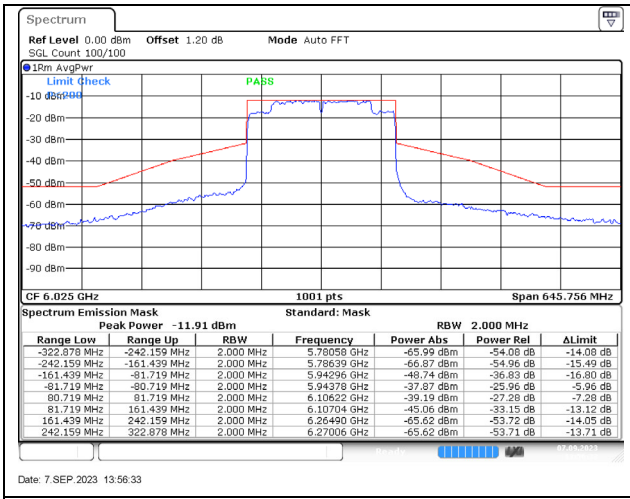
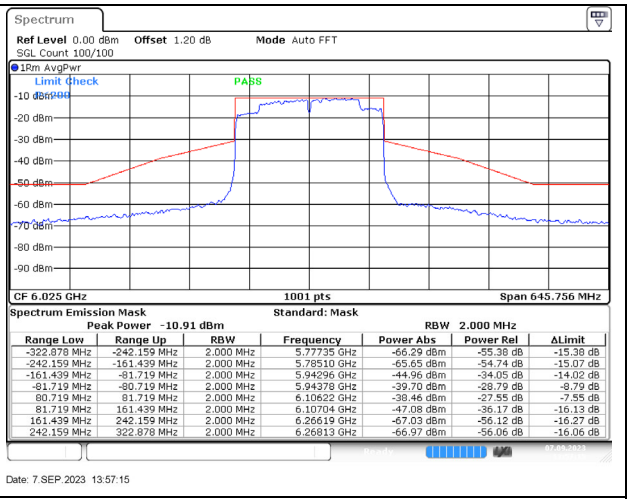
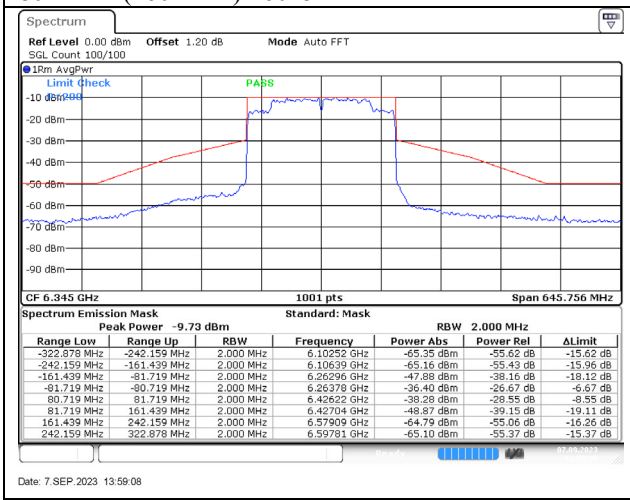


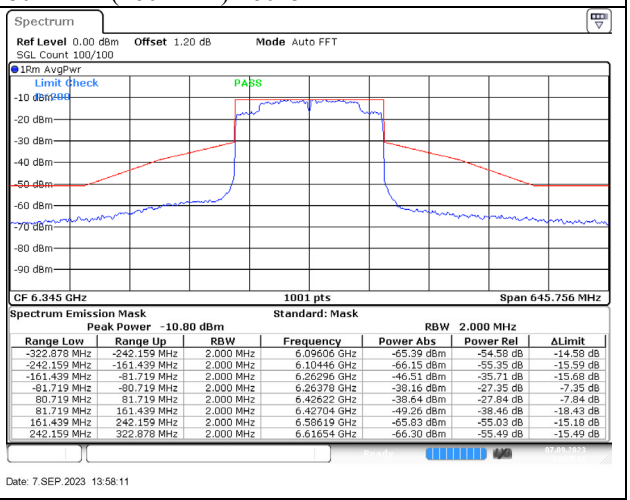
802.11ax (160 MHz) / 6025MHz / Chain A



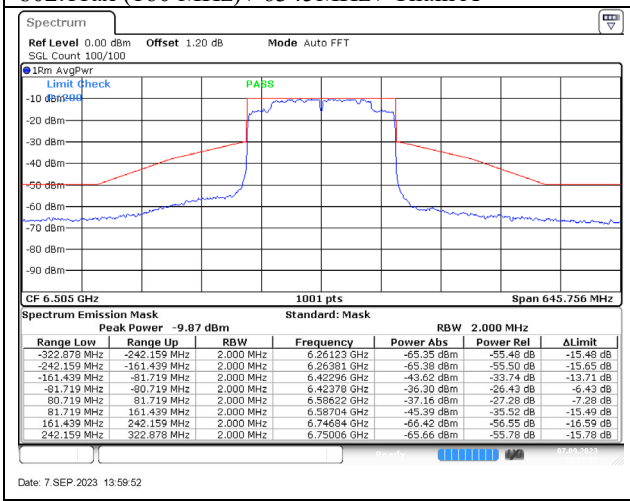
802.11ax (160 MHz) / 6025MHz / Chain B



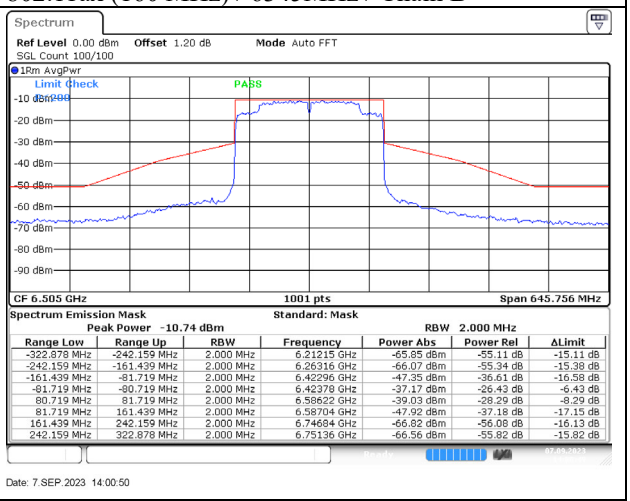
802.11ax (160 MHz) / 6345MHz / Chain A



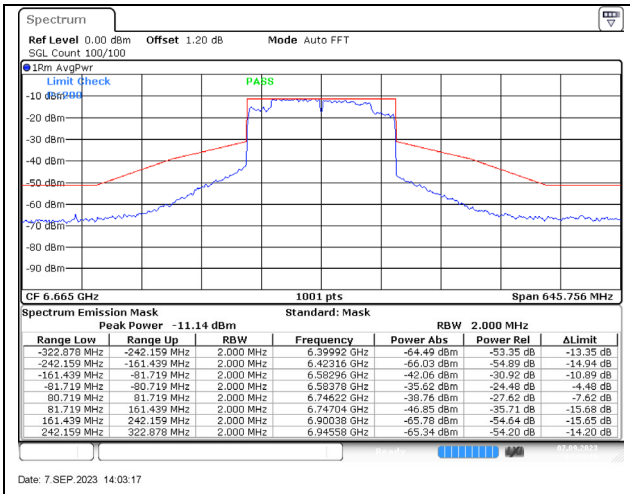
802.11ax (160 MHz) / 6345MHz / Chain B



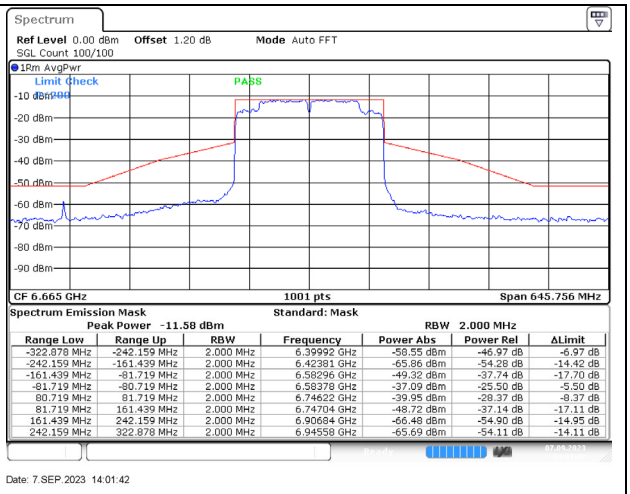
802.11ax (160 MHz) / 6505MHz / Chain A



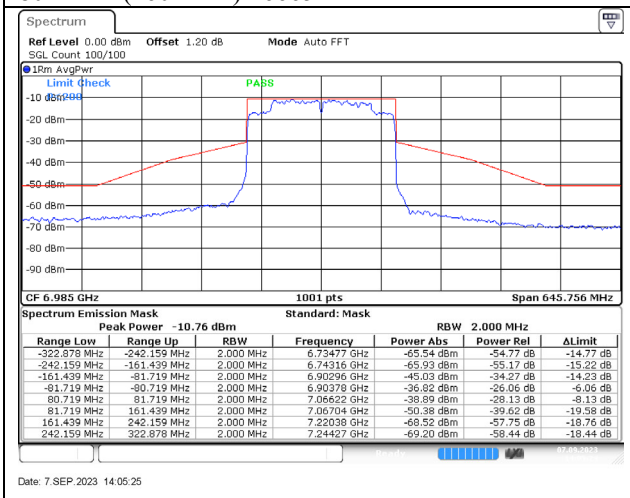
802.11ax (160 MHz) / 6505MHz / Chain B



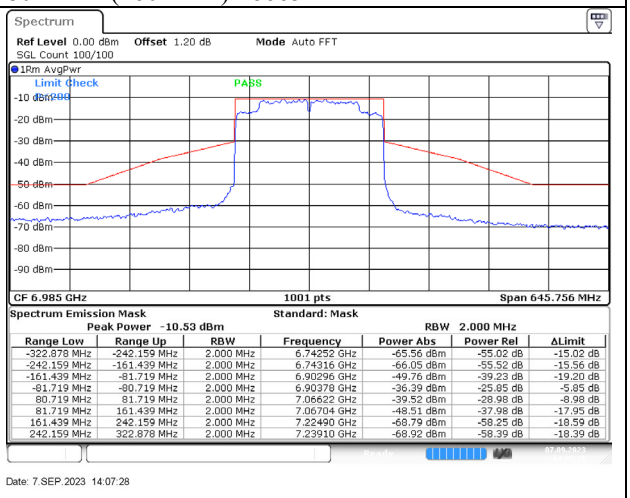
802.11ax (160 MHz) / 6665MHz / Chain A



802.11ax (160 MHz) / 6665MHz / Chain B



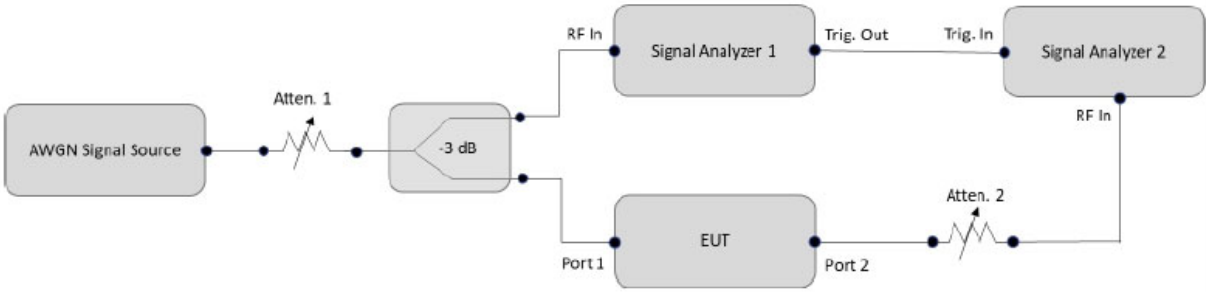
802.11ax (160 MHz) / 6985MHz / Chain A



802.11ax (160 MHz) / 6985MHz / Chain B

9. Contention Based Protocol

9.1. Test Setup



9.2. Limits

Unlicensed indoor low-power devices must detect co-channe radio frequency power that is at least -62 dBm (The threshold is referenced to a 0dBi antenna gain.) or lower. Additionally, indoor low-power devices must detect co-channek energy with 90% or greater certainty.

9.3. Test Procedure

1. Set the signal analyzer center frequency to the nominal EUT channel center frequency. The span range of the signal analyzer shall be between two times and five times the OBW of the EUT. Connect the output port of the EUT to the signal analyzer 2. Ensure that the attenuator 2 provides enough attenuation to not overload the signal analyzer 2 receiver.
2. Monitoring the signal analyzer 2, verify the EUT is operating and transmitting with the parameters (set as following section 4.7.5 EUT operating condition).
3. Determine number of times detection threshold test as following table

Test Items	Number of Tests	Placement of Incumbent Transmission
$BW_{EUT} \leqq BW_{Inc}$	Once	Same as EUT transmission
$BW_{Inc} < BW_{EUT} \leqq 2xBW_{Inc}$	Once	Contained within BWEUT
$2xBW_{Inc} < BW_{EUT} \leqq 4xBW_{Inc}$	Twice. (Incumbent transmission is contained within BWEUT)	Closely to the lower edge and upper edge of the EUT Channel
$BW_{EUT} > 4xBW_{Inc}$	Three times	Closely to the lower edge ,in the middle and upper edge of the EUT Channel

4. Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 MHz-wide AWGN signal. Use step c table to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.
5. Set the AWGN signal power to an extremely low level (more than 20 dB below the -62 dBm threshold). Connect the AWGN signal source, via a -3 dB splitter, to the signal analyzer 1 and the EUT.
6. Transmit the AWGN signal (RF ON) and verify its characteristics on the signal analyzer 1.
7. Monitor the signal analyzer 2 to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.
8. (Including all losses in the RF paths) Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.
9. Refer to step c table to determine number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step d, choose a different center frequency for the AWGN signal and repeat the process.

9.4. Test Result of Contention Based Protocol

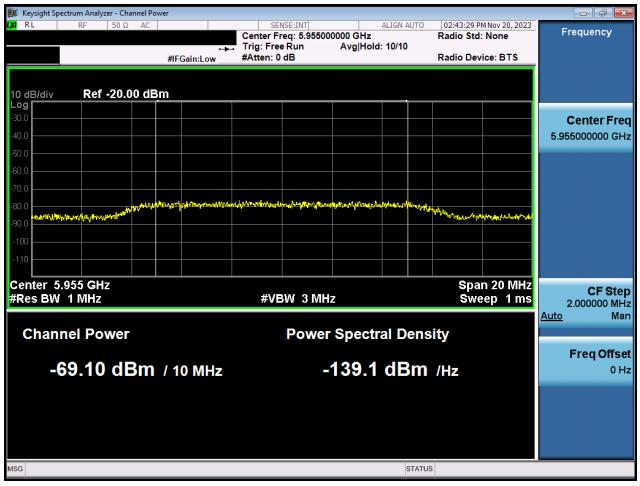
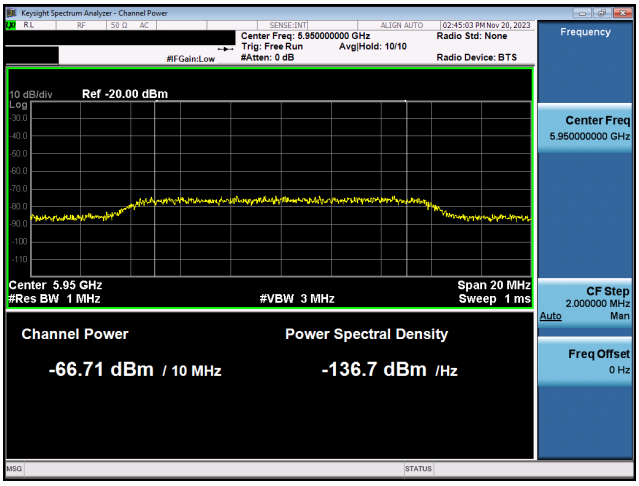
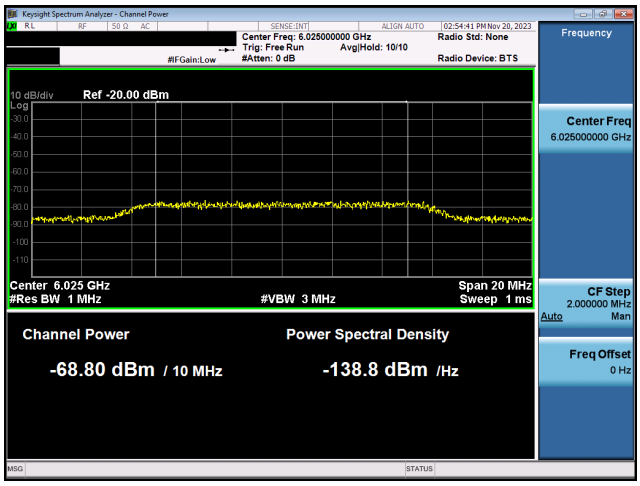
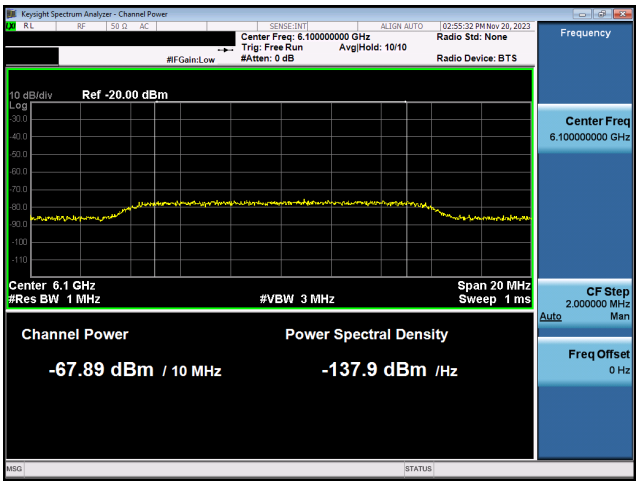
Product : Notebook Computer
Test Item : Contention Based Protocol

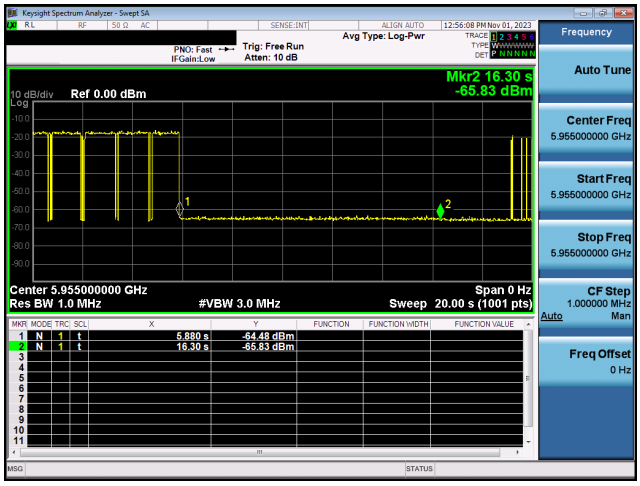
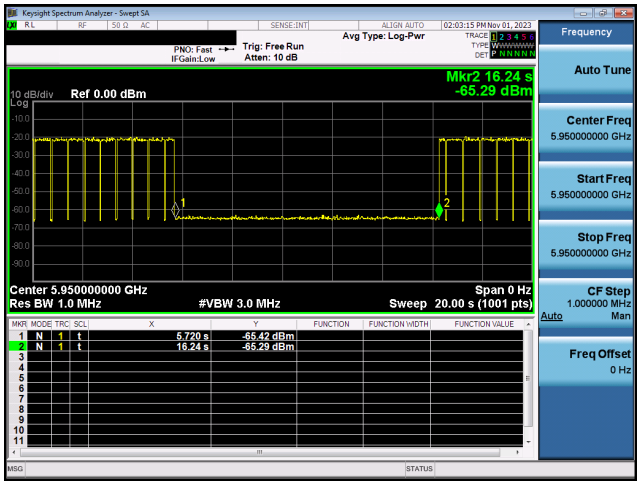
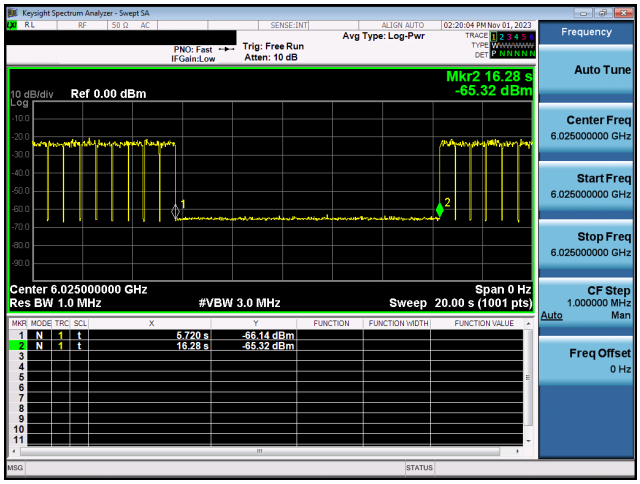
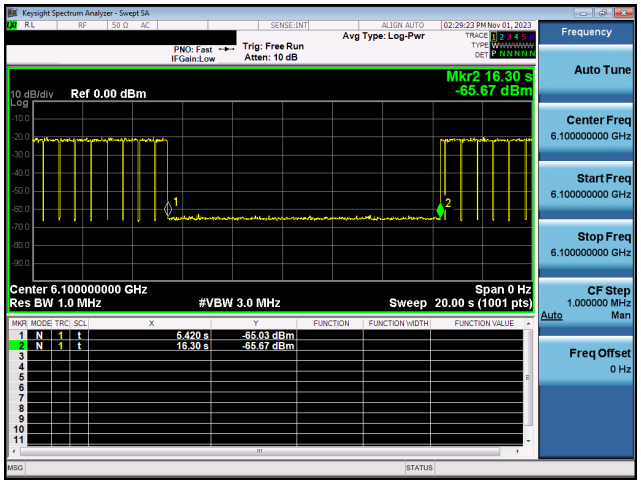
Contention Based Protocol Measurement											
Measurement Mode		Conducted measurement			Device Type		client				
					Test Result						
Operation Band	Operation Mode	Channel Bandwidth (MHz)	Channel Number	Channel Frequency (MHz)	AWGN Signals Frequency (MHz)	The Incumbent Signal (AWGN) Level (dBm	Number of Times	Number of Detected	Detection Rate	Limit	Pass/ Fail
U-NII 5	802.11ax	20MHz	01	5955	5955	-69.10	10	10	100%	90%	Pass
		160MHz	15	6025	5950	-66.71	10	10	100%	90%	Pass
					6025	-68.80	10	10	100%	90%	Pass
					6100	-67.89	10	10	100%	90%	Pass

Lowest Interference (AWGN) Level Check											
Operation Band	Operation Mode	Channel Bandwidth	Channel Number	Channel Frequency	AWGN Signals Frequency (MHz)	Injected (AWGN) POWER (dBm)	Antenna Gain (dBi)	Path Loss (dB)	Adjusted Power (dBm)	Detection limit (dBm)	EUT Tx Status
U-NII 5	802.11ax	20MHz	1	5955	5955	-69.10	0.42	0	-69.52	-62	Ceased
						-70.00	0.42	0	-70.42	-62	Minimal
						-78.40	0.42	0	-78.82	-62	Normal
		160MHz	15	6025	5950	-66.71	0.42	0	-67.13	-62	Ceased
						-67.20	0.42	0	-67.62	-62	Minimal
						-70.70	0.42	0	-71.12	-62	Normal
					6025	-68.80	0.42	0	-69.22	-62	Ceased
						-69.20	0.42	0	-69.62	-62	Minimal
						-72.40	0.42	0	-72.82	-62	Normal
					6100	-67.89	0.42	0	-68.31	-62	Ceased
						-68.40	0.42	0	-68.82	-62	Minimal
						-71.70	0.42	0	-72.12	-62	Normal

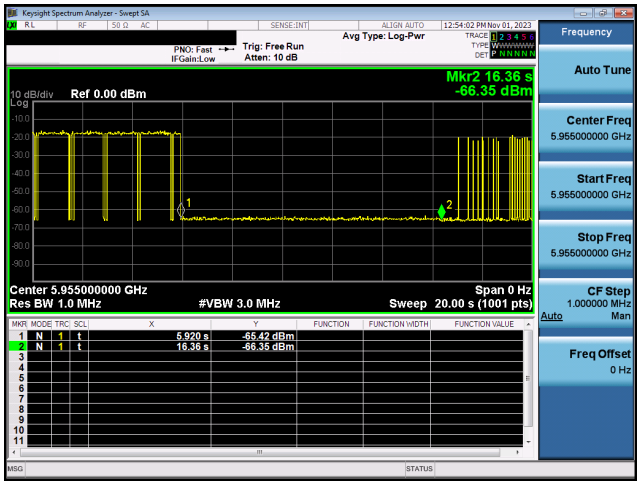
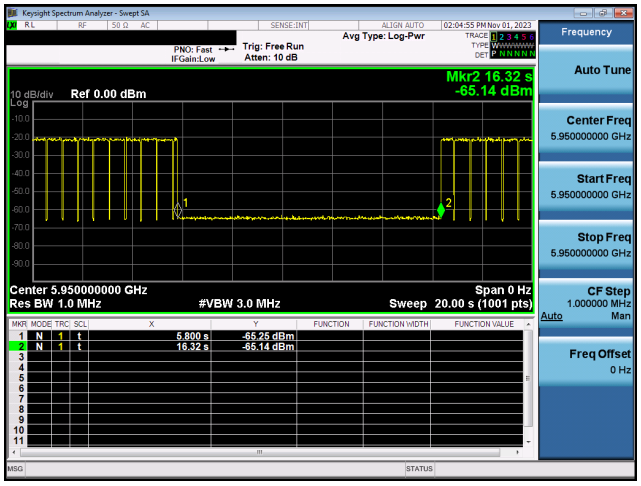
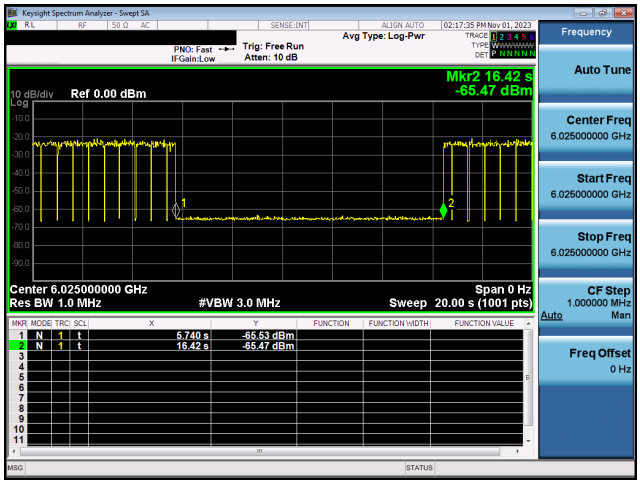
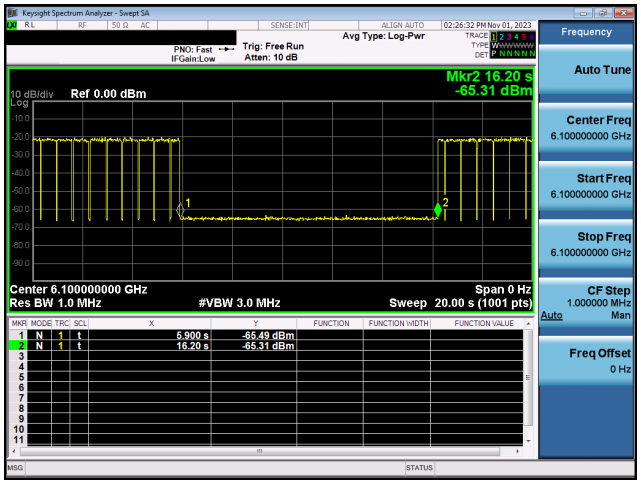
Note:

1. Adjusted Power(dBm) = Injected (AWGN) Power - Lowest Gain
2. Lowest Gain = Antenna Gain + Path loss
3. Only one chain was performed for testing.
4. The AWGN level is reported for the following conditions:
   - Ceased = AWGN level at which no transmission is detected, consistently for a minimum period of 10 seconds.
   - Minimal = AWGN level at which the system begins to trigger the transmission switch-off, albeit not being kept off consistently.
   - Normal = AWGN level at which no impact on the transmission is detected, consistently for a minimum period of 10 seconds.
5. This device does not use Channel Puncturing or Bandwidth Reduction for incumbent avoidance.

Plots of shows Incumbent signal level	
802.11ax (20MHz) / 5955MHz	802.11ax (160MHz) / 5950MHz (Lower Edge)
	
802.11ax (160MHz) / 6025MHz (Middle)	802.11ax (160MHz) / 6100MHz (Upper Edge)
	

Plots of EUT ceased transmission in the time domain	
802.11ax (20MHz) / 5955MHz	802.11ax (160MHz) / 5950MHz (Low Edge - 5950 MHz)
	
802.11ax (160MHz) / 6025MHz (Middle - 6025 MHz)	802.11ax (160MHz) / 6100MHz (High Edge - 6100 MHz)
	

Note: Injected Interference signal at 10 sec.

Plots of Start transmitting	
802.11ax (20MHz) / 5955MHz	802.11ax (160MHz) / 5950MHz (Low Edge - 5950 MHz)
	
802.11ax (160MHz) / 6025MH (Middle - 6025 MHz)	802.11ax (160MHz) / 6100MHz (High Edge - 6100 MHz)
	

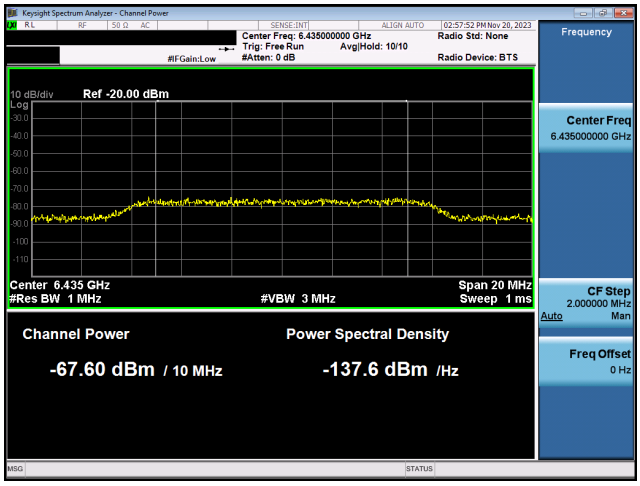
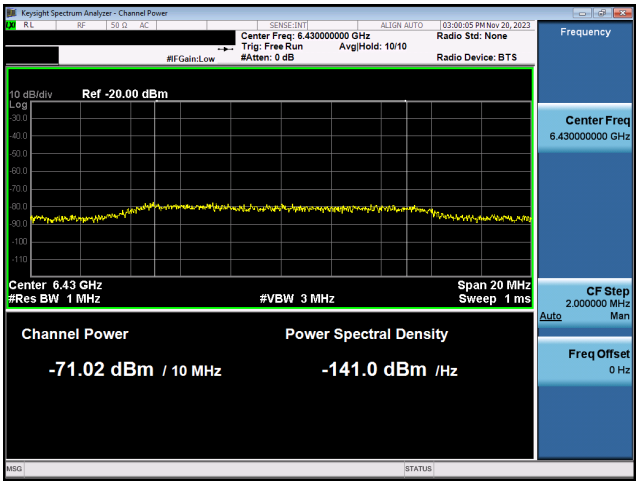
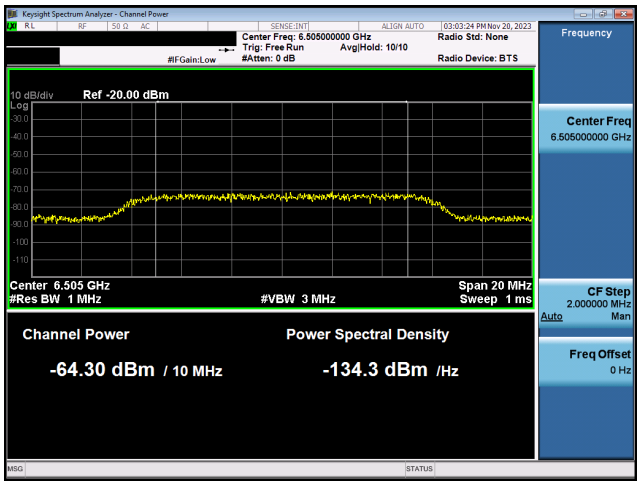
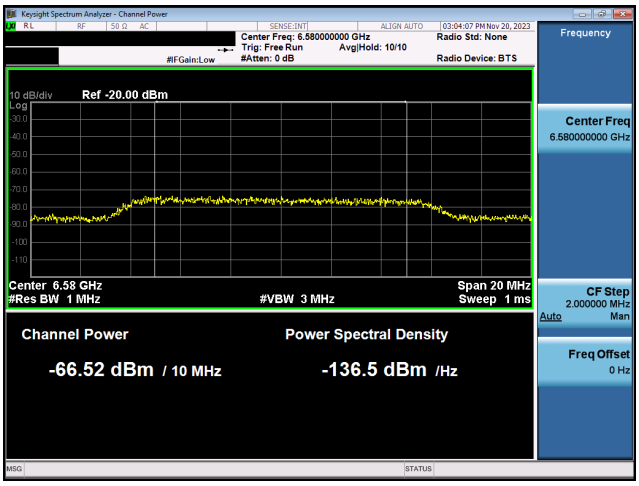
Product : Notebook Computer
Test Item : Contention Based Protocol

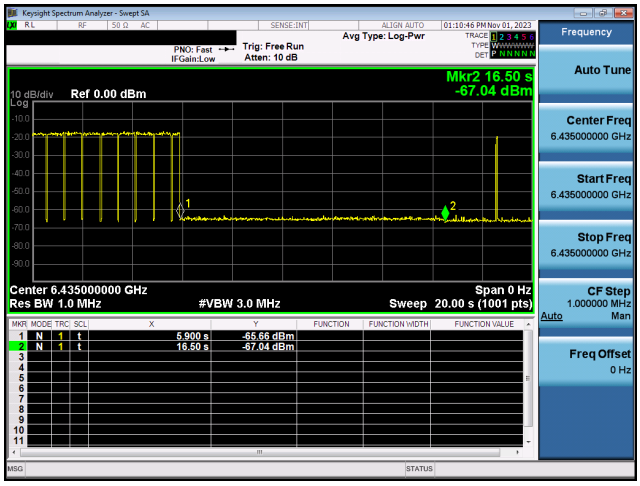
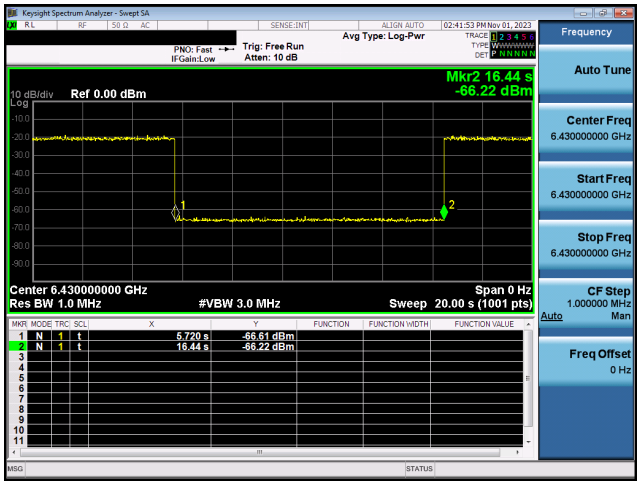
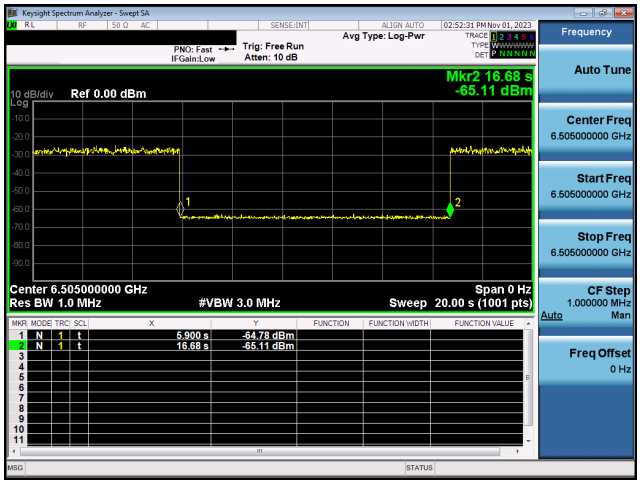
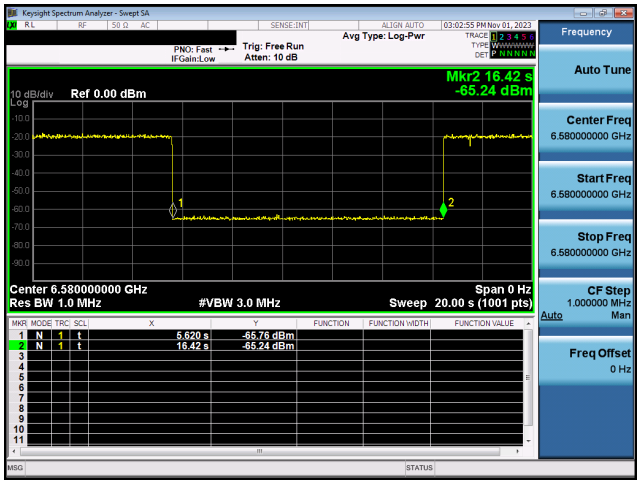
Contention Based Protocol Measurement											
Measurement Mode		Conducted measurement			Device Type			client			
					Test Result						
Operation Band	Operation Mode	Channel Bandwidth (MHz)	Channel Number	Channel Frequency (MHz)	AWGN Signals Frequency (MHz)	The Incumbent Signal (AWGN) Level (dBm)	Number of Times	Number of Detected	Detection Rate	Limit	Pass/ Fail
U-NII 6	802.11ax	20MHz	97	6435	6435	-67.60	10	10	100%	90%	Pass
		160MHz	111	6505	6430	-71.02	10	10	100%	90%	Pass
					6505	-64.30	10	10	100%	90%	Pass
					6580	-66.52	10	10	100%	90%	Pass

Lowest Interference (AWGN) Level Check											
Operation Band	Operation Mode	Channel Bandwidth	Channel Number	Channel Frequency	AWGN Signals Frequency (MHz)	Injected (AWGN) POWER (dBm)	Antenna Gain (dBi)	Path Loss (dB)	Adjusted Power (dBm)	Detection limit (dBm)	EUT Tx Status
U-NII 6	802.11ax	20MHz	97	6435	6435	-67.60	0.42	0	-68.02	-62	Ceased
						-68.10	0.42	0	-68.52	-62	Minimal
						-75.60	0.42	0	-76.02	-62	Normal
		160MHz	111	6505	6430	-71.02	0.42	0	-71.44	-62	Ceased
						-71.70	0.42	0	-72.12	-62	Minimal
						-73.20	0.42	0	-73.62	-62	Normal
					6505	-64.30	0.42	0	-64.72	-62	Ceased
						-65.10	0.42	0	-65.52	-62	Minimal
						-70.30	0.42	0	-70.72	-62	Normal
					6580	-66.52	0.42	0	-66.94	-62	Ceased
						-67.20	0.42	0	-67.62	-62	Minimal
						-68.40	0.42	0	-68.82	-62	Normal

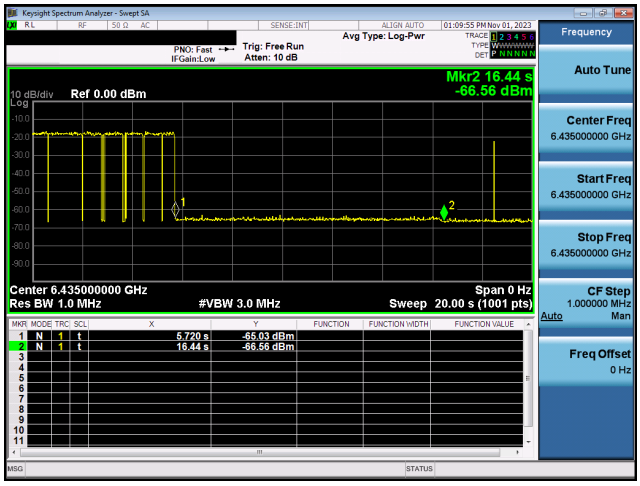
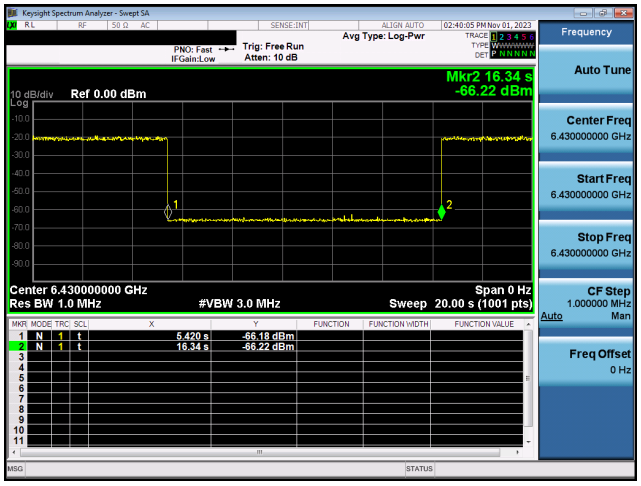
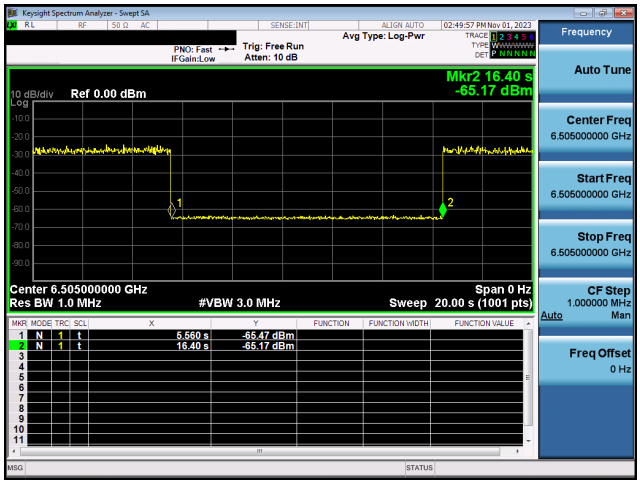
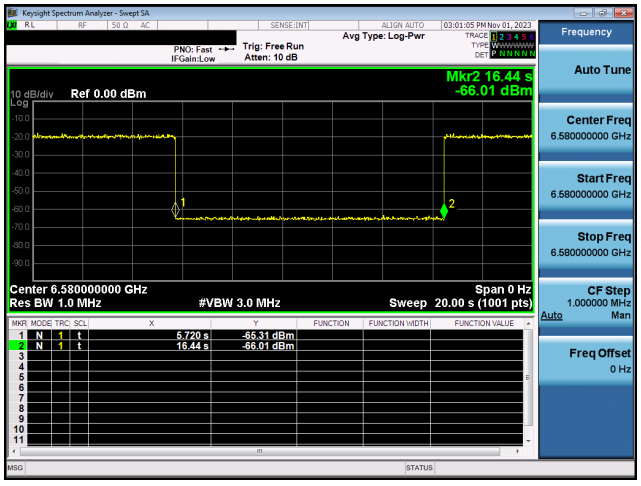
Note:

1. Adjusted Power(dBm) = Injected (AWGN) Power - Lowest Gain
2. Lowest Gain = Antenna Gain + Path loss
3. Only one chain was performed for testing.
4. The AWGN level is reported for the following conditions:
   - Ceased = AWGN level at which no transmission is detected, consistently for a minimum period of 10 seconds.
   - Minimal = AWGN level at which the system begins to trigger the transmission switch-off, albeit not being kept off consistently.
   - Normal = AWGN level at which no impact on the transmission is detected, consistently for a minimum period of 10 seconds.
5. This device does not use Channel Puncturing or Bandwidth Reduction for incumbent avoidance.

Plots of shows Incumbent signal level	
802.11ax (20MHz) / 6435MHz	802.11ax (160MHz) / 6430MHz (Lower Edge)
	
802.11ax (160MHz) / 6505 MHz (Middle)	802.11ax (160MHz) / 6580MHz (Upper Edge)
	

Plots of EUT ceased transmission in the time domain	
802.11ax (20MHz) / 6435MHz	802.11ax (160MHz) / 6430MHz (Low Edge - 6430MHz)
	
802.11ax (160MHz) / 6505MHz (Middle - 6505MHz)	802.11ax (160MHz) / 6580MHz (High Edge - 6580MHz)
	

Note: Injected Interference signal at 10 sec.

Plots of Start transmitting	
802.11ax (20MHz) / 6435MHz	802.11ax (160MHz) / 6430MHz (Low Edge - 6430MHz)
	
802.11ax (160MHz) / 6505MHz (Middle - 6505MHz)	802.11ax (160MHz) / 6580MHz (High Edge - 6580MHz)
	

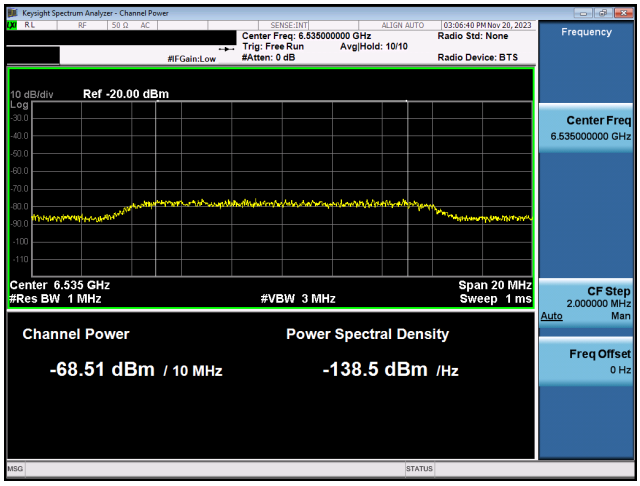
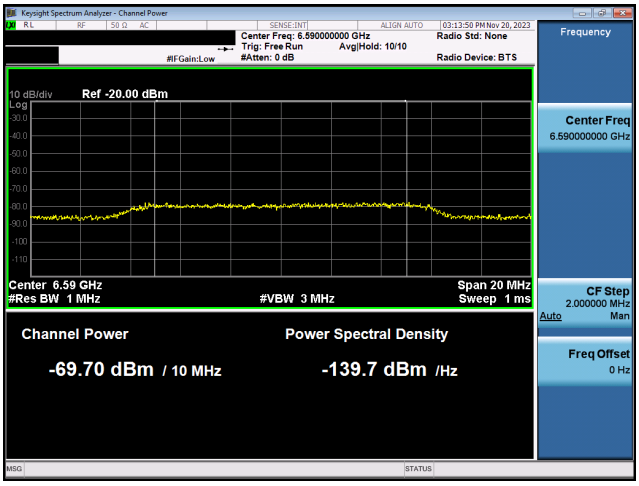
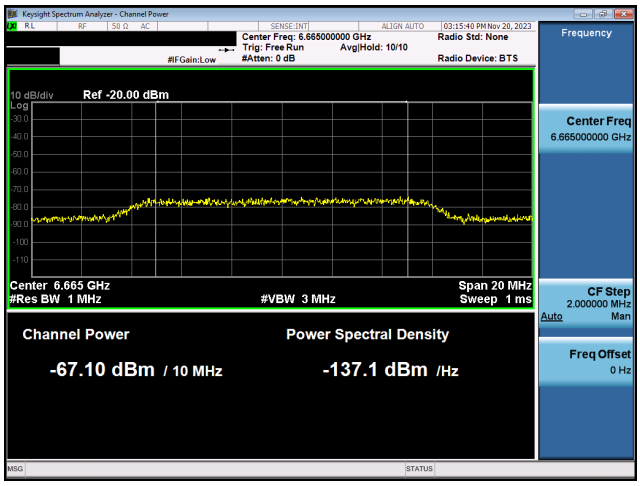
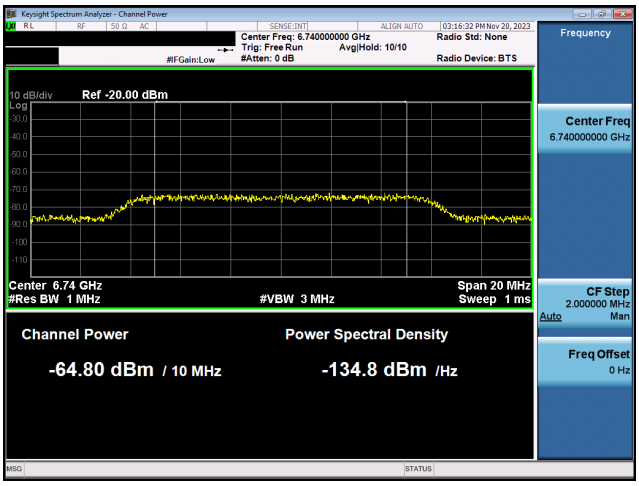
Product : Notebook Computer
Test Item : Contention Based Protocol

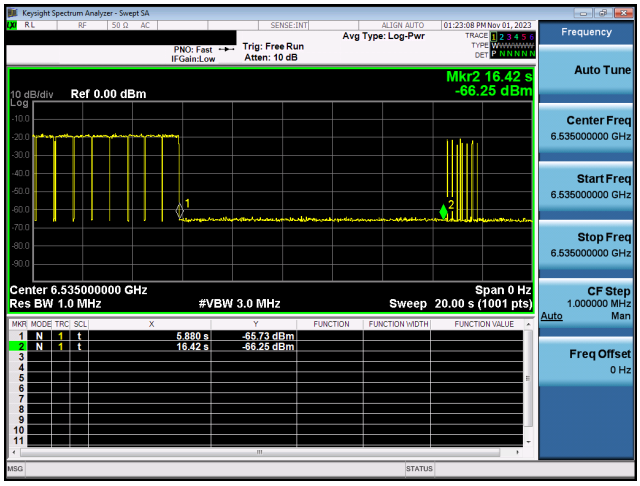
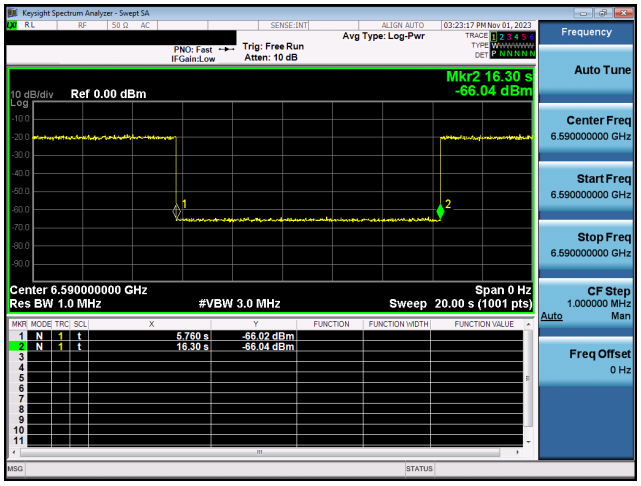
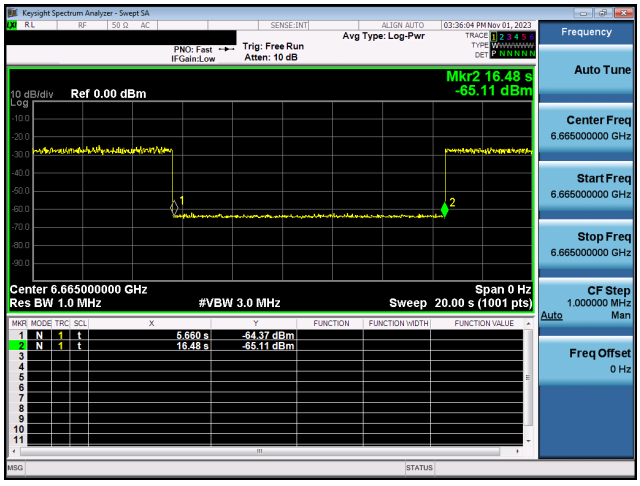
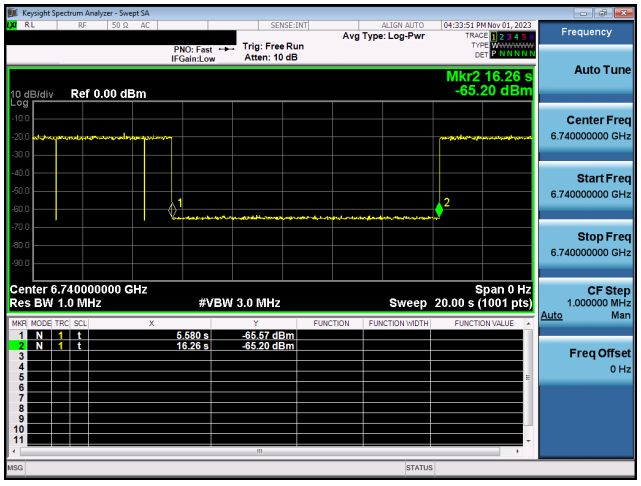
Contention Based Protocol Measurement											
Measurement Mode		Conducted measurement			Device Type			client			
					Test Result						
Operation Band	Operation Mode	Channel Bandwidth (MHz)	Channel Number	Channel Frequency (MHz)	AWGN Signals Frequency (MHz)	The Incumbent Signal (AWGN) Level (dBm)	Number of Times	Number of Detected	Detection Rate	Limit	Pass/ Fail
U-NII 7	802.11ax	20MHz	117	6535	6535	-68.51	10	10	100%	90%	Pass
		160MHz	143	6665	6590	-69.70	10	10	100%	90%	Pass
					6665	-67.10	10	10	100%	90%	Pass
					6740	-64.80	10	10	100%	90%	Pass

Lowest Interference (AWGN) Level Check											
Operation Band	Operation Mode	Channel Bandwidth	Channel Number	Channel Frequency	AWGN Signals Frequency (MHz)	Injected (AWGN) POWER (dBm)	Antenna Gain (dBi)	Path Loss (dB)	Adjusted Power (dBm)	Detection limit (dBm)	EUT Tx Status
U-NII 7	802.11ax	20MHz	117	6535	6535	-68.51	0.42	0	-68.93	-62	Ceased
						-69.20	0.42	0	-69.62	-62	Minimal
						-75.20	0.42	0	-75.62	-62	Normal
		160MHz	143	6665	6590	-69.70	0.42	0	-70.12	-62	Ceased
						-70.20	0.42	0	-70.62	-62	Minimal
						-72.20	0.42	0	-72.62	-62	Normal
					6665	-67.10	0.42	0	-67.52	-62	Ceased
						-67.40	0.42	0	-67.82	-62	Minimal
						-73.20	0.42	0	-73.62	-62	Normal
					6740	-64.80	0.42	0	-65.22	-62	Ceased
						-65.40	0.42	0	-65.82	-62	Minimal
						-68.10	0.42	0	-68.52	-62	Normal

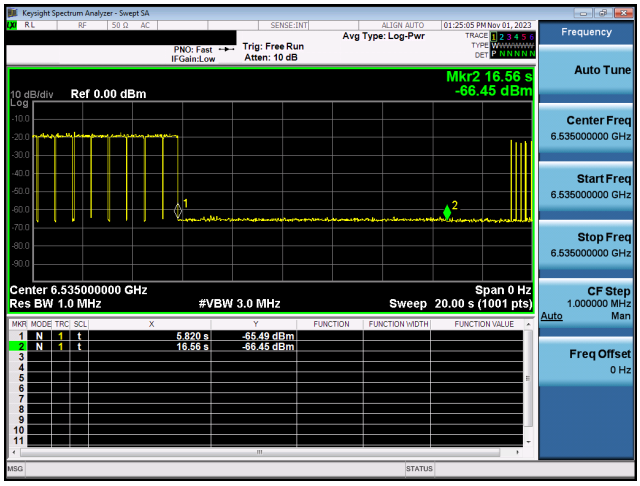
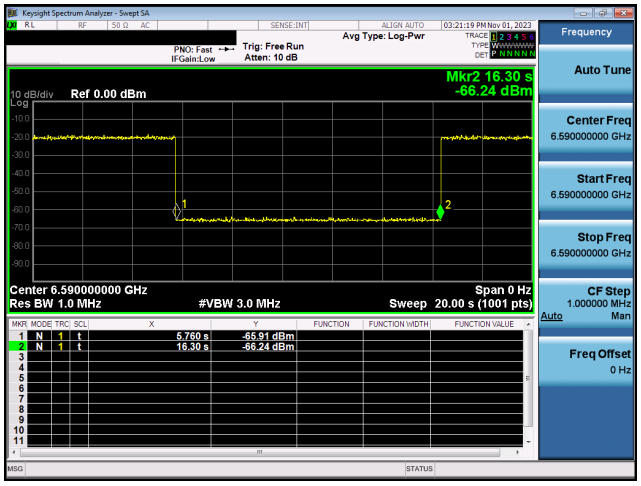
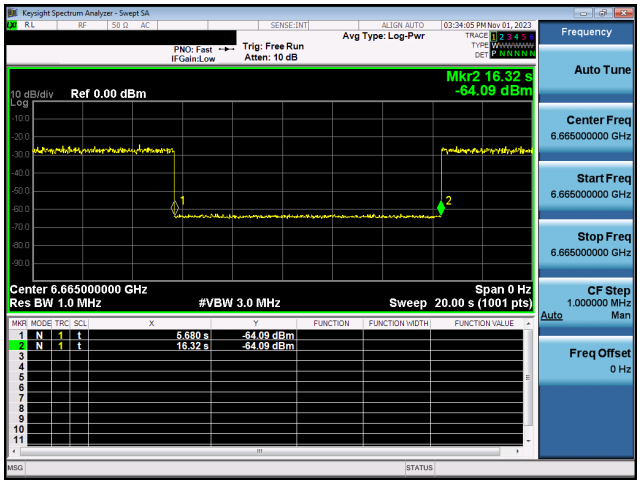
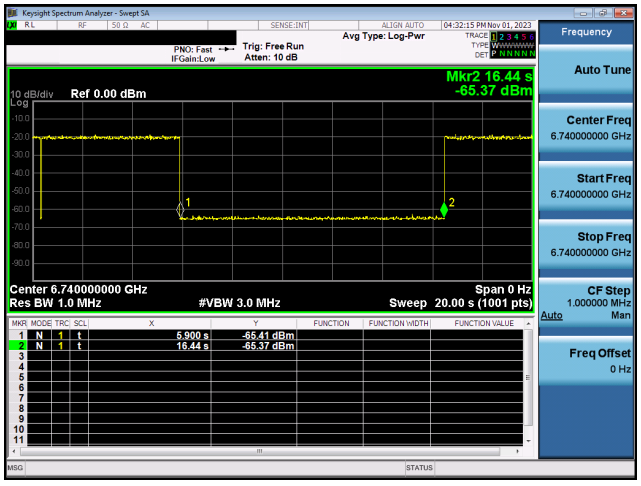
Note:

1. Adjusted Power(dBm) = Injected (AWGN) Power - Lowest Gain
2. Lowest Gain = Antenna Gain + Path loss
3. Only one chain was performed for testing.
4. The AWGN level is reported for the following conditions:
   - Ceased = AWGN level at which no transmission is detected, consistently for a minimum period of 10 seconds.
   - Minimal = AWGN level at which the system begins to trigger the transmission switch-off, albeit not being kept off consistently.
   - Normal = AWGN level at which no impact on the transmission is detected, consistently for a minimum period of 10 seconds.
5. This device does not use Channel Puncturing or Bandwidth Reduction for incumbent avoidance.

Plots of shows Incumbent signal level	
802.11ax (20MHz) / 6535MHz	802.11ax (160MHz) / 6590MHz (Lower Edge)
	
802.11ax (160MHz) / 6665MHz (Middle)	802.11ax (160MHz) / 6740MHz (Upper Edge)
	

Plots of EUT ceased transmission in the time domain	
802.11ax (20MHz) / 6535MHz	802.11ax (160MHz) / 6590MHz (Low Edge - 6590 MHz)
	
802.11ax (160MHz) / 6665MHz (Middle - 6665MHz)	802.11ax (160MHz) / 6740MHz (High Edge - 6740MHz)
	

Note: Injected Interference signal at 10 sec.

Plots of Start transmitting	
802.11ax (20MHz) / 6535MHz	802.11ax (160MHz) / 6590MHz (Low Edge - 6590MHz)
	
802.11ax (160MHz) / 6665MHz (Middle - 6665MHz)	802.11ax (160MHz) / 6740MHz (High Edge - 6740MHz)
	

Product : Notebook Computer
Test Item : Contention Based Protocol

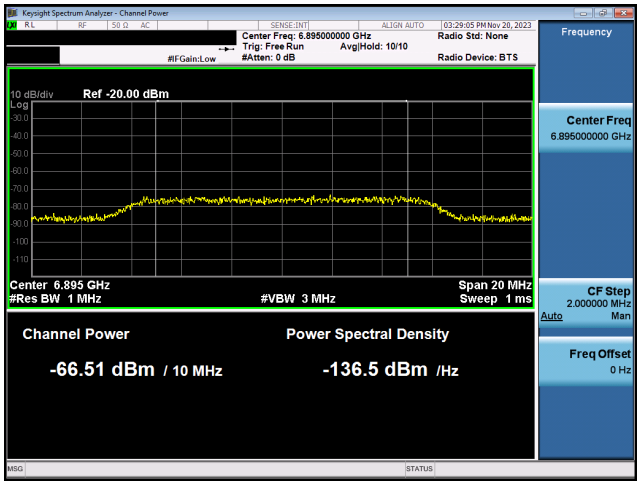
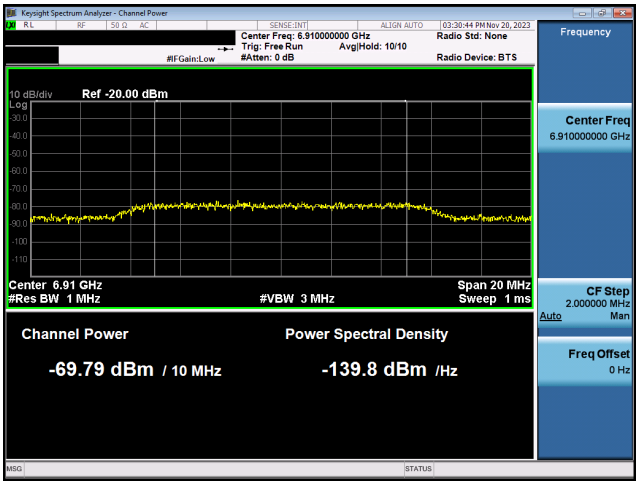
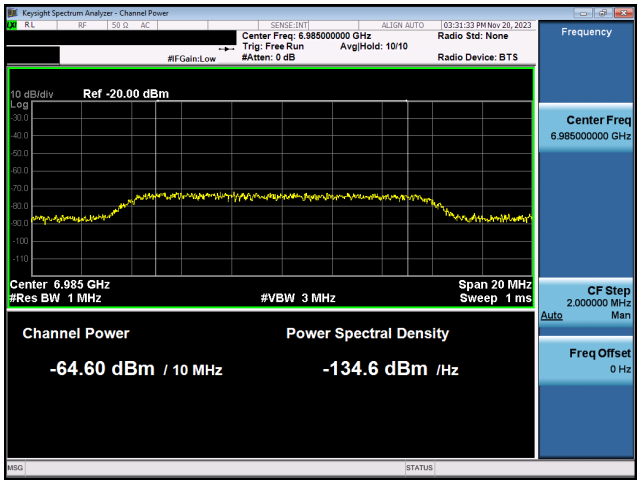
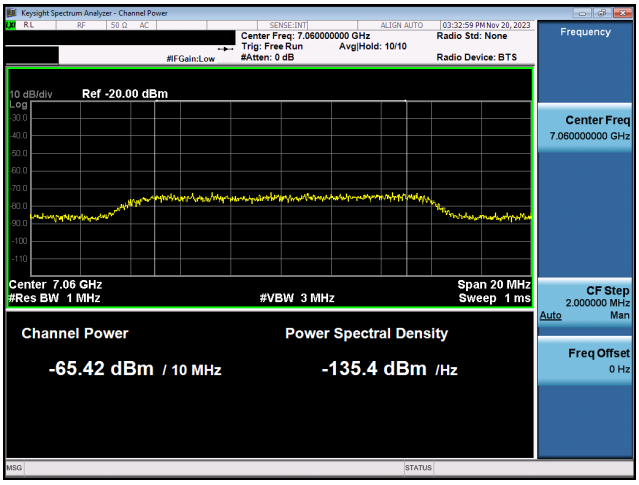
Contention Based Protocol Measurement											
Measurement Mode		Conducted measurement			Device Type		client				
					Test Result						
Operation Band	Operation Mode	Channel Bandwidth (MHz)	Channel Number	Channel Frequency (MHz)	AWGN Signals Frequency (MHz)	The Incumbent Signal (AWGN) Level (dBm)	Number of Times	Number of Detected	Detection Rate	Limit	Pass/ Fail
U-NII 8	802.11ax	20MHz	189	6895	6895	-66.51	10	10	100%	90%	Pass
		160MHz	207	6985	6910	-69.79	10	10	100%	90%	Pass
					6985	-64.60	10	10	100%	90%	Pass
					7060	-65.42	10	10	100%	90%	Pass

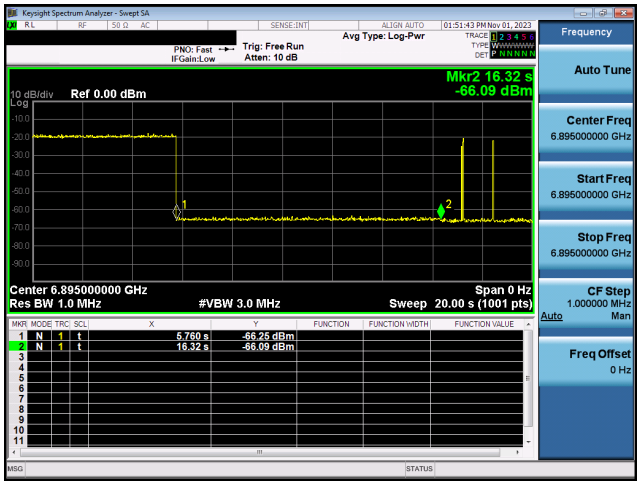
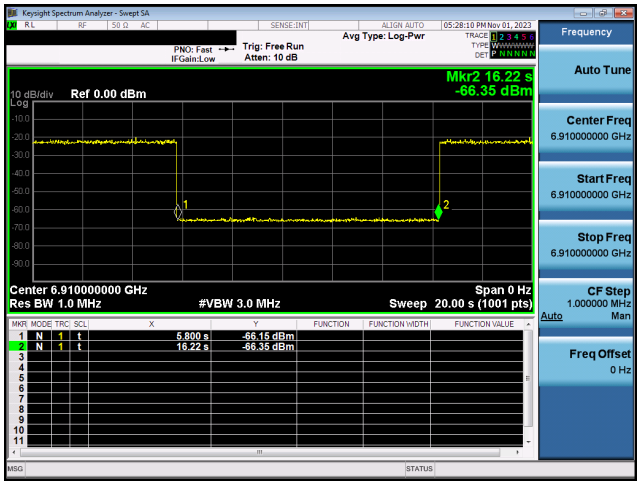
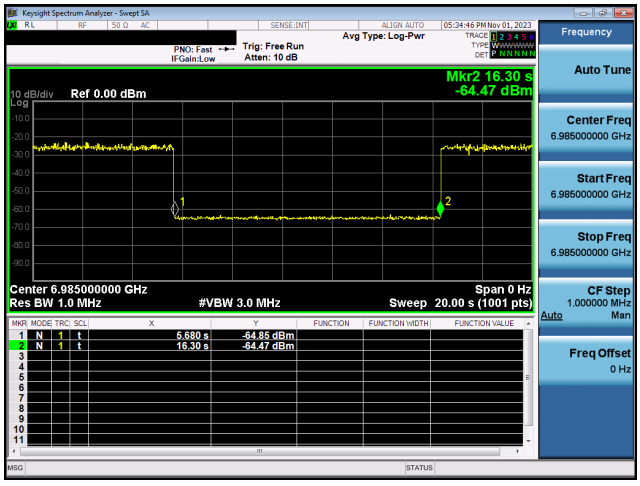
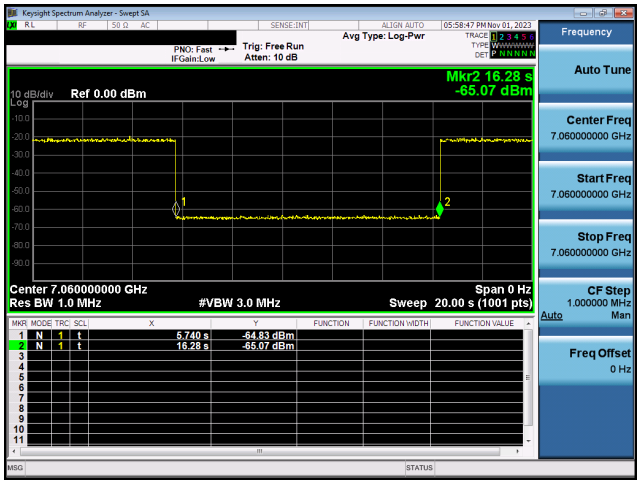
Lowest Interference (AWGN) Level Check											
Operation Band	Operation Mode	Channel Bandwidth	Channel Number	Channel Frequency	AWGN Signals Frequency (MHz)	Injected (AWGN) POWER (dBm)	Antenna Gain (dBi)	Path Loss (dB)	Adjusted Power (dBm)	Detection limit (dBm)	EUT Tx Status
U-NII 8	802.11ax	20MHz	189	6895	6895	-66.51	0.42	0	-66.93	-62	Ceased
						-66.80	0.42	0	-67.22	-62	Minimal
						-73.50	0.42	0	-73.92	-62	Normal
		160MHz	207	6985	6910	-69.79	0.42	0	-70.21	-62	Ceased
						-70.70	0.42	0	-71.12	-62	Minimal
						-73.00	0.42	0	-73.42	-62	Normal
					6985	-64.60	0.42	0	-65.02	-62	Ceased
						-65.70	0.42	0	-66.12	-62	Minimal
						-71.00	0.42	0	-71.42	-62	Normal
					7060	-65.42	0.42	0	-65.84	-62	Ceased
						-65.80	0.42	0	-66.22	-62	Minimal
						-67.50	0.42	0	-67.92	-62	Normal

Note:

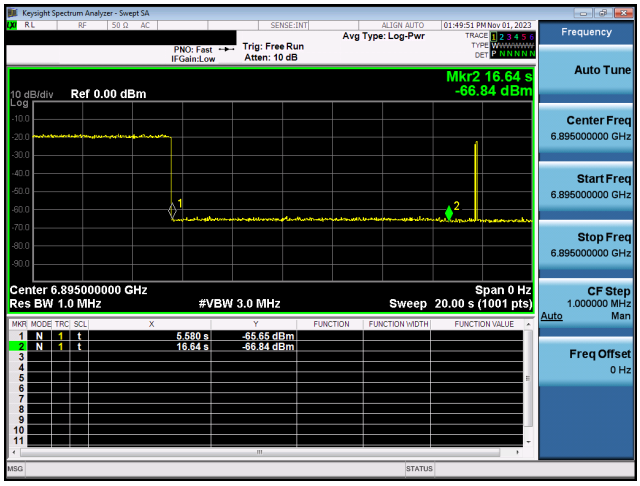
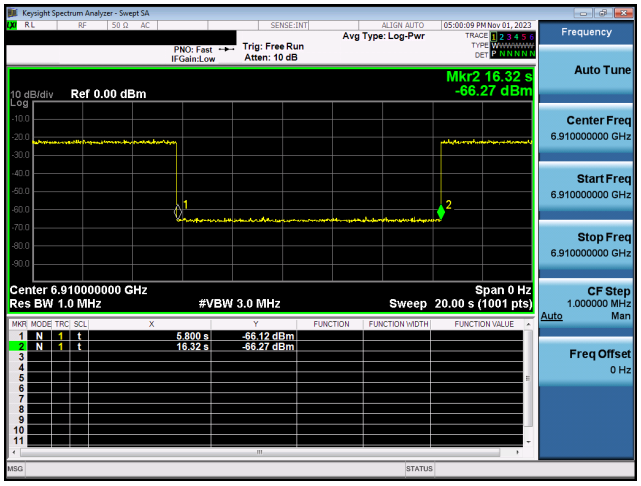
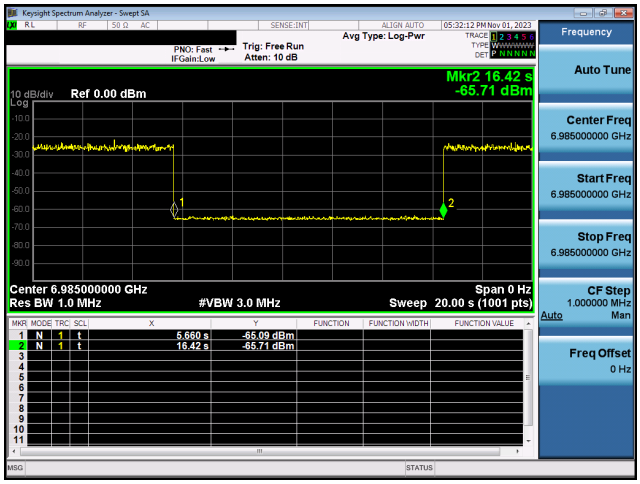
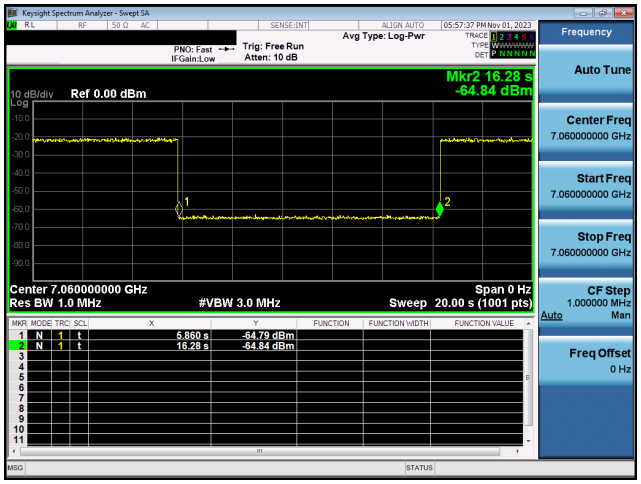
1. Adjusted Power(dBm) = Injected (AWGN) Power - Lowest Gain
2. Lowest Gain = Antenna Gain + Path loss
3. Only one chain was performed for testing.
4. The AWGN level is reported for the following conditions:
   - Ceased = AWGN level at which no transmission is detected, consistently for a minimum period of 10 seconds.
   - Minimal = AWGN level at which the system begins to trigger the transmission switch-off, albeit not being kept off consistently.
   - Normal = AWGN level at which no impact on the transmission is detected, consistently for a minimum period of 10 seconds.
5. This device does not use Channel Puncturing or Bandwidth Reduction for incumbent avoidance.

6.

Plots of shows Incumbent signal level	
802.11ax (20MHz) / 6895MHz	802.11ax (160MHz) / 6910MHz (Lower Edge)
	
802.11ax (160MHz) / 6985MHz (Middle)	802.11ax (160MHz) / 7060MHz (Upper Edge)
	

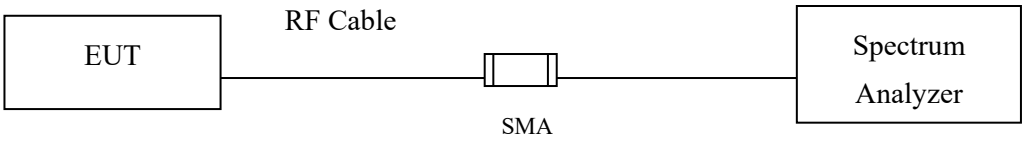
Plots of EUT ceased transmission in the time domain	
802.11ax (20MHz) / 6895MHz	802.11ax (160MHz) / 6910MHz (Low Edge - 6910MHz)
	
802.11ax (160MHz) / 6985MHz (Middle - 6985MHz)	802.11ax (160MHz) / 7060MHz (High Edge - 7060MHz)
	

Note: Injected Interference signal at 10 sec.

Plots of Start transmitting	
802.11ax (20MHz) / 6895MHz	802.11ax (160MHz) / 6910MHz (Low Edge - 6910MHz)
	
802.11ax (160MHz) / 6985MHz (Middle - 6985MHz)	802.11ax (160MHz) / 7060MHz (High Edge - 7060MHz)
	

10. Duty Cyclc

10.1. Test Setup



10.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to U-NII test procedure of KDB789033 for compliance to FCC 47CFR 15.407 requirements.

10.3. Duty Cycle

Product : Notebook Computer
Test Item : Duty Cycle

SISO A

Mode	Time On (ms)	Time On + Time Off (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11ax-20 MHz	3.9750	4.0350	98.51	0.07
802.11ax-40 MHz	3.9900	4.0350	98.88	0.05
802.11ax-80 MHz	3.9900	4.0350	98.88	0.05
802.11ax-160 MHz	3.9750	4.0350	98.51	0.07

SISO B

Mode	Time On (ms)	Time On + Time Off (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11ax-20 MHz	3.9750	4.0350	98.51	0.07
802.11ax-40 MHz	3.9750	4.0350	98.51	0.07
802.11ax-80 MHz	3.9900	4.0350	98.88	0.05
802.11ax-160 MHz	3.9900	4.0350	98.88	0.05

MIMO

Mode	Time On (ms)	Time On + Time Off (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11ax-20 MHz	3.9990	4.0400	98.99	0.04
802.11ax-40 MHz	3.9990	4.0400	98.99	0.04
802.11ax-80 MHz	3.9990	4.0700	98.26	0.08
802.11ax-160 MHz	2.3120	2.3520	98.30	0.07

Note:

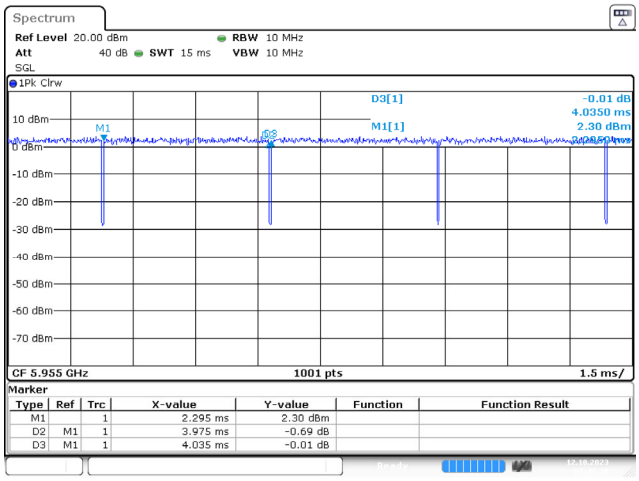
Offset = 20 log(1/duty cycle)

Accotding to KDB 789033

If power averaging (rms) mode was used in step (iv) above, the correction factor is 10 log (1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB must be added to the measured emission levels.

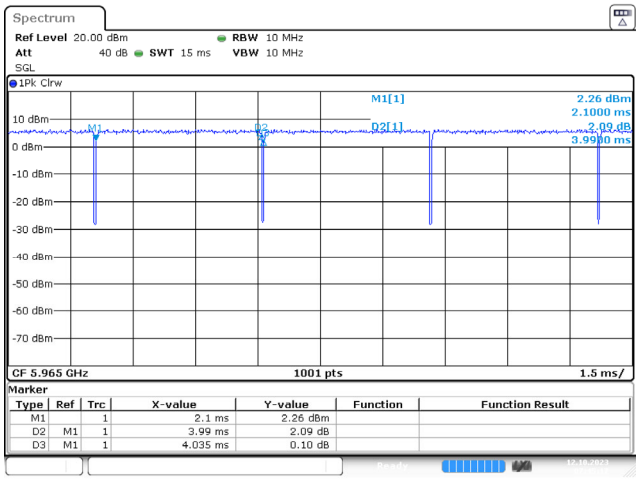
If linear voltage averaging mode was used in step (iv) above, the correction factor is 20 log (1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB must be added to the measured emission levels.

802.11ax (20MHz) / 5955MHz / SISO A



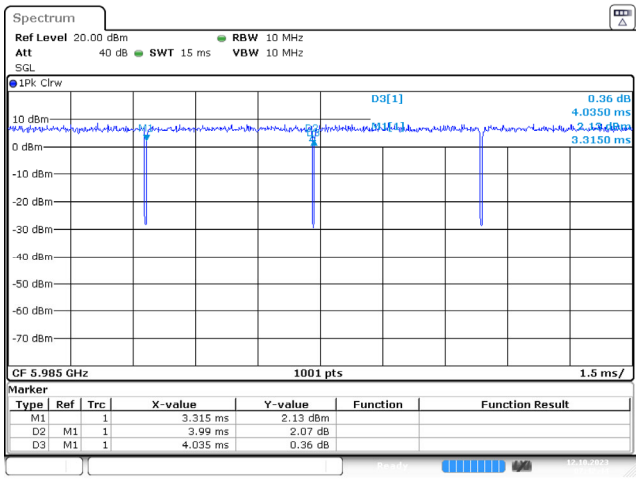
Date: 12.OCT.2023 07:47:38

802.11ax (40MHz) / 5965MHz / SISO A



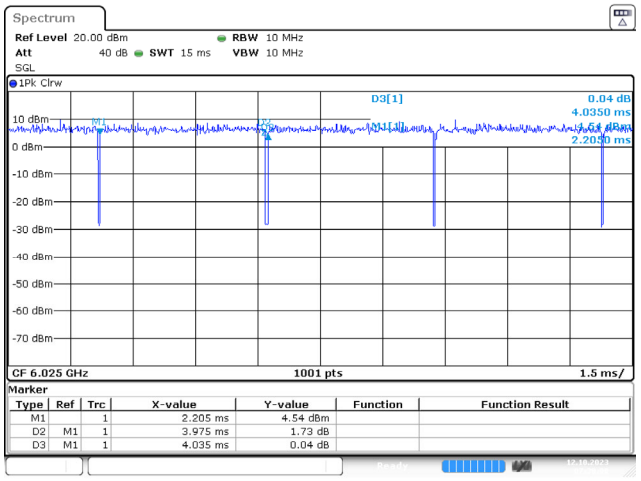
Date: 12.OCT.2023 07:45:17

802.11ax (80MHz) / 5985MHz / SISO A



Date: 12.OCT.2023 07:42:44

802.11ax (160MHz) / 6025MHz / SISO A



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