

Speckle Contrast Measurement System with Extremely High Sensitivity Camera

Dr. SPECKLE Model: **SM01VS11**



Product appearance



Example of measurement

Exposure-time Dependent Speckle Noise Evaluation Tool

Features

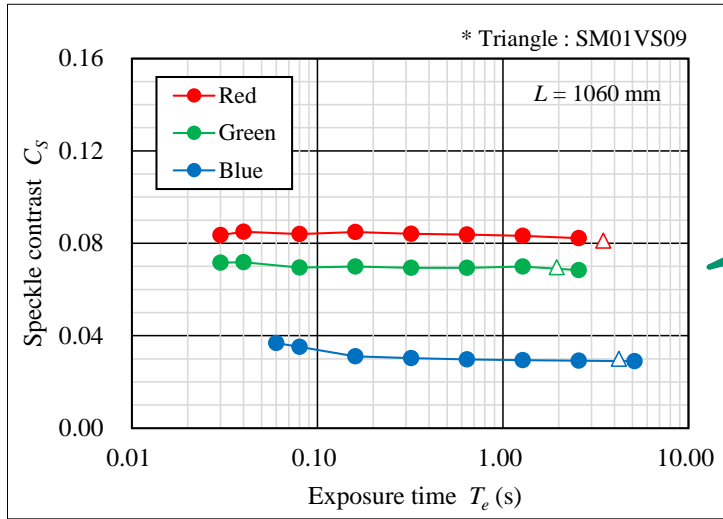
- The SM01VS11 is equipped with Electron Multiplying CCD camera.
- Up to 20 time enhancement of the sensitivity compared to the current system model SM01VS09 is feasible.
- The SM01VS11 can measure speckle contrast at the specific exposure time close to human eye response time, which is estimated to be approximately 80 ms.
- A wide range of the exposure time in measurement allows for user to set it almost freely.
- The software for SM01VS11 is as functional as the software for Dr. SPECKLE series.

Applications

Speckle noise evaluation of laser displays using temporal-averaging type speckle-reduction device.

Example:

Laser TV (model 75-LT1 manufactured by Mitsubishi electric)



C_s are nearly constant at various exposure time.



This temporal-averaging type speckle-reduction device is sufficiently fast compared to human eye response time.

Specifications (tentative)

Speckle measurement	Measurement value	Speckle contrast $C_s = \sigma / I_{bar}$ (σ is standard deviation and I_{bar} is average intensity of captured image)
	Range	0.01 ~ 1.00 (Measurement resolution: Significant to two decimal places) * Measurement lower limit is 0.01 ~ 0.03, which is dependent on EM gain parameter (0 ~ 100).
Measurement conditions	Luminous Flux	10 lm (lumens) or over (monochromatic) * Assuming a scanning type lase projector
	Observation distance L	660 mm or longer (Maximum distance is TBD)
	Observed area on screen	36 mm square (the case of $L = 1000 \text{ mm}$ and imaging area is 300×300 pixels)
	Wavelength	Visual light region
	Projection image	Light beam with spatial uniform and temporally static image
Camera	Image sensor	Electron Multiplying CCD image sensor, 260 thousand pixels (512×512)
	Imager size	$8.2 \text{ mm} \times 8.2 \text{ mm}$ (pixel size $16 \mu\text{m} \times 16 \mu\text{m}$)
	Shutter	Electronic shutter
	Cooling method	Peltier cooling (Air cooling, -30 degrees C)
	A/D Conversion	16-bit (65,536 gradation)
	Color	Black & White
	Lens	Canon telephoto fixed focal length lens f 135 mm/F2
	External trigger	Synchronous photography by a TTL CMOS 5V falling edge signal
Exposure time (shutter speed)		0.01 ~ 6.5 s
Aperture size		Pinhole diameter: $\phi 1.2 \text{ mm}$
Filter wheel		Filter type: Red, Green, Blue, ND (OD: 2.0)
Consumption		150W (without computer)
Outer dimensions and weight	Speckle meas. Unit	$366 \text{ (L)} \times 132 \text{ (W)} \times 222 \text{ (H)} \text{ mm}$, 5.8kg
	Control Unit	$253 \text{ (L)} \times 215 \text{ (W)} \times 154 \text{ (H)} \text{ mm}$, 4.2kg

OXIDE

Oxide Corporation



1747-1 Makihara, Mukawa, Hokuto, Yamanashi 408-0302 JAPAN

Tel: +81-551-26-0022, Fax: +81-551-26-0033

Sales@opt-oxide.com, <http://www.opt-oxide.com>

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