ASEK37610OK

ACS37610OK Evaluation Board User Guide

DESCRIPTION

This user guide documents the features, operation, and use of the ACS37610OK current sensor with the corresponding evaluation board. Allegro MicroSystems offers evaluation board units that offer a method for rapid evaluation of the Allegro current sensor in a lab environment, without the requirement for a custom circuit board.

The evaluation board is used to evaluate the functionality of the ACS37610OK, an economical and precise solution for AC and DC current sensing in busbar and high-current printed circuit board (PCB) applications. Applied current through a busbar or PCB generates a magnetic field that is sensed by the Hall integrated circuit (IC). The ACS37610OK outputs an analog signal that varies linearly with the field sensed within the range specified. Differential sensing topology virtually eliminates error from common-mode stray magnetic fields. High isolation is achieved via the noncontact nature of this assembly.

This guide includes a schematic of the ACS37610OK evaluation board (EVB), measurement and operation techniques, PCB layouts, and a bill of materials (BOM). The test equipment document (TED) and description of each board for which this document is applicable is listed in Table 1.

FEATURES

The evaluation board and programming board listed in Table 1 can be used for the evaluation of all gain options of the ACS37610OK, allowing for streamlined and fast evaluation of the device. The ACS37610 evaluation board features test points for ease of access to the device pins. The evaluation board is multilayered, which allows for improved thermal performance, better power distribution, and greater signal integrity.

EVALUATION BOARD CONTENTS

The ACS37610OK evaluation board consists of two layers, shown in the Layout section. An image of the complete evaluation board is shown in Figure 1. A detailed list of components is provided in the Bill of Materials (BOM) section.

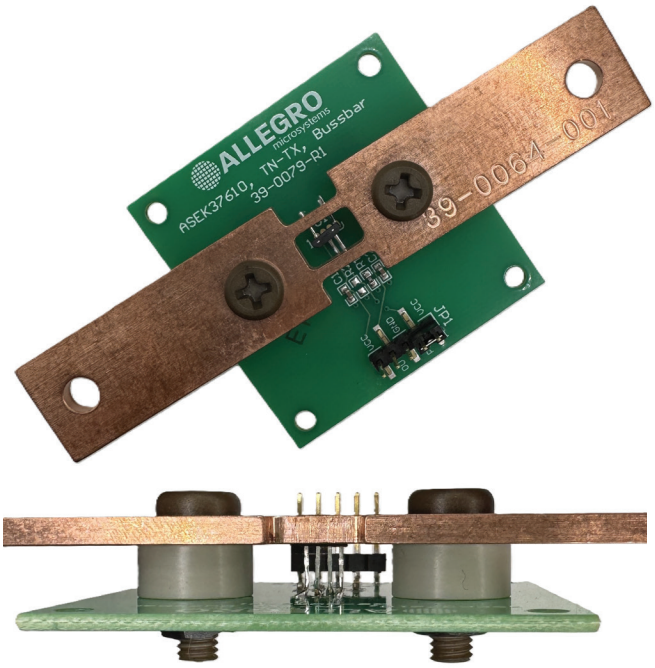

Figure 1: ACS37610OK Evaluation Board

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Table 1: Evaluation Board Configurations

Configuration Name	Internal Number	Sensing Method
ACSEVB-Busbar03-37610OK01	TED-0003140	PCB Sensing

USING THE EVALUATION BOARD

Evaluation Board Connections

NOTE: Board appearance varies by board configuration. Concepts remain applicable.

The supply voltage V_{CC} may be applied across the VCC and GND test points. The ACS37610 analog output V_{OUT} may be observed by attaching an oscilloscope probe or digital multimeter (DMM) to the OUT test point. The FAULT output may be observed by attaching an oscilloscope probe or DMM to the FAULT test point. These connections are shown on the ASEK37610 busbar evaluation board for reference, in Figure 2.

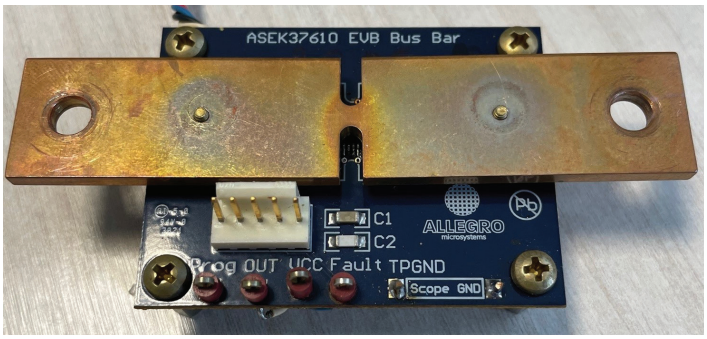

Figure 2: ASEK37610 Test-Point Connections

High current may be applied directly to the busbar using the current connection screws. The high-current connections are shown on the evaluation board for reference in Figure 3. If a busbar is not used and a PCB sensing ASEK37610 evaluation board is used, current connections are applied to banana jacks (I_IN and I_OUT) on the PCB.

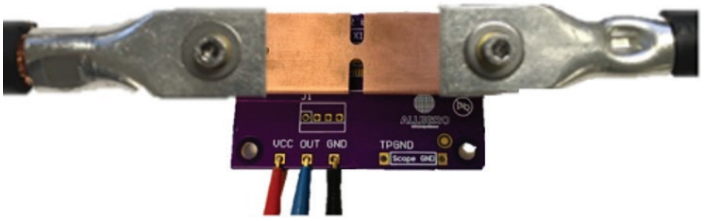

Figure 3: Primary Current Connections

Common Measurements

The ASEK37610 evaluation board is useful when measuring device characteristics such as quiescent output voltage, $V_{OUT(Q)}$, and sensitivity, sens.

To measure the ACS37610 quiescent output voltage, ensure the device is powered using the correct supply voltage, typically 3.3 V or 5 V. Using an oscilloscope to view the output waveform, or a multimeter to view the output voltage level, verify the VOUT pin on the evaluation board is $V_{CC}/2$ (for bidirectional devices) or $V_{CC}/10$ (for unidirectional devices). For example, in the case of a bidirectional output device with nominal V_{CC} = 5 V, verify that $V_{OUT(Q)}$ = 2.5 V.

To measure device sensitivity, first ensure the evaluation board is powered using the VCC and GND test points. After confirming that the device is powered, measure the device quiescent output voltage. To do so, apply a known current (I_P) to the device and measure the device output. To calculate device sensitivity, use:

Equation 1—Measured Sensitivity Calculation:

$$\text{sens}\left[\frac{\text{mV}}{A}\right] = \frac{V_{OUT}[\text{V}] - V_{OUT(Q)}[\text{V}]}{\text{IP}[\text{A}]} \times 1000$$

Calculating Full-Scale Current Range Using CF and IC Sensitivity

The ACS37610 is currently offered in several different gain selections: 5 mV/G, 10 mV/G, or 20 mV/G. The full-scale current-sensing range of the device depends on the sensitivity of the sensor and the design of the reference busbar or PCB. To calculate the maximum current-sensing range, the coupling factor (CF) and IC sensitivity must be known. For example, for the case of a coupling factor of 0.21 G/A, device sensitivity of 10 mV/G, and desired output voltage swing of 2000 mV, the maximum current sensing range is calculated as:

Equation 2—Full-Scale Current Calculation:

$$2000\ \text{mV} \times \frac{\text{G}}{10\ \text{mV}} \times \frac{\text{A}}{0.21\ \text{G}} = 952\ \text{A}$$

For the example in Equation 2, the maximum current sensing range is 952 A.

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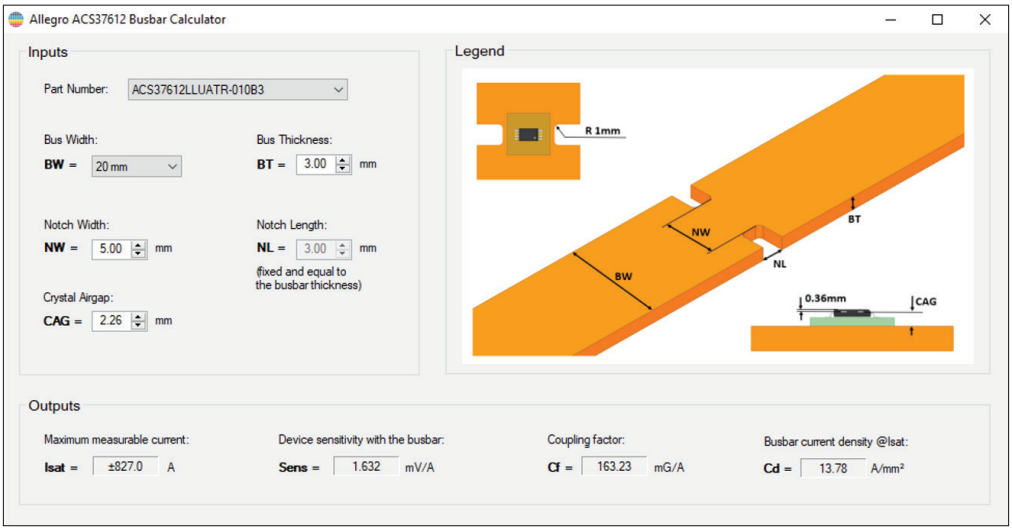
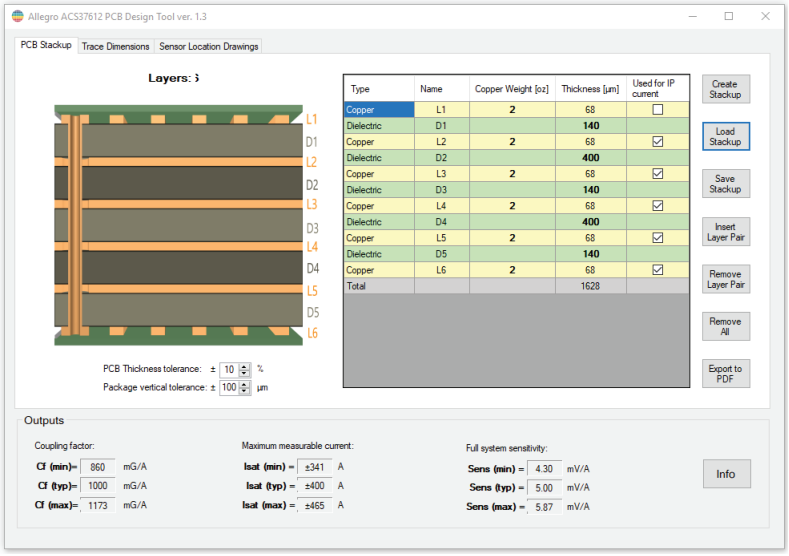
Busbar Design Recommendations, GUI

For busbar design recommendations, refer to the Allegro application note Guidelines for Designing a Busbar with Notch for Allegro's Coreless AS37612 Differential Current Sensor (https://www.allegromicro.com/-/media/allegro/allegromicro/files/application-notes/an296188-ACS37610-guidelines-for-designing-a-busbar-web.ashx), in conjunction with the Allegro interactive busbar design tool in the ACS37610 Samples Programmer on the ACS37610 webpage (https://allegromicro.com/en/products/sense/current-sensor-ics/sip-package-zero-to-thousand-amp-sensor-ics/ACS37610).



Inputs to the GUI include part number, bus width, bus thickness, notch width, and air gap.

For PCB sensing design recommendations, refer to the Coreless PCB Calculator, located in the Design Support Tools section of the ACS37610 webpage (https://allegromicro.com/en/products/sense/current-sensor-ics/sip-package-zero-to-thousand-amp-sensor-ics/ACS37610).



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SCHEMATIC

The ACS37610OK schematic is shown in Figure 4.

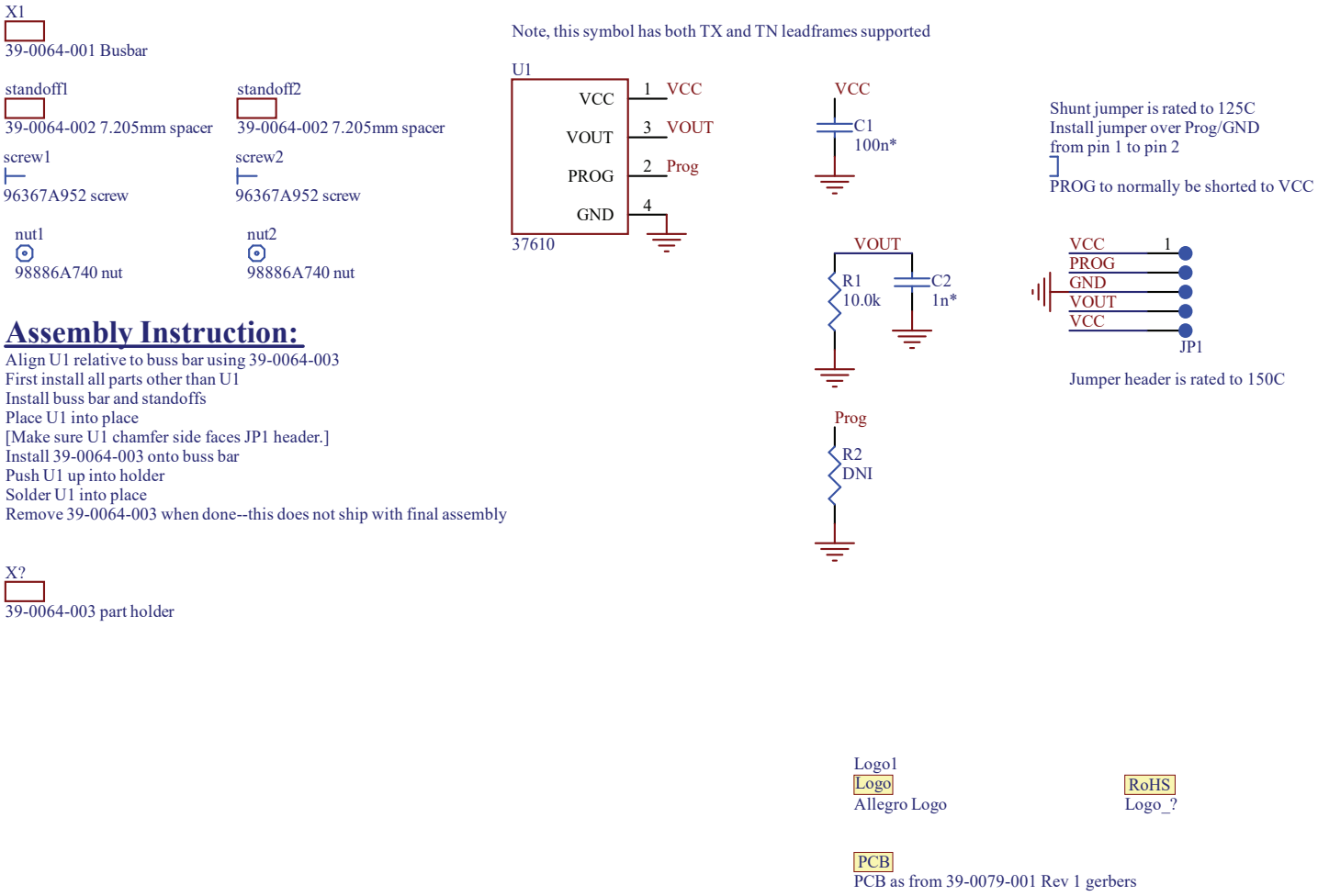

Figure 4: ACS37610OK Evaluation Board Schematic

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LAYOUT

The ACS37610OK evaluation board layout is shown in Figure 5.

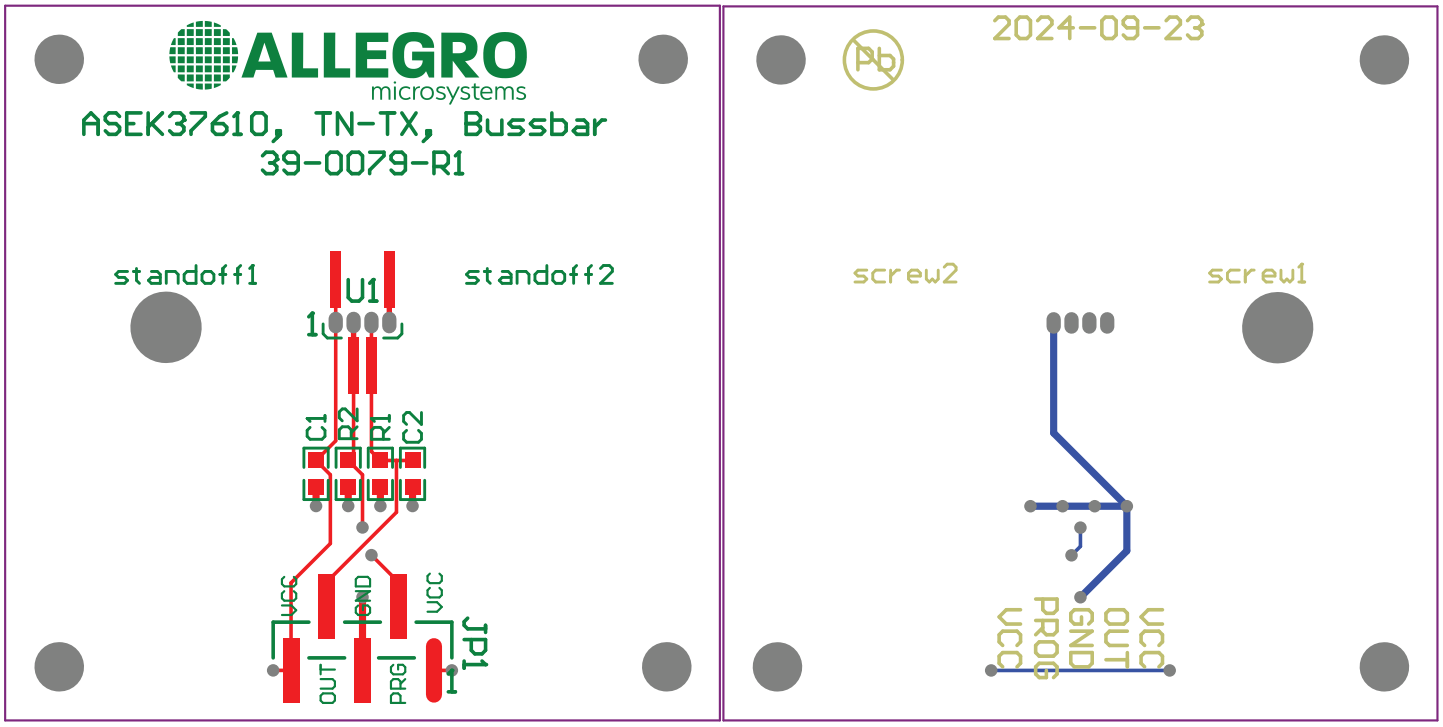

Figure 5: ACS37610OK Evaluation Board Layout, Top (Left) and Bottom (Right)

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BILL OF MATERIALS (BOM)

The ACS37610OK evaluation board bill of materials is shown in Table 2.

Table 2: ACS37610OK Evaluation Board Bill of Materials

Designator/PCB Label	Quantity	Description	Manufacturer	Manufacturer Part Number
X1	1	Busbar	Allegro	39-0064-001
U1	1	IC, SIP, sensor	Allegro	ACS37610LOKATN-010B5-C
standoff1, standoff2	2	Spacer, PEEK, 7.205 mm tall, M5 hole	Allegro	39-0064-002
C2	1	Capacitor, 0603, monolithic, 16 V, X8R, 150 °C rated, 1 nF	TDK	C1608X8R1H102K080AA
C1	1	Capacitor, 0603, monolithic, 16 V, X8R, 150 °C rated, 100 nF	Murata	GCM188L81H104KA57D
R1	1	Resistor, 0603, 100mW, thick film, 1%, 10.0 kΩ	Yageo	RC0603FR-0710KL
R2	1	Do not install		
screw1, screw2	2	Screw, high-strength high-temperature PEEK, M5 × 16 mm, 0.8 mm pitch	McMaster-Carr	96367A952
nut1, nut2	2	Nut, high-strength high-temperature PEEK, M5, 0.8 mm pitch	McMaster-Carr	98886A740
JS1	1	Jumper, 2-pin shunt, gold plating, 125 °C rated	Molex	90059-0013
JP1	1	Jumper, 5-pin male, gold plating, 150 °C rated	Sullins	GBC05SFBN-M30

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RELATED LINKS

- Product web page: https://www.allegromicro.com/en/products/sense/current-sensor-ics/field-current-sensors/acs37610

APPLICATION SUPPORT

- Application support web page: https://www.allegromicro.com/en/about-allegro/contact-us/technical-assistance
- Sales support web page: https://go.allegromicro.com/contact-sales

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Revision History

Number	Date	Description
–	September 23, 2025	Initial release

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