

Test data, continued

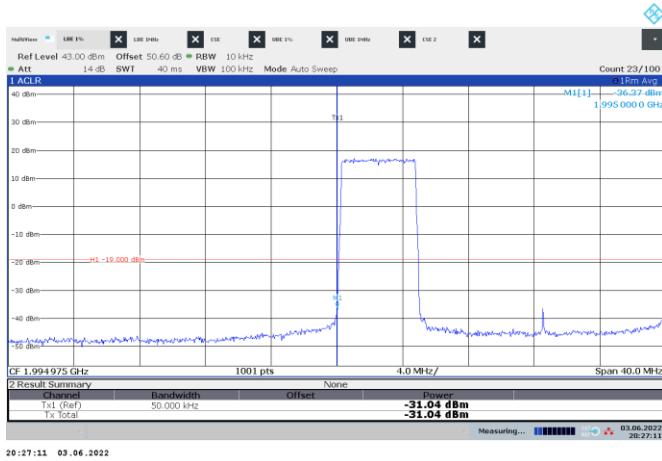


Figure 8.6-109: Conducted emission at the lower band edge

Frequency: 1995 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 1x LTE 5 MHz + 1 x NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: None



Figure 8.6-110: Conducted emission 1 MHz away from the lower band edge

Frequency: 1994 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 1x LTE 5 MHz + 1 x NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

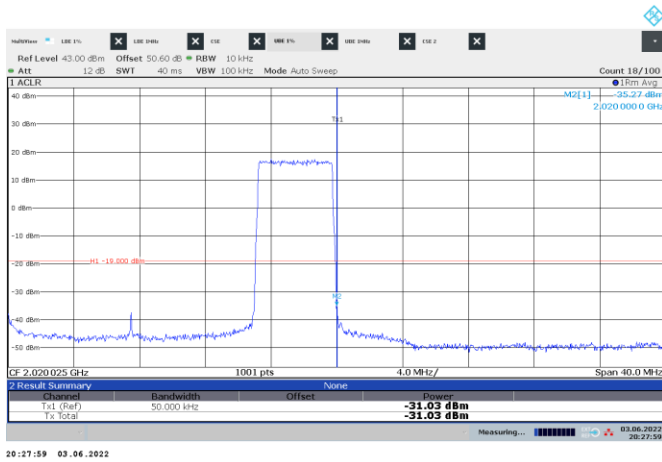


Figure 8.6-111: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 1x LTE 5 MHz + 1 x NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: None

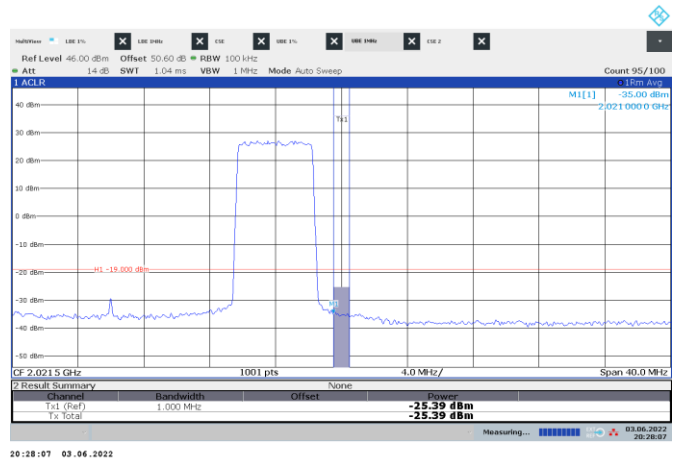


Figure 8.6-112: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 1x LTE 5 MHz + 1 x NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

Test data, continued

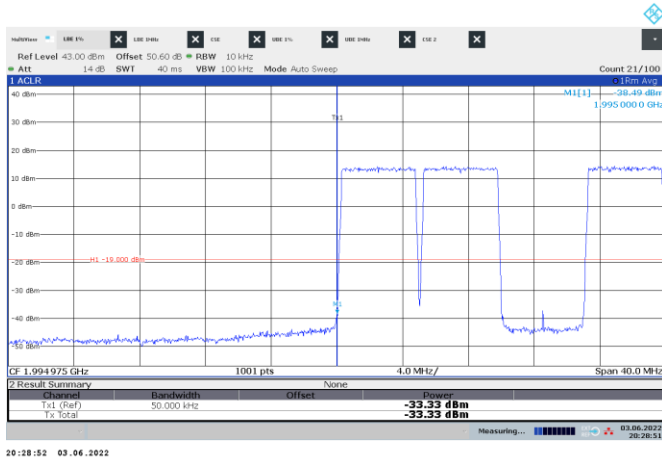


Figure 8.6-113: Conducted emission at the lower band edge

Frequency: 1995 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 2x LTE 5 MHz + 2 x NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: None



Figure 8.6-114: Conducted emission 1 MHz away from the lower band edge

Frequency: 1994 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 2x LTE 5 MHz + 2 x NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

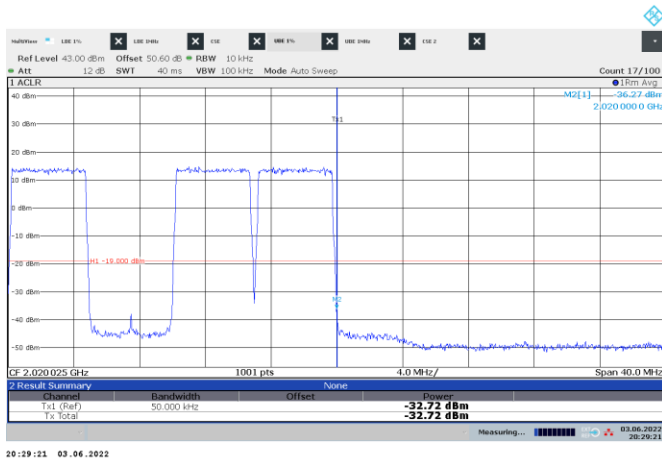


Figure 8.6-115: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 2x LTE 5 MHz + 2 x NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: None

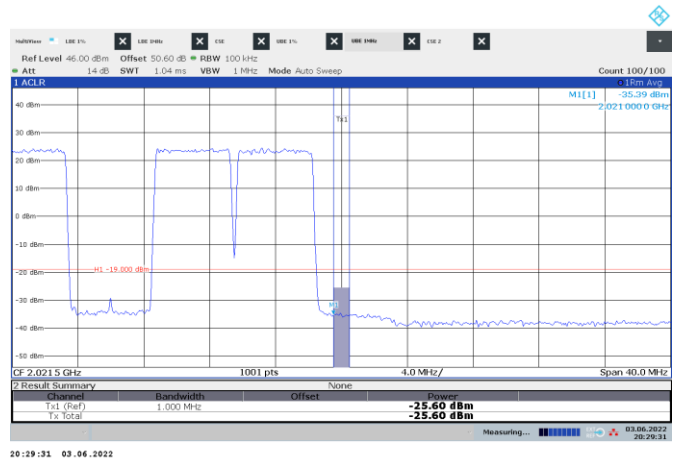


Figure 8.6-116: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 2x LTE 5 MHz + 2 x NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

Test data, continued

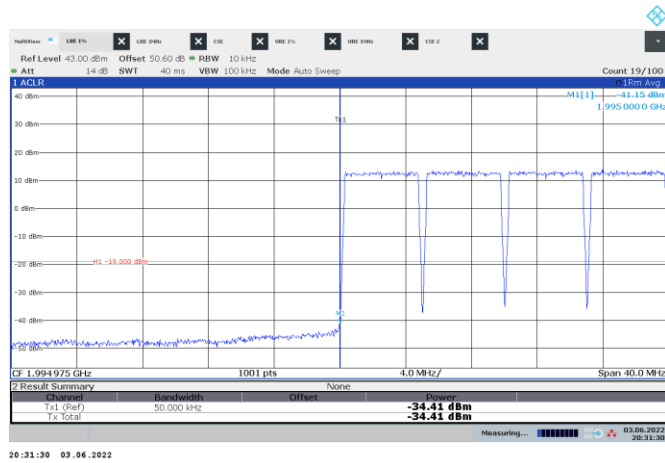


Figure 8.6-117: Conducted emission at the lower band edge

Frequency: 1995 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 3x LTE 5 MHz + 2 x NR 5 MHz
 Limit: -19 dBm/100 kHz Notes: None

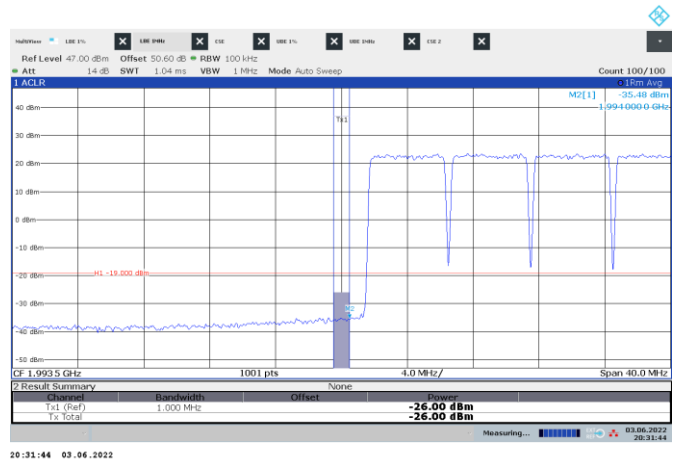


Figure 8.6-118: Conducted emission 1 MHz away from the lower band edge

Frequency: 1994 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 3x LTE 5 MHz + 2 x NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

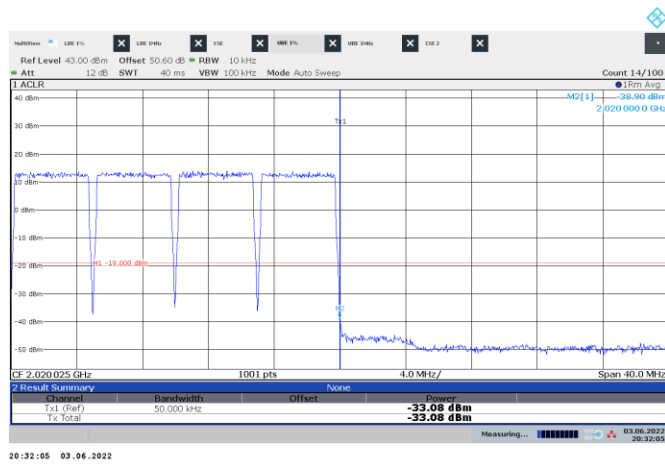


Figure 8.6-119: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 3x LTE 5 MHz + 2 x NR 5 MHz
 Limit: -19 dBm/100 kHz Notes: None

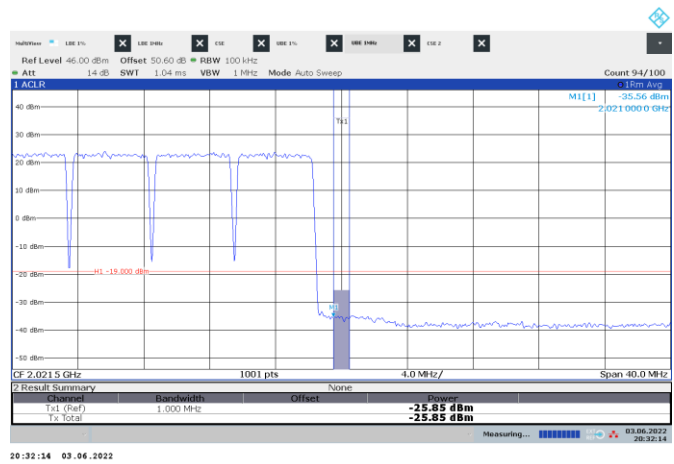


Figure 8.6-120: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 3x LTE 5 MHz + 2 x NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

Test data, continued



Figure 8.6-121: Conducted emission at the lower band edge

Frequency: 1995 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 1x LTE 10 MHz + 1x NR 10 MHz
 Limit: -19 dBm/100 kHz Notes: None



Figure 8.6-122: Conducted emission 1 MHz away from the lower band edge

Frequency: 1994 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 1x LTE 10 MHz + 1x NR 10 MHz
 Limit: -19 dBm/MHz Notes: None

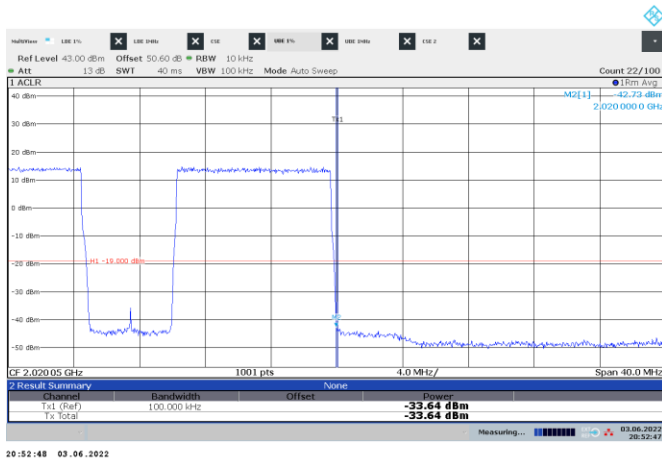


Figure 8.6-123: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 1x LTE 10 MHz + 1x NR 10 MHz
 Limit: -19 dBm/100 kHz Notes: None

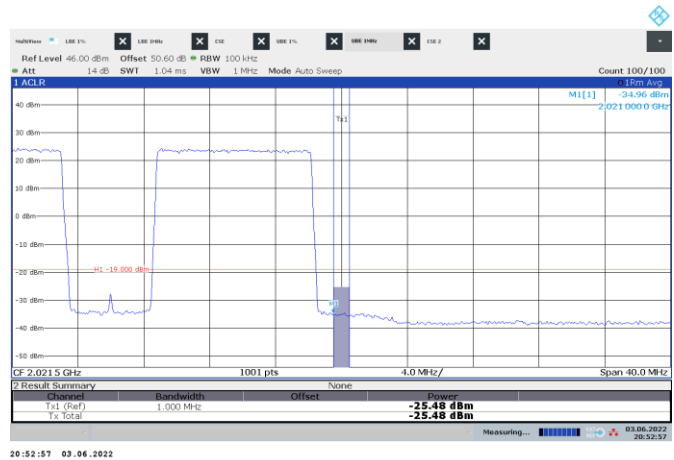


Figure 8.6-124: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 1x LTE 10 MHz + 1x NR 10 MHz
 Limit: -19 dBm/MHz Notes: None

8.7 Spurious out-of-band emissions (Band 70A)

8.7.1 Definitions and limits

RSS-170, Section 5.4:

The transmitter unwanted emissions shall be measured for all channel bandwidths with the carrier frequency set at both the highest and lowest channels in which the equipment is designed to operate.

The e.i.r.p. density of unwanted and carrier-off state emissions outlined in this section (Section 5.4) shall be averaged over any 2-ms active transmission using an RMS detector with a resolution bandwidth of 1 MHz for broadband emissions and a resolution bandwidth of 1 kHz for discrete emissions, unless stated otherwise.

For ATC equipment operating in the bands 2000–2020 MHz and 2180–2200 MHz, the unwanted emission limits shall be determined using a measurement bandwidth of 1 MHz or greater. However, in the 1 MHz band immediately outside and adjacent to the equipment's operating frequency block, a resolution bandwidth of at least 1% of the occupied bandwidth may be employed.

5.4.1.2 ATC Base Station Equipment operating in bands 2000–2020 MHz and 2180–2200 MHz

The unwanted emissions of ATC base station equipment transmitting in the bands 2000-2020 MHz and 2180-2200 MHz shall comply with the following:

(1) The power of any unwanted emissions at frequencies outside the equipment's operating frequency block shall be attenuated below the transmitter power P (dBW), by $43 + 10 \log p$ (watts), dB.

(2) For equipment operating in the band 2180–2200 MHz, in addition to (1), the power of any emissions on all frequencies between 2200 MHz and 2290 MHz shall not exceed an e.i.r.p. of -100.6 dBW/4 kHz (-70.6 dBm/4 kHz).

*** This requirement is for implementation and is enforced at the time of licensing. Therefore, results are not included in this report.**

Requirement number 2 above is amended as detailed in the following ISED document...

<https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11536.html>

8.7.2 Test summary

Test date	June 3, 2022
Test engineer	Moustapha Salah Toubeh

8.7.3 Observations, settings and special notes

- The spectrum was searched from 30 MHz to the 10th harmonic.
- All measurements were performed using an average (RMS) detector per ANSI C63.26 Paragraph 5.7.2 method.
- Limit line ($43 + 10 \log_{10}(P)$ or -13 dBm) was adjusted for MIMO operation by 6 dB*: -13 dBm $- 6$ dB = -19 dBm
*MIMO correction factor for 4 antenna ports: $10 \times \log_{10}(4) = 6$ dB
- RBW 1 MHz, VBW was wider than RBW.
- On the conducted spurious emissions plots "FAIL" levels belong to either fundamental frequency or band edges, which were re-measured further down in the report.

Note: for Multi-carrier configurations including X carriers in the band, $X/2$ carriers are located at the lowest edge of the band and $X/2$ carriers are located at the highest edge of the band.

8.7.4 Test data



Figure 8.7-1: Conducted spurious emissions of LTE 5 MHz low channel with IB-IoT1, single carrier operation



Figure 8.7-2: Conducted spurious emissions of LTE 5 MHz mid channel with IB-IoT1, single carrier operation

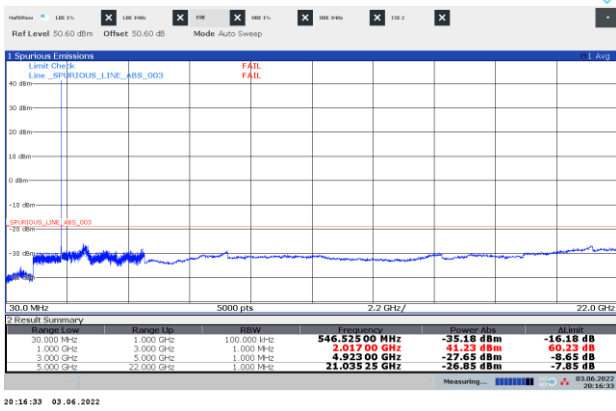


Figure 8.7-3: Conducted spurious emissions of LTE 5 MHz top channel with IB-IoT1, single carrier operation

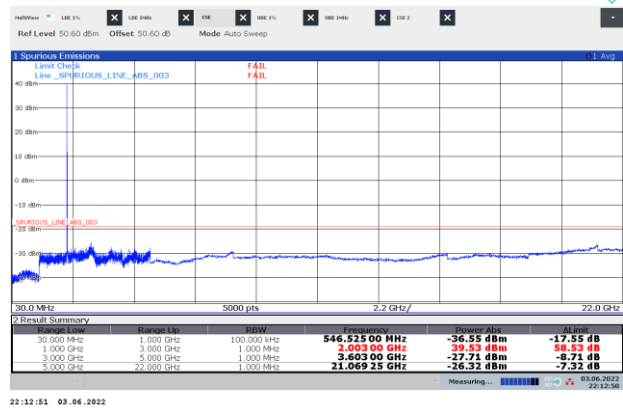


Figure 8.7-4: Conducted spurious emissions of LTE 5 MHz low channel with IB-IoT2, single carrier operation

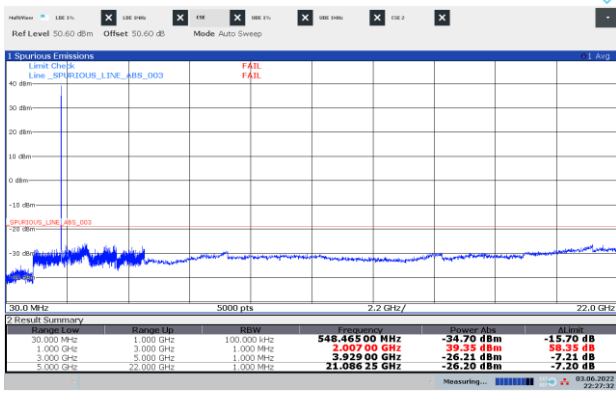


Figure 8.7-5: Conducted spurious emissions of LTE 5 MHz mid channel with IB-IoT2, single carrier operation



Figure 8.7-6: Conducted spurious emissions of LTE 5 MHz top channel with IB-IoT2, single carrier operation

Test data, continued



22:27:32 03.06.2022

Figure 8.7-7: Conducted spurious emissions of LTE 10 MHz low channel, single carrier operation



22:28:10 03.06.2022

Figure 8.7-8: Conducted spurious emissions of LTE 10 MHz mid channel, single carrier operation



20:48:42 03.06.2022

Figure 8.7-9: Conducted spurious emissions of LTE 10 MHz top channel, single carrier operation



22:36:16 03.06.2022

Figure 8.7-10: Conducted spurious emissions of LTE 15 MHz low channel, single carrier operation



22:37:21 03.06.2022

Figure 8.7-11: Conducted spurious emissions of LTE 15 MHz mid channel, single carrier operation



21:09:56 03.06.2022

Figure 8.7-12: Conducted spurious emissions of LTE 15 MHz top channel, single carrier operation

Test data, continued

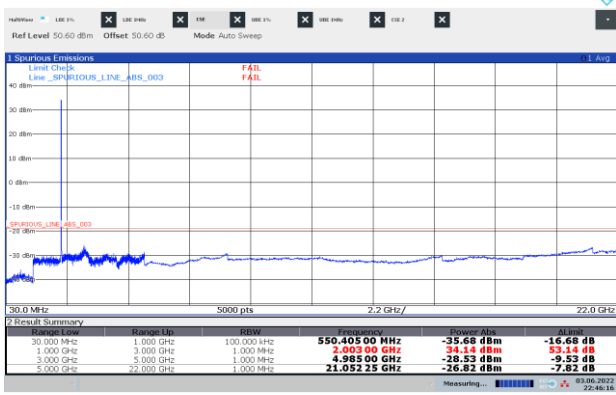


Figure 8.7-13: Conducted spurious emissions of LTE 20 MHz mid channel, single carrier operation

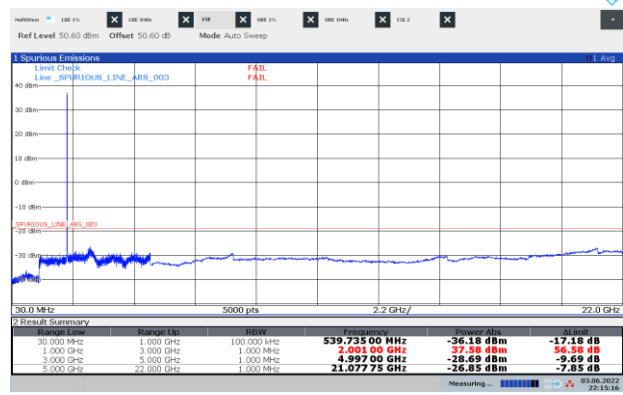


Figure 8.7-14: Conducted spurious emissions of LTE 5 MHz, two-carrier operation

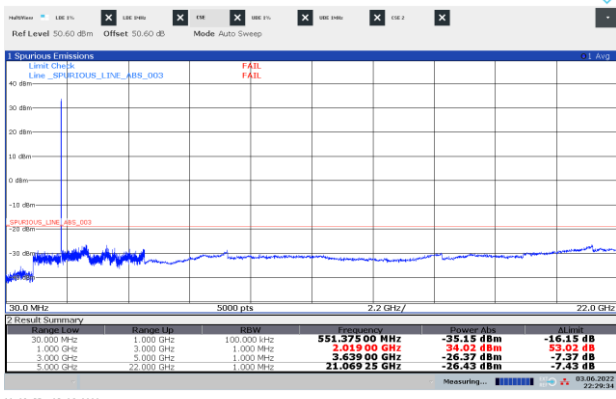


Figure 8.7-15: Conducted spurious emissions of LTE 10 MHz, two-carrier operation

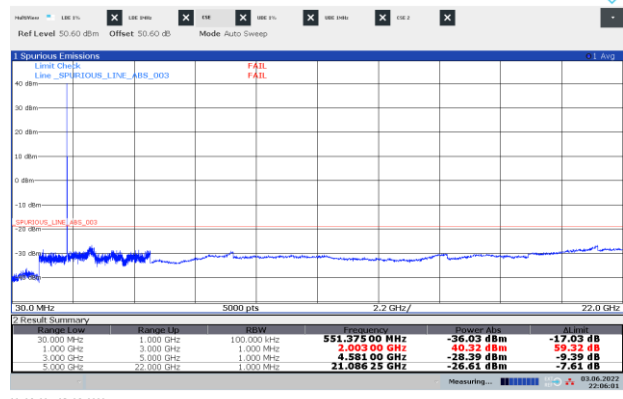


Figure 8.7-16: Conducted spurious emissions of NR5 MHz low channel, single carrier operation

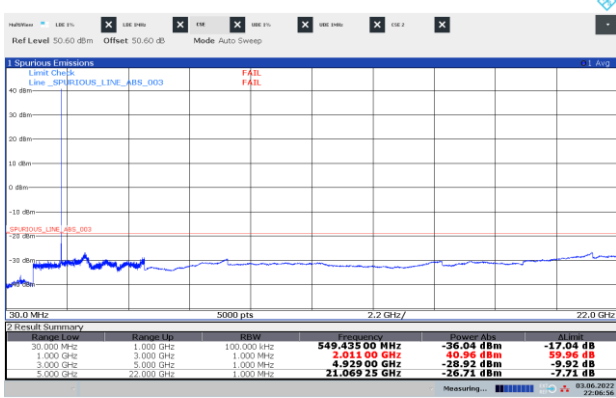


Figure 8.7-17: Conducted spurious emissions of NR5 MHz mid channel, single carrier operation

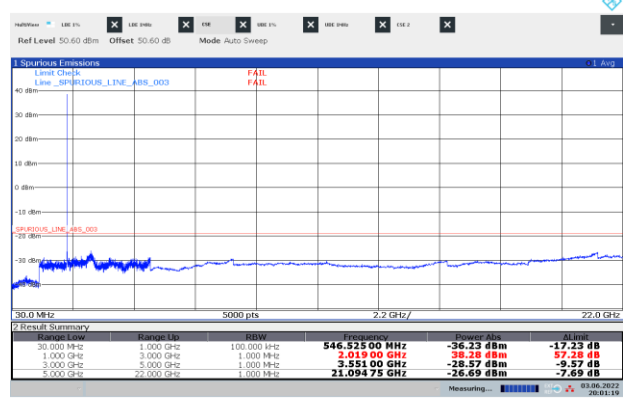


Figure 8.7-18: Conducted spurious emissions of NR5 MHz top channel, single carrier operation

Test data, continued

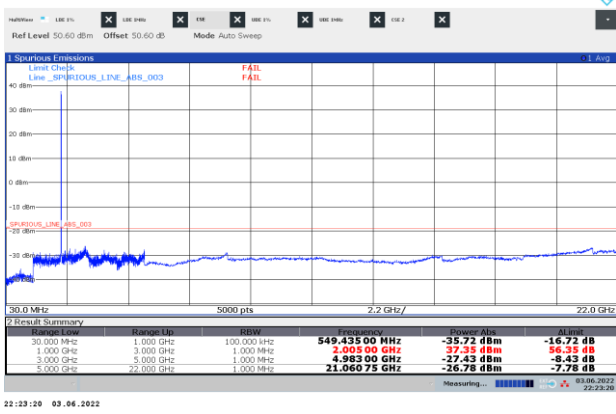


Figure 8.7-19: Conducted spurious emissions of NR10 MHz low channel, single carrier operation



Figure 8.7-20: Conducted spurious emissions of NR10 MHz mid channel, single carrier operation



Figure 8.7-21: Conducted spurious emissions of NR10 MHz top channel, single carrier operation

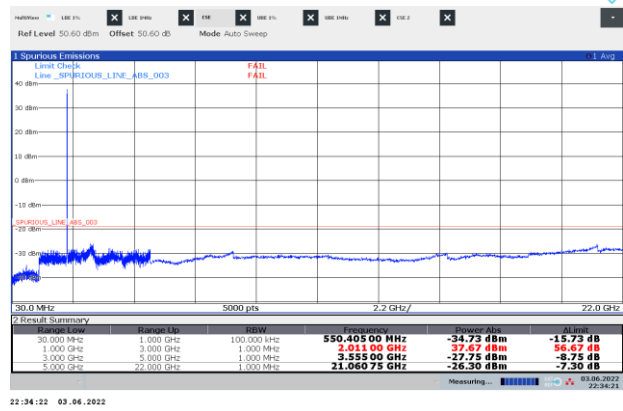


Figure 8.7-22: Conducted spurious emissions of NR15 MHz low channel, single carrier operation



Figure 8.7-23: Conducted spurious emissions of NR15 MHz mid channel, single carrier operation

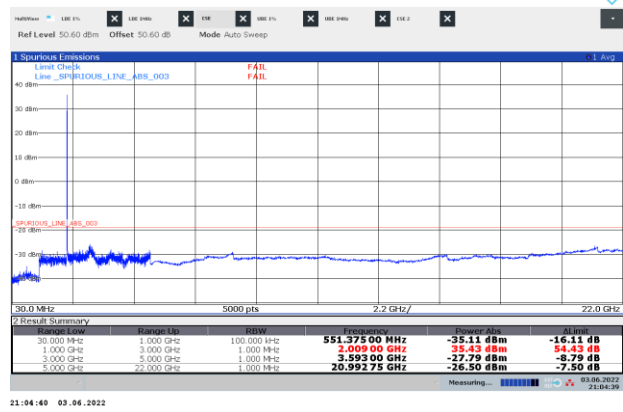


Figure 8.7-24: Conducted spurious emissions of NR15 MHz top channel, single carrier operation

Test data, continued



22:44:47 03.06.2022

Figure 8.7-25: Conducted spurious emissions of NR20 MHz mid channel, single carrier operation



22:08:49 03.06.2022

Figure 8.7-26: Conducted spurious emissions of NR 5 MHz, two-carrier operation



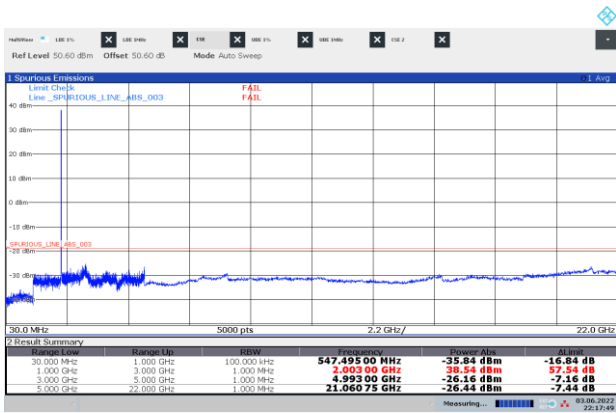
22:09:39 03.06.2022

Figure 8.7-27: Conducted spurious emissions of NR 5 MHz, three-carrier operation



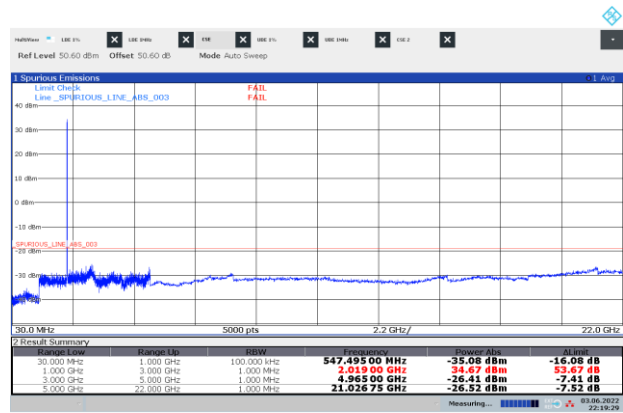
22:20:41 03.06.2022

Figure 8.7-28: Conducted spurious emissions of NR 10 MHz, two-carrier operation



22:17:50 03.06.2022

Figure 8.7-29: Conducted spurious emissions of multi-RAT operation, 1xLTE 5 MHz and 1xNR 5 MHz, two-carrier operation



22:19:20 03.06.2022

Figure 8.7-30: Conducted spurious emissions of multi-RAT operation, 2xLTE 5 MHz and 2xNR 5 MHz, four-carrier operation

Test data, continued

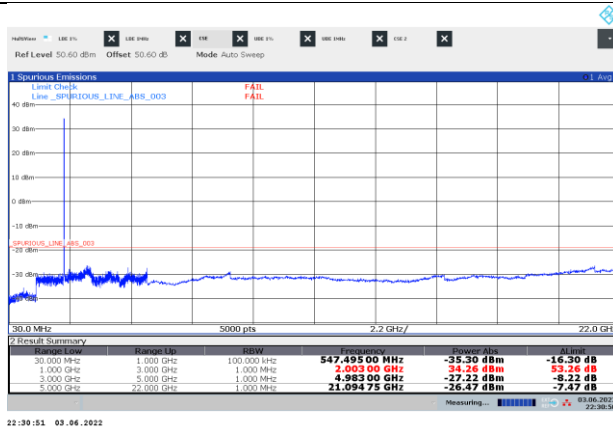


Figure 8.7-31: Conducted spurious emissions of multi-RAT operation, 1xLTE 10 MHz and 1xNR 10 MHz, two-carrier operation

Test data, continued

On the plots below the measured *Tx1 (Ref)* value in the “Power” column must be -19 dBm and lower.

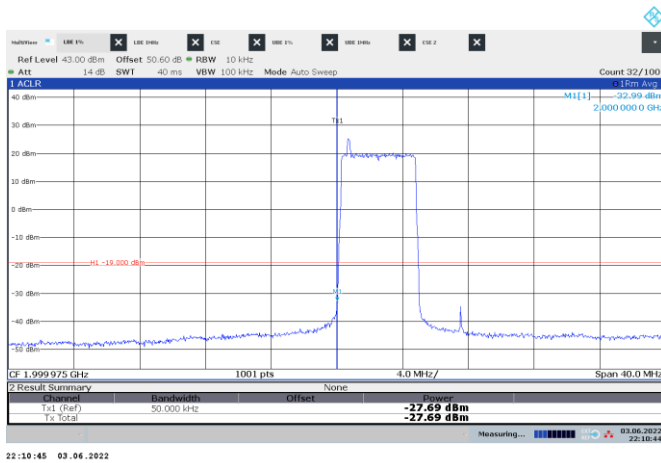


Figure 8.7-32: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: LTE 5 MHz with IB-IoT1
 Limit: -19 dBm/50 kHz Notes: None

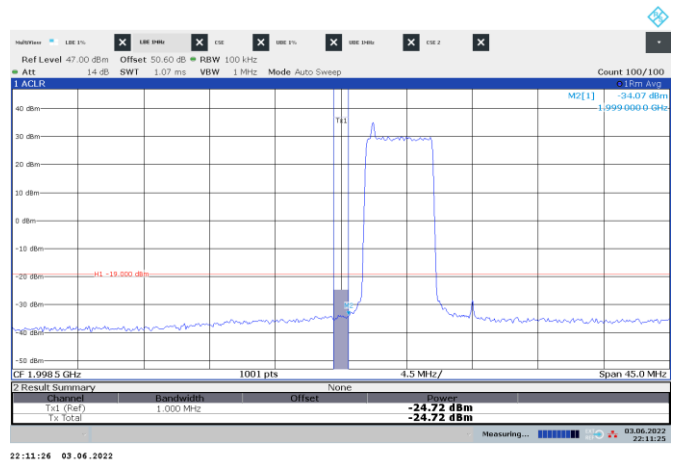


Figure 8.7-33: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: LTE 5 MHz with IB-IoT1
 Limit: -19 dBm/MHz Notes: None

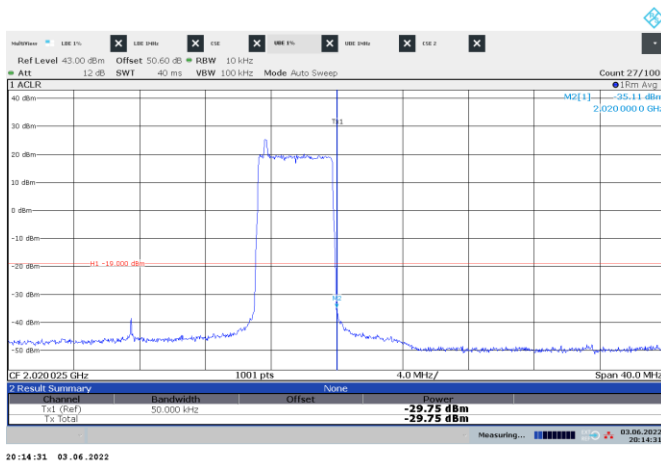


Figure 8.7-34: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: LTE 5 MHz with IB-IoT1
 Limit: -19 dBm/50 kHz Notes: Same plot in band 70



Figure 8.7-35: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: LTE 5 MHz with IB-IoT1
 Limit: -19 dBm/MHz Notes: Same plot in band 70

Test data, continued



Figure 8.7-36: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: LTE 5 MHz with IB-IoT2
 Limit: -19 dBm/50 kHz Notes: None

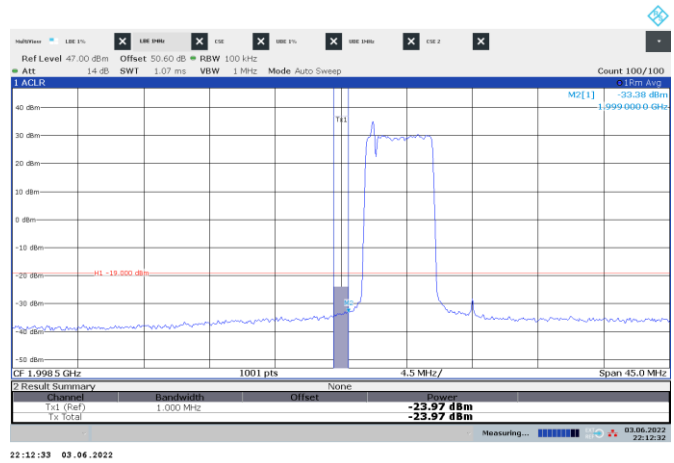


Figure 8.7-37: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: LTE 5 MHz with IB-IoT2
 Limit: -19 dBm/MHz Notes: None

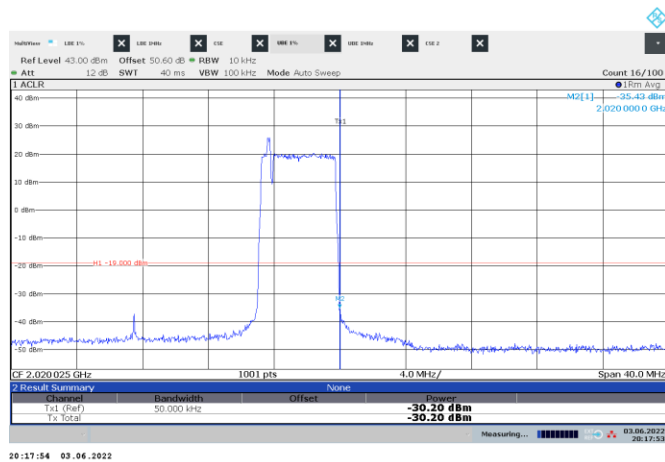


Figure 8.7-38: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: LTE 5 MHz with IB-IoT2
 Limit: -19 dBm/50 kHz Notes: Same plot in band 70

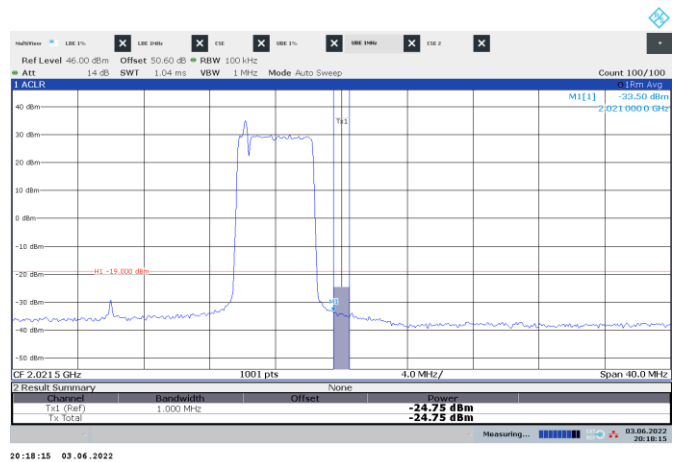


Figure 8.7-39: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: LTE 5 MHz with IB-IoT2
 Limit: -19 dBm/MHz Notes: Same plot in band 70

Test data, continued

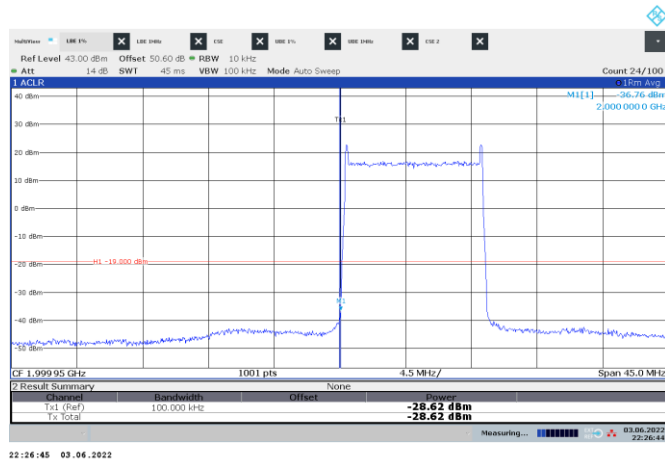


Figure 8.7-40: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: LTE 10 MHz with IoT
 Limit: -19 dBm/100 kHz Notes: None

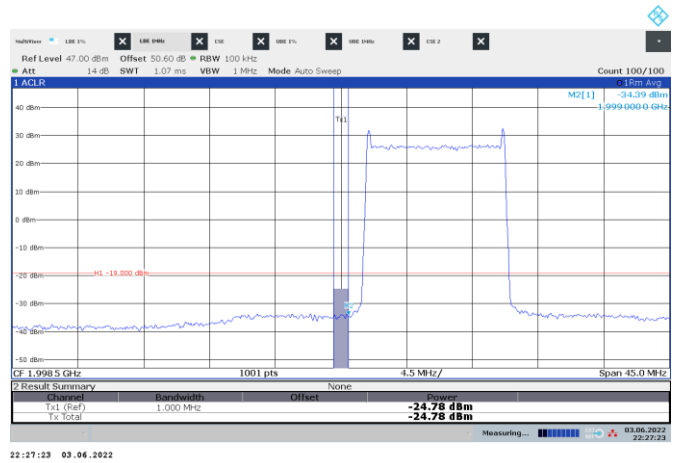


Figure 8.7-41: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: LTE 10 MHz with IoT
 Limit: -19 dBm/MHz Notes: None

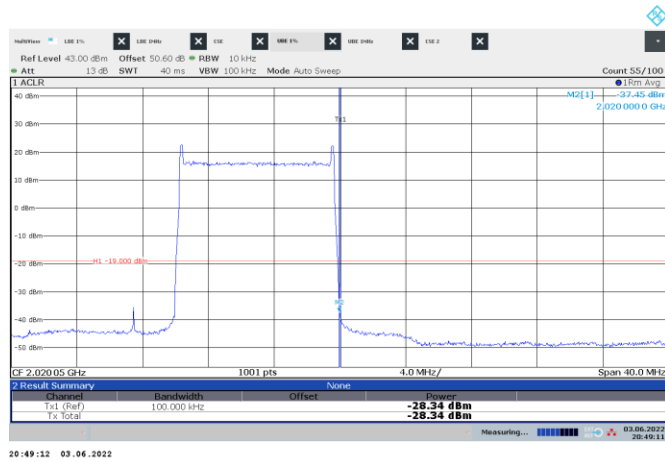


Figure 8.7-42: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: LTE 10 MHz with IoT
 Limit: -19 dBm/100 kHz Notes: Same plot in band 70

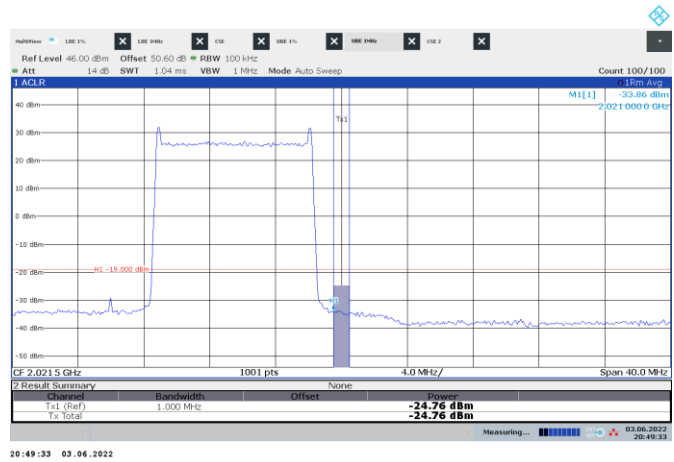


Figure 8.7-43: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: LTE 10 MHz with IoT
 Limit: -19 dBm/MHz Notes: Same plot in band 70

Test data, continued

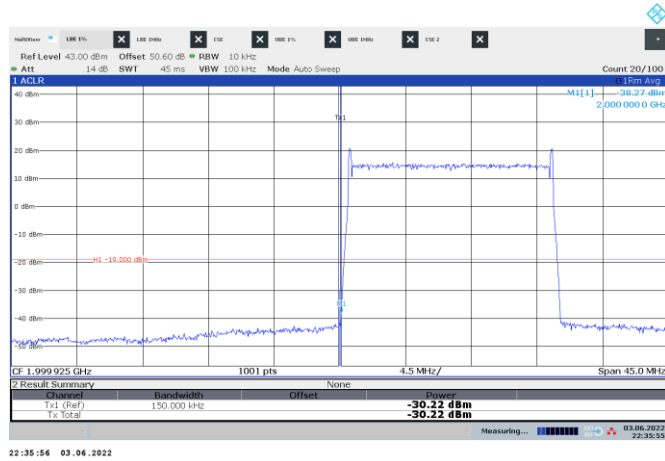


Figure 8.7-44: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: LTE 15 MHz with IoT
 Limit: -19 dBm/150 kHz Notes: None

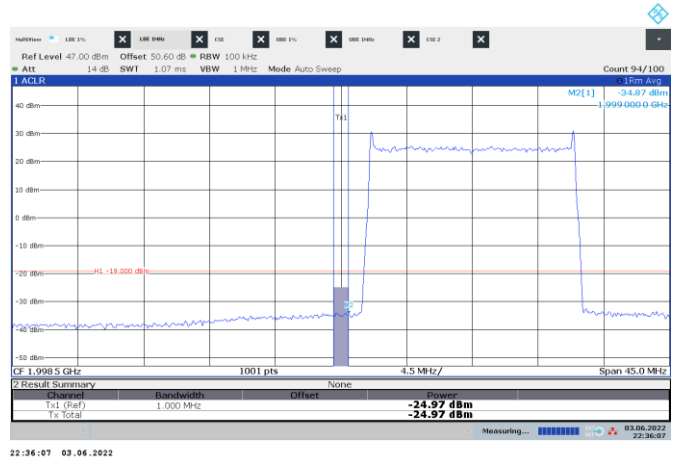


Figure 8.7-45: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: LTE 15 MHz with IoT
 Limit: -19 dBm/MHz Notes: None

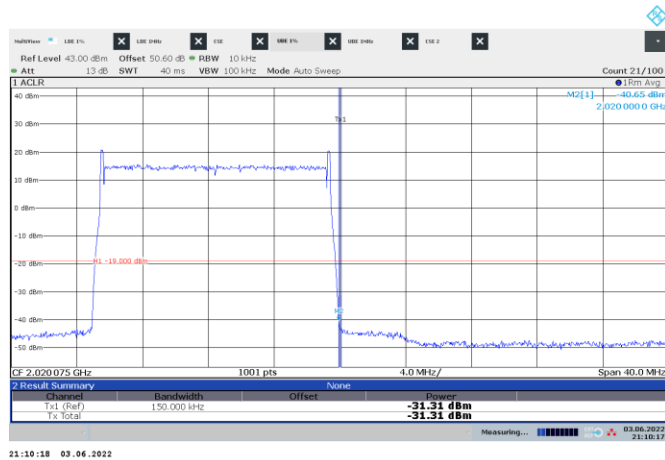


Figure 8.7-46: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: LTE 15 MHz with IoT
 Limit: -19 dBm/150 kHz Notes: Same plot in band 70

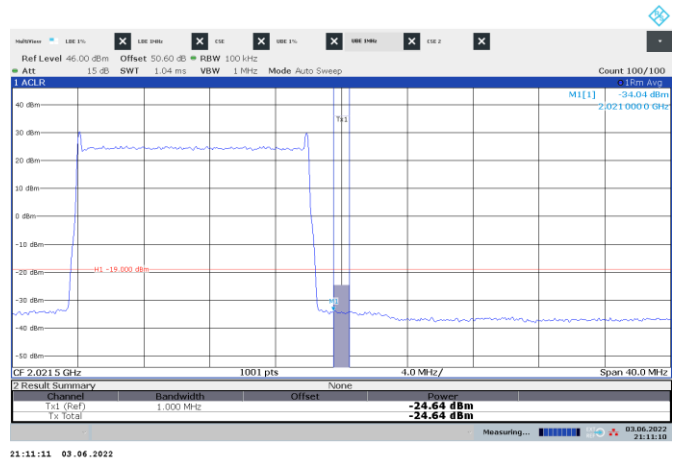


Figure 8.7-47: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: LTE 15 MHz with IoT
 Limit: -19 dBm/MHz Notes: Same plot in band 70

Test data, continued

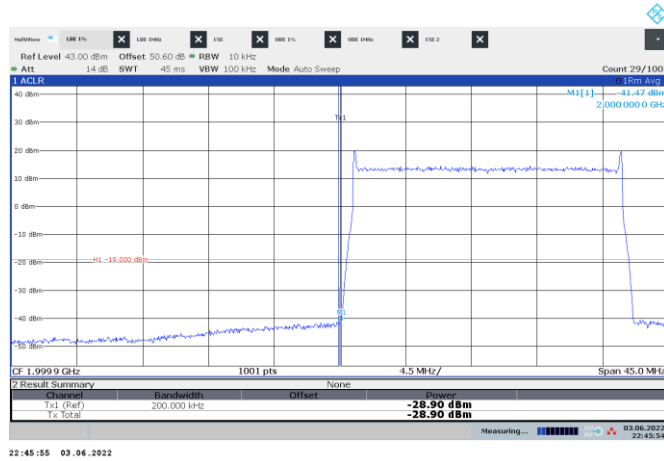


Figure 8.7-48: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: LTE 20 MHz with IoT
 Limit: -19 dBm/200 kHz Notes: None

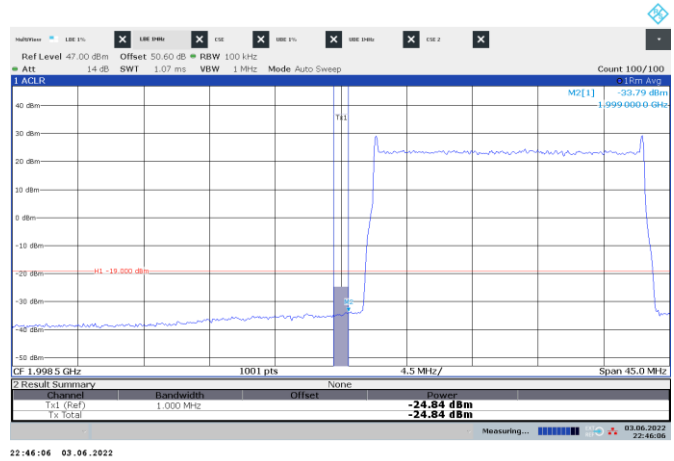


Figure 8.7-49: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: LTE 20 MHz with IoT
 Limit: -19 dBm/MHz Notes: None

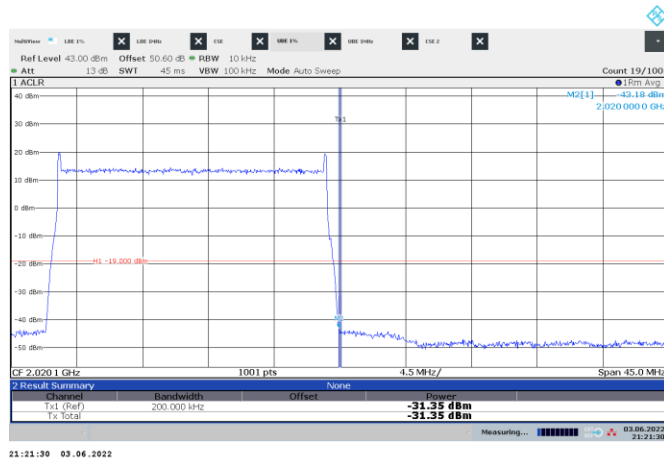


Figure 8.7-50: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: LTE 20 MHz with IoT
 Limit: -19 dBm/200 kHz Notes: Same plot in band 70

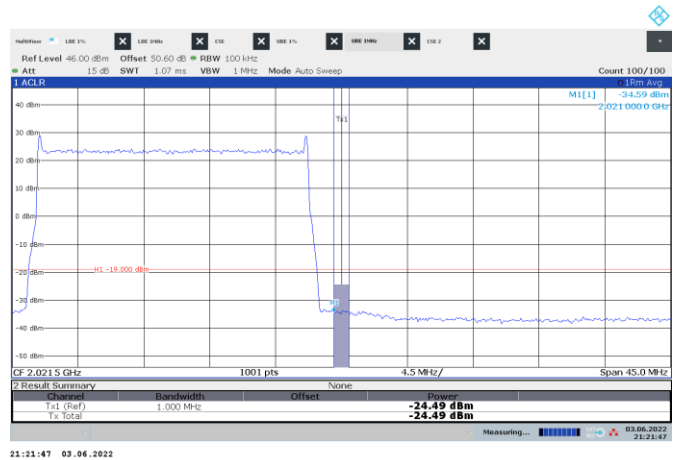


Figure 8.7-51: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: LTE 20 MHz with IoT
 Limit: -19 dBm/MHz Notes: Same plot in band 70

Test data, continued



Figure 8.7-52: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Multi-carrier operation
 Meas. BW: 1% of EBW Tech.: 2 x LTE 5 MHz with IoT
 Limit: -19 dBm/50 kHz Notes: None

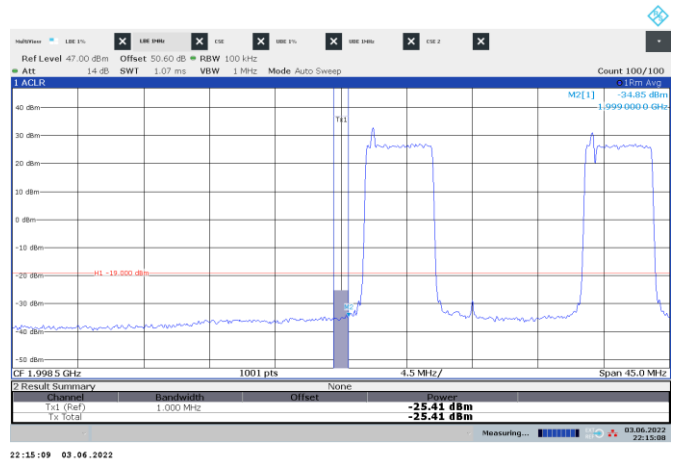


Figure 8.7-53: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Multi-carrier operation
 Meas. BW: 1 MHz Tech.: 2 x LTE 5 MHz with IoT
 Limit: -19 dBm/MHz Notes: None

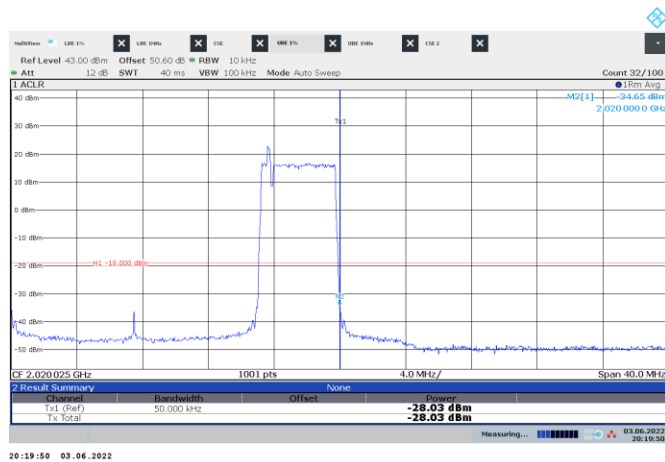


Figure 8.7-54: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Multi-carrier operation
 Meas. BW: 1% of EBW Tech.: 2 x LTE 5 MHz with IoT
 Limit: -19 dBm/50 kHz Notes: Same plot in band 70

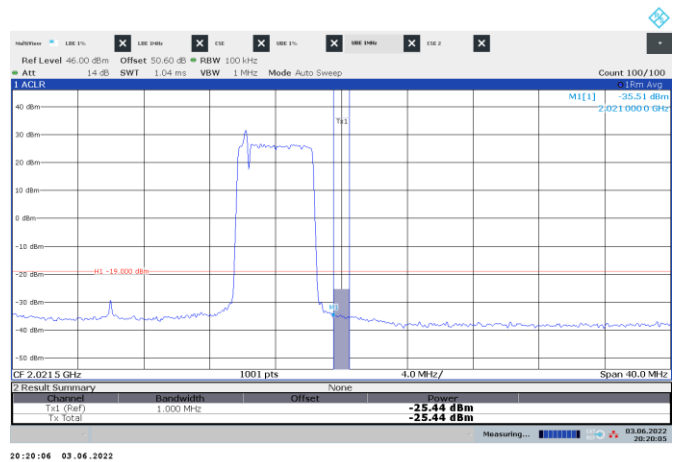


Figure 8.7-55: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Multi-carrier operation
 Meas. BW: 1 MHz Tech.: 2 x LTE 5 MHz with IoT
 Limit: -19 dBm/MHz Notes: Same plot in band 70

Test data, continued

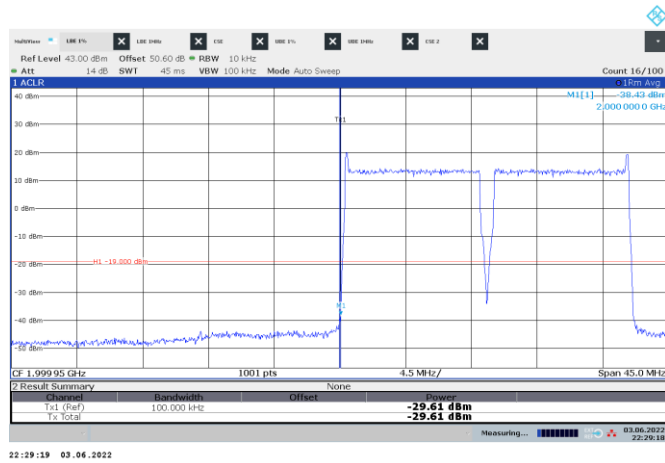


Figure 8.7-56: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Multi-carrier operation
 Meas. BW: 1% of EBW Tech.: 2 x LTE 10 MHz with IoT
 Limit: -19 dBm/150 kHz Notes: None



Figure 8.7-57: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Multi-carrier operation
 Meas. BW: 1 MHz Tech.: 2 x LTE 10 MHz with IoT
 Limit: -19 dBm/MHz Notes: None

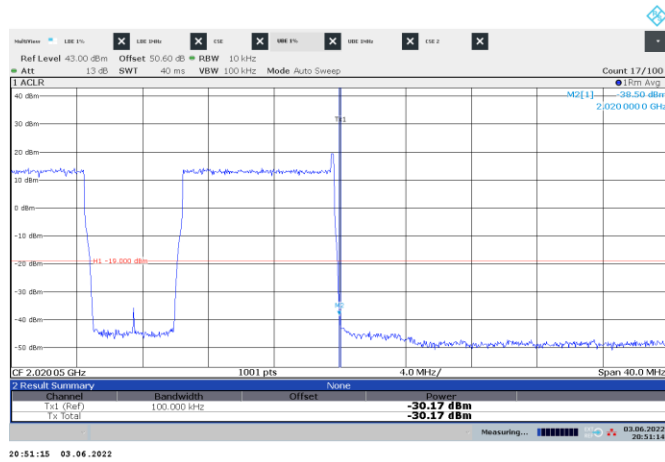


Figure 8.7-58: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Multi-carrier operation
 Meas. BW: 1% of EBW Tech.: 2 x LTE 10 MHz with IoT
 Limit: -19 dBm/150 kHz Notes: Same plot in band 70

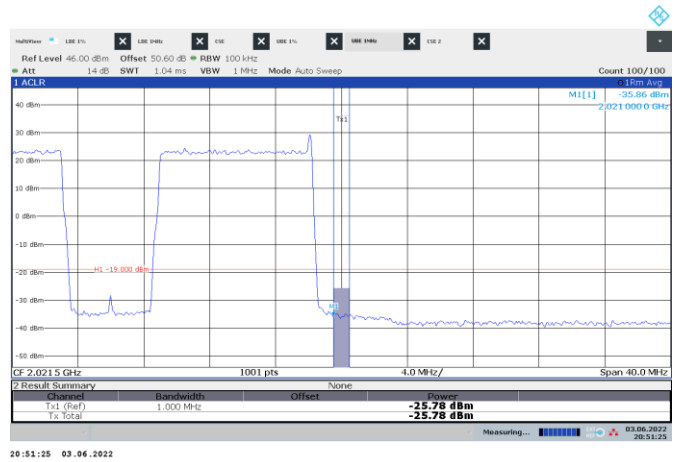


Figure 8.7-59: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Multi-carrier operation
 Meas. BW: 1 MHz Tech.: 2 x LTE 10 MHz with IoT
 Limit: -19 dBm/MHz Notes: Same plot in band 70

Test data, continued

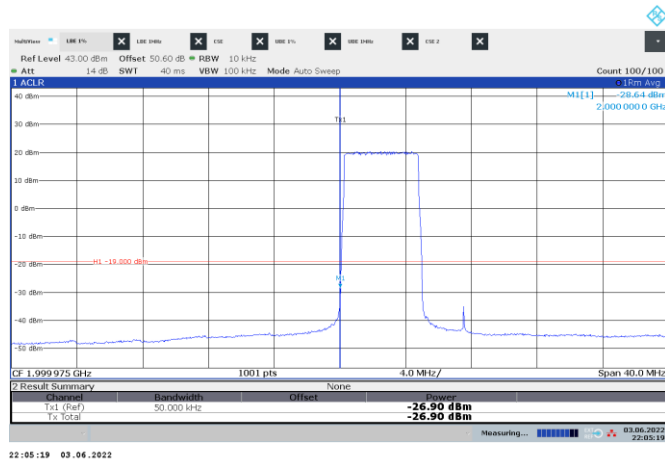


Figure 8.7-60: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: None

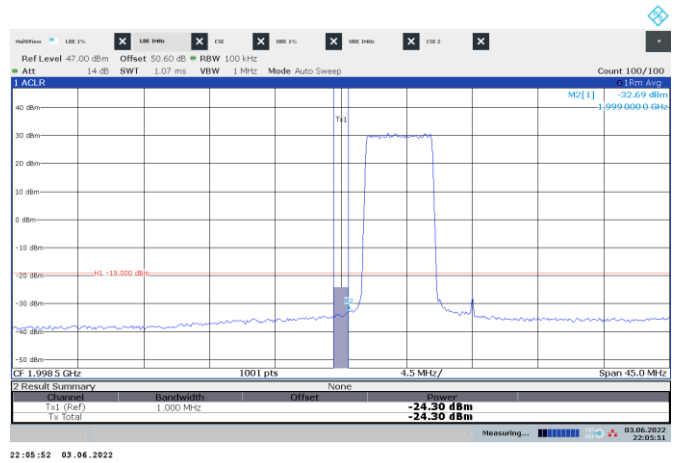


Figure 8.7-61: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: NR 5 MHz
 Limit: -19 dBm/MHz Notes: Measured result is < 23 dBm/MHz

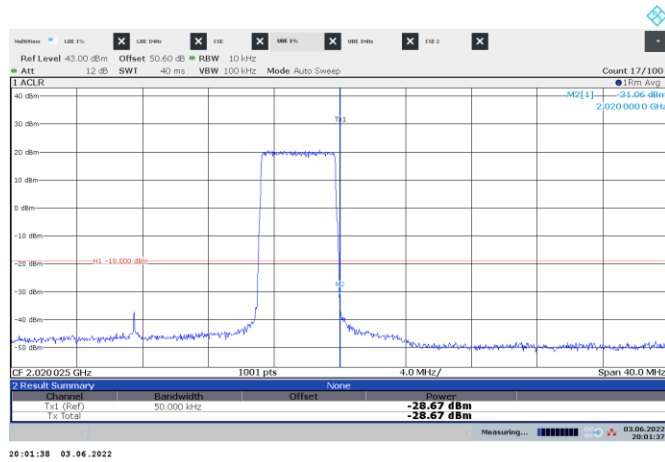


Figure 8.7-62: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: Same plot in band 70

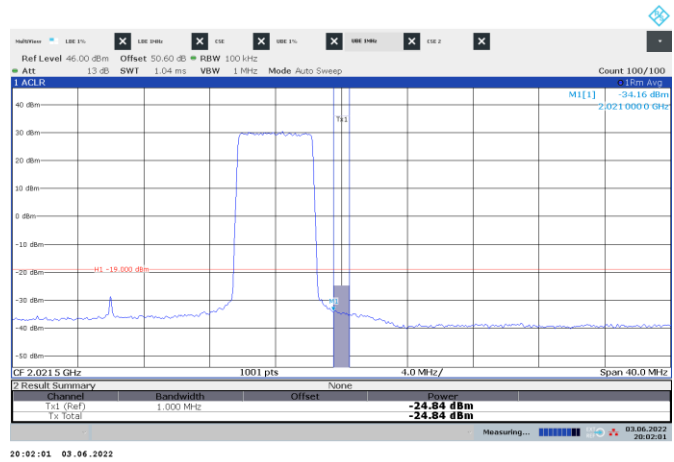


Figure 8.7-63: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: NR 5 MHz
 Limit: -19 dBm/MHz Notes: Same plot in band 70

Test data, continued

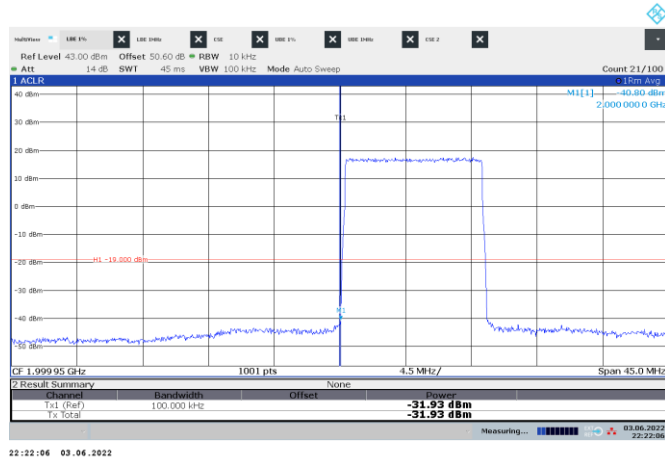


Figure 8.7-64: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: NR 10 MHz
 Limit: -19 dBm/100 kHz Notes: None

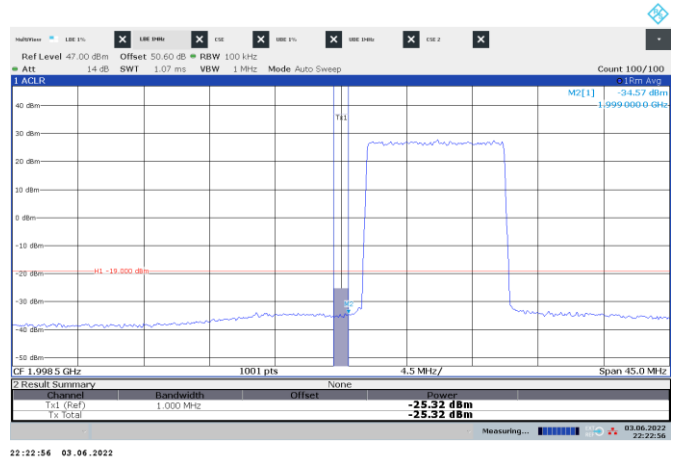


Figure 8.7-65: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: NR 10 MHz
 Limit: -19 dBm/MHz Notes: None

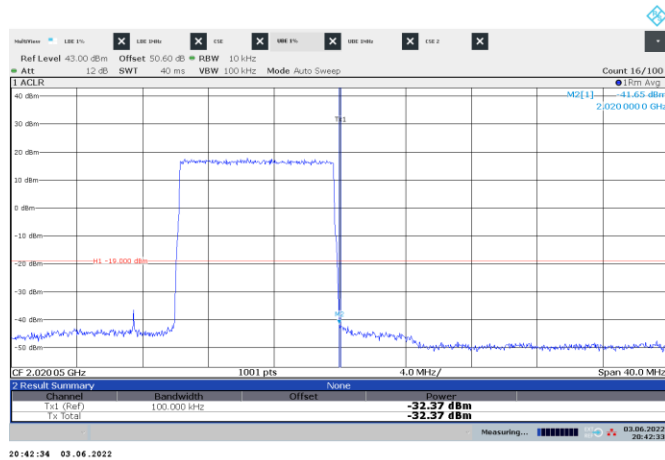


Figure 8.7-66: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: NR 10 MHz
 Limit: -19 dBm/100 kHz Notes: Same plot in band 70

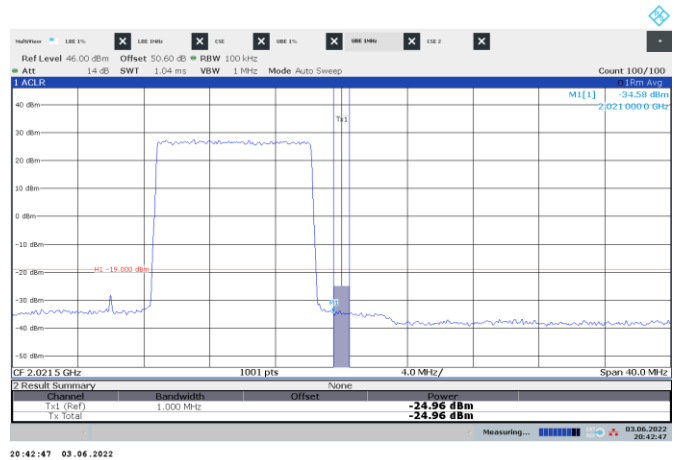


Figure 8.7-67: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: NR 10 MHz
 Limit: -19 dBm/MHz Notes: Same plot in band 70

Test data, continued

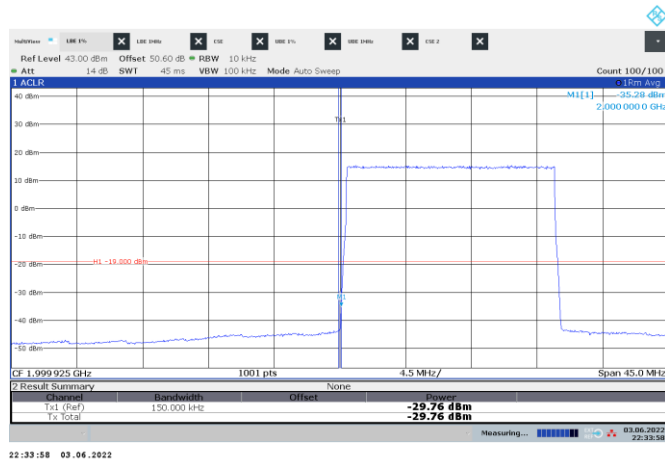


Figure 8.7-68: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: NR 15 MHz
 Limit: -19 dBm/150 kHz Notes: None

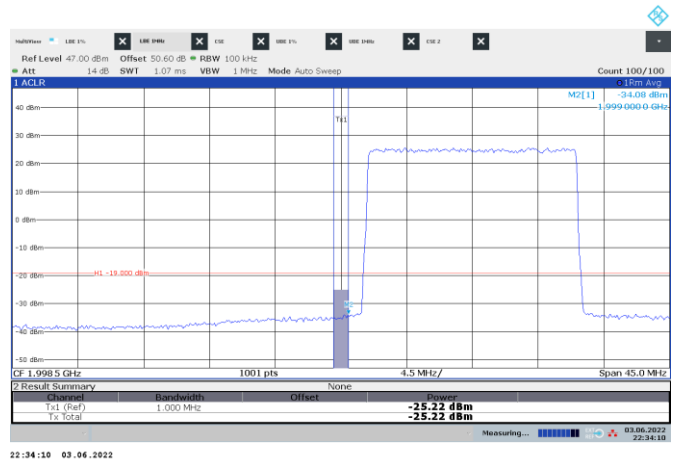


Figure 8.7-69: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: NR 15 MHz
 Limit: -19 dBm/MHz Notes: None

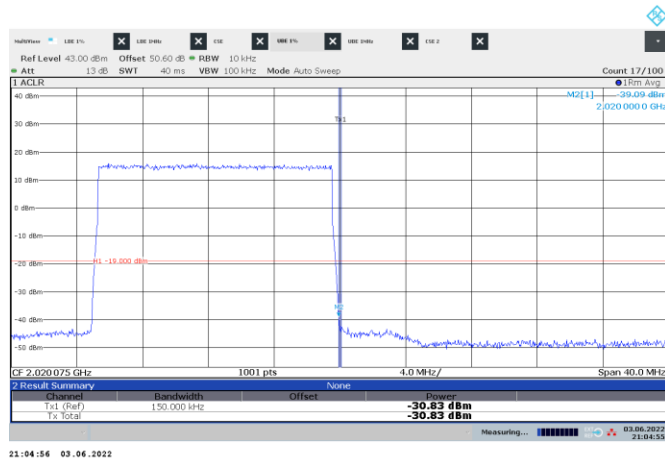


Figure 8.7-70: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: NR 15 MHz
 Limit: -19 dBm/150 kHz Notes: Same plot in band 70

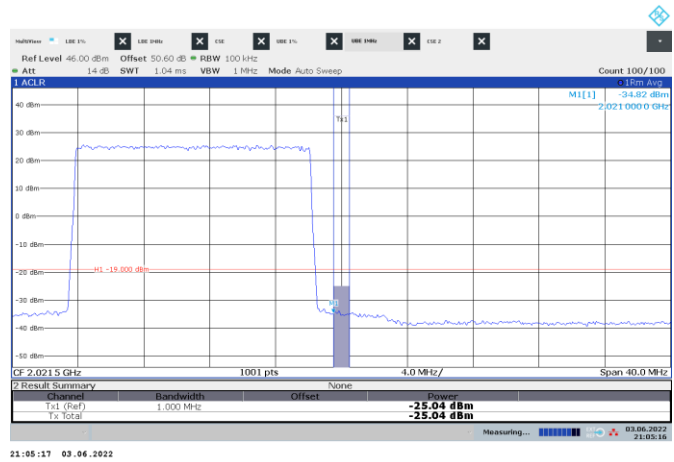


Figure 8.7-71: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: NR 15 MHz
 Limit: -19 dBm/MHz Notes: Same plot in band 70

Test data, continued

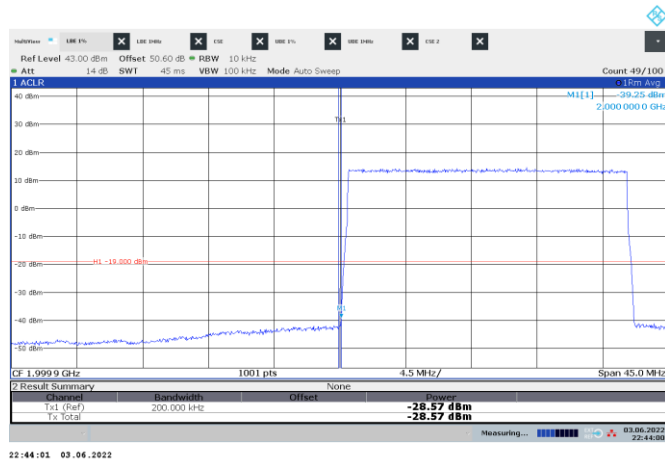


Figure 8.7-72: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: NR 20 MHz
 Limit: -19 dBm/200 kHz Notes: None

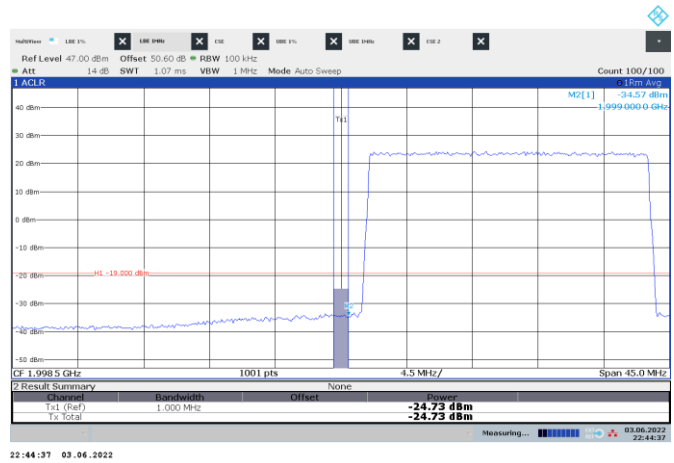


Figure 8.7-73: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: NR 20 MHz
 Limit: -19 dBm/MHz Notes: None

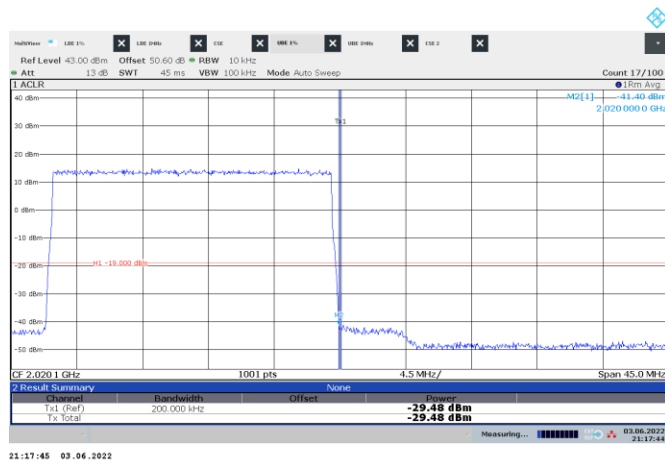


Figure 8.7-74: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: NR 20 MHz
 Limit: -19 dBm/200 kHz Notes: Same plot in band 70

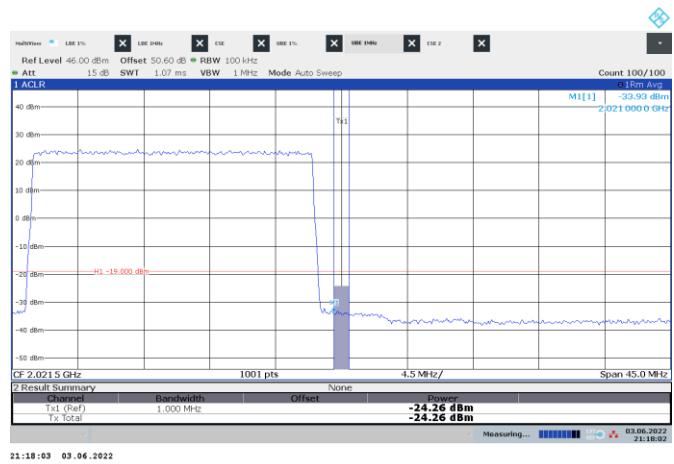


Figure 8.7-75: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: NR 20 MHz
 Limit: -19 dBm/MHz Notes: Same plot in band 70

Test data, continued

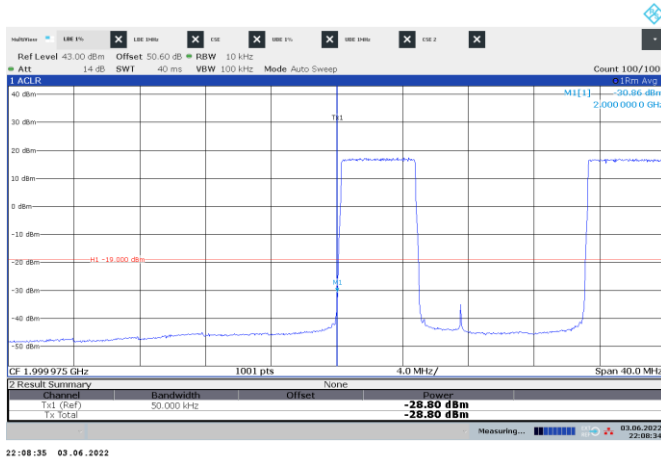


Figure 8.7-76: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Multi-carrier operation
 Meas. BW: 1% of EBW Tech.: 2 × NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: None

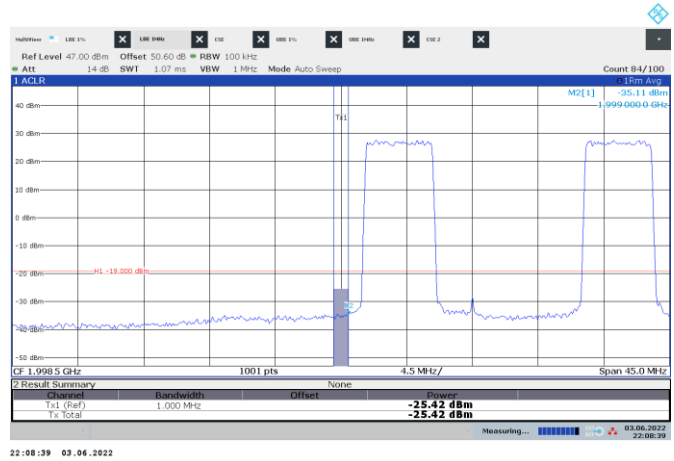


Figure 8.7-77: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Multi-carrier operation
 Meas. BW: 1 MHz Tech.: 2 × NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

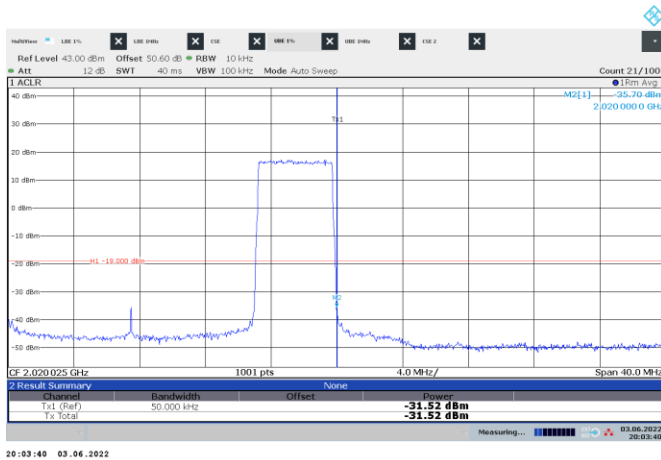


Figure 8.7-78: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Multi-carrier operation
 Meas. BW: 1% of EBW Tech.: 2 × NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: Same plot in band 70

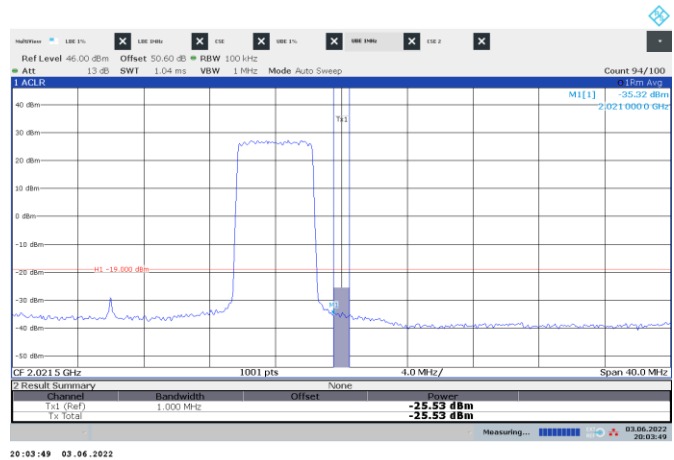


Figure 8.7-79: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Multi-carrier operation
 Meas. BW: 1 MHz Tech.: 2 × NR 5 MHz
 Limit: -19 dBm/MHz Notes: Same plot in band 70

Test data, continued

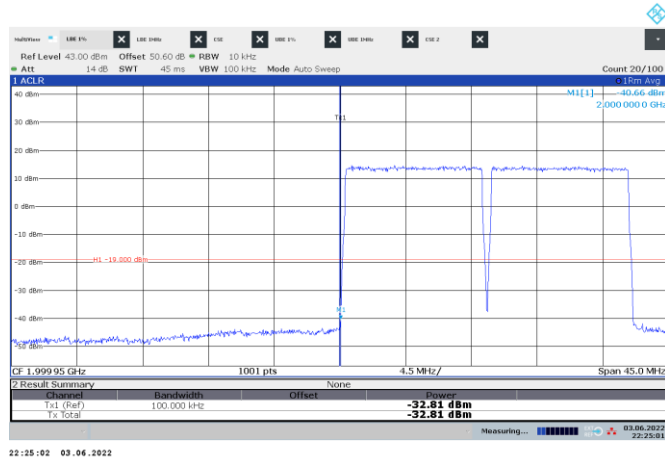


Figure 8.7-80: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Multi-carrier operation
 Meas. BW: 1% of EBW Tech.: 2 × NR 10 MHz
 Limit: -19 dBm/100 kHz Notes: None

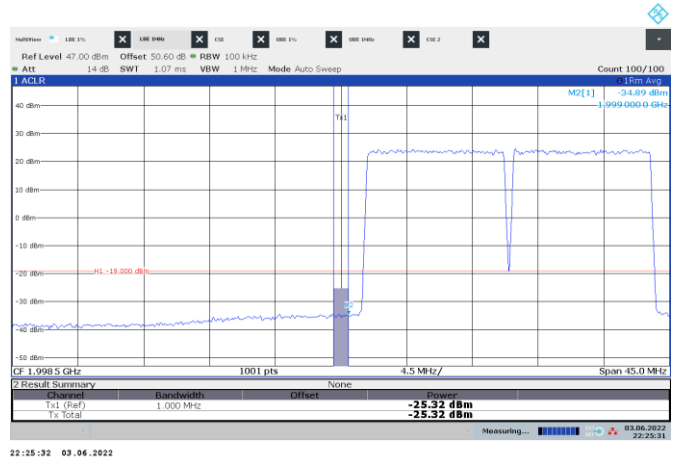


Figure 8.7-81: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Multi-carrier operation
 Meas. BW: 1 MHz Tech.: 2 × NR 10 MHz
 Limit: -19 dBm/MHz Notes: None

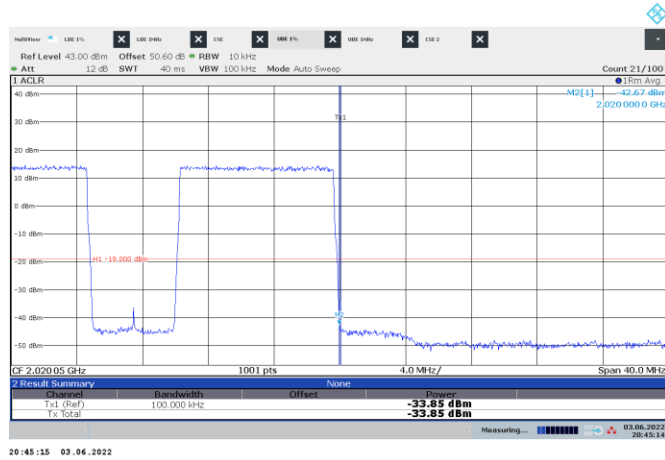


Figure 8.7-82: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Multi-carrier operation
 Meas. BW: 1% of EBW Tech.: 2 × NR 10 MHz
 Limit: -19 dBm/100 kHz Notes: Same plot in band 70



Figure 8.7-83: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Multi-carrier operation
 Meas. BW: 1 MHz Tech.: 2 × NR 10 MHz
 Limit: -19 dBm/MHz Notes: Same plot in band 70

Test data, continued

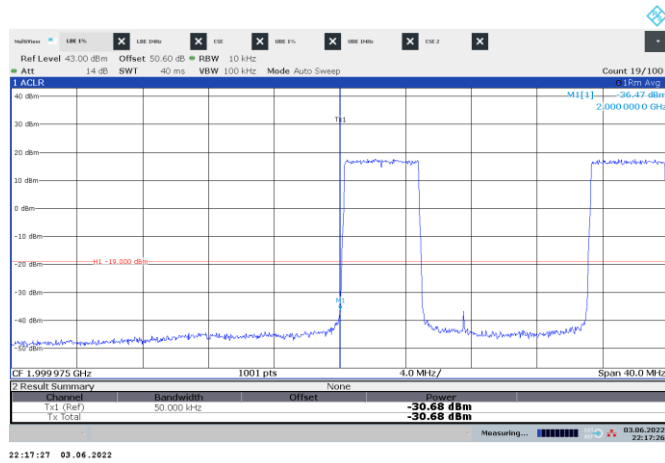


Figure 8.7-84: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 1x LTE 5 MHz + 1x NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: None

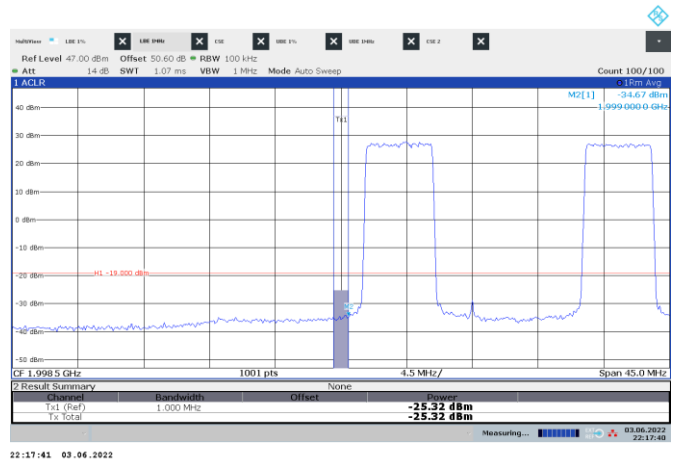


Figure 8.7-85: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 1x LTE 5 MHz + 1x NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

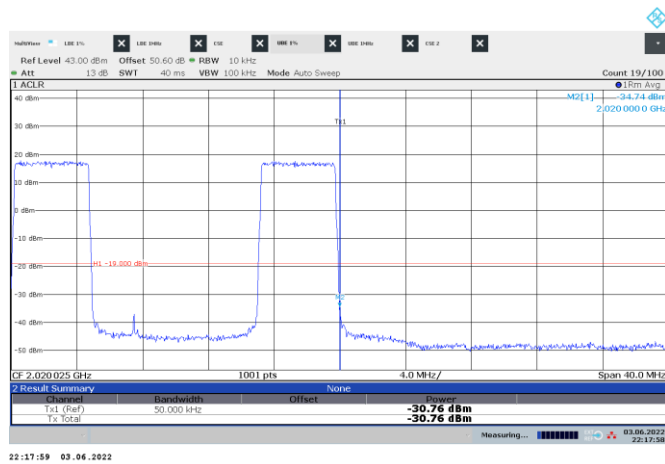


Figure 8.7-86: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 1x LTE 5 MHz + 1x NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: None

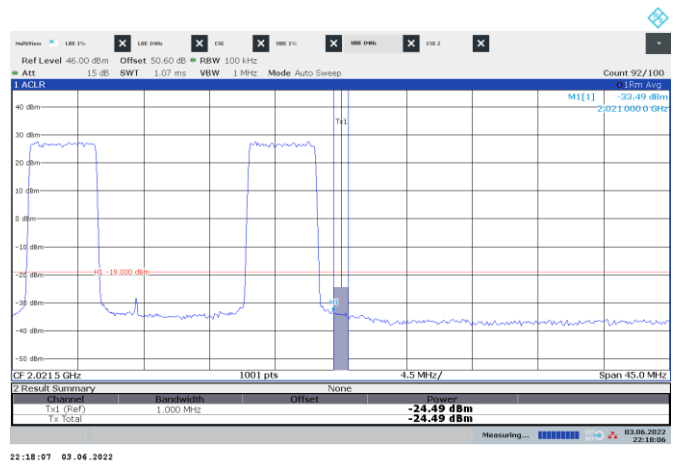


Figure 8.7-87: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 1x LTE 5 MHz + 1x NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

Test data, continued

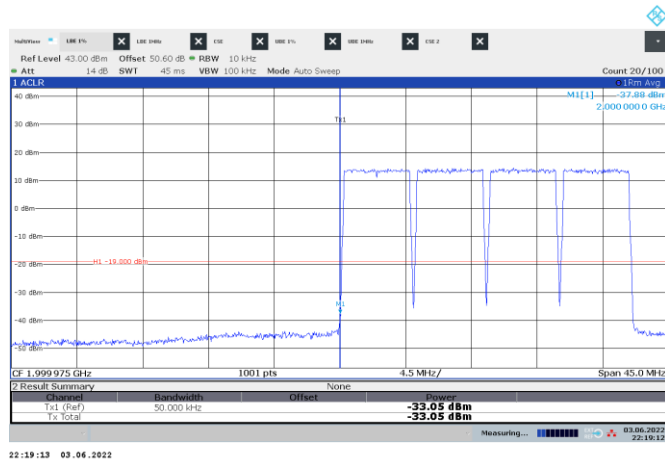


Figure 8.7-88: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 2x LTE 5 MHz + 2 x NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: None

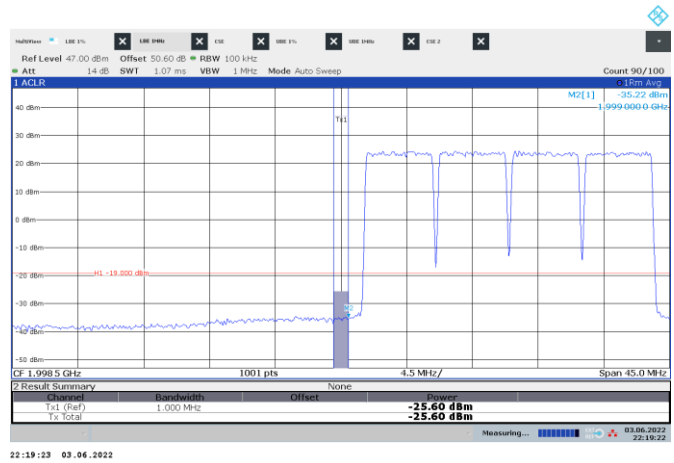


Figure 8.7-89: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 2x LTE 5 MHz + 2 x NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

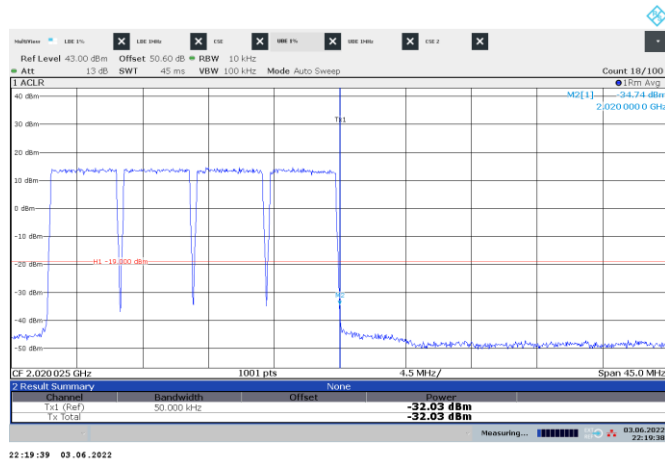


Figure 8.7-90: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 2x LTE 5 MHz + 2 x NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: None

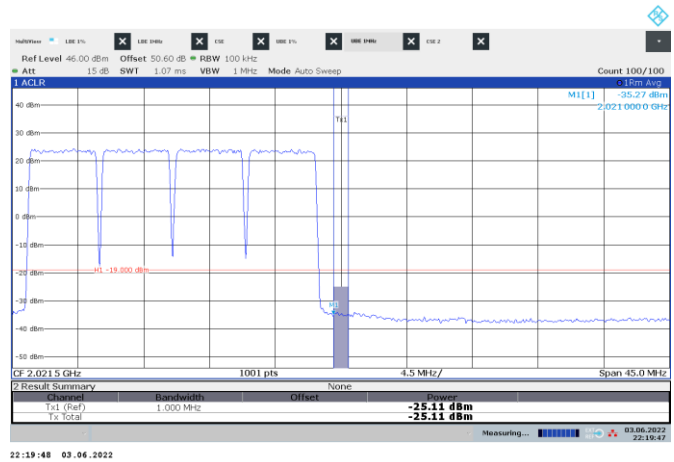


Figure 8.7-91: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 2x LTE 5 MHz + 2 x NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

Test data, continued

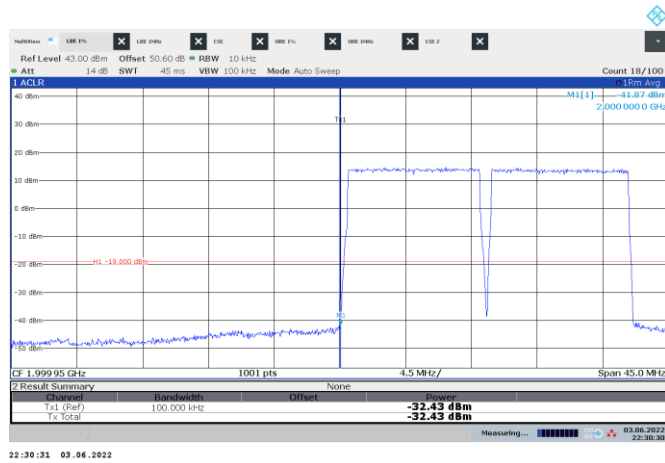


Figure 8.7-92: Conducted emission at the lower band edge

Frequency: 2000 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 1x LTE 10 MHz + 1x NR 10 MHz
 Limit: -19 dBm/100 kHz Notes: None

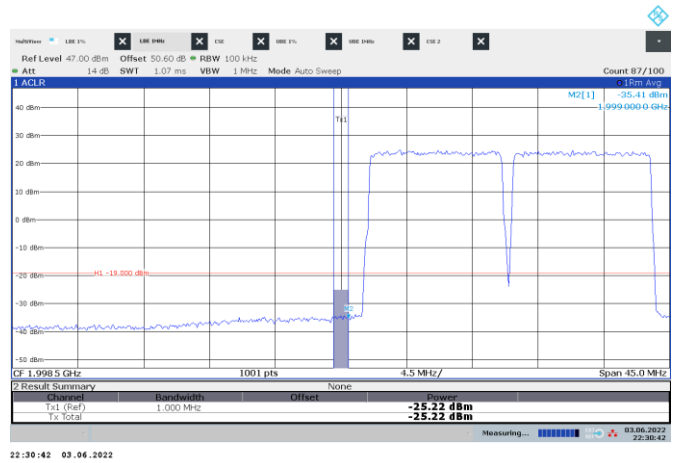


Figure 8.7-93: Conducted emission 1 MHz away from the lower band edge

Frequency: 1999 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 1x LTE 10 MHz + 1x NR 10 MHz
 Limit: -19 dBm/MHz Notes: None

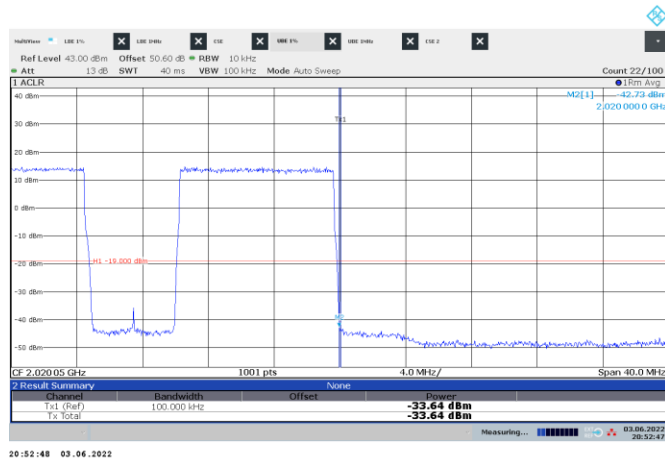


Figure 8.7-94: Conducted emission at the upper band edge

Frequency: 2020 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 1x LTE 10 MHz + 1x NR 10 MHz
 Limit: -19 dBm/100 kHz Notes: Same plot in band 70

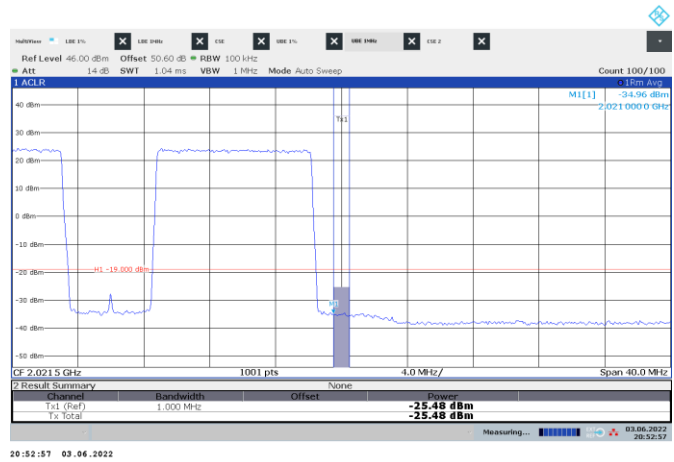


Figure 8.7-95: Conducted emission 1 MHz away from the upper band edge

Frequency: 2021 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 1x LTE 10 MHz + 1x NR 10 MHz
 Limit: -19 dBm/MHz Notes: Same plot in band 70

8.8 Receiver conducted spurious emissions (Band 66 & 70 & 70A)

8.8.1 Definitions and limits

RSS-Gen, 7.4

If the receiver has a detachable antenna of known impedance, an antenna-conducted spurious emissions measurement is permitted as an alternative to radiated measurement. However, the radiated method of section 7.3 is preferred.

The antenna-conducted test shall be performed with the antenna disconnected and with the receiver antenna port connected to a measuring instrument having equal input impedance to that specified for the antenna. The RF cable connecting the receiver under test to the measuring instrument shall also have the same impedance to that specified for the receiver’s antenna.

The spurious emissions from the receiver at any discrete frequency, measured at the antenna port by the antenna-conducted method, shall not exceed 2 nW in the frequency range 30–1000 MHz and 5 nW above 1 GHz.

8.8.2 Test summary

Test date	June 3, 2022
Test engineer	Moustapha Salah Toubeh

8.8.3 Observations, settings and special notes

Spectrum analyzer settings:

Detector mode	RMS
Resolution bandwidth	1 MHz
Video bandwidth	RBW × 3
Trace mode	Averaging

8.8.4 Test data

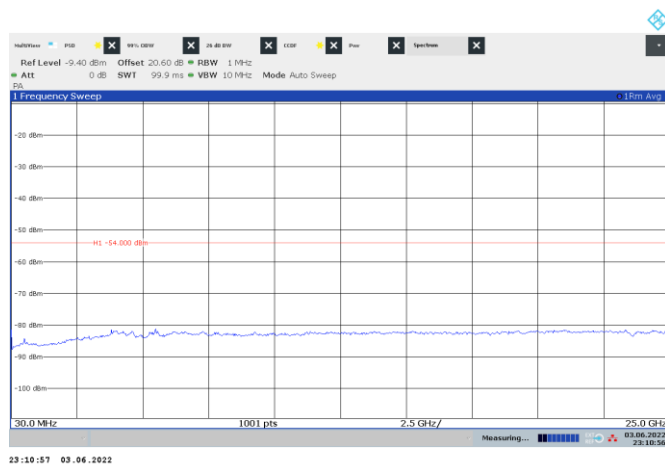


Figure 8.8-1: Receiver conducted spurious emissions for Band 70 and 70A, mid channel for Band 70 and 70A

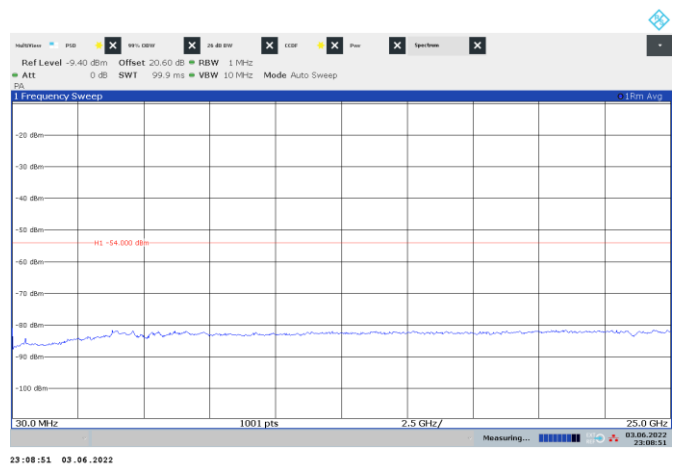


Figure 8.8-2: Receiver conducted spurious emissions for Band 66, mid channel for Band 66

8.9 Frequency stability (Band 66)

8.9.1 Definitions and limits

FCC 27.54:

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

RSS-139, Section 6.4:

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

8.9.2 Test summary

Test date	June 3, 2022
Test engineer	Moustapha Salah Toubeh

8.9.3 Observations, settings and special notes

Testing was performed per ANSI C63.26 Paragraphs 5.6.3, 5.6.4 and 5.6.5 methods.
 26 dBc points including frequency tolerance were assessed to remain within assigned band.

8.9.4 Test data

Table 8.9-1: Frequency error results

Temperature, °C	Voltage, V _{DC}	Frequency error, kHz
-40	48.0	-11.015
-30	48.0	-11.672
-20	48.0	-9.665
-10	48.0	-12.013
0	48.0	-13.480
+10	48.0	-14.154
+20	40.8	-11.340
+20	48.0	-10.489
+20	55.2	-8.892
+30	48.0	-14.150
+40	48.0	-9.425
+50	48.0	-11.742
+55	48.0	-9.769

8.10 Frequency stability (Band 70/70A)

8.10.1 Definitions and limits

FCC 27.54:

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

RSS-139, Section 6.4:

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

8.10.2 Test summary

Test date	June 3, 2022
Test engineer	Moustapha Salah Toubeh

8.10.3 Observations, settings and special notes

Testing was performed per ANSI C63.26 Paragraphs 5.6.3, 5.6.4 and 5.6.5 methods.
 26 dBc points including frequency tolerance were assessed to remain within assigned band. The maximum allowed drift (± 1.0 ppm) is ± 1935 Hz

8.10.4 Test data

Table 8.10-1: Frequency error results

Temperature, °C	Voltage, V _{DC}	Frequency error, kHz
-40	48.0	-11.421
-30	48.0	-11.120
-20	48.0	-14.562
-10	48.0	-13.423
0	48.0	-12.822
+10	48.0	-12.542
+20	40.8	-10.268
+20	48.0	-12.303
+20	55.2	-11.357
+30	48.0	-10.748
+40	48.0	-8.449
+50	48.0	-7.879
+55	48.0	-9.452

8.11 Occupied bandwidth (Band 66)

8.11.1 Definitions and limits

FCC §2.1049:

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.

RSS-Gen, 6.7

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

8.11.2 Test summary

Test date	May 31, 2022
Test engineer	Moustapha Salah Toubeh

8.11.3 Observations, settings and special notes

Testing was performed per ANSI C63.26 Paragraphs 5.4.3 and 5.4.4 methods.

Spectrum analyzer settings:

Detector mode	Peak
Resolution bandwidth	≥1 % of EBW
Video bandwidth	RBW × 3
Trace mode	Max Hold

8.11.4 Test data

Table 8.11-1: Occupied bandwidth results for LTE 5 MHz channel

Remarks	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
5 MHz, Low channel	2112.5	4.790	4.504
5 MHz, Mid channel	2155.0	4.840	4.506
5 MHz, Top channel	2197.5	4.840	4.512
5 MHz with IB-IoT1, Low channel	2112.5	4.750	4.498
5 MHz with IB-IoT1, Mid channel	2155.0	4.750	4.499
5 MHz with IB-IoT1, Top channel	2197.5	4.790	4.490
5 MHz with IB-IoT2, Low channel	2112.5	4.750	4.510
5 MHz with IB-IoT2, Mid channel	2155.0	4.790	4.503
5 MHz with IB-IoT2, Top channel	2197.5	4.750	4.506

Table 8.11-2: Occupied bandwidth results for LTE 10 MHz channel

Remarks	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
10 MHz, Low channel	2115.0	9.540	8.954
10 MHz, Mid channel	2155.0	9.540	8.950
10 MHz, Top channel	2195.0	9.590	8.956
10 MHz with IoT, Low channel	2115.0	9.740	9.392
10 MHz with IoT, Mid channel	2155.0	9.740	9.394
10 MHz with IoT, Top channel	2195.0	9.740	9.384

Test data, continued

Table 8.11-3: Occupied bandwidth results for LTE 15 MHz channel

Remarks	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
15 MHz, Low channel	2117.5	14.140	13.430
15 MHz, Mid channel	2155.0	14.140	13.409
15 MHz, Top channel	2192.5	14.240	13.405
15 MHz with IoT, Low channel	2117.5	14.440	13.966
15 MHz with IoT, Mid channel	2155.0	14.440	13.956
15 MHz with IoT, Top channel	2192.5	14.440	13.960

Table 8.11-4: Occupied bandwidth results for LTE 20 MHz channel

Remarks	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
20 MHz, Low channel	2120.0	18.930	17.868
20 MHz, Mid channel	2155.0	18.780	17.881
20 MHz, Top channel	2190.0	18.780	17.862
20 MHz with IoT, Low channel	2120.0	18.930	18.361
20 MHz with IoT, Mid channel	2155.0	19.030	18.366
20 MHz with IoT, Top channel	2190.0	18.980	18.370

Table 8.11-5: Occupied bandwidth results for NR 5 MHz channel

Remarks	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
5 MHz, Low channel	2112.5	4.840	4.498
5 MHz, Mid channel	2155.0	4.840	4.493
5 MHz, Top channel	2197.5	4.840	4.490

Table 8.11-6: Occupied bandwidth results for NR 10 MHz channel

Remarks	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
10 MHz, Low channel	2115.0	9.740	9.280
10 MHz, Mid channel	2155.0	9.740	9.281
10 MHz, Top channel	2195.0	9.740	9.279

Table 8.11-7: Occupied bandwidth results for NR 15 MHz channel

Remarks	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
15 MHz, Low channel	2117.5	14.540	14.108
15 MHz, Mid channel	2155.0	14.590	14.111
15 MHz, Top channel	2192.5	14.630	14.102

Table 8.11-8: Occupied bandwidth results for NR 20 MHz channel

Remarks	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
20 MHz, Low channel	2120.0	19.630	18.893
20 MHz, Mid channel	2155.0	19.530	18.938
20 MHz, Top channel	2190.0	19.580	18.917

Test data, continued

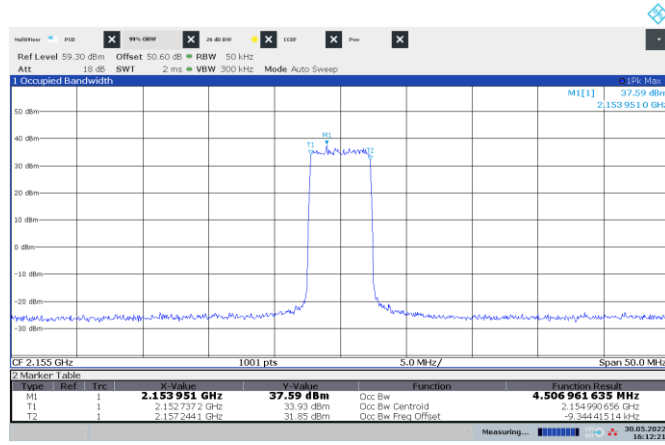


Figure 8.11-1: 99% Occupied bandwidth sample plot for LTE 5 MHz channel

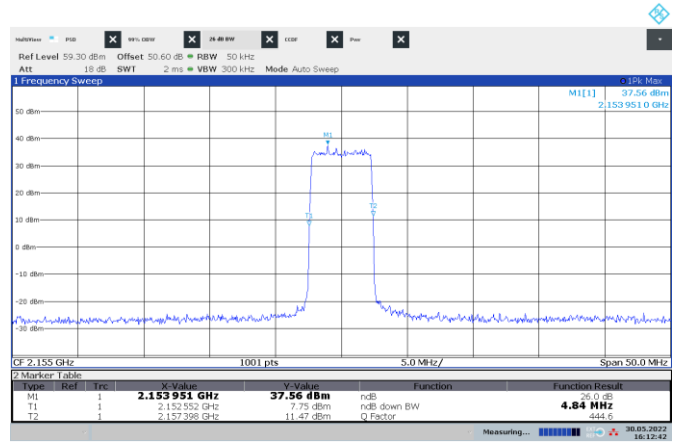


Figure 8.11-2: 26 dB bandwidth sample plot for LTE 5 MHz channel

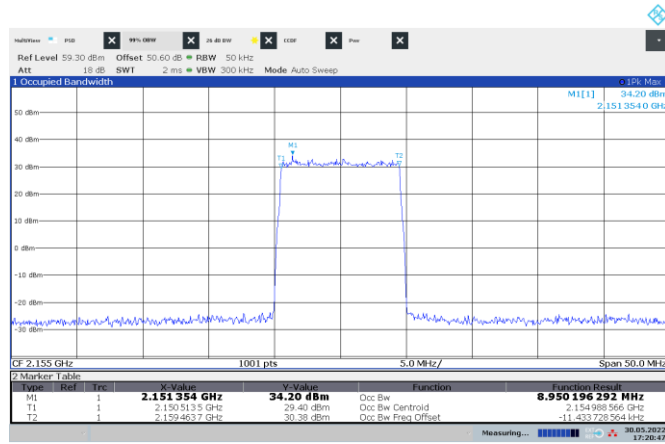


Figure 8.11-3: 99% Occupied bandwidth sample plot for LTE 10 MHz channel

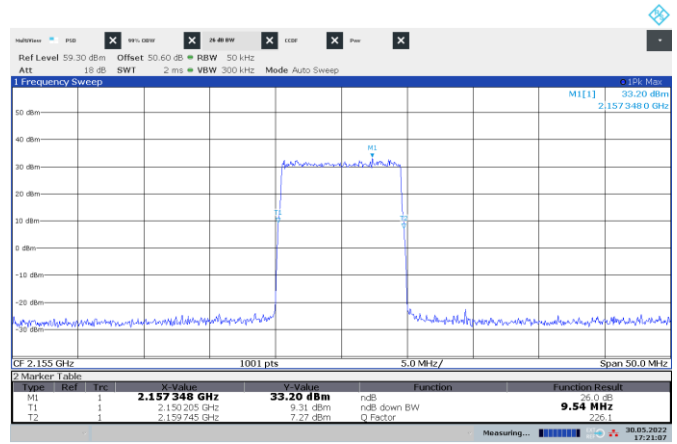


Figure 8.11-4: 26 dB bandwidth sample plot for LTE 10 MHz channel