



**FREQUENCY
DEVICES™**

424 & 428 Series

4-Bit Programmable

28-Pin DIP 4 -Pole Filters

Description:

The 424 and 428 Series of high-performance, linear active filters represent a breakthrough line of 4- and 8-pole programmable filters. These new filters take advantage of the company's proprietary designs using surface mount technology to duplicate the specifications of the current products in a low profile, compact package that occupies 60% less board space. Available low-pass and high-pass models are factory tuned to one of 10 preset 4-bit binary ranges or one of 7 log-weighted ranges from 10 Hz to 102.4 kHz. Contact factory for custom discrete tuning ranges (maximum span 1000:1).

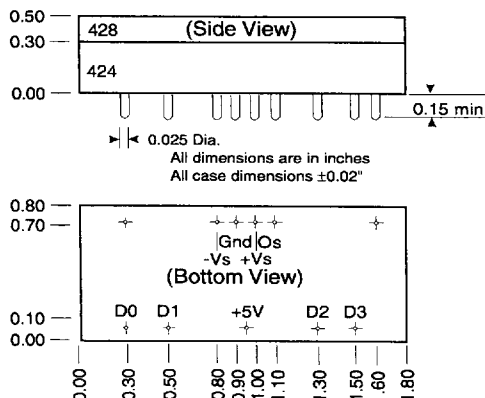
Features/Benefits:

- Compact 1.8"L x 0.8"W x 0.3"H min. (28 pin DIP footprint) minimizes board space requirements.
- Low harmonic distortion and wide signal-to-noise ratio to 16 bit resolution.
- Digitally programmable corner frequency allows selecting cut-off frequencies specific to each application
- Plug-in ready-to-use, reducing engineering design and manufacturing cycle time.
- Factory tuned, no external clocks or adjustments needed
- Broad range of transfer characteristics and corner frequencies to meet a wide range of applications.

Applications

- Anti-alias filtering
- Data acquisition systems
- Communication systems and electronics
- Medical electronics equipment and research
- Aerospace, navigation and sonar applications
- Acoustic and vibration analysis and control
- Real and compressed time data analysis
- Noise elimination
- Signal reconstruction

Pin-Out & Package Data



Available 424 Low-Pass Models:

- 424L4B 4-pole Butterworth
- 424L4L 4-pole Bessel
- 424L4Y2 4-pole Cheby (0.2 dB Ripple)
- 424L4Y5 4-pole Cheby (0.5 dB Ripple)

Available 424 High-Pass Models:

- 424H4B 4-pole Butterworth
- 424H4Y2 4-pole Cheby (0.2 dB Ripple)
- 424H4Y5 4-pole Cheby (0.5 dB Ripple)

Available 428 Low-Pass Models:

- 428L4B 8-pole Butterworth
- 428L4E 8-pole, 6 zero elliptic, 1.77 (-80dB)
- 428L4EX 8-pole, 6 zero elliptic, 1.56 (-80dB)
- 428L4EY 8-pole, 6 zero elliptic, 2.00 (-100dB)
- 428L4L 8-pole Bessel
- 428L4D60 8-pole constant delay (-60 dB)
- 428L4D80 8-pole constant delay (-80 dB)
- 428L4D10 8-pole constant delay (-100 dB)

Available 428 High-Pass Models:

- 428H4B 8-pole Butterworth
- 428H4E 8-pole, 6 zero elliptic, 1.77 (-80dB)
- 428H4EX 8-pole, 6 zero elliptic, 1.56 (-80dB)
- 428H4EY 8-pole, 6 zero elliptic, 2.00 (-100dB)

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424 & 428 Series

Specification (25°C and Vs ± 15 Vdc)

Ordering Information

Analog Input Characteristics¹

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

Analog Output Characteristics

Impedance (Closed Loop)	1 Ω typ. 10 Ω max.
Linear Operating Range	± 10 V
Maximum Current²	± 2 mA
Offset Voltage³	2 mV typ. 20 mV max.
Offset Temp. Coeff.	50 μ V/°C

Power Supply ($\pm V$)

Rated Voltage	± 15 Vdc
Operating Range	± 12 to ± 18 Vdc
Maximum Safe Voltage	± 18 Vdc

Quiescent Current

424, 4-Pole	± 13 mA typ. ± 20 mA max.
428, 8-Pole	± 25 mA typ. ± 40 mA max.

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 $\pm V_s$.
3. Adjustable to zero.
4. Units operate with or without offset pin connected.

Filter Type

L - Low Pass
H - High Pass

Poles

4 - 4 Pole
8 - 8 Pole

Ordering Information

424 Transfer Function

B - Butterworth
L - Bessel
Y2 - 0.2 Ripple Chebychev
Y5 - 0.5 Ripple Chebychev

428 Transfer Function

B - Butterworth
L - Bessel
D60 - constant delay (-60 dB)
D80 - constant delay (-80 dB)
D10 - constant delay (-100 dB)
E - elliptic 1.77 (-80 dB)
EX - elliptic 1.56 (-80 dB)
EY - elliptic 2.00 (-100 dB)

428 L4E-L7

Model Number

Binary Tuning Ranges

Model Number	Tuning Range (Hz)	*Minimum Step (Hz)	424 Case	428 Case
1	10-160	10	B-1	B-2
2	25-400	25	B-1	B-2
3	50-800	50	B-1	B-2
4	100-1.60k	100	B-1	B-2
5	250-4.00k	250	B-1	B-2
6	500-8.00k	500	B-1	B-2
7	1.00k-16.0k	1.00k	B-1	B-2
8	2.50k-40.0k	2.50k	B-1	B-2
9	5.00k-80.0k	5.00k	B-1	B-2
10	6.40k-102.4k	6.40k	B-1	B-2

*Contact factory for custom step frequency. Maximum step 6.40 kHz.

Log Weighted Tuning Ranges

Model Number	Log Weighted Frequency's (Hz)	424 Case	428 Case
L1	10, 30, 100, 300, 1.00k	B-1	B-2
L2	25, 75, 250, 750, 2.50k	B-1	B-2
L3	50, 300, 500, 1.50k, 5.00k	B-1	B-2
L4	100, 300, 1.00k, 3.00k, 10.0k	B-1	B-2
L5	250, 750, 2.50k, 7.50k, 25.0k	B-1	B-2
L6	500, 1.50k, 5.00k, 15.0k, 50.0k	B-1	B-2
L7	1.00k, 3.00k, 10.0k, 30.0k, 100.0k	B-1	B-2

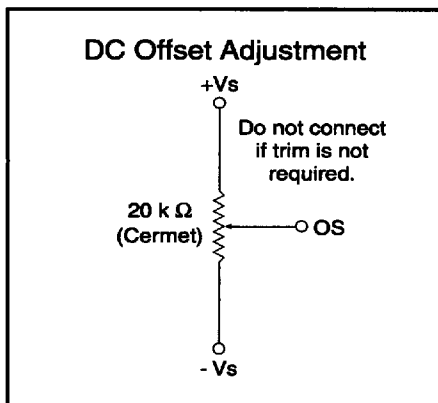
*Contact factory for custom frequency's.

Discrete Frequency's

Customer must specify f_1, f_2, f_3, f_4, f_5 . Maximum span $f_1 \Rightarrow f_5$ 1,000:1.

Contact factory for custom frequency's

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