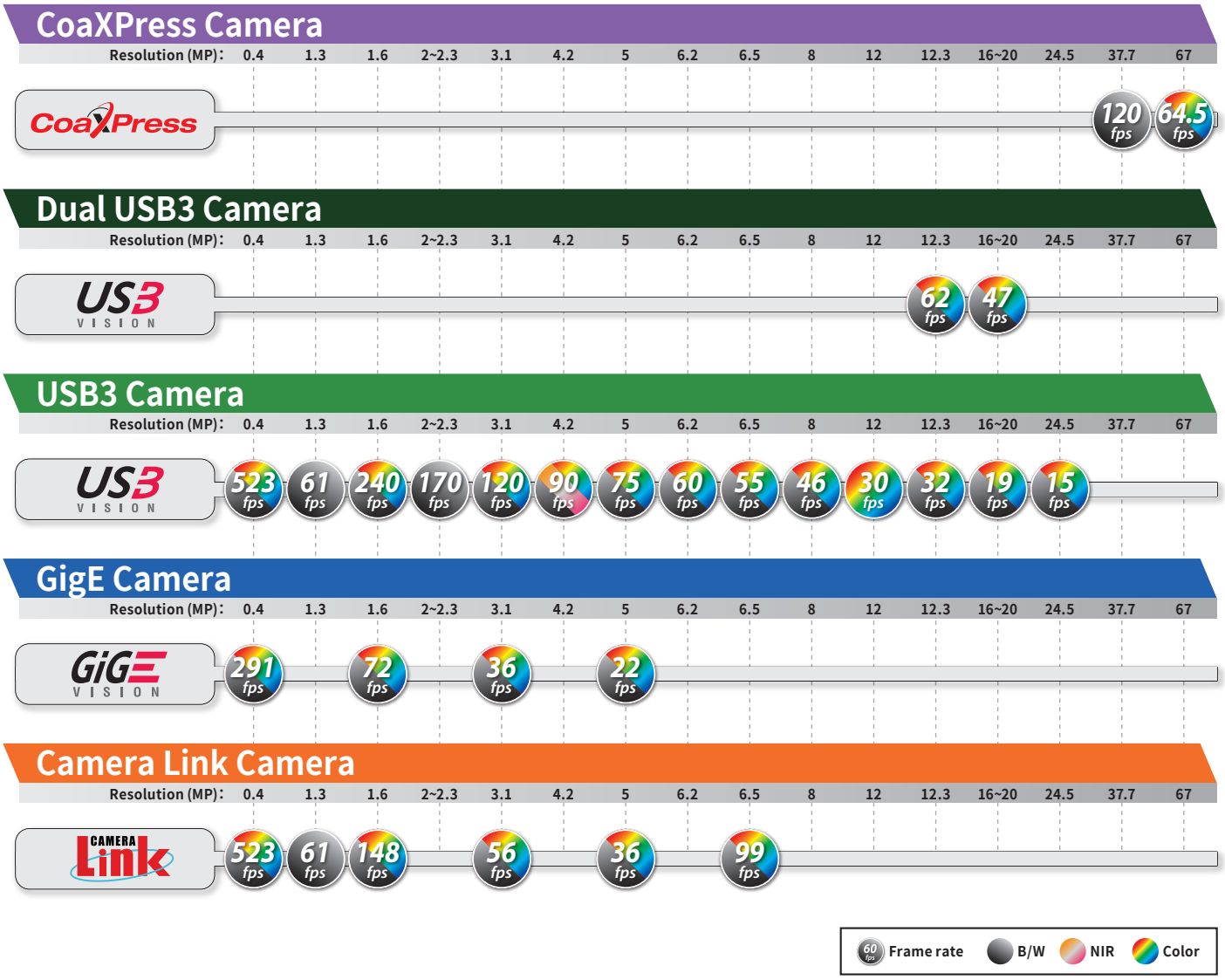
CAMERA CATALOG

ALL MODELS 2023-2024

Toshiba Teli Corporation

Toshiba Teli Machine Vision Camera Lineup



Digital interface camera lineup & selection table are here

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 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

Group	Interface	Model	Resolution	Image Size	Frame Rate	Page
EX Series	CoaXPress 2.0	**EX670AMG-X / EX670AMCG-X**	67 MP	1.8 type (APS-C)	64.5 fps	P7
		EX370BMG-X	37.7 MP	4/3 type	120 fps	
DDU Series	USB3.2 Gen1 (Dual USB3)	**DDU1207MG / DDU1207MCG / DDU1207MCF**	12.3 MP	1.1 type	62 fps	P8 - P9
		DDU1607MG / DDU1607MCG / DDU1607MCF	16 MP	1.1 type	47 fps	
DU Series	USB3.2 Gen1	**DU657M / DU657MC**	6.5 MP	1.1 type	55 fps	
		DU1207MG / DU1207MCG / DU1207MCF	12.3 MP	1.1 type	32 fps	
BU Series	USB3.2 Gen1	**BU040M / BU040MG / BU040MCG / BU040MCF**	0.4 MP	1/2.9 type	523 fps	P10 - P13
		BU132M	1.3 MP	1/1.8 type	61 fps	
		BU160M / BU160MG / BU160MCG / BU160MCF	1.6 MP	1/2.9 type	240 fps	
		BU205M	2.2 MP	2/3 type	170 fps	
		BU238M / BU238MC / BU238MCF	2.3 MP	1/1.2 type	165 fps	
		BU302MG / BU302MCG / BU302MCF	3.1 MP	1/1.8 type	120 fps	
		BU406M / BU406MN / BU406MC / BU406MCF	4.2 MP	1 type	90 fps	
		BU502MG / BU502MCF	5 MP	1/1.8 type	75 fps	
		BU505MG / BU505MCG / BU505MCF	5 MP	2/3 type	75 fps	
		BU602M / BU602MC / BU602MCF	6.2 MP	1/1.8 type	60 fps	
		BU805MG / BU805MCF	8 MP	2/3 type	46 fps	
		BU1203MC / BU1203MCF	12 MP	1/1.7 type	30 fps	
		BU1207MG / BU1207MCG / BU1207MCF	12.3 MP	1.1 type	31 fps	
		BU2006MG / BU2006MCF	20 MP	1.0 type	19 fps	
		BU2409MG / BU2409MCG / BU2409MCF	24.5 MP	1.2 type	15 fps	
BG Series	GigE (PoE)	**BG040M / BG040MCG / BG040MCF**	0.4 MP	1/2.9 type	291 fps	P14 - P15
		BG160M / BG160MCG / BG160MCF	1.6 MP	1/2.9 type	72 fps	
		BG302LMG / BG302LMCG / BG302LMCF	3.1 MP	1/1.8 type	36 fps	
		BG505LMG / BG505LMCG / BG505LMCF	5 MP	2/3 type	22 fps	
BC Series	Camera Link	**BC040M / BC040MC**	0.4 MP	1/2.9 type	523 fps	P16 - P18
		BC160M / BC160MC	1.6 MP	1/2.9 type	148 fps	
		BC302LMG / BC302LMCG / BC302LMCF	3.1 MP	1/1.8 type	56 fps	
		BC505LMG / BC505LMCG / BC505LMCF	5 MP	2/3 type	36 fps	
CSC Series	Camera Link	**CSCS60BM18**	1.3 MP	1/1.8 type	61 fps	
		CSC6M100BMP11 / CSC6M100CMP11	6.5 MP	1.1 type	99 fps	

Camera Data	Spectral sensitivity characteristics	P19 - P21
	PIN assignment	P23

Accessories	Cables	P23
	Cable / Tripod attachment compatibility table	P24
	Tripod attachment	P25
	Lens	P27 - P32

Appendix	Toshiba Teli Machine Vision Camera Lineup	P1
	High speed response with original IP core "Teli Core Technology"	P15
	Softoware development kit "TeliCamSDK"	P16
	Confirmed board list	P24
	Explanation of Lens Specification	P26
	Glossary	P33 - P36
	Toshiba Teli's quarity control	P37 - P38

Visit our web site

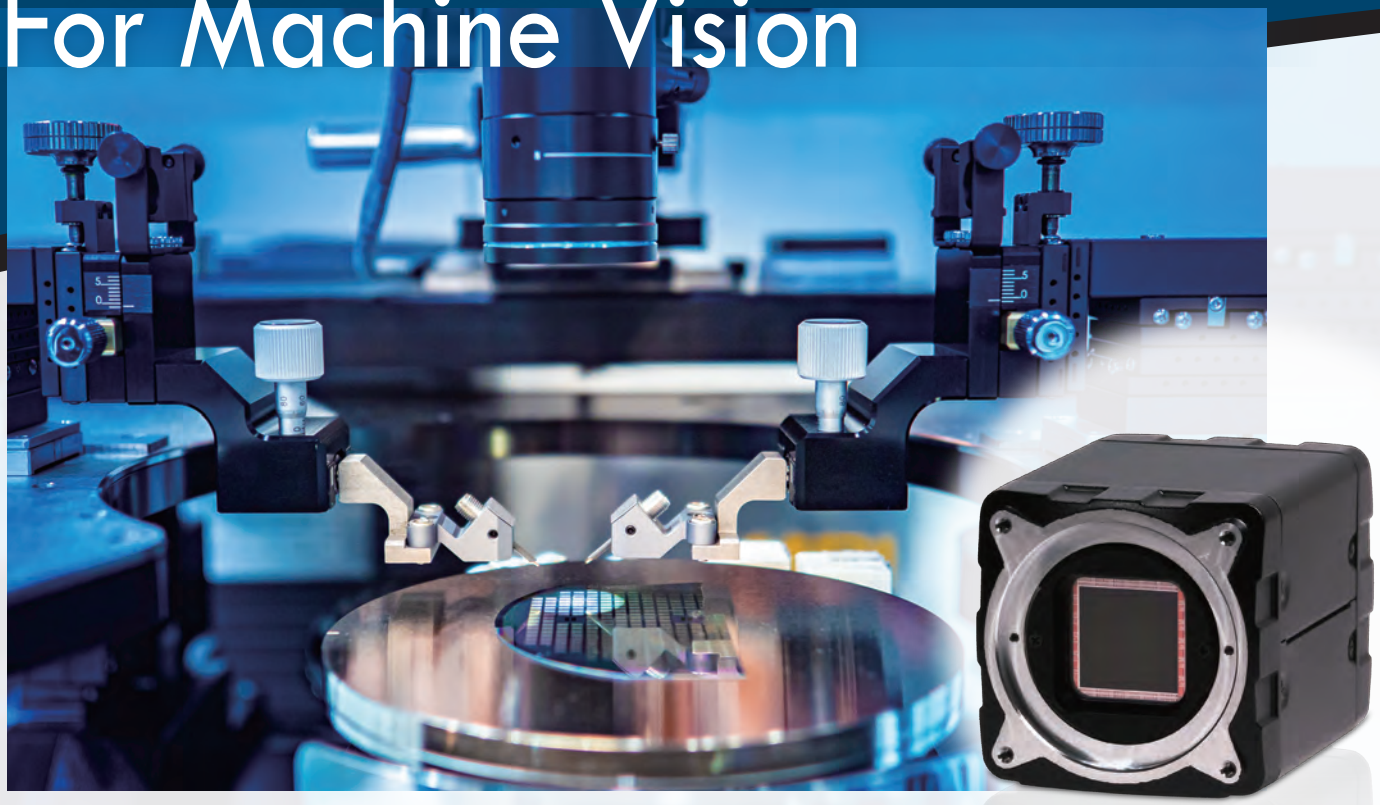
www.toshiba-teli.co.jp/en/ teli camera GO

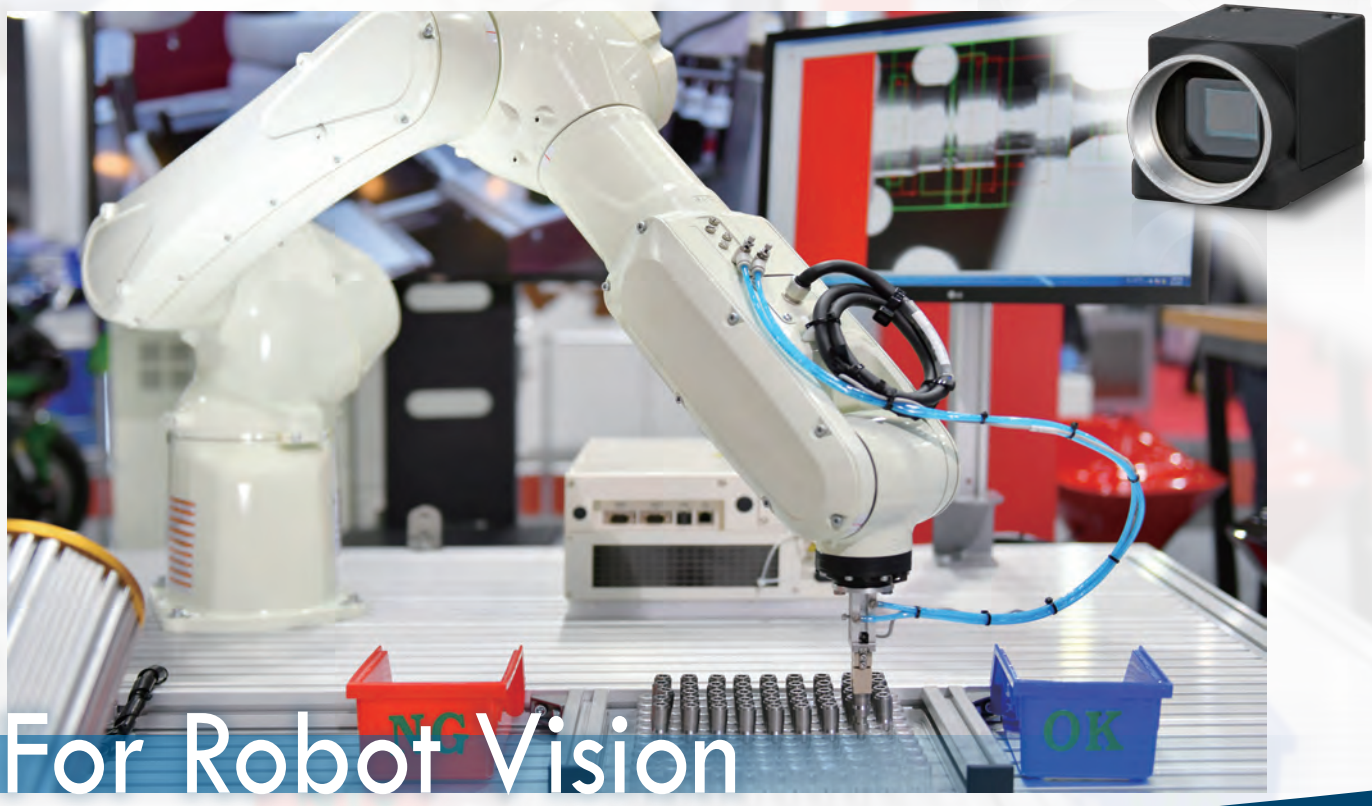
Compatibility with optional parts and EMC

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 applications

For Machine Vision





For Robot Vision

and new application fields

Imaging solution is supported

USB3 VISION　GiGE VISION　CAMERA Link　CoaXPress

Toshiba Teli Corporation

Software
COGNEX
MVTec Software GmbH
NATIONAL INSTRUMENTS
MATROX IMAGING
SHARP
SSIL SCIENCE SOLUTIONS INTERNATIONAL LABORATORY, INC.

Board
TECHNO SCOPE
EDEC LINSEY SYSTEM
MICRO-TECHNICA
EURESYS
AVAL DATA CORPORATION

FA-PC
ADVANTECH Enabling an Intelligent Planet
Portwell
CASO Subsidiary of CASWELL
Soliton
ADLINK TECHNOLOGY INC.
NEC

Lens/Lighting
CORRECT SEIWA OPTICAL CO.,LTD.
MORITEX Vision Creating Value
Kenko Tokina
FUJIFILM
VS TECHNOLOGY MACHINE VISION OPTICS
μ-TRON
RICOH
Lelmac
TAMRON
CCS CREATING CUSTOMER SATISFACTION
Kowa

Cable
OKI
NISSEI
3M
Newtech
everpro

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.

Peripherals are here

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 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.

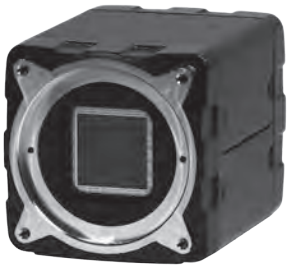
Solutions

EX Series

NEW

Details are here.

CoaXPress



EX Series
60mm × 60mm × 80mm
280g

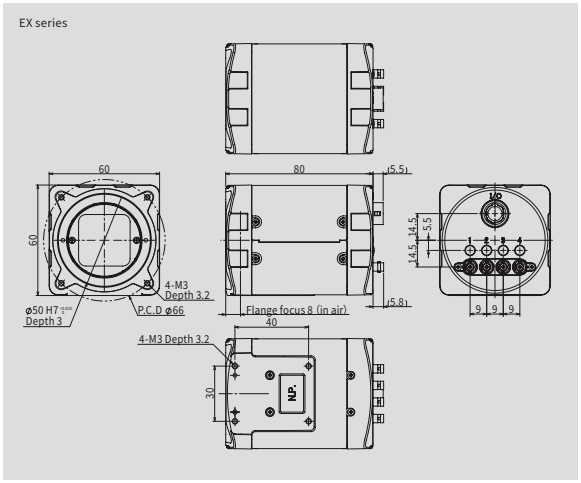
Outline

The EX Series is an integrated camera with a CoaXPress 2.0 interface. The use of CXP-12 Quad allows high-speed transfer of images.
Incorporating 4/3 type to 1.8 type (APS-C) CMOS sensor, the EX Series provides a wide field of view.
Measuring only 60 mm square, the chassis can be installed easily.
The lens-mountless structure makes it possible to use different lenses according to the application requirements.

Features

- 50Gbps transfer bandwidth provided by CoaXPress 2.0 CXP-12 Quad
  - Bandwidth ten times wider than USB 3.1 Gen1
  - Bandwidth seven times wider than the Camera Link Full configuration
- The electronic global shutter makes it possible to capture fast moving subjects sharply with minimal motion blur.
- The optional F or M42 mount adapter makes it possible to use various lenses, including those for single-lens reflex cameras.
- "Teli Core Technology" contributes to the enhancement of the response speed of camera systems.
- The EX Series can be connected to various image processing systems with a flexible and reliable long coaxial cable.
- TELI original software "TeliCamSDK" is available to free download as SDK.

Dimensions



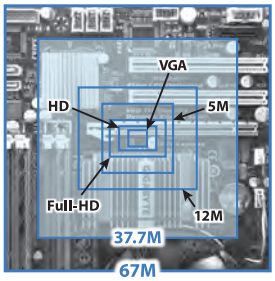
Accessory information (options)

CoaXPress cable ▶ P23
Lens ▶ P32
Tripod attachment ▶ P24
F-mount lens adaptor / M42-mount lens adaptor

Camera data

Spectral sensitivity characteristics ▶ P20, 22
Pin assignment ▶ P23

Wider field of view with high resolution of 67Mp

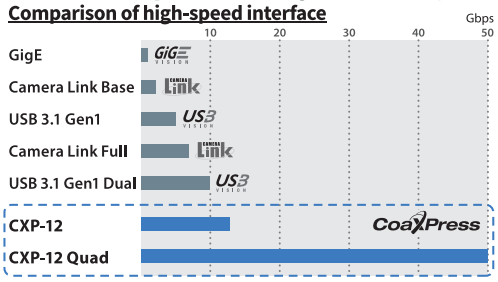


VGA (640×480)
HD (1,280×720)
Full-HD (1,920×1,080)
5M (2,448×2,048)
12M (4,096×3,000)
37.7M (6,144×6,144)
67M (8,192×8,192)

* The above image is the result of software simulation.

50Gbps transfer bandwidth provided by CXP-12 Quad

Comparison of high-speed interface



* These are the data transfer bands of each interface and are different from the video data transfer bands.

Specifications

B/W | COLOR	B/W		Color
Pixles	37.7M	67M	67M
Model	EX370BMG-X	EX670AMG-X	EX670AMCG-X
Interface	CoaXPress 2.0 CXP-12 Quad		
Imager	4/3 type GS-CMOS (EV2S36MB)	1.8 type GS-CMOS (EV2S67MB)	1.8 type GS-CMOS (EV2S67MC)
Resolution	6,144(H) x 6,144(V)	8,192(H) x 8,192(V)	
Frame rate	120fps (CXP-12 Quad, Mono 8bit) 42.1fps (CXP-6 Quad, Mono 8bit) 21fps (CXP-12, Mono 8bit) 10.7fps (CXP-6, Mono 8bit)	64.5fps (CXP-12 Quad, Mono 8bit) 31.6fps (CXP-6 Quad, Mono 8bit) 15.8fps (CXP-12, Mono 8bit) 8fps (CXP-6, Mono 8bit)	64.5fps (CXP-12 Quad, Bayer 8bit) 31.6fps (CXP-6 Quad, Bayer 8bit) 15.8fps (CXP-12, Bayer 8bit) 8fps (CXP-6, Bayer 8bit)
Pixel size	2.5µm x 2.5µm		
Electronic shutter	MANUAL : 10µs to 1s Random Trigger Shutter : 10µs to 1s (Timed or Bulk mode), 200µs to Trigger width (TriggerWidth mode)		
Scan method	Progressive		
Color filter	-		RGB primary color mosaic
Standard sensitivity	2,350 lx (F5.6, 1/125s)	2,500 lx (F8, 1/66.7s)	2,100 lx (F5.6, 1/66.7s)
Minimum sensitivity	2 lx (F1.4, Gain : +36dB, Video level : 50%)	1 lx (F1.4, Gain : +36dB, Video level : 50%)	2 lx (F1.4, Gain : +36dB, Video level : 50%)
Gain	0dB to +36dB (MANUAL)		
White balance	-		MWB, OPWB
Sync System	Internal synchronization		
Image output format	Mono 12bit / Mono 10bit / Mono 8bit		Bayer 8bit
Readout mode	All pixel, Scalable, Binning, Mirroring, Flip		All pixel, Scalable, Mirroring, Flip
Power supply	PoCXP or External connector : 24V (18.5V~26V) ch1 only		
Power consumption	13.6W (All-pixels readout, CXP-12 Quad)	13W (All-pixels readout, CXP-12 Quad)	13.3W (All-pixels readout, CXP-12 Quad)
Lens mount	Mount less (Φ50 H7)		
External dimension	60(W) x 60(H) x 80(D) mm (not including protrusion)		
Mass	280 g		
Operation Assurance	Temperature : 0° C to 40° C (below 60° C on cabinet surface, below 75° C on image sensor) Humidity : 10% to 90% (no condensation)	Temperature : 0° C to 40° C (below 60° C on cabinet surface) Humidity : 10% to 90% (no condensation)	
Conformity	CE, FCC, RoHS, WEEE, CoaXPress, GenICam, IIDC2		

DU Series / DDU (Dual USB) Series

Details are here.

DU Series
40mm × 40mm × 35mm
85g

DDU Series
40mm × 40mm × 35mm
90g

Outline

DU series has USB3.2 Gen 1 interface for image output and control.
With Dual USB 3.1 Gen 1 interfaces, the DDU series provides double the transfer bandwidth of conventional cameras with a single interface, making it possible to capture images at higher speed.
The DU series is available with 6.5MP and 12.3MP resolution options whereas the DDU series is available with 12.3MP and 16MP resolution options.
Compact and light, suitable for set in equipment. 3 years warranty.

Features

Easy operation

- "Teli Core Technology" contributes to the enhancement of the response speed of camera systems.
- 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.
- "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)

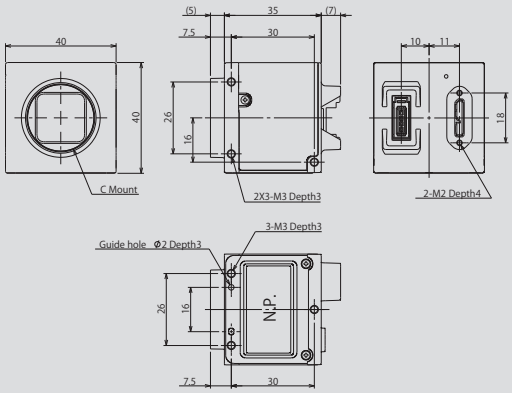
USB3 cable ▶ P23
Lens ▶ P27 - 32
Tripod attachment ▶ P24 - 25
Confirmed boards list ▶ P24

Camera Data

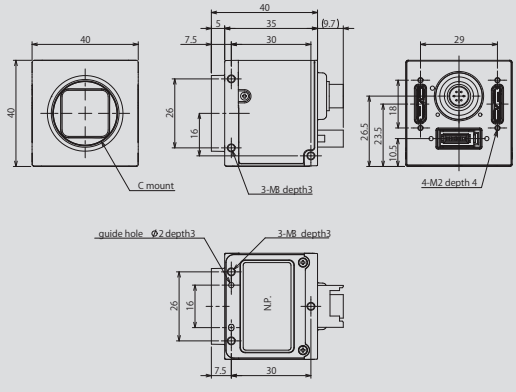
Spectral sensitivity characteristics ▶ 20, 22
Pin assignment ▶ P23

Dimensions

DU series



DDU series



Specifications

B/W | COLOR	B/W			
Pixles	6.5M	12.3M		16M
Model*1	DU657M	DU1207MG	DDU1207MG	DDU1607MG
Interface	USB3.2 Gen1 (Only SuperSpeed is supported)		USB3.2 Gen1 (Only SuperSpeed is supported) corresponding to Dual USB3	
Imager*2	1.1 type GS-CMOS (TELI original)	1.1 type GS-CMOS (IMX253LLR)		1.1 type GS-CMOS (XGS16000)
Resolution	2,560(H) x 2,560(V)	4,096(H) x 3,000(V)		4,000(H) x 4,000(V)
Frame rate	Mono8 : 55 fps	Mono8 : 32 fps	<Dual / Single> Mono8 : 62 / 31 fps	<Dual / Single> Mono8 : 47 / 23 fps
Pixel size	5.0µm x 5.0µm	3.45µm x 3.45µm		3.2µm x 3.2µm
Electronic shutter	MANUAL : 10µs to 200ms Random Trigger Shutter : 10µs to 200ms (Edge or Bulk mode), 10µs to Trigger width (Level mode)	MANUAL : 1.51µs to 16.11µs (Short exposure mode), 26µs to 16s AE : 26µs to 1s Random Trigger Shutter : 26µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 16s AE : 30µs to 1s Random Trigger Shutter : 30µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 1s Random Trigger Shutter : 30µs to 1s (Edge or Bulk mode), 50µs to Trigger width (Level mode)
Scan method	Progressive			
Color filter	-			
Standard sensitivity	900 lx (F5.6, 1/60s)	860 lx (F5.6, 1/32s)	1,600 lx (F5.6, 1/62s)	2,700 lx (F8, 1/50s)
Minimum sensitivity	16 lx (F2.8, Gain : x8, Video level : 50%)	1 lx (F1.4, Gain : +36dB, Video level : 50%)	4 lx (F1.4, Gain : +24dB, Video level : 50%)	6 lx (F1.4, Gain : x8, Video level : 50%)
Gamma / LUT	γ=1.0 to 0.45 / Available			
Gain	x1 to x8 (MANUAL)	MANUAL : 0dB to +36dB, AGC : 0dB to +24dB	0dB to +24dB (MANUAL, AGC)	x1 to x8 (MANUAL, AGC)
White Balance	-			
Sync System	Internal / Bus synchronization			
Image output format	Mono8	Mono12, Mono10, Mono8		
Readout mode	All pixel, Scalable, Binning, Mirroring, Flip	All pixel, Scalable, Binning, Decimation, Mirroring, Flip		
Power supply	DC5V ±5% (from USB connector)			
Power consumption	3.6W	4.0W	5.0W	5.3W
Lens mount	C-Mount			
External dimension	40 (W)mm x 40 (H)mm x 35 (D)mm (not including protrusion)			
Mass	Approx. 85g	Approx. 90g		
Operation Assurance	Temperature : -5° C to 45° C Humidity : 10% to 90% (no condensation)	Temperature : -5° C to 45° C (below 65 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	Temperature : -5° C to 45° C (below 60 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	
Conformity	CE, FCC, RoHS, WEEE, USB3 Vision, GenICam, IIDC2			

*1 : MG : with Dust proof glass

*2 : GS-CMOS : Global shutter CMOS

B/W ／ COLOR	COLOR			
Pixles	6.5M	12.3M		16M
Model*1	DU657MC	DU1207MCG / DU1207MCF	DDU1207MCG / DDU1207MCF	DDU1607MCG / DDU1607MCF
Interface	USB3.2 Gen1 (Only SuperSpeed is supported)		USB3.2 Gen1 (Only SuperSpeed is supported) corresponding to Dual USB3	
Imager*2	1.1 type GS-CMOS (TELI original)	1.1 type GS-CMOS (IMX253LQJ)		1.1 type GS-CMOS (XGS16000)
Resolution	2,560(H) x 2,560(V)	4,096(H) x 3,000(V)		4,000(H) x 4,000(V)
Frame rate	Bayer8 : 55 fps	Bayer8 / Mono8 : 31 fps	<Dual / Single> Bayer8 / Mono8 : 62 / 31 fps	<Dual / Single> Bayer8 : 47 / 23 fps
Pixel size	5.0µm x 5.0µm	3.45µm x 3.45µm		3.2µm x 3.2µm
Electronic shutter	MANUAL : 10µs to 200ms Random Trigger Shutter : 10µs to 200ms (Edge or Bulk mode), 10µs to Trigger width (Level mode)	MANUAL : 1.51µs to 16.11µs (Short exposure mode), 26µs to 16s AE : 26µs to 1s Random Trigger Shutter : 26µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 16s AE : 30µs to 1s Random Trigger Shutter : 30µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 1s Random Trigger Shutter : 30µs to 1s (Edge or Bulk mode), 50µs to Trigger width (Level mode)
Scan method	Progressive			
Color filter	RGB primary color mosaic			
Standard sensitivity	2,200 lx (F5.6, 1/60s)	MCG : 1,150 lx, MCF : 1,425 lx (F5.6, 1/31s)	MCG : 2,300 lx, MCF : 2,800 lx (F5.6, 1/62s)	MCG：2,700 lx, MCF：3,300 lx (F5.6, 1/50s)
Minimum sensitivity	40 lx (F2.8, Gain : x8, Video level : 50%)	MCG : 1 lx, MCF : 1 lx (F1.4, Gain : +36dB, Video level : 50%)	MCG : 6 lx, MCF : 6 lx (F1.4, Gain : +24dB, Video level : 50%)	MCG：11 lx, MCF：13 lx (F1.4, Gain : x8, Video level : 50%)
Gamma / LUT	γ=1.0 to 0.45 / Available			
Gain	x1 to x8 (MANUAL)	MANUAL : 0dB to +36dB, AGC : 0dB to +24dB	0dB to +24dB (MANUAL, AGC)	x1 to x8 (MANUAL, AGC)
White Balance	MWB, OPWB			
Sync System	Internal / Bus synchronization			
Image output format	Bayer8	RGB, BGR, YUV422, YUV411, Bayer12, Bayer10, Bayer8, Mono8	Bayer12, Bayer10, Bayer8	Bayer12, Bayer10, Bayer8
Readout mode	All pixel, Scalable, Binning, Mirroring, Flip	All pixel, Scalable, Binning, Decimation, Mirroring, Flip		
Power supply	DC5V ±5% (from USB connector)			
Power consumption	3.6W	4.5W	5.0W	5.3W
Lens mount	C-Mount			
External dimension	40 (W)mm x 40 (H)mm x 35 (D)mm (not including protrusion)			
Mass	Approx. 85g	Approx. 90g		
Operation Assurance	Temperature : -5° C to 45° C Humidity : 10% to 90% (no condensation)	Temperature : -5° C to 45° C (below 65 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	Temperature : -5° C to 45° C (below 60 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	
Conformity	CE, FCC, RoHS, WEEE, USB3 Vision, GenICam, IIDC2			

*1 : MCG : with Dust proof glass, MCF : with IR cut filter

*2 : GS-CMOS : Global shutter CMOS

BU Series

Details are here.

BU Series
29mm x 29mm x 16mm
33g

Outline

BU series have USB3.2 Gen1 interface for image output and control.
Compact and light, suitable for set in equipment.
3 years warranty.
Wide product range from 0.4M (523fps) to 24.5M (15fps).

Features

Easy operation

- "Teli Core Technology" contributes to the enhancement of the response speed of camera systems.
- 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.

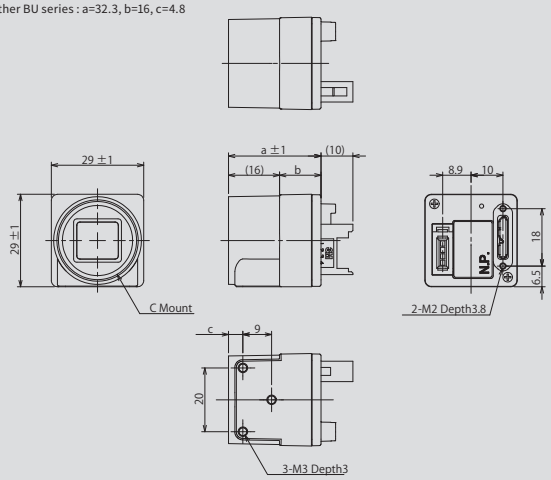
Various function

- "Event notifications" camera notified status information via event Packet.
- "BUS synchronization mode" synchronized exposure timing of multiple cameras.
- "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.

Dimensions

*1 BU406M, BU406MN : a=32, b=16, c=4.5
*2 Other BU series : a=32.3, b=16, c=4.8



Accessory information (options)

USB3 cable ▶ P23
Lens ▶ P27 - 32
Tripod attachment ▶ P24 - 25
Confirmed boards list ▶ P24

Camera Data

Spectral sensitivity characteristics ▶ P20 - 22
Pin assignment ▶ P23

Specifications

B/W | COLOR	B/W			
Pixles	0.4M	1.3M	1.6M	2.2M
Model*1	BU040M / BU040MG	BU132M	BU160M / BU160MG	BU205M
Interface	USB3.2 Gen1 (Only SuperSpeed is supported)			
Imager*2	1/2.9 type GS-CMOS (IMX287LLR)	1/1.8 type GS-CMOS (EV76C560ABT)	1/2.9 type GS-CMOS (IMX273LLR)	2/3 type GS-CMOS (CMV2000-3E5M)
Resolution	720(H) x 540(V)	1,280(H) x 1,024(V)	1,440(H) x 1,080(V)	2,048(H) x 1,088(V)
Frame rate	Mono8 : 523 fps (High-fps mode), 437 fps (Normal mode)	Mono8 : 61 fps	Mono8 : 240 fps (High-fps mode), 227 fps (Normal mode)	Mono8 : 170 fps
Pixel size	6.90µm x 6.90µm	5.3µm x 5.3µm	3.45µm x 3.45µm	5.5µm x 5.5µm
Electronic shutter	MANUAL : 1.08µs to 13.31µs (Short exposure mode), 20µs to 16s AE : 20µs to 1s Random Trigger Shutter : 20µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 1s Random Trigger Shutter : 30µs to 1s (Edge or Bulk mode)	MANUAL : 1.08µs to 13.31µs (Short exposure mode), 20µs to 16s AE : 20µs to 1s Random Trigger Shutter : 20µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 16s Random Trigger Shutter : 30µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)
Scan method	Progressive			
Color filter	-			
Standard sensitivity	2,800 lx (F5.6, 1/500s)	500 lx (F5.6, 1/62.5s)	3,000 lx (F4, 1/250s)	3,300 lx (F8, 1/200s)
Minimum sensitivity	2 lx (F1.4, Gain : +36dB, Video level : 50%)	2 lx (F1.4, Gain : +18dB, Video level : 50%)	3 lx (F1.4, Gain : +36dB, Video level : 50%)	7 lx (F1.4, Gain : x8, Video level : 50%)
Gamma / LUT	γ=1.0 to 0.45 / Available			
Gain	MANUAL : 0 to +36dB, AGC : 0 to +24dB	0dB to +18dB (MANUAL)	MANUAL : 0 to +36dB, AGC : 0 to +24dB	x1 to x8 (MANUAL)
White Balance	-			
Sync System	Internal / Bus synchronization			
Image output format	Mono12, Mono10, Mono8	Mono10 / Mono8	Mono12, Mono10, Mono8	Mono8
Readout mode	All pixel, Scalable, Binning, Decimation, Mirroring, Flip			All pixel, Scalable, Decimation, Mirroring, Flip
Power supply	DC5V ±5% (from USB connector)			
Power consumption	2.2W	1.7W	2.4W	2.7W
Lens mount	C-Mount			
External dimension	29 (W)mm x 29 (H)mm x 16 (D)mm (not including protrusion)			
Mass	Approx. 33g			Approx. 32g
Operation Assurance	Temperature : 0° C to 40° C (below 60 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	Temperature : 0° C to 40° C (below 50 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	Temperature : 0° C to 40° C (below 60 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	Temperature : 0° C to 40° C (below 50 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)
Conformity	CE, FCC, RoHS, WEEE, USB3 Vision, GenICam, IIDC2			

*1 : CF : with IR cut filter
*2 : GS-CMOS : Global shutter CMOS

Specifications

B/W | COLOR	B/W			
Pixles	2.3M	3.1M	4.2M	
Model*1	BU238M	BU302MG	BU406M	BU406MN
Interface	USB3.2 Gen1 (Only SuperSpeed is supported)			
Imager*2	1/1.2 type GS-CMOS (IMX174LLJ)	1/1.8 type GS-CMOS (IMX252LLR)	1.0 type GS-CMOS (CMV4000-3E5M)	1.0 type GS-CMOS (CMV4000-3E12M)
Resolution	1,920(H) x 1,200(V)	2,048(H) x 1,536(V)	2,048(H) x 2,048(V)	
Frame rate	Mono8 : 165 fps	Mono8 : 120 fps	Mono8 : 90 fps	
Pixel size	5.86µm x 5.86µm	3.45µm x 3.45µm	5.5µm x 5.5µm	
Electronic shutter	MANUAL : 30µs to 16s Random Trigger Shutter : 30µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 1.08µs to 14.44µs (Short exposure mode), 22µs to 16s AE : 30µs to 1s Random Trigger Shutter : 30µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 16s Random Trigger Shutter : 30µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)	
Scan method	Progressive			
Color filter	-			
Standard sensitivity	3,300 lx (F8, 1/200s)	3,250 lx (F5.6, 1/120s)	3,000 lx (F11, 1/90s)	2,400 lx (F11, 1/90s)
Minimum sensitivity	7 lx (F1.4, Gain : +18dB, Video level : 50%)	2 lx (F1.4, Gain : +36dB, Video level : 50%)	3 lx (F1.4, Gain : x8, Video level : 50%)	
Gamma / LUT	γ=1.0 to 0.45 / Available			
Gain	-6dB to +18dB (MANUAL)	MANUAL : 0 to +36dB, AGC : 0 to +24dB	x1 to x8 (MANUAL)	
White Balance	-			
Sync System	Internal / Bus synchronization			
Image output format	Mono8	Mono12, Mono10, Mono8	Mono8	
Readout mode	All pixel, Scalable, Mirroring, Flip	All pixel, Scalable, Binning, Decimation, Mirroring, Flip	All pixel, Scalable, Decimation, Mirroring, Flip	
Power supply	DC5V ±5% (from USB connector)			
Power consumption	2.9W		2.7W	
Lens mount	C-Mount			
External dimension	29 (W)mm x 29 (H)mm x 16 (D)mm (not including protrusion)			
Mass	Approx. 33g		Approx. 32g	
Operation Assurance	Temperature : 0° C to 40° C (below 50 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)			
Conformity	CE, FCC, RoHS, WEEE, USB3 Vision, GenICam, IIDC2			

*1 : MG : with Dust proof glass

*2 : GS-CMOS : Global shutter CMOS

B/W | COLOR	B/W			
Pixles	5M	5M	6.2M	8M
Model*1	BU502MG*3	BU505MG	BU602M	BU805MG*3
Interface	USB3.2 Gen1 (Only SuperSpeed is supported)			
Imager*2	1/1.8 type GS-CMOS (IMX547AAM)	2/3 type GS-CMOS (IMX250LLR)	1/1.8 type RS-CMOS (IMX178LLJ)	2/3 type GS-CMOS (IMX546AAM)
Resolution	2,448(H) x 2,048(V)	2,448(H) x 2,048(V)	3,072(H) x 2,048(V)	2,840(H) x 2,840(V)
Frame rate	Mono8 : 75 fps	Mono8 : 75 fps	Mono8 : 60 fps	Mono8 : 46 fps
Pixel size	2.74µm x 2.74µm	3.45µm x 3.45µm	2.4µm x 2.4µm	2.74µm x 2.74µm
Electronic shutter	MANUAL : (TBD) µs to 16s AE : (TBD) µs to 1s Random Trigger Shutter : (TBD) µs to 16s (Edge or Bulk mode)	MANUAL : 1.08µs to 14.44µs (Short exposure mode), 22µs to 16s AE : 22µs to 1s Random Trigger Shutter : 30µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 23.3µs to 16s AE : 23.3µs to 1s Random Trigger Shutter : 23.3µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : (TBD) µs to 16s AE : (TBD) µs to 1s Random Trigger Shutter : (TBD) µs to 16s (Edge or Bulk mode)
Scan method	Progressive			
Color filter	-			
Standard sensitivity	TBD	2,100 lx (F5.6, 1/75s)	2,100 lx (F5.6, 1/62.5s)	TBD
Minimum sensitivity	TBD	2 lx (F1.4, Gain : +36dB, Video level : 50%)	5 lx (F1.4, Gain : +24dB, Video level : 50%)	TBD
Gamma / LUT	γ=1.0 to 0.45 / Available			
Gain	MANUAL : 0dB to +36dB	MANUAL : 0 to +36dB, AGC : 0 to +24dB	0dB to +24dB (MANUAL, AGC)	MANUAL : 0dB to +36dB
White Balance	-			
Sync System	Internal / Bus synchronization		Internal synchronization	Internal / Bus synchronization
Image output format	Mono12, Mono10, Mono8			
Readout mode	All pixel, Scalable, Binning, Decimation, Mirroring, Flip		All pixel, Scalable, Binning, Mirroring, Flip	All pixel, Scalable, Binning, Decimation, Mirroring, Flip
Power supply	DC5V ±5% (from USB connector)			
Power consumption	TBD	2.9W	2.4W	TBD
Lens mount	C-Mount			
External dimension	29 (W)mm x 29 (H)mm x 16 (D)mm (not including protrusion)			
Mass	TBD	Approx. 33g		TBD
Operation Assurance	Temperature : 0° C to 40° C (below 60 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	Temperature : 0° C to 40° C (below 50 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	Temperature : 0° C to 40° C (below 60 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	
Conformity	CE, FCC, RoHS, WEEE, USB3 Vision, GenICam, IIDC2			

*1 : MG : with Dust proof glass, MN : using NIR sensor

*2 : GS-CMOS : Global shutter CMOS

*3 : Under development

Specifications

B/W | COLOR	B/W		
Pixles	12.3M	20M	24.5M
Model*1	BU1207MG	BU2006MG	BU2409MG
Interface	USB3.2 Gen1 (Only SuperSpeed is supported)		
Imager*2	1.1 type GS-CMOS (IMX253LLR)	1.0 type RS-CMOS (IMX183CLK)	1.2 type GS-CMOS (IMX540LLR)
Resolution	4,096(H) x 3,000(V)	5,472(H) x 3,648(V)	5,320(H) x 4,600(V)
Frame rate	Mono8 : 31 fps	Mono8 : 19 fps	Mono8 : 15 fps
Pixel size	3.45µm x 3.45µm	2.4µm x 2.4µm	2.74µm x 2.74µm
Electronic shutter	MANUAL : 1.51µs to 16.11µs (Short exposure mode), 26µs to 16s Random Trigger Shutter : 26µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 59.4µs to 16s AE : 59.4µs to 1s Random Trigger Shutter : 59.4µs to 16s (Edge or Bulk mode)	MANUAL :18µs to 16s Random Trigger Shutter : 18µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode)
Scan method	Progressive		
Color filter	-		
Standard sensitivity	860 lx (F5.6, 1/32s)	1,940 lx (F5.6, 1/19s)	1,950 lx (F11, 1/20s)
Minimum sensitivity	1 lx (F1.4, Gain : +36dB, Video level : 50%)	4 lx (F1.4, Gain : +24dB, Video level : 50%)	1 lx (F1.4, Gain : +36dB, Video level : 50%)
Gamma / LUT	γ=1.0 to 0.45 / Available		
Gain	0dB to +36dB (MANUAL)	0dB to +24dB (MANUAL, AGC)	0dB to +36dB (MANUAL)
White Balance	-		
Sync System	Internal / Bus synchronization	Internal synchronization	Internal / Bus synchronization
Image output format	Mono12, Mono10, Mono8		
Readout mode	All pixel, Scalable, Binning, Decimation, Mirroring, Flip	All pixel, Scalable, Mirroring, Flip	All pixel, Scalable, Binning, Decimation, Mirroring, Flip
Power supply	DC5V ±5% (from USB connector)		
Power consumption	3.0W	2.9W	3.3W
Lens mount	C-Mount		
External dimension	29 (W)mm x 29 (H)mm x 16 (D)mm (not including protrusion)		
Mass	Approx. 34g		Approx. 33g
Operation Assurance	Temperature : 0° C to 40° C (below 60 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)		
Conformity	CE, FCC, RoHS, WEEE, USB3 Vision, GenICam, IIDC2		

*1 : MG : with Dust proof glass, MN : using NIR sensor

*2 : GS-CMOS : Global shutter CMOS

B/W | COLOR	COLOR				
Pixles	0.4M	1.6M	2.3M	3.1M	4.2M
Model*1	BU040MCG / BU040MCF	BU160MCG / BU160MCF	BU238MC / BU238MCF	BU302MCG / BU302MCF	BU406MC / BU406MCF
Interface	USB3.2 Gen1 (Only SuperSpeed is supported)				
Imager*2	1/2.9 type GS-CMOS (IMX287LQR)	1/2.9 type GS-CMOS (IMX273LQR)	1/1.2 type GS-CMOS (IMX174LQJ)	1/1.8 type GS-CMOS (IMX252LQR)	1/1 type GS-CMOS (CMV4000-3E5C)
Resolution	720(H) x 540(V)	1,440(H) x 1,080(V)	1,920(H) x 1,200(V)	2,048(H) x 1,536(V)	2,048(H) x 2,048(V)
Frame rate	Bayer8 / Mono8 : 523 fps (High-fps mode), 437 fps (Normal mode)	Bayer8 / Mono8 : 240 fps (High-fps mode), 227 fps (Normal mode)	Bayer8 : 165 fps	Bayer8 / Mono8 : 120 fps	Bayer8 : 90 fps
Pixel size	6.90µm x 6.90µm	3.45µm x 3.45µm	5.86µm x 5.86µm	3.45µm x 3.45µm	5.5µm x 5.5µm
Electronic shutter	MANUAL : 1.08µs to 13.31µs (Short exposure mode), 20µs to 16s AE : 20µs to 1s Random Trigger Shutter : 20µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)		MANUAL : 30µs to 16s Random Trigger Shutter : 30µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 1.08µs to 14.44µs (Short exposure mode), 22µs to 16s AE : 22µs to 1s Random Trigger Shutter : 22µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 16s Random Trigger Shutter : 30µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)
Scan method	Progressive				
Color filter	RGB primary color mosaic				
Standard sensitivity	MCG : 2,300 lx, MCF : 2,500 lx (F4, 1/500s)	MCG : 2,300 lx, MCF : 2,400 lx (F2.8, 1/250s)	MC : 3,700 lx , MCF : 4,100 lx (F8, 1/200s)	MCG : 2,400 lx, MCF : 2,650 lx (F4, 1/120s)	MCG : 4,800 lx, MCF : 4,800 lx (F8, 1/90s)
Minimum sensitivity	MCG : 1 lx, MCF : 3 lx (F1.4, Gain : +36dB, Video level : 50%)	MCG : 1 lx, MCF : 3 lx (F1.4, Gain : +36dB, Video level : 50%)	MC : 8 lx, MCF : 9 lx (F1.4, Gain : +18dB, Video level : 50%)	MCG : 3 lx, MCF : 3 lx F1.4, Gain : +36dB, Video level : 50%)	MC : 8 lx, MCF : 9 lx (F1.4, Gain : x8, Video level : 50%)
Gamma / LUT	γ=1.0 to 0.45 / Available				
Gain	MANUAL : 0dB to +36dB, AGC : 0dB to +24dB		-6dB to +18dB (MANUAL)	MANUAL : 0dB to +36dB, AGC : 0dB to +24dB	x1 to x8 (MANUAL)
White Balance	MWB, OPWB				
Sync System	Internal synchronization				
Image output format	RGB, BGR, YUV422, YUV411, Bayer12, Bayer10, Bayer8, Mono8		Bayer8	RGB, BGR, YUV422, YUV411, Bayer12, Bayer10, Bayer8, Mono8	Bayer8
Readout mode	All pixel, Scalable, Binning, Decimation, Mirroring, Flip		All pixel, Scalable, Mirroring, Flip	All pixel, Scalable, Binning, Decimation, Mirroring, Flip	All pixel, Scalable, Decimation, Mirroring, Flip
Power supply	DC5V ±5% (from USB connector)				
Power consumption	3.2W	3.4W	2.9W	3.6W	2.7W
Lens mount	C-Mount				
External dimension	29 (W)mm x 29 (H)mm x 16 (D)mm (not including protrusion)				
Mass	Approx. 33g		Approx. 32g	Approx. 33g	Approx. 32g
Operation Assurance	Temperature : 0° C to 40° C (below 60 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)		Temperature : 0° C to 40° C (below 50 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)		
Conformity	CE, FCC, RoHS, WEEE, USB3 Vision, GenICam, IIDC2				

*1 : MCG : with Dust proof glass, MCF : with IR cut filter

*2 : GS-CMOS : Global shutter CMOS

Specifications

B/W | COLOR	COLOR			
Pixles	5M	5M	6.2M	8M
Model*1	BU502MCF*3	BU505MCG / BU505MCF	BU602MC / BU602MCF	BU805MCF*3
Interface	USB3.2 Gen1 (Only SuperSpeed is supported)			
Imager*2	1/1.8 type GS-CMOS (IMX547AAQ)	2/3 type GS-CMOS (IMX250LQR)	1/1.8 type RS-CMOS (IMX178LQJ)	2/3 type GS-CMOS (IMX546AAQ)
Resolution	2,448(H) x 2,048(V)	2,448(H) x 2,048(V)	3,072(H) x 2,048(V)	2,840(H) x 2,840(V)
Frame rate	Bayer8 : 75 fps	Bayer8 / Mono8 : 75 fps	Bayer8 / Mono8 : 60 fps	Bayer8 : 46 fps
Pixel size	2.74µm x 2.74µm	3.45µm x 3.45µm	2.4µm x 2.4µm	2.74µm x 2.74µm
Electronic shutter	MANUAL : (TBD) µs to 16s AE : (TBD) µs to 1s Random Trigger Shutter : (TBD) µs to 16s (Edge or Bulk mode)	MANUAL : 1.08µs to 14.41µs (Short exposure mode), 22µs to 16s AE : 22µs to 1s Random Trigger Shutter : 22µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 23.3µs to 16s AE : 23.3µs to 1s Random Trigger Shutter : 23.3µs to 16s (Edge or Bulk mode)	MANUAL : (TBD) µs to 16s AE : (TBD) µs to 1s Random Trigger Shutter : (TBD) µs to 16s (Edge or Bulk mode)
Scan method	Progressive			
Color filter	RGB primary color mosaic			
Standard sensitivity	TBD	MCG : 3,000 lx, MCF : 3,300 lx (F5.6, 1/75s)	MC : 3,000 lx, MCF : 3,400 lx (F5.6, 1/62.5s)	TBD
Minimum sensitivity	TBD	MCG : 2 lx, MCF : 2 lx (F1.4, Gain : +36dB, Video level : 50%)	MC : 6 lx, MCF : 7 lx (F1.4, Gain : +24dB, Video level : 50%)	TBD
Gamma / LUT	γ=1.0 to 0.45 / Available			
Gain	MANUAL : 0dB to +36dB	MANUAL : 0dB to +36dB, AGC : 0dB to +24dB	0dB to +24dB (MANUAL, AGC)	MANUAL : 0dB to +36dB
White Balance	MWB, OPWB			
Sync System	Internal / Bus synchronization		Internal synchronization	Internal / Bus synchronization
Image output format	Bayer12, Bayer10, Bayer8	RGB, BGR, YUV422, YUV411, Bayer12, Bayer10, Bayer8, Mono8		Bayer12, Bayer10, Bayer8
Readout mode	All pixel, Scalable, Binning, Decimation, Mirroring, Flip		All pixel, Scalable, Binning,Mirroring, Flip	All pixel, Scalable, Binning, Decimation, Mirroring, Flip
Power supply	DC5V ±5% (from USB connector)			
Power consumption	TBD	3.6W	3.0W	TBD
Lens mount	C-Mount			
External dimension	29 (W)mm x 29 (H)mm x 16 (D)mm (not including protrusion)			
Mass	TBD	Approx. 33g		TBD
Operation Assurance	Temperature : 0° C to 40° C (below 60 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	Temperature : 0° C to 40° C (below 50 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	Temperature : 0° C to 40° C (below 60 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	
Conformity	CE, FCC, RoHS, WEEE, USB3 Vision, GenICam, IIDC2			

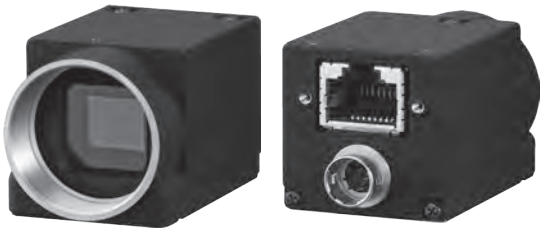
*1 : MCG : with Dust proof glass, MCF : with IR cut filter
*2 : GS-CMOS : Global shutter CMOS, RS-CMOS : Rolling shutter CMOS
*3 : Under development

B/W | COLOR	COLOR			
Pixles	12M	12.3M	20M	24.5M
Model*1	BU1203MC / BU1203MCF	BU1207MCG / BU1207MCF	BU2006MCF	BU2409MCG / BU2409MCF
Interface	USB3.2 Gen1 (Only SuperSpeed is supported)			
Imager*2	1/1.7 type RS-CMOS (IMX226CQJ)	1.1 type GS-CMOS (IMX253LQR)	1.0 type RS-CMOS (IMX183CQJ)	1.2 type GS-CMOS (IMX540LQR)
Resolution	4,000(H) x 3,000(V)	4,096(H) x 3,000(V)	5,472(H) x 3,648(V)	5,320(H) x 4,600(V)
Frame rate	Bayer8 / Mono8 : 30 fps	Bayer8 : 31 fps	Bayer8：19 fps	Bayer8 : 15 fps
Pixel size	1.85µm x 1.85µm	3.45µm x 3.45µm	2.4µm x 2.4µm	2.74µm x 2.74µm
Electronic shutter	MANUAL : 23.3µs to 16s AE : 23.3µs to 1s Random Trigger Shutter : 23.3µs to 16s (Edge mode), 50µs to Trigger width (Level mode)	MANUAL : 1.51µs to 16.11µs (Short exposure mode), 26µs to 16s Random Trigger Shutter : 26µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 59.4µs ~ 16s AE : 59.4µs ~ 1s Random Trigger Shutter : 59.4µs ~ 16s (Edge or Bulk mode)	MANUAL :18µs to 16s Random Trigger Shutter : 18µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode)
Scan method	Progressive			
Color filter	RGB primary color mosaic			
Standard sensitivity	MC : 4,200 lx, MCF : 4,600 lx (F8, 1/30s)	MCG : 1,150 lx, MCF : 1,425 lx (F5.6, 1/31s)	1,940 lx (F5.6, 1/19s)	MCG : 1,850 lx, MCF : 2,000 lx (F8, 1/20s)
Minimum sensitivity	MC : 13 lx, MCF : 14 lx (F1.4, Gain : +24dB, Video level : 50%)	MCG : 1 lx, MCF : 1 lx (F1.4, Gain : +36dB, Video level : 50%)	4 lx (F1.4, Gain : +24dB, Video level : 50%)	MCG : 3 lx, MCF : 3 lx (F1.4, Gain : +36dB, Video level : 50%)
Gamma / LUT	γ=1.0 to 0.45 / Available			
Gain	0dB to +18dB (MANUAL)	0dB to +36dB (MANUAL)	0dB to +24dB (MANUAL, AGC)	0dB to +36dB (MANUAL)
White Balance	MWB, OPWB			
Sync System	Internal synchronization	Internal / Bus synchronization	Internal synchronization	Internal / Bus synchronization
Image output format	Bayer8, Mono8	Bayer12, Bayer10, Bayer8	RGB, BGR, YUV422, YUV411, Bayer12, Bayer10, Bayer8, Mono8	Bayer12, Bayer10, Bayer8
Readout mode	All pixel, Scalable, Mirroring, Flip	All pixel, Scalable, Binning, Decimation, Mirroring, Flip	All pixel, Scalable, Mirroring, Flip	All pixel, Scalable, Binning, Decimation, Mirroring, Flip
Power supply	DC5V ±5% (from USB connector)			
Power consumption	2.7W	3.1W	2.9W	3.3W
Lens mount	C-Mount			
External dimension	29 (W)mm x 29 (H)mm x 16 (D)mm (not including protrusion)			
Mass	Approx. 32g	Approx. 34g		Approx. 33g
Operation Assurance	Temperature : 0° C to 40° C (below 50 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	Temperature : 0° C to 40° C (below 60 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)		
Conformity	CE, FCC, RoHS, WEEE, USB3 Vision, GenICam, IIDC2			

*1 : MCG : with Dust proof glass, MCF : with IR cut filter
*2 : GS-CMOS : Global shutter CMOS, RS-CMOS : Rolling shutter CMOS
*3 : Under development

BG Series

Details are here.



BGSeries
29mm x 29mm x 40mm
60g

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 0.4MP (291fps) to 5MP (22fps).

Features

Easy operation

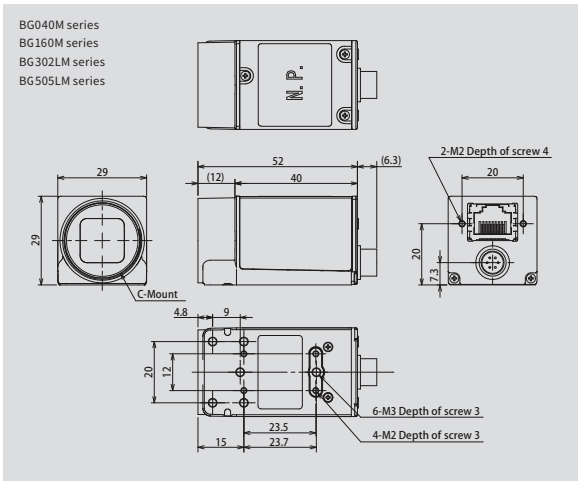
- "Teli Core Technology" contributes to the enhancement of the response speed of camera systems.
- "Gigabit Ethernet interface" makes PC connection easier.
- Power supply complies with Power over Ethernet (PoE) based on IEEE802.3af.
- Body size in most compact class is suitable for setting in equipment.
- 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

- "Scalable mode" achieve higher speed image output.(*1)

*functions and modes of *1 above are different depend on model.

Dimensions



Accessory information (options)

LAN cable (Category 5e or more)

Lens ▶ P27 - 32
C/CS mount converting ring ▶ P32
Tripod attachment ▶ P24 - 25

Camera Data

- Spectral sensitivity characteristics ▶ P20 - 22
- Pin assignment ▶ P23

Specifications

B/W | COLOR	B/W			
Pixles	0.4M	1.6M	3.1M	5M
Model*1	BG040M	BG160M	BG302LMG	BG505LMG
Interface	Gigabit Ethernet IEEE802.3ab (1000BASE-T) conformity			
Imager*2	1/2.9 type GS-CMOS (IMX287LLR)	1/2.9 type GS-CMOS (IMX273LLR)	1/1.8 type GS-CMOS (IMX265LLR)	2/3 type GS-CMOS (IMX264LLR)
Resolution	720(H) x 540(V)	1,440(H) x 1,080(V)	2,048(H) x 1,536(V)	2,448(H) x 2,048(V)
Frame rate	Mono8 : 291 fps	Mono8 : 72 fps	Mono8 : 36 fps	Mono8 : 22 fps
Pixel size	6.90µm x 6.90µm	3.45µm x 3.45µm		
Electronic shutter	MANUAL : 1.08µs to 13.31µs (Short exposure mode), 20µs to 16s AE : 20µs to 1s Random Trigger Shutter : 20µs to 16s (Edge or Bulk mode), 200µs to Trigger width (Level mode)		MANUAL : 30µs to 16s AE : 30µs to 1s Random Trigger Shutter : 30µs to 16s (Edge or Bulk mode), 200µs to Trigger width (Level mode)	MANUAL : 1.08µs to 14.44µs (Short exposure mode), 32µs to 16s AE : 32µs to 1s Random Trigger Shutter : 32µs to 16s (Edge or Bulk mode), 200µs to Trigger width (Level mode)
Scan method	Progressive			
Color filter	-			
Standard sensitivity	1,890 lx (F5.6, 1/333s)	1,700 lx F5.6, 1/77s)	3,850 lx (F11, 1/36s)	2,600 lx (F11, 1/22s)
Minimum sensitivity	1 lx (F1.4, Gain : +36dB, Video level : 50%)	1 lx (F1.4, Gain : +36dB, Video level : 50%)	2 lx (F1.4, Gain : +24dB, Video level : 50%)	1 lx (F1.4, Gain : +36dB, Video level : 50%)
Gamma / LUT	γ=1.0 to 0.45 / Available			
Gain	MANUAL : 0 to +36dB, AGC : 0 to +24dB		0dB to +24dB (MANUAL, AGC)	MANUAL : 0 to +36dB, AGC : 0 to +24dB
White Balance	-			
Sync System	Internal synchronization			
Image output format	Mono12, Mono10, Mono8			
Readout mode	All pixel, Scalable, Binning, Decimation, Mirroring, Flip			
Power supply	PoE (Power over Ethenet) / DC12V ±10%			
Power consumption	3.3W (PoE) 2.7W (DC12V)		3.2W (PoE) 2.7W (DC12V)	
Lens mount	C-Mount			
External dimension	29 (W)mm x 29 (H)mm x 40 (D)mm (not including protrusion)			
Mass	Approx. 59g		Approx. 60g	
Operation Assurance	Temperature : 0° C to 40° C (below 60 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)			
Conformity	CE, FCC, RoHS, WEEE, GigE Vision, GenICam, PoE, IIDC2			

*1 : MCG : with Dust proof glass, MCF : with IR cut filter
*2 : GS-CMOS : Global shutter CMOS

Specifications

B/W | COLOR	COLOR			
Pixles	0.4M	1.6M	3.1M	5M
Model*1	BG040MCG / BG040MCF	BG160MCG / BG160MCF	BG302LMCG / BG302LMCF	BG505LMCG / BG505LMCF
Interface	Gigabit Ethernet IEEE802.3ab (1000BASE-T) conformity			
Imager*2	1/2.9 type GS-CMOS (IMX287LQR)	1/2.9 type GS-CMOS (IMX273LQR)	1/1.8 type GS-CMOS (IMX265LQR)	2/3 type GS-CMOS (IMX264LQR)
Resolution	720(H) x 540(V)	1,440(H) x 1,080(V)	2,048(H) x 1,536(V)	2,448(H) x 2,048(V)
Frame rate	Bayer8 : 291 fps	Bayer8 : 72 fps	Bayer8 / Mono8 : 36 fps	Bayer8 / Mono8 : 22 fps
Pixel size	6.90µm x 6.90µm	3.45µm x 3.45µm		
Electronic shutter	MANUAL : 1.08µs to 13.31µs (Short exposure mode), 20µs to 16s AE : 20µs to 1s Random Trigger Shutter : 20µs to 16s (Edge or Bulk mode), 200µs to Trigger width (Level mode)		MANUAL : 30µs to 16s AE : 30µs to 16s Random Trigger Shutter : 30µs to 16s (Edge or Bulk mode), 200µs to Trigger width (Level mode)	MANUAL : 1.08µs to 13.31µs (Short exposure mode), 32µs to 16s AE : 32µs to 16s Random Trigger Shutter : 32µs to 16s (Edge or Bulk mode), 200µs to Trigger width (Level mode)
Scan method	Progressive			
Color filter	RGB primary color mosaic		RGB primary color mosaic	
Standard sensitivity	MCG : 1,550 lx, MCF : 1,650 lx (F4, 1/333s)	MCG : 2,800 lx, MCF : 2,900 lx (F5.6, 1/77s)	MCG : 2,500 lx, MCF : 2,600 lx (F8, 1/36s)	MCG : 3,100 lx, MCF : 3,200 lx (F11, 1/22s)
Minimum sensitivity	MCG : 2 lx, MCF : 2 lx (F1.4, Gain : +36dB, Video level : 50%)	MCG : 2 lx, MCF : 2 lx (F1.4, Gain : +36dB, Video level : 50%)	MCG : 3 lx, MCF : 3 lx (F1.4, Gain : +24dB, Video level : 50%)	MCG : 1 lx, MCF : 1 lx (F1.4, Gain : +36dB, Video level : 50%)
Gamma / LUT	γ=1.0 to 0.45 / Available			
Gain	MANUAL : 0 to +36dB, AGC : 0 to +24dB		0dB to +24dB (MANUAL, AGC)	MANUAL : 0 to +36dB, AGC : 0 to +24dB
White Balance	MWB, OPWB			
Sync System	Internal synchronization			
Image output format	Bayer12, Bayer10, Bayer8		Bayer12, Bayer10, Bayer8, Mono8	
Readout mode	All pixel, Scalable, Binning, Decimation, Mirroring, Flip			
Power supply	PoE (Power over Ethenet) / DC12V ±10%			
Power consumption	3.4W (PoE) 2.8W (DC12V)		3.6W (PoE) 2.9W (DC12V)	
Lens mount	C-Mount			
External dimension	29 (W)mm x 29 (H)mm x 40 (D)mm (not including protrusion)			
Mass	Approx. 59g			
Operation Assurance	Temperature : 0° C to 40° C (below 60 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)			
Conformity	CE, FCC, RoHS, WEEE, GigE Vision, GenICam, PoE, IIDC2			

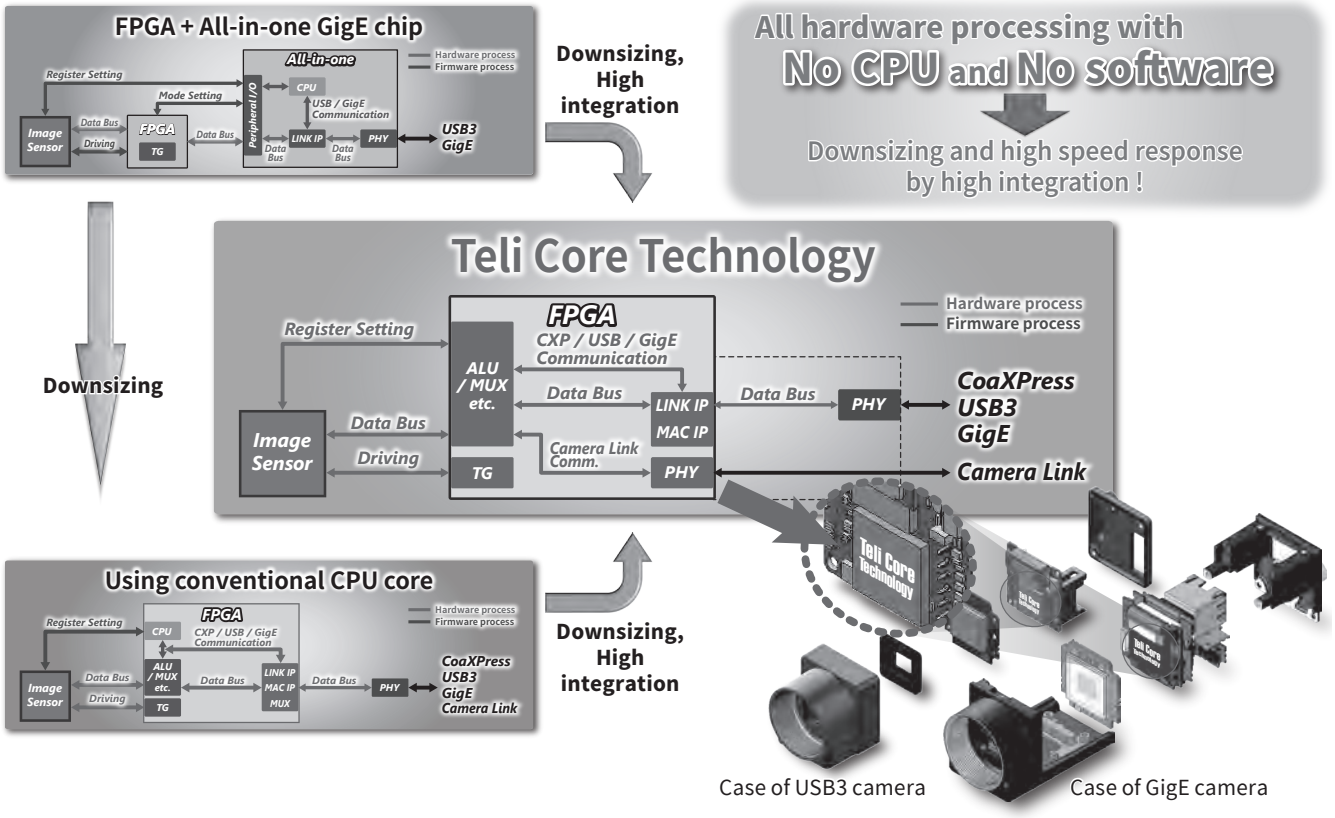
*1 : MCG : with Dust proof glass, MCF : with IR cut filter

*2 : GS-CMOS : Global shutter CMOS

Featuring TELI original IP "Teli Core Technology"

Appendix

Models equipped with TELI's original IP core are now available one after another!



TeliCamSDK

Software Development Kit

Details are here.

Software download page

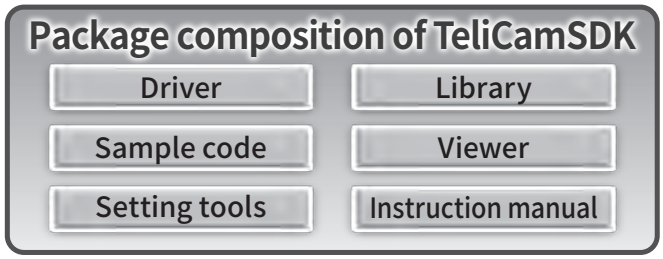
Outline

"TeliCamSDK" is SDK (Software Development Kit) for USB3 cameras, GigE cameras and CoaXPress (CXP) cameras supplied by Toshiba Teli Corporation.
"TeliCam SDK" includes driver software, library, sample code, viewer software, setting tools and instruction manual.

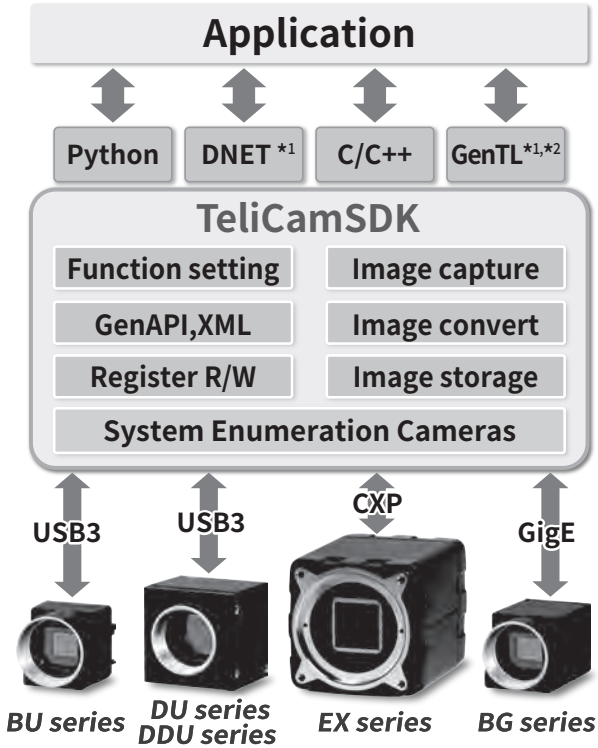
Package composition of TeliCamSDK

- As standard of digital camera such as USB3 Vision, GigE Vision or CoaXPress is not supported by OS, software for control and imaging (driver, library etc.) is necessary.
- Third party's specific driver can be used with its image processing library. However, camera manufacturer's SDK is necessary for user who does not use third party's software.

* TeliCamSDK contains the components necessary for application development.



Configuration of package



Features

- Driver and API designed in-house
- Camera control is possible without being aware of camera interface
- Application can be created with less code implementation
- Provides multiple ways to access camera
  - Register access
  - Access using Gen I Cam node
  - Access by dedicated function
- Support for python language API "pitelicam" *3
- Support for ImageJ plug-in "TeliPlugin" *4
- Simplification of image capture processing
- Supports GenTL interface
- High performance API
- Providing utility functions
- Code can be reused on Windows and Linux
- Easy-to-use, easy-to-understand sample code

Programming language

- C/C++
- C#
- VB.NET
- C ++/CLI (for Windows)

Supporting industrial protocol

- USB3 Vision
- GigE Vision
- CoaXPress
- IIDC2
- GenICam

Specifications

- Supporting OS; for Windows*5

Language / OS	Windows 10	Windows 11
Japanese	Support	Support
English	Support	Support

- Supporting OS; for Linux*5

Language / Distribution	Linux				
	Intel / AMD			ARM	Others
	Ubuntu				
	18.04 LTS amd64	20.04 LTS amd64	22.04 LTS amd64		
Japanese	Support	Support	Support	Support	Contact sales
English	Support	Support	Support	Support	Contact sales

TeliCamSDK for Linux supported ARM architectures. - Jetson nano / Raspberry pi 4 *6

*1: for Windows *2 : for USB, CXP *3 : Supports TeliCamSDK v4.0.0.1 or later *4 : Supports TeliCamSDK v4.0.1.1 or later *5 : Please contact us for other OS and distributions.
*6 : Image might be missed depending on PC specifications.

BC Series / CSCS60BM18

BC Series
Details are here.

CSCS60BM18
Details are here.

BC040M Series / BC160M Series / CSCS60BM18

BC302LM Series / BC505LM Series

Outline

Cameras with Camera Link interface.
Compact size of 29mm x 29mm and light weight, suitable for setting in equipment.
Product range from 0.4MP (523fps) to 5MP (36fps).

Features

Easy operation

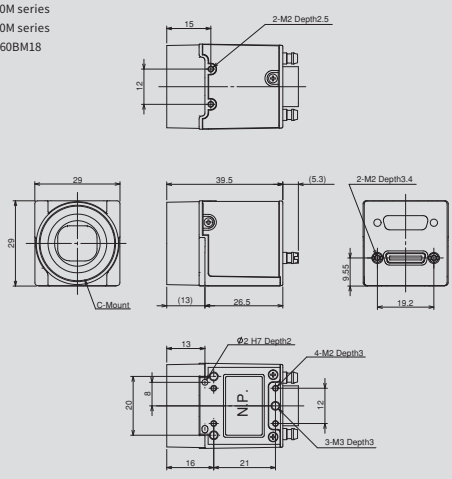
- Powered by frame grabber board complying PoCL.
- High accuracy of optical axes is guaranteed for CSCS60BM18.

Various function

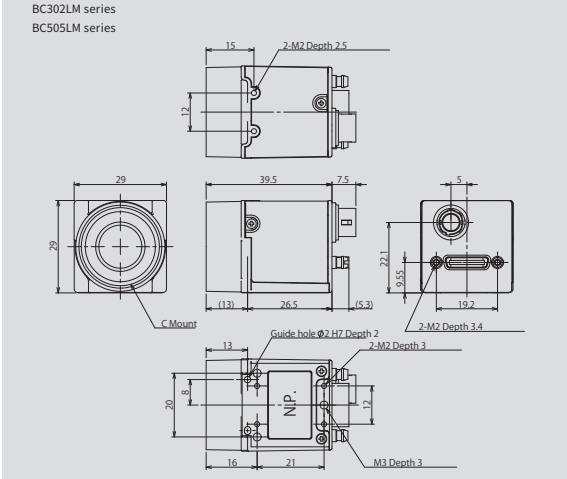
- Higher speed image capturing is achieved by partial scanning function.
- CSCS60BM18 has finer image processing functions.
  - –Sequential shutter mode allows setting different condition of imaging and output.
  - –Inverse function (horizontal / vertical)

Dimensions

BC040M series
BC160M series
CSCS60BM18



BC302LM series
BC505LM series



Accessory information (options)

Camera Link cable ····· SDR-XXX, PoCL compatible
(Depending on the grabber board to be connected)
Lens ····· ▶P27 - 32
Tripod attachment ····· ▶P24 - 25
Confirmed boards list ····· ▶P24

Camera Data

- Spectral sensitivity characteristics ····· ▶P20 - 21
- Pin assignment ····· ▶P23

CSC6M100BMP11 / CSC6M100CMP11

Details are here.

CSC6M100BMP11 / CSC6M100CMP11

Outline

With CameraLink interface.
This camera is 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

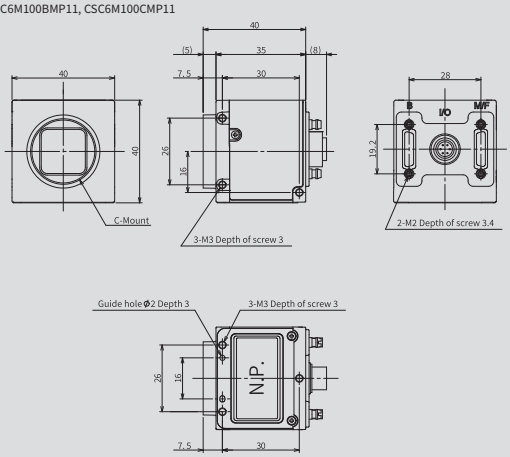
- As it employs a global electronic shutter similar to a CCD image sensor, clear images of even fast-moving object are obtainable with less blur.
- High 6.5Mega pixels 99fps realized high quality image.
- This camera achieves accurate optical axes.

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 scaned 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.
  - –Inverse pixel (horizontal / vertical) function

Dimensions

CSC6M100BMP11, CSC6M100CMP11



Accessory information (options)

Camera Link cable ····· SDR-XXX, PoCL compatible
(Depending on the grabber board to be connected)
Lens ····· ▶P27 - 32
Tripod attachment ····· ▶P24 - 25
Confirmed boards list ····· ▶P24

Camera Data

- Spectral sensitivity characteristics ····· ▶P20, 22
- Pin assignment ····· ▶P23

Specifications

B/W | COLOR	B/W					
Pixles	0.4M	1.3M	1.6M	3.1M	5M	6.5M
Model*1	BC040M	CSCS60BM18	BC160M	BC302LMG	BC505LMG	CSC6M100BMP11
Interface	Camera Link (Base configuration)					Camera Link (Full configuration)
Imager*2	1/2.9 type GS-CMOS (IMX287LLR)	1/1.8 type GS-CMOS (EV76C560ABT)	1/2.9 type GS-CMOS (IMX273LLR)	1/1.8 type GS-CMOS (IMX265LLR)	2/3 type GS-CMOS (IMX264LLR)	1.1 type GS-CMOS (TELI original)
Resolution	720(H) x 540(V)	1,280(H) x 1,024(V)	1,440(H) x 1,080(V)	2,048(H) x 1,536(V)	2,448(H) x 2,048(V)	2,560(H) x 2,560(V)
Frame rate	Mono8 (3tap) : 523 fps (High-fps mode) / 436 fps (Normal mode) Mono8 (2tap) : 377 fps (Normal mode)	Mono8 : 61 fps	Mono8 (3tap) : 148 fps Mono8 (2tap) : 99 fps	Mono8 (3tap) : 56 fps Mono8 (2tap) : 52 fps	Mono8 (3tap) : 36 fps Mono8 (2tap) : 32.6 fps	Mono8 : 99 fps
Pixel size	6.90µm x 6.90µm	5.3µm x5.3µm	3.45µm x 3.45µm	3.45µm x 3.45µm		5.0µm x 5.0µm
Electronic shutter	MANUAL : 1.08 µs to 13.31 µs (Short exposure mode), 14.8 µs to 16 s Random Trigger Shutter : 14.8 µs to 16 s (Edge mode, Normal), 1.08 µs to 13.31 µs (Edge mode, Short exposure mode), 14.8 µs to Trigger width (Level mode)	MANUAL : 10µs to 1s Random Trigger Shutter : 10 µs to 1s (Fixed or Bulk mode)	MANUAL : 1.08 µs to 13.31 µs (Short exposure mode), 14.8 µs to 16 s Random Trigger Shutter : 14.8 µs to 16 s (Edge mode, Normal), 1.08 µs to 13.31 µs (Edge mode, Short exposure mode), 14.8 µs to Trigger width (Level mode)	MANUAL : 30µs to 16s AE : 30µs to 1s Random Trigger Shutter : 30µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)		MANUAL : 10µs to 200ms Random Trigger Shutter : 10 µs to 200ms (Fixed or Bulk trigger mode), 10µs to Trigger width (Pulse width mode)
Scan method	Progressive					
Color filter	-					
Standard sensitivity	2,700 lx (F11, 1/125s)	500 lx (F5.6 1/62s)	2,600 lx (F11, 1/31s)	700 lx (F5.6, 1/52s)	400 lx (F5.6, 1/32.6s)	900 lx (F5.6, 1/62.5s)
Minimum sensitivity	2 lx (F1.4, Gain : +24dB, Video level : 50%)	2.6 lx (F1.4, Gain : x3, Video level : 50%)	2 lx (F1.4, Gain : +24dB, Video level : 50%)	6 lx (F1.4, Gain : +24dB, Video level : 50%)	3 lx (F1.4, Gain : +24dB, Video level : 50%)	8 lx (F2.8, Gain : Max, Video level : 50%)
Gamma / LUT	γ=1.0 to 0.45 / Available					γ=1.0, 16 steps preset / LUT
Gain	0dB to +24dB (MANUAL)	Analog : x1, 1.x5, x2, x3 (MANUAL) Digital : 0dB to +6dB (MANUAL)	0dB to +24dB (MANUAL)	0dB to +24dB (MANUAL, AGC)		Analog : 0 / +3 / +6 / +9dB Digital : 0dB to +18dB
White Balance	-					
Sync System	Internal synchronization					
Image output format	Mono12, Mono10, Mono8	Mono10, Mono8	Mono12, Mono10, Mono8			
Readout mode	All pixel, Scalable, Binning, Decimation, Mirroring, Flip	All pixel, Scalable, Mirroring, Flip	All pixel, Scalable, Binning, Decimation, Mirroring, Flip			All pixel, WOI, Binning, WOI with Binning, Mirroring, Flip
Power supply	DC12V ±10%					
Power consumption	1.6W	0.96W	1.7W	1.8W		3.84W
Lens mount	C-Mount					
External dimension	29 (W)mm x 29 (H)mm x 26.5 (D)mm (not including protrusion)					40 (W)mm x 40 (H)mm x 35 (D)mm (not including protrusion)
Mass	Approx. 33g			Approx. 44g		Approx. 100g
Operation Assurance	Temperature : -5° C to 45° C Humidity : 90% or less (no condensation)					Temperature : -5° C to 45° C Humidity : 10% to 90% (no condensation)
Conformity	CE, FCC, RoHS, WEEE, Camera Link, PoCL, GenICam (GenCP), IIDC2					CE, FCC, RoHS, WEEE, Camera Link, PoCL

*1 : MG : with Dust proof glass
*2 : GS-CMOS : Global shutter CMOS

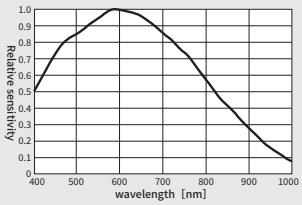
B/W / COLOR	COLOR				
Pixles	0.4M	1.6M	3.1M	5M	6.5M
Model*1	BC040MC	BC160MC	BC302LMCG*3 / BC302LMCF*3	BC505LMCG / BC505LMCF	CSC6M100CMP11
Interface	Camera Link (Base configuration)				Camera Link (Full configuration)
Imager*2	1/2.9 type GS-CMOS (IMX287LQR)	1/2.9 type GS-CMOS (IMX273LQR)	1/1.8 type GS-CMOS (IMX265LQR)	2/3 type GS-CMOS (IMX264LQR)	1.1 type GS-CMOS (TELI original)
Resolution	720(H) x 540(V)	1,440(H) x 1,080(V)	2,048(H) x 1,536(V)	2,448(H) x 2,048(V)	2,560(H) x 2,560(V)
Frame rate	Bayer8 (3tap) : 436 fps Bayer8 (2tap) : 377 fps	Bayer8 (3tap) : 148 fps Bayer8 (2tap) : 99 fps	Bayer8 (3tap) : 56 fps Bayer8 (2tap) : 52 fps	Bayer8 (3tap) : 36 fps Bayer8 (2tap) : 32.6 fps	Bayer8 : 99 fps
Pixel size	6.90µm x 6.90µm	3.45µm x 3.45µm			5.0µm x 5.0µm
Electronic shutter	MANUAL : 1.08 µs to 13.31 µs (Short exposure mode), 14.8 µs to 16 s Random Trigger Shutter : 14.8 µs to 16 s (Edge mode, Normal), 1.08 µs to 13.31 µs (Edge mode, Short exposure mode), 14.8 µs to Trigger width (Level mode)		MANUAL : 30µs to 16s AE : 30µs to 1s Random Trigger Shutter : 30µs to 16s (Edge or Bulk mode), 50µs to Trigger width (Level mode)		MANUAL : 10µs to 200ms Random Trigger Shutter : 10µs to 200ms (Fixed or Bulk trigger mode), 10µs to Trigger width (Pulse width mode)
Scan method	Progressive				
Color filter	RGB primary color mosaic				
Standard sensitivity	2,100 lx (F8, 1/125s)	2,100 lx (F8, 1/31s)	MCG : (TBD) lx, MCF : (TBD) lx (F5.6, 1/52s)	MCG : 1,150 lx, MCF : 1,400 lx (F5.6, 1/32.6s)	2,200 lx (F5.6, 1/62.5s)
Minimum sensitivity	3 lx (F1.4, Gain : +24dB, Video level : 50%)		MCG : (TBD) lx, MCF : (TBD) lx (F1.4, Gain : +24dB, Video level : 50%)	MCG : 3 lx, MCF : 3 lx (F1.4, Gain : +24dB, Video level : 50%)	20 lx (F2.8, Gain : Max, Video level : 50%)
Gamma / LUT	γ=1.0 to 0.45 / Available				γ=1.0, 16 steps / LUT
Gain	0dB to +24dB (MANUAL)		0dB to +24dB (MANUAL, AGC)		Analog : 0 / +3 / +6 / +9dB Digital : 0dB to +18dB
White Balance	MWB / OPWB				
Sync System	Internal synchronization				
Image output format	Bayer12, Bayer10, Bayer8				RAW12, RAW10, RAW8
Readout mode	All pixel, Scalable, Binning, Decimation, Mirroring, Flip				All pixel, WOI, Binning, WOI with Binning, Mirroring, Flip
Power supply	DC12V ±10%				
Power consumption	1.7W		TBD	2.2W	3.84W
Lens mount	C-Mount				
External dimension	29 (W)mm x 29 (H)mm x 26.5 (D)mm (not including protrusion)				40 (W)mm x 40 (H)mm x 35 (D)mm (not including protrusion)
Mass	Approx. 33g		Approx. 44g		Approx. 100g
Operation Assurance	Temperature : -5° C to 45° C Humidity : 90% or less (no condensation)				Temperature : -5° C to 45° C Humidity : 10% to 90% (no condensation)
Conformity	CE, FCC, RoHS, WEEE, Camera Link, PoCL, GenICam (GenCP), IIDC2				CE, FCC, RoHS, WEEE, Camera Link, PoCL

*1 : MCG : with Dust proof glass, MCF : with IR cut filter
*2 : GS-CMOS : Global shutter CMOS
*3 : Planning

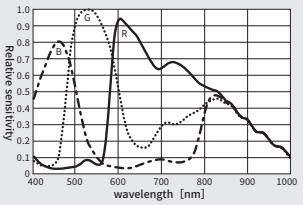
No.	Interface				Imager	IR cut filter
	USB3.2 Gen1	Gigabit Ethernet	Camera Link	CoaXPress		
1	BU040MG	BG040M	BC040M		IMX287LLR	
2	BU040MCG	BG040MC	BC040MC		IMX287LQR	
3	BU040MCF	BG040MCF			IMX287LQR	●
4	BU132M		CSCS60BM18		EV76C560ABT	
5	BU160MG	BG160M	BC160M		IMX273LLR	
6	BU160MCG	BG160MC	BC160MC		IMX273LQR	
7	BU160MCF	BG160MCF			IMX273LQR	●
8	BU205M				CMV2000-3E5M	
9	BU238M				IMX174LLJ	
10	BU238MC				IMX174LQJ	
11	BU238MCF				IMX174LQJ	●
12	BU302MG				IMX252LLR	
13	BU302MCG				IMX252LQR	
14	BU302MCF				IMX252LQR	●
15		BG302LMG	BC302LMG		IMX265LLR	
16		BG302LMCG	(BC302LMCG)*1		IMX265LQR	
17		BG302LMCF	(BC302LMCF)*1		IMX265LQR	●
18	BU406M				CMV4000-3E5M	
	BU406MN				CMV4000-3E12M	
19	BU406MC				CMV4000-3E5C	
20	BU406MCF				CMV4000-3E5C	●
21	BU502MG*2				IMX547AAM	
22	BU502MCF*2				IMX547AAQ	●
23	BU505MG				IMX250LLR	
24	BU505MCG				IMX250LQR	
25	BU505MCF				IMX250LQR	●
26		BG505LMG	BC505LMG		IMX264LLR	
27		BG505LMCG	BC505LMCG		IMX264LQR	
28		BG505LMCF	BC505LMCF		IMX264LQR	●
29	BU602M				IMX178LLJ	
30	BU602MC				IMX178LQJ	
31	BU602MCF				IMX178LQJ	●
32	DU657M		CSC6M100BMP11		TELI Original (Mono)	
33	DU657MC		CSC6M100CMP11		TELI Original (Color)	
34	BU805MG*2				IMX546AAM	
35	BU805MCF*2				IMX546AAQ	●
36	BU1203MC				IMX226CQJ	
37	BU1203MCF				IMX226CQJ	●
38	BU1207MG DU1207MG DDU1207MG				IMX253LLR	
39	BU1207MCG DU1207MCG DDU1207MCG				IMX253LQR	
40	BU1207MCF DU1207MCF DDU1207MCF				IMX253LQR	●
41	DDU1607MG				XGS16000 (Mono)	
42	DDU1607MCG				XGS16000 (Color)	
43	DDU1607MCF				XGS16000 (Color)	●
44	BU2006MG				IMX183CLK	
45	BU2006MCF				IMX183CQJ	●
46	BU2409MG				IMX540LLR	
47	BU2409MCG				IMX540LQR	
48	BU2409MCF				IMX540LQR	●
49				EX370BMG-X	EV2S36MB	
				EX670AMG-X	EV2S67MB	
50				EX670AMCG-X	EV2S67MC	

*1 : Planning
*2 : Under development

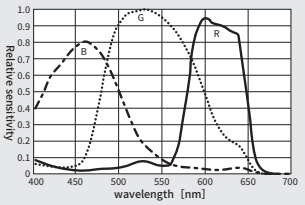
① BU040MG / BG040M / BC040M



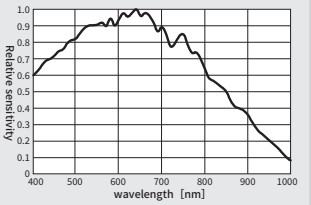
② BU040MCG / BG040MC / BC040MC



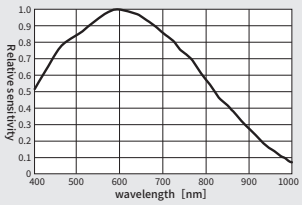
③ BU040MCF / BG040MCF



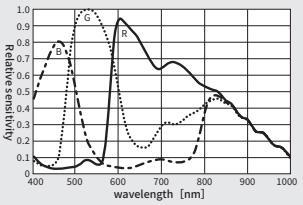
④ BU132M / CSCS60BM18



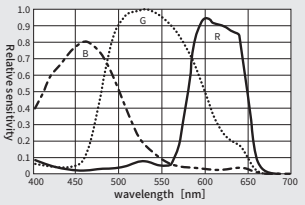
⑤ BU160MG / BG160M / BC160M



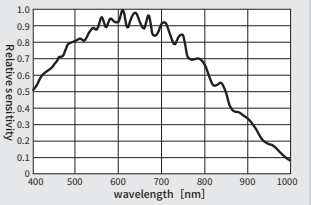
⑥ BU160MCG / BG160MC / BC160MC



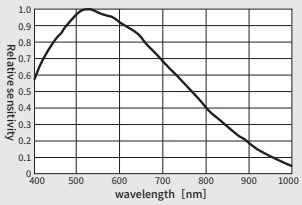
⑦ BU160MCF / BG160MCF



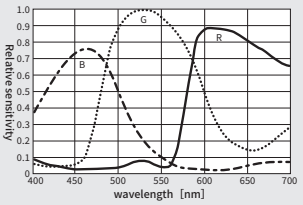
⑧ BU205M



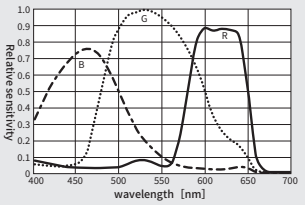
⑨ BU238M



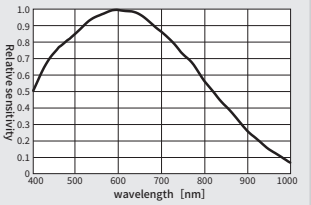
⑩ BU238MC



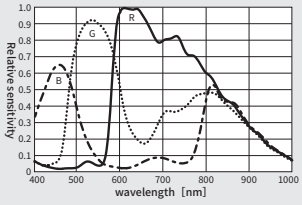
⑪ BU238MCF



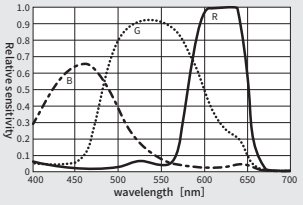
⑫ BU302MG



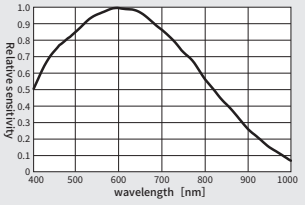
⑬ BU302MCG



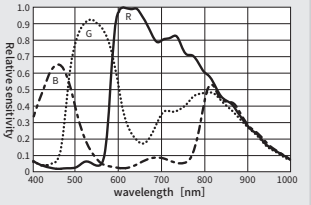
⑭ BU302MCF



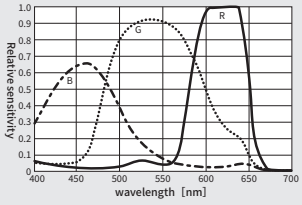
⑮ BG302LMG / BC302LMG



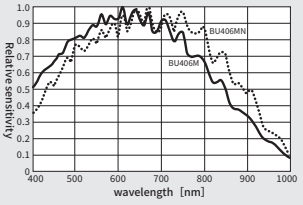
⑯ BG302LMCG / (BC302LMCG)



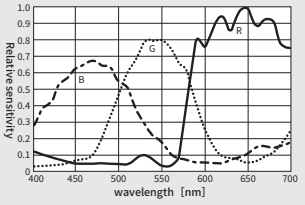
⑰ BG302LMCF / (BC302LMCF)



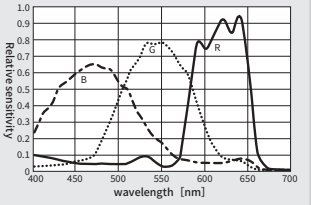
⑱ BU406M / BU406MN



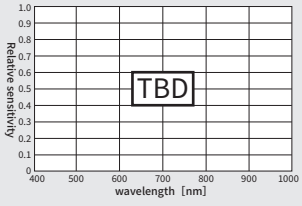
⑲ BU406MC



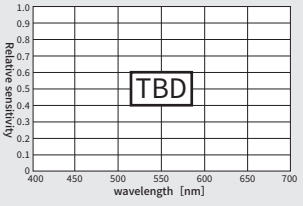
⑳ BU406MCF



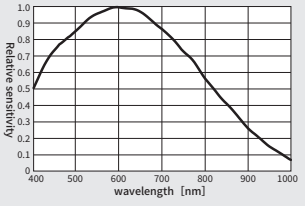
㉑ BU502MG



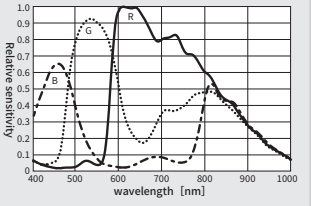
㉒ BU502MCF



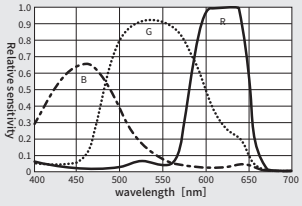
㉓ BU505MG



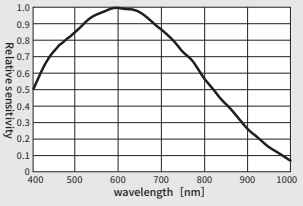
㉔ BU505MCG



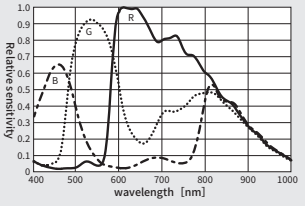
㉕ BU505MCF



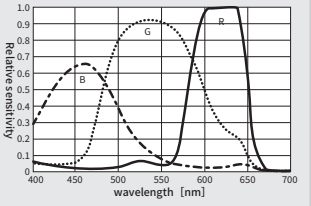
㉖ BG505LMG / BC505LMG

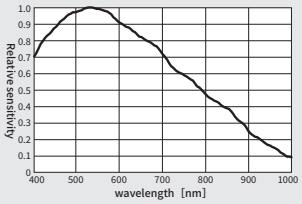


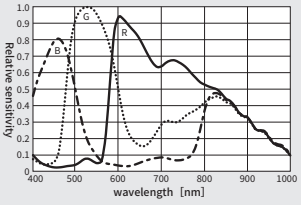
㉗ BG505LMCG / BC505LMCG

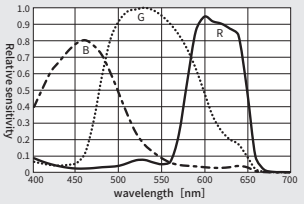


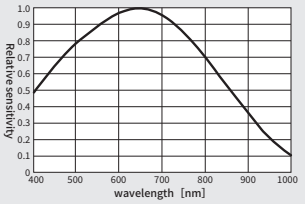
㉘ BG505LMCF / BC505LMCF

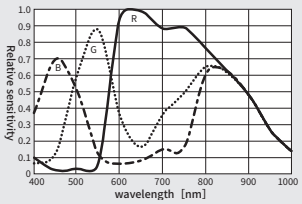


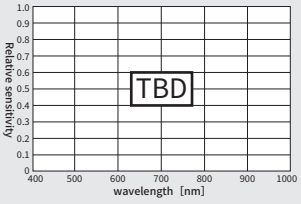
(29)
BU602M


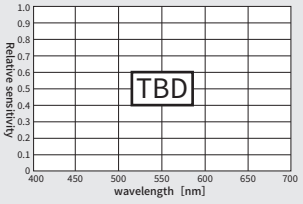
(30)
BU602MC


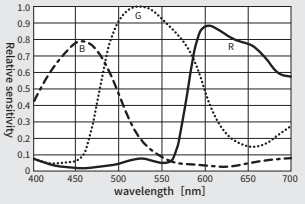
(31)
BU602MCF


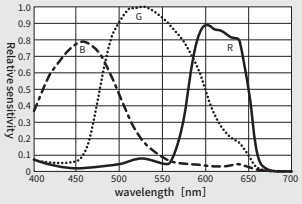
(32)
DU657M / CSC6M100BMP11


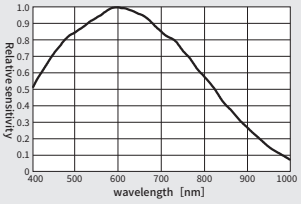
(33)
DU657MC / CSC6M100CMP11


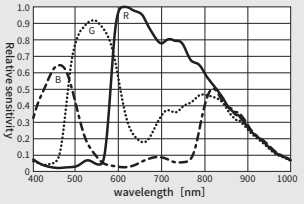
(34)
BU805MG


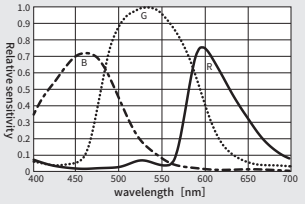
(35)
BU805MCF


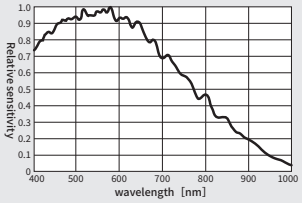
(36)
BU1203MC


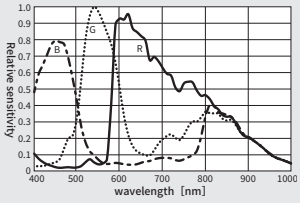
(37)
BU1203MCF


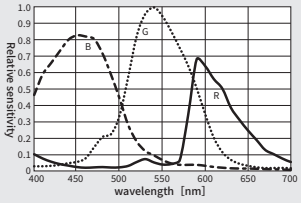
(38)
BU1207MG / DU1207MG / DDU1207MG


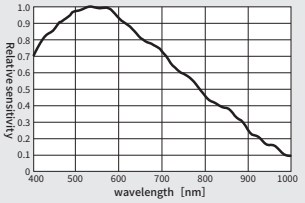
(39)
BU1207MCG / DU1207MCG / DDU1207MCG


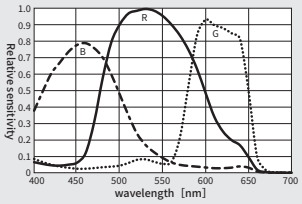
(40)
BU1207MCF / DU1207MCF / DDU1207MCF


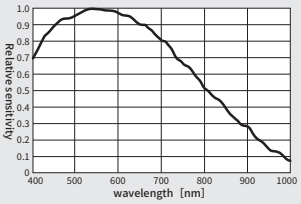
(41)
DDU1607MG


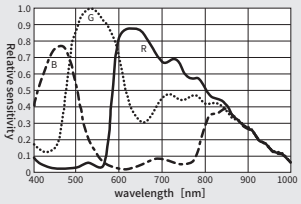
(42)
DDU1607MCG


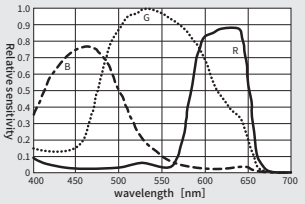
(43)
DDU1607MCF


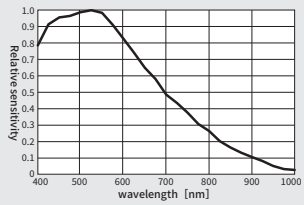
(44)
BU2006MG


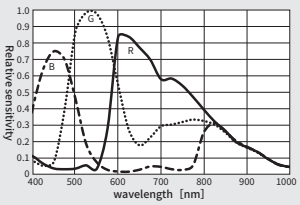
(45)
BU2006MCF


(46)
BU2409MG


(47)
BU2409MCG


(48)
BU2409MCF


(49)
EX370BMG-X / EX670AMG-X


(50)
EX670AMCG-X


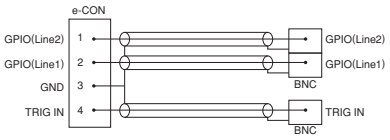
Standard pin assignment for individual camera DC IN connectors. Please see user guide for details.

■BU / DU / DDU 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	I/O*1	GPIO (Line2)
2	O	GPIO (Line1)
3	—	GND
4	I	TRIG_IN

Examples of wiring cable



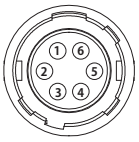
***1 : Pin No.1 is I/O but please check the latest specifications of Camera.**

■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

Connector pin assignment



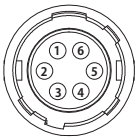
■BC series*3

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

Pin No.	I/O	Assignment
1	O	GPIO Output
2	—	GPIO GND
3	—	GND
4	I	External Trigger Input
5	I/O	GPIO_Input / Output
6	—	DC+12V

*3 : Limited to models with two connectors.

Connector pin assignment



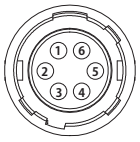
■BG series

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

Pin No.	I/O	Assignment
1	I	+12V
2	I	TRIG
3	*2	Line 1
4	O	Line 2
5	—	I/O GND
6	—	GND

*2 : BG302 and BG505 are "I/O" Others are "O"

Connector pin assignment



■EX series

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

Pin No.	I/O	Assignment	Pin No.	I/O	Assignment
1	—	GND	7	I	Line1
2	I	DC+24V	8	—	IO GND
3	—	IO GND	9	O	Line4
4	O	Line3	10	—	IO GND
5	—	IO GND	11	I	DC+24V
6	I	Line0	12	—	GND

Connector pin assignment

■Power supply for GigE camera CPCBG

Model	Cable length
CPCBG-03	3m

■Recommended USB3 cable

Cable length	Manufacturer *1	Model *1	Types
3m	Hirakawa Hewtech Corp.	UB3-ST-SA0-MBS-0300-00K	Normal
		UB3-SHF-SA0-MBS-0300-00K	Robot
	Oki Electric Cable Co., Ltd.	USB3-KT5-A-MBS-030	Robot*2
	Nissei Electric Co., Ltd.	NU3MBASU3S 3m	Normal
		NU3MBASU3B 3m	Robot
	3M	1U30A-MB2-SA1-300	Normal
	DYDEN Corp.	RM-USB3.0-A-BS-3000	Robot
5m*3	Hirakawa Hewtech Corp.	UB3-ST-SA0-MBS-0500-00K	Normal
		UB3-SHF-SA0-MBS-0500-00K	Robot
	Oki Electric Cable Co., Ltd.	USB3-KT5-A-MBS-050	Robot*2
	3M Corp.	1U30A-MB2-SA1-500	Normal
	DYDEN Corp.	RM-USB3.0-A-BS-5000	Robot
5/10/20m/~50m*4	EverPro Technologies	Active Optical Cable (AOC hybrid)	Robot
5/7/9m	Nissei Electric Co., Ltd.	Active Optical Cable with low profile angle connector NUAMBLUASUAG[_]m (Right angle)	Robot
30m	Oki Electric Cable Co., Ltd.	USB3-AVS-A-MBS-300	Robot

■Recommended CoaXPress cable

Cable length	Manufacturer *1	Model *1	Types
-*5	Hirakawa Hewtech Corp.	CP12-24CHF-HH-HH-[_][_][_][_]-00K(SQLP) [_][_][_][_] : Cable length (m)	High sliding type
7m	Nissei Electric Co., Ltd.	NCMBMBCBB7m (Straight)	Robot
		NCMBMBLCBB7m (Right angle)	Robot

*1 : Indicated company name or product name are trademarks or registered trademarks.
*2 : High sliding cable
*3 : If you would like to use cable longer than 5m, please ask our sales department.
*4 : It's possible to create from over 20m to 50m. Please contact our sales department for your desired cable length.
*5 : Please contact our sales department for your desired cable length.
* If you would like a cable made by the other manufacturer than the above, or for other details, please contact our sales department.

USB3

Board		Chip		USB
Manufacturer	Model	Manufacturer	Model	Number of ports
Aval Global (Aval Data)	APX-3424-1	RENESAS	µPD720202 x 4	4port
IOI	U3X4-PCIE4XE111	FRESCO LOGIC	FL1100 x 4	4port
	U3-PCIE1XG205-1S	RENESAS	uPD720202 x 1	2port
	U3-PCIE1XG211-1S	FRESCO LOGIC	FL1100 x 1	4port
Techno Scope	PXU-51	RENESAS	uPD720202 x 1	2port
	PXU-53	RENESAS	uPD720202 x 3	3port

* There are restrictions, depending on the camera mode. You are advised to perform sufficient verification with an actual setup in an actual usage environment.
* These components might be obsolete or on the last-order list. For details, contact the respective manufacturers.

Camera Link

Camera model	Manufacturer	Model
BC series CSCS60BM18	Aval Global (Aval Data)	APX-3312
	Interface	PEX-H530821/PEX-H530921/PEX-H531021/PEX-H531122
	Matrox	Solios-CameraLink
	Tietech (Graphin)	IPM-8531PoCL-BE/IPM-8580CL-M（PoCL）/IPM-5512
	Cognex	MVS-8600
	Micro-Technica	MTPCI-TL2/MTPCI-PL-G
		MTPEX-PL-G/MTPEX-ML-G/MTPEX-QL-G/MTPEX-DL-G/MTPEX-FL-G
	Photoron	FDM-PCIe CL
	Euresys	Grablink series
	Teledyne DALSA	X-64 Xcelera-CL PX4 Full X-64 Xcelera-CL PX4 Dual X-64 Xcelera-CL PX8 Full
CSC6M100BMP11 CSC6M100CMP11	Teledyne DALSA	X-64 Xcelera-CL PX4 Full X-64 Xcelera-CL PX8 Full

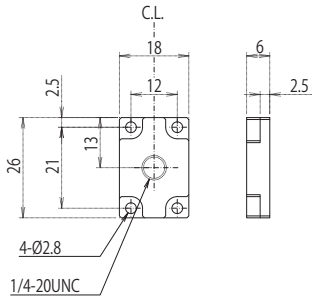
* There are restrictions, depending on the camera mode. You are advised to perform sufficient verification with an actual setup in an actual usage environment.
* These components might be obsolete or on the last-order list. For details, contact the respective manufacturers.

Cable/Tripod attachment compatibility table

Camera model / Option		Cable between camera and power supply adapter	Tripod attachment
USB3.2 Gen 1	BU series	(USB3 cable)	CPTBUBG
	DU series	(USB3 cable)	CPTC6M
USB3.2 Gen 1 (Dual)	DDU series	(USB3 cable : 2 or 1)	CPTC6M
Gigabit Ethernet (PoE)	BG series	When not PoE, Use CPCBG-03	CPTBUBG
Camera Link (PoCL) Base Configuration	BC series	Cameralink cable (SDR-XXX), PoCL Applied *1	CPT8560
	CSCS60BM18		
Camera Link (PoCL) Full Configuration	CSC6M100BMP11	Cameralink cable (SDR-XXX), PoCL Applied, Full configuration *1	CPTC6M
	CSC6M100CMP11		
CoaXPress 2.0	EX series	(CXP cable for 12Gbps)	CPTEX

1 : XXX depends on the connector on the board side.

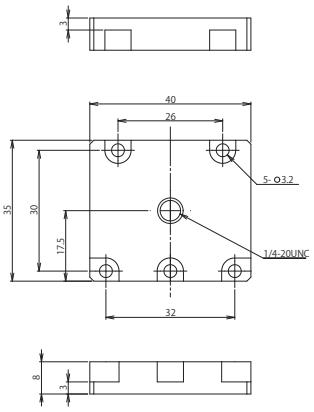
■CPT8560



●Applicable cameras

CSCS60BM18
BC040M
BC040MC
BC160M
BC160MC
BC302LMG
BC302LMCG
BC302LMCF
BC505LMG
BC505LMCG
BC505LMCF

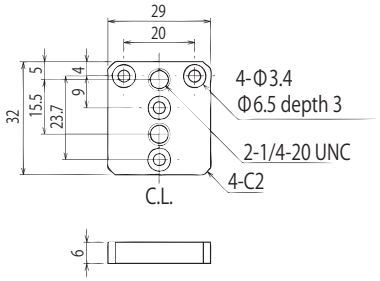
■CPTC6M



●Applicable cameras

CSC6M100BMP11
CSC6M100CMP11
DU657M
DU657MC
DU1207MG
DU1207MCG
DU1207MCF
DDU1207MG
DDU1207MCG
DDU1207MCF
DDU1607MG
DDU1607MCG
DDU1607MCF

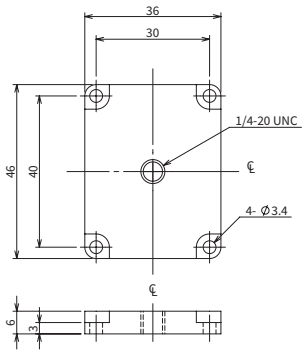
■CPTBUBG



●Applicable cameras

BU040MG
BU040MCG
BU040MCF
BU132M
BU160MG
BU160MCG
BU160MCF
BU205M
BU238M
BU238MC
BU238MCF
BU302MG
BU302MCG
BU302MCF
BU406M
BU406MN
BU406MC
BU406MCF
BU502MG
BU502MCF
BU505MG
BU505MCG
BU505MCF
BU602M
BU602MC
BU602MCF
BU805MG
BU805MCF
BU1203MC
BU1203MCF
BU1207MG
BU1207MCG
BU1207MCF
BU2006MG
BU2006MCF
BU2409MG
BU2409MCG
BU2409MCF
BG040M
BG040MCG
BG040MCF
BG160M
BG160MCG
BG160MCF
BG302LMG
BG302LMCG
BG302LMCF
BG505LMG
BG505LMCG
BG505LMCF

■CPTEX



●Applicable cameras

EX370BMG-X
EX670AMG-X
EX670AMCG-X

◎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=√(6402+4802)=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).

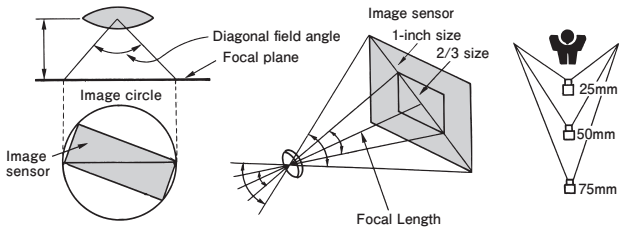
$$x' = fM = 35 \cdot 0.16 = 5.6\,\text{mm}$$

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)

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

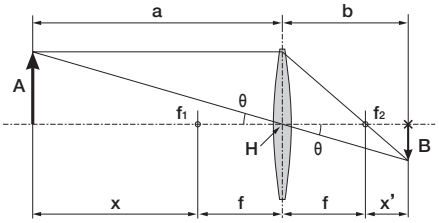
The half of the image size of sensor is substituted for B (Image Height).

(e) Angle of View (AOV)

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

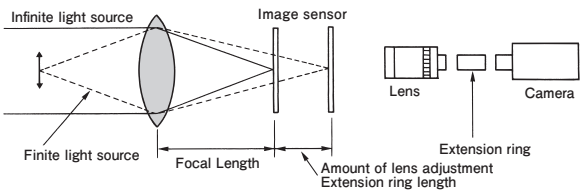
■Explanation of Symbols

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

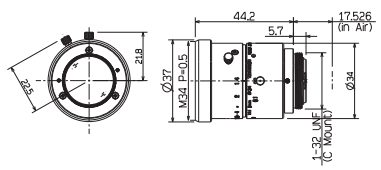
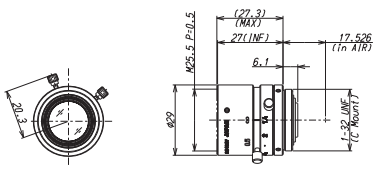
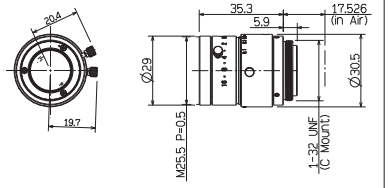


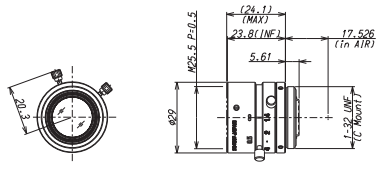
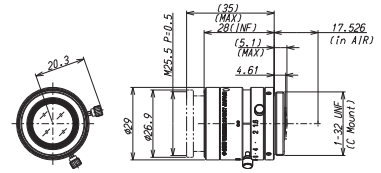
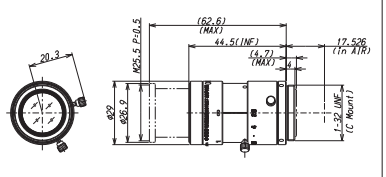
(6) Imaging at Short Working Distance

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'.

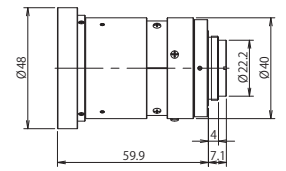
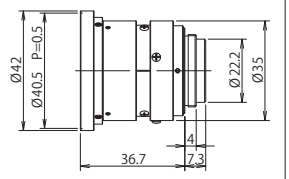
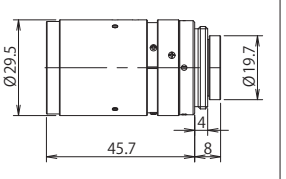
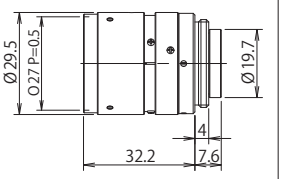


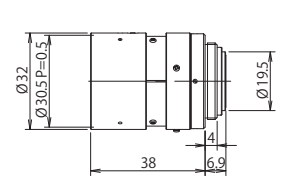
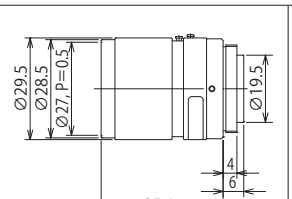
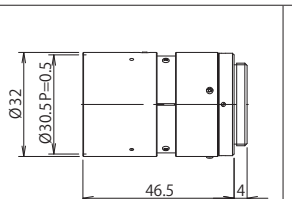
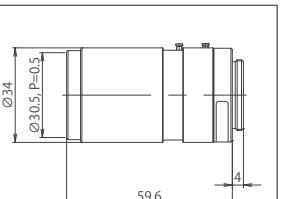
■High resolution C-mount lens (Compatible with 1/1.8 type, Recommended camera: 1.5 to 2MP) Made by Tamron

Outline View			
Model	**M118FM06**	**M118FM08**	**M118FM12**
Image size [Type]	1/1.8	1/1.8	1/1.8
Forcal 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 x 44.3	ϕ29 x 27.3	ϕ29 x 35.3
Weight [g]	57	44	57

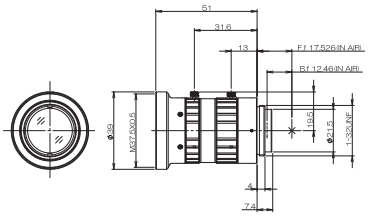
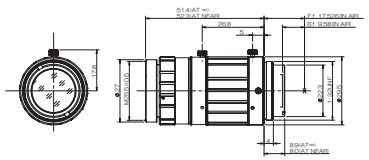
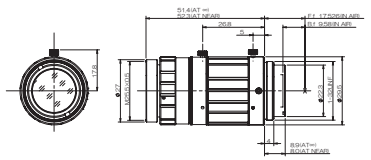
Outline View			
Model	**M118FM16**	**M118FM25**	**M118FM50**
Image size [Type]	1/1.8	1/1.8	1/1.8
Forcal length [mm]	16	25	50
Aperture [F/#]	1.4	1.6	2.8
Image Circle [mm]	8.9	8.9	8.9
Applicable Pixel Pitch [µm]	4.4	4.4	4.4
Ext. Dimensions [mm]	ϕ29 x 24.1	ϕ29 x 35	ϕ29 x 62.6
Weight [g]	39	39	52

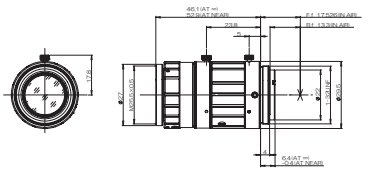
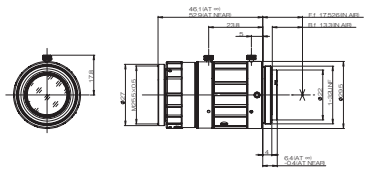
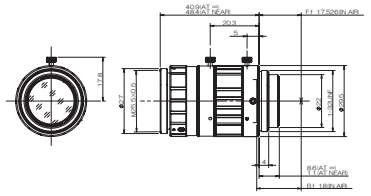
■High resolution C-mount lens (Compatible with 2/3 type, Recommended camera: 1.5 to 2MP) Made by Ricoh

Outline View				
Model	**FL-CC0614A-2M**	**FL-CC0814A-2M**	**FL-CC1214A-2M**	**FL-CC1614A-2M**
Image size [Type]	2/3	2/3	2/3	2/3
Forcal length [mm]	6	8	12	16
Aperture [F/#]	1.4	1.4	1.4	1.4
Image Circle [mm]	11	11	11	11
Applicable Pixel Pitch [µm]	5.4	5.4	5.4	5.4
Ext. Dimensions [mm]	ϕ48.0 x 59.9	ϕ42.0 x 36.7	ϕ29.5 x 45.7	ϕ29.5 x 32.2
Weight [g]	149	76	68	54

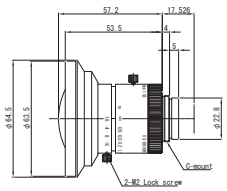
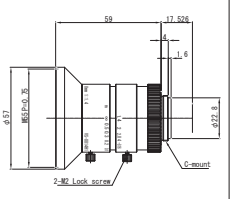
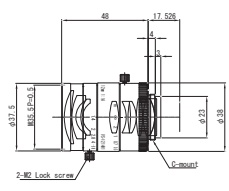
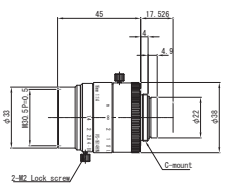
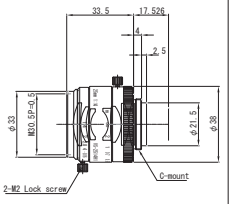
Outline View				
Model	**FL-CC2514A-2M**	**FL-CC3516-2M**	**FL-CC5024A-2M**	**FL-CC7528-2M**
Image size [Type]	2/3	2/3	2/3	2/3
Forcal length [mm]	25	35	50	75
Aperture [F/#]	1.4	1.6	2.4	2.8
Image Circle [mm]	11	11	11	11
Applicable Pixel Pitch [µm]	5.4	5.4	5.4	5.4
Ext. Dimensions [mm]	ϕ32.0 x 38.0	ϕ29.5 x 35.4	ϕ32.0 x 46.5	ϕ34 x 59.6
Weight [g]	63	64	66	125

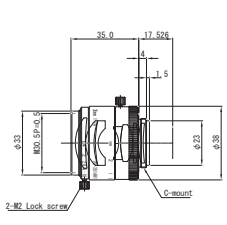
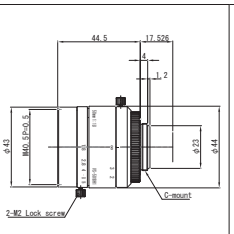
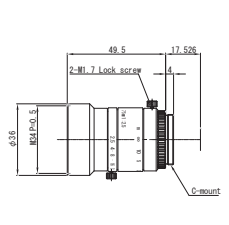
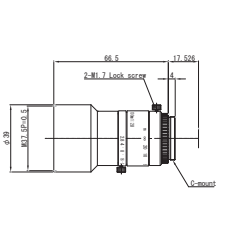
■High resolution C-mount lens (Compatible with 2/3 type, Recommended camera: 5MP) Made by FUJIFILM

Outline View			
Model	**HF6XA-5M**	**HF8XA-5M**	**HF12XA-5M**
Image size [Type]	2/3	2/3	2/3
Forcal length [mm]	6	8	12
Aperture [F/#]	1.9	1.6	1.6
Image Circle [mm]	11	11	11
Applicable Pixel Pitch [µm]	3.45	3.45	3.45
Ext. Dimensions [mm]	ϕ39 x 51	ϕ29.5 x 51.5	ϕ29.5 x 51.5
Weight [g]	100	79	79

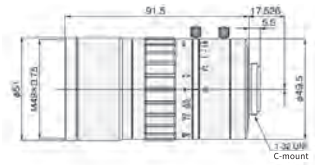
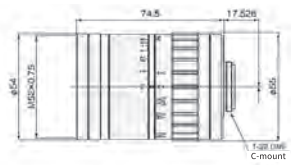
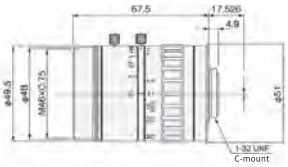
Outline View			
Model	**HF16XA-5M**	**HF25XA-5M**	**HF35XA-5M**
Image size [Type]	2/3	2/3	2/3
Forcal length [mm]	16	25	35
Aperture [F/#]	1.6	1.6	1.9
Image Circle [mm]	11	11	11
Applicable Pixel Pitch [µm]	3.45	3.45	3.45
Ext. Dimensions [mm]	ϕ29.5 x 46	ϕ29.5 x 46	ϕ29.5 x 41.5
Weight [g]	71	72	60

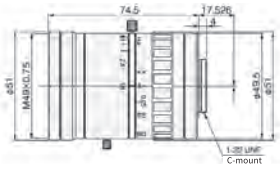
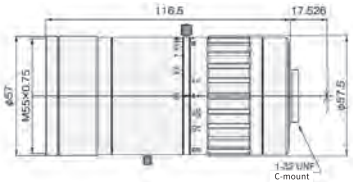
■High resolution C-mount lens (Compatible with 1 type, Recommended camera: 9MP) Made by VS Technology

Outline View					
Model	**VS-0618H1**	**VS-0814H1**	**VS-1214H1**	**VS-1614H1N**	**VS-2514H1**
Image size [Type]	1	1	1	1	1
Forcal length [mm]	6	8	12	16	25
Aperture [F/#]	1.8	1.4	1.4	1.4	1.4
Image Circle [mm]	16	16	16	16	16
Applicable Pixel Pitch [µm]	3.7	3.7	3.7	3.7	3.7
Ext. Dimensions [mm]	ϕ64.5 x 57.2	ϕ57 x 59	ϕ38 x 48	ϕ38 x 45	ϕ38 x 33.5
Weight [g]	200	—	140	—	90

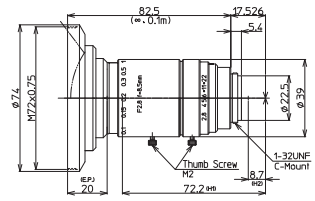
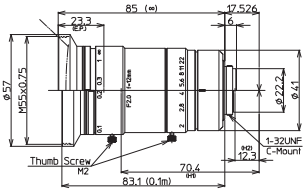
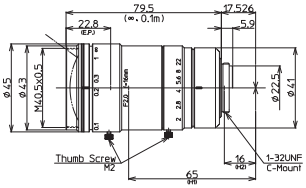
Outline View				
Model	**VS-3514H1**	**VS-5018H1**	**SV-7525H**	**SV-10028H**
Image size [Type]	1	1	1	1
Forcal length [mm]	35	50	75	100
Aperture [F/#]	1.4	1.8	2.5	2.8
Image Circle [mm]	16	16	16	16
Applicable Pixel Pitch [µm]	3.7	3.7	3.7	3.7
Ext. Dimensions [mm]	ϕ38 x 35	ϕ44 x 44.5	ϕ36 x 49.5	ϕ39 x 66.5
Weight [g]	100	135	85	105

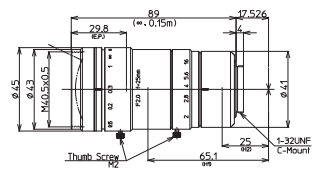
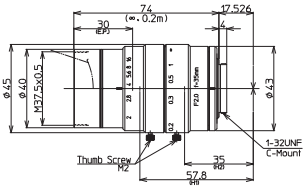
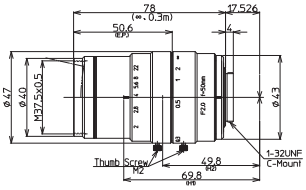
■High resolution C-mount lens (Compatible with 1.1 type, Recommended camera: 5 to 12MP) Made by Mutron

Outline View			
Model	**HF1618V-2**	**HF2514V-2**	**HF3514V-2**
Image size [Type]	1.1	1.1	1.1
Forcal length [mm]	16	25	35
Aperture [F/#]	1.8	1.4	1.4
Image Circle [mm]	17.4	17.4	17.4
Applicable Pixel Pitch [µm]	5.4	5.4	5.4
Ext. Dimensions [mm]	ϕ51 x 91.5	ϕ54 x 74.5	ϕ49.5 x 67.5
Weight [g]	300	295	—

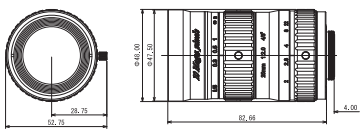
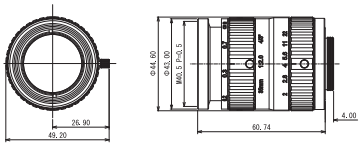
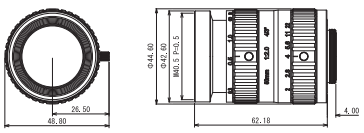
Outline View		
Model	**HF5018V-2**	**HF7518V-2**
Image size [Type]	1.2	1.2
Forcal length [mm]	50	70
Aperture [F/#]	1.8	1.8
Image Circle [mm]	17.4	17.4
Applicable Pixel Pitch [µm]	5.4	5.4
Ext. Dimensions [mm]	ϕ51 x 74.5	ϕ57 x 116.5
Weight [g]	245	490

■High resolution lens (Compatible with 4/3 type, Recommended camera: 8.45 to 10MP) Made by Kowa Optronics

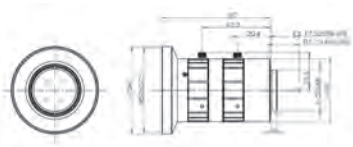
Outline View			
Model	**LM8XC2**	**LM12XC2**	**LM16XC2**
Image size [Type]	4/3	4/3	4/3
Forcal length [mm]	8.5	12	16
Aperture [F/#]	2.8	2	2
Image Circle [mm]	23	23	23
Applicable Pixel Pitch [µm]	5.5	5.5	5.5
Ext. Dimensions [mm]	ϕ74 x 82.5	ϕ57 x 85	ϕ45 x 79.5
Weight [g]	245	270	250

Outline View			
Model	**LM25XC2**	**LM35XC2**	**LM50XC2**
Image size [Type]	4/3	4/3	4/3
Forcal 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 x 89	ϕ45 x 74	ϕ47 x 78
Weight [g]	255	210	235

■High resolution C-mount lens (Compatible with 4/3 type, Recommended camera: 8.45 to 10MP) Made by Kenko Tokina

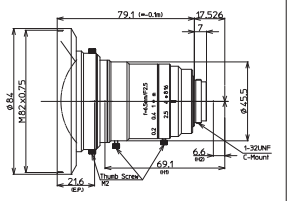
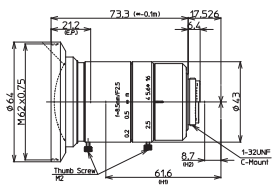
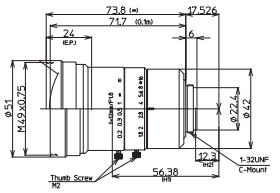
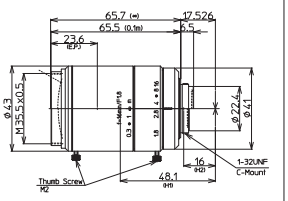
Outline View			
Model	**KCM-2520U43MP10**	**KCM-3520U43MP10**	**KCM-5020U43MP10**
Image size [Type]	4/3	4/3	4/3
Forcal length [mm]	25	35	50
Aperture [F/#]	2	2	2
Image Circle [mm]	23	23	23
Applicable Pixel Pitch [µm]	5	5	5
Ext. Dimensions [mm]	ϕ48 x 82.7	ϕ44.6 x 54.9	ϕ44.6 x 53.7
Weight [g]	250	173	170

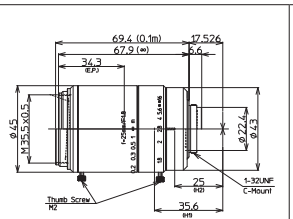
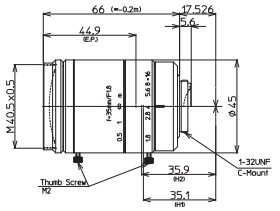
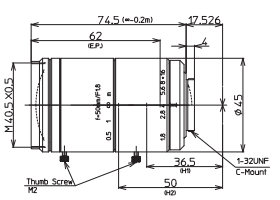
■High resolution C-mount lens (Compatible with 1.1 type, Recommended camera: 12MP) Made by FUJIFILM

Outline View			
Model	**CF8ZA-1S**	**CF12ZA-1S**	**CF16ZA-1S**
Image size [Type]	1.1	1.1	1.1
Forcal length [mm]	8	12	16
Aperture [F/#]	1.8	1.8	1.8
Image Circle [mm]	17.6	17.6	17.6
Applicable Pixel Pitch [µm]	2.5	2.5	2.5
Ext. Dimensions [mm]	ϕ54 x 67	ϕ39 x 67.6	ϕ39 x 67.6
Weight [g]	180	180	180

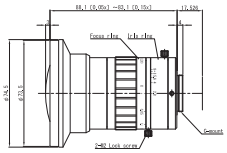
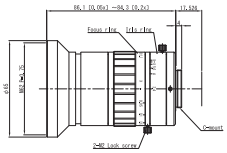
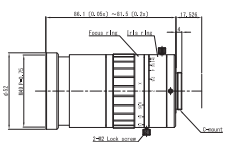
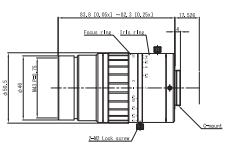
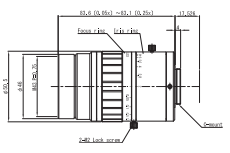
Outline View			
Model	**CF25ZA-1S**	**CF35ZA-1S**	**CF50ZA-1S**
Image size [Type]	1.1	1.1	1.1
Forcal length [mm]	25	35	50
Aperture [F/#]	1.8	1.8	2.4
Image Circle [mm]	17.6	17.6	17.6
Applicable Pixel Pitch [µm]	2.5	2.5	2.5
Ext. Dimensions [mm]	ϕ39 x 67.3	ϕ39 x 67.3	ϕ39 x 68
Weight [g]	170	165	155

■High resolution C-mount lens (Compatible with 2/3 to 1.1 type, Recommended camera: 5 to 24MP) Made by Kowa Optronics

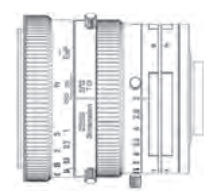
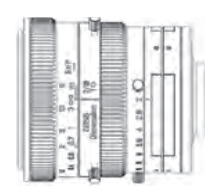
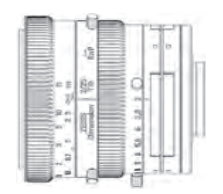
Outline View				
Model	**LM6FC24M**	**LM8FC24M**	**LM12FC24M**	**LM16FC24M**
Image size [Type]	1.1	1.1	1.1	1.1
Forcal length [mm]	6.5	8.5	12	16
Aperture [F/#]	2.5	2.5	1.8	1.8
Image Circle [mm]	17.6	17.6	17.6	17.6
Applicable Pixel Pitch [µm]	2.5	2.5	2.5	2.5
Ext. Dimensions [mm]	ϕ84 x 79.1	ϕ64 x 73.3	ϕ51 x 73.8	ϕ43 x 65.5
Weight [g]	300	230	260	200

Outline View			
Model	**LM25FC24M**	**LM35FC24M**	**LM50FC24M**
Image size [Type]	1.1	1.1	1.1
Forcal length [mm]	25	35	50
Aperture [F/#]	1.8	1.8	1.8
Image Circle [mm]	17.6	17.6	17.6
Applicable Pixel Pitch [µm]	2.5	2.5	2.5
Ext. Dimensions [mm]	ϕ45 x 67.9	ϕ45 x 66	ϕ45 x 74.5
Weight [g]	220	205	205

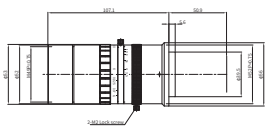
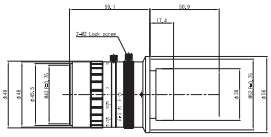
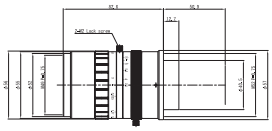
■High resolution C-mount lens (Compatible with 1.2 type, Recommended camera: 24.5MP) Made by VS Technology

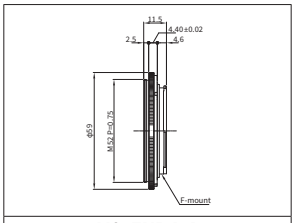
Outline View					
Model	**VS-LLD10**	**VS-LLD12.5**	**VS-LLD15**	**VS-LLD18**	**VS-LLD20**
Image size [Type]	4/3	4/3	4/3	4/3	4/3
Forcal length [mm]	10	12.5	15	18	20
Aperture [F/#]	F2.8 to 16	F2.4 to 16	F2 to 16	F2 to 16	F2 to 16
Image Circle [mm]	22.6	22.6	22.6	22.6	22.6
Applicable Pixel Pitch [µm]	2.74	2.74	2.74	2.74	2.74
Ext. Dimensions [mm]	ϕ74.5 x 88.1 to 83.1mm	ϕ65 x 86.1 to 84.3mm	ϕ52 x 86.1 to 81.5mm	ϕ50.5 x 83.8 to 82.3mm	ϕ50.5 x 83.6 to 83.1mm
Weight [g]	450	380	330	320	310

■High resolution C-mount lens (Compatible with 4/3 type, Recommended camera: 25MP) Made by ZEISS [Contact: Kenko Tokina Co., Ltd.]

Outline View					
Model	**Dimension 2/12**	**Dimension 2/18**	**Dimension 2/25**	**Dimension 2/35**	**Dimension 2/50**
Image size [Type]	4/3	4/3	4/3	4/3	4/3
Forcal length [mm]	12	18	25	35	50
Aperture [F/#]	2	2	2	2	2
Image Circle [mm]	22.1	22.1	22.1	22.1	22.1
Applicable Pixel Pitch [µm]	2.74	2.74	2.74	2.74	2.74
Ext. Dimensions [mm]	ϕ64 x 60	ϕ63 x 61.2	ϕ64 x 60	ϕ64 x 70	ϕ64 x 69(∞)
Weight [g]	264	291	283	323	306

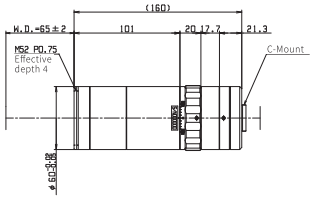
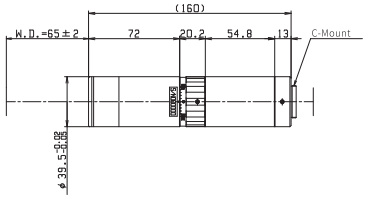
■High resolution lens (M52mm mount APS-C, Recommended camera: 67MP) Made by VS Technology

Outline View			
Model	**VS-HX3535**	**VS-HX5035**	**VS-HX7535**
Image size [Type]	APS-C	APS-C	APS-C
Forcal length [mm]	35	50	75
Aperture [F/#]	F3.5 to 16	F3.5 to 16	F3.5 to 16
Image Circle [mm]	32	32	32
Applicable Pixel Pitch [µm]	2.5	2.5	2.5
Ext. Dimensions [mm]	ϕ56 x 107.1	ϕ56 x 59.1	ϕ57 x 82.6
Weight [g]	500	250	430



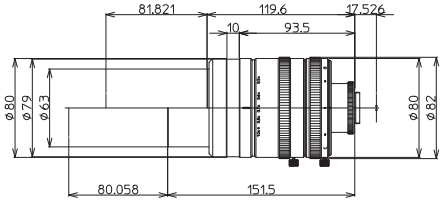
VS-EXR4.4
M52mm ⇒ F-mount adaptor

■High resolution telecentric lens (Compatible with C-mount 1.2 type, Recommended camera: 24.5M) Made by Seiwa Optronics

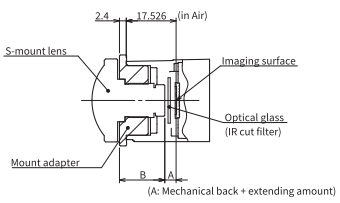
Outline View		
Model	**FHL-0.5X-65-CA**	**FHL-1X-65-CA**
Magnification	0.5X	1X
Working distance	65mm	65mm
Depth of field (maximum aperture)	1.92mm	480µm
Resolving power	125LP/mm	243LP/mm
Optical resolution	8µm	4.1µm
Numerical aperture	0.042	0.082
Effective F	6	6
Image Circle [Type]	19.3mm (1.2 type)	19.3mm (1.2 type)

* The resolution shown herein is the theoretical center resolution calculated from the numerical aperture (NA) at a wavelength of 550 nm and is provided only as a guide.
* The depth of field is calculated based on a permissible circle of confusion of ϕ40 µm.
* Lenses with a coaxial illumination port are also available. For details, contact lens manufacturers.

■Telecentric Macro Zoom lens
(4/3 Type,Recommended Camera Class approx. 21M) Made by Kowa Optical

Outline View		
Model	**LM1119TC**	
Image size [Type]	4/3	
Magnification [X]	0.5	1.0
Object side NA	0.05 ～ 0.007	0.1 ～ 0.014
Work Distance [mm]	80	81.8
Image Circle [mm]	23	
Applicable Pixel Pitch [µm]	3.5	
Ext. Dimensions [mm]	ϕ82 x 151.5	
Weight [g]	1,000	

■Mount adapter (Toshiba Teli)
This adapter makes it possible to mount an S-mount lens on a C-mount camera.

Block diagram	
Model	**SCAR**

Lens combinations
Let the focal length be "A". Then, S-mount lenses that satisfy the following conditions can be used:
- Lenses with optical glass: B ≦ 14.5 mm
- Lenses without optical glass: B ≦ 18.0 mm

■C-CS mount converter (Ricoh)
The adapter when using a C-Mount lens for a CS mount camera.

Model	**FP-MA**

■Extension ring (Ricoh)
6-piece set consisting of 0.5 mm, 1 mm, 5 mm, 10 mm, 20 mm, and 40 mm rings.

Model	**FP-RGST**

□A

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

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.

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.

□B

BERT
Bit Error Rate Test.

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.

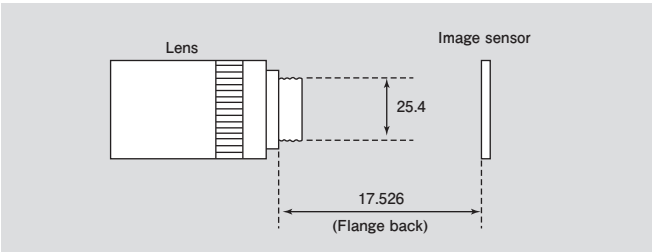
Blooming
Refers to a phenomenon in which intense light entering the imaging unit appears to spread to surrounding areas.

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.

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.

□C

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.

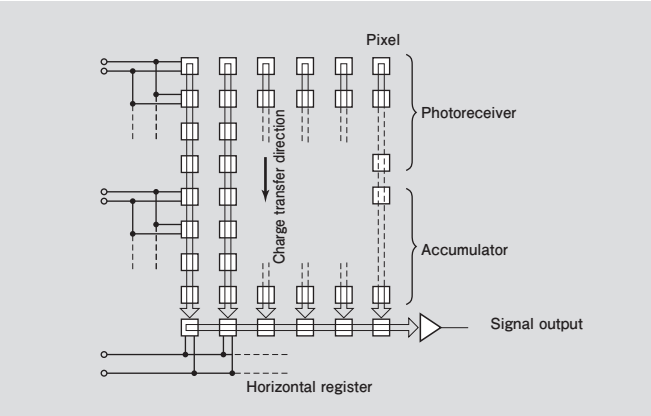


CameraLink
CameraLink, an interface standard for communication between a camera and frame grabber board, has been reviewed and standardized by the AIA (Automated Imaging Association) with the goal of standardizing previously non-standardized interfaces for cameras and grabber boards. The configurations 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.

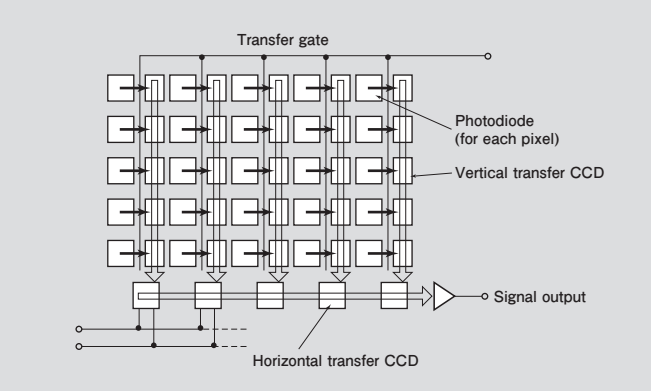
CCD Image sensor
CCD image sensor is an initial of Charge-Coupled Device, using charge-coupled phenomenon each next elements to elements, it causes transmission of electronics.

There are two kinds of systems separate by transfer system.

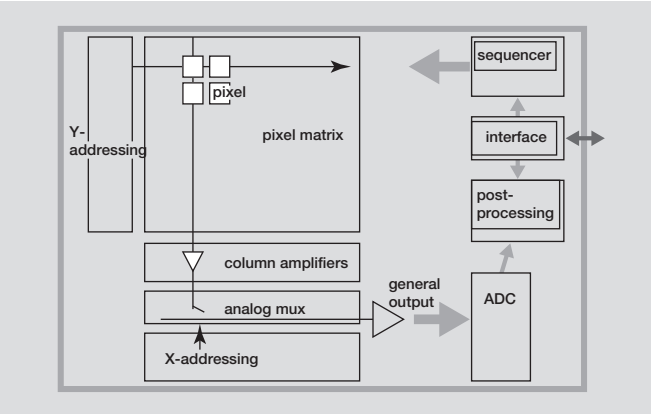
●Frame transfer CCD
A CCD that transfers signal charges photoelectrically converted at the photoreceiver to the accumulator during vertical flyback time and then scans in sequence for each line using a horizontal transfer CCD.



●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.



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.



CoaXPress
An interface standard of camera and frame grabber board. Version 2.0 standards, high speed data transfer of 12.5Gbps can be achieved with single coaxial cable. The 4-channel specification supports 50 Gbps of transfer rate. Expected as interface in next generation.

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

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.

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.

☐D

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.

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.

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

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.

☐E

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

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).

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).

☐F

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.

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.

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.

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

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

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.

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).

☐G

Gamma (γ) 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 (γ = 1) are preferred for TV systems.

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.

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.

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

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.

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.

☐H

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.

Hi-Vision
This indicates HDTV (high definition TV). Full hi vision is 1,920X1,080, there is also 720p (progressive at 1,260X720 pixels) and 1,080i (interlace at 1,920X1,080 pixels).

☐I

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.

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.

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.

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

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

☐M
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.

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

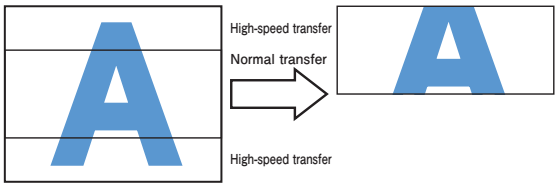
Multiple shutter
Outputs images exposed using the external trigger signal according to the scanning signal with functions applying a random trigger shutter. Overlapping exposures are possible until the scanning signal is input, enabling strobe-like imaging with moving subjects if the trigger signal is 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.

☐N
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.

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

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

☐P
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.



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

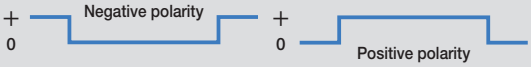
Designation	Horizontal (H) x Vertical (V) dots lines
VGA	640 x 480
SVGA	800 x 600
XGA	1,024 x 768
SXGA	1,280 x 1,024 or 1,280 x 960
UXGA	1,600 x 1,200
QSXGA	2,560 x 2,048

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

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

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

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



☐R
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.

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.

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.

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.

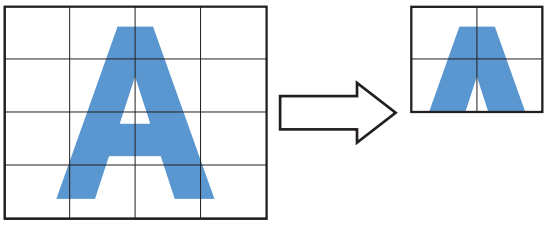
RoHS directive
RoHS is an acronym for Restriction of Hazardous Substances, a directive implemented by the EU in February 2003 to restrict the use of specified hazardous substances in electronic and electrical devices.

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.

☐S
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.

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.



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

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.

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.

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

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.

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.

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.

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

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

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

□T

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

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

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.

□U

USB
USB stands for Universal Serial Bus. It is a serial interface standard for PCs developed by a group of seven companies, including Intel and Microsoft in the United States. The earlier versions of the USB standard specify three transfer modes: 480 Mbps High Speed, 12M bps Full Speed, and 1.5M bps Low Speed. The USB 3.0 standard published in September 2007 specifies a new protocol to provide a SuperSpeed transfer mode at a rate of 5 Gbps. While USB 2.0 provides 2.5 W, USB 3.0 provides 4.5 W. USB 3.1 released in 2013 has two variants. USB 3.1 Gen 2 doubles the maximum transfer rate to 10 Gbps while the SuperSpeed transfer mode of USB 3.0 is referred to as USB 3.1 Gen 1 in the USB 3.1 standard. With the release of USB 3.2 in 2017, USB 3.1 Gen 1 was renamed USB 3.2 Gen 1.

USB3 Vision
Camera standard using USB3 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.

□W

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.

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.

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.

□Y

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

Toshiba Teli's quality control

Continuous growth･･･with･･･continuous quality improvement

Produt planning	R & D• Design	Procurement	Manufacture	Service
◆Clear value for customers ◆Compliance with law and regulation about product in the world	◆Advanced R & D ◆Environmentally friendly design (environmentally friendly product) ◆Enhancing quality function development (QFD)	◆Continuous improvement of global SCM and network. ◆Assurance of quality and reliability (accelerated life test etc.)	◆Control of revision and effect ◆Strict quality control by periodical audit on outsourcing vendor.	◆Reduction of repair LT by improvement of procedure. ◆Feedback from repair information to design for improvement.

Safe & secure product･･･with･･･product quality evaluation

For the purpose of prevention from quality problem (quality improvement), "Environmental test (temperature, humidity, vibration etc.)" and "Accelerated life test (Evaluation on mounted PCB etc.)" corresponding to customer use are conducted. And also, for the purpose of compliance with global low and regulation by category, EMC tests are conducted with following facilities.

Anechoic chamber

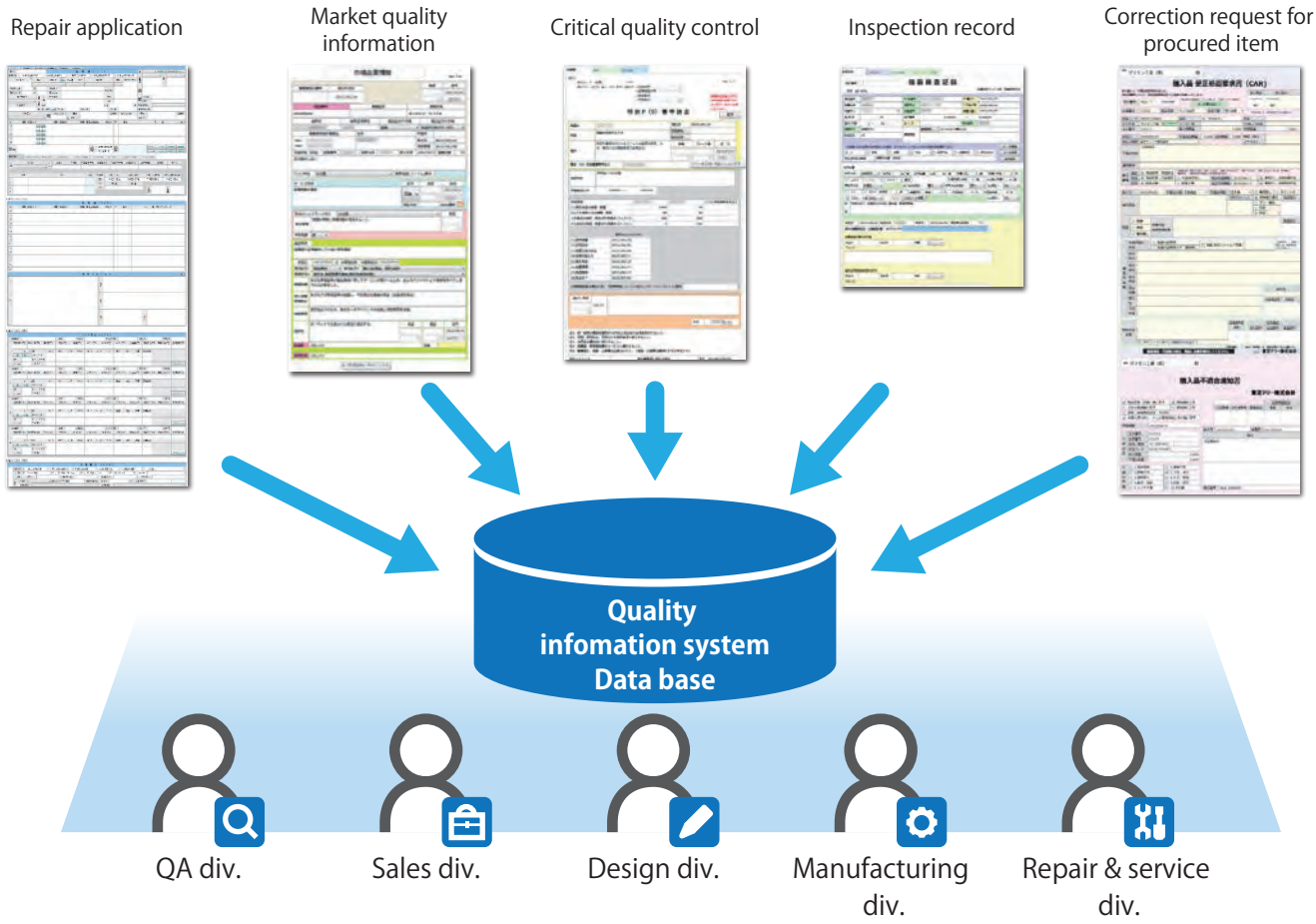
Temperature shock tester

Vibration/Impact Testing Machine

Temperature & humidity testing chamber

Quality information sharing･･･Fully utilizing of quality information data base

Unified management of quality information achieves information sharing among concerned divisions for analysis and effective use.



About warranty & service organization

◆ **Warranty**

For all of our products, we repair them for free of charge in case defect is caused in our responsibility and within 1 year after delivery. We offer 3 years warranty for some of the products. Please check warranty period when you purchase them.

◆ **After sales service**

We offer quick and ensured service. Please contact our distributor if you find defect on our product.

◆ **Demonstration, catalog, document request**

Various demonstration goods are available for your inquiry such as trial use or more detailed contents.

Please contact our distributor for explanation in detail, quotation and application of demonstration.

Inquiries about Products & Services are here

ISO 9001
ISO 14001
BUREAU VERITAS
Certification

○**Certification range**

Development and manufacturing of industrial camera, monitor camera, their application system and wireless remote controlling device.

○**Certified organization**

Head quarter

CAMERA CATALOG

ALL MODELS 2023-2024

For your safety

- Before using this product, please read "Operation Manual" carefully in order to use this product afely and correctly.
- If this product should be used in the extraordinary conditions or environments, or if you have any questions or problems, please contact our sales division.

Toshiba Teli Corporation

MaxxVision®
Sigmaringer Str. 121
70567 Stuttgart
Tel.: 0711 997 996 3
www.maxxvision.com

URL: https://www.toshiba-teli.co.jp/en/

teli camera search

4000-0558-2306a1