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CAS 140CTS

Array Spectrometer

Product highlights

- **Proven optical setup of the popular CAS 140CT**
- **New detector concept**
- **4 ms shortest integration time**
- **High-end detector electronics offer a fast read-out.**
- **Doubling of dynamic range compared to CAS 140CT**
- **Robust connection via PCI interface**



The CAS 140CTS is the newest member in the Instrument Systems Array Spectrometer family. In comparison to the well-established CAS 140CT the detector concept based on a high-end back-thinned CCD has been redesigned. The new detector unit allows a significant improvement of the shortest integration time from 10 ms to 4 ms. Additionally, the read-out time of the CCD has been reduced by nearly a factor of two and thus, the spectrometer features a particularly short overall detection time. This development makes the CAS 140CTS the ideal device for very fast measurements.

No compromise in performance has been made compared to the CAS 140CT. The new CAS 140CTS provides the same high accuracy and is equally robust and reliable even in difficult environments. The new detector concept reduces the integration time but not at the expense of a higher noise level, giving low-noise spectra on unprecedented short time scales. This feature makes the CAS 140CTS and the Instrument Systems LED Tester an ideal combination that defines new standards in LED production testing.

In addition, the dynamic measuring range of the CAS 140CTS has been improved by a factor of two. This extended dynamic range offers unprecedented measurement accuracy of color coordinates and correlated color temperature of white LEDs. The CAS 140CTS is fully compatible with the complete range of accessories offered by Instrument Systems. Different versions ranging from 200 nm to 1050 nm are available.

Instrument Systems
light measurement

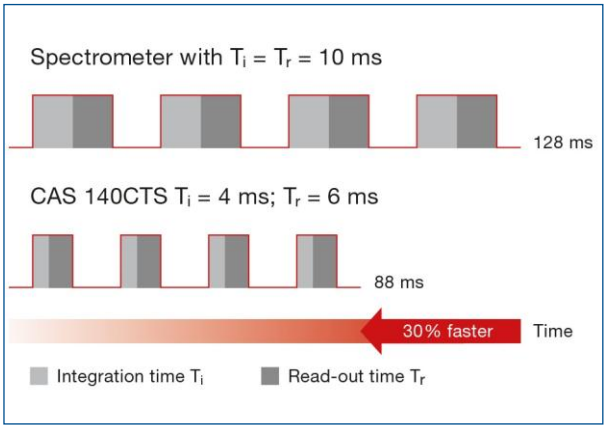
Fast and accurate measurements in LED production testing

The Instrument Systems LED Tester is a turnkey solution that allows a transfer of the precision of laboratory measurements to production settings. The optimized test system is based on the new CAS 140CTS and is equipped with a source meter and a control PC with tester software developed in-house. It combines user-configurable binning tables and measurements of all relevant optical and electrical parameters of LEDs with an easy connection to LED handler machines and wafer probing systems.



LED Tester equipped with a CAS 140CTS

One limiting factor of speed in LED production testing is the integration time of the spectrometer in combination with its sensitivity. With the new CAS 140CTS that limit is lowered by a factor of 2. The improved integration and read-out times allow significantly shorter test cycles during the production process. At the same time maximum accuracy and reproducibility even for critical parameters like color coordinates and correlated color temperature of white LEDs is guaranteed.



Comparison of an optical test cycle for 4-chip LEDs with typical source meter set-up times

Measurement of angle-dependent spatial radiation properties

A second application for the CAS 140CTS is its combination with the LGS series of goniophotometers from Instrument Systems. The analysis of angle-dependent spatial radiation properties ranges from small or medium-sized (LGS350) to large (LGS1000) SSL luminaires, lamps and LED modules.

The use of a spectroradiometer offers the unique advantage that all photometric, radiometric and colorimetric quantities can be obtained from the measured spectral data. Quantities like chromaticity coordinates, color temperature and even color rendering index can be determined as a function of angle when using a spectoradiometer. The achieved measurement accuracy is superior which is especially important for SSL lamps and LED modules.



LGS 350 benchtop version for angular-resolved analysis of small and medium-sized samples

The extremely large dynamic range and the very short measuring times of the CAS 140CTS are ideal for a fast and accurate measurement of the spatial light distribution. Consequently, a significant reduction of measuring time when performing long spatial sequences can be achieved.
Due to the two times better dynamic range the density filters come less into operation, resulting in a reduced overall measurement time. Accordingly, the LGS series of goniophotometers in combination with the new CAS 140CTS delivers faster and more accurate results.

Technical Specifications

Model	UV/VIS	UV/VIS/NIR	VIS	VIS/NIR	NIR
Spectral range	200-800 nm	220-1020 / 300-1100 nm	360-830 nm	380-1040 nm	750-1050 nm
Detector	BT-CCD	BT-CCD	BT-CCD	BT-CCD	BT-CCD
Number of pixels	1024 x 128	1024 x 128	1024 x 128	1024 x 128	1024 x 128
Spectral resolution *1	2.7 nm	3.7 nm	2.2 nm	3.0 nm	2.0 nm
Data point interval	0.6 nm	0.8 nm	0.5 nm	0.65 nm	0.3 nm
Wavelength accuracy	+/-0.3 nm	+/-0.3 nm	+/-0.3 nm	+/-0.3 nm	+/-0.3 nm
Stray light (broadband for Illuminant A)*2	$5 \cdot 10^{-4}$	$5 \cdot 10^{-4}$	$5 \cdot 10^{-4}$	$5 \cdot 10^{-4}$	$5 \cdot 10^{-4}$
Stray light for LEDs *3	$1 \cdot 10^{-4}$	$1 \cdot 10^{-4}$	$1 \cdot 10^{-4}$	$1 \cdot 10^{-4}$	$1 \cdot 10^{-4}$
Integration time	4 msec - 65 sec	4 msec - 65 sec	4 msec - 65 sec	4 msec - 65 sec	4 msec - 65 sec
Linearity	0.5%	0.5%	0.5%	0.5%	0.5%
CCD temperature	-10°C	-10°C	-10°C	-10°C	-10°C
Measuring range LED measurements					
luminous intensity*4	4 µcd – 40 kcd	2 µcd – 16 kcd	3 µcd – 30 kcd	2 µcd – 16 kcd	-
luminous flux*4	0.1 mlm – 1 Mlm	0.05 mlm – 500 klm	0.06 mlm – 600 klm	0.05 mlm – 500 klm	-
Measurement uncertainty LED measurements*5					
Luminous intensity, luminous flux	± 4%				-
Dominant wavelength	± 0.5 nm				-
Color coordinates (x, y)	± 0.0015	± 0.002	± 0.0015	± 0.002	-
Spectroradiometry					
Irradiance sensitivity Range [W/m²nm]*6	$5 \cdot 10^{-8} – 1 \cdot 10^{3}$	$2 \cdot 10^{-8} – 4 \cdot 10^{2}$	$3 \cdot 10^{-8} – 6 \cdot 10^{2}$	$2 \cdot 10^{-8} – 4 \cdot 10^{2}$	$5 \cdot 10^{-8} – 1 \cdot 10^{3}$
Signal sensitivity at 1s integration time [W/m²nm]*6	$1 \cdot 10^{-6}$	$4 \cdot 10^{-7}$	$6 \cdot 10^{-7}$	$4 \cdot 10^{-7}$	$1 \cdot 10^{-6}$
Spectroradiometric accuracy*7	+/-3.5%	+/-3.5%	+/-3.5%	+/-3.5%	+/-3.5%
Spectrophotometry					
Baseline noise*8	+/-0.4%				
Transmission measuring accuracy	+/-0.5% T or +/-0.02A at 1A				
Baseline drift*9	0.15%/h or +/- 0.006A/h				
Spectrograph					
Focal length, grating	approx. 120 mm, f/3.5, plane ruled grating				
Slit	Standard: 100 µm, optional 50 µm or 250 µm				
Filter wheel	Density filter OD 1 to OD 4; UV/VIS and UV/VIS/NIR with UV density filters				
Electrical data					
AD converter	16 Bit resolution				
PC interface	PCI bus plug-in card				
Triggering	1 TTL input with an ascending slope; 2 software-controlled TTL outputs; 1 TTL output with flash pulse				
Other					
Dimensions (H, W, D)	192 x 330 x 348 mm³				
Power consumption	50 VA max.				
Ambient temperature	15 - 35°C; relative humidity 0-70%, non-condensing				
Weight	approx. 10 kg				
Applicable standards	Meets EN 60721-4-7 Class 7M2, EN 60721-4-7 Class 2M2, EN 61326:2004-05 and EN 61010-2002-08				

*1 Approximate value for a 100 µm (IR2 model 250 µm) standard slit. Other values for optional 50 µm and 250 µm slits.
*2 Measured with an OG 455 cut-off filter at 400 nm and a silicon filter (1200 nm cut-off wavelength) at 1000 nm, relative to the peak intensity of unweighted spectral data.
*3 Measured at 150 nm distance to the left of the peak wavelength, relative to the peak intensity of unweighted spectral data.
*4 Applies for a signal/noise ratio of 10:1, for yellow LED with 585 nm, with LED-436 adapter for luminous intensity and ISP250 for luminous flux. The values are a factor of 20 to 100 higher for white LEDs.
*5 Minimum attainable, expanded measurement uncertainty related to twofold standard deviation. Only applies to the measurement and ambient conditions used for calibration and for adequate signal dynamic range. Measured for diffuse color LEDs, without density filter.
*6 Measured with the EOP-120 optical probe and OFG-414 fiber bundle at 600 nm (and at 1200 nm for the IR1 model and at 1600 nm for the IR2 model), a signal-to-noise ratio of 10:1, and without averaging.
*7 Minimum attainable, expanded measurement uncertainty related to twofold standard deviation. Only applies to the measurement and ambient conditions used for calibration (e.g. without density filters, optimum spectral range, sufficient signal level etc.)
*8 At shortest integration time and without averaging. When averaged, this value improves (e.g. averaged over 9 times equals a threefold noise reduction).
*9 Applies to a LS100-130 light source after 1 hour warm-up time.

Ordering Information

Order number	Description				
Spectrometer	**Model**	**Detector**	**Spectral range**	**Spectral resolution**	**Data point interval**
CAS140CT-241	VIS	CCD (back-thinned)	360 – 830 nm	2.2 nm	0.5 nm
CAS140CT-242	UV-VIS	CCD (back-thinned)	200 – 800 nm	2.7 nm	0.6 nm
CAS140CT-243	VIS-NIR	CCD (back-thinned)	380 – 1040 nm	3.0 nm	0.65 nm
CAS140CT-244	UV-VIS-NIR	CCD (back-thinned)	220 – 1020 nm	3.7 nm	0.8 nm
CAS140CT-245	NIR	CCD (back-thinned)	750 – 1050 nm	2.0 nm	0.3 nm
CAS140CT-246	UV-VIS-NIR	CCD (back-thinned)	300 – 1100 nm	3.7 nm	0.8 nm
Options					
CAS140CT-330	50 µm slit (instead of the standard 100 µm slit)				
CAS140CT-332	250 µm slit (instead of the standard 100 µm slit)				
CAS140CT-333	500 µm slit (instead of the standard 100 µm slit)				
ACS-010	Accessory identification (Ident key)				
Software					
SW-120	SpecWin Light spectral software for Windows XP/7. Supports emission, transmission, reflection, and LED/display measurement				
SW-130	SpecWin Pro spectral software for Windows XP/7. Same as SW-120 plus extended functions like Goniometer, DTS500, NVIS, Basic IDE etc.				
SW-231	DLL driver software for custom programs; runs on Windows XP/7				
SW-233	LabVIEW® driver software; also requires SW-231				

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