

# CTD455-BB-48B5 Evaluation Board User Guide

## DESCRIPTION

The Allegro CTD455 evaluation board demonstrates the advantages of the CT455 high dV/dt optimized XtremeSense™ TMR coreless current sensor in enabling high-accuracy current measurements for many consumer, enterprise, and industrial applications. The device supports a  $\pm 48$  mT magnetic field range where the CT455 senses and translates the magnetic field into a linear analog output voltage. While the sensor is pre-programmed to compensate for gain and offset temperature drift, the ability to adjust offset and gain relaxes mechanical tolerances during sensor mounting. The device has less than 300 ns output response time, while the current consumption is approximately 6.0 mA. The CT455 is housed in a very low-profile, industry-standard 8-lead TSSOP package that is both green and RoHS compliant.

## FEATURES

- Preset magnetic field range:  $\pm 48$  mT
- Low-noise performance
- Optimized for high dV/dt applications
- Linear analog output voltage
- Response time:  $< 300$  ns
- Supply voltage: 5.0 V
- Operating temperature:  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$



Figure 1: CTD455-BB-48B5 Evaluation Board

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Table 1: CTD455-BB-48B5 Evaluation Board Configurations

Configuration Name	Part Number	Output Voltage Range	Coupling Coefficient	Bandwidth
CTD455-BB-48B5	CT455-A48B5-TS08	0.50 to 4.50 V	42 $\mu\text{T/A}$	1 MHz
CTD455-PT-48B5				

Table 2: General Specifications

Specification	Min.	Nom.	Max.	Units
Input Operating Temperature	-40	-	125	$^{\circ}\text{C}$
Input Operating Voltage	4.75	5.0	5.50	V

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## USING THE EVALUATION BOARD

This section provides an overview of the connections and configuration options of the CTD455-BB-48B5 evaluation board. Figure 2 highlights the proper configuration. The CT455 datasheet contains detailed information on the use and functionality of each pin, detailed specifications about the sensor, and should be consulted for more information than is contained in this user guide.



Figure 2: CTD455-BB-48B5 Evaluation Board with Busbar

### Power Input and Board Configuration

When current is flowing through a busbar above or below the CT455, the XtremeSense™ TMR sensor inside the chip senses the field which in turn generates a differential voltage signal that then goes through the Analog Front-End (AFE) to output a current measurement as low as  $\pm 1.0\%$  full-scale total output error ( $E_{OUT}$ ).

The chip is designed to enable a fast response time of 300 ns for the current measurement from the OUT pin as the bandwidth for the CT455 is 1.0 MHz. Even with a high bandwidth, the chip consumes a minimal amount of power.

For high-current applications, use the busbar. For other applications, remove the busbar and connect power to the terminal heads. To ensure safety, do not let the busbar come into direct contact with the sensor.

### Power-On Time

Power-On Time of 100  $\mu$ s is the amount of time required by CT455 to start up, fully power the chip, and becoming fully operational from the moment the supply voltage is greater than the UVLO voltage. This time includes the ramp-up time and the settling time (within 10% of steady-state voltage under an applied magnetic field) after the power supply has reached the minimum  $V_{CC}$ .

### Response Time

Response Time of 300 ns for the CT455 is the time interval between the following terms: when the primary current signal reaches 90% of its final value, and when the chip reaches 90% of its output corresponding to the applied current.

## SCHEMATIC

Figure 3 below shows the schematic of the CTD455-BB-48B5 evaluation board.

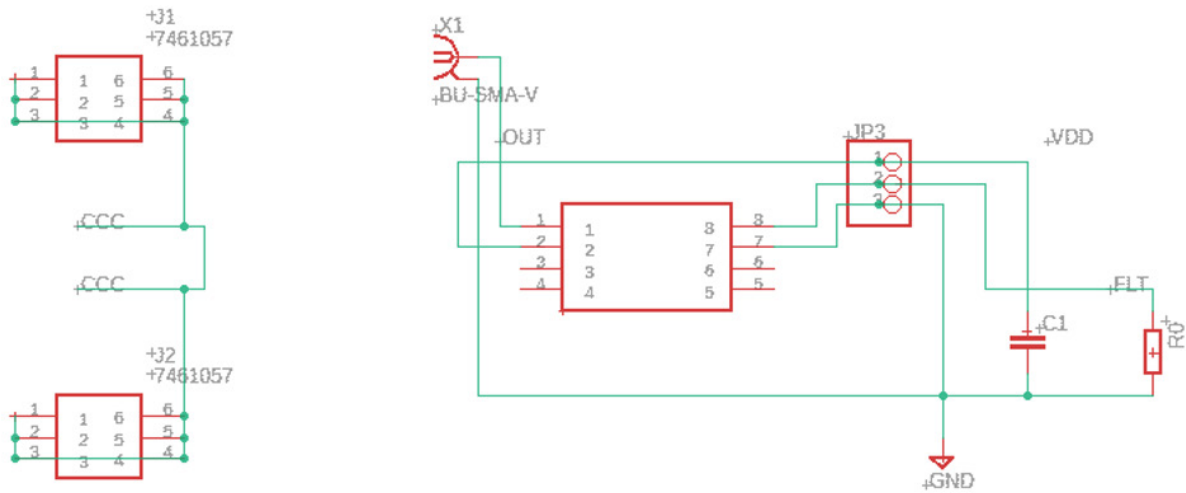


Figure 3: CTD455-BB-48B5 Schematic

## LAYOUT

Figures 4 and 5 below show the top and bottom layers of the CTD455-BB-48B5 evaluation board.

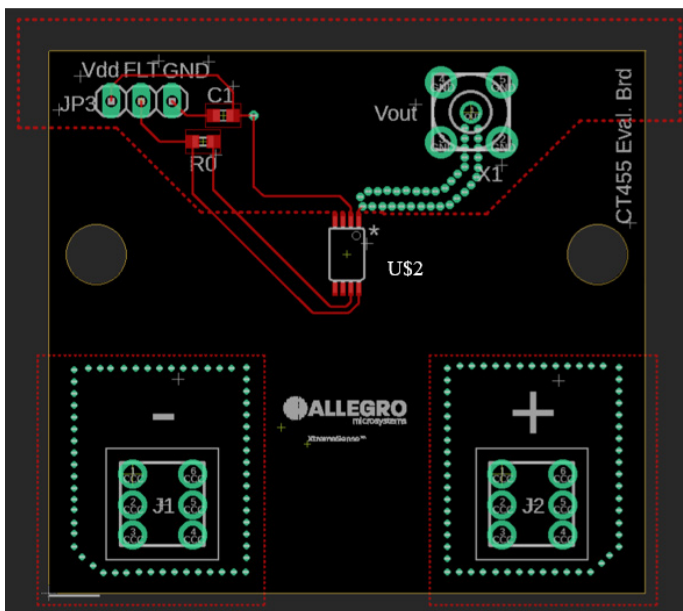


Figure 4: CTD455-BB-48B5 Top Layer

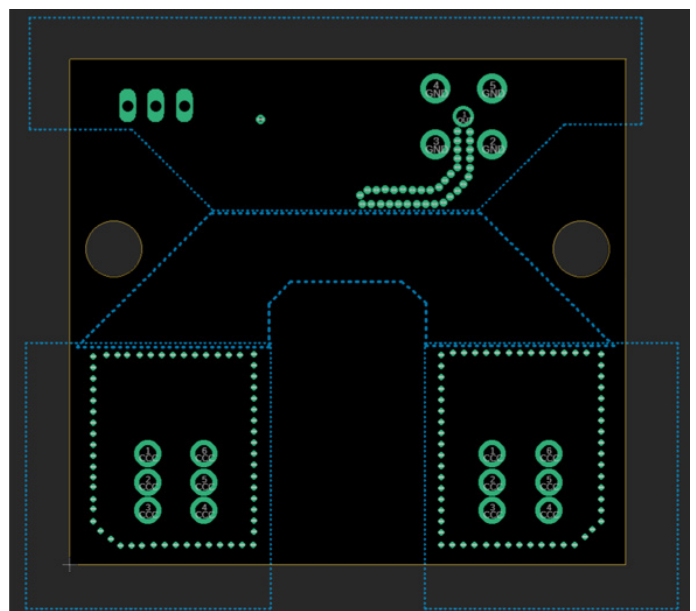


Figure 5: CTD455-BB-48B5 Bottom Layer

## Bill of Materials

Table 3: CTD455-BB-48B5 Bill of Materials

Designator	Quantity	Description	Manufacturer	Manufacturer Part Number
<b>ELECTRICAL COMPONENTS</b>				
PCB	1	CTD455-BB-48B5 Evaluation Board	Allegro MicroSystems	–
U\$2	1	CT455 Sensor	Allegro MicroSystems	–
JP3	4	Male Header Connectors, 3-pin	Samtec	TSW-103-07-F-S
C1	1	Capacitor, Ceramic, 1.0 $\mu$ F, 25 V, 10% X7R 0603	TDK	MSAST168SB7105KTNA01
VOUT	1	SMA Connector	Clinch Connectivity	142-0701-201
R0	1	Resistor, 0 $\Omega$	Yageo	RC1206FR-130RL
<b>OTHER COMPONENTS</b>				
BB	1	Busbar (1/2" width, 1/16" thick)	Tobar Industries	–
J1, J2	2	Connector Heads, 6-pin	Würth Elektronik	732-3200-ND
J2	1	M3 Terminal Screw, Black	Keystone	36-7701-2
J1	1	M3 Terminal Screw, Red	Keystone	36-7701-3
S1, S2	2	Plastic High Temperature Screws for Busbar	Misumi	SPS-M5X15-C
N1, N2	2	Plastic High Temperature Nuts for Busbar	Misumi	SPS-M5-N
W1, W2	2	Plastic High Temperature Washers for Busbar	Misumi	SPS-6-W

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## RELATED LINKS

CT455 Product Page:

<https://www.allegromicro.com/en/products/sense/current-sensor-ics/sip-package-zero-to-thousand-amp-sensor-ics/ct455>

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## Revision History

Number	Date	Description
–	May 23, 2024	Initial release
1	July 31, 2024	Update to configuration naming convention (all pages); updated description and features (page 1); updated Table 1 (page 1); updated Power Input and Board Configuration (page 2); updated Bill of Materials (page 4)

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