

Active Cooling for Commercial LED Thermal Management



Reputable Supplier

Delta is the world's largest manufacturer of fans and fan components serving companies such as 3M, Intel and Motorola.

Lifetime Fan Rating

70,000 hours continuous operation at 40°C with 15 ~ 65% RH

In case of fan failure, light will dim or shut off.

LED lighting products offer well-established advantages, including reliability, long life, energy efficiency and high luminous flux. Increasingly, engineers and designers are taking advantage of LED capabilities in more broad, mainstream applications, including street, stadium and warehouse lighting, as well as in manufacturing operations. Subsequently, the utilization of LED products in more complex and commercial applications has created new challenges for effective thermal management in LED design.

Thermal management is widely recognized as being critical for the optimal functioning of LED products. Without it, the life of an LED product is significantly shortened. Both passive and active cooling provide state-of-the-art design solutions. Historically, the use of products in smaller, less complex applications, demonstrated that passive cooling technologies were adequate. For example, heat sinks created more surface area for heat absorption. However, larger LED applications require a combination of passive and active cooling technologies, in order to supply necessary thermal management for the optimal performance and life of LED products.

Light Efficient Design reviewed various active cooling technologies and determined that fans currently provide the most reliable and effective convection cooling option. Fans force air into the environment, effectively lowering the ambient temperature, while pushing air across the heat sink and cooling efficiently. Fans have been successfully used by high-tech manufacturers, such as Apple, IBM and HP through several product generations. In servers, desktops, and laptops, fans have provided consistent, unobtrusive cooling in compact spaces.

Pete Joseph, president of Halcyon Electrical Designs and product engineer, agrees that a heat sink becomes more efficient when air is circulated. "Fan-based thermal management results in a more compact design that requires less aluminum and delivers cost savings," he states. "In addition, for retrofit applications, the streamlined design is more likely to ensure proper fit within existing space constraints."

Light Efficient Design performed tests to measure the temperature of the LED product and its key electronic components with and without fans. Findings revealed that fans maintained the temperature below rated temperatures for LED products, and that using fans resulted in lower temperatures than any other method.

When asked his opinion, Pete Joseph suggested three features today's lighting specifiers would question regarding commercial LED light designs utilizing a fan for thermal management:

1. Is the fan produced by a reputable supplier?
2. What is the lifetime rating of the fan, in hours?
3. If something happens to the fan, how will I know?

After a rigorous review process, Light Efficient Design selected a market leader, Delta Electronics, to supply fans for their products. Delta Electronics has a documented fan life span of 70,000 hours, compared with a 50,000 hour life-span provided by most other manufacturers. If the fan should fail, the affected light is designed to either dim or shut down.

Heat reduction is the primary goal of LED product designs, in order to illicit the highest possible performance. Quality thermal management distinguishes Light Efficient Design's products from less effective product designs. A combination of state-of-the-art passive and active technologies produces dependable, preferred lighting solutions.