

# TC4M009-C

Telecentric lens for 4/3" detectors, magnification 2.000 x, C-mount

## SPECIFICATIONS

Magnification	(x)	2.000
Image circle Ø	(mm)	22.0

### Object field of view(8)

with KAI-2020 14.8 mm diagonal w x h 11.84 x 8.88	(mm x mm)	5.9 x 4.4
with KAI-04050 16 mm diagonal w x h 12.8 x 9.6	(mm x mm)	6.4 x 4.8
with KAI-4022/4021 21.5 mm diagonal w x h 15.2 x 15.2	(mm x mm)	7.6 x 7.6
with KAI-08050 22.6 mm diagonal w x h 18.1 x 13.6(7)	(mm x mm)	9.1 x 6.8

### Optical specifications

Working distance (1)	(mm)	63.3
wF/# (2)		22
Telecentricity typical (max) (3)	(deg)	<0.08 (0.10)
Distortion typical (max) (4)	(%)	<0.05 (0.10)
Field depth (5)	(mm)	0.4
CTF@ 70 lp/mm	(%)	> 30

### Mechanical specifications

Mount		C
Length (6)	(mm)	170.0
Diameter	(mm)	45
Mass	(g)	180

Last update: 2018-06-12

## NOTES

- Working Distance: distance between the front end of the mechanics and the object. Set this distance within +/- 3% of the nominal value for maximum resolution and minimum distortion.
- Working F/#: the real F/# of a lens when used as a macro. Lenses with smaller apertures can be supplied on request.
- Maximum slope of chief rays inside the lens: when converted to milliradians, it gives the maximum measurement error for any millimeter of object displacement. Typical (average production) values and maximum (guaranteed) values are listed.
- Percent deviation of the real image compared to an ideal, undistorted image: typical (average production) values and maximum (guaranteed) values are listed.
- At the borders of the field depth the image can be still used for measurement but, to get a very sharp image, only half of the nominal field depth should be considered. Pixel size used for calculation is 4.8 µm.
- Measured from the front end of the mechanics to the camera flange.
- With KAI-08050 (22.6 mm diagonal) detectors, the FOV of TC4M yyy lenses may show some vignetting at the image corners, as these lenses are optimized for 1.2" detectors (21.5 mm)
- For the fields with the indication "Ø =", the image of a circular object of such diameter is fully inscribed into the detector.

## COMPATIBLE PRODUCTS

Despite the efforts made to generate an error-free compatibility list, we always recommend to consult the Opto Engineering® technical support department before purchasing a compatible product. Opto Engineering® shall not be liable for any damage or malfunctioning caused by the incorrect selection of a compatible product.



LTCLHP series

High-performance telecentric illuminators

LTCLHP023-R	Telecentric HP illuminator, beam diameter 16 mm, red
LTCLHP023-G	Telecentric HP illuminator, beam diameter 16 mm, green
LTCLHP023-B	Telecentric HP illuminator, beam diameter 16 mm, blue
LTCLHP023-W	Telecentric HP illuminator, beam diameter 16 mm, white



All product specifications and data are subject to change without notice to improve reliability, functionality, design or other. Photos and pictures are for illustration purposes only.



### LTLA series

High-power strobed LED low angle diffused ringlights

LTLAB2-R	Diffusive strobed low angle ring light illuminator - medium size high power red
LTLAB2-G	Diffusive strobed low angle ring light illuminator - medium size high power green
LTLAB2-W	Diffusive strobed low angle ring light illuminator - medium size high power white



### LTLAIC series (discontinued models)

Continuous LED low angle diffused ringlights

LT2RZF050-60-2-W-24V	LED ringlight, 2 LED rows, 50.8 mm outer diameter, 60°, white, 24V
LT2RZF050-60-2-R-24V	LED ringlight, 2 LED rows, 50.8 mm outer diameter, 60°, red, 24V
LT2RZF050-60-2-G-24V	LED ringlight, 2 LED rows, 50.8 mm outer diameter, 60°, green, 24V
LT2RZF050-60-2-B-24V	LED ringlight, 2 LED rows, 50.8 mm outer diameter, 60°, blue, 24V



### LTLAIC series

Continuous LED low angle diffused ringlights

LT3RZF050-60-1-W-24V	LED ringlight, 1 LED row, 56.4 mm outer diameter, 60°, white, 24V
LT3RZF050-60-1-R-24V	LED ringlight, 1 LED row, 56.4 mm outer diameter, 60°, red, 24V
LT3RZF050-60-1-G-24V	LED ringlight, 1 LED row, 56.4 mm outer diameter, 60°, green, 24V
LT3RZF050-60-1-B-24V	LED ringlight, 1 LED row, 56.4 mm outer diameter, 60°, blue, 24V



### LTLADC series

Continuous LED low angle direct ringlights

LTZZO130-75-3-W-24V	LED low angle ringlight, 3 LED rows, outer diameter 131 mm, 75°, white, 24V
LTZZO130-75-3-R-24V	LED low angle ringlight, 3 LED rows, outer diameter 131 mm, 75°, red, 24V
LTZZO130-75-3-G-24V	LED low angle ringlight, 3 LED rows, outer diameter 131 mm, 75°, green, 24V
LTZZO130-75-3-B-24V	LED low angle ringlight, 3 LED rows, outer diameter 131 mm, 75°, blue, 24V



### LTRNST series

LED ring illuminators - straight type

LTRN023RD	Ring LED illuminator, inner diameter 28 mm, straight type, red 630 nm
LTRN023GR	Ring LED illuminator, inner diameter 28 mm, straight type, green 525 nm
LTRN023BL	Ring LED illuminator, inner diameter 28 mm, straight type, blue 470 nm
LTRN023NW	Ring LED illuminator, inner diameter 28 mm, straight type, white



### LTRNOB series

LED ring illuminators - oblique type

LTRN075R45	Ring LED illuminator, inner diameter 28 mm, oblique type, red 630 nm
LTRN075G45	Ring LED illuminator, inner diameter 28 mm, oblique type, green 525 nm
LTRN075B45	Ring LED illuminator, inner diameter 28 mm, oblique type, blue 470 nm
LTRN075W45	Ring LED illuminator, inner diameter 28 mm, oblique type, white



### LTRNOBHP series

High power LED ring illuminators, oblique type

LTRNHP075R45	High power LED ring illuminators, oblique type, inner diam. 28mm, red, 625 nm
LTRNHP075G45	High power LED ring illuminators, oblique type, inner diam. 28mm, green, 525 nm
LTRNHP075B45	High power LED ring illuminators, oblique type, inner diam. 28mm, blue, 475 nm
LTRNHP075W45	High power LED ring illuminators, oblique type, inner diam. 28mm, white, 6200 k



### LTRNDC series

Continuous LED direct ringlights

LTZGK050-15-2-W-24V	LED ringlight, 2 LED rows, outer diameter 50 mm, 15°, white, 24V
LTZGK050-15-2-R-24V	LED ringlight, 2 LED rows, outer diameter 50 mm, 15°, red, 24V

LTZGK050-15-2-G-24V	LED ringlight, 2 LED rows, outer diameter 50 mm, 15°, green, 24V
LTZGK050-15-2-B-24V	LED ringlight, 2 LED rows, outer diameter 50 mm, 15°, blue, 24V
LTZGK070-45-3-W-24V	LED ringlight, 3 LED rows, outer diameter 70 mm, 45°, white, 24V
LTZGK070-45-3-R-24V	LED ringlight, 3 LED rows, outer diameter 70 mm, 45°, red, 24V
LTZGK070-45-3-G-24V	LED ringlight, 3 LED rows, outer diameter 70 mm, 45°, green, 24V
LTZGK070-45-3-B-24V	LED ringlight, 3 LED rows, outer diameter 70 mm, 45°, blue, 24V



LTBC series

Continuous LED backlight

LTBC054054-W	Continuous LED backlight, 54x54 illumination area, white
LTBC054054-G	Continuous LED backlight, 54x54 illumination area, green



LTBFC series

Continuous flat side-emitting LED backlights

LTPVRG25X36-00-1-W-24V	Flat side-emitting LED backlight, thin borders, 25X36 mm illumination area, white, 24V
LTPVRG25X36-00-1-R-24V	Flat side-emitting LED backlight, thin borders, 25X36 mm illumination area, red, 24V
LTPVRG25X36-00-1-G-24V	Flat side-emitting LED backlight, thin borders, 25X36 mm illumination area, green, 24V
LTPVRG25X36-00-1-B-24V	Flat side-emitting LED backlight, thin borders, 25X36 mm illumination area, blue, 24V



LTBRDC series

Continuous LED bar lights

LTZPFL040-00-6-W-24V	LED bar light, 6 LED rows, 40X26.3 illumination area, white, 24V
LTZPFL040-00-6-R-24V	LED bar light, 6 LED rows, 40X26.3 illumination area, red, 24V
LTZPFL040-00-6-G-24V	LED bar light, 6 LED rows, 40X26.3 illumination area, green, 24V
LTZPFL040-00-6-B-24V	LED bar light, 6 LED rows, 40X26.3 illumination area, blue, 24V



LTCXC series

Continuous LED coaxial lights

LT2QOG025-00-X-W-24V	LED coaxial light, 25x25.6 mm light emitting area, white, 24V
LT2QOG025-00-X-R-24V	LED coaxial light, 25x25.6 mm light emitting area, red, 24V
LT2QOG025-00-X-G-24V	LED coaxial light, 25x25.6 mm light emitting area, green, 24V
LT2QOG025-00-X-B-24V	LED coaxial light, 25x25.6 mm light emitting area, blue, 24V



CMHO series

Clamping mechanics

CMHO023	Clamping mechanics for TCxx004, 007, 009, 012 and LTCLHP023-X
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