

Luminance, contrast, flicker and chromaticity measurements all with just one device

Multimedia Display Tester

3298F



- Luminance, contrast, flicker and chromaticity measurements
- Digital and bar graph indications
- Shading cylinder type optical system
- Luminance measurement range of 0.01 to 40,000 cd/m²
- Memory for measured data from 200 displays
- GO/NO-GO determination functions
- User-specified color calibration coefficients
- Light source color calibration coefficients
- Easy operation
- Compact and lightweight
- Battery-driven

Adjust and inspect the luminance, contrast, flicker and chromaticity of displays more efficiently.

High cost-performance

Lets you measure luminance, contrast, flicker and chromaticity all with just one device. The low-cost design greatly reduces the product's price.

Digital and bar graph indications

Measurements for adjustment or inspection work are displayed both as digital values and bar graphs. User-specified MIN, MAX and other criteria can be entered for GO/NO-GO testing of production line samples.

Light source color calibration coefficients

Color correction coefficients for three light source types (type A standard light source, three-wavelength fluorescent lamp and CRT display) ensure accurate chromaticity measurements for each color and light source.

Excellent PC interface

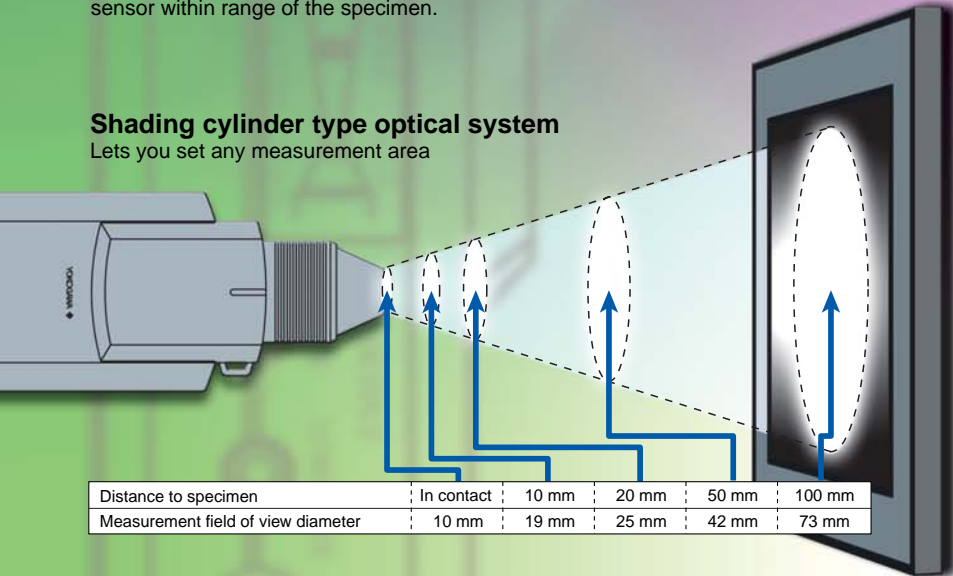
In addition to a built-in memory with capacity to store measurement data for up to 200 displays, an RS-232 interface port included as standard equipment makes data communication and control from a PC simple.

Easy operation with contact-free system

The shading cylinder type optical system lets you make easy measurements just by moving the sensor within range of the specimen.

Shading cylinder type optical system

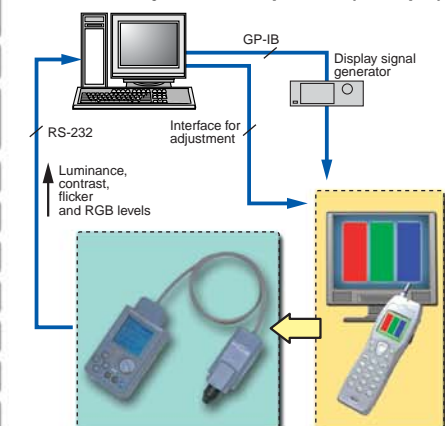
Lets you set any measurement area



Applications

Displays	LCD modules
	Backlights
	Plasma displays
Electroluminescent (EL) displays	LED displays
	LCD TVs, plasma TVs
Products with displays	LCD monitors for PCs, laptops
	Mobile phones, PDAs
	Digital still cameras, video cameras
	Projectors
	Car navigation systems
	Video game machines

Automated adjustment/inspection (example)



Luminance Measurement

Displays luminance as a digital value and bar graph in a range of 0.01 to 40,000 cd/m². User-specified MIN, MAX and other criteria can be entered for GO/NO-GO testing.



Contrast Measurement

Measures the luminance of the "white" and "black" displays to instantaneously calculate and display the contrast. The calculated contrast is compared with the user-set value for GO/NO-GO testing.



Flicker Measurement

Displays flicker ratio (ACrms/DC) as digital values (% and dB) and a bar graph. Useful for flicker adjustment.



Chromaticity Measurement

Chromaticity measurement mode Displays GO or NO-GO for the measured value based on the user-specified reference color and range. A different color calibration coefficient can be set for up to 10 different display types and 6 reference colors, enabling more precise chromaticity measurements for each color in each display.



Display modes
(x, y, L), (u', v', L), (X, Y, Z), (Tc, duv, L)

White balance measurement mode
Displays the difference between the RGBL measured values and the target values in real time.



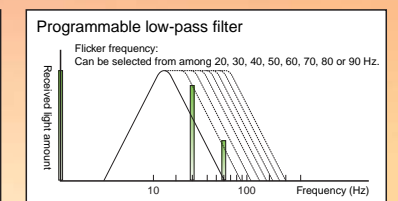
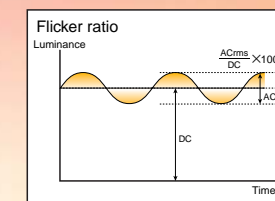
Display modes
R, G, B, RGB ratio

Measurement Functions



Flicker Measurement

Measures the light's average luminance (DC) and effective flicker value (ACrms) to calculate and display the flicker ratio (ACrms/DC). The flicker of base frequencies between 20 and 90 Hz can be measured by varying the programmable low-pass filter's cutoff frequency.



$$\text{Flicker ratio (\%)} = \frac{\text{ACrms}}{\text{DC}} \times 100$$

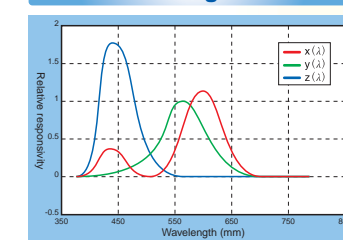
$$\text{Flicker ratio (dB)} = 10 \log \left(\frac{\text{ACrms}}{\text{DC}} \right)$$

The flicker correction function enables conversions to flicker ratios (% and dB) defined by JEITA and VESA standards.

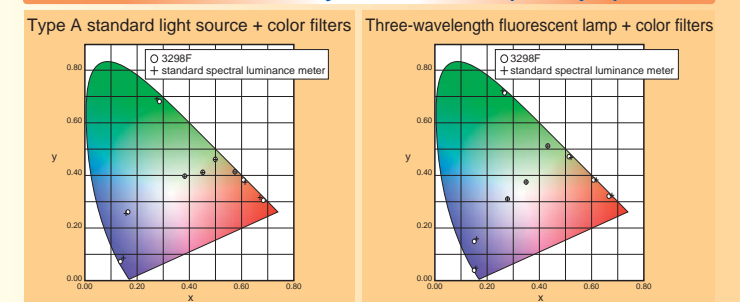
High-Precision Chromaticity Measurement

The characteristics of the color filters in 3298F's photodetector approximate the CIE 1931 color matching functions, and the tester performs optimization calculations to minimize error. Each sensor is calibrated with a combination of a type A standard light source/three-wavelength fluorescent lamp and color filters. The optimized coefficient calculated for each light source is used to enable high-precision color measurement.

CIE 1931 Color Matching Functions

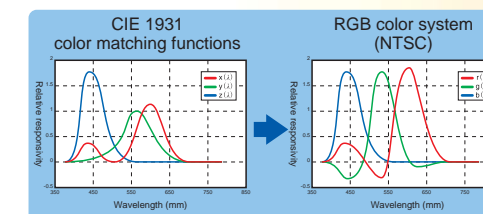


3298F Chromaticity Measurement (Example)



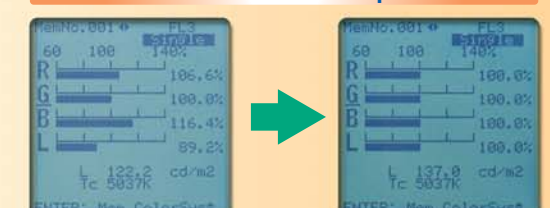
White Balance Adjustment

The 3298F displays RGBL levels for differences between Rm, Gm and Bm values (calculated from measured tristimulus values) and Rs, Gs and Bs values (calculated from the target color temperature/luminance) in real time. Displays can be adjusted to the target color temperature/luminance by adjusting all their RGBL values to 100%.



Conversion of tristimulus XYZ values to RGB values

Measurement Example



Displaying difference between target color temperature/luminance and measured values

After adjusting RGBL values to 100%

Main Specifications [Tester Specifications]

Model	3298 02 (tester) + 3298 11 (sensor)		3298 02 (tester) + 3298 21 (sensor)			
Sensor type	Black and white		Color			
Optical system	Enclosed cylinder type (minimum optical bore diameter: 10 mm; viewing angle: approximately 30°)					
Photodetector unit	Silicon photodiode					
Measurement field of view	Distance to specimen	In contact	10 mm	20 mm	50 mm	100 mm
	Visual bore in measurement	10 mm	19 mm	25 mm	42 mm	73 mm
Luminance measurement range	0.01 to 40,000 cd/m ²					
Luminance measurement range settings	40.00/400.0/4,000/40,000 cd/m ²		400.0/4,000/40,000 cd/m ²			
Luminance measurement precision	±4% of indicated value + ±0.035% of full-scale value (at 23 ± 3°C, 70% RH or less, with type A standard light source, when the indication is at least 2% and 2 cd/m ² of the set range's full-scale value)			±4% of indicated value + ±0.035% of full-scale value (at 23 ± 3°C, 70% RH or less, with type A standard light source, when the indication is at least 2% of the set range's full-scale value)		
Flicker measurement range settings	2%/4%/8%/20% rms					
Flicker measurement precision	±1% (Reference value; For sine wave of 200 cd/m ² , 10% rms and 30 Hz at 23 ± 3°C, 70% RH or less)					
Flicker measurement luminance range	5 to 40,000 cd/m ² (for sine wave of 10% rms and 30 Hz at 23 ± 3°C, 70% RH or less)		25 to 40,000 cd/m ² (for sine wave of 10% rms and 30 Hz at 23 ± 3°C, 70% RH or less)			
Flicker measurement filter	Programmable low-pass filter, flicker base frequency can be selected from among 20, 30, 40, 50, 60, 70, 80 or 90 Hz					
Spectral responsivity	Approximates CIE 1931 standard spectral luminous efficiency response		Approximates CIE 1931 color matching functions			
Color system	—		Chromaticity coordinates: (x, y, L) or (u', v', L) Tristimulus values: (X, Y, Z) or (R, G, B) or (RGB ratio) Correlated color temperatures: (Tc, duv, L)			
Chromaticity precision (deviation in x and y values)	—		<ul style="list-style-type: none"> ±0.002 or less, for type A standard light source (at 23 ± 3°C, 70% RH or less, and luminance of at least 2% of the set range's full-scale value) ±0.03 or less, for combination of type A standard light source/three-wavelength fluorescent lamp + color filters (at 23 ± 3°C, 70% RH or less, and luminance of at least 1% of the set range's full-scale value) 			
User-defined luminance calibration coefficients	Linear correction of measured luminance values		—			
User-defined color calibration coefficients	—		6 colors × 10 displays; XYZ measured values and entered values			
Data memory	Up to 200 data for each measured item					
Input	Trigger input (contact)					
Output	Monitor output (0 to 2 V), DC luminance output (0 to 2 V), GO/NO-GO output (open collector)					
Communication port	RS-232 (9,600 to 38,400 bps)					
Operating temperature and humidity range	5 to 40°C, 70% RH or less					
Dimensions and weight	Sensor dimensions: approx. 67 (W) × 150 (H) × 40 (D) mm; tester dimensions: approximately 107 (W) × 176 (H) × 55 (D) mm; weight: approximately 1 kg					
Display	128 × 128-pixel dot matrix LCD					
Power supply	Four AA batteries or optional AC adapter					
Battery life	Approximately 6 hours (for the alkaline batteries provided)					

Model and Suffix Codes

Model	Suffix Code	Specification
329802		Multimedia display tester* with 1.5 meter long extension cable
Language	-E	English display and user's manual
	-J	Japanese display and user's manual
329811		Black and white sensor, with rubber bumper
329821		Color sensor, with rubber bumper

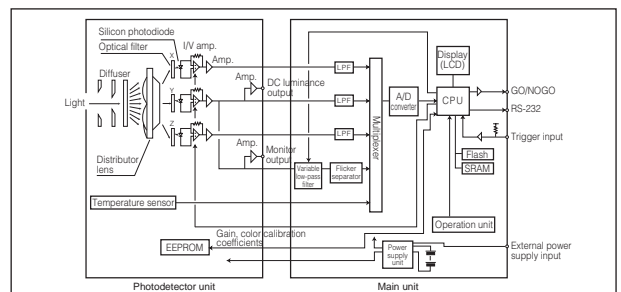
* Excluding an AC adapter; order the proper adapter with the correct input voltage separately if necessary.

Optional Accessories and Software

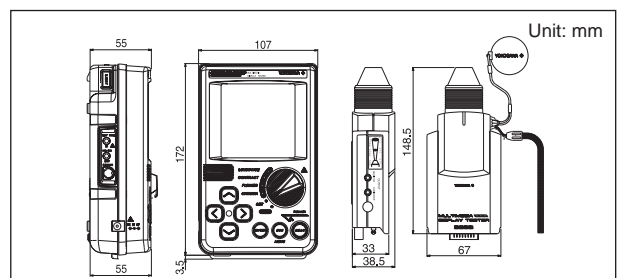
Product	Part Number	Specification
AC adapter	A1020UP	100 V AC adapter
AC adapter	A1022UP	120 V AC adapter
AC adapter	B9108WB	220-240 V AC adapter
Sensor cable	B8300LA	1.5 m long
Sensor cable	B8300LB	3.0 m long
Sensor cable	B8300LG	5.0 m long
RS-232 cable (for PC connection)	B8300LC	For 9-pin D-Sub connector on PC
RS-232 cable (for PC connection)	B8300LD	For 25-pin D-Sub connector on PC
Carrying case	329891	Case for storing tester
Recorder output plugs	B8300LJ	Four plugs
Rubber Bumper	B8300LH	

Product	Part Number	Suffix Code	Specification
Light measurement data management software	329831	-J	Japanese version
	329831	-E	English version

Block Diagram



Dimensions



NOTICE

- Before operating the product, read the user's manual thoroughly for proper and safe operation.
- If this product is for use with a system requiring safeguards that directly involve personnel safety, please contact the Yokogawa sales offices.

YOKOGAWA

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