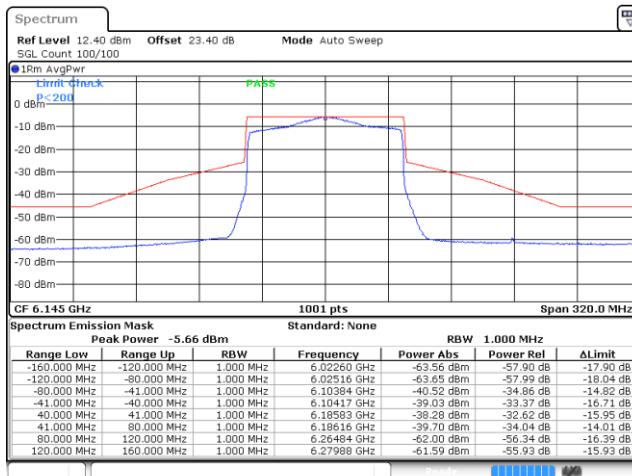




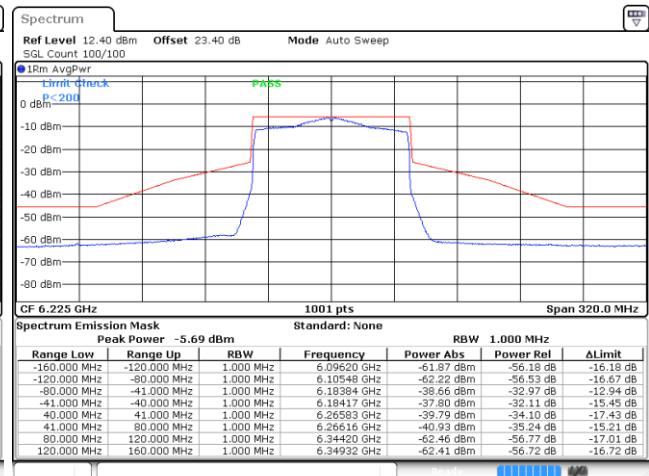
EUT Mode : 802.11ax HE80

Plot on Channel 6145MHz



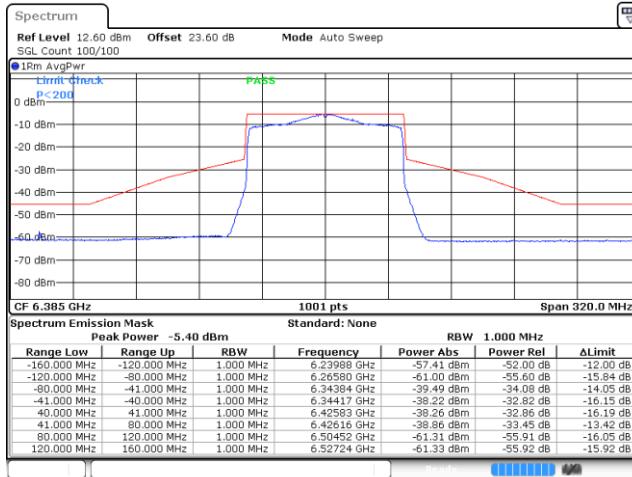
Date: 18.SEP.2021 01:47:27

Plot on Channel 6225MHz



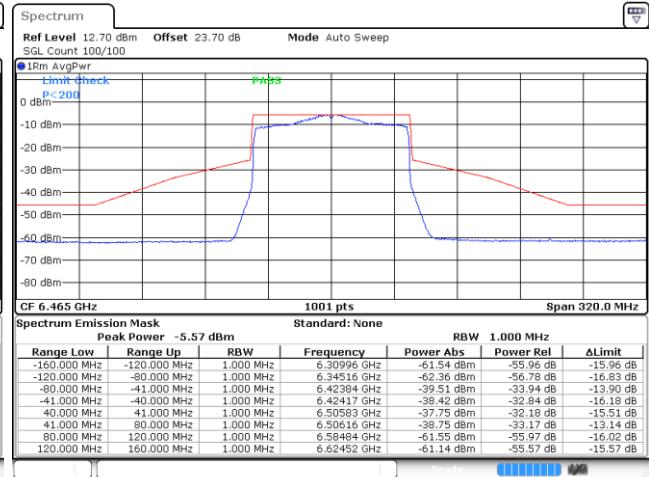
Date: 18.SEP.2021 02:12:57

Plot on Channel 6385MHz



Date: 18.SEP.2021 02:29:27

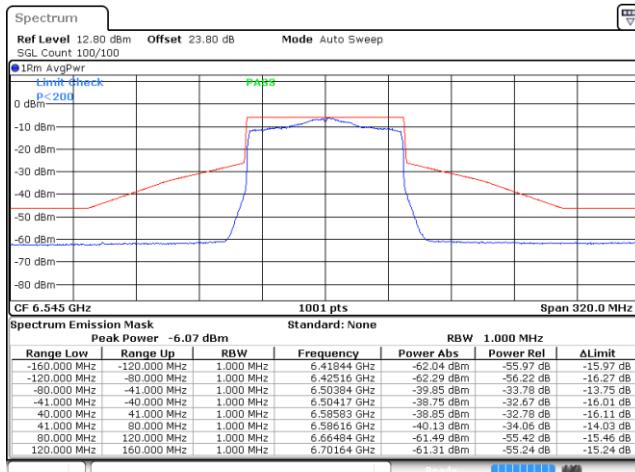
Plot on Channel 6465MHz



Date: 21.SEP.2021 20:38:11

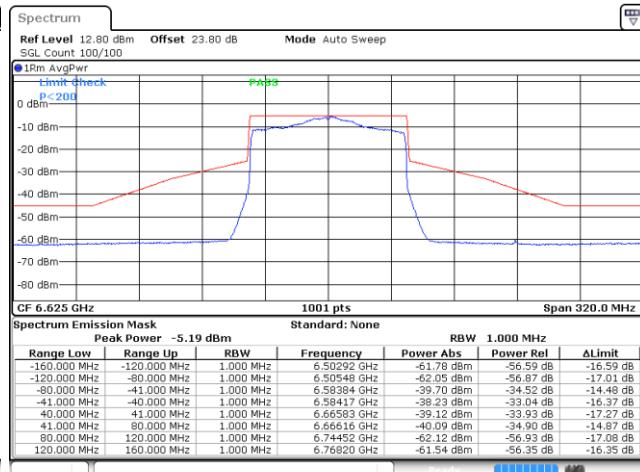


Plot on Channel 6545MHz



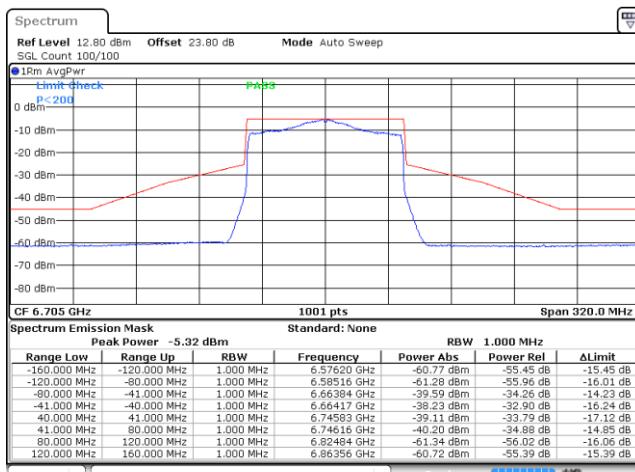
Date: 21 SEP 2021 20:54:05

Plot on Channel 6625MHz



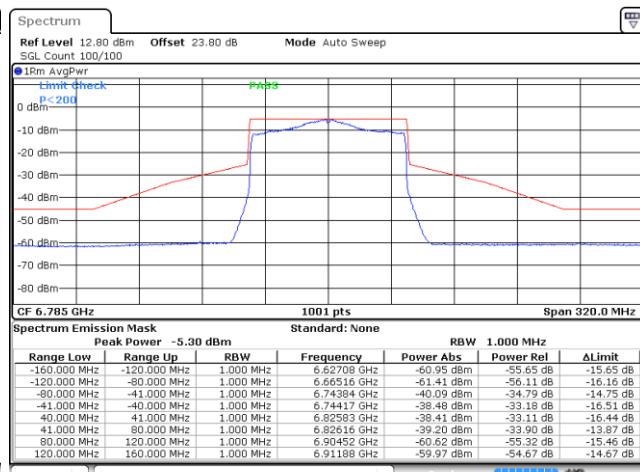
Date: 21 SEP 2021 23:06:07

Plot on Channel 6705MHz



Date: 21 SEP 2021 23:22:17

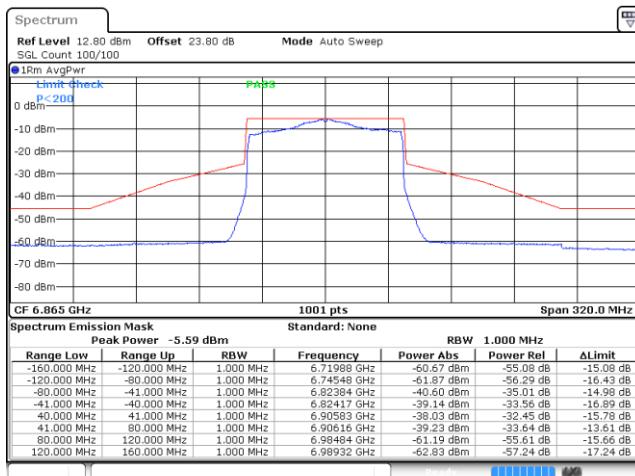
Plot on Channel 6785MHz



Date: 21 SEP 2021 23:37:06

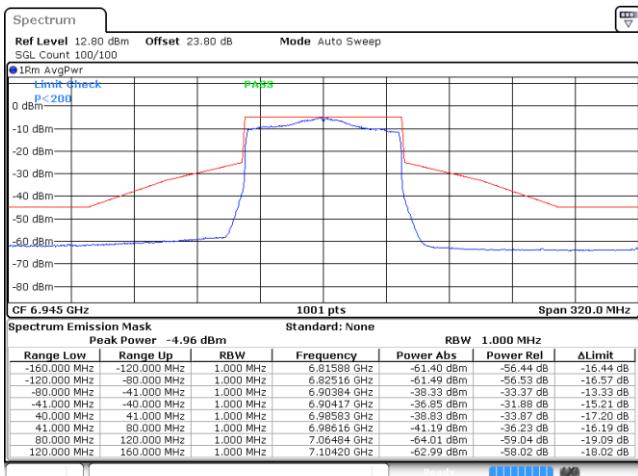


Plot on Channel 6865MHz



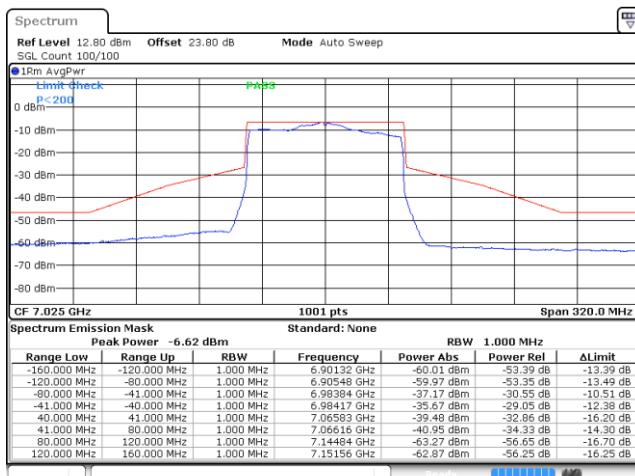
Date: 21 SEP 2021 23:56:16

Plot on Channel 6945MHz



Date: 22 SEP 2021 00:12:22

Plot on Channel 7025MHz

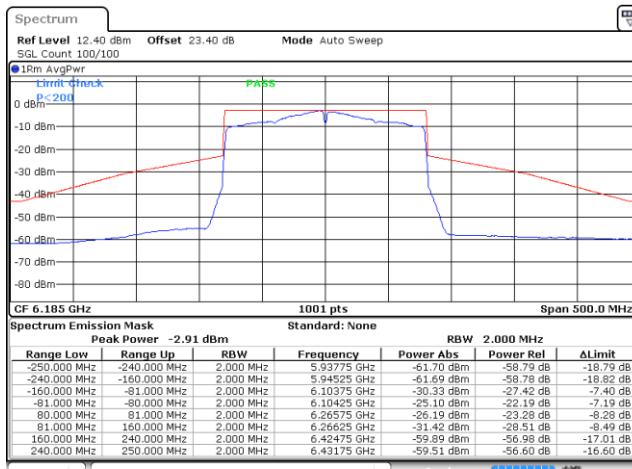


Date: 22 SEP 2021 00:25:18



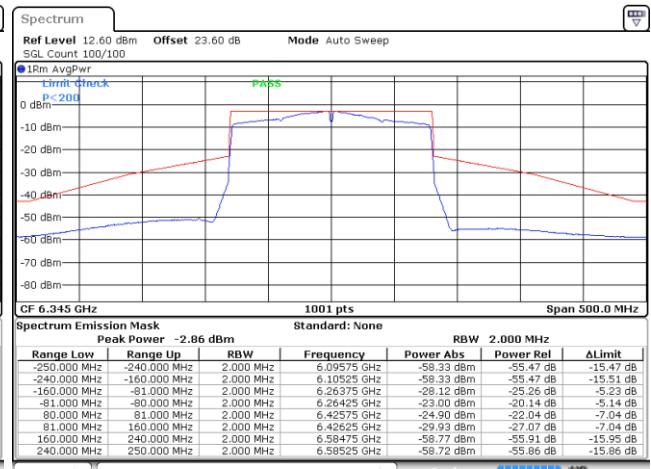
EUT Mode : 802.11ax HE160

Plot on Channel 6185MHz



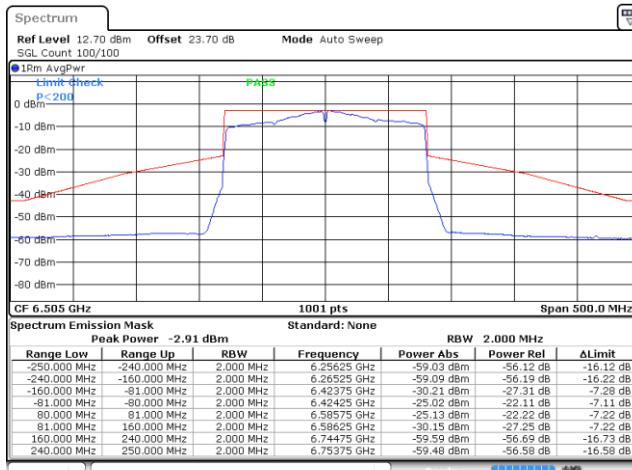
Date: 20 SEP 2021 19:33:18

Plot on Channel 6345MHz



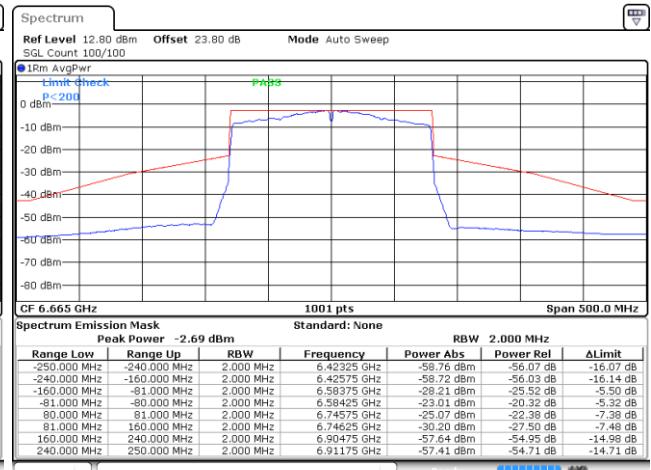
Date: 21 SEP 2021 02:21:15

Plot on Channel 6505MHz



Date: 22 SEP 2021 00:43:05

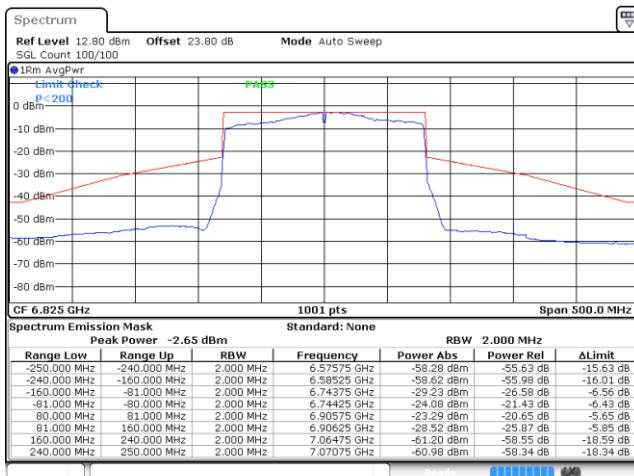
Plot on Channel 6665MHz



Date: 22 SEP 2021 00:58:25

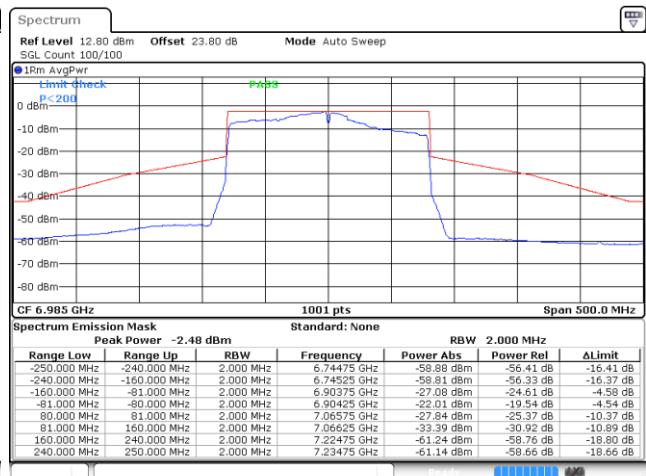


Plot on Channel 6825MHz



Date: 22 SEP 2021 01:19:27

Plot on Channel 6985MHz



Date: 22 SEP 2021 01:41:22

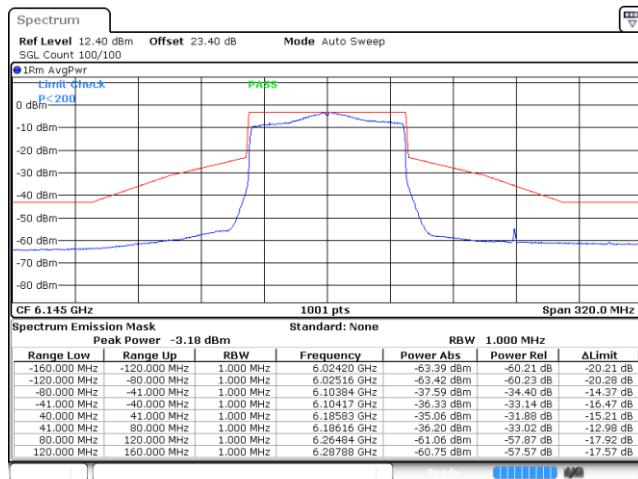


<STBC Mode>

MIMO <Ant. 7+2(7)>

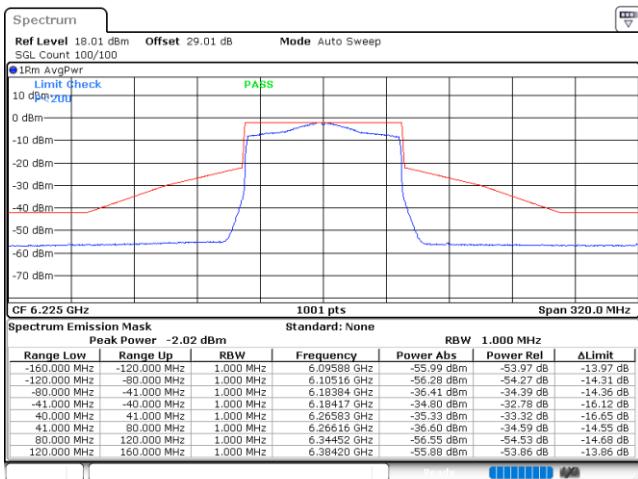
EUT Mode : 802.11ax HE80

Plot on Channel 6145MHz



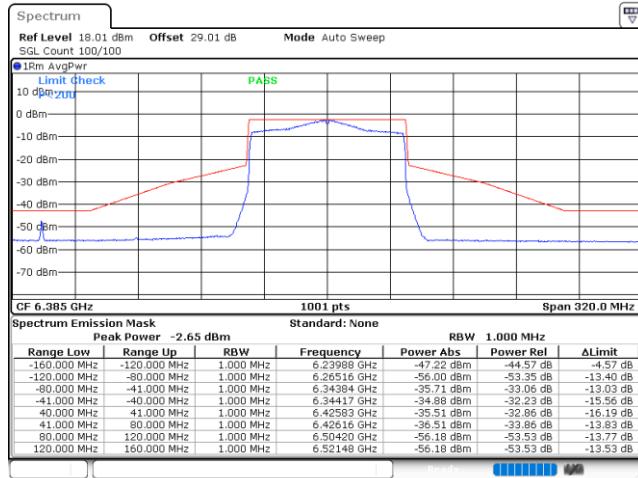
Date: 8.OCT.2021 06:31:45

Plot on Channel 6225MHz



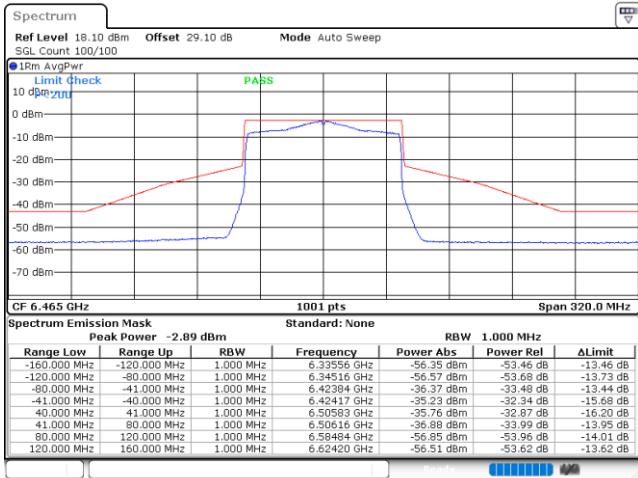
Date: 3.NOV.2021 15:36:05

Plot on Channel 6385MHz



Date: 3.NOV.2021 15:54:45

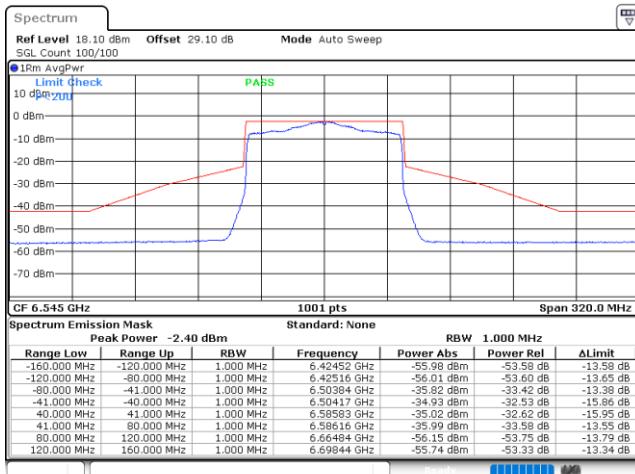
Plot on Channel 6465MHz



Date: 3.NOV.2021 14:30:28

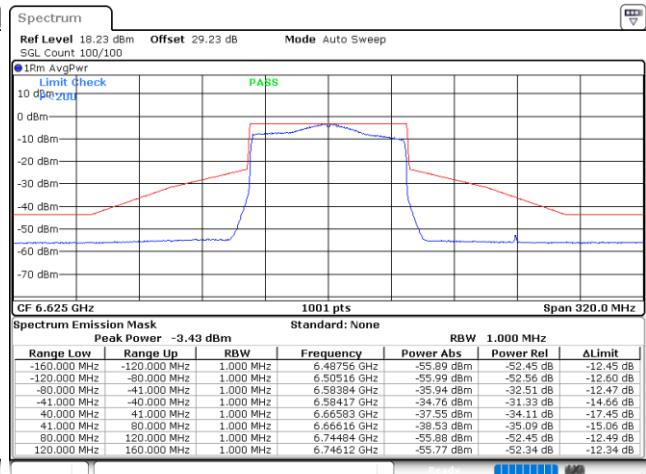


Plot on Channel 6545MHz



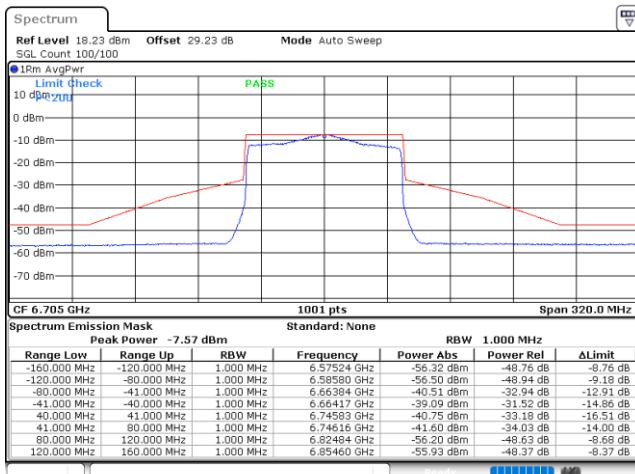
Date: 3.NOV.2021 14:36:52

Plot on Channel 6625MHz



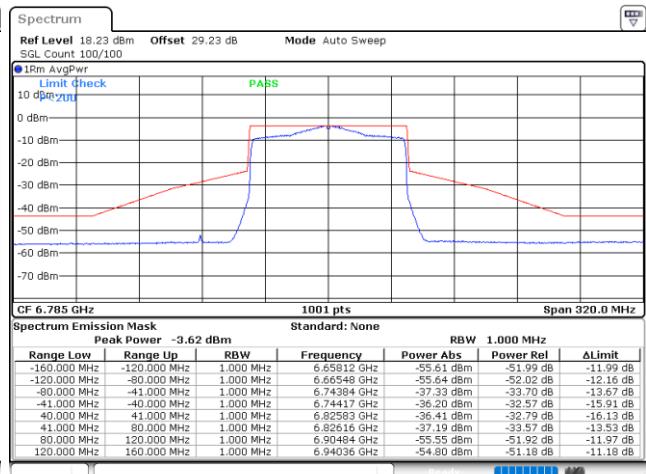
Date: 3.NOV.2021 12:49:57

Plot on Channel 6705MHz



Date: 3.NOV.2021 12:50:47

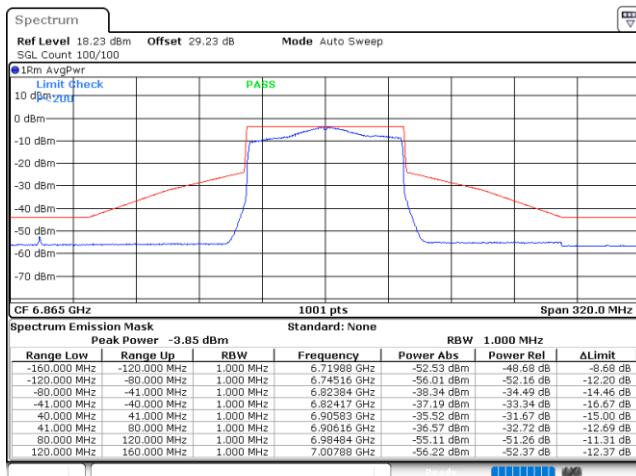
Plot on Channel 6785MHz



Date: 3.NOV.2021 13:06:29

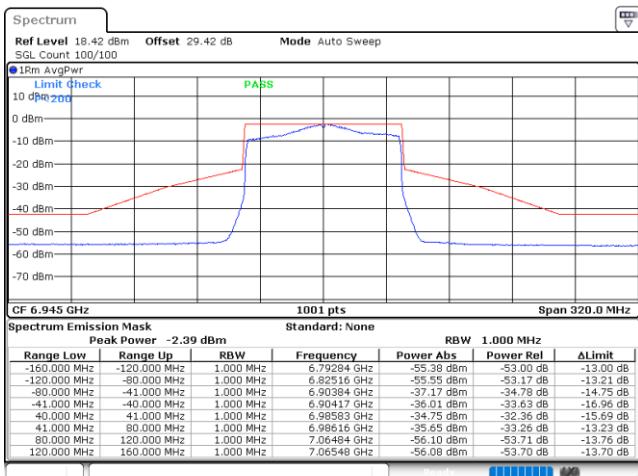


Plot on Channel 6865MHz



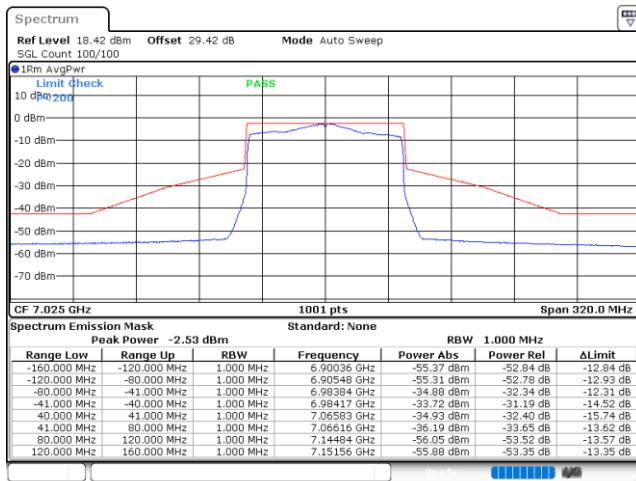
Date: 3.NOV.2021 13:15:41

Plot on Channel 6945MHz



Date: 3.NOV.2021 10:15:47

Plot on Channel 7025MHz

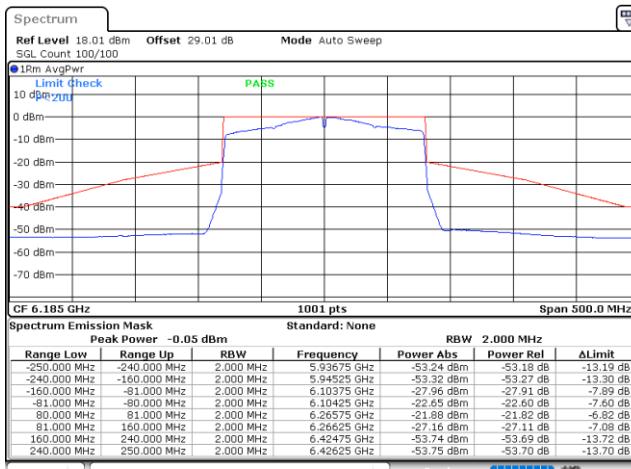


Date: 3.NOV.2021 10:32:19



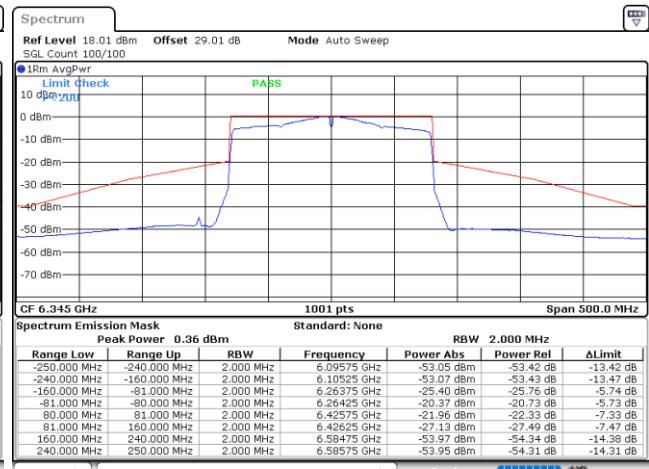
EUT Mode : 802.11ax HE160

Plot on Channel 6185MHz



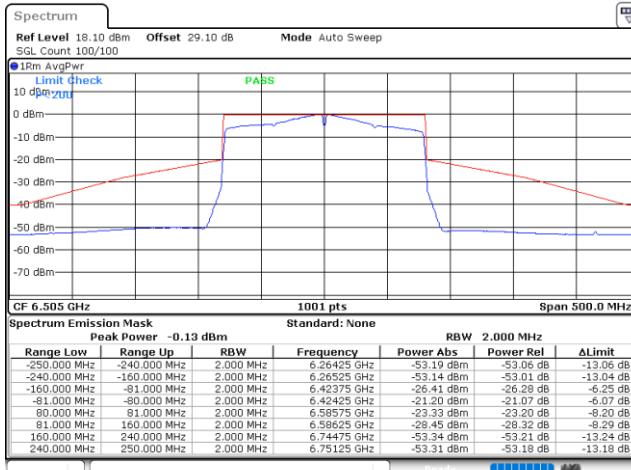
Date: 3.NOV.2021 16:06:05

Plot on Channel 6345MHz



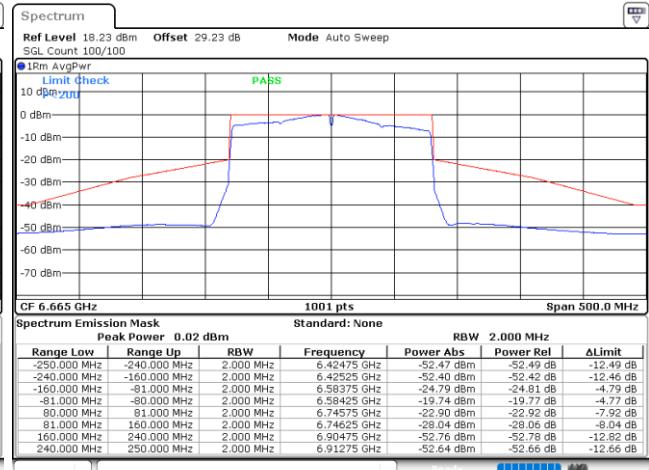
Date: 3.NOV.2021 16:16:31

Plot on Channel 6505MHz



Date: 3.NOV.2021 14:58:07

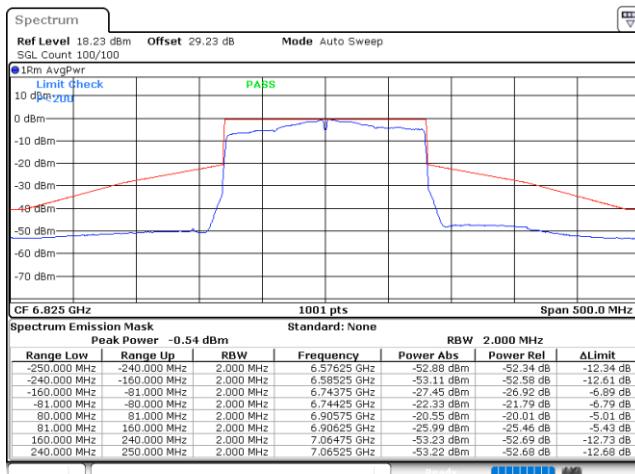
Plot on Channel 6665MHz



Date: 3.NOV.2021 13:29:20

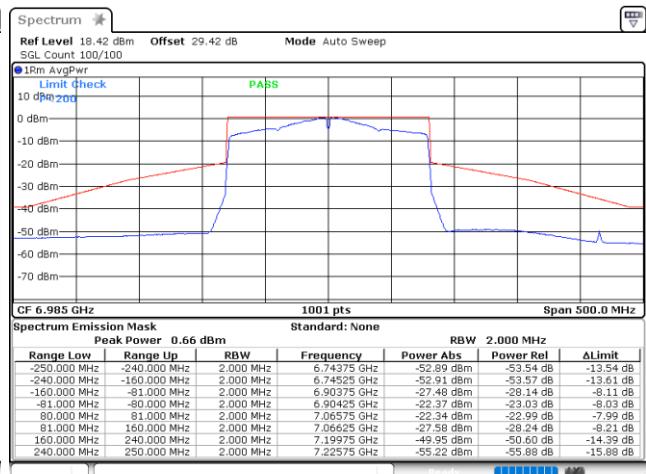


Plot on Channel 6825MHz



Date: 3.NOV.2021 13:44:55

Plot on Channel 6985MHz



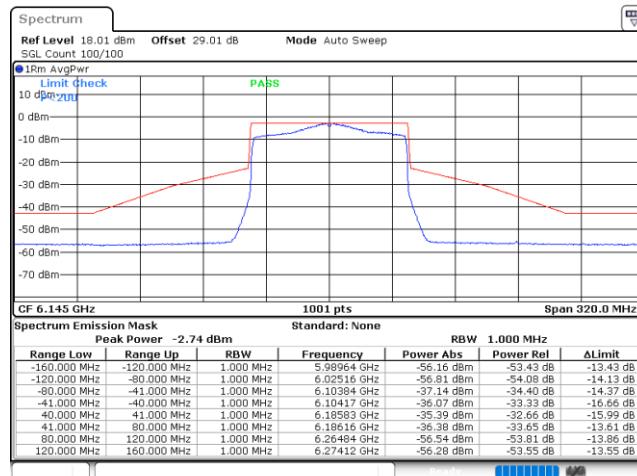
Date: 3.NOV.2021 11:10:13



MIMO <Ant. 7+2(2)>

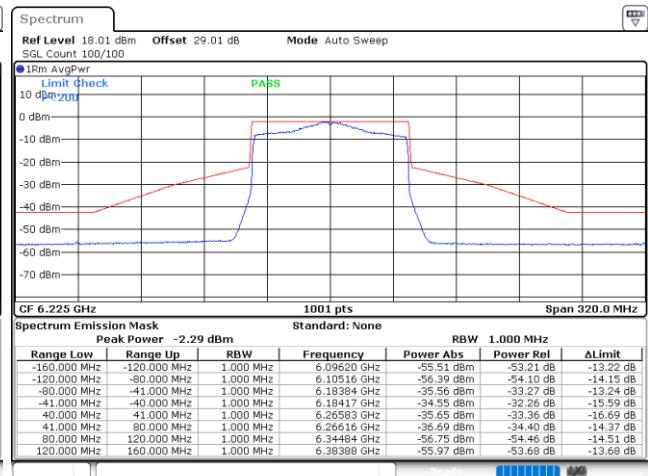
EUT Mode : 802.11ax HE80

Plot on Channel 6145MHz



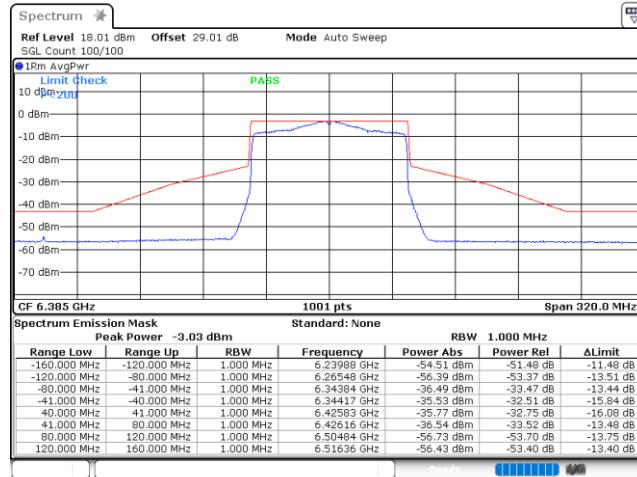
Date: 3.NOV.2021 15:11:35

Plot on Channel 6225MHz



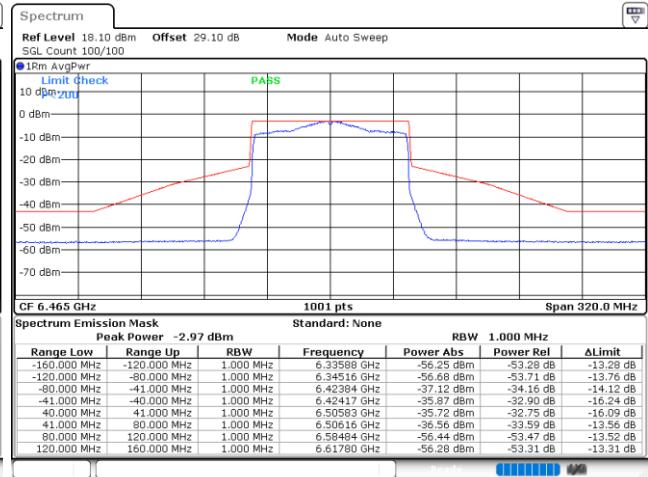
Date: 3.NOV.2021 15:35:35

Plot on Channel 6385MHz



Date: 3.NOV.2021 15:55:35

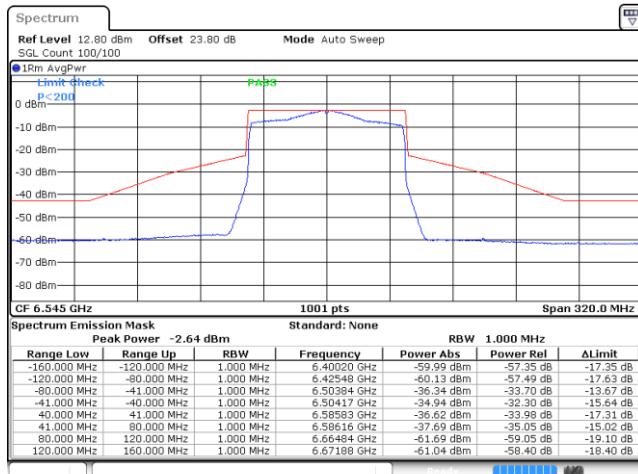
Plot on Channel 6465MHz



Date: 3.NOV.2021 14:25:27

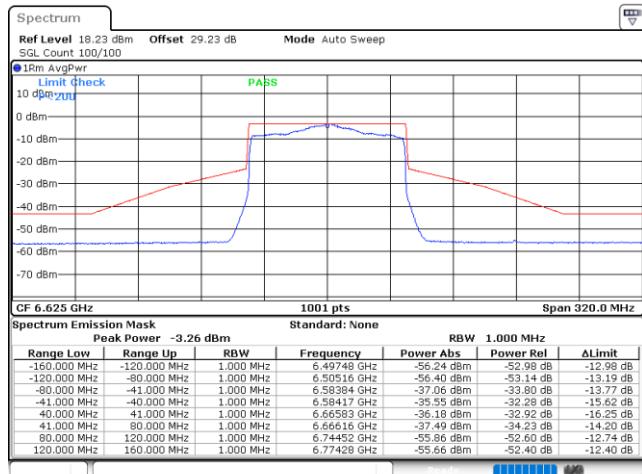


Plot on Channel 6545MHz



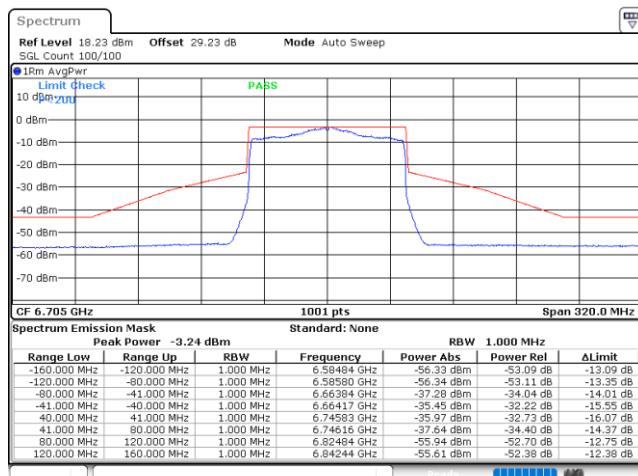
Date: 3.NOV.2021 14:33:13

Plot on Channel 6625MHz



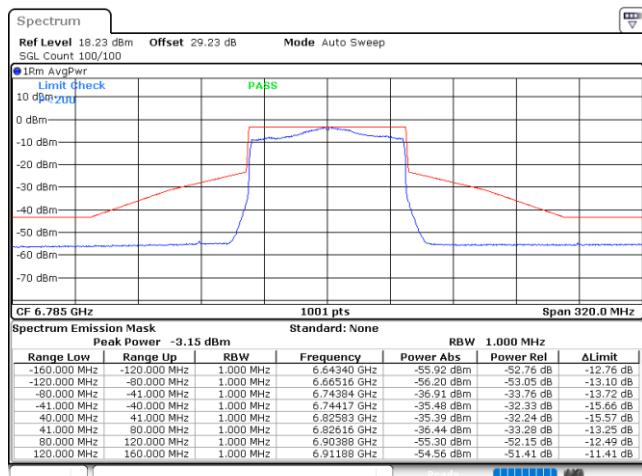
Date: 3.NOV.2021 11:28:34

Plot on Channel 6705MHz



Date: 3.NOV.2021 12:53:42

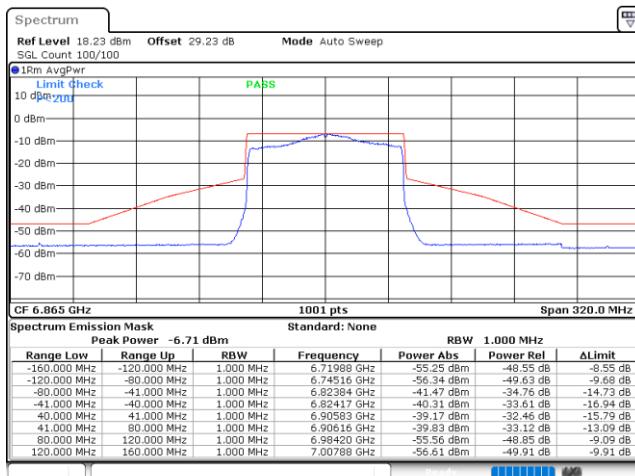
Plot on Channel 6785MHz



Date: 3.NOV.2021 13:05:21

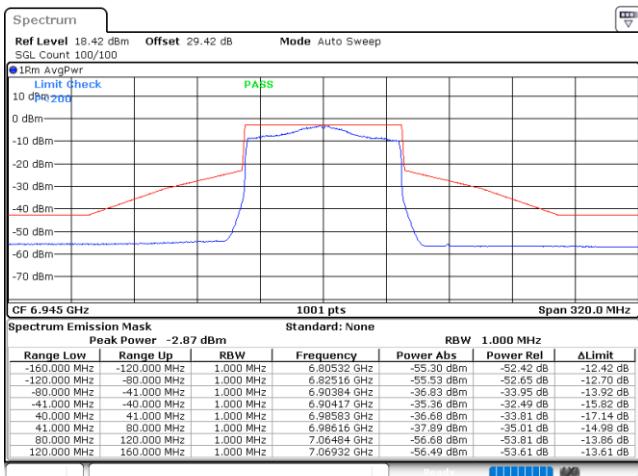


Plot on Channel 6865MHz



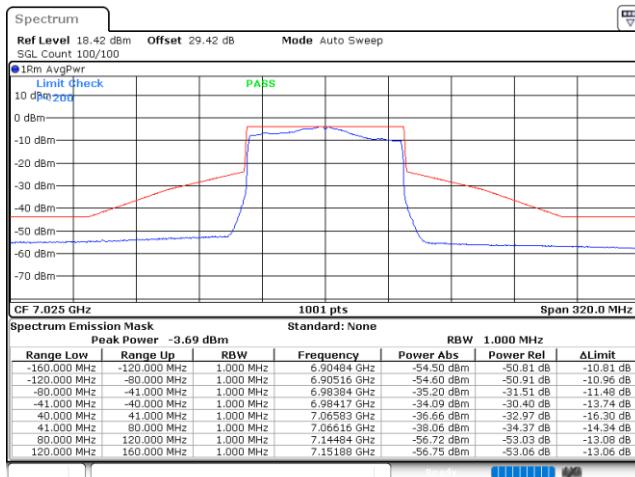
Date: 28.OCT.2021 11:13:56

Plot on Channel 6945MHz



Date: 3.NOV.2021 10:22:53

Plot on Channel 7025MHz

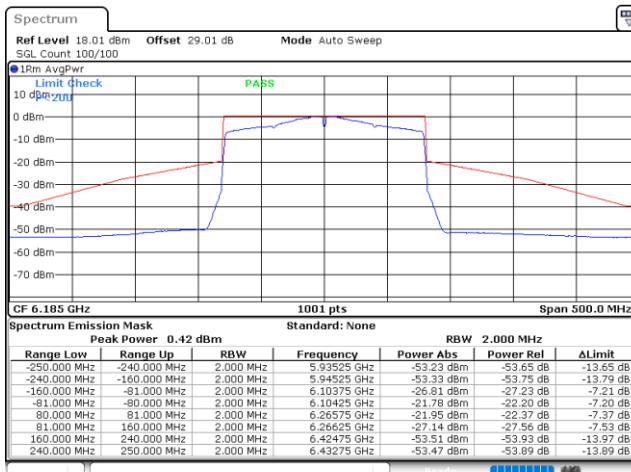


Date: 3.NOV.2021 10:30:39



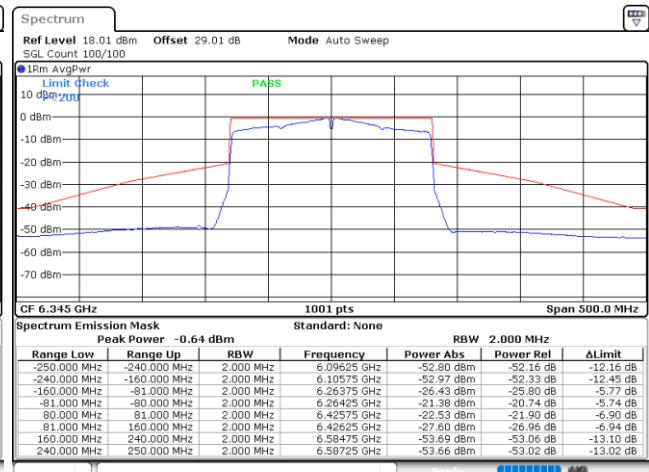
EUT Mode : 802.11ax HE160

Plot on Channel 6185MHz



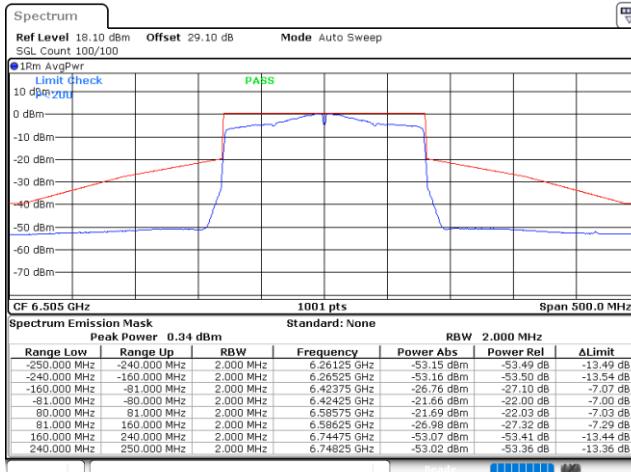
Date: 3.NOV.2021 16:05:29

Plot on Channel 6345MHz



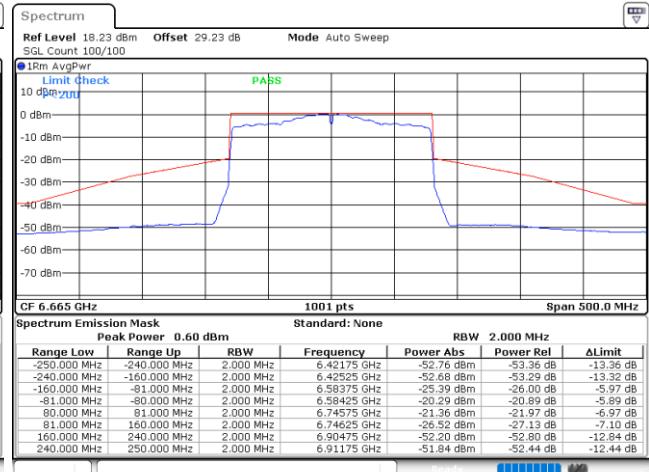
Date: 3.NOV.2021 16:17:21

Plot on Channel 6505MHz



Date: 3.NOV.2021 14:57:27

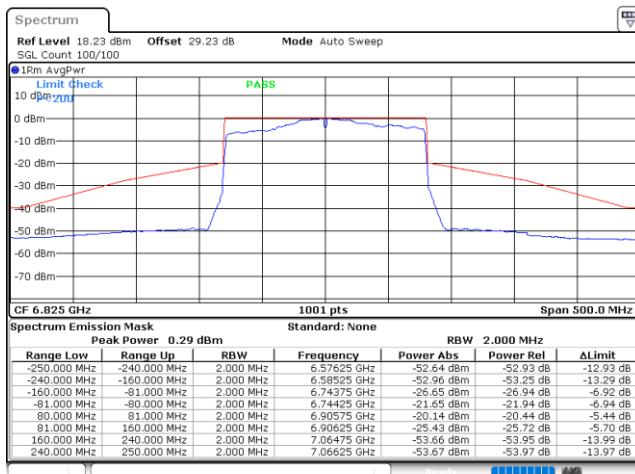
Plot on Channel 6665MHz



Date: 3.NOV.2021 13:28:32

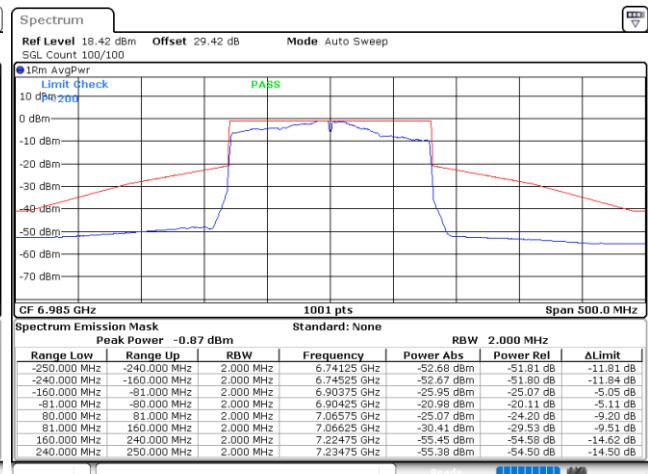


Plot on Channel 6825MHz



Date: 3.NOV.2021 13:45:57

Plot on Channel 6985MHz



Date: 3.NOV.2021 11:10:54



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

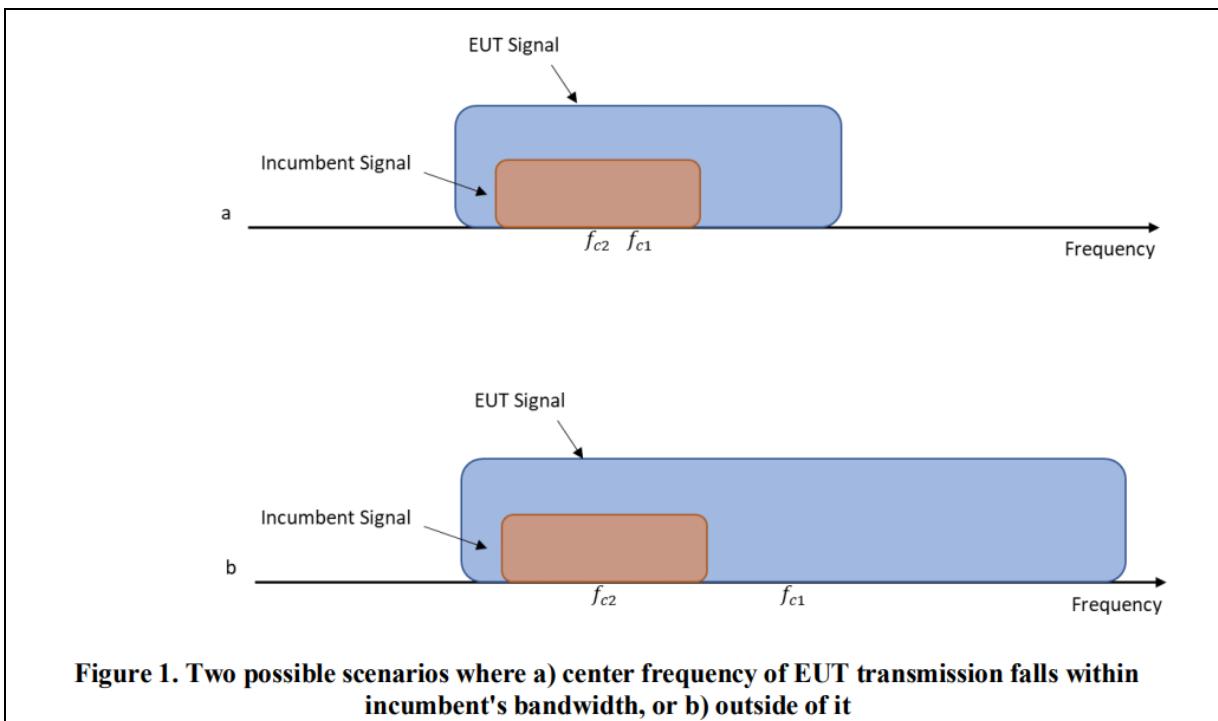
where:

BW_{EUT} : Transmission bandwidth of EUT signal

BW_{Inc} : Transmission bandwidth of the simulated incumbent signal (10 MHz wide AWGN signal)

f_{c1} : Center frequency of EUT transmission

f_{c2} : Center frequency of simulated incumbent signal



3.5.2 Measuring Instruments

See list of measuring equipment of this test report.

3.5.3 Test Procedures

The testing follows FCC KDB 987594 D02 U-NII 6GHz EMC Measurement v01.

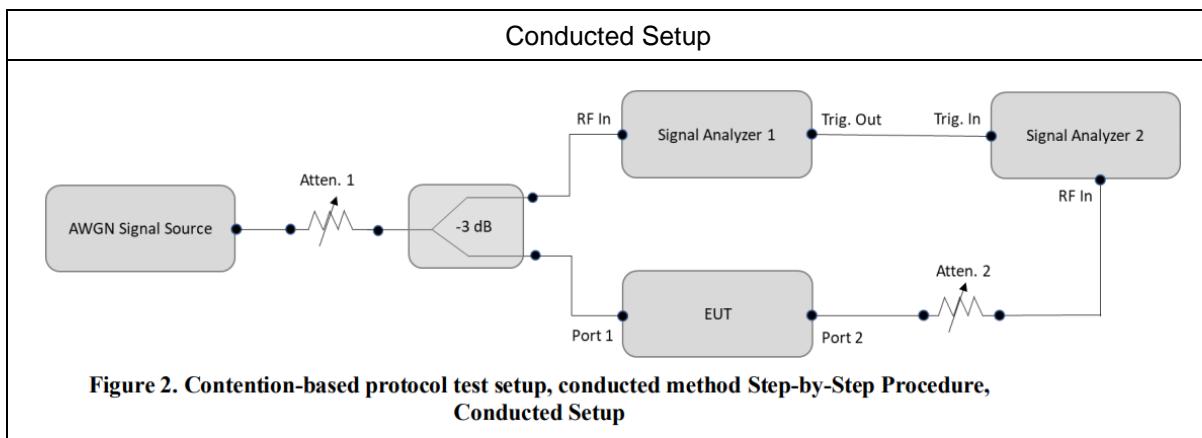
Section I) Contention Based Protocol

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





3.5.5 Support Unit used in test configuration and system

Instrument	Brand Name	Model No.	Characteristics
Laptop	HP	Pavilion 15t-cu000	LAN
Companion (Client)	GIGABYTE	GB-BRi5H-8250	WiFi



3.5.6 Test Result of Contention Based Protocol

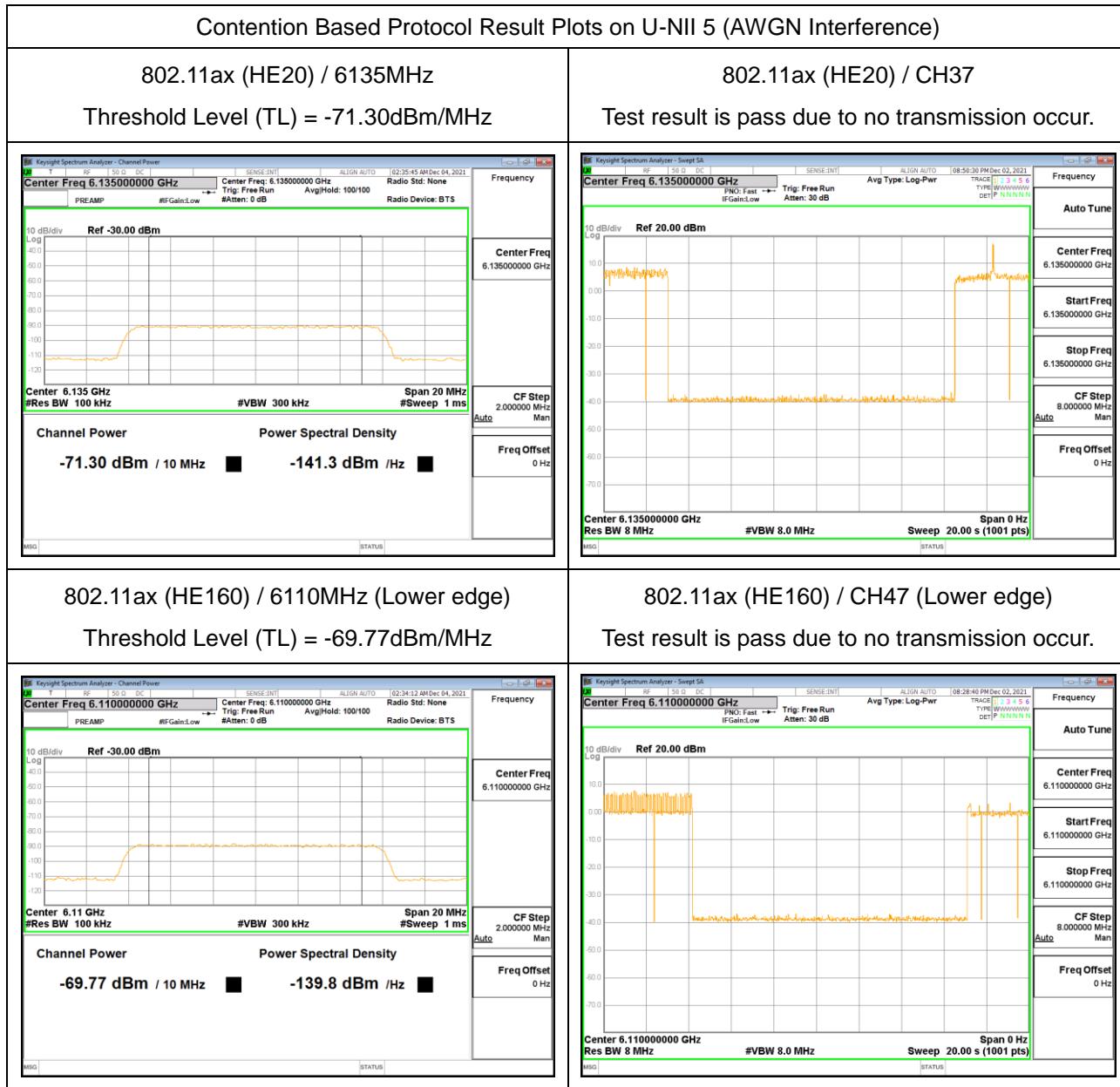
Test Engineer :	Andy Kao				Temperature :	21.3~23.1°C	
					Relative Humidity :	44.8~46.8%	

Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Measured Detection level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Margin (dB)
UNII Band 5	6135	20	6135	-71.30	100	-58.34	12.96
	6185	160	6110	-69.77	100	-58.34	11.43
			6185	-67.28	100	-58.34	8.94
			6260	-73.59	100	-58.34	15.25
UNII Band 6	6455	20	6455	-69.10	100	-58.34	10.76
	6505	160	6430	-70.09	100	-58.34	11.75
			6505	-64.22	100	-58.34	5.88
			6580	-70.03	100	-58.34	11.69
UNII Band 7	6695	20	6695	-69.46	100	-58.34	11.12
	6665	160	6590	-69.26	100	-58.34	10.92
			6665	-64.26	100	-58.34	5.92
			6740	-68.91	100	-58.34	10.57
UNII Band 8	7015	20	7015	-67.50	100	-58.34	9.16
	6985	160	6910	-62.30	100	-58.34	3.96
			6985	-63.51	100	-58.34	5.17
			7060	-69.26	100	-58.34	10.92

Note: Threshold Level (TL) = -62dBm + minimum antenna gain

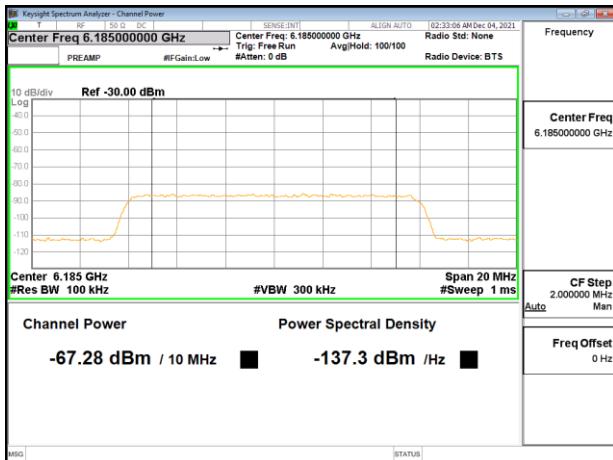


3.5.7 Test Plots of Contention Based Protocol Test





802.11ax (HE160) / 6185MHz (Middle)
Threshold Level (TL) = -67.28dBm/MHz

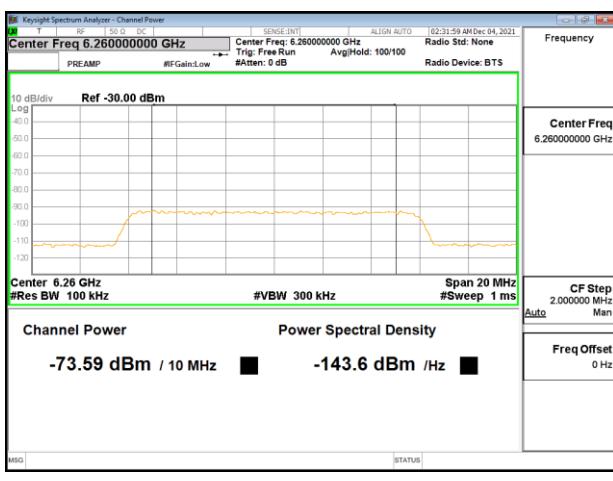


802.11ax (HE160) / CH47 (Middle)

Test result is pass due to no transmission occur.

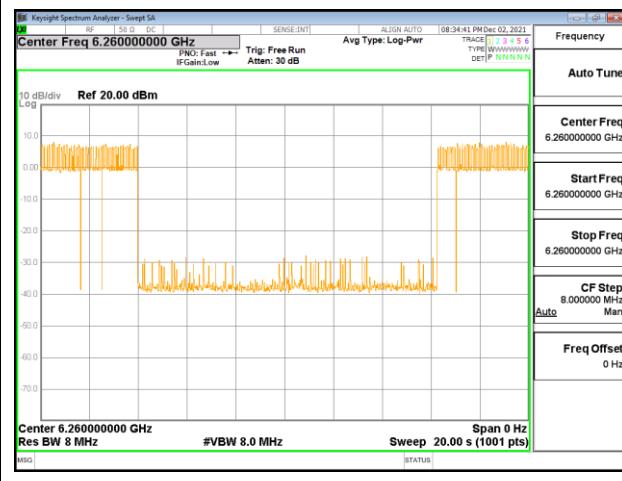


802.11ax (HE160) / 6260MHz (Upper edge)
Threshold Level (TL) = -73.59dBm/MHz



802.11ax (HE160) / CH47 (Upper edge)

Test result is pass due to no transmission occur.



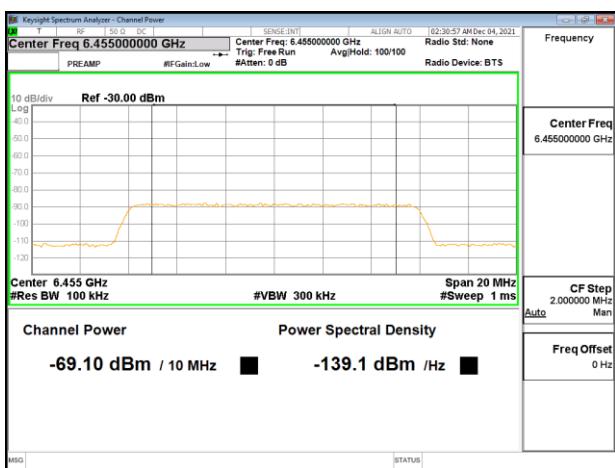
Note: The noise observed on 6260MHz is coming from adjacent 20MHz channels where the incumbent signal was not present.



Contention Based Protocol Result Plots on U-NII 6 (AWGN Interference)

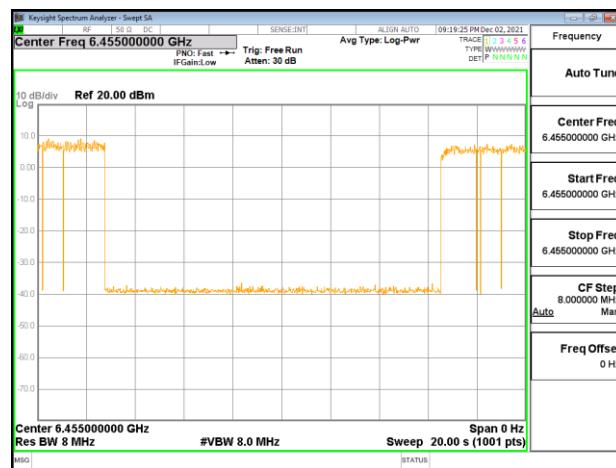
802.11ax (HE20) / 6455MHz

Threshold Level (TL) = -69.10dBm/MHz



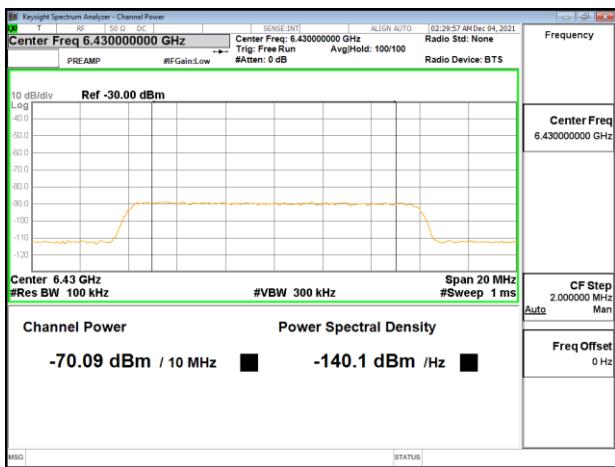
802.11ax (HE20) / CH101

Test result is pass due to no transmission occur.



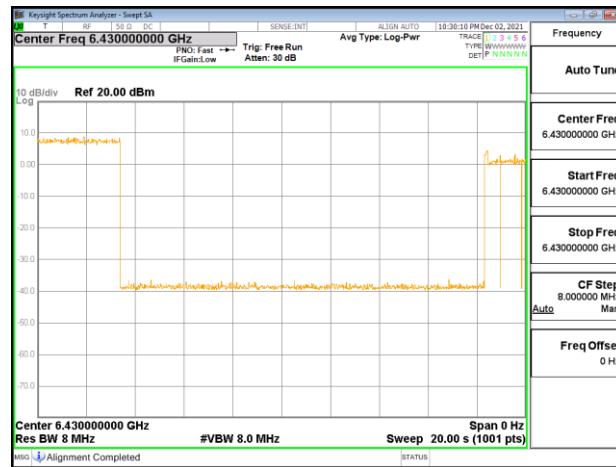
802.11ax (HE160) / 6430MHz (Lower edge)

Threshold Level (TL) = -70.09dBm/MHz



802.11ax (HE160) / CH111 (Lower edge)

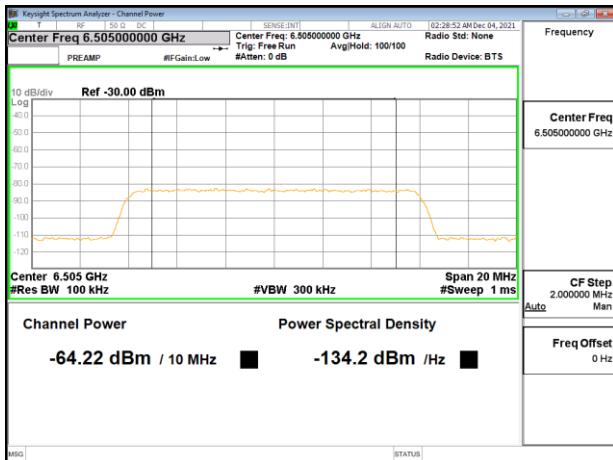
Test result is pass due to no transmission occur.





802.11ax (HE160) / 6505MHz (Middle)

Threshold Level (TL) = -64.22dBm/MHz



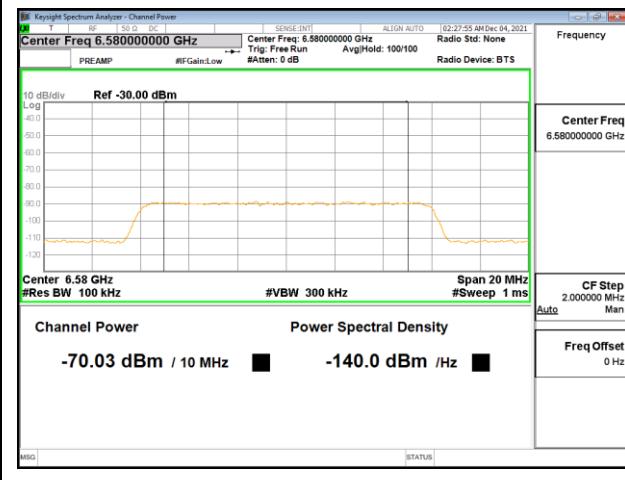
802.11ax (HE160) / CH111 (Middle)

Test result is pass due to no transmission occur.



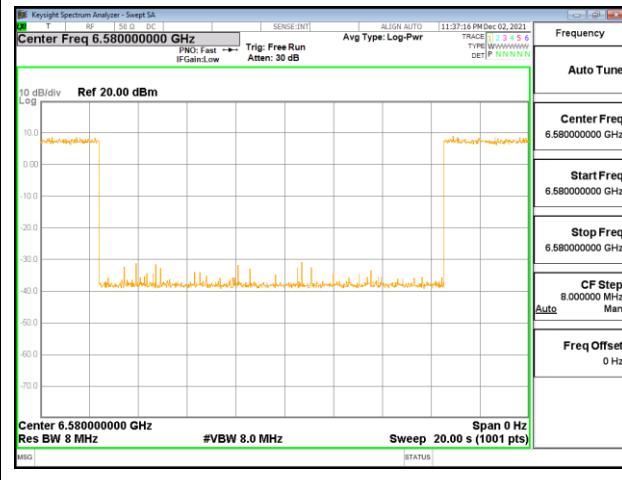
802.11ax (HE160) / 6580MHz (Upper edge)

Threshold Level (TL) = -70.03dBm/MHz



802.11ax (HE160) / CH111 (Upper edge)

Test result is pass due to no transmission occur.

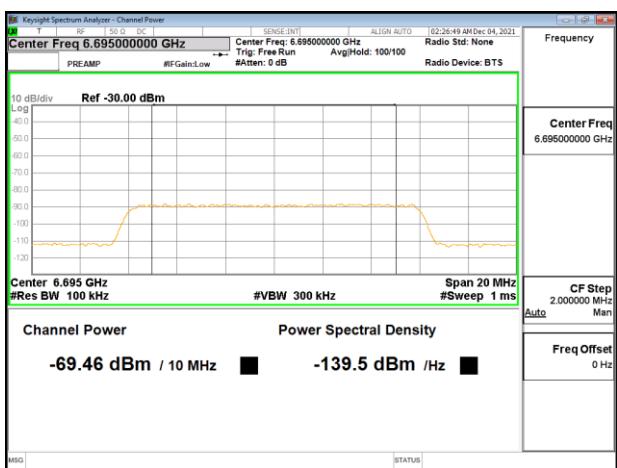




Contention Based Protocol Result Plots on U-NII 7 (AWGN Interference)

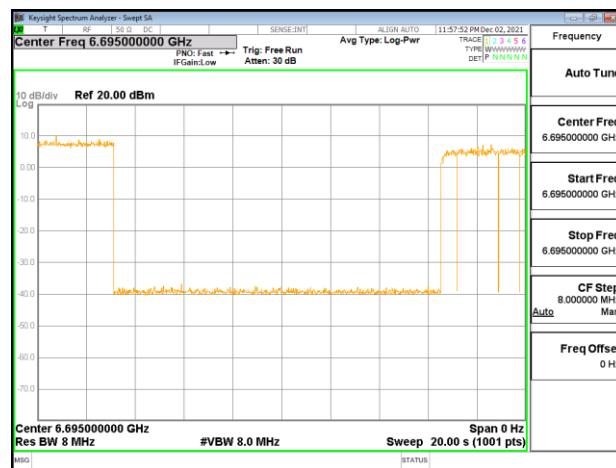
802.11ax (HE20) / 6695MHz

Threshold Level (TL) = -69.46dBm/MHz



802.11ax (HE160) / 6590MHz (Lower edge)

Threshold Level (TL) = -69.26dBm/MHz



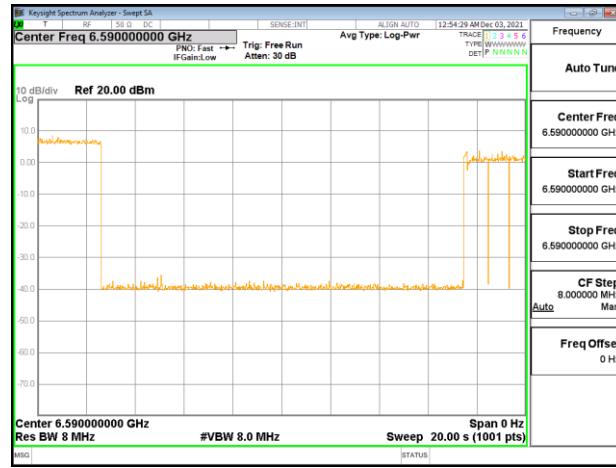
802.11ax (HE160) / 6590MHz (Lower edge)

Threshold Level (TL) = -69.26dBm/MHz



802.11ax (HE160) / CH143 (Lower edge)

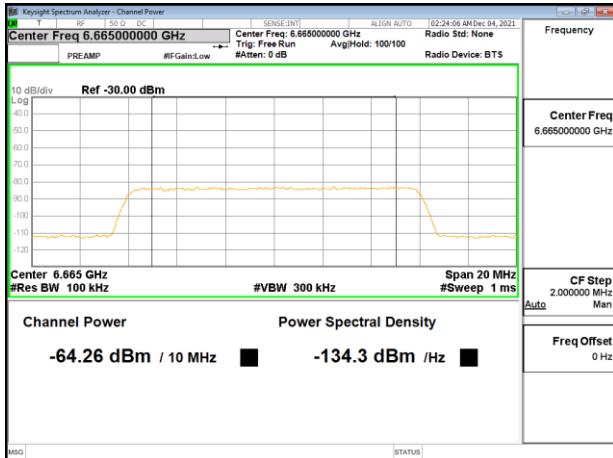
Test result is pass due to no transmission occur.





802.11ax (HE160) / 6665MHz (Middle)

Threshold Level (TL) = -64.26dBm/MHz



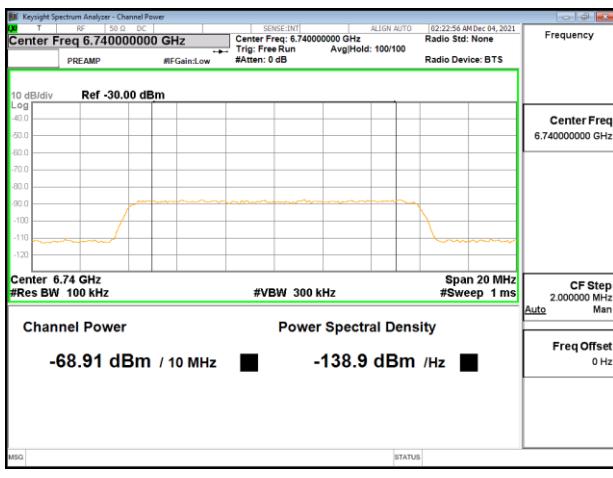
802.11ax (HE160) / CH143 (Middle)

Test result is pass due to no transmission occur.



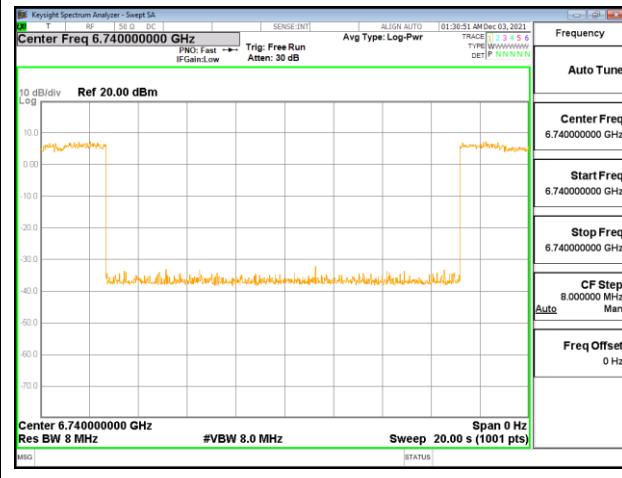
802.11ax (HE160) / 6740MHz (Upper edge)

Threshold Level (TL) = -68.91dBm/MHz



802.11ax (HE160) / CH143 (Upper edge)

Test result is pass due to no transmission occur.

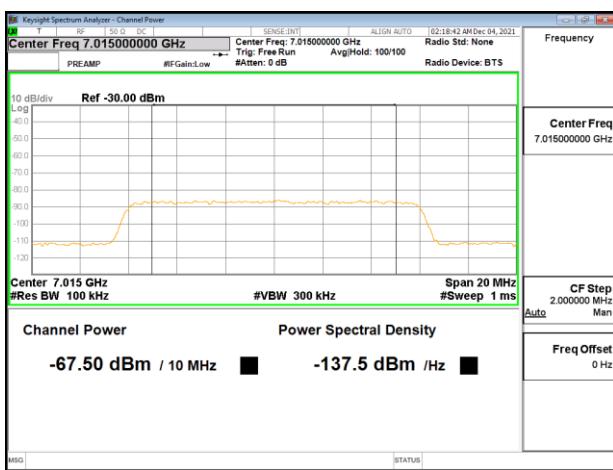




Contention Based Protocol Result Plots on U-NII 8 (AWGN Interference)

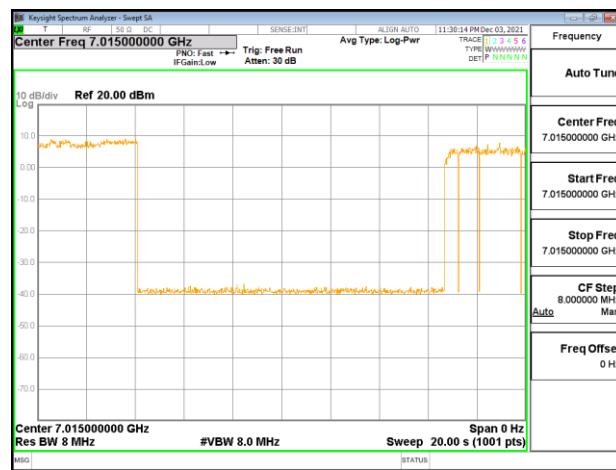
802.11ax (HE20) / 7015MHz

Threshold Level (TL) = -67.50dBm/MHz



802.11ax (HE20) / CH213

Test result is pass due to no transmission occur.



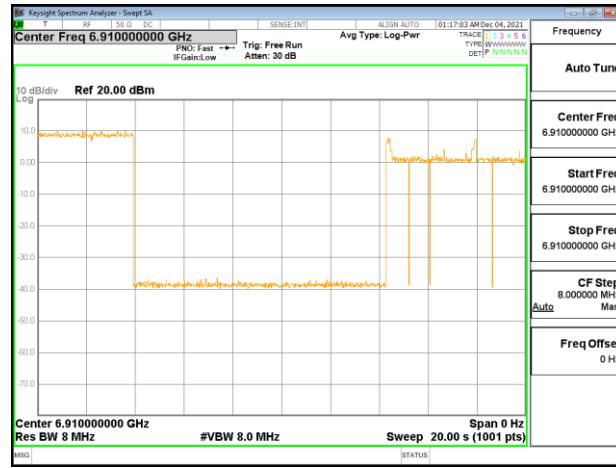
802.11ax (HE160) / 6910MHz (Lower edge)

Threshold Level (TL) = -62.30dBm/MHz



802.11ax (HE160) / CH207 (Lower edge)

Test result is pass due to no transmission occur.





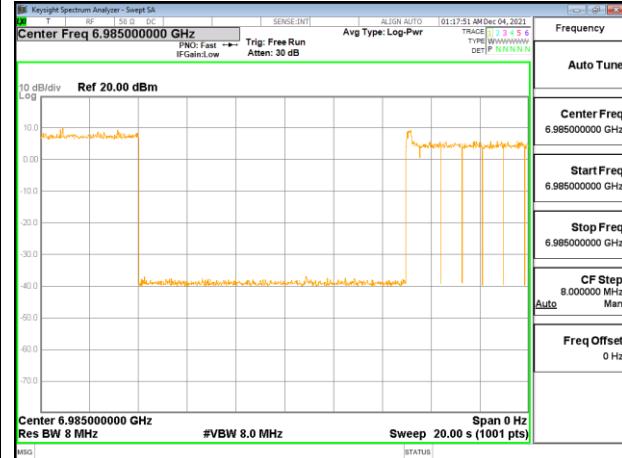
802.11ax (HE160) / 6985MHz (Middle)

Threshold Level (TL) = -63.51dBm/MHz



802.11ax (HE160) / CH207 (Middle)

Test result is pass due to no transmission occur.



802.11ax (HE160) / 7060MHz (Upper edge)

Threshold Level (TL) = -69.26dBm/MHz

802.11ax (HE160) / CH207 (Upper edge)

Test result is pass due to no transmission occur.

