

Toshiba Launches Charge Pump White LED Driver With Constant Current Regulator

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Toshiba America Electronic Components, Inc. (TAEC)* today announced a new charge pump DC/DC converter IC that drives the white light-emitting diodes (LEDs) used to backlight liquid-crystal display (LCD) panels and illuminate keypads in portable devices such as cell phones, PDAs, MP3 players and digital cameras. Specially designed for constant current driving, TCA62735FLG can drive up to four white LEDs with uniform brightness. Mass production is scheduled to start this month with a monthly production volume of three million units.

“A wide range of portable applications from cell phones to MP3 players increasingly use white LEDs for LCD panel backlighting and keypad illumination. In response, Toshiba Corporation engineered the TCA62735FLG white LED driver to provide an efficient solution in electrical performance with constant current output for up to four white LEDs,” said Andrew Burt, director of the Wireless Business Unit at TAEC. “The optimized design minimizes total circuit size, contributing to the portable equipment’s small form factor.”

The TCA62735FLG incorporates a power circuit and 4-channel fixed current output in a single chip and can drive fixed current to a total of four white LEDs, one for each output. It has a total output current capacity of greater than 120 milliamperes (mA) across all four channels. It achieves high-precision current regulation of 2.5 percent between the four channels and all four white LEDs attain identical brightness. Since TCA62735FLG monitors the power supply voltage and output pin voltage, it automatically switches the optimum step-up scaling factor in

the LED load from 1.5 times to 2 times. Toshiba designed this device to minimize the efficiency degradation resulting from power supply voltage fluctuations, which was a weakness of older generation charge pump DC/DC converters. The switching frequency of 1 megahertz (MHz) makes it possible to select a small external component. The TCA62735FLG is housed in a space-saving 4mm x 4mm standard QFN16 package.

Main Features

- Has an output current capacity that supports power supply voltage of 2.8 to 5.5 volts (V) and can provide more than 120mA to a total of four channels
- Features on-chip fixed current output with standard current precision of 2.5 percent between outputs; configurable with a single external resistor
- Provides a built-in, over-output voltage protection circuit
- Provides a built-in soft start function
- Has shutdown consumption current of 1 microampere maximum (rated 0 typical)
- Achieves power-efficiency of 70 percent or greater (rated at a power supply voltage of 3.6V, output current of 120mA and white LED forward voltage of 3.6V)
- Achieves power-efficiency of 90 percent or greater (rated at a power supply voltage of 3.6V, output current of 80mA and white LED forward voltage of 3.2V)

Development Background

Previous product generations of charge pump type DC/DC converters that only output voltage were characterized by wildly changing LED current values due to fluctuating white LED forward voltage drop (Vf).

As well, these devices had difficulty achieving uniform brightness. When the relative ratio between the output voltage and white LED V_f was not suitable, reduced efficiency resulted. By employing a constant current driver, this new product can provide uniform brightness across all four LEDs. Since it automatically switches the optimum step-up scaling factor, it can attain high efficiency in lighting the white LEDs.

Samples are currently available and volume production is scheduled to begin this month. Pricing is \$0.96 each in 1,000-piece quantities. An evaluation kit to speed designs is also available.

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