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 (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-46.89	-0.024941	Within authorized band for Band 2	Pass
	-20	8.93	0.004750		
	-10	-13.92	-0.007404		
	0	-21.01	-0.011176		
	10	-26.34	-0.014011		
	20	-35.10	-0.018670		
	30	-40.87	-0.021739		
	40	-44.98	-0.023926		
	50	-17.12	-0.009106		
16QAM					
3.85	-30	29.68	0.015787	Within authorized band for Band 2	Pass
	-20	42.44	0.022574		
	-10	14.09	0.007495		
	0	19.31	0.010271		
	10	22.13	0.011771		
	20	30.94	0.016457		
	30	29.70	0.015798		
	40	38.74	0.020606		
	50	36.69	0.019516		
Voltage					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	17.87	0.009505	Within authorized band for Band 2	Pass
	3.85	24.43	0.012995		
	4.40	-24.43	-0.012995		
16QAM					
25	3.50	-12.47	-0.006633	Within authorized band for Band 2	Pass
	3.85	-27.58	-0.014670		
	4.40	18.12	0.009638		
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					
3.85	-30	-24.69	-0.009740	Within authorized band for Band 7	Pass
	-20	-28.70	-0.011321		
	-10	-28.64	-0.011298		
	0	-28.28	-0.011156		
	10	-24.15	-0.009527		
	20	-32.37	-0.012769		
	30	-30.50	-0.012032		
	40	-31.40	-0.012387		
	50	-33.13	-0.013069		
16QAM					
3.85	-30	13.62	0.005373	Within authorized band for Band 7	Pass
	-20	31.19	0.012304		
	-10	48.41	0.019097		
	0	27.07	0.010679		
	10	34.96	0.013791		
	20	37.08	0.014627		
	30	39.34	0.015519		
	40	44.88	0.017704		
	50	43.82	0.017286		
Voltage					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	9.81	0.003870	Within authorized band for Band 7	Pass
	3.85	46.18	0.018217		
	4.40	-15.26	-0.006020		
16QAM					
25	3.50	-9.14	-0.003606	Within authorized band for Band 7	Pass
	3.85	-27.42	-0.010817		
	4.40	37.87	0.014939		
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	-13.33	-0.018841	Within authorized band for Band 12	Pass
	-20	-22.23	-0.031420		
	-10	-29.10	-0.041131		
	0	-31.13	-0.044000		
	10	-35.26	-0.049837		
	20	-37.55	-0.053074		
	30	-39.87	-0.056353		
	40	-42.34	-0.059845		
	50	-43.19	-0.061046		
16QAM					
3.85	-30	-15.41	-0.021781	Within authorized band for Band 12	Pass
	-20	-6.48	-0.009159		
	-10	2.00	0.002827		
	0	7.37	0.010417		
	10	10.03	0.014177		
	20	15.16	0.021428		
	30	18.93	0.026756		
	40	19.70	0.027845		
	50	23.07	0.032608		
Voltage					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	11.43	0.016155	Within authorized band for Band 12	Pass
	3.85	16.25	0.022968		
	4.40	-2.53	-0.003576		
16QAM					
25	3.50	-37.21	-0.052594	Within authorized band for Band 12	Pass
	3.85	-43.96	-0.062134		
	4.40	-24.02	-0.033951		
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 (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-10.41	-0.014662	Within authorized band for Band 17	Pass
	-20	-19.38	-0.027296		
	-10	-24.58	-0.034620		
	0	-31.33	-0.044127		
	10	-37.48	-0.052789		
	20	-40.53	-0.057085		
	30	-41.47	-0.058408		
	40	-41.70	-0.058732		
	50	-47.06	-0.066282		
16QAM					
3.85	-30	32.07	0.045169	Within authorized band for Band 17	Pass
	-20	41.84	0.058930		
	-10	3.72	0.005239		
	0	10.11	0.014239		
	10	13.93	0.019620		
	20	18.61	0.026211		
	30	26.06	0.036704		
	40	30.51	0.042972		
	50	29.97	0.042211		
Voltage					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	18.97	0.026718	Within authorized band for Band 17	Pass
	3.85	24.72	0.034817		
	4.40	7.58	0.010676		
16QAM					
25	3.50	6.37	0.008972	Within authorized band for Band 17	Pass
	3.85	-5.76	-0.008113		
	4.40	22.27	0.031366		
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=2595.0MHz					
Temperature					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	14.03	0.017131	Within authorized band for Band 26	Pass
	-20	13.32	0.016264		
	-10	12.22	0.014921		
	0	11.80	0.014408		
	10	8.04	0.009817		
	20	6.52	0.007961		
	30	5.81	0.007094		
	40	3.78	0.004615		
	50	5.95	0.007265		
16QAM					
3.85	-30	17.80	0.021734	Within authorized band for Band 26	Pass
	-20	29.98	0.036606		
	-10	46.31	0.056545		
	0	3.12	0.003810		
	10	13.03	0.015910		
	20	19.30	0.023565		
	30	21.89	0.026728		
	40	28.47	0.034762		
	50	30.93	0.037766		
Voltage					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	5.39	0.006581	Within authorized band for Band 26	Pass
	3.85	1.14	0.001392		
	4.40	10.51	0.012833		
16QAM					
25	3.50	20.66	0.025226	Within authorized band for Band 26	Pass
	3.85	4.35	0.005311		
	4.40	45.28	0.055287		
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=2595.0MHz					
Temperature					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	21.37	0.025547	Within authorized band for Band 26	Pass
	-20	11.16	0.013341		
	-10	5.95	0.007113		
	0	7.52	0.008990		
	10	5.24	0.006264		
	20	3.48	0.004160		
	30	3.39	0.004053		
	40	4.68	0.005595		
	50	4.62	0.005523		
16QAM					
3.85	-30	35.43	0.042355	Within authorized band for Band 26	Pass
	-20	41.61	0.049743		
	-10	47.39	0.056653		
	0	2.35	0.002809		
	10	3.28	0.003921		
	20	3.56	0.004256		
	30	5.26	0.006288		
	40	6.57	0.007854		
	50	9.41	0.011249		
Voltage					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	31.87	0.038099	Within authorized band for Band 26	Pass
	3.85	35.68	0.042654		
	4.40	24.56	0.029360		
16QAM					
25	3.50	13.90	0.016617	Within authorized band for Band 26	Pass
	3.85	5.15	0.006157		
	4.40	25.53	0.030520		
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 (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-42.43	-0.016351	Within authorized band for Band 41	Pass
	-20	-56.85	-0.021908		
	-10	-16.55	-0.006378		
	0	-28.91	-0.011141		
	10	-16.94	-0.006528		
	20	-10.54	-0.004062		
	30	-46.23	-0.017815		
	40	-33.25	-0.012813		
	50	16.45	0.006339		
16QAM					
3.85	-30	16.62	0.006405	Within authorized band for Band 41	Pass
	-20	41.53	0.016004		
	-10	53.11	0.020466		
	0	20.27	0.007811		
	10	28.67	0.011048		
	20	8.96	0.003453		
	30	24.35	0.009383		
	40	31.93	0.012304		
	50	38.05	0.014663		
Voltage					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	-61.88	-0.023846	Within authorized band for Band 41	Pass
	3.85	10.57	0.004073		
	4.40	-10.91	-0.004204		
16QAM					
25	3.50	-7.00	-0.002697	Within authorized band for Band41	Pass
	3.85	-25.72	-0.009911		
	4.40	46.62	0.017965		
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 (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	13.29	0.007616	Within authorized band for Band 66	Pass
	-20	8.50	0.004871		
	-10	10.46	0.005994		
	0	9.97	0.005713		
	10	4.75	0.002722		
	20	6.94	0.003977		
	30	11.92	0.006831		
	40	7.58	0.004344		
	50	-6.47	-0.003708		
16QAM					
3.85	-30	34.42	0.019725	Within authorized band for Band 66	Pass
	-20	46.73	0.026779		
	-10	16.88	0.009673		
	0	18.97	0.010871		
	10	33.12	0.018980		
	20	31.76	0.018201		
	30	42.66	0.024447		
	40	-8.78	-0.005032		
	50	4.55	0.002607		
Voltage					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.50	21.60	0.012378	Within authorized band for Band 66	Pass
	3.85	36.96	0.021181		
	4.40	20.99	0.012029		
16QAM					
25	3.50	7.12	0.004080	Within authorized band for Band 66	Pass
	3.85	-10.01	-0.005736		
	4.40	24.08	0.013799		
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.					

Appendix G: Modulation Characteristics

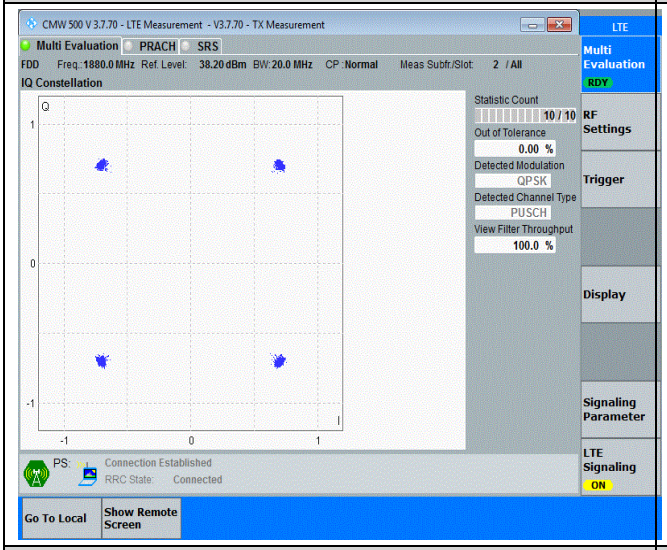
Test Result

Band	Bandwidth	Modulation	Channel	RB Configuration	Result	Verdict
Band2	20MHz	QPSK	18900	100RB#0	PASS	PASS
Band2	20MHz	16QAM	18900	100RB#0	PASS	PASS
Band7	20MHz	QPSK	21100	100RB#0	PASS	PASS
Band7	20MHz	16QAM	21100	100RB#0	PASS	PASS
Band12	10MHz	QPSK	23095	50RB#0	PASS	PASS
Band12	10MHz	16QAM	23095	50RB#0	PASS	PASS
Band17	10MHz	QPSK	23790	50RB#0	PASS	PASS
Band17	10MHz	16QAM	23790	50RB#0	PASS	PASS
Band26	10MHz	QPSK	26740	50RB#0	PASS	PASS
Band26	10MHz	16QAM	26740	50RB#0	PASS	PASS
Band26	15MHz	QPSK	26915	75RB#0	PASS	PASS
Band26	15MHz	16QAM	26915	75RB#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

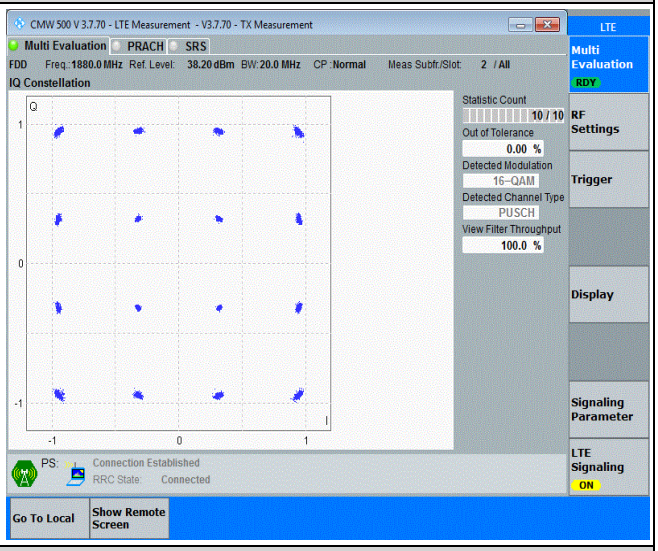
Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.

Test Graphs

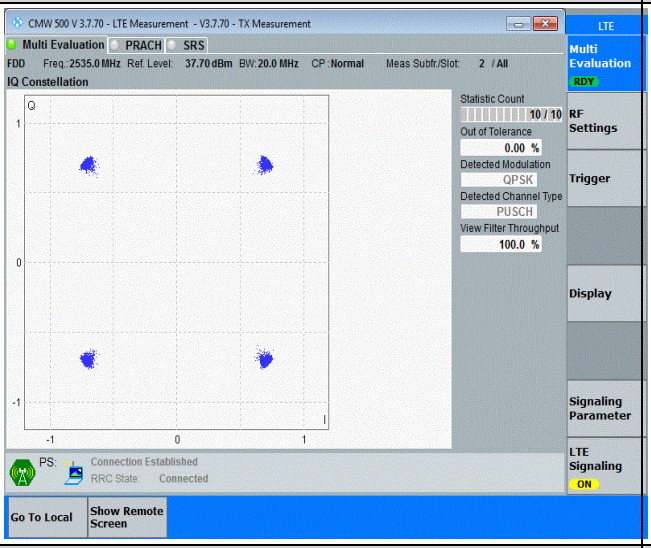
Band2-20MHz-QPSK-18900-100RB#0



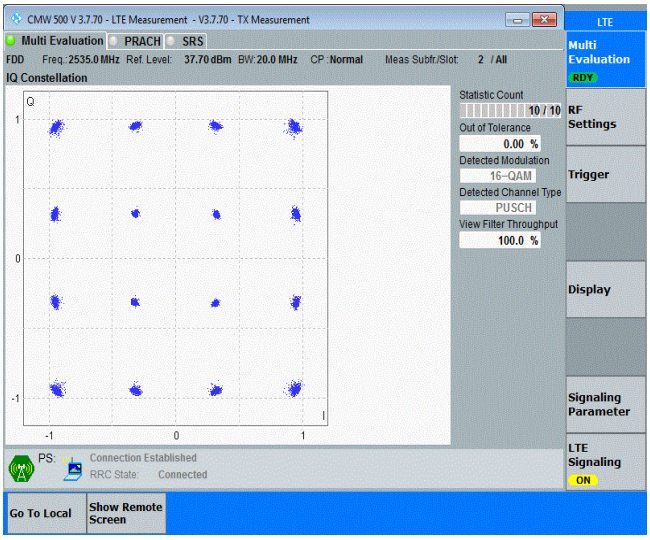
Band2-20MHz-16QAM-18900-100RB#0



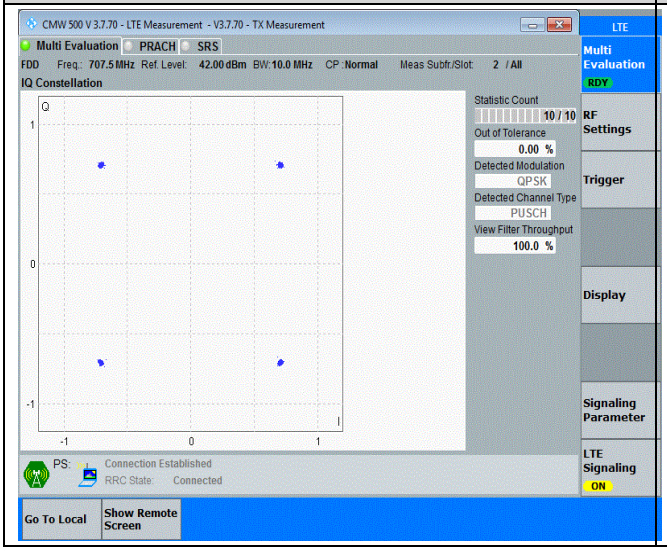
Band7-20MHz-QPSK-21100-100RB#0



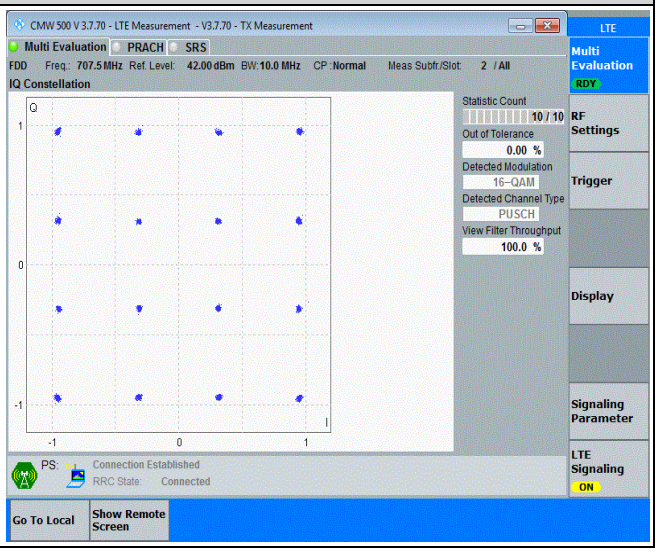
Band7-20MHz-16QAM-21100-100RB#0



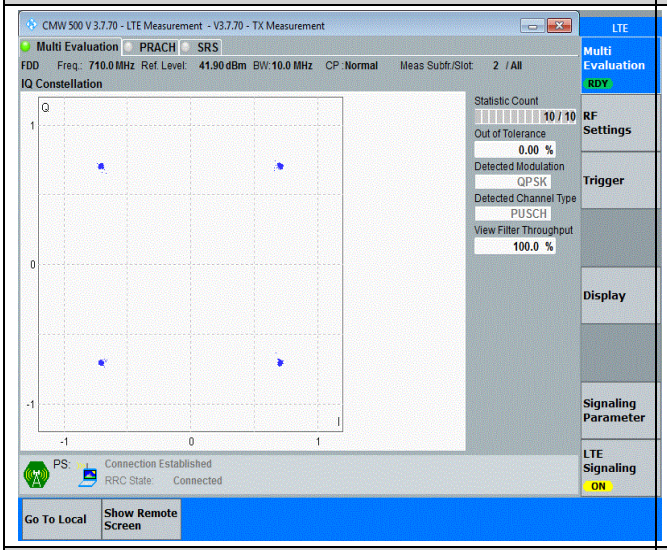
Band12-10MHz-QPSK-23095-50RB#0



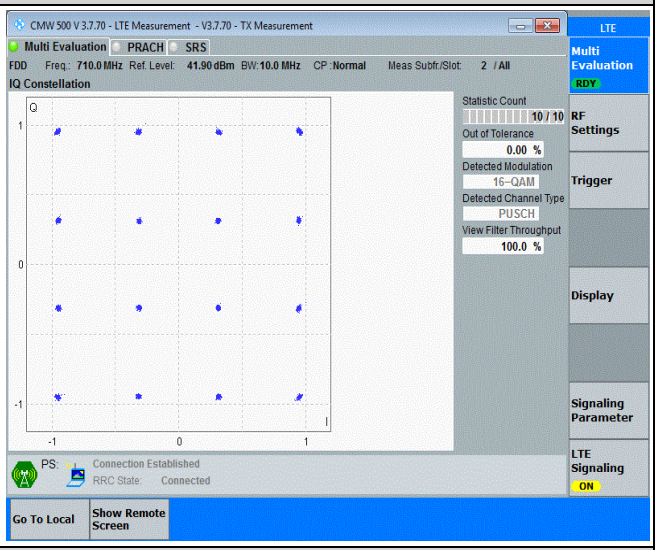
Band12-10MHz-16QAM-23095-50RB#0



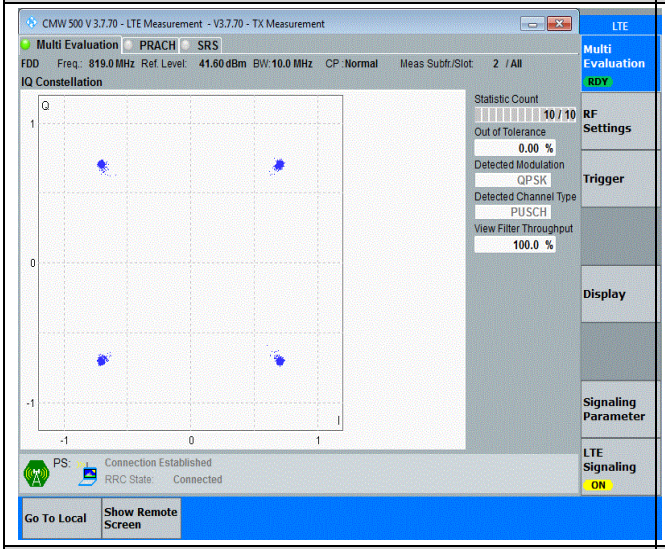
Band17-10MHz-QPSK-23790-50RB#0



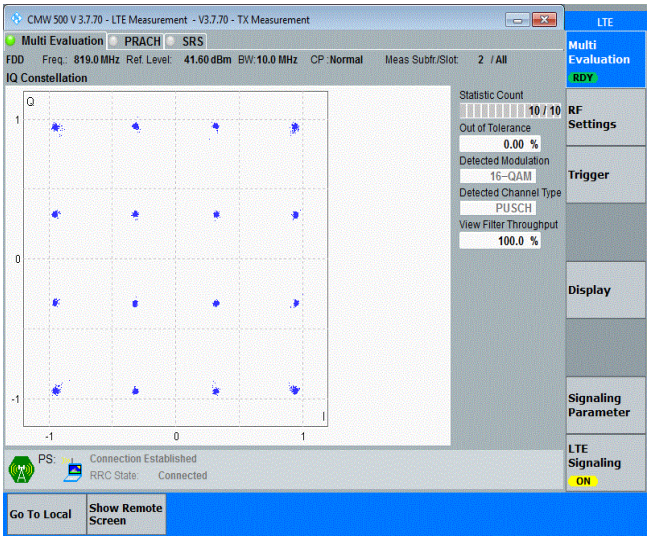
Band17-10MHz-16QAM-23790-50RB#0



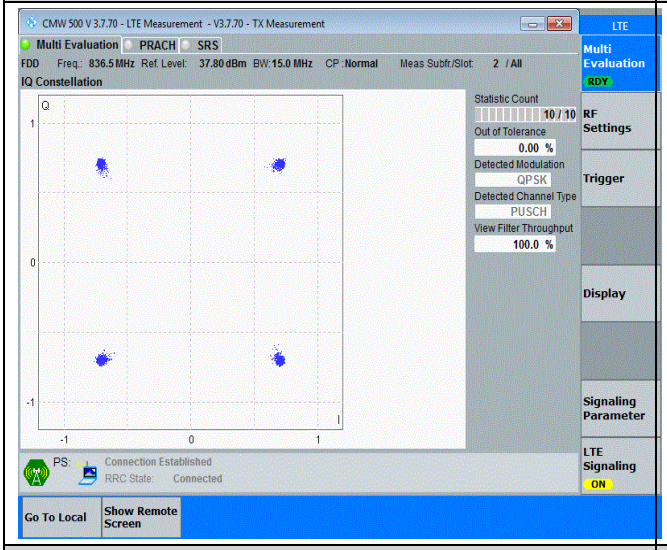
Band26-10MHz-QPSK-26740-50RB#0



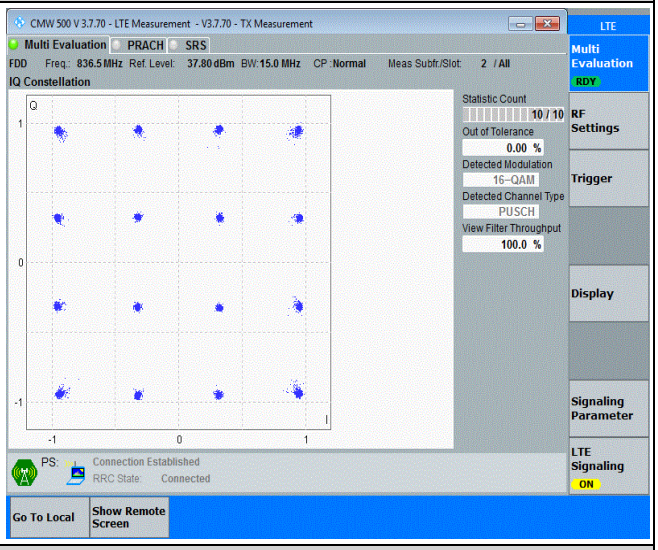
Band26-10MHz-16QAM-26740-50RB#0



Band26-15MHz-QPSK-26915-75RB#0

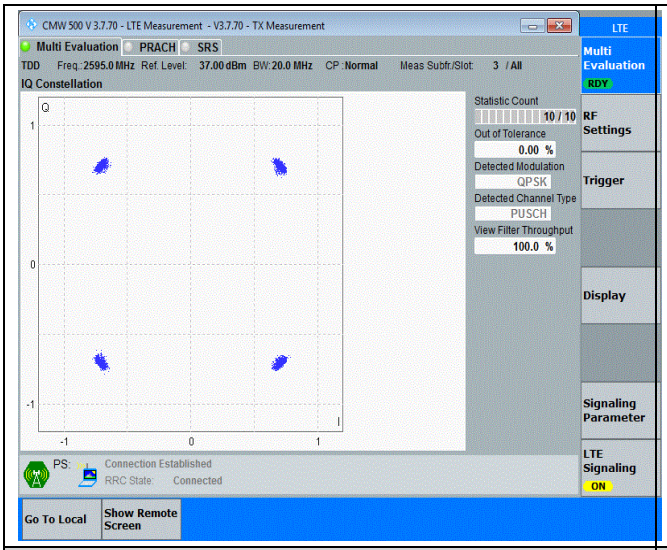


Band26-15MHz-16QAM-26915-75RB#0

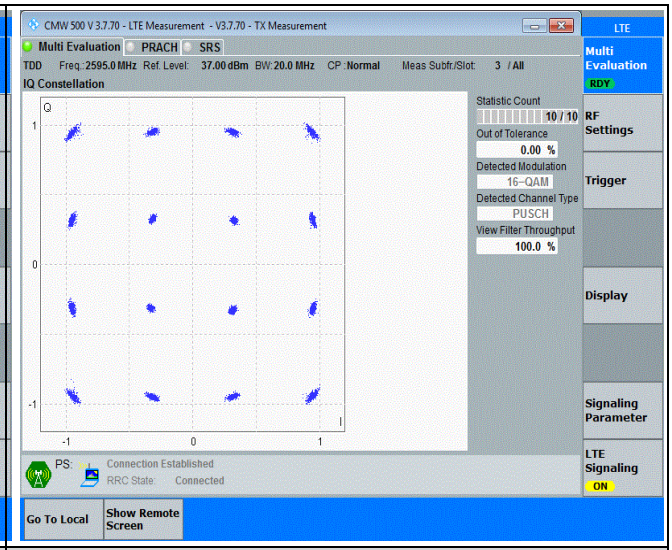
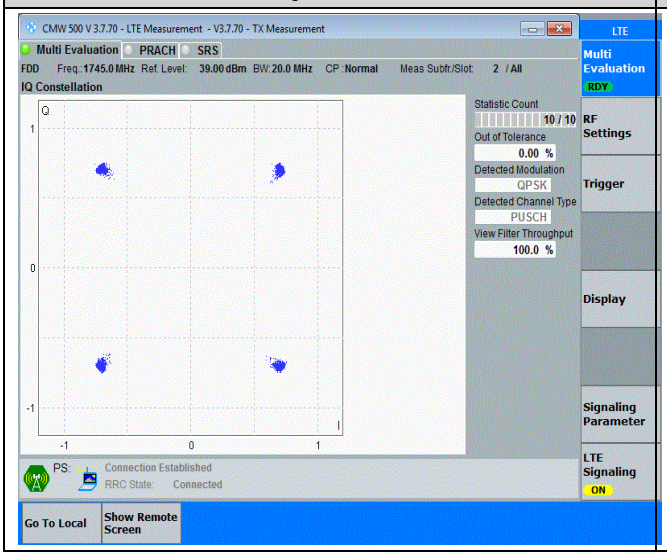
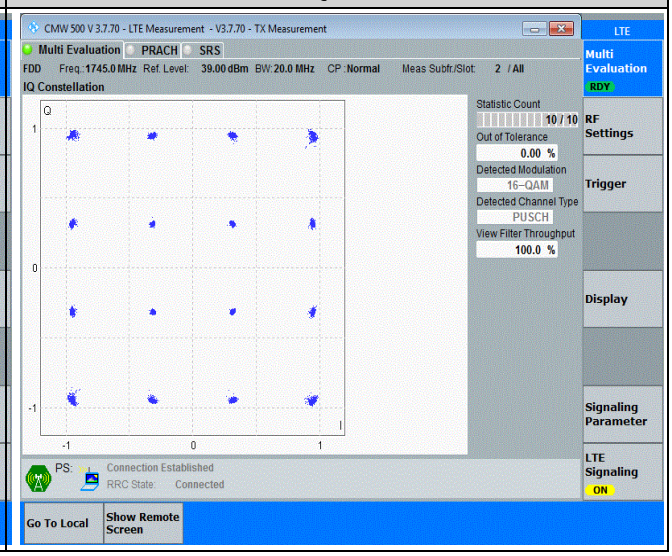


Band41-20MHz-QPSK-40640-100RB#0

Band41-20MHz-16QAM-40640-100RB#0



Band66-20MHz-QPSK-132322-100RB#0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