SCM5B35

Linearized 4-wire RTD-input Modules

DESCRIPTION

The high-accuracy SCM5B35 4-wire RTD-input module offers a significant advantage over 3-wire measurement techniques (Figure below). The SCM5B35 measures only the voltage dropped across the RTD and almost completely ignores the resistance or length of the RTD lead wires. The SCM5B34 3-wire RTD module provides lead resistance compensation, but requires equal lead resistances, while the SCM5B35 4-wire does not.

Each SCM5B35 RTD-input module provides a single channel of RTD input which is filtered, isolated, amplified, linearized, and converted to a high-level analog voltage output. This voltage output is logic switch controlled, which allows 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 ±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 module provides RTD excitation by a precision current source. The excitation current is available on two leads which are separate from the two input signal measuring leads. The excitation current does not flow in the input signal leads, which allows RTD measurement to be totally independent of lead resistance. The excitation current is very small (0.25mA for 100Ω Pt and 120Ω Ni and 1.0mA for 10Ω Cu) which minimizes RTD self-heating.

Signal filtering is accomplished with a six-pole filter which provides 95dB of normal-mode rejection at 60Hz and 90dB at 50Hz. Two poles are on the field side of the isolation barrier, and four poles 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 to suppress transmission of common-mode spikes or surges. The module is powered from +5VDC, ±5%.

FEATURES

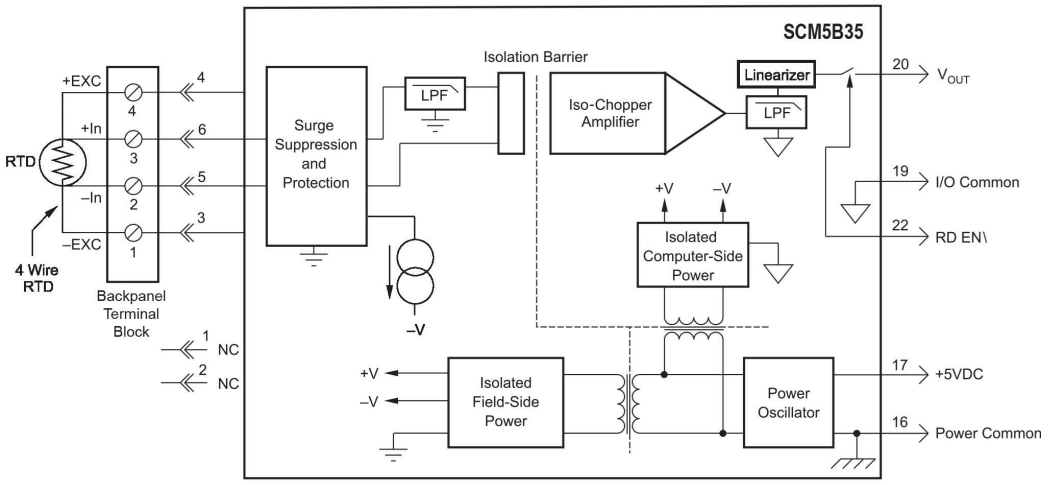
- Interfaces to 100Ω Platinum, 10Ω Copper, or 120Ω Nickel-RTDs
- True 4-wire Input
- Linearizes RTD Signal
- High-level Voltage Output
- 1500Vrms Transformer Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- Input Protected to 240VAC, Continuous
- 160dB CMR
- 95dB NMR at 60Hz, 90dB at 50Hz
- CSA C/US Certified
- CE and ATEX Compliant
- Manufactured per RoHS III Directive 2015/863
- Mix and Match SCM5B Types on Backpanel

BENEFITS

- Protects User Equipment from Lightning and Heavy Equipment Power-line Voltage
- Reduces EMC Concerns and Electrical Noise in Measured Signals
- Convenient System Expansion and Repair
- Signal Filtering in Noisy Environments
- Simplifies Sensor Interface and Signal Conditioning Design
- Provides Isolation of External Sensors
- Breaks Ground Loops

APPLICATIONS

- Analog Signal Conditioning
- Analog Signal Isolation
- Analog Signal Filtering
- Industrial Process Control
- Test and Measurement
- System and Signal Monitoring
- Temperature Measurement



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SCM5B35 Block Diagram - For Module Dimensions and Pinouts, See Page 1-44

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Specifications

Typical* at T_A = +25°C and +5VDC Power

Module	SCM5B35
Input Range Limits	–200°C to +850°C (100Ω Pt) –80°C to +320°C (120Ω Ni) –100°C to +260°C (10Ω Cu)
Input Resistance	
Normal	50MΩ
Power Off	40kΩ
Overload	40kΩ
Input Protection	
Continuous	240Vrms (max)
Transient	ANSI/IEEE C37.90.1
Sensor Excitation Current	
100Ω Pt, 120Ω Ni	0.25mA
10Ω Cu	1.0mA
Lead Resistance Effect	
100Ω Pt, 120Ω Ni	±0.0005°C/Ω(1)
10Ω Cu	±0.005°C/Ω(1)
CMV, Input to Output	
Continuous	1500Vrms (max)
Transient	ANSI/IEEE C37.90.1
CMR (50Hz or 60Hz)	160dB
NMR	95dB at 60Hz, 90dB at 50Hz
Accuracy	See Ordering Information
Conformity Error(3)	±0.025% Span
Stability	
Input Offset	±0.01°C/°C
Output Offset	±20µV/°C
Gain	±35ppm of Reading/°C
Noise	
Input, 0.1 to 10Hz	0.2µVrms
Output, 100kHz	200µVrms
Bandwidth, –3dB	4Hz
Response Time, 90% Span	0.2s
Output Range	See Ordering Information
Output Resistance	50Ω
Output Protection	Continuous Short-to-Ground
Output Selection Time (to ±1mV of V_{OUT})	6µs at C_{LOAD} = 0 to 2000pF
Output Current Limit	+8mA
Output Enable Control	
Max Logic "0"	+0.8V
Min Logic "1"	+2.4V
Max Logic "1"	+36V
Input Current "0,1"	0.5µA
Open Input Response	
Lead 1,4	Downscale
Lead 2,3	Non-deterministic
Open Input Detection Time	3s
Power Supply Voltage	+5VDC ±5%
Power Supply Current	30mA
Power Supply Sensitivity	
100Ω Pt, 120Ω Ni	±0.2°C/V
10Ω Cu	±0.5°C/V
Mechanical Dimensions (h)x(w)x(d)	2.28" x 2.26" x 0.60" (58mm x 57mm x 15mm)
Environmental	
Operating Temperature Range	–40°C to +85°C
Storage Temperature 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	Performance B

Ordering Information

Model	Input Range	Output Range	Accuracy(2)
100Ω Pt **			
SCM5B35-01	–100°C to +100°C	0V to +5V	±0.12°C
SCM5B35-01D	(–148°F to +212°F)	0V to +10V	
SCM5B35-02	0°C to +100°C	0V to +5V	±0.06°C
SCM5B35-02D	(+32°F to +212°F)	0V to +10V	
SCM5B35-03	0°C to +200°C	0V to +5V	±0.12°C
SCM5B35-03D	(+32°F to +392°F)	0V to +10V	
SCM5B35-04	0°C to +600°C	0V to +5V	±0.36°C
SCM5B35-04D	(+32°F to +1112°F)	0V to +10V	
SCM5B35-05	–100°C to +200°C	0V to +5V	±0.18°C
SCM5B35-05D	(-148°F to +392°F)	0V to +10V	
10Ω Cu **	0°C to +120°C		
SCM5B35C-01	(10Ω at 0°C)	0V to +5V	±0.23°C
SCM5B35C-01D	(+32°F to +248°F)	0V to +10V	
SCM5B35C-02	0°C to +120°C	0V to +5V	±0.23°C
SCM5B35C-02D	(10Ω at 25°C)	0V to +10V	
	(+32°F to +248°F)		
SCM5B35C-03	0°C to +160°C	0V to +5V	±0.32°C
SCM5B35C-03D	(10Ω at 0°C)	0V to +10V	
	(+32°F to +320°F)		
120Ω Ni **			
SCM5B35N-01 (3)	0°C to +300°C	0V to +5V	±0.23°C
SCM5B35N-01D	(+32°F to +572°F)	0V to +10V	

**RTD Standards

Type	Alpha Coefficient	DIN	JIS	IEC
100Ω Pt	0.00385			
120Ω Ni	0.00672	DIN 43760	JIS C 1604-1989	IEC 751
10Ω Cu	0.004274			

NOTES :
*Contact factory for maximum values.
(1) "Ω" refers to the resistance in one lead.
(2) Includes conformity, hysteresis and repeatability.
(3) Conformity error is ±0.05% Span for SCM5B35N-01.

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