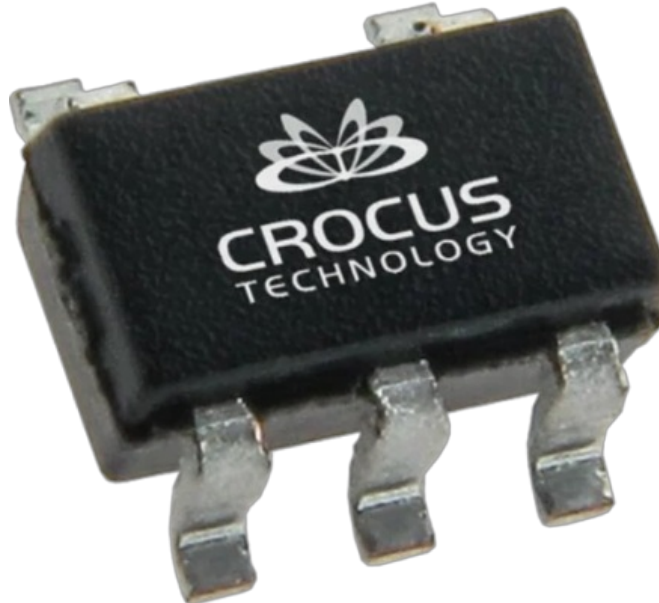


## ALLEGRO CT220 Linear Magnetic Sensor User Guide

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ALLEGRO CT220 Linear Magnetic Sensor User Guide



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## DESCRIPTION

The CTD221-BB-15 evaluation board is designed to demonstrate the current sensing capabilities of the CT220 linear magnetic sensor from Allegro Microsystems. The CT220 is a contactless current sensor based on XtremeSense™ tunnel magnetoresistance (TMR) technology. It features a full-bridge configuration comprising four TMR elements monolithically integrated with active CMOS circuitry, allowing it to have high resolution and low noise in a small-package footprint. This user guide describes how to connect and use the CTD221-BB-15 evaluation board.

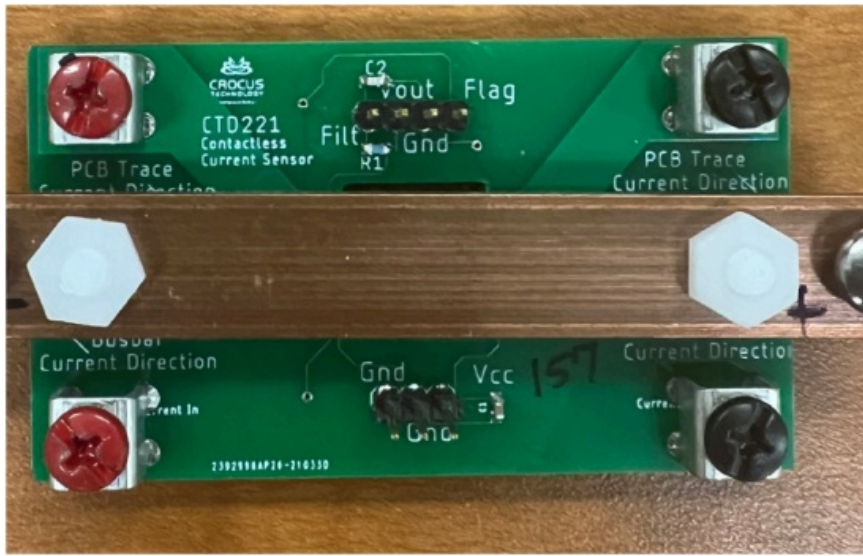
## FEATURES

- **Field range:**  $\pm 1.5$  mT
- **Gain:** 30 mV/V/mT
- 3 V to 5 V power supply

## EVALUATION BOARD CONTENTS

- CTD221-BB-15 evaluation board

**Figure 1: CTD221-BB-15 Evaluation Board**



**Table 1: CTD221-BB-15 Evaluation Board Configurations**

Configuration Name	Part Number	B-Field	Gain
CTD221-BB-15	CT220RMV-IS5	±15 mT	30 mV/V/mT

**Table 2: General Specifications**

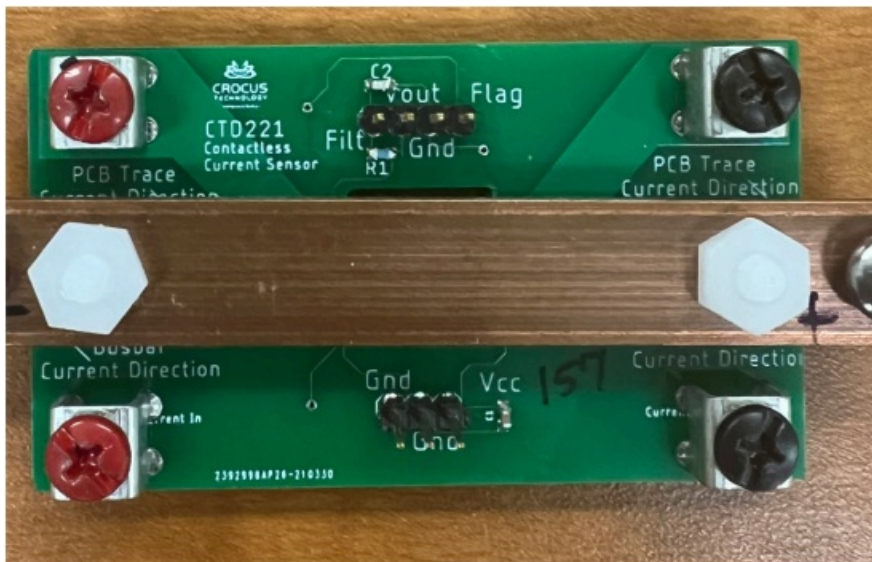
Specification	Min.	Typ.	Max.	Units
Input Operating Voltage	3	3.3	5	V
Cutoff Frequency (3 dB)	–	10	–	kHz
Operating Temperature	–40	–	85	°C

### USING THE EVALUATION BOARD

This section provides an overview of the connections and configuration options of the CTD221-BB-15 evaluation board. Each group of connections highlighted in Figure 2 has a detail section below. The product datasheet contains detailed information about the use and functionality of each pin and should be consulted for more-detailed information than is contained in this user guide.

The evaluation board is powered by connecting a DV bias voltage between the VCC and GND pins on the PCB. The OUT pin of the PCB should be connected to a digital voltmeter (DVM) or an oscilloscope to monitor the output of the CT220 current sensor. The data present in this section is for a 5 V bias voltage.

**Figure 2: CTD221-BB-15 Evaluation Board with Busbar**



## Low-Current Mode

In low-current mode, the current passes through a 0.9 mm-wide trace on the top layer of the PCB. This mode can be used to measure currents in the range of  $\pm 3.85$  A. Clearance between the trace and IC pads is 0.35 mm, which provides isolation of 1 kV between the current trace and the SOT23 pins. In addition to the excellent linearity across temperature, the high signal-to-noise ratio (SNR) of the CT220 enables it to measure extremely low currents.

## Medium-Current Mode

In medium-current mode, the current passes through a 2 mm wide trace on the bottom layer of the PCB. This wider trace (compared to low-current mode) allows for a larger current to be detected. This mode can be used to measure currents of  $\pm 10$  A, with the ability to resolve in 10 mA steps. The isolation of the CT220 for this configuration is 5.1 kVrms because the distance between the bottom trace and the SOT23 pins is 1.6 mm.

## High-Current Mode

The high-current mode is used for applications involving currents too large to pass through the PCB traces. In this mode, the current is passed through a copper busbar. The busbar is 1/2" wide and 1/16" thick. The user has the flexibility to adjust the distance of the busbar from the top surface of the PCB using plastic, temperature-resistant washers. The CTD221 evaluation board is shipped with spacers to maintain a 4 mm gap between the PCB and the busbar. With this configuration, the CTD221 can be used to measure currents in the full range of 50 A and to measure currents in the range of  $\pm 50$  A with a 50 mA resolution. With a spacing distance of 4 mm between the CT220 and the busbar, the isolation voltage exceeds 5.1 kVrms in the high-current mode.

## SCHEMATIC

The schematic of the CTD221-BB-15 evaluation board is shown in **Figure 3**.

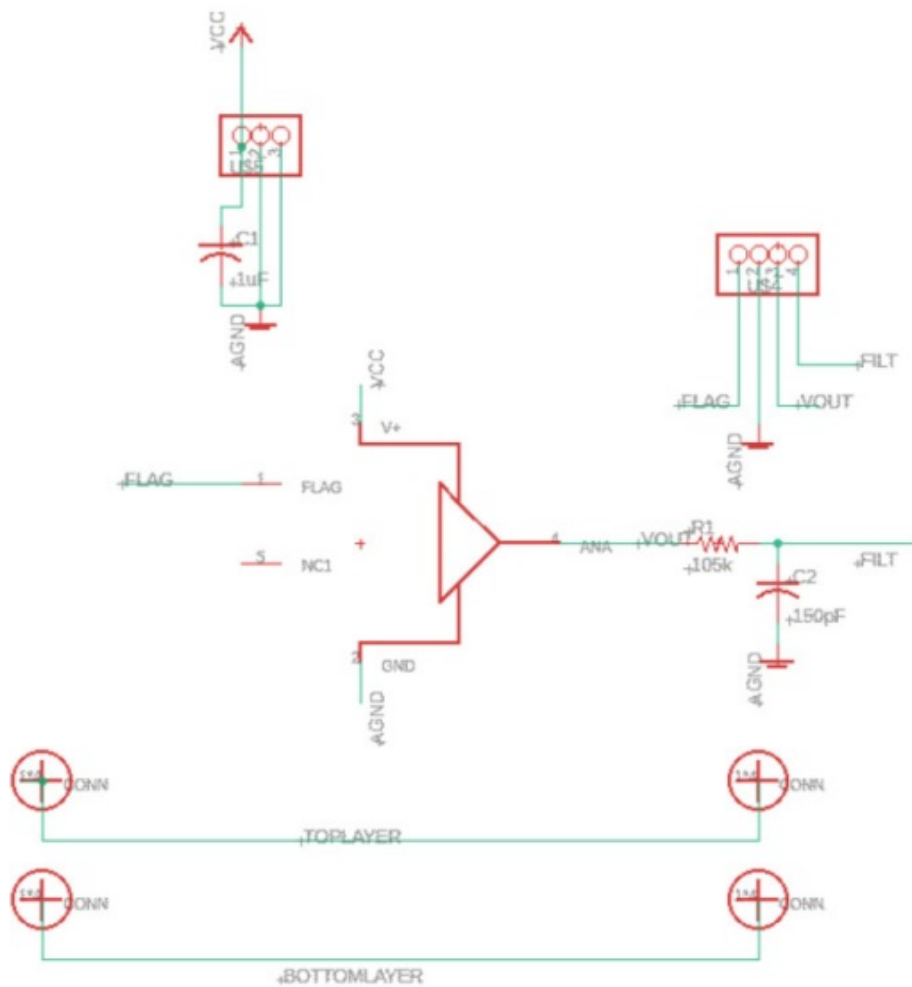


Figure 3: CTD221-BB-15 Evaluation Board Schematic

## LAYOUT

The top and bottom layers of the CTD221-BB-15 evaluation board are shown in **Figure 4** and **Figure 5**.

Figure 4: Top Layer

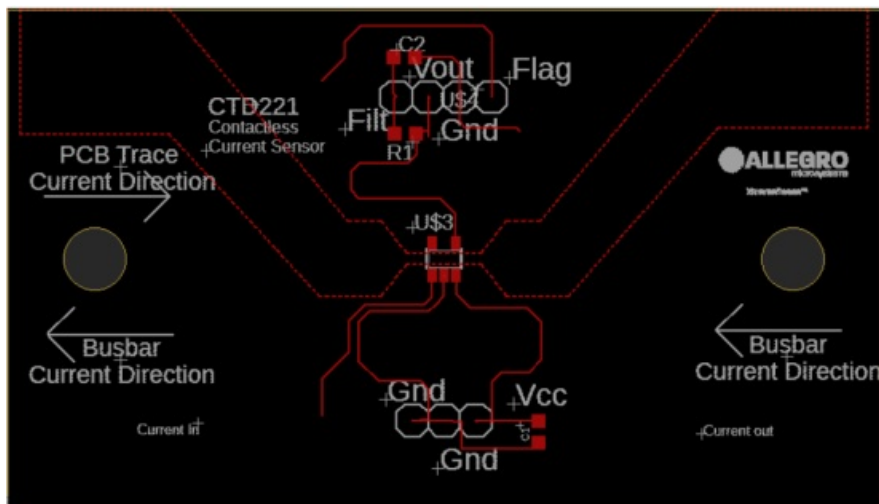
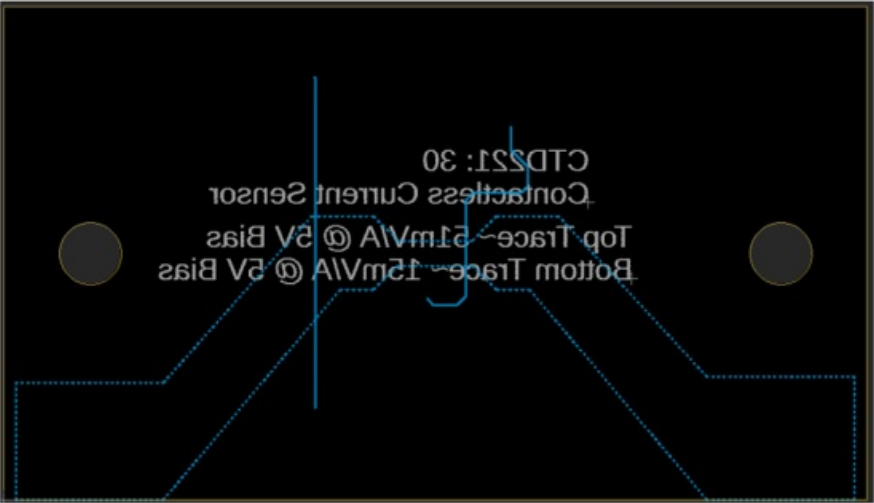


Figure 5: Bottom Layer



**BILL OF MATERIALS**

Table 3: CT220RMV-IS5 Version Evaluation Board Bill of Material

Designator	Quantity	Description	Manufacturer	Manufacturer Part Number
<b>ELECTRICAL COMPONENTS</b>				
–	1	CTD221-BB-15 EVA L PCB	Allegro Microsystems	–
U\$3	1	CT220 Sensor	Allegro Microsystems	–
FLAG, GND, VOUT, FILTER	1	Male Header Connectors	Samtec	TSW-104-07-F-S
GND, VCC	1	Male Header Connectors	Samtec	TSW-102-07-F-S
C1	1	Capacitor, Ceramic, 1.0 $\mu$ F, 25 V, 10% X7R 0603	TDK	MSAST168SB7105KTNA01
C2	1	Capacitor, Ceramic, 150 pF, 1 kV, 10% X5F 0603	Vishay	562R10TST15
R1	1	Resistor, 105 k $\Omega$ , 1/10 W, 1% 0603	Vishay	TNPW0603105KBEEA
<b>OTHER COMPONENTS</b>				
–	1	Busbar (1/2" width, 1/16" thick)	–	–
–	4	Connector Heads	Keystone Electronics	36-7701-ND
–	4	M3x6mm Metal Screws for Connector Heads	UXCell	fa15120300ux0251
–	2	Plastic High Temperature Screws for Busbar	Misumi	SPS-M5X15-C
–	2	Plastic High Temperature Nuts for Busbar	Misumi	SPS-M5-N
–	2	Plastic High Temperature Washers for Busbar	Misumi	SPS-6-W

## RELATED LINKS

CT220 Product Webpage:

<https://www.allegromicro.com/en/products/sense/current-sensor-ics/sip-package-zero-to-thousand-amp-sensor-ics/ct220>

## Revision History

Number	Date	Description
—	September 11, 2024	Initial release

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**Documents / Resources**

	<a href="#">ALLEGRO CT220 Linear Magnetic Sensor</a> [pdf] User Guide CTD221-BB-15, CT220RMV-IS5, CT220 Linear Magnetic Sensor, CT220, Linear Magnetic Sensor, Magnetic Sensor, Sensor
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**References**

- [User Manual](#)

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