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 below).

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.

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, ±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.

FEATURES

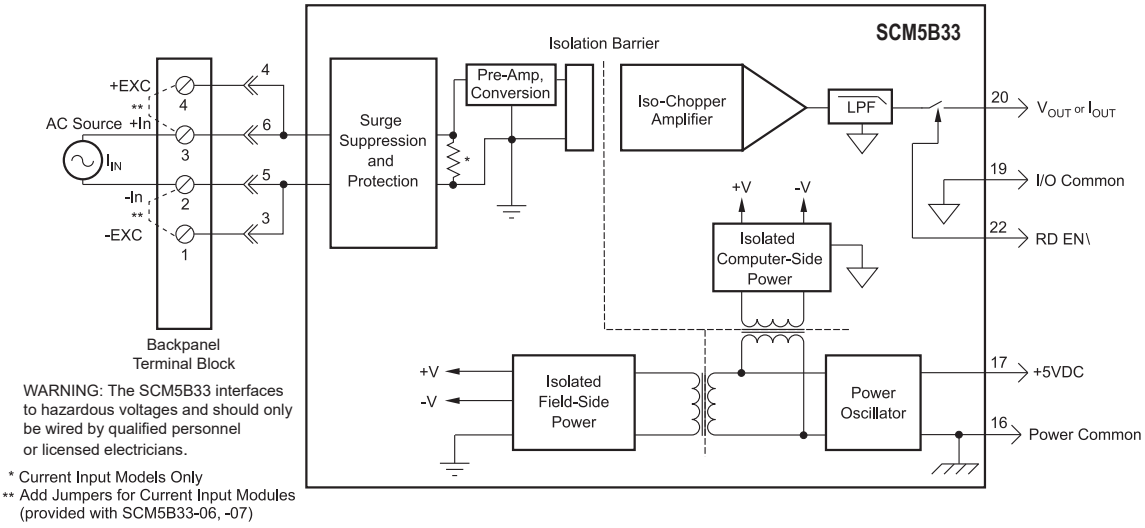
- Interfaces RMS Voltage (0-300V) or RMS Current (0-5A)
- Designed for Standard Operation with Frequencies of 45Hz to 1000Hz (Extended Range to 20kHz)
- Compatible with Standard Current and Potential Transformers
- Industry Standard Outputs: 0-1mA, 0-20mA, 4-20mA, 0-5V or 0-10VDC
- ±0.25% Factory Calibrated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



SCM5B33 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	SCM5B33
Input	
Signal Range	100mV to 300Vrms, 0 to 5Arms
Standard Frequency Range	45Hz to 1000Hz
Extended Frequency Range	1kHz to 20kHz
Impedance	1MΩ shunted by 100pF (-01 thru -05), 0.10Ω (-06), 0.025Ω (-07)
Coupling	AC
Protection(1)	
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), 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	
Continuous	1500Vrms (max)
Transient	ANSI/IEEE C37.90.1
Output to Power	
Continuous	50VDC (max)
Rejection (50-60Hz Common Mode)	100dB
Response Time (0 to 99%)	<400ms
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 (max)	(Loop Voltage - 4.2V) / (Loop Current)
Supply Voltage	+5VDC ±5%
Current	120mA
Sensitivity	±200ppm/%
Mechanical Dimensions (h)x(w)x(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

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-1mA
SCM5B33-02B	0V to 1V	0mA-1mA
SCM5B33-03B	0V to 10V	0mA-1mA
SCM5B33-04B	0V to 150V	0mA-1mA
SCM5B33-05B	0V to 300V	0mA-1mA
SCM5B33-06B	0A to 1A	0mA-1mA
SCM5B33-07B	0A to 5A	0mA-1mA
SCM5B33-01C	0mV to 100mV	4-20mA
SCM5B33-02C	0V to 1V	4-20mA
SCM5B33-03C	0V to 10V	4-20mA
SCM5B33-04C	0V to 150V	4-20mA
SCM5B33-05C	0V to 300V	4-20mA
SCM5B33-06C	0A to 1A	4-20mA
SCM5B33-07C	0A to 5A	4-20mA
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	0-20mA
SCM5B33-02E	0V to 1V	0-20mA
SCM5B33-03E	0V to 10V	0-20mA
SCM5B33-04E	0V to 150V	0-20mA
SCM5B33-05E	0V to 300V	0-20mA
SCM5B33-06E	0A to 1A	0-20mA
SCM5B33-07E	0A to 5A	0-20mA

NOTES:
*Contact factory 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 √ 2500 / (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.
(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 thru -07) or 1.00% accuracy error (-01). Accuracy includes linearity, hysteresis and repeatability but not source or external shunt inaccuracy (if used).

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