

This high magnification lens with beam splitter for axial illumination is optimized for 16k with 5  $\mu\text{m}$  (82 mm) line scan sensors. Optimized for a specific magnification of 3.33x the lens provides high performance in a compact and robust package. The V90-Mount interface makes it easy to install numerous mounts and allows the rotation of the lens into the best azimuth.

## Key features

- Designed for 16k / 5  $\mu\text{m}$  line scan sensors
- Optimized for 3.33x magnification
- Diffraction limited design
- With beam splitter for coaxial illumination

## Applications

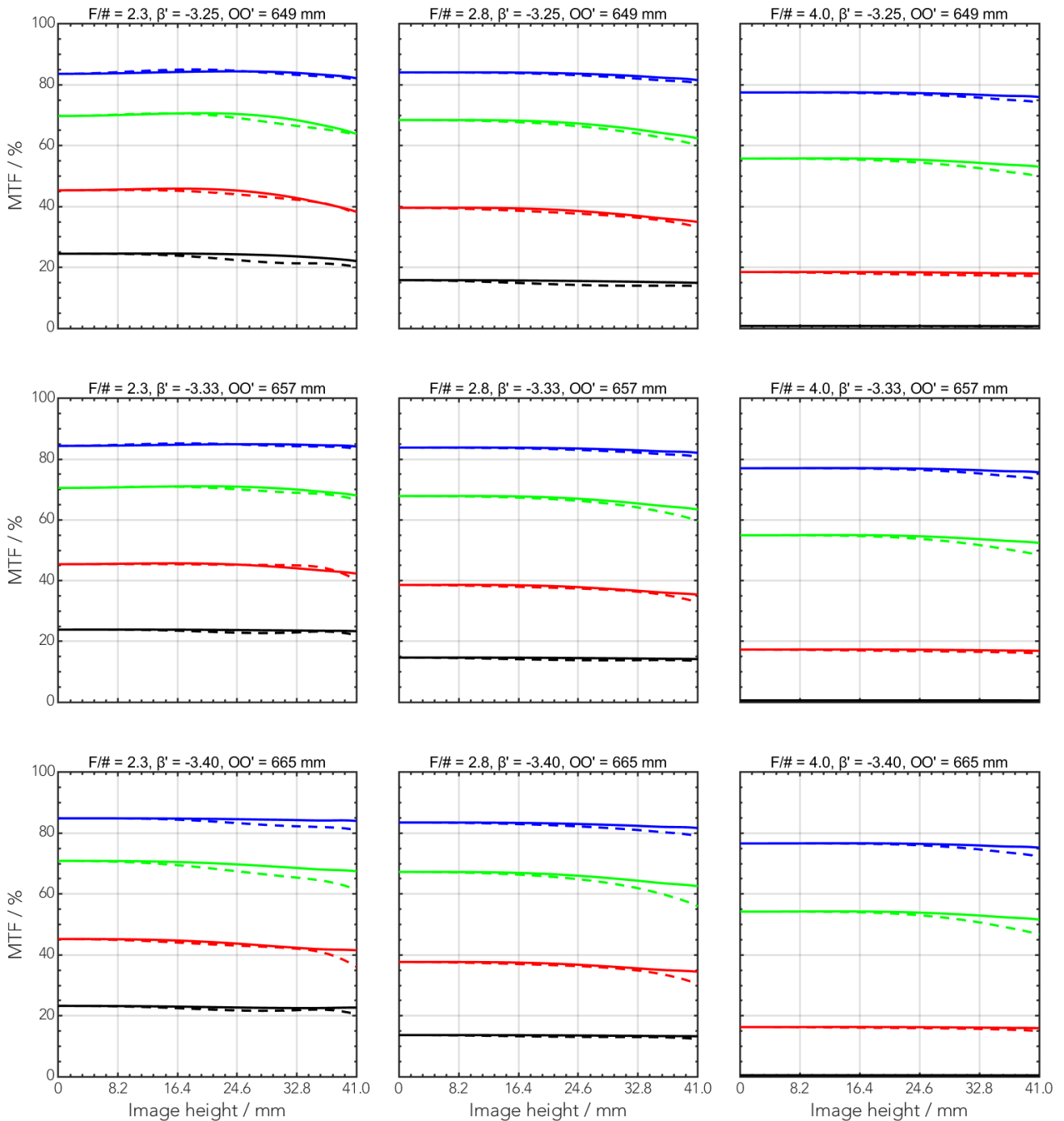
- FPD inspection
- PCB inspection
- Micro defect detection
- AOI (Automated Optical Inspection)

## Technical specifications

Type [with beamsplitter]	V90-BS
ID [with beamsplitter]	1098892
Interface	V90-Mount
Focal length [mm]	116
F/# range	F/2.3 ... F/11
Numerical aperture [object   image]	0.16   0.05
Max. sensor size [mm]	82
Max. angle of view [°]	9
Rec. magnification range	-3.33 (-3.5 ... -3.2)
Rec. working distance range [mm]	48 ... 51
Max. mechanical focus travel [mm]	30.9
Filter thread [mm]	-
Storage temperature [°C]	0 ... +50
Net. weight [g]	1900
Additional info	Max. chief ray angle in object space = 4.5°
f'eff [mm]	116.94
SF [mm]	-14.60
S'F' [mm]	36.86
HH' [mm]	-1.44
$\beta'$ P	0.97
SEP [mm]	105.51
S'AP [mm]	-77.01
$\Sigma d$ [mm]	181.00

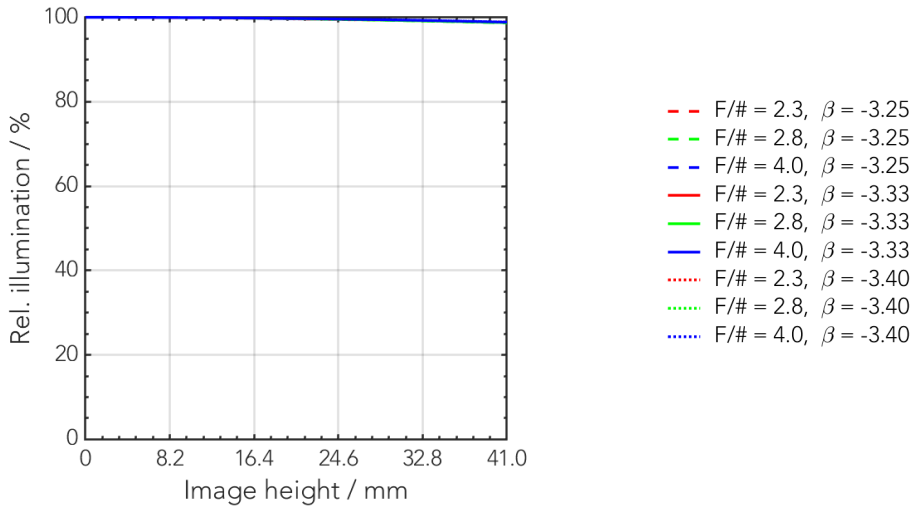
## MTF charts

Spectrum name	VIS LED					
Wavelengths [nm]	425	475	525	575	625	675
Rel. weights [%]	1.5	13.6	26.5	27.8	24.2	6.4

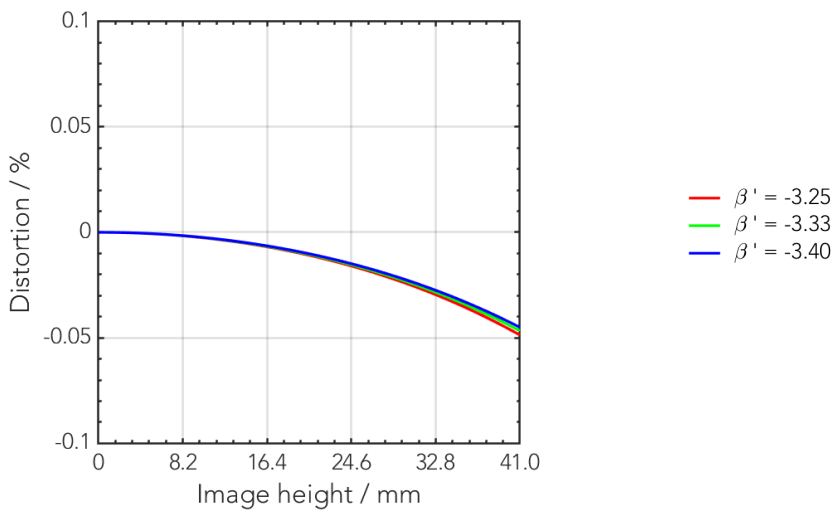


— 18 LP/mm, radial     — 36 LP/mm, radial     — 72 LP/mm, radial     — 108 LP/mm, radial  
- - - 18 LP/mm, tangential     - - - 36 LP/mm, tangential     - - - 72 LP/mm, tangential     - - - 108 LP/mm, tangential

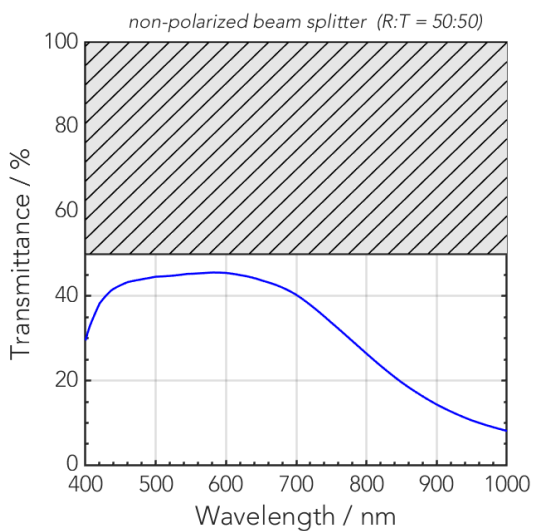
## Rel. illumination vs. image height



## Distortion vs. image height



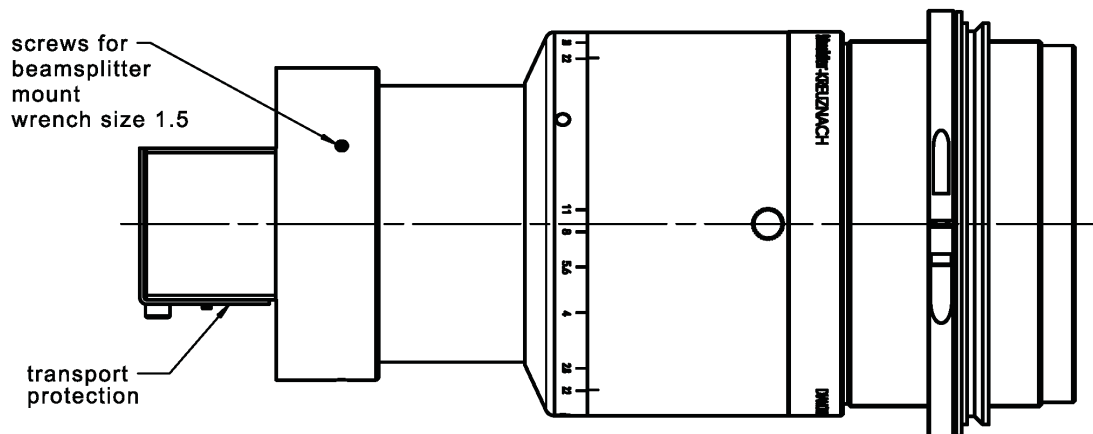
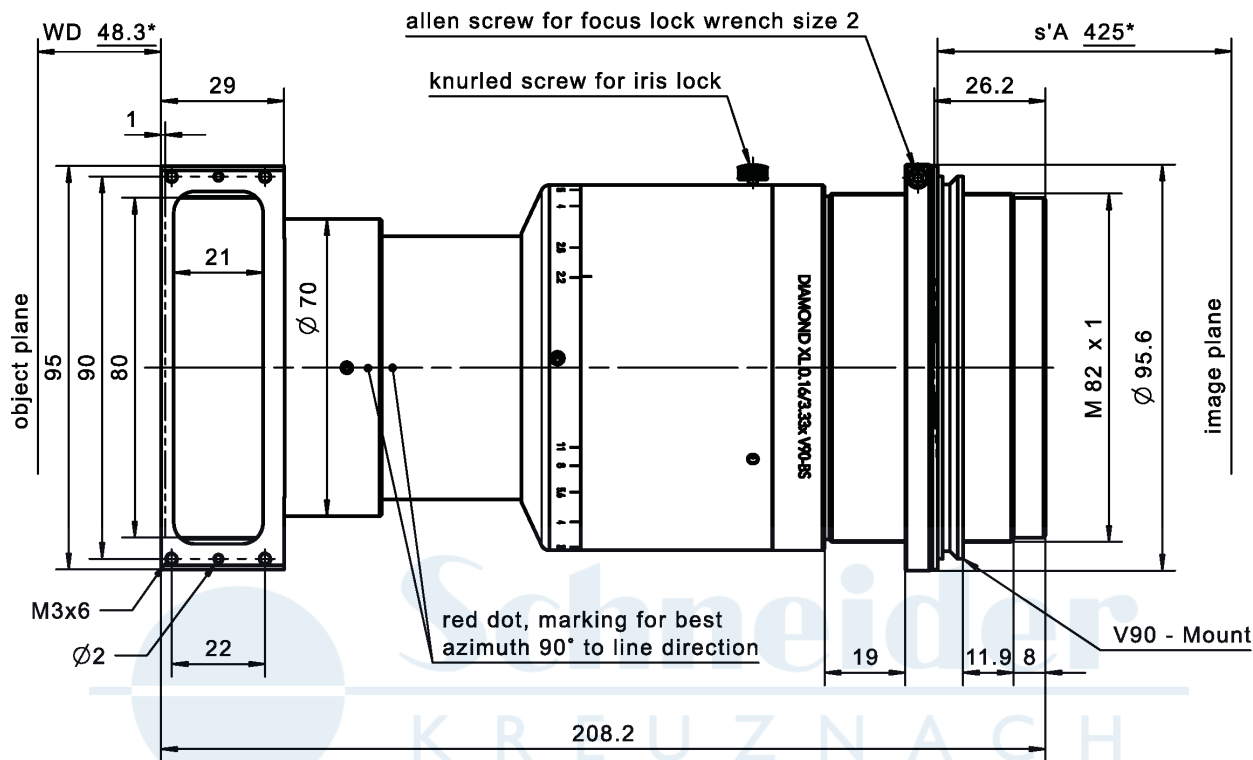
## Transmittance vs. wavelength



## Technical drawings

\* WD and s'A  
in air at  
beta' -3.33

view without  
transport protection



Accessories	Mount	Eff. length	ID
Adapter	V90 / M95 x 1	10 mm	1077293
	M95 x 1 / M90 x 1	6.6 mm	1084889
	M95 x 1 / M72 x 0.75	6.6 mm	1077295
Extension tube	M72 x 0.75 / M72 x 0.75	5 mm	1072420
	M72 x 0.75 / M72 x 0.75	10 mm	1072421
	M72 x 0.75 / M72 x 0.75	25 mm	26406
	M72 x 0.75 / M72 x 0.75	50 mm	1054733
	M72 x 0.75 / M72 x 0.75	100 mm	1079483
	M90 x 1 / M90 x 1	10 mm	1084875
	M90 x 1 / M90 x 1	25 mm	1084876
	M90 x 1 / M90 x 1	50 mm	1084877
	M90 x 1 / M90 x 1	100 mm	1084878
	M95 x 1 / M95 x 1	10 mm	1077290
	M95 x 1 / M95 x 1	25 mm	1062892
	M95 x 1 / M95 x 1	50 mm	1062893
	M95 x 1 / M95 x 1	100 mm	1062894
	M95 x 1 / M95 x 1	200 mm	1077291

Annotation	
Focal length	Nominal focal length
F/# range	Image space F-number range for infinity focus position
Numerical aperture	Maximum real numerical aperture (depending on recommended magnification range either for infinity or respective fixed magnification)
Max. sensor size	Image circle diameter
Max. angle of view	Angle of view associated with maximum sensor size (depending on recommended magnification range either for infinity or respective fixed magnification)
Rec. magnification range	Magnification range as recommended by Schneider-Kreuznach
Rec. working distance range	Working distance, i.e. distance between object and first mechanical element, associated with recommended magnification range
Max. mechanical focus travel	Maximum possible movement of the lens from infinity position (depending on recommended magnification range either for infinity or respective fixed magnification)
Net weight	weight of unpacked lens without lens cap
$f'_{\text{eff}}$	Effective focal length
SF	Distance between vertex of first lens surface and object space focal point
S'F'	Distance between vertex of last lens surface and image space focal point (back focal distance at infinity)
HH'	Distance between principal planes
$\beta'P$	Pupil magnification (= exit pupil diameter / entrance pupil diameter)
SEP	Distance between vertex of first lens surface and entrance pupil
S'AP	Distance between vertex of last lens surface and exit pupil
$\Sigma d$	Distance between vertices of first and last lens surface
s'A	Flange focal distance (in air) for infinite object distance (depending on recommended magnification range either for infinity or respective fixed magnification)
$\beta'$	Magnification (= image size / object size), negative value because image is inverted
OO'	Distance between object and image

Unless otherwise stated all dimensions in this data sheet are in mm.

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