

SCIM5B37

Non-Linearized Thermocouple Module

Description

SCIM5B37 Thermocouple Input module provides a single channel of thermocouple input signal which is converted to a standard level analog voltage output (Figure 1). This signal output is controlled by a logic-switch controlled which allows these modules to share a common analog bus without the requirement of external multiplexers.

The SCIM5B modules are designed with a completely isolated output side circuit which can be floated to more than $\pm 50V$ from Power Common, pin 16. No connection is required between I/O Common and Power Common for proper operation of the output switch. The output switch can be turned on continuously by simply shorting pins 22,19.

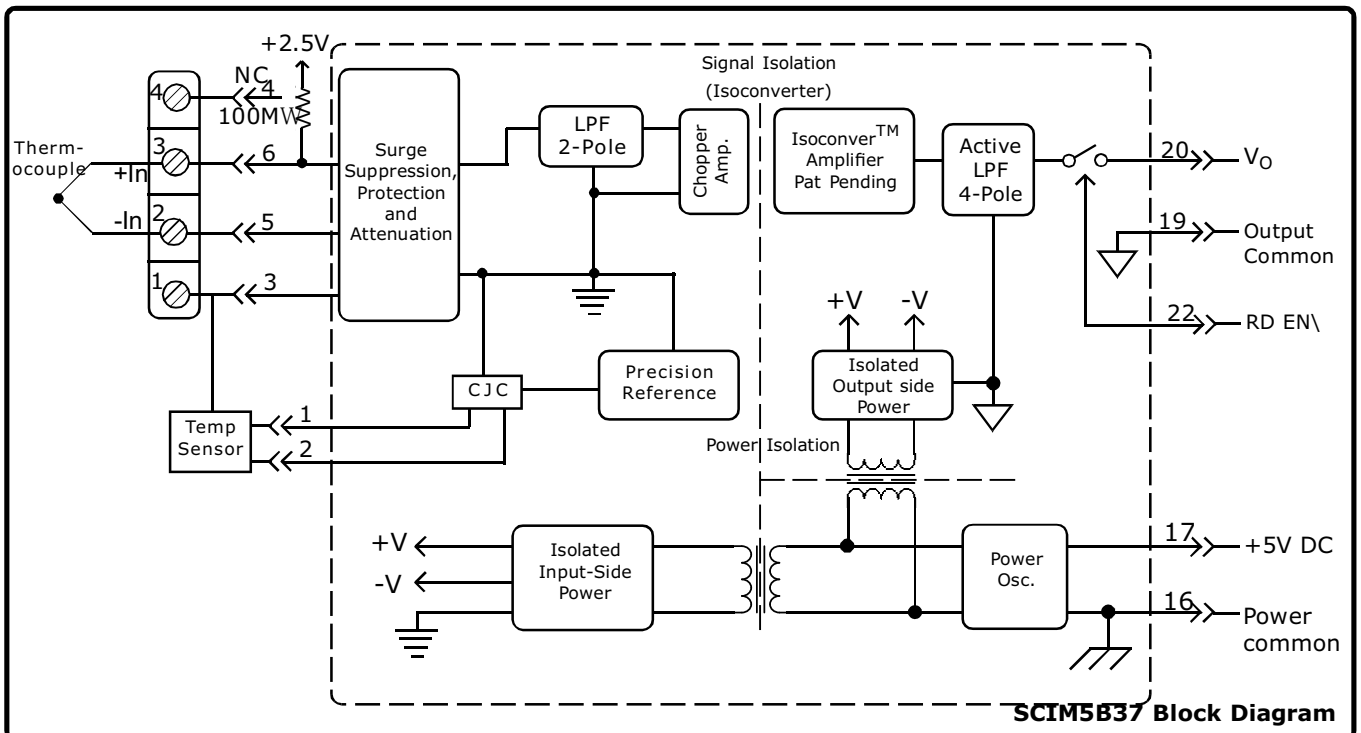
The SCIM5B37 can interface to nine industry standard thermocouple types: J, K, T, E, R, S, C, N, and B whose corresponding output signal operates over a 0V to +5V range. Each module is cold-junction compensated to correct for parasitic thermocouples formatted by the thermocouple wire and screw terminals 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 Ω resistor, $\pm 20\%$ tolerance, between screw Terminals 1 and 3 on the SCIM5B01/02/03/04/05/06/06 backpanels.

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

After the filtering, the input signal is chopped by a proprietary converter circuit which eliminates common mode spikes and surges. The module is powered from +5VDC, $\pm 5\%$. A special input protection circuitry on the SCIM5B37 module protect against accidental input voltages upto 250VAC

Features

- J, K, T, E, R, S, C, N and B Types Thermocouples input.
- Standard Output of either 0 to 10V $\pm 10V$, 0 to 5V, 1 to 5V
- 1.5KV Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- 250V AC Continuous Protected on Input
- 160dB CMR
- 95dB NMR at 60Hz, 90dB at 50Hz
- $\pm 0.03\%$ Accuracy
- $\pm 1\mu V^{\circ}C$ Drift
- ± 0.005 Linearity
- CSA , CE and ATEX Compliant
- Mix and match with all SCIM5B types on Backpanel



SCIM5B37 Block Diagram

Specifications Typical at T_A=+25°C and +5V Power supply

Ordering Information

Module	SCIM5B37
Input	
Range	-0.1V to +0.5V
Bias Current	-25nA
Resistance	
Normal	50MΩ
Power off	40KΩ
Overload	40KΩ
Protection	
Continuous	250V rms max.
Transient	ANSI/IEEE C37.90.1
CMV, Input to Output	
Continuous	1500Vrms max
Transient	ANSI/IEEE C37.90.1
CMR (50 or 60Hz)	160dB
NMR	95dB at 60Hz, 90dB at 50Hz
Accuracy	See Ordering Information
Nonlinearity	±0.005% Span
Stability	
Input Offset	±1μV/°C
Output Offset	±20μV/°C
Gain	±25ppm/°C
Noise	
Input, 0.1 to 10Hz	0.2μV rms
Output, 100KHz	200μV rms
Bandwidth - 3dB	4Hz
Response Time, 90% Span	200mS
Output	
Range	See Ordering Information
Resistance	50Ω
Protection	Continuous Short to Ground
Selection Time	6uS at C _{load} = 0 to 2000pF
(to ±1mV of V _{OUT})	
Current Limit	+8mA
Output Enable Control	
Max Logic "0"	+0.8V
Min Logic "1"	+2.4V
Max Logic "1"	+36V
Current "0,1"	0.5μA
Open input Response	Upscale
Open Input Detection Time	<10s
Cold junction Compensation	
Accuracy, 25°C	±0.25°C
Accuracy, +5°C to +45°C	±0.5°C
Accuracy, -40°C to +85°C	±1.25°C
Power supply voltage	+5V DC ±5%
Power supply Current	30mA
Power supply Sensitivity	±2μV/% RTI ⁽³⁾
Mechanical Dimensions	2.28" x 2.26" x 0.60"
(H) (W) (D)	(58mm x 57mm x 15mm)
Environmental	
Operating Temp. Range	-40°C to +85°C
ATEX Group II, Cat, 3	-20°C to +40°C
Storage Temp. Range	-40°C to +85°C
Relative Humidity	0 to 95% Noncondensing
Emissions EN61000-6-4	ISM, Group 1
Radiated, Conducted	Class A
Immunity EN61000-6-2	ISM, Group 1
RF	Performance A ±0.5% Span Error
ESD,EFT,Surge, Voltage Dips	Performance B

Model	TC Type*	Input Range	Output Ranges	Accuracy ⁽¹⁾
SCIM5B37J	J	-100°C +760°C (-148°F to +1400°F)	1,2,3,4,8	±0.03% ±0.26°C
SCIM5B37K	K	-100°C to +1350°C (-148°F to +2462°F)	1,2,3,4,8	±0.03% ±0.44°C
SCIM5B37T	T	-100°C to +400°C (-148°F to +752°F)	1,2,3,4,8	±0.03% ±0.15°C
SCIM5B37E	E	0°C +900°C (+32°F to +1652°F)	1,2,3,4,8	±0.03% ±0.27°C
SCIM5B37R	R	0°C +1750°C (+32°F to +3182°F)	1,2,3,4,8	±0.03% ±0.53°C
SCIM5B37S	S	0°C +1750°C (+32°F to +3182°F)	1,2,3,4,8	±0.03% ±0.53°C
SCIM5B37B	B	0°C +1800°C (+32°F to +3272°F)	1,2,3,4,8	±0.03% ±0.54°C
SCIM5B37C	C	+350°C +1300°C (+662°F to +2372°F)	1,2,3,4,8	±0.03% ±0.29°C
SCIM5B37N	N	-100°C +1300°C (+148°F to +2372°F)	1,2,3,4,8	±0.03% ±0.42°C

*** Thermocouple Alloy Combinations**

Standards: DINIEC 584, ANSIMC96-1-82, JISC 1602-1981

Type	Material
J	Iron vs. Copper-Nickel
K	Nickel-Chromium vs. Nickel-Aluminum
T	Copper vs. Copper-Nickel
E	Nickel-Chromium vs. Copper-Nickel
R	Platinum-13% Rhodium vs. Platinum
S	Platinum-10% Rhodium vs. Platinum
B	Platinum-30% Rhodium vs. Platinum-6% Rhodium
C	Tungsten-5% Rhenium vs. Tungsten-26% Rhenium
N	Nickel-14.2% Chromium-1.4% Silicon vs. Nickel-4.4% Silicon- 0.1% Magnesium.

Output Ranges Available

Output Range	Part No. Suffix	Example
1. -5V to +5V	Z	SCIM5B35-JZ
2. -10V to +10V	X	SCIM5B35-JX
3. 0V to +5V	NONE	SCIM5B35-J
4. 0V to +10V	D	SCIM5B35-JD
8. 1V to +5V	Y	SCIM5B35-JY

Notes:

- (1). Includes nonlinearity, hysteresis and repeatability. Does not include a 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, Types R, S 0.168°C/°C. Type N 0.037°C/°C, Type C, 0.072°C/°C
- (3). RTI=Referenced to input.