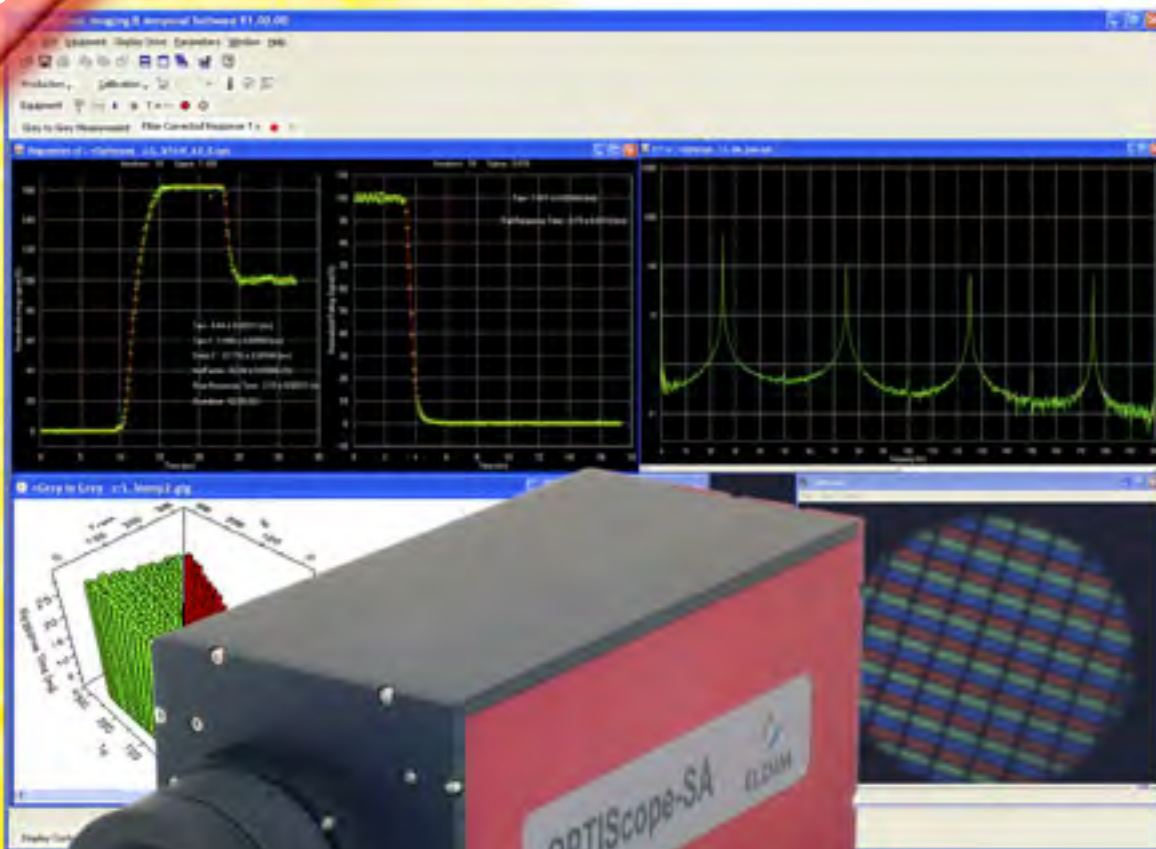


Temporal Analyser

OPTIScope-SA

VESA 2.0
FPDM compliant



Response time

Luminance

Flicker

Gamma curves

Overdrive & Underdrive

Systems for full analysis of display temporal behavior

OPTIScope-SA's benefits

Accurate measurements due to direct optical collection, short sampling step and excellent signal over noise ratio

Absolute luminance measurements for gamma curves and iso-step luminance temporal analysis

Easy & simple acquisition area positioning with direct view CMOS visualisation

User friendly software for automation of measurement and analysis with advanced algorithms for new driving technologies

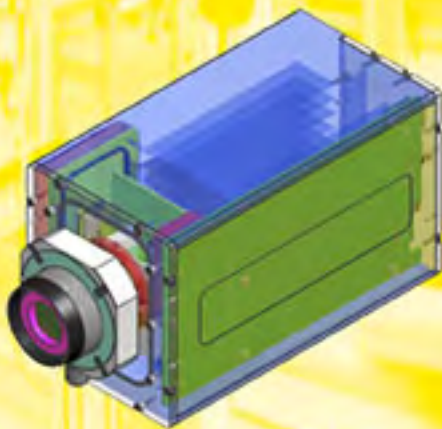
Full solution with ELDIM FPDDrive and FPDlite display controller or other systems

ADVANCED TEMPORAL ANALYSER by  ELDIM

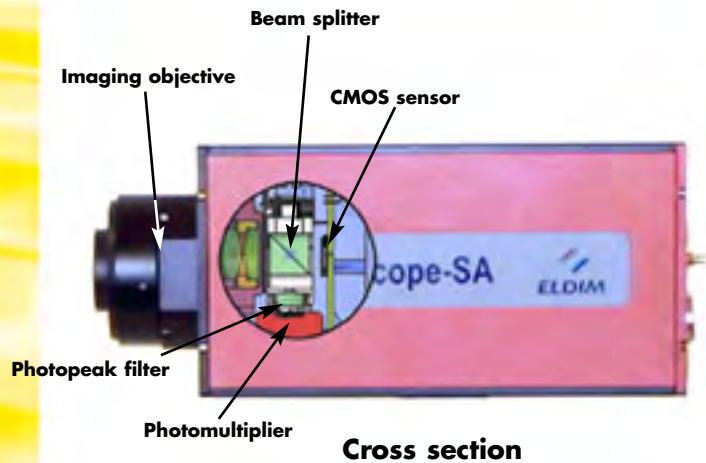
Description



OPTIScope-SA look like a conventional camera but includes all the hardware needed for temporal and luminance measurements. An imaging objective collects the light in a angular aperture of $\pm 1^\circ$ following **VESA standard**. An image of the target is obtained with a color CMOS sensor for easy alignment of the system. Part of the light goes on a photomultiplier across a photo peak filter. An additional system including calibrated photodiode and LED illumination allows self calibration for accurate luminance measurements. The **OPTIScope-SA** can be used at various distances from the display down to $\sim 30\text{cm}$. It is totally equivalent to PM + digital oscilloscope.

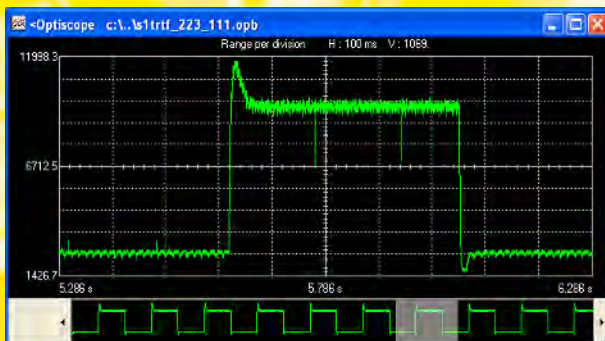


Side view

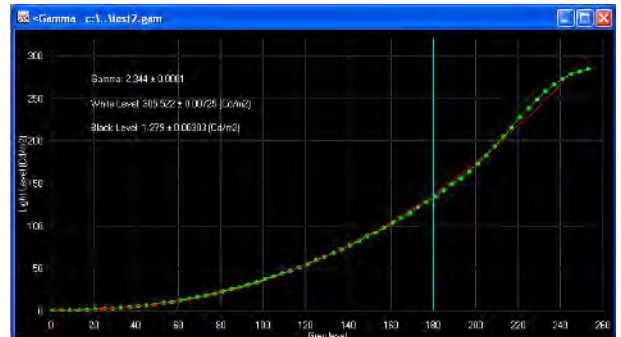


Cross section

The electronics includes a 16bits analog to digital converter and on board 4M memory. USB 2.0 connection with PC allows real time and unlimited acquisitions with a sampling step between 5 and $20\mu\text{s}$. The CMOS color sensor offers a 1M pixels resolution for alignment purpose. Dark noise is automatically corrected using a shutter.



Example of temporal response of an overdriven LCD between two intermediate grey levels.



Gamma curve of a LCD display

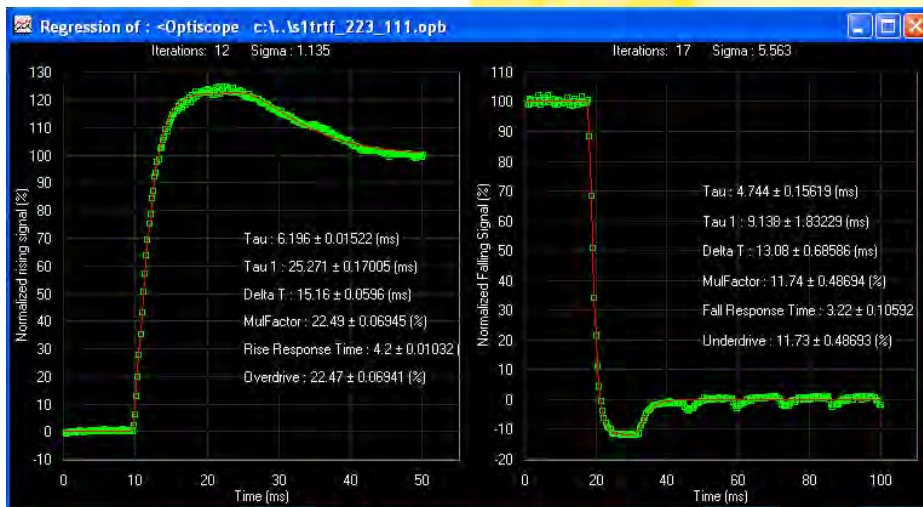
The measurement software can control the display for automated gamma and grey to grey response time measurements. Coupled with the **ELDIM FPDDrive** or **FPDLite** equipment, it offers a full solution for automated analysis of the temporal behavior of displays.

Data analysis

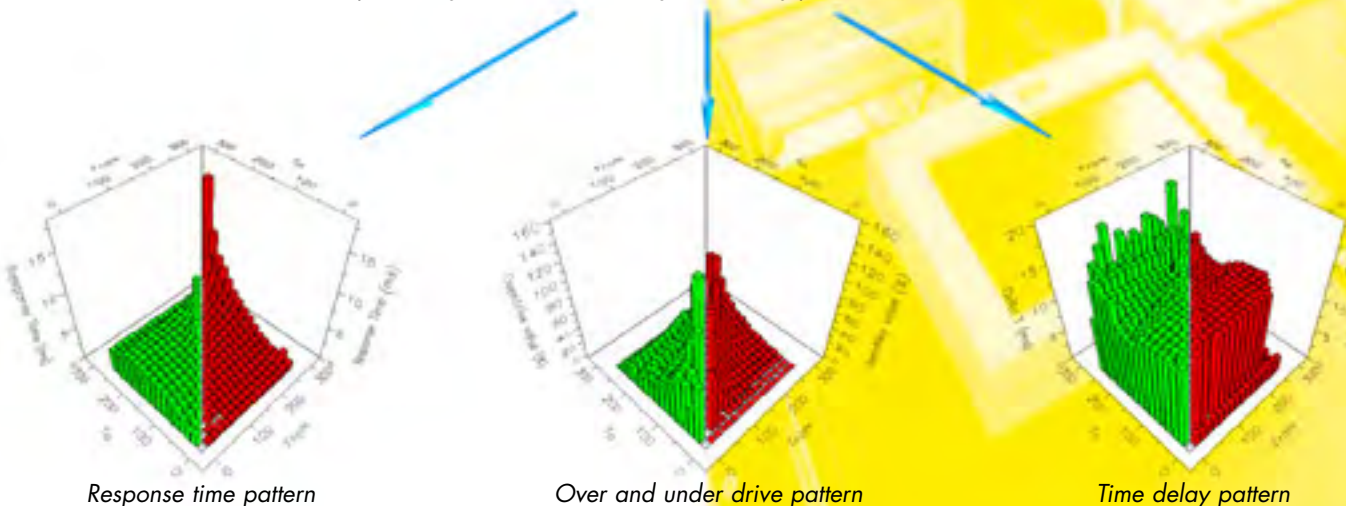
OPTIScope-SA comes with a complete and sophisticated solution for measurement analysis and response time extraction. VESA procedure, low pass and stop band filtering can be applied. Response time compensation due to low pass filtering is also available. The software can also apply direct regression with different mathematical model. This is useful to extract more precisely response time values and additional parameters related to the shape of the temporal behaviors (overdrive, underdrive, time delay...).



Direct regression of theoretical behaviors on measured profiles present many advantages. The response time is more precisely determined with also an estimation of the error. More parameters can be extracted like over and under drive amplitude, time delay for overdrive application... and custom behaviors can be treated.



Example of regression on the rising and falling profiles for an overdriven LCD



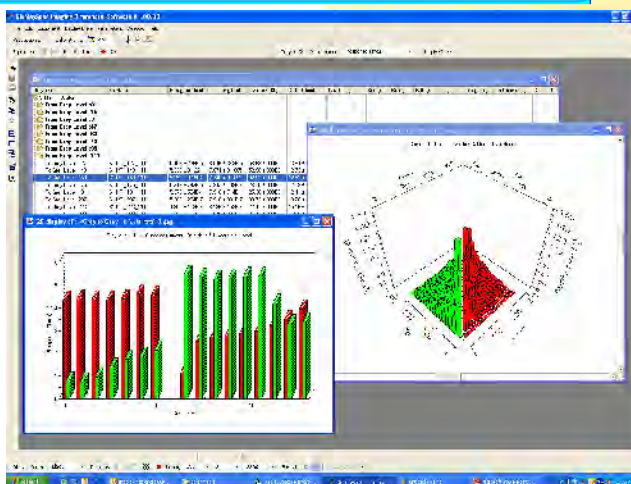
Response time pattern

Over and under drive pattern

Time delay pattern



Software solution



Automated measurement & analysis software

Specifications

Hardware features	Autorange or fixed range for PM Auto-zero and noise correction by shutter Imaging by a 1024x1280 color CMOS sensor Optical collection with $\pm 1^\circ$ angular aperture Trigger TTL input Working distance 30cm - 100cm (17mm spot diameter at 50cm)
Digitizer	16 bits + digital filtering and sub-sampling Sampling interval 5-20 μ s (typical 16 μ s) 4M samples on board memory Unlimited acquisition time through USB 2.0 connection
Performances	Luminance accuracy at $\pm 3\%$ around A Response time accuracy $< 0.5\%$ and repeatability $< 0.2\%$ (with LED test module)
Software features	Time and frequency domain display mode Flicker analysis Absolute gamma measurement & analysis Low pass and band stop signal filtering Response time analysis (direct, VESA, corrected low pass, regression) Full regression on temporal behaviors (simple, overdriven and under driven models) Fully automated grey level measurement (iso grey level steps or iso luminance steps) Display control trough FPDDrive , FPDLite or other systems Custom display control possible using DLL connection
Voltage & power	110/200V, 15W
Size & weight	Weight: 2.5kg Size (L x W x H): 225mm x 90mm x 100mm



**ELECTRONICS FOR DISPLAYS
AND IMAGING DEVICES**

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