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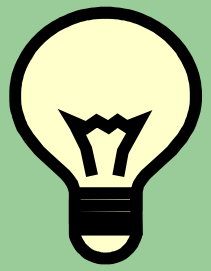
FC LED Introduction

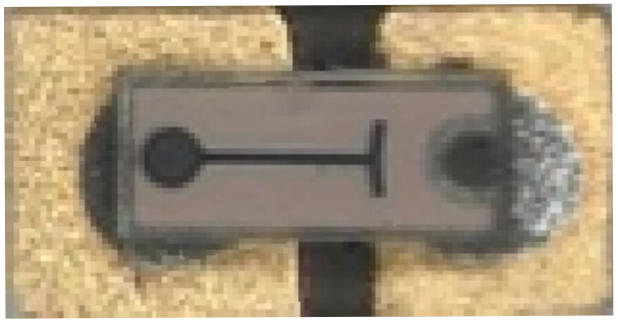


The Next Generation in Lighting

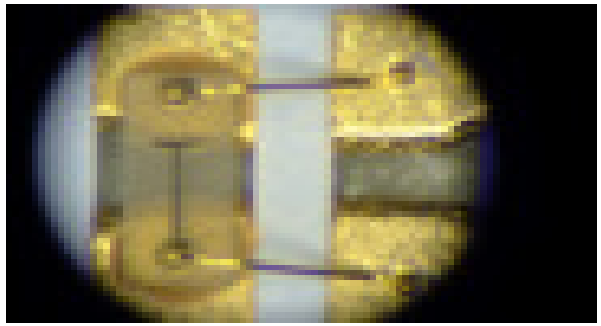
GRAND V. DEVELOPMENT CO., LTD.
鴻捷開發股份有限公司

What is FC LED?

- FC (Flip-Chip) LED is a new patented technology by mounting the LED diode upside down compare to the present day LED production. (Diagram A)
- Majority of the current market LED products are using gold wire bonding method for their LED (Diagram B)



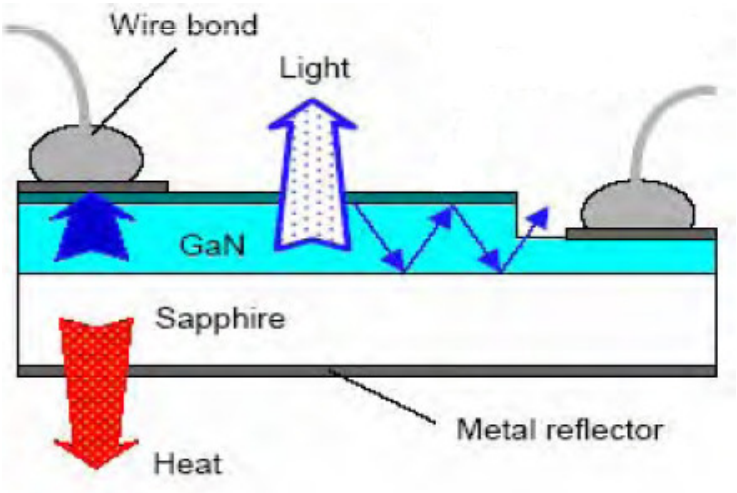
(Diagram A)



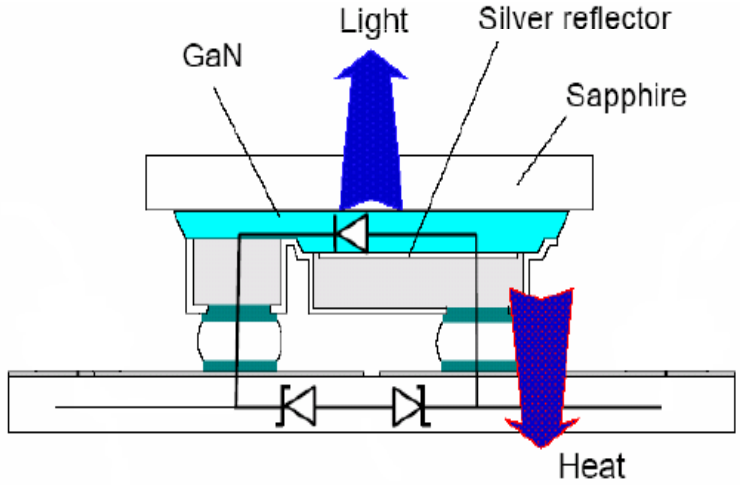
(Diagram B)

Diagrams

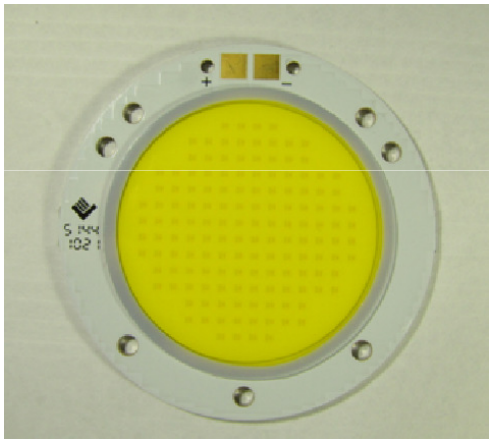
Current LED (Wire Bond)

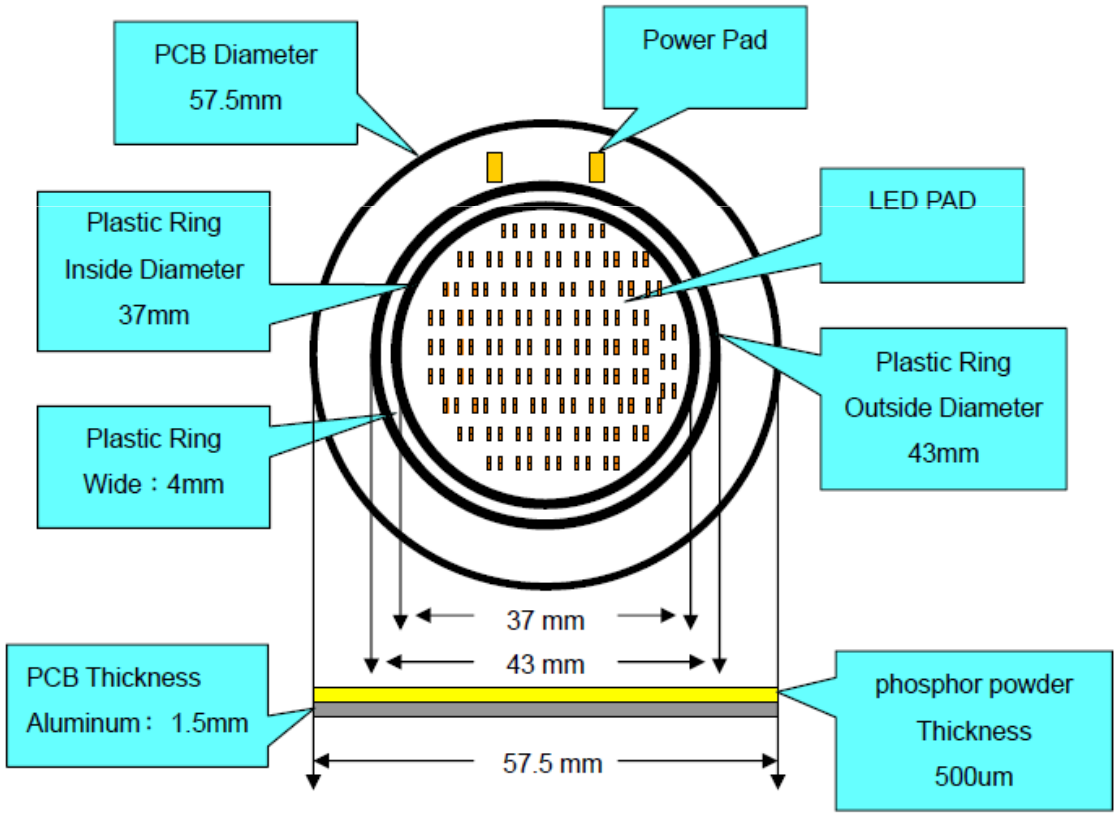


Flip Chip LED



FC LED
12W Light Engine Chip Layout





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Benefit of FC LED - 1

- In our FC LED, we apply patented Flip Chip process instead of traditional wire bonding. Flip-chip not only shorten the production process (which means more stable quality), but also significantly reduce thermal resistance and result in higher heat dissipation rate than in the traditional golden wire bonding LED. Therefore, by release the heat much faster, and no lead frame for certain light angles, our FC LED light engine is the ideal lighting component for your need.

- Below are some of the EXCITING benefits from FC LED:

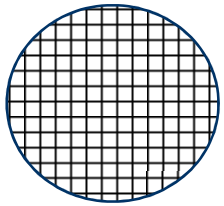
  - No need heavy weight thermal HEAT SINK (due to better heat dissipation rate)
  - Cheaper in Production: Less cost due to minimizing heat sink unit
  - Longer life: Almost no decade (estimated about 3% in 6000 hours)
  - Surface light (COB - Chip on Board) instead of Spot light (individual separate LED bulbs unit), FC LED also provides higher module reflective brightness.
  - No Shadow of light, no lead frame for certain light angles limitation.

Benefit of FC LED - 2

- our flip-chip technology on LED have about 200 times faster thermal dissipation rate on each diode compare to ordinary wire-bond LED.
- our flip-chip technology allow wider light angle of about 120 degree.
- with constant 450mA current, we are producing similar lighting specification as other higher current LED products.
- our flip-chip technology only need about 18 square cm of heatsink per watt. So if your fixture can satisfied this you don't need to have another outer heatsink mechanism to dissipate heat.
- our product ranges (currently) are 4W, 6W, 9W, 12W, 15W, and 18W, they are suitable for majority of indoor and outdoor main or secondary lighting usage.

Shorten Process

Wire Bond LED Process



Epi-Wafer

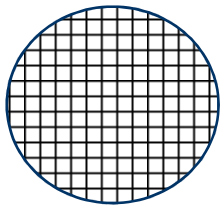
Die bond

Wire Bond
Prop Stand

Encapsulating
Phosphor

Modulate

FINAL ASSY
Personalization



Epi-Wafer

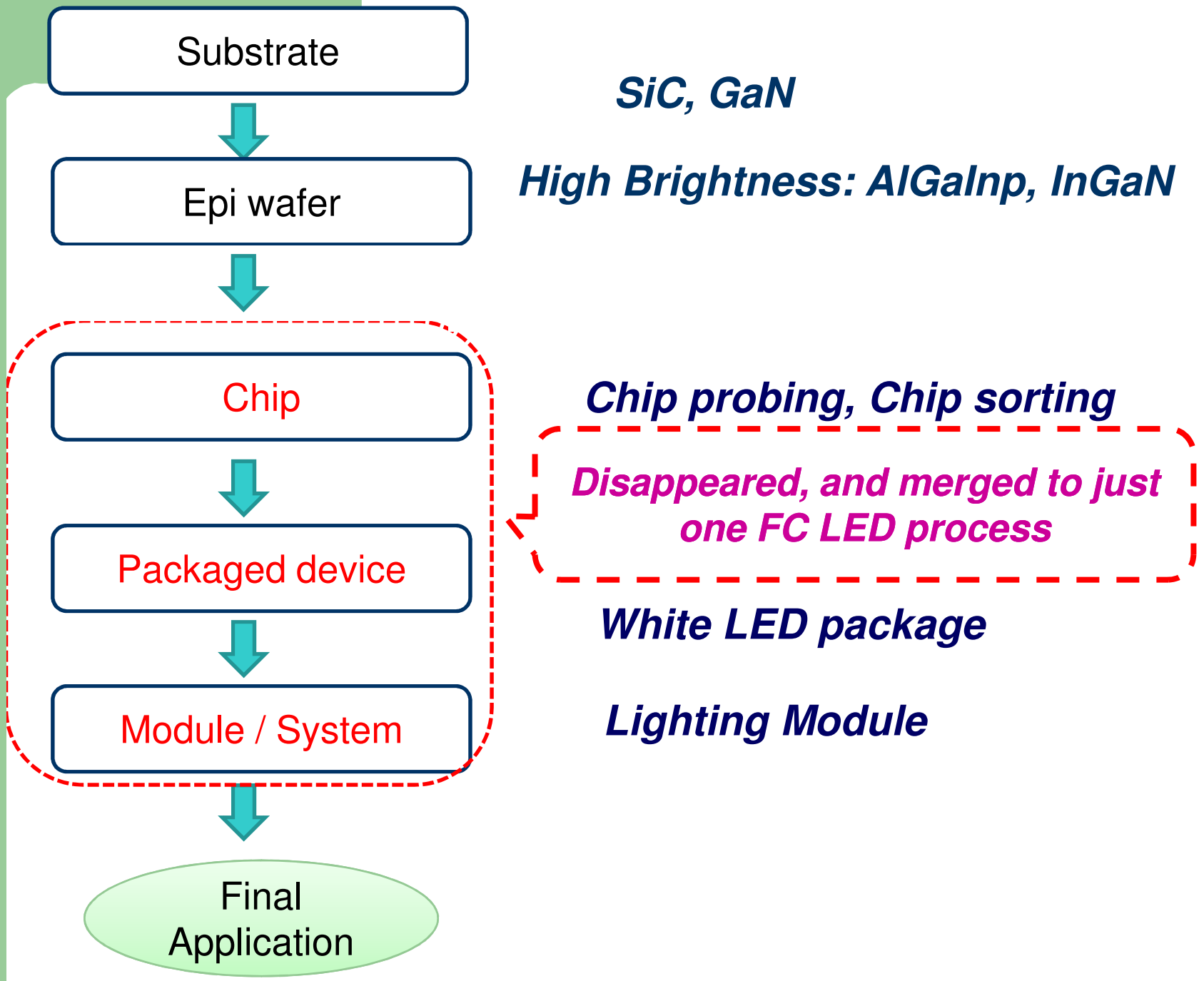
Die bond

Wire Bond
Lead Frame
Eliminated

Encapsulating
Phosphor
Eliminated

Modulate

FC LED


Substrate
Epi wafer
Chip
Packaged device
Module / System
Final Application
SiC, GaN
High Brightness: AlGaInp, InGaN
Chip probing, Chip sorting
Disappeared, and merged to just one FC LED process
White LED package
Lighting Module

No need for heavy weight thermal HEAT SINK anymore!!

Bulky & Heavy Metal
Heat Sink Unit

Bulky & Heavy Metal
Heat Sink Unit

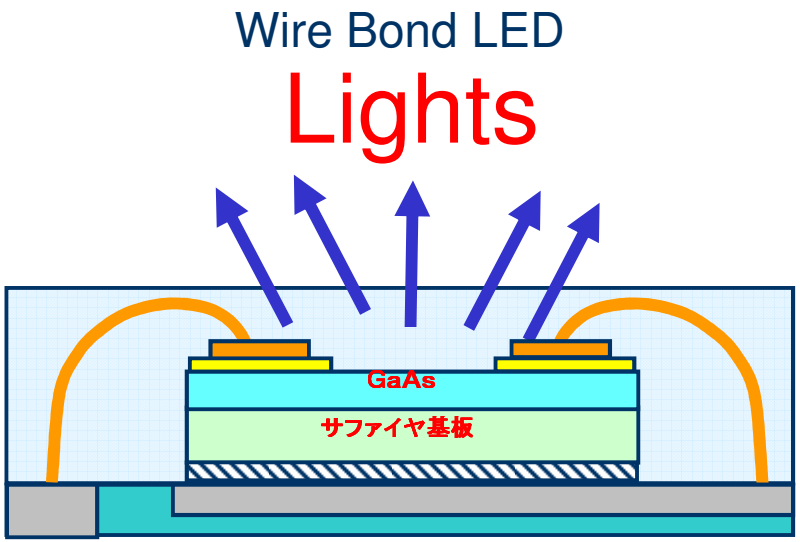
Surface light (COB - Chip on Board)
VS.
Spot light (individual separate High Power LED bulbs unit)

FC LED – Surface Light
(no spotting effect)
Ex. 1 x 12W LED chip = 10W unit

Ordinary High PowerLED –
Spot Light (due to separate bulb composition)
Ex. 3 x 3W LED bulb = 9W unit

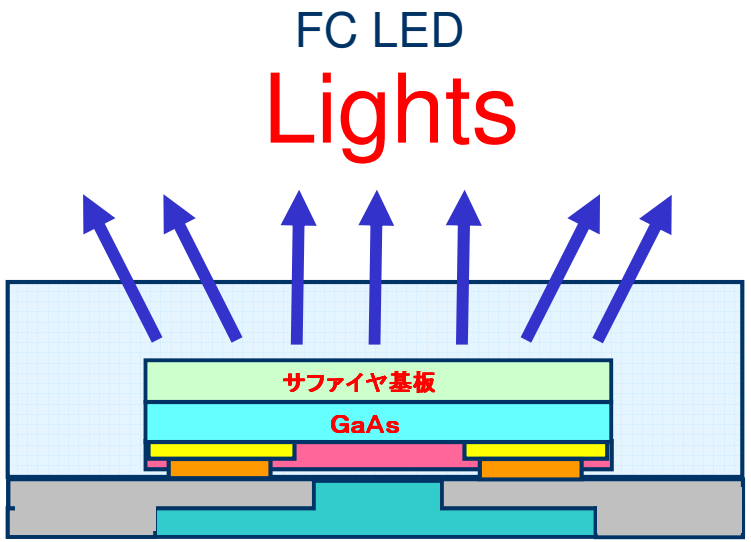
No Shadow of Light

Wire Bond LED



- 20% radiate light covered by wires
- Chip-by-chip Encapsulating (Lead Frame) Phosphor
- Require lots of equipments because of point 2

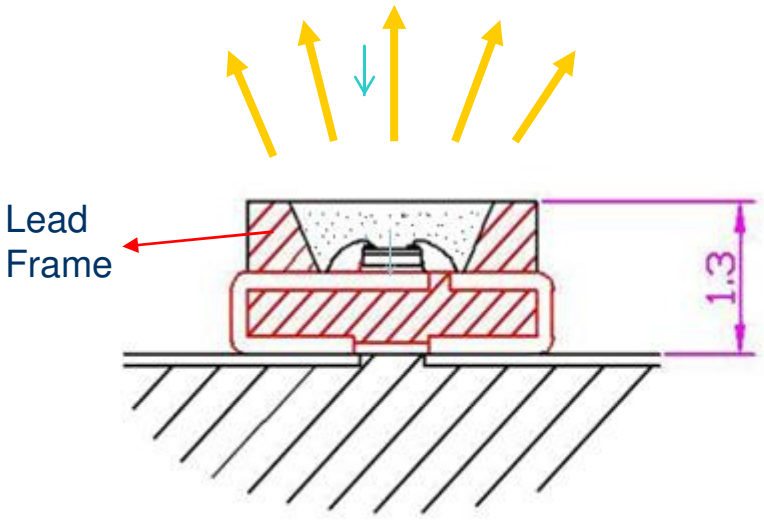
FC LED



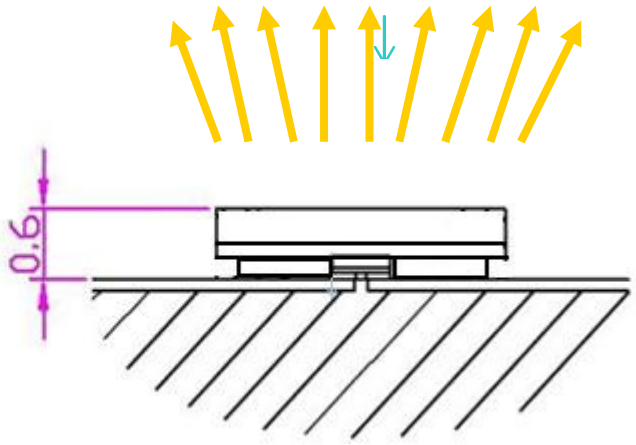
- No wire no cover for radiate surface
- Phosphor powder printing by module
- 90% less equipments required

No Lead Frame for Certain Light Angles

Encapsulated Lead Frame High Power LED CHIP



FC LED Technology



Available Color Temperature

- Warm White (3500K)

- Cool White (5500K)

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Thank You!

For your interest in our product! ☺