# IMAGING REVOLUTION

# CAMERA CATALOG
## ALL MODELS 2015-2016

USB3 VISION

GiGE VISION

# SEDECO
## TOSHIBA TELI CORPORATION

# Teli's Camera Lineup

**CSC ,BU,BG and DU/DG (=as Premium BU/BG) Series**

| | 0.3M | | 0.8M | 1.3M | 2M | 2.3M | 3M | 5M | 8M | 12M |
|---|---|---|---|---|---|---|---|---|---|---|
| | ICX424 | ICX414 | ICX204 | ICX445 | ICX274 | IMX174 | IMX252 | IMX250 | IMX255 | IMX253 |
| **USB3** | BU030 / BU030C / BU030CF | BU031 | BU080 | BU130 / BU130C / BU130CF | | BU238M (NEW) / BU238MC (NEW) / BU238MCF (NEW) | BU302M / BU302MC / BU302MCF | BU505M / BU505MC / BU505MCF | DU806M / DU806MC / DU806MCF | DU1207M / DU1207MC / DU1207MCF |
| **GigE** | BG030 / BG030C / BG030CF | BG031 | BG080 | BG130 / BG130C / BG130CF | BG202 / BG202C / BG202CF | | | BG505M / BG505MC / BG505MCF | | |
| **CameraLink** | CSCLV90BC3 / CSCV90BC3 / CSCLV125BC3 / CSCLV125CC3 | | CSCX30BC3 | | | | DC302M / DC302MC / DC302MCF (ON-DEMAND) | DC505M / DC505MC / DC505MCF (ON-DEMAND) | DC806M / DC806MC / DC806MCF (ON-DEMAND) | DC1207M / DC1207MC / DC1207MCF (ON-DEMAND) |

*(CCD: 0.3M–2M columns; GS-CMOS: 2.3M–12M columns)*

| | 1.3M | 2M | 2M | 4M | 6.5M | 12M | 6M | 12M |
|---|---|---|---|---|---|---|---|---|
| | EV76C560 | EV76C570 | CMV2000 | CMV4000 | Original | Original | IMX178 | IMX226 |
| **USB3** | BU132M / BU132MC / BU132MCF (ON-DEMAND) | BU202M / BU202MC / BU202MCF (ON-DEMAND) | BU205M (NEW) / BU205MC / BU205MCF | BU406M / BU406MC / BU406MCF | DU657M (NEW) / DU657MC (NEW) | | BU602MC / BU602MCF | BU1203MC / BU1203MCF |
| **GigE** | | | BG205MCS (NEW) / BG205MCCS (NEW) / BG205MCFCS (NEW) | BG406M / BG406MC / BG406MCF | | | BG602MC / BG602MCF | BG1203MC / BG1203MCF |
| **CameraLink** | CSCS60BM18 / CSCS60CM18 | CSCU60BM18 / CSCU60CM18 | | | CSC6M100BMP11 (NEW) / CSC6M100CMP11 (NEW) | CSC12M25BMP19-01B / CSC12M25CMP19 | | |

*(GS-CMOS: 1.3M–12M columns; RS-CMOS: 6M, 12M columns)*

**Status**

- AVAILABLE
- UNDER DEVELOPMENT
- PLANNING
- B/W
- COLOR

GS : Global shutter
RS : Rolling shutter
C : Color
CF : Color( Including IR-cut filter)

＊These model names are tentative and not fix on development. This table will be changed without notice.

# Flexible Image Sensor

Various sensors, camera control, interfaces and intelligent image handling as customer solution.

Contributing to customer's value creation with various camera shape for any kind of demand.

**Flexible Sensor**
A variety of optical sizes, pixel counts, and readout methods

**Flexible Intelligence**
Built-in function to perform a variety of intelligent image processing

**Flexible Mechanic**
Compatible with a variety of shapes and camera heads

**Flexible Interface**
Compatible with a variety of interfaces; affinity with peripheral equipment

**Flexible Control**
A variety of controls and easy-to-understand GUI

# INDEX

## Visit our web site

www.toshiba-teli.co.jp/en/

### Compatibility with optional parts and EMC conditions

The customer is responsible for confirming final EMC compatibility for all systems and equipment when used with parts not specified by Toshiba Teli Corporation.

# For machine vision purpose

Wide product range of optimized high specification cameras for machine vision purpose.
TELI cameras support users to achieve tremendous improvement of productivity in various field.
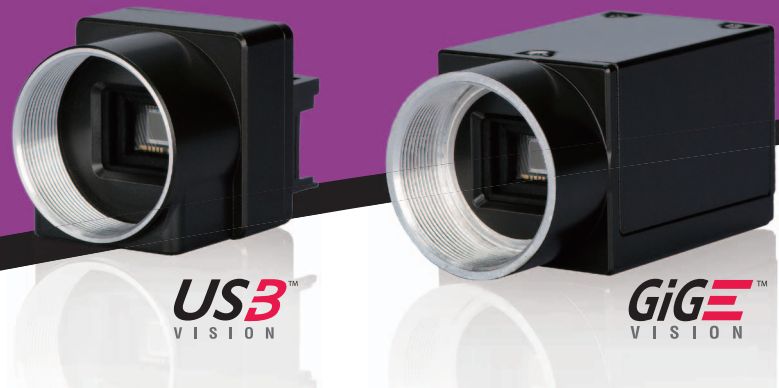
# For Machinevision

# Expanding application field

Needs of application field is expanding other than machine vision usage.
TELI cameras are also applied to microscope in medical field and
conference purpose.

For Other Application

# Imaging solution is supported

USB VISION

GiGE VISION

## TOSHIBA TELI CORPORATION

COGNEX

MVTec Software GmbH

NATIONAL INSTRUMENTS

MATROX IMAGING

EURESYS
Excellence in vision

ADLINK TECHNOLOGY INC.

TECHNO SCOPE

Teli's Camera

Software

Cable

Board

Newtech

NISSEI

OKI

Portwell
Together in Electric Dream!

AVAL DATA CORPORATION

MICRO-TECHNICA
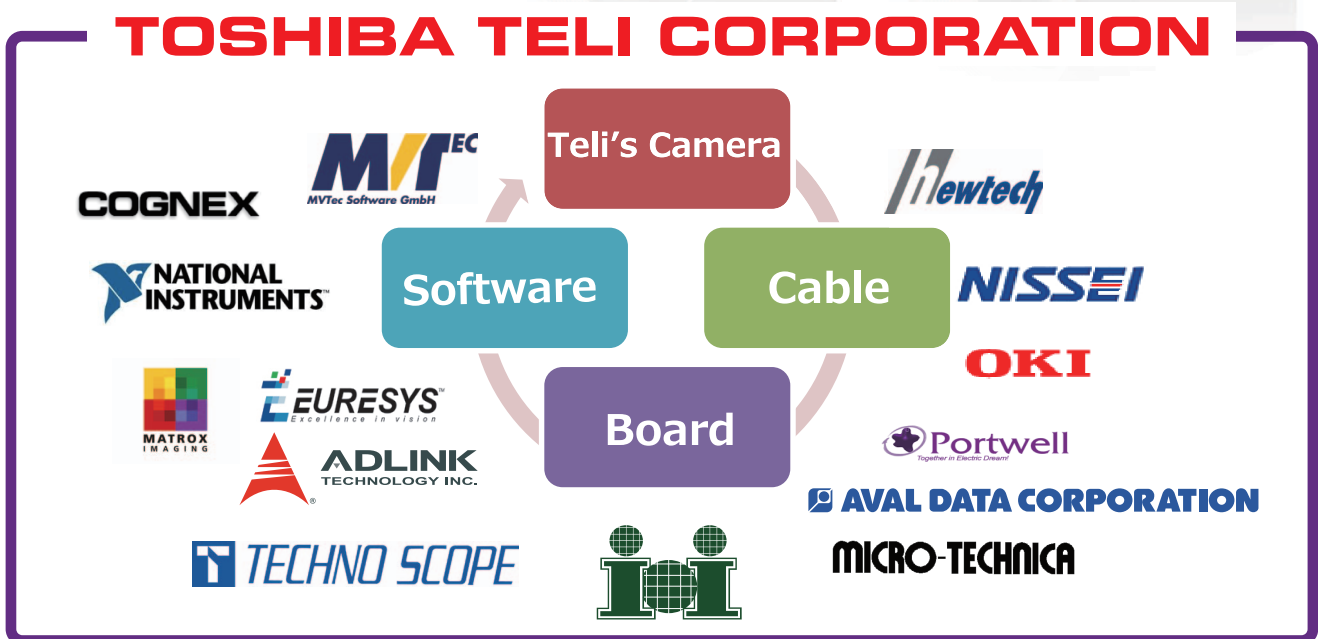
# The Solutions of Peripheral Equipment

Demand for higher quality digital image processing is growing recently as opportunity of handling visual images in digital mode is increasing.

The best system design of lens, grabber board, software is required to achieve high image quality.

Toshiba Teli has extremely high reputation by supporting industry in various fields with reliable technology brand of TELI.

TELI keeps offering customers the best solution with collaborated peripheral manufacturers.

# by TELI cameras

## Cables

Camera cable is one of the most important factors of imaging. Camera cannot achieve enough performance with unreliable cable.

Toshiba Teli sells and recommends optimized machine vision cables with lock which can connect to various interface.



## Boards

In case of CameraLink or CoaXPress, grabber board is required to capture to PC. Even in case of Gigabit Ethernet or USB3.0, grabber board is required for multi connection or long distance connection to get stable input signal.

TELI cameras are reliable as they are tested to connect to various grabber boards.



## Software

TeliCamSDK achieves the best performance of TELI cameras as it is software specifically developed for combination of TELI cameras.

As it is easy programmable software, users can save their cost and time of development tremendously.

Furthermore, TeliCamSDK is tested and confirmed its connection to various image process application library which users already have.

Various software are available to download in TELI website. Please try to use them.



# Solutions

USB3.0

GigE

CameraLink

CoaX

Smart Photo Sensor

DVI Camera

Analog Camera

Camera Data

Monitor

Accessories

Appendix

## Global Standard   USB3.0 Camera
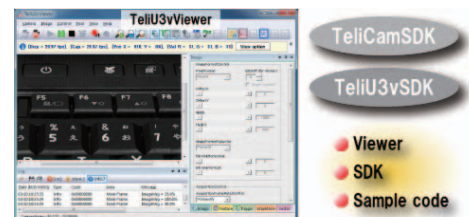
# BU Series / DU Series

Details are here.

**USB3 VISION**

BU Series

DU Series

| BU Series CCD model | 27g |
| 29mm × 29mm × 13mm | |

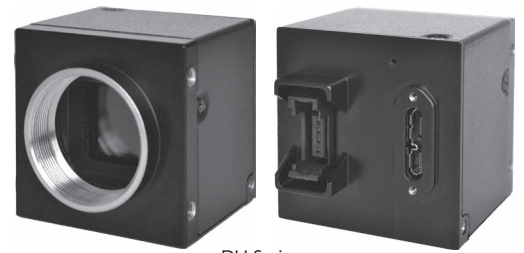| BU Series CMOS model | 32g |
| 29mm × 29mm × 16mm | |

| DU Series CMOS model | 85g |
| 40mm × 40mm × 35mm | |

## Outline

BU series and DU series have USB3.0 interface for image output and control.
Compact and light, suitable for set in equipment. 3 years warranty.
Wide product range from 0.3M to 12M.

## Features

### Easy operation

・Featuring newly developed TELI original IP core achieves super high speed correspondence.
・Body size in most compact class is suitable for setting in equipment.
・Power is supplied by USB cable.
・e-CON connector is equipped.
・TELI original software "TeliCamSDK" is available to free download as SDK.

### Various function

・"Event notifications" camera notified status information via event Packet.
・"BUS synchronization mode" synchronized exposure timing of multiple cameras completely.
・"Bulk trigger mode" outputs multiple images by one trigger input.[*1]
・"Sequential shutter mode" allows output several different setting image.[*2]
・"Image buffer" allows readout image data from host PC on demand.[*3]
・"Scalable mode and binning mode" higher speed image scan is available.[*4]
・"BERT function" measures correspondence quality of cables.[*5]
  *functions and modes of *1 to *5 above are different depend on model.

## Accessory information (options)

## Featuring TELI original newly developed IP core

・Acheived high integration with TELI.
・Super high speed corresponding technology tremendously reduced communication time.

**Pursuing Performance**
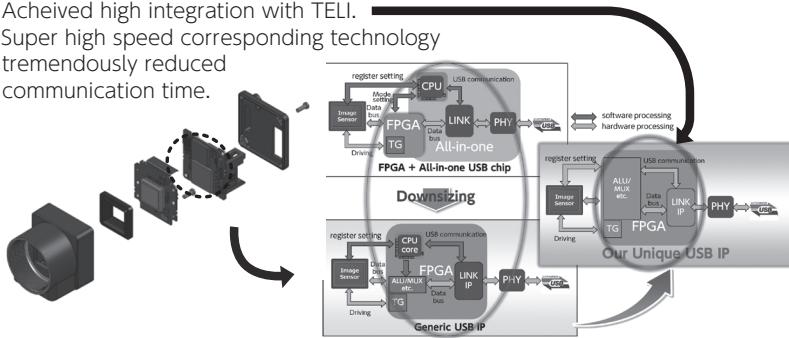
Access   response

| Command | TELI's unique USB IP | Generic USB IP | All in one USB chip |
|---|---|---|---|
| | | | 100 times faster |
| | | 10 times faster | |
| Read register | 2.2 − 5µs | 40.8 − 44.6µs | 223 − 546µs |
| Software trigger(write register) | 2.2 − 5.4µs | 46.9 − 71.0µs | 314 − 324µs |

## Dimensions

BU030, BU031, BU080, BU130, BU030C/CF, BU130C/CF
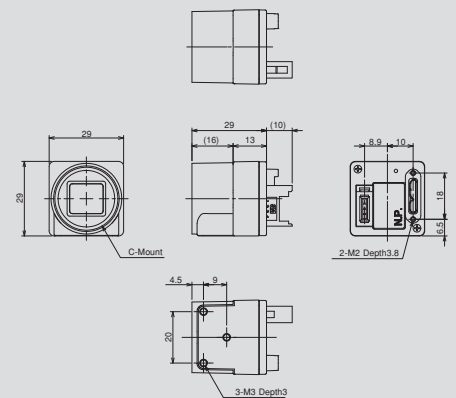
BU205M, BU238M, BU406M, BU238MC/MCF, BU406MC/MCF, BU1203MCF

DU657M, DU657MC

# Specifications

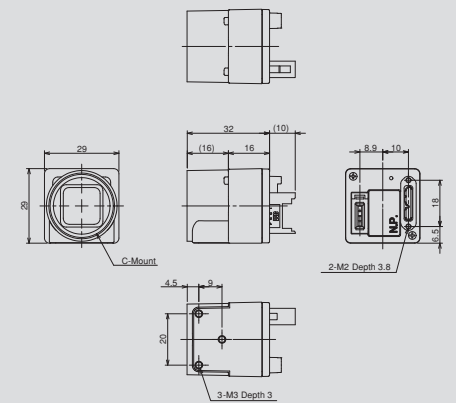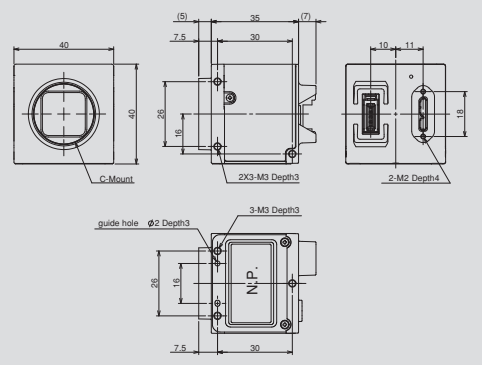| Item | BU030 | BU031 | BU080 | BU130 | BU205M | BU238M | BU406M | DU657M |
|---|---|---|---|---|---|---|---|---|
| B/W / COLOR | B/W | | | | | | | |
| Pixels | 0.3M | 0.3M | 0.8M | 1.3M | 2M | 2.3M | 4M | 6.5M |
| Interface | USB 3.0 (Only SuperSpeed is supported) | | | | | | | |
| Imager | 1/3 type CCD (ICX424AL) | 1/2 type CCD (ICX414AL) | 1/3 type CCD (ICX204AL) | 1/3 type CCD (ICX445AL) | 2/3 type GS-CMOS (CMV2000) | 1/1.2 type GS-CMOS (IMX174) | 1.0 type GS-CMOS (CMV4000) | 1.1 type GS-CMOS (TELI Original) |
| Resolution | 640 (H) × 480 (V) | 640 (H) × 480 (V) | 1,024(H)×768(V) | 1,280(H)×960(V) | 2,048(H)×1,088(V) | 1,936(H)×1,216(V) | 2,048(H)×2,048(V) | 2,560(H)×2,560(V) |
| Frame Rate | 125 fps | 125 fps | 40 fps | 30 fps | 170 fps | 165 fps | 90 fps | 55 fps |
| Pixel Size | 7.4(H)×7.4(V) μm | 9.9(H) × 9.9(V) μm | 4.65 (H) × 4.65 (V) μm | 3.75(H)×3.75(V) μm | 5.5(H)×5.5(V) μm | 5.86(H)×5.86(V) μm | 5.5(H)×5.5(V) μm | 5.0(H)×5.0(V) μm |
| Electronic Shutter | MANUAL：10 μs to 16 s, Random Trigger Shutter | MANUAL：10 μs to 16 s, Random Trigger Shutter | MANUAL：30 μs to 16 s, Random Trigger Shutter | MANUAL：30 μs to 16 s, Random Trigger Shutter | MANUAL：30 μs to 16 s, Random Trigger Shutter | MANUAL：30 μs to 16 s, Random Trigger Shutter | MANUAL：30 μs to 16 s, Random Trigger Shutter | MANUAL：10 μs to 200 ms, Random Trigger Shutter |
| Scan Method | Progressive | | | | | | | |
| Color Filter | — | | | | | | | |
| Standard Sensitivity | 1,700 lx, F5.6, 1/125 s | 1,700 lx, F5.6, 1/125 s | 1,700 lx, F5.6, 1/40 s | 1,300 lx, F8, 1/30 s | 3,800 lx, F8, 1/200 s | 3,300 lx, F8, 1/200 s | 3,500 lx, F11, 1/90 s | 900 lx, F5.6, 1/60 s |
| Minimum Sensitivity | 7 lx, F1.4 (Gain +18 dB, Video level 50%) | 7 lx, F1.4 (Gain +18 dB, Video level 50%) | 7 lx, F1.4 (Gain +18 dB, Video level 50%) | 3 lx, F1.4 (Gain +18 dB, Video level 50%) | 8 lx, F1.4 (Gain ×8, Video level 50%) | 7 lx, F1.4 (Gain ×8, Video level 50%) | 4 lx, F1.4 (Gain ×8, Video level 50%) | 16 lx, F2.8 (Gain ×8, Video level 50%) |
| Gamma | $\gamma$=1.0 to 0.45 (factory setting : OFF $\gamma$=1.0) | | | | | | | |
| Gain | MANUAL 0 to +18 dB (factory setting: 0 dB) | MANUAL 0 to +18 dB (factory setting: 0 dB) | MANUAL 0 to +18 dB (factory setting: 0 dB) | MANUAL 0 to +18 dB (factory setting: 0 dB) | MANUAL (Digital gain) ×1 to ×8 (factory setting: ×1) | MANUAL -6 to +18 dB (factory setting: 0 dB) | MANUAL (Digital gain) ×1 to ×8 (factory setting: ×1) | MANUAL (Digital gain) ×1 to ×8 (factory setting: ×1) |
| White Balance | — | | | | | | | |
| Sync System | Internal synchronization | | | | | | | |
| Image Output Format | Mono 8 bit, Mono 10 bit / All pixel readout / Scalable mode / Binning mode | Mono 8 bit, Mono 10 bit / All pixel readout / Scalable mode / Binning mode | Mono 8 bit, Mono 10 bit / All pixel readout / Scalable mode / Binning mode | Mono 8 bit, Mono 10 bit / All pixel readout / Scalable mode / Binning mode | Mono 8 bit / All pixel readout / Scalable mode / Decimation mode / Reverse (H/V) | Mono 8 bit / All pixel readout / Scalable mode / Reverse (H/V) | Mono 8 bit / All pixel readout / Scalable mode / Decimation mode / Reverse (H/V) | Mono 8 bit / All pixel readout / Scalable mode / Binning mode / Reverse (H/V) |
| Power Supply | DC+5 V ± 5% (from USB connector) | | | | | | | |
| Power Consumption | 2.6 W Max | 2.6 W Max | 2.6 W Max | 2.6 W Max | 2.7 W Max | 2.9 W Max | 2.7 W Max | 3.6 W Max |
| Lens Mount | C - Mount | | | | | | | |
| Dimensions | 29 (W) × 29 (H) × 13 (D) mm (Not including protrusion) | 29 (W) × 29 (H) × 13 (D) mm (Not including protrusion) | 29 (W) × 29 (H) × 13 (D) mm (Not including protrusion) | 29 (W) × 29 (H) × 13 (D) mm (Not including protrusion) | 29 (W) × 29 (H) × 16 (D) mm (Not including protrusion) | 29 (W) × 29 (H) × 16 (D) mm (Not including protrusion) | 29 (W) × 29 (H) × 16 (D) mm (Not including protrusion) | 40 (W) × 40 (H) × 35 (D) mm (Not including protrusion) |
| Weight | Approx. 27 g | Approx. 27 g | Approx. 27 g | Approx. 27 g | Approx. 32 g | Approx. 32 g | Approx. 32 g | Approx. 85 g |
| Operation Assurance | Temperature：0℃ to 40℃ (Camera housing temperature：less than 50℃) Humidity：10% to 90% (no condensation) | | | | | | | Temperature：-5℃ to 45℃ Humidity：10% to 90% (no condensation) |
| Conformity | CE, FCC, RoHS, USB3 Vision, GenICam, IIDC2, WEEE | | | | | | | |

| Item | BU030C/CF | BU130C/CF | BU238MC/MCF | BU406MC/MCF | DU657MC | BU1203MCF |
|---|---|---|---|---|---|---|
| B/W / COLOR | COLOR | | | | | |
| Pixels | 0.3M | 1.3M | 2.3M | 4M | 6.5M | 12M |
| Interface | USB 3.0 (Only SuperSpeed is supported) | | | | | |
| Imager | 1/3 type CCD (ICX424AQ) | 1/3 type CCD (ICX445AQ) | 1/1.2 type GS-CMOS (IMX174) | 1.0 type GS-CMOS (CMV4000) | 1.1 type GS-CMOS (TELI Original) | 1/1.7 type RS-CMOS (IMX226CQJ) |
| Resolution | 640 (H) × 480 (V) | 1,280 (H) × 960 (V) | 1,936 (H) × 1,216 (V) | 2,048 (H) × 2,048 (V) | 2,560 (H) × 2,560 (V) | 4,000 (H) × 3,000 (V) |
| Frame Rate | 125 fps | 30 fps | 165 fps | 90 fps | 55 fps | 30 fps |
| Pixel Size | 7.4(H) × 7.4(V) μm | 3.75(H) × 3.75(V) μm | 5.86(H) × 5.86(V) μm | 5.5(H) × 5.5(V) μm | 5.0(H) × 5.0(V) μm | 1.85(H) × 1.85(V) μm |
| Electronic Shutter | MANUAL：10 μs to 16 s, Random Trigger Shutter | MANUAL：30 μs to 16 s, Random Trigger Shutter | MANUAL：30 μs to 16 s, Random Trigger Shutter | MANUAL：30 μs to 16 s, Random Trigger Shutter | MANUAL：10 μs to 200 ms, Random Trigger Shutter | TBD |
| Scan Method | Progressive | | | | | |
| Color Filter | RGB primary color mosaic-on-tip color filter | | | | | |
| Standard Sensitivity | 3,500 lx, F5.6, 1/125 s (with IR-cut filter) | 1,250 lx, F5.6, 1/30 s (with IR-cut filter) | 4,100 lx, F8, 1/200 s (with IR-cut filter) | 4,800 lx, F8, 1/90 s (with IR-cut filter) | 2,200 lx, F5.6, 1/60 s | TBD |
| Minimum Sensitivity | 14 lx, F1.4 (Gain +18 dB, Video level 50%) | 5 lx, F1.4 (Gain +18 dB, Video level 50%) | 9 lx, F1.4 (Gain +18 dB, Video level 50%) (with IR-cut filter) | 10 lx, F1.4 (Gain ×8, Video level 50%) | 40 lx, F2.8 (Gain ×8, Video level 50%) | TBD |
| Gamma | $\gamma$=1.0 to 0.45 (factory setting: OFF $\gamma$=1.0) | | | | | |
| Gain | MANUAL 0 to +18 dB (factory setting: 0 dB) | MANUAL 0 to +18 dB (factory setting: 0 dB) | MANUAL -6 to +18 dB (factory setting: 0 dB) | MANUAL (Digital gain) ×1 to ×8 (factory setting: ×1) | MANUAL (Digital gain) ×1 to ×8 (factory setting: ×1) | MANUAL 0 to +18 dB (factory setting: 0 dB) |
| White Balance | MWB, OPWB | | | | | |
| Sync System | Internal synchronization | | | | | |
| Image Output Format | YUV4:1:1 12 bit, YUV4:2:2 16 bit, RGB 24 bit Bayer 8bit, Bayer 10bit, Mono 8bit / All pixel readout / Scalable mode | YUV4:1:1 12 bit, YUV4:2:2 16 bit, RGB 24 bit Bayer 8bit, Bayer 10bit, Mono 8bit / All pixel readout / Scalable mode | Bayer 8 bit / All pixel readout / Scalable mode / Reverse (H/V) | Bayer 8 bit / All pixel readout / Scalable mode / Decimation mode / Reverse (H/V) | Bayer 8 bit / All pixel readout / Scalable mode / Binning mode / Reverse (H/V) | TBD |
| Power Supply | DC+5 V ± 5% (from USB connector) | | | | | |
| Power Consumption | 2.7 W Max | 2.7 W Max | 2.9 W Max | 2.7 W Max | 3.6 W Max | TBD |
| Lens Mount | C - Mount | | | | | |
| Dimensions | 29 (W) × 29 (H) × 13 (D) mm (Not including protrusion) | 29 (W) × 29 (H) × 13 (D) mm (Not including protrusion) | 29 (W) × 29 (H) × 16 (D) mm (Not including protrusion) | 29 (W) × 29 (H) × 16 (D) mm (Not including protrusion) | 40 (W) × 40 (H) × 35 (D) mm (Not including protrusion) | 29 (W) × 29 (H) × 16 (D) mm (Not including protrusion) |
| Weight | Approx. 27 g | Approx. 27 g | Approx. 32 g | Approx. 32 g | Approx. 85 g | Approx. 32 g |
| Operation Assurance | Temperature: 0℃ to 40℃ (Camera housing temperature: less than 50℃) Humidity: 10% to 90% (no condensation) | | | | Temperature: -5℃ to 45℃ Humidity: 10% to 90% (no condensation) | Temperature: 0℃ to 40℃ (Camera housing temperature: less than 50℃) Humidity: 10% to 90% (no condensation) |
| Conformity | CE, FCC, RoHS, USB3 Vision, GenICam, IIDC2, WEEE | | | | | |

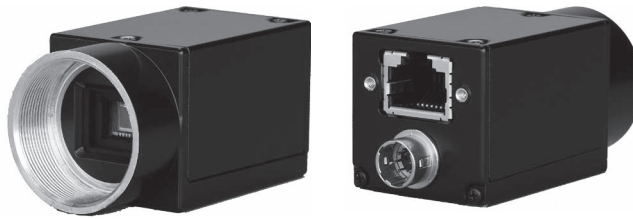\* Please refer include IR cut filter, for BXXXXCF, and exclude IR cut filter for BXXXXXC.
\* GS-CMOS : Global Shutter type CMOS image sensor.
 RS-CMOS : Rolling Shutter type CMOS image sensor.

USB3.0

GigE

CameraLink

CoaX

Smart Photo Sensor

DVI Camera

Analog Camera

Camera Data

Monitor

Accessories

Appendix

## Global Standard　GigE Camera

# BG Series

Details are here.

GiGE™
VISION

29mm × 29mm × 40mm　53g

### Outline

BG series has Gigabit Ethernet interface for image output and camera control.
Compact and light, suitable for set in equipment. 3 years warranty.
Wide product range from 0.3M to 2M.

### Features

**Easy operation**

- "Gigabit Ethernet interface" makes PC connection easier.
- Power supply complies with Power over Ethernet (PoE) based on IEEE802.3af.
- Body size in most compact class is suitable for setting in equipment.
- LAN cable is adopted for flexible connection to equipment which needs long cable.
- TELI original software "TeliCamSDK" is available to free download as SDK.

**Various function**

- BG205M-CS, MC-CS, MCF-CS has CS mount. Sensible in infra-red range.
- "Scalable mode" achieve higher speed image output.[*1]

*functions and modes of *1 above are different depend on model.
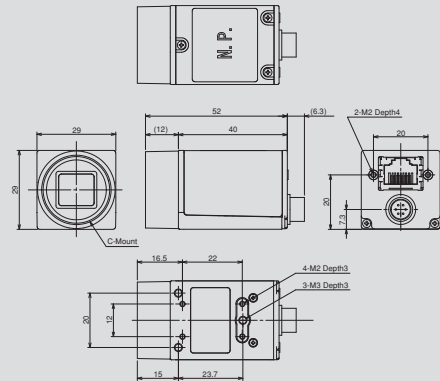
### BG205M-CS, MC-CS, MCF-CS (with CMOSIS sensor)

- High sensitivity (1,200 lx F11 1/50 s) surpassing CCD.
- Clear image with FPN correction.
- Suitable for ITS purpose with CS mount.

### Dimensions

BG030, BG031, BG080, BG130, BG202, BG205M-CS,
BG030C/CF, BG130C/CF, BG202C/CF, BG205MC-CS/MCF-CS

*BG205M-CS, BG205MC-CS, BG205MCF-CS are D = 47mm.

### Accessory information (options)

LAN cable (Category 5e or more)
C-Mount lens ························· ▶P32 ～ 34
C/CS mount converting ring ········ ▶P35
Tripod attachment ··················· ▶P30
　　　　　・Spectral response ······· ▶P23, 24
　　　　　・Pin assignment ·········· ▶P25
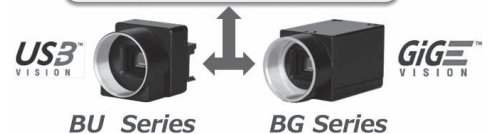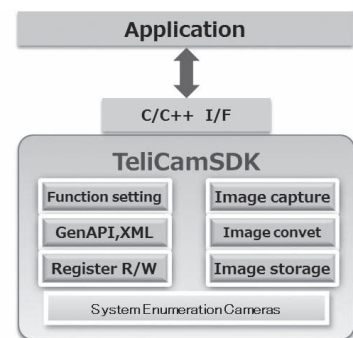
## SDK　BU/DU Series, BG Series

# TeliCamSDK

### Features

- Adopting various interface.
- Easy programming with various functions.
- Code volume is vastly reduced to be less than one third.
- Easier image capturing.
- Complying with GenICam.
- With plenty sample code.
- Easy understanding API manual.
- Integrated SDK both USB3.0 and GigE.

**Applied Gen TL[*], .NET, C++**　*USB3.0 only

**Makes development term shorter**

Application

C/C++ I/F

**TeliCamSDK**

| Function setting | Image capture |
| GenAPI,XML | Image convet |
| Register R/W | Image storage |

System Enumeration Cameras

USB VISION

**BU Series**　　**BG Series**

GiGE™ VISION

9

## Specifications

| B/W ／ COLOR | B/W | | | | | |
|---|---|---|---|---|---|---|
| Pixels | 0.3M | | 0.8M | 1.3M | 2M | |
| Item　Model Name | BG030 | BG031 | BG080 | BG130 | BG202 | BG205M-CS |
| Interface | Gigabit Ethernet IEEE802.3ab (1000BASE-T) compatible | | | | | |
| Imager | 1/3 type CCD (ICX424AL) | 1/2 type CCD (ICX414AL) | 1/3 type CCD (ICX204AL) | 1/3 type CCD (ICX445AL) | 1/1.8 type CCD (ICX274AL) | 2/3 type GS-CMOS (CMV2000) |
| Resolution | 640 (H) × 480 (V) | | 1,024 (H) × 768 (V) | 1,280 (H) × 960 (V) | 1,600 (H) × 1,200 (V) | 2,048 (H) × 1,088 (V) |
| Frame Rate | 125 fps | | 40 fps | 30 fps | 20 fps | 50 fps |
| Pixel Size | 7.4(H) × 7.4(V) $\mu$m | 9.9(H) × 9.9(V) $\mu$m | 4.65(H) × 4.65(V) $\mu$m | 3.75(H) × 3.75(V) $\mu$m | 4.40(H) × 4.40(V) $\mu$m | 5.5(H) × 5.5(V) $\mu$m |
| Electronic Shutter | MANU : 10 $\mu$s to 16 s, AE Random Trigger Shutter | | MANU : 30 $\mu$s to 16 s, AE Random Trigger Shutter | | | MANU : 10 $\mu$s to 1 s, AE Random Trigger Shutter |
| Scan Method | Progressive | | | | | |
| Color Filter | — | | | | | |
| Standard Sensitivity | 1,700 lx, F5.6, 1/125 s | | 1,700 lx, F5.6, 1/40 s | 1,300 lx, F8, 1/30 s | 525 lx, F8, 1/20 s | 1,200 lx, F11, 1/50 s |
| Minimum Sensitivity | 7 lx, F1.4 (Gain +18 dB, Video level 50%) | | | 3 lx, F1.4 (Gain +18 dB, Video level 50%) | 2 lx, F1.4 (Gain +18 dB, Video level 50%) | |
| Gamma | $\gamma$=1.0 to 0.45 (factory setting : OFF $\gamma$=1.0) | | | | | |
| Gain | MANUAL 0 to +18 dB (factory setting : 0 dB), AGC | | | | | |
| White Balance | — | | | | | |
| Sync System | Internal synchronization | | | | | |
| Image Output Format | Mono 8 bit, Mono 10 bit All pixel readout / Scalable mode / Binning mode | | | | | Mono 8 bit All pixel readout / Scalable mode / Decimation mode / Reverse (H/V) |
| Power Supply | PoE (Power over Ethernet) DC12 V ± 10% | | | | | |
| Power Consumption | 3.4 W Max (PoE) 2.9 W Max (DC12 V) | | | | 3.6 W Max (PoE) 3.2 W Max (DC12 V) | 3.1 W Max (PoE) 2.6 W Max (DC12 V) |
| Lens Mount | C - Mount | | | | | CS - Mount |
| Dimensions | 29 (W) × 29 (H) × 40 (D) mm  (Not including protrusion) | | | | | |
| Weight | Approx. 53 g | | | | | Approx. 50 g |
| Operation Assurance | Temperature : 0℃ to 40℃ (Camera housing temperature : less than 50℃ ) Humidity : 10% to 90% (no condensation) | | | | | |
| Conformity | CE, FCC, RoHS, GigE Vision, GenICam, PoE, WEEE | | | | | |

| B/W ／ COLOR | COLOR | | | |
|---|---|---|---|---|
| Pixels | 0.3M | 1.3M | 2M | |
| Item　Model Name | BG030C/CF | BG130C/CF | BG202C/CF | BG205MC-CS/MCF-CS |
| Interface | Gigabit Ethernet IEEE802.3ab (1000BASE-T) compatible | | | |
| Imager | 1/3 type CCD (ICX424AQ) | 1/3 type CCD (ICX445AQ) | 1/1.8 type CCD (ICX274AQ) | 2/3 type GS-CMOS (CMV2000) |
| Resolution | 640 (H) × 480 (V) | 1,280 (H) × 960 (V) | 1,600 (H) × 1,200 (V) | 2,048 (H) × 1,088 (V) |
| Frame Rate | 125 fps | 30 fps | 20 fps | 50 fps |
| Pixel Size | 7.4(H) × 7.4(V) $\mu$m | 3.75(H) × 3.75(V) $\mu$m | 4.40(H) × 4.40(V) $\mu$m | 5.5(H) × 5.5(V) $\mu$m |
| Electronic Shutter | MANU : 10 $\mu$s to 16 s, AE Random Trigger Shutter | MANU : 30 $\mu$s to 16 s, AE Random Trigger Shutter | | MANU : 10 $\mu$s to 1 s, AE Random Trigger Shutter |
| Scan Method | Progressive | | | |
| Color Filter | RGB primary color mosaic-on-tip color filter | | | |
| Standard Sensitivity | 3,500 lx, F5.6, 1/125 s (with IR-cut filter) | 1,250 lx, F5.6, 1/30 s (with IR-cut filter) | 725 lx, F5.6, 1/20 s (with IR-cut filter) | BU205MC-CS : 2,300 lx, F11, 1/50 s BU205MCF-CS : 2,900 lx, F11, 1/50 s |
| Minimum Sensitivity | 14 lx, F1.4 (Gain +18 dB, Video level 50%) | 5 lx, F1.4 (Gain +18 dB, Video level 50%) | 3 lx, F1.4 (Gain +18 dB, Video level 50%) | BU205MC-CS : 3 lx, F1.4 (Gain +18 dB, Video level 50%) BU205MCF-CS : 4 lx, F1.4 (Gain +18 dB, Video level 50%) |
| Gamma | $\gamma$=1.0 to 0.45 (factory setting : OFF $\gamma$=1.0) | | | |
| Gain | MANUAL 0 to +18 dB (factory setting : 0 dB), AGC | | | |
| White Balance | MWB, OPWB | | | |
| Sync System | Internal synchronization | | | |
| Image Output Format | RGB 24 bit, YUV422 16 bit, YUV411 12 bit BayerRG10 10 bit, BayerRG8 8 bit All pixel readout / Scalable mode / Binning mode (BG202C/CF only : Decimation mode) | | | BayerGR8 8 bit, BayerRG8 8 bit BayerBG8 8 bit, BayerGB8 8 bit All pixel readout / Scalable mode / Decimation mode / Reverse (H/V) |
| Power Supply | PoE (Power over Ethernet) DC12 V ± 10% | | | |
| Power Consumption | 3.8 W Max (PoE) 3.2 W Max (DC12 V) | 3.1 W Max (PoE) 2.6 W Max (DC12 V) | 4.0 W Max (PoE) 3.4 W Max (DC12 V) | 3.1 W Max (PoE) 2.6 W Max (DC12 V) |
| Lens Mount | C - Mount | | | CS - Mount |
| Dimensions | 29 (W) × 29 (H) × 40 (D) mm  (Not including protrusion) | | | |
| Weight | Approx. 53 g | | | Approx. 51 g |
| Operation Assurance | Temperature : 0℃ to 40℃ (Camera housing temperature : less than 50℃ ) Humidity : 10% to 90% (no condensation) | | | |
| Conformity | CE, FCC, RoHS, GigE Vision, GenICam, PoE, WEEE | | | |

* Please refer include IR cut filter, for BXXXXCF, and exclude IR cut filter for BXXXXXC.
* GS-CMOS : Global Shutter type CMOS image sensor.

High reliability　CameraLink Camera　　　　　　　　0.3M /0.8M /1.4M

# CSCLV90BC3
# CSCV90BC3/CSCV125BC3/CSCV125CC3
# CSCX30BC3/CSCS60BM18/CSCS20BC2

Details are here.

CSCS60BM18　　　　　　　CSCLV90BC3　　　　　　　CSCV90BC3

## Outline

Cameras with CameraLink interface.
Suitable for setting in equipment with compact size of 20mm cubic or 29mm cubic, and also light weight for 0.3M to 1.4M.
Wide product range for frame rate of 0.3M 4 times speed 125 fps, 1.3M 60fps etc.

## Features

**Easy operation**

・Powered by frame grabber board complying PoCL.
・Capturing image with no deterioration in horizontal resolution by scanning all pixels.
・Selectable connecting direction of cable for CSCLV90BC3.
・High accuracy of optical axes is guaranteed for CSCS60BM18.

**Various function**

・Higher speed image capturing is achieved by partial scanning function.
・CSCS60BM18 has finer image processing functions.
　−Sequential shutter mode allows setting different condition of imaging and output.
　−Inverse function (horizontal / vertical)

## Dimensions
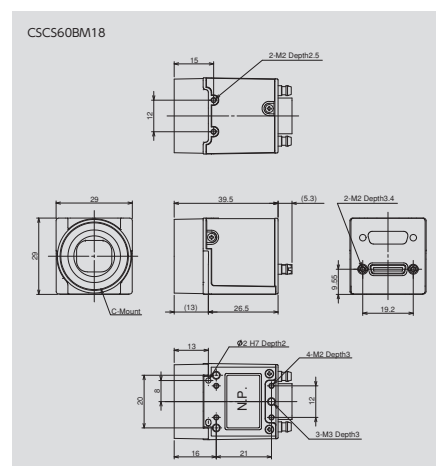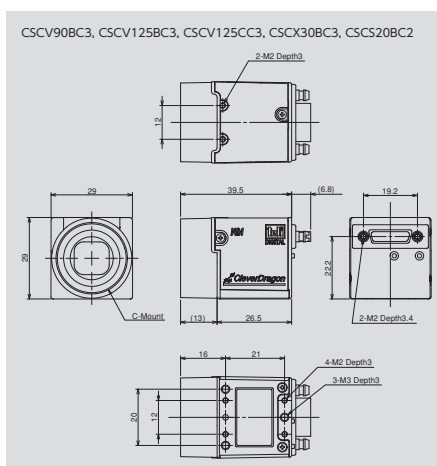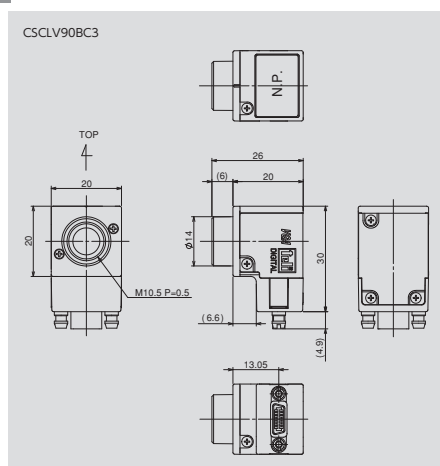
CSCLV90BC3

CSCV90BC3, CSCV125BC3, CSCV125CC3, CSCX30BC3, CSCS20BC2

CSCS60BM18

# CSCU15BC18/CSCU30BC18/CSCU30CC18
# CSCQS15BC23/CSCQS15CC23

Details are here.

**PoCL**

CSCU30BC18　　　　　CSCU15BC18　　　　　CSCQS15BC23

## Outline
With CameraLink interface.
Both of 2M and 5M have CCD. Choice of 2M 1/1.8 type 15 /30 fps and 5M 2/3 type 15 fps.
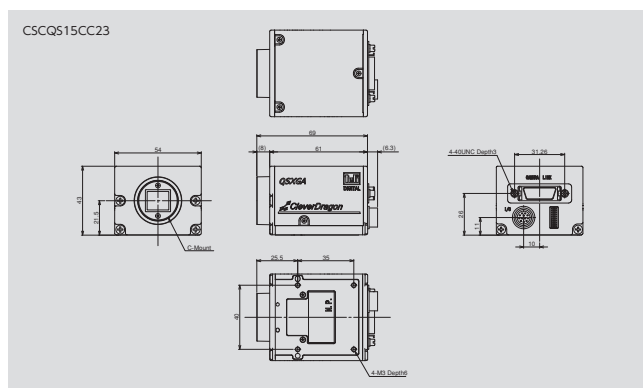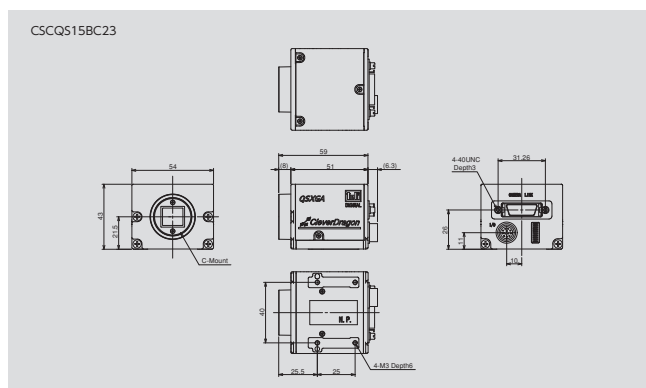
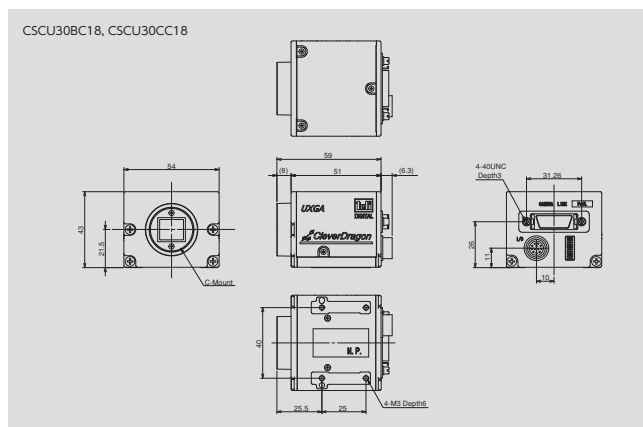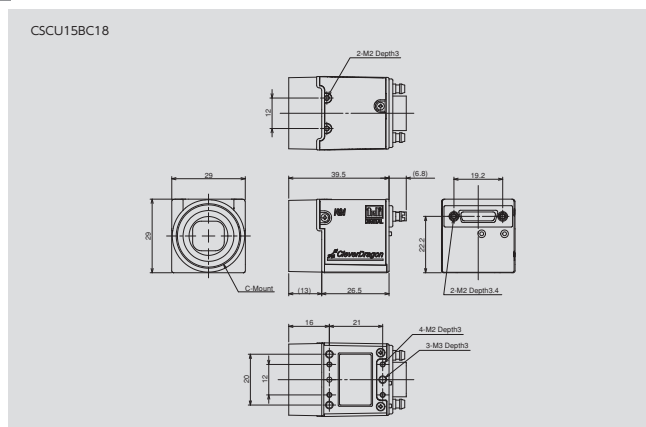## Features

**Easy operation**
・Powered by frame grabber board based on PoCL (CSCU15BC18/CSCU30CC18)

**Various function**
・Higher speed image scanning with partial scanning function.
・CSCS60BM18 has smoother image processing function.
  −By high speed draft scanning mode, CSCU15BC18 scans 4 lines among 16 lines, and CSCU30BC/CSCU30CC18 scans 2 lines among 8 lines.
・CSCU30BC18/CSCU30CC18/CSCQS15BC23/CSCQS15CC23
  −With multiple shutter function, image can be scan at any time and stocked image can be output at any time by trigger signal from outside.

## Dimensions

CSCU15BC18



CSCU30BC18, CSCU30CC18



CSCQS15BC23



CSCQS15CC23



USB3.0 | GigE | CameraLink | CoaX | Smart Photo Sensor | DVI Camera | Analog Camera | Camera Data | Monitor | Accessories | Appendix

12

USB3.0

GigE

CameraLink

CoaX

Smart Photo Sensor

DVI Camera

Analog Camera

Camera Data

Monitor

Accessories

Appendix

# CSC6M100BMP11/CSC6M100CMP11
# CSC12M25BMP19-01B/CSC12M25CMP19

Details are here.

CSC6M100BMP11 / CSC6M100CMP11

CSC12M25BMP19-01B / CSC12M25CMP19

## Outline

With CameraLink interface.
Both of 6.5M(1.1 type 6.55M pixel 99 fps) and 12M(1.9 type 12.58M pixel 25 fps) are suitable for high speed image processing with CMOS sensor originally developed by TELI. 3 years warranty.
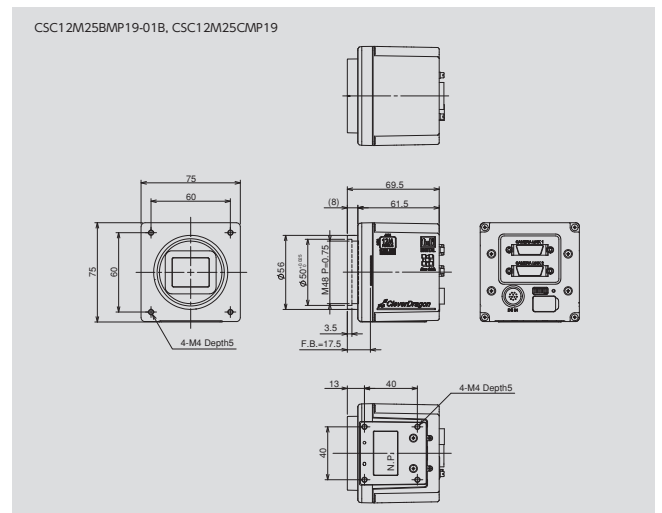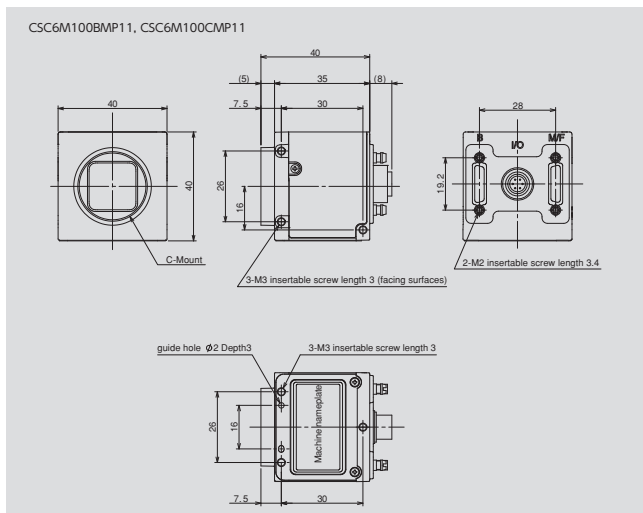Smoother image processing is achieved by TELI original functions.

## Features

**Easy operation**

· Clear image with less camera shake as CCD is achieved by global electronic shutter.
· Both of 6.5M and 12M achieve accurate optical axes.

**Various function**

· Functions for efficient image processing
 − Any partial area in vertical or horizontal can be scanned with WOI function.
 − 2 (H) x 2 (V) or 4 (H) x 4 (V) can be scan as 1 pixel without changing viewing direction by binning function.
 − Higher speed scanning can be achieved by using WOI functions and binning function at the same time.
· CSC6M100BMP11 / CSC6M100CMP11
 − Inverse pixel (horizontal / vertical) function
· CSC12M25BMP19-01B / CSC12M25CMP19
 − Optimum lens can be selectable to 1.9 type 12.58M pixel image sensor by TFL-II Mount.

## Dimensions

CSC6M100BMP11, CSC6M100CMP11

CSC12M25BMP19-01B, CSC12M25CMP19

# High reliability　CameraLink Camera

## ■ Specifications

| B/W ／ COLOR | B/W | | | | | |
|---|---|---|---|---|---|---|
| Pixels | 0.3M | | | 0.8M | 1.3M | 1.4M |
| Item　Model Name | CSCLV90BC3 | CSCV90BC3 | CSCV125BC3 | CSCX30BC3 | CSCS60BM18 | CSCS20BC2 |
| Interface | CameraLink (PoCL-Lite) | | CameraLink (PoCL) | | | |
| Imager | 1/3 type CCD (ICX424AL) | | | 1/3 type CCD (ICX204AL) | 1/1.8 type GS-CMOS (EV76C560ABT) | 1/2 type CCD (ICX267AL) |
| Resolution | 648(H) × 494(V) | | | 1,024(H) × 768(V) | 1,280(H) × 1,024(V) | 1,360(H) × 1,024(V) |
| Frame Rate | 90 fps | 92.4 fps | 126.2 fps | 22.99 fps | 61 fps | 19.5 fps |
| Pixel Size | 7.4(H) × 7.4(V) μm | | | 4.65(H) × 4.65(V) μm | 5.3(H) × 5.3(V) μm | 4.65(H) × 4.65(V) μm |
| Electronic Shutter | 1/20,000 to 8 s, Random Trigger Shutter | | 1/100,000 to 8 s, Random Trigger Shutter | 1/20,000 to 8 s, Random Trigger Shutter | 1/100,000 to 1 s, Random Trigger Shutter | 1/20,000 to 2 s, Random Trigger Shutter |
| Scan Method | Progressive | | | | | |
| Scanning Frequency | Horizontal: 46.2 kHz Vertical: 92.6 Hz (Maximum Speed with Normal Shutter) Pixel Clock Frequency: 36 MHz (1CLK) ± 100 ppm | Horizontal: 46.153 kHz Vertical: 92.4 Hz (Maximum Speed with Normal Shutter) Pixel Clock Frequency: 36.000 MHz (1CLK) ± 100 ppm | Horizontal: 62.937 kHz Vertical: 126.26 Hz (Maximum Speed with Normal Shutter) Pixel Clock Frequency: 49.090902 MHz (1CLK) ± 100 ppm | Horizontal: 23.22 kHz Vertical: 29.99 Hz (Maximum Speed with Normal Shutter) Pixel Clock Frequency: 29.50 MHz (1CLK) ± 100 ppm | Horizontal: 63.776 kHz Vertical: 61.25 Hz (Maximum Speed with Normal Shutter) Pixel Clock Frequency: 50 MHz (1CLK) | Horizontal: 20.11 kHz Vertical: 19.49 Hz (Maximum Speed with Normal Shutter) Pixel Clock Frequency: 36.00 MHz (1CLK) ± 100 ppm |
| Color Filter | — | | | | | |
| Standard Sensitivity | 600 lx, F5.6 (FIX Gain) | | 850 lx, F5.6 (FIX Gain) | 400 lx, F5.6 | 500 lx, F5.6 | |
| Minimum Sensitivity | 6 lx, F1.4 (Gain 10 dB, Video Level 50%) | | 8 lx, F1.4 (Gain 10 dB, Video Level 50%) | 4 lx, F1.4 (Gain 10 dB, Video Level 50%) | 2.6 lx, F1.4 (Gain MAX, Video Level 50%) | 5 lx, F1.4 (Gain 10 dB, Video Level 50%) |
| Gamma | γ=1.0 | | | | | |
| Gain | MANUAL 0 to approx. +12 dB (1 step = Approx. 0.132 dB) | | MANUAL -6 to approx. +18 dB (1 step = Approx. 0.1 dB) | MANUAL 0 to approx. +12 dB (1 step = Approx. 0.132 dB) | MANUAL Analog: x1 / x1.5 / x2 / x3 Digital: 0 to approx. +6 dB (1 step = Approx. 0.1 dB) | MANUAL 0 to approx. +12 dB (1 step = Approx. 0.132 dB) |
| White Balance | — | | | | | |
| Sync System | Internal synchronization | | | | | |
| Image Output Format | Data: 10 / 8 bit Switching All pixel readout: 648 (H) × 494 (V) [Approx. 90 fps] Partial Scan: 648 (H) × 120 to 494 (V) [Approx. 95 to 290 fps] minimum lines: 120, minimum step: 1 line | Data: 10 / 8 bit Switching All pixel readout: 648 (H) × 494 (V) [Approx. 92.4 fps] Partial Scan: 648 (H) × 120 to 480 (V) [Approx. 94.8 to 293.9 fps] minimum lines: 120, minimum step: 1 line | Data: 10 / 8 bit Switching All pixel readout: 648(H) × 494(V) [Approx. 126.2 fps] Partial Scan: 648(H) × 120 to 480(V) [Approx. 129.5 to 395.8 fps] minimum lines: 120, minimum step: 1 line | Data: 10 / 8 bit Switching All pixel readout: 1,024 (H) × 768 (V) [Approx. 29.99 fps] Partial Scan: 1,024 (H) × 192 to 384 (V) [Approx. 52.75 to 85.14 fps] minimum lines: 192, minimum step: 1 line | All pixel readout: 1,280 (H) × 1,024 (V) [Approx. 61 fps] Scalable: minimum area 64(H) × 64(V) | Data: 10 / 8 bit Switching All pixel readout: 1,360(H) × 1,024(V) [Approx. 19.5 fps] Partial Scan: 1,360(H) × 512 to 768(V) [Approx. 25.0 to 34.8 fps] minimum lines: 512, minimum step: 1 line |
| Power Supply | DC12 V ± 10% | | | | | |
| Power Consumption | Approx. 1.4 W | Approx. 1.6 W | Approx. 1.8 W | Approx. 1.3 W | Approx. 0.96 W | Approx. 1.8 W |
| Lens Mount | M10.5 P0.5 (female) | C - Mount | | | | |
| Dimensions | 20 (W) × 20 (H) × 20 (D) mm (Not including protrusion) | 29 (W) × 29 (H) × 26.5 (D) mm (Not including protrusion) | | | | |
| Weight | Approx. 18 g | Approx. 45 g | Approx. 40 g | Approx. 45 g | Approx. 33 g | Approx. 40 g |
| Operation Assurance | Temperature: -5℃ to 45℃　Humidity: 10% to 90% (no condensation) | | | | | |
| Conformity | CE, FCC, RoHS, WEEE | | | | | |

| B/W ／ COLOR | B/W | | | | |
|---|---|---|---|---|---|
| Pixels | 2M | | 5M | 6.5M | 12M |
| Item　Model Name | CSCU15BC18 | CSCU30BC18 | CSCQS15BC23 | CSC6M100BMP11 | CSC12M25BMP19-01B |
| Interface | CameraLink (PoCL) | | CameraLink (PoCL / Non PoCL) | CameraLink (PoCL) | CameraLink (Non PoCL) |
| Imager | 1/1.8 type CCD (ICX274AL) | | 2/3 typeCCD (ICX625AL) | 1.1 type GS-CMOS (TELI Original) | 1.9 type GS-CMOS (TELI Original) |
| Resolution | 1,616(H) × 1,200(V) | 1,628(H) × 1,236(V) | 2,456(H) × 2,058(V) | 2,560(H) × 2,560(V) | 4,096(H) × 3,072(V) |
| Frame Rate | 15.0 fps | 30 fps | 15 fps | 99.2 fps | 25 fps |
| Pixel Size | 4.40(H) × 4.40(V) μm | | 3.45(H) × 3.45(V) μm | 5.0(H) × 5.0(V) μm | 6(H) × 6(V) μm |
| Electronic Shutter | 1/20,000 to 2 s, Random Trigger Shutter | 1/65,934 to 1/30 s, Random Trigger Shutter | 1/20,000 to 2 s, Random Trigger Shutter | 1/100,000 to 1/5 s, Random Trigger Shutter | 1/20,000 to 2 s, Random Trigger Shutter |
| Scan Method | Progressive | | | | |
| Scanning Frequency | Horizontal: 18.75 kHz Vertical: 15.48 Hz (Maximum Speed with Normal Shutter) Pixel Clock Frequency: 36.00 MHz (1CLK) ± 100 ppm | Horizontal: 37.500 kHz Vertical: 30.000 Hz Pixel Clock Frequency: 72.000 MHz | Horizontal: 31.185 kHz Vertical: 15.104 Hz Pixel Clock Frequency: 60.000 MHz | Pixel Clock Frequency: 84, 72, 60 MHz | Horizontal: 75 kHz Vertical: 25 Hz Medium Configuration, 10 bit, when Shutter OFF |
| Color Filter | — | | | | |
| Standard Sensitivity | 200 lx, F5.6 | 600 lx, F5.6 | 400 lx, F5.6 | 900 lx, F5.6 (Exposure Time 1/60 s) | 2,000 lx, F5.6 |
| Minimum Sensitivity | 2 lx, F1.4 (Gain 10 dB, Video Level 50%) | 6 lx, F1.4 (Gain MAX, Video Level 50%) | 6.25 lx, F1.4 (Gain MAX, Video Level 50%) | 8 lx, F2.8 (Gain MAX, Exposure Time 1/60 s, Video Level 50%) | 30 lx, F2.8 (Gain MAX, Video Level 50%) |
| Gamma | γ=1.0 | | | γ=1.0, 16 Steps Preset, or LUT | γ=1.0 |
| Gain | MANUAL 0 to approx. +12 dB (1 step = Approx. 0.132 dB) | MANUAL 0 to +12 dB (150 Steps) | MANUAL 0 to +12 dB (121 Steps) | MANUAL 0 to approx. +18 dB (1 step = Approx. 0.1 dB) | MANUAL 0 to +18 dB (180 Steps) |
| White Balance | — | | | | |
| Sync System | Internal synchronization | | | | |
| Image Output Format | Data: 10 / 8 bit Switching All pixel readout: 1,616 (H) × 1,200 (V) [Approx. 15.0 fps] Partial Scan: 1,616 (H) × 600 to 900 (V) [Approx. 19.9 to 27.8 fps] minimum lines: 600, minimum step: 1 line | Data: 12 / 10 / 8 bit Switching All pixel readout: 1,616 (H) × 1,200 (V) [Approx. 30 fps] Partial Scan: 1,628 (H) × 50 to 1,236 (V) [Approx. 30 to 183 fps] High-speed draft mode: 1,628 (H) × 309 (V) [Approx. 89 fps] | Data: 12 / 10 / 8 bit Switching All pixel readout: 2,456 (H) × 2,058 (V) [Approx. 15 fps] Partial Scan: 2,456 (H) × 100 to 2,058 (V) [Approx. 15 to 52 fps] High-speed draft mode: 2,456 (H) × 257 (V) [Approx. 37.1 fps] | Data: 12 / 10 / 8 bit Switching All pixel readout: 2,560 (H) × 2,560 (V) [Approx. 85 fps] Binning (2×2): 1,280 (H) × 1,280 (V) [Approx. 170 fps] Binning (4×4): 640 (H) × 640 (V) [Approx. 340 fps] WOI / Binning: Depends on the window setting Reverse (H/V) / Rotation (180-degree) | Data: 10 / 8 / ex 8 bit Switching All pixel readout: 4,096 (H) × 3,072 (V) [Approx. 25 fps] Binning (2×2): 2,048 (H) × 1,536 (V) [Approx. 41.8 fps] Sub sampling: 2×2: 2,048 (H) × 1,536 (V) [Approx. 50 fps] 4×4: 1,024 (H) × 768 (V) [Approx. 100 fps] 8×8: 512 (H) × 384 (V) [Approx. 200 fps] |
| Power Supply | DC12 V ± 10% | | | | |
| Power Consumption | Approx. 1.8 W | Approx. 3.5 W | Approx. 4 W | Approx. 3.84 W | Approx. 5.4 W |
| Lens Mount | C - Mount | | | | TFL-Ⅱ Mount F-Mount lens can be used by FTAR-2 (as optional accessory) mount conversion adaptor. |
| Dimensions | 29 (W) × 29 (H) × 26.5 (D) mm (Not including protrusion) | 54(W) × 43(H) × 51(D) mm (Not including protrusion) | | 40 (W) × 40 (H) × 35 (D) mm (Not including protrusion) | 75 (W) × 75 (H) × 69.5 (D) mm (Not including protrusion) |
| Weight | Approx. 40 g | Approx. 170 g | Approx. 180 g | Approx. 100 g | Approx. 450 g |
| Operation Assurance | Temperature: -5℃ to 45℃　Humidity: 10% to 90% (no condensation) | | | | |
| Conformity | CE, FCC, RoHS, WEEE | | | | |

\* GS-CMOS : Global Shutter type CMOS image sensor.

# High reliability　CameraLink Camera

## Specifications

| B/W ／ COLOR | COLOR | | | | |
|---|---|---|---|---|---|
| Pixels | 0.3M | 2M | 5M | 6.5M | 12M |
| Item　Model Name | CSCV125CC3 | CSCU30CC18 | CSCQS15CC23 | CSC6M100CMP11 | CSC12M25CMP19 |
| Interface | CameraLink (PoCL) | | CameraLink (PoCL / Non PoCL) | CameraLink (PoCL) | CameraLink (Non PoCL) |
| Imager | 1/3 type CCD (ICX424AQ) | 1/1.8 type CCD (ICX274AQ) | 2/3 type CCD (ICX625AQ) | 1.1 type GS-CMOS (TELI Original) | 1.9 type GS-CMOS (TELI Original) |
| Resolution | 640(H) × 480(V) | 1,628(H) × 1,236(V) | 2,448(H) × 2,058(V) | 2,560(H) × 2,560(V) | 4,096(H) × 3,072(V) |
| Frame Rate | 127.7 fps | 30 fps | 15.1 fps | 99.2 fps | 25 fps |
| Pixel Size | 7.4(H) × 7.4(V) μm | 4.40(H) × 4.40(V) μm | 3.45(H) × 3.45(V) μm | 5.0(H) × 5.0(V) μm | 6(H) × 6(V) μm |
| Electronic Shutter | 1/100,000 to 8 s, Random Trigger Shutter | 1/65,934 to 1/30 s, Random Trigger Shutter | 1/20,000 to 2 s, Random Trigger Shutter | 1/100,000 to 1/5 s, Random Trigger Shutter | 1/20,000 to 2 s, Random Trigger Shutter |
| Scan Method | Progressive | | | | |
| Scanning Frequency | Horizontal: 62.937 kHz Vertical: 126.26 Hz (Maximum Speed with Normal Shutter) Pixel Clock Frequency: 49.090902 MHz (1CLK) ± 100 ppm | Horizontal: 37.500 kHz Vertical: 30.000 Hz Pixel Clock Frequency: 72.000 MHz | Horizontal: 31.18 kHz Vertical: 15.09 Hz Pixel Clock Frequency: 80.000 MHz | Pixel Clock Frequency: 84, 72, 60 MHz | Horizontal: 78.4 kHz Vertical: 25 Hz Medium Configuration, 10 bit, when Shutter OFF |
| Color Filter | RGB primary color mosaic-on-tip color filter | | | | |
| Standard Sensitivity | 2,400 lx, F5.6 (FIX Gain) | 2,400 lx, F8 | 1,800 lx, F8 | 2,500 lx, F5.6 (Exposure Time 1/60 s) | 3,000 lx, F4 |
| Minimum Sensitivity | 20 lx, F1.4 (Gain 18 dB, Video Level 50%) | 35 lx, F1.4 (Gain MAX, Video Level 50%) | 14 lx, F1.4 (Gain MAX, Video Level 50%) | 20 lx, F2.8 (Gain MAX, Exposure Time 1/60 s, Video Level 50%) | 125 lx, F2.8 (Gain MAX, Video Level 50%) |
| Gamma | ON / OFF switching [Factory setting: OFF] * Disabled when RAW Data Output (8 / 10 bit) (OFF) | ON (Equivalent to 0.65) / OFF (γ=1) Switching | | γ=1.0, 16 Steps Preset, or LUT | γ=1.0 |
| Gain | MANUAL -6 to approx. +18 dB (1 Step = Approx. 0.1 dB) | MANUAL 0 to +6 dB (76 Steps) | MANUAL 0 to +6 dB (61 Steps) | Analog: 0 / +3 / +6 / +9 dB switching Digital: 0 to +18 dB (180 steps, 1 step = 0.1 dB) | MANUAL 0 to +18 dB (180 Steps) |
| White Balance | MANUAL or OPWB (*OPWB only works at RGB 24 bit) | MWB, OPWB | | | |
| Sync System | Internal synchronization | | | | |
| Image Output Format | Data: RGB 24 bit, RAW 10 bit, RAW 8 bit Switching All pixel readout: 640 (H) × 480 (V) [Approx. 127.7 fps] Partial Scan: 640 (H) × 120 to 480 (V) [Approx. 127.7 to 378.6 fps] minimum lines: 120, minimum step: 2 line | Data: RGB 24 bit / RAW (12 / 10 / 8 bit) Switching All pixel readout: 1,628 (H) × 1,236 (V) [Approx. 30 fps] Partial Scan: 1,628 (H) × 50 to 1,236 (V) [Approx. 30 to 183 fps] High-speed draft mode: 1,628 (H) × 309 (V) [Approx. 89 fps] | Data: RGB 24 bit / RAW (12 / 10 / 8bit) Switching All pixel readout: 2,448 (H) × 2,058 (V) [Approx. 15.1 fps] Partial Scan: 2,448 (H) × 100 to 2,058 (V) [Approx. 15.1 to 52.3 fps] High-speed draft mode: RGB 2,448 (H) × 253 (V), RAW 2,448 (H) × 254 (V) [Approx. 37.2 fps] | Data: 12 / 10 / 8 bit Switching All pixel readout: 2,560 (H) × 2,560 (V) [Approx. 85 fps] Binning (2×2): 1,280 (H) × 1,280 (V) [Approx. 170 fps] Binning (4×4): 640 (H) × 640 (V) [Approx. 340 fps] WOI / Binning: Depends on the window setting Reverse (H/V) / Rotation (180-degree) | Data: RAW 10 bit / RAW 8 bit / ex8 bit Switching All pixel readout: 4,096(H) × 3,072(V) [Approx. 25 fps] (Medium Configuration, 10 bit, Shutter OFF) |
| Power Supply | DC12 V ± 10% | | | | |
| Power Consumption | Approx. 1.8 W | Approx. 4.5 W | Approx. 4.9 W | Approx. 3.84 W | Approx. 5.4 W |
| Lens Mount | C - Mount | | | | TFL-Ⅱ Mount F-Mount lens can be used by FTAR-2 (as optional accessory) mount conversion adaptor. |
| Dimensions | 29 (W) × 29 (H) × 26.5 (D) mm (Not including protrusion) | 54(W) × 43(H) × 51(D) mm (Not including protrusion) | 54 (W) × 43 (H) × 61 (D) mm (Not including protrusion) | 40 (W) × 40 (H) × 35 (D) mm (Not including protrusion) | 75 (W) × 75 (H) × 69.5 (D) mm (Not including protrusion) |
| Weight | Approx. 40 g | Approx. 175 g | Approx. 190 g | Approx. 100 g | Approx. 450 g |
| Operation Assurance | Temperature: -5℃ to 45℃　Humidity: 10% to 90% (no condensation) | | | | |
| Conformity | CE, FCC, RoHS, WEEE | | | | |

\* GS-CMOS : Global Shutter type CMOS image sensor. CSC12M25CMP19,and CSC12M25BMP19 are approved KC directive.

## Accessory information (options)

# CSX12M25CMP19

Details are here.

## Outline

With CoaXPress interface.
With TELI originally developed 1.9 type 12.58M pixel CMOS sensor.

## Features

· Useful functions
 − Higher speed image scanning with scalable mode.
 − Clear image with less blurred is achieved by global electronic shutter.
· TFL-Ⅱ Mount
 − Optimum lens can be selectable to 1.9 type 12.58M pixel image sensor by TFL-Ⅱ Mount.
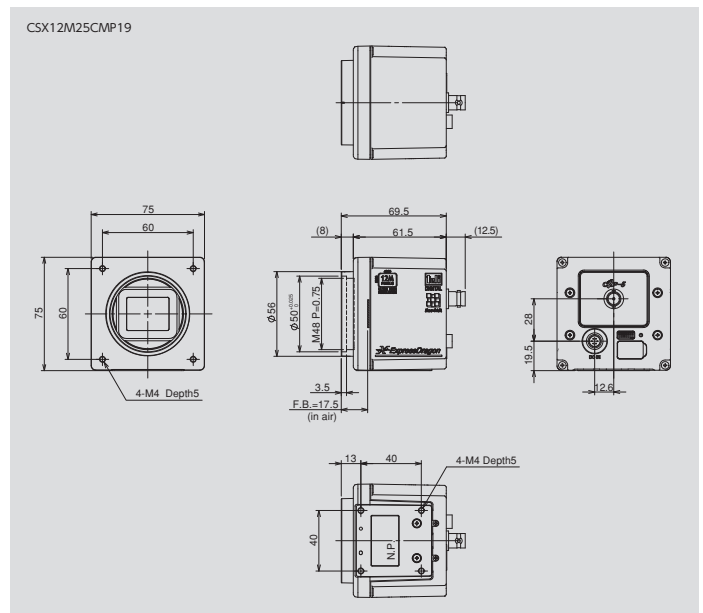
## Accessory information (options)

## Specifications

| B/W ／ COLOR | COLOR |
|---|---|
| Pixels | 12M |
| Item　　Model Name | CSX12M25CMP19 |
| Interface | CoaXPress (CXP-5) |
| Imager | 1.9 type GS-CMOS (TELI Original) |
| Resolution | 4,096 (H) × 3,072 (V) pixels |
| Frame Rate | 25 fps |
| Pixel Size | 6.0(H) × 6.0(V) $\mu$m |
| Electronic Shutter | 1/20,000 s to 2 s, Random Trigger Shutter |
| Scan Method | Progressive |
| Color Filter | RGB primary color mosaic-on-tip color filter |
| Standard Sensitivity | 3,000 lx, F4, 5,000 K |
| Minimum Sensitivity | 125 lx, F2.8 (Gain MAX, Video Level 50%) |
| Gamma | $\gamma$=1.0 |
| Gain | MANUAL (Digital gain) 0 to +18 dB (180 step, factory setting : 0 dB) |
| White Balance | MWB, OPWB |
| Sync System | Internal synchronization |
| Image Output Format | RAW 8 bit, Scalable mode |
| Power Supply | DC24 V ± 10% (ripple 50 mV (p-p) or less) |
| Power Consumption | Approx. 6.5 W |
| Lens Mount | TFL-Ⅱ Mount |
| Dimensions | 75 (W) × 75 (H) × 69.5 (D) mm (Not including protrusion) |
| Weight | Approx. 430 g |
| Operation Assurance | Temperature : -5℃ to 45℃ Humidity : 10% to 90% (no condensation) |
| Conformity | CE, FCC, RoHS, WEEE |

\* GS-CMOS : Global Shutter type CMOS image sensor.

## Dimensions



CSX12M25CMP19

USB3.0

GigE

CameraLink

CoaX

Smart Photo Sensor

DVI Camera

Analog Camera

Camera Data

Monitor

Accessories

Appendix

# SPS02

Details are here.

〈Full-scale〉

## Outline

SPS02 is a micro size sensor with high speed image processing function.
This sensor can build image system in one chip and processes in very high speed as pre - process is done in devise section.
This can judge easily while conventional sensor cannot.

## Features

Easy operation

· "Camera" and "image processor" and "judgment output" are achieved in super high speed with extremely compact size.
· Easy operation. With Windows application of "SPS Viewer", Judgment conditions, start of process, testing items, switching and even revision of application can be set during monitoring image.
· Applicable to various setting conditions with S-Mount lens and original high luminance ring lighting.
· Application for distinction of area and direction can be downloaded.
· "Visual Architect" is available for development of application software.
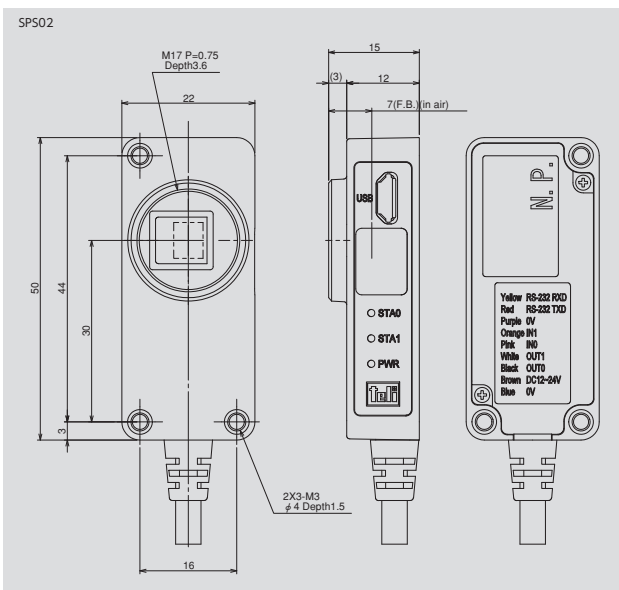
## Accessory information (options)

Visual architect as development environment
· USB cable (type A-micro B)
· S-Mount lens in various type
· Extension tube for S-Mount
· S-Mount lens
    ⇒For details, please contact our staff.

## Specifications

| Item            Model Name | SPS02 |
|---|---|
| Imager | 1/2 type CMOS (TELI Original) |
| Resolution | 144 (H) × 176 (V) pixels |
| Sensing Area | 4.8(H) × 5.9(V) mm |
| Pixel Size | 33.6(H) × 33.6(V) $\mu$m |
| Exposure Time | 1 $\mu$s to 20 ms |
| GPIO : Output | 2 Line<br>NPN Open Collector<br>Power Supply Voltage : 30 V (maximum)<br>Residual Voltage : 1 V (maximum)<br>Load Current : 100 mA (maximum) |
| GPIO : Input | 2 Line<br>ON Voltage : 0.5 V (maximum)<br>ON Current : 30 $\mu$A (short-circuit)<br>OFF Current : 50 $\mu$A (maximum) |
| USB | USB2.0 High speed<br>USB-Micro Type-B Receptacle |
| RS-232C | TXD / RXD |
| Protection Circuit for GPIO | Output : Over Current Protection<br>Input : Over Voltage Protection |
| LED Signal Light | STA0 : Red, STA1 : Green, PWR : Orange |
| Power Supply | Power and I/O cable for the power supply :<br>DC12 to 24 V ± 10% (ripple 10% or less)<br>USB cable : DC5 V ± 5% (ripple 10% or less)<br>If both an I/O cable for the power supply and<br>a USB cable are connected, power is supplied<br>from an I/O cable for the power supply. |
| Power Consumption | 2.4 W |
| Lens Mount | M17 P=0.75 |
| Dimensions | 22 (W) × 50 (H) × 12 (D) mm (Not including protrusion) |
| Weight | Approx. 56 g (including 1m cable) |
| Operation Assurance | Temperature : 0℃ to 40℃<br>(Camera housing temperature : less than 60℃ )<br>Humidity : 35% to 85% (no condensation) |
| Conformity | CE, FCC, RoHS, WEEE |

## Dimensions

SPS02

M17 P=0.75
Depth3.6

15

(3) 12

7(F.B.)(in air)

22

USB

N.P.

50

44

30

STA0

STA1

PWR

3

Yellow  RS-232 RXD
Red      RS-232 TXD
Purple   0V
Orange  IN1
Pink     IN0
White    OUT1
Black    OUT0
Brown   DC12-24V
Blue     0V

2X3-M3
φ 4 Depth1.5

16

* Smart Photo Sensor is powered by a licensed technology of AnaFocus - www.anafocus.com
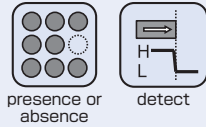
# Application examples

## Basic application software for SPS02

### Area distinction

**1. Existence discrimination based on registered condition of area (number of pixel)**
- Existence of parts
- Existence of hole or mark
- Existence of substance

presence or absence

detect

**2. Blob data output (RS-232C)**
- Area value (number of pixel)
- Number counting
- Sensing position

area

count

positioning

**Reference time of processing : exposure time + 5 ms**

### Direction checking

**1. Checking direction with area discrimination application by extracting pattern and characteristics of object.**
- Front or reverse of parts
- Direction of parts
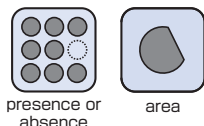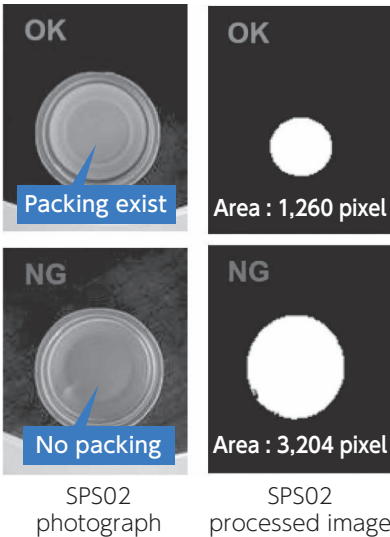(Location of pattern against center of work)

front / back

direction
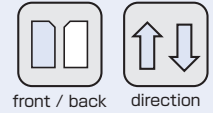
**2. Blob data output (RS-232C)**
- Area size value of pattern
- Center of object
- Gravity center of object

area

positioning

**Reference time of processing : exposure time + 1 ms ~**

## Existence checking of packing in cap  ⟨Container⟩

OK

Packing exist

OK

Area : 1,260 pixel

NG

No packing

NG

Area : 3,204 pixel

SPS02 photograph

SPS02 processed image

presence or absence

area

**Processing time : approx. 6 ms**
- Discriminate by area value gained from cap inside reflection.

## Discrimination of pill shape  ⟨medicine⟩ ⟨food⟩

OK  監視領域

OK  監視領域

Area : 923 pixel

NG  監視領域

NG  監視領域

Area : 618 pixel

SPS02 image before processing

SPS02 processed image

area

**Processing time : approx. 1.5 ms**
- Processing time can be reduced by "monitoring area setting" and "auto trigger" function.

**Monitoring area :**
Processing only in time when object is in monitoring area.

**Auto trigger :**
Unique function which processes objects in monitoring area only.

## Measuring granule  ⟨medicine⟩ ⟨food⟩

監視領域

Area : 3,042 pixel  監視領域
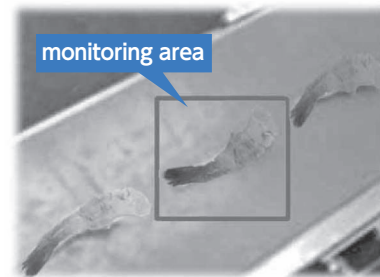
SPS02 image before processing

SPS02 processed image
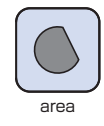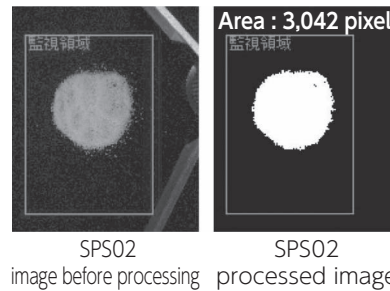
area

**Processing time : approx. 5 ms**
- Quantification by measuring granule area,
- By RS-232C communication,

## Sorting by object size  ⟨food⟩

monitoring area

area

**Processing time : approx. 3 ms**
- Objects in random direction or size can be stably detected.
- Upper limit and lower limit of area value can be set.

OK

NG

OK

NG

Size in standard

bigger

Size in standard

Smaller
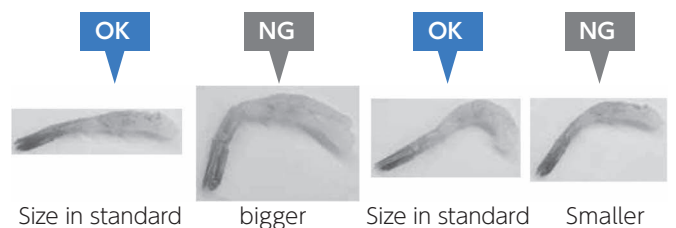
**Deciding by size of shrimps even their shapes are in random.**

USB3.0

GigE

CameraLink

CoaX

Smart Photo Sensor

DVI Camera

Analog Camera

Camera Data

Monitor

Accessories

Appendix

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# New concept  Smart Photo Sensor

## Sorting vegetable by shape  `food`



area

- Vegetable can be sorted by their shape such as length, thickness, curve etc.
- Upper limit and lower limit of size can be set.

**OK** — Size in standard
**NG** — longer
**NG** — fat
**NG** — curved
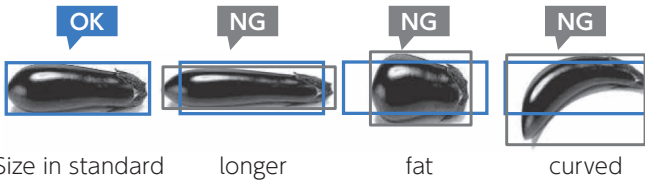
**Decision is made by blob information of dimension coming through RS-232C.**

## Judging direction of label  `Mechanical`  `Electrical`



monitoring area

**Small area : OK**   **Large area : NG**

area

- Judging not by using "direction application" but "area size application".
- Judging direction of label by checking area size of "monitoring area".

**Judging area size of characters in "monitoring area".**
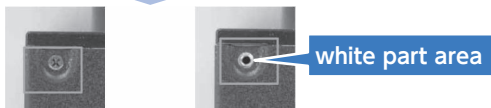
## Checking screw existance  `Mechanical`  `Electrical`



monitoring area

presence or absence

- Decision by existence of screw in monitoring area.

Expansion

white part area

**screwed : OK**   **no screw : NG**

**Decision by area of white part.**

## Judging direction of chip  `Electronic`



monitoring area

direction

- Judging OK or NG by "checking direction" on image taken in.
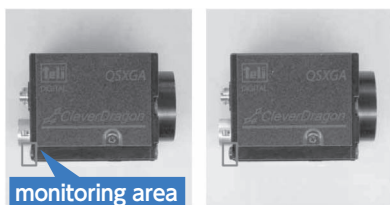
**OK**  **OK**  **NG**  **OK**  **OK**  **OK**

**Judging direction by checking extracted pattern in "monitoring area".**

## Checking tightness of screw  `Mechanical`  `Electrical`



monitoring area

area

- Judging tightness of screw by checking area size of "monitoring area".

Expansion

black area

**Small area : OK**   **Large area : NG**

**Judging by size of black area in monitoring area.**

# CSDS60CM3

Details are here.

## Outline

High vision camera with 1/3 type single plated CMOS sensor.
Can be connected directly to monitor without PC by DVI-D for image output.
Suitable for visual inspection and observation with high color reproducibility.

## Features

**Easy operation**

· Stress free monitoring with 60 fps perfect motion picture.
· Can be connected to monitor with DVI-D input terminal.
· Selectable size of 1,280 x 1,024 and 1,280 x 720.
· Still images and motion pictures are able to record to SD card and USB memory by storage device (IR-100) which sold separately.
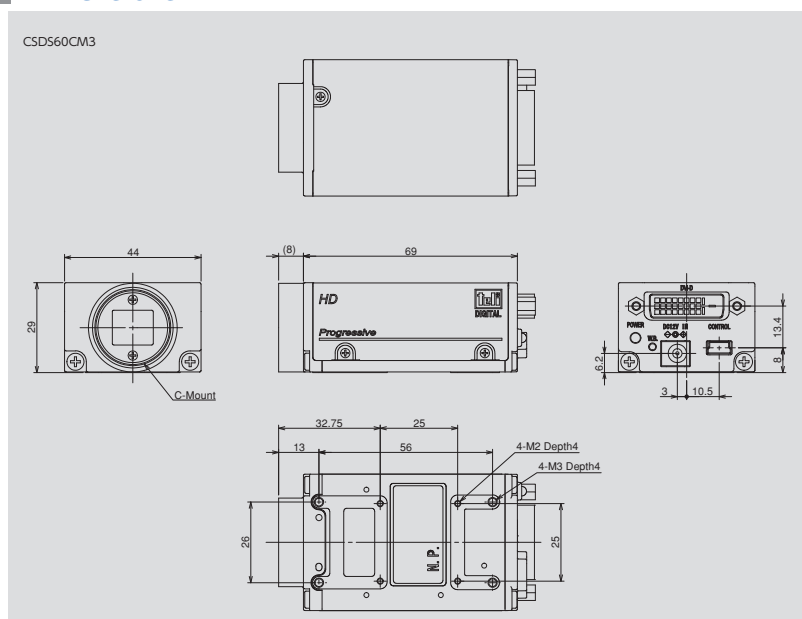
**Various function**

· Vertical and horizontal each 2 lines can be displayed. Useful for easy visual alignment and size measuring.
· Emphasizing edges by contour correction. Useful for checking scratch and dents.

## Accessory information (options)

DVI-D cable (single link)
Power adapter (SPU16A-105-ASN) · · · · · · · · · · · · · · · · · · · · · ▶P27, 28
AC cable (APC1025-01P) · · · · · · · · · · · · · · · · · · · · · · · · · · ▶P29
C-Mount lens · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · ▶P32 ~ 34
Tripod attachment · · · · · · · · · · · · · · · · · · · · · · · · · · · · · ▶P30
　　　　　· Spectral sensitivity characteristic · · · · ▶P23, 24
　　　　　· Pin assignment · · · · · · · · · · · · · · · · · ▶P25

## Specifications

| B/W ／ COLOR | COLOR |
|---|---|
| Pixels | 1.4M |
| Item ＼ Model Name | CSDS60CM3 |
| Interface | DVI-D |
| Imager | 1/3 type RS-CMOS (IMX035LQR) |
| Resolution | 1,280 (H) × 1,024 (V) pixels, 1,280 (H) × 720 (V) pixels |
| Frame Rate | 60 fps |
| Pixel Size | 3.63(H) × 3.63(V) $\mu$m |
| Electronic Shutter | Rolling shutter 1/10,000 to 1/60 s (9 phase) |
| Scan Method | Progressive |
| Color Filter | RGB primary color mosaic-on-tip color filter |
| Standard Sensitivity | 2,000 lx, F4, 5,000 K |
| Minimum Sensitivity | 6 lx, F1.4 (Gain +24 dB, gamma 16, Video level 50%) |
| Gamma | 17 step Change (Fatory setting $\gamma$=5) |
| Gain | MANUAL (0 to +24 dB) / AUTO Switching (factory setting : +24 dB) |
| White Balance | MWB, OPWB, AUTO |
| Sync System | Internal synchronization |
| Image Output Format | Color 8 bit each RGB All pixel readout / Mirror mode (H/V) |
| Power Supply | DC connector supply : DC 12 V ± 10% (Ripple voltage 50 mV (p-p) ) Camera control connector supply : DC 5 V ± 5% (Ripple voltage 50 mV (p-p) ) When both DC cable and Mini-USB cable for camera control were connected, +12 V from DC cable is given priority. |
| Power Consumption | 2.0 W |
| Lens Mount | C - Mount |
| Dimensions | 44 (W) × 29 (H) × 77 (D) mm (Not including protrusion) |
| Weight | Approx. 100 g |
| Operation Assurance | Temperature : 0℃ to 40℃ Humidity : 10% to 90% (no condensation) |
| Conformity | CE, FCC, RoHS, WEEE |

\* RS-CMOS : Rolling Shutter type CMOS image sensor.

## Dimensions

CSDS60CM3

Side tabs: USB3.0 | GigE | CameraLink | CoaX | Smart Photo Sensor | DVI Camera | Analog Camera | Camera Data | Monitor | Accessories | Appendix

USB3.0

GigE

CameraLink

CoaX

Smart Photo Sensor

DVI Camera

Analog Camera

Camera Data

Monitor

Accessories

Appendix

## Traditional standard Analog Camera

### Outline

Analogue camera with 0.3M to 0.4M CCD. Most suitable camera can be selectable among interlace, progressive and double progressive mono chrome camera.
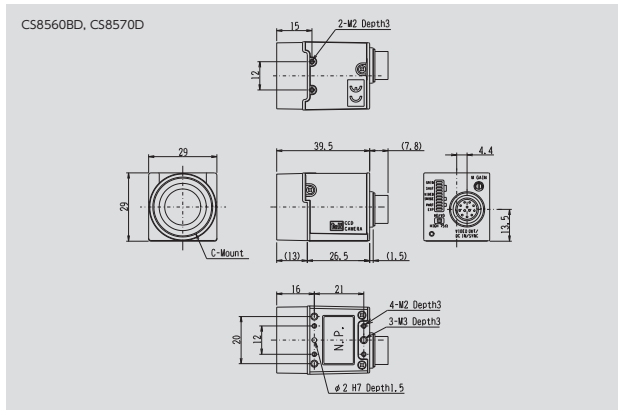
# CS8560BD/CS8570D

Details are here.

### Dimensions

CS8560BD, CS8570D

### Features

**Easy operation**

· All pixels can be scanned in 1/60 sec.
· Image without deterioration in vertical resolution even in random shuttering.
· Easy arithmetic processing in image processing by pixel square lattice with the column.

**Various function**

· Higher speed image taking by partial scanning function.
· Any image intake can be output anytime by multiple shuttering.
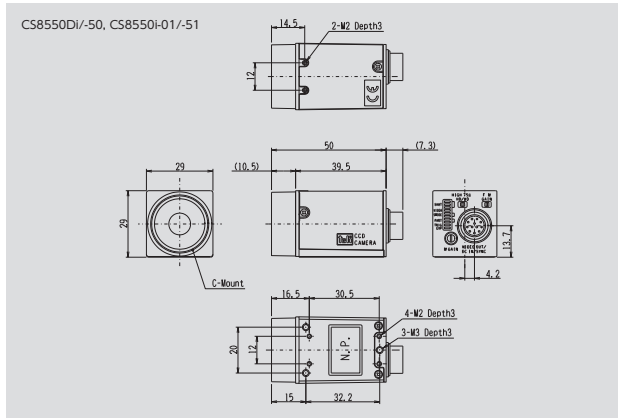
# CS8550Di/-50 · CS8550i-01/-51

SALE WHILE STOCK LAST

Details are here.

### Dimensions

CS8550Di/-50, CS8550i-01/-51

### Features

**Easy operation**

· Scanning all pixels
  (CS8550Di/-50 : 1/60 sec . CS8550i-01/-51 : 1/30 sec)
· Image without deterioration in vertical resolution even in random shuttering.
· Easy arithmetic processing in image processing by pixel square lattice with the column.

**Various function**

· Higher speed image taking by partial scanning function.
· Any image intake can be output anytime by multiple shuttering.

### Accessory information (options)

BNC-BNC cable

# CS8620Bi/CS8630Bi
# CS8620BHi/CS8630BH

Details are here.

teli CCD CAMERA

USB3.0

GigE

CameraLink

CoaX

Smart Photo Sensor

DVI Camera
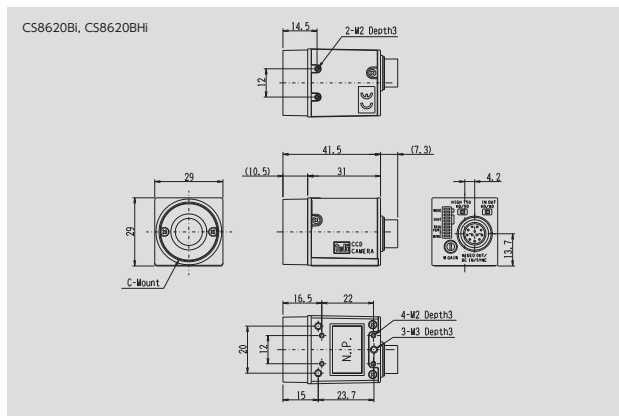
Analog Camera

Camera Data

Monitor

Accessories

Appendix

## Dimensions



CS8620Bi, CS8620BHi

## Features

**Easy operation**

· Clear image with high S/N ratio of 60dB.
· CS8620BHi/CS8630BH can capture in near infra-red range.

## Specifications

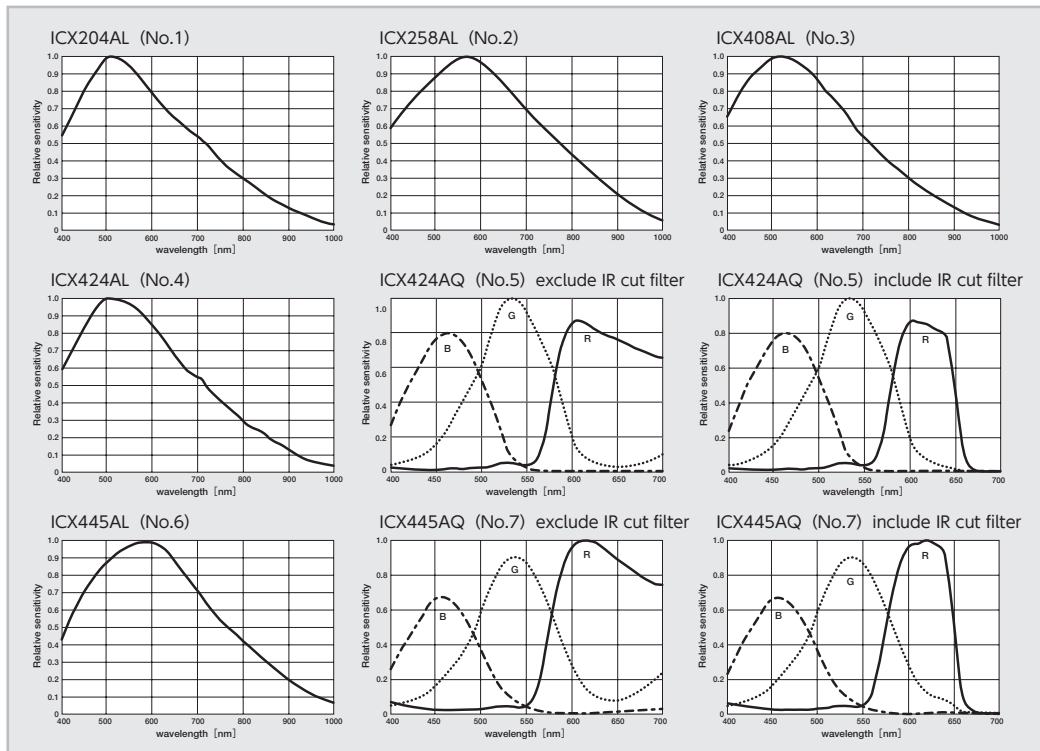| B/W ／ COLOR | B/W | | | |
|---|---|---|---|---|
| Pixels | 0.3M | | 0.4M | |
| Model Name / Item | CS8560BD/CS8570D | CS8550Di/CS8550Di-50 CS8550i-01/CS8550i-51 | CS8620Bi/CS8620BHi | CS8630Bi/CS8630BH |
| Interface | Analog | | | |
| Imager | CS8560BD：1/3 type CCD (ICX424AL) CS8570D：1/2 type CCD (ICX414AL) | 1/3 type CCD (ICX424AL) | CS8620Bi：1/2 type CCD (ICX418AL) CS8620BHi：1/2 type CCD (ICX428AL) | CS8630Bi：1/3 type CCD (ICX408AL) CS8630BH：1/3 type CCD (ICX258AL) |
| Active pixels | 659(H) × 494(V) pixels | | 768(H) × 494(V) pixels | |
| Frame Rate | 60 fps | CS8550Di/CS8550Di-50　60 fps CS8550i-01/CS8550i-51　30 fps | 30 fps | |
| Scanning Area | CS8560BD　4.88(H) × 3.66(V) mm CS8570D　6.4(H) × 4.8(V) mm | 4.8(H) × 3.6(V) mm | 6.5(H) × 4.85(V) mm | 4.8(H) × 3.6(V) mm |
| Pixel Size | CS8560BD　7.4(H) × 7.4(V) μm CS8570D　6.4(H) × 4.8(V) μm | 7.4(H) × 7.4(V) μm | 8.4(H) × 9.8(V) μm | 6.35(H) × 7.4(V) μm |
| Electronic Shutter | Selectable via rear panel DIP SW Automatically changed by TRIG signal | | | |
| Scan Method | 1/60 s Non-interlace mode 1/120 s Non-interlace mode | CS8550Di / CS8550Di-50 1/60 s Non-interlace mode 1/120 s 2:1 Interlace mode CS8550i-01 / CS8550i-51 1/30 s Non-interlace mode 1/60 s 2:1 Interlace mode | 2:1 Interlace mode | |
| Resolution | 485 TV lines (H) / 485 lines (V) (350 TV lines) | | | |
| S/N | 52 dB (factory setting) | | 60 dB (p-p) / rms (typical) (GAIN MGC, γ=1.0) | |
| Standard Sensitivity | 400 lx, F5.6 | CS8550Di/CS8550Di-50　400 lx, F5.6 CS8550i-01/CS8550i-51　400 lx, F8 | CS8620Bi　200 lx, F5.6, 3,100 K CS8620BHi　400 lx, F11, 3,100 K | CS8630Bi　200 lx, F5.6, 3,100 K CS8630BH　400 lx, F8, 3,100 K |
| Minimum Sensitivity | 4 lx, F1.4 (Gain MAX, Video level 50%) | CS8550Di / CS8550Di-50 4 lx, F1.4 (Gain MAX, Video level 50%) CS8550i-01 / CS8550i-51 2 lx, F1.4 (Gain MAX, Video level 50%) | CS8620Bi： 0.2 lx, F1.4 (Gain MAX, γ=0.45) CS8620BHi： 0.1 lx, F1.4 (Gain MAX, γ=0.45) | 0.2 lx, F1.4 (Gain MAX, γ=0.45) |
| Gamma | γ=1.0 | | γ=1.0 / 0.45 selectable via rear panel DIP SW (factory setting：γ=1.0) | |
| Gain | FIX：factory setting MANUAL：Setting through GAIN VR (FIX / MANUAL switching via rear panel DIP SW) | MANUAL | MANUAL, AUTO | |
| TV System | Special format (Non-confoeming to EIA) | | Based on EIA standard | |
| Sync System | Internal / External automatic switch-over | | | |
| Image Output Format | All pixel readout / Partial-scan (1/2, 1/4, Programmable) | | — | |
| Video Output | VS：1.0 V (p-p) ／ 75Ω | | | |
| Power Supply | DC12 V ± 10% (ripple less than 50 mV (p-p)) | | DC12 V ± 10% (ripple less than 10 mV (p-p)) | |
| Power Consumption | Approx. 1.5 W | CS8550Di / CS8550Di-50：Approx. 1.8 W CS8550i-01 / CS8550i-51：Approx. 1.3 W | Approx. 1.3 W | |
| Lens Mount | C - Mount | | | |
| Dimensions | 29 (W) × 29 (H) × 26.5 (D) mm (Not including protrusion) | 29 (W) × 29 (H) × 39.5 (D) mm (Not including protrusion) | 29 (W) × 29 (H) × 31 (D) mm (Not including protrusion) | |
| Weight | CS8560BD：Approx. 41g CS8570D：Approx. 42 g | Approx. 50 g | Approx. 42 g | |
| Operation Assurance | Temperature：-5℃ to 45℃ Humidity: 10% to 90% (no condensation) | Temperature：-5℃ to 50℃ Humidity: 10% to 90% (no condensation) | Temperature：-10℃ to 50℃ Humidity：20% to 80% (no condensation) | |
| Conformity | CE, FCC, RoHS, WEEE | | | |

# Spectral sensitivity characteristics 1

| Imager | Type name | I / F | | | | | | Graph No. |
|---|---|---|---|---|---|---|---|---|
| | | USB3.0 | GigE Vision | CameraLink | CoaxPress | DVI-D | Analog | |
| 1/3 Type CCD | ICX204AL | BU080 | BG080 | CSCX30BC3 | | | | 1 |
| | ICX258AL | | | | | | CS8630BH | 2 |
| | ICX408AL | | | | | | CS8630Bi | 3 |
| | ICX424AL | BU030 | BG030 | CSCLV90BC3 CSCV90BC3 CSCV125BC3 | | | CS8560BD CS8550Di/-50 CS8550i-01/-51 | 4 |
| | ICX424AQ | BU030C/CF | BG030C/CF | CSCV125CC3 | | | | 5 |
| | ICX445AL | BU130 | BG130 | | | | | 6 |
| | ICX445AQ | BU130C/CF | BG130C/CF | | | | | 7 |
| 1/2 Type CCD | ICX267AL | | | CSCS20BC2 | | | | 8 |
| | ICX414AL | BU031 | BG031 | | | | CS8570D | 9 |
| | ICX418AL | | | | | | CS8620Bi | 10 |
| | ICX428AL | | | | | | CS8620BHi | 11 |
| 1/1.8 Type CCD | ICX274AL | | BG202 | CSCU15BC18 CSCU30BC18 | | | | 12 |
| | ICX274AQ | | BG202C/CF | CSCU30CC18 | | | | 13 |
| 2/3 Type CCD | ICX625AL | | | CSCQS15BC23 | | | | 14 |
| | ICX625AQ | | | CSCQS15CC23 | | | | 15 |
| 1/3 Type RS-CMOS | IMX035LQR | | | | | CSDS60CM3 | | 16 |
| 1/1.8 Type GS-CMOS | EV76C560ABT | | | CSCS60BM18 | | | | 17 |
| 1/1.7 Type RS-CMOS | IMX226CQJ | BU1203MCF | | | | | | 18 |
| 2/3 Type GS-CMOS | CMV2000 B/W | BU205M | BG205M-CS | | | | | 19 |
| | CMV2000 Color | | BG205MC-CS/MCF-CS | | | | | |
| | CMV4000 B/W | BU406M | | | | | | 20 |
| | CMV4000 Color | BU406MC/MCF | | | | | | |
| 1/1.2 Type GS-CMOS | IMX174LLJ | BU238M | | | | | | 21 |
| | IMX174LQJ | BU238MC/MCF | | | | | | |
| 1.1 Type GS-CMOS | TELI Original B/W | DU657M | | CSC6M100BMP11 | | | | 22 |
| | TELI Original Color | DU657MC | | CSC6M100CMP11 | | | | |
| 1.9 Type GS-CMOS | TELI Original B/W | | | CSC12M25BMP19-01B | CSX12M25CMP19 | | | 23 |
| | TELI Original Color | | | CSC12M25CMP19 | | | | |

* Please refer include IR cut filter, for BXXXXCF and CSCXXXXXX, and exclude IR cut filter for BXXXXXC.
* GS-CMOS : Global Shutter type CMOS image sensor.
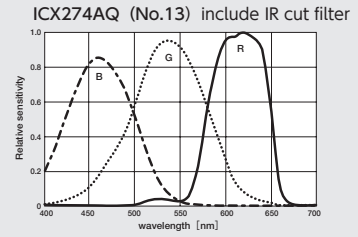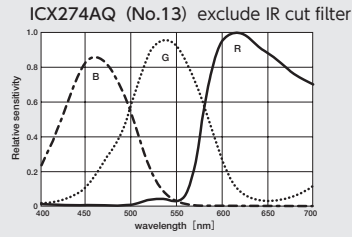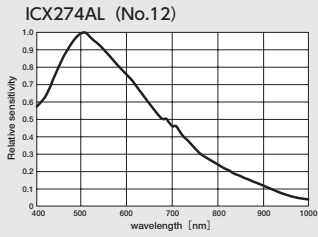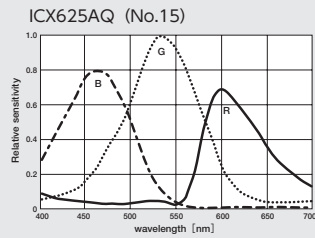  RS-CMOS : Rolling Shutter type CMOS image sensor.

## 1/3 Type CCD



ICX204AL (No.1)

ICX258AL (No.2)

ICX408AL (No.3)

ICX424AL (No.4)

ICX424AQ (No.5) exclude IR cut filter

ICX424AQ (No.5) include IR cut filter

ICX445AL (No.6)

ICX445AQ (No.7) exclude IR cut filter

ICX445AQ (No.7) include IR cut filter

## 1/2 Type CCD



ICX267AL (No.8)

ICX414AL (No.9)

ICX418AL (No.10)

ICX428AL (No.11)

# Spectral sensitivity characteristics 2

## 1/1.8 Type CCD

ICX274AL (No.12)

ICX274AQ (No.13) exclude IR cut filter

ICX274AQ (No.13) include IR cut filter

## 2/3 Type CCD

ICX625AL (No.14)

ICX625AQ (No.15)

## 1/3 Type RS-CMOS

IMX035LQR (No.16)

## 1/1.8 Type GS-CMOS

EV76C560ABT (No.17)

## 1/1.7 Type RS-CMOS

IMX226CQJ (No.18)

## 2/3 Type GS-CMOS

CMV2000/4000 (B/W) (No.19,20)

CMV2000/4000 (Color) (No.19,20) exclude IR cut filter

CMV2000/4000 (Color) (No.19,20) include IR cut filter

## 1/1.2 Type GS-CMOS

IMX174LLJ (No.21)

IMX174LQJ (No.21) exclude IR cut filter

IMX174LQJ (No.21) include IR cut filter

## 1.1 Type GS-CMOS

TELI Original B/W (No.22)

TELI Original Color (No.22)

## 1.9 Type GS-CMOS

TELI Original B/W (No.23)

TELI Original Color (No.23)

\* GS-CMOS : Global Shutter type CMOS image sensor.
 RS-CMOS : Rolling Shutter type CMOS image sensor.

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# PIN assignment

Standard pin assignment for individual camera DC IN connectors. Please see user guide for details.

## ■BU/DU series

Applied connector (Cable side) :
e-con connector : XN2A-1470(Made by OMRON ) or equivalent,
Shielded wire : UL1533(AWG28) (made by Hitachi densen)

| Pin No. | I/O | Assignment |
|---|---|---|
| 1 | O | GPIO (Line2) |
| 2 | O | GPIO (Line1) |
| 3 | — | GND |
| 4 | I | TRIG_IN |

Examples of wiring cable



## ■BG series

Applicable connectors (cable side): HR10A-7P-6S (73) (HIROSE) or equivalent

| Pin No. | I/O | Assignment |
|---|---|---|
| 1 | I | +12V |
| 2 | I | Line 0 |
| 3 | O | Line 1 |
| 4 | O | Line 2 |
| 5 | — | I/O GND |
| 6 | — | GND |

## ■CSCU30BC18/CSCU30CC18

Applicable connectors (cable side): HR10A-10P-12S (73) (HIROSE) or equivalent

| Pin No. | I/O | Assignment |
|---|---|---|
| 1 | — | GND |
| 2 | — | N.C. |
| 3 | — | N.C. |
| 4 | — | N.C. |
| 5 | — | GND |
| 6 | — | N.C. |
| 7 | O | VD |
| 8 | — | GND |
| 9 | — | N.C. |
| 10 | O | WEN. |
| 11 | I | TRIG |
| 12 | — | GND |

## ■CSCQS15BC23/CSCQS15CC23

Applicable connectors (cable side): HR10A-10P-12S (73) (HIROSE) or equivalent

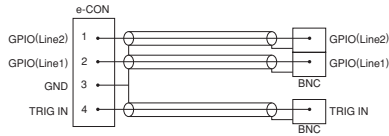| Pin No. | I/O | Assignment |
|---|---|---|
| 1 | — | GND |
| 2 | I | +12V |
| 3 | — | N.C. |
| 4 | — | N.C. |
| 5 | — | GND |
| 6 | — | N.C. |
| 7 | O | VD |
| 8 | — | GND |
| 9 | — | N.C. |
| 10 | O | WEN. |
| 11 | I | TRIG |
| 12 | — | GND |

## ■CSC6M100BMP11/CSC6M100CMP11

Applicable connectors (cable side): HR10A-7P-6S (73) (HIROSE) or equivalent

| Pin No. | I/O | Assignment |
|---|---|---|
| 1 | O | GPO |
| 2 | — | GND |
| 3 | — | GND |
| 4 | I | TRIG |
| 5 | — | N.C. |
| 6 | — | DC+12V |

## ■CSC12M25BMP19-01B/CSC12M25CMP19

Applicable connectors (cable side): HR10A-10P-12S (73) (HIROSE) or equivalent

| Pin No. | I/O | Assignment |
|---|---|---|
| 1 | — | GND |
| 2 | I | +12V |
| 3 | — | GND |
| 4 | — | N.C. |
| 5 | — | GND |
| 6 | I | N.C. |
| 7 | I | N.C. |
| 8 | — | GND |
| 9 | — | N.C. |
| 10 | — | N.C. |
| 11 | I | TRIG |
| 12 | — | GND |

## ■CSDS60CM3

Camera side: UX60SC-MB-5ST (80) (HIROSE)

| Pin No. | I/O | Assignment |
|---|---|---|
| 1 | — | POWER |
| 2 | I/O | USB D− |
| 3 | I/O | USB D+ |
| 4 | — | N.C. |
| 5 | — | USB_GND |

Mini-USB connector



## ■CS8560BD/CS8570D/CS8550Di/-50/CS8550i-01/-51

Applicable connectors (cable side): HR10A-10P-12S (73) (HIROSE) or equivalent

| Pin No. | CS8560BD/CS8570D | CS8550Di/-50 | CS8550i-01/-51 |
|---|---|---|---|
| | | Assignment | |
| 1 | GND | | |
| 2 | +12V | | |
| 3 | VIDEO  GND | | |
| 4 | VIDEO  OUT | | |
| 5 | HD  GND | | |
| 6 | HD  IN | | |
| 7 | VD  IN | | |
| 8 | TRIG  GND | | |
| 9 | N.C. | | TRIG  IN |
| 10 | WEN  OUT | | GND |
| 11 | TRIG  IN | | +12V |
| 12 | VD  GND | | |

## ■CS8620Bi/CS8630Bi/CS8620BHi/CS8630BH

Applicable connectors (cable side): HR10A-10P-12S (73) (HIROSE) or equivalent

| Pin No. | External synchronization | | | Internal synchronization |
|---|---|---|---|---|
| | HD・VD | VS/SYNC | Restart/Reset | |
| 1 | GND | | | |
| 2 | +12V | | | |
| 3 | GND | | | |
| 4 | VIDEO  OUT | | | |
| 5 | GND | | | |
| 6 | HD  IN | — | HD  IN | HD  OUT * |
| 7 | VD  IN | VS/SYNC  IN | R.R  IN | VD  OUT * |
| 8 | GND | | | |
| 9 | CLK  OUT | | | |
| 10 | WEN  OUT | | — | WEN  OUT |
| 11 | TRIG  IN | | | |
| 12 | VD  GND | | | |

* HD and VD output is enabled through a switch on the back panel of the camera for internal synchronous operation.



4pin          6pin          12pin
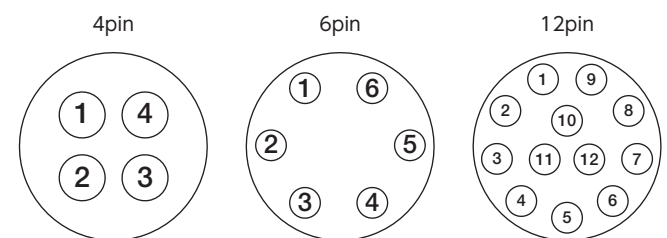
Diagram of receptacle as seen from connection side (back of camera/CCU).

# Monitor/Image Recorder

USB3.0
GigE
CameraLink
CoaX
Smart Photo Sensor
DVI Camera
Analog Camera
Camera Data
Monitor
Accessories
Appendix

## Outline
Analog LCD display monitor of mono chrome and color with TFT LC module, and image storage devise.

# 9LM20SB
## 8.4 type LCD B/W monitor

Details are here.

### Features
- Clear and precise display of EIA type standard signal in 8 bit (256 gradation) with 8.4 inch LED back light type TFT LCD module.
- Progressive scan
- Under scan display
- Cascade connection of image output (automatic terminal function).
- Vertical and horizontal 2 lines can be displayed. Useful for easy visual alignment and size measuring.
- Complying VESA standard free mount.

### Dimensions
9LM20SB
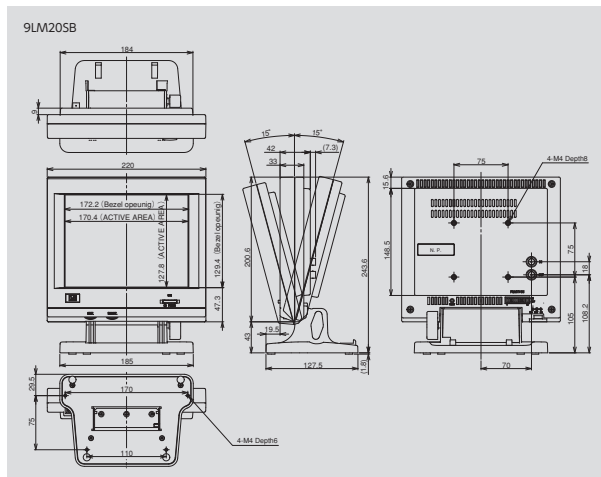
# T05SSB003
## 5.6 type LCD color monitor

Details are here.

### Features
- Full color image with high contrast in 320 (H) x 234 (V) with 5.6 inch TFT LCD module.
- Composite video signal like TV camera output can be directly connected to display.
- Vertical inverse display.
- Can be mounted on camera tripod.

### Dimensions
T05SSB003
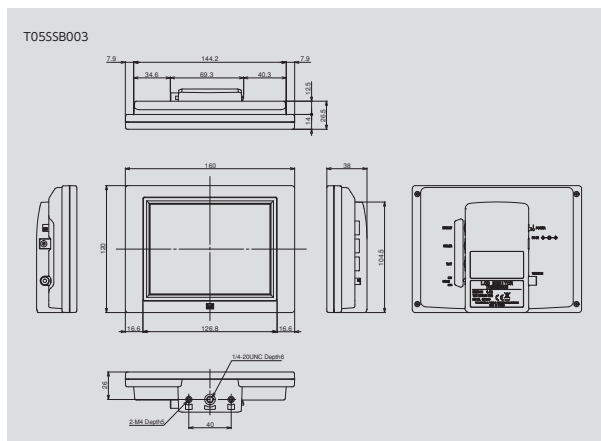
# VR570
## Image recorder

Details are here.

### Features
- Motion picture (MP4) and still picture (JPEG) can be recorded to and reproduced from SD/SDHC card with monitoring by connecting to analog CTV camera. (NTSC/PAL)
- Bright and clear 5.6 inch TFT color LCD module.
- High quality image can be recorded even in low bit rate with applying H.264 as motion picture compression technology.
- Still image can be recorded during recording or reproducing motion picture.
- Complying to SDHC card with maximum 32GB capacity, achieved long time recording.
- Recorded image can be reproduced with MP4 media player in PC.

### Dimensions
VR570

USB3.0  
GigE  
CameraLink  
CoaX  
Smart Photo Sensor  
DVI Camera  
Analog Camera  
Camera Data  
Monitor  
Accessories  
Appendix

# Monitor/Image Recorder
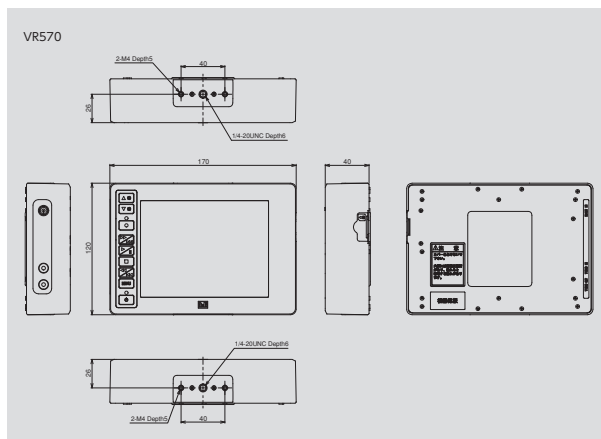
## Specifications

| B/W / COLOR | B/W | COLOR | COLOR |
|---|---|---|---|
| Item — Model Name | 9LM20SB | T05SSB003 | VR570 |
| Display area | 170.4(H) × 127.8 (V) mm | 113.3 (H) × 84.7 (V) mm | |
| Resolution | 256-gradation  800 (H) × 600 (V) dot | 320 (RGB) (H) × 234 (V) dot | |
| Back light | LED Edge light type | 3 x 6 LED back light system | CCFL system |
| Display interface | Based on EIA standard (Interlace) | NTSC (M) / PAL (B・G) format compatible | NTSC/PAL |
| Input level | 1.0V (p-p) (VIDEO 0.7 V (p-p) SYNC 0.3 V (p-p) ) | VBS : 1.0 V (p-p) 75 Ω | |
| Connector | BNC connector × 1 line | RCA pin jack × 1 line | RCA pin jack input × 1 line, output × 1 line |
| Brightness | 450 cd/m² (Typ) / 350 cd/m² (Min) | 500 cd/m² (Typ) / 360 cd/m²(Min) | 450 cd/m² (Typ) |
| Contrast | 600 : 1 (Typ) | 300 : 1 (Typ) | 400 : 1 (Typ) |
| Power Supply | DC12 V ± 0.5 V | | DC12 V ± 5 % |
| Power Consumption | 0.7 A MAX | 0.45 A MAX | 0.9 A MAX |
| Operation Assurance | Temperature : 0℃ to 35℃ Humidity : 20% to 85% (no condensation) | Temperature : 0℃ to 40℃ Humidity : 20% to 85% (no condensation) | Temperature : 0℃ to 40℃ Humidity : 10% to 80% (no condensation) |
| Dimensions | 220 (W) × 250 (H) × 130 (D) mm | 160(W) × 120(H) × 38(D) mm | 170(W) × 120(H) × 40(D) mm |
| Weight | less than 1.6 kg | Approx. 400 g | Approx. 570 g |
| Conformity | CE, FCC, RoHS, WEEE | | |
| Storage media | — | | SD card : 1GB, 2GB  SDHC card : 4GB, 8GB, 16GB, 32GB |
| Recording quality | — | | Still images : JPEG Full : 640 × 480 (NTSC), Small : 320 × 240 (NTSC) Full : 768 × 576 (PAL), Small : 384 × 288 (PAL) Video images : MP4 Full : 720 × 480 30 fps (NTSC), Small : 320 × 240 30 fps (NTSC) Full : 720 × 576 25fps (PAL), Small : 360 × 288 25fps (PAL) |

# Power supply adapter (option)

### Outline
Power supply adapter for cameras and monitors.

# CA130D/ CA130D-01
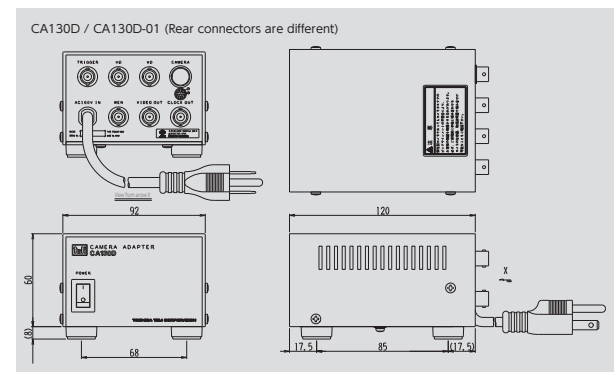
## Dimensions



CA130D / CA130D-01 (Rear connectors are different)

· Interface connector of image processor is suitable for BNC.
· Using with 12 core multiple cable.

* This model is for Japanese market only.



# STD-12020T-H

· Suitable for using camera in internal synchronism.



# STD-1225P-L



# SPU16A-105-ASN

· Power supply for HD or FULL HD camera.

# Power supply adapter (option)

## Specifications

| Item \ Model Name | CA130D/CA130D-01 | STD-12020T-H | SPU16A-105-ASN | STD-1225P-L |
|---|---|---|---|---|
| Input voltage | AC100 V ± 10%   50/60 Hz | AC100 to 240 V (47 to 63 Hz) | AC100 to 240 V | |
| Output voltage | DC12 V ± 5% | | DC12 V ± 10% | DC12 V ± 5% |
| Output current | 0.9 A | 2.0 A MAX | 1.25 A MAX | 2.5 A MAX |
| Dimensions | 92(W) × 68(H) × 120(D) mm | 50(W) × 34(H) × 88(D) mm | 38(W) × 36(H) × 91(D) mm | 58(W) × 34(H) × 95(D) mm |
| Weight | Approx. 1 kg | Approx. 200 g | Approx. 165 g | Approx. 230 g |
| Conformity | PSE | CE, FCC, PSE | | |

## Power supply adapter/Cable/Tripod attachment compatibility table

| Camera Model | Options | CA130D | CA130D-01 | STD-12020T-H | SPU16A-105-ASN (Power supply cable (Option) (APC1025-01P)) | CPC3440 (12Pin-12Pin) | CPRC3700 (12Pin-12Pin, Robot type) | CPCBG-XX (6Pin-12pin) | CPCDS60CM3 (DC plug-12pin) | Tripod attachment |
|---|---|---|---|---|---|---|---|---|---|---|
| Digital cameras — USB3.0 | BU030 | Supplied from USB 3.0 cable, so not needed | | | | (USB 3.0 cable) | | | | CPTBU |
| | BU031 | | | | | | | | | CPTBU |
| | BU080 | | | | | | | | | CPTBU |
| | BU130 | | | | | | | | | CPTBU |
| | BU205M | | | | | | | | | CPTBU |
| | BU238M | | | | | | | | | CPTBU |
| | BU406M | | | | | | | | | CPTBU |
| | DU657M | | | | | | | | | CPTC6M |
| | BU030C/CF | | | | | | | | | CPTBU |
| | BU130C/CF | | | | | | | | | CPTBU |
| | BU238MC/MCF | | | | | | | | | CPTBU |
| | BU406MC/MCF | | | | | | | | | CPTBU |
| | DU657MC | | | | | | | | | CPTC6M |
| | BU1203MCF | | | | | | | | | CPTBU |
| Digital cameras — GigE (PoE) | BG030 | Supplied from Gig-E cable, so not needed | | | | When not Poe, Use CPCBG-XX (*1) | | | | CPT8600 |
| | BG031 | | | | | | | | | CPT8600 |
| | BG080 | | | | | | | | | CPT8600 |
| | BG130 | | | | | | | | | CPT8600 |
| | BG202 | | | | | | | | | CPT8600 |
| | BG030C/CF | | | | | | | | | CPT8600 |
| | BG130C/CF | | | | | | | | | CPT8600 |
| | BG202C/CF | | | | | | | | | CPT8600 |
| | BG205M-CS | | | | | | | | | CPT8600 |
| | BG205MC-CS/MCF-CS | | | | | | | | | CPT8600 |
| Digital cameras — CSC series | CSCLV90BC3 | Supplied from CameraLink cable, so not needed | | | | PoCL-Lite Cable (*1) | | | | CPT8531A (*2) |
| | CSCV90BC3 | | | | | CameraLink cable (SDR-XXX, PoCL Applied) (*1) | | | | CPT8560 |
| | CSCV125BC3 | | | | | | | | | CPT8560 |
| | CSCX30BC3 | | | | | | | | | CPT8560 |
| | CSCS60BM18 | | | | | | | | | CPT8560 |
| | CSCS20BC2 | | | | | | | | | CPT8560 |
| | CSCU15BC18 | | | | | | | | | CPT8560 |
| | CSCU30BC18 | | | | | CameraLink cable (MDR-XXX, PoCL Applied) (*1) | | | | CPT4000CL |
| | CSCQS15BC23 | ○ | ○ | ○ | | ○ | ○ | | | CPT4000CL |
| | CSC6M100BMP11 | Supplied from CameraLink cable, so not needed | | | | CameraLink cable (SDR-XXX, PoCL Applied Full Configuration) (*1) | | | | CPTC6M |
| | CSC12M25BMP19-01B | ○ | ○ | ○ | | ○ | ○ | | | CPTC12M |
| | CSCV125CC3 | Supplied from CameraLink cable, so not needed | | | | CameraLink cable (MDR-XXX, PoCL Applied) (*1) | | | | CPT8560 |
| | CSCU30CC18 | | | | | | | | | CPT4000CL |
| | CSCQS15CC23 | ○ | ○ | ○ | | ○ | ○ | | | CPT4000F |
| | CSC6M100CMP11 | Supplied from CameraLink cable, so not needed | | | | CameraLink cable (SDR-XXX, PoCL Applied Full Configuration) (*1) | | | | CPTC6M |
| | CSC12M25CMP19 | ○ | ○ | ○ | | ○ | ○ | | | CPTC12M |
| CSX series | CSX12M25CMP19 | Supplied from BNC coaxial cable, so not needed | | | | (BNC coaxial cable) | | | | CPTC12M |
| DVI Camera | CSDS60CM3 | | ○ | | ○ | | | | ○ | CPT8420 |
| Analog Camera | CS8550Di/-50 | ○ | ○ | | | ○ | ○ | | | CPT8550 |
| | CS8550i-01/-51 | ○ | ○ | | | ○ | ○ | | | CPT8550 |
| | CS8560BD | ○ | ○ | | | ○ | ○ | | | CPT8560 |
| | CS8570D | ○ | ○ | | | ○ | ○ | | | CPT8560 |
| | CS8620Bi/CS8630Bi | ○ | ○ | | | ○ | ○ | | | CPT8600 |
| | CS8620BHi/CS8630BH | ○ | ○ | | | ○ | ○ | | | CPT8600 |
| Monitor | 9LM20SB | Specialized (STD-1225P-L) | | | | – | – | – | – | – |
| | T05SSB003 | Specialized (STD-1225P-L(V)) | | | | – | – | – | – | – |
| | VR570 | Specialized (STD-1225P-L) | | | | – | – | – | – | – |

○ Can be used.   *1 Depend on each grabber.   *2 B meta (Option) is necessary for attach tripod.

USB3.0

GigE

CameraLink

CoaX

Smart Photo Sensor

DVI Camera

Analog Camera

Camera Data

Monitor

Accessories

Appendix

# Cables (options)

## ■Power supply for GigE camera  CPCBG

| Model | Cable length |
|---|---|
| CPCBG-03 | 3m |
| CPCBG-05 | 5m |

●Applicable cameras

| | |
|---|---|
| BG030 | BG205M-CS |
| BG031 | BG030C/CF |
| BG080 | BG130C/CF |
| BG130 | BG202C/CF |
| BG202 | BG205MC-CS/MCF-CS |

## ■Cable between camera and power supply adapter (12 Pin - 12 Pin)  CPC3440-XX

| Model | Cable length |
|---|---|
| CPC3440-02 | 2m |
| CPC3440-03 | 3m |
| CPC3440-05 | 5m |
| CPC3440-10 | 10m |

●Applicable cameras

| | |
|---|---|
| CSCQS15BC23 | CSCQS15CC23 |
| CSC12M25BMP19-01B | CSC12M25CMP19 |
| CS8550Di/-50 | CS8550i-01/-51 |
| CS8560BD | CS8570D |
| CS8620Bi | CS8630Bi |
| CS8620BHi | CS8630BH |

## ■Cable between camera and power supply adapter (12 Pin - 12 Pin)  CPRC3700-XX

| Model | Cable length |
|---|---|
| CPRC3700-02 | 2m |
| CPRC3700-03 | 3m |
| CPRC3700-05 | 5m |
| CPRC3700-10 | 10m |

●Applicable cameras

| | |
|---|---|
| CSCQS15BC23 | CSCQS15CC23 |
| CSC12M25BMP19-01B | CSC12M25CMP19 |
| CS8550Di/-50 | CS8550i-01/-51 |
| CS8560BD | CS8570D |
| CS8620Bi | CS8630Bi |
| CS8620BHi | CS8630BH |

## ■Cable between camera and power supply adapter (DC plug - 12 P)  CPCDS60CM3-XX

| Model | Cable length |
|---|---|
| CPCDS60CM3-03 | 3m |
| CPCDS60CM3-06 | 6m |

●Applicable camera

CSDS60CM3

## ■Recommended USB3.0 cable

| Cable length | Maker | Model | Robot Type |
|---|---|---|---|
| 3m | HIRAKAWA HEWTECH CORP | UB3-ST-SA0-MBS-0300-00K | × |
| | | UB3-HF-SA0-MBS-0300-00K | ○ |
| | Oki Electronic Cable Co., Ltd | USB-KR1-A-MBS-030 | ○ |
| | NISSEI ELECTRIC CO.,LTD. | NU3MBASU3S 3m | × |
| | | NU3MBASU3B 3m | ○ |
| 5m | HIRAKAWA HEWTECH CORP | UB3-ST-SA0-MBS-0500-00K | × |
| | | UB3-HF-SA0-MBS-0500-00K | ○ |
| | Oki Electronic Cable Co., Ltd | USB-KR1-A-MBS-050 | ○ |
| 20m | EverPro Technologies | Active Optical cable (AOC Hybrid) | ○ |

* We are possible to supply above USB cables, please contact our sales staff or dealer.
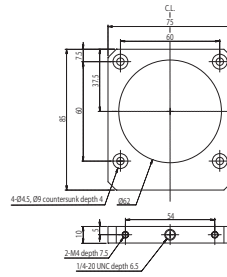
# Tripod attachment (option)

## ■CPT8600
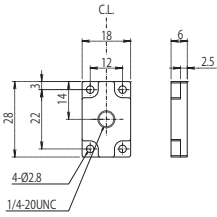


●Applicable cameras
BG030
BG031
BG080
BG130
BG202
BG205M-CS
BG030C/CF
BG130C/CF
BG202C/CF
BG205MC-CS
BG205MCF-CS
CS8620Bi/CS8620BHi
CS8630Bi/CS8630BH

## ■CPTC12M



●Applicable cameras
CSC12M25BMP19-01B
CSC12M25CMP19
CSX12M25CMP19

## ■CPT8560
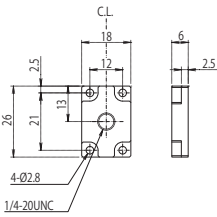


CSCV125BC3
CSCV125CC3
CSCV90BC3
CSCX30BC3
CSCS20BC2
CSCU15BC18
CS8560BD
CS8570D

## ■CPT8550
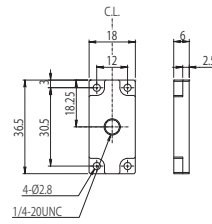


CS8550Di/-50
CS8550i-01/-51

## ■CPT8531A
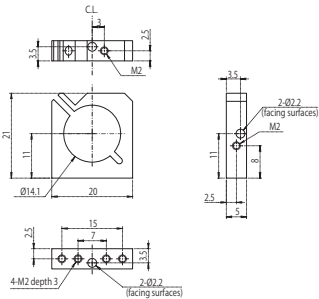


CSCLV90BC3

## ■CPT8420
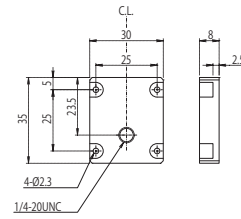


CSDS60CM3

## ■CPT4000F
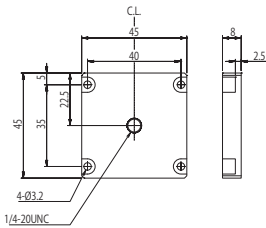


CSCQS15CC23

## ■CPT4000CL
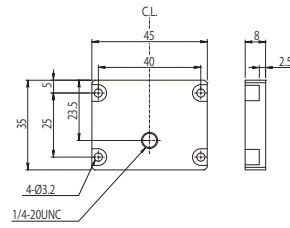


CSCU30BC18
CSCU30CC18
CSCQS15BC23

## ■CPTBU
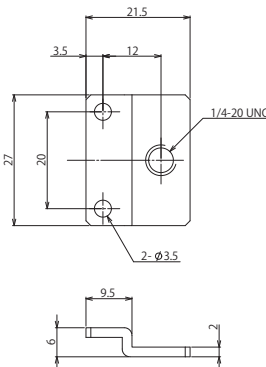


BU030
BU031
BU080
BU130
BU205M
BU238M
BU406M
BU030C/CF
BU130C/CF
BU238MC/MCF
BU406MC/MCF
BU1203MCF

## ■CPTC6M
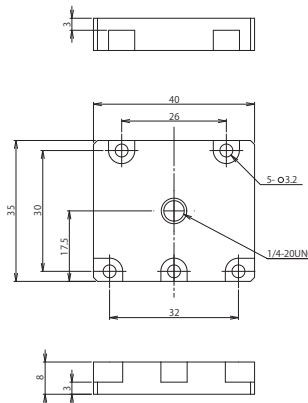


DU657M
DU657MC
CSC6M100BMP11
CSC6M100CMP11

USB3.0
GigE
CameraLink
CoaX
Smart Photo Sensor
DVI Camera
Analog Camera
Camera Data
Monitor
Accessories
Appendix

# Explanation of Lens Specifications

## ◎How to Get the Basic Selection of a Lens for Your Camera

To utilize an industrial camera, you need to select a lens and a camera to suit the desired purposes besides selecting a sensor from various imaging devices. Here we describe an applicable procedure of selecting a lens with "(5) Lens Equation" as shown in the next item "Explanation of Optical Terms".

### ■Sample Exercise

You need to get images of a subject which has a height of 30 mm to fill the entire screen, with 8 mm diameter type (type 1/2) and VGA format camera from approximately 200 mm working distance.

### ■Calculation for Selection

Firstly, you have to calculate a image size of your camera. The resolution of VGA cameras is 640 (H) by 480 (V). Thus, "the diagonal resolution D" is given by $D=\sqrt{(640^2+480^2)}=800$ pixels. With "the diagonal image size $Y'_D$", "the vertical image size $Y'_v$" is calculated as:

$$Y'_v = Y'_D \frac{V}{D} = 8 \frac{480}{800} = 4.8 \text{ mm}$$

Hence "the optical magnification M" is caluculated by the Lens Equation (c):

$$M = \frac{B}{A} = \frac{Y'_v/2}{Y_v/2} = \frac{4.8/2}{30/2} = 0.16$$

"The focal length of a lens f" can be calculated by equation (c). When the working distance $x_0 = 200$ mm, the focal length $f_0$ is given by

$$f_0 = Mx_0 = 0.16 \cdot 200 = 32 \text{ mm}$$

You can use 35 mm C-Mount lenses which is available in the market. Here, we will define the approximated value 35 mm as f. In this case, "the object distance x" is given by:

$$x = \frac{f}{M} = \frac{35}{0.16} = 218.75 \text{ mm}$$

The object distance x is the length from the front focal point of the lens. When you express "the object distance a" as a length from the principal point of the lens to the object, a becomes a value which is added the focal length to the x. Thus a=x+f=218.75+35=253.75 mm.

With a lens which is focus adjustable up to approx. 300 mm, "the thickness x' " of the extension ring(s) you can use, is given by the equation (c).

$$x' = f M = 35 \cdot 0.16 = 5.6 \text{ mm}$$

In this case, you should use a 5 mm thickness extension ring(s), and then adjust the rest 0.6 mm with the focusing mechanism of the lens.

## ◎Explanation of Optical Terms

### (1) Image Size of a Camera

The light receiving surface size of an image sensor is referred to as the "Image Size". In case of an area sensor, an image size is expressed with the diagonal length of a sensor (unit: mm), and forms such as "TYPE" or "INCH( ″)" customarily. Popular industrial cameras use image sizes with a 11 mm dia. (type 2/3), 8 mm dia. (type 1/2), and/or 6 mm dia. (type 1/3). Recently the varieties of image size are increasing. The applicable lens needs an image circle which is larger than the image size of a camera.
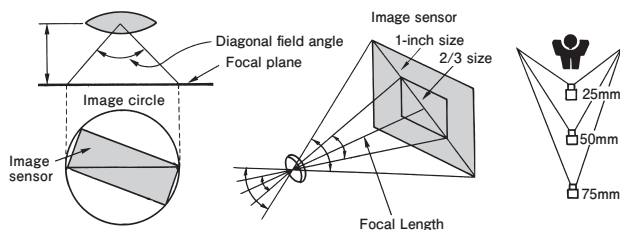


### (2) Focal Point and Focal Length

The most photographic lenses regard as convex lenses generally. When parallel lights are entered from a side of a lens, the lights are collected to a point on the axis of the other side. The point is referred to as "focal point", and the point is referred to as "principal point" because it regards as the center of lens. Also The distance from principal point to focal point is referred to as the "focal length". The 12 mm, 16 mm, 25 mm, etc. focal length are often used in general C-Mount lenses.

### (3) F/# (F-number)

「"The F/#" is used as an indicator for a brightness of a lens. F/# (F) is calculated by "the focal length (f)" and "the effective aperture of lens (d)" as F=f/d. The smaller value expresses brighter. The F/# value is expressed to a geometric progressions of square root of 2, such as F1.4, F2, F2.8, F4···, etc. The value increases by square root of 2, with a half reduction for the amount of a light.

### (4) Field of View, Field of Angle, and Optical Magnification

The capture areas by image sensor are different depending the focal length and/or the working distance. The area is referred to as "Field of View (FOV)" and indicated at the angle is called "Angle of View (AOV)". Also the ratio of FOV to the sensor size is referred to as "Optical Magnification".

### (5) Lens Equation

There are two kinds indicated in the next as the formula which indicates an image formation relation of the lens.

(a) The Gaussian Lens Equation

$$\frac{1}{a} + \frac{1}{b} = \frac{1}{f}$$

(b) The Newtonian Lens Equation

$$x \, x' = f^2$$

The Gaussian Lens Equation (a) is generally well-known, but we will recommend you convenience and use of the Newtonian Lens Equation (b) because it's compatible, with the use for which extension ring(s) is used. The "Optical Magnification M", the "FOV", and the "AOV" are given by

(c) Optical Magnification (M)

$$M = \frac{B}{A} = \frac{b}{a} = \frac{f}{x} = \frac{x'}{f}$$

(d) Field of View (FOV) (FOV)

$$FOV = 2A = 2 \frac{B}{M} = 2 \frac{Bx}{f} = 2 \frac{Bf}{x'}$$

The half of the image size of sensor is substituted for B (Image Height).

(e) Angle of View (AOV)

$$AOV = 2\theta = 2\tan^{-1} \frac{B}{f+x'}$$

### ■Explanation of Symbols

f : focal length (from principal point H to focal point)
a : distance from object to principal point H
b : distance from principal point H to image plane
x : distance from object to front focal point ($f_1$)
x' : distance from rear focal point ($f_2$) to image plane
M : Optical Magnification
A : Object Height (from the optical axis)
B : Image Height (from the optical axis)
FOV : Field of View
AOV : Angle of View
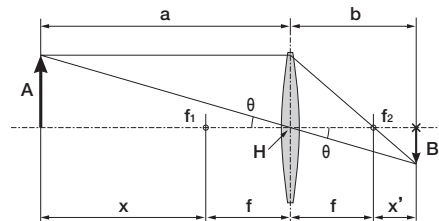


### (6) Imaging at Short Working Distance

The Newtonian Lens Equation (b) shows that image position is moved as x' when object is located in finite distance. Lenses which have focusing mechanism can match focal point with sensor by move the image x' using the focus ring. In case of using focus ring less lenses, you can focus by extension ring(s) whose thickness is identical x'.
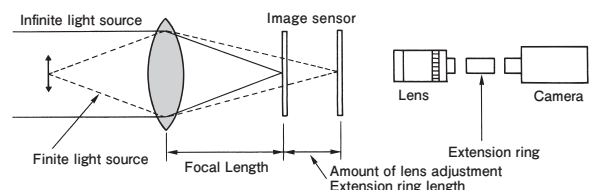
# Lens (options)

## ■Compact Lenses (Recommended Camera Class: approx. 0.3M)

| Model | 219HA | 25HA | 17HF | 20HC |
|---|---|---|---|---|
| Image Size [Type] | 2/3 | 2/3 | 2/3 | 2/3 |
| Focal Length [mm] | 8 | 12 | 16 | 25 |
| Aperture (F/#) | 1.4 | 1.8 | 1.4 | 1.6 |
| Image Circle [mm] | 11 | 11 | 11 | 11 |
| Applicable Pixel Pitch [μm] | 13.8 | 13.8 | 13.8 | 13.8 |
| Ext. Dimensions [mm] | φ29 × 27 | φ29 × 27 | φ30.5 × 25 | φ30.5 × 25.5 |
| Weight [g] | 40 | 40 | 50 | 40 |

| Model | 35HB | 21HC | 1A1HB |
|---|---|---|---|
| Image Size [Type] | 2/3 | 2/3 | 2/3 |
| Focal Length [mm] | 35 | 50 | 75 |
| Aperture (F/#) | 2.1 | 2.8 | 3.9 |
| Image Circle [mm] | 11 | 11 | 11 |
| Applicable Pixel Pitch [μm] | 13.8 | 13.8 | 13.8 |
| Ext. Dimensions [mm] | φ30.5 × 32 | φ30.5 × 38.5 | φ30.5 × 65.5 |
| Weight [g] | 44 | 52 | 68 |

## ■High Resolution Lenses (Recommended Camera Class: approx. 1.5M-2M)

| Model | DF6HA-1 | HF9HA-1 | HF12.5HA-1 | HF16HA-1 |
|---|---|---|---|---|
| Image Size [Type] | 1/2 | 2/3 | 2/3 | 2/3 |
| Focal Length [mm] | 6 | 9 | 12.5 | 16 |
| Aperture (F/#) | 1.4 | 1.8 | 1.4 | 1.6 |
| Image Circle [mm] | 8 | 11 | 11 | 11 |
| Applicable Pixel Pitch [μm] | 4.5 | 6.2 | 6.2 | 6.2 |
| Ext. Dimensions [mm] | φ29.5 × 36.7 | φ29.5 × 35 | φ29.5 × 29.5 | φ29.5 × 29.5 |
| Weight [g] | 55 | 55 | 45 | 45 |

| Model | HF25HA-1 | HF35HA-1 | HF50HA-1 | HF75HA-1 |
|---|---|---|---|---|
| Image Size [Type] | 2/3 | 2/3 | 2/3 | 2/3 |
| Focal Length [mm] | 25 | 35 | 50 | 75 |
| Aperture (F/#) | 1.4 | 1.6 | 2.3 | 2.8 |
| Image Circle [mm] | 11 | 11 | 11 | 11 |
| Applicable Pixel Pitch [μm] | 6.2 | 6.2 | 6.2 | 6.2 |
| Ext. Dimensions [mm] | φ29.5 × 29.5 | φ29.5 × 29.5 | φ29.5 × 29.5 | φ29.5 × 48 |
| Weight [g] | 45 | 45 | 45 | 55 |

| Model | M118FM06 | M118FM08 | M118FM12 |
|---|---|---|---|
| Image Size [Type] | 1/1.8 | 1/1.8 | 1/1.8 |
| Focal Length [mm] | 6 | 8 | 12 |
| Aperture (F/#) | 1.4 | 1.4 | 1.8 |
| Image Circle [mm] | 8.9 | 8.9 | 8.9 |
| Applicable Pixel Pitch [μm] | 4.4 | 4.4 | 4.4 |
| Ext. Dimensions [mm] | φ29 × 44.3 | φ29 × 27.3 | φ29 × 35.3 |
| Weight [g] | — | 44 | — |

| Model | M118FM16 | M118FM25 | M118FM50 |
|---|---|---|---|
| Image Size [Type] | 1/1.8 | 1/1.8 | 1/1.8 |
| Focal Length [mm] | 16 | 25 | 50 |
| Aperture (F/#) | 1.4 | 1.6 | 2.8 |
| Image Circle [mm] | 8.9 | 8.9 | 8.9 |
| Applicable Pixel Pitch [μm] | 4.4 | 4.4 | 4.4 |
| Ext. Dimensions [mm] | φ29 × 24.1 | φ29 × 35 | φ29 × 62.6 |
| Weight [g] | 39 | 39 | 52 |

| Model | FL-HC1214-2M | FL-CC1614-2M | FL-CC2514-2M |
|---|---|---|---|
| Image Size [Type] | 1/2 | 2/3 | 2/3 |
| Focal Length [mm] | 12 | 16 | 25 |
| Aperture (F/#) | 1.4 | 1.8 | 1.4 |
| Image Circle [mm] | 8 | 11 | 11 |
| Applicable Pixel Pitch [μm] | 3.9 | 5.4 | 5.4 |
| Ext. Dimensions [mm] | φ29.5 × 28.5 | φ29.5 × 33.2 | φ29.5 × 32 |
| Weight [g] | 55 | 63 | 55 |

| Model | FL-CC3516-2M | FL-CC5028-2M | FL-CC7528-2M |
|---|---|---|---|
| Image Size [Type] | 2/3 | 2/3 | 2/3 |
| Focal Length [mm] | 35 | 50 | 75 |
| Aperture (F/#) | 1.6 | 2.1 | 2.8 |
| Image Circle [mm] | 11 | 11 | 11 |
| Applicable Pixel Pitch [μm] | 5.4 | 5.4 | 5.4 |
| Ext. Dimensions [mm] | φ29.5 × 35.4 | φ29.5 × 34 | φ34 × 59.6 |
| Weight [g] | 64 | 55 | 125 |

# Lens (options)

## ■High Resolution Lenses (Recommended Camera Class: approx. 5M)

| Model | KCM-1216UMP5 | KCM-1616UMP5 | KCM-2016UMP5 | KCM-2516UMP5 | KCM-3514UMP5 |
|---|---|---|---|---|---|
| Image Size [Type] | 1 | 1 | 1 | 1 | 1 |
| Focal Length [mm] | 12 | 16 | 20 | 25 | 35 |
| Aperture (F/#) | 1.6 | 1.6 | 1.6 | 1.6 | 1.4 |
| Image Circle [mm] | 16 | 16 | 16 | 16 | 16 |
| Applicable Pixel Pitch [μm] | 5 | 5 | 5 | 5 | 5 |
| Ext. Dimensions [mm] | φ54 × 60.4 | φ47.5 × 57.8 | φ43 × 55.0 | φ43 × 51.4 | φ43 × 49.0 |
| Weight [g] | 185 | 201 | 163 | 157 | 154 |

## ■High Resolution Lenses (Recommended Camera Class: approx. 9M)

| Model | M23FM06 | M23FM08 | M23FM12 | M23FM16 |
|---|---|---|---|---|
| Image Size [Type] | 2/3 | 2/3 | 2/3 | 2/3 |
| Focal Length [mm] | 6 | 8 | 12 | 16 |
| Aperture (F/#) | 1.8 | 1.8 | 1.8 | 1.8 |
| Image Circle [mm] | 11 | 11 | 11 | 11 |
| Applicable Pixel Pitch [μm] | 2.5 | 2.5 | 2.5 | 2.5 |
| Ext. Dimensions [mm] | φ69.9 × 42 | φ55 × 59.1 | φ55 × 67.2 | φ55 × 83.9 |
| Weight [g] | 240 | 280 | 333 | 358 |

| Model | M23FM25 | M23FM35 | M23FM50 |
|---|---|---|---|
| Image Size [Type] | 2/3 | 2/3 | 2/3 |
| Focal Length [mm] | 25 | 35 | 50 |
| Aperture (F/#) | 1.8 | 1.8 | 2.8 |
| Image Circle [mm] | 11 | 11 | 11 |
| Applicable Pixel Pitch [μm] | 2.5 | 2.5 | 2.5 |
| Ext. Dimensions [mm] | φ55 × 87.2 | φ55 × 87.2 | φ55 × 88.25 |
| Weight [g] | 380 | 388 | 374 |

| Model | VS-0618H1 | VS-0814H1 | VS-1214H1 |
|---|---|---|---|
| Image Size [Type] | 1 | 1 | 1 |
| Focal Length [mm] | 6 | 8 | 12 |
| Aperture (F/#) | 1.8 | 1.4 | 1.4 |
| Image Circle [mm] | 16 | 16 | 16 |
| Applicable Pixel Pitch [μm] | 3.7 | 3.7 | 3.7 |
| Ext. Dimensions [mm] | φ64.5 × 57.2 | φ57 × 59 | φ38 × 48 |
| Weight [g] | 200 | — | 140 |

| Model | VS-1614H1N | VS-2514H1 | VS-3514H1 |
|---|---|---|---|
| Image Size [Type] | 1 | 1 | 1 |
| Focal Length [mm] | 16 | 25 | 35 |
| Aperture (F/#) | 1.4 | 1.4 | 1.4 |
| Image Circle [mm] | 16 | 16 | 16 |
| Applicable Pixel Pitch [μm] | 3.7 | 3.7 | 3.7 |
| Ext. Dimensions [mm] | φ38 × 45 | φ38 × 33.5 | φ38 × 35 |
| Weight [g] | — | 90 | 100 |

| Model | VS-5018H1 | VS-7525H | VS-10028H |
|---|---|---|---|
| Image Size [Type] | 1 | 1 | 1 |
| Focal Length [mm] | 50 | 75 | 100 |
| Aperture (F/#) | 1.8 | 2.5 | 2.8 |
| Image Circle [mm] | 16 | 16 | 16 |
| Applicable Pixel Pitch [μm] | 3.7 | 3.7 | 3.7 |
| Ext. Dimensions [mm] | φ44 × 44.5 | φ36 × 49.5 | φ39 × 66.5 |
| Weight [g] | 135 | 85 | 105 |
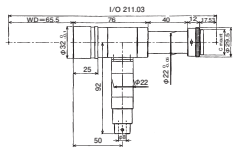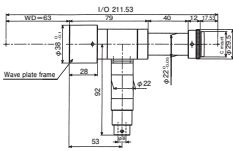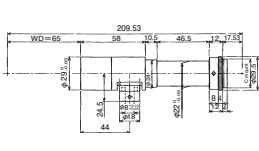
## ■High Resolution Lenses (Recommended Camera Class: approx. 5M-12M)

| Model | HF1618V | HF2514V | HF3514V | HF5018V | HF7518V |
|---|---|---|---|---|---|
| Image Size [Type] | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| Focal Length [mm] | 16 | 25 | 35 | 50 | 70 |
| Aperture (F/#) | 1.8 | 1.4 | 1.4 | 1.8 | 1.8 |
| Image Circle [mm] | 17.4 | 17.4 | 17.4 | 17.4 | 17.4 |
| Applicable Pixel Pitch [μm] | 5.4 | 5.4 | 5.4 | 5.4 | 5.4 |
| Ext. Dimensions [mm] | φ51 × 91.5 | φ54 × 74.5 | φ49.5 × 61.5 | φ51 × 74.5 | φ57 × 116.5 |
| Weight [g] | 300 | 295 | — | 245 | 490 |

| Model | M111FM50 |
|---|---|
| Image Size [Type] | 1.1 |
| Focal Length [mm] | 50 |
| Aperture (F/#) | 1.8 |
| Image Circle [mm] | 17.4 |
| Applicable Pixel Pitch [μm] | 3.5 |
| Ext. Dimensions [mm] | φ51 × 94.7 |
| Weight [g] | 415 |

# Lens (options)

## ■Telecentric Lenses w/ Coaxial Illumination (1.1 Type)

| | | | |
|---|---|---|---|
| Outline View |  |  |  |
| Model | **MP-1F-65-S** | **MP-1F-65P** | **MP-2F-65** |
| Image Size [Type] | 1.1 | 1.1 | 1.1 |
| Magnification [×] | 1 | 1 | 2 |
| Object Side NA | 0.063 | 0.063 | 0.1 |
| Effective Aperture (F/#) | 8 | 8 | 10 |
| Working Distance [mm] | 65.5 | 62.5 | 65 |
| Image Circle [mm] | 17.4 | 17.4 | 17.4 |
| Applicable Pixel Pitch [μm] | 8.5 | 8.5 | 8.5 |
| Ext. Dimensions [mm] | Length : 133.1 | Length : 136.1 | Length : 127 |
| Weight [g] | 185 | 215 | 130 |

## ■High Resolution Lenses (4/3 Type, Recommended Camera Class: approx. 8.4M-10M)

| Model | **LM8XC2** | **LM12XC2** | **LM16XC2** |
|---|---|---|---|
| Image Size [Type] | 4/3 | 4/3 | 4/3 |
| Focal Length [mm] | 8.5 | 12 | 16 |
| Aperture (F/#) | 2.8 | 2 | 2 |
| Image Circle [mm] | 23 | 23 | 23 |
| Applicable Pixel Pitch [μm] | 5.5 | 5.5 | 5.5 |
| Ext. Dimensions [mm] | φ74 × 82.5 | φ57 × 85 | φ45 × 79.5 |
| Weight [g] | 245 | 270 | 250 |

| Model | **LM25XC2** | **LM35XC2** | **LM50XC2** |
|---|---|---|---|
| Image Size [Type] | 4/3 | 4/3 | 4/3 |
| Focal Length [mm] | 25 | 35 | 50 |
| Aperture (F/#) | 2 | 2 | 2 |
| Image Circle [mm] | 23 | 23 | 23 |
| Applicable Pixel Pitch [μm] | 5.5 | 5.5 | 5.5 |
| Ext. Dimensions [mm] | φ45 × 89 | φ45 × 74 | φ47 × 78 |
| Weight [g] | 255 | 210 | 235 |

| Model | **KCM-2520U43MP10** | **KCM-3520U43MP10** | **KCM-5020U43MP10** |
|---|---|---|---|
| Image Size [Type] | 4/3 | 4/3 | 4/3 |
| Focal Length [mm] | 25 | 35 | 50 |
| Aperture (F/#) | 2 | 2 | 2 |
| Image Circle [mm] | 23 | 23 | 23 |
| Applicable Pixel Pitch [μm] | 5 | 5 | 5 |
| Ext. Dimensions [mm] | φ48 × 82.7 | φ44.6 × 54.9 | φ44.6 × 53.7 |
| Weight [g] | 250 | 173 | 170 |

## ■Telecentric Macro Zoom Lenses (4/3 Type, Recommended Camera Class: approx. 21M)

| Model | **LM1119TC** | |
|---|---|---|
| Image Size [Type] | 4/3 | |
| Magnification [×] | 0.5 | 1.0 |
| Object Side NA | 0.05 ~ 0.007 | 0.1 ~ 0.014 |
| Working Distance [mm] | 80 | 81.8 |
| Image Circle [mm] | 23 | |
| Applicable Pixel Pitch [μm] | 3.5 | |
| Ext. Dimensions [mm] | φ82 × 151.5 | |
| Weight [g] | 1,000 | |

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# Lens (options)

## ■TFL-Ⅱ Mount Lenses

Applicable cameras : CSC12M25BMP19-01B
CSC12M25CMP19
CSX12M25CMP19

| Outline View | |
|---|---|
| Model | **FV5026W-TFL II** |
| Focal Length | 50mm |
| Max Aperture Ratio | 1：2.6 |
| Image Side | 320 ～ ∞ |
| Resolving Power（center） | 200L／mm |
| Optical Distortion | 0.11% |
| Max Image Format | φ45mm |

| Outline View | | | | |
|---|---|---|---|---|
| Model | LS05 | LS07 | LS10 | LS15 |
| Magnification ［×］ | 0.5 | 0.7 | 1.0 | 1.5 |

A special TFL-II lens adapter TFL2-MTS is required to use the lenses shown to the left.

| Outline View | | | | |
|---|---|---|---|---|
| Model | ML-L02035 | | ML-L03505 | |
| Magnification ［×］ | 0.2 | 0.35 | 0.35 | 0.5 |
| Max Aperture Ratio | 555.4 ± 16.6 | 345.6 ± 10.4 | 345.6 ± 10.4 | 261.7 ± 7.8 |
| Iris Range | Less than ± 0.1% | | Less than ± 0.1% | |
| Image Circle | 19.3mm | 12.6mm | 12.6mm | 10mm |
| Flange Back | F5.8 ～ 32 | F6.6 ～ 36.6 | F6.6 ～ 36.6 | F7.4 ～ 41 |
| Usable range of magnification | 51.5 | | 51.5 | |

## ■20 mm Cube Camera（M10.5 P0.5 Female Type）Lenses

### High Magnification Lens

| Outline View | | | | | | | |
|---|---|---|---|---|---|---|---|
| Model | NMPL-05LS | NMPL-075LS | NMPL-1LS | NMPL-2LS | NMPL-3LS | NMPL-4LS | NMPL-5LS |
| Magnification ［×］ | 0.5 | 0.75 | 1 | 2 | 3 | 4 | 5 |
| Working Distance ［mm］ | 111 | 108 | 71 | 90 | 70 | 70 | 70 |
| Optics tube Length ［mm］ | 38.1 | 68.1 | 56.1 | 56.1 | 68.1 | 86.1 | 94.1 |

### Coaxial Episcopic Lens

| Outline View | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Model | For Color | NMBL-2LSF | NMBL-3LSF | NMBL-4LSF | NMBL-5LSF | NMBL-6LSF | NMBL-7LSF | NMBL-8LSF |
| | For Black and White | NMBL-2LS | NMBL-3LS | NMBL-4LS | NMBL-5LS | NMBL-6LS | NMBL-7LS | NMBL-8LS |
| Magnification ［×］ | | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Working Distance ［mm］ | | 90 | 70 | 70 | 70 | 64 | 58 | 56 |
| Optics tube Length ［mm］ | | 56.1 | 68.1 | 86.1 | 94.1 | 104.1 | 116.1 | 125.1 |

## ■C/CS mount Conversion Adapter : FP-MA
The adapter when using a C-Mount lens for a CS mount camera.

## ■Extension Ring : FP-RGST
Used in conjunction with C-Mount lenses.
6-piece set consisting of 0.5 mm, 1 mm, 5 mm, 10 mm, 20 mm, and 40 mm rings.

## 1. AGC
Automatic Gain Control. Controls gain automatically to maintain constant output signal levels.

## 2. ALC (AE)
Function to automatically vary the speed of the electronic shutter based on subject brightness to maintain constant output signals. This function is ideal for various applications - for example, when varying the magnification on TV-monitor microscopes. It can also be used in lieu of aperture adjustments with fixed-aperture lenses or optical systems that lack aperture control, like endoscopes.

## 3. Aspect ratio
The ratio of the vertical and horizontal size of a display screen. NTSC systems use a ratio of 4:3. A ratio of 1:1 is used for medical applications, including X-ray systems. A ratio of 16:9 is used for high definition TV.

## 4. BERT
Bit Error Rate Test.

## 5. Binning
A function that increases sensitivity and enlarges the pixel area by combining several adjacent elements on a CCD. The number of pixels in the horizontal and vertical direction is indicated by binning 2 x 1, binning 2 x 2, etc.

## 6. Blooming
Refers to a phenomenon in which intense light entering the imaging unit appears to spread to surrounding areas.

## 7. Bulk trigger
A function to output multiple images by one time trigger. It can be combined with sequential shutter well, and can get images in different conditions sequentially by combination.

## 8. Bus synchronism
A function to synchronize multiple cameras using bus such as USB and so on without trigger signal. It is effective for monitoring and recording multiple spot.

## 9. C mount, CS mount
Threaded type lens mount for visual monitoring system. Specification is standardized as JEITA TT-4506B. Both of C and CS mount have same specification of thread to mount, but different flange back. C mount has 17.526 mm flange back while CS mount has 12.5 mm flange back.
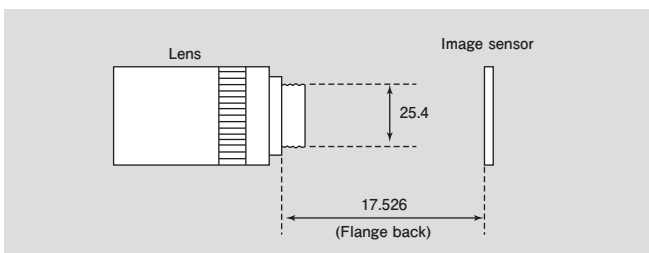


## 10. CameraLink
CameraLink, an interface standard for communication between a camera and frame grabber board, has been reviewed and standardized by the AIA (Automated Imaging Association) with the goal of standardizing previously non-standardized interfaces for cameras and grabber boards. The configurations are the base configuration (one cable) using one set to send and receive, the medium configuration (two cables) using two sets to send and receive, and the full configuration (two cables) using three sets to send and receive.

## 11. CCD Image sensor
CCD image sensor is an initial of Charge-Coupled Device, using charge-coupled phenomenon each next elements to elements, it causes transmission of electronics.
There are two kinds of systems separate by transfer system.

## ●Frame transfer CCD
A CCD that transfers signal charges photoelectrically converted at the photoreceiver to the accumulator during vertical flyback time and then scans in sequence for each line using a horizontal transfer CCD.
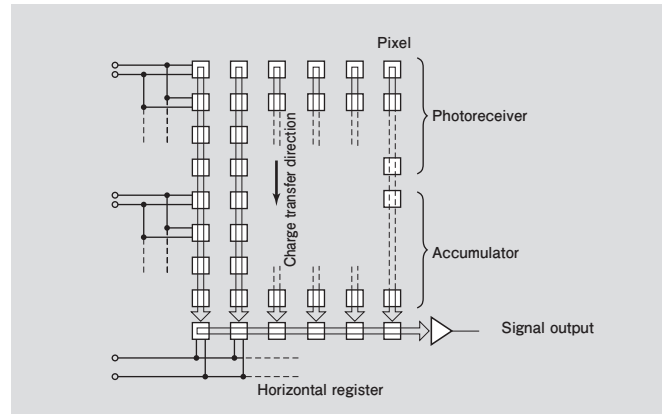


## ●Interline transfer CCD
A CCD that transfers the signal charges photoelectrically converted at the photoreceiver en masse to the vertical register before transferring vertically, transferring horizontally, and scanning each line from the CCD.
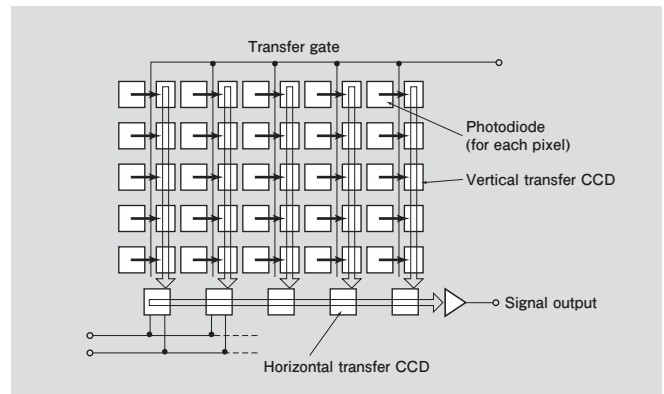


## 12. CMOS image sensor
CMOS is an acronym for Complementary Metal Oxide Semiconductor, a widely-used semiconductor for LSIs and memory. A CMOS image sensor outputs images by scanning the photodiode and amplifier for each pixel. The main advantages are low current consumption and random scanning capacity.
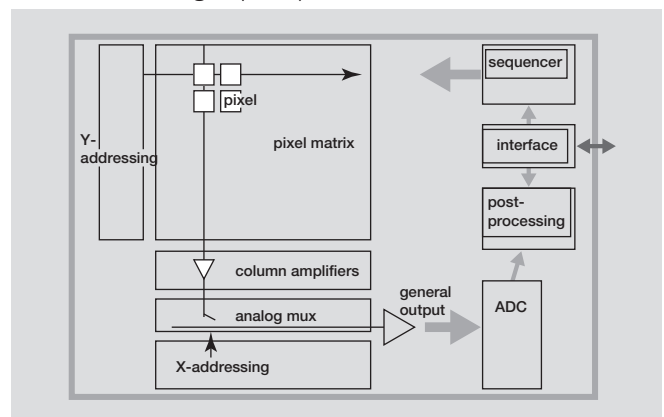


## 13. CoaXPress
An interface standard of camera and frame grabber board. High speed data transfer of 6.25Gbps can be achieved with single coaxial cable. Expected as interface in next generation.

## 14. Color bar
A color standard signal used to adjust the color of color

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monitors. This may take the form of a color bar signal generated electrically by a color bar generator circuit or a color bar chart used for camera adjustments. A color bar consists of seven colors - white, yellow, cyan, green, magenta, red, and blue - counting from left to right.

## 15. Color temperature
The red/yellow/blue radiant energy distribution varies depending on ideal blackbody temperature. This temperature is expressed in K (Kelvin). Color temperature correction filtering or electrical color temperature correction is used, since differences in color temperature for color TV cameras can prevent accurate reproduction of color.

## 16. Composite synchronization signal
Combines vertical and horizontal synchronizing signals into a single system. Systems with separate vertical and horizontal synchronizing signals are called separate sync systems.

## 17. Dark current
Dark current is a signal current present when all light to a lens is blocked; it increases with ambient temperature. Lower values are preferred for image processing applications.

## 18. Depth of field
Range of distance between subject and camera to keep fine pinto. The field becomes deeper by squeezing iris or reducing optical magnification (shorten focus distance or away from subject). The smaller imaging element size, the shallower the depth of field in range of iris with no diffraction.

## 19. Dot clock
Refers to the display time per dot (pixel) converted to frequency.

## 20. DVI
DVI is the acronym for Digital Visual Interface. It is a standard for interfacing LCDs and digital video equipment. It is recognized by the terminal, terminals for digital only are called DVI-D, and for both analog and digital, they are called DVI-I.

## 21. Electronic lines
Electrically generated lines that are superimposed on the monitor's screen to show horizontal and vertical.

## 22. Electronic shutter
Used to produce blur-free images of moving subjects by reducing CCD accumulation times and to adjust sensitivity (e.g., for the ALC function).

## 23. External synchronization
Used to synchronize scan timing when using multiple cameras simultaneously. This may include VBS, VS, or HD/VD. VBS also synchronizes the burst (color) signal. VS synchronizes vertical and horizontal scanning. HD and VD, respectively, synchronize vertical and horizontal scanning. External synchronization is also referred to as genlock (generator lock).

## 24. F mount
Bayonet type lens mount developed for single-lens reflex camera by Nikon. Used for cameras with large size imaging element in industrial field.

## 25. Field/Frame
A single scan from the top to the bottom of the screen is called the field or frame. With interlaced scanning, a screen formed of two fields is called a frame.

## 26. Fixed pattern noise (FPN)
Noise caused by irregularity in the amplifier of each pixel in the image sensor, normally this noise is very large in CMOS.

## 27. Flange back
Refers to the distance from the lens flange surface to the imaging plane in the imaging unit.

## 28. Flicker
Refers to the phenomenon of flickering light and dark screens when imaging under fluorescent lighting.

## 29. Frame rate
Refers to the number of frames captured per second. EIA format cameras are capable of 30 frames per second. High-speed cameras achieve 60 fps, and high-resolution cameras 12 fps.

## 30. Full frame
Refers to the ability to output all data for a frame when using a random trigger shutter. Conventional systems generally enabled the capture of only data for a field (at half the nominal vertical resolution).

## 31. Gamma ($\gamma$) characteristics
For TV cameras, this refers to the signal output for incident light; for monitors, this is the relationship between image brightness and input signals. Linear characteristics ($\gamma = 1$) are preferred for TV systems.

## 32. Gen<i>Cam (GenICam)
A standard, defined by EMVA (European Machine Vision Association), to control camera with common API (Application Program Interface) independent from interface.

## 33. Gigabit Ethernet
The Ethernet connection format is specified by IEEE802.3ab. Normally consisting of four pairs of unshielded twisted pair cables connected using RJ-45 connectors, this standard is compatible with the 10/100BASE-T format used in PC LAN networks. Supports data transfer rates of up to 1 Gbps. The main advantages of Gigabit Ethernet for FA cameras include the elimination of the need for dedicated data importing interface boards and the ability to use cables up to 100 meter long.

## 34. GigE Vision
A camera interface standardized by AIA which works on Gigabit Ethernet technology.

## 35. Global reset
Global reset is a function in rolling shutter camera to gain synchronized image which is same as taken by global shutter. This is suitable for compensating disadvantage of rolling shutter.

## 36. Global shutter function
An electronic shutter system in CMOS image sensors which enables exposure of all pixels simultaneously, as with CCDs. The electronic shutter systems used with earlier CMOS image sensors are called rolling or focal-plane shutters; these shutters typically produce anomalous images with moving subjects unless a mechanical shutter is used, since different pixels are exposed for each line at slightly different times.

## 37. HDMI
HDMI is an acronym for High Definition Multimedia Interface. This is a digital interface that carries video, audio, and control signals on one cable, it is an advancement of DVI.

## 38. Hi-Vision
This indicates HDTV (high definition TV). Full hi vision is 1,920×1,080, there is also 720p (progressive at 1,260×720 pixels) and 1,080i (interlace at 1,920×1,080 pixels).

## 39. IEEE1394
Standard for high-speed serial interfaces permitting transfer speeds of 100 Mbps or more. Transfer speeds are defined as 100 Mbps, 200 Mbps, and 400 Mbps, with standards also provided for speeds of 800 Mbps, 1.6

Gbps, and 3.2 Gbps or higher. IEEE 1394.a allows transfer speeds of up to 400 Mbps; IEEE 1394.b allows transfer speeds exceeding 800 Mbps. Allows up to 63 devices to be connected, with a maximum distance of 4.5 m between devices. Power can be supplied via the bus.

## 40. IIDC, IIDC2 protocol
IIDC is standard control protocol of industrial camera of IEEE1394. IIDC2 is also standard control protocol of camera developed by JIIA (Japan Industrial Imaging Association) and 1394 Trade Association. It is applicable to not only IEEE1394 but CoaXPress, USB3.0, Vision and future interface as well.

## 41. Image band frequency
The frequency characteristics of an image signal, normally expressed as an output signal level for a constant sine wave input and the curve corresponding to the phase frequency.

## 42. Interlacing
Also called interlaced scanning; images on TV monitors are created by scanning alternate lines, creating the completed image with the second scan.

## 43. IR cut filter
A filter which pass through visible light but cut long wave of near infra-red light.

## 44. Minimum luminance
Refers to the maximum sensitivity of a TV camera under practical conditions. If luminance drops below this level, noise tends to increase significantly, and problems arise with contrast detection.

## 45. Moiré
Refers to the phenomenon in which fringes appear on the screen when imaging subjects with a fine grid pattern.

## 46. Multiple shutter
Outputs images exposed using the external trigger signal according to the scanning signal with functions applying a random trigger shutter. Overlapping exposures are possible until the scanning signal is input, enabling strobe-like imaging with moving subjects if the trigger signal is input continuously during imaging. This can also be effective, when using multiple cameras, for inputting simultaneously-exposed images to a processing system by shifting the timing.

## 47. ND filter
A filter which can adjust amount of light without changing color temperature.ND2 adjusts light amount by one step, ND4 adjusts by 2 steps, ND8 adjust by 3 and so on. These can gain accuracy with high color re-production.

## 48. Non-interlacing (Progressive scanning)
A scanning method that scans sequentially, also known as progressive scanning. Interlaced scanning scans alternate lines; this system scans sequentially.

## 49. OSD
An acronym for On-Screen Display, in which multiple setting menus are displayed on screen.

## 50. Partial scanning
Refers to scanning partial areas vertically, such as the middle half; enables images to be output faster than conventional scanning. Programmable partial scanning also allows specification of areas using external pulses.
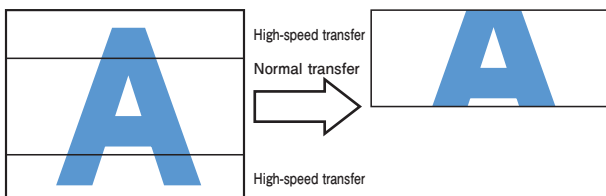


## 51. Pixel count (graphic) designations and units
Toshiba Teli defines computer pixel counts as follows:

| Designation | Horizontal (H) × Vertical (V) |
|---|---|
| | dots       lines |
| VGA | 640 × 480 |
| SVGA | 800 × 600 |
| XGA | 1,024 × 768 |
| SXGA | 1,280 × 1,024 or 1,280 × 960 |
| UXGA | 1,600 × 1,200 |
| QSXGA | 2,560 × 2,048 |

## 52. PoCL
An acronym for Power over CameraLink, in which a power supply circuit has been added according to the CameraLink standard.

## 53. PoCL-Lite
This is a PoCL connection without the RGB transfer capability, there are 14 pin and 26 pin types.

## 54. PoE
An acronym for Power over Ethernet, the power is carried over the Gigabit Ethernet cables.

## 55. Polarity
Indicates the type of synchronizing signal, as shown below.



## 56. Raw data
Electronic signals captured from an image sensor, such as a CCD, that are directly digitalized. Further processing is required to view the data.

## 57. REACH directive
REACH is an acronym for Registration Evaluation Authorization and Restriction of Chemicals. It was implemented in the EU in December 2006 to limit the use of chemicals to protect human health and the environment.

## 58. Resolution
An indication of the ultimate detail with which a subject can be reproduced, resolution is generally measured by the number of black and white lines that can be reproduced per unit of screen height and width. Horizontal resolution describes the horizontal value, while vertical resolution describes the vertical value. If 500 white and black lines can be produced, the resolution is 500.

## 59. Restart/Reset
Images can be obtained at the desired timing according to the restart reset pulse input (VD input) for continuous HD input. This can be used to obtain high sensitivity with long accumulation times, since images are easily produced at low shutter speeds.

## 60. RoHS directive
RoHS is an acronym for Restriction of Hazardous Substances, a directive implemented by the EU in February 2003 to restrict the use of specified hazardous substances in electronic and electrical devices.

## 61. Rolling shutter
Electronic shutter system equipped by CMOS image sensor is generally called rolling shutter or focal plane. As exposure timing of pixel is different in each line, moving subject cannot be shot clearly without mechanical shutter. Sensor with global reset is available recently to avoid this.

## 62. S mount
Threaded type lens mount for machine vision. Specifications

are standardized as JIIA LE-005. S mount, for smaller camera than C mount, is equipped with mounting thread (M12 x 0.5) among mount used for board camera which is suitable for machine vision.

## 63. Scalable

Allows scanning of the screen in units of 1/16th of the screen area. Only adjacent units of rectangular forms can be selected; units of irregular shapes are not permitted. In scalable mode, the camera scans only the specified sections at standard speed, rapidly skipping over other sections, reducing the trigger interval when vertical clipping widths are small. Note that trigger intervals cannot be reduced along the horizontal axis due to the CCD sensor operation mechanism, even when clipping width is reduced.
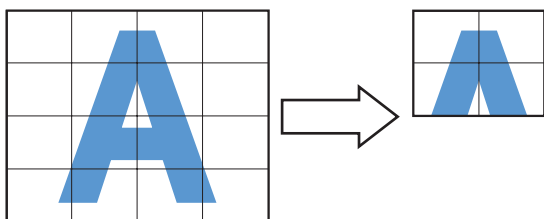


## 64. SDK

Abbreviation of Software Development Kit. A bundle of necessary programs to develop software for a certain system.

## 65. Sequential shutter

A function to get multiple image in different brightness by setting parameters, such as shutter speed and gain, to each memory bank and switching sequentially. It is suitable to get image in wade dynamic range.

## 66. Shading noise

Refers to the distortion between highlights and shadows caused by variations in imaging sensitivity, subject brightness, light transmittance through the lens, and CRT illumination. Shading noise is normally expressed as the degree of signal nonuniformity when the imaging unit is subjected to uniform illumination.

$$\text{Shading} = \frac{\text{Signal maximum} - \text{signal minimum}}{(\text{Signal maximum} + \text{signal minimum}) / 2} \times 100 \ (\%)$$

## 67. Shading noise correction

A sawtooth or parabolic waveform synchronized to the vertical and horizontal frequencies is normally added to the image signal to correct shading on-screen.

## 68. Smearing

Refers to bright banding that appears on screen in the presence of bright points of light in an imaging area. This phenomenon can cause vertical banding due to excessive charge build-up, particularly in TV cameras incorporating solid-state imaging sensors.

## 69. SN ratio

The ratio of a TV camera output signal to the noise component found within the signal. It is expressed as the ratio in decibels of the rated signal output to the output when light is shielded.

## 70. Spectral sensitivity characteristics

Imaging units may exhibit differences in sensitivity to different colors (wavelengths) and to intensity.

## 71. Square pixels

Almost CCD or CMOS sensor have square grid array, eliminate the need for correction processing in image processing.

## 72. Standard subject luminance

Refers to the luminance required to ensure optimal performance of cameras.

## 73. TFL-II mount

A 48 mm diameter mount (threaded) compliant with the standard for lens mounts for machine vision.

## 74. TTL level

The signal level that can operate TTL within the voltage level required to operate a digital IC.

## 75. TV format

●NTSC format
Standard color TV format used in countries such as Japan and the USA, with an aspect ratio of 4:3, horizontal scanning frequency of 15.734 kHz, and vertical scanning frequency of 59.94 Hz. This format is notable for its capacity to transmit color signals at a B/W TV format bandwidth frequency (6 MHz). Other color formats include PAL and SECAM.

●EIA format
Standard B/W TV camera format, with an aspect ratio of 4:3, horizontal scanning frequency of 15.75 kHz, and vertical scanning frequency of 60 Hz.

●CCIR format
Standard B/W TV camera format used in Europe, with an aspect ratio of 4:3, horizontal scanning frequency of 15.625 kHz, and vertical scanning frequency of 50 Hz.

●RGB format
Format in which the three primary color (red, green, blue) video signals are output together with a synchronizing signal. Compared to NTSC format, this produces high quality images with high color reproducibility and high resolution.

## 76. USB

An acronym for Universal Serial Bus, this standard for PC serial interfaces was jointly introduced by seven companies, including Intel and Microsoft. Data transfer speeds are 12 Mbps for full-speed mode and 1.5 Mbps for low-speed mode. USB 3.0, released in September of 2007, reaches a maximum of 5 Gbps.

## 77. USB3 Vision

Camera standard using USB3.0 interface which is equipped by most of PC. Expected to be major interface in future as it does not need grabber board and its high speed transfer capability.

## 78. White balance

Refers to the color balance for devices such as color TV cameras and color monitors. Adjusting the image so that white objects appear white is called white balance adjustment.

## 79. White clip

Image contrast may become blurred, making the image hard to view when the TV screen includes intense spot lights. This is resolved using a white clip circuit to compress video signals with levels exceeding a preset value.

## 80. WOI (Window of Interest)

Scanning speeds for CMOS cameras can be increased by scanning only those areas specified by the user. Partial scanning with CCD cameras lets users set partial scanning limits only along a vertical axis; the WOI function allows scanning of areas specified in terms of both vertical and horizontal edges.

## 81. YUV

Data format for displaying luminance signals and color difference signals. It achieves high data compression ratios with little degradation.

# Available boards

### USB3.0

| Camera | Maker | Board model |
|---|---|---|
| BU/DU Series | Aval Data | APX-3424-1 (4 Port) |
| | IOI | U3XX4-PCIE4XE111 (4 Port) |

### Analog

| Camera | Maker | Board model |
|---|---|---|
| CS8560BD | Asia Electronics | PRS-800 |
| | Cognex | MVS-8500Le/MVS-8501/MVS-8504/e |
| | FAST | FVC-05/FV-GP440 |
| | Matrox | Solios-Analog/MeteorII-MultiChannel |
| | Euresys Inc. | Domino Series |
| | LinX | GINGA ++M2/M4/M1e/2e/4e |
| CS8570D | Asia Electronics | PRS-800 |
| | Cognex | MVS-8500Le/MVS-8501/MVS-8504/e |
| | Teledyne Dalsa | PC2-Vision |
| | FAST | FVC-05/FV-GP440 |
| | Matrox | Solios-Analog/MeteorII-MultiChannel |
| | Euresys Inc. | Domino Series |
| CS8620Bi | Cognex | MVS-8500Le/MVS-8501/MVS-8504/e |
| | Teledyne Dalsa | PC2-Vision |
| | Micro Technica | MTPCI-DC2-G/DX-G/DD2-G/DM2-G/MTPEX-DX-G |
| | Matrox | Solios-Analog |
| | LinX | GINGA ++M2/M4/M1e/2e/4e |
| CS8630Bi | Teledyne Dalsa | PC2-Vision |
| | Matrox | Solios-Analog |
| | LinX | GINGA ++M2/M4/M1e/2e/4e |

### CameraLink

| Camera | Maker | Board model |
|---|---|---|
| CSCLV90BC3 | Aval Data | APX-3311 |
| | Graphin | IPM-5512-Lite/5514-Lite |
| | Micro Technica | MTPEX-DL-G |
| CSCV90BC3 | Aval Data | APX-3312 |
| | Interface | PEX-H530821/-H530921/-H531021/-H531122 |
| | Matrox | Solios-CameraLink |
| | Graphin | IPM-8531PoCL-BE/8580CL-M (PoCL)/IPM-5512 |
| | Cognex | MVS-8600 |
| | Micro Technica | MTPCI-TL2/PL-G MTPEX-PL-G/ML-G/QL-G/DL-G/FL-G |
| | Photron | FDM-PCIe CL |
| | Euresys Inc. | Grablink Series |
| CSCX30BC3 | Aval Data | APX-3312 |
| | Interface | PEX-H530821/-H530921/-H531021/-H531122/CPZ-530421/-530521/LPC-530421/-530521/PEX-530421/-530521 |
| | Matrox | Solios-CameraLink |
| | Graphin | IPM-8531PoCL-BE/8580CL-M (PoCL)/IPM-5512 |
| | Cognex | MVS-8600 |
| | Micro Technica | MTPCI-TL2/PL-G MTPEX-PL-G/ML-G/QL-G/DL-G/FL-G |
| | Photron | FDM-PCIe CL |
| | Euresys Inc. | Grablink Series |
| | LinX | GINGA digital CL2/CL2e/4e |
| CSCS20BC2 | Graphin | IPM-8531PoCL-BE/8580CL-M (PoCL)/IPM-5512 |
| | Photron | FDM-PCIe CL |
| | Micro Technica | MTPCI-TL2/PL-G MTPEX-PL-G/ML-G/QL-G/DL-G/FL-G |
| | Matrox | Solios-CameraLink |
| | LinX | GINGA digital CL2/CL2e/4e |

### CameraLink

| Camera | Maker | Board model |
|---|---|---|
| CSCU15BC18 | Aval Data | APX-3312 |
| | Interface | PEX-H530821/-H530921/-H531021/-H531122 |
| | Graphin | IPM-8531PoCL-BE/8580CL-M (PoCL)/IPM-5512 |
| | Matrox | Solios-CameraLink |
| | FAST | FHC3312 |
| | LinX | GINGA digital CL2/CL2e/4e |
| CSCU30BC18 | Aval Data | APX-3312/3313 |
| | Graphin | IPM-8531PoCL-BE/8580CL-M (PoCL)/IPM-5512 |
| | Micro Technica | MTPCI-TL2/PL-G MTPEX-PL-G/ML-G/QL-G/DL-G/FL-G |
| | Matrox | Solios-CameraLink |
| | FAST | FHC3312 |
| | LinX | GINGA digital CL2/CL2e/4e |
| CSCQS15BC23 | Aval Data | APX-3312/3318 |
| | Teledyne Dalsa | X-64 CL iPro |
| | FAST | FVC06 |
| | Photron | FDM-PCIe CL |
| | Micro Technica | MTPCI-TL2/PL-G MTPEX-PL-G/ML-G/QL-G/DL-G/FL-G |
| | Matrox | Solios-CameraLink |
| | LinX | GINGA digital CL2e/4e |
| CSCU30CC18 | Aval Data | APX-3312/3313/3318 |
| | Soliton Systems | EXpresso Series |
| | Photron | FDM-PCIe CL |
| | Micro Technica | MTPCI-TL2/PL-G MTPEX-PL-G/ML-G/QL-G/DL-G/FL-G |
| | LinX | GINGA digital CL2e/4e |
| CSCQS15CC23 | Aval Data | APX-3312 |
| | Interface | PEX-H530821/-H530921/-H531021/-H531122 |
| | Graphin | IPM-8531PoCL-BE/8580CL-M (PoCL)/IPM-5512 |
| | Cognex | MVS-8600 |
| | Photron | FDM-PCIe CL |
| | Matrox | Solios-CameraLink |
| | Micro Technica | MTPEX-QL-G/DL-G/FL-G |
| | LinX | GINGA digital CL2e/4e |
| CSC6M100BMP11 | Teledyne Dalsa | X-64 Xcelera-CL PX4 Full |
| CSC6M100CMP11 | Teledyne Dalsa | X-64 Xcelera-CL PX4 Full |
| CSC12M25BMP19-01B (*1) | Aval Data | APX-3312/3313/3318 |
| | Edec Linsey System | MUCap-HD2 |
| | Graphin | IPM-8531PoCL-BE/IPM-5512 IPM8580-CL |
| | Cognex | MVS-8600 |
| | Teledyne Dalsa | X-64 Xcelera-CL PX4 Dual/Full |
| | DITECT | DPX-CLM100 |
| | National Instruments Japan | PCIe-1429 |
| | FAST | FHC3312/3313 |
| | Matrox | Solios-CameraLink |
| | LinX | GINGA digital CL2e/4e |
| CSC12M25CMP19 | Aval Data | APX-3312/3313/3318 |
| | Micro Technica | MTPEX-FL-G |
| | Teledyne Dalsa | X-64 Xcelera-CL PX4 Dual/Full |

### CoaXPress

| Camera | Maker | Board model |
|---|---|---|
| CSX12M25CMP19 | Aval Data | APX-3662 |

(*1) Some functions are not available.

# ■Product warranty and service system

Corresponding to various needs of customers, our company's products achieve valued manufacturing in flexible production system.
Liability and quality are assured with traceability system (quality assurance) complying to international standard.



◆ Contract distributors
● Sub-distributors
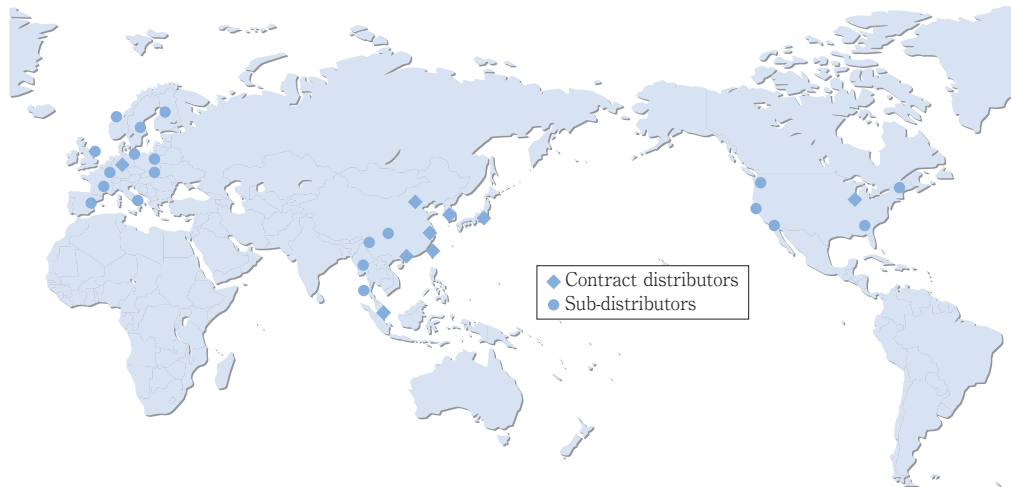
## ■Product warranty
Free repair for all products within one year after delivery, provided defects are caused by our company.
Some of the products are warrantied for three years. Please check it at your purchase.

## ■After-sales service
Our company provides quick and reliable service.
Please contact to our sales office or distributer in your nearest.

## ■Demonstrations
Corresponding to needs of customers such as "trial use" or "more details", products for demonstration are available. Please feel free to contact us.

## ■Catalogs and literature requests
Please contact our sales office or distributor for "application of demonstration", "product presentation in details" or "quotation".



**Headquarters**



**Showroom**

Please read the following disclaimers before using Toshiba Teli products.

Disclaimers

● Toshiba Teli accepts no responsibility for losses arising from fire, earthquake, other accidents attributable to external causes or attributable to negligence or errors on the part of the user, improper use or use under abnormal circumstances.

● Toshiba Teli accepts no responsibility for incidental losses (including business losses or losses from business suspension) arising from use or non-use of these products.

● Toshiba Teli accepts no responsibility for losses arising from use other than as described in the corresponding instruction manuals (including hot-swapping or turning off power while saving data).

● Toshiba Teli accepts no responsibility for losses arising from malfunctions attributable to use in combination with other devices.

● Toshiba Teli accepts no responsibility for losses arising due to repairs or modifications performed by the customer or final user.

# ■Environmental preservation activities

**ISO 14001**
**BUREAU VERITAS** Certification

Cirtifications for
Electronics for Industrial, developing system, production and sales

Cirtificated place
- Main office and factory
- Chubu branch
- Nishinihon service center and Kansai branch

At Toshiba Teli, we believe it is our responsibility to pass on our irreplaceable global environment to the next generation in a healthy condition. Therefore, we participate in environmental preservation activities. To reduce the burden on the earth's environment throughout the product lifecycle, we are promoting the development of environmentally conscious products (ECP) through technologies such as lead-free manufacturing and energy conservation.

●Development of environmentally conscious products
●Promotion of green procurement
●Reduction of and safe handling of harmful chemicals
●Reduction in scrap, promotion of recycling
●Promotion of energy conservation, centered on control of power consumption

# ■Quality control system

**ISO 9001**
**BUREAU VERITAS** Certification

Cirtifications for
Electronics for Industrial, developing system, production and sales

Cirtificated place
- Main office and factory
- Chubu branch
- Nishinihon service center and Kansai branch

Leading the industry, Toshiba Teli was certified for the international quality management system ISO 9001 in 1994. We are promoting quality improvement activities in order to provide safe and security products that satisfy our customers around the world.

# Quality policy

We will strengthen the quality of all business activities, improve customers' satisfaction, and to aim to be one of the top global companies with the continuous technological innovation and wholehearted manufacturing.
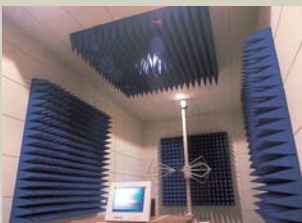
### RF anechoic chamber
We use our RF anechoic chamber to test our products and assure they satisfy international standards for immunity, the ability to not malfunction when exposed to electromagnetic waves from other equipment, and for emissions, unintended electromagnetic radiation from the product.

### Shielded room
We use our shielded room to test products against static electricity, power surges, and bursts of static from power lines. Specifically, our products bound for international markets meet the required standards of each country and are labeled with the CE mark for EU countries and the KC mark for Korea.

### Temperature chamber
We use our temperature chamber to do environmental tests on our products to determine operating and storage temperatures. To confirm the safety of our products, we test abnormal conditions in the worst case scenarios by exposing the products to extreme heat and humidity and then testing for leaks and pressure resistance.

### Vibration and shock testing lab
We use our vibration and shock testing lab to test the reliability and safety of our products in a wide range of operating environments that include automated factories, medical facilities, testing laboratories, and more. Whenever necessary, we acquire safety certifications, such as the TÜV-GS and GM marks for international markets and the UL and ETL marks for markets in the USA.
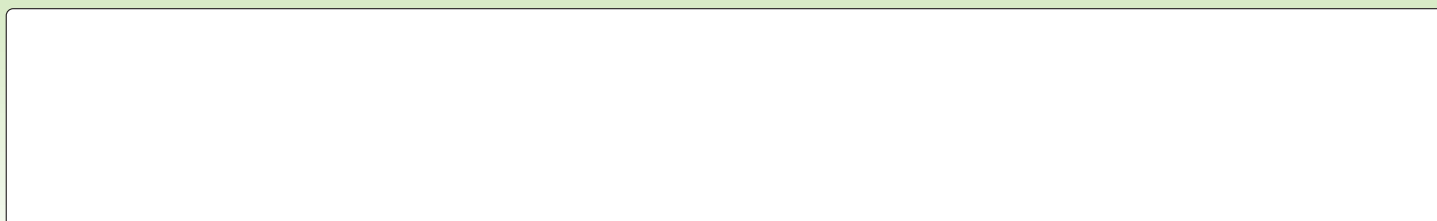
**IMAGING REVOLUTION**

SEDECO

Rendementsweg 2n    T: +31 (0)297 241717
3641 SK  Mijdrecht   F: +31 (0)297 241778
the Netherlands      Info@sedeco.nl

www.sedeco.nl

**TOSHIBA TELI CORPORATION**   URL : http://www.toshiba-teli.co.jp/en/

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