

Technical Manual of HOB Technique





The status quo of LED package

As is known to us, LED display, in comparison to LCD and DLP screens, has much huge advantages. It is seen widely application in the current market and also in radio and television broadcasting, which is done by mainstream SMD technique. It, however, reveals certain disadvantages and causes pains.

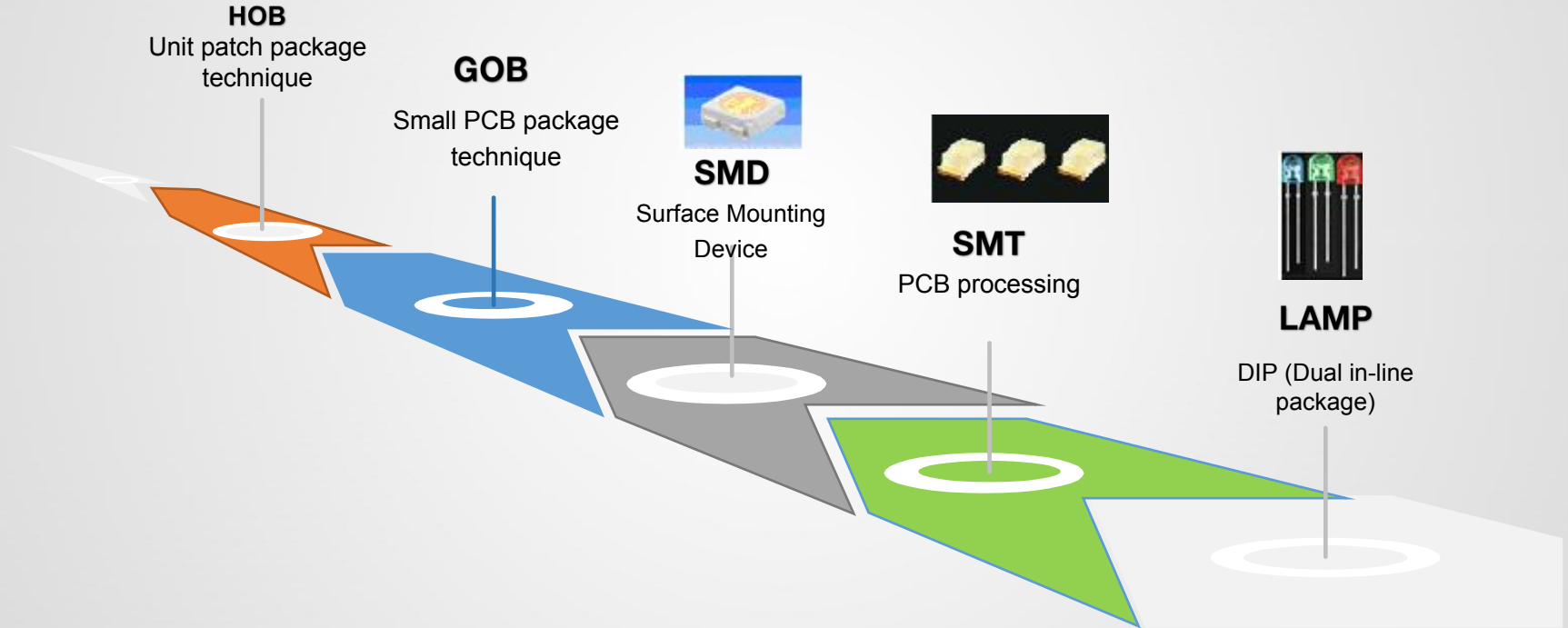
- 1 Heavy moiré patterns on screen of digital device
- 2 Conventional LED screens, with masks or without, always are hunted by the light reflection on surface when in front of a digital camera, and it worsens displaying cold colors.
- 3 Poor protection and incurs damages to screen and its masks during transportation and installation.
- 4 Maximum viewing angle of led screen is within 145° , giving unsatisfying viewing effects.
- 5 Particles, vapor, static electricity, moisture and other elements would make LED screen vulnerable to malfunction, such as LED failure.



Issues remained unsolved in this industry



Various LED Package Techniques in its History





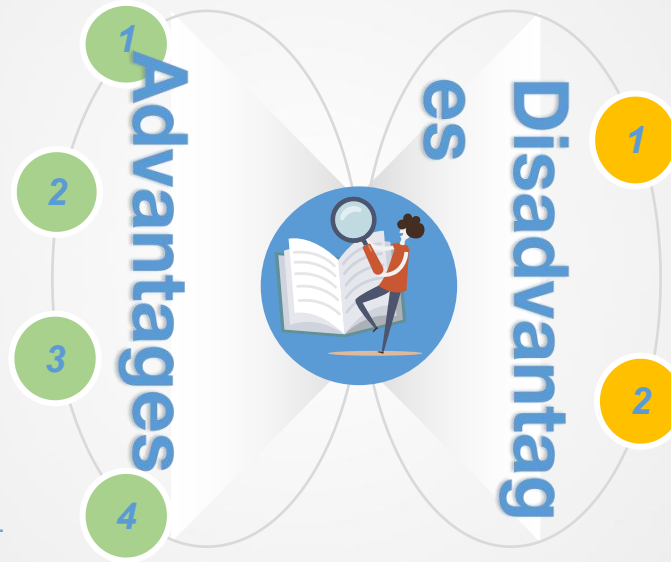
SMD Issues Analyzed

Technical issues

- High temperature in reflow soldering unavoidably brings damage to LEDs
- Exposed directly to the air, LEDs are open to any natural risks like oxidization, moisture, static electricity, etc., which cause LED failure or malfunction
- Color variation or color cast is shown on unit patches of one module

Comprehensive Analysis of HOB

- ◆ High temperature gluing in all sides to cover complete protection of LED surface.
- ◆ Epoxy resin is used to package LEDs in vacuum condition and then processed curing after compression molding method under high temperatures.
- ◆ Uniformity of thermal conductivity is an advantage to enhance thermal distribution and reduce color cast caused by temperature variation.
- ◆ Surface hardness of resin higher than 70 HRC (Hardness Rockwell C) ensuring great durability.



- ◆ Heavy investment in equipment like compression molding machine.
- ◆ Modular patches on the module are frustratingly difficult to repair and maintain, which therefore are required technical operation back in manufacturing sites.



Refilling method on Nanoscale Photonic Thermal Conductivity Materials

Technical

Explanation

The new HOB (High-temperature On Board) technique developed by our R&D team is designed for, not only enhancement of SMD LED modules, but compatible with COB led modules, which fit well and remove most of deficiencies in this industry. Its surficial layer is seamless and gives clear expression and anti-blue light, which, as a whole, relieve condition of sore eyes after long viewing the led screen.

HOB technique: HOB is an technology where epoxy resin is processed under high temperature in vacuum environment to package the LED modules for the second time and produce smooth layers photonic processing, which, as a result, improves screen performance, functional stability, prolong its life cycle, and contributes to high first pass yield.



Technical comparison

Vantages of HOB

1. Better thermal stability and adaptability to surroundings than GOB.

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2. Maintenance of singular LED on the LED patch complement to the shortcoming of COB.

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3. Moiré pattern reduces largely comparing with SMD technology

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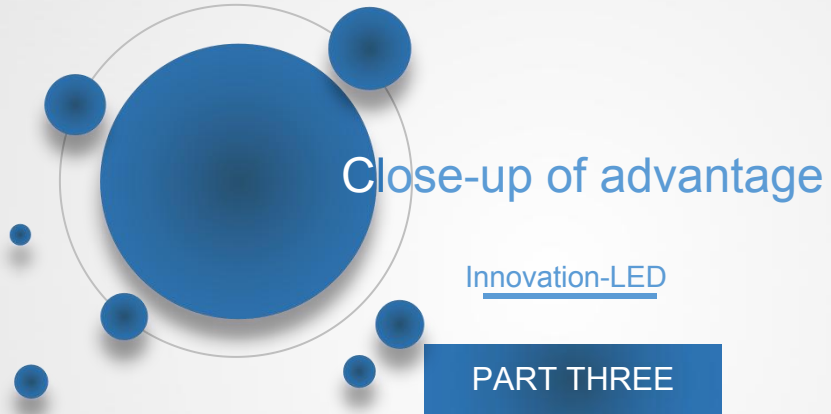
4. Longer life span than SMD products

4

5. More capable of protecting from moisture, collision, static electricity

5







Advantage summary

纳米级黑科技
让你看得比想象还远

纳米级高因子光学导热填充技术

基于过程可控、工艺简单的理念,在兼顾COB模组优点的同时,通过创新的特殊处理——使用纳米级高因子材料进行全包裹填充形成透光绝缘层,使LED灯珠与外界环境完全隔离,有效提升了产品稳定性、延长产品寿命。
该项技术使传统的显示产品级面光源,发光更加均匀,大幅提升了产品的可视角度,并有效消除摩尔纹,其透光涂层显著提高了产品对比度,降低眩光及刺目感,减轻视觉疲劳,并且使原来的显示产品拥有了五指一按功能。

产品技术8大优势

<p>1 6防功能</p>	<p>2 抗撞击</p>	<p>3 外观优美</p>
<p>4 面光源广视角</p>	<p>5 产品稳定性高</p>	<p>6 显示更柔和</p>
<p>7 安装便捷</p>	<p>8 拼装更精准</p>	<p>9 五指一按</p>

Parametric standards:

1. Glue hardness: over 35D
2. Module surface roughness: 0.02mm (20 μ)
3. Brightness loss: **90%**
4. Trimming precision: $\leq 0.03\text{mm}$
5. Temperature range: $-20^{\circ} + 80^{\circ}$
6. Glue thickness: 0.035-0.05



IP level



Six functions

The nanoscale photonic layer is applied on the surface seamlessly and prevent external contact, exposure of LED pins. It therefore effectively meet functions of waterproof, anti-dust, anti-static electricity, anti-corrosion, and anti-oxidation. The protection rating is safely rated as 67.





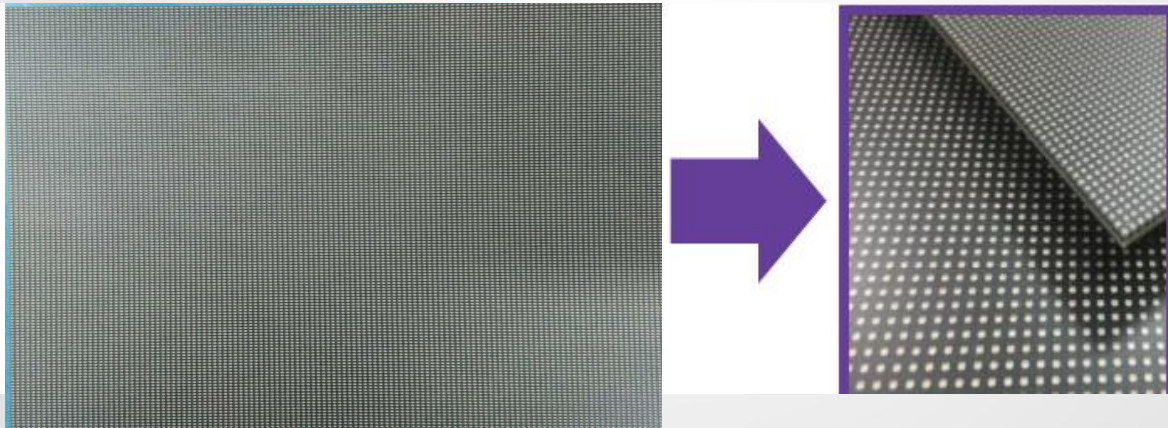
Anti-collision



Stress like collision applied on LED module surface would cause LEDs fall off easily because SMD LEDs are soldered on the PCB but still leaves room.

Before ready for use, much damage like sudden movement or collision during transportation or installation would increase LED failure rate, which will be a “disaster” for a project case.

Our HOB technology ensures the bond between LEDs and PCB are sealed closely enough, as safe and hardened to form a solid protection layer against collision.





Smooth surface

(expandable as interactive screen)

Surface: Smooth layer after special procedures shows great effect on surface and improved surficial ink distribution, which makes the screen look uniform in pure black color when the screen is off.



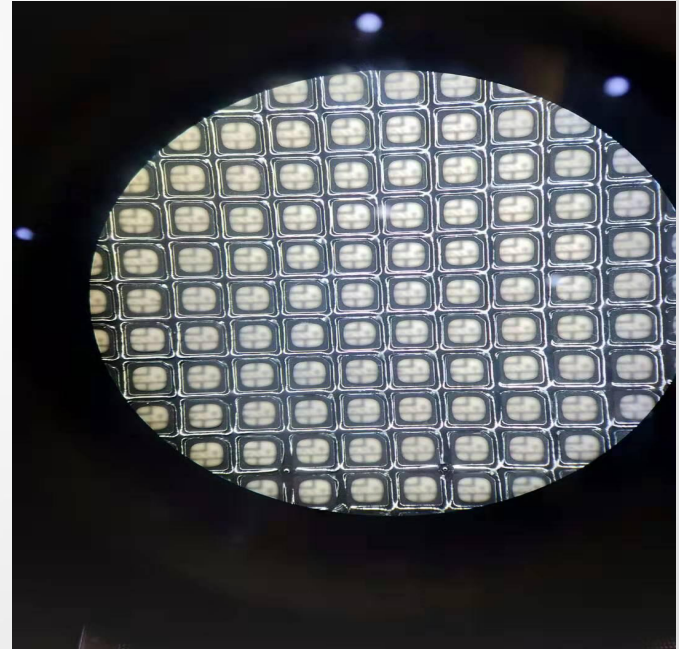


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Stability

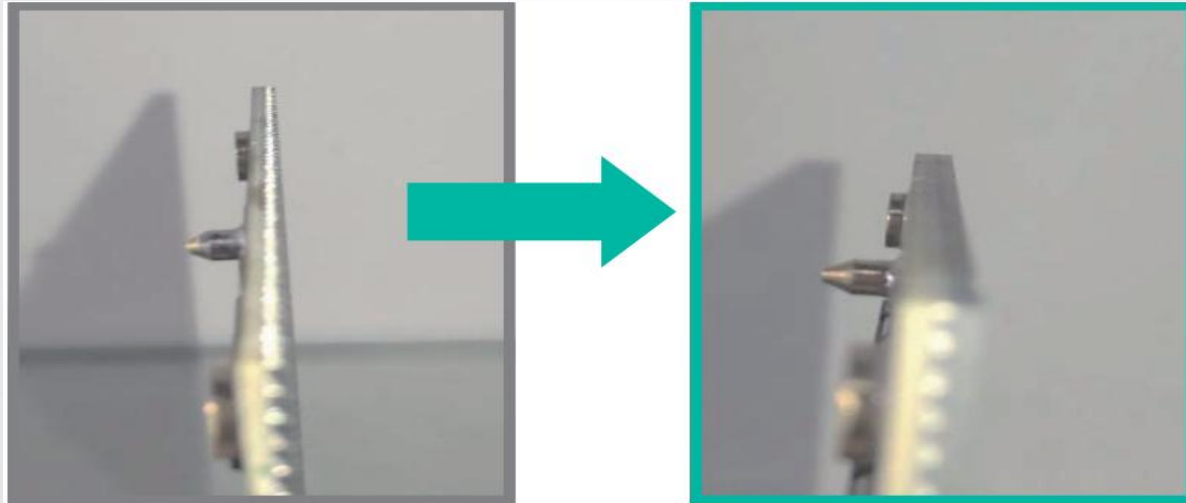
Overall thermal conductivity in the heat dissipation system of an led screen is regarded an significant indicator to its quality. But for that in traditional LED package technologies, gap exists and comes in the way between LED chips.

The LED products processed by HOB method is proved to remove gap and carry away heat between LEDs and pcb in an effective way, because the filled layer is made of nanoscale photonic thermally-conductive materials. That is, the whole LED module is considered as a flat section to transfer heat down the inside, which is constructively helpful to prolong its life span, and keep its performance.



Assembly with precision

Our GOB products have smooth, crystal surface (processed by DIAO cnc machine) and undergoes high-precision trimming, which leads to its 0.02mm in surface roughness.



Bright colors and softened expression

The surface layer in black matte is characteristic of reducing diffuse reflection, moire pattern; and it also raises contrast ratio, alleviates sensation of dazzle and glare, which in mass helps relieve eyes of exhaustion.



同种产品未用我司工艺单蓝色中呈现不均匀发光现象



同批次显示产品使用我司工艺后发光均匀, 颜色更柔和。

>> Blue colors of SMD LEDs not evenly distributed on the same LED screen

>> Much improvement present in overall color uniformity on same screen but with HOB technology

>> HOB LEDs in the same batch credited with even brightness distribution and softened colors.



Features	SMD	COB	HOB
Waterproof	✘	👍	👍
Moisture proof	✘	👍	👍
Anti-dust	✘	👍	👍
Anti-static electricity	✘	👍	👍
Anti-oxidation	✘	👍	👍
Anti-collision	✘	👍	👍
Anti-radiation	!	👍	👍
Anti-moire	✘	✘	👍
Visual comfort	✘	!	👍
LED Color uniformity	!	👍	👍
Uniformity thermal conductivity	!	👍	👍
Interactivity (touchscreen)	✘	👍	👍
Maintainability	Good	Bad	Between good and bad