

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

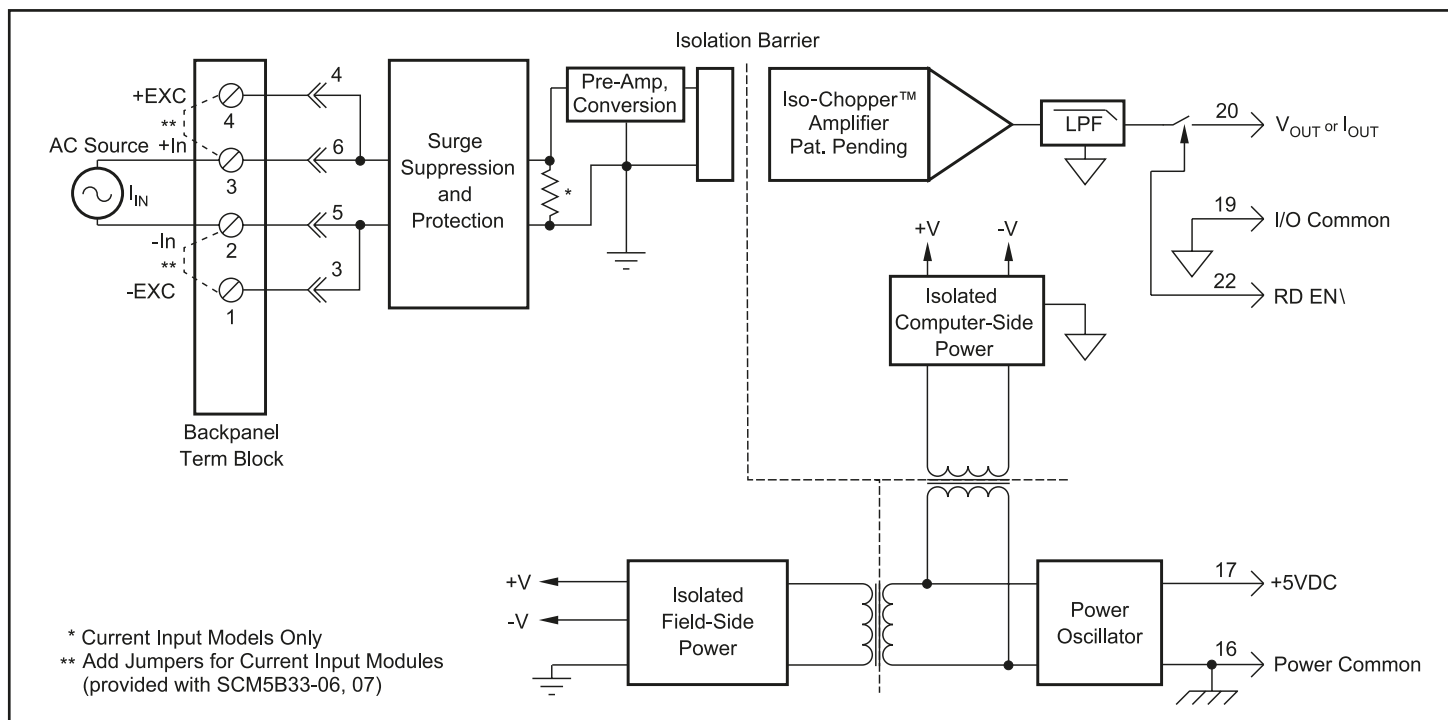


Figure 1: SCM5B33 Block Diagram

Specifications

Typical* at T_A = +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), 0.10Ω (-06), 0.025Ω (-07) AC
Coupling	350Vrms
Protection ⁽¹⁾	10Arms
Continuous (-01 thru -05)	ANSI/IEEE C37.90.1
Continuous (-06 thru -07)	See note 2
Transient (-01 thru -05)	
Transient (-06 thru -07)	
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), 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) ⁽³⁾⁽⁴⁾	
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
Continuous	ANSI/IEEE C37.90.1
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 _{load} = 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) [†]	Output (DC) [†]
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

[†] 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 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).