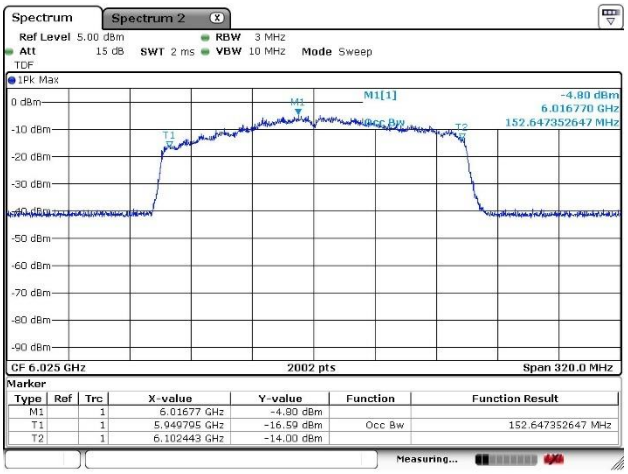
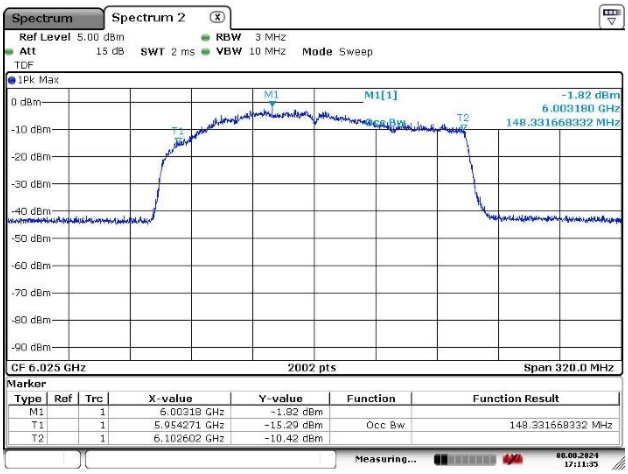
11ax_HE160_SU (Band 5)

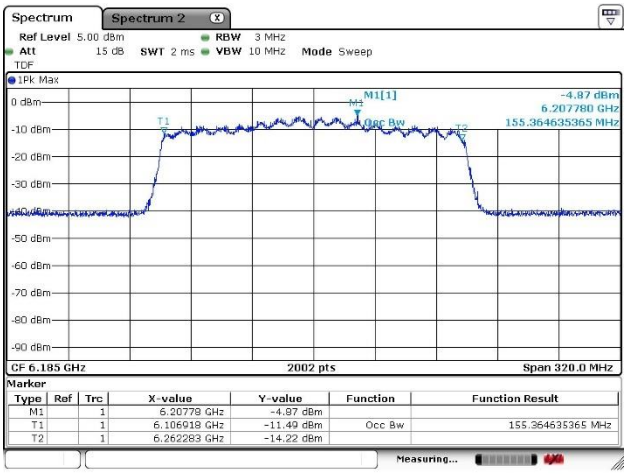
Port 1_Low Channel (6 025 ㎒)



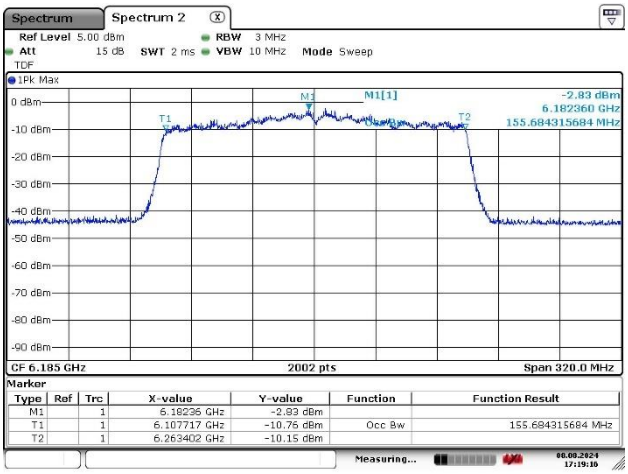
Port 2_Low Channel (6 025 ㎒)



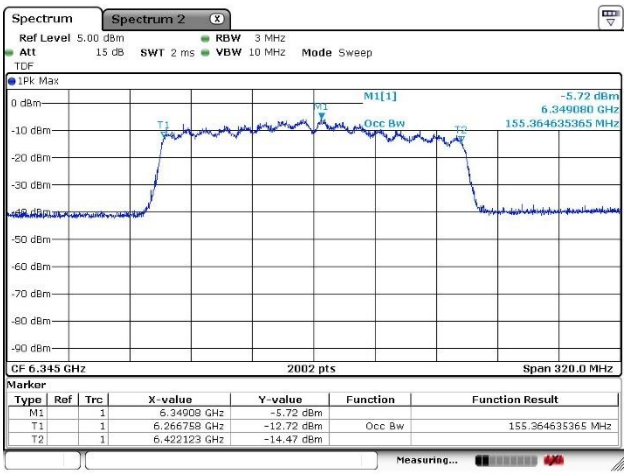
Port 1_Middle Channel (6 185 ㎒)



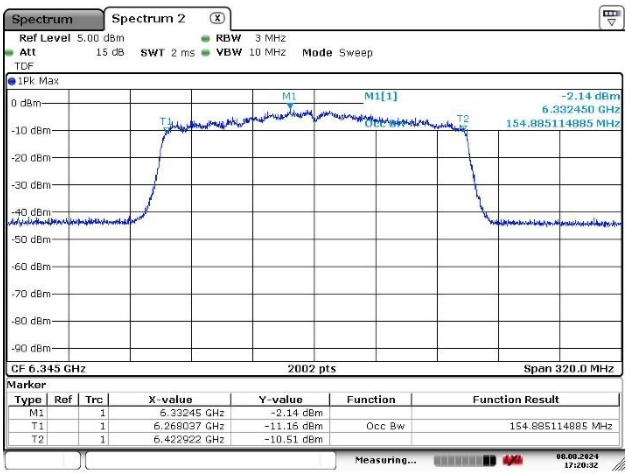
Port 2_Middle Channel (6 185 ㎒)



Port 1_High Channel (6 345 ㎒)

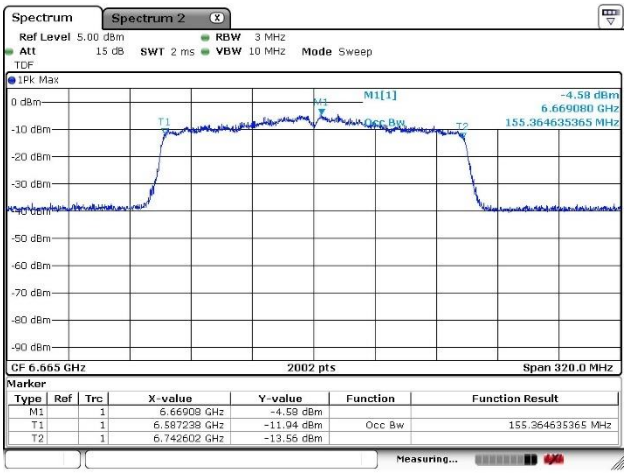


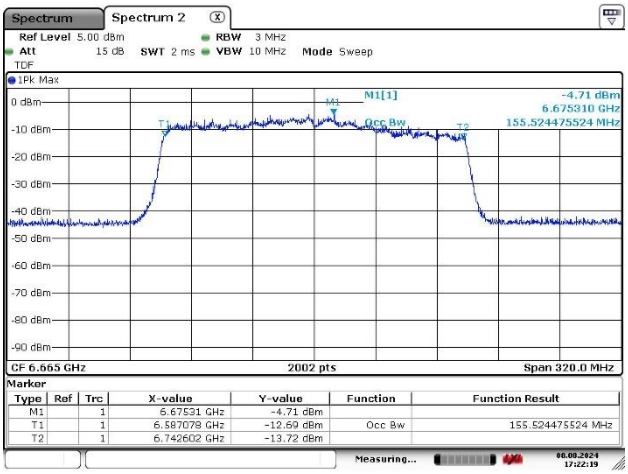
Port 2_High Channel (6 345 ㎒)



11ax_HE160_SU (Band 7)

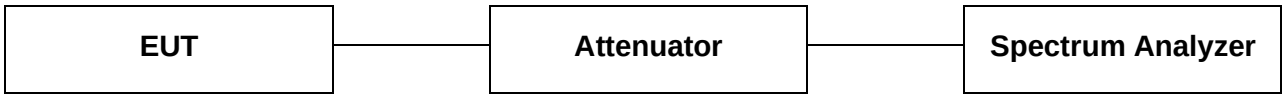
Port 1_Middle Channel (6 665 ㎒)	Port 2_Middle Channel (6 665 ㎒)





4. In band Emissions

4.1. Test Setup

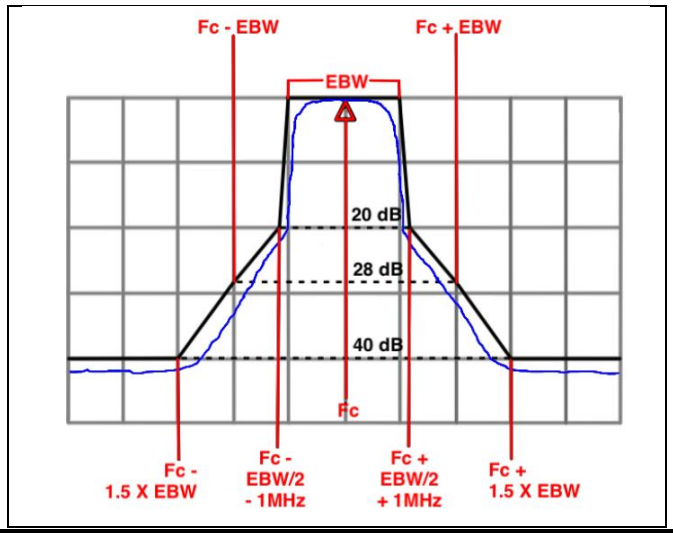


4.2. Limit

According to §15.407(b)(7), for transmitters operating within the 5.925-7.125 ㎓ bands: Power spectral density must be suppressed by 20 ㏈ at 1 ㎒ outside of channel edge, by 28 ㏈ at one channel bandwidth from the channel center, and by 40 ㏈ at one- and one-half times the channel bandwidth away from channel center. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 ㏈ and 28 ㏈ suppression, and at frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 ㏈ and 40 ㏈ suppression. Emissions removed from the channel center by more than one- and one-half times the channel bandwidth must be suppressed by at least 40 ㏈.

4.3. Test Procedure

1. Connect output of the antenna port to a spectrum analyzer or EMI receiver, with appropriate attenuation, as to not damage the instrumentation.
2. Set the reference level of the measuring equipment in accordance with procedure 4.1.5.2 of ANSI C63.10-2013.
3. Measure the 26 dB EBW using the test procedure 12.4.1 of ANSI C63.10-2013. (This will be used to determine the channel edge.)
4. Measure the power spectral density (which will be used for emissions mask reference) using the following procedure:
   a) Set the span to encompass the entire 26 dB EBW of the signal.
   b) Set RBW = same RBW used for 26 dB EBW measurement.
   c) Set VBW ≥ 3 X RBW
   d) Number of points in sweep ≥ [2 X span / RBW].
   e) Sweep time = auto.
   f) Detector = RMS (i.e., power averaging)
   g) Trace average at least 100 traces in power averaging (rms) mode.
   h) Use the peak search function on the instrument to find the peak of the spectrum.
5. For the purposes of developing the emission mask, the channel bandwidth is defined as the 26 dB EBW or 99% of the occupied bandwidth.
6. Using the measuring equipment limit line function, develop the emissions mask based on the following requirements. The emissions power spectral density must be reduced below the peak power spectral density (in dB) as follows:
   a) Suppressed by 20 dB at 1 MHz outside of the channel edge. (The channel edge is defined as the 26-dB point on either side of the carrier center frequency.)
   b) Suppressed by 28 dB at one channel bandwidth from the channel center.
   c) Suppressed by 40 dB at one- and one-half times the channel bandwidth from the channel center.
7. Adjust the span to encompass the entire mask as necessary.
8. Clear trace.
9. Trace average at least 100 traces in power averaging (rms) mode.
10. Adjust the reference level as necessary so that the crest of the channel touches the top of the emission mask.



4.4. Test Result

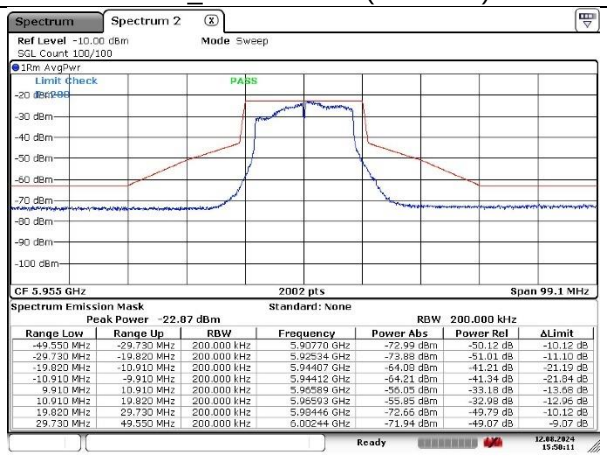
Ambient temperature : (23 ± 1) ℃

Relative humidity : 47 % R.H.

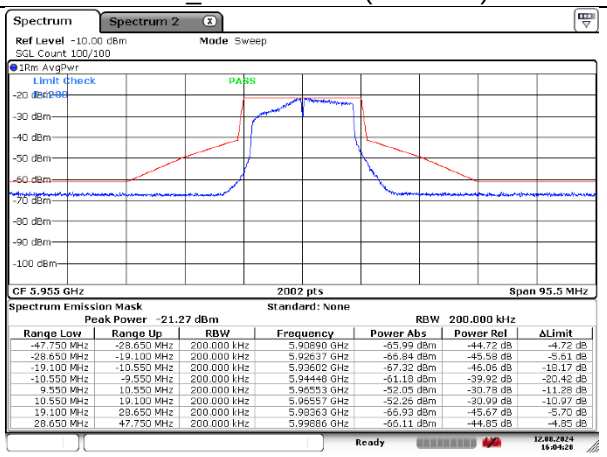
- Test plots

11a (Band 5)

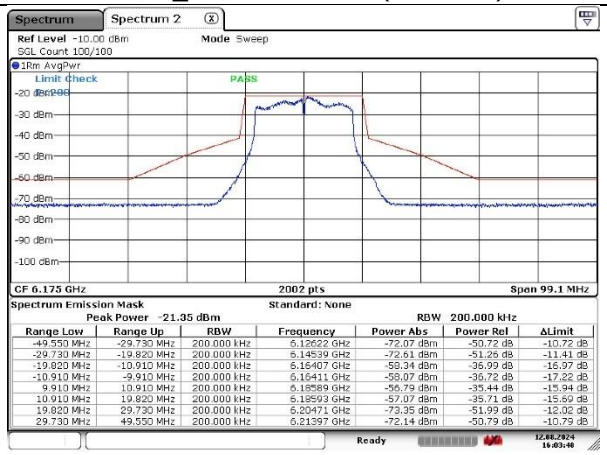
Port 1_Low Channel (5 955 ㎒)



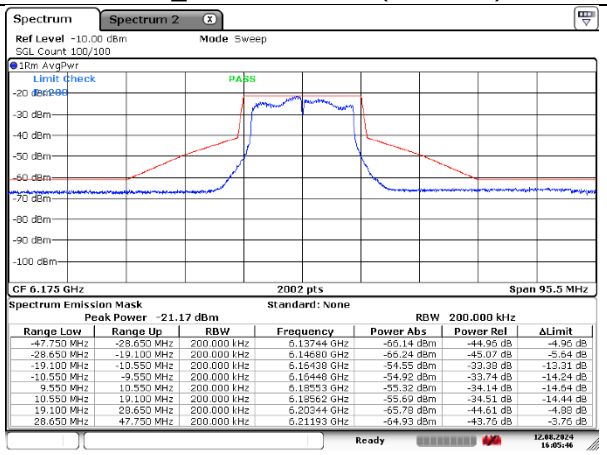
Port 2_Low Channel (5 955 ㎒)



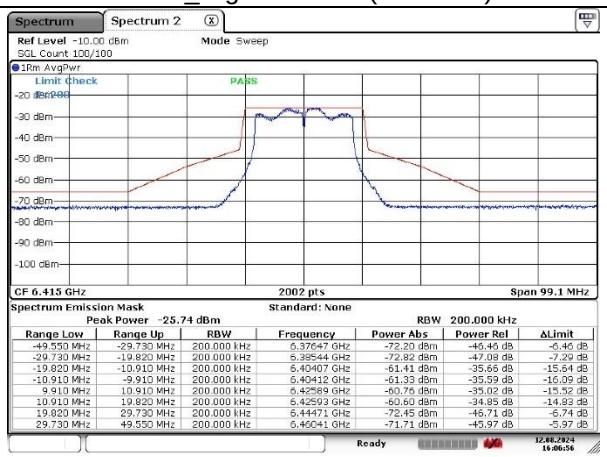
Port 1_Middle Channel (6 175 ㎒)



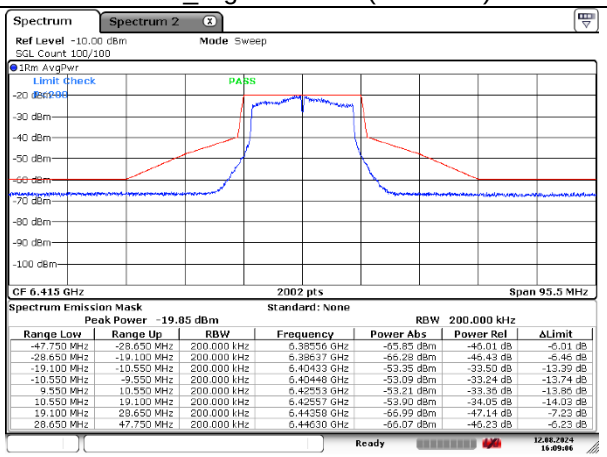
Port 2_Middle Channel (6 175 ㎒)



Port 1_High Channel (6 415 ㎒)

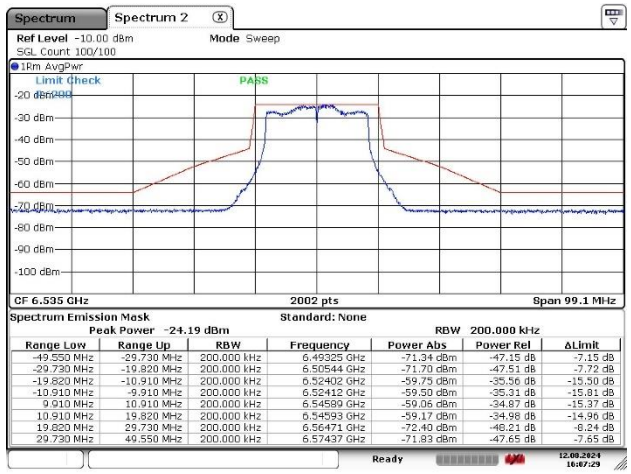


Port 2_High Channel (6 415 ㎒)

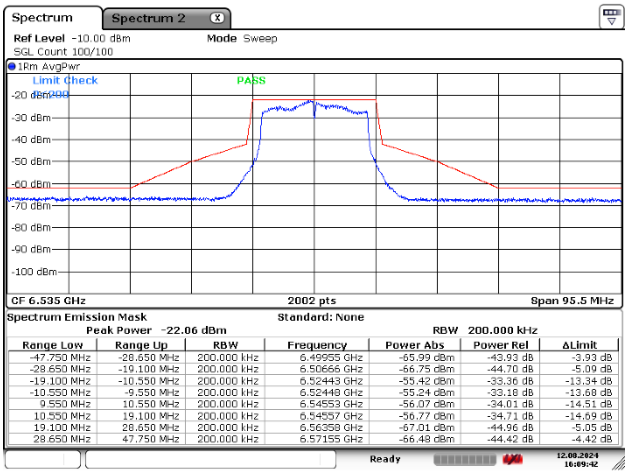


11a (Band 7)

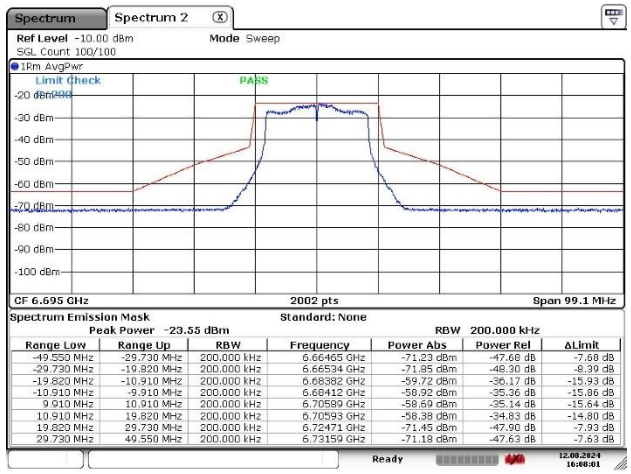
Port 1_Low Channel (6 535 ㎒)



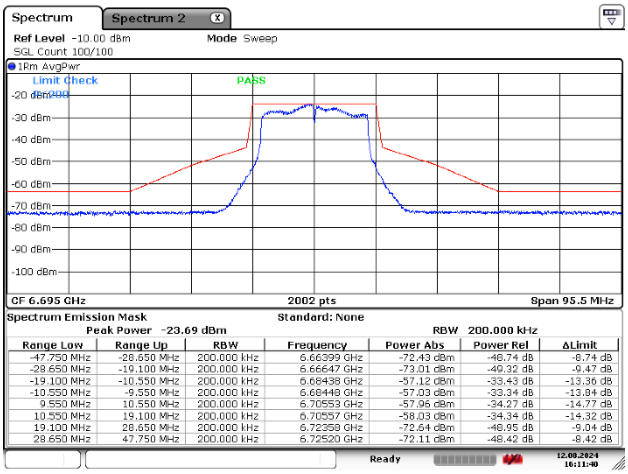
Port 2_Low Channel (6 535 ㎒)



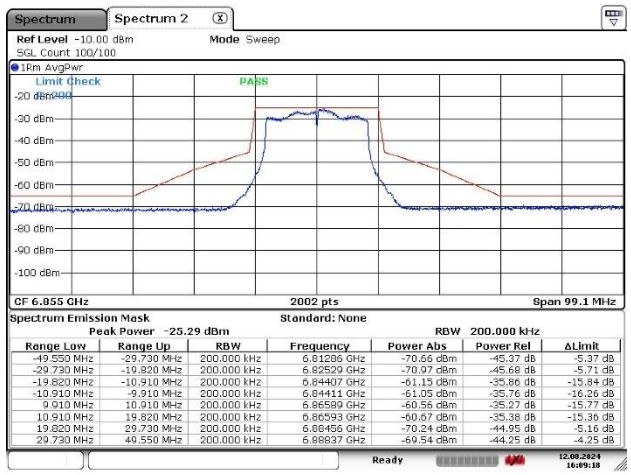
Port 1_Middle Channel (6 695 ㎒)



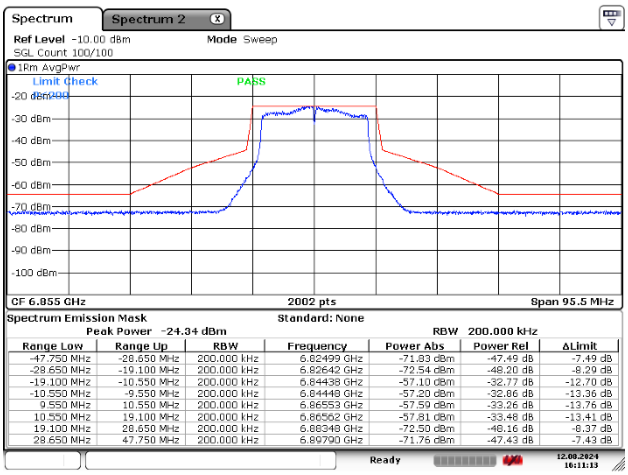
Port 2_Middle Channel (6 695 ㎒)



Port 1_High Channel (6 855 ㎒)

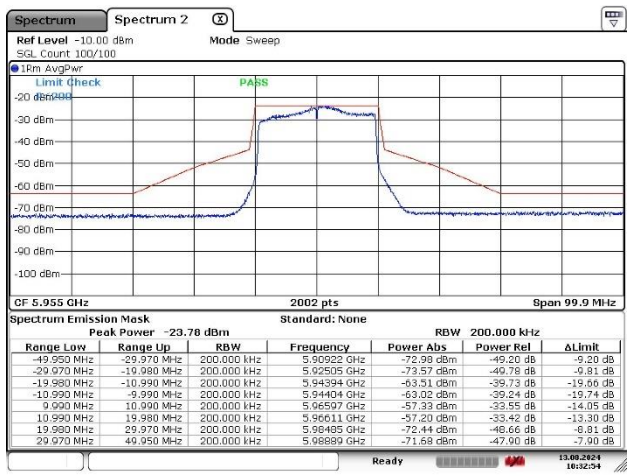


Port 2_High Channel (6 855 ㎒)

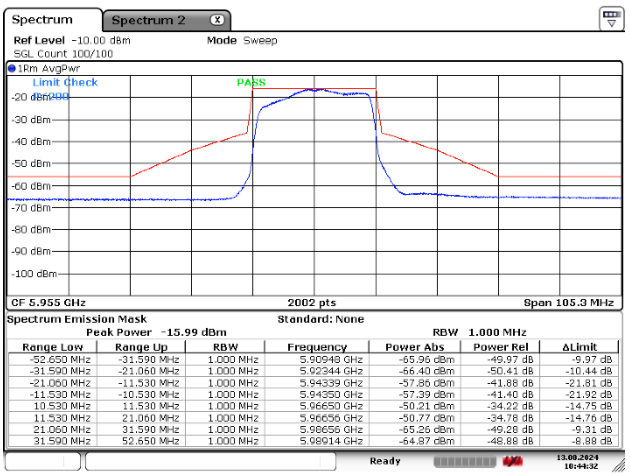


11ax_HE20_SU (Band 5)

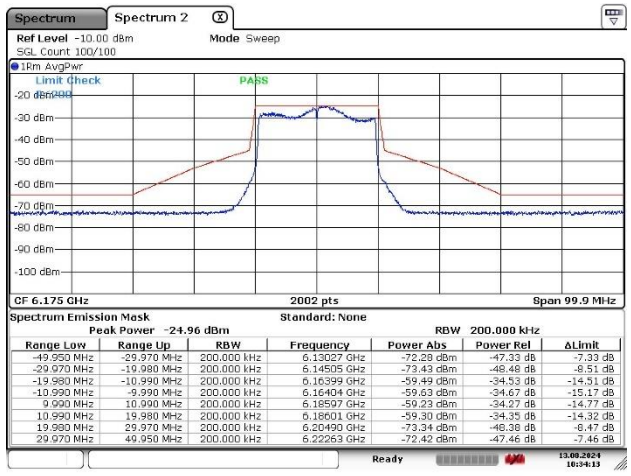
Port 1_Low Channel (5 955 ㎒)



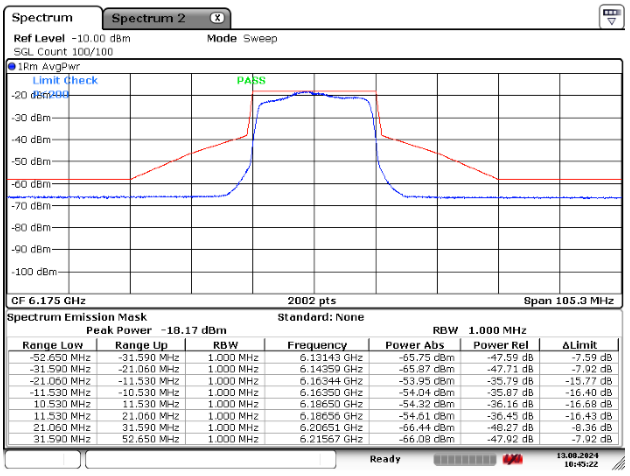
Port 2_Low Channel (5 955 ㎒)



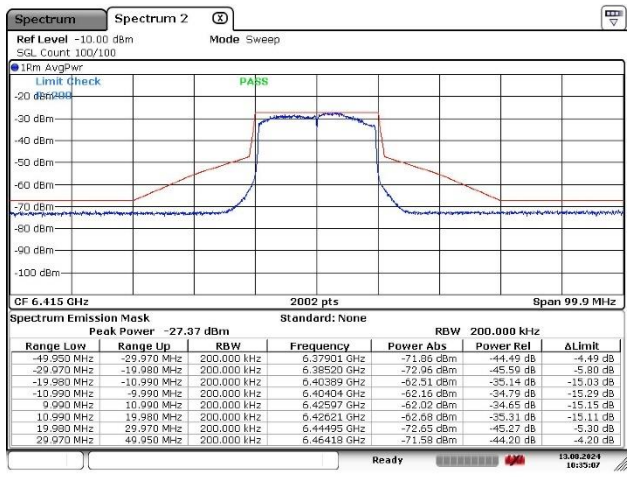
Port 1_Middle Channel (6 175 ㎒)



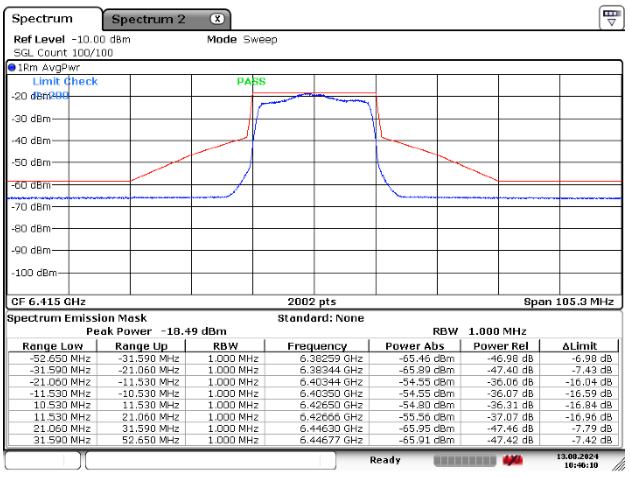
Port 2_Middle Channel (6 175 ㎒)



Port 1_High Channel (6 415 ㎒)

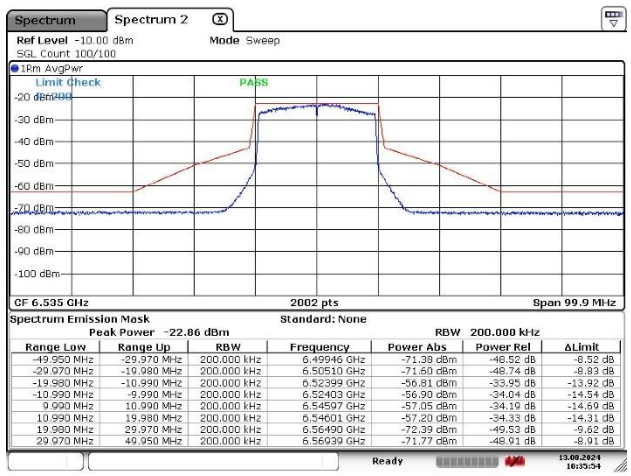


Port 2_High Channel (6 415 ㎒)

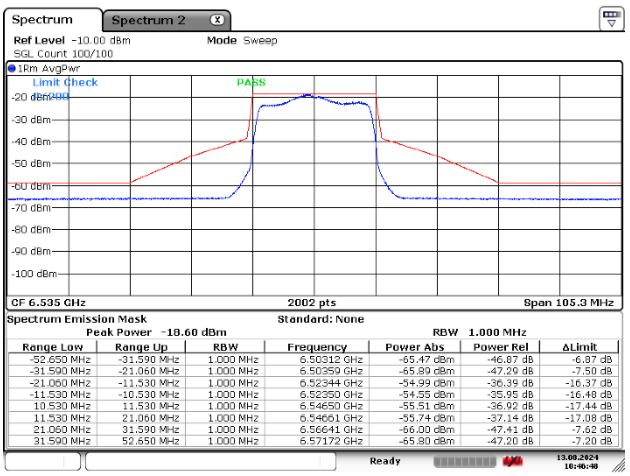


11ax_HE20_SU (Band 7)

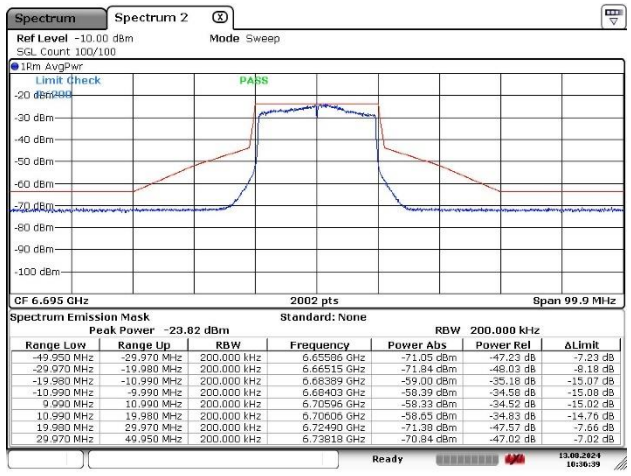
Port 1_Low Channel (6 535 ㎒)



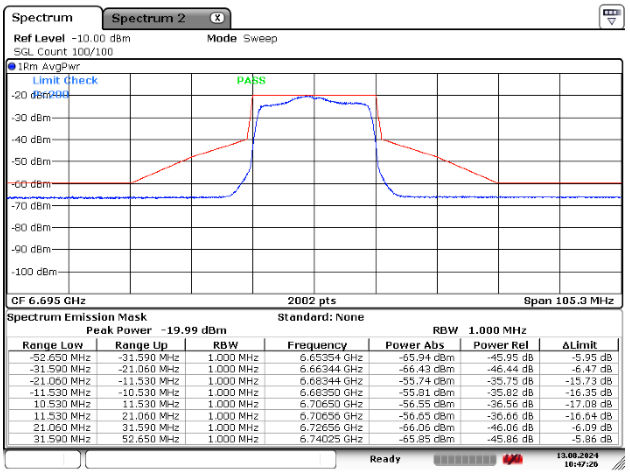
Port 2_Low Channel (6 535 ㎒)



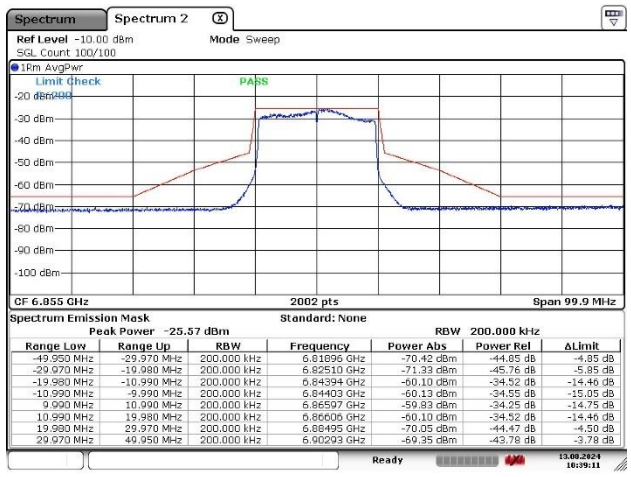
Port 1_Middle Channel (6 695 ㎒)



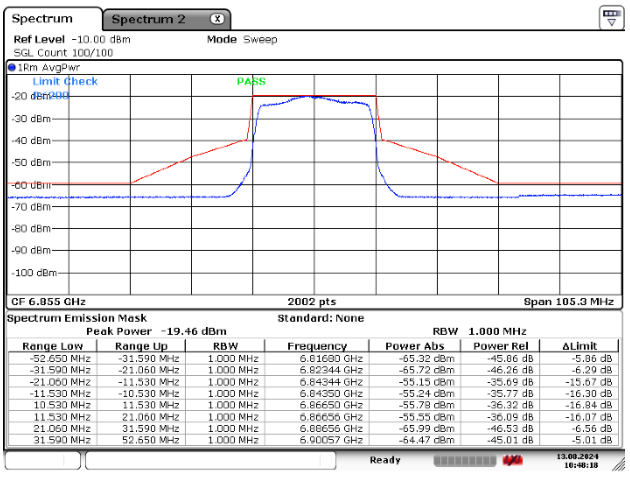
Port 2_Middle Channel (6 695 ㎒)



Port 1_High Channel (6 855 ㎒)

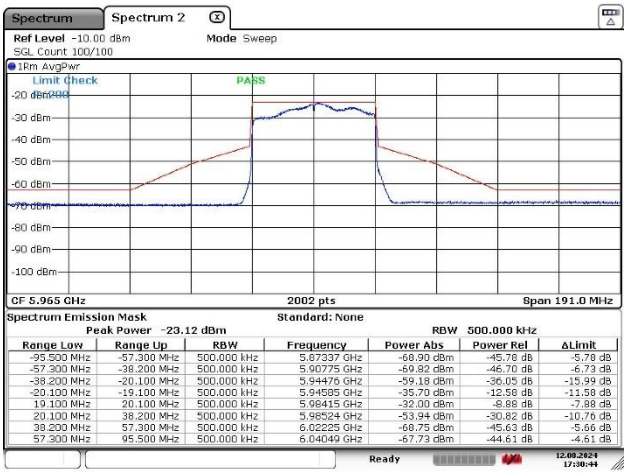


Port 2_High Channel (6 855 ㎒)

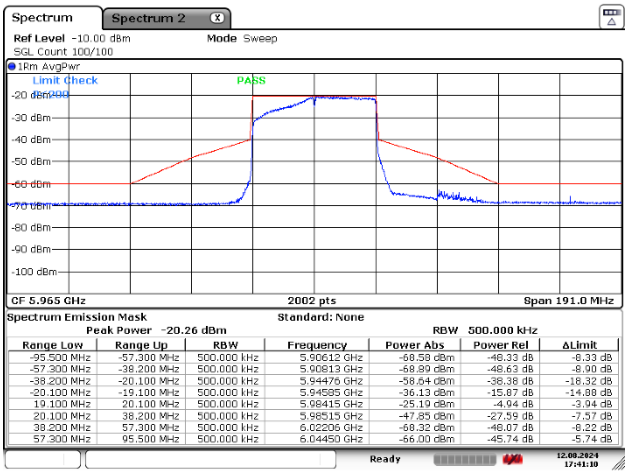


11ax_HE40_SU (Band 5)

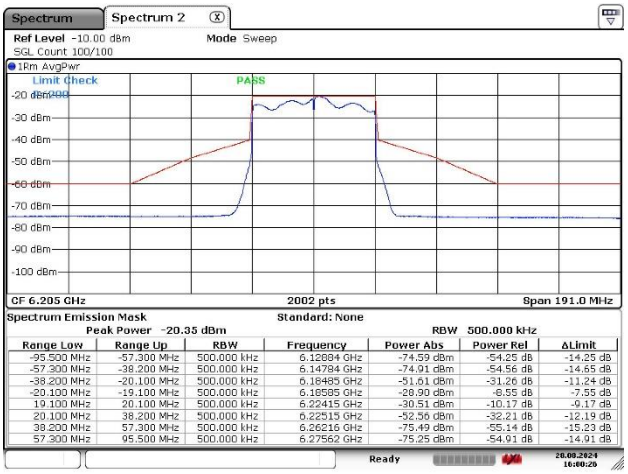
Port 1_Low Channel (5 965 ㎒)



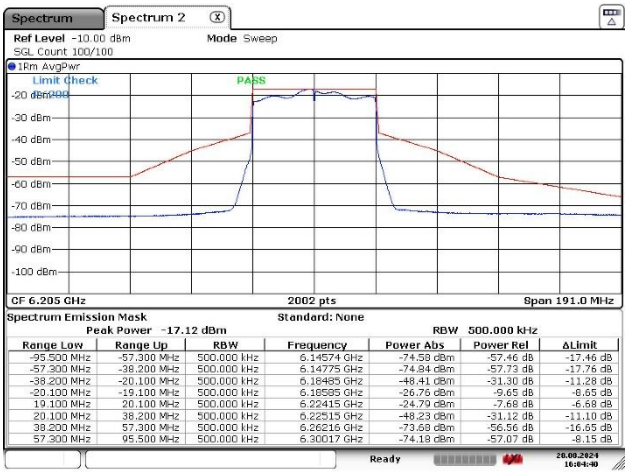
Port 2_Low Channel (5 965 ㎒)



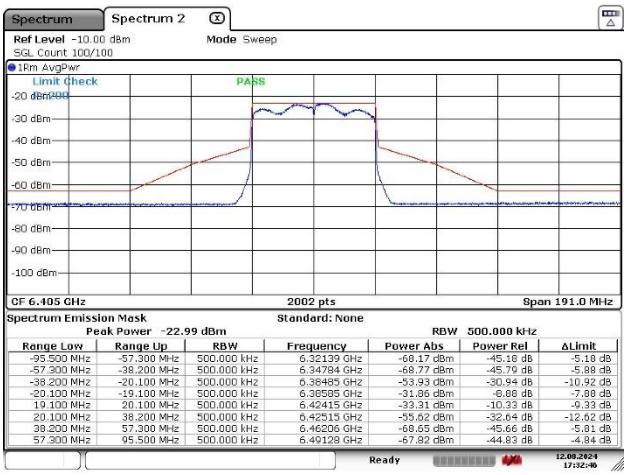
Port 1_Middle Channel (6 205 ㎒)



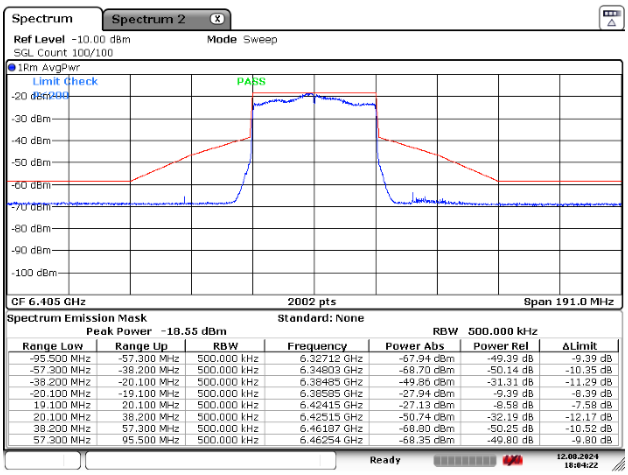
Port 2_Middle Channel (6 205 ㎒)



Port 1_High Channel (6 405 ㎒)

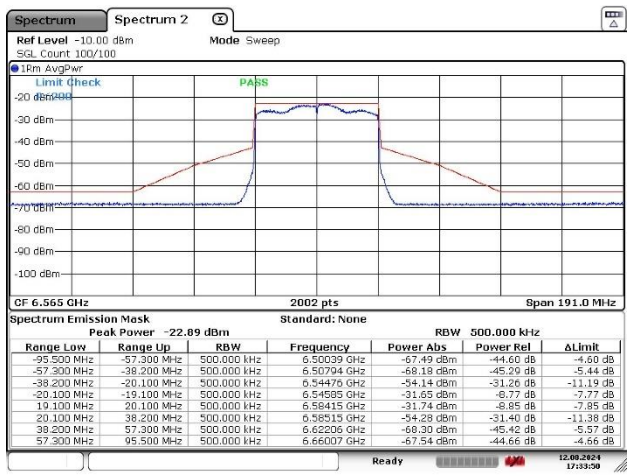


Port 2_High Channel (6 405 ㎒)

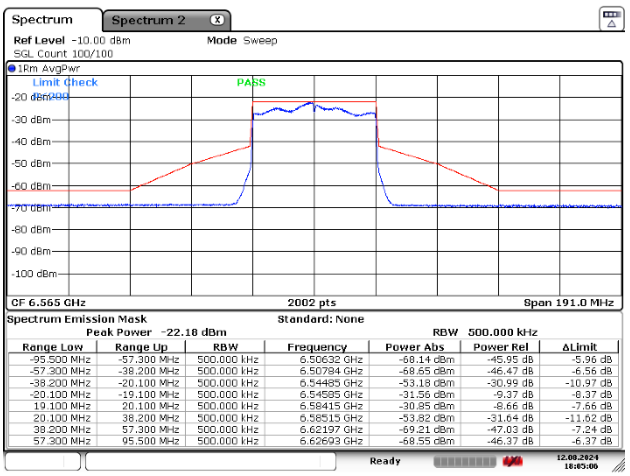


11ax_HE40_SU (Band 7)

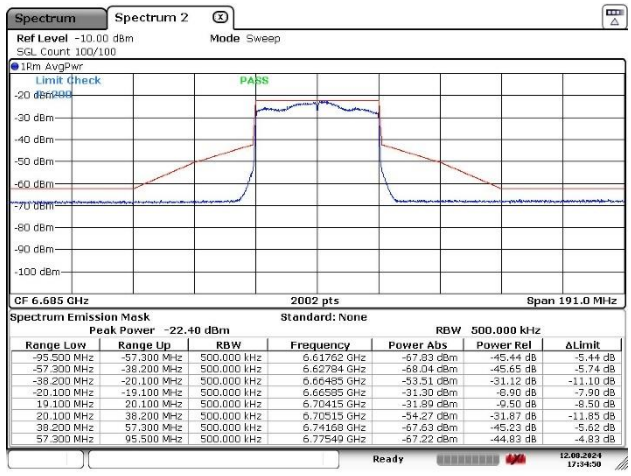
Port 1_Low Channel (6 565 ㎒)



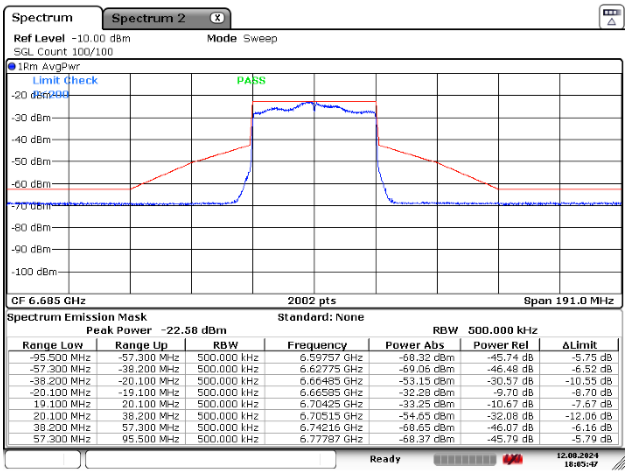
Port 2_Low Channel (6 565 ㎒)



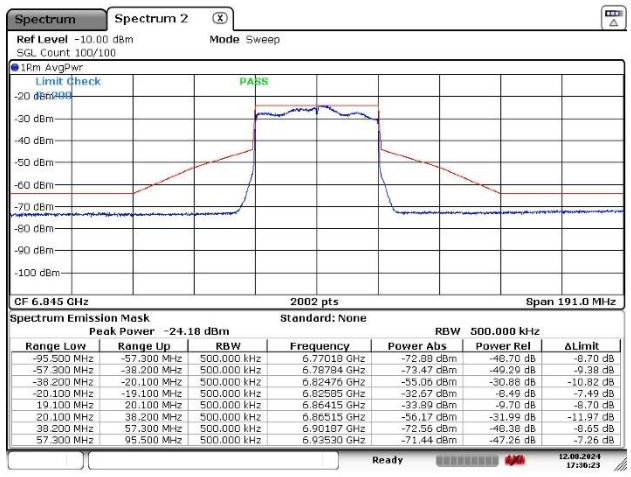
Port 1_Middle Channel (6 685 ㎒)



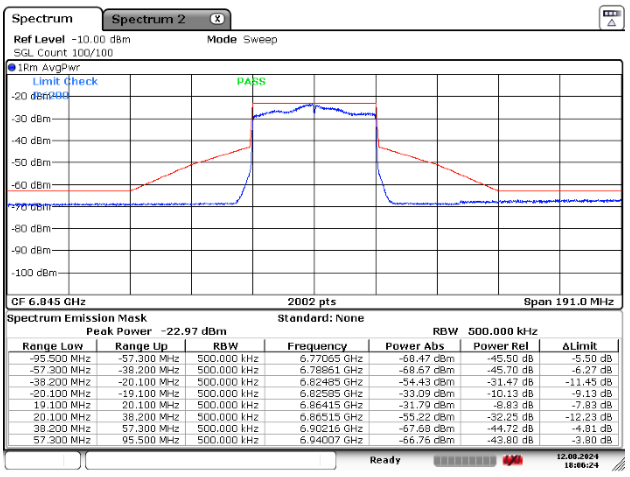
Port 2_Middle Channel (6 685 ㎒)



Port 1_High Channel (6 845 ㎒)

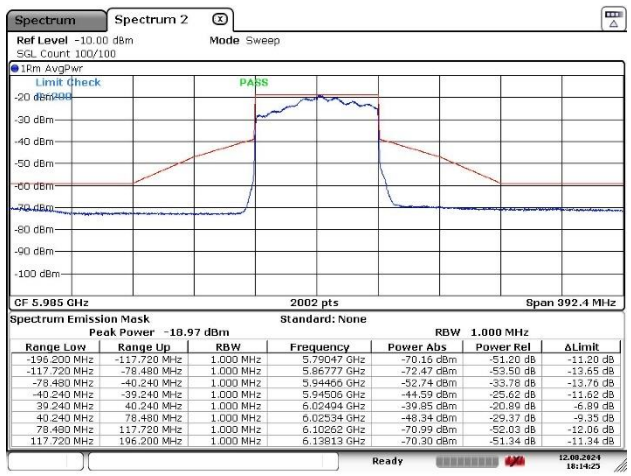


Port 2_High Channel (6 845 ㎒)

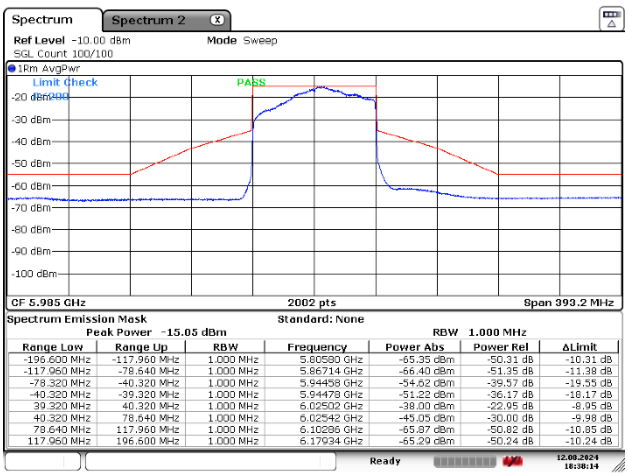


11ax_HE80_SU (Band 5)

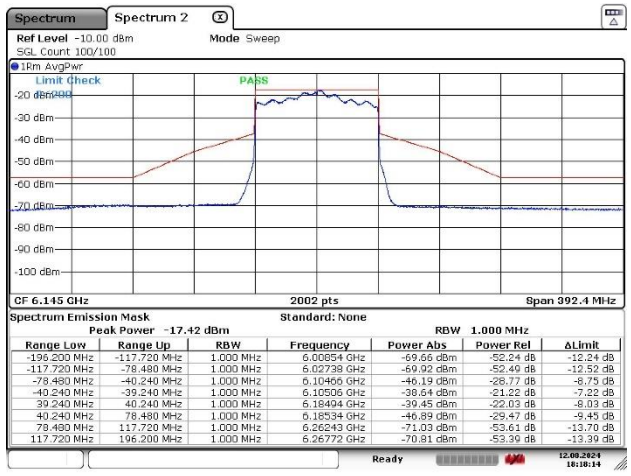
Port 1_Low Channel (5 985 ㎒)



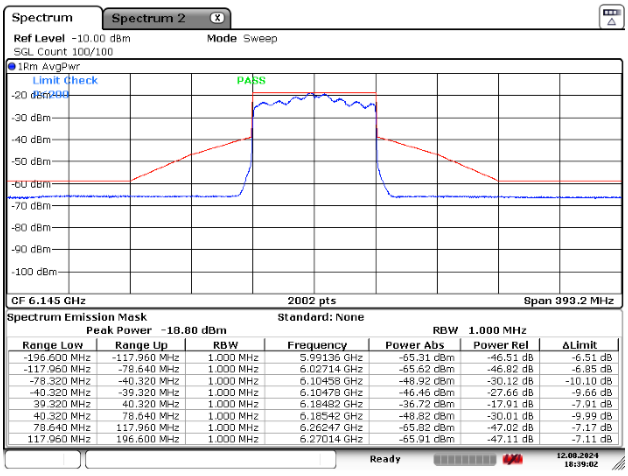
Port 2_Low Channel (5 985 ㎒)



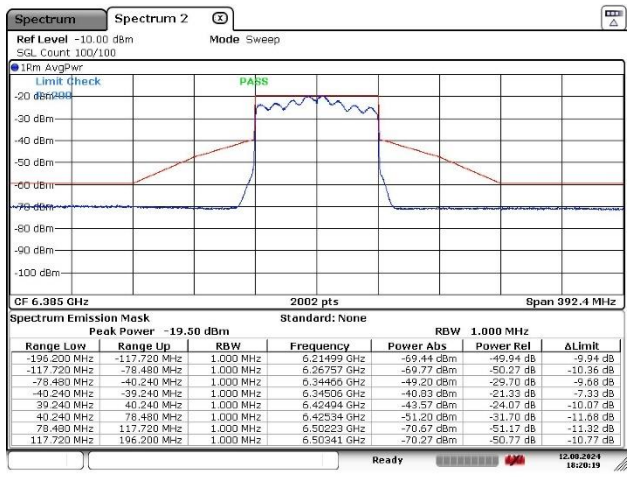
Port 1_Middle Channel (6 145 ㎒)



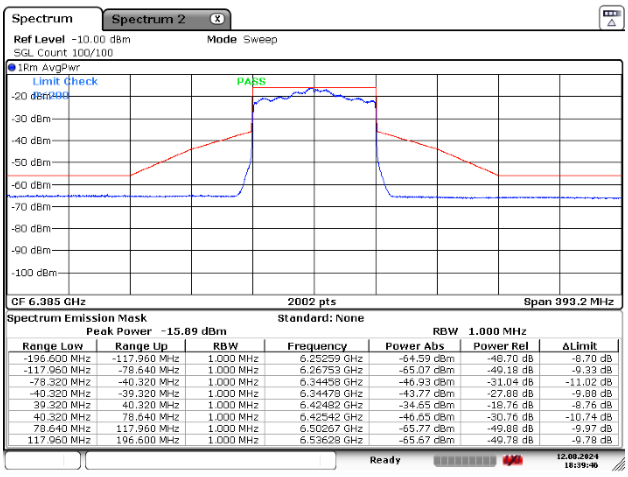
Port 2_Middle Channel (6 145 ㎒)



Port 1_High Channel (6 385 ㎒)

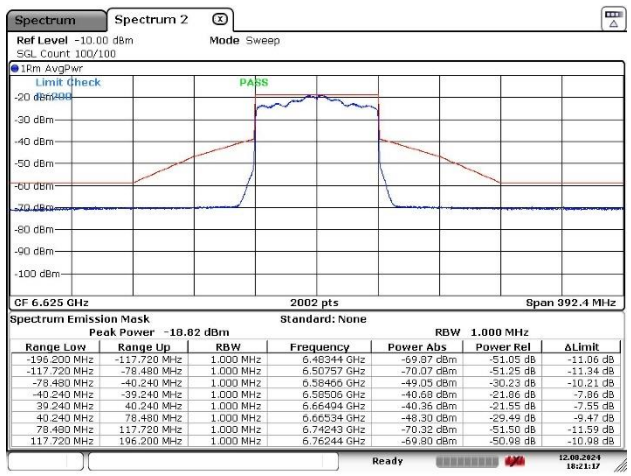


Port 2_High Channel (6 385 ㎒)

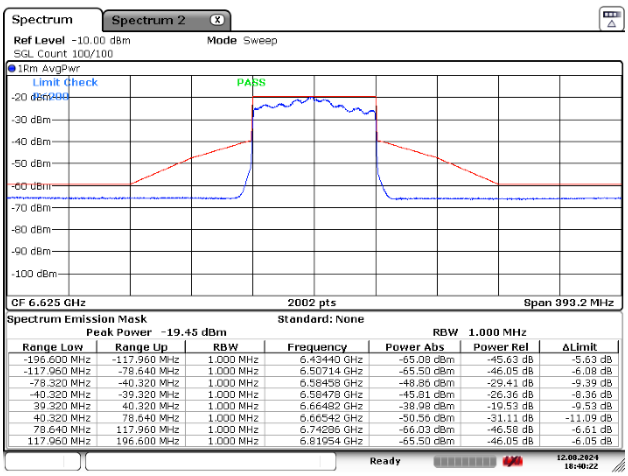


11ax_HE80_SU (Band 7)

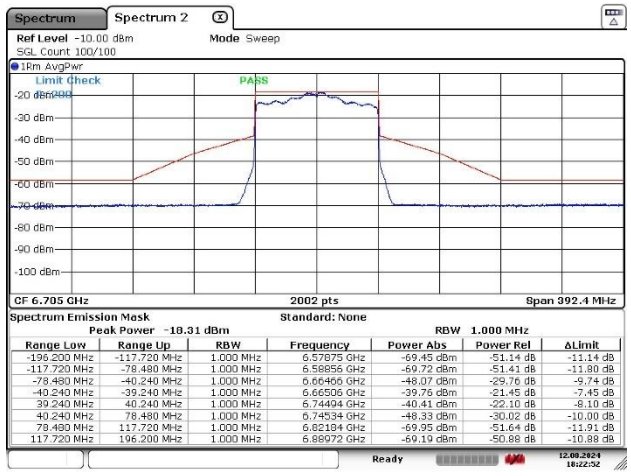
Port 1_Low Channel (6 625 ㎒)



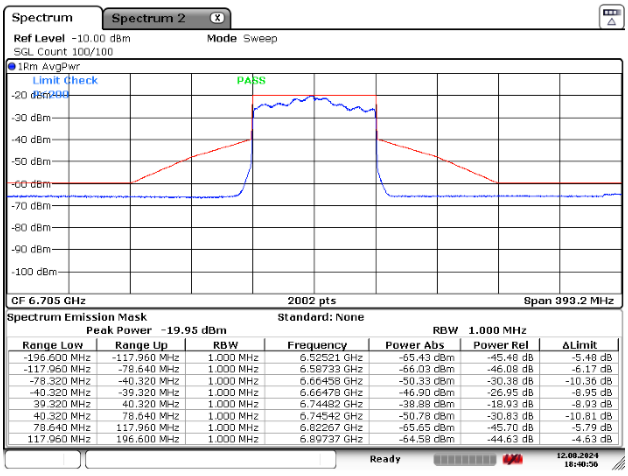
Port 2_Low Channel (6 625 ㎒)



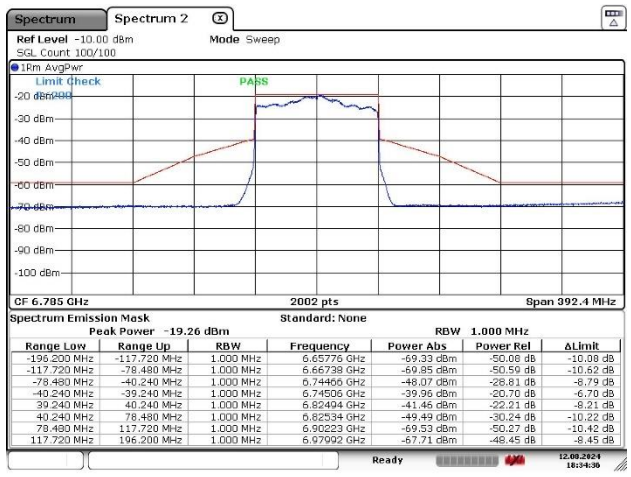
Port 1_Middle Channel (6 705 ㎒)



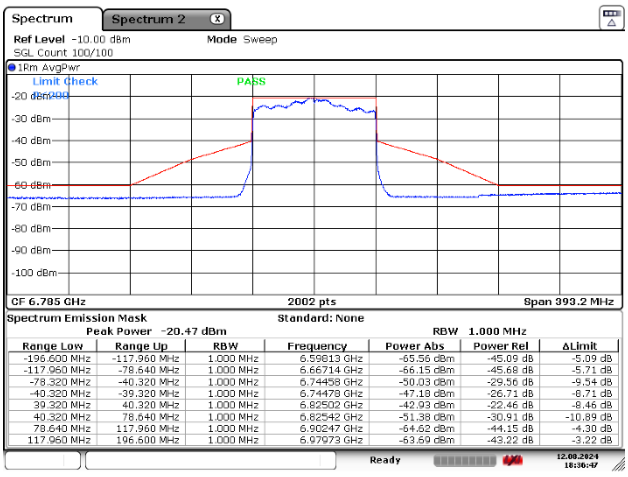
Port 2_Middle Channel (6 705 ㎒)



Port 1_High Channel (6 785 ㎒)

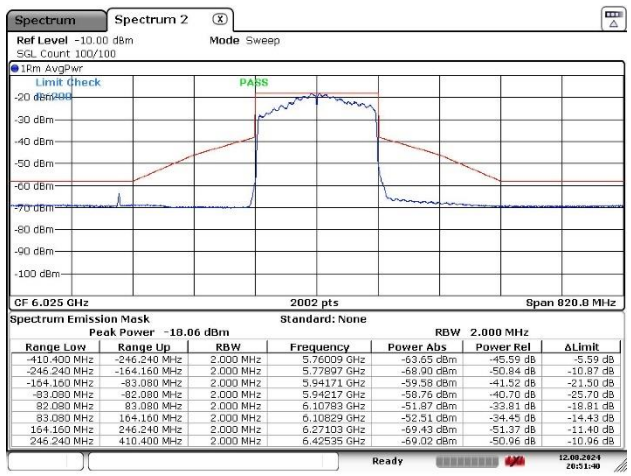


Port 2_High Channel (6 785 ㎒)

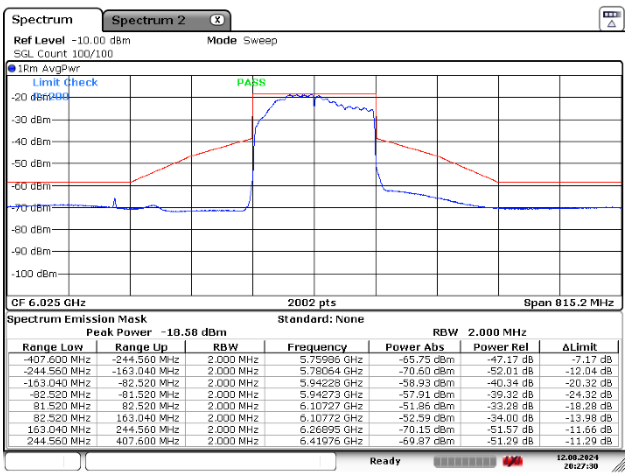


11ax_HE160_SU (Band 5)

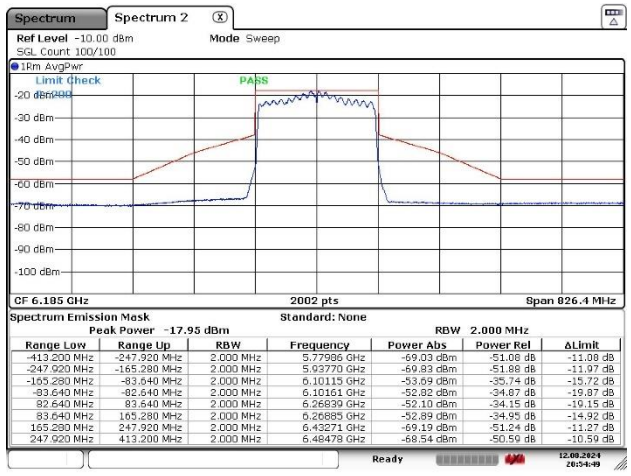
Port 1_Low Channel (6 025 ㎒)



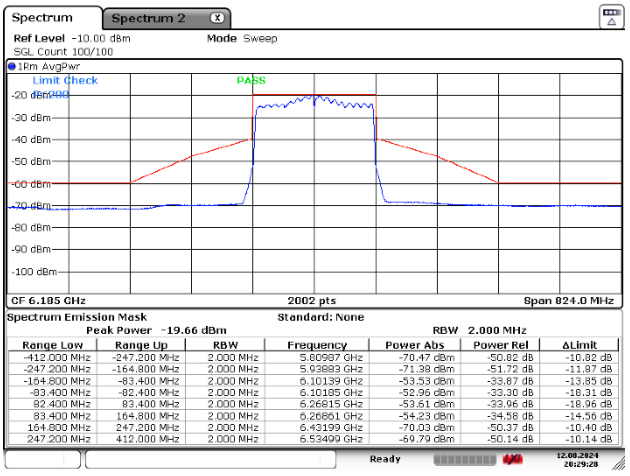
Port 2_Low Channel (6 025 ㎒)



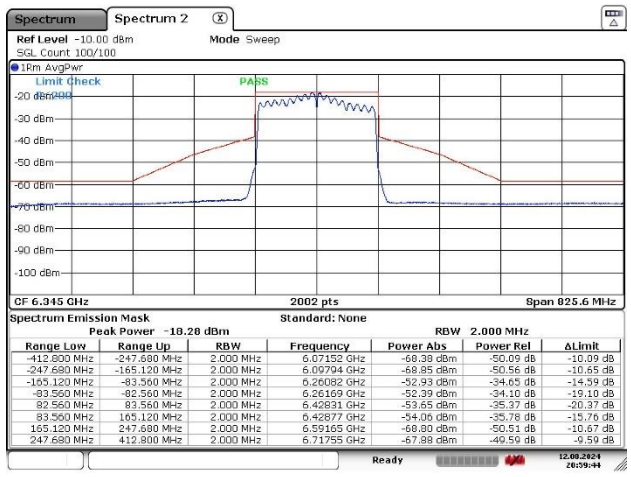
Port 1_Middle Channel (6 185 ㎒)



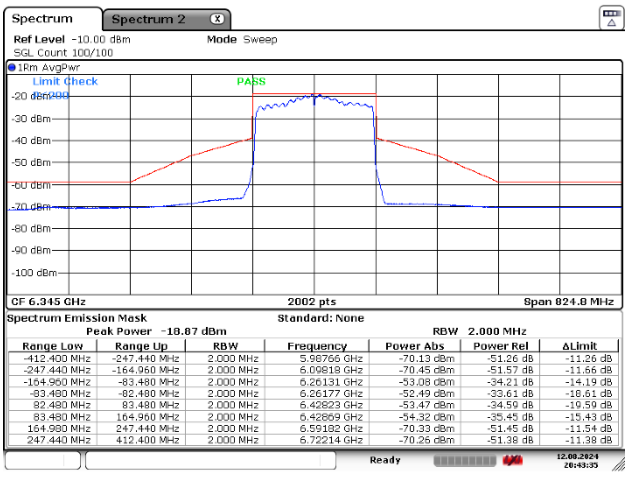
Port 2_Middle Channel (6 185 ㎒)



Port 1_High Channel (6 345 ㎒)

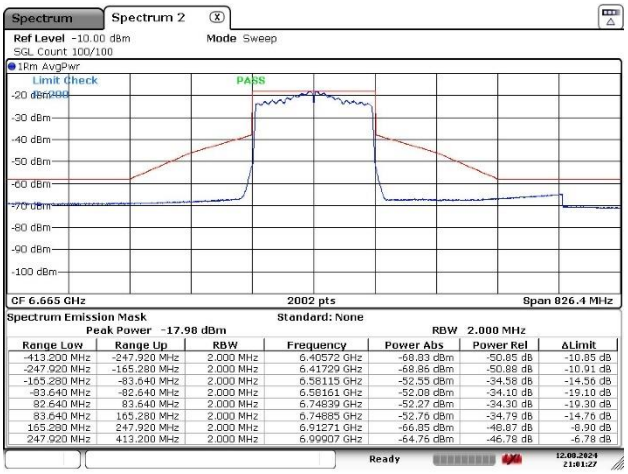


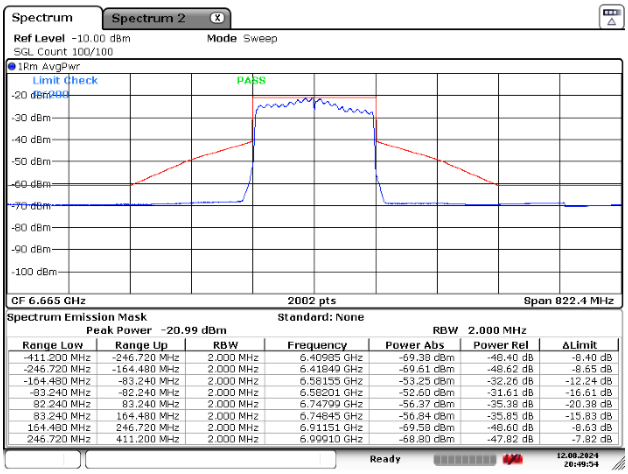
Port 2_High Channel (6 345 ㎒)



11ax_HE160_SU (Band 7)

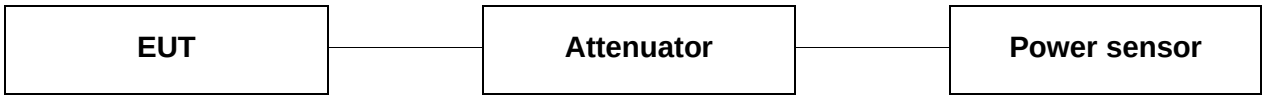
Port 1_Middle Channel (6 665 ㎒)	Port 2_Middle Channel (6 665 ㎒)





5. Maximum E.I.R.P.

5.1. Test Setup



5.2. Limit

According to 15.407(a)(9)
For very low power devices operating in the 5.925-6.425 ㎓ and 6.525-6.875 ㎓ bands, the maximum power spectral density must not exceed -5 ㏈m e.i.r.p in any 1-megahertz band and the maximum e.i.r.p must not exceed 14 ㏈m.

5.3. Test Procedure

1. This measurement settings are specified in section Ⅱ.E.3.a of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied:
   - The EUT is configured to transmit continuously or to transmit with a consistent duty cycle.
   - At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
   - The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
3. If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section II.B.
4. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
5. Adjust the measurement in ㏈m by adding 10 log (1/x) where x is the duty cycle (e.g., 10 log (1/0.25) if the duty cycle is 25 %).

5.4. Test Result

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

Test mode: 11a

Band	Freq. (㎒)	Ch.	Average Power (㏈m)			Duty Cycle Correction Factor (㏈)	MIMO Average Power Result (㏈m)
			Port 1	Port 2	MIMO		
U-NII 5	5 955	1	-6.42	-5.49	-2.92	-	-2.92
	6 175	45	-5.14	-5.31	-2.21		**-2.21**
	6 415	93	-9.28	-3.32	-2.34		-2.34
U-NII 7	6 535	117	-7.38	-5.31	-3.21		-3.21
	6 695	149	-6.68	-5.94	-3.28		-3.28
	6 855	181	-8.77	-5.05	-3.51		-3.51

Band	Freq. (㎒)	Ch.	MIMO Average Power Result (㏈m)	Directional Antenna Gain (㏈i)	MIMO E.I.R.P. (㏈m)	Limit (㏈m)
U-NII 5	5 955	1	-2.92	5.64	2.72	14
	6 175	45	-2.21		3.43	
	6 415	93	-2.34		3.30	
U-NII 7	6 535	117	-3.21	4.84	1.63	
	6 695	149	-3.28		1.56	
	6 855	181	-3.51		1.33	

Remark;

1. According to KDB 662911, Average power of each port and antenna gain was combined by using below calculation.

   - Average power: 10 log {10^(Port 1 power / 10)+10^(Port 2 power / 10)}

   - Unequal antenna gains, with equal transmit powers. For antenna gains given by G_1, G_2, …, G_N ㏈i
   (i) If transmit signals are correlated, then
   Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/N_{ANT}$] ㏈i [Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

2. Average Power Result (㏈m) = Average Power (㏈m) + Duty Cycle Correction Factor (㏈)
3. E.I.R.P. (㏈m) = Average Power Result (㏈m) + Directional Antenna Gain (㏈i)

Test mode: 11ax_HE20_26T

Band	Freq. (㎒)	Average Power (dB m)								
		RU Index								
		Low			Middle			High		
		Port 1	Port 2	MIMO	Port 1	Port 2	MIMO	Port 1	Port 2	MIMO
U-NII 5	5 955	-12.75	-18.39	-11.70	-13.26	-15.29	-11.15	-12.14	-12.13	-9.12
	6 175	-10.98	-10.42	-7.68	-12.12	-10.12	-8.00	-13.25	-8.94	**-7.57**
	6 415	-14.37	-9.75	-8.46	-15.93	-9.98	-9.00	-16.17	-9.65	-8.78
U-NII 7	6 535	-12.36	-10.68	-8.43	-13.51	-10.56	-8.78	-13.06	-9.94	-8.22
	6 695	-11.54	-11.65	-8.58	-12.79	-11.36	-9.01	-12.54	-10.58	-8.44
	6 855	-13.22	-10.90	-8.90	-14.71	-10.79	-9.31	-15.27	-10.01	-8.88

Band	Freq. (㎒)	MIMO Average Power (dB m)			Duty Cycle Correction Factor (dB)	MIMO Average Power Result (dB m)		
		RU Index				RU Index		
		Low	Middle	High		Low	Middle	High
U-NII 5	5 955	-11.70	-11.15	-9.12	-	-11.70	-11.15	-9.12
	6 175	-7.68	-8.00	-7.57		-7.68	-8.00	-7.57
	6 415	-8.46	-9.00	-8.78		-8.46	-9.00	-8.78
U-NII 7	6 535	-8.43	-8.78	-8.22		-8.43	-8.78	-8.22
	6 695	-8.58	-9.01	-8.44		-8.58	-9.01	-8.44
	6 855	-8.90	-9.31	-8.88		-8.90	-9.31	-8.88

Band	Freq. (㎒)	MIMO Average Power Result (dB m)			Directional Antenna Gain (dB i)	MIMO E.I.R.P. (dB m)			Limit (dB m)
		RU Index				RU Index			
		Low	Middle	High		Low	Middle	High	
U-NII 5	5 955	-11.70	-11.15	-9.12	5.64	-6.06	-5.51	-3.48	14
	6 175	-7.68	-8.00	-7.57		-2.04	-2.36	-1.93	
	6 415	-8.46	-9.00	-8.78		-2.82	-3.36	-3.14	
U-NII 7	6 535	-8.43	-8.78	-8.22	4.84	-3.59	-3.94	-3.38	
	6 695	-8.58	-9.01	-8.44		-3.74	-4.17	-3.60	
	6 855	-8.90	-9.31	-8.88		-4.06	-4.47	-4.04	

Test mode: 11ax_HE20_52T

Band	Freq. (㎒)	Average Power (㏈m)								
		RU Index								
		Low			Middle			High		
		Port 1	Port 2	MIMO	Port 1	Port 2	MIMO	Port 1	Port 2	MIMO
U-NII 5	5 955	-12.13	-14.33	-10.08	-11.35	-12.51	-8.88	-9.45	-8.52	-5.95
	6 175	-9.52	-8.42	-5.92	-12.14	-7.38	-6.13	-11.95	-6.92	-5.73
	6 415	-11.21	-6.69	**-5.38**	-12.22	-6.42	-5.41	-12.67	-6.64	-5.67
U-NII 7	6 535	-10.23	-9.15	-6.65	-10.73	-8.54	-6.49	-10.83	-8.31	-6.38
	6 695	-9.60	-9.69	-6.63	-10.56	-8.98	-6.69	-10.72	-8.54	-6.48
	6 855	-11.22	-9.06	-7.00	-12.97	-8.51	-7.18	-13.10	-8.05	-6.87

Band	Freq. (㎒)	MIMO Average Power (㏈m)			Duty Cycle Correction Factor (㏈)	MIMO Average Power Result (㏈m)		
		RU Index				RU Index		
		Low	Middle	High		Low	Middle	High
U-NII 5	5 955	-10.08	-8.88	-5.95	-	-10.08	-8.88	-5.95
	6 175	-5.92	-6.13	-5.73		-5.92	-6.13	-5.73
	6 415	-5.38	-5.41	-5.67		-5.38	-5.41	-5.67
U-NII 7	6 535	-6.65	-6.49	-6.38		-6.65	-6.49	-6.38
	6 695	-6.63	-6.69	-6.48		-6.63	-6.69	-6.48
	6 855	-7.00	-7.18	-6.87		-7.00	-7.18	-6.87

Band	Freq. (㎒)	MIMO Average Power Result (㏈m)			Directional Antenna Gain (㏈i)	MIMO E.I.R.P. (㏈m)			Limit (㏈m)
		RU Index				RU Index			
		Low	Middle	High		Low	Middle	High	
U-NII 5	5 955	-10.08	-8.88	-5.95	5.64	-4.44	-3.24	-0.31	14
	6 175	-5.92	-6.13	-5.73		-0.28	-0.49	-0.09	
	6 415	-5.38	-5.41	-5.67		0.26	0.23	-0.03	
U-NII 7	6 535	-6.65	-6.49	-6.38	4.84	-1.81	-1.65	-1.54	
	6 695	-6.63	-6.69	-6.48		-1.79	-1.85	-1.64	
	6 855	-7.00	-7.18	-6.87		-2.16	-2.34	-2.03	

Test mode: 11ax_HE20_106T

Band	Freq. (㎒)	Average Power (㏈m)								
		RU Index								
		Low			Middle			High		
		Port 1	Port 2	MIMO	Port 1	Port 2	MIMO	Port 1	Port 2	MIMO
U-NII 5	5 955	-9.20	-9.26	-6.22	-	-	-	-7.12	-6.60	**-3.84**
	6 175	-8.65	-5.88	-4.04	-	-	-	-8.80	-5.56	-3.87
	6 415	-10.77	-5.42	-4.31	-	-	-	-11.03	-5.73	-4.61
U-NII 7	6 535	-8.32	-6.54	-4.33	-	-	-	-8.35	-6.78	-4.48
	6 695	-7.89	-6.95	-4.38	-	-	-	-8.22	-6.75	-4.41
	6 855	-9.74	-6.58	-4.87	-	-	-	-10.02	-6.31	-4.77

Band	Freq. (㎒)	MIMO Average Power (㏈m)			Duty Cycle Correction Factor (㏈)	MIMO Average Power Result (㏈m)		
		RU Index				RU Index		
		Low	Middle	High		Low	Middle	High
U-NII 5	5 955	-6.22	-	-3.84	-	-6.22	-	-3.84
	6 175	-4.04	-	-3.87		-4.04	-	-3.87
	6 415	-4.31	-	-4.61		-4.31	-	-4.61
U-NII 7	6 535	-4.33	-	-4.48		-4.33	-	-4.48
	6 695	-4.38	-	-4.41		-4.38	-	-4.41
	6 855	-4.87	-	-4.77		-4.87	-	-4.77

Band	Freq. (㎒)	MIMO Average Power Result (㏈m)			Directional Antenna Gain (㏈i)	MIMO E.I.R.P. (㏈m)			Limit (㏈m)
		RU Index				RU Index			
		Low	Middle	High		Low	Middle	High	
U-NII 5	5 955	-6.22	-	-3.84	5.64	-0.58	-	1.80	14
	6 175	-4.04	-	-3.87		1.60	-	1.77	
	6 415	-4.31	-	-4.61		1.33	-	1.03	
U-NII 7	6 535	-4.33	-	-4.48	4.84	0.51	-	0.36	
	6 695	-4.38	-	-4.41		0.46	-	0.43	
	6 855	-4.87	-	-4.77		-0.03	-	0.07	

Test mode: 11ax_HE20_242T

Band	Freq. (㎒)	Average Power (㏈m)								
		RU Index								
		Low			Middle			High		
		Port 1	Port 2	MIMO	Port 1	Port 2	MIMO	Port 1	Port 2	MIMO
U-NII 5	5 955	-	-	-	-5.80	-6.27	-3.02	-	-	-
	6 175	-	-	-	-7.58	-4.64	-2.86	-	-	-
	6 415	-	-	-	-10.09	-4.65	-3.56	-	-	-
U-NII 7	6 535	-	-	-	-4.93	-4.08	**-1.47**	-	-	-
	6 695	-	-	-	-6.49	-5.21	-2.79	-	-	-
	6 855	-	-	-	-7.81	-5.41	-3.44	-	-	-

Band	Freq. (㎒)	MIMO Average Power (㏈m)			Duty Cycle Correction Factor (㏈)	MIMO Average Power Result (㏈m)		
		RU Index				RU Index		
		Low	Middle	High		Low	Middle	High
U-NII 5	5 955	-	-3.02	-	-	-	-3.02	-
	6 175	-	-2.86	-		-	-2.86	-
	6 415	-	-3.56	-		-	-3.56	-
U-NII 7	6 535	-	-1.47	-		-	-1.47	-
	6 695	-	-2.79	-		-	-2.79	-
	6 855	-	-3.44	-		-	-3.44	-

Band	Freq. (㎒)	MIMO Average Power Result (㏈m)			Directional Antenna Gain (㏈i)	MIMO E.I.R.P. (㏈m)			Limit (㏈m)
		RU Index				RU Index			
		Low	Middle	High		Low	Middle	High	
U-NII 5	5 955	-	-3.02	-	5.64	-	2.62	-	14
	6 175	-	-2.86	-		-	2.78	-	
	6 415	-	-3.56	-		-	2.08	-	
U-NII 7	6 535	-	-1.47	-	4.84	-	3.37	-	
	6 695	-	-2.79	-		-	2.05	-	
	6 855	-	-3.44	-		-	1.40	-	

Test mode: 11ax_HE20_SU

Band	Freq. (㎒)	Average Power (㏈m)								
		RU Index								
		Low			Middle			High		
		Port 1	Port 2	MIMO	Port 1	Port 2	MIMO	Port 1	Port 2	MIMO
U-NII 5	5 955	-	-	-	-5.71	-6.12	-2.90	-	-	-
	6 175	-	-	-	-7.55	-4.61	-2.83	-	-	-
	6 415	-	-	-	-9.28	-3.61	-2.57	-	-	-
U-NII 7	6 535	-	-	-	-4.71	-3.71	**-1.17**	-	-	-
	6 695	-	-	-	-6.33	-5.01	-2.61	-	-	-
	6 855	-	-	-	-7.77	-5.29	-3.35	-	-	-

Band	Freq. (㎒)	MIMO Average Power (㏈m)			Duty Cycle Correction Factor (㏈)	MIMO Average Power Result (㏈m)		
		RU Index				RU Index		
		Low	Middle	High		Low	Middle	High
U-NII 5	5 955	-	-2.90	-	-	-	-2.90	-
	6 175	-	-2.83	-		-	-2.83	-
	6 415	-	-2.57	-		-	-2.57	-
U-NII 7	6 535	-	-1.17	-		-	-1.17	-
	6 695	-	-2.61	-		-	-2.61	-
	6 855	-	-3.35	-		-	-3.35	-

Band	Freq. (㎒)	MIMO Average Power Result (㏈m)			Directional Antenna Gain (㏈i)	MIMO E.I.R.P. (㏈m)			Limit (㏈m)
		RU Index				RU Index			
		Low	Middle	High		Low	Middle	High	
U-NII 5	5 955	-	-2.90	-	5.64	-	2.74	-	14
	6 175	-	-2.83	-		-	2.81	-	
	6 415	-	-2.57	-		-	3.07	-	
U-NII 7	6 535	-	-1.17	-	4.84	-	3.67	-	
	6 695	-	-2.61	-		-	2.23	-	
	6 855	-	-3.35	-		-	1.49	-	

Remark;

1. According to KDB 662911, Average power of each port and antenna gain was combined by using below calculation.

   - Average power: 10 log {10^(Port 1 power / 10)+10^(Port 2 power / 10)}

   - Unequal antenna gains, with equal transmit powers. For antenna gains given by G_1, G_2, …, G_N ㏈i
   (i) If transmit signals are correlated, then
   Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/N_{ANT}$] ㏈i [Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

2. Average Power Result (㏈m) = Average Power (㏈m) + Duty Cycle Correction Factor (㏈)
3. E.I.R.P. (㏈m) = Average Power Result (㏈m) + Directional Antenna Gain (㏈i)