



# An automated test instrument for alignment and optical quality measurement

PHASICS innovative solution delivers the most complete lens characterization: **on & off-axis MTF and wave front error** at multiple wavelengths. It benefits from PHASICS patented technology to provide accurate results even for **large field of view**. The Kaleo MTF instrument is ideal for measuring small sets of lenses, at the design, prototyping or production phase. It can be used either by production operators with an easy, step-by-step procedure, or by R&D engineers with access to more features and settings. One single acquisition provides comprehensive characterization!

## MARKETS



Automotive  
ADAS



Security

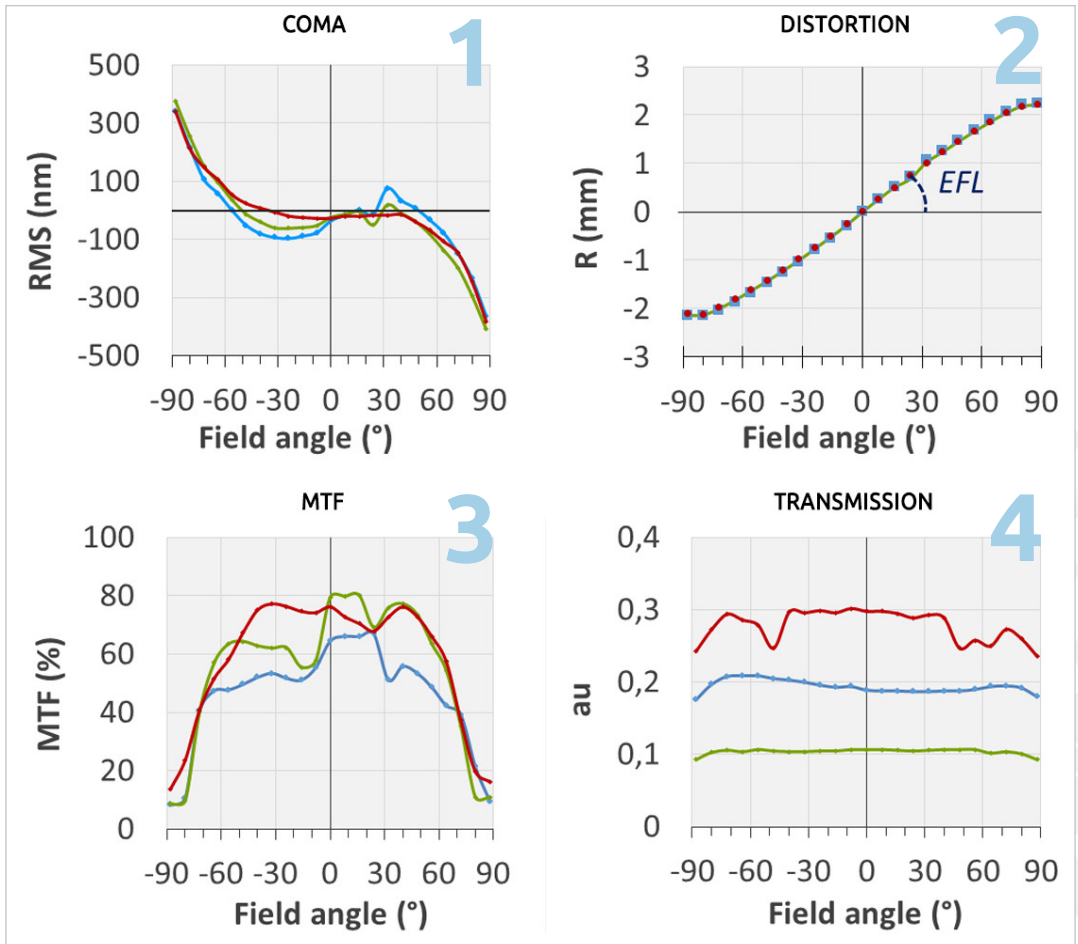


Drones



Mobile phone

# LENS CHARACTERIZATION



Aberrations of a complex zoom lens with high NA (F/2)

— 450 nm — 530 nm — 660 nm

## OUTCOMES

- On-axis & off-axis MTF
- Through focus MTF
- Transmitted wave front error
- Zernike polynomials
- Lens parameters : EFL, f#
- OPD in the lens exit pupil
- Astigmatism
- Distortion
- Field curvature
- Relative illumination

# ADVANTAGES

---

- Single shot measurement
- Fully automated measurement process
- No need to realign for off-axis measurement
- Easy alignment
- Autofocus
- Manual or motorized sample holder
- Single or multiple lens tray
- Cost effective solution
- Accuracy similar to interferometry
- MTF measurement up to cut-off frequency
- Several wavelengths (RGB + IR by default)
- High quality collimated source
- Measurement at several azimuths

# SOFTWARE

---

## ACQUISITION MANAGEMENT

- Possibility to select wavelengths, field angles, number of iterations (for repeatability assessment)
- Real time display of relative illumination and intensity
- Settings database

## RESULTS MANAGEMENT

- Selection of computed and saved parameters
- Aberration and MTF vs field angle for each wavelength and azimuth
- Possibility to post-process data after acquisition

## INTERFACE MANAGEMENT

- Supervisor interface: access to all parameters and settings
- Operator interface: quick and easy-to-use for optimal throughput

# Kaleo MTF ON & OFF-AXIS TESTING

## SPECIFICATIONS

MTF on-axis	Accuracy <1%*	Repeatability <0.5%*
MTF off-axis	Accuracy <2%**	Repeatability <1%**
MTF max frequency	1000 cc/mm	
MTF accuracy	LWIR & MWIR $\pm 0.02 / \pm 0.03$ SWIR & Visible $\pm 0.01 / \pm 0.02$	
MTF repeatability	LWIR & MWIR $\pm 0.015$ SWIR & Visible $\pm 0.01$	
EFL accuracy	Accuracy 1%	Repeatability 0.5% (tested on a 5 mm EFL lens)
Distortion	Accuracy <0.5%	Repeatability <0.05%
OPD (on-axis)	Accuracy 20nm RMS	Repeatability <5nm RMS
Field curvature	Accuracy <5 $\mu$ m	Repeatability <1 $\mu$ m

\* This specification is obtained for optics measured at 660 nm for 3 frequencies and a chief ray angle below 8°.

\*\* This specification is given over the whole field of view.

## FUNCTIONALITIES

Optical set up	Finite to infinite configuration
Wavelength range	400-1100 nm / 900-1700 nm / 3-5 $\mu$ m / 8-14 $\mu$ m
Entrance pupil diameter	Up to 8.8 mm
Diameter range	2 to 200 mm
f#	> 1.8
Focal length range	5 to 500 mm
Flange focal length	8 to 30 mm
Field of view	Up to $\pm 120^\circ$
Azimuth	0°, 90°, 180°, 270°, motorized
Dimensions (height x width x depth)	1520 mm x 650 mm x 840 mm
Weight	195 kg
Sample holder / Tray	Manual or motorized, single or multiple lens tray

# Kaleo MTF

MTF & WFE

measurement station  
for wide angle lenses

**PHASICS**  
the phase control company

