

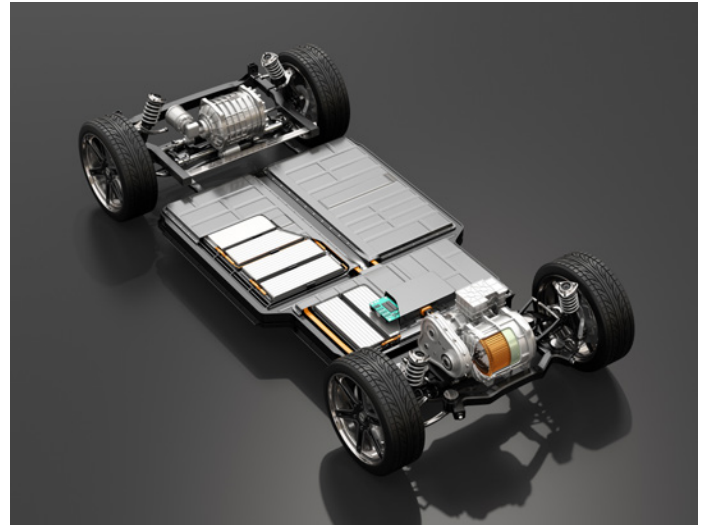
AC Current Sensors

CCSNP1000

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Efficient sensing for motor current is critical to electric vehicles (BEVs, HEVs and PHEVs). Although current sensors are needed throughout an EV to enable a range of functions, the AC current sensor is key to controlling AC motors. The packaging of these single or multiphase sensors can cause roadblocks in a vehicle's development process as there is limited space to mount them.

We provide customized solutions to meet a wide range of performance needs based on our established modular design building blocks. CTS current sensors are accurate within $\pm 2.5\%$ at 800-1500A, and solutions can be tailored to fit unique needs. Our AC current sensors provide a cost-effective solution for high-amperage AC drive motors, even with customized packaging and mounting options.



Engineered per customer application design, the current range is scalable up to 1500A or more. Designed using Hall-effect technology, these sensors provide a consistent, high-performance signal in a light weight, streamlined solution. Regardless of your busbar arrangement or other housing requirements, our engineers can build a sensor to exact specifications, guaranteeing that it will fit your motor.

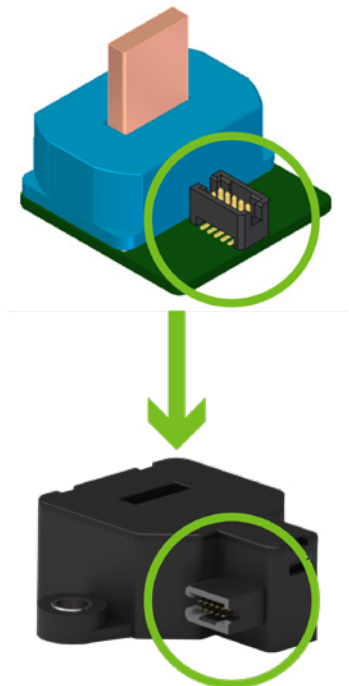
APPLICATION

CTS engineers collaborate with our customers to create unique solutions. One customer had a challenging request, a highly accurate current sensor that could operate at 1,000A while being able to fit in a very limited space. This customer had already designed a motor in a way that worked best for their vehicle, however, none of the off-the-shelf sensing solutions they explored would fit.

Our engineering team worked hand in hand with the design engineers to create a customized casing to fit their application. This enabled the current sensor to be properly mounted and fastened with their busbar arrangement, including mounting tabs with screws, a snap-fit, and being soldered into the PCB.

From concept development to high-volume production at one of our global manufacturing locations, CTS provides design and development support for your AC current sensor needs. The EV market continues to evolve, so as your current sensors evolve with it, CTS can partner with your team to create a unique solution.

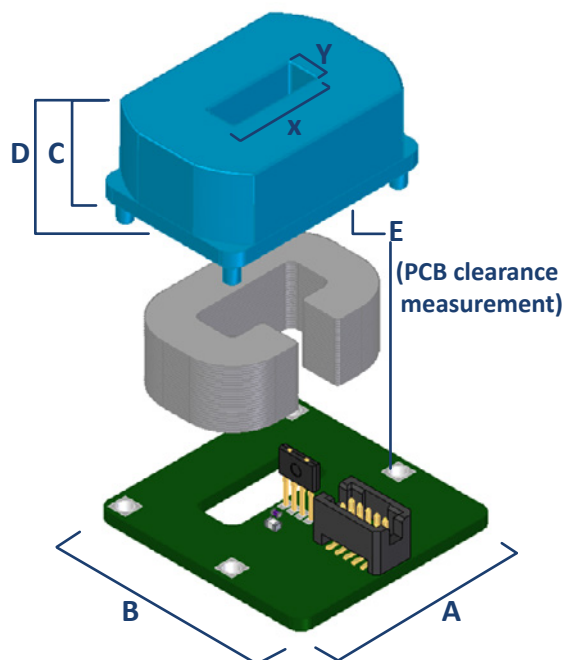
We have been a trusted supplier of automotive sensors to major OEMs for a wide range of safety and powertrain applications since the 1970's, and first entered the EV space with the creation of our DC current sensors. With over 100 million automotive sensors in the field, we have the engineering expertise and production capabilities to support a wide array of applications.



The graphic depicts the change in connector orientation and casing shape.

DESIGN PROCESS

Current Sensor Example	
Current Range	±1000A (full scale) ±900A (normal operation)
Sensor Output accuracy	±2.5% within ±900A range ±5.0% beyond ±900A range
Operating Temperature	-40°C to +150°C
Bus Bar Dimensions (X + Y)	12mm x 3mm
Supply Voltage	5±0.5 Vdc
Flammability Requirement	UL94 V-0
Connector	Surface mount, right angle, wire harness, solder pins, etc.
Application Mounting and Fastening	Mounting tabs with screws, soldered into PCB, snap-fit, etc.
Dimension A	29mm
Dimension B	38.3mm
Dimension C	11.5mm
Dimension D	17.1mm
Dimension E	1.6mm



Breakdown of an example current sensor.
Sensors are completely customizable.

AUTOMOTIVE EXPERTISE

CTS Corporation began expanding into the automotive market in the early 1970's, when the U.S. government first issued requirements for controlling automotive emissions. To meet the new demand for throttle positioning sensing and exhaust gas recirculation controls, we developed custom under-the-hood and chassis position sensors. Over the last forty years, CTS has grown into a variety of transportation markets, including commercial and off-road vehicles, heavy equipment, and motorcycles. Today, we are a leading provider of sensing solutions, smart actuators, and pedals.

Our sensors are found throughout vehicles designed by the world's top manufacturers to monitor speed, throttle position, electrical current, and a variety of other safety and efficiency-related areas. With the emergence of electric vehicles (EVs) and consumer demands for smart features, CTS began designing solutions to fit the needs of this rapidly evolving market, including DC and AC current sensors. Our technology is also behind many interior sensors, to detect seat belt tension and seat track position.

ABOUT CTS

Founded in 1896, CTS Corporation (NYSE: CTS) is a leading designer and manufacturer of sensors, actuators, and electronic components. A solution provider to OEMs in the aerospace, communications, defense, industrial, information technology, medical, and transportation markets, CTS provides advanced technology, exceptional customer service and superior value to industry partners. Located in the Americas, Europe, and Asia, we aim to deliver innovative sensing, connectivity and motion solutions for the creation and advancement of products and services around the world.

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