

Appendix F: Frequency Stability

Test Result

LTE Band 2 part:

Reference Frequency: LTE Band 2 (10MHz) Middle channel=18900 Frequency=1880.0MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-22.26	-0.011840	Within authorized band for Band 2	Pass
	-20	-12.19	-0.006484		
	-10	-14.38	-0.007649		
	0	-13.40	-0.007128		
	10	-7.65	-0.004069		
	20	-14.76	-0.007851		
	30	-12.09	-0.006431		
	40	-12.36	-0.006574		
	50	-5.45	-0.002899		
16QAM					
3.85	-30	4.55	0.002420	Within authorized band for Band 2	Pass
	-20	-19.10	-0.010160		
	-10	-4.66	-0.002479		
	0	-11.44	-0.006085		
	10	-15.41	-0.008197		
	20	-18.40	-0.009787		
	30	-3.82	-0.002032		
	40	-16.94	-0.009011		
	50	-14.58	-0.007755		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-15.95	-0.008484	Within authorized band for Band 2	Pass
	3.85	-15.09	-0.008027		
	4.40	-13.19	-0.007016		
16QAM					
25	3.50	-18.98	-0.010096	Within authorized band for Band 2	Pass
	3.85	-14.52	-0.007723		
	4.40	-16.65	-0.008856		
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.					

LTE Band 4 part:

Reference Frequency: LTE Band 4(10MHz) Middle channel=20175 Frequency=1732.5MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-4.88	-0.002817	Within authorized band for Band 4	Pass
	-20	-8.17	-0.004716		
	-10	-4.65	-0.002684		
	0	-14.23	-0.008214		
	10	-13.02	-0.007515		
	20	-4.82	-0.002782		
	30	-6.67	-0.003850		
	40	-15.05	-0.008687		
	50	-10.50	-0.006061		
16QAM					
3.85	-30	-8.14	-0.004698	Within authorized band for Band 4	Pass
	-20	-16.85	-0.009726		
	-10	-13.62	-0.007861		
	0	9.64	0.005564		
	10	-19.03	-0.010984		
	20	-11.22	-0.006476		
	30	4.62	0.002667		
	40	5.31	0.003065		
	50	-9.96	-0.005749		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-9.87	-0.005697	Within authorized band for Band 4	Pass
	3.85	-15.26	-0.008808		
	4.40	-15.72	-0.009074		
16QAM					
25	3.50	-19.40	-0.011198	Within authorized band for Band 4	Pass
	3.85	-5.32	-0.003071		
	4.40	-16.45	-0.009495		
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.					

LTE Band 5 part:

Reference Frequency: LTE Band 5(10MHz) Middle channel=20525 Frequency=836.5MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-10.89	-0.013019	±2.5	Pass
	-20	-14.20	-0.016975		
	-10	-5.29	-0.006324		
	0	-8.28	-0.009898		
	10	-2.53	-0.003025		
	20	-3.69	-0.004411		
	30	-10.54	-0.012600		
	40	-9.87	-0.011799		
	50	-4.45	-0.005320		
16QAM					
3.85	-30	-10.50	-0.012552	±2.5	Pass
	-20	-16.71	-0.019976		
	-10	-11.32	-0.013533		
	0	-11.86	-0.014178		
	10	-8.44	-0.010090		
	20	-7.61	-0.009097		
	30	-6.82	-0.008153		
	40	-4.61	-0.005511		
	50	-8.74	-0.010448		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-6.74	-0.008057	±2.5	Pass
	3.85	-11.40	-0.013628		
	4.40	-11.40	-0.013628		
16QAM					
25	3.50	-2.63	-0.003144	±2.5	Pass
	3.85	-6.38	-0.007627		
	4.40	-8.41	-0.010054		
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.					

LTE Band 7 part:

Reference Frequency: LTE Band 7(10MHz) Middle channel=21100 Frequency=2535.0MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-21.96	-0.008663	Within authorized band for Band 7	Pass
	-20	-18.17	-0.007168		
	-10	12.43	0.004903		
	0	11.46	0.004521		
	10	-15.91	-0.006276		
	20	17.28	0.006817		
	30	9.94	0.003921		
	40	-17.60	-0.006943		
	50	15.31	0.006039		
16QAM					
3.85	-30	11.62	0.004584	Within authorized band for Band 7	Pass
	-20	14.41	0.005684		
	-10	7.32	0.002888		
	0	-19.61	-0.007736		
	10	18.51	0.007302		
	20	-16.74	-0.006604		
	30	-16.34	-0.006446		
	40	5.98	0.002359		
	50	19.87	0.007838		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-5.62	-0.002217	Within authorized band for Band 7	Pass
	3.85	6.75	0.002663		
	4.40	-20.57	-0.008114		
16QAM					
25	3.50	11.07	0.004367	Within authorized band for Band 7	Pass
	3.85	-9.74	-0.003842		
	4.40	9.34	0.003684		
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.					

LTE Band 17 part:

Reference Frequency: LTE Band 17(10MHz) Middle channel=23790 Frequency=710.0MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-12.86	-0.018113	Within authorized band for Band 17	Pass
	-20	-10.11	-0.014239		
	-10	-10.71	-0.015085		
	0	-9.26	-0.013042		
	10	-7.38	-0.010394		
	20	-12.30	-0.017324		
	30	-13.00	-0.018310		
	40	-8.63	-0.012155		
	50	-14.55	-0.020493		
16QAM					
3.85	-30	-4.51	-0.006352	Within authorized band for Band 17	Pass
	-20	-9.56	-0.013465		
	-10	-11.00	-0.015493		
	0	-10.20	-0.014366		
	10	-8.24	-0.011606		
	20	-6.38	-0.008986		
	30	-8.01	-0.011282		
	40	-7.81	-0.011000		
	50	-14.10	-0.019859		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-9.60	-0.013521	Within authorized band for Band 17	Pass
	3.85	-8.77	-0.012352		
	4.40	-9.83	-0.013845		
16QAM					
25	3.50	-10.69	-0.015056	Within authorized band for Band 17	Pass
	3.85	-14.81	-0.020859		
	4.40	-6.24	-0.008789		
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.					

LTE Band 38 part:

Reference Frequency: LTE Band 38(10MHz) Middle channel=38000 Frequency=2595.0MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-12.86	-0.004956	Within authorized band for Band 38	Pass
	-20	-15.85	-0.006108		
	-10	-12.97	-0.004998		
	0	-8.60	-0.003314		
	10	-11.17	-0.004304		
	20	-15.46	-0.005958		
	30	-13.55	-0.005222		
	40	-12.49	-0.004813		
	50	-13.95	-0.005376		
16QAM					
3.85	-30	-14.28	-0.005503	Within authorized band for Band 38	Pass
	-20	-12.80	-0.004933		
	-10	3.45	0.001329		
	0	-12.49	-0.004813		
	10	-12.10	-0.004663		
	20	-14.25	-0.005491		
	30	-16.82	-0.006482		
	40	-20.36	-0.007846		
	50	-15.94	-0.006143		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-12.75	-0.004913	Within authorized band for Band 38	Pass
	3.85	-22.13	-0.008528		
	4.40	-16.31	-0.006285		
16QAM					
25	3.50	3.82	0.001472	Within authorized band for Band 38	Pass
	3.85	-18.01	-0.006940		
	4.40	-15.21	-0.005861		
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.					

LTE Band 41 part:

Reference Frequency: LTE Band 41 (10MHz) Middle channel=40640 Frequency=2595.0MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-17.09	-0.006586	Within authorized band for Band 41	Pass
	-20	-11.22	-0.004324		
	-10	-16.94	-0.006528		
	0	-10.96	-0.004224		
	10	-5.01	-0.001931		
	20	-4.02	-0.001549		
	30	-11.00	-0.004239		
	40	-17.62	-0.006790		
	50	-16.59	-0.006393		
16QAM					
3.85	-30	-20.47	-0.007888	Within authorized band for Band 41	Pass
	-20	-14.23	-0.005484		
	-10	2.32	0.000894		
	0	-4.48	-0.001726		
	10	-17.57	-0.006771		
	20	-10.16	-0.003915		
	30	-5.01	-0.001931		
	40	-16.19	-0.006239		
	50	-19.00	-0.007322		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-12.73	-0.004906	Within authorized band for Band 41	Pass
	3.85	-19.17	-0.007387		
	4.40	-20.87	-0.008042		
16QAM					
25	3.50	-13.56	-0.005225	Within authorized band for Band41	Pass
	3.85	-13.49	-0.005198		
	4.40	-9.28	-0.003576		
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.					

LTE Band 66 part:

Reference Frequency: LTE Band 66 (10MHz) Middle channel=132322 Frequency=1745.0MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-6.92	-0.003966	Within authorized band for Band 66	Pass
	-20	-8.54	-0.004894		
	-10	-9.27	-0.005312		
	0	-13.29	-0.007616		
	10	-12.89	-0.007387		
	20	-8.48	-0.004860		
	30	2.05	0.001175		
	40	-17.31	-0.009920		
	50	-13.42	-0.007691		
16QAM					
3.85	-30	-15.81	-0.009060	Within authorized band for Band 66	Pass
	-20	-15.84	-0.009077		
	-10	-15.08	-0.008642		
	0	-3.65	-0.002092		
	10	-4.72	-0.002705		
	20	3.83	0.002195		
	30	-10.29	-0.005897		
	40	11.39	0.006527		
	50	-12.27	-0.007032		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-14.15	-0.008109	Within authorized band for Band 66	Pass
	3.85	-17.51	-0.010034		
	4.40	-13.82	-0.007920		
16QAM					
25	3.50	-9.91	-0.005679	Within authorized band for Band 66	Pass
	3.85	-9.67	-0.005542		
	4.40	-5.49	-0.003146		
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.					

Appendix G: Modulation Characteristics

Test Result

Band	Bandwidth	Modulation	Channel	RB Configuration	Result	Verdict
Band2	20MHz	QPSK	18900	100RB#0	PASS	PASS
Band2	20MHz	16QAM	18900	100RB#0	PASS	PASS
Band4	20MHz	QPSK	20175	100RB#0	PASS	PASS
Band4	20MHz	16QAM	20175	100RB#0	PASS	PASS
Band5	10MHz	QPSK	20525	50RB#0	PASS	PASS
Band5	10MHz	16QAM	20525	50RB#0	PASS	PASS
Band7	20MHz	QPSK	21100	100RB#0	PASS	PASS
Band7	20MHz	16QAM	21100	100RB#0	PASS	PASS
Band17	10MHz	QPSK	23790	50RB#0	PASS	PASS
Band17	10MHz	16QAM	23790	50RB#0	PASS	PASS
Band38	20MHz	QPSK	38000	100RB#0	PASS	PASS
Band38	20MHz	16QAM	38000	100RB#0	PASS	PASS
Band41	20MHz	QPSK	40640	100RB#0	PASS	PASS
Band41	20MHz	16QAM	40640	100RB#0	PASS	PASS
Band66	20MHz	QPSK	132322	100RB#0	PASS	PASS
Band66	20MHz	16QAM	132322	100RB#0	PASS	PASS

Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.

Test Graphs





