TEGAM

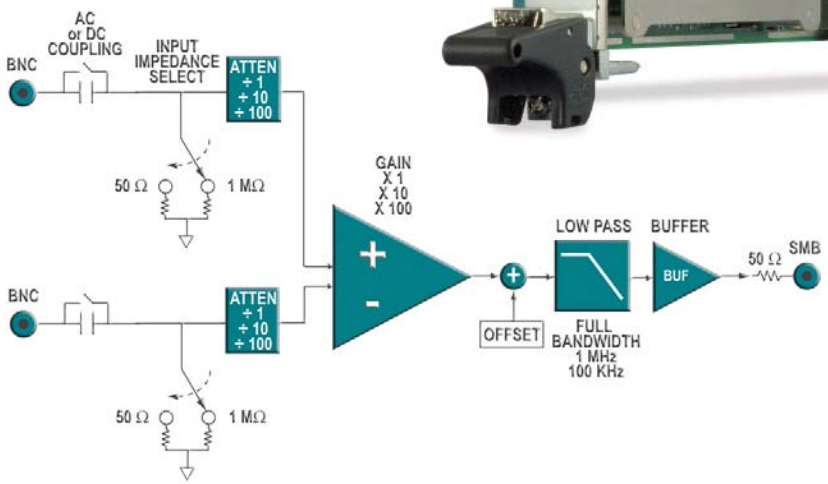
Model 4040A

DIFFERENTIAL INSTRUMENTATION AMPLIFIER

Differential Instrumentation Amplifier

- Differential 100 V Common Mode Input
- DC-50 MHz Bandwidth
- AC/DC Coupling
- Programmable Attenuation/Gain/Offset
- 9 nV/√Hz Input Noise
- 50 Ω Output

Figure 1 Block Diagram



Range Table

Net Gain	Input Attenuation	Internal Amplifier Gain	Peak AC Input Amplitudes (V) d per channel a.b.c.d.	Max Differential Voltage (V) w/o clipping a.b.c.d.	Max Volts to Chassis a.b.c.	Noise Referred to Input	-3 db Bandwidth
÷100	÷100	X1	≤100	≤100	100 V	990 nV/√Hz	20 MHz
÷10	÷10	X1	≤10	≤10	40 V	99 nV/√Hz	20 MHz
÷10	÷100	X10	≤10	≤10	100 V	990 nV/√Hz	50 MHz
1	÷1	X1	≤1	≤1	4 V	9 nV/√Hz	20 MHz
1	÷10	X10	≤1	≤1	40 V	99 nV/√Hz	50 MHz
1	÷100	X100	≤1	≤1	100 V	990 nV/√Hz	20 MHz
10	÷1	X10	≤0.1	≤0.1	4 V	9 nV/√Hz	50 MHz
10	÷10	X100	≤0.1	≤0.1	40 V	99 nV/√Hz	20 MHz
100	÷1	X100	≤0.01	≤0.01	4 V	9 nV/√Hz	20 MHz

a) DC coupled, 1 MΩ input
b) AC coupled, 1 MΩ input: DC + Peak AC not to exceed 100 V; Peak AC component not to exceed table
c) 5 Vrms max into 50 Ω
d) DAC offset adjustment to zero

The TEGAM Model 4040A expands the measurment range of your digitizer or analog inputs to real-world signals ranging from 100 V supply voltages to millivolt detector outputs. Elevated voltages and noisy environments present a barrier to making acceptable measurements with common digitizers that are limited by input impedance and voltage levels. Your investment in a high performance digitizer is significantly enhanced by having an instrumentation grade connection to the point of measurement.

The TEGAM Model 4040A includes six stages of signal-matching to ensure that you get the maximum use from your high-speed digitizer:

1. **Selectable input impedance** of 50 Ω or 1 MΩ, to match impedance with coaxial cables or oscilloscope probes.
2. Selectable **AC or DC coupling** allows processing of small AC signals with large DC offset.
3. **Selectable input attenuations** of ÷10 and ÷100 allows input levels as high as 100 V to be safely processed by the digitizer[1].
4. Instrumentation amplifier to **reject common-mode voltages** and provides gain of X1, X10 and X100 for measuring small signals[1].
5. **Programmable low-pass filters** to assist with noisy signals or to anti-alias at lower sampling rates.
6. **Programmable output offset** allows centering the output signal in the digitizer's span to maximize dynamic range.

[1]See the Range Table for specific combinations and limitations of settings.

Software

The TEGAM Model 4040A comes complete with VISA-compliant drivers for LabVIEW, Microsoft C++ and Visual Basic. In addition, an interactive front panel application provides manual control of all of the board's features.

Prices and specifications subject to change without notice.

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Specifications

	VALUE	CLARIFICATIONS
Input		
Channels	Single Channel	Differential Inputs
Gains	100, 10, 1, 0.1, 0.001	
Maximum Voltage Range	±100 V (±10V into 50 Ω)	DC + Peak AC
Coupling	AC-10 Hz, DC	
Input Impedance	1 MΩ || 20 pF or 50 Ω	Selectable
Input Voltage Range	±100 V ±10 V ±1 V	For Gain 1, 0.1 and 0.01 @ 1 MΩ Input Impedance For Gain 10, 1 and 0.1 For Gain 100, 10 and 1
CMRR	>77 dB at 60 Hz	>50 dB at 1 MHz
Total Harmonic Distortion	<-60 dB @ 1 MHz	Output 1 Vp-p in 50 Ω
DC Gain Accuracy	±(0.1 % input + 100 µV)	Offset set to 0
AC Gain Accuracy	1 %	10 kHz Sine Wave, Calibrated
Overvoltage Protection in Any Range	±100 V	DC + Peak AC
Offset Offset Accuracy	65,535 steps ±(0.5 % of Setting + 300 uV)	All Gain Ranges Referenced to 1 V Range
Temperature Stability	±(0.01 % of rdg + 40 uV)°/C	All Gains
Noise	9 nV/√Hz	CMR=±1 V, Gain 10 and 100, Referred to Input for Frequencies >100 Hz
Rise Time	≤10 ns	Attenuate = ÷1, Gain = 1, 2 Vp-p @ 20 MHz, Square Wave Applied
Output		
Type	Single Ended 2 Vp-p	
Output Resistance	50 Ω	
Bandwidth	See Range Table	See Range Table
Passband Ripple	±0.25 dB See graph in manual	DC to 10 MHz Referred to 10 kHz 10 MHz to 50 MHz Referred to 10 kHz
LP Filter, Cutoff Frequency	100 kHz, 1 MHz	Single Pole Filter
Included Accessories	Software Driver for LabVIEW Manual	P/N 1000019 P/N 4040A-901-01A
Optional Accessories	SMB to BNC Adapter Cable	P/N 1000018

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