

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	-17.64	-0.009383	Within authorized band for Band 2	Pass
	-20	-21.69	-0.011537		
	-10	-18.12	-0.009638		
	0	-16.64	-0.008851		
	10	-20.93	-0.011133		
	20	-18.58	-0.009883		
	30	-11.23	-0.005973		
	40	-5.28	-0.002809		
	50	-19.91	-0.010590		
16QAM					
3.85	-30	-13.35	-0.007101	Within authorized band for Band 2	Pass
	-20	-16.35	-0.008697		
	-10	4.13	0.002197		
	0	-3.69	-0.001963		
	10	-14.38	-0.007649		
	20	-17.02	-0.009053		
	30	-19.18	-0.010202		
	40	-15.72	-0.008362		
	50	-15.39	-0.008186		
64QAM					
3.85	-30	-18.07	-0.009612	Within authorized band for Band 2	Pass
	-20	-15.94	-0.008479		
	-10	-19.76	-0.010511		
	0	2.75	0.001463		
	10	-19.33	-0.010282		
	20	-16.39	-0.008718		
	30	5.65	0.003005		
	40	-19.23	-0.010229		
	50	-15.79	-0.008399		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.60	-18.30	-0.009734	Within authorized band for Band 2	Pass
	3.85	-28.12	-0.014957		
	4.40	-17.51	-0.009314		
16QAM					
25	3.60	-17.07	-0.009080	Within authorized band for Band 2	Pass
	3.85	-17.55	-0.009335		
	4.40	-16.79	-0.008931		
64QAM					
25	3.60	-4.95	-0.002633	Within authorized band for Band 2	Pass
	3.85	-17.87	-0.009505		
	4.40	-17.48	-0.009298		
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	67.06	0.026454	Within authorized band for Band 7	Pass
	-20	-28.85	-0.011381		
	-10	-29.51	-0.011641		
	0	-28.24	-0.011140		
	10	-24.98	-0.009854		
	20	57.65	0.022742		
	30	-24.58	-0.009696		
	40	-14.96	-0.005901		
	50	-21.56	-0.008505		
16QAM					
3.85	-30	-25.51	-0.010063	Within authorized band for Band 7	Pass
	-20	47.81	0.018860		
	-10	-20.64	-0.008142		
	0	-21.86	-0.008623		
	10	71.55	0.028225		
	20	-22.00	-0.008679		
	30	-19.20	-0.007574		
	40	-29.21	-0.011523		
	50	-20.00	-0.007890		
64QAM					
3.85	-30	-21.96	-0.008663	Within authorized band for Band 7	Pass
	-20	-38.82	-0.015314		
	-10	-32.20	-0.012702		
	0	-25.69	-0.010134		
	10	-41.71	-0.016454		
	20	20.63	0.008138		
	30	65.63	0.025890		
	40	-29.43	-0.011609		
	50	-30.68	-0.012103		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.60	-29.95	-0.011815	Within authorized band for Band 7	Pass
	3.85	40.28	0.015890		
	4.40	17.75	0.007002		
16QAM					
25	3.60	-11.00	-0.004339	Within authorized band for Band 7	Pass
	3.85	-29.23	-0.011531		
	4.40	-28.31	-0.011168		
64QAM					
25	3.60	-19.23	-0.007586	Within authorized band for Band 7	Pass
	3.85	-32.60	-0.012860		
	4.40	-29.43	-0.011609		
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 (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-15.02	-0.021230	Within authorized band for Band 12	Pass
	-20	-3.78	-0.005343		
	-10	-14.18	-0.020042		
	0	-15.13	-0.021385		
	10	-9.67	-0.013668		
	20	-12.85	-0.018163		
	30	-11.54	-0.016311		
	40	-15.39	-0.021753		
	50	-9.16	-0.012947		
16QAM					
3.85	-30	-18.64	-0.026346	Within authorized band for Band 12	Pass
	-20	-11.57	-0.016353		
	-10	-1.70	-0.002403		
	0	-16.31	-0.023053		
	10	-8.23	-0.011633		
	20	14.25	0.020141		
	30	-11.72	-0.016565		
	40	-8.67	-0.012254		
	50	-24.00	-0.033922		
64QAM					
3.85	-30	-4.52	-0.006389	Within authorized band for Band 12	Pass
	-20	-16.19	-0.022883		
	-10	1.29	0.001823		
	0	-9.63	-0.013611		
	10	-10.00	-0.014134		
	20	-3.75	-0.005300		
	30	-9.46	-0.013371		
	40	-15.55	-0.021979		
	50	10.51	0.014855		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.60	-12.57	-0.017767	Within authorized band for Band 12	Pass
	3.85	-18.64	-0.026346		
	4.40	-18.22	-0.025753		
16QAM					
25	3.60	-4.46	-0.006304	Within authorized band for Band 12	Pass
	3.85	8.00	0.011307		
	4.40	2.10	0.002968		
64QAM					
25	3.60	-3.58	-0.005060	Within authorized band for Band 12	Pass
	3.85	-11.04	-0.015604		
	4.40	-11.43	-0.016155		
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 (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-16.92	-0.021637	Within authorized band for Band 13	Pass
	-20	-13.98	-0.017877		
	-10	7.77	0.009936		
	0	-9.21	-0.011777		
	10	-14.20	-0.018159		
	20	-14.92	-0.019079		
	30	-13.05	-0.016688		
	40	-2.47	-0.003159		
	50	-13.53	-0.017302		
16QAM					
3.85	-30	-13.06	-0.016701	Within authorized band for Band 13	Pass
	-20	-9.08	-0.011611		
	-10	-10.77	-0.013772		
	0	3.78	0.004834		
	10	-12.69	-0.016228		
	20	-7.37	-0.009425		
	30	7.10	0.009079		
	40	-13.29	-0.016995		
	50	-9.20	-0.011765		
64QAM					
3.85	-30	-5.08	-0.006496	Within authorized band for Band 13	Pass
	-20	-16.48	-0.021074		
	-10	-14.46	-0.018491		
	0	-10.27	-0.013133		
	10	-9.48	-0.012123		
	20	-8.91	-0.011394		
	30	-1.56	-0.001995		
	40	-6.35	-0.008120		
	50	-9.30	-0.011893		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.60	-16.99	-0.021726	Within authorized band for Band 13	Pass
	3.85	7.48	0.009565		
	4.40	-15.98	-0.020435		
16QAM					
25	3.60	-18.41	-0.023542	Within authorized band for Band 13	Pass
	3.85	-13.50	-0.017263		
	4.40	2.05	0.002621		
64QAM					
25	3.60	-16.22	-0.020742	Within authorized band for Band 13	Pass
	3.85	-12.22	-0.015627		
	4.40	9.10	0.011637		
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 (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-8.67	-0.010586	Within authorized band for Band 26	Pass
	-20	-6.34	-0.007741		
	-10	-10.34	-0.012625		
	0	-9.74	-0.011893		
	10	-3.96	-0.004835		
	20	-13.23	-0.016154		
	30	-11.73	-0.014322		
	40	-9.71	-0.011856		
	50	-13.90	-0.016972		
16QAM					
3.85	-30	2.63	0.003211	Within authorized band for Band 26	Pass
	-20	-11.47	-0.014005		
	-10	-6.88	-0.008400		
	0	-8.18	-0.009988		
	10	2.40	0.002930		
	20	-6.42	-0.007839		
	30	-12.45	-0.015201		
	40	-7.68	-0.009377		
	50	-9.93	-0.012125		
64QAM					
3.85	-30	-9.26	-0.011306	Within authorized band for Band 26	Pass
	-20	-7.90	-0.009646		
	-10	-8.83	-0.010781		
	0	-13.00	-0.015873		
	10	-6.11	-0.007460		
	20	-13.38	-0.016337		
	30	-6.39	-0.007802		
	40	-9.03	-0.011026		
	50	-8.57	-0.010464		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.60	-7.90	-0.009646	Within authorized band for Band 26	Pass
	3.85	-7.95	-0.009707		
	4.40	-8.91	-0.010879		
16QAM					
25	3.60	-7.00	-0.008547	Within authorized band for Band 26	Pass
	3.85	1.99	0.002430		
	4.40	-4.53	-0.005531		
64QAM					
25	3.60	-10.97	-0.013394	Within authorized band for Band 26	Pass
	3.85	-7.35	-0.008974		
	4.40	-6.57	-0.008022		
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 (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-13.76	-0.016449	Within authorized band for Band 26	Pass
	-20	-11.32	-0.013533		
	-10	-7.61	-0.009097		
	0	-13.09	-0.015649		
	10	-11.79	-0.014094		
	20	-16.28	-0.019462		
	30	-11.86	-0.014178		
	40	-9.14	-0.010926		
	50	-12.99	-0.015529		
16QAM					
3.85	-30	-12.33	-0.014740	Within authorized band for Band 26	Pass
	-20	-13.15	-0.015720		
	-10	-10.26	-0.012265		
	0	-7.68	-0.009181		
	10	-14.63	-0.017490		
	20	-3.71	-0.004435		
	30	-9.86	-0.011787		
	40	-6.68	-0.007986		
	50	-9.50	-0.011357		
64QAM					
3.85	-30	-12.15	-0.014525	Within authorized band for Band 26	Pass
	-20	-12.72	-0.015206		
	-10	-12.43	-0.014860		
	0	-11.62	-0.013891		
	10	-5.38	-0.006432		
	20	-11.37	-0.013592		
	30	-12.17	-0.014549		
	40	-11.70	-0.013987		
	50	-12.97	-0.015505		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.60	-13.95	-0.016677	Within authorized band for Band 26	Pass
	3.85	-18.38	-0.021973		
	4.40	-8.70	-0.010400		
16QAM					
25	3.60	-14.48	-0.017310	Within authorized band for Band 26	Pass
	3.85	-11.29	-0.013497		
	4.40	-4.62	-0.005523		
64QAM					
25	3.60	-14.09	-0.016844	Within authorized band for Band 26	Pass
	3.85	-8.53	-0.010197		
	4.40	-11.80	-0.014106		
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	-6.79	-0.002607	Within authorized band for Band 41	Pass
	-20	-8.47	-0.003251		
	-10	5.14	0.001973		
	0	-4.42	-0.001697		
	10	6.59	0.002530		
	20	-5.65	-0.002169		
	30	-7.78	-0.002987		
	40	-4.48	-0.001720		
	50	-4.82	-0.001850		
16QAM					
3.85	-30	-8.21	-0.003152	Within authorized band for Band 41	Pass
	-20	-6.98	-0.002679		
	-10	7.77	0.002983		
	0	-7.75	-0.002975		
	10	-8.50	-0.003263		
	20	-3.53	-0.001355		
	30	-6.94	-0.002664		
	40	3.75	0.001440		
	50	-5.49	-0.002107		
64QAM					
3.85	-30	-2.85	-0.001094	Within authorized band for Band 41	Pass
	-20	-5.01	-0.001923		
	-10	-8.84	-0.003393		
	0	-4.05	-0.001555		
	10	-8.77	-0.003367		
	20	-4.46	-0.001712		
	30	3.45	0.001324		
	40	-7.48	-0.002871		
	50	-3.79	-0.001455		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.60	-9.56	-0.003670	Within authorized band for Band 41	Pass
	3.85	-19.86	-0.007624		
	4.40	-2.62	-0.001006		
16QAM					
25	3.60	-7.58	-0.002910	Within authorized band for Band41	Pass
	3.85	5.14	0.001973		
	4.40	-8.25	-0.003167		
64QAM					
25	3.60	2.35	0.000902	Within authorized band for Band41	Pass
	3.85	-6.90	-0.002649		
	4.40	-6.88	-0.002641		
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	-14.09	-0.008074	Within authorized band for Band 66	Pass
	-20	-13.35	-0.007650		
	-10	-8.70	-0.004986		
	0	-14.51	-0.008315		
	10	-13.48	-0.007725		
	20	-13.42	-0.007691		
	30	-5.85	-0.003352		
	40	8.78	0.005032		
	50	-11.97	-0.006860		
16QAM					
3.85	-30	-3.78	-0.002166	Within authorized band for Band 66	Pass
	-20	-12.36	-0.007083		
	-10	-14.42	-0.008264		
	0	-14.08	-0.008069		
	10	-12.15	-0.006963		
	20	-13.00	-0.007450		
	30	-12.92	-0.007404		
	40	13.45	0.007708		
	50	-3.62	-0.002074		
64QAM					
3.85	-30	-4.06	-0.002327	Within authorized band for Band 66	Pass
	-20	10.31	0.005908		
	-10	-12.17	-0.006974		
	0	-14.28	-0.008183		
	10	6.35	0.003639		
	20	-11.03	-0.006321		
	30	-12.76	-0.007312		
	40	-11.52	-0.006602		
	50	-14.43	-0.008269		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.60	-11.44	-0.006556	Within authorized band for Band 66	Pass
	3.85	-21.97	-0.012590		
	4.40	-13.58	-0.007782		
16QAM					
25	3.60	-15.85	-0.009083	Within authorized band for Band 66	Pass
	3.85	-12.15	-0.006963		
	4.40	-14.16	-0.008115		
64QAM					
25	3.60	-8.48	-0.004860	Within authorized band for Band 66	Pass
	3.85	-11.07	-0.006344		
	4.40	7.87	0.004510		
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.					

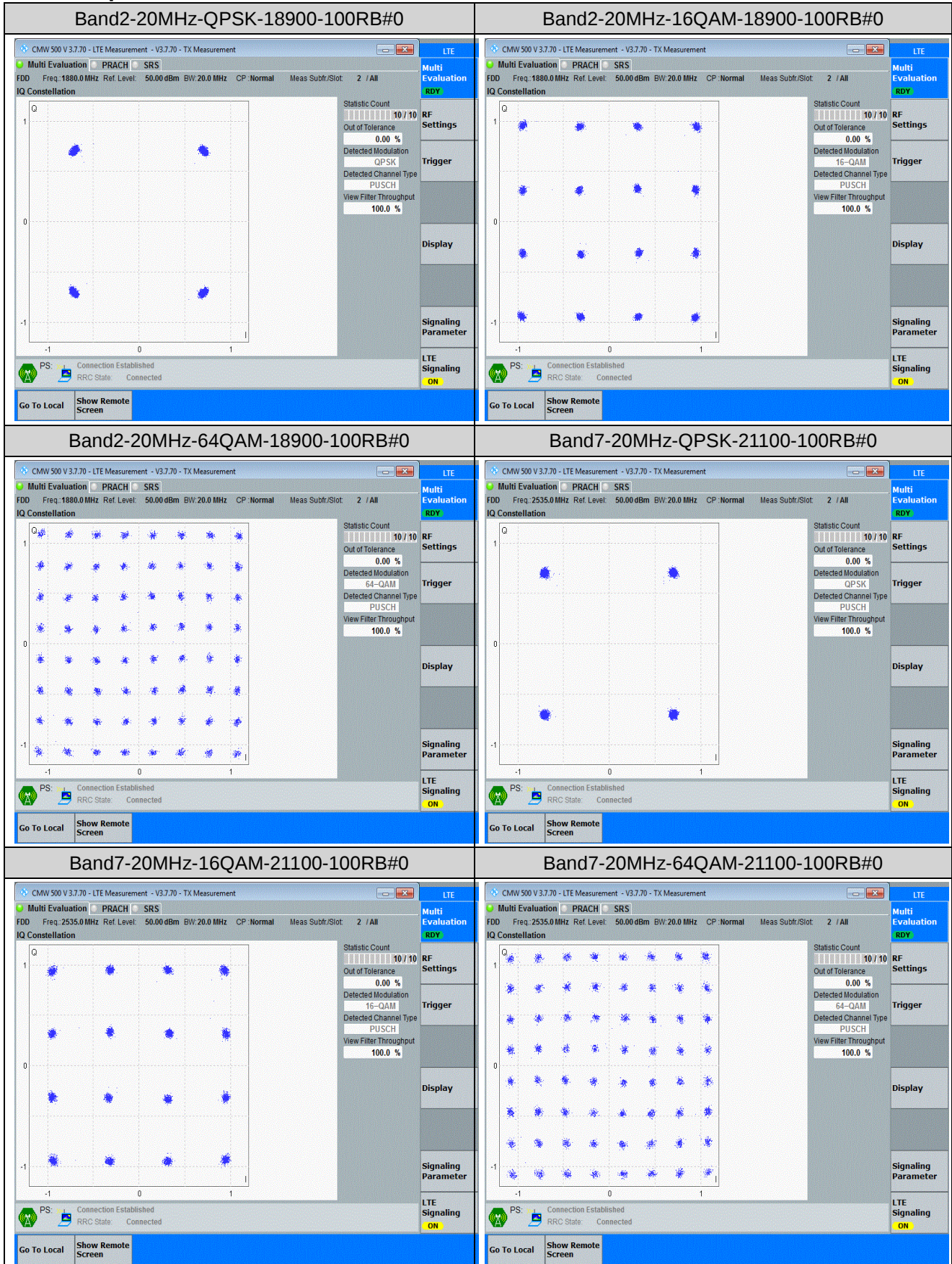
Appendix G: Modulation Characteristics

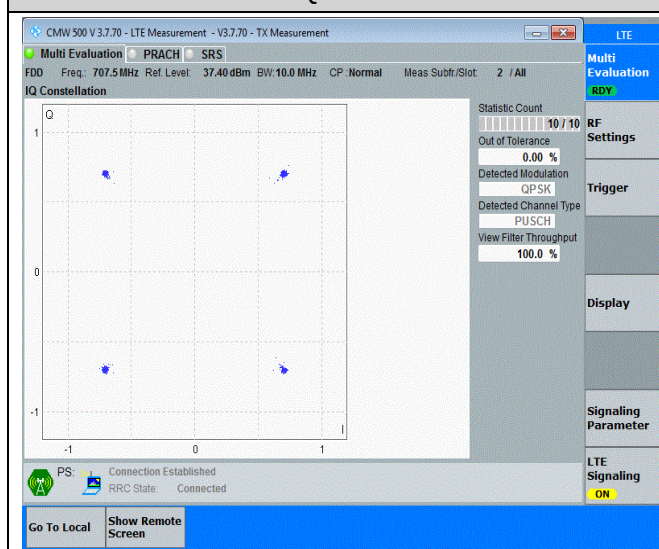
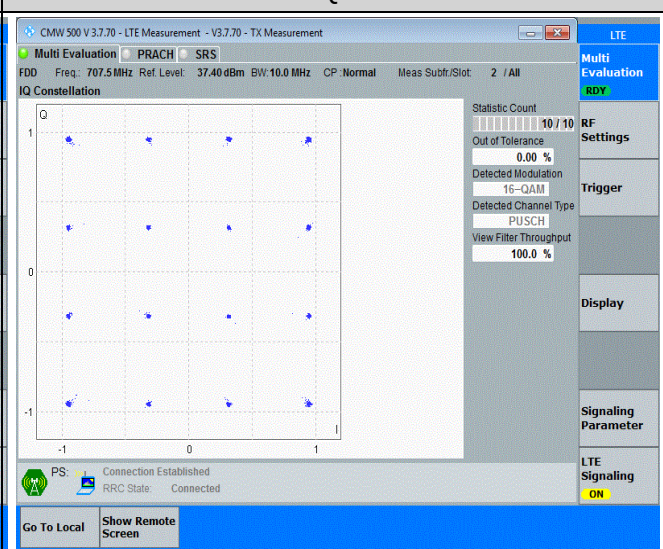
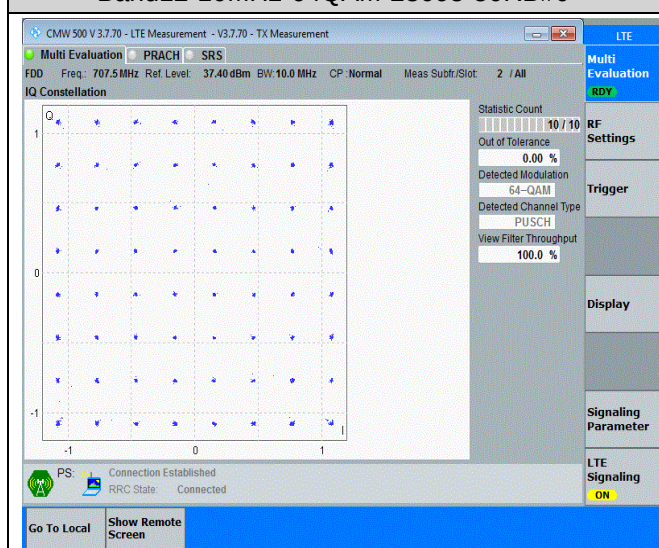
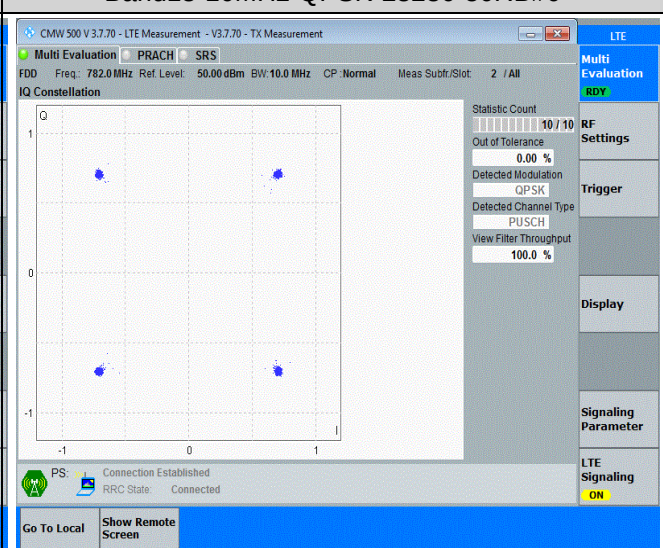
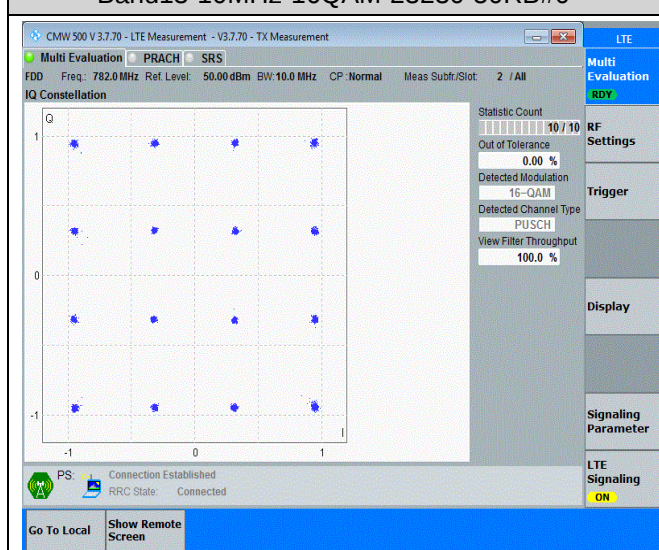
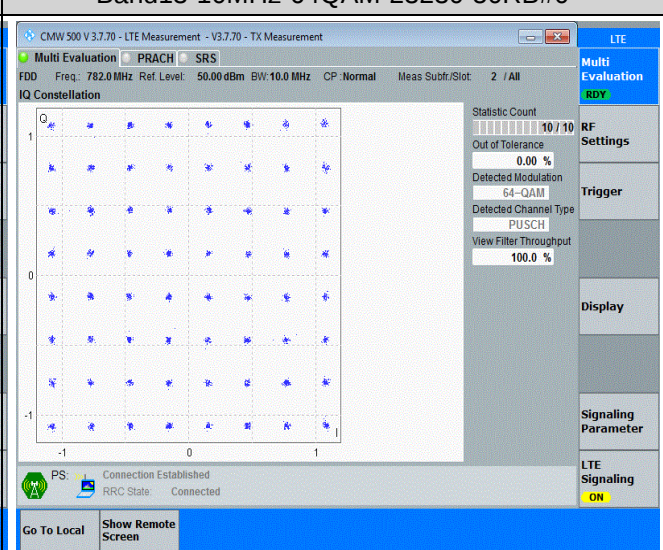
Test Result

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	40740	100RB#0	PASS	PASS
Band41	20MHz	16QAM	40740	100RB#0	PASS	PASS
Band41	20MHz	64QAM	40740	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



Band12-10MHz-QPSK-23095-50RB#0 	Band12-10MHz-16QAM-23095-50RB#0 
Band12-10MHz-64QAM-23095-50RB#0 	Band13-10MHz-QPSK-23230-50RB#0 
Band13-10MHz-16QAM-23230-50RB#0 	Band13-10MHz-64QAM-23230-50RB#0 
Band26-10MHz-QPSK-26740-50RB#0 	Band26-10MHz-16QAM-26740-50RB#0 

