**OPTO ENGINEERING®**

# TCCR4M096-C

Telecentric CORE lens for 4/3" detectors, magnification 0.186 x, C-mount

## SPECIFICATIONS

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|---|---|---|
| Part number | | TCCR4M096-C |
| Magnification | (x) | 0.186 |
| Image shape dimension (8) | (Ø, x mm) | Ø=22.5, x=18.6 |
| Phase adjustment (7) | | Yes |

### Object field of view 7

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|---|---|---|
| with IMX174/IMX249 13.3 mm diag w x h 11.35 x 7.13 | (mm x mm) | 60.8 x 38.2 |
| with KAI-2020 14.8 mm diagonal w x h 11.84 x 8.88 | (mm x mm) | 63.5 x 47.6 |
| with IMX253/IMX304 17.6 mm diag w x h 14.16 x 10.37 | (mm x mm) | 76.3 x 55.9 |
| with KAI-4022/4021 21.5 mm diagonal w x h 15.2 x 15.2 | (mm x mm) | 81.7 x 81.7 |
| with KAI-08050 22.6 mm diagonal w x h 18.1 x 13.6 | (mm x mm) | 97.3 x 73.1 |

### Optical specifications

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|---|---|---|
| Working distance (1) | (mm) | 278.6 |
| wF/# (2) | | 16 |
| Telecentricity typical (max) (3) | (deg) | < 0.05 (0.10) |
| Distortion typical (max) (4) | (%) | < 0.04 (0.10) |
| Field depth (5) | (mm) | 38.2 |
| CTF@ 50 lp/mm | (%) | > 35 |

### Mechanical specifications

| | | |
|---|---|---|
| Mount (6) | | C |
| A | (mm) | 139 |
| B | (mm) | 172 |
| C | (mm) | 254 |
| Mass | (g) | 4389 |

### Compatibility

LTCLCR096-x, CMHOCR096, CMPTCR096, LTCLHP096-x

*Last update: 2019-05-10*





Image shape dimensions (Ø, x )

## NOTES

1. 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.

2. Working F-number (wF/#): the real F-number of a lens when used as a macro. Lenses with smaller apertures can be supplied on request.

3. 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.

4. Percent deviation of the real image compared to an ideal, undistorted image: typical (average production) values and maximum (guaranteed) values are listed.

5. At the borders of the field depth the image can be still used for measurement but, to get a perfectly sharp image, only half of the nominal field depth should be considered. Pixel size used for calculation is 5.5 µm.

6. In case the of vignetting, FOV dimensions are indicated with "Ø = , x= ", where "Ø =" stands for diameter and "x=" indicates the nominal FOV height and length (see Tech Info for related drawing).

7. Indicates the availability of an integrated camera phase adjustment feature.

8. Indicates the dimensions and shape of image, where "Ø =" stands for diameter and "x=" indicates the nominal image height and length (see Tech Info for related drawing).

## 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.
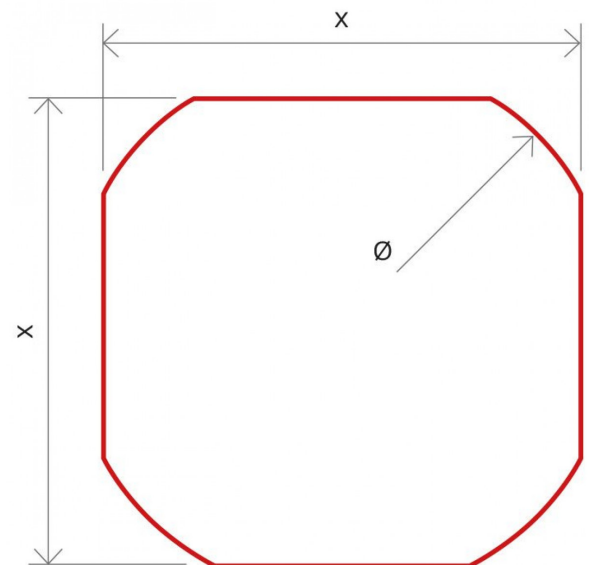
**LTCLHP series**

High-performance telecentric illuminators

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|---|---|
| LTCLHP096-G | Telecentric HP illuminator, beam diameter 120 mm, green |
| LTCLHP096-R | Telecentric HP illuminator, beam diameter 120 mm, red |
| LTCLHP096-B | Telecentric HP illuminator, beam diameter 120 mm, blue |
| LTCLHP096-W | Telecentric HP illuminator, beam diameter 120 mm, white |

**LTCLHP CORE series**

Ultra compact telecentric illuminators

| | |
|---|---|
| LTCLCR096-R | Telecentric CORE illuminator, beam dimensions Ø = 120; x = 99, red |
| LTCLCR096-G | Telecentric CORE illuminator, beam dimensions Ø = 120; x = 99, green |
| LTCLCR096-W | Telecentric CORE illuminator, beam dimensions Ø = 120; x = 99, white |

**LTBC series**

Continuos LED backlight

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|---|---|
| LTBC174174-W | Continuos LED backlight, 174x174 illumination area, white |
| LTBC174174-G | Continuos LED backlight, 174x174 illumination area, green |

**CMHOCR series**

Clamping mechanics CORE series

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|---|---|
| CMHOCR096 | Clamping mechanics for CORE telecentric lenses and illuminators TCCRxx96 and LTCLCR096-x |

**CMPTCR series**

CORE series mounting plates

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|---|---|
| CMPTCR096 | Mechanical components designed for CORE telecentric lenses and illuminators Ø 96mm |

**CMT series**

Precision alignment mechanics

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|---|---|
| CMTHCR096 | Precision alignment mechanics for CORE telecentric optics 096 |

**mvBlueFOX3-2 series**

USB3 vision camera with Sony Pregius CMOS sensors

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|---|---|
| RT-mvBF3-2089a | USB3 Vision camera with Sony Pregius CMOS sensor IMX267 |
| RT-mvBF3-2089 | USB3 Vision camera with Sony Pregius CMOS sensor IMX255 |
| RT-mvBF3-2124a | USB3 Vision camera with Sony Pregius CMOS sensor IMX304 |
| RT-mvBF3-2124 | USB3 Vision camera with Sony Pregius CMOS sensor IMX253 |

**mvBlueCOUGAR series**

GigE & Dual GigE Vision cameras

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|---|---|
| RT-mvBC-X109b | Camera with interface GigE (1GB/s), sensor size 1", mpixel 8.95, resolution 4112 x 2176, sensor name IMX267, sensor type CMOS |
| RT-mvBC-XD109b | Camera with interface Dual GigE (2GB/s), sensor size 1", mpixel 8.95, resolution 4112 X 2176, sensor name IMX267, sensor type CMOS |
| RT-mvBC-X1012b | Camera with interface GigE (1GB/s), sensor size 1.1", mpixel 12.37, resolution 4112 x 3008, sensor name IMX304, sensor type CMOS |
| RT-mvBC-XD107 | Camera with interface Dual GigE (2GB/s), sensor size 1.1", mpixel 7.1, resolution 3216 x 2208, sensor name IMX420, sensor type CMOS |
| RT-mvBC-XD1012b | Camera with interface Dual GigE (2GB/s), sensor size 1.1", mpixel 12.37, resolution 4112 x 3008, sensor name IMX304, sensor type CMOS |

**TCLIB Suite**

Software library & stand-alone tools for the optimization of telecentric setups

| TCLIB-01 | Software library & stand-alone tools for the optimization of telecentric setups |
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COE HR AS-X series

20MP, 26MP and 29MP area scan cameras for high-speed applications

| COE-200-M-POE-070-IR-C | HR Area Scan camera IMX183, CMOS, Rolling shutter, 5472 × 3648, 20.4 MP, 2.4 pix, 1", Gray, GigE, 6 fps, POE, C - mount, Glass filter |
|---|---|
| COE-200-C-POE-070-IR-C | HR Area Scan camera IMX183, CMOS, Rolling shutter, 5472 × 3648, 20.4 MP, 2.4 pix, 1", Color, GigE, 6 fps, POE, C - mount, Infrared cut filter |
| COE-200-M-USB-070-IR-C | HR Area Scan camera IMX183, CMOS, Rolling shutter, 5472 × 3648, 20.4 MP, 2.4 pix, 1", Gray, 14 fps, C - mount, Glass filter |
| COE-200-C-USB-070-IR-C | HR Area Scan camera IMX183, CMOS, Rolling shutter, 5472 × 3648, 20.4 MP, 2.4 pix, 1", Color, 14 fps, C - mount, Infrared cut filter |