

## 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	14.31	0.007612	Within authorized band for Band 2	Pass
	-20	-17.05	-0.009069		
	-10	-12.75	-0.006782		
	0	16.64	0.008851		
	10	-9.71	-0.005165		
	20	-18.50	-0.009840		
	30	-1.90	-0.001011		
	40	17.55	0.009335		
	50	11.74	0.006245		
16QAM					
3.87	-30	-16.22	-0.008628	Within authorized band for Band 2	Pass
	-20	-14.89	-0.007920		
	-10	18.40	0.009787		
	0	6.27	0.003335		
	10	-14.29	-0.007601		
	20	-6.62	-0.003521		
	30	13.09	0.006963		
	40	6.59	0.003505		
	50	5.97	0.003176		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	13.69	0.007282	Within authorized band for Band 2	Pass
	3.87	-14.26	-0.007585		
	4.45	-16.72	-0.008894		
16QAM					
25	3.50	14.55	0.007739	Within authorized band for Band 2	Pass
	3.87	10.11	0.005378		
	4.45	10.51	0.005590		

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					
3.87	-30	-5.09	-0.006085	±2.5	Pass
	-20	-4.73	-0.005655		
	-10	-8.98	-0.010735		
	0	-9.68	-0.011572		
	10	-9.34	-0.011166		
	20	-12.72	-0.015206		
	30	-8.71	-0.010412		
	40	6.18	0.007388		
	50	-3.16	-0.003778		
16QAM					
3.87	-30	-7.52	-0.008990	±2.5	Pass
	-20	-5.74	-0.006862		
	-10	2.03	0.002427		
	0	-7.54	-0.009014		
	10	-7.25	-0.008667		
	20	-6.35	-0.007591		
	30	-3.52	-0.004208		
	40	-6.78	-0.008105		
	50	-0.86	-0.001028		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-8.80	-0.010520	±2.5	Pass
	3.87	-9.97	-0.011919		
	4.45	-4.61	-0.005511		
16QAM					
25	3.50	-6.32	-0.007555	±2.5	Pass
	3.87	4.86	0.005810		
	4.45	-5.66	-0.006766		

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					
3.87	-30	-18.18	-0.007172	Within authorized band for Band 7	Pass
	-20	-28.81	-0.011365		
	-10	-9.63	-0.003799		
	0	-25.62	-0.010107		
	10	-19.34	-0.007629		
	20	-14.31	-0.005645		
	30	19.34	0.007629		
	40	-17.74	-0.006998		
	50	-11.97	-0.004722		
16QAM					
3.87	-30	-17.71	-0.006986	Within authorized band for Band 7	Pass
	-20	-33.87	-0.013361		
	-10	-22.33	-0.008809		
	0	16.34	0.006446		
	10	20.60	0.008126		
	20	-7.04	-0.002777		
	30	-13.38	-0.005278		
	40	16.29	0.006426		
	50	-16.19	-0.006387		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-20.53	-0.008099	Within authorized band for Band 7	Pass
	3.87	-24.22	-0.009554		
	4.45	-35.10	-0.013846		
16QAM					
25	3.50	13.02	0.005136	Within authorized band for Band 7	Pass
	3.87	-7.77	-0.003065		
	4.45	12.09	0.004769		
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		
<b>QPSK</b>					
3.87	-30	-6.02	-0.008479	Within authorized band for Band 17	Pass
	-20	-3.52	-0.004958		
	-10	-1.46	-0.002056		
	0	-7.98	-0.011239		
	10	-4.45	-0.006268		
	20	-10.24	-0.014423		
	30	-5.69	-0.008014		
	40	-5.36	-0.007549		
	50	-4.98	-0.007014		
<b>16QAM</b>					
3.87	-30	-3.08	-0.004338	Within authorized band for Band 17	Pass
	-20	-9.91	-0.013958		
	-10	-8.67	-0.012211		
	0	-8.90	-0.012535		
	10	-1.49	-0.002099		
	20	-11.62	-0.016366		
	30	-4.89	-0.006887		
	40	-7.75	-0.010915		
	50	-10.36	-0.014592		
<b>Voltage</b>					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
<b>QPSK</b>					
25	3.50	-5.74	-0.008085	Within authorized band for Band 17	Pass
	3.87	-12.02	-0.016930		
	4.45	-7.44	-0.010479		
<b>16QAM</b>					
25	3.50	-5.11	-0.007197	Within authorized band for Band 17	Pass
	3.87	-5.06	-0.007127		
	4.45	-9.14	-0.012873		

*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		
<b>QPSK</b>					
3.87	-30	22.03	0.008489	Within authorized band for Band 41	Pass
	-20	-20.86	-0.008039		
	-10	-17.25	-0.006647		
	0	-10.33	-0.003981		
	10	-25.31	-0.009753		
	20	-17.88	-0.006890		
	30	-16.82	-0.006482		
	40	22.40	0.008632		
	50	-24.20	-0.009326		
<b>16QAM</b>					
3.87	-30	-13.13	-0.005060	Within authorized band for Band 41	Pass
	-20	17.75	0.006840		
	-10	19.04	0.007337		
	0	18.01	0.006940		
	10	-21.54	-0.008301		
	20	-3.48	-0.001341		
	30	11.00	0.004239		
	40	24.26	0.009349		
	50	17.87	0.006886		
<b>Voltage</b>					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
<b>QPSK</b>					
25	3.50	-15.36	-0.005919	Within authorized band for Band 41	Pass
	3.87	19.74	0.007607		
	4.45	16.24	0.006258		
<b>16QAM</b>					
25	3.50	20.06	0.007730	Within authorized band for Band41	Pass
	3.87	13.52	0.005210		
	4.45	14.52	0.005595		

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	17.05	0.009771	Within authorized band for Band 66	Pass
	-20	-15.85	-0.009083		
	-10	14.16	0.008115		
	0	7.21	0.004132		
	10	9.70	0.005559		
	20	5.95	0.003410		
	30	-16.75	-0.009599		
	40	-5.25	-0.003009		
	50	-13.58	-0.007782		
16QAM					
3.87	-30	-12.57	-0.007203	Within authorized band for Band 66	Pass
	-20	-17.02	-0.009754		
	-10	-16.04	-0.009192		
	0	12.53	0.007181		
	10	-18.67	-0.010699		
	20	-17.74	-0.010166		
	30	-15.31	-0.008774		
	40	20.31	0.011639		
	50	-18.61	-0.010665		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-12.46	-0.007140	Within authorized band for Band 66	Pass
	3.87	10.04	0.005754		
	4.45	-15.32	-0.008779		
16QAM					
25	3.50	-14.13	-0.008097	Within authorized band for Band 66	Pass
	3.87	-19.51	-0.011181		
	4.45	14.85	0.008510		

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
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
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





