CCS Tunable Camera Calibration Sources

Applications
- Auto White Balance
- Quantum Efficiency
- Vignetting Correction
- SNR
- Spatial Non Uniformity
- Pixel Defects
- Channel Cross Talk

One Instrument, Multiple Spectrums
CCS Tunable Camera Calibration Sources are an integral part of Labsphere’s growing line of TruLume sensor calibration solutions. The tunable source simplifies and enhances production testing of camera modules by eliminating multiple steps in the image quality correction process, with a choice of uniform standard illuminants and colors from one compact and robust source.

Multi-Sourced Solution
The CCS-1000 is engineered with high resolution dc controlled LEDs, each calibrated with the integrating sphere source. It is nearly every visible light source in one device plus NIR spectra to correct for filter leakage. With the software controlled LED channels it is possible to generate the spectrum of standard indoor and outdoor illuminants such as A, B, C, D50, D55, D65, D75, F2, F12, Neutral E and SSL-CW with very high reproducibility. Not only does the user have the option to select from predefined spectrums, the CCS-1000 also allows one to create their own spectral arrangement and save them to recall at anytime for user defined test methods. With the integrated spectrometer option, one can monitor the broad range of the VIS-NIR spectra as well as radiometric and photometric performance.

High Uniformity
Prevents over correction

One Instrument, Multiple Spectrums
Saves time and space

High Luminance and Color Stability
Provides reliable results

Extended VIS-NIR Spectrums
Monitor color and NIR correction
Large area port in a compact and robust instrument
Ideal for production and R&D

DC Drivers
Reduce low frequency noise common to PWM

Compact And Robust For Production Environments
The CCS-1000 is engineered for the high performance requirements in the field of camera module production testing and calibration for image and color quality. The source is engineered to easily mount in a production test station. The 7.5 cm diameter window enables test and calibration over a large field of view with highly uniform illumination. With Labsphere’s highly diffuse reflectance material, Spectralon®, and seasoned LED module long term repeatability and reproducibility are ensured. The power control module is tethered to the source module by way of a detachable 2 m cable.

OPTIONS
Spectral Monitor
When monitoring the spectral radiance and photometric performance in near real time is important, Labsphere offers the CCS-1100. The CCS-1100 has the same high performance and light output control of the CCS-1000 with the added benefit of a spectral monitor that allows one to capture the spectral output in addition to the programmed output.

OSC-1000 Optimization Solution Creator
This option allows users to upload their desired spectral output target, which will optimize the LED inputs for the best match. With this program, users can create and save custom spectra for future use.

Order Information

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Order Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCS-1000</td>
<td>AA-01226-100</td>
<td>Tunable Camera Calibration Source</td>
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<tr>
<td>CCS-1100</td>
<td>AA-01226-000</td>
<td>Tunable Camera Calibration Source with Integrated Spectrometer</td>
</tr>
<tr>
<td>OSC-1000</td>
<td>OSC-1000</td>
<td>Optimization Solution Creator Option</td>
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</tbody>
</table>

Accessories Include
- Quick Start Guide
- Programming Commands
- Uniformity Report
- Calibration Certificate

http://www.onset-eo.com
The CCS-1000 and 1100 allows reproduction of standard spectrums with exceptional color matching with high uniformity across a large area and dynamic range.

### CONTROL SOFTWARE
- Predefined Spectrums
- Individual LED Channel Control
- Spectral Output
- Photometric Performance

Figure 1: Example of Illuminant A, Shown with NIR sources and exceptional color matching in the visible region

Figure 2: Choose From a Selection of Preset Spectrums or Create Your Own

Figure 3: Optional OSC-1000 Optimization Solution Creator will Optimize the Spectral Output to Your Target Spectrum

Figure 4: Luminance Uniformity Chart of Typical CCS

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**CHAPTER 1 TEST-MEASUREMENT**

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### Illuminant Illuminant CRI CCS CRI (Typical) Illuminant Duv CCS Duv Tolerance

<table>
<thead>
<tr>
<th>Illuminant</th>
<th>Illuminant CRI</th>
<th>CCS CRI (Typical)</th>
<th>Illuminant Duv</th>
<th>CCS Duv Tolerance</th>
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<tbody>
<tr>
<td>A*</td>
<td>100</td>
<td>96</td>
<td>0.0000</td>
<td>±0.002</td>
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<tr>
<td>B*</td>
<td>98.7</td>
<td>99</td>
<td>-0.0013</td>
<td>±0.002</td>
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<tr>
<td>C*</td>
<td>97.5</td>
<td>98</td>
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<tr>
<td>D50*</td>
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<td>98</td>
<td>0.0032</td>
<td>±0.002</td>
</tr>
<tr>
<td>D55*</td>
<td>100</td>
<td>97</td>
<td>0.0032</td>
<td>±0.002</td>
</tr>
<tr>
<td>D65*</td>
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</tr>
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<td>D75*</td>
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<tr>
<td>F2*</td>
<td>64.1</td>
<td>65</td>
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<tr>
<td>F12*</td>
<td>83.0</td>
<td>82</td>
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<tr>
<td>Neutral E*</td>
<td>95.3</td>
<td>97</td>
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<tr>
<td>SSL-CW</td>
<td>86.1</td>
<td>86</td>
<td>-0.0018</td>
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</table>

*CIE 15:2004 Colorimetry

### CCS Tunable Camera Calibration Sources

<table>
<thead>
<tr>
<th>Luminaire Spatial Uniformity:</th>
<th>&gt;97%</th>
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<tbody>
<tr>
<td>Typical Spectral Output CIE 1931 Illuminants and more:</td>
<td>Illuminant A</td>
</tr>
<tr>
<td></td>
<td>Illuminant B</td>
</tr>
<tr>
<td></td>
<td>Illuminant C</td>
</tr>
<tr>
<td></td>
<td>Illuminant D50</td>
</tr>
<tr>
<td></td>
<td>Illuminant D55</td>
</tr>
<tr>
<td></td>
<td>Illuminant D65</td>
</tr>
<tr>
<td></td>
<td>Illuminant D75</td>
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<tr>
<td></td>
<td>Illuminant F2</td>
</tr>
<tr>
<td></td>
<td>Illuminant F12</td>
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<tr>
<td></td>
<td>Neutral E</td>
</tr>
<tr>
<td>SSL-CW</td>
<td>NIR</td>
</tr>
<tr>
<td></td>
<td>750 nm</td>
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<tr>
<td></td>
<td>840 nm</td>
</tr>
<tr>
<td></td>
<td>950 nm</td>
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</tbody>
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#### Light Source:
- Integrating Sphere
- LED Module: filter white channels and discrete color channels controlled with direct current
- Spectral Range: 380 nm to 1000 nm
- Current Regulated DC Drivers

#### Luminance Range:
50 to 500 cd/m²

#### Stability:
COV ≤ 0.2% after 5 minute warm up

#### Warm Up Time:
5 minutes

#### Control: Software Development Kit and LabVIEW User Software
- Individual Light Channel Control
- On, Off
- Preset Functions for Illuminant Spectrums
- Luminance, x, y, CCT, CRI, Duv
- All Off
- Stability indicator

#### With Spectrometer Option
- Spectral Radiance (mW/cm²-sr-nm)
- Luminance (cd/m²)
- Illuminance (lux)
- CRI
- Duv
- Source Calibration

#### Operating Temperature:
20 - 40 degrees C, 0 - 70% RH

#### Computer Requirements:
Windows®, 32 bit

#### Power Input:
110/220 VAC, 50/60 Hz

#### Dimensions: Integrating Sphere Source Module
- 18 cm x 18 cm x 24 cm

#### Power Module
- 43 cm x 37 cm x 5 cm

#### Weight: Integrating Sphere Source Module
- 8 kg
- 6 kg

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