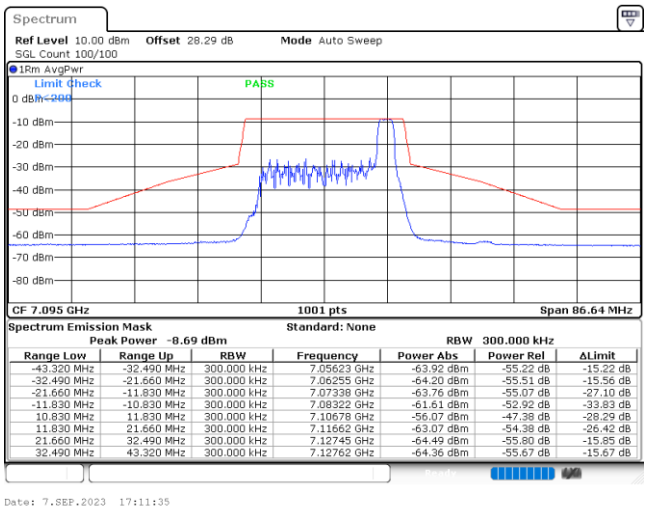
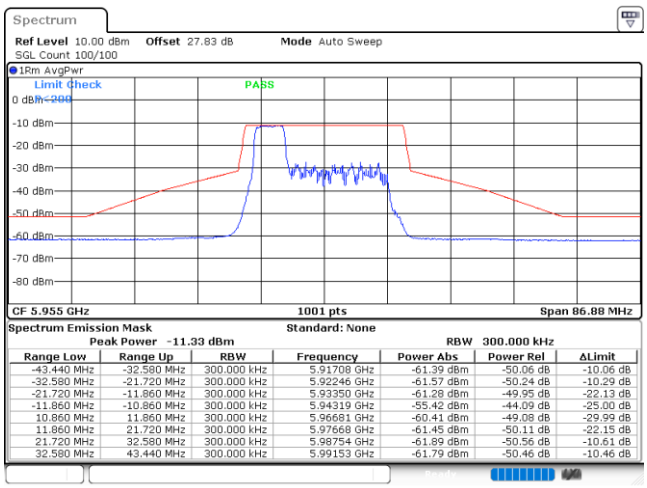
Plot on Channel 7095 MHz

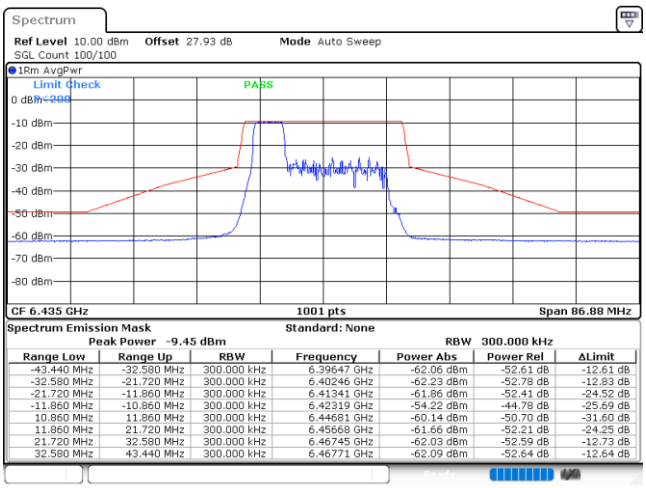


EUT Mode	802.11ax HE20 52RU37

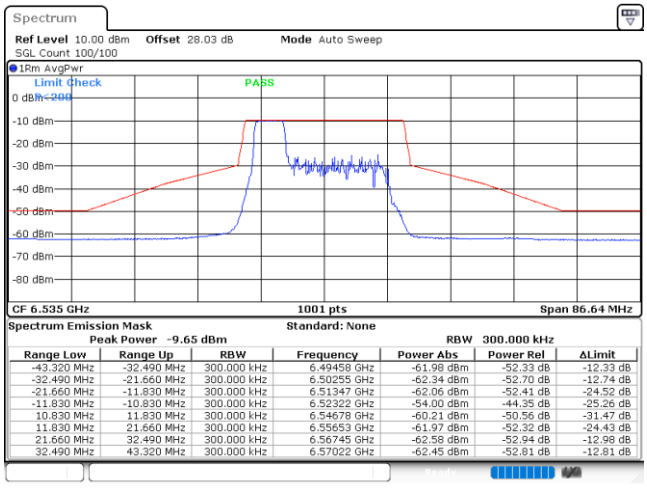
Plot on Channel 5955 MHz



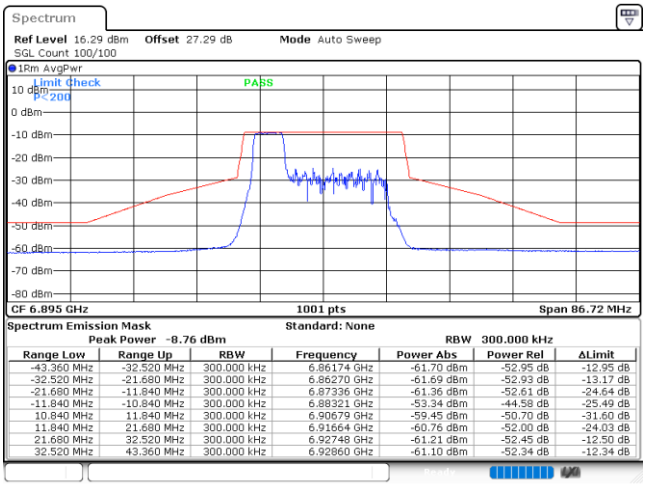
Plot on Channel 6435 MHz



Plot on Channel 6535 MHz

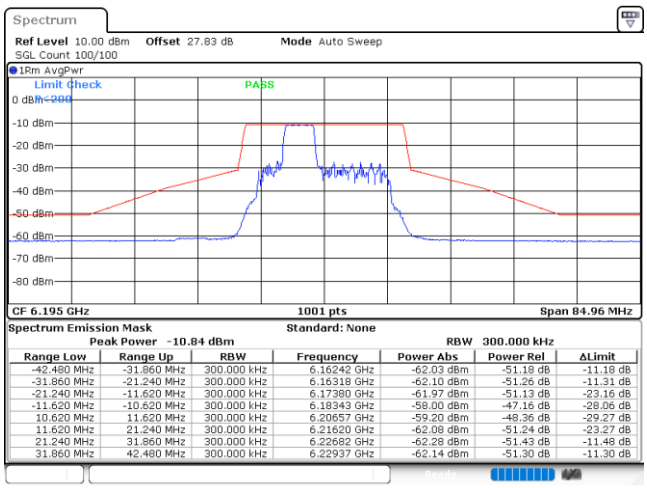


Plot on Channel 6895 MHz

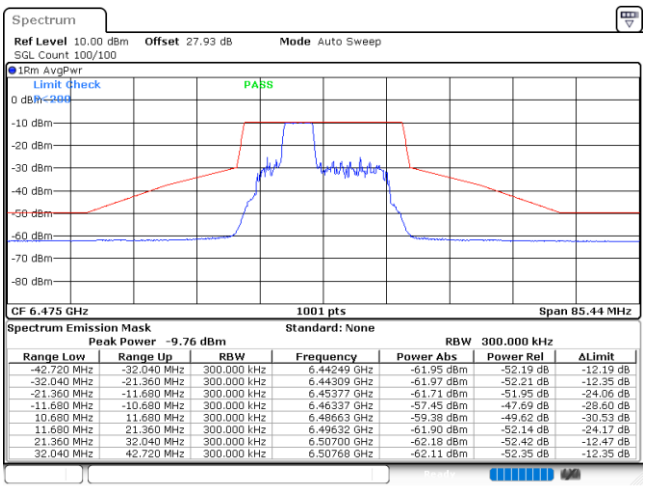


EUT Mode	802.11ax HE20 52RU38

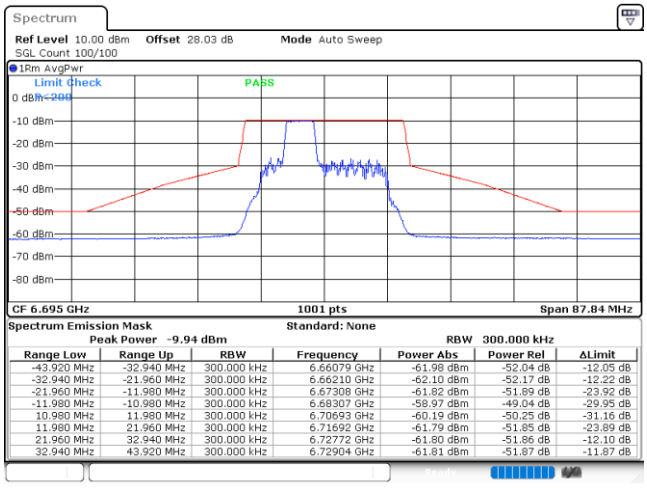
Plot on Channel 6195 MHz



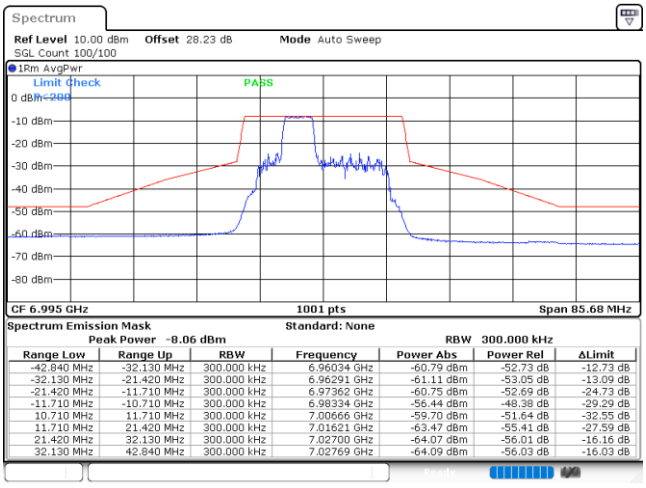
Plot on Channel 6475 MHz



Plot on Channel 6695 MHz

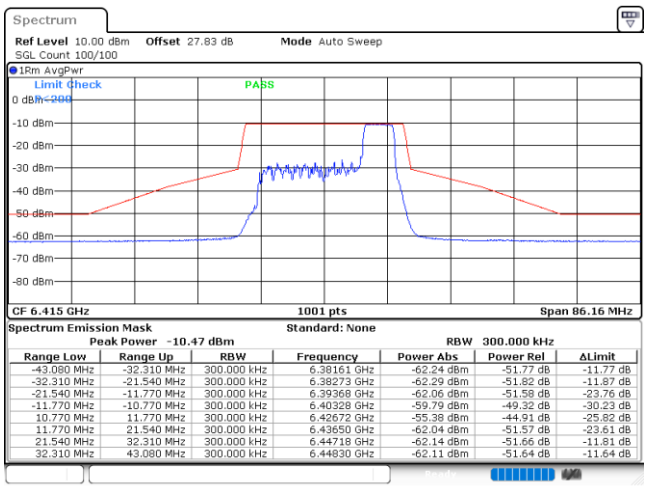


Plot on Channel 6995 MHz

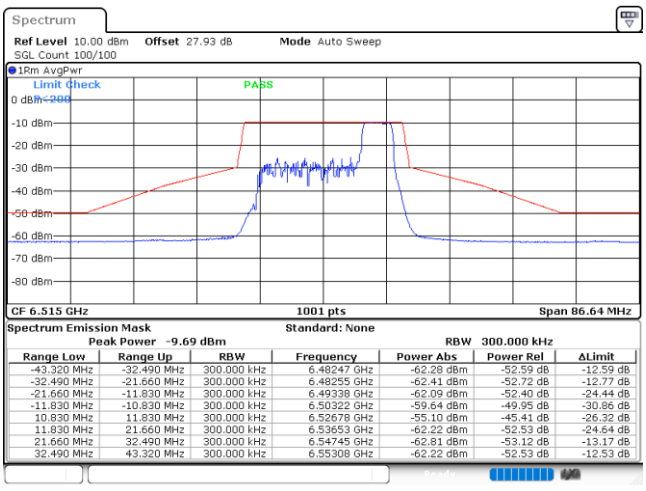


EUT Mode	802.11ax HE20 52RU40

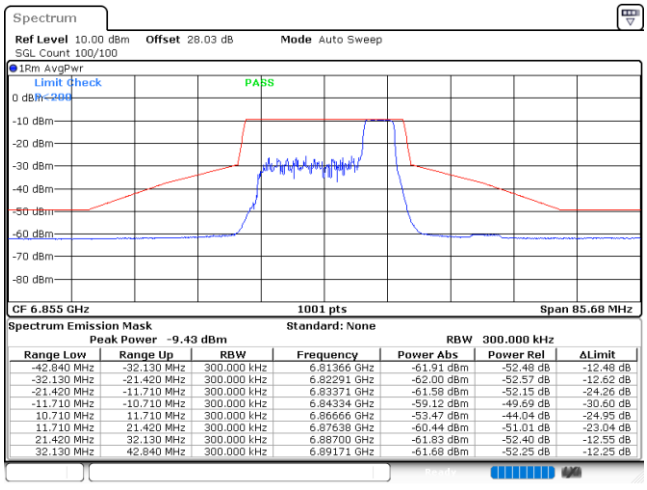
Plot on Channel 6415 MHz



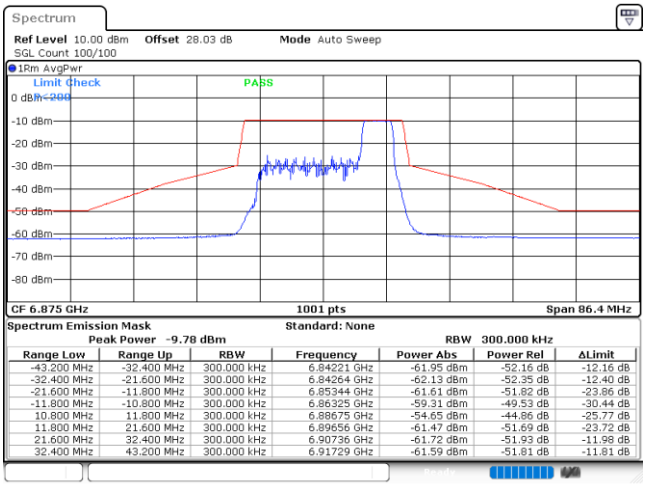
Plot on Channel 6515 MHz



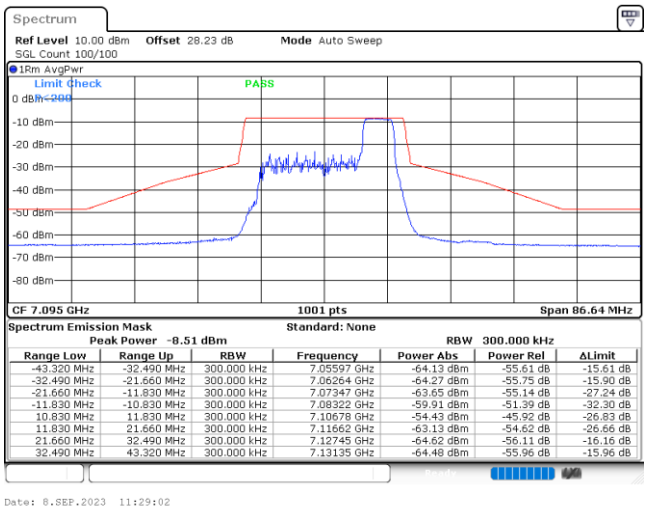
Plot on Channel 6855 MHz



Plot on Channel 6875 MHz

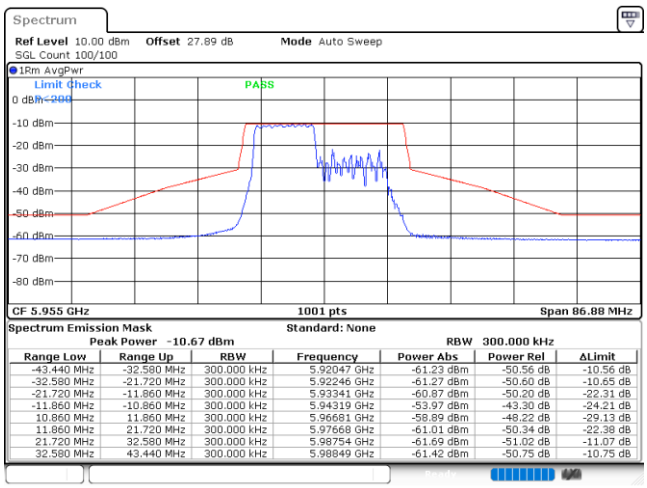


Plot on Channel 7095 MHz

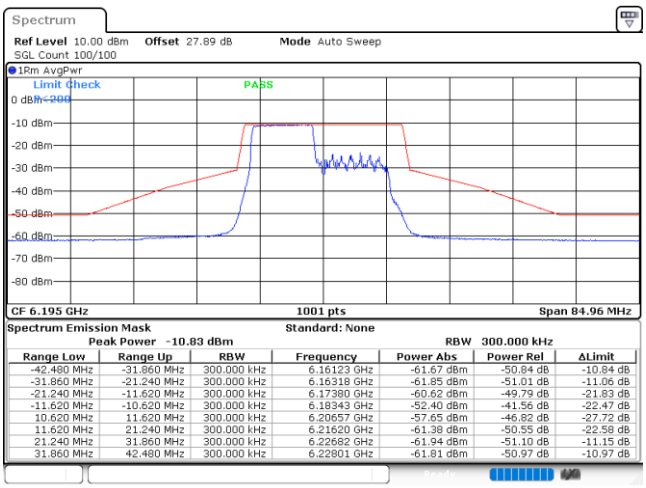


EUT Mode	802.11ax HE20 106RU53

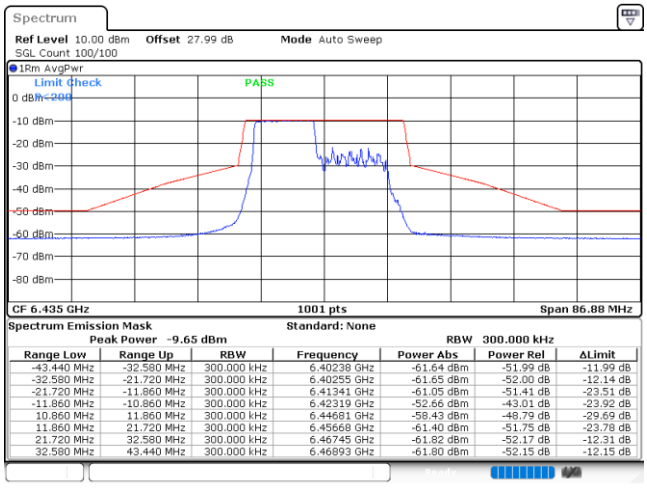
Plot on Channel 5955 MHz



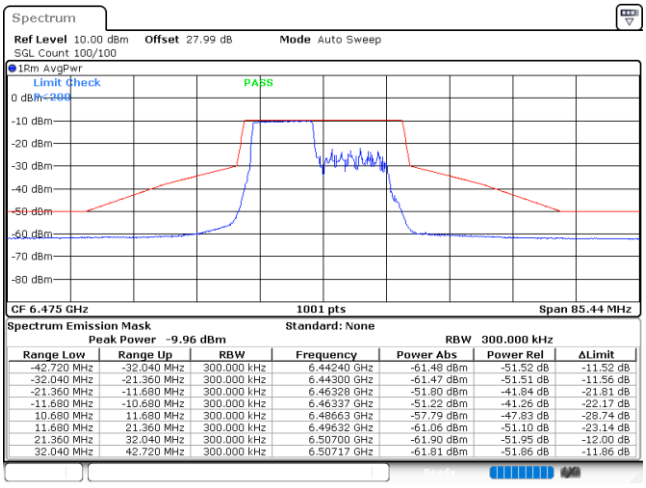
Plot on Channel 6195 MHz



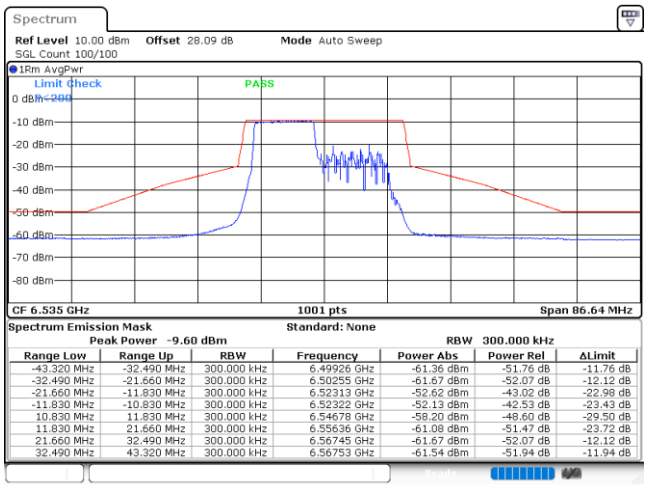
Plot on Channel 6435 MHz



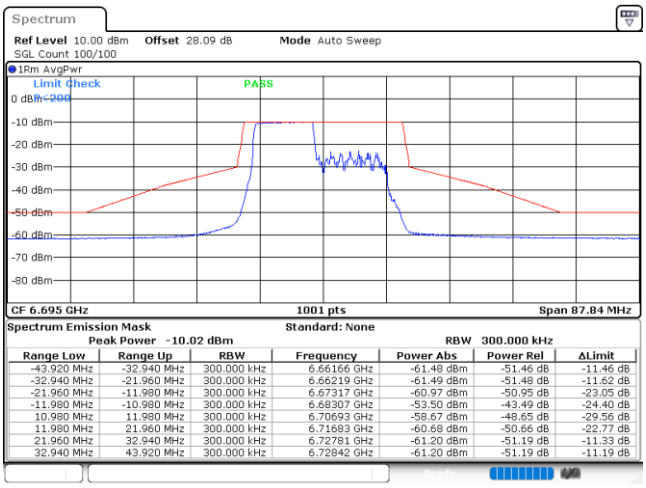
Plot on Channel 6475 MHz



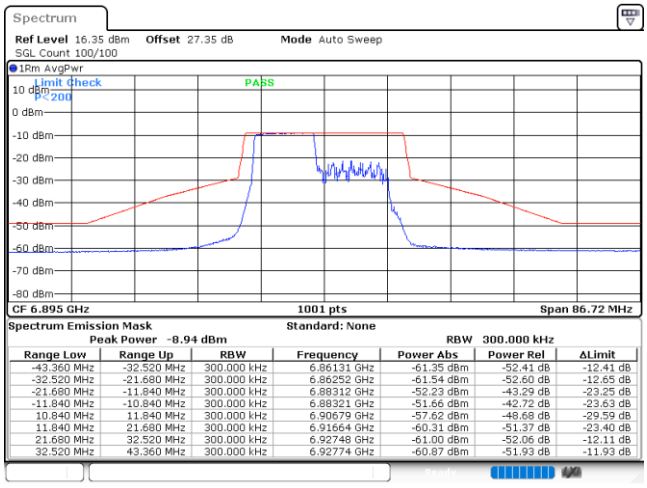
Plot on Channel 6535 MHz



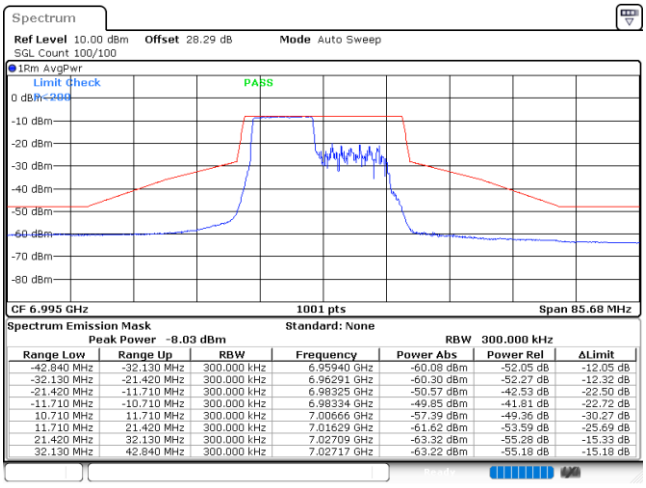
Plot on Channel 6695 MHz



Plot on Channel 6895 MHz

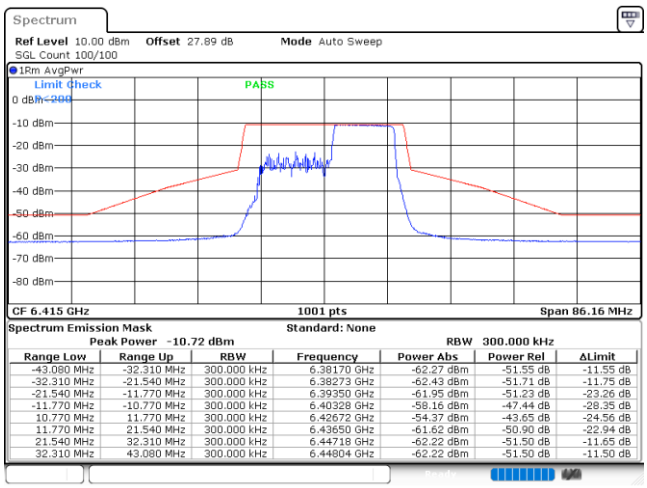


Plot on Channel 6995 MHz

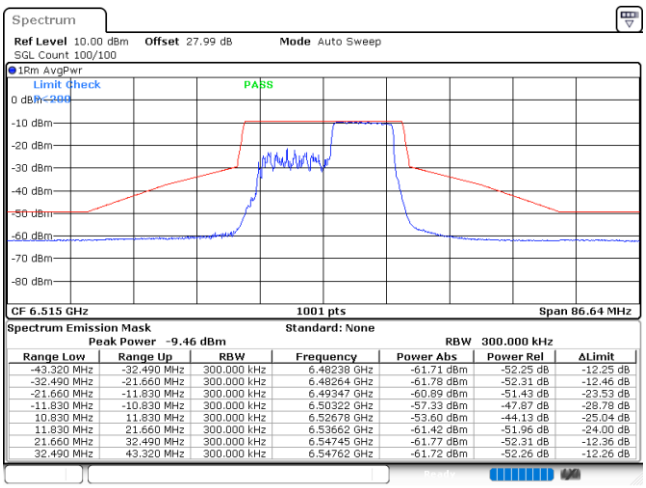


EUT Mode	802.11ax HE20 106RU54

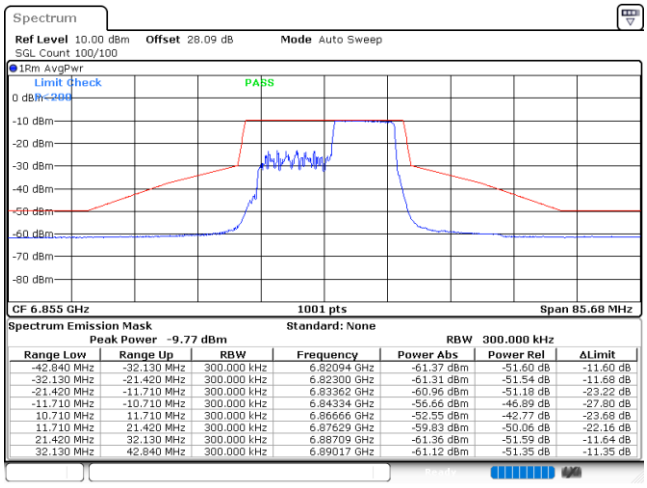
Plot on Channel 6415 MHz



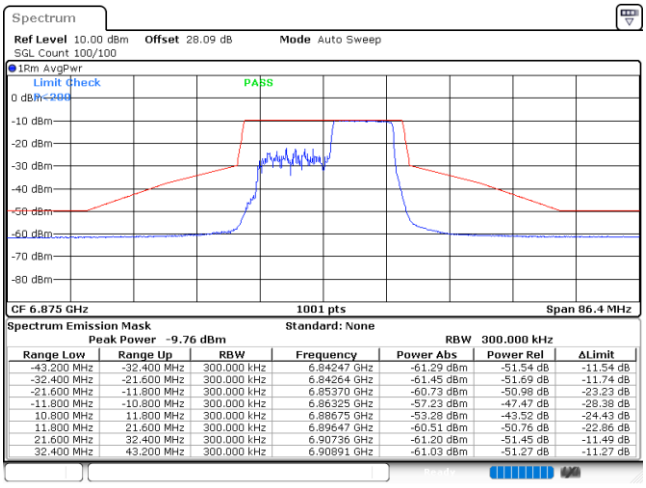
Plot on Channel 6515 MHz



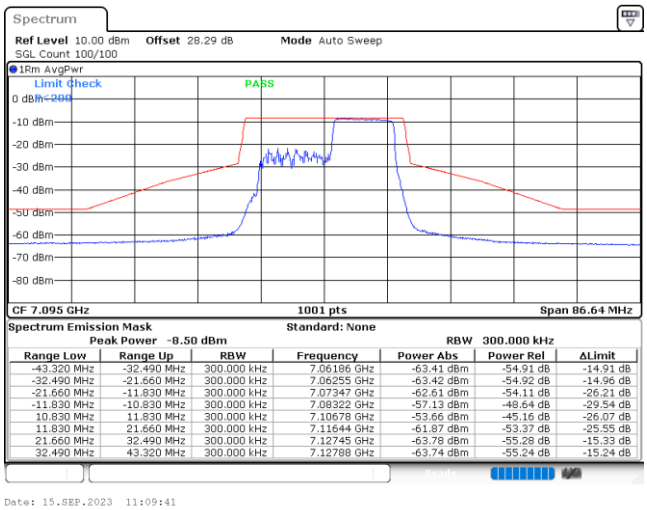
Plot on Channel 6855 MHz



Plot on Channel 6875 MHz

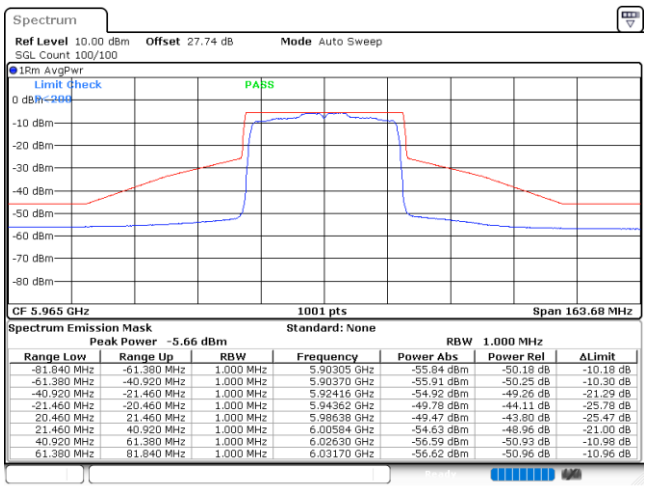


Plot on Channel 7095 MHz



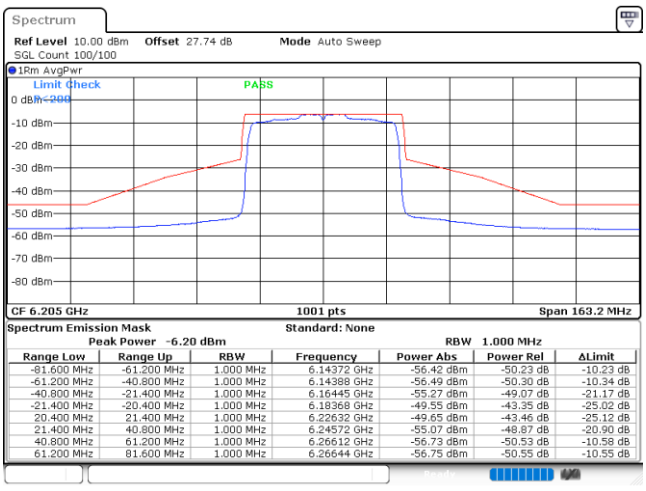
EUT Mode	802.11ax HE40 Full RU

Plot on Channel 5965 MHz



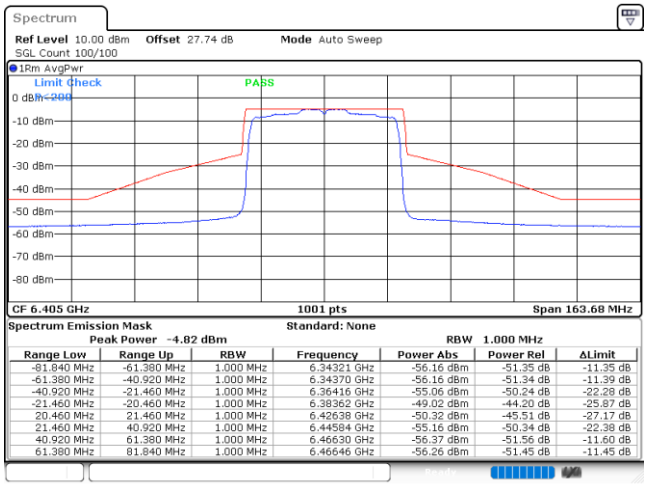
Date: 30.AUG.2023 11:34:53

Plot on Channel 6205 MHz



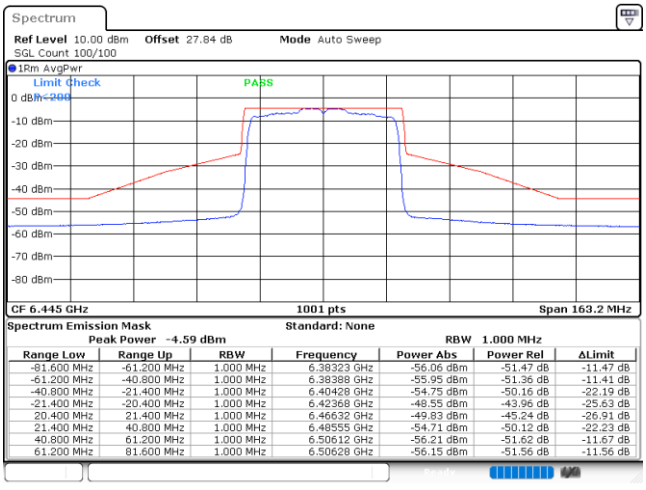
Date: 30.AUG.2023 12:01:35

Plot on Channel 6405 MHz



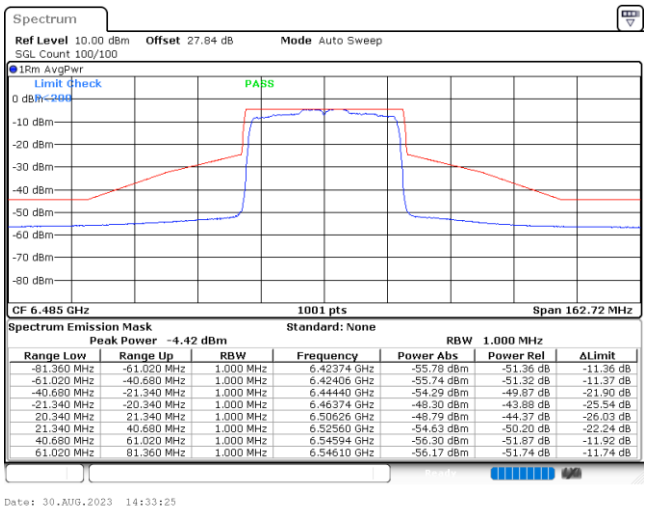
Date: 30.AUG.2023 13:51:44

Plot on Channel 6445 MHz

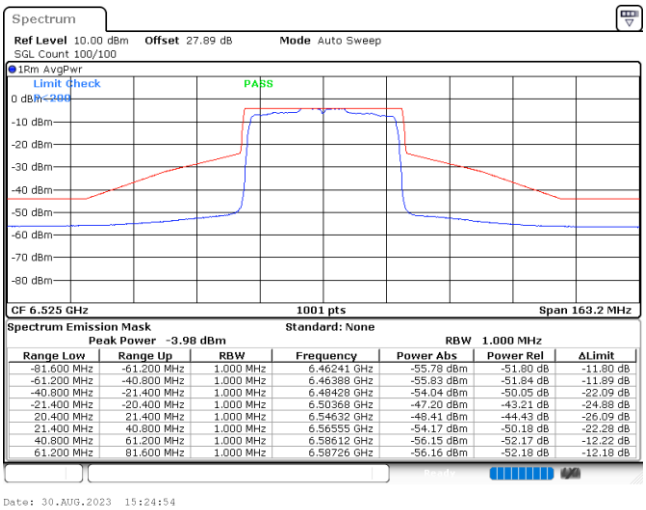


Date: 30.AUG.2023 14:20:33

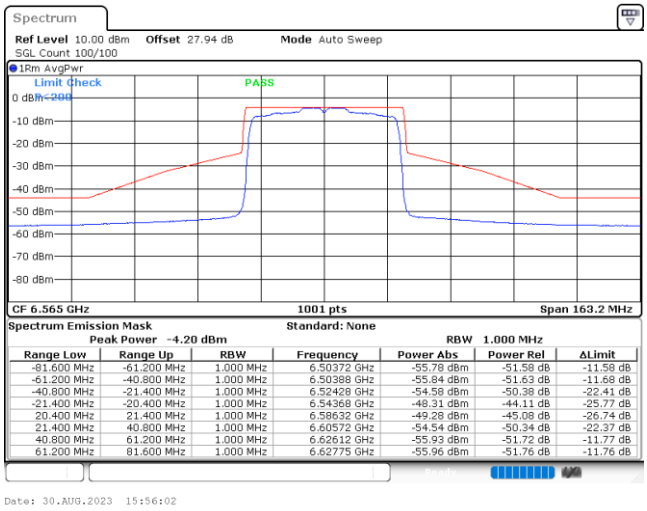
Plot on Channel 6485 MHz



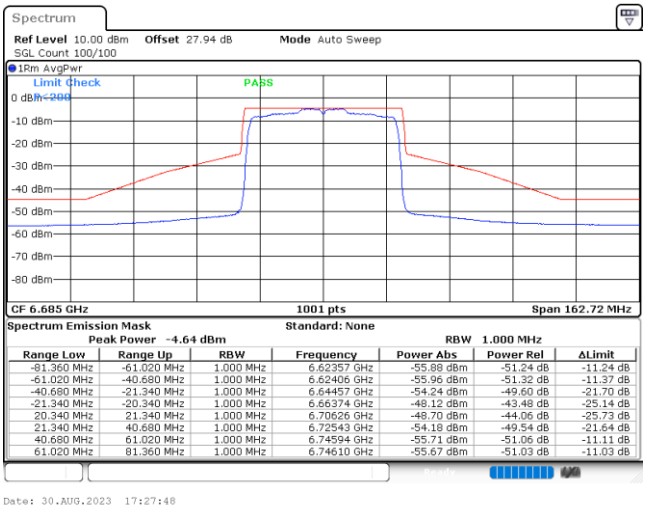
Plot on Channel 6525 MHz



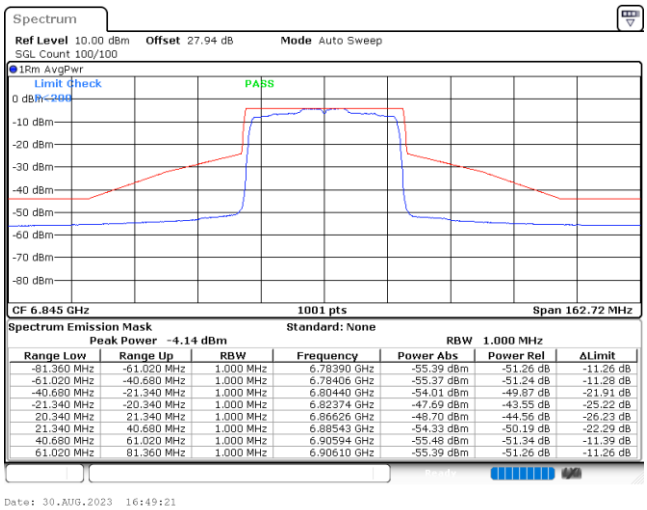
Plot on Channel 6565 MHz



Plot on Channel 6685 MHz

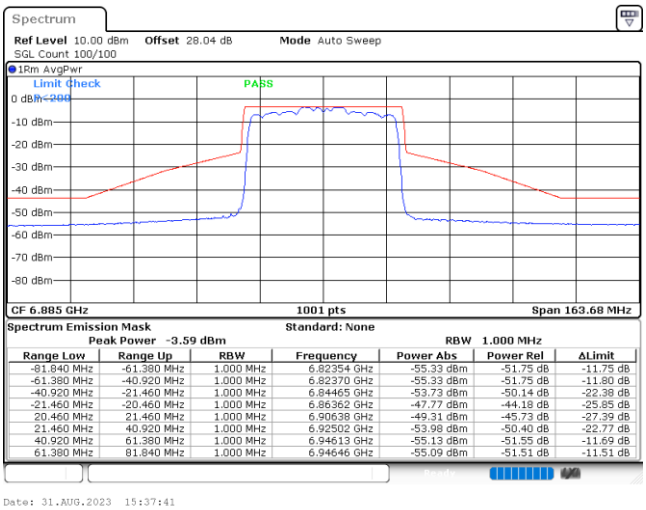


Plot on Channel 6845 MHz



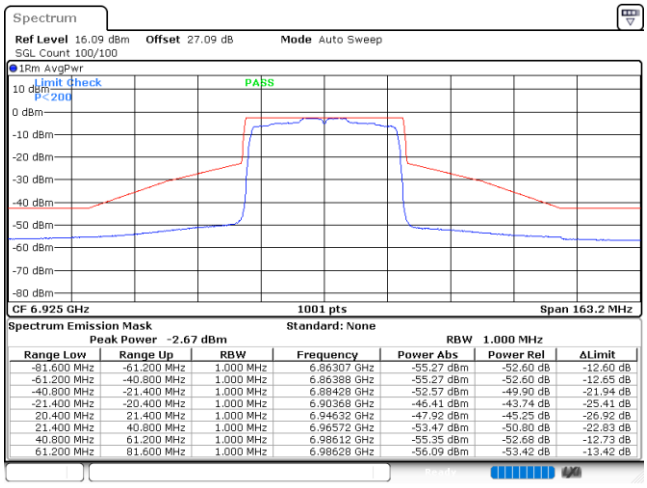
Date: 30.AUG.2023 16:49:21

Plot on Channel 6885 MHz



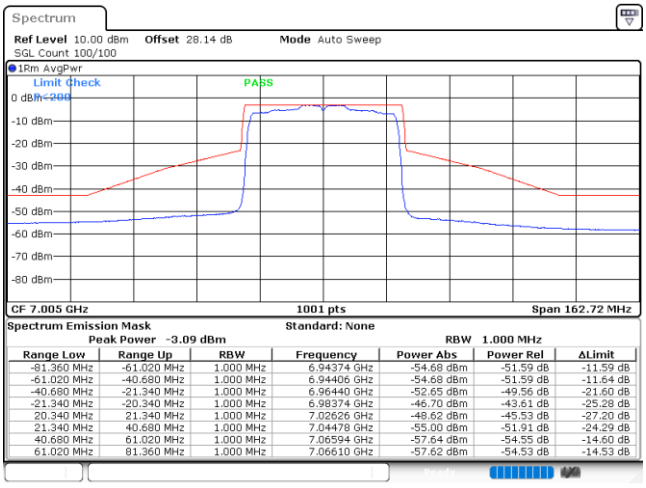
Date: 31.AUG.2023 15:37:41

Plot on Channel 6925 MHz



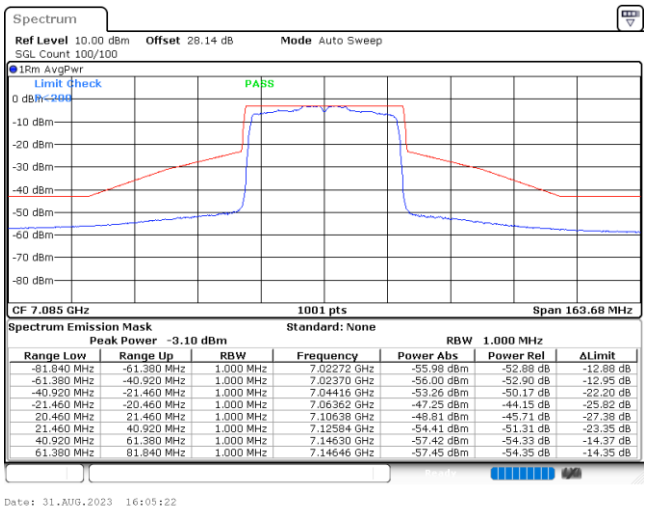
Date: 6.DEC.2023 16:53:39

Plot on Channel 7005 MHz



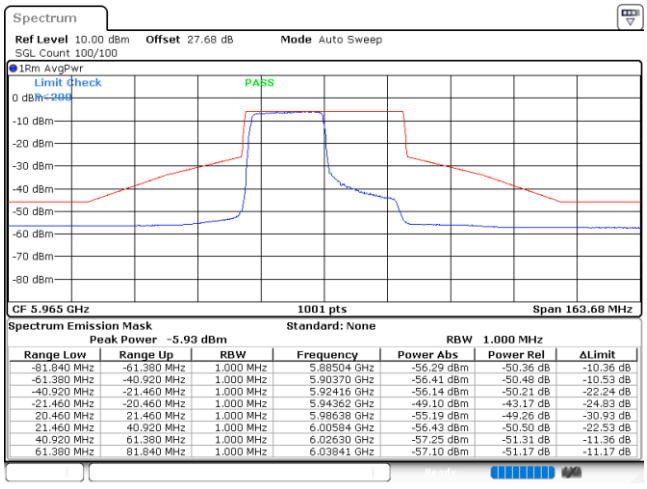
Date: 31.AUG.2023 15:46:36

Plot on Channel 7085 MHz

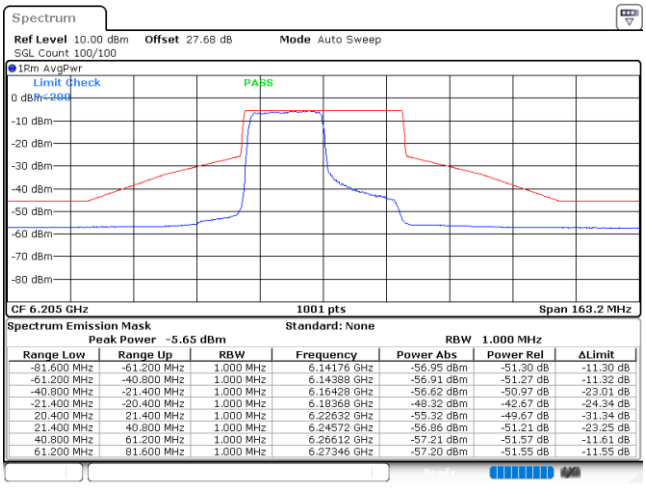


EUT Mode	802.11ax HE40 242RU61

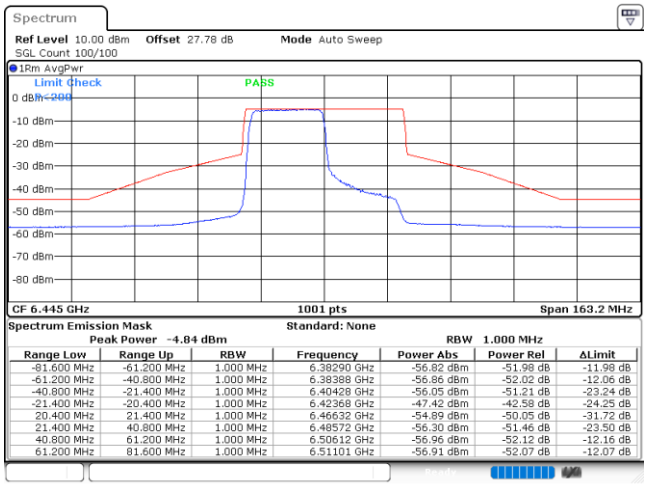
Plot on Channel 5965 MHz



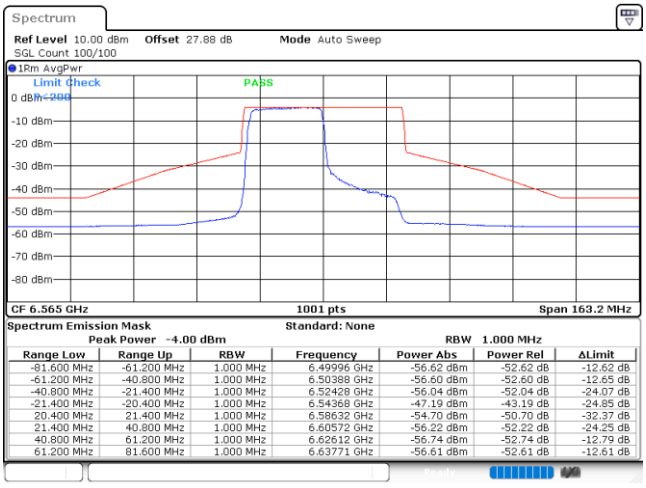
Plot on Channel 6205 MHz



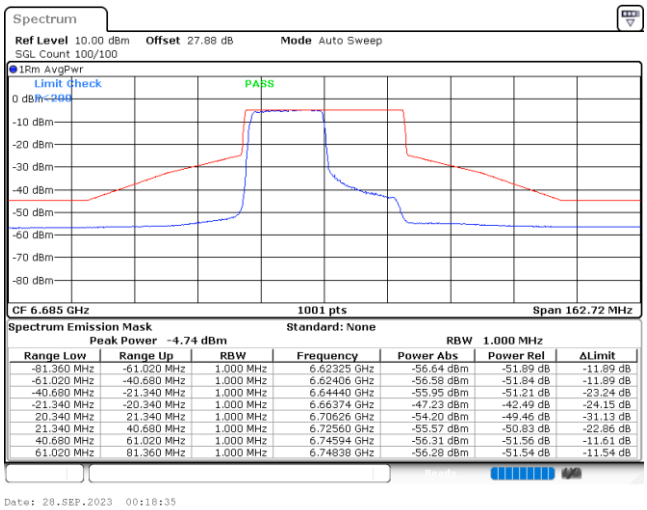
Plot on Channel 6445 MHz



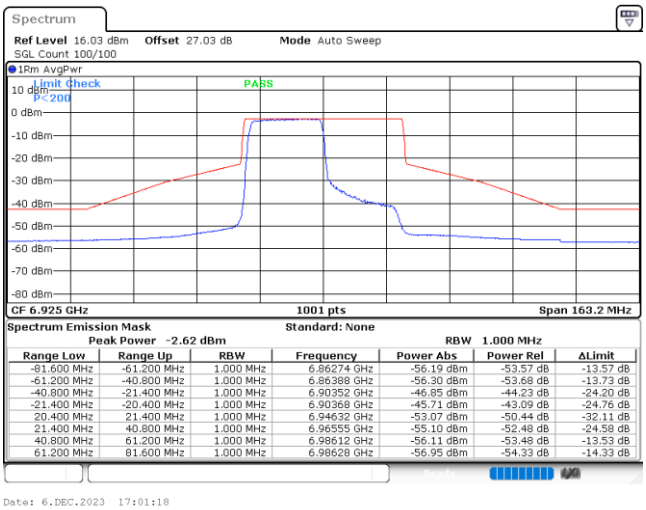
Plot on Channel 6565 MHz



Plot on Channel 6685 MHz

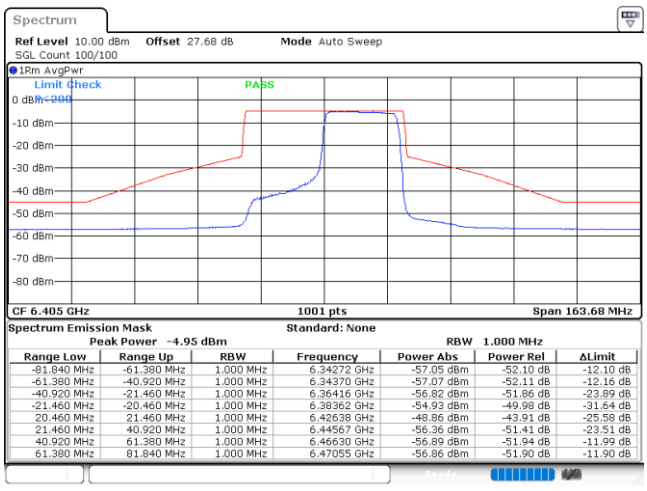


Plot on Channel 6925 MHz



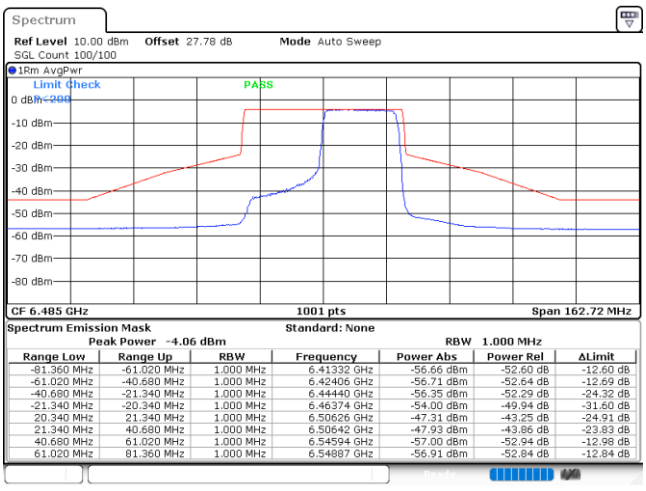
EUT Mode	802.11ax HE40 242RU62

Plot on Channel 6405 MHz



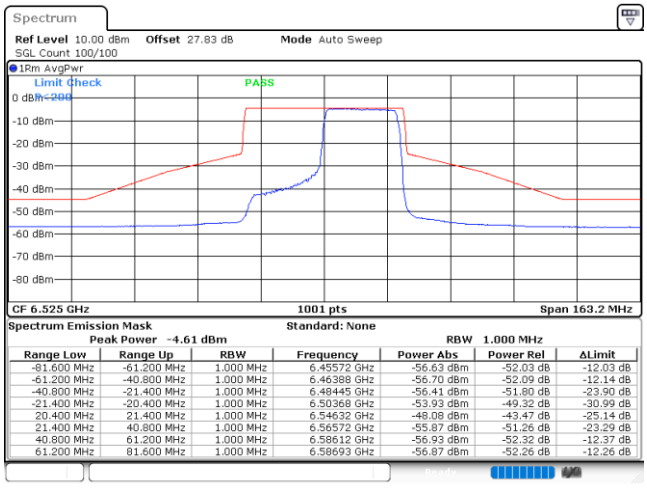
Date: 27.SEP.2023 23:07:05

Plot on Channel 6485 MHz



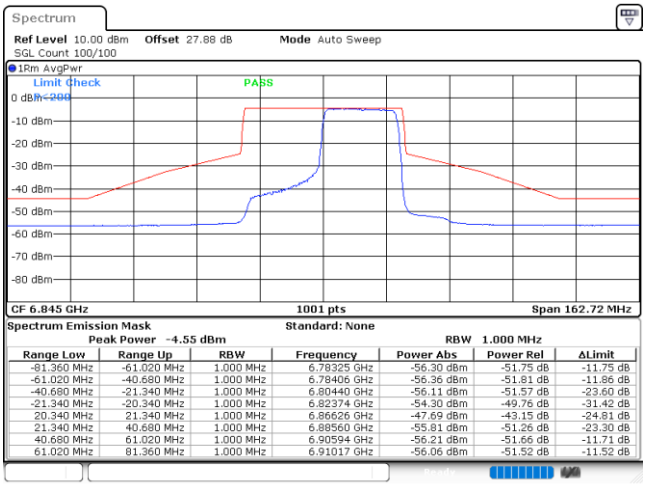
Date: 27.SEP.2023 23:37:47

Plot on Channel 6525 MHz



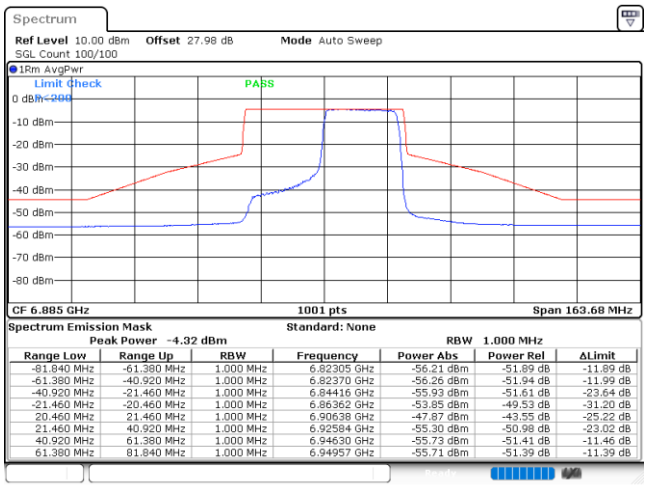
Date: 27.SEP.2023 23:54:35

Plot on Channel 6845 MHz

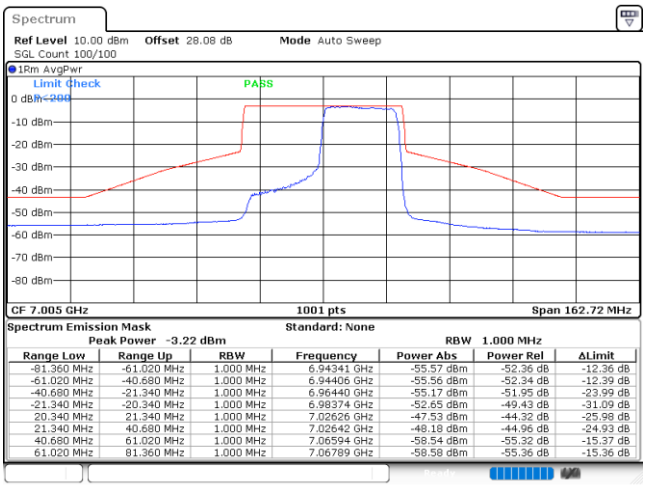


Date: 28.SEP.2023 00:23:10

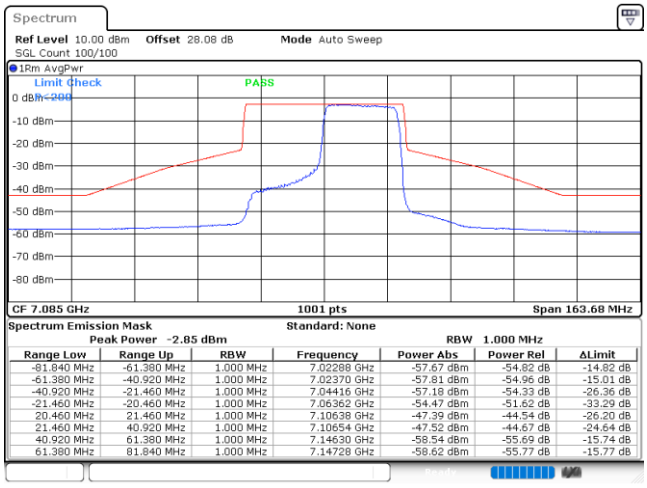
Plot on Channel 6885 MHz



Plot on Channel 7005 MHz

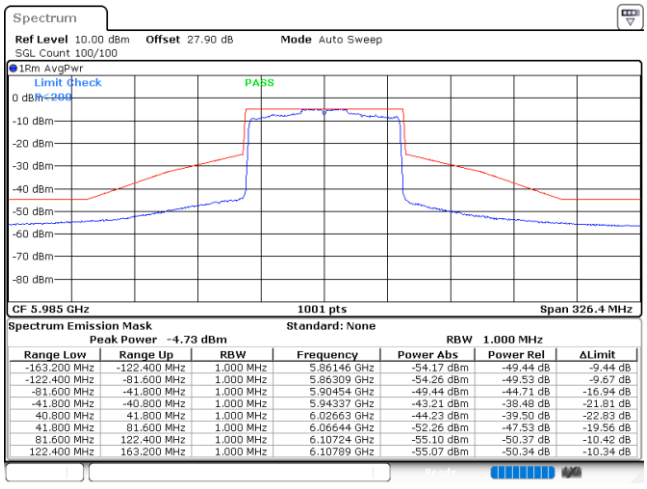


Plot on Channel 7085 MHz

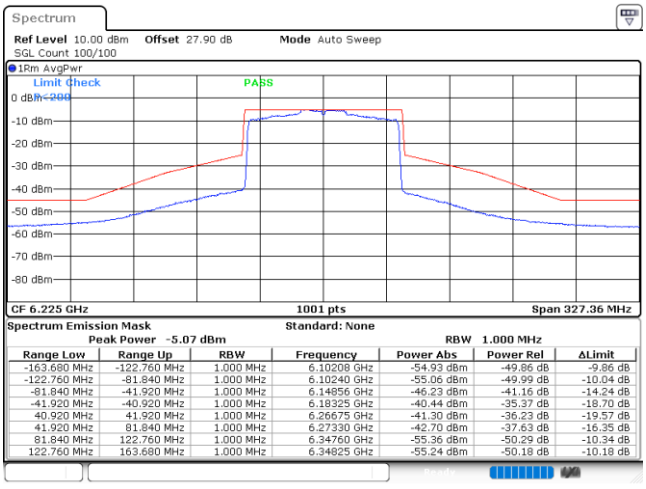


EUT Mode	802.11ax HE80 Full RU

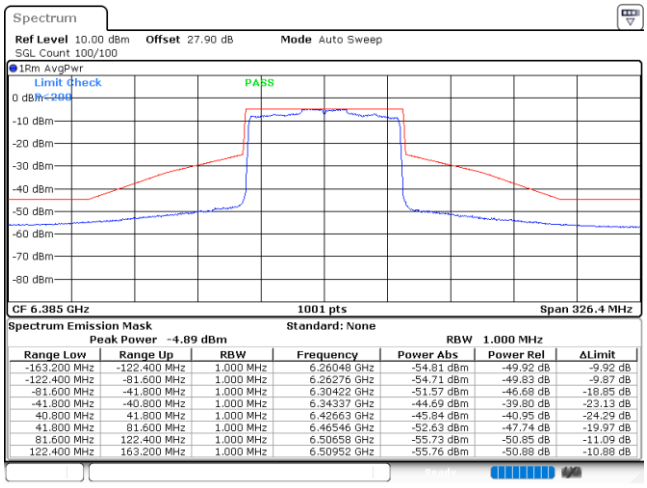
Plot on Channel 5985 MHz



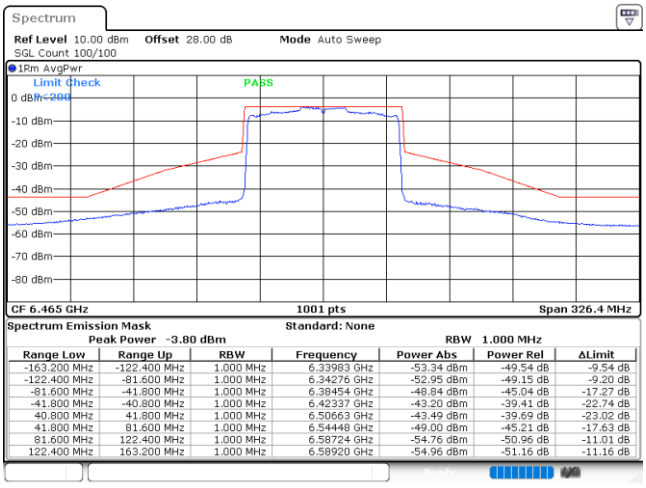
Plot on Channel 6225 MHz



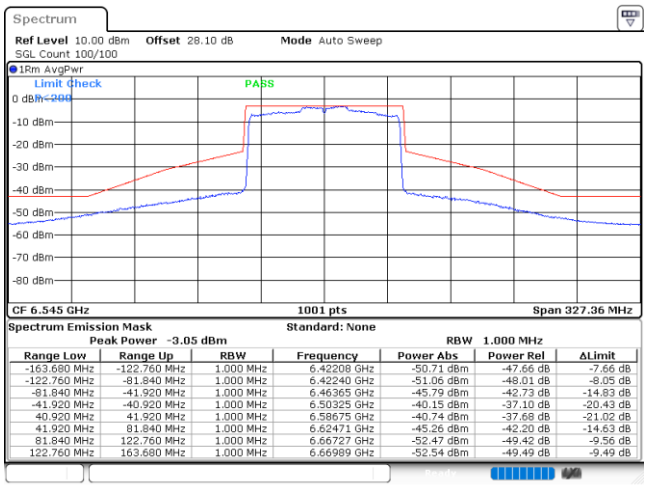
Plot on Channel 6385 MHz



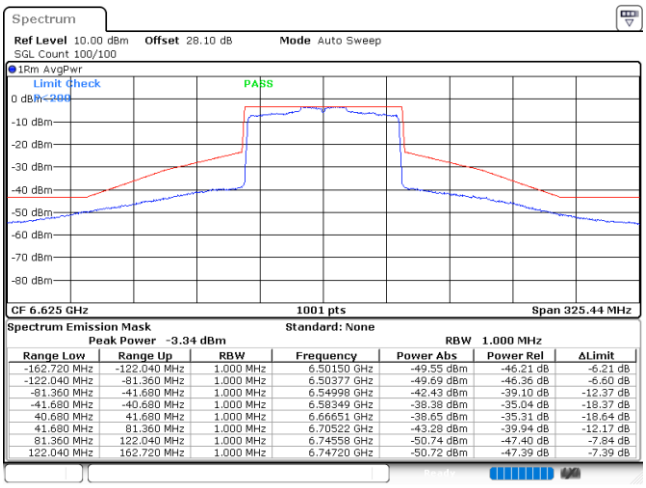
Plot on Channel 6465 MHz



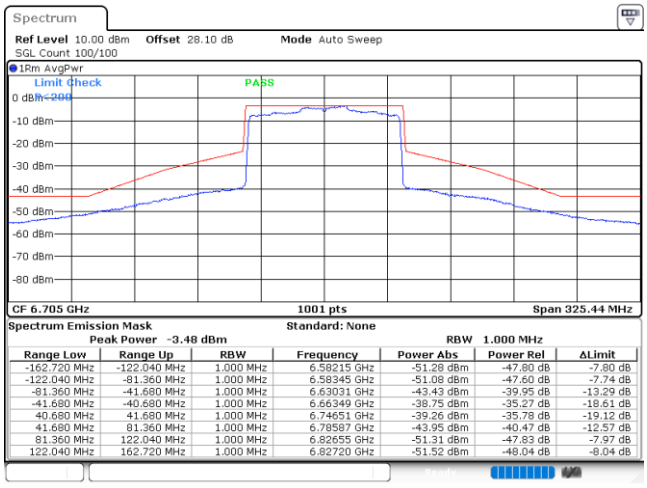
Plot on Channel 6545 MHz



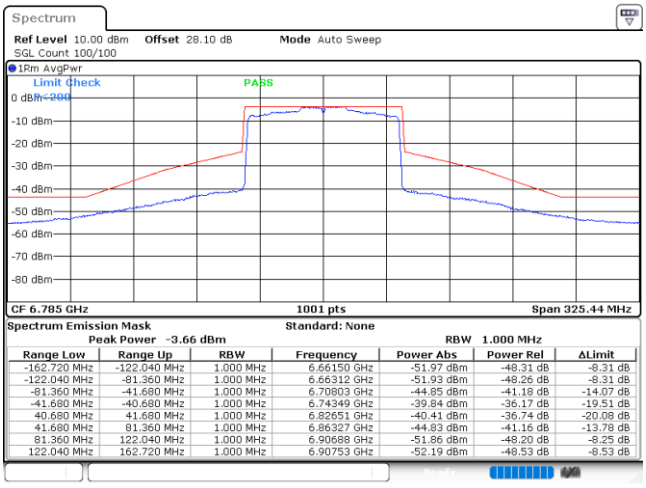
Plot on Channel 6625 MHz



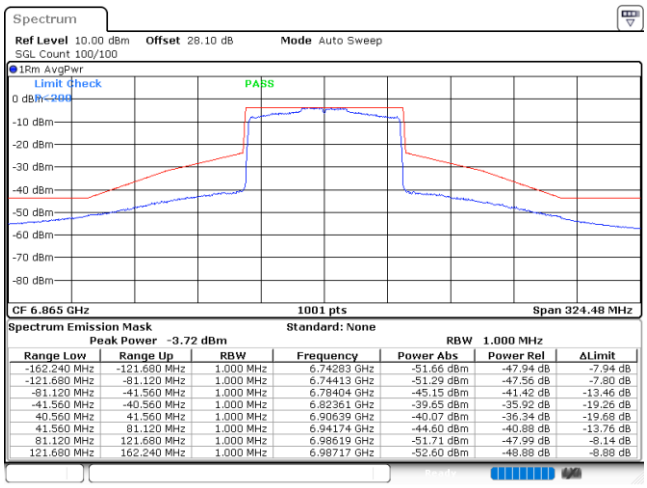
Plot on Channel 6705 MHz



Plot on Channel 6785 MHz



Plot on Channel 6865 MHz



Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-162.240 MHz	-121.680 MHz	1.000 MHz	6.74283 GHz	-51.66 dBm	-47.94 dB	-7.94 dB
-121.680 MHz	-81.120 MHz	1.000 MHz	6.74413 GHz	-51.29 dBm	-47.56 dB	-7.80 dB
-81.120 MHz	-41.560 MHz	1.000 MHz	6.78404 GHz	-45.15 dBm	-41.42 dB	-13.46 dB
-41.560 MHz	-40.560 MHz	1.000 MHz	6.82361 GHz	-39.65 dBm	-35.92 dB	-19.26 dB
40.560 MHz	41.560 MHz	1.000 MHz	6.90639 GHz	-40.07 dBm	-36.34 dB	-19.68 dB
41.560 MHz	81.120 MHz	1.000 MHz	6.94174 GHz	-44.60 dBm	-40.88 dB	-13.76 dB
81.120 MHz	121.680 MHz	1.000 MHz	6.98619 GHz	-51.71 dBm	-47.99 dB	-8.14 dB
121.680 MHz	162.240 MHz	1.000 MHz	6.98717 GHz	-52.60 dBm	-48.88 dB	-8.88 dB

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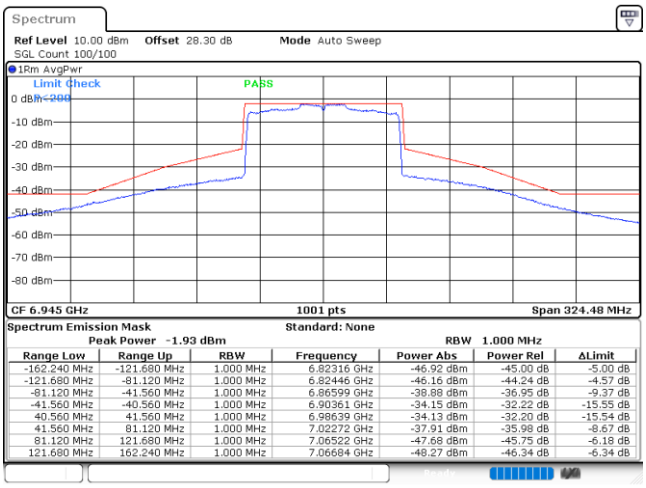
Plot on Channel 6945 MHz



Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-162.240 MHz	-121.680 MHz	1.000 MHz	6.82316 GHz	-46.92 dBm	-45.00 dB	-5.00 dB
-121.680 MHz	-81.120 MHz	1.000 MHz	6.82446 GHz	-46.16 dBm	-44.24 dB	-4.57 dB
-81.120 MHz	-41.560 MHz	1.000 MHz	6.86599 GHz	-38.88 dBm	-36.95 dB	-9.37 dB
-41.560 MHz	-40.560 MHz	1.000 MHz	6.90361 GHz	-34.15 dBm	-32.22 dB	-15.55 dB
40.560 MHz	41.560 MHz	1.000 MHz	6.98639 GHz	-34.13 dBm	-32.20 dB	-15.54 dB
41.560 MHz	81.120 MHz	1.000 MHz	7.02272 GHz	-37.91 dBm	-35.98 dB	-8.67 dB
81.120 MHz	121.680 MHz	1.000 MHz	7.06522 GHz	-47.68 dBm	-45.75 dB	-6.18 dB
121.680 MHz	162.240 MHz	1.000 MHz	7.06684 GHz	-48.27 dBm	-46.34 dB	-6.34 dB

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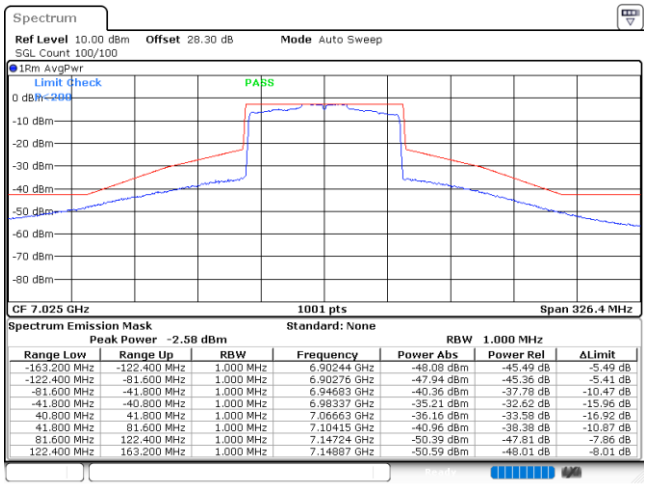
Plot on Channel 7025 MHz



Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-163.200 MHz	-122.400 MHz	1.000 MHz	6.90244 GHz	-48.08 dBm	-45.49 dB	-5.49 dB
-122.400 MHz	-81.600 MHz	1.000 MHz	6.90276 GHz	-47.94 dBm	-45.36 dB	-5.41 dB
-81.600 MHz	-41.800 MHz	1.000 MHz	6.94683 GHz	-40.36 dBm	-37.78 dB	-10.47 dB
-41.800 MHz	-40.800 MHz	1.000 MHz	6.98337 GHz	-35.21 dBm	-32.62 dB	-15.96 dB
40.800 MHz	41.800 MHz	1.000 MHz	7.06663 GHz	-36.16 dBm	-33.58 dB	-16.92 dB
41.800 MHz	81.600 MHz	1.000 MHz	7.10415 GHz	-40.96 dBm	-38.38 dB	-10.87 dB
81.600 MHz	122.400 MHz	1.000 MHz	7.14724 GHz	-50.39 dBm	-47.81 dB	-7.86 dB
122.400 MHz	163.200 MHz	1.000 MHz	7.14887 GHz	-50.59 dBm	-48.01 dB	-8.01 dB

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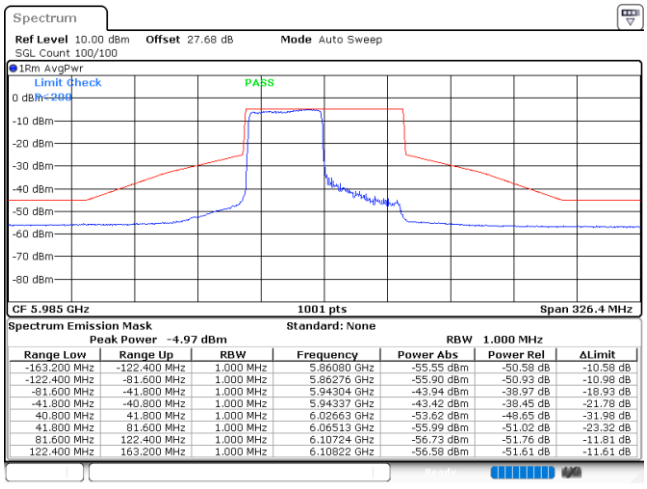
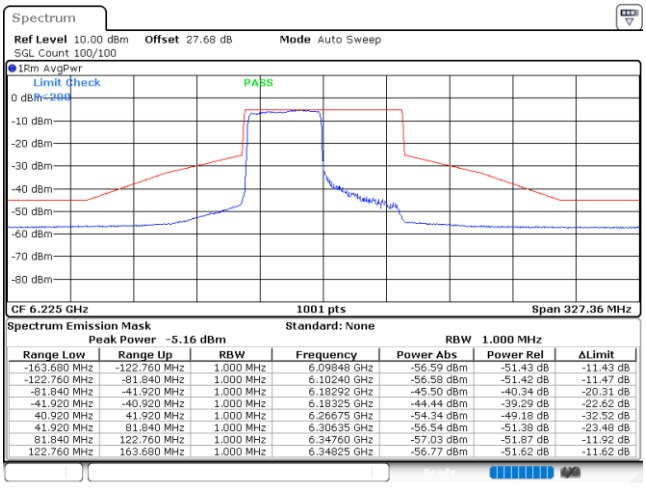
EUT Mode	802.11ax HE80 484RU65

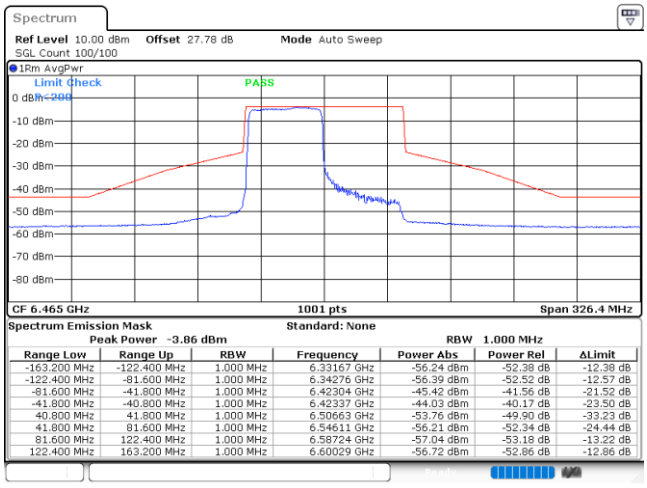
Plot on Channel 5985 MHz



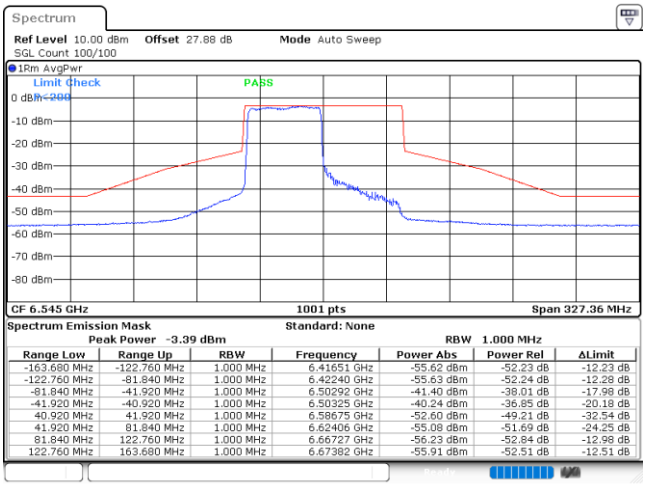
Plot on Channel 6225 MHz



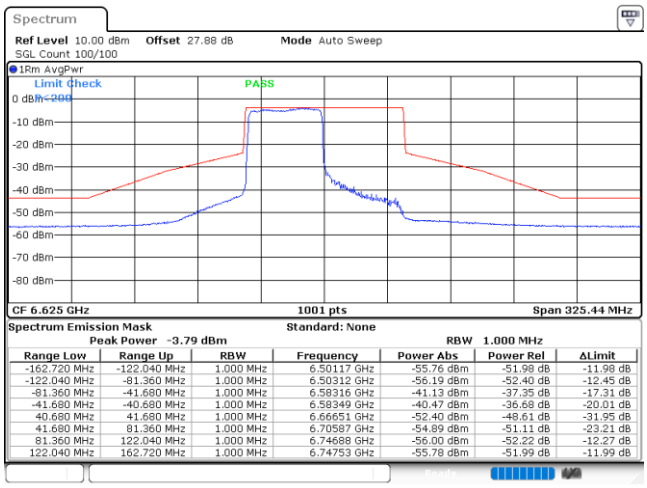
Plot on Channel 6465 MHz



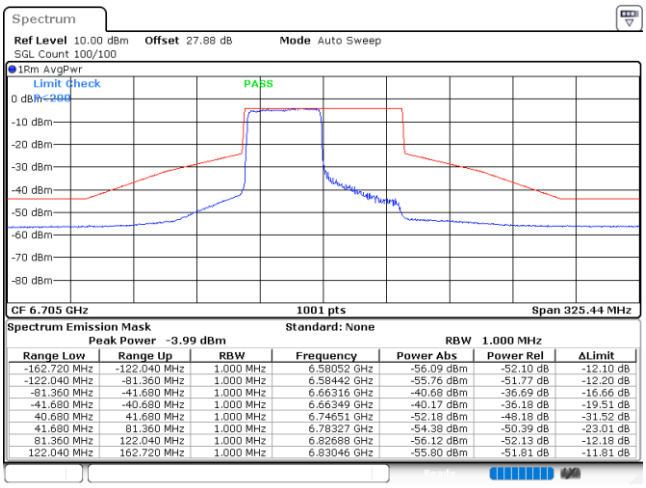
Plot on Channel 6545 MHz



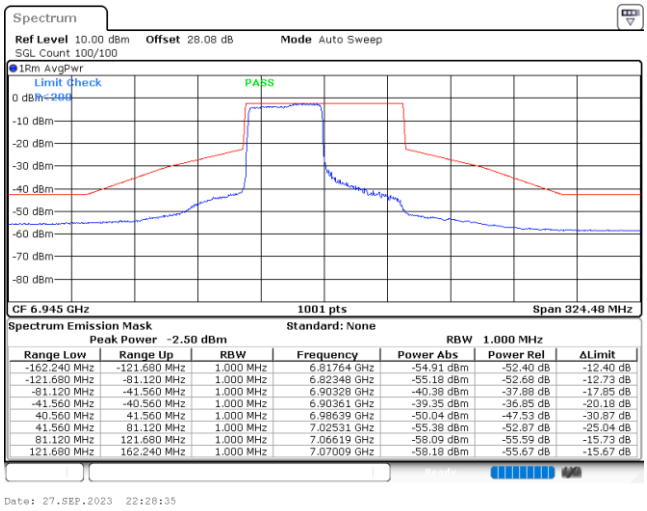
Plot on Channel 6625 MHz



Plot on Channel 6705 MHz

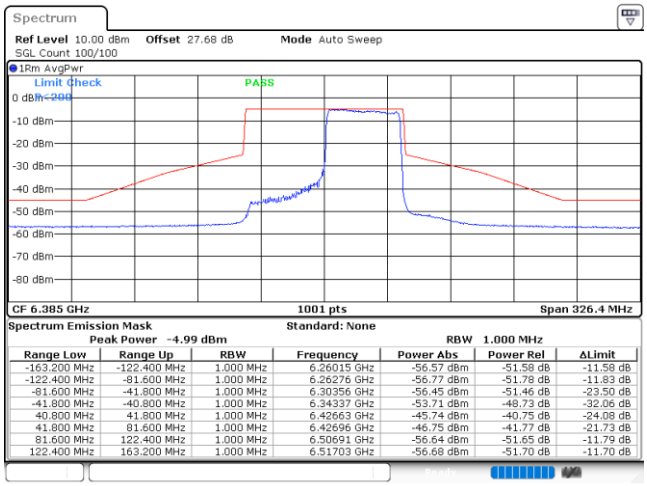


Plot on Channel 6945 MHz

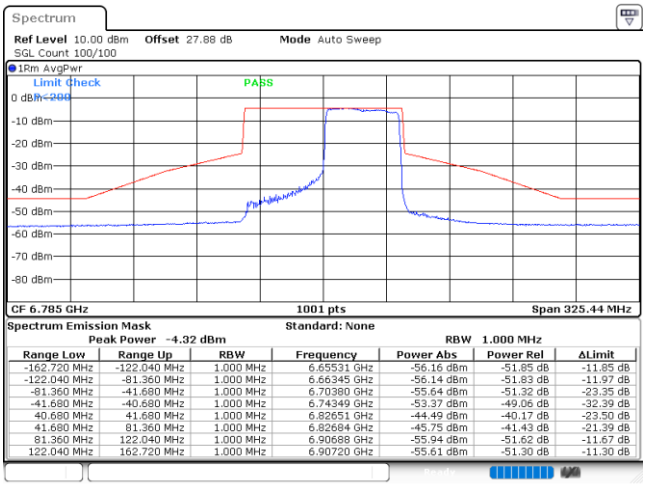


EUT Mode	802.11ax HE80 484RU66

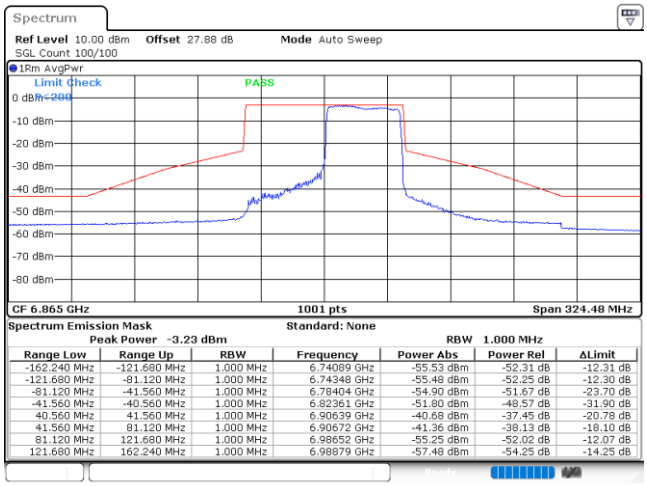
Plot on Channel 6385 MHz



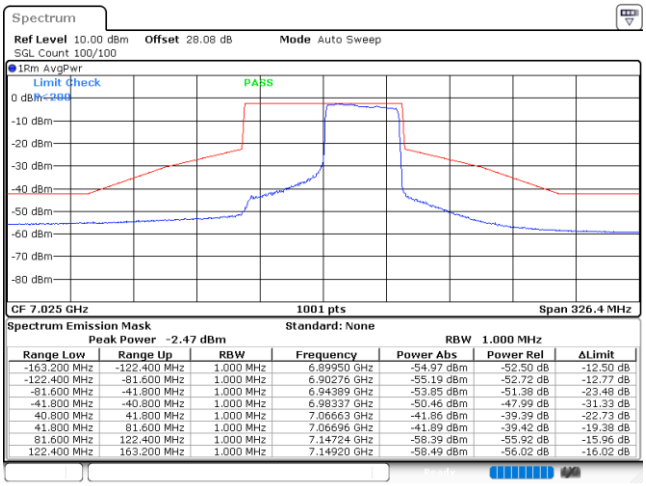
Plot on Channel 6785 MHz



Plot on Channel 6865 MHz



Plot on Channel 7025 MHz



3.5 Contention Based Protocol

3.5.1 Limit of Contention Based Protocol

<FCC 14-30 CFR 15.407>

(d)(6) Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 GHz band must employ a contention-based protocol.

FCC KDB 987594 D02 U-NII 6GHz EMC Measurement v01

Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel and stay off the channel as long as detected radio frequency power is equal to or greater than the threshold (-62 dBm). The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain. To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel. For example, an 802.11 device that plans to transmit a 40 MHz- wide signal (on a primary 20 MHz channel and a secondary 20 MHz channel) must detect energy throughout the entire 40 MHz channel. Additionally, low-power indoor devices must detect co-channel energy with 90% or greater certainty.

Table 1. Criteria to determine number of times detection threshold test may be performed

If	Number of Tests	Placement of Incumbent Transmission
$BW_{EUT} \leq BW_{Inc}$	Once	Tune incumbent and EUT transmissions ($f_{c1} = f_{c2}$)
$BW_{Inc} < BW_{EUT} \leq 2BW_{Inc}$	Once	Incumbent transmission is contained within BW_{EUT}
$2BW_{Inc} < BW_{EUT} \leq 4BW_{Inc}$	Twice. Incumbent transmission is contained within BW_{EUT}	Incumbent transmission is located as closely as possible to the lower edge and upper edge, respectively, of the EUT channel
$BW_{EUT} > 4BW_{Inc}$	Three times	Incumbent transmission is located as closely as possible to the lower edge of the EUT channel, in the middle of EUT channel, and as closely as possible to the upper edge of the EUT channel

where:

$BWEUT$: Transmission bandwidth of EUT signal

$BWInc$: Transmission bandwidth of the simulated incumbent signal (10 MHz wide AWGN signal)

$fc1$: Center frequency of EUT transmission

$fc2$: Center frequency of simulated incumbent signal

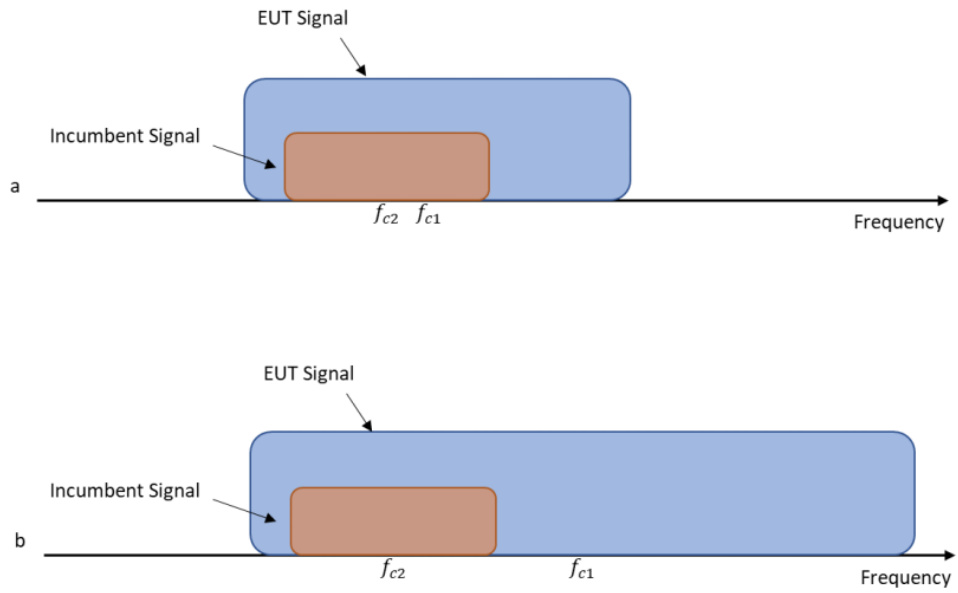


Figure 1. Two possible scenarios where a) center frequency of EUT transmission falls within incumbent's bandwidth, or b) outside of it

3.5.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.5.3 Test Procedures

The testing follows FCC KDB 987594 D02 U-NII 6GHz EMC Measurement v01.
Section I) Contention Based Protocol
Conducted method Step-by-Step Procedure, Conducted Setup

1. Configure the EUT to transmit with a constant duty cycle.
2. Set the operating parameters of the EUT including power level, operating frequency, modulation and bandwidth.
3. 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.
4. Connect the output port of the EUT to the signal analyzer 2, as shown in test setup Figure 2. Ensure that the attenuator 2 provides enough attenuation to not overload the signal analyzer 2 receiver.
5. Monitoring the signal analyzer 2, verify the EUT is operating and transmitting with the parameters set at step two.
6. Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 MHz-wide AWGN signal. Use Table 1 to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.
7. 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 as shown in test setup Figure 2.
8. Transmit the AWGN signal (RF ON) and verify its characteristics on the signal analyzer 1.

9. 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.
10. (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.
11. Refer to Table 1 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 5, choose a different center frequency for the AWGN signal and repeat the process.
12. For the contention-based protocol test where only one channel in each supported sub-band needs to be tested. The narrowest and widest bandwidth in each channel shall be measured EUT was driven in MIMO mode, the interferer level was injected to both chains to monitor the performance, while the interferer level is determined according the lowest antenna gain among both antennas (i.e, lower interferer level).

3.5.4 Test Setup

Conducted Setup

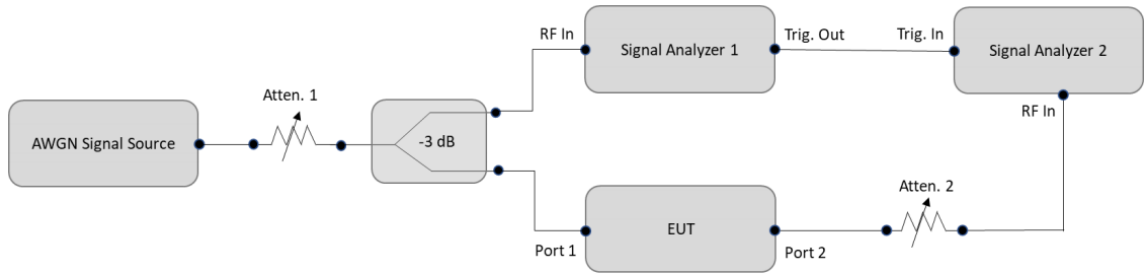


Figure 2. Contention-based protocol test setup, conducted method Step-by-Step Procedure, Conducted Setup

3.5.5 Support Unit used in test configuration and system

Instrument	Brand Name	Model No.	Characteristics
WLAN AP	ASUS	GT-AXE11000	Dual Band AP
Notebook	DELL	Latitude 3400	LAN

3.5.6 Antenna gain for Contention Based Protocol Test

CBP Antenna Gain	<UNII-5>: -2.7 dBi <UNII-6>: -3.9 dBi <UNII-7>: -4.1 dBi <UNII-8>: -4.5 dBi

3.5.7 Test Summary of Contention Based Protocol Test

Test Engineer :	Kai Liao	Temperature :	24~26℃
		Relative Humidity :	45~50%

Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 5	6135	20	6135	-68.04	100	-62	-65.34	3.34
					Result: Stop Transmission			
				-74.04	< 90	-62	-71.34	9.34
					Result: Minimal Operation			
				-75.04	0	-62	-72.34	10.34
					Result: Normal Operation			
	6145	80	6110	-70.25	100	-62	-67.55	5.55
					Result: Stop Transmission			
				-74.25	< 90	-62	-71.55	9.55
					Result: Minimal Operation			
				-75.25	0	-62	-72.55	10.55
					Result: Normal Operation			
			6145	-70.99	100	-62	-68.29	6.29
					Result: Stop Transmission			
				-74.99	< 90	-62	-72.29	10.29
					Result: Minimal Operation			
				-75.99	0	-62	-73.29	11.29
					Result: Normal Operation			
			6180	-68.07	100	-62	-65.37	3.37
					Result: Stop Transmission			
				-73.07	< 90	-62	-70.37	8.37
					Result: Minimal Operation			
				-74.07	0	-62	-71.37	9.37
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (-2.7 dBi).

Note 2: The antenna gain has included the path loss between RF connector and antenna.

Note 3: Margin = Regulated Threshold level - Adjusted Power.

Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 6	6455	20	6455	-67.21	100	-62	-63.31	1.31
					Result: Stop Transmission			
				-74.21	< 90	-62	-70.31	8.31
					Result: Minimal Operation			
				-75.21	0	-62	-71.31	9.31
					Result: Normal Operation			
	6465	80	6430	-73.14	100	-62	-69.24	7.24
					Result: Stop Transmission			
				-74.14	< 90	-62	-70.24	8.24
					Result: Minimal Operation			
				-75.14	0	-62	-71.24	9.24
					Result: Normal Operation			
			6465	-68.15	100	-62	-64.25	2.25
					Result: Stop Transmission			
				-74.15	< 90	-62	-70.25	8.25
					Result: Minimal Operation			
				-75.15	0	-62	-71.25	9.25
					Result: Normal Operation			
			6500	-70.38	100	-62	-66.48	4.48
					Result: Stop Transmission			
				-73.38	< 90	-62	-69.48	7.48
					Result: Minimal Operation			
				-74.38	0	-62	-70.48	8.48
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (-3.9 dBi).

Note 2: The antenna gain has included the path loss between RF connector and antenna.

Note 3: Margin = Regulated Threshold level - Adjusted Power.

Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 7	6695	20	6695	-68.38	100	-62	-64.28	2.28
					Result: Stop Transmission			
				-74.38	< 90	-62	-70.28	8.28
					Result: Minimal Operation			
				-75.38	0	-62	-71.28	9.28
					Result: Normal Operation			
	6705	80	6670	-67.42	100	-62	-63.32	1.32
					Result: Stop Transmission			
				-73.42	< 90	-62	-69.32	7.32
					Result: Minimal Operation			
				-74.42	0	-62	-70.32	8.32
					Result: Normal Operation			
			6705	-68.41	100	-62	-64.31	2.31
					Result: Stop Transmission			
				-73.41	< 90	-62	-69.31	7.31
					Result: Minimal Operation			
				-74.41	0	-62	-70.31	8.31
					Result: Normal Operation			
			6740	-69.48	100	-62	-65.38	3.38
					Result: Stop Transmission			
				-72.48	< 90	-62	-68.38	6.38
					Result: Minimal Operation			
				-73.48	0	-62	-69.38	7.38
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (-4.1 dBi).

Note 2: The antenna gain has included the path loss between RF connector and antenna.

Note 3: Margin = Regulated Threshold level - Adjusted Power.

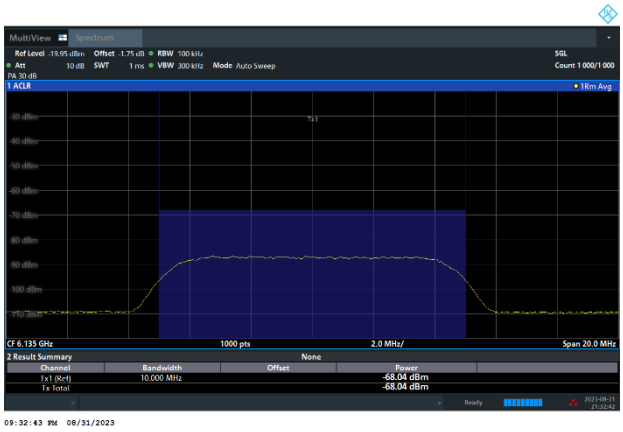
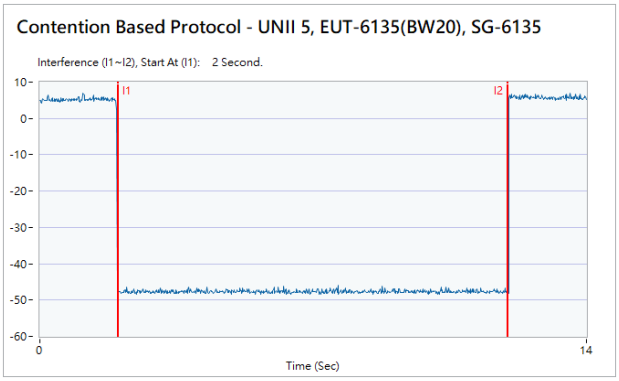
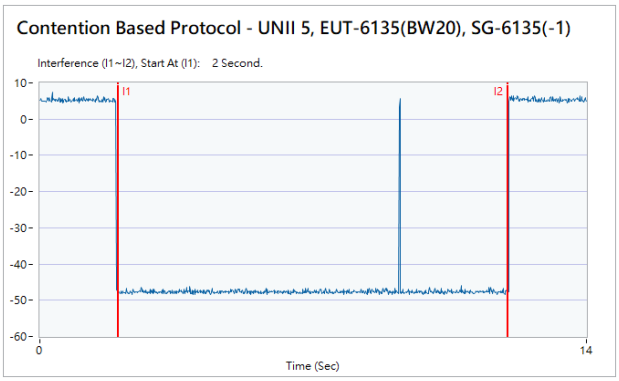
Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 8	7015	20	7015	-71.22	100	-62	-66.72	4.72
					Result: Stop Transmission			
				-76.22	< 90	-62	-71.72	9.72
					Result: Minimal Operation			
				-77.22	0	-62	-72.72	10.72
					Result: Normal Operation			
	7025	80	6990	-73.03	100	-62	-68.53	6.53
					Result: Stop Transmission			
				-76.03	< 90	-62	-71.53	9.53
					Result: Minimal Operation			
				-77.03	0	-62	-72.53	10.53
					Result: Normal Operation			
			7025	-71.29	100	-62	-66.79	4.79
					Result: Stop Transmission			
				-74.29	< 90	-62	-69.79	7.79
					Result: Minimal Operation			
				-75.29	0	-62	-70.79	8.79
					Result: Normal Operation			
			7060	-70.25	100	-62	-65.75	3.75
					Result: Stop Transmission			
				-74.25	< 90	-62	-69.75	7.75
					Result: Minimal Operation			
				-75.25	0	-62	-70.75	8.75
					Result: Normal Operation			

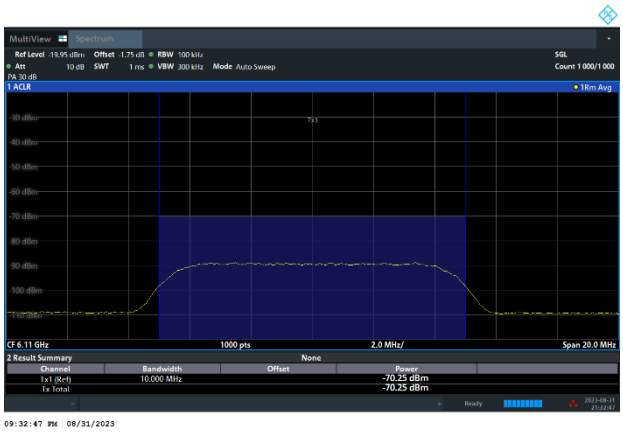
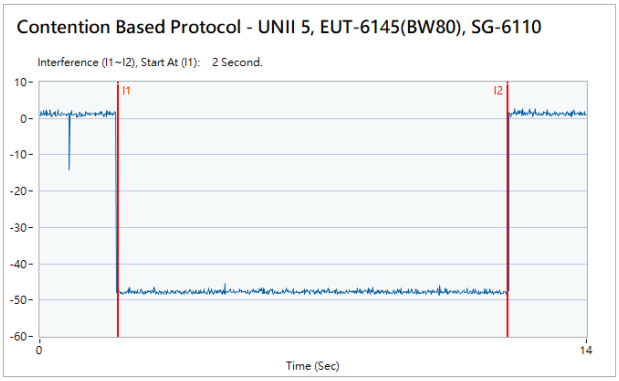
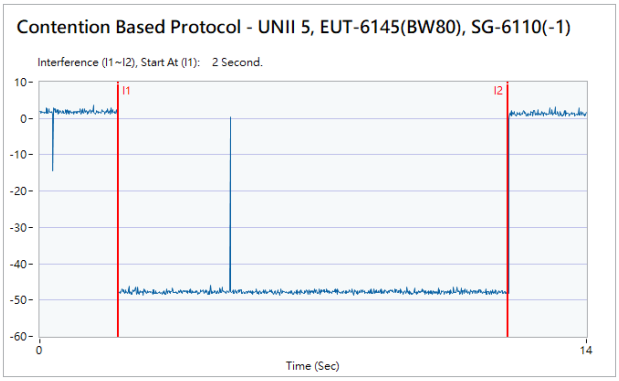
Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (-4.5 dBi).

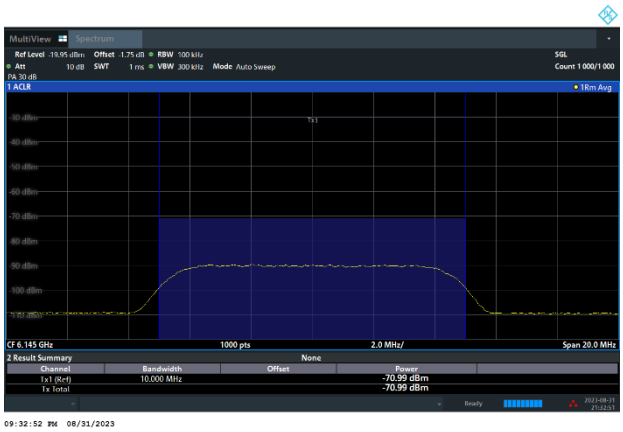
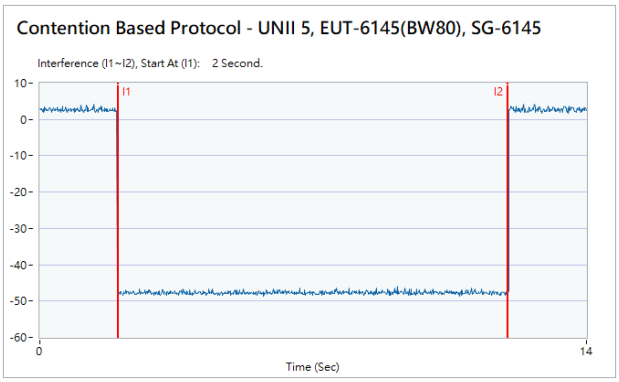
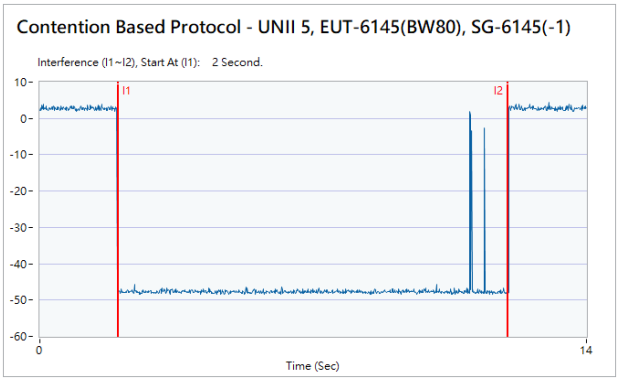
Note 2: The antenna gain has included the path loss between RF connector and antenna.

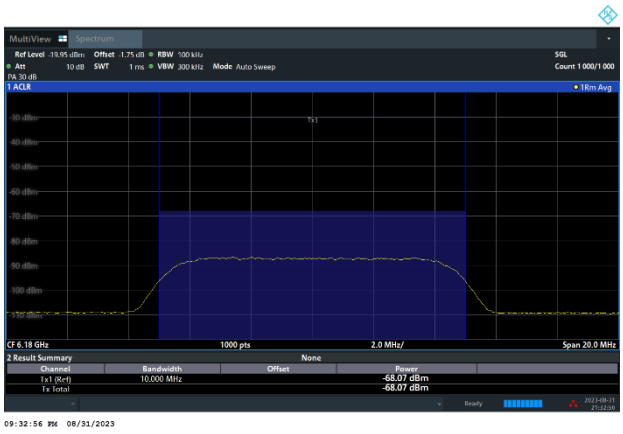
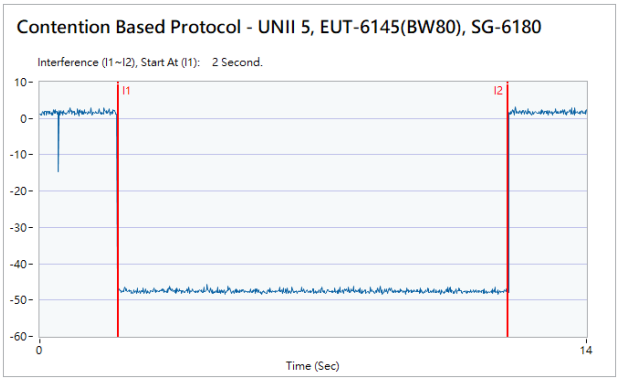
Note 3: Margin = Regulated Threshold level - Adjusted Power.

3.5.8 Test Plots of Contention Based Protocol Test

Contention Based Protocol Result Plots on U-NII 5 (AWGN Interference)	
802.11ax (HE20) / 6135MHz Threshold Level (TL) = -68.04dBm	802.11ax (HE20) / CH37 Test result is pass due to no transmission occur.
	
802.11ax (HE20) / 6135MHz Threshold Level (TL) = -69.04dBm	802.11ax (HE20) / CH37 Transmit when the interferer is 1dB lower.
	

Contention Based Protocol Result Plots on U-NII 5 (AWGN Interference)	
802.11ax (HE80) / 6110MHz (Lower edge) Threshold Level (TL) = -70.25dBm	802.11ax (HE80) / CH39 (Lower edge) Test result is pass due to no transmission occur.
	
802.11ax (HE80) / 6110MHz (Lower edge) Threshold Level (TL) = -71.25dBm	802.11ax (HE80) / CH39 (Lower edge) Transmit when the interferer is 1dB lower.
	

Contention Based Protocol Result Plots on U-NII 5 (AWGN Interference)	
802.11ax (HE80) / 6145MHz (Middle) Threshold Level (TL) = -70.99dBm	802.11ax (HE80) / CH39 (Middle) Test result is pass due to no transmission occur.
	
802.11ax (HE80) / 6145MHz (Middle) Threshold Level (TL) = -71.99dBm	802.11ax (HE80) / CH39 (Middle) Transmit when the interferer is 1dB lower.
	

Contention Based Protocol Result Plots on U-NII 5 (AWGN Interference)	
802.11ax (HE80) / 6180MHz (Upper edge) Threshold Level (TL) = -68.07dBm	802.11ax (HE80) / CH39 (Upper edge) Test result is pass due to no transmission occur.
	
802.11ax (HE80) / 6180MHz (Upper edge) Threshold Level (TL) = -69.07dBm	802.11ax (HE80) / CH39 (Upper edge) Transmit when the interferer is 1dB lower.