# SCM5B30/31

## Analog Voltage-input Modules, Narrow Bandwidth

## DESCRIPTION

Each SCM5B30 and SCM5B31 voltage input module provides a single channel of analog input which is filtered, isolated, amplified, and converted to a high-level analog voltage output (Figure below). This voltage output is logic-switch controlled, allowing 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.

Signal filtering is accomplished with a six-pole filter which provides 95dB of normal-mode rejection at 60Hz and 90dB at 50Hz. Two poles of this filter are on the field side of the isolation barrier, and the other four are on the computer side.

After the 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, ±5%.

A special input circuit on the SCM5B30 and SCM5B31 modules provides protection against accidental connection of power-line voltages up to 240VAC.

## FEATURES

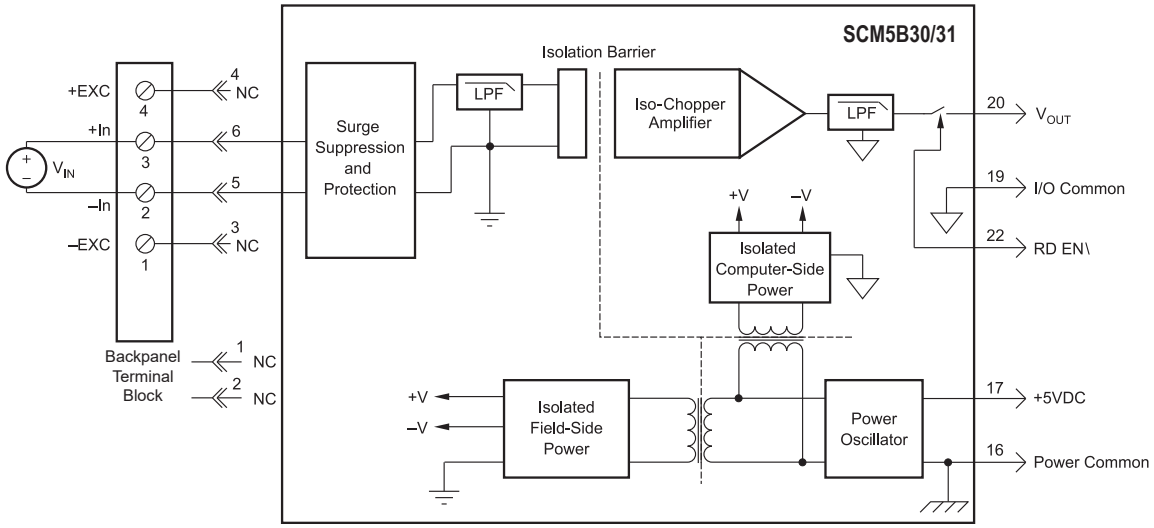
- Accepts Millivolt and Voltage Level Signals
- High-level Voltage Outputs
- 1500Vrms Transformer Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- Input Protected to 240VAC, Continuous
- 160dB CMR
- ±0.03% Accuracy
- 95dB NMR at 60Hz, 90dB at 50Hz
- ±0.005% Linearity
- ±1µV/°C Drift
- CSA C/US Certified
- 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




**SCM5B30/31 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 | SCM5B30 | SCM5B31 |
|---|---|---|
| Input Range | ±10mV to ±1V | ±1V to ±40V |
| Input Bias Current | ±0.5nA | ±0.05nA |
| Input Resistance | | |
| Normal | 50MΩ | 650kΩ (-01 thru -06)<br>2MΩ (-07 thru -10) |
| Power Off | 40kΩ | 650kΩ (-01 thru -06)<br>2MΩ (-07 thru -10) |
| Overload | 40kΩ | 650kΩ (-01 thru -06)<br>2MΩ (-07 thru -10) |
| Input 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 (50Hz or 60Hz) | 160dB | 160dB |
| NMR | 95dB at 60Hz, 90dB at 50Hz | 95dB at 60Hz, 90dB at 50Hz |
| Accuracy(1) | ±0.03% Span | ±0.03% Span |
| Linearity | ±0.005% Span | ±0.005% Span |
| Stability | | |
| Input Offset | ±1µV/°C | ±20µV/°C |
| Output Offset | ±20µV/°C | ±20µV/°C |
| Gain | ±25ppm/°C | ±50ppm/°C |
| Noise | | |
| Input, 0.1 to 10Hz | 0.2µVrms | 2µVrms |
| Output, 100kHz | 200µVrms | 200µVrms |
| Bandwidth, –3dB | 4Hz | 4Hz |
| Response Time, 90% Span | 0.2s | 0.2s |
| 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 | 30mA | 30mA |
| Power Supply Sensitivity | ±2µV/% RTI(2) | ±200µV/% RTI(2) |
| Mechanical Dimensions (h)x(w)x(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 Temp. Range | –40°C to +85°C | –40°C to +85°C |
| Storage Temp. 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:
*Contact factory for maximum values.
(1) Includes linearity, hysteresis and repeatability.
(2) RTI = Referenced to input.
(3) Same as SCM5B31-01 with 50MΩ input resistance.

## Ordering Information

| Model | Input Range | Output Range |
|---|---|---|
| SCM5B30-01 | –10mV to +10mV | –5V to +5V |
| SCM5B30-01D | –10mV to +10mV | –10V to +10V |
| SCM5B30-02 | –50mV to +50mV | –5V to +5V |
| SCM5B30-02D | –50mV to +50mV | –10V to +10V |
| SCM5B30-03 | –100mV to +100mV | –5V to +5V |
| SCM5B30-03D | –100mV to +100mV | –10V to +10V |
| SCM5B30-04 | –10mV to +10mV | 0V to +5V |
| SCM5B30-04D | –10mV to +10mV | 0V to +10V |
| SCM5B30-05 | –50mV to +50mV | 0V to +5V |
| SCM5B30-05D | –50mV to +50mV | 0V to +10V |
| SCM5B30-06 | –100mV to +100mV | 0V to +5V |
| SCM5B30-06D | –100mV to +100mV | 0V to +10V |
| SCM5B30-07(3) | –1V to +1V | –5V to +5V |
| SCM5B30-07D(3) | –1V to +1V | –10V to +10V |
| SCM5B31-01 | –1V to +1V | –5V to +5V |
| SCM5B31-01D | –1V to +1V | –10V to +10V |
| SCM5B31-02 | –5V to +5V | –5V to +5V |
| SCM5B31-02D | –5V to +5V | –10V to +10V |
| SCM5B31-03 | –10V to +10V | –5V to +5V |
| SCM5B31-03D | –10V to +10V | –10V to +10V |
| SCM5B31-04 | –1V to +1V | 0V to +5V |
| SCM5B31-04D | –1V to +1V | 0V to +10V |
| SCM5B31-05 | –5V to +5V | 0V to +5V |
| SCM5B31-05D | –5V to +5V | 0V to +10V |
| SCM5B31-06 | –10V to +10V | 0V to +5V |
| SCM5B31-06D | –10V to +10V | 0V to +10V |
| SCM5B31-07 | –20V to +20V | –5V to +5V |
| SCM5B31-07D | –20V to +20V | –10V to +10V |
| SCM5B31-08 | –20V to +20V | 0V to +5V |
| SCM5B31-08D | –20V to +20V | 0V to +10V |
| SCM5B31-09 | –40V to +40V | –5V to +5V |
| SCM5B31-09D | –40V to +40V | –10V to +10V |
| SCM5B31-10 | –40V to +40V | 0V to +5V |
| SCM5B31-10D | –40V to +40V | 0V to +10V |



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