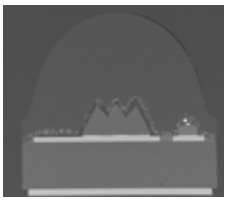
XLAMP XB-D: a high-brightness LED based on Cree SC³ technology

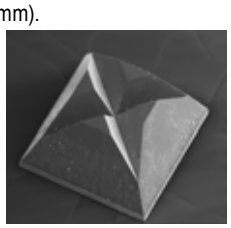
For 30 years, the light output ratio of white high-brightness LED (HB-LED) has doubled every 18 months, and at the same time the price has been steadily decreasing. This results in a significant increase of the lumens per dollar. To illustrate this trend, Cree announced in January 2012, The XLAMP XB-D, a new LED which doubles the lumens per dollar of previously available LEDs. The XB-D delivers up to 136 lumens per watt in cool white (6000K) or up to 105 lumens per watt in warm white (3000K), both at 350 mA and 85°C.

Technology analysis

Manufactured in the news Cree SC³ technology, the component integrates a silicon carbide LED chip and a silicon protective diode in a tiny ceramic package (2.45mm x 2.45mm).

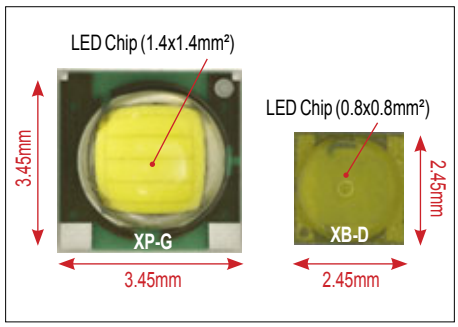


LED cross section (Courtesy of System Plus Consulting)



LED Die SEM view (Courtesy of System Plus Consulting)

The cross section of the LED reveals that the silicon carbide chip is patterned into shapes in order to increase the probability that emitted photon exits the LED die with a minimum of internal reflexion and thus increase light extraction.
The LED chip structure, the phosphor technology and the package design allow the XB-D LED to be more efficient than the XP-G LED.



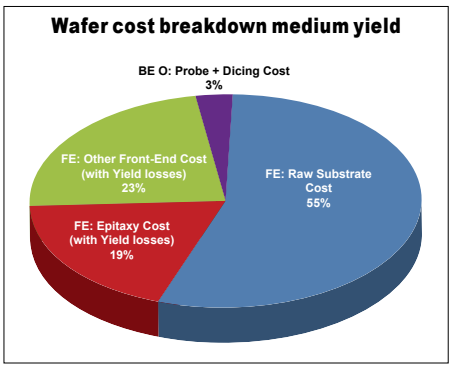
LEDs size comparison (Courtesy of System Plus Consulting)

A simple calculation shows that the XB-D LED die area is reduced by about 67% compared to the XP-G, reducing the package area by around 49%.

Cost analysis

The main part of the manufacturing cost is due to raw wafer with 55% of the total manufacturing cost. The epitaxial GaN represents 20 % of the wafer cost.
The main part of the packaging consumables cost is due to the phosphor and the silicon lens with around 20% each.

The full reverse costing report combining technological analysis of the device and detailed manufacturing cost is already available.



2012 cost breakdown (Courtesy of System Plus Consulting)

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