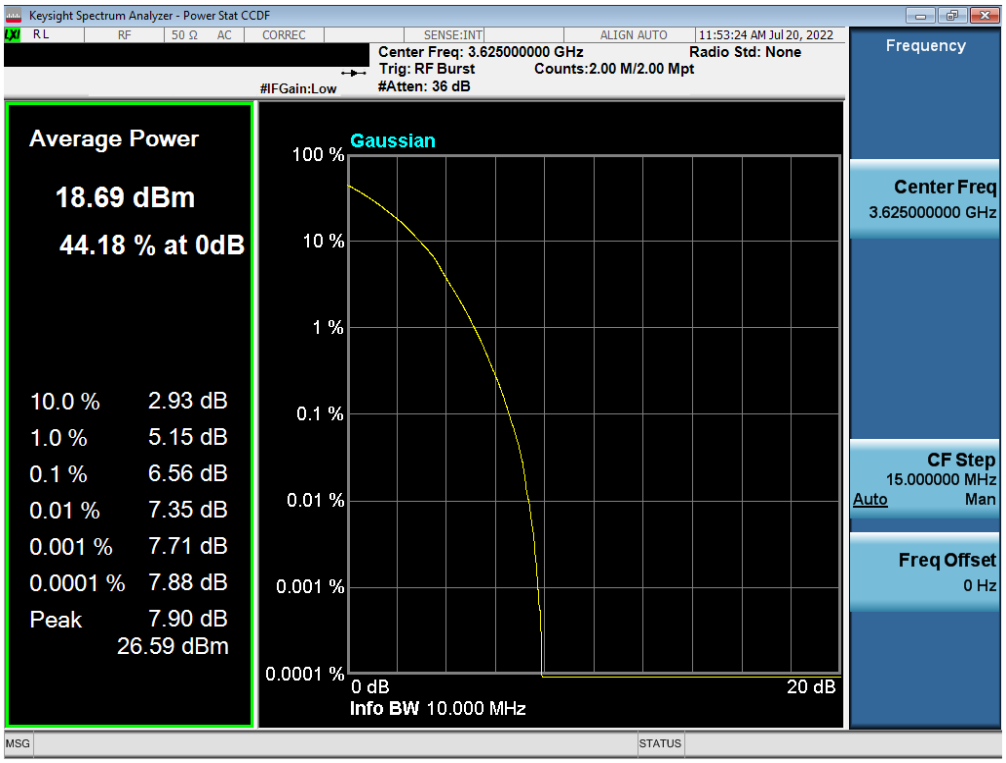
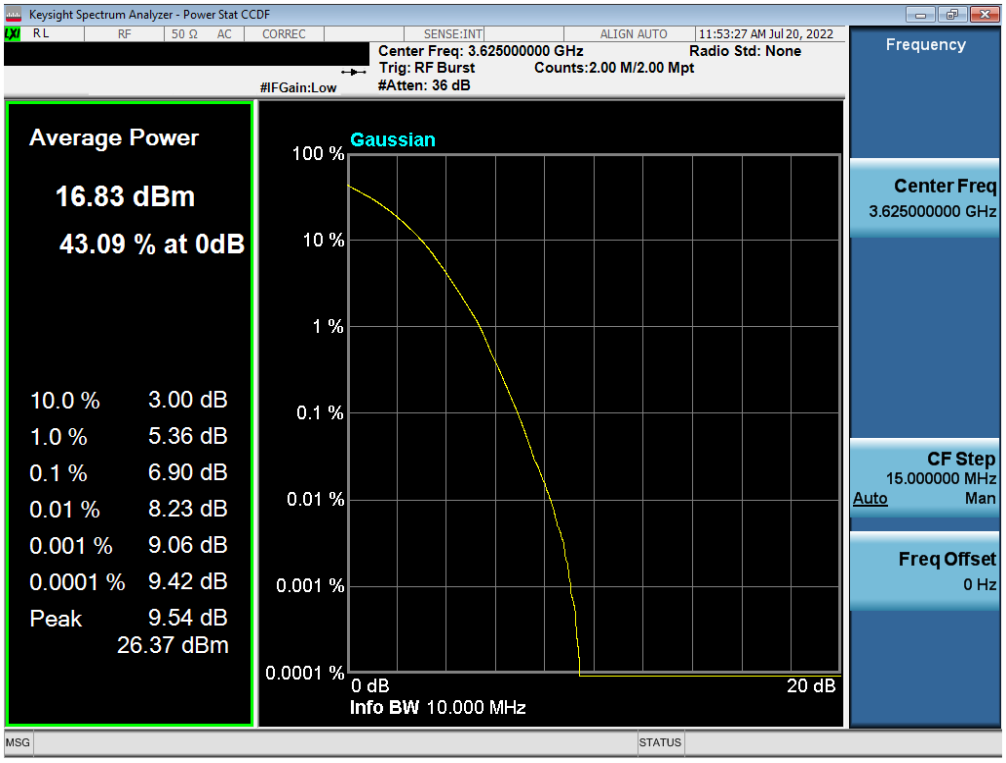
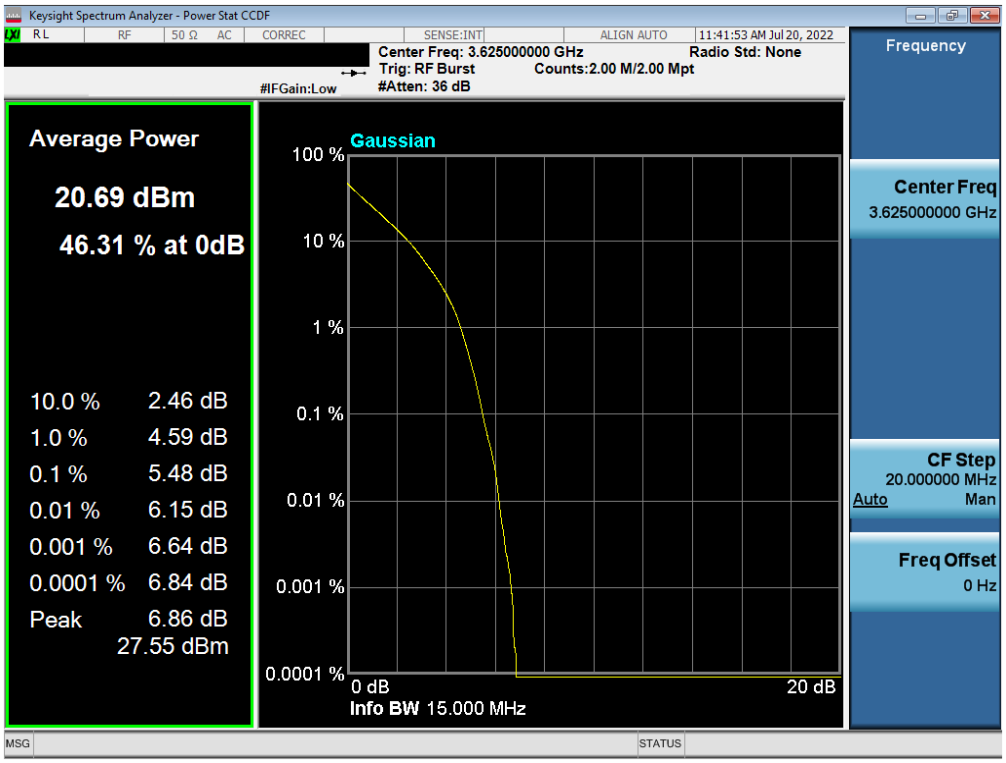


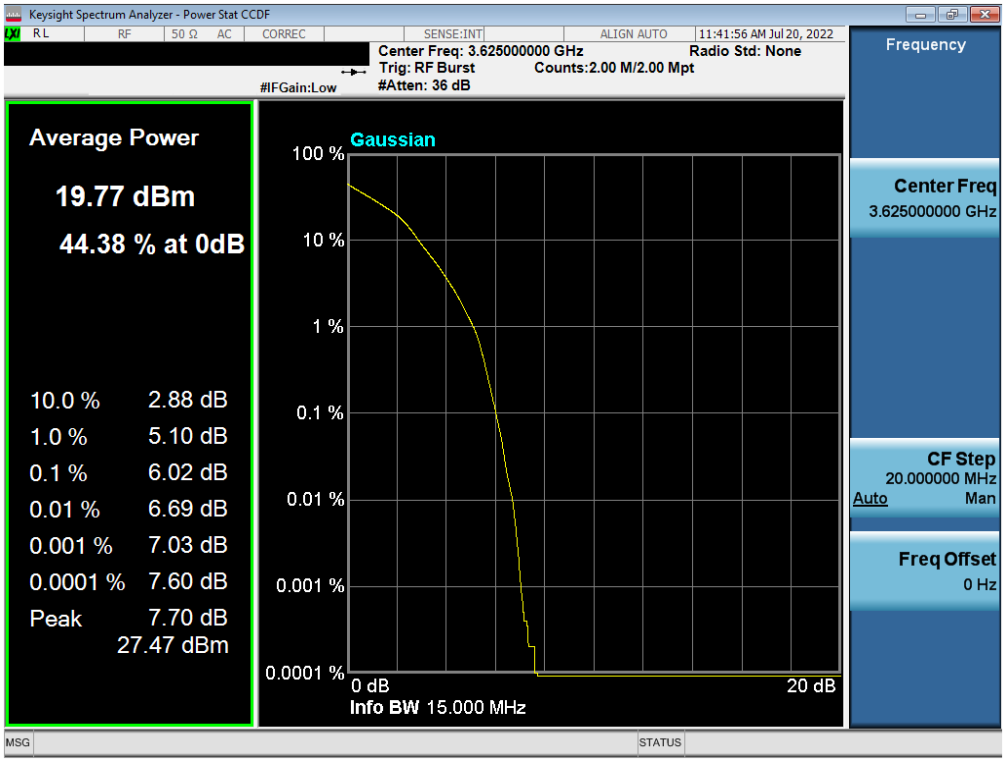
Plot 7-78. PAR Plot (LTE Band 48 - 10MHz 64-QAM - Full RB)



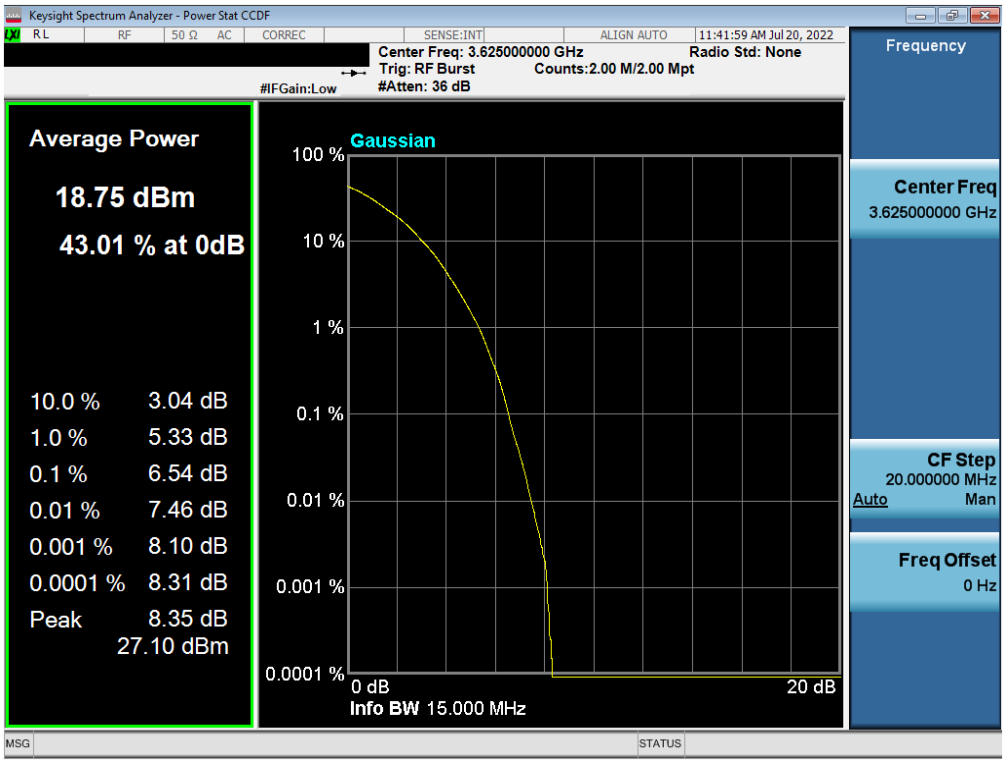
Plot 7-79. PAR Plot (LTE Band 48 - 10MHz 256-QAM - Full RB)



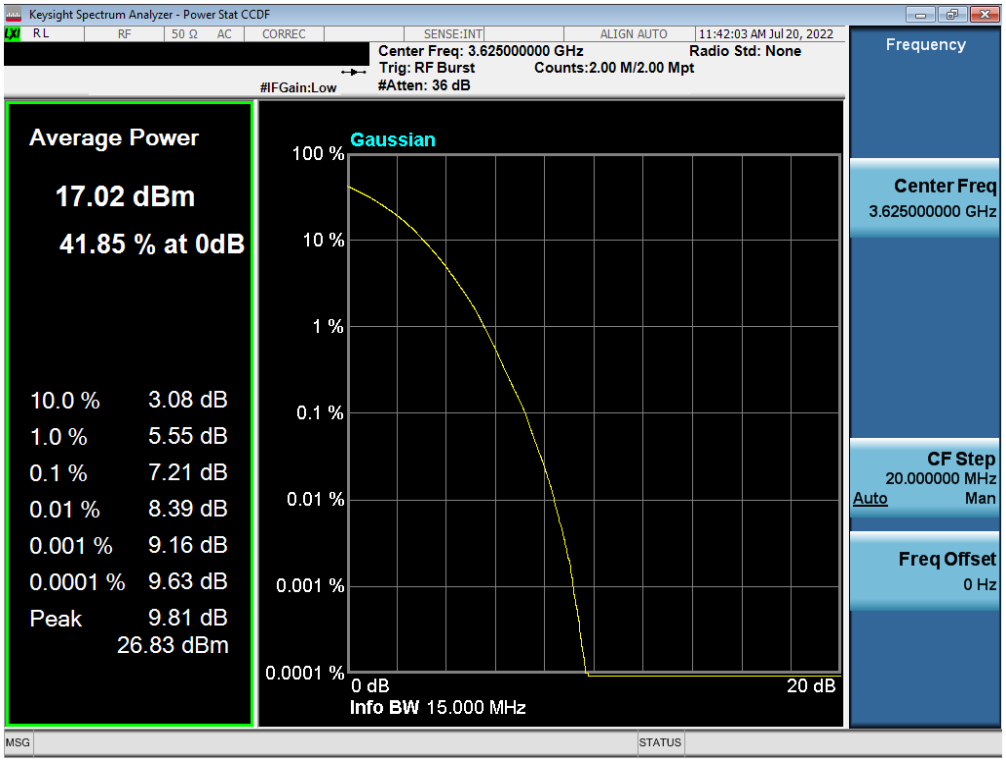
Plot 7-80. PAR Plot (LTE Band 48 - 15MHz QPSK - Full RB)



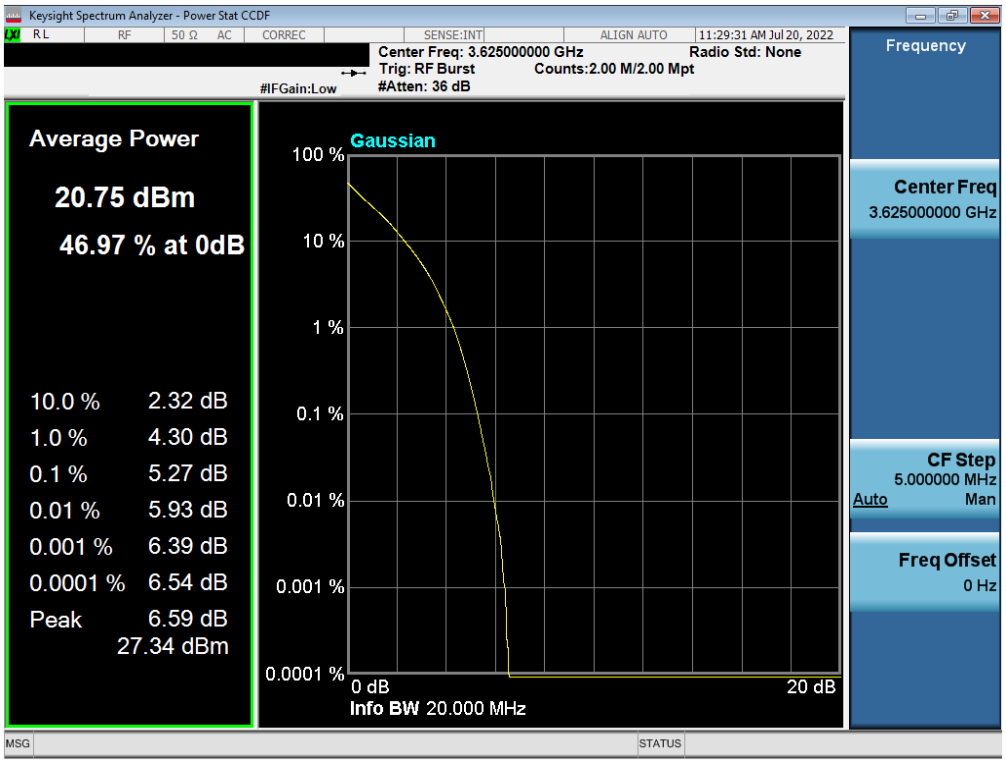
Plot 7-81. PAR Plot (LTE Band 48 - 15MHz 16-QAM - Full RB)



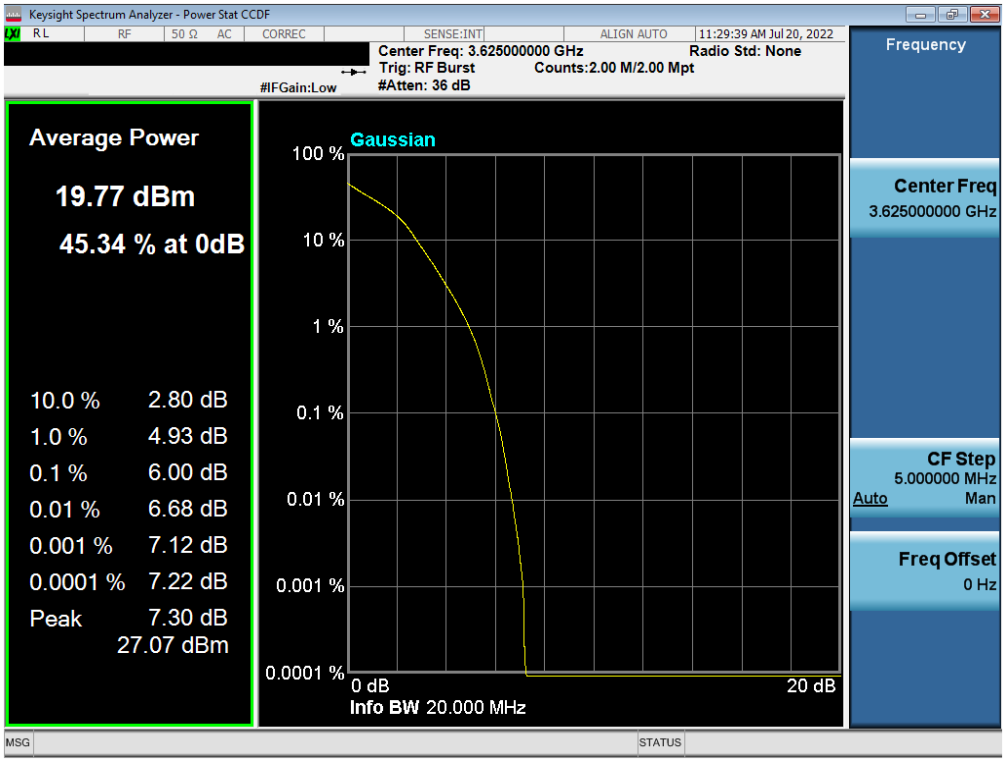
Plot 7-82. PAR Plot (LTE Band 48 - 15MHz 64-QAM - Full RB)



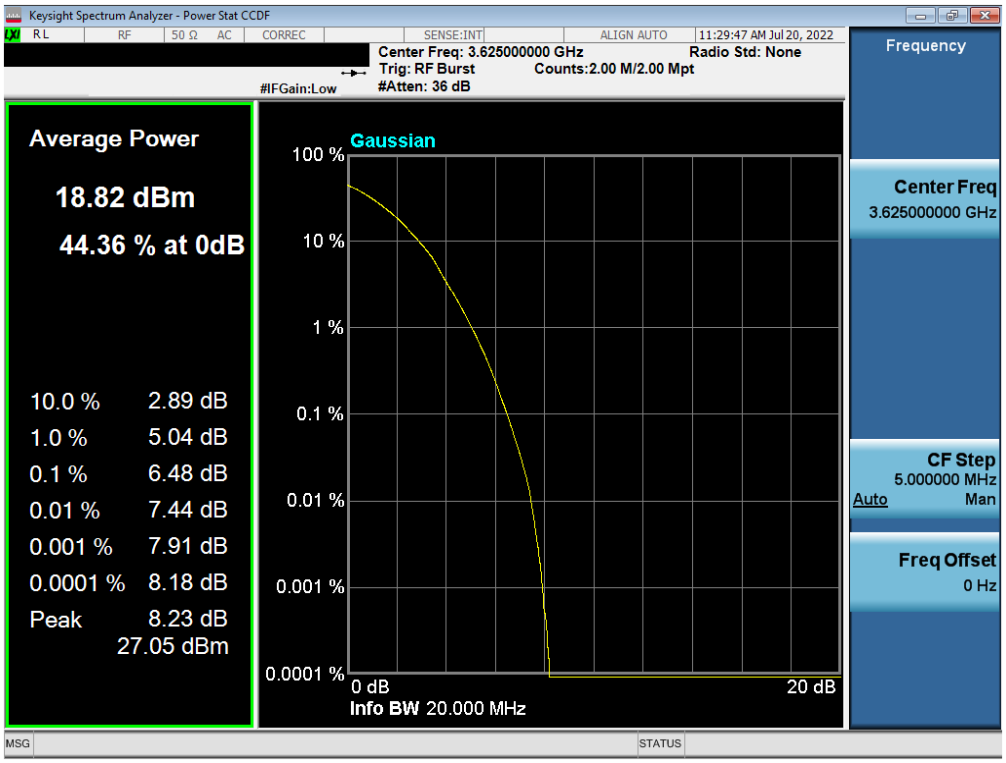
Plot 7-83. PAR Plot (LTE Band 48 - 15MHz 256-QAM - Full RB)



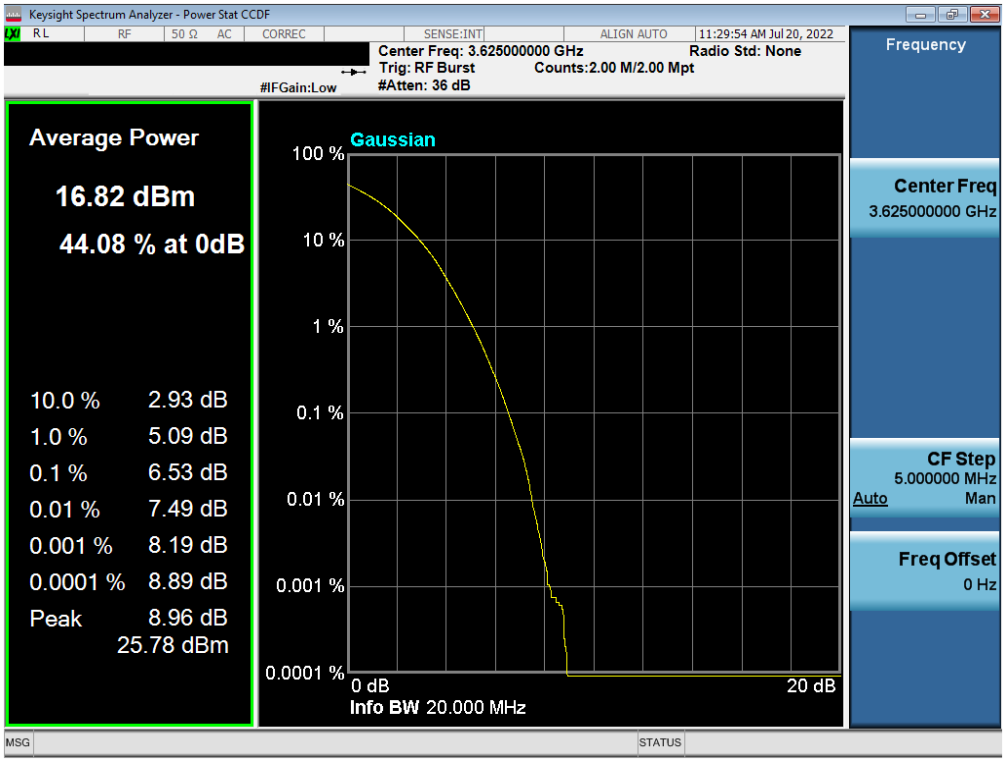
Plot 7-84. PAR Plot (LTE Band 48 - 20MHz QPSK - Full RB)



Plot 7-85. PAR Plot (LTE Band 48 - 20MHz 16-QAM - Full RB)



Plot 7-86. PAR Plot (LTE Band 48 - 20MHz 64-QAM - Full RB)



Plot 7-87. PAR Plot (LTE Band 48 - 20MHz 256-QAM - Full RB)

7.6 Radiated Power (EIRP)

§96.41(b)

Test Overview

Equivalent Isotropic Radiated Power (EIRP) measurements are calculated by adding highest antenna gain to maximum measured conducted output power. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI C63.26-2015

Test Settings

The relevant equation for determining the EIRP from the conducted RF output power measured is:

EIRP = PMeas – LC + GT

Where:

EIRP = Equivalent Isotropic Radiated Power (expressed in the same units as PMeas, typically dBW or dBm)

PMeas = measured transmitter output power or PSD, in dBW or dBm

LC = signal attenuation in the connecting cable between the transmitter and antenna in dB

GT = gain of the transmitting antenna, in dBi (EIRP)

Test Setup

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

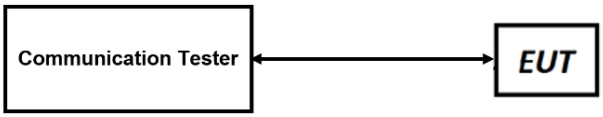


Figure 7-5. EIRP Measurement Setup

Test Notes

1) The worst case emissions are reported with the modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

3) The Level (dBm) readings in the table were taken with a correction table loaded into the base station simulator. The correction table was used to account for the signal attenuation in the connecting cable between the transmitter and antenna.

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).

5) Uplink carrier aggregation for LTE B48 is only supported in this EUT while operating in Power Class 3.

6) For ULCA, conducted power measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device.

Antenna 3b – EIRP

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
5 MHz	QPSK	3552.5	2.60	1 / 0	19.40	**22.00**	**0.158**	23.00	-1.00
		3625.0	2.60	1 / 24	19.23	21.83	0.152	23.00	-1.17
		3697.5	2.60	1 / 0	19.31	21.91	0.155	23.00	-1.09
	16-QAM	3552.5	2.60	1 / 0	18.38	**20.98**	0.125	23.00	-2.02
	64-QAM	3552.5	2.60	1 / 0	17.74	**20.34**	0.108	23.00	-2.66
	256-QAM	3552.5	2.60	1 / 0	14.65	**17.25**	**0.053**	23.00	-5.75
10 MHz	QPSK	3555.0	2.60	1 / 49	19.40	**22.00**	**0.158**	23.00	-1.00
		3625.0	2.60	1 / 49	19.14	21.74	0.149	23.00	-1.26
		3695.0	2.60	1 / 0	19.28	21.88	0.154	23.00	-1.12
	16-QAM	3695.0	2.60	1 / 0	18.48	**21.08**	0.128	23.00	-1.92
	64-QAM	3555.0	2.60	1 / 0	17.38	**19.98**	0.100	23.00	-3.02
	256-QAM	3555.0	2.60	1 / 0	14.47	**17.07**	**0.051**	23.00	-5.93
15 MHz	QPSK	3557.5	2.60	1 / 74	19.30	21.90	0.155	23.00	-1.10
		3625.0	2.60	1 / 74	19.30	21.90	0.155	23.00	-1.10
		3692.5	2.60	1 / 37	19.40	**22.00**	**0.158**	23.00	-1.00
	16-QAM	3692.5	2.60	1 / 37	18.57	**21.17**	0.131	23.00	-1.83
	64-QAM	3625.0	2.60	1 / 74	17.32	**19.92**	0.098	23.00	-3.08
	256-QAM	3692.5	2.60	1 / 74	14.51	**17.11**	**0.051**	23.00	-5.89
20 MHz	QPSK	3560.0	2.60	1 / 99	19.40	**22.00**	**0.158**	23.00	-1.00
		3625.0	2.60	1 / 99	19.38	21.98	0.158	23.00	-1.02
		3690.0	2.60	1 / 0	19.37	21.97	0.157	23.00	-1.03
	16-QAM	3625.0	2.60	1 / 99	18.66	**21.26**	0.134	23.00	-1.74
	64-QAM	3560.0	2.60	1 / 99	17.55	**20.15**	0.104	23.00	-2.85
	256-QAM	3560.0	2.60	1 / 99	15.00	**17.60**	**0.058**	23.00	-5.40

Table 7-2. EIRP Data (LTE Band 48)

Power State	Band	Bandwidth (PCC + SCC)	PCC					SCC					ULCA Conducted Power [dBm]	Ant. Gain [dBi]	EIRP [dBm/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
			Modulation	UL Channel	UL Frequency [MHz]	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency [MHz]	UL # RB	UL RB Offset						
Max	LTE B48	20MHz + 5MHz	QPSK	55340	3560.0	1	99	QPSK	55457	3571.7	1	0	19.36	2.60	21.96	0.157	23.00	-1.04
				55990	3625.0	1	99		56107	3636.7	1	0	19.14	2.60	21.74	0.149	23.00	-1.26
				56640	3690.0	1	0		56523	3678.3	1	24	19.16	2.60	21.76	0.150	23.00	-1.24
			QPSK	55340	3560	100	0	QPSK	55457	3571.7	25	0	17.58	2.60	20.18	0.104	23.00	-2.82
			16-QAM	55340	3560	100	0	16-QAM	55457	3571.7	25	0	16.55	2.60	19.15	0.082	23.00	-3.85
			64-QAM	55340	3560	100	0	64-QAM	55457	3571.7	25	0	16.49	2.60	19.09	0.081	23.00	-3.91
			256-QAM	55340	3560	100	0	256-QAM	55457	3571.7	25	0	14.56	2.60	17.16	0.052	23.00	-5.84
Max	LTE B48	20MHz + 10MHz	QPSK	55340	3560.0	1	99	QPSK	55484	3574.4	1	0	19.28	2.60	21.88	0.154	23.00	-1.12
				55990	3625.0	1	99		56134	3639.4	1	0	19.28	2.60	21.88	0.154	23.00	-1.12
				56640	3690.0	1	0		56496	3675.6	1	49	19.20	2.60	21.80	0.151	23.00	-1.20
			QPSK	55340	3560	100	0	QPSK	55484	3574.4	50	0	17.59	2.60	20.19	0.104	23.00	-2.81
			16-QAM	55340	3560	100	0	16-QAM	55484	3574.4	50	0	16.40	2.60	19.00	0.079	23.00	-4.00
			64-QAM	55340	3560	100	0	64-QAM	55484	3574.4	50	0	16.57	2.60	19.17	0.083	23.00	-3.83
			256-QAM	55340	3560	100	0	256-QAM	55484	3574.4	50	0	14.51	2.60	17.11	0.051	23.00	-5.89
Max	LTE B48	20MHz + 15MHz	QPSK	55340	3560.0	1	99	QPSK	55511	3577.1	1	0	19.28	2.60	21.88	0.154	23.00	-1.12
				55990	3625.0	1	99		56161	3642.1	1	0	19.13	2.60	21.73	0.149	23.00	-1.27
				56640	3690.0	1	0		56469	3672.9	1	74	19.28	2.60	21.88	0.154	23.00	-1.12
			QPSK	55340	3560	100	0	QPSK	55511	3577.1	75	0	17.50	2.60	20.10	0.102	23.00	-2.90
			16-QAM	55340	3560	100	0	16-QAM	55511	3577.1	75	0	16.51	2.60	19.11	0.081	23.00	-3.89
			64-QAM	55340	3560	100	0	64-QAM	55511	3577.1	75	0	16.50	2.60	19.10	0.081	23.00	-3.90
			256-QAM	55340	3560	100	0	256-QAM	55511	3577.1	75	0	14.49	2.60	17.09	0.051	23.00	-5.91
Max	LTE B48	20MHz + 20MHz	QPSK	55340	3560.0	1	99	QPSK	55538	3579.8	1	0	19.31	2.60	21.91	0.155	23.00	-1.09
				55990	3625.0	1	99		56188	3644.8	1	0	19.39	2.60	21.99	0.158	23.00	-1.01
				56640	3690.0	1	0		56442	3670.2	1	99	19.19	2.60	21.79	0.151	23.00	-1.21
			QPSK	55990	3625	100	0	QPSK	56188	3644.8	100	0	17.43	2.60	20.03	0.101	23.00	-2.97
			16-QAM	55990	3625	100	0	16-QAM	56188	3644.8	100	0	16.45	2.60	19.05	0.080	23.00	-3.95
			64-QAM	55990	3625	100	0	64-QAM	56188	3644.8	100	0	16.55	2.60	19.15	0.082	23.00	-3.85
			256-QAM	55990	3625	100	0	256-QAM	56188	3644.8	100	0	14.55	2.60	17.15	0.052	23.00	-5.85

Table 7-3. EIRP Data (ULCA Band 48)

Antenna 2a – EIRP

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
5 MHz	QPSK	3552.5	2.20	1 / 24	19.80	**22.00**	**0.158**	23.00	-1.00
		3625.0	2.20	1 / 0	19.57	21.77	0.150	23.00	-1.23
		3697.5	2.20	1 / 0	19.61	21.81	0.152	23.00	-1.19
	16-QAM	3552.5	2.20	1 / 12	18.81	**21.01**	0.126	23.00	-1.99
	64-QAM	3625.0	2.20	1 / 24	18.20	**20.40**	0.110	23.00	-2.60
	256-QAM	3552.5	2.20	1 / 0	14.94	**17.14**	**0.052**	23.00	-5.86
10 MHz	QPSK	3555.0	2.20	1 / 0	19.80	**22.00**	**0.158**	23.00	-1.00
		3625.0	2.20	1 / 0	19.61	21.81	0.152	23.00	-1.19
		3695.0	2.20	1 / 49	19.70	21.90	0.155	23.00	-1.10
	16-QAM	3625.0	2.20	1 / 49	18.80	**21.00**	0.126	23.00	-2.00
	64-QAM	3625.0	2.20	1 / 49	18.24	**20.44**	0.111	23.00	-2.56
	256-QAM	3555.0	2.20	50 / 0	14.84	**17.04**	**0.051**	23.00	-5.96
15 MHz	QPSK	3557.5	2.20	1 / 0	19.80	**22.00**	**0.158**	23.00	-1.00
		3625.0	2.20	1 / 74	19.76	21.96	0.157	23.00	-1.04
		3692.5	2.20	1 / 37	19.78	21.98	0.158	23.00	-1.02
	16-QAM	3625.0	2.20	1 / 37	18.95	**21.15**	0.130	23.00	-1.85
	64-QAM	3625.0	2.20	1 / 74	18.38	**20.58**	0.114	23.00	-2.42
	256-QAM	3557.5	2.20	75 / 0	14.92	**17.12**	**0.052**	23.00	-5.88
20 MHz	QPSK	3560.0	2.20	1 / 0	19.72	21.92	0.156	23.00	-1.08
		3625.0	2.20	1 / 0	19.68	21.88	0.154	23.00	-1.12
		3690.0	2.20	1 / 0	19.80	**22.00**	**0.158**	23.00	-1.00
	16-QAM	3560.0	2.20	1 / 0	18.58	**20.78**	0.120	23.00	-2.22
	64-QAM	3560.0	2.20	1 / 99	18.34	**20.54**	0.113	23.00	-2.46
	256-QAM	3690.0	2.20	100 / 0	14.91	**17.11**	**0.051**	23.00	-5.89

Table 7-4. EIRP Data (LTE Band 48)

Power State	Band	Bandwidth (PCC + SCC)	PCC					SCC					ULCA Conducted Power [dBm]	Ant. Gain [dBi]	EIRP [dBm/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
			Modulation	UL Channel	UL Frequency [MHz]	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency [MHz]	UL # RB	UL RB Offset						
Max	LTE B48	20MHz + 5MHz	QPSK	55340	3560.0	1	99	QPSK	55457	3571.7	1	0	19.75	2.20	21.95	0.157	23.00	-1.05
				55990	3625.0	1	99		56107	3636.7	1	0	19.63	2.20	21.83	0.152	23.00	-1.17
				56640	3690.0	1	0		56523	3678.3	1	24	19.50	2.20	21.70	0.148	23.00	-1.30
			QPSK	55340	3560	100	0	QPSK	55457	3571.7	25	0	17.91	2.20	20.11	0.103	23.00	-2.89
			16-QAM	55340	3560	100	0	16-QAM	55457	3571.7	25	0	16.93	2.20	19.13	0.082	23.00	-3.87
			64-QAM	55340	3560	100	0	64-QAM	55457	3571.7	25	0	16.87	2.20	19.07	0.081	23.00	-3.93
			256-QAM	55340	3560	100	0	256-QAM	55457	3571.7	25	0	14.85	2.20	17.05	0.051	23.00	-5.95
Max	LTE B48	20MHz + 10MHz	QPSK	55340	3560.0	1	99	QPSK	55484	3574.4	1	0	19.68	2.20	21.88	0.154	23.00	-1.12
				55990	3625.0	1	99		56134	3639.4	1	0	19.79	2.20	21.99	0.158	23.00	-1.01
				56640	3690.0	1	0		56496	3675.6	1	49	19.57	2.20	21.77	0.150	23.00	-1.23
			QPSK	55990	3625	100	0	QPSK	56134	3639.4	50	0	17.90	2.20	20.10	0.102	23.00	-2.90
			16-QAM	55990	3625	100	0	16-QAM	56134	3639.4	50	0	16.93	2.20	19.13	0.082	23.00	-3.87
			64-QAM	55990	3625	100	0	64-QAM	56134	3639.4	50	0	16.98	2.20	19.18	0.083	23.00	-3.82
			256-QAM	55990	3625	100	0	256-QAM	56134	3639.4	50	0	14.95	2.20	17.15	0.052	23.00	-5.85
Max	LTE B48	20MHz + 15MHz	QPSK	55340	3560.0	1	99	QPSK	55511	3577.1	1	0	19.55	2.20	21.75	0.150	23.00	-1.25
				55990	3625.0	1	99		56161	3642.1	1	0	19.51	2.20	21.71	0.148	23.00	-1.29
				56640	3690.0	1	0		56469	3672.9	1	74	19.63	2.20	21.83	0.152	23.00	-1.17
			QPSK	56640	3690	100	0	QPSK	56469	3672.9	75	0	17.96	2.20	20.16	0.104	23.00	-2.84
			16-QAM	56640	3690	100	0	16-QAM	56469	3672.9	75	0	16.80	2.20	19.00	0.079	23.00	-4.00
			64-QAM	56640	3690	100	0	64-QAM	56469	3672.9	75	0	16.97	2.20	19.17	0.083	23.00	-3.83
			256-QAM	56640	3690	100	0	256-QAM	56469	3672.9	75	0	14.88	2.20	17.08	0.051	23.00	-5.92
Max	LTE B48	20MHz + 20MHz	QPSK	55340	3560.0	1	99	QPSK	55538	3579.8	1	0	19.53	2.20	21.73	0.149	23.00	-1.27
				55990	3625.0	1	99		56188	3644.8	1	0	19.54	2.20	21.74	0.149	23.00	-1.26
				56640	3690.0	1	0		56442	3670.2	1	99	19.80	2.20	22.00	0.158	23.00	-1.00
			QPSK	56640	3690	100	0	QPSK	56442	3670.2	100	0	17.81	2.20	20.01	0.100	23.00	-2.99
			16-QAM	56640	3690	100	0	16-QAM	56442	3670.2	100	0	16.97	2.20	19.17	0.083	23.00	-3.83
			64-QAM	56640	3690	100	0	64-QAM	56442	3670.2	100	0	16.85	2.20	19.05	0.080	23.00	-3.95
			256-QAM	56640	3690	100	0	256-QAM	56442	3670.2	100	0	14.94	2.20	17.14	0.052	23.00	-5.86

Table 7-5. EIRP Data (ULCA Band 48)

Antenna 4 – EIRP

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
5 MHz	QPSK	3552.5	2.50	1 / 0	19.50	**22.00**	**0.158**	23.00	-1.00
		3625.0	2.50	1 / 0	19.30	**21.80**	0.151	23.00	-1.20
		3697.5	2.50	1 / 0	19.14	21.64	0.146	23.00	-1.36
	16-QAM	3552.5	2.50	1 / 0	18.51	**21.01**	0.126	23.00	-1.99
	64-QAM	3552.5	2.50	1 / 24	17.87	**20.37**	0.109	23.00	-2.63
	256-QAM	3552.5	2.50	1 / 24	14.75	**17.25**	**0.053**	23.00	-5.75
10 MHz	QPSK	3555.0	2.50	1 / 49	19.50	**22.00**	**0.158**	23.00	-1.00
		3625.0	2.50	1 / 0	19.23	21.73	0.149	23.00	-1.27
		3695.0	2.50	1 / 49	19.20	21.70	0.148	23.00	-1.30
	16-QAM	3625.0	2.50	1 / 0	18.59	**21.09**	0.129	23.00	-1.91
	64-QAM	3555.0	2.50	1 / 0	17.49	**19.99**	0.100	23.00	-3.01
	256-QAM	3555.0	2.50	1 / 0	14.54	**17.04**	**0.051**	23.00	-5.96
15 MHz	QPSK	3557.5	2.50	1 / 74	19.50	**22.00**	**0.158**	23.00	-1.00
		3625.0	2.50	1 / 0	19.44	21.94	0.156	23.00	-1.06
		3692.5	2.50	1 / 0	19.32	21.82	0.152	23.00	-1.18
	16-QAM	3625.0	2.50	1 / 37	18.63	**21.13**	0.130	23.00	-1.87
	64-QAM	3625.0	2.50	1 / 0	17.47	**19.97**	0.099	23.00	-3.03
	256-QAM	3557.5	2.50	75 / 0	14.66	**17.16**	**0.052**	23.00	-5.84
20 MHz	QPSK	3560.0	2.50	1 / 99	19.50	**22.00**	**0.158**	23.00	-1.00
		3625.0	2.50	1 / 0	19.37	21.87	0.154	23.00	-1.13
		3690.0	2.50	1 / 0	19.18	21.68	0.147	23.00	-1.32
	16-QAM	3625.0	2.50	1 / 0	18.74	**21.24**	0.133	23.00	-1.76
	64-QAM	3560.0	2.50	1 / 99	17.63	**20.13**	0.103	23.00	-2.87
	256-QAM	3560.0	2.50	1 / 99	15.13	**17.63**	**0.058**	23.00	-5.37

Table 7-6. EIRP Data (LTE Band 48)

Power State	Band	Bandwidth (PCC + SCC)	PCC					SCC					ULCA Conducted Power [dBm]	Ant. Gain [dBi]	EIRP [dBm/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
			Modulation	UL Channel	UL Frequency [MHz]	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency [MHz]	UL # RB	UL RB Offset						
Max	LTE B48	20MHz + 5MHz	QPSK	55340	3560.0	1	99	QPSK	55457	3571.7	1	0	19.44	2.50	21.94	0.156	23.00	-1.06
				55990	3625.0	1	99		56107	3636.7	1	0	19.29	2.50	21.79	0.151	23.00	-1.21
				56640	3690.0	1	0		56523	3678.3	1	24	19.40	2.50	21.90	0.155	23.00	-1.10
			QPSK	55340	3560	100	0	QPSK	55457	3571.7	25	0	17.66	2.50	20.16	0.104	23.00	-2.84
			16-QAM	55340	3560	100	0	16-QAM	55457	3571.7	25	0	16.56	2.50	19.06	0.081	23.00	-3.94
			64-QAM	55340	3560	100	0	64-QAM	55457	3571.7	25	0	16.67	2.50	19.17	0.083	23.00	-3.83
			256-QAM	55340	3560	100	0	256-QAM	55457	3571.7	25	0	14.54	2.50	17.04	0.051	23.00	-5.96
Max	LTE B48	20MHz + 10MHz	QPSK	55340	3560.0	1	99	QPSK	55484	3574.4	1	0	19.23	2.50	21.73	0.149	23.00	-1.27
				55990	3625.0	1	99		56134	3639.4	1	0	19.22	2.50	21.72	0.149	23.00	-1.28
				56640	3690.0	1	0		56496	3675.6	1	49	19.22	2.50	21.72	0.149	23.00	-1.28
			QPSK	55340	3560	100	0	QPSK	55484	3574.4	50	0	17.57	2.50	20.07	0.102	23.00	-2.93
			16-QAM	55340	3560	100	0	16-QAM	55484	3574.4	50	0	16.69	2.50	19.19	0.083	23.00	-3.81
			64-QAM	55340	3560	100	0	64-QAM	55484	3574.4	50	0	16.64	2.50	19.14	0.082	23.00	-3.86
			256-QAM	55340	3560	100	0	256-QAM	55484	3574.4	50	0	14.64	2.50	17.14	0.052	23.00	-5.86
Max	LTE B48	20MHz + 15MHz	QPSK	55340	3560.0	1	99	QPSK	55511	3577.1	1	0	19.47	2.50	21.97	0.157	23.00	-1.03
				55990	3625.0	1	99		56161	3642.1	1	0	19.40	2.50	21.90	0.155	23.00	-1.10
				56640	3690.0	1	0		56469	3672.9	1	74	19.20	2.50	21.70	0.148	23.00	-1.30
			QPSK	55340	3560	100	0	QPSK	55511	3577.1	75	0	17.50	2.50	20.00	0.100	23.00	-3.00
			16-QAM	55340	3560	100	0	16-QAM	55511	3577.1	75	0	16.65	2.50	19.15	0.082	23.00	-3.85
			64-QAM	55340	3560	100	0	64-QAM	55511	3577.1	75	0	16.60	2.50	19.10	0.081	23.00	-3.90
			256-QAM	55340	3560	100	0	256-QAM	55511	3577.1	75	0	14.61	2.50	17.11	0.051	23.00	-5.89
Max	LTE B48	20MHz + 20MHz	QPSK	55340	3560.0	1	99	QPSK	55538	3579.8	1	0	19.32	2.50	21.82	0.152	23.00	-1.18
				55990	3625.0	1	99		56188	3644.8	1	0	19.27	2.50	21.77	0.150	23.00	-1.23
				56640	3690.0	1	0		56442	3670.2	1	99	19.47	2.50	21.97	0.157	23.00	-1.03
			QPSK	56640	3690	100	0	QPSK	56442	3670.2	100	0	17.56	2.50	20.06	0.101	23.00	-2.94
			16-QAM	56640	3690	100	0	16-QAM	56442	3670.2	100	0	16.56	2.50	19.06	0.081	23.00	-3.94
			64-QAM	56640	3690	100	0	64-QAM	56442	3670.2	100	0	16.61	2.50	19.11	0.081	23.00	-3.89
			256-QAM	56640	3690	100	0	256-QAM	56442	3670.2	100	0	14.56	2.50	17.06	0.051	23.00	-5.94

Table 7-7. EIRP Data (ULCA Band 48)

Antenna 1a – EIRP

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
5 MHz	QPSK	3552.5	0.20	1 / 0	21.20	**21.40**	**0.138**	23.00	-1.60
		3625.0	0.20	1 / 24	21.01	21.21	0.132	23.00	-1.79
		3697.5	0.20	1 / 0	21.13	21.33	0.136	23.00	-1.67
	16-QAM	3552.5	0.20	1 / 0	20.20	**20.40**	0.110	23.00	-2.60
	64-QAM	3552.5	0.20	1 / 24	19.59	**19.79**	0.095	23.00	-3.21
	256-QAM	3552.5	0.20	1 / 24	16.50	**16.70**	**0.047**	23.00	-6.30
10 MHz	QPSK	3555.0	0.20	1 / 49	21.20	**21.40**	**0.138**	23.00	-1.60
		3625.0	0.20	1 / 49	20.96	21.16	0.131	23.00	-1.84
		3695.0	0.20	1 / 49	21.08	21.28	0.134	23.00	-1.72
	16-QAM	3695.0	0.20	1 / 49	20.20	**20.40**	0.110	23.00	-2.60
	64-QAM	3555.0	0.20	1 / 49	19.19	**19.39**	0.087	23.00	-3.61
	256-QAM	3555.0	0.20	1 / 49	16.28	**16.48**	**0.044**	23.00	-6.52
15 MHz	QPSK	3557.5	0.20	1 / 74	21.13	21.33	0.136	23.00	-1.67
		3625.0	0.20	1 / 74	21.11	21.31	0.135	23.00	-1.69
		3692.5	0.20	1 / 0	21.20	**21.40**	**0.138**	23.00	-1.60
	16-QAM	3692.5	0.20	1 / 0	20.35	**20.55**	0.114	23.00	-2.45
	64-QAM	3625.0	0.20	1 / 74	19.09	**19.29**	0.085	23.00	-3.71
	256-QAM	3692.5	0.20	1 / 74	16.31	**16.51**	**0.045**	23.00	-6.49
20 MHz	QPSK	3560.0	0.20	1 / 0	21.20	**21.40**	**0.138**	23.00	-1.60
		3625.0	0.20	1 / 99	21.14	21.34	0.136	23.00	-1.66
		3690.0	0.20	1 / 99	21.15	21.35	0.136	23.00	-1.65
	16-QAM	3625.0	0.20	1 / 99	20.45	**20.65**	0.116	23.00	-2.35
	64-QAM	3560.0	0.20	1 / 0	19.30	**19.50**	0.089	23.00	-3.50
	256-QAM	3560.0	0.20	1 / 0	16.76	**16.96**	**0.050**	23.00	-6.04

Table 7-8. EIRP Data (LTE Band 48)

Power State	Band	Bandwidth (PCC + SCC)	PCC					SCC					ULCA Conducted Power [dBm]	Ant. Gain [dBi]	EIRP [dBm/10MHz]	EIRP [Watts/10MHz]	EIRP Limit [dBm/10MHz]	Margin [dB]
			Modulation	UL Channel	UL Frequency [MHz]	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency [MHz]	UL # RB	UL RB Offset						
Max	LTE B48	20MHz + 5MHz	QPSK	55340	3560.0	1	99	QPSK	55457	3571.7	1	0	21.25	0.20	21.45	0.140	23.00	-1.55
				55990	3625.0	1	99		56107	3636.7	1	0	21.30	0.20	21.50	0.141	23.00	-1.50
				56640	3690.0	1	0		56523	3678.3	1	24	21.39	0.20	21.59	0.144	23.00	-1.41
			QPSK	56640	3690	100	0	QPSK	56523	3678.3	25	0	19.70	0.20	19.90	0.098	23.00	-3.10
			16-QAM	56640	3690	100	0	16-QAM	56523	3678.3	25	0	18.62	0.20	18.82	0.076	23.00	-4.18
			64-QAM	56640	3690	100	0	64-QAM	56523	3678.3	25	0	18.58	0.20	18.78	0.076	23.00	-4.22
			256-QAM	56640	3690	100	0	256-QAM	56523	3678.3	25	0	16.69	0.20	16.89	0.049	23.00	-6.11
Max	LTE B48	20MHz + 10MHz	QPSK	55340	3560.0	1	99	QPSK	55484	3574.4	1	0	21.49	0.20	21.69	0.148	23.00	-1.31
				55990	3625.0	1	99		56134	3639.4	1	0	21.24	0.20	21.44	0.139	23.00	-1.56
				56640	3690.0	1	0		56496	3675.6	1	49	21.42	0.20	21.62	0.145	23.00	-1.38
			QPSK	55340	3560	100	0	QPSK	55484	3574.4	50	0	19.64	0.20	19.84	0.096	23.00	-3.16
			16-QAM	55340	3560	100	0	16-QAM	55484	3574.4	50	0	18.61	0.20	18.81	0.076	23.00	-4.19
			64-QAM	55340	3560	100	0	64-QAM	55484	3574.4	50	0	18.52	0.20	18.72	0.074	23.00	-4.28
			256-QAM	55340	3560	100	0	256-QAM	55484	3574.4	50	0	16.50	0.20	16.70	0.047	23.00	-6.30
Max	LTE B48	20MHz + 15MHz	QPSK	55340	3560.0	1	99	QPSK	55511	3577.1	1	0	21.21	0.20	21.41	0.138	23.00	-1.59
				55990	3625.0	1	99		56161	3642.1	1	0	21.41	0.20	21.61	0.145	23.00	-1.39
				56640	3690.0	1	0		56469	3672.9	1	74	21.35	0.20	21.55	0.143	23.00	-1.45
			QPSK	55990	3625	100	0	QPSK	56161	3642.1	75	0	19.57	0.20	19.77	0.095	23.00	-3.23
			16-QAM	55990	3625	100	0	16-QAM	56161	3642.1	75	0	18.59	0.20	18.79	0.076	23.00	-4.21
			64-QAM	55990	3625	100	0	64-QAM	56161	3642.1	75	0	18.54	0.20	18.74	0.075	23.00	-4.26
			256-QAM	55990	3625	100	0	256-QAM	56161	3642.1	75	0	16.51	0.20	16.71	0.047	23.00	-6.29
Max	LTE B48	20MHz + 20MHz	QPSK	55340	3560.0	1	99	QPSK	55538	3579.8	1	0	21.23	0.20	21.43	0.139	23.00	-1.57
				55990	3625.0	1	99		56188	3644.8	1	0	21.49	0.20	21.69	0.148	23.00	-1.31
				56640	3690.0	1	0		56442	3670.2	1	99	21.27	0.20	21.47	0.140	23.00	-1.53
			QPSK	55990	3625	100	0	QPSK	56188	3644.8	100	0	19.56	0.20	19.76	0.095	23.00	-3.24
			16-QAM	55990	3625	100	0	16-QAM	56188	3644.8	100	0	18.69	0.20	18.89	0.077	23.00	-4.11
			64-QAM	55990	3625	100	0	64-QAM	56188	3644.8	100	0	18.51	0.20	18.71	0.074	23.00	-4.29
			256-QAM	55990	3625	100	0	256-QAM	56188	3644.8	100	0	16.56	0.20	16.76	0.047	23.00	-6.24

Table 7-9. EIRP Data (ULCA Band 48)

7.7 Radiated Spurious Emissions

§2.1053 §96.41(e)

Test Overview

Radiated spurious emissions measurements are performed using the field strength conversion method described in KDB 971168 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized broadband hybrid antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed while the EUT is operating at maximum power and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI C63.26-2015

TIA-603-E-2016 – Section 2.2.12

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.

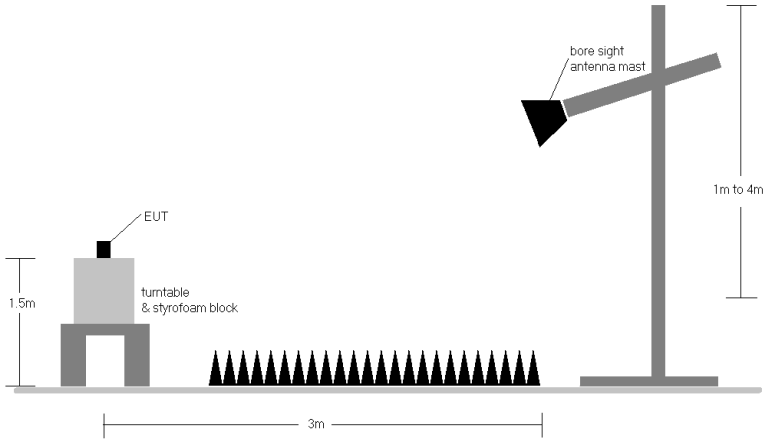


Figure 7-6. Test Instrument & Measurement Setup

Test Notes

1. Field strengths are calculated using the Measurement quantity conversions in KDB 971168 Section 5.8.4.
   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. 1RB config was found and reported as a worst case RB size.

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. 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.

8. For LTE Band 48 pre-scans 1-18GHz, the RBW is set to 1MHz and VBW to 30kHz. For final measurements above 1GHz, the RBW is set to 1MHz and VBW to 3MHz when measuring with an RMS detector and max hold trace.

9. Uplink carrier aggregation intra-band radiated spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. The worst case (highest) emissions were found while operating with QPSK modulation with both carriers set to transmit using 1RB

7.7.1 Antenna 3b Radiated Spurious Emissions Measurements

LTE Band 48

Bandwidth (MHz):	20
Frequency (MHz):	3560.0
Modulation Signal:	QPSK
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/MHz]	Limit [dBm/MHz]	Margin [dB]
7120.0	V	-	-	-80.04	10.75	37.71	-57.55	-40.00	-17.55
10680.0	V	-	-	-82.20	15.79	40.59	-54.67	-40.00	-14.67
14240.0	V	-	-	-80.79	18.48	44.69	-50.57	-40.00	-10.57

Table 7-10. Radiated Spurious Data (LTE Band 48 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
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/MHz]	Limit [dBm/MHz]	Margin [dB]
7250.0	V	-	-	-79.91	11.59	38.68	-56.57	-40.00	-16.57
10875.0	V	-	-	-81.18	15.46	41.28	-53.98	-40.00	-13.98
14500.0	V	-	-	-80.54	20.16	46.62	-48.63	-40.00	-8.63

Table 7-11. Radiated Spurious Data (LTE Band 48 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	3690.0
Modulation Signal:	QPSK
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/MHz]	Limit [dBm/MHz]	Margin [dB]
7380.0	V	-	-	-79.98	10.90	37.92	-57.34	-40.00	-17.34
11070.0	V	-	-	-82.13	15.98	40.85	-54.41	-40.00	-14.41
14760.0	V	-	-	-82.32	20.78	45.46	-49.79	-40.00	-9.79

Table 7-12. Radiated Spurious Data (LTE Band 48 – High Channel)

ULCA Band 48

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
Modulation Signal:	QPSK

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/MHz]	Limit [dBm/MHz]	Margin [dB]
7120.0	V	-	-	-79.65	8.93	36.28	-58.98	-40.00	-18.98
10680.0	V	-	-	-83.30	14.88	38.58	-56.68	-40.00	-16.68
14240.0	V	-	-	-83.87	19.01	42.14	-53.12	-40.00	-13.12

Table 7-13. Radiated Spurious Data (ULCA Band 48– Low 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 / 0
Modulation Signal:	QPSK

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/MHz]	Limit [dBm/MHz]	Margin [dB]
7250.0	V	-	-	-79.82	8.96	36.14	-59.12	-40.00	-19.12
10875.0	V	-	-	-83.37	15.24	38.87	-56.39	-40.00	-16.39
14500.0	V	-	-	-83.95	19.82	42.87	-52.39	-40.00	-12.39

Table 7-14. Radiated Spurious Data (ULCA Band 48– Mid Channel)

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
Modulation Signal:	QPSK

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/MHz]	Limit [dBm/MHz]	Margin [dB]
7380.0	V	-	-	-79.81	9.33	36.52	-58.74	-40.00	-18.74
11070.0	V	-	-	-83.34	15.87	39.53	-55.73	-40.00	-15.73
14760.0	V	-	-	-83.79	20.82	44.03	-51.23	-40.00	-11.23

Table 7-15. Radiated Spurious Data (ULCA Band 48– High Channel)

7.7.2 Antenna 2a Radiated Spurious Emissions Measurements

LTE Band 48

Bandwidth (MHz):	20
Frequency (MHz):	3560.0
Modulation Signal:	QPSK
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/MHz]	Limit [dBm/MHz]	Margin [dB]
7120.0	H	-	-	-80.08	10.75	37.67	-57.59	-40.00	-17.59
10680.0	H	-	-	-82.20	15.79	40.59	-54.67	-40.00	-14.67
14240.0	H	-	-	-80.53	18.48	44.95	-50.31	-40.00	-10.31

Table 7-16. Radiated Spurious Data (LTE Band 48 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
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/MHz]	Limit [dBm/MHz]	Margin [dB]
7250.0	H	-	-	-80.34	11.59	38.25	-57.00	-40.00	-17.00
10875.0	H	-	-	-81.65	15.46	40.81	-54.45	-40.00	-14.45
14500.0	H	-	-	-81.38	20.16	45.78	-49.47	-40.00	-9.47

Table 7-17. Radiated Spurious Data (LTE Band 48 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	3690.0
Modulation Signal:	QPSK
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/MHz]	Limit [dBm/MHz]	Margin [dB]
7380.0	H	-	-	-80.09	10.90	37.81	-57.45	-40.00	-17.45
11070.0	H	-	-	-82.15	15.98	40.83	-54.43	-40.00	-14.43
14760.0	H	-	-	-82.24	20.78	45.54	-49.71	-40.00	-9.71

Table 7-18. Radiated Spurious Data (LTE Band 48 – High Channel)

ULCA Band 48

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
Modulation Signal:	QPSK

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/MHz]	Limit [dBm/MHz]	Margin [dB]
7120.0	H	-	-	-79.89	8.93	36.04	-59.22	-40.00	-19.22
10680.0	H	-	-	-83.35	14.88	38.53	-56.73	-40.00	-16.73
14240.0	H	-	-	-83.95	19.01	42.06	-53.20	-40.00	-13.20

Table 7-19. Radiated Spurious Data (ULCA Band 48– Low 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 / 0
Modulation Signal:	QPSK

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/MHz]	Limit [dBm/MHz]	Margin [dB]
7250.0	H	-	-	-79.81	8.96	36.15	-59.11	-40.00	-19.11
10875.0	H	-	-	-83.39	15.24	38.85	-56.41	-40.00	-16.41
14500.0	H	-	-	-83.88	19.82	42.94	-52.32	-40.00	-12.32

Table 7-20. Radiated Spurious Data (ULCA Band 48– Mid Channel)

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
Modulation Signal:	QPSK

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/MHz]	Limit [dBm/MHz]	Margin [dB]
7380.0	H	-	-	-79.80	9.33	36.53	-58.73	-40.00	-18.73
11070.0	H	-	-	-83.42	15.87	39.45	-55.81	-40.00	-15.81
14760.0	H	-	-	-83.84	20.82	43.98	-51.28	-40.00	-11.28

Table 7-21. Radiated Spurious Data (ULCA Band 48– High Channel)

7.7.3 Antenna 4 Radiated Spurious Emissions Measurements

LTE Band 48

Bandwidth (MHz):	20
Frequency (MHz):	3560.0
Modulation Signal:	QPSK
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/MHz]	Limit [dBm/MHz]	Margin [dB]
7120.0	H	-	-	-80.28	10.75	37.47	-57.79	-40.00	-17.79
10680.0	H	-	-	-82.21	15.79	40.58	-54.68	-40.00	-14.68
14240.0	H	-	-	-80.72	18.48	44.76	-50.50	-40.00	-10.50

Table 7-22. Radiated Spurious Data (LTE Band 48 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
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/MHz]	Limit [dBm/MHz]	Margin [dB]
7250.0	H	-	-	-80.45	11.59	38.14	-57.11	-40.00	-17.11
10875.0	H	-	-	-81.45	15.46	41.01	-54.25	-40.00	-14.25
14500.0	H	-	-	-81.32	20.16	45.84	-49.41	-40.00	-9.41

Table 7-23. Radiated Spurious Data (LTE Band 48 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	3690.0
Modulation Signal:	QPSK
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/MHz]	Limit [dBm/MHz]	Margin [dB]
7380.0	H	-	-	-80.14	10.90	37.76	-57.50	-40.00	-17.50
11070.0	H	-	-	-81.74	15.98	41.24	-54.02	-40.00	-14.02
14760.0	H	-	-	-82.28	20.78	45.50	-49.75	-40.00	-9.75

Table 7-24. Radiated Spurious Data (LTE Band 48 – High Channel)

ULCA Band 48

Sample #:	
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
Modulation Signal:	QPSK

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/MHz]	Limit [dBm/MHz]	Margin [dB]
7120.0	H	-	-	-79.86	8.93	36.07	-59.19	-40.00	-19.19
10680.0	H	-	-	-83.49	14.88	38.39	-56.87	-40.00	-16.87
14240.0	H	-	-	-83.71	19.01	42.30	-52.96	-40.00	-12.96

Table 7-25. Radiated Spurious Data (ULCA Band 48– Low 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 / 0
Modulation Signal:	QPSK

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/MHz]	Limit [dBm/MHz]	Margin [dB]
7250.0	H	-	-	-80.37	11.60	38.23	-57.03	-40.00	-17.03
10875.0	H	-	-	-81.78	15.45	40.67	-54.59	-40.00	-14.59
14500.0	H	-	-	-81.54	20.17	45.63	-49.63	-40.00	-9.63

Table 7-26. Radiated Spurious Data (ULCA Band 48– Mid Channel)

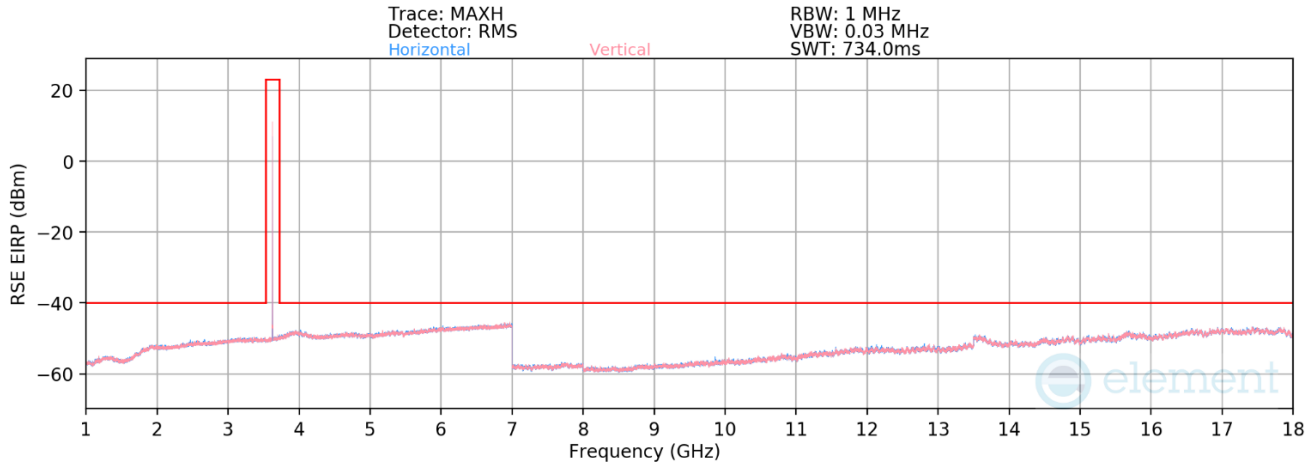
PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	3690.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	3670.2
SCC RB / Offset:	1 / 0
Modulation Signal:	QPSK

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/MHz]	Limit [dBm/MHz]	Margin [dB]
7380.0	H	-	-	-80.04	10.90	37.86	-57.40	-40.00	-17.40
11070.0	H	-	-	-82.15	15.98	40.83	-54.43	-40.00	-14.43
14760.0	H	-	-	-82.06	20.78	45.72	-49.54	-40.00	-9.54

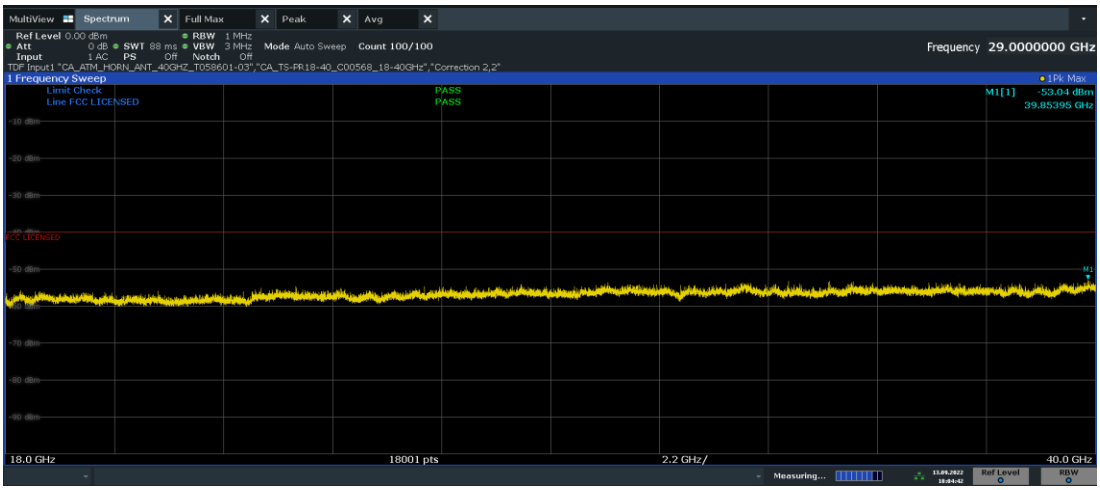
Table 7-27. Radiated Spurious Data (ULCA Band 48– High Channel)

7.7.4 Antenna 1a Radiated Spurious Emissions Measurements

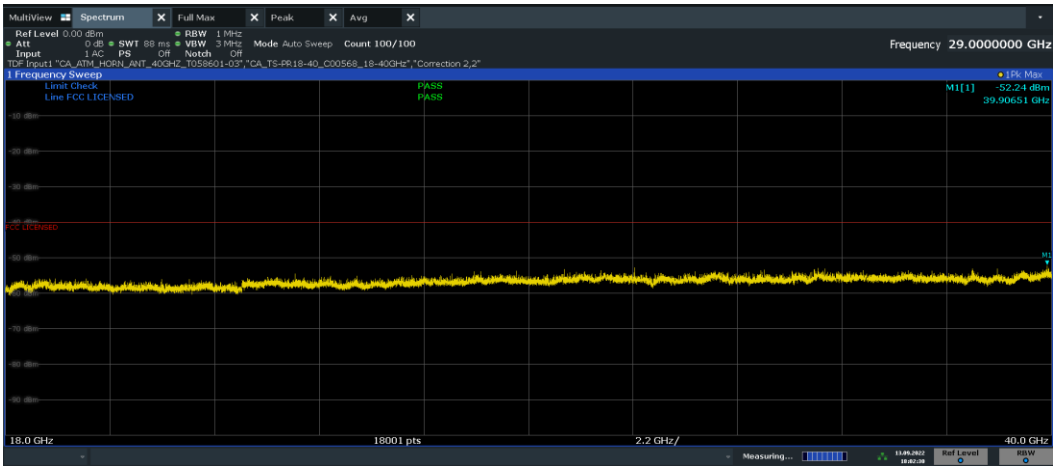
LTE Band 48



Plot 7-88. Radiated Spurious Plot 1 – 18GHz (LTE Band 48)



Plot 7-89. Radiated Spurious Plot 18 – 40GHz (LTE Band 48 – Ant. Pol H)



Plot 7-90. Radiated Spurious Plot 18 – 40GHz (LTE Band 48 – Ant. Pol V)

Bandwidth (MHz):	20
Frequency (MHz):	3560.0
Modulation Signal:	QPSK
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/MHz]	Limit [dBm/MHz]	Margin [dB]
7120.0	-	-	-	-79.75	10.75	38.00	-57.26	-40.00	-17.26
10680.0	-	-	-	-81.41	15.79	41.38	-53.88	-40.00	-13.88
14240.0	-	-	-	-80.00	18.48	45.48	-49.78	-40.00	-9.78

Table 7-28. Radiated Spurious Data (LTE Band 48 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	3625.0
Modulation Signal:	QPSK
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/MHz]	Limit [dBm/MHz]	Margin [dB]
7250.0	-	-	-	-80.14	11.59	38.45	-56.80	-40.00	-16.80
10875.0	-	-	-	-81.30	15.46	41.16	-54.10	-40.00	-14.10
14500.0	-	-	-	-80.82	20.16	46.34	-48.91	-40.00	-8.91

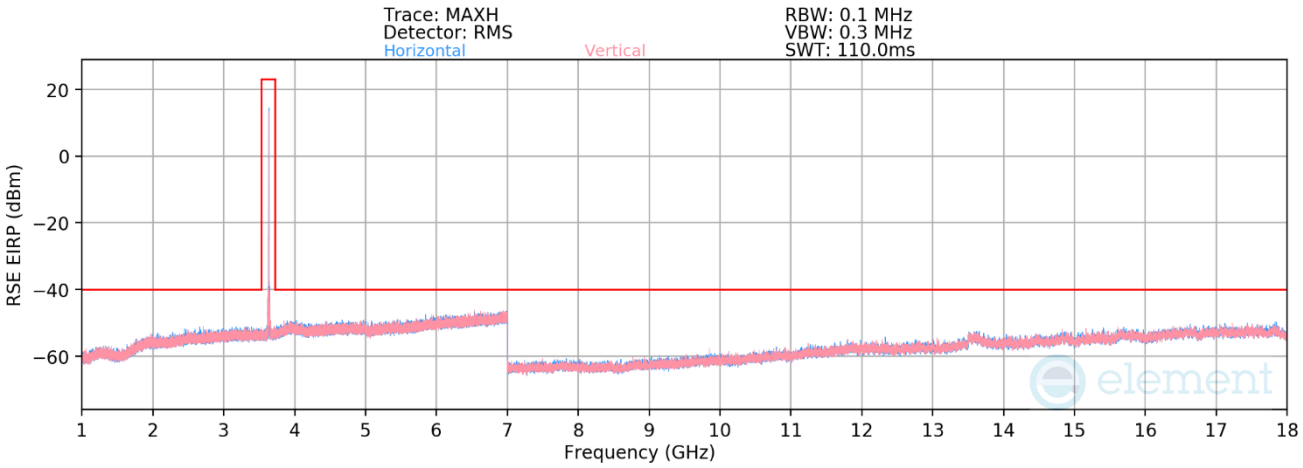
Table 7-29. Radiated Spurious Data (LTE Band 48 – Mid Channel)

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

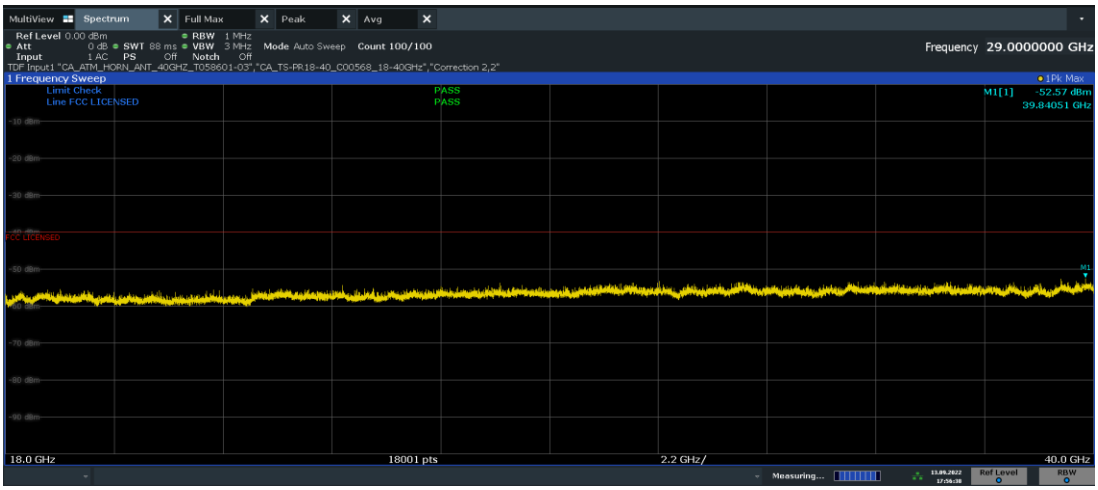
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]
7380.0	-	-	-	-79.65	10.90	38.25	-57.01	-40.00	-17.01
11070.0	-	-	-	-81.36	15.98	41.62	-53.64	-40.00	-13.64
14760.0	-	-	-	-81.69	20.78	46.09	-49.16	-40.00	-9.16

Table 7-30. Radiated Spurious Data (LTE Band 48 – High Channel)

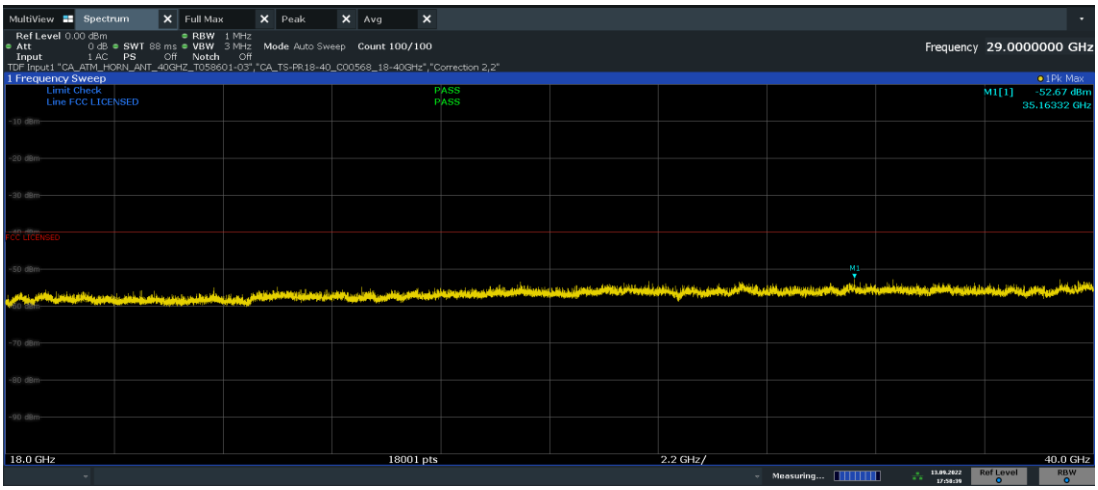
ULCA Band 48



Plot 7-91. Radiated Spurious Plot 1 – 18GHz (ULCA Band 48)



Plot 7-92. Radiated Spurious Plot 18 – 40GHz (ULCA Band 48, Ant. Pol H)



Plot 7-93. Radiated Spurious Plot 18 – 40GHz (ULCA Band 48, Ant. Pol V)

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
Modulation Signal:	QPSK

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/MHz]	Limit [dBm/MHz]	Margin [dB]
7120.0	V	-	-	-78.93	8.93	37.00	-58.26	-40.00	-18.26
10680.0	V	-	-	-82.43	14.88	39.45	-55.81	-40.00	-15.81
14240.0	V	-	-	-82.20	19.01	43.81	-51.45	-40.00	-11.45

Table 7-31. Radiated Spurious Data (ULCA Band 48– Low 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 / 0
Modulation Signal:	QPSK

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/MHz]	Limit [dBm/MHz]	Margin [dB]
7250.0	V	-	-	-79.04	8.96	36.92	-58.34	-40.00	-18.34
10875.0	V	-	-	-82.39	15.24	39.85	-55.41	-40.00	-15.41
14500.0	V	-	-	-82.69	19.82	44.13	-51.13	-40.00	-11.13

Table 7-32. Radiated Spurious Data (ULCA Band 48– Mid Channel)

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
Modulation Signal:	QPSK

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/MHz]	Limit [dBm/MHz]	Margin [dB]
7380.0	V	-	-	-78.96	9.33	37.37	-57.89	-40.00	-17.89
11070.0	V	-	-	-82.32	15.87	40.55	-54.71	-40.00	-14.71
14760.0	V	-	-	-83.53	20.82	44.29	-50.97	-40.00	-10.97

Table 7-33. Radiated Spurious Data (ULCA Band 48– High Channel)

7.8 Frequency Stability / Temperature Variation

§2.1055

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015 and TIA-603-E-2016. 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

TIA-603-E-2016

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

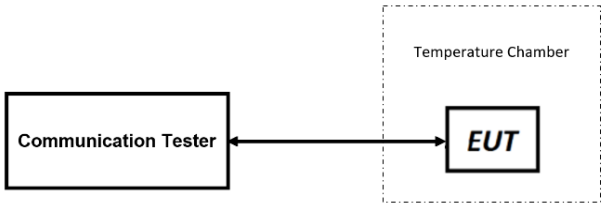


Figure 7-7. Test Instrument & Measurement Setup

Test Notes

All ports were tested and only the worst case data were reported.

Frequency Stability / Temperature Variation

LTE Band 48

Low Channel Frequency (Hz):	3,560,000,000
High Channel Frequency (Hz):	3,690,000,000
Ref. Voltage (VDC):	3.8

Voltage (%)	Power (VDC)	Temp (°C)	Low Freq. (Hz)	High Freq. (Hz)	Low Freq. Dev. (Hz)	High Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	3,560,000,031	3,560,000,032	16	17	0.000000478
		- 20	3,560,000,029	3,560,000,025	14	10	0.000000393
		- 10	3,560,000,032	3,560,000,027	17	12	0.000000478
		0	3,560,000,032	3,560,000,035	17	20	0.000000562
		+ 10	3,560,000,035	3,560,000,029	20	14	0.000000562
		+ 20 (Ref)	3,560,000,015	3,560,000,015	0	0	0.000000000
		+ 30	3,560,000,029	3,560,000,035	14	20	0.000000562
		+ 40	3,560,000,030	3,560,000,028	15	13	0.000000421
		+ 50	3,560,000,025	3,560,000,024	10	9	0.000000281
Battery Endpoint	3.23	+ 20	3,560,000,034	3,560,000,033	19	18	0.000000534

Table 7-34. LTE Band 48 Frequency Stability Data

7.9 End User Device Additional Requirement (CBSD Protocol)

§96.47

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 CBSD (Ruckus FCC ID: S9GQ910US00) 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-TS-0122 v1.0.2

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.

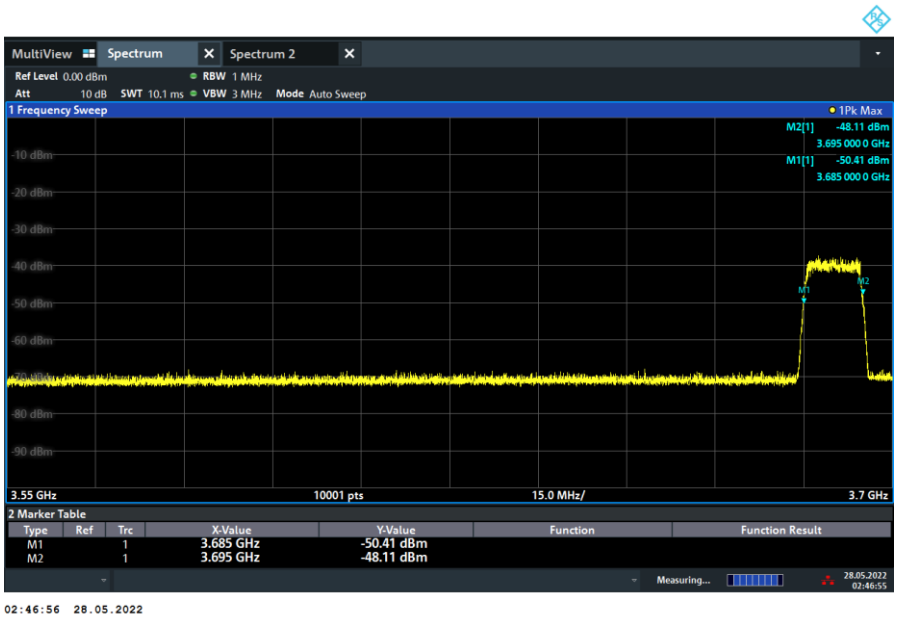
1. Run#1:
    a. Setup WINNF.PT.C.HBT.1 with 3685MHz – 3695MHz.
    b. Enable AP service from Ruckus Cloud management.
    c. Check EUT Tx frequency.
    d. Disable AP service from Ruckus Cloud management and check EUT stop transmission within 10s.
2. Run#2:
    a. Setup WINNF.PT.C.HBT.1 with 3615MHz – 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.

Test Notes

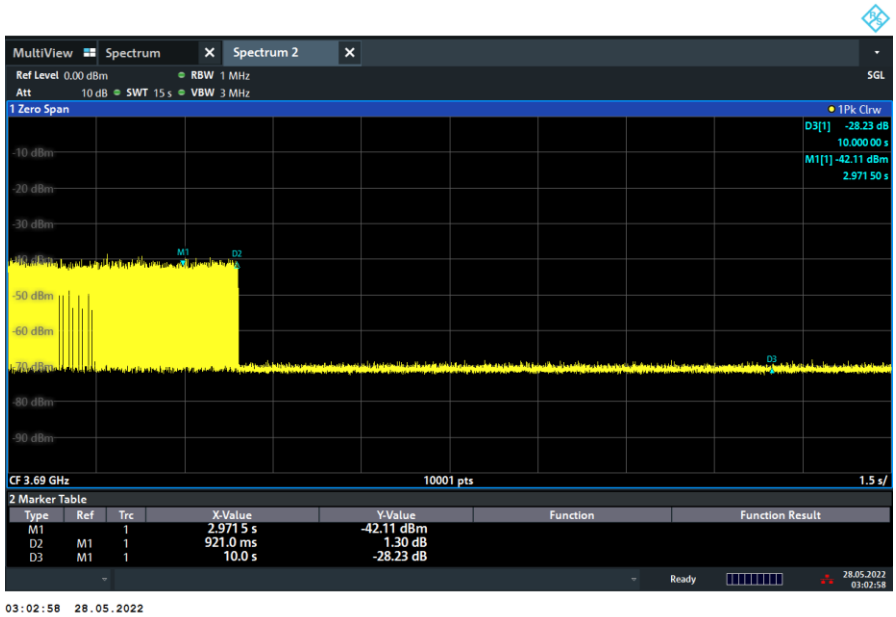
The EUT is an End User Device.

Run#1:

- Tx Frequency Set: 3685 – 3695MHz
- MaxEIRP Set: 10dBm/MHz



Plot 7-94. Run#1 End User Device Frequency of Operations



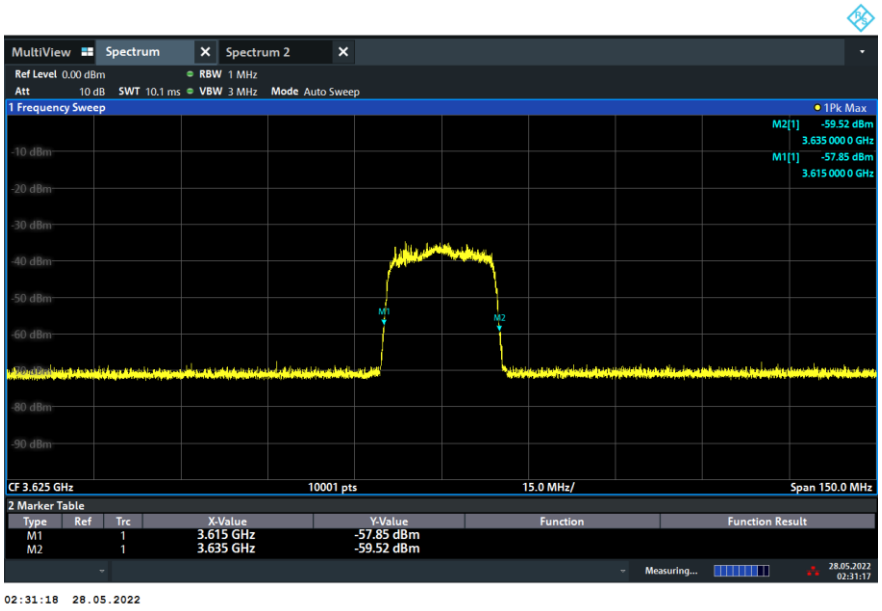
Plot 7-95. Run#1 End User Device Discontinues Operations within 10s

Note:

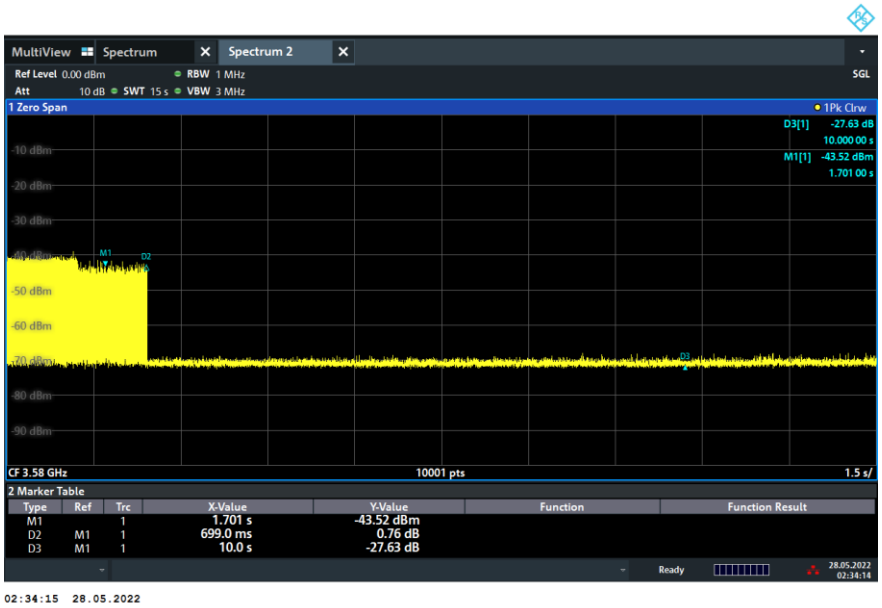
Marker 1: CBSD sends instructions to discontinue LTE operations.
Marker 2: EUT discontinues operation.
Marker 3: 10 seconds elapsed time from CBSD sending instructions to EUT.

Run#2:

- Tx Frequency Set: 3615 – 3635MHz
- MaxEIRP Set: 10dBm/MHz



Plot 7-96. Run#2 End User Device Frequency of Operations



Plot 7-97. 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 Apple **Tablet Devices FCC ID: BCGA2757** complies with all of the End User Device requirements of Part 96 of the FCC Rules for LTE operation only.