

Test data, continued

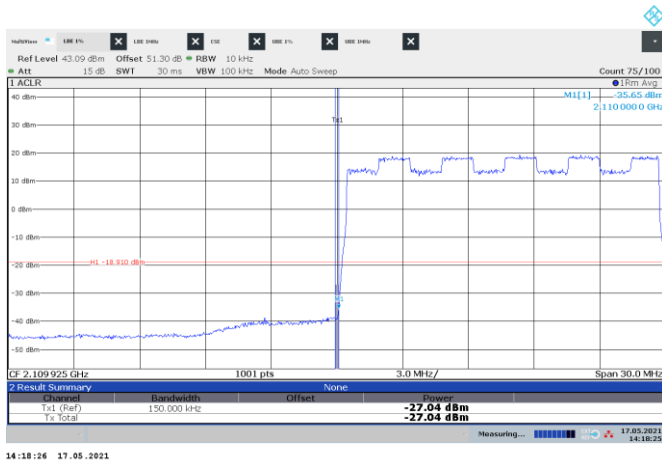


Figure 8.3-125: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: NR 15 MHz
 Limit: -19 dBm/150 kHz Notes: None



Figure 8.3-126: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: NR 15 MHz
 Limit: -19 dBm/MHz Notes: None



Figure 8.3-127: Conducted emission at the upper band edge

Frequency: 2200 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: NR 15 MHz
 Limit: -19 dBm/150 kHz Notes: None



Figure 8.3-128: Conducted emission 1 MHz away from the upper band edge

Frequency: 2201 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: NR 15 MHz
 Limit: -19 dBm/MHz Notes: None

Test data, continued

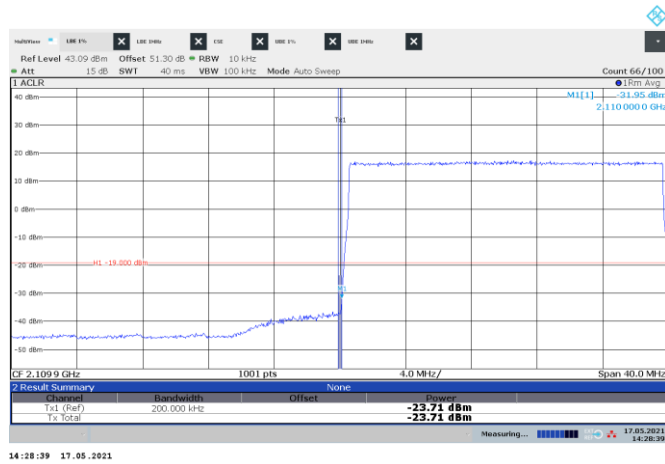


Figure 8.3-129: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: NR 20 MHz
 Limit: -19 dBm/200 kHz Notes: None

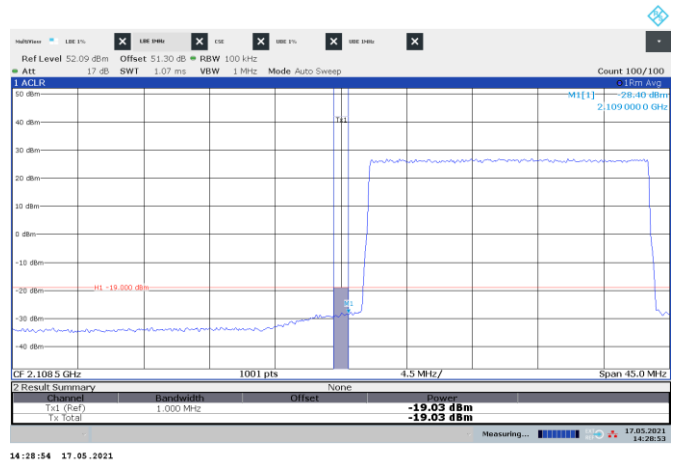


Figure 8.3-130: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: NR 20 MHz
 Limit: -19 dBm/MHz Notes: None

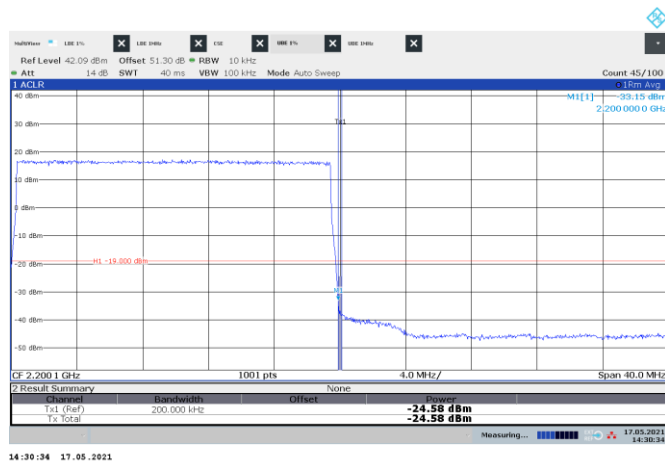


Figure 8.3-131: Conducted emission at the upper band edge

Frequency: 2200 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: NR 20 MHz
 Limit: -19 dBm/200 kHz Notes: None

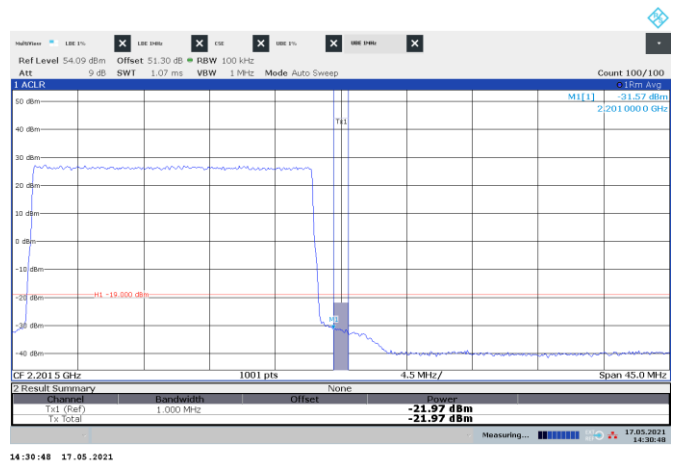


Figure 8.3-132: Conducted emission 1 MHz away from the upper band edge

Frequency: 2201 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: NR 20 MHz
 Limit: -19 dBm/MHz Notes: None

Test data, continued

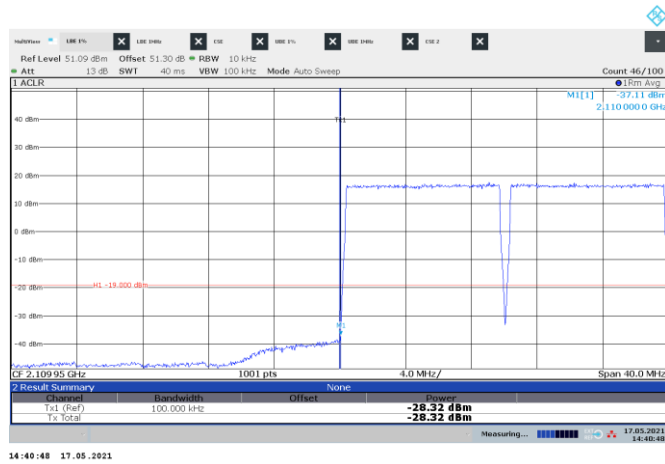


Figure 8.3-133: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-carrier operation
 Meas. BW: 1% of EBW Tech.: 2 × NR 10 MHz
 Limit: -19 dBm/100 kHz Notes: None

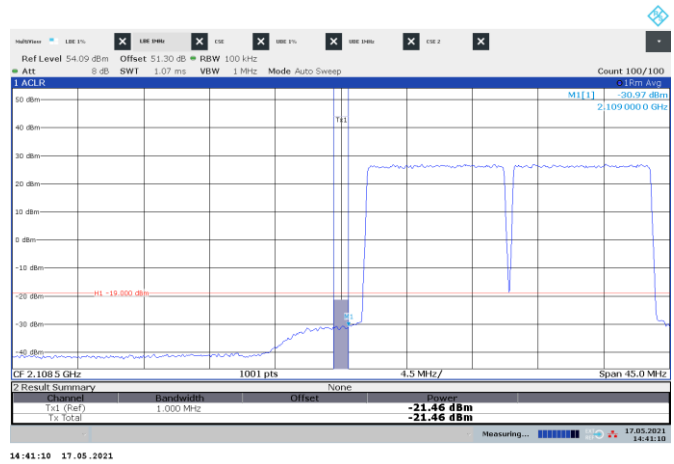


Figure 8.3-134: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-carrier operation
 Meas. BW: 1 MHz Tech.: 2 × NR 10 MHz
 Limit: -19 dBm/MHz Notes: None

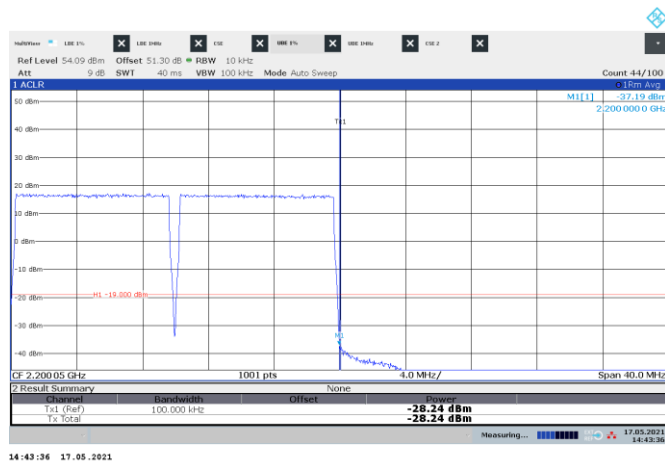


Figure 8.3-135: Conducted emission at the upper band edge

Frequency: 2200 MHz Mode: Multi-carrier operation
 Meas. BW: 1% of EBW Tech.: 2 × NR 10 MHz
 Limit: -19 dBm/100 kHz Notes: None

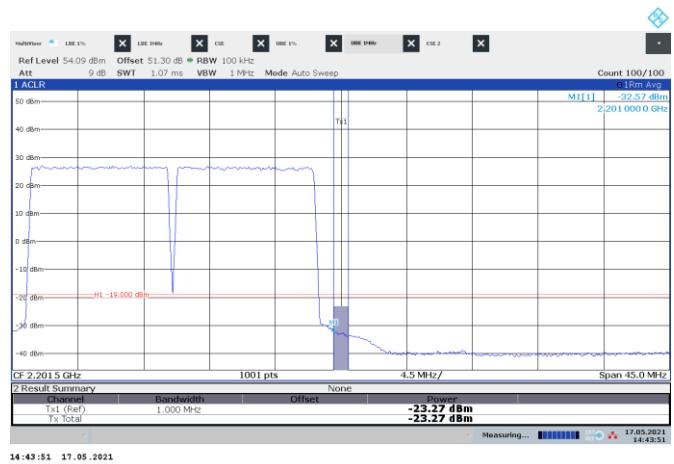


Figure 8.3-136: Conducted emission 1 MHz away from the upper band edge

Frequency: 2201 MHz Mode: Multi-carrier operation
 Meas. BW: 1 MHz Tech.: 2 × NR 10 MHz
 Limit: -19 dBm/MHz Notes: None

Test data, continued

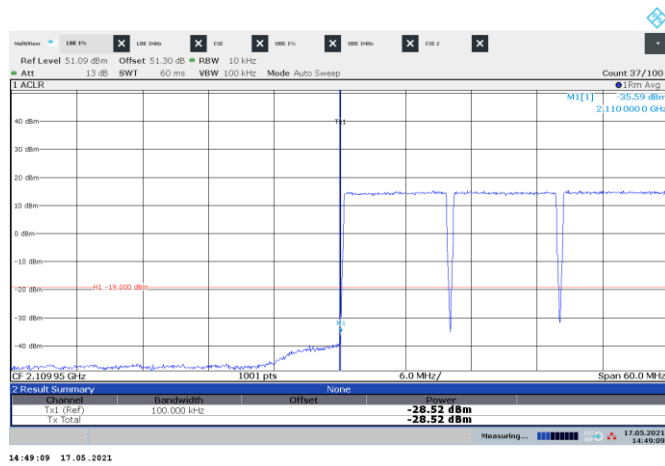


Figure 8.3-137: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-carrier operation
 Meas. BW: 1% of EBW Tech.: 3 × NR 10 MHz
 Limit: -19 dBm/100 kHz Notes: None

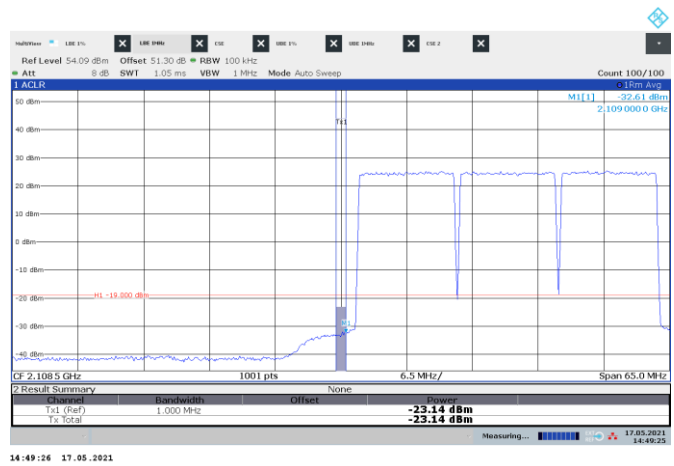


Figure 8.3-138: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-carrier operation
 Meas. BW: 1 MHz Tech.: 3 × NR 10 MHz
 Limit: -19 dBm/MHz Notes: None



Figure 8.3-139: Conducted emission at the upper band edge

Frequency: 2200 MHz Mode: Multi-carrier operation
 Meas. BW: 1% of EBW Tech.: 3 × NR 10 MHz
 Limit: -19 dBm/100 kHz Notes: None

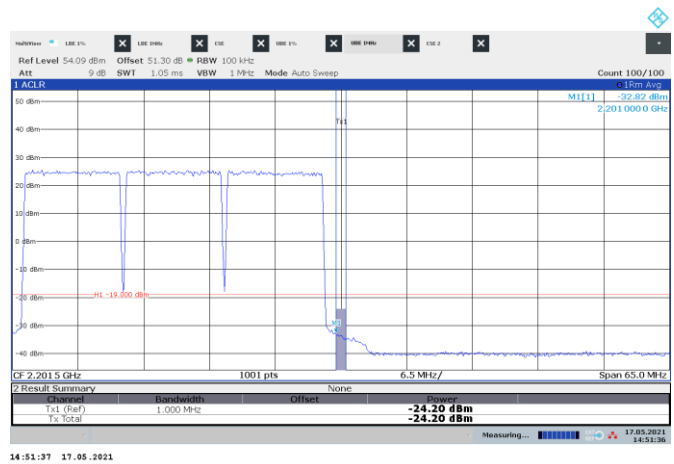


Figure 8.3-140: Conducted emission 1 MHz away from the upper band edge

Frequency: 2201 MHz Mode: Multi-carrier operation
 Meas. BW: 1 MHz Tech.: 3 × NR 10 MHz
 Limit: -19 dBm/MHz Notes: None

Test data, continued

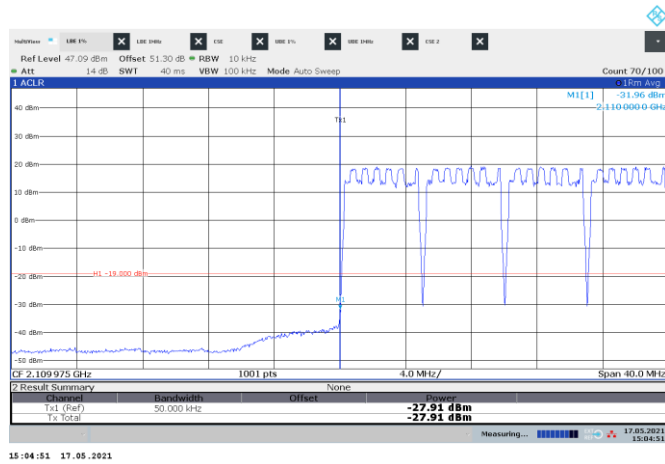


Figure 8.3-141: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-carrier operation
 Meas. BW: 1% of EBW Tech.: 4 × NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: None

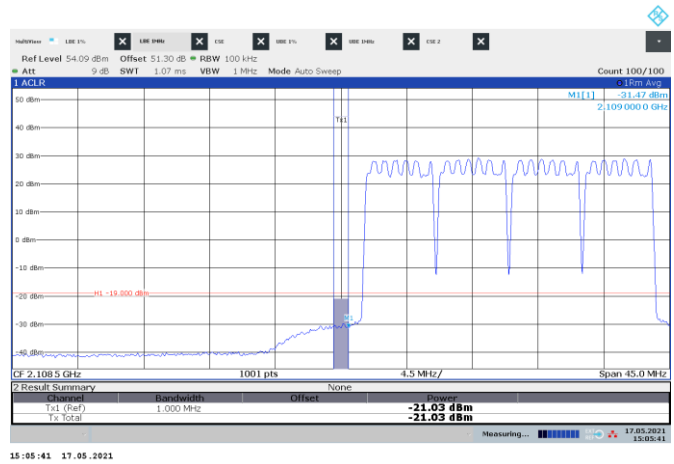


Figure 8.3-142: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-carrier operation
 Meas. BW: 1 MHz Tech.: 4 × NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

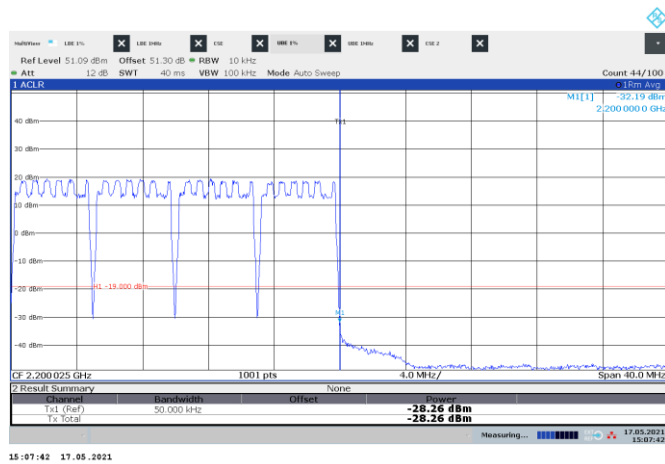


Figure 8.3-143: Conducted emission at the upper band edge

Frequency: 2200 MHz Mode: Multi-carrier operation
 Meas. BW: 1% of EBW Tech.: 4 × NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: None

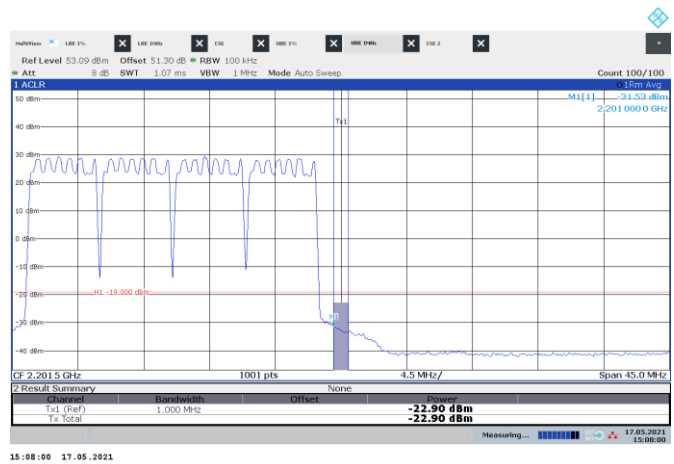


Figure 8.3-144: Conducted emission 1 MHz away from the upper band edge

Frequency: 2201 MHz Mode: Multi-carrier operation
 Meas. BW: 1 MHz Tech.: 4 × NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

Test data, continued

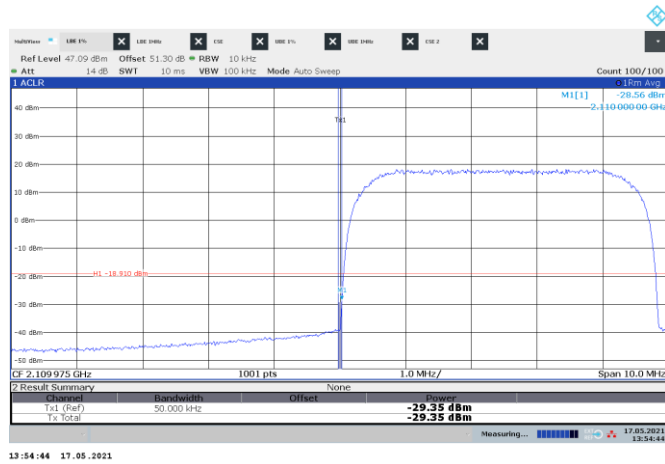


Figure 8.3-145: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: WCDMA (5 MHz)
 Limit: -19 dBm/50 kHz Notes: None

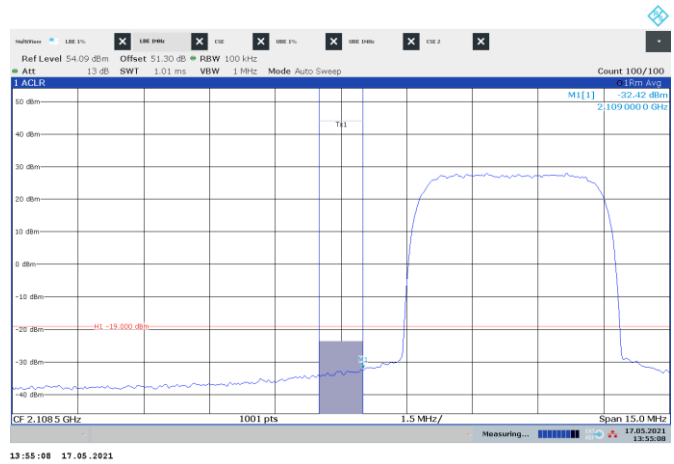


Figure 8.3-146: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: WCDMA (5 MHz)
 Limit: -19 dBm/MHz Notes: Measured result is < 22 dBm/MHz



Figure 8.3-147: Conducted emission at the upper band edge

Frequency: 2200 MHz Mode: Single-carrier operation
 Meas. BW: 1% of EBW Tech.: WCDMA (5 MHz)
 Limit: -19 dBm/50 kHz Notes: Upper channel is 2152.6 MHz

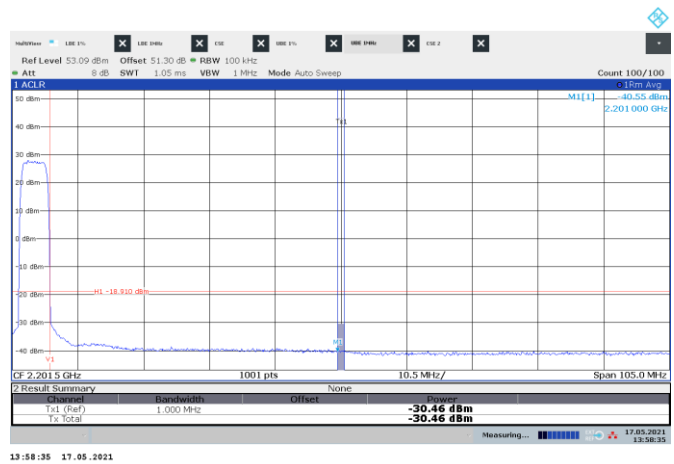


Figure 8.3-148: Conducted emission 1 MHz away from the upper band edge

Frequency: 2201 MHz Mode: Single-carrier operation
 Meas. BW: 1 MHz Tech.: WCDMA (5 MHz)
 Limit: -19 dBm/MHz Notes: Upper channel is 2152.6 MHz

Test data, continued

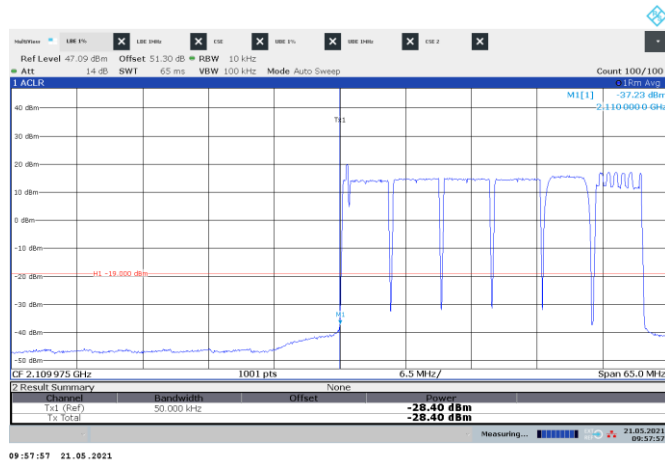


Figure 8.3-149: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 4 × LTE 5 MHz + WCDMA + NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: None



Figure 8.3-150: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 4 × LTE 5 MHz + WCDMA + NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

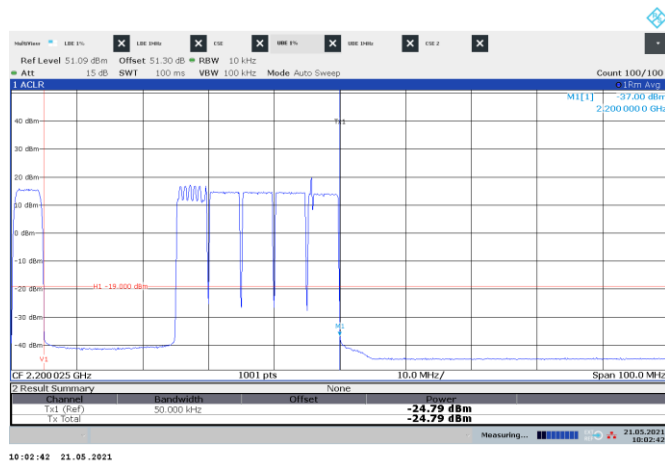


Figure 8.3-151: Conducted emission at the upper band edge

Frequency: 2200 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: 4 × LTE 5 MHz + WCDMA + NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: WCDMA upper channel is 2152.6 MHz

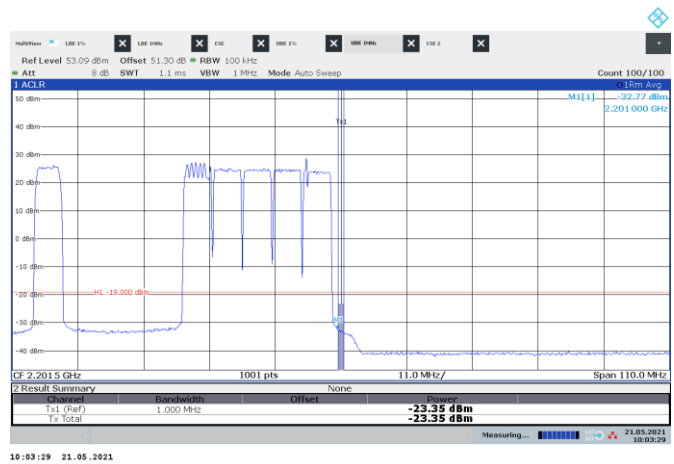


Figure 8.3-152: Conducted emission 1 MHz away from the upper band edge

Frequency: 2201 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: 4 × LTE 5 MHz + WCDMA + NR 5 MHz
 Limit: -19 dBm/MHz Notes: WCDMA upper channel is 2152.6 MHz

Test data, continued

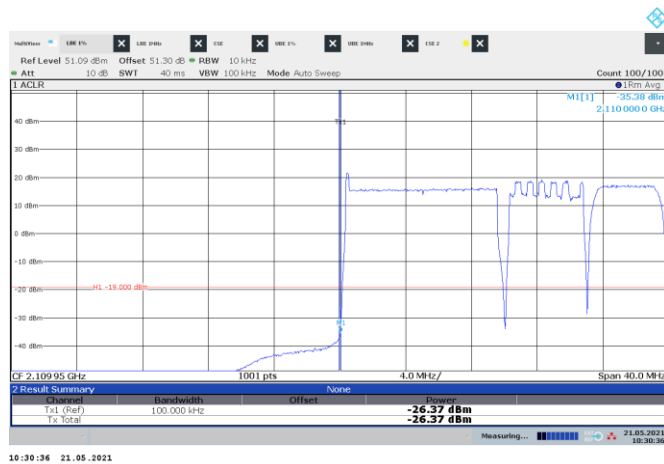


Figure 8.3-153: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: LTE 10 MHz + NR 5 MHz + WCDMA
 Limit: -19 dBm/100 kHz Notes: None

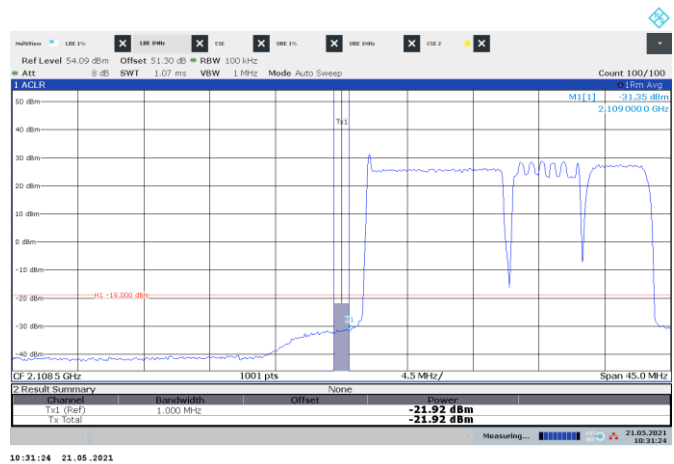


Figure 8.3-154: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: LTE 10 MHz + NR 5 MHz + WCDMA
 Limit: -19 dBm/MHz Notes: None

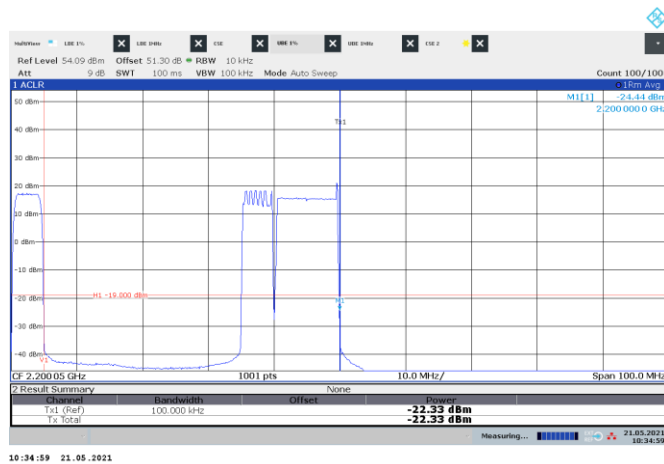


Figure 8.3-155: Conducted emission at the upper band edge

Frequency: 2200 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: LTE 10 MHz + NR 5 MHz + WCDMA
 Limit: -19 dBm/100 kHz Notes: WCDMA upper channel is 2152.6 MHz

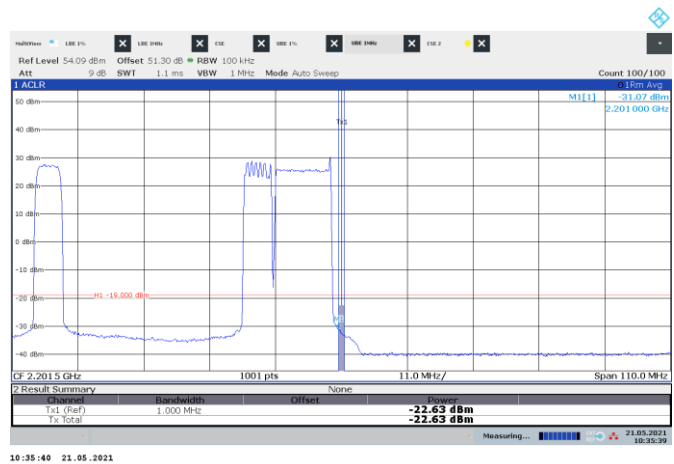


Figure 8.3-156: Conducted emission 1 MHz away from the upper band edge

Frequency: 2201 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: LTE 10 MHz + NR 5 MHz + WCDMA
 Limit: -19 dBm/MHz Notes: WCDMA upper channel is 2152.6 MHz

Test data, continued

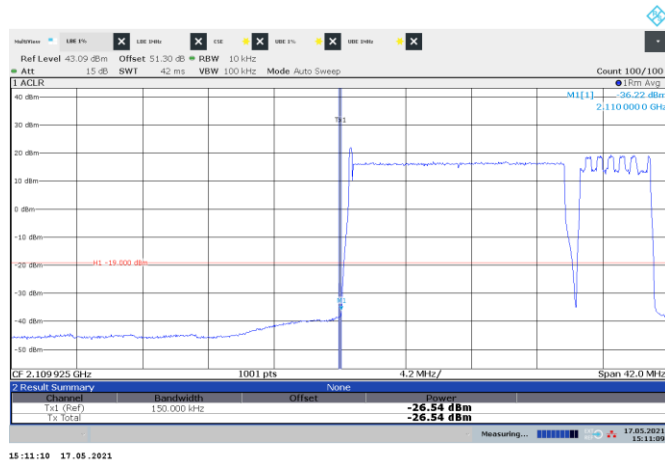


Figure 8.3-157: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: LTE 15 MHz + NR 5 MHz
 Limit: -19 dBm/150 kHz Notes: None

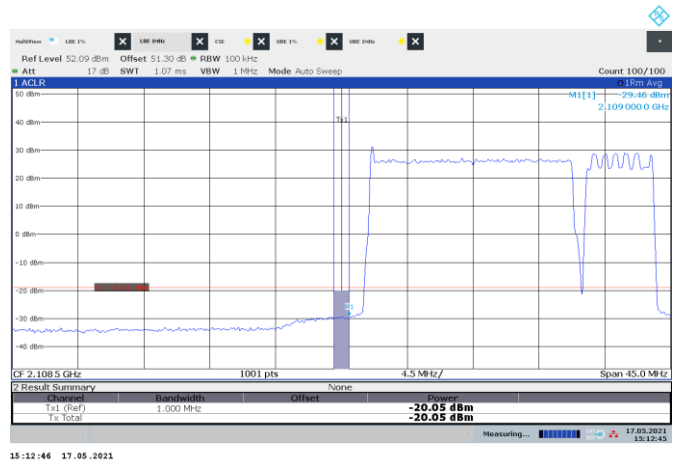


Figure 8.3-158: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: LTE 15 MHz + NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

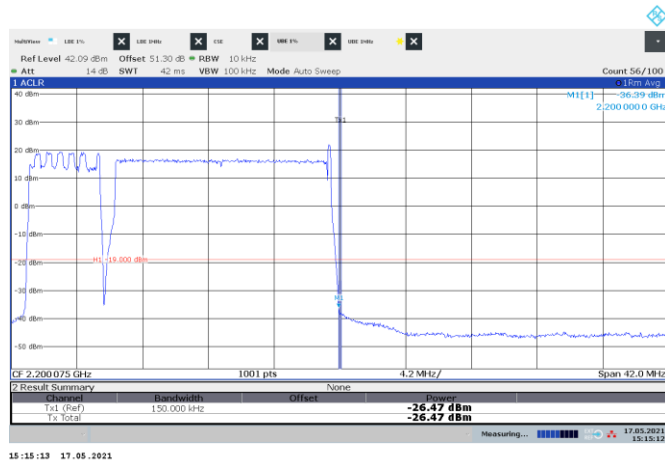


Figure 8.3-159: Conducted emission at the upper band edge

Frequency: 2200 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: LTE 15 MHz + NR 5 MHz
 Limit: -19 dBm/150 kHz Notes: None

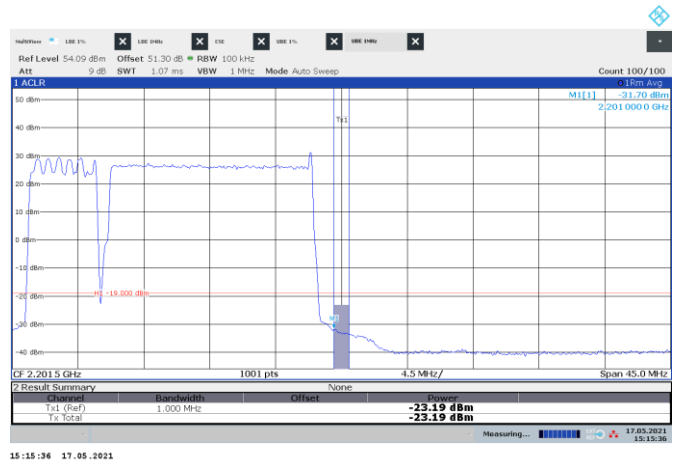


Figure 8.3-160: Conducted emission 1 MHz away from the upper band edge

Frequency: 2201 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: LTE 15 MHz + NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

Test data, continued

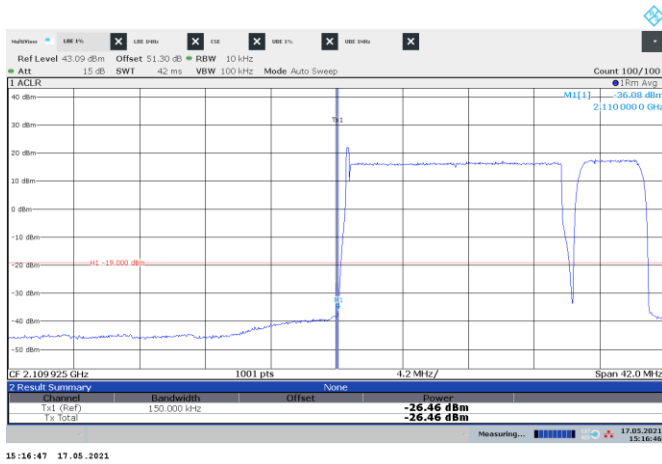


Figure 8.3-161: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: LTE 15 MHz + WCDMA
 Limit: -19 dBm/150 kHz Notes: None

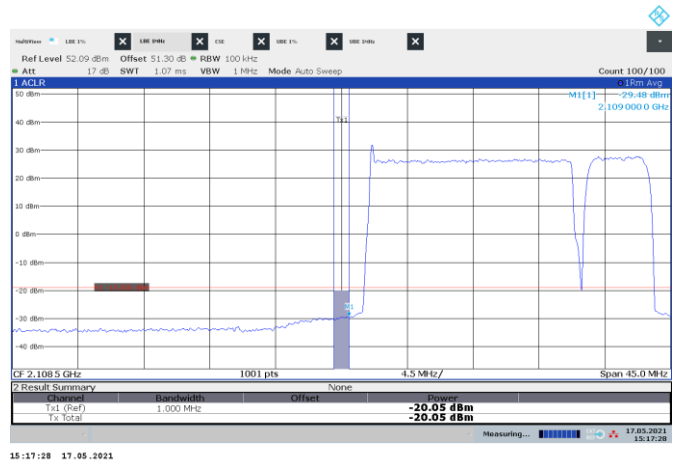


Figure 8.3-162: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: LTE 15 MHz + WCDMA
 Limit: -19 dBm/MHz Notes: None

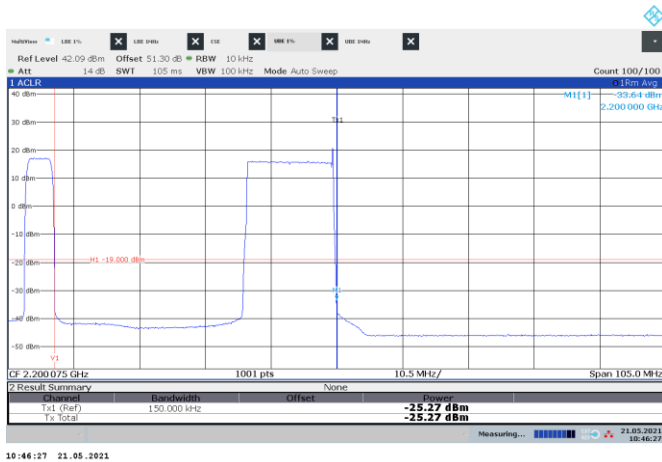


Figure 8.3-163: Conducted emission at the upper band edge

Frequency: 2200 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: LTE 15 MHz + NR 5 MHz
 Limit: -19 dBm/150 kHz Notes: WCDMA upper channel is 2152.6 MHz

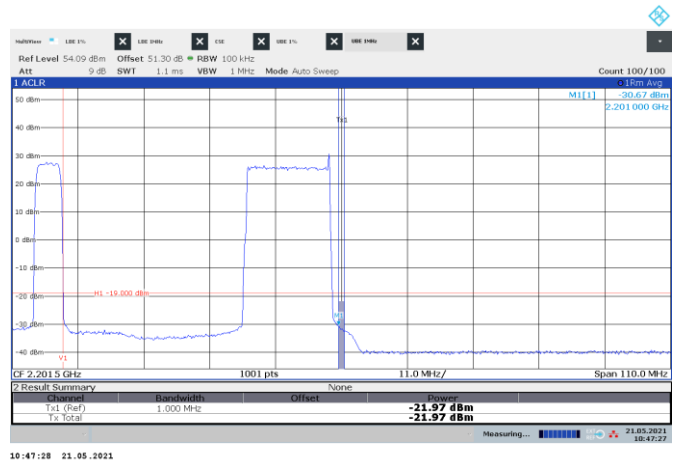


Figure 8.3-164: Conducted emission 1 MHz away from the upper band edge

Frequency: 2201 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: LTE 15 MHz + NR 5 MHz
 Limit: -19 dBm/MHz Notes: WCDMA upper channel is 2152.6 MHz

Test data, continued

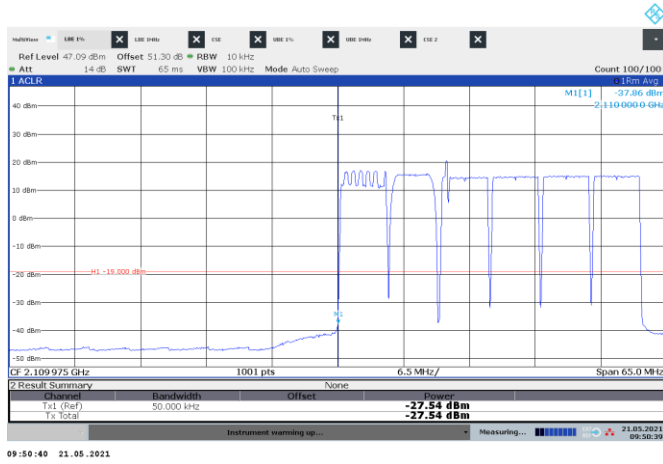


Figure 8.3-165: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: NR 5 MHz + WCDMA + 4 × LTE 5 MHz
 Limit: -19 dBm/50 kHz Notes: None

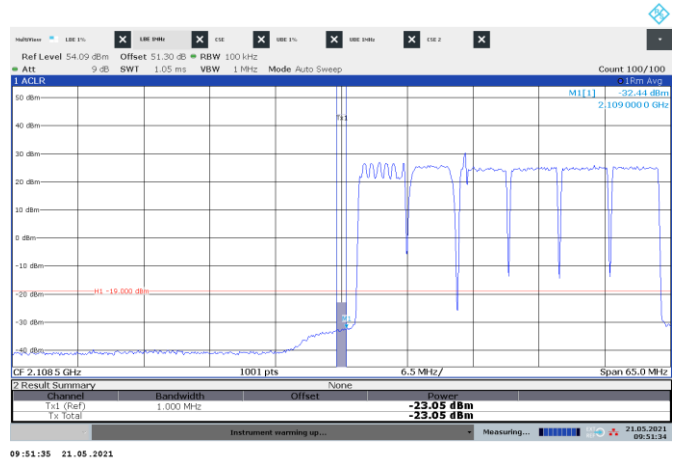


Figure 8.3-166: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: NR 5 MHz + WCDMA + 4 × LTE 5 MHz
 Limit: -19 dBm/MHz Notes: None

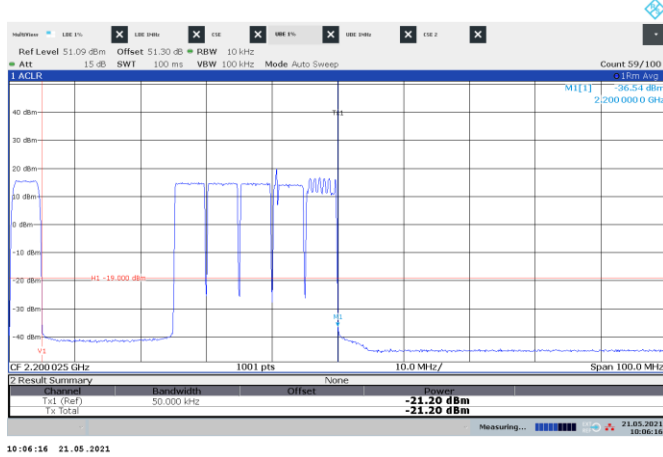


Figure 8.3-167: Conducted emission at the upper band edge

Frequency: 2200 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: NR 5 MHz + WCDMA + 4 × LTE 5 MHz
 Limit: -19 dBm/50 kHz Notes: Re-measured value: -30.02 dBm/50 kHz
 WCDMA upper channel is 2152.6 MHz

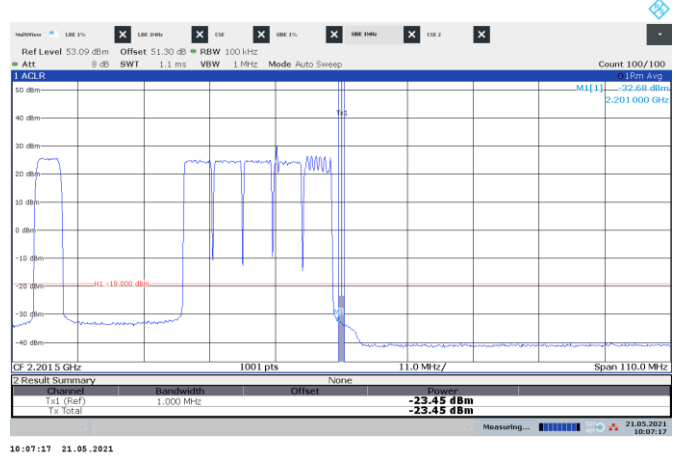


Figure 8.3-168: Conducted emission 1 MHz away from the upper band edge

Frequency: 2201 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: NR 5 MHz + WCDMA + 4 × LTE 5 MHz
 Limit: -19 dBm/MHz Notes: WCDMA upper channel is 2152.6 MHz

Test data, continued

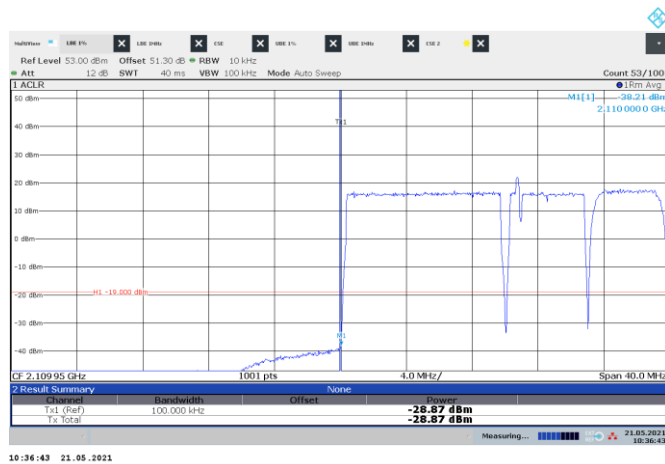


Figure 8.3-169: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: NR 10 MHz + LTE 5 MHz + WCDMA
 Limit: -19 dBm/100 kHz Notes: None



Figure 8.3-170: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: NR 10 MHz + LTE 5 MHz + WCDMA
 Limit: -19 dBm/MHz Notes: None

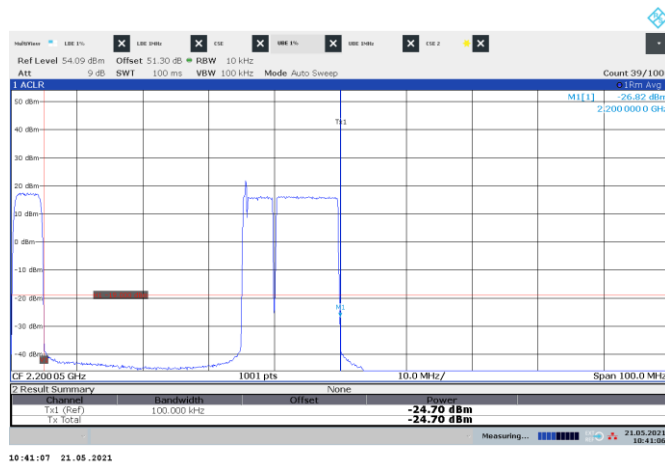


Figure 8.3-171: Conducted emission at the upper band edge

Frequency: 2200 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: NR 10 MHz + LTE 5 MHz + WCDMA
 Limit: -19 dBm/100 kHz Notes: WCDMA upper channel is 2152.6 MHz

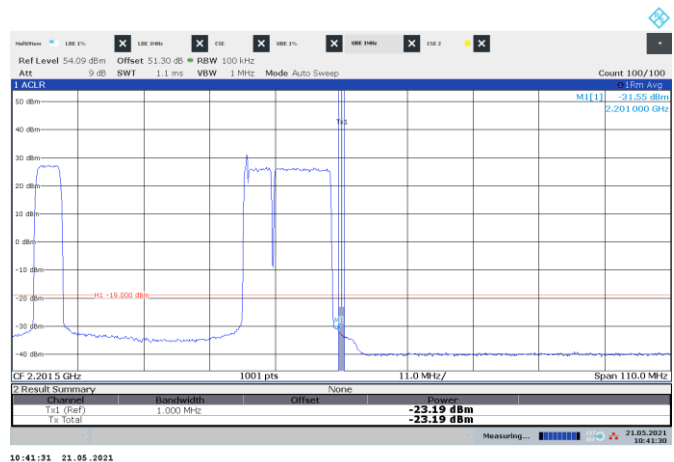


Figure 8.3-172: Conducted emission 1 MHz away from the upper band edge

Frequency: 2201 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: NR 10 MHz + LTE 5 MHz + WCDMA
 Limit: -19 dBm/MHz Notes: WCDMA upper channel is 2152.6 MHz

Test data, continued

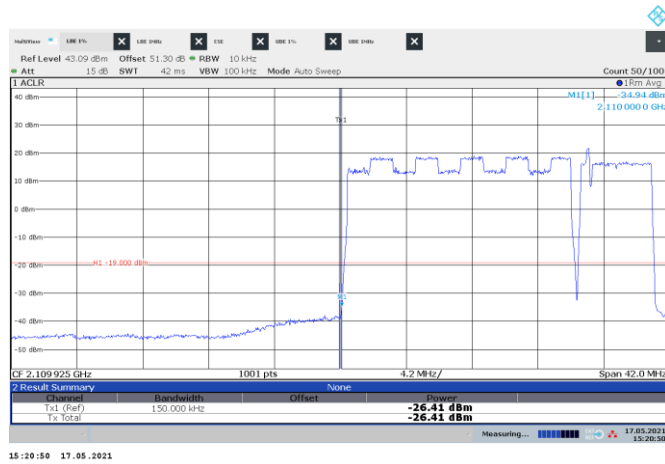


Figure 8.3-173: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: NR 15 MHz + LTE 5 MHz
 Limit: -19 dBm/150 kHz Notes: None



Figure 8.3-174: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: NR 15 MHz + LTE 5 MHz
 Limit: -19 dBm/MHz Notes: None



Figure 8.3-175: Conducted emission at the upper band edge

Frequency: 2200 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: NR 15 MHz + LTE 5 MHz
 Limit: -19 dBm/150 kHz Notes: None

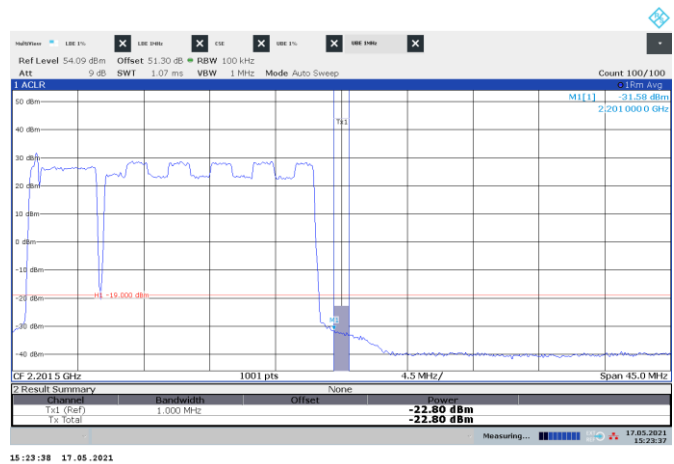


Figure 8.3-176: Conducted emission 1 MHz away from the upper band edge

Frequency: 2201 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: NR 15 MHz + LTE 5 MHz
 Limit: -19 dBm/MHz Notes: None

Test data, continued



Figure 8.3-177: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: NR 15 MHz + WCDMA
 Limit: -19 dBm/150 kHz Notes: None



Figure 8.3-178: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: NR 15 MHz + WCDMA
 Limit: -19 dBm/MHz Notes: None

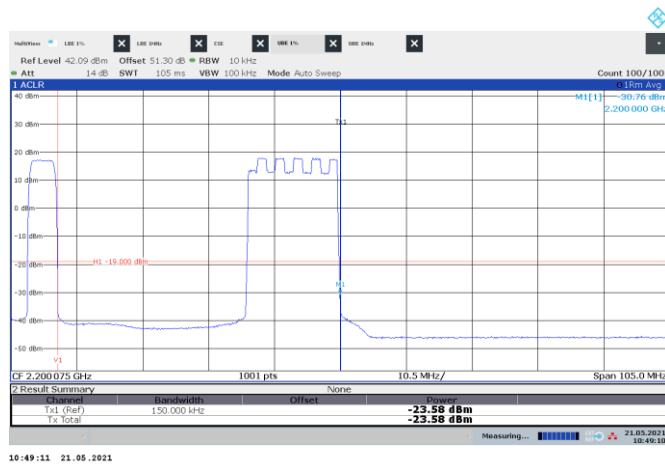


Figure 8.3-179: Conducted emission at the upper band edge

Frequency: 2200 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: NR 15 MHz + WCDMA
 Limit: -19 dBm/150 kHz Notes: WCDMA upper channel is 2152.6 MHz

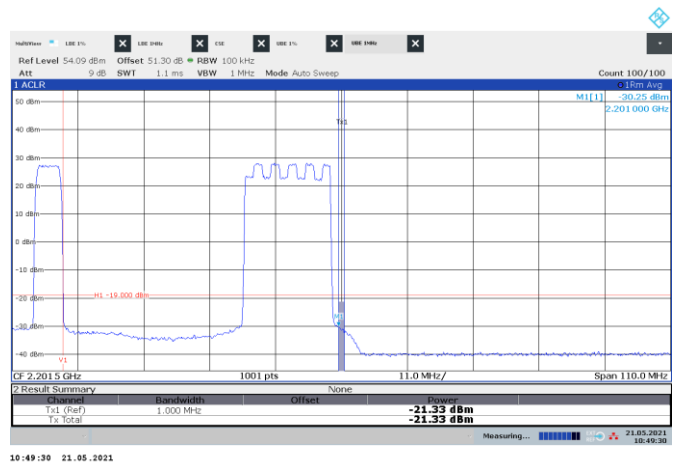


Figure 8.3-180: Conducted emission 1 MHz away from the upper band edge

Frequency: 2201 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: NR 15 MHz + WCDMA
 Limit: -19 dBm/MHz Notes: WCDMA upper channel is 2152.6 MHz

Test data, continued

Note: since WCDMA upper channel is 2152.6 MHz, the upper band edge at 2200 MHz was covered in other multi-RAT combinations

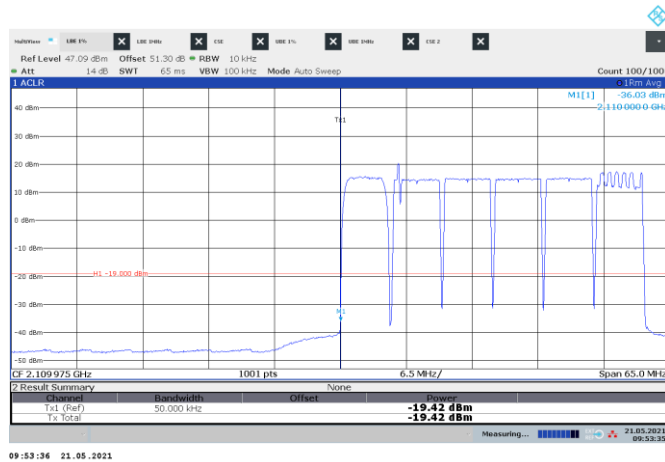


Figure 8.3-181: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: WCDMA + 4 x LTE 5 MHz + NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: Re-measured value: -29.31 dBm/50 kHz

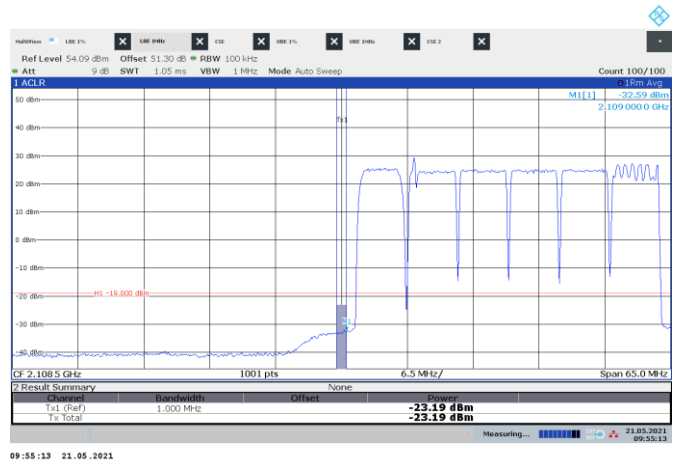


Figure 8.3-182: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: WCDMA + 4 x LTE 5 MHz + NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

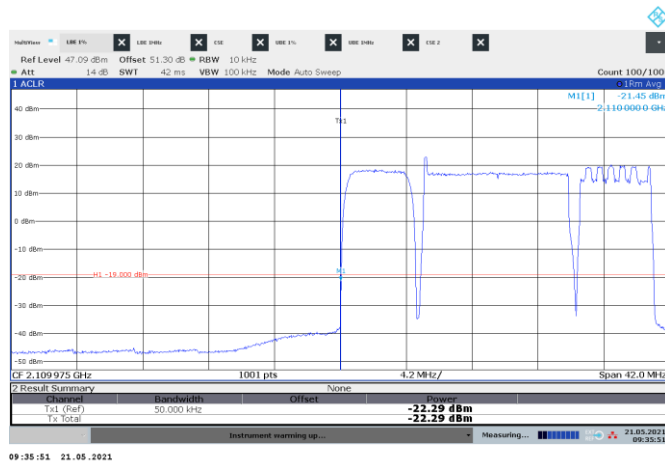


Figure 8.3-183: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: WCDMA + LTE 10 MHz + NR 5 MHz
 Limit: -19 dBm/50 kHz Notes: None

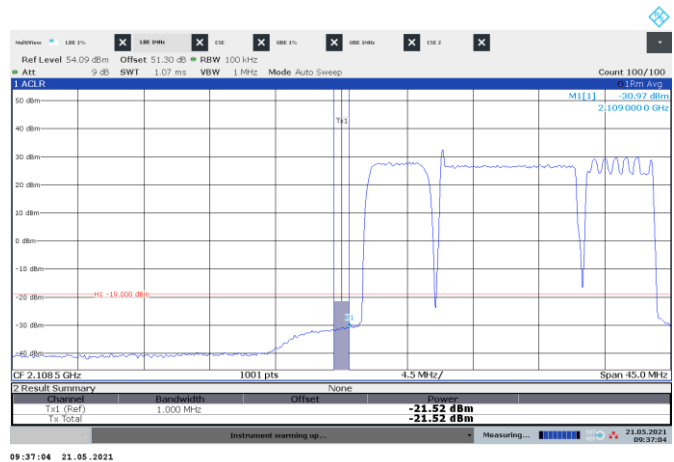


Figure 8.3-184: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: WCDMA + LTE 10 MHz + NR 5 MHz
 Limit: -19 dBm/MHz Notes: None

Test data, continued

Note: since WCDMA upper channel is 2152.6 MHz, the upper band edge at 2200 MHz was covered in other multi-RAT combinations

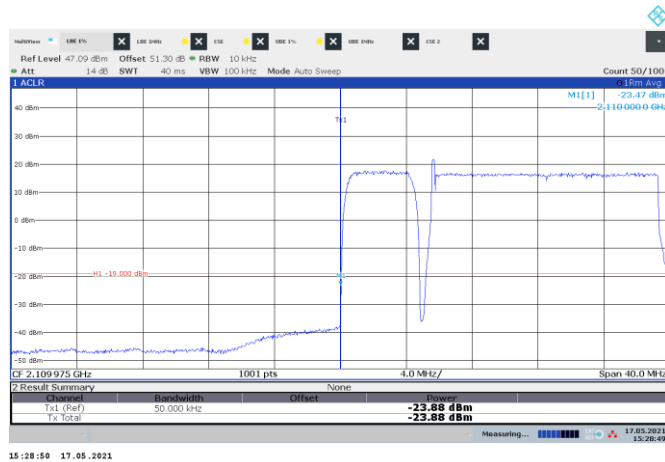


Figure 8.3-185: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: WCDMA + LTE 15 MHz
 Limit: -19 dBm/50 kHz Notes: None

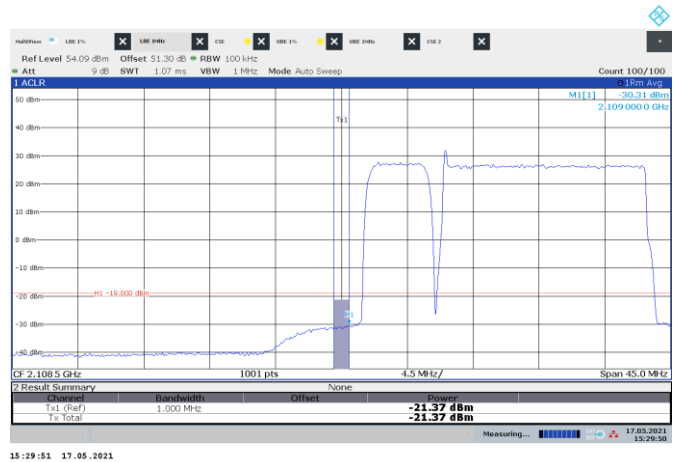


Figure 8.3-186: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: WCDMA + LTE 15 MHz
 Limit: -19 dBm/MHz Notes: None

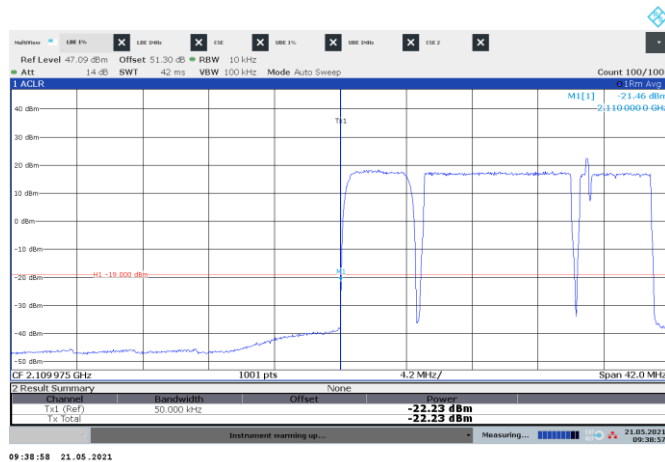


Figure 8.3-187: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: WCDMA + NR 10 MHz + LTE 5 MHz
 Limit: -19 dBm/50 kHz Notes: None

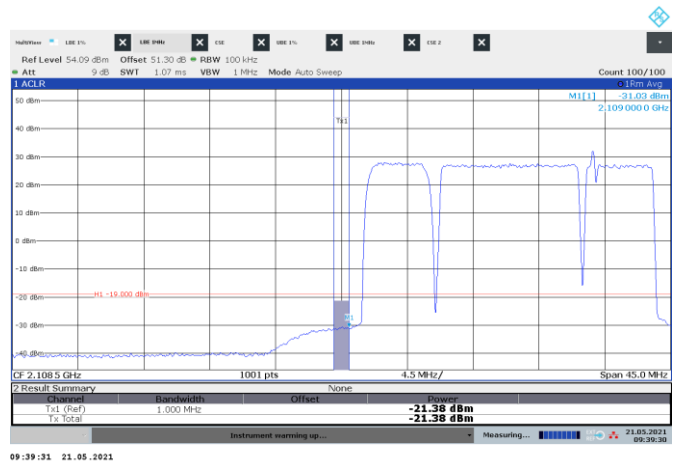


Figure 8.3-188: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: WCDMA + NR 10 MHz + LTE 5 MHz
 Limit: -19 dBm/MHz Notes: None

Test data, continued

Note: since WCDMA upper channel is 2152.6 MHz, the upper band edge at 2200 MHz was covered in other multi-RAT combinations

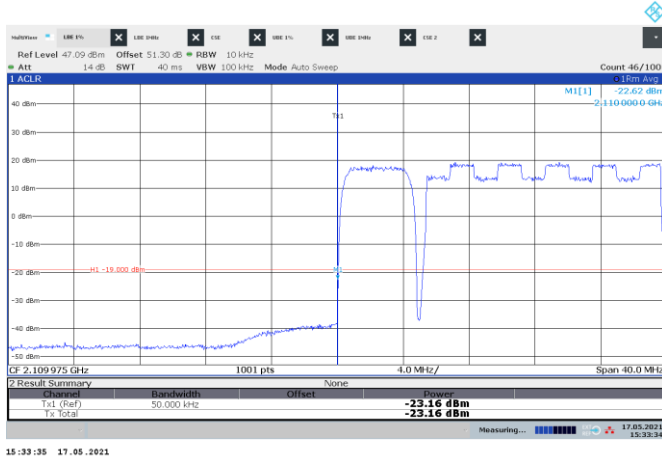


Figure 8.3-189: Conducted emission at the lower band edge

Frequency: 2110 MHz Mode: Multi-RAT operation
 Meas. BW: 1% of EBW Tech.: WCDMA + NR 15 MHz
 Limit: -19 dBm/50 kHz Notes: None



Figure 8.3-190: Conducted emission 1 MHz away from the lower band edge

Frequency: 2109 MHz Mode: Multi-RAT operation
 Meas. BW: 1 MHz Tech.: WCDMA + NR 15 MHz
 Limit: -19 dBm/MHz Notes: None

8.4 Radiated spurious emissions (Band 66 & 2/25)

8.4.1 Definitions and limits

FCC §27.53:

(h) AWS emission limits

(1) General protection levels. Except as otherwise specified below, for operations in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, and 2180–2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

(3) Measurement procedure.

(i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1-megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. 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.

(ii) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(iii) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

FCC §24.238(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 resolution bandwidth of 1 MHz or greater. However, 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 the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz 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.

RSS-139, Section 6.6:

i. In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB.

ii. After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB.

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

he 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>

Section 8
Test name
Specification

Testing data
Radiated spurious emissions (Band 66 & 2/25)
FCC Part 24 and 27, RSS-133, Issue 6 and RSS-170 Issue 3



Definitions and limits, continued

RSS-133, Section 6.5.1:

- i. In the first 1.0 MHz bands immediately outside and adjacent to the equipment’s operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB.
- ii. After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB. If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

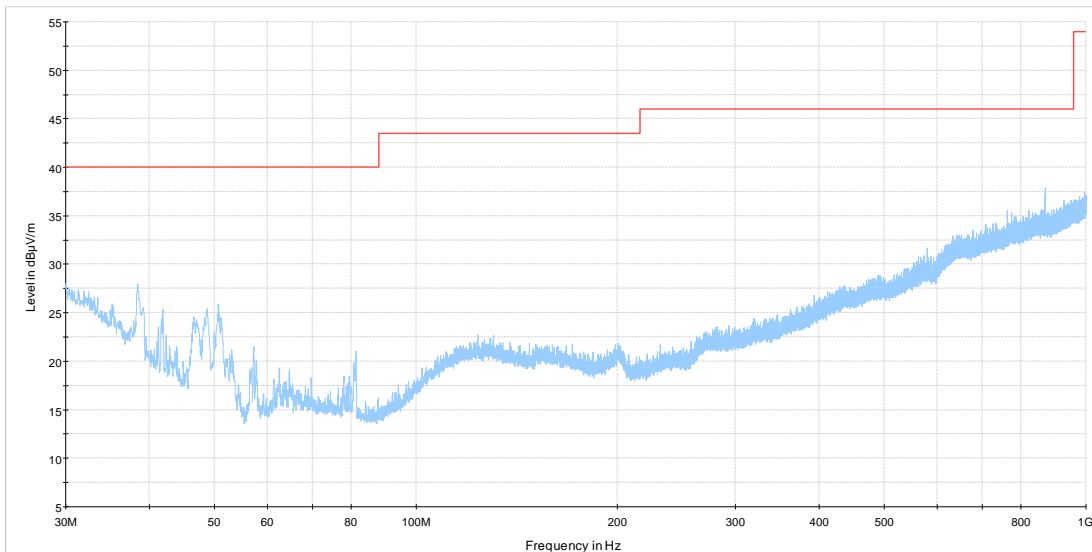
8.4.2 Test summary

Test date	May 14 & 17, 2021
Test engineer	Predrag Golic

8.4.3 Observations, settings and special notes

- The spectrum was searched from 30 MHz to the 10th harmonic per ANSI C63.26 Paragraph 5.5.3.2 method.
- RBW within 30–1000 MHz was 100 kHz and 1 MHz above 1 GHz. VBW was wider than RBW.
- Testing was performed with RF ports terminated with 50 Ohm load.
- **Testing was performed with dual band (Band 2/25 and Band 66) simultaneous transmission.**

8.4.4 Test data



RE 30 MHz to 1 GHz
 Preview Result 1-PK+
 FCC Part 15 Limit - Class B, QP, 3 m

Figure 8.4-1: Radiated spurious emissions within 30–1000 MHz, dual band multi-RAT operation (limit at 82.23 dBµV/m)

Test data, continued

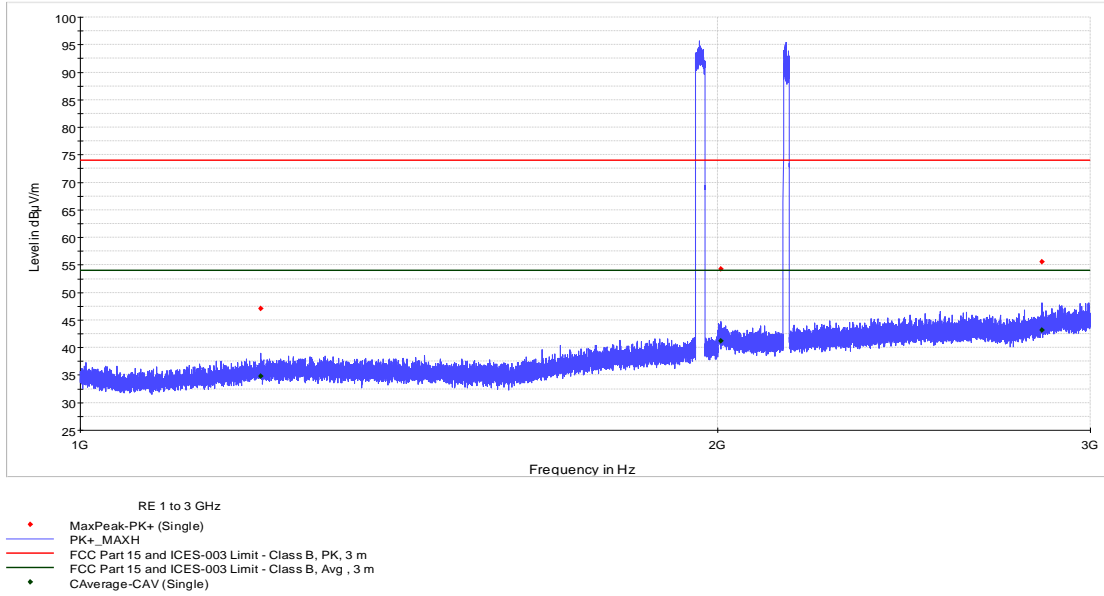


Figure 8.4-2: Radiated spurious emissions within 1–3 GHz, dual band multi-RAT operation (limit at 82.23 dBµV/m)

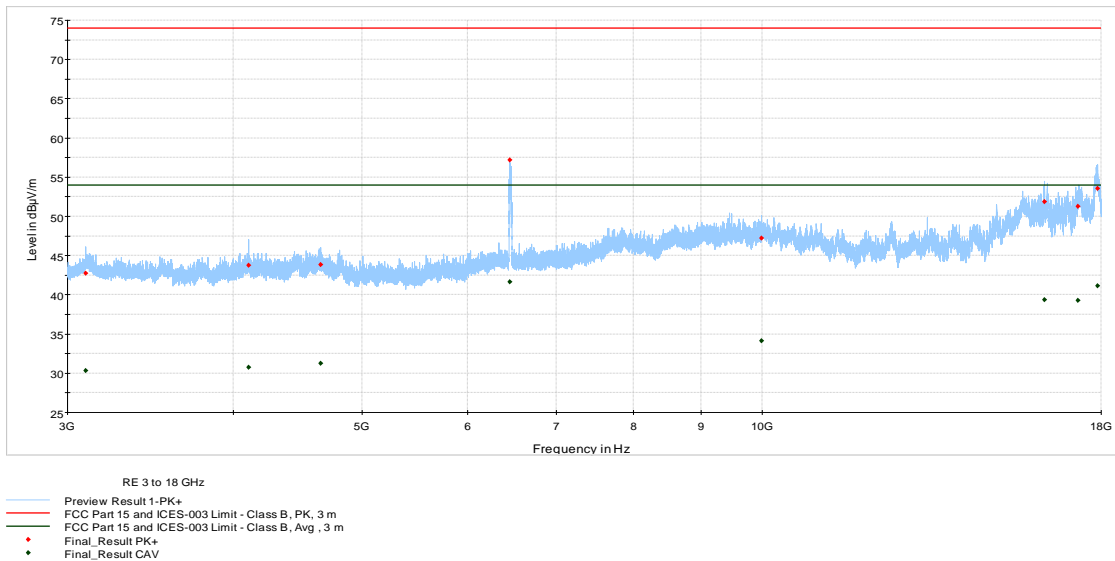


Figure 8.4-3: Radiated spurious emissions within 3–18 GHz, dual band multi-RAT operation (limit at 82.23 dBµV/m)

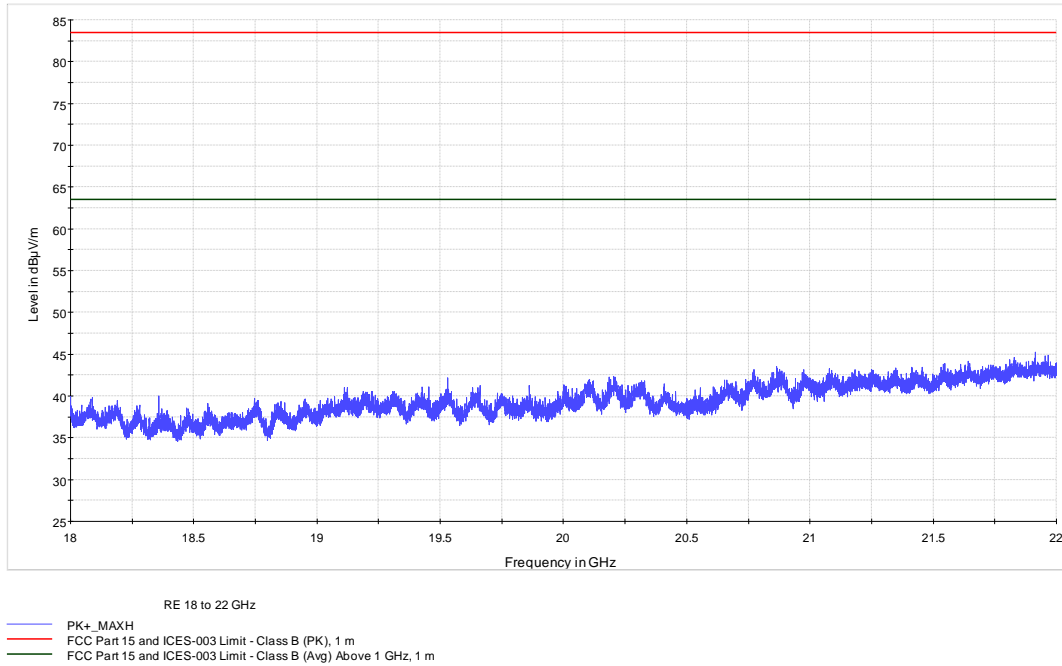


Figure 8.4-4: Radiated spurious emissions within 18–22 GHz, dual band multi-RAT operation (limit at 82.23 dBµV/m)

8.5 Spurious out-of-band emissions (Band 2/25)

8.5.1 Definitions and limits

FCC §24.238(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 resolution bandwidth of 1 MHz or greater. However, 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 the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz 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.

RSS-133, Section 6.5.1:

- i. In the first 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB.
- ii. After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB. If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

8.5.2 Test summary

Test date	May 18, 2021
Test engineer	Andrey Adelberg

8.5.3 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
- Only GSM and CDMA are SISO, therefore all multi-RAT combinations with GSM and CDMA have a limit of -13 dBm.
- 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.

8.5.4 Test data

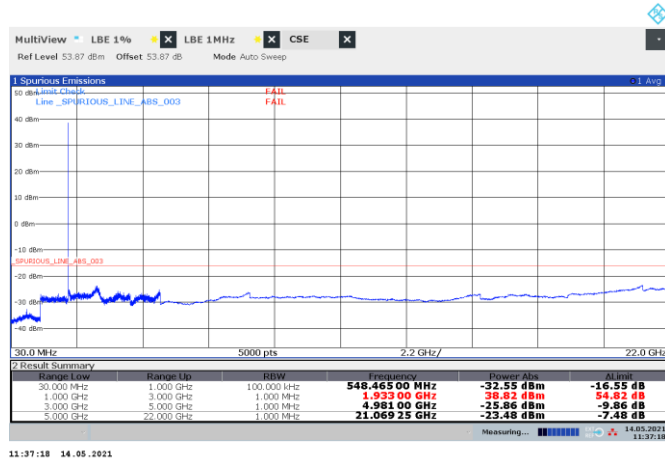


Figure 8.5-1: Conducted spurious emissions of LTE 5 MHz low channel, single carrier operation

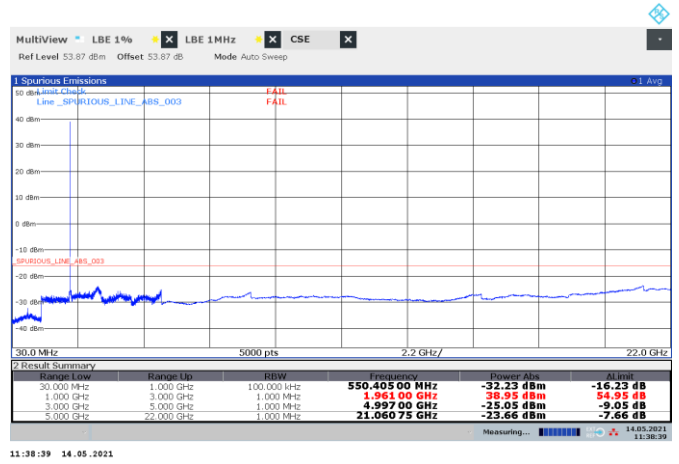


Figure 8.5-2: Conducted spurious emissions of LTE 5 MHz mid channel, single carrier operation



Figure 8.5-3: Conducted spurious emissions of LTE 5 MHz top channel, single carrier operation

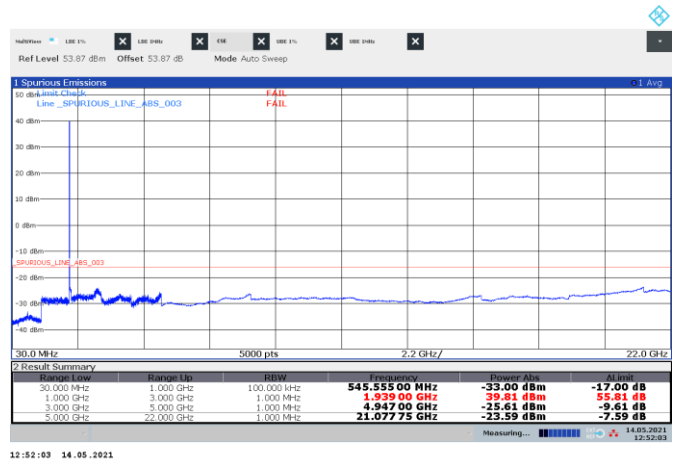


Figure 8.5-4: Conducted spurious emissions of LTE 10 MHz low channel, single carrier operation

Test data, continued

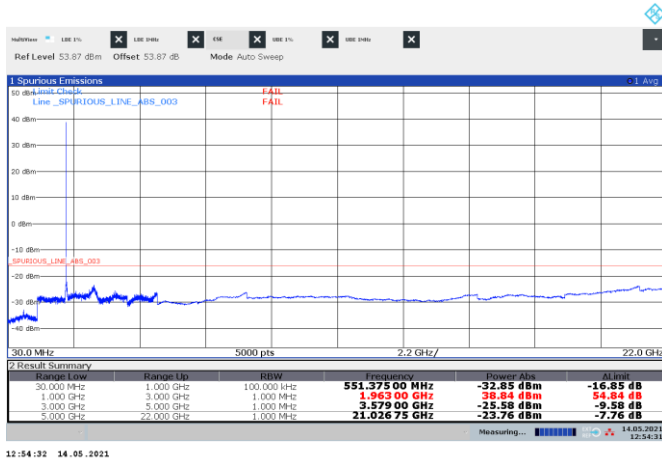


Figure 8.5-5: Conducted spurious emissions of LTE 10 MHz mid channel, single carrier operation

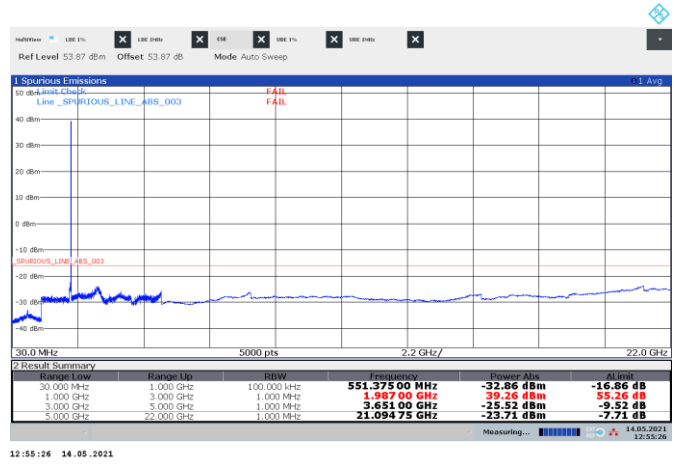


Figure 8.5-6: Conducted spurious emissions of LTE 10 MHz top channel, single carrier operation

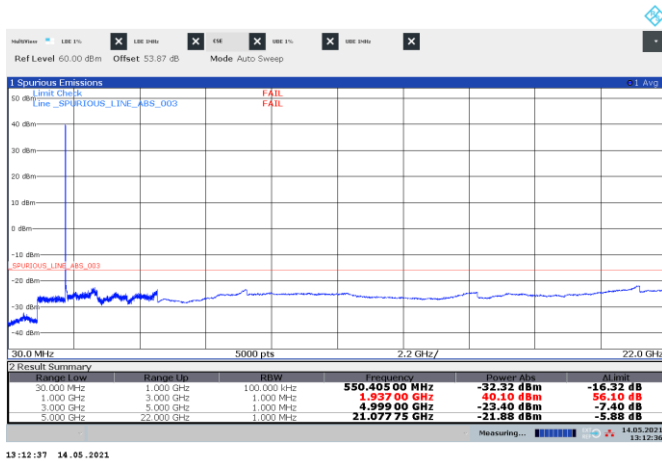


Figure 8.5-7: Conducted spurious emissions of LTE 15 MHz low channel, single carrier operation

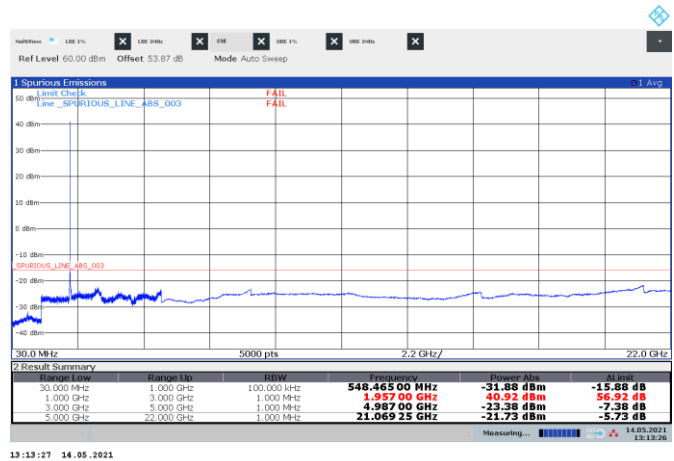


Figure 8.5-8: Conducted spurious emissions of LTE 15 MHz mid channel, single carrier operation

Test data, continued

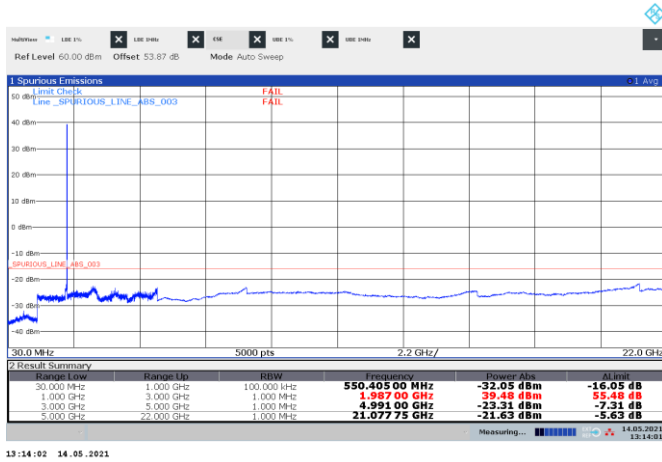


Figure 8.5-9: Conducted spurious emissions of LTE 15 MHz top channel, single carrier operation

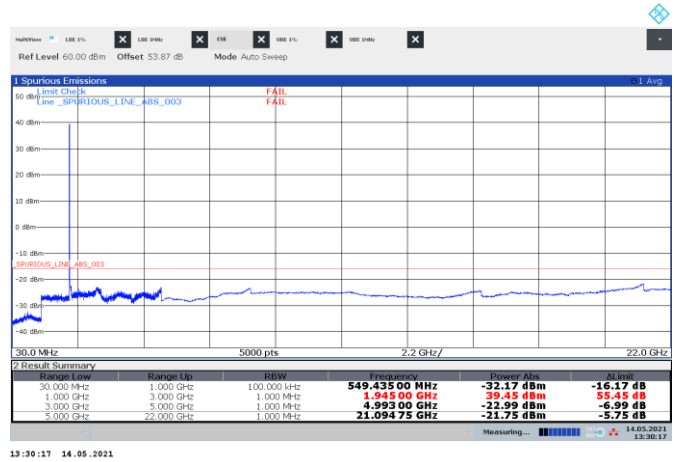


Figure 8.5-10: Conducted spurious emissions of LTE 20 MHz low channel, single carrier operation

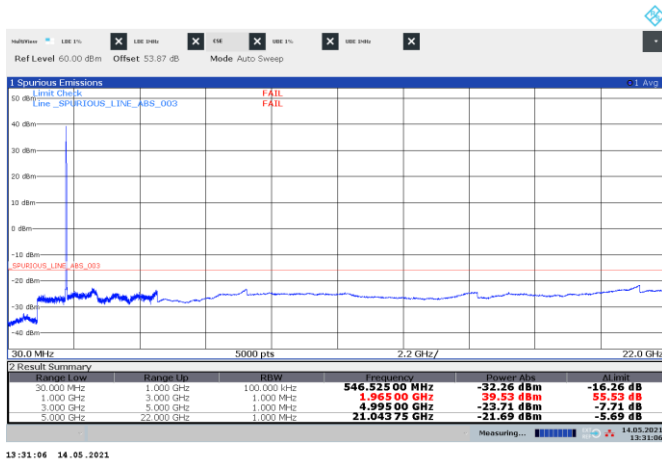


Figure 8.5-11: Conducted spurious emissions of LTE 20 MHz mid channel, single carrier operation

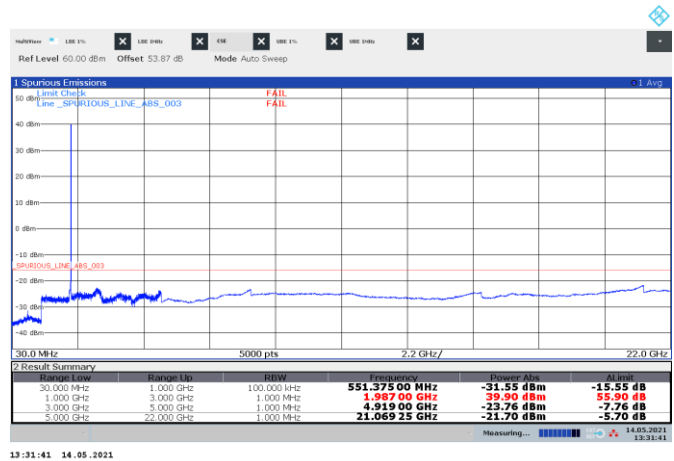


Figure 8.5-12: Conducted spurious emissions of LTE 20 MHz top channel, single carrier operation

Test data, continued

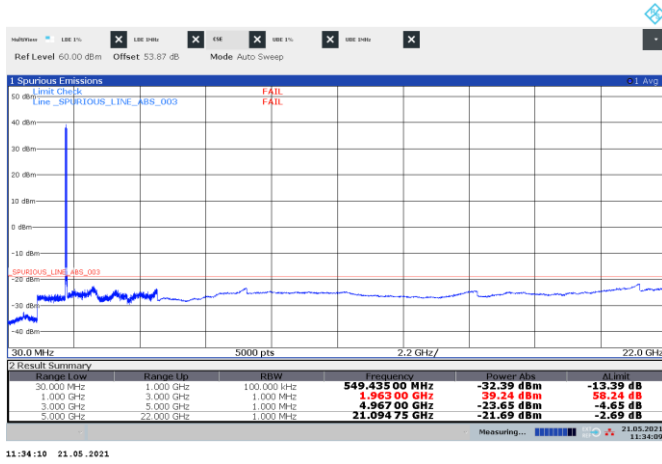


Figure 8.5-13: Conducted spurious emissions of 2xLTE 5 MHz and LTE 5 MHz (non-contiguous), multi-carrier operation

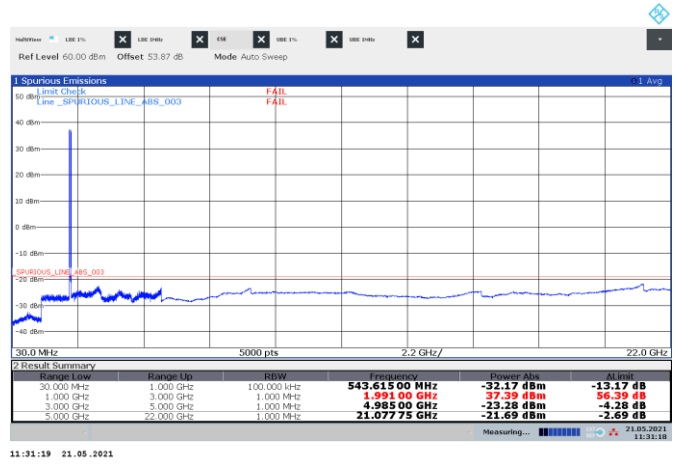


Figure 8.5-14: Conducted spurious emissions of 2xLTE 10 MHz (non-contiguous), multi-carrier operation

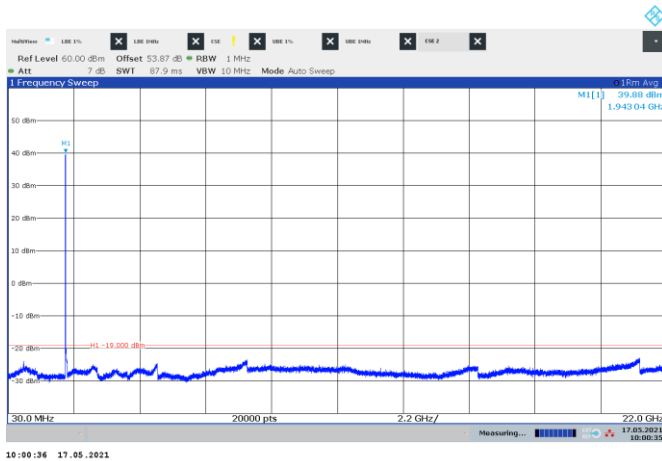


Figure 8.5-15: Conducted spurious emissions of 2xLTE 10 MHz contiguous bottom channels, multi-carrier operation

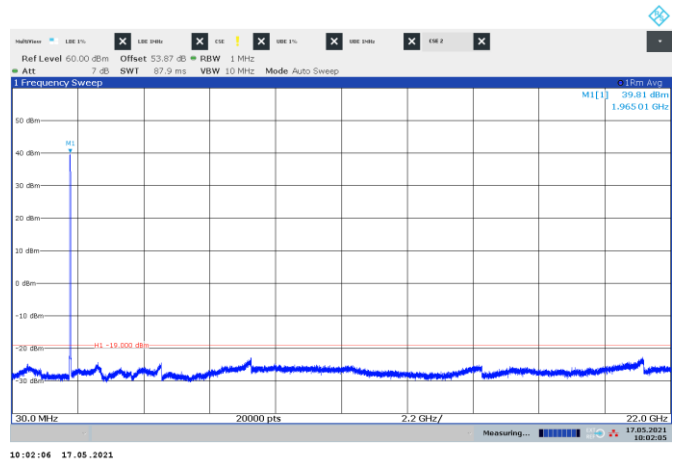


Figure 8.5-16: Conducted spurious emissions of 2xLTE 10 MHz contiguous mid channels, multi-carrier operation

Test data, continued

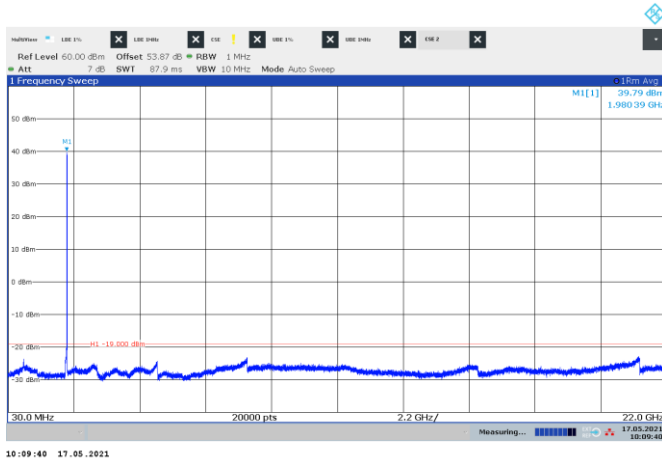


Figure 8.5-17: Conducted spurious emissions of 2xLTE 10 MHz contiguous top channels, multi-carrier operation

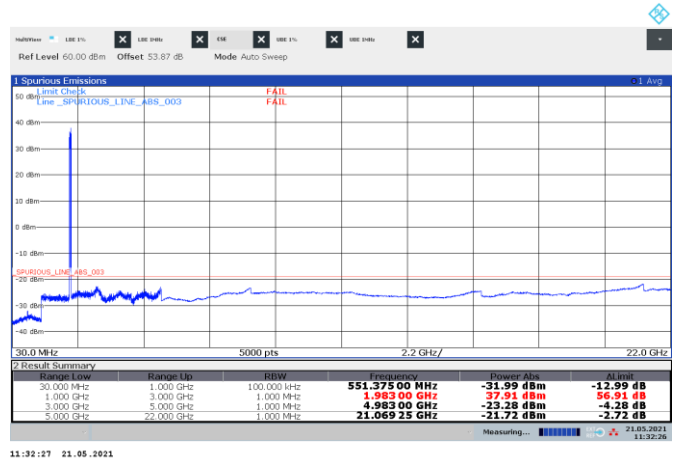


Figure 8.5-18: Conducted spurious emissions of 2xLTE 15 MHz (non-contiguous), multi-carrier operation

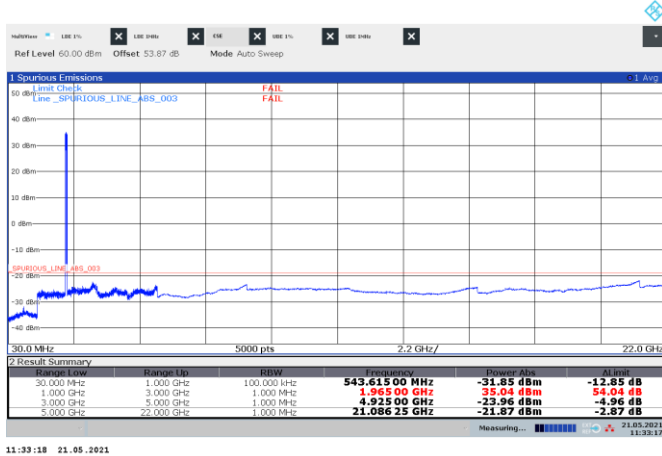


Figure 8.5-19: Conducted spurious emissions of 2xLTE 20 MHz (non-contiguous), multi-carrier operation

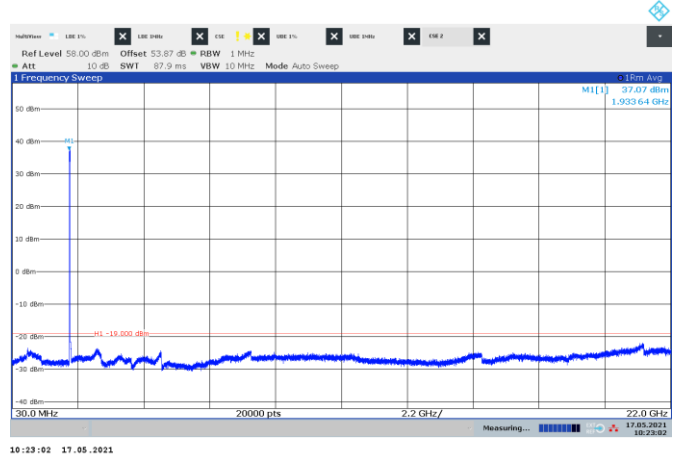


Figure 8.5-20: Conducted spurious emissions of 3xLTE 10 MHz contiguous low channels, multi-carrier operation

Test data, continued

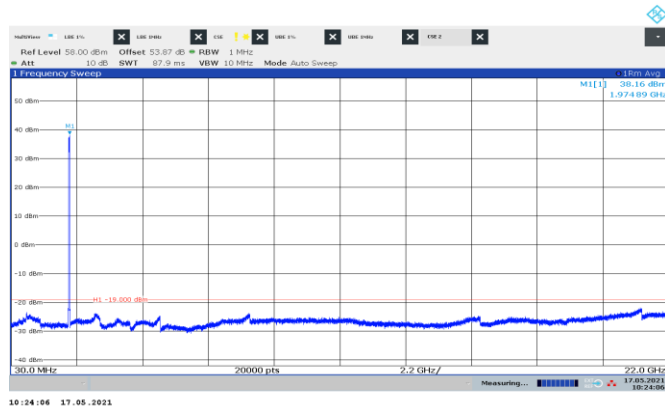


Figure 8.5-21: Conducted spurious emissions of 3xLTE 10 MHz contiguous mid channels, multi-carrier operation

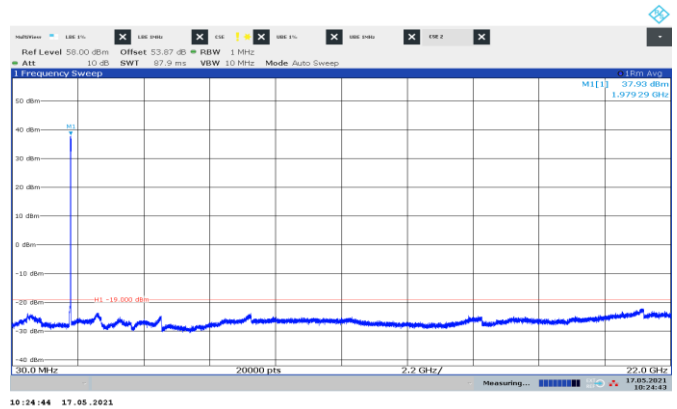


Figure 8.5-22: Conducted spurious emissions of 3xLTE 10 MHz contiguous top channels, multi-carrier operation



Figure 8.5-23: Conducted spurious emissions of 4xLTE 5 MHz contiguous low channels, multi-carrier operation



Figure 8.5-24: Conducted spurious emissions of 4xLTE 5 MHz contiguous mid channels, multi-carrier operation



Figure 8.5-25: Conducted spurious emissions of 4xLTE 5 MHz contiguous top channels, multi-carrier operation

Test data, continued

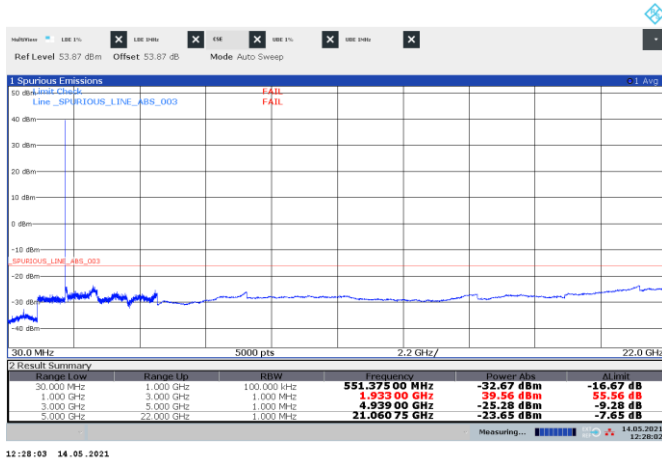


Figure 8.5-26: Conducted spurious emissions of NR 5 MHz low channel, single carrier operation

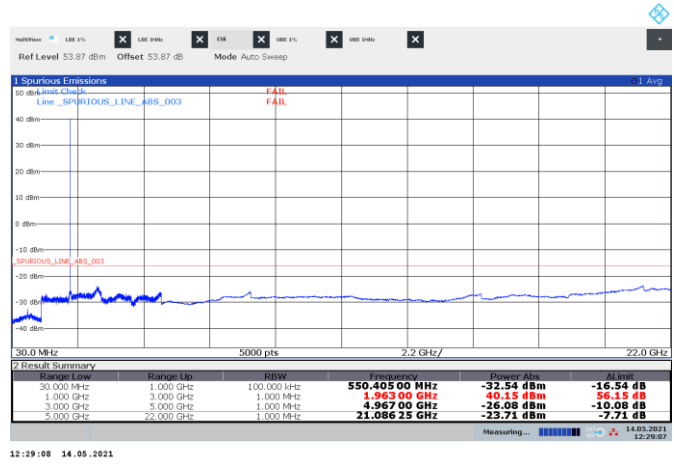


Figure 8.5-27: Conducted spurious emissions of NR 5 MHz mid channel, single carrier operation

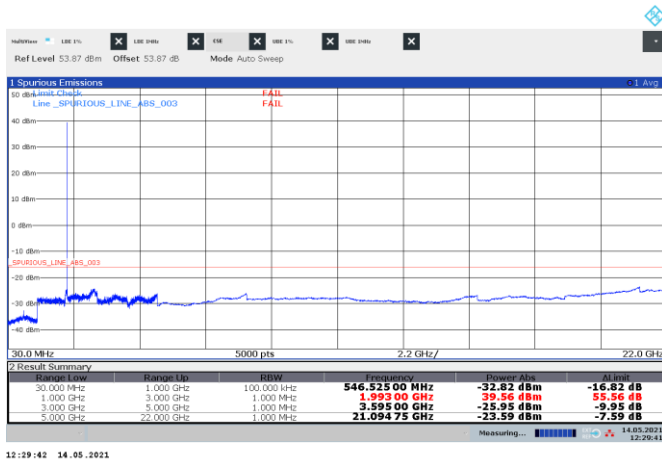


Figure 8.5-28: Conducted spurious emissions of NR 5 MHz top channel, single carrier operation

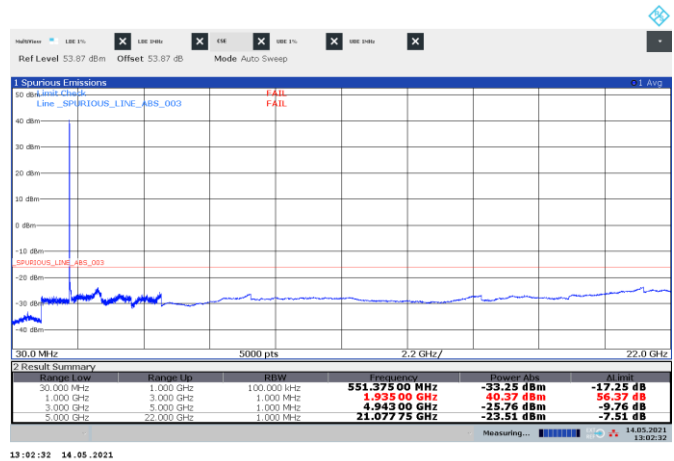


Figure 8.5-29: Conducted spurious emissions of NR 10 MHz low channel, single carrier operation

Test data, continued

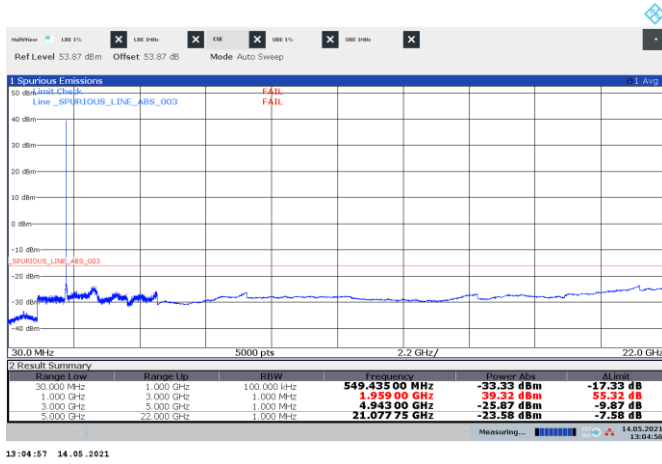


Figure 8.5-30: Conducted spurious emissions of NR 10 MHz mid channel, single carrier operation

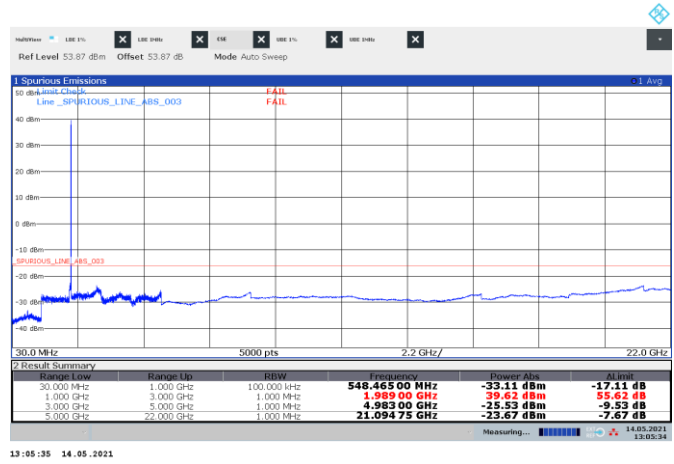


Figure 8.5-31: Conducted spurious emissions of NR 10 MHz top channel, single carrier operation

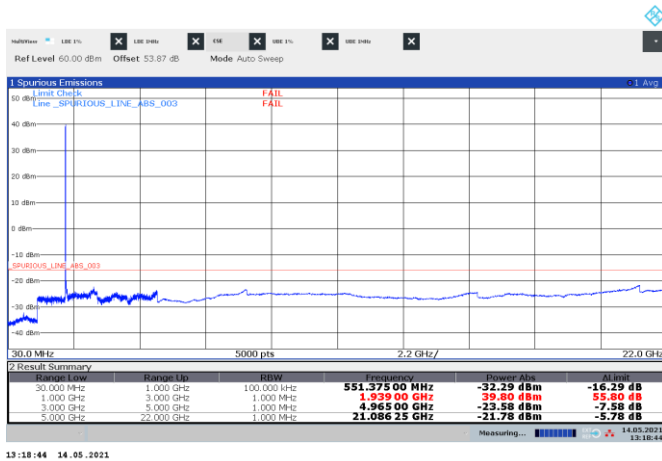


Figure 8.5-32: Conducted spurious emissions of NR 15 MHz low channel, single carrier operation

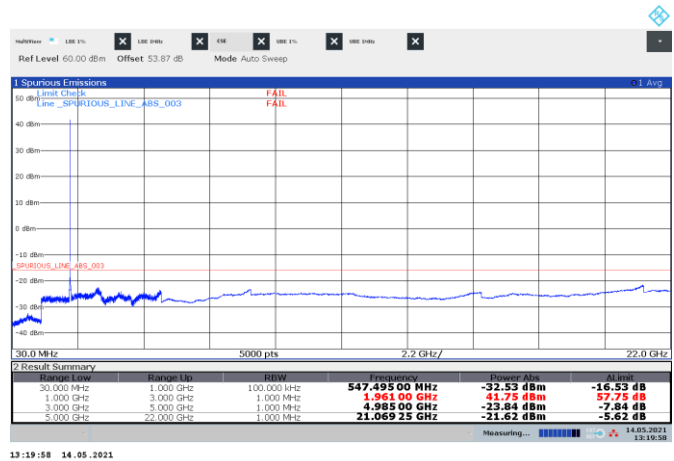


Figure 8.5-33: Conducted spurious emissions of NR 15 MHz mid channel, single carrier operation

Test data, continued

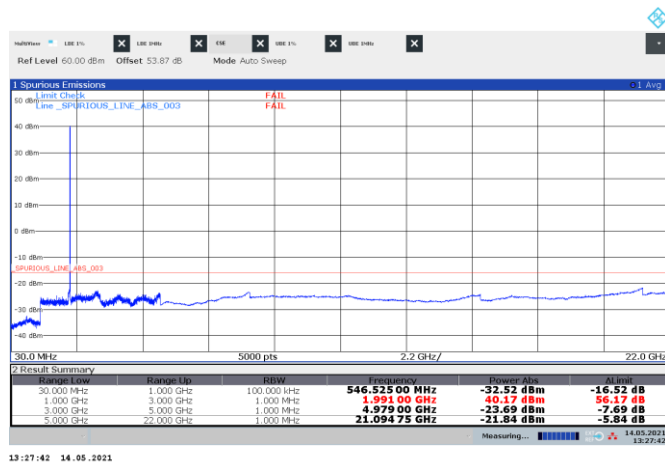


Figure 8.5-34: Conducted spurious emissions of NR 15 MHz top channel, single carrier operation

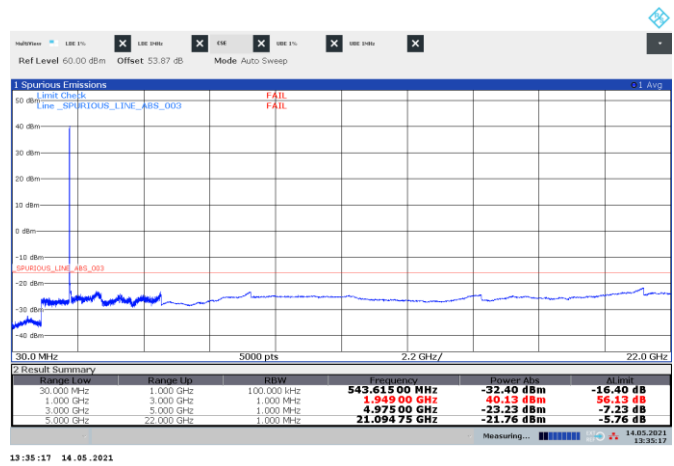


Figure 8.5-35: Conducted spurious emissions of NR 20 MHz low channel, single carrier operation

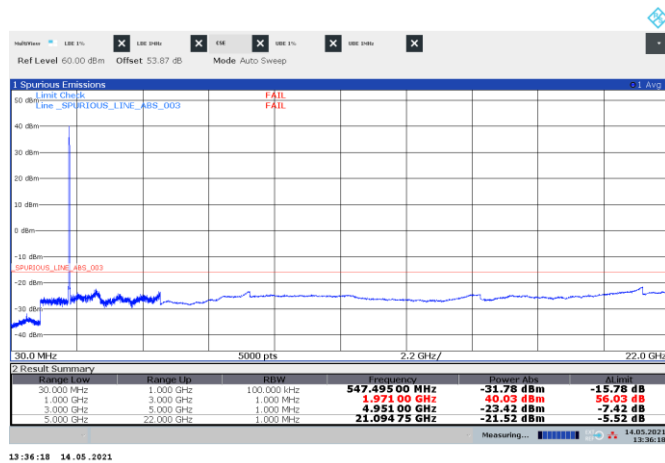


Figure 8.5-36: Conducted spurious emissions of NR 20 MHz mid channel, single carrier operation

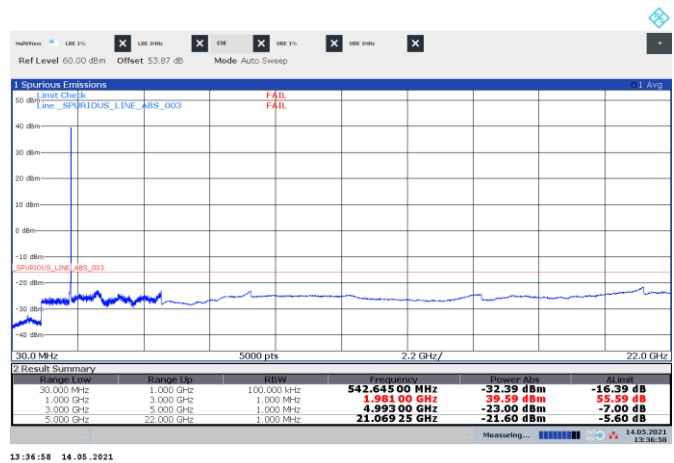


Figure 8.5-37: Conducted spurious emissions of NR 20 MHz top channel, single carrier operation

Test data, continued

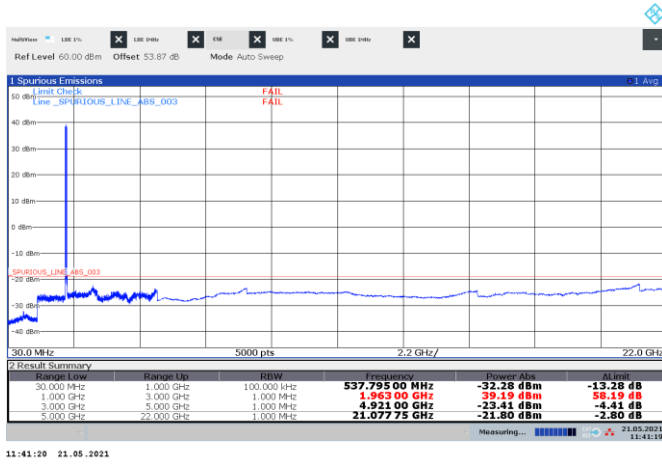


Figure 8.5-38: Conducted spurious emissions of 2xNR 5 MHz and NR 5 MHz (non-contiguous) channels, multi-carrier operation

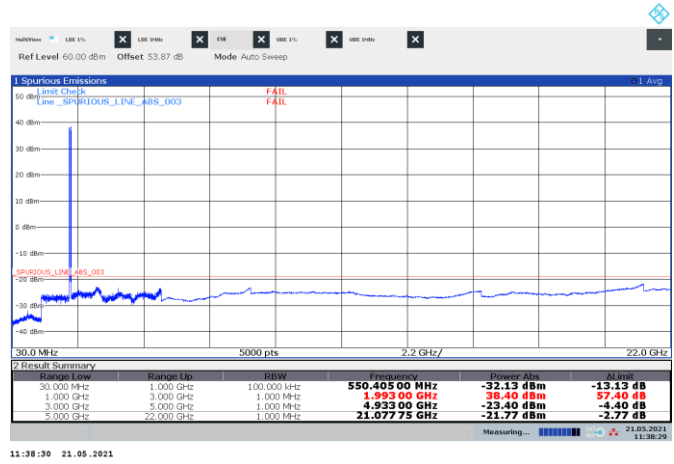


Figure 8.5-39: Conducted spurious emissions of 2xNR 10 MHz non-contiguous channels, multi-carrier operation



Figure 8.5-40: Conducted spurious emissions of 2xNR 5 MHz contiguous bottom channels, multi-carrier operation

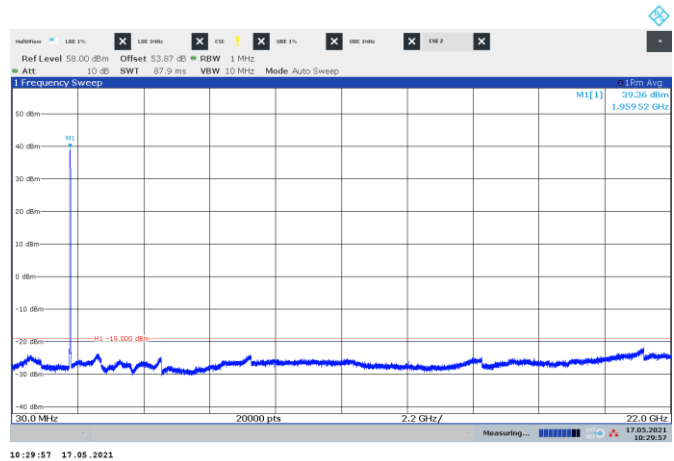


Figure 8.5-41: Conducted spurious emissions of 2xNR 5 MHz contiguous mid channels, multi-carrier operation

Test data, continued

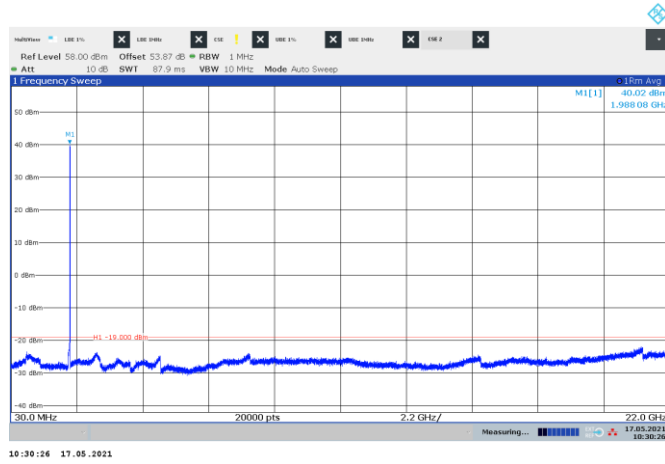


Figure 8.5-42: Conducted spurious emissions of 2xNR 5 MHz contiguous top channels, multi-carrier operation

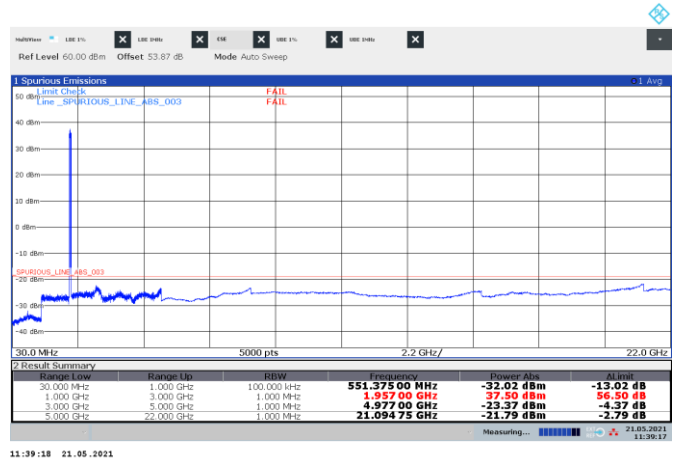


Figure 8.5-43: Conducted spurious emissions of 2xNR 15 MHz non-contiguous channels, multi-carrier operation

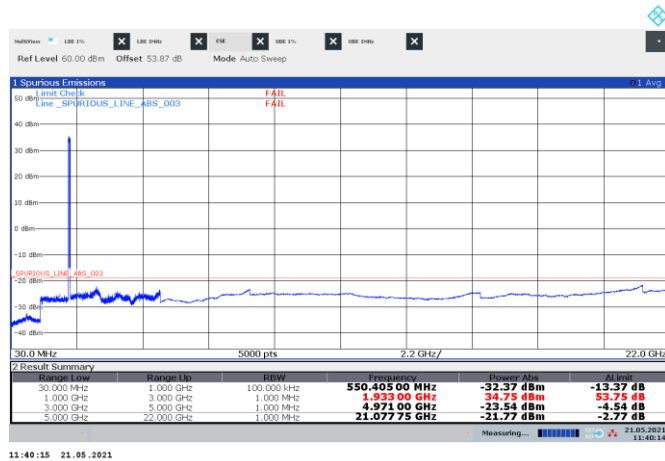


Figure 8.5-44: Conducted spurious emissions of 2xNR 20 MHz non-contiguous channels, multi-carrier operation

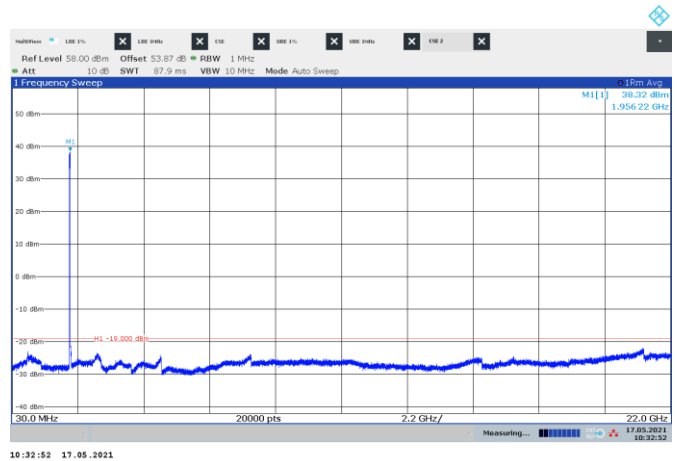


Figure 8.5-45: Conducted spurious emissions of 3xNR 10 MHz contiguous bottom channels, multi-carrier operation

Test data, continued

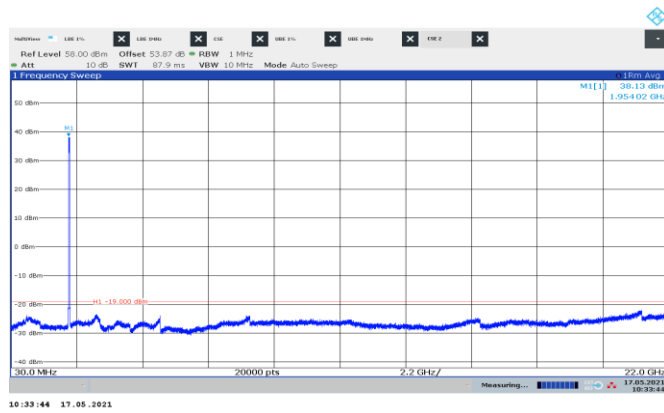


Figure 8.5-46: Conducted spurious emissions of 3xNR 10 MHz contiguous mid channels, multi-carrier operation

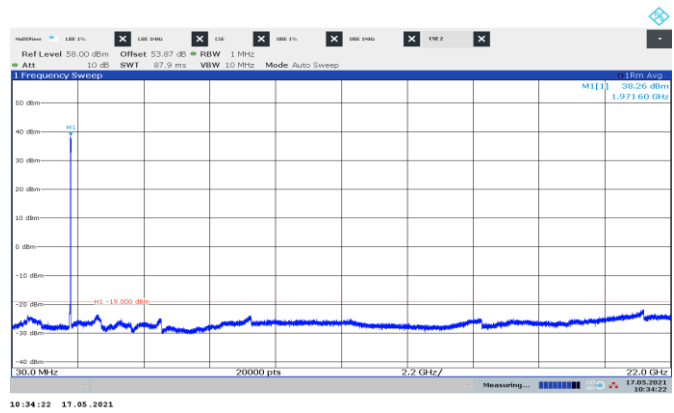


Figure 8.5-47: Conducted spurious emissions of 3xNR 10 MHz contiguous top channels, multi-carrier operation



Figure 8.5-48: Conducted spurious emissions of 4xNR 5 MHz contiguous bottom channels, multi-carrier operation



Figure 8.5-49: Conducted spurious emissions of 4xNR 5 MHz contiguous mid channels, multi-carrier operation



Figure 8.5-50: Conducted spurious emissions of 4xNR 5 MHz contiguous top channels, multi-carrier operation