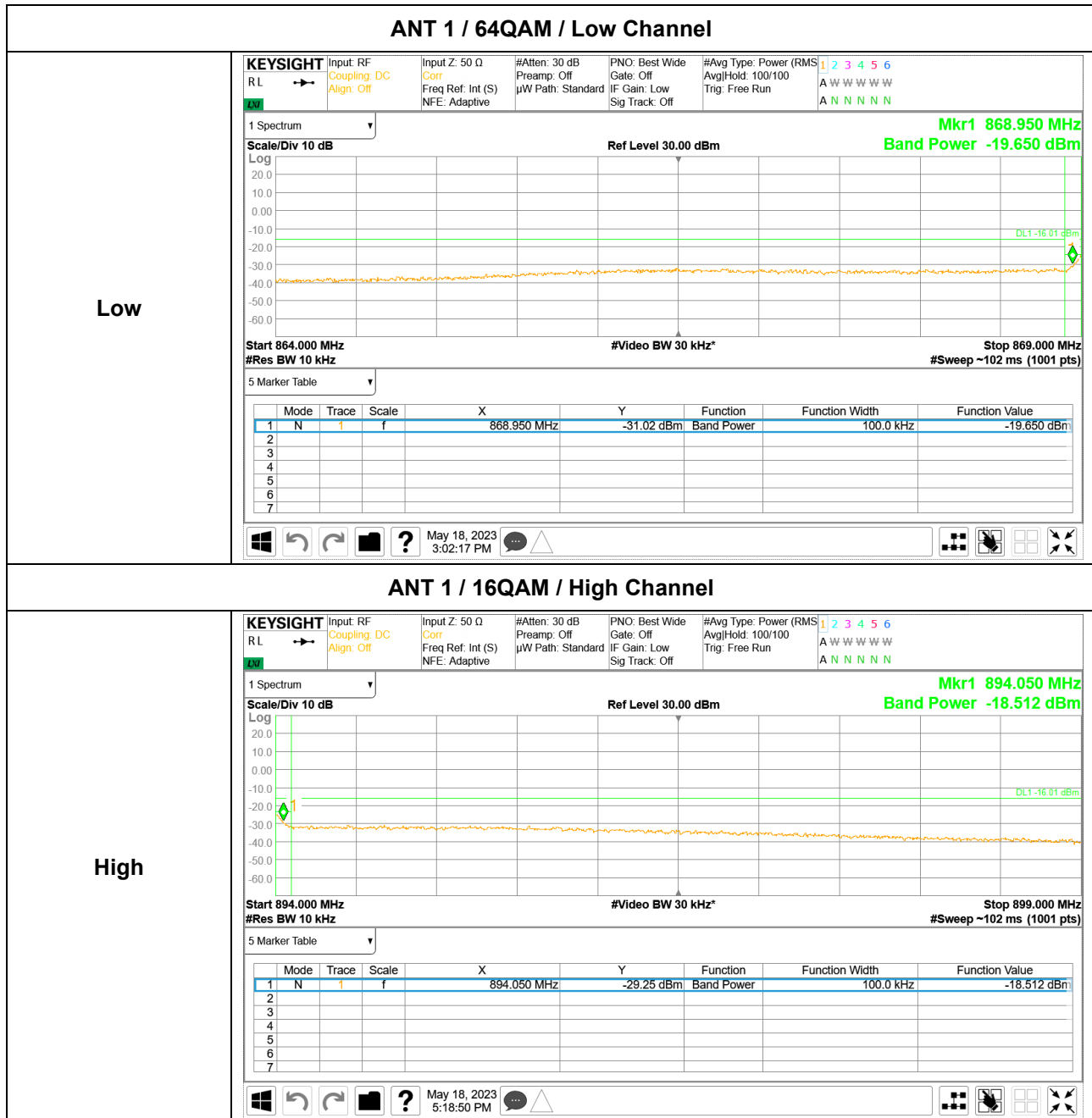


8.4.2. WORST PLOT OF OUT OF BAND EMISSIONS (BAND EDGE)

5G NR n5 15 MHz (1 Carrier) – 2TX



5G NR n5 15 MHz (1 Carrier) – 4TX



5G NR n5 10 MHz 1C + 5G NR n5 15 MHz 1C (2 Carrier) – 2TX – Contiguous



5G NR n5 10 MHz 1C + 5G NR n5 15 MHz 1C (2 Carrier) – 4TX – Contiguous



5G NR n5 15 MHz 1C + LTE B5 10 MHz 1C (2 Carrier) – 2TX – Contiguous



5G NR n5 15 MHz 1C + LTE B5 10 MHz 1C (2 Carrier) – 4TX – Contiguous



5G NR n5 5 MHz 1C + 5G NR n5 15 MHz 1C + LTE B5 5 MHz 1C (3 Carrier) – 2TX – Contiguous



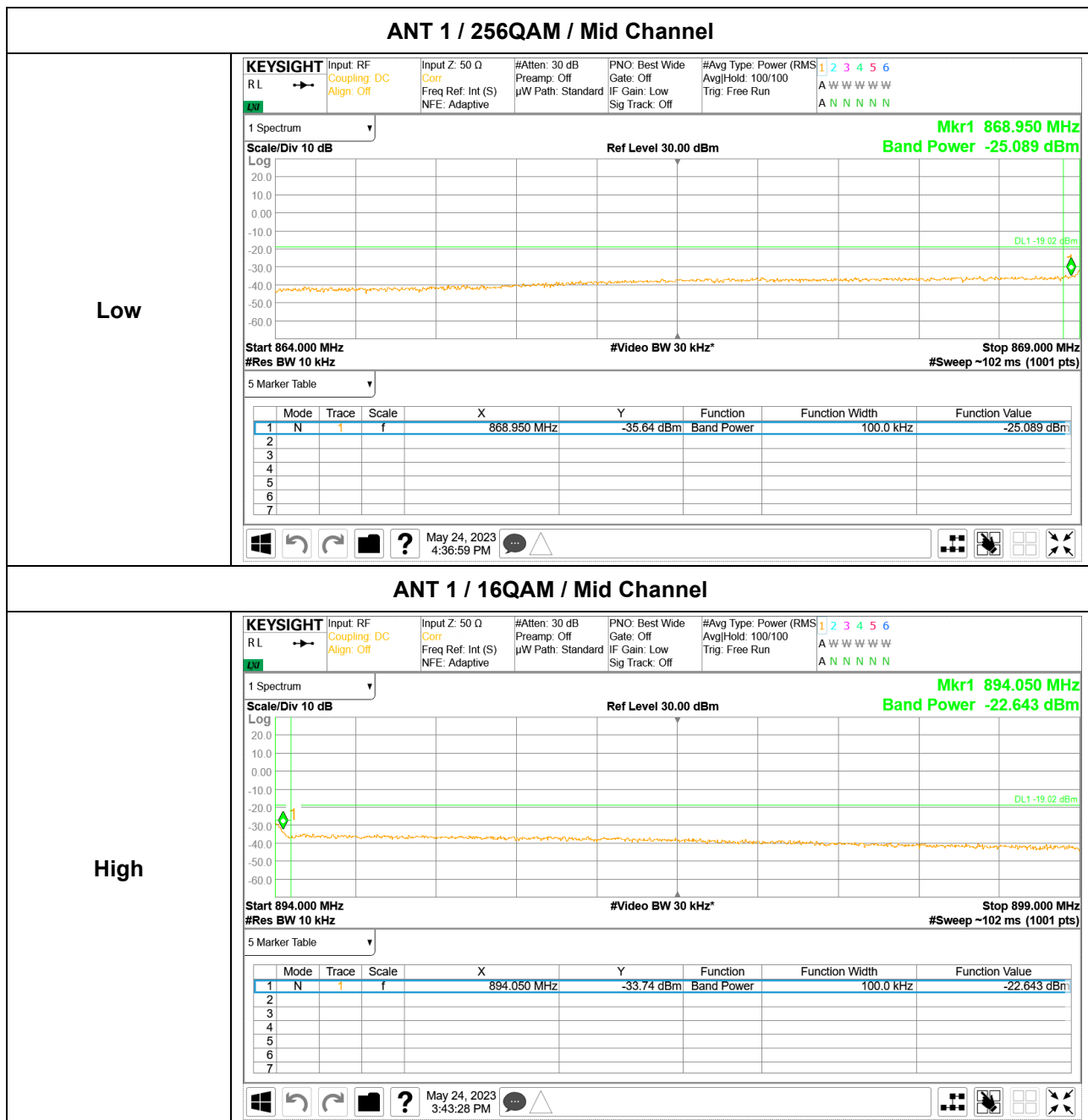
5G NR n5 5 MHz 1C + 5G NR n5 15 MHz 1C + LTE B5 5 MHz 1C (3 Carrier) – 4TX – Contiguous



DSS B5 10 MHz 1C + 5G NR n5 15 MHz 1C (2 Carrier) – 2TX – Contiguous



DSS B5 10 MHz 1C + 5G NR n5 15 MHz 1C (2 Carrier) – 4TX – Contiguous



8.5. OUT OF BAND EMISSIONS (SPURIOUS)

RULE PART(S)

FCC : §2.1051 §22.917

LIMITS

§22.917

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows:

(1) In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy, provided that the measured power is integrated over the full required reference bandwidth (i.e., 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(2) In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz.

(c) Alternative out of band emission limit. Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

(d) Interference caused by out of band emissions. If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

TEST PROCEDURE

Section 5.7.4 of ANSI C63.26:

Spurious unwanted emission measurements

- a) Set the spectrum analyzer start frequency to the lowest frequency generated by the EUT, without going below 9 kHz, and the stop frequency to the lower frequency covered by the measurements previously performed in 5.7.3. As an alternative, the stop frequency can be set to the value specified in 5.1.1, depending on the EUT operating range, if the resulting plot can clearly demonstrate compliance for all frequencies not addressed by the out-of-band emissions measurements performed as per 5.7.3.
- b) When using an average power (rms) detector, ensure that the number of points in the sweep $\geq 2 \times (\text{span} / \text{RBW})$. This may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the spectrum analyzer capabilities. This requirement does not apply to peak-detected power measurements. When average power is specified by the applicable regulation, a peak-detector can be utilized for preliminary measurements to accommodate wider frequency spans. Any emissions found in the preliminary measurement to exceed the applicable limit(s) shall be further examined using a power averaging (rms) detector with the minimum number of measurement points as defined above.
- c) The sweep time should be set to auto-couple for performing peak-detector measurements. For measurements that use a power averaging (rms) detector, the sweep time shall be set as described for out-of-band emissions measurements in item d) of 5.7.3.
- d) Identify and measure the highest spurious emission levels in each frequency range. It is not necessary to re-measure the out-of-band emissions as a part of this test. Record the frequencies and amplitudes corresponding to the measured emissions and capture the data plots.
- e) Repeat step b) through step d) for the upper spurious emission frequency range if not already captured by a wide span measurement performed as per the alternative provided in step a). The upper frequency for this measurement is defined in 5.1.1 as a function of the EUT operating range.
- f) Compare the results with the corresponding limit in the applicable regulation.
- g) The test report shall include the data plots of the measuring instrument display and the measured data.

NOTE:

- 1) In 9 kHz to 30 MHz frequency range, RBW narrower than reference bandwidth(100 kHz) is used.
So following correction factor is applied.

$$\text{Formula: } 10 \log [(reference\ bandwidth)/(resolution\ bandwidth)]$$

- a) 9 kHz to 150 kHz applied 1 kHz RBW: $10 \log (100\text{ kHz} / 1\text{ kHz}) = 20\text{ dB}$
b) 150 kHz to 30 MHz applied 10 kHz RBW: $10 \log (100\text{ kHz} / 10\text{ kHz}) = 10\text{ dB}$

- 2) For all frequencies below 869 MHz and above 894 MHz, correction has been added to the limit for each port according to KDB 662911 D01 v02r01.

- 2TX MIMO correction: $10 \log(N_{ANT}) = 10 \log(2) = 3.01\text{ dB}$
- 2TX MIMO Limit : $-13\text{ dBm} - 3.01\text{ dB} = -16.01\text{ dBm}$
- 4TX MIMO correction: $10 \log(N_{ANT}) = 10 \log(4) = 6.02\text{ dB}$
- 4TX MIMO Limit : $-13\text{ dBm} - 6.02\text{ dB} = -19.02\text{ dBm}$

RESULTS

See the following pages.

8.5.1. CONDUCTED SPURIOUS EMISSIONS RESULT

5G NR n5 15 MHz (1 Carrier) – 2TX

ANT	Modulation	CH	Result (dBm)				
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ 864 MHz	899 MHz ~ 1 GHz	1 GHz ~ 10 GHz
1	QPSK	L	-35.31	-35.29	-29.04	-40.84	-17.53
		M	-35.25	-34.94	-36.17	-34.53	-17.83
		H	-35.85	-35.65	-43.86	-29.82	-18.14
	16QAM	L	-36.51	-35.98	-28.84	-40.54	-17.98
		M	-36.01	-35.82	-36.01	-34.41	-17.77
		H	-36.01	-35.95	-42.72	-30.48	-18.46
	64QAM	L	-35.87	-35.53	-29.64	-40.07	-18.11
		M	-36.40	-34.87	-35.29	-34.33	-18.04
		H	-35.93	-35.88	-43.18	-29.36	-18.61
	256QAM	L	-36.23	-35.73	-29.10	-40.56	-17.99
		M	-35.89	-36.12	-35.14	-35.29	-18.40
		H	-36.20	-35.99	-42.35	-29.39	-18.60
2	QPSK	L	-34.94	-39.83	-31.97	-36.99	-18.06
		M	-34.75	-39.70	-37.71	-35.62	-18.71
		H	-35.03	-39.87	-42.34	-30.78	-18.92
	16QAM	L	-35.43	-39.42	-31.36	-38.43	-18.33
		M	-35.41	-38.33	-37.64	-34.76	-19.15
		H	-35.15	-39.29	-42.86	-31.34	-18.60
	64QAM	L	-36.03	-39.62	-32.15	-38.14	-18.00
		M	-35.68	-40.01	-36.82	-35.23	-18.81
		H	-35.05	-40.07	-42.80	-31.24	-18.64
	256QAM	L	-35.24	-39.50	-31.65	-38.39	-18.23
		M	-36.02	-39.83	-36.74	-34.75	-18.99
		H	-35.46	-39.61	-43.51	-30.93	-18.80

5G NR n5 15 MHz (1 Carrier) – 4TX

ANT	Modulation	CH	Result (dBm)				
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ 864 MHz	899 MHz ~ 1 GHz	1 GHz ~ 10 GHz
1	QPSK	L	-36.37	-35.57	-32.27	-41.88	-22.19
		M	-36.56	-35.14	-39.00	-38.52	-21.97
		H	-36.87	-35.60	-45.93	-32.72	-22.18
	16QAM	L	-36.64	-35.26	-32.19	-42.50	-22.19
		M	-36.54	-35.33	-38.33	-38.36	-22.75
		H	-36.38	-35.26	-45.80	-33.51	-22.98
	64QAM	L	-36.38	-34.97	-32.86	-42.73	-22.41
		M	-36.40	-35.26	-37.82	-38.40	-22.38
		H	-37.10	-35.08	-46.43	-33.34	-22.69
	256QAM	L	-36.36	-34.99	-32.69	-42.43	-22.48
		M	-36.52	-35.41	-39.15	-37.92	-22.55
		H	-36.74	-35.31	-45.79	-32.67	-22.29
2	QPSK	L	-35.53	-43.74	-34.55	-40.70	-22.37
		M	-35.18	-44.56	-40.02	-38.25	-23.05
		H	-35.23	-44.34	-44.93	-33.45	-22.89
	16QAM	L	-36.15	-43.58	-34.20	-40.50	-22.10
		M	-35.97	-43.86	-41.15	-37.63	-23.19
		H	-35.93	-44.02	-46.27	-33.74	-22.98
	64QAM	L	-35.73	-44.19	-35.04	-39.91	-22.29
		M	-35.62	-44.04	-40.60	-38.73	-23.27
		H	-35.37	-44.73	-44.67	-34.24	-23.35
	256QAM	L	-35.96	-43.88	-35.04	-40.55	-22.29
		M	-36.03	-44.24	-39.03	-38.26	-22.89
		H	-35.75	-44.44	-46.44	-34.01	-22.71

ANT	Modulation	CH	Result (dBm)				
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ 864 MHz	899 MHz ~ 1 GHz	1 GHz ~ 10 GHz
3	QPSK	L	-36.98	-46.54	-34.38	-39.79	-22.37
		M	-36.29	-46.72	-40.70	-37.77	-21.90
		H	-36.35	-46.84	-45.77	-33.19	-22.51
	16QAM	L	-36.46	-46.01	-30.97	-36.30	-22.25
		M	-36.55	-46.31	-40.61	-37.11	-22.41
		H	-37.35	-46.29	-46.94	-33.60	-22.84
	64QAM	L	-36.48	-46.46	-35.24	-39.89	-22.86
		M	-36.95	-46.51	-41.36	-36.93	-22.16
		H	-37.75	-46.82	-46.56	-33.98	-22.76
	256QAM	L	-36.20	-46.36	-34.27	-40.23	-22.41
		M	-36.65	-46.91	-40.69	-37.86	-22.51
		H	-37.77	-46.89	-46.77	-33.02	-22.61
4	QPSK	L	-35.27	-46.08	-36.18	-42.83	-22.20
		M	-35.48	-46.12	-41.83	-40.35	-21.53
		H	-35.23	-46.48	-46.29	-36.48	-22.25
	16QAM	L	-35.05	-45.29	-35.40	-42.95	-22.22
		M	-35.34	-45.60	-42.47	-39.19	-21.77
		H	-35.25	-46.40	-46.30	-36.55	-22.63
	64QAM	L	-35.82	-46.17	-36.45	-43.88	-21.97
		M	-34.65	-46.01	-40.76	-40.39	-22.01
		H	-35.31	-46.35	-46.48	-35.92	-22.25
	256QAM	L	-35.71	-45.91	-36.41	-43.36	-22.09
		M	-35.47	-46.15	-42.38	-40.41	-21.78
		H	-34.99	-46.59	-46.25	-36.24	-22.72

5G NR n5 10 MHz 1C + 5G NR n5 15 MHz 1C (2 Carrier)- 2TX - Contiguous

ANT	Modulation	CH	Result (dBm)				
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ 864 MHz	899 MHz ~ 1 GHz	1 GHz ~ 10 GHz
1	QPSK	M	-35.77	-34.91	-29.44	-29.53	-20.39
	16QAM	M	-36.15	-34.95	-29.05	-29.66	-20.39
	64QAM	M	-36.03	-35.10	-29.57	-29.43	-20.29
	256QAM	M	-36.08	-34.69	-29.42	-29.83	-20.16
2	QPSK	M	-35.69	-42.08	-32.04	-30.42	-20.80
	16QAM	M	-35.38	-41.25	-31.90	-29.73	-21.02
	64QAM	M	-35.24	-41.84	-31.57	-30.01	-20.99
	256QAM	M	-35.04	-41.84	-32.29	-30.00	-21.11

5G NR n5 10 MHz 1C + 5G NR n5 15 MHz 1C (2 Carrier)- 4TX - Contiguous

ANT	Modulation	CH	Result (dBm)				
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ 864 MHz	899 MHz ~ 1 GHz	1 GHz ~ 10 GHz
1	QPSK	M	-37.17	-34.27	-32.87	-32.94	-24.79
	16QAM	M	-36.99	-34.29	-32.73	-32.67	-24.26
	64QAM	M	-37.21	-34.32	-32.99	-32.50	-24.81
	256QAM	M	-36.67	-34.26	-32.77	-33.01	-24.15
2	QPSK	M	-36.49	-45.91	-34.38	-33.26	-25.23
	16QAM	M	-36.06	-46.01	-35.68	-32.84	-25.46
	64QAM	M	-35.98	-46.47	-35.42	-33.40	-25.45
	256QAM	M	-36.28	-46.50	-35.58	-33.40	-25.42
3	QPSK	M	-37.31	-48.51	-34.97	-32.81	-24.63
	16QAM	M	-37.60	-48.57	-35.27	-32.60	-24.60
	64QAM	M	-38.06	-48.79	-35.59	-32.69	-24.36
	256QAM	M	-36.93	-48.95	-35.33	-31.92	-24.55
4	QPSK	M	-35.38	-48.21	-36.41	-35.47	-24.08
	16QAM	M	-35.58	-47.97	-35.76	-34.55	-24.26
	64QAM	M	-36.08	-47.88	-36.38	-35.47	-24.17
	256QAM	M	-35.74	-48.15	-36.68	-35.22	-24.27

5G NR n5 15 MHz 1C + LTE B5 10 MHz 1C (2 Carrier) – 2TX - Contiguous

ANT	Modulation	CH	Result (dBm)				
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ 864 MHz	899 MHz ~ 1 GHz	1 GHz ~ 10 GHz
1	QPSK	M	-36.13	-34.65	-29.51	-29.36	-19.62
	16QAM	M	-36.45	-34.75	-29.05	-29.57	-20.35
	64QAM	M	-36.34	-34.98	-29.27	-29.27	-20.54
	256QAM	M	-36.68	-35.42	-29.00	-29.62	-20.34
2	QPSK	M	-35.46	-41.59	-32.66	-30.46	-20.93
	16QAM	M	-36.02	-41.79	-31.49	-30.16	-21.33
	64QAM	M	-35.97	-41.98	-31.59	-30.06	-21.19
	256QAM	M	-35.27	-42.14	-32.32	-30.64	-21.36

5G NR n5 15 MHz 1C + LTE B5 10 MHz 1C (2 Carrier) – 4TX - Contiguous

ANT	Modulation	CH	Result (dBm)				
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ 864 MHz	899 MHz ~ 1 GHz	1 GHz ~ 10 GHz
1	QPSK	M	-36.57	-33.99	-32.75	-32.13	-24.83
	16QAM	M	-36.96	-34.11	-32.72	-33.40	-24.73
	64QAM	M	-36.86	-34.21	-32.95	-32.73	-24.43
	256QAM	M	-37.06	-34.35	-32.18	-32.59	-24.49
2	QPSK	M	-35.49	-45.90	-35.74	-32.92	-25.37
	16QAM	M	-35.53	-46.15	-35.52	-33.64	-25.04
	64QAM	M	-35.68	-46.18	-35.24	-32.89	-25.23
	256QAM	M	-36.46	-46.08	-35.27	-33.45	-24.95
3	QPSK	M	-37.27	-48.52	-35.33	-32.64	-24.39
	16QAM	M	-37.61	-48.39	-35.15	-32.54	-24.81
	64QAM	M	-36.43	-48.30	-34.98	-32.67	-24.12
	256QAM	M	-37.41	-48.39	-34.76	-32.88	-24.93
4	QPSK	M	-35.09	-47.80	-36.68	-34.87	-23.89
	16QAM	M	-35.31	-47.88	-36.72	-35.42	-24.33
	64QAM	M	-36.05	-48.07	-36.76	-34.56	-24.18
	256QAM	M	-35.27	-48.01	-36.39	-34.98	-23.79

5G NR n5 5 MHz 1C + 5G NR n5 15 MHz 1C + LTE B5 5 MHz 1C (3 Carrier) – 2TX - Contiguous

ANT	Modulation	CH	Result (dBm)				
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ 864 MHz	899 MHz ~ 1 GHz	1 GHz ~ 10 GHz
1	QPSK	M	-36.93	-35.08	-29.11	-29.83	-20.47
	16QAM	M	-36.41	-34.97	-29.08	-28.94	-20.06
	64QAM	M	-37.30	-34.88	-29.59	-30.31	-20.33
	256QAM	M	-36.85	-34.69	-29.39	-29.52	-20.15
2	QPSK	M	-35.97	-42.07	-31.91	-30.03	-21.20
	16QAM	M	-36.01	-41.69	-31.32	-30.23	-21.03
	64QAM	M	-36.21	-41.97	-31.30	-29.95	-20.98
	256QAM	M	-35.89	-41.75	-31.73	-30.34	-20.67

5G NR n5 5 MHz 1C + 5G NR n5 15 MHz 1C + LTE B5 5 MHz 1C (3 Carrier) – 4TX - Contiguous

ANT	Modulation	CH	Result (dBm)				
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ 864 MHz	899 MHz ~ 1 GHz	1 GHz ~ 10 GHz
1	QPSK	M	-36.35	-34.14	-32.68	-32.86	-24.93
	16QAM	M	-36.84	-34.40	-32.54	-32.97	-24.63
	64QAM	M	-36.72	-34.03	-32.77	-33.32	-24.49
	256QAM	M	-36.73	-34.01	-31.87	-33.25	-24.34
2	QPSK	M	-35.52	-46.08	-34.76	-33.24	-25.32
	16QAM	M	-35.31	-46.18	-35.17	-33.33	-25.27
	64QAM	M	-36.49	-46.04	-35.82	-33.48	-25.02
	256QAM	M	-35.57	-46.14	-35.24	-33.22	-24.76
3	QPSK	M	-36.75	-49.02	-35.13	-33.23	-24.24
	16QAM	M	-37.19	-48.66	-35.11	-32.60	-24.66
	64QAM	M	-37.48	-48.91	-35.50	-33.13	-24.65
	256QAM	M	-37.84	-48.90	-35.84	-32.82	-24.64
4	QPSK	M	-35.15	-48.24	-36.80	-35.21	-24.35
	16QAM	M	-35.65	-48.21	-36.12	-35.54	-24.66
	64QAM	M	-35.30	-48.26	-36.85	-35.04	-24.16
	256QAM	M	-35.19	-48.26	-36.99	-35.61	-24.45

DSS B5 10 MHz 1C + 5G NR n5 15 MHz 1C (2 Carrier) – 2TX - Contiguous

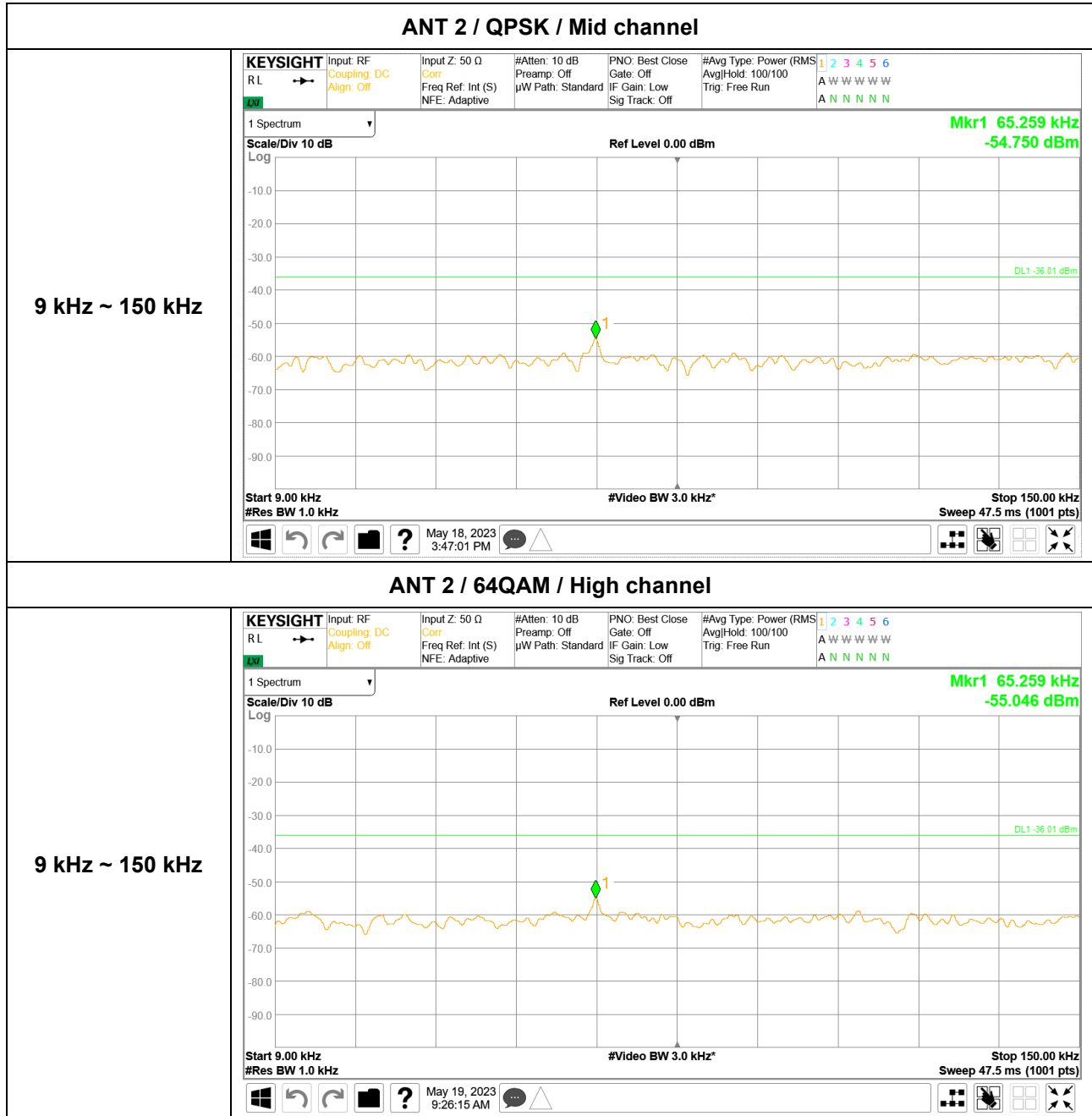
ANT	Modulation	CH	Result (dBm)				
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ 864 MHz	899 MHz ~ 1 GHz	1 GHz ~ 10 GHz
1	QPSK	M	-36.73	-34.82	-29.34	-29.72	-20.28
	16QAM	M	-36.59	-34.43	-29.84	-29.73	-20.36
	64QAM	M	-35.90	-34.75	-29.12	-29.95	-20.18
	256QAM	M	-36.73	-34.94	-29.39	-29.07	-20.34
2	QPSK	M	-35.81	-41.64	-32.17	-30.20	-20.70
	16QAM	M	-35.89	-41.11	-31.70	-30.04	-21.00
	64QAM	M	-34.90	-42.48	-31.96	-30.30	-21.26
	256QAM	M	-35.78	-41.90	-32.20	-29.30	-20.91

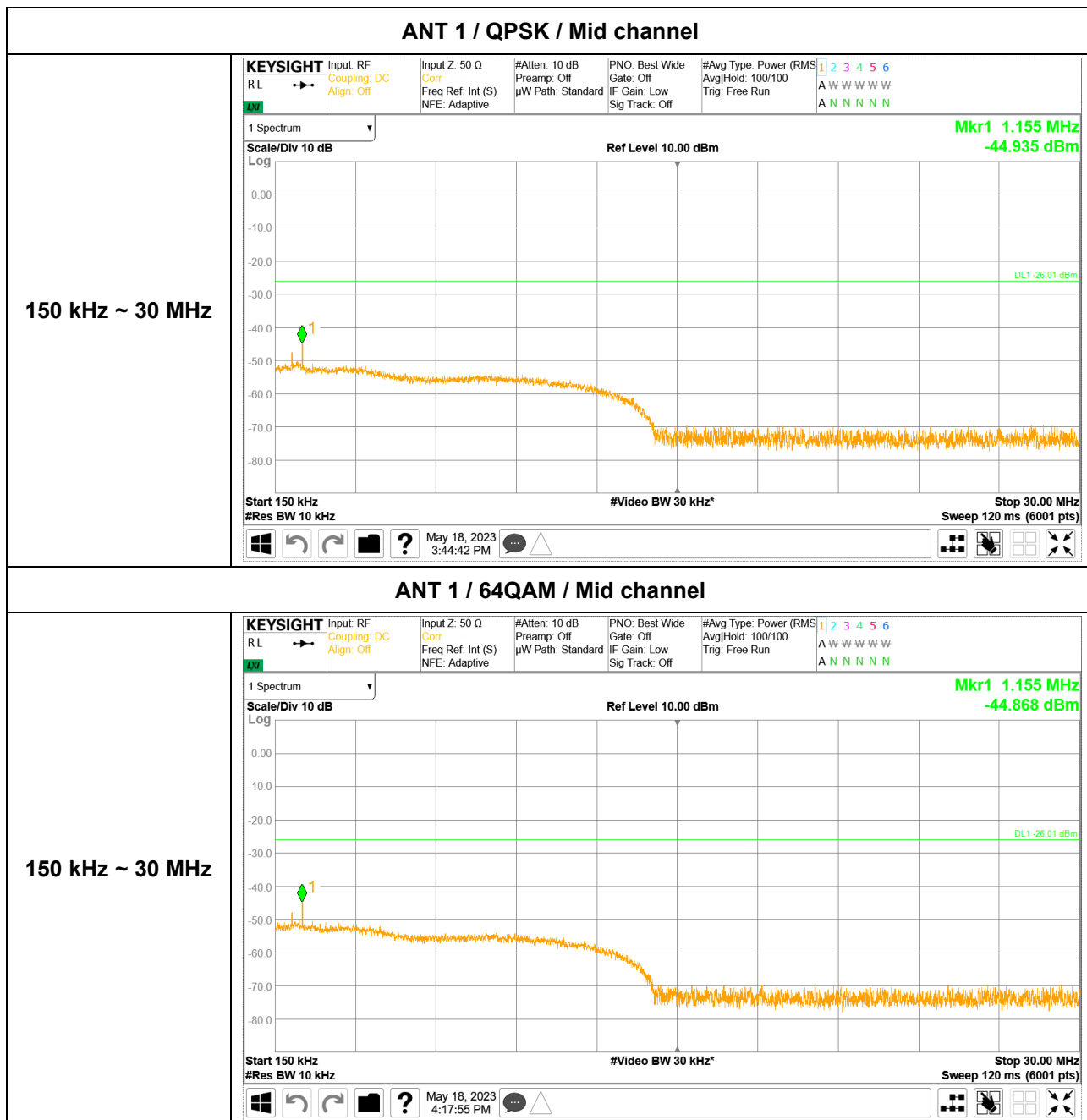
DSS B5 10 MHz 1C + 5G NR n5 15 MHz 1C (2 Carrier) – 4TX - Contiguous

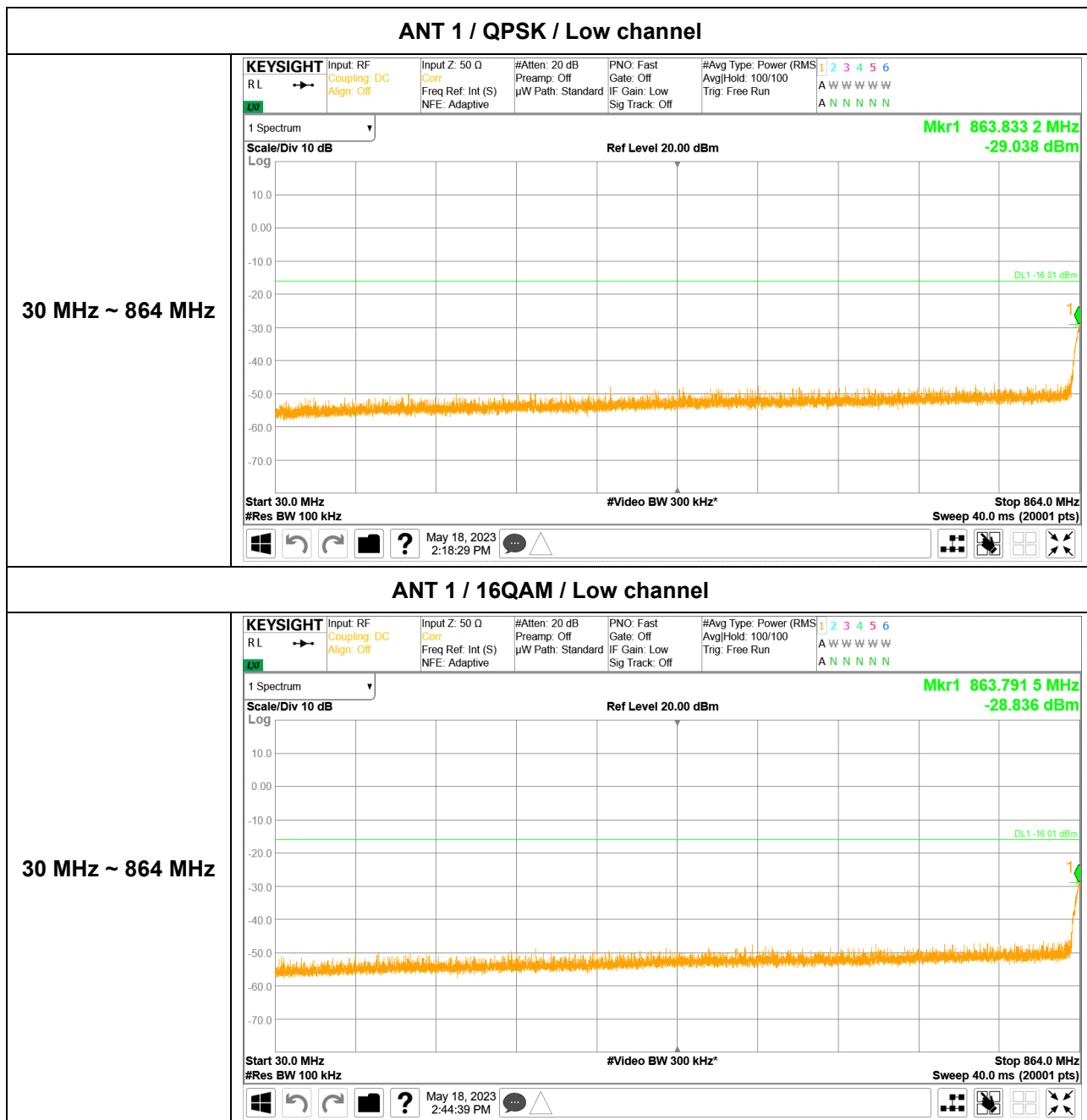
ANT	Modulation	CH	Result (dBm)				
			9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ 864 MHz	899 MHz ~ 1 GHz	1 GHz ~ 10 GHz
1	QPSK	M	-37.29	-34.23	-32.52	-32.41	-24.75
	16QAM	M	-37.60	-34.07	-32.44	-32.22	-24.01
	64QAM	M	-36.96	-34.42	-33.39	-33.03	-24.80
	256QAM	M	-37.13	-34.15	-32.81	-32.35	-24.54
2	QPSK	M	-36.54	-46.03	-35.79	-33.37	-25.07
	16QAM	M	-36.25	-45.82	-35.45	-33.43	-24.62
	64QAM	M	-36.33	-46.55	-35.91	-33.66	-25.21
	256QAM	M	-36.40	-46.24	-35.39	-32.98	-25.03
3	QPSK	M	-37.63	-48.61	-35.07	-33.49	-24.53
	16QAM	M	-37.34	-48.41	-34.86	-33.60	-24.61
	64QAM	M	-37.15	-49.00	-35.89	-33.37	-24.88
	256QAM	M	-37.58	-48.65	-35.61	-32.64	-24.48
4	QPSK	M	-35.55	-48.26	-36.79	-35.13	-24.44
	16QAM	M	-36.05	-47.96	-36.59	-35.82	-24.00
	64QAM	M	-35.66	-47.94	-37.02	-35.54	-24.52
	256QAM	M	-35.88	-48.05	-36.83	-34.58	-24.31

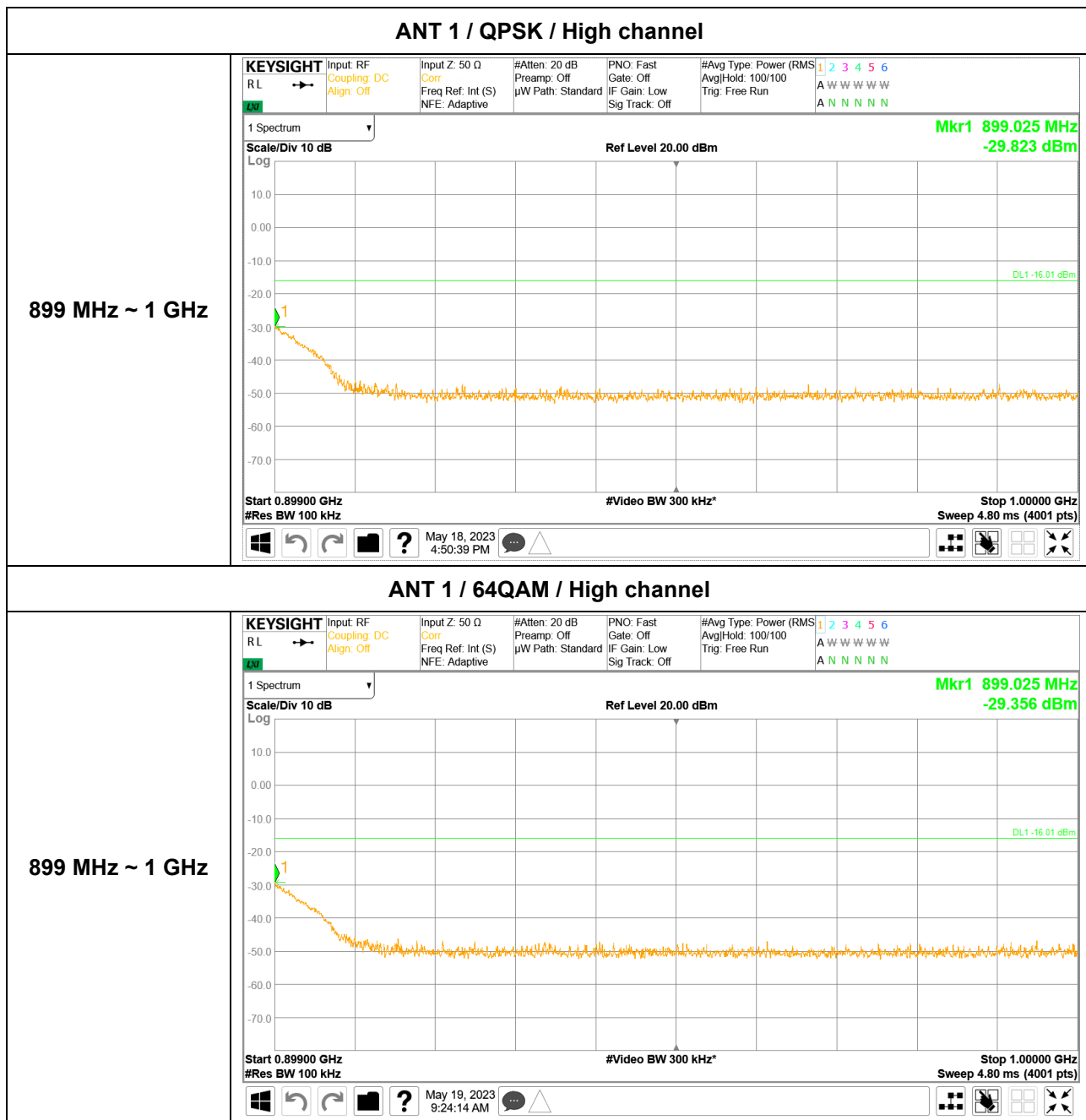
8.5.2. WORST PLOT OF OUT OF BAND EMISSIONS (SPURIOUS)

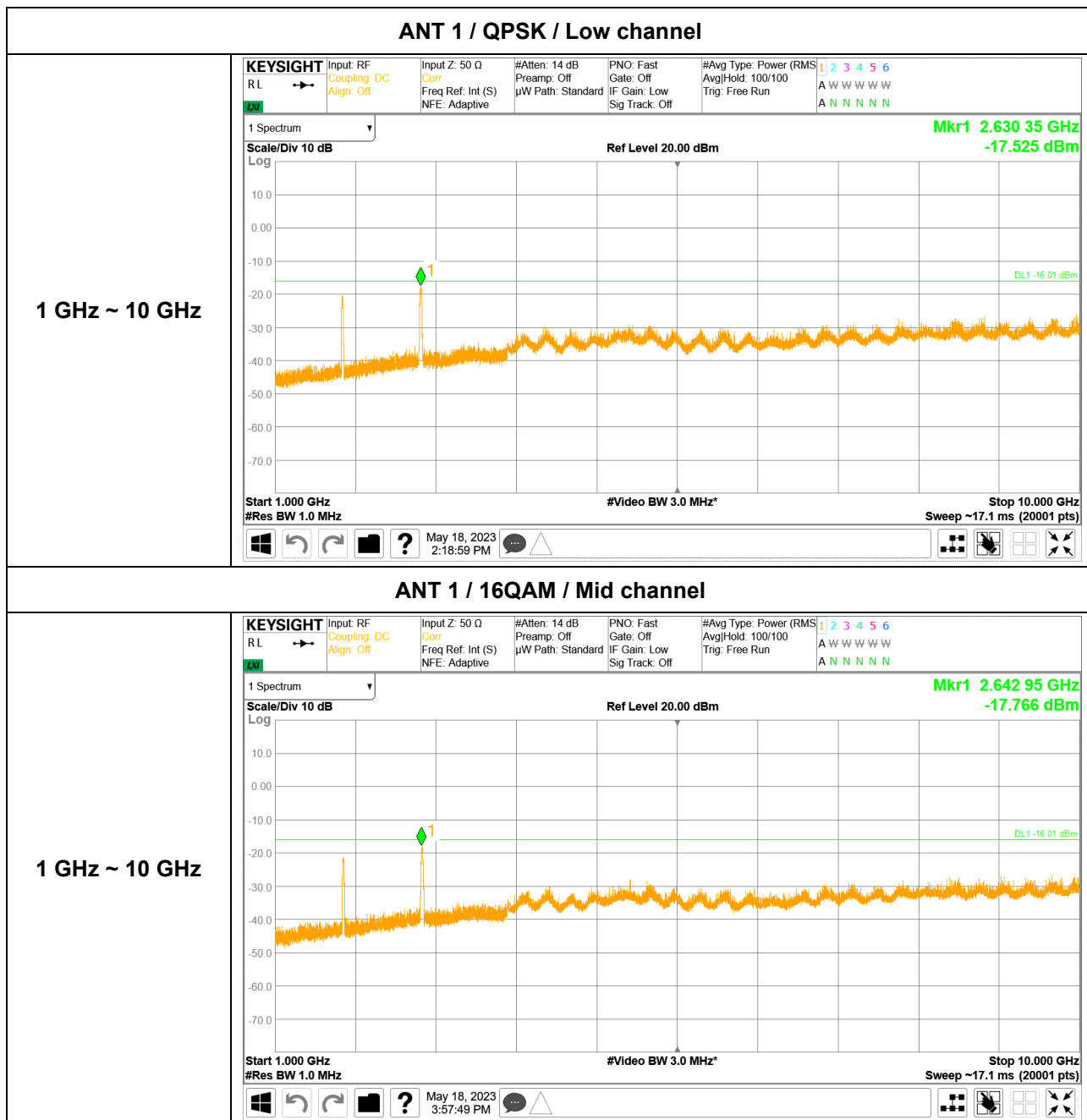
5G NR n5 15 MHz (1 Carrier) – 2TX



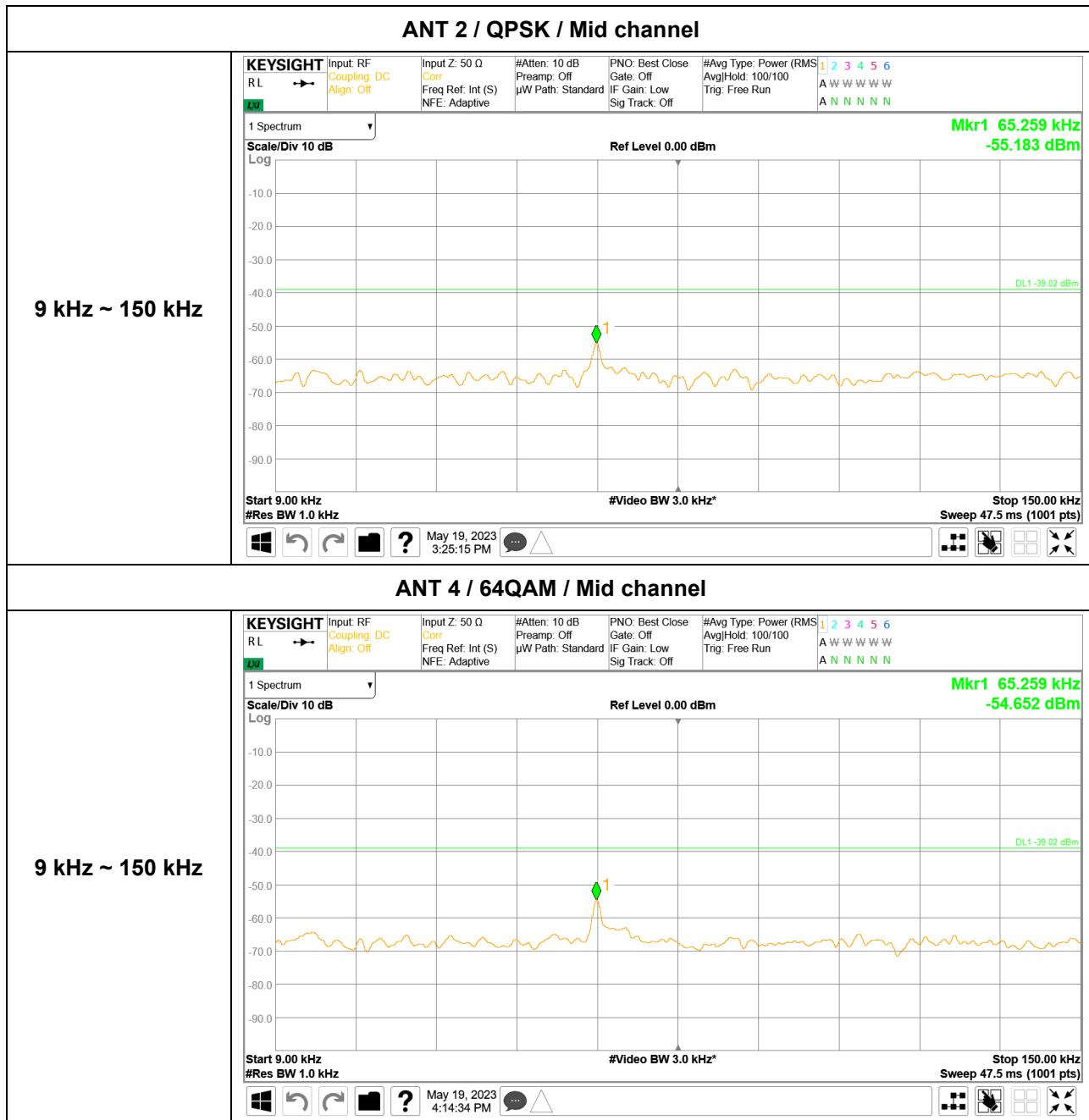


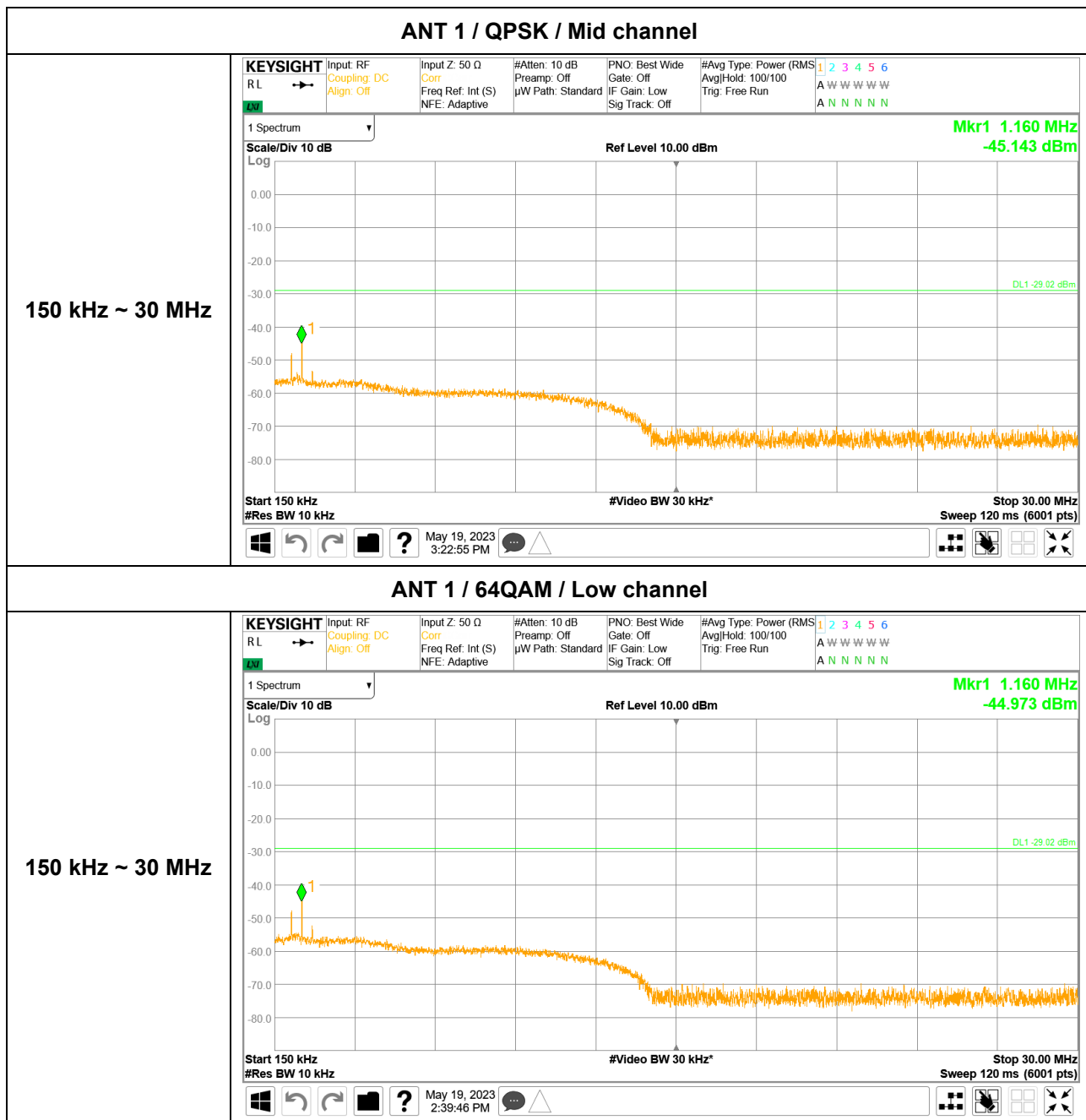


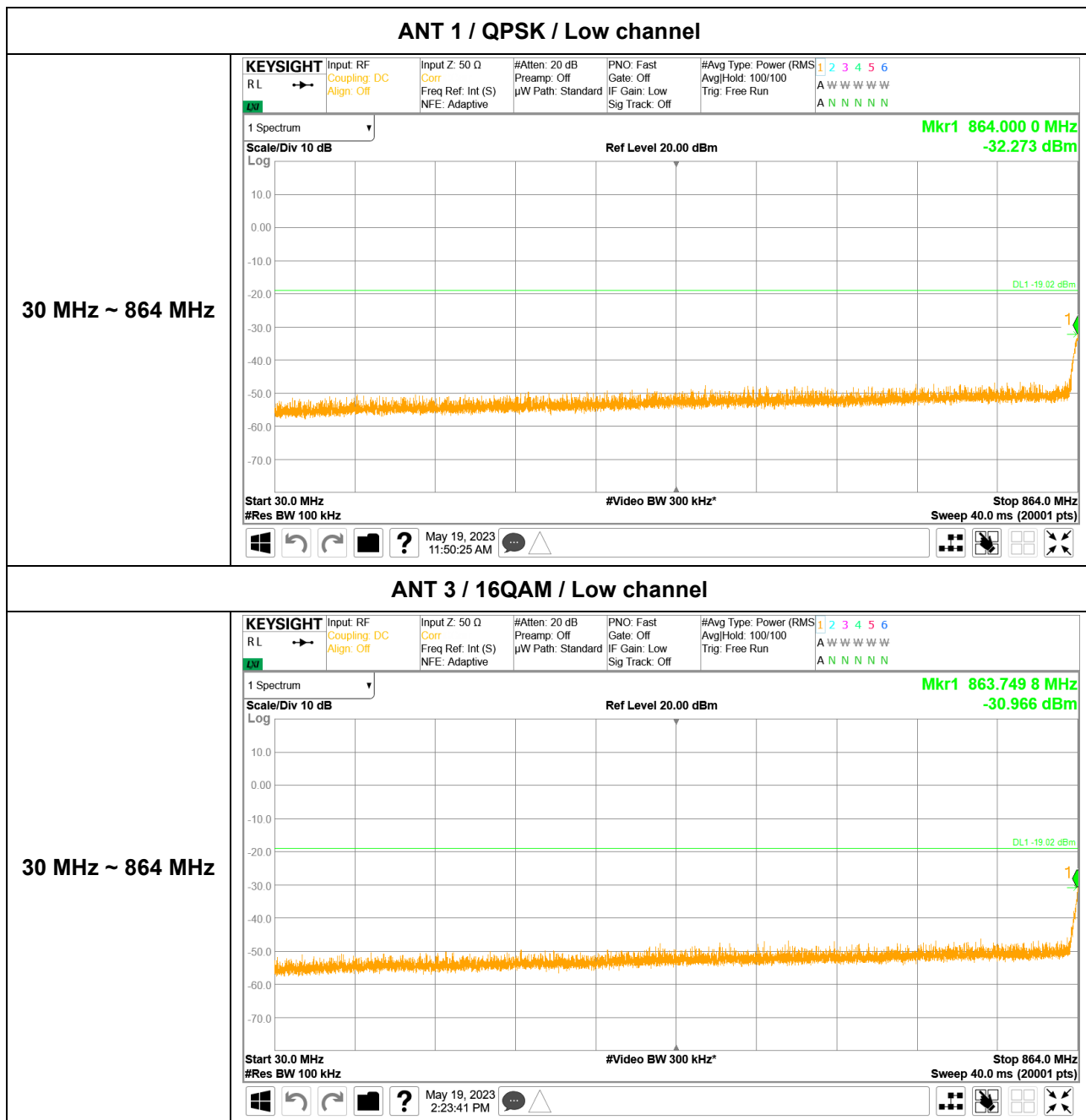


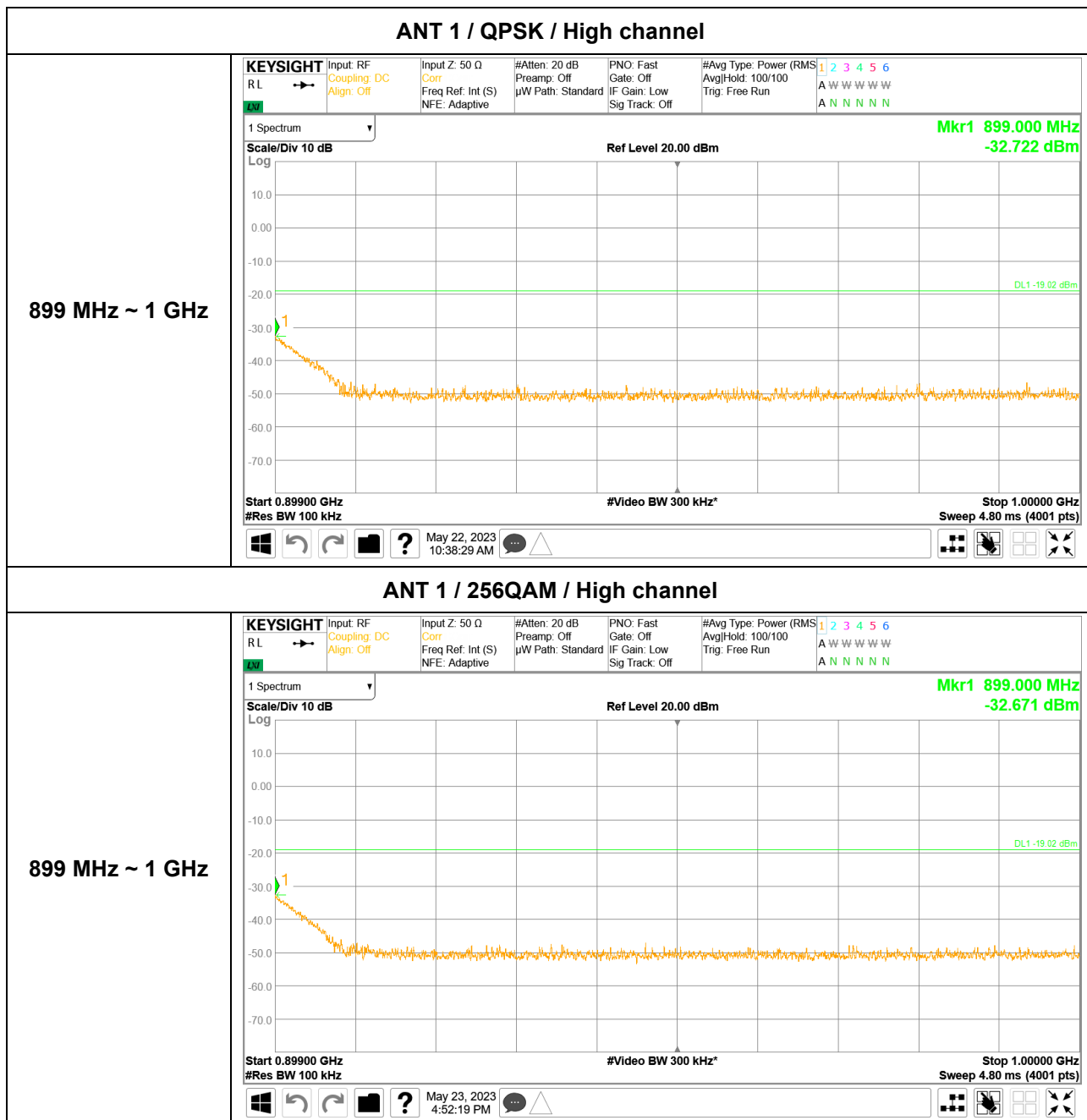


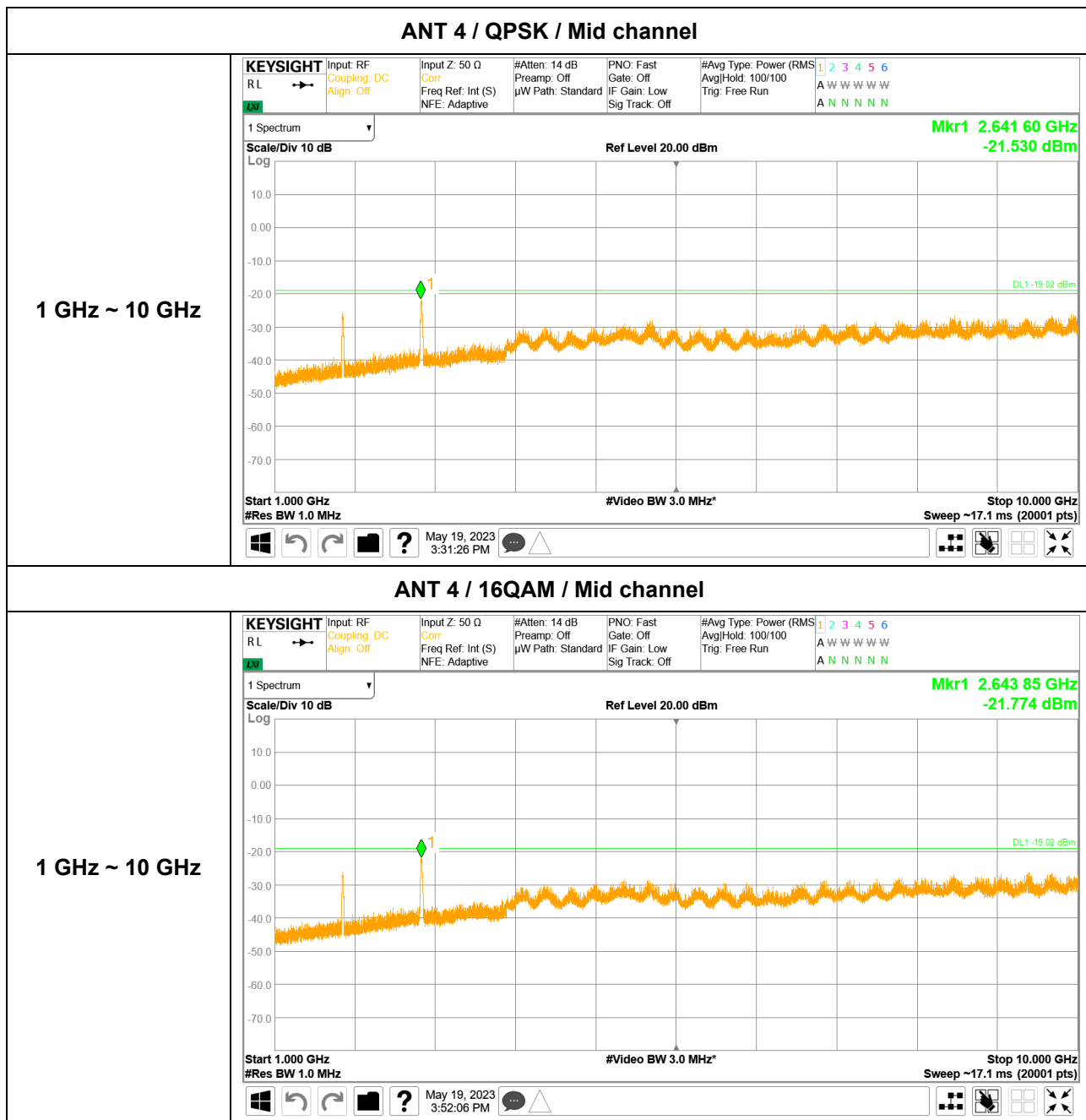
5G NR n5 15 MHz (1 Carrier) – 4TX



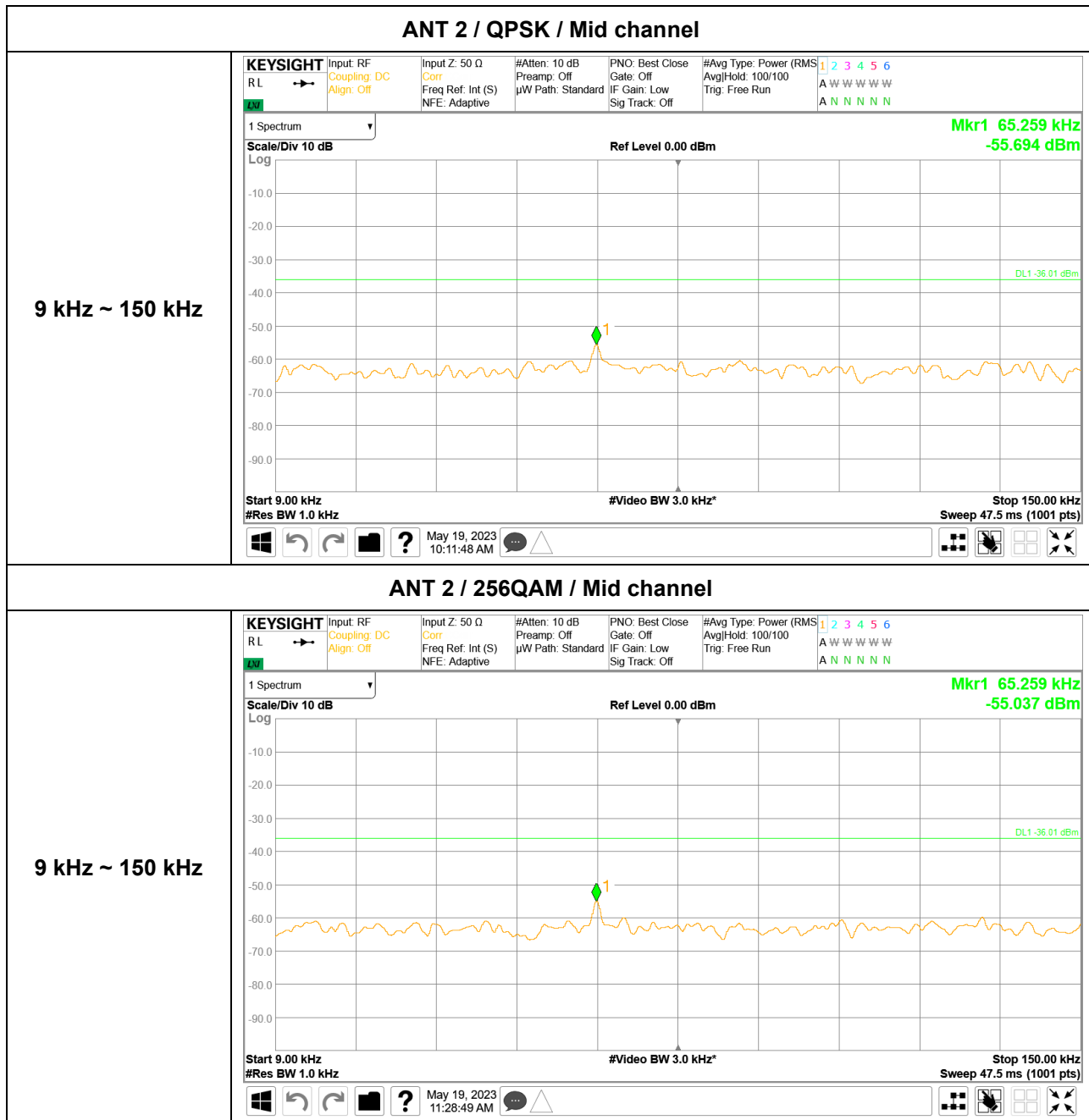


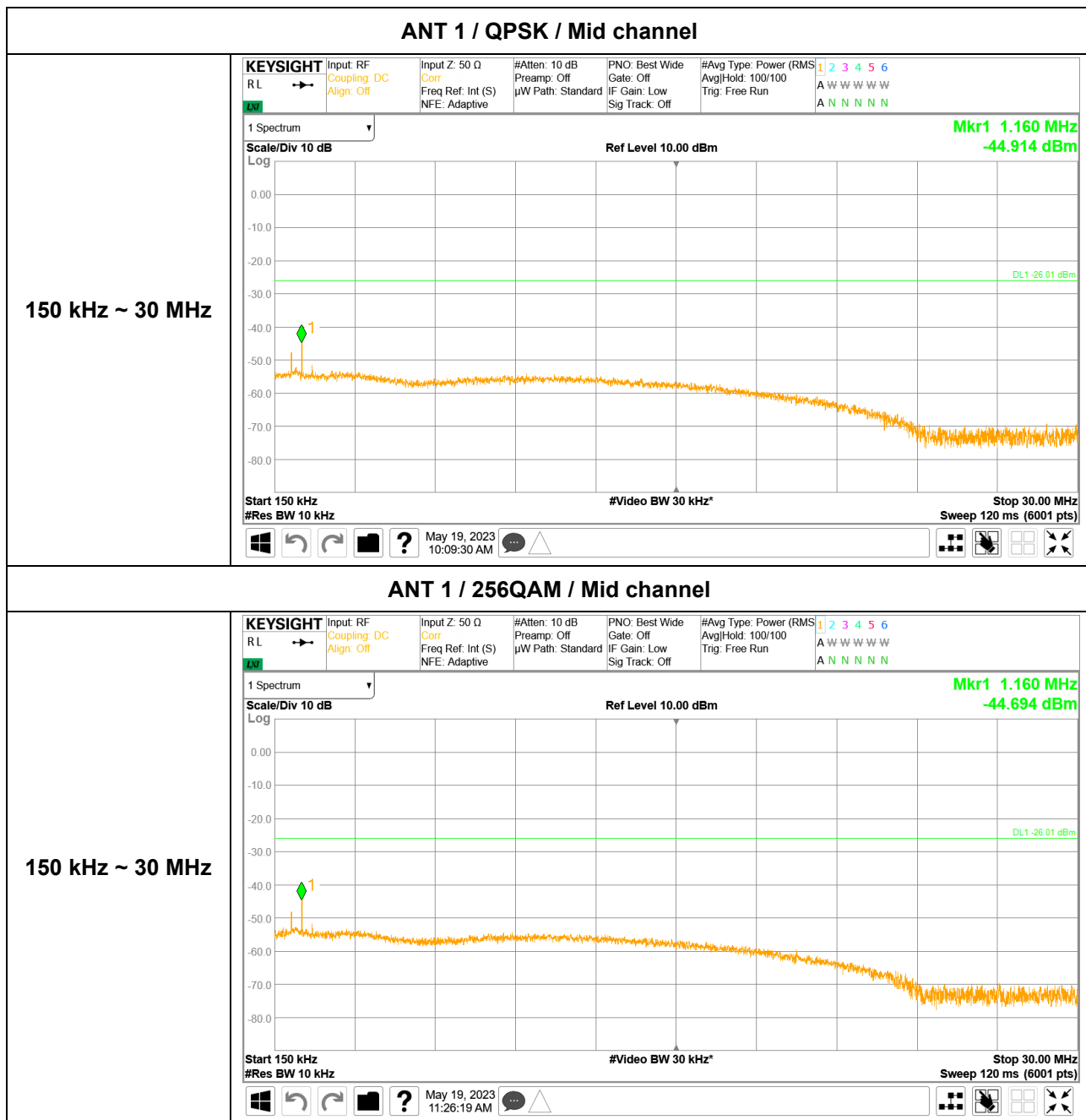


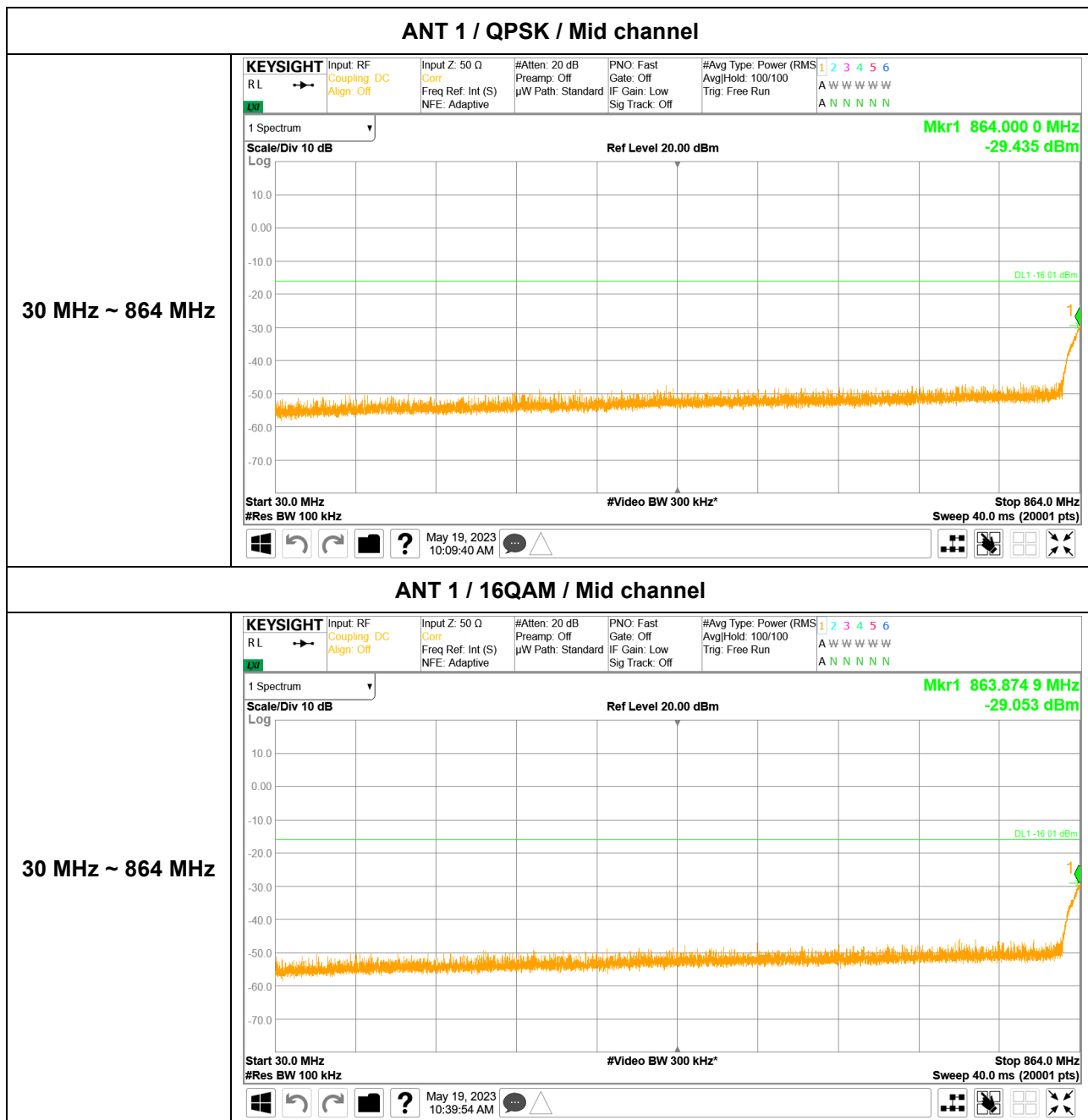


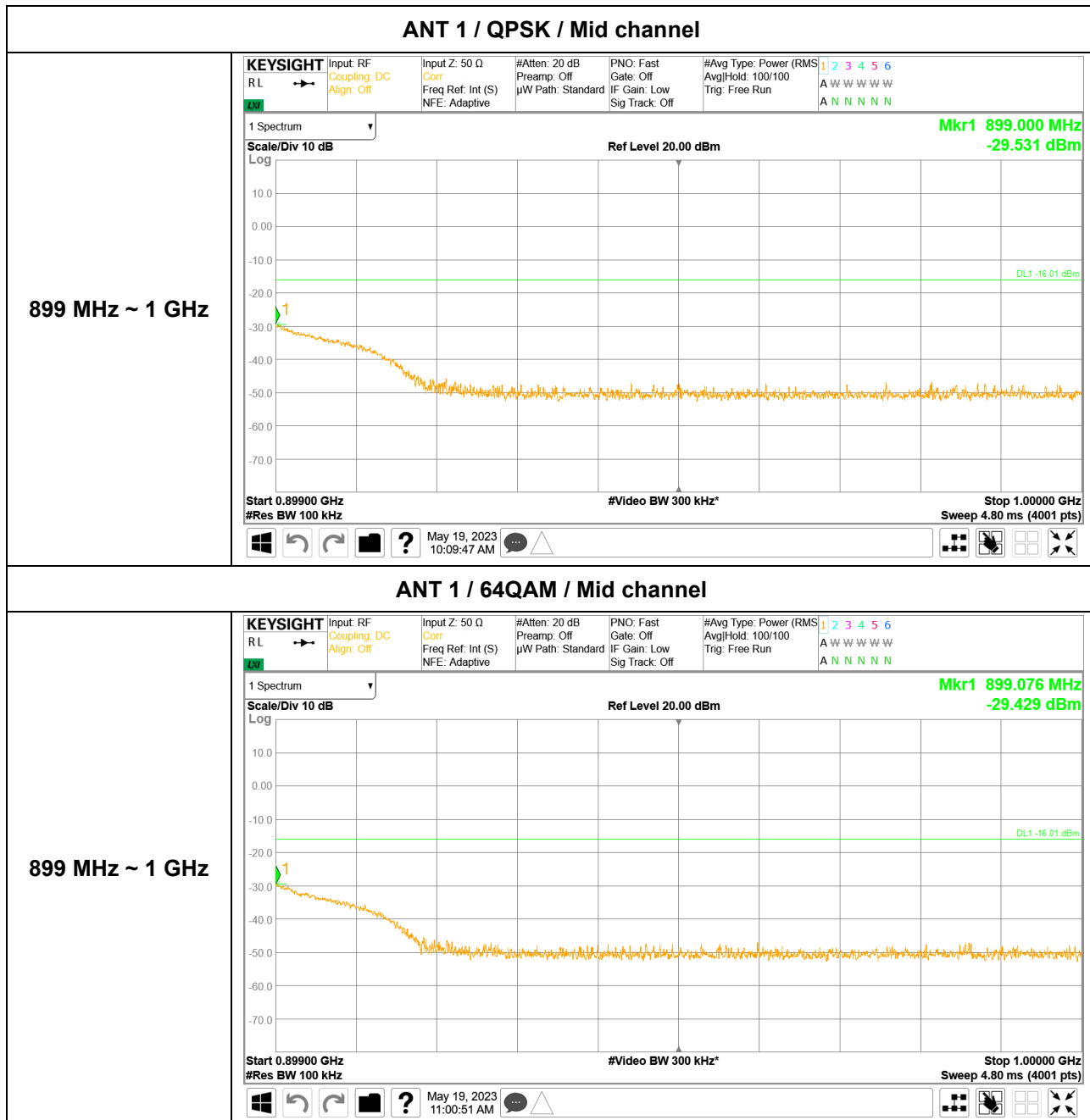


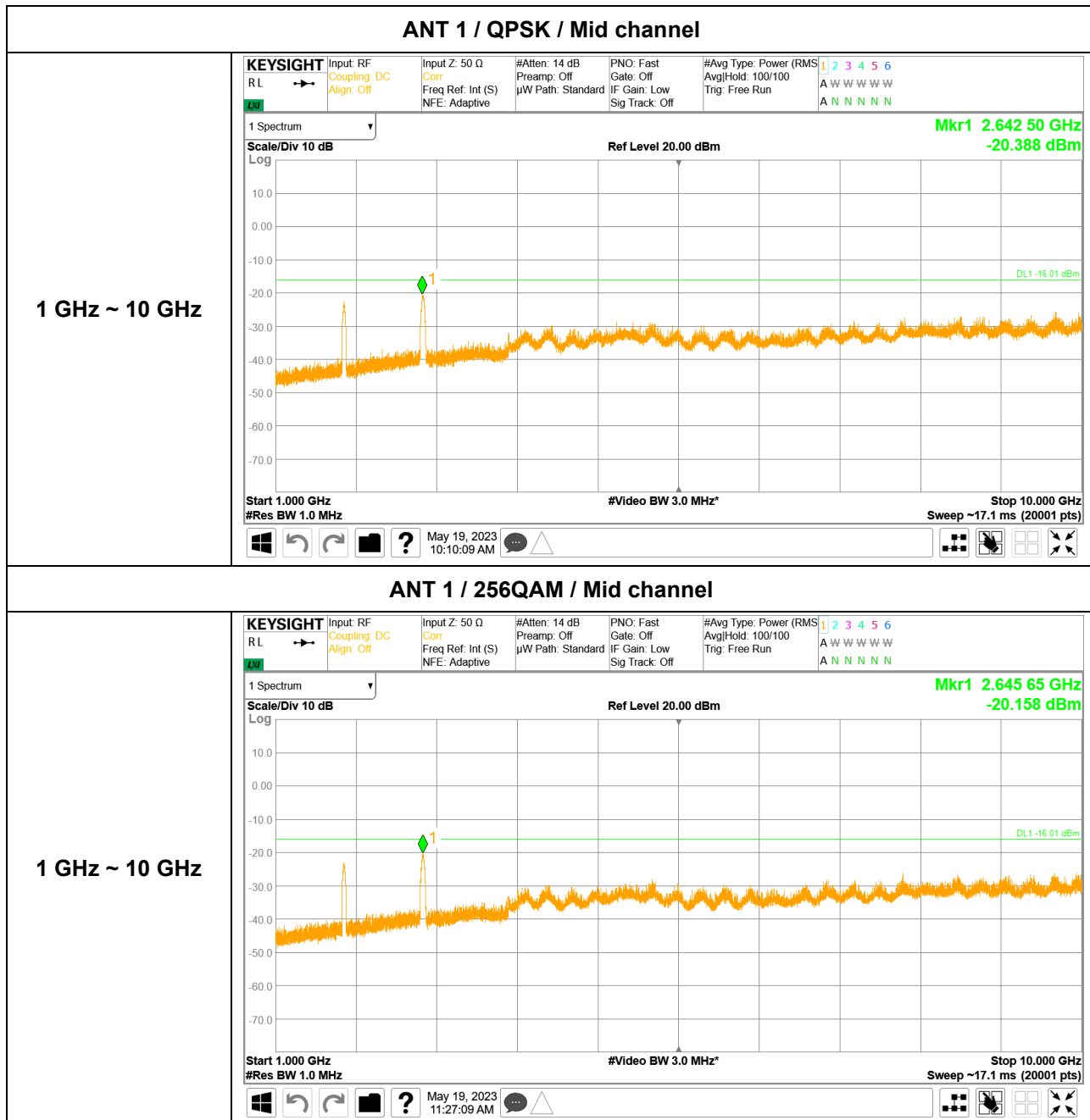
5G NR n5 10 MHz 1C + 5G NR n5 15 MHz 1C (2 Carrier) – 2TX - Contiguous



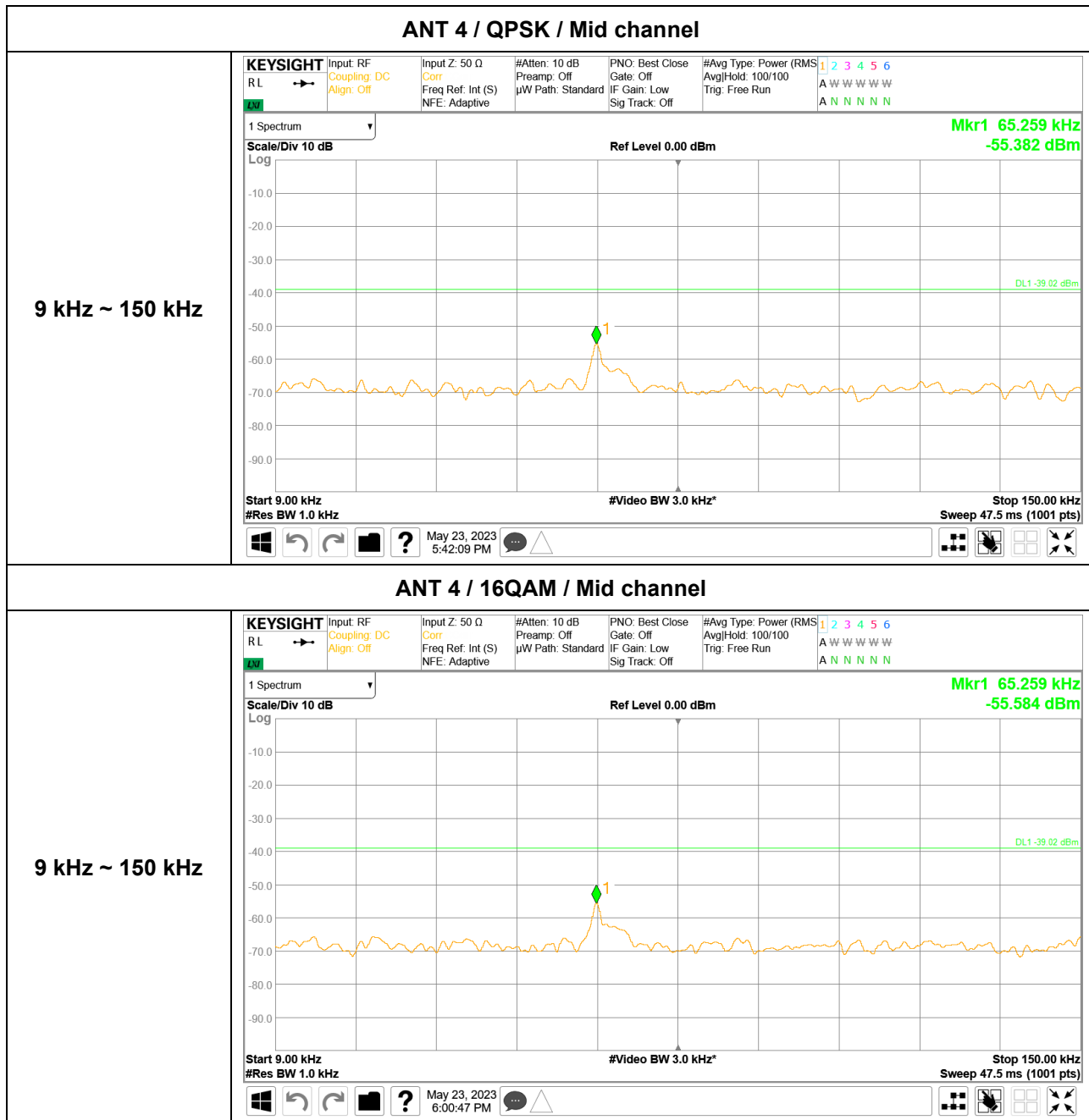


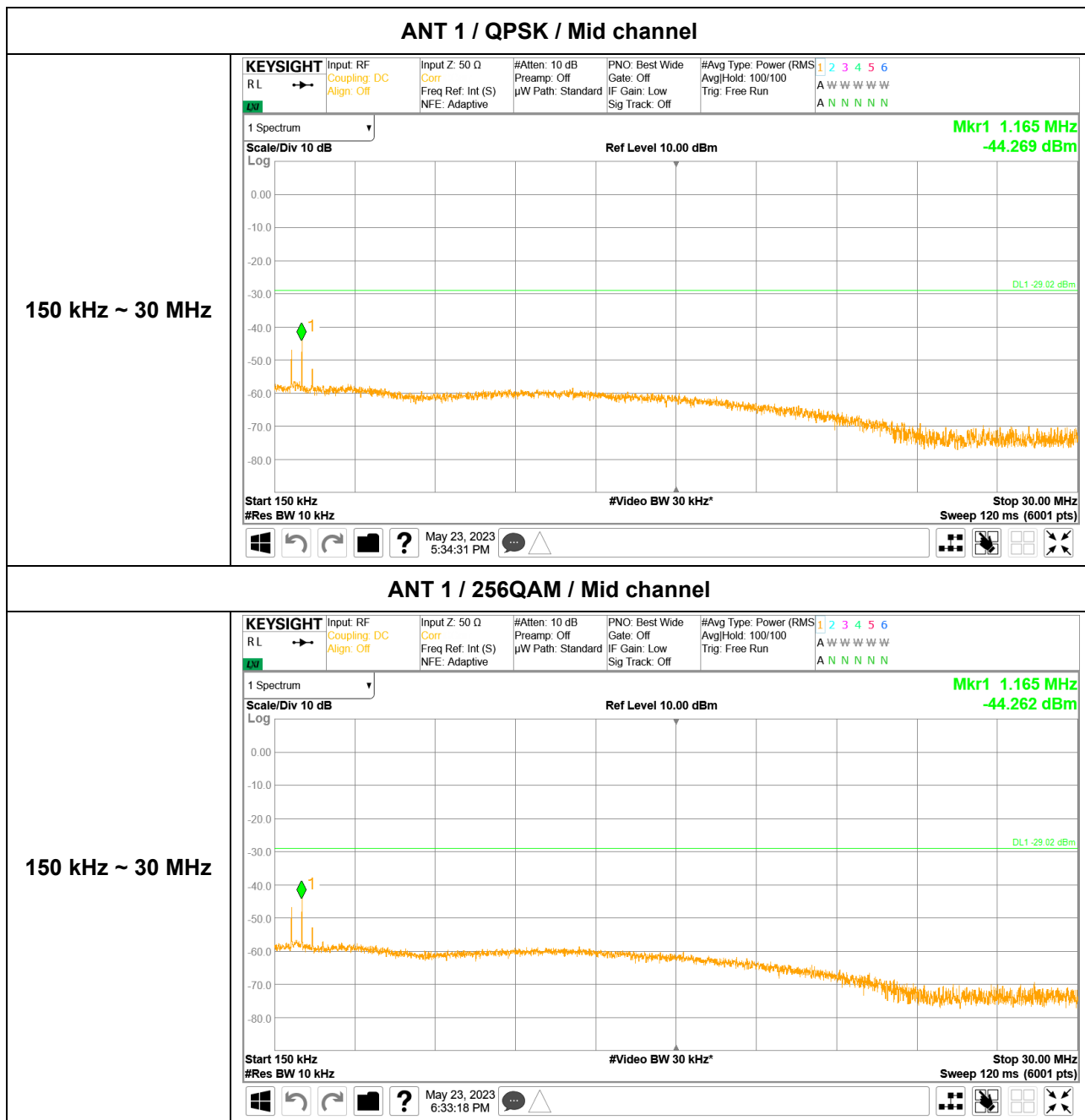


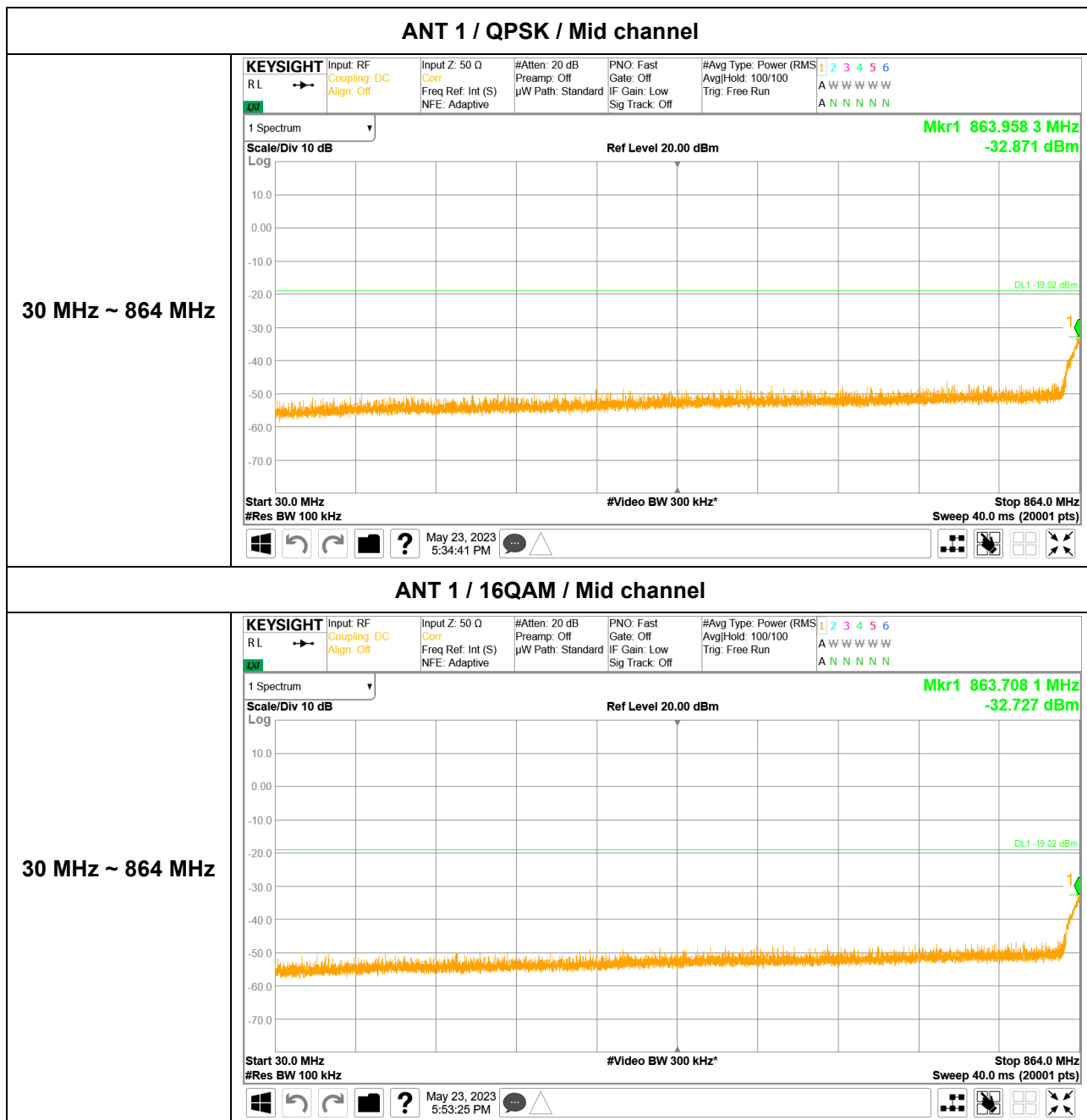


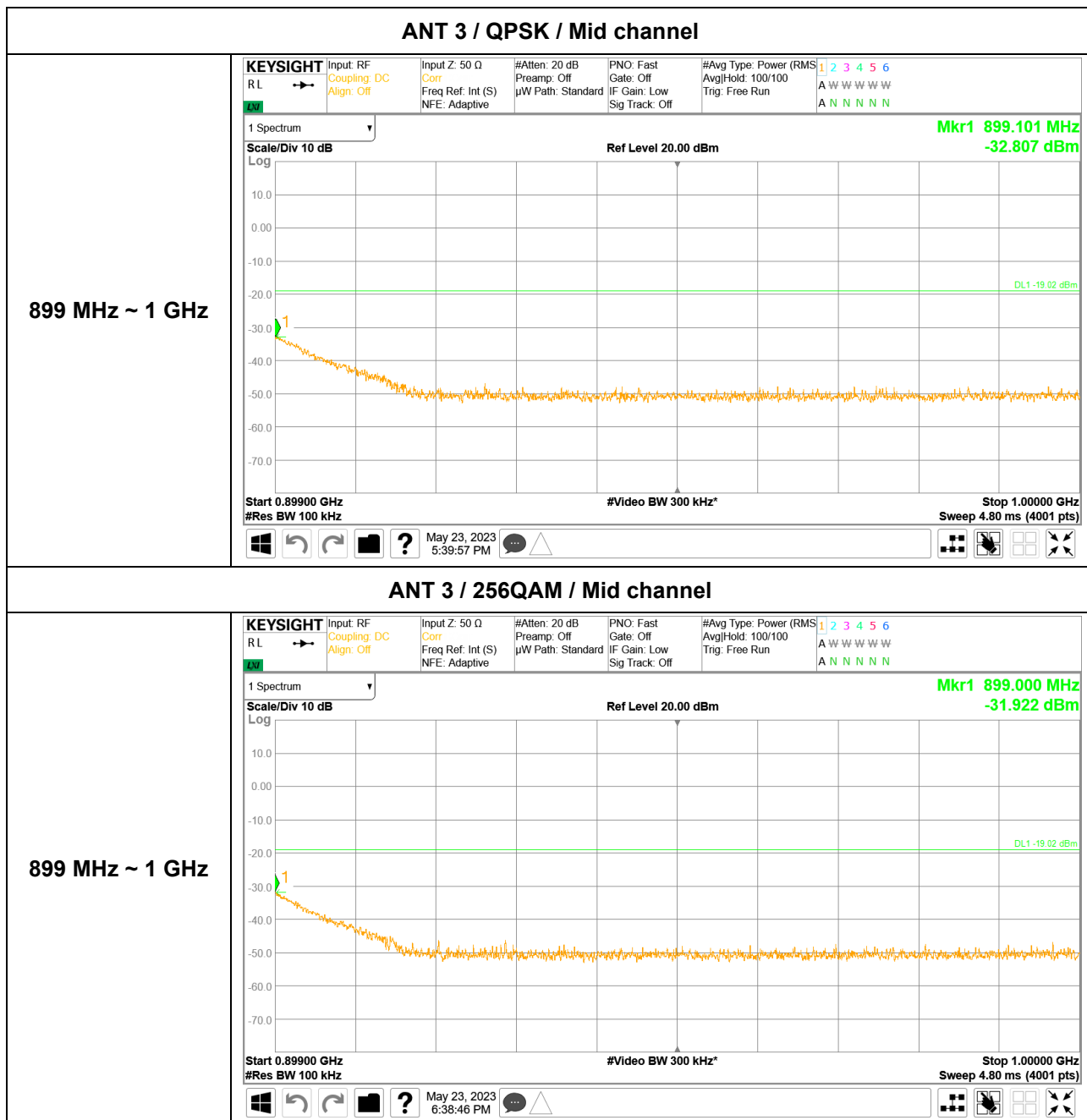


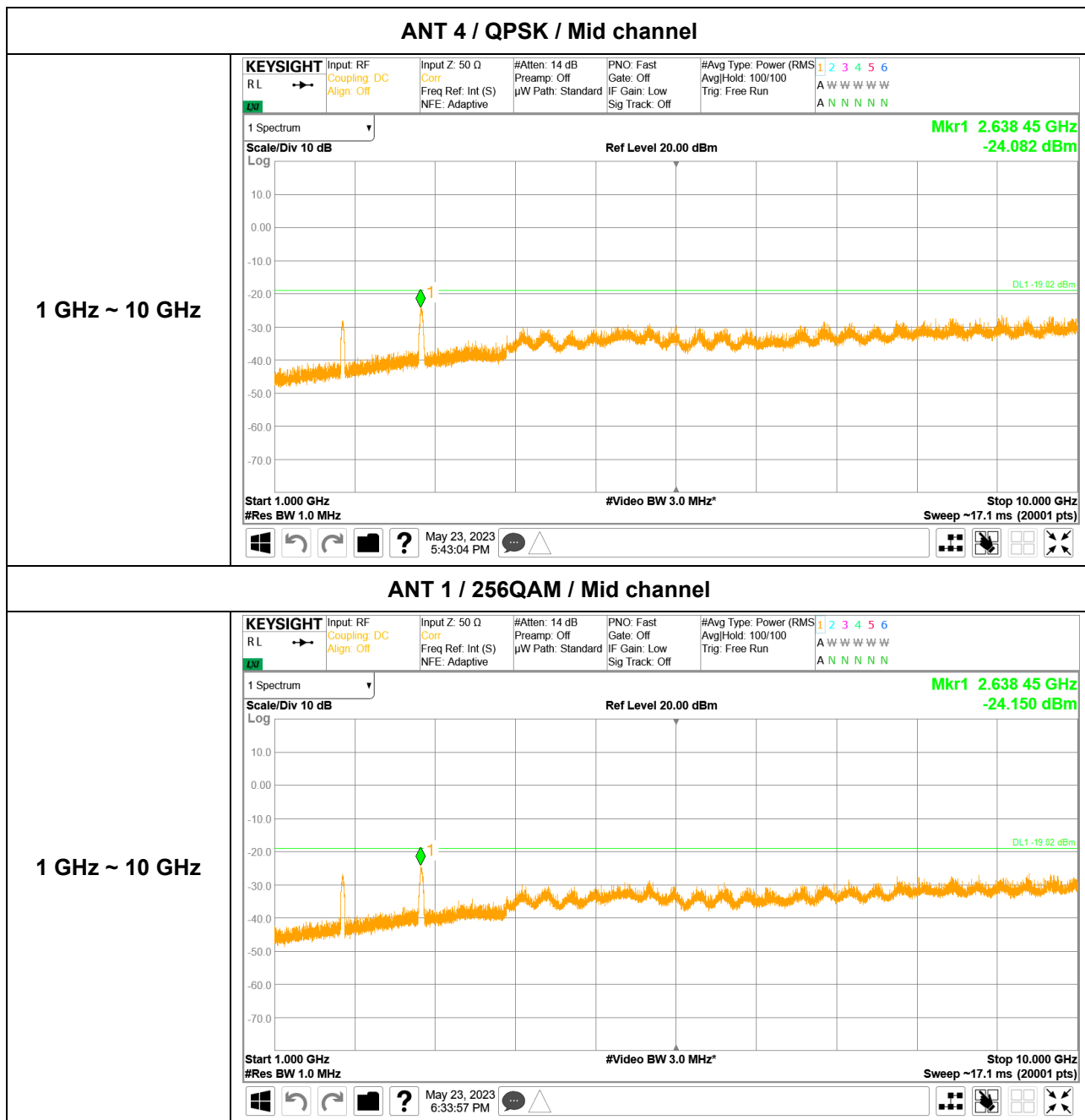
5G NR n5 10 MHz 1C + 5G NR n5 15 MHz 1C (2 Carrier) – 4TX - Contiguous











5G NR n5 15 MHz 1C + LTE B5 10 MHz 1C (2 Carrier) – 2TX - Contiguous

