



1.0 Hz to 100 kHz
Fixed Frequency

16 Pin DIP
4-Pole Filters

Description

The D74 and DP74 Series of low-power, fixed-frequency, linear active filters are high performance, 4-pole filters in a compact package. These Butterworth and Bessel low-pass and Butterworth high-pass filters (D74 only) combine linear active filter design with the space savings of a 16-pin dual in-line package (DIP). Each model comes factory tuned to a user-specified corner frequency between 1 Hz and 100 kHz (DP74, 1 Hz to 5kHz). These fully self-contained units require no external components or adjustments and operate with dynamic input voltage range from non-critical $\pm 5V$ to $\pm 18V$ power supplies.

Features/Benefits:

- Low cost solution for low frequency signal conditioning
- Compact DIP design minimizes board space requirements
- Plug-in ready-to-use, reducing engineering design and manufacturing time
- Factory tuned, no external clocks or adjustments needed saving time and labor of other discrete assembly solutions
- Low harmonic distortion and wide signal-to-noise ratio to 12 bit resolution

Applications

- Anti-alias filtering
- Vibration & shock analysis
- Automatic test equipment
- Aerospace, navigation and sonar
- Communication systems
- Medical electronics
- Sound and vibration testing
- Noise elimination
- Process control

**Available Low-Pass Models:**

D74L4B	4-pole Butterworth	.2
DP74L4B	4-pole Butterworth (Low Power)	.2
D74L4L	4-pole Bessel	.2
DP74L4L	4-pole Bessel (Low Power)	.2

Available High-Pass Models:

D74H4B	4-pole Butterworth	.2
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General Specifications:

Pin-out/package data & ordering information . . .	.3
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Model	D74L4B & DP74L4B		D74L4L & DP74L4L		Model	D74H4B	
Product Specifications	Low-Pass		Low-Pass			High-Pass	
Transfer Function	4-Pole, Butterworth		4-Pole, Bessel		Transfer Function	4-Pole, Butterworth	
Size	0.88" x 0.46" x 0.375"		0.88" x 0.46" x 0.375"		Size	0.88" x 0.46" x 0.375"	
Range f_c D74 DP74	1 Hz to 100 kHz 1 Hz to 5 kHz		1 Hz to 100 kHz 1 Hz to 5 kHz		Range f_c	1 Hz to 100 kHz	
Theoretical Transfer Characteristics	Appendix A Page 7		Appendix A Page 2		Theoretical Transfer Characteristics	Appendix A Page 27	
Passband Ripple (theoretical)	0.0 dB		0.0 dB		Passband Ripple (theoretical)	0.0 dB	
DC Voltage Gain (non-inverting)	0 ± 0.1 dB typ.		0 ± 0.1 dB typ.		Voltage Gain (non-inverting)	0 ± 0.1 dB to 100 kHz	
Stopband Attenuation Rate	24 dB/octave		24 dB/octave		Stopband Attenuation Rate	24 dB/octave	
					Power Bandwidth	120 kHz	
					Small Signal Bandwidth	(-6 dB) 1 MHz	
Cutoff Frequency Stability Amplitude Phase	f_c ± 2% max. ± 0.03% /°C -3 dB -180°		f_c ± 2% max. ± 0.03% /°C -3 dB -121°		Cutoff Frequency Stability Amplitude Phase	f_c ± 2% max. ± 0.03% /°C -3 dB -180°	
Filter Attenuation (theoretical)	0.67 dB 3.01 dB 60.0 dB 80.0 dB	0.80 f_c 1.00 f_c 5.62 f_c 10.0 f_c	1.86 dB 3.01 dB 60.0 dB 80.0 dB	0.80 f_c 1.00 f_c 8.48 f_c 15.12 f_c	Filter Attenuation (theoretical)	80 dB 60 dB 3.01 dB 0.00 dB	0.10 f_c 0.18 f_c 1.00 f_c 4.00 f_c
Total Harmonic Distortion @ 1 kHz D74 DP74	<-70 dB <-70 dB		<-70 dB <-70 dB		Total Harmonic Distortion @ 1 kHz D74 DP74	<-70 dB <-70 dB	
Wide Band Noise (5 Hz - 2 MHz)	200 µVrms typ.		200 µVrms typ.		Wide Band Noise (5 Hz - 2 MHz)	400 µVrms typ.	
Narrow Band Noise (20 Hz - 100 kHz)	50 µVrms typ.		50 µVrms typ.		Narrow Band Noise (20 Hz - 100 kHz)	100 µVrms typ.	
Filter Mounting Assembly	FMA-01A		FMA-01A		Filter Mounting Assembly	FMA-01A	



Specification

(25°C and $V_s \pm 15$ Vdc)

Analog Input Characteristics¹

Impedance	10 k Ω min.
Voltage Range	± 10 Vpeak
Max. Safe Voltage	$\pm V_s$

Analog Output Characteristics

Impedance	1 Ω
Linear Operating Range	± 10 V
Maximum Current ²	
D74	± 10 mA
DP74	± 5 mA
Offset Voltage	10 mV max. 3 mV typ.
Offset Temp. Coeff.	20 μ V / °C

Power Supply ($\pm V$)

Rated Voltage	± 15 Vdc
Operating Range	± 5 to ± 18 Vdc
Maximum Safe Voltage	± 18 Vdc
Quiescent Current D74	5 mA max. 3 mA typ.
Quiescent Current DP74	1 mA max. 600 μ A typ.

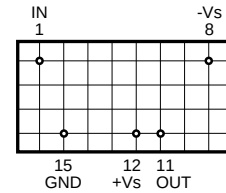
Temperature

Operating	0 to + 70 °C
Storage	- 25 to + 85 °C

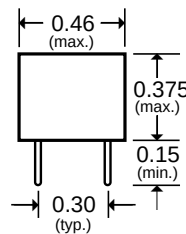
Notes:

1. Input and output signal voltage referenced to supply common.
2. Output is short circuit protected to common.
DO NOT CONNECT TO $\pm V_s$.

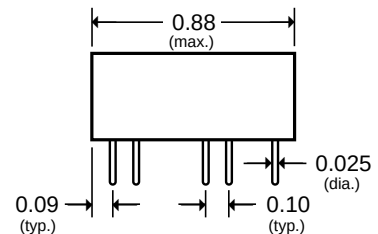
All dimensions are in inches
All case dimensions ± 0.01 "
Grid Dimensions 0.1" x 0.1"



BOTTOM VIEW



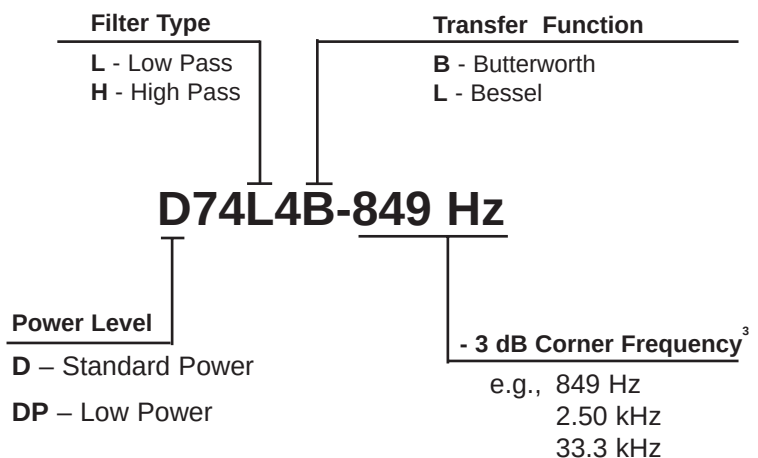
FRONT VIEW



SIDE VIEW

Filter Mounting Assembly-See FMA-01A

Ordering Information



3. How to Specify Corner Frequency:

Corner frequencies are specified by attaching a three digit frequency designator to the basic model number. Corner frequencies can range from 1 Hz to 100 kHz.



Theoretical Transfer Characteristics

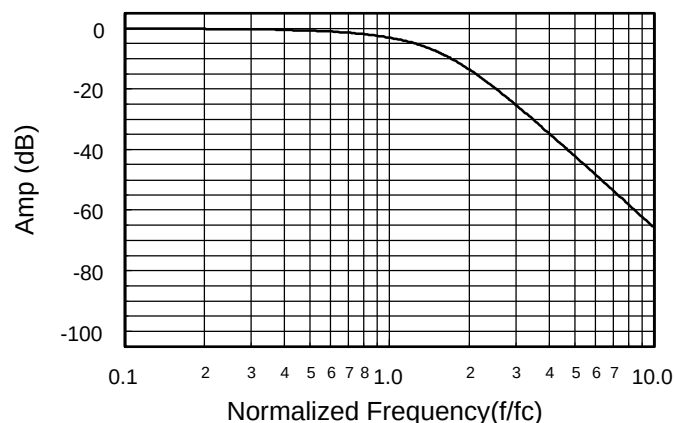
f/f _c (Hz)	Amp (dB)	Phase (deg)	Delay ¹ (sec)
0.00	0.00	0.00	.336
0.10	-0.028	-12.1	.336
0.20	-0.111	-24.2	.336
0.30	-0.251	-36.3	.336
0.40	-0.448	-48.4	.336
0.50	-0.705	-60.6	.336
0.60	-1.02	-72.7	.336
0.70	-1.41	-84.8	.336
0.80	-1.86	-96.8	.335
0.85	-2.11	-103	.334
0.90	-2.40	-109	.333
0.95	-2.69	-115	.332
1.00	-3.01	-121	.330
1.10	-3.71	-133	.325
1.20	-4.51	-144	.318
1.30	-5.39	-156	.308
1.40	-6.37	-166	.295
1.50	-7.42	-177	.280
1.60	-8.54	-187	.263
1.70	-9.71	-195	.246
1.80	-10.9	-204	.228
1.90	-12.2	-212	.211
2.00	-13.4	-219	.194
2.25	-16.5	-235	.158
2.50	-19.5	-248	.129
2.75	-22.4	-259	.107
3.00	-25.1	-267	.089
3.25	-27.6	-275	.076
3.50	-30.0	-281	.065
4.00	-34.4	-291	.049
5.00	-41.9	-305	.031
6.00	-48.1	-315	.021
7.00	-53.4	-321	.016
8.00	-58.0	-326	.012
9.00	-62.0	-330	.009
10.0	-65.7	-333	.008

1. Normalized Group Delay:

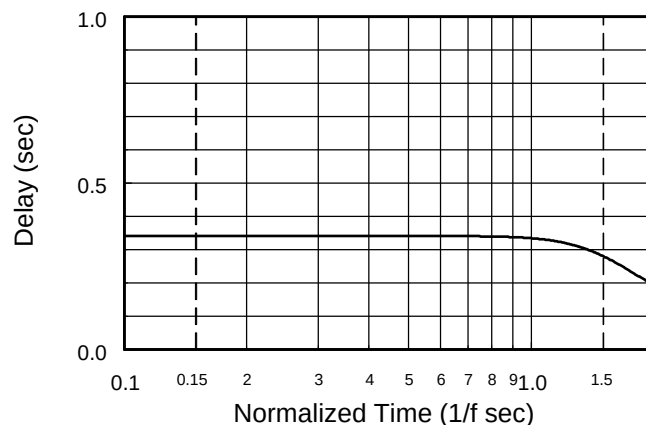
The above delay data is normalized to a corner frequency of 1.0Hz. The actual delay is the normalized delay divided by the actual corner frequency (fc).

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

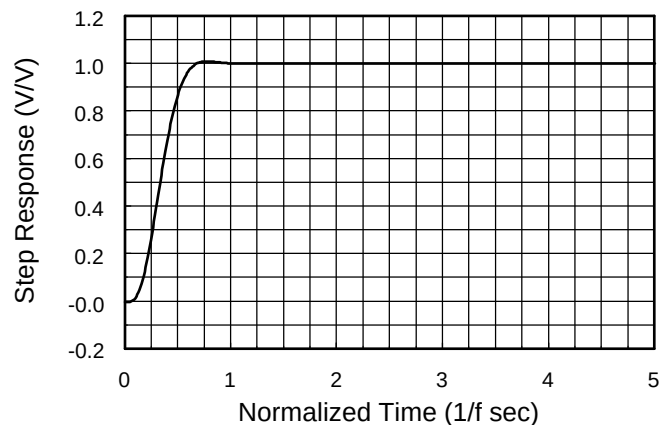
Frequency Response



Delay (Normalized)



Step Response





Theoretical Transfer Characteristics

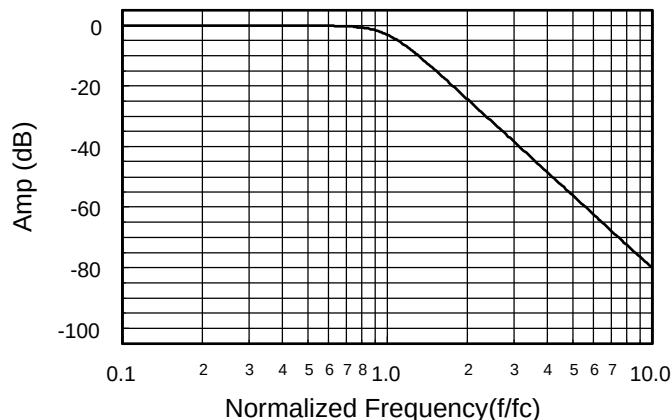
f/f_c (Hz)	Amp (dB)	Phase (deg)	Delay¹ (sec)
0.00	0.00	0.00	.416
0.10	0.00	-15.0	.418
0.20	0.00	-30.1	.423
0.30	-0.00	-45.5	.433
0.40	-0.003	-61.4	.449
0.50	-0.017	-78.0	.474
0.60	-0.072	-95.7	.511
0.70	-0.243	-115	.558
0.80	-0.674	-136	.604
0.85	-1.047	-147	.619
0.90	-1.555	-158	.622
0.95	-2.21	-169	.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

1. Normalized Group Delay:

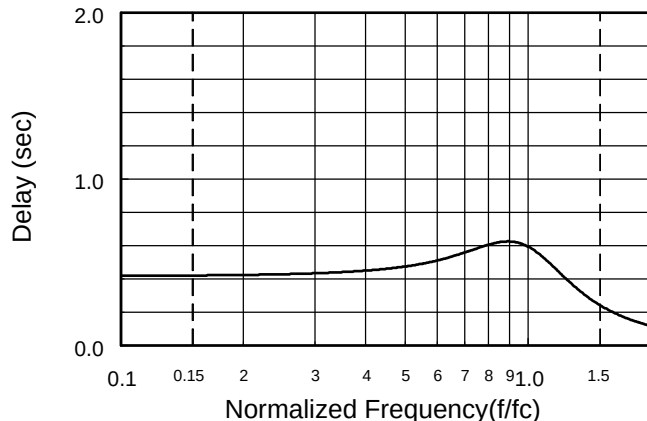
The above delay data is normalized to a corner frequency of 1.0Hz. The actual delay is the normalized delay divided by the actual corner frequency (fc).

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

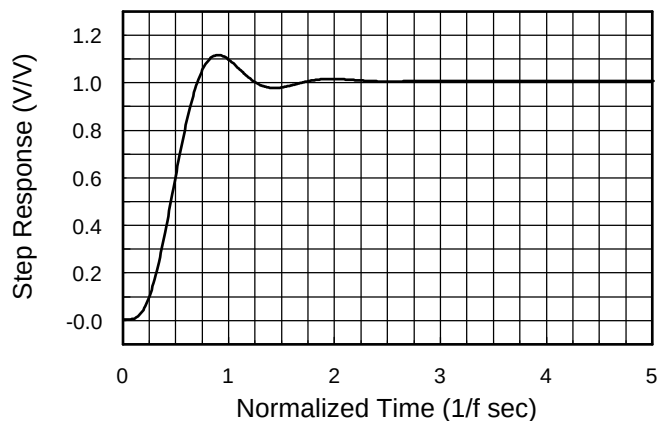
Frequency Response



Delay (Normalized)

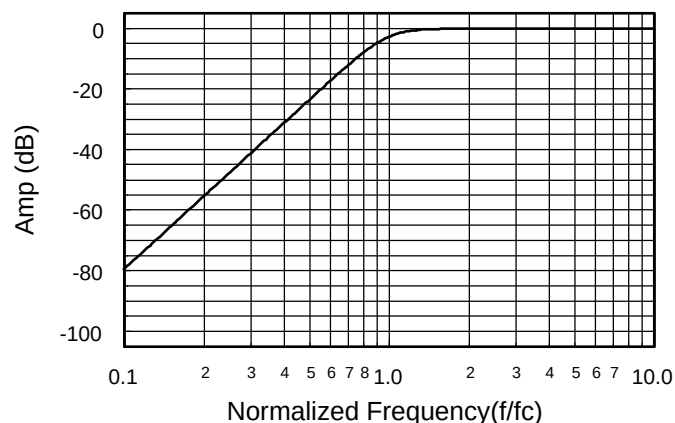


Step Response



**Theoretical Transfer Characteristics**

f/f_c (Hz)	Amp (dB)	Phase (deg)	Delay¹ (sec)
0.10	-80.0	345	.418
0.20	-55.9	330	.423
0.30	-41.8	314	.433
0.40	-31.8	299	.449
0.50	-24.1	282	.474
0.60	-17.8	264	.511
0.70	-12.6	245	.558
0.80	-8.43	224	.604
0.85	-6.69	213	.619
0.90	-5.22	202	.622
0.95	-3.99	191	.612
1.00	-3.01	180	.588
1.20	-0.908	143	.427
1.40	-0.285	118	.289
1.60	-0.100	100	.204
1.80	-0.039	87.6	.152
2.00	-0.017	78.0	.119
2.50	-0.003	61.4	.072
3.00	-0.001	50.7	.049
4.00	0.00	37.8	.027
5.00	0.00	30.1	.017
6.00	0.00	25.1	.012
7.00	0.00	21.4	.009
8.00	0.00	18.8	.007
9.00	0.00	16.7	.005
10.0	0.00	15.0	.004

Frequency Response**1. Normalized Group Delay:**

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

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