

Apacer optical inspection solution  
**AL100 Spectroradiometer**



V01-0217

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## Product Feature

- High Precision and Superior Optical Performance
  - **High-Sensitivity Sensor:** Equipped with a Sony ILX563A high-sensitivity 3000-pixel CCD array sensor.
  - **Accurate Measurement:** Features 96% to 97% luminance accuracy (Standard Illuminant A) and 0.002 chromaticity accuracy.
  - **Patented Technology:** Utilizes patented depolarization technology to ensure the accuracy of measurement results.
  - **Spectral Range:** Provides a wide spectral measurement range from 380 nm to 780 nm.
- Flexible Measurement and Operation Experience
  - **Dual Mode Measurement:** Supports contact measurement or non-contact measurement within 5cm.
  - **Visualized Operation:** Equipped with a 4.3-inch touch LCD screen to display measurement data and graphics in real-time.
  - **Diverse Parameters:** Simultaneously measures key indicators such as luminance, chromaticity (CIE1931/CIE1976), color temperature (CCT), color rendering index (CRI R1-R15), and dominant wavelength.
  - **Overexposure Warning:** Numerical values are displayed in red to alert the user when overexposure occurs.
- Powerful Software/Hardware Integration and Expandability
  - **Professional Analysis Software (ASR):**
    - Supports single, continuous, and average measurement modes.
    - Provides Gamma measurement evaluation, Uniformity measurement (supporting 4 to 13 points), and Color Gamut evaluation (e.g., NTSC, sRGB, Adobe RGB, etc.).
    - Data can be exported in CSV, XLS, or PDF formats.
  - **Development Support:** Provides a complete SDK supporting multiple programming languages such as C++, Python, C#, and Labview for secondary development.
  - **Calibration Flexibility:** Supports user self-calibration, including RGBW matrix calibration and spectral scale calibration.
- Mobile and Durable Design
  - **Lightweight and Portable:** The device weighs only 330g and uses reinforced plastic materials with an impact-resistant shell.
  - **High Endurance:** Built-in 3350mAh large-capacity battery.
  - **Ample Storage:** Standard 8GB SD memory card included, with support for up to 16GB.
- **Model Selection:** Choose between different models based on application needs: **AL100** provides an optical resolution of 5.5nm, while **AL110** offers a higher resolution of 3nm and a luminance measurement range up to 200,000 cd/m<sup>2</sup>.

## Hardware Overview

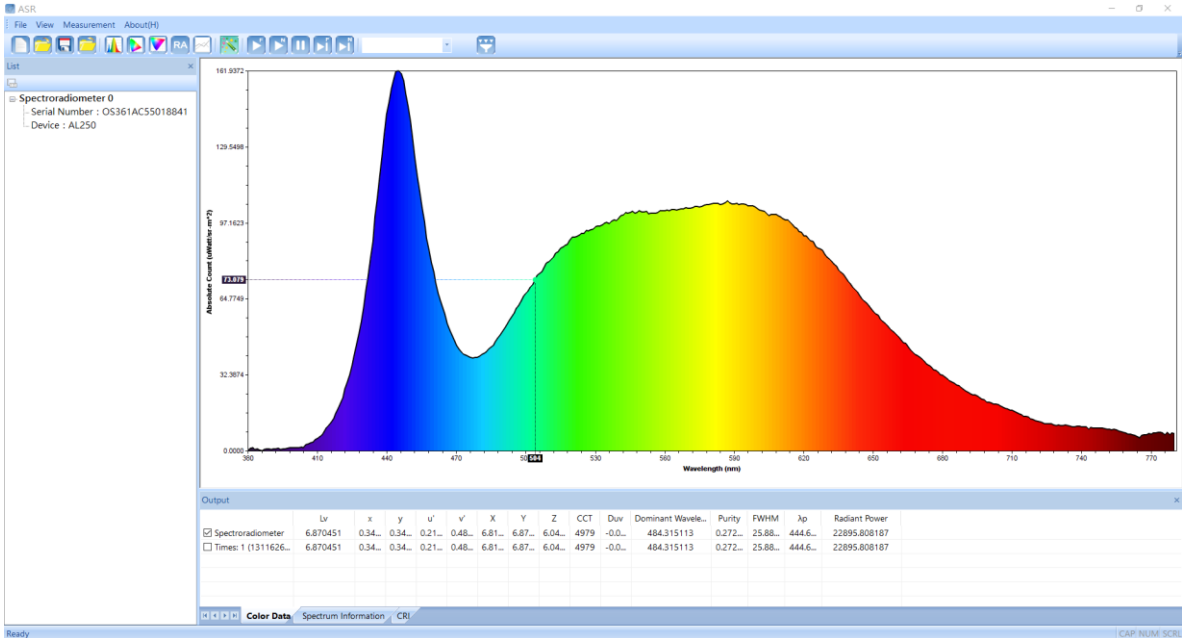


# Specification |

## Specification

Model		AL100	AL110
Display		4.3" Touch Screen	
Measurement Functions		Luminance, CIE1931(x,y)/CIE1976 (u',v'), Correlated Color Temperature (CCT, Duv), Dominant Wavelength ( $\lambda$ D), XYZ Tristimulus Values, Peak Wavelength ( $\lambda$ P), Peak Wavelength Value ( $\lambda$ PV), Color Rendering Index (CRI R1-R15, Ra), Spectrum(380-780nm)	
Measurement Mode		Contact or Non-contact (within 5cm)	
Acceptance Angle		5 °	
Luminance Range		0.5~70000 cd/m <sup>2</sup> (nit)	1~200000 cd/m <sup>2</sup> (nit)
Repeatability (2 $\sigma$ ) ( Illuminant A)	Luminance	99% (10~70000 cd/m <sup>2</sup> (nit))	97% (200~200000 cd/m <sup>2</sup> (nit))
	Chromaticity	x:0.002 y:0.002	x:0.002 y:0.002
Accuracy (Illuminant A)	Luminance	97% (10~70000 cd/m <sup>2</sup> (nit))	97%(200~200000 cd/m <sup>2</sup> (nit))
	Chromaticity	Luminance: 97% (10~70k nit) Chromaticity: 0.002 (Lv $\geq$ 10 nit)	Luminance: 97% (200~200k nit) Chromaticity: 0.002 (Lv $\geq$ 200 nit)
Resolution (FWHM)		5.5nm	3nm
Measuring Time		1ms~60s	
Storage		16GB SD Card	
Battery Capacity		3350mAH	
Dimensions (L/W/H)mm		184×97×32mm (diameters: lens hood, 32mm; lens sleeve, 7mm)	
Over-Exposure Warning		Numerical value turns red when overexposed	
Device Calibration		RGBW matrix calibration and spectral scale calibration	
Gauge Mounting Aperture		M6, ¼ 20UNC	
Weight		330g	
Operation/Storage Environment		0°C~40°C, <80% RH / -10°C~60°C <70%RH	
Accessories		Lens cap, USB cable, AC power adapter , Impact-resistant shell, 8GB SD Card	

## ASR Feature



### ➤ Diverse Measurement Modes & Data Visualization

- **Measurement Modes:** The software supports "Single," "Continuous," and "Average" measurement modes. Users can select the optimal mode based on the stability of the light source.
- **Visualized Graphics:** Beyond real-time numerical values, ASR can plot spectral power distributions (380-780nm), CIE 1931 and CIE 1976 chromaticity diagrams, and CRI (Color Rendering Index) bar charts.

### ➤ Color Gamut Evaluation

ASR software features built-in international standard gamut specifications, allowing users to evaluate the color reproduction capabilities of a display:

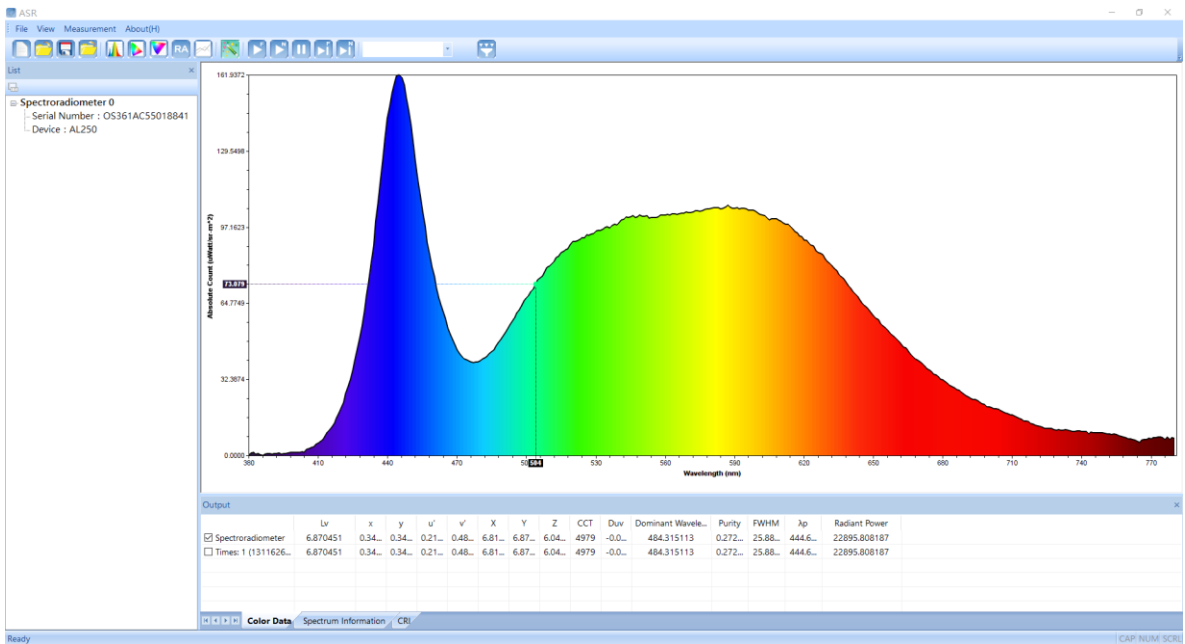
- **Supported Standards:** Includes NTSC, sRGB/Rec.709, Adobe RGB, REC2020, and DCI-P3.
- **Measurement Analysis:** After measuring the RGB primary colors and the white point (D65), the software automatically calculates the coverage percentage (Gp%) against standard gamuts.

### ➤ Uniformity Measurement

For large-sized displays or backlight modules, ASR provides precise brightness and chromaticity distribution analysis:

- **Multi-point Settings:** Users can choose from 4, 5, 9, or 13-point measurement layouts based on testing specifications.
- **Variation Evaluation:** Once measurements are complete, the software automatically calculates "Luminance Variation" to ensure consistent luminous performance across the entire panel.

## ASR Feature



### ➤ Gamma Measurement & Calibration

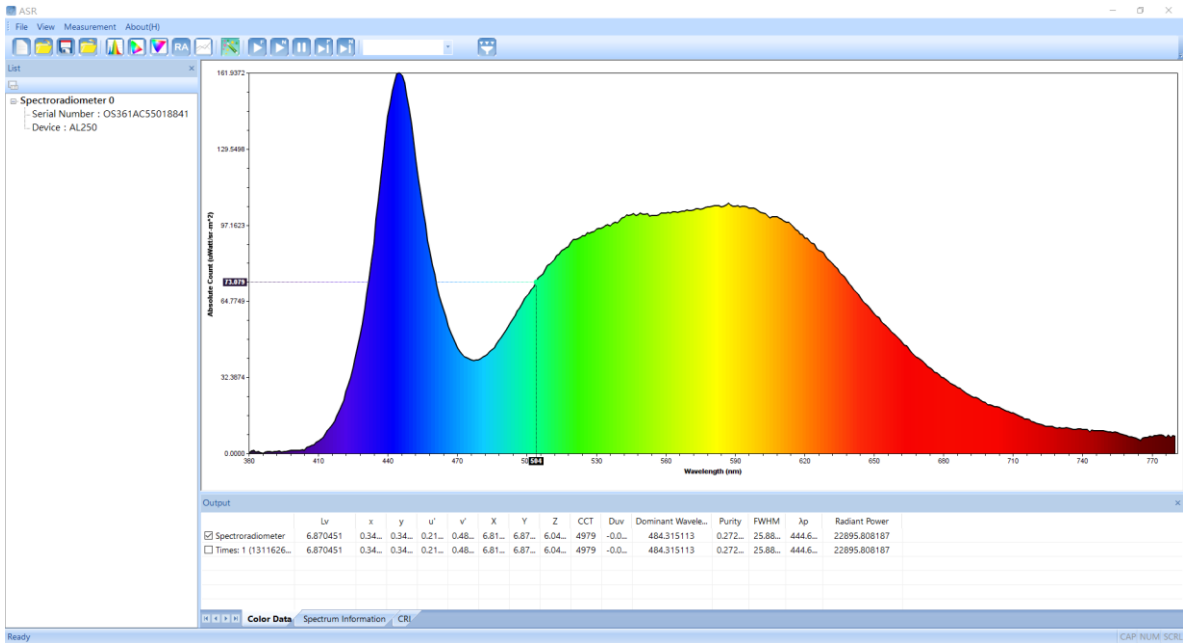
This function is used to evaluate the non-linear relationship between display grayscale levels and luminance output:

- **Grayscale Levels:** Measurements can be configured for different levels (e.g., 64 levels or higher).
- **Curve Comparison:** The software measures maximum luminance ( $L_{max}$ ) and plots a comparison between the actual Gamma curve and the target curve (e.g., Gamma 2.2).

### ➤ Data Storage & Advanced Calibration

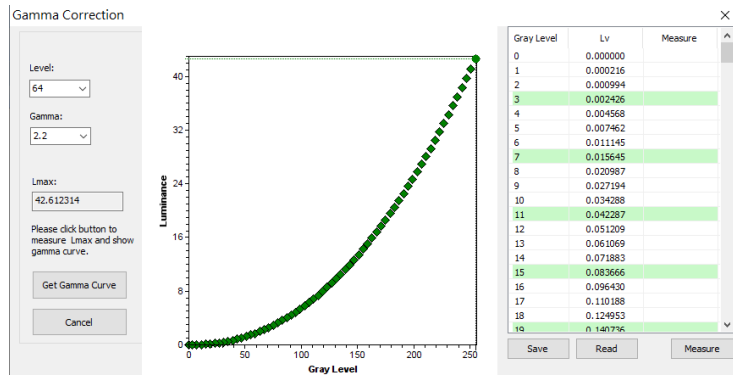
- **Report Export:** All data can be exported as CSV, XLS, or PDF reports (including gamut graphics) for convenient quality control records.
- **User Self-Calibration:** Supports RGBW matrix calibration and spectral benchmark calibration, ensuring the instrument maintains high accuracy over long-term use.

## ASR Data

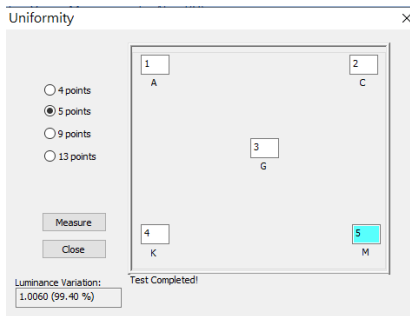


- Lv: Luminance.
- x, y: CIE 1931 x, y chromaticity.
- u', v': CIE 1976 u', v' chromaticity.
- X, Y, Z: XYZ Tristimulus values.
- CCT: Correlated Color Temperature.
- Duv: Blackbody radiation track deviation.
- Dominant Wavelength: The perceived primary wavelength.
- FWHM: Full Width at Half Maximum (Spectral bandwidth).
- $\lambda_p$ : Peak wavelength.
- Radiant Power: Radiation luminance ( $\mu\text{W}/\text{m}^2 \cdot \text{sr} \cdot \text{nm}$ )
- Spectrum(380nm-780nm) :  $\mu\text{W}/\text{m}^2 \cdot \text{sr} \cdot \text{nm}$
- CRI(Color Rendering Index) : R1-R15 , Ra

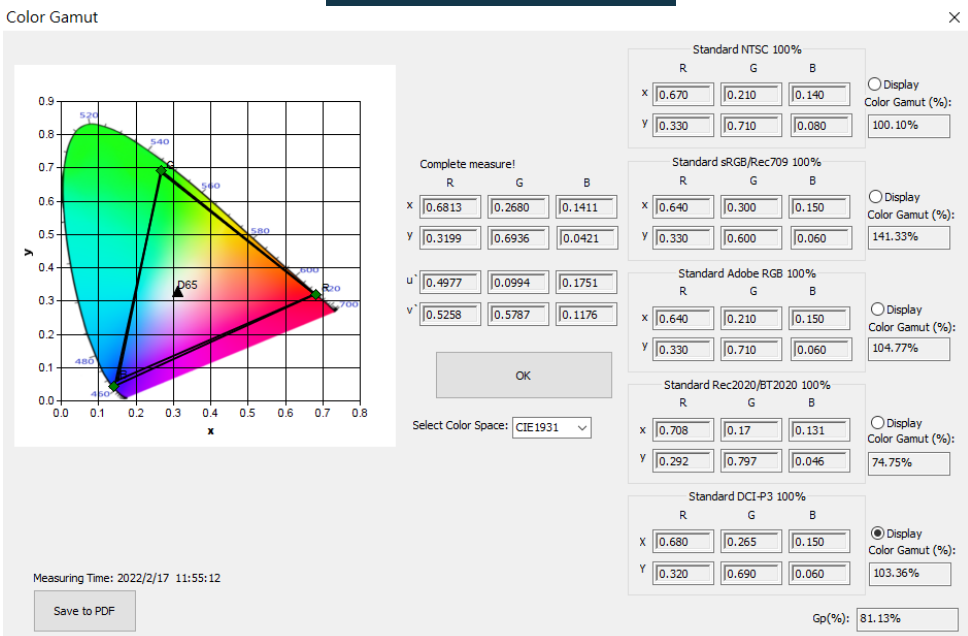
## ASR Add Function



Gamma measurement



Uniformity measurement



Color Gamut measurement

## Polarization

### ➤ Causes of Polarization Effects

- **Display Design:** Modern display screens use two polarizing filters in their design to represent changes in brightness, which causes the emitted light to become polarized in a single direction.
- **Instrument Interference:** This polarized light interferes with standard dispersive luminance meters, leading to deviations in measurement data due to polarization factors.

### ➤ Error Impact of Unaddressed Polarization Effects

If a luminance meter without "depolarization technology" is used to measure the same panel, simply rotating the instrument's angle (for example, from 0° to 90°) will result in significant inconsistencies in measurement results:

- **Luminance Error:** Experimental data shows that luminance error can reach as high as 13.96%.
- **Chromaticity Error:** The error in chromaticity (color accuracy) can reach up to 0.0097.
- **Spectral Inconsistency:** From spectral comparison charts, it can be observed that the spectral waveforms for various colors such as red, green, blue, and white do not coincide at different angles.

### ➤ Technical Advantages of the AL100 Series: Patented Depolarization Technology

- **Ensuring Accuracy:** The AL100 series specifically utilizes patented depolarization technology, which is one of the core features of its "high precision and superior optical performance."
- **Eliminating Environmental Variables:** Through this technology, measurement results will not fluctuate drastically due to the polarization characteristics of the display or the angle at which the instrument is placed, ensuring the stability and precision of the measured values.

