**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 | = | 25 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 1 -a 2.0000000000e-01 0.0000000000e+00

raw alpha1 = 0.2000000000

raw alpha2 = 0.2000000000

warped alpha1 = 0.2312656694

warped alpha2 = 0.2312656694

gain at dc : mag = 2.376381920e+00 phase = 0.0000000000 pi

gain at centre: mag = 1.680355771e+00 phase = -0.2500000000 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-1.4530850560 + j 0.0000000000

Z-plane zeros:

-1.0000000000 + j 0.0000000000

Z-plane poles:

0.1583844403 + j 0.0000000000

Recurrence relation:

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

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

+ ( 0.1583844403 \* 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 | = | 25 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 2 -a 2.0000000000e-01 0.0000000000e+00

raw alpha1 = 0.2000000000

raw alpha2 = 0.2000000000

warped alpha1 = 0.2312656694

warped alpha2 = 0.2312656694

gain at dc : mag = 4.044976518e+00 phase = 0.0000000000 pi

gain at centre: mag = 2.860230326e+00 phase = -0.4129462918 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-1.6007204312 + j 0.9241763718

-1.6007204312 + j -0.9241763718

Z-plane zeros:

-1.0000000000 + j 0.0000000000 2 times

Z-plane poles:

0.0422302558 + j 0.2675032941

0.0422302558 + j -0.2675032941

Recurrence relation:

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

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

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

+ ( -0.0733414069 \* y[n- 2])

+ ( 0.0844605117 \* 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 | = | 25 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 3 -a 2.0000000000e-01 0.0000000000e+00

raw alpha1 = 0.2000000000

raw alpha2 = 0.2000000000

warped alpha1 = 0.2312656694

warped alpha2 = 0.2312656694

gain at dc : mag = 6.692928250e+00 phase = -0.0000000000 pi

gain at centre: mag = 4.732614952e+00 phase = -0.5526731752 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-1.9219604388 + j 0.0000000000

-1.5219745994 + j 1.4520162194

-1.5219745994 + j -1.4520162194

Z-plane zeros:

-1.0000000000 + j 0.0000000000 3 times

Z-plane poles:

0.0198981001 + j 0.0000000000

-0.0292680938 + j 0.4002068819

-0.0292680938 + j -0.4002068819

Recurrence relation:

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

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

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

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

+ ( 0.0032040352 \* y[n- 3])

+ ( -0.1598574107 \* y[n- 2])

+ ( -0.0386380876 \* 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 | = | 25 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 4 -a 2.0000000000e-01 0.0000000000e+00

raw alpha1 = 0.2000000000

raw alpha2 = 0.2000000000

warped alpha1 = 0.2312656694

warped alpha2 = 0.2312656694

gain at dc : mag = 1.056597132e+01 phase = 0.0000000000 pi

gain at centre: mag = 7.471269972e+00 phase = -0.6713254167 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-1.9908250903 + j 0.5961277337

-1.9908250903 + j -0.5961277337

-1.4461229831 + j 1.8266815638

-1.4461229831 + j -1.8266815638

Z-plane zeros:

-1.0000000000 + j 0.0000000000 4 times

Z-plane poles:

-0.0195769423 + j 0.1464502609

-0.0195769423 + j -0.1464502609

-0.0938724392 + j 0.4803097620

-0.0938724392 + j -0.4803097620

Recurrence relation:

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

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

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

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

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

+ ( -0.0052287165 \* y[n- 4])

+ ( -0.0134763737 \* y[n- 3])

+ ( -0.2686913792 \* y[n- 2])

+ ( -0.2268987629 \* 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 | = | 25 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 5 -a 2.0000000000e-01 0.0000000000e+00

raw alpha1 = 0.2000000000

raw alpha2 = 0.2000000000

warped alpha1 = 0.2312656694

warped alpha2 = 0.2312656694

gain at dc : mag = 1.586440152e+01 phase = 0.0000000000 pi

gain at centre: mag = 1.121782589e+01 phase = -0.7723549982 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-2.1829933234 + j 0.0000000000

-2.0065322064 + j 1.0431836933

-2.0065322064 + j -1.0431836933

-1.3915854812 + j 2.1376687660

-1.3915854812 + j -2.1376687660

Z-plane zeros:

-1.0000000000 + j 0.0000000000 5 times

Z-plane poles:

-0.0437469796 + j 0.0000000000

-0.0650156995 + j 0.2434425397

-0.0650156995 + j -0.2434425397

-0.1559272702 + j 0.5320072045

-0.1559272702 + j -0.5320072045

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])

+ ( -0.0008536670 \* y[n- 5])

+ ( -0.0221282544 \* y[n- 4])

+ ( -0.0777614976 \* y[n- 3])

+ ( -0.4307183479 \* y[n- 2])

+ ( -0.4856329190 \* 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 | = | 25 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 6 -a 2.0000000000e-01 0.0000000000e+00

raw alpha1 = 0.2000000000

raw alpha2 = 0.2000000000

warped alpha1 = 0.2312656694

warped alpha2 = 0.2312656694

gain at dc : mag = 2.282725061e+01 phase = -0.0000000000 pi

gain at centre: mag = 1.614130370e+01 phase = -0.8604658280 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-2.2835092212 + j 0.4662897259

-2.2835092212 + j -0.4662897259

-2.0079573511 + j 1.4116312867

-2.0079573511 + j -1.4116312867

-1.3523230858 + j 2.4148286812

-1.3523230858 + j -2.4148286812

Z-plane zeros:

-1.0000000000 + j 0.0000000000 6 times

Z-plane poles:

-0.0771221550 + j 0.1004616624

-0.0771221550 + j -0.1004616624

-0.1121260500 + j 0.3127155647

-0.1121260500 + j -0.3127155647

-0.2144282040 + j 0.5658826001

-0.2144282040 + j -0.5658826001

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])

+ ( -0.0006482767 \* y[n- 6])

+ ( -0.0083102858 \* y[n- 5])

+ ( -0.0695694301 \* y[n- 4])

+ ( -0.2282693437 \* y[n- 3])

+ ( -0.6895164410 \* y[n- 2])

+ ( -0.8073528180 \* 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 | = | 25 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 7 -a 2.0000000000e-01 0.0000000000e+00

raw alpha1 = 0.2000000000

raw alpha2 = 0.2000000000

warped alpha1 = 0.2312656694

warped alpha2 = 0.2312656694

gain at dc : mag = 3.179090240e+01 phase = 0.0000000000 pi

gain at centre: mag = 2.247956267e+01 phase = -0.9395552122 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-2.4475302301 + j 0.0000000000

-2.3424294409 + j 0.8562223874

-2.3424294409 + j -0.8562223874

-2.0036636580 + j 1.7314478781

-2.0036636580 + j -1.7314478781

-1.3221152750 + j 2.6685200172

-1.3221152750 + j -2.6685200172

Z-plane zeros:

-1.0000000000 + j 0.0000000000 7 times

Z-plane poles:

-0.1006244381 + j 0.0000000000

-0.1133289418 + j 0.1748301546

-0.1133289418 + j -0.1748301546

-0.1583298833 + j 0.3639935974

-0.1583298833 + j -0.3639935974

-0.2681537416 + j 0.5878623192

-0.2681537416 + j -0.5878623192

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])

+ ( -0.0002873249 \* y[n- 7])

+ ( -0.0053022272 \* y[n- 6])

+ ( -0.0391312790 \* y[n- 5])

+ ( -0.1897508754 \* y[n- 4])

+ ( -0.5213351486 \* y[n- 3])

+ ( -1.0902526847 \* y[n- 2])

+ ( -1.1802495714 \* 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 | = | 25 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 8 -a 2.0000000000e-01 0.0000000000e+00

raw alpha1 = 0.2000000000

raw alpha2 = 0.2000000000

warped alpha1 = 0.2312656694

warped alpha2 = 0.2312656694

gain at dc : mag = 4.318013703e+01 phase = 0.0000000000 pi

gain at centre: mag = 3.053296770e+01 phase = 0.9878972531 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-2.5536638839 + j 0.3964997957

-2.5536638839 + j -0.3964997957

-2.3786122061 + j 1.1955920270

-2.3786122061 + j -1.1955920270

-1.9963081427 + j 2.0174001928

-1.9963081427 + j -2.0174001928

-1.2974156454 + j 2.9037374204

-1.2974156454 + j -2.9037374204

Z-plane zeros:

-1.0000000000 + j 0.0000000000 8 times

Z-plane poles:

-0.1281961781 + j 0.0759103100

-0.1281961781 + j -0.0759103100

-0.1498535824 + j 0.2321348023

-0.1498535824 + j -0.2321348023

-0.2023489211 + j 0.4026670074

-0.2023489211 + j -0.4026670074

-0.3167620875 + j 0.6016661856

-0.3167620875 + j -0.6016661856

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])

+ ( -0.0001591094 \* y[n- 8])

+ ( -0.0029975846 \* y[n- 7])

+ ( -0.0263108856 \* y[n- 6])

+ ( -0.1335297443 \* y[n- 5])

+ ( -0.4600854853 \* y[n- 4])

+ ( -1.0366987392 \* y[n- 3])

+ ( -1.6745487806 \* y[n- 2])

+ ( -1.5943215381 \* 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 | = | 25 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 9 -a 2.0000000000e-01 0.0000000000e+00

raw alpha1 = 0.2000000000

raw alpha2 = 0.2000000000

warped alpha1 = 0.2312656694

warped alpha2 = 0.2312656694

gain at dc : mag = 5.749458786e+01 phase = 0.0000000000 pi

gain at centre: mag = 4.065481296e+01 phase = 0.9203906334 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-2.6977984433 + j 0.0000000000

-2.6259724980 + j 0.7445371418

-2.6259724980 + j -0.7445371418

-2.4010726383 + j 1.4986967667

-2.4010726383 + j -1.4986967667

-1.9872221357 + j 2.2780504291

-1.9872221357 + j -2.2780504291

-1.2763888614 + j 3.1238430153

-1.2763888614 + j -3.1238430153

Z-plane zeros:

-1.0000000000 + j 0.0000000000 9 times

Z-plane poles:

-0.1485373312 + j 0.0000000000

-0.1571501256 + j 0.1356542947

-0.1571501256 + j -0.1356542947

-0.1855721962 + j 0.2773370077

-0.1855721962 + j -0.2773370077

-0.2436788028 + j 0.4321148331

-0.2436788028 + j -0.4321148331

-0.3604899602 + j 0.6097350026

-0.3604899602 + j -0.6097350026

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])

+ ( -0.0000880203 \* y[n- 9])

+ ( -0.0018286473 \* y[n- 8])

+ ( -0.0172735360 \* y[n- 7])

+ ( -0.0990179765 \* y[n- 6])

+ ( -0.3763129851 \* y[n- 5])

+ ( -1.0079431412 \* y[n- 4])

+ ( -1.8805470762 \* y[n- 3])

+ ( -2.4798551360 \* y[n- 2])

+ ( -2.0423195009 \* 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 | = | 25 |
| corner2 | = |  |
| adzero | = |  |
| logmin | = |  |

**Results**

Command line: /www/usr/fisher/helpers/mkfilter -Be -Lp -o 10 -a 2.0000000000e-01 0.0000000000e+00

raw alpha1 = 0.2000000000

raw alpha2 = 0.2000000000

warped alpha1 = 0.2312656694

warped alpha2 = 0.2312656694

gain at dc : mag = 7.531164678e+01 phase = 0.0000000000 pi

gain at centre: mag = 5.325337614e+01 phase = 0.8569553843 pi

gain at hf : mag = 0.000000000e+00

S-plane zeros:

S-plane poles:

-2.8009953673 + j 0.3510994550

-2.8009953673 + j -0.3510994550

-2.6768678330 + j 1.0567671471

-2.6768678330 + j -1.0567671471

-2.4147516277 + j 1.7743624795

-2.4147516277 + j -1.7743624795

-1.9772016155 + j 2.5189312892

-1.9772016155 + j -2.5189312892

-1.2580184160 + j 3.3313498192

-1.2580184160 + j -3.3313498192

Z-plane zeros:

-1.0000000000 + j 0.0000000000 10 times

Z-plane poles:

-0.1712715421 + j 0.0606053719

-0.1712715421 + j -0.0606053719

-0.1862725632 + j 0.1838667357

-0.1862725632 + j -0.1838667357

-0.2199532176 + j 0.3135138417

-0.2199532176 + j -0.3135138417

-0.2821955257 + j 0.4546161660

-0.2821955257 + j -0.4546161660

-0.3997914437 + j 0.6137180366

-0.3997914437 + j -0.6137180366

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])

+ ( -0.0000509400 \* y[n-10])

+ ( -0.0011347978 \* y[n- 9])

+ ( -0.0116660287 \* y[n- 8])

+ ( -0.0729233653 \* y[n- 7])

+ ( -0.3090001301 \* y[n- 6])

+ ( -0.9287141757 \* y[n- 5])

+ ( -2.0282176877 \* y[n- 4])

+ ( -3.1863392000 \* y[n- 3])

+ ( -3.5398196283 \* y[n- 2])

+ ( -2.5189685846 \* y[n- 1])