FREQUENCY DEVICES™, INC.

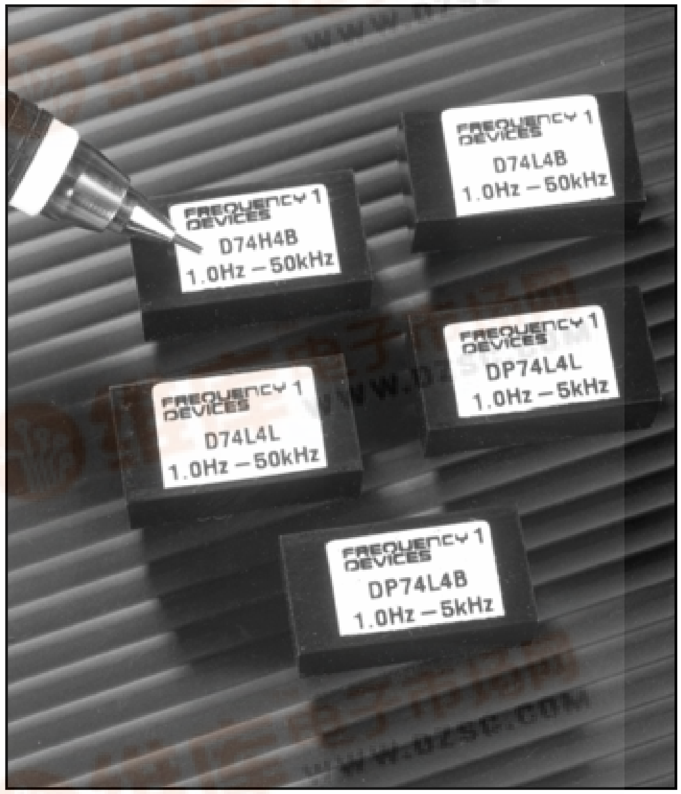
D74 & DP74 Series

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 ±5V to ±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:

Available High-Pass Models:

General Specifications:

FREQUENCY DEVICES™, INC.

D74 & DP74 Series

Fixed Frequency

4-Pole Low-Pass and High-Pass Filters

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 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	1.86 dB 0.80 f_c 3.01 dB 1.00 f_c 60.0 dB 8.48 f_c 80.0 dB 15.12 f_c	**Filter Attenuation** (theoretical)	80 dB 0.10 f_c 60 dB 0.18 f_c 3.01 dB 1.00 f_c 0.00 dB 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**	 <-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

1784 Chessie Lane, Ottawa, IL 61350 • Tel: 800/252-7074, 815/434-7800 • FAX: 815/434-8176

FREQUENCY DEVICES™, INC.

D74 & DP74 Series

Specification

(25°C and Vs ±15 Vdc)

Analog Input Characteristics[1]

Impedance 10 kΩ min.
Voltage Range ± 10 Vpeak
Max. Safe Voltage ±Vs

Analog Output Characteristics

Impedance 1 Ω
Linear Operating Range ±10 V
Maximum Current[2]
D74 ±10 mA
DP74 ±5 mA

Offset Voltage

f_c < 100 Hz	f_c ≥100 Hz
0 – 50ºC	0 – 70ºC
10 mV max.	10 mV max.
3 mV typ.	3 mV typ.

Offset Temp. Coeff. 20 µV / °C

Power Supply (±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**
1.5 mA max.
600 µA typ.

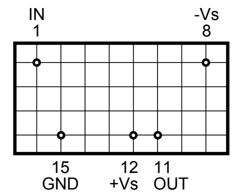
Temperature

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

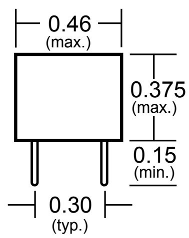
Notes:
1. Input and output signal voltage referenced to supply common.
2. Output is short circuit protected to common. DO NOTCONNECTTO ±Vs.

Pin-Out and Package Data
Ordering Information

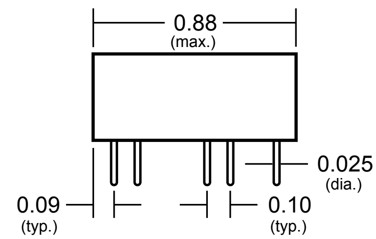
All dimensions are in inches
All case dimensions ±0.01"
Grid Dimensions 0.1" x 0.1"



BOTTOM VIEW



FRONT VIEW



SIDE VIEW

Filter Mounting Assembly-See FMA-01A

Ordering Information

Filter Type
L - Low Pass
H - High Pass

Transfer Function
B - Butterworth
L - Bessel

D74L4B-849 Hz

Power Level
D – Standard Power
DP – Low Power

- 3 dB Corner Frequency[3]
e.g., 849 Hz
2.50 kHz
33.3 kHz

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.

IN-00D74-01

1784 Chessie Lane, Ottawa, IL 61350 • Tel: 800/252-7074, 815/434-7800 • FAX: 815/434-8176

FREQUENCY DEVICES™, INC.

Low-Pass

4-Pole

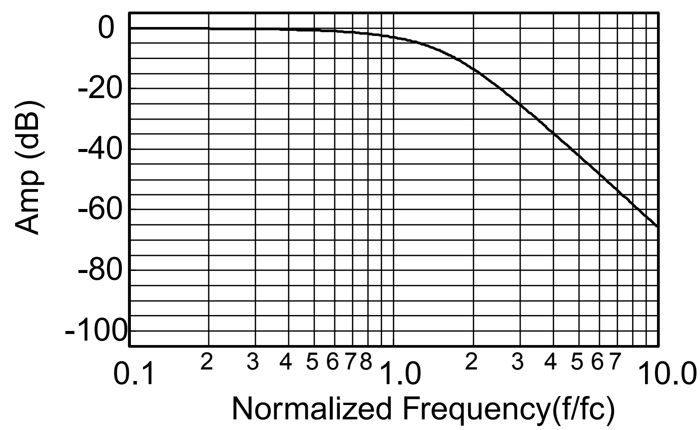
Bessel

Appendix A

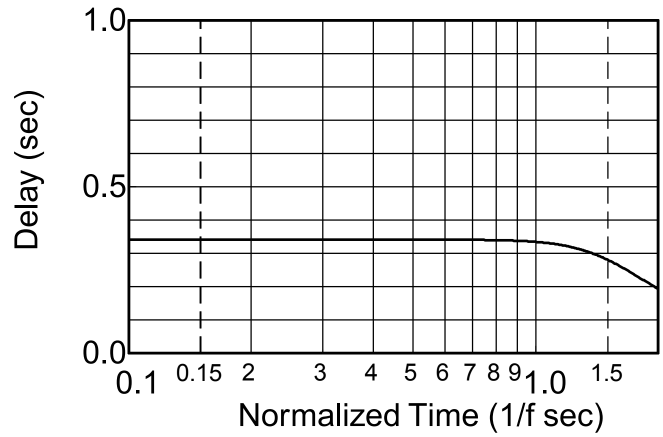
Theoretical Transfer Characteristics

f/fc (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

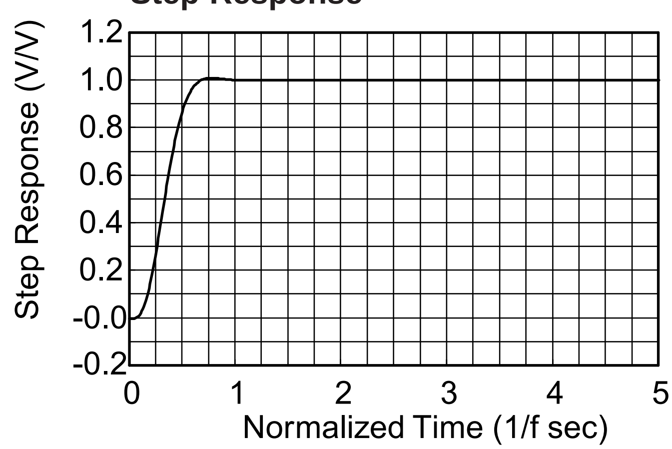
Frequency Response



Delay (Normalized)



Step 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).

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

Appendix A

Low-Pass

4-Pole

Butterworth

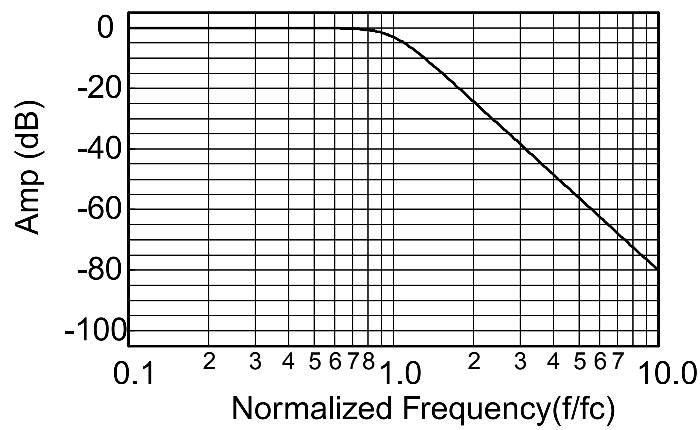
Theoretical Transfer Characteristics

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

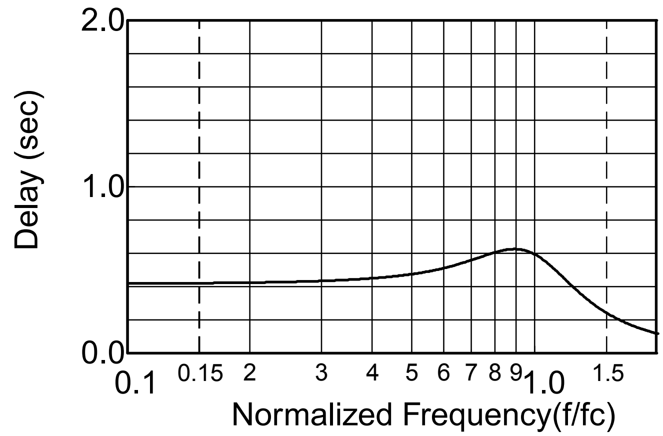
1.**Normalized Group Delay:**
The above delay data is normalized to a corner frequency of 1.0Hz.The actual delay is the normalized delay divided by the actual corner frequency (fc).

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

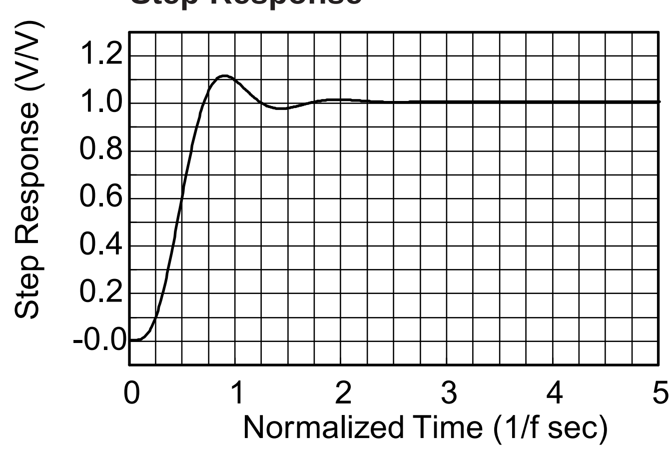
Frequency Response



Delay (Normalized)



Step Response

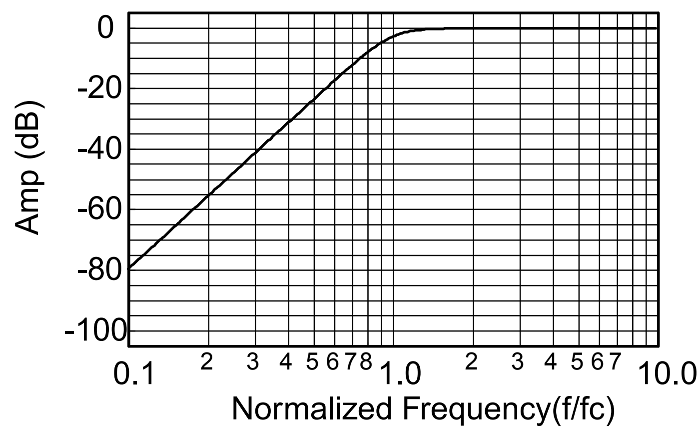


1784 Chessie Lane, Ottawa, IL 61350 • Tel: 800/252-7074, 815/434-7800 • FAX: 815/434-8176

Theoretical Transfer Characteristics

f/fc (Hz)	Amp (dB)	Phase (deg)	Delay[1] (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).

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

1784 Chessie Lane, Ottawa, IL 61350 • Tel: 800/252-7074, 815/434-7800 • FAX: 815/434-8176