



Lowpass & Highpass

Description

The 5BAF Series are differential-input low-pass and high-pass filters that are pin-out and package compatible with industry-standard 5B Series signal conditioning modules. Each filter comes factory tuned to a user specified corner or center frequency from 1 Hz to 100 kHz. These filters are ideally suited to sharply limit A/D converter bandwidth to eliminate unwanted signals and noise.

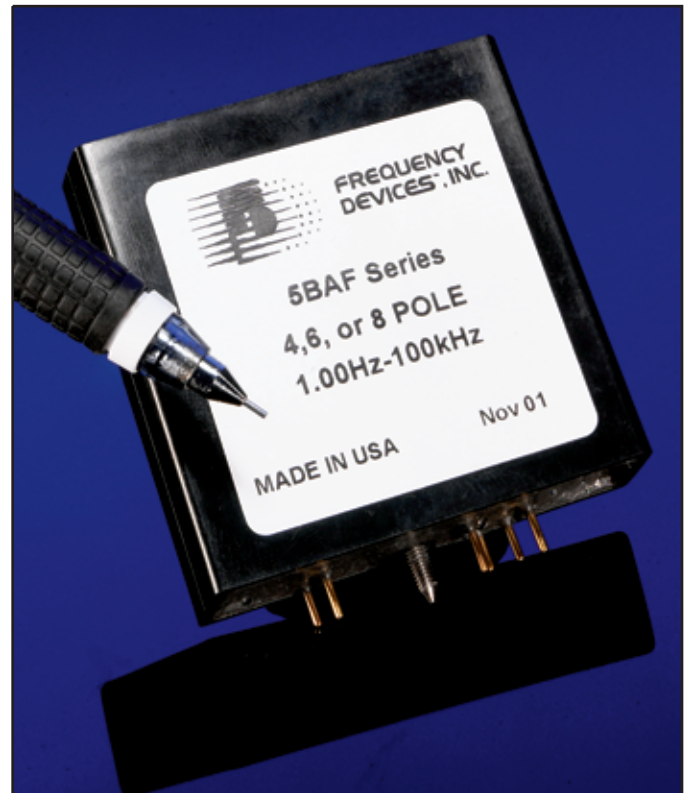
To serve real-world applications, all 5BAF Series filters are configured with a differential input having a common mode rejection ratio of < -70 dB (min.) at 1 kHz. A self contained dc-to-dc converter enables the 5BAF filters to operate from a non-critical +5, $\pm 10\%$ volt power source, key in many systems since +5V logic power is readily available.

Features/Benefits:

- The 10 volt input range with overall gain of 1 provides an excellent match to both the transducer output and the data acquisition board input.
- 5BAF modules allow for partitioning between system segments providing a means to minimize ground loops.
- 5B plug-in compatible provides quick and easy insertion.
- Factory tuned, no external clocks or adjustments needed.
- Broad range of corner or center frequencies to meet a wide range of applications.

Applications

- Vibration analysis
- Industrial and process control
- Noise reduction
- Signal reduction
- Test systems



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General Specifications:

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Note: Contact factory for lower frequency, noise or distortion options.



Low-Pass Butterworth

Model	5BAF-LPBU8	5BAF-LPBU6	5BAF-LPBU4	
Product Specifications				
Transfer Function	8-Pole Butterworth	6-Pole Butterworth	4-Pole Butterworth	
Size	Std. 5B	Std. 5B	Std. 5B	
Range f_c	1.00 Hz to 100 kHz	1.00 Hz to 100 kHz	1.00 Hz to 100 kHz	
Theoretical Transfer Characteristics	Appendix A Page 9	Appendix A Page 8	Appendix A Page 7	
Passband Ripple (theoretical)	0.0 dB	0.0 dB	0.0 dB	
DC Voltage Gain (non-inverting)	0 ± 0.1 dB typ	0 ± 0.1 dB typ	0 ± 0.1 dB typ.	
Differential Gain	$1 \pm 0.3\%$	$1 \pm 0.3\%$	$1 \pm 0.3\%$	
Stopband Attenuation Rate	48 dB/octave	36 dB/octave	24 dB/octave	
Accuracy f_c	$\pm 2\%$ max.	$\pm 2\%$ max.	$\pm 2\%$ max.	
Phase	-360°	-270°	-180°	
Filter Attenuation (theoretical)	0.12 dB $0.80 f_c$ 3.01 dB $1.00 f_c$ 60.0 dB $2.37 f_c$ 80.0 dB $3.16 f_c$	0.29 dB $0.80 f_c$ 3.01 dB $1.00 f_c$ 60.0 dB $3.16 f_c$ 80.0 dB $4.46 f_c$	0.67 dB $0.80 f_c$ 3.01 dB $1.00 f_c$ 60.0 dB $5.62 f_c$ 80.0 dB $10.00 f_c$	
Impedance	1.0 M Ω min.	1.0 M Ω min.	1.0 M Ω min.	
Com. Mode Voltage Range	± 20 V	± 20 V	± 20 V	
Com. Mode Rejection Ratio @ 1 kHz	<-70 dB min.	<-70 dB min.	<-70 dB min.	
Linear Voltage Range	± 10 V peak	± 10 V peak	± 10 V peak	
Max. Safe Voltage (Power ON or OFF)	± 40 V	± 40 V	± 40 V	
Narrow Band Noise (5 Hz – 100 kHz)	50 μ Vrms max.	50 μ Vrms max.	50 μ Vrms max.	



Low-Pass Bessel

Model	5BAF-LPBE8	5BAF-LPBE6	5BAF-LPBE4	
Product Specifications				
Transfer Function	8-Pole Bessel	6-Pole Bessel	4-Pole Bessel	
Size	Std. 5B	Std. 5B	Std. 5B	
Range f_c	1.00 Hz to 100 kHz	1.00 Hz to 100 kHz	1.00 Hz to 100 kHz	
Theoretical Transfer Characteristics	Appendix A Page 4	Appendix A Page 3	Appendix A Page 2	
Passband Ripple (theoretical)	0.0 dB	0.0 dB	0.0 dB	
DC Voltage Gain (non-inverting)	0 ± 0.1 dB typ	0 ± 0.1 dB typ	0 ± 0.1 dB typ.	
Differential Gain	$1 \pm 0.3\%$	$1 \pm 0.3\%$	$1 \pm 0.3\%$	
Stopband Attenuation Rate	48 dB/octave	36 dB/octave	24 dB/octave	
Accuracy f_c	$\pm 2\%$ max.	$\pm 2\%$ max.	$\pm 2\%$ max.	
Phase	-182°	-155°	-121°	
Filter Attenuation (theoretical)	1.91 dB 0.80 f_c 3.01 dB 1.00 f_c 60.0 dB 4.52 f_c 80.0 dB 6.07 f_c	1.89 dB 0.80 f_c 3.01 dB 1.00 f_c 60.0 dB 5.41 f_c 80.0 dB 7.99 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	
Impedance	1.0 M Ω min.	1.0 M Ω min.	1.0 M Ω min.	
Com. Mode Voltage Range	± 20 V	± 20 V	± 20 V	
Com. Mode Rejection Ratio @ 1 kHz	<-70 dB min.	<-70 dB min.	<-70 dB min.	
Linear Voltage Range	± 10 V peak	± 10 V peak	± 10 V peak	
Max. Safe Voltage (Power ON or OFF)	± 40 V	± 40 V	± 40 V	
Narrow Band Noise (5 Hz – 100 kHz)	50 μ Vrms max.	50 μ Vrms max.	50 μ Vrms max.	



High-Pass Butterworth

Model	5BAF-HPBU8	5BAF-HPBU6	5BAF-HPBU4	
Product Specifications				
Transfer Function	8-Pole Butterworth	6-Pole Butterworth	4-Pole Butterworth	
Size	Std. 5B	Std. 5B	Std. 5B	
Range f_c	1.00 Hz to 100 kHz	1.00 Hz to 100 kHz	1.00 Hz to 100 kHz	
Theoretical Transfer Characteristics	Appendix A Page 29	Appendix A Page 28	Appendix A Page 27	
Passband Ripple (theoretical)	0.0 dB	0.0 dB	0.0 dB	
DC Voltage Gain (non-inverting)	$0 \pm 0.1\text{dB}$ to 100kHz	$0 \pm 0.1\text{dB}$ to 100kHz	$0 \pm 0.1\text{dB}$ to 100kHz	
Differential Gain	$1 \pm 0.3\%$	$1 \pm 0.3\%$	$1 \pm 0.3\%$	
Stopband Attenuation Rate	48 dB/octave	36 dB/octave	24 dB/octave	
Small Signal Bandwidth	(-6 dB) 1 MHz	(-6 dB) 1 MHz	(-6 dB) 1 MHz	
Power Bandwidth	120 kHz	120 kHz	120 kHz	
Accuracy f_c	$\pm 2\%$ max.	$\pm 2\%$ max.	$\pm 2\%$ max.	
Phase	-360°	-270°	-180°	
Filter Attenuation (theoretical)	80.0 dB $0.31 f_c$ 60.0 dB $0.42 f_c$ 3.01 dB $1.00 f_c$ 00.0 dB $2.00 f_c$	80.0 dB $0.21 f_c$ 60.0 dB $0.32 f_c$ 3.01 dB $1.00 f_c$ 00.0 dB $2.50 f_c$	80.0 dB $0.10 f_c$ 60.0 dB $0.18 f_c$ 3.01 dB $1.00 f_c$ 00.0 dB $4.00 f_c$	
Impedance	1.0 M Ω min.	1.0 M Ω min.	1.0 M Ω min.	
Com. Mode Voltage Range	$\pm 20\text{ V}$	$\pm 20\text{ V}$	$\pm 20\text{ V}$	
Com. Mode Rejection Ratio @ 1 kHz	<-70 dB min.	<-70 dB min.	<-70 dB min.	
Linear Voltage Range	$\pm 10\text{ V}$ peak	$\pm 10\text{ V}$ peak	$\pm 10\text{ V}$ peak	
Max. Safe Voltage (Power ON or OFF)	$\pm 40\text{ V}$	$\pm 40\text{ V}$	$\pm 40\text{ V}$	
Narrow Band Noise (5 Hz – 100 kHz)	100 μVrms max.	100 μVrms max.	100 μVrms max.	



Pin-Out, Package Data And Order Information

Specifications

Analog Input Characteristics¹

See transfer function specifications.

Analog Output Characteristics^{1,2}

Impedance (Closed Loop)	<1 Ω typ. 10 Ω max.
Linear Operating Range	± 10 V pk
Maximum Current	± 2.0 mA
Offset Voltage	± 3 mV typ.
Offset Temp. Coeff.	± 100 μ V/ $^{\circ}$ C
Gain Drift	± 30 ppm/ $^{\circ}$ C
Output Load ³	See note 3

Power Supply ($\pm$ Vs)

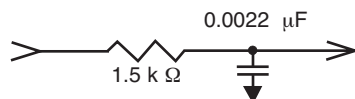
Rated Voltage	$+ 5$ V ± 0.5 Vdc	
Quiescent Current	Typ.	Max.
	8P	113mA 150mA
	6P	101mA 127mA
	4P	75mA 98mA

Temperature

Operating	-25 to + 85 $^{\circ}$ C
Storage	-40 to + 85 $^{\circ}$ C

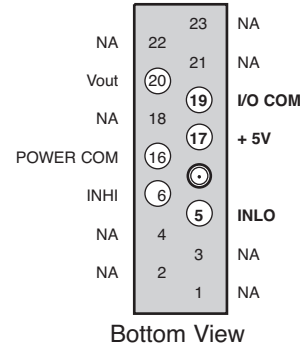
Notes:

1. Input and output signal voltage referenced to I/O COM.
2. Output is short circuit protected to common. DO NOT CONNECT TO +5V or POWER COM.
3. Output can drive a series 1.5 k Ω resistor and 0.0022 μ F capacitor without slew rate limiting with a ± 10 V square wave input.



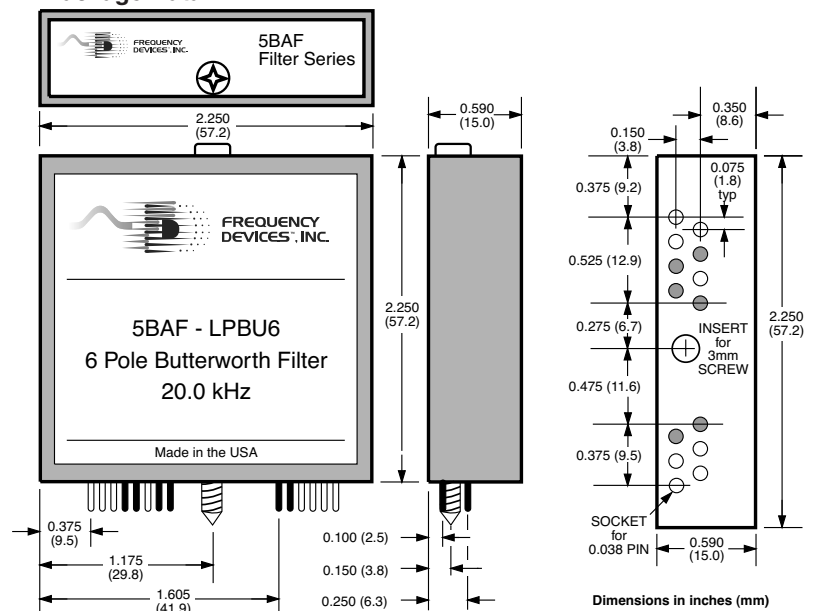
4. How to specify Corner Frequencies:
Corner frequencies are specified by attaching a three digit frequency designator to the basic model number. Corner frequencies can range from 1 Hz to 50 kHz.

Pin Designations



Bottom View

Package Data



Ordering Information

BE - Bessel-LP Only
BU - Butterworth

Corner Frequency⁴

1 Hz to 100 kHz

5BAF-LPBE6-f_c

of Poles

4, 6, 8

LP - Lowpass
HP - Highpass

We hope the information given here will be helpful. The information is based on data and our best knowledge, and we consider the information to be true and accurate. Please read all statements, recommendations or suggestions herein in conjunction with our conditions of sale which apply to all goods supplied by us. We assume no responsibility for the use of these statements, recommendations or suggestions, nor do we intend them as a recommendation for any use which would infringe any patent or copyright.

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