































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	4.65	0.005638	± 2.5	PASS
		VH	TN	1.26	0.001528	± 2.5	PASS
	MCH	VL	TN	-0.81	-0.000968	± 2.5	PASS
		VN	TN	-1.87	-0.002236	± 2.5	PASS
		VH	TN	0.43	0.000514	± 2.5	PASS
	HCH	VL	TN	2.41	0.002841	± 2.5	PASS
		VN	TN	3.51	0.004138	± 2.5	PASS
		VH	TN	3.15	0.003713	± 2.5	PASS
16QAM	LCH	VL	TN	-1.34	-0.001625	± 2.5	PASS
		VN	TN	2.51	0.003044	± 2.5	PASS
		VH	TN	3.7	0.004486	± 2.5	PASS
	MCH	VL	TN	-1.57	-0.001877	± 2.5	PASS
		VN	TN	-1.29	-0.001542	± 2.5	PASS
		VH	TN	0.99	0.001184	± 2.5	PASS
	HCH	VL	TN	4.46	0.005258	± 2.5	PASS
		VN	TN	-1.2	-0.001415	± 2.5	PASS
		VH	TN	0.17	0.000200	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VN	-30	0.64	0.000776	± 2.5	PASS
		VN	-20	0.43	0.000521	± 2.5	PASS
		VN	-10	-1.67	-0.002025	± 2.5	PASS
		VN	0	-0.19	-0.000230	± 2.5	PASS
		VN	10	1.89	0.002292	± 2.5	PASS
		VN	20	4.02	0.004874	± 2.5	PASS
		VN	30	0.83	0.001006	± 2.5	PASS
		VN	40	3.33	0.004038	± 2.5	PASS
		VN	50	-1.42	-0.001722	± 2.5	PASS
	MCH	VN	-30	3.58	0.004280	± 2.5	PASS

	VN	VN	-20	3.09	0.003694	± 2.5	PASS
		VN	-10	0.41	0.000490	± 2.5	PASS
		VN	0	4.09	0.004889	± 2.5	PASS
		VN	10	3.6	0.004304	± 2.5	PASS
		VN	20	0.2	0.000239	± 2.5	PASS
		VN	30	1.41	0.001686	± 2.5	PASS
		VN	40	2.46	0.002941	± 2.5	PASS
		VN	50	4.38	0.005236	± 2.5	PASS
	HCH	VN	-30	-0.04	-0.000047	± 2.5	PASS
		VN	-20	0.44	0.000519	± 2.5	PASS
		VN	-10	3.88	0.004574	± 2.5	PASS
		VN	0	0.45	0.000530	± 2.5	PASS
		VN	10	-1.68	-0.001980	± 2.5	PASS
		VN	20	4.02	0.004739	± 2.5	PASS
		VN	30	-0.74	-0.000872	± 2.5	PASS
		VN	40	4.3	0.005069	± 2.5	PASS
		VN	50	-1.2	-0.001415	± 2.5	PASS
		16QAM	LCH	VN	-30	3.3	0.004001
VN	-20			2.95	0.003577	± 2.5	PASS
VN	-10			4.99	0.006051	± 2.5	PASS
VN	0			3.21	0.003892	± 2.5	PASS
VN	10			1.14	0.001382	± 2.5	PASS
VN	20			-1.41	-0.001710	± 2.5	PASS
VN	30			1.68	0.002037	± 2.5	PASS
VN	40			0.3	0.000364	± 2.5	PASS
VN	50			-0.97	-0.001176	± 2.5	PASS
MCH	VN		-30	2.48	0.002923	± 2.5	PASS
	VN		-20	1.77	0.002087	± 2.5	PASS
	VN		-10	1.96	0.002311	± 2.5	PASS
	VN		0	4.25	0.005010	± 2.5	PASS
	VN		10	0.78	0.000919	± 2.5	PASS
	VN		20	-0.27	-0.000318	± 2.5	PASS
	VN		30	1.33	0.001568	± 2.5	PASS
	VN		40	1.82	0.002145	± 2.5	PASS
	VN		50	4.45	0.005246	± 2.5	PASS
HCH	VN		-30	1.79	0.002110	± 2.5	PASS
	VN		-20	4.7	0.005540	± 2.5	PASS
	VN		-10	-0.1	-0.000118	± 2.5	PASS
	VN		0	2.51	0.002959	± 2.5	PASS
	VN		10	1.55	0.001827	± 2.5	PASS
	VN		20	3.47	0.004091	± 2.5	PASS

		VN	30	-1.63	-0.001921	± 2.5	PASS
		VN	40	1.77	0.002087	± 2.5	PASS
		VN	50	4.38	0.005163	± 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	-0.91	-0.001102	± 2.5	PASS
		VH	TN	1.7	0.002059	± 2.5	PASS
	MCH	VL	TN	3.88	0.004638	± 2.5	PASS
		VN	TN	-1.13	-0.001351	± 2.5	PASS
		VH	TN	2.43	0.002905	± 2.5	PASS
	HCH	VL	TN	3.16	0.003729	± 2.5	PASS
		VN	TN	2.6	0.003068	± 2.5	PASS
		VH	TN	3.75	0.004425	± 2.5	PASS
16QAM	LCH	VL	TN	0.11	0.000133	± 2.5	PASS
		VN	TN	-0.01	-0.000012	± 2.5	PASS
		VH	TN	2.19	0.002653	± 2.5	PASS
	MCH	VL	TN	1.4	0.001674	± 2.5	PASS
		VN	TN	0.39	0.000466	± 2.5	PASS
		VH	TN	-0.87	-0.001040	± 2.5	PASS
	HCH	VL	TN	2.77	0.003268	± 2.5	PASS
		VN	TN	0.64	0.000755	± 2.5	PASS
		VH	TN	-1.79	-0.002112	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VN	-30	0.67	0.000812	± 2.5	PASS
		VN	-20	4.25	0.005148	± 2.5	PASS
		VN	-10	-1.63	-0.001975	± 2.5	PASS
		VN	0	2.37	0.002871	± 2.5	PASS
		VN	10	1.56	0.001890	± 2.5	PASS
		VN	20	4.24	0.005136	± 2.5	PASS
		VN	30	4.09	0.004955	± 2.5	PASS
		VN	40	3.11	0.003767	± 2.5	PASS
		VN	50	0.53	0.000642	± 2.5	PASS
	MCH	VN	-30	3.63	0.004340	± 2.5	PASS
		VN	-20	0.31	0.000371	± 2.5	PASS

		VN	-10	0.57	0.000681	± 2.5	PASS		
		VN	0	2.03	0.002427	± 2.5	PASS		
		VN	10	1.41	0.001686	± 2.5	PASS		
		VN	20	-1.71	-0.002044	± 2.5	PASS		
		VN	30	-0.56	-0.000669	± 2.5	PASS		
		VN	40	-0.35	-0.000418	± 2.5	PASS		
		VN	50	4.68	0.005595	± 2.5	PASS		
	HCH	VN	-30	3.26	0.003847	± 2.5	PASS		
		VN	-20	-0.02	-0.000024	± 2.5	PASS		
		VN	-10	4.09	0.004826	± 2.5	PASS		
		VN	0	0.03	0.000035	± 2.5	PASS		
		VN	10	-0.18	-0.000212	± 2.5	PASS		
		VN	20	-1.19	-0.001404	± 2.5	PASS		
		VN	30	-1.19	-0.001404	± 2.5	PASS		
		VN	40	0.21	0.000248	± 2.5	PASS		
		VN	50	3.19	0.003764	± 2.5	PASS		
		16QAM	LCH	VN	-30	1.74	0.002080	± 2.5	PASS
				VN	-20	-1.06	-0.001267	± 2.5	PASS
				VN	-10	1.13	0.001351	± 2.5	PASS
VN	0			-0.34	-0.000406	± 2.5	PASS		
VN	10			4.7	0.005619	± 2.5	PASS		
VN	20			0.52	0.000622	± 2.5	PASS		
VN	30			1.93	0.002307	± 2.5	PASS		
VN	40			-0.4	-0.000478	± 2.5	PASS		
VN	50			2.76	0.003299	± 2.5	PASS		
MCH	VN		-30	2.92	0.003445	± 2.5	PASS		
	VN		-20	2.29	0.002702	± 2.5	PASS		
	VN		-10	-0.78	-0.000920	± 2.5	PASS		
	VN		0	-1.28	-0.001510	± 2.5	PASS		
	VN		10	2.97	0.003504	± 2.5	PASS		
	VN		20	0.67	0.000791	± 2.5	PASS		
	VN		30	-0.66	-0.000779	± 2.5	PASS		
	VN		40	-0.02	-0.000024	± 2.5	PASS		
	VN		50	3.1	0.003658	± 2.5	PASS		
HCH	VN		-30	2.6	0.003068	± 2.5	PASS		
	VN	-20	1.31	0.001546	± 2.5	PASS			
	VN	-10	3.11	0.003670	± 2.5	PASS			
	VN	0	3.41	0.004024	± 2.5	PASS			
	VN	10	-0.91	-0.001074	± 2.5	PASS			
	VN	20	2.08	0.002454	± 2.5	PASS			
	VN	30	-1.02	-0.001204	± 2.5	PASS			

		VN	40	2.83	0.003339	± 2.5	PASS
		VN	50	2.97	0.003504	± 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	4.33	0.005239	± 2.5	PASS
		VH	TN	4.92	0.005953	± 2.5	PASS
	MCH	VL	TN	0.08	0.000096	± 2.5	PASS
		VN	TN	-1.75	-0.002092	± 2.5	PASS
		VH	TN	-1.59	-0.001901	± 2.5	PASS
	HCH	VL	TN	1.11	0.001311	± 2.5	PASS
		VN	TN	0.79	0.000933	± 2.5	PASS
		VH	TN	1.56	0.001843	± 2.5	PASS
16QAM	LCH	VL	TN	0.53	0.000641	± 2.5	PASS
		VN	TN	-1.62	-0.001960	± 2.5	PASS
		VH	TN	3.91	0.004731	± 2.5	PASS
	MCH	VL	TN	-0.43	-0.000514	± 2.5	PASS
		VN	TN	-1.74	-0.002080	± 2.5	PASS
		VH	TN	-0.71	-0.000849	± 2.5	PASS
	HCH	VL	TN	-0.76	-0.000898	± 2.5	PASS
		VN	TN	1.6	0.001890	± 2.5	PASS
		VH	TN	2.44	0.002882	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VN	-30	-0.12	-0.000145	± 2.5	PASS
		VN	-20	-1.5	-0.001815	± 2.5	PASS
		VN	-10	0.29	0.000351	± 2.5	PASS
		VN	0	-1.46	-0.001766	± 2.5	PASS
		VN	10	2.69	0.003255	± 2.5	PASS
		VN	20	4.75	0.005747	± 2.5	PASS
		VN	30	4.45	0.005384	± 2.5	PASS
		VN	40	-1.83	-0.002214	± 2.5	PASS
		VN	50	-0.49	-0.000593	± 2.5	PASS
	MCH	VN	-30	2.43	0.002905	± 2.5	PASS
		VN	-20	4.63	0.005535	± 2.5	PASS
		VN	-10	-0.59	-0.000705	± 2.5	PASS

		VN	0	0.5	0.000598	± 2.5	PASS		
		VN	10	-1.89	-0.002259	± 2.5	PASS		
		VN	20	0.65	0.000777	± 2.5	PASS		
		VN	30	-0.49	-0.000586	± 2.5	PASS		
		VN	40	-1.37	-0.001638	± 2.5	PASS		
		VN	50	1.22	0.001458	± 2.5	PASS		
	HCH	VN	-30	-0.13	-0.000154	± 2.5	PASS		
		VN	-20	-0.21	-0.000248	± 2.5	PASS		
		VN	-10	-1.81	-0.002138	± 2.5	PASS		
		VN	0	4.21	0.004973	± 2.5	PASS		
		VN	10	0.68	0.000803	± 2.5	PASS		
		VN	20	3.83	0.004525	± 2.5	PASS		
		VN	30	2.37	0.002800	± 2.5	PASS		
		VN	40	-1.53	-0.001807	± 2.5	PASS		
		VN	50	0.3	0.000354	± 2.5	PASS		
		16QAM	LCH	VN	-30	-0.08	-0.000096	± 2.5	PASS
				VN	-20	-0.92	-0.001100	± 2.5	PASS
				VN	-10	0.09	0.000108	± 2.5	PASS
VN	0			1.96	0.002343	± 2.5	PASS		
VN	10			-0.58	-0.000693	± 2.5	PASS		
VN	20			3.19	0.003814	± 2.5	PASS		
VN	30			3.52	0.004208	± 2.5	PASS		
VN	40			-0.06	-0.000072	± 2.5	PASS		
VN	50			1.06	0.001267	± 2.5	PASS		
MCH	VN		-30	4.61	0.005446	± 2.5	PASS		
	VN		-20	2.09	0.002469	± 2.5	PASS		
	VN		-10	1.17	0.001382	± 2.5	PASS		
	VN		0	2.9	0.003426	± 2.5	PASS		
	VN		10	-1.16	-0.001370	± 2.5	PASS		
	VN		20	0.2	0.000236	± 2.5	PASS		
	VN		30	1.25	0.001477	± 2.5	PASS		
	VN		40	4.47	0.005281	± 2.5	PASS		
	VN		50	-0.11	-0.000130	± 2.5	PASS		
HCH	VN		-30	-1.54	-0.001819	± 2.5	PASS		
	VN		-20	-0.06	-0.000071	± 2.5	PASS		
	VN		-10	-0.83	-0.000981	± 2.5	PASS		
	VN		0	-1.93	-0.002280	± 2.5	PASS		
	VN		10	2.54	0.003001	± 2.5	PASS		
	VN		20	-1.99	-0.002351	± 2.5	PASS		
	VN		30	1.95	0.002304	± 2.5	PASS		
	VN		40	2.67	0.003154	± 2.5	PASS		

		VN	50	4.49	0.005304	± 2.5	PASS
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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	2.06	0.002485	± 2.5	PASS
		VH	TN	4.42	0.005332	± 2.5	PASS
	MCH	VL	TN	0.72	0.000861	± 2.5	PASS
		VN	TN	0.83	0.000992	± 2.5	PASS
		VH	TN	4.2	0.005021	± 2.5	PASS
	HCH	VL	TN	3.13	0.003709	± 2.5	PASS
		VN	TN	4.31	0.005107	± 2.5	PASS
		VH	TN	-0.17	-0.000201	± 2.5	PASS
16QAM	LCH	VL	TN	4.51	0.005440	± 2.5	PASS
		VN	TN	-0.94	-0.001134	± 2.5	PASS
		VH	TN	3.8	0.004584	± 2.5	PASS
	MCH	VL	TN	-0.7	-0.000837	± 2.5	PASS
		VN	TN	2.03	0.002427	± 2.5	PASS
		VH	TN	4.42	0.005284	± 2.5	PASS
	HCH	VL	TN	-1.67	-0.001979	± 2.5	PASS
		VN	TN	1.16	0.001374	± 2.5	PASS
		VH	TN	2.19	0.002595	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VN	-30	4.52	0.005452	± 2.5	PASS
		VN	-20	2.66	0.003209	± 2.5	PASS
		VN	-10	4.82	0.005814	± 2.5	PASS
		VN	0	0.95	0.001146	± 2.5	PASS
		VN	10	2.44	0.002943	± 2.5	PASS
		VN	20	4.54	0.005476	± 2.5	PASS
		VN	30	2.68	0.003233	± 2.5	PASS
		VN	40	3.68	0.004439	± 2.5	PASS
		VN	50	-1.3	-0.001568	± 2.5	PASS
	MCH	VN	-30	-0.7	-0.000837	± 2.5	PASS
		VN	-20	-0.11	-0.000132	± 2.5	PASS
		VN	-10	-1.46	-0.001745	± 2.5	PASS
		VN	0	3.52	0.004208	± 2.5	PASS
		VN	10	4.46	0.005332	± 2.5	PASS

		VN	20	1.63	0.001949	± 2.5	PASS
		VN	30	-0.82	-0.000980	± 2.5	PASS
		VN	40	-0.9	-0.001076	± 2.5	PASS
		VN	50	3.7	0.004423	± 2.5	PASS
	HCH	VN	-30	-1.36	-0.001611	± 2.5	PASS
		VN	-20	4.11	0.004870	± 2.5	PASS
		VN	-10	2.89	0.003424	± 2.5	PASS
		VN	0	0.23	0.000273	± 2.5	PASS
		VN	10	1.62	0.001919	± 2.5	PASS
		VN	20	1.05	0.001244	± 2.5	PASS
		VN	30	4.38	0.005190	± 2.5	PASS
		VN	40	-1.35	-0.001600	± 2.5	PASS
		VN	50	2.05	0.002429	± 2.5	PASS
16QAM	LCH	VN	-30	1.01	0.001207	± 2.5	PASS
		VN	-20	-0.45	-0.000538	± 2.5	PASS
		VN	-10	-0.5	-0.000598	± 2.5	PASS
		VN	0	-1.68	-0.002008	± 2.5	PASS
		VN	10	-0.62	-0.000741	± 2.5	PASS
		VN	20	3.35	0.004005	± 2.5	PASS
		VN	30	4.2	0.005021	± 2.5	PASS
		VN	40	2.36	0.002821	± 2.5	PASS
		VN	50	1.27	0.001518	± 2.5	PASS
	MCH	VN	-30	3.45	0.004088	± 2.5	PASS
		VN	-20	4.97	0.005889	± 2.5	PASS
		VN	-10	2.38	0.002820	± 2.5	PASS
		VN	0	3.24	0.003839	± 2.5	PASS
		VN	10	4.27	0.005059	± 2.5	PASS
		VN	20	3.34	0.003957	± 2.5	PASS
		VN	30	3.07	0.003637	± 2.5	PASS
		VN	40	-0.47	-0.000557	± 2.5	PASS
		VN	50	4.63	0.005486	± 2.5	PASS
	HCH	VN	-30	-0.71	-0.000841	± 2.5	PASS
		VN	-20	3.26	0.003863	± 2.5	PASS
		VN	-10	1.89	0.002239	± 2.5	PASS
		VN	0	-0.96	-0.001137	± 2.5	PASS
		VN	10	-0.32	-0.000379	± 2.5	PASS
		VN	20	3.06	0.003626	± 2.5	PASS
		VN	30	4.29	0.005083	± 2.5	PASS
		VN	40	0.69	0.000818	± 2.5	PASS
		VN	50	1.8	0.002133	± 2.5	PASS