11n(HT20)	5745	17.079	≥0.5
	5785	17.188	≥0.5
	5825	16.476	≥0.5
802.11n(HT40)	5755	35.666	≥0.5
	5795	36.048	≥0.5

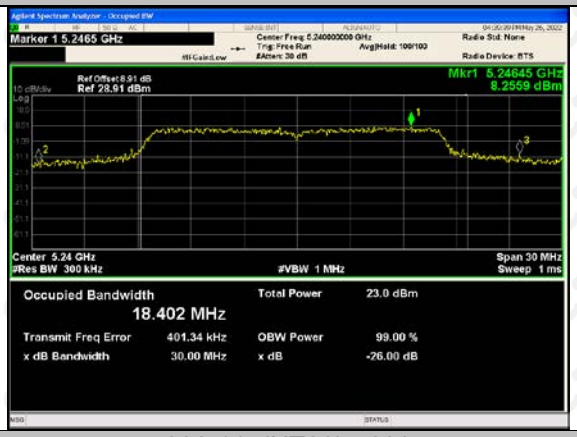
Test Graph ANT 0

802.11a-5180



802.11a-5200

802.11a-5240



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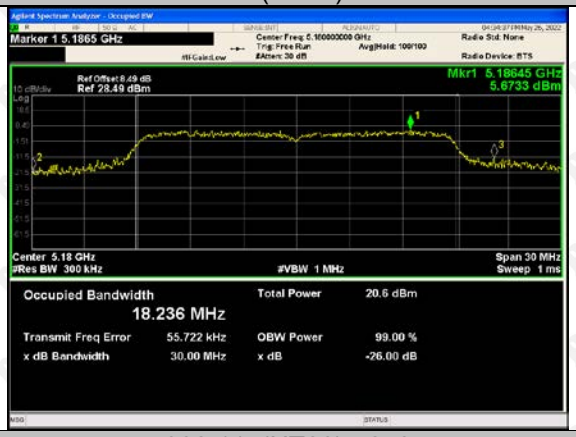

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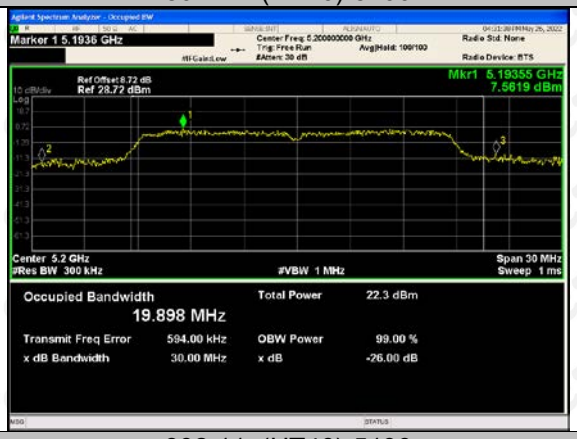

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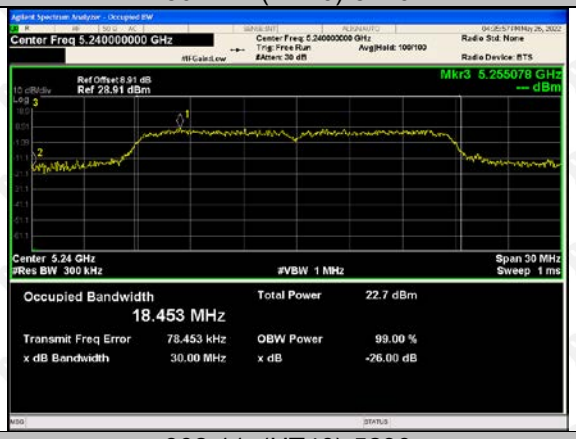

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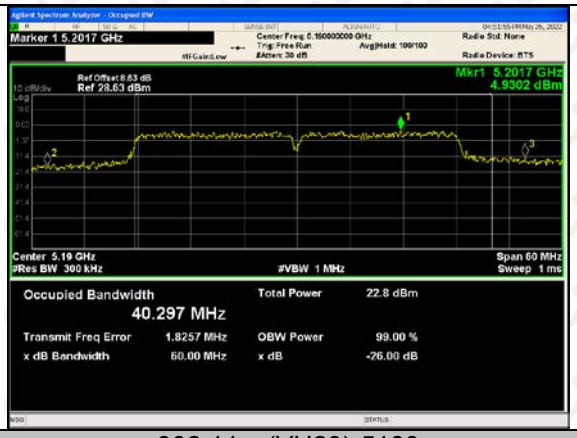
802.11n(HT40)-5230



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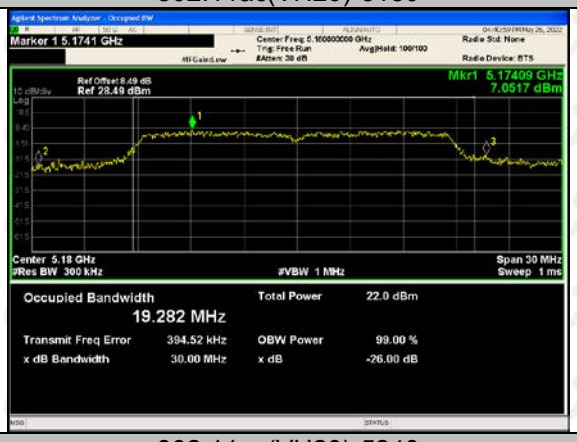
802.11ac(VH20)-5200



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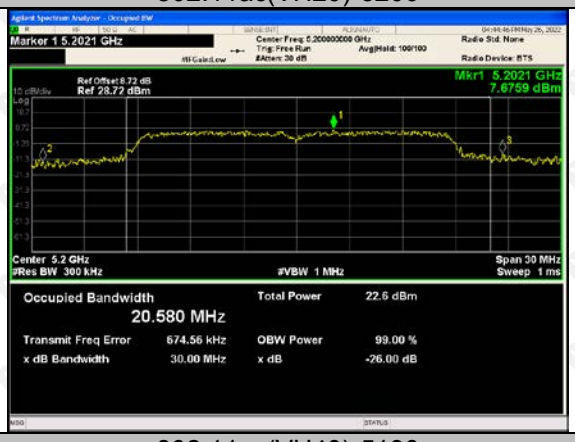

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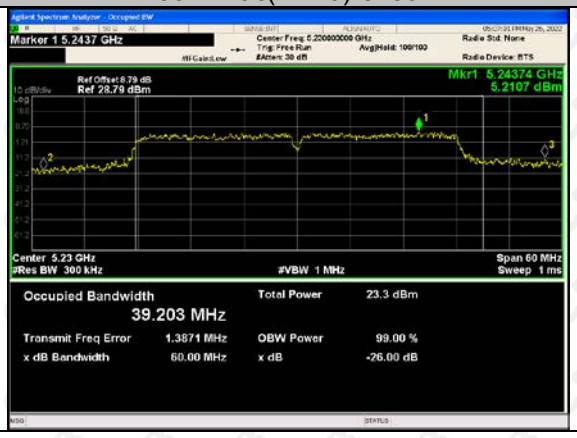
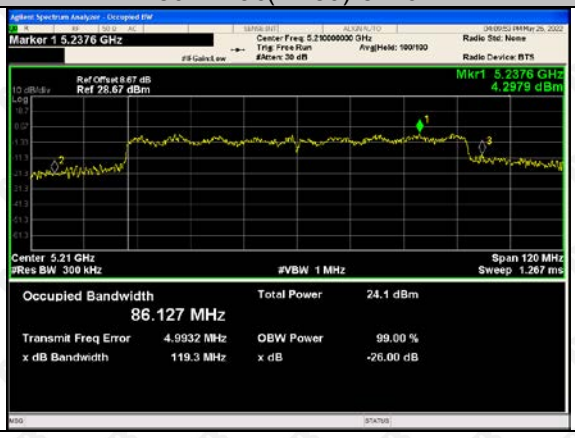
802.11ac(VH40)-5230

802.11ac(VH80)-5210





5725-5850MHz

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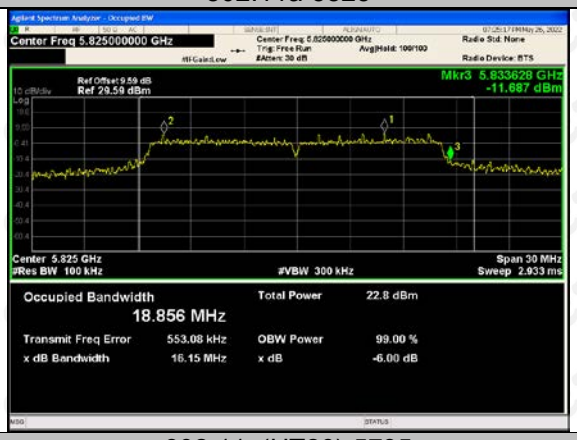
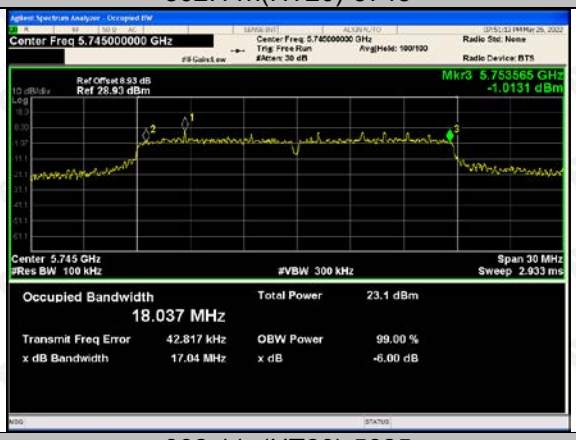
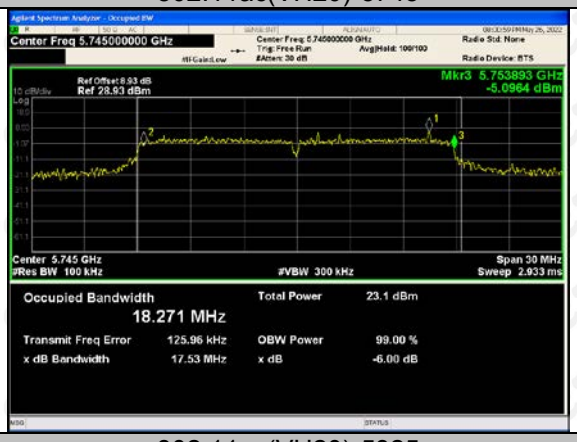
802.11a-5825	802.11n(HT20)-5745
	
802.11n(HT20)-5785	802.11n(HT20)-5825
802.11n(HT40)-5755	802.11n(HT40)-5795

802.11ac(VH20)-5745

802.11ac(VH20)-5785



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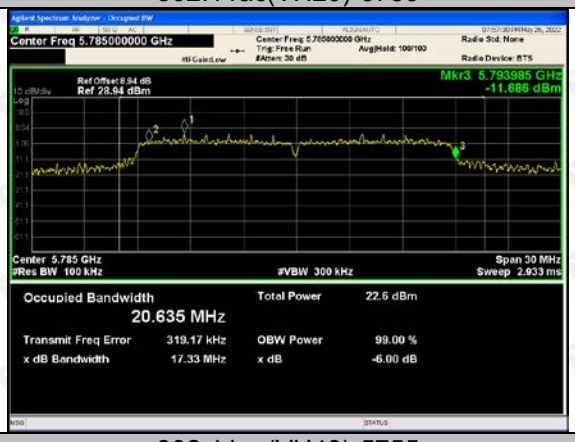

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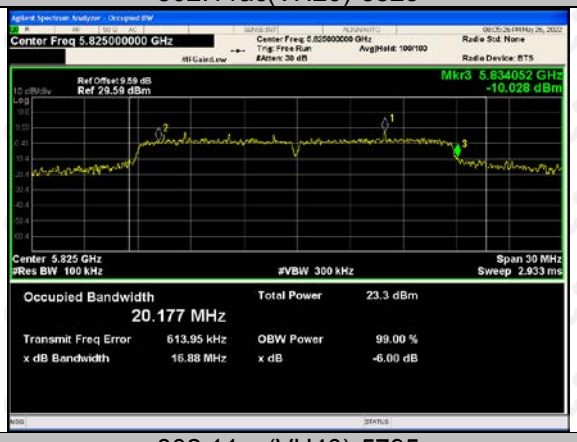

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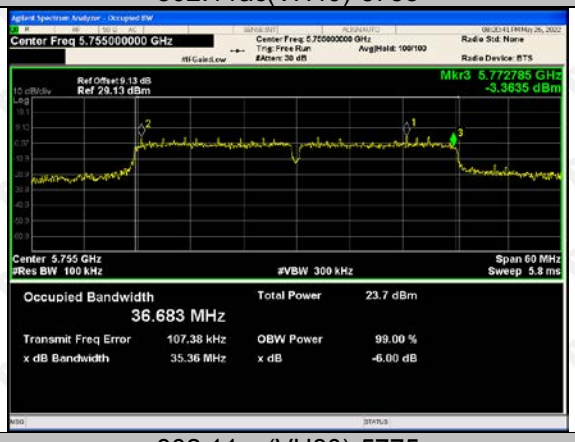
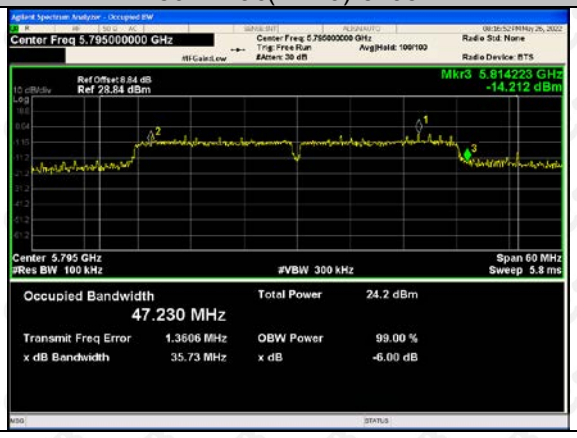
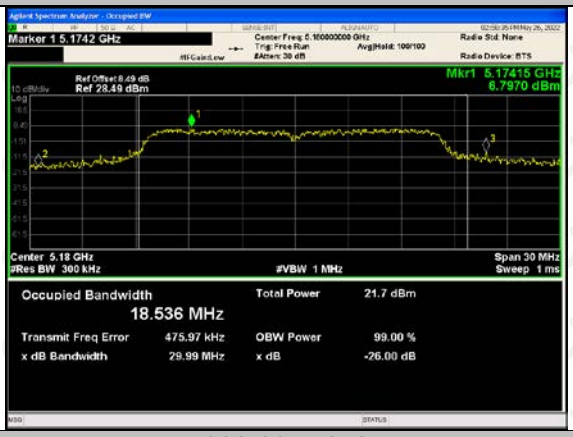


802.11ac(VH80)-5775



ANT 1

802.11a-5180



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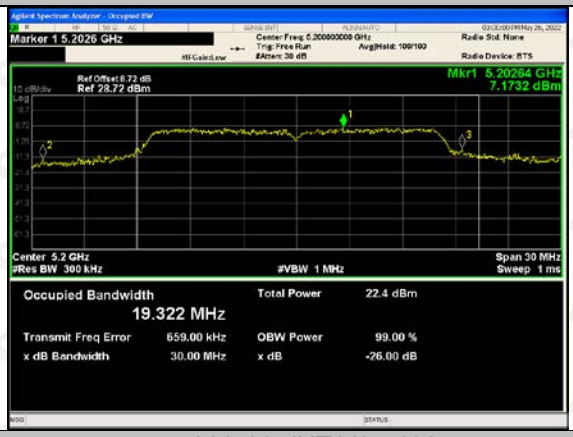
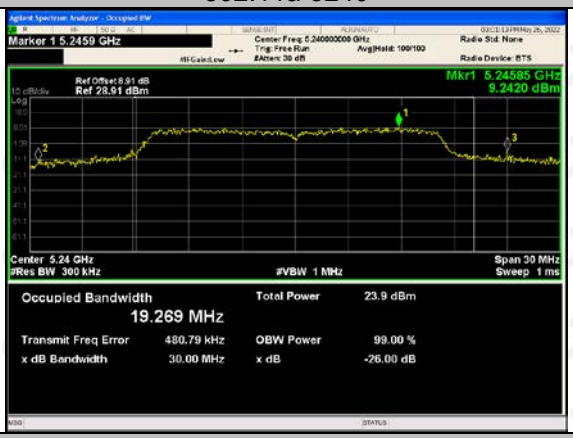


802.11a-5240



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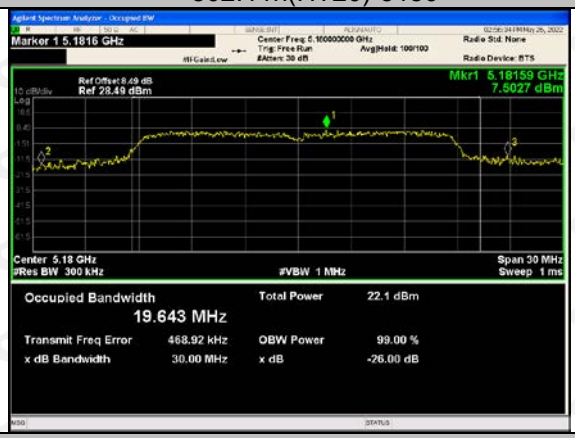

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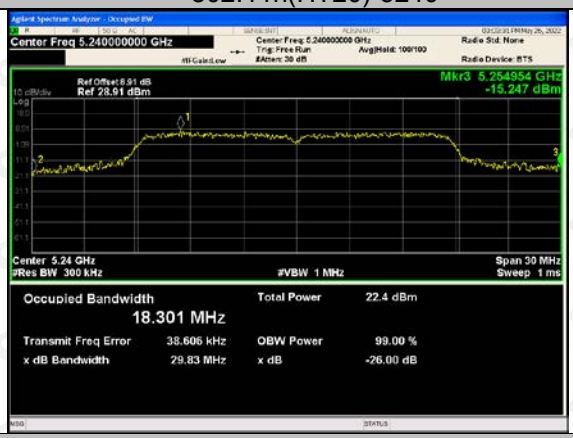
802.11n(HT20)-5240



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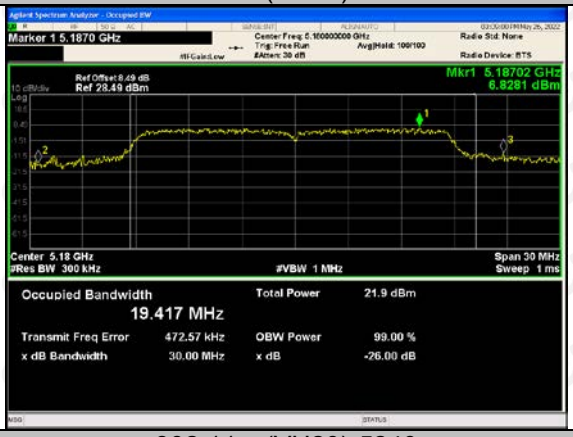
802.11n(HT40)-5230

802.11ac(VH20)-5180



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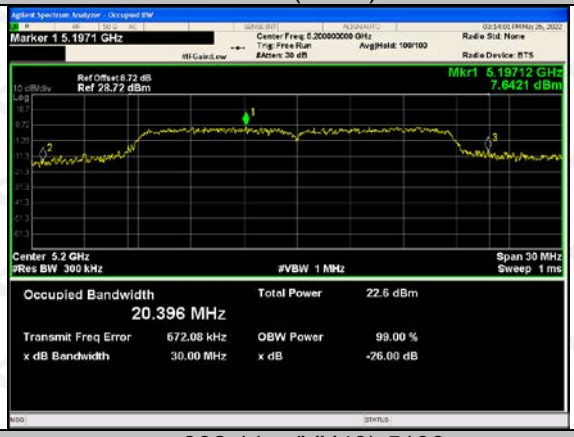

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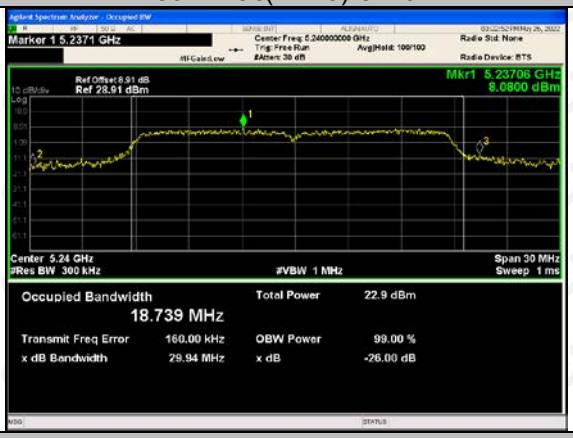

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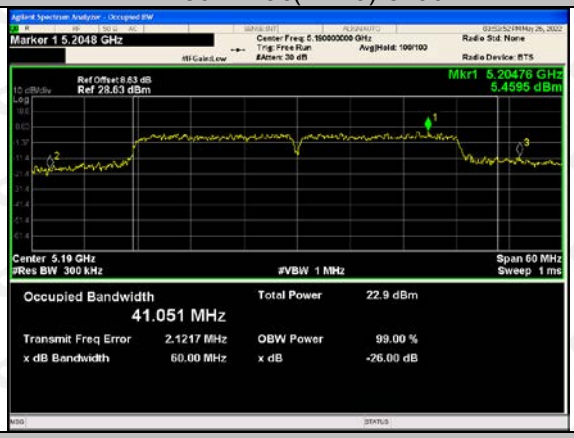

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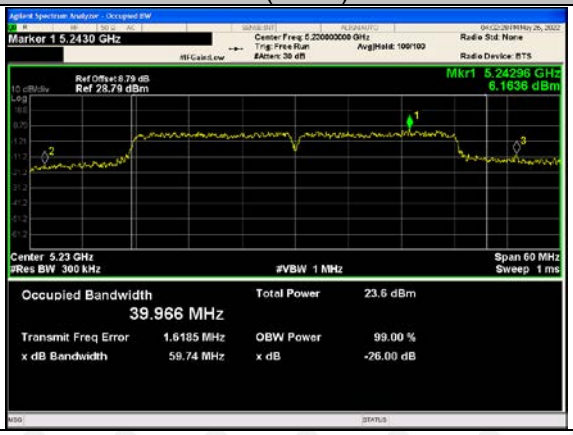

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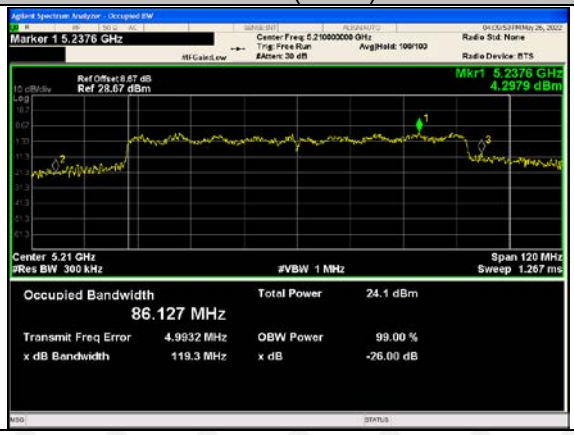
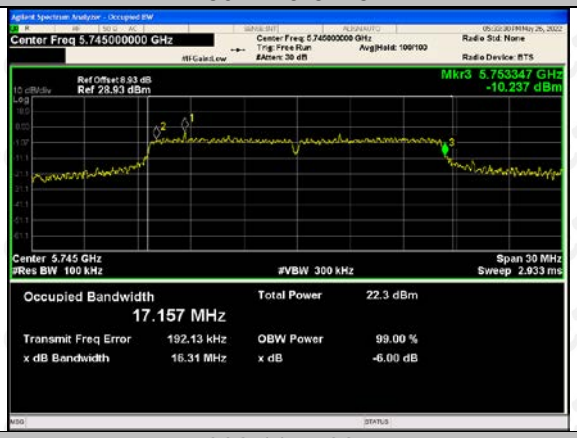
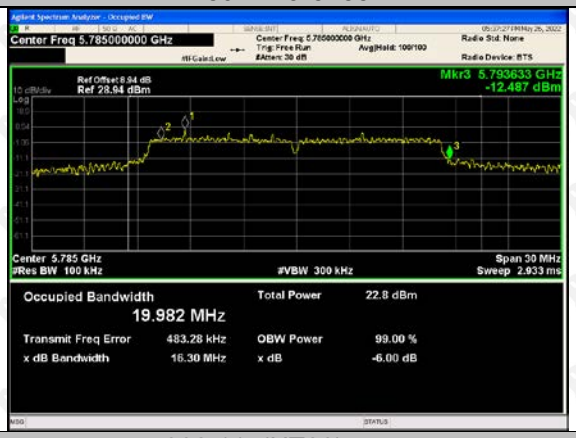


802.11a-5745	802.11a-5785
	
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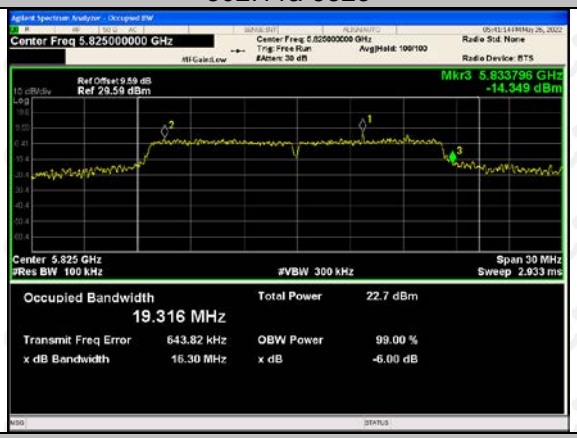	
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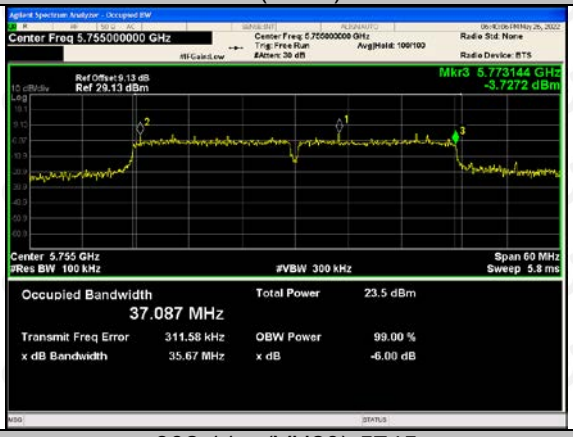
802.11n(HT40)-5755



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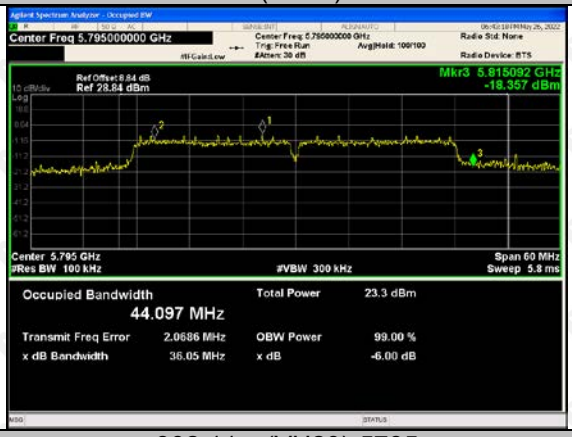

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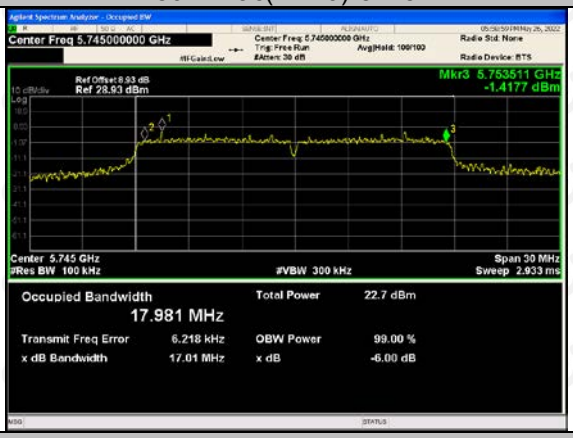

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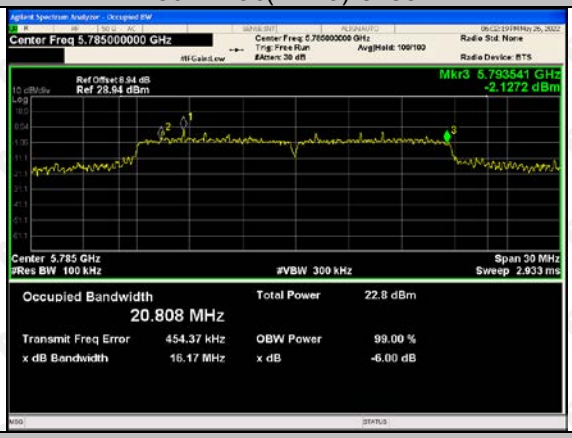


802.11ac(VH20)-5825

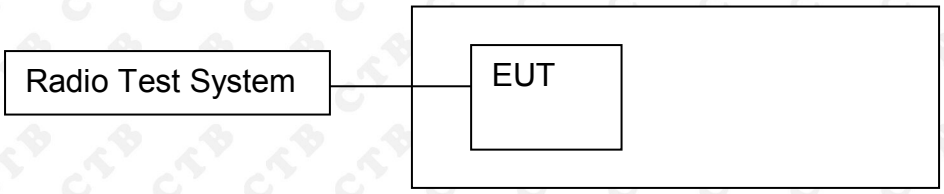
802.11ac(VH40)-5755

802.11ac(VH40)-5795

802.11ac(VH80)-5775

11. POWER SPECTRAL DENSITY

11.1 Block Diagram Of Test Setup



11.2 Limit

(1) For the band 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

11.3 Test procedure

According to KDB789033 D02v02r01 sectionE, the following is the measurement procedure.

For devices operating in the bands 5.15−5.25 GHz, 5.25−5.35 GHz, and 5.47−5.725 GHz, the preceding procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in Section 15.407(a)(5). For devices operating in the band 5.725−5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:
a) Set RBW ≥ 1/T, where T is defined in II.B.1.a).

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.
Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the II.F.5.c) and II.F.5.d), since RBW=100 kHz is available on nearly all spectrum analyzers.

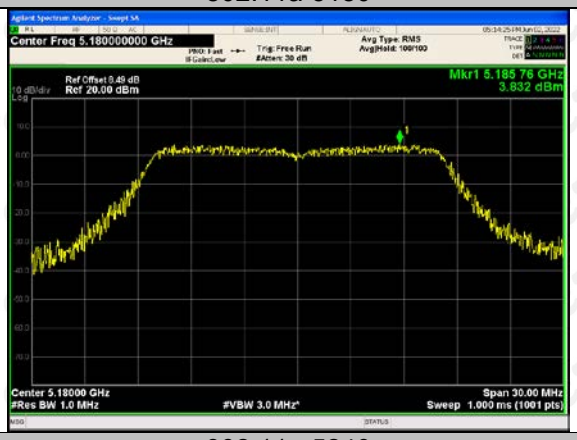
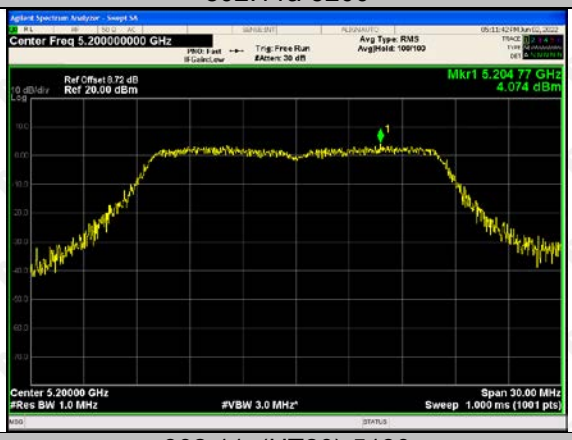
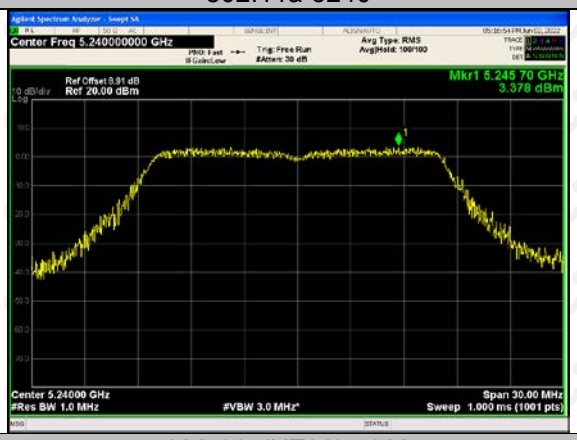
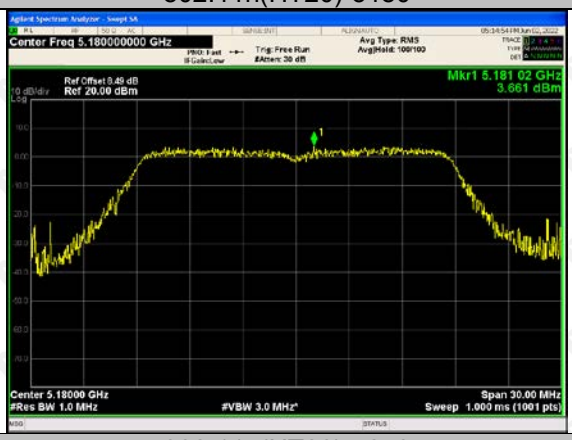
11.4 Test Result

ANT 0+1

Test mode	Test Channel (MHz)	PSD [dBm/MHz] ANT 1	PSD [dBm/MHz] ANT 2	PSD [dBm/MHz] Total	Limit (dBm)	Result
802.11a	5180	3.832	4.088	6.972	11	Pass
	5200	4.074	3.579	6.844	11	Pass
	5240	3.378	4.272	6.858	11	Pass
802.11n(HT20)	5180	3.825	3.644	6.746	11	Pass
	5200	4.008	3.274	6.667	11	Pass
	5240	3.511	4.156	6.856	11	Pass
802.11n(HT40)	5190	3.512	3.777	6.657	11	Pass
	5230	3.889	3.541	6.729	11	Pass
802.11ac(VH20)	5210	4.297	3.893	7.110	11	Pass
	5180	3.661	3.831	6.757	11	Pass
	5200	4.124	3.445	6.808	11	Pass
802.11ac(VH40)	5240	4.805	3.746	7.318	11	Pass
	5190	4.018	3.806	6.924	11	Pass
802.11ac(VH80)	5230	3.615	3.447	6.542	11	Pass

Test mode	Test Channel (MHz)	PSD [dBm/500kHz] ANT 1	PSD [dBm/500kHz] ANT 2	PSD [dBm/500kHz] Total	Limit (dBm)	Result
802.11a	5745	9.278	8.951	12.128	30	Pass
	5785	8.517	8.745	11.643	30	Pass
	5825	9.039	9.846	12.472	30	Pass
802.11n(HT20)	5745	9.234	8.237	11.774	30	Pass
	5785	8.656	8.53	11.604	30	Pass
	5825	9.114	8.892	12.015	30	Pass
802.11n(HT40)	5755	6.277	6.235	9.266	30	Pass
	5795	6.495	6.867	9.695	30	Pass
802.11ac(VH20)	5745	5.303	4.827	8.082	30	Pass
	5785	9.271	8.899	12.099	30	Pass
	5825	8.703	9.413	12.083	30	Pass
802.11ac(VH40)	5755	9.143	9.522	12.347	30	Pass
	5795	5.738	6.296	9.036	30	Pass
802.11ac(VH80)	5775	6.587	6.057	9.340	30	Pass

ANT 0

802.11a-5180	802.11a-5200
	
802.11a-5240	802.11n(HT20)-5180
	
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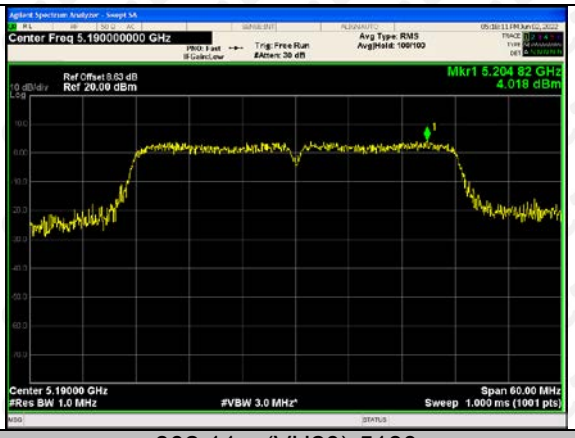
802.11n(HT40)-5190	802.11n(HT40)-5230



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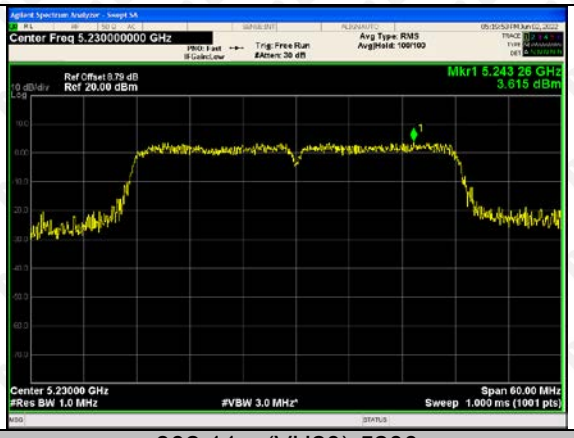

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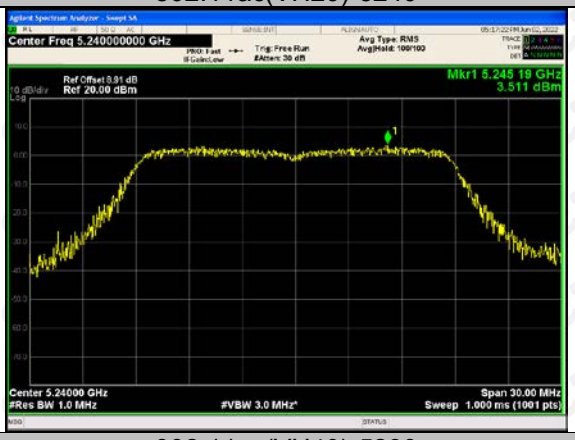
802.11ac(VH20)-5240

802.11ac(VH40)-5190



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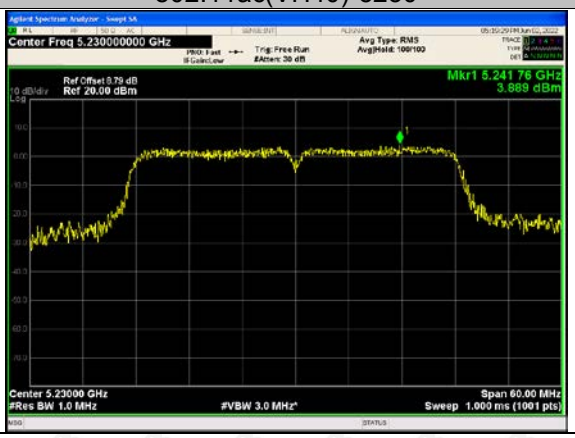
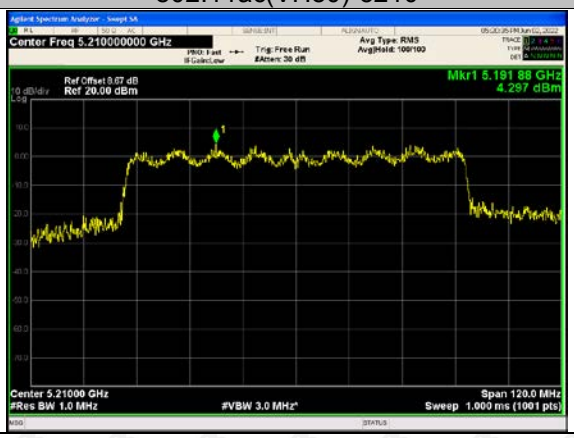
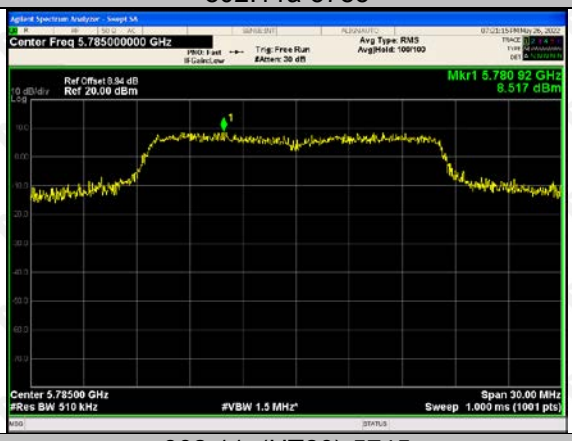
802.11ac(VH80)-5210



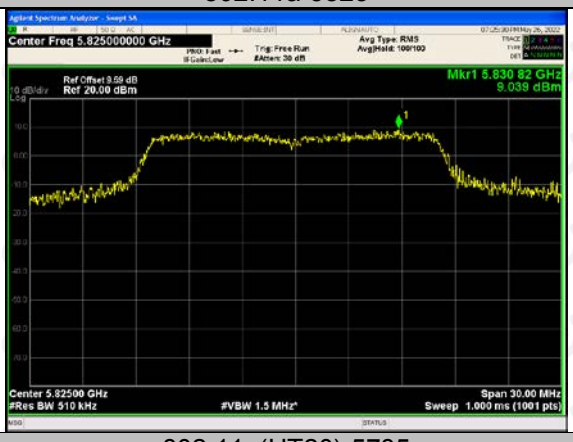


802.11a-5745

802.11a-5785



802.11a-5825



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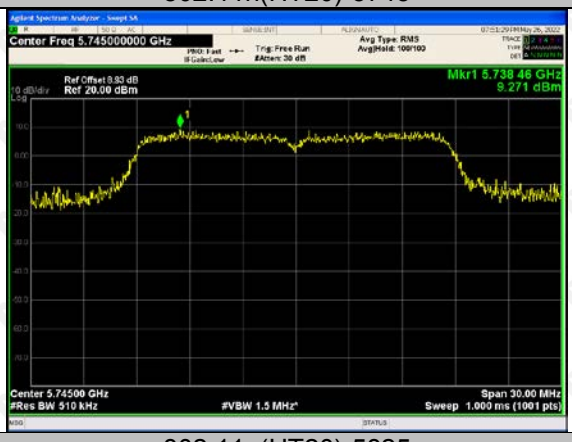

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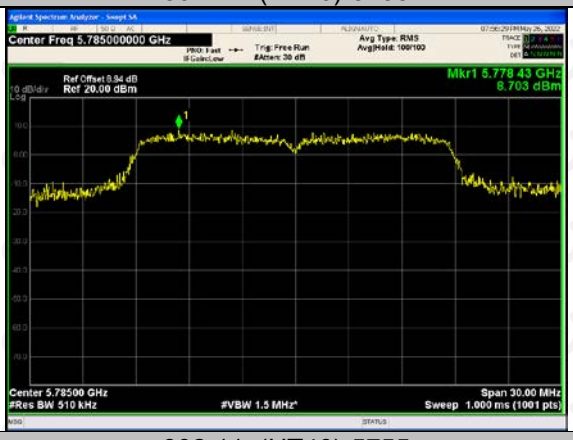

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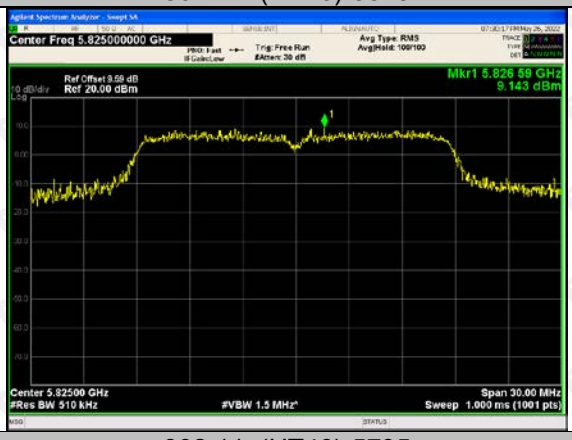

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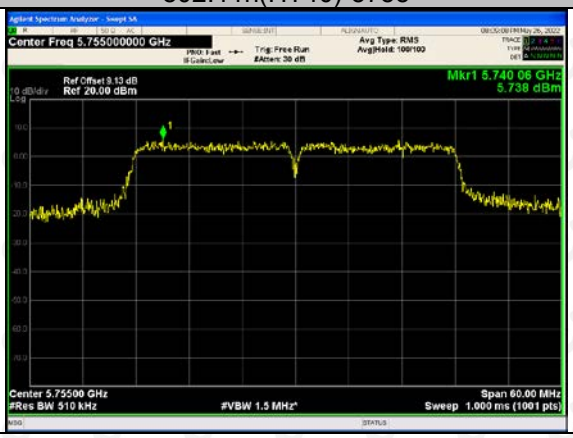

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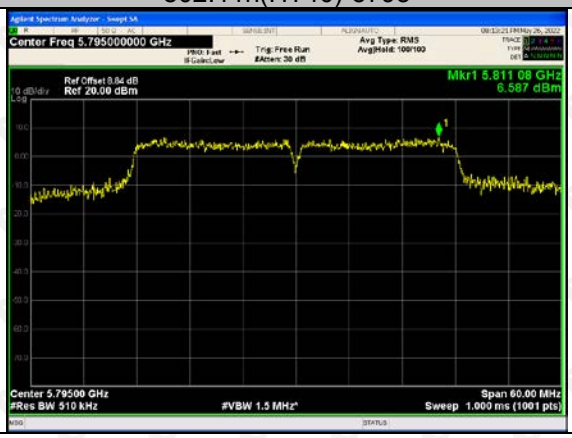
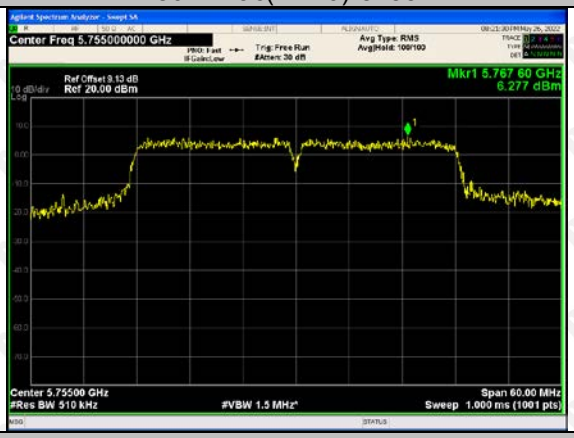


802.11ac(VH20)-5745

802.11ac(VH20)-5785

802.11ac(VH20)-5825

802.11ac(VH40)-5755



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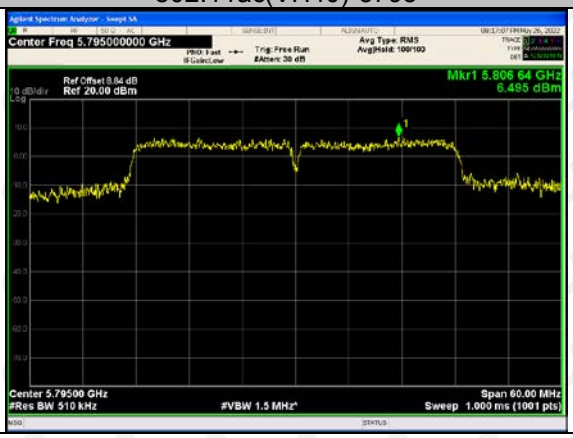

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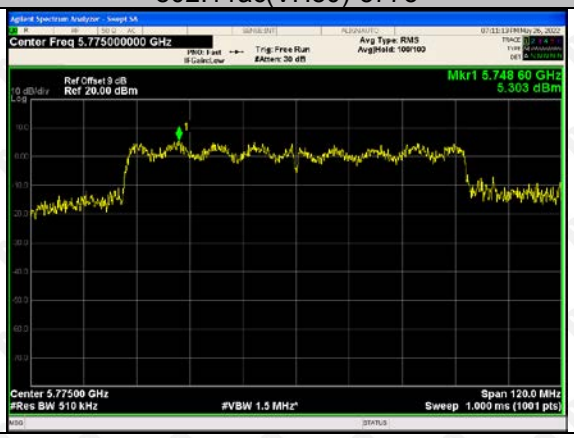
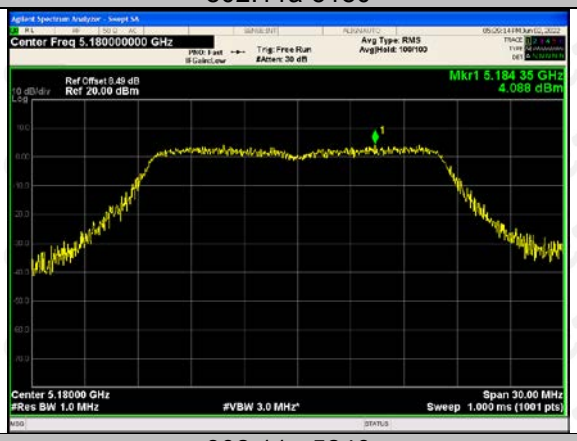


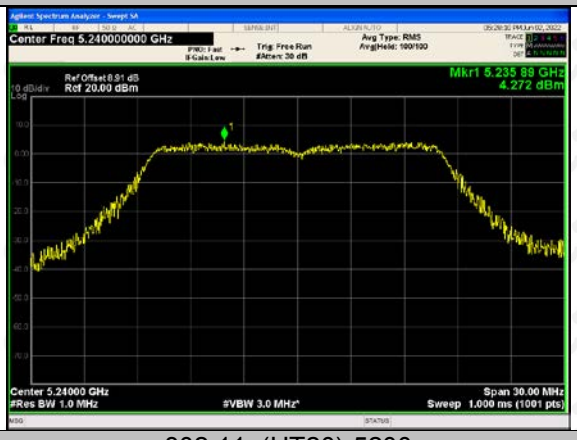
ANT 1

802.11a-5180



802.11a-5200

802.11a-5240

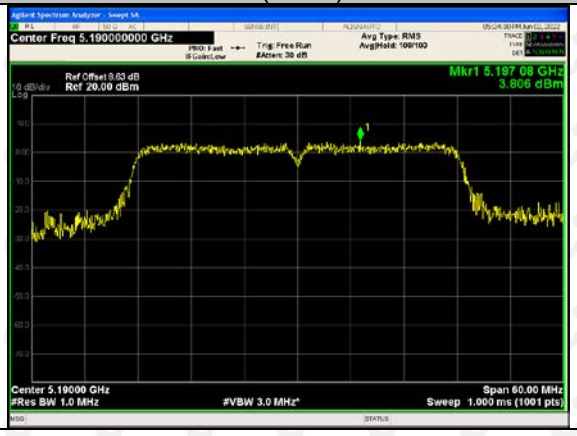


802.11n(HT20)-5180

802.11n(HT20)-5200

802.11n(HT20)-5240

802.11n(HT40)-5190



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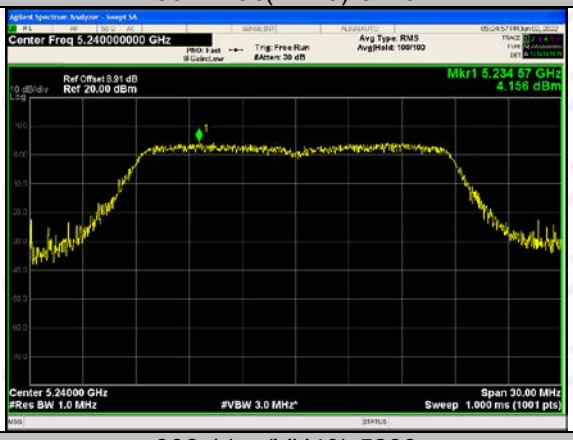
802.11ac(VH20)-5240	802.11ac(VH40)-5190
	
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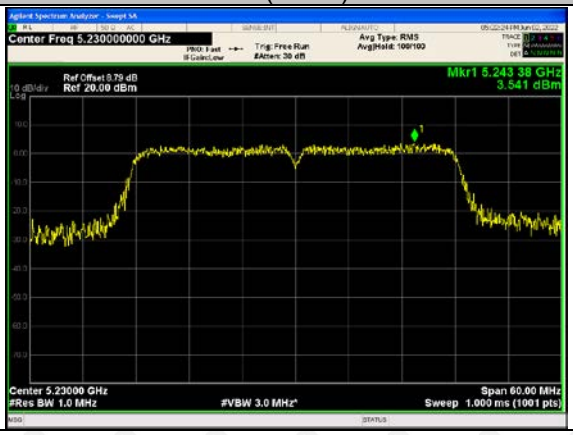	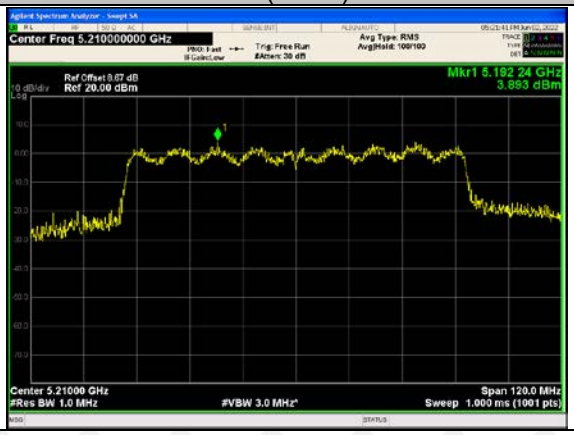

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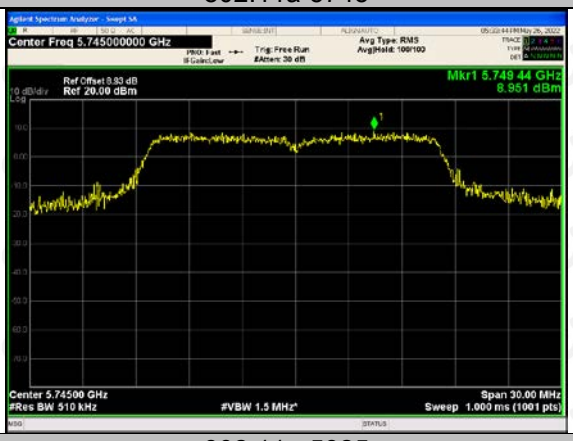
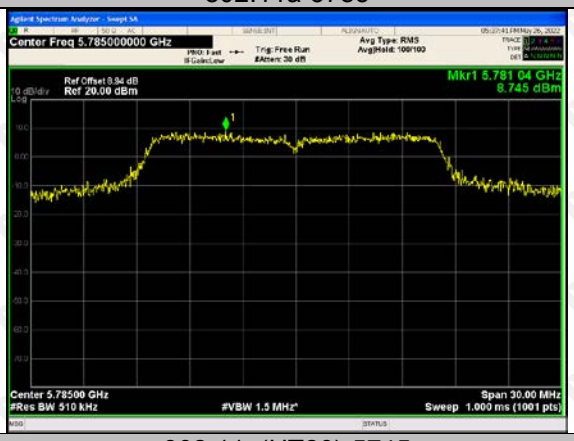
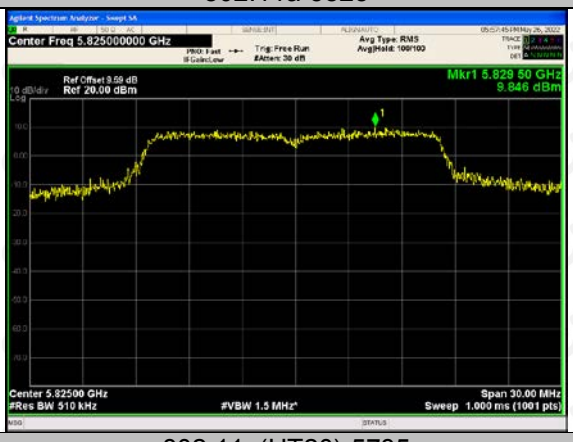


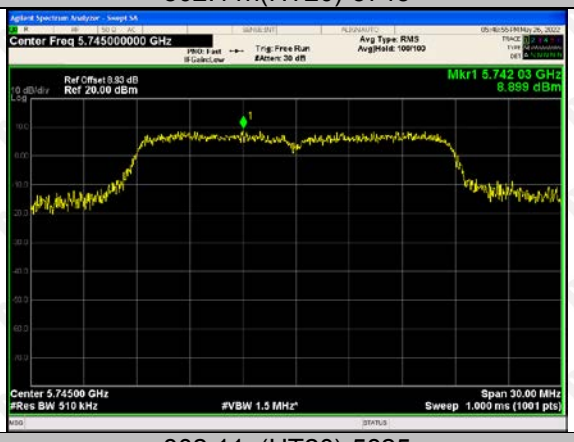
802.11a-5785



802.11a-5825



802.11n(HT20)-5745



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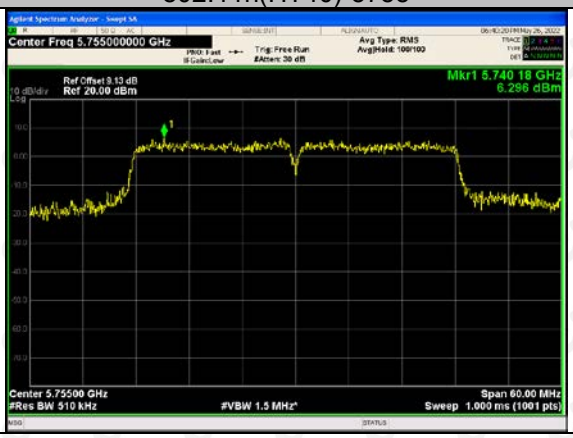
802.11n(HT20)-5825

802.11n(HT40)-5755



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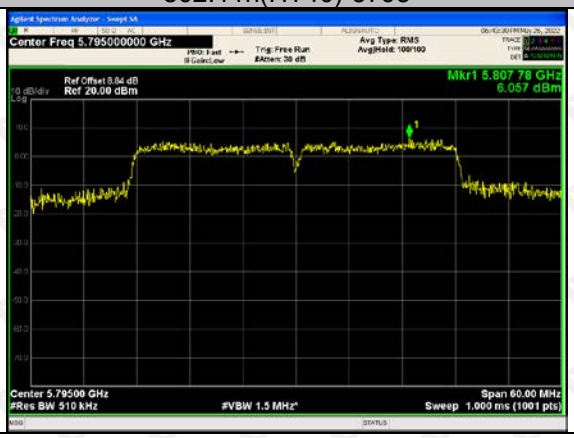
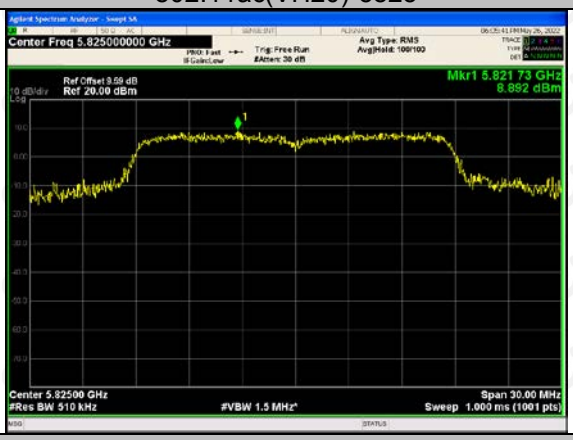


802.11ac(VH20)-5745

802.11ac(VH20)-5785

802.11ac(VH20)-5825



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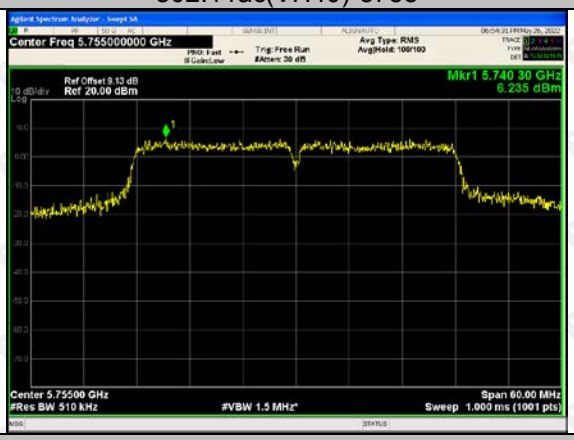
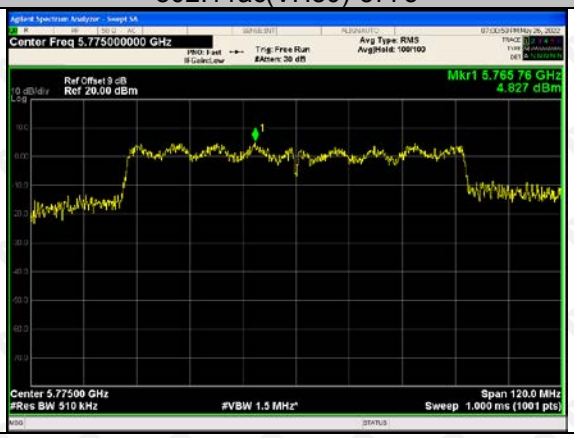


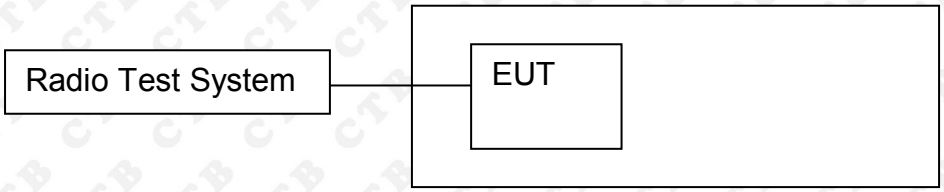
802.11ac(VH40)-5795

802.11ac(VH80)-5775



12. FREQUENCY STABILITY

12.1 Block Diagram Of Test Setup



12.2 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 user's manual.

12.3 Test procedure

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.

2. Set EUT as normal operation.

3. Turn the EUT on and couple its output to spectrum.

4. Turn the EUT off and set the chamber to the highest temperature specified.

5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.

6. Repeat step with the temperature chamber set to the lowest temperature.

12.4 Test Result

ANT0:

TX Frequency (5180-5240MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5180.0357	5180	0.0357	6.8919
		V max (V)	132	5180.0388	5180	0.0388	7.4903
		V min (V)	108	5180.0369	5180	0.0369	7.1236
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	-20	5180.0368	5180	0.0368	7.1042
		T (°C)	-10	5180.0377	5180	0.0377	7.2780
		T (°C)	0	5180.0320	5180	0.0320	6.1776
		T (°C)	10	5180.0301	5180	0.0301	5.8108
		T (°C)	20	5180.0398	5180	0.0398	7.6834
		T (°C)	30	5180.0333	5180	0.0333	6.4286
		T (°C)	40	5180.0378	5180	0.0378	7.2973
		T (°C)	50	5180.0369	5180	0.0369	7.1236
		T (°C)	60	5180.0322	5180	0.0322	6.2162
		T (°C)	70	5180.0362	5180	0.0362	6.9884
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5200.0336	5200	0.0336	6.4615
		V max (V)	132	5200.0378	5200	0.0378	7.2692
		V min (V)	108	5200.0301	5200	0.0301	5.7885
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	-20	5200.0366	5200	0.0366	7.0385
		T (°C)	-10	5200.0302	5200	0.0302	5.8077
		T (°C)	0	5200.0359	5200	0.0359	6.9038
		T (°C)	10	5200.0340	5200	0.0340	6.5385
		T (°C)	20	5200.0354	5200	0.0354	6.8077
		T (°C)	30	5200.0320	5200	0.0320	6.1538
		T (°C)	40	5200.0347	5200	0.0347	6.6731
		T (°C)	50	5200.0335	5200	0.0335	6.4423
		T (°C)	60	5200.0364	5200	0.0364	7.0000
		T (°C)	70	5200.0308	5200	0.0308	5.9231
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5240.0337	5240	0.0337	6.4313
		V max (V)	132	5240.0329	5240	0.0329	6.2786
		V min (V)	108	5240.0374	5240	0.0374	7.1374
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	-20	5240.0312	5240	0.0312	5.9542
		T (°C)	-10	5240.0348	5240	0.0348	6.6412
		T (°C)	0	5240.0378	5240	0.0378	7.2137
		T (°C)	10	5240.0370	5240	0.0370	7.0611
		T (°C)	20	5240.0323	5240	0.0323	6.1641
		T (°C)	30	5240.0398	5240	0.0398	7.5954
		T (°C)	40	5240.0341	5240	0.0341	6.5076
		T (°C)	50	5240.0351	5240	0.0351	6.6985
		T (°C)	60	5240.0312	5240	0.0312	5.9542
		T (°C)	70	5240.0300	5240	0.0300	5.7252
Limits				±20ppm			
Result				Complies			

TX Frequency (5725-5850MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5745.0335	5745	0.0335	5.8312
		V max (V)	132	5745.0374	5745	0.0374	6.5100
		V min (V)	108	5745.0321	5745	0.0321	5.5875
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	-20	5745.0369	5745	0.0369	6.4230
		T (°C)	-10	5745.0322	5745	0.0322	5.6049
		T (°C)	0	5745.0312	5745	0.0312	5.4308
		T (°C)	10	5745.0374	5745	0.0374	6.5100
		T (°C)	20	5745.0333	5745	0.0333	5.7963
		T (°C)	30	5745.0357	5745	0.0357	6.2141
		T (°C)	40	5745.0389	5745	0.0389	6.7711
		T (°C)	50	5745.0369	5745	0.0369	6.4230
		T (°C)	60	5745.0335	5745	0.0335	5.8312
		T (°C)	70	5745.0377	5745	0.0377	6.5622
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5785.0345	5785	0.0345	5.9637
		V max (V)	132	5785.0326	5785	0.0326	5.6353
		V min (V)	108	5785.0366	5785	0.0366	6.3267
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	-20	5785.0355	5785	0.0355	6.1366
		T (°C)	-10	5785.0335	5785	0.0335	5.7908
		T (°C)	0	5785.0326	5785	0.0326	5.6353
		T (°C)	10	5785.0354	5785	0.0354	6.1193
		T (°C)	20	5785.0310	5785	0.0310	5.3587
		T (°C)	30	5785.0312	5785	0.0312	5.3933
		T (°C)	40	5785.0377	5785	0.0377	6.5169
		T (°C)	50	5785.0387	5785	0.0387	6.6897
		T (°C)	60	5785.0389	5785	0.0389	6.7243
		T (°C)	70	5785.0349	5785	0.0349	6.0328
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5825.0342	5825	0.0342	5.8712
		V max (V)	132	5825.0368	5825	0.0368	6.3176
		V min (V)	108	5825.0309	5825	0.0309	5.3047
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	-20	5825.0301	5825	0.0301	5.1674
		T (°C)	-10	5825.0370	5825	0.0370	6.3519
		T (°C)	0	5825.0354	5825	0.0354	6.0773
		T (°C)	10	5825.0347	5825	0.0347	5.9571
		T (°C)	20	5825.0305	5825	0.0305	5.2361
		T (°C)	30	5825.0375	5825	0.0375	6.4378
		T (°C)	40	5825.0366	5825	0.0366	6.2833
		T (°C)	50	5825.0300	5825	0.0300	5.1502
		T (°C)	60	5825.0327	5825	0.0327	5.6137
		T (°C)	70	5825.0335	5825	0.0335	5.7511
Limits				±20ppm			
Result				Complies			

ANT1:

TX Frequency (5180-5240MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5180.0357	5180	0.0357	6.8919
		V max (V)	132	5180.0377	5180	0.0377	7.2780
		V min (V)	108	5180.0352	5180	0.0352	6.7954
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	-20	5180.0341	5180	0.0341	6.5830
		T (°C)	-10	5180.0302	5180	0.0302	5.8301
		T (°C)	0	5180.0310	5180	0.0310	5.9846
		T (°C)	10	5180.0374	5180	0.0374	7.2201
		T (°C)	20	5180.0371	5180	0.0371	7.1622
		T (°C)	30	5180.0311	5180	0.0311	6.0039
		T (°C)	40	5180.0312	5180	0.0312	6.0232
		T (°C)	50	5180.0359	5180	0.0359	6.9305
		T (°C)	60	5180.0325	5180	0.0325	6.2741
		T (°C)	70	5180.0306	5180	0.0306	5.9073
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5200.0374	5200	0.0374	7.1923
		V max (V)	132	5200.0305	5200	0.0305	5.8654
		V min (V)	108	5200.0376	5200	0.0376	7.2308
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	-20	5200.0354	5200	0.0354	6.8077
		T (°C)	-10	5200.0343	5200	0.0343	6.5962
		T (°C)	0	5200.0357	5200	0.0357	6.8654
		T (°C)	10	5200.0328	5200	0.0328	6.3077
		T (°C)	20	5200.0337	5200	0.0337	6.4808
		T (°C)	30	5200.0333	5200	0.0333	6.4038
		T (°C)	40	5200.0302	5200	0.0302	5.8077
		T (°C)	50	5200.0322	5200	0.0322	6.1923
		T (°C)	60	5200.0378	5200	0.0378	7.2692
		T (°C)	70	5200.0367	5200	0.0367	7.0577
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5240.0365	5240	0.0365	6.9656
		V max (V)	132	5240.0397	5240	0.0397	7.5763
		V min (V)	108	5240.0308	5240	0.0308	5.8779
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	-20	5240.0316	5240	0.0316	6.0305
		T (°C)	-10	5240.0357	5240	0.0357	6.8130
		T (°C)	0	5240.0366	5240	0.0366	6.9847
		T (°C)	10	5240.0347	5240	0.0347	6.6221
		T (°C)	20	5240.0389	5240	0.0389	7.4237
		T (°C)	30	5240.0314	5240	0.0314	5.9924
		T (°C)	40	5240.0378	5240	0.0378	7.2137
		T (°C)	50	5240.0379	5240	0.0379	7.2328
		T (°C)	60	5240.0306	5240	0.0306	5.8397
		T (°C)	70	5240.0328	5240	0.0328	6.2595
Limits				±20ppm			
Result				Complies			

TX Frequency (5725-5850MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5745.0318	5745	0.0318	5.5352
		V max (V)	132	5745.0314	5745	0.0314	5.4656
		V min (V)	108	5745.0323	5745	0.0323	5.6223
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	-20	5745.0369	5745	0.0369	6.4230
		T (°C)	-10	5745.0304	5745	0.0304	5.2916
		T (°C)	0	5745.0315	5745	0.0315	5.4830
		T (°C)	10	5745.0377	5745	0.0377	6.5622
		T (°C)	20	5745.0388	5745	0.0388	6.7537
		T (°C)	30	5745.0371	5745	0.0371	6.4578
		T (°C)	40	5745.0360	5745	0.0360	6.2663
		T (°C)	50	5745.0311	5745	0.0311	5.4134
		T (°C)	60	5745.0342	5745	0.0342	5.9530
		T (°C)	70	5745.0378	5745	0.0378	6.5796
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5785.0357	5785	0.0357	6.1711
		V max (V)	132	5785.0352	5785	0.0352	6.0847
		V min (V)	108	5785.0395	5785	0.0395	6.8280
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	-20	5785.0344	5785	0.0344	5.9464
		T (°C)	-10	5785.0327	5785	0.0327	5.6525
		T (°C)	0	5785.0324	5785	0.0324	5.6007
		T (°C)	10	5785.0380	5785	0.0380	6.5687
		T (°C)	20	5785.0345	5785	0.0345	5.9637
		T (°C)	30	5785.0324	5785	0.0324	5.6007
		T (°C)	40	5785.0347	5785	0.0347	5.9983
		T (°C)	50	5785.0317	5785	0.0317	5.4797
		T (°C)	60	5785.0336	5785	0.0336	5.8081
		T (°C)	70	5785.0301	5785	0.0301	5.2031
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5825.0325	5825	0.0325	5.5794
		V max (V)	132	5825.0320	5825	0.0320	5.4936
		V min (V)	108	5825.0397	5825	0.0397	6.8155
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	-20	5825.0333	5825	0.0333	5.7167
		T (°C)	-10	5825.0322	5825	0.0322	5.5279
		T (°C)	0	5825.0389	5825	0.0389	6.6781
		T (°C)	10	5825.0376	5825	0.0376	6.4549
		T (°C)	20	5825.0345	5825	0.0345	5.9210
		T (°C)	30	5825.0387	5825	0.0387	6.6438
		T (°C)	40	5825.0335	5825	0.0335	5.7511
		T (°C)	50	5825.0388	5825	0.0388	6.6609
		T (°C)	60	5825.0358	5825	0.0358	6.1459
		T (°C)	70	5825.0304	5825	0.0304	5.2189
Limits				±20ppm			
Result				Complies			

13. OPERATION IN THE ABSENCE OF INFORMATION TO THE TRANSMIT

13.1 Requirement

15.407(c) requirement:
The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signal ling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

13.2 Test Results

Operation in the absence of information to the transmit:

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling
signal of ASK message transmitting from remote device and verify whether it shall resend or
discontinue transmission. (manufacturer declare)

14. ANTENNA REQUIREMENT

15.203 requirement:

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is External Antenna and no consideration of replacement. The best case gain of the antenna is 1.0dBi.

15. EUT PHOTOGRAPHS

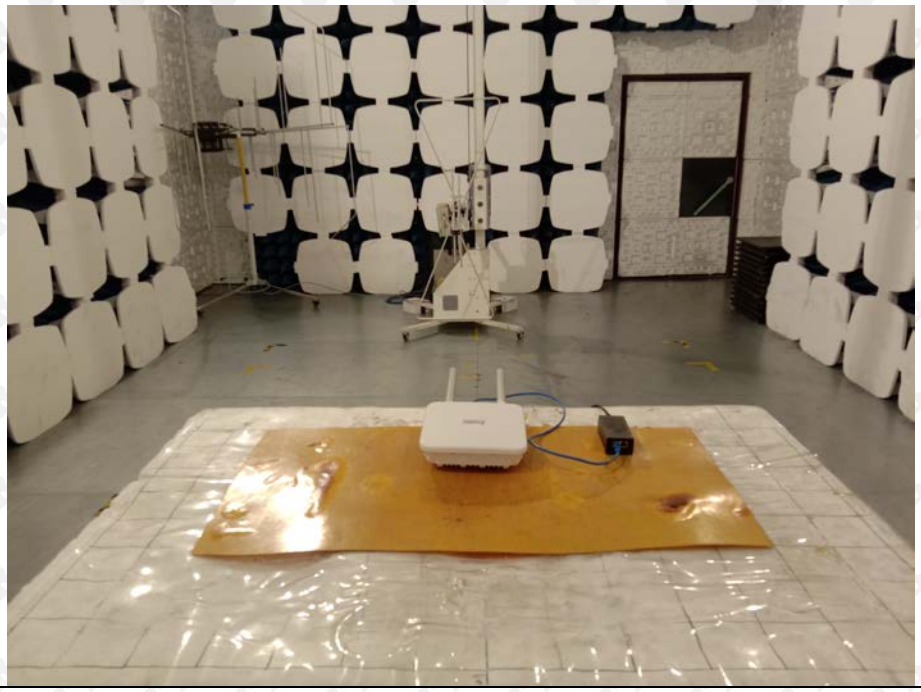
EUT Photo 1

EUT Photo 2

16. EUT TEST SETUP PHOTOGRAPHS

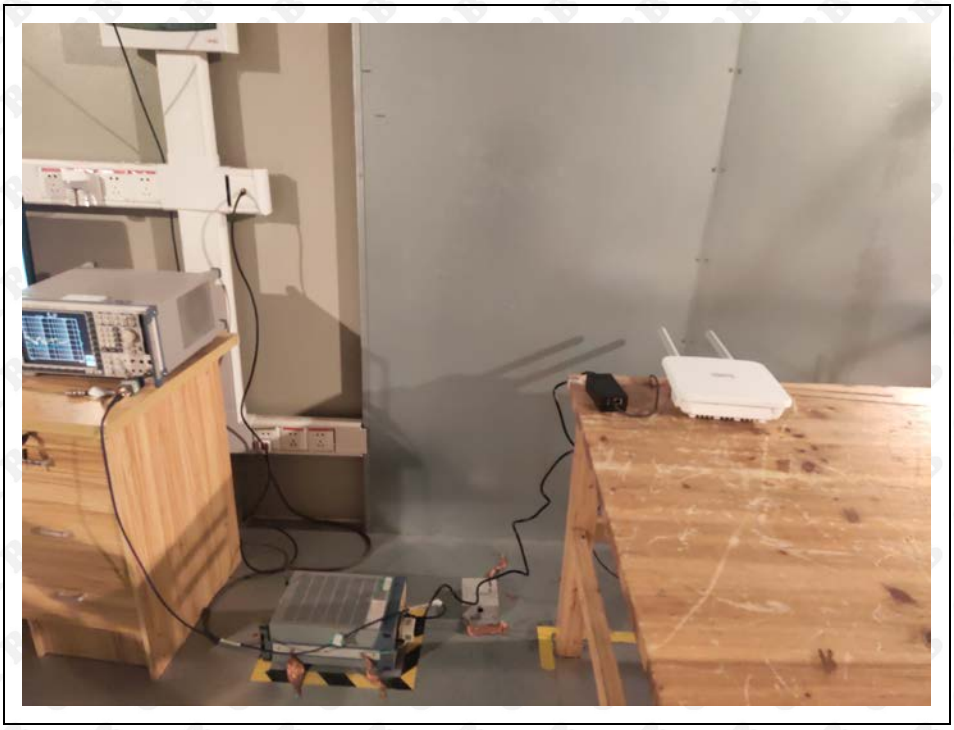
Spurious emissions

Below 1G



Above 1GHz

Conducted Emission



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