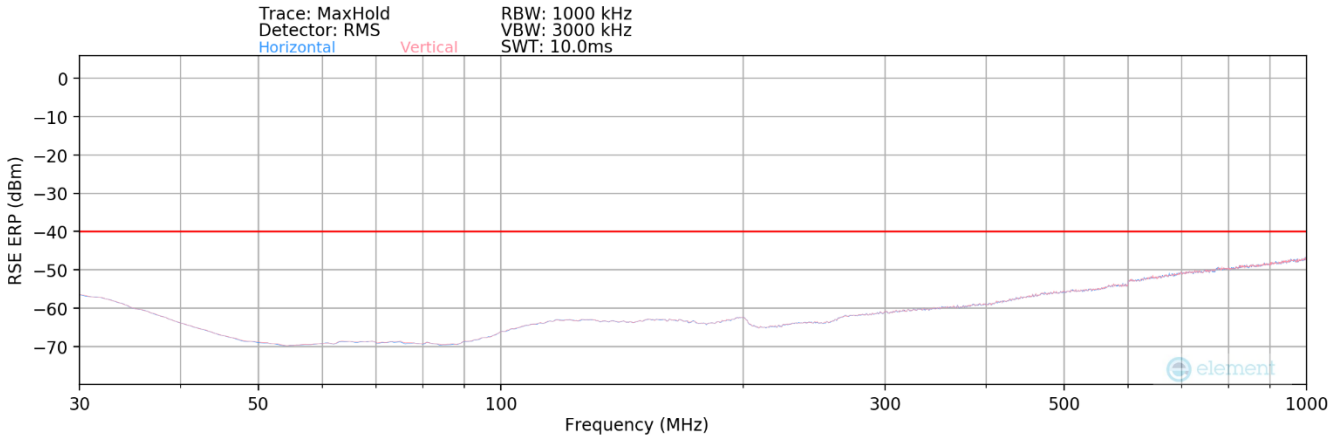
NR Band n48 - Ant 3

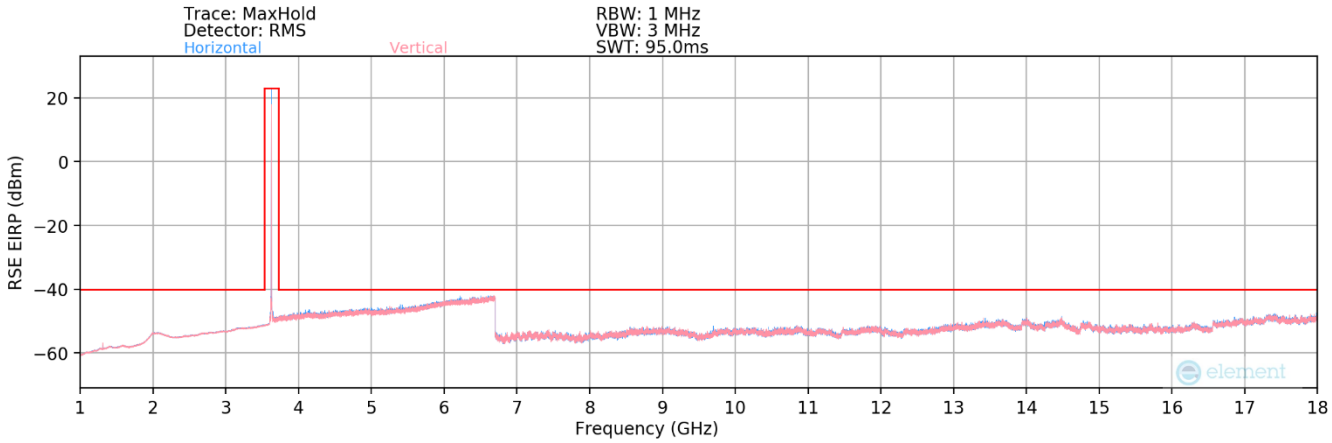


Plot 7-123. Radiated Spurious Plot (NR Band n48 – Below 1GHz)

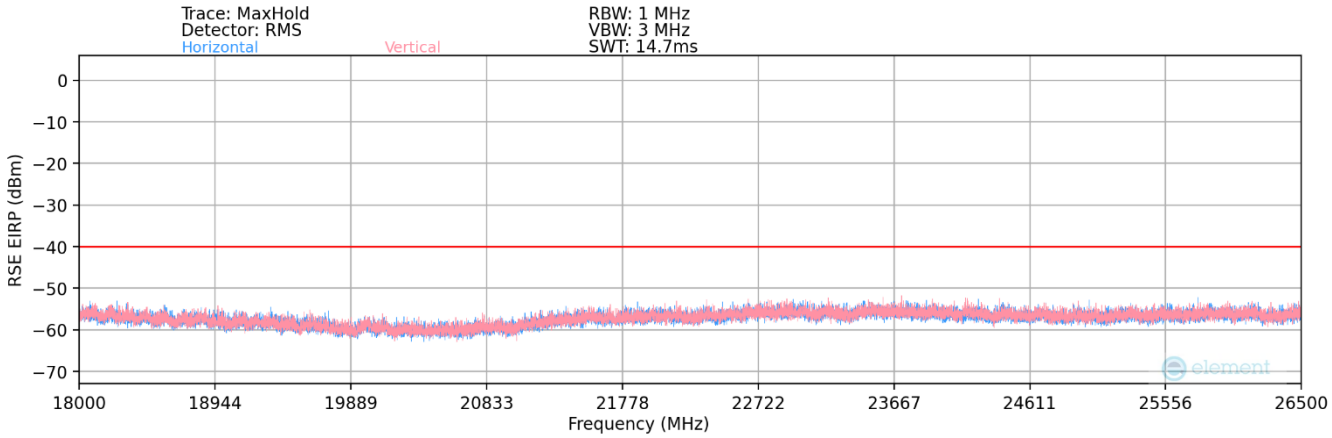
Bandwidth (MHz):	40
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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]
748.52	V	-	-	-89.50	29.42	46.92	-50.49	-40.00	-10.49

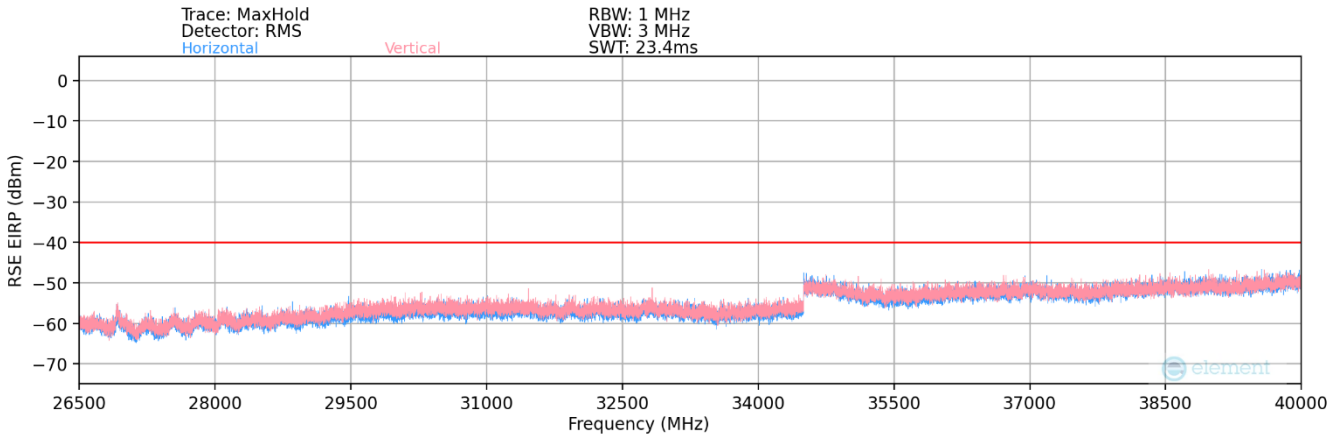
Table 7-53. Radiated Spurious Data (NR Band n48 – Mid Channel)



Plot 7-124. Radiated Spurious Plot (NR Band n48 – 1GHz - 18GHz)



Plot 7-125. Radiated Spurious Plot (NR Band n48 – 18GHz - 26.5GHz)



Plot 7-126. Radiated Spurious Plot (NR Band n48 – 26GHz - 40GHz)

Bandwidth (MHz):	40
Frequency (MHz):	3570.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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]
7140.00	V	-	-	-76.99	9.87	39.88	-55.38	-40.00	-15.38
10710.00	V	-	-	-78.89	13.13	41.24	-54.02	-40.00	-14.02
14280.00	V	-	-	-78.88	15.68	43.80	-51.45	-40.00	-11.45

Table 7-54. Radiated Spurious Data (NR Band n48 – Low Channel)

Bandwidth (MHz):	40
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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	-	-	-76.14	9.58	40.44	-54.81	-40.00	-14.81
10875.00	V	-	-	-77.81	12.84	42.03	-53.23	-40.00	-13.23
14500.00	V	-	-	-78.23	15.45	44.22	-51.04	-40.00	-11.04

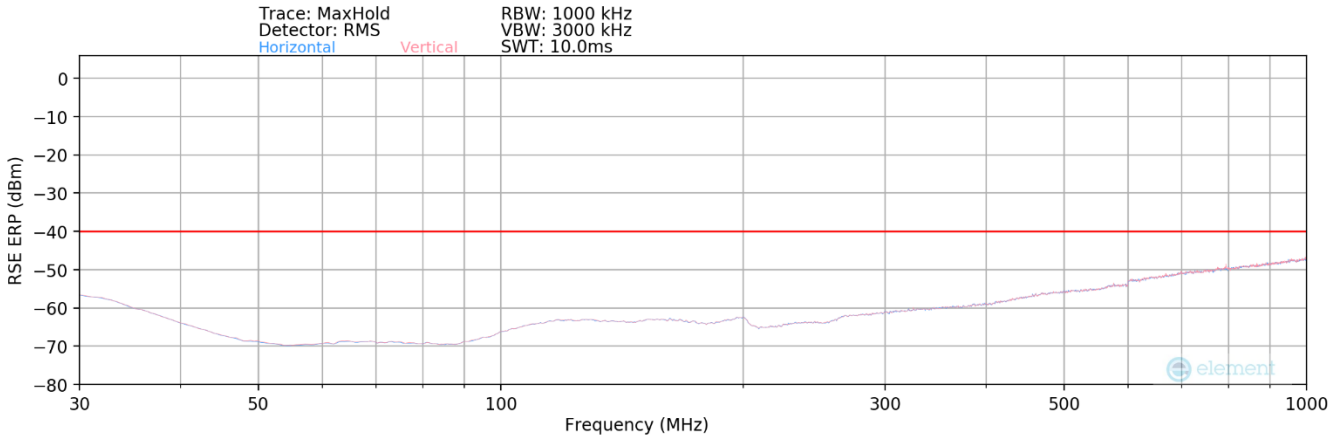
Table 7-55. Radiated Spurious Data (NR Band n48 – Mid Channel)

Bandwidth (MHz):	40
Frequency (MHz):	3680.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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]
7360.00	V	-	-	-76.44	9.38	39.94	-55.32	-40.00	-15.32
11040.00	V	-	-	-77.35	12.64	42.29	-52.97	-40.00	-12.97
14720.00	V	-	-	-79.36	15.02	42.66	-52.60	-40.00	-12.60

Table 7-56. Radiated Spurious Data (NR Band n48 – High Channel)

NR Band n48 - Ant 5

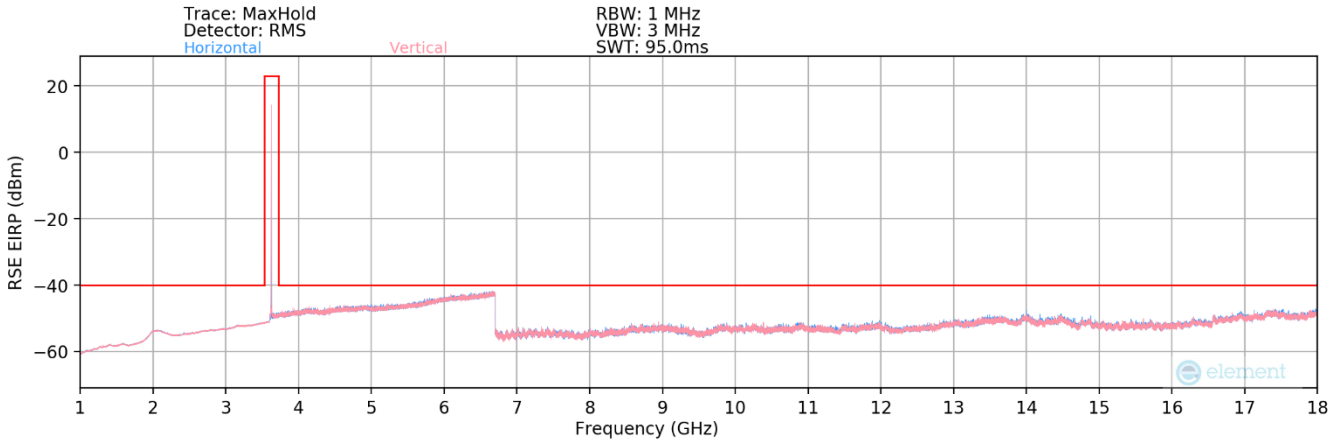


Plot 7-127. Radiated Spurious Plot (NR Band n48 – Below 1GHz)

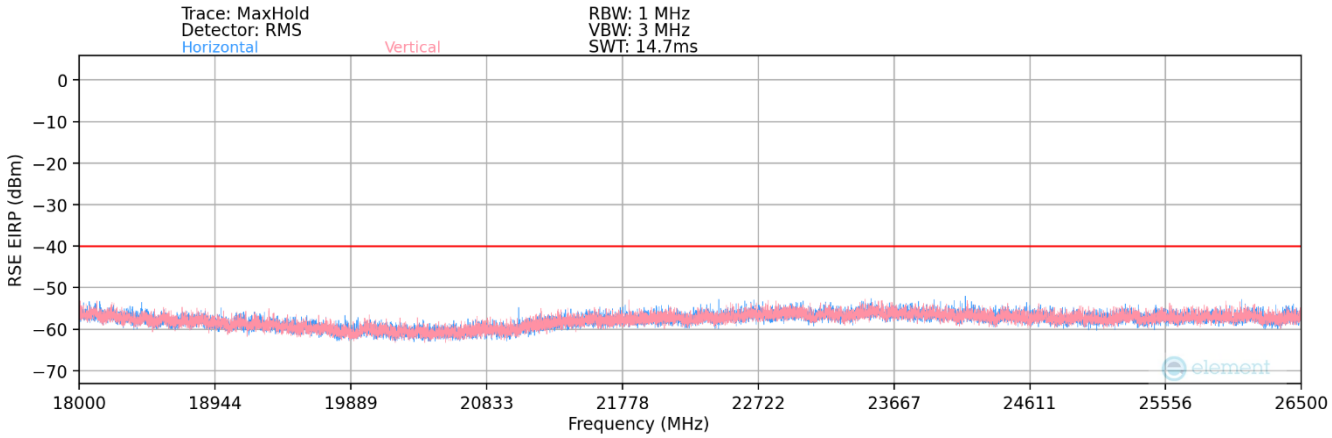
Bandwidth (MHz):	40
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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]
966.05	H	-	-	-89.12	31.93	49.81	-47.60	-40.00	-7.60

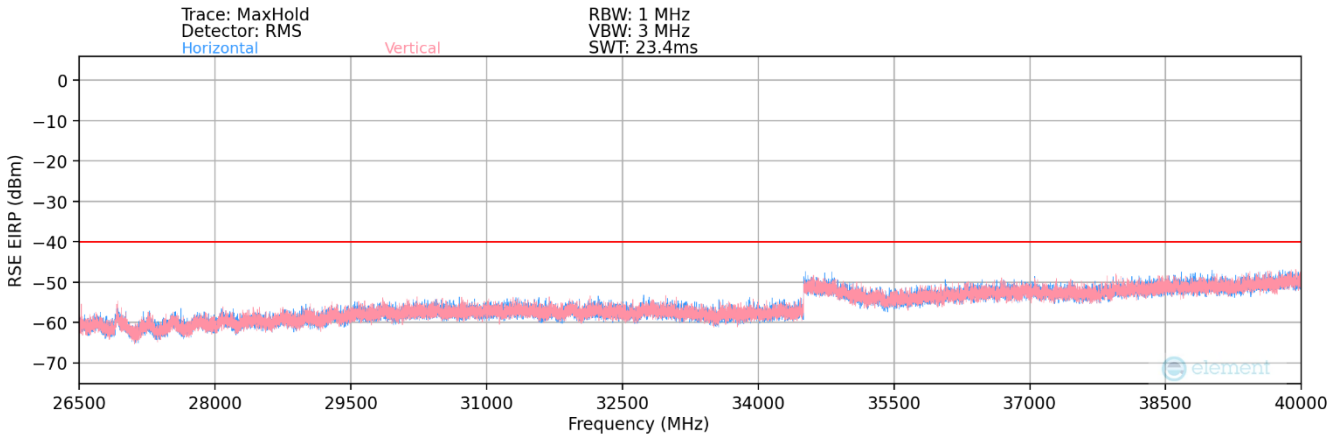
Table 7-57. Radiated Spurious Data (NR Band n48 – Mid Channel)



Plot 7-128. Radiated Spurious Plot (NR Band n48 – 1GHz - 18GHz)



Plot 7-129. Radiated Spurious Plot (NR Band n48 – 18GHz - 26.5GHz)



Plot 7-130. Radiated Spurious Plot (NR Band n48 – 26GHz - 40GHz)

Bandwidth (MHz):	40
Frequency (MHz):	3570.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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]
7140.00	H	-	-	-74.32	9.87	42.55	-52.71	-40.00	-12.71
10710.00	H	-	-	-75.54	13.13	44.59	-50.67	-40.00	-10.67
14280.00	H	-	-	-74.75	15.68	47.93	-47.32	-40.00	-7.32

Table 7-58. Radiated Spurious Data (NR Band n48 – Low Channel)

Bandwidth (MHz):	40
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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	179	75	-72.39	9.58	44.19	-51.06	-40.00	-11.06
10875.00	H	-	-	-75.13	12.84	44.71	-50.55	-40.00	-10.55
14500.00	H	-	-	-74.80	15.45	47.65	-47.61	-40.00	-7.61

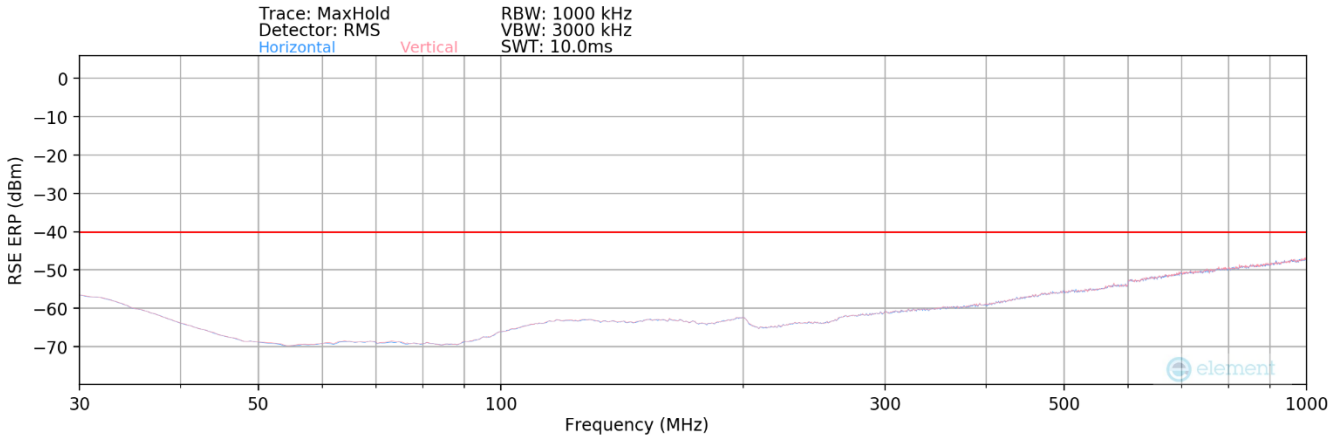
Table 7-59. Radiated Spurious Data (NR Band n48 – Mid Channel)

Bandwidth (MHz):	40
Frequency (MHz):	3680.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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]
7360.00	H	-	-	-74.08	9.38	42.30	-52.96	-40.00	-12.96
11040.00	H	-	-	-74.99	12.64	44.65	-50.61	-40.00	-10.61
14720.00	H	-	-	-75.40	15.02	46.62	-48.64	-40.00	-8.64

Table 7-60. Radiated Spurious Data (NR Band n48 – High Channel)

NR Band n48 - Ant 8

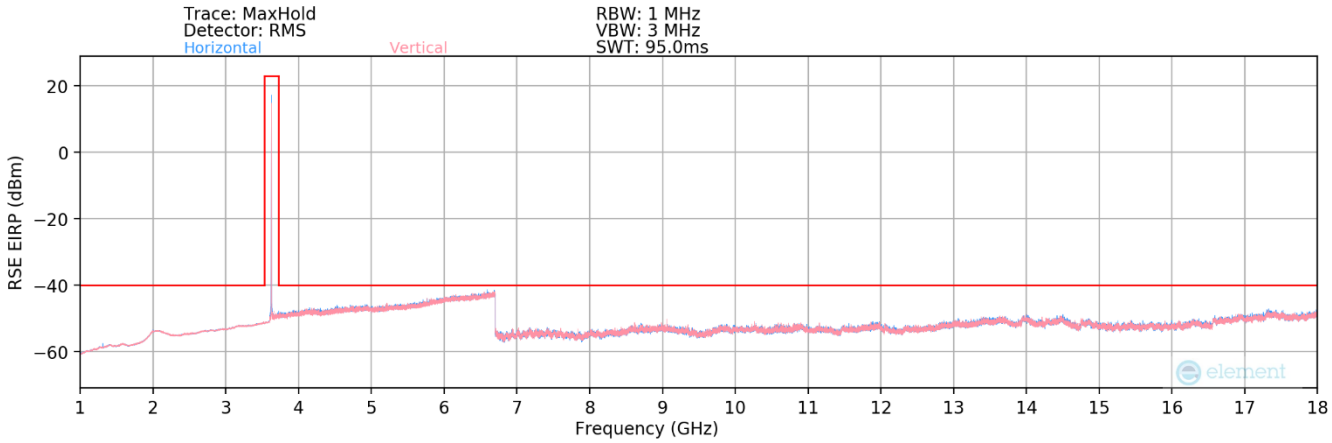


Plot 7-131. Radiated Spurious Plot (NR Band n48 – Below 1GHz)

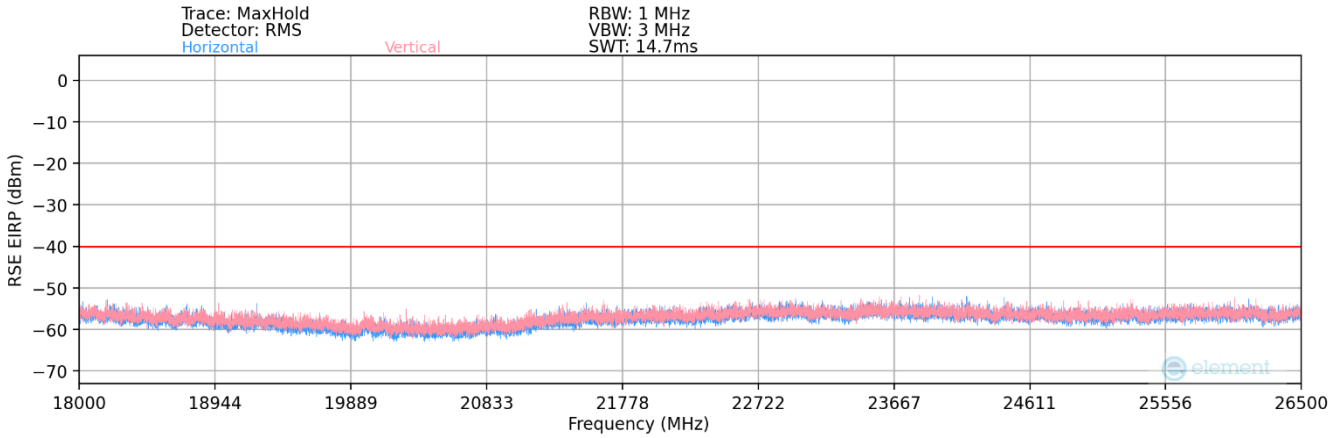
Bandwidth (MHz):	40
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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]
961.10	H	-	-	-89.37	31.93	49.56	-47.85	-40.00	-7.85

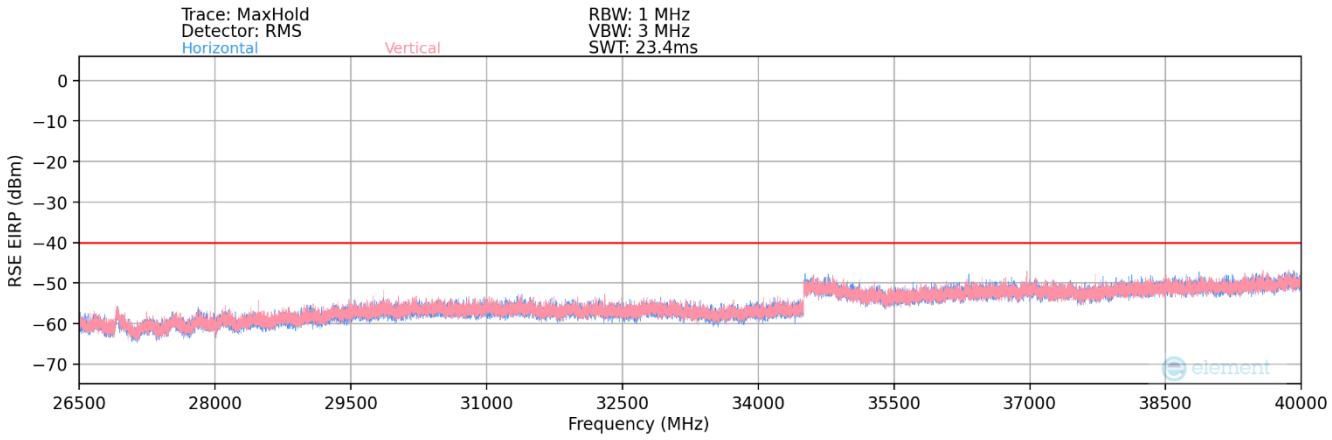
Table 7-61. Radiated Spurious Data (NR Band n48 – Mid Channel)



Plot 7-132. Radiated Spurious Plot (NR Band n48 – 1GHz - 18GHz)



Plot 7-133. Radiated Spurious Plot (NR Band n48 – 18GHz - 26.5GHz)



Plot 7-134. Radiated Spurious Plot (NR Band n48 – 26GHz - 40GHz)

Bandwidth (MHz):	40
Frequency (MHz):	3570.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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]
7140.00	H	-	-	-76.91	9.87	39.96	-55.30	-40.00	-15.30
10710.00	H	-	-	-78.45	13.13	41.68	-53.58	-40.00	-13.58
14280.00	H	-	-	-79.07	15.68	43.61	-51.64	-40.00	-11.64

Table 7-62. Radiated Spurious Data (NR Band n48 – Low Channel)

Bandwidth (MHz):	40
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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	-	-	-76.22	9.58	40.36	-54.89	-40.00	-14.89
10875.00	H	-	-	-78.19	12.84	41.65	-53.61	-40.00	-13.61
14500.00	H	-	-	-78.55	15.45	43.90	-51.36	-40.00	-11.36

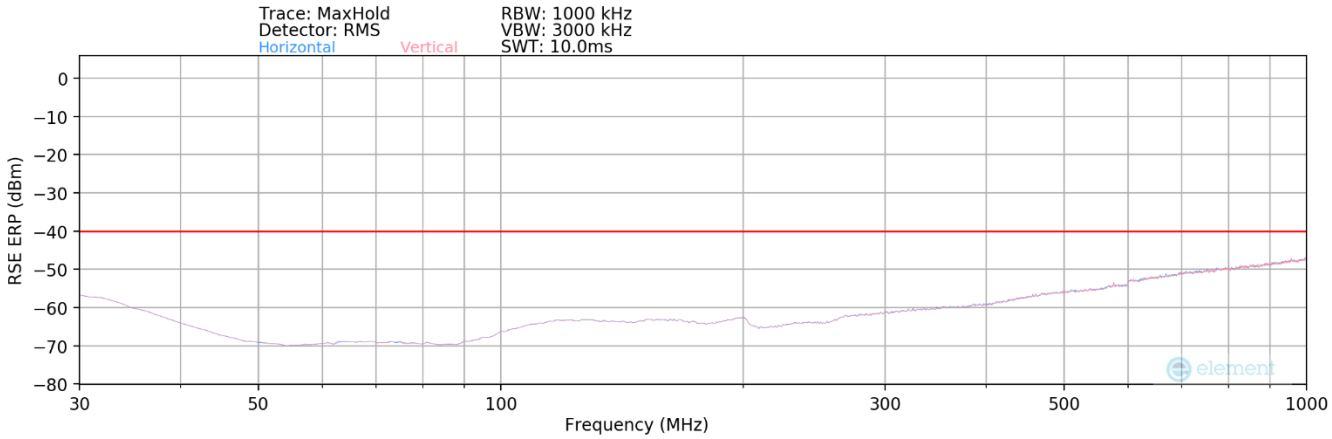
Table 7-63. Radiated Spurious Data (NR Band n48 – Mid Channel)

Bandwidth (MHz):	40
Frequency (MHz):	3680.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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]
7360.00	H	-	-	-76.47	9.38	39.91	-55.35	-40.00	-15.35
11040.00	H	-	-	-77.66	12.64	41.98	-53.28	-40.00	-13.28
14720.00	H	-	-	-79.24	15.02	42.78	-52.48	-40.00	-12.48

Table 7-64. Radiated Spurious Data (NR Band n48 – High Channel)

UL-MIMO NR Band n48

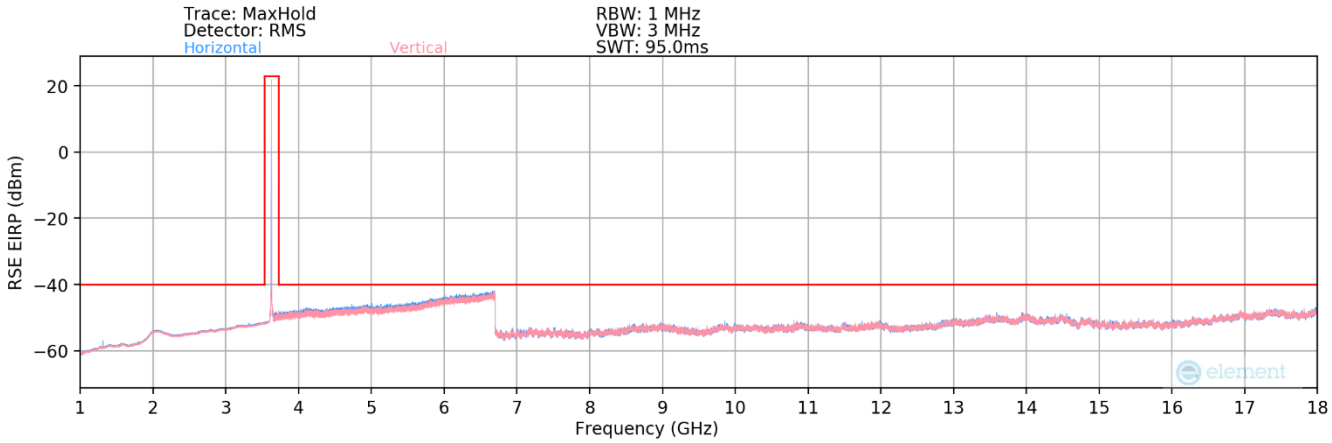


Plot 7-135. Radiated Spurious Plot (NR Band n48 – Below 1GHz)

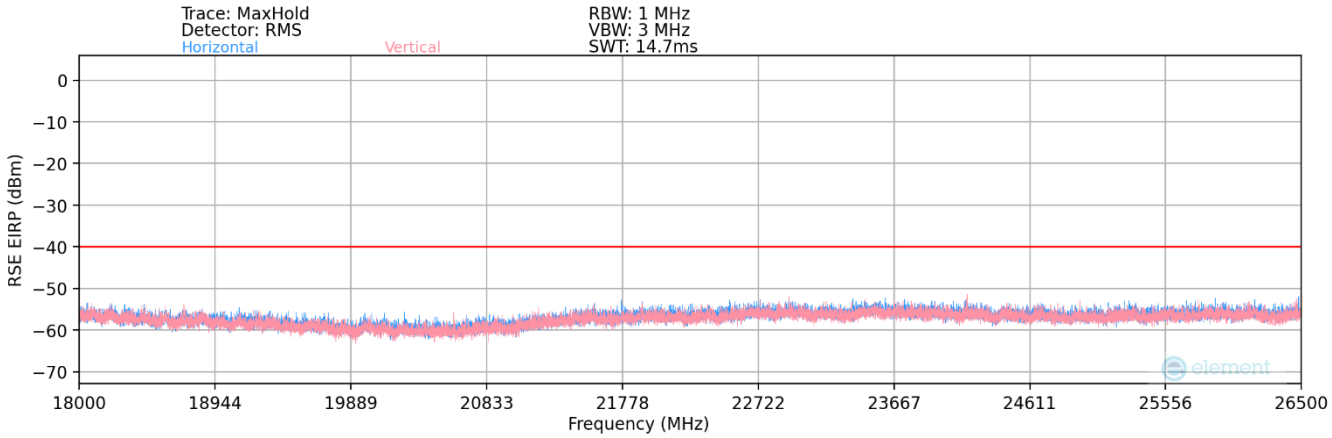
Bandwidth (MHz):	40
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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]
776.42	V	-	-	-90.29	29.72	46.43	-50.98	-40.00	-10.98

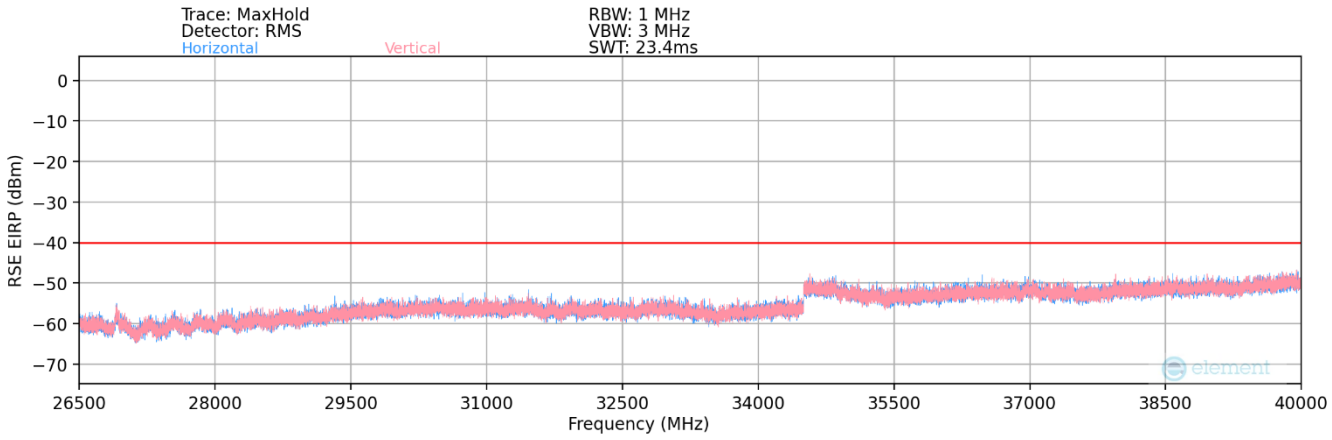
Table 7-65. Radiated Spurious Data (NR Band n48 – Mid Channel)



Plot 7-136. Radiated Spurious Plot (NR Band n48 – 1GHz - 18GHz)



Plot 7-137. Radiated Spurious Plot (NR Band n48 – 18GHz - 26.5GHz)



Plot 7-138. Radiated Spurious Plot (NR Band n48 – 26GHz - 40GHz)

Bandwidth (MHz):	40
Frequency (MHz):	3570.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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]
7140.00	V	-	-	-76.79	9.87	40.08	-55.18	-40.00	-15.18
10710.00	V	-	-	-78.69	13.13	41.44	-53.82	-40.00	-13.82
14280.00	V	-	-	-78.13	15.68	44.55	-50.70	-40.00	-10.70

Table 7-66. Radiated Spurious Data (NR Band n48 – Low Channel)

Bandwidth (MHz):	40
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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	-	-	-75.84	9.58	40.74	-54.51	-40.00	-14.51
10875.00	V	-	-	-78.17	12.84	41.67	-53.59	-40.00	-13.59
14500.00	V	-	-	-78.25	15.45	44.20	-51.06	-40.00	-11.06

Table 7-67. Radiated Spurious Data (NR Band n48 – Mid Channel)

Bandwidth (MHz):	40
Frequency (MHz):	3680.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 53

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]
7360.00	V	-	-	-76.60	9.95	40.35	-54.91	-40.00	-14.91
11040.00	V	-	-	-77.36	12.53	42.17	-53.09	-40.00	-13.09
14720.00	V	215	234	-77.27	15.05	44.78	-50.48	-40.00	-10.48

Table 7-68. Radiated Spurious Data (NR Band n48 – High Channel)

7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015. The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 96, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI C63.26-2015 – Section 5.6

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

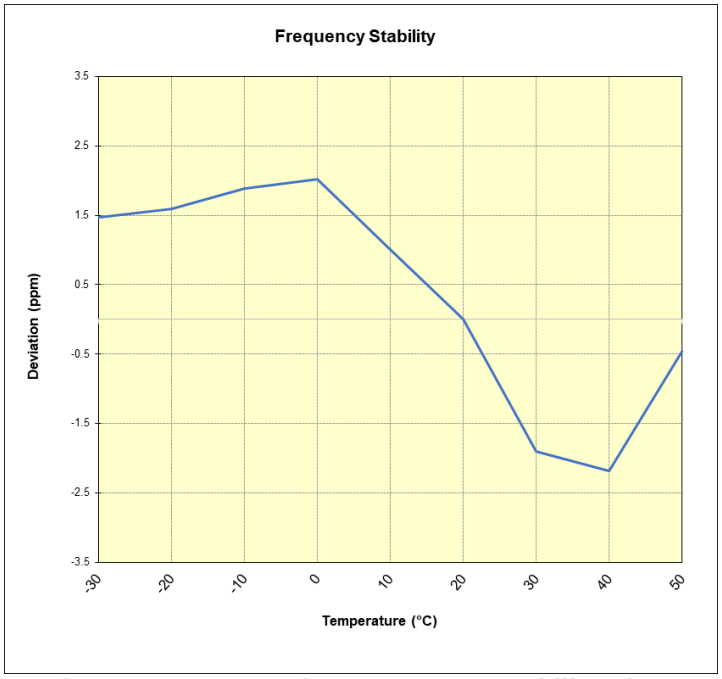
None

LTE Band 48

Operating Frequency (Hz):	3,625,000,000
Ref. Voltage (VDC):	8.8

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	8.8	- 30	3,625,010,654	5,323	0.0001469
		- 20	3,625,011,084	5,753	0.0001587
		- 10	3,625,012,180	6,849	0.0001889
		0	3,625,012,664	7,333	0.0002023
		+ 10	3,625,008,974	3,643	0.0001005
		+ 20 (Ref)	3,625,005,331	0	0.0000000
		+ 30	3,624,998,438	-6,893	-0.0001901
		+ 40	3,624,997,402	-7,929	-0.0002187
		+ 50	3,625,003,682	-1,649	-0.0000455
Battery Endpoint	6.00	+ 20	3,625,003,170	-2,161	-0.0000596

Table 7-69. LTE Band 48 Frequency Stability Data



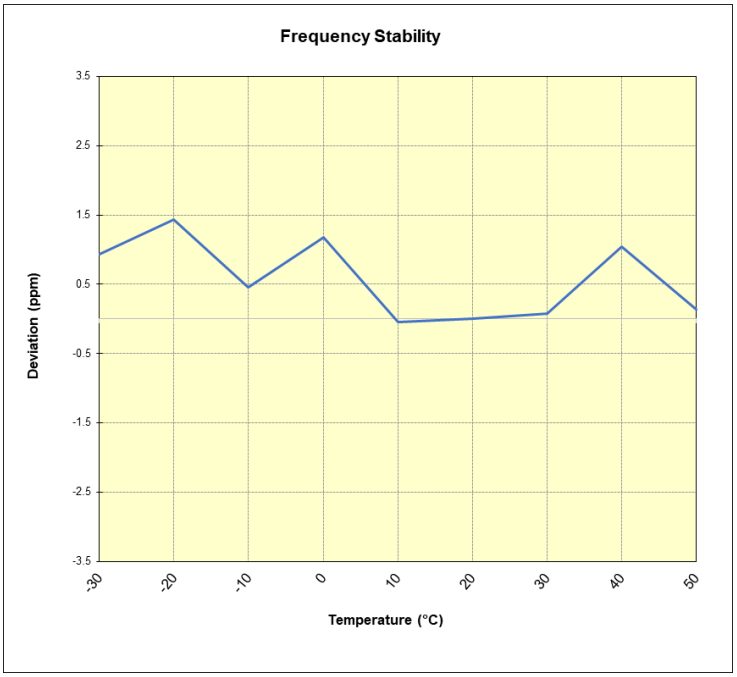
Plot 7-139. LTE Band 48 Frequency Stability Chart

NR Band n48

Operating Frequency (Hz):	3,625,000,000
Ref. Voltage (VDC):	8.8

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	8.8	- 30	3,625,170,466	3,378	0.0000932
		- 20	3,625,172,310	5,221	0.0001440
		- 10	3,625,168,767	1,678	0.0000463
		0	3,625,171,342	4,253	0.0001173
		+ 10	3,625,166,938	-151	-0.0000042
		+ 20 (Ref)	3,625,167,089	0	0.0000000
		+ 30	3,625,167,370	282	0.0000078
		+ 40	3,625,170,853	3,765	0.0001038
		+ 50	3,625,167,602	513	0.0000142
Battery Endpoint	6.00	+ 20	3,625,166,074	-1,015	-0.0000280

Table 7-70. NR Band n48 Frequency Stability Data



Plot 7-140. NR Band n48 Frequency Stability Chart

7.9 End User Device Additional Requirement (CBSD Protocol)

Test Overview and Limit

End user device additional requirements (CBSD Protocol) are tested per the test procedures listed below. During testing, the EUT is connected to a certified LTE CBSD (Ruckus FCC ID: S9GQ910US00) or to a certified NR CBSD (FCC ID: PIDAV2700) as a companion device to show compliance with Part 96.47.

End User Devices may operate only if they can positively receive and decode an authorization signal transmitted by a CBSD, including the frequencies and power limits for their operation.

An End User Device must discontinue operations, change frequencies, or change its operational power level within 10 seconds of receiving instructions from its associated CBSD.

Test Procedure Used

KDB 940660 D01 v03, WINNF-18-IN-00178 v1.0.0.00

Test Setup/Method

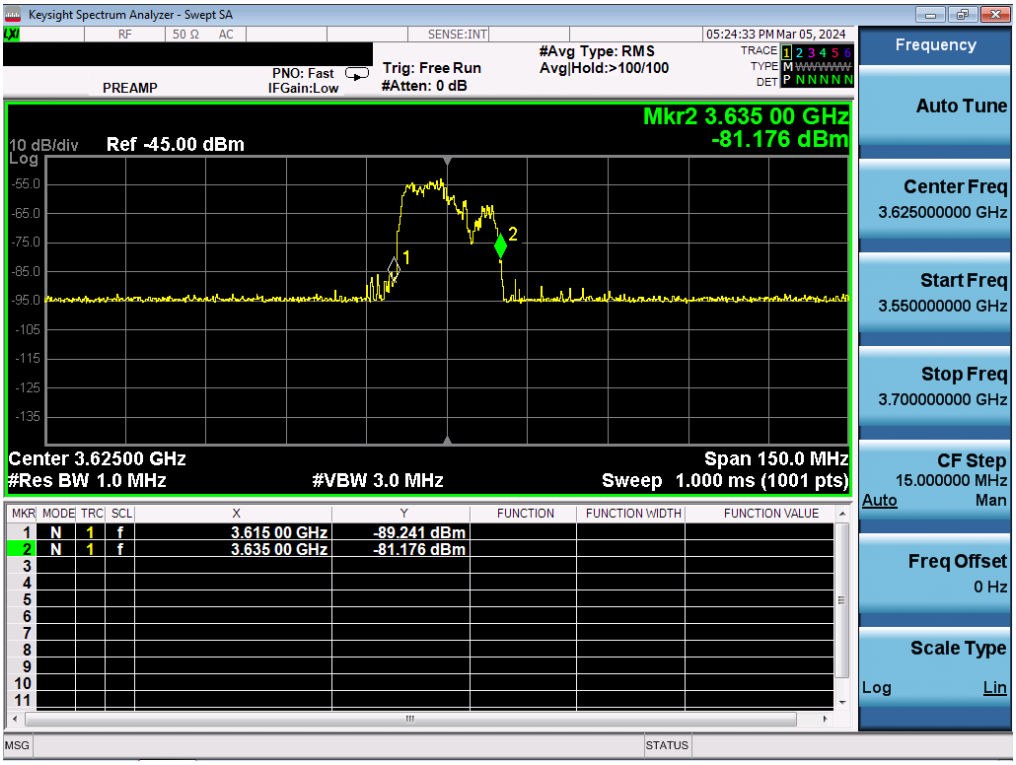
The EUT was connected via an RF cable to a certified CBSD and spectrum analyzer. The following procedure is performed by applying WINNF-TS-0122 CBRS CBSD Test Specification.

1. Run#1:
    a. Setup WINNF.PT.C.HBT.1 with 3615MHz – 3635MHz.
    b. Enable AP service from Ruckus Cloud management.
    c. Check EUT Tx frequency.
    d. Disable AP service from Ruckus Cloud management and check EUT stop transmission within 10s.
2. Run#2:
    a. Setup WINNF.PT.C.HBT.1 with 3660MHz – 3680MHz.
    b. Enable AP service from Ruckus Cloud management.
    c. Check EUT Tx frequency.
    d. Disable AP service from Ruckus Cloud management and check EUT stop transmission within 10s.

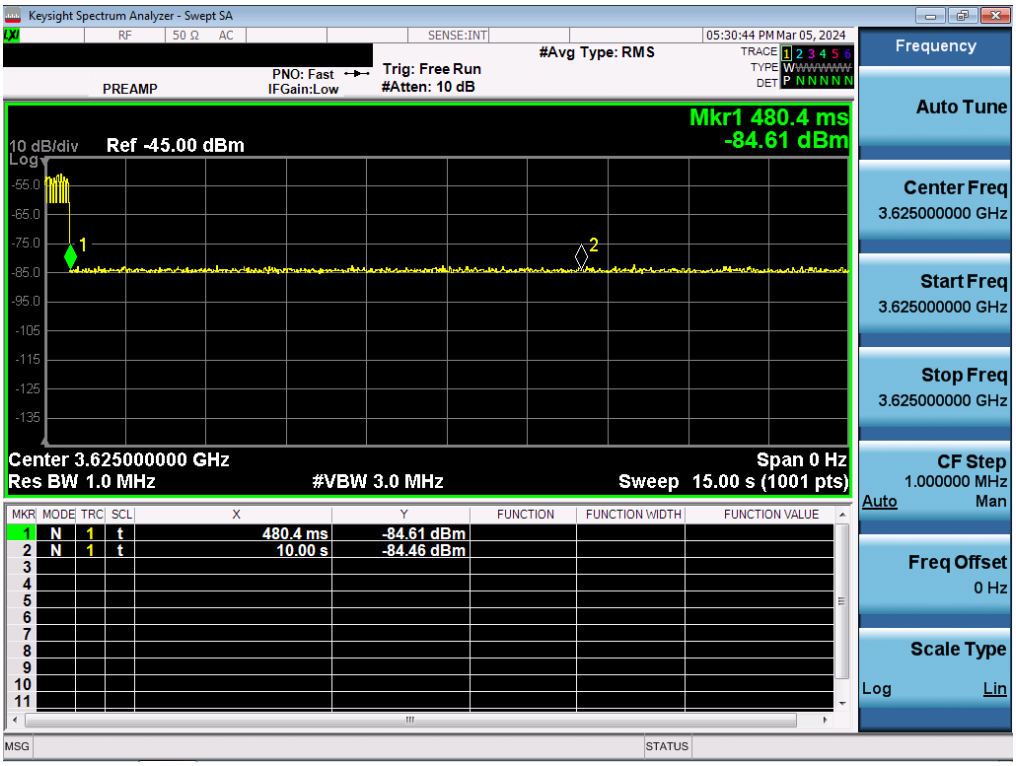
Test Notes

The EUT is an End User Device.

Run#1:



Plot 7-141. Run#1 End User Device Frequency of Operations

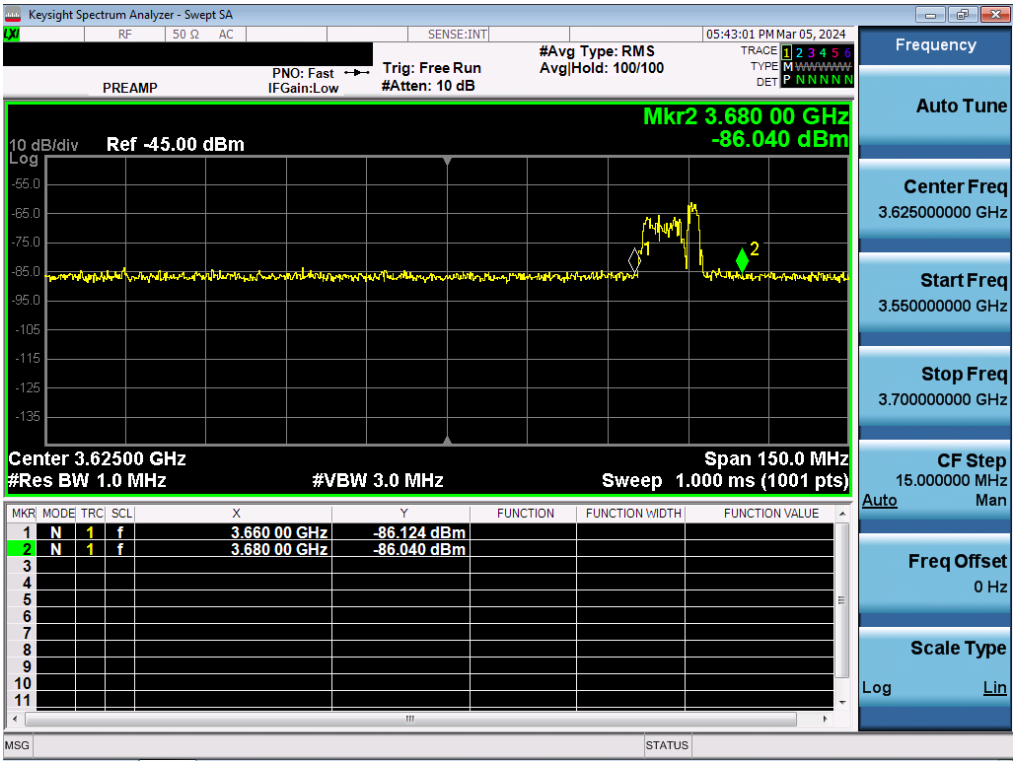


Plot 7-142. Run#1 End User Device Discontinues Operations within 10s

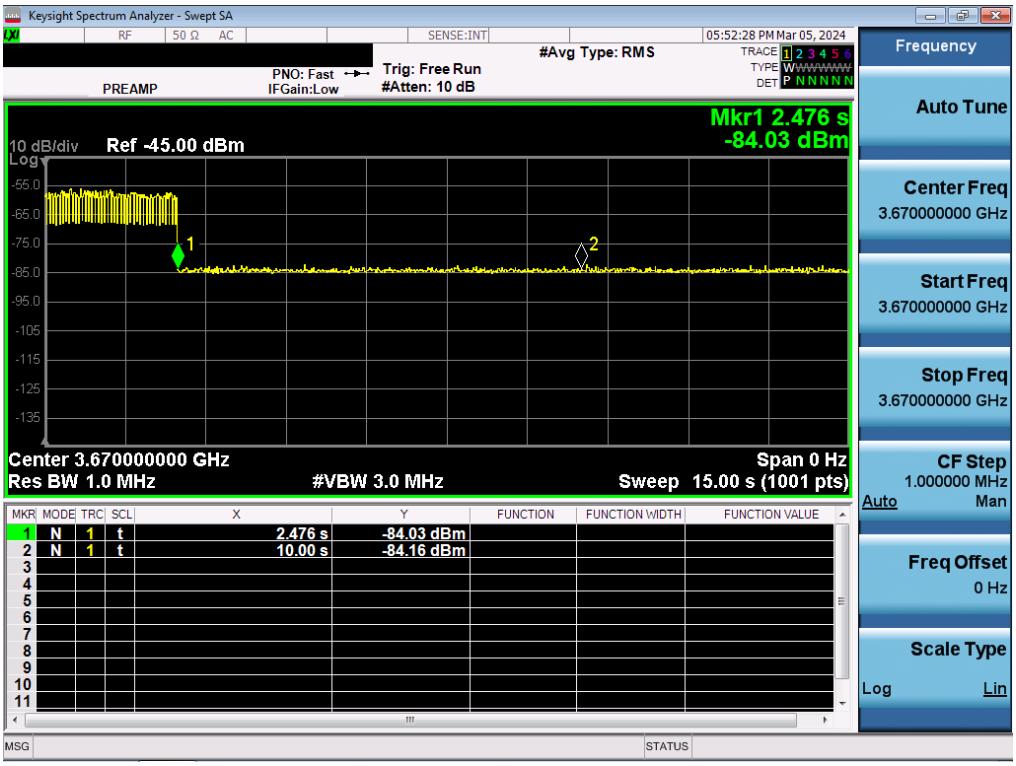
Note:

Marker 1: CBSD sends instructions to discontinue LTE operations.
Marker 2: EUT discontinues operation.
Marker 3: 10 seconds elapsed time from CBSD sending instructions to EUT.

Run#2:



Plot 7-143. Run#2 End User Device Frequency of Operations



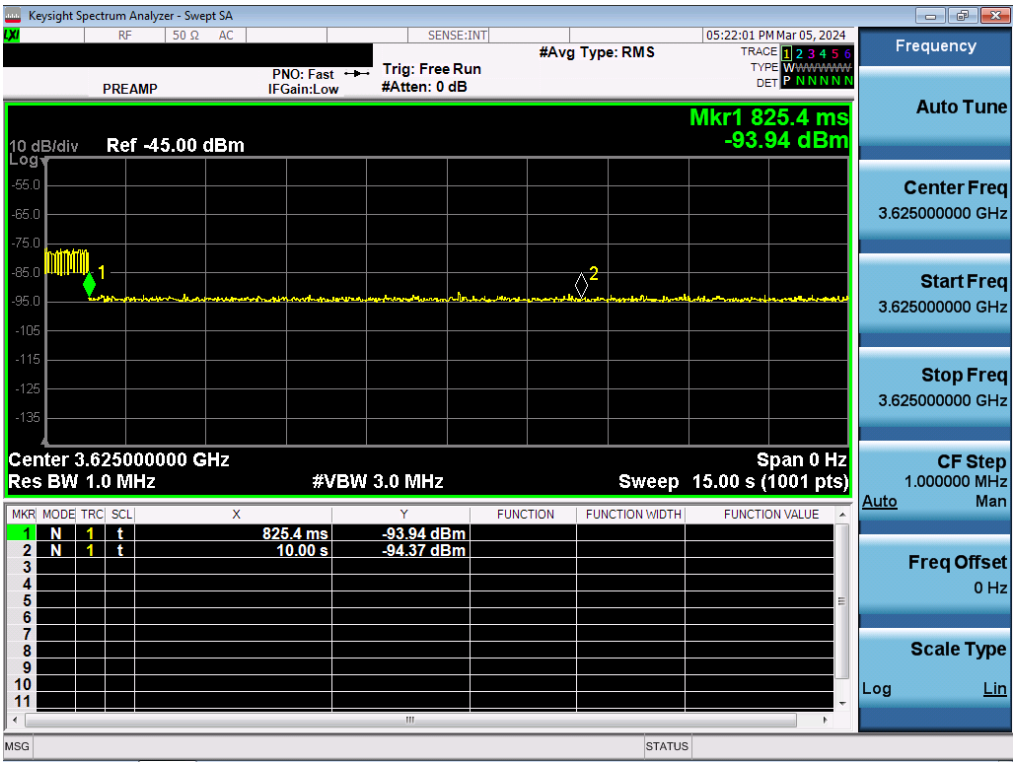
Plot 7-144. Run#2 End User Device Discontinues Operations within 10s

Note:

Marker 1: CBSD sends instructions to discontinue LTE operations.
Marker 2: EUT discontinues operation.
Marker 3: 10 seconds elapsed time from CBSD sending instructions to EUT.

Run#1: NR Band n48

Plot 7-145. Run#1 End User Device Frequency of Operations

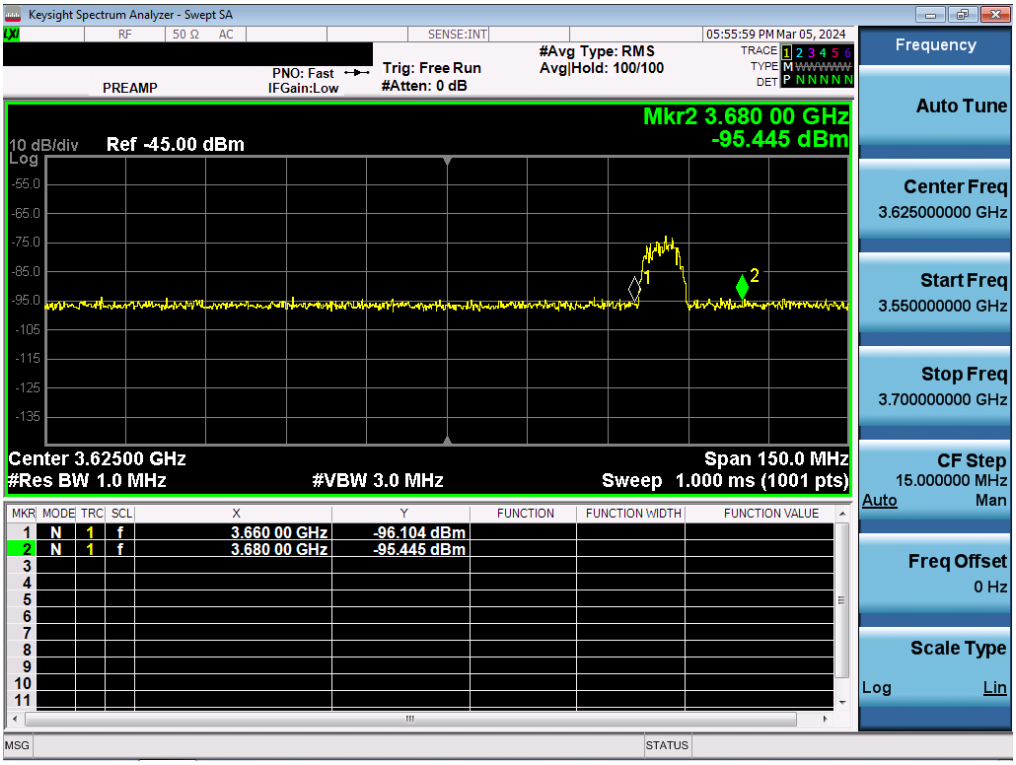


Plot 7-146. Run#1 End User Device Discontinues Operations within 10s

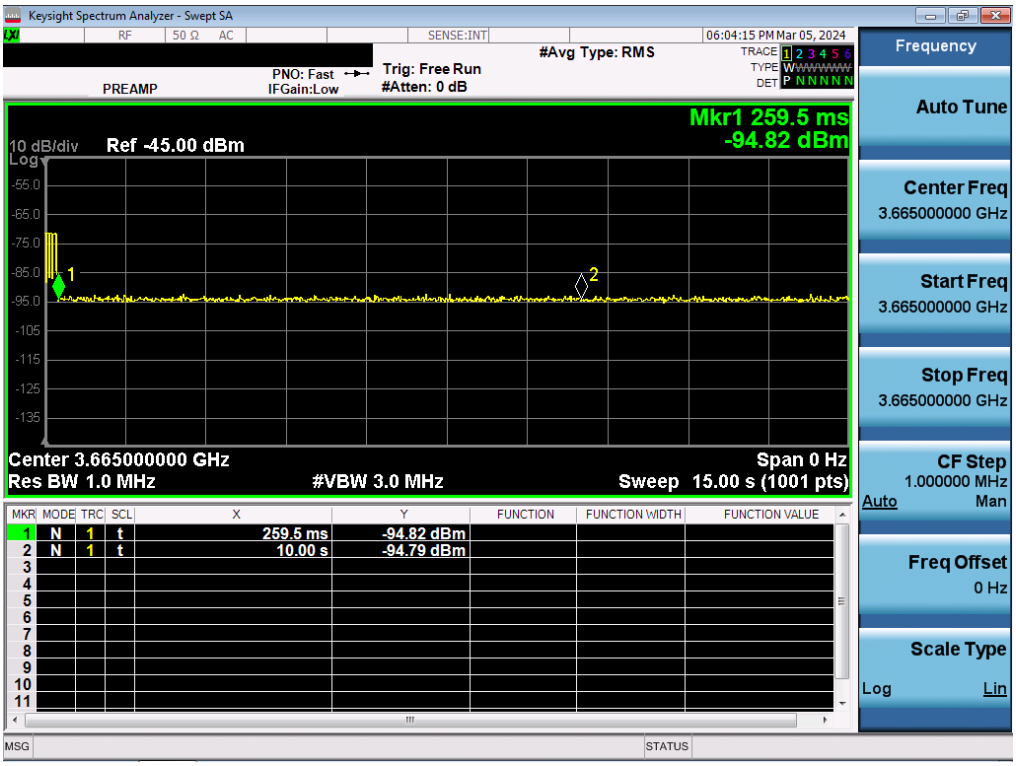
Note:

Marker 1: CBSD sends instructions to discontinue NR operations.
Marker 2: EUT discontinues operation.
Marker 3: 10 seconds elapsed time from CBSD sending instructions to EUT.

Run#2:



Plot 7-147. Run#2 End User Device Frequency of Operations



Plot 7-148. Run#2 End User Device Discontinues Operations within 10s

Note:

Marker 1: CBSD sends instructions to discontinue NR operations.
Marker 2: EUT discontinues operation.
Marker 3: 10 seconds elapsed time from CBSD sending instructions to EUT.

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Microsoft Corporation Portable Computing Device FCC ID: C3K2077** complies with all of the End User Device requirements of Part 96 of the FCC Rules.