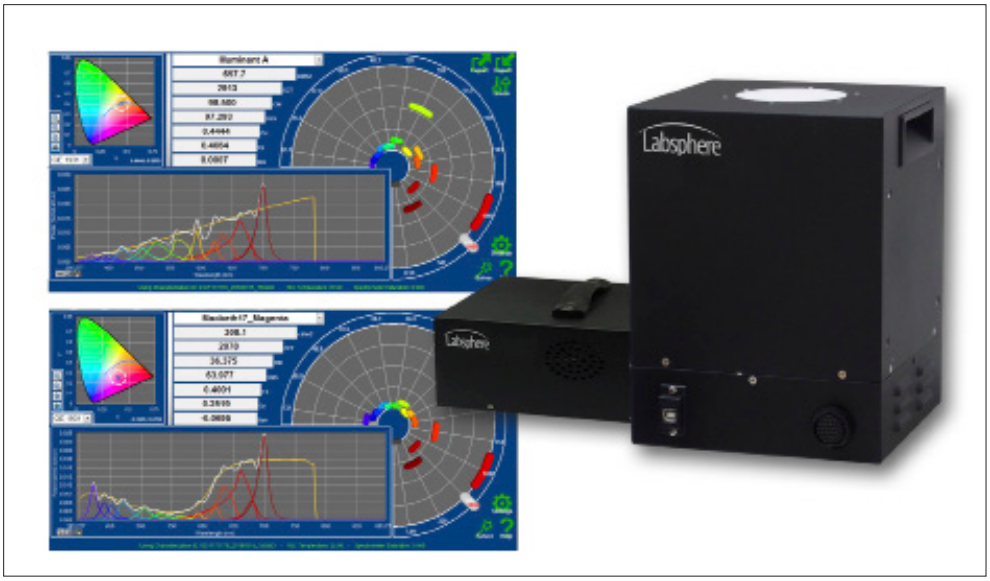
CREATE
any spectrum

Color Tunable Sources for Image Sensor Characterization



Highly uniform illumination

The 7.5 cm diameter port enables test and calibration with highly uniform illumination.

Trusted test data

Labsphere is a recognized leader in image sensor calibration sources. Our Tunable Image Sensor Characterization Sources are engineered for the high performance requirements in image sensor production testing and calibration.

Save money, save space

One instrument produces multiple spectrums. Large area uniform luminance field in a compact and robust instrument. The sources are designed to easily mount in a production test station with active spectral feedback loop and user recalibration features.

Repeatable, reproducible results

With Labsphere's diffuse reflectance material, Spectralon®, and thermal-controlled LED module, long term repeatability and reproducibility are ensured.

Labsphere
Advancing the Technology of Light: Measure. Create. Reflect.

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PB-13080-000 Rev 12

Measurement Applications

- Cross Talk
- Color Balance
- Distortion
- Dynamic Range
- Flat Fielding
- ISO Speed
- Linearity
- Pixel Defects
- Pixel Shading
- PRNU
- Quantum Efficiency
- Saturation Exposure
- Sensitivity
- Signal-to-Noise
- Spatial and Angular Non-Uniformity
- Vignetting Correction
- White Balance, White Noise

Industry Applications

- Ambient Light Sensor Calibration
- Automotive Camera Calibration
- CMOS Image Sensor Test
- Lens Testing
- Mobile Camera Calibration
- Photodiode Responsivity
- RGB Sensor Test
- Spectrum/Illuminant Simulation
- Technical and Industrial Photography

Features

- Resolution and Accuracy – 15 LED channels in the Visible and NIR with options for 23 and 32+ channels
- User Spectral Optimization – Quickly simulate any continuous spectrum, CIE Illuminant or Macbeth®/X-RITE® Color Patch
- Performance Metrics – Built-in spectral and color performance matching metrics of any simulated spectra
- Built-in spectrometer monitor and feedback loop to ensure accurate spectral output and correction for every wavelength channel
- Built-in user spectral radiance reference for user recalibration
- Extended use life with built in user recharacterization and calibration features.
- No down time returning unit for recalibration
- DC constant current drivers and thermal control for continuous stable performance
- Viewing Area – Large area 75 mm uniform radiance port
- Exceptional uniformity from narrow to 140° field of view (FOV)
- Quick Integration – Compact and robust for tester and production line integration

Calibration*

The spectral radiance of the source is monitored with an embedded spectroradiometer. The systems include a stable quartz tungsten halogen reference source used to recalibrated the spectral radiance responsivity of the spectroradiometer at the discretion of the user. This ensures continuous accurate spectral monitoring of the performance of the systems.

Active Feedback Control*

Achieve reproducible results with the active feedback control feature enabled. The calibrated embedded spectroradiometer can be used to measure and correct for any spectral radiance changes due to ambient conditions, inter reflections during test or long term drift, ensuring stability and optimal performance over time. Unlike broadband monitors the spectral feedback measures the total spectral distribution and corrects for individual LED input to the total spectral output.

System LED Characterization*

Limit down time by not having to return your source to the supplier for recharacterization with this embedded analytical feature! Characterization data are used to create the underlying predictive output model of the tunable calibration source system used for optimizing the spectral radiance to desired target spectra. The characterization feature is performed with the internal spectroradiometer of the tunable calibration source. The user can use this feature after long term use to recalibrate the spectral radiance of the source.

*applies to Labsphere's tunable calibration sources with the embedded spectroradiometer

Specifications

Light Source:	Integrating Sphere - 15 mm Tunable LED Light Engine and Discrete Color Channels Current Regulated DC Driver Control Spectral Range: CCS-1000: Visible, 850 nm and 940 nm CCS-1100: Visible, 850 nm and Calibration Lamp
Spectral Presets:	Source Spectra Illuminant A Illuminant B Illuminant C Illuminant D50 Illuminant D55 Illuminant D65 Illuminant D75 Neutral E SSL-CW SSL-WW RGB
Macbeth® ColorChecker (Color, Index#)	Orange, 7 Purple, 10 Blue, 13 Green, 14 Yellow, 16 Magenta, 17 Cyan, 18 840 nm 950 nm
Luminance Spatial Uniformity: (1-(max - min)) x 100%>94% over 360° x 200° FOV	
Output Port:	75 mm diameter
Luminance Range:	10 to 1000 cd/m^2
Long Term Stability:	+/- 1%
Short Term Stability:	+/- 0.1% COV after 500 msec
Initial Warm-Up Time:	500 msec
Control: Software Development Kit and LabVIEW User Software	Individual Light Channel Control Preset Functions for Illuminant Spectrums Luminance, x, y, CCT, CRI, Duv Stability Indicator Active Spectral Feedback Loop Embedded User Recalibration Process User Recharacterization
With Spectrometer Monitor Option	Spectral Radiance (W/m^2-sr-nm) Luminance (cd/m^2) Illuminance (lux) (optional) CRI Duv
Operating Temperature:	20 - 40°C, 0 - 70% RH
Computer Requirements:	Windows®, 32 bit or 64 bit USB
Power Input:	110/240 VAC, 50/60 Hz, 335 W
Dimensions: Integrating Sphere Source Module	25 cm x 18 cm x 18 cm (H x W x L)
Power Module	14 cm x 23 cm x 37 cm (H x W x L)
Weight: Integrating Sphere Source Module	8 kg
Power Module	6 kg

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Additional Optical Specifications

Spectral Range:	380 nm - 1000 nm (User Configurations Available)
Spectral Output:	Standard 15 and 16 channels. 1 to 32+ channels available.
Spectral Bandwidth:	Visible Typical ≈20 nm FWHM, NIR Typical ≈50 nm FWHM
Source Geometry:	75 mm Diameter Uniform Output, Lambertian Radiant Source
Spatial Uniformity:	97% Uniformity
CCT Range:	1,900K – 40,000K
Preset Spectra: Visible	CIE Illuminants A, B, C, D50, D55, D65, D75, E, SSL-WW Macbeth®/X-Rite® Color Patches
Custom Preset Spectra:	Arbitrary spectra can be configured as presets using Labsphere's OSC-1000 optimization option
Accuracy Specifications	
Color Stability:	≤ 0.001 x,y
Illumination Accuracy:	< 1.0%
Spectral Accuracy:	≤ 0.006 in x,y
Temperature Stability:	Active Thermoelectric Cooler with Feedback, Temperature Control within ± 1°C
Long Term Drift:	Output: ≤ 0.2% Spectral: ≤ 1 nm (Typical, Channel Dependent)
Electrical Specifications	
Dynamic Range Adjustment:	3 - 4 Decades
LED Control:	DC Constant Current regulated with feature of optical spectral feedback control
General Specifications	
Software:	Firmware contains: - Full Spectral Calibration and Handles Spectral Fitting - Preset Stored Spectral - User Spectrum Matching - Real-time Spectral Feedback Loop - Spectrometer Calibration - Systems Field Characterization and Calibration - Radiometric, Photometric and Color Matching Metrics
Interface:	USB 2.0 Type B Connector and DB-9 Connector

Ordering Information

Order Number	Model Number	Description
AA-01367-000	CCS-1000	Tunable LED Source Without Spectrometer Includes visible, 850 nm and 940 nm LEDs
AA-01367-100	CCS-1100	Tunable LED Source With Spectrometer Includes visible, 850 nm LED and calibration lamp
AS-03025-100		OSC-1000 Software

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