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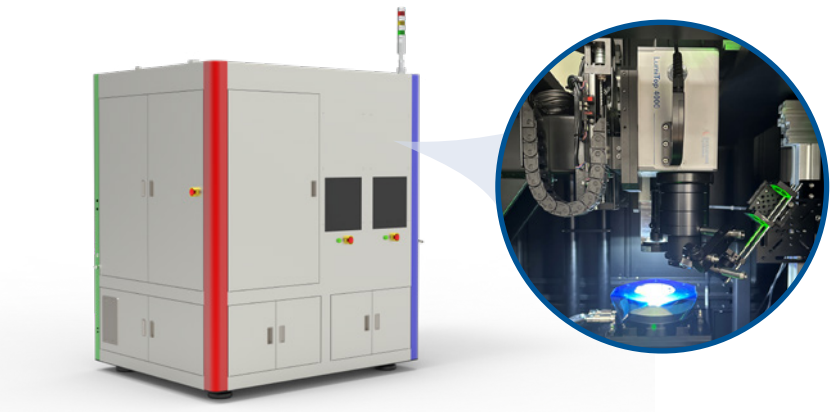
Instrument Systems
KONICA MINOLTA Group

RTS

MicroLED Full-Wafer Optical Inspection System



We bring quality to light.



01 \\ RTS – Full-Wafer MicroLED Testing Solution

The RTS system is designed for optical inspection of Micro LED wafers. It combines Rapitech's automated wafer handling technology with high-precision measurement solutions from Instrument Systems to form a high-efficiency, high-precision inspection system.

RTS provides fast, non-destructive, and high-sensitivity testing, enabling effective evaluation of emission characteristics and uniformity of wafers, and supporting process optimization and yield improvement.

Non-Destructive, High-Sensitivity Measurement

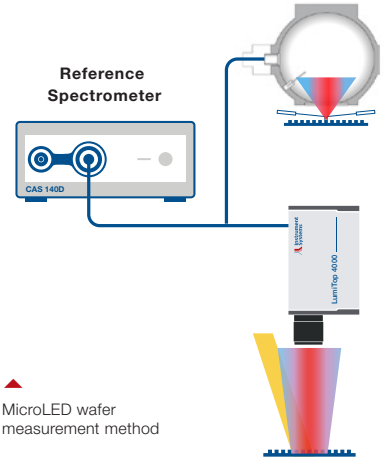
RTS utilizes a non-contact, low-power excitation method, allowing direct testing of Micro LED wafers without cutting or coating, reducing sample loss. The measurement process does not damage the material structure and is suitable for quality control in both R&D and production. Compared to conventional EL point measurement, which may cause irreversible damage, RTS maintains sample integrity while providing stable measurement results. Equipped with a CAS high-sensitivity spectrometer and a low-luminance LumiTop imaging colorimeter, the system detects weak light signals down to 0.009 cd/m² and measures wavelength, luminance, and color. All measurement data are traceable to Instrument Systems' metrology laboratory.

Fast, Efficient Full-Wafer Testing

RTS can complete full scanning of a 6-inch wafer within minutes, meeting efficiency and stability requirements for mass production. Combined with LumiSuite SDK and algorithm-assisted analysis, it automatically identifies defect regions and generates distribution maps of wavelength, luminance, and color, improving inspection and analysis efficiency. RTS integrates spectrometer and camera on a single platform based on the LumiTop concept, enabling simultaneous multi-parameter measurement and correlation with display module results. The modular design supports different excitation wavelengths, filters, and detection modules, and is suitable for Micro LED, quantum dots, and other optoelectronic materials.

Data Visualization and Cost Efficiency

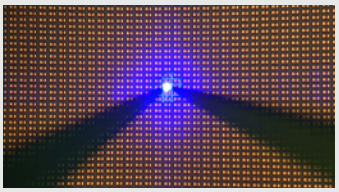
RTS generates optical distribution maps and supports output formats such as CSV, Excel, and images for further analysis and reporting. The non-destructive approach extends sample and component lifetime, reduces equipment and maintenance costs, and supports yield improvement.



MicroLED wafer measurement method

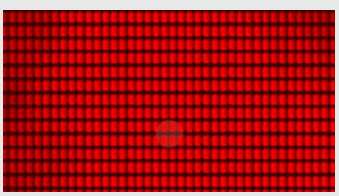
Single-LED Point Excitation

- Measurement of electroluminescence using an integrating sphere
- Proven LED illumination test technology



2D Measurement of Photoluminescence or Electroluminescence

- Combined with LumiTop imaging colorimeter for comparable measurement results
- Proven single-shot imaging measurement technology



02 \\ RTS vs. Conventional Inspection Methods

RTS measurement combines non-destructive testing, high sensitivity, multifunctionality, and efficiency, making it an ideal tool for Micro LED wafer inspection and optoelectronic material research. Whether for quality control in mass production or material optimization in R&D, RTS provides accurate and stable measurement data, helping improve product performance and market competitiveness.
As LED sizes continue to shrink, conventional inspection methods are increasingly challenged. RTS enables full-point measurement of Micro LED wafers and is suitable for advanced manufacturing requirements with high throughput and high resolution.

Measurement Method	RTS Measurement	Traditional EL Measurement	Optical Microscopy
Testing Speed	Fast (up to tens of thousands of Micro LEDs per second)	Slower (requires electrode contact)	Slow (point-by-point observation)
Sensitivity	High (detects weak light signals)	Medium	Low
Accuracy	High (wavelength accuracy WD 0.5 nm)	Medium	Low
Non-Destructive	Non-destructive	Requires electrode cwontact, may damage samples	Non-destructive
Application Scope	Broad (optoelectronic materials, semiconductors, etc.)	Limited to electroluminescent materials	Limited to surface observation

03 \\ RTS Key Features

◢ Fully Automated Testing
Automatic wafer loading, alignment, and testing for higher efficiency.

◢ High-Precision Optical Measurement
High-precision spectrometers combined with imaging colorimeters ensure accurate and traceable wavelength, luminance, and color measurement. Higher consistency than typical PL systems.

◢ Wide Luminance Range
0.009 to 120,000,000 cd/m² using LumiTop (low luminance) and CAS spectrometer.

◢ LiveCal – High-Precision Real-Time Calibration
Real-time calibration by Instrument Systems reduces environmental impact and ensures stable, repeatable results.

◢ High-Sensitivity Detection
High-efficiency optics and sensitive spectrometer for accurate data capture.

◢ Fast Full-Wafer Scanning
< 5 min for 6-inch wafers, ideal for high-volume production.

◢ Algorithm-Based Inspection
Detects defects and generates wafer maps (wavelength, luminance, color). Improves consistency and reduces defects.

◢ Multi-Wafer Compatibility
Supports 4"–8" Micro LED wafers.

◢ High-Precision XYZθ Stage
Accurate positioning and high repeatability.

◢ Non-Destructive Testing
No contact, no wafer damage.

◢ Modular System Design
Flexible configuration of light sources, filters, and spectrometers (Instrument Systems).

◢ CIE Color Measurement
Accurate x, y, u, v, u', v' measurement via LumiSuite.

◢ Luminance and Uniformity Analysis
Evaluates luminance and uniformity of regions or individual pixels.

◢ Advanced Color Analysis (CCT)
For Micro LED, AR, automotive, and other applications.

04 \\ Technical Specifications

RTS MicroLED Wafer-Level Optical Inspection System	
System Configuration	
Single Wafer Measurement Time	< 5 min [1]
Number of Dies per Measurement	100,000 [2], [3]
Minimum Detectable Die Size	15 µm × 20 µm [3]
Spectrometer Peak Wavelength (WD) Accuracy	0.5 nm
Wafer Sizes	4", 6", 8"
Measurement Parameters	LOP, WLD, WLC, WLP, x, y, u, v, u', v'
Chromaticity Accuracy (x, y)	±0.002
Optics	100 mm Lens, 2X, 5X, 10X [3]
Data Output	CSV, Excel, Image (PNG/TIFF)
Environmental Requirements	
Cleanroom Class	Clean room (Class ~ 10000)
Temperature	15 °C – 35 °C
Humidity	<85 % RH with no condensation
System Specifications	
Dimensions	On request
Weight	On request
Power Supply	100 – 240 VAC, 50/60 Hz

[1] Based on 6" wafer, die size 35 µm × 60 µm, pitch 15 µm, measurement area 7 × 7 mm
[2] Based on die size 15 µm × 20 µm, pitch 10 µm, measurement area 7 × 7 mm
[3] Using 100 mm lens without magnification; smaller sizes possible with Micro Lens

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