

Battery Charger Extends Backup Battery Life In Automotive eCall Systems

[Intersil](#)'s ISL78693 is a 3.6-V single-cell battery charger IC that extends the life of lithium iron phosphate (LiFePO₄) batteries used in automotive emergency call (eCall) systems. According to the vendor, the battery charger IC offers up to 4x lower leakage current (3 μ A) than competitive chargers, allowing the eCall backup battery to remain charged for a longer period of time.

Automakers worldwide are installing eCall in their Vehicle to Infrastructure (V2I) systems. In the event of a crash, the eCall system automatically broadcasts its location via GPS and contacts the nearest 24-hour emergency call center for help. Thus, V2I eCall systems must be capable of operating reliably and autonomously from the backup battery at a moment's notice, even if the vehicle is involved in an accident minutes after being parked for several months.

The ISL78693 is designed to support emerging worldwide eCall systems such as Japan's D-Call Net trial, which saves additional life-saving seconds by automatically transmitting vehicle data to an emergency call center that assesses collision severity and dispatches ground or air-ambulance help. Europe's eCall initiative also brings immediate assistance to motorists involved in a collision, and both ERA-GLONASS in Russia and OnStar in the United States provide safety and ambulance call services.

The charger's battery temperature monitoring and low 3.6-V output voltage helps safeguard and extend the life of popular LiFePO₄ batteries. According to Intersil, the ISL78693 offers a much simpler and easier to use solution than the competition, requiring only five external passive components to program the full charging platform (Fig. 2.) The ISL78693's 3-mm x 3-mm 10-pin DFN package easily fits on space-constrained PCBs, creating a very robust, small footprint design. It also offers a unique charge current thermal foldback feature that prevents overheating by automatically reducing the battery charging current to enhance reliability (Fig 3.)

"Carmakers want an automotive-qualified battery charger that prevents rapid discharging of the backup battery during a traffic accident or when the vehicle is parked for an extended period of time," said Philip Chesley, senior vice president of Precision Products at Intersil. "The ISL78693 leverages Intersil's innovative power management technology to deliver a solution that provides the industry's lowest leakage current and a charging profile optimized for eCall applications."

This complete charger for single-cell lithium chemistry batteries also offers the following specifications and features:

- Reverse battery leakage of 700 nA (typ) and 3 μ A (max) over -40°C to +85°C increases duration the backup battery remains charged when Vin supply is off.
- Up to 1-A programmable charging current, allows tradeoff of battery charging time against heat dissipation and expected battery lifetime.
- Guaranteed operation down to 2.65 V after start-up, preventing shut off during cold-crank start.
- 1% initial voltage accuracy provides precise control of charging level to extend operating lifetime of battery.
- Integrated power transistor and current sensor.
- 10% trickle charge preconditions fully drained battery until it reaches 2.6-V minimum charge level.
- NTC thermistor input protects battery by monitoring temperature and shuts off charger when battery is outside the specified charging temperature.
- Accepts constant current/constant voltage (CC/CV) types of voltage adapters or USB power.
- AEC-Q100 Grade-3 qualified.

The 3.6-V ISL78693 is pin-compatible with the 4.1-V ISL78692 Li-ion battery charger. Either charger can be combined with the ISL78268 55-V synchronous buck controller, ISL78201 2.5-A synchronous buck/boost regulator, ISL78206 2.5-A synchronous buck regulator, and ISL78233 3-A synchronous buck regulator to provide a full power supply solution from 12-V lead acid battery to eCall battery.

Available now, the ISL78693 battery charger is offered in a 10-pin, 3-mm x 3-mm DFN package and is priced at \$0.99 each in 1,000-piece quantities. An ISL78693EVAL1Z evaluation board is also available for \$56. For more information, visit www.intersil.com/products/isl78693.



Fig. 1. With its very low 3- μ A leakage current, the ISL78693 single-cell battery charger IC extends the runtime of lithium iron phosphate backup batteries used in automotive emergency call (eCall) systems.

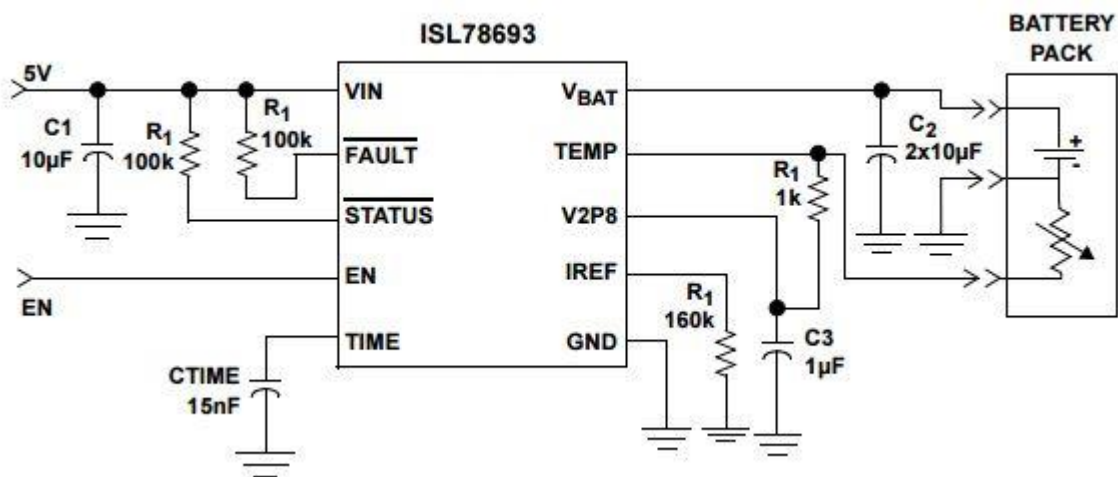


Fig. 2. The ISL78693 offers simplicity and ease of use, requiring only five external passive components to program the full charging platform. This charger is designed to work with various types of ac adapters or a USB port.

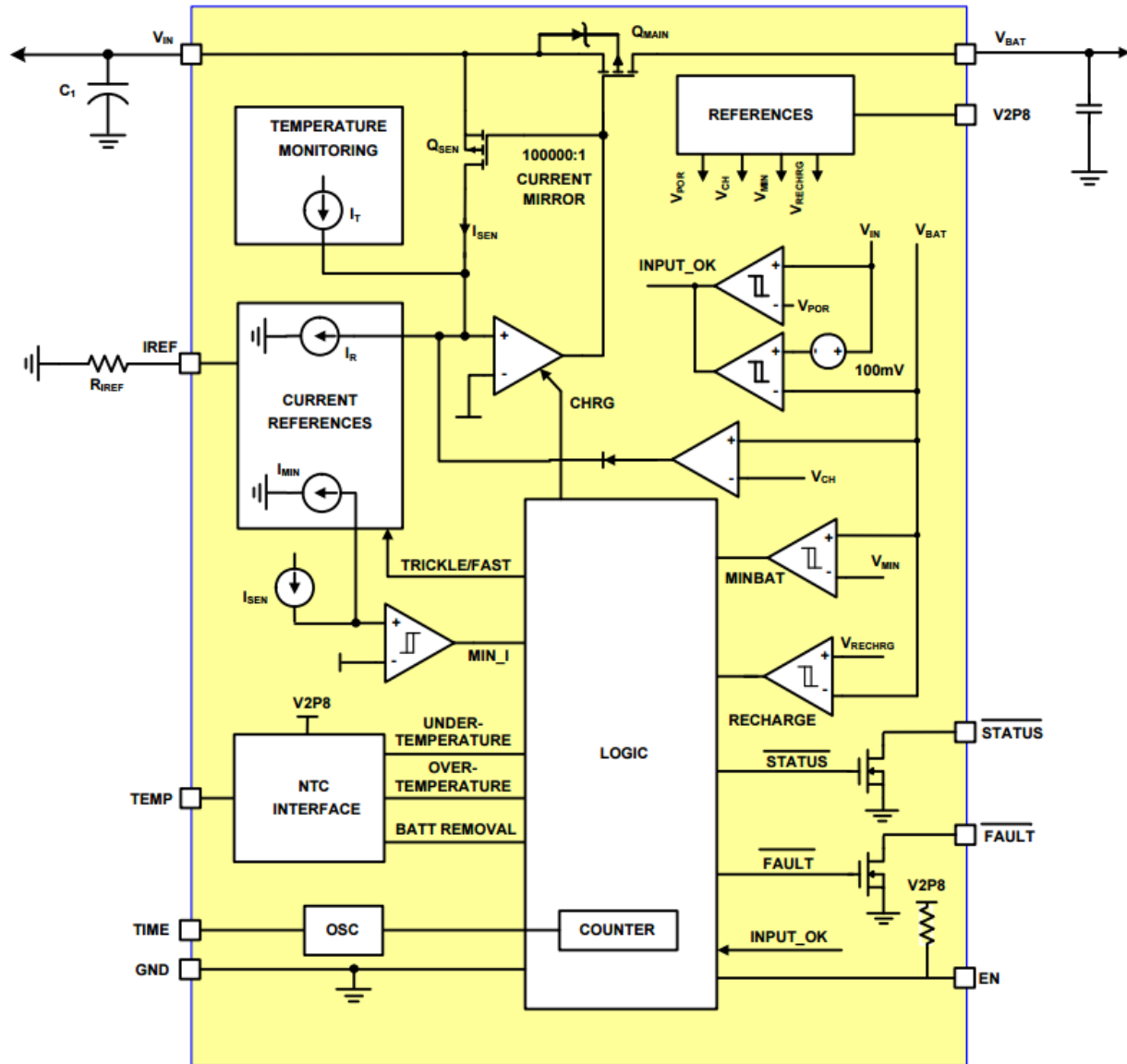


Fig. 3. The ISL78693 is complete charger for single-cell lithium chemistry batteries. In addition to its other capabilities, it features a unique charge-current thermal foldback that prevents overheating by automatically reducing the battery charging current to enhance reliability.