



Beyond 85°C: Rethinking LED Design for High-Temperature Applications

As electronic systems become smaller, denser, and more thermally demanding, thermal design extends beyond processors and power semiconductors. Even small components such as indicator LEDs can contribute to the system-level reliability equation.

For equipment operating in elevated temperatures, the question is not simply whether an LED will illuminate, but whether its optical, electrical, mechanical, and material characteristics remain predictable throughout its intended operating life.

This is increasingly important in industrial automation, energy infrastructure, automotive electronics, transportation, and high-density computing—where temperature, space, and reliability constraints often intersect.

When Thermal Margin Matters

For many standard LED applications, 85°C is a common upper temperature specification. While sufficient for systems operating well below this point, it can leave limited thermal margin in hotter environments.

For example, an LED mounted on a control board inside an enclosure may experience temperatures above ambient due to PCB hot spots, nearby heat-generating components, limited airflow, continuous operation, and enclosure conditions.

Operating close to the maximum temperature rating also leaves less room for thermal cycling and changes in operating conditions over the product lifetime.

The goal, therefore, is not simply to stay below the maximum rating, but to understand the LED's actual thermal environment and design with adequate thermal margin.

The Value of an Additional 25°C

Kingbright's 2nd Generation High-Temperature LEDs are rated up to 110°C, providing an additional 25°C of rated temperature range.

An 85°C specification may be adequate for many applications, but it can become a constraint in sustained high-temperature environments.

That added range gives engineers greater flexibility when establishing thermal design margins and selecting LEDs for demanding operating environments.

Applications

- For high-temperature industrial use
- For high-density, compact environments
- Traffic signaling
- Backlighting
- Interior and exterior automotive lighting
- Substitution of micro incandescent lamps
- Signal and symbol luminaire for orientation
- Marker lights (e.g. Steps, exit ways, etc.)
- Decorative and entertainment lighting
- Indoor and outdoor commercial and residential architectural lighting

Download Brochure:

https://www.kingbrightusa.com/webimages/2nd_HighTemp_SMD_LED.pdf

