

## Why All The Talk About High Power LED Technology?

*by Brian Coates, Technical Sales Manager, Lumex*

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It is in the headlines worldwide. Cities, states, and countries around the globe are transitioning away from traditional lighting and towards newer technologies such as high-power LEDs for traffic, street, and other public lighting applications.

For example, the EU member nations - Japan, Australia, Brazil, and Canada -- will be enforcing bans on incandescent bulbs by 2012. Design engineers in medical device, sign, consumer electronic, appliance, decorative, security, and other lighting applications are also increasingly integrating high-power (1-watt capacity or higher) LEDs in the development of new products.



*High Power LEDs are used in a number of sign applications, including exit lighting, construction signs, emergency lighting, and billboards.*

What is it about high-power LEDs that is creating such a buzz? Why is the LED market forecast to see significant growth in 2010 despite the chal-

lenging economy? The answer is two-fold; today's high-power LEDs provide enhanced efficiency and better light.



*A number of new high-power LED technologies on the market combine energy efficiency and quality light performance.*

## Enhanced Efficiency

High-power LEDs are extremely energy efficient and provide excellent lumens per watt performance compared to alternative technologies. For example, a standard high-power LED can offer 80 lumens per Watt compared to 70 lumens per Watt for CFL (compact florescent lights) and just 15 lumens per Watt for incandescent lights.

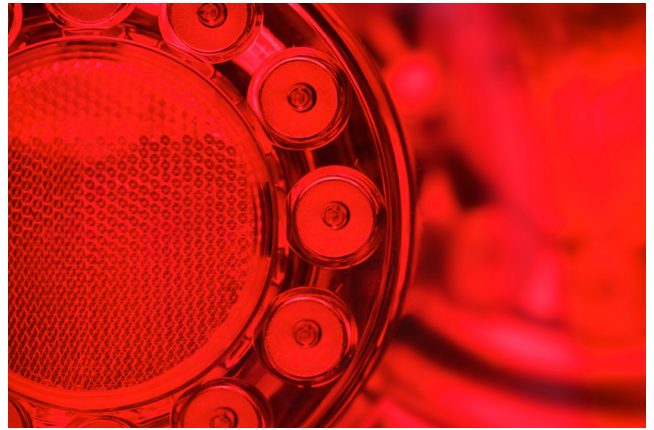
A typical high-power LED consumes between 1W to 10W of energy. These are low energy consumption figures when compared to 40W for a low-power appliance bulb and 60W for standard fluorescent fixture. In some instances the energy consumption of 60W incandescent equivalent CFL

is 15W, which is much closer to that of high-power LEDs. However, high-power LEDs mercury-free composition is typically an important factor. CFLs contain small amounts of mercury and currently many cities, states, and countries worldwide are working to restrict the use of mercury-containing lamps. Often in cases where both CFL and LED technologies can meet energy-efficiency targets, only LEDs also meet hazardous material requirements.

High-power LEDs also provide enhanced efficiency in a number of other areas. The lifetime of a high-power LED can be 10 to 15 times longer than that of a traditional incandescent bulb and three to 10 times longer than a CFL. This fact, combined with the enhanced durability of LED technology results in major reduction in lighting maintenance expenses as well as a reduction in physical waste. The nature of LED light is also very efficient. LED light is directional and hence more targeted and efficient than traditional lighting applications which scatter light in 180°.

### **Better Light**

Technological advancements over the past three years in particular have greatly enhanced the quality of light provided by high-power LEDs. Color rendering is measured on a scale of 1 to 100, where 100 is a perfect match to sunlight across the visible spectrum. When the color rendering index (CRI) rating falls below 80, the color perceived under this light will not match an object's true color. A good CRI score is generally considered to be greater than 90. Most compact fluorescent bulbs rate between 75-90 where incandescent bulbs garner ratings up to 100. LEDs are just now reaching 90 and better. Thanks to recent advancements, both white and color high-power LEDs now provide consistently high color rendering scores.



*There are a number of automotive applications for high power LEDs including taillights and headlights, turn signals, dash board backlighting, map lights, overhead lighting, running lights, license plate illumination, accent lighting for decoration and signal lighting.*

Early white LEDs were created with phosphor coatings over blue chips. Until a few years ago, this format achieved adequate 'cold' white light required for appliance applications, work areas, or walkways, but could not reliably achieve a 'warm' white light needed for homey applications such as ambiance and kitchen lighting. Advancements in phosphor coatings and lessons learned from mass production have allowed for the creation of automated systems which measure the radiated spectrum with an automated sort for cold and warm white LED light. Whereas in the past, LED options were limited to "white" or "not-white," today some manufactures can divide their "shades" of white into 50 different categories.

Further improvements in both white and color LED rendering were made possible by recent advancements in RGB LEDs. RGB LEDs combine a red, green, and blue chip in a single package. These chips can be used to produce light of any color. Previously, RGB LEDs suffered from a lack of stability in color mixing, and the introduction of new high-power LED drivers have addressed this technical challenge. The recent

introduction of high-power RGB LEDs, such as Lumex's 3-Watt through-hole AstraLED and 3-Watt SMT TitanBrite, has allowed for consistent, quality color rendering performance on color and white applications.

The use of RGB LED technologies such as the AstraLED and TitanBrite can result in up to a 30% cost savings, as well as 67% real estate package savings when compared to the use of individual high power red, green, and blue packages. The use of a single RGB package also enhances production efficiencies as a single part number eliminates the need for three separate LED part numbers.



*Medical device applications for high power LEDs include surgical lighting, sensor systems, diagnostic equipment, small tool instruments, and digital scales and monitors.*

LEDs also offer greater design flexibility than alternatives lighting options. LED systems are compact in size (for example the AstraLED is 10mm x

16mm while the TitanBrite is 10mm x 10mm) and can be used in conjunction with sensors and other lighting controls like dimmers, daylight controls, and dynamic color tuning.

High-power LEDs combine market-leading efficiency with higher quality light performance. The significant cost-savings and performance attributes of high-power LEDs have made them a popular choice for a growing number of applications. Already, we can see high-power LED technology in almost any room in our homes and offices. The high-power LED applications of the future will likely incorporate sensor technology for automatic turn on. Another area of likely growth is in infrared LED technology which will greatly enhance night vision systems.

### **Lumex TitanBrite™ High Power LEDs**

.5-Watt, PLCC-4, SuperFluxLED: SML-LX1110xxx-xTR

1-Watt Thru-Hole, SuperBeamLED: SSL-LX100T123

1-Watt 7mm x 6mm, LuxLED: SML-LX2723xxx-TR

1-Watt 10.60mm x 10mm, AstraLED: SML-LX1610

2-Watt 8mm Round LED: SML-LXL8047xxxTR/2

2-Watt 9mm Squared LED: SML-LXL99xxxTR/2

3-Watt 8mm Round LED: SML-LXL8047xxxTR/3

3-Watt AstraLED™ RGB: SML-LX1610RGBW/A

3-Watt 10mm Squared RGB LED: SML-LX3939RGBC-TR

5-Watt 9mm Squared: SML-LXL99xxxTR/5

5-Watt 10mm Squared LED: SML-LX3939UWC-TR

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