

High Power with an Ultra-High-Efficiency Package and New Elements

Development and Mass Production of the CL-652S Series of White Power LED Lamps for General Lighting Featuring the World's Highest Luminous Efficiency

After developing the white power LED lamp series CL-650S for general lighting and entering the market of general lighting products for the first time in October 2003, Citizen Electronics (Fujiyoshida City, Yamanashi Prefecture; Capital: 1,988,550,000 yen; President: Takashi Masuzawa), a manufacturer of precision electronic parts, has developed the new series of white power LED lamps, CL-652S, which features the world's highest luminous efficiency of its kind available on a mass production basis. Its mass production will begin later on.

The CL-652S series is an epoch-making product in that it has solved the heat dissipation problem of the conventional LED lamps and boasts of the sharply increased luminance of the elements and of the world's highest light output efficiency.

The new series of LEDs is designed to be installed on a single (rear) side of lighting device substrates to allow separation of electrical connections from thermal connections. This dispenses with the need for a special substrate to improve heat dissipation. This means cost reduction and far less restrictions on circuit substrate design because it is simply needed to combine a general substrate with a heat sink. The light conversion design based on the advanced light simulation technique exclusive to Citizen Electronics, well experience in the light characteristics of LED, ensures the world's highest level of luminous efficiency of its kind now available by mass production.

The following two models will be available.

·Luminous flux of 60 lm at a driving current of 350 mA (Luminous efficiency: 50 lm/W); CL-652S-8WJ-SD

·Luminous flux of 35 lm at a driving current of 200 mA (Luminous efficiency: 50 lm/W); CL-652S-8WK-SD

Plans are now under way to develop in autumn 2005 a model of higher heat dissipation efficiency and luminous efficiency with a luminous flux of 70 lm (luminous efficiency of 60 lm/W) at a driving current of 350 mA.

Samples of the new series will be available for shipment in December 2004. Its mass production will start in June 2005 at a monthly rate of 100,000 pieces, which will be increased to a monthly rate of one million by the end of 2005. The new product was shown at the Citizen Electronic booth of CEATEC JAPAN 2004, Makuhari Messe, which was opened on October 5, 2004.



Citizen Electronics developed a commercial model of white power LED lamp for general lighting for the first time in autumn 2003. The new series features a luminous efficiency about 1.5 to 2 times higher than that of the original model, representing a significant advance in the luminous efficiency of LED lamps, which had been far lower than that of the fluorescent lamp.

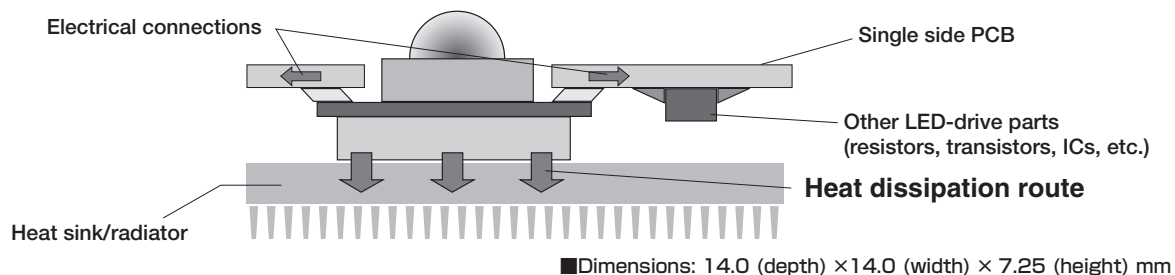
The white LED has drawn attraction as a general light source of the next generation, but had the disadvantage of low luminous efficiency compared with the fluorescent lamp (about 60 lm/W to 100 lm/W). The new series, however, is comparable to the fluorescent lamp in luminous efficiency and of course is already far better than the incandescent lamp (about 16 lm/W) in luminous efficiency.

The white power LED for general lighting also offers other advantages, that is, low power consumption (about one-third that of the incandescent lamp), maintenance-free performance owing to long life (about 40,000 hours, or about 20 times longer than the incandescent lamp), none of the mercury and other noxious substances contained in the fluorescent lamp, no heat of the light itself, small size, lightweight, and thin design. The demand for white LEDs for general lighting has been increasing year after year, for example, for lights at elevated places and outdoors where maintenance work is difficult; for reading lights and footlights in hospitals where heat is undesirable for safety; for lights for perishable foods that must be kept free of heat; for car lights for effective saving of fuel because of small size, thin design, and lightweight compared with the ordinary electric bulb. The market of white LEDs shows certain prospects of increasing growth with the improvement of their luminous efficiency, indicating that white LEDs will occupy one day the principal place in the field for general lighting, as a new type of light source that will be clean and energy-saving.

The main features of the CL-652S series are as follows:

1. The world's highest luminous efficiency (50 lm/W) among mass production models of LED lamps owing to the unique light conversion design
2. The high heat-dissipation design permits large-current drive.
3. Better in heat dissipation and luminous efficiency than those lamps composed of large elements because an LED lamp consisting of two or more small elements are superior to them in this regard.
4. The new series is adaptable to various customer specifications and applications by changing the number of elements installed in the LED.
5. The new series, free of heat dissipation on the substrate, means less restrictions on circuit board design because no heat dissipation circuit is needed on the substrate. It also means low cost because the metal case or frame may be used instead of the substrate for heat dissipation.
6. Single (rear) side mounting adds to good appearance because no other parts are visible through the lens.
7. Friendly to environment because the new series can be mounted with lead-free solder.

Citizen Electronics is the leading manufacturer of chip type (surface mounting) LED lamps, and our products are employed in an extensive range of electronic devices, including mobile telephones. Citizen Electronics chip LEDs are manufactured by our exclusive process and ensure high reliability and cost performance. We are confident that the series CL-652S, also manufactured by the same process, will enjoy increasing acceptance and defy other makes for superior quality and low cost.



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| ● Sample shipment: December 2004 | ● Luminous efficiency: 50 lm/W (as of December 2004) |
| ● Start of mass production: June 2005 | 60 lm/W (target set for October 2005) |

■ For any questions about the product, contact the following.

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Note: The performance and specifications are subject to change for improvement without notice.