

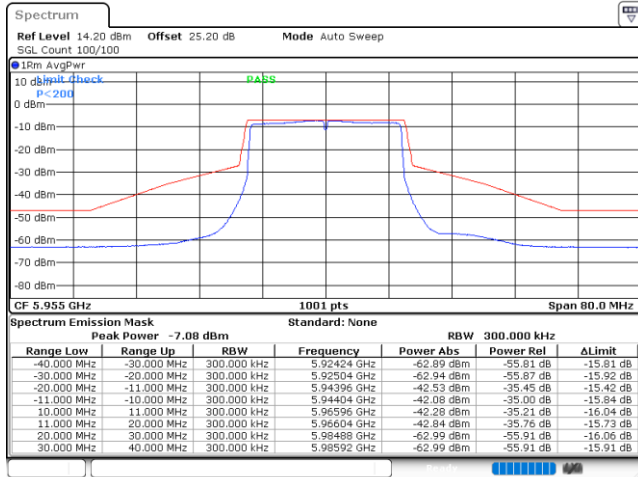


<Standard Client>

EUT Mode : 802.11ax HE20

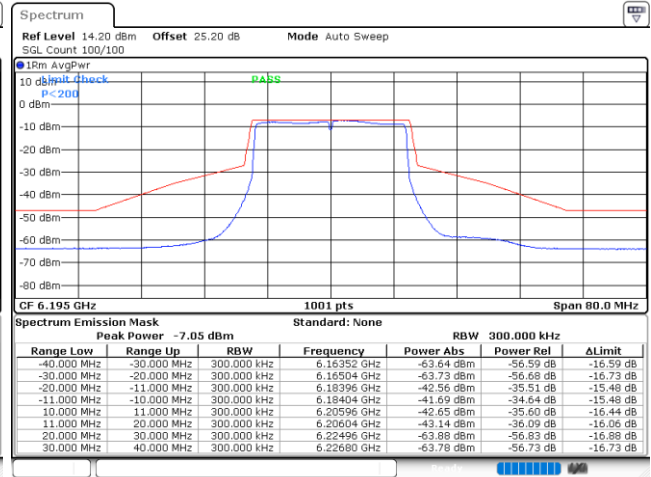
MIMO <Ant. 9+8(9)>

Plot on Channel 5955MHz



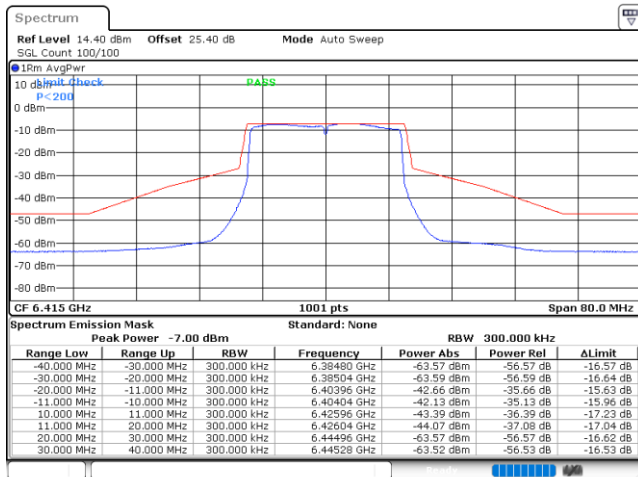
Date: 28.JAN.2022 11:51:11

Plot on Channel 6195MHz



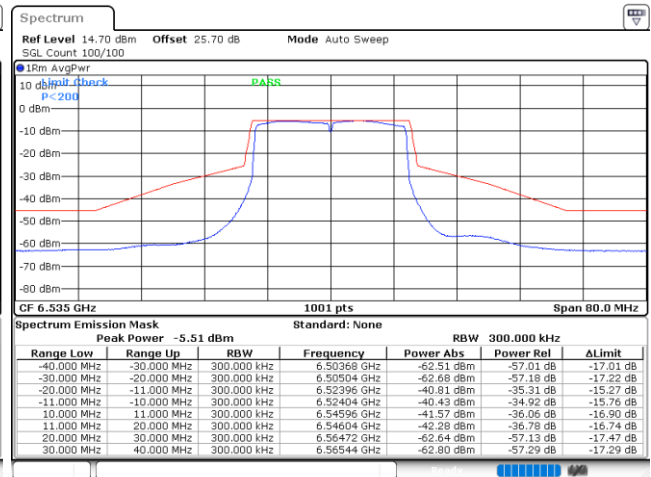
Date: 28.JAN.2022 11:57:11

Plot on Channel 6415MHz



Date: 28.JAN.2022 12:01:50

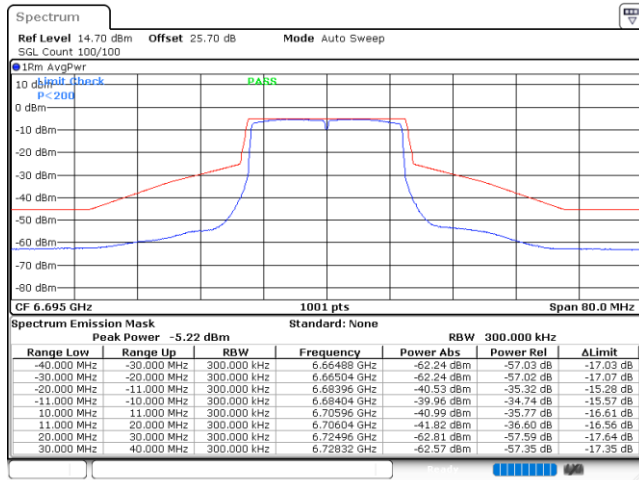
Plot on Channel 6535MHz



Date: 28.JAN.2022 16:14:38

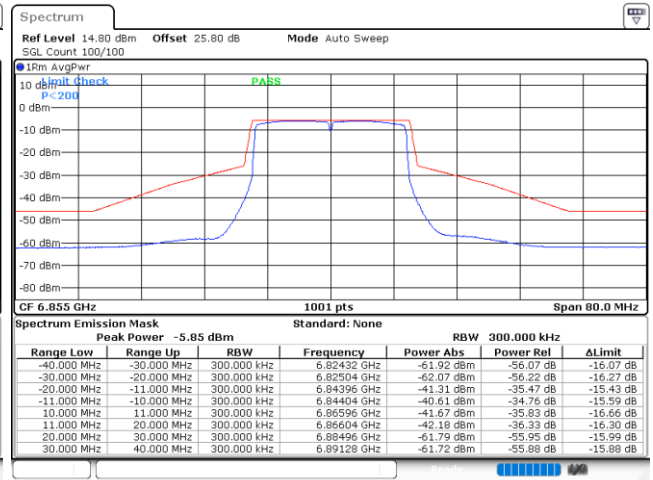


Plot on Channel 6695MHz



Date: 28.JAN.2022 16:26:36

Plot on Channel 6855MHz

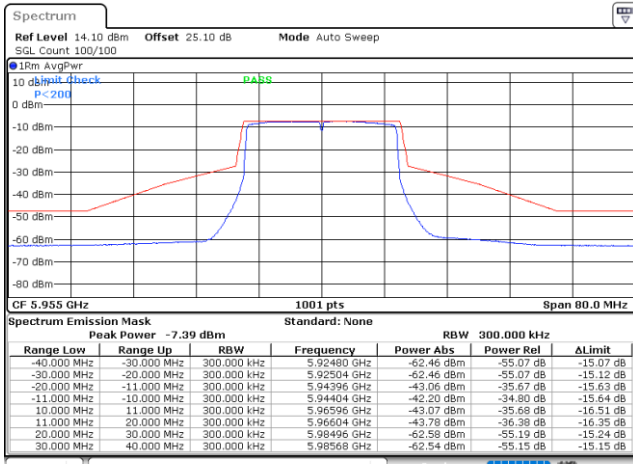


Date: 28.JAN.2022 16:32:59



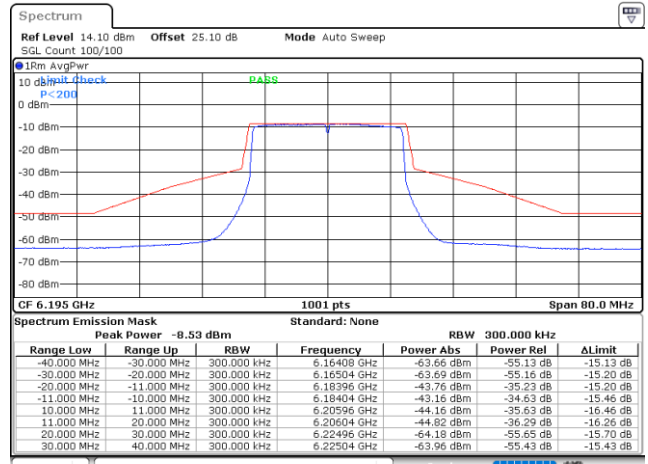
MIMO <Ant. 9+8(8)>

Plot on Channel 5955MHz



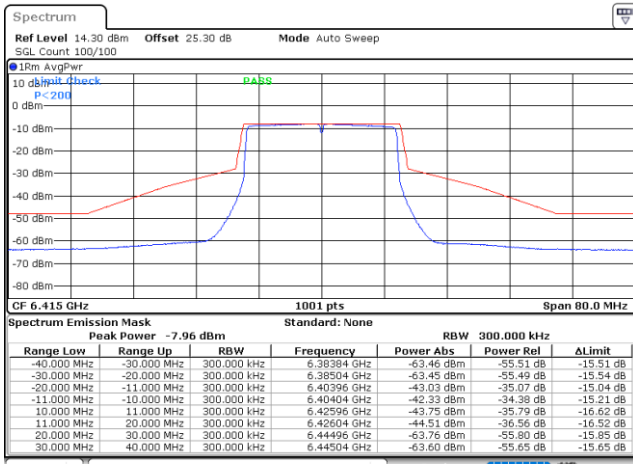
Date: 28.JAN.2022 11:52:27

Plot on Channel 6195MHz



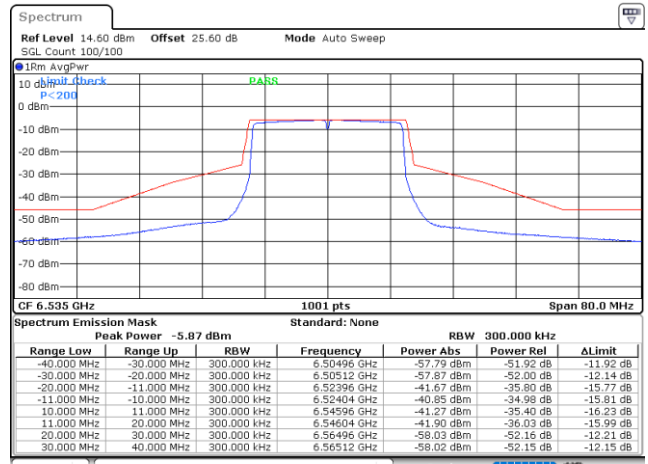
Date: 28.JAN.2022 11:59:16

Plot on Channel 6415MHz



Date: 28.JAN.2022 12:03:03

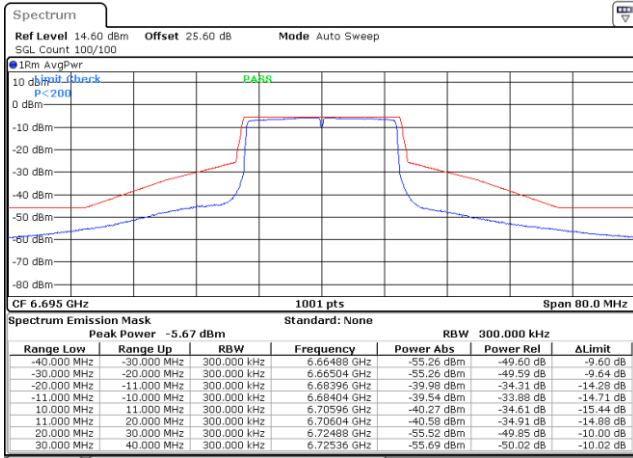
Plot on Channel 6535MHz



Date: 28.JAN.2022 16:16:19

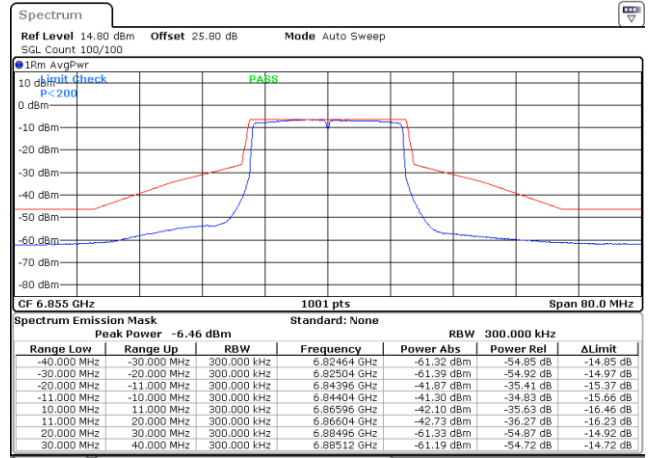


Plot on Channel 6695MHz



Date: 28.JAN.2022 16:28:04

Plot on Channel 6855MHz



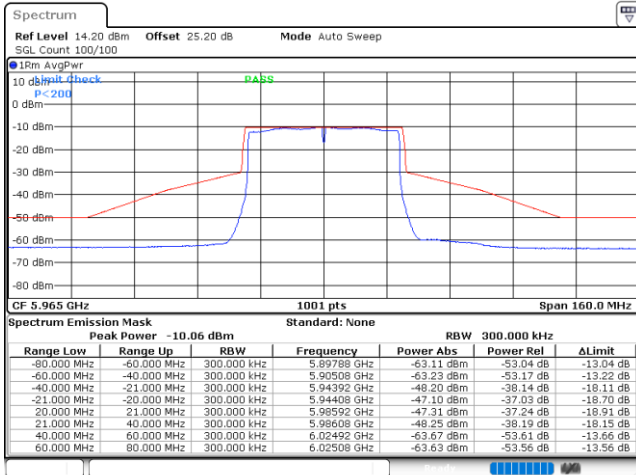
Date: 28.JAN.2022 16:34:47



EUT Mode : 802.11ax HE40

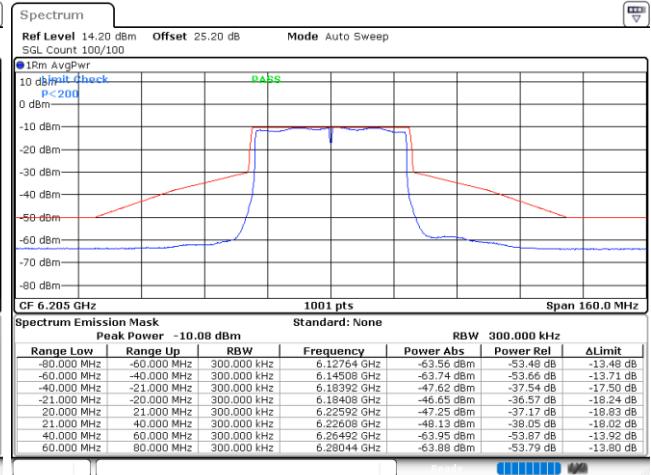
MIMO <Ant. 9+8(9)>

Plot on Channel 5965MHz



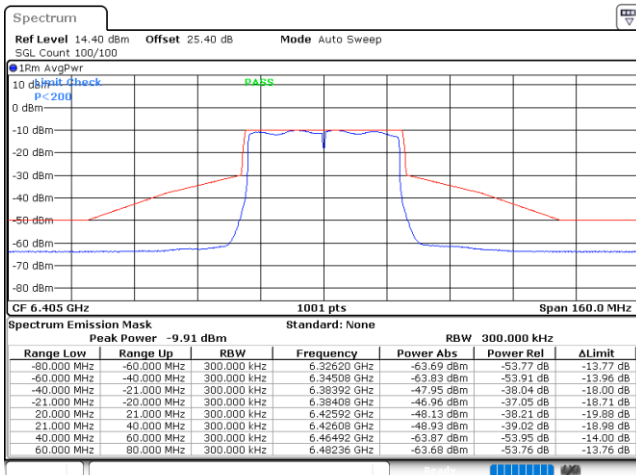
Date: 28 JAN. 2022 17:36:41

Plot on Channel 6205MHz



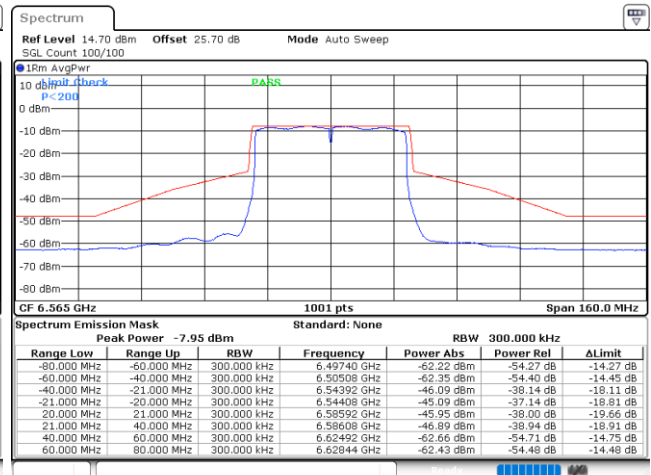
Date: 28 JAN. 2022 17:42:48

Plot on Channel 6405MHz



Date: 29 JAN. 2022 10:39:09

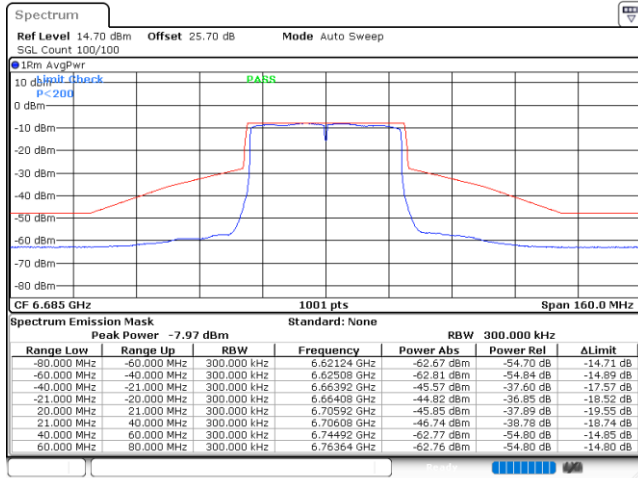
Plot on Channel 6565MHz



Date: 29 JAN. 2022 10:47:48

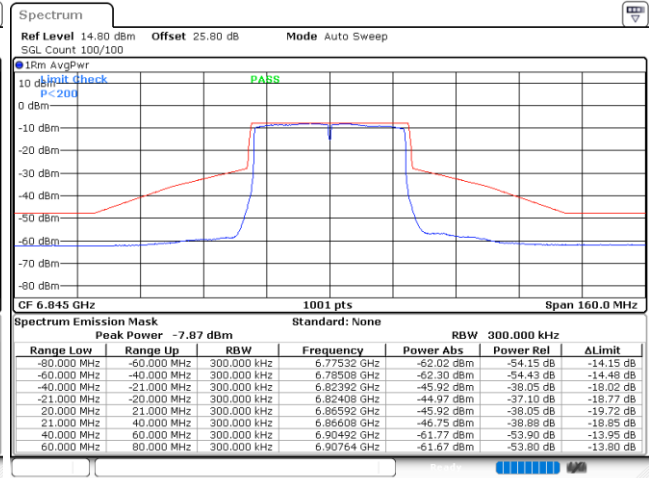


Plot on Channel 6685MHz



Date: 29.JAN.2022 10:53:39

Plot on Channel 6845MHz

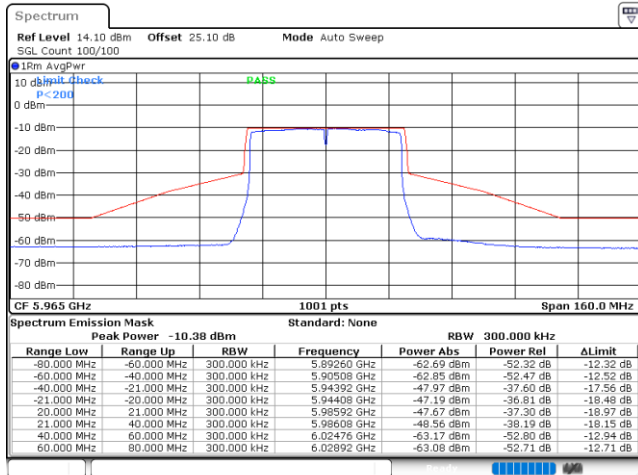


Date: 29.JAN.2022 10:58:29



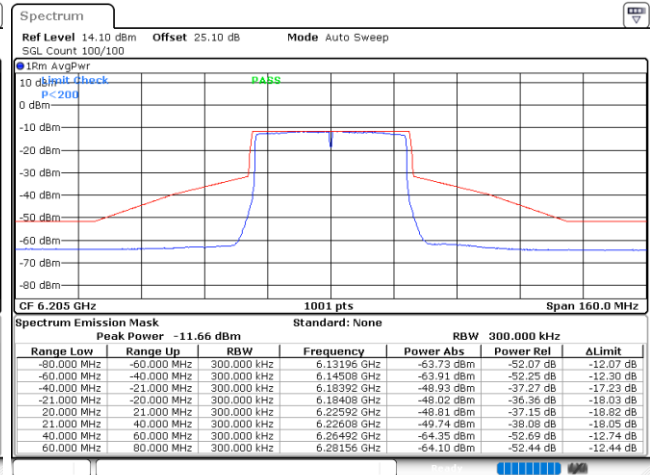
MIMO <Ant. 9+8(8)>

Plot on Channel 5965MHz



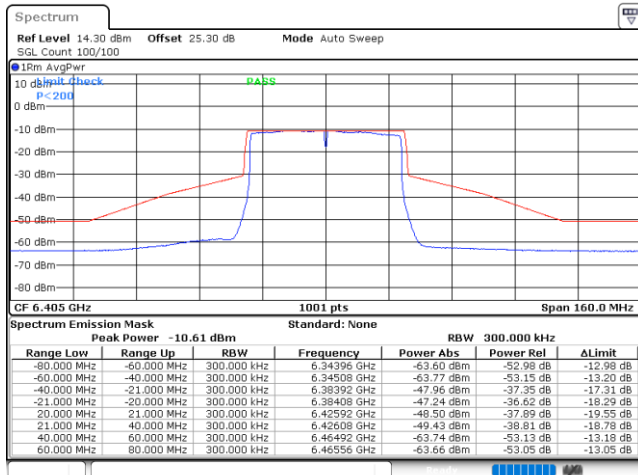
Date: 28.JAN.2022 17:38:03

Plot on Channel 6205MHz



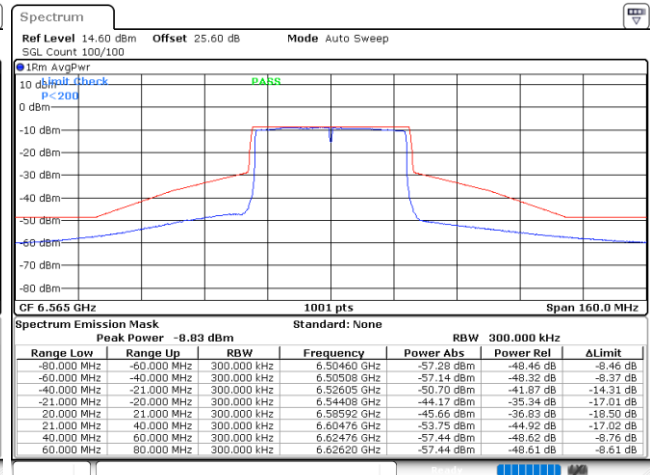
Date: 28.JAN.2022 17:43:55

Plot on Channel 6405MHz



Date: 29.JAN.2022 10:40:18

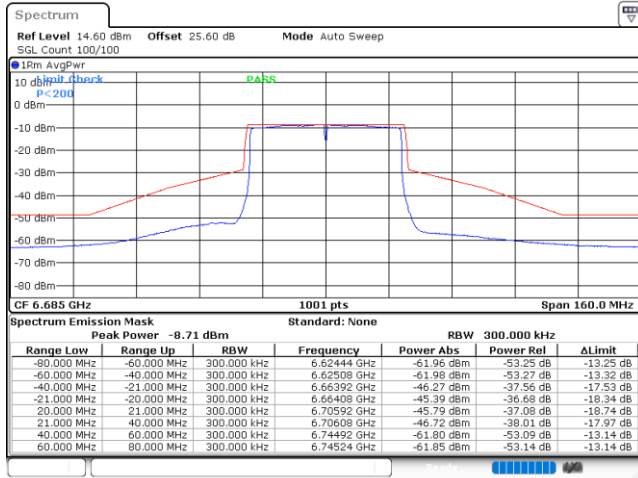
Plot on Channel 6565MHz



Date: 29.JAN.2022 10:48:49

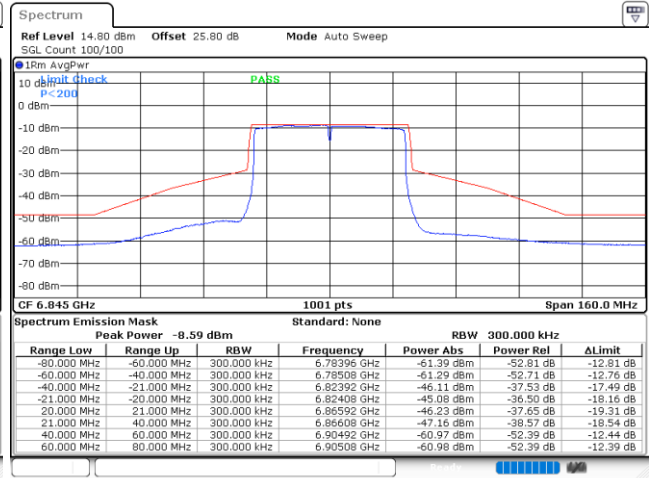


Plot on Channel 6685MHz



Date: 29.JAN.2022 10:55:23

Plot on Channel 6845MHz



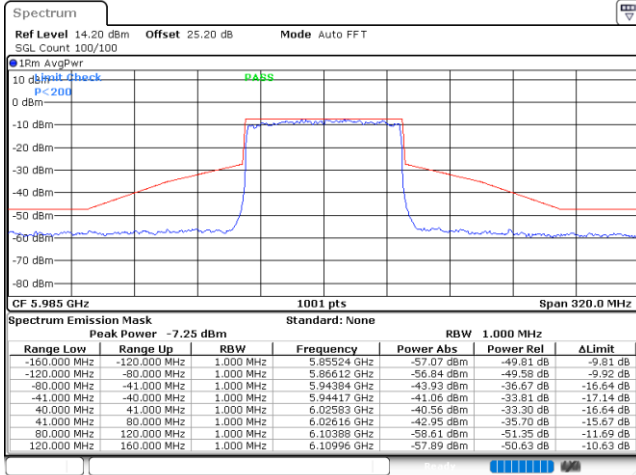
Date: 29.JAN.2022 10:59:33



EUT Mode : 802.11ax HE80

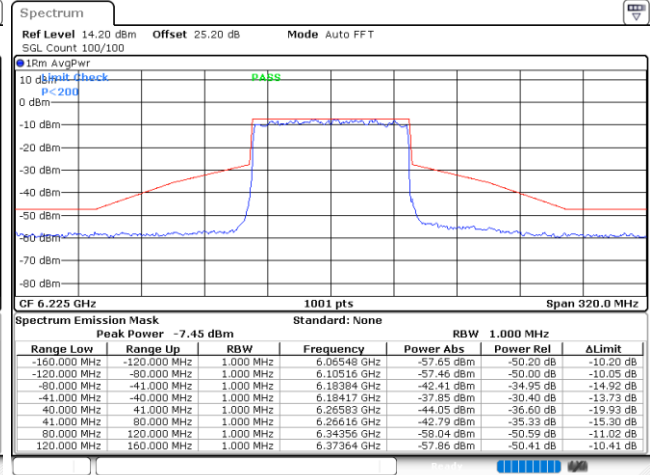
MIMO <Ant. 9+8(9)>

Plot on Channel 5985MHz



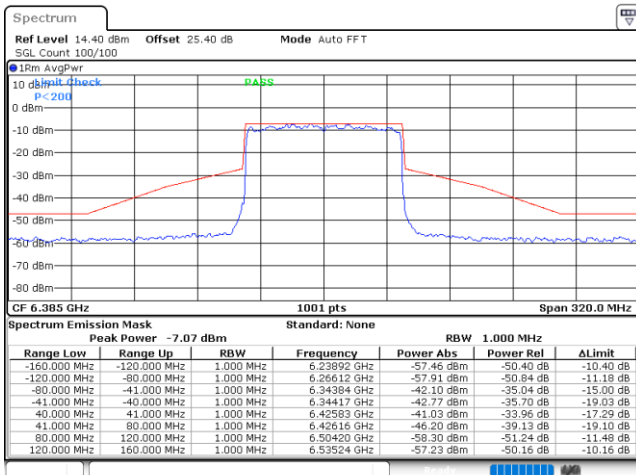
Date: 29.JAN.2022 11:05:05

Plot on Channel 6225MHz



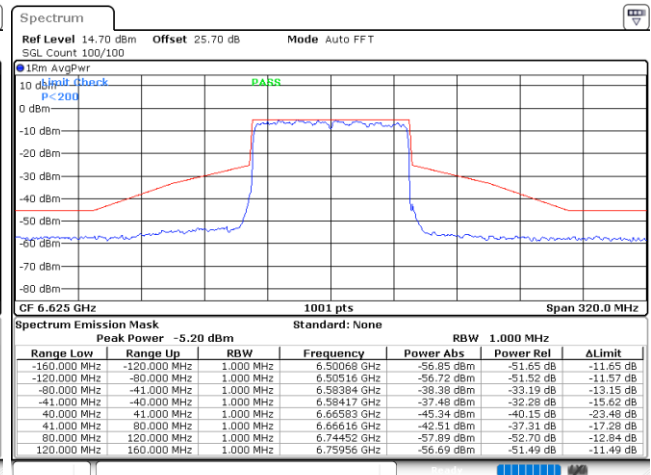
Date: 29.JAN.2022 11:10:21

Plot on Channel 6385MHz



Date: 29.JAN.2022 11:16:28

Plot on Channel 6625MHz

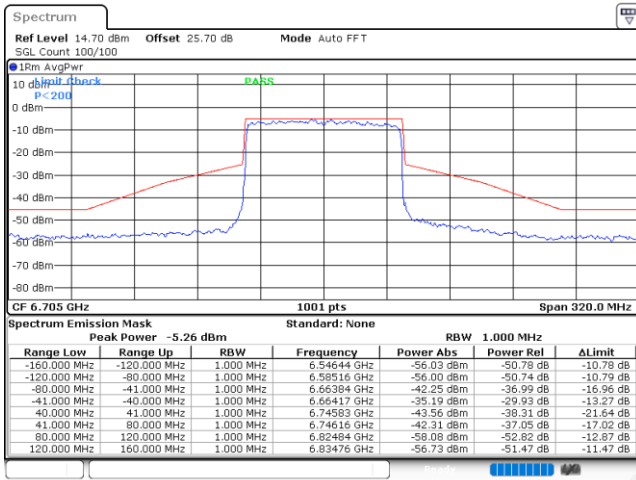


Date: 29.JAN.2022 11:22:14

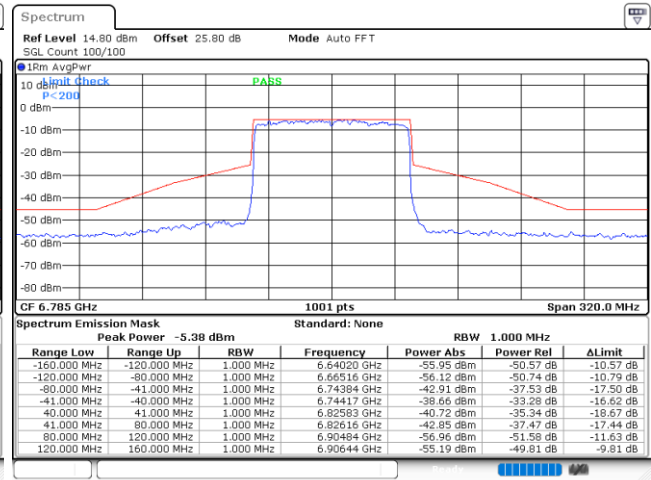


Plot on Channel 6705MHz

Plot on Channel 6785MHz



Date: 29.JAN.2022 11:29:27

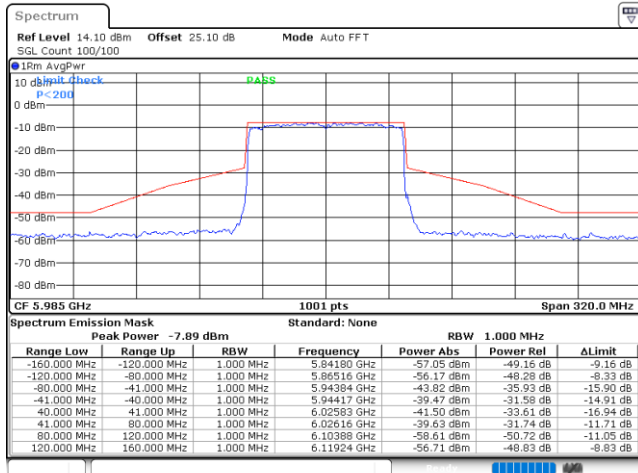


Date: 29.JAN.2022 11:38:44



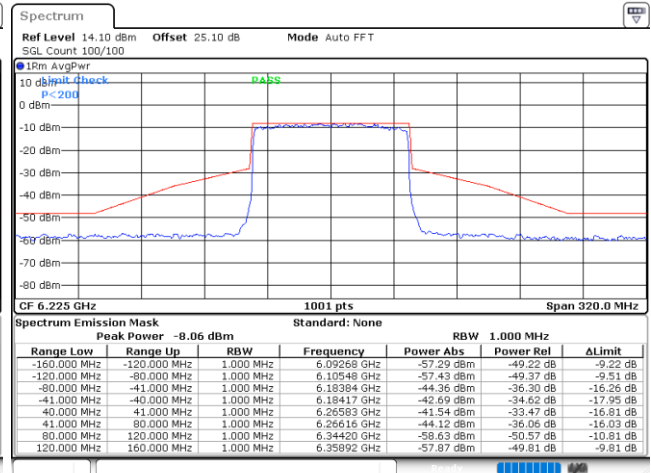
MIMO <Ant. 9+8(8)>

Plot on Channel 5985MHz



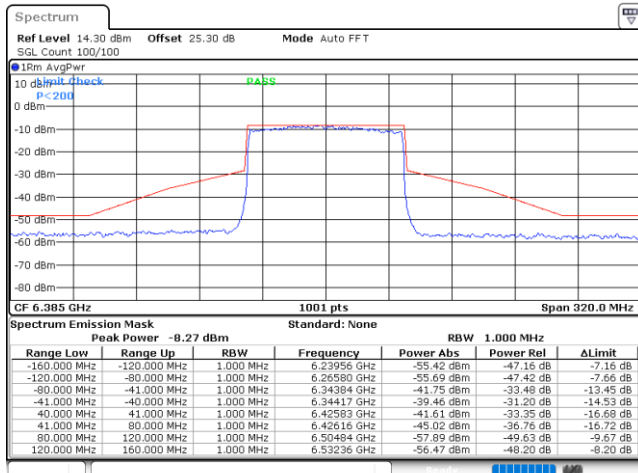
Date: 29.JAN.2022 11:06:12

Plot on Channel 6225MHz



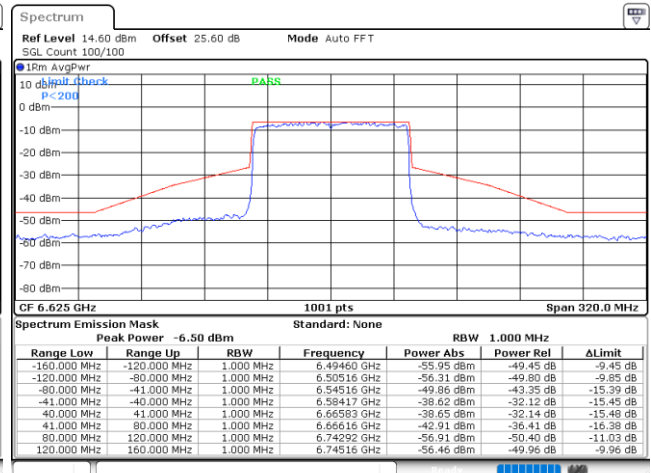
Date: 29.JAN.2022 11:11:17

Plot on Channel 6385MHz



Date: 29.JAN.2022 11:17:44

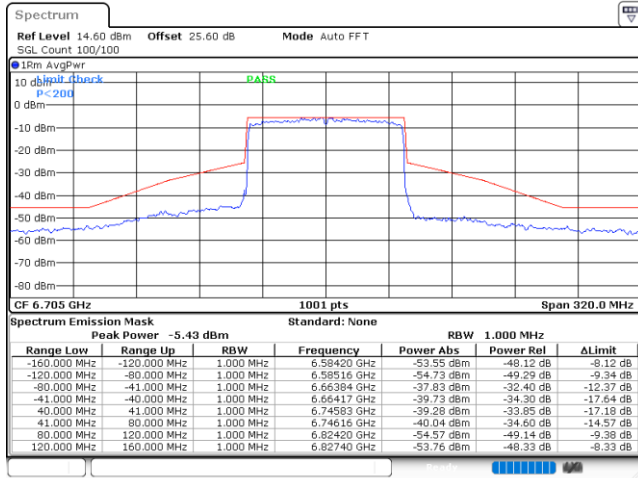
Plot on Channel 6625MHz



Date: 29.JAN.2022 11:23:35

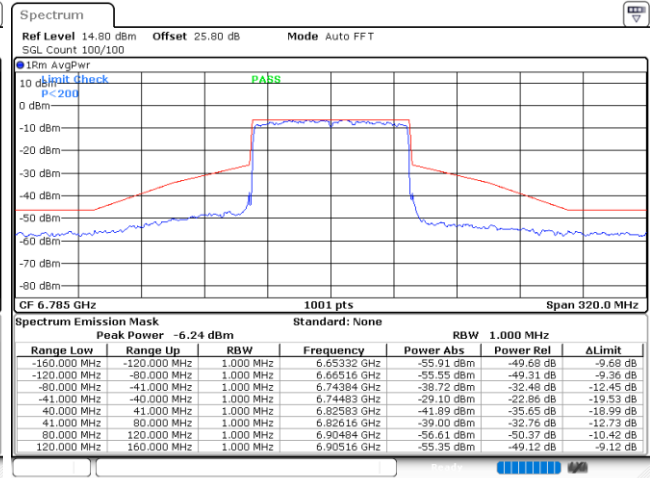


Plot on Channel 6705MHz



Date: 29.JAN.2022 11:34:33

Plot on Channel 6785MHz



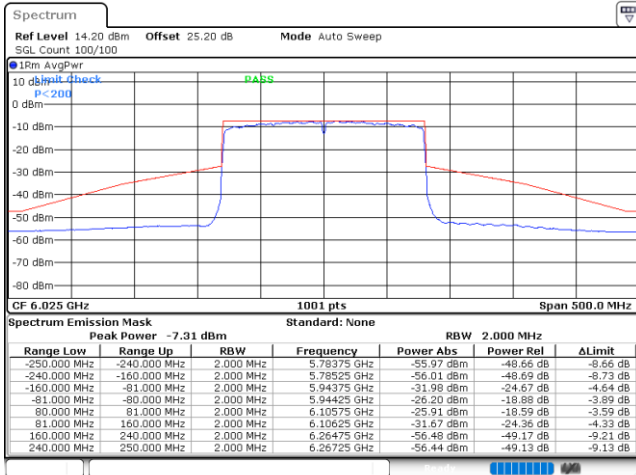
Date: 29.JAN.2022 11:44:18



EUT Mode : 802.11ax HE160

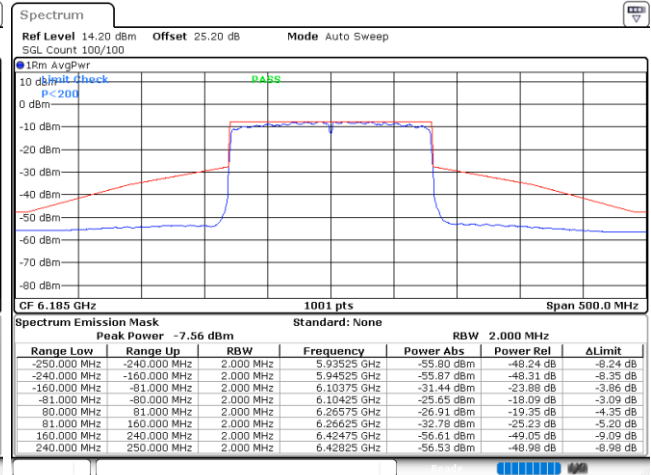
MIMO <Ant. 9+8(9)>

Plot on Channel 6025MHz



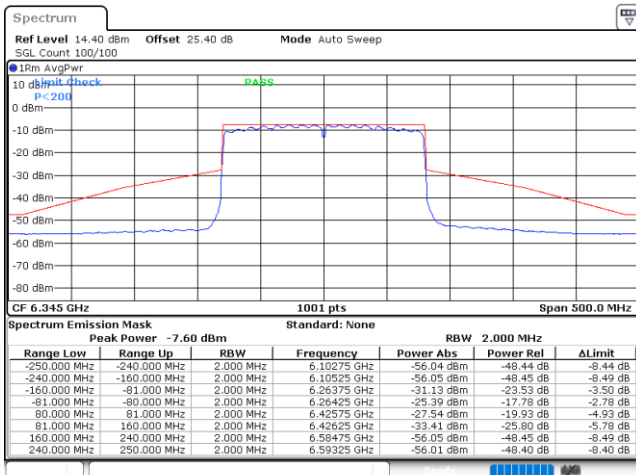
Date: 29 JAN.2022 12:14:47

Plot on Channel 6185MHz



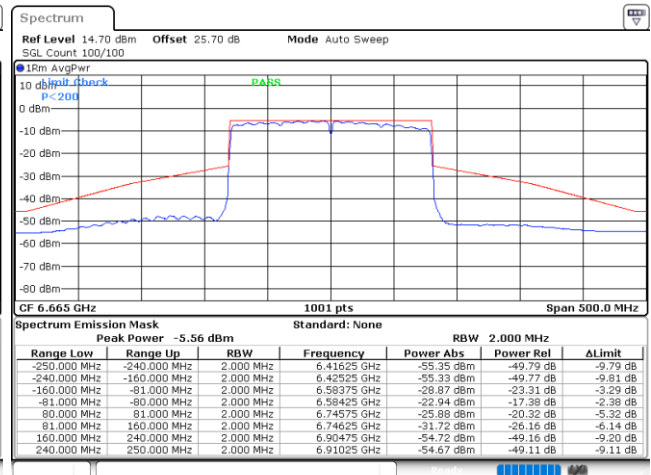
Date: 29 JAN.2022 12:14:48

Plot on Channel 6345MHz



Date: 29 JAN.2022 12:30:43

Plot on Channel 6665MHz

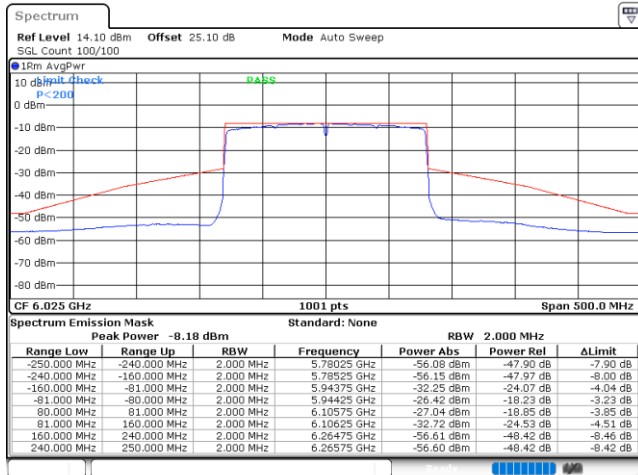


Date: 29 JAN.2022 12:35:24



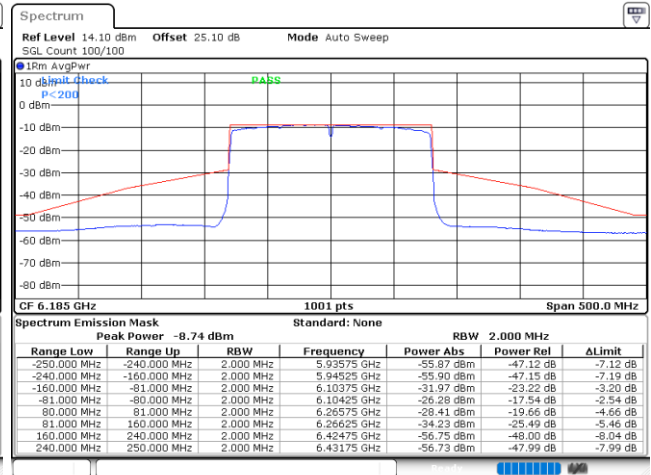
MIMO <Ant. 9+8(8)>

Plot on Channel 6025MHz



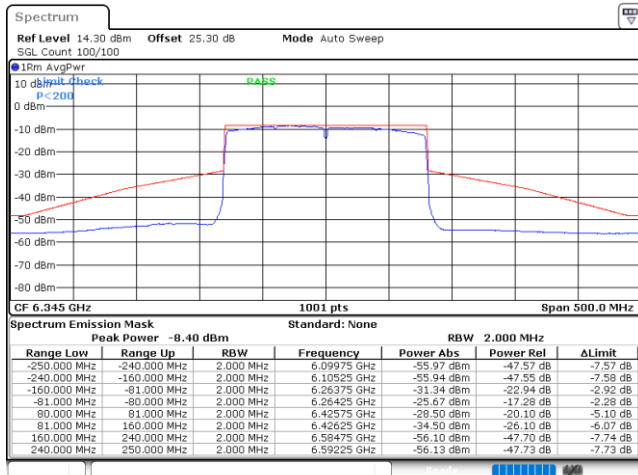
Date: 29.JAN.2022 12:10:19

Plot on Channel 6185MHz



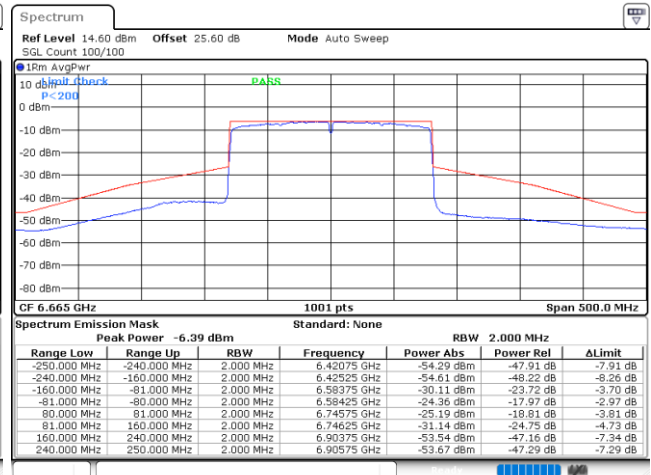
Date: 29.JAN.2022 12:26:15

Plot on Channel 6345MHz



Date: 29.JAN.2022 12:31:56

Plot on Channel 6665MHz



Date: 29.JAN.2022 12:36:30



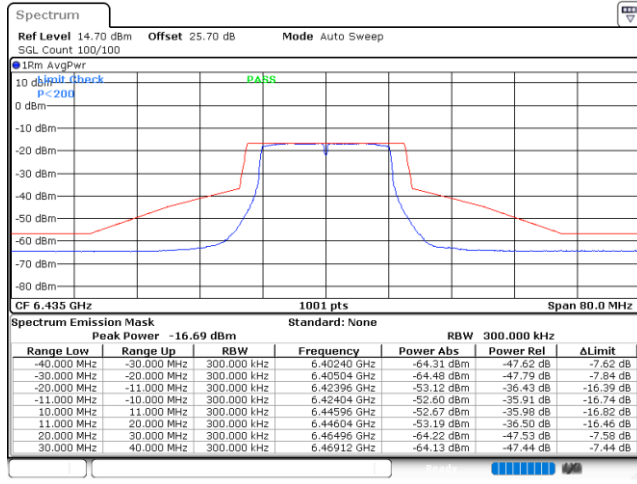
<CDD Mode>

<Indoor Client>

EUT Mode : 802.11a

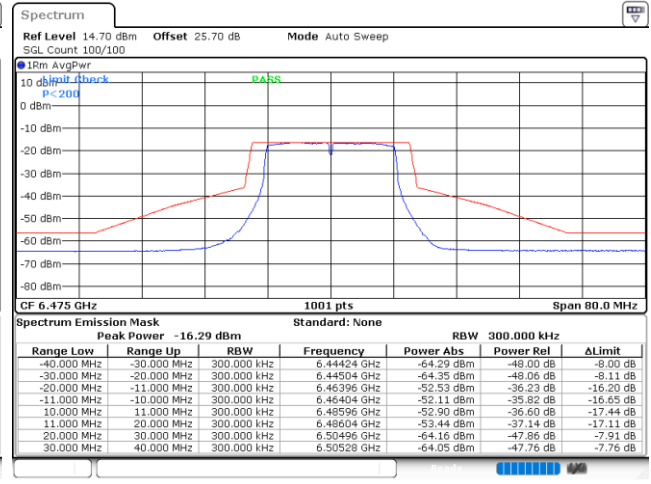
MIMO <Ant. 9+8(9)>

Plot on Channel 6435MHz



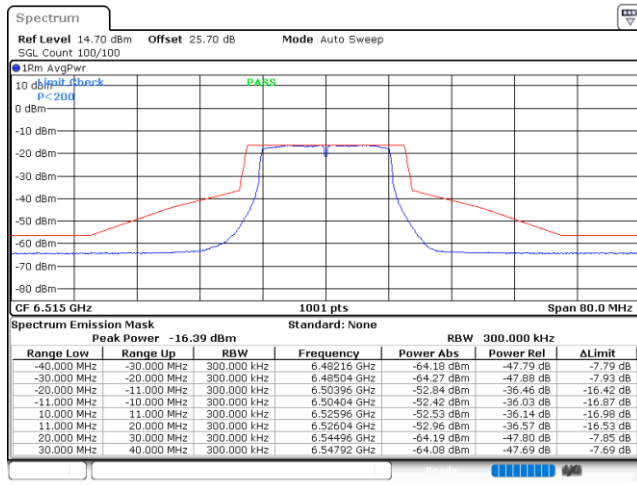
Date: 14.JAN.2022 17:39:58

Plot on Channel 6475MHz



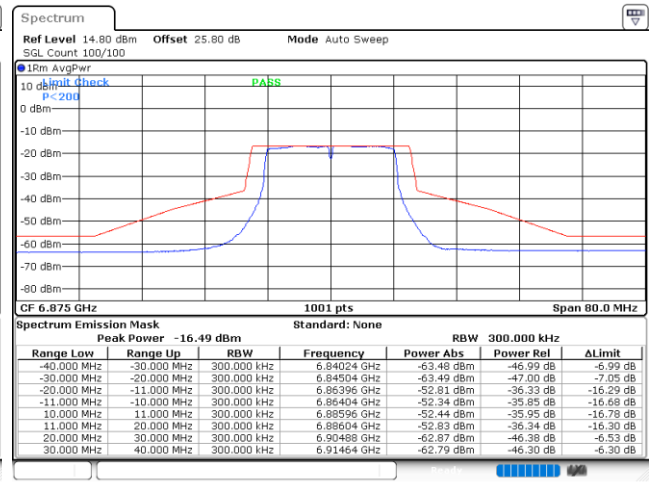
Date: 14.JAN.2022 17:43:32

Plot on Channel 6515MHz



Date: 14.JAN.2022 17:46:56

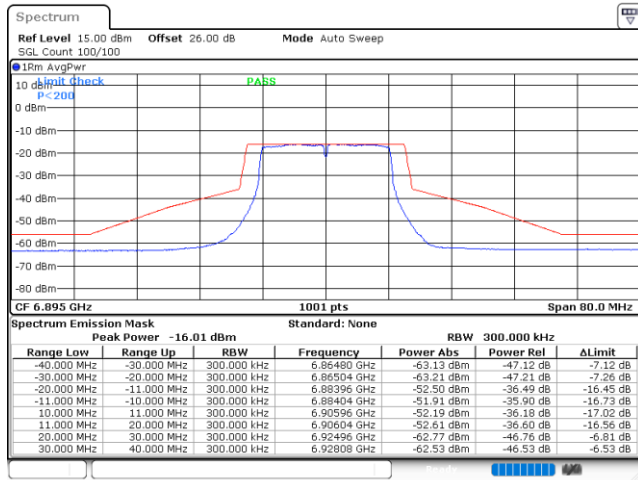
Plot on Channel 6875MHz



Date: 14.JAN.2022 17:59:14

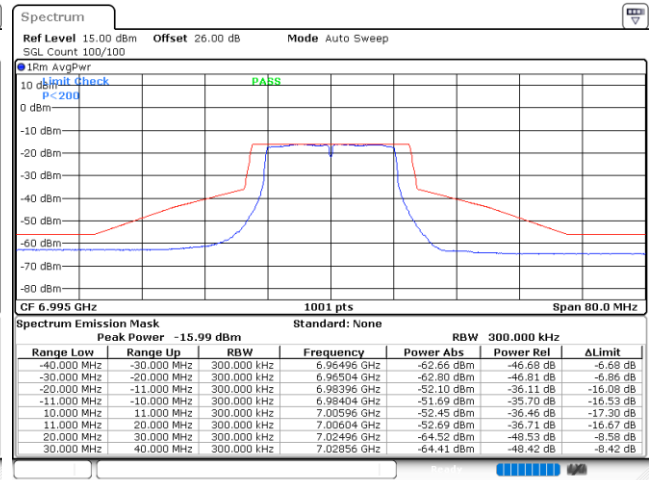


Plot on Channel 6895MHz



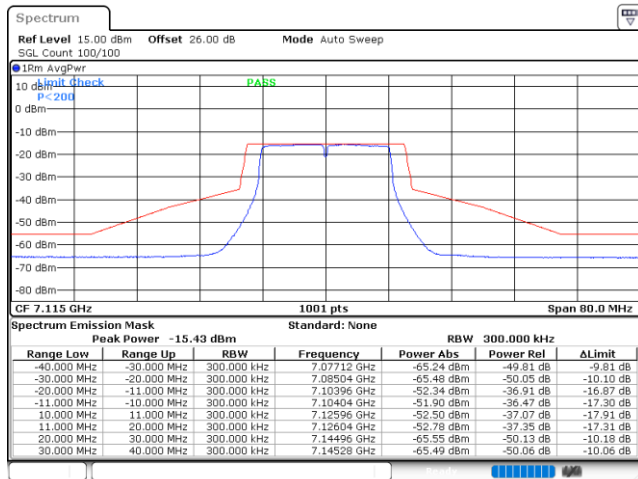
Date: 14.JAN.2022 18:04:14

Plot on Channel 6995MHz



Date: 14.JAN.2022 18:39:12

Plot on Channel 7115MHz

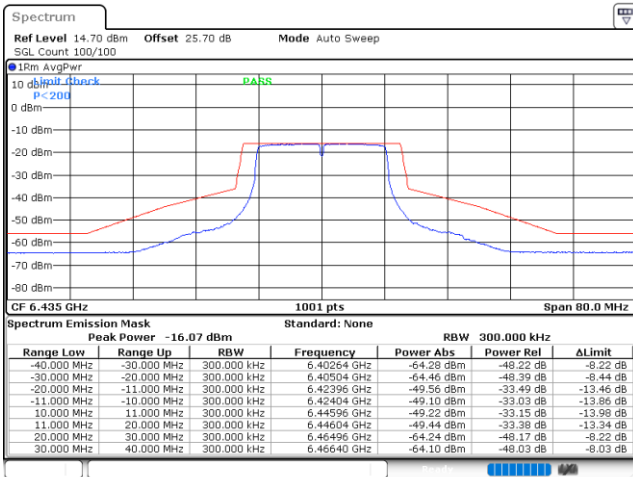


Date: 14.JAN.2022 18:45:26



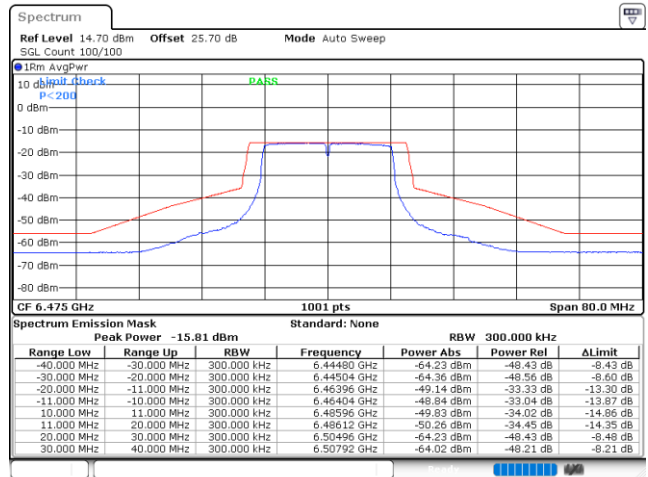
MIMO <Ant. 9+8(8)>

Plot on Channel 6435MHz



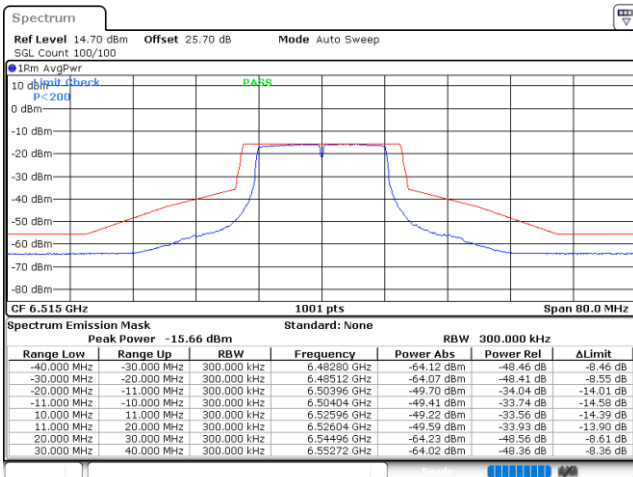
Date: 14. JAN. 2022 17:41:25

Plot on Channel 6475MHz



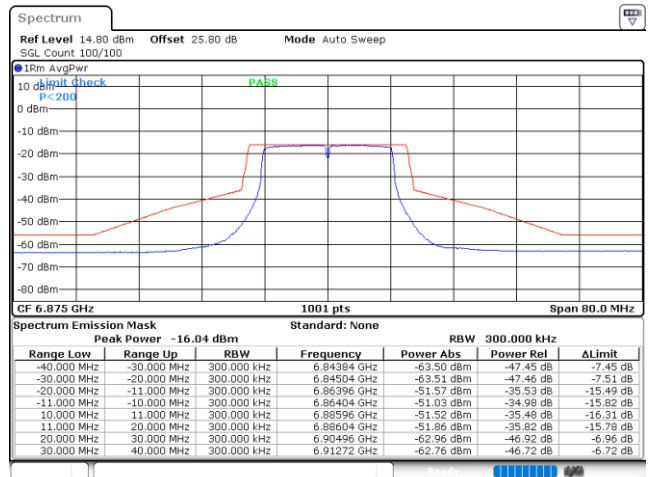
Date: 14. JAN. 2022 17:44:54

Plot on Channel 6515MHz



Date: 14. JAN. 2022 17:48:12

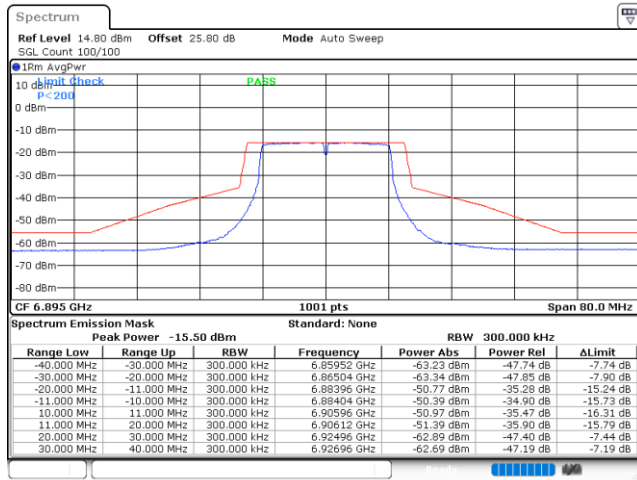
Plot on Channel 6875MHz



Date: 14. JAN. 2022 18:02:43

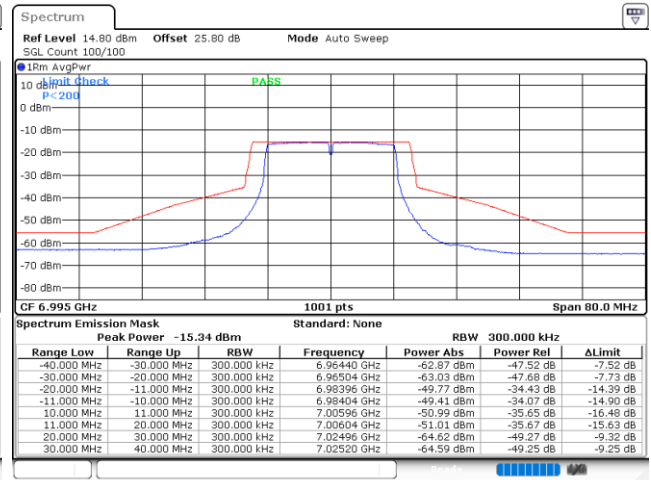


Plot on Channel 6895MHz



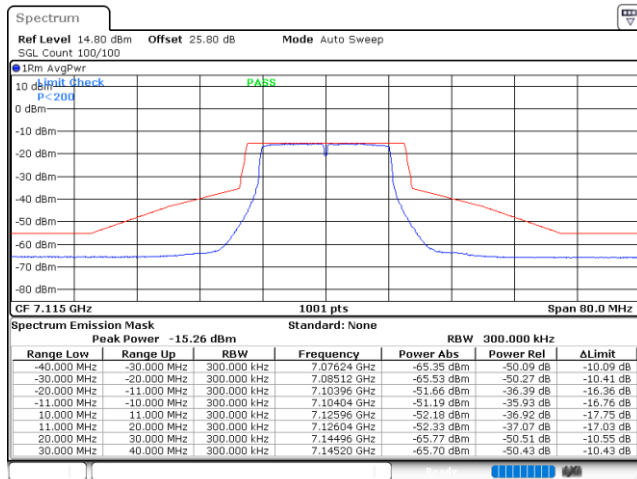
Date: 14. JAN. 2022 18:05:41

Plot on Channel 6995MHz



Date: 14. JAN. 2022 18:40:28

Plot on Channel 7115MHz



Date: 14. JAN. 2022 18:46:43

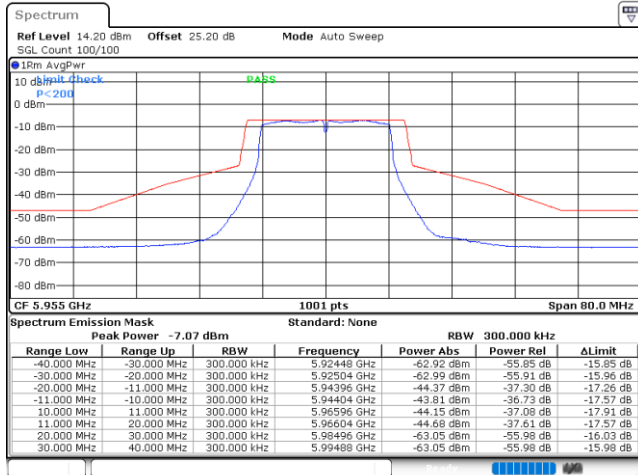


<Standard Client>

EUT Mode :	802.11a
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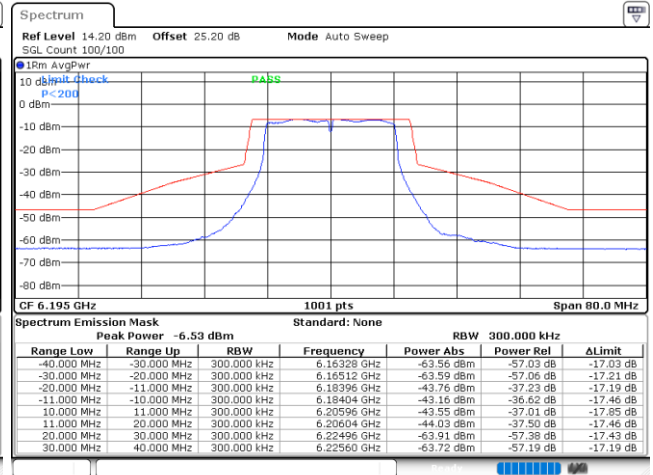
MIMO <Ant. 9+8(9)>

Plot on Channel 5955MHz



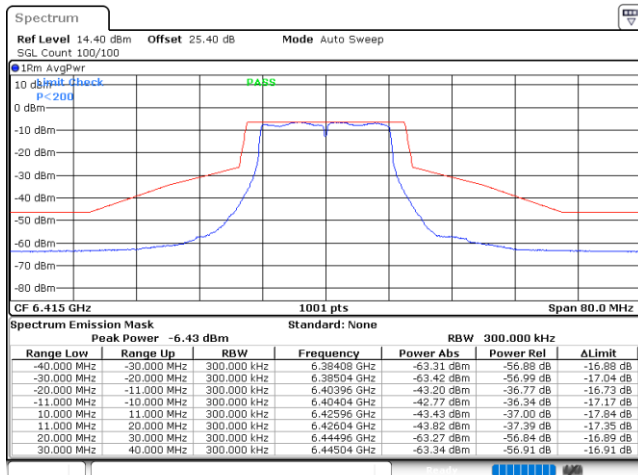
Date: 28.JAN.2022 11:07:59

Plot on Channel 6195MHz



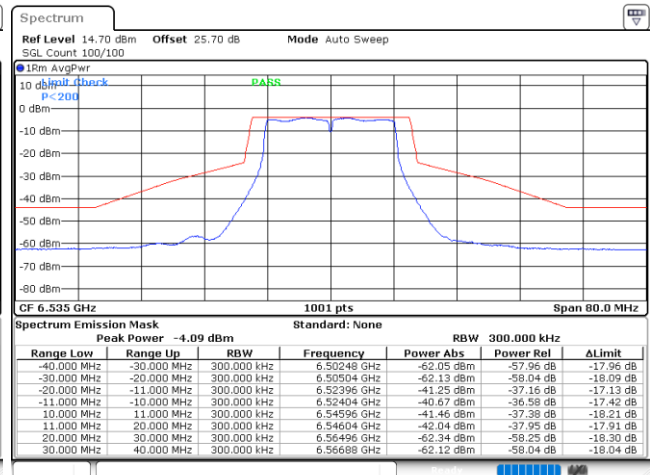
Date: 28.JAN.2022 11:23:59

Plot on Channel 6415MHz



Date: 28.JAN.2022 11:28:28

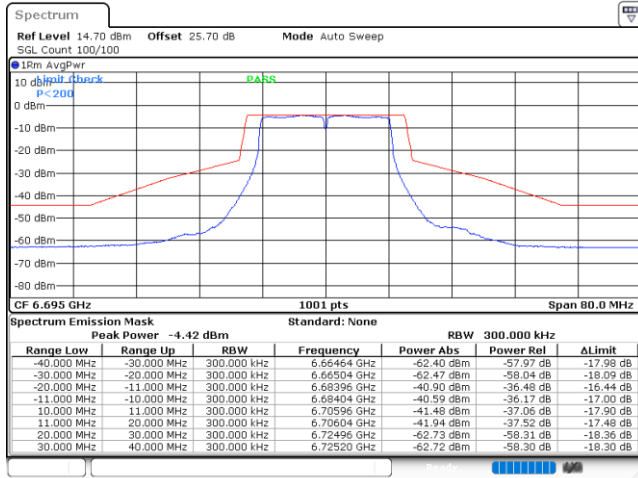
Plot on Channel 6535MHz



Date: 28.JAN.2022 11:35:47

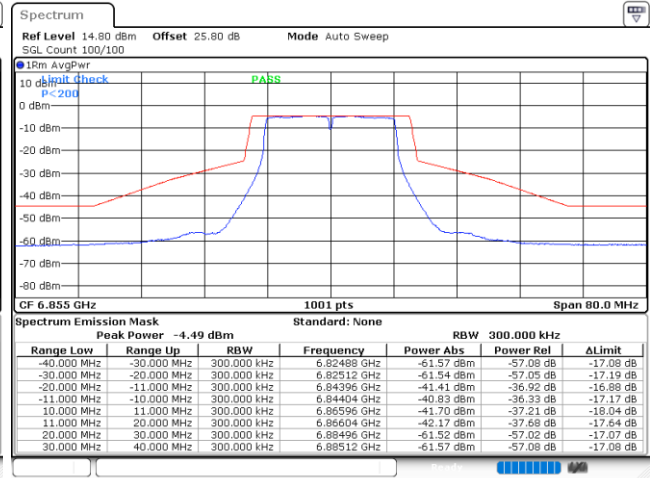


Plot on Channel 6695MHz



Date: 28.JAN.2022 11:40:39

Plot on Channel 6855MHz

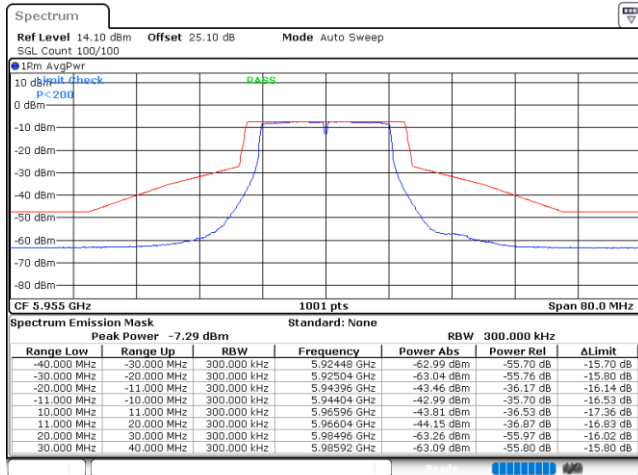


Date: 28.JAN.2022 11:45:38



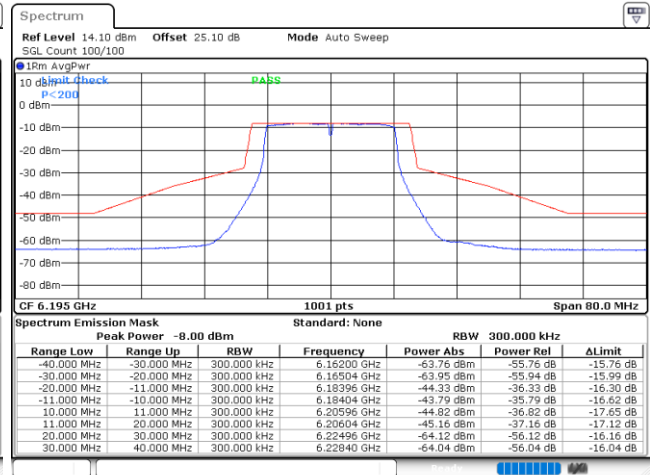
MIMO <Ant. 9+8(8)>

Plot on Channel 5955MHz



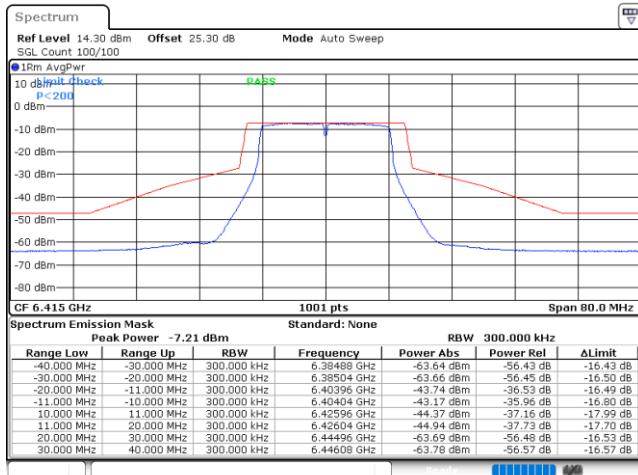
Date: 28.JAN.2022 11:10:32

Plot on Channel 6195MHz



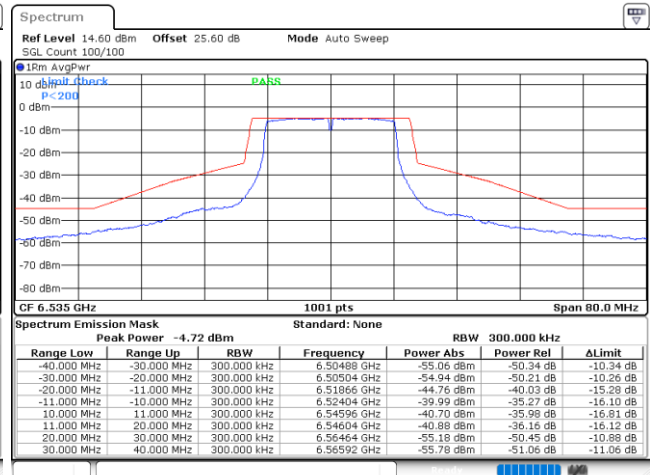
Date: 28.JAN.2022 11:25:04

Plot on Channel 6415MHz



Date: 28.JAN.2022 11:29:26

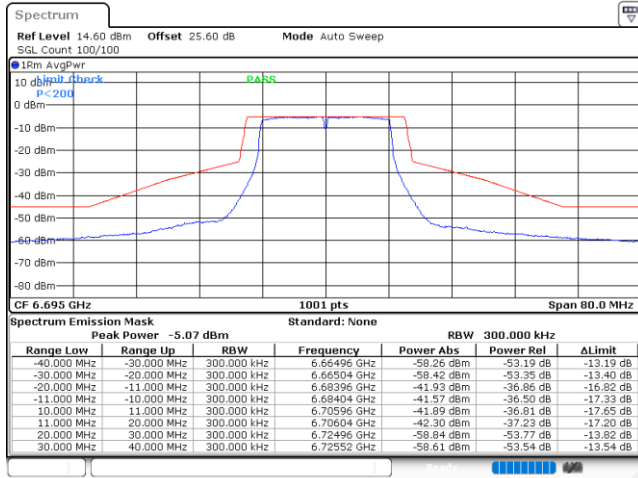
Plot on Channel 6535MHz



Date: 28.JAN.2022 11:36:49

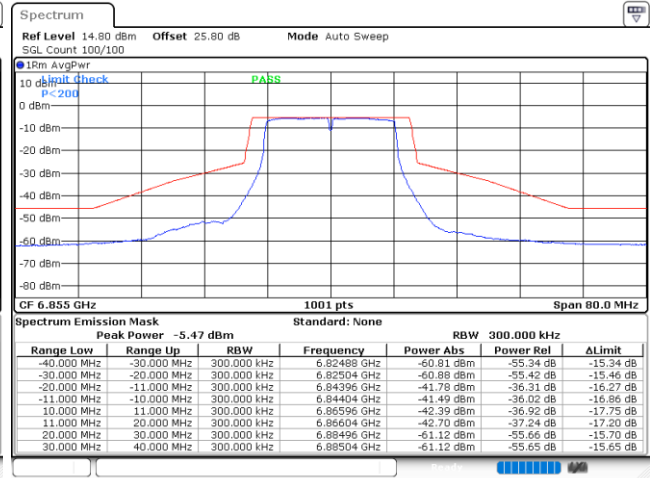


Plot on Channel 6695MHz



Date: 29.JAN.2022 11:42:00

Plot on Channel 6855MHz



Date: 28.JAN.2022 11:46:41



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

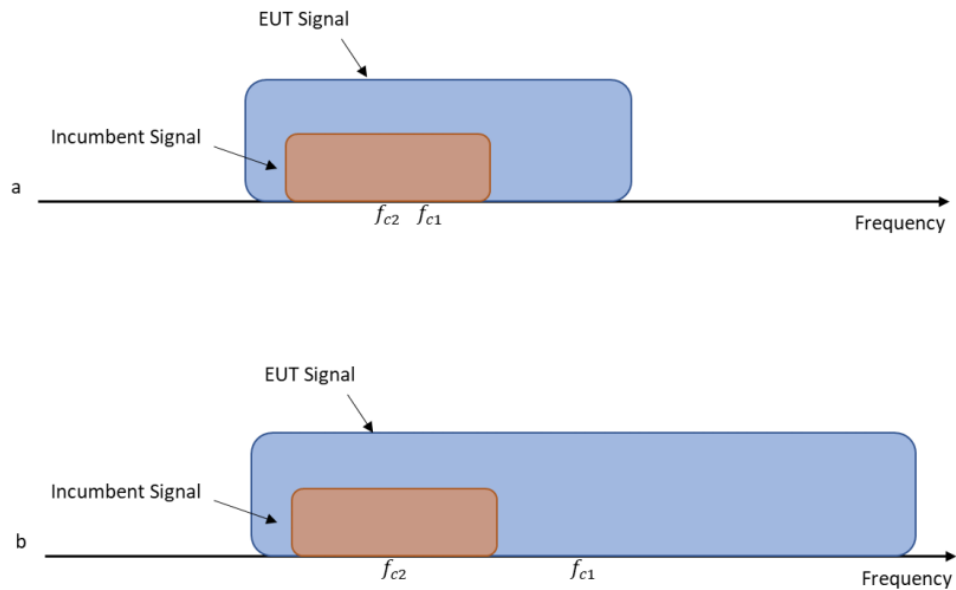


Figure 1. Two possible scenarios where a) center frequency of EUT transmission falls within incumbent's bandwidth, or b) outside of it

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

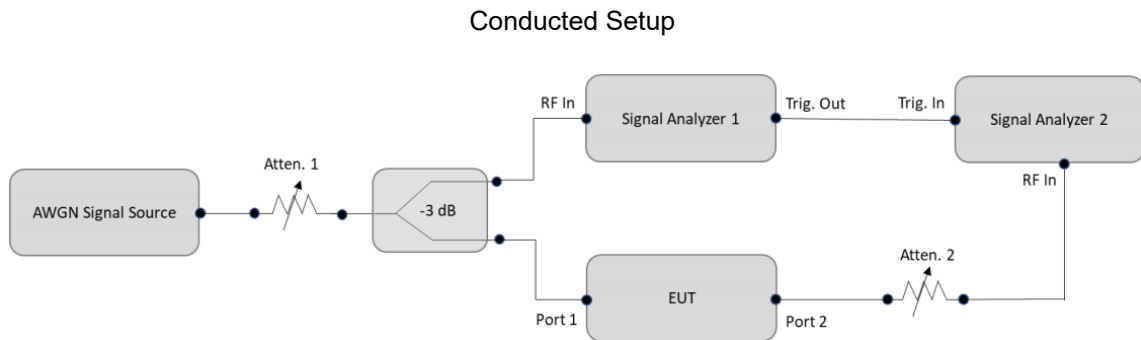


Figure 2. Contention-based protocol test setup, conducted method Step-by-Step Procedure, Conducted Setup

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	Acer	N15C1	LAN



3.5.6 Test Summary of Contention Based Protocol Test

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

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	-74.64	100	-59.1	15.54
			6110	-74.47	100	-59.1	15.37
	6185	160	6185	-69.5	100	-59.1	10.4
			6260	-73.76	100	-59.1	14.66
UNII Band 6	6455	20	6455	-77.35	100	-58.8	18.55
			6430	-74.74	100	-58.8	15.94
	6505	160	6505	-68.12	100	-58.8	9.32
			6580	-74.17	100	-58.8	15.37
UNII Band 7	6695	20	6695	-74.31	100	-58.7	15.61
			6590	-77.11	100	-58.7	18.41
	6665	160	6665	-72.76	100	-58.7	14.06
			6740	-77.9	100	-58.7	19.2
UNII Band 8	7015	20	7015	-68.85	100	-59.2	9.65
			6910	-76.65	100	-59.2	17.45
	6985	160	6985	-71.59	100	-59.2	12.39
			7060	-75.46	100	-59.2	16.26

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



3.5.7 Test Plots of Contention Based Protocol Test

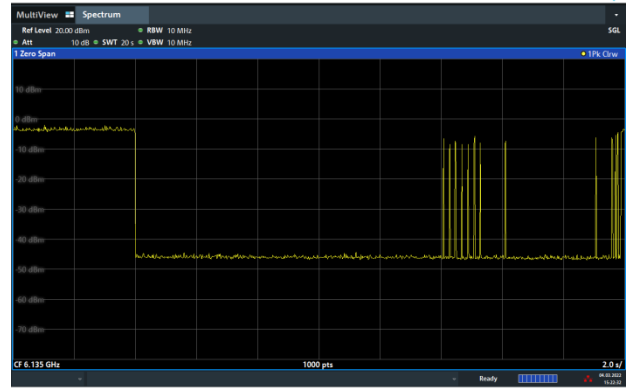
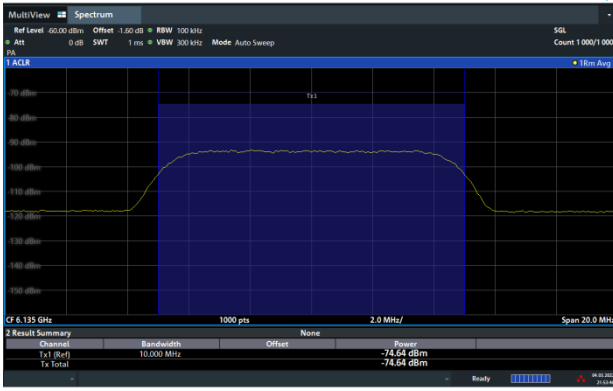
Contention Based Protocol Result Plots on U-NII 5 (AWGN Interference)

802.11ax (HE20) / 6135MHz

802.11ax (HE20) / CH37

Threshold Level (TL) = -dBm

Test result is pass due to no transmission occur.

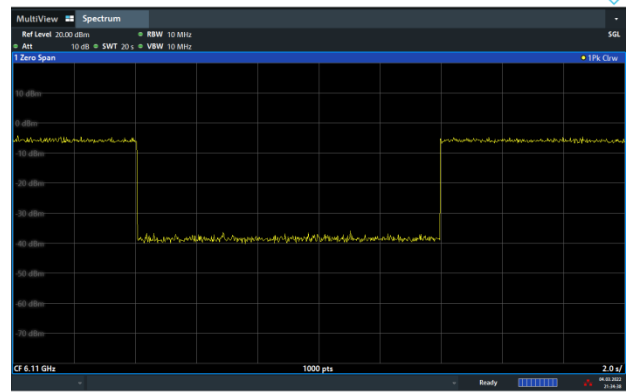
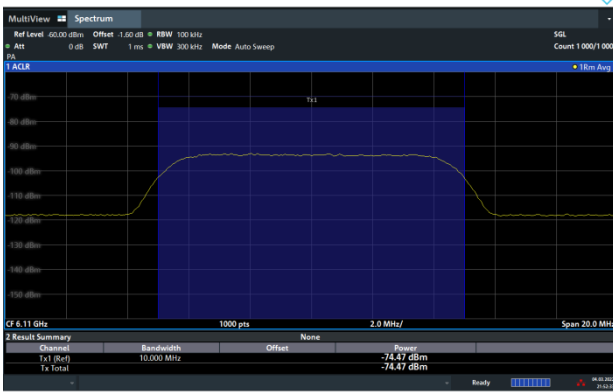


802.11ax (HE160) / 6110MHz (Lower edge)

802.11ax (HE160) / CH47 (Lower edge)

Threshold Level (TL) = -dBm

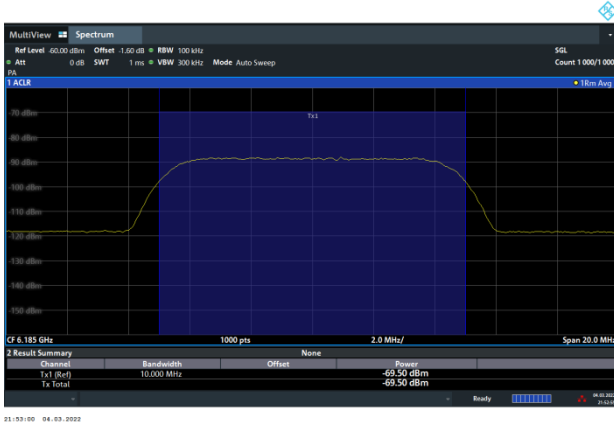
Test result is pass due to no transmission occur.





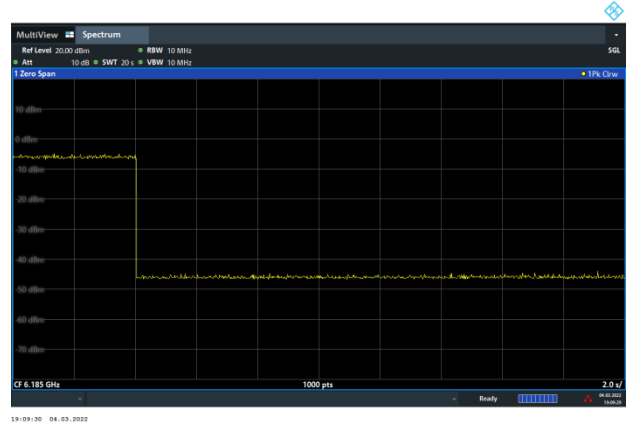
802.11ax (HE160) / 6185MHz (Middle)

Threshold Level (TL) = -69.5dBm



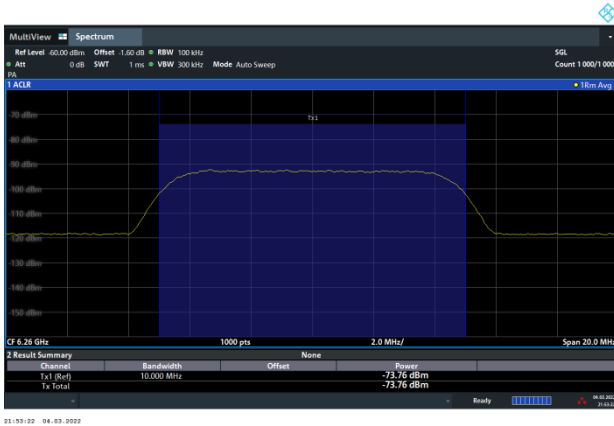
802.11ax (HE160) / CH47 (Middle)

Test result is pass due to no transmission occur.



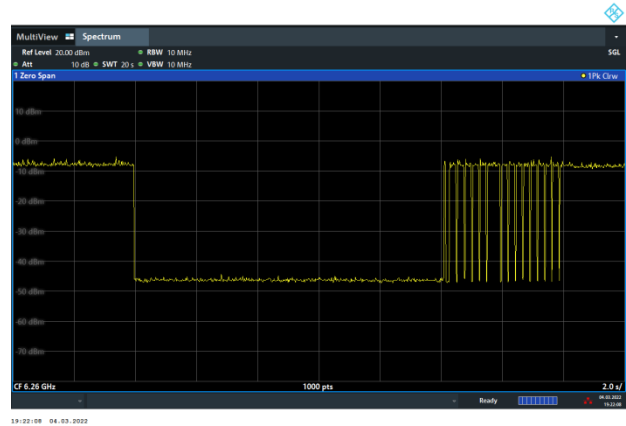
802.11ax (HE160) / 6260MHz (Upper edge)

Threshold Level (TL) = -73.76dBm



802.11ax (HE160) / CH47 (Upper edge)

Test result is pass due to no transmission occur.

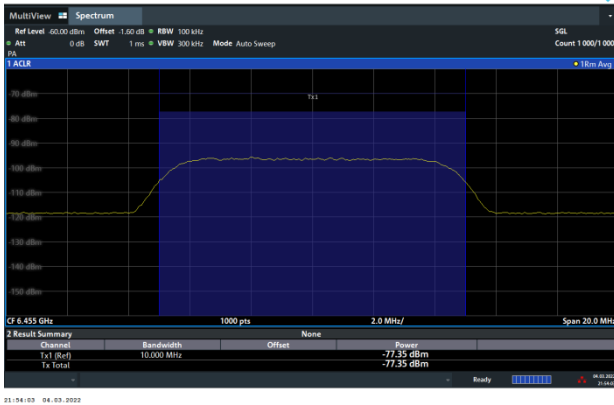




Contention Based Protocol Result Plots on U-NII 6 (AWGN Interference)

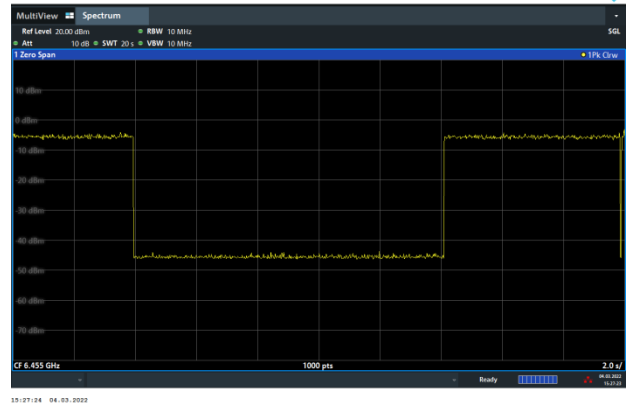
802.11ax (HE20) / 6455MHz

Threshold Level (TL) = -77.35dBm



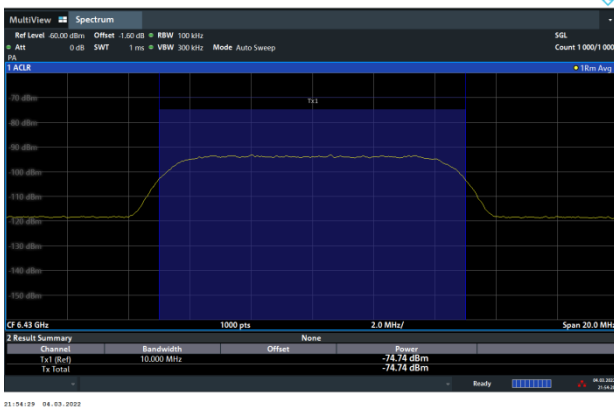
802.11ax (HE20) / CH101

Test result is pass due to no transmission occur.



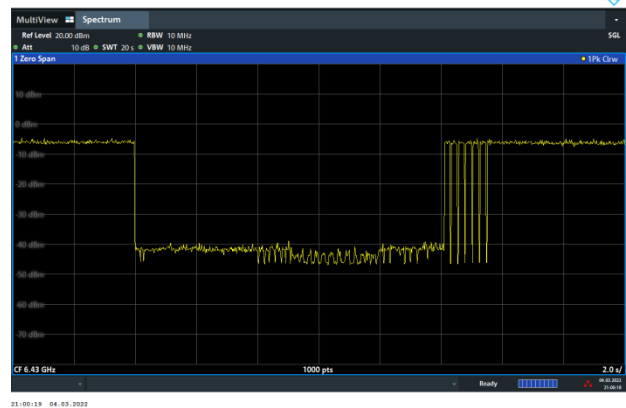
802.11ax (HE160) / 6430MHz (Lower edge)

Threshold Level (TL) = -74.74dBm



802.11ax (HE160) / CH111 (Lower edge)

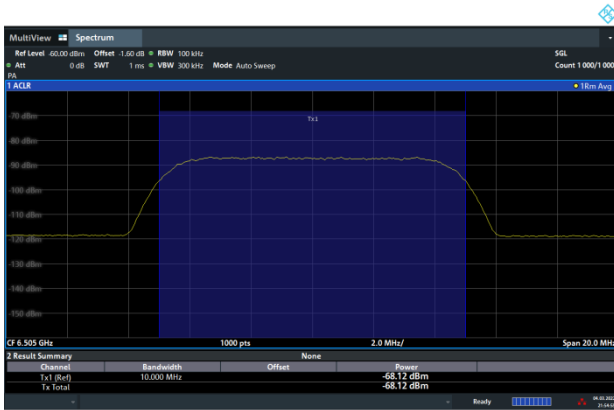
Test result is pass due to no transmission occur.





802.11ax (HE160) / 6505MHz (Middle)

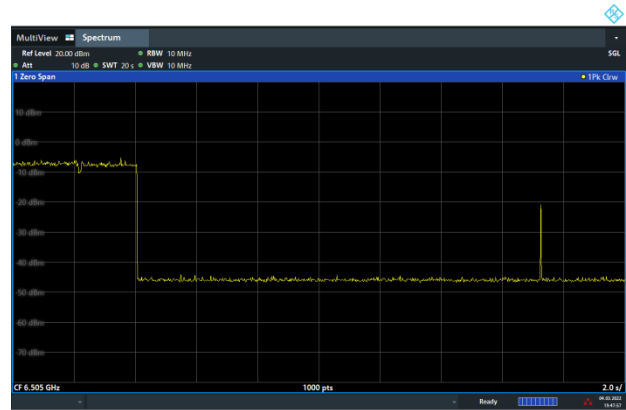
Threshold Level (TL) = -68.12dBm



21:04:26 04.03.2022

802.11ax (HE160) / CH111 (Middle)

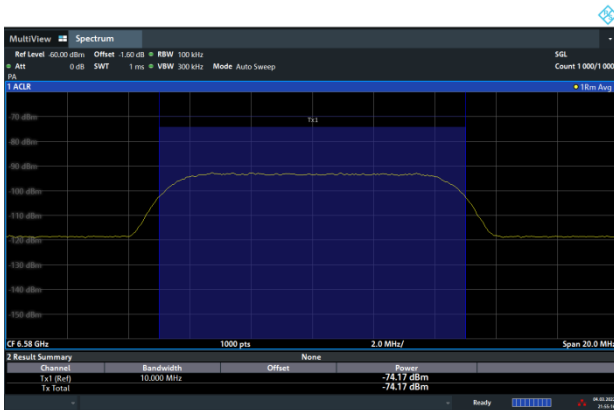
Test result is pass due to no transmission occur.



21:47:57 04.03.2022

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

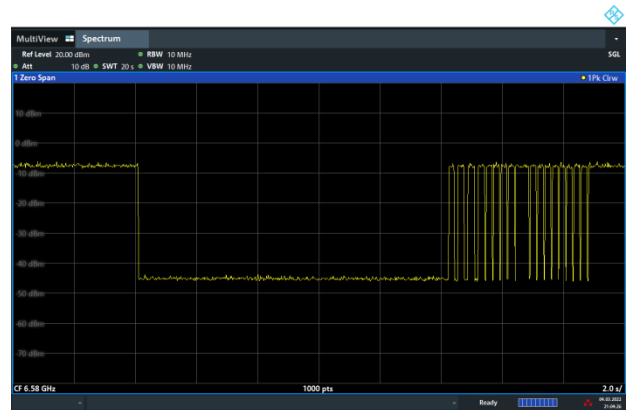
Threshold Level (TL) = -74.17dBm



21:05:14 04.03.2022

802.11ax (HE160) / CH111 (Upper edge)

Test result is pass due to no transmission occur.



21:04:27 04.03.2022