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HIGH PRECISION CURRENT MEASUREMENT FOR COMPACT POWERELECTRONICS



Reliable High Current Sensing for Compact Industrial Drives.

CHALLENGE

Compact electric drive systems such as, light e-mobility platforms, drones, robotic actuators and industrial power modules must handle high current, fast switching, and tight thermal limits within extremely limited spaces on Printed Circuit Boards (PCB).

As PCB designs shrink and power density rises, developers face multiple constraints at once:

- high measurement accuracy over wide temperature ranges,
- managing self-heating, temperature cycles and thermal drift,
- ensuring signal integrity under high dI/dt conditions,
- and fitting the entire current sensing stage into space restricted layouts without adding complexity (e.g., Kelvin routing).

The key challenge:

How can engineers ensure precise, stable and reliable current sensing in compact, high load power-applications — without increasing module size or compromising efficiency?



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Measurement and control using precision micro components.

SOLUTION

The WAT shunt resistor from Isabellenhütte provides a robust and compact solution for accurate high current measurement in miniaturized performance electronics.

Compared to standard resistors, the WAT series combines:

- Low ohmic values (0.2 to 0.75 mOhm) for high current levels
- Ultra low inductance, ideal for fast switching motor controllers
- Optimized TCR ensuring minimal temperature dependent drift
- High continuous and pulse load capability despite a compact 2512 footprint
- Large copper terminations enabling efficient heat spreading into the PCB

This design ensures stable, low-noise current-measurement even under dynamic load steps, thermal cycling, and tight mechanical or layout requirements.

For design engineers, this resistor provides precise current sensing without unnecessary complexity, enables simplified PCB routing through its 2-terminal layout, and enhances overall system reliability and control accuracy in densely packed power modules.

APPLICATION

The WAT is particularly well suited for brushless drone bldc motor controllers, where clean and responsive current feedback is essential for flight stability.

It also supports light e-mobility drive systems such as e-scooters and e-bikes, as well as robotics and servo drives operating under highly dynamic loads.

Beyond motion control, the WAT performs reliably in compact DC-DC converters, power stages, and battery-management peripherals used in both portable and industrial environments.

For mechanical dimensions & technical performance see:

www.isabellenhuetten.com/solutions/products/wat

