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.
**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
  - Orange, 7
  - Purple, 10
  - Blue, 13
  - Green, 14
  - Yellow, 16
  - Magenta, 17
  - Cyan, 18
  - 840 nm
  - 950 nm

[Macbeth® ColorChecker](Color, Index#)

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/m²

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
- Spectral Radiance (W/m²-sr-nm)
- Luminance (cd/m²)
- Illuminance (lux) (optional)
- CRI
- Duv

With Spectrometer Monitor Option

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
Ordering Information

<table>
<thead>
<tr>
<th>Order Number</th>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA-01367-000</td>
<td>CCS-1000</td>
<td>Tunable LED Source Without Spectrometer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Includes visible, 850 nm and 940 nm LEDs</td>
</tr>
<tr>
<td>AA-01367-100</td>
<td>CCS-1100</td>
<td>Tunable LED Source With Spectrometer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Includes visible, 850 nm LED and calibration lamp</td>
</tr>
<tr>
<td>AS-03025-100</td>
<td></td>
<td>OSC-1000 Software</td>
</tr>
</tbody>
</table>

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