ISSUE: December 2025

10-MHz TMR Current Sensor Enhances Control Of WBG Power Electronics

Allegro MicroSystems' ACS37100 is described as the industry's first commercially available magnetic current sensor to achieve 10-MHz bandwidth. It features Allegro's advanced XtremeSense TMR (tunneling magnetoresistance) technology. According to the vendor, the TMR current sensor helps power system designers master the control signal chain and unlock the full potential of fast-switching GaN and SiC FETs.

Tailored to the needs of electric vehicles (xEVs), clean energy power conversion systems, and AI data center power supplies, the ACS37100 achieves an industry-leading 50-ns response time, says the vendor, providing the high-fidelity data needed for optimal efficiency and protection in demanding high-frequency applications (see the figure).

Migration to GaN and SiC promises greater power density and efficiency, but their faster switching speeds create significant control challenges. At sub-megahertz frequencies, conventional magnetic current sensors lack the speed and precision to provide the high-fidelity, real-time data required for stable control and protection loops. This can leave advanced systems vulnerable to damage and may prevent them from operating at their full potential.

The ACS37100 is engineered to solve this control challenge. According to the vendor, its industry-leading bandwidth and response time provide the high-fidelity current sense feedback essential for demanding control loops in high-speed switching applications. This magnetic current sensor enables designers to confidently and reliably control faster systems, maximize efficiency, and increase power density, says the vendor. Leveraging advanced TMR technology, the device delivers a low noise of 26 mArms across the full 10-MHz bandwidth.

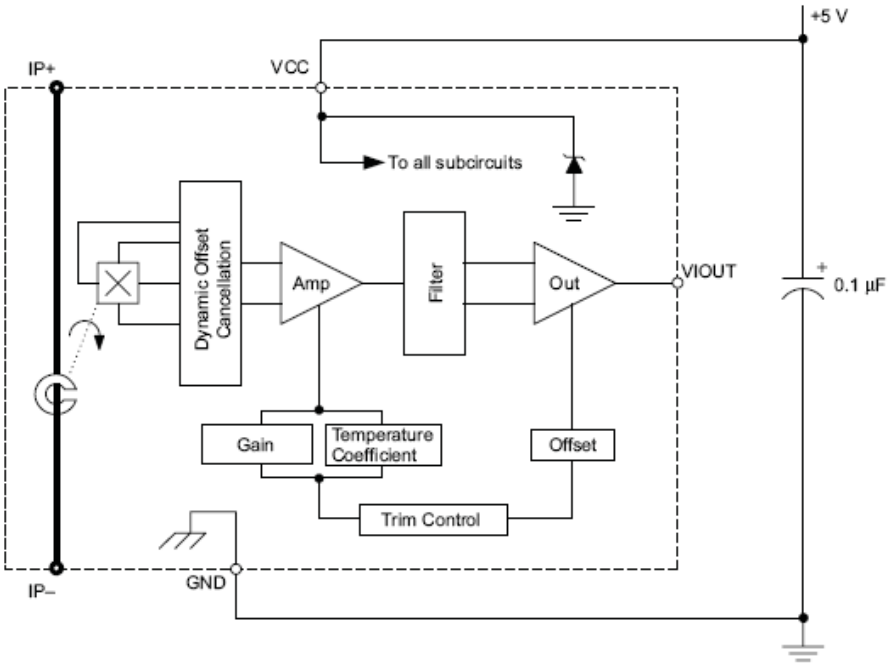
"The ACS37100 marks a critical inflection point for magnetic sensors. Our TMR technology is enabling current sensors that are ten times faster and four times lower noise versus typical Hall-based products," said Matt Hein, business line director of current sensors at Allegro. "This leap in performance solves important challenges in high-voltage power conversion, especially related to wide-bandgap solutions."

The ACS37100 is engineered to minimize energy loss while maximizing operational efficiency and reliability, making it the well suited for a variety of automotive and industrial uses like xEV charging, clean energy power conversion, and AI data center power supplies.

Other specifications include 5-kV of integrated reinforced isolation (60 seconds per UL 62368-1), 1.2-mΩ internal conductor resistance and a -40°C to +150°C automotive-grade, operating temperature range. The ACS37100 is available in an industry-standard SOICW-16 package that supports a working reinforced isolation up to 565 Vrms (basic 1,097 Vrms) with 8-mm creepage and clearance. It features a voltage reference output and an adjustable overcurrent fault.

See the ACS37100 page for datasheets, samples, and evaluation boards.

(a)



(b)

Figure. The XtremeSense TMR current sensor provides the high-fidelity signal needed to master the power conversion signal chain in EVs, clean energy, and data center designs adopting GaN and SiC FETs. Housed in an SOICW-16 package, the sensor is pictured in (a), while the internal block diagram is shown in (b).