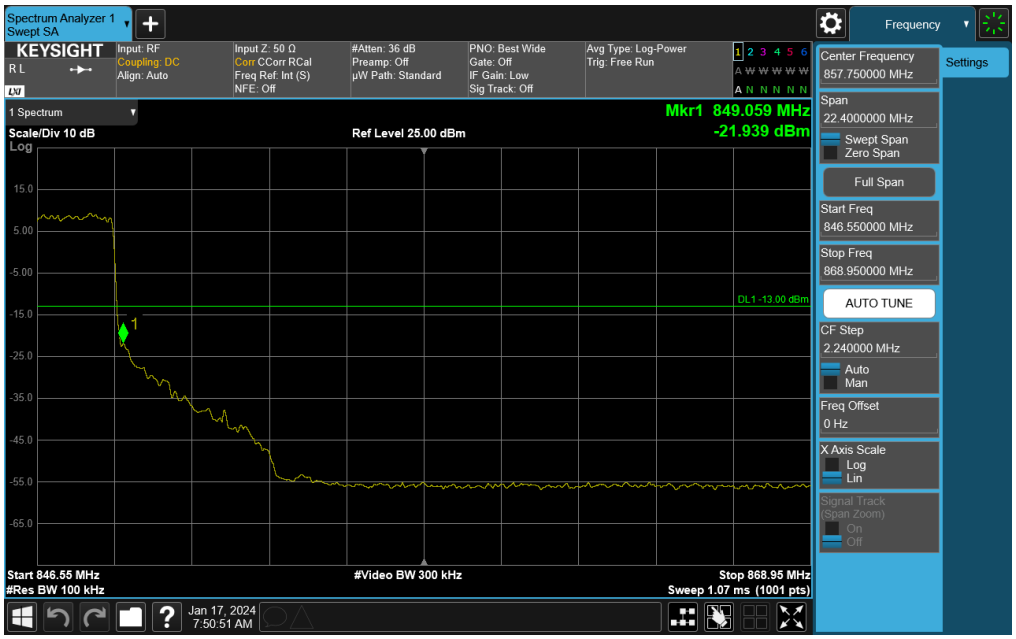
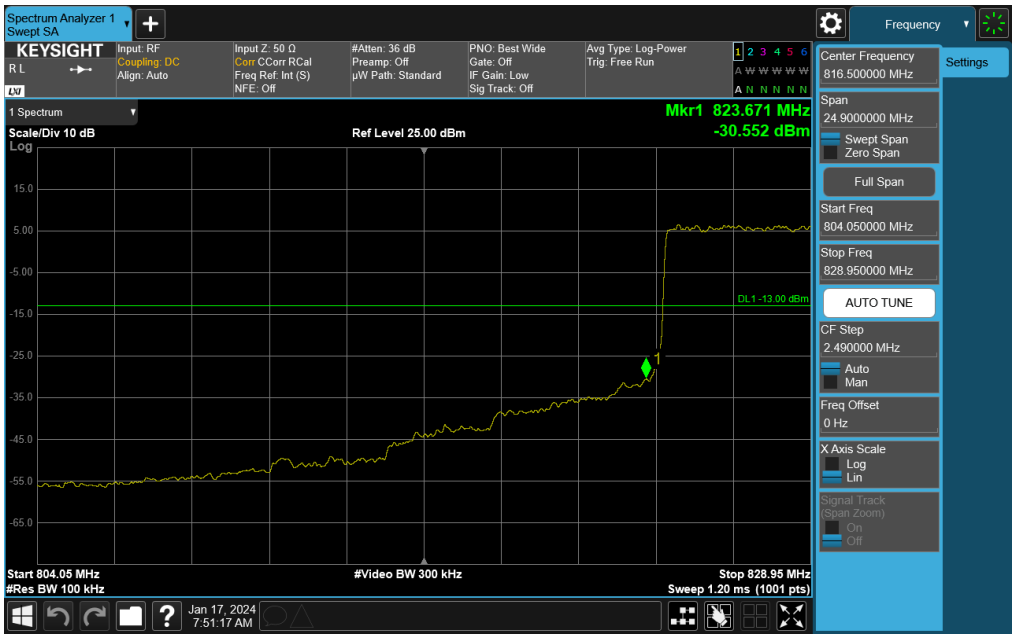
NR Band n5

Plot 7-104. Lower BE Plot (NR Band n5 DFT-s-OFDM QPSK – 5.0MHz - Full RB)

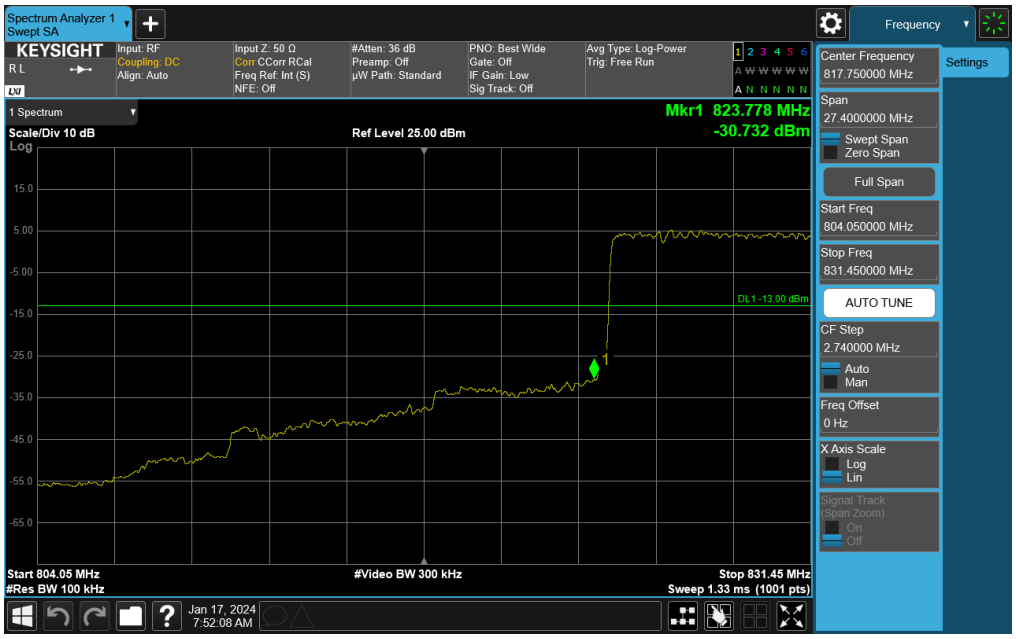


Plot 7-105. Upper BE Plot (NR Band n5 DFT-s-OFDM QPSK – 5.0MHz - Full RB)



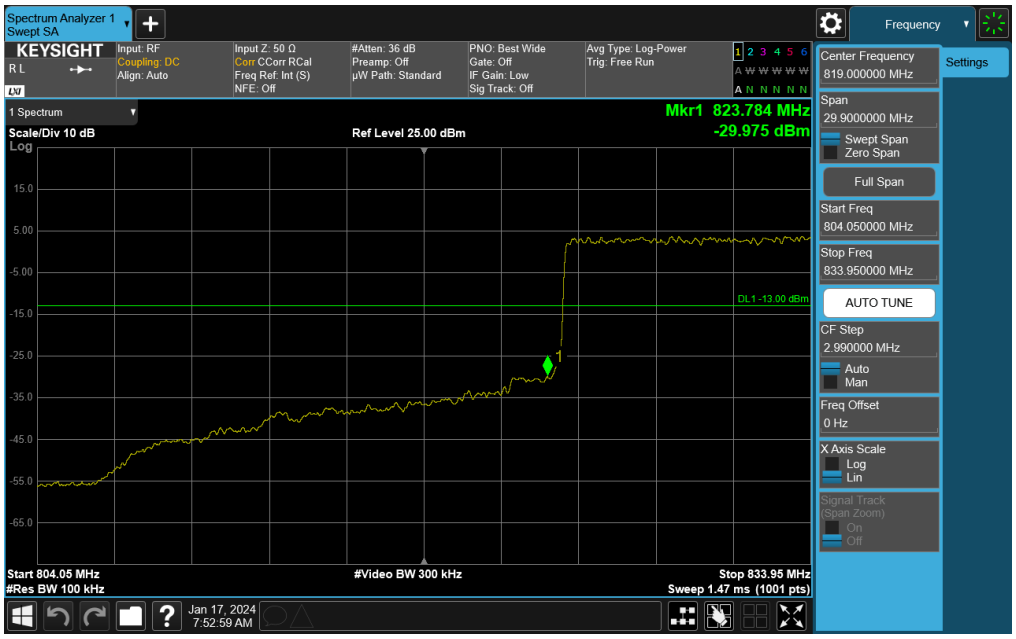
Plot 7-106. Lower BE Plot (NR Band n5 DFT-s-OFDM QPSK – 10.0MHz - Full RB)

Plot 7-107. Upper BE Plot (NR Band n5 DFT-s-OFDM QPSK – 10.0MHz - Full RB)

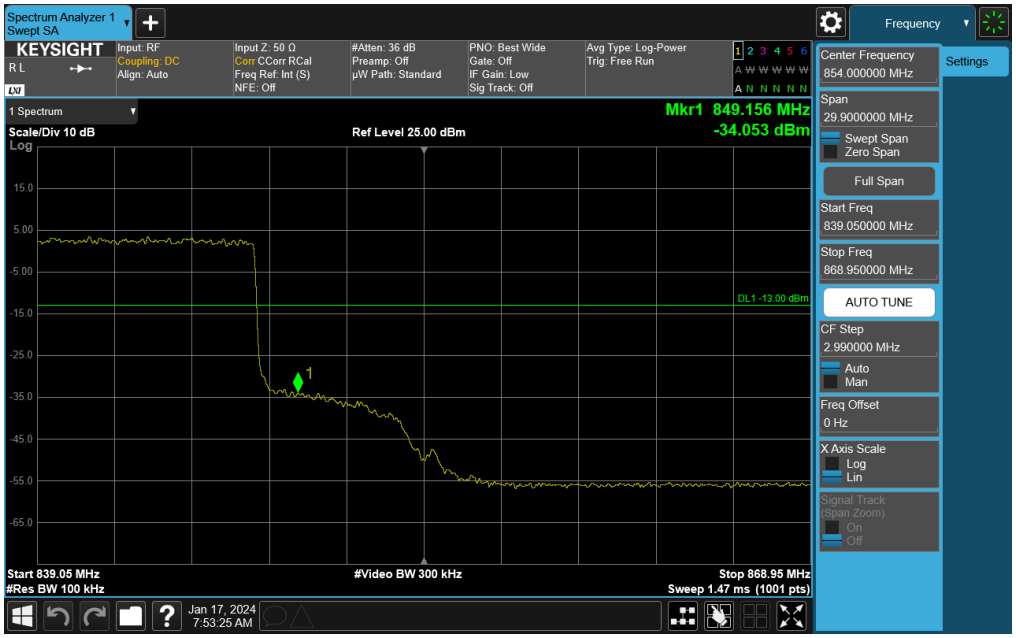


Plot 7-108. Lower BE Plot (NR Band n5 DFT-s-OFDM QPSK – 15.0MHz - Full RB)

Plot 7-109. Upper BE Plot (NR Band n5 DFT-s-OFDM QPSK – 15.0MHz - Full RB)

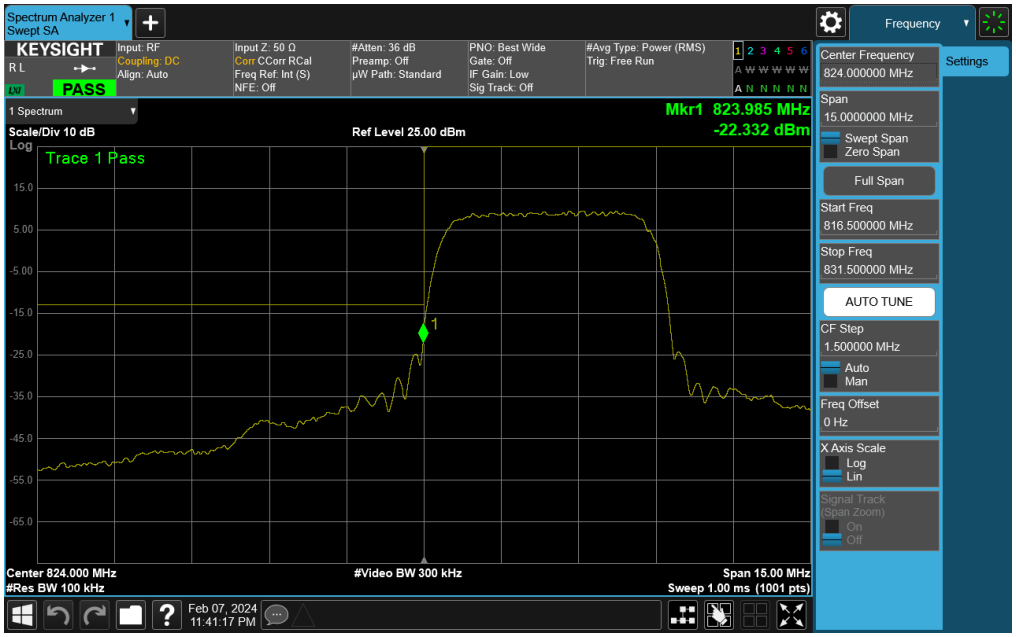


Plot 7-110. Lower BE Plot (NR Band n5 DFT-s-OFDM QPSK – 20.0MHz - Full RB)

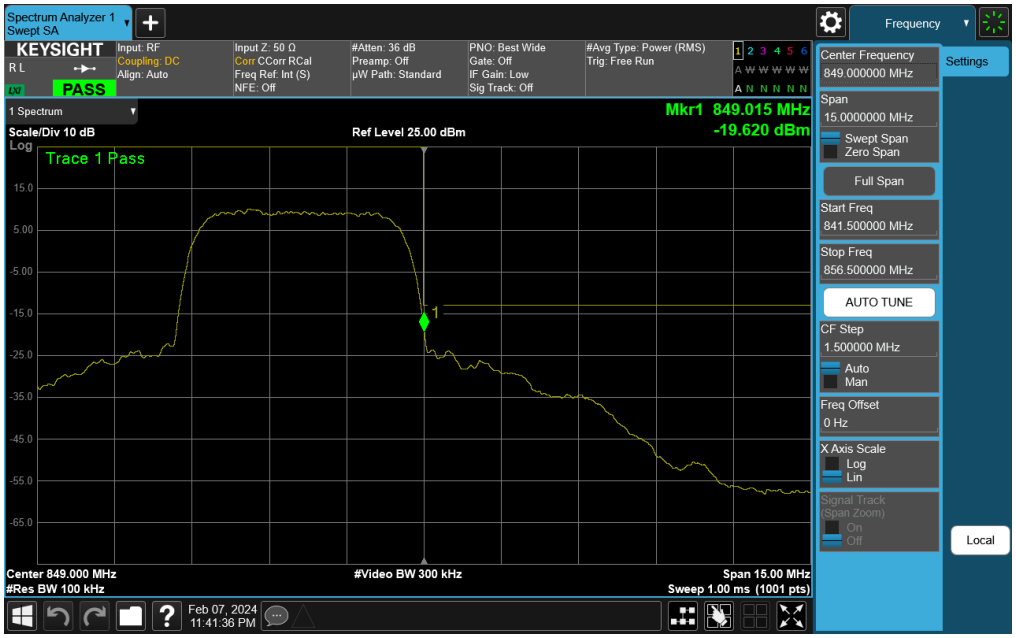


Plot 7-111. Upper BE Plot (NR Band n5 DFT-s-OFDM QPSK –20.0MHz - Full RB)

WCDMA Cell



Plot 7-112. Lower BE Plot (WCDMA Cell – Ch. 4132)



Plot 7-113. Upper BE Plot (WCDMA Cell – Ch. 4233)

7.5 Radiated Power (ERP)

§22.913(a)(5)

Test Overview

Effective Radiated Power (ERP) 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 – Section 5.2.5.5

Test Settings

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

ERP = PMeas – LC + GT

Where:

ERP = Effective Radiated Power, respectively (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 dBd (ERP) or dBi (EIRP)

Test Setup

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

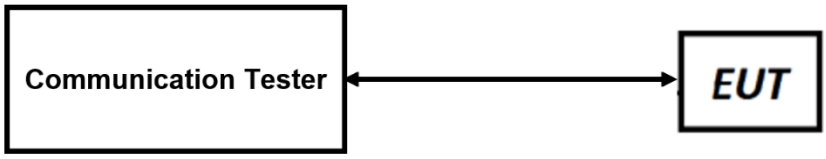


Figure 7-4. ERP/EIRP Measurement Setup

Test Notes:

1. The EUT was tested in all possible test configurations. The worst case emissions are reported with the EUT 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. Uplink carrier aggregation for LTE B5 is only supported in this EUT while operating in Power Class 3.

5. 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.

6. The Ant. Gains (GT) are listed in dBi.

7.5.1 Antenna 4 – ERP

LTE Band 26

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
1.4 MHz	QPSK	824.7	-2.10	1 / 0	25.62	21.37	0.137	38.45	-17.08
		836.5	-2.10	1 / 0	25.70	**21.45**	0.140	38.45	-17.00
		848.3	-2.10	1 / 3	25.67	21.42	0.139	38.45	-17.03
	16-QAM	824.7	-2.10	1 / 0	25.04	**20.79**	0.120	38.45	-17.66
	64-QAM	824.7	-2.10	1 / 0	23.90	**19.65**	0.092	38.45	-18.80
	256-QAM	836.5	-2.10	1 / 5	20.96	**16.71**	0.047	38.45	-21.74
3 MHz	QPSK	825.5	-2.10	1 / 0	25.61	21.36	0.137	38.45	-17.09
		836.5	-2.10	1 / 0	25.70	**21.45**	0.140	38.45	-17.00
		847.5	-2.10	1 / 0	25.55	21.30	0.135	38.45	-17.15
	16-QAM	825.5	-2.10	1 / 0	25.03	**20.78**	0.120	38.45	-17.67
	64-QAM	825.5	-2.10	1 / 0	23.93	**19.68**	0.093	38.45	-18.77
	256-QAM	825.5	-2.10	1 / 0	20.95	**16.70**	0.047	38.45	-21.75
5 MHz	QPSK	826.5	-2.10	1 / 0	25.70	**21.45**	0.140	38.45	-17.00
		836.5	-2.10	1 / 0	25.70	**21.45**	0.140	38.45	-17.00
		846.5	-2.10	1 / 0	25.67	21.42	0.139	38.45	-17.03
	16-QAM	836.5	-2.10	1 / 0	25.13	**20.88**	0.122	38.45	-17.57
	64-QAM	826.5	-2.10	1 / 0	24.11	**19.86**	0.097	38.45	-18.59
	256-QAM	826.5	-2.10	1 / 0	20.84	**16.59**	0.046	38.45	-21.86
10 MHz	QPSK	829.0	-2.10	1 / 0	25.59	21.34	0.136	38.45	-17.11
		836.5	-2.10	1 / 25	25.70	**21.45**	0.140	38.45	-17.00
		844.0	-2.10	1 / 25	25.55	21.30	0.135	38.45	-17.15
	16-QAM	844.0	-2.10	1 / 25	25.09	**20.84**	0.121	38.45	-17.61
	64-QAM	829.0	-2.10	1 / 25	24.05	**19.80**	0.095	38.45	-18.65
	256-QAM	829.0	-2.10	1 / 0	20.83	**16.58**	0.045	38.45	-21.87

Table 7-2. Antenna 4 ERP Data (LTE Band 26)

LTE Band 5

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
1.4 MHz	QPSK	829.0	-2.10	1 / 0	25.34	21.09	0.129	38.45	-17.36
		836.5	-2.10	1 / 0	25.41	**21.16**	0.131	38.45	-17.29
		844.0	-2.10	1 / 3	25.41	**21.16**	0.131	38.45	-17.29
	16-QAM	836.5	-2.10	1 / 3	24.58	**20.33**	0.108	38.45	-18.12
	64-QAM	829.0	-2.10	1 / 5	23.55	**19.30**	0.085	38.45	-19.15
	256-QAM	829.0	-2.10	1 / 0	20.65	**16.40**	0.044	38.45	-22.05
3 MHz	QPSK	829.0	-2.10	1 / 0	25.33	21.08	0.128	38.45	-17.37
		836.5	-2.10	1 / 0	25.30	21.05	0.127	38.45	-17.40
		844.0	-2.10	1 / 0	25.35	**21.10**	0.129	38.45	-17.35
	16-QAM	844.0	-2.10	1 / 0	24.82	**20.57**	0.114	38.45	-17.88
	64-QAM	844.0	-2.10	1 / 14	23.60	**19.35**	0.086	38.45	-19.10
	256-QAM	844.0	-2.10	1 / 0	20.49	**16.24**	0.042	38.45	-22.21
5 MHz	QPSK	829.0	-2.10	1 / 0	25.58	**21.33**	0.136	38.45	-17.12
		836.5	-2.10	1 / 0	25.47	21.22	0.132	38.45	-17.23
		844.0	-2.10	1 / 0	25.37	21.12	0.129	38.45	-17.33
	16-QAM	836.5	-2.10	1 / 0	24.80	**20.55**	0.114	38.45	-17.90
	64-QAM	844.0	-2.10	1 / 12	23.65	**19.40**	0.087	38.45	-19.05
	256-QAM	836.5	-2.10	1 / 12	20.52	**16.27**	0.042	38.45	-22.18
10 MHz	QPSK	829.0	-2.10	1 / 0	25.36	21.11	0.129	38.45	-17.34
		836.5	-2.10	1 / 0	25.32	21.07	0.128	38.45	-17.38
		844.0	-2.10	1 / 25	25.37	**21.12**	0.129	38.45	-17.33
	16-QAM	844.0	-2.10	1 / 25	24.76	**20.51**	0.112	38.45	-17.94
	64-QAM	844.0	-2.10	1 / 25	23.57	**19.32**	0.086	38.45	-19.13
	256-QAM	844.0	-2.10	1 / 0	20.59	**16.34**	0.043	38.45	-22.11

Table 7-3. Antenna 4 ERP Data (LTE Band 5)

ULCA - LTE Band 5

Power State	Band	Bandwidth (PCC + SCC)	PCC					SCC					ULCA Tx. Power [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
			Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset						
Max	LTE B5	10MHz + 10MHz	QPSK	20450	829.0	1	49	QPSK	20549	838.9	1	0	25.58	-2.10	21.33	0.136	38.45	-17.12
				20475	831.5	1	49		20574	841.4	1	0	25.46	-2.10	21.21	0.132	38.45	-17.24
				20600	844.0	1	0		20501	834.1	1	49	25.64	-2.10	**21.39**	**0.138**	38.45	-17.06
			QPSK	20600	844	50	0	QPSK	20501	834.1	50	0	24.38	-2.10	20.13	0.103	38.45	-18.32
			16-QAM	20600	844	50	0	16-QAM	20501	834.1	50	0	23.42	-2.10	19.17	0.083	38.45	-19.28
			64-QAM	20600	844	50	0	64-QAM	20501	834.1	50	0	23.45	-2.10	19.20	0.083	38.45	-19.25
			256-QAM	20600	844	50	0	256-QAM	20501	834.1	50	0	21.37	-2.10	17.12	0.052	38.45	-21.33

Table 7-4. Antenna 4 ERP Data (ULCA LTE Band 5)

NR Band n26

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
5 MHz	π/2 BPSK	829.0	-2.10	1 / 12	25.58	21.33	0.136	38.45	-17.12
		836.5	-2.10	1 / 12	25.64	**21.39**	0.138	38.45	-17.06
		844.0	-2.10	1 / 1	25.48	21.23	0.133	38.45	-17.22
	QPSK	829.0	-2.10	1 / 23	25.61	21.36	0.137	38.45	-17.09
		836.5	-2.10	1 / 1	25.66	**21.41**	0.138	38.45	-17.04
		844.0	-2.10	1 / 1	25.62	21.37	0.137	38.45	-17.08
	16-QAM	844.0	-2.10	1 / 1	24.86	**20.61**	0.115	38.45	-17.84
	64-QAM	829.0	-2.10	1 / 23	23.77	**19.52**	0.090	38.45	-18.93
	256-QAM	836.5	-2.10	1 / 1	21.38	**17.13**	0.052	38.45	-21.32
10 MHz	π/2 BPSK	829.0	-2.10	1 / 1	25.60	21.35	0.136	38.45	-17.10
		836.5	-2.10	1 / 50	25.63	**21.38**	0.137	38.45	-17.07
		844.0	-2.10	1 / 25	25.57	21.32	0.136	38.45	-17.13
	QPSK	829.0	-2.10	1 / 50	25.57	21.32	0.136	38.45	-17.13
		836.5	-2.10	1 / 1	25.60	**21.35**	0.136	38.45	-17.10
		844.0	-2.10	1 / 25	25.57	21.32	0.135	38.45	-17.14
	16-QAM	844.0	-2.10	1 / 50	24.94	**20.69**	0.117	38.45	-17.77
	64-QAM	836.5	-2.10	1 / 25	23.48	**19.23**	0.084	38.45	-19.22
	256-QAM	829.0	-2.10	1 / 1	21.41	**17.16**	0.052	38.45	-21.29
15 MHz	π/2 BPSK	831.5	-2.10	1 / 1	25.67	21.42	0.139	38.45	-17.03
		836.5	-2.10	1 / 77	25.68	**21.43**	0.139	38.45	-17.03
		841.5	-2.10	1 / 1	25.62	21.37	0.137	38.45	-17.09
	QPSK	831.5	-2.10	1 / 36	25.70	**21.45**	0.140	38.45	-17.00
		836.5	-2.10	1 / 77	25.68	21.43	0.139	38.45	-17.02
		841.5	-2.10	1 / 1	25.63	21.38	0.137	38.45	-17.08
	16-QAM	841.5	-2.10	1 / 77	24.95	**20.70**	0.117	38.45	-17.75
	64-QAM	841.5	-2.10	1 / 1	23.51	**19.26**	0.084	38.45	-19.19
	256-QAM	831.5	-2.10	1 / 1	21.52	**17.27**	0.053	38.45	-21.18
20 MHz	π/2 BPSK	834.0	-2.10	1 / 50	25.67	21.42	0.139	38.45	-17.03
		836.5	-2.10	1 / 1	25.69	**21.44**	0.139	38.45	-17.01
		839.0	-2.10	1 / 50	25.60	21.35	0.137	38.45	-17.10
	QPSK	834.0	-2.10	1 / 1	25.70	**21.45**	0.140	38.45	-17.00
		836.5	-2.10	1 / 1	25.58	21.33	0.136	38.45	-17.12
		839.0	-2.10	1 / 50	25.62	21.37	0.137	38.45	-17.08
	16-QAM	834.0	-2.10	1 / 50	24.88	**20.63**	0.116	38.45	-17.82
	64-QAM	836.5	-2.10	1 / 104	23.47	**19.22**	0.084	38.45	-19.23
	256-QAM	836.5	-2.10	1 / 1	21.49	**17.24**	0.053	38.45	-21.21

Table 7-5. Antenna 4 ERP Data (NR Band n26)

NR Band n5

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
5 MHz	π/2 BPSK	829.0	-2.10	1 / 1	25.63	**21.38**	0.137	38.45	-17.07
		836.5	-2.10	1 / 1	25.52	21.27	0.134	38.45	-17.18
		844.0	-2.10	1 / 1	25.56	21.31	0.135	38.45	-17.14
	QPSK	829.0	-2.10	1 / 23	25.70	**21.45**	0.140	38.45	-17.00
		836.5	-2.10	1 / 23	25.62	21.37	0.137	38.45	-17.08
		844.0	-2.10	1 / 1	25.55	21.30	0.135	38.45	-17.15
	16-QAM	829.0	-2.10	1 / 1	24.97	**20.72**	0.118	38.45	-17.73
	64-QAM	829.0	-2.10	1 / 1	23.21	**18.96**	0.079	38.45	-19.49
	256-QAM	836.5	-2.10	1 / 1	21.20	**16.95**	0.050	38.45	-21.50
10 MHz	π/2 BPSK	829.0	-2.10	1 / 1	25.61	**21.36**	0.137	38.45	-17.09
		836.5	-2.10	1 / 1	25.53	21.28	0.134	38.45	-17.18
		844.0	-2.10	1 / 1	25.51	21.26	0.134	38.45	-17.19
	QPSK	829.0	-2.10	1 / 1	25.67	**21.42**	0.139	38.45	-17.04
		836.5	-2.10	1 / 50	25.60	21.35	0.136	38.45	-17.11
		844.0	-2.10	1 / 1	25.56	21.31	0.135	38.45	-17.14
	16-QAM	829.0	-2.10	1 / 50	24.68	**20.43**	0.110	38.45	-18.02
	64-QAM	829.0	-2.10	1 / 50	22.98	**18.73**	0.075	38.45	-19.72
	256-QAM	829.0	-2.10	1 / 1	21.26	**17.01**	0.050	38.45	-21.44
15 MHz	π/2 BPSK	831.5	-2.10	1 / 1	25.70	**21.45**	0.140	38.45	-17.00
		836.5	-2.10	1 / 1	25.70	21.45	0.140	38.45	-17.00
		841.5	-2.10	1 / 1	25.59	21.34	0.136	38.45	-17.11
	QPSK	831.5	-2.10	1 / 1	25.70	**21.45**	0.140	38.45	-17.00
		836.5	-2.10	1 / 1	25.62	21.37	0.137	38.45	-17.08
		841.5	-2.10	1 / 36	25.60	21.35	0.137	38.45	-17.10
	16-QAM	831.5	-2.10	1 / 1	25.20	**20.95**	0.124	38.45	-17.50
	64-QAM	836.5	-2.10	1 / 1	23.44	**19.19**	0.083	38.45	-19.26
	256-QAM	831.5	-2.10	1 / 1	21.39	**17.14**	0.052	38.45	-21.31
20 MHz	π/2 BPSK	834.0	-2.10	1 / 1	25.66	**21.41**	0.138	38.45	-17.04
		836.5	-2.10	1 / 1	25.62	21.37	0.137	38.45	-17.08
		839.0	-2.10	1 / 1	25.59	21.34	0.136	38.45	-17.11
	QPSK	834.0	-2.10	1 / 1	25.70	**21.45**	0.140	38.45	-17.00
		836.5	-2.10	1 / 1	25.69	21.44	0.139	38.45	-17.01
		839.0	-2.10	1 / 50	25.64	21.39	0.138	38.45	-17.06
	16-QAM	839.0	-2.10	1 / 1	24.99	**20.74**	0.119	38.45	-17.71
	64-QAM	839.0	-2.10	1 / 1	23.54	**19.29**	0.085	38.45	-19.16
	256-QAM	839.0	-2.10	1 / 50	21.51	**17.26**	0.053	38.45	-21.19

Table 7-6. Antenna 4 ERP Data (NR Band n5)

WCDMA Cell

Frequency [MHz]	Mode	Conducted Power [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
826.40	WCDMA850	25.59	-2.10	21.34	0.136	38.45	-17.11
836.60	WCDMA850	25.70	-2.10	**21.45**	**0.140**	38.45	-17.00
846.60	WCDMA850	25.62	-2.10	21.37	0.137	38.45	-17.08

Table 7-7. Antenna 4 ERP Data (WCDMA Cell)

7.5.2 Antenna 2 – ERP

LTE Band 26

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
1.4 MHz	QPSK	824.7	-2.10	1 / 0	24.57	20.32	0.108	38.45	-18.13
		836.5	-2.10	1 / 0	24.65	20.40	0.110	38.45	-18.05
		848.3	-2.10	1 / 3	24.67	**20.42**	0.110	38.45	-18.03
	16-QAM	824.7	-2.10	1 / 0	23.91	**19.66**	0.092	38.45	-18.79
	64-QAM	824.7	-2.10	1 / 5	22.84	**18.59**	0.072	38.45	-19.86
	256-QAM	824.7	-2.10	1 / 0	19.81	**15.56**	0.036	38.45	-22.89
3 MHz	QPSK	825.5	-2.10	1 / 0	24.50	20.25	0.106	38.45	-18.20
		836.5	-2.10	1 / 0	24.67	**20.42**	0.110	38.45	-18.03
		847.5	-2.10	1 / 0	24.60	20.35	0.108	38.45	-18.10
	16-QAM	847.5	-2.10	1 / 0	24.10	**19.85**	0.097	38.45	-18.60
	64-QAM	825.5	-2.10	1 / 0	22.95	**18.70**	0.074	38.45	-19.75
	256-QAM	825.5	-2.10	1 / 0	19.85	**15.60**	0.036	38.45	-22.85
5 MHz	QPSK	826.5	-2.10	1 / 0	24.70	**20.45**	0.111	38.45	-18.00
		836.5	-2.10	1 / 0	24.69	20.44	0.111	38.45	-18.01
		846.5	-2.10	1 / 0	24.70	**20.45**	0.111	38.45	-18.00
	16-QAM	836.5	-2.10	1 / 0	24.22	**19.97**	0.099	38.45	-18.48
	64-QAM	826.5	-2.10	1 / 0	23.02	**18.77**	0.075	38.45	-19.68
	256-QAM	826.5	-2.10	1 / 0	19.93	**15.68**	0.037	38.45	-22.77
10 MHz	QPSK	829.0	-2.10	1 / 0	24.47	20.22	0.105	38.45	-18.23
		836.5	-2.10	1 / 25	24.69	**20.44**	0.111	38.45	-18.01
		844.0	-2.10	1 / 25	24.57	20.32	0.108	38.45	-18.13
	16-QAM	844.0	-2.10	1 / 25	24.10	**19.85**	0.097	38.45	-18.60
	64-QAM	829.0	-2.10	1 / 49	22.89	**18.64**	0.073	38.45	-19.81
	256-QAM	829.0	-2.10	1 / 0	19.89	**15.64**	0.037	38.45	-22.81

Table 7-8. Antenna 2 ERP Data (LTE Band 26)

LTE Band 5

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
1.4 MHz	QPSK	829.0	-2.10	1 / 5	24.39	20.14	0.103	38.45	-18.31
		836.5	-2.10	1 / 0	24.32	20.07	0.102	38.45	-18.38
		844.0	-2.10	1 / 0	24.59	**20.34**	0.108	38.45	-18.11
	16-QAM	844.0	-2.10	1 / 3	23.70	**19.45**	0.088	38.45	-19.00
	64-QAM	844.0	-2.10	1 / 0	22.72	**18.47**	0.070	38.45	-19.98
	256-QAM	844.0	-2.10	1 / 0	19.68	**15.43**	0.035	38.45	-23.02
3 MHz	QPSK	829.0	-2.10	1 / 0	24.35	20.10	0.102	38.45	-18.35
		836.5	-2.10	1 / 0	24.37	20.12	0.103	38.45	-18.33
		844.0	-2.10	1 / 0	24.39	**20.14**	0.103	38.45	-18.31
	16-QAM	844.0	-2.10	1 / 0	23.73	**19.48**	0.089	38.45	-18.97
	64-QAM	844.0	-2.10	1 / 0	22.90	**18.65**	0.073	38.45	-19.80
	256-QAM	844.0	-2.10	1 / 0	19.69	**15.44**	0.035	38.45	-23.01
5 MHz	QPSK	829.0	-2.10	1 / 0	24.58	20.33	0.108	38.45	-18.12
		836.5	-2.10	1 / 0	24.34	20.09	0.102	38.45	-18.36
		844.0	-2.10	1 / 0	24.59	**20.34**	0.108	38.45	-18.11
	16-QAM	844.0	-2.10	1 / 0	23.89	**19.64**	0.092	38.45	-18.81
	64-QAM	844.0	-2.10	1 / 24	22.76	**18.51**	0.071	38.45	-19.94
	256-QAM	844.0	-2.10	1 / 0	19.69	**15.44**	0.035	38.45	-23.01
10 MHz	QPSK	829.0	-2.10	1 / 0	24.35	20.10	0.102	38.45	-18.35
		836.5	-2.10	1 / 25	24.39	20.14	0.103	38.45	-18.31
		844.0	-2.10	1 / 49	24.49	**20.24**	0.106	38.45	-18.21
	16-QAM	844.0	-2.10	1 / 49	23.69	**19.44**	0.088	38.45	-19.01
	64-QAM	844.0	-2.10	1 / 49	22.74	**18.49**	0.071	38.45	-19.96
	256-QAM	844.0	-2.10	1 / 25	19.57	**15.32**	0.034	38.45	-23.13

Table 7-9. Antenna 2 ERP Data (LTE Band 5)

ULCA - LTE Band 5

Power State	Band	Bandwidth (PCC + SCC)	PCC					SCC					ULCA Tx. Power [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
			Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset						
Max	LTE B5	10MHz + 10MHz	QPSK	20450	829.0	1	49	QPSK	20549	838.9	1	0	24.62	-2.10	**20.37**	**0.109**	38.45	-18.08
				20475	831.5	1	49		20574	841.4	1	0	24.49	-2.10	20.24	0.106	38.45	-18.21
				20600	844.0	1	0		20501	834.1	1	49	24.52	-2.10	20.27	0.106	38.45	-18.18
			QPSK	20450	829	50	0	QPSK	20549	838.9	50	0	23.46	-2.10	19.21	0.083	38.45	-19.24
			16-QAM	20450	829	50	0	16-QAM	20549	838.9	50	0	22.38	-2.10	18.13	0.065	38.45	-20.32
			64-QAM	20450	829	50	0	64-QAM	20549	838.9	50	0	22.43	-2.10	18.18	0.066	38.45	-20.27
			256-QAM	20450	829	50	0	256-QAM	20549	838.9	50	0	20.37	-2.10	16.12	0.041	38.45	-22.33

Table 7-10. Antenna 2 ERP Data (ULCA LTE Band 5)

NR Band n26

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
5 MHz	π/2 BPSK	829.0	-2.10	1 / 23	24.58	20.33	0.108	38.45	-18.12
		836.5	-2.10	1 / 1	24.69	20.44	0.111	38.45	-18.01
		844.0	-2.10	1 / 1	24.70	**20.45**	0.111	38.45	-18.00
	QPSK	829.0	-2.10	1 / 23	24.53	20.28	0.107	38.45	-18.17
		836.5	-2.10	1 / 12	24.70	**20.45**	0.111	38.45	-18.00
		844.0	-2.10	1 / 1	24.68	20.43	0.110	38.45	-18.02
	16-QAM	836.5	-2.10	1 / 1	24.12	**19.87**	0.097	38.45	-18.58
	64-QAM	844.0	-2.10	1 / 12	22.69	**18.44**	0.070	38.45	-20.01
	256-QAM	836.5	-2.10	1 / 23	20.54	**16.29**	0.043	38.45	-22.16
10 MHz	π/2 BPSK	829.0	-2.10	1 / 50	24.68	**20.43**	0.110	38.45	-18.03
		836.5	-2.10	1 / 50	24.64	20.39	0.109	38.45	-18.06
		844.0	-2.10	1 / 1	24.67	20.42	0.110	38.45	-18.03
	QPSK	829.0	-2.10	1 / 50	24.61	20.36	0.109	38.45	-18.09
		836.5	-2.10	1 / 50	24.68	20.43	0.110	38.45	-18.02
		844.0	-2.10	1 / 25	24.70	**20.45**	0.111	38.45	-18.00
	16-QAM	829.0	-2.10	1 / 25	23.95	**19.70**	0.093	38.45	-18.75
	64-QAM	836.5	-2.10	1 / 50	22.49	**18.24**	0.067	38.45	-20.21
	256-QAM	836.5	-2.10	1 / 25	20.45	**16.20**	0.042	38.45	-22.25
15 MHz	π/2 BPSK	831.5	-2.10	1 / 77	24.66	20.41	0.110	38.45	-18.05
		836.5	-2.10	1 / 1	24.69	20.44	0.111	38.45	-18.01
		841.5	-2.10	1 / 77	24.70	**20.45**	0.111	38.45	-18.00
	QPSK	831.5	-2.10	1 / 36	24.64	20.39	0.109	38.45	-18.07
		836.5	-2.10	1 / 36	24.67	20.42	0.110	38.45	-18.03
		841.5	-2.10	1 / 77	24.70	**20.45**	0.111	38.45	-18.00
	16-QAM	831.5	-2.10	1 / 77	23.86	**19.61**	0.091	38.45	-18.84
	64-QAM	841.5	-2.10	1 / 36	22.46	**18.21**	0.066	38.45	-20.24
	256-QAM	836.5	-2.10	1 / 1	20.47	**16.22**	0.042	38.45	-22.23
20 MHz	π/2 BPSK	834.0	-2.10	1 / 50	24.62	20.37	0.109	38.45	-18.08
		836.5	-2.10	1 / 50	24.63	20.38	0.109	38.45	-18.07
		839.0	-2.10	1 / 1	24.65	**20.40**	0.110	38.45	-18.05
	QPSK	834.0	-2.10	1 / 104	24.66	20.41	0.110	38.45	-18.04
		836.5	-2.10	1 / 104	24.70	**20.45**	0.111	38.45	-18.00
		839.0	-2.10	1 / 1	24.67	20.42	0.110	38.45	-18.03
	16-QAM	836.5	-2.10	1 / 50	23.95	**19.70**	0.093	38.45	-18.75
	64-QAM	836.5	-2.10	1 / 104	22.58	**18.33**	0.068	38.45	-20.12
	256-QAM	836.5	-2.10	1 / 50	20.45	**16.20**	0.042	38.45	-22.26

Table 7-11. Antenna 2 ERP Data (NR Band n26)

NR Band n5

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
5 MHz	π/2 BPSK	829.0	-2.10	1 / 23	24.70	**20.45**	0.111	38.45	-18.00
		836.5	-2.10	1 / 23	24.67	20.42	0.110	38.45	-18.04
		844.0	-2.10	1 / 1	24.65	20.40	0.110	38.45	-18.05
	QPSK	829.0	-2.10	1 / 1	24.69	**20.44**	0.111	38.45	-18.01
		836.5	-2.10	1 / 23	24.65	20.40	0.110	38.45	-18.05
		844.0	-2.10	1 / 23	24.62	20.37	0.109	38.45	-18.08
	16-QAM	829.0	-2.10	1 / 1	23.93	**19.68**	0.093	38.45	-18.77
	64-QAM	836.5	-2.10	1 / 12	22.43	**18.18**	0.066	38.45	-20.28
	256-QAM	836.5	-2.10	1 / 12	20.41	**16.16**	0.041	38.45	-22.29
10 MHz	π/2 BPSK	829.0	-2.10	1 / 1	24.60	20.35	0.108	38.45	-18.10
		836.5	-2.10	1 / 50	24.69	20.44	0.111	38.45	-18.01
		844.0	-2.10	1 / 1	24.70	**20.45**	0.111	38.45	-18.00
	QPSK	829.0	-2.10	1 / 1	24.70	**20.45**	0.111	38.45	-18.00
		836.5	-2.10	1 / 50	24.68	20.43	0.111	38.45	-18.02
		844.0	-2.10	1 / 1	24.70	20.45	0.111	38.45	-18.00
	16-QAM	836.5	-2.10	1 / 50	23.85	**19.60**	0.091	38.45	-18.85
	64-QAM	829.0	-2.10	1 / 1	22.43	**18.18**	0.066	38.45	-20.27
	256-QAM	829.0	-2.10	1 / 50	20.81	**16.56**	0.045	38.45	-21.89
15 MHz	π/2 BPSK	831.5	-2.10	1 / 1	24.63	20.38	0.109	38.45	-18.07
		836.5	-2.10	1 / 1	24.67	**20.42**	0.110	38.45	-18.03
		841.5	-2.10	1 / 77	24.53	20.28	0.107	38.45	-18.18
	QPSK	831.5	-2.10	1 / 1	24.70	**20.45**	0.111	38.45	-18.00
		836.5	-2.10	1 / 77	24.60	20.35	0.108	38.45	-18.10
		841.5	-2.10	1 / 1	24.52	20.27	0.106	38.45	-18.18
	16-QAM	836.5	-2.10	1 / 1	23.88	**19.63**	0.092	38.45	-18.82
	64-QAM	841.5	-2.10	1 / 77	22.50	**18.25**	0.067	38.45	-20.20
	256-QAM	841.5	-2.10	1 / 77	20.47	**16.22**	0.042	38.45	-22.23
20 MHz	π/2 BPSK	834.0	-2.10	1 / 1	24.60	20.35	0.108	38.45	-18.10
		836.5	-2.10	1 / 1	24.62	**20.37**	0.109	38.45	-18.08
		839.0	-2.10	1 / 1	24.60	20.35	0.108	38.45	-18.10
	QPSK	834.0	-2.10	1 / 1	24.70	**20.45**	0.111	38.45	-18.00
		836.5	-2.10	1 / 104	24.66	20.41	0.110	38.45	-18.04
		839.0	-2.10	1 / 104	24.67	20.42	0.110	38.45	-18.03
	16-QAM	834.0	-2.10	1 / 1	23.89	**19.64**	0.092	38.45	-18.81
	64-QAM	834.0	-2.10	1 / 1	22.41	**18.16**	0.065	38.45	-20.29
	256-QAM	834.0	-2.10	1 / 104	20.40	**16.15**	0.041	38.45	-22.30

Table 7-12. Antenna 2 ERP Data (NR Band n5)

WCDMA Cell

Frequency [MHz]	Mode	Conducted Power [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
826.40	WCDMA850	24.62	-2.10	20.37	0.109	38.45	-18.08
836.60	WCDMA850	24.70	-2.10	**20.45**	**0.111**	38.45	-18.00
846.60	WCDMA850	24.65	-2.10	20.40	0.110	38.45	-18.05

Table 7-13. Antenna 2 ERP Data (WCDMA Cell)

7.6 Radiated Spurious Emissions

§2.1053, 22.917(a)

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 tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

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 = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

Test Setup

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

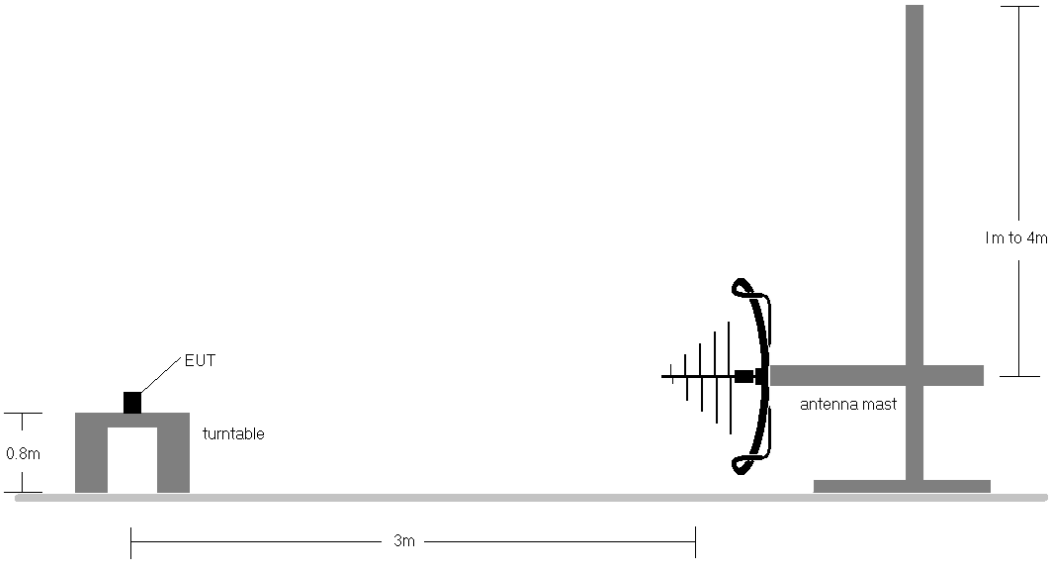


Figure 7-5. Test Instrument & Measurement Setup < 1GHz

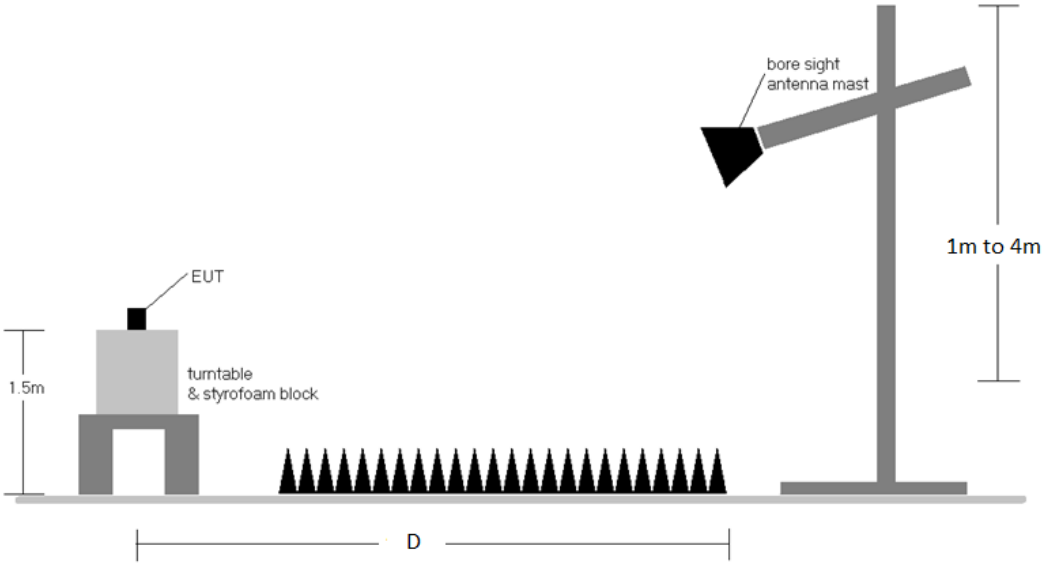


Figure 7-6. Test Instrument & Measurement Setup >1 GHz

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. This device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to “1”.

3. 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.

4. This unit was tested with its standard battery.

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

6. D is the measurement test distance and emissions 1-18GHz were measured at a 3 meters test distance.

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

8. ULCA spurious emissions 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.

9. 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.

10. Spurious emission in EN-DC Operating mode with Sub 6GHz NR carrier as well as an LTE carrier (anchor) has been checked and was found to not to be the worst case.

11. Uplink carrier aggregation inter-band emission was investigated and found to not be the worst case.

7.6.1 Antenna 4 – Radiated Spurious Emission Measurements

LTE Band 26/5

Bandwidth (MHz):	10
Frequency (MHz):	829.0
RB / Offset:	1 / 24

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]
1658.0	H	-	-	-72.40	-5.07	29.53	-65.73	-13.00	-52.73
2487.0	H	-	-	-73.96	-0.72	32.33	-62.93	-13.00	-49.93
3316.0	H	-	-	-75.42	1.66	33.24	-62.02	-13.00	-49.02

Table 7-14. Antenna 4 Radiated Spurious Data (LTE Band 26/5 – Low Channel)

Bandwidth (MHz):	10
Frequency (MHz):	836.5
RB / Offset:	1 / 24

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]
1673.0	H	-	-	-72.19	-5.07	29.74	-65.52	-13.00	-52.52
2509.5	H	-	-	-74.03	-0.67	32.30	-62.96	-13.00	-49.96
3346.0	H	-	-	-75.65	1.96	33.31	-61.95	-13.00	-48.95

Table 7-15. Antenna 4 Radiated Spurious Data (LTE Band 26/5 – Mid Channel)

Bandwidth (MHz):	10
Frequency (MHz):	844.0
RB / Offset:	1 / 24

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]
1688.0	H	201	329	-69.55	-4.95	32.50	-62.76	-13.00	-49.76
2532.0	H	-	-	-73.74	-0.55	32.71	-62.55	-13.00	-49.55
3376.0	H	-	-	-75.85	2.05	33.20	-62.06	-13.00	-49.06
4220.0	H	-	-	-76.56	2.96	33.40	-61.86	-13.00	-48.86

Table 7-16. Antenna 4 Radiated Spurious Data (LTE Band 26/5 – High Channel)

ULCA LTE Band 5

PCC Bandwidth (MHz):	10
PCC Frequency (MHz):	829.0
PCC RB / Offset:	1 / 49
SCC Bandwidth (MHz):	10
SCC Frequency (MHz):	838.9
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]
1658.0	H	-	-	-73.27	-4.82	28.91	-66.35	-13.00	-53.35
2487.0	H	-	-	-74.11	-0.83	32.06	-63.20	-13.00	-50.20
3316.0	H	-	-	-75.51	1.69	33.18	-62.08	-13.00	-49.08

Table 7-17. Antenna 4 Radiated Spurious Data (ULCA LTE Band 5 – Low Channel)

PCC Bandwidth (MHz):	10
PCC Frequency (MHz):	844.0
PCC RB / Offset:	1 / 0
SCC Bandwidth (MHz):	10
SCC Frequency (MHz):	834.1
SCC RB / Offset:	1 / 49

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]
1688.0	H	-	-	-72.55	-4.24	30.21	-65.05	-13.00	-52.05
2532.0	H	-	-	-74.10	-0.40	32.50	-62.76	-13.00	-49.76
3376.0	H	-	-	-75.83	2.06	33.23	-62.03	-13.00	-49.03

Table 7-18. Antenna 4 Radiated Spurious Data (ULCA LTE Band 5 – High Channel)

NR Band n26/n5

Bandwidth (MHz):	20
Frequency (MHz):	834.0
RB / 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]
1668.0	H	-	-	-74.85	-4.39	27.76	-67.49	-13.00	-54.49
2502.0	H	-	-	-76.21	-0.06	30.73	-64.52	-13.00	-51.52
3336.0	H	-	-	-77.01	1.89	31.88	-63.38	-13.00	-50.38

Table 7-19. Antenna 4 Radiated Spurious Data (NR Band n26/n5 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	836.5
RB / 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]
1673.0	H	-	-	-74.97	-4.32	27.71	-67.55	-13.00	-54.55
2509.5	H	-	-	-76.16	-0.04	30.80	-64.46	-13.00	-51.46
3346.0	H	-	-	-76.98	2.00	32.02	-63.24	-13.00	-50.24

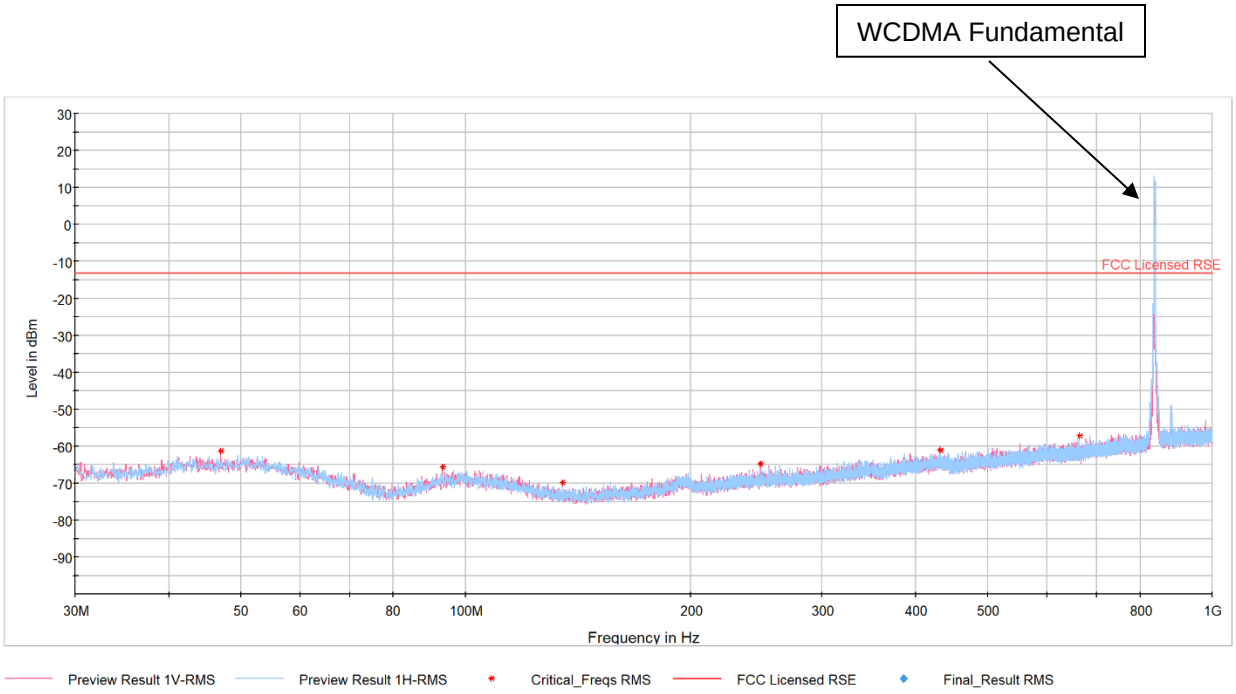
Table 7-20. Antenna 4 Radiated Spurious Data (NR Band n26/n5 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	839.0
RB / Offset:	1 / 50

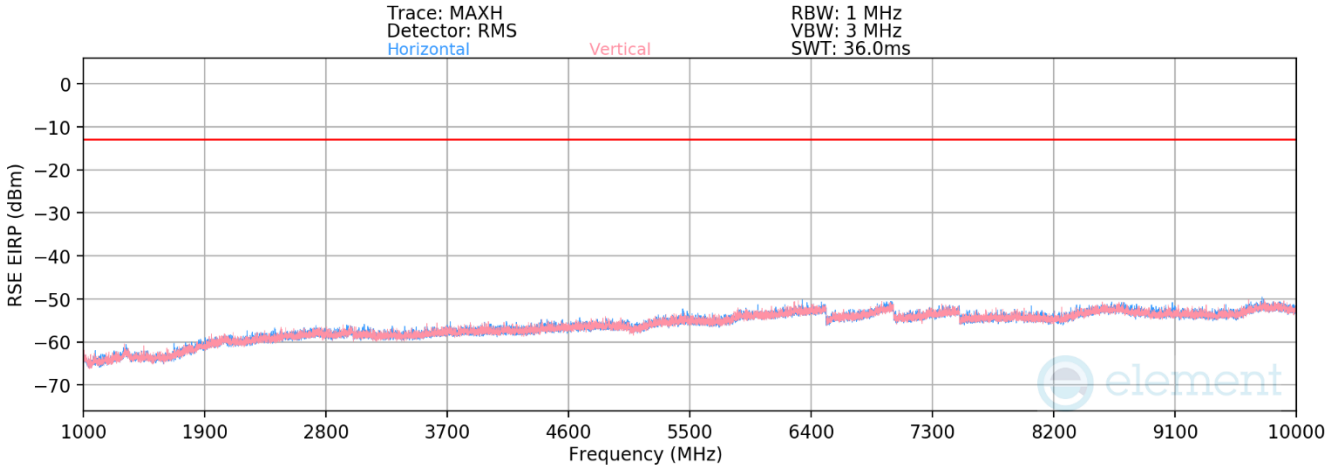
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1678.0	H	-	-	-75.23	-4.24	27.53	-67.73	-13.00	-54.73
2517.0	H	-	-	-76.02	-0.01	30.97	-64.29	-13.00	-51.29
3356.0	H	-	-	-77.21	1.97	31.76	-63.50	-13.00	-50.50

Table 7-21. Antenna 4 Radiated Spurious Data (NR Band n26/n5 – High Channel)

WCDMA Cell



Plot 7-114. Antenna 4 Radiated Spurious Plot below 1GHz (WCDMA Cell)



Plot 7-115. Antenna 4 Radiated Spurious Plot above 1GHz (WCDMA Cell)

Mode:	WCDMA RMC
Channel:	4132
Frequency (MHz):	826.4

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]
1652.8	H	-	-	-76.69	-4.21	26.10	-69.16	-13.00	-56.16
2479.2	H	-	-	-77.14	0.87	30.73	-64.53	-13.00	-51.53
3305.6	H	-	-	-78.00	2.41	31.41	-63.85	-13.00	-50.85

Table 7-22. Antenna 4 Radiated Spurious Data (WCDMA Cell – Low Channel)

Mode:	WCDMA RMC
Channel:	4183
Frequency (MHz):	836.6

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]
1673.2	H	-	-	-76.65	-3.75	26.60	-68.66	-13.00	-55.66
2509.8	H	-	-	-77.30	0.83	30.53	-64.73	-13.00	-51.73
3346.4	H	-	-	-78.41	2.64	31.23	-64.03	-13.00	-51.03

Table 7-23. Antenna 4 Radiated Spurious Data (WCDMA Cell – Mid Channel)

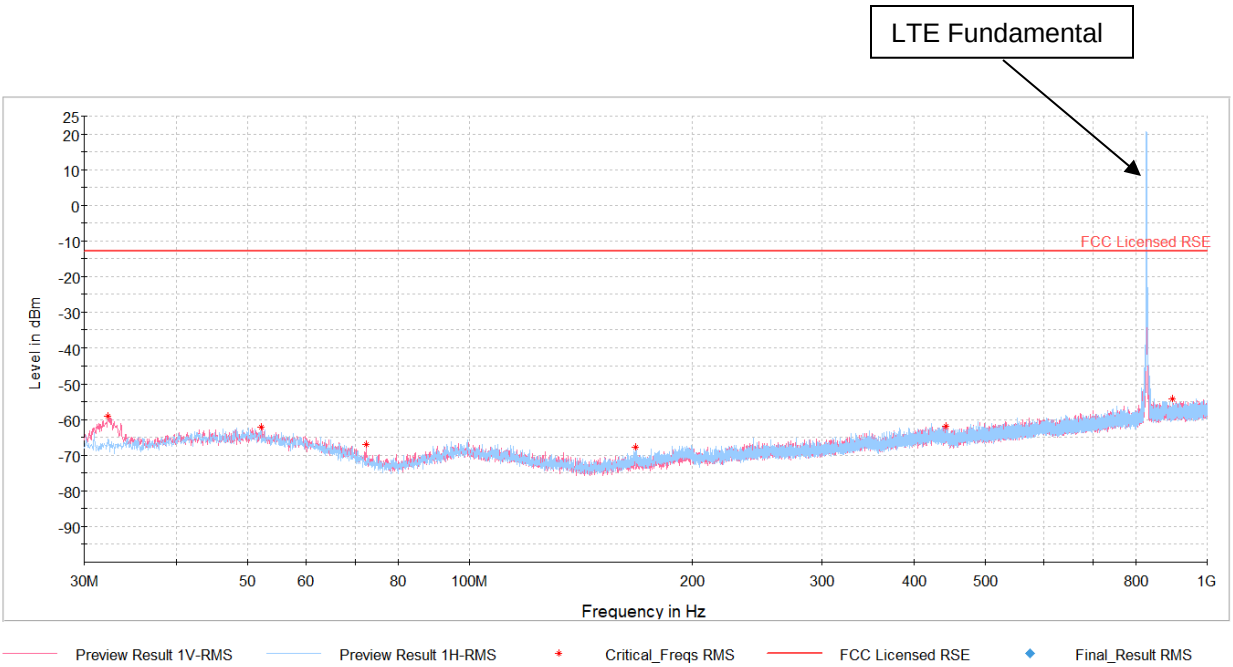
Mode:	WCDMA RMC
Channel:	4233
Frequency (MHz):	846.6

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]
1693.2	H	-	-	-73.96	-3.79	29.25	-66.01	-13.00	-53.01
2539.8	H	-	-	-77.55	1.12	30.57	-64.68	-13.00	-51.68
3386.4	H	-	-	-78.50	2.44	30.94	-64.31	-13.00	-51.31

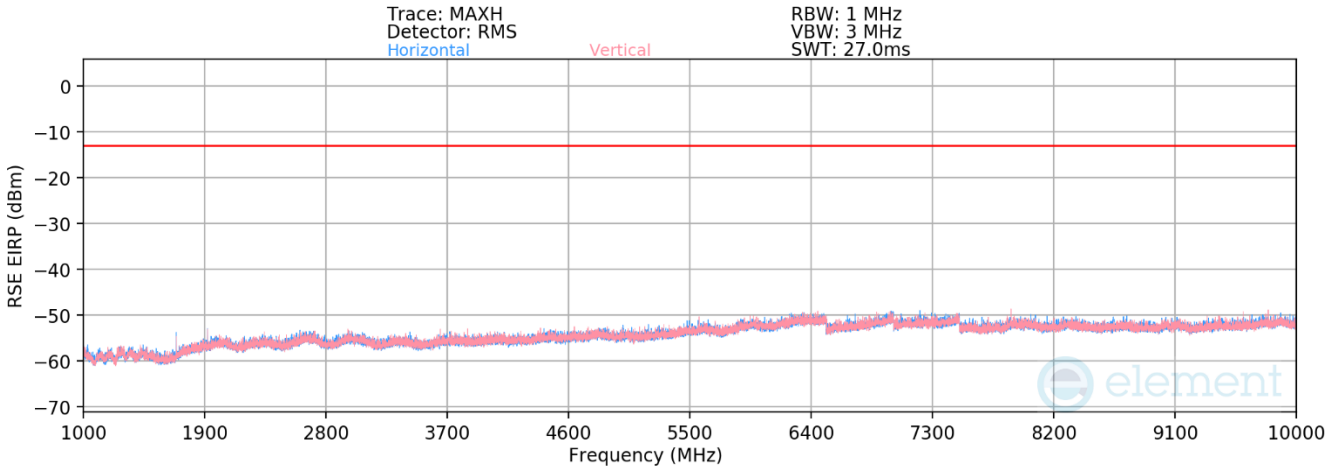
Table 7-24. Antenna 4 Radiated Spurious Data (WCDMA Cell – High Channel)

7.6.2 Antenna 2 – Radiated Spurious Emission Measurements

LTE Band 26/5



Plot 7-116. Antenna 2 Radiated Spurious Plot below 1GHz (LTE Band 26/5)



Plot 7-117. Antenna 2 Radiated Spurious Plot above 1GHz (LTE Band 26/5)

Bandwidth (MHz):	10
Frequency (MHz):	829.0
RB / 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]
1658.0	H	-	-	-72.00	-5.07	29.93	-65.33	-13.00	-52.33
2487.0	H	-	-	-73.97	-0.72	32.31	-62.95	-13.00	-49.95
3316.0	H	-	-	-75.53	1.66	33.13	-62.13	-13.00	-49.13

Table 7-25. Antenna 2 Radiated Spurious Data (LTE Band 26/5 – Low Channel)

Bandwidth (MHz):	10
Frequency (MHz):	836.5
RB / 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]
1673.0	H	210	336	-68.60	-5.03	33.37	-61.89	-13.00	-48.89
2509.5	H	-	-	-73.94	-0.71	32.34	-62.92	-13.00	-49.92
3346.0	H	-	-	-75.59	1.96	33.37	-61.88	-13.00	-48.88
4182.5	H	-	-	-76.64	2.93	33.29	-61.97	-13.00	-48.97

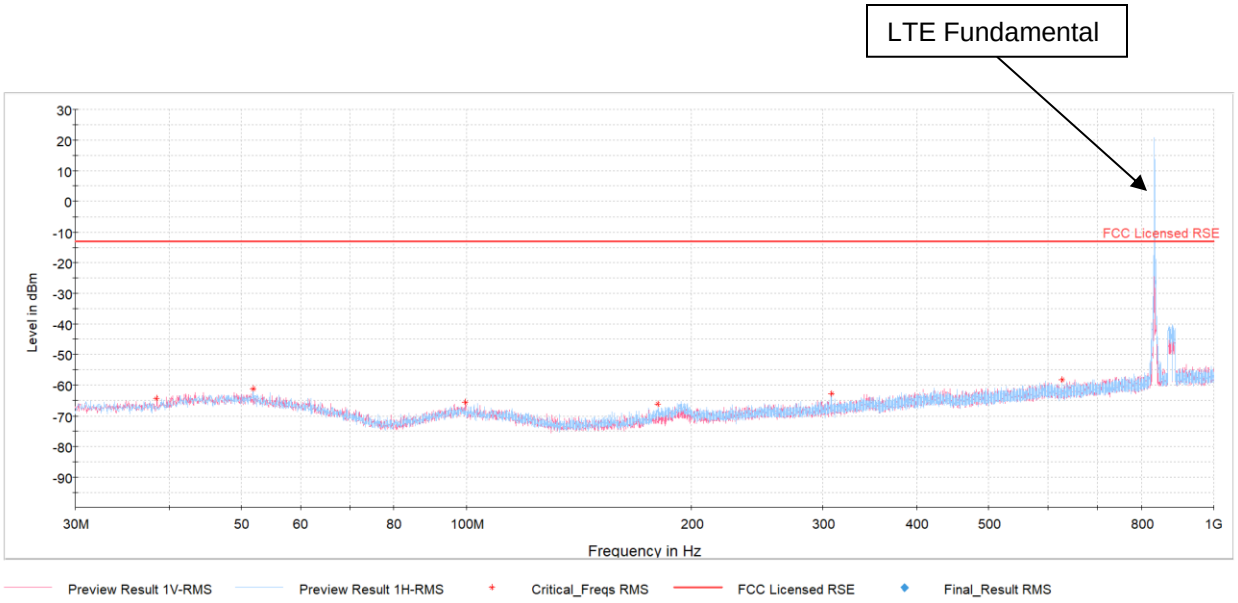
Table 7-26. Antenna 2 Radiated Spurious Data (LTE Band 26/5 – Mid Channel)

Bandwidth (MHz):	10
Frequency (MHz):	844.0
RB / Offset:	1 / 50

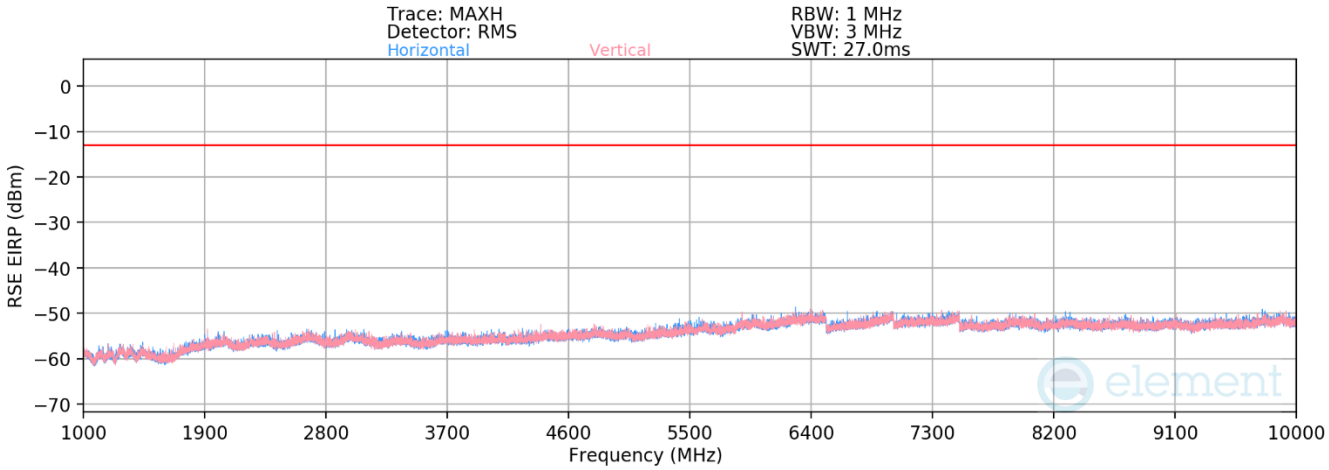
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1688.0	H	109	175	-67.70	-4.95	34.35	-60.91	-13.00	-47.91
2532.0	H	-	-	-73.78	-0.55	32.67	-62.59	-13.00	-49.59
3376.0	H	-	-	-75.90	2.05	33.15	-62.11	-13.00	-49.11
4220.0	H	-	-	-76.54	2.96	33.42	-61.83	-13.00	-48.83

Table 7-27. Antenna 2 Radiated Spurious Data (LTE Band 26/5 – High Channel)

ULCA LTE Band 5



Plot 7-118. Antenna 2 Radiated Spurious Plot below 1GHz (ULCA LTE Band 5)



Plot 7-119. Antenna 2 Radiated Spurious Plot above 1GHz (ULCA LTE Band 5)

PCC Bandwidth (MHz):	10
PCC Frequency (MHz):	829.0
PCC RB / Offset:	1 / 49
SCC Bandwidth (MHz):	10
SCC Frequency (MHz):	838.9
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]
1658.0	H	312	62	-68.03	-5.03	33.94	-61.32	-13.00	-48.32
2487.0	H	-	-	-74.63	-0.41	31.96	-63.30	-13.00	-50.30
3316.0	H	-	-	-76.17	1.96	32.79	-62.47	-13.00	-49.47
4145.0	H	-	-	-76.96	3.11	33.16	-62.10	-13.00	-49.10

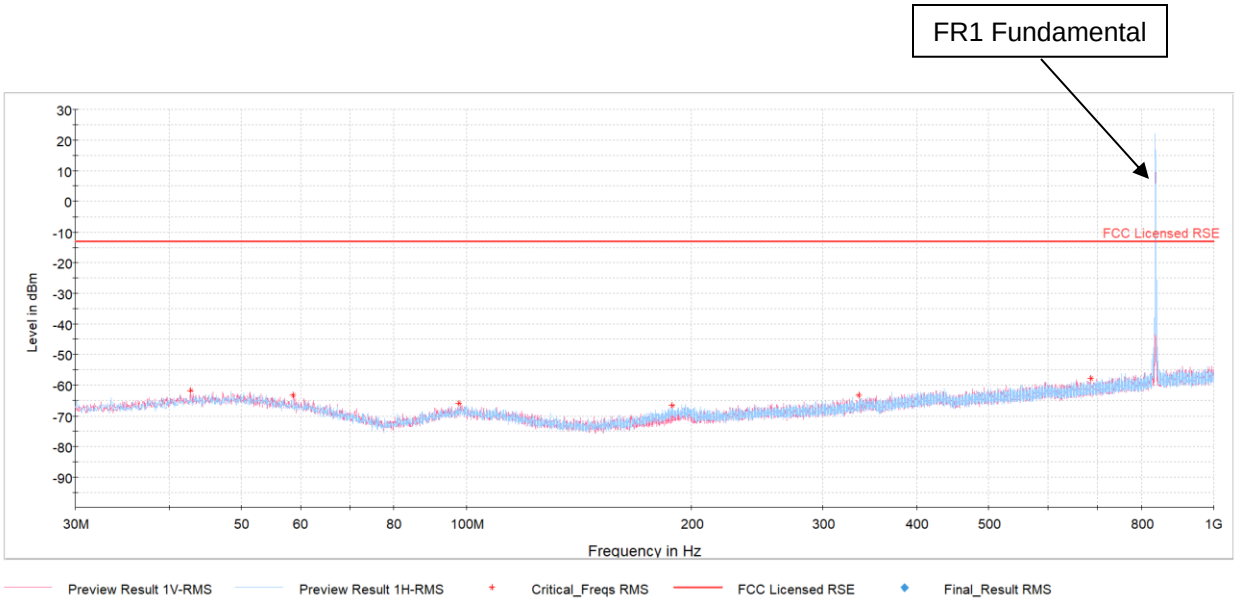
Table 7-28. Antenna 2 Radiated Spurious Data (ULCA LTE Band 5 – Low Channel)

PCC Bandwidth (MHz):	10
PCC Frequency (MHz):	844.0
PCC RB / Offset:	1 / 0
SCC Bandwidth (MHz):	10
SCC Frequency (MHz):	834.1
SCC RB / Offset:	1 / 49

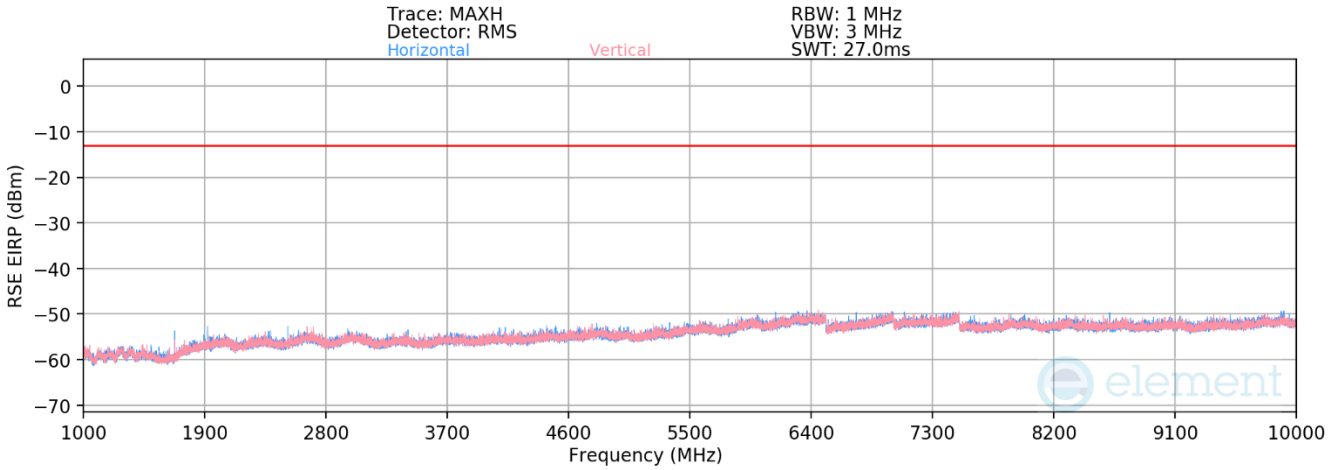
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1688.0	H	111	37	-68.57	-5.03	33.40	-61.86	-13.00	-48.86
2532.0	H	-	-	-74.41	-0.41	32.18	-63.07	-13.00	-50.07
3376.0	H	-	-	-75.94	1.80	32.86	-62.40	-13.00	-49.40
4220.0	H	-	-	-76.89	2.89	33.00	-62.25	-13.00	-49.25

Table 7-29. Antenna 2 Radiated Spurious Data (ULCA LTE Band 5 – High Channel)

NR Band n26/n5



Plot 7-120. Antenna 2 Radiated Spurious Plot below 1GHz (NR Band n26/n5)



Plot 7-121. Antenna 2 Radiated Spurious Plot above 1GHz (NR Band n26/n5)

Bandwidth (MHz):	20
Frequency (MHz):	834.0
RB / 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]
1668.0	H	208	169	-65.93	-5.03	36.04	-59.21	-13.00	-46.21
2502.0	H	-	-	-74.07	-0.76	32.17	-63.09	-13.00	-50.09
3336.0	H	-	-	-75.64	1.80	33.16	-62.09	-13.00	-49.09
4170.0	H	-	-	-77.01	2.93	32.92	-62.34	-13.00	-49.34

Table 7-30. Antenna 2 Radiated Spurious Data (NR Band n26/n5 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	836.5
RB / 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]
1673.0	H	222	176	-65.37	-5.03	36.60	-58.65	-13.00	-45.65
2509.5	H	-	-	-74.07	-0.76	32.17	-63.09	-13.00	-50.09
3346.0	H	-	-	-75.85	1.96	33.12	-62.14	-13.00	-49.14
4182.5	H	-	-	-76.75	2.93	33.18	-62.08	-13.00	-49.08

Table 7-31. Antenna 2 Radiated Spurious Data (NR Band n26/n5 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	839.0
RB / 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]
1678.0	H	305	72	-65.36	-5.03	36.61	-58.65	-13.00	-45.65
2517.0	H	-	-	-73.81	-0.67	32.52	-62.74	-13.00	-49.74
3356.0	H	-	-	-75.92	1.96	33.04	-62.21	-13.00	-49.21
4195.0	H	-	-	-76.57	2.93	33.36	-61.89	-13.00	-48.89

Table 7-32. Antenna 2 Radiated Spurious Data (NR Band n26/n5 – High Channel)

WCDMA Cell

Mode:	WCDMA RMC
Channel:	4132
Frequency (MHz):	826.4

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]
1652.8	H	-	-	-76.55	-4.21	26.23	-69.02	-13.00	-56.02
2479.2	H	-	-	-77.23	0.87	30.64	-64.61	-13.00	-51.61
3305.6	H	-	-	-77.98	2.41	31.43	-63.83	-13.00	-50.83

Table 7-33. Antenna 2 Radiated Spurious Data (WCDMA Cell – Low Channel)

Mode:	WCDMA RMC
Channel:	4183
Frequency (MHz):	836.6

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]
1673.2	H	-	-	-76.71	-3.79	26.50	-68.76	-13.00	-55.76
2509.8	H	-	-	-77.49	1.06	30.57	-64.69	-13.00	-51.69
3346.4	H	-	-	-78.49	2.64	31.15	-64.11	-13.00	-51.11

Table 7-34. Antenna 2 Radiated Spurious Data (WCDMA Cell – Mid Channel)

Mode:	WCDMA RMC
Channel:	4233
Frequency (MHz):	846.6

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]
1693.2	H	-	-	-76.35	-3.79	26.86	-68.39	-13.00	-55.39
2539.8	H	-	-	-77.54	1.12	30.58	-64.68	-13.00	-51.68
3386.4	H	-	-	-78.26	2.40	31.13	-64.12	-13.00	-51.12

Table 7-35. Antenna 2 Radiated Spurious Data (WCDMA Cell – High Channel)

7.7 Frequency Stability / Temperature Variation

§2.1055, 22.355

Test Overview and Limit

Frequency Tolerance testing is performed in accordance with the guidelines of ANSI C63.26-2015 and TIA-603-E-2016. All port were tested and only the worst case data were reported. The Frequency Tolerance 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 22, the Frequency Tolerance of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency.

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

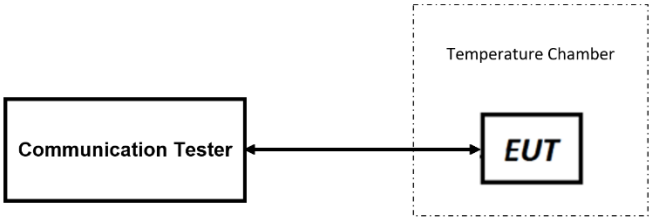


Figure 7-7. Test Instrument & Measurement Setup

Test Notes

1. All port were tested and only the worst case data were reported.

Frequency Tolerance / Temperature Variation

LTE Band 26/5

Operating Frequency (Hz):	836,500,000
Ref. Voltage (VDC):	3.80
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	836,500,014	14.00	0.0000017
		- 20	836,499,979	-21.00	-0.0000025
		- 10	836,499,983	-17.00	-0.0000020
		0	836,500,026	26.00	0.0000031
		+ 10	836,500,011	11.00	0.0000013
		+ 20 (Ref)	836,500,000	0.00	0.0000000
		+ 30	836,499,977	-23.00	-0.0000027
		+ 40	836,500,031	31.00	0.0000037
		+ 50	836,499,978	-22.00	-0.0000026
Battery Endpoint	3.40	+ 20	836,499,987	-13.00	-0.0000016

Table 7-36. LTE Band 26/5 Frequency Tolerance Data

Frequency Tolerance / Temperature Variation

NR Band n26/5

Operating Frequency (Hz):	836,500,000
Ref. Voltage (VDC):	3.80
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	836,499,981	-19.00	-0.0000023
		- 20	836,500,024	24.00	0.0000029
		- 10	836,500,031	31.00	0.0000037
		0	836,499,971	-29.00	-0.0000035
		+ 10	836,500,017	17.00	0.0000020
		+ 20 (Ref)	836,500,000	0.00	0.0000000
		+ 30	836,500,022	22.00	0.0000026
		+ 40	836,499,986	-14.00	-0.0000017
		+ 50	836,500,025	25.00	0.0000030
Battery Endpoint	3.40	+ 20	836,500,027	27.00	0.0000032

Table 7-37. NR Band n26/n5 Frequency Tolerance Data

Frequency Tolerance / Temperature Variation

WCDMA Cellular

Operating Frequency (Hz):	836,600,000
Ref. Voltage (VDC):	3.80
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	836,600,032	32.00	0.0000038
		- 20	836,600,022	22.00	0.0000026
		- 10	836,599,982	-18.00	-0.0000022
		0	836,599,990	-10.00	-0.0000012
		+ 10	836,600,025	25.00	0.0000030
		+ 20 (Ref)	836,600,000	0.00	0.0000000
		+ 30	836,600,028	28.00	0.0000033
		+ 40	836,600,031	31.00	0.0000037
		+ 50	836,600,041	41.00	0.0000049
Battery Endpoint	3.40	+ 20	836,599,981	-19.00	-0.0000023

Table 7-38. WCDMA Cell Frequency Tolerance Data

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the Apple **Tablet Device FCC ID: BCGA2899** complies with all the requirements of Part 22 of the FCC rules.