

DI-5B47 Linearized Thermocouple Input Modules

FEATURES

- Interfaces to Types J, K, T, E, R, S, N, and B Thermocouples
- Linearizes Thermocouple Signal
- High Level Voltage Outputs
- 1500Vrms Transformer Isolation
- ANSI/IEEE C37.90.1-1989 Transient Protection
- Input Protected to 240VAC Continuous
- 160dB CMR
- 95dB NMR at 60Hz, 90dB at 50Hz
- $\pm 1\mu\text{V}/^\circ\text{C}$ Drift
- CSA Certified
- Mix and Match DI-5B Types

DESCRIPTION

Each DI-5B47 thermocouple input module provides a single channel of thermocouple input which is filtered, isolated, amplified, linearized and converted to a high level analog voltage output (see block diagram). This voltage output is logic switch controlled, which allows these modules to share a common analog bus without the requirement of external multiplexers.

The DI-5B modules are designed with a completely isolated computer side circuit which can be floated to $\pm 50\text{V}$ from Power Common, pin 16. This complete isolation means that no connection is required between I/O Common and Power Common for proper operation of the output switch. If desired, the output switch can be turned on continuously by simply connecting pin 22, the Read-Enable pin to I/O Common, pin 19.

The DI-5B47 can interface to eight industry standard thermocouple types: J, K, T, E, R, S, N, and B. Its corresponding output signal operates over a 0 to $+5\text{V}$ range. Each module is cold-junction compensated to correct for parasitic thermocouples formed by the thermocouple wire and screw terminals on the mounting hardware. Upscale open thermocouple detect is provided by an internal pull-up resistor. Downscale indication can be implemented by installing an external $47\text{M}\Omega$ resistor, $\pm 20\%$ tolerance, between screw terminals 1 and 3.

Signal filtering is accomplished with a six-pole filter which provides 95dB of normal-mode-rejection at 60Hz and 90dB at 50Hz. Two poles of this filter are on the field side of the isolation barrier, and the other four are on the computer side.

After the initial field-side filtering, the input signal is chopped by a proprietary chopper circuit. Isolation is provided by transformer coupling, again using a proprietary technique to suppress transmission of common mode spikes or surges. The module is powered from $+5\text{VDC}$, $\pm 5\%$.

A special circuit in the input stage of the module provides protection against accidental connection of power-line voltages up to 240VAC.

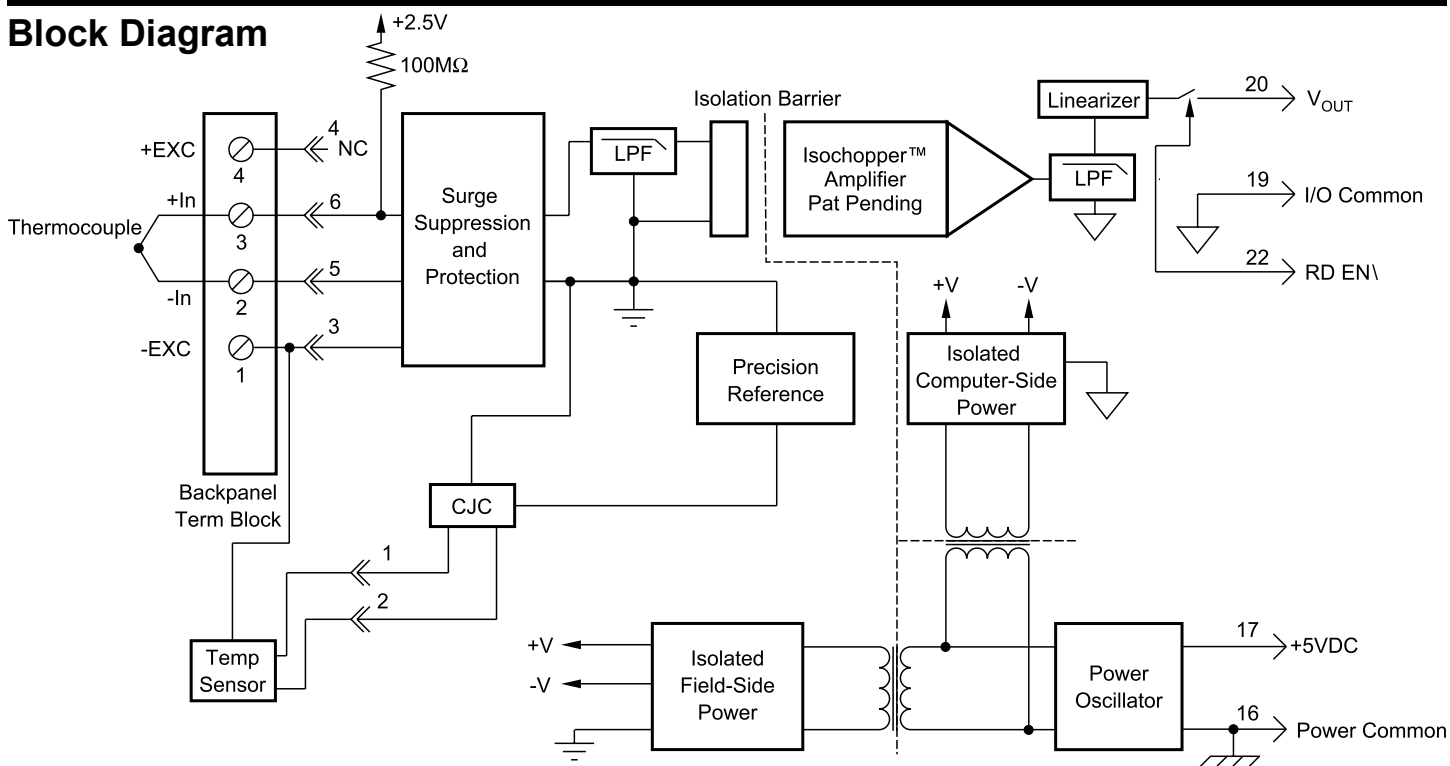
SPECIFICATIONS

Typical at $T_A = +25^\circ\text{C}$ and $+5\text{V}$ Power

		DI-5B47
Input Range		-0.1V to $+0.5\text{V}$
Input Bias Current		-25nA
Input Resistance:	Normal Power Off Overload	50M Ω 40k Ω 40k Ω
Input Protection:	Continuous Transient	240Vrms max ANSI/IEEE C37.90.1-1989
CMV, Input to Output:	Continuous Transient	1500Vrms max ANSI/IEEE C37.90.1-1989
CMR (50Hz or 60Hz)		160dB
NMR		95dB at 60Hz, 90dB at 50Hz
Accuracy		See ordering information
Stability:	Input Offset Output Offset Gain	$\pm 1\mu\text{V}/^\circ\text{C}^*$ $\pm 20\mu\text{V}/^\circ\text{C}$ $\pm 25\text{ppm}/^\circ\text{C}$
Noise:	Input, 0.1 to 10Hz Output, 100kHz	0.2 μVrms 300 $\mu\text{Vp-p}$, 150 μVrms
Bandwidth, -3dB		4Hz
Response Time, 90% Span		0.2s
Output Range		0V to $+5\text{V}$
Output Resistance		50 Ω
Output Protection		Continuous Short to Ground
Output Selection Time (to $\pm 1\text{mV}$ of V_{OUT})		6 μs at $C_{\text{load}} = 0$ to 2000pF
Output Current Limit		$\pm 14\text{mA}$ max
Output Enable Control		Max Logic "0" Min Logic "1" Max Logic "1" Input Current, "0", "1"
		+0.8V +2.4V +36V 0.5 μA
Open Input Response		Upscale
Open Input Detection Time		10s
Cold Junction Compensation		
Accuracy, 25°C		$\pm 0.25^\circ\text{C}$
Accuracy, $+5^\circ\text{C}$ to $+45^\circ\text{C}$		$\pm 0.5^\circ\text{C}$
Accuracy, -40°C to $+85^\circ\text{C}$		$\pm 1.25^\circ\text{C}$
Power Supply Voltage		$+5\text{VDC} \pm 5\%$
Power Supply Current		30mA
Power Supply Sensitivity		$\pm 2\mu\text{V}/\%$ RTI**
Mechanical Dimensions		2.28" \times 2.26" \times 0.60" (58mm \times 57mm \times 15mm)
Environmental		
Operating Temperature		-40°C to $+85^\circ\text{C}$
Storage Temperature		-40°C to $+85^\circ\text{C}$
Relative Humidity		0 to 95% Noncondensing
RFI Susceptibility		$\pm 0.5\%$ Span Error at 400MHz, 5W, 3ft
*This is equivalent to $^\circ\text{C}$ as follows: Type J = $0.020^\circ\text{C}/^\circ\text{C}$, Types K & T = $0.025^\circ\text{C}/^\circ\text{C}$, Type E = $0.016^\circ\text{C}/^\circ\text{C}$, Types R & S = $0.168^\circ\text{C}/^\circ\text{C}$, Type N = $0.037^\circ\text{C}/^\circ\text{C}$, Type C = $0.072^\circ\text{C}/^\circ\text{C}$.		
**RTI-Referenced to Input.		

DI-5B47 Linearized Thermocouple Input Modules

Block Diagram



Ordering Information

Model Number	Type	Input Range	Accuracy*
DI-5B47J-01	J	0°C to +760°C (+32°F to +1400°F)	±0.61°C
DI-5B47J-02	J	-100°C to +300°C (-148°F to +572°F)	±0.32°C
DI-5B47J-03	J	0°C to +500°C (+32°F to +932°F)	±0.36°C
DI-5B47J-12	J	-100°C to +760°C (-148°F to +1400°F)	±0.70°C
DI-5B47K-04	K	0°C to +1000°C (+32°F to +1832°F)	±0.80°C
DI-5B47K-05	K	0°C to +500°C (+32°F to +932°F)	±0.38°C
DI-5B47K-13	K	-100°C to +1350°C (-148°F to +2462°F)	±1.20°C
DI-5B47K-14	K	0°C to +1200°C (+32°F to +2192°F)	±0.96°C
DI-5B47T-06	T	-100°C to +400°C (-148°F to +752°F)	±0.80°C
DI-5B47T-07	T	0°C to +200°C (+32°F to +392°F)	±0.25°C
DI-5B47E-08	E	0°C to +1000°C (+32°F to +1832°F)	±1.00°C
DI-5B47R-09	R	+500°C to +1750°C (+932°F to +3182°F)	±1.30°C
DI-5B47S-10	S	+500°C to +1750°C (+932°F to +3182°F)	±1.30°C
DI-5B47B-11	B	+500°C to +1800°C (+932°F to +3272°F)	±2.00°C
DI-5B47N-15	N	-100°C to +1300°C (-148°F to +2372°F)	±1.15°C

*Includes conformity, hysteresis, and repeatability. Does not include CJC accuracy.



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