SCM5B38

Strain Gauge Input Modules, Wide Bandwidth

DESCRIPTION

Each SCM5B38 strain gauge input module provides a single channel of strain gauge input which is filtered, isolated, amplified, and converted to a high-level analog voltage output (Figure below). 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 module family is 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 SCM5B38 can interface to full-bridge or half-bridge transducers with a nominal resistance of 100Ω to 10kΩ. A matched pair of bridge-completion resistors (to ±1mV at +10V excitation) allows use of low-cost half-bridge or quarter-bridge transducers (Figures 1, 2, 3). The 10kHz bandwidth allows measurement of high-speed processes such as vibration analysis.

Strain gauge excitation is provided from the module by a very stable 10V or 3.333V source. The excitation supply is fully isolated, allowing the amplifier inputs to operate over the full range of the excitation voltage. This feature offers significant flexibility in real world applications. Full-scale sensitivities of 2mV/V, 3mV/V or 10mV/V are offered as standard. With 10V excitation, this results in ±20mV, ±30mV or ±100mV full-scale input range producing ±5V full-scale output.

The input signal is processed through a wide-bandwidth pre-amplifier on the field side of the isolation barrier. After amplification, 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 +5VDC, ±5%.

Special input circuits on the SCM5B38 module provide protection of the signal inputs and the isolated excitation supply up to 240VAC.

FEATURES

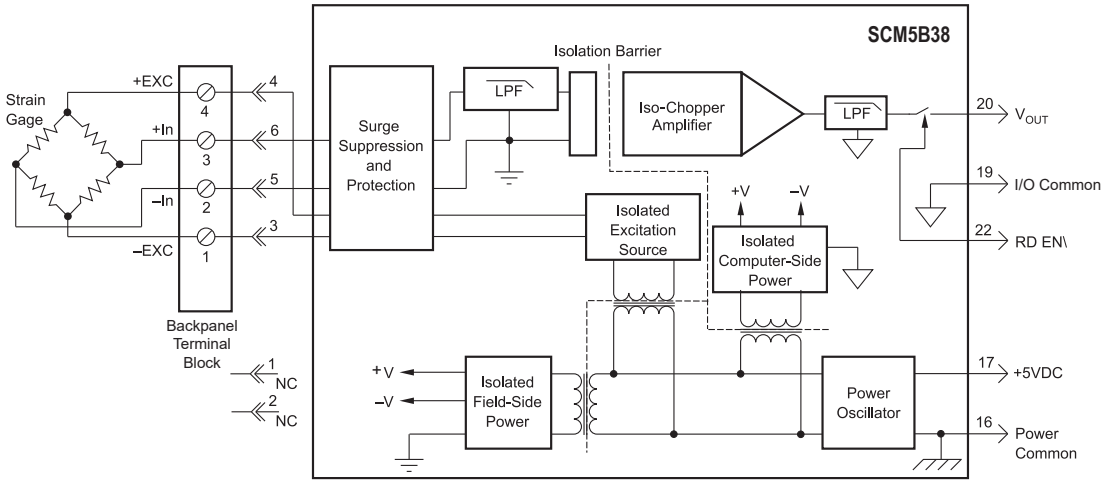
- Interfaces to 100Ω thru 10kΩ, Full-Bridge, Half-Bridge, or Quarter-Bridge Strain Gauges
- High-level Voltage Output
- 1500Vrms Transformer Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- Input Protected to 240VAC, Continuous
- Fully Isolated Excitation Supply
- 100dB CMR
- 10kHz Signal Bandwidth
- ±0.03% Accuracy
- ±0.01% Linearity
- ±1µV/°C Drift
- 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
- Torque Measurement
- Civil Engineering
- Geotechnical Monitoring



SCM5B38 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	Full Bridge SCM5B38-01,-02,-05,-06,-07	Half Bridge SCM5B38-03,-04
Input Range	±10mV to ±100mV	±10mV to ±100mV
Input Bias Current	±0.3nA	±0.3nA
Input Resistance		
Normal	50MΩ	50MΩ
Power Off	40kΩ	40kΩ
Overload	40kΩ	40kΩ
Signal Input Protection		
Continuous	240Vrms (max)	240Vrms (max)
Transient	ANSI/IEEE C37.90.1	ANSI/IEEE C37.90.1
Excitation Output (-02, -04, -05, -07)	+10V ±3mV	+10V ±3mV
Load Resistance	300Ω to 10kΩ	300Ω to 10kΩ
Excitation Output (-01, -03, -06)	+3.333V ±2mV	+3.333V ±2mV
Load Resistance	100Ω to 10kΩ	100Ω to 10kΩ
Excitation Load Regulation	±5ppm/mA	±5ppm/mA
Excitation Stability	±15ppm/°C	±15ppm/°C
Half-Bridge Voltage Level (-04)	NA	+5V ±1mV
Half-Bridge Voltage Level (-03)	NA	+1.667V ±1mV
Isolated Excitation Protection		
Continuous	240Vrms (max)	240Vrms (max)
Transient	ANSI/IEEE C37.90.1	ANSI/IEEE C37.90.1
CMV, Input to Output		
Continuous	1500Vrms (max)	1500Vrms (max)
Transient	ANSI/IEEE C37.90.1	ANSI/IEEE C37.90.1
CMR (50 or 60Hz)	100dB	100dB
NMR (–3dB at 10kHz)	120dB per Decade Above 10kHz	120dB per Decade Above 10kHz
Accuracy[2]	±0.03% Span	±0.03% Span
Linearity	±0.01% Span	±0.01% Span
Stability		
Input Offset	±1µV/°C	±1µV/°C
Output Offset	±40µV/°C	±40µV/°C
Gain	±25ppm of Reading/°C	±25ppm of Reading/°C
Noise		
Input, 0.1 to 10Hz	0.4µVrms	2µVrms
Output, 100kHz	10mVp-p	10mVp-p
Bandwidth, –3dB	10kHz	10kHz
Rise Time, 10 to 90% Span	35µs	35µs
Settling Time, to 0.1%	250µs	250µs
Output Range	See Ordering Information	See Ordering Information
Output Resistance	50Ω	50Ω
Output Protection	Continuous Short-to-Ground	Continuous Short-to-Ground
Output Selection Time (to ±1mV of V_{OUT})	6µs at C_{LOAD} = 0 to 2000pF	6µs at C_{LOAD} = 0 to 2000pF
Output Current Limit	±8mA	±8mA
Output Enable Control		
Max Logic "0"	+0.8V	+0.8V
Min Logic "1"	+2.4V	+2.4V
Max Logic "1"	+36V	+36V
Input Current "0,1"	0.5µA	0.5µA
Power Supply Voltage	+5VDC ±5%	*+5VDC ±5%
Power Supply Current	170mA Full Exc. Load, 70mA No Exc. Load	170mA Full Exc. Load, 70mA No Exc. Load
Power Supply Sensitivity	±2µV/% RTI[3]	±2µV/% RTI[3]
Mechanical Dimensions (h)x(w)x(d)	2.28" x 2.26" x 0.60" (58mm x 57mm x 15mm)	2.28" x 2.26" x 0.60" (58mm x 57mm x 15mm)
Environmental		
Operating Temperature Range	–40°C to +85°C	–40°C to +85°C
Storage Temperature Range	–40°C to +85°C	–40°C to +85°C
Relative Humidity	0 to 95% Noncondensing	0 to 95% Noncondensing
Emissions EN61000-6-4	ISM, Group 1	ISM, Group 1
Radiated, Conducted	Class A	Class A
Immunity EN61000-6-2	ISM, Group 1	ISM, Group 1
RF	Performance A ±0.5% Span Error	Performance A ±0.5% Span Error
ESD, EFT	Performance B	Performance B

NOTES:
(1) Strain element. (2) Includes linearity, hysteresis and repeatability. (3) RTI = Referenced to input.
*Contact factory for maximum values.

Ordering Information

Model (10kHz)	Input Type Bridge	Input Range	Excitation	Sens.	Output Range
SCM5B38-01 SCM5B38-01D	Full	–10mV to +10mV	+3.333V	3mV/V	–5V to +5V –10V to +10V
SCM5B38-02 SCM5B38-02D	Full	–30mV to +30mV	+10.0V	3mV/V	–5V to +5V –10V to +10V
SCM5B38-03 SCM5B38-03D	Half	–10mV to +10mV	+3.333V	3mV/V	–5V to +5V –10V to +10V
SCM5B38-04 SCM5B38-04D	Half	–30mV to +30mV	+10.0V	3mV/V	–5V to +5V –10V to +10V
SCM5B38-05 SCM5B38-05D	Full	–20mV to +20mV	+10.0V	2mV/V	–5V to +5V –10V to +10V
SCM5B38-06 SCM5B38-06D	Full	– 33.3mV to +33.3mV	+3.333V	10mV/V	–5V to +5V –10V to +10V
SCM5B38-07 SCM5B38-07D	Full	–100mV to +100mV	+10.0V	10mV/V	–5V to +5V –10V to +10V

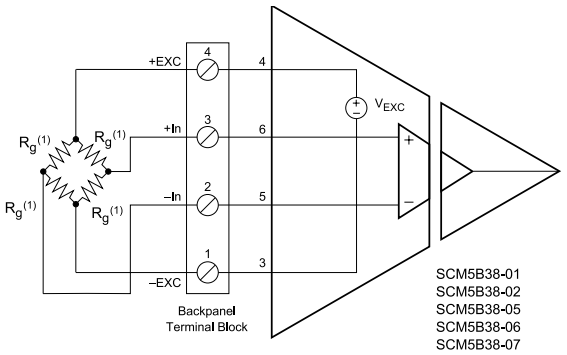

Figure 1: Full-Bridge Connection

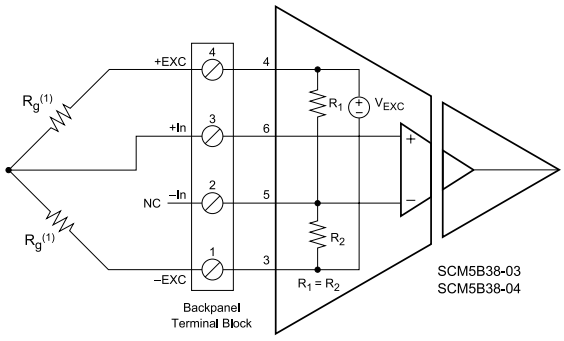

Figure 2: Half-Bridge Connection

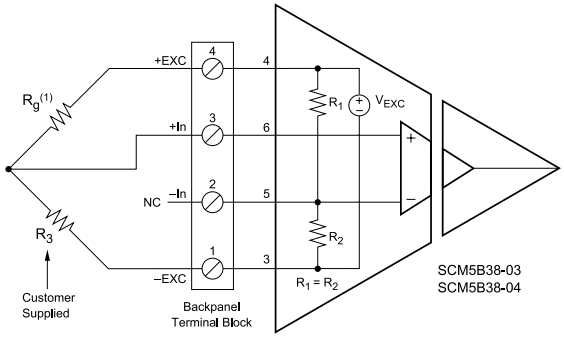

Figure 3: Quarter-Bridge Connection

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