SCM5B38

Strain Gage Input Modules, Wide Bandwidth

Description

Each SCM5B38 Strain Gage input module provides a single channel of strain gage input which is filtered, isolated, amplified, and converted to a high-level analog voltage output (Figure 1). 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 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 2, 3, 4). The 10kHz bandwidth allows measurement of high speed processes such as vibration analysis.

Strain gage 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 pre-amplifier on the field side of the isolation barrier. This pre-amplifier has a gain-bandwidth product of 5MHz and is bandwidth limited to 10kHz. 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 Gages
- 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
- Mix and Match SCM5B Types on Backpanel

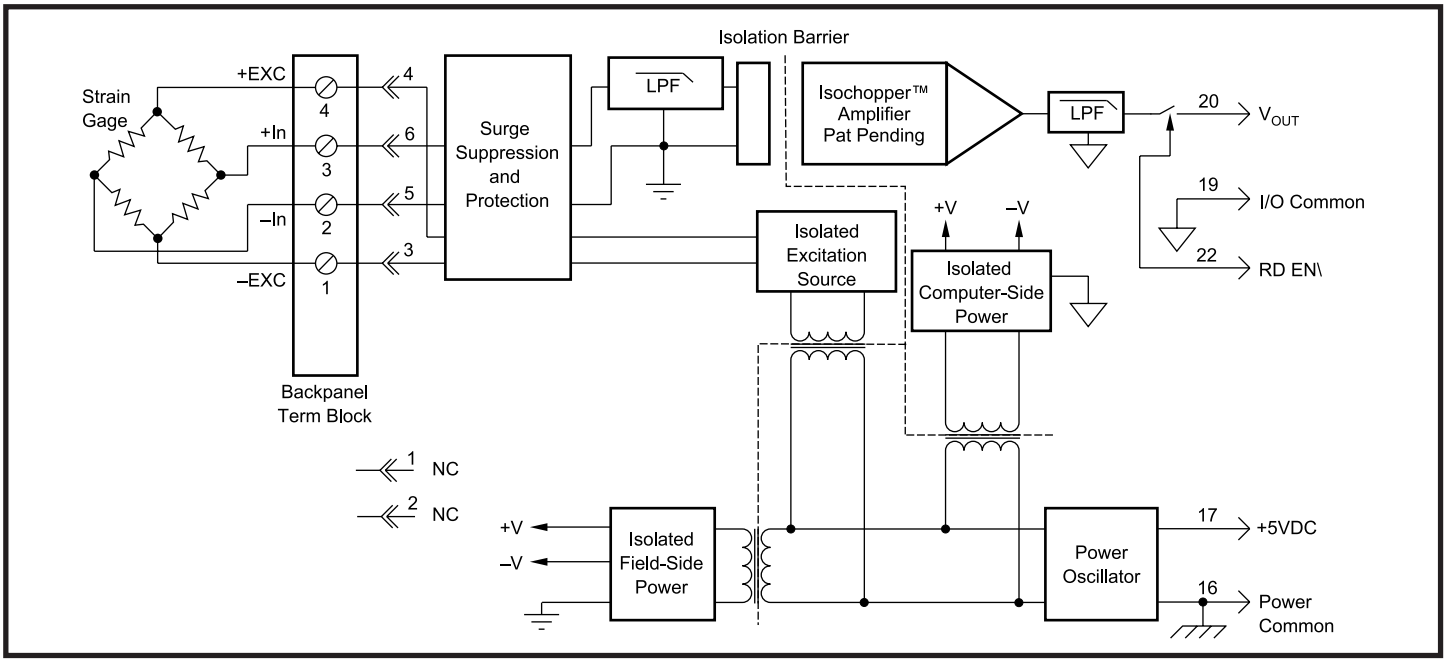

Figure 1: SCM5B38 Block Diagram

Specifications

Typical at T_A=+25°C and +5V power

Module	Full Bridge SCM5B38-01,-02,-05,-06,-07	Half Bridge SCM5B38-03,-04
Input Range	±10mV to ±100mV	*
Input Bias Current	±0.3nA	*
Input Resistance		
Normal	50MΩ	*
Power Off	40kΩ	*
Overload	40kΩ	*
Signal Input Protection		
Continuous	240Vrms max	*
Transient	ANSI/IEEE C37.90.1	*
Excitation Output (-02, -04, -05, -07)	+10V ±3mV	*
Load Resistance	300Ω to 10kΩ	*
Excitation Output (-01, -03, -06)	+3.333V ±2mV	*
Load Resistance	100Ω to 10kΩ	*
Excitation Load Regulation	±5ppm/mA	*
Excitation Stability	±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	*
Transient	ANSI/IEEE C37.90.1	*
CMV, Input to Output		
Continuous	1500Vrms max	*
Transient	ANSI/IEEE C37.90.1	*
CMR (50 or 60Hz)	100dB	*
NMR (–3dB at 10kHz)	120dB per Decade above 10kHz	*
Accuracy[2]	±0.03% Span	*
Linearity	±0.01% Span	*
Stability		
Input Offset	±1µV/°C	*
Output Offset	±40µV/°C	*
Gain	±25ppm of Reading/°C	*
Noise		
Input, 0.1 to 10Hz	0.4µVrms	2µVrms
Output, 100kHz	10mVp-p	*
Bandwidth, –3dB	10kHz	*
Rise Time, 10 to 90% Span	35µs	*
Settling Time, to 0.1%	250µs	*
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	*
Power Supply Voltage	+5VDC ±5%	*
Power Supply Current	170mA Full Exc. Load, 70mA No Exc. Load	*
Power Supply Sensitivity	±2µV/% RTI[3]	*
Mechanical Dimensions (h)(w)(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 (10kHz)	Input Bridge Type	Input Range	Excitation	Sens.	Output Range†
SCM5B38-01	Full	–10mV to +10mV	+3.333V	3mV/V	1, 2
SCM5B38-02	Full	–30mV to +30mV	+10.0V	3mV/V	1, 2
SCM5B38-03	Half	–10mV to +10mV	+3.333V	3mV/V	1, 2
SCM5B38-04	Half	–30mV to +30mV	+10.0V	3mV/V	1, 2
SCM5B38-05	Full	–20mV to +20mV	+10.0V	2mV/V	1, 2
SCM5B38-06	Full	–33.3mV to +33.3mV	+3.333V	10mV/V	1, 2
SCM5B38-07	Full	–100mV to +100mV	+10.0V	10mV/V	1, 2

†Output Ranges Available

Output Range	Part No. Suffix	Example
1. –5V to +5V	NONE	SCM5B38-01
2. –10V to +10V	D	SCM5B38-01D

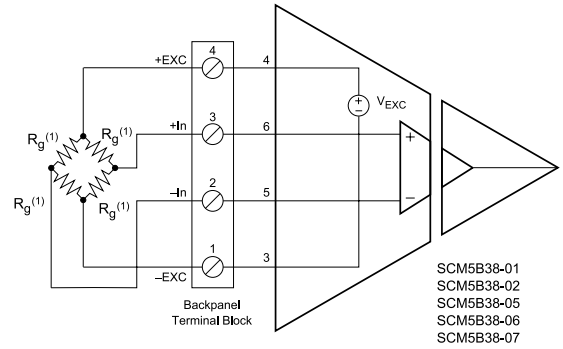

Figure 2: Full Bridge Connection

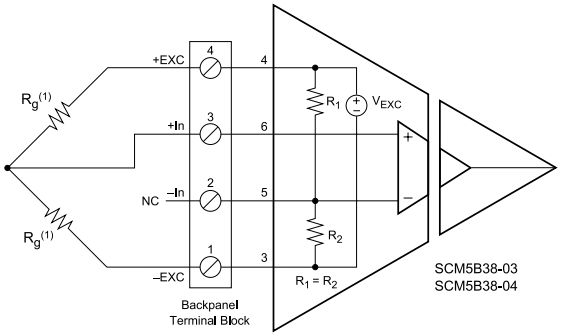

Figure 3: Half Bridge Connection

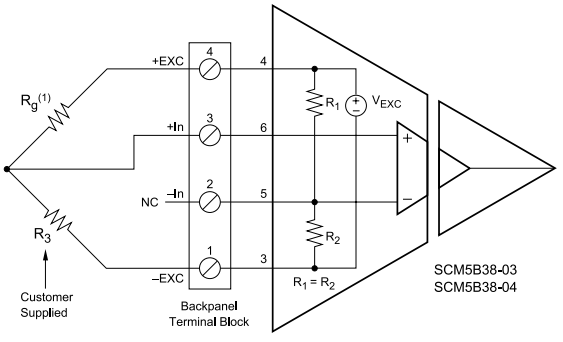

Figure 4: Quarter Bridge Connection

NOTES:
* Same as –01, –02, –05, –06, –07 modules.
(1) Strain element. (2) Includes linearity, hysteresis and repeatability. (3) RTI = Referenced to input.