

Test data, continued

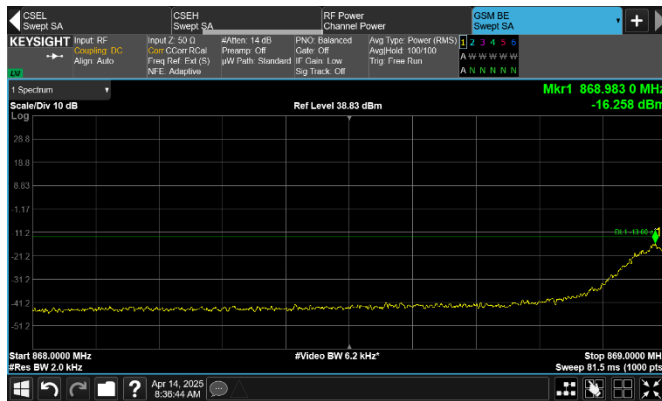


Figure 8.2-591: Conducted emission at the lower band edge

Frequency: 869 MHz
Meas. BW: 2 kHz
Limit: -13 dBm/2 kHz

Mode: Multi-RAT operation
Tech.: 2xGSM + 2xLTE 1.4 + 2xNR 5 MHz
Notes: Non-contiguous

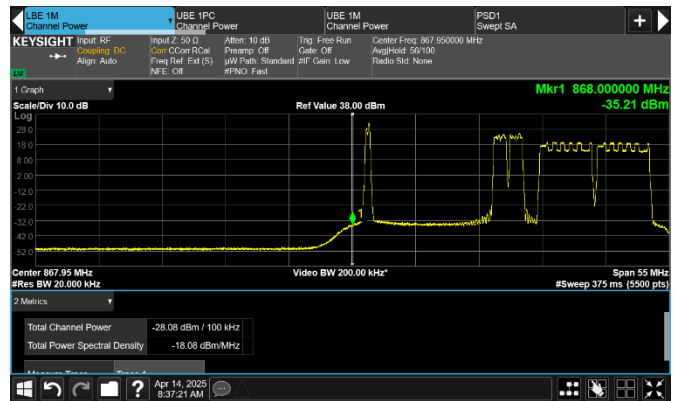


Figure 8.2-592: Conducted emission 1 MHz away from the lower band edge

Frequency: 868 MHz
Meas. BW: 100 kHz
Limit: -13 dBm/100 kHz

Mode: Multi-RAT operation
Tech.: 2xGSM + 2xLTE 1.4 + 2xNR 5 MHz
Notes: Non-contiguous

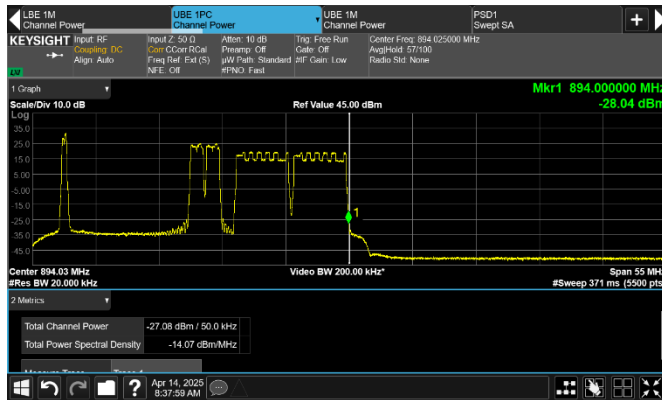


Figure 8.2-593: Conducted emission at the upper band edge

Frequency: 894 MHz
Meas. BW: 50 kHz
Limit: -13 dBm/50 kHz

Mode: Multi-RAT operation
Tech.: 2xGSM + 2xLTE 1.4 + 2xNR 5 MHz
Notes: Non-contiguous

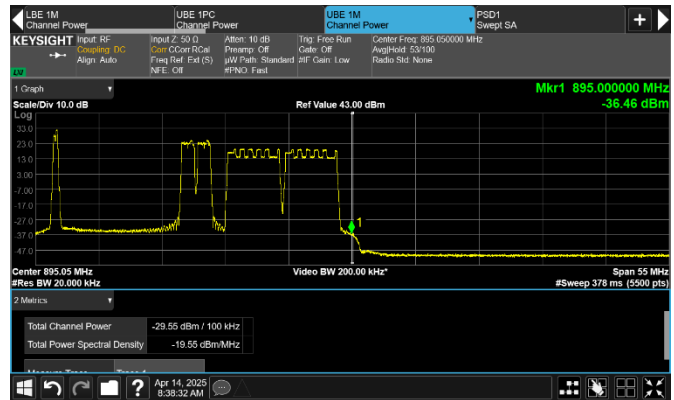


Figure 8.2-594: Conducted emission 1 MHz away from the upper band edge

Frequency: 895 MHz
Meas. BW: 100 kHz
Limit: -13 dBm/100 kHz

Mode: Multi-RAT operation
Tech.: 2xGSM + 2xLTE 1.4 + 2xNR 5 MHz
Notes: Non-contiguous

Test data, continued

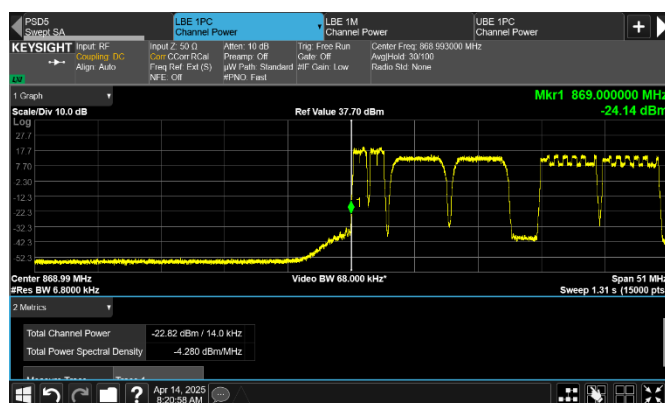


Figure 8.2-595: Conducted emission at the lower band edge

Frequency: 869 MHz
Meas. BW: 14 kHz
Limit: -19 dBm/14 kHz

Mode: Multi-RAT operation
Tech.: 2xLTE 1.4 + 2xWCDMA + 2xNR 5
Notes: Non-contiguous

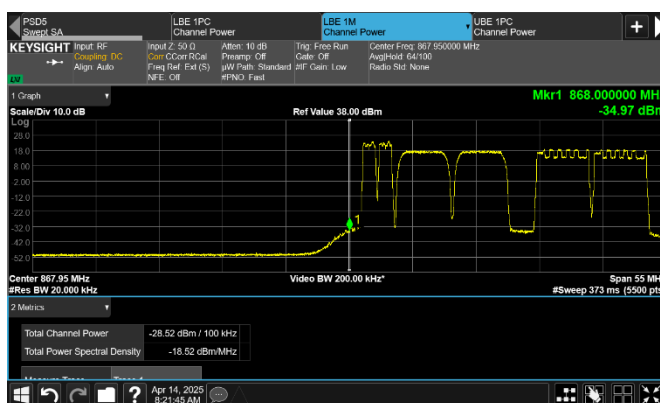


Figure 8.2-596: Conducted emission 1 MHz away from the lower band edge

Frequency: 868 MHz
Meas. BW: 100 kHz
Limit: -19 dBm/100 kHz

Mode: Multi-RAT operation
Tech.: 2xLTE 1.4 + 2xWCDMA + 2xNR 5
Notes: Non-contiguous

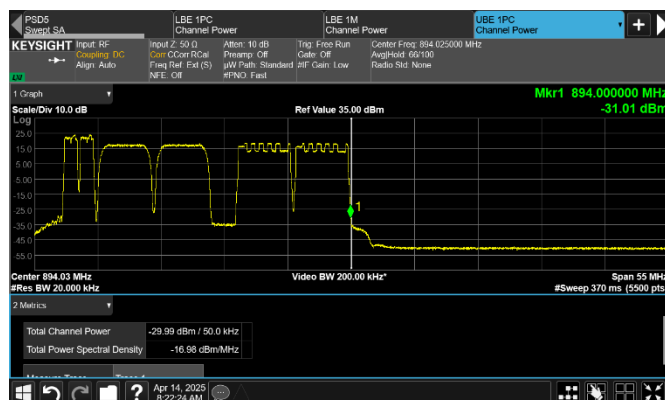


Figure 8.2-597: Conducted emission at the upper band edge

Frequency: 894 MHz
Meas. BW: 50 kHz
Limit: -19 dBm/50 kHz

Mode: Multi-RAT operation
Tech.: 2xLTE 1.4 + 2xWCDMA + 2xNR 5
Notes: Non-contiguous

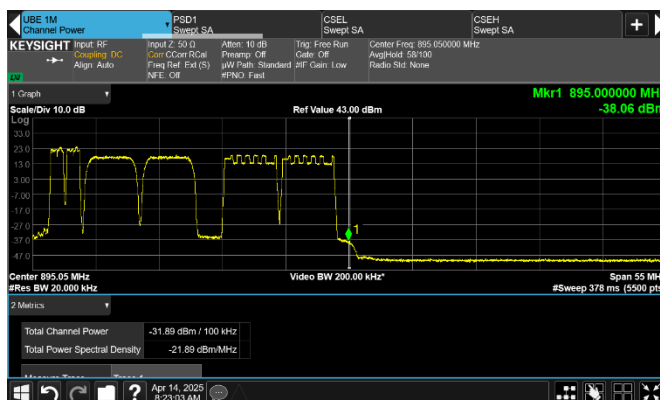


Figure 8.2-598: Conducted emission 1 MHz away from the upper band edge

Frequency: 895 MHz
Meas. BW: 100 kHz
Limit: -19 dBm/100 kHz

Mode: Multi-RAT operation
Tech.: 2xLTE 1.4 + 2xWCDMA + 2xNR 5
Notes: Non-contiguous

8.3 Radiated spurious emissions

8.3.1 Definitions and limits

FCC §22.917 Emission limitations for cellular equipment.

(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.

RSS-132, Section 5.5: Transmitter Unwanted Emissions

Equipment shall meet the unwanted emission limits specified below:

- (i) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated below the transmitter output power P (dBW) by at least $43 + 10 \log(p)$ dB.
- (ii) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated below the transmitter output power P (dBW) by at least $43 + 10 \log(p)$ dB. If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

8.3.1 Test summary

Test date	April 23, 2025
Test engineer	Dhara Patel

8.3.2 Observations, settings and special notes

The spectrum was analyzed at a distance of 3 meters, ranging from 30 MHz to at least the 10th harmonic, in accordance with ANSI C63.26 Paragraph 5.5.3.2. The resolution bandwidth (RBW) was set to 100 kHz for frequencies between 30–1000 MHz and 1 MHz for frequencies above 1 GHz, with the video bandwidth (VBW) set wider than the RBW.

Testing was conducted with RF ports terminated with a 50 Ohm load. The limit line of -13 dBm/100 kHz was recalculated for field strength measurement at a distance of 3 meters, resulting in a value of 82.23 dBμV/m.

Transmission testing was performed on the channels that yielded the maximum power results in previous sections. No emissions, other than those displayed in the plots, were detected during the spectrum scans.

Each of the four ports was configured with one NB-IoT and one NR5 carrier, resulting in a total of four NB-IoT and four NR5 carriers across all ports.

8.3.1 Test data

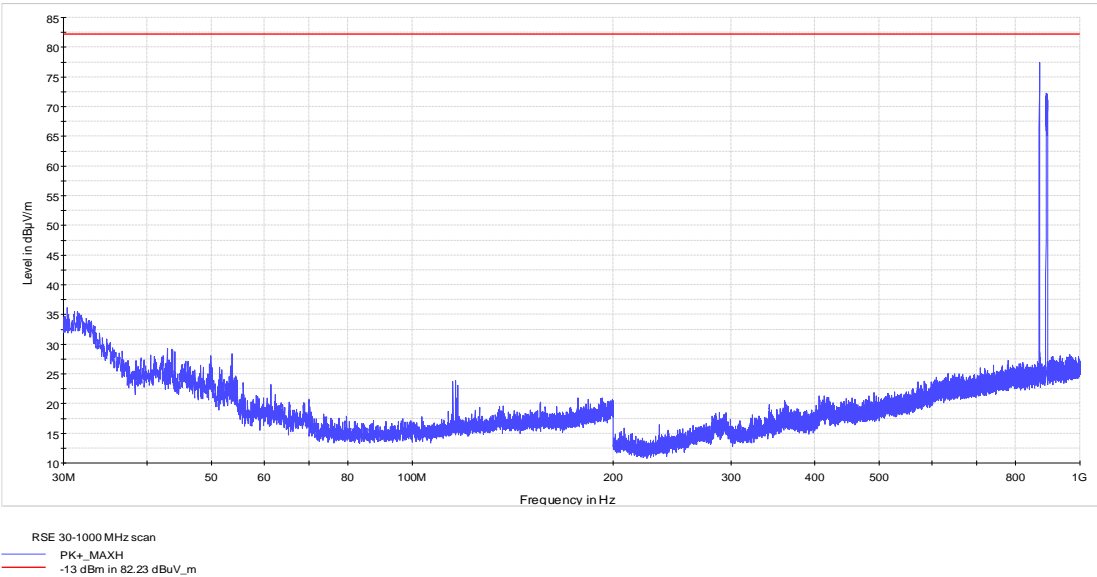


Figure 8.3-1: Radiated spurious emissions within 30–1000 MHz

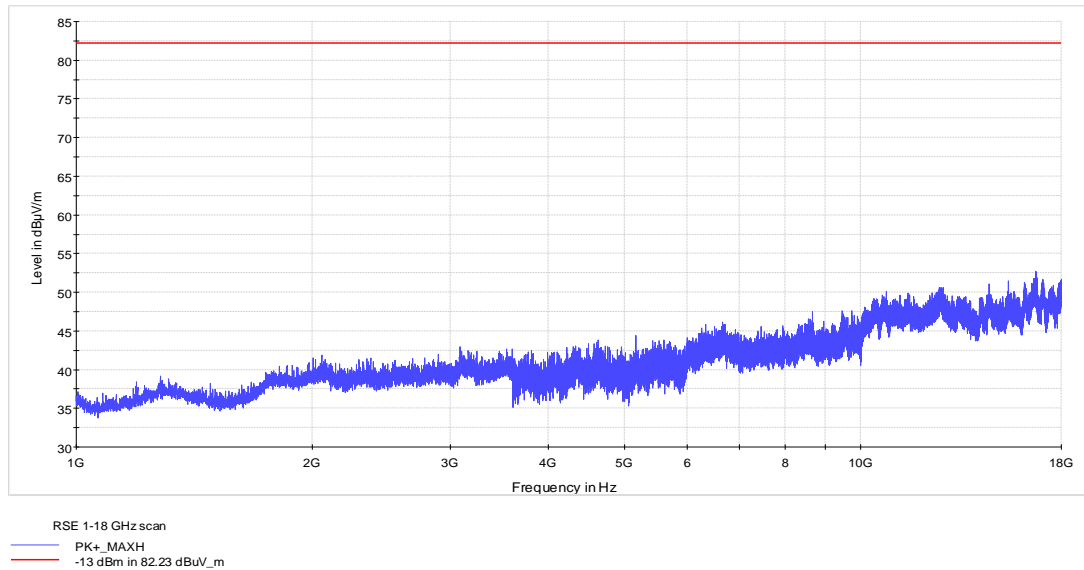


Figure 8.3-2: Radiated spurious emissions within 1–18 GHz

8.4 Frequency stability

8.4.1 Definitions and limits

RSS-132, Section 5.3:

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within each of the sub-bands when tested at the temperature and supply voltage variations specified in RSS-Gen.

8.4.2 Test summary

Test date	April 15, 2025
Test engineer	Dhara Patel

8.4.3 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 the assigned band.

8.4.4 Test data

Table 8.4-1: Frequency error results

Temperature, °C	Voltage, V _{DC}	Frequency error, Hz
-40	48.00	0.78
-30	48.00	-0.81
-20	48.00	-0.89
-10	48.00	0.57
0	48.00	-0.87
10	48.00	-1.02
20	48.00	-1.68
20	40.80	-1.45
20	55.20	1.75
30	48.00	1.45
40	48.00	1.22
50	48.00	-1.49
55	48.00	1.16

Max negative drift: -1.68 Hz, Max positive drift: +1.75 Hz. Given their minimal magnitude, these drifts do not cause any significant shift in occupied bandwidth beyond the allocated frequency block.

8.5 Occupied bandwidth

8.5.1 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.

8.5.2 Test summary

Test date	April 7, 2025, April 8, 2025, June 2, 2025
Test engineer	Dhara Patel

8.5.3 Observations, settings and special notes

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

Modulation Selection: The EUT supports multiple Quadrature Amplitude Modulation (QAM) schemes. QPSK was chosen as the worst-case modulation due to its higher power output

Spectrum analyzer settings:

Detector mode	Peak
Resolution bandwidth	$\geq 1\%$ of EBW
Video bandwidth	RBW $\times 3$
Trace mode	Max Hold

8.5.4 Test data

Table 8.5-1: Occupied bandwidth results for NR

Channel size	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
5 MHz	871.5	4.78	4.481
5 MHz	881.5	4.77	4.484
5 MHz	891.5	4.79	4.477
10 MHz	874.0	9.61	9.227
10 MHz	881.5	9.63	9.229
10 MHz	889.0	9.61	9.221
15 MHz	876.5	14.66	14.098
15 MHz	881.5	14.67	14.114
15 MHz	886.5	14.65	14.115
20 MHz	879.0	19.56	18.925
20 MHz	881.5	19.56	18.933
20 MHz	884.0	19.50	18.954
25 MHz	881.5	24.46	23.740

Table 8.5-2: Occupied bandwidth results for LTE

Channel size, notes	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
1.4 MHz	869.7	1.31	1.127
1.4 MHz	881.5	1.29	1.126
1.4 MHz	893.3	1.31	1.127
3 MHz	870.5	2.93	2.703
3 MHz	881.5	2.92	2.700
3 MHz	892.5	2.93	2.699
5 MHz, SC with IB	871.5	4.72	4.475
5 MHz, SC with IB	881.5	4.70	4.470
5 MHz, SC with IB	891.5	4.70	4.463
10 MHz, SC with GB	874.0	9.71	9.371
10 MHz, SC with GB	881.5	9.71	9.377
10 MHz, SC with GB	889.0	9.71	9.367

Table 8.5-3: Occupied bandwidth for WCDMA

Channel size	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
5 MHz	871.4	4.62	4.179
5 MHz	881.6	4.65	4.177
5 MHz	891.6	4.63	4.163

Table 8.5-4: Occupied bandwidth for SA IoT

Channel size	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
0.4 MHz	869.2	0.306	0.2116
0.4 MHz	881.5	0.307	0.2107
0.4 MHz	893.8	0.308	0.2114

Table 8.5-5: Occupied bandwidth for GSM

Channel size	Frequency, MHz	26 dB BW, MHz	99% OBW, MHz
0.2 MHz	869.2	0.310	0.2437
0.2 MHz	869.4	0.307	0.2439
0.2 MHz	881.6	0.308	0.2428
0.2 MHz	893.6	0.318	0.2438
0.2 MHz	893.8	0.308	0.2432

Test data, continued

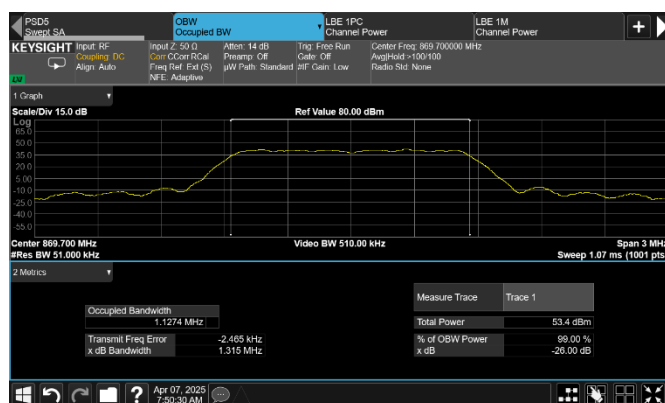


Figure 8.5-1: Sample plot for LTE 1.4 MHz channel

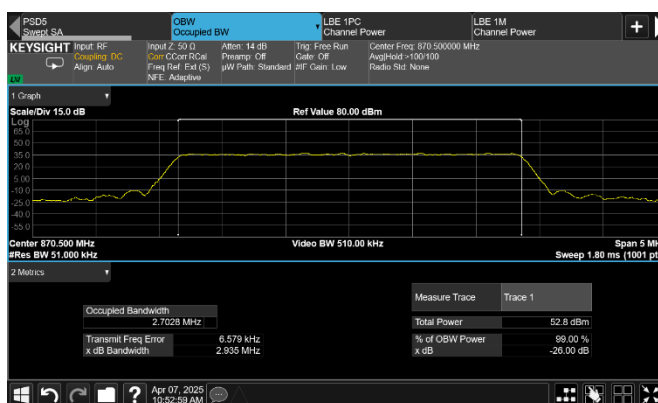


Figure 8.5-2: Sample plot for LTE 3 MHz channel

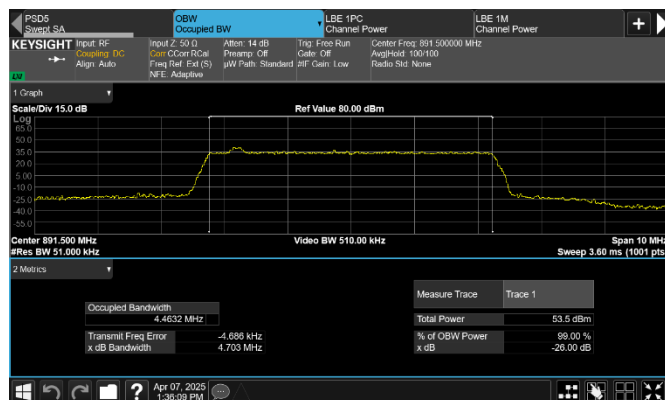


Figure 8.5-3: Sample plot for LTE 5 MHz + IB channel

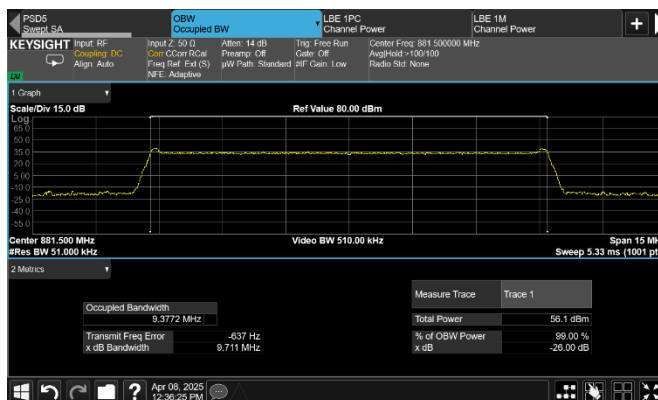


Figure 8.5-4: Sample plot for LTE 10 MHz + GB channel

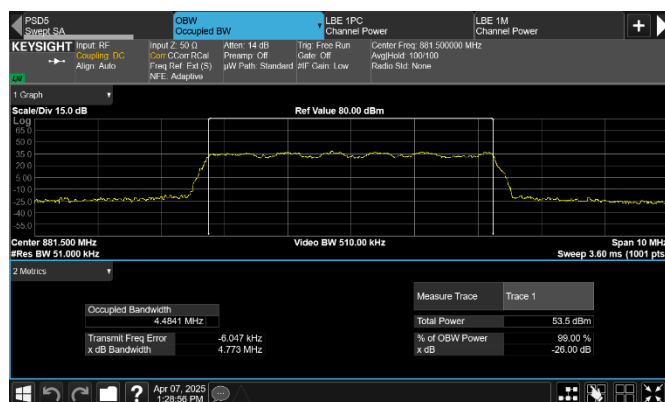


Figure 8.5-5: Sample plot for NR 5 MHz



Figure 8.5-6: Sample plot for NR 10 MHz

Test data, continued

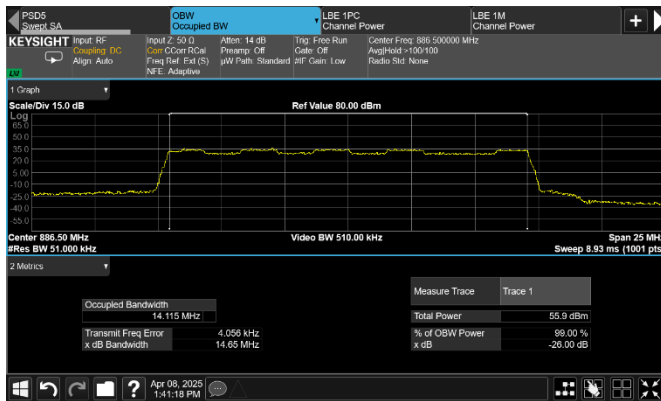


Figure 8.5-7: Sample plot for NR 15 MHz channel

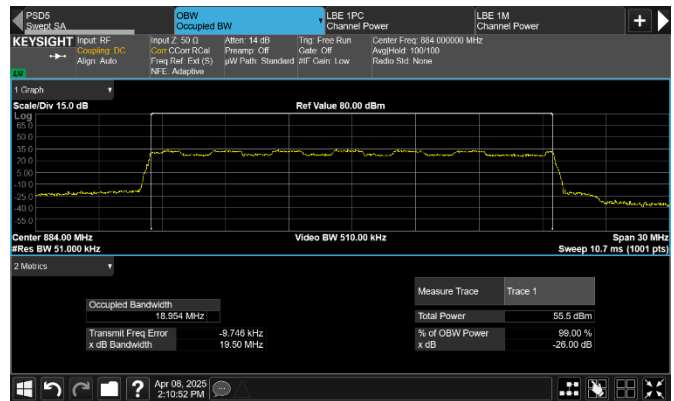


Figure 8.5-8: Sample plot for NR 20 MHz channel

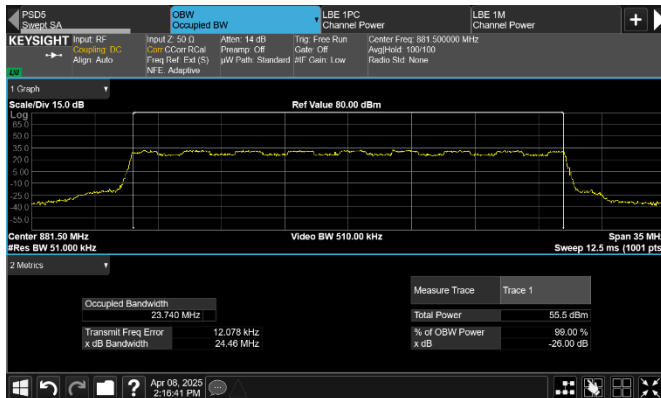


Figure 8.5-9: Sample plot for NR 25 MHz channel

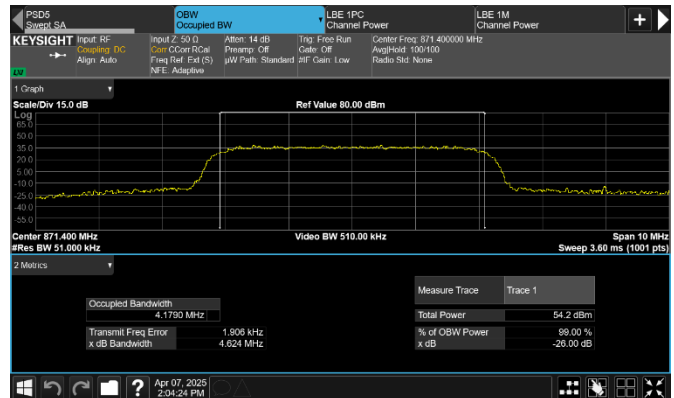


Figure 8.5-10: Sample plot for WCDMA

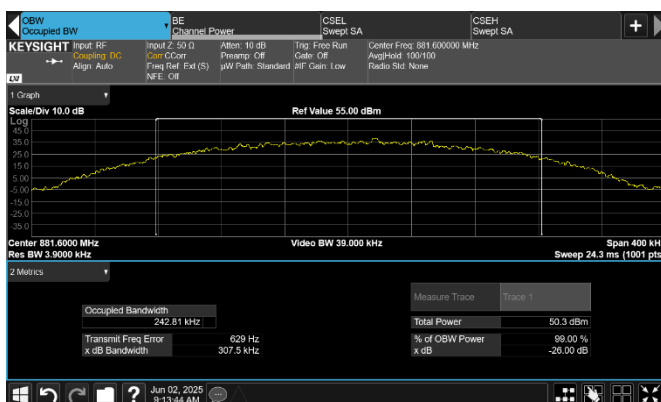


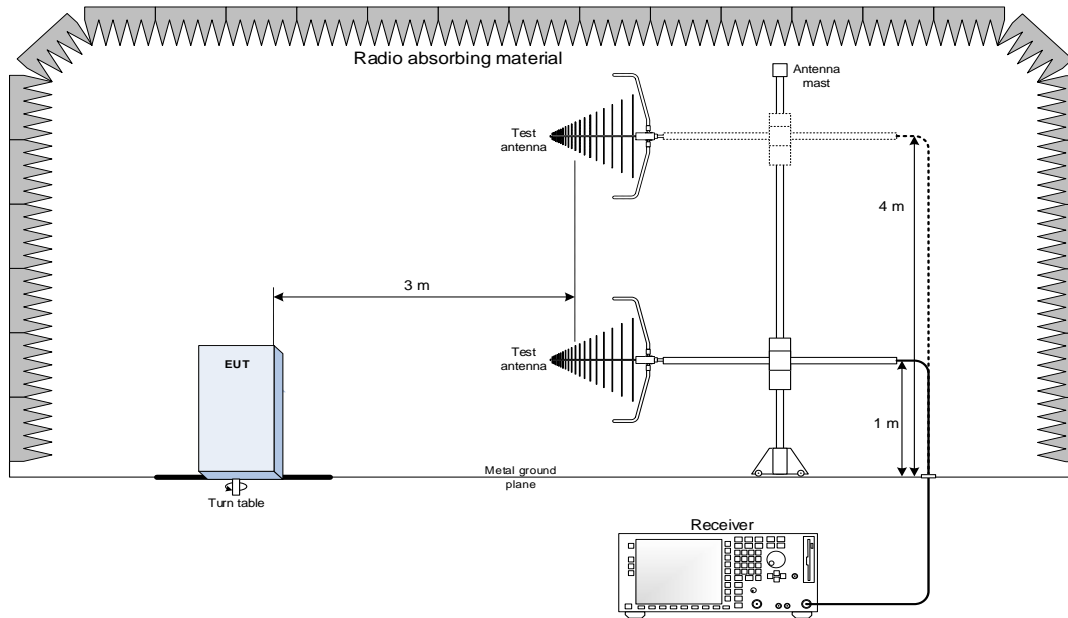
Figure 8.5-11: Sample plot for GSM



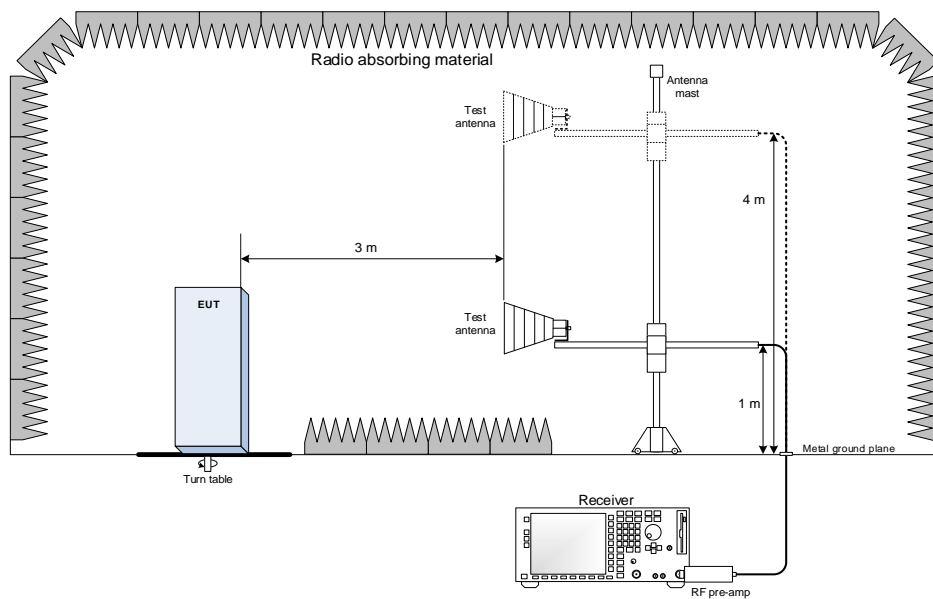
Figure 8.5-12: Sample plot for SA IoT

Section 9. Block diagrams of test setups

9.1 Radiated emissions set-up for frequencies below 1 GHz



9.2 Radiated emissions set-up for frequencies above 1 GHz



9.3 Conducted emissions set-up

