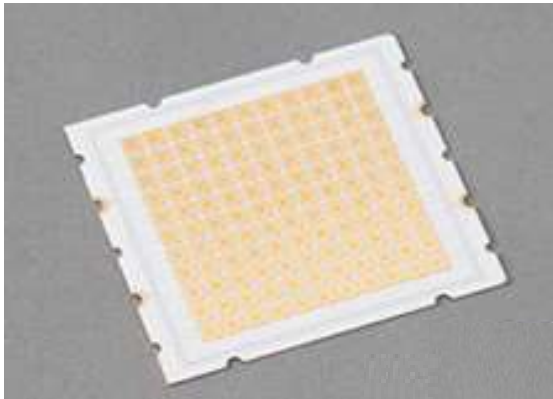


## High-heat-dissipation ceramic packages for LEDs (with thicker Cu plating)



### ■ What are the features of the product?

High-heat-dissipation ceramic packages for LEDs are used for LED lighting for the interior and exterior of vehicles.

Conventional incandescent and fluorescent lamps have lower energy conversion efficiency. Thus, they have been increasingly replaced by LED lamps because of higher energy conversion efficiency and longer product life of them. Notably, the output power of automotive LEDs is expected to increase, and LED chips generate larger amount of heat accordingly. So higher heat dissipation characteristics will be required for their packaging.

In 2006, we started to mass-produce alumina packages, whose heat-dissipation performance is higher than that of resin packages, for LEDs. With the expansion of LED lighting to general and in-vehicle applications, there was growing demand for packages with higher heat-dissipation performance.

### ■ Why was the product certified as one of the Nittoku Green Products?

Resource saving

Energy saving

Substance of Concern

The heat-dissipation performance of packages can be increased by attaching a heatsink. However, there was a concern about resource depletion because minor metals are used for heatsinks. Thus, our high-heat-dissipation ceramic packages for LEDs achieved high heat dissipation performance and weight reduction with a simple structure by applying thicker Cu plating without using a heatsink.

By using a ceramic package for LED lighting, the product life becomes more than tripled even in automotive applications, in which high output is required.

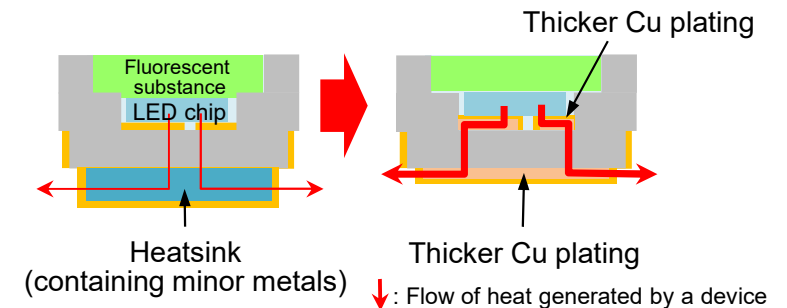
### ■ Comment from the developers

We worked on the development of LED substrates by focusing on how to expand the use of LEDs globally, increase the brightness, and allow LEDs to emit light efficiently.

We have achieved higher heat-dissipation performance and weight reduction by using a ceramic package for an LED device and fabricating the heat dissipation unit with Cu plating without using a heatsink containing minor metals. We have succeeded in increasing the output of LEDs, which was not possible using a resin package.

### [Cross-sectional structure]

- Conventional product - With thicker Cu plating



The heat dissipation pattern of Cu plating, which has high thermal conductivity, diffuses heat generated by a device in the horizontal direction, making it possible to improve the heat-dissipation performance without using a heatsink.