

## Isolated, Digital Output, Power Monitoring IC with Zero-Crossing Detection, Overcurrent and Overvoltage Flagging

### FEATURES AND BENEFITS

- Accurate power monitoring for AC and DC applications
- UL 60950-1 (ed. 2) and UL 62368-1 (ed. 1) certified for reinforced isolation up to 517 V<sub>RMS</sub> in a single package
- Accurate measurements of active, reactive, and apparent power, as well as power factor
- Separate RMS and instantaneous measurements for both voltage and current channels
- Two programmable averaging blocks
- 0.85 mΩ primary conductor resistance for low power loss and high inrush current withstand capability
- Compatible with floating and non-floating GND
- Dedicated voltage or current zero crossing pin
- Fast, user-programmable overcurrent fault pin (5 μs typ.)
- User-programmable undervoltage and overvoltage RMS thresholds
- 1 kHz bandwidth
- Current sensing range up to 90 A
- Options for I<sup>2</sup>C or SPI digital interface protocols

### DESCRIPTION

The Allegro ACS37800 power monitoring IC greatly simplifies the addition of power monitoring to many AC or DC powered systems. The sensor may be powered from the same supply as the system's MCU, eliminating the need for multiple power supplies. The device's construction includes a copper conduction path that generates a magnetic field proportional to applied current. The magnetic field is sensed differentially to reject errors introduced by common mode fields.

Allegro's Hall-effect-based, galvanically isolated current sensing technology achieves reinforced isolation ratings (4800 V<sub>RMS</sub>) in a small PCB footprint. These features enable isolated current sensing without expensive Rogowski coils, oversized current transformers, isolated operational amplifiers, or the power loss of shunt resistors.

The ACS37800 power monitoring IC offers key power measurement parameters that can easily be accessed through its SPI or I<sup>2</sup>C digital protocol interfaces. Dedicated and configurable I/O pins for voltage/current zero crossing, undervoltage and overvoltage reporting, and fast overcurrent fault detection are available in I<sup>2</sup>C mode. User configuration of the IC is available through on-chip EEPROM.

The ACS37800 is provided in a small low-profile surface mount SOIC16 wide-body package, is lead (Pb) free, and is fully calibrated prior to shipment from the Allegro factory. Customer calibration can further increase accuracy in application.

### PACKAGE

16-pin SOICW (suffix MA)



Not to scale



CB Certificate Number:  
US-32210-M1-UL  
US-36315-UL

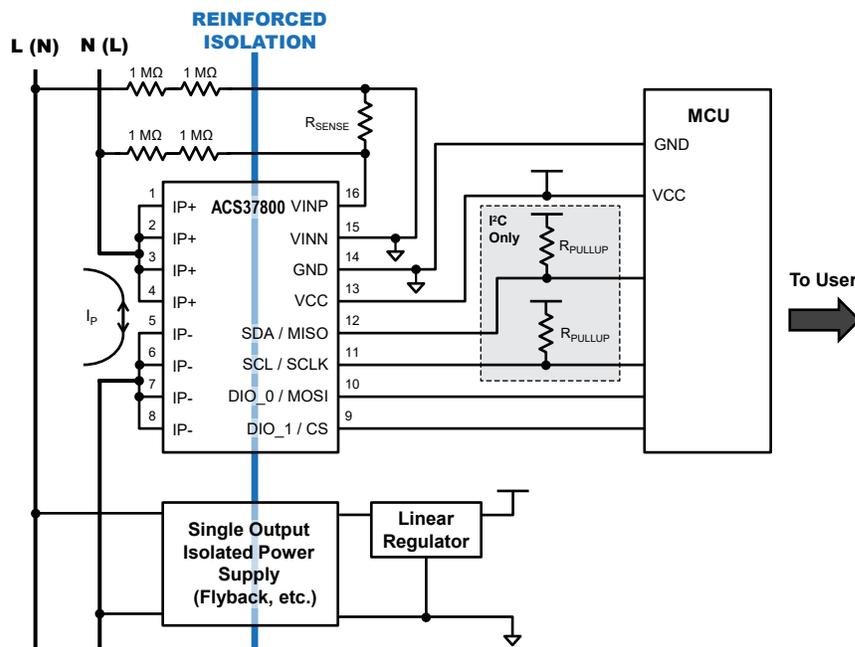


Figure 1: Typical Application

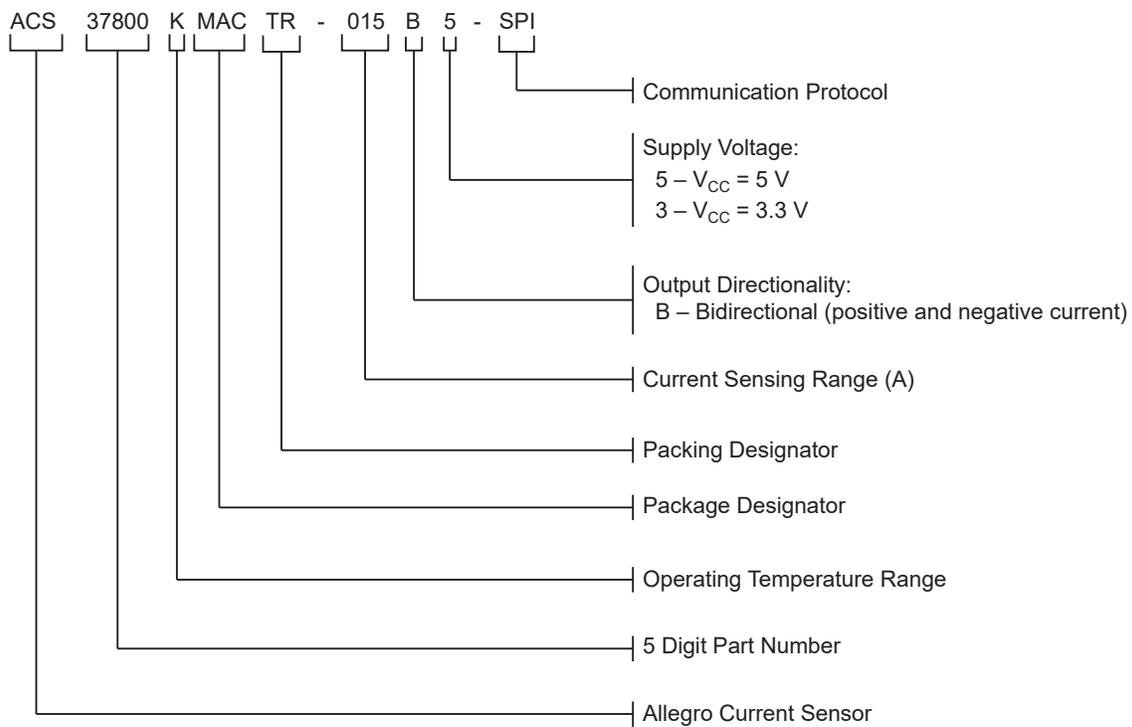
# ACS37800

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### SELECTION GUIDE

Part Number	V <sub>CC(typ)</sub> (V)	I <sub>PR</sub> (A)	Communication Protocol	T <sub>A</sub> (°C)	Packing [1]
ACS37800KMACTR-015B5-SPI	5	±15	SPI	-40 to 125	Tape and reel, 1000 pieces per reel, 3000 pieces per box
ACS37800KMACTR-030B3-SPI	3.3	±30			
ACS37800KMACTR-030B3-I2C	3.3	±30	I2C		
ACS37800KMACTR-090B3-I2C	3.3	±90			

[1] Contact Allegro for additional packing options.



### ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Notes	Rating	Units
Supply Voltage	$V_{CC}$		6.5	V
Reverse Supply Voltage	$V_{RCC}$		-0.5	V
Input Voltage	$V_{INP}, V_{INN}$		$V_{CC} + 0.5$	V
Reverse Input Voltage	$V_{RNP}, V_{RNN}$		-0.5	V
Digital I/O Voltage	$V_{DIO}$	SPI, I <sup>2</sup> C, and general purpose I/O	6	V
Reverse Digital I/O Voltage	$V_{RDIO}$		-0.5	V
Maximum Continuous Current	$I_{CMAX}$	$T_A = 25^\circ\text{C}$	60	A
Operating Ambient Temperature	$T_A$	Range K	-40 to 125	$^\circ\text{C}$
Junction Temperature	$T_{J(max)}$		165	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-65 to 170	$^\circ\text{C}$

### ISOLATION CHARACTERISTICS

Characteristic	Symbol	Notes	Rating	Unit
Dielectric Strength Test Voltage	$V_{ISO}$	Agency type-tested for 60 seconds per UL 60950-1 (edition 2) and UL 62368-1 (edition 1); Production tested at 3000 $V_{RMS}$ for 1 second, in accordance with UL 60950-1 (edition 2) and UL 62368-1 (edition 1)	4800	$V_{RMS}$
Working Voltage for Basic Isolation	$V_{WVBI}$	Maximum approved working voltage for basic (single) isolation according to UL 60950-1 (edition 2) and UL 62368-1 (edition 1)	1480	$V_{PK}$ or VDC
			1047	$V_{RMS}$
Working Voltage for Reinforced Isolation	$V_{WVRI}$	Maximum approved working voltage for reinforced isolation according to UL 60950-1 (edition 2) and UL 62368-1 (edition 1)	730	$V_{PK}$ or VDC
			517	$V_{RMS}$
Clearance	$D_{cl}$	Minimum distance through air from IP leads to signal leads	7.5	mm
Creepage	$D_{cr}$	Minimum distance along package body from IP leads to signal leads	7.9	mm
Distance Through Insulation	DTI	Minimum internal distance through insulation	90	$\mu\text{m}$
Comparative Tracking Index	CTI	Material Group II	400 to 599	V

### ESD RATINGS

Characteristic	Symbol	Notes	Value	Unit
Human Body Model	$V_{HBM}$	Per JEDEC JS-001	$\pm 5$	kV
Charged Device Model	$V_{CDM}$	Per JEDEC JS-002	$\pm 1$	kV

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Test Conditions [1]	Value	Units
Package Thermal Resistance (Junction to Ambient)	$R_{\theta JA}$	Mounted on the Allegro ASEK37800 evaluation board with 750 mm <sup>2</sup> of 4 oz. copper on each side, connected to pins 1 and 2, and to pins 3 and 4, with thermal vias connecting the layers. Performance values include the power consumed by the PCB.	23	$^\circ\text{C}/\text{W}$
Package Thermal Resistance (Junction to Lead)	$R_{\theta JL}$	Mounted on the Allegro ACS37800 evaluation board.	5	$^\circ\text{C}/\text{W}$

[1] Refer to the Thermal Performance section below.

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