# CTD433-HSWF20MR

## CT433-20AC Evaluation Board User Guide

## DESCRIPTION

The CT433 is a high bandwidth and ultralow-noise integrated contact current sensor that uses Allegro patented XtremeSense™ tunnel magnetoresistance (TMR) technology to enable high-accuracy current measurements for many industrial, consumer, and automotive applications. The device supports multiple current ranges where the integrated current-carrying conductor (CCC) handles up to 70 A of current and generates a current measurement as a linear analog output voltage. The device achieves a total output error of less than ±1% full-scale (FS) overvoltage and the full temperature range. The device has a ~300 ns output response time while the current consumption is ~6 mA and is immune to common-mode fields. The CT433 is optimized for high dV/dt applications, which minimizes capacitive coupling to VOUT, allowing the CT433 to be used in switching applications. The CT433 is offered in an industry-standard 16-lead small-outline integrated circuit (SOIC) wide package that is green and RoHS-compliant.

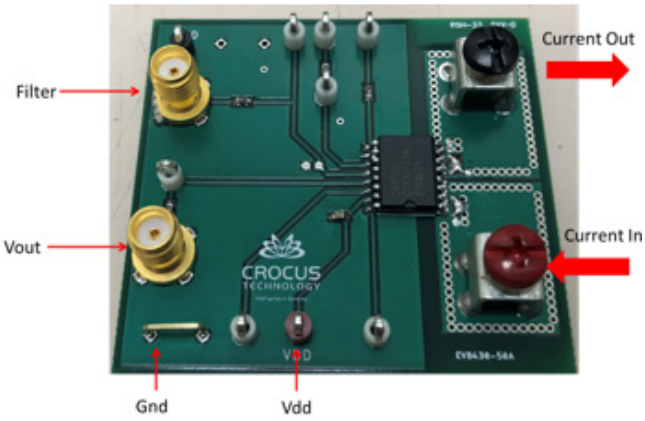


**Figure 1: CT433-20AC Evaluation Board**

## FEATURES

- Low noise: 9.5 to 19 mA rms at $f_{BW}$ = 100 kHz
- Optimized for high dV/dt applications
- Integrated current-carrying conductor
- Response time: ~300 ns
- Total error output ≤ ±1% FS, –40°C to 125°C
- Immunity to common-mode fields: –54 dB
- Linear analog output voltage
- Supply voltage: 3 V to 3.6 V

## Table of Contents



## EVALUATION BOARD CONTENTS

- CT433-20AC evaluation board

**Table 1: CT433-20AC Evaluation Board Configurations**

| Configuration Name | Part Number | Sensitivity | Bandwidth |
|---|---|---|---|
| CT433-20AC Evaluation Board | CTD433-HSWF20MR | 50 mV/V | 1 MHz |

**Table 2: General Specifications**

| Specification | Min | Nom | Max | Units |
|---|---|---|---|---|
| Input Operating Temperature | –40 | – | 125 | ºC |
| Input Operating Current | –20 | – | 20 | A |

## USING THE EVALUATION BOARD

### Introduction

This section provides an overview of the connections and configuration options of the CTD433-20AC evaluation board. The proper configuration is shown in Figure 2 and is detailed in the sections that follow. The CT433 datasheet contains detailed information about the use and functionality of each pin and detailed specifications about the sensor, and it should be consulted for more detailed information than is contained in this user guide.

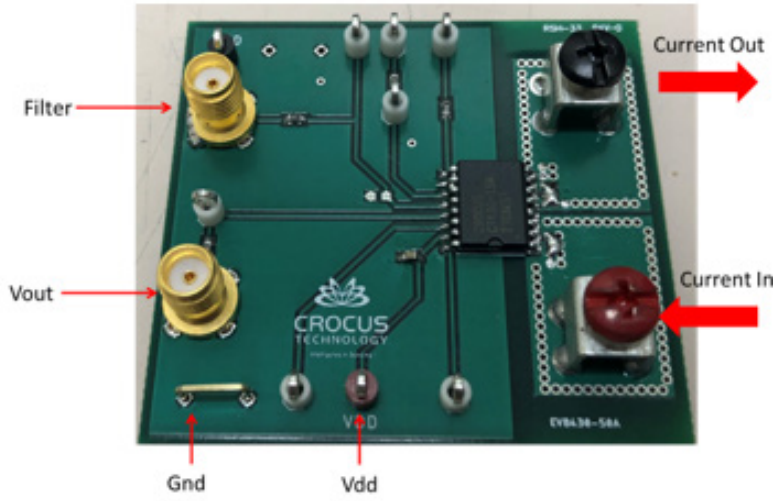


**Figure 2: CT433-20AC Evaluation Board**

### Power Input

The two large connectors (with screws) are used to connect and drive the external current to be measured. Due to the PCB trace thermal limitation of the CT433 evaluation board, do not exceed 20 $A_{PK}$.

### Board Configuration

A fully assembled evaluation board is illustrated in Figure 1 and Figure 2. The current to be measured is connected to the screw connectors located on the right side of the PCB. These connectors are galvanically isolated from the rest of the PCB. The CT433 can be biased by applying a 3.3 V bias voltage between the VDD and GND pins on the PCB and its output can be measured either from the VOUT SMA connector or the VOUT header pin on the PCB. In addition, if C2 is populated with a 100 pF capacitor, the FILTER SMA connector provides a filtered output of the CT433 with a 3 dB cutoff frequency of approximately 100 kHz; otherwise, the 3 dB cutoff frequency is 1 MHz. See Figure 3.

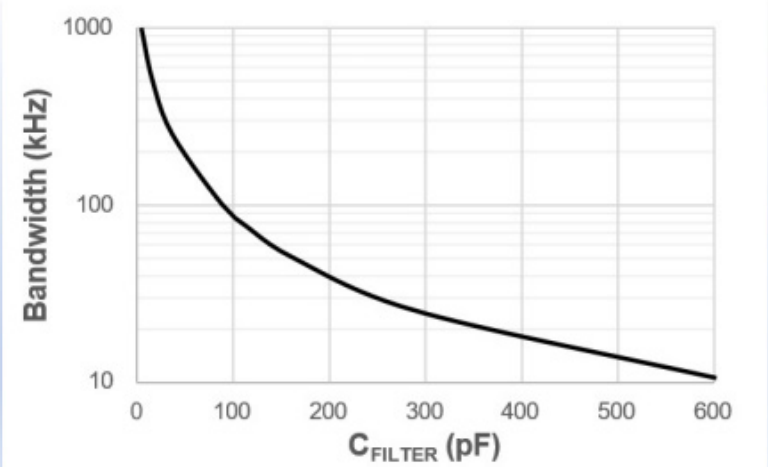


**Figure 3: CT433-20AC Evaluation Board**



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## SCHEMATIC

The schematic of the CT433-20AC evaluation board is shown in Figure 4.

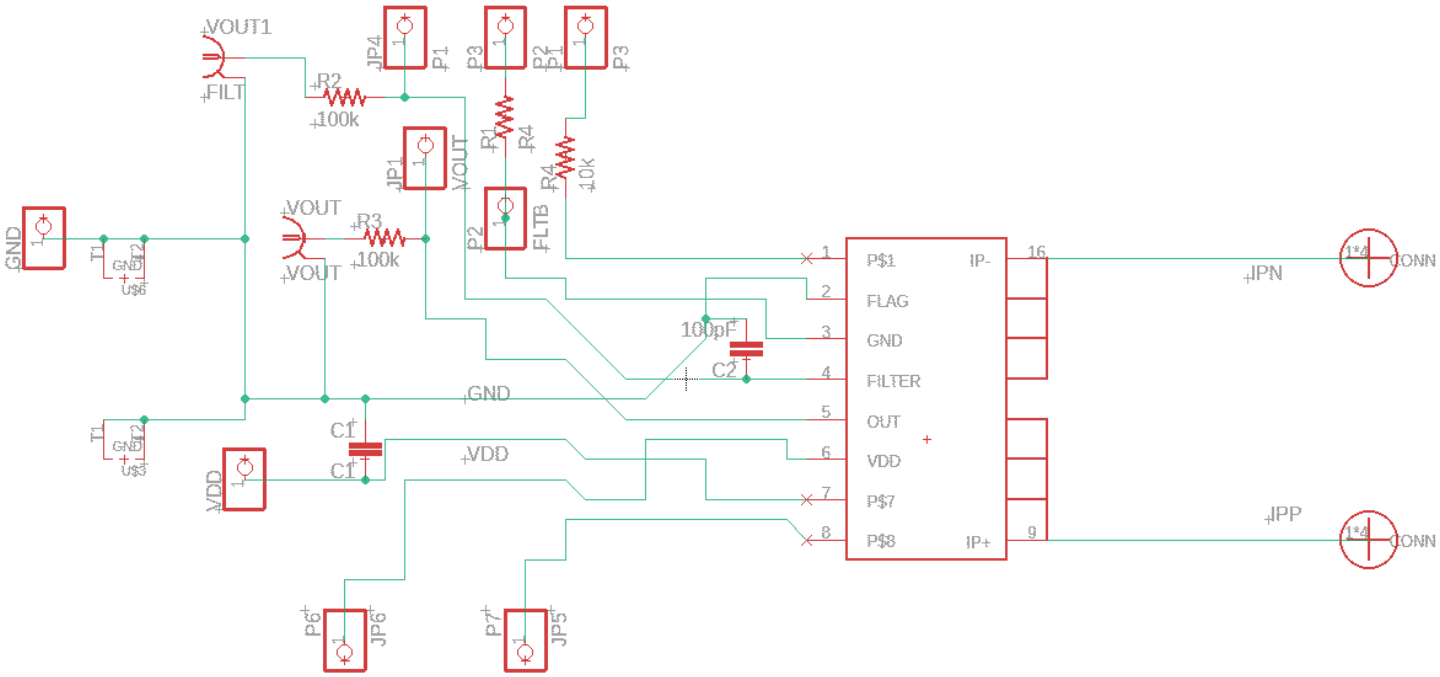


**Figure 4: CT433-20AC Evaluation Board Schematic**



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## LAYOUT

The top and bottom layers of the CT433-20AC evaluation board are shown in Figure 5 and Figure 6, respectively.

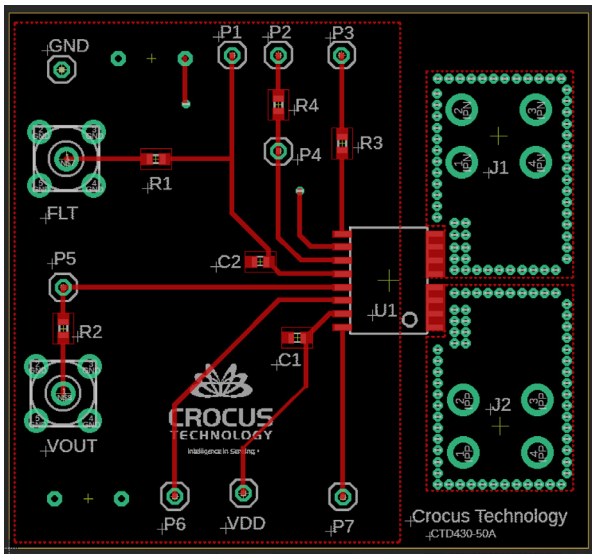


**Figure 5: Top Layer**

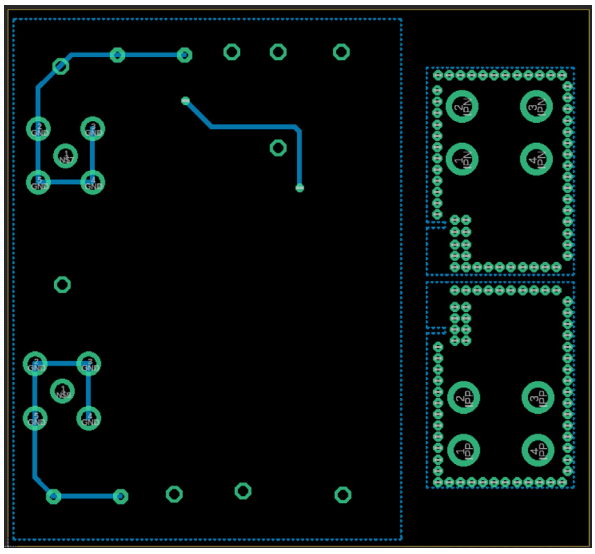

**Figure 6: Bottom Layer**



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## BILL OF MATERIALS

| Designator | Quantity | Description | Manufacturer | Manufacturer Part Number |
|---|---|---|---|---|
| PCB | 1 | CT433-20AC evaluation board | Allegro MicroSystems | – |
| U1 | 1 | CT433-HSWF20MR sensor | Allegro MicroSystems | – |
| C1 | 1 | 1.0 µF, X5R or better SMD Capacitor 0603 | TDK | CGA3E1X7R1E105K080AC |
| C2 | 1 | 100 pF, X5R or better SMD Capacitor 0603 (optional) | KEMET | C0603C101K4HACAUTO |
| R1, R2, R3 | 3 | 10 kΩ, ±10% or better SMD Resistor 0603 | Panasonic | ERJ-3GEYJ103V |
| R4 | 1 | 100 kΩ, ±10% or better SMD Resistor 0603 | Yageo | RC0603FR-07100KL |
| VOUT, FLT | 2 | SMA Connectors | Clinch Connectivity | 142-0701-201 |
| J1, J2 | 2 | Screw Connectors | Keystone | 534-7701 |
| J2 | 1 | M3 Terminal Screw Red | Keystone | 36-7701-2 |
| J1 | 1 | M3 Terminal Screw Black | Keystone | 36-7701-3 |
| P1–7, GND, VDD | 9 | Male Header Connectors - Single pin | Wurth Elektronik | 732-5334-ND |



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## RELATED LINKS

CT433 product page:

https://www.allegromicro.com/en/products/sense/current-sensor-ics/zero-to-fifty-amp-integrated-conductor-sensor-ics/CT433

For samples or applications support contact, visit https://www.allegromicro.com/en/about-allegro/contact-us/technical-assistance and navigate to the appropriate region.



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## Revision History

| Number | Date | Description |
|---|---|---|
| – | August 7, 2024 | Initial release |





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