2025 Micro-LED Display Industry and Technology Trends

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1. Micro-LED Market Analysis and Forecast

1.1 Micro-LED Display Industry Outlook

- Mini-LED BLU technology utilizes thousands of Mini-LEDs and hundreds to thousands of Local Dimming Zones to achieve picture quality comparable to OLED. This technology is rapidly being adopted in premium TVs, laptops, tablets, and automotive clusters due to its characteristics such as high brightness, high contrast ratio, improved color accuracy, and no burn-in phenomenon.
- In the consumer TV market, Samsung Electronics is showcasing industry-leading technology with its Neo QLED series, which features over *** Mini-LEDs and up to *** Local Dimming Zones. LG Electronics is pursuing a differentiation strategy focused on viewing angles and color accuracy through its QNED Mini-LED, which combines IPS panels and Nano-Cell technology, while TCL is focusing on ultra-slim TVs through its OD Zero structure. These Mini-LED TV product lines support DisplayHDR *** and feature high performance such as brightness of *** to *** nits and high refresh rates (*** to ***Hz).
- Meanwhile, Micro-LED is currently one of the most promising next-generation technologies in the display industry, offering superior brightness, longer lifespan, high temperature resistance, and high transparency compared to OLED. In particular, it overcomes the drawbacks of OLED, such as burn-in issues and the lifespan limitations of organic materials, making it a strong candidate to replace OLED in the premium display market in the future.
- *** has been establishing a mass production system in Vietnam centered on ultra-large Micro-LED TVs of 110 inches or more, while Chinese latecomers such as Vista are rapidly securing production capacity of several thousand units per month. Taiwan's AUO is focusing on the development of small, high-precision Micro-LED displays tailored for the smartwatch and medical device markets.
- As of 2025, the Micro-LED market is still in its early stages, with annual production capacity for Micro-LED TVs amounting to only about *** units out of the global TV market of approximately *** million units. However, the market is growing rapidly, and annual production of Micro-LED TVs is expected to increase to about *** million units by 2030. In particular, the premium TV market is estimated to be around *** million units annually, and Micro-LED possesses structural advantages that enable it to expand its market share within this segment.
- *** is a company that has secured the most advanced technological leadership in the ultra-large TV market and has been building a full-scale Micro-LED mass production system centered on its Vietnam factory since 2022. In particular, it is launching Micro-LED TVs centered on ultra-large premium product lines of 110 inches or more and is minimizing equipment investment burdens by procuring LTPS backplanes through external supply chains. This strategy enables the company to focus on profitability in its business operations.

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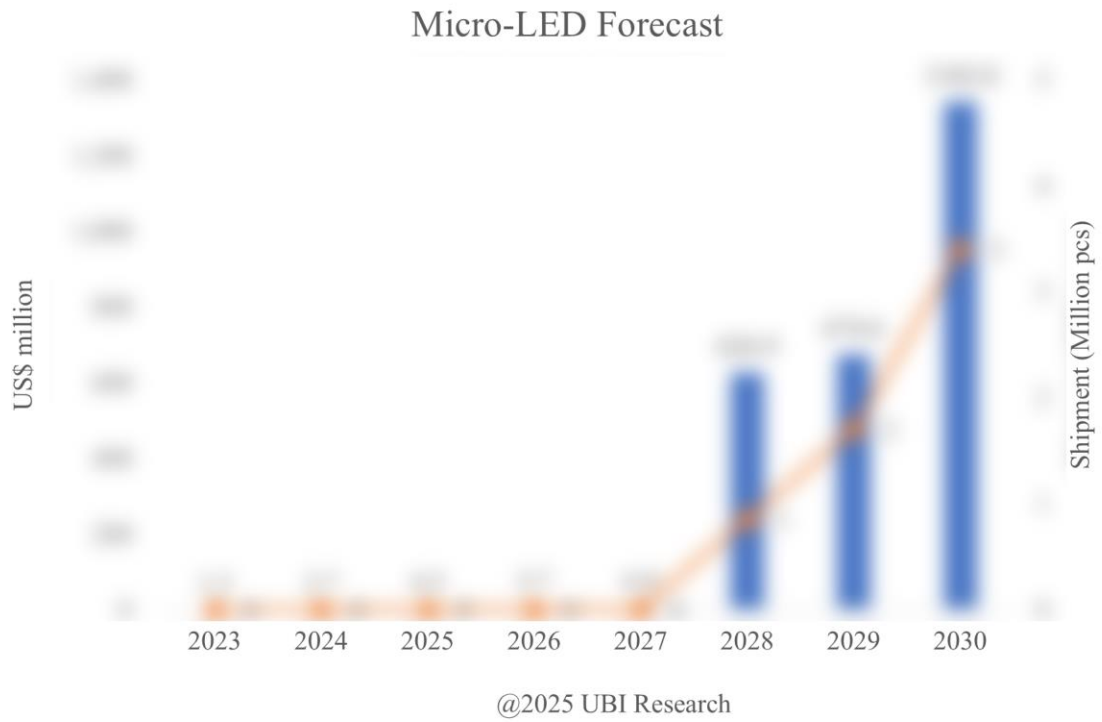
1. Micro-LED Market Analysis and Forecast

1.3 Micro-LED Display Market Outlook

- The initial market entry of Micro-LEDs was inevitably focused on high-end products, leading to the large-screen TV market and the AR glasses market, which require ultra-high brightness, becoming the initial targets. Going forward, gradual expansion is expected to center on killer applications, with the automotive display, smart watch, and transparent display sectors currently exploring entry strategies.



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2. Analysis of Micro-LED Display Products by Application

2.2 Current Status of Large Micro-LED Display Product Development

- At the 2024 CES and SID exhibitions, major TV and display companies actively showcased large-sized Micro-LED products. TCL CSOT exhibited a 163-inch 4K Micro-LED display, while Innolux displayed an 187-inch product composed of 96 12.3-inch modules tiled together, targeting museums and cinemas. At the 2025 CES, Hisense unveiled a 136-inch Micro-LED product achieving 10,000 nits of brightness, while Innolux showcased a 204-inch 8K display at Touch Taiwan 2025, and AUO revealed a 127-inch 4K Micro-LED TV. High-resolution implementation and cost reduction are expected to be the core technical challenges in the competitive landscape.

		Samsung	LG Electronics		BOE	Hisense	AUO	Innolux	
Display	Size								
	Resolution								
	PPI								
Unit Module	Size								
	Backplane								
	Number of Module								
Micro-LED Chip	Pixel pitch								
	Chip size								

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2. Analysis of Micro-LED Display Products by Application

2.3 Development Products of Transparent Micro-LED Display

- At Touch Taiwan 2025, a 30-inch transparent Micro-LED window for vehicles and a 17.3-inch dual-sided transparent Micro-LED display were exhibited. The dual-sided product can display different information on both sides simultaneously, demonstrating its potential for various service areas requiring interaction. Such displays are expected to expand their applications beyond commercial advertising to interior design and home appliances, as they can simultaneously fulfill information transmission and design elements.

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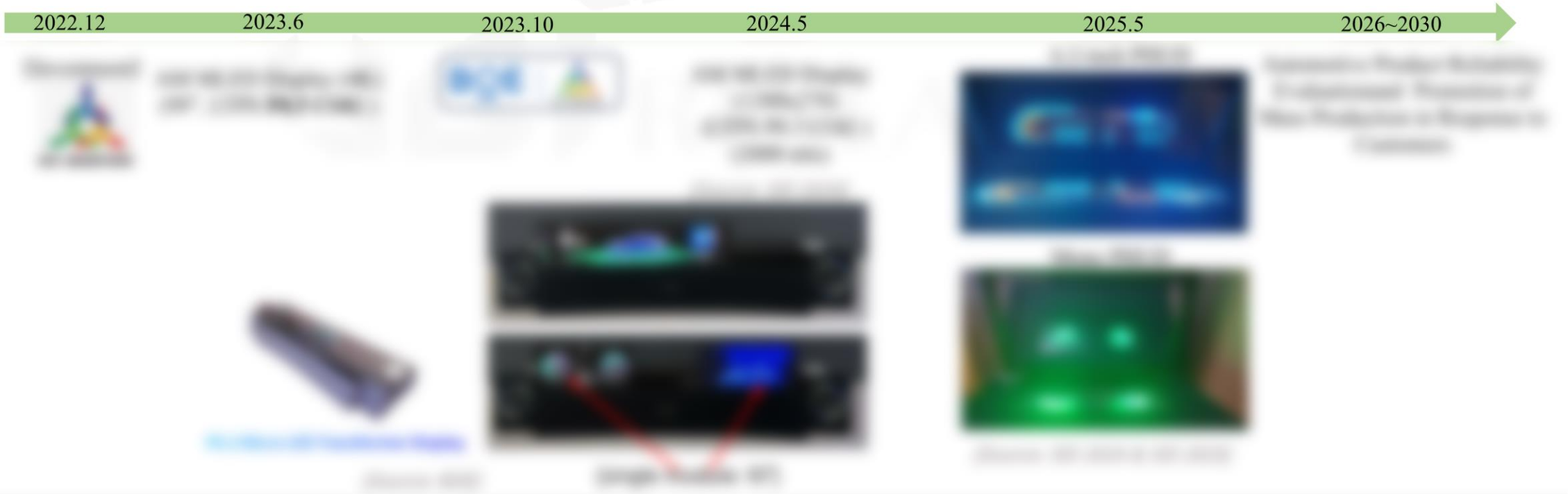
3. Product Development Status of Micro-LED Display Companies

3.1 Product Development Status by Chinese Companies

❖ **BOE**

- In 2019, we established a joint venture with Rohinni and began developing Mini/Micro-LED technology. In 2023, HC Semitek, a subsidiary of BOE, broke ground on a 6" Micro-LED epitaxial wafer production line in Zhuhai, China, and in March 2025, it began operating the world's first 6" Micro-LED mass production line. (Annual capacity of *** 6-inch Micro-LED wafers). Based on COG technology, we have focused on developing technology and products for large-scale commercial displays, and are currently exploring market entry into various fields such as automotive and AR/VR. In May this year, the company showcased a 6.2-inch 30,000-nit RGB PHUD and a high-brightness monochrome PHUD with a panel brightness of 300,000 nits at SID 2025. The company plans to pursue customer-oriented product mass production, including reliability evaluations based on automotive display product standards, over the next 2-3 years.



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5.4 Epitaxy and Chip Fabrication Process Issues

- Wavelength uniformity

- Defects

- External Quantum Efficiency

- Chip architecture

- Chip manufacturing process

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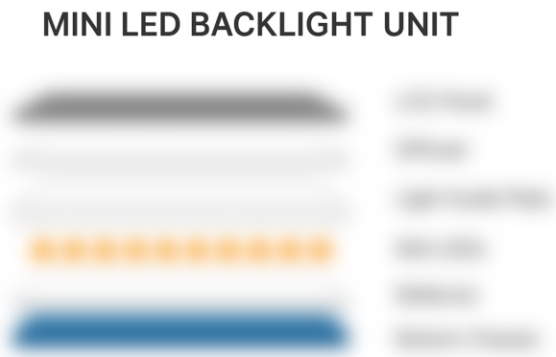
6.2 Local Dimming Technology

Development Status of Mini-LED BLU Technology

- Mini-LED BLU is a backlight light source technology that arrays tens of thousands of small LEDChips of 100-300μm size, and is attracting attention as an alternative or complementary technology to OLED in the premium display market based on its high brightness, high contrast ratio, and long life characteristics.
- Since 2018, major brands such as ***, ***, ***, and *** have adopted Mini-LED BLUs in their premium laptop, tablet, and TV products, and commercialization is in full swing. Initially, HDI (high-density circuit board)-based passive drive systems were the mainstream, but later TFT backplane-based active drive (AM, Active Matrix) structures were introduced to enable pixel-by-pixel dimming control, improving image quality and enabling precision control.
- Compared to conventional BLU technology, performance is differentiated by an increase in the number of Local Dimming zones, a thinner profile due to shorter optical distance (OD), and improved HDR. Competition with OLEDs is expected to intensify further as cost reductions and optical structure sophistication are pursued in parallel.
- The halo phenomenon, which has been a technical challenge, is being improved through increased dimming zones and precise optical design, and the introduction of bonding automation and transfer processes to improve productivity is also expanding. Chinese companies, in particular, are increasing price competitiveness by vertically integrating their own LEDChips, panels, and modules, and Taiwanese companies such as Ennostar and Epistar are leading the market by advancing LED packaging technology.
- Mini-LED BLUs are expanding beyond TVs to high-end IT displays, automotive digital clusters and CIDs, and signage, with TFT-based AM Mini-LEDs emerging as a promising alternative technology, especially in the automotive industry for displays requiring high temperature and long life characteristics.



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6. Mini-LED BLU Technology

6.10 Mini-LED BLU Supply Chain by Company

- Apple

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