

## CT220BMV-IS5 Evaluation Board User Guide

### DESCRIPTION

The CTD221-BB-1.5 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-1.5 evaluation board.

### FEATURES

- Field range:  $\pm 1.5$  mT
- Gain: 300 mV/V/mT
- 3 V to 5 V power supply

### EVALUATION BOARD CONTENTS

- CTD221-BB-1.5 evaluation board

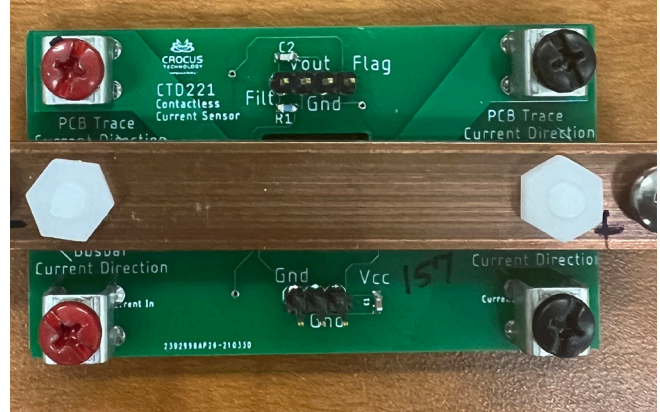


Figure 1: CTD221-BB-1.5 Evaluation Board

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Table 1: CTD221-BB-1.5 Evaluation Board Configurations

Configuration Name	Part Number	B-Field	Gain
CTD221-BB-1.5	CT220BMV-IS5	$\pm 1.5$ mT	300 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-1.5 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.

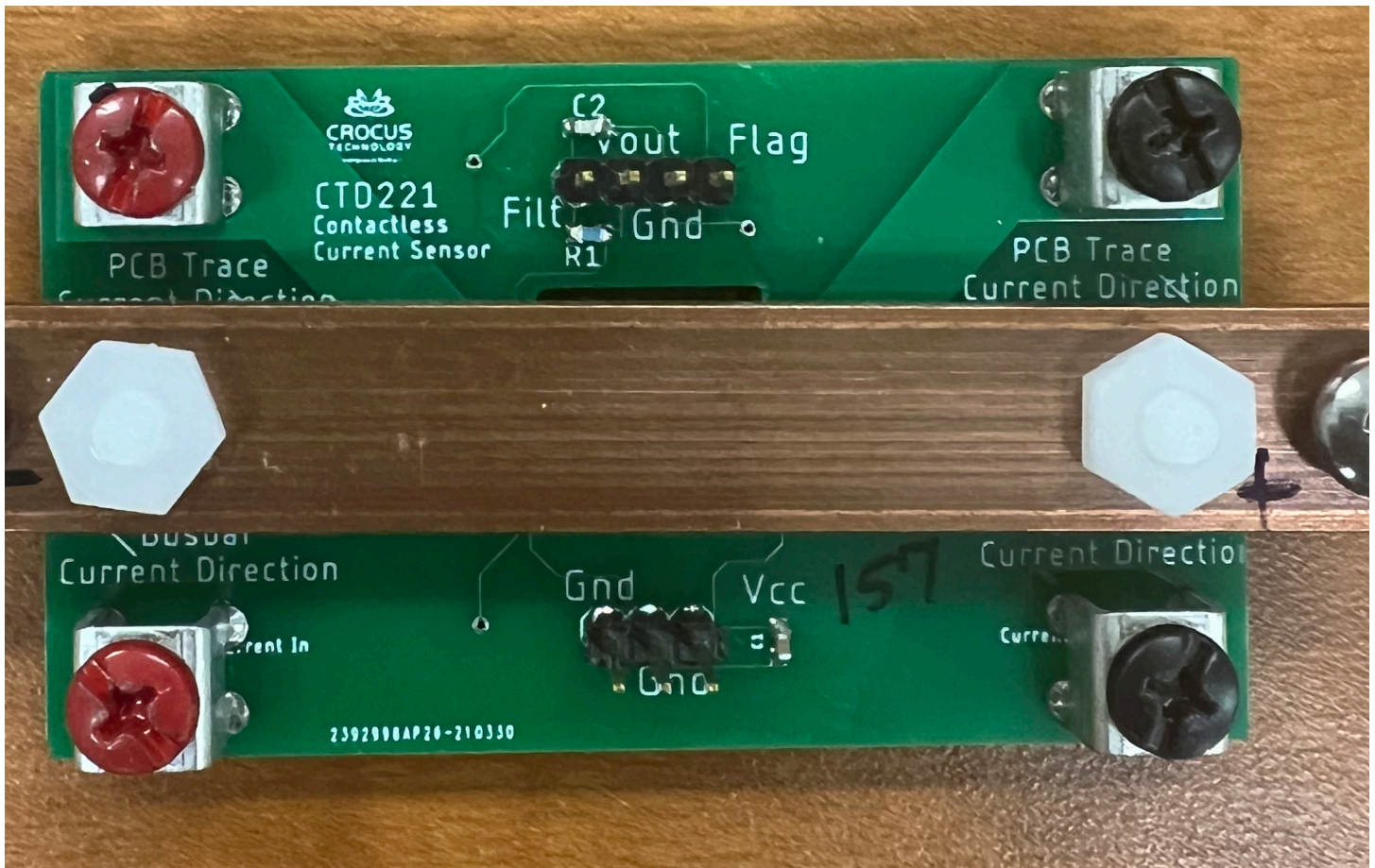


Figure 2: CTD221-BB-1.5 Evaluation Board with Busbar

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## 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. The CTD221 can detect currents as low as 5 mA.

## 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 kV<sub>rms</sub> 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 kV<sub>rms</sub> in the high-current mode.

## SCHEMATIC

The schematic of the CTD221-BB-1.5 evaluation board is shown in Figure 3.

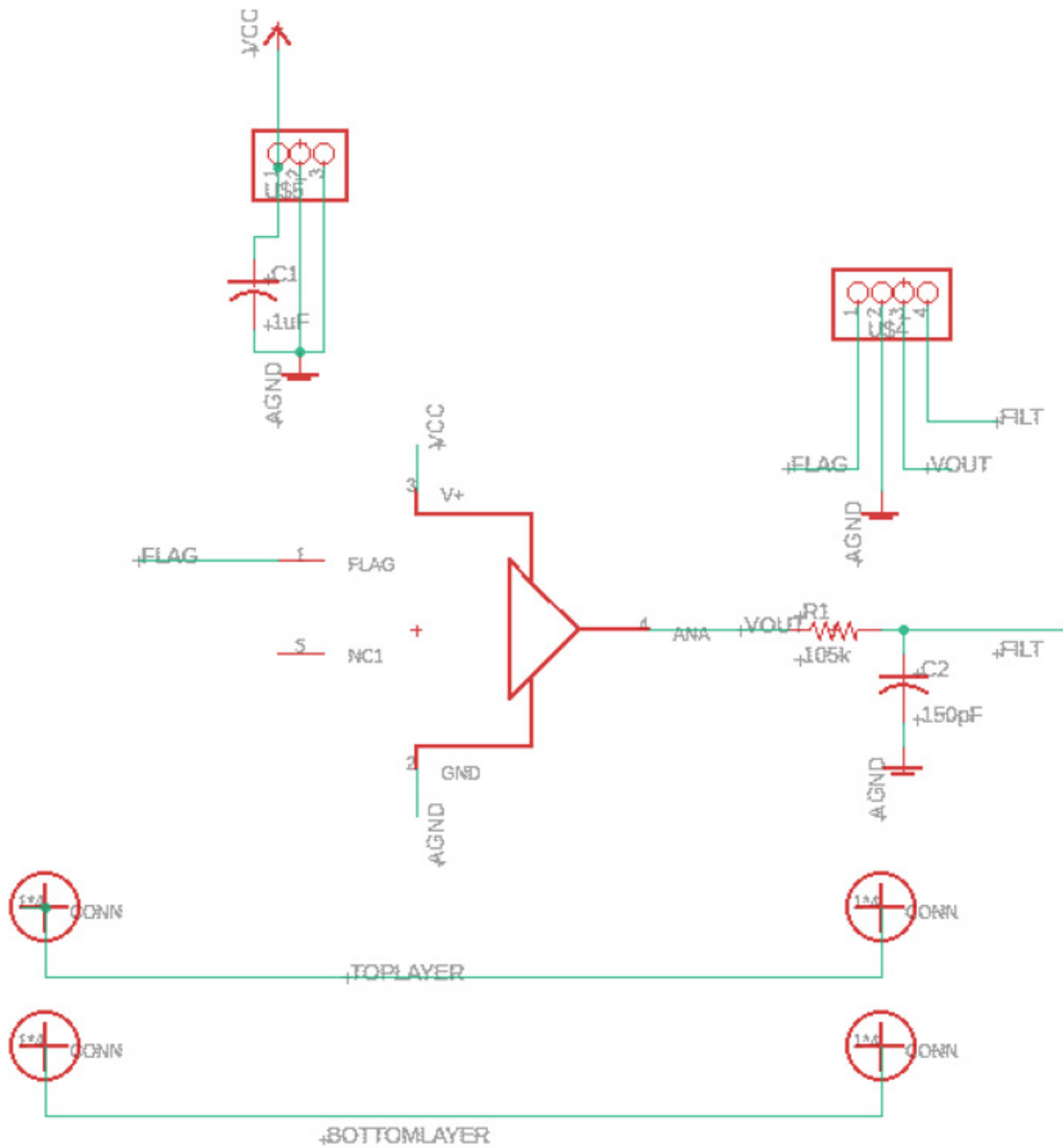


Figure 3: CTD221-BB-1.5 Evaluation Board Schematic

## LAYOUT

The top and bottom layers of the CTD221-BB-1.5 evaluation board are shown in Figure 4 and Figure 5.

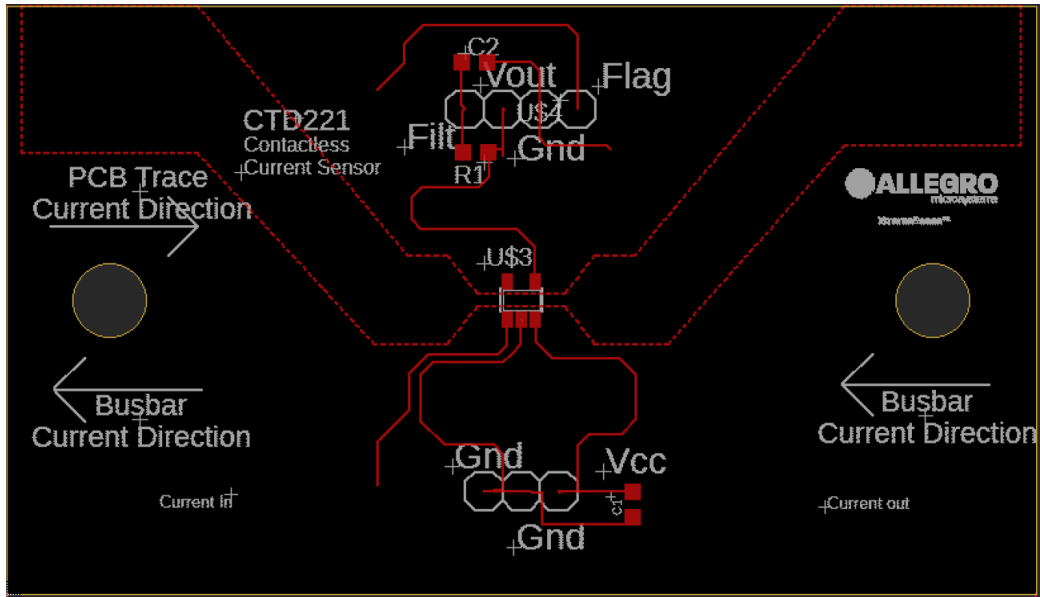


Figure 4: Top Layer

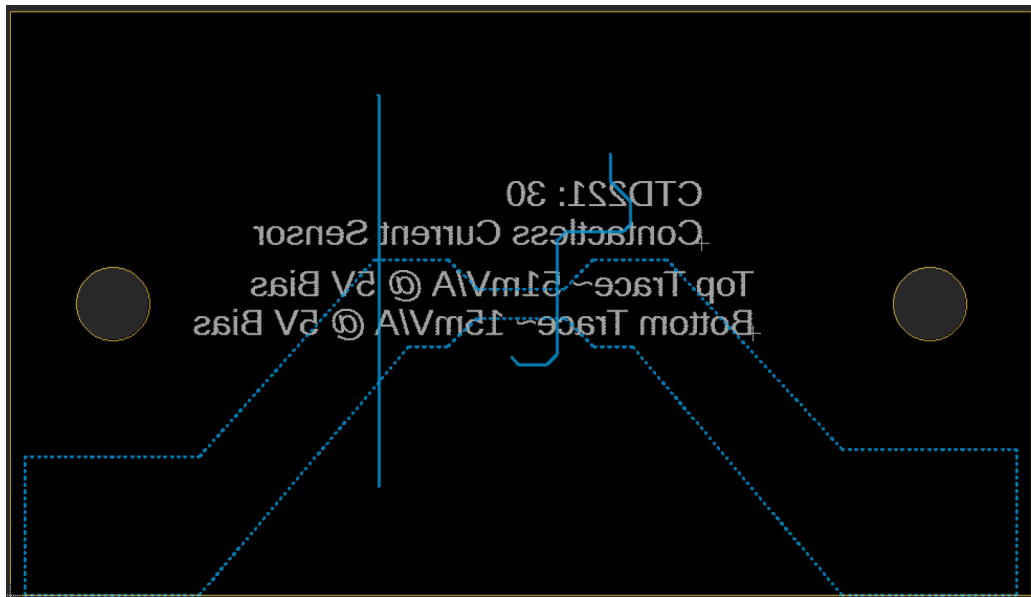


Figure 5: Bottom Layer

## BILL OF MATERIALS

Table 3: CT220BMV-IS5 Version Evaluation Board Bill of Materials

Designator	Quantity	Description	Manufacturer	Manufacturer Part Number
<b>ELECTRICAL COMPONENTS</b>				
-	1	CTD221-BB-1.5 EVAL 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	15120300ux0251
-	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

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## RELATED LINKS

CT220 Product Webpage:

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

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## Revision History

Number	Date	Description
-	September 11, 2024	Initial release

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