Accurate PWM LED Dimming without External Signal Generators, Clocks or μControllers

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LEDs can be dimmed in two ways: analog and pulse-width modulation (PWM) dimming. Analog dimming changes LED light output by simply adjusting the DC current in the string, while PWM dimming achieves the same effect by varying the duty cycle of a constant current in the string to effectively change the average current in the string. Despite its attractive simplicity, analog dimming is inappropriate for many applications because it loses dimming accuracy by about 25%+ at only 10:1 brightness levels, and it skews the color of the LEDs. In contrast, PWM dimming can produce 3000:1 and higher dimming ratios (at 100Hz) without any significant loss of accuracy, and no change in LED color.

The LT3761 combines the simplicity of analog dimming with the accuracy of PWM dimming by generating its own PWM signal. High dimming ratios are possible by adjusting a simple DC signal at its dimming input—no additional PWM-generating microcontrollers, oscillators or signal generators are required. The LT3761’s internal PWM signal can produce 25:1 dimming, while it can still deliver up to 3000:1 dimming with an external PWM signal.

HIGH POWER LED DRIVER

The LT3761 is a high power LED driver similar to the LT3755-2 and LT3756-2 family. It is a 4.5V-to-60V input to 0V-to-80V output single-switch controller IC that can be configured as a boost, SEPIC, buck-boost mode or buck mode LED driver. It has a 100kHz to 1MHz switching frequency range, open LED protection, extra internal logic to provide short-circuit protection, and can be operated as a constant voltage regulator with current limit or as a constant-current SLA battery or supercap charger.

Figure 1 shows a 94% high efficiency 60V, 1A (60W) 350kHz automotive headlamp application with PWM dimming. The LT3761 uses the same high performance PWM dimming scheme as the LT3755/LT3756 family, but with the additional feature of the internally generated PWM dimming signal and no additional pins.

INTERNAL PWM DIMMING GENERATOR

Unlike other high power LED drivers, the LT3761 can generate its own PWM dimming signal to produce up to 25:1 dimming. This enables it to produce accurate PWM dimming without the need for external PWM-generating components. The
The LT3761 generates its own PWM signal to achieve accurate PWM dimming, but with the simple control of analog dimming. High dimming ratios are possible by adjusting a simple DC signal at its dimming input—no additional PWM-generating microcontrollers, oscillators or signal generators are required.

**CONCLUSION**

The high power and high performance LT3761 LED driver has its own onboard PWM dimming signal generator that is both accurate and easy to use. ■