

APPENDIX I

Table of the special case of the elliptic function filters of section 2.3.3.

Tabulated for $n = 2$ to $n = 9$ and from $a_s = 35$ to 70dB in steps of 5dB .

Note that the passband width is given as BW where $(BW)^2$ is the ratio of the passband edge frequencies ie. $BW = x^{-1} = \sqrt{f_u/f_L}$

The overall filter transfer function is given by:

$$H(p) = \prod_{r=1}^{r=N} \left[\frac{p + \omega_{zr}}{\omega + \omega_{pr}} \right]$$

N= 2

AS=	35DB	40DB	45DB	50DB
Bk=	1.464798	1.329424	1.237264	1.172797
WP				
1	1.387772	1.222238	1.162148	1.119171
2	0.764659	0.818177	0.868482	0.893519
WZ				
1	2.476265	2.448774	2.433545	2.425852
2	0.403834	0.408368	0.410923	0.412362
AS=	55DB	60DB	65DB	70DB
BW=	1.126839	1.093631	1.069481	1.051595
WP				
1	1.888853	1.855312	1.843588	1.836218
2	0.919873	0.938693	0.953671	0.965856
WZ				
1	2.428298	2.417632	2.416135	2.415294
2	0.413172	0.413623	0.413884	0.414028

N= 3

AS=	35DB	40DB	45DB	50DB
Bk=	2.486226	2.836838	1.785768	1.687271
WP				
1	2.116168	1.848625	1.646888	1.585471
2	1.888888	1.888888	1.888888	1.888888
3	1.472552	0.543294	0.687238	0.664244
WZ				
1	4.359327	4.142519	4.084387	3.914237
2	1.888888	1.888888	1.888888	1.888888
3	0.229393	0.241399	0.249731	0.255478
AS=	55DB	60DB	65DB	70DB
Bk=	1.476125	1.377354	1.381551	1.242523
WP				
1	1.399632	1.318755	1.255985	1.206675
2	1.888888	1.888888	1.888888	1.888888
3	0.714473	0.753291	0.796188	0.828724
WZ				
1	3.854681	3.814917	3.788195	3.778158
2	1.888888	1.888888	1.888888	1.888888
3	0.259425	0.262129	0.263978	0.265241

N= 4

AS=	35DB	40DB	45DB	50DB
BW=	4.043984	3.224621	2.689879	2.319041
WP				
1	3.549515	2.905554	2.471063	2.162745
2	1.624629	1.515605	1.429970	1.351169
3	0.615533	0.659803	0.699316	0.734363
4	0.231729	0.344169	0.404684	0.462376
WZ				
1	7.369776	6.661043	6.183591	5.855067
2	1.753393	1.680757	1.630245	1.594421
3	0.570323	0.594973	0.613405	0.627137
4	0.135322	0.150127	0.161718	0.170682
AS=	55DB	60DB	65DB	70DB
BW=	2.552266	1.852141	1.698470	1.577957
WP				
1	1.935444	1.762052	1.620720	1.522557
2	1.305025	1.250659	1.220122	1.167011
3	0.766269	0.794470	0.819590	0.841555
4	0.516677	0.567263	0.613976	0.658790
WZ				
1	5.632125	5.470782	5.354394	5.269891
2	1.565645	1.549911	1.536131	1.526062
3	0.637492	0.645199	0.650965	0.655282
4	0.177553	0.182789	0.186763	0.189766

N= 5

AS=	35DB	40DB	45DB	50DB
BW=	6.816176	5.132209	4.086130	3.309350
WP				
1	5.961270	4.622282	3.750990	3.156516
2	2.726547	2.395311	2.150200	1.961019
3	1.000000	1.000000	1.000000	1.000000
4	0.366734	0.417402	0.465072	0.509705
5	0.167138	0.216343	0.266596	0.316005
WZ				
1	12.46082	10.62713	9.437149	8.628074
2	2.970812	2.699413	2.512190	2.376616
3	1.000000	1.000000	1.000000	1.000000
4	0.336631	0.370451	0.398059	0.420413
5	0.080230	0.094090	0.105964	0.115901
AS=	55DB	60DB	65DB	70DB
BW=	2.900050	2.542065	2.271527	2.061309
WP				
1	2.731161	2.415354	2.173023	1.964660
2	1.813031	1.693339	1.590000	1.512540
3	1.000000	1.000000	1.000000	1.000000
4	0.501000	0.590049	0.626924	0.660703
5	0.366142	0.414010	0.460019	0.503053
WZ				
1	6.057000	7.643540	7.337326	7.107120
2	2.800272	2.800270	2.800373	2.811459
3	1.000000	1.000000	1.000000	1.000000
4	0.435410	0.452043	0.464338	0.473604
5	0.124111	0.130029	0.136290	0.140704

N= 6

AS=	35DB	40DB	45DB	50DB
BW=	11.49359	8.175079	6.217032	4.965237
WP				
1	10.08546	7.362292	5.706339	4.623092
2	4.594976	3.311293	3.265266	2.865570
3	1.678309	1.580473	1.503766	1.441534
4	0.595838	0.632722	0.664997	0.693705
5	0.217629	0.262370	0.306254	0.340971
6	0.099153	0.135827	0.175244	0.216306
WZ				
1	21.02750	16.93433	14.37105	12.66145
2	5.012121	4.305910	3.632449	3.500235
3	1.694211	1.606031	1.540893	1.491644
4	0.590245	0.622653	0.648974	0.670401
5	0.199516	0.232239	0.260930	0.285095
6	0.047557	0.059052	0.069504	0.076900
AS=	55DB	60DB	65DB	70DB
BW=	4.114867	3.509244	3.061423	2.720090
WP				
1	3.873927	3.332730	2.927917	2.616444
2	2.561916	2.324503	2.134638	1.979993
3	1.389749	1.345837	1.300076	1.275264
4	0.719555	0.743032	0.764482	0.784152
5	0.390333	0.430199	0.466464	0.505052
6	0.258136	0.300054	0.341540	0.382190
WZ				
1	11.46718	10.60329	9.961441	9.474556
2	3.259063	3.079441	2.942902	2.837471
3	1.453750	1.424224	1.400958	1.382475
4	0.667872	0.702137	0.713797	0.723340
5	0.326035	0.324734	0.339301	0.352427
6	0.067205	0.094310	0.120387	0.155546

N= 7

AS=	35DB	40DB	45DB	50DB
BW=	19.40418	13.02541	9.462163	7.278095
WP				
1	17.02531	11.73017	8.684671	6.776239
2	7.753299	6.071218	4.967842	4.197662
3	2.829354	2.514871	2.283635	2.105571
4	0.999999	0.999999	0.999999	1.000000
5	0.353438	0.327635	0.437899	0.474931
6	0.128977	0.164712	0.201295	0.238228
7	0.058736	0.085252	0.115146	0.147575
WZ				
1	35.48763	26.95197	21.87577	18.56618
2	8.457620	6.861635	5.835723	5.135655
3	2.859445	2.561903	2.350675	2.194944
4	0.999999	0.999999	0.999999	1.000000
5	0.349716	0.390335	0.425410	0.455593
6	0.118237	0.145737	0.171358	0.194717
7	0.025179	0.037562	0.045713	0.053561
AS=	55DB	60DB	65DB	70DB
BW=	5.844475	4.852141	4.135658	3.688341
WP				
1	5.581795	4.687477	3.954555	3.462278
2	3.634972	3.209075	2.877512	2.613429
3	1.963719	1.847727	1.750937	1.665873
4	1.000000	1.000000	1.000000	1.000000
5	0.509238	0.541206	0.571123	0.599207
6	0.275105	0.311616	0.347523	0.382639
7	0.161759	0.217039	0.252873	0.286827
WZ				
1	16.29932	14.68045	13.48637	12.58292
2	4.666882	4.269605	3.992098	3.778076
3	2.677000	1.985819	1.914182	1.857165
4	1.000000	1.000000	1.000000	1.000000
5	0.481464	0.563571	0.582417	0.583455
6	0.215662	0.234214	0.250498	0.264655
7	0.151352	0.168118	0.174149	0.179473

N= 8

AS=	35DB	40DB	45DB	50DB
BW=	33.19732	20.78627	14.40514	10.67003
WP				
1	29.10242	18.71755	13.22128	9.934164
2	13.19933	9.682961	7.561942	6.153038
3	4.797537	4.008415	3.474669	3.084435
4	1.688572	1.591519	1.518652	1.460654
5	0.592216	0.628331	0.658479	0.684625
6	0.200440	0.249475	0.287797	0.324209
7	0.075762	0.103274	0.132241	0.162521
8	0.034362	0.053426	0.075636	0.100663
WZ				
1	60.48777	43.03816	33.30208	27.22074
2	14.38525	10.94265	8.884169	7.530565
3	4.846333	4.084797	3.579673	3.220506
4	1.690492	1.595475	1.525566	1.471497
5	0.591544	0.626773	0.655495	0.679500
6	0.206253	0.244810	0.279355	0.310510
7	0.069516	0.091386	0.112560	0.132792
8	0.016532	0.023235	0.030028	0.036737
AS=	55DB	60DB	65DB	70DB
BW=	8.303203	6.711060	5.590736	4.770462
WP				
1	7.816201	6.373200	5.345624	4.587151
2	5.162046	4.437171	3.887444	3.459654
3	2.786279	2.550960	2.360451	2.203050
4	1.413008	1.372931	1.338579	1.308686
5	0.707710	0.720369	0.747061	0.764126
6	0.353902	0.392009	0.423648	0.453916
7	0.193692	0.225369	0.257239	0.289046
8	0.127939	0.156907	0.187069	0.210000
WZ				
1	23.16050	20.31455	18.24337	16.69150
2	6.590326	5.917496	5.403303	5.015509
3	2.955017	2.753009	2.596432	2.472499
4	1.420708	1.394305	1.366310	1.343324
5	0.699934	0.717203	0.731096	0.744422
6	0.338408	0.363213	0.385144	0.404449
7	0.181700	0.199191	0.215089	0.229375
8	0.0943177	0.109226	0.1254015	0.139916

N= 9

AS=	35DB	40DB	45DB	50DB
BW=	64.42415	33.60879	21.97275	15.64837
WP				
1	56.05552	30.24259	20.16504	14.56892
2	24.54622	15.56691	11.52743	9.022706
3	8.626860	6.429649	5.293568	4.521923
4	2.942269	2.543891	2.311677	2.139656
5	0.999999	0.999999	0.999999	0.999999
6	0.339374	0.393099	0.432557	0.467321
7	0.115917	0.155530	0.168909	0.221145
8	0.040736	0.064148	0.086750	0.110832
9	0.017840	0.033066	0.049591	0.066639
WZ				
1	113.7321	69.32932	50.76706	39.91746
2	26.55130	17.59623	13.54032	11.04296
3	8.705247	6.550570	5.454014	4.722963
4	2.945302	2.551035	2.324127	2.159166
5	0.999999	0.999999	0.999999	0.999999
6	0.339524	0.391996	0.430269	0.463136
7	0.114873	0.152659	0.163351	0.211732
8	0.037663	0.056830	0.073654	0.090555
9	0.008793	0.014424	0.019698	0.025052
AS=	55DB	60DB	65DB	70DB
BW=	11.79776	9.285621	7.559391	6.323233
WP				
1	11.10572	8.816996	7.227845	6.079920
2	7.335141	6.137931	5.255309	4.564264
3	3.957559	3.527259	3.188982	2.916515
4	2.004916	1.695471	1.604561	1.727594
5	0.999999	1.000000	1.000000	1.000000
6	0.498774	0.527573	0.554151	0.576040
7	0.252661	0.283506	0.313500	0.342679
8	0.136323	0.162921	0.190234	0.218130
9	0.090344	0.113417	0.138384	0.164477
WZ				
1	32.90000	26.10700	24.67219	22.13000
2	9.364665	6.176550	7.356770	6.652071
3	4.200000	3.011290	3.514249	3.820000
4	2.032692	1.933113	1.653256	1.700000
5	0.999999	0.999999	1.000000	1.000000
6	0.491953	0.517300	0.539502	0.559164
7	0.235195	0.262370	0.284555	0.300000
8	0.106764	0.122271	0.136622	0.150000
9	0.030387	0.035570	0.040532	0.045167