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Catalyst – Novel step-down switching regulator circuit architecture patented

A patent for a novel step-down switching regulator circuit architecture, applicable to step-down regulators for driving high brightness LEDs, has been received by Catalyst Semiconductor. The patent, titled 'LED current bias control using step-down regulator' (patent number 7,323,828), was developed to simplify the design of high-brightness LED lighting in emerging household, commercial and automotive lighting applications.

The patent is embedded in the company's new line of inductor-based, step-down LED drivers, which bridge the gap between the two traditional choices for LED driver design: simple-to-use, but power-hungry linear regulators; and switching regulators, which offer lower power dissipation, but are more complex and difficult to implement. The new patent enables a simpler, smaller, more cost-effective and far more power-efficient 'green' LED driver alternative to linear regulators, says the company.

"When using this new step-down switching scheme, the designer simply selects a control resistor and the patented switching regulation scheme provides an inherently stable and accurate LED bias across a wide range of voltage operating environments without the complicated equations or calculations associated with alternative LED switching regulators," said Anthony Russell, Catalyst's power management director and co-inventor of the patent.

Traditional switching regulators operate in both continuous conduction mode (CCM) and discontinuous conduction mode (DCM), making them intrinsically complex. Catalyst's patented step-down switching regulator architecture operates at the precise intersection between CCM and DCM, the point Catalyst calls crossover conduction mode (XCM), to offer a simpler and more power-efficient solution. Catalyst's XCM architecture enables efficient operation over a wide range of high voltage system supplies, versus linear regulators which operate efficiently over a very small supply voltage range. Additionally, the XCM operation offers unconditional stability and eliminates the need for high-power current sense resistors and associated

interface pins, reducing size, complexity and cost.

The first product to incorporate Catalyst's step-down switching regulator architecture is its CAT4201, a high-efficiency 7W buck LED driver optimized for driving high-brightness, 350mA LEDs at up to 94 percent efficiency, says the company.

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