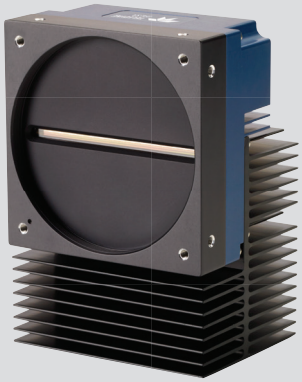
TELEDYNE DALSA
Everywhereyoulook™
Part of the Teledyne Imaging Group

Linea™ HS Multifield

16k Multi-array CMOS TDI Camera



Key Features

- Capture three field images simultaneously in a single scan
- High speed 133 kHz x 3
- High sensitivity multi-array TDI
- Bi-directionality
- Assisted alignment marks

Programmability

- Multiple Regions of Interest for calibration, data reduction
- 8 or 12 bit output
- Flat field and lens shading correction
- Programmable coefficient sets

Typical Applications

- Flat panel display inspection
- Printed circuit board inspection
- Semiconductor wafer
- Life sciences
- Web inspection
- General purpose machine vision

Industry's First Multifield TDI Camera with High Throughput and Detectability

Based on Teledyne DALSA's industry leading CMOS TDI technology, the new Linea HS Multifield™ camera is the most advanced TDI product in the marketplace. This camera delivers the highest performance available, with unique features that significantly improve detectability for many demanding applications. The camera comes with high-speed fiber optic interface, delivering up to 8.4 Gigapixels per second over a single and long length fiber optic cable.

Multifield Technology

Multifield is a new imaging technology that enables capturing multiple images simultaneously using various lighting conditions (e.g. brightfield, darkfield, and backlight) in a single scan.

Teledyne DALSA's Linea HS Multifield camera is the first in the industry capable of capturing up to three images using light sources at different wavelengths. The camera uses advanced wafer-level coated dichroic filters with minimum spectral crosstalk to spectrally isolate three images captured by separate TDI arrays. It can be used for color imaging as well.

This new technology significantly improves inspection speeds and image quality, as it eliminates the need for multiple scans. The difference between traditional color imaging and multifield imaging is the filter technology. Conventional color filters have significant spectral crosstalk between RGB channels, while the multifield filters have minimum spectral crosstalk.

Specifications

Resolution	16,384 x 256 pixels
Line rate	133 kHz x 3
Pixel Size	5 x 5 µm
Bit depth	8 or 12 bit selectable
Lens Mounts	M90 x 1
Responsivity	*See graph*
Dynamic Range	69 dB
Nominal Gain Range	1x to 10x
Size	97 x 140.5 x 78.6 mm
Mass	1200 g
Operating Temp	0 to +60 °C (front plate)
Power Supply	+12 to +24 VDC
Power Dissipation	28 W
Data and Control	Camera Link HS CX4
GPIO	Hirose 12-pin
Regulatory Compliance	CE, FCC, RoHS

Camera Models

Part Number	Resolution	Max. Line Rate	Pixel Size	Output
HL-HF-16K13T-00-R	16,384 x (64 +128 + 64)	133 kHz x 3	5 x 5 µm	F1, F2, F3

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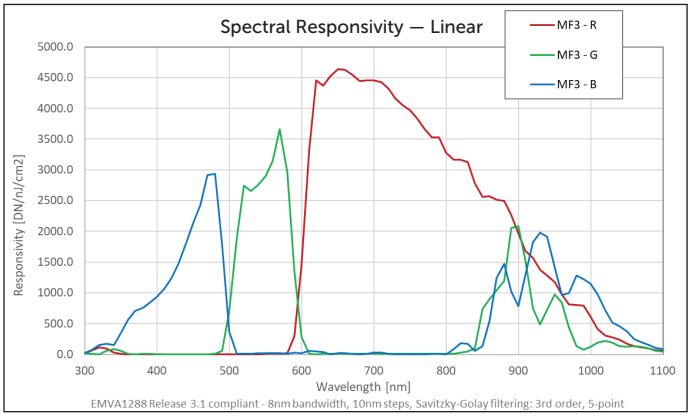

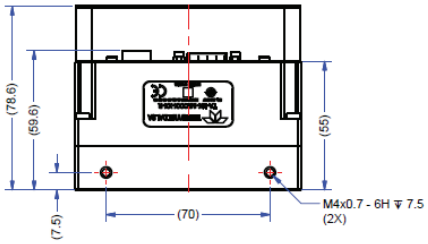

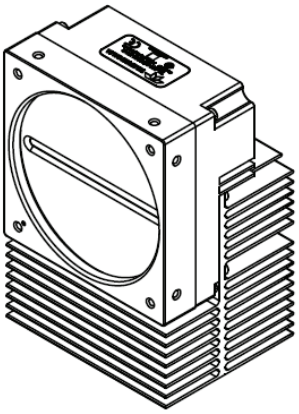

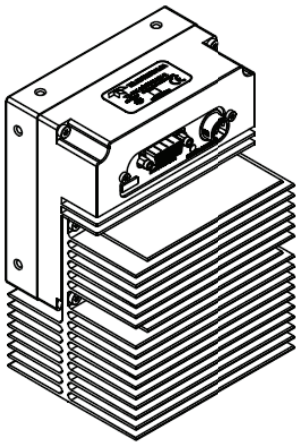

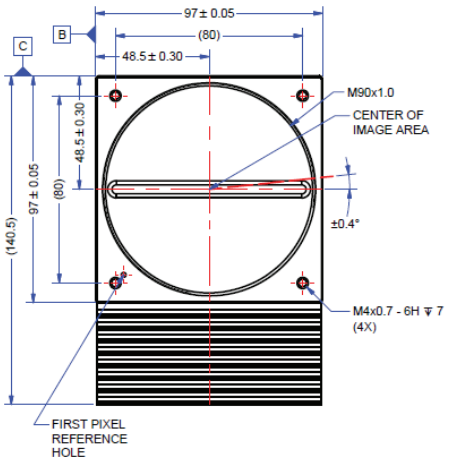

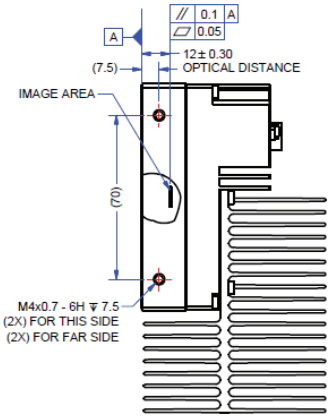

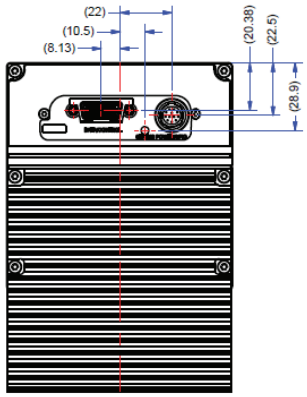

NOTES:
1. UNITS: MILLIMETERS.
2. IMAGE AREA IS ALIGNED TO DATUMS A B & C.

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Xenon Kelly_M Diamond 5x

This high resolution 5.0x lens with beam splitter for axial illumination is optimized for 16k / 5 µm (82 mm) line scan cameras. It provides high performance at 72 LP/mm and detects smallest targets to solve the most challenging applications. The V-Mount interface makes it easy to install mounts and rotate the lens into the highest performance.

Key features

- Optimized for 82 mm line scan sensors
- With beam splitter for axial in-line illumination
- 400 nm to 1000 nm AR-coating

Applications

- FPD inspection
- PCB inspection
- High resolution defect detection
- Quality assurance systems

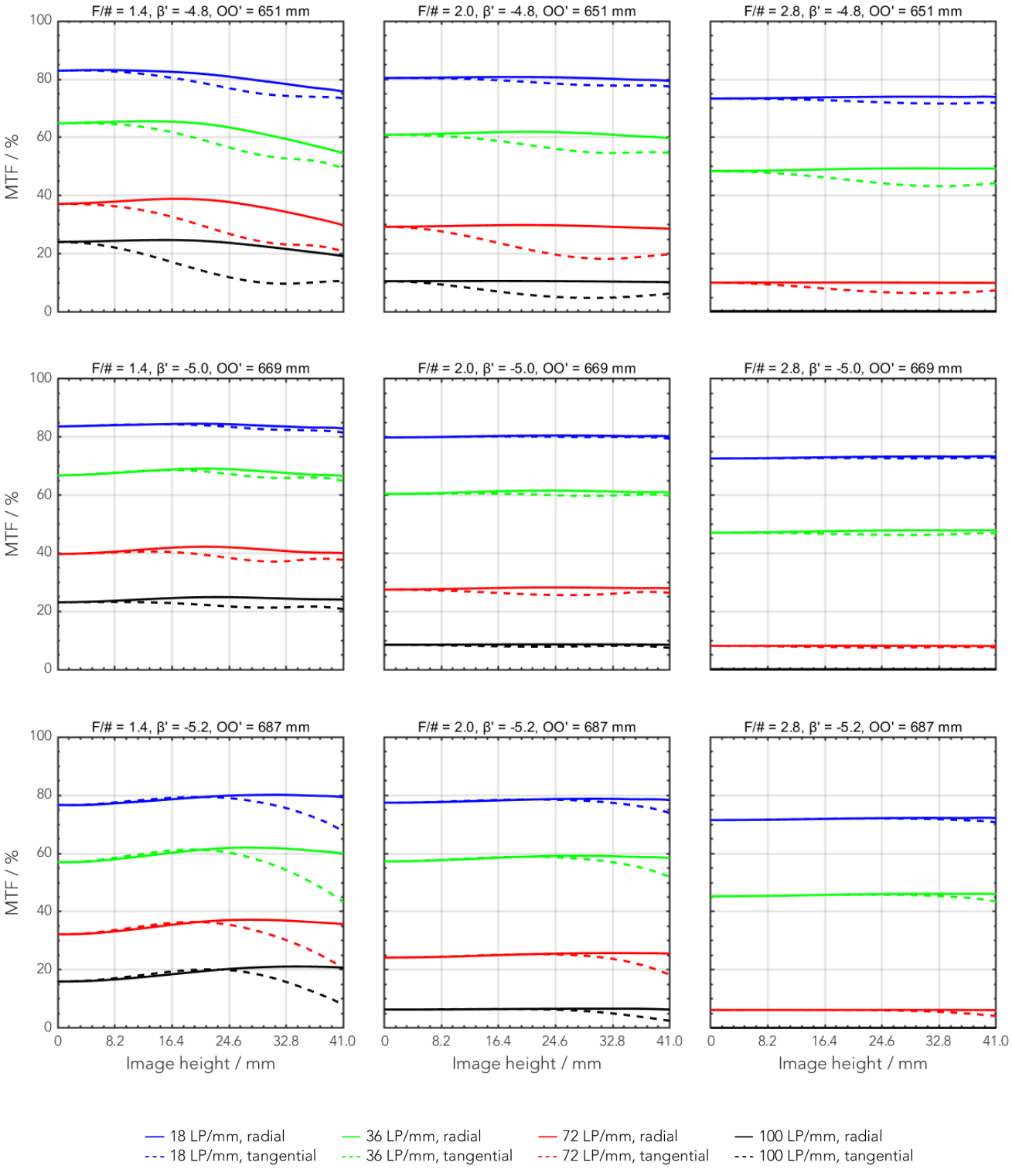
Technical specifications

Type [standard]	-0003
ID [standard]	1096957
Interface	V90-Mount
Focal length [mm]	92
F/# range	F/1.4 ... F/11
Numerical aperture	0.225
Max. sensor size [mm]	82
Max. angle of view [°]	7
Rec. magnification range	-5 (-5.2 ... -4.8)
Rec. working distance range [mm]	31 ... 33
Max. mechanical focus travel [mm]	-
Filter thread [mm]	-
Storage temperature [°C]	0 … +50
Net. weight [standard] [g]	2870
Additional info	Max. chief ray angle in object space = 3.4°
f'eff [mm]	92.42
SF [mm]	-14.51
S'F' [mm]	-28.18
HH' [mm]	3.64
ß'P	0.79
SEP [mm]	103.12
S'AP [mm]	-100.76
Σd [mm]	202.14

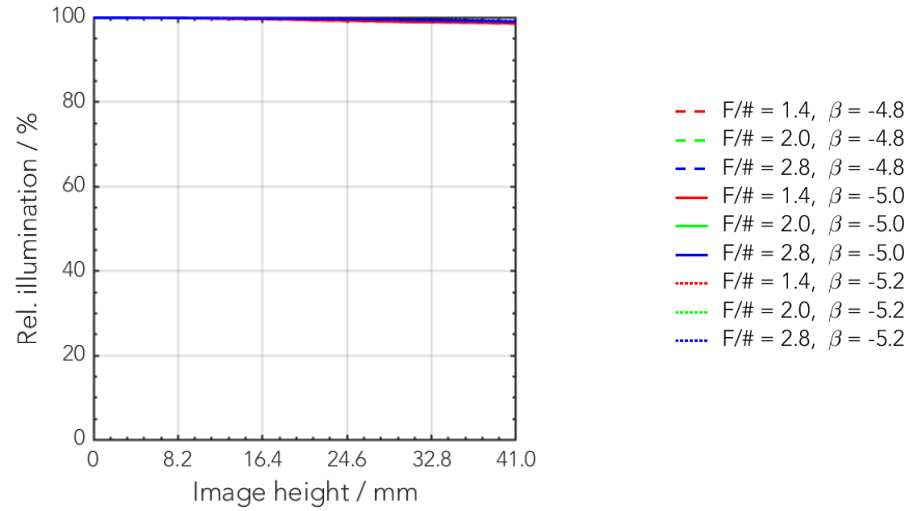
Xenon Kelly_M Diamond 5x

MTF charts

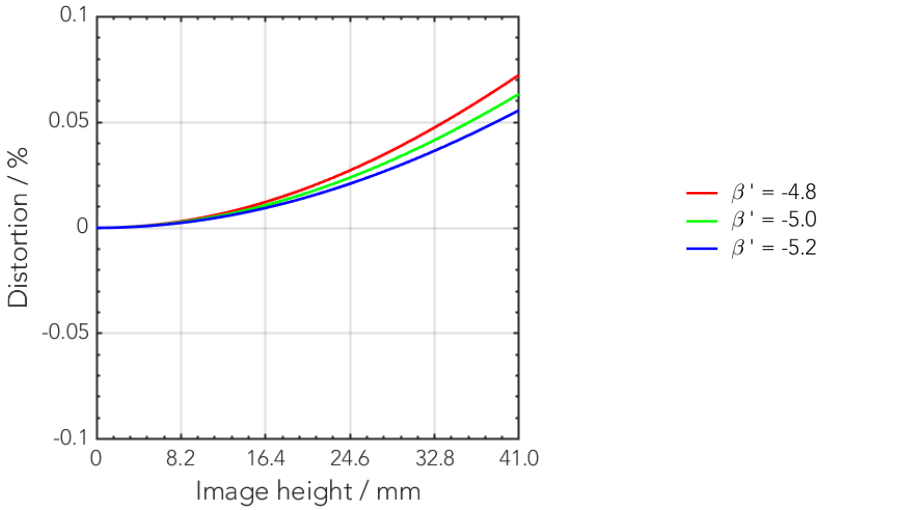
Spectrum name	-									
Wavelengths [nm]	-	-	-	-	-	-	-	-	-	-
Rel. weights [%]	-	-	-	-	-	-	-	-	-	-



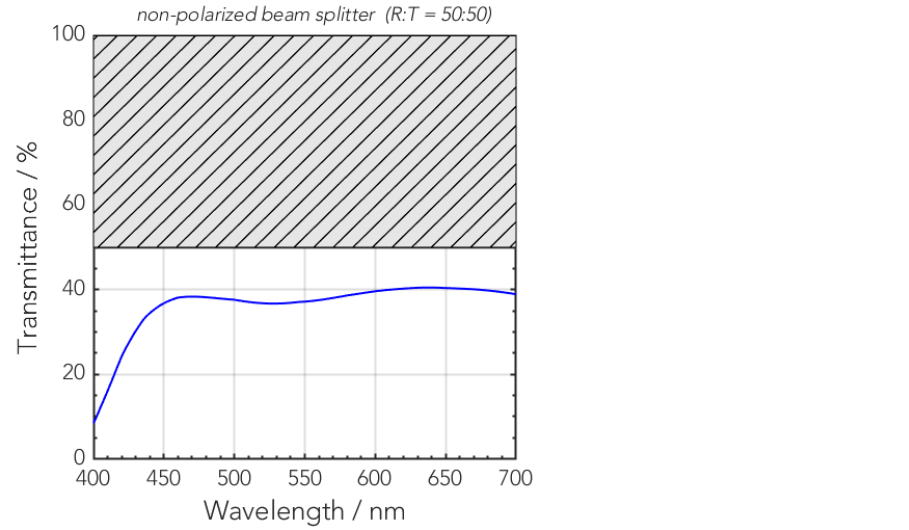
Rel. illumination vs. image height



Distortion vs. image height



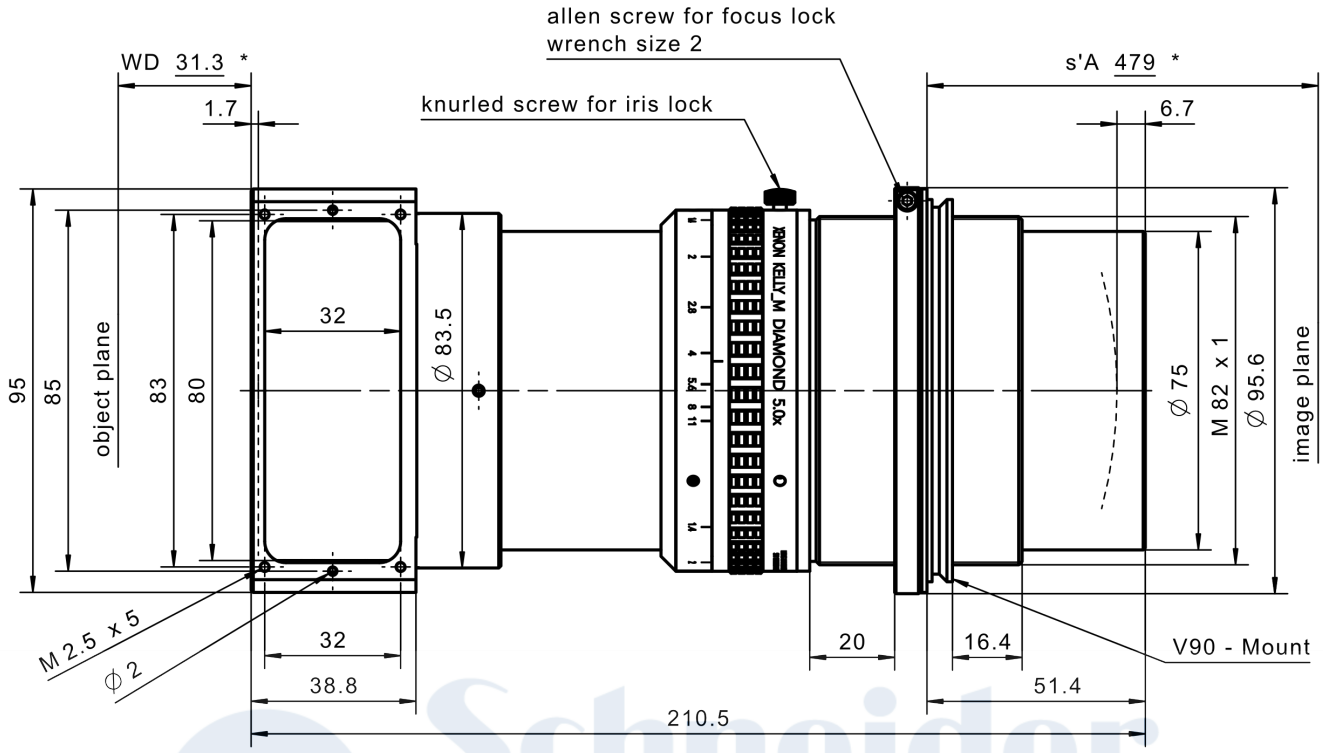
Transmittance vs. wavelength

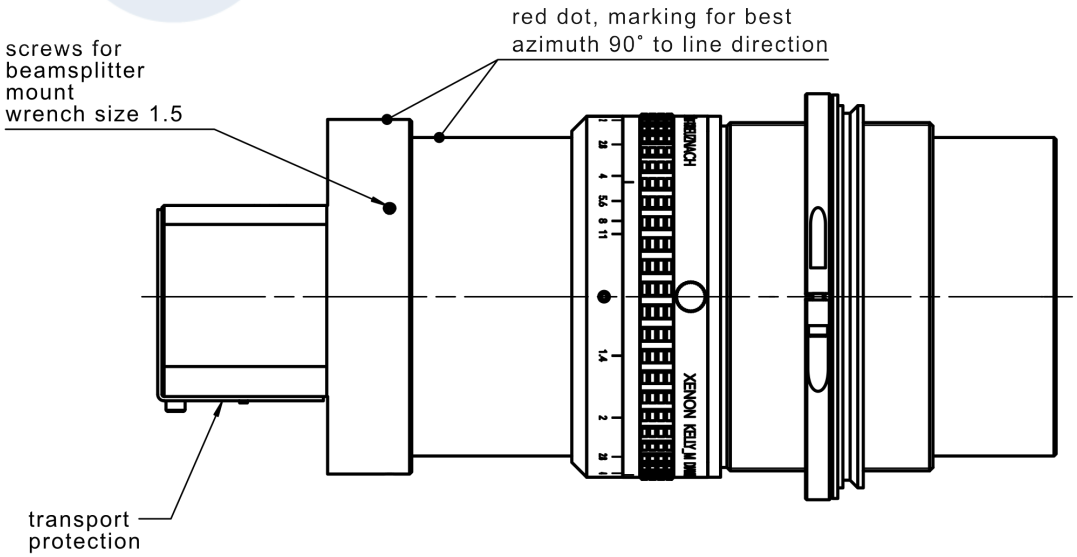


Technical drawings

* WD and s'A in air at beta' -5.0

view without transport protection





Xenon Kelly_M Diamond 5x

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'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
ß'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
Σ 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)
ß'	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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