

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					
3.87	-30	-14.15	-0.007527	Within authorized band for Band 2	Pass
	-20	-13.90	-0.007394		
	-10	-16.35	-0.008697		
	0	-7.48	-0.003979		
	10	-11.99	-0.006378		
	20	-9.24	-0.004915		
	30	-13.99	-0.007441		
	40	-8.44	-0.004489		
	50	-18.31	-0.009739		
16QAM					
3.87	-30	-16.14	-0.008585	Within authorized band for Band 2	Pass
	-20	-16.05	-0.008537		
	-10	-11.17	-0.005941		
	0	-12.59	-0.006697		
	10	-9.90	-0.005266		
	20	-7.41	-0.003941		
	30	-12.03	-0.006399		
	40	-7.72	-0.004106		
	50	-14.56	-0.007745		
64QAM					
3.87	-30	-21.24	-0.011298	Within authorized band for Band 2	Pass
	-20	-12.55	-0.006676		
	-10	-16.02	-0.008521		
	0	-19.18	-0.010202		
	10	-18.84	-0.010021		
	20	-15.84	-0.008426		
	30	-2.40	-0.001277		
	40	-14.71	-0.007824		
	50	-10.01	-0.005324		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	-16.37	-0.008707	Within authorized band for Band 2	Pass
	3.87	-17.77	-0.009452		
	4.45	-8.23	-0.004378		
16QAM					
25	3.45	-15.06	-0.008011	Within authorized band for Band 2	Pass
	3.87	-11.76	-0.006255		
	4.45	-7.20	-0.003830		
64QAM					
25	3.45	-21.54	-0.011457	Within authorized band for Band 2	Pass
	3.87	9.83	0.005229		
	4.45	-14.23	-0.007569		
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 (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.87	-30	-13.80	-0.005444	Within authorized band for Band 7	Pass
	-20	-12.60	-0.004970		
	-10	-10.83	-0.004272		
	0	11.19	0.004414		
	10	-13.63	-0.005377		
	20	-7.72	-0.003045		
	30	-16.28	-0.006422		
	40	-21.47	-0.008469		
	50	-13.10	-0.005168		
16QAM					
3.87	-30	-11.89	-0.004690	Within authorized band for Band 7	Pass
	-20	-11.83	-0.004667		
	-10	-10.24	-0.004039		
	0	-14.02	-0.005531		
	10	-8.63	-0.003404		
	20	-13.78	-0.005436		
	30	-12.37	-0.004880		
	40	-12.07	-0.004761		
	50	-10.06	-0.003968		
64QAM					
3.87	-30	-20.53	-0.008099	Within authorized band for Band 7	Pass
	-20	-24.15	-0.009527		
	-10	-21.06	-0.008308		
	0	-21.93	-0.008651		
	10	-18.04	-0.007116		
	20	-17.42	-0.006872		
	30	5.65	0.002229		
	40	-15.61	-0.006158		
	50	-16.74	-0.006604		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	-8.84	-0.003487	Within authorized band for Band 7	Pass
	3.87	-13.42	-0.005294		
	4.45	-12.87	-0.005077		
16QAM					
25	3.45	-14.32	-0.005649	Within authorized band for Band 7	Pass
	3.87	-17.02	-0.006714		
	4.45	-9.26	-0.003653		
64QAM					
25	3.45	4.05	0.001598	Within authorized band for Band 7	Pass
	3.87	15.91	0.006276		
	4.45	-15.84	-0.006249		
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.					

LTE Band 12 part:

Reference Frequency: LTE Band 12(10MHz) Middle channel=23095 Frequency=707.5MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.87	-30	-8.43	-0.011915	Within authorized band for Band 12	Pass
	-20	-10.09	-0.014261		
	-10	-7.10	-0.010035		
	0	-8.27	-0.011689		
	10	-6.25	-0.008834		
	20	-5.64	-0.007972		
	30	-5.61	-0.007929		
	40	-7.97	-0.011265		
	50	-8.70	-0.012297		
16QAM					
3.87	-30	-10.20	-0.014417	Within authorized band for Band 12	Pass
	-20	-8.96	-0.012664		
	-10	-6.94	-0.009809		
	0	-9.83	-0.013894		
	10	-7.95	-0.011237		
	20	-6.61	-0.009343		
	30	-4.42	-0.006247		
	40	-10.59	-0.014968		
	50	-9.80	-0.013852		
64QAM					
3.87	-30	-6.61	-0.009343	Within authorized band for Band 12	Pass
	-20	-10.43	-0.014742		
	-10	-10.80	-0.015265		
	0	-8.93	-0.012622		
	10	-11.39	-0.016099		
	20	-7.38	-0.010431		
	30	-6.88	-0.009724		
	40	-7.07	-0.009993		
	50	-6.75	-0.009541		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	-6.58	-0.009300	Within authorized band for Band 12	Pass
	3.87	-11.54	-0.016311		
	4.45	-9.81	-0.013866		
16QAM					
25	3.45	-8.87	-0.012537	Within authorized band for Band 12	Pass
	3.87	-8.74	-0.012353		
	4.45	-7.80	-0.011025		
64QAM					
25	3.45	-12.13	-0.017145	Within authorized band for Band 12	Pass
	3.87	-12.76	-0.018035		
	4.45	-10.44	-0.014756		
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.					

LTE Band 13 part:

Reference Frequency: LTE Band 13(10MHz) Middle channel=23230 Frequency=782.0MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.87	-30	-13.23	-0.016918	Within authorized band for Band 17	Pass
	-20	-13.52	-0.017289		
	-10	-12.19	-0.015588		
	0	-9.31	-0.011905		
	10	-6.27	-0.008018		
	20	-8.90	-0.011381		
	30	-6.97	-0.008913		
	40	-6.62	-0.008465		
	50	-6.64	-0.008491		
16QAM					
3.87	-30	-5.76	-0.007366	Within authorized band for Band 17	Pass
	-20	-9.24	-0.011816		
	-10	-8.37	-0.010703		
	0	-7.05	-0.009015		
	10	-9.34	-0.011944		
	20	-6.15	-0.007864		
	30	-6.90	-0.008824		
	40	-10.91	-0.013951		
	50	-10.86	-0.013887		
64QAM					
3.87	-30	-11.92	-0.015243	Within authorized band for Band 17	Pass
	-20	-9.60	-0.012276		
	-10	-11.62	-0.014859		
	0	-11.92	-0.015243		
	10	-8.25	-0.010550		
	20	-8.24	-0.010537		
	30	6.08	0.007775		
	40	-9.84	-0.012583		
	50	-7.37	-0.009425		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	-9.93	-0.012698	Within authorized band for Band 17	Pass
	3.87	-8.33	-0.010652		
	4.45	-10.76	-0.013760		
16QAM					
25	3.45	-3.35	-0.004284	Within authorized band for Band 17	Pass
	3.87	-8.55	-0.010934		
	4.45	-8.88	-0.011355		
64QAM					
25	3.45	-14.81	-0.018939	Within authorized band for Band 17	Pass
	3.87	-8.85	-0.011317		
	4.45	-8.10	-0.010358		
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.					

LTE Band 26 part:

Reference Frequency: LTE Band 26(10MHz) Middle channel=26740 Frequency=819.0MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.87	-30	-5.01	-0.006117	Within authorized band for Band 38	Pass
	-20	-5.55	-0.006777		
	-10	-5.55	-0.006777		
	0	-5.52	-0.006740		
	10	-7.11	-0.008681		
	20	-11.00	-0.013431		
	30	-11.00	-0.013431		
	40	-4.94	-0.006032		
	50	-10.84	-0.013236		
16QAM					
3.87	-30	-11.14	-0.013602	Within authorized band for Band 38	Pass
	-20	-9.24	-0.011282		
	-10	-13.75	-0.016789		
	0	-7.74	-0.009451		
	10	-9.98	-0.012186		
	20	-3.43	-0.004188		
	30	-10.80	-0.013187		
	40	-11.72	-0.014310		
	50	-7.57	-0.009243		
64QAM					
3.87	-30	-3.25	-0.003968	Within authorized band for Band 38	Pass
	-20	-12.00	-0.014652		
	-10	-7.34	-0.008962		
	0	-6.34	-0.007741		
	10	-11.34	-0.013846		
	20	-5.42	-0.006618		
	30	-11.22	-0.013700		
	40	-12.12	-0.014799		
	50	-9.63	-0.011758		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	-11.49	-0.014029	Within authorized band for Band 38	Pass
	3.87	-6.98	-0.008523		
	4.45	-6.34	-0.007741		
16QAM					
25	3.45	-9.38	-0.011453	Within authorized band for Band 38	Pass
	3.87	-11.74	-0.014335		
	4.45	-10.01	-0.012222		
64QAM					
25	3.45	-10.77	-0.013150	Within authorized band for Band 38	Pass
	3.87	-11.87	-0.014493		
	4.45	-9.16	-0.011184		
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.					

LTE Band 26 part:

Reference Frequency: LTE Band 26(10MHz) Middle channel=26915 Frequency=836.5MHz					
Temperature					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.87	-30	-14.65	-0.017513	Within authorized band for Band 38	Pass
	-20	-10.76	-0.012863		
	-10	-9.96	-0.011907		
	0	-9.47	-0.011321		
	10	-7.95	-0.009504		
	20	-12.56	-0.015015		
	30	-4.38	-0.005236		
	40	-12.12	-0.014489		
	50	-8.84	-0.010568		
16QAM					
3.87	-30	-9.50	-0.011357	Within authorized band for Band 38	Pass
	-20	-9.53	-0.011393		
	-10	-12.76	-0.015254		
	0	-7.05	-0.008428		
	10	-11.19	-0.013377		
	20	-1.95	-0.002331		
	30	-13.15	-0.015720		
	40	-2.36	-0.002821		
	50	-8.07	-0.009647		
64QAM					
3.87	-30	-11.44	-0.013676	Within authorized band for Band 38	Pass
	-20	-3.86	-0.004614		
	-10	-9.21	-0.011010		
	0	-12.70	-0.015182		
	10	-7.68	-0.009181		
	20	-11.54	-0.013796		
	30	-13.96	-0.016689		
	40	-8.04	-0.009611		
	50	-8.00	-0.009564		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	-4.81	-0.005750	Within authorized band for Band 38	Pass
	3.87	-11.44	-0.013676		
	4.45	-9.60	-0.011476		
16QAM					
25	3.45	1.93	0.002307	Within authorized band for Band 38	Pass
	3.87	-3.25	-0.003885		
	4.45	-6.19	-0.007400		
64QAM					
25	3.45	-10.17	-0.012158	Within authorized band for Band 38	Pass
	3.87	-9.17	-0.010962		
	4.45	-12.20	-0.014585		
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					
3.87	-30	-9.74	-0.003753	Within authorized band for Band 41	Pass
	-20	-5.42	-0.002089		
	-10	-3.38	-0.001303		
	0	-2.98	-0.001148		
	10	-5.72	-0.002204		
	20	-10.54	-0.004062		
	30	-6.15	-0.002370		
	40	-15.41	-0.005938		
	50	-9.43	-0.003634		
16QAM					
3.87	-30	-10.67	-0.004112	Within authorized band for Band 41	Pass
	-20	-14.06	-0.005418		
	-10	-16.49	-0.006355		
	0	-14.46	-0.005572		
	10	-10.53	-0.004058		
	20	-14.13	-0.005445		
	30	-12.76	-0.004917		
	40	4.58	0.001765		
	50	-10.31	-0.003973		
64QAM					
3.87	-30	-13.35	-0.005145	Within authorized band for Band 41	Pass
	-20	-9.11	-0.003511		
	-10	4.65	0.001792		
	0	-8.45	-0.003256		
	10	-9.96	-0.003838		
	20	-4.49	-0.001730		
	30	-7.91	-0.003048		
	40	-7.50	-0.002890		
	50	-11.27	-0.004343		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	-15.15	-0.005838	Within authorized band for Band 41	Pass
	3.87	-16.11	-0.006208		
	4.45	-12.30	-0.004740		
16QAM					
25	3.45	-13.38	-0.005156	Within authorized band for Band41	Pass
	3.87	-12.29	-0.004736		
	4.45	-14.22	-0.005480		
64QAM					
25	3.45	-8.71	-0.003356	Within authorized band for Band41	Pass
	3.87	11.50	0.004432		
	4.45	-6.49	-0.002501		
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					
3.87	-30	-11.96	-0.006854	Within authorized band for Band 66	Pass
	-20	-6.45	-0.003696		
	-10	-5.24	-0.003003		
	0	-7.54	-0.004321		
	10	-8.57	-0.004911		
	20	5.62	0.003221		
	30	-7.12	-0.004080		
	40	-14.99	-0.008590		
	50	-5.88	-0.003370		
16QAM					
3.87	-30	-5.36	-0.003072	Within authorized band for Band 66	Pass
	-20	-7.71	-0.004418		
	-10	-10.33	-0.005920		
	0	-10.99	-0.006298		
	10	-5.95	-0.003410		
	20	-6.31	-0.003616		
	30	-10.67	-0.006115		
	40	-7.58	-0.004344		
	50	2.70	0.001547		
64QAM					
3.87	-30	-14.49	-0.008304	Within authorized band for Band 66	Pass
	-20	-17.22	-0.009868		
	-10	-14.55	-0.008338		
	0	4.63	0.002653		
	10	-11.86	-0.006797		
	20	-16.49	-0.009450		
	30	-14.15	-0.008109		
	40	5.15	0.002951		
	50	-15.05	-0.008625		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	-9.07	-0.005198	Within authorized band for Band 66	Pass
	3.87	-13.28	-0.007610		
	4.45	-10.03	-0.005748		
16QAM					
25	3.45	-4.45	-0.002550	Within authorized band for Band 66	Pass
	3.87	-7.93	-0.004544		
	4.45	-10.31	-0.005908		
64QAM					
25	3.45	-15.76	-0.009032	Within authorized band for Band 66	Pass
	3.87	10.36	0.005937		
	4.45	-16.57	-0.009496		
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
Band2	20MHz	64QAM	18900	100RB#0	PASS	PASS
Band7	20MHz	QPSK	21100	100RB#0	PASS	PASS
Band7	20MHz	16QAM	21100	100RB#0	PASS	PASS
Band7	20MHz	64QAM	21100	100RB#0	PASS	PASS
Band12	10MHz	QPSK	23095	50RB#0	PASS	PASS
Band12	10MHz	16QAM	23095	50RB#0	PASS	PASS
Band12	10MHz	64QAM	23095	50RB#0	PASS	PASS
Band13	10MHz	QPSK	23230	50RB#0	PASS	PASS
Band13	10MHz	16QAM	23230	50RB#0	PASS	PASS
Band13	10MHz	64QAM	23230	50RB#0	PASS	PASS
Band26	10MHz	QPSK	26740	50RB#0	PASS	PASS
Band26	10MHz	16QAM	26740	50RB#0	PASS	PASS
Band26	10MHz	64QAM	26740	50RB#0	PASS	PASS
Band26	15MHz	QPSK	26915	75RB#0	PASS	PASS
Band26	15MHz	16QAM	26915	75RB#0	PASS	PASS
Band26	15MHz	64QAM	26915	75RB#0	PASS	PASS
Band41	20MHz	QPSK	40640	100RB#0	PASS	PASS
Band41	20MHz	16QAM	40640	100RB#0	PASS	PASS
Band41	20MHz	64QAM	40640	100RB#0	PASS	PASS
Band66	20MHz	QPSK	132322	100RB#0	PASS	PASS
Band66	20MHz	16QAM	132322	100RB#0	PASS	PASS
Band66	20MHz	64QAM	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







