













## 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	-2.50	-0.001330	Within authorized band for Band 2	Pass
	-20	-4.25	-0.002261		
	-10	7.38	0.003926		
	0	-3.78	-0.002011		
	10	-3.09	-0.001644		
	20	1.82	0.000968		
	30	6.05	0.003218		
	40	5.22	0.002777		
	50	4.58	0.002436		
16QAM					
3.85	-30	8.15	0.004335	Within authorized band for Band 2	Pass
	-20	5.59	0.002973		
	-10	2.57	0.001367		
	0	4.13	0.002197		
	10	-6.11	-0.003250		
	20	5.28	0.002809		
	30	6.11	0.003250		
	40	7.05	0.003750		
	50	6.32	0.003362		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	8.43	0.004484	Within authorized band for Band 2	Pass
	3.85	6.11	0.003250		
	4.40	7.95	0.004229		
16QAM					
25	3.50	10.54	0.005606	Within authorized band for Band 2	Pass
	3.85	-6.32	-0.003362		
	4.40	8.10	0.004309		

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	-3.18	-0.001835	Within authorized band for Band 4	Pass
	-20	-2.89	-0.001668		
	-10	1.65	0.000952		
	0	4.11	0.002372		
	10	-2.17	-0.001253		
	20	-3.69	-0.002130		
	30	-4.52	-0.002609		
	40	-3.88	-0.002240		
	50	-5.59	-0.003227		
16QAM					
3.85	-30	4.38	0.002528	Within authorized band for Band 4	Pass
	-20	-1.77	-0.001022		
	-10	4.76	0.002747		
	0	8.14	0.004698		
	10	-2.76	-0.001593		
	20	-3.52	-0.002032		
	30	3.99	0.002303		
	40	3.08	0.001778		
	50	5.95	0.003434		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-2.93	-0.001691	Within authorized band for Band 4	Pass
	3.85	-6.17	-0.003561		
	4.40	3.78	0.002182		
16QAM					
25	3.50	3.83	0.002211	Within authorized band for Band 4	Pass
	3.85	2.43	0.001403		
	4.40	8.03	0.004635		

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	-5.22	-0.006240	±2.5	Pass
	-20	-3.20	-0.003825		
	-10	-3.68	-0.004399		
	0	-1.89	-0.002259		
	10	-5.41	-0.006467		
	20	-2.26	-0.002702		
	30	1.69	0.002020		
	40	-2.35	-0.002809		
	50	3.30	0.003945		
16QAM					
3.85	-30	-3.63	-0.004340	±2.5	Pass
	-20	-4.85	-0.005798		
	-10	-1.33	-0.001590		
	0	-3.29	-0.003933		
	10	-3.02	-0.003610		
	20	2.17	0.002594		
	30	1.95	0.002331		
	40	-3.38	-0.004041		
	50	-2.52	-0.003013		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-3.98	-0.004758	±2.5	Pass
	3.85	1.76	0.002104		
	4.40	-4.62	-0.005523		
16QAM					
25	3.50	-7.00	-0.008368	±2.5	Pass
	3.85	1.95	0.002331		
	4.40	-1.70	-0.002032		

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	8.78	0.003464	Within authorized band for Band 7	Pass
	-20	-5.72	-0.002256		
	-10	6.71	0.002647		
	0	3.46	0.001365		
	10	5.55	0.002189		
	20	-11.57	-0.004564		
	30	-5.88	-0.002320		
	40	3.98	0.001570		
	50	-7.88	-0.003108		
16QAM					
3.85	-30	-2.39	-0.000943	Within authorized band for Band 7	Pass
	-20	-5.65	-0.002229		
	-10	-7.61	-0.003002		
	0	-9.03	-0.003562		
	10	-7.22	-0.002848		
	20	-12.17	-0.004801		
	30	12.69	0.005006		
	40	3.32	0.001310		
	50	6.01	0.002371		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	6.17	0.002434	Within authorized band for Band 7	Pass
	3.85	-6.97	-0.002750		
	4.40	5.28	0.002083		
16QAM					
25	3.50	8.35	0.003294	Within authorized band for Band 7	Pass
	3.85	-6.05	-0.002387		
	4.40	-8.96	-0.003535		

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	-3.46	-0.004873	Within authorized band for Band 17	Pass
	-20	3.62	0.005099		
	-10	-3.96	-0.005577		
	0	-1.27	-0.001789		
	10	1.70	0.002394		
	20	-5.01	-0.007056		
	30	-2.60	-0.003662		
	40	-2.06	-0.002901		
	50	-3.15	-0.004437		
16QAM					
3.85	-30	-4.31	-0.006070	Within authorized band for Band 17	Pass
	-20	-1.59	-0.002239		
	-10	2.35	0.003310		
	0	-1.54	-0.002169		
	10	-2.55	-0.003592		
	20	-4.31	-0.006070		
	30	-2.90	-0.004085		
	40	-2.70	-0.003803		
	50	-1.16	-0.001634		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-2.98	-0.004197	Within authorized band for Band 17	Pass
	3.85	3.50	0.004930		
	4.40	2.35	0.003310		
16QAM					
25	3.50	1.50	0.002113	Within authorized band for Band 17	Pass
	3.85	-1.17	-0.001648		
	4.40	-0.83	-0.001169		

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	-6.27	-0.002416	Within authorized band for Band 38	Pass
	-20	-10.31	-0.003973		
	-10	-5.11	-0.001969		
	0	-11.76	-0.004532		
	10	-8.90	-0.003430		
	20	8.27	0.003187		
	30	-7.28	-0.002805		
	40	11.16	0.004301		
	50	-4.76	-0.001834		
16QAM					
3.85	-30	-7.84	-0.003021	Within authorized band for Band 38	Pass
	-20	6.59	0.002539		
	-10	-7.27	-0.002802		
	0	-9.50	-0.003661		
	10	5.18	0.001996		
	20	8.98	0.003461		
	30	9.03	0.003480		
	40	-6.24	-0.002405		
	50	-7.47	-0.002879		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-4.63	-0.001784	Within authorized band for Band 38	Pass
	3.85	-7.95	-0.003064		
	4.40	9.04	0.003484		
16QAM					
25	3.50	5.09	0.001961	Within authorized band for Band 38	Pass
	3.85	-7.31	-0.002817		
	4.40	-6.61	-0.002547		

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	-6.42	-0.002474	Within authorized band for Band 41	Pass
	-20	6.01	0.002316		
	-10	-9.58	-0.003692		
	0	4.95	0.001908		
	10	-8.44	-0.003252		
	20	-6.85	-0.002640		
	30	-8.88	-0.003422		
	40	6.19	0.002385		
	50	5.64	0.002173		
16QAM					
3.85	-30	-6.84	-0.002636	Within authorized band for Band 41	Pass
	-20	-6.42	-0.002474		
	-10	-10.09	-0.003888		
	0	6.38	0.002459		
	10	-7.91	-0.003048		
	20	-7.38	-0.002844		
	30	-14.26	-0.005495		
	40	-7.94	-0.003060		
	50	-9.13	-0.003518		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-8.10	-0.003121	Within authorized band for Band 41	Pass
	3.85	-9.48	-0.003653		
	4.40	7.68	0.002960		
16QAM					
25	3.50	7.17	0.002763	Within authorized band for Band41	Pass
	3.85	-5.42	-0.002089		
	4.40	5.72	0.002204		

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	-4.62	-0.002648	Within authorized band for Band 66	Pass
	-20	-3.76	-0.002155		
	-10	-4.52	-0.002590		
	0	-4.78	-0.002739		
	10	-4.38	-0.002510		
	20	-2.72	-0.001559		
	30	-7.17	-0.004109		
	40	-5.92	-0.003393		
	50	-3.86	-0.002212		
16QAM					
3.85	-30	-1.77	-0.001014	Within authorized band for Band 66	Pass
	-20	-4.63	-0.002653		
	-10	-6.19	-0.003547		
	0	-7.52	-0.004309		
	10	-7.50	-0.004298		
	20	-7.41	-0.004246		
	30	1.69	0.000968		
	40	-5.29	-0.003032		
	50	-7.77	-0.004453		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-2.52	-0.001444	Within authorized band for Band 66	Pass
	3.85	-6.17	-0.003536		
	4.40	-3.25	-0.001862		
16QAM					
25	3.50	-4.09	-0.002344	Within authorized band for Band 66	Pass
	3.85	-3.82	-0.002189		
	4.40	2.62	0.001501		
<i>Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.</i>					



## 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









