



A.6. Contention Based Protocol

Measurement Limit and Method:

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

Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel (in which incumbent signal is transmitted) and stay off the incumbent 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.

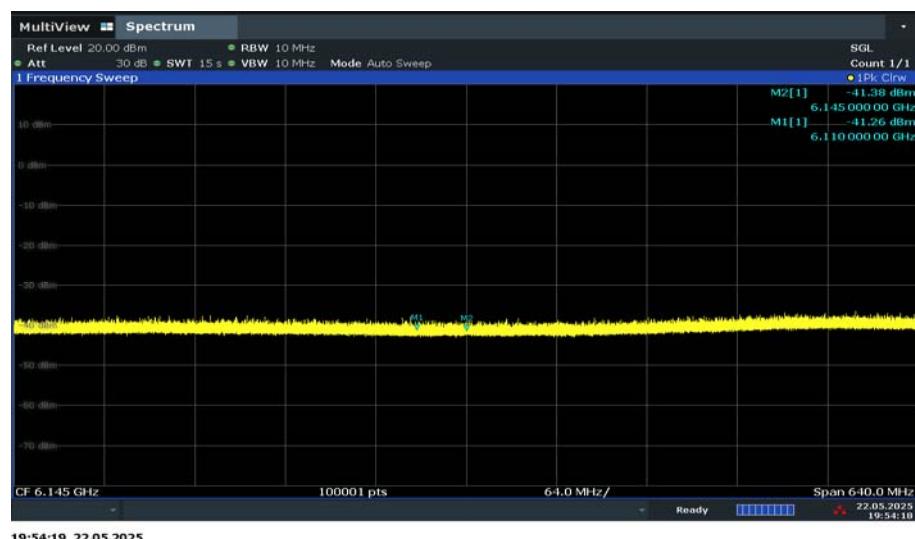
To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel. For example, an 802.11 device that plans to transmit a 40 MHz- wide signal (on a primary 20 MHz channel and a secondary 20 MHz channel) must detect energy throughout the entire 40 MHz channel. Additionally, low-power indoor devices must detect co-channel energy with 90% or greater certainty.

The measurement is made according to KDB 987594.

EUT does not use channel puncturing for incumbent avoidance. The EUT use bandwidth reduction for incumbent avoidance. Following figure illustrates an example scenarios of an 80MHz channel centered at 6145 MHz.

For the lower edge:

A 10 MHz AWGN signal (center frequency is 6110MHz) is injected.



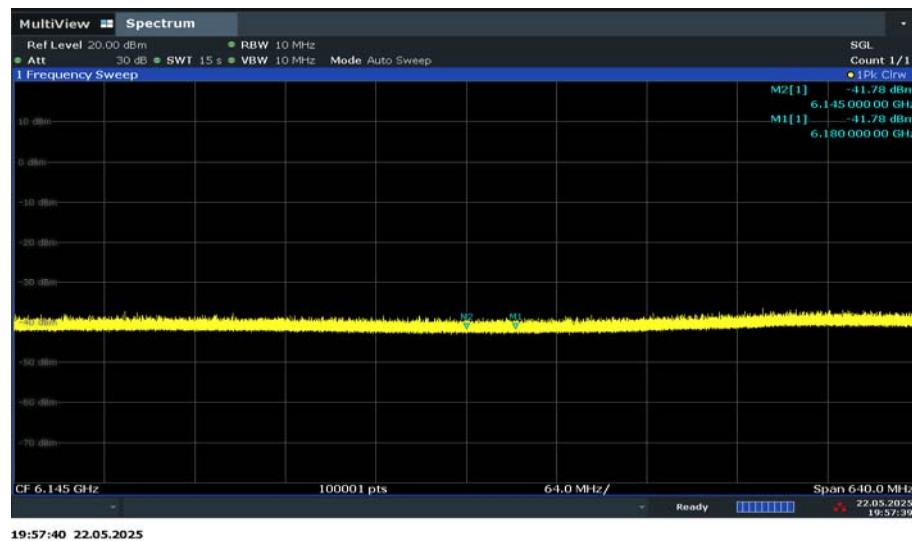
For the center frequency

A 10 MHz AWGN signal (center frequency is 6145MHz) is injected.



For the upper edge:

A 10 MHz AWGN signal (center frequency is 6180MHz) is injected.



Measurement Results:

Note: The test evaluated the minimum antenna gain, which is reflected in the Ant Gain column.

Band	BW (MHz)	Fre. (MHz)	Incumbent Freq (MHz)	AWGN Signal Level (at Antenna Port) (dBm)	Incumbent Signal Level (Refer to 0dBi Antenna) (dBm)	Detection Rate(%)	Threshold Level(dB m)
UNII Band 5	20	6135	6135 fc1 = fc2	-69.5	-63.4	100	-62
					Cease transmission		
				/	/	/	-62
					Minimal transmission		
				-70	-63.9	0	-62
					Normal transmission		
	80	6145	6110Lower Edge	-68	-61.9	100	-62
					Cease transmission		
				/	/	/	/
					Minimal transmission		
				-69	-62.9	0	-62
					Normal transmission		
				-70	-63.9	90	-62
					Cease transmission		
	6145	6145 fc1 = fc2	6180 Upper	/	/	/	-62
					Minimal transmission		
				-70.5	-64.4	0	-62
					Normal transmission		
				-68	-61.9	100	-62
					Cease transmission		

			Edge		/	/	-62		
					Minimal transmission				
				-69	-62.9				
					0				
					Normal transmission				
Band	BW (MHz)	Fre. (MHz)	Incumbent Freq (MHz)	AWGN Signal Level (at Antenna Port) (dBm)	Incumbent Signal Level (Refer to 0dBi Antenna) (dBm)	Detection Rate(%)	Threshold Level(dB m)		
UNII Band 6	20	6455	6455 fc1 = fc2	-72	-65.9	100	-62		
					Cease transmission				
				-72.5	/	/	-62		
					Minimal transmission				
					-66.4	0	-62		
80 UNII Band 6	80	6465	6430 Lower Edge	-70.5	-64.4	90	-62		
					Cease transmission				
				-71	/	/	-62		
					Minimal transmission				
					-64.9	0	-62		
			6465 fc1 = fc2	-72	Normal transmission				
					-65.9	90	-62		
				-72.5	Cease transmission				
					/	/	-62		
					Minimal transmission				
			6500 Upper	-70.5	-66.4	0	-62		
					Normal transmission				
					-64.4	100	-62		
					Cease transmission				

			Edge	/	/	/	-62
					Minimal transmission		
					-71	-64.9	0
						Normal transmission	
Band	BW (MHz)	Fre. (MHz)	Incumbent Freq (MHz)	AWGN Signal Level (at Antenna Port) (dBm)	Incumbent Signal Level (Refer to 0dBi Antenna) (dBm)	Detection Rate(%)	Threshold Level(dB m)
UNII Band 7	20	6855	6855 fc1 = fc2	-72.5	-66.4	100	-62
					Cease transmission		
				-73	/	/	-62
					Minimal transmission		
					-66.9	0	-62
80 UNII Band 7	80	6625	6590 Lower Edge	-71.5	-65.4	90	-62
					Cease transmission		
				-72	/	/	-62
					Minimal transmission		
					-65.9	0	-62
			6625 fc1 = fc2	-72.5	-66.4	100	-62
					Cease transmission		
				-73	/	/	-62
					Minimal transmission		
					-66.9	0	-62
			6660 Upper	-71.5	-65.4	90	-62
					Cease transmission		

			Edge	/	/	/	-62
					Minimal transmission		
					-72	-65.9	0
						Normal transmission	
Band	BW (MHz)	Fre. (MHz)	Incumbent Freq (MHz)	AWGN Signal Level (at Antenna Port) (dBm)	Incumbent Signal Level (Refer to 0dBi Antenna) (dBm)	Detection Rate(%)	Threshold Level(dB m)
UNII Band 8	20	7015	7015 fc1 = fc2	-73.5	-67.4	100	-62
					Cease transmission		
				-74	/	/	-62
					Minimal transmission		
					-67.9	0	-62
80 UNII Band 8	80	6945	6910 Lower Edge	-72.5	-66.4	90	-62
					Cease transmission		
				-73	/	/	-62
					Minimal transmission		
					-66.9	0	-62
			6945 fc1 = fc2	-73.5	Normal transmission		
					-67.4	100	-62
				-74	Cease transmission		
					/	/	-62
					Minimal transmission		
			6980 Upper	-72.5	-67.9	0	-62
					Normal transmission		
					-66.4	100	-62
					Cease transmission		

			Edge	/	/	/	-62
					Minimal transmission		
			-73	-66.9	0	-62	
					Normal transmission		

Note: Incumbent signal level (dBm) = AWGN Signal power Level (dBm)-Antenna Gain (dBi),

The EUT encounters the incumbent signal that its power level is less than or equal to the detection threshold (-62dBm) with reference to 0dBi antenna gain. Path loss is negligible (0dB).

EUT support bandwidth reduction mechanism.

Conclusion: PASS

Test graphs as below:

Mode	AWGN Signal Level	ceased transmission
802.1ax-HE20-7015MHz	See test graph	See test graph
802.11ax-HE80-6145MHz(middle)	See test graph	See test graph

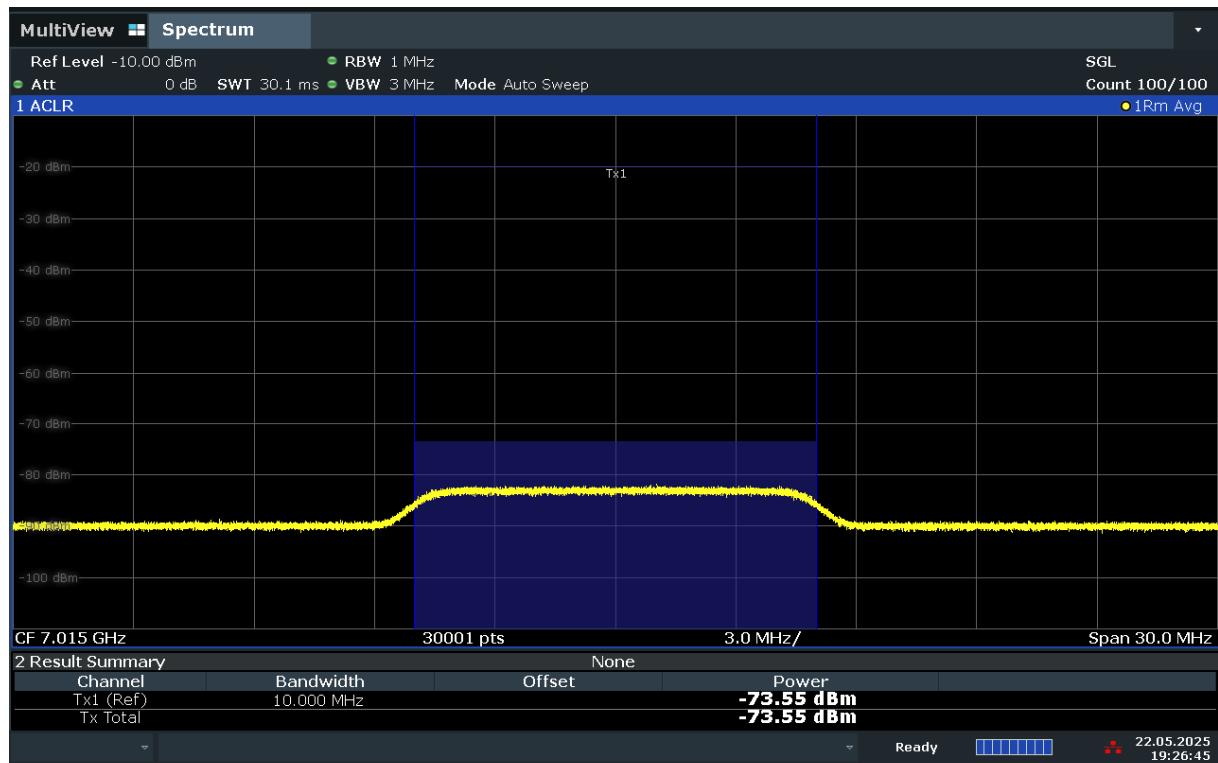
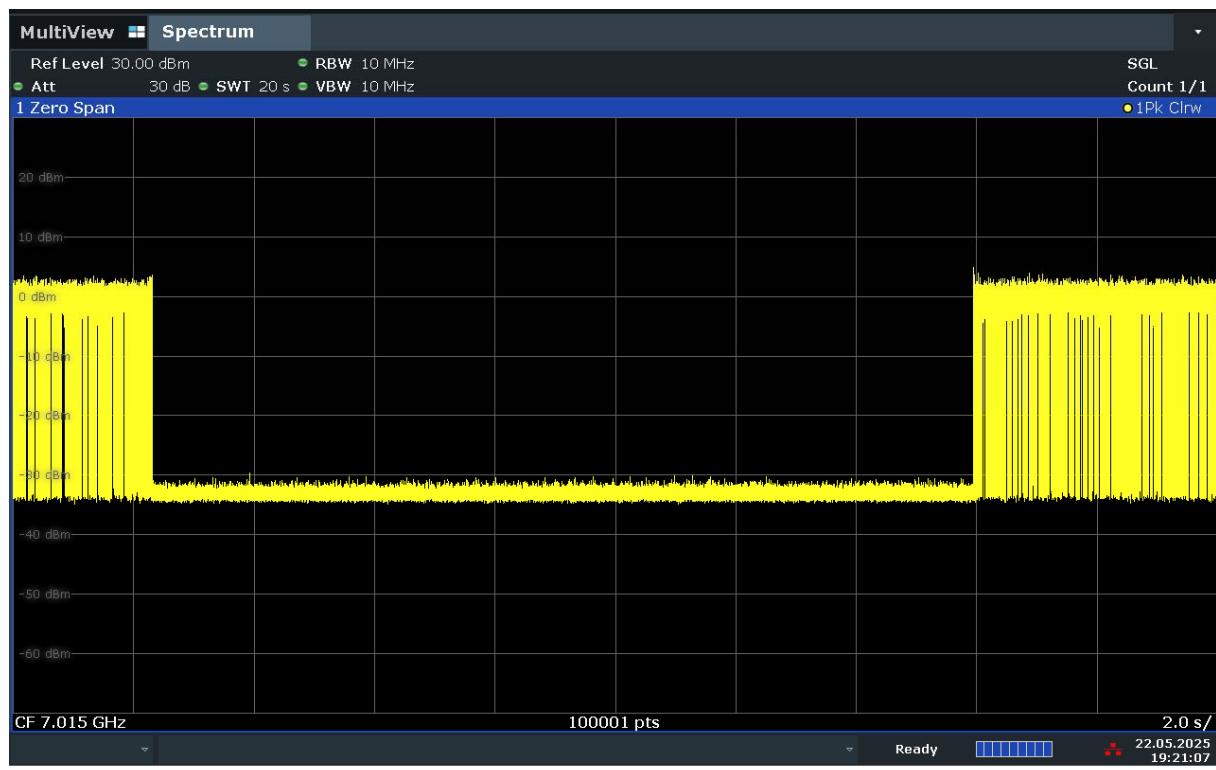
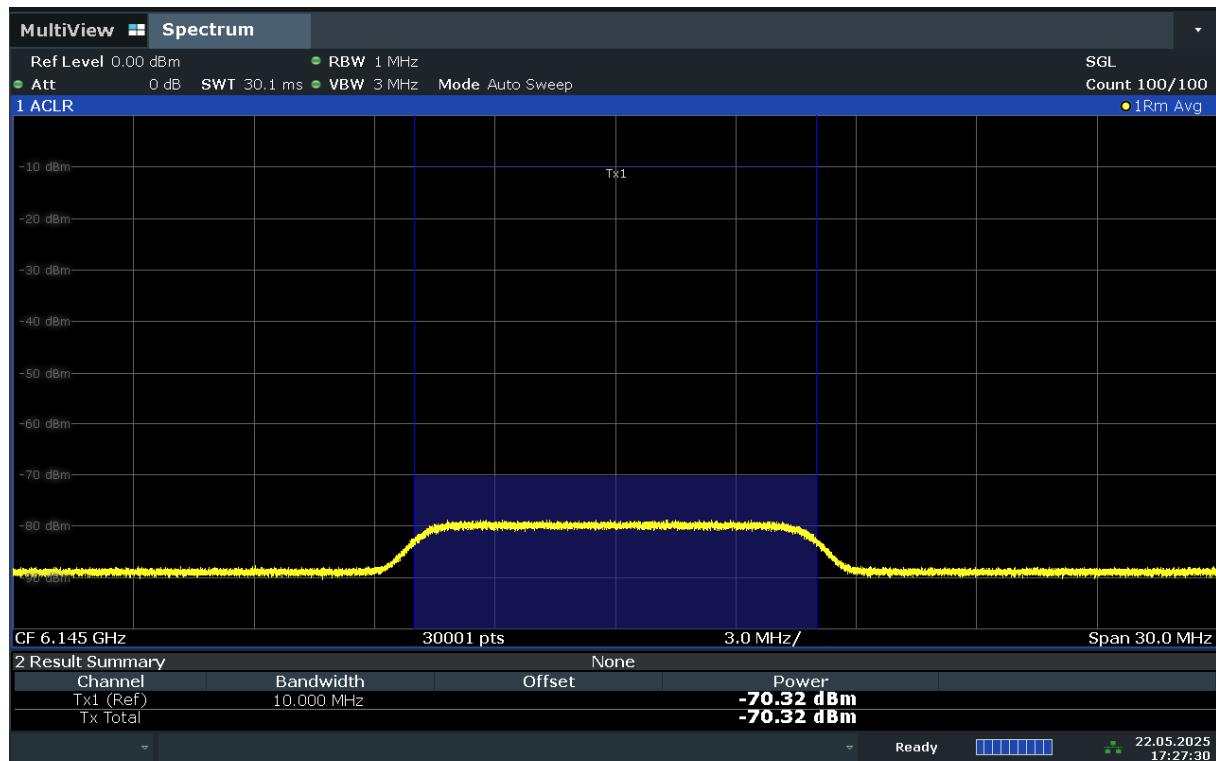


Fig.1 Contention Based Protocol 802.11ax-HE20(ch7015MHz-AWGN Signal Level)



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Fig.2 Contention Based Protocol 802.11ax-HE20 (ch7015MHz-ceased transmission)


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Fig.3 Contention Based Protocol 802.11ax-HE80 (ch6145MHz-middle-AWGN Signal Level)

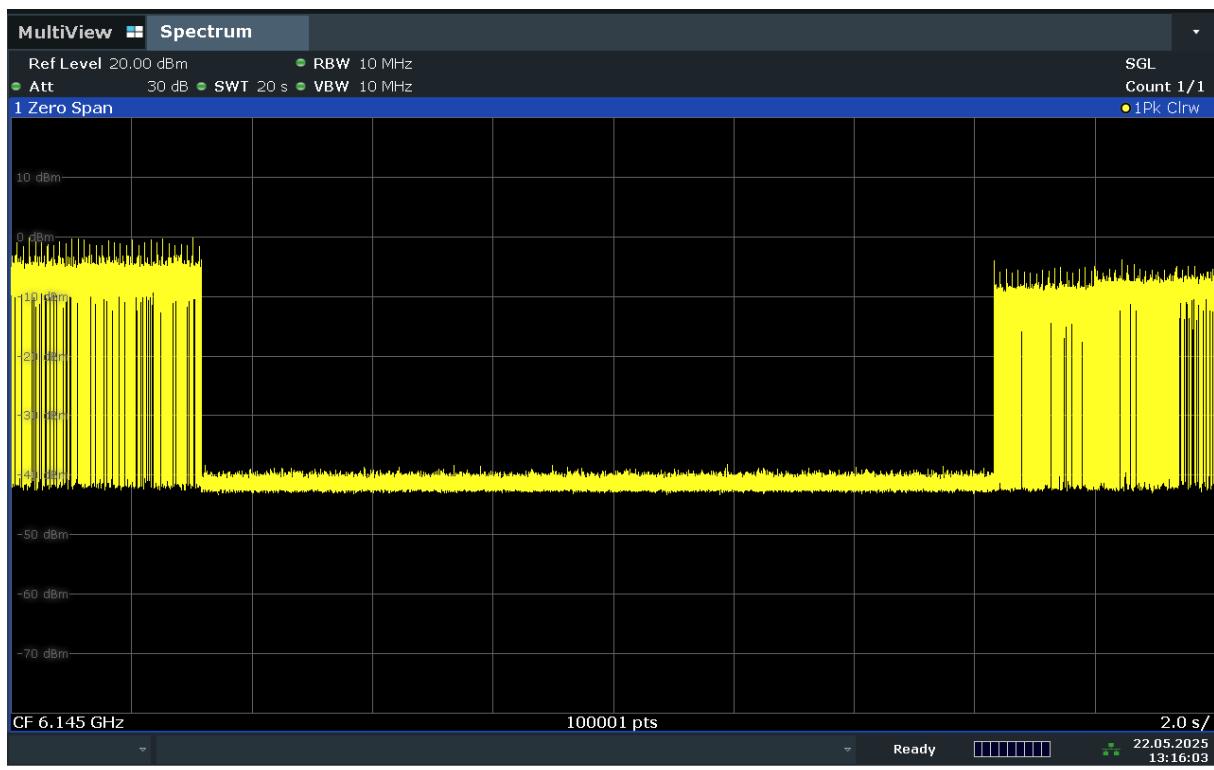
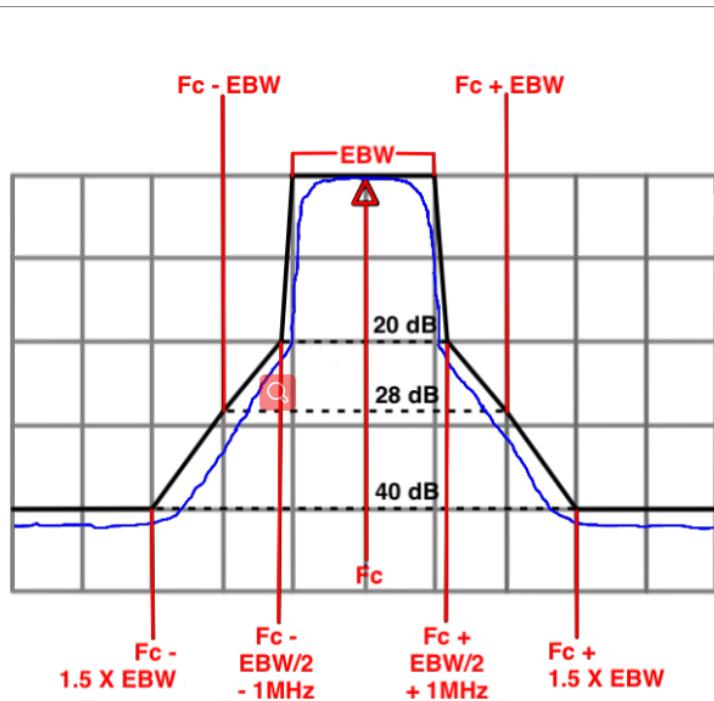


Fig.4 Contention Based Protocol 802.11ax-HE80 (ch6145MHz-middle-ceased transmission)

A.7. In-Band Emissions

Measurement Limit and Method:

1. Take nominal bandwidth as reference channel bandwidth provided that 26 dB emission bandwidth is always larger than nominal bandwidth
2. 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 $\geq 3 \times$ RBW
 - d) Number of points in sweep $\geq [2 \times \text{span} / \text{RBW}]$.
 - 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.
3. 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.
4. Adjust the span to encompass the entire mask as necessary.
5. Clear trace.
6. Trace average at least 100 traces in power averaging (rms) mode.
7. Adjust the reference level as necessary so that the crest of the channel touches the top of the emission mask.



Generic Emission Mask

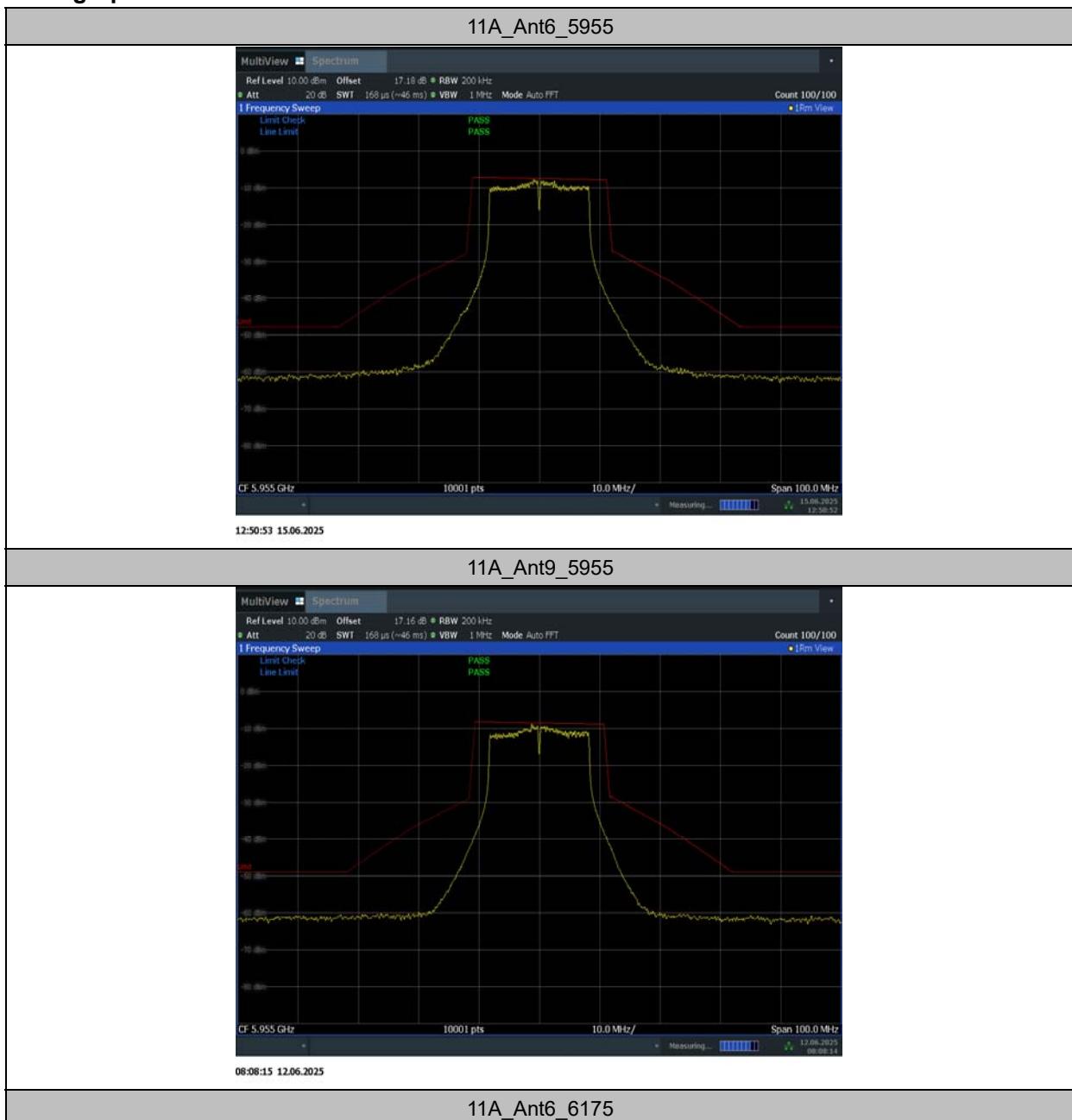
The measurement is made according to KDB 987594.

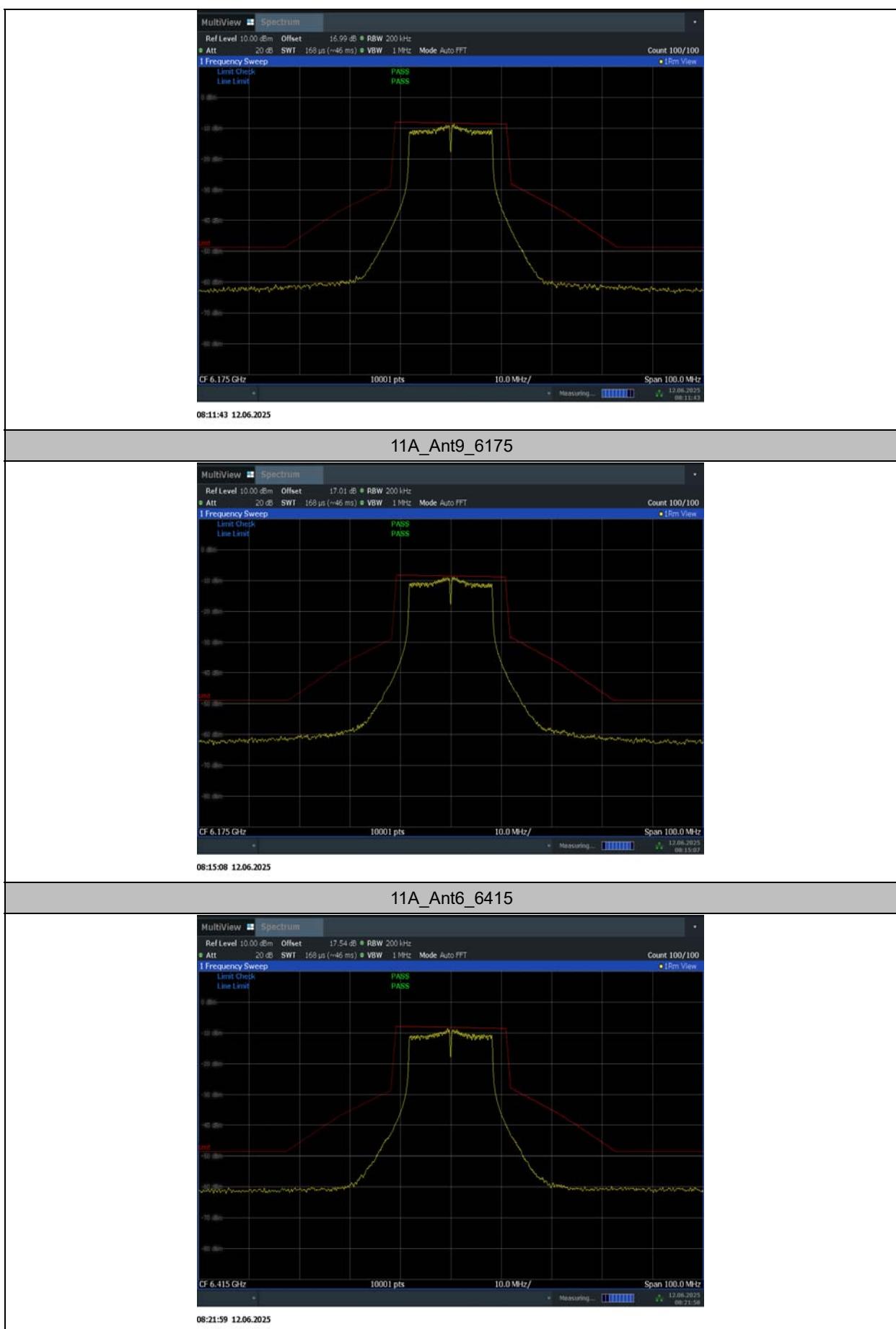
Measurement Results:

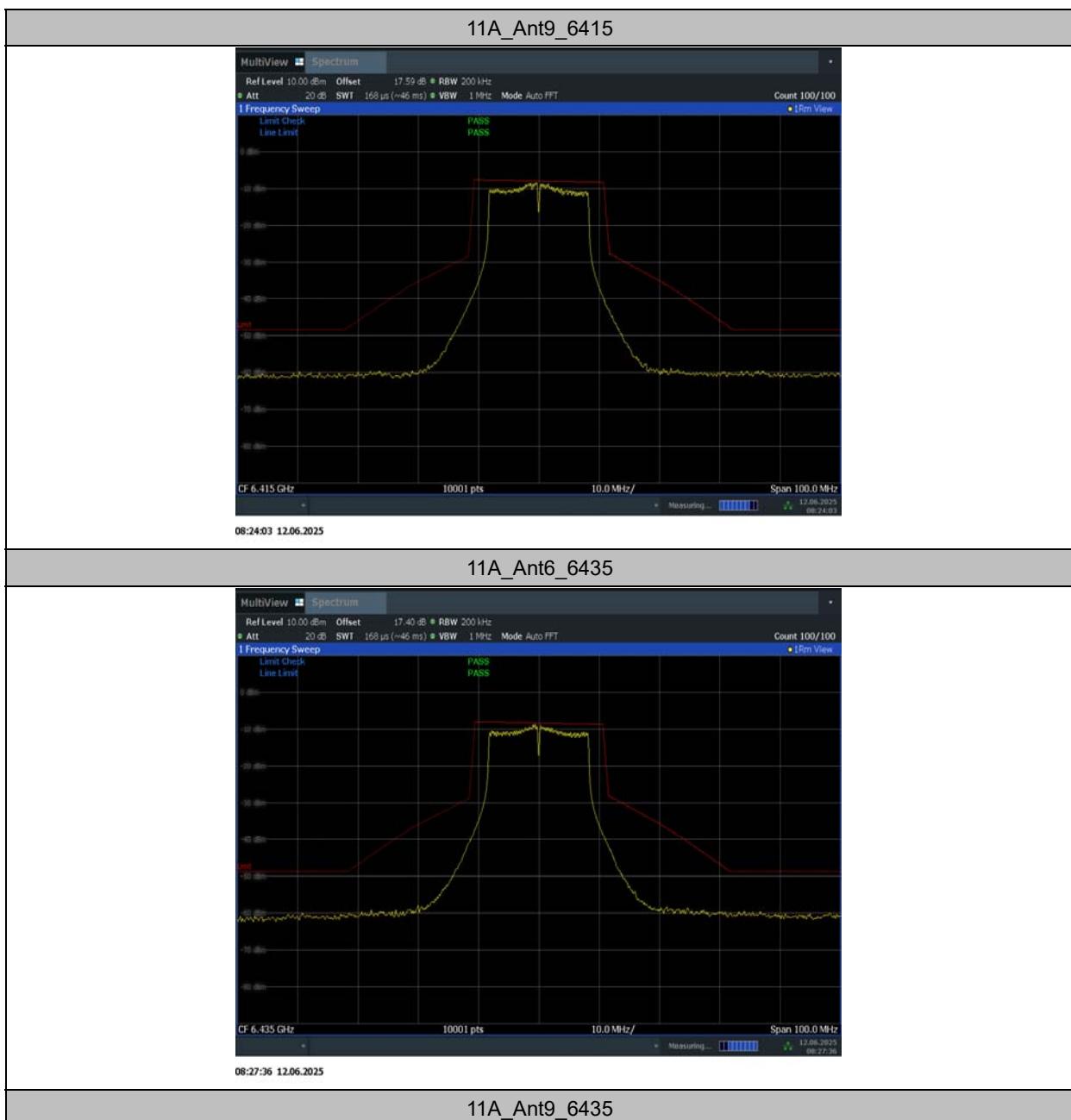
TestMode	Antenna	Channel	Result	Limit	Verdict
11A	Ant6	5955	See test graph	See test graph	PASS
	Ant9	5955	See test graph	See test graph	PASS
	Ant6	6175	See test graph	See test graph	PASS
	Ant9	6175	See test graph	See test graph	PASS
	Ant6	6415	See test graph	See test graph	PASS
	Ant9	6415	See test graph	See test graph	PASS
	Ant6	6435	See test graph	See test graph	PASS
	Ant9	6435	See test graph	See test graph	PASS
	Ant6	6475	See test graph	See test graph	PASS
	Ant9	6475	See test graph	See test graph	PASS
	Ant6	6515	See test graph	See test graph	PASS
	Ant9	6515	See test graph	See test graph	PASS
	Ant6	6535	See test graph	See test graph	PASS
	Ant9	6535	See test graph	See test graph	PASS
	Ant6	6695	See test graph	See test graph	PASS
	Ant9	6695	See test graph	See test graph	PASS
	Ant6	6855	See test graph	See test graph	PASS
	Ant9	6855	See test graph	See test graph	PASS
	Ant6	6875	See test graph	See test graph	PASS
	Ant9	6875	See test graph	See test graph	PASS
	Ant6	6895	See test graph	See test graph	PASS

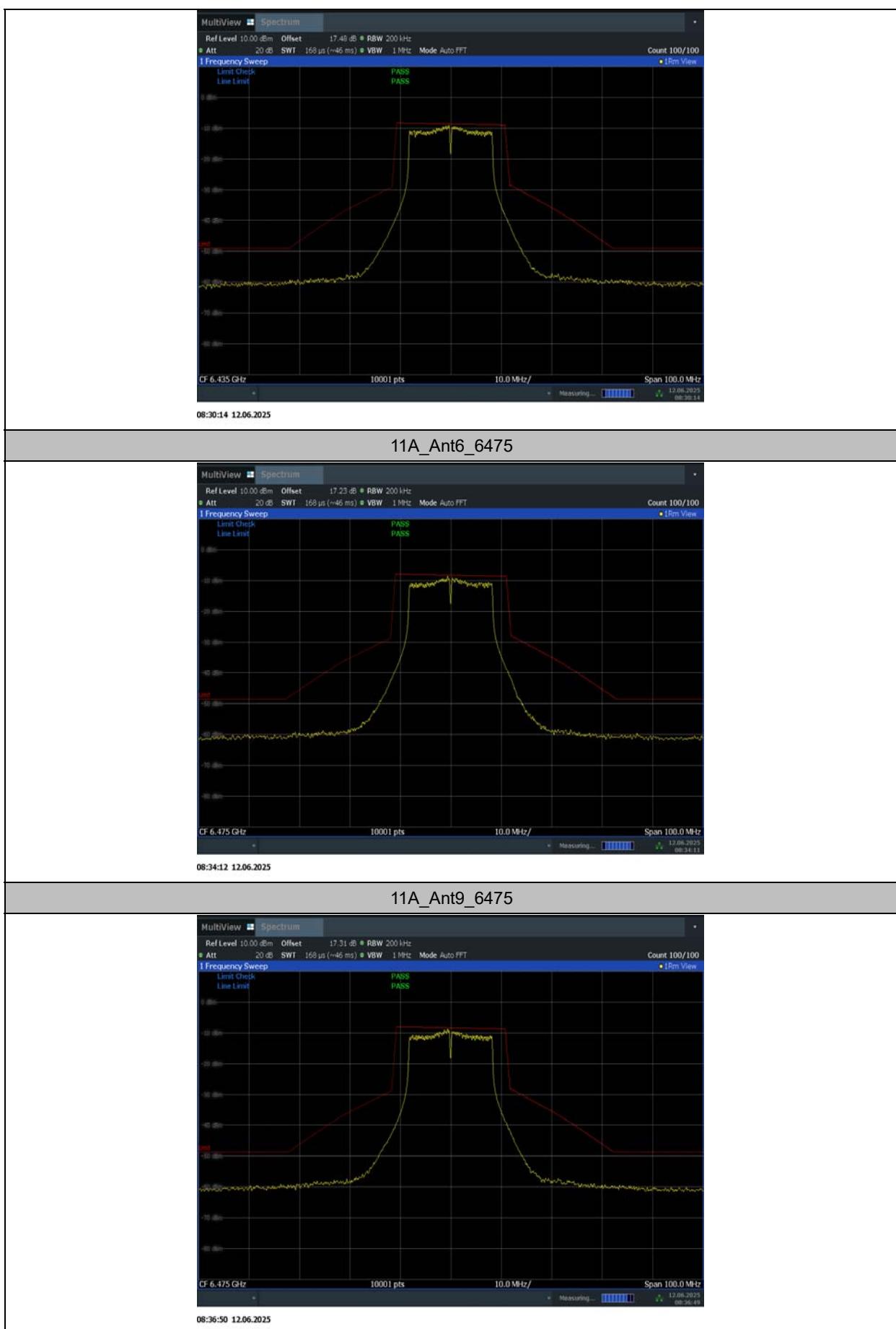
	Ant9	6895	See test graph	See test graph	PASS
	Ant6	6995	See test graph	See test graph	PASS
	Ant9	6995	See test graph	See test graph	PASS
	Ant6	7115	See test graph	See test graph	PASS
	Ant9	7115	See test graph	See test graph	PASS
11AX20MIMO	Ant6	5955	See test graph	See test graph	PASS
	Ant9	5955	See test graph	See test graph	PASS
	Ant6	6175	See test graph	See test graph	PASS
	Ant9	6175	See test graph	See test graph	PASS
	Ant6	6415	See test graph	See test graph	PASS
	Ant9	6415	See test graph	See test graph	PASS
	Ant6	6435	See test graph	See test graph	PASS
	Ant9	6435	See test graph	See test graph	PASS
	Ant6	6475	See test graph	See test graph	PASS
	Ant9	6475	See test graph	See test graph	PASS
	Ant6	6515	See test graph	See test graph	PASS
	Ant9	6515	See test graph	See test graph	PASS
	Ant6	6535	See test graph	See test graph	PASS
	Ant9	6535	See test graph	See test graph	PASS
	Ant6	6695	See test graph	See test graph	PASS
	Ant9	6695	See test graph	See test graph	PASS
	Ant6	6855	See test graph	See test graph	PASS
	Ant9	6855	See test graph	See test graph	PASS
	Ant6	6875	See test graph	See test graph	PASS
	Ant9	6875	See test graph	See test graph	PASS
	Ant6	6895	See test graph	See test graph	PASS
	Ant9	6895	See test graph	See test graph	PASS
	Ant6	6995	See test graph	See test graph	PASS
	Ant9	6995	See test graph	See test graph	PASS
	Ant6	7115	See test graph	See test graph	PASS
	Ant9	7115	See test graph	See test graph	PASS
11AX40MIMO	Ant6	5965	See test graph	See test graph	PASS
	Ant9	5965	See test graph	See test graph	PASS
	Ant6	6165	See test graph	See test graph	PASS
	Ant9	6165	See test graph	See test graph	PASS
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	Ant9	6405	See test graph	See test graph	PASS
	Ant6	6445	See test graph	See test graph	PASS
	Ant9	6445	See test graph	See test graph	PASS
	Ant6	6485	See test graph	See test graph	PASS
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	Ant6	6525	See test graph	See test graph	PASS
	Ant9	6525	See test graph	See test graph	PASS

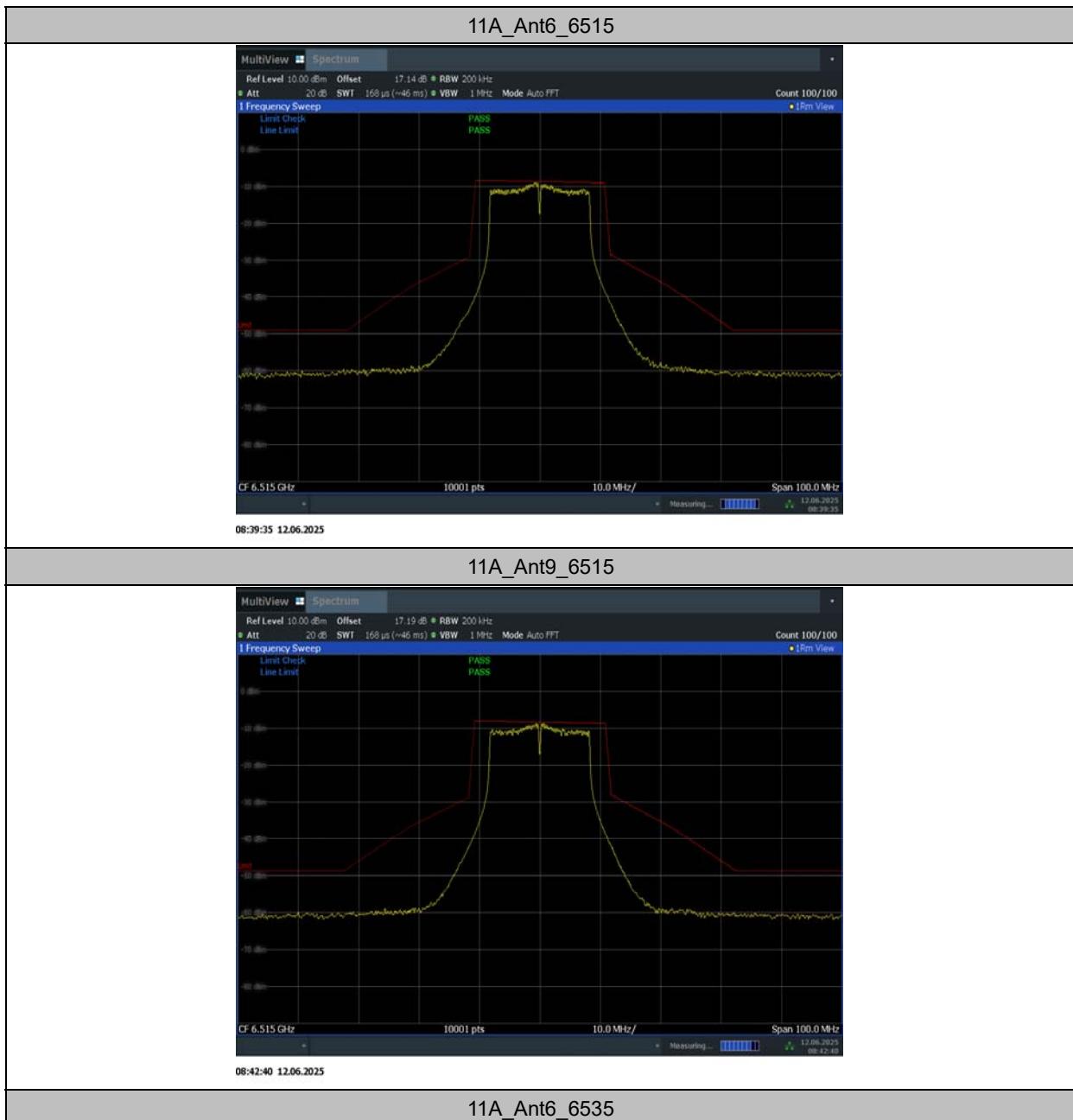
	Ant6	6565	See test graph	See test graph	PASS
	Ant9	6565	See test graph	See test graph	PASS
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	Ant9	6685	See test graph	See test graph	PASS
	Ant6	6845	See test graph	See test graph	PASS
	Ant9	6845	See test graph	See test graph	PASS
	Ant6	6885	See test graph	See test graph	PASS
	Ant9	6885	See test graph	See test graph	PASS
	Ant6	6925	See test graph	See test graph	PASS
	Ant9	6925	See test graph	See test graph	PASS
	Ant6	6965	See test graph	See test graph	PASS
	Ant9	6965	See test graph	See test graph	PASS
	Ant6	7085	See test graph	See test graph	PASS
	Ant9	7085	See test graph	See test graph	PASS
11AX80MIMO	Ant6	5985	See test graph	See test graph	PASS
	Ant9	5985	See test graph	See test graph	PASS
	Ant6	6145	See test graph	See test graph	PASS
	Ant9	6145	See test graph	See test graph	PASS
	Ant6	6385	See test graph	See test graph	PASS
	Ant9	6385	See test graph	See test graph	PASS
	Ant6	6465	See test graph	See test graph	PASS
	Ant9	6465	See test graph	See test graph	PASS
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	Ant9	6865	See test graph	See test graph	PASS
	Ant6	6945	See test graph	See test graph	PASS
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	Ant6	7025	See test graph	See test graph	PASS
	Ant9	7025	See test graph	See test graph	PASS

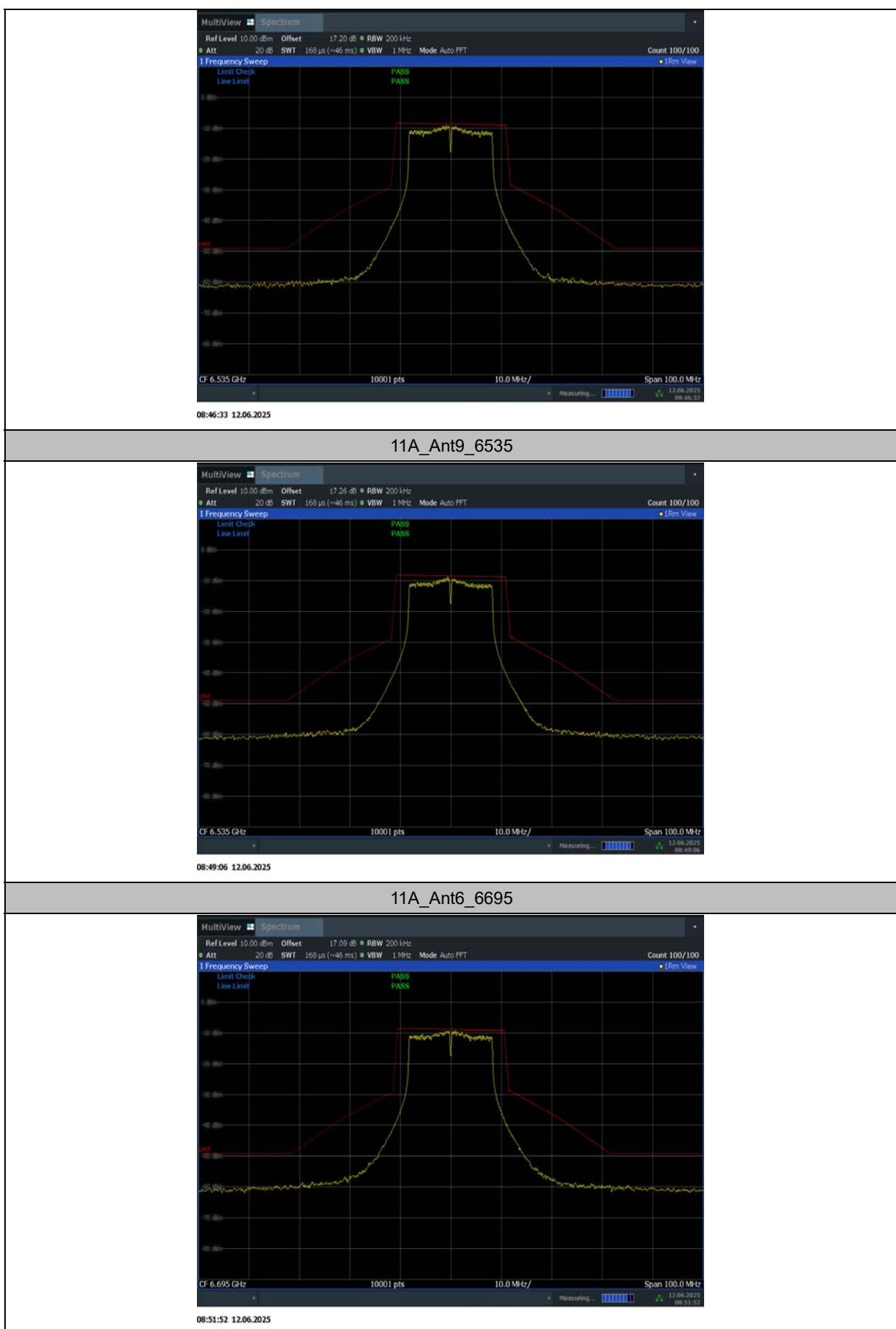
Test graphs as below:


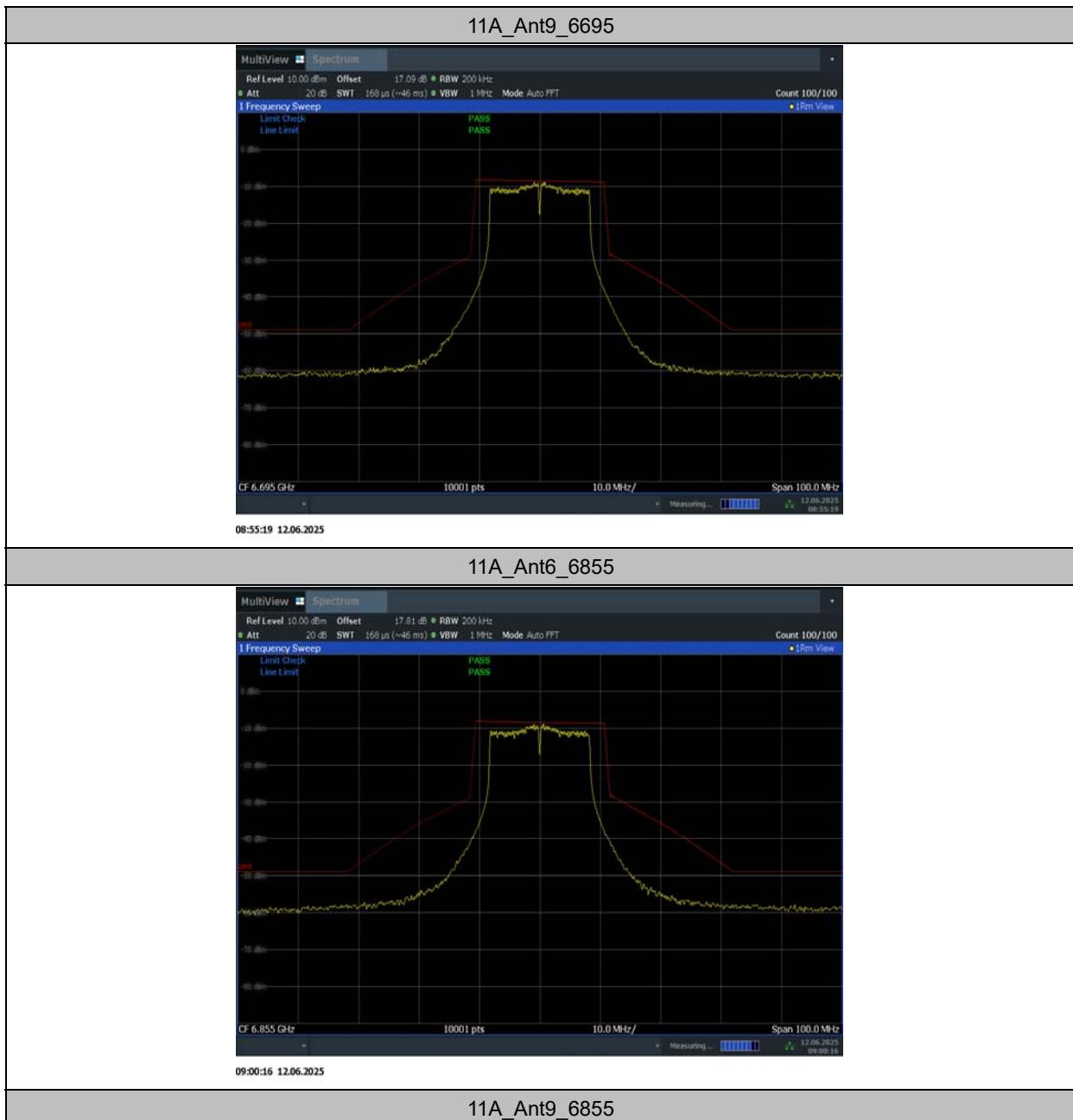


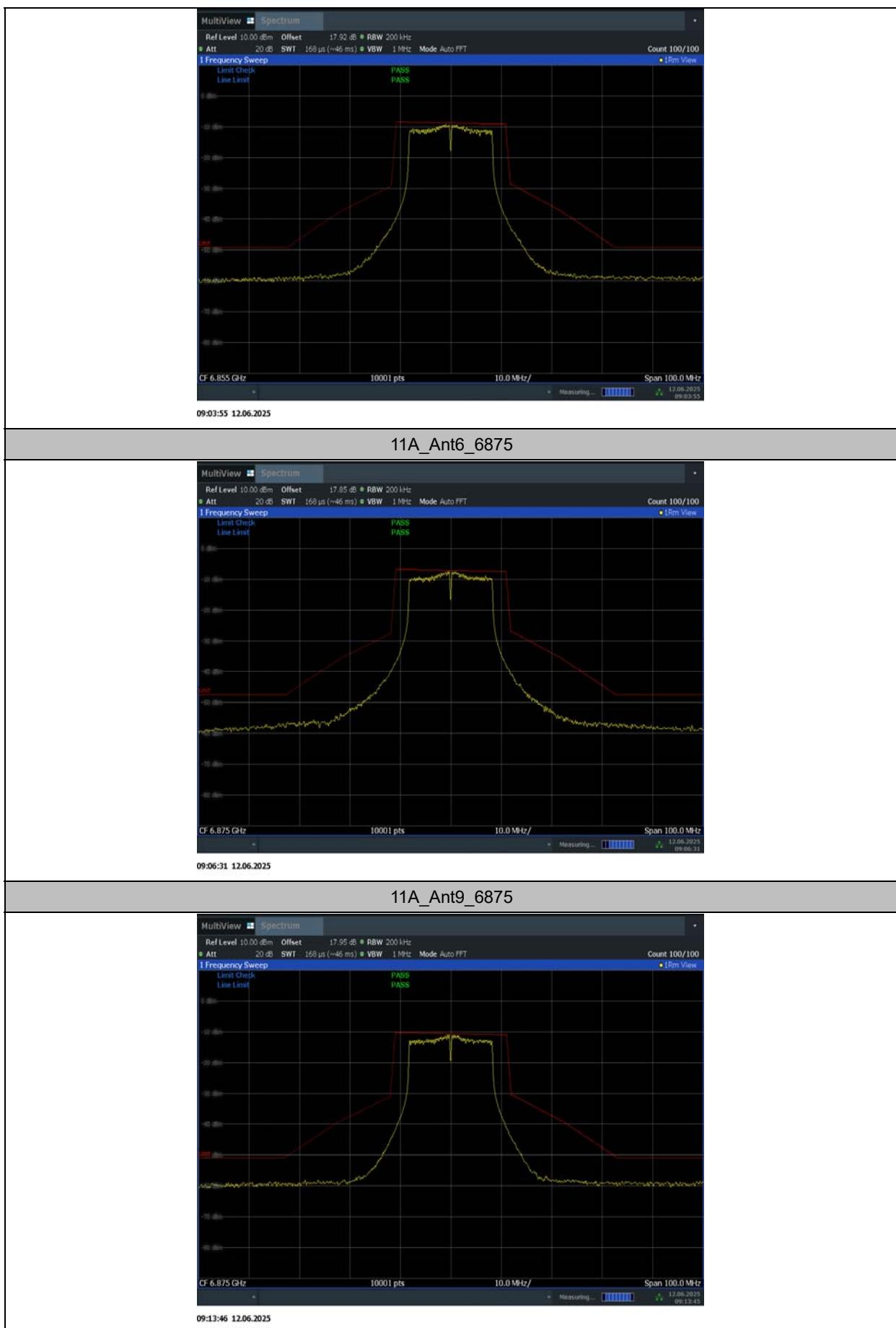


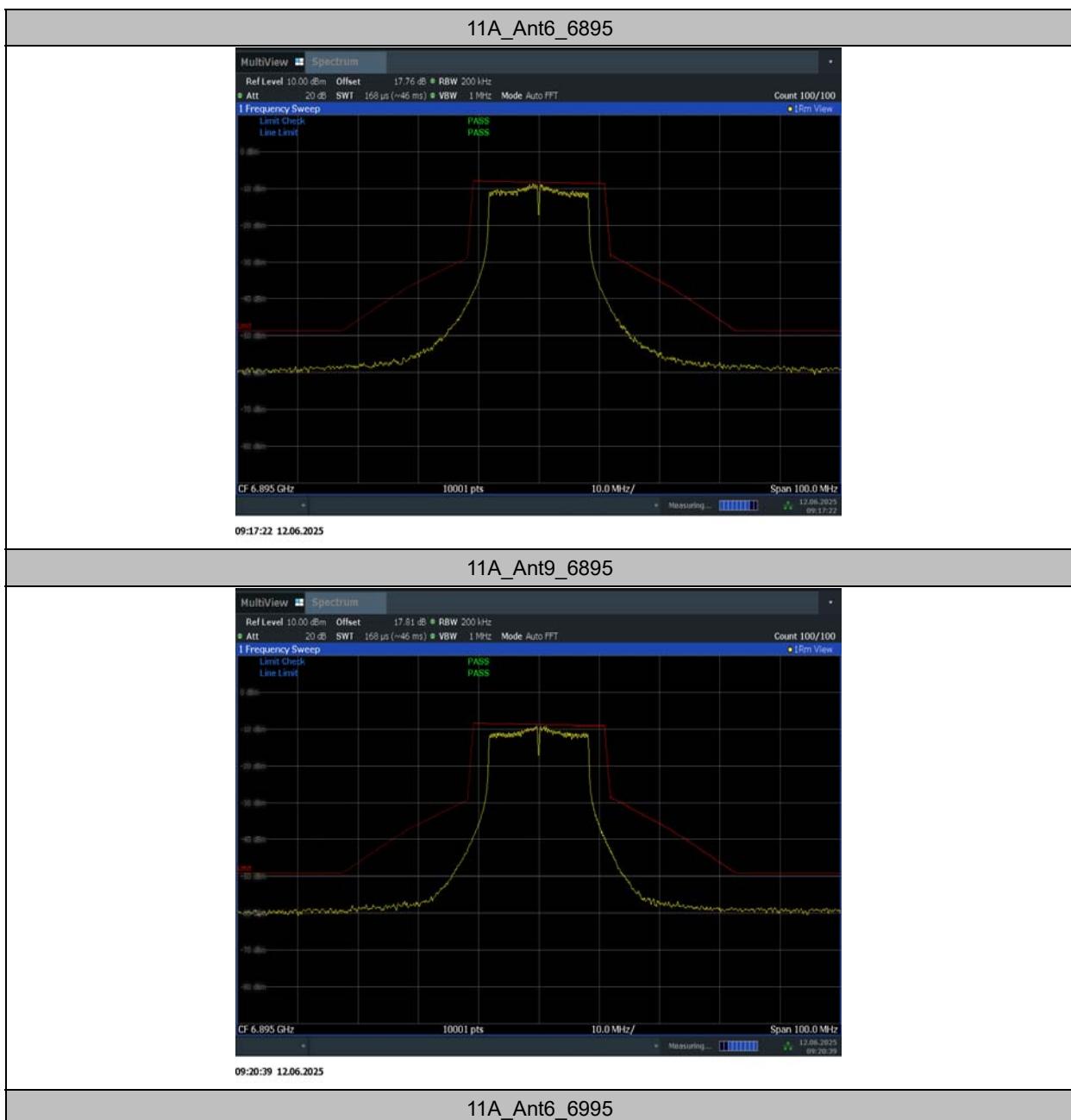


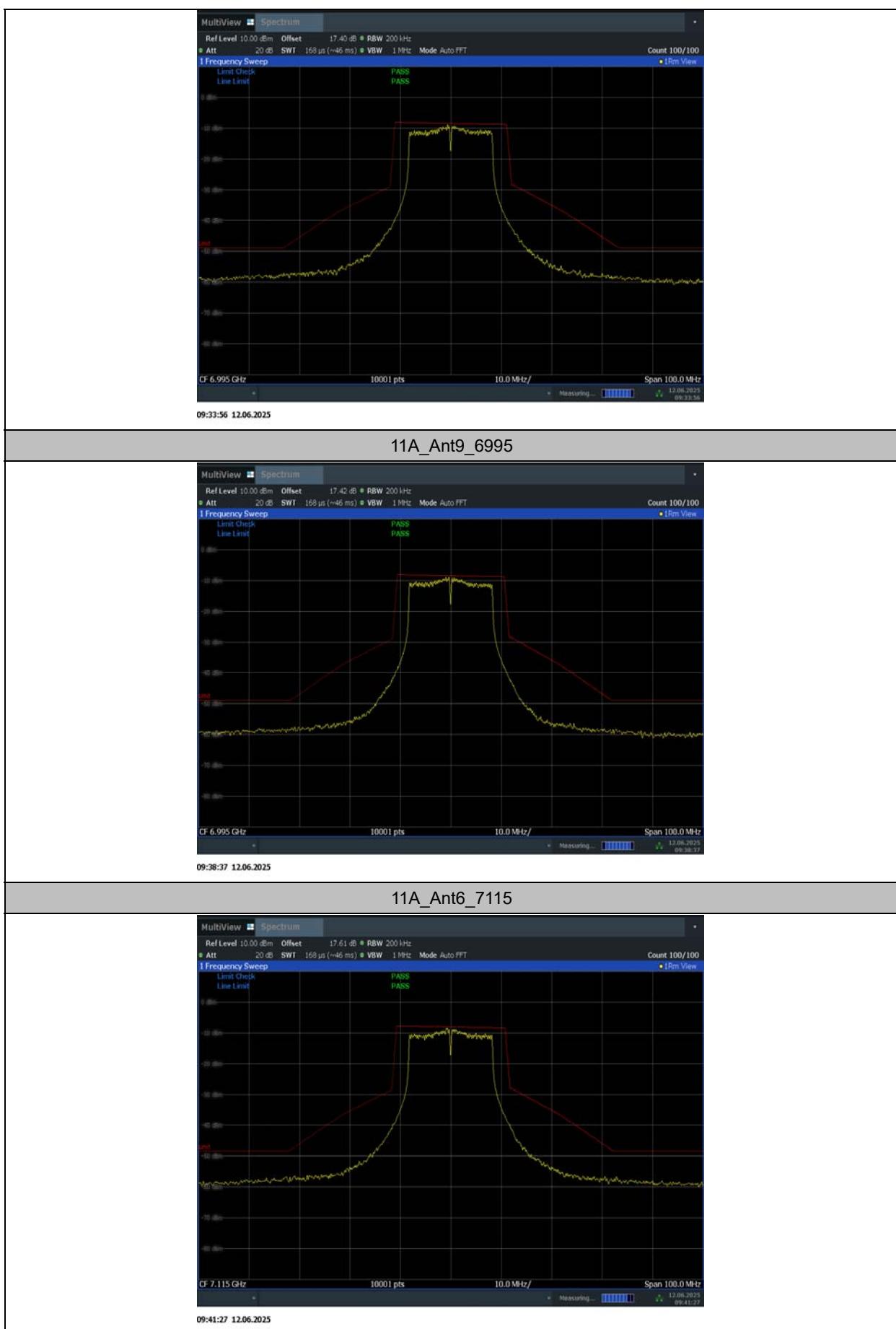


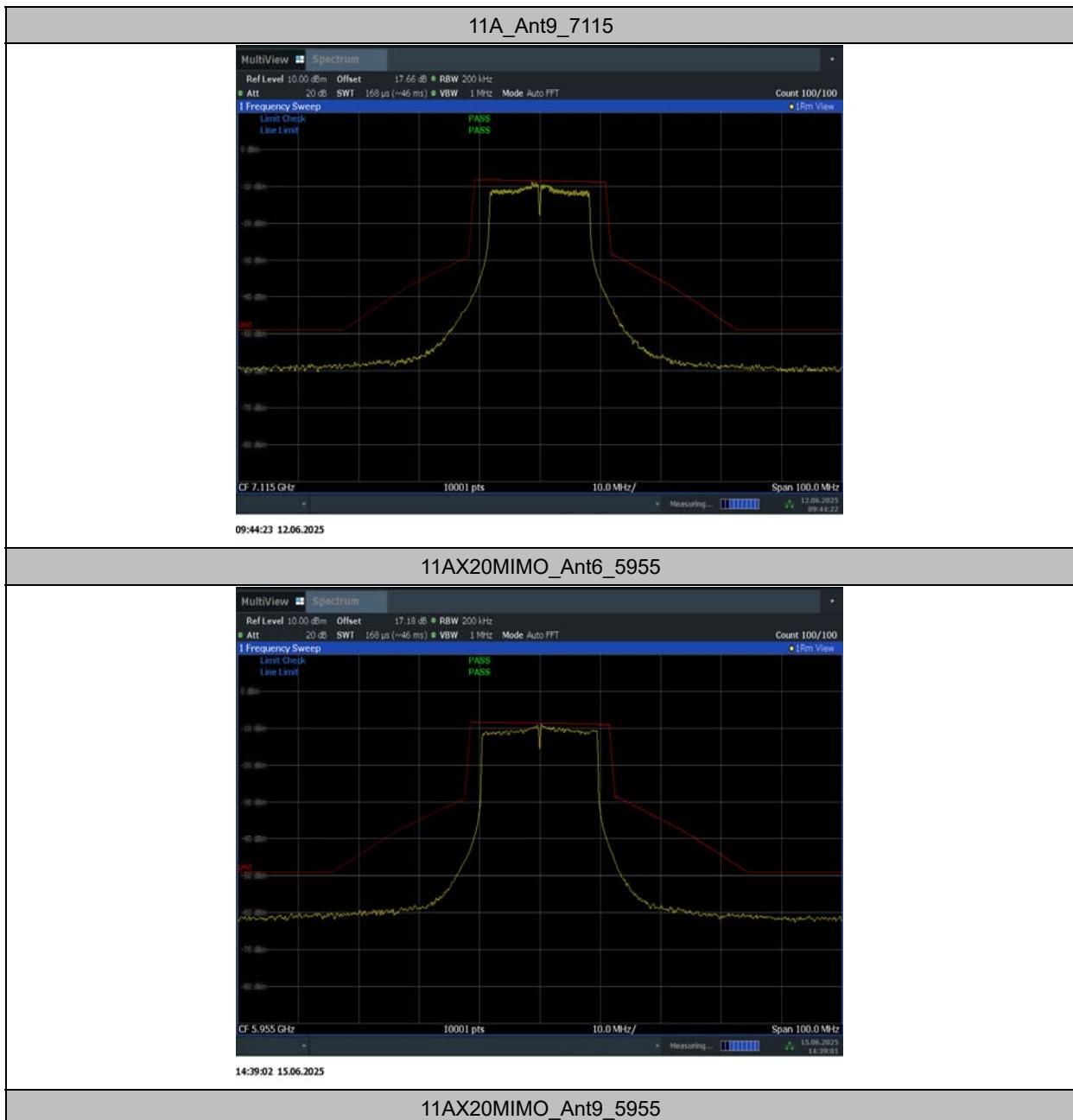


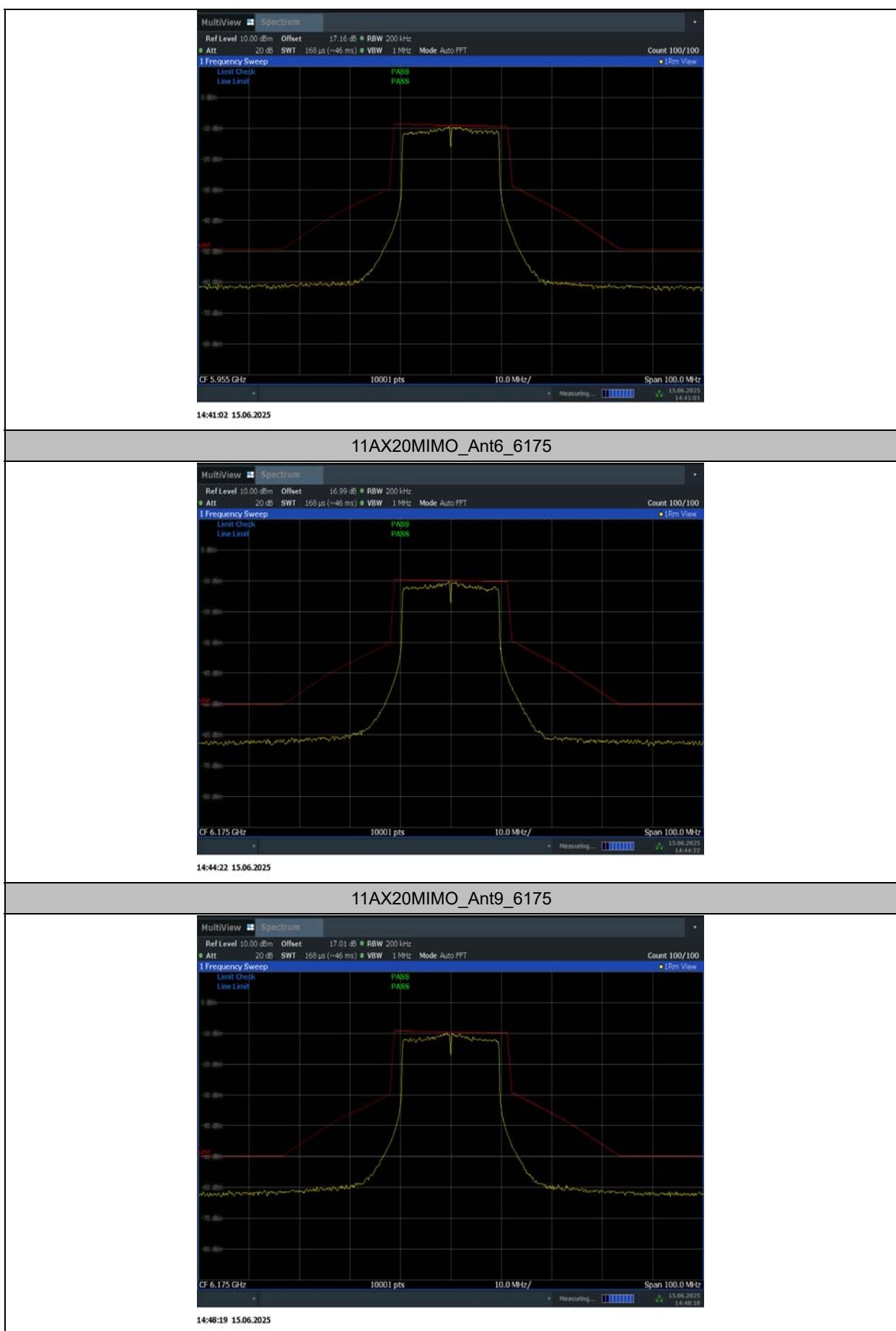


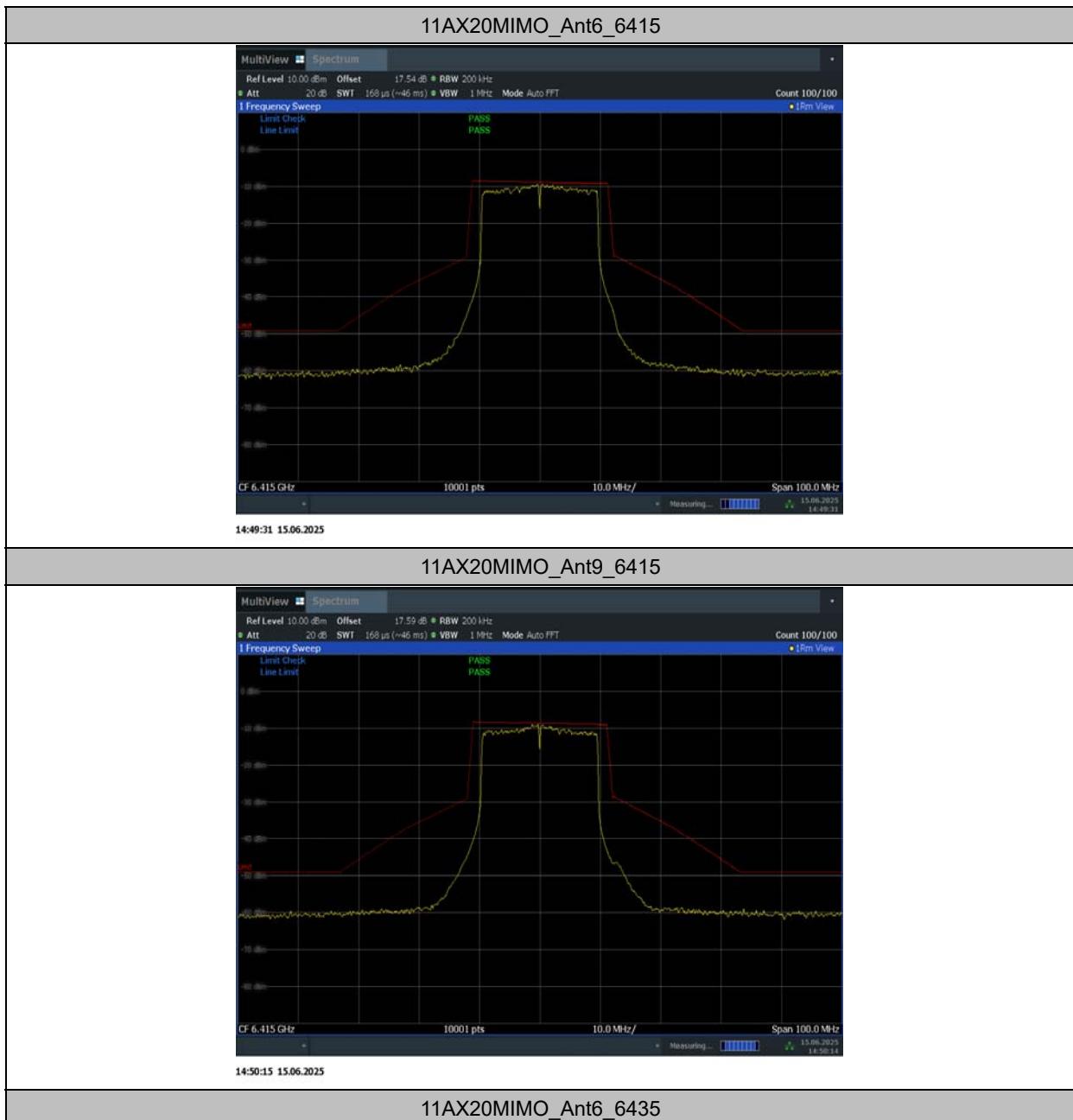


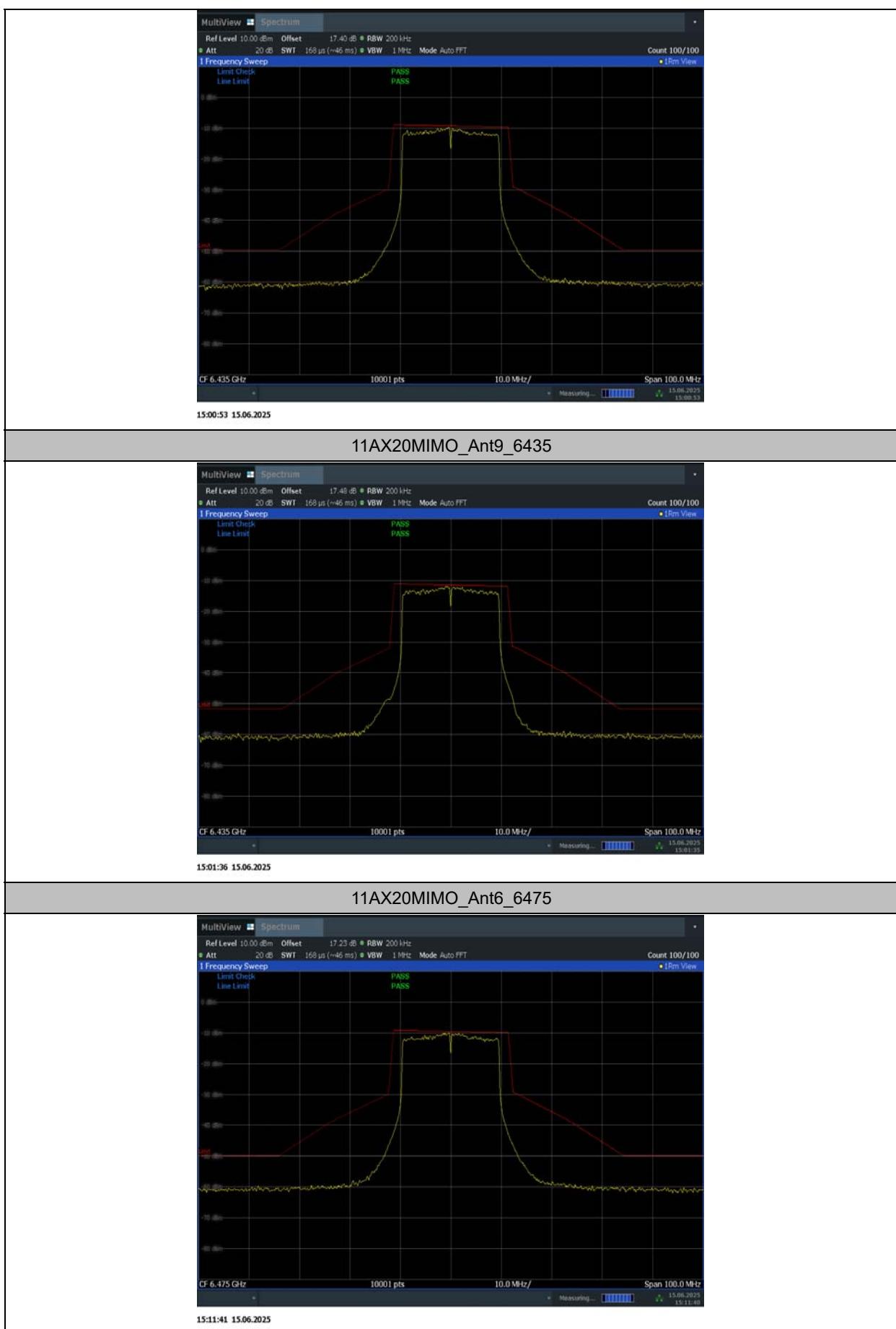


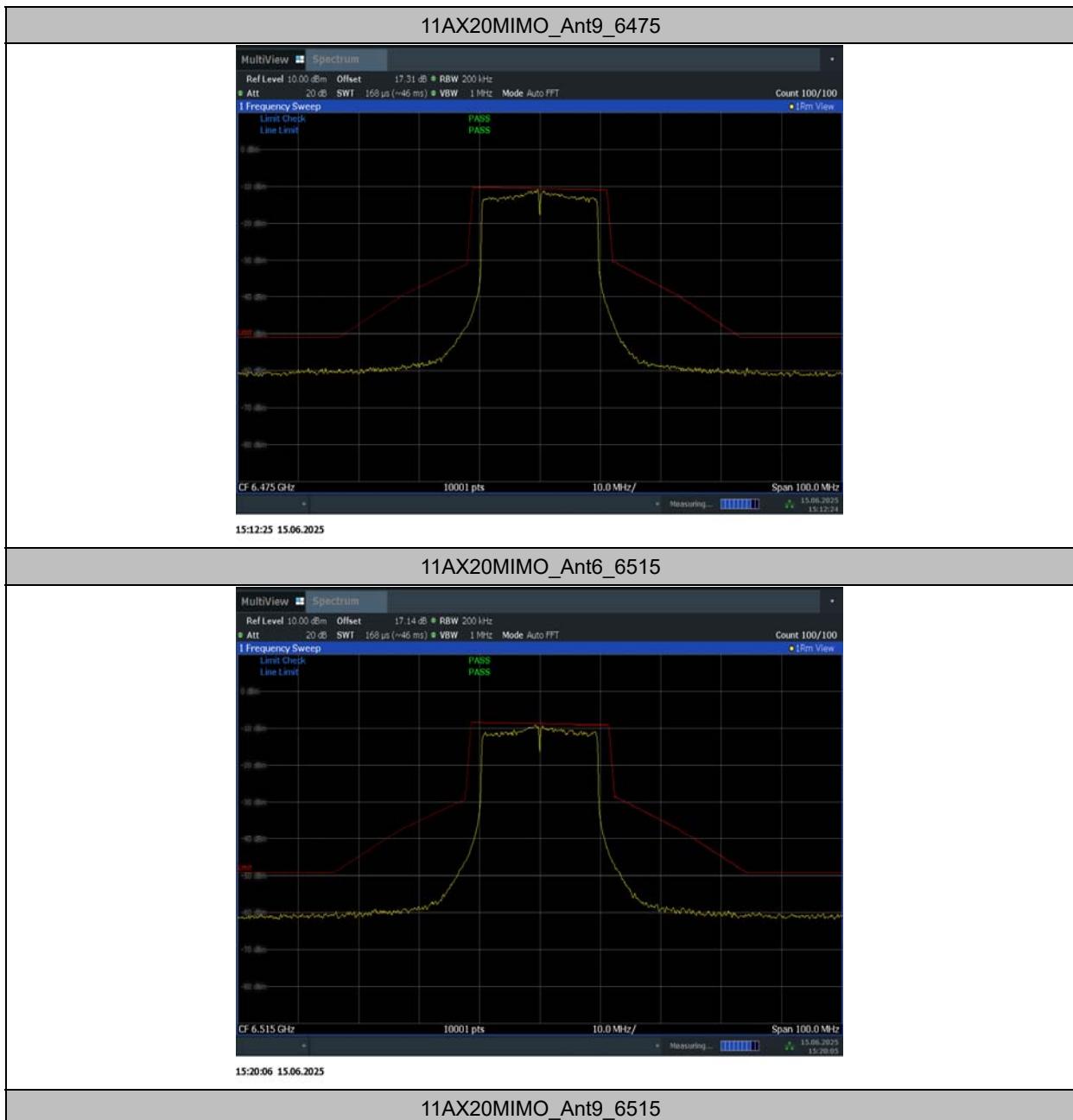


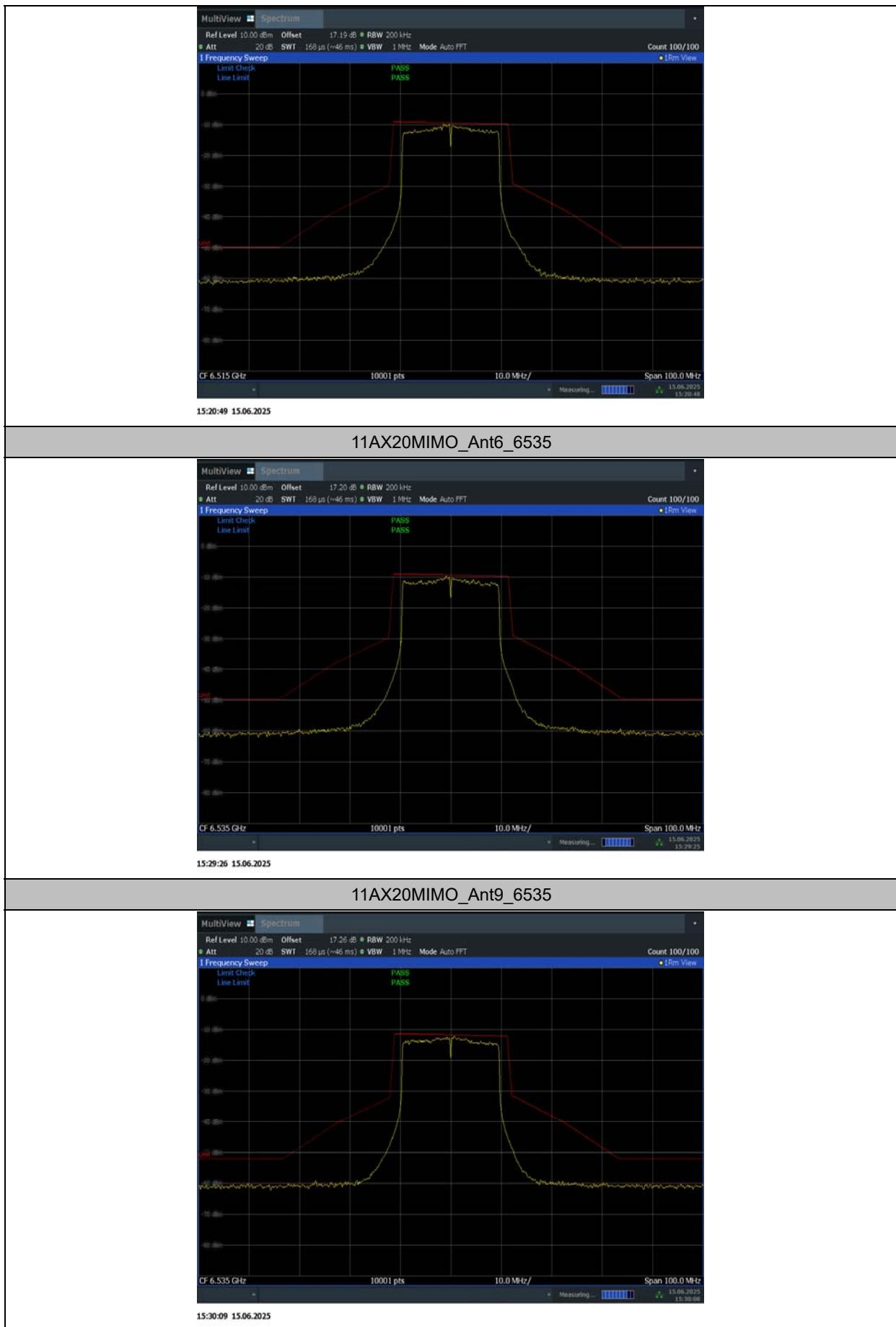


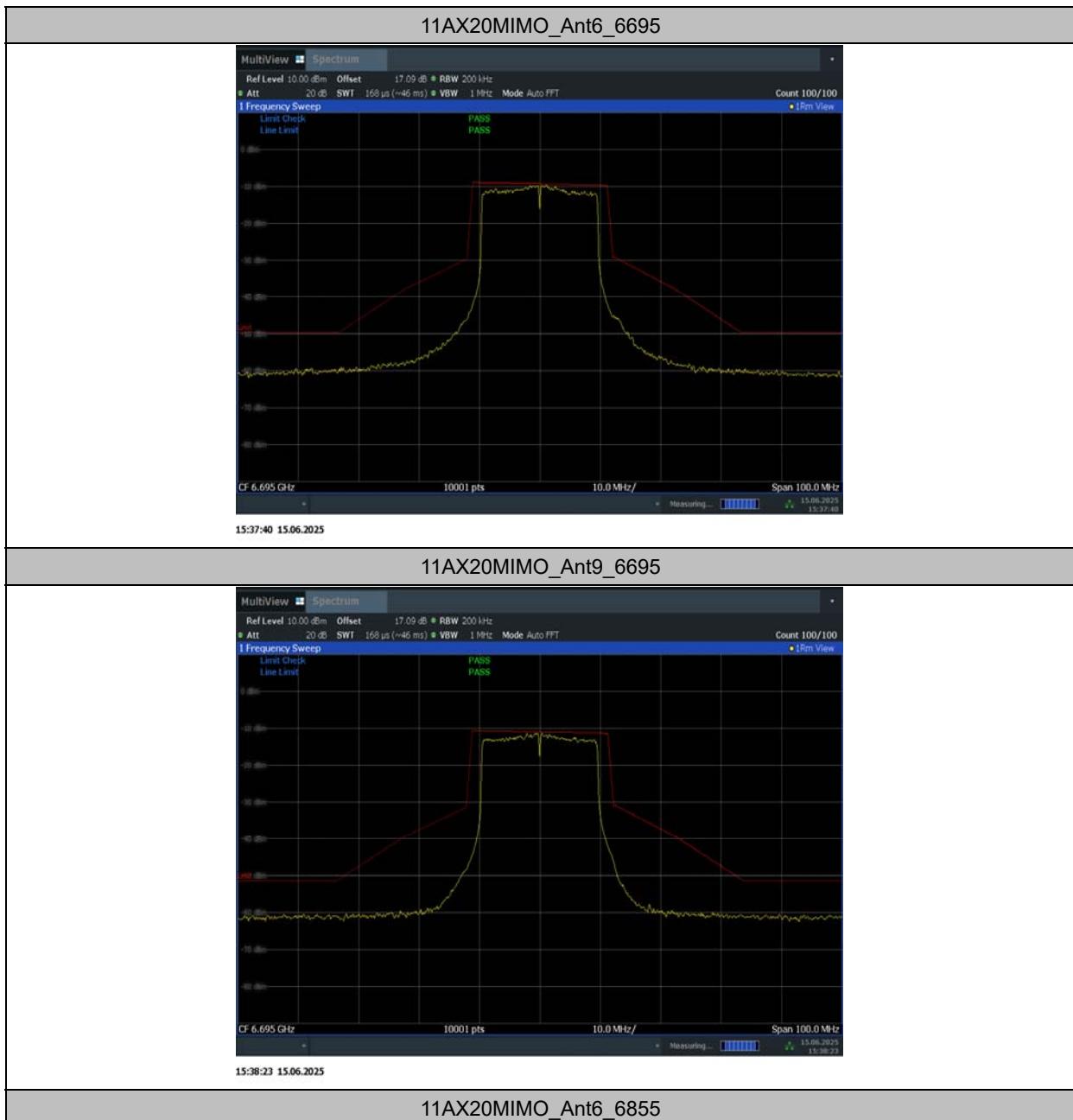


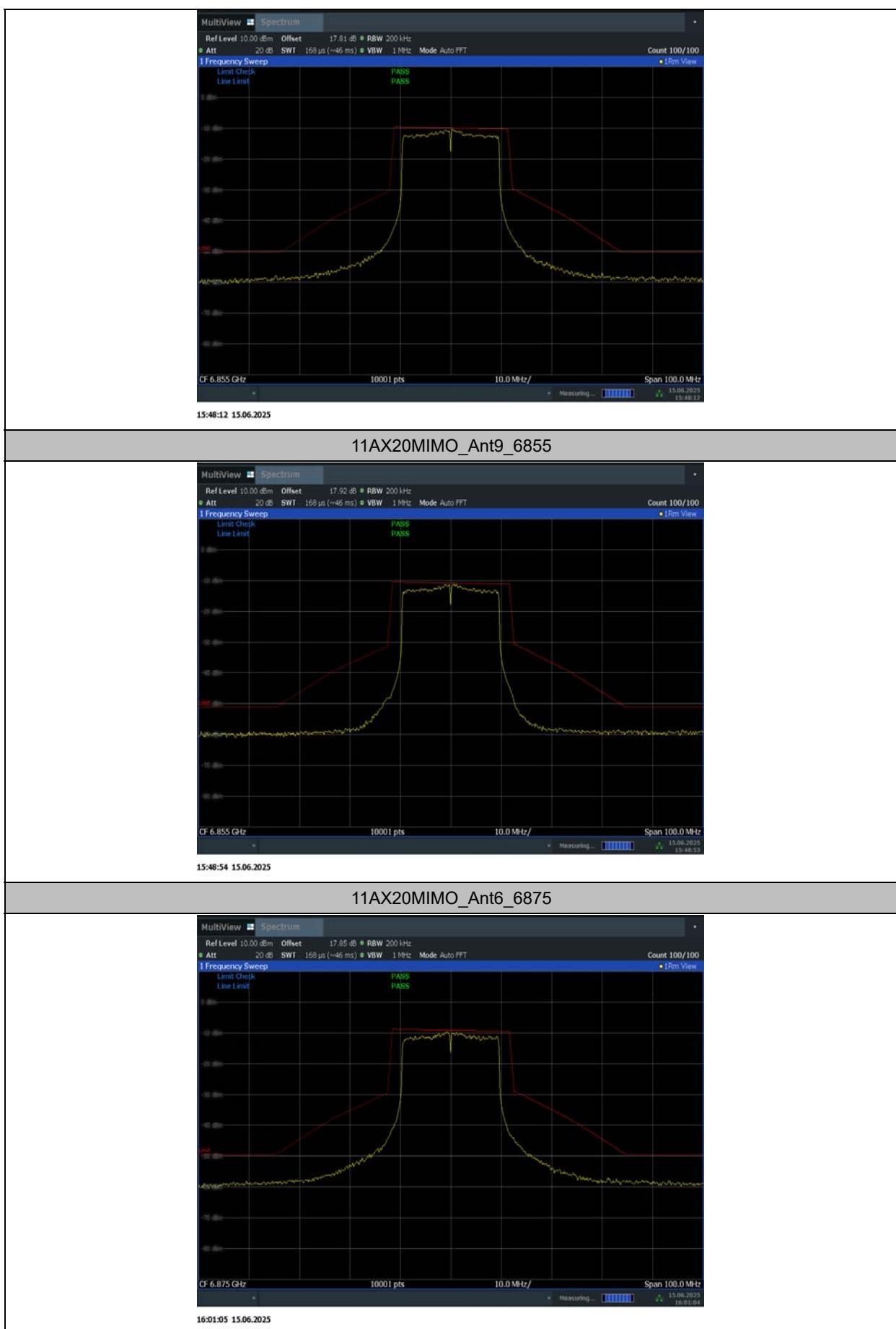


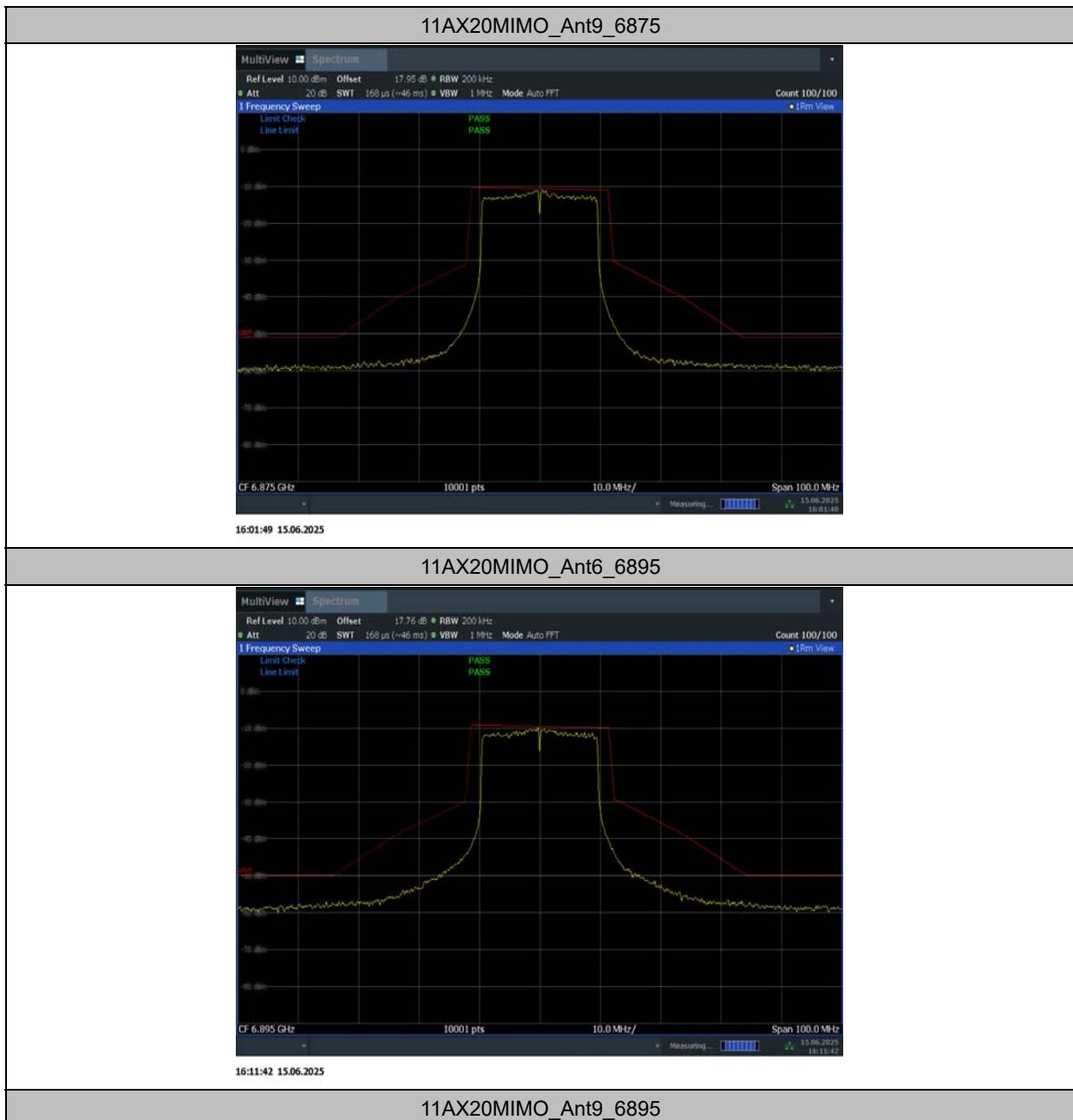


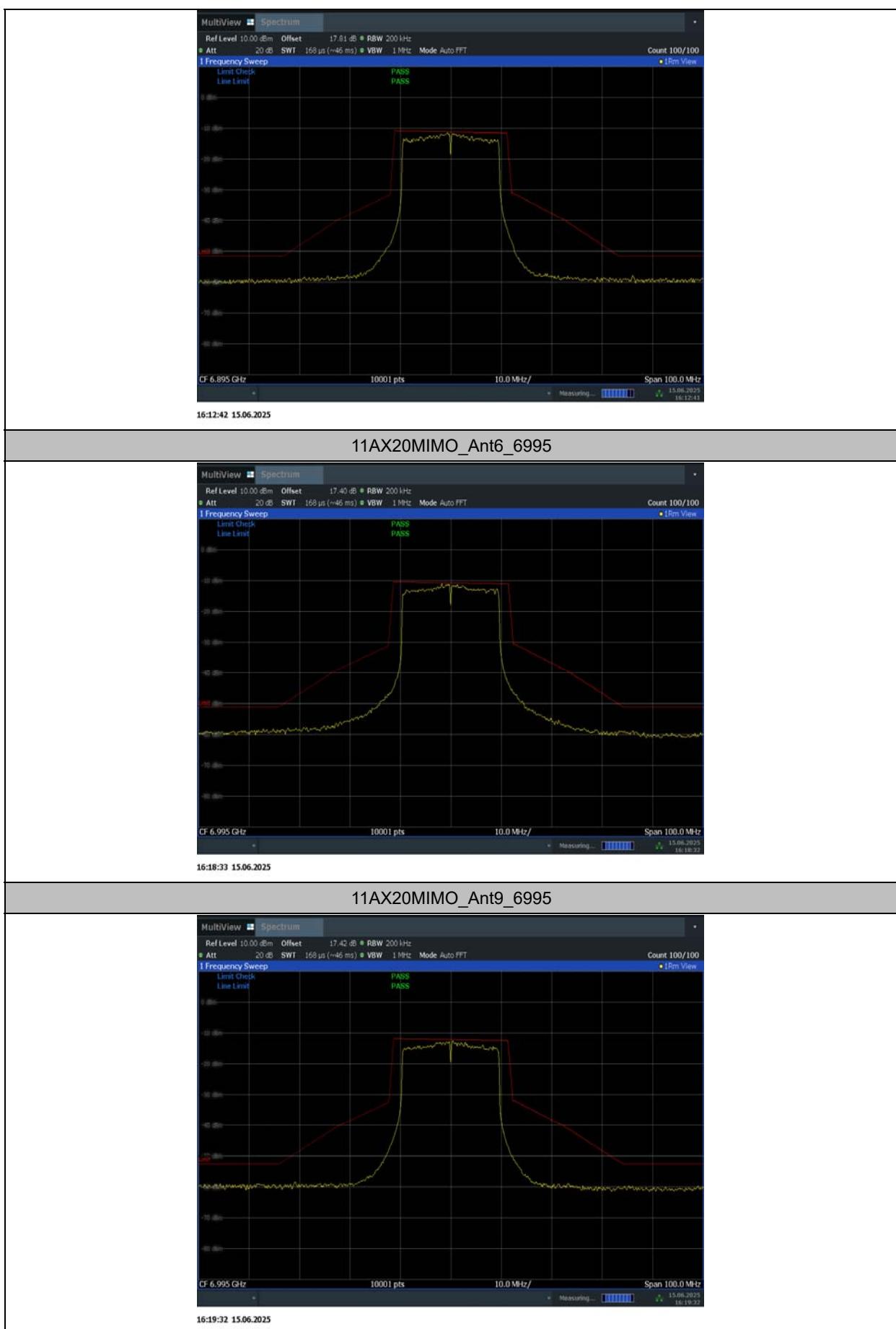


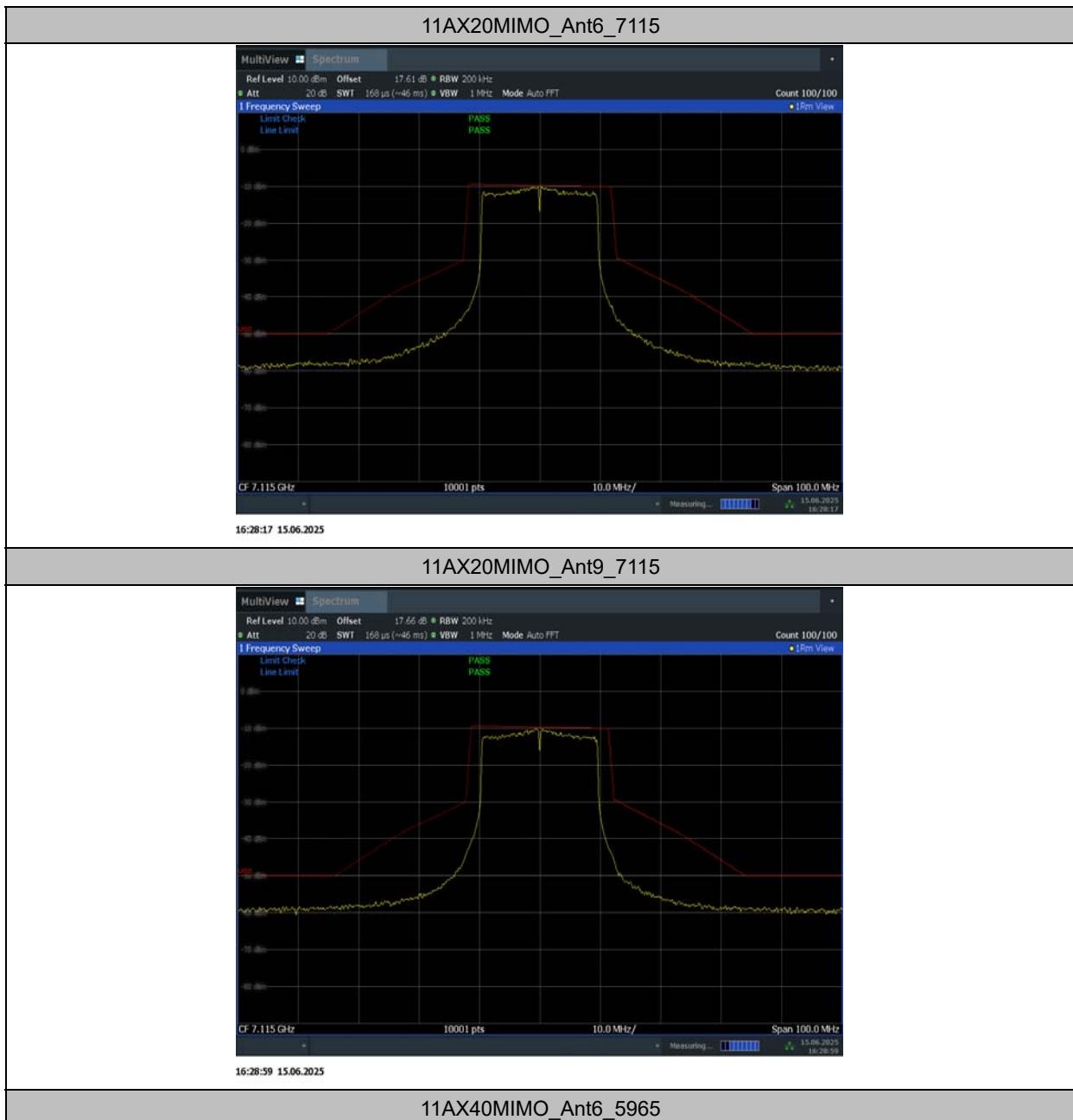


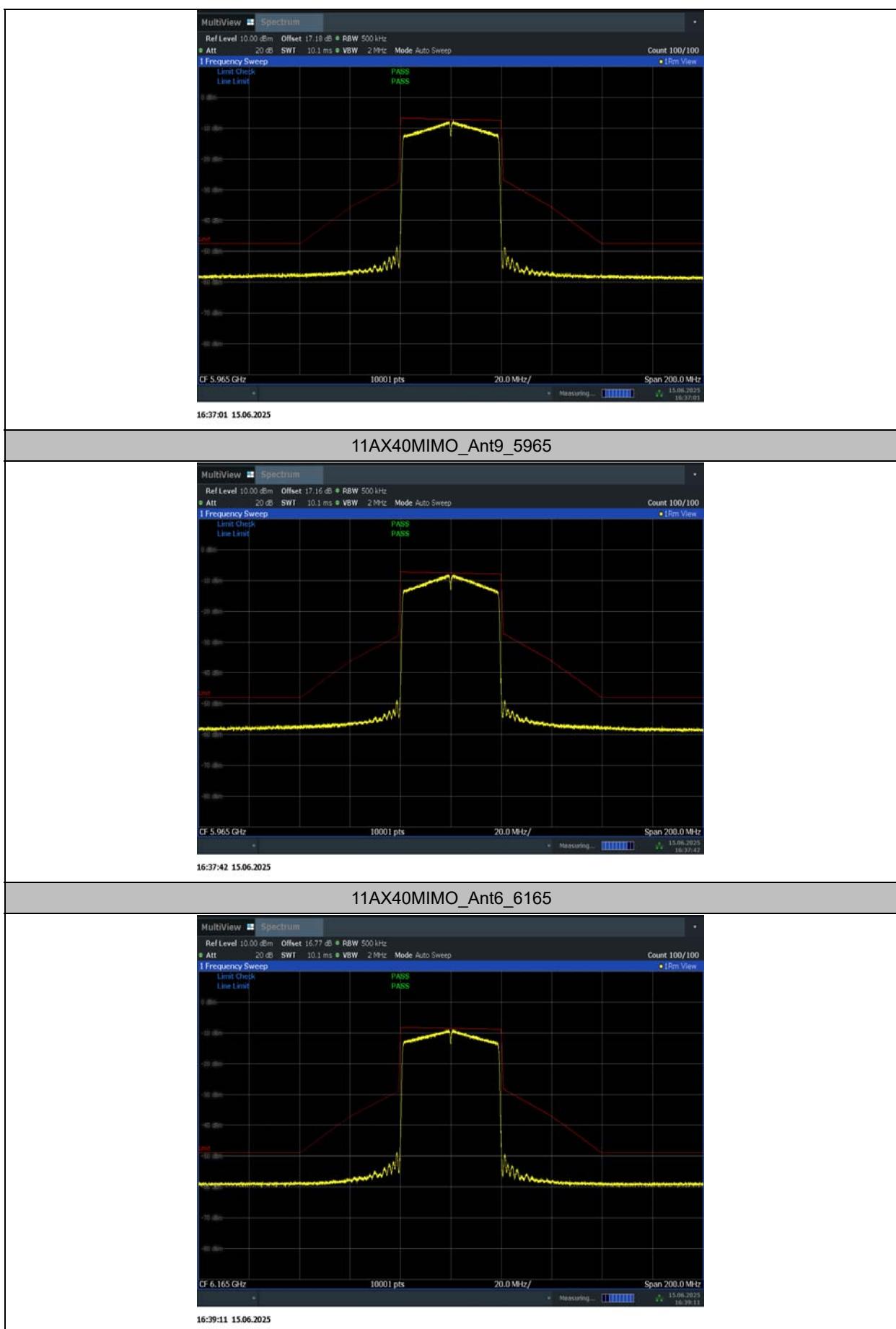


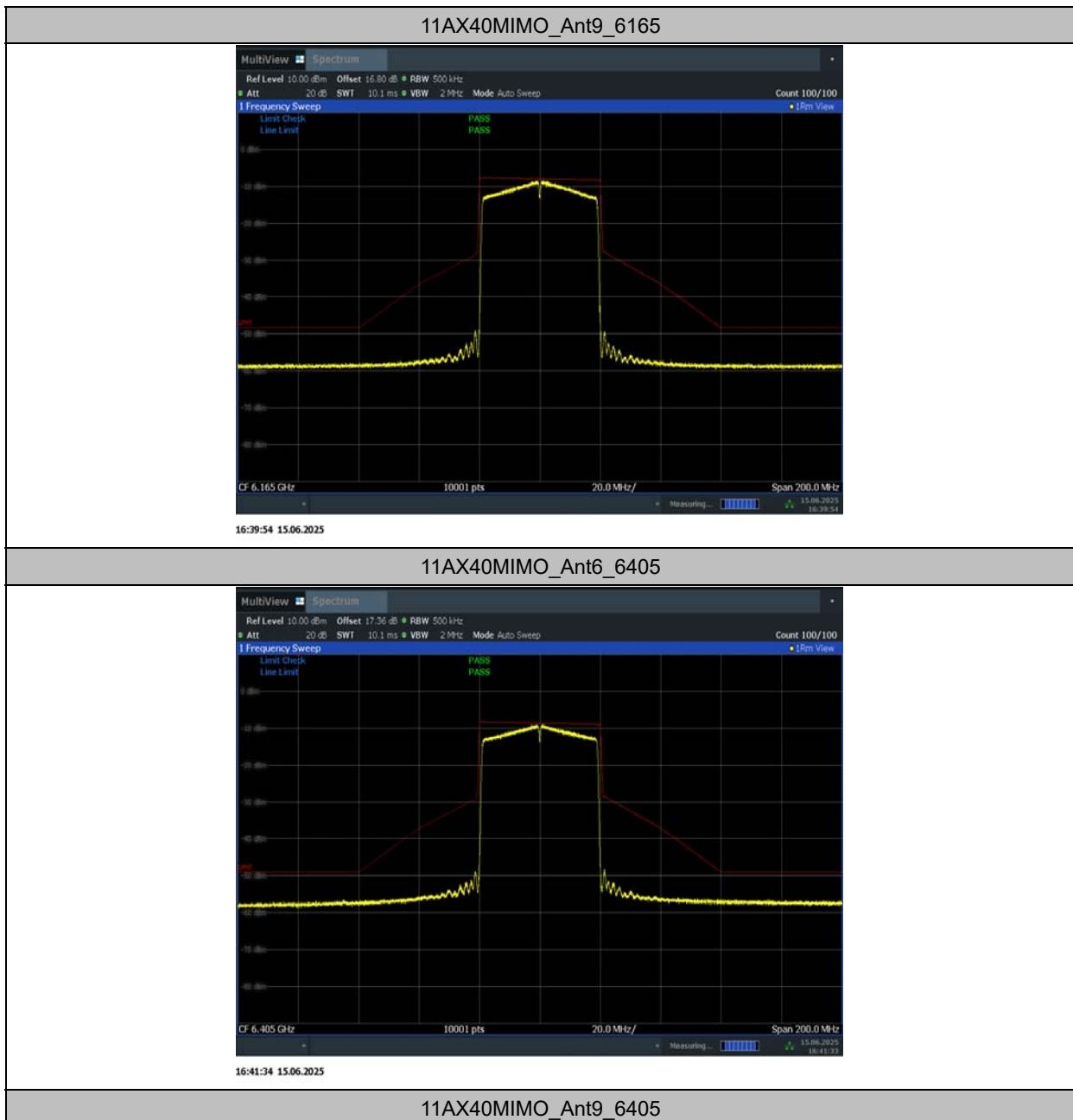


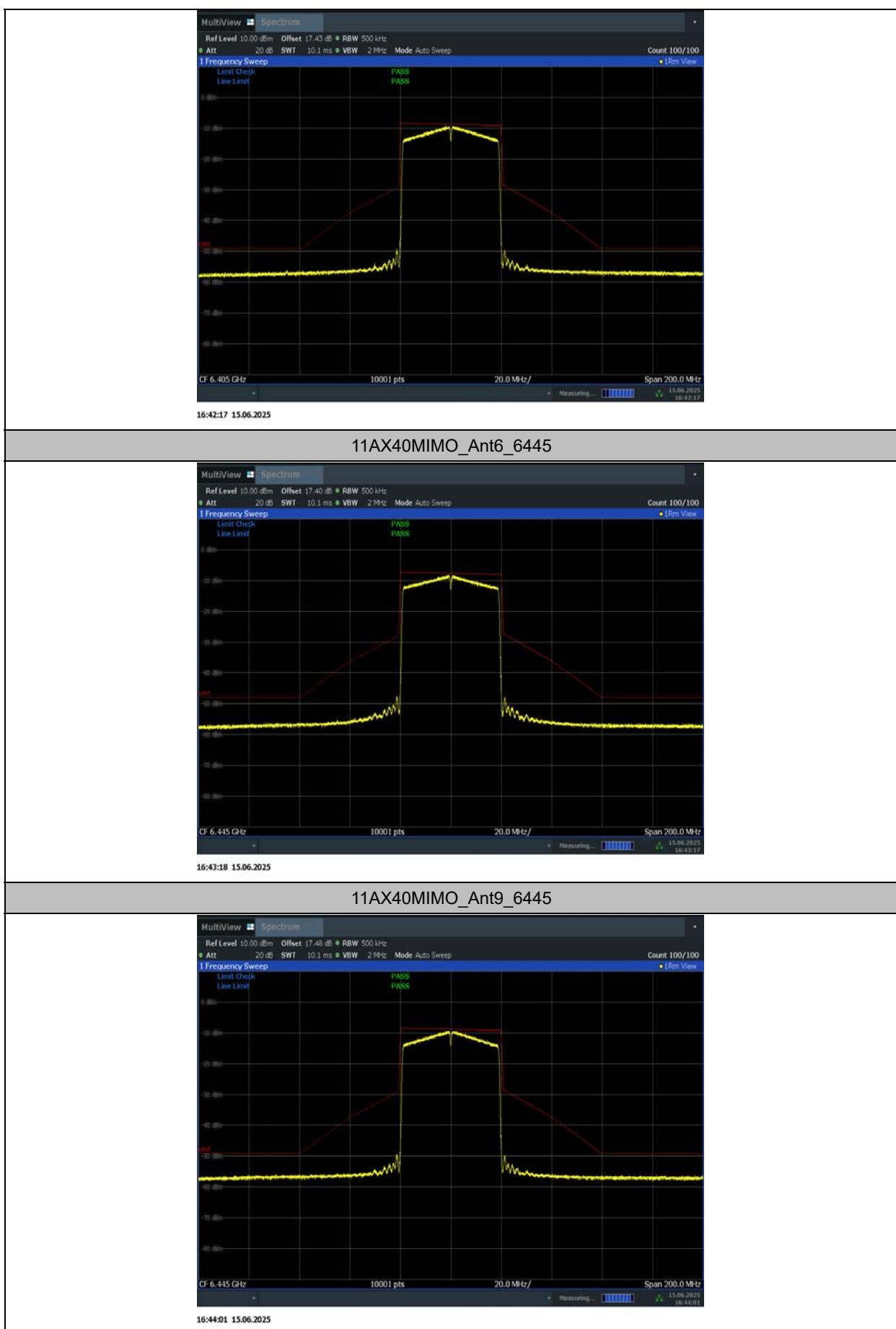


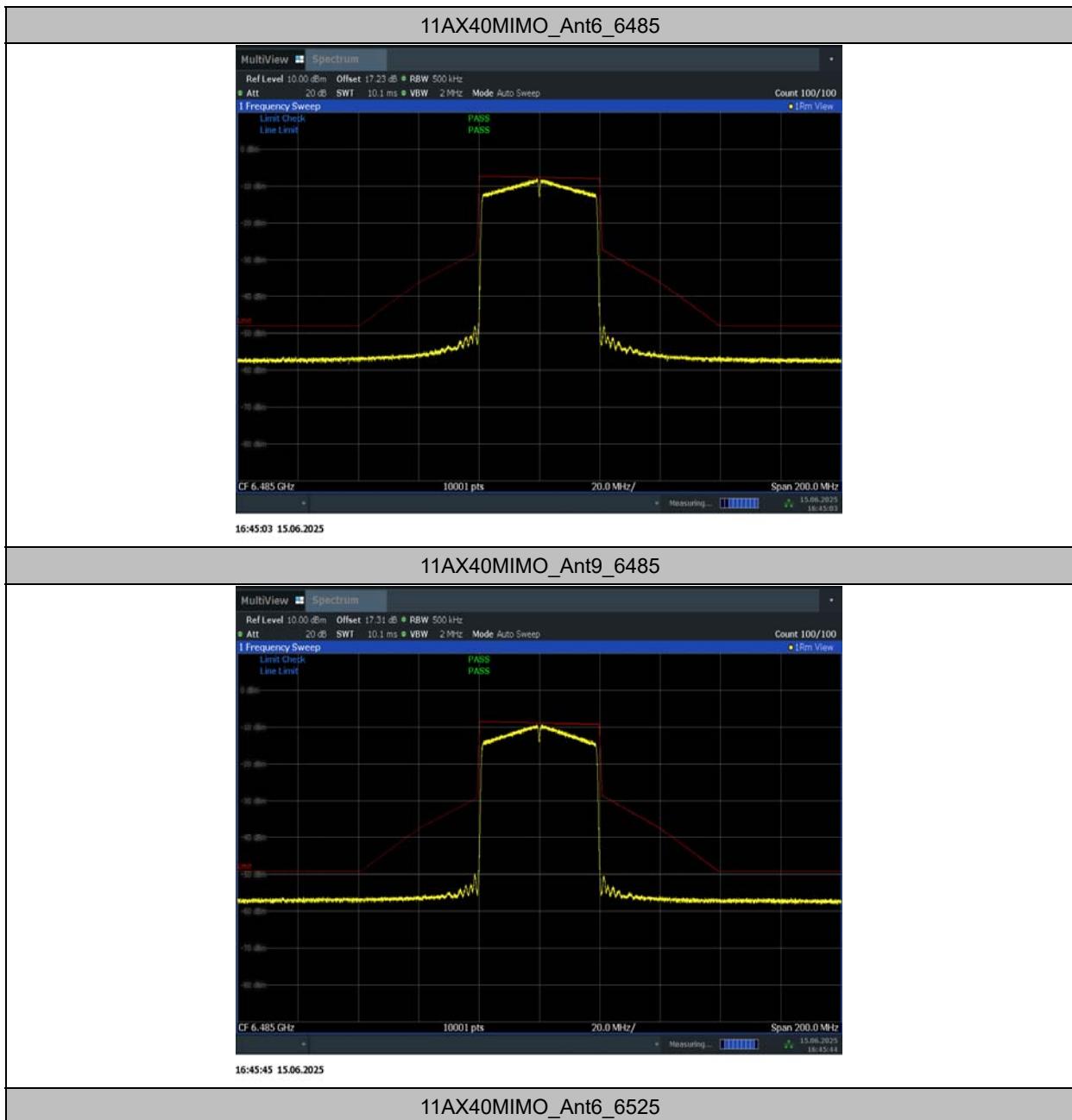


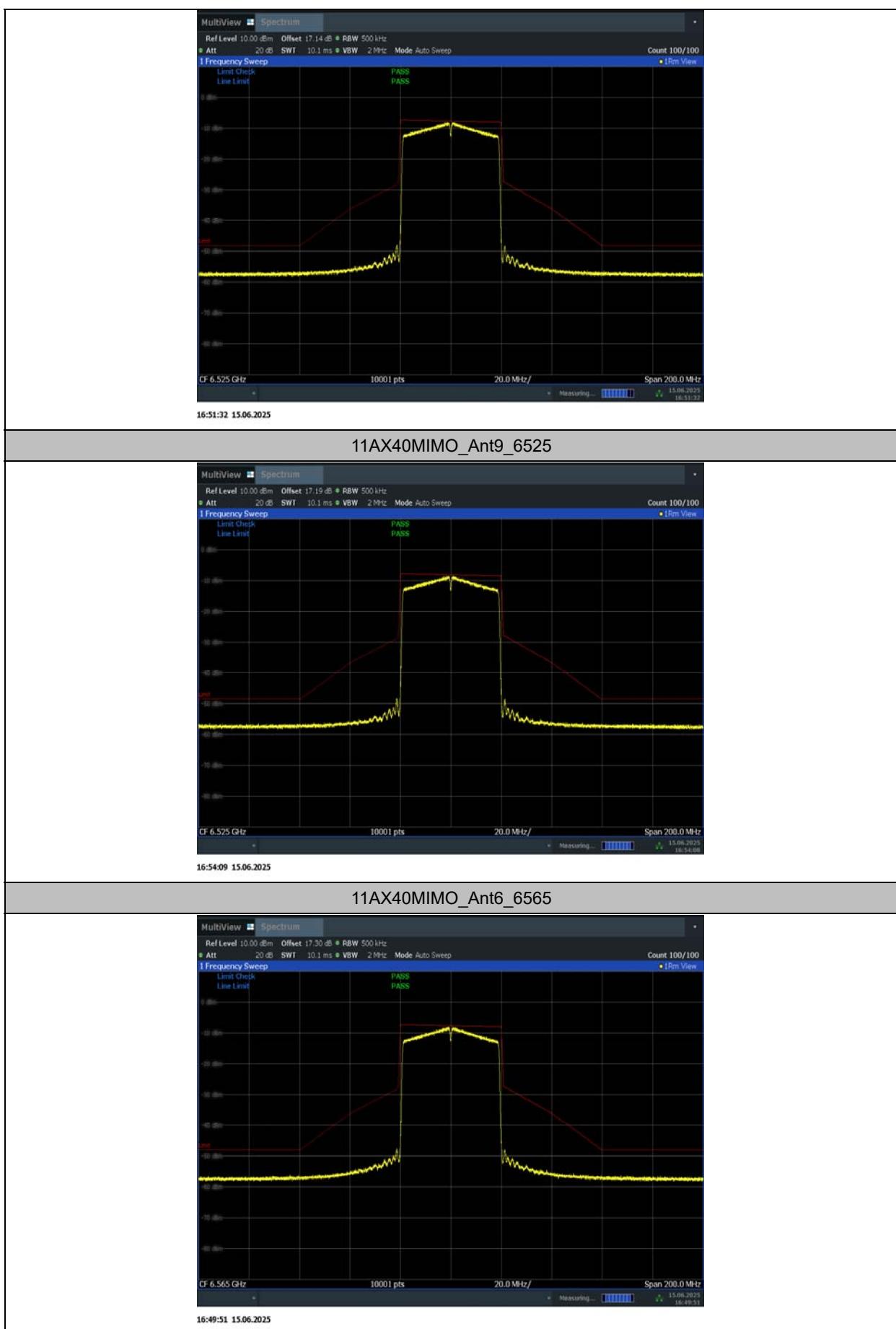


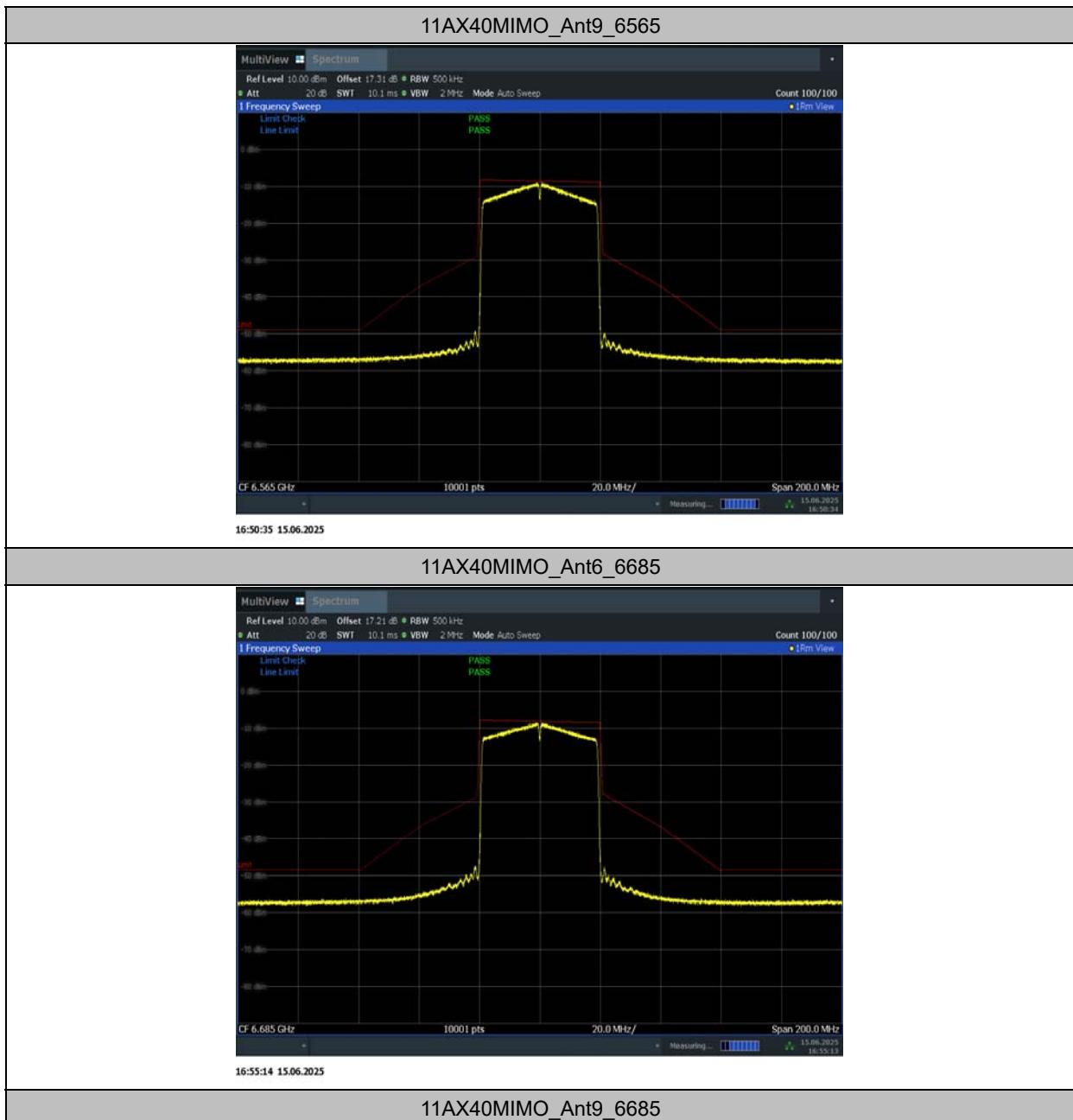


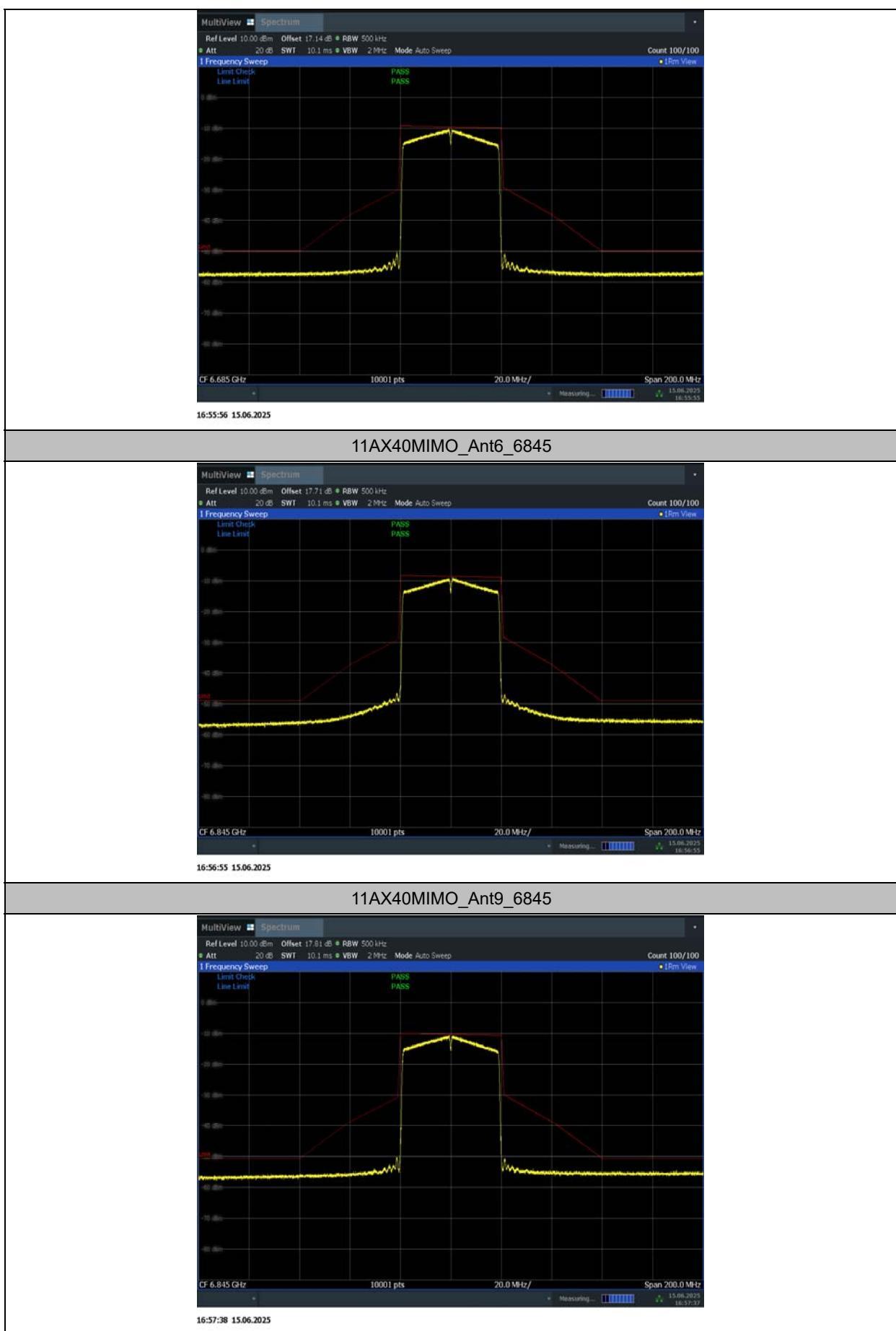


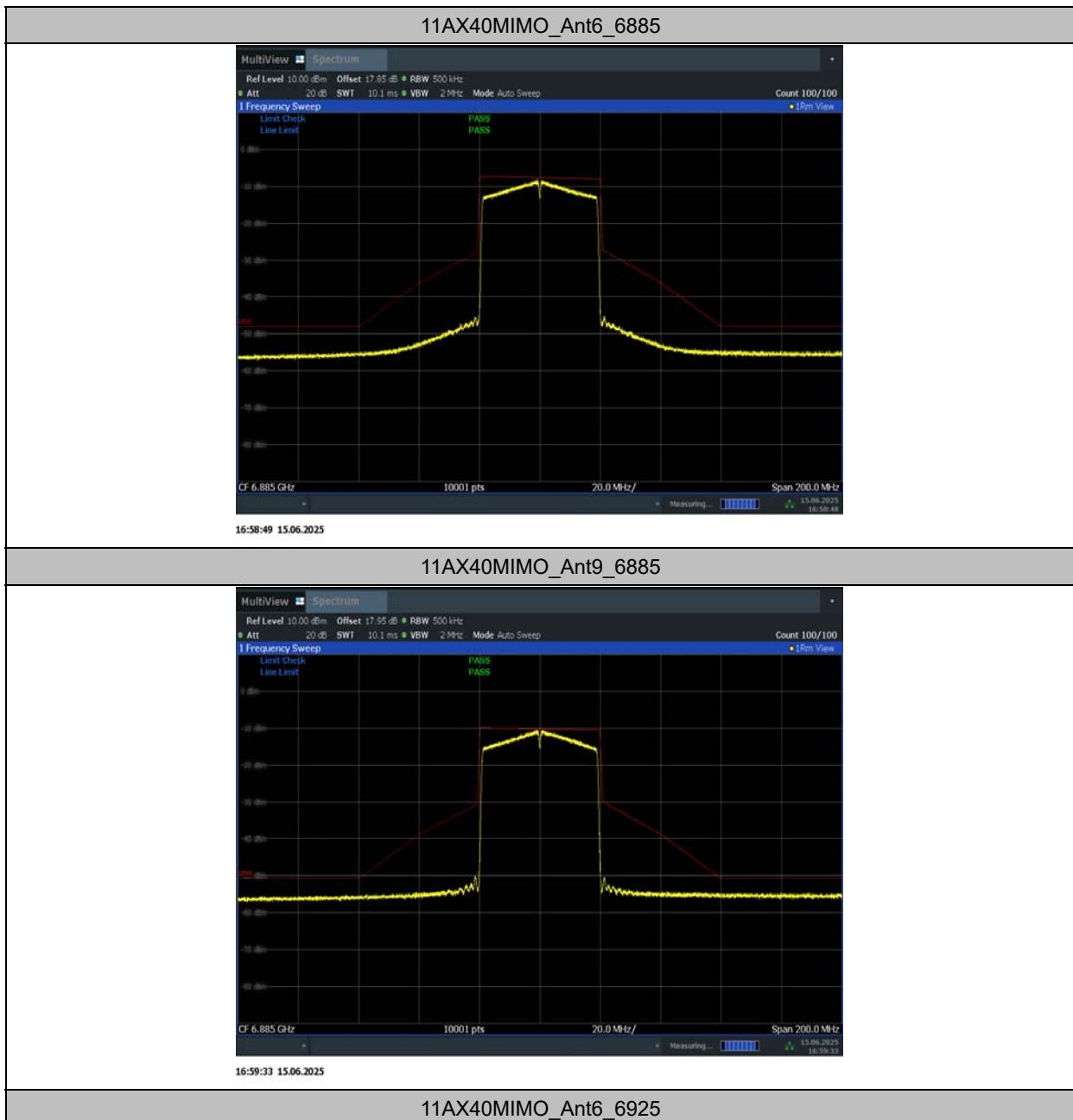


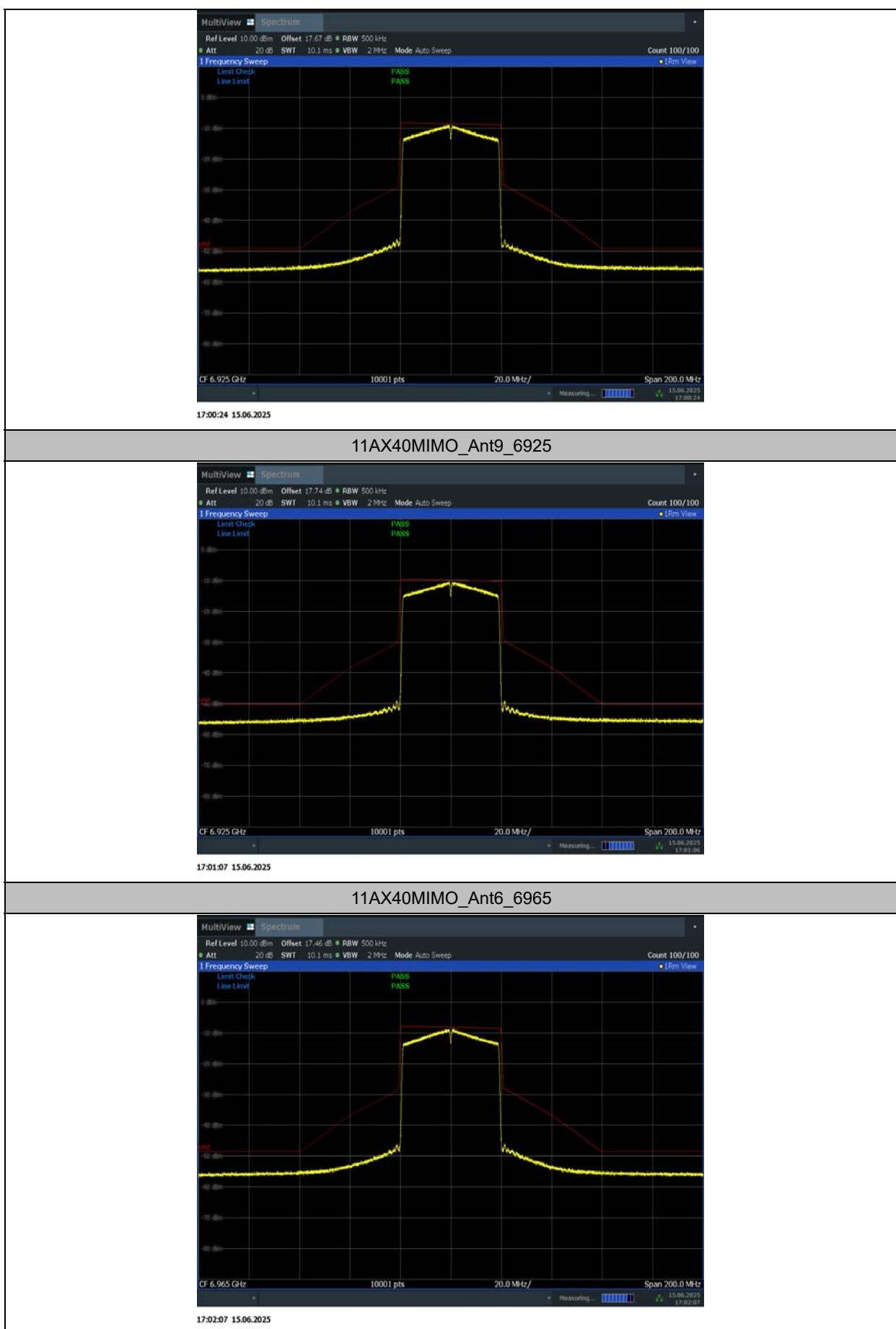


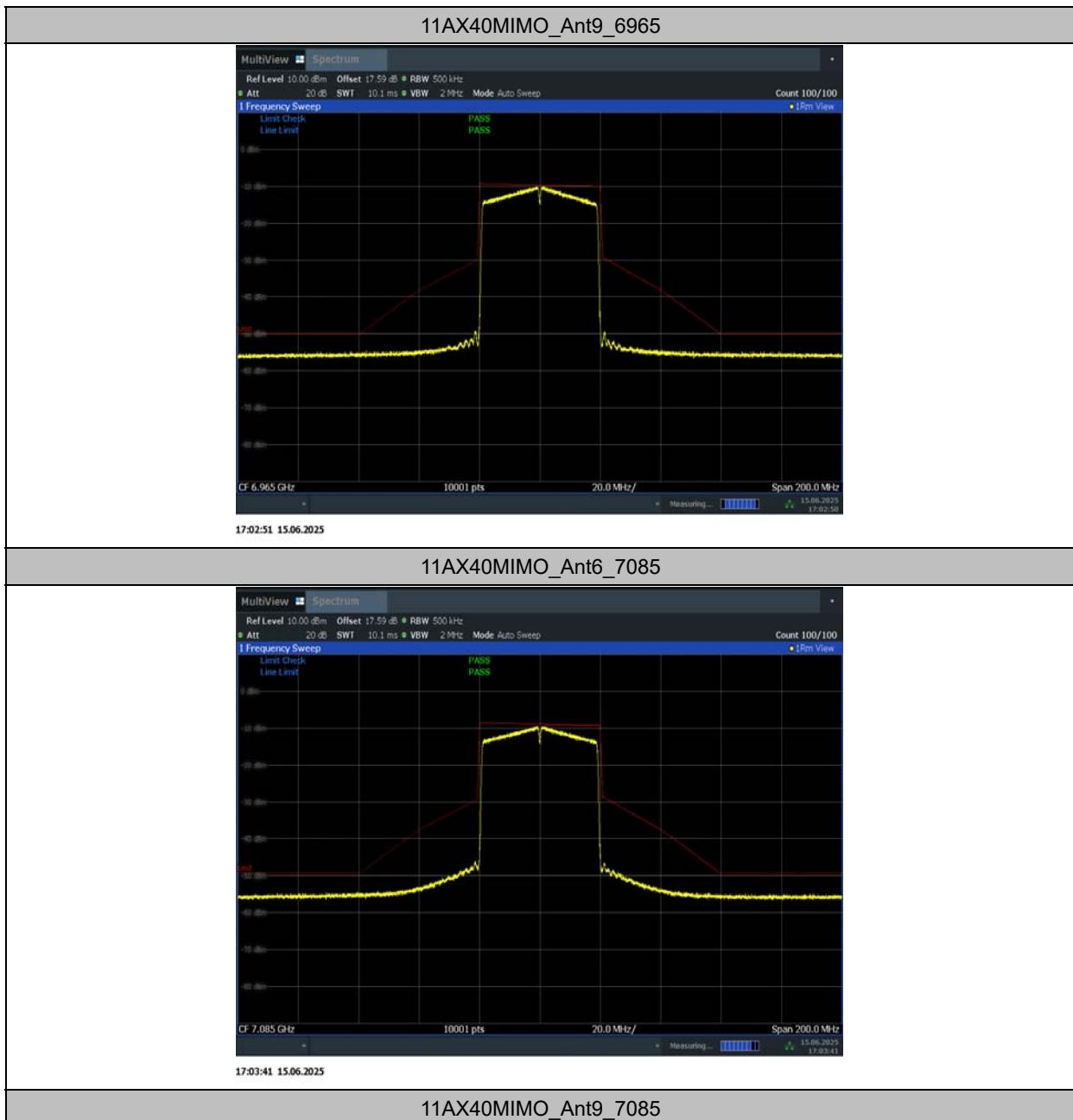


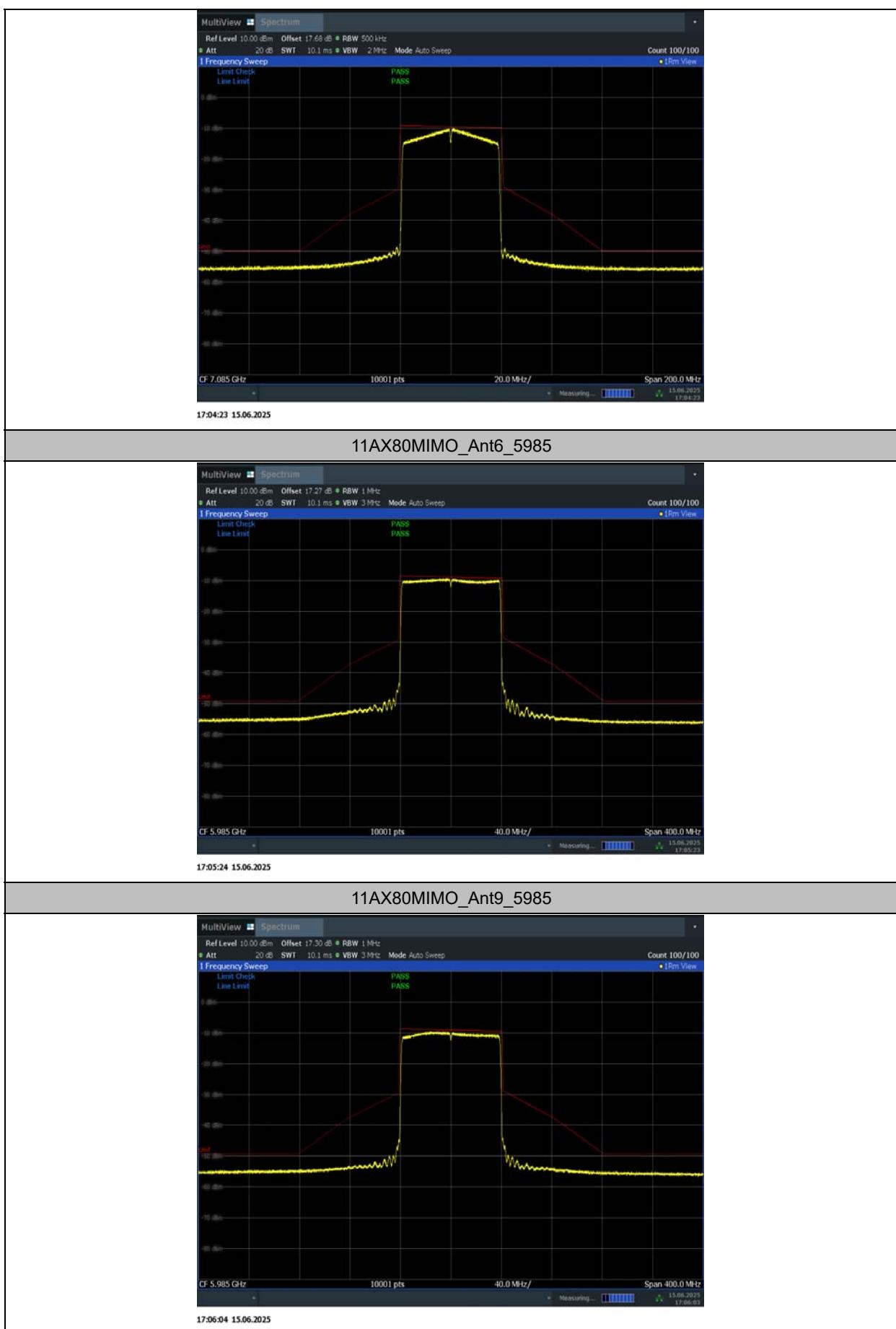


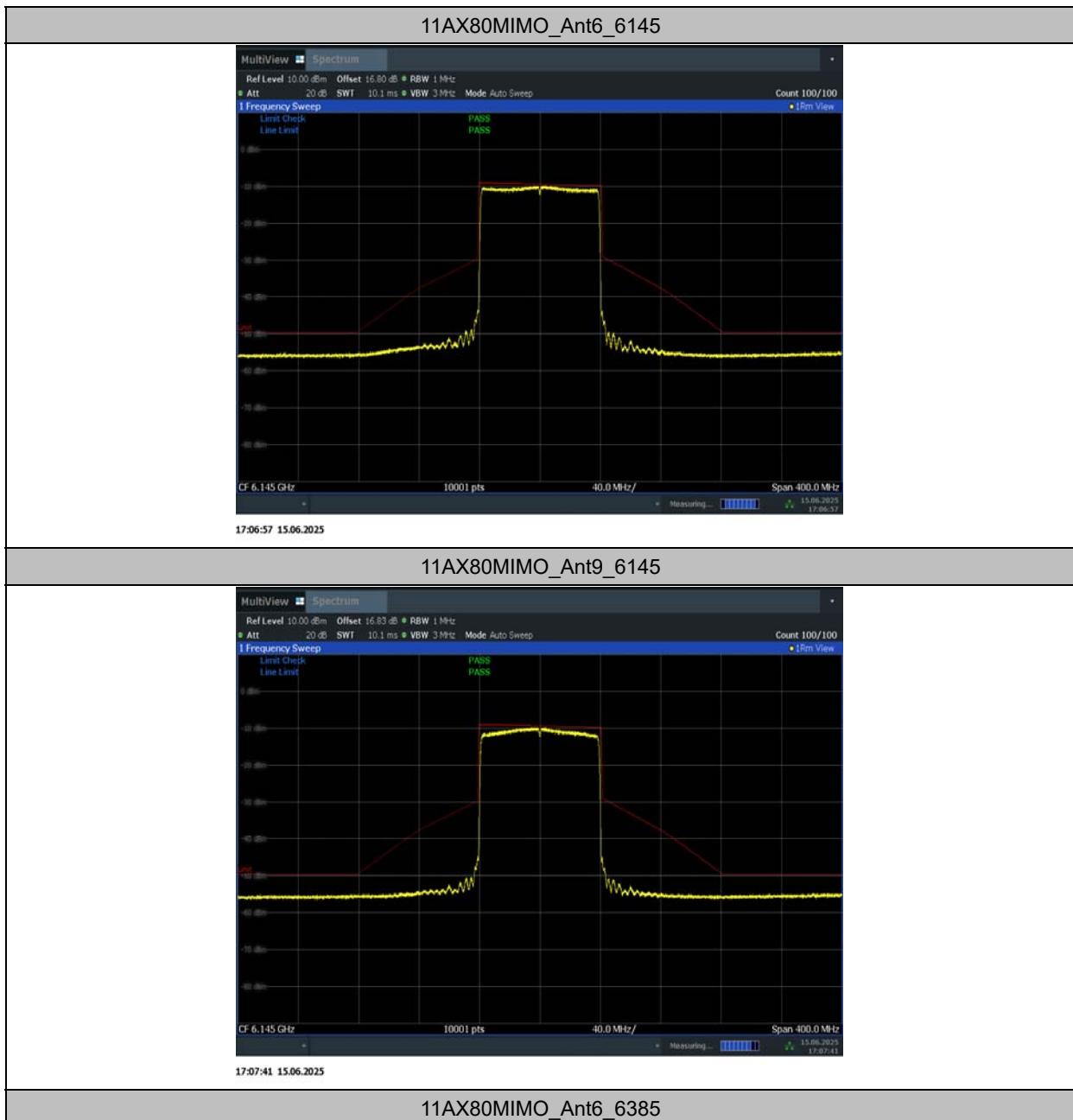


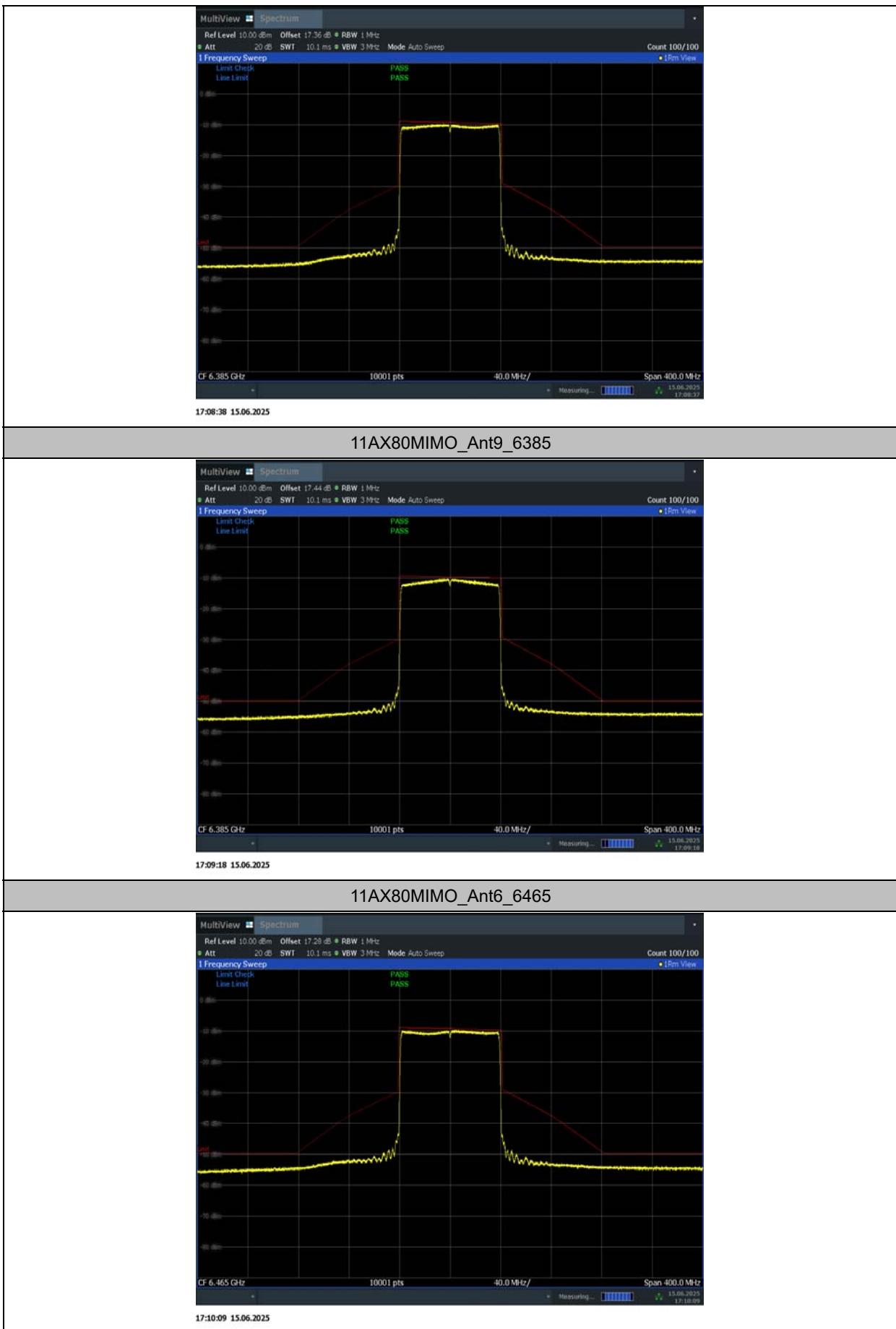


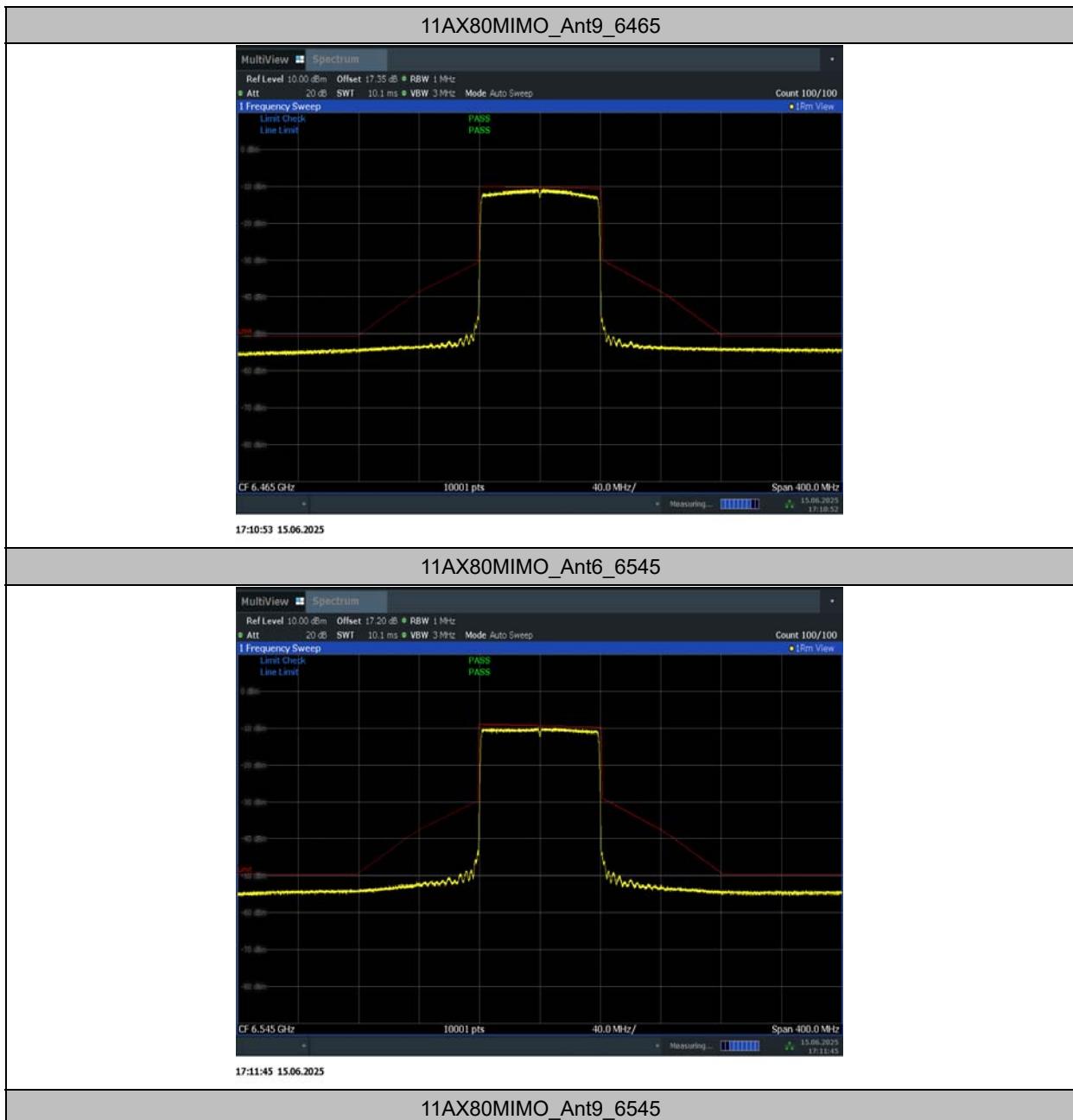


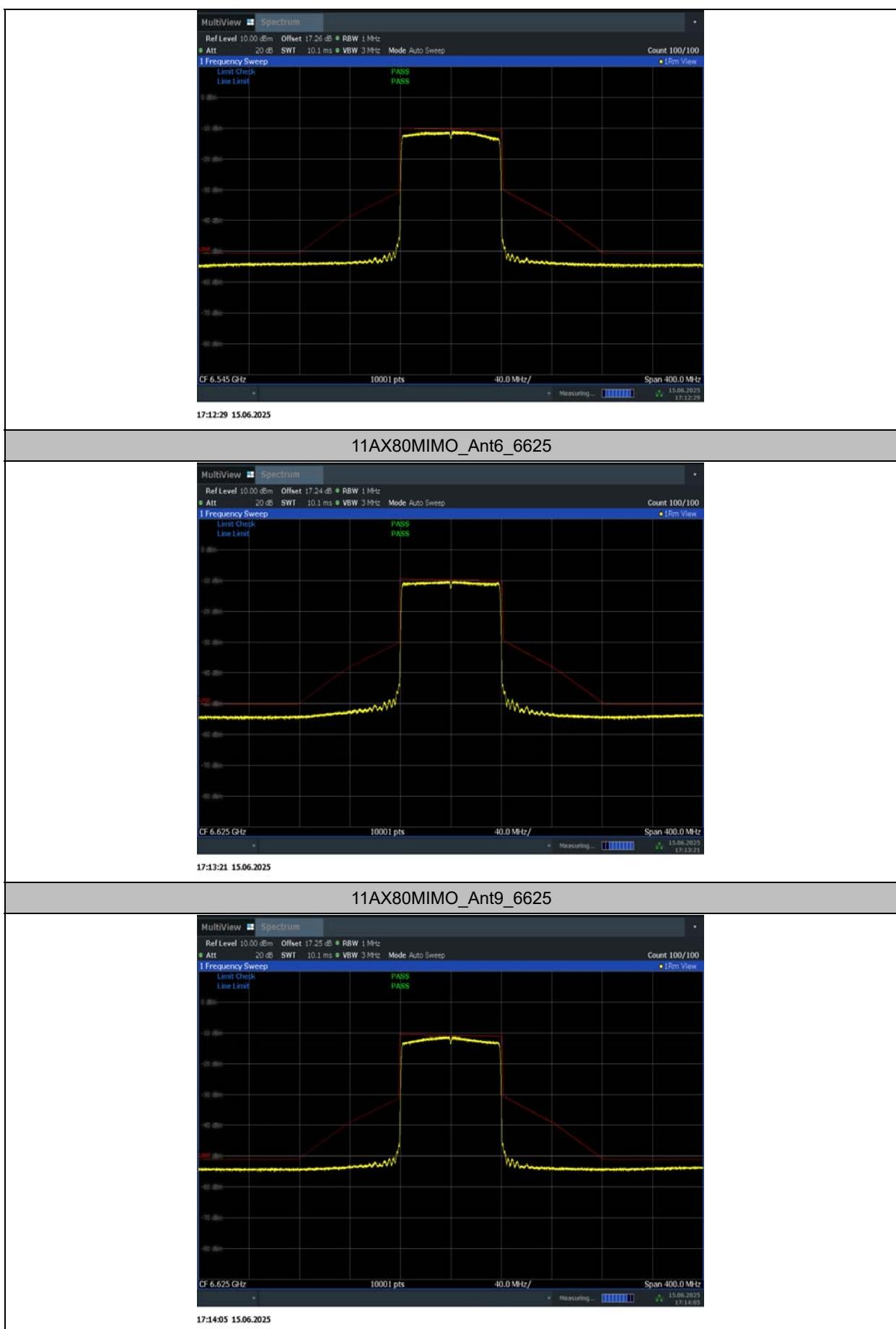


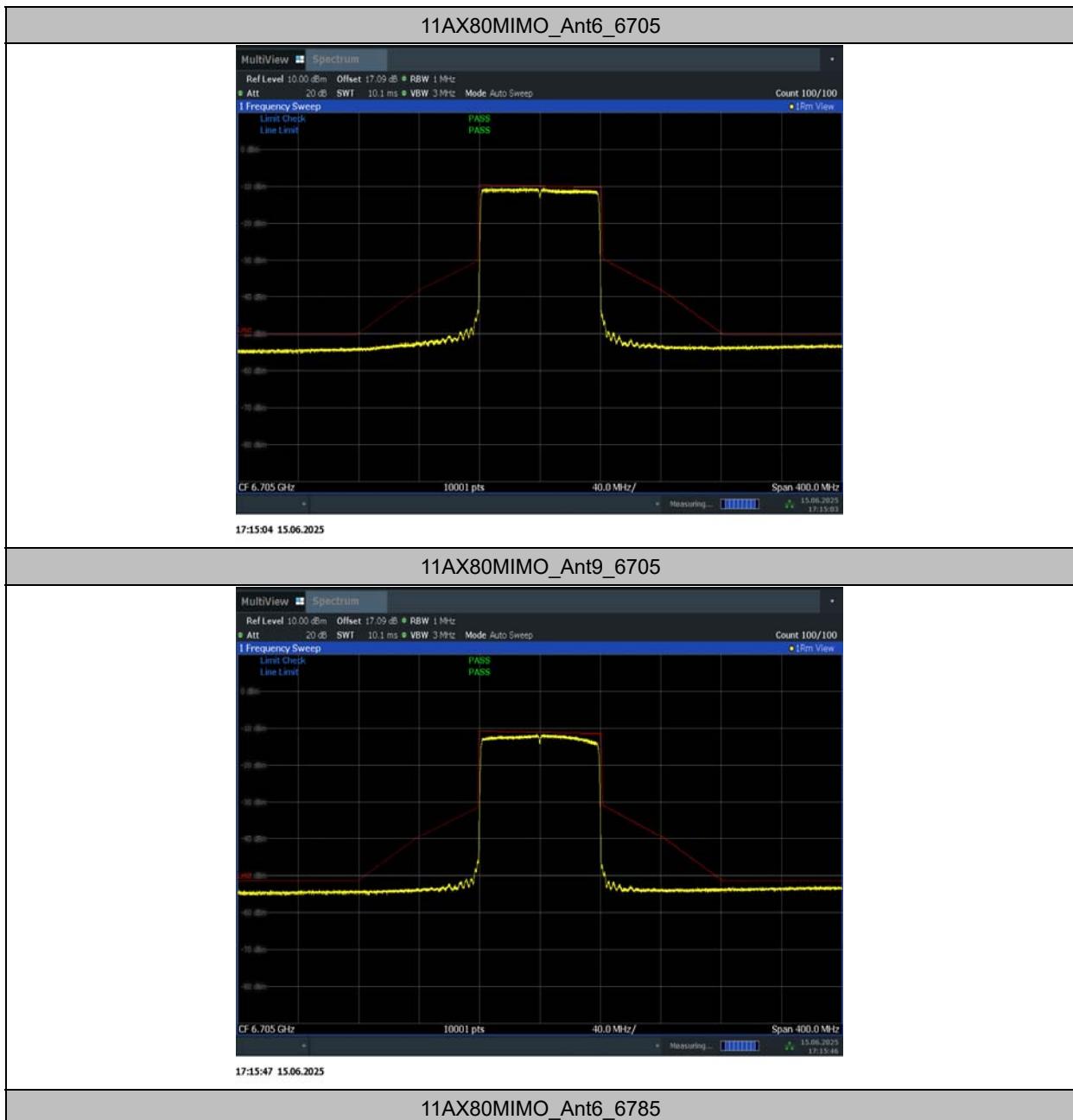


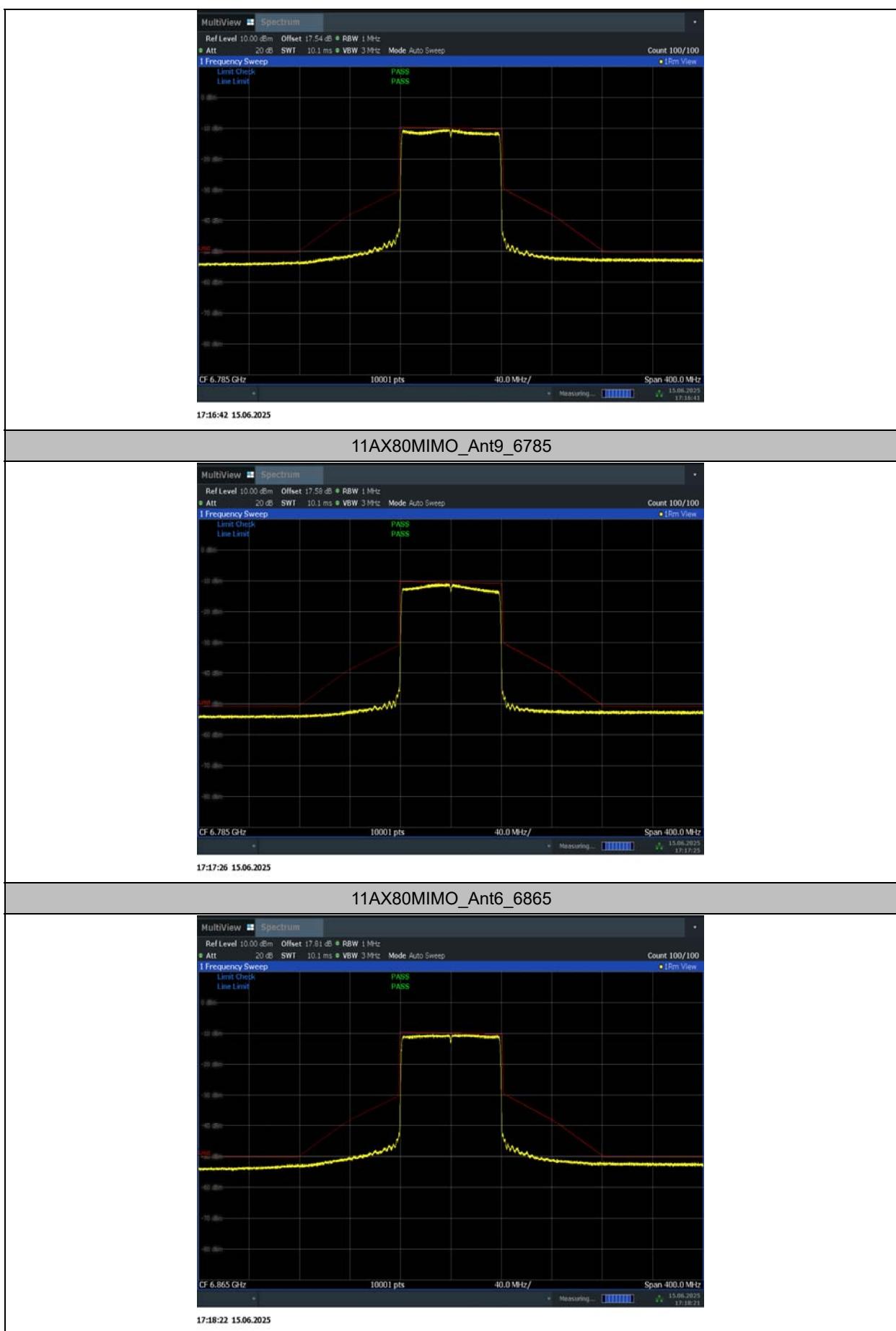


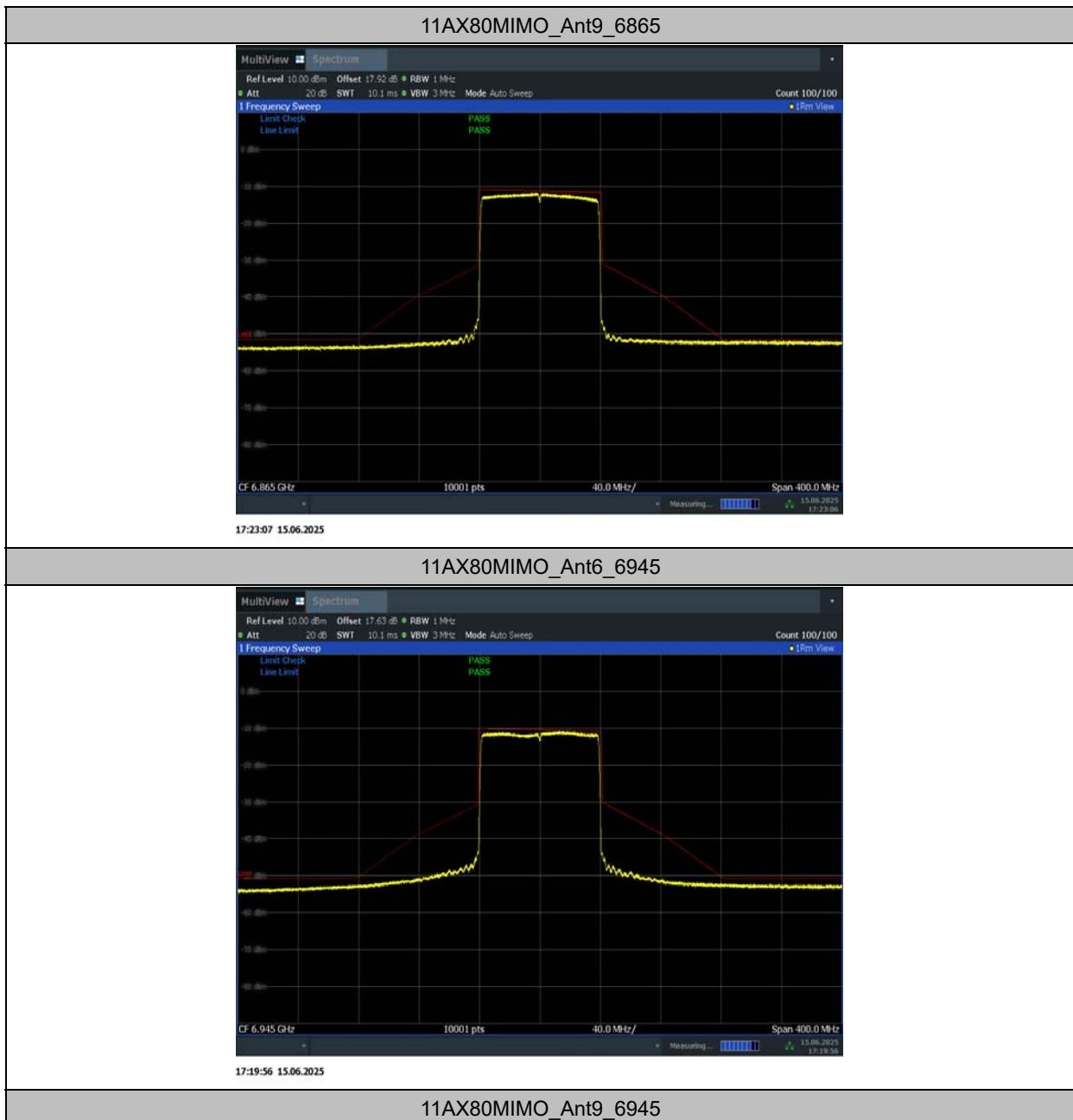


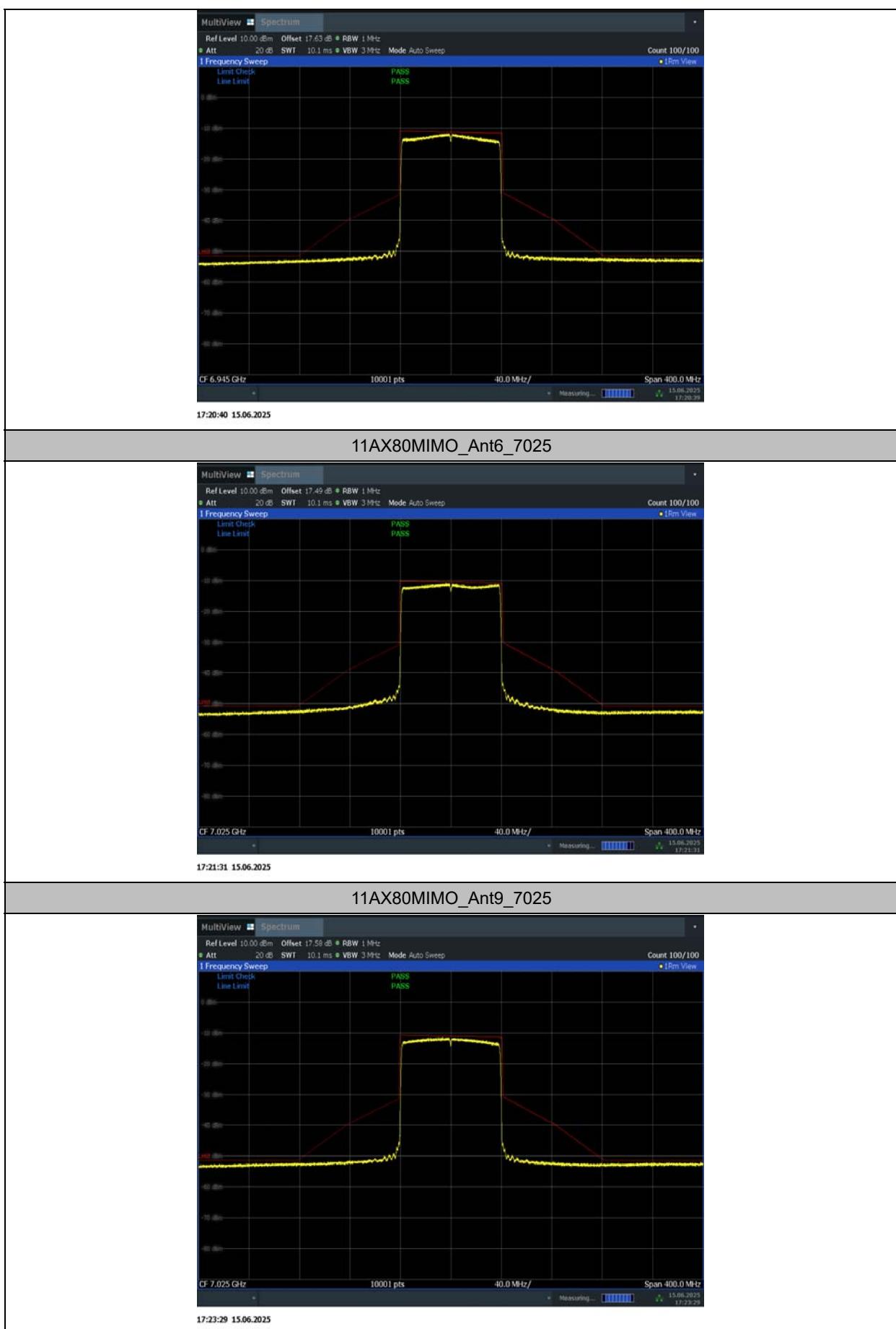












11ax-RU

Test Mode	Antenna	Frequency [MHz]	RU Size	RU Index	Result	Limit	Verdict
11AX20MIMO	Ant6	5955	26Tone	RU0	See test graph	See test graph	PASS
			52Tone	RU37	See test graph	See test graph	PASS
			106Tone	RU53	See test graph	See test graph	PASS
	Ant9	5955	26Tone	RU0	See test graph	See test graph	PASS
			52Tone	RU37	See test graph	See test graph	PASS
			106Tone	RU53	See test graph	See test graph	PASS
	Ant6	6175	26Tone	RU0	See test graph	See test graph	PASS
			52Tone	RU37	See test graph	See test graph	PASS
			106Tone	RU53	See test graph	See test graph	PASS
	Ant9	6175	26Tone	RU0	See test graph	See test graph	PASS
			52Tone	RU37	See test graph	See test graph	PASS
			106Tone	RU53	See test graph	See test graph	PASS
	Ant6	6415	26Tone	RU0	See test graph	See test graph	PASS
			52Tone	RU37	See test graph	See test graph	PASS
			106Tone	RU53	See test graph	See test graph	PASS
	Ant9	6415	26Tone	RU0	See test graph	See test graph	PASS
			52Tone	RU37	See test graph	See test graph	PASS
			106Tone	RU53	See test graph	See test graph	PASS
	Ant6	6435	26Tone	RU0	See test graph	See test graph	PASS
			52Tone	RU37	See test graph	See test graph	PASS
			106Tone	RU53	See test graph	See test graph	PASS
	Ant9	6435	26Tone	RU0	See test graph	See test graph	PASS
			52Tone	RU37	See test graph	See test graph	PASS
			106Tone	RU53	See test graph	See test graph	PASS
	Ant6	6475	26Tone	RU0	See test graph	See test graph	PASS
			52Tone	RU37	See test graph	See test graph	PASS
			106Tone	RU53	See test graph	See test graph	PASS
	Ant9	6475	26Tone	RU0	See test graph	See test graph	PASS
			52Tone	RU37	See test graph	See test graph	PASS
			106Tone	RU53	See test graph	See test graph	PASS
	Ant6	6515	26Tone	RU0	See test graph	See test graph	PASS
			52Tone	RU37	See test graph	See test graph	PASS
			106Tone	RU53	See test graph	See test graph	PASS
	Ant9	6515	26Tone	RU0	See test graph	See test graph	PASS
			52Tone	RU37	See test graph	See test graph	PASS
			106Tone	RU53	See test graph	See test graph	PASS
	Ant6	6535	26Tone	RU8	See test graph	See test graph	PASS
			52Tone	RU40	See test graph	See test graph	PASS
			106Tone	RU54	See test graph	See test graph	PASS
	Ant9	6535	26Tone	RU8	See test graph	See test graph	PASS

			52Tone	RU40	See test graph	See test graph	PASS
			106Tone	RU54	See test graph	See test graph	PASS
			26Tone	RU8	See test graph	See test graph	PASS
Ant6	6695		52Tone	RU40	See test graph	See test graph	PASS
			106Tone	RU54	See test graph	See test graph	PASS
			26Tone	RU8	See test graph	See test graph	PASS
Ant9	6695		52Tone	RU40	See test graph	See test graph	PASS
			106Tone	RU54	See test graph	See test graph	PASS
			26Tone	RU8	See test graph	See test graph	PASS
Ant6	6855		52Tone	RU40	See test graph	See test graph	PASS
			106Tone	RU54	See test graph	See test graph	PASS
			26Tone	RU8	See test graph	See test graph	PASS
Ant9	6855		52Tone	RU40	See test graph	See test graph	PASS
			106Tone	RU54	See test graph	See test graph	PASS
			26Tone	RU8	See test graph	See test graph	PASS
Ant6	6875		52Tone	RU40	See test graph	See test graph	PASS
			106Tone	RU54	See test graph	See test graph	PASS
			26Tone	RU8	See test graph	See test graph	PASS
Ant9	6875		52Tone	RU40	See test graph	See test graph	PASS
			106Tone	RU54	See test graph	See test graph	PASS
			26Tone	RU8	See test graph	See test graph	PASS
Ant6	6895		52Tone	RU40	See test graph	See test graph	PASS
			106Tone	RU54	See test graph	See test graph	PASS
			26Tone	RU8	See test graph	See test graph	PASS
Ant9	6895		52Tone	RU40	See test graph	See test graph	PASS
			106Tone	RU54	See test graph	See test graph	PASS
			26Tone	RU8	See test graph	See test graph	PASS
Ant6	6995		52Tone	RU40	See test graph	See test graph	PASS
			106Tone	RU54	See test graph	See test graph	PASS
			26Tone	RU8	See test graph	See test graph	PASS
Ant9	6995		52Tone	RU40	See test graph	See test graph	PASS
			106Tone	RU54	See test graph	See test graph	PASS
			26Tone	RU8	See test graph	See test graph	PASS
Ant6	7115		52Tone	RU40	See test graph	See test graph	PASS
			106Tone	RU54	See test graph	See test graph	PASS
			26Tone	RU8	See test graph	See test graph	PASS
Ant9	7115		52Tone	RU40	See test graph	See test graph	PASS
			106Tone	RU54	See test graph	See test graph	PASS
			26Tone	RU8	See test graph	See test graph	PASS

Test graphs as below:
