



MIC2039 Evaluation Board

High-Accuracy, High-Side, Adjustable
Current Limit Power Switch

General Description

The MIC2039 is a high-side MOSFET power distribution switch providing increased system reliability by using 5% current limit accuracy.

The MIC2039 has an operating input voltage range from 2.5V to 5.5V, is internally current limited, and has thermal shutdown to protect the device and system. The MIC2039 is offered with either active-high or active-low logic level enable input controls. It has an open drain fault status output flag with a built-in 32ms delay that asserts low during overcurrent or thermal shutdown conditions.

The MIC2039 switch features an adjustable output current limit that is resistor programmable from 0.2A to 2.5A. The MIC2039 switch also offers a unique Kickstart feature, which allows momentary high-current surges up to the secondary current limit (I_{LIMIT_2nd}) during startup or while operating in steady state. This is useful for charging loads with high inrush currents, such as capacitors. After an overcurrent condition is established, these switches enter into a constant current limit mode unless the die temperature exceeds the thermal shutdown specification.

The MIC2039 is offered in both 6-pin SOT-23 and 6-pin 2mm x 2mm thin DFN packages. It has an operating junction temperature range of -40°C to $+125^{\circ}\text{C}$.

Requirements

The MIC2039 evaluation board requires a single power supply to provide V_{IN} . The V_{IN} power supply must be able to deliver a minimum of 2.5V and more than 1.5A capability. The output load can either be active or passive.

Precautions

The evaluation board does not have reverse polarity protection. Applying a negative voltage to the V_{IN} terminal can damage the device. In addition, the maximum V_{IN} operating voltage of the MIC2039 evaluation board is 5.5V. Exceeding 5.5V on V_{IN} can permanently damage the device.

Getting Started

1. Connect an external supply to V_{IN} terminal.

Apply the desired input voltage to the V_{IN} and ground terminals of the evaluation board, paying careful attention to polarity and supply voltage. The user can place an ammeter between the input supply and the V_{IN} terminal to the evaluation board. Make sure that the supply voltage is monitored at the V_{IN} terminal. The ammeter and/or power lead resistance can reduce the voltage supplied to the input.

2. Connect the load to the V_{OUT} and ground terminals.

The load can be either passive (resistive) or active (as in an electronic load). The user can place an ammeter between the load and the V_{OUT} terminal. Make sure that the output voltage is monitored at the V_{OUT} terminal.

3. Enable the switch.

The MIC2039 evaluation boards are configured for default enable using a 10k Ω pull-up resistor from the ENABLE pin to V_{IN} . To disable the switch, place a jumper short across the jumper pins at TP2.

4. Fault detection

The MIC2039 is equipped with an error flag pin, FAULT/. TP3 is provided to monitor the FAULT/ pin.

Ordering Information

| Part Number | Description |
|-------------------|---|
| MIC2039-05AYM6 EV | Evaluation board featuring the MIC2039AYM6 Power Switch Current limit is set for 500mA |
| MIC2039-1AYM6 EV | Evaluation board featuring the MIC2039AYM6 Power Switch Current limit is set for 1A |
| MIC2039-05AYMT EV | Evaluation board featuring the MIC2039AYMT Power Switch Current limit is set for 500mA |
| MIC2039-1AYMT EV | Evaluation board featuring the MIC2039AYMT Power Switch Current limit is set for 1A |

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Micrel Inc. • 2180 Fortune Drive • San Jose, CA 95131 • USA • tel +1 (408) 944-0800 • fax + 1 (408) 474-1000 • <http://www.micrel.com>

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Application Information

Adjustable Current Limit

The factory sets the MIC2039-xYMx evaluation boards for either a 500mA or 1A current limit. However, connecting a resistor (R3) from the ILIMIT pin to GND allows the current limit to be adjusted from 0.2A to 2.5A. For the MIC2039-xYMT evaluation board, jumper TP4 must be shorted for R3 to connect to the ILIMIT pin of the IC. The following equation determines the value of R3:

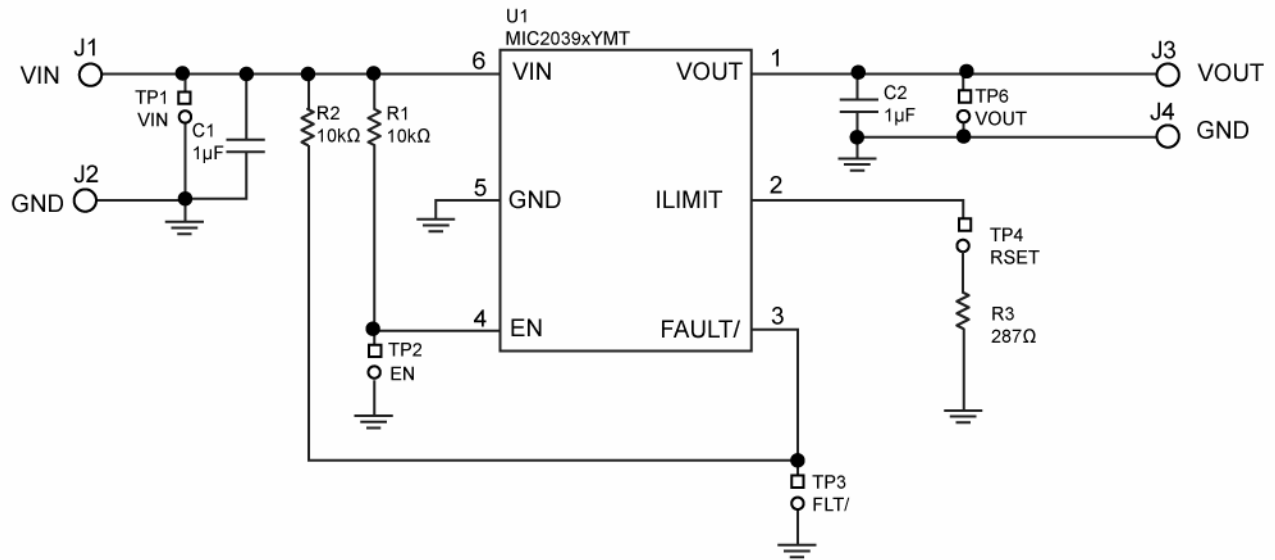
$$R3 \cong 289/I_{LIMIT} \quad \text{Eq. 1}$$

where I_{LIMIT} is the typical current limit from the electrical table. If the output current exceeds the set current limit, the MIC2039 switch enters constant current limit mode. The maximum allowable current limit may be less than the full specified and/or expected current if the MIC2039 is not mounted on a circuit board with sufficiently low thermal resistance. Resistor values (1%) for select current limit settings are shown in [Table 1](#).

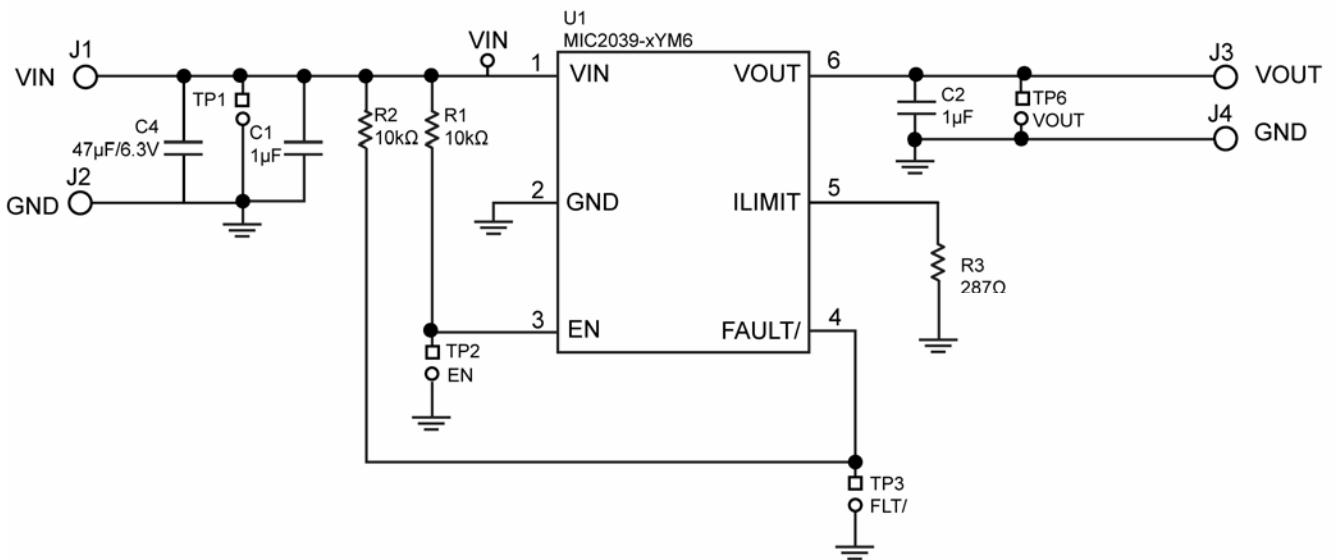
| I_{LIMIT} | 0.2A | 0.5A | 1.0A | 2A | 2.5A |
|-------------|----------------|--------------|--------------|--------------|--------------|
| R3 | 1.43k Ω | 576 Ω | 287 Ω | 143 Ω | 115 Ω |

Table 1. Resistor Selection for Adjustable Current Limit

Evaluation Board Schematics



MIC2039xYMT Evaluation Board



MIC2039xYM6 Evaluation Board

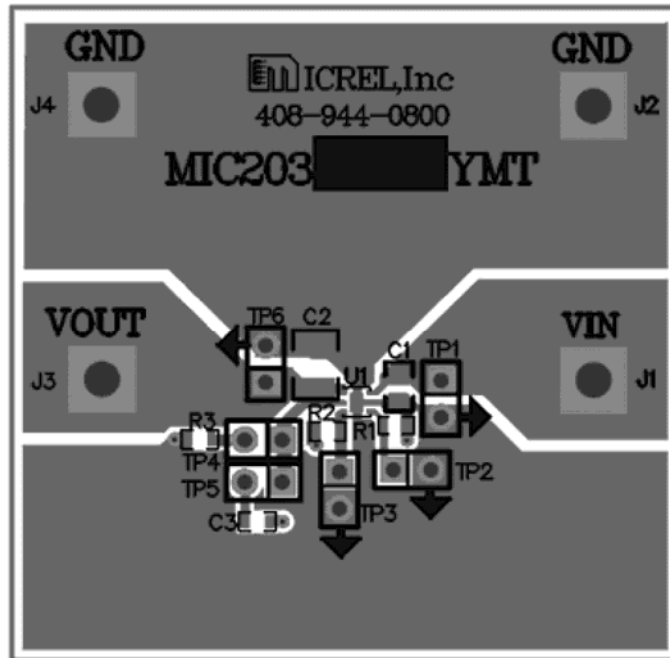
Bill of Materials

| Item | Part Number | Manufacturer | Description | Qty. |
|--------|--|-----------------------------|--|----------|
| C1, C2 | C1608X5R0J105K | TDK ⁽¹⁾ | 1 μ F/6.3V ceramic capacitor, X5R, 0603 | 2 |
| | 06036D105KAT2A | AVX ⁽²⁾ | | |
| R1, R2 | CRCW060310K0FKEA | Vishay/Dale ⁽³⁾ | 10k Ω , film resistor, 0603, 1% | 2 |
| R3 | CRCW06032870FKEA | Vishay/Dale | 287 Ω film resistor, 0603, 1% or | 1 |
| | CRCW06031430FKEA | | 143 Ω film resistor, 0603, 1% | |
| U1 | MIC2039xYMT MIC2039xYM6 | Micrel⁽⁴⁾ | High-accuracy, high-side, adjustable current limit power switch | 1 |

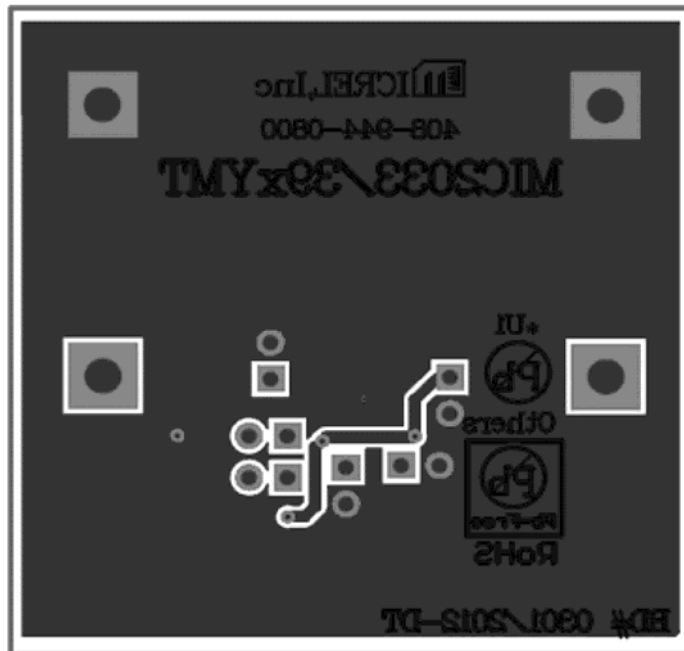
Notes:

1. TDK: www.tdk.com.
2. AVX: www.avx.com.
3. Vishay: www.vishay.com.
4. **Micrel, Inc.:** www.micrel.com.

Evaluation Board PCB Layout

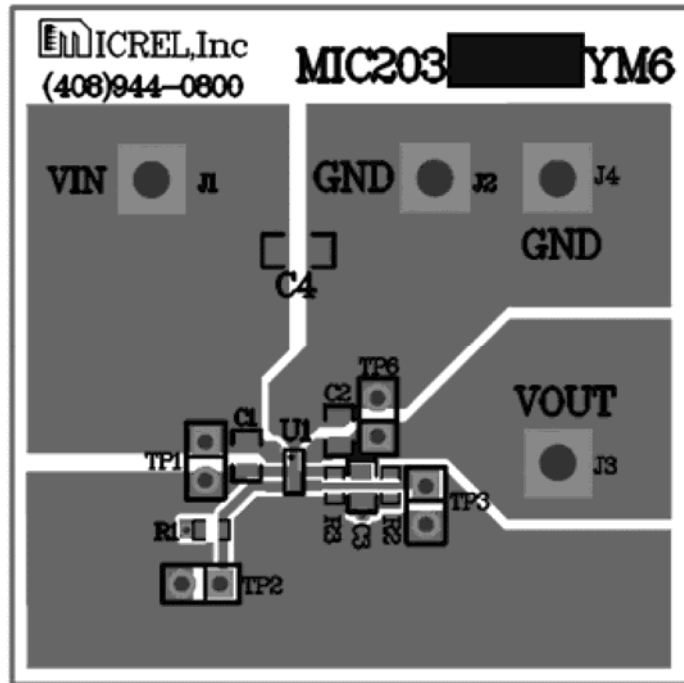


MIC2039xYMT Evaluation Board – Top Layer

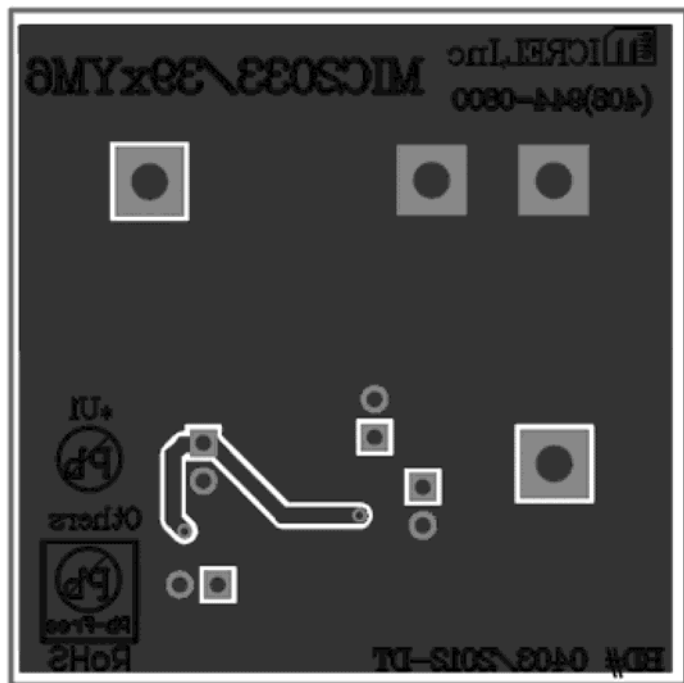


MIC2039xYMT Evaluation Board – Bottom Layer

Evaluation Board PCB Layout (Continued)



MIC2039xYM6 Evaluation Board – Top Layer



MIC2039xYM6 Evaluation Board – Bottom Layer

MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA
TEL +1 (408) 944-0800 FAX +1 (408) 474-1000 WEB <http://www.micrel.com>

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