Reference Design Enables Flicker-Free TRIAC Dimming for LED Downlights

Power Integrations, a leader in high-voltage integrated circuits for LED lighting, introduced a new reference design (DER-281 [1]) detailing an 85%-efficient, 15 W PAR38 downlight driver that delivers flicker-free dimming without the use of unreliable high-voltage electrolytic bulk capacitors. Based on Power Integrations' LNK405EG, a member of the company's popular *LinkSwitch-PH* [2] family of LED driver ICs, the design's novel approach to dimming eliminates the need to sacrifice reliability and efficiency in order to achieve flicker-free performance across a broad range of TRIAC dimmers.

Typical TRIAC dimmers were designed for incandescent lights that use an order of magnitude more power than LED lights of equivalent lumen output. The low current requirement of LED lights, especially when dimmed, can cause TRIACs to switch off unexpectedly or oscillate, creating an annoying flickering effect. Early-generation LED lighting designs addressed this problem either by storing energy in an unreliable electrolytic bulk capacitor, adversely affecting bulb lifetime, or by allowing a continuous flow of current into the bulb, wasting energy and thereby defeating the main benefit of LED lighting. Single-stage *LinkSwitch-PH* [2] ICs, combined with the innovative active damping and bleeding circuitry employed in DER-281 [1], eliminate these pitfalls, providing flicker-free dimming with high efficiency and long lifetime.

"Early adopters of LED lighting have often been disappointed by bulbs that fail because of flawed two-stage drivers reliant on electrolytic bulk capacitors," said Andy Smith, product marketing manager at Power Integrations. "A more robust driver technology is essential as lighting systems become long-lived appliances, rather than disposable items. We believe that the advanced, single-stage approach embodied in DER-281 [1] meets every one of the LED designer's checkboxes – it is

highly efficient, accurate, and meets all PFC and harmonic content rules. It's also long-lived and compatible with existing home dimmers."

The reference design report [1] can be downloaded for free on the Power Integrations' website
at http://www.powerint.com/sites/default/files/PDFFiles/der281.pdf [1].

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