

Kenngrößen normierter Tiefpassfilter

Tiefpass mit kritischer Dämpfung

$A_0 = 1$
 $A(\Omega = 1) = -3 \text{ [dB]}$

Ordnung n	Teilfilter	Pollage Re	Im	quadr. Glieder a_{11}	a_{12}	Polfrequenz Ω_p	Polgüte Q_p
1	1	-1.00000000	± 0	1	0	1	0.5
2	1	-1.55377397	± 0	3.10754795	0.4142136	1.55377397	0.5
3	1	-1.96145918	± 0	1.96145918	0	1.96145918	0.5
3	2	-1.96145918	± 0	3.92291835	0.2599210	1.96145918	0.5
4	1	-2.29895922	± 0	4.59791845	0.1892071	2.29895922	0.5
4	2	-2.29895922	± 0	4.59791845	0.1892071	2.29895922	0.5
5	1	-2.59326512	± 0	2.59326512	0	2.59326512	0.5
5	2	-2.59326512	± 0	5.18653023	0.1486984	2.59326512	0.5
5	3	-2.59326512	± 0	5.18653023	0.1486984	2.59326512	0.5
6	1	-2.85758555	± 0	5.71517109	0.1224620	2.85758555	0.5
6	2	-2.85758555	± 0	5.71517109	0.1224620	2.85758555	0.5
6	3	-2.85758555	± 0	5.71517109	0.1224620	2.85758555	0.5
7	1	-3.09953475	± 0	3.09953475	0	3.09953475	0.5
7	2	-3.09953475	± 0	6.19906951	0.1040895	3.09953475	0.5
7	3	-3.09953475	± 0	6.19906951	0.1040895	3.09953475	0.5
7	4	-3.09953475	± 0	6.19906951	0.1040895	3.09953475	0.5
8	1	-3.32397047	± 0	6.64794095	0.0905077	3.32397047	0.5
8	2	-3.32397047	± 0	6.64794095	0.0905077	3.32397047	0.5
8	3	-3.32397047	± 0	6.64794095	0.0905077	3.32397047	0.5
8	4	-3.32397047	± 0	6.64794095	0.0905077	3.32397047	0.5
9	1	-3.53421459	± 0	3.53421459	0	3.53421459	0.5
9	2	-3.53421459	± 0	7.06842918	0.0800597	3.53421459	0.5
9	3	-3.53421459	± 0	7.06842918	0.0800597	3.53421459	0.5
9	4	-3.53421459	± 0	7.06842918	0.0800597	3.53421459	0.5
9	5	-3.53421459	± 0	7.06842918	0.0800597	3.53421459	0.5
10	1	-3.73265672	± 0	7.46531344	0.0717735	3.73265672	0.5
10	2	-3.73265672	± 0	7.46531344	0.0717735	3.73265672	0.5
10	3	-3.73265672	± 0	7.46531344	0.0717735	3.73265672	0.5
10	4	-3.73265672	± 0	7.46531344	0.0717735	3.73265672	0.5
10	5	-3.73265672	± 0	7.46531344	0.0717735	3.73265672	0.5

Kenngrößen normierter Tiefpassfilter

Bessel Tiefpass unkorrigiert (Thompson Tiefpass)

$A_0 = 1$
 $A(\Omega = 1) = X$ [dB]

Ordnung n	Teilfilter	Polloge Re	Im	quadr. Glieder a_{11}	a_{12}	Polfrequenz Ω_p	Polgüte Q_p
1	1	-1	± 0	1	0	1	0.5
2	1	-1.5	± 0.86602540	1	0.33333333	1.73205081	0.5773503
3	1	-1.83890732	± 1.75438096	0.569371154	0.15481236	2.54154140	0.6910466
3	2	-2.32218535	± 0	1	0	2.32218535	0.5
4	1	-2.10378977	± 2.65741777	0.366265022	0.08704886	3.38936581	0.8055381
4	2	-2.896212	± 0.86723384	0.633734818	0.10940753	3.02326619	0.5219345
5	1	-2.32467426	± 3.57102306	0.256073341	0.05507725	4.26102289	0.9164774
5	2	-3.35195637	± 1.74266156	0.469709003	0.0700649	3.77789370	0.5635356
5	3	-3.64673867	± 0	1	0	3.64673867	0.5
6	1	-2.51593224	± 4.49267296	0.189781235	0.03771589	5.14917715	1.0233140
6	2	-3.73570836	± 2.62627231	0.358292815	0.04795514	4.56648915	0.6111945
6	3	-4.24835933	± 0.86750974	0.451925953	0.05318829	4.33602700	0.5103178
7	1	-2.6856856	± 5.42069410	0.146771481	0.02732477	6.04953152	1.1262546
7	2	-4.07013916	± 3.51717405	0.281314788	0.03455837	5.37927003	0.6608214
7	3	-4.75834202	± 1.73938630	0.370770987	0.0389601	5.06628893	0.5323586
7	4	-4.97178653	± 0	1	0	4.97178653	0.5
8	1	-2.83898389	± 6.35391122	0.117235831	0.0206475	6.95931155	1.2256694
8	2	-4.36828703	± 4.41444057	0.226516759	0.02592741	6.21041199	0.7108521
8	3	-5.2048432	± 2.61617604	0.306755769	0.0294683	5.82535577	0.5596092
8	4	-5.58788833	± 0.86760241	0.349491707	0.03127225	5.65484128	0.5059909
9	1	-2.9792608	± 7.29146265	0.096041022	0.01611826	7.87663777	1.3219114
9	2	-4.63843989	± 5.31727168	0.186325743	0.02008496	7.05609685	0.7606110
9	3	-5.60442182	± 3.49815692	0.256808821	0.02291127	6.60656081	0.5894061
9	4	-6.1293694	± 1.73784663	0.302019123	0.02463705	6.37097168	0.5197086
9	5	-6.2970172	± 0	1	0	6.29701720	0.5
10	1	-3.10895123	± 8.23266768	0.080290679	0.01291282	8.80013607	1.4152901
10	2	-4.88621957	± 6.22498548	0.156045472	0.01596791	7.91363291	0.8097910
10	3	-5.9675831	± 4.38870694	0.217506067	0.01822397	7.40761748	0.6206547
10	4	-6.61529164	± 2.61156822	0.261565102	0.01976973	7.11212852	0.5375522
10	5	-6.92205034	± 0.86766396	0.28446224	0.02054754	6.97621829	0.5039127

Kenngrößen normierter Tiefpassfilter

Bessel Tiefpass, 3dB korrigiert (Thompson Tiefpass)

$A_0 = 1$
 $A(\Omega = 1) = -3 \text{ [dB]}$

Ordnung n	Teilfilter	Pollage Re	Im	quadr. Glieder a_{11}	a_{12}	Polfrequenz Ω_p	Polgüte Q_p
1	1	-1	± 0	1	0	1	0.5
2	1	-1.101601331	± 0.63600982	1.361654129	0.61803399	1.27201965	0.5773503
3	1	-1.047409161	± 0.99926444	0.999629202	0.47719136	1.44761713	0.6910466
3	2	-1.3226758	± 0	1	0	1.32267580	0.5
4	1	-0.995208764	± 1.25710574	0.774253975	0.38899073	1.60335752	0.8055383
4	2	-1.37006783	± 0.41024972	1.3396637	0.48890415	1.43017156	0.5219346
5	1	-0.957676548	± 1.47112432	0.621595207	0.32453296	1.75537778	0.9164774
5	2	-1.380877326	± 0.71790959	1.140176696	0.41284504	1.55634712	0.5635356
5	3	-1.502316271	± 0	1	0	1.50231627	0.5
6	1	-0.930656523	± 1.66186327	0.513053656	0.27564071	1.90470761	1.0233140
6	2	-1.381858097	± 0.97147189	0.968607026	0.35047268	1.68916827	0.6111945
6	3	-1.571490403	± 0.32089637	1.22173438	0.38871837	1.60391913	0.5103178
7	1	-0.909867781	± 1.83645135	0.433227776	0.23807183	2.04949090	1.1262575
7	2	-1.378903217	± 1.19156678	0.83036309	0.30109549	1.82241748	0.6608214
7	3	-1.612038766	± 0.58924451	1.094436855	0.33945736	1.71635604	0.5323557
7	4	-1.684368179	± 0	1	0	1.68436818	0.5
8	1	-0.892869719	± 1.99832584	0.372765065	0.2087455	2.18872623	1.2256694
8	2	-1.373841218	± 1.388356576	0.720236277	0.26212501	1.95319576	0.7108521
8	3	-1.636939418	± 0.82279563	0.975366333	0.29792377	1.83209260	0.5596092
8	4	-1.7574084	± 0.27286758	1.111249562	0.31616145	1.77846591	0.5059911
9	1	-0.87839928	± 2.14980053	0.325741593	0.18541773	2.32233237	1.3219116
9	2	-1.367588316	± 1.56773372	0.631959743	0.23104897	2.08040545	0.7606110
9	3	-1.652396492	± 1.03138957	0.871016712	0.26356166	1.94786514	0.5894061
9	4	-1.807170543	± 0.51238373	1.024356242	0.28341438	1.87840423	0.5197086
9	5	-1.85660051	± 0	1	0	1.85660051	0.5
10	1	-0.865756902	± 2.29260483	0.288317886	0.16651203	2.45062684	1.4153089
10	2	-1.360692278	± 1.73350574	0.560356263	0.20590852	2.20375263	0.8097910
10	3	-1.661810241	± 1.22110022	0.781532026	0.23514479	2.06220732	0.6204702
10	4	-1.842196245	± 0.72725760	0.939275303	0.25493356	1.98055311	0.5375522
10	5	-1.927619691	± 0.24162347	1.021499116	0.26496386	1.94270419	0.5039127

Kenngrößen normierter Tiefpassfilter

Butterworth Tiefpass

$A_0 = 1$
 $A(\Omega = 1) = -3 \text{ [dB]}$

Ordnung n	Teilfilter	Pollage Re	Im	quadr. Glieder a_{11}	a_{12}	Polfrequenz Ω_p	Polgüte Q_p
1	1	-1	± 0	1	0	1	0.5
2	1	-0.707106781	± 0.707106781	1.414213562	1	1	0.707106781
3	1	-0.5	± 0.866025404	1	1	1	1
3	2	-1	± 0	1	0	1	0.5
4	1	-0.382683432	± 0.923879533	0.765366865	1	1	1.306562965
4	2	-0.923879533	± 0.382683432	1.847759065	1	1	0.5411961
5	1	-0.309016994	± 0.951056516	0.618033989	1	1	1.618033989
5	2	-0.809016994	± 0.587785252	1.618033989	1	1	0.618033989
5	3	-1	± 0	1	0	1	0.5
6	1	-0.258819045	± 0.965925826	0.51763809	1	1	1.931851653
6	2	-0.707106781	± 0.707106781	1.414213562	1	1	0.707106781
6	3	-0.965925826	± 0.258819045	1.931851653	1	1	0.51763809
7	1	-0.222520934	± 0.974927912	0.445041868	1	1	2.246979604
7	2	-0.623489802	± 0.781831482	1.246979604	1	1	0.801937736
7	3	-0.900968868	± 0.433883739	1.801937736	1	1	0.554958132
7	4	-1	± 0	1	0	1	0.5
8	1	-0.195090322	± 0.98078528	0.390180644	1	1	2.562915448
8	2	-0.555570233	± 0.831469612	1.111140466	1	1	0.899976223
8	3	-0.831469612	± 0.555570233	1.662939225	1	1	0.601344887
8	4	-0.98078528	± 0.195090322	1.961570561	1	1	0.509795579
9	1	-0.173648178	± 0.984807753	0.347296355	1	1	2.879385242
9	2	-0.5	± 0.866025404	1	1	1	1
9	3	-0.766044443	± 0.64278761	1.532088886	1	1	0.652703645
9	4	-0.939692621	± 0.342020143	1.879385242	1	1	0.532088886
9	5	-1	± 0	1	0	1	0.5
10	1	-0.156434465	± 0.987688341	0.31286893	1	1	3.196226611
10	2	-0.4539905	± 0.891006524	0.907980999	1	1	1.101344632
10	3	-0.707106781	± 0.707106781	1.414213562	1	1	0.707106781
10	4	-0.891006524	± 0.4539905	1.782013048	1	1	0.561163119
10	5	-0.987688341	± 0.156434465	1.975376681	1	1	0.506232563

Kenngrößen normierter Tiefpassfilter

Tschebyscheff Tiefpass

Ar = 0.01 [dB] A₀ (gerade) = 0.99884937
 ε = 0.048012895 A(Ω = 1) = -0.01 [dB]

Ordnung n	Teilfilter	Pollage		quadr. Glieder		Polfrequenz Ω _P	Polgüte Q _P
		Re	Im	a ₁₁	a ₁₂		
1	1	-20.82773809	± 0	20.82773809	0	20.82773809	0.5
2	1	-2.227764054	± 2.33729174	0.427353314	0.0959153	3.228910862	0.724697675
3	1	-0.794685254	± 1.626214611	0.485141229	0.30524112	1.809999617	1.138815403
3	2	-1.589370509	± 0	1.589370509	0	1.589370509	0.5
4	1	-0.410866377	± 1.355528329	0.409582698	0.49843784	1.416427983	1.723708804
4	2	-0.99191918	± 0.561478218	1.527014492	0.76972727	1.139807637	0.574546626
5	1	-0.252512248	± 1.228199883	0.321213895	0.63603627	1.253888905	2.482827897
5	2	-0.661085647	± 0.759069273	1.304919742	0.98695211	1.006588492	0.761314738
5	3	-0.817146798	± 0	0.817146798	0	0.817146798	0.5
6	1	-0.171465506	± 1.158666356	0.249966453	0.72891177	1.171284827	3.415511525
6	2	-0.468452475	± 0.848202642	0.997879963	1.06508132	0.968966172	1.034220357
6	3	-0.639917982	± 0.310463714	2.529906357	1.97674267	0.711254344	0.555738676
7	1	-0.124263537	± 1.116643611	0.196878955	0.79218313	1.123536551	4.520781309
7	2	-0.348178693	± 0.895478649	0.7543598	1.08329403	0.960786352	1.379731686
7	3	-0.503132789	± 0.496953158	2.012108432	1.99957991	0.707181056	0.702777746
7	4	-0.558435266	± 0	0.558435266	0	0.558435266	0.5
8	1	-0.094292754	± 1.089337086	0.157740015	0.83643762	1.09341045	5.797955832
8	2	-0.268523046	± 0.92349539	0.580622783	1.08114144	0.961742357	1.790800402
8	3	-0.401873138	± 0.617059892	1.482202209	1.84411705	0.736386399	0.916192611
8	4	-0.474041688	± 0.216682619	3.489874729	3.68097872	0.521216729	0.549758326
9	1	-0.074045711	± 1.07060308	0.128588001	0.86830148	1.073160622	7.246608943
9	2	-0.213206127	± 0.941472548	0.457608619	1.0731601	0.96531208	2.263800041
9	3	-0.326650738	± 0.698786532	1.097979544	1.68066289	0.771364584	1.180717651
9	4	-0.400696449	± 0.371816548	2.681991233	3.34666209	0.546630761	0.682100831
9	5	-0.426412255	± 0	0.426412255	0	0.426412255	0.5
10	1	-0.059712675	± 1.057197023	0.106512693	0.89187676	1.058882028	8.866476282
10	2	-0.173292931	± 0.953711212	0.368867089	1.06428775	0.969327353	2.796788492
10	3	-0.269910069	± 0.756869503	0.836019391	1.5486999	0.803556401	1.48856322
10	4	-0.340106528	± 0.485940134	1.933465634	2.84244123	0.593135958	0.871985553
10	5	-0.37701099	± 0.167443559	4.430871811	5.87631651	0.412522281	0.547095829

Tschebyscheff Tiefpass

Ar = 0.1 [dB]
 ε = 0.152620419

A₀ (gerade) = 0.98855309
 A(Ω = 1) = -0.1 [dB]

Ordnung n	Teilfilter	Pollage		quadr. Glieder		Polfrequenz		Polgüte	
		Re	Im	a ₁₁	a ₁₂	Ω _p	Q _p		
1	1	-6.552203217	± 0	6.552203217	0	6.5522032		0.5	
2	1	-1.186178123	± 1.38094842	0.715850846	0.30174677	1.8204497		0.767359327	
3	1	-0.484702855	± 1.206155285	0.573698585	0.59180442	1.2999029		1.340927582	
3	2	-0.969405709	± 0	0.969405709	0	0.9694057		0.5	
4	1	-0.264156367	± 1.122609815	0.397218247	0.75186196	1.1532699		2.182930279	
4	2	-0.637729885	± 0.465000211	2.047534751	1.60533072	0.7892557		0.618800957	
5	1	-0.166533685	± 1.080372009	0.278732124	0.8368641	1.0931318		3.282014113	
5	2	-0.435990847	± 0.667706622	1.371212551	1.57252447	0.797446		0.914521514	
5	3	-0.538914324	± 0	0.538914324	0	0.5389143		0.5	
6	1	-0.114693369	± 1.056518912	0.203107334	0.88543625	1.0627261		4.632901254	
6	2	-0.313348112	± 0.773425523	0.899941918	1.4360098	0.8344903		1.33157067	
6	3	-0.428041481	± 0.283093389	3.25060179	3.79706399	0.5131875		0.599459971	
7	1	-0.083840965	± 1.041833334	0.153492191	0.91537705	1.0452014		6.233238214	
7	2	-0.234917164	± 0.835485465	0.623766043	1.32762977	0.8678837		1.847212092	
7	3	-0.339465138	± 0.463659453	2.056014554	3.02831473	0.5746448		0.846397398	
7	4	-0.376777878	± 0	0.376777878	0	0.3767779		0.5	
8	1	-0.063980124	± 1.032181362	0.119645841	0.93502351	1.0341624		8.08190346	
8	2	-0.182199979	± 0.875041106	0.456130679	1.25173088	0.8938086		2.452822938	
8	3	-0.272681539	± 0.584683774	1.310306419	2.40263134	0.6451437		1.182961744	
8	4	-0.321649806	± 0.205313638	4.417893725	6.8675523	0.3815918		0.59317894	
9	1	-0.050438055	± 1.025509635	0.095688455	0.948574	1.0267492		10.17831919	
9	2	-0.145230591	± 0.901818038	0.348121316	1.19851236	0.9134373		3.1447827	
9	3	-0.222506174	± 0.669353876	0.89441878	2.00987407	0.7053677		1.585052	
9	4	-0.272944229	± 0.356155759	2.71120299	4.96658787	0.4487154		0.821990932	
9	5	-0.290461181	± 0	0.290461181	0	0.2904612		0.5	
10	1	-0.040788671	± 1.0207104	0.078175652	0.95830103	1.0215251		12.5221663	
10	2	-0.118373335	± 0.920796154	0.274687048	1.16025728	0.9283737		3.921380357	
10	3	-0.184370792	± 0.730747965	0.64920987	1.76060932	0.7536479		2.043837601	
10	4	-0.232320751	± 0.469169074	1.695199301	3.64840268	0.5235385		1.126757918	
10	5	-0.257529536	± 0.161664645	5.570800701	10.8158481	0.3040673		0.590354215	

Tschebyscheff Tiefpass

Ar = 0.2 [dB]
 $\epsilon = 0.217091105$

A₀ (gerade) = 0.97723722
 A($\Omega = 1$) = -0.2 [dB]

Ordnung n	Teilfilter	Pollage		quadr. Glieder		Polfrequenz		Polgüte	
		Re	Im	a ₁₁	a ₁₂	Ω_p	Q _p		
1	1	-4.606360993	± 0	4.606360993	0	4.606361			0.5
2	1	-0.963542542	± 1.195162847	0.817660307	0.42429902	1.5351966			0.796641813
3	1	-0.407317067	± 1.117014583	0.576271614	0.7073993	1.1889612			1.459503312
3	2	-0.814634133	± 0	0.814634133	0	0.8146341			0.5
4	1	-0.224810721	± 1.071504216	0.375103043	0.83426413	1.0948338			2.435012523
4	2	-0.542741092	± 0.443831578	2.208264774	2.03436298	0.70111094			0.645896718
5	1	-0.142583709	± 1.047414962	0.255204333	0.89492809	1.0570753			3.706858653
5	2	-0.373288997	± 0.647338047	1.337015993	1.7908591	0.7472558			1.000907876
5	3	-0.461410576	± 0	0.461410576	0	0.4614106			0.5
6	1	-0.098524313	± 1.033544548	0.182804267	0.92771145	1.0382299			5.268902109
6	2	-0.269173429	± 0.756607121	0.834764492	1.55060716	0.8030621			1.491718668
6	3	-0.367697742	± 0.276937427	3.470549682	4.71929697	0.4603216			0.625951072
7	1	-0.072166302	± 1.024917071	0.136722237	0.94727202	1.0274546			7.118659169
7	2	-0.202205484	± 0.821919675	0.564473685	1.39579222	0.8464272			2.092987753
7	3	-0.29219539	± 0.456131008	1.991560259	3.40792553	0.5416952			0.926939942
7	4	-0.324312416	± 0	0.324312416	0	0.3243124			0.5
8	1	-0.055143274	± 1.019211896	0.105858114	0.95984612	1.0207025			9.255004935
8	2	-0.157034757	± 0.864046124	0.407229005	1.29662061	0.8782002			2.796196945
8	3	-0.235019122	± 0.577337162	1.209717152	2.57365686	0.6233395			1.326146438
8	4	-0.277223957	± 0.202733851	4.700538105	8.4778714	0.3434445			0.619435134
9	1	-0.043510823	± 1.015252611	0.084271769	0.96840008	1.0161846			11.67737689
9	2	-0.125284422	± 0.892798162	0.308284382	1.23033805	0.9015458			3.597996231
9	3	-0.19194687	± 0.662659079	0.80656612	2.101014	0.689899			1.797109323
9	4	-0.235457693	± 0.352593531	2.619652731	5.56289476	0.4239841			0.900340317
9	5	-0.250568843	± 0	0.250568843	0	0.2505688			0.5
10	1	-0.035209445	± 1.012396753	0.068621895	0.97448136	1.0130088			14.38547021
10	2	-0.102181788	± 0.913296305	0.241978889	1.18406075	0.9189947			4.496861525
10	3	-0.159151866	± 0.724796052	0.578041844	1.81600712	0.7420638			2.331307153
10	4	-0.20054305	± 0.46534771	1.562068537	3.89459654	0.5067208			1.263371721
10	5	-0.222303684	± 0.160347893	5.917811134	13.3101958	0.2740992			0.61649722

Tschebyscheff Tiefpass

Ar = 0.5 [dB]
 ε = 0.3493114

A₀ (gerade) = 0.94406088
 A(Ω=1) = -0.5 [dB]

Ordnung n	Teilfilter	Pollage		quadr. Glieder		Polfrequenz		Polgüte	
		Re	Im	a ₁₁	a ₁₂	Ω _P	Q _P		
1	1	-2.862775161	± 0	2.862775161	0	2.8627752		0.5	
2	1	-0.712812257	± 1.004042486	0.940259889	0.65954245	1.2313418		0.863720978	
3	1	-0.313228243	± 1.021927491	0.548345863	0.87531357	1.0688535		1.706189477	
3	2	-0.626456486	± 0	0.626456486	0	0.6264565		0.5	
4	1	-0.17535307	± 1.016252893	0.329760218	0.94027501	1.0312704		2.940554174	
4	2	-0.423339759	± 0.420945731	2.375564938	2.80574277	0.5970024		0.705110237	
5	1	-0.111962921	± 1.011557369	0.216189708	0.96545225	1.0177347		4.54496333	
5	2	-0.293122733	± 0.625176836	1.229626738	2.09746055	0.6904832		1.177805565	
5	3	-0.362319624	± 0	0.362319624	0	0.3623196		0.5	
6	1	-0.077650075	± 1.008460847	0.151805169	0.97749531	1.0114459		6.512845593	
6	2	-0.212143951	± 0.738244577	0.719119713	1.69488621	0.7681212		1.810377229	
6	3	-0.289794027	± 0.27021627	3.691704548	6.36953182	0.396229		0.683638983	
7	1	-0.05700319	± 1.006408538	0.112199132	0.98414783	1.0080216		8.841799735	
7	2	-0.159719389	± 0.807076984	0.471925758	1.47735901	0.8227293		2.575546176	
7	3	-0.230801205	± 0.447893935	1.818204389	3.93889709	0.5038632		1.091552468	
7	4	-0.256170011	± 0	0.256170011	0	0.25617		0.5	
8	1	-0.043620077	± 1.005002068	0.086211489	0.98820882	1.0059482		11.53079405	
8	2	-0.124219469	± 0.851999614	0.335124248	1.34891998	0.8610074		3.465670278	
8	3	-0.185907573	± 0.569287941	1.036706389	2.78823065	0.5988743		1.610677433	
8	4	-0.219292935	± 0.199907341	4.980968014	11.3568821	0.2967361		0.676574782	
9	1	-0.034452717	± 1.004003973	0.06827654	0.9908731	1.0045949		14.57932825	
9	2	-0.099202644	± 0.882906277	0.251348075	1.26684162	0.888462		4.478015556	
9	3	-0.151987268	± 0.655317053	0.671706707	2.20974664	0.6727114		2.213051681	
9	4	-0.186439984	± 0.348686921	2.385020837	6.39621604	0.3954016		1.060399183	
9	5	-0.198405287	± 0	0.198405287	0	0.1984053		0.5	
10	1	-0.027899411	± 1.003273174	0.055392493	0.99271798	1.003661		17.98713652	
10	2	-0.080967243	± 0.905065806	0.196117869	1.2110939	0.9086803		5.611406649	
10	3	-0.126109438	± 0.71826429	0.474267527	1.88038078	0.7292511		2.891342315	
10	4	-0.158907162	± 0.461154061	1.33583389	4.20318968	0.4877649		1.534747863	
10	5	-0.176149947	± 0.15890286	6.259890499	17.7686415	0.2372318		0.673380252	

Tschebyscheff 1dB

Tschebyscheff Tiefpass

Ar = 1 [dB]
 $\epsilon = 0.50884714$

A₀ (gerade) = 0.89125094
 A($\Omega = 1$) = -1 [dB]

Ordnung n	Teilfilter	Pollage		quadr. Glieder		Polfrequenz Ω_P	Polgüte Q _P
		Re	Im	a ₁₁	a ₁₂		
1	1	-1.965226728	± 0	1.965226728	0	1.9652267	0.5
2	1	-0.548867164	± 0.895128574	0.995668068	0.90702098	1.0500049	0.956520071
3	1	-0.247085302	± 0.965998675	0.497051222	1.0058292	0.9970981	2.017720344
3	2	-0.494170605	± 0	0.494170605	0	0.4941706	0.5
4	1	-0.139535996	± 0.983379164	0.282889623	1.01367973	0.9932295	3.559044071
4	2	-0.336869694	± 0.407328987	2.411395789	3.57912248	0.5285812	0.784548474
5	1	-0.089458362	± 0.990107112	0.181032104	1.01182326	0.9941403	5.556441306
5	2	-0.234205033	± 0.611919848	1.09110729	2.32938481	0.6552083	1.39879207
5	3	-0.289493341	± 0	0.289493341	0	0.2894933	0.5
6	1	-0.062181024	± 0.993411202	0.12552538	1.0093544	0.9953554	8.003690687
6	2	-0.169881716	± 0.727227473	0.609201175	1.79301572	0.7468063	2.198018362
6	3	-0.23206274	± 0.266183729	3.721730759	8.01880293	0.3531386	0.760868874
7	1	-0.045708981	± 0.995283958	0.092092126	1.00737452	0.996333	10.89865691
7	2	-0.12807372	± 0.798155764	0.391989109	1.53032609	0.8083659	3.155861901
7	3	-0.185071887	± 0.442943032	1.60617731	4.33933358	0.4800522	1.296934468
7	4	-0.205414297	± 0	0.205414297	0	0.2054143	0.5
8	1	-0.035008233	± 0.996451283	0.07042913	1.0058938	0.9970661	14.24045102
8	2	-0.099695014	± 0.844750608	0.275574657	1.38208847	0.8506131	4.266076562
8	3	-0.149204132	± 0.56444431	0.875458894	2.93376223	0.5838315	1.956485787
8	4	-0.175998274	± 0.198206484	5.009828112	14.2326058	0.2650683	0.753042323
9	1	-0.027667447	± 0.997229674	0.055599965	1.00479033	0.9976134	18.02864976
9	2	-0.079665237	± 0.876949058	0.205485311	1.2896799	0.8805602	5.526627377
9	3	-0.122054225	± 0.650895443	0.556610895	2.28017873	0.6622402	2.712893485
9	4	-0.149721671	± 0.346334231	2.103364527	7.02424876	0.3773115	1.260043088
9	5	-0.159330475	± 0	0.159330475	0	0.1593305	0.5
10	1	-0.022414451	± 0.997775508	0.045006301	1.00395723	0.9980272	22.26303078
10	2	-0.065049271	± 0.900106289	0.159743259	1.22786356	0.9024537	6.936693635
10	3	-0.101316615	± 0.714328395	0.389282437	1.92111844	0.7214777	3.560510416
10	4	-0.127666383	± 0.458627062	1.126613121	4.41233272	0.4760646	1.864486839
10	5	-0.141519276	± 0.158032115	6.289486339	22.2213062	0.2121364	0.749496508

Tschebyscheff Tiefpass

Ar = 2 [dB]
 $\epsilon = 0.764783102$

A_0 (gerade) = 0.79432823
 $A(\Omega=1) = -2$ [dB]

Ordnung n	Teilfilter	Pollage		quadr. Glieder		Polfrequenz		Polgüte	
		Re	Im	a_{11}	a_{12}	Ω_p	Q_p		
1	1	-1.307560272	± 0	1.307560272	0	1.3075603		0.5	
2	1	-0.401908215	± 0.813345076	0.976618975	1.21497762	0.9072268		1.128649209	
3	1	-0.184455394	± 0.923077124	0.416333145	1.12854695	0.9413263		2.551636633	
3	2	-0.368910789	± 0	0.368910789	0	0.3689108		0.5	
4	1	-0.104887252	± 0.95795296	0.225885759	1.07680273	0.963678		4.593875513	
4	2	-0.253220227	± 0.396797108	2.285706756	4.51327839	0.4707106		0.929448968	
5	1	-0.067460981	± 0.973455719	0.141699891	1.05023591	0.9757905		7.232258115	
5	2	-0.176615142	± 0.601628721	0.89846181	2.54355827	0.6270168		1.77509346	
5	3	-0.218308321	± 0	0.218308321	0	0.2183083		0.5	
6	1	-0.046973215	± 0.981705172	0.097257914	1.03524863	0.9828283		10.46158243	
6	2	-0.128333211	± 0.718658064	0.481605786	1.87638797	0.7300266		2.844262159	
6	3	-0.175306427	± 0.263047108	3.508720625	10.007393	0.3161109		0.901595403	
7	1	-0.034566356	± 0.986620521	0.070933364	1.0260463	0.9872259		14.28015496	
7	2	-0.096852779	± 0.791208227	0.304860443	1.57383426	0.7971141		4.115081316	
7	3	-0.13995632	± 0.43908744	1.317945776	4.70841822	0.4608531		1.646417499	
7	4	-0.155339796	± 0	0.155339796	0	0.1553398		0.5	
8	1	-0.026492379	± 0.989787011	0.054045115	1.02001247	0.9901415		18.68728879	
8	2	-0.075443914	± 0.839100911	0.212583302	1.40888305	0.8424857		5.58352317	
8	3	-0.112909796	± 0.560669304	0.690371435	3.05718131	0.5719254		2.532665205	
8	4	-0.133186185	± 0.196880877	4.714501842	17.6989146	0.2376986		0.892354683	
9	1	-0.020947144	± 0.991947113	0.042558289	1.01584943	0.9921683		23.68266171	
9	2	-0.060314898	± 0.872303652	0.157778499	1.30795628	0.8743864		7.248510843	
9	3	-0.092407785	± 0.647447496	0.432087222	2.33793735	0.6540088		3.538710303	
9	4	-0.113354929	± 0.344499617	1.723644945	7.60286721	0.3626697		1.599708647	
9	5	-0.120629796	± 0	0.120629796	0	0.1206298		0.5	
10	1	-0.016975812	± 0.993486808	0.034388209	1.01285904	0.9936318		29.26610603	
10	2	-0.049265725	± 0.896237397	0.122297745	1.24120516	0.8975904		9.10968452	
10	3	-0.076733166	± 0.711258025	0.299870149	1.95398003	0.7153852		4.661512198	
10	4	-0.09668943	± 0.456655763	0.887533981	4.58961222	0.4667797		2.413809581	
10	5	-0.107181059	± 0.157352852	5.913813049	27.5879577	0.1903883		0.888161993	

Tschebyscheff Tiefpass

Ar = 3 [dB]
 ε = 0.997628345

A₀ (gerade) = 0.70794578
 A(Ω = 1) = -3 [dB]

Ordnung n	Teilfilter	Pollage		quadr. Glieder		Polfrequenz		Polgüte	
		Re	Im	a ₁₁	a ₁₂	Ω _p	Q _p		
1	1	-1.002377293	± 0	1.002377293	0	1.0023773		0.5	
2	1	-0.322449826	± 0.777157571	0.910942402	1.41253356	0.8413963		1.304693414	
3	1	-0.149310104	± 0.903814429	0.355850155	1.19164794	0.9160644		3.067657173	
3	2	-0.298620208	± 0	0.298620208	0	0.2986202		0.5	
4	1	-0.085170399	± 0.946484433	0.18862063	1.1073133	0.9503088		5.578867757	
4	2	-0.205619531	± 0.392046689	2.098372626	5.10256154	0.4426963		1.076493752	
5	1	-0.054859871	± 0.965927476	0.117218754	1.06834697	0.9674841		8.81777599	
5	2	-0.143625007	± 0.596976011	0.761919196	2.65246009	0.6140102		2.137546215	
5	3	-0.177530272	± 0	0.177530272	0	0.1775303		0.5	
6	1	-0.038229513	± 0.976406017	0.080076043	1.04730662	0.9771541		12.78010197	
6	2	-0.104444971	± 0.714778813	0.400312254	1.9163788	0.7223694		3.458133812	
6	3	-0.142674483	± 0.261627204	3.213215503	11.2606523	0.2980013		1.044340022	
7	1	-0.028145643	± 0.982695683	0.058243432	1.03467937	0.9830987		17.46449116	
7	2	-0.078862339	± 0.788060751	0.251450635	1.59423775	0.7919969		5.021388305	
7	3	-0.113959382	± 0.437340722	1.115861407	4.89587339	0.4519443		1.982918348	
7	4	-0.126485371	± 0	0.126485371	0	0.1264854		0.5	
8	1	-0.021578157	± 0.986766352	0.044300442	1.02651124	0.9870023		22.8704017	
8	2	-0.061449393	± 0.83654012	0.174677492	1.42131177	0.838794		6.825079716	
8	3	-0.091965516	± 0.558958238	0.573186775	3.11631359	0.5664733		3.079813478	
8	4	-0.108480723	± 0.196280031	4.313870442	19.8831199	0.2242631		1.033653949	
9	1	-0.0170652	± 0.989551909	0.034844567	1.02092467	0.989699		28.99758143	
9	2	-0.049137285	± 0.870197344	0.129366877	1.31638203	0.8715836		8.868861595	
9	3	-0.075282688	± 0.645884137	0.356086421	2.36499541	0.6502567		4.318766637	
9	4	-0.092347888	± 0.343667771	1.458481454	7.89666928	0.3558591		1.926730906	
9	5	-0.098274569	± 0	0.098274569	0	0.0982746		0.5	
10	1	-0.013831962	± 0.99154176	0.02813243	1.01693566	0.9916382		35.84589979	
10	2	-0.040141917	± 0.894482744	0.100140647	1.24733265	0.895383		11.15271886	
10	3	-0.062522501	± 0.709865525	0.246239737	1.96920895	0.7126136		5.698857037	
10	4	-0.078782947	± 0.455761722	0.73654564	4.67452454	0.4625208		2.935411957	
10	5	-0.08733157	± 0.157044787	5.40922431	30.9694669	0.1796938		1.028802174	