ISSUE: June 2025

Laser Driver ICs Combine Power And Firing Functions For LiDAR Systems

Silanna Semiconductor's FirePower series laser driver ICs significantly reduce the size and increase the peak power of LiDAR applications. The ICs are said to be the first to combine charging and firing on a single chip. This enables a significant reduction in size and losses as well as the removal of several components from the PCB to reduce the component count and BOM cost (Fig. 1.)

The integration also creates the ability to develop high-performance laser-based applications that deliver unmatched pulse power and precision, according to the vendor. For example, using the IC enables a 400-W quad EEL (edge-emitting laser) module to shrink from 400 mm^2 to 80 mm^2 (an 80% improvement), while enabling a 73% improvement in V_{IN}-to-laser efficiency.

The first product to be launched in the FirePower family is the SL2001, a 14-pin 3.5-mm^2 IC with a sub-2 ns FWHM laser pulse and dual drive for peak-power outputs of up to 1000 W (Fig. 2). The device has high charging efficiency and operates from a supply range of 3 V to 24 V to fire either EEL diodes or VCSELs (vertical cavity surface emitting lasers) with a pulse repetition frequency of over 10 MHz.

The SL2001 also has a differential Laser Fire output indication with a sub 0.1-ns peak-to-peak jitter. Built-in laser output power sensing and control enables the SL2001 to meet eye-safety requirements. The device also uniquely, according to the vendor, implements programmability via an I^2C interface and multi-time-programmable ROM, removing the need for an on-PCB MCU. The SL2001 can track and respond to both input voltage and resonant capacitor voltage.

The IC is targeted at LiDAR and other time-of-flight sensing systems used in industrial manufacturing and automotive systems.

Product marketing director Ken Boyden said, "LiDAR and similar laser-based applications have traditionally relied on third-party power supply regulators to meet the high-voltage requirements of resonant pulsed laser systems. The FirePower family is the first to consolidate both highly efficient high voltage charging and high-power firing on a single chip. As the first product in the FirePower family, the SL2001 sets new benchmarks for performance and efficiency, while reducing component count and BOM cost."

The SL2001 is available in a 1-mm x 3.5-mm WLCSP Package and is available immediately as an evaluation kit or in sample quantities. For more information, see the product brief.

Fig. 1. FirePower is the described as the first high-performance laser driver design to integrate both power and firing functions in a single chip. This frees up board space while delivering performance and cost savings to accelerate future laser and LiDAR innovation. FirePower technology enables finely adjusted power output and pulse width to ensure the highest level of precision and safety in a variety of devices.

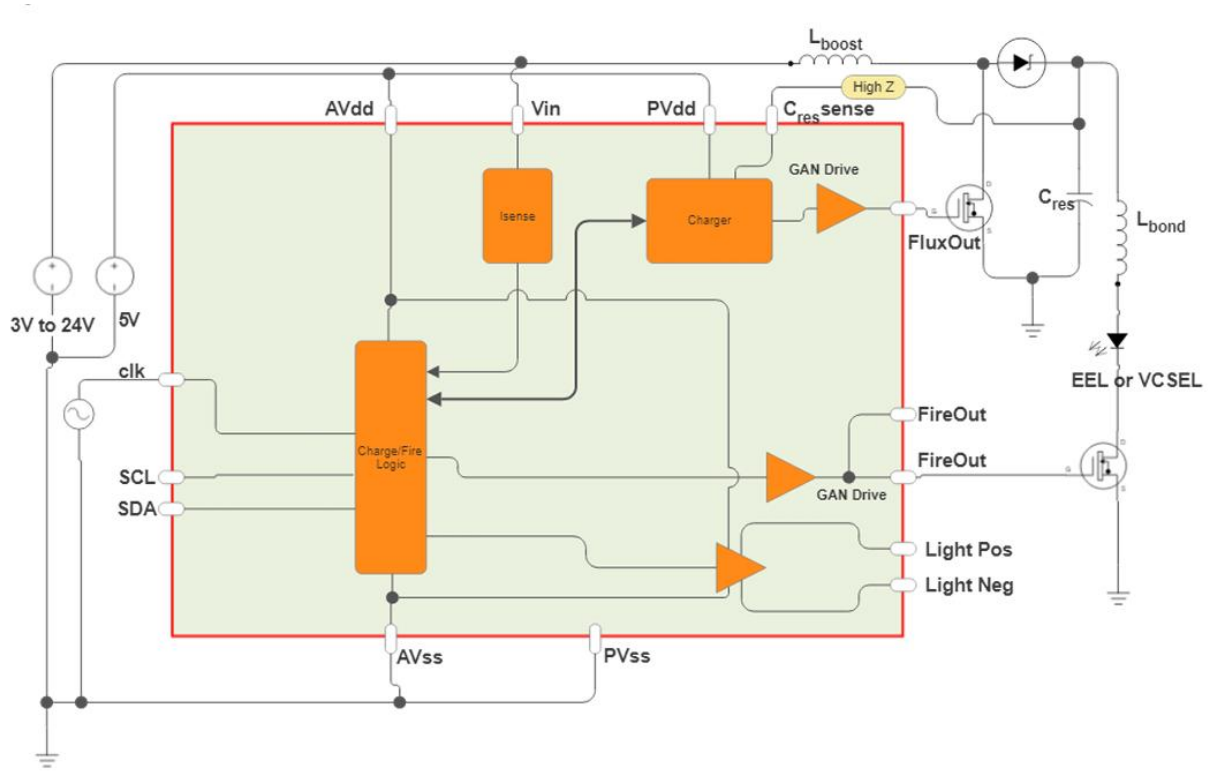

Fig. 2. Typical application circuit for the SL2001 laser driver IC, the first member of the FirePower series. Measuring 1 mm x 3 mm, the SL2001 is an integrated timing controller and driver for laser time-of-flight measurement systems employing edge-emitting laser diodes or VCSEL arrays.