

MAX16170

High-Voltage Ideal Diode Controller with Integrated CSA

General Description

The MAX16170, a high-voltage ideal diode controller, offers full system-level protections for automotive applications. The MAX16170 is designed to enhance system safety, reliability, and performance with added diagnostics, robust fault-recovery mode, and a high-side, integrated current-sense amplifier (CSA). The MAX16170 features dual-gate-driver topology that supports common-drain configuration and protects systems against reverse voltage, input overvoltage (OV), undervoltage (UV), overcurrent, and thermal fault conditions. During power-up, the device monitors the health of the external power metal-oxide semiconductor field effect transistors (MOSFETs) for open or short-circuit conditions and asserts an open-drain output (FETOK) when one or both power MOSFETs are damaged. Additionally, the device offers an open-drain fault output ($\overline{\text{FLT}}$) that asserts low when there is a fault condition.

During normal operation, the MAX16170 regulates the voltage drop across the drain-to-source of MOSFET (Q1) to 10mV to block DC flow to the battery in reverse voltage fault condition. A resistor from a low-voltage input (ILIM) to ground sets the overcurrent threshold.

During sleep mode of operation, the device consumes only 5 μ A (typ) while delivering 1mA (min) of current to the load to support stand-by system operation. In shutdown mode, the charge pump is disabled, and the OV and UV resistive dividers are disconnected from the battery through the TERM switch to lower the shutdown supply current to 3 μ A (typ).

The MAX16170 is available in a 4mm x 4mm x 0.75mm, 20-pin, side-wettable, TQFN package with an exposed pad and operates over the automotive temperature range of -40°C to $+125^{\circ}\text{C}$.

Features and Benefits

- 3V to 65V Operating Voltage Range
 - Supports 12V/24V Battery Systems
- -42V to $+76\text{V}$ Input Protection Range
 - Wider Transients Immunity
- High-Side CSA
 - Enables System Power-Level Measurement
- Output Sensing
 - Enables Fast Fault Recovery
- 30kHz Active Rectification
 - Facilitates System Level Testing Per Automotive Standard
- Support ORing Application
- Robust Fault-Recovery Mode
- 5 μ A Shutdown Mode Current
 - Extends Battery Life
- Resistor-Adjustable OCP Threshold
 - Adds Design Flexibility
- 1mA (min) Sleep Mode Current Output
 - Supports Standby Mode of Operation
- FETOK/ $\overline{\text{FLT}}$ Outputs
 - Enhance System Diagnostics
- AEC-Q100 Qualification in Progress

Applications

- Automotive Power Systems
- Network/Telecom Power Systems
- RAID Systems
- Servers
- PoE Systems

Notes

