

# 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  $\pm 50V$  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 SCM5B38 can interface to full-bridge or half-bridge transducers with a nominal resistance of  $100\Omega$  to  $10k\Omega$ . A matched pair of bridge-completion resistors (to  $\pm 1mV$  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  $\pm 20mV$ ,  $\pm 30mV$  or  $\pm 100mV$  full scale input range producing  $\pm 5V$  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

### Features

- Interfaces to  $100\Omega$  Thru  $10k\Omega$ , Full-Bridge, Half-Bridge, or Quarter-Bridge Strain Gages
- High-Level Voltage Output
- $1500V_{rms}$  Transformer Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- Input Protected to  $240VAC$  Continuous
- Fully Isolated Excitation Supply
- $100dB$  CMR
- $10kHz$  Signal Bandwidth
- $\pm 0.03\%$  Accuracy
- $\pm 0.01\%$  Linearity
- $\pm 1\mu V/^\circ C$  Drift
- CSA C/US Certified
- CE and ATEX Compliant
- Mix and Match SCM5B Types on Backpanel

using a proprietary technique to suppress transmission of common mode spikes or surges. The module is powered from  $+5VDC$ ,  $\pm 5\%$ .

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

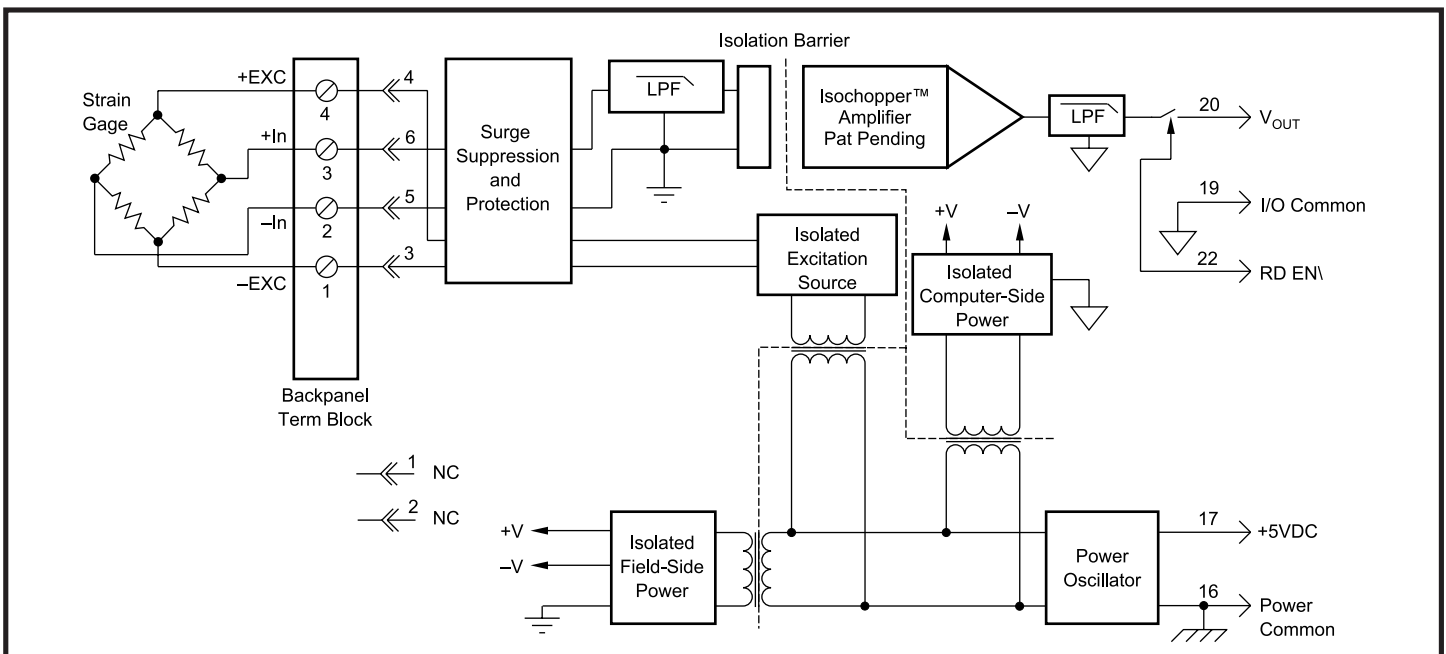


Figure 1: SCM5B38 Block Diagram

**Specifications** Typical\* at  $T_A = +25^\circ\text{C}$  and +5VDC power

Module	Full Bridge SCM5B38-01,-02,-05,-06,-07	Half Bridge SCM5B38-03,-04
Input Range	$\pm 10\text{mV}$ to $\pm 100\text{mV}$	*
Input Bias Current	$\pm 0.3\text{nA}$	*
Input Resistance		
Normal	$50\text{M}\Omega$	*
Power Off	$40\text{k}\Omega$	*
Overload	$40\text{k}\Omega$	*
Signal Input Protection		
Continuous	$240\text{Vrms}$ max	*
Transient	ANSI/IEEE C37.90.1	*
Excitation Output (-02, -04, -05, -07)	$+10\text{V} \pm 3\text{mV}$	*
Load Resistance	$300\Omega$ to $10\text{k}\Omega$	*
Excitation Output (-01, -03, -06)	$+3.333\text{V} \pm 2\text{mV}$	*
Load Resistance	$100\Omega$ to $10\text{k}\Omega$	*
Excitation Load Regulation	$\pm 5\text{ppm}/\text{mA}$	*
Excitation Stability	$\pm 15\text{ppm}/^\circ\text{C}$	*
Half Bridge Voltage Level (-04)	NA	$+5\text{V} \pm 1\text{mV}$
Half Bridge Voltage Level (-03)	NA	$+1.667\text{V} \pm 1\text{mV}$
Isolated Excitation Protection		
Continuous	$240\text{Vrms}$ max	*
Transient	ANSI/IEEE C37.90.1	*
CMV, Input to Output		
Continuous	$1500\text{Vrms}$ max	*
Transient	ANSI/IEEE C37.90.1	*
CMR (50 or 60Hz)	$100\text{dB}$	*
NMR (-3dB at 10kHz)	$120\text{dB}$ per Decade above 10kHz	*
Accuracy <sup>(2)</sup>	$\pm 0.03\%$ Span	*
Linearity	$\pm 0.01\%$ Span	*
Stability		*
Input Offset	$\pm 1\mu\text{V}/^\circ\text{C}$	*
Output Offset	$\pm 40\mu\text{V}/^\circ\text{C}$	*
Gain	$\pm 25\text{ppm}$ of Reading/ $^\circ\text{C}$	*
Noise		
Input, 0.1 to 10Hz	$0.4\mu\text{Vrms}$	$2\mu\text{Vrms}$
Output, 100kHz	$10\text{mVp-p}$	*
Bandwidth, -3dB	$10\text{kHz}$	*
Rise Time, 10 to 90% Span	$35\mu\text{s}$	*
Settling Time, to 0.1%	$250\mu\text{s}$	*
Output Range	See Ordering Information	*
Output Resistance	$50\Omega$	*
Output Protection	Continuous Short to Ground	*
Output Selection Time (to $\pm 1\text{mV}$ of $V_{\text{OUT}}$ )	$6\mu\text{s}$ at $C_{\text{load}} = 0$ to $2000\text{pF}$	*
Output Current Limit	$\pm 8\text{mA}$	*
Output Enable Control		
Max Logic "0"	$+0.8\text{V}$	*
Min Logic "1"	$+2.4\text{V}$	*
Max Logic "1"	$+36\text{V}$	*
Input Current "0,1"	$0.5\mu\text{A}$	*
Power Supply Voltage	$+5\text{VDC} \pm 5\%$	*
Power Supply Current	$170\text{mA}$ Full Exc. Load, $70\text{mA}$ No Exc. Load	*
Power Supply Sensitivity	$\pm 2\mu\text{V}/\% \text{ RTI}^{(3)}$	*
Mechanical Dimensions (h)(w)(d)	$2.28" \times 2.26" \times 0.60"$ ( $58\text{mm} \times 57\text{mm} \times 15\text{mm}$ )	*
Environmental		
Operating Temperature Range	$-40^\circ\text{C}$ to $+85^\circ\text{C}$	*
Storage Temperature Range	$-40^\circ\text{C}$ to $+85^\circ\text{C}$	*
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 $\pm 0.5\%$ Span Error	*
ESD, EFT	Performance B	*

\* Contact factory or your local Dataforth sales office for maximum values.

**Ordering Information**

Model (10kHz)	Input Bridge Type	Input Range	Excitation	Sens.	Output Range <sup>1</sup>
SCM5B38-01	Full	$-10\text{mV}$ to $+10\text{mV}$	$+3.333\text{V}$	$3\text{mV}/\text{V}$	1, 2
SCM5B38-02	Full	$-30\text{mV}$ to $+30\text{mV}$	$+10.0\text{V}$	$3\text{mV}/\text{V}$	1, 2
SCM5B38-03	Half	$-10\text{mV}$ to $+10\text{mV}$	$+3.333\text{V}$	$3\text{mV}/\text{V}$	1, 2
SCM5B38-04	Half	$-30\text{mV}$ to $+30\text{mV}$	$+10.0\text{V}$	$3\text{mV}/\text{V}$	1, 2
SCM5B38-05	Full	$-20\text{mV}$ to $+20\text{mV}$	$+10.0\text{V}$	$2\text{mV}/\text{V}$	1, 2
SCM5B38-06	Full	$-33.3\text{mV}$ to $+33.3\text{mV}$	$+3.333\text{V}$	$10\text{mV}/\text{V}$	1, 2
SCM5B38-07	Full	$-100\text{mV}$ to $+100\text{mV}$	$+10.0\text{V}$	$10\text{mV}/\text{V}$	1, 2

**Output Ranges Available**

Output Range	Part No. Suffix	Example
1. $-5\text{V}$ to $+5\text{V}$	NONE	SCM5B38-01
2. $-10\text{V}$ to $+10\text{V}$	D	SCM5B38-01D

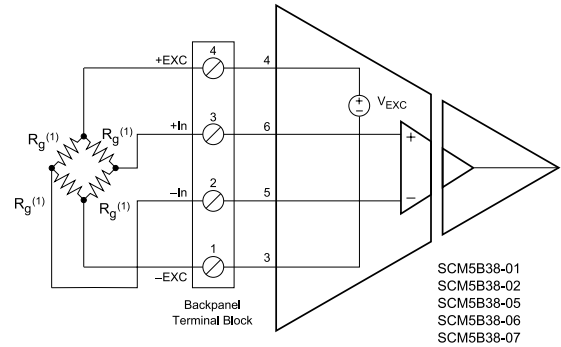


Figure 2: Full Bridge Connection

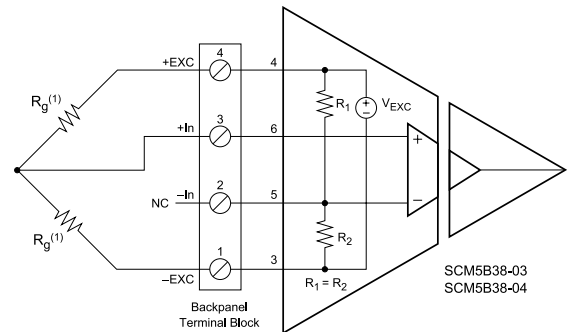


Figure 3: Half Bridge Connection

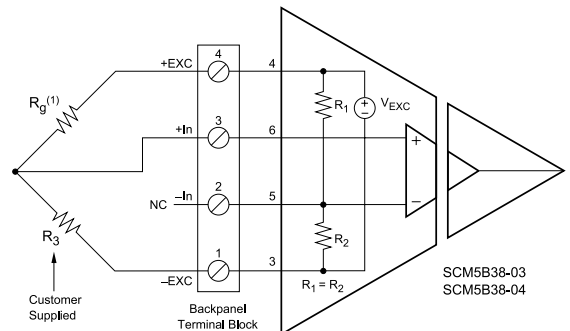


Figure 4: Quarter Bridge Connection

NOTES:

\* Same as -01, -02, -05, -06, -07 modules.

(1) Strain element. (2) Includes linearity, hysteresis and repeatability. (3) RTI = Referenced to input.