

Application Note

LED Lighting Solutions



The explosion in LED lighting usage is plain to see all around us. From kitchen recessed lighting to the latest LED backlights in LCD TV sets, the growth seems unstoppable. This is driven partly by environmental concerns forcing consumers and businesses to re-examine their energy expenses. Despite the current financial downturn, LED sales are still forecast to grow by an estimated 3 % in 2009.

Controlling the Current

LED drivers can be either linear or switching current supplies. Linear drivers are best suited when the supply voltage is slightly greater than the load voltage. Linear drivers use resistors to limit the current.

Switching supplies are often used for LED drivers as they are more efficient than linear supplies, generating less heat. Generally LED applications require a shielded inductor as they require fewer turns to achieve a specific inductance. This results in lower DC resistance. Less DC resistance is required for low energy consumption. Current Sense resistors provide the feedback necessary to the current regulation controller to monitor and limit the current fed to the LED diode string.

Overtemperature

Unlike filament and plasma-based lighting (light bulbs and neon), LEDs are very sensitive to heat. The PN junction should not be allowed to reach temperatures greater than +85 °C to ensure normal operating life times and as high reliability as possible.

Controlling the temperature of the LEDs to below +85 °C has proven to be critical to their life span. Polymer PTC thermistors limit current and react to increases in temperature by changing from a low-resistance state to a high-resistance state. This temperature regulation provides overtemperature protection for the LED as well as aiding in limiting current.

Surge and ESD

The mechanical housing for the placement of LED diodes can expose the LED device package to the outside world where external ESD transients may be applied. The ESD transients can damage the LEDs or the downstream circuitry. To help avoid damage, the use of ESD Protection devices (meeting IEC 61000-4-2 Level 4 ESD standard requirements) across the LEDs is required.

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Bourns' Solution

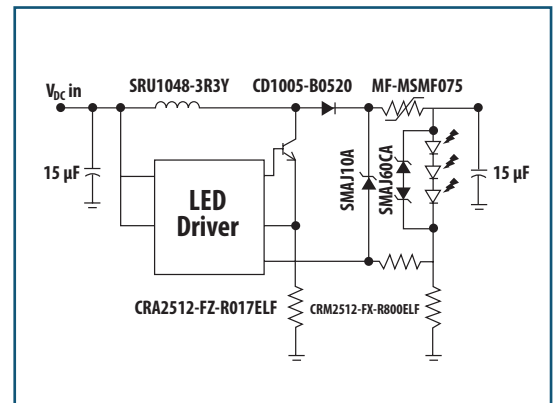
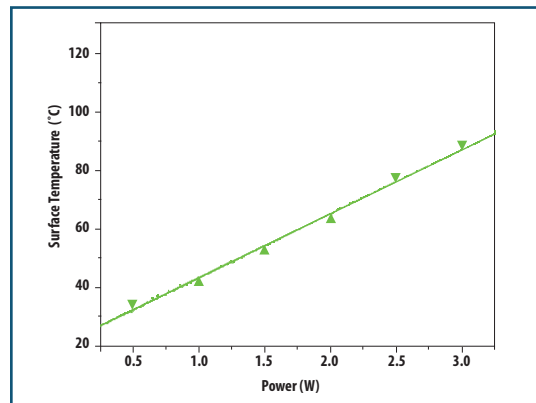
The SMAJxxCA series can provide voltage signal clamping and protection against ESD, EFT and Surge transients applied within the circuitry.

The SRU1048 series offers high-current handling and low DC resistance in a compact form factor.

The CRA2512 series are current sense resistors in standard 2512 chip sizes with a high-power density (3 W) and low TCR (75 PPM). The surface temperature of the resistor is lower than similar parts of the same size from other manufacturers, reaching typically 48 °C under a load of 1 W.

The PWR263S-20 series are SMD resistors in D2PAK casings with very low-inductance and high-power ratings. They can be used with linear current regulators to limit the current especially in high luminosity LEDs which consume a lot of current. These resistors also do not exhibit high surface temperatures which is a requirement in many designs.

The Bourns® MF-MSMF075 Multifuse® polymer PTC provides overcurrent and overtemperature protection.



Bourns® products are available through an extensive network of manufacturer's representatives, agents and distributors. To obtain technical applications assistance, a quotation, or to place an order, contact a Bourns representative in your area.

Specifications subject to change without notice. Actual performance in specific customer applications may differ due to the influence of other variables. Customers should verify actual device performance in their specific applications.

For more information on Surge and ESD protection and other products from Bourns, please visit

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