

LumiCam 2400

Imaging colorimeter optimized for display elements in vehicles



We bring quality to light.

\\ Outstanding measurement accuracy for luminance and color distributions

As an imaging measurement system, the LumiCam 2400 captures the luminance and color distributions of screens or multifunction displays within seconds. It provides 5 megapixel images which present the spatially resolved measured values coded for luminance and chromaticity. The LumiCam 2400 models are perfect for versatile automotive test applications, e.g. measurement of luminance and color distributions of displays and control elements or uniformity analysis of flat panel display screens in car interiors.

Instrument Systems offers the LumiCam 2400 in three variants:

The **LumiCam 2400 Mono** is a compact luminance camera with $V(\lambda)$ filter for reliable and accurate luminance measurements.

The **LumiCam 2400 Color** is equipped with three additional color filters for chromaticity measurements and is perfectly suited for broadband light sources. To achieve optimal measurement results for LED based test objects, the **LumiCam 2400 Advanced** features a total of six color filters and a patented matrix optimization algorithm. The 5 megapixel resolution of all models allows for convenient imaging and analysis of whole instrument clusters or small details with high resolution.

All LumiCam models come with a powerful software that calculates all relevant quantities as, e.g., the luminance L_v , the color coordinates x and y as well as color temperature, color uniformity or dominant wavelength. Versatile analytical tools, such as spotmeter, polygon, line or 3D box, permit comprehensive evaluation of the measured data. The LumiCam software offers the possibility of false-color presentation for particularly impressive visualization of the values obtained.

\\ Technical specifications

LumiCam 2400	Mono	Color	Advanced
Quantities			
Photometric quantities	Luminance (cd/m ²), luminous intensity (cd), contrast		
Colorimetric quantities	–	Color coordinates (x,y), color coordinates (u',v'), tristimulus values (X, Y, Z), dominant wavelength (nm), color saturation, correlated color temperature CCT (K)	
Camera data			
Sensor	Sony IMX264LLR CMOS Sensor		
Sensor size	2/3", 11.1 mm diagonal		
Effective number of pixels (h x v)	2428 x 2028 (5 MP)		
Pixel size	3.45 µm x 3.45 µm		
AD converter	12 bit		
Exposure time	40 µs to 30 s		
Aperture reproducibility ¹⁾	0.5 %		
Luminance measurement			
Measurement range ²⁾	1 mcd/m ² ... 2 Mcd/m ²		
Extended measurement range ^{3), 4)}	up to 2 x 10 ¹⁰ cd/m ²		

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Measurement time (at 10 cd/m ²) ⁵⁾	1 s		
Measurement time (at 100 cd/m ²) ⁵⁾	0.8 s		
Accuracy for std. illuminant A ⁶⁾	3 %	3 %	3 %
Accuracy for LED color light ⁷⁾	–	–	2 %
Repeatability ⁸⁾	0.1 %		
Uniformity ⁹⁾	0.5 %		
Filter match ¹⁰⁾	f ₁ ' = 3 %		
Smear	No smear (due to CMOS technique)		
Color measurement			
Measurement time (at 10 cd/m ²) ⁵⁾		12 s	17 s
Measurement time (at 100 cd/m ²) ⁵⁾		7 s	10 s
Accuracy (x, y) for std. illuminant A ¹¹⁾		0.003	0.003 ¹³⁾
Accuracy (x, y) for color light ^{11), 12)}		0.010	0.010 ¹³⁾
Accuracy (x, y) for LED color light ⁷⁾		–	0.005
Repeatability (x, y) ⁸⁾		0.0001	0.0001
Uniformity (x, y) ⁹⁾		0.001	0.001
Accuracy (dominant wavelength) ⁷⁾		–	1 nm
Repeatability (dominant wavelength) ¹⁴⁾		0.05 nm	0.05 nm
Filter match		f ₁ ' = 3 % (for Y) f ₁ ' = 6 % (for X) f ₁ ' = 4 % (for Z)	f ₁ ' = 3 % (for Y) f ₁ ' = 6 % (for X) f ₁ ' = 4 % (for Z)
General			
Interface	Gigabit Ethernet	Gigabit Ethernet, USB 1.0/2.0	
Operating system	Windows 7 (32/64 bit), Windows 10 (32/64 bit)		
Dimensions (l x w x h)	135 mm x 100 mm x 81 mm	275 mm x 120 mm x 175 mm	
Weight	1 kg	3 kg	
Power supply	12 V external		
Operating conditions	10 to 40 °C ¹⁵⁾ , max. 75 % relative humidity (non-condensing)		

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¹⁾ For external apertures (diameter 4 mm, 8 mm, 16 mm, 32 mm) with effective f-numbers 14 (4 mm) – 1.4 (32 mm).

²⁾ 1 mcd/m² with 30 s exposure time, 32 mm aperture and a SNR 10:1; 2 Mcd/m² with 40 μs exposure time and 4 mm aperture.

³⁾ If (optionally available) density filters are used. Value for OD4 filter.

⁴⁾ Specification of LumiCam 2400 Advanced in the extended measurement range identical to the LumiCam 2400 Color (e.g. regarding accuracy of color coordinates).

⁵⁾ Reference value for largest aperture opening (32 mm) and white LED. First measurement may take longer.

⁶⁾ Extended measurement uncertainty (double standard deviation, k = 2).

⁷⁾ Verified using a test set of color LEDs (peak wavelength between 449 nm and 640 nm) and white LEDs (3000 K to 5000 K); maximum deviation from measurement with reference spectrometer.

⁸⁾ Auto exposure, 50 repetitions at 100 cd/m², double standard deviation evaluated within spotmeter with r = 100 px.

⁹⁾ Evaluated in 90 % image height x 90 % image width using 10 x 10 binning, three averages. Double standard deviation of deviation from average image value.

¹⁰⁾ Y-filter or V(λ) filter.

¹¹⁾ Narrowband and LED based light sources (white and monochrome) should be measured using advanced mode. For other broadband light sources (e.g. illuminant A) color mode is recommended.

¹²⁾ Maximum deviation from reference source (illuminant A with set of glass filters).

¹³⁾ Using 4-filter color mode.

¹⁴⁾ Auto exposure, 50 repetitions at 300 cd/m², double standard deviation evaluated in spotmeter with r = 100 px, for narrowband radiation (e.g. LED).

¹⁵⁾ 20 ... 25 °C for specified measurement accuracy.



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