

WP525

Imaging Spectral Colorimeter



The only all-in-one tristimulus imaging spectral colorimeter

Description

The WP525 is a unique imaging colorimeter solution comprising an integrated 24.6 MP, tristimulus-filtered camera and an internal reference spectroradiometer. As a result, the WP525 has superb performance without the hassle and cost of multiple discrete instruments. Everything needed is in one compact package, and the included Photometrica® software features all the tools required to characterize displays and lighting efficiently.

All display types and sizes

With a wide assortment of lenses available, from microscope objectives to wide-angle, the WP525 is configurable for measurements of any display size, from microdisplays to smartwatches, tablets, TVs, or cinema walls. The system supports electronic or manual lenses from 24 to 100 mm focal length, and fixed focus microscope lenses up to 10X magnification. In addition, our Conometer® Viewing Angle Lens for measurements, and the XR1 Near Eye Display Lens for analysis of augmented and virtual reality displays are available.

Key Features

- 24.6 MP imaging
- XYZ tristimulus filters
- Integrated spot spectroradiometer
- 0.002 cd/m² sensitivity
- Low polarization
- Automatic dark measurements
- EF lenses
- No beam splitter

Applications

- Flat panel displays
- Near eye displays
- Lighting
- LED arrays

WP525 Imaging Spectral Colorimeter

Description

Key to the WP525's unique capability is the high-speed linear translation stage. The stage has multiple positions for imaging light with the spectroradiometer or with the X_{Red} , X_{Blue} , Y and Z tristimulus filters and camera. In addition, there is standard filtering up to ND2 in the spectrometer path.

Conveniently, the moving stage also provides positions where the imager or spectrometer is shuttered from illumination. Dark measurements to correct detector noise are fully automated.

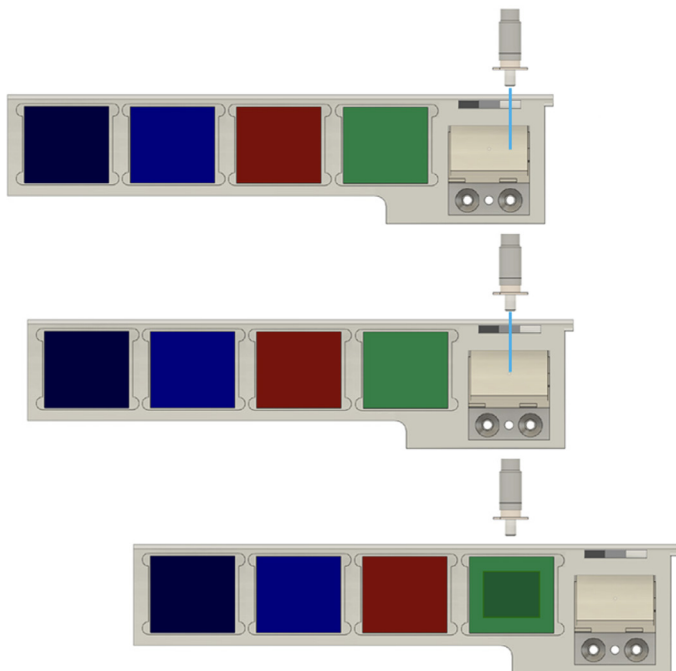


Illustration: The fiber is fixed, and the stage moves left and right.

Top: a prism blocks the imager and deflects light to the fiber through an ND0 filter.

Middle: the prism deflects light through a ND1 filter.

Bottom: a tristimulus filter in front of the imager.

Measure and correct all colors

The tristimulus-filtered imager provides accurate color measurements. However, the spectroradiometer can be much better. For example, the imager accuracy can be improved by 2x to 10x when measuring white or monochrome LEDs and correcting with the internal reference spectroradiometer. Making color corrections with the integrated spot spectroradiometer is fast and automatic.

AR/VR display testing

The periscope design [XR1 Near Eye Display \(NED\) Lens](#) provides optimal test performance for augmented and virtual reality displays. The periscope design ensures the lens readily fits into final assemblies of glasses, headsets, and helmets. Under different stimuli, human visual accommodation results in varying pupil diameters. Therefore, we made sure the entrance pupil aperture is adjustable from 1.5 to 5.0 mm.



Distortion corrected

A menu-driven registration and distortion correction assistant allows users to correct for lens distortions. Once the correction is applied, any distortions in the display under test are revealed and can be analyzed.

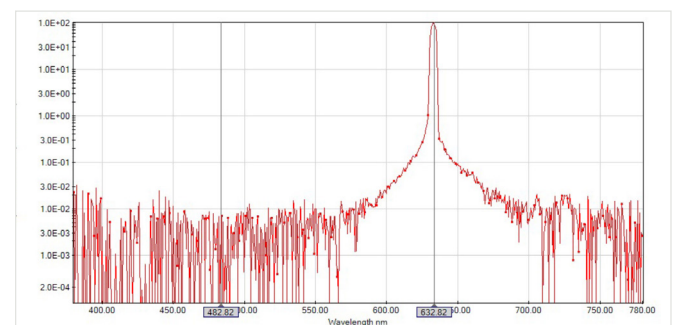
Viewing angle

The [Conometer® Lens](#) enables viewing angle measurements of flat panel displays and backlights.



Spectral performance

The integrated, low-noise CMOS spectrometer is optimized for color measurements. The combination of low optical stray light and high dynamic range using exposure time stacking enables superb color measurements.



HeNe laser spectrum plotted in log scale showing $<1E-4$ stray light

Comprehensive solution for production testing

The WP525 has all the right features for deployment in production applications:

- The precision mechanics are rated for two million color and spectral measurements before maintenance is required.
- The high-accuracy spectroradiometer and camera have hardware triggers to synchronize the measurement with other equipment in the test setup.
- The camera uses advanced thermal management to keep the sensor cool and sensitive.
- Air filters attach to the fan vents to help keep dust out of the electronics area.
- Westboro Photonics also offers on-site recalibration software to minimize production downtime and other costs related to off-site calibration.
- In addition, Westboro Photonics' network of international distributors and local recalibration labs provide additional support.

Flat panel display testing

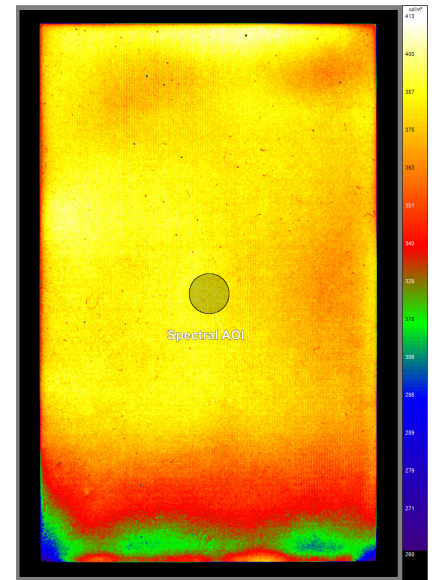
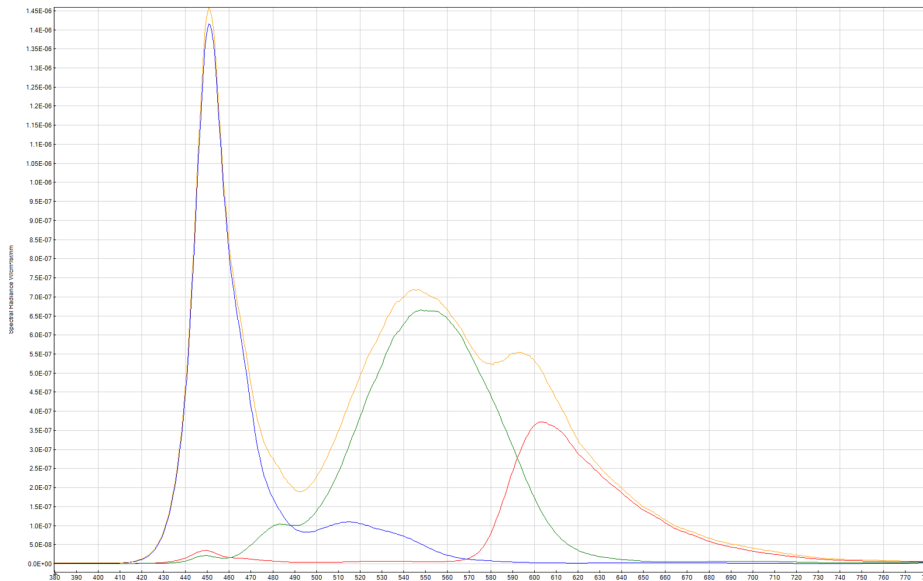
With our comprehensive display performance and defect tests, users can readily deploy solutions to production with minimal engineering effort. Performance tests include uniformity, gamma, gamut, contrast, and viewing angle. Defect tests include pixel and line defects, mura, dust, debris, etc.

Versatility for many applications

Westboro Photonics also offers specialized add-on software packages to help with specific tests, e.g., [Uniformity](#), [Graphics](#), [Styling Line](#), [Beam Pattern](#), [Head Up Display](#), and more.

How can I learn more?

Visit our website for more information about our latest products and [Photometrica software](#) capabilities to measure and analyze displays, lighting and more.

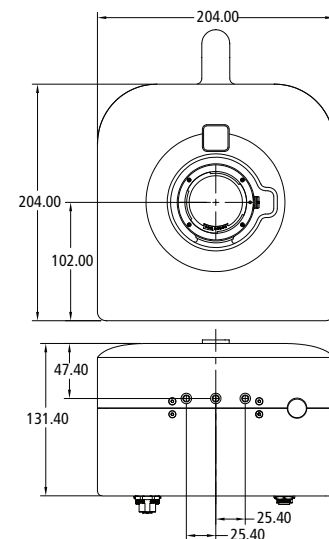


Photometrica software windows show an example of the spectral data from the measurement spot 2D for white, red, green and blue display settings; and an image of the display surface pseudo color mapped to luminance.

WP525 Imaging Spectral Colorimeter

TECHNICAL SPECIFICATIONS*	
2D Measurements	Luminance, chromaticity
Spot Measurements	Spectrum, luminance, chromaticity, radiance etc.
CAMERA	
Resolution	4608 (H) × 5328 (V) (24.6 MP)
Pixel size	2.74 μm x 2.74 μm
Dynamic range	>100dB with HDR imaging
Luminance range 2D ^{2,4}	0.002 cd/m ² – 3 E+5 cd/m ²
Precision for luminance and chromaticity, u', v' ⁵	±0.05% ±0.00004
SPECTRORADIOMETER	
Wavelength range	380-780 nm
Resolution bandpass	4.2 nm
Data point interval	0.57 nm
Wavelength accuracy	0.5 nm
Stray light, 8 bandwidths from HeNe laser	3 E-5
Spectral spot area; diameter	28 040 pixels; 189 pixels
Luminance range ^{3,4}	0.11 cd/m ² – 3 E+6 cd/m ²
Precision ⁵	±0.1 % for Y; ±0.000 1 for u', v'
Accuracy of spot spectroradiometer ⁶	±3.5% for Y; ±0.001 5 for u', v'
Polarization sensitivity ⁷	+/-0.1% for Y; +/- 0.000 1 for u', v'
MEASUREMENT TIME⁸	
2D luminance, 2D color	Y: 0.7 s, XYZ: 4 s
Spectrum	0.1 s
Combo: 2D color + Spectro	5 s
GENERAL	
Operating System	Windows 10/11 (64 bit)
Dimensions (l x w x h) ¹	190 mm x 190 mm x 100 mm
Height of optical axis above camera mount	102 mm
Interface	USB3, Gigabit Ethernet
Weight	3.9 kg without lens
Power supply	12 V, 4A max
Operating temperature range	15 – 35 °C, 0-85% humidity, non-condensing

ORDERING SPECIFICATIONS	
WP525 Imaging Spectral Colorimeter	
OPTIONS	
-01	Delete internal spectrometer
ELECTRONIC LENSES	
LS-24-1.4-EF	24 mm
LS-35-1.4-EF	35 mm
LS-50-1.4-EF	50 mm
LS-70-1.4-EF	70 mm macro
MANUAL LENSES	
LS-24-1.4-EFM	24 mm
LS-35-1.4-EFM	35 mm
LS-50-1.4-EFM	50 mm
LS-100-2.8-EFM	100 mm macro
LS-2X-EF	2x microscope
LS-5X-EF	5x microscope
LS-10X-EF	10x microscope
LS-Cono-EF	160° Conometer Viewing Angle
LS-NED-EF	XR1 Near Eye Display



* Specifications are preliminary and unless specified otherwise, are for a 189 pixel diameter spot in the center of the image, 50 mm lens at iris F1.4 at 1 meter working distance and measuring illuminant A. Accuracy and precision specifications are at 23°C +/- 2°C after calibration and after 30 minutes of warmup. Specifications are subject to change.

- 1 Excluding lens and handle.
- 2 Imager using exposure times from 65 μs to 8.2 s and iris settings F1.4, F2.8 and F5.6.
- 3 Spectrometer using exposure times from 0.5 ms to 8.2 s, without averaging, and with internal ND0, ND1 and ND2 and with calibrated iris positions F1.2, F2.8, and F5.6.
- 4 Lower measurement limit based on a single exposure at 8.2 s exposure time and a signal to noise ratio of 10:1. Averaging up to 100 measurements can improve noise level by 10x and improve precision.

- 5 2σ deviation for repeat measurements (Y ≈ 100 cd/m² using auto single or auto-HDR captures).
- 6 Immediately after calibration and relative to standard for measurements with HDR and adequate signal to noise.
- 7 Maximum deviation from average when measuring broadband, linear polarized light at varying polarization angles.
- 8 Measurement period using the SDK; using minimum exposure times and a fast PC.

Westboro Photonics continually pursues improvements to the instruments. Specification adjustments, errata or omissions do not constitute grounds for compensation.