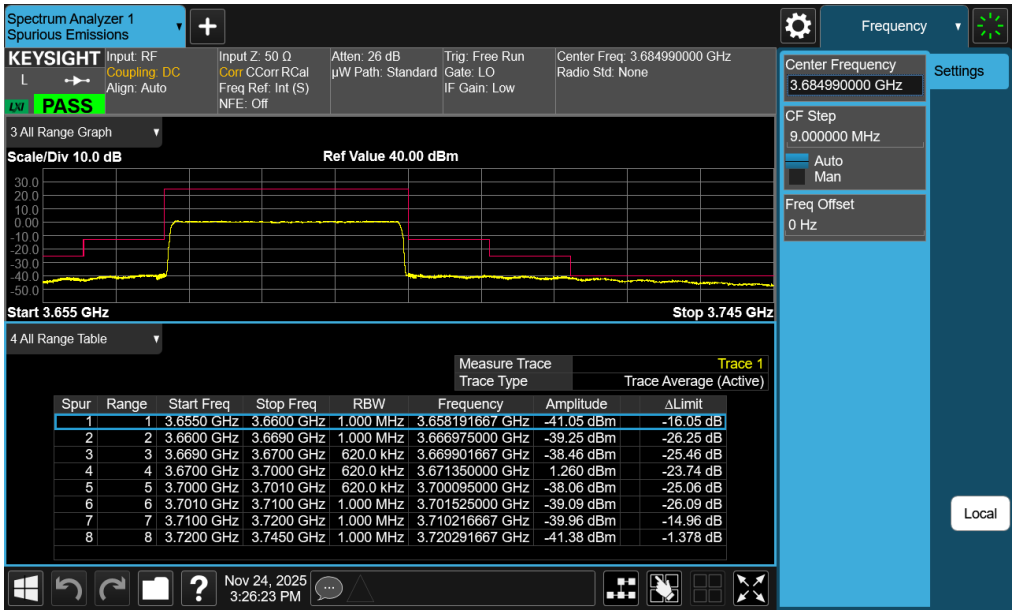


Plot 7-52. Channel Edge Plot (NR Band n48 - 30MHz DFT-s-OFDM-BPSK - High Channel - Ant F)

7.6 Radiated Power (EIRP)

Test Overview

Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI C63.26:2015 with the EUT transmitting into an integral antenna. Measurements are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

ANSI C63.26:2015 – Section 5.2.4.4

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration.
8. The integration bandwidth was set equal to 10MHz. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize.

Test Setup

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

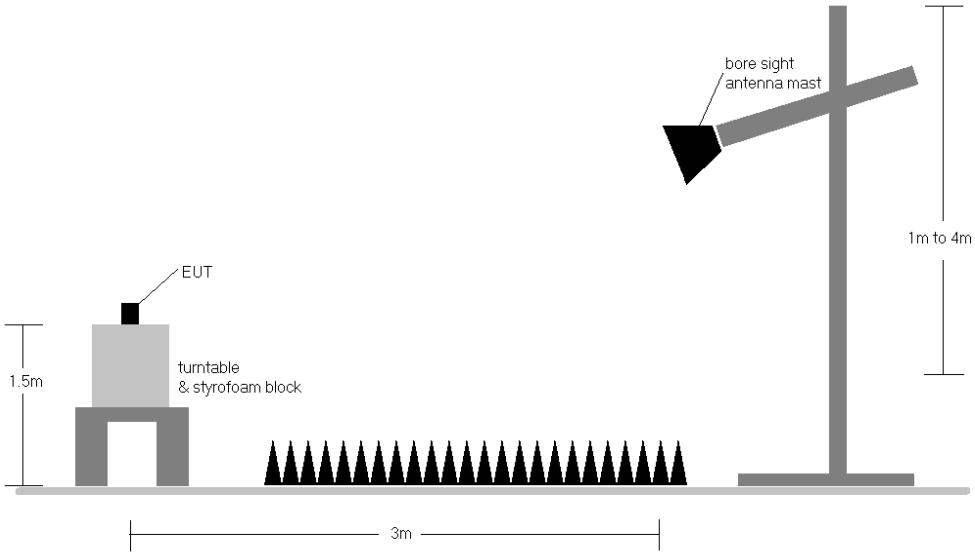


Figure 7-6. Radiated Test Setup >1GHz

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

3) 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.

4) The worst case EIRP shown in this section is found with LTE operating only using 1RB. As such, the EIRP/10MHz and full channel EIRP values will be identical since 1RB is fully contained within all available channel bandwidths for LTE Band 48 (i.e. 5, 10, 15, 20MHz).

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
20 MHz	QPSK	3560.00	H	100	315	9.84	1 / 0	9.16	19.00	0.079	23.00	-4.00
	QPSK	3625.00	H	102	314	9.92	1 / 99	11.90	**21.82**	**0.152**	23.00	-1.18
	QPSK	3690.00	H	101	310	9.91	1 / 99	10.69	20.60	0.115	23.00	-2.40
	16-QAM	3560.00	H	100	315	9.84	1 / 0	8.33	18.17	0.066	23.00	-4.83
	16-QAM	3625.00	H	102	314	9.92	1 / 0	10.99	20.91	0.123	23.00	-2.09
	16-QAM	3690.00	H	101	310	9.91	1 / 99	9.55	19.46	0.088	23.00	-3.54
15 MHz	QPSK	3557.50	H	100	315	9.84	1 / 19	8.86	18.70	0.074	23.00	-4.30
	QPSK	3625.00	H	102	314	9.92	1 / 19	11.69	**21.61**	**0.145**	23.00	-1.39
	QPSK	3692.50	H	101	310	9.91	1 / 36	10.47	20.38	0.109	23.00	-2.62
	16-QAM	3557.50	H	100	315	9.84	1 / 19	8.16	18.00	0.063	23.00	-5.00
	16-QAM	3625.00	H	102	314	9.92	1 / 19	9.47	19.39	0.087	23.00	-3.61
	16-QAM	3692.50	H	101	310	9.91	1 / 36	9.65	19.56	0.090	23.00	-3.44
10 MHz	QPSK	3555.00	H	100	315	9.84	1 / 22	9.11	18.95	0.078	23.00	-4.05
	QPSK	3625.00	H	102	314	9.92	1 / 22	12.02	**21.94**	**0.156**	23.00	-1.06
	QPSK	3695.00	H	101	310	9.90	1 / 1	11.02	20.92	0.124	23.00	-2.08
	16-QAM	3555.00	H	100	315	9.84	1 / 22	7.34	17.18	0.052	23.00	-5.82
	16-QAM	3625.00	H	102	314	9.92	1 / 22	10.52	20.44	0.111	23.00	-2.56
	16-QAM	3695.00	H	101	310	9.90	1 / 1	9.87	19.77	0.095	23.00	-3.23
5 MHz	QPSK	3552.50	H	100	315	9.83	1 / 5	9.13	18.97	0.079	23.00	-4.03
	QPSK	3625.00	H	102	314	9.92	1 / 1	11.83	**21.75**	**0.149**	23.00	-1.25
	QPSK	3697.50	H	101	310	9.90	1 / 5	10.63	20.53	0.113	23.00	-2.47
	16-QAM	3552.50	H	100	315	9.83	1 / 5	7.02	16.86	0.049	23.00	-6.14
	16-QAM	3625.00	H	102	314	9.92	1 / 1	10.15	20.07	0.102	23.00	-2.93
	16-QAM	3697.50	H	101	310	9.90	1 / 5	9.40	19.30	0.085	23.00	-3.70
20 MHz	QPSK (Opposite Pol.)	3625.00	V	244	271	9.92	1 / 99	10.57	**20.49**	**0.112**	23.00	-2.51

Table 7-11. EIRP Data (LTE Band 48 – Ant F)

Bandwidth	Modulation	PCC			SCC			Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degrees]	Ant. Gain [dBi]	Substitute Level [dBm]	EIRP [dBm/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
		Bandwidth [MHz]	Frequency [MHz]	RB / Offset	Bandwidth [MHz]	Frequency [MHz]	RB / Offset									
40 MHz	QPSK	20	3560.0	1 / 99	20	3579.8	1 / 0	H	100	318	9.84	9.00	18.84	0.077	23.00	-4.16
		20	3625.0	1 / 99	20	3644.8	1 / 0	H	105	315	9.92	11.80	21.72	0.148	23.00	-1.28
		20	3690.0	1 / 0	20	3670.2	1 / 99	H	100	309	9.91	10.78	20.69	0.117	23.00	-2.31
	16-QAM	20	3560.0	1 / 99	20	3579.8	1 / 0	H	100	318	9.84	8.99	18.83	0.076	23.00	-4.17
		20	3625.0	1 / 99	20	3644.8	1 / 0	H	105	315	9.92	11.76	21.68	0.147	23.00	-1.32
		20	3690.0	1 / 0	20	3670.2	1 / 99	H	100	309	9.91	10.77	20.68	0.117	23.00	-2.32
35 MHz	QPSK	20	3557.5	1 / 99	15	3577.1	1 / 0	H	100	318	9.84	9.00	18.84	0.077	23.00	-4.16
		20	3625.0	1 / 99	15	3642.1	1 / 0	H	105	315	9.92	11.80	21.72	0.148	23.00	-1.28
		20	3692.5	1 / 0	15	3672.9	1 / 74	H	100	309	9.91	10.78	20.69	0.117	23.00	-2.31
	16-QAM	20	3557.5	1 / 99	15	3577.1	1 / 0	H	100	318	9.84	8.99	18.83	0.076	23.00	-4.17
		20	3625.0	1 / 99	15	3642.1	1 / 0	H	105	315	9.92	11.76	21.68	0.147	23.00	-1.32
		20	3692.5	1 / 0	15	3672.9	1 / 74	H	100	309	9.91	10.77	20.68	0.117	23.00	-2.32
30 MHz	QPSK	20	3555.0	1 / 99	10	3574.4	1 / 0	H	100	318	9.84	9.21	19.05	0.080	23.00	-3.95
		20	3625.0	1 / 99	10	3639.4	1 / 0	H	105	315	9.92	12.03	21.95	0.157	23.00	-1.05
		20	3695.0	1 / 0	10	3678.3	1 / 49	H	100	309	9.90	10.79	20.69	0.117	23.00	-2.31
	16-QAM	20	3555.0	1 / 99	10	3574.4	1 / 0	H	100	318	9.84	8.90	18.74	0.075	23.00	-4.26
		20	3625.0	1 / 99	10	3639.4	1 / 0	H	105	315	9.92	11.60	21.52	0.142	23.00	-1.48
		20	3695.0	1 / 0	10	3678.3	1 / 49	H	100	309	9.90	10.52	20.42	0.110	23.00	-2.58
25 MHz	QPSK	20	3552.5	1 / 99	5	3571.7	1 / 0	H	100	318	9.83	9.26	19.10	0.081	23.00	-3.90
		20	3625.0	1 / 99	5	3636.7	1 / 0	H	105	315	9.92	12.02	21.94	0.156	23.00	-1.06
		20	3697.5	1 / 0	5	3678.3	1 / 24	H	100	309	9.90	10.41	20.31	0.107	23.00	-2.69
	16-QAM	20	3552.5	1 / 99	5	3571.7	1 / 0	H	100	318	9.83	8.86	18.70	0.074	23.00	-4.30
		20	3625.0	1 / 99	5	3636.7	1 / 0	H	105	315	9.92	11.47	21.39	0.138	23.00	-1.61
		20	3697.5	1 / 0	5	3678.3	1 / 24	H	100	309	9.90	10.45	20.35	0.108	23.00	-2.65

Table 7-12. EIRP Data (ULCA LTE Band 48 – Ant F)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
40 MHz	π/2 BPSK	3570.00	H	115	315	9.84	1 / 1	10.42	20.26	0.106	23.00	-2.74
	π/2 BPSK	3625.00	H	113	314	9.92	1 / 104	10.61	20.53	0.113	23.00	-2.47
	π/2 BPSK	3680.00	H	110	318	9.93	1 / 53	11.06	20.99	**0.125**	23.00	-2.01
	QPSK	3570.00	H	115	315	9.84	1 / 1	10.40	20.24	0.106	23.00	-2.76
	QPSK	3625.00	H	113	314	9.92	1 / 104	10.58	20.50	0.112	23.00	-2.50
	QPSK	3680.00	H	110	318	9.93	1 / 53	11.00	20.93	0.124	23.00	-2.07
	16-QAM	3570.00	H	115	315	9.84	1 / 1	10.19	20.03	0.101	23.00	-2.97
	16-QAM	3625.00	H	113	314	9.92	1 / 104	10.32	20.24	0.106	23.00	-2.76
	16-QAM	3680.00	H	110	318	9.93	1 / 53	10.82	20.75	0.119	23.00	-2.25
30 MHz	π/2 BPSK	3565.00	H	115	315	9.84	1 / 1	10.31	20.15	0.104	23.00	-2.85
	π/2 BPSK	3625.00	H	113	314	9.92	1 / 1	10.65	20.57	0.114	23.00	-2.43
	π/2 BPSK	3685.00	H	110	318	9.92	1 / 39	11.11	21.03	**0.127**	23.00	-1.97
	QPSK	3565.00	H	115	315	9.84	1 / 1	10.40	20.24	0.106	23.00	-2.76
	QPSK	3625.00	H	113	314	9.92	1 / 1	10.48	20.40	0.110	23.00	-2.60
	QPSK	3685.00	H	110	318	9.92	1 / 39	10.98	20.90	0.123	23.00	-2.10
	16-QAM	3565.00	H	115	315	9.84	1 / 1	10.74	20.58	0.114	23.00	-2.42
	16-QAM	3625.00	H	113	314	9.92	1 / 1	10.28	20.20	0.105	23.00	-2.80
	16-QAM	3685.00	H	110	318	9.92	1 / 39	10.20	20.12	0.103	23.00	-2.88
20 MHz	π/2 BPSK	3560.00	H	115	315	9.84	1 / 1	9.38	19.22	0.084	23.00	-3.78
	π/2 BPSK	3625.00	H	113	314	9.92	1 / 25	10.62	20.54	0.113	23.00	-2.46
	π/2 BPSK	3690.00	H	110	318	9.91	1 / 25	11.17	21.08	0.128	23.00	-1.92
	QPSK	3560.00	H	115	315	9.84	1 / 49	9.28	19.12	0.082	23.00	-3.88
	QPSK	3625.00	H	113	314	9.92	1 / 25	10.83	20.75	0.119	23.00	-2.25
	QPSK	3690.00	H	110	318	9.91	1 / 25	11.19	21.10	**0.129**	23.00	-1.90
	16-QAM	3560.00	H	115	315	9.84	1 / 49	9.41	19.25	0.084	23.00	-3.75
	16-QAM	3625.00	H	113	314	9.92	1 / 25	10.90	20.82	0.121	23.00	-2.18
	16-QAM	3690.00	H	110	318	9.91	1 / 25	10.75	20.66	0.116	23.00	-2.34
15 MHz	π/2 BPSK	3557.50	H	115	315	9.84	1 / 1	9.39	19.22	0.084	23.00	-3.78
	π/2 BPSK	3625.00	H	113	314	9.92	1 / 19	10.61	20.53	0.113	23.00	-2.47
	π/2 BPSK	3692.50	H	110	318	9.91	1 / 19	11.19	**21.10**	**0.129**	23.00	-1.90
	QPSK	3557.50	H	115	315	9.84	1 / 1	9.46	19.29	0.085	23.00	-3.71
	QPSK	3625.00	H	113	314	9.92	1 / 19	10.38	20.30	0.107	23.00	-2.70
	QPSK	3692.50	H	110	318	9.91	1 / 19	10.95	20.86	0.122	23.00	-2.14
	16-QAM	3557.50	H	115	315	9.84	1 / 1	9.80	19.63	0.092	23.00	-3.37
	16-QAM	3625.00	H	113	314	9.92	1 / 19	10.72	20.64	0.116	23.00	-2.36
	16-QAM	3692.50	H	110	318	9.91	1 / 19	10.65	20.56	0.114	23.00	-2.44
10 MHz	π/2 BPSK	3555.00	H	115	315	9.84	1 / 12	9.24	19.07	0.081	23.00	-3.93
	π/2 BPSK	3625.00	H	113	314	9.92	1 / 12	10.30	**20.22**	**0.105**	23.00	-2.78
	π/2 BPSK	3695.00	H	110	318	9.90	1 / 12	10.27	20.18	0.104	23.00	-2.82
	QPSK	3555.00	H	115	315	9.84	1 / 12	9.15	18.98	0.079	23.00	-4.02
	QPSK	3625.00	H	113	314	9.92	1 / 12	9.71	19.63	0.092	23.00	-3.37
	QPSK	3695.00	H	110	318	9.90	1 / 12	10.06	19.97	0.099	23.00	-3.03
	16-QAM	3555.00	H	115	315	9.84	1 / 12	10.33	20.16	0.104	23.00	-2.84
	16-QAM	3625.00	H	113	314	9.92	1 / 12	10.10	20.02	0.100	23.00	-2.98
	16-QAM	3695.00	H	110	318	9.90	1 / 12	9.98	19.89	0.097	23.00	-3.11
40 MHz	QPSK (CP-OFDM)	3680.00	H	109	190	9.93	1 / 104	10.63	**20.56**	**0.114**	23.00	-2.44
	QPSK (Opposite Pol.)	3680.00	V	189	342	9.93	1 / 1	10.53	20.46	0.111	23.00	-2.54

Table 7-13. EIRP Data (NR Band n48 – Ant F)

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 integral 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 = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
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

Test Setup

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

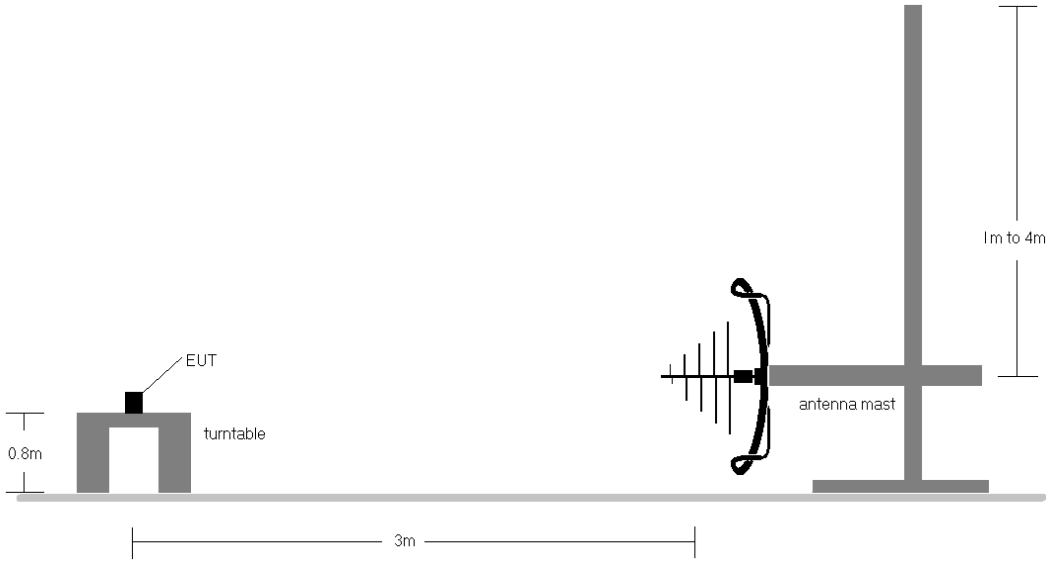


Figure 7-7. Test Instrument & Measurement Setup < 1GHz

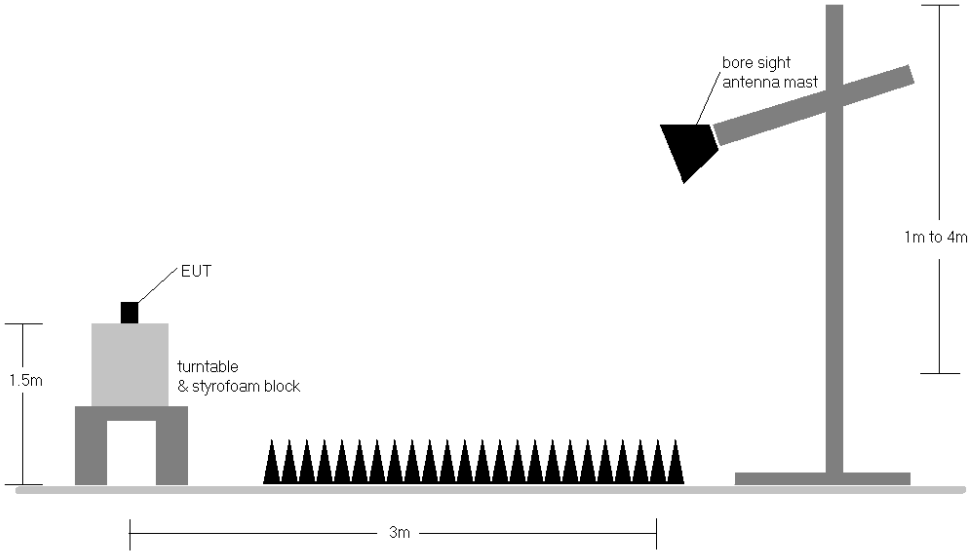


Figure 7-8. Test Instrument & Measurement Setup >1 GHz

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 EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

3) This unit was tested with its standard battery.

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

5) 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.

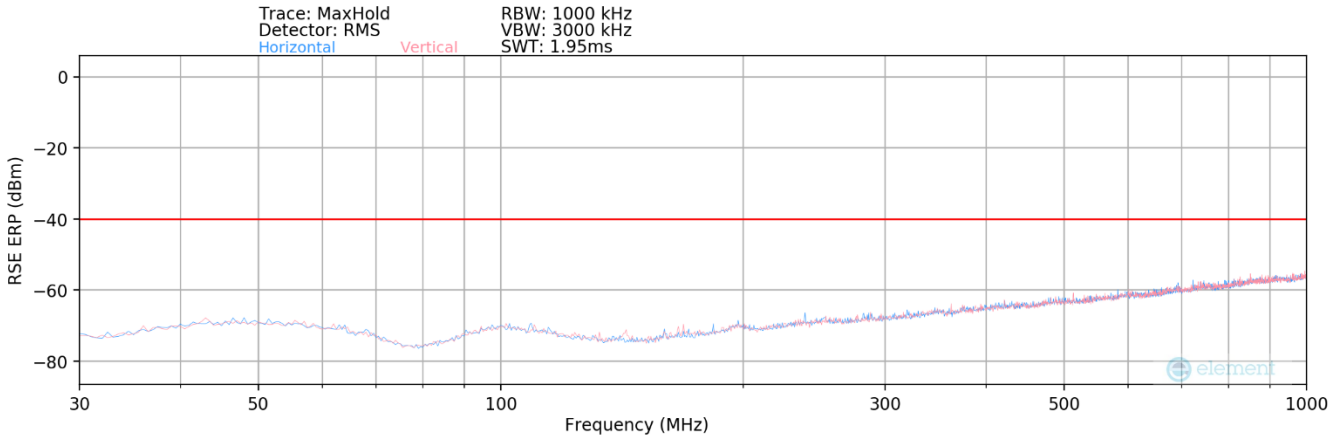
6) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

7) 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.

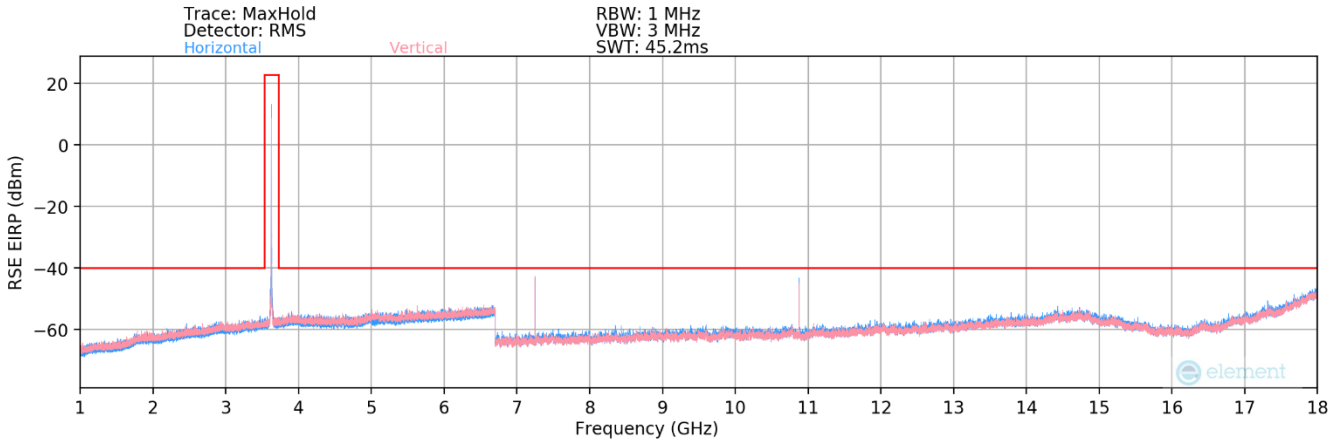
8) Spurious emissions shown in this section are measured while operating in EN-DC mode with Sub 6GHz NR carrier as well as an LTE carrier (anchor). Spurious emissions from the NR carrier device are subject to the rules under which the NR carrier operates. Spurious emissions caused by the LTE carrier must meet the requirements of the rules under which the LTE carrier operates.

9) Since, SRS-1 (Antenna F) has the highest target power, only Antenna F RSE is reported for the overall n48 worst case. All the other SRS-2, SRS-3, and SRS-4 have been checked and was found to be not to be the worst case.

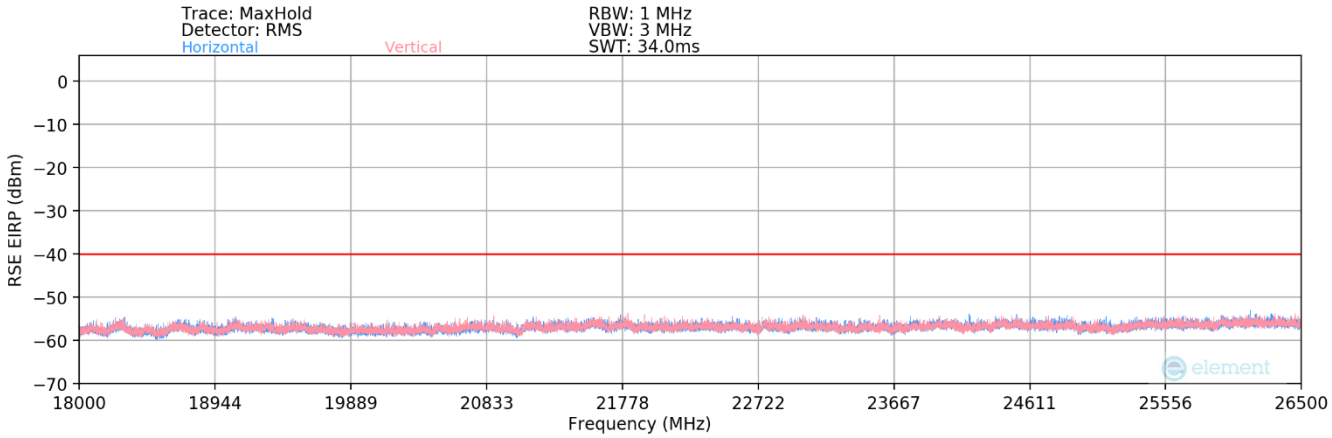
LTE Band 48 – Ant F



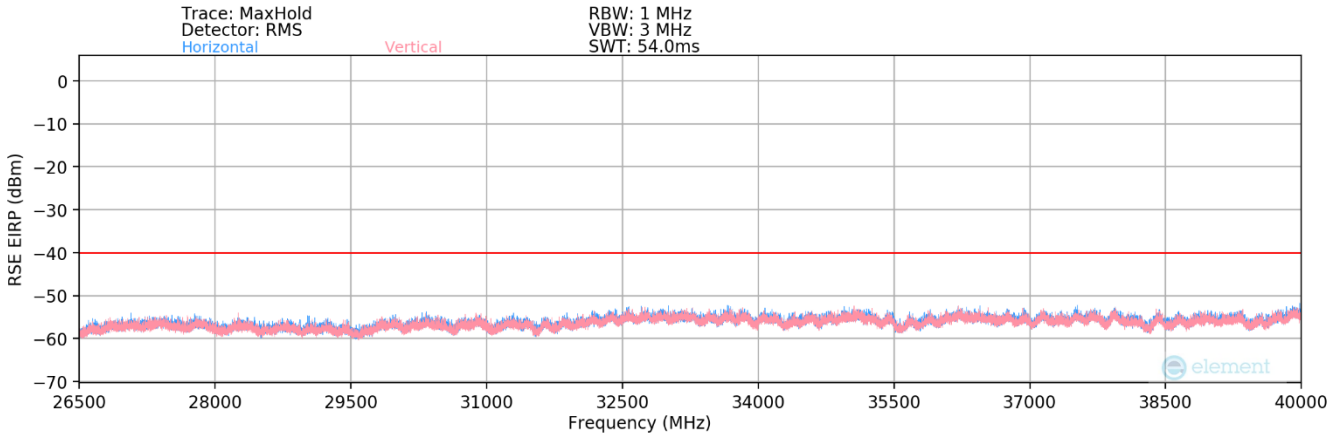
Plot 7-53. Radiated Spurious Plot (LTE Band 48 – Ant F)



Plot 7-54. Radiated Spurious Plot (LTE Band 48 – Ant F)



Plot 7-55. Radiated Spurious Plot (LTE Band 48 – Ant F)



Plot 7-56. Radiated Spurious Plot (LTE Band 48 – Ant F)

Bandwidth (MHz):	20
Frequency (MHz):	3625.0
RB Config (Size / Offset):	1 / 50

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]
458.23	H	-	-	-81.14	23.83	49.69	-47.71	-40.00	-7.71
551.65	H	-	-	-79.28	25.67	53.39	-44.02	-40.00	-4.02

Table 7-14. Radiated Spurious Data (LTE Band 48 – Mid Channel - Ant F)

Bandwidth (MHz):	20
Frequency (MHz):	3560.0
RB Config (Size / Offset):	1 / 50

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]
7120.00	H	220	291	-65.07	6.79	48.72	-46.54	-40.00	-6.54
10680.00	H	152	314	-67.29	10.68	50.39	-44.87	-40.00	-4.87
14240.00	H	-	-	-79.77	17.52	44.75	-50.51	-40.00	-10.51
17800.00	H	-	-	-80.06	23.83	50.77	-44.49	-40.00	-4.49
21360.00	H	-	-	-54.87	-3.35	48.78	-56.02	-40.00	-16.02
24920.00	H	-	-	-55.70	-3.24	48.06	-56.74	-40.00	-16.74
28480.00	H	-	-	-56.53	-1.13	49.34	-55.46	-40.00	-15.46
32040.00	H	-	-	-57.73	0.34	49.61	-55.19	-40.00	-15.19

Table 7-15. Radiated Spurious Data (LTE Band 48 – Low Channel - Ant F)

Bandwidth (MHz):	20
Frequency (MHz):	3625.0
RB Config (Size / Offset):	1 / 50

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	208	306	-64.26	6.91	49.65	-45.61	-40.00	-5.61
10875.00	H	156	315	-67.39	10.34	49.95	-45.31	-40.00	-5.31
14500.00	H	-	-	-79.52	18.09	45.57	-49.69	-40.00	-9.69
18125.00	H	-	-	-55.34	-3.25	48.41	-56.39	-40.00	-16.39
21750.00	H	-	-	-55.02	-3.63	48.35	-56.45	-40.00	-16.45
25375.00	H	-	-	-55.42	-3.04	48.54	-56.26	-40.00	-16.26
29000.00	H	-	-	-57.17	-1.23	48.60	-56.20	-40.00	-16.20
32625.00	H	-	-	-56.29	0.61	51.32	-53.48	-40.00	-13.48

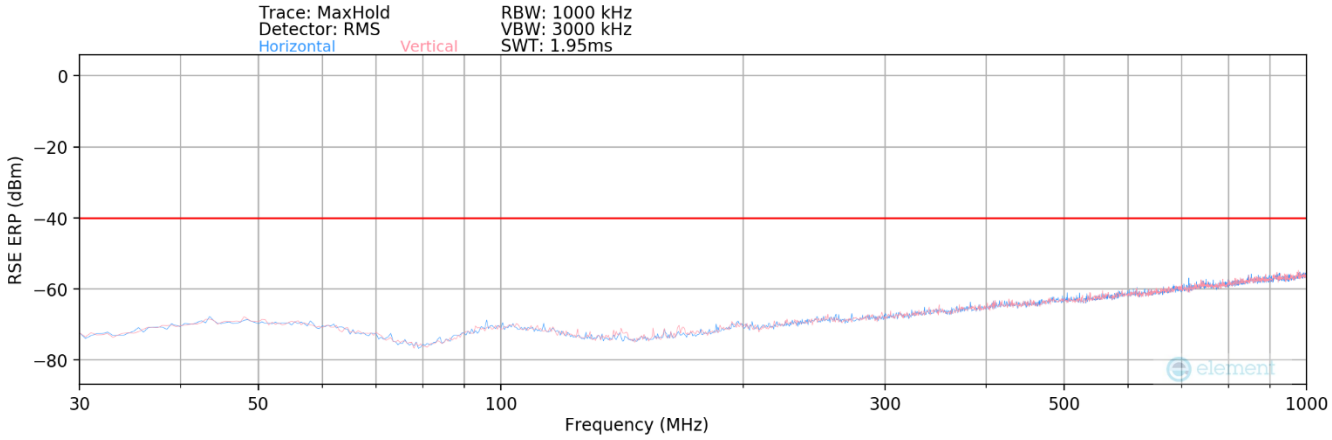
Table 7-16. Radiated Spurious Data (LTE Band 48 – Mid Channel - Ant F)

Bandwidth (MHz):	20
Frequency (MHz):	3690.0
RB Config (Size / Offset):	1 / 50

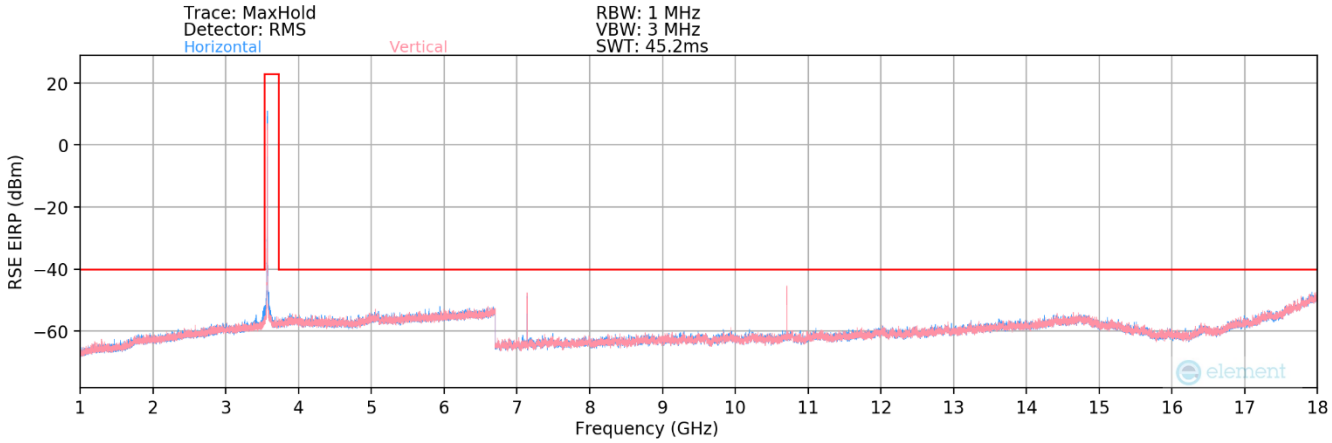
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7380.00	H	193	299	-68.12	7.54	46.42	-48.84	-40.00	-8.84
11070.00	H	142	322	-67.47	11.31	50.84	-44.42	-40.00	-4.42
14760.00	H	-	-	-79.98	19.28	46.30	-48.96	-40.00	-8.96
18450.00	H	-	-	-55.58	-3.45	47.97	-56.83	-40.00	-16.83
22140.00	H	-	-	-54.05	-3.81	49.14	-55.66	-40.00	-15.66
25830.00	H	-	-	-55.16	-2.62	49.22	-55.58	-40.00	-15.58
29520.00	H	-	-	-57.93	-0.66	48.41	-56.39	-40.00	-16.39
33210.00	H	-	-	-55.84	0.21	51.37	-53.43	-40.00	-13.43

Table 7-17. Radiated Spurious Data (LTE Band 48 – High Channel - Ant F)

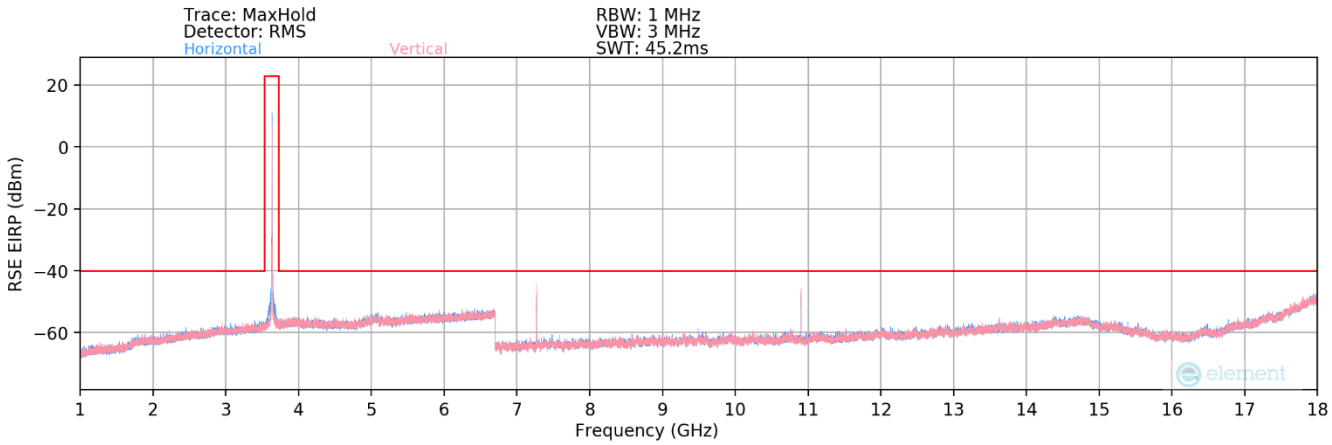
ULCA LB48 – Ant F



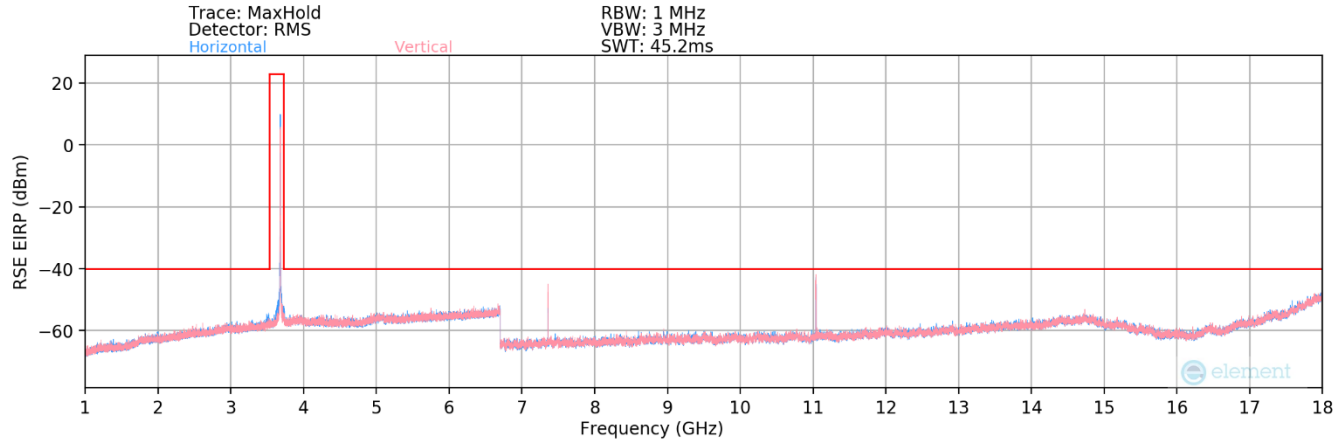
Plot 7-57. Radiated Spurious Plot (ULCA LB48 – Ant F – Mid Channel)



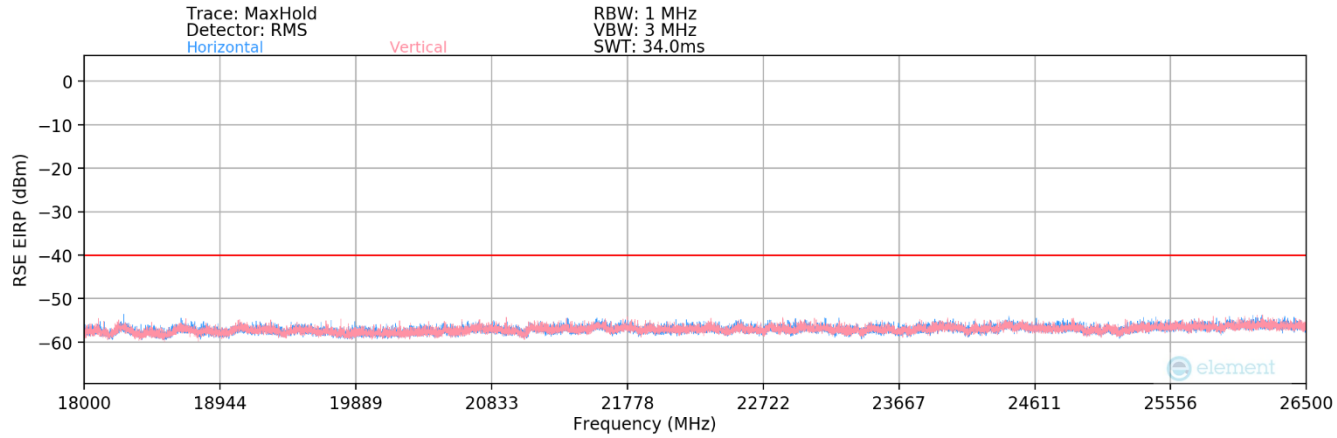
Plot 7-58. Radiated Spurious Plot (ULCA LB48 – Ant F – Low Channel)



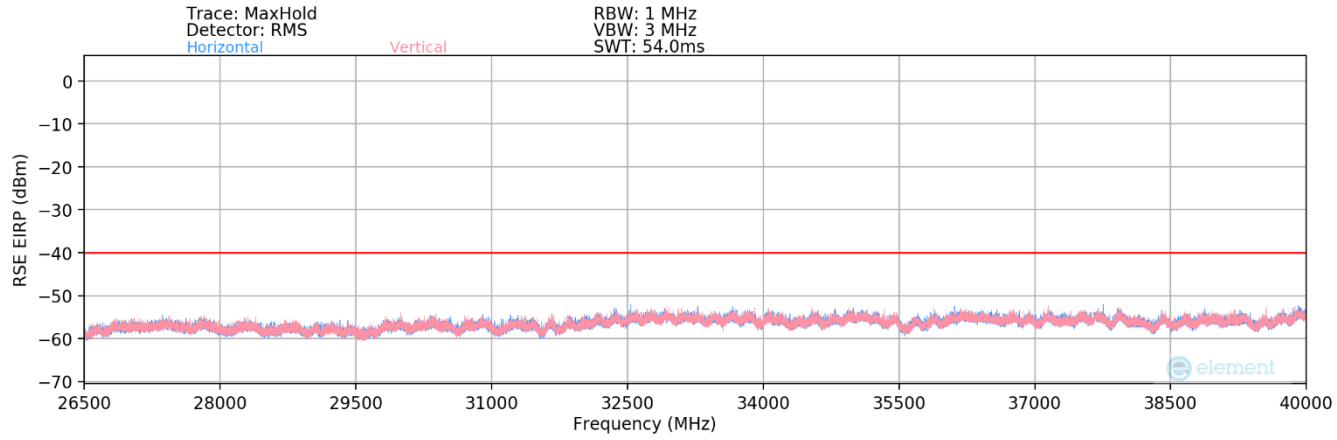
Plot 7-59. Radiated Spurious Plot (ULCA LB48 – Ant F – Mid Channel)



Plot 7-60. Radiated Spurious Plot (ULCA LB48 – Ant F – High Channel)



Plot 7-61. Radiated Spurious Plot (ULCA LB48 – Ant F – Mid Channel)



Plot 7-62. Radiated Spurious Plot (ULCA LB48 – Ant F – Mid Channel)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	3625.0
PCC RB / Offset:	1/99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	3644.8
SCC RB / Offset:	1/1

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]
456.54	H	-	-	-81.11	23.83	49.72	-47.69	-40.00	-7.69
548.46	H	-	-	-79.30	25.63	53.33	-44.08	-40.00	-4.08

Table 7-18. Radiated Spurious Data (ULCA LB48 – Mid Channel - Ant F)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	3560.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	3579.8
SCC RB / Offset:	1 / 0

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]
7120.00	H	217	307	-68.52	6.79	45.27	-49.99	-40.00	-9.99
10680.00	H	133	358	-76.51	10.68	41.17	-54.09	-40.00	-14.09
14240.00	H	-	-	-81.24	17.52	43.28	-51.98	-40.00	-11.98
17800.00	H	-	-	-81.69	23.83	49.14	-46.12	-40.00	-6.12
21360.00	H	-	-	-55.96	-3.35	47.69	-57.11	-40.00	-17.11
24920.00	H	-	-	-56.19	-3.24	47.57	-57.23	-40.00	-17.23
28480.00	H	-	-	-56.74	-1.13	49.13	-55.67	-40.00	-15.67
32040.00	H	-	-	-56.98	0.34	50.36	-54.44	-40.00	-14.44

Table 7-19. Radiated Spurious Data (ULCA LB48 – Low Channel - Ant F)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	3625.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	3644.8
SCC RB / Offset:	1 / 0

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	222	304	-67.39	6.91	46.52	-48.74	-40.00	-8.74
10875.00	H	144	355	-77.53	10.34	39.81	-55.45	-40.00	-15.45
14500.00	H	-	-	-80.78	18.09	44.31	-50.95	-40.00	-10.95
18125.00	H	-	-	-55.69	-3.25	48.06	-56.74	-40.00	-16.74
21750.00	H	-	-	-54.90	-3.63	48.47	-56.33	-40.00	-16.33
25375.00	H	-	-	-55.72	-3.04	48.24	-56.56	-40.00	-16.56
29000.00	H	-	-	-56.95	-1.23	48.82	-55.98	-40.00	-15.98
32625.00	H	-	-	-56.83	0.61	50.78	-54.02	-40.00	-14.02

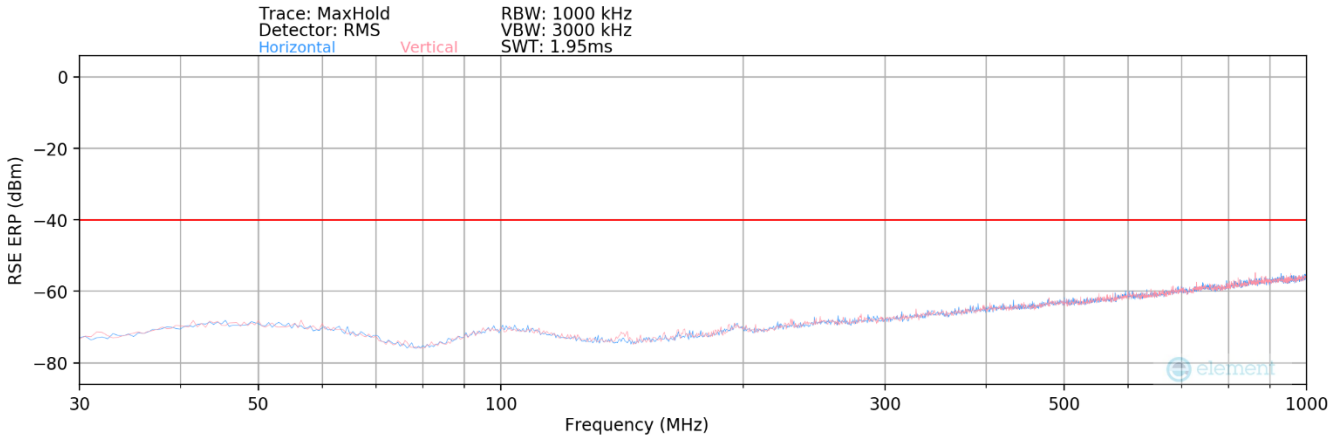
Table 7-20. Radiated Spurious Data (ULCA LB48 – Mid Channel - Ant F)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	3690.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	3670.2
SCC RB / Offset:	1 / 0

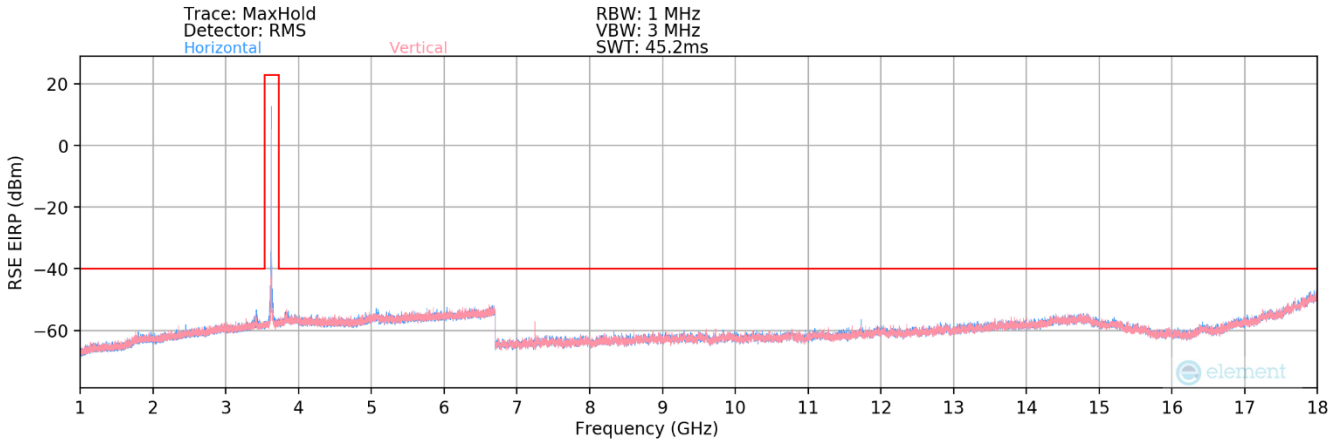
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7380.00	H	215	310	-67.89	7.54	46.65	-48.61	-40.00	-8.61
11070.00	H	119	355	-72.01	11.31	46.30	-48.96	-40.00	-8.96
14760.00	H	-	-	-81.09	19.28	45.19	-50.07	-40.00	-10.07
18450.00	H	-	-	-55.94	-3.45	47.61	-57.19	-40.00	-17.19
22140.00	H	-	-	-55.17	-3.81	48.02	-56.78	-40.00	-16.78
25830.00	H	-	-	-54.89	-2.62	49.49	-55.31	-40.00	-15.31
29520.00	H	-	-	-56.89	-0.66	49.45	-55.35	-40.00	-15.35
33210.00	H	-	-	-56.73	0.21	50.48	-54.32	-40.00	-14.32

Table 7-21. Radiated Spurious Data (ULCA LB48 – High Channel - Ant F)

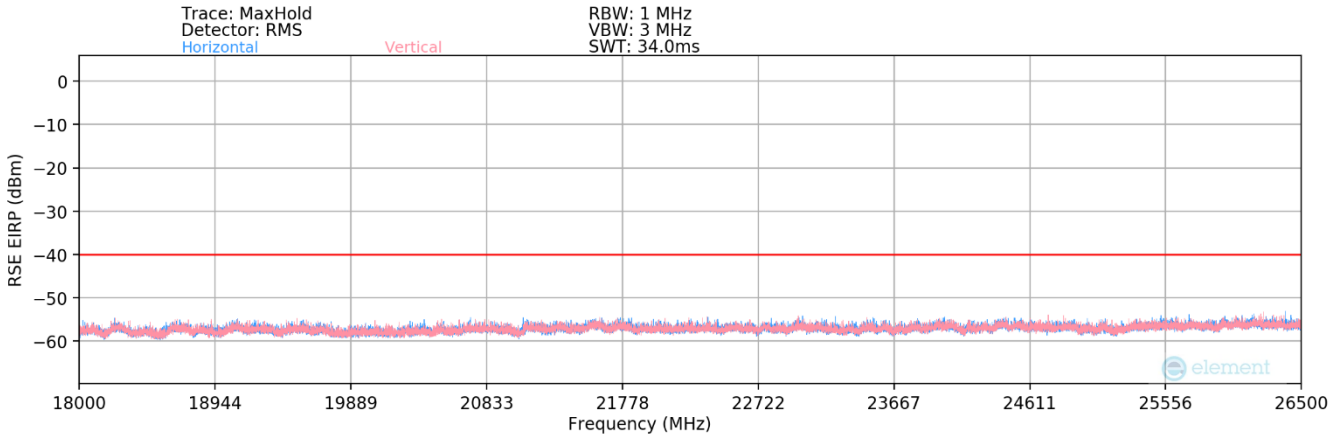
NR Band n48 – Ant F



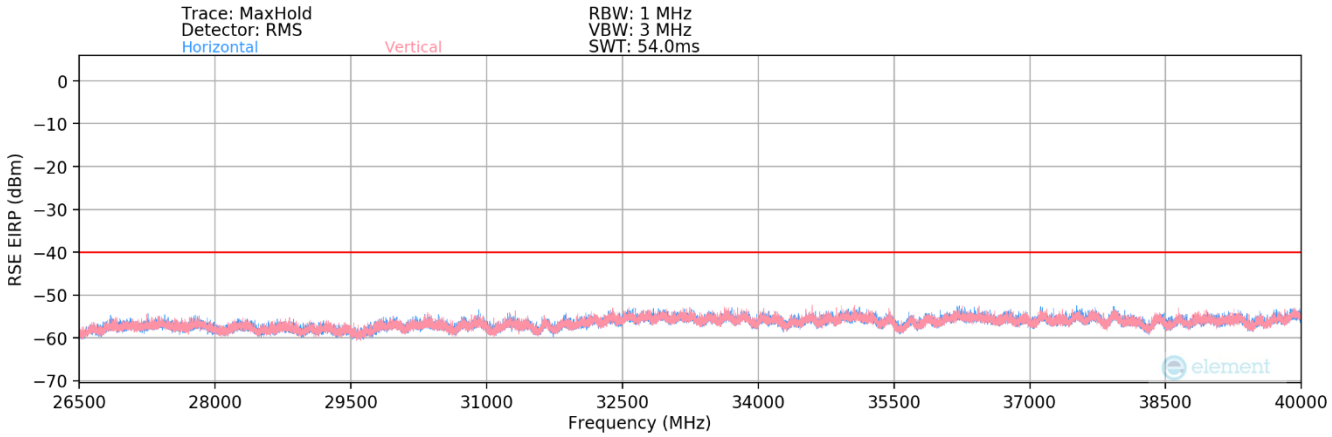
Plot 7-63. Radiated Spurious Plot (NR Band n48 – Ant F)



Plot 7-64. Radiated Spurious Plot (NR Band n48 – Ant F)



Plot 7-65. Radiated Spurious Plot (NR Band n48 – Ant F)



Plot 7-66. Radiated Spurious Plot (NR Band n48 – Ant F)

Bandwidth (MHz):	40
Frequency (MHz):	3625.0
RB Config (Size / Offset):	1 / 50

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]
459.68	H	-	-	-81.12	23.84	49.72	-47.69	-40.00	-7.69
548.56	H	-	-	-79.30	25.63	53.33	-44.08	-40.00	-4.08

Table 7-22. Radiated Spurious Data (NR Band n48 – Mid Channel - Ant F)

Bandwidth (MHz):	40
Frequency (MHz):	3570.0
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	213	303	-66.99	7.07	47.08	-48.18	-40.00	-8.18
10710.00	H	167	276	-74.89	10.21	42.32	-52.94	-40.00	-12.94
14280.00	H	-	-	-81.19	18.66	44.47	-50.79	-40.00	-10.79
17850.00	H	-	-	-81.75	18.66	43.91	-51.35	-40.00	-11.35
21420.00	H	-	-	-55.92	-3.31	47.77	-57.03	-40.00	-17.03
24990.00	H	-	-	-56.04	-3.34	47.62	-57.18	-40.00	-17.18
28560.00	H	-	-	-56.64	-1.17	49.19	-55.61	-40.00	-15.61
32130.00	H	-	-	-57.19	0.40	50.21	-54.59	-40.00	-14.59

Table 7-23. Radiated Spurious Data (NR Band n48 – Low Channel - Ant F)

Bandwidth (MHz):	40
Frequency (MHz):	3625.0
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	212	307	-63.97	6.91	49.94	-45.32	-40.00	-5.32
10875.00	H	178	286	-73.38	10.34	43.96	-51.30	-40.00	-11.30
14500.00	H	-	-	-78.55	18.09	46.54	-48.72	-40.00	-8.72
18125.00	H	-	-	-55.16	-3.25	48.59	-56.21	-40.00	-16.21
21750.00	H	-	-	-54.40	-3.63	48.97	-55.83	-40.00	-15.83
25375.00	H	-	-	-55.17	-3.04	48.79	-56.01	-40.00	-16.01
29000.00	H	-	-	-57.47	-1.23	48.30	-56.50	-40.00	-16.50
32625.00	H	-	-	-56.22	0.61	51.39	-53.41	-40.00	-13.41

Table 7-24. Radiated Spurious Data (NR Band n48 – Mid Channel - Ant F)

Bandwidth (MHz):	40
Frequency (MHz):	3680.0
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	216	302	-67.29	7.16	46.87	-48.39	-40.00	-8.39
11040.00	H	174	287	-70.84	10.72	46.88	-48.37	-40.00	-8.37
14720.00	H	-	-	-81.59	18.33	43.74	-51.52	-40.00	-11.52
18400.00	H	-	-	-55.68	-3.44	47.88	-56.92	-40.00	-16.92
22080.00	H	-	-	-54.48	-3.87	48.65	-56.15	-40.00	-16.15
25760.00	H	-	-	-54.86	-2.69	49.45	-55.35	-40.00	-15.35
29440.00	H	-	-	-57.67	-0.78	48.55	-56.25	-40.00	-16.25
33120.00	H	-	-	-56.18	0.31	51.13	-53.67	-40.00	-13.67

Table 7-25. Radiated Spurious Data (NR Band n48 – High Channel - Ant F)

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

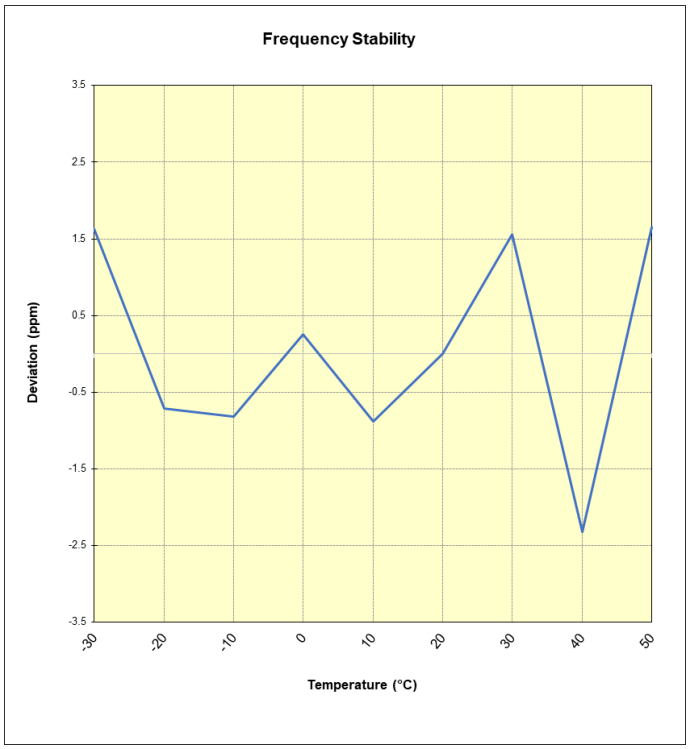
None

LTE Band 48

Operating Frequency (Hz):	3,625,000,000
Ref. Voltage (VDC):	4.446

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.446	- 30	3,624,719,940	5,920	0.0001633
		- 20	3,624,711,423	-2,597	-0.0000716
		- 10	3,624,711,051	-2,969	-0.0000819
		0	3,624,714,928	908	0.0000251
		+ 10	3,624,710,818	-3,202	-0.0000883
		+ 20 (Ref)	3,624,714,020	0	0.0000000
		+ 30	3,624,719,684	5,664	0.0001563
		+ 40	3,624,705,628	-8,392	-0.0002315
		+ 50	3,624,720,018	5,998	0.0001655
Battery Endpoint	4.446	+ 20	3,624,706,868	-7,152	-0.0001973

Table 7-26. LTE Band 48 Frequency Stability Data



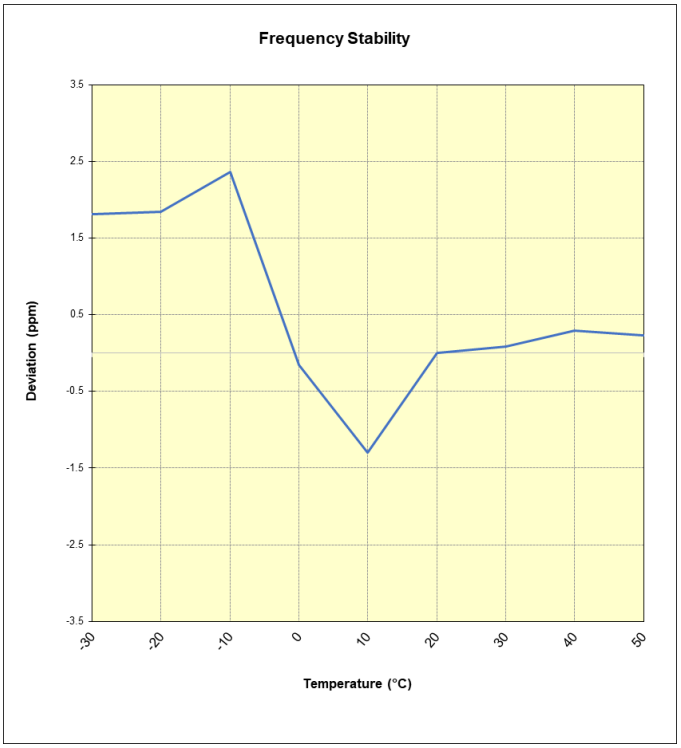
Plot 7-67. LTE Band 48 Frequency Stability Chart

NR Band n48

Operating Frequency (Hz):	3,625,000,000
Ref. Voltage (VDC):	4.446

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.446	- 30	3,623,906,798	6,576	0.0001815
		- 20	3,623,906,888	6,666	0.0001839
		- 10	3,623,908,791	8,569	0.0002365
		0	3,623,899,651	-571	-0.0000158
		+ 10	3,623,895,532	-4,690	-0.0001294
		+ 20 (Ref)	3,623,900,222	0	0.0000000
		+ 30	3,623,900,520	298	0.0000082
		+ 40	3,623,901,302	1,080	0.0000298
		+ 50	3,623,901,066	844	0.0000233
Battery Endpoint	4.446	+ 20	3,623,900,667	445	0.0000123

Table 7-27. NR Band n48 Frequency Stability Data



Plot 7-68. 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 v03r01, WINNF-18-IN-00178 v1.0.0.00

Test Setup/Method

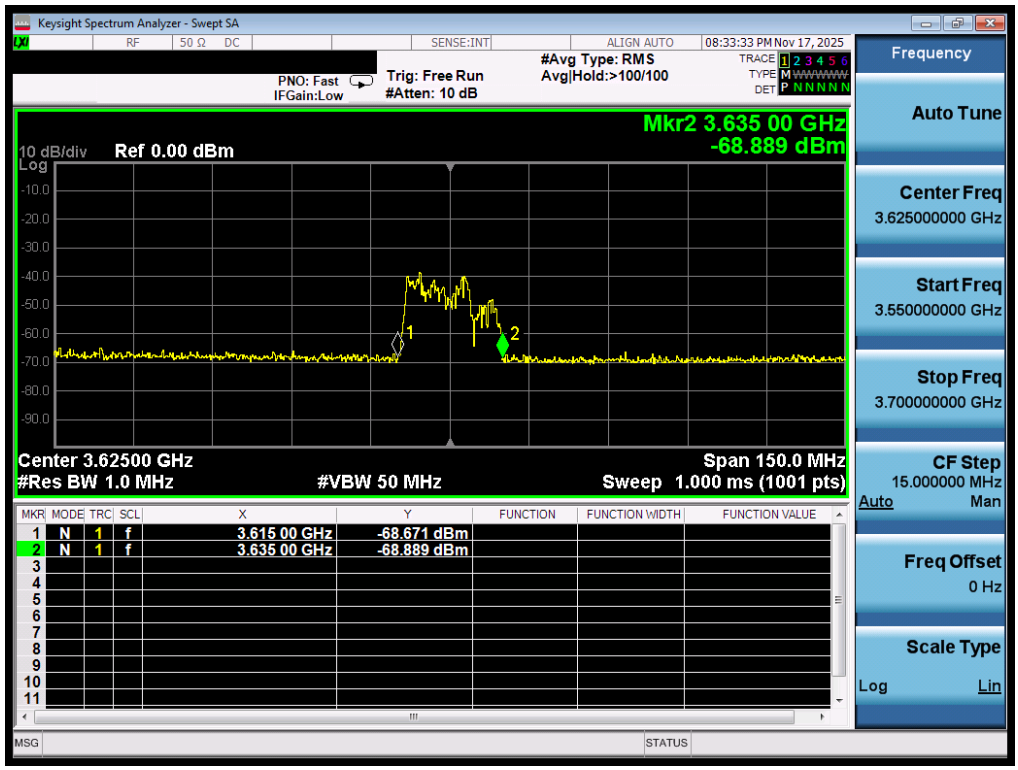
The EUT was connected via an RF cable to a certified CBSD and spectrum analyzer. The following procedure is performed by applying WINNF-TS-0122 CBRS CBSD Test Specification.

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.

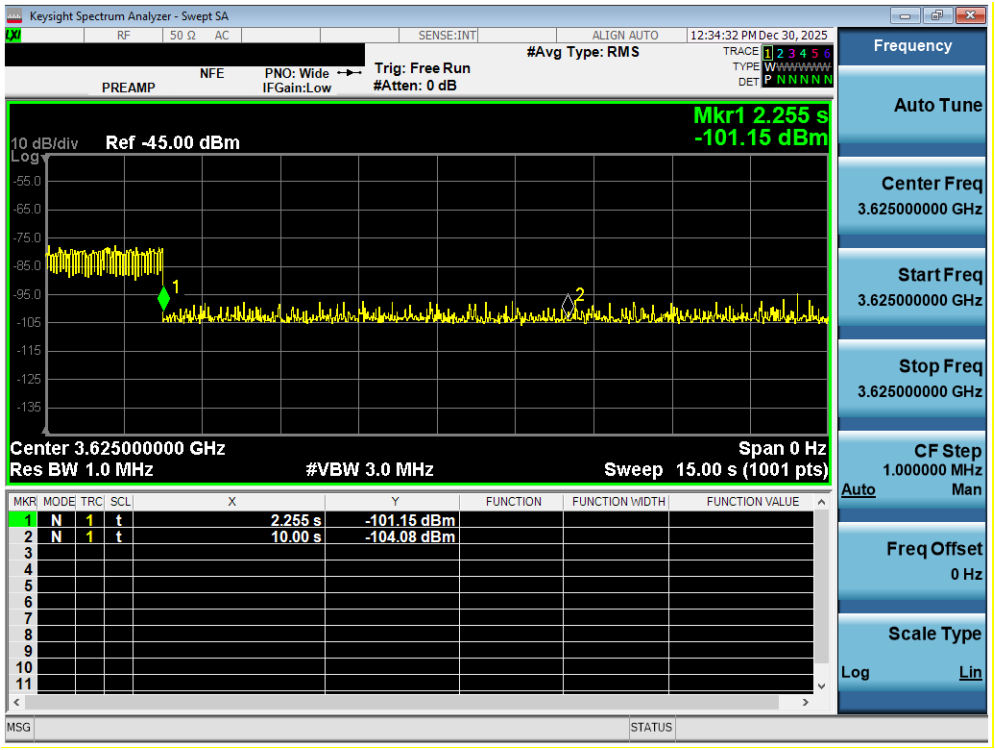
Test Notes

The EUT is an End User Device.

LTE
Run#1:



Plot 7-69. Run#1 End User Device Frequency of Operations

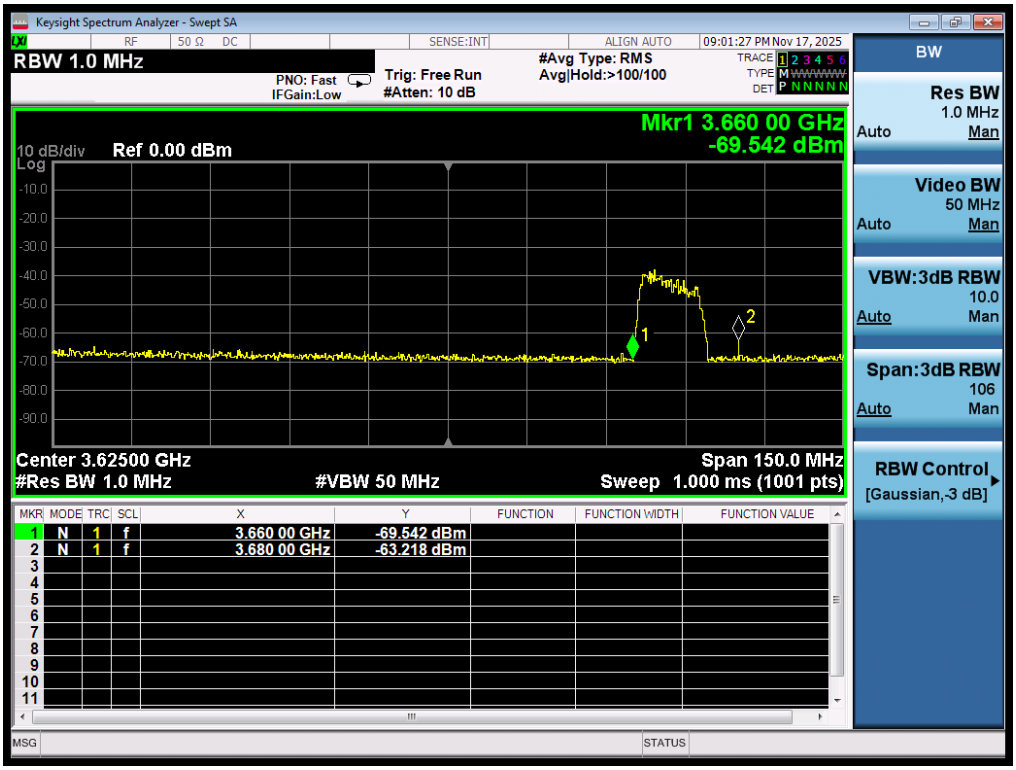


Plot 7-70. Run#1 End User Device Discontinues Operations within 10s

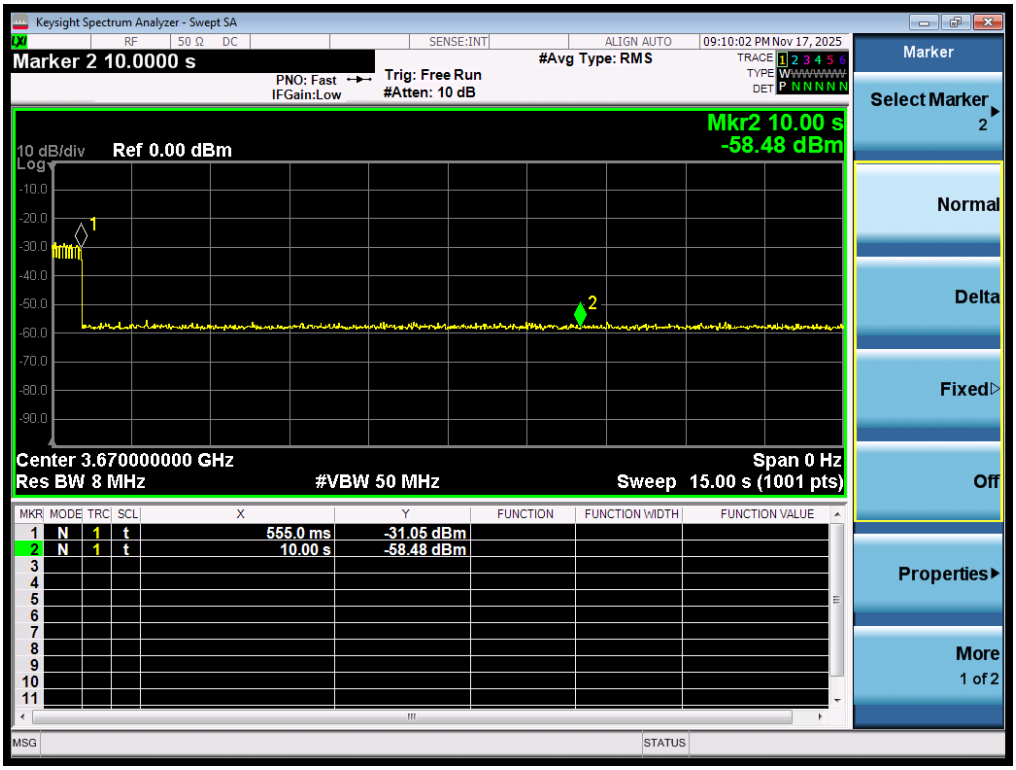
Note:

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 7-71. Run#2 End User Device Frequency of Operations

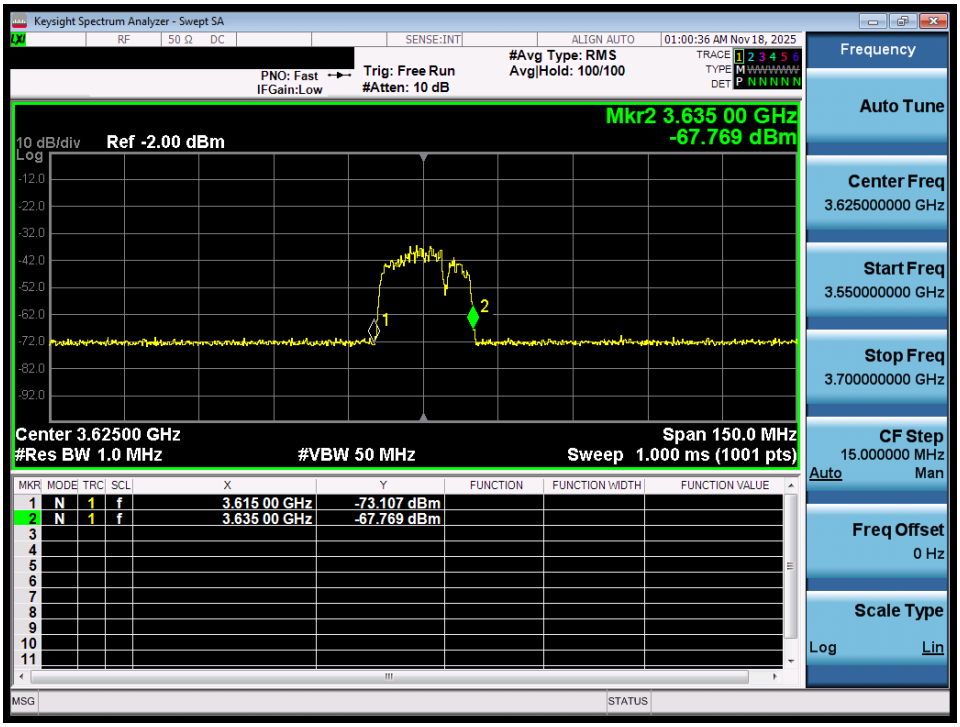


Plot 7-72. Run#2 End User Device Discontinues Operations within 10s

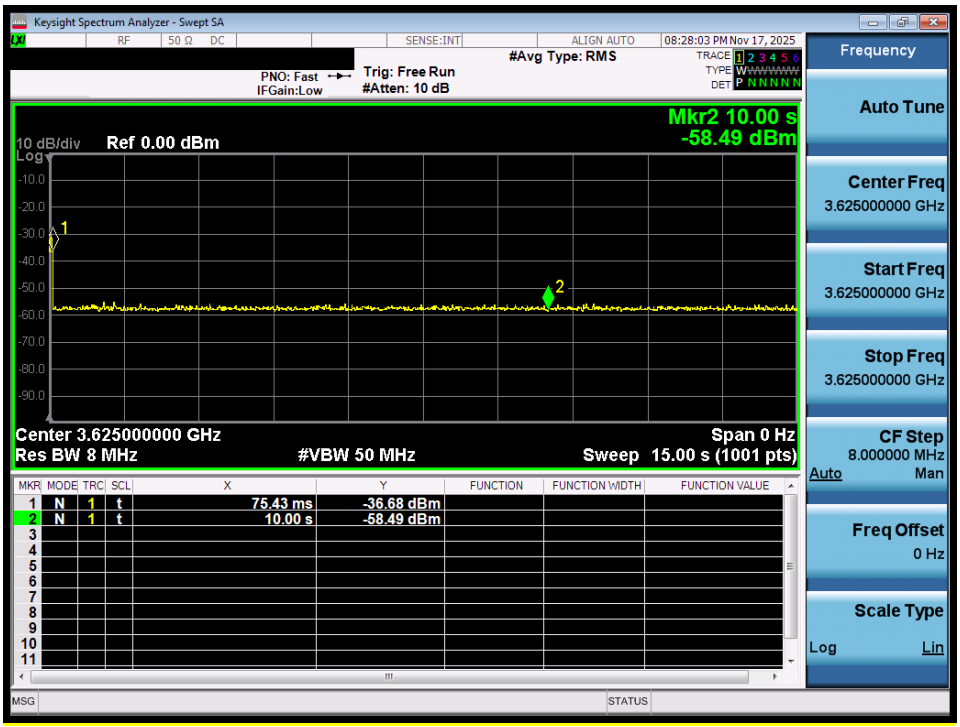
Note:

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.

NR
Run#1:



Plot 7-73. Run#1 End User Device Frequency of Operations

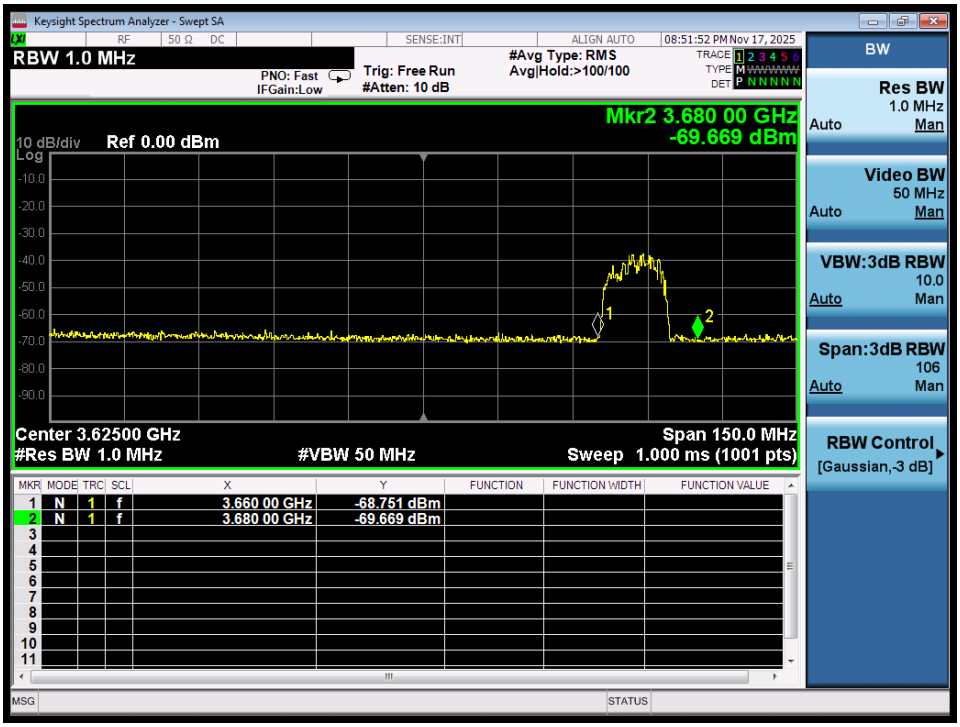


Plot 7-74. Run#1 End User Device Discontinues Operations within 10s

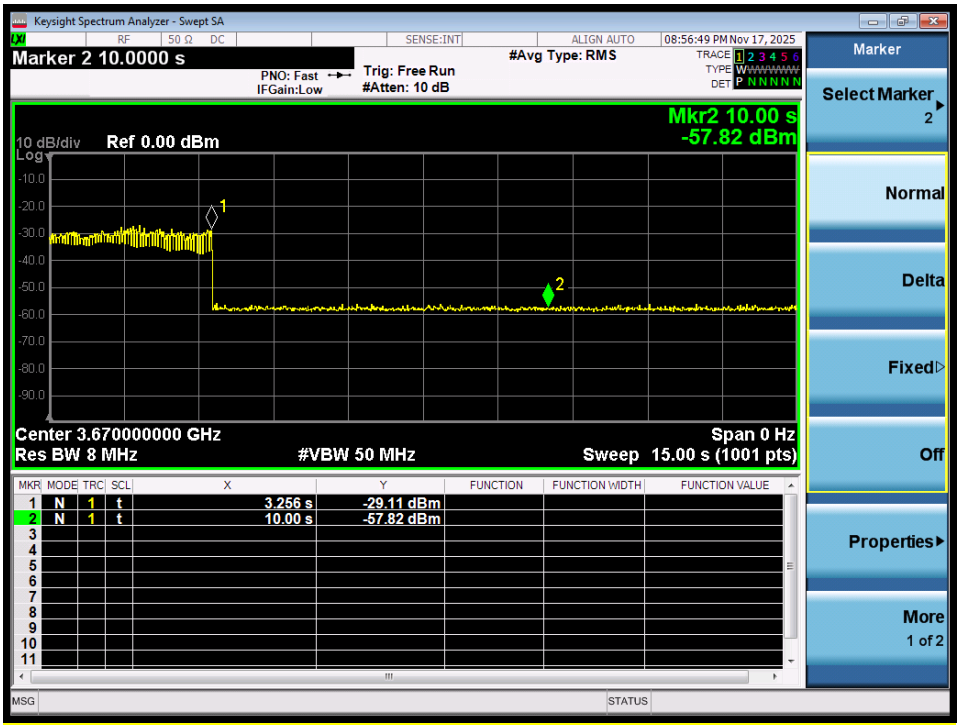
Note:

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 7-75. Run#2 End User Device Frequency of Operations



Plot 7-76. 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.

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMA576U** complies with all of the End User Device requirements of Part 96 of the FCC Rules for LTE and 5G NR operation.

- END OF TEST REPORT -