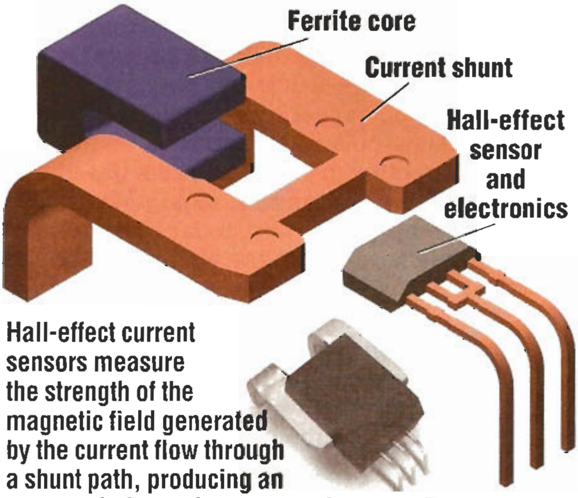
Hall-effect current sensors

The best place to measure current consumption is in the main power feed. The technique is called high-side current sensing. However, measurements at that location are fraught with problems. Of primary concern is that the measurement is at main line voltage, a problem if the current being measured feeds an electronic circuit that checks it for control or overload sensing.

A new generation of small Hall-effect-based current sensors simplify the task. Hall-effect devices measure current via the intensity of the magnetic field generated by the current flow. Of course, higher currents produce stronger magnetic fields. These fields now provide the means to measure high-side current in applications where it has not been physically or economically feasible.



Hall-effect current sensors measure the strength of the magnetic field generated by the current flow through a shunt path, producing an output relative to the amount of current. They also provide electrical isolation between the voltage of the sensed current and the output of the sensor.

Hall-effect devices are named for Edwin Herbert Hall. He found that if you place a conductor carrying an electric current in a magnetic field, a voltage is induced across the conductor at right angles to the current flow. The strength of that induced voltage indicates the relative strength of the magnetic field.

In Hall-effect sensors, current to be measured passes through a shunt path. This path is extremely low resistance, typically only a few milliohms. The shunt produces little insertion loss when placed in a current path, so it works well with high-current, low-voltage circuits.

The Hall-effect sensor and calibration electronics sit in a small notch next to the shunt. A ferrite core wrapped around the shunt and Hall-effect sensor completes the magnetic path and helps concentrate the magnetic field through the sensor.

The sensor produces an output voltage directly related to the strength of the magnetic field generated by the current flowing through the shunt. Many such sensors operate from a single 5-Vdc supply so their output does not need level shifting before connecting to an a/d converter, microprocessor, or microcontroller.

Hall-effect current sensors are virtually immune to environmental contaminants. They're rugged and suitable for use under severe conditions. These devices work well with dc motors, automotive applications, robotic, and heavy-machinery sensing applications, or any applications in harsh environments. There is no electrical connection between the current path and sensor and, unlike current transformers, Hall-based sensors measure dc as well as ac currents. **MD**

Edited by Robert Repas