

# 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, 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 (-).

### ► 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 Certified, CE and ATEX Compliant

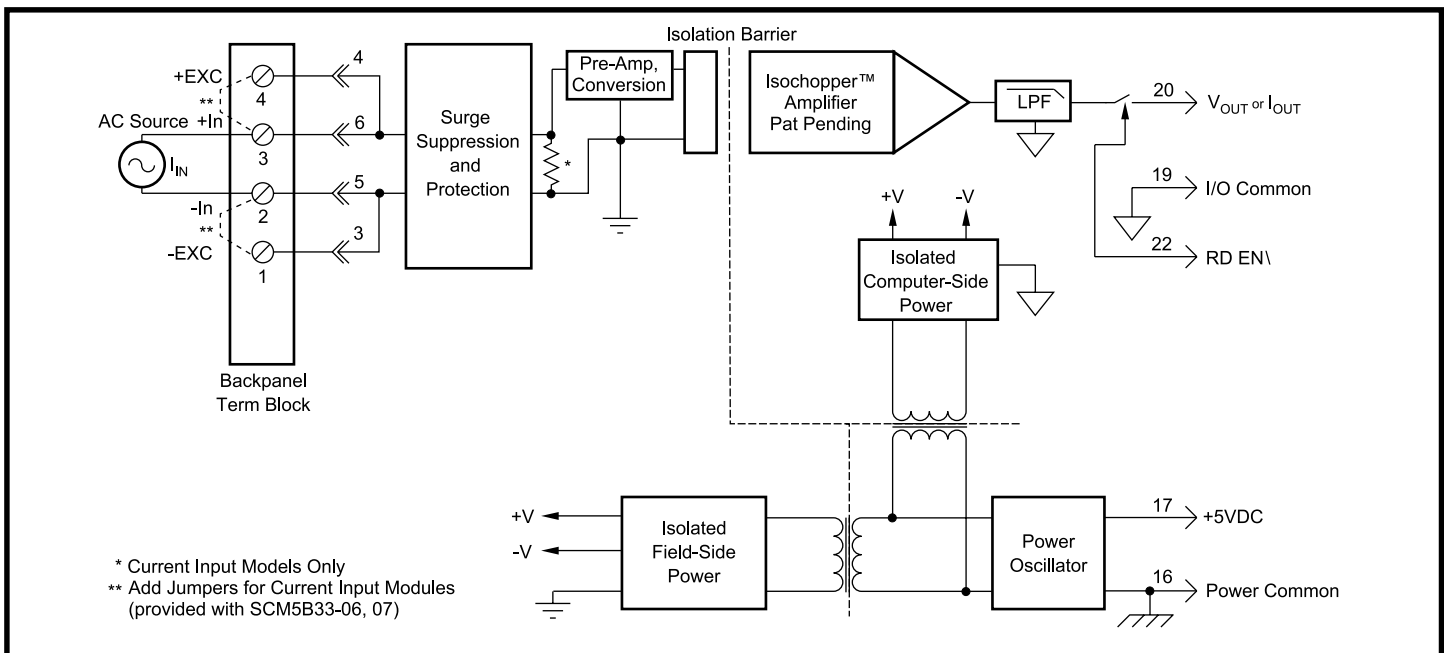


Figure 1: SCM5B33 Block Diagram

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

Module	SCM5B33
<b>Input</b>	
Signal Range	100mV to 300Vrms, 0 to 5Arms
Standard Frequency Range	45Hz to 1000Hz
Extended Frequency Range	1kHz to 20kHz
Impedance	1 M $\Omega$ $\pm$ 1% shunted by 100pF (-01 thru -05), 0.10 $\Omega$ (-06), 0.025 $\Omega$ (-07)
<b>Coupling Protection<sup>(1)</sup></b>	AC
Continuous (-01 thru -05)	300Vrms
Continuous (-06 thru -07)	10Arms
Transient (-01 thru -05)	ANSI/IEEE C37.90.1
Transient (-06 thru -07)	See note 2
<b>Output</b>	
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), 8mA (0-5, 0-10V models)
Voltage Limit	$\pm$ 18V (0-5, 0-10V models)
Resistance	50 $\Omega$ (0-5, 0-10V models)
Protection	Continuous Short to Ground
Ripple and Noise (100kHz)	0.025% Span rms
<b>Accuracy<sup>(3)(4)</sup></b>	
Sinusoid	
50/60 Hz	$\pm$ 0.25% Span
45Hz to 1kHz	$\pm$ 0.25% Reading Additional Factor
1kHz to 20kHz	$\pm$ 0.75% Reading Additional Factor
Non-Sinusoid	
Crest Factor = 1 to 2	$\pm$ 0.05% Reading Additional Error
Crest Factor = 2 to 3	$\pm$ 0.15% Reading Additional Error
Crest Factor = 3 to 4	$\pm$ 0.30% Reading Additional Error
Crest Factor = 4 to 5	$\pm$ 0.40% Reading Additional Error
Vs. Temperature	$\pm$ 100ppm/ $^\circ\text{C}$
<b>Isolation (Common Mode)</b>	
Input to Output, Input to Power	1500Vrms max
Continuous	ANSI/IEEE C37.90.1
Transient	
Output to Power	50VDC max
Continuous	
Rejection (50-60Hz Common Mode)	100dB
Response Time (0 to 99%)	<400ms
<b>Output Enable Control</b>	
Selection Time	6.0 $\mu\text{s}$ at $C_{\text{LOAD}} = 0$ to 2000pF
Voltage	
Max Logic "0"	+0.8V
Min/Max Logic "1"	+2.4V/+36V
Current "0,1"	0.5 $\mu\text{A}$
<b>Loop Voltage</b>	+4.2VDC min, +26VDC max, -40 $^\circ\text{C}$ to +85 $^\circ\text{C}$
Load Resistance (maximum)	(Loop Voltage - 4.2) / (Loop Current)
<b>Supply Voltage</b>	+5VDC $\pm$ 5%
Current	120mA
Sensitivity	$\pm$ 200ppm/%
<b>Environmental</b>	
Operating Temp. Range	-40 $^\circ\text{C}$ to +85 $^\circ\text{C}$
ATEX Group II, Category 3	-20 $^\circ\text{C}$ to +40 $^\circ\text{C}$
Storage Temp. 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, Surge, Voltage Dips	Performance B
Dimensions (h)(w)(d)	2.28" x 2.26" x 0.60" (58mm x 57mm x 15mm)

**NOTES:**

(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 C-37.90.1 applies with a 0.05 $\Omega$  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	0-100mV	0-5V
SCM5B33-02	0-1V	0-5V
SCM5B33-03	0-10V	0-5V
SCM5B33-04	0-150V	0-5V
SCM5B33-05	0-300V	0-5V
SCM5B33-06	0-1A	0-5V
SCM5B33-07	0-5A	0-5V
SCM5B33-01B	0-100mV	0-1mA
SCM5B33-02B	0-1V	0-1mA
SCM5B33-03B	0-10V	0-1mA
SCM5B33-04B	0-150V	0-1mA
SCM5B33-05B	0-300V	0-1mA
SCM5B33-06B	0-1A	0-1mA
SCM5B33-07B	0-5A	0-1mA
SCM5B33-01C	0-100mV	4-20mA
SCM5B33-02C	0-1V	4-20mA
SCM5B33-03C	0-10V	4-20mA
SCM5B33-04C	0-150V	4-20mA
SCM5B33-05C	0-300V	4-20mA
SCM5B33-06C	0-1A	4-20mA
SCM5B33-07C	0-5A	4-20mA
SCM5B33-01D	0-100mV	0-10V
SCM5B33-02D	0-1V	0-10V
SCM5B33-03D	0-10V	0-10V
SCM5B33-04D	0-150V	0-10V
SCM5B33-05D	0-300V	0-10V
SCM5B33-06D	0-1A	0-10V
SCM5B33-07D	0-5A	0-10V
SCM5B33-01E	0-100mV	0-20mA
SCM5B33-02E	0-1V	0-20mA
SCM5B33-03E	0-10V	0-20mA
SCM5B33-04E	0-150V	0-20mA
SCM5B33-05E	0-300V	0-20mA
SCM5B33-06E	0-1A	0-20mA
SCM5B33-07E	0-5A	0-20mA

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

**†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 10-100% rated span. Add 0.25% accuracy error (-02 thru -07) or 1.00% accuracy error (-01) for 0-10% Span measurements. Accuracy includes nonlinearity, hysteresis and repeatability but not source or external shunt inaccuracy (if used).