**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 | = | 10 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 1 -a 8.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0800000000

raw alpha2 = 0.0800000000

warped alpha1 = 0.0817280878

warped alpha2 = 0.0817280878

gain at dc : mag = 4.894742855e+00 phase = 0.0000000000 pi

gain at centre: mag = 3.461105865e+00 phase = -0.2500000000 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.5135127207 + j 0.0000000000

Z-plane zeros:

-1.0000000000 + j 0.0000000000

Z-plane poles:

0.5913983514 + j 0.0000000000

Recurrence relation:

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

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

+ ( 0.5913983514 \* 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 | = | 10 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 2 -a 8.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0800000000

raw alpha2 = 0.0800000000

warped alpha1 = 0.0817280878

warped alpha2 = 0.0817280878

gain at dc : mag = 1.567826380e+01 phase = 0.0000000000 pi

gain at centre: mag = 1.108620665e+01 phase = -0.4129462918 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.5656862964 + j 0.3265991355

-0.5656862964 + j -0.3265991355

Z-plane zeros:

-1.0000000000 + j 0.0000000000 2 times

Z-plane poles:

0.5341772035 + j 0.1952931460

0.5341772035 + j -0.1952931460

Recurrence relation:

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

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

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

+ ( -0.3234846976 \* y[n- 2])

+ ( 1.0683544070 \* y[n- 1])

**Filter Design Results**

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**Summary**

You specified the following parameters:

|  |  |  |
| --- | --- | --- |
| filtertype | = | Bessel |
| passtype | = | Lowpass |
| ripple | = |  |
| order | = | 3 |
| samplerate | = | 125 |
| corner1 | = | 10 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 3 -a 8.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0800000000

raw alpha2 = 0.0800000000

warped alpha1 = 0.0817280878

warped alpha2 = 0.0817280878

gain at dc : mag = 4.785512021e+01 phase = -0.0000000000 pi

gain at centre: mag = 3.383868002e+01 phase = -0.5526731752 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.6792108487 + j 0.0000000000

-0.5378579280 + j 0.5131349994

-0.5378579280 + j -0.5131349994

Z-plane zeros:

-1.0000000000 + j 0.0000000000 3 times

Z-plane poles:

0.4929769346 + j 0.0000000000

0.5142281763 + j 0.3061650795

0.5142281763 + j -0.3061650795

Recurrence relation:

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

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

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

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

+ ( 0.1765684016 \* y[n- 3])

+ ( -0.8651729334 \* y[n- 2])

+ ( 1.5214332873 \* 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 | = | 10 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 4 -a 8.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0800000000

raw alpha2 = 0.0800000000

warped alpha1 = 0.0817280878

warped alpha2 = 0.0817280878

gain at dc : mag = 1.351949513e+02 phase = -0.0000000000 pi

gain at centre: mag = 9.559726685e+01 phase = -0.6713254167 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.7035472593 + j 0.2106684486

-0.7035472593 + j -0.2106684486

-0.5110523603 + j 0.6455397885

-0.5110523603 + j -0.6455397885

Z-plane zeros:

-1.0000000000 + j 0.0000000000 4 times

Z-plane poles:

0.4706081470 + j 0.1145941636

0.4706081470 + j -0.1145941636

0.4942058451 + j 0.3841295150

0.4942058451 + j -0.3841295150

Recurrence relation:

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

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

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

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

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

+ ( -0.0919165925 \* y[n- 4])

+ ( 0.6006489336 \* y[n- 3])

+ ( -1.5567079401 \* y[n- 2])

+ ( 1.9296279843 \* 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 | = | 10 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 5 -a 8.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0800000000

raw alpha2 = 0.0800000000

warped alpha1 = 0.0817280878

warped alpha2 = 0.0817280878

gain at dc : mag = 3.508023803e+02 phase = 0.0000000000 pi

gain at centre: mag = 2.480547420e+02 phase = -0.7723549982 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.7714585160 + j 0.0000000000

-0.7090980726 + j 0.3686557056

-0.7090980726 + j -0.3686557056

-0.4917790900 + j 0.7554410525

-0.4917790900 + j -0.7554410525

Z-plane zeros:

-1.0000000000 + j 0.0000000000 5 times

Z-plane poles:

0.4432833748 + j 0.0000000000

0.4496614323 + j 0.1972708052

0.4496614323 + j -0.1972708052

0.4701511376 + j 0.4457106680

0.4701511376 + j -0.4457106680

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])

+ ( 0.0448577871 \* y[n- 5])

+ ( -0.3690099172 \* y[n- 4])

+ ( 1.2719460080 \* y[n- 3])

+ ( -2.3219218420 \* y[n- 2])

+ ( 2.2829085146 \* 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 | = | 10 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 6 -a 8.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0800000000

raw alpha2 = 0.0800000000

warped alpha1 = 0.0817280878

warped alpha2 = 0.0817280878

gain at dc : mag = 8.441780385e+02 phase = 0.0000000000 pi

gain at centre: mag = 5.969240156e+02 phase = -0.8604658280 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.8069803128 + j 0.1647843702

-0.8069803128 + j -0.1647843702

-0.7096017114 + j 0.4988631737

-0.7096017114 + j -0.4988631737

-0.4779039632 + j 0.8533879287

-0.4779039632 + j -0.8533879287

Z-plane zeros:

-1.0000000000 + j 0.0000000000 6 times

Z-plane poles:

0.4201247225 + j 0.0833687208

0.4201247225 + j -0.0833687208

0.4278334854 + j 0.2628775813

0.4278334854 + j -0.2628775813

0.4431003519 + j 0.4970024822

0.4431003519 + j -0.4970024822

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])

+ ( -0.0205082331 \* y[n- 6])

+ ( 0.2045193570 \* y[n- 5])

+ ( -0.8850057404 \* y[n- 4])

+ ( 2.1439107533 \* y[n- 3])

+ ( -3.1008466477 \* y[n- 2])

+ ( 2.5821171196 \* 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 | = | 10 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 7 -a 8.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0800000000

raw alpha2 = 0.0800000000

warped alpha1 = 0.0817280878

warped alpha2 = 0.0817280878

gain at dc : mag = 1.911831757e+03 phase = 0.0000000000 pi

gain at centre: mag = 1.351869200e+03 phase = -0.9395552122 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.8649444865 + j 0.0000000000

-0.8278024128 + j 0.3025845499

-0.8278024128 + j -0.3025845499

-0.7080843425 + j 0.6118846980

-0.7080843425 + j -0.6118846980

-0.4672286795 + j 0.9430411308

-0.4672286795 + j -0.9430411308

Z-plane zeros:

-1.0000000000 + j 0.0000000000 7 times

Z-plane poles:

0.3961876116 + j 0.0000000000

0.3985133819 + j 0.1496457250

0.3985133819 + j -0.1496457250

0.4053144197 + j 0.3175271818

0.4053144197 + j -0.3175271818

0.4145850460 + j 0.5406924346

0.4145850460 + j -0.5406924346

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])

+ ( 0.0088353291 \* y[n- 7])

+ ( -0.1039600409 \* y[n- 6])

+ ( 0.5437278824 \* y[n- 5])

+ ( -1.6486143253 \* y[n- 4])

+ ( 3.1551384446 \* y[n- 3])

+ ( -3.8550920947 \* y[n- 2])

+ ( 2.8330133068 \* 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 | = | 10 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 8 -a 8.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0800000000

raw alpha2 = 0.0800000000

warped alpha1 = 0.0817280878

warped alpha2 = 0.0817280878

gain at dc : mag = 4.124087546e+03 phase = -0.0000000000 pi

gain at centre: mag = 2.916170270e+03 phase = 0.9878972531 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.9024515691 + j 0.1401209709

-0.9024515691 + j -0.1401209709

-0.8405892143 + j 0.4225160201

-0.8405892143 + j -0.4225160201

-0.7054849415 + j 0.7129387626

-0.7054849415 + j -0.7129387626

-0.4584999586 + j 1.0261657409

-0.4584999586 + j -1.0261657409

Z-plane zeros:

-1.0000000000 + j 0.0000000000 8 times

Z-plane poles:

0.3749408037 + j 0.0663776934

0.3749408037 + j -0.0663776934

0.3776783871 + j 0.2049191717

0.3776783871 + j -0.2049191717

0.3824777619 + j 0.3643051084

0.3824777619 + j -0.3643051084

0.3856093868 + j 0.5783465149

0.3856093868 + j -0.5783465149

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])

+ ( -0.0036087843 \* y[n- 8])

+ ( 0.0490832225 \* y[n- 7])

+ ( -0.3020015499 \* y[n- 6])

+ ( 1.1033289276 \* y[n- 5])

+ ( -2.6343242320 \* y[n- 4])

+ ( 4.2445263026 \* y[n- 3])

+ ( -4.5604909024 \* y[n- 2])

+ ( 3.0414126789 \* y[n- 1])

**Filter Design Results**

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**Summary**

You specified the following parameters:

|  |  |  |
| --- | --- | --- |
| filtertype | = | Bessel |
| passtype | = | Lowpass |
| ripple | = |  |
| order | = | 9 |
| samplerate | = | 125 |
| corner1 | = | 10 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 9 -a 8.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0800000000

raw alpha2 = 0.0800000000

warped alpha1 = 0.0817280878

warped alpha2 = 0.0817280878

gain at dc : mag = 8.545768839e+03 phase = -0.0000000000 pi

gain at centre: mag = 6.042771097e+03 phase = 0.9203906334 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.9533879747 + j 0.0000000000

-0.9280050582 + j 0.2631155635

-0.9280050582 + j -0.2631155635

-0.8485266145 + j 0.5296316627

-0.8485266145 + j -0.5296316627

-0.7022739938 + j 0.8050512040

-0.7022739938 + j -0.8050512040

-0.4510692022 + j 1.1039499163

-0.4510692022 + j -1.1039499163

Z-plane zeros:

-1.0000000000 + j 0.0000000000 9 times

Z-plane poles:

0.3543767477 + j 0.0000000000

0.3551746494 + j 0.1217783216

0.3551746494 + j -0.1217783216

0.3573116095 + j 0.2523673821

0.3573116095 + j -0.2523673821

0.3595676455 + j 0.4050372288

0.3595676455 + j -0.4050372288

0.3567218632 + j 0.6110610773

0.3567218632 + j -0.6110610773

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])

+ ( 0.0014040447 \* y[n- 9])

+ ( -0.0217227127 \* y[n- 8])

+ ( 0.1540805565 \* y[n- 7])

+ ( -0.6603187085 \* y[n- 6])

+ ( 1.8938032884 \* y[n- 5])

+ ( -3.7941396070 \* y[n- 4])

+ ( 5.3561124283 \* y[n- 3])

+ ( -5.2010602627 \* y[n- 2])

+ ( 3.2119282830 \* 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 | = | 10 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 10 -a 8.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0800000000

raw alpha2 = 0.0800000000

warped alpha1 = 0.0817280878

warped alpha2 = 0.0817280878

gain at dc : mag = 1.711410772e+04 phase = 0.0000000000 pi

gain at centre: mag = 1.210150162e+04 phase = 0.8569553843 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.9898572323 + j 0.1240767260

-0.9898572323 + j -0.1240767260

-0.9459912056 + j 0.3734560277

-0.9459912056 + j -0.3734560277

-0.8533606984 + j 0.6270504955

-0.8533606984 + j -0.6270504955

-0.6987327940 + j 0.8901772503

-0.6987327940 + j -0.8901772503

-0.4445771821 + j 1.1772817443

-0.4445771821 + j -1.1772817443

Z-plane zeros:

-1.0000000000 + j 0.0000000000 10 times

Z-plane poles:

0.3355564476 + j 0.0554245432

0.3355564476 + j -0.0554245432

0.3363029086 + j 0.1693998187

0.3363029086 + j -0.1693998187

0.3372736436 + j 0.2938773571

0.3372736436 + j -0.2938773571

0.3367385239 + j 0.4409233201

0.3367385239 + j -0.4409233201

0.3282226659 + j 0.6396575687

0.3282226659 + j -0.6396575687

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])

+ ( -0.0005222117 \* y[n-10])

+ ( 0.0090729955 \* y[n- 9])

+ ( -0.0730293973 \* y[n- 8])

+ ( 0.3598632735 \* y[n- 7])

+ ( -1.2073089239 \* y[n- 6])

+ ( 2.8966760837 \* y[n- 5])

+ ( -5.0677050314 \* y[n- 4])

+ ( 6.4412468866 \* y[n- 3])

+ ( -5.7663157314 \* y[n- 2])

+ ( 3.3481883790 \* y[n- 1])