**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 | = | 5 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 1 -a 4.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0400000000

raw alpha2 = 0.0400000000

warped alpha1 = 0.0402118901

warped alpha2 = 0.0402118901

gain at dc : mag = 8.915815088e+00 phase = 0.0000000000 pi

gain at centre: mag = 6.304433309e+00 phase = -0.2500000000 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.2526587569 + j 0.0000000000

Z-plane zeros:

-1.0000000000 + j 0.0000000000

Z-plane poles:

0.7756795110 + j 0.0000000000

Recurrence relation:

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

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

+ ( 0.7756795110 \* 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 | = | 5 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 2 -a 4.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0400000000

raw alpha2 = 0.0400000000

warped alpha1 = 0.0402118901

warped alpha2 = 0.0402118901

gain at dc : mag = 5.050469146e+01 phase = 0.0000000000 pi

gain at centre: mag = 3.571220981e+01 phase = -0.4129462918 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.2783292228 + j 0.1606934517

-0.2783292228 + j -0.1606934517

Z-plane zeros:

-1.0000000000 + j 0.0000000000 2 times

Z-plane poles:

0.7469818758 + j 0.1232168489

0.7469818758 + j -0.1232168489

Recurrence relation:

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

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

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

+ ( -0.5731643146 \* y[n- 2])

+ ( 1.4939637515 \* 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 | = | 5 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 3 -a 4.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0400000000

raw alpha2 = 0.0400000000

warped alpha1 = 0.0402118901

warped alpha2 = 0.0402118901

gain at dc : mag = 2.711023309e+02 phase = -0.0000000000 pi

gain at centre: mag = 1.916982966e+02 phase = -0.5526731752 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.3341856234 + j 0.0000000000

-0.2646370966 + j 0.2524729103

-0.2646370966 + j -0.2524729103

Z-plane zeros:

-1.0000000000 + j 0.0000000000 3 times

Z-plane poles:

0.7136597706 + j 0.0000000000

0.7446039236 + j 0.1944970479

0.7446039236 + j -0.1944970479

Recurrence relation:

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

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

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

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

+ ( 0.4226750651 \* y[n- 3])

+ ( -1.6550518354 \* y[n- 2])

+ ( 2.2028676179 \* 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 | = | 5 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 4 -a 4.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0400000000

raw alpha2 = 0.0400000000

warped alpha1 = 0.0402118901

warped alpha2 = 0.0402118901

gain at dc : mag = 1.330668083e+03 phase = -0.0000000000 pi

gain at centre: mag = 9.409244253e+02 phase = -0.6713254167 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.3461596349 + j 0.1036531836

-0.3461596349 + j -0.1036531836

-0.2514482092 + j 0.3176187734

-0.2514482092 + j -0.3176187734

Z-plane zeros:

-1.0000000000 + j 0.0000000000 4 times

Z-plane poles:

0.7015925442 + j 0.0751762505

0.7015925442 + j -0.0751762505

0.7419663002 + j 0.2457445822

0.7419663002 + j -0.2457445822

Recurrence relation:

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

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

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

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

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

+ ( -0.3041592568 \* y[n- 4])

+ ( 1.5960375869 \* y[n- 3])

+ ( -3.1910200543 \* y[n- 2])

+ ( 2.8871176889 \* 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 | = | 5 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 5 -a 4.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0400000000

raw alpha2 = 0.0400000000

warped alpha1 = 0.0402118901

warped alpha2 = 0.0402118901

gain at dc : mag = 5.908173436e+03 phase = -0.0000000000 pi

gain at centre: mag = 4.177709501e+03 phase = -0.7723549982 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.3795733616 + j 0.0000000000

-0.3488907486 + j 0.1813861440

-0.3488907486 + j -0.1813861440

-0.2419653663 + j 0.3716924421

-0.2419653663 + j -0.3716924421

Z-plane zeros:

-1.0000000000 + j 0.0000000000 5 times

Z-plane poles:

0.6809736000 + j 0.0000000000

0.6928366823 + j 0.1307243082

0.6928366823 + j -0.1307243082

0.7364217983 + j 0.2878790495

0.7364217983 + j -0.2878790495

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])

+ ( 0.2116396822 \* y[n- 5])

+ ( -1.3993115731 \* y[n- 4])

+ ( 3.7525227570 \* y[n- 3])

+ ( -5.1097576527 \* y[n- 2])

+ ( 3.5394905611 \* 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 | = | 5 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 6 -a 4.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0400000000

raw alpha2 = 0.0400000000

warped alpha1 = 0.0402118901

warped alpha2 = 0.0402118901

gain at dc : mag = 2.395969255e+04 phase = 0.0000000000 pi

gain at centre: mag = 1.694206108e+04 phase = -0.8604658280 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.3970508118 + j 0.0810772790

-0.3970508118 + j -0.0810772790

-0.3491385491 + j 0.2454508803

-0.3491385491 + j -0.2454508803

-0.2351385202 + j 0.4198843077

-0.2351385202 + j -0.4198843077

Z-plane zeros:

-1.0000000000 + j 0.0000000000 6 times

Z-plane poles:

0.6668103245 + j 0.0563777977

0.6668103245 + j -0.0563777977

0.6843632868 + j 0.1759915147

0.6843632868 + j -0.1759915147

0.7285962712 + j 0.3247272784

0.7285962712 + j -0.3247272784

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])

+ ( -0.1422802283 \* y[n- 6])

+ ( 1.1395670964 \* y[n- 5])

+ ( -3.8512763692 \* y[n- 4])

+ ( 7.0384217426 \* y[n- 3])

+ ( -7.3466431593 \* y[n- 2])

+ ( 4.1595397650 \* 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 | = | 5 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 7 -a 4.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0400000000

raw alpha2 = 0.0400000000

warped alpha1 = 0.0402118901

warped alpha2 = 0.0402118901

gain at dc : mag = 9.018718382e+04 phase = -0.0000000000 pi

gain at centre: mag = 6.377196925e+04 phase = -0.9395552122 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.4255703703 + j 0.0000000000

-0.4072957107 + j 0.1488777846

-0.4072957107 + j -0.1488777846

-0.3483919726 + j 0.3010597808

-0.3483919726 + j -0.3010597808

-0.2298860624 + j 0.4639955160

-0.2298860624 + j -0.4639955160

Z-plane zeros:

-1.0000000000 + j 0.0000000000 7 times

Z-plane poles:

0.6490966615 + j 0.0000000000

0.6552845373 + j 0.1023700968

0.6552845373 + j -0.1023700968

0.6757525167 + j 0.2148285683

0.6757525167 + j -0.2148285683

0.7193693337 + j 0.3577670064

0.7193693337 + j -0.3577670064

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])

+ ( 0.0926657569 \* y[n- 7])

+ ( -0.8744780076 \* y[n- 6])

+ ( 3.5784963076 \* y[n- 5])

+ ( -8.2397847975 \* y[n- 4])

+ ( 11.5430252792 \* y[n- 3])

+ ( -9.8512532460 \* y[n- 2])

+ ( 4.7499094369 \* 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 | = | 5 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 8 -a 4.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0400000000

raw alpha2 = 0.0400000000

warped alpha1 = 0.0402118901

warped alpha2 = 0.0402118901

gain at dc : mag = 3.193776579e+05 phase = 0.0000000000 pi

gain at centre: mag = 2.258341077e+05 phase = 0.9878972531 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.4440246218 + j 0.0689423823

-0.4440246218 + j -0.0689423823

-0.4135870785 + j 0.2078865198

-0.4135870785 + j -0.2078865198

-0.3471130142 + j 0.3507804466

-0.3471130142 + j -0.3507804466

-0.2255913532 + j 0.5048945235

-0.2255913532 + j -0.5048945235

Z-plane zeros:

-1.0000000000 + j 0.0000000000 8 times

Z-plane poles:

0.6353434440 + j 0.0461306617

0.6353434440 + j -0.0461306617

0.6450799875 + j 0.1416936461

0.6450799875 + j -0.1416936461

0.6669876934 + j 0.2491344405

0.6669876934 + j -0.2491344405

0.7093060068 + j 0.3877707561

0.7093060068 + j -0.3877707561

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])

+ ( -0.0586383381 \* y[n- 8])

+ ( 0.6386514185 \* y[n- 7])

+ ( -3.0770659006 \* y[n- 6])

+ ( 8.5735247895 \* y[n- 5])

+ (-15.1242655856 \* y[n- 4])

+ ( 17.3167118101 \* y[n- 3])

+ (-12.5831540162 \* y[n- 2])

+ ( 5.3134342636 \* 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 | = | 5 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 9 -a 4.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0400000000

raw alpha2 = 0.0400000000

warped alpha1 = 0.0402118901

warped alpha2 = 0.0402118901

gain at dc : mag = 1.074367989e+06 phase = 0.0000000000 pi

gain at centre: mag = 7.596928903e+05 phase = 0.9203906334 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.4690863747 + j 0.0000000000

-0.4565974609 + j 0.1294582364

-0.4565974609 + j -0.1294582364

-0.4174924417 + j 0.2605896059

-0.4174924417 + j -0.2605896059

-0.3455331623 + j 0.3961016509

-0.3455331623 + j -0.3961016509

-0.2219352692 + j 0.5431659280

-0.2219352692 + j -0.5431659280

Z-plane zeros:

-1.0000000000 + j 0.0000000000 9 times

Z-plane poles:

0.6200324302 + j 0.0000000000

0.6237590533 + j 0.0855691609

0.6237590533 + j -0.0855691609

0.6356023072 + j 0.1763070499

0.6356023072 + j -0.1763070499

0.6580827829 + j 0.2800085448

0.6580827829 + j -0.2800085448

0.6987189693 + j 0.4152624418

0.6987189693 + j -0.4152624418

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])

+ ( 0.0361333089 \* y[n- 9])

+ ( -0.4469788612 \* y[n- 8])

+ ( 2.4835321686 \* y[n- 7])

+ ( -8.1411261514 \* y[n- 6])

+ ( 17.3659057828 \* y[n- 5])

+ (-25.0218054775 \* y[n- 4])

+ ( 24.3792419665 \* y[n- 3])

+ (-15.5077379518 \* y[n- 2])

+ ( 5.8523586558 \* 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 | = | 5 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 10 -a 4.0000000000e-02 0.0000000000e+00

raw alpha1 = 0.0400000000

raw alpha2 = 0.0400000000

warped alpha1 = 0.0402118901

warped alpha2 = 0.0402118901

gain at dc : mag = 3.457215320e+06 phase = 0.0000000000 pi

gain at centre: mag = 2.444620397e+06 phase = 0.8569553843 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-0.4870299950 + j 0.0610482858

-0.4870299950 + j -0.0610482858

-0.4654470131 + j 0.1837480006

-0.4654470131 + j -0.1837480006

-0.4198709098 + j 0.3085216633

-0.4198709098 + j -0.3085216633

-0.3437908196 + j 0.4379854060

-0.3437908196 + j -0.4379854060

-0.2187410626 + j 0.5792466866

-0.2187410626 + j -0.5792466866

Z-plane zeros:

-1.0000000000 + j 0.0000000000 10 times

Z-plane poles:

0.6073755865 + j 0.0394557060

0.6073755865 + j -0.0394557060

0.6134616787 + j 0.1202501436

0.6134616787 + j -0.1202501436

0.6265413107 + j 0.2073760334

0.6265413107 + j -0.2073760334

0.6490511046 + j 0.3081590352

0.6490511046 + j -0.3081590352

0.6877886497 + j 0.4406309504

0.6877886497 + j -0.4406309504

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])

+ ( -0.0217192171 \* y[n-10])

+ ( 0.3012846437 \* y[n- 9])

+ ( -1.8998620952 \* y[n- 8])

+ ( 7.1765621146 \* y[n- 7])

+ (-17.9969646061 \* y[n- 6])

+ ( 31.3334899657 \* y[n- 5])

+ (-38.3927239217 \* y[n- 4])

+ ( 32.7257173947 \* y[n- 3])

+ (-18.5945171308 \* y[n- 2])

+ ( 6.3684366602 \* y[n- 1])