



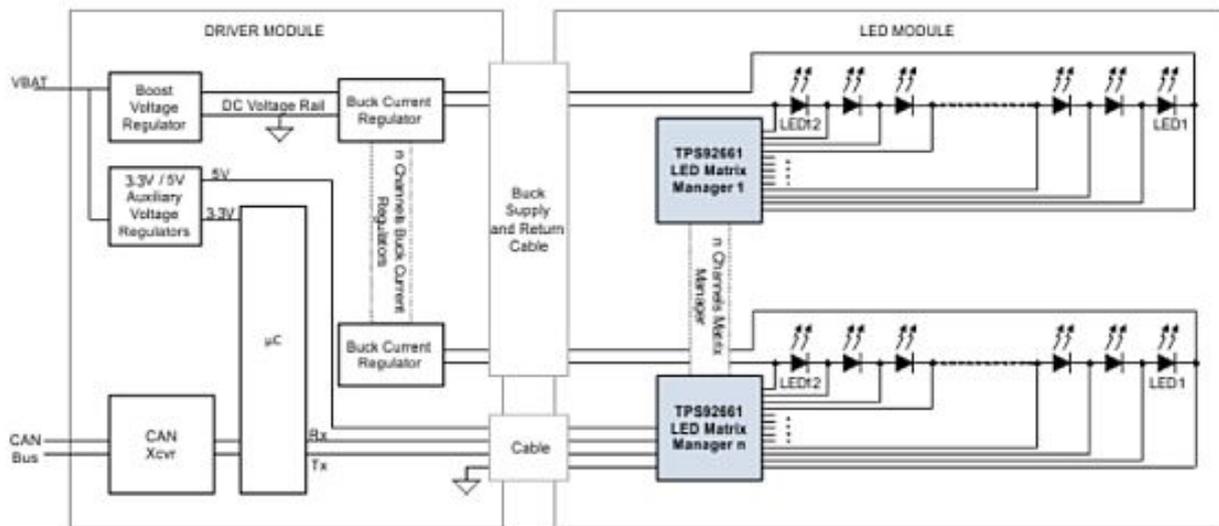
[Multi-LED matrix manager enables simpler, lower-cost adaptive headlights](#)

[Lee Goldberg](#) - November 05, 2014

Texas Instruments' [TPS92661-Q1](#) LED matrix manager is a welcome (and well-timed) entry into the automotive electronics market because it will help designers address some of the important technical and economic challenges associated with LED-based headlights. It's also likely that the elements which enable the device to precisely control up to 96 high-brightness LEDs will help find it applications beyond its intended market in many non-automotive lighting products.

LED headlights have become one of 2014's most sought-after automotive features for many good reasons. HBLEDs can also be arranged in switchable arrays whose light quality rivals HID systems and are much easier to dim. Addressable HBLED arrays also allow stylists to create eye-popping photonic accents within the headlight housing, or even on other parts of the car's body. Even more important (at least to sensible consumers), using HBLED arrays in headlights opens up new possibilities for so-called adaptive lighting systems which adjust their output, light pattern, and even "steer" their beams to light your way into turns. But since these capabilities come at a cost, namely bulky, complex and costly control circuitry, adaptive lighting has been mostly confined to premium-level vehicles.

TI's TPS92661-Q1 helps designers reduce the size and cost of adaptive automotive headlight control systems by integrating a complete high-brightness LED matrix manager. capable of controlling up to 96 LEDs from a single serial port. The device includes uses a shunt FET dimming matrix of 12 individually controlled MOSFET switches which can steer current through or around the connected LEDs (see the block diagram below). Each of the 12 channels has its own 10-bit pulse-width modulation (PWM) brightness control, which can be addressed via a serial communication port by a master microcontroller. Naturally, TI recommends its [AEC-Q100-qualified C2000 Piccolo MCU](#) , but the serial interface makes it easy to use a Freescale, Siemens, or other automotive-rated MCU.



A peek inside the TPS92661-Q1

Designers can put the TPS92661-Q1 's pixel-level intensity control capabilities to work in headlamp beam forming and beam steering systems, as well as other special effects which enhance a vehicle's safety and appearance. The controller also includes LED open/short fault diagnostics and reporting alerts driver via the master microcontroller in the event of headlamp failures or damage.

TI may not realize it yet, but these same capabilities could also be exceptionally valuable in other applications. For example, boats, aircraft and off-road vehicles can also benefit from adaptive lighting. And it's easy to imagine streetlights, outdoor lighting systems which can adjust their intensity and beam pattern to external light conditions and changing traffic patterns or the requirements of a particular event. I think that the technology used in this LED controller may have great potential for use in a new generation of theatrical lighting equipment and perhaps even in lights used in sports venues.

Available now in volume from TI and its authorized distributors, the TPS92661-Q1 is offered in a 48-pin HTQFP package and is priced at US\$3.70 each in 1,000-unit quantities.

For more information, samples and evaluation modules, visit www.ti.com/tps92661-q1. You can also order the TPS92661EVM-001 evaluation module which demonstrates the individual PWM dimming control of each LED [by clicking here](#).