

SCM5B38

Strain Gage Input Modules, Narrow 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 100Ω 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).

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.

After initial field side filtering 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 $+5VDC$, $\pm 5\%$.

► Features

- Interfaces to 100Ω Thru $10k\Omega$, Full-Bridge, Half-Bridge, or Quarter-Bridge Strain Gages
- High Level Voltage Output
- $1500V_{rms}$ Transformer Isolation
- ANSI/IEEE C37.90.1-1989 Transient Protection
- Input Protected to $240VAC$ Continuous
- Fully Isolated Excitation Supply
- $160dB$ CMR
- $4Hz$ Signal Bandwidth
- $\pm 0.03\%$ Accuracy
- $\pm 0.01\%$ Linearity
- $\pm 1\mu V/^\circ C$ Drift
- CSA Certified, FM Approved, CE Compliant
- Mix and Match SCM5B Types on Backpanel

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

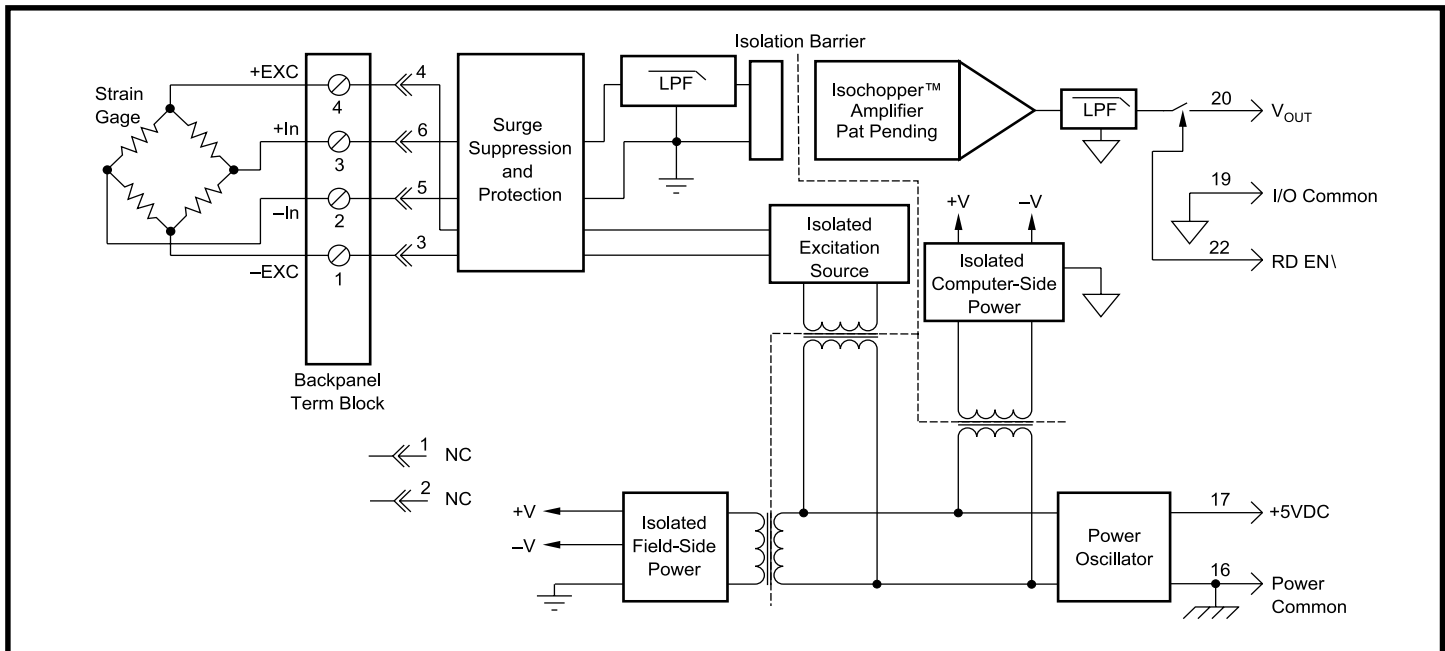


Figure 1: SCM5B38 Block Diagram

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

Module	Full Bridge SCM5B38-31,-32,-35,-36,-37	Half Bridge SCM5B38-33,-34
Input Range	$\pm 10\text{mV}$ to $\pm 100\text{mV}$	*
Input Bias Current	$\pm 0.5\text{nA}$	*
Input Resistance		
Normal	$50\text{M}\Omega$	*
Power Off	$40\text{k}\Omega$	*
Overload	$40\text{k}\Omega$	*
Signal Input Protection		
Continuous	240Vrms max	*
Transient	ANSI/IEEE C37.90.1-1989	*
Excitation Output (-32, -34, -35, -37)	$+10\text{V} \pm 3\text{mV}$	*
Excitation Output (-31, -33, -36)	$+3.333\text{V} \pm 2\text{mV}$	*
Excitation Load Regulation	$\pm 5\text{ppm}/\text{mA}$	*
Excitation Stability	$\pm 15\text{ppm}/^\circ\text{C}$	*
Half Bridge Voltage Level (-34)	NA	$+5\text{V} \pm 1\text{mV}$
Half Bridge Voltage Level (-33)	NA	$+1.667\text{V} \pm 1\text{mV}$
Isolated Excitation Protection		
Continuous	240Vrms max	*
Transient	ANSI/IEEE C37.90.1-1989	*
CMV, Input to Output		
Continuous	1500Vrms max	*
Transient	ANSI/IEEE C37.90.1-1989	*
CMR (50 or 60Hz)	160dB	*
NMR	95dB at 60Hz, 90dB at 50Hz	*
Accuracy ⁽²⁾	$\pm 0.03\%$ Span	*
Nonlinearity	$\pm 0.01\%$ Span	*
Stability		
Input Offset	$\pm 1\mu\text{V}/^\circ\text{C}$	*
Output Offset	$\pm 20\mu\text{V}/^\circ\text{C}$	*
Gain	$\pm 25\text{ppm}$ of Reading/ $^\circ\text{C}$	*
Noise		
Input, 0.1 to 10Hz	$0.2\mu\text{Vrms}$	$1\mu\text{Vrms}$
Output, 100kHz	$200\mu\text{Vrms}$	*
Bandwidth, -3dB	4Hz	*
Response Time, 90% Span	0.2s	*
Output Range	$\pm 5\text{V}$	*
Output Resistance	50Ω	*
Output Protection	Continuous Short to Ground	*
Output Selection Time (to $\pm 1\text{mV}$ of V_{OUT})	$6\mu\text{s}$ at $C_{load} = 0$ to 2000pF	*
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	170mA Full Exc. Load, 70mA No Exc. Load	*
Power Supply Sensitivity	$\pm 2\mu\text{V}/\%$ 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°C to $+85^\circ\text{C}$	*
Storage Temperature Range	-40°C to $+85^\circ\text{C}$	*
Relative Humidity	0 to 95% Noncondensing	*
Emissions	EN50081-1, ISM Group 1, Class A (Radiated, Conducted)	*
Immunity	EN50082-1, ISM Group 1, Class A (ESD, RF, EFT)	*

Ordering Information

Model	Input Bridge Type	Input Range	Excitation	Output Range
SCM5B38-31	Full	100Ω to $10\text{k}\Omega$	3.333V at $3\text{mV}/\text{V}$ Sensitivity	-5V to $+5\text{V}$
SCM5B38-32	Full	300Ω to $10\text{k}\Omega$	10.0V at $3\text{mV}/\text{V}$ Sensitivity	-5V to $+5\text{V}$
SCM5B38-33	Half	100Ω to $10\text{k}\Omega$	3.333V at $3\text{mV}/\text{V}$ Sensitivity	-5V to $+5\text{V}$
SCM5B38-34	Half	300Ω to $10\text{k}\Omega$	10.0V at $3\text{mV}/\text{V}$ Sensitivity	-5V to $+5\text{V}$
SCM5B38-35	Full	300Ω to $10\text{k}\Omega$	10.0V at $2\text{mV}/\text{V}$ Sensitivity	-5V to $+5\text{V}$
SCM5B38-36	Full	100Ω to $10\text{k}\Omega$	3.333V at $10\text{mV}/\text{V}$ Sensitivity	-5V to $+5\text{V}$
SCM5B38-37	Full	300Ω to $10\text{k}\Omega$	10.0V at $10\text{mV}/\text{V}$ Sensitivity	-5V to $+5\text{V}$

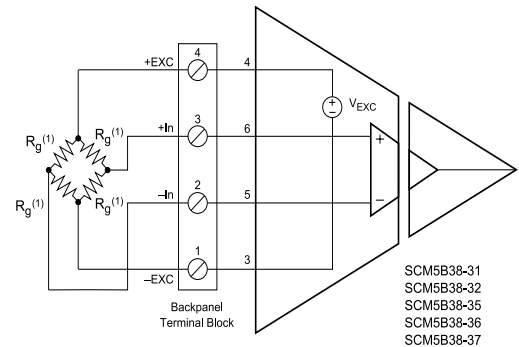


Figure 2: Full Bridge Connection

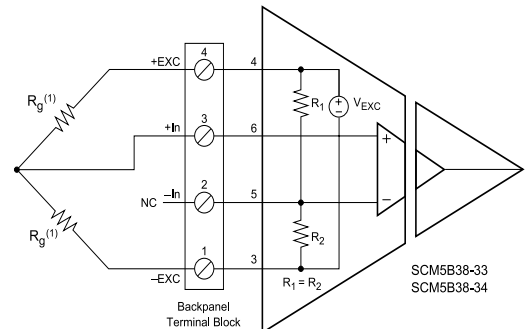


Figure 3: Half Bridge Connection

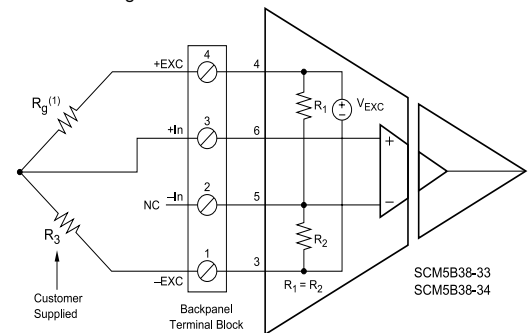


Figure 4: Quarter Bridge Connection

NOTES:
 * Same as -31, -32, -35, -36, -37 modules.
 (1) Strain element.
 (2) Includes excitation error, nonlinearity, hysteresis and repeatability.
 (3) Referenced to input.