BOURNS®

Importance of Protecting Lighting Chip-On-Board LEDs from Thermal Runaway

APPLICATION BRIEF

Situation

Chip-on-Board (COB) LEDs are increasingly used in both residential and industrial lighting due to their high intensity and energy efficiency. However, COB LEDs and their associated power circuits (e.g., drivers) are prone to heat accumulation—especially when installed in sealed or insulated lighting fixtures. Overheating not only shortens the LED lifespan and affects luminous output, but also poses safety risks such as fire hazards and could threaten compliance with regulatory protection requirements such as UL 1598 thermal protection.

While many systems rely on software- or IC-based thermal sensing for protection, these solutions can fail under certain fault conditions. Therefore, a reliable backup solution is needed to help ensure safety and to meet stringent lighting safety standards.

Solution – Miniature Thermal Cutoff Devices Help Safeguard Lighting Systems

Bourns® Miniature Thermal Cutoff (TCO) devices—also known as mini-breakers—offer precise and very compact thermal protection for COB LED modules and drivers. By physically interrupting the circuit when a defined temperature is exceeded, these devices serve as a highly effective mechanism to help prevent thermal damage. These devices are especially beneficial in COB LED systems where consistent heat dissipation can be challenging.

Bourns® SE Series and SD Series Mini-Breakers can be integrated directly onto the LED module heatsink or driver PCB so they are able to respond quickly to localized temperature anomalies further aiding in safe and reliable lighting operation.

Bourns® SE Series and SD Series Mini-Breakers

Key Product Features

SE Series

- Ultra-compact design: Surface-mount package, footprint as small as 4.4 x 2.8 x 1.23 mm
- Precision trip accuracy: Tight ±5 °C temperature tolerance
- Resettable design: Rated for up to 6,000 cycles
- Compliance: RoHS, REACH, and UL/TÜV certifications
- Reliable ratings: DC 9 V / 25 A contact capacity
- Resistance: Ultra-low: (~2 mΩ)
- Max Voltage: DC 54 V / 5 A, 100 cycles

SD Series

- Compact design: Surface-mount package, as small as 6.95 x 3.75 x 1.4 mm
- Precise operation accuracy: +55 up to 150 °C, with a tight ±5 °C temperature tolerance
- Resettable design: Rated for up to 10,000 cycles
- Compliance: RoHS, REACH, and AEC-Q200/Automotive Grade
- Reliable ratings: DC 14 V / 8 A contact capacity
- Resistance: Ultra-low: (~2 mΩ)

Benefits

- Enhanced safety: Stand-alone and additional protection against overheating
- Precise operating temperature: Proven bimetal technology (trip and reset)
- Compact & flexible: Enables easy integration into modern slim lighting designs
- Long-term reliability: Provides high cycle durability and stable resistance
- Compliance ready: Supports product qualification under UL 1598 & other standards

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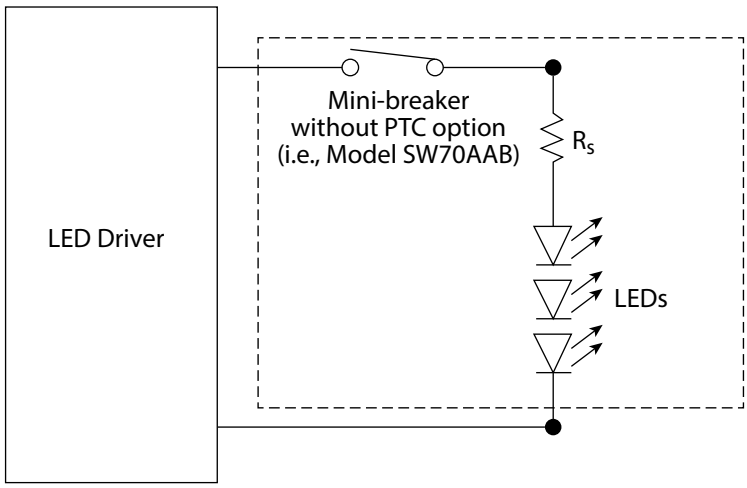
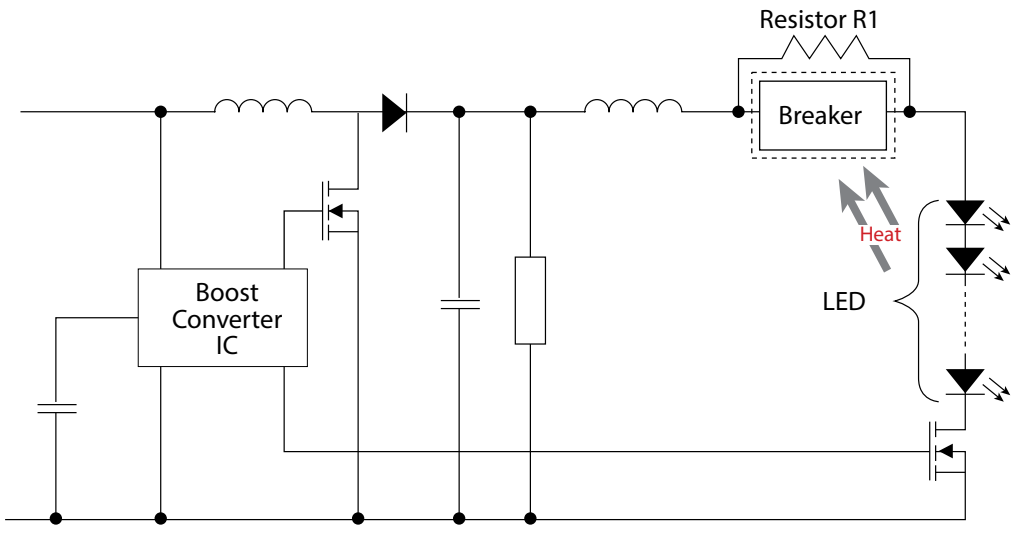
Use Cases



LED Protection Diagram



Headlight Protection Diagram (SD Only)

Conclusion

COB LED systems require dependable thermal protection to operate safely and efficiently in space-constrained and high-heat environments. Bourns® Mini-Breakers provide an ideal, ultra-compact protection mechanism that enables designers to meet both regulatory compliance and reliability goals in both residential and industrial lighting applications.

To learn more about the enhanced protection capabilities of Bourns® Mini-Breakers, please see: bourns.com/products/mini-breakers