UL-MIMO NR Band n48 – Antenna 3

Plot 7-59. PAR Plot (NR Band n78 - 10MHz CP-OFDM QPSK– Full RB)

Plot 7-60. PAR Plot (NR Band n78 - 10MHz CP-OFDM 256-QAM– Full RB)

© 2023 ELEMENT V11.0 9/14/2022

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

7.7 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the field strength conversion method described in ANSI C63.26-2015 with the EUT transmitting into an external antenna. Measurements on signals operating below 1GHz are performed using hybrid (biconical/log) antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

ANSI C63.26-2015 – Section 5.5.4

Test Settings

1. RBW = 1MHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Max Hold (In cases where the level is within 2dB of the limit, the final measurement is taken using triggering/gating and trace averaging.)
7. The trace was allowed to stabilize

© 2023 ELEMENT V11.0 9/14/2022

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

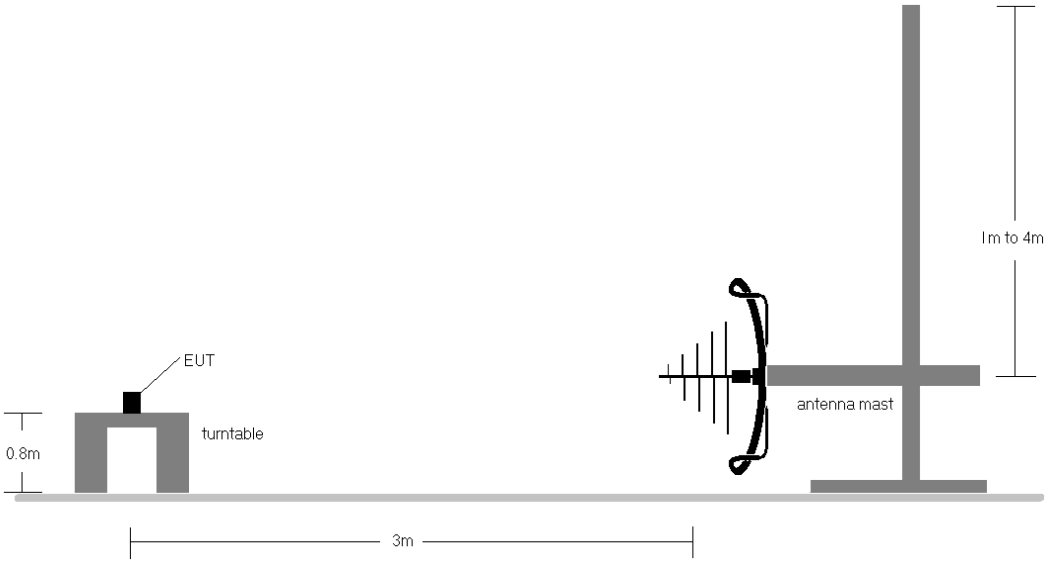


Figure 7-6. Test Instrument & Measurement Setup < 1GHz

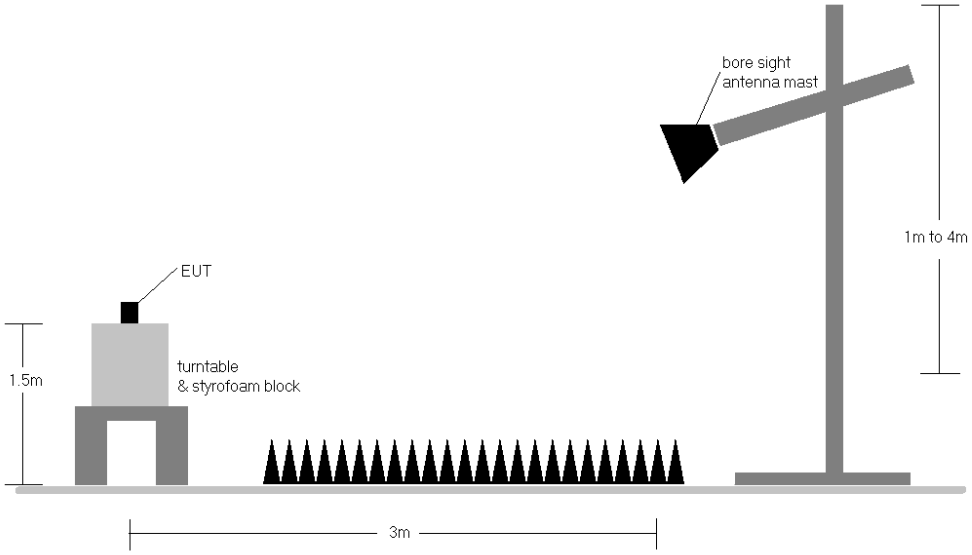


Figure 7-7. Test Instrument & Measurement Setup >1 GHz

© 2023 ELEMENT V11.0 9/14/2022

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

Test Notes

1) Field strengths are calculated using the Measurement quantity conversions in ANSI C63.26-2015 Section 5.2.7:
   a) E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
   b) EIRP (dBm) = E(dBµV/m) + 20logD – 104.8; where D is the measurement distance in meters.

2) The unit was tested while powered by a DC power source.

3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

4) Emissions below 18GHz were measured at a 3-meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

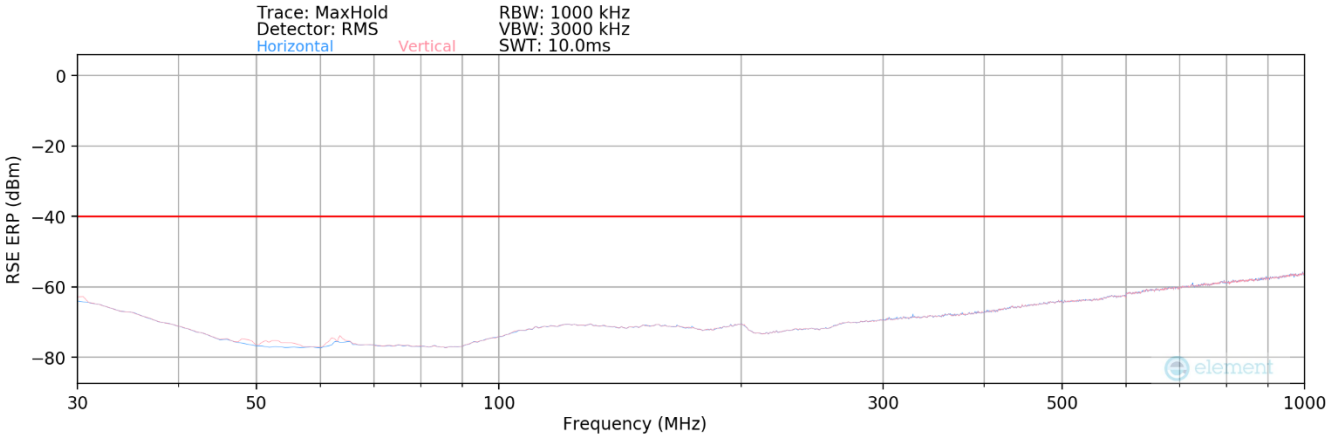
5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

6) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

© 2023 ELEMENT V11.0 9/14/2022

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

NR Band n48



Plot 7-61. Radiated Spurious Plot-Below 1 GHz (NR Band n48)

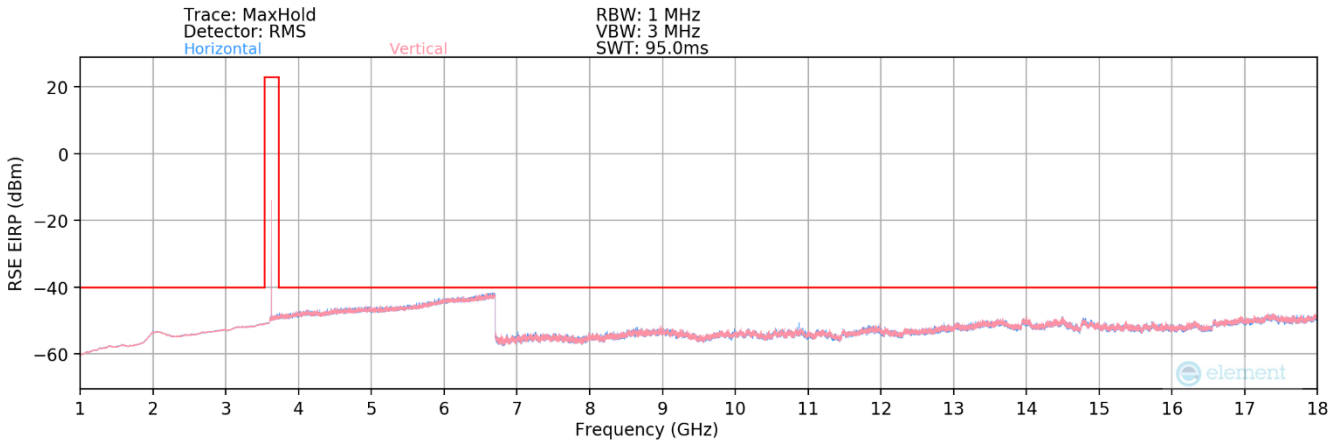
Bandwidth (MHz):	10
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
58.07	H	-	-	-80.62	14.27	40.65	-56.76	-40.00	-16.76
211.29	H	-	-	-80.32	17.67	44.35	-53.06	-40.00	-13.06
408.01	H	-	-	-79.78	23.44	50.66	-46.74	-40.00	-6.74

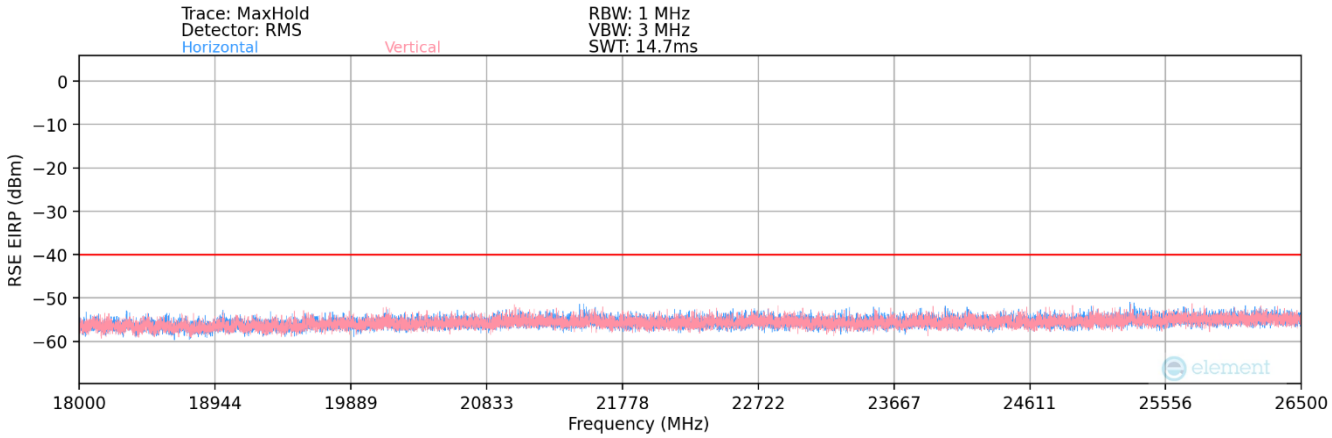
Table 7-4. Radiated Spurious Data (NR Band n48)

© 2023 ELEMENT V11.0 9/14/2022

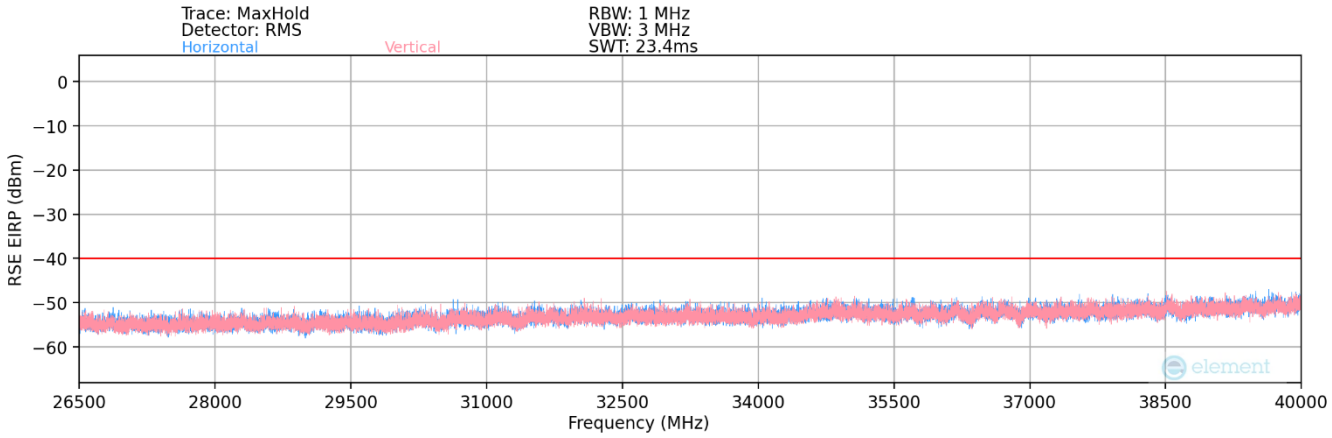
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Plot 7-62. Radiated Spurious Plot Above 1GHz (NR Band n48)



Plot 7-63. Radiated Spurious Plot Above 18GHz (NR Band n48)



Plot 7-64. Radiated Spurious Plot Above 26.5GHz (NR Band n48)

© 2023 ELEMENT V11.0 9/14/2022

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

Bandwidth (MHz):	10
Frequency (MHz):	3555.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7110.00	H	-	-	-76.29	9.01	39.72	-55.54	-40.00	-15.54
10665.00	H	310	76	-72.60	12.62	47.02	-48.23	-40.00	-8.23
14220.00	H	-	-	-78.38	15.91	44.53	-50.73	-40.00	-10.73
17775.00	H	-	-	-79.55	17.57	45.02	-50.24	-40.00	-10.24
21330.00	H	-	-	-56.33	4.04	54.71	-50.09	-40.00	-10.09

Table 7-5. Radiated Spurious Data (NR Band n48 – Low Channel)

Bandwidth (MHz):	10
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7250.00	H	-	-	-76.19	9.18	39.99	-55.27	-40.00	-15.27
10875.00	H	326	65	-69.40	11.95	49.55	-45.71	-40.00	-5.71
14500.00	H	283	43	-76.15	15.94	46.79	-48.46	-40.00	-8.46
18125.00	H	-	-	-56.21	1.60	52.39	-52.41	-40.00	-12.41
21750.00	H	-	-	-57.19	3.86	53.67	-51.13	-40.00	-11.13
25375.00	H	-	-	-56.11	4.26	55.14	-49.66	-40.00	-9.66

Table 7-6. Radiated Spurious Data (NR Band n48 – Mid Channel)

Bandwidth (MHz):	10
Frequency (MHz):	3695.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 12

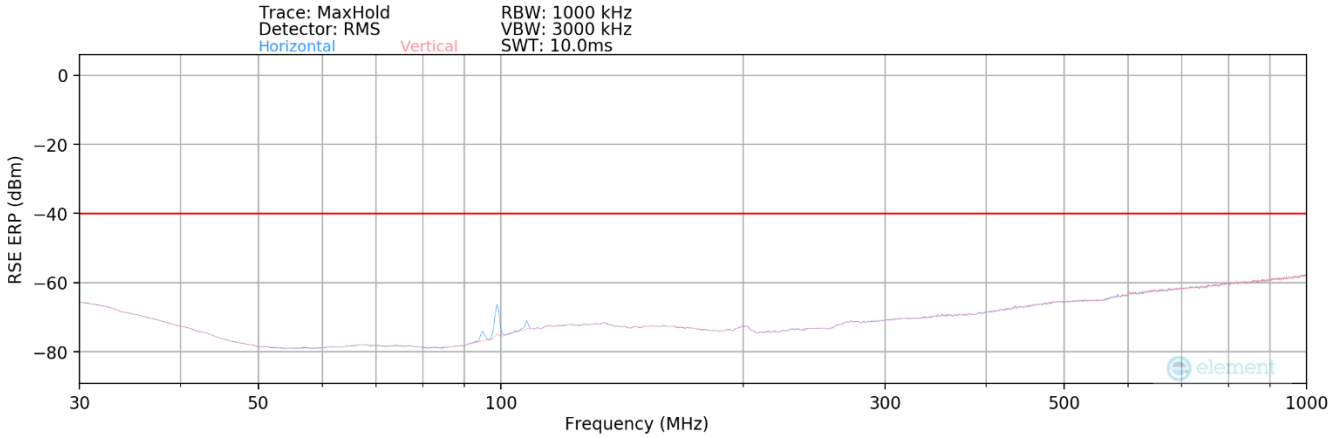
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7390.00	H	-	-	-76.97	9.87	39.90	-55.36	-40.00	-15.36
11085.00	H	398	321	-73.19	12.25	46.06	-49.19	-40.00	-9.19
14780.00	H	166	39	-75.88	16.33	47.45	-47.80	-40.00	-7.80
18475.00	H	-	-	-56.27	1.86	52.59	-52.21	-40.00	-12.21
22170.00	H	-	-	-56.73	3.80	54.06	-50.74	-40.00	-10.74
25865.00	H	-	-	-56.28	4.10	54.82	-49.98	-40.00	-9.98

Table 7-7. Radiated Spurious Data (NR Band n48 – High Channel)

© 2023 ELEMENT V11.0 9/14/2022

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

UL-MIMO NR Band n48



Plot 7-65. Radiated Spurious Plot-Below 1 GHz (UL-MIMO NR Band n48)

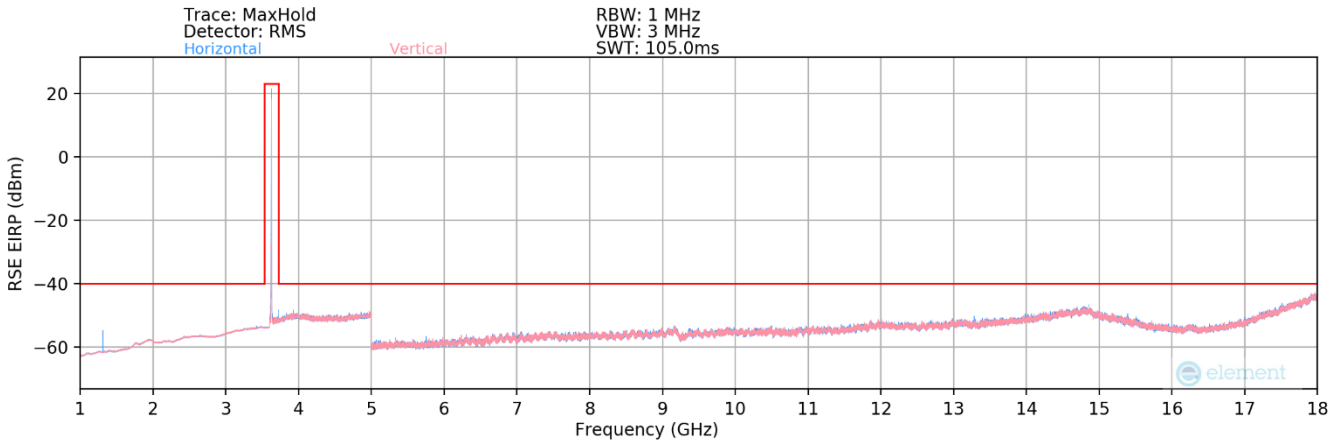
Bandwidth (MHz):	10
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1/12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
95.00	H	169	183	-93.85	15.72	28.87	-68.54	-40.00	-28.54
99.00	H	154	41	-87.96	17.09	36.13	-61.28	-40.00	-21.28
102.00	H	-	-	-97.49	17.79	27.30	-70.10	-40.00	-30.10
443.00	H	-	-	-96.89	24.56	34.67	-62.73	-40.00	-22.73

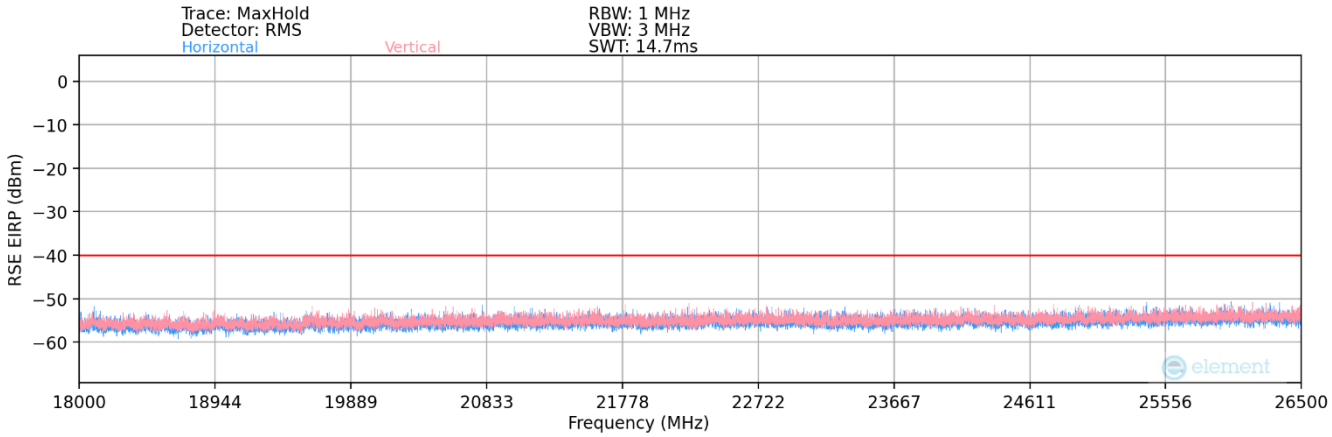
Table 7-8. Radiated Spurious Data (UL-MIMO NR Band n48)

© 2023 ELEMENT V11.0 9/14/2022

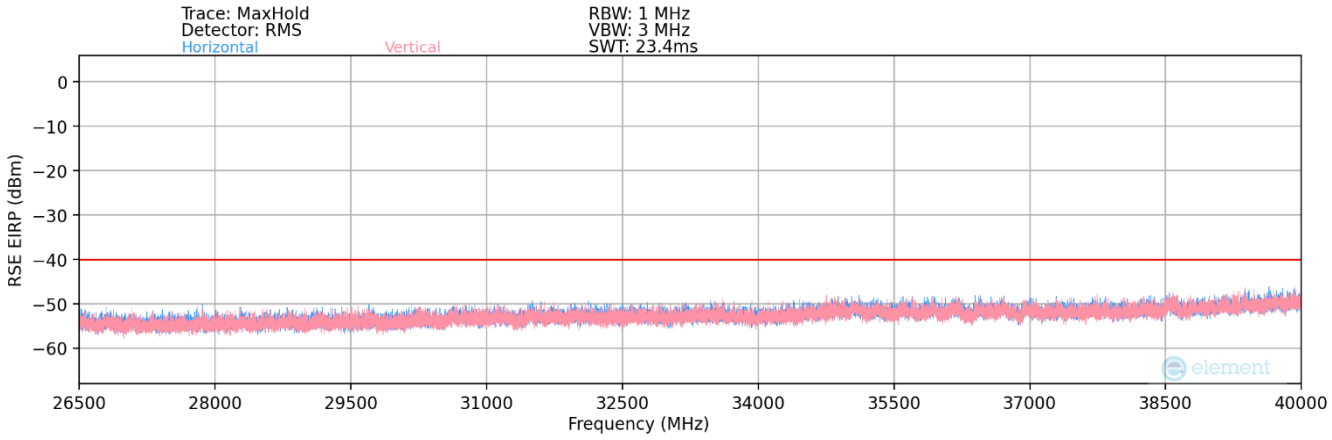
Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.



Plot 7-66. Radiated Spurious Plot Above 1GHz (UL-MIMO NR Band n48)



Plot 7-67. Radiated Spurious Plot Above 18GHz (UL-MIMO NR Band n48)



Plot 7-68. Radiated Spurious Plot Above 26.5GHz (UL-MIMO NR Band n48)

© 2023 ELEMENT V11.0 9/14/2022

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

Bandwidth (MHz):	10
Frequency (MHz):	3555.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1/12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7110.00	V	-	-	-74.42	3.80	36.38	-58.88	-40.00	-18.88
10665.00	V	312	295	-72.59	7.82	42.23	-53.03	-40.00	-13.03
14220.00	V	399	95	-72.41	12.23	46.82	-48.44	-40.00	-8.44
17775.00	V	-	-	-75.09	15.47	47.38	-47.87	-40.00	-7.87
21330.00	V	-	-	-58.90	4.04	52.14	-52.66	-40.00	-12.66
24885.00	V	-	-	-58.97	4.19	52.23	-52.57	-40.00	-12.57

Table 7-9. Radiated Spurious Data (UL-MIMO NR Band n48– Low Channel)

Bandwidth (MHz):	10
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1/12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7250.00	V	-	-	-73.48	3.66	37.18	-58.08	-40.00	-18.08
10875.00	V	322	301	-71.88	8.06	43.18	-52.08	-40.00	-12.08
14500.00	V	366	84	-74.72	13.05	45.33	-49.93	-40.00	-9.93
18125.00	V	-	-	-57.84	1.60	50.76	-54.04	-40.00	-14.04
21750.00	V	-	-	-58.25	3.86	52.61	-52.19	-40.00	-12.19
25375.00	V	-	-	-57.95	4.26	53.31	-51.49	-40.00	-11.49

Table 7-10. Radiated Spurious Data (UL-MIMO NR Band n48– Mid Channel)

Bandwidth (MHz):	10
Frequency (MHz):	3695.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1/12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7390.00	V	-	-	-74.48	4.27	36.79	-58.47	-40.00	-18.47
11085.00	V	380	317	-70.49	8.18	44.69	-50.57	-40.00	-10.57
14780.00	V	390	149	-75.40	13.43	45.03	-50.23	-40.00	-10.23
18475.00	V	-	-	-56.07	1.86	52.79	-52.01	-40.00	-12.01
22170.00	V	-	-	-57.27	3.80	53.52	-51.28	-40.00	-11.28
25865.00	V	-	-	-58.09	4.64	53.55	-51.25	-40.00	-11.25

Table 7-11. Radiated Spurious Data (UL-MIMO NR Band n48– High Channel)

© 2023 ELEMENT V11.0 9/14/2022

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Telit Module FCC ID: RI7FN990A28** complies with all of the End User Device requirements of Part 96 of the FCC Rules for NR operation only.

© 2023 ELEMENT V11.0 9/14/2022

Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from Element. If you have any questions about this or have an inquiry about obtaining additional rights to this report or assembly of contents thereof, please contact ct.info@element.com.