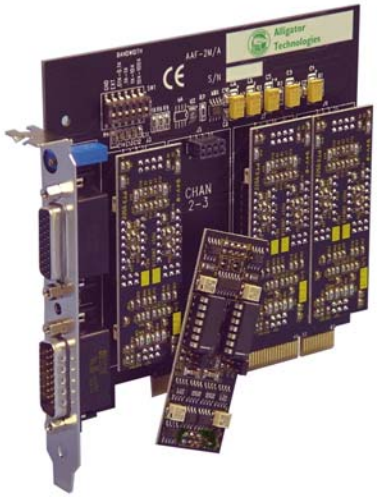
AAF-2

2 to 8 Channel Low-Pass Filter Card Series For PC based PCI or Stand-Alone Data Acquisition Systems

Features

- Compatible to 3.3V or 5V PCI bus
- Variable cutoff frequency ranges between 0.1 Hz and 200kHz
- Expandable in 2 channel pairs
- Differential or Single ended operation
- Multiple cards can be installed in a single system
- Choice of 8-pole Cauer, Bessel, Butterworth, high-speed Cauer, and linear phase delay filters
- Unity gain accuracy to 0.001dB @0.25Fc



The AAF-2 is a multi-channel low-pass filter board designed for use in front of A/D converters with resolution up to 16-bits. It is ideal for filtering applications in sound and vibration testing, ultrasonics, acoustics, structural analysis, industrial, test, scientific and laboratory data collection and applied mechanical applications in electronics, aerospace, field research, automotive, and process control industries. The AAF-2 protects and filters 2, 4, 6, or 8 differential analog channels. Each 2-channel pair is available with any one of 8-pole Cauer, Bessel, Butterworth, or linear phase filters.

The cutoff frequency of the AAF-2 is set by an on-board potentiometer, which sets the same cutoff frequency for all filters on the board. Optionally, the cutoff frequency can be controlled with an external clock source for tracking filter applications, very low cutoff frequencies, or other special purposes.

Applications

The AAF-2 is ideally suited for removing unwanted higher frequency signals that can erroneously appear as lower frequencies below half the A/D sampling rate. This phenomenon, known as aliasing, cannot be removed with post-acquisition processing such as digital filters. The AAF-2 also is ideal for eliminating noise and interference introduced before the electrical signals from the sensors are digitized by the A/D board.

Filter Type	Strength/Weakness	Application
Cauer	Good passband flatness and low noise with sharpest cutoff Non-uniform group delay	For frequency-domain applications requiring a sharp cutoff; also useful in the time domain
Bessel	Uniform group delay; lowest wideband noise Drooping amplitude response in the frequency domain; gentler cutoff frequency	For time-domain applications requiring minimum distortion of rapid slope changes
Butterworth	Best passband flatness and very low noise Non-uniform group delay (but more uniform than Cauer filters) and gentler cutoff slope	For frequency-domain applications requiring minimum noise or maximum passband flatness
High-Speed Cauer	Similar to Cauer with lower noise as well as higher cutoff frequency and higher stopband rejection Non-uniform group delay (more uniform than Cauer	Similar applications to Cauer, but with a need for a cutoff higher than 50 kHz or a higher stopband rejection
High-Speed Linear Phase	Highest maximum cutoff frequency; sharper cutoff than Bessel Reduced I/O voltage limits ±3V typ, ±4.5V max for high-speed linear phase	For highest-speed applications, especially in the time domain

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Filter Characteristics

	Cutoff Frequency	Passband Gain (to 85% of fc)	Stopband Rejection	Attenuation Slope	Total Wideband Noise	Phase Match
Bessel	0.1 Hz - 33 kHz standard* (150:1)					
	0.1 Hz - 67 kHz modified (75:1)	**	84dB Typ.	45dB/octave Typ.	60μVRMS Typ.	1.2° Typ.
Butterworth	0.1 Hz - 50 kHz standard (100:1)	0dB + 0.15				
	0.1 Hz - 100 kHz modified (50:1)	- 0.5dB	90dB Typ.	48dB/octave Typ.	80μVRMS Typ.	1.2° Typ.
Cauer	0.1Hz - 50 kHz (100:1)	0dB ± 0.4dB	75dB Typ.	120dB/octave Typ.	165μVRMS Typ.	2.5° Typ.
High-Speed	0.1 Hz - 50 kHz standard (100:1)	0dB - 0.5				
Cauer	0.1 Hz - 100 kHz modified (50:1)	+ 0.1 dB	90dB Typ.	90dB/octave Typ.	135μVRMS Typ.	1.0° Typ.
High-Speed	0.1 Hz - 100 kHz standard (50:1)					
Linear Phase	0.1 Hz - 200 kHz modified (25:1)	***	75dB Typ.	55dB/octave Typ.	175μVRMS Typ.	1.7° Typ.

NOTE; Please indicate cutoff frequency choice at the time the order is placed.

* To 47 kHz below 55°C with external clock.

** Bessel passband performance: Group delay approximately ½ of one cycle at fc, passband group delay variation <1%; amplitude 3 dB down at fc.

*** High-speed linear phase passband performance: Group delay approximately one cycle of fc; passband group delay variation < 2% max., 1% typ.

Connector Pin Assignments

All I/O connections from the AAF-2 are made via two high density 26-pin DSUB connectors that extend out of the rear of the computer.

Output Connector

DIGITAL GROUND	1	2	
ANALOG GROUND	3	4	CHAN 7 OUT HI
CHAN 6 OUT HI	5	6	CHAN 4 OUT HI
CHAN 3 OUT HI	7	8	CHAN 1 OUT HI
ANALOG GROUND	9	10	
SCFCLK	11	12	ANALOG GROUND
CHAN 7 OUT LO	13	14	CHAN 6 OUT LO
CHAN 4 OUT LO	15	16	CHAN 3 OUT LO
CHAN 1 OUT LO	17	18	CHAN 0 OUT HI
FREQ IN	19	20	
ANALOG GROUND	21	22	CHAN 5 OUT HI
CHAN 5 OUT LO	23	24	CHAN 2 OUT HI
CHAN 2 OUT LO	25	26	CHAN 0 OUT LO

Input Connector

	1	2	CHAN 7 IN HI
CHAN 6 IN HI	3	4	CHAN 5 IN HI
CHAN 4 IN HI	5	6	CHAN 3 IN HI
CHAN 2 IN HI	7	8	CHAN 1 IN HI
CHAN 0 IN HI	9	10	
CHAN 7 IN LO	11	12	CHAN 6 IN LO
CHAN 5 IN LO	13	14	CHAN 4 IN LO
CHAN 3 IN LO	15	16	CHAN 2 IN LO
CHAN 1 IN LO	17	18	CHAN 0 IN LO
ANALOG GROUND	19	20	ANALOG GROUND
ANALOG GROUND	21	22	ANALOG GROUND
ANALOG GROUND	23	24	ANALOG GROUND
ANALOG GROUND	25	26	ANALOG GROUND

Options

Screw Terminal Card. The STA-AAF-3 provides screw terminals for connection of the customer wiring, a breadboard area, and two 26 pin I/O connectors which are identical to the AAF-2 I/O.

BNC I/O. The AT-BNC-2/I can be connected to the AAF-2 to provide 8 channels of BNC input. The AT-BNC-2/O can also be used to provide 8 channels of BNC output.

Custom Cable Accessories. A variety of custom cable accessories, including twisted-pair ribbon cables and BNC connector boxes and cables, are available for connecting the AAF-2 to any A/D board.

Specification

Input Characteristics

Please refer to the AAF-2F data sheet for greater detail on input characteristics and filter specifications.

Input mating connector is Female DB26S

Output Characteristics

Please refer to the AAF-2F data sheet for for greater detail on output characteristics and filter specifications.

Output mating connector is Male DB26P

Environment & Installation

Power Requirements ..... PCI 3.3V or 5V bus power

Nominal Voltage	Maximum Load
+5V	10mA
+12V	60mA per filter channel
-12V	60mA per filter channel

Operating temperature..... 0°C to 70°C

Dimensions..... 5” (W) x 3.9” (H) (195mm x 100mm)

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