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## ***Functionally Isolated Modulators Enable Precise Motor Control In Robots***

[Texas Instruments'](#) AMC0106M05, AMC0136 and AMC0106M25 are described as the industry's first functionally isolated modulators and are intended to help designers achieve more precise motor control in compact robot designs. The isolated modulators enable increased precision and higher resolution of 12 to 14 effective number of bits (ENOBs) for accurate and reliable phase current sensing and dc voltage sensing measurements (Fig. 1).

Offered in small leadless packages, the modulators help designers achieve smooth torque operation and fine motor control, while decreasing size and cost in low-voltage (<60-V) robotics designs. See Figs. 2 and 3.

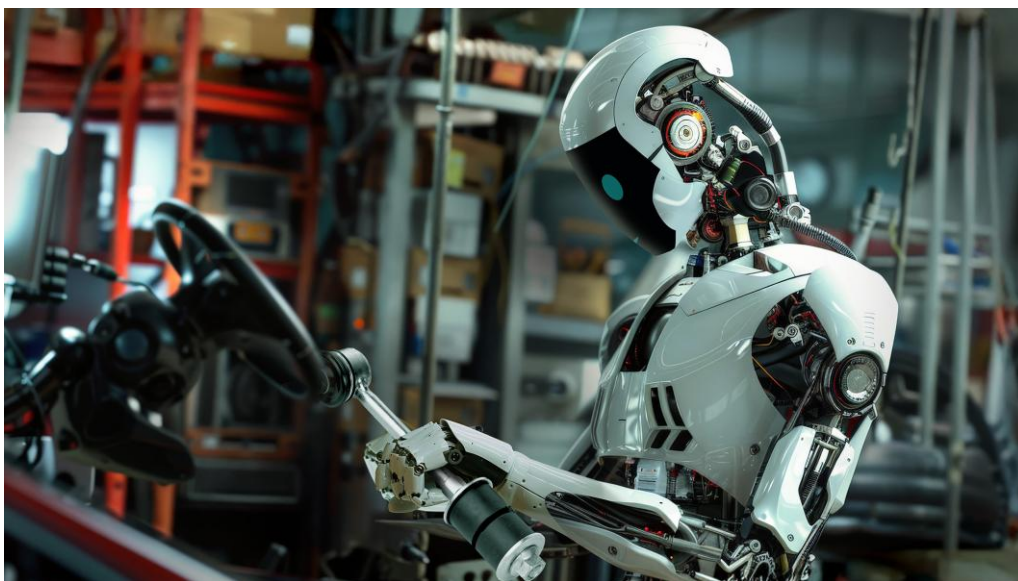
Engineers today are challenged to design smarter robots to perform more-detailed tasks. The galvanically isolated modulators enable robotics engineers to achieve precise motor control and system protection in smaller, more sophisticated designs. This precision makes it possible for robots to complete a variety of complex tasks, such as threading a needle or handling small nuts and bolts.

In addition, the small size of the modulators—measuring just 3.5 mm x 2.7 mm—requires 50% less board space than competing reinforced isolation solutions, says TI. With this decrease in size, designers have more space to incorporate additional features that support precise control and reliable operation in compact robot applications.

"These modulators from TI enable designers to increase robotics accuracy and productivity in new use cases and smaller form factors, from the factory floor to the operating room," said Karthik Vasanth, vice president and general manager of Data Converters and Clocks at TI. "For example, where humanoid robots could previously only complete simple tasks, our new functionally isolated modulators now allow them to carry out more dexterous and precise jobs."

Production quantities of the new functionally isolated modulators are available now on TI.com in an 8-pin very thin small-outline (VSON) package. To support designers, evaluation modules for all three modulators are available, as well as reference designs and simulation models.

For more information about the modulators, see the technical article, "[How Advanced Current and Voltage Sensing Enable Ultra-Precise Robotics](#)" or see the [AMC0106M05](#), [AMC0136](#) and [AMC0106M25](#) product pages.



*Fig. 1. As robotics expands to more complex applications—from manufacturing to medicine—the demand is rising for more precise, smaller and high-performance designs to enable the next-generation of robots. TI's functionally isolated modulators will help engineers achieve more precise motor control and reliable operations for compact and powerful robotic applications. These small modulators reduce board space by 50% and deliver higher resolution for accurate and reliable current and voltage sensing.*

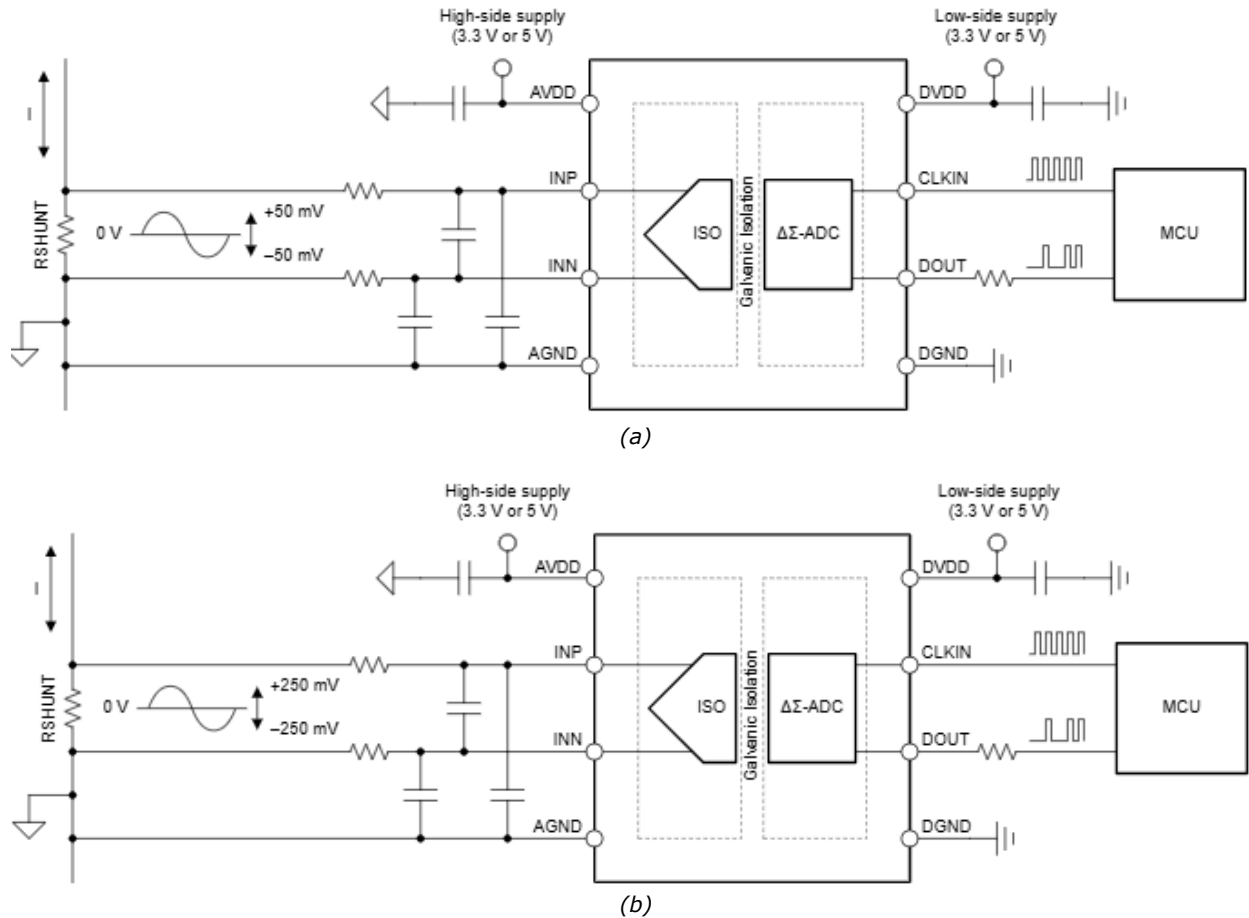


Fig. 2. Intended for current sensing, the AMC0106M05 (shown in a) is a precision, functionally isolated, delta-sigma modulator with a  $\pm 50$ -mV input voltage range, while the AMC0106M25 (shown in b) is a similar device with a  $\pm 250$ -mV input voltage range. The isolation barrier separates parts of the system that operate on different common-mode voltage levels. With both devices, the isolation barrier supports a working voltage up to 200 Vrms or 280 Vdc and transient overvoltages up to 570 Vrms or 800 Vdc.

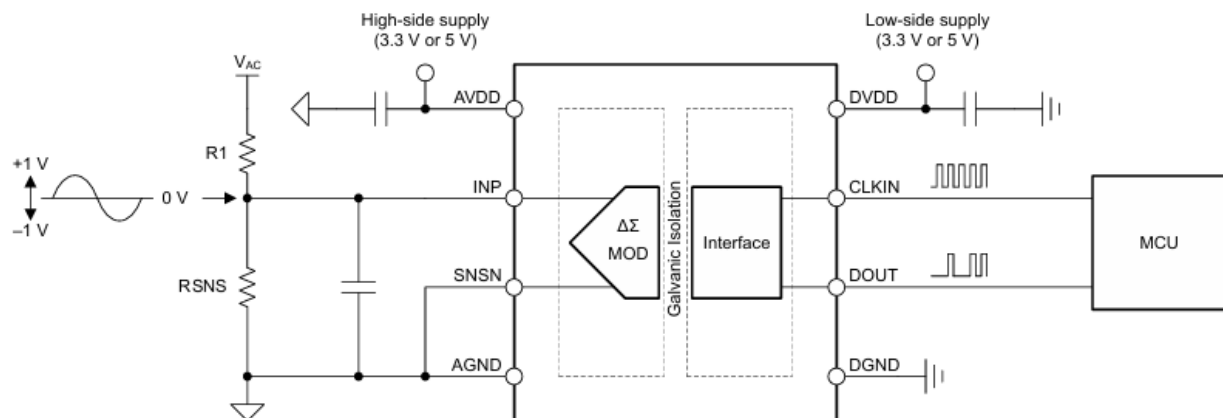


Fig. 3. The AMC0136 is a precision, galvanically isolated delta-sigma ( $\Delta\Sigma$ ) modulator with a  $\pm 1$ -V, high impedance input and external clock. The high impedance input is optimized for connection to high impedance resistive dividers or other voltage signal sources with high output resistance.