## **DATAFORTH**<sup>®</sup>

# **SCM5B47** Linearized Thermocouple Input Modules

### Description

Each SCM5B47 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 (Figure 1). This voltage output is logic-switch controlled, allowing these modules to share a common analog bus without the requirement of external multiplexers.

The SCM5B modules are designed with a completely isolated computer side circuit which can be floated to  $\pm$ 50V 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 SCM5B47 can interface to eight industry standard thermocouple types: J, K, T, E, R, S, N, and B. Its corresponding output signal operates over a 0V to +5V range. Each module is cold-junction compensated to correct for parasitic thermocouples formed by the thermocouple wire and screw terminals on the mounting backpanel. Upscale open thermocouple detect is provided by an internal pull-up resistor. Downscale indication can be implemented by installing an external 47M $\Omega$  resistor, ±20% tolerance, between screw terminals 1 and 3 on the SCMPB01/02/03/04/05/06/07 backpanels.

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

#### 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 Transient Protection
- Input Protected to 240VAC Continuous
- •160dB CMR
- 95dB NMR at 60Hz, 90dB at 50Hz
- ±1µV/°C Drift
- CSA Certified, FM Approved, CE and ATEX Compliant
- Mix and Match SCM5B Types on Backpanel

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 +5VDC,  $\pm$ 5%.

A special input circuit on the SCM5B47 modules provides protection against accidental connection of power-line voltages up to 240VAC.

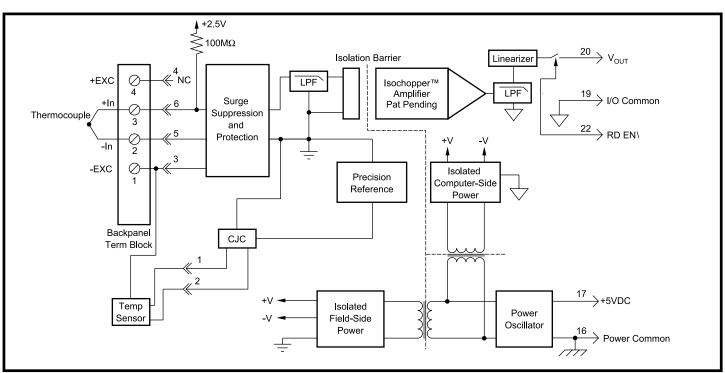


Figure 1: SCM5B47 Block Diagram

SCM5B

#### **Specifications** Typical at T<sub>A</sub>=+25°C and +5V power

Module	SCM5B47
Input Range Input Bias Current Input Resistance Normal Power Off Overload Input Protection Continuous Transient	-0.1V to +0.5V -25nA 50MΩ 40kΩ 40kΩ 240Vrms max ANSI/IEEE C37.90.1
CMV, Input to Output Continuous Transient CMR (50Hz or 60Hz) NMR	1500Vrms max ANSI/IEEE C37.90.1 160dB 95dB at 60Hz, 90dB at 50Hz
Accuracy Stability Input Offset Output Offset Gain Noise Input, 0.1 to 10Hz Output, 100kHz Bandwidth, -3dB Response Time, 90% Span	See Ordering Information ±1µV/°C <sup>(2)</sup> ±20µV/°C ±25ppm/°C 0.2µVrms 300µVp-p, 150µVrms 4Hz 0.2s
Output Range Output Resistance Output Protection Output Selection Time (to ±1mV of V <sub>ουτ</sub> ) Output Current Limit	See Ordering Information $50\Omega$ Continuous Short to Ground 6µs at C <sub>load</sub> = 0 to 2000pF +8mA
Output Enable Control Max Logic "0" Min Logic "1" Max Logic "1" Input Current "0,1" Open Input Response Open Input Detection Time Cold Junction Compensation Accuracy, 25°C Accuracy, +5°C to +45°C Accuracy, -40°C to +85°C	+0.8V +2.4V +36V 0.5µA Upscale <10s ±0.25°C ±0.5°C ±0.5°C ±1.25°C
Power Supply Voltage Power Supply Current Power Supply Sensitivity	+5VDC ±5% 30mA ±2µV/% RTI <sup>(3)</sup>
Mechanical Dimensions (h)(w)(d)	2.28" x 2.26" x 0.6" (58mm x 57mm x 15mm)
Environmental Operating Temp. Range ATEX Group II, Category 3 Storage Temp. Range Relative Humidity Emissions EN61000-6-4 Radiated, Conducted Immunity EN61000-6-2 RF ESD, EFT, Surge, Voltage Dips NOTES:	-40°C to +85°C -20°C to +40°C -40°C to +85°C 0 to 95% Noncondensing ISM, Group 1 Class A ISM, Group 1 Performance A ±0.5% Span Error Performance B

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(1) Includes conformity, hysteresis and repeatability. Does not include CJC accuracy. (2) This is equivalent to °C as follows: Type J 0.020 °C/°C, Types K, T 0.025°C/°C, Type E 0.016°C/°C, Types R, S 0.168°C/°C, Type N 0.037°C/°C, Type C 0.072°C/°C. (3) Referenced to input.

#### **Ordering Information**

Model	TC Type <sup>‡</sup>	Input Range	Output Range <sup>†</sup>	Accu	Iracy <sup>(1)</sup>
SCM5B47J-01	J	0°C to +760°C (+32°F to +1400°F)	3, 4	±0.08%	±0.61°C
SCM5B47J-02	J	-100°C to +300°C (-148°F to +572°F)	3, 4	±0.08%	±0.32°C
SCM5B47J-03	J	0°C to +500°C (+32°F to 932°F)	3, 4	±0.07%	±0.36°C
SCM5B47K-04	К	0°C to +1000°C (+32°F to +1832°F)	3, 4	±0.08%	±0.80°C
SCM5B47K-05	K	0°C to +500°C (+32°F to +932°F)	3, 4	±0.08%	±0.38°C
SCM5B47T-06	Т	–100°C to +400°C (–148°F to +752°F)	3, 4	±0.16%	±0.80°C
SCM5B47T-07	Т	0°C to +200°C (+32°F to +392°F)	3, 4	±0.13%	±0.25°C
SCM5B47E-08	Е	0°C to +1000°C (+32°F to +1832°F)	3, 4	±0.10%	±1.0°C
SCM5B47R-09	R	+500°C to +1750°C (+932°F to +3182°F)	3, 4	±0.10%	±1.3°C
SCM5B47S-10	S	+500°C to +1750°C (+932°F to +3182°F)	3, 4	±0.10%	±1.3°C
SCM5B47B-11	В	+500°C to +1800°C (+932°F to +3272°F)	3, 4	±0.15%	±2.0°C
SCM5B47J-12	J	–100°C to +760°C (–148°F to +1400°F)	3, 4	±0.08%	±0.70°C
SCM5B47K-13	К	–100°C to +1350°C (–148°F to +2462°F)	3, 4	±0.08%	±1.20°C
SCM5B47K-14	К	0°C to +1200°C (+32°F to +2192°F)	3, 4	±0.08%	±0.96°C
SCM5B47N-15	Ν	–100°C to +1300°C (–148°F to +2372°F)	3, 4	±0.08%	±1.15°C

#### <sup>‡</sup> Thermocouple Alloy Combinations

Standards: DIN IEC 584, ANSI MC96-1-82, JIS C 1602-1981

Туре	Material
JKTERSBN	Iron vs. Copper-Nickel Nickel-Chromium vs. Nickel-Aluminum Copper vs. Copper-Nickel Nickel-Chromium vs. Copper-Nickel Platinum-13% Rhodium vs. Platinum Platinum-10% Rhodium vs. Platinum Platinum-30% Rhodium vs. Platinum-6% Rhodium Nickel-14.2% Chromium-1.4% Silicon vs. Nickel-4.4% Silicon- 0.1% Magnesium

#### <sup>†</sup>Output Ranges Available

Visit our website www.dataforth.com

Ou	tput Range	Part No. Suffix	Example
3.	0V to +5V	NONE	SCM5B47J-01
4.	0V to +10V	D	SCM5B47J-01D