FREQUENCY DEVICES™

# Model D01L4B

## Linear Active DIP Filters

## 4-Pole Butterworth Low-Pass Filter

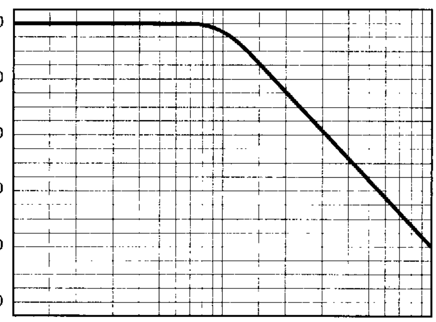
### Description

The D01L4B is an 4-pole low-pass Butterworth transfer function, is maximally flat, has no ripple in the passband, and has a monotonic roll-off at the rate of 24 dB/ octave in the stopband.

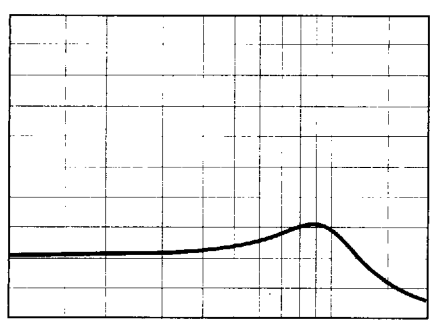
### Specifications

| | |
|---|---|
| Transfer Function | 4-pole Butterworth Low-Pass |
| Size | 1.80" x 0.80" x 0.30" |
| Passband Ripple (theoretical) | 0.0 dB |
| DC Voltage Gain (non-inverting) | 0 ± 0.1 dB typ.<br>0 ± 0.2 dB max. |
| Stopband Attenuation Rate | 24 dB/octave |
| Cutoff Frequency $f_c$ (-3 dB) | |
| Accuracy | ± 5 % max. |
| Stability | ± 0.02 % / °c |
| Range $f_c$ | 100 Hz to 1 MHz |
| Phase Shift | – 180° |
| Filter Attenuation | (theoretical) |
| 0.12 dB | 0.80 $f_c$ |
| 3.01 dB | 1.00 $f_c$ |
| 60.0 dB | 5.62 $f_c$ |
| 80.0 dB | 10.0 $f_c$ |
| Phase Match [2] | |
| Amplitude Accuracy [2] | |
| Total Harmonic Distortion @ 2.5 VRMS | |
| 1 kHz | < – 80 dB typ. |
| 100 kHz | < – 65 dB typ. |
| Wide Band Noise (20 Hz - 4 MHz) | 70 µVRMS typ. |
| Narrow Band Noise (20 Hz - 100 kHz) | 20 µVRMS typ. |

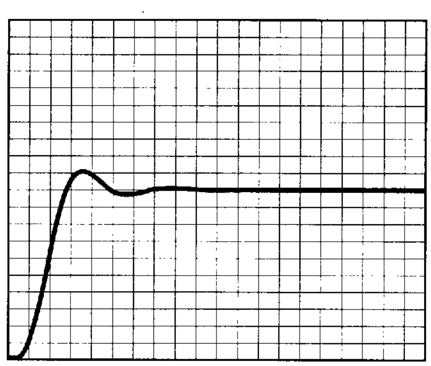
### Frequency Response




### Delay (Normalized)




### Step Response




### Theoretical Transfer Characteristics

| f/fc (Hz) | Amp (dB) | Phase (deg) | Delay [1] (sec) |
|---|---|---|---|
| 0.00 | 0.00 | 0.00 | .416 |
| 0.10 | 0.00 | -15.0 | .418 |
| 0.20 | 0.00 | -30.1 | .423 |
| 0.30 | -0.00 | -45.5 | .433 |
| 0.40 | -0.003 | -61.4 | .449 |
| 0.50 | -0.017 | -78.0 | .474 |
| 0.60 | -0.072 | -95.7 | .511 |
| 0.70 | -0.243 | -115 | .558 |
| 0.80 | -0.674 | -136 | .604 |
| 0.85 | -1.047 | -147 | .619 |
| 0.90 | -1.555 | -158 | .622 |
| 0.95 | -2.21 | -169 | .612 |
| 1.00 | -3.01 | -180 | .588 |
| 1.10 | -4.97 | -200 | .513 |
| 1.20 | -7.24 | -217 | .427 |
| 1.30 | -9.62 | -231 | .350 |
| 1.40 | -12.0 | -242 | .289 |
| 1.50 | -14.3 | -252 | .241 |
| 1.60 | -16.4 | -260 | .204 |
| 1.70 | -18.5 | -266 | .175 |
| 1.80 | -20.5 | -272 | .152 |
| 1.90 | -22.3 | -277 | .134 |
| 2.00 | -24.1 | -282 | .119 |
| 2.25 | -28.2 | -291 | .091 |
| 2.50 | -31.8 | -299 | .072 |
| 2.75 | -35.1 | -304 | .059 |
| 3.00 | -38.2 | -309 | .049 |
| 3.25 | -41.0 | -313 | .041 |
| 3.50 | -43.5 | -317 | .035 |
| 4.00 | -48.2 | -322 | .027 |
| 5.00 | -55.9 | -330 | .017 |
| 6.00 | -62.3 | -335 | .012 |
| 7.00 | -67.6 | -339 | .009 |
| 8.00 | -72.2 | -341 | .007 |
| 9.00 | -76.3 | -343 | .005 |
| 10.0 | -80.0 | -345 | .004 |

2.Phase Match and Amplitude Accuracy in the pass band are within ±5% max. of the theoretical transfer characteristics.

1.Normalized Group Delay: The above delay data is normalized to a corner frequency of 1.0 Hz. The actual delay is the normalized delay divided by the actual corner frequency (fc).

$$\text{Actual Delay} = \frac{\text{Normalized Delay}}{\text{Actual Corner Frequency (fc) in Hz}}$$



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4