

## Appendix F: Frequency Stability

### Test Result

TE 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	-4.89	-0.002601	Within authorized band for Band 2	Pass
	-20	-5.81	-0.003090		
	-10	-8.48	-0.004511		
	0	-2.59	-0.001378		
	10	2.60	0.001383		
	20	-5.85	-0.003112		
	30	-4.59	-0.002441		
	40	-3.45	-0.001835		
	50	-11.47	-0.006101		
16QAM					
3.85	-30	-8.24	-0.004383	Within authorized band for Band 2	Pass
	-20	-7.85	-0.004176		
	-10	-4.36	-0.002319		
	0	-4.92	-0.002617		
	10	2.20	0.001170		
	20	4.56	0.002426		
	30	-2.86	-0.001521		
	40	-4.52	-0.002404		
	50	-9.71	-0.005165		
64QAM					
3.85	-30	-2.27	-0.001207	Within authorized band for Band 2	Pass
	-20	-4.22	-0.002245		
	-10	-2.16	-0.001149		
	0	-3.82	-0.002032		
	10	-5.81	-0.003090		
	20	-3.59	-0.001910		
	30	-3.13	-0.001665		
	40	-4.55	-0.002420		
	50	-1.77	-0.000941		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	-3.85	-0.002048	Within authorized band for Band 2	Pass
	3.85	-4.75	-0.002527		
	4.40	-2.98	-0.001585		
16QAM					
25	3.45	-4.41	-0.002346	Within authorized band for Band 2	Pass
	3.85	-6.87	-0.003654		
	4.40	-3.85	-0.002048		
64QAM					
25	3.45	-2.23	-0.001186	Within authorized band for Band 2	Pass
	3.85	-5.25	-0.002793		
	4.40	-3.78	-0.002011		
<i>Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.</i>					

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	-5.58	-0.006671	±2.5	Pass
	-20	-4.45	-0.005320		
	-10	-4.35	-0.005200		
	0	-2.42	-0.002893		
	10	-4.13	-0.004937		
	20	-3.23	-0.003861		
	30	-2.32	-0.002773		
	40	-3.95	-0.004722		
	50	-4.11	-0.004913		
16QAM					
3.85	-30	-4.48	-0.005356	±2.5	Pass
	-20	-4.26	-0.005093		
	-10	-3.82	-0.004567		
	0	-4.28	-0.005117		
	10	-4.62	-0.005523		
	20	1.90	0.002271		
	30	-2.76	-0.003299		
	40	-4.19	-0.005009		
	50	-6.41	-0.007663		
64QAM					
3.85	-30	-5.94	-0.007101	±2.5	Pass
	-20	-1.97	-0.002355		
	-10	2.96	0.003539		
	0	1.73	0.002068		
	10	-2.70	-0.003228		
	20	2.42	0.002893		
	30	-3.06	-0.003658		
	40	1.69	0.002020		
	50	-4.16	-0.004973		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	-5.32	-0.006360	±2.5	Pass
	3.85	-2.10	-0.002510		
	4.40	-7.07	-0.008452		
16QAM					
25	3.45	-2.53	-0.003025	±2.5	Pass
	3.85	-4.99	-0.005965		
	4.40	-4.56	-0.005451		
64QAM					
25	3.45	-3.92	-0.004686	±2.5	Pass
	3.85	1.80	0.002152		
	4.40	-1.49	-0.001781		
<i>Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.</i>					

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	-4.81	-0.001897	Within authorized band for Band 7	Pass
	-20	3.28	0.001294		
	-10	-6.51	-0.002568		
	0	5.11	0.002016		
	10	-7.82	-0.003085		
	20	-3.32	-0.001310		
	30	-4.03	-0.001590		
	40	-4.22	-0.001665		
	50	-7.90	-0.003116		
16QAM					
3.85	-30	-7.85	-0.003097	Within authorized band for Band 7	Pass
	-20	-9.24	-0.003645		
	-10	-5.18	-0.002043		
	0	3.38	0.001333		
	10	-8.15	-0.003215		
	20	-6.12	-0.002414		
	30	-3.28	-0.001294		
	40	5.89	0.002323		
	50	-4.76	-0.001878		
64QAM					
3.85	-30	-5.59	-0.002205	Within authorized band for Band 7	Pass
	-20	3.91	0.001542		
	-10	-7.10	-0.002801		
	0	-4.43	-0.001748		
	10	-3.68	-0.001452		
	20	-4.23	-0.001669		
	30	-6.97	-0.002750		
	40	-5.88	-0.002320		
	50	-4.16	-0.001641		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	3.73	0.001471	Within authorized band for Band 7	Pass
	3.85	-6.34	-0.002501		
	4.40	-4.46	-0.001759		
16QAM					
25	3.45	-4.82	-0.001901	Within authorized band for Band 7	Pass
	3.85	-7.10	-0.002801		
	4.40	-6.59	-0.002600		
64QAM					
25	3.45	-3.53	-0.001393	Within authorized band for Band 7	Pass
	3.85	3.58	0.001412		
	4.40	-3.09	-0.001219		
<i>Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.</i>					

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					
3.85	-30	-5.74	-0.008113	Within authorized band for Band 12	Pass
	-20	-3.75	-0.005300		
	-10	-2.95	-0.004170		
	0	-5.71	-0.008071		
	10	-8.08	-0.011420		
	20	-6.79	-0.009597		
	30	-5.82	-0.008226		
	40	-3.99	-0.005640		
	50	-4.81	-0.006799		
16QAM					
3.85	-30	-7.22	-0.010205	Within authorized band for Band 12	Pass
	-20	-6.51	-0.009201		
	-10	-5.28	-0.007463		
	0	-6.69	-0.009456		
	10	-3.42	-0.004834		
	20	-4.11	-0.005809		
	30	-5.94	-0.008396		
	40	-5.44	-0.007689		
	50	-6.41	-0.009060		
64QAM					
3.85	-30	1.12	0.001583	Within authorized band for Band 12	Pass
	-20	-2.59	-0.003661		
	-10	-2.47	-0.003491		
	0	-2.35	-0.003322		
	10	-2.86	-0.004042		
	20	-2.17	-0.003067		
	30	-3.08	-0.004353		
	40	-4.96	-0.007011		
	50	-4.63	-0.006544		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	-6.47	-0.009145	Within authorized band for Band 12	Pass
	3.85	-6.61	-0.009343		
	4.40	-3.48	-0.004919		
16QAM					
25	3.45	-5.55	-0.007845	Within authorized band for Band 12	Pass
	3.85	-4.94	-0.006982		
	4.40	-3.98	-0.005625		
64QAM					
25	3.45	-4.11	-0.005809	Within authorized band for Band 12	Pass
	3.85	-3.89	-0.005498		
	4.40	-3.22	-0.004551		
<i>Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.</i>					



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					
3.85	-30	-6.77	-0.008657	Within authorized band for Band 17	Pass
	-20	-2.59	-0.003312		
	-10	-5.35	-0.006841		
	0	-1.89	-0.002417		
	10	-3.89	-0.004974		
	20	-5.55	-0.007097		
	30	-3.49	-0.004463		
	40	-4.66	-0.005959		
	50	-5.72	-0.007315		
16QAM					
3.85	-30	-6.07	-0.007762	Within authorized band for Band 17	Pass
	-20	-6.21	-0.007941		
	-10	-5.92	-0.007570		
	0	-2.92	-0.003734		
	10	4.01	0.005128		
	20	-4.25	-0.005435		
	30	2.12	0.002711		
	40	-4.42	-0.005652		
	50	-7.25	-0.009271		
64QAM					
3.85	-30	-4.51	-0.005767	Within authorized band for Band 17	Pass
	-20	-2.79	-0.003568		
	-10	-2.53	-0.003235		
	0	-4.35	-0.005563		
	10	1.16	0.001483		
	20	-5.84	-0.007468		
	30	-5.81	-0.007430		
	40	-3.16	-0.004041		
	50	-1.65	-0.002110		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	-4.69	-0.005997	Within authorized band for Band 17	Pass
	3.85	-3.26	-0.004169		
	4.40	-4.53	-0.005793		
16QAM					
25	3.45	-4.45	-0.005691	Within authorized band for Band 17	Pass
	3.85	-3.38	-0.004322		
	4.40	-6.71	-0.008581		
64QAM					
25	3.45	-3.46	-0.004425	Within authorized band for Band 17	Pass
	3.85	-5.71	-0.007302		
	4.40	-2.35	-0.003005		
<i>Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.</i>					

LTE Band 26 part (PART 22) :

Reference Frequency: LTE Band 26(15MHz) Middle channel=26915 Frequency=836.5MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.85	-30	-4.03	-0.004818	±2.5	Pass
	-20	2.20	0.002630		
	-10	-4.32	-0.005164		
	0	-5.16	-0.006169		
	10	-4.92	-0.005882		
	20	-5.94	-0.007101		
	30	-4.65	-0.005559		
	40	-3.56	-0.004256		
	50	-3.98	-0.004758		
16QAM					
3.85	-30	-2.70	-0.003228	±2.5	Pass
	-20	-4.19	-0.005009		
	-10	-2.88	-0.003443		
	0	-3.08	-0.003682		
	10	-6.07	-0.007256		
	20	-4.38	-0.005236		
	30	-2.59	-0.003096		
	40	-2.80	-0.003347		
	50	-3.50	-0.004184		
64QAM					
3.85	-30	-2.29	-0.002738	±2.5	Pass
	-20	-1.69	-0.002020		
	-10	-3.46	-0.004136		
	0	-1.79	-0.002140		
	10	3.32	0.003969		
	20	-1.63	-0.001949		
	30	-8.11	-0.009695		
	40	-2.57	-0.003072		
	50	-7.54	-0.009014		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	-4.29	-0.005129	±2.5	Pass
	3.85	-1.97	-0.002355		
	4.40	-5.08	-0.006073		
16QAM					
25	3.45	-6.45	-0.007875	±2.5	Pass
	3.85	-5.25	-0.006410		
	4.40	-1.39	-0.001697		
64QAM					
25	3.45	-2.76	-0.003299	±2.5	Pass
	3.85	-5.09	-0.006085		
	4.40	-2.65	-0.003168		
<i>Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.</i>					

LTE Band 26 part(PART 90S):

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					
3.85	-30	-1.52	-0.001856	±2.5	Pass
	-20	-3.92	-0.004786		
	-10	3.29	0.004017		
	0	-2.12	-0.002589		
	10	-8.08	-0.009866		
	20	-5.34	-0.006520		
	30	-7.61	-0.009292		
	40	-6.14	-0.007497		
	50	-4.96	-0.006056		
16QAM					
3.85	-30	-6.74	-0.008230	±2.5	Pass
	-20	1.63	0.001990		
	-10	-5.14	-0.006276		
	0	-3.91	-0.004774		
	10	-5.69	-0.006947		
	20	-3.13	-0.003822		
	30	-7.07	-0.008632		
	40	-6.67	-0.008144		
	50	-7.05	-0.008608		
64QAM					
3.85	-30	-3.91	-0.004774	±2.5	Pass
	-20	-5.54	-0.006764		
	-10	-2.96	-0.003614		
	0	2.39	0.002918		
	10	1.79	0.002186		
	20	-5.98	-0.007302		
	30	-6.38	-0.007790		
	40	-5.58	-0.006813		
	50	-5.84	-0.007131		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	-5.32	-0.006360	±2.5	Pass
	3.85	-2.10	-0.002510		
	4.40	-7.07	-0.008452		
16QAM					
25	3.45	-4.09	-0.004889	±2.5	Pass
	3.85	-3.91	-0.004674		
	4.40	-2.82	-0.003371		
64QAM					
25	3.45	-8.41	-0.010269	±2.5	Pass
	3.85	-6.77	-0.008266		
	4.40	-6.72	-0.008205		
<i>Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.</i>					

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	-7.37	-0.002840	Within authorized band for Band 41	Pass
	-20	-5.01	-0.001931		
	-10	-2.20	-0.000848		
	0	-1.63	-0.000628		
	10	-4.59	-0.001769		
	20	5.95	0.002293		
	30	-2.22	-0.000855		
	40	-5.34	-0.002058		
	50	-6.65	-0.002563		
16QAM					
3.85	-30	7.41	0.002855	Within authorized band for Band 41	Pass
	-20	-8.44	-0.003252		
	-10	3.35	0.001291		
	0	-7.48	-0.002882		
	10	-7.58	-0.002921		
	20	-5.65	-0.002177		
	30	-8.27	-0.003187		
	40	-2.85	-0.001098		
	50	-2.88	-0.001110		
64QAM					
3.85	-30	-3.65	-0.001407	Within authorized band for Band 41	Pass
	-20	-3.69	-0.001422		
	-10	2.59	0.000998		
	0	-4.94	-0.001904		
	10	-13.35	-0.005145		
	20	-9.98	-0.003846		
	30	-8.38	-0.003229		
	40	-2.85	-0.001098		
	50	-8.93	-0.003441		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	2.27	0.000875	Within authorized band for Band 41	Pass
	3.85	-10.01	-0.003857		
	4.40	-3.29	-0.001268		
16QAM					
25	3.45	-9.27	-0.003572	Within authorized band for Band41	Pass
	3.85	-6.62	-0.002551		
	4.40	2.09	0.000805		
64QAM					
25	3.45	-8.58	-0.003306	Within authorized band for Band41	Pass
	3.85	-6.47	-0.002493		
	4.40	-9.04	-0.003484		
<i>Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.</i>					



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	4.68	0.002682	Within authorized band for Band 66	Pass
	-20	4.85	0.002779		
	-10	3.71	0.002126		
	0	2.96	0.001696		
	10	5.92	0.003393		
	20	3.19	0.001828		
	30	4.58	0.002625		
	40	3.89	0.002229		
	50	-2.22	-0.001272		
16QAM					
3.85	-30	5.01	0.002871	Within authorized band for Band 66	Pass
	-20	6.01	0.003444		
	-10	-1.70	-0.000974		
	0	5.84	0.003347		
	10	-4.09	-0.002344		
	20	-3.95	-0.002264		
	30	-3.09	-0.001771		
	40	-2.39	-0.001370		
	50	-3.18	-0.001822		
64QAM					
3.85	-30	2.42	0.001387	Within authorized band for Band 66	Pass
	-20	3.10	0.001777		
	-10	-1.26	-0.000722		
	0	2.12	0.001215		
	10	-2.75	-0.001576		
	20	-2.13	-0.001221		
	30	-3.83	-0.002195		
	40	-5.62	-0.003221		
	50	3.06	0.001754		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.45	3.89	0.002229	Within authorized band for Band 66	Pass
	3.85	-4.01	-0.002298		
	4.40	6.11	0.003501		
16QAM					
25	3.45	3.05	0.001748	Within authorized band for Band 66	Pass
	3.85	5.36	0.003072		
	4.40	2.88	0.001650		
64QAM					
25	3.45	-4.46	-0.002556	Within authorized band for Band 66	Pass
	3.85	-2.47	-0.001415		
	4.40	-3.56	-0.002040		
<i>Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.</i>					

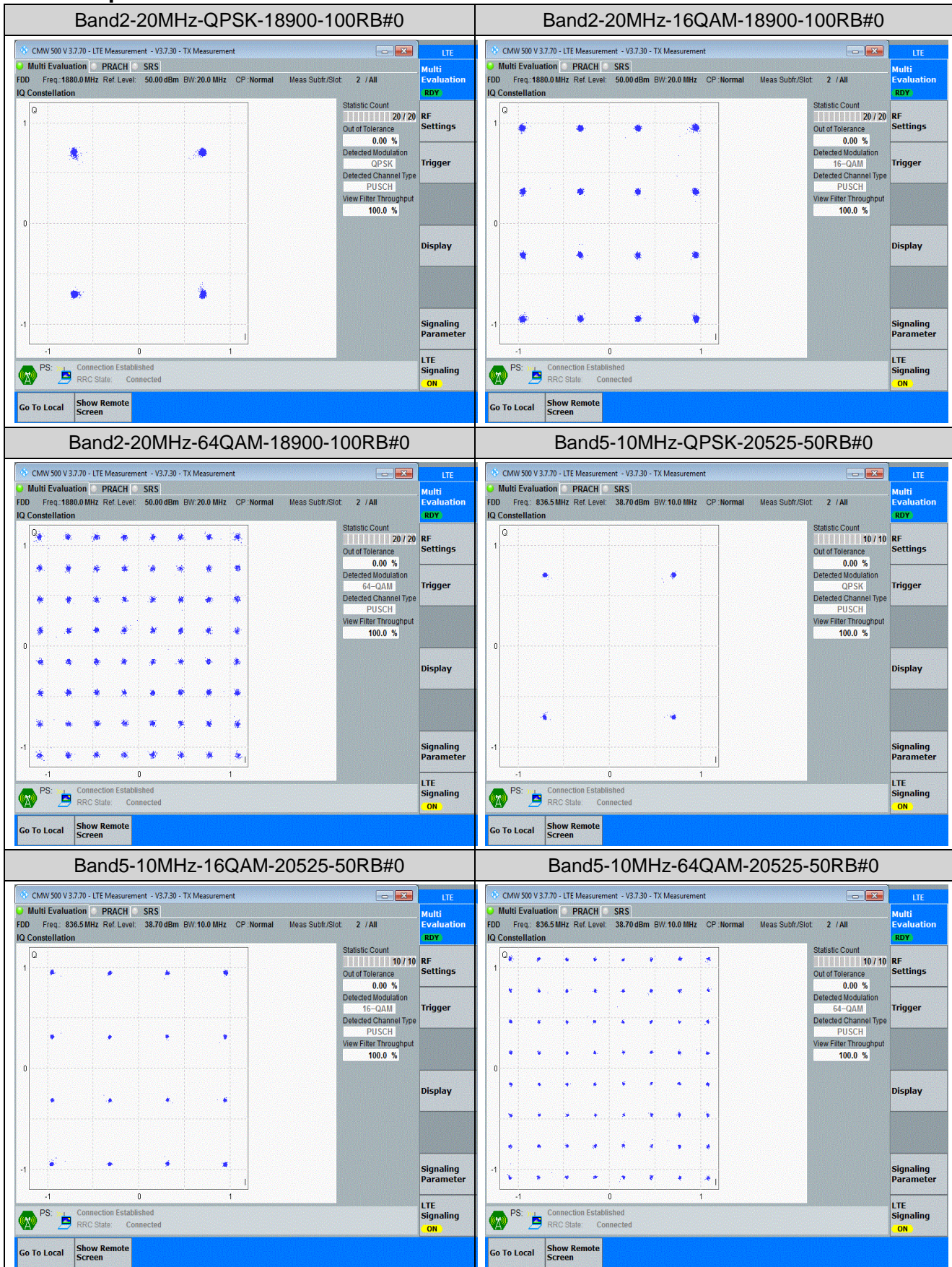
## Appendix G: Modulation Characteristics

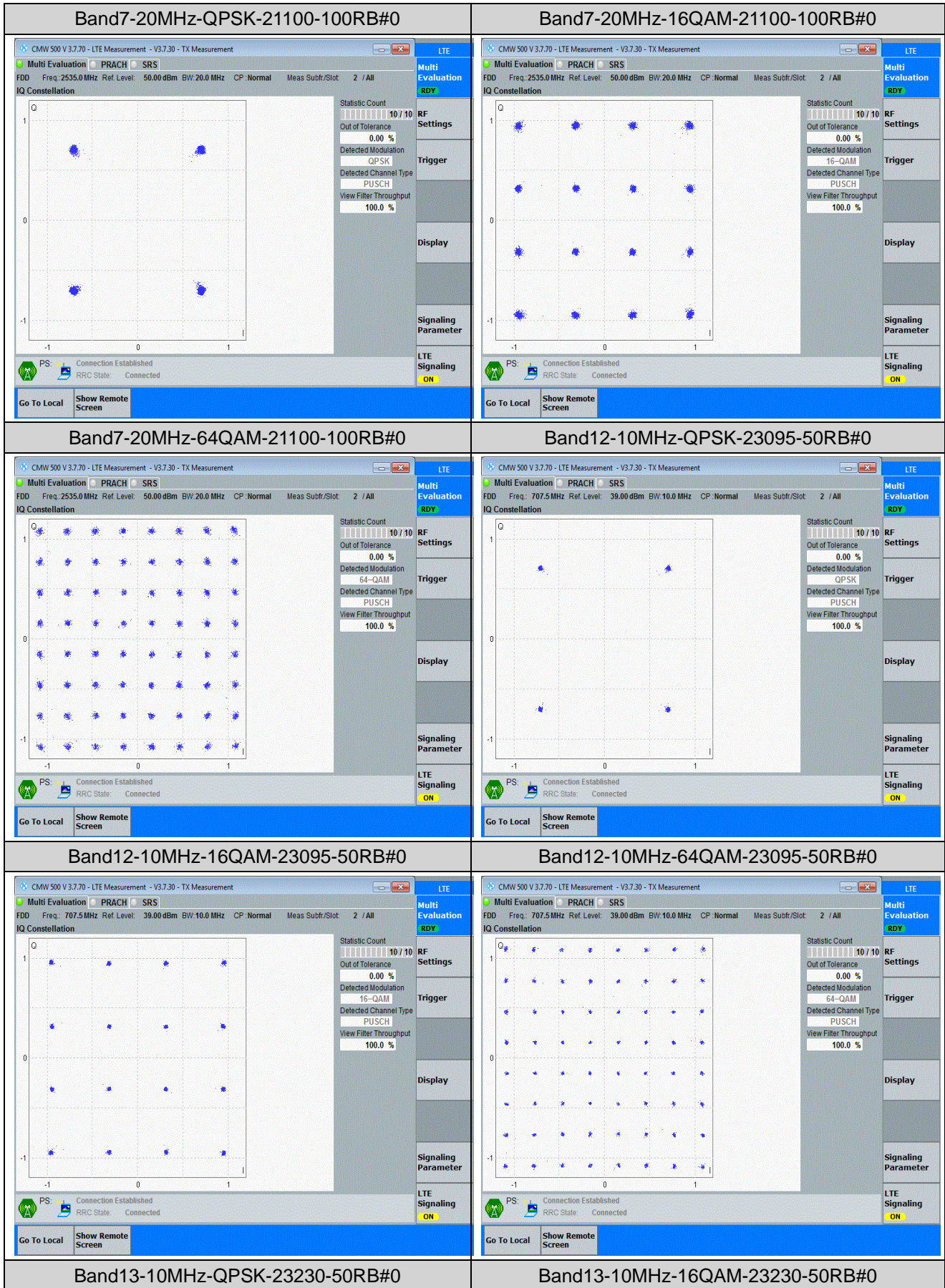
### Test Result

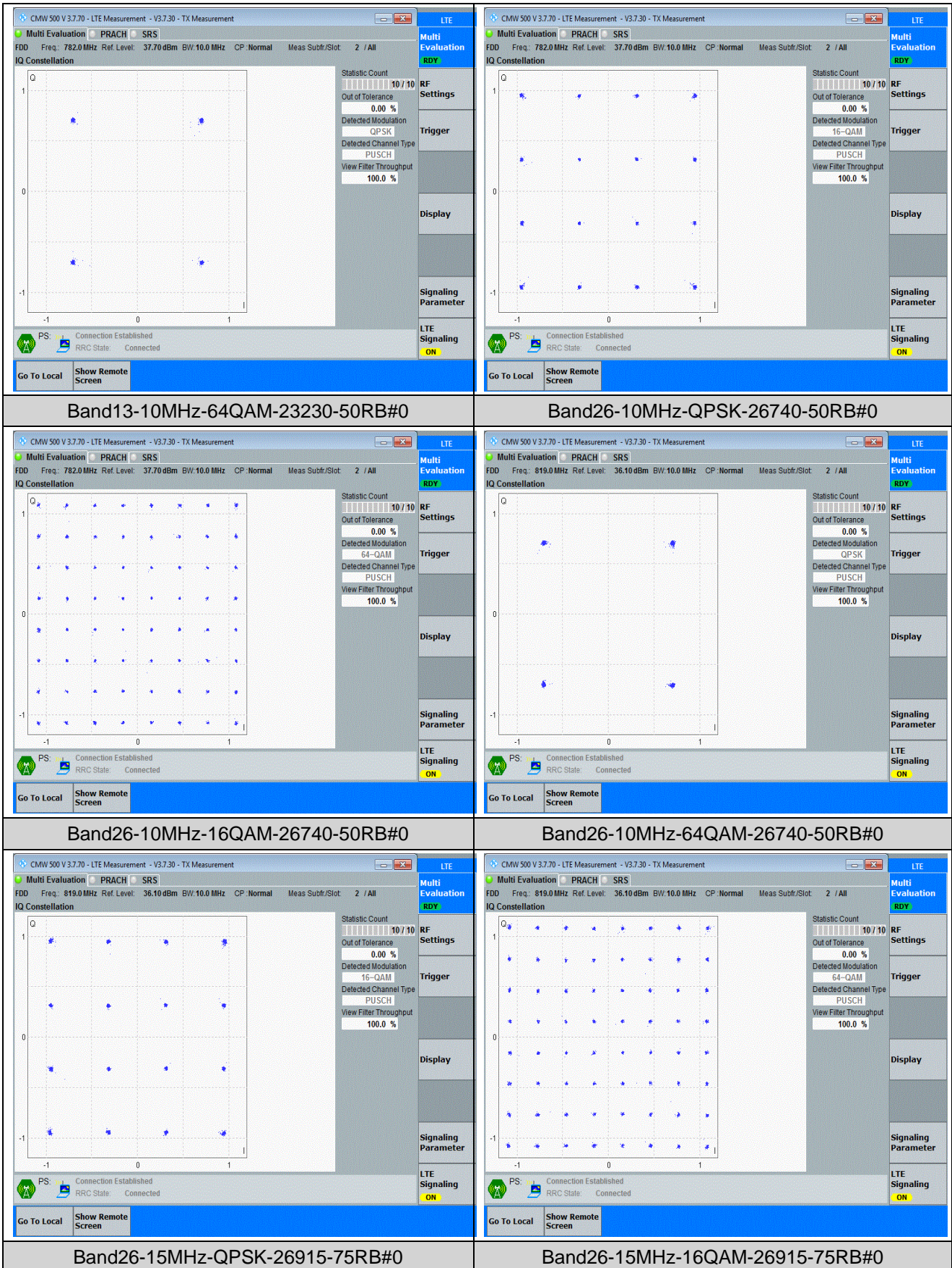
Band	Bandwidth	Modulation	Channel	RB Configuration	Result	Verdict
Band2	20MHz	QPSK	18900	100RB#0	PASS	PASS
Band2	20MHz	16QAM	18900	100RB#0	PASS	PASS
Band2	20MHz	64QAM	18900	100RB#0	PASS	PASS
Band5	10MHz	QPSK	20525	50RB#0	PASS	PASS
Band5	10MHz	16QAM	20525	50RB#0	PASS	PASS
Band5	10MHz	64QAM	20525	50RB#0	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

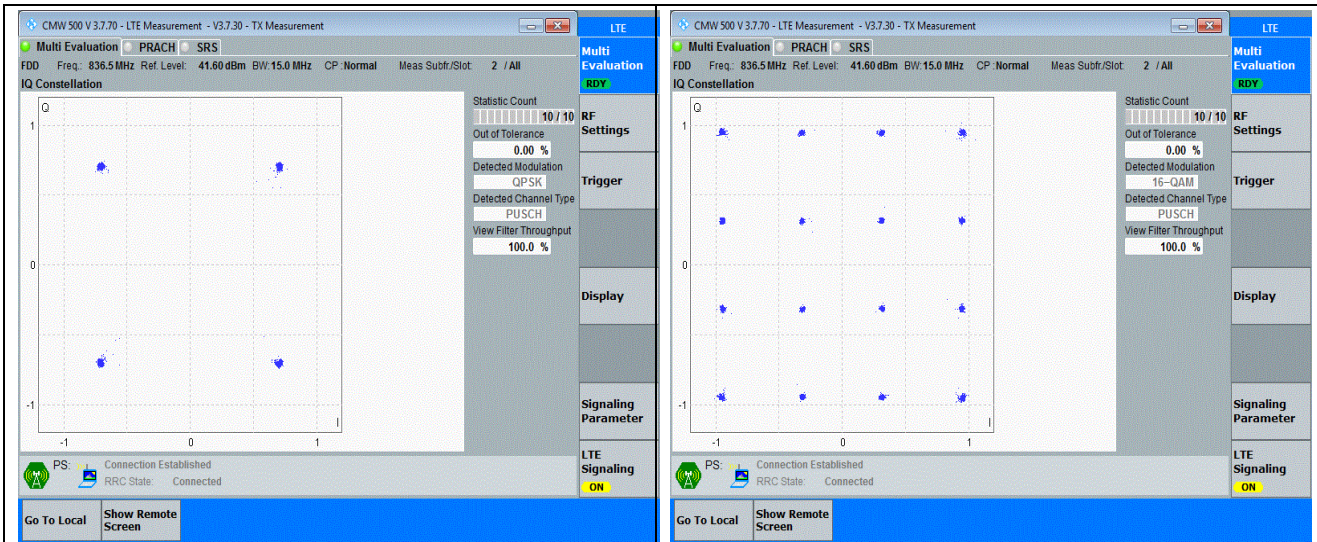
*Remark: All bandwidth and all modulation had been tested, but only the worst case data displayed in this report.*

## Test Graphs



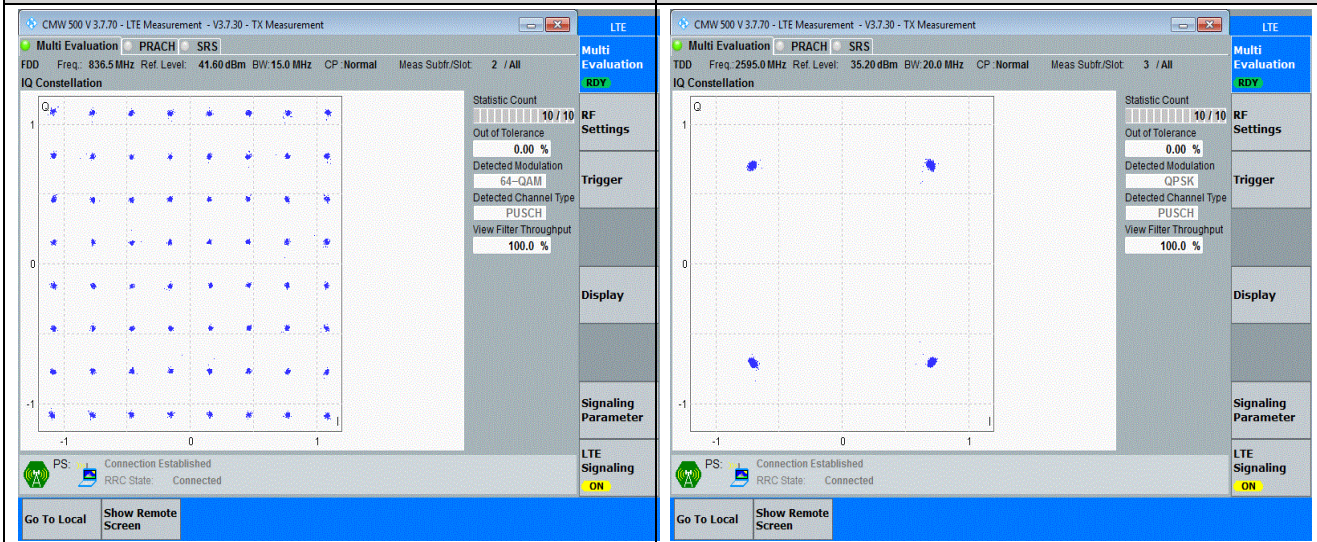






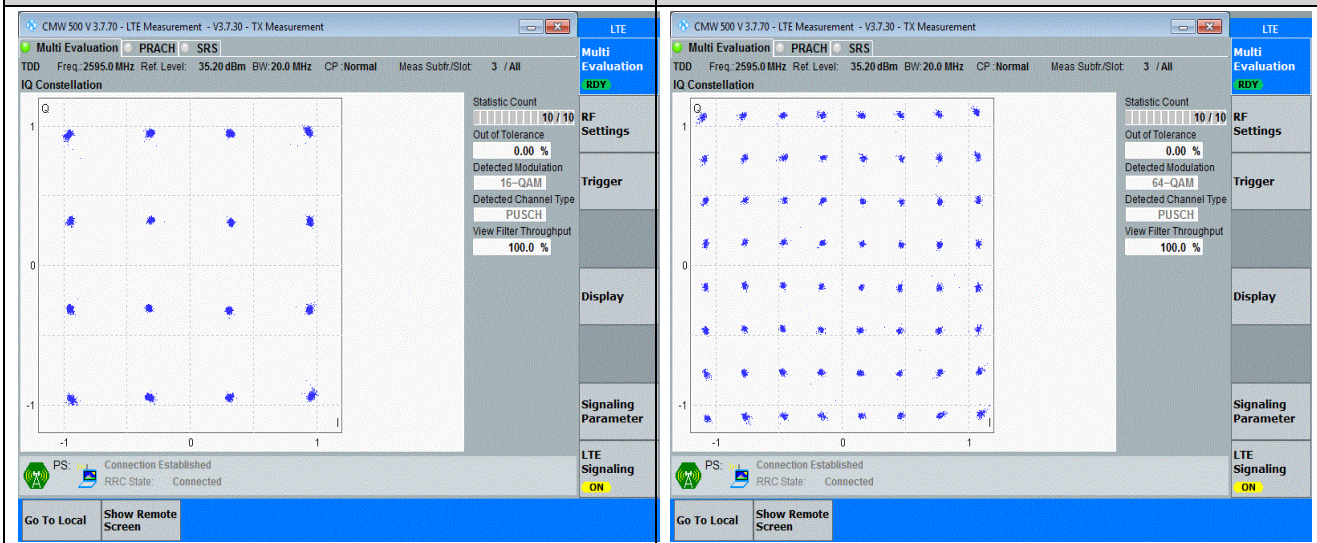
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Band41-20MHz-QPSK-40640-100RB#0



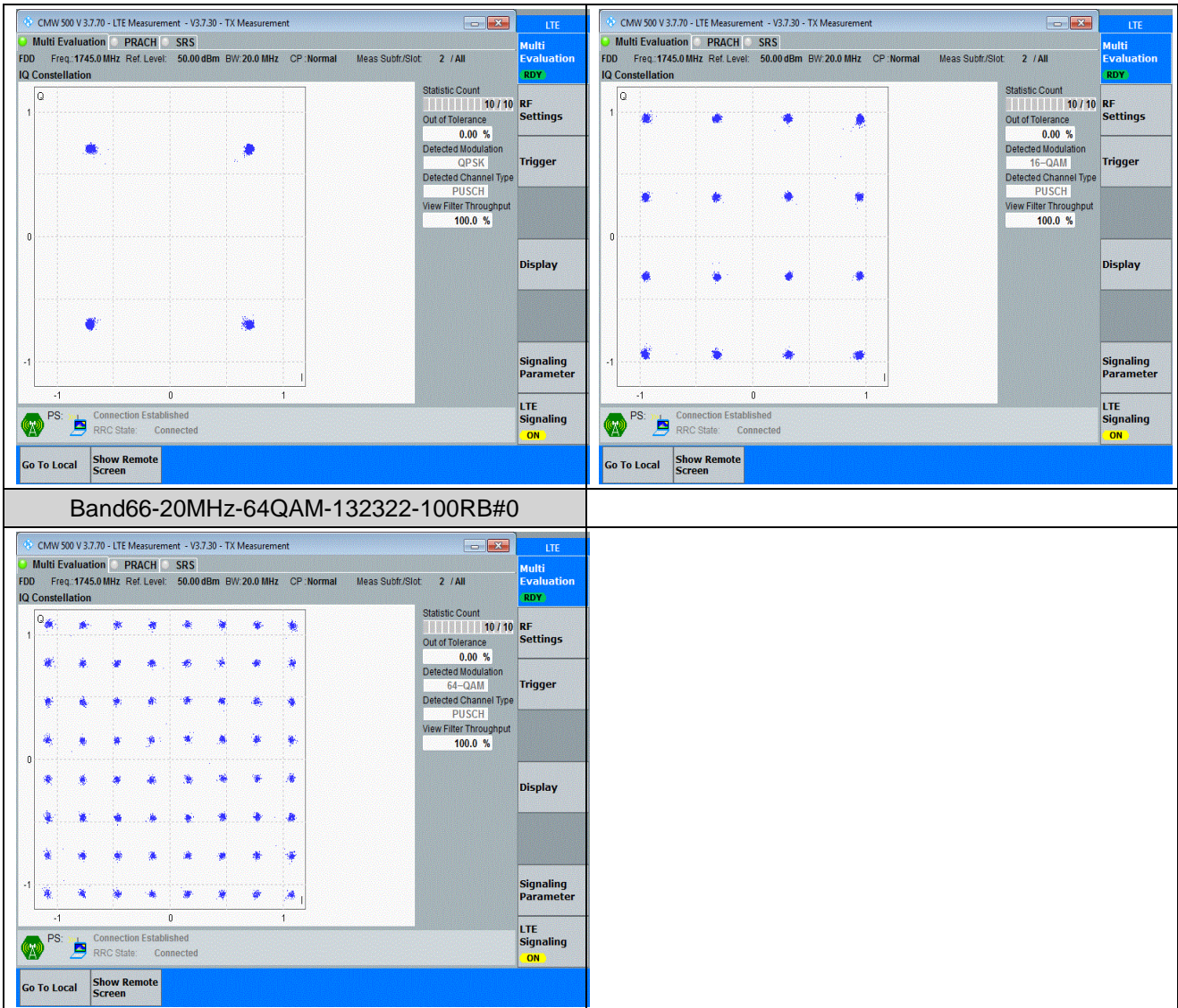
Band41-20MHz-16QAM-40640-100RB#0

Band41-20MHz-64QAM-40640-100RB#0



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

Band66-20MHz-16QAM-132322-100RB#0



**Band66-20MHz-64QAM-132322-100RB#0**