

Flip-Chip Bonding for Monolithic of Matrix-Addressable GaN-Based Micro-Light-Emitting Diodes Array

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Abstract : A 64×64 GaN-based micro-light-emitting diode array (μ LEDA) with $20 \mu\text{m}$ in pixel size and $40 \mu\text{m}$ in pitch by flip-chip bonding (FCB) is demonstrated in this study. Besides, an underfilling (UF) technology is applied to the process for improving the uniformity of device. With those configurations, good characteristics are presented, operation voltage and series resistance of a pixel in the 450 nm flip chip μ LEDA are 2.89 V and 1077Ω ($4.3 \text{ m}\Omega\text{-cm}^2$) at 25 A/cm^2 , respectively. The μ LEDA can sustain higher current density compared to conventional LED, and the power of the device is $9.5 \mu\text{W}$ at $100 \mu\text{A}$ and 0.42 mW at 20 mA .

Keywords : GaN, micro-light-emitting diode array(μ LEDA), flip-chip bonding, underfilling

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