

# 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 using a proprietary technique to suppress

### Features

- Interfaces to  $100\Omega$  Thru  $10k\Omega$ , 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
- $\pm 0.03\%$  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

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.

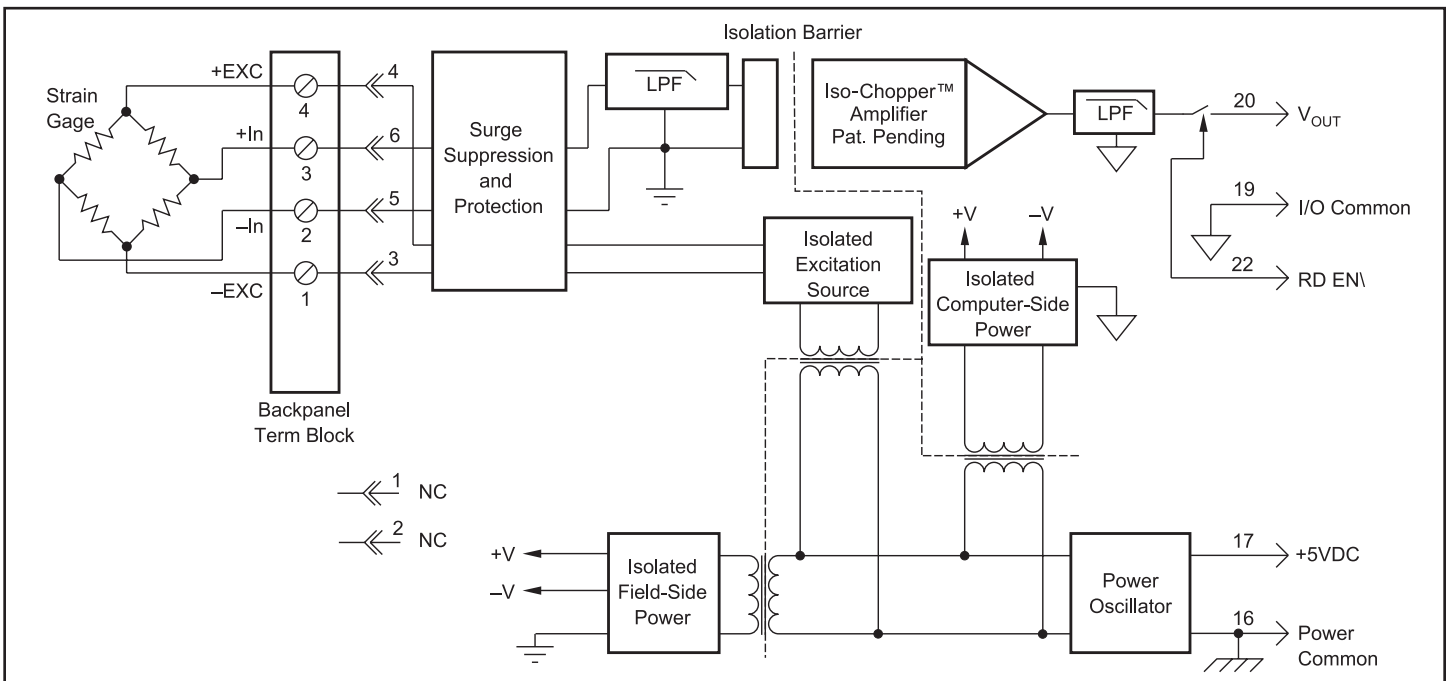


Figure 1: SCM5B38 Block Diagram

**Specifications** Typical\* at T<sub>A</sub> = +25°C and +5VDC power

| Module   | Full Bridge<br>SCM5B38-01,-02,-05,-06,-07     | Half Bridge<br>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 <sup>(2)</sup>                              | ±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 <sub>OUT</sub> ) | 6μs at C <sub>load</sub> = 0 to 2000pF        | 6μs at C <sub>load</sub> = 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,<br>70mA No Exc. Load    | 170mA Full Exc. Load,<br>70mA No Exc. Load    |
| Power Supply Sensitivity                             | ±2μV/% RTI <sup>(3)</sup>                     | ±2μV/% RTI <sup>(3)</sup>                     |
| Mechanical Dimensions (h)(w)(d)                      | 2.28" x 2.26" x 0.60"<br>(58mm x 57mm x 15mm) | 2.28" x 2.26" x 0.60"<br>(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                                 |

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

NOTES:

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

**Ordering Information**

| Model (10kHz) | Type Bridge Input | Input Range        | Excitation | Sens.  | Output Range <sup>†</sup> |
|---------------|-------------------|--------------------|------------|--------|---------------------------|
| 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 |

