

## Coreless, High Precision, Hall-Effect Current Sensor IC with Common-Mode Field Rejection, Overcurrent and Overtemperature Detection

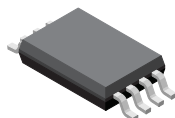
### FEATURES AND BENEFITS

- Eliminates need for concentrator core or shield
- Contactless, lossless, non-invasive current sensing
- Suited for applications where current flows through busbar or PCB
- High operating bandwidth: DC to 250 kHz
- Overcurrent (OCF) and Overtemperature (OTF) detection on Fault Pin
- Differential Hall sensing rejects common-mode magnetic fields
- Very fast response time ( $<2 \mu\text{s}$  typ)
- Very wide sensing range (2.5 to 60 mV/G)
  - Ideal for sensing currents from 100 A to  $>4000$  A
- Factory-programmed segmented linear temperature compensation (TC) provides low thermal drift
  - Sensitivity  $\pm 1\%$  (typ)
  - Offset  $\pm 3$  mV (typ)
- Customer-programmable, high-resolution offset and sensitivity trim
- Wide Hall elements spacing for improved SNR and thermal performance
- Ultra-sensitive Hall elements for improved noise performance

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### PACKAGE:

8-pin TSSOP package (suffix LU)



*Not to scale*

### DESCRIPTION

The Allegro ACS37610 current sensor IC enables low-cost solutions for AC and DC current sensing without the need for an external field concentrator core or a U-shaped magnetic shield. It is designed for applications where hundreds or thousands of amps flow through a busbar or PCB.

Current flowing through a busbar or PCB trace generates a magnetic field that is sensed by the monolithic, low-offset, linear Hall IC. The differential sensing topology virtually eliminates all types of errors due to common-mode stray magnetic fields. The wide spacing between the differential Hall elements (2.5 mm) coupled with the increased sensitivity of each Hall element enables the ACS37610 to achieve superior signal to noise (SNR) and improved resolution. While not mandatory, a notch or slit in the current-carrying busbar or PCB copper trace provides further improvements to the system's SNR. High isolation is achieved via the no-contact nature of this simple assembly.

The ACS37610 is offered in 150 kHz and 250 kHz bandwidth options as well as regular and low-power mode enabling customers to achieve optimal SNR, response time, and power consumption. A dedicated user-programmable overcurrent and overtemperature fault pin, and a slew of built-in diagnostics,

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### TYPICAL APPLICATIONS

- High voltage traction motor inverter
- 48 V / 12 V auxiliary inverter
- Heterogeneous redundant battery monitoring
- Overcurrent detection
- DC/DC converter
- Smart fuse
- Power distribution unit (PDU)
- Power supply

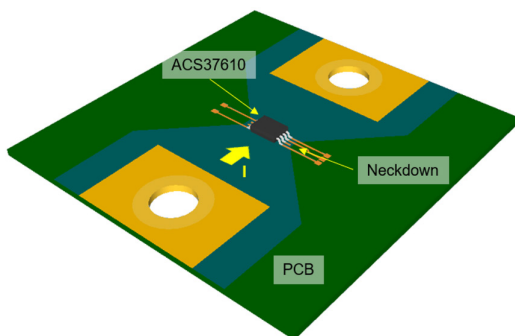


Figure 1: Current Through PCB

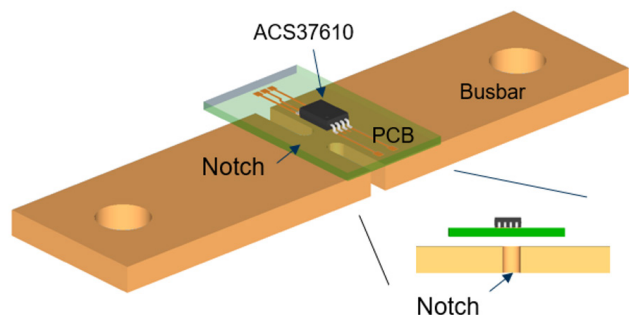


Figure 2: Current Through Busbar

### FEATURES AND BENEFITS (continued)

- Wide ambient temperature range:  $-40^{\circ}\text{C}$  to  $150^{\circ}\text{C}$
- 3.3 or 5.0 V single supply operation
- Programmable through Output pin or through dedicated Programming pin for easier device programming
- AEC-Q100 Grade 0, automotive qualified
- Monolithic Hall IC for high reliability
- Surface mount, small footprint, low-profile TSSOP8 package

### DESCRIPTION (continued)

including broken ground and VCC detection, make it ideal for safety-critical applications. The accuracy and flexibility of this device is enhanced by user programmability, performed via the output pin or through the dedicated programming pin, which allows the device to be optimized in the application and cancels errors due to mechanical assembly tolerances on the PCB. Device specifications apply across an extended ambient temperature range:  $-40^{\circ}\text{C}$  to  $150^{\circ}\text{C}$ .

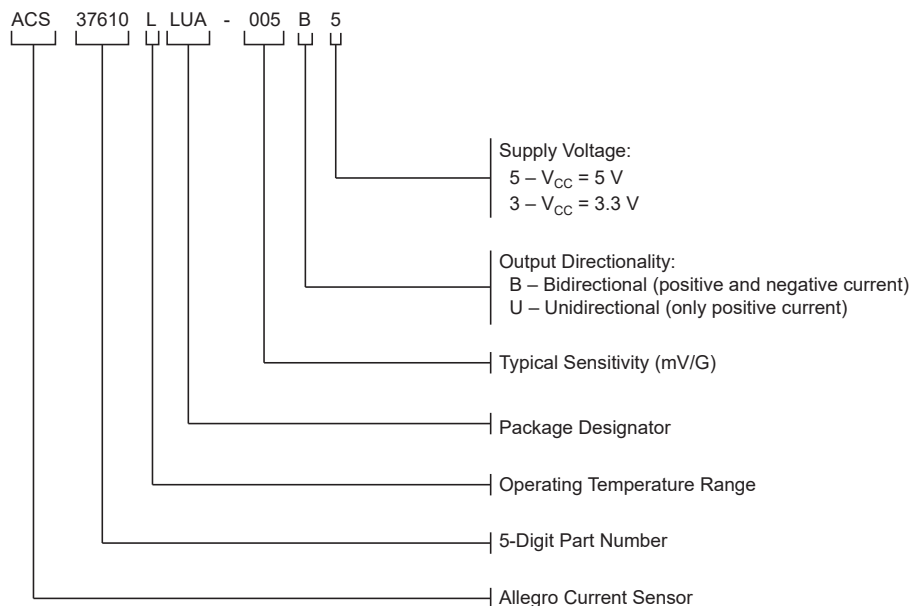
The ACS37610 is suitable for space-constrained applications because of its low-profile 8-pin surface mount TSSOP package (thin-shrink small outline package, suffix LU) that is lead (Pb) free, with 100% matte tin leadframe plating. The sensor can be mounted in a horizontal or vertical orientation relative to the busbar, providing superior flexibility in mechanical assemblies.

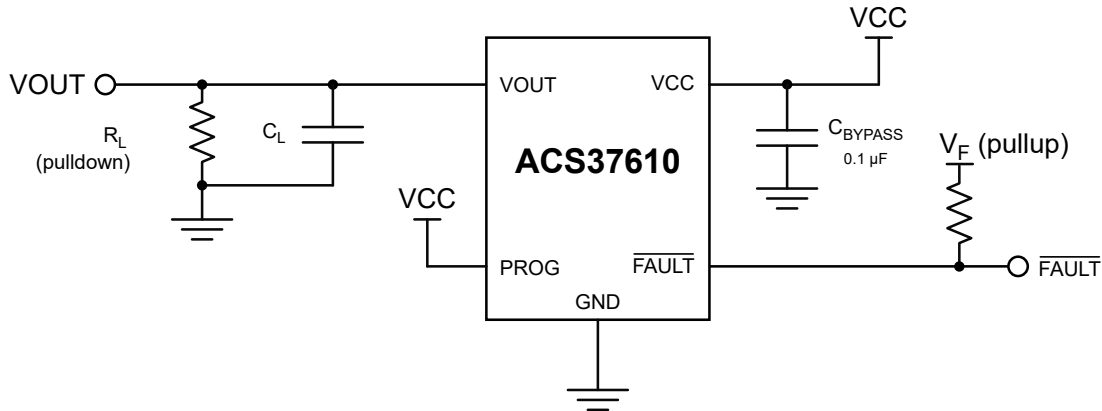
### SELECTION GUIDE

Part Number	Nominal Supply Voltage (V)	Differential Magnetic Input Range, (G)	Sensitivity Sens (Typ.) (mV/G) <sup>[1]</sup>	T <sub>A</sub> (°C)	Packing <sup>[2]</sup>
ACS37610LLUA-005B5	5	$\pm 400$	5	-40 to 150	4000 pieces per 13-inch reel
ACS37610LLUA-010B5	5	$\pm 200$	10		
ACS37610LLUA-020B5	5	$\pm 100$	20		
ACS37610LLUA-020U5	5	0 to 200	20		
ACS37610LLUA-010B3	3.3	$\pm 132$	10		

<sup>[1]</sup> Measured at nominal supply voltage. Contact Allegro for other sensitivity options.

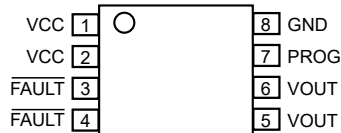
<sup>[2]</sup> Contact Allegro for additional packing options.





**Figure 3: Typical Application Circuit**

The ACS37610 outputs an analog signal,  $V_{OUT}$ , that varies linearly with the bidirectional AC or DC field sensed, within the range specified.  $C_L$  is for optimal noise management, with values that depend on the application.  $R_L$  is an optional pull-down to GND or pullup to VCC for broken wire detection. For broken GND function, it is recommended to tie PROG pin to VCC when not used.



**Figure 4: Pinout Diagram**

### Pinout List

Number	Name	Description
1,2	VCC	Input power supply; also used for programming
3,4	$\overline{\text{FAULT}}$	Fault output; overcurrent, overtemperature
5,6	VOUT	Analog output signal; also used for programming
7	PROG	Bidirectional programming pin
8	GND	Ground pin

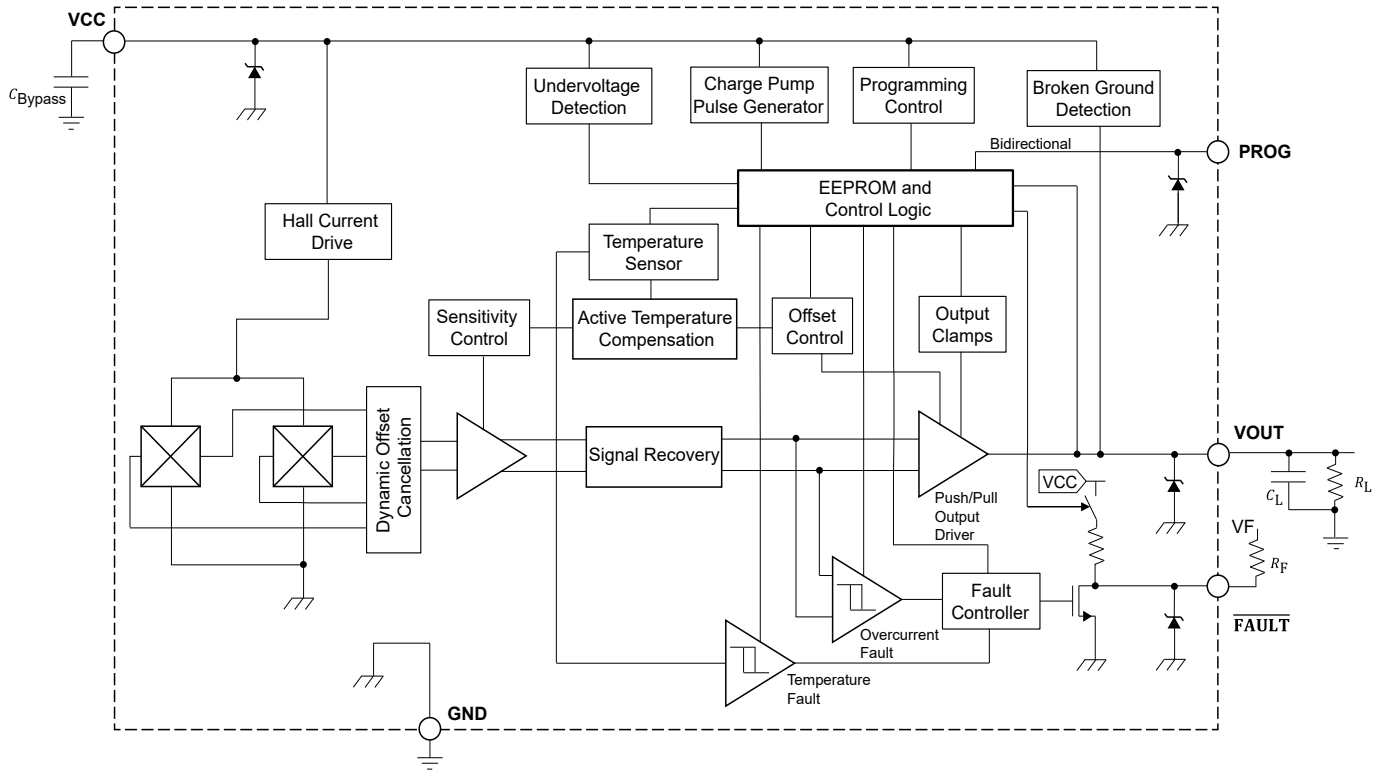


Figure 5: Functional Block Diagram

### Revision History

Number	Date	Description
–	March 22, 2021	Advance information

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