**Filter Design Results**

Generated by:   [http://www-users.cs.york.ac.uk/~fisher/mkfilter](http://www-users.cs.york.ac.uk/%7Efisher/mkfilter)

**Summary**

You specified the following parameters:

|  |  |  |
| --- | --- | --- |
| filtertype | = | Bessel |
| passtype | = | Lowpass |
| ripple | = |  |
| order | = | 1 |
| samplerate | = | 125 |
| corner1 | = | 15 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 1 -a 1.2000000000e-01 0.0000000000e+00

raw alpha1 = 0.1200000000

raw alpha2 = 0.1200000000

warped alpha1 = 0.1260277994

warped alpha2 = 0.1260277994

gain at dc : mag = 3.525711689e+00 phase = 0.0000000000 pi

gain at centre: mag = 2.493054644e+00 phase = -0.2500000000 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.7918560176 + j 0.0000000000

Z-plane zeros:

-1.0000000000 + j 0.0000000000

Z-plane poles:

0.4327386422 + j 0.0000000000

Recurrence relation:

y[n] = ( 1 \* x[n- 1])

+ ( 1 \* x[n- 0])

+ ( 0.4327386422 \* y[n- 1])

**Filter Design Results**

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**Summary**

You specified the following parameters:

|  |  |  |
| --- | --- | --- |
| filtertype | = | Bessel |
| passtype | = | Lowpass |
| ripple | = |  |
| order | = | 2 |
| samplerate | = | 125 |
| corner1 | = | 15 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 2 -a 1.2000000000e-01 0.0000000000e+00

raw alpha1 = 0.1200000000

raw alpha2 = 0.1200000000

warped alpha1 = 0.1260277994

warped alpha2 = 0.1260277994

gain at dc : mag = 8.381720246e+00 phase = 0.0000000000 pi

gain at centre: mag = 5.926771224e+00 phase = -0.4129462918 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.8723096426 + j 0.5036282070

-0.8723096426 + j -0.5036282070

Z-plane zeros:

-1.0000000000 + j 0.0000000000 2 times

Z-plane poles:

0.3510704736 + j 0.2368954900

0.3510704736 + j -0.2368954900

Recurrence relation:

y[n] = ( 1 \* x[n- 2])

+ ( 2 \* x[n- 1])

+ ( 1 \* x[n- 0])

+ ( -0.1793699506 \* y[n- 2])

+ ( 0.7021409472 \* y[n- 1])

**Filter Design Results**

Generated by:   [http://www-users.cs.york.ac.uk/~fisher/mkfilter](http://www-users.cs.york.ac.uk/%7Efisher/mkfilter)

**Summary**

You specified the following parameters:

|  |  |  |
| --- | --- | --- |
| filtertype | = | Bessel |
| passtype | = | Lowpass |
| ripple | = |  |
| order | = | 3 |
| samplerate | = | 125 |
| corner1 | = | 15 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 3 -a 1.2000000000e-01 0.0000000000e+00

raw alpha1 = 0.1200000000

raw alpha2 = 0.1200000000

warped alpha1 = 0.1260277994

warped alpha2 = 0.1260277994

gain at dc : mag = 1.911247600e+01 phase = -0.0000000000 pi

gain at centre: mag = 1.351456138e+01 phase = -0.5526731752 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-1.0473687915 + j 0.0000000000

-0.8293972470 + j 0.7912735570

-0.8293972470 + j -0.7912735570

Z-plane zeros:

-1.0000000000 + j 0.0000000000 3 times

Z-plane poles:

0.3126077852 + j 0.0000000000

0.3111804936 + j 0.3666867401

0.3111804936 + j -0.3666867401

Recurrence relation:

y[n] = ( 1 \* x[n- 3])

+ ( 3 \* x[n- 2])

+ ( 3 \* x[n- 1])

+ ( 1 \* x[n- 0])

+ ( 0.0723038252 \* y[n- 3])

+ ( -0.4258473547 \* y[n- 2])

+ ( 0.9349687723 \* y[n- 1])

**Filter Design Results**

Generated by:   [http://www-users.cs.york.ac.uk/~fisher/mkfilter](http://www-users.cs.york.ac.uk/%7Efisher/mkfilter)

**Summary**

You specified the following parameters:

|  |  |  |
| --- | --- | --- |
| filtertype | = | Bessel |
| passtype | = | Lowpass |
| ripple | = |  |
| order | = | 4 |
| samplerate | = | 125 |
| corner1 | = | 15 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 4 -a 1.2000000000e-01 0.0000000000e+00

raw alpha1 = 0.1200000000

raw alpha2 = 0.1200000000

warped alpha1 = 0.1260277994

warped alpha2 = 0.1260277994

gain at dc : mag = 4.079071536e+01 phase = 0.0000000000 pi

gain at centre: mag = 2.884339144e+01 phase = -0.6713254167 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-1.0848964561 + j 0.3248587075

-1.0848964561 + j -0.3248587075

-0.7880620488 + j 0.9954467445

-0.7880620488 + j -0.9954467445

Z-plane zeros:

-1.0000000000 + j 0.0000000000 4 times

Z-plane poles:

0.2824187071 + j 0.1350466343

0.2824187071 + j -0.1350466343

0.2724769904 + j 0.4543238477

0.2724769904 + j -0.4543238477

Recurrence relation:

y[n] = ( 1 \* x[n- 4])

+ ( 4 \* x[n- 3])

+ ( 6 \* x[n- 2])

+ ( 4 \* x[n- 1])

+ ( 1 \* x[n- 0])

+ ( -0.0275034953 \* y[n- 4])

+ ( 0.2119281620 \* y[n- 3])

+ ( -0.6864621858 \* y[n- 2])

+ ( 1.1097913950 \* y[n- 1])

**Filter Design Results**

Generated by:   [http://www-users.cs.york.ac.uk/~fisher/mkfilter](http://www-users.cs.york.ac.uk/%7Efisher/mkfilter)

**Summary**

You specified the following parameters:

|  |  |  |
| --- | --- | --- |
| filtertype | = | Bessel |
| passtype | = | Lowpass |
| ripple | = |  |
| order | = | 5 |
| samplerate | = | 125 |
| corner1 | = | 15 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 5 -a 1.2000000000e-01 0.0000000000e+00

raw alpha1 = 0.1200000000

raw alpha2 = 0.1200000000

warped alpha1 = 0.1260277994

warped alpha2 = 0.1260277994

gain at dc : mag = 8.103603020e+01 phase = 0.0000000000 pi

gain at centre: mag = 5.730112647e+01 phase = -0.7723549982 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-1.1896181799 + j 0.0000000000

-1.0934560200 + j 0.5684810271

-1.0934560200 + j -0.5684810271

-0.7583419379 + j 1.1649186460

-0.7583419379 + j -1.1649186460

Z-plane zeros:

-1.0000000000 + j 0.0000000000 5 times

Z-plane poles:

0.2540685983 + j 0.0000000000

0.2508110117 + j 0.2298601706

0.2508110117 + j -0.2298601706

0.2306491944 + j 0.5197347629

0.2306491944 + j -0.5197347629

Recurrence relation:

y[n] = ( 1 \* x[n- 5])

+ ( 5 \* x[n- 4])

+ ( 10 \* x[n- 3])

+ ( 10 \* x[n- 2])

+ ( 5 \* x[n- 1])

+ ( 1 \* x[n- 0])

+ ( 0.0095077647 \* y[n- 5])

+ ( -0.0921935388 \* y[n- 4])

+ ( 0.3859210943 \* y[n- 3])

+ ( -0.9151104069 \* y[n- 2])

+ ( 1.2169890105 \* y[n- 1])

**Filter Design Results**

Generated by:   [http://www-users.cs.york.ac.uk/~fisher/mkfilter](http://www-users.cs.york.ac.uk/%7Efisher/mkfilter)

**Summary**

You specified the following parameters:

|  |  |  |
| --- | --- | --- |
| filtertype | = | Bessel |
| passtype | = | Lowpass |
| ripple | = |  |
| order | = | 6 |
| samplerate | = | 125 |
| corner1 | = | 15 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 6 -a 1.2000000000e-01 0.0000000000e+00

raw alpha1 = 0.1200000000

raw alpha2 = 0.1200000000

warped alpha1 = 0.1260277994

warped alpha2 = 0.1260277994

gain at dc : mag = 1.512462083e+02 phase = -0.0000000000 pi

gain at centre: mag = 1.069472195e+02 phase = -0.8604658280 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-1.2443941327 + j 0.2541037250

-1.2443941327 + j -0.2541037250

-1.0942326500 + j 0.7692658626

-1.0942326500 + j -0.7692658626

-0.7369459680 + j 1.3159564299

-0.7369459680 + j -1.3159564299

Z-plane zeros:

-1.0000000000 + j 0.0000000000 6 times

Z-plane poles:

0.2253791634 + j 0.0959727447

0.2253791634 + j -0.0959727447

0.2174773766 + j 0.3026804672

0.2174773766 + j -0.3026804672

0.1870585943 + j 0.5707520017

0.1870585943 + j -0.5707520017

Recurrence relation:

y[n] = ( 1 \* x[n- 6])

+ ( 6 \* x[n- 5])

+ ( 15 \* x[n- 4])

+ ( 20 \* x[n- 3])

+ ( 15 \* x[n- 2])

+ ( 6 \* x[n- 1])

+ ( 1 \* x[n- 0])

+ ( -0.0030070647 \* y[n- 6])

+ ( 0.0351226184 \* y[n- 5])

+ ( -0.1840135151 \* y[n- 4])

+ ( 0.5560037281 \* y[n- 3])

+ ( -1.0870871389 \* y[n- 2])

+ ( 1.2598302685 \* y[n- 1])

**Filter Design Results**

Generated by:   [http://www-users.cs.york.ac.uk/~fisher/mkfilter](http://www-users.cs.york.ac.uk/%7Efisher/mkfilter)

**Summary**

You specified the following parameters:

|  |  |  |
| --- | --- | --- |
| filtertype | = | Bessel |
| passtype | = | Lowpass |
| ripple | = |  |
| order | = | 7 |
| samplerate | = | 125 |
| corner1 | = | 15 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 7 -a 1.2000000000e-01 0.0000000000e+00

raw alpha1 = 0.1200000000

raw alpha2 = 0.1200000000

warped alpha1 = 0.1260277994

warped alpha2 = 0.1260277994

gain at dc : mag = 2.687054954e+02 phase = -0.0000000000 pi

gain at centre: mag = 1.900034780e+02 phase = -0.9395552122 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-1.3337770786 + j 0.0000000000

-1.2765025976 + j 0.4665968086

-1.2765025976 + j -0.4665968086

-1.0918928099 + j 0.9435493234

-1.0918928099 + j -0.9435493234

-0.7204842773 + j 1.4542050549

-0.7204842773 + j -1.4542050549

Z-plane zeros:

-1.0000000000 + j 0.0000000000 7 times

Z-plane poles:

0.1998402730 + j 0.0000000000

0.1965482327 + j 0.1703968088

0.1965482327 + j -0.1703968088

0.1834898468 + j 0.3611642165

0.1834898468 + j -0.3611642165

0.1435714987 + j 0.6112836115

0.1435714987 + j -0.6112836115

Recurrence relation:

y[n] = ( 1 \* x[n- 7])

+ ( 7 \* x[n- 6])

+ ( 21 \* x[n- 5])

+ ( 35 \* x[n- 4])

+ ( 35 \* x[n- 3])

+ ( 21 \* x[n- 2])

+ ( 7 \* x[n- 1])

+ ( 1 \* x[n- 0])

+ ( 0.0008749648 \* y[n- 7])

+ ( -0.0120551033 \* y[n- 6])

+ ( 0.0753892450 \* y[n- 5])

+ ( -0.2843418090 \* y[n- 4])

+ ( 0.6945556726 \* y[n- 3])

+ ( -1.1978403534 \* y[n- 2])

+ ( 1.2470594294 \* y[n- 1])

**Filter Design Results**

Generated by:   [http://www-users.cs.york.ac.uk/~fisher/mkfilter](http://www-users.cs.york.ac.uk/%7Efisher/mkfilter)

**Summary**

You specified the following parameters:

|  |  |  |
| --- | --- | --- |
| filtertype | = | Bessel |
| passtype | = | Lowpass |
| ripple | = |  |
| order | = | 8 |
| samplerate | = | 125 |
| corner1 | = | 15 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 8 -a 1.2000000000e-01 0.0000000000e+00

raw alpha1 = 0.1200000000

raw alpha2 = 0.1200000000

warped alpha1 = 0.1260277994

warped alpha2 = 0.1260277994

gain at dc : mag = 4.592088250e+02 phase = 0.0000000000 pi

gain at centre: mag = 3.247096741e+02 phase = 0.9878972531 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-1.3916144172 + j 0.2160718314

-1.3916144172 + j -0.2160718314

-1.2962203287 + j 0.6515356670

-1.2962203287 + j -0.6515356670

-1.0878844354 + j 1.0993785092

-1.0878844354 + j -1.0993785092

-0.7070242598 + j 1.5823863444

-0.7070242598 + j -1.5823863444

Z-plane zeros:

-1.0000000000 + j 0.0000000000 8 times

Z-plane poles:

0.1746119897 + j 0.0748317858

0.1746119897 + j -0.0748317858

0.1678819129 + j 0.2308452243

0.1678819129 + j -0.2308452243

0.1496579230 + j 0.4093123431

0.1496579230 + j -0.4093123431

0.1013199309 + j 0.6437746589

0.1013199309 + j -0.6437746589

Recurrence relation:

y[n] = ( 1 \* x[n- 8])

+ ( 8 \* x[n- 7])

+ ( 28 \* x[n- 6])

+ ( 56 \* x[n- 5])

+ ( 70 \* x[n- 4])

+ ( 56 \* x[n- 3])

+ ( 28 \* x[n- 2])

+ ( 8 \* x[n- 1])

+ ( 1 \* x[n- 0])

+ ( -0.0002371875 \* y[n- 8])

+ ( 0.0037596224 \* y[n- 7])

+ ( -0.0276467012 \* y[n- 6])

+ ( 0.1230176368 \* y[n- 5])

+ ( -0.3759870302 \* y[n- 4])

+ ( 0.7866218363 \* y[n- 3])

+ ( -1.2539522651 \* y[n- 2])

+ ( 1.1869435131 \* y[n- 1])

**Filter Design Results**

Generated by:   [http://www-users.cs.york.ac.uk/~fisher/mkfilter](http://www-users.cs.york.ac.uk/%7Efisher/mkfilter)

**Summary**

You specified the following parameters:

|  |  |  |
| --- | --- | --- |
| filtertype | = | Bessel |
| passtype | = | Lowpass |
| ripple | = |  |
| order | = | 9 |
| samplerate | = | 125 |
| corner1 | = | 15 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 9 -a 1.2000000000e-01 0.0000000000e+00

raw alpha1 = 0.1200000000

raw alpha2 = 0.1200000000

warped alpha1 = 0.1260277994

warped alpha2 = 0.1260277994

gain at dc : mag = 7.604101696e+02 phase = 0.0000000000 pi

gain at centre: mag = 5.376911874e+02 phase = 0.9203906334 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-1.4701602792 + j 0.0000000000

-1.4310188629 + j 0.4057341404

-1.4310188629 + j -0.4057341404

-1.3084600998 + j 0.8167120351

-1.3084600998 + j -0.8167120351

-1.0829330327 + j 1.2414193740

-1.0829330327 + j -1.2414193740

-0.6955657527 + j 1.7023324818

-0.6955657527 + j -1.7023324818

Z-plane zeros:

-1.0000000000 + j 0.0000000000 9 times

Z-plane poles:

0.1526845097 + j 0.0000000000

0.1497560616 + j 0.1359640695

0.1497560616 + j -0.1359640695

0.1395783896 + j 0.2813113526

0.1395783896 + j -0.2813113526

0.1164386000 + j 0.4495616652

0.1164386000 + j -0.4495616652

0.0608276033 + j 0.6699451812

0.0608276033 + j -0.6699451812

Recurrence relation:

y[n] = ( 1 \* x[n- 9])

+ ( 9 \* x[n- 8])

+ ( 36 \* x[n- 7])

+ ( 84 \* x[n- 6])

+ (126 \* x[n- 5])

+ (126 \* x[n- 4])

+ ( 84 \* x[n- 3])

+ ( 36 \* x[n- 2])

+ ( 9 \* x[n- 1])

+ ( 1 \* x[n- 0])

+ ( 0.0000601223 \* y[n- 9])

+ ( -0.0010851758 \* y[n- 8])

+ ( 0.0091055923 \* y[n- 7])

+ ( -0.0476598330 \* y[n- 6])

+ ( 0.1688971937 \* y[n- 5])

+ ( -0.4477061504 \* y[n- 4])

+ ( 0.8264869289 \* y[n- 3])

+ ( -1.2673053183 \* y[n- 2])

+ ( 1.0858858188 \* y[n- 1])

**Filter Design Results**

Generated by:   [http://www-users.cs.york.ac.uk/~fisher/mkfilter](http://www-users.cs.york.ac.uk/%7Efisher/mkfilter)

**Summary**

You specified the following parameters:

|  |  |  |
| --- | --- | --- |
| filtertype | = | Bessel |
| passtype | = | Lowpass |
| ripple | = |  |
| order | = | 10 |
| samplerate | = | 125 |
| corner1 | = | 15 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 10 -a 1.2000000000e-01 0.0000000000e+00

raw alpha1 = 0.1200000000

raw alpha2 = 0.1200000000

warped alpha1 = 0.1260277994

warped alpha2 = 0.1260277994

gain at dc : mag = 1.226362724e+03 phase = -0.0000000000 pi

gain at centre: mag = 8.671693985e+02 phase = 0.8569553843 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-1.5263972523 + j 0.1913309996

-1.5263972523 + j -0.1913309996

-1.4587541817 + j 0.5758833051

-1.4587541817 + j -0.5758833051

-1.3159144398 + j 0.9669355562

-1.3159144398 + j -0.9669355562

-1.0774723687 + j 1.3726869539

-1.0774723687 + j -1.3726869539

-0.6855548124 + j 1.8154129314

-0.6855548124 + j -1.8154129314

Z-plane zeros:

-1.0000000000 + j 0.0000000000 10 times

Z-plane poles:

0.1309727972 + j 0.0613629550

0.1309727972 + j -0.0613629550

0.1252901185 + j 0.1873610435

0.1252901185 + j -0.1873610435

0.1117666846 + j 0.3241961628

0.1117666846 + j -0.3241961628

0.0840840984 + j 0.4835488091

0.0840840984 + j -0.4835488091

0.0222965432 + j 0.6910640422

0.0222965432 + j -0.6910640422

Recurrence relation:

y[n] = ( 1 \* x[n-10])

+ ( 10 \* x[n- 9])

+ ( 45 \* x[n- 8])

+ (120 \* x[n- 7])

+ (210 \* x[n- 6])

+ (252 \* x[n- 5])

+ (210 \* x[n- 4])

+ (120 \* x[n- 3])

+ ( 45 \* x[n- 2])

+ ( 10 \* x[n- 1])

+ ( 1 \* x[n- 0])

+ ( -0.0000143920 \* y[n-10])

+ ( 0.0002899483 \* y[n- 9])

+ ( -0.0027712985 \* y[n- 8])

+ ( 0.0163435908 \* y[n- 7])

+ ( -0.0686943530 \* y[n- 6])

+ ( 0.2049710127 \* y[n- 5])

+ ( -0.4953488728 \* y[n- 4])

+ ( 0.8139956697 \* y[n- 3])

+ ( -1.2525812907 \* y[n- 2])

+ ( 0.9488204838 \* y[n- 1])