MicroLED Yield Solutions
MicroLED displays offer many key performance benefits such as high brightness, increased contrast and extended lifetime. Major challenges to broad market adoption include both technology readiness and cost. Improved yield provides a pathway to both lower cost and mature technology, both of which are key elements required for the transition to high volume manufacturing. Since the overall yield is the combined result of the yields of the constituent process steps, including source microLEDs, source driver ICs, backplane, mass transfer and bonding, the yield of each step needs to be optimized.

MicroLED Display Yield is a Combination of Transitional Yields

\[
\text{Display Yield} = \text{MicroLED Epi & Patterning Yield} \times \text{Backplane & Driver IC Yield} \times \text{Transfer & Bonding Yield}
\]

KLA’s comprehensive solution for microLED manufacturing provides a pathway to yield improvement throughout the entire process—from epitaxy wafer to final display. Our proven process and process control products are designed to meet the unique and demanding challenges of the complex microLED production flow to help accelerate the yield required for wide market adoption.

KLA’s MicroLED Yield Solutions

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<td>Primaxx®/Sect™ Release Etch</td>
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5D Analyzer® and Klarity® Data Analytics

Epitaxy and MicroLED Patterning

Backplane Manufacturing

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Display Assembly

OASIS AI and Data Analytics
Epitaxy and MicroLED Patterning - Process

**SPTS Omega® ICP Etch:** Low damage plasma etch of tapered or vertical mesa structures.

**SPTS Omega® Rapier:** Tunable Si thinning.

**SPTS Mosaic™:** Plasma dicing for particle-free singulation of Si submounts.

**Primaxx/Xactix Release Etch:** Highly selective, dry vapor etch of sacrificial Si or SiOx layers.

**SPTS Delta™ PECVD:** Deposition of SiN for anti-reflection coating or stress compensation layers with excellent WTW and WIW thickness, RI and stress uniformity for high yields.

**SPTS Sigma® PVD:** Frontside and back side metal deposition with tunable stress and long throw option for reliable coverage in deep structures.

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Epitaxy and MicroLED Patterning - Process Control

**Candela® 8720 Advanced Surface Inspection for Substrate and Epitaxy Layers:** Automated inspection with sensitivity to sub-micron defects enables yield improvement and excursion control for microLED substrate and epitaxy layers.

**8 Series (8935) Patterned Wafer Defect Inspection:** High-speed defect inspection supporting microLED wafer screening for increased quality control. Advanced optical inspection capability with DefectWise® AI technology provides enhanced inline defect discovery and binning to drive yield improvements.

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KLA’s microLED portfolio also includes metrology systems which provide accurate feedback on film thickness, wafer shape, critical dimensions and overlay to maintain tight control of microLED wafer processes for improved performance and yield. Visit kla.com to learn more.
**Backplane**

**Orbotech Flare BP Inspection and Metrology System:** Full inspection of the entire panel area enabled by WireSense™ innovative detection technology. This supports irregular and complex pixel design on both the front and back of the glass.

**Orbotech Ignite BP Testing System:** Ensures perfectly formed anodes and cathodes before they are connected to LEDs. This is enabled by eLite™, a unique electro-optic sensing technology.

**Mass Transfer**

**Orbotech Flare MT Inspection and Metrology System:** In-scan measurements of every LED, ensuring 100% measurement coverage enabled by LEDSense™ technology and 360° darkfield capability, including accurate X/Y, shift measurement and appearance classification.

**Orbotech Ignite MT Testing System:** ColorScale™ technology, including LED luminance and brightness uniformity that can identify burnt LED and connector defects.