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LED 101 - LED Technology

A Disruptive Technology

Light-emitting diodes (LEDs) are compound semiconductor devices that convert electricity to light. Invented by GE scientists in the 1960s, LEDs are vastly different from traditional incandescent, fluorescent and neon light sources.

LEDs stand out because unlike lamps that can shatter, they are robust and highly resistant to shock and vibration. Due to the solid-state nature of LEDs (see Figure 1 and 2), there are no filaments to break, no moving parts to fail and no glass components of any kind. With LEDs, breakage during transportation, installation or operation - a common problem of traditional light sources - is virtually eliminated. This robustness speeds installation times and installer training.

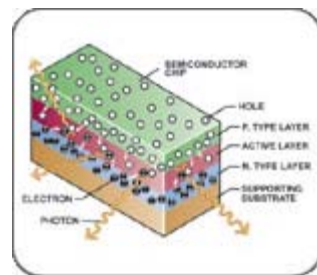


Figure 1: LED Semiconductor Chip



Figure 2: Complete LED Package

The benefits of using LEDs vary depending on the application, but typical technology features include:

- Up to 90 percent energy-cost savings
- A long life of up to 50,000 hours
- Minimized maintenance hassles and costs
- Low-voltage operation
- Excellent cold-weather performance

Environmental friendliness is also a factor, as LEDs do not contain mercury.

Applications Then and Now

Years ago, small size, ruggedness, fast-switching capability, low power consumption and compatibility with integrated circuitry made LEDs a great choice for indicator-light applications. Today, these same attributes and other benefits such as increased light output, long life that's measured in years and dramatic energy savings have inspired a variety of innovative LED solutions that serve as viable alternatives to traditional neon, incandescent and fluorescent light sources.

Common applications of LEDs include: automotive taillights, cell phone display, keypad backlighting, full motion video displays, traffic signals, illuminated signage, camera flash and architectural accent lighting.

A Systems Focus

Getting the most value from an LED solution involves more than just a great LED. It requires a great system design. An LED solution is only as good as its weakest link. At GE Lumination, we've developed an expertise in designing and building highly advanced LED systems. Our world-class engineers combine the best available components with innovative optical, electrical and thermal management designs to create "complete" LED systems that are optimized for superior performance.

A Bright Future

The emergence of white LED solutions, from GE Lumination and others shows progress toward a new "general illumination" era for LEDs. Over the next several years, continued improvements in white LED color quality and performance are expected to push LEDs into more applications - directly competing with traditional lighting technologies for a share of the "general illumination" market.

Where's This Growing?

According to industry sources, the LED industry grew nearly 50 percent year-over-year between 1995 and 2004, and its growth trajectory between 2004 and 2009 is expected to nearly double, from \$3.7 billion to \$7.3 billion.

Many industry observers would attribute these high-growth forecasts to the low penetration of LEDs in general illumination (1 percent), signage (5 percent) and transportation (25 percent) applications. At GE Lumination, we are superbly positioned to continue as an industry-leading innovator for years to come.

