

Optimizations of

Adaptive driving beam Light Engine

Optical • Thermal • Manufacture • Reliability

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Innovation enriches life



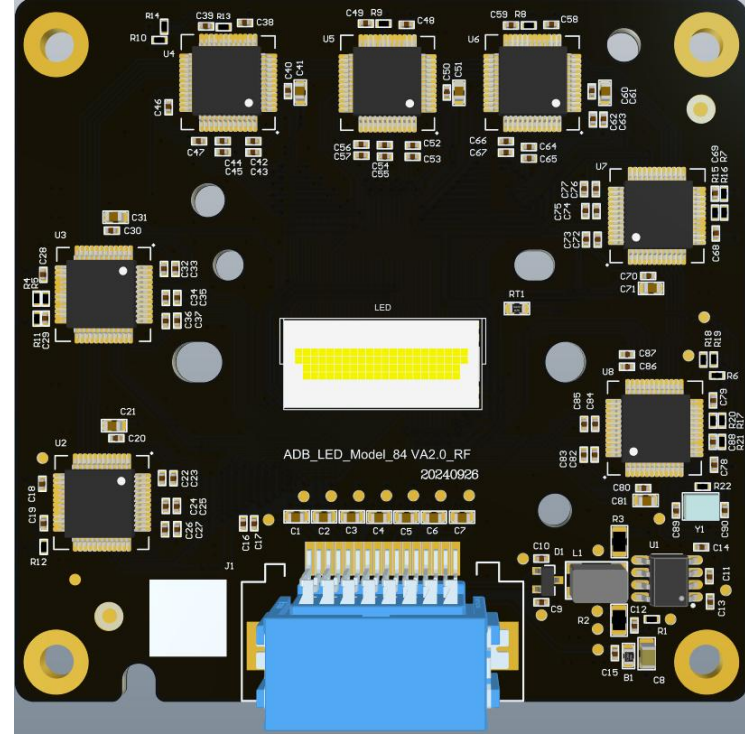
What Adaptive Driving Beam Enables

Dynamic shaping of the high beam to improve visibility without glare



Conventional high beam

High output, but glare risk in traffic



Adaptive driving beam (ADB)

Masking zones enable glare - free illumination

- Precise beam shaping with micron - scale pixel gaps
- Real - time masking for oncoming vehicles
- Improves safety, comfort, and driver confidence

Performance Highlights - 84 pixel ADB light source



Luminous flux
~ 107 lm per pixel

If =300 mA, Ta = 25° C

CCT uniformity
≤ ±500 K

Light source variation

Contrast
> 200:1

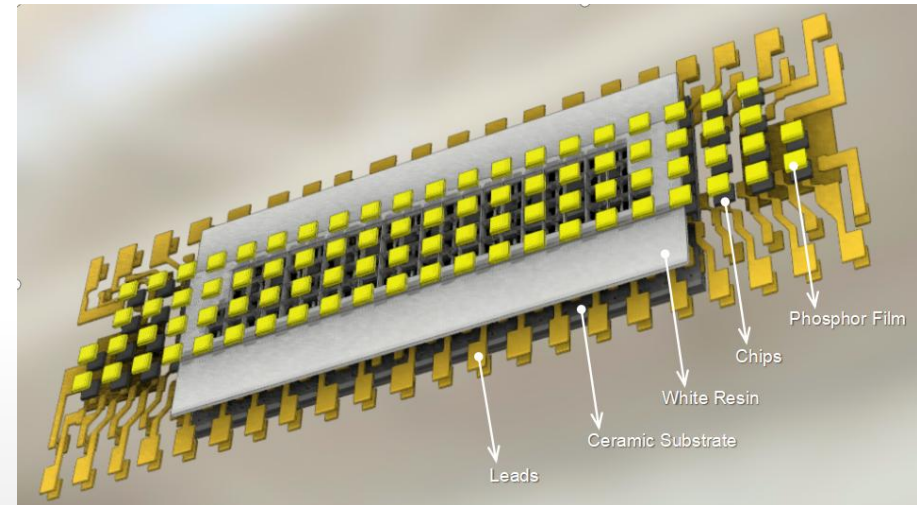
Angular error
< 1°

Pixel gap
~ 50 μm

Micron - scale pixel spacing

Thermal resistance
0.53 K/W

Rθ j - c (electrical)

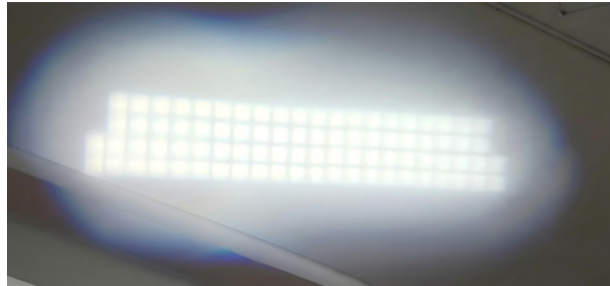


High brightness with robust thermal margin

Optimized material selection and thermal–electrical separation design support efficiency and reliability for automotive ADB systems.



Stray Light

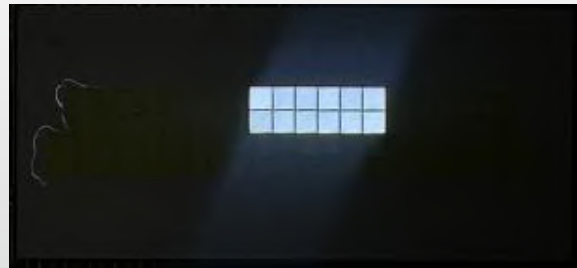


Stray light 437cd



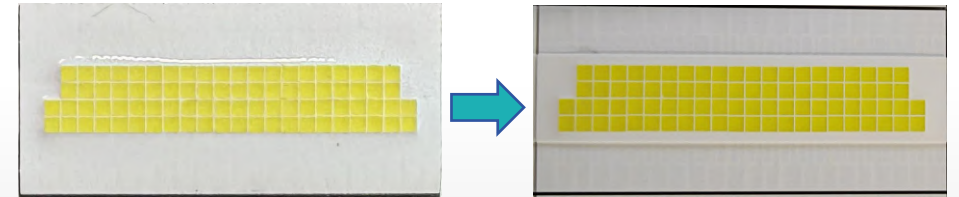
Stray light 300cd

Crosstalk



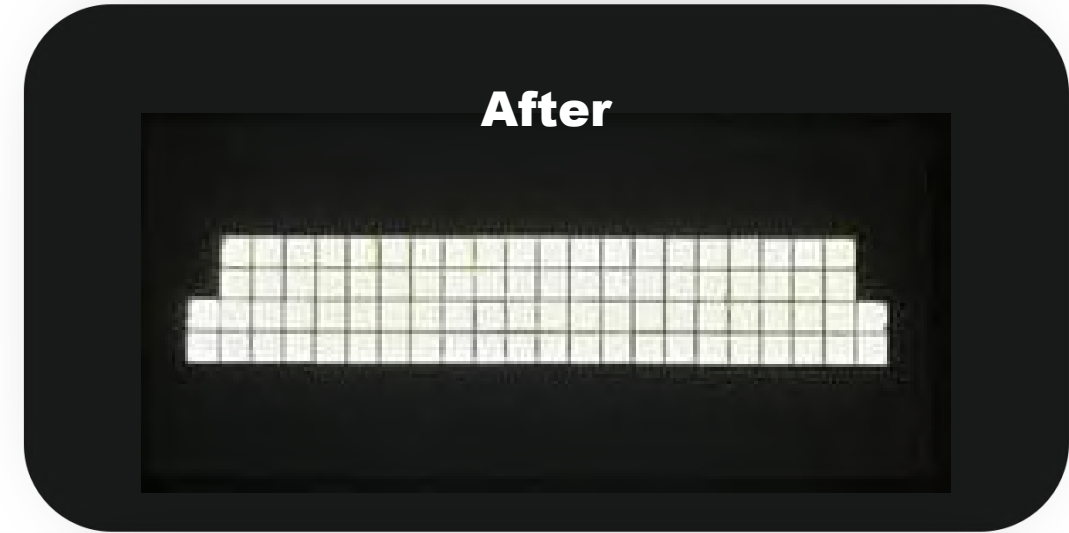
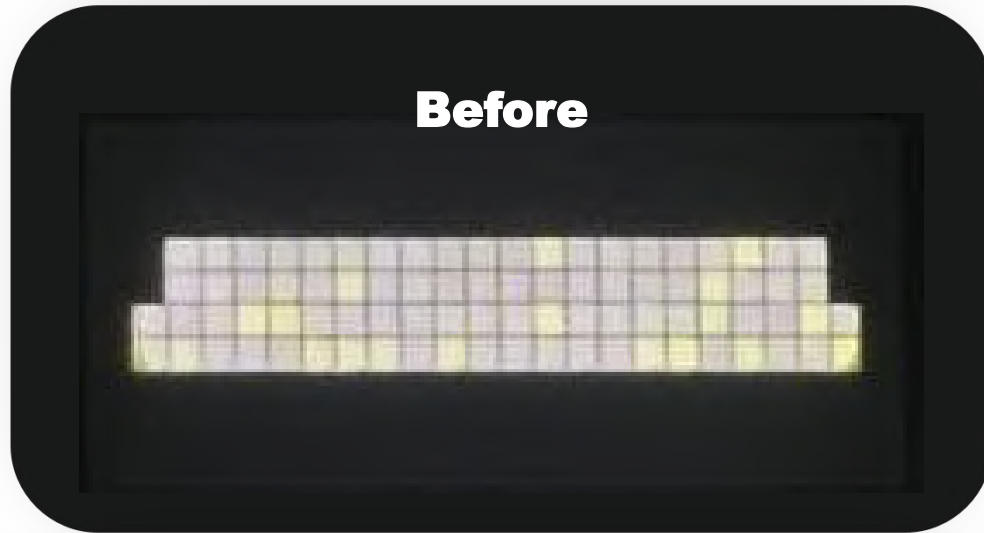
Cause

- ▶ Package-level scatter paths ※ (sidewalls, encapsulant, phosphor, adhesive)
- ▶ Pixel gap & surface finish
- ▶ Die placement ($\Delta X/\Delta Y$) creating edge blur



Solution: Resin bank height & Content

- ▶ Reduces high-angle stray light
- ▶ Lower sidewall scattering
- ▶ weakening lateral light transport

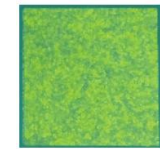


Root cause

- ▶ Optical path non-uniformity
- ▶ Process control
- ▶ Color converting layer non uniformity

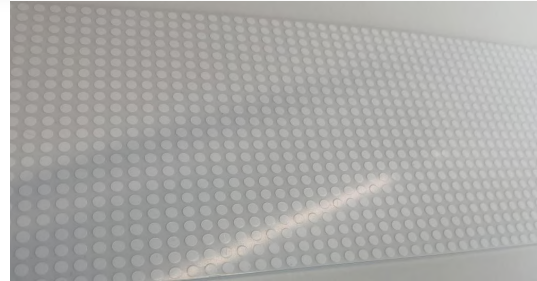
Optimization route

- ▶ Phosphor flim tighten bin
- ▶ Phosphor particle-size control and optimized doping
- ▶ Adhesive optimization



Mini LED Backlight

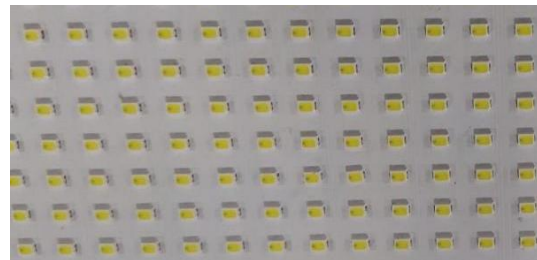
**OOD
Molding
Mini COB**



**Dispensing
Mini COB**



POB

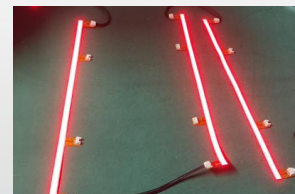


Mini LED Lighting

Exterior Digit Lighting



Interior display



**Ambient
Lighting**

Thank You!



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