



NEWS

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High-performance LED as compact component

A new dimension for developers and designers

Osram Opto Semiconductors is the first supplier to offer "Golden Dragon" high-performance LED as compact components. This bright 1 Watt light source can be incorporated in standard SMT (Surface Mount Technology) soldering processes, giving developers and luminaire designers enormous freedom. In terms of their reliability, LED even meet the stringent requirements of the automobile industry.



The "Golden Dragon" provides concentrated light with high luminous efficacy (optical efficiency of 20 lm/W) and therefore takes up very little space. Even so, it is a giant among LED. The high-performance LED is 0.8 to 1.8 mm high and located in a 6 x 7 mm casing. With a chip size of 700 µm, it is more than twice as large as the Power TOPLED, which measures just 300 µm. Six Power TOPLED are needed to achieve the

light output of one “Golden Dragon”. The space requirements are four times greater. The advantages of the high-performance LED are therefore particularly welcome in applications that call for high light output from a small footprint or that require light to be injected into transparent materials.

Potential areas of application include reversing lights on cars, traffic lights and special uses in general lighting. They also include backlighting for displays such as TFT (Thin Film Transistor) and LCD (Liquid Crystal Display) displays and illuminated advertising both indoors and outdoors. The LED can replace small incandescent lamps, can be used for illuminating facades and can act as marker lights for steps and escape routes. Thanks to these high-intensity units, mobile lighting systems such as bicycle lights can now produce levels of brightness that make a real contribution to road safety. What's more, the life of the LED is impressively long. Depending on the operating and ambient conditions, they may last more than 20,000 hours. The first samples of the “Golden Dragon” in red and yellow are available now. Volume production will start in mid 2003. White versions are already in development and will follow in just a few months.

High-performance LED of the “Golden Dragon” type have been specially developed for high-volume manufacturing processes and are suitable for standard reflow soldering processes. No special machines are needed. The package and the chips fully comply with the high standards of quality required by the automobile industry. The “Golden Dragon” operates reliably in the temperature range from -40 to +100°C and can withstand frequent fluctuations in temperature (up to 1000 times). Even the extraordinarily difficult conditions of tropical climate will not impair its operation. The perfect combination of high-performance LED and package will open up countless new applications.

Development know-how required

Development and fabrication of the large chips for the “Golden Dragon” meant that the development team faced enormous challenges. The semiconductor material generally withstands only certain current densities. The current, which comes from a 30 µm thick bond wire, therefore has to be distributed as uniformly as possible over the chip. This gets more and more difficult, the larger the chip. Non-uniform distribution would impair the cost/luminous efficacy ratio and could mean that it would be worse than that of a small LED. This problem was solved with the aid of sophisticated process technology.

Further development work was also needed to ensure good thermal management in the package because large high-performance LED naturally consume more current and therefore generate more heat. What was needed was an efficient means of cooling in a very small area. Engineers had to bear in mind that there were several different materials with different thermal coefficients of expansion, all within a very small space. With fluctuating temperatures, as is the case for example when the LED are used outdoors or during soldering, high stresses can occur and these have to be compensated. The difficult problem of cooling was solved by placing a copper block directly under the chip.

