

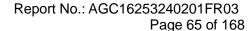
Test Graph 802.11ax40 ANT2 2422 MCS0 DTSBW

x dB

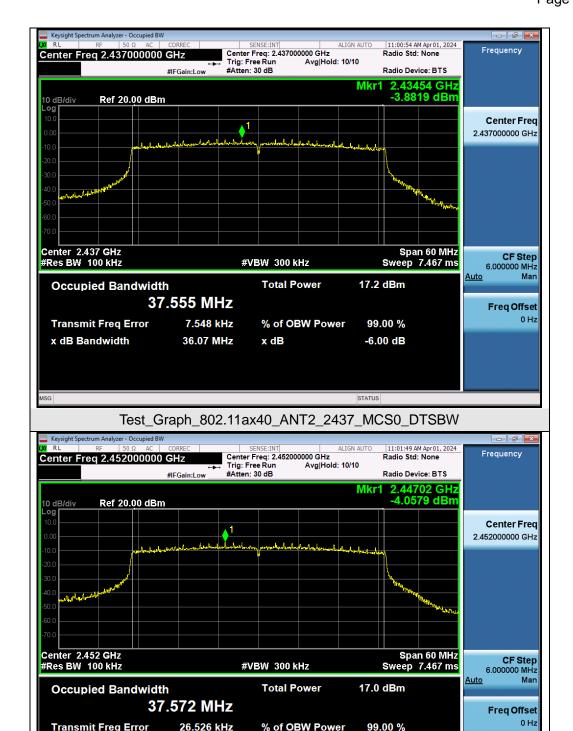
-6.00 dB

35.77 MHz

x dB Bandwidth







Test Graph 802.11ax40 ANT2 2452 MCS0 DTSBW

x dB

-6.00 dB

35.89 MHz

x dB Bandwidth



Report No.: AGC16253240201FR03

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9. Power Spectral Density Measurement

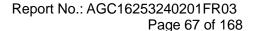
9.1 Provisions Applicable

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

9.2 Measurement Procedure

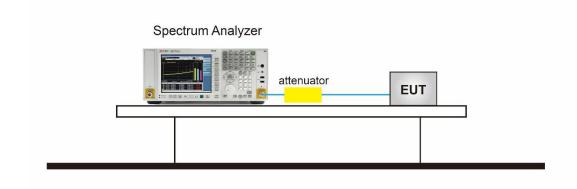
⊠For Peak power spectral density test:

- 1. The testing follows the ANSI C63.10 Section 11.10.2 Method PKPSD.
- 2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 3. Set the RBW = 20 kHz.
- 4. Set the VBW \geq [3 × RBW].
- 5. Set the Span ≥ [1.5 × DTS bandwidth].
- 6. Sweep time=Auto couple.
- 7. Detector function=Peak.
- 8. Trace Mode=Max hold.
- When the measurement bandwidth of Maximum PSD is specified in 3 kHz, add a constant factor 10*log(3kHz/20kHz) = -8.23 dB to the measured result.
- 10. Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission.
- 11. The indicated level is the peak output power, after any corrections for external attenuators and cables.
- For Average power spectral density test:
- 1. The testing follows the ANSI C63.10 Section 11.10.5 Method AVPSD.
- 2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
- 3. Set Span to at least 1.5 times the OBW.
- 4. Set RBW to:3 kHz ≤ RBW ≤ 100 kHz.
- 5. Set VBW≥[3×RBW].
- 6. Sweep Time=Auto couple.
- 7. Detector function=RMS (i.e., power averaging).
- 8. Trace average at least 100 traces in power averaging (rms) mode.
- 9. When the measurement bandwidth of Maximum PSD is specified in 3 kHz, add a constant factor 10*log(3kHz/20kHz) = -8.23 dB to the measured result.
- 10. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
- 11. Add [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is 25%.
- 12. Record the test results in the report.



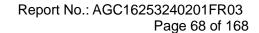


9.3 Measurement Setup (Block Diagram of Configuration)



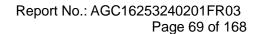
9.4 Measurement Result

Test Data of Conducted Output Power Spectral Density-ANT 1						
Test Mode	Test Frequency (MHz)	Power Spectral density (dBm/20kHz)	Power Spectral density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail	
	2412	0.375	-7.864	≪8	Pass	
802.11b	2437	1.174	-7.065	≪8	Pass	
	2462	1.104	-7.135	≪8	Pass	
802.11g	2412	-3.962	-12.201	≪8	Pass	
	2437	-4.324	-12.563	≪8	Pass	
	2462	-3.896	-12.135	≪8	Pass	
802.11n20	2412	-4.202	-12.441	≪8	Pass	
	2437	-3.399	-11.638	≪8	Pass	
	2462	-3.253	-11.492	≪8	Pass	
802.11n40	2422	-7.698	-15.937	≪8	Pass	
	2437	-7.630	-15.869	≪8	Pass	
	2452	-7.078	-15.317	≤8	Pass	
802.11ax20	2412	-4.775	-13.014	≪8	Pass	
	2437	-4.740	-12.979	≪8	Pass	
	2462	-5.759	-13.998	≤8	Pass	
802.11ax40	2422	-8.574	-16.813	≤8	Pass	
	2437	-8.343	-16.582	≤8	Pass	
	2452	-8.080	-16.319	≪8	Pass	





Test Data of Conducted Output Power Spectral Density-ANT 2						
Test Mode	Test Frequency (MHz)	Power Spectral density (dBm/20kHz)	Power Spectral density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail	
	2412	0.962	-7.277	≤8	Pass	
802.11b	2437	4.240	-3.999	≪8	Pass	
	2462	0.851	-7.388	≪8	Pass	
	2412	-3.850	-12.089	≪8	Pass	
802.11g	2437	-3.837	-12.076	≪8	Pass	
	2462	-3.352	-11.591	≤8	Pass	
802.11n20	2412	-3.654	-11.893	≤8	Pass	
	2437	-3.573	-11.812	≤8	Pass	
	2462	-3.690	-11.929	≤8	Pass	
	2422	-6.547	-14.786	≤8	Pass	
802.11n40	2437	-6.658	-14.897	≤8	Pass	
	2452	-6.026	-14.265	≤8	Pass	
802.11ax20	2412	-4.508	-12.747	≤8	Pass	
	2437	-4.315	-12.554	≤8	Pass	
	2462	-4.503	-12.742	≤8	Pass	
802.11ax40	2422	-8.051	-16.29	≤8	Pass	
	2437	-8.013	-16.252	≤8	Pass	
	2452	-7.706	-15.945	≪8	Pass	

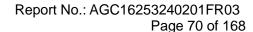




Test Data of Conducted Output Power Spectral Density-MIMO						
Test Mode	Test Frequency (MHz)	Power Spectral density (dBm/20kHz)	Power Spectral density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail	
802.11n20	2412	-1.629	-9.868	≤7.38	Pass	
	2437	-1.512	-9.751	≤7.38	Pass	
	2462	-2.075	-10.314	≤7.38	Pass	
802.11n40	2422	-5.294	-13.533	≤7.38	Pass	
	2437	-5.165	-13.404	≤7.38	Pass	
	2452	-4.879	-13.118	≤7.38	Pass	
802.11ax20	2412	-0.909	-9.148	≤7.38	Pass	
	2437	-0.475	-8.714	≤7.38	Pass	
	2462	-0.456	-8.695	≤7.38	Pass	
802.11ax40	2422	-4.074	-12.313	≤7.38	Pass	
	2437	-4.107	-12.346	≤7.38	Pass	
	2452	-3.51	-11.749	≤7.38	Pass	

Note:

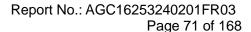
^{1.} The Total Power Spectral Density (dBm) = $10*\log \{10^{(Ant1 PSD/10)} + 10^{(Ant2 PSD/10)}\}$.





Test Graphs of Conducted Output Power Spectral Density

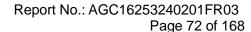








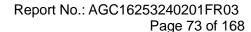
Start Fred 2.397839250 GHz Stop Freq 2.426160750 GHz Michigan **CF Step** 2.832150 MHz <u>Auto</u> Mar Freq Offset 0 Hz Scale Type Center 2.41200 GHz #Res BW 20 kHz Span 28.32 MHz Sweep 67.53 ms (1000 pts) Log #VBW 62 kHz Test_Graph_802.11g_ANT1_2412_6Mbps_PSD



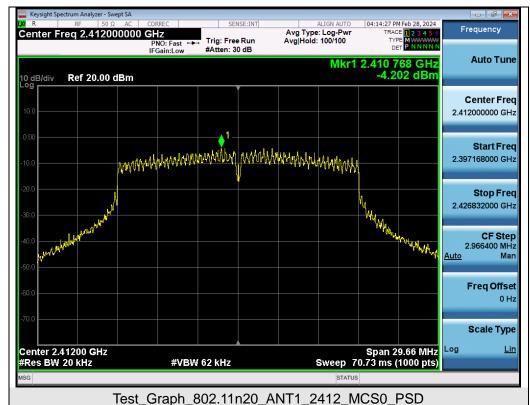


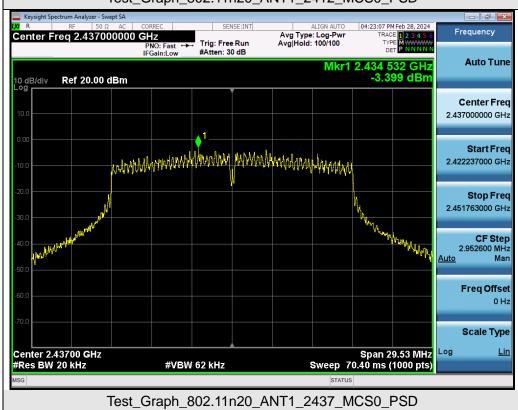


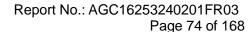




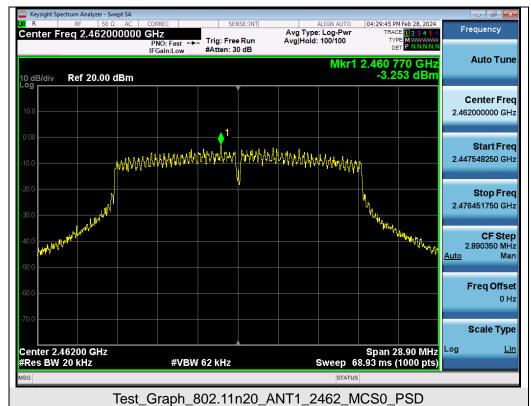


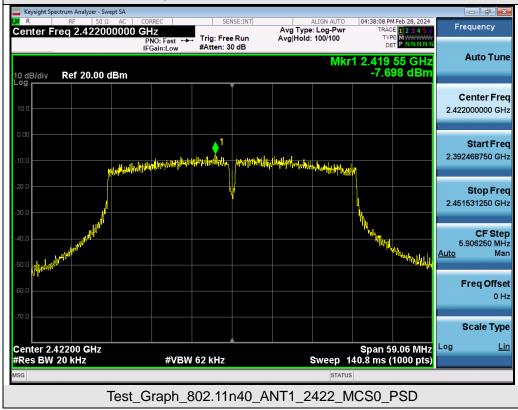


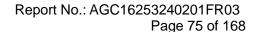






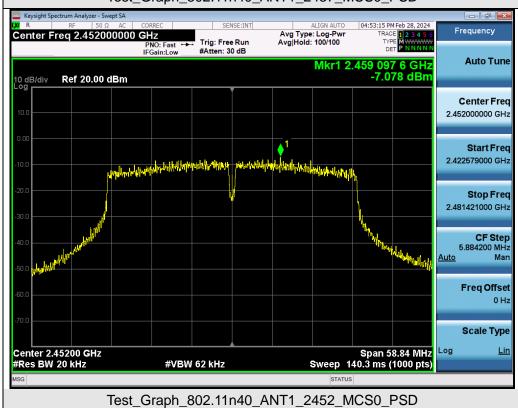


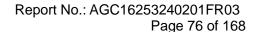








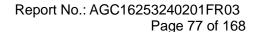




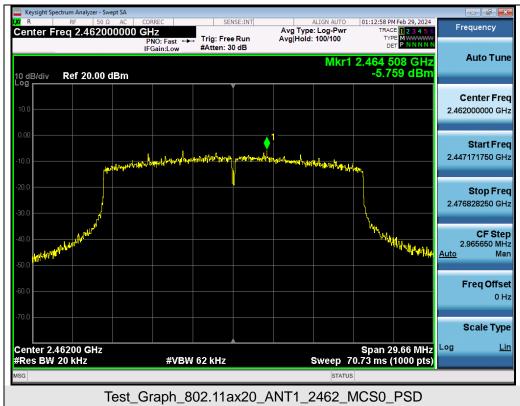


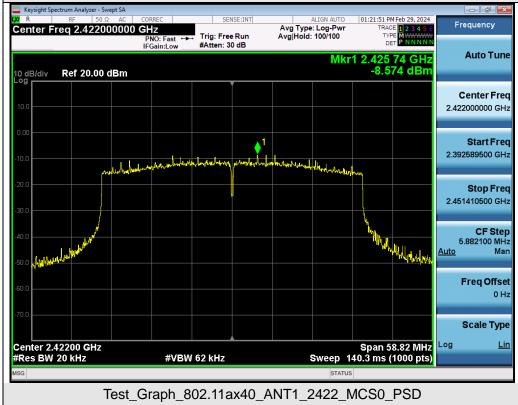


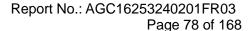












5.859750 MHz

Freq Offset 0 Hz

Scale Type

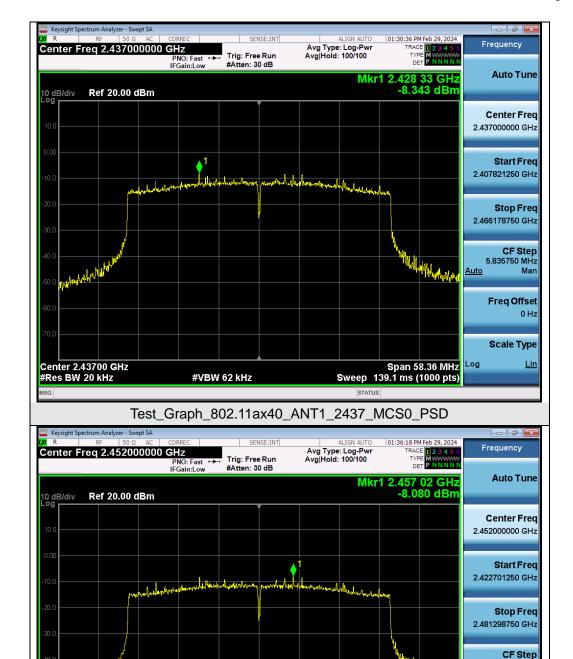
Mar

<u>Auto</u>

Log

Span 58.60 MHz Sweep 139.7 ms (1000 pts)



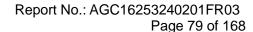


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Test_Graph_802.11ax40_ANT1_2452_MCS0_PSD

#VBW 62 kHz

Center 2.45200 GHz #Res BW 20 kHz



Stop Freq 2.447764000 GHz

CF Step 2.152800 MHz Man

Freq Offset

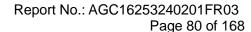
<u>Auto</u>





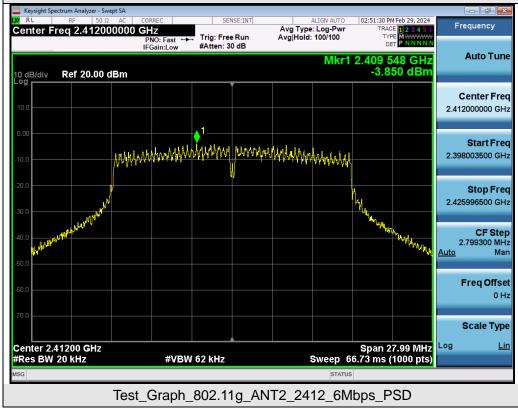
Center 2.43700 GHz
#Res BW 20 kHz #VBW 62 kHz Sweep 51.35 ms (1000 pts)

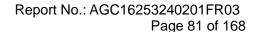
Test_Graph_802.11b_ANT2_2437_1Mbps_PSD



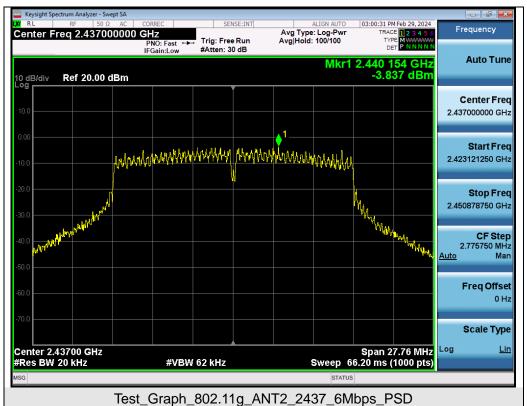




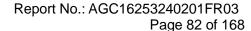




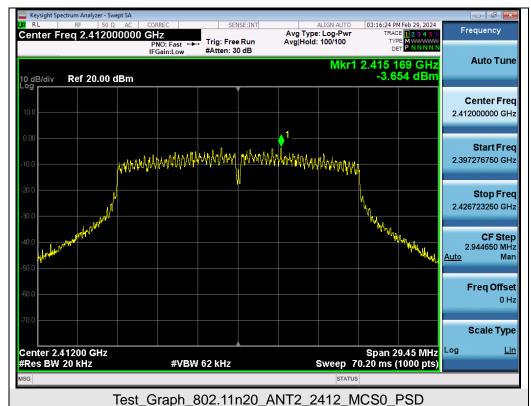


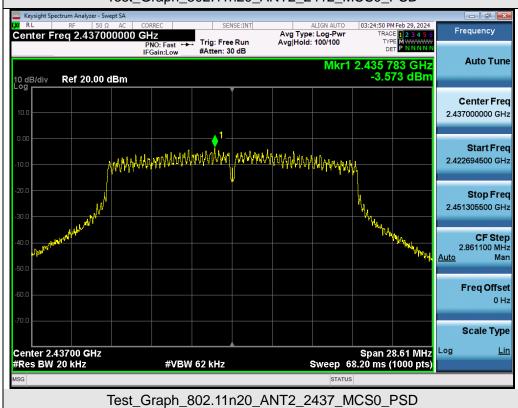


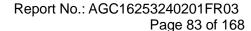




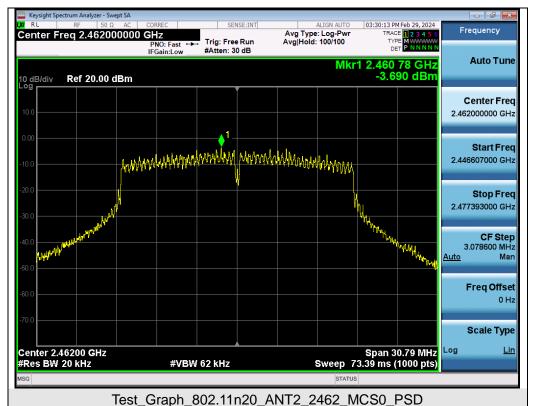




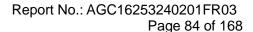






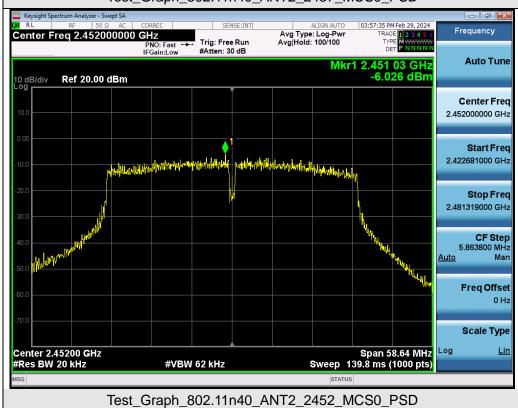


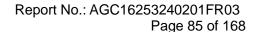






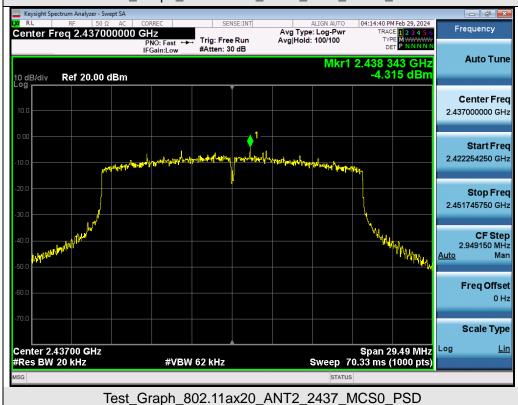


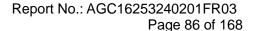




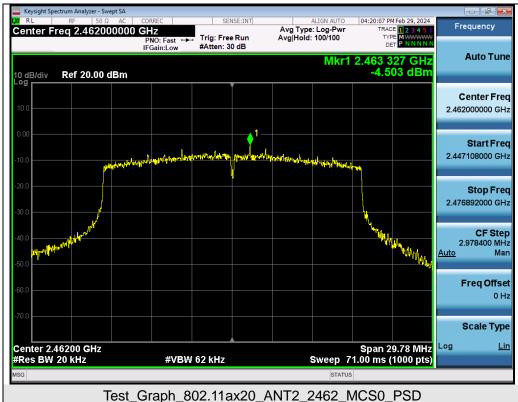




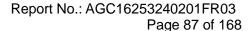




















10. Conducted Band Edge and Out-of-Band Emissions

10.1 Provisions Applicable

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

10.2 Measurement Procedure

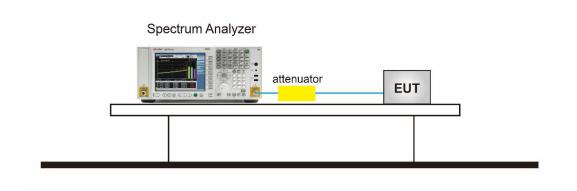
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

- Step 1: Measurement Procedure In-Band Reference Level
 - 1. Set instrument center frequency to DTS channel center frequency.
 - 2. Set the span to ≥ 1.5 times the DTS bandwidth.
 - 3. Set the RBW = 100 kHz.
 - 4. Set the VBW \geq 3 x RBW.
 - Detector = peak.
 - 6. Sweep time = auto couple.
 - 7. Trace mode = max hold.
 - 8. Allow trace to fully stabilize.
 - 9. Use the peak marker function to determine the maximum PSD level.
 - 10. Note that the channel found to contain the maximum PSD level can be used to establish the reference level.
- Step 2: Measurement Procedure Out of Band Emission
 - 1. Set RBW = 100 kHz.
 - 2. Set VBW ≥ 300 kHz.
 - 3. Detector = peak.
 - 4. Sweep = auto couple.
 - 5. Trace Mode = max hold.6. Allow trace to fully stabilize.
 - 7. Use the peak marker function to determine the maximum amplitude level.

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

10.3 Measurement Setup (Block Diagram of Configuration)



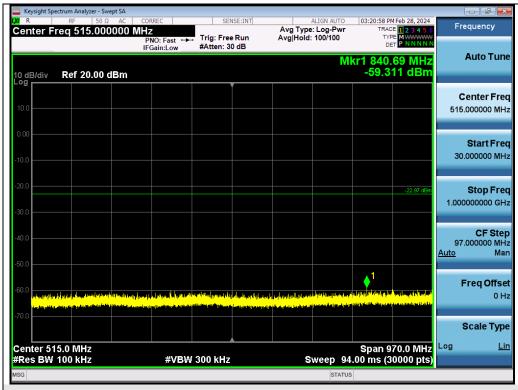
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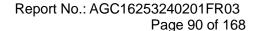
10.4 Measurement Result

Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands

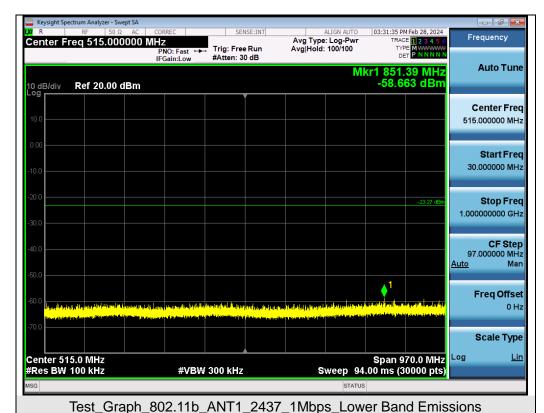


Test_Graph_802.11b_ANT1_2412_1Mbps_Lower Band Emissions









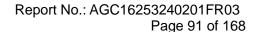




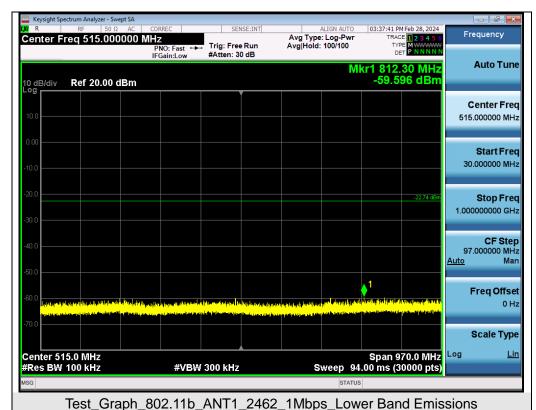
Test_Graph_802.11b_ANT1_2437_1Mbps_Higher Band Emissions

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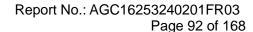
Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/



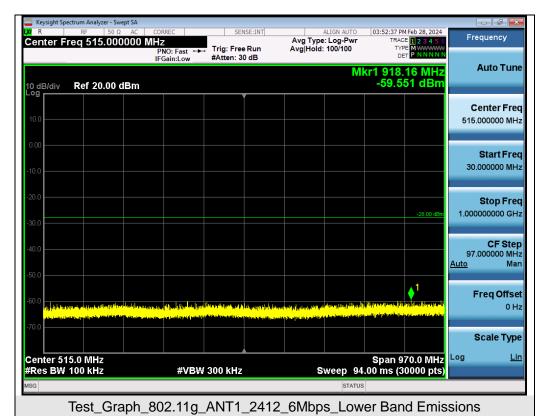




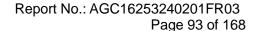




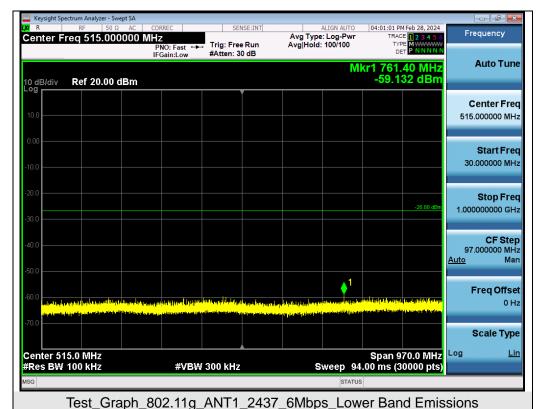




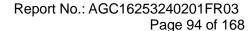




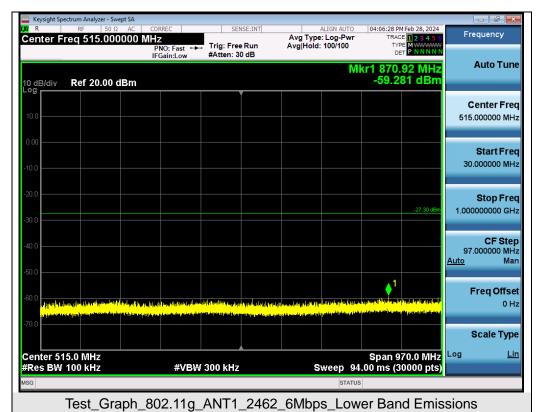




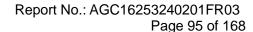
Center Freq 13.741750000 GHz
PNO: Fast
IFGain:Low 04:04:59 PM Feb 28, 2024 Frequency Avg Type: Log-Pwr Avg|Hold: 100/100 Trig: Free Run #Atten: 30 dB **Auto Tune** Mkr1 24.952 0 GHz -49.443 dBm 10 dB/div Ref 20.00 dBm Center Freq 13.741750000 GHz Start Fred 2.483500000 GHz -26.88 dE 25.000000000 GHz **CF Step** 2.251650000 GHz <u>Auto</u> Mar Freq Offset 0 Hz Scale Type Center 13.74 GHz #Res BW 100 kHz Span 22.52 GHz Sweep 2.152 s (30000 pts) Log #VBW 300 kHz Test_Graph_802.11g_ANT1_2437_6Mbps_Higher Band Emissions



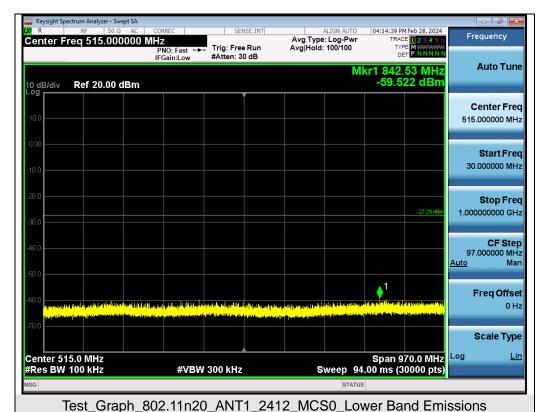






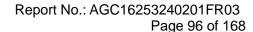




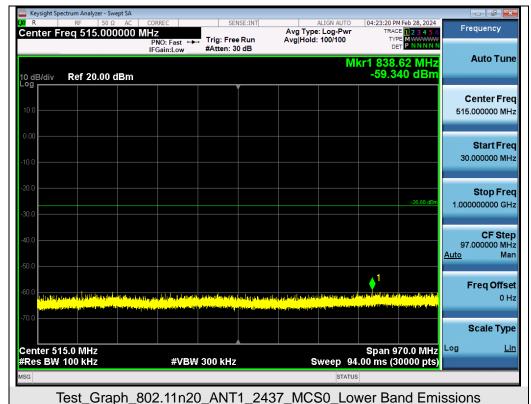


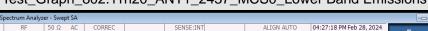


Test_Graph_802.11n20_ANT1_2412_MCS0_Higher Band Emissions

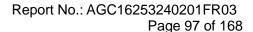








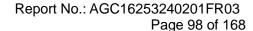




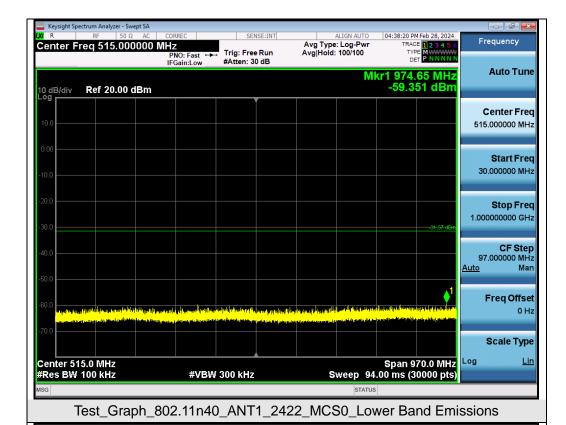






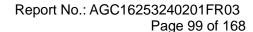




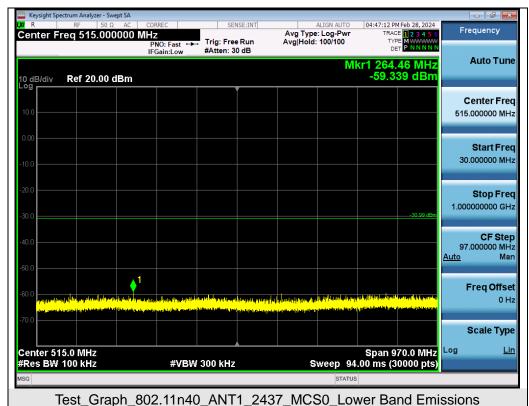




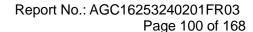
Test_Graph_802.11n40_ANT1_2422_MCS0_Higher Band Emissions



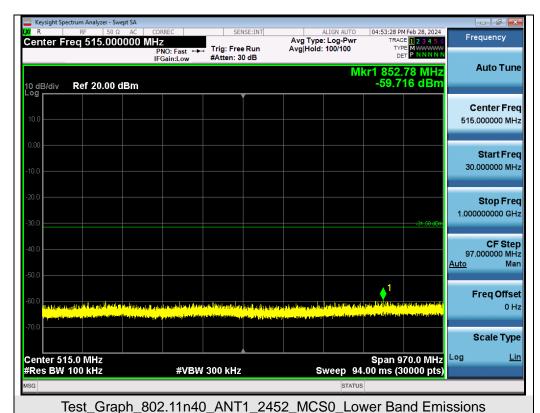




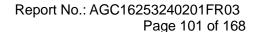




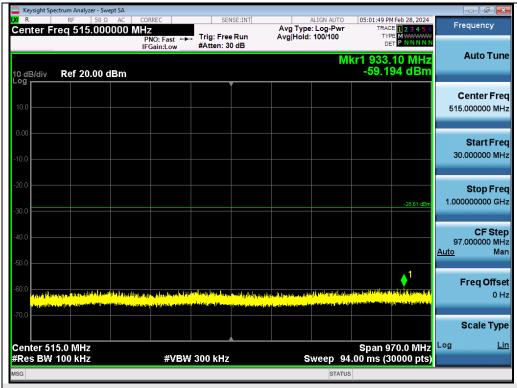






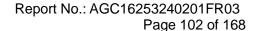




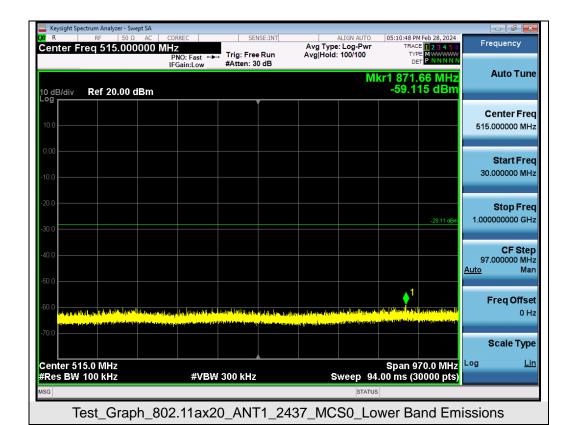


Test_Graph_802.11ax20_ANT1_2412_MCS0_Lower Band Emissions









05:14:46 PM Feb 28, 2024

TRACE 1 2 3 4 5 6

TYPE M P N N N N Center Freq 13.741750000 GHz
PNO: Fast PIGain:Low Avg Type: Log-Pwi Avg|Hold: 100/100 Trig: Free Run #Atten: 30 dB **Auto Tune** Mkr1 24.988 7 GHz -48.959 dBm 10 dB/div Ref 20.00 dBm Center Freq 13.741750000 GHz Start Fred 2.483500000 GHz 25.000000000 GHz **CF Step** 2.251650000 GHz <u>Auto</u> Mar Freq Offset 0 Hz Scale Type

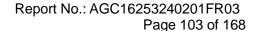
Test_Graph_802.11ax20_ANT1_2437_MCS0_Higher Band Emissions

#VBW 300 kHz

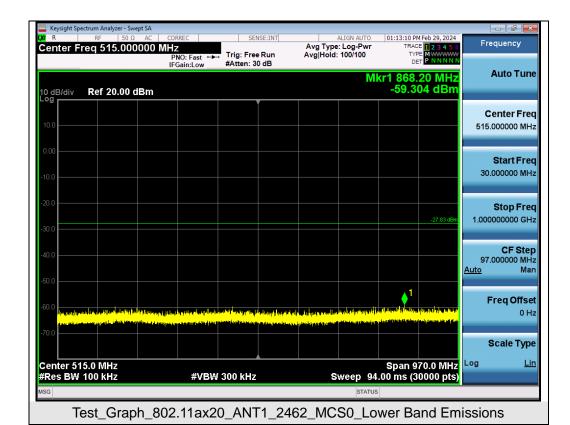
Span 22.52 GHz Sweep 2.152 s (30000 pts)

Log

Center 13.74 GHz #Res BW 100 kHz





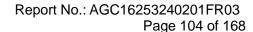


01:17:09 PM Feb 29, 2024

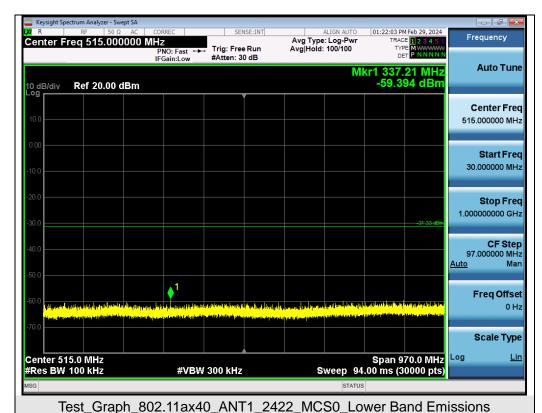
TRACE 1 2 3 4 5 6

TYPE M P N N N N Center Freq 13.750000000 GHz
PNO: Fast
IFGain:Low Avg Type: Log-Pwi Avg|Hold:>100/100 Trig: Free Run #Atten: 30 dB **Auto Tune** Mkr1 24.991 7 GHz -49.098 dBm 10 dB/div Ref 20.00 dBm Center Freq 13.750000000 GHz Start Fred 2.500000000 GHz 25.000000000 GHz **CF Step** 2.250000000 GHz <u>Auto</u> Mar Freq Offset 0 Hz Scale Type Center 13.75 GHz #Res BW 100 kHz Span 22.50 GHz Sweep 2.152 s (30000 pts) Log #VBW 300 kHz

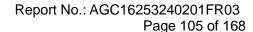
Test_Graph_802.11ax20_ANT1_2462_MCS0_Higher Band Emissions



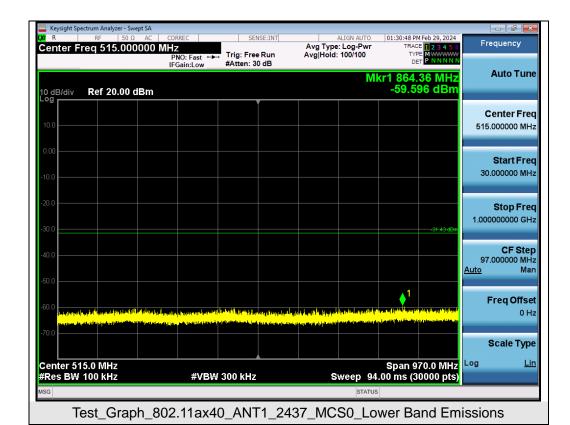






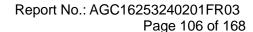




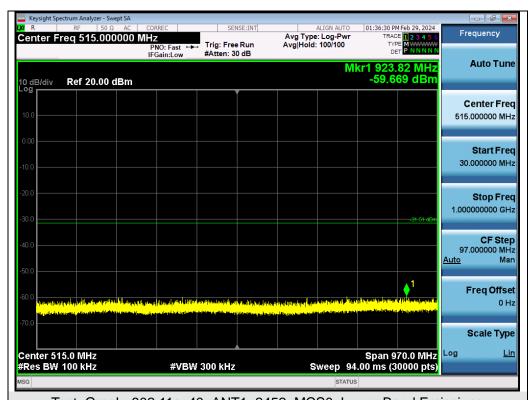




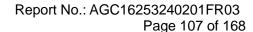
Test_Graph_802.11ax40_ANT1_2437_MCS0_Higher Band Emissions



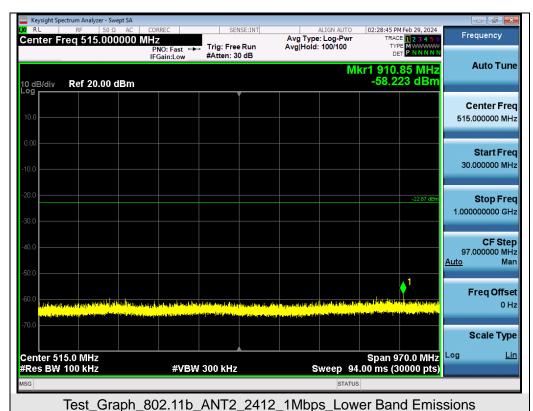




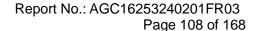




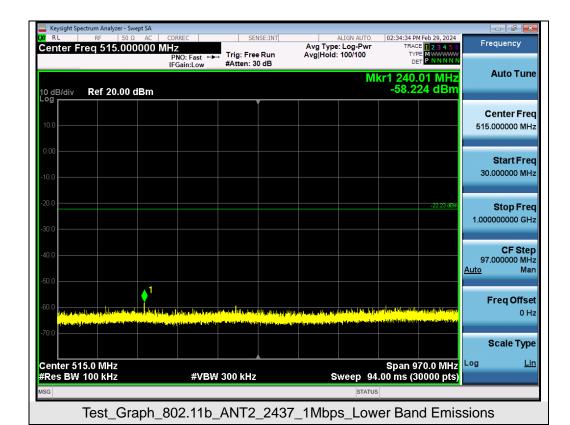








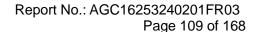




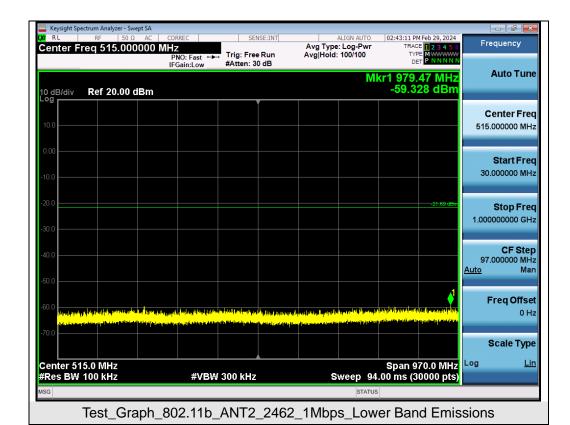


Test_Graph_802.11b_ANT2_2437_1Mbps_Higher Band Emissions

#VBW 300 kHz

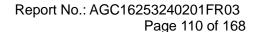




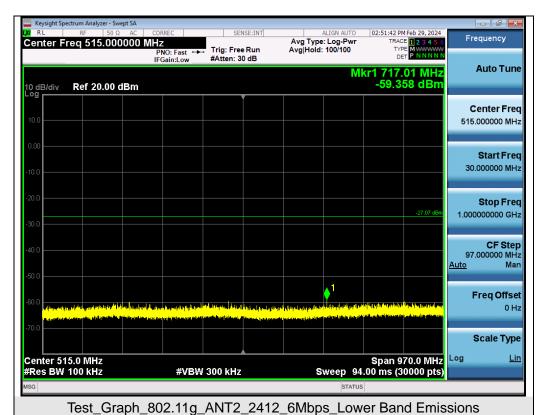




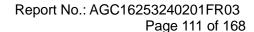
Test_Graph_802.11b_ANT2_2462_1Mbps_Higher Band Emissions



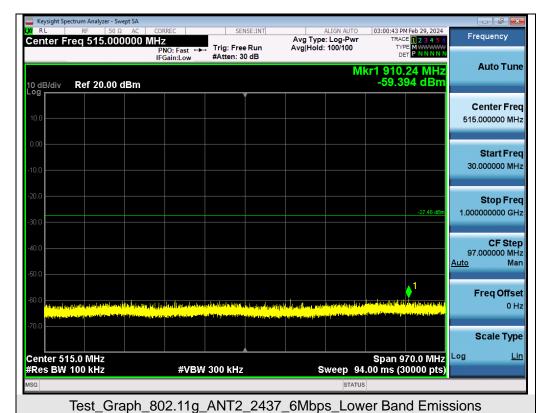








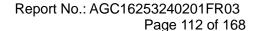




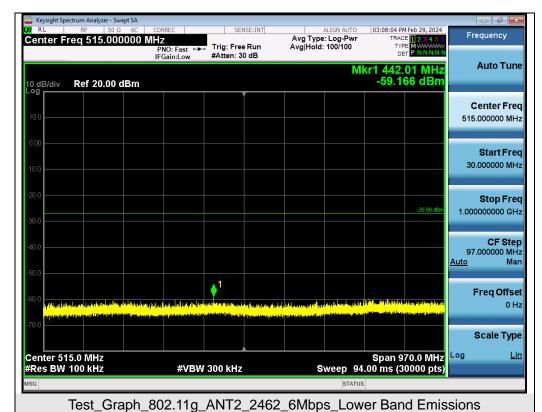
Center Freq 13.741750000 GHz
PNO: Fast
FGain:Low 03:04:41 PM Feb 29, 2024

TRACE 1 2 3 4 5 6

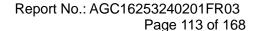
TYPE M P N N N N Frequency Avg Type: Log-Pwr Avg|Hold: 100/100 Trig: Free Run #Atten: 30 dB Mkr1 24.449 1 GHz -48.831 dBm **Auto Tune** 10 dB/div Ref 20.00 dBm Center Freq 13.741750000 GHz Start Fred 2.483500000 GHz 25.000000000 GHz **CF Step** 2.251650000 GHz <u>Auto</u> Mar Freq Offset 0 Hz Scale Type Center 13.74 GHz #Res BW 100 kHz Span 22.52 GHz Sweep 2.152 s (30000 pts) Log #VBW 300 kHz Test_Graph_802.11g_ANT2_2437_6Mbps_Higher Band Emissions



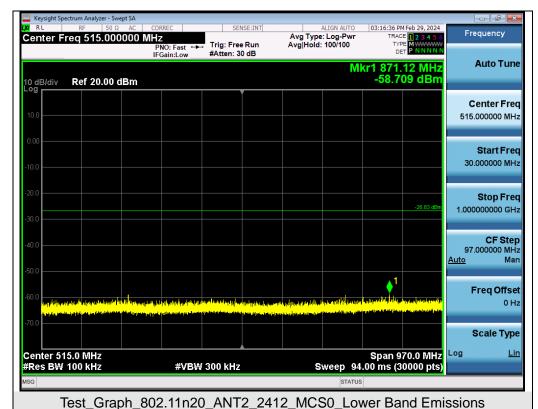




Center Freq 13.750000000 GHz
PNO: Fast →
IFGain:Low Frequency Avg Type: Log-Pwr Avg|Hold: 100/100 Trig: Free Run #Atten: 30 dB **Auto Tune** Mkr1 2.500 8 GHz -48.261 dBm 10 dB/div Ref 20.00 dBm Center Freq 13.750000000 GHz Start Fred 2.500000000 GHz 25.000000000 GHz **CF Step** 2.250000000 GHz <u>Auto</u> Mar Freq Offset 0 Hz Scale Type Center 13.75 GHz #Res BW 100 kHz Span 22.50 GHz Sweep 2.152 s (30000 pts) Log #VBW 300 kHz Test_Graph_802.11g_ANT2_2462_6Mbps_Higher Band Emissions



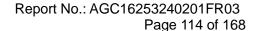




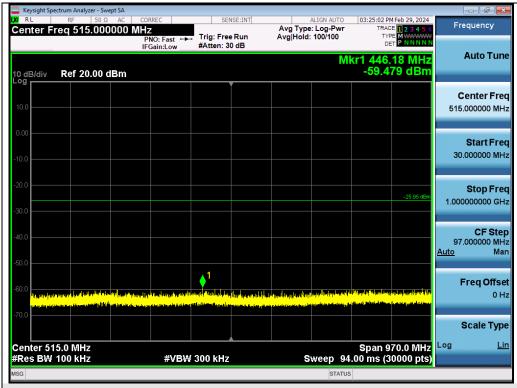
03:20:34 PM Feb 29, 2024

TRACE 1 2 3 4 5 6

TYPE M P N N N N Center Freq 13.741750000 GHz
PNO: Fast
IFGain:Low Avg Type: Log-Pwr Avg|Hold: 100/100 Trig: Free Run #Atten: 30 dB **Auto Tune** Mkr1 24.979 7 GHz -48.917 dBm 10 dB/div Ref 20.00 dBm Center Freq 13.741750000 GHz Start Fred 2.483500000 GHz -26.83 dE 25.000000000 GHz **CF Step** 2.251650000 GHz <u>Auto</u> Mar Freq Offset 0 Hz Scale Type Center 13.74 GHz #Res BW 100 kHz Span 22.52 GHz Sweep 2.152 s (30000 pts) Log #VBW 300 kHz Test_Graph_802.11n20_ANT2_2412_MCS0_Higher Band Emissions

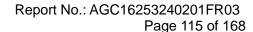




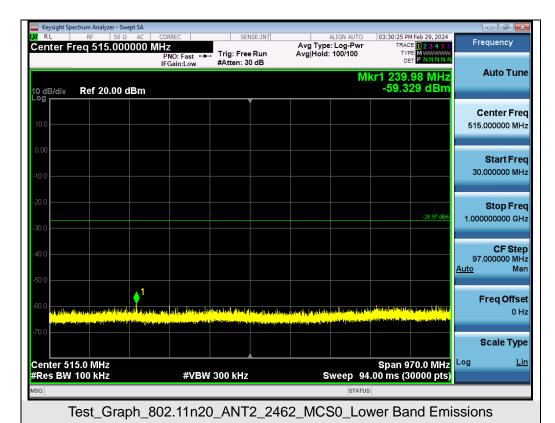


Test_Graph_802.11n20_ANT2_2437_MCS0_Lower Band Emissions



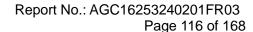




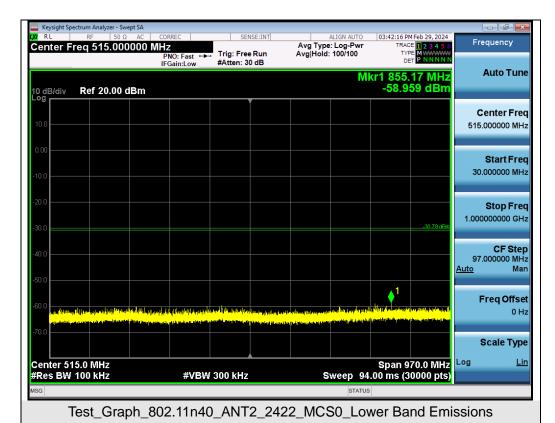




Test_Graph_802.11n20_ANT2_2462_MCS0_Higher Band Emissions









Test_Graph_802.11n40_ANT2_2422_MCS0_Higher Band Emissions

