

































Appendix F: Frequency Stability

Test Result

Channel Bandwidth: 1.4 MHz

Channel Bandwidth: 1.4 MHz							
Voltage							
Modulation	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VL	TN	2.77	0.003359	± 2.5	PASS
		VN	TN	-0.74	-0.000897	± 2.5	PASS
		VH	TN	-1.9	-0.002304	± 2.5	PASS
	MCH	VL	TN	2.54	0.003036	± 2.5	PASS
		VN	TN	4.83	0.005774	± 2.5	PASS
		VH	TN	3	0.003586	± 2.5	PASS
	HCH	VL	TN	4.59	0.005411	± 2.5	PASS
		VN	TN	3.01	0.003548	± 2.5	PASS
		VH	TN	4.47	0.005269	± 2.5	PASS
16QAM	LCH	VL	TN	2.09	0.002534	± 2.5	PASS
		VN	TN	-0.76	-0.000922	± 2.5	PASS
		VH	TN	2.95	0.003577	± 2.5	PASS
	MCH	VL	TN	0.31	0.000371	± 2.5	PASS
		VN	TN	4.53	0.005415	± 2.5	PASS
		VH	TN	-1.22	-0.001458	± 2.5	PASS
	HCH	VL	TN	-1.87	-0.002204	± 2.5	PASS
		VN	TN	0.06	0.000071	± 2.5	PASS
		VH	TN	-1.49	-0.001756	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VN	-30	3.34	0.004050	± 2.5	PASS
		VN	-20	0.79	0.000958	± 2.5	PASS
		VN	-10	3.07	0.003723	± 2.5	PASS
		VN	0	-1.19	-0.001443	± 2.5	PASS
		VN	10	0.65	0.000788	± 2.5	PASS
		VN	20	2.18	0.002643	± 2.5	PASS
		VN	30	-0.52	-0.000631	± 2.5	PASS
		VN	40	-1.96	-0.002377	± 2.5	PASS
		VN	50	4.54	0.005505	± 2.5	PASS

	MCH	VN	-30	1.57	0.001877	± 2.5	PASS
		VN	-20	-0.77	-0.000921	± 2.5	PASS
		VN	-10	3.81	0.004555	± 2.5	PASS
		VN	0	0.18	0.000215	± 2.5	PASS
		VN	10	3.34	0.003993	± 2.5	PASS
		VN	20	3.88	0.004638	± 2.5	PASS
		VN	30	2.83	0.003383	± 2.5	PASS
		VN	40	-1.29	-0.001542	± 2.5	PASS
		VN	50	1.48	0.001769	± 2.5	PASS
	HCH	VN	-30	-0.63	-0.000743	± 2.5	PASS
		VN	-20	-1.43	-0.001686	± 2.5	PASS
		VN	-10	-1.69	-0.001992	± 2.5	PASS
		VN	0	-1.27	-0.001497	± 2.5	PASS
		VN	10	2.24	0.002641	± 2.5	PASS
		VN	20	1.78	0.002098	± 2.5	PASS
		VN	30	2.88	0.003395	± 2.5	PASS
		VN	40	-0.44	-0.000519	± 2.5	PASS
		VN	50	2.12	0.002499	± 2.5	PASS
16QAM	LCH	VN	-30	-0.24	-0.000291	± 2.5	PASS
		VN	-20	-1.53	-0.001855	± 2.5	PASS
		VN	-10	4.53	0.005493	± 2.5	PASS
		VN	0	-0.8	-0.000970	± 2.5	PASS
		VN	10	2.46	0.002983	± 2.5	PASS
		VN	20	0.47	0.000570	± 2.5	PASS
		VN	30	-1.24	-0.001504	± 2.5	PASS
		VN	40	-0.55	-0.000667	± 2.5	PASS
		VN	50	-0.33	-0.000400	± 2.5	PASS
	MCH	VN	-30	0.03	0.000035	± 2.5	PASS
		VN	-20	-1.8	-0.002122	± 2.5	PASS
		VN	-10	1.45	0.001709	± 2.5	PASS
		VN	0	2.58	0.003041	± 2.5	PASS
		VN	10	0.09	0.000106	± 2.5	PASS
		VN	20	3.34	0.003937	± 2.5	PASS
		VN	30	-1.82	-0.002145	± 2.5	PASS
		VN	40	3.09	0.003643	± 2.5	PASS
		VN	50	4.1	0.004833	± 2.5	PASS
	HCH	VN	-30	3.92	0.004621	± 2.5	PASS
		VN	-20	-1.01	-0.001191	± 2.5	PASS
		VN	-10	-0.54	-0.000637	± 2.5	PASS
VN		0	-0.82	-0.000967	± 2.5	PASS	
VN		10	4.11	0.004845	± 2.5	PASS	

		VN	20	3.88	0.004574	± 2.5	PASS
		VN	30	-0.86	-0.001014	± 2.5	PASS
		VN	40	3.99	0.004704	± 2.5	PASS
		VN	50	-0.25	-0.000295	± 2.5	PASS

Channel Bandwidth: 3 MHz

Channel Bandwidth: 3 MHz+							
Voltage							
Modulation	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VL	TN	2.77	0.003356	± 2.5	PASS
		VN	TN	1.28	0.001551	± 2.5	PASS
		VH	TN	3.54	0.004288	± 2.5	PASS
	MCH	VL	TN	1.49	0.001781	± 2.5	PASS
		VN	TN	-0.31	-0.000371	± 2.5	PASS
		VH	TN	1.76	0.002104	± 2.5	PASS
	HCH	VL	TN	-0.5	-0.000590	± 2.5	PASS
		VN	TN	3.7	0.004366	± 2.5	PASS
		VH	TN	4.04	0.004767	± 2.5	PASS
16QAM	LCH	VL	TN	0.91	0.001102	± 2.5	PASS
		VN	TN	1.89	0.002290	± 2.5	PASS
		VH	TN	2.04	0.002471	± 2.5	PASS
	MCH	VL	TN	-1.76	-0.002104	± 2.5	PASS
		VN	TN	4.5	0.005380	± 2.5	PASS
		VH	TN	4.84	0.005786	± 2.5	PASS
	HCH	VL	TN	2.23	0.002631	± 2.5	PASS
		VN	TN	4.88	0.005758	± 2.5	PASS
		VH	TN	4.64	0.005475	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VN	-30	2.51	0.003041	± 2.5	PASS
		VN	-20	2.37	0.002871	± 2.5	PASS
		VN	-10	-1.35	-0.001635	± 2.5	PASS
		VN	0	-1.1	-0.001333	± 2.5	PASS
		VN	10	-0.9	-0.001090	± 2.5	PASS
		VN	20	3.8	0.004603	± 2.5	PASS
		VN	30	-1.71	-0.002071	± 2.5	PASS
		VN	40	2.89	0.003501	± 2.5	PASS
	MCH	VN	-30	3.27	0.003909	± 2.5	PASS

	VN	VN	-20	0.5	0.000598	± 2.5	PASS
		VN	-10	1.56	0.001865	± 2.5	PASS
		VN	0	1.08	0.001291	± 2.5	PASS
		VN	10	1.54	0.001841	± 2.5	PASS
		VN	20	0.04	0.000048	± 2.5	PASS
		VN	30	-0.07	-0.000084	± 2.5	PASS
		VN	40	-0.61	-0.000729	± 2.5	PASS
		VN	50	4.74	0.005666	± 2.5	PASS
	HCH	VN	-30	0.14	0.000165	± 2.5	PASS
		VN	-20	2.52	0.002973	± 2.5	PASS
		VN	-10	0.06	0.000071	± 2.5	PASS
		VN	0	4.31	0.005086	± 2.5	PASS
		VN	10	1.2	0.001416	± 2.5	PASS
		VN	20	4.14	0.004885	± 2.5	PASS
		VN	30	2.8	0.003304	± 2.5	PASS
		VN	40	1.8	0.002124	± 2.5	PASS
		VN	50	1.14	0.001345	± 2.5	PASS
		16QAM	LCH	VN	-30	1.32	0.001578
VN	-20			2.15	0.002570	± 2.5	PASS
VN	-10			-1.17	-0.001399	± 2.5	PASS
VN	0			1.71	0.002044	± 2.5	PASS
VN	10			4.94	0.005906	± 2.5	PASS
VN	20			-0.54	-0.000646	± 2.5	PASS
VN	30			2.22	0.002654	± 2.5	PASS
VN	40			3.14	0.003754	± 2.5	PASS
VN	50			4.7	0.005619	± 2.5	PASS
MCH	VN		-30	0.73	0.000861	± 2.5	PASS
	VN		-20	-1.95	-0.002301	± 2.5	PASS
	VN		-10	2.51	0.002962	± 2.5	PASS
	VN		0	-0.84	-0.000991	± 2.5	PASS
	VN		10	-1.8	-0.002124	± 2.5	PASS
	VN		20	0.47	0.000555	± 2.5	PASS
	VN		30	0.83	0.000979	± 2.5	PASS
	VN		40	4.42	0.005215	± 2.5	PASS
	VN		50	-0.15	-0.000177	± 2.5	PASS
HCH	VN		-30	-1.32	-0.001558	± 2.5	PASS
	VN		-20	4.72	0.005569	± 2.5	PASS
	VN		-10	1.91	0.002254	± 2.5	PASS
	VN		0	4.4	0.005192	± 2.5	PASS
	VN		10	1.12	0.001322	± 2.5	PASS
	VN		20	2.98	0.003516	± 2.5	PASS

		VN	30	-1.61	-0.001900	± 2.5	PASS
		VN	40	4.88	0.005758	± 2.5	PASS
		VN	50	3.5	0.004130	± 2.5	PASS

Channel Bandwidth: 5 MHz

Channel Bandwidth: 5 MHz							
Voltage							
Modulation	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VL	TN	2.77	0.003351	± 2.5	PASS
		VN	TN	-0.4	-0.000484	± 2.5	PASS
		VH	TN	-1.63	-0.001972	± 2.5	PASS
	MCH	VL	TN	3.95	0.004722	± 2.5	PASS
		VN	TN	0.11	0.000132	± 2.5	PASS
		VH	TN	0.58	0.000693	± 2.5	PASS
	HCH	VL	TN	2.14	0.002528	± 2.5	PASS
		VN	TN	3.29	0.003887	± 2.5	PASS
		VH	TN	2.35	0.002776	± 2.5	PASS
16QAM	LCH	VL	TN	3.08	0.003727	± 2.5	PASS
		VN	TN	-0.03	-0.000036	± 2.5	PASS
		VH	TN	-0.15	-0.000181	± 2.5	PASS
	MCH	VL	TN	2.37	0.002833	± 2.5	PASS
		VN	TN	1.68	0.002008	± 2.5	PASS
		VH	TN	-1.58	-0.001889	± 2.5	PASS
	HCH	VL	TN	4.86	0.005741	± 2.5	PASS
		VN	TN	0.15	0.000177	± 2.5	PASS
		VH	TN	4.97	0.005871	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VN	-30	-0.05	-0.000060	± 2.5	PASS
		VN	-20	2.18	0.002638	± 2.5	PASS
		VN	-10	-0.36	-0.000436	± 2.5	PASS
		VN	0	0.28	0.000339	± 2.5	PASS
		VN	10	1.29	0.001561	± 2.5	PASS
		VN	20	3.07	0.003714	± 2.5	PASS
		VN	30	2.07	0.002505	± 2.5	PASS
		VN	40	1.34	0.001621	± 2.5	PASS
		VN	50	0.15	0.000181	± 2.5	PASS
	MCH	VN	-30	4.09	0.004889	± 2.5	PASS
		VN	-20	1.74	0.002080	± 2.5	PASS

		VN	-10	4.35	0.005200	± 2.5	PASS		
		VN	0	4.81	0.005750	± 2.5	PASS		
		VN	10	1.75	0.002092	± 2.5	PASS		
		VN	20	4.49	0.005368	± 2.5	PASS		
		VN	30	0.39	0.000466	± 2.5	PASS		
		VN	40	4.07	0.004866	± 2.5	PASS		
		VN	50	0.86	0.001028	± 2.5	PASS		
	HCH	VN	-30	4.7	0.005552	± 2.5	PASS		
		VN	-20	2.02	0.002386	± 2.5	PASS		
		VN	-10	3.55	0.004194	± 2.5	PASS		
		VN	0	-0.19	-0.000224	± 2.5	PASS		
		VN	10	4.56	0.005387	± 2.5	PASS		
		VN	20	0.11	0.000130	± 2.5	PASS		
		VN	30	3.15	0.003721	± 2.5	PASS		
		VN	40	1.95	0.002304	± 2.5	PASS		
		VN	50	1.34	0.001583	± 2.5	PASS		
		16QAM	LCH	VN	-30	1.37	0.001638	± 2.5	PASS
				VN	-20	4.74	0.005666	± 2.5	PASS
				VN	-10	-0.95	-0.001136	± 2.5	PASS
VN	0			3.32	0.003969	± 2.5	PASS		
VN	10			2.93	0.003503	± 2.5	PASS		
VN	20			4.43	0.005296	± 2.5	PASS		
VN	30			-0.36	-0.000430	± 2.5	PASS		
VN	40			1.26	0.001506	± 2.5	PASS		
VN	50			4.84	0.005786	± 2.5	PASS		
MCH	VN		-30	-1.98	-0.002339	± 2.5	PASS		
	VN		-20	4.13	0.004879	± 2.5	PASS		
	VN		-10	-0.81	-0.000957	± 2.5	PASS		
	VN		0	-0.25	-0.000295	± 2.5	PASS		
	VN		10	-1.73	-0.002044	± 2.5	PASS		
	VN		20	1.99	0.002351	± 2.5	PASS		
	VN		30	1.23	0.001453	± 2.5	PASS		
	VN		40	2.46	0.002906	± 2.5	PASS		
	VN		50	-1.08	-0.001276	± 2.5	PASS		
HCH	VN		-30	-1.64	-0.001937	± 2.5	PASS		
	VN		-20	4.47	0.005281	± 2.5	PASS		
	VN		-10	-1.51	-0.001784	± 2.5	PASS		
	VN		0	-0.87	-0.001028	± 2.5	PASS		
	VN		10	-1.17	-0.001382	± 2.5	PASS		
	VN		20	2.64	0.003119	± 2.5	PASS		
	VN		30	2.38	0.002812	± 2.5	PASS		

		VN	40	-0.72	-0.000851	± 2.5	PASS
		VN	50	1.45	0.001713	± 2.5	PASS

Channel Bandwidth: 10 MHz

Channel Bandwidth: 10 MHz							
Voltage							
Modulation	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VL	TN	2.77	0.003341	± 2.5	PASS
		VN	TN	-0.8	-0.000965	± 2.5	PASS
		VH	TN	2.07	0.002497	± 2.5	PASS
	MCH	VL	TN	2.66	0.003180	± 2.5	PASS
		VN	TN	1.21	0.001447	± 2.5	PASS
		VH	TN	0.21	0.000251	± 2.5	PASS
	HCH	VL	TN	0.78	0.000924	± 2.5	PASS
		VN	TN	0.84	0.000995	± 2.5	PASS
		VH	TN	2.42	0.002867	± 2.5	PASS
16QAM	LCH	VL	TN	2.42	0.002919	± 2.5	PASS
		VN	TN	3.03	0.003655	± 2.5	PASS
		VH	TN	-0.46	-0.000555	± 2.5	PASS
	MCH	VL	TN	4.56	0.005451	± 2.5	PASS
		VN	TN	1.46	0.001745	± 2.5	PASS
		VH	TN	-1.13	-0.001351	± 2.5	PASS
	HCH	VL	TN	1.58	0.001872	± 2.5	PASS
		VN	TN	2.53	0.002998	± 2.5	PASS
		VH	TN	2.12	0.002512	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VN	-30	4.89	0.005899	± 2.5	PASS
		VN	-20	-1.3	-0.001568	± 2.5	PASS
		VN	-10	0.12	0.000145	± 2.5	PASS
		VN	0	0.04	0.000048	± 2.5	PASS
		VN	10	-0.84	-0.001013	± 2.5	PASS
		VN	20	-1	-0.001206	± 2.5	PASS
		VN	30	-1.16	-0.001399	± 2.5	PASS
		VN	40	4.24	0.005115	± 2.5	PASS
		VN	50	3.97	0.004789	± 2.5	PASS
	MCH	VN	-30	-1.98	-0.002367	± 2.5	PASS
		VN	-20	1.34	0.001602	± 2.5	PASS
		VN	-10	4.9	0.005858	± 2.5	PASS

		VN	0	-1.68	-0.002008	± 2.5	PASS		
		VN	10	4.01	0.004794	± 2.5	PASS		
		VN	20	2.06	0.002463	± 2.5	PASS		
		VN	30	3.95	0.004722	± 2.5	PASS		
		VN	40	1.29	0.001542	± 2.5	PASS		
		VN	50	4.73	0.005655	± 2.5	PASS		
	HCH	VN	-30	2.91	0.003448	± 2.5	PASS		
		VN	-20	2.62	0.003104	± 2.5	PASS		
		VN	-10	3.03	0.003590	± 2.5	PASS		
		VN	0	-0.12	-0.000142	± 2.5	PASS		
		VN	10	2.2	0.002607	± 2.5	PASS		
		VN	20	2.96	0.003507	± 2.5	PASS		
		VN	30	2.71	0.003211	± 2.5	PASS		
		VN	40	-1.69	-0.002002	± 2.5	PASS		
		VN	50	3.98	0.004716	± 2.5	PASS		
		16QAM	LCH	VN	-30	-0.02	-0.000024	± 2.5	PASS
				VN	-20	1.3	0.001554	± 2.5	PASS
				VN	-10	3.7	0.004423	± 2.5	PASS
VN	0			3.73	0.004459	± 2.5	PASS		
VN	10			4.95	0.005918	± 2.5	PASS		
VN	20			1.34	0.001602	± 2.5	PASS		
VN	30			0.14	0.000167	± 2.5	PASS		
VN	40			2.89	0.003455	± 2.5	PASS		
VN	50			3.84	0.004591	± 2.5	PASS		
MCH	VN		-30	0.26	0.000308	± 2.5	PASS		
	VN		-20	4.18	0.004953	± 2.5	PASS		
	VN		-10	1.4	0.001659	± 2.5	PASS		
	VN		0	3.4	0.004028	± 2.5	PASS		
	VN		10	-0.19	-0.000225	± 2.5	PASS		
	VN		20	-0.21	-0.000249	± 2.5	PASS		
	VN		30	0.89	0.001055	± 2.5	PASS		
	VN		40	1.42	0.001682	± 2.5	PASS		
	VN		50	3.77	0.004467	± 2.5	PASS		
HCH	VN	-30	3.65	0.004325	± 2.5	PASS			
	VN	-20	-0.21	-0.000249	± 2.5	PASS			
	VN	-10	-1.77	-0.002097	± 2.5	PASS			
	VN	0	4.15	0.004917	± 2.5	PASS			
	VN	10	4.1	0.004858	± 2.5	PASS			
	VN	20	4.8	0.005687	± 2.5	PASS			
	VN	30	2.69	0.003187	± 2.5	PASS			
	VN	40	3.75	0.004443	± 2.5	PASS			

		VN	50	-1.51	-0.001789	± 2.5	PASS
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