

# SCM5B33

## Isolated True RMS Input Modules



### Description

Each SCM5B33 True RMS input module provides a single channel of AC input which is converted to its True RMS DC value, filtered, isolated, amplified, and converted to a standard process voltage or current output (Figure 1).

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 field voltage or current input signal is processed through a pre-amplifier and RMS converter on the field side of the isolation barrier. The converted DC signal is then chopped by a proprietary chopper circuit and transferred across the transformer isolation barrier, suppressing transmission of common mode spikes and surges. The computer side circuitry reconstructs, filters and converts the signal to industry standard outputs. Modules are powered from +5VDC,  $\pm 5\%$

For current output models, in addition to the 5VDC module power, an external loop supply of 4.2V to 26V is required. The loop supply connection, with series load, is between pin 20 (+) and pin 19 (-).

Due to circuit limitations, SCM5B33-04x and -05x are not ATEX compliant.

**WARNING:** The SCM5B33 interfaces to hazardous voltages and should only be wired by qualified personnel or licensed electricians.

### Features

- Interfaces RMS Voltage (0 – 300V) or RMS Current (0 – 5A)
- Designed for Standard Operation with Frequencies of 45Hz to 1000Hz (Extended Range to 20kHz)
- Compatible with Standard Current and Potential Transformers
- Industry Standard Output of Either 0-1mA, 0-20mA, 4-20mA, 0-5V or 0-10VDC
- $\pm 0.25\%$  Factory Calibrated Accuracy (Accuracy Class 0.2)
- 1500Vrms Continuous Transformer Isolation
- Input Overload Protected to 480V Max (Peak AC & DC) or 10A RMS Continuous
- ANSI/IEEE C37.90.1 Transient Protection
- CSA C/US Certified
- CE Compliant
- ATEX Compliant (all models except SCM5B33-04x, -05x)
- Mix and Match SCM5B Types on Backpanel

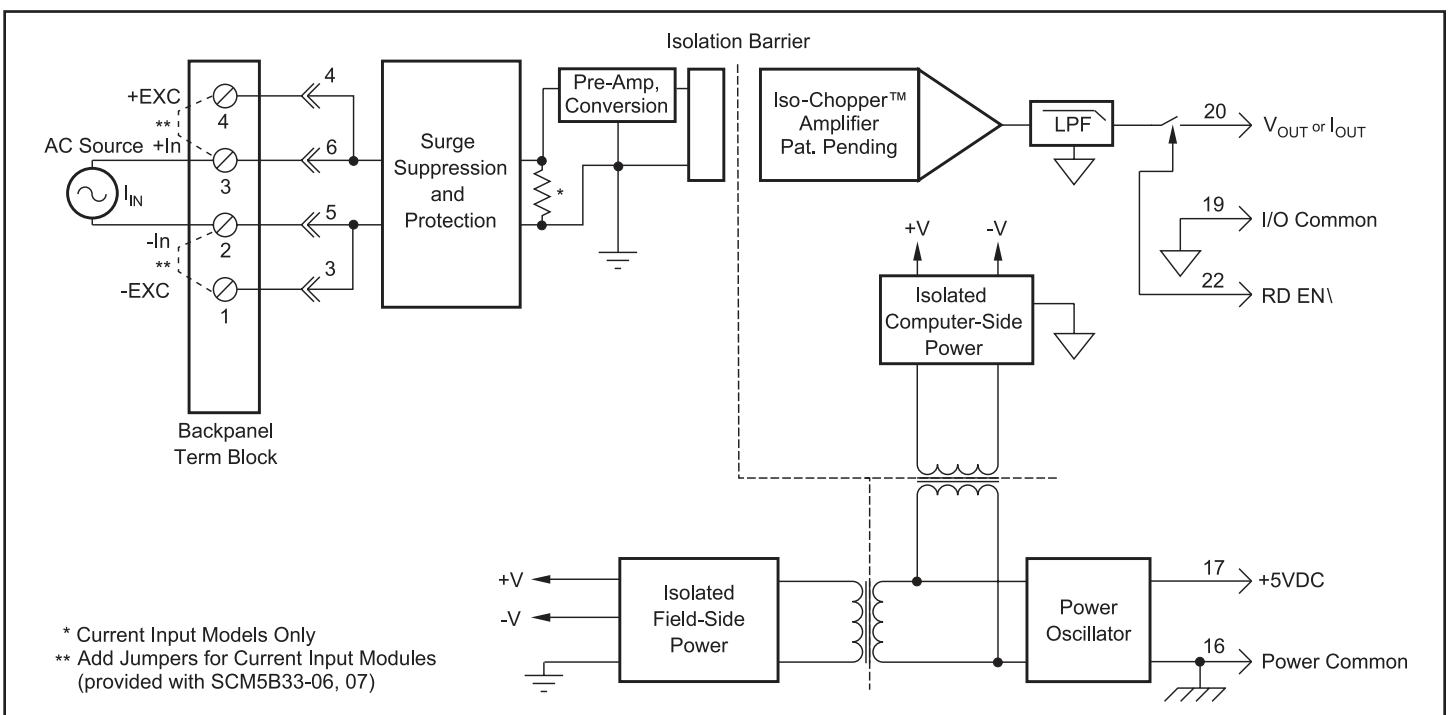


Figure 1: SCM5B33 Block Diagram

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

| Module                                    | SCM5B33  |
|---|--|
| Input                                     |  |
| Signal Range                              | 100mV to 300Vrms, 0 to 5Arms   |
| Standard Frequency Range                  | 45Hz to 1000Hz   |
| Extended Frequency Range                  | 1kHz to 20kHz  |
| Impedance                                 | 1 MΩ shunted by 100pF (-01 thru -05),<br>0.10Ω (-06), 0.025Ω (-07)       |
| Coupling                                  | AC   |
| Protection <sup>(1)</sup>                 |  |
| Continuous (-01 thru -05)                 | 350Vrms  |
| Continuous (-06 thru -07)                 | 10Arms   |
| Transient (-01 thru -05)                  | ANSI/IEEE C37.90.1   |
| Transient (-06 thru -07)                  | See note 2   |
| Output                                    |  |
| Signal Range                              | 0-5V or 0-10V or 0-1mA or 0-20mA or 4-20mA                               |
| Current Limit                             | 1.4mA (0-1mA models), 30mA (0/4-20mA models),<br>8mA (0-5, 0-10V models) |
| Voltage Limit                             | ±18V (0-5, 0-10V models)   |
| Resistance                                | 50Ω (0-5, 0-10V models)  |
| Protection                                | Continuous Short to Ground   |
| Ripple and Noise (100kHz)                 | 0.025% Span rms  |
| Accuracy (10-100% Span) <sup>(3)(4)</sup> |  |
| Sinusoid                                  |  |
| 50/60 Hz                                  | ±0.25% Span  |
| 45Hz to 1kHz                              | ±0.25% Reading Additional Error  |
| 1kHz to 20kHz                             | ±0.75% Reading Additional Error  |
| Non-Sinusoid                              |  |
| Crest Factor = 1 to 2                     | ±0.05% Reading Additional Error  |
| Crest Factor = 2 to 3                     | ±0.15% Reading Additional Error  |
| Crest Factor = 3 to 4                     | ±0.30% Reading Additional Error  |
| Crest Factor = 4 to 5                     | ±0.40% Reading Additional Error  |
| Vs. Temperature                           | ±100ppm/°C   |
| Isolation (Common Mode)                   |  |
| Input to Output, Input to Power           | 1500Vrms max<br>ANSI/IEEE C37.90.1                                       |
| Continuous                                |  |
| Transient                                 |  |
| Output to Power                           |  |
| Continuous                                | 50VDC max  |
| Rejection (50-60Hz Common Mode)           | 100dB  |
| Response Time (0 to 99%)                  | 4 00ms   |
| Output Enable Control                     |  |
| Selection Time                            | 6.0μs at C <sub>load</sub> = 0 to 2000pF                                 |
| Max Logic "0"                             | +0.8V  |
| Min/Max Logic "1"                         | +2.4V/+36V   |
| Current "0,1"                             | 0.5μA  |
| Loop Voltage                              | +4.2VDC min, +26VDC max, -40°C to +85°C                                  |
| Load Resistance (maximum)                 | (Loop Voltage - 4.2) / (Loop Current)                                    |
| Supply Voltage                            | +5VDC ±5%  |
| Current                                   | 120mA  |
| Sensitivity                               | ±200ppm/%  |
| 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   |
| HazLoc ATEX                               | All models except SCM5B33-04x, -05x                                      |
| 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  |

NOTES:

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

(1) SCM5B33 and SCMPB01, 02, 03, 04, 05, 06, 07, XEV rating only. Backpanels obtained from other sources may have lower ratings.

(2) For 1 to 25 seconds the max allowable transient current rating is  $\sqrt{2500 / \text{event time}}$ . For less than 1 second, ANSI/IEEE C37.90.1 applies with a 0.05Ω load. For greater than 25 seconds, the 10A rms continuous rating applies.

**Ordering Information**

| Model       | Input (rms) <sup>†</sup> | Output (DC) <sup>†</sup> |
|-------------|--------------------------|--------------------------|
| SCM5B33-01  | 0mV to 100mV             | 0V to 5V                 |
| SCM5B33-02  | 0V to 1V                 | 0V to 5V                 |
| SCM5B33-03  | 0V to 10V                | 0V to 5V                 |
| SCM5B33-04  | 0V to 150V               | 0V to 5V                 |
| SCM5B33-05  | 0V to 300V               | 0V to 5V                 |
| SCM5B33-06  | 0A to 1A                 | 0V to 5V                 |
| SCM5B33-07  | 0A to 5A                 | 0V to 5V                 |
| SCM5B33-01B | 0mV to 100mV             | 0mA to 1mA               |
| SCM5B33-02B | 0V to 1V                 | 0mA to 1mA               |
| SCM5B33-03B | 0V to 10V                | 0mA to 1mA               |
| SCM5B33-04B | 0V to 150V               | 0mA to 1mA               |
| SCM5B33-05B | 0V to 300V               | 0mA to 1mA               |
| SCM5B33-06B | 0A to 1A                 | 0mA to 1mA               |
| SCM5B33-07B | 0A to 5A                 | 0mA to 1mA               |
| SCM5B33-01C | 0mV to 100mV             | 4mA to 20mA              |
| SCM5B33-02C | 0V to 1V                 | 4mA to 20mA              |
| SCM5B33-03C | 0V to 10V                | 4mA to 20mA              |
| SCM5B33-04C | 0V to 150V               | 4mA to 20mA              |
| SCM5B33-05C | 0V to 300V               | 4mA to 20mA              |
| SCM5B33-06C | 0A to 1A                 | 4mA to 20mA              |
| SCM5B33-07C | 0A to 5A                 | 4mA to 20mA              |
| SCM5B33-01D | 0mV to 100mV             | 0V to 10V                |
| SCM5B33-02D | 0V to 1V                 | 0V to 10V                |
| SCM5B33-03D | 0V to 10V                | 0V to 10V                |
| SCM5B33-04D | 0V to 150V               | 0V to 10V                |
| SCM5B33-05D | 0V to 300V               | 0V to 10V                |
| SCM5B33-06D | 0A to 1A                 | 0V to 10V                |
| SCM5B33-07D | 0A to 5A                 | 0V to 10V                |
| SCM5B33-01E | 0mV to 100mV             | 0mA to 20mA              |
| SCM5B33-02E | 0V to 1V                 | 0mA to 20mA              |
| SCM5B33-03E | 0V to 10V                | 0mA to 20mA              |
| SCM5B33-04E | 0V to 150V               | 0mA to 20mA              |
| SCM5B33-05E | 0V to 300V               | 0mA to 20mA              |
| SCM5B33-06E | 0A to 1A                 | 0mA to 20mA              |
| SCM5B33-07E | 0A to 5A                 | 0mA to 20mA              |

<sup>†</sup> Modules can be ordered with other input/output ranges. Consult factory for ordering details and specifications.

**<sup>†</sup>Output Ranges Available**

| Output Range   | Part No. Suffix | Example     |
|----------------|-----------------|-------------|
| 3. 0V to +5V   | NONE            | SCM5B33-01  |
| 4. 0V to +10V  | D               | SCM5B33-01D |
| 5. 4mA to 20mA | C               | SCM5B33-01C |
| 6. 0mA to 20mA | E               | SCM5B33-01E |
| 7. 0mA to 1mA  | B               | SCM5B33-01B |

(3) At standard 60Hz factory calibration. Consult factory for calibration at other frequencies.

(4) For 0-10% Span measurements, add 0.25% accuracy error (-02 through -07) or 1.00% accuracy error (-01). Accuracy includes linearity, hysteresis and repeatability but not source or external shunt inaccuracy (if used).