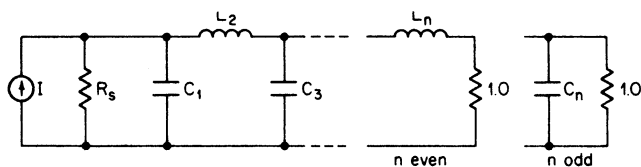

CHAPTER 11

NORMALIZED FILTER DESIGN TABLES

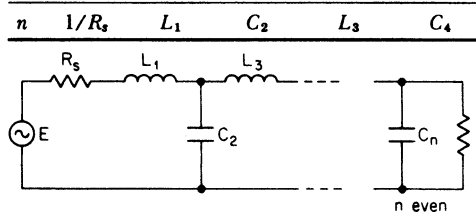
TABLE 11-1 Butterworth Pole Locations

Order n	Real Part $-\alpha$	Imaginary Part $\pm j\beta$
2	0.7071	0.7071
3	0.5000 1.0000	0.8660
4	0.9239 0.3827	0.3827 0.9239
5	0.8090 0.3090 1.0000	0.5878 0.9511
6	0.9659 0.7071 0.2588	0.2588 0.7071 0.9659
7	0.9010 0.6235 0.2225 1.0000	0.4339 0.7818 0.9749
8	0.9808 0.8315 0.5556 0.1951	0.1951 0.5556 0.8315 0.9808
9	0.9397 0.7660 0.5000 0.1737 1.0000	0.3420 0.6428 0.8660 0.9848
10	0.9877 0.8910 0.7071 0.4540 0.1564	0.1564 0.4540 0.7071 0.8910 0.9877

TABLE 11-2 Butterworth LC Element Values*



n	R_s	C_1	L_2	C_3	L_4
2	1.0000	1.4142	1.4142		
	1.1111	1.0353	1.8352		
	1.2500	0.8485	2.1213		
	1.4286	0.6971	2.4387		
	1.6667	0.5657	2.8284		
	2.0000	0.4483	3.3461		
	2.5000	0.3419	4.0951		
	3.3333	0.2447	5.3126		
	5.0000	0.1557	7.7067		
	10.0000	0.0743	14.8138		
3	Inf.	1.4142	0.7071		
	1.0000	1.0000	2.0000	1.0000	
	0.9000	0.8082	1.6332	1.5994	
	0.8000	0.8442	1.3840	1.9259	
	0.7000	0.9152	1.1652	2.2774	
	0.6000	1.0225	0.9650	2.7024	
	0.5000	1.1811	0.7789	3.2612	
	0.4000	1.4254	0.6042	4.0642	
	0.3000	1.8380	0.4396	5.3634	
	0.2000	2.6687	0.2842	7.9102	
4	0.1000	5.1672	0.1377	15.4554	
	Inf.	1.5000	1.3333	0.5000	
	1.0000	0.7654	1.8478	1.8478	0.7654
	1.1111	0.4657	1.5924	1.7439	1.4690
	1.2500	0.3882	1.6946	1.5110	1.8109
	1.4286	0.3251	1.8618	1.2913	2.1752
	1.6667	0.2690	2.1029	1.0824	2.6131
	2.0000	0.2175	2.4524	0.8826	3.1868
	2.5000	0.1692	2.9858	0.6911	4.0094
	3.3333	0.1237	3.8826	0.5072	5.3381
5	5.0000	0.0804	5.6835	0.3307	7.9397
	10.0000	0.0392	11.0942	0.1616	15.6421
	Inf.	1.5307	1.5772	1.0824	0.3827



* Reprinted from A. I. Zverev, *Handbook of Filter Synthesis*, John Wiley and Sons, New York, 1967.

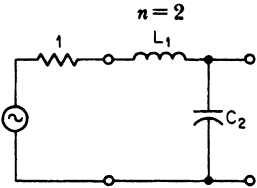
TABLE 11-2 Butterworth LC Element Values (*Continued*)

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7
5	1.0000	0.6180	1.6180	2.0000	1.6180	0.6180		
	0.9000	0.4416	1.0265	1.9095	1.7562	1.3887		
	0.8000	0.4698	0.8660	2.0605	1.5443	1.7380		
	0.7000	0.5173	0.7313	2.2849	1.3326	2.1083		
	0.6000	0.5860	0.6094	2.5998	1.1255	2.5524		
	0.5000	0.6857	0.4955	3.0510	0.9237	3.1331		
	0.4000	0.8378	0.3877	3.7357	0.7274	3.9648		
	0.3000	1.0937	0.2848	4.8835	0.5367	5.3073		
	0.2000	1.6077	0.1861	7.1849	0.3518	7.9345		
	0.1000	3.1522	0.0912	14.0945	0.1727	15.7103		
	Inf.	1.5451	1.6944	1.3820	0.8944	0.3090		
6	1.0000	0.5176	1.4142	1.9319	1.9319	1.4142	0.5176	
	1.1111	0.2890	1.0403	1.3217	2.0539	1.7443	1.3347	
	1.2500	0.2445	1.1163	1.1257	2.2389	1.5498	1.6881	
	1.4286	0.2072	1.2363	0.9567	2.4991	1.3464	2.0618	
	1.6667	0.1732	1.4071	0.8011	2.8580	1.1431	2.5092	
	2.0000	0.1412	1.6531	0.6542	3.3687	0.9423	3.0938	
	2.5000	0.1108	2.0275	0.5139	4.1408	0.7450	3.9305	
	3.3333	0.0816	2.6559	0.3788	5.4325	0.5517	5.2804	
	5.0000	0.0535	3.9170	0.2484	8.0201	0.3628	7.9216	
	10.0000	0.0263	7.7053	0.1222	15.7855	0.1788	15.7375	
	Inf.	1.5529	1.7593	1.5529	1.2016	0.7579	0.2588	
7	1.0000	0.4450	1.2470	1.8019	2.0000	1.8019	1.2470	0.4450
	0.9000	0.2985	0.7111	1.4043	1.4891	2.1249	1.7268	1.2961
	0.8000	0.3215	0.6057	1.5174	1.2777	2.3338	1.5461	1.6520
	0.7000	0.3571	0.5154	1.6883	1.0910	2.6177	1.3498	2.0277
	0.6000	0.4075	0.4322	1.9284	0.9170	3.0050	1.1503	2.4771
	0.5000	0.4799	0.3536	2.2726	0.7512	3.5532	0.9513	3.0640
	0.4000	0.5899	0.2782	2.7950	0.5917	4.3799	0.7542	3.9037
	0.3000	0.7745	0.2055	3.6706	0.4373	5.7612	0.5600	5.2583
	0.2000	1.1448	0.1350	5.4267	0.2874	8.5263	0.3692	7.9079
	0.1000	2.2571	0.0665	10.7004	0.1417	16.8222	0.1823	15.7480
	Inf.	1.5576	1.7988	1.6588	1.3972	1.0550	0.6560	0.2225
n	$1/R_s$	L_1	C_2	L_3	C_4	L_5	C_6	L_7

TABLE 11-2 Butterworth LC Element Values (Continued)

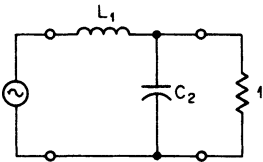
n	R_1	C_1	L_2	C_3	L_4	C_5	L_6	C_7	L_8	C_9	L_{10}
8	1.0000	0.3902	1.1111	1.6629	1.9616	1.9616	1.6629	1.1111	0.3902		
	1.1111	0.2075	0.7575	0.9925	1.6362	1.5900	2.1612	1.7092	1.2671		
	1.2500	0.1774	0.8199	0.8499	1.7779	1.3721	2.3874	1.5393	1.6246		
	1.4286	0.1513	0.9138	0.7257	1.9852	1.1760	2.6879	1.3490	2.0017		
	1.6667	0.1272	1.0455	0.6102	2.2740	0.9912	3.0945	1.1530	2.4524		
	2.0000	0.1042	1.2341	0.5003	2.6863	0.8139	3.6678	0.9558	3.0408		
	2.5000	0.0822	1.5201	0.3945	3.3106	0.6424	4.5308	0.7594	3.8825		
	3.3333	0.0608	1.9995	0.2919	4.3563	0.4757	5.9714	0.5650	5.2400		
	5.0000	0.0400	2.9608	0.1921	6.4523	0.3133	8.8538	0.3732	7.8952		
	10.0000	0.0198	5.8479	0.0949	12.7455	0.1547	17.4999	0.1846	15.7510		
	Inf.	1.5607	1.8246	1.7287	1.5283	1.2588	0.9371	0.5776	0.1951		
9	1.0000	0.3473	1.0000	1.5321	1.8794	2.0000	1.8794	1.5321	1.0000	0.3473	
	0.9000	0.2242	0.5388	1.0835	1.1859	1.7905	1.6538	2.1796	1.6930	1.2447	
	0.8000	0.2434	0.4623	1.1777	1.0200	1.9542	1.4336	2.4189	1.5318	1.6033	
	0.7000	0.2719	0.3954	1.3162	0.8734	2.1885	1.2323	2.7314	1.3464	1.9812	
	0.6000	0.3117	0.3330	1.5092	0.7361	2.5124	1.0410	3.1516	1.1533	2.4328	
	0.5000	0.3685	0.2735	1.7846	0.6046	2.9734	0.8565	3.7426	0.9579	3.0223	
	0.4000	0.4545	0.2159	2.2019	0.4775	3.6706	0.6771	4.6310	0.7624	3.8654	
	0.3000	0.5987	0.1600	2.9006	0.3539	4.8373	0.5022	6.1128	0.5680	5.2249	
	0.2000	0.8878	0.1054	4.3014	0.2333	7.1750	0.3312	9.0766	0.3757	7.8838	
	0.1000	1.7558	0.0521	8.5074	0.1153	14.1930	0.1638	17.9654	0.1862	15.7504	
	Inf.	1.5628	1.8424	1.7772	1.6202	1.4037	1.1408	0.8414	0.5155	0.1736	
10	1.0000	0.3129	0.9080	1.4142	1.7820	1.9754	1.9754	1.7820	1.4142	0.9080	0.3129
	1.1111	0.1614	0.5924	0.7853	1.3202	1.3230	1.8968	1.6956	2.1883	1.6785	1.2267
	1.2500	0.1388	0.6452	0.6762	1.4400	1.1420	2.0779	1.4754	2.4377	1.5245	1.5861
	1.4286	0.1190	0.7222	0.5797	1.6130	0.9802	2.3324	1.2712	2.7592	1.3431	1.9646
	1.6667	0.1004	0.8292	0.4891	1.8528	0.8275	2.6825	1.0758	3.1895	1.1526	2.4169
	2.0000	0.0825	0.9818	0.4021	2.1943	0.6808	3.1795	0.8864	3.7934	0.9588	3.0072
	2.5000	0.0652	1.2127	0.3179	2.7108	0.5384	3.9302	0.7018	4.7002	0.7641	3.8512
	3.3333	0.0484	1.5992	0.2358	3.5754	0.3995	5.1858	0.5211	6.2118	0.5700	5.2122
	5.0000	0.0319	2.3740	0.1556	5.3082	0.2636	7.7010	0.3440	9.2343	0.3775	7.8738
	10.0000	0.0158	4.7005	0.0770	10.5104	0.1305	15.2505	0.1704	18.2981	0.1872	15.7481
	Inf.	1.5643	1.8552	1.8121	1.6869	1.5100	1.2921	1.0406	0.7626	0.4654	0.1564
n	$1/R_1$	L_1	C_2	L_3	C_4	L_5	C_6	L_7	C_8	L_9	C_{10}

TABLE 11-3 Butterworth Uniform Dissipation Network*



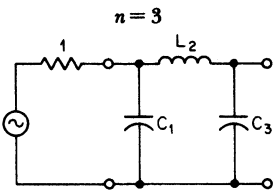
d	L_1	C_2	α_0 , dB
0	0.7071	1.414	0
0.05	0.7609	1.410	0.614
0.10	0.8236	1.398	1.22
0.15	0.8974	1.374	1.83
0.20	0.9860	1.340	2.42
0.25	1.094	1.290	2.99
0.30	1.228	1.223	3.53
0.35	1.400	1.138	4.05
0.40	1.628	1.034	4.52
0.45	1.944	0.9083	4.94
0.50	2.414	0.7630	5.30
0.55	3.183	0.5989	5.59
0.60	4.669	0.4188	5.82
0.65	8.756	0.2267	5.96

d	C_2	L_1	α_0 , dB
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* By permission of P. R. Geffe.

TABLE 11-4 Butterworth Uniform Dissipation Network*



d	C_1	L_2	C_3	α_o , dB
0	0.5000	1.333	1.500	0
0.05	0.5405	1.403	1.457	0.868
0.10	0.5882	1.481	1.402	1.73
0.15	0.6452	1.567	1.334	2.60
0.20	0.7143	1.667	1.250	3.45
0.25	0.8000	1.786	1.149	4.30
0.30	0.9091	1.939	1.026	5.15
0.35	1.053	2.164	0.8743	5.98
0.40	1.250	2.581	0.6798	6.82
0.45	1.538	3.806	0.4126	7.66

d	L_3	C_2	L_1	α_o , dB
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* By permission of P. R. Geffe.

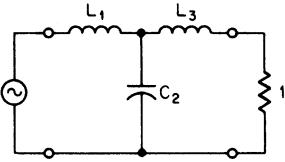
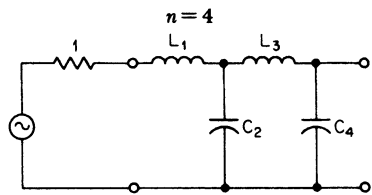


TABLE 11-5 Butterworth Uniform Dissipation Network*



d	L_1	C_2	L_3	C_4	α_0 , dB
0	0.3827	1.082	1.577	1.531	0
0.05	0.4144	1.156	1.636	1.454	1.13
0.10	0.4518	1.240	1.701	1.362	2.27
0.15	0.4967	1.339	1.777	1.250	3.39
0.20	0.5515	1.459	1.879	1.113	4.51
0.25	0.6199	1.609	2.039	0.9400	5.63
0.30	0.7077	1.812	2.384	0.7099	6.73
0.35	0.8243	2.124	3.848	0.3651	7.82

d	C_4	L_3	C_2	L_1	α_0 , dB
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* By permission of P. R. Geffe.

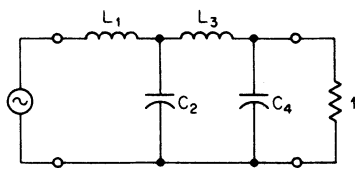
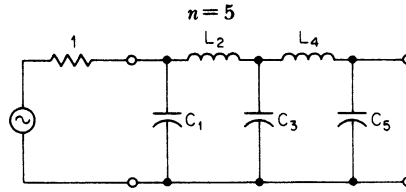


TABLE 11-6 Butterworth Uniform Dissipation Network*



d	C_1	L_2	C_3	L_4	C_5	α_0 , dB
0	0.3090	0.8944	1.382	1.694	1.545	0
0.02	0.3189	0.9199	1.412	1.712	1.504	0.562
0.04	0.3294	0.9468	1.443	1.730	1.461	1.12
0.06	0.3406	0.9754	1.476	1.750	1.414	1.69
0.08	0.3526	1.006	1.512	1.771	1.364	2.25
0.10	0.3654	1.038	1.549	1.794	1.309	2.81
0.12	0.3794	1.073	1.589	1.822	1.250	3.37
0.14	0.3943	1.111	1.633	1.854	1.184	3.93
0.16	0.4104	1.151	1.681	1.894	1.113	4.48
0.18	0.4281	1.195	1.734	1.946	1.034	5.04
0.20	0.4472	1.243	1.796	2.018	0.9452	5.59
0.22	0.4681	1.296	1.867	2.124	0.8434	6.15
0.24	0.4911	1.354	1.953	2.300	0.7242	6.70
0.26	0.5165	1.419	2.061	2.631	0.5798	7.25
0.28	0.5446	1.493	2.204	3.453	0.3965	7.79
0.30	0.5760	1.578	2.409	8.084	0.1476	8.34

d	L_5	C_4	L_3	C_2	L_1	α_0 , dB
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* By permission of P. R. Geffe.

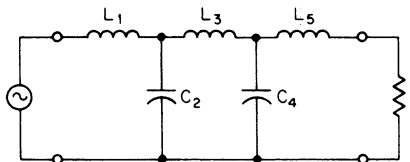
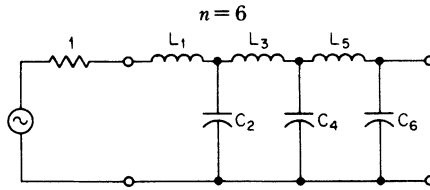


TABLE 11-7 Butterworth Uniform Dissipation Network*



d	L_1	C_2	L_3	C_4	L_5	C_6	α_0 , dB
0	0.2588	0.7579	1.202	1.553	1.759	1.533	0
0.02	0.2671	0.7804	1.232	1.581	1.727	1.502	0.671
0.04	0.2760	0.8043	1.264	1.611	1.786	1.446	1.34
0.06	0.2854	0.8297	1.297	1.643	1.802	1.386	2.01
0.08	0.2955	0.8569	1.333	1.679	1.821	1.321	2.68
0.10	0.3064	0.8860	1.372	1.714	1.844	1.250	3.35
0.12	0.3181	0.9172	1.413	1.755	1.874	1.171	4.02
0.14	0.3307	0.9508	1.458	1.802	1.917	1.083	4.69
0.16	0.3443	0.9871	1.508	1.860	1.979	0.9839	5.30
0.18	0.3594	1.027	1.558	1.923	2.080	0.8690	6.00
0.20	0.3754	1.070	1.621	2.008	2.258	0.7313	6.68
0.22	0.3931	1.117	1.690	2.122	2.646	0.5586	7.34

d	C_6	L_5	C_4	L_3	C_2	L_1	α_0 , dB
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* By permission of P. R. Geffe.

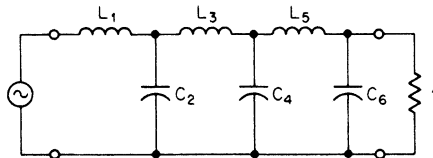
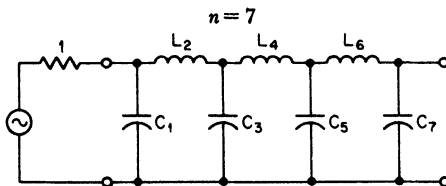


TABLE 11-8 Butterworth Uniform Dissipation Network*



d	C_1	L_2	C_3	L_4	C_5	L_6	C_7	α_0 , dB
0	0.2225	0.6560	1.054	1.397	1.659	1.799	1.588	0
0.02	0.2297	0.6759	1.084	1.428	1.684	1.808	1.496	0.781
0.04	0.2373	0.6972	1.114	1.461	1.712	1.818	1.428	1.56
0.06	0.2454	0.7198	1.146	1.496	1.742	1.832	1.354	2.34
0.08	0.2542	0.7440	1.180	1.533	1.775	1.851	1.274	3.12
0.10	0.2636	0.7699	1.217	1.573	1.813	1.878	1.184	3.90
0.12	0.2739	0.7980	1.254	1.614	1.860	1.923	1.085	4.68
0.14	0.2846	0.8281	1.294	1.659	1.910	1.992	0.9701	5.45
0.16	0.2966	0.8608	1.344	1.715	1.979	2.111	0.8350	6.23
0.18	0.3091	0.8960	1.394	1.778	2.073	2.356	0.6679	7.00
0.20	0.3232	0.9243	1.453	1.862	2.233	3.177	0.4220	7.77

d	L_7	C_6	L_5	C_4	L_3	C_2	L_1	α_0 , dB
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* By permission of P. R. Geffe.

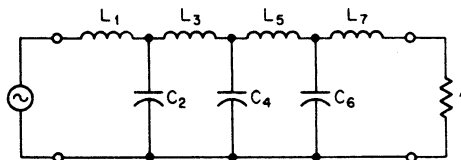
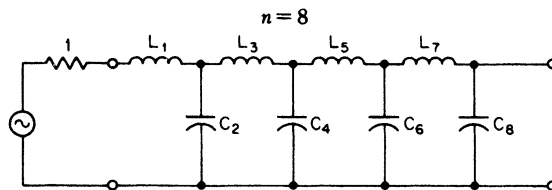


TABLE 11-9 Butterworth Uniform Dissipation Network*



d	L_1	C_2	L_3	C_4	L_5	C_6	L_7	C_8	α_0 , dB
0	0.1951	0.5776	0.9371	1.259	1.528	1.729	1.824	1.561	0
0.02	0.2014	0.5954	0.9636	1.290	1.558	1.752	1.830	1.488	0.890
0.04	0.2081	0.6144	0.9918	1.323	1.590	1.777	1.838	1.409	1.78
0.06	0.2152	0.6347	1.022	1.357	1.624	1.806	1.851	1.321	2.67
0.08	0.2229	0.6564	1.054	1.394	1.622	1.839	1.872	1.224	3.56
0.10	0.2312	0.6796	1.088	1.434	1.703	1.880	1.908	1.114	4.45
0.12	0.2400	0.7046	1.124	1.478	1.750	1.932	1.972	0.9856	5.33
0.14	0.2496	0.7316	1.164	1.526	1.804	2.003	2.101	0.8305	6.22
0.16	0.2600	0.7608	1.208	1.579	1.869	2.110	2.414	0.6307	7.10
0.18	0.2713	0.7926	1.255	1.639	1.951	2.294	3.683	0.3439	7.98

d	C_8	L_7	C_6	L_5	C_4	L_3	C_2	L_1	α_0 , dB
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* By permission of P. R. Geffe.

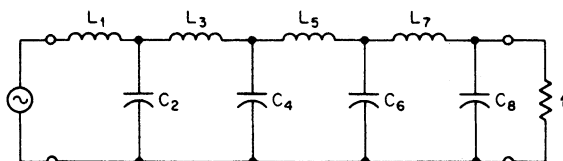
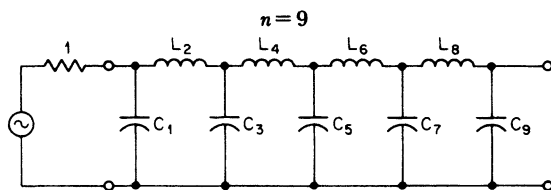


TABLE 11-10 Butterworth Uniform Dissipation Network*



d	C_1	L_2	C_3	L_4	C_5	L_6	C_7	L_8	C_9	α_0 , dB
0	0.1736	0.5155	0.8414	1.141	1.404	1.620	1.777	1.842	1.563	0
0.02	0.1793	0.5316	0.8659	1.171	1.435	1.649	1.798	1.845	1.480	1.00
0.04	0.1852	0.5488	0.8921	1.202	1.469	1.680	1.822	1.851	1.388	2.00
0.06	0.1916	0.5671	0.9199	1.236	1.504	1.713	1.850	1.864	1.286	3.00
0.08	0.1984	0.5867	0.9496	1.272	1.543	1.751	1.884	1.891	1.171	4.00
0.10	0.2058	0.6077	0.9814	1.311	1.584	1.794	1.931	1.942	1.036	5.00
0.12	0.2137	0.6303	1.016	1.353	1.630	1.844	1.997	2.054	0.8735	5.99
0.14	0.2223	0.6547	1.053	1.398	1.682	1.907	2.101	2.340	0.6614	6.99
0.16	0.2315	0.6812	1.093	1.448	1.742	1.991	2.293	3.620	0.3486	7.98

d	L_9	C_8	L_7	C_6	L_5	C_4	L_3	C_2	L_1	α_0 , dB
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* By permission of P. R. Geffe.

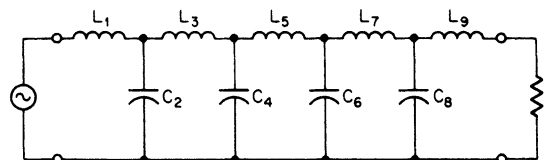
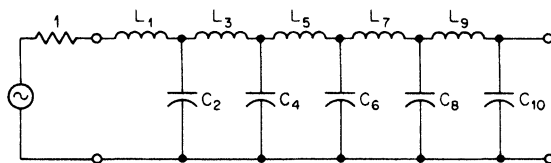


TABLE 11-11 Butterworth Uniform Dissipation Network*

$n = 10$



d	L_1	C_2	L_3	C_4	L_5	C_6	L_7	C_8	L_9	C_{10}	α_0 , dB
0	0.1564	0.4654	0.7626	1.041	1.292	1.510	1.687	1.812	1.855	1.564	0
0.02	0.1614	0.4800	0.7854	1.069	1.324	1.541	1.714	1.831	1.855	1.471	1.11
0.04	0.1669	0.4956	0.8096	1.099	1.357	1.574	1.744	1.853	1.860	1.367	2.22
0.06	0.1726	0.5123	0.8353	1.132	1.392	1.610	1.777	1.882	1.875	1.249	3.33
0.08	0.1788	0.5301	0.8629	1.166	1.430	1.648	1.814	1.920	1.910	1.114	4.44
0.10	0.1854	0.5493	0.8924	1.203	1.471	1.692	1.860	1.976	1.991	0.9508	5.55
0.12	0.1926	0.5698	0.9242	1.243	1.516	1.741	1.918	2.067	2.201	0.7409	6.65
0.14	0.2003	0.5921	0.9584	1.286	1.566	1.798	1.997	2.239	3.051	0.4349	7.76

d	C_{10}	L_9	C_8	L_7	C_6	L_5	C_4	L_3	C_2	L_1	α_0 , dB
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* By permission of P. R. Geffe.

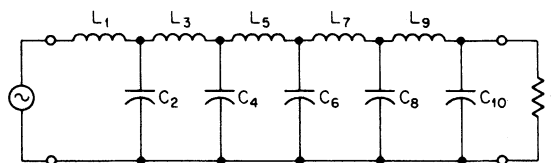
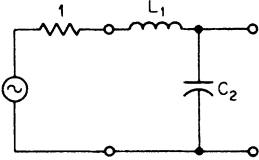


TABLE 11-12 Butterworth Lossy-L Network*

$n = 2$

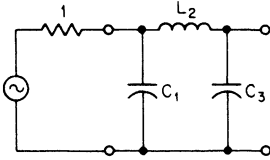


d	L_1	C_2
0	0.7071	1.414
0.05	0.7330	1.364
0.10	0.7609	1.314
0.15	0.7910	1.264
0.20	0.8236	1.214
0.25	0.8589	1.164
0.30	0.8975	1.114
0.35	0.9397	1.064
0.40	0.9860	1.014
0.45	1.037	0.9642
0.50	1.094	0.9142
0.55	1.157	0.8642
0.60	1.228	0.8142
0.65	1.309	0.7642

* By permission of P. R. Geffe.

TABLE 11-13 Butterworth Lossy-L Network*

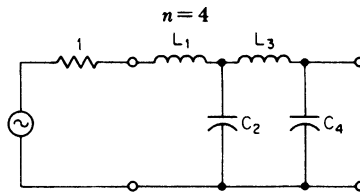
$n = 3$



d	C_1	L_2	C_3
0	0.5000	1.333	1.500
0.05	0.5128	1.403	1.390
0.10	0.5263	1.480	1.284
0.15	0.5405	1.565	1.182
0.20	0.5556	1.660	1.084
0.25	0.5714	1.766	0.9911
0.30	0.5882	1.885	0.9018
0.35	0.6061	2.021	0.8164
0.40	0.6250	2.177	0.7350
0.45	0.6452	2.358	0.6573

* By permission of P. R. Geffe.

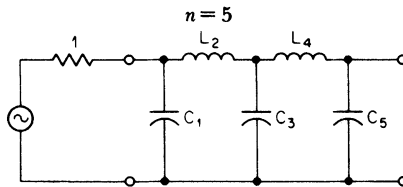
TABLE 11-14 Butterworth Lossy-L Network*



d	L_1	C_2	L_3	C_4
0	0.3827	1.082	1.577	1.531
0.05	0.3979	1.087	1.698	1.362
0.10	0.4144	1.091	1.834	1.205
0.15	0.4323	1.095	1.990	1.061
0.20	0.4518	1.098	2.170	0.9289
0.25	0.4732	1.100	2.380	0.8072
0.30	0.4967	1.102	2.628	0.6955
0.35	0.5227	1.102	2.926	0.5933

* By permission of P. R. Geffe.

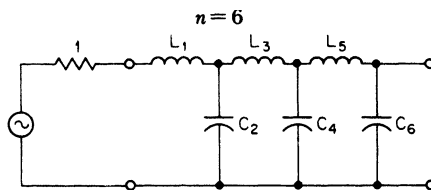
TABLE 11-15 Butterworth Lossy-L Network*



d	C_1	L_2	C_3	L_4	C_5
0	0.3090	0.8944	1.382	1.694	1.545
0.02	0.3129	0.9127	1.369	1.762	1.452
0.04	0.3168	0.9316	1.355	1.834	1.363
0.06	0.3209	0.9514	1.342	1.911	1.278
0.08	0.3251	0.9719	1.327	1.993	1.197
0.10	0.3294	0.9934	1.313	2.080	1.119
0.12	0.3338	1.016	1.298	2.173	1.046
0.14	0.3383	1.039	1.283	2.273	0.9754
0.16	0.3429	1.063	1.268	2.380	0.9086
0.18	0.3477	1.089	1.253	2.494	0.8450
0.20	0.3526	1.116	1.237	2.620	0.7844
0.22	0.3576	1.144	1.221	2.754	0.7269
0.24	0.3628	1.173	1.204	2.901	0.6721
0.26	0.3682	1.204	1.188	3.061	0.6201
0.28	0.3737	1.237	1.171	3.237	0.5076
0.30	0.3794	1.271	1.154	3.431	0.5236

* By permission of P. R. Geffe.

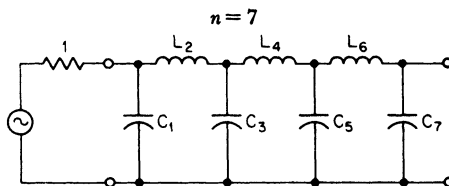
TABLE 11-16 Butterworth Lossy-L Network*



d	L_1	C_2	L_3	C_4	L_5	C_6
0	0.2588	0.7579	1.202	1.553	1.759	1.553
0.02	0.2629	0.7631	1.235	1.519	1.850	1.436
0.04	0.2671	0.7683	1.271	1.485	1.947	1.326
0.06	0.2714	0.7736	1.308	1.451	2.052	1.223
0.08	0.2760	0.7789	1.347	1.417	2.165	1.125
0.10	0.2806	0.7843	1.388	1.383	2.228	1.034
0.12	0.2854	0.7897	1.432	1.349	2.421	0.9487
0.14	0.2904	0.7952	1.478	1.315	2.565	0.8684
0.16	0.2955	0.8007	1.527	1.281	2.723	0.7932
0.18	0.3009	0.8063	1.579	1.248	2.896	0.7227
0.20	0.3064	0.8118	1.634	1.214	3.807	0.6567
0.22	0.3121	0.8174	1.692	1.181	3.298	0.5949

* By permission of P. R. Geffe.

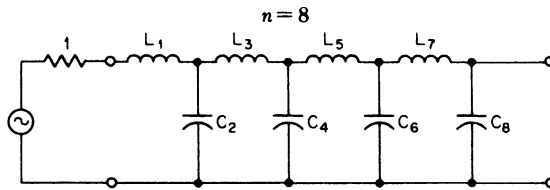
TABLE 11-17 Butterworth Lossy-L Network*



d	C_1	L_2	C_3	L_4	C_5	L_6	C_7
0	0.2225	0.6560	1.054	1.397	1.659	1.799	1.588
0.02	0.2255	0.6688	1.053	1.449	1.602	1.913	1.417
0.04	0.2286	0.6822	1.051	1.504	1.546	2.038	1.288
0.06	0.2318	0.6960	1.048	1.564	1.490	2.173	1.167
0.08	0.2351	0.7104	1.045	1.627	1.436	2.322	1.056
0.10	0.2384	0.7255	1.043	1.694	1.382	2.484	0.9532
0.12	0.2419	0.7412	1.039	1.766	1.330	2.664	0.8581
0.14	0.2454	0.7575	1.036	1.842	1.278	2.862	0.7703
0.16	0.2491	0.7746	1.032	1.924	1.228	3.083	0.6892
0.18	0.2529	0.7924	1.028	2.013	1.178	3.330	0.6144
0.20	0.2568	0.8110	1.024	2.108	1.130	3.609	0.5454

* By permission of P. R. Geffe.

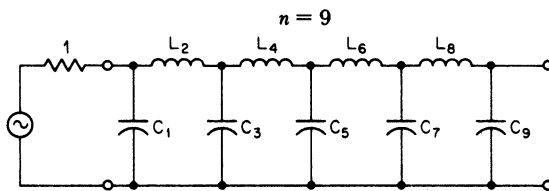
TABLE 11-18 Butterworth Lossy-L Network*



d	L_1	C_2	L_3	C_4	L_5	C_6	L_7	C_8
0	0.1951	0.5776	0.9371	1.259	1.528	1.729	1.824	1.561
0.02	0.1982	0.5829	0.9613	1.243	1.602	1.648	1.963	1.398
0.04	0.2014	0.5884	0.9868	1.227	1.680	1.569	2.116	1.249
0.06	0.2047	0.5939	1.014	1.211	1.764	1.493	2.285	1.113
0.08	0.2081	0.5996	1.042	1.194	1.856	1.419	2.472	0.9894
0.10	0.2116	0.6053	1.071	1.178	1.954	1.347	2.681	0.8768
0.12	0.2152	0.6111	1.102	1.160	2.061	1.278	2.914	0.7743
0.14	0.2190	0.6170	1.134	1.143	2.177	1.211	3.178	0.6810
0.16	0.2229	0.6231	1.169	1.124	2.302	1.147	3.477	0.5962
0.18	0.2270	0.6292	1.206	1.107	2.440	1.084	3.819	0.5191

* By permission of P. R. Geffe.

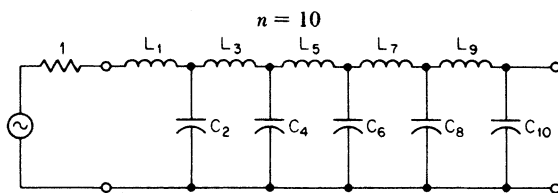
TABLE 11-19 Butterworth Lossy-L Network*



d	C_1	L_2	C_3	L_4	C_5	L_6	C_7	L_8	C_9
0	0.1736	0.5155	0.8414	1.141	1.404	1.620	1.777	1.842	1.563
0.02	0.1761	0.5253	0.8432	1.180	1.371	1.716	1.672	2.006	1.377
0.04	0.1786	0.5354	0.8450	1.221	1.338	1.821	1.571	2.189	1.211
0.06	0.1812	0.5460	0.8467	1.264	1.304	1.934	1.474	2.393	1.061
0.08	0.1839	0.5570	0.8483	1.310	1.271	2.058	1.383	2.623	0.9261
0.10	0.1866	0.5684	0.8497	1.359	1.238	2.193	1.294	2.884	0.8054
0.12	0.1894	0.5802	0.8510	1.412	1.204	2.342	1.211	3.180	0.6971
0.14	0.1924	0.5926	0.8522	1.467	1.171	2.505	1.132	3.521	0.6001
0.16	0.1954	0.6054	0.8533	1.527	1.137	2.686	1.057	3.917	0.5132

* By permission of P. R. Geffe.

TABLE 11-20 Butterworth Lossy-L Network*



d	L_1	C_2	L_3	C_4	L_5	C_6	L_7	C_8	L_9	C_{10}
0	0.1564	0.4654	0.7626	1.041	1.292	1.510	1.687	1.812	1.855	1.564
0.02	0.1589	0.4704	0.7812	1.034	1.348	1.457	1.807	1.682	2.044	1.357
0.04	0.1614	0.4754	0.8006	1.027	1.408	1.404	1.939	1.560	2.258	1.173
0.06	0.1641	0.4806	0.8209	1.019	1.472	1.353	2.084	1.444	2.501	1.010
0.08	0.1669	0.4859	0.8422	1.011	1.541	1.302	2.245	1.336	2.778	0.8660
0.10	0.1697	0.4913	0.8603	1.003	1.614	1.251	2.423	1.234	3.096	0.7387
0.12	0.1726	0.4969	0.8880	0.9949	1.694	1.201	2.621	1.139	3.466	0.6263
0.14	0.1757	0.5024	0.9127	0.9861	1.780	1.152	2.842	1.050	3.901	0.5270

* By permission of P. R. Geffe.

TABLE 11-21 Butterworth Active Low-Pass Values*

Order n	C_1	C_2	C_3
2	1.414	0.7071	
3	3.546	1.392	0.2024
4	1.082 2.613	0.9241 0.3825	
5	1.753 3.235	1.354 0.3090	0.4214
6	1.035 1.414 3.863	0.9660 0.7071 0.2588	
7	1.531 1.604 4.493	1.336 0.6235 0.2225	0.4885
8	1.020 1.202 1.800 5.125	0.9809 0.8313 0.5557 0.1950	
9	1.455 1.305 2.000 5.758	1.327 0.7661 0.5000 0.1736	0.5170
10	1.012 1.122 1.414 2.202 6.390	0.9874 0.8908 0.7071 0.4540 0.1563	

* Reprinted from *Electronics*, McGraw-Hill, Inc., August 18, 1969.

TABLE 11-22 0.01-dB Chebyshev Pole Locations

Order n	Real Part $-\alpha$	Imaginary Part $\pm j\beta$
2	0.6743	0.7075
3	0.4233 0.8467	0.8663
4	0.6762 0.2801	0.3828 0.9241
5	0.5120 0.1956 0.6328	0.5879 0.9512
6	0.5335 0.3906 0.1430	0.2588 0.7072 0.9660
7	0.4393 0.3040 0.1085 0.4876	0.4339 0.7819 0.9750
8	0.4268 0.3618 0.2418 0.08490	0.1951 0.5556 0.8315 0.9808
9	0.3686 0.3005 0.1961 0.06812 0.3923	0.3420 0.6428 0.8661 0.9848

TABLE 11-23 0.1-dB Chebyshev Pole Locations

Order n	Real Part $-\alpha$	Imaginary Part $\pm j\beta$
2	0.6104	0.7106
3	0.3490 0.6979	0.8684
4	0.2177 0.5257	0.9254 0.3833
5	0.3842 0.1468 0.4749	0.5884 0.9521
6	0.3916 0.2867 0.1049	0.2590 0.7077 0.9667
7	0.3178 0.2200 0.0785 0.3528	0.4341 0.7823 0.9755
8	0.3058 0.2592 0.1732 0.06082	0.1952 0.5558 0.8319 0.9812
9	0.2622 0.2137 0.1395 0.04845 0.2790	0.3421 0.6430 0.8663 0.9852

TABLE 11-24 0.25-dB Chebyshev Pole Locations

Order n	Real Part $-\alpha$	Imaginary Part $\pm j\beta$
2	0.5621	0.7154
3	0.3062 0.6124	0.8712
4	0.4501 0.1865	0.3840 0.9272
5	0.3247 0.1240 0.4013	0.5892 0.9533
6	0.3284 0.2404 0.08799	0.2593 0.7083 0.9675
7	0.2652 0.1835 0.06550 0.2944	0.4344 0.7828 0.9761
8	0.2543 0.2156 0.1441 0.05058	0.1953 0.5561 0.8323 0.9817
9	0.2176 0.1774 0.1158 0.04021 0.2315	0.3423 0.6433 0.8667 0.9856

TABLE 11-25 0.5-dB Chebyshev Pole Locations

Order n	Real Part $-\alpha$	Imaginary Part $\pm j\beta$
2	0.5129	0.7225
3	0.2683 0.5366	0.8753
4	0.3872 0.1605	0.3850 0.9297
5	0.2767 0.1057 0.3420	0.5902 0.9550
6	0.2784 0.2037 0.07459	0.2596 0.7091 0.9687
7	0.2241 0.1550 0.05534 0.2487	0.4349 0.7836 0.9771
8	0.2144 0.1817 0.1214 0.04264	0.1955 0.5565 0.8328 0.9824
9	0.1831 0.1493 0.09743 0.03383 0.1949	0.3425 0.6436 0.8671 0.9861

TABLE 11-26 1-dB Chebyshev Pole Locations

Order n	Real Part $-\alpha$	Imaginary Part $\pm j\beta$
2	0.4508	0.7351
3	0.2257 0.4513	0.8822
4	0.3199 0.1325	0.3868 0.9339
5	0.2265 0.08652 0.2800	0.5918 0.9575
6	0.2268 0.1660 0.06076	0.2601 0.7106 0.9707
7	0.1819 0.1259 0.04494 0.2019	0.4354 0.7846 0.9785
8	0.1737 0.1473 0.09840 0.03456	0.1956 0.5571 0.8337 0.9836
9	0.1482 0.1208 0.07884 0.02739 0.1577	0.3427 0.6442 0.8679 0.9869

TABLE 11-27 0.01-dB Chebyshev LC Element Values*

n	R_s	C_1	L_2	C_3	L_4
2	1.1007	1.3472	1.4829		
	1.1111	1.2472	1.5947		
	1.2500	0.9434	1.9974		
	1.4286	0.7591	2.3442		
	1.6667	0.6091	2.7496		
	2.0000	0.4791	3.2772		
	2.5000	0.3634	4.0328		
	3.3333	0.2590	5.2546		
	5.0000	0.1642	7.6498		
	10.0000	0.0781	14.7492		
	Inf.	1.4118	0.7415		
3	1.0000	1.1811	1.8214	1.1811	
	0.9000	1.0917	1.6597	1.4802	
	0.8000	1.0969	1.4431	1.8057	
	0.7000	1.1600	1.2283	2.1653	
	0.6000	1.2737	1.0236	2.5984	
	0.5000	1.4521	0.8294	3.1644	
	0.4000	1.7340	0.6452	3.9742	
	0.3000	2.2164	0.4704	5.2800	
	0.2000	3.1934	0.3047	7.8338	
	0.1000	6.1411	0.1479	15.3899	
	Inf.	1.5012	1.4330	0.5905	
4	1.1000	0.9500	1.9382	1.7608	1.0457
	1.1111	0.8539	1.9460	1.7439	1.1647
	1.2500	0.6182	2.0749	1.5417	1.6170
	1.4286	0.4948	2.2787	1.3336	2.0083
	1.6667	0.3983	2.5709	1.1277	2.4611
	2.0000	0.3156	2.9943	0.9260	3.0448
	2.5000	0.2418	3.6406	0.7293	3.8746
	3.3333	0.1744	4.7274	0.5379	5.2085
	5.0000	0.1121	6.9102	0.3523	7.8126
	10.0000	0.0541	13.4690	0.1729	15.5100
	Inf.	1.5287	1.6939	1.3122	0.5229
n	$1/R_s$	L_1	C_2	L_3	C_4

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TABLE 11-27 0.01-dB Chebyshev *LC* Element Values (*Continued*)

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7
5	1.0000	0.9766	1.6849	2.0366	1.6849	0.9766		
	0.9000	0.8798	1.4558	2.1738	1.6412	1.2739		
	0.8000	0.8769	1.2350	2.3785	1.4991	1.6066		
	0.7000	0.9263	1.0398	2.6582	1.3228	1.9772		
	0.6000	1.0191	0.8626	3.0408	1.1345	2.4244		
	0.5000	1.1658	0.6985	3.5835	0.9421	3.0092		
	0.4000	1.3983	0.5442	4.4027	0.7491	3.8453		
	0.3000	1.7966	0.3982	5.7721	0.5573	5.1925		
	0.2000	2.6039	0.2592	8.5140	0.3679	7.8257		
	0.1000	5.0406	0.1266	16.7406	0.1819	15.6126		
	Inf.	1.5466	1.7950	1.6449	1.2365	0.4883		
6	1.1007	0.8514	1.7956	1.8411	2.0266	1.6312	0.9372	
	1.1111	0.7597	1.7817	1.7752	2.0941	1.6380	1.0533	
	1.2500	0.5445	1.8637	1.4886	2.4025	1.5067	1.5041	
	1.4286	0.4355	2.0383	1.2655	2.7346	1.3318	1.8987	
	1.6667	0.3509	2.2978	1.0607	3.1671	1.1451	2.3568	
	2.0000	0.2786	2.6781	0.8671	3.7683	0.9536	2.9483	
	2.5000	0.2139	3.2614	0.6816	4.6673	0.7606	3.7899	
	3.3333	0.1547	4.2448	0.5028	6.1631	0.5676	5.1430	
	5.0000	0.0997	6.2227	0.3299	9.1507	0.3760	7.7852	
	10.0000	0.0483	12.1707	0.1623	18.1048	0.1865	15.5950	
	Inf.	1.5510	1.8471	1.7897	1.5976	1.1904	0.4686	
7	1.0000	0.9127	1.5947	2.0021	1.8704	2.0021	1.5947	0.9127
	0.9000	0.8157	1.3619	2.0886	1.7217	2.2017	1.5805	1.2060
	0.8000	0.8111	1.1504	2.2618	1.5252	2.4647	1.4644	1.5380
	0.7000	0.8567	0.9673	2.5158	1.3234	2.8018	1.3066	1.9096
	0.6000	0.9430	0.8025	2.8720	1.1237	3.2496	1.1310	2.3592
	0.5000	1.0799	0.6502	3.3822	0.9276	3.8750	0.9468	2.9478
	0.4000	1.2971	0.5072	4.1563	0.7350	4.8115	0.7584	3.7900
	0.3000	1.6692	0.3716	5.4540	0.5459	6.3703	0.5682	5.1476
	0.2000	2.4235	0.2423	8.0565	0.3604	9.4844	0.3776	7.8019
	0.1000	4.7006	0.1186	15.8718	0.1784	18.8179	0.1879	15.6523
	Inf.	1.5593	1.8671	1.8657	1.7651	1.5633	1.1610	0.4564
n	$1/R_s$	L_1	C_2	L_3	C_4	L_5	C_6	L_7

TABLE 11-27 0.01-dB Chebyshev LC Element Values (Continued)

n	R_n	C_1	L_2	C_3	L_4	C_5	L_6	C_7	L_8	C_9	L_{10}
8	1.1007	0.8145	1.7275	1.7984	2.0579	1.8695	1.9796	1.5694	0.8966		
	1.1111	0.7248	1.7081	1.7239	2.1019	1.8259	2.0595	1.5827	1.0111		
	1.2500	0.5176	1.7772	1.4315	2.3601	1.5855	2.4101	1.4754	1.4597		
	1.4286	0.4138	1.9422	1.2141	2.6686	1.3723	2.7734	1.3142	1.8544		
	1.6667	0.3336	2.1896	1.0169	3.0808	1.1660	3.2393	1.1369	2.3136		
	2.0000	0.2650	2.5533	0.8313	3.6598	0.9639	3.8820	0.9518	2.9073		
	2.5000	0.2036	3.1118	0.6537	4.5303	0.7653	4.8393	0.7627	3.7524		
	3.3333	0.1474	4.0539	0.4826	5.9828	0.5697	6.4287	0.5718	5.1118		
	5.0000	0.0951	5.9495	0.3170	8.8889	0.3770	9.6002	0.3804	7.7668		
	10.0000	0.0462	11.6509	0.1562	17.6067	0.1870	19.1009	0.1895	15.6158		
9	Inf.	1.5588	1.8848	1.8988	1.8556	1.7433	1.5391	1.1412	0.4483		
	1.0000	0.8854	1.5513	1.9614	1.8616	2.0717	1.8616	1.9614	1.5513	0.8854	
	0.9000	0.7886	1.3192	2.0330	1.6941	2.2249	1.7402	2.1774	1.5478	1.1764	
	0.8000	0.7834	1.1127	2.1959	1.4930	2.4614	1.5603	2.4565	1.4423	1.5076	
	0.7000	0.8273	0.9353	2.4404	1.2924	2.7808	1.3 62	2.8093	1.2927	1.8793	
	0.6000	0.9109	0.7761	2.7852	1.0962	3.2140	1.1688	3.2747	1.1233	2.3295	
	0.5000	1.0436	0.6290	3.2805	0.9045	3.8249	0.9710	3.9223	0.9436	2.9193	
	0.4000	1.2542	0.4910	4.0329	0.7167	4.7444	0.7739	4.8900	0.7582	3.7637	
	0.3000	1.6151	0.3599	5.2951	0.5325	6.2792	0.5780	6.4989	0.5697	5.1254	
	0.2000	2.3468	0.2349	7.8274	0.3518	9.3504	0.3835	9.7114	0.3797	7.7882	
10	0.1000	4.5556	0.1150	15.4334	0.1743	18.5641	0.1908	19.3382	0.1895	15.6645	
	Inf.	1.5646	1.8884	1.9242	1.8977	1.8425	1.7261	1.5217	1.1273	0.4427	
	1.1007	0.7970	1.6930	1.7690	2.0395	1.8827	2.0724	1.8529	1.9472	1.5380	0.8773
	1.1111	0.7083	1.6714	1.6921	2.0763	1.8281	2.1308	1.8167	2.0310	1.5541	0.9910
	1.2500	0.5049	1.7353	1.4005	2.3184	1.5706	2.4371	1.5953	2.3952	1.4574	1.4381
	1.4286	0.4037	1.8958	1.1871	2.6178	1.3552	2.7830	1.3895	2.7685	1.3027	1.8327
	1.6667	0.3256	2.1375	0.9942	3.0205	1.1497	3.2370	1.1863	3.2448	1.1300	2.2923
	2.0000	0.2586	2.4932	0.8128	3.5878	0.9497	3.8698	0.9849	3.9004	0.9484	2.8867
	2.5000	0.1988	3.0398	0.6394	4.4418	0.7538	4.8173	0.7849	4.8757	0.7617	3.7333
	3.3333	0.1440	3.9619	0.4723	5.8678	0.5612	6.3951	0.5863	6.4939	0.5722	5.0955
n	5.0000	0.0930	5.8175	0.3103	8.7290	0.3715	9.5486	0.3893	9.7217	0.3814	7.7563
	10.0000	0.0451	11.3993	0.1530	17.2866	0.1844	19.0046	0.1938	19.3005	0.1904	15.6234
	Inf.	1.5625	1.8978	1.9323	1.9288	1.8907	1.8309	1.7128	1.5088	1.1173	0.4386

TABLE 11-28 0.1-dB Chebyshev *LC* Element Values*

n	R_s	C_1	L_2	C_3	L_4
2	1.3554	1.2087	1.6382		
	1.4286	0.9771	1.9824		
	1.6667	0.7326	2.4885		
	2.0000	0.5597	3.0538		
	2.5000	0.4169	3.8265		
	3.3333	0.2933	5.0502		
	5.0000	0.1841	7.4257		
	10.0000	0.0868	14.4332		
	Inf.	1.3911	0.8191		
3	1.0000	1.4328	1.5937	1.4328	
	0.9000	1.4258	1.4935	1.6219	
	0.8000	1.4511	1.3557	1.8711	
	0.7000	1.5210	1.1927	2.1901	
	0.6000	1.6475	1.0174	2.6026	
	0.5000	1.8530	0.8383	3.1594	
	0.4000	2.1857	0.6603	3.9675	
	0.3000	2.7630	0.4860	5.2788	
	0.2000	3.9418	0.3172	7.8503	
	0.1000	7.5121	0.1549	15.4656	
	Inf.	1.5133	1.5090	0.7164	
4	1.3554	0.9924	2.1476	1.5845	1.3451
	1.4286	0.7789	2.3480	1.4292	1.7001
	1.6667	0.5764	2.7304	1.1851	2.2425
	2.0000	0.4398	3.2269	0.9672	2.8563
	2.5000	0.3288	3.9605	0.7599	3.6976
	3.3333	0.2329	5.1777	0.5602	5.0301
	5.0000	0.1475	7.6072	0.3670	7.6143
	10.0000	0.0704	14.8873	0.1802	15.2297
	Inf.	1.5107	1.7682	1.4550	0.6725

* Reprinted from A. I. Zverev, *Handbook of Filter Synthesis*, John Wiley and Sons, New York, 1967.

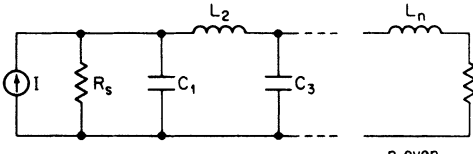
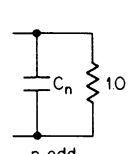
TABLE 11-28 0.1-dB Chebyshev LC Element Values (*Continued*)

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7
5	1.0000	1.3013	1.5559	2.2411	1.5559	1.3013		
	0.9000	1.2845	1.4329	2.3794	1.4878	1.4883		
	0.8000	1.2998	1.2824	2.5819	1.3815	1.7384		
	0.7000	1.3580	1.1170	2.8679	1.2437	2.0621		
	0.6000	1.4694	0.9469	3.2688	1.0846	2.4835		
	0.5000	1.6535	0.7777	3.8446	0.9126	3.0548		
	0.4000	1.9538	0.6119	4.7193	0.7333	3.8861		
	0.3000	2.4765	0.4509	6.1861	0.5503	5.2373		
	0.2000	3.5457	0.2950	9.1272	0.3659	7.8890		
	0.1000	6.7870	0.1447	17.9569	0.1820	15.7447		
	Inf.	1.5613	1.8069	1.7659	1.4173	0.6507		
6	1.3554	0.9419	2.0797	1.6581	2.2473	1.5344	1.2767	
	1.4286	0.7347	2.2492	1.4537	2.5437	1.4051	1.6293	
	1.6667	0.5422	2.6003	1.1830	3.0641	1.1850	2.1739	
	2.0000	0.4137	3.0679	0.9575	3.7119	0.9794	2.7936	
	2.5000	0.3095	3.7652	0.7492	4.6512	0.7781	3.6453	
	3.3333	0.2195	4.9266	0.5514	6.1947	0.5795	4.9962	
	5.0000	0.1393	7.2500	0.3613	9.2605	0.3835	7.6184	
	10.0000	0.0666	14.2200	0.1777	18.4267	0.1901	15.3495	
	Inf.	1.5339	1.8838	1.8306	1.7485	1.3937	0.6383	
7	1.0000	1.2615	1.5196	2.2392	1.6804	2.2392	1.5196	1.2615
	0.9000	1.2422	1.3946	2.3613	1.5784	2.3966	1.4593	1.4472
	0.8000	1.2550	1.2449	2.5481	1.4430	2.6242	1.3619	1.6967
	0.7000	1.3100	1.0826	2.8192	1.2833	2.9422	1.2326	2.0207
	0.6000	1.4170	0.9169	3.2052	1.1092	3.3841	1.0807	2.4437
	0.5000	1.5948	0.7529	3.7642	0.9276	4.0150	0.9142	3.0182
	0.4000	1.8853	0.5926	4.6179	0.7423	4.9702	0.7384	3.8552
	0.3000	2.3917	0.4369	6.0535	0.5557	6.5685	0.5569	5.2167
	0.2000	3.4278	0.2862	8.9371	0.3692	9.7697	0.3723	7.8901
	0.1000	6.5695	0.1405	17.6031	0.1838	19.3760	0.1862	15.8127
	Inf.	1.5748	1.8577	1.9210	1.8270	1.7340	1.3786	0.6307
n	$1/R_s$	L_1	C_2	L_3	C_4	L_5	C_6	L_7

TABLE 11-28 0.1-dB Chebyshev LC Element Values (Continued)

n	R_e	C_1	L_2	C_3	L_4	C_5	L_6	C_7	L_8	C_9	L_{10}
8	1.3554	0.9234	2.0454	1.6453	2.2826	1.6841	2.2300	1.5091	1.2515		
	1.4286	0.7186	2.2054	1.4350	2.5554	1.4974	2.5422	1.3882	1.6029		
	1.6667	0.5298	2.5459	1.1644	3.0567	1.2367	3.0869	1.1769	2.1477		
	2.0000	0.4042	3.0029	0.9415	3.6917	1.0118	3.7619	0.9767	2.7690		
	2.5000	0.3025	3.6859	0.7365	4.6191	0.7990	4.7388	0.7787	3.6240		
	3.3333	0.2147	4.8250	0.5421	6.1483	0.5930	6.3423	0.5820	4.9811		
	5.0000	0.1364	7.1050	0.3554	9.1917	0.3917	9.5260	0.3863	7.6164		
	10.0000	0.0652	13.9469	0.1749	18.3007	0.1942	19.0437	0.1922	15.3880		
	Inf.	1.5422	1.9106	1.9008	1.9252	1.8200	1.7231	1.3683	0.6258		
	1.0000	1.2446	1.5017	2.2220	1.6829	2.2957	1.6829	2.2220	1.5017	1.2446	
9	0.9000	1.2244	1.3765	2.3388	1.5756	2.4400	1.5870	2.3835	1.4444	1.4297	
	0.8000	1.2361	1.2276	2.5201	1.4365	2.6561	1.4572	2.6168	1.3505	1.6788	
	0.7000	1.2898	1.0670	2.7856	1.2751	2.9647	1.3019	2.9422	1.2248	2.0029	
	0.6000	1.3950	0.9035	3.1653	1.1008	3.3992	1.1304	3.3937	1.0761	2.4264	
	0.5000	1.5701	0.7419	3.7166	0.9198	4.0244	0.9494	4.0377	0.9121	3.0020	
	0.4000	1.8566	0.5840	4.5594	0.7359	4.9750	0.7630	5.0118	0.7382	3.8412	
	0.3000	2.3560	0.4307	5.9781	0.5509	6.5700	0.5736	6.6413	0.5579	5.2068	
	0.2000	3.3781	0.2832	8.8291	0.3661	9.7609	0.3827	9.9047	0.3737	7.8891	
	0.1000	6.4777	0.1366	17.3994	0.1823	19.3816	0.1912	19.6976	0.1873	15.8393	
	Inf.	1.5804	1.8727	1.9584	1.9094	1.9229	1.8136	1.7150	1.3611	0.6223	
10	1.3554	0.9146	2.0279	1.6346	2.2777	1.6963	2.2991	1.6805	2.2155	1.4962	1.2397
	1.4286	0.7110	2.1837	1.4231	2.5425	1.5002	2.5915	1.5000	2.5322	1.3789	1.5903
	1.6667	0.5240	2.5194	1.1536	3.0362	1.2349	3.1229	1.2444	3.0839	1.1717	2.1351
	2.0000	0.3998	2.9713	0.9326	3.6647	1.0089	3.7923	1.0214	3.7669	0.9741	2.7572
	2.5000	0.2993	3.6476	0.7295	4.5843	0.7962	4.7673	0.8090	4.7547	0.7779	3.6136
	3.3333	0.2124	4.7758	0.5370	6.1022	0.5907	6.3734	0.6020	6.3758	0.5822	4.9735
	5.0000	0.1350	7.0347	0.3522	9.1248	0.3902	9.5681	0.3987	9.5942	0.3871	7.6148
	10.0000	0.0646	13.8141	0.1734	18.1739	0.1935	19.1282	0.1981	19.2158	0.1929	15.4052
	Inf.	1.5460	1.9201	1.9216	1.9700	1.9102	1.9194	1.8083	1.7090	1.3559	0.6198
n	$1/R_e$	L_1	C_2	L_3	C_4	L_5	C_6	L_7	C_8	L_9	C_{10}

TABLE 11-29 0.25-dB Chebyshev LC Element Values

n	R_s	C_1	L_2	C_3	L_4
2	2	0.6552	2.7632		
	3	0.3740	4.3118		
	4	0.2637	5.7389		
	8	0.1215	11.2589		
	Inf.	1.3584	0.8902		
3	1	1.6325	1.4360	1.6325	
	0.5	3.2663	1.0775	1.6325	
	0.333	4.8988	0.9572	1.6325	
	0.25	6.5326	0.8971	1.6325	
	0.125	13.0639	0.8081	1.6325	
	Inf.	1.5348	1.5285	0.8169	
4	2	0.6747	3.6860	1.0247	1.8806
	3	0.4149	6.2744	0.7682	2.1302
	4	0.3020	8.8161	0.6667	2.2533
	8	0.1448	19.0204	0.5334	2.4516
	Inf.	1.4817	1.8213	1.5068	0.7853

n	$1/R_s$	L_1	C_2	L_3	C_4
n even					
n odd					

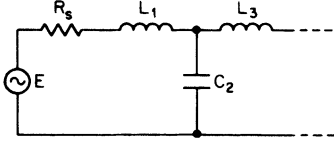
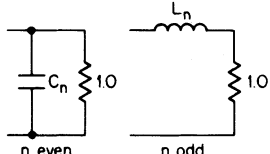
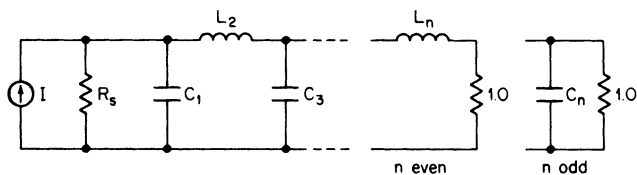



TABLE 11-29 0.25-dB Chebyshev *LC* Element Values (*Continued*)

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7
5	1	1.5046	1.4436	2.4050	1.4436	1.5046		
	0.5	3.0103	0.7218	3.6080	1.4436	1.5046		
	0.333	4.5149	0.4812	4.8100	1.4436	1.5046		
	0.25	6.0196	0.3615	6.0130	1.4436	1.5046		
	0.125	12.0402	0.1807	10.8230	1.4436	1.5046		
	Inf.	1.5765	1.7822	1.8225	1.4741	0.7523		
6	2	0.6867	3.2074	0.9308	3.8102	1.2163	1.7088	
	3	0.4330	5.0976	0.5392	6.0963	1.0804	1.8393	
	4	0.3173	6.9486	0.3821	8.2530	1.0221	1.8987	
	8	0.1539	14.3100	0.1762	16.7193	0.9393	1.9868	
	Inf.	1.5060	1.9221	1.8191	1.8329	1.4721	0.7610	
7	1	1.5120	1.4169	2.4535	1.5350	2.4535	1.4169	1.5120
	0.5	3.024	0.7085	4.9069	1.1515	2.4535	1.4169	1.5120
	0.333	4.5361	0.4723	7.3596	1.0230	2.4535	1.4169	1.5120
	0.25	6.0471	0.3542	9.8120	0.9593	2.4535	1.4169	1.5120
	0.125	12.0952	0.1776	19.6251	0.8631	2.4535	1.4169	1.5120
	Inf.	1.6009	1.8287	1.9666	1.8234	1.8266	1.4629	0.7555
n	$1/R_s$	L_1	C_2	L_3	C_4	L_5	C_6	L_7

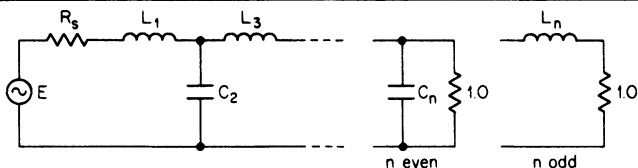
TABLE 11-30 0.5-dB Chebyshev LC Element Values*



n	R_s	C_1	L_2	C_3	L_4	C_5	L_6
2	1.9841	0.9827	1.9497				
	2.0000	0.9086	2.1030				
	2.5000	0.5635	3.1647				
	3.3333	0.3754	4.4111				
	5.0000	0.2282	6.6995				
	10.0000	0.1052	13.3221				
	Inf.	1.3067	0.9748				
3	1.0000	1.8636	1.2804	1.8636			
	0.9000	1.9175	1.2086	2.0255			
	0.8000	1.9965	1.1203	2.2368			
	0.7000	2.1135	1.0149	2.5172			
	0.6000	2.2889	0.8937	2.8984			
	0.5000	2.5571	0.7592	3.4360			
	0.4000	2.9854	0.6146	4.2416			
	0.3000	3.7292	0.4633	5.5762			
	0.2000	5.2543	0.3087	8.2251			
	0.1000	9.8899	0.1534	16.1177			
4	Inf.	1.5720	1.5179	0.9318			
	1.9841	0.9202	2.5864	1.3036	1.8258		
	2.0000	0.8452	2.7198	1.2383	1.9849		
	2.5000	0.5162	3.7659	0.8693	3.1205		
	3.3333	0.3440	5.1196	0.6208	4.4790		
	5.0000	0.2100	7.7076	0.3996	6.9874		
	10.0000	0.0975	15.3520	0.1940	14.2616		
	Inf.	1.4361	1.8888	1.5211	0.9129		

TABLE 11-30 0.5-dB Chebyshev LC Element Values* (Continued)

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6
5	1.0000	1.8068	1.3025	2.6914	1.3025	1.8068	
	0.9000	1.8540	1.2220	2.8478	1.2379	1.9701	
	0.8000	1.9257	1.1261	3.0599	1.1569	2.1845	
	0.7000	2.0347	1.0150	3.3525	1.0582	2.4704	
	0.6000	2.2006	0.8901	3.7651	0.9420	2.8609	
	0.5000	2.4571	0.7537	4.3672	0.8098	3.4137	
	0.4000	2.8692	0.6091	5.2960	0.6640	4.2447	
	0.3000	3.5877	0.4590	6.8714	0.5075	5.6245	
	0.2000	5.0639	0.3060	10.0537	0.3430	8.3674	
	0.1000	9.5560	0.1525	19.6465	0.1731	16.5474	
	Inf.	1.6299	1.7400	1.9217	1.5138	0.9034	
6	1.9841	0.9053	2.5774	1.3675	2.7133	1.2991	1.7961
	2.0000	0.8303	2.7042	1.2912	2.8721	1.2372	1.9557
	2.5000	0.5056	3.7219	0.8900	4.1092	0.8808	3.1025
	3.3333	0.3370	5.0554	0.6323	5.6994	0.6348	4.4810
	5.0000	0.2059	7.6145	0.4063	8.7319	0.4121	7.0310
	10.0000	0.0958	15.1862	0.1974	17.6806	0.2017	14.4328
	Inf.	1.4618	1.9799	1.7803	1.9253	1.5077	0.8981
n	$1/R_s$	L_1	C_2	L_3	C_4	L_5	C_6

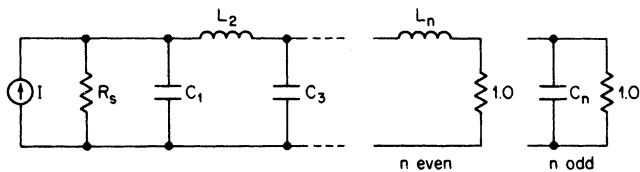


* Reprinted from A. I. Zverev, *Handbook of Filter Synthesis*, John Wiley and Sons, New York, 1967.

TABLE 11-30 0.5-dB Chebyshev LC Element Values (*Continued*)

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7	L_8	C_9	L_{10}
7	1.0000	1.7896	1.2961	2.7177	1.3848	2.7177	1.2961	1.7896			
	0.9000	1.8348	1.2146	2.8691	1.3080	2.8829	1.2335	1.9531			
	0.8000	1.9045	1.1249	3.0761	1.2149	3.1071	1.1546	2.1681			
	0.7000	2.0112	1.0070	3.3638	1.1050	3.4163	1.0582	2.4554			
	0.6000	2.1744	0.8824	3.7717	0.9786	3.8524	0.9441	2.8481			
	0.5000	2.4275	0.7470	4.3695	0.8377	4.4886	0.8137	3.4050			
	0.4000	2.8348	0.6035	5.2947	0.6846	5.4698	0.6690	4.2428			
	0.3000	3.5456	0.4548	6.8674	0.5221	7.1341	0.5129	5.6350			
	0.2000	5.0070	0.3034	10.0491	0.3524	10.4959	0.3478	8.4041			
	0.1000	9.4555	0.1513	19.6486	0.1778	20.6314	0.1761	16.6654			
8	Inf.	1.6464	1.7772	2.0306	1.7782	1.9239	1.5034	0.8948			
	1.9841	0.8998	2.5670	1.3697	2.7585	1.3903	2.7175	1.2938	1.7852		
	2.0000	0.8249	2.6916	1.2919	2.9134	1.3160	2.8800	1.2331	1.9449		
	2.5000	0.5017	3.6988	0.8878	4.1404	0.9184	4.1470	0.8815	3.0953		
	3.3333	0.3344	5.0234	0.6304	5.7323	0.6577	5.7761	0.6370	4.4807		
	5.0000	0.2044	7.5682	0.4052	8.7771	0.4257	8.8833	0.4146	7.0453		
	10.0000	0.0951	15.1014	0.1969	17.7747	0.2081	18.0544	0.2035	14.4924		
	Inf.	1.4710	2.0022	1.8248	2.0440	1.7911	1.9218	1.5003	0.8926		
	1.0000	1.7822	1.2921	2.7162	1.3922	2.7734	1.3922	2.7162	1.2921	1.7822	
	0.9000	1.8367	1.2103	2.8658	1.3135	2.9353	1.3165	2.8834	1.2302	1.9458	
9	0.8000	1.8955	1.1139	3.0709	1.2189	3.1565	1.2246	3.1102	1.1523	2.1611	
	0.7000	2.0013	1.0028	3.3565	1.1075	3.4635	1.1157	3.4232	1.0568	2.4489	
	0.6000	2.1634	0.8786	3.7621	0.9801	3.8985	0.9900	3.8647	0.9436	2.8426	
	0.5000	2.4150	0.7436	4.3573	0.8385	4.5355	0.8493	4.5087	0.8140	3.4010	
	0.4000	2.8203	0.6008	5.2792	0.6850	5.5207	0.6957	5.5023	0.6700	4.2416	
	0.3000	3.5279	0.4528	6.8474	0.5223	7.1951	0.5318	7.1876	0.5142	5.6390	
	0.2000	4.9830	0.3021	10.0212	0.3526	10.5818	0.3600	10.5925	0.3491	8.4189	
	0.1000	9.4131	0.1507	19.5995	0.1779	20.8006	0.1822	20.8588	0.1770	16.7140	
	Inf.	1.6533	1.7890	2.0570	1.8383	2.0481	1.7910	1.9199	1.4981	0.8911	
	1.9841	0.8972	2.5610	1.3683	2.7631	1.4009	2.7795	1.3927	2.7148	1.2908	1.7801
10	2.0000	0.8223	2.6845	1.2901	2.9166	1.3246	2.9300	1.3191	2.8783	1.2306	1.9398
	2.5000	0.4999	3.6868	0.8858	4.1383	0.9216	4.2020	0.9238	4.1540	0.8812	3.0919
	3.3333	0.3332	5.0071	0.6289	5.7274	0.6594	5.8399	0.6631	5.7948	0.6376	4.4804
	5.0000	0.2037	7.5446	0.4042	8.7695	0.4266	8.9727	0.4300	8.9249	0.4154	7.0518
	10.0000	0.0948	15.0578	0.1965	17.7624	0.2086	18.2313	0.2107	18.1644	0.2041	14.5199
	Inf.	1.4753	2.0107	1.8386	2.0733	1.8432	2.0494	1.7904	1.9183	1.4965	0.8900
	1.0000	1.7822	1.2921	2.7162	1.3922	2.7734	1.3922	2.7162	1.2921	1.7822	
	0.9000	1.8367	1.2103	2.8658	1.3135	2.9353	1.3165	2.8834	1.2302	1.9458	
	0.8000	1.8955	1.1139	3.0709	1.2189	3.1565	1.2246	3.1102	1.1523	2.1611	
	0.7000	2.0013	1.0028	3.3565	1.1075	3.4635	1.1157	3.4232	1.0568	2.4489	
11	0.6000	2.1634	0.8786	3.7621	0.9801	3.8985	0.9900	3.8647	0.9436	2.8426	
	0.5000	2.4150	0.7436	4.3573	0.8385	4.5355	0.8493	4.5087	0.8140	3.4010	
	0.4000	2.8203	0.6008	5.2792	0.6850	5.5207	0.6957	5.5023	0.6700	4.2416	
	0.3000	3.5279	0.4528	6.8474	0.5223	7.1951	0.5318	7.1876	0.5142	5.6390	
	0.2000	4.9830	0.3021	10.0212	0.3526	10.5818	0.3600	10.5925	0.3491	8.4189	
	0.1000	9.4131	0.1507	19.5995	0.1779	20.8006	0.1822	20.8588	0.1770	16.7140	
	Inf.	1.6533	1.7890	2.0570	1.8383	2.0481	1.7910	1.9199	1.4981	0.8911	
	1.9841	0.8972	2.5610	1.3683	2.7631	1.4009	2.7795	1.3927	2.7148	1.2908	1.7801
	2.0000	0.8223	2.6845	1.2901	2.9166	1.3246	2.9300	1.3191	2.8783	1.2306	1.9398
	2.5000	0.4999	3.6868	0.8858	4.1383	0.9216	4.2020	0.9238	4.1540	0.8812	3.0919
	3.3333	0.3332	5.0071	0.6289	5.7274	0.6594	5.8399	0.6631	5.7948	0.6376	4.4804
	5.0000	0.2037	7.5446	0.4042	8.7695	0.4266	8.9727	0.4300	8.9249	0.4154	7.0518
	10.0000	0.0948	15.0578	0.1965	17.7624	0.2086	18.2313	0.2107	18.1644	0.2041	14.5199
	Inf.	1.4753	2.0107	1.8386	2.0733	1.8432	2.0494	1.7904	1.9183	1.4965	0.8900
n	$1/R_s$	L_1	C_2	L_3	C_4	L_5	C_6	L_7	C_8	L_9	C_{10}

TABLE 11-31 1-dB Chebyshev LC Element Values



n	R_s	C_1	L_2	C_3	L_4
2	3	0.5723	3.1317		
	4	0.3653	4.6002		
	8	0.1571	9.6582		
	Inf.	1.2128	1.1093		
3	1	2.2160	1.0883	2.2160	
	0.5	4.4309	0.8168	2.2160	
	0.333	6.6469	0.7259	2.2160	
	0.25	8.8619	0.6799	2.2160	
	0.125	17.7248	0.6120	2.2160	
	Inf.	1.6522	1.4595	1.1080	
4	3	0.6529	4.4110	0.8140	2.5346
	4	0.4517	7.0825	0.6118	2.8484
	8	0.2085	17.1639	0.4275	3.2811
	Inf.	1.3499	2.0102	1.4879	1.1057
n	$1/R_s$	L_1	C_2	L_3	C_4

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7
5	1	2.2072	1.1279	3.1025	1.1279	2.2072		
	0.5	4.4144	0.5645	4.6532	1.1279	2.2072		
	0.333	6.6216	0.3763	6.2050	1.1279	2.2072		
	0.25	8.8288	0.2822	7.7557	1.1279	2.2072		
	0.125	17.6565	0.1406	13.9606	1.1279	2.2072		
	Inf.	1.7213	1.6448	2.0614	1.4928	1.1031		
6	3	0.6785	3.8725	0.7706	4.7107	0.9692	2.4060	
	4	0.4810	5.6441	0.4759	7.3511	0.8494	2.5820	
	8	0.2272	12.3095	0.1975	16.740	0.7256	2.7990	
	Inf.	1.3775	2.0969	1.6896	2.0744	1.4942	1.1022	
7	1	2.2043	1.1311	3.1472	1.1942	3.1472	1.1311	2.2043
	0.5	4.4075	0.5656	6.2934	0.8951	3.1472	1.1311	2.2043
	0.333	6.6118	0.3774	9.4406	0.7955	3.1472	1.1311	2.2043
	0.25	8.8151	0.2828	12.5879	0.7466	3.1472	1.1311	2.2043
	0.125	17.6311	0.1414	25.175	0.6714	3.1472	1.1311	2.2043
	Inf.	1.7414	1.6774	2.1554	1.7028	2.0792	1.4943	1.1016
n	$1/R_s$	L_1	C_2	L_3	C_4	L_5	C_6	L_7

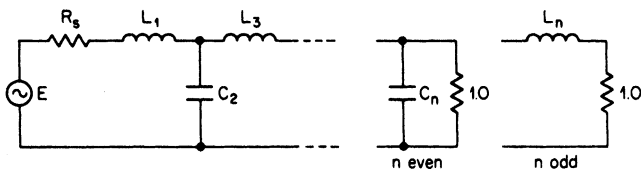
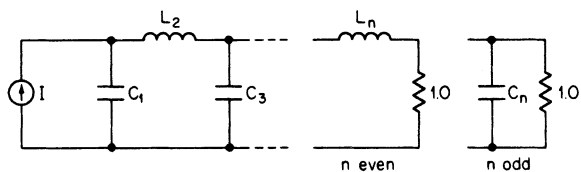


TABLE 11-32 0.1-dB Chebyshev Uniform Dissipation Network



n	d	C_1	L_2	C_3	L_4	C_5	L_6	C_7
2	0.0172	1.3855	0.8433					
	0.0257	1.3816	0.8550					
	0.0515	1.3680	0.8939					
3	0.024	1.4848	1.5390	0.7556				
	0.036	1.4696	1.5543	0.7765				
	0.072	1.4168	1.6015	0.8473				
4	0.0275	1.4375	1.7978	1.5103	0.7266			
	0.0412	1.3975	1.8148	1.5394	0.7570			
	0.0824	1.2556	1.8767	1.6353	0.8637			
5	0.0294	1.4558	1.8064	1.8280	1.4933	0.7194		
	0.0441	1.3945	1.8076	1.8643	1.5352	0.7591		
	0.0881	1.1449	1.8416	2.0209	1.6839	0.9123		
6	0.0305	1.3672	1.8874	1.8612	1.8361	1.4907	0.7224	
	0.0457	1.2645	1.8973	1.8842	1.8907	1.5454	0.7738	
	0.0915	0.6579	2.3639	2.1574	2.1803	1.7574	0.9825	
7	0.0312	1.3628	1.8252	1.9694	1.8797	1.8455	1.4963	0.7316
	0.0468	1.2079	1.8220	2.0207	1.9213	1.9192	1.5646	0.7957
n	d	L_1	C_2	L_3	C_4	L_5	C_6	L_7

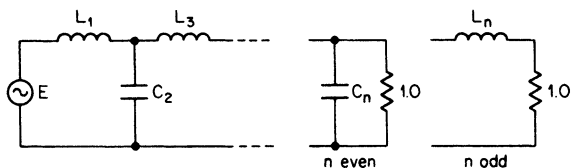
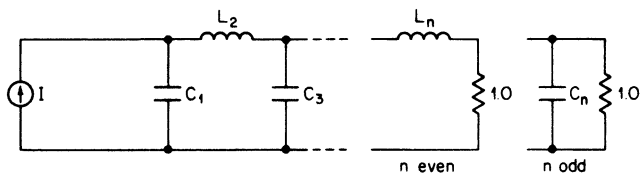


TABLE 11-33 0.25-dB Chebyshev Uniform Dissipation Network



n	d	C_1	L_2	C_3	L_4	C_5	L_6	C_7
2	0.0209	1.3504	0.9157					
	0.0313	1.3376	0.9413					
	0.0626	1.3120	1.0004					
3	0.0266	1.5022	1.5548	0.8733				
	0.0399	1.4834	1.5674	0.9046				
	0.0798	1.4220	1.6062	1.0149				
4	0.0292	1.3894	1.8590	1.5593	0.8651			
	0.0439	1.3370	1.8818	1.5866	0.9107			
	0.0877	1.1444	1.9764	1.6823	1.0839			
5	0.0306	1.4599	1.7670	1.8976	1.5503	0.8503		
	0.0459	1.3881	1.7604	1.9455	1.5917	0.9102		
	0.0919	1.0397	1.8181	2.2035	1.7528	1.1497		
6	0.0314	1.3054	1.9347	1.8339	1.9443	1.5697	0.8883	
	0.0471	1.1696	1.9560	1.8541	2.0218	1.6259	0.9700	
7	0.0319	1.3584	1.7680	2.0376	1.8610	1.9707	1.5820	0.9091
	0.0479	1.1264	1.7722	2.1452	1.9132	2.0814	1.6541	1.0125
n	d	L_1	C_2	L_3	C_4	L_5	C_6	L_7

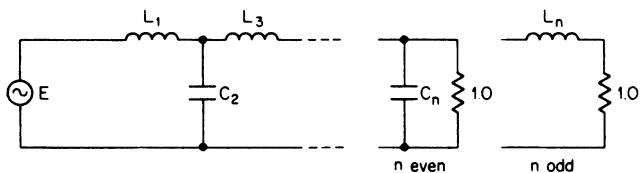
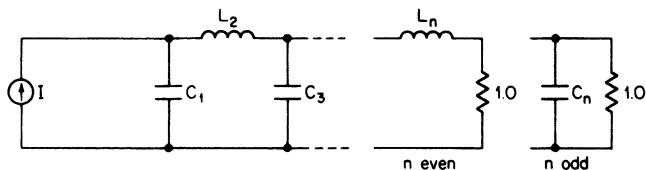


TABLE 11-34 0.5-dB Chebyshev Uniform Dissipation Network



n	d	C_1	L_2	C_3	L_4	C_5	L_6	C_7
2	0.0240	1.2855	1.0228					
	0.0360	1.2730	1.0478					
	0.0720	1.2313	1.1340					
3	0.0286	1.5376	1.5341	1.0122				
	0.0428	1.5189	1.5423	1.0589				
	0.0856	1.4489	1.5621	1.2247				
4	0.0305	1.3205	1.9413	1.5631	1.0275			
	0.0457	1.2549	1.9741	1.5850	1.0964			
	0.0915	0.9991	2.1359	1.6692	1.3707			
5	0.0315	1.5031	1.6980	2.0264	1.5773	1.0529		
	0.0472	1.4162	1.6768	2.0995	1.6133	1.1482		
	0.0944	0.7139	2.0994	2.7297	1.8007	1.5751		
6	0.0320	1.2200	2.0123	1.7707	2.0758	1.5927	1.0858	
	0.0480	1.0389	2.0612	1.7895	2.1976	1.6448	1.2117	
7	0.0324	1.3659	1.6801	2.1488	1.8047	2.1230	1.6090	1.1228
	0.0485	0.9024	1.8171	2.4475	1.8985	2.3126	1.6811	1.2856
n	d	L_1	C_2	L_3	C_4	L_5	C_6	L_7

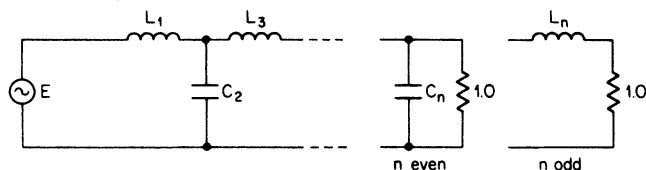
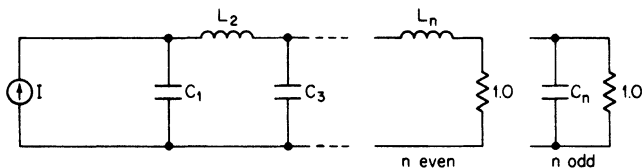


TABLE 11-35 1-dB Chebyshev Uniform Dissipation Network



n	d	C_1	L_2	C_3	L_4	C_5	L_6	C_7
2	0.0274	1.1762	1.1811					
	0.0411	1.1020	1.2201					
	0.0821	1.0898	1.3564					
3	0.0304	1.6215	1.4562	1.2328				
	0.0457	1.6029	1.4518	1.3062				
	0.0913	1.5241	1.4387	1.5908				
4	0.0317	1.2015	2.0965	1.5037	1.2847			
	0.0475	1.1141	2.1544	1.5132	1.3984			
	0.0950	0.7434	2.5398	1.5890	1.9049			
5	0.0322	1.5869	1.5610	2.2258	1.5269	1.3419		
	0.0484	1.4680	1.5218	2.3591	1.5507	1.5052		
6	0.0326	1.0736	2.1789	1.6385	2.3150	1.5454	1.4052	
	0.0489	0.7747	2.3611	1.6958	2.5658	1.5894	1.6293	
7	0.0328	1.3610	1.5258	2.4016	1.6865	2.4067	1.5634	1.4749
n	d	L_1	C_2	L_3	C_4	L_5	C_6	L_7

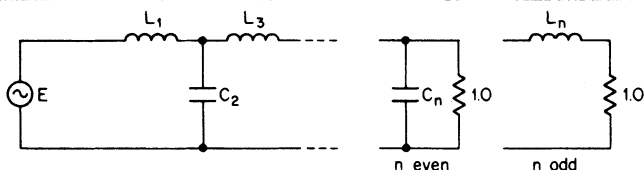


TABLE 11-36 0.01-dB Chebyshev Active Low-Pass Values

Order n	C_1	C_2
2	1.4826	0.7042
4	1.4874	1.1228
	3.5920	0.2985
6	1.8900	1.5249
	2.5820	0.5953
	7.0522	0.1486
8	2.3652	1.9493
	2.7894	0.8196
	4.1754	0.3197
	11.8920	0.08672

TABLE 11-37 0.1-dB Chebyshev Active Low-Pass Values*

Order n	C_1	C_2	C_3
2	1.638	0.6955	
3	6.653	1.825	0.1345
4	1.900 4.592	1.241 0.2410	
5	4.446 6.810	2.520 0.1580	0.3804
6	2.553 3.487 9.531	1.776 0.4917 0.1110	
7	5.175 4.546 12.73	3.322 0.3331 0.08194	0.5693
8	3.270 3.857 5.773 16.44	2.323 0.6890 0.2398 0.06292	
9	6.194 4.678 7.170 20.64	4.161 0.4655 0.1812 0.04980	0.7483
10	4.011 4.447 5.603 8.727 25.32	2.877 0.8756 0.3353 0.1419 0.04037	

* Reprinted from *Electronics*, McGraw-Hill, Inc., August 18, 1969.

TABLE 11-38 0.25-dB Chebyshev Active Low-Pass Values*

Order n	C_1	C_2	C_3
2	1.778	0.6789	
3	8.551	2.018	0.1109
4	2.221 5.363	1.285 0.2084	
5	5.543 8.061	2.898 0.1341	0.3425
6	3.044 4.159 11.36	1.875 0.4296 0.09323	
7	6.471 5.448 15.26	3.876 0.2839 0.06844	0.5223
8	3.932 4.638 6.942 19.76	2.474 0.6062 0.2019 0.05234	
9	7.766 5.637 8.639 24.87	4.891 0.3983 0.1514 0.04131	0.6919
10	4.843 5.368 6.766 10.53 30.57	3.075 0.7725 0.2830 0.1181 0.03344	

* Reprinted from *Electronics*, McGraw-Hill, Inc., August 18, 1969.

TABLE 11-39 0.5-dB Chebyshev Active Low-Pass Values*

Order n	C_1	C_2	C_3
2	1.950	0.6533	
3	11.23	2.250	0.0895
4	2.582 6.233	1.300 0.1802	
5	6.842 9.462	3.317 0.1144	0.3033
6	3.592 4.907 13.40	1.921 0.3743 0.07902	
7	7.973 6.446 18.07	4.483 0.2429 0.05778	0.4700
8	4.665 5.502 8.237 23.45	2.547 0.5303 0.1714 0.04409	
9	9.563 6.697 10.26 29.54	5.680 0.3419 0.1279 0.03475	0.6260
10	5.760 6.383 8.048 12.53 36.36	3.175 0.6773 0.2406 0.09952 0.02810	

* Reprinted from *Electronics*, McGraw-Hill, Inc., August 18, 1969.

TABLE 11-40 1-dB Chebyshev Active Low-Pass Values*

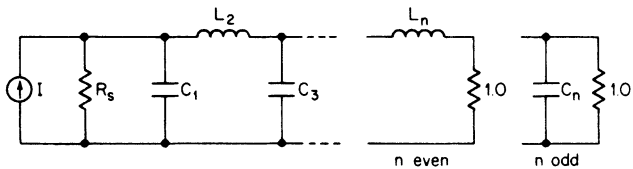
Order n	C_1	C_2	C_3
2	2.218	0.6061	
3	16.18	2.567	0.06428
4	3.125 7.546	1.269 0.1489	
5	8.884 11.55	3.935 0.09355	0.2540
6	4.410 6.024 16.46	1.904 0.3117 0.06425	
7	10.29 7.941 22.25	5.382 0.1993 0.04684	0.4012
8	5.756 6.792 10.15 28.94	2.538 0.4435 0.1395 0.03568	
9	12.33 8.281 12.68 36.51	6.853 0.2813 0.1038 0.02808	0.5382
10	7.125 7.897 9.952 15.50 44.98	3.170 0.5630 0.1962 0.08054 0.02269	

* Reprinted from *Electronics*, McGraw-Hill, Inc., August 18, 1969.

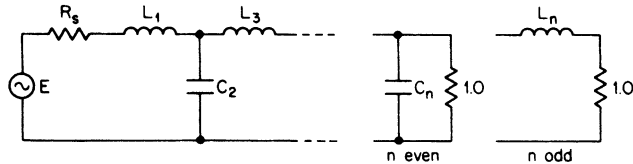
TABLE 11-41 Bessel Pole Locations

Order n	Real Part $-\alpha$	Imaginary Part $\pm j\beta$
2	1.1030	0.6368
3	1.0509 1.3270	1.0025
4	1.3596 0.9877	0.4071 1.2476
5	1.3851 0.9606 1.5069	0.7201 1.4756
6	1.5735 1.3836 0.9318	0.3213 0.9727 1.6640
7	1.6130 1.3797 0.9104 1.6853	0.5896 1.1923 1.8375
8	1.7627 0.8955 1.3780 1.6419	0.2737 2.0044 1.3926 0.8253
9	1.8081 1.6532 1.3683 0.8788 1.8575	0.5126 1.0319 1.5685 2.1509

TABLE 11-42 Bessel LC Element Values*



<i>n</i>	<i>R_s</i>	<i>C₁</i>	<i>L₂</i>	<i>C₃</i>	<i>L₄</i>
2	1.0000	0.5755	2.1478		
	1.1111	0.5084	2.3097		
	1.2500	0.4433	2.5096		
	1.4286	0.3801	2.7638		
	1.6667	0.3191	3.0993		
	2.0000	0.2601	3.5649		
	2.5000	0.2032	4.2577		
	3.3333	0.1486	5.4050		
	5.0000	0.0965	7.6876		
	10.0000	0.0469	14.5097		
3	Inf.	1.3617	0.4539		
	1.0000	0.3374	0.9705	2.2034	
	0.9000	0.3708	0.8650	2.3745	
	0.8000	0.4124	0.7609	2.5867	
	0.7000	0.4657	0.6584	2.8575	
	0.6000	0.5365	0.5576	3.2159	
	0.5000	0.6353	0.4587	3.7144	
	0.4000	0.7829	0.3618	4.4573	
	0.3000	1.0283	0.2673	5.6888	
	0.2000	1.5176	0.1752	8.1403	
4	0.1000	2.9825	0.0860	15.4697	
	Inf.	1.4631	0.8427	0.2926	
	1.0000	0.2334	0.6725	1.0815	2.2404
	1.1111	0.2085	0.7423	0.9670	2.4143
	1.2500	0.1839	0.8292	0.8534	2.6304
	1.4286	0.1596	0.9406	0.7410	2.9066
	1.6667	0.1356	1.0886	0.6299	3.2727
	2.0000	0.1120	1.2952	0.5202	3.7824
	2.5000	0.0887	1.6040	0.4120	4.5430
	3.3333	0.0658	2.1174	0.3056	5.8048
5	5.0000	0.0434	3.1416	0.2013	8.3185
	10.0000	0.0214	6.2086	0.0993	15.8372
	Inf.	1.5012	0.9781	0.6127	0.2114
<i>n</i>	1/ <i>R_s</i>	<i>L₁</i>	<i>C₂</i>	<i>L₃</i>	<i>C₄</i>
2					
3					
4					
5					



* Reprinted from A. I. Zverev, *Handbook of Filter Synthesis*, John Wiley and Sons, New York, 1967.

TABLE 11-42 Bessel LC Element Values (Continued)

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7
5	1.0000	0.1743	0.5072	0.8040	1.1110	2.2582		
	0.9000	0.1926	0.4542	0.8894	0.9945	2.4328		
	0.8000	0.2154	0.4016	0.9959	0.8789	2.6497		
	0.7000	0.2447	0.3494	1.1323	0.7642	2.9272		
	0.6000	0.2836	0.2977	1.3138	0.6506	3.2952		
	0.5000	0.3380	0.2465	1.5672	0.5382	3.8077		
	0.4000	0.4194	0.1958	1.9464	0.4270	4.5731		
	0.3000	0.5548	0.1457	2.5768	0.3174	5.8433		
	0.2000	0.8251	0.0964	3.8352	0.2095	8.3747		
	0.1000	1.6349	0.0478	7.6043	0.1036	15.9487		
	Inf.	1.5125	1.0232	0.7531	0.4729	0.1618		
6	1.0000	0.1365	0.4002	0.6392	0.8538	1.1126	2.2645	
	1.1111	0.1223	0.4429	0.5732	0.9456	0.9964	2.4388	
	1.2500	0.1082	0.4961	0.5076	1.0600	0.8810	2.6554	
	1.4286	0.0943	0.5644	0.4424	1.2069	0.7665	2.9325	
	1.6667	0.0804	0.6553	0.3775	1.4022	0.6530	3.3001	
	2.0000	0.0666	0.7824	0.3131	1.6752	0.5405	3.8122	
	2.5000	0.0530	0.9725	0.2492	2.0837	0.4292	4.5770	
	3.3333	0.0395	1.2890	0.1859	2.7633	0.3193	5.8467	
	5.0000	0.0261	1.9209	0.1232	4.1204	0.2110	8.3775	
	10.0000	0.0130	3.8146	0.0612	8.1860	0.1045	15.9506	
	Inf.	1.5124	1.0329	0.8125	0.6072	0.3785	0.1287	
7	1.0000	0.1106	0.3259	0.5249	0.7020	0.8690	1.1052	2.2659
	0.9000	0.1224	0.2923	0.5815	0.6302	0.9630	0.9899	2.4396
	0.8000	0.1372	0.2589	0.6521	0.5586	1.0803	0.8754	2.6556
	0.7000	0.1562	0.2257	0.7428	0.4873	1.2308	0.7618	2.9319
	0.6000	0.1815	0.1927	0.8634	0.4163	1.4312	0.6491	3.2984
	0.5000	0.2168	0.1599	1.0321	0.3457	1.7111	0.5374	3.8090
	0.4000	0.2698	0.1274	1.2847	0.2755	2.1304	0.4269	4.5718
	0.3000	0.3579	0.0951	1.7051	0.2058	2.8280	0.3177	5.8380
	0.2000	0.5338	0.0630	2.5448	0.1365	4.2214	0.2100	8.3623
	0.1000	1.0612	0.0313	5.0616	0.0679	8.3967	0.1040	15.9166
	Inf.	1.5087	1.0293	0.8345	0.6752	0.5031	0.3113	0.1054
n	$1/R_s$	L_1	C_2	L_3	C_4	L_5	C_6	L_7

TABLE 11-42 Bessel LC Element Values (Continued)

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7	L_8	C_9	L_{10}
8	1.0000	0.0919	0.2719	0.4409	0.5936	0.7303	0.8695	1.0956	2.2656		
	1.1111	0.0825	0.3013	0.3958	0.6580	0.6559	0.9639	0.9813	2.4388		
	1.2500	0.0731	0.3380	0.3509	0.7385	0.5817	1.0816	0.8678	2.6541		
	1.4286	0.0637	0.3850	0.3061	0.8418	0.5078	1.2328	0.7552	2.9295		
	1.6667	0.0545	0.4477	0.2616	0.9794	0.4342	1.4340	0.6435	3.2949		
	2.0000	0.0452	0.5354	0.2173	1.1718	0.3608	1.7153	0.5329	3.8041		
	2.5000	0.0360	0.6667	0.1732	1.4599	0.2878	2.1367	0.4233	4.5645		
	3.3333	0.0269	0.8852	0.1294	1.9396	0.2151	2.8380	0.3151	5.8271		
	5.0000	0.0179	1.3218	0.0859	2.8981	0.1429	4.2389	0.2083	8.3441		
	10.0000	0.0089	2.6307	0.0427	5.7710	0.0711	8.4376	0.1032	15.8768		
9	Inf.	1.5044	1.0214	0.8392	0.7081	0.5743	0.4253	0.2616	0.0883		
	1.0000	0.0780	0.2313	0.3770	0.5108	0.6306	0.7407	0.8639	1.0863	2.2649	
	0.9000	0.0864	0.2077	0.4180	0.4588	0.6994	0.6655	0.9578	0.9730	2.4376	
	0.8000	0.0970	0.1841	0.4691	0.4069	0.7854	0.5905	1.0750	0.8604	2.6524	
	0.7000	0.1105	0.1607	0.5348	0.3553	0.8957	0.5157	1.2255	0.7488	2.9271	
	0.6000	0.1286	0.1373	0.6222	0.3038	1.0427	0.4411	1.4258	0.6380	3.2915	
	0.5000	0.1538	0.1141	0.7445	0.2525	1.2483	0.3667	1.7059	0.5283	3.7993	
	0.4000	0.1916	0.0910	0.9278	0.2014	1.5563	0.2926	2.1256	0.4197	4.5578	
	0.3000	0.2545	0.0680	1.2329	0.1506	2.0692	0.2189	2.8241	0.3124	5.8171	
	0.2000	0.3803	0.0452	1.8426	0.1000	3.0941	0.1455	4.2196	0.2065	8.3276	
10	0.1000	0.7573	0.0925	3.6704	0.0498	6.1666	0.0725	8.4023	0.1023	15.8408	
	Inf.	1.5006	1.0127	0.8361	0.7220	0.6142	0.4963	0.3654	0.2238	0.0754	
	1.0000	0.0672	0.1998	0.3270	0.4454	0.5528	0.6493	0.7420	0.8561	1.0781	2.2641
	1.1111	0.0604	0.2216	0.2937	0.4941	0.4967	0.7205	0.6668	0.9492	0.9656	2.4365
	1.2500	0.0536	0.2488	0.2606	0.5548	0.4408	0.8093	0.5918	1.0654	0.8539	2.6508
	1.4286	0.0467	0.2836	0.2275	0.6327	0.3850	0.9233	0.5170	1.2147	0.7430	2.9249
	1.6667	0.0400	0.3301	0.1945	0.7366	0.3294	1.0753	0.4423	1.4134	0.6331	3.2885
	2.0000	0.0332	0.3951	0.1617	0.8818	0.2739	1.2879	0.3678	1.6913	0.5242	3.7953
	2.5000	0.0265	0.4924	0.1290	1.0995	0.2186	1.6064	0.2936	2.1076	0.4164	4.5521
	3.3333	0.0198	0.6546	0.0965	1.4620	0.1635	2.1369	0.2197	2.8007	0.3099	5.8087
10	5.0000	0.0132	0.9786	0.0641	2.1864	0.1087	3.1971	0.1461	4.1854	0.2049	8.3137
	10.0000	0.0066	1.9499	0.0319	4.3583	0.0542	6.3759	0.0728	8.3359	0.1015	15.8108
	Inf.	1.4973	1.0045	0.8297	0.7258	0.6355	0.5401	0.4342	0.3182	0.1942	0.0653
	n	$1/R_s$	L_1	C_2	L_3	C_4	L_5	C_6	L_7	C_8	L_{10}

TABLE 11-43 Bessel Active-Low-Pass Values

Order n	C_1	C_2	C_3
2	0.9066	0.6800	
3	1.423	0.9880	0.2538
4	0.7351 1.012	0.6746 0.3900	
5	1.010 1.041	0.8712 0.3100	0.3095
6	0.6352 0.7225 1.073	0.6100 0.4835 0.2561	
7	0.8532 0.7250 1.100	0.7792 0.4151 0.2164	0.3027
8	0.5673 0.6090 0.7257 1.116	0.5540 0.4861 0.3590 0.1857	
9	0.7564 0.6048 0.7307 1.137	0.7070 0.4352 0.3157 0.1628	0.2851
10	0.5172 0.5412 0.6000 0.7326 1.151	0.5092 0.4682 0.3896 0.2792 0.1437	

TABLE 11-44 Linear Phase with Equiripple Error of 0.05° Pole Locations

Order n	Real Part $-\alpha$	Imaginary Part $\pm j\beta$
2	1.0087	0.6680
3	0.8541 1.0459	1.0725
4	0.9648 0.7448	0.4748 1.4008
5	0.8915 0.6731 0.9430	0.8733 1.7085
6	0.8904 0.8233 0.6152	0.4111 1.2179 1.9810
7	0.8425 0.7708 0.5727 0.8615	0.7791 1.5351 2.2456
8	0.8195 0.7930 0.7213 0.5341	0.3711 1.1054 1.8134 2.4761
9	0.7853 0.7555 0.6849 0.5060 0.7938	0.7125 1.4127 2.0854 2.7133
10	0.7592 0.7467 0.7159 0.6475 0.4777	0.3413 1.0195 1.6836 2.3198 2.9128

TABLE 11-45 Linear Phase with Equiripple Error
of 0.5° Pole Locations

Order n	Real Part $-\alpha$	Imaginary Part $\pm j\beta$
2	0.8590	0.6981
3	0.6969 0.8257	1.1318
4	0.7448 0.6037	0.5133 1.4983
5	0.6775 0.5412 0.7056	0.9401 1.8256
6	0.6519 0.6167 0.4893	0.4374 1.2963 2.0982
7	0.6190 0.5816 0.4598 0.6283	0.8338 1.6453 2.3994
8	0.5791 0.5665 0.5303 0.4184	0.3857 1.1505 1.8914 2.5780
9	0.5688 0.5545 0.5179 0.4080 0.5728	0.7595 1.5089 2.2329 2.9028
10	0.5249 0.5193 0.5051 0.4711 0.3708	0.3487 1.0429 1.7261 2.3850 2.9940

TABLE 11-46 Linear Phase with Equiripple Error of 0.05° LC Element Values*

n	R_s	C_1	L_2	C_3	L_4
2	1.0000	0.6480	2.1085		
	1.1111	0.5703	2.2760		
	1.2500	0.4955	2.4817		
	1.4286	0.4235	2.7422		
	1.6667	0.3544	3.0848		
	2.0000	0.2880	3.5589		
	2.5000	0.2244	4.2630		
	3.3333	0.1637	5.4270		
	5.0000	0.1059	7.7400		
	10.0000	0.0513	14.6480		
	Inf.	1.3783	0.4957		
3	1.0000	0.4328	1.0427	2.2542	
	0.9000	0.4745	0.9330	2.4258	
	0.8000	0.5262	0.8238	2.6400	
	0.7000	0.5925	0.7153	2.9146	
	0.6000	0.6805	0.6078	3.2795	
	0.5000	0.8032	0.5015	3.7884	
	0.4000	0.9865	0.3967	4.5487	
	0.3000	1.2910	0.2938	5.8106	
	0.2000	1.8983	0.1931	8.3253	
	0.1000	3.7161	0.0950	15.8472	
	Inf.	1.5018	0.9328	0.3631	
4	1.0000	0.3363	0.7963	1.1428	2.2459
	1.1111	0.2993	0.8810	1.0212	2.4241
	1.2500	0.2631	0.9865	0.9012	2.6445
	1.4286	0.2275	1.1216	0.7826	2.9254
	1.6667	0.1926	1.3009	0.6657	3.2970
	2.0000	0.1584	1.5509	0.5502	3.8138
	2.5000	0.1250	1.9244	0.4364	4.5844
	3.3333	0.0923	2.5448	0.3242	5.8626
	5.0000	0.0606	3.7818	0.2139	8.4091
	10.0000	0.0298	7.4845	0.1058	16.0266
	Inf.	1.5211	1.0444	0.7395	0.2925
n	$1/R_s$	L_1	C_2	L_3	C_4

* Reprinted from A. I. Zverev, *Handbook of Filter Synthesis*, John Wiley and Sons, New York, 1967.

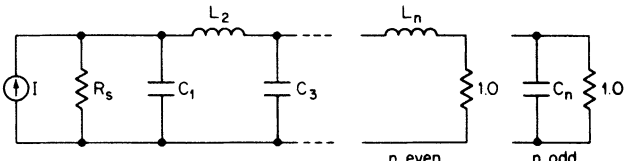
TABLE 11-46 Linear Phase with Equiripple Error of 0.05° LC Element Values (*Continued*)

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7
5	1.0000	0.2751	0.6541	0.8892	1.1034	2.2873		
	0.9000	0.3031	0.5868	0.9841	0.9904	2.4589		
	0.8000	0.3380	0.5197	1.1026	0.8774	2.6733		
	0.7000	0.3827	0.4529	1.2548	0.7648	2.9484		
	0.6000	0.4420	0.3865	1.4575	0.6526	3.3144		
	0.5000	0.5248	0.3204	1.7408	0.5410	3.8254		
	0.4000	0.6486	0.2549	2.1651	0.4302	4.5896		
	0.3000	0.8544	0.1899	2.8713	0.3205	5.8595		
	0.2000	1.2649	0.1257	4.2817	0.2120	8.3922		
	0.1000	2.4940	0.0624	8.5082	0.1051	15.9739		
	Inf.	1.5144	1.0407	0.8447	0.6177	0.2456		
6	1.0000	0.2374	0.5662	0.7578	0.8760	1.1163	2.2448	
	1.1111	0.2120	0.6272	0.6799	0.9726	0.9977	2.4214	
	1.2500	0.1870	0.7032	0.6023	1.0931	0.8807	2.6396	
	1.4286	0.1622	0.8008	0.5253	1.2475	0.7652	2.9174	
	1.6667	0.1378	0.9306	0.4487	1.4530	0.6512	3.2849	
	2.0000	0.1138	1.1118	0.3725	1.7401	0.5387	3.7958	
	2.5000	0.0901	1.3830	0.2969	2.1698	0.4277	4.5579	
	3.3333	0.0669	1.8340	0.2217	2.8849	0.3182	5.8220	
	5.0000	0.0441	2.7343	0.1472	4.3129	0.2103	8.3408	
	10.0000	0.0218	5.4312	0.0732	8.5924	0.1041	15.8769	
	Inf.	1.5050	1.0306	0.8554	0.7283	0.5389	0.2147	
7	1.0000	0.2085	0.4999	0.6653	0.7521	0.8749	1.0671	2.2845
	0.9000	0.2302	0.4488	0.7374	0.6768	0.9687	0.9580	2.4538
	0.8000	0.2573	0.3978	0.8274	0.6013	1.0861	0.8489	2.6655
	0.7000	0.2919	0.3470	0.9431	0.5258	1.2369	0.7400	2.9375
	0.6000	0.3380	0.2964	1.0972	0.4503	1.4381	0.6314	3.2996
	0.5000	0.4023	0.2461	1.3127	0.3749	1.7196	0.5235	3.8051
	0.4000	0.4986	0.1960	1.6356	0.2995	2.1416	0.4163	4.5613
	0.3000	0.6585	0.1463	2.1734	0.2242	2.8445	0.3101	5.8180
	0.2000	0.9778	0.0970	3.2480	0.1492	4.2496	0.2052	8.3246
	0.1000	1.9340	0.0482	6.4698	0.0744	8.4623	0.1017	15.8281
	Inf.	1.4988	1.0071	0.8422	0.7421	0.6441	0.4791	0.1911
n	$1/R_s$	L_1	C_2	L_3	C_4	L_5	C_6	L_7

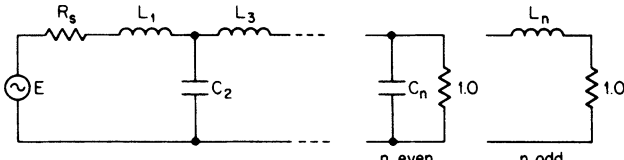
TABLE 11-46 Linear Phase with Equiripple Error of 0.05° LC Element Values (Continued)

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7	L_8	C_9	L_{10}
8	1.0000	0.1891	0.4543	0.6031	0.6750	0.7590	0.8427	1.0901	2.2415		
	1.1111	0.1691	0.5035	0.5415	0.7500	0.6813	0.9362	0.9735	2.4176		
	1.2500	0.1494	0.5650	0.4802	0.8435	0.6041	1.0527	0.8588	2.6349		
	1.4286	0.1298	0.6438	0.4191	0.9637	0.5272	1.2019	0.7459	2.9113		
	1.6667	0.1105	0.7487	0.3583	1.1237	0.4508	1.4004	0.6345	3.2767		
	2.0000	0.0914	0.8953	0.2978	1.3475	0.3748	1.6776	0.5247	3.7846		
	2.5000	0.0725	1.1148	0.2376	1.6827	0.2991	2.0927	0.4164	4.5418		
	3.3333	0.0539	1.4801	0.1776	2.2411	0.2237	2.7833	0.3096	5.7978		
	5.0000	0.0356	2.2095	0.1180	3.3568	0.1488	4.1627	0.2046	8.3004		
	10.0000	0.0176	4.3954	0.0588	6.7021	0.0742	8.2969	0.1013	15.7878		
9	Inf.	1.4953	1.0018	0.8264	0.7396	0.6688	0.5858	0.4369	0.1743		
	1.0000	0.1718	0.4146	0.5498	0.6132	0.6774	0.7252	0.8450	1.0447	2.2834	
	0.9000	0.1900	0.3724	0.6097	0.5519	0.7513	0.6529	0.9382	0.9382	2.4512	
	0.8000	0.2125	0.3302	0.6846	0.4905	0.8436	0.5805	1.0481	0.8314	2.6613	
	0.7000	0.2415	0.2882	0.7807	0.4291	0.9624	0.5079	1.1933	0.7247	2.9315	
	0.6000	0.2800	0.2463	0.9088	0.3676	1.1207	0.4352	1.3870	0.6184	3.2914	
	0.5000	0.3337	0.2046	1.0880	0.3062	1.3424	0.3624	1.6581	0.5125	3.7941	
	0.4000	0.4141	0.1631	1.3565	0.2448	1.6749	0.2897	2.0647	0.4075	4.5462	
	0.3000	0.5478	0.1219	1.8038	0.1834	2.2289	0.2170	2.7420	0.3035	5.7960	
	0.2000	0.8148	0.0809	2.6977	0.1222	3.3369	0.1445	4.0960	0.2007	8.2890	
10	0.1000	1.6146	0.0403	5.3782	0.0610	6.6602	0.0721	8.1556	0.0995	15.7520	
	Inf.	1.4907	0.9845	0.8116	0.7197	0.6646	0.6089	0.5359	0.4003	0.1598	
	1.0000	0.1601	0.3867	0.5125	0.5702	0.6243	0.6557	0.7319	0.8178	1.0767	2.2387
	1.1111	0.1433	0.4288	0.4604	0.6336	0.5609	0.7290	0.6567	0.9089	0.9608	2.4151
	1.2500	0.1267	0.4812	0.4084	0.7127	0.4977	0.8205	0.5820	1.0221	0.8471	2.6323
	1.4286	0.1102	0.5486	0.3567	0.8143	0.4348	0.9380	0.5079	1.1672	0.7354	2.9082
	1.6667	0.0939	0.6383	0.3051	0.9498	0.3721	1.0944	0.4342	1.3600	0.6254	3.2727
	2.0000	0.0778	0.7637	0.2537	1.1392	0.3096	1.3131	0.3609	1.6291	0.5170	3.7791
	2.5000	0.0618	0.9515	0.2024	1.4232	0.2473	1.6408	0.2880	2.0320	0.4102	4.5340
	3.3333	0.0460	1.2641	0.1515	1.8961	0.1852	2.1866	0.2154	2.7022	0.3049	5.7860
10.0000	0.0304	0.0304	1.8885	0.1007	2.8416	0.1232	3.2775	0.1433	4.0406	0.2014	8.2806
	0.0151	3.7600	0.1515	3.7600	5.6766	0.0615	6.5485	0.0714	8.0520	0.0997	15.7441
	Inf.	1.4905	0.9858	0.8018	0.7123	0.6540	0.6141	0.5669	0.5003	0.3741	0.1494
	n	$1/R_s$	L_1	C_2	C_4	L_5	C_6	L_7	C_8	L_9	C_{10}

TABLE 11-47 Linear Phase with Equiripple Error of 0.5° LC Element Values*



n	R_s	C_1	L_2	C_3	L_4
2	1.0000	0.8245	1.9800		
	1.1111	0.7166	2.1640		
	1.2500	0.6160	2.3850		
	1.4286	0.5216	2.6603		
	1.6667	0.4327	3.0181		
	2.0000	0.3489	3.5088		
	2.5000	0.2700	4.2329		
	3.3333	0.1956	5.4242		
	5.0000	0.1258	7.7842		
	10.0000	0.0606	14.8185		
	Inf.	1.4022	0.5821		
3	1.0000	0.5534	1.0218	2.4250	
	0.9000	0.6059	0.9213	2.5929	
	0.8000	0.6710	0.8197	2.8046	
	0.7000	0.7540	0.7173	3.0787	
	0.6000	0.8639	0.6141	3.4462	
	0.5000	1.0168	0.5105	3.9625	
	0.4000	1.2448	0.4068	4.7385	
	0.3000	1.6231	0.3034	6.0326	
	0.2000	2.3771	0.2008	8.6197	
	0.1000	4.6332	0.0994	16.3738	
	Inf.	1.5495	0.9820	0.4506	
4	1.0000	0.4526	0.7967	1.2669	2.0504
	1.1111	0.3996	0.8889	1.1137	2.2502
	1.2500	0.3486	1.0028	0.9699	2.4866
	1.4286	0.2995	1.1481	0.8333	2.7788
	1.6667	0.2521	1.3405	0.7024	3.1576
	2.0000	0.2062	1.6083	0.5762	3.6769
	2.5000	0.1618	2.0079	0.4542	4.4438
	3.3333	0.1190	2.6708	0.3358	5.7080
	5.0000	0.0777	3.9916	0.2207	8.2168
	10.0000	0.0380	7.9426	0.1088	15.7068
	Inf.	1.4944	1.0715	0.7889	0.3708
n	$1/R_s$	L_1	C_2	L_3	C_4



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TABLE 11-47 Linear Phase with Equiripple Error of 0.5° LC Element Values (*Continued*)

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7
5	1.0000	0.3658	0.6768	0.9513	1.0113	2.4446		
	0.9000	0.4027	0.6099	1.0486	0.9157	2.6062		
	0.8000	0.4485	0.5427	1.1700	0.8182	2.8114		
	0.7000	0.5069	0.4752	1.3260	0.7189	3.0787		
	0.6000	0.5843	0.4074	1.5341	0.6181	3.4387		
	0.5000	0.6921	0.3395	1.8253	0.5160	3.9462		
	0.4000	0.8530	0.2714	2.2623	0.4130	4.7108		
	0.3000	1.1201	0.2033	2.9908	0.3094	5.9881		
	0.2000	1.6524	0.1352	4.4478	0.2057	8.5444		
	0.1000	3.2454	0.0674	8.8185	0.1024	16.2117		
	Inf.	1.5327	1.0180	0.8740	0.6709	0.3182		
6	1.0000	0.3313	0.5984	0.8390	0.7964	1.2734	2.0111	
	1.1111	0.2934	0.6667	0.7446	0.8985	1.1050	2.2282	
	1.2500	0.2571	0.7515	0.6542	1.0223	0.9549	2.4742	
	1.4286	0.2219	0.8600	0.5666	1.1787	0.8164	2.7718	
	1.6667	0.1876	1.0040	0.4812	1.3848	0.6859	3.1529	
	2.0000	0.1541	1.2051	0.3976	1.6709	0.5615	3.6720	
	2.5000	0.1216	1.5058	0.3155	2.0972	0.4420	4.4362	
	3.3333	0.0898	2.0058	0.2347	2.8044	0.3266	5.6935	
	5.0000	0.0589	3.0038	0.1553	4.2137	0.2146	8.1871	
	10.0000	0.0290	5.9928	0.0771	8.4320	0.1058	15.6296	
	Inf.	1.4849	1.0430	0.8427	0.7651	0.5972	0.2844	
7	1.0000	0.2826	0.5332	0.7142	0.6988	0.9219	0.9600	2.4404
	0.9000	0.3118	0.4802	0.7896	0.6322	1.0137	0.8718	2.5953
	0.8000	0.3481	0.4271	0.8836	0.5649	1.1287	0.7809	2.7936
	0.7000	0.3945	0.3739	1.0043	0.4967	1.2768	0.6875	3.0535
	0.6000	0.4560	0.3206	1.1650	0.4277	1.4750	0.5919	3.4051
	0.5000	0.5416	0.2671	1.3899	0.3580	1.7531	0.4947	3.9025
	0.4000	0.6695	0.2136	1.7271	0.2874	2.1714	0.3961	4.6534
	0.3000	0.8819	0.1601	2.2890	0.2163	2.8700	0.2969	5.9091
	0.2000	1.3054	0.1066	3.4127	0.1445	4.2690	0.1974	8.4236
	0.1000	2.5731	0.0532	6.7835	0.0724	8.4691	0.0983	15.9666
	Inf.	1.5079	0.9763	0.8402	0.7248	0.6741	0.5305	0.2532
n	$1/R_s$	L_1	C_2	L_3	C_4	L_5	C_6	L_7

TABLE 11-47 Linear Phase with Equiripple Error of 0.5° LC Element Values (Continued)

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7	L_8	C_9	L_{10}
8	1.0000	0.2718	0.4999	0.6800	0.6312	0.8498	0.7447	1.3174	1.9626		
	1.1111	0.2408	0.5567	0.6045	0.7116	0.7452	0.8529	1.1169	2.2146		
	1.2500	0.2114	0.6271	0.5324	0.8086	0.6506	0.9780	0.9551	2.4766		
	1.4286	0.1828	0.7173	0.4622	0.9315	0.5612	1.1331	0.8117	2.7837		
	1.6667	0.1549	0.8373	0.3934	1.0939	0.4753	1.3355	0.6795	3.1715		
	2.0000	0.1276	1.0049	0.3256	1.3201	0.3920	1.6148	0.5550	3.6960		
	2.5000	0.1009	1.2559	0.2589	1.6580	0.3107	2.0297	0.4362	4.4654		
	3.3333	0.0747	1.6734	0.1930	2.2194	0.2311	2.7164	0.3220	5.7294		
	5.0000	0.0492	2.5074	0.1279	3.3400	0.1530	4.0835	0.2114	8.2345		
	10.0000	0.0242	5.0066	0.0636	6.6971	0.0760	8.1733	0.1042	15.7101		
9	Inf.	1.4915	1.0265	0.8169	0.7548	0.6709	0.6318	0.4995	0.2387		
	1.0000	0.2347	0.4493	0.5914	0.5747	0.7027	0.6552	0.8944	0.9255	2.4332	
	0.9000	0.2594	0.4045	0.6547	0.5193	0.7754	0.5943	0.9809	0.8427	2.5822	
	0.8000	0.2900	0.3597	0.7336	0.4635	0.8662	0.5322	1.0895	0.7566	2.7745	
	0.7000	0.3291	0.3148	0.8348	0.4073	0.9829	0.4690	1.2299	0.6673	3.0283	
	0.6000	0.3810	0.2699	0.9695	0.3505	1.1388	0.4046	1.4183	0.5753	3.3734	
	0.5000	0.4533	0.2249	1.1580	0.2932	1.3572	0.3392	1.6834	0.4812	3.8629	
	0.4000	0.5613	0.1799	1.4405	0.2355	1.6854	0.2727	2.0828	0.3855	4.6032	
	0.3000	0.7407	0.1348	1.9111	0.1772	2.2331	0.2054	2.7508	0.2889	5.8424	
	0.2000	1.0986	0.0898	2.8522	0.1185	3.3299	0.1373	4.0895	0.1921	8.3246	
10	0.1000	2.1702	0.0448	5.6749	0.0594	6.6230	0.0688	8.1099	0.0956	15.7718	
	Inf.	1.4888	0.9495	0.8044	0.6892	0.6589	0.5952	0.5645	0.4475	0.2141	
	1.0000	0.2359	0.4369	0.5887	0.5428	0.7034	0.5827	0.8720	0.6869	1.4317	1.8431
	1.1111	0.2081	0.4866	0.5218	0.6141	0.6141	0.6729	0.7394	0.8187	1.1397	2.1907
	1.2500	0.1827	0.5480	0.4601	0.6972	0.5376	0.7708	0.6394	0.9483	0.9616	2.4734
	1.4286	0.1582	0.6267	0.3999	0.8024	0.4651	0.8922	0.5487	1.1042	0.8122	2.7907
	1.6667	0.1343	0.7314	0.3407	0.9416	0.3948	1.0514	0.4631	1.3052	0.6777	3.1847
	2.0000	0.1108	0.8777	0.2823	1.1356	0.3263	1.2719	0.3811	1.5809	0.5525	3.7138
	2.5000	0.0877	1.0969	0.2247	1.4258	0.2591	1.6003	0.3017	1.9888	0.4338	4.4876
	3.3333	0.0651	1.4619	0.1676	1.9085	0.1931	2.1451	0.2242	2.6628	0.3200	5.7573
10.0000	5.0000	0.0429	2.1910	0.1112	2.8724	0.1280	3.2311	0.1483	4.0033	0.2100	8.2726
	10.0000	0.0212	4.3764	0.0553	5.7612	0.0636	6.4830	0.0736	8.0118	0.1035	15.7776
	Inf.	1.4973	1.0192	0.8005	0.7312	0.6498	0.6331	0.5775	0.5501	0.4369	0.2091
n	$1/R_s$	L_1	C_2	L_3	C_4	L_5	C_6	L_7	C_8	L_9	C_{10}

TABLE 11-48 Linear Phase with Equiripple
Error of 0.05° Active Low-Pass Values

Order n	C_1	C_2
2	0.9914	0.6891
4	1.0365 1.3426	0.8344 0.2959
6	1.1231 1.2146 1.6255	0.9257 0.3810 0.1430
8	1.2203 1.2610 1.3864 1.8723	1.0126 0.4285 0.1894 0.08324
10	1.3172 1.3392 1.3968 1.5444 2.0934	1.0957 0.4676 0.2139 0.1116 0.05483

TABLE 11-49 Linear Phase with Equiripple
Error of 0.5° Active Low-Pass Values

Order n	C_1	C_2
2	1.1641	0.7011
4	1.3426 1.6565	0.9103 0.2314
6	1.5340 1.6215 2.0437	1.0578 0.2993 0.1054
8	1.7268 1.7652 1.8857 2.3901	1.1962 0.3445 0.1374 0.06134
10	1.9051 1.9257 1.9798 2.1227 2.6969	1.3218 0.3826 0.1562 0.07971 0.04074

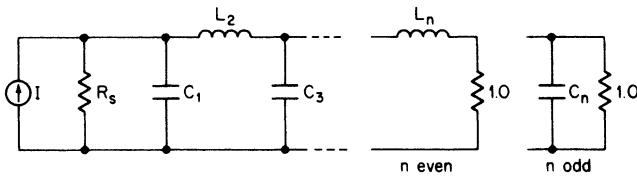
TABLE 11-50 Transitional Gaussian to 6-dB Pole Locations

Order n	Real Part $-\alpha$	Imaginary Part $\pm j\beta$
3	0.9622	1.2214
	0.9776	
4	0.7940	0.5029
	0.6304	1.5407
5	0.6190	0.8254
	0.3559	1.5688
	0.6650	
6	0.5433	0.3431
	0.4672	0.9991
	0.2204	1.5067
7	0.4580	0.5932
	0.3649	1.1286
	0.1522	1.4938
	0.4828	
8	0.4222	0.2640
	0.3833	0.7716
	0.2878	1.2066
	0.1122	1.4798
9	0.3700	0.4704
	0.3230	0.9068
	0.2309	1.2634
	0.08604	1.4740
	0.3842	
10	0.3384	0.2101
	0.3164	0.6180
	0.2677	0.9852
	0.1849	1.2745
	0.06706	1.4389

TABLE 11-51 Transitional Gaussian to 12-dB Pole Locations

Order n	Real Part $-\alpha$	Imaginary Part $\pm j\beta$
3	0.9360	1.2168
	0.9630	
4	0.9278	1.6995
	0.9192	0.5560
5	0.8075	0.9973
	0.7153	2.0532
	0.8131	
6	0.7019	0.4322
	0.6667	1.2931
	0.4479	2.1363
7	0.6155	0.7703
	0.5486	1.5154
	0.2905	2.1486
	0.6291	
8	0.5441	0.3358
	0.5175	0.9962
	0.4328	1.6100
	0.1978	2.0703
9	0.4961	0.6192
	0.4568	1.2145
	0.3592	1.7429
	0.1489	2.1003
10	0.5065	
	0.4535	0.2794
	0.4352	0.8289
	0.3886	1.3448
	0.2908	1.7837
	0.1136	2.0599

TABLE 11-52 Transitional Gaussian to 6-dB LC Element Values*



n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7
3	1.0000	0.4042	0.8955	2.3380				
	0.9000	0.4440	0.8038	2.5027				
	0.8000	0.4935	0.7121	2.7088				
	0.7000	0.5568	0.6205	2.9739				
	0.6000	0.6407	0.5292	3.3275				
	0.5000	0.7575	0.4384	3.8223				
	0.4000	0.9319	0.3482	4.5635				
	0.3000	1.2213	0.2590	5.7972				
	0.2000	1.7980	0.1709	8.2605				
	0.1000	3.5236	0.0845	15.6391				
4	Inf.	1.4742	0.8328	0.3446				
	1.0000	0.4198	0.7832	1.1598	2.1427			
	1.1111	0.3720	0.8717	1.0279	2.3286			
	1.2500	0.3256	0.9816	0.9010	2.5539			
	1.4286	0.2804	1.1220	0.7781	2.8367			
	1.6667	0.2365	1.3083	0.6587	3.2069			
	2.0000	0.1938	1.5678	0.5424	3.7179			
	2.5000	0.1524	1.9552	0.4289	4.4761			
	3.3333	0.1122	2.5982	0.3180	5.7296			
	5.0000	0.0733	3.8797	0.2095	8.2221			
5	10.0000	0.0359	7.7138	0.1035	15.6717			
	Inf.	1.4871	1.0222	0.7656	0.3510			
	1.0000	0.4544	0.8457	1.0924	1.0774	2.4138		
	0.9000	0.4991	0.7622	1.2046	0.9769	2.5746		
	0.8000	0.5543	0.6781	1.3452	0.8739	2.7797		
	0.7000	0.6247	0.5936	1.5263	0.7687	3.0475		
	0.6000	0.7179	0.5086	1.7683	0.6615	3.4087		
	0.5000	0.8476	0.4233	2.1077	0.5527	3.9183		
	0.4000	1.0411	0.3379	2.6176	0.4428	4.6863		
	0.3000	1.3621	0.2526	3.4680	0.3321	5.9690		
6	0.2000	2.0019	0.1677	5.1693	0.2212	8.5360		
	0.1000	3.9166	0.0833	10.2723	0.1103	16.2354		
	Inf.	1.5392	1.0993	1.0203	0.8269	0.3824		
	1.0000	0.5041	0.9032	1.2159	1.0433	1.4212	2.0917	
	1.1111	0.4427	1.0079	1.0739	1.1892	1.2274	2.3324	
	1.2500	0.3853	1.1364	0.9415	1.3611	1.0620	2.5935	
	1.4286	0.3306	1.2999	0.8145	1.5753	0.9111	2.9053	
	1.6667	0.2779	1.5162	0.6914	1.8557	0.7692	3.3032	
	2.0000	0.2271	1.8169	0.5713	2.2433	0.6333	3.8456	
	2.5000	0.1780	2.2654	0.4534	2.8200	0.5016	4.6459	
7	3.3333	0.1308	3.0091	0.3376	3.7758	0.3730	5.9662	
	5.0000	0.0853	4.4902	0.2235	5.6803	0.2468	8.5904	
	10.0000	0.0416	8.9199	0.1109	11.3810	0.1225	16.4352	
	Inf.	1.5664	1.2166	1.1389	1.1010	0.8844	0.4062	

TABLE 11-52 Transitional Gaussian to 6-dB LC Element Values* (*Continued*)

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7
7	1.0000	0.4918	0.9232	1.2146	1.1224	1.3154	1.1407	2.5039
	0.9000	0.5403	0.8318	1.3393	1.0196	1.4426	1.0434	2.6575
	0.8000	0.6001	0.7399	1.4950	0.9141	1.6040	0.9401	2.8593
	0.7000	0.6760	0.6474	1.6952	0.8061	1.8144	0.8317	3.1285
	0.6000	0.7763	0.5545	1.9626	0.6956	2.0986	0.7190	3.4967
	0.5000	0.9157	0.4613	2.3373	0.5829	2.5004	0.6029	4.0203
	0.4000	1.1236	0.3681	2.9002	0.4684	3.1072	0.4844	4.8129
	0.3000	1.4685	0.2750	3.8389	0.3524	4.1232	0.3644	6.1397
	0.2000	2.1560	0.1823	5.7166	0.2354	6.1604	0.2433	8.7977
	0.1000	4.2137	0.0905	11.3483	0.1178	12.2787	0.1217	16.7743
	Inf.	1.5950	1.2166	1.2240	1.1784	1.1260	0.8975	0.4110
n	$1/R_s$	L_1	C_2	L_3	C_4	L_5	C_6	L_7

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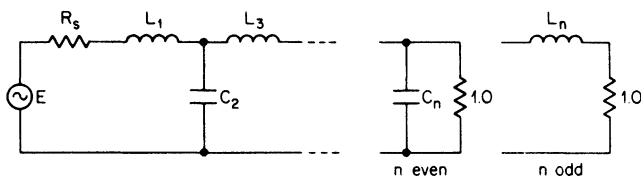
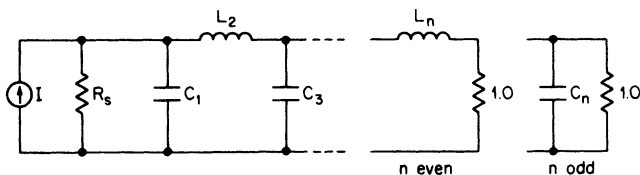


TABLE 11-52 Transitional Gaussian to 6-dB LC Element Values (Continued)

n	R_e	C_1	L_2	C_3	L_4	C_5	L_6	C_7	L_8	C_9	L_{10}
8	1.0502	0.5031	0.9699	1.2319	1.1924	1.4262	1.0449	1.6000	1.9285		
	1.1111	0.4586	1.0338	1.1286	1.2497	1.2635	1.2099	1.3372	2.2286		
	1.2500	0.3964	1.1670	0.9831	1.4404	1.0842	1.4259	1.1197	2.5453		
	1.4286	0.3392	1.3351	0.8487	1.6698	0.9299	1.6706	0.9502	2.8771		
	1.6667	0.2848	1.5571	0.7195	1.9674	0.7863	1.9808	0.7989	3.2846		
	2.0000	0.2325	1.8656	0.5939	2.3776	0.6487	2.4039	0.6569	3.8326		
	2.5000	0.1822	2.3255	0.4710	2.9870	0.5151	3.0295	0.5204	4.6374		
	3.3333	0.1337	3.0879	0.3504	3.9662	0.3840	4.0640	0.3874	5.9636		
	5.0000	0.0872	4.6062	0.2318	6.0063	0.2547	6.1243	0.2566	8.5995		
	10.0000	0.0425	9.1467	0.1150	12.0217	0.1268	12.2919	0.1276	16.4808		
9	Inf.	1.5739	1.2698	1.2325	1.2633	1.2017	1.1404	0.9066	0.4148		
	1.0000	0.4979	0.9367	1.2371	1.1589	1.3845	1.1670	1.3983	1.1422	2.5277	
	0.9000	0.5475	0.8439	1.3648	1.0517	1.5194	1.0673	1.5233	1.0527	2.6698	
	0.8000	0.6083	0.7505	1.5238	0.9424	1.6894	0.9625	1.6850	0.9540	2.8635	
	0.7000	0.6854	0.6567	1.7278	0.8306	1.9103	0.8527	1.8996	0.8472	3.1279	
	0.6000	0.7870	0.5624	1.9998	0.7165	2.2081	0.7383	2.1929	0.7342	3.4938	
	0.5000	0.9280	0.4679	2.3811	0.6002	2.6288	0.6202	2.6105	0.6166	4.0174	
	0.4000	1.1383	0.3732	2.9537	0.4820	3.2641	0.4993	3.2438	0.4960	4.8118	
	0.3000	1.4873	0.2788	3.9087	0.3625	4.3274	0.3763	4.3062	0.3734	6.1429	
	0.2000	2.1829	0.1848	5.8191	0.2421	6.4590	0.2518	6.4381	0.2496	8.8109	
10	0.1000	4.2652	0.0918	11.5490	0.1211	12.8601	0.1262	12.8438	0.1250	16.8186	
	Inf.	1.6014	1.2508	1.2817	1.2644	1.2805	1.2103	1.1456	0.9096	0.4160	
	1.1372	0.4682	1.0839	1.1516	1.2991	1.3293	1.2748	1.4216	1.1730	1.5040	2.1225
	1.1372	0.4682	1.0839	1.1516	1.2991	1.3293	1.2748	1.4216	1.1730	1.5040	2.1225
	1.2500	0.4087	1.1987	1.0148	1.4855	1.1389	1.5155	1.1705	1.4593	1.1798	2.5537
	1.4286	0.3489	1.3718	0.8744	1.7253	0.9733	1.7813	0.9908	1.7344	0.9878	2.9155
	1.6667	0.2928	1.6000	0.7409	2.0334	0.8219	2.1124	0.8388	2.0664	0.8275	3.3380
	2.0000	0.2389	1.9169	0.6114	2.4574	0.6776	2.5622	0.6868	2.5129	0.6799	3.8995
	2.5000	0.1872	2.3893	0.4848	3.0868	0.5377	3.2364	0.5451	3.1699	0.5387	4.7218
	3.3333	0.1373	3.1723	0.3606	4.1290	0.4007	4.3241	0.4065	4.2549	0.4011	6.0762
10.0000	5.0000	0.0895	4.7317	0.2385	6.2048	0.2657	6.5094	0.2698	6.4154	0.2659	8.7681
	10.0000	0.0437	9.3953	0.1183	12.4165	0.1322	13.0503	0.1345	12.8837	0.1323	16.8178
	Inf.	1.6077	1.3178	1.2927	1.3406	1.3070	1.3160	1.2409	1.1733	0.9311	0.4257
n	$1/R_e$	L_1	C_2	L_3	C_4	L_5	C_6	L_7	C_8	L_9	C_{10}

TABLE 11-53 Transitional Gaussian to 12-dB *LC* Element Values*



<i>n</i>	<i>R_s</i>	<i>C₁</i>	<i>L₂</i>	<i>C₃</i>	<i>L₄</i>	<i>C₅</i>	<i>L₆</i>	<i>C₇</i>
3	1.0000	0.4152	0.9050	2.3452				
	0.9000	0.4560	0.8126	2.5101				
	0.8000	0.5067	0.7202	2.7166				
	0.7000	0.5715	0.6278	2.9825				
	0.6000	0.6573	0.5356	3.3372				
	0.5000	0.7769	0.4438	3.8336				
	0.4000	0.9554	0.3526	4.5775				
	0.3000	1.2517	0.2623	5.8157				
	0.2000	1.8420	0.1732	8.2884				
	0.1000	3.6083	0.0856	15.6955				
	Inf.	1.4800	0.8440	0.3527				
4	1.0000	0.3097	0.6545	1.0598	2.1518			
	1.1111	0.2757	0.7262	0.9418	2.3289			
	1.2500	0.2423	0.8156	0.8268	2.5459			
	1.4286	0.2096	0.9300	0.7146	2.8203			
	1.6667	0.1775	1.0821	0.6050	3.1814			
	2.0000	0.1461	1.2944	0.4980	3.6812			
	2.5000	0.1153	1.6118	0.3934	4.4241			
	3.3333	0.0853	2.1393	0.2913	5.6532			
	5.0000	0.0560	3.1917	0.1916	8.0979			
	10.0000	0.0276	6.3425	0.0944	15.4048			
	Inf.	1.4585	0.9300	0.6294	0.2707			
5	1.0000	0.2909	0.5837	0.8112	0.9660	2.3745		
	0.9000	0.3207	0.5253	0.8961	0.8707	2.5377		
	0.8000	0.3577	0.4667	1.0019	0.7746	2.7433		
	0.7000	0.4051	0.4081	1.1379	0.6777	3.0092		
	0.6000	0.4680	0.3495	1.3192	0.5804	3.3650		
	0.5000	0.5556	0.2908	1.5727	0.4827	3.8642		
	0.4000	0.6865	0.2322	1.9528	0.3850	4.6138		
	0.3000	0.9038	0.1738	2.5859	0.2875	5.8631		
	0.2000	1.3372	0.1155	3.8515	0.1907	8.3597		
	0.1000	2.6347	0.0575	7.6464	0.0947	15.8420		
	Inf.	1.4953	0.9388	0.7587	0.5724	0.2592		

TABLE 11-53 Transitional Gaussian to 12-dB LC Element Values* (*Continued*)

n	R_s	C_1	L_2	C_3	L_4	C_5	L_6	C_7
6	1.0000	0.3164	0.6070	0.7962	0.7880	1.1448	2.1154	
	1.1111	0.2813	0.6750	0.7108	0.8826	1.0087	2.3076	
	1.2500	0.2470	0.7597	0.6273	0.9994	0.8804	2.5365	
	1.4286	0.2135	0.8681	0.5452	1.1481	0.7580	2.8209	
	1.6667	0.1807	1.0123	0.4644	1.3451	0.6402	3.1908	
	2.0000	0.1487	1.2136	0.3847	1.6194	0.5263	3.6993	
	2.5000	0.1174	1.5148	0.3060	2.0292	0.4157	4.4522	
	3.3333	0.0868	2.0154	0.2282	2.7098	0.3080	5.6952	
	5.0000	0.0570	3.0146	0.1513	4.0679	0.2028	8.1654	
	10.0000	0.0280	6.0071	0.0753	8.1355	0.1002	15.5460	
7	Inf.	1.4732	0.9894	0.8129	0.7484	0.5979	0.2752	
	1.0000	0.3207	0.6267	0.8091	0.7753	0.9241	0.9649	2.3829
	0.9000	0.3534	0.5641	0.8946	0.7016	1.0176	0.8750	2.5374
	0.8000	0.3940	0.5015	1.0015	0.6270	1.1350	0.7824	2.7351
	0.7000	0.4458	0.4387	1.1388	0.5513	1.2867	0.6876	2.9937
	0.6000	0.5146	0.3758	1.3218	0.4747	1.4899	0.5910	3.3428
	0.5000	0.6102	0.3128	1.5781	0.3972	1.7755	0.4931	3.8355
	0.4000	0.7531	0.2498	1.9626	0.3189	2.2054	0.3943	4.5779
	0.3000	0.9902	0.1869	2.6034	0.2399	2.9236	0.2951	5.8175
	0.2000	1.4630	0.1243	3.8851	0.1603	4.3624	0.1961	8.2974
8	0.1000	2.8780	0.0619	7.7299	0.0803	8.6825	0.0976	15.7326
	Inf.	1.4861	0.9693	0.8643	0.8040	0.7689	0.6157	0.2826
n	$1/R_s$	L_1	C_2	L_3	C_4	L_5	C_6	L_7

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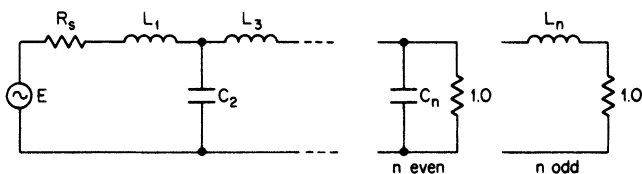


TABLE 11-53 Transitional Gaussian to 12-dB LC Element Values (Continued)

n	R_q	C_1	L_2	C_2	L_3	C_3	L_4	C_4	L_5	C_5	L_6	C_6	L_7	C_7	L_8	C_8	L_9	C_{10}
8	1.0000	0.3449	0.6565	0.8686	0.8028	0.9701	0.8182	1.2503	2.0612									
	1.1111	0.3053	0.7304	0.7729	0.9044	0.8550	0.9339	1.0753	2.2930									
	1.2500	0.2674	0.8221	0.6810	1.0276	0.7489	1.0694	0.9272	2.5445									
	1.4286	0.2308	0.9394	0.5913	1.1837	0.6480	1.2378	0.7929	2.8444									
	1.6667	0.1952	1.0953	0.5034	1.3898	0.5504	1.4579	0.6673	3.2267									
	2.0000	0.1604	1.3128	0.4168	1.6764	0.4553	1.7620	0.5476	3.7473									
	2.5000	0.1265	1.6381	0.3314	2.1045	0.3621	2.2143	0.4323	4.5145									
	3.3333	0.0934	2.1788	0.2471	2.8155	0.2702	2.9640	0.3203	5.7789									
	5.0000	0.0613	3.2575	0.1638	4.2343	0.1794	4.4583	0.2111	8.2899									
	10.0000	0.0301	6.4874	0.0814	8.4843	0.0894	8.9330	0.1044	15.7917									
9	Inf.	1.4974	1.0324	0.8943	0.8908	0.8494	0.8098	0.6452	0.2955									
	1.0000	0.3318	0.6500	0.8467	0.8167	0.9426	0.8239	0.9857	0.9630	2.4140								
	0.9000	0.3657	0.5852	0.9363	0.7389	1.0390	0.7492	1.0803	0.8785	2.5608								
	0.8000	0.4078	0.5201	1.0480	0.6602	1.1599	0.6725	1.2003	0.7894	2.7524								
	0.7000	0.4614	0.4550	1.1914	0.5806	1.3160	0.5936	1.3568	0.6963	3.0070								
	0.6000	0.5324	0.3897	1.3825	0.4999	1.5251	0.5127	1.5681	0.6001	3.3538								
	0.5000	0.6312	0.3243	1.6500	0.4183	1.8192	0.4301	1.8667	0.5015	3.8460								
	0.4000	0.7787	0.2590	2.0512	0.3358	2.2620	0.3460	2.3177	0.4016	4.5897								
	0.3000	1.0234	0.1938	2.7200	0.2526	3.0021	0.2607	3.0729	0.3009	5.8332								
	0.2000	1.5113	0.1288	4.0574	0.1687	4.4850	0.1744	4.5875	0.2000	8.3219								
10	0.1000	2.9716	0.0641	8.0692	0.0845	8.9384	0.0875	9.1379	0.0996	15.7849								
	Inf.	1.4917	0.9908	0.9105	0.8770	0.8910	0.8457	0.8022	0.6376	0.2917								
	1.0139	0.3500	0.6698	0.8817	0.8148	1.0183	0.7949	1.0929	0.7508	1.4303								
	1.1111	0.3092	0.7364	0.7856	0.9200	0.8864	0.9293	0.9147	0.9187	1.1138								
	1.2500	0.2701	0.8290	0.6907	1.0477	0.7734	1.0708	0.7890	1.0712	1.2809								
	1.4286	0.2328	0.9474	0.5992	1.2075	0.6681	1.2428	0.6777	1.2503	1.4914								
	1.6667	0.1968	1.1046	0.5099	1.4179	0.5671	1.4663	0.5734	1.4791	1.7409								
	2.0000	0.1616	1.3239	0.4221	1.7103	0.4689	1.7746	0.4734	1.7920	2.0834								
	2.5000	0.1274	1.6517	0.3355	2.1467	0.3728	2.2329	0.3761	2.2552	2.5840								
	3.3333	0.0941	2.1966	0.2501	2.8714	0.2781	2.9923	0.2806	3.0215	3.4640								
11	5.0000	0.0617	3.2837	0.1658	4.3171	0.1845	4.5061	0.1863	4.5478	5.1622								
	10.0000	0.0303	6.5385	0.0824	8.6473	0.0919	9.0397	0.0929	9.1181	10.2022								
	Inf.	1.4826	1.0350	0.9134	0.9263	0.9061	0.9159	0.8654	0.8190	0.6502								
	1.0139	0.3500	0.6698	0.8817	0.8148	1.0183	0.7949	1.0929	0.7508	1.4303								
	1.1111	0.3092	0.7364	0.7856	0.9200	0.8864	0.9293	0.9147	0.9187	1.1138								
	1.2500	0.2701	0.8290	0.6907	1.0477	0.7734	1.0708	0.7890	1.0712	1.2809								
	1.4286	0.2328	0.9474	0.5992	1.2075	0.6681	1.2428	0.6777	1.2503	1.4914								
	1.6667	0.1968	1.1046	0.5099	1.4179	0.5671	1.4663	0.5734	1.4791	1.7409								
	2.0000	0.1616	1.3239	0.4221	1.7103	0.4689	1.7746	0.4734	1.7920	2.0834								
	2.5000	0.1274	1.6517	0.3355	2.1467	0.3728	2.2329	0.3761	2.2552	2.5840								

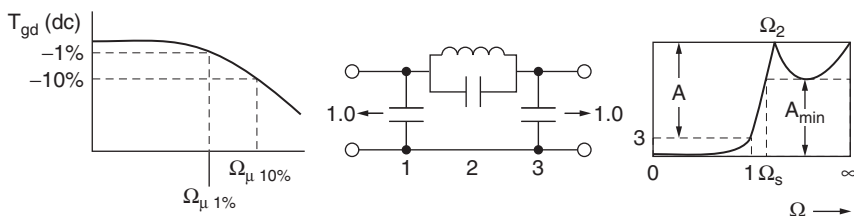
TABLE 11-54 Transitional Gaussian to 6-dB
Active Low-Pass Values

Order n	C_1	C_2
4	1.2594	0.8989
	1.5863	0.2275
6	1.8406	1.3158
	2.1404	0.3841
	4.5372	0.09505
8	2.3685	1.7028
	2.6089	0.5164
	3.4746	0.1870
	8.9127	0.05094
10	2.9551	2.1329
	3.1606	0.6564
	3.7355	0.2568
	5.4083	0.1115
	14.9120	0.03232

TABLE 11-55 Transitional Gaussian to 12-dB Active
Low-Pass Values

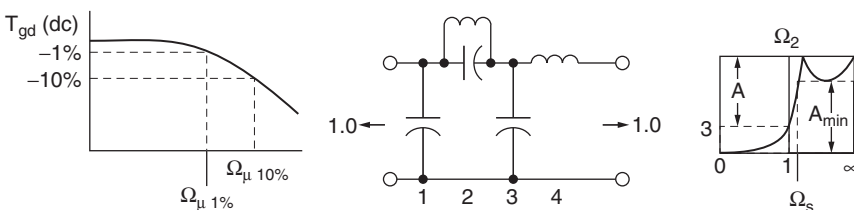
Order n	C_1	C_2
4	1.0778	0.2475
	1.0879	0.7965
6	1.4247	1.0330
	1.5000	0.3150
	2.2326	0.09401
8	1.8379	1.3309
	1.9324	0.4106
	2.3105	0.1557
	5.0556	0.04573
10	2.2051	1.5984
	2.2978	0.4965
	2.5733	0.1983
	3.4388	0.08903
	8.8028	0.02669

TABLE 11-56 Maximally Flat Delay with Chebyshev Stopband



$N = 3$

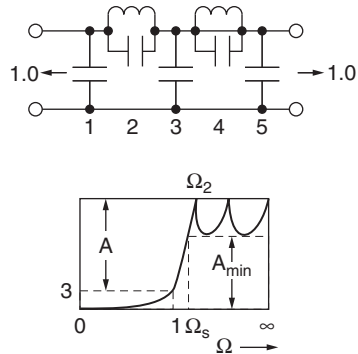
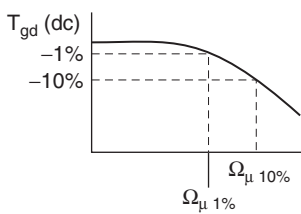
A_{\min}	Ω_s	$T_{gd} \text{ (dc)}$	$\Omega_\mu 1\%$	$\Omega_\mu 10\%$	C_1	C_2	L_2	Ω_2	C_3
18	2.152	1.325	.9091	1.461	2.124	.2769	.5242	2.625	.001434
26	2.721	1.493	.8010	1.304	2.144	.1399	.6931	3.211	.1489
34	3.514	1.602	.7522	1.206	2.166	.07387	.8068	4.096	.2320
42	4.627	1.668	.7122	1.161	2.180	.03958	.8769	5.368	.2791
50	6.178	1.706	.6959	1.134	2.189	.02133	.9178	7.147	.3052
58	8.309	1.727	.6886	1.121	2.193	.01151	.9407	9.610	.3197
66	11.23	1.739	.6850	1.112	2.196	.006226	.9537	12.98	.3275
70	13.07	1.743	.6838	1.109	2.198	.004579	.9580	15.10	.3301



$N = 4$

A_{\min}	Ω_s	$T_{gd} \text{ (dc)}$	$\Omega_\mu 1\%$	$\Omega_\mu 10\%$	C_1	C_2	L_2	Ω_2	C_3	L_4
18	2.070	1.471	1.303	1.923	2.107	.3324	.5088	2.432	.1690	.1575
26	2.466	1.662	1.164	1.704	2.127	.1915	.6744	2.783	.3419	.1795
34	2.988	1.807	1.068	1.568	.1756	.1586	.5905	3.268	2.439	.4078
42	3.548	1.910	1.007	1.432	.2445	.09775	.6647	3.923	2.472	.4383
50	4.341	1.980	.9720	1.432	.1420	.08106	.5386	4.786	1.033	2.245
58	5.363	2.027	.9509	1.396	.1760	.04895	.5862	5.903	1.048	2.244
66	6.665	2.057	.9382	1.377	.1972	.03014	.6171	7.332	1.059	2.240
70	7.447	2.068	.9297	1.369	.2046	.02374	.6281	8.189	1.063	2.240

TABLE 11-56 Maximally Flat Delay with Chebyshev Stopband (*Continued*)

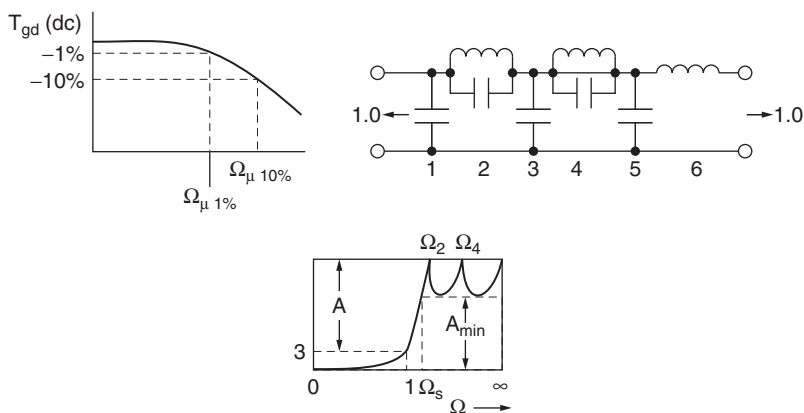


N = 5

A_{min}	Ω_s	$T_{gd} \text{ (dc)}$	$\Omega_\mu \text{ 1\%}$	$\Omega_\mu \text{ 10\%}$	C_1	C_2	L_2
34	2.6802	1.745	1.550	2.142	.02930	.3317	.3665
42	3.0263	1.904	1.408	1.968	.1338	.2216	.4381
50	3.4467	2.035	1.316	1.840	2.1836	.08543	.8830
58	3.9701	2.139	1.304	1.750	2.203	.06060	.9418
66	4.6213	2.218	1.215	1.688	2.218	.04274	.9872
70	5.0044	2.250	1.191	1.665	2.224	.03582	1.006

Ω_2	C_3	C_4	L_4	Ω_4	C_5
2.868	2.420	.07329	.5638	4.919	.1111
3.209	2.435	.05333	.6496	5.373	.1513
3.641	.5958	.08228	.3358	6.016	.07096
4.186	.6503	.05559	.3818	6.864	.1007
4.863	.6922	.03799	.4168	7.947	.1221
5.268	.7092	.03150	.4307	8.585	.1305

TABLE 11-56 Maximally Flat Delay with Chebyshev Stopband (*Continued*)

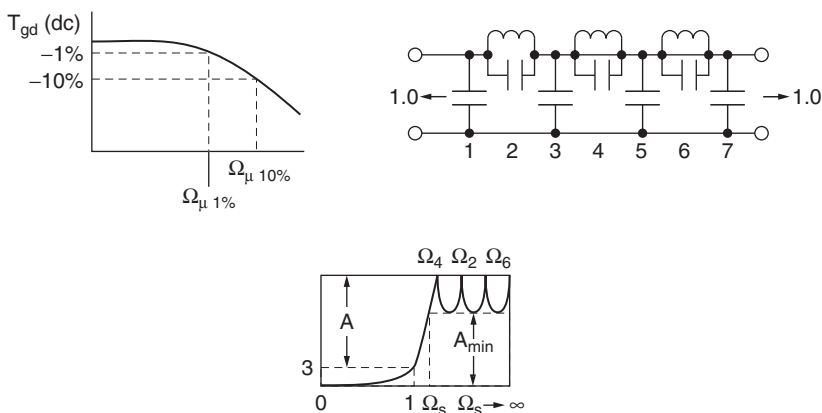


N = 6

A_{\min}	Ω_s	$T_{gd} \text{ (dc)}$	$\Omega_{\mu} 1\%$	$\Omega_{\mu} 10\%$	C_1	C_2	L_2
18	2.0530	1.415	2.096	—	.09332	.09400	1.907
26	2.3648	1.631	2.093	—	.1568	.07374	2.047
34	2.6429	1.820	1.910	2.604	2.128	.1820	.6982
42	2.9239	1.985	1.753	2.343	2.150	.1375	.7730
50	3.2353	2.129	1.643	2.190	2.172	.1047	.8371
58	3.6033	2.251	1.549	2.066	2.190	.07957	.8927
66	4.0446	2.352	1.485	1.982	2.206	.06014	.9396
70	4.2965	2.395	1.451	1.939	2.213	.05216	.9602

Ω_2	C_3	C_4	L_4	Ω_4	C_5	L_6
2.362	.4290	.2681	.2033	4.283	.08674	.1107
2.574	.5121	.2078	.2763	4.174	.1506	.1193
2.805	.4206	.2526	.2164	4.277	.08769	.09013
3.067	.4943	.1647	.2960	4.529	.1591	.09865
3.378	.5627	.1134	.3668	4.903	.2144	.1061
3.752	.6231	.08054	.4266	5.395	.2577	.1125
4.207	.6738	.05814	.4751	6.017	.2916	.1178
4.468	.6957	.04967	.4958	6.377	.3056	.1201

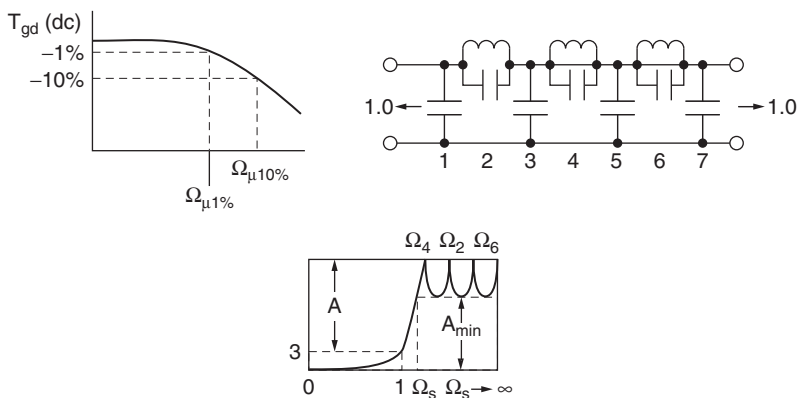
TABLE 11-56 Maximally Flat Delay with Chebyshev Stopband (*Continued*)



N = 7								
A_{\min}	Ω_s	$T_{gd}(\text{dc})$	$\Omega_\mu 1\%$	$\Omega_\mu 10\%$	C_1	C_2	L_2	Ω_2
38	2.7259	1.839	2.357	—	.06065	.1728	.3777	3.919
42	2.8814	1.923	2.244	—	.07500	.1560	.4038	3.984
50	3.1288	2.080	2.087	2.704	.1064	.1259	.4543	4.181
58	3.3944	2.221	1.940	2.532	.1367	.1004	.5013	4.457
66	3.6959	2.348	1.839	2.395	.2557	.1169	.3703	4.806
70	3.8657	2.405	1.808	2.330	2.221	.04079	.9757	5.013

C_3	C_4	L_4	Ω_4	C_5	C_6	L_6	Ω_6	L_8
2.367	.2635	.4537	2.891	.2176	.09914	.1905	7.276	.01189
2.375	.2285	.4857	3.002	.2648	.08555	.2152	7.369	.02704
2.396	.1751	.5460	3.234	.3447	.06519	.2596	7.687	.05283
2.421	.1361	.6008	3.497	.4102	.05039	.2981	8.159	.07411
2.343	.07932	.8728	3.800	.5051	.04595	.2832	8.766	.06607
.6640	.1576	.4019	3.973	.3035	.05842	.2056	9.125	.03636

TABLE 11-56 Maximally Flat Delay with Chebyshev Stopband (*Continued*)



N = 8

A_{\min}	Ω_s	$T_{gd} \text{ (dc)}$	$\Omega_{\mu} 1\%$	$\Omega_{\mu} 10\%$	C_1	C_2	L_2	Ω_2
34	2.6318	1.798	2.660	—	.05238	.2052	.3371	3.802
42	2.8660	1.971	2.643	—	.06575	.1851	.3635	3.855
50	3.1053	2.128	2.434	—	2.198	.06844	.9184	3.987
58	3.3358	2.272	2.264	2.906	2.203	.06164	.9265	4.185
66	3.5839	2.403	2.152	2.738	2.209	.05407	.9386	4.439
70	3.7175	2.464	2.100	2.671	.1545	.09950	.4780	4.585

C_3	C_4	L_4	Ω_4	C_5	C_6	L_6	Ω_6	C_7	C_8
2.354	.3089	.4189	2.781	.1356	.1600	.1637	6.179	.07187	.06295
2.363	.2249	.4973	2.990	.2432	.1184	.2204	6.190	.1178	.07113
.5909	.5620	.1736	3.202	.09376	.1597	.1552	6.352	.06576	.06069
.5878	.3242	.2631	3.424	.2016	.1163	.1959	6.625	.1011	.06493
.6106	.2185	.3400	3.669	.2754	.08764	.2333	6.993	.1305	.06877
2.430	.1005	.6877	3.804	.4684	.05036	.3814	7.216	.2339	.09422

