# TCCAGE23048 | DATASHEET

OPTO ENGINEERING

## Bi-telecentric multi mirror system for 2/3”sensors

### KEY ADVANTAGES

**90° lateral imaging**
the 4 orthonormal views allow visualization of object features that are hidden when looked at from the top

**Long and thin object inspection**
the characteristic aspect ratio of the four image segments perfectly fits long and thin objects

**Built-in illumination**
the device also incorporates two different light sources, for back and direct illumination

**Suitable for measurement**
the telecentric optics makes this module perfect for any multiple-measurement application.

**TCCAGE** is an integrated optomechanical system designed to fully inspect and measure parts from the side without any need of rotation. Four orthonormal views of an object are provided by a bitelecentric lens through an array of mirrors.

## SPECIFICATIONS

### Optical specifications

| | | |
|---|---|---|
| Magnification | | 0.184 |
| Sensor size[1] | (mm x mm) | 8.5 x 7.1 |
| FOV (diameter x height) [2] | (mm x mm) | 8.0 x 32.0 |
| Min sensor size | | 2/3” |
| w$f$/N[3] | | 8 |
| Depth of field [4] | | 12.2 |

### Mechanical specifications

| | | |
|---|---|---|
| Mount | | C |
| Phase adjustment[7] | | Yes |
| Length | (mm) | 200.8 |
| Width | (mm) | 111.0 |
| Height | (mm) | 248.0 |
| Mass | (g) | 2156 |

### Environment

| | | |
|---|---|---|
| Operating temperature | (°C) | 0-40 |
| Storage temperature | (°C) | 0-50 |
| Operating relative humidity | (%) | 20 - 85, non-condensing |
| Installation | | Indoor use only |

### Eye safety

| | |
|---|---|
| Risk group (CEI EN 62471:2010) | Exempt |

[1] Recommended sensor. Different sensor sizes may cause incomplete images
[2] Maximum sample diameter in each of the four views and maximum sample height with the recommended sensor.
[3] Working $f/N$: the real $f/N$ of a lens in operating conditions. Lenses with reduced aperture can be supplied on request.
[4] At the limits of the depth of field, the image can still be used for measurements. For a very sharp image, however, only half of the depth of field should be considered. Pixel size used for calculation is 3.45 µm.
[5] Tolerance ± 2 %.
[6] Drop to 50% intensity @ 25°C.
[7] Indicates the availability of an integrated camera phase adjustment feature

## COMPATIBLE PRODUCTS

**Full list of compatible products available *here*.**


A wide selection of innovative machine vision components.

### Electrical specifications of coaxial light

| | | |
|---|---|---|
| Light color, peak wavelength | | white, 6300K |
| Supply voltage[5] | (V) | 24 |
| Max continuous current | (mA) | 280 |
| Typical pulse voltage | (V) | 36 |
| Max pulse current | (A) | 2.8 |
| Peak power consumption | (W) | 6.7 |
| Max duty cycle | (%) | 10 |
| Max pulse duration | (ms) | 10 |
| Estimated MTBF[6] | (hours) | 20000 |
| Cable length | (mm) | 1 |
| Connector | | Flying leads |
| Included cables | | - |

### Electrical specifications of ring light

| | | |
|---|---|---|
| Light color, peak wavelength | | white, 6300K |
| Supply voltage[5] | (V) | 24 |
| Max continuous current | (mA) | 105 |
| Typical pulse voltage | (V) | 36 |
| Max pulse current | (A) | 0.315 |
| Peak power consumption | (W) | 2.5 |
| Max duty cycle | (%) | 10 |
| Max pulse duration | (ms) | 10 |
| Estimated MTBF[6] | (hours) | 20000 |
| Cable length | (mm) | 1 |
| Connector | | Flying leads |
| Included cables | | - |

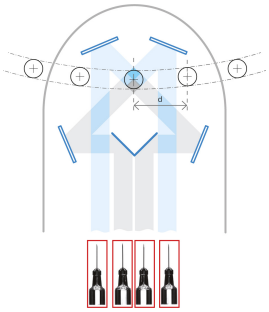
## COAXIAL LIGHTING PINOUT

| Function | Cable color |
|---|---|
| LED + | Black/White |
| LED - | Black |

## RINGLIGHT PINOUT

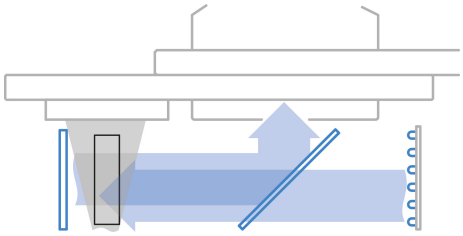
| Function | Cable color |
|---|---|
| LED + | Red |
| LED - | White |

## WORKING PRINCIPLE AND ADDITIONAL INFO



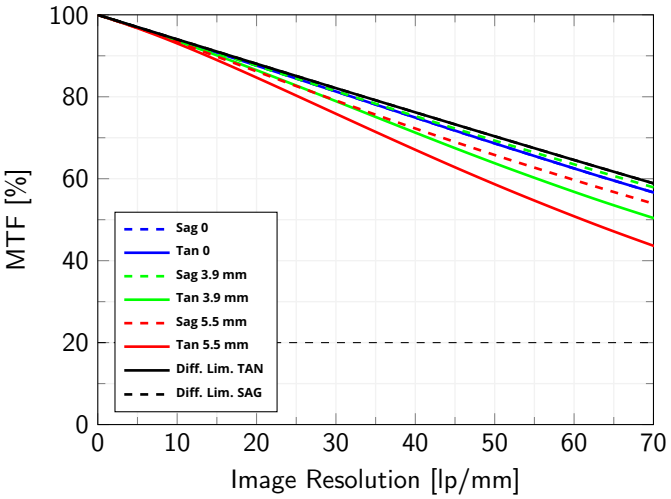
The four views are equally spaced by 90° and partially overlapped, obtaining complete coverage of the object lateral surfaces.

TCCAGE is provided with an extra port placed right above the object. This port can be used to inspect the top of the part using an additional lens and camera system.



TCCAGE series integrates both direct and back-light illumination.

**Image Resolution**




Modulation Transfer Function (MTF) vs. Image Resolution, wavelength range 486 nm - 656 nm from the centre to to the corner of images sensor

**LED color spectrum**