CAMERA CATALOG All Models 2024

Toshiba Teli Corporation

Toshiba Teli Machine Vision Camera Lineup





Digital interface camera lineup & selection table are here

Flexible	Flexible Sensor	A variety of optical sizes, pixel counts, and readout methods
lmage Sensor	Flexible Mechanic	Compatible with a variety of shapes and camera heads
/arious sensors, camera control, interfaces and ntelligent image handling as customer solution.	Flexible Interface	Compatible with a variety of interfaces; affinity with peripheral equipment
Contributing to customer's value creation with various camera shape for any kind of demand.	Flexible Control	A variety of controls and easy-to-understand GUI

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Group	Interface	Model	Resolution	Image Size	Frame Rate	Page	
	CoaXPress 2.0	EX370BMG-X	37.7 MP	4/3 type	120 fps	D7	
EX Series	(CXP-12 Quad)	EX670AMG-X / EX670AMCG-X	67 MP	1.8 type (APS-C)	64.5 fps	P1	
	USB 5Ghps	DDU1207MG / DDU1207MCG / DDU1207MCF	12.3 MP	1.1 type	62 fps		
DDU Series	(USB3.1 Gen1) x 2ch	DDU1607MG / DDU1607MCG / DDU1607MCF	16 MP	1.1 type	47 fps		
	(Dual USB3)	DDU2607MG / DDU2607MCG / DDU2607MCF	26.2 MP	1.1 type	28.3 fps	P8 - P9	
DUCATION	USB 5Gbps	DU657M / DU657MC	6.5 MP	1.1 type	55 fps		
USB3.1 Gen1)		DU1207MG / DU1207MCG / DU1207MCF	12.3 MP	1.1 type	32 fps		
		BU040M / BU040MG / BU040MCG / BU040MCF	0.4 MP	1/2.9 type	523 fps		
		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		
BII Series	USB 5Gbps	BU502MG / BU502MCF	5 MP	1/1.8 type	75.6 fps	D10 - D13	
Do Series	(USB3.1 Gen1)	BU505MG / BU505MCG / BU505MCF	5 MP	2/3 type	75 fps	110-115	
	BU602M / BU602MC / BU602MCF	6.2 MP	1/1.8 type	60 fps			
		BU805MG / BU805MCF	8.1 MP	2/3 type	46.7 fps		
		BU1203MC / BU1203MCF	12 MP	1/1.7 type	30 fps		
		BU1207MG / BU1207MCG / BU1207MCF	12.3 MP	1.1 type	31 fps		
		BU1208MG / BU1208MCF	12.3 MP	1.1 type	30.8 fps		
		BU2006MG / BU2006MCF	20 MP	1.0 type	19 fps		
		BU2409MG / BU2409MCG / BU2409MCF	24.5 MP	1.2 type	15 fps		
		BG040M / BG040MCG / BG040MCF	0.4 MP	1/2.9 type	291 fps	P14 - P15	
BG Series	GigE (PoE)	BG160M / BG160MCG / BG160MCF	1.6 MP	1/2.9 type	72 fps		
De Series	0162 (102)	BG302LMG / BG302LMCG / BG302LMCF	3.1 MP	1/1.8 type	36 fps	114 115	
		BG505LMG / BG505LMCG / BG505LMCF	5 MP	2/3 type	22 fps		
		BC040M / BC040MC	0.4 MP	1/2.9 type	523 fps		
BC Series	Camera Link (Base)	BC160M / BC160MC	1.6 MP	1/2.9 type	148 fps		
Debenes	cumera Emix (Base)	BC302LMG / BC302LMCG / BC302LMCF	3.1 MP	1/1.8 type	56 fps	P16 - P18	
		BC505LMG / BC505LMCG / BC505LMCF	5 MP	2/3 type	36 fps		
CSC Series	Camera Link (Base)	CSCS60BM18	1.3 MP	1/1.8 type	61 fps		
	Camera Link (Full)	CSC6M100BMP11/CSC6M100CMP11	6.5 MP	1.1 type	99 fps		
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		Lens				P27 - P32	
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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





and new application fields



Imaging solution is supported



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

Viewer Sample code

High-speed Interface CoaXPress Camera

EX Series













60mm × 60mm × 80mm

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.

Accessory information (options)

- CoaXPress cable
 P23

- F-mount lens adaptor / M42-mount lens adaptor

Camera data

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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)





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

Specifications -

D/W COLOR	D/W COO			
Pixles	37.7M	67	7M	
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, Mono8) 42.1fps (CXP-6 Quad, Mono8) 21fps (CXP-12, Mono8) 10.7fps (CXP-6, Mono8)	64.5fps (CXP-12 Quad, Mono8) 31.6fps (CXP-6 Quad, Mono8) 15.8fps (CXP-12, Mono8) 8fps (CXP-6, Mono8)	64.5fps (CXP-12 Quad, Bayer8) 31.6fps (CXP-6 Quad, Bayer8) 15.8fps (CXP-12, Bayer8) 8fps (CXP-6, Bayer8)	
Pixel size		2.5μm x 2.5μm		
Electronic shutter	Random Trigger Shutter : 10µs to	MANUAL : 10µs to 1s 1s (Timed or Bulk mode), 200µs to 1	Frigger width (TriggerWidth mode)	
Scan method	Progressive			
Color filter	- RGB primary			
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%)	
LUT		Input 12bit, Output 12bit		
Gain		MANUAL : 0dB to +36dB		
White balance		-	MWB, OPWB	
Sync System		Internal synchronization		
Image output format	Mono12p, Mo	no10p, Mono8	Bayer8	
Readout mode	All pixel, Scalable, Bi	nning, Mirroring, Flip	All pixel, Scalable, Mirroring, Flip	
Power supply	PoCXP or E	xternal connector : 24V (18.5V~26	V) 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 6	0(H) x 80(D) mm (not including pr	otrusion)	
Mass		Approx. 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, GenICa	m, IIDC2	

EX series

Dimensions





EX Series

DU Series / DDU (Dual USB) Series













Outline

DU series has USB 5Gbps (USB 3.1 Gen 1) interface for image output and control.

With Dual USB3 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 to 26.2MP 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. (12)
- "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)

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Camera Data

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Pin assignment	▶ P23

Dimensions







B/W COLOR	B/W				
Pixles	6.5M	12.	.3M	16M	26.2 M
Model*1	DU657M	DU1207MG	DDU1207MG	DDU1607MG	DDU2607MG
Interface	USB 5Gbps (USB3.1 Gen1, O	nly SuperSpeed is supported)	USB 5Gbps (U	B 5Gbps (USB3.1 Gen1) x2ch (Only SuperSpeed is supported) corresponding to Dual USB3	
Imager*2	1.1 type GS-CMOS (TELI original)	1.1 type ((IMX2:	1.1 type GS-CMOS (IMX253LLR)		1.1 type GS-CMOS (GMAX0505)
Resolution	2,560(H) x 2,560(V)	4,096(H)	x 3,000(V)	4,000(H) × 4,000(V)	5,120(H) x 5,120(V)
Frame rate	Mono8 : 55 fps	Mono8 : 32 fps	<dual single=""> Mono8 : 62 / 31 fps</dual>	<dual single=""> Mono8 : 47 / 23 fps</dual>	<dual single=""> Mono8 : 28.4/ 14.4 fps</dual>
Pixel size	5.0μm x 5.0μm	3.45µm :	x 3.45μm	3.2µm x 3.2µm	2.5µm x 2.5µm
Electronic shutter	MANUAL : 10µs to 200ms Random Trigger Shutter : 10µs to 200ms (Edge / 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 / Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 16s AE : 30µs to 1s Random Trigger Shutter : 30µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 1s Random Trigger Shutter : 30µs to 1s (Edge / Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 16s Random Trigger Shutter : 30µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode)
Scan method			Progressive		
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)	TBD
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%)	TBD
Gamma / LUT		·	γ=1.0 to 0.45 / Available		
Gain	MANUAL : x1 to x8	MANUAL : 0dB to +36dB, AGC : 0dB to +24dB	MANUAL : 0dB to +24dB, AGC : 0dB to +24dB	MANUAL AGC : >	: x1 to x8, x1 to x8
Sync System			Internal / Bus synchronization		
Image output format	Mono8		Mono12, Mo	no10, Mono8	
Readout mode	All pixel, Scalable, Binning, Mirroring, Flip		All pixel, Scalable, Binning,	Decimation, Mirroring, Flip	
Power supply			DC5V \pm 5% (from USB connector)		
Power consumption	3.6W (maximum)	4.0W (maximum)	5.0W (maximum)	5.3W (maximum)	TBD
Lens mount			C-Mount		
External dimension		40 (W)mm x	40 (H)mm x 35 (D)mm (not includin	g protrusion)	
Mass	Approx. 85g		Appro	ox. 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, GenICa	m, IIDC2	

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

B/W / COLOR	COLOR					
Pixles	6.5M	12.	3M	16M	26.2 M	
	DUCETNC	DU1207MCG	DDU1207MCG	DDU1607MCG	DDU2607MCG	
Model	DU657MC	DU1207MCF	DDU1207MCF	DDU1607MCF	DDU2607MCF	
Interface	USB 5Gbps (USB3.1 Gen1, O	nly SuperSpeed is supported)	USB 5Gbps (U	SB3.1 Gen1) x2ch (Only SuperSpee corresponding to Dual USB3	d is supported)	
Imager*2	1.1 type GS-CMOS (TELI original)	1.1 type ((IMX25	GS-CMOS 53LQJ)	1.1 type GS-CMOS (XGS16000)	1.1 type GS-CMOS (GMAX0505)	
Resolution	2,560(H) x 2,560(V)	4,096(H)	x 3,000(V)	4,000(H) x 4,000(V)	5,120(H) x 5,120(V)	
Frame rate	Bayer8 : 55 fps	Bayer8 / Mono8 : 31 fps	<dual single=""> Bayer8 / Mono8 : 62 / 31 fps</dual>	<dual single=""> Bayer8 : 47 / 23 fps</dual>	<dual single=""> Mono8 : 28.4/ 14.4 fps</dual>	
Pixel size	5.0μm x 5.0μm	3.45µm :	x 3.45μm	3.2μm x 3.2μm	2.5μm x 2.5μm	
Electronic shutter	MANUAL : 10µs to 200ms Random Trigger Shutter : 10µs to 200ms (Edge / Bulk mode), 10µs to Trigger width (Level mode)	MANUAL : 1.51 µs to 16.11 µs (Short exposure mode), 26µs to 16s AE : 26µs to 1s Random Trigger Shutter : 26µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 16s AE : 30µs to 1s Random Trigger Shutter : 30µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 1s Random Trigger Shutter : 30µs to 1s (Edge / Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 16s Random Trigger Shutter : 30µs to 16s (Edge / 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)	TBD	
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%)	TBD	
Gamma / LUT		·	γ=1.0 to 0.45 / Available	·		
Gain	MANUAL : x1 to x8	MANUAL : 0dB to +36dB, AGC : 0dB to +24dB	MANUAL : 0dB to +24dB, AGC : 0dB to +24dB	MANUAL AGC : :	:x1 to x8, x1 to x8	
White Balance			MWB, OPWB			
Sync System			Internal / Bus synchronization			
Image output format	Bayer8	RGB, BGR, YUV422, YUV411, Bayer12, Bayer10, Bayer8, Mono8		Bayer12, Bayer10, Bayer8		
Readout mode	All pixel, Scalable, Binning, Mirroring, Flip		All pixel, Scalable, Binning,	, Decimation, Mirroring, Flip		
Power supply			DC5V \pm 5% (from USB connector)			
Power consumption	3.6W (maximum)	4.5W (maximum)	5.0W (maximum)	5.3W (maximum)	TBD	
Lens mount			C-Mount			
External dimension		40 (W)mm x	40 (H)mm x 35 (D)mm (not includin	g protrusion)		
Mass	Approx. 85g		Appro	эх. 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 Hu	e : -5° C to 45° C (below 60 ° C on cal midity : 10% to 90% (no condensat	pinet surface) ion)	
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.





29mm x 29mm x 16mm

Outline

BU series have USB 5Gbps (USB3.1 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).

Dimensions



Camera Data

- Spectral sensitivity characteristics
 P20 22

Features

Easy operation

- $\boldsymbol{\cdot}$ "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.(12)
- "Image buffer" allows readout image data from host PC on demand.(13)
- "Scalable mode and binning mode" higher speed image scan is available.^(*4)
- "BERT function" measures correspondence quality of cables." *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
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Specifications

B/W COLOR	B/W				
Pixles	0.4M	1.3M	1.6M	2.2M	
Model*1	BU040M BU040MG	BU132M	BU160M BU160MG	BU205M	
Interface		USB 5Gbps (USB3.1 Gen1) (Or	nly 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) × 1,024(V)	1,440(H) × 1,080(V)	2,048(H) × 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 / Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 1s Random Trigger Shutter : 30µs to 1s (Edge / 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 / Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 16s Random Trigger Shutter : 30µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode)	
Scan method		Progr	essive		
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	5 / Available		
Gain	MANUAL : 0 to +36dB, AGC : 0 to +24dB	MANUAL : 0dB to +18dB	MANUAL : 0 to +36dB, AGC : 0 to +24dB	MANUAL : x1 to x8	
Sync System		Internal / Bus s	ynchronization		
Image output format	Mono12, Mono10, Mono8	Mono10, Mono8	Mono12, Mono10, Mono8	Mono8	
Readout mode	All pi	xel, Scalable, Binning, Decimation, Mirroring	, Flip	All pixel, Scalable, Decimation, Mirroring, Flip	
Power supply		DC5V ±5% (from	uUSB connector)		
Power consumption	2.2W (maximum)	1.7W (maximum)	2.4W (maximum)	2.7W (maximum)	
Lens mount		C-Me	ount		
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) 23/vicino : CaplCam UDC2	Temperature : 0° C to 40° C (below 50 ° C on cabinet surface) Humidity : 10% to 90% (no condensation)	
Comornity		CE, FCC, ROHS, WEEE, USI	53 VISION, GENICAM, IIDCZ		

*1 : MG : with Dust proof glass

*2 : GS-CMOS : Global shutter CMOS

B/W COLOR	B/W				
Pixles	2.3M	3.1M	4.2	2M	
Model*1	BU238M	BU302MG	BU406M	BU406MN	
Interface		USB 5Gbps (USB3.1 Gen1) (Or	nly 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) × 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 :	κ 5.5μm	
Electronic shutter	MANUAL : 30µs to 16s Random Trigger Shutter : 30µs to 16s (Edge / 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)	re MANUAL : 30µs to 16s Random Trigger Shutter : 30µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode)		
Scan method	Progressive				
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	5 / Available		
Gain	MANUAL : -6dB to +18dB	MANUAL : 0 to +36dB, AGC : 0 to +24dB	MANUAL : x1 to x8		
Sync System		Internal / Bus s	ynchronization		
Image output format	Mono8	Mono12, Mono10, Mono8	Мо	no8	
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 (m	aximum)	2.7W (m	aximum)	
Lens mount		C-Mc	ount		
External dimension		29 (W)mm x 29 (H)mm x 16 (D)	mm (not including protrusion)		
Mass	Approx. 32g	Approx. 33g	Appro	эх. 32g	
Operation Assurance		Temperature : 0° C to 40° C (be Humidity : 10% to 90	elow 50 ° C on cabinet surface) % (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	B/W			
Pixles	5M	5M	6.2M	8.1M
Model*1	BU502MG	BU505MG	BU602M	BU805MG
Interface		USB 5Gbps (USB3.1 Gen1) (Or	nly 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)	2,848(H) x 2,848(V)
Frame rate	Mono8 : 75.6fps (High Framerate Mode), 74.9fps (Standard Mode)	Mono8 : 75 fps	Mono8 : 60 fps	Mono8 : 46.7 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 : 1.02µs to 2.47µs (Short exposure mode ON), 10µs to 16s (Short exposure mode OFF) Random Trigger Shutter : 10µs to 16s (Edge / 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 : 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 : 1.02µs to 2.47µs (Short exposure mode ON), 10µs to 16s (Short exposure mode OFF) Random Trigger Shutter : 10µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode)
Scan method		Progre	essive	
Standard sensitivity	2,710 lx (F5.6, 1/83.3s)	2,100 lx (F5.6, 1/75s)	2,100 lx (F5.6, 1/62.5s)	3,480 lx (F8, 1/52.6s)
Minimum sensitivity	2 lx (F1.4, Gain : +36dB, Video level: 50%)	2 lx (F1.4, Gain : +36dB, Video level : 50%)	5 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	5 / Available	
Gain	MANUAL : 0dB to +36dB	MANUAL : 0 to +36dB, AGC : 0 to +24dB	MANUAL : 0 to +24dB, AGC : 0 to +24dB	MANUAL : 0dB to +36dB
Sync System	Internal / Bus s	ynchronization	Internal synchronization	Internal / Bus synchronization
Image output format		Mono12, Mor	no10, 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	2.7W (maximum)	2.9W (maximum)	2.4W (maximum)	2.7W (maximum)
Lens mount		C-Mc	bunt	
External dimension		29 (W)mm x 29 (H)mm x 16 (D)	mm (not including protrusion)	
Mass		Appro	x. 33g	
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

*2 : GS-CMOS : Global shutter CMOS

B/W COLOR	B/W				
Pixles	12.3	BM	20M	24.5M	
Model*1	BU1207MG	BU1208MG*3	BU2006MG	BU2409MG	
Interface		USB 5Gbps (USB3.1 Gen1) (O	nly SuperSpeed is supported)		
Imager*2	1.1 type GS-CMOS (IMX253LLR)	1/1.1 type GS-CMOS (IMX545AAM)	1.0 type RS-CMOS (IMX183CLK)	1.2 type GS-CMOS (IMX540LLR)	
Resolution	4,096(H) x 3,000(V)	4,096(H) x 3,008(V)	5,472(H) x 3,648(V)	5,328(H) x 4,608(V)	
Frame rate	Mono8 : 31 fps	Mono8 : 30.8fps	Mono8:19 fps	Mono8 : 15 fps	
Pixel size	3.45µm x 3.45µm	2.74μm x 2.74μm	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 / Bulk mode), 50µs to Trigger width (Level mode)	TBD	MANUAL : 56.4µs to 16s AE : 56.4µs to 1s Random Trigger Shutter : 59.4µs to 16s (Edge / Bulk mode)	MANUAL :18µs to 16s Random Trigger Shutter : 18µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode)	
Scan method		Progr	essive		
Standard sensitivity	860 lx (F5.6, 1/32s)	TBD	1,940 lx (F5.6, 1/19s)	1,950 lx (F11, 1/20s)	
Minimum sensitivity	1 lx (F1.4, Gain : +36dB, Video level : 50%)	TBD	3 lx (F1.4, Gain : +24dB, Video level : 50%)	1 lx (F1.4, Gain : +36dB, Video level : 50%)	
Gamma / LUT		γ=1.0 to 0.4	5 / Available		
Gain	MANUAL : 0d	B to +36dB	MANUAL : 0dB to +24dB, AGC : 0dB to +24dB	MANUAL : 0dB to +36dB	
Sync System	Internal / Bus sy	nchronization	Internal synchronization	Internal / Bus synchronization	
Image output format		Mono12, Mo	no10, Mono8		
Readout mode	All pixel, Scalable, Binning, I	Decimation, Mirroring, Flip	All pixel, Scalable, Mirroring, Flip	All pixel, Scalable, Binning, Decimation, Mirroring, Flip	
Power supply		DC5V ±5% (fron	n USB connector)		
Power consumption	3.0W (maximum)	TBD	2.7W (maximum)	3.3W (maximum)	
Lens mount		C-M	ount		
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 (be Humidity : 10% to 90	elow 60 ° C on cabinet surface) % (no condensation)		
Conformity		CE, FCC, RoHS, WEEE, US	B3 Vision, GenICam, IIDC2		

*1: MG with Dust proof glass, MN : using NIR sensor *2: GS-CMOS : Global shutter CMOS *3 : Under development

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		USB 5Gbps	(USB3.1 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) × 1,080(V)	1,920(H) × 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 / Bulk mode), 50μs to Trigger width (Level mode)		MANUAL : 30µs to 16s Random Trigger Shutter : 30µs to 16s (Edge / 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 / Bulk mode), 50µs to Trigger width (Level mode)	MANUAL : 30µs to 16s Random Trigger Shutter : 30µs to 16s (Edge / 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)	MC : 3.700 lx, MCF : 4,100 lx (F8, 1/90s)
Minimum sensitivity	MCG:1lx, MCF:3lx Mu um sensitivity (F1.4, Gain:+36dB, Video level: (F1.4, Ga 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 : 00 AGC : 0dE	dB to +36dB, 8 to +24dB	MANUAL : -6dB to +18dB	MANUAL : 0dB to +36dB, AGC : 0dB to +24dB	MANUAL : x1 to x8
White Balance			MWB, OPWB		
Sync System			Internal synchronization		1
Image output format	RGB, BGR, YUV422, YUV411, Ba	yer12, 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 \pm 5% (from USB connector)		
Power consumption	3.2W (maximum)	3.4W (maximum)	2.9W (maximum)	3.6W (maximum)	2.7W (maximum)
Lens mount			C-Mount		
External dimension		29 (W)mm x	29 (H)mm x 16 (D)mm (not includin	g protrusion)	
Mass	Appro	эх. 33g	Approx. 32g	Approx. 33g	Approx. 32g
Operation Assurance	Temperature : 0° C to 40° C (be Humidity : 10% to 90	elow 60 ° C on cabinet surface) % (no condensation)	Temperatur Hu	e : 0° C to 40° C (below 50 ° C on cab midity : 10% to 90% (no condensati	inet surface) on)
Conformity	CE, FCC, RoHS, WEEE, USB3 Vision, GenlCam, IIDC2				

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

B/W COLOR	COLOR				
Pixles	5M	5M	6.2M	8.1M	
Model*1	BU502MCF	BU505MCG BU505MCF	BU602MC BU602MCF	BU805MCF	
Interface		USB 5Gbps (USB3.1 Gen1) (Or	nly 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)	2,848(H) x 2,848(V)	
Frame rate	Bayer8 : 75.6fps (High Framerate Mode), 74.9fps (Standard Mode)	Bayer8 / Mono8 : 75 fps	Bayer8 / Mono8 : 60 fps	Bayer8 : 46.7 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 : 1.02µs to 2.47µs (Short exposure MANUAL : 1.02 mode ON), 10µs to 16s (Short exposure n mode OFF) Random Trigger Shutter : 10µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode) 50µs to T		MANUAL : 1.08µs to 14.41µs (Short exposure mode), 22µs to 16s AE : 22µs to 1s Random Trigger Shutter : 22µs 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)	MANUAL : 1.02µs to 2.47µs (Short exposure mode ON), 10µs to 16s (Short exposure mode OFF) Random Trigger Shutter : 10µs to 16s (Edge / Bulk mode), 50µs to Trigger width (Level mode)	
Scan method	Progressive				
Color filter		RGB primary	color mosaic		
Standard sensitivity	2,390 lx (F4, 1/83.3s)	2,390 lx MCG : 3,000 lx, MCF : 3,300 lx (F4, 1/83.3s) (F5.6, 1/75s)		3,000 lx (F5.6, 1/52.6s)	
Minimum sensitivity	3 lx (F1.4, Gain: +36dB, Video level: 50%)	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%)	2 lx (F1.4, Gain: +36dB, Video level: 50%)	
Gamma / LUT		γ=1.0 to 0.45	5 / 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 s	ynchronization	Internal synchronization	Internal / Bus synchronization	
Image output format	Bayer12, Bayer10, Bayer8	RGB, BGR, YUV422, YUV411, Ba	yer12, 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 \pm 5% (from	uUSB connector)		
Power consumption	2.7W	3.6W	3.0W	2.7W	
Lens mount		C-Mc	ount		
External dimension		29 (W)mm x 29 (H)mm x 16 (D)	mm (not including protrusion)		
Mass		Appro	x. 33g		
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

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

 *2 : GS-CMOS : Global shutter CMOS, RS-CMOS : Rolling shutter CMOS
 CE, FCC, RoHS, WEEE, USB3 Vision, GenICam, IIDC2

B/W COLOR	COLOR					
Pixles	12M	12.3	M	20M	24.5M	
Model*1	BU1203MC BU1203MCF	BU1207MCG BU1207MCF	BU1208MCF* ³	BU2006MCF	BU2409MCG BU2409MCF	
Interface		USB 5Gbps (USB3.1 Gen1) (Only SuperSpeed is	supported)		
Imager*2	1/1.7 type RS-CMOS (IMX226CQJ)	1.1 type GS-CMOS (IMX253LQR)	1.1 type GS-CMOS 1/1.1 type GS-CMOS (IMX253LQR) (IMX545AAQ)		1.2 type GS-CMOS (IMX540LQR)	
Resolution	4,000(H) × 3,000(V)	4,096(H) x 3,000(V)	4,096(H) x 3,008(V)	5,472(H) x 3,648(V)	5,328(H) x 4,608(V)	
Frame rate	Bayer8 / Mono8 : 30 fps	Bayer8: 31 fps	Bayer8 : 30.8fps	Bayer8:19 fps	Bayer8 : 15 fps	
Pixel size	1.85µm x 1.85µm	3.45µm x 3.45µm	2.74μm x 2.74μm	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)	ANUAL : 1.51µs to 16.11µs (Short exposure mode), 26µs to 16s Random Trigger Shutter : TBD 26µs to 16: (Edge / Bulk mode), 0µs to Trigger width (Level mode)		MANUAL : 56.4μs ~ 16s AE : 56.4μs ~ 1s Random Trigger Shutter : 59.4μs ~ 16s (Edge / 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)	TBD	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%)	TBD	4 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 +18dB	MANUAL : 0	to +36dB	MANUAL : 0dB to +24dB, AGC : 0dB to +24dB	MANUAL : 0 to +36dB	
White Balance			MWB, OPWB			
Sync System	Internal synchronization	Internal / Bus sy	nchronization	Internal synchronization	Internal / Bus synchronization	
Image output format	Bayer8, Mono8	Bayer12, Baye	er10, Bayer8	RGB, BGR, YUV422, YUV411, Bayer12, Bayer10, Bayer8, Mono8	Bayer12, Bayer10, Bayer8	
Readout mode	All pixel, Scalable, Mirroring, Flip	All pixel, Scalable, Binning, I	Decimation, Mirroring, Flip	All pixel, Scalable, Mirroring, Flip	All pixel, Scalable, Binning, Decimation, Mirroring, Flip	
Power supply			DC5V \pm 5% (from USB connector)			
Power consumption	2.7W	3.1W	TBD	2.9W	3.3W	
Lens mount			C-Mount			
External dimension		29 (W)mm x 2	9 (H)mm x 16 (D)mm (not includin	g 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)	e) 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					

 Lonormity

 *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





60g 29mm x 29mm x 40mm

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. $^{\scriptscriptstyle{(1)}}$ *functions and modes of *1 above are different depend on model.

Accessory information (options)

- LAN cable (Category 5e or more)
- Lens P27 32
- C/CS mount converting ring
 P32
- Tripod attachment ••••• P24 25



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).

Dimensions



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		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 1/2.9 type GS-CMOS (IMX287LLR) (IMX273LLR)		2/3 type GS-CMOS (IMX264LLR)		
Resolution	720(H) x 540(V)	1,440(H) × 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 / Bulk mode), 200µs to Trigger width (Level mode)		MANUAL : 30µs to 16s AE : 30µs to 1s Random Trigger Shutter : 30µs to 16s (Edge / 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 / Bulk mode), 200µs to Trigger width (Level mode)		
Scan method		Progr	essive			
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 0.4	5 / Available			
Gain	MANUAL : 0 to +360	dB, AGC : 0 to +24dB	0dB to +24dB (MANUAL, AGC)	MANUAL: 0 to +36dB, AGC: 0 to +24dB		
Sync System		Internal syn	chronization			
Image output format		Mono12, Mo	no10, Mono8			
Readout mode		All pixel, Scalable, Binning	Decimation, Mirroring, Flip			
Power supply		PoE (Power over Eth	enet) / DC12V ±10%			
Power consumption	PoE : 3.3W DC12V : 2.7V	(maximum) V (maximum)	PoE : 3.2W (maximum) DC12V : 2.7W (maximum)			
Lens mount		C-M	ount			
External dimension		29 (W)mm x 29 (H)mm x 40 (D)	mm (not including protrusion)			
Mass	Appro	ox. 59g	Appr	ox. 60g		
Operation Assurance		Temperature : 0° C to 40° C (b Humidity : 10% to 90	elow 60 ° C on cabinet surface) % (no condensation)			
Conformity	CE, FCC, RoHS, WEEE, GigE Vision, GenlCam, PoE, IIDC2					

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

*2 : GS-CMOS : Global shutter CMOS

B/W COLOR	COLOR				
Pixles	0.4M	1.6M	3.1M	5M	
Model*1	BG040MCG	BG160MCG	BG302LMCG	BG505LMCG	
Model	BG040MCF	BG160MCF	BG302LMCF	BG505LMCF	
Interface		Gigabit Ethernet IEEE802.3a	ab (1000BASE-T) conformity		
Imager*2	1/2.9 type GS-CMOS (IMX287LQR)	1/2.9 type GS-CMOS 1/1.8 type GS-CMOS (IMX273LQR) (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 (Sh AE : 20µ Random Trigger Shutter : 20µ 200µs to Trigger w	(Short exposure mode), 20µs to 16s : 20µs to 1s : 20µs to 16s (Edge / Bulk mode), er width (Level mode) (Edge / Bulk mode), Er width (Level mode) (Edge / Bulk mode), : 200µs to Trigger width (Level mode) (Edge / Bulk mode), : 200µs to Trigger width (Level mode) (Edge / Bulk mode), : 200µs to Trigger width (Level mode) (Edge / Bulk mode) (Edge / Bulk mode), : 200µs to Trigger width (Level mode) (Edge / Bulk mode) (Edge /		MANUAL : 1.08µs to 13.31µs (Short exposure mode), 32µs to 16s AE : 32µs to 16s Random Trigger Shutter : 32µs to 16s (Edge / 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 0.4	5 / Available		
Gain	MANUAL : 0 to +36d	B, AGC : 0 to +24dB	0dB to +24dB (MANUAL, AGC)	MANUAL: 0 to +36dB, AGC: 0 to +24dB	
White Balance		MWB,	OPWB		
Sync System		Internal syn	chronization		
Image output format	Bayer12, Bay	ver10, Bayer8	Bayer12, Bayer1	0, Bayer8, Mono8	
Readout mode		All pixel, Scalable, Binning,	Decimation, Mirroring, Flip		
Power supply		PoE (Power over Eth	enet) / DC12V ±10%		
Power consumption	PoE : 3.4W DC12V : 2.8W	(maximum) V (maximum)	PoE : 3.6W (maximum) DC12V : 2.9W (maximum)		
Lens mount		C-M	ount		
External dimension		29 (W)mm x 29 (H)mm x 40 (D)	mm (not including protrusion)		
Mass		Appro	x. 59g		
Operation Assurance		Temperature : 0° C to 40° C (be Humidity : 10% to 90	elow 60 ° C on cabinet surface) % (no condensation)		
Conformity		CE, FCC, RoHS, WEEE, GigE	Vision, GenlCam, 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

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



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.



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
- GenlCam

Specifications

Supporting OS; for Windows^{*5}

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

Supporting OS; for Linux^{*5}

	Linux					
Language / Distribution	Intel / AMD					
Language / Distribution	Ubuntu			ARM	Others	
	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	
	1- 1 1.45					

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

*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











BC040M Series / BC160M Series / CSCS60BM18







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





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

B/W COLOR	B/W						
Pixles	0.4M	1.3M	1.6M	3.1M	5M		
Model*1	BC040M	CSCS60BM18	BC160M	BC302LMG	BC505LMG		
Interface			Camera Link (Base 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)		
Resolution	720(H) x 540(V)	1,280(H) × 1,024(V)	1,440(H) × 1,080(V)	2,048(H) x 1,536(V)	2,448(H) x 2,048(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		
Pixel size	6.90μm x 6.90μm	5.3µm x5.3µm	3.45μm x 3.45μm	3.45µm :	κ 3.45μm		
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 : 10µs 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, 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 / Bulk mode), 50µs to Trigger width (Level 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)		
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%)		
Gamma / LUT			γ=1.0 to 0.45 / Available				
Gain	MANUAL : 0dB to +24dB	Analog : x1, 1.x5, x2, x3 (MANUAL) Digital : 0dB to +6dB (MANUAL)	MANUAL : 0dB to +24dB	MANUAL : 0 AGC : 0dB	dB to +24dB to +24dB		
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, S	calable, Binning, Decimation, Mirro	oring, Flip		
Power supply			DC12V ±10%				
Power consumption	1.6W (maximum)	0.96W (maximum)	1.7W (maximum)	1.8W (m	aximum)		
Lens mount			C-Mount				
External dimension		29 (W)mm x 2	9 (H)mm x 26.5 (D)mm (not includin	g protrusion)			
Mass		Approx. 33g		Appro	эх. 44g		
Operation Assurance		Hu	Temperature : -5° C to 45° C midity : 90% or less (no condensatio	n)			
Conformity	CE, FCC, RoHS, WEEE, Camera Link, PoCL, GenlCam (GenCP), IIDC2						

*1 : MG : with Dust proof glass

*2 : GS-CMOS : Global shutter CMOS

B/W / COLOR	COLOR						
Pixles	0.4M	1.6M	3.1M	5M			
Model*1	BC040MC	BC160MC	BC302LMCG ^{'3} BC302LMCF ^{'3}	BC505LMCG BC505LMCF			
Interface		Camera Link (Ba	se 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)			
Resolution	720(H) x 540(V)	1,440(H) × 1,080(V)	2,048(H) x 1,536(V)	2,448(H) x 2,048(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			
Pixel size	6.90μm x 6.90μm		3.45µm x 3.45µm				
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 / Bulk mode), 50µs to Trigger width (Level 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)			
Minimum sensitivity	3 (F1.4, Gain : +24dB	lx , 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%)			
Gamma / LUT		γ=1.0 to 0.45	5 / Available				
Gain	MANUAL : 0	dB to +24dB	MANUAL : 0 AGC : 0dB	dB to +24dB to +24dB			
White Balance		MWB /	OPWB				
Sync System		Internal sync	chronization				
Image output format		Bayer12, Bay	ver10, Bayer8				
Readout mode		All pixel, Scalable, Binning,	Decimation, Mirroring, Flip				
Power supply		DC12V	±10%				
Power consumption	1.6W (maximum)	1.7W (maximum)	TBD	2.2W (maximum)			
Lens mount		C-Mo	ount				
External dimension	A	29 (W)mm x 29 (H)mm x 26.5 (D	Jmm (not including protrusion)				
Mass	Appro	IX. 33g	Appro	IX. 44g			
Operation Assurance		Temperature : Humidity : 90% or les	: -5° C to 45° C ss (no condensation)				
Conformity	CE, FCC, RoHS, WEEE, Camera Link, PoCL, GenlCam (GenCP), IIDC2						

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

CSC6M100BMP11 / CSC6M100CMP11







CSC6M100BMP11/CSC6M100CMP11



40mm x 40mm x 35mm 100g

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.

Dimensions

Easy operation

Features

- 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

Accessory information (options)

• Camera Link cable •••• SDR-XXX, PoCL compatible

(Depending on the grabber board to be connected)

- Lens ••••• P27 32
- Confirmed boards list
 P24

Camera Data

Pin assignment
 P23





Specifications

B/W / COLOR	B/W	COLOR		
Pixles	6.5	5M		
Model	CSC6M100BMP11 CSC6M100CMP11			
Interface	Camera Link (Fu	Il configuration)		
Imager*1	1.1 type GS-CMC	DS (TELI original)		
Resolution	2,560(H) :	x 2,560(V)		
Frame rate	Mono8 : 99 fps	Bayer8 : 99 fps		
Pixel size	5.0μm >	x 5.0μm		
Electronic shutter	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 m			
Standard sensitivity	900 lx (F5.6, 1/62.5s)	2,200 lx (F5.6, 1/62.5s)		
Minimum sensitivity	8 lx (F2.8, Gain : Max, Video level : 50%)	20 lx (F2.8, Gain : Max, Video level : 50%)		
Gamma / LUT	γ=1.0, 16 step	s preset / LUT		
Gain	Analog : 0 / + Digital : 0d	-3 / +6 / +9dB B to +18dB		
White Balance	-	MWB / OPWB		
Sync System	Internal syn	chronization		
Image output format	Mono12, Mono10, Mono8	RAW12, RAW10, RAW8		
Readout mode	All pixel, WOI, Binning, WOI with Binning, Mirroring, Flip			
Power supply	DC12V	±10%		
Power consumption	3.84W (m	iaximum)		
Lens mount	C-Me	ount		
External dimension	40 (W)mm x 40 (H)mm x 35 (D)	mm (not including protrusion)		
Mass	Approx. 100g			
Operation Assurance	Temperature : Humidity : 10% to 90	: -5° C to 45° C % (no condensation)		
Conformity	CE, FCC, RoHS, WEEE	E, Camera Link, PoCL		

*1 : GS-CMOS : Global shutter CMOS

	Interface					
No.	USB 5Gbps (USB3.1 Gen1)	Gigabit Ethernet	Camera Link	CoaXPress	Imager	IR cut filter
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	•
	BU406M				CMV4000-3E5M	
18	BU406MN				CMV4000-3F12M	
19	BU406MC				CMV4000-3E5C	
20	BU406MCF				CMV4000-3E5C	
20	BU502MG				IMX547AAM	•
21	BU502MCF				IMX547AA0	
22	BU505MG				IMX250LLR	•
23	BUS05MCG				IMX250LOR	
24	BUS05MCE				IMX250LQR	
25	DOSOSINCI	BG505I MG	BC505LMG		IMX250LQR	•
20		BG505LMCG	BC505LMCG		IMX264LOR	
21		BG505LMCE	BC505LMCE		IMX264LOR	
20	BU602M	DOSUSEINCI	Destiseiter		IMX178111	•
30	BU602MC				IMX178LO1	
31	BU602MCE				IMX178LO1	
32	DU657M		CSC6M100BMP11		TELLOriginal (Mono)	•
32	DU657MC		CSC6M100CMP11		TELLOriginal (Color)	
34	BU805MG				IMX546AAM	
35	BU805MCF				IMX546AAO	•
36	BU1203MC				IMX226COJ	
37	BU1203MCF				IMX226COJ	•
	BU1207MG					
38	DU1207MG				IMX253LLR	
	DDU1207MG					
	BU1207MCG					
39					IMX253LQR	
	BUI207MCE					
40	DU1207MCF				IMX253LQR	•
	DDU1207MCF					
41	BU1208MG*2				IMX545AAM	
42	BU1208MCF*2				IMX545AAQ	•
43	DDU1607MG				XGS16000 (Mono)	
44	DDU1607MCG				XGS16000 (Color)	
45	DDU1607MCF				XGS16000 (Color)	•
46	BU2006MG				IMX183CLK	
47	BU2006MCF				IMX183CQJ	•
48	BU2409MG				IMX540LLR	
49	BU2409MCG				IMX540LQR	
50	BU2409MCF				IMX540LQR	•
51	DDU2607MG*2				GMAX0505 (Mono)	
52	DDU2607MCG*2				GMAX0505 (Color)	
53	DDU2607MCF*2				GMAX0505 (Color)	•
				EX370BMG-X	EV2S36MB	
54				EX670AMG-X	EV2S67MB	
55				EX670AMCG-X	EV2S67MC	
				ENOTORINGO-A	LY250THC	

*1 : Planning *2 : Under development

Spectral sensitivity characteristics 2

BU040MG / BG040M / BC040M 0.0 <

















wavelength [nm]

















1





wavelength [nm]



BU505MG

Ø



Camera Data







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24



28



21

Spectral sensitivity characteristics 3

















































Camera Data













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	0	GPIO (Line1)
3	-	GND
4	1	TRIG IN

Examples of wiring cable



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

■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	0	Line 2
5	-	I/O GND
6	-	GND

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

Cables (options)





Connector pin assignment

Recommended USB3 cable



Cable length	Manufacturer *1	Model *1	Types	
	Hirakawa Hawtash Carp	UB3-ST-SA0-MBS-0300-00K	Normal	
	Hirakawa newtech corp.	UB3-SHF-SA0-MBS-0300-00K	Robot	
	Oki Electric Cable Co., Ltd.	USB3-KT5-A-MBS-030	Robot*2	
3m	Niccoi Flactric Co. 1td	NU3MBASU3S 3m	Normal	
	NISSEI Electric CO., Ltd.	Model *1 Types UB3-ST-SA0-MBS-0300-00K Normal UB3-SHF-SA0-MBS-0300-00K Robot USB3-KT5-A-MBS-0300 Robot*2 NU3MBASU3S 3m Normal NU3MBASU3S 3m Robot NU3MBASU3B 3m Robot 1U30A-MB2-SA1-300 Normal UB3-ST-SA0-MBS-0500-00K Normal UB3-ST-SA0-MBS-0500-00K Normal UB3-ST-SA0-MBS-0500-00K Robot UB3-ST-SA0-MBS-0500-00K Robot UB3-ST-SA0-MBS-0500-00K Robot UB3-SHF-SA0-MBS-0500 Robot UB3-SHF-SA0-MBS-0500 Robot USB3-KT5-A-MBS-0500 Robot USB3-KT5-A-MBS-0500 Robot EPIUH62-A0B3K005M Robot EPIUH62-A0B3K005M Robot EPIUH62-A0B3K0020M Robot Active Optical Cable (AOC hybrid) Robot Active Optical Cable (AOC hybrid) Robot MU3MBLUASUAG[_]m (Right angle) USB3-AVS-A-MBS-300		
	3M	1U30A-MB2-SA1-300	Normal	
	DYDEN Corp.	RM-USB3.0-A-BS-3000	Robot	
	Ulizalization Ulaurta als Cauza	RM-USB3.0-A-BS-3000 Robot UB3-ST-SA0-MBS-0500-00K Normal UB3-SHF-SA0-MBS-0500-00K Robot		
	Hirakawa Hewtech Corp.	UB3-SHF-SA0-MBS-0500-00K	Types 5-0300-00K Normal S-0300-00K Robot S-0300-00K Robot MBS-030 Robot*2 3S 3m Normal 3B 3m Robot SA1-300 Normal BS-3000 Robot S-0500-00K Normal SS-0500-00K Robot S-0500-00K Robot SA1-500 Normal BS-5000 Robot 3K015M Robot 3K005M Robot 3K020M Robot al Cable gle connector m (Right angle) Robot	
E	Oki Electric Cable Co., Ltd.	USB3-KT5-A-MBS-050	Robot*2	
SILL	3M Corp.	1U30A-MB2-SA1-500	Normal	
	DYDEN Corp.	RM-USB3.0-A-BS-5000	Robot	
	EverPro Technologies	EPIUH62-A0B3K005M	Robot	
10m		EPIUH62-A0B3K010M	Robot	
20m	EverPro Technologies	EPIUH62-A0B3K020M	Robot	
20~50m*4		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
7~~	Niccoi Electric Co. 1td	NCMBMBCBB7m (Straight)	Robot
(111	NISSEI Electric Co., Ltu.	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.

■CSC6M100BMP11 / CSC6M100CMP11

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

Pin No.	1/0	Assignment
1	0	GPO
2	-	GND
3	-	GND
4	1	TRIG
5	-	N.C.
6	_	DC+12V



BC series*³

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

		(
Pin No.	I/O	Assignment
1	0	GPIO Output
2	-	GPIO GND
3	-	GND
4	1	External Trigger Input
5	I/O	GPIO_Input / Output
6	_	DC+12V
L		



*3 : Limited to models with two connectors.

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	1	Line1
2	I	DC+24V	8	-	IO GND
3	-	IO GND	9	0	Line4
4	0	Line3	10	-	IO GND
5	-	IO GND	11	1	DC+24V
6	1	Line0	12	-	GND





■CoaXPress

Camera model	Manufacturer	Model
	Aval Global (Aval Data)	APX-36124
EV corios	Matrox	Rapixo CXP
EX series	Euresys	CoaxLink Quad CXP-12
	Teledyne DALSA	Xtium2 CXP PX8 series

* 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.

USB3

Board		Chip		USB
Manufacturer	Model	Manufacturer	Model	Number of ports
	U3X4-PCIE4XE111	FRESCO LOGIC	FL1100 x 4	4port
IOI	U3-PCIE1XG205-1S	RENESAS	uPD720202 x 1	2port
	U3-PCIE1XG211-1S	FRESCO LOGIC	FL1100 × 1	4port
Tachna Scana	PXU-51	RENESAS	uPD720202 x 1	2port
Techno Scope	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	
	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	
BC series	Minus Tashaina	MTPCI-TL2 / MTPCI-PL-G	
CSCS60BM18	Micro-recinica	MTPEX-PL-G / MTPEX-ML-G / MTPEX-QL-G / MTPEX-DL-G / MTPEX-FL-G	
	Photoron	FDM-PCIe CL	
	Euresys	Grablink series	
		X-64 Xcelera-CL PX4 Full	
	Teledyne DALSA	X-64 Xcelera-CL PX4 Dual	
		X-64 Xcelera-CL PX8 Full	
CSC6M100BMP11	Taladyna DALSA	X-64 Xcelera-CL PX4 Full	
CSC6M100CMP11	Teleuyne DALSA	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

Accessories

Camera model Option		Cable between camera and power supply adapter	Tripod attachment
	BU series	(USB3 cable)	CPTBUBG
USB 5Gbps (USB3.1 Gen1)	DU series	(USB3 cable)	CPTC6M
USB 5Gbps x2 channel (Dual) DDU series		(USB3 cable : 2 or 1)	CPTC6M
Gigabit Ethernet (PoE) BG series		When not PoE, Use CPCBG-03	CPTBUBG
Camera Link (PoCL)	BC series	Comerclink coble (SDR XXX) RoCL Applied *1	CDT9560
Base Configuration	CSCS60BM18		CF 16500
Camera Link (PoCL)	CSC6M100BMP11	Compression (CDD XXX) Doct Applied Full configuration *1	CDTCGM
Full Configuration	CSC6M100CMP11	Cameralink Cable (SDR-AAA), POCE Applied, Full Comiguration	CFICOM
CoaXPress 2.0 EX series		(CXP cable for 12Gbps)	CPTEX

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

CPT8560



Applicable cameras	
CSCS60BM18	BC302LMG
BC040M	BC302LMCG
BC040MC	BC302LMCF
BC160M	BC505LMG
BC160MC	BC505LMCG
	BC505LMCF

■CPTBUBG



•Applicable cameras

BU040MG	BU505MG
BU040MCG	BU505MCG
BU040MCF	BU505MCF
BU132M	BU602M
BU160MG	BU602MC
BU160MCG	BU602MCF
BU160MCF	BU805MG
BU205M	BU805MCF
BU238M	BU1203MC
BU238MC	BU1203MCF
BU238MCF	BU1207MG
BU302MG	BU1207MCG
BU302MCG	BU1207MCF
BU302MCF	BU1208MG
BU406M	BU1208MCF
BU406MN	BU2006MG
BU406MC	BU2006MCF
BU406MCF	BU2409MG
BU502MG	BU2409MCG
BU502MCF	BU2409MCF

BG040M BG040MCG BG040MCF BG160MCG BG160MCF BG302LMCG BG302LMCF BG302LMCF BG505LMCG BG505LMCG BG505LMCF



•Applicable cameras

C2C6MI00RMb1
CSC6M100CMP1
DU657M
DU657MC
DU1207MG
DU1207MCG
DU1207MCF

DDU1207MG
DDU1207MCG
DDU1207MCF
DDU1607MG
DDU1607MCG
DDU1607MCF
DDU2607MG
DDU2607MCG
DDU2607MCF

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 $D=\sqrt{(6402+4802)}=800$ pixels. With "the diagonal image size Y'_b", "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):

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

"The focal length of a lens f" can be calculated by equation (c). When the working distance $x_0 = 200$ mm, the focal length f₀ 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:

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

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).

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

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

OExplanation 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)

<code>["The F/#"</code> is used as an indicator for a brightness of a lens. <code>F/# (F)</code> 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

<u>x</u> f

(c) Optical Magnification (M)

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

(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)

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

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 (f1)

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			35.3 5.9 17526 (in Ar) 17526 (in Ar) 17526 (in Ar) 17526 (in Ar) 17526 (in Ar)
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



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

Outline View			5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	50-4 50-4 22.2 7.6
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
AM 1 1 1 1 1				



■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		59 17.526 (C) (C) (C) (C) (C) (C) (C) (C)			30.5 17.526 1
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]	ф64.5 x 57.2	φ57 x 59	ф38 х 48	ф38 х 45	ф38 x 33.5
Weight [g]	200	_	140	_	90

Outline View	35.0 17.5% 4 5 8 0 2.12 Lock torm		49.5 2.50.7 Lock Society 40.5 2.50.7 Lock Society 40.5 2.50.7 Lock Society 40.5 40.5 40.5 40.5 40.5 40.5 40.5 40.5	
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]	ф38 x 35	φ44 x 44.5	ф36 х 49.5	ф39 х 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	91.5 72.526 90 90 90 90 90 90 90 90 90 90 90 90 90	74.5 17.526 10 00000 10 0000 10 0000 10 0000 10 0000 10 0000 10 0000 10 0000 10 0000 10 0000 10 0000 10 0000 10 0000 10 0000 10 0000 10 0000 10 0000 10 0000 10 0000 10 000000	67.5 17.506 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9
Model	HF1618V-2	HF2514V-2	HF3514V-2
Model Image size [Type]	HF1618V-2	HF2514V-2	HF3514V-2
Model	HF1618V-2 1.1 16	HF2514V-2	HF3514V-2
Image size [Type]		1.1	1.1
Forcal length [mm]		25	35
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
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
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
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]	φ51×91.5	ϕ 54×74.5	φ49.5×67.5



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

Outline View	825 (**.0.1m) 12526 (**.0.1m) 12004 10000 10000 10000 10000000000	85 (m) 17.526	795 725 759 759 759 759 759 759 759 75
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]	ф74 x 82.5	φ57 x 85	φ45 x 79.5
14(-1-b+E-1			

Outline View	20.8 (= 0.5m) 17.526 10.5m) 17.526 10.5m) 10.5m 10.	State Score Score State Score	
Model	LM25XC2	LM35XC2	LM50XC2
Model Image size [Type]	LM25XC2 4/3	LM35XC2 4/3	LM50XC2 4/3
Model Image size [Type] Forcal length [mm]	LM25XC2 4/3 25	LM35XC2 4/3 35	LM50XC2 4/3 50
Model Image size [Type] Forcal length [mm] Aperture [F/#]	LM25XC2 4/3 25 2	LM35XC2 4/3 35 2	LM50XC2 4/3 50 2
Model Image size [Type] Forcal length [mm] Aperture [F/#] Image Circle [mm]	LM25XC2 4/3 25 2 23	LM35XC2 4/3 35 2 23	LM50XC2 4/3 50 2 23
Model Image size [Type] Forcal length [mm] Aperture [F/#] Image Circle [mm] Applicable Pixel Pitch [µm]	LM25XC2 4/3 25 2 2 23 5.5	LM35XC2 4/3 35 2 23 5.5	LM50XC2 4/3 50 2 23 5.5
Model Image size [Type] Forcal length [mm] Aperture [F/#] Image Circle [mm] Applicable Pixel Pitch [µm] Ext. Dimensions [mm]	LM25XC2 4/3 25 2 2 23 5.5 ¢45x89	LM35XC2 4/3 35 2 23 5.5 ¢45 x 74	LM50XC2 4/3 50 2 23 5.5 \$\phi47 x 78

■ 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]	ф48 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	ф39 x 67.6	ф39 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]	ф39 x 67.3	ф39 x 67.3	ф39 х 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			73.6 /m 77.5 /m 77.7 /m 77.	55.7 00 17 526
Model	LM6FC24M	LM8FC24M	LM12FC24M	LM16FC24M
Image size [Type]				
initiage size [Type]	1.1	1.1	1.1	1.1
Forcal length [mm]	1.1 6.5	1.1 8.5	1.1 12	1.1 16
Forcal length [mm] Aperture [F/#]	1.1 6.5 2.5	1.1 8.5 2.5	1.1 12 1.8	1.1 16 1.8
Forcal length [mm] Aperture [F/#] Image Circle [mm]	1.1 6.5 2.5 17.6	1.1 8.5 2.5 17.6	1.1 12 1.8 17.6	1.1 16 1.8 17.6
Forcal length [mm] Aperture [F/#] Image Circle [mm] Applicable Pixel Pitch [µm]	1.1 6.5 2.5 17.6 2.5	1.1 8.5 2.5 17.6 2.5	1.1 12 1.8 17.6 2.5	1.1 16 1.8 17.6 2.5
Forcal length [mm] Aperture [F/#] Image Circle [mm] Applicable Pixel Pitch [µm] Ext. Dimensions [mm]	1.1 6.5 2.5 17.6 2.5 φ84×79.1	1.1 8.5 2.5 17.6 2.5 φ64 x 73.3	1.1 12 1.8 17.6 2.5 φ51 x 73.8	1.1 16 1.8 17.6 2.5 φ43 x 65.5



■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					
Model	Dimension 2/12	Dimension 2/18	Dimension 2/25	Dimension 2/35	Dimension 2/50
Image size [Type]	Dimension 2/12 4/3	Dimension 2/18 4/3	Dimension 2/25 4/3	Dimension 2/35 4/3	Dimension 2/50 4/3
Image size [Type] Forcal length [mm]	Dimension 2/12 4/3 12	Dimension 2/18 4/3 18	Dimension 2/25 4/3 25	Dimension 2/35 4/3 35	Dimension 2/50 4/3 50
Image size [Type] Forcal length [mm] Aperture [F/#]	Algorithm Dimension 2/12 4/3 12 2 2	Algorithm Algorithm <t< th=""><th>A/3 25 2</th><th>A/3 35 2</th><th>Dimension 2/50 4/3 50 2</th></t<>	A/3 25 2	A/3 35 2	Dimension 2/50 4/3 50 2
Image size [Type] Forcal length [mm] Aperture [F/#] Image Circle [mm]	Dimension 2/12 4/3 12 2 22.1	Dimension 2/18 4/3 18 2 22.1	Dimension 2/25 4/3 25 2 22.1	Dimension 2/35 4/3 35 2 22.1	Dimension 2/50 4/3 50 2 22.1
Image size [Type] Forcal length [mm] Aperture [F/#] Image Circle [mm] Applicable Pixel Pitch [µm]	Dimension 2/12 4/3 12 2 22.1 2.74	A/3 18 2 22.1 2.74	Dimension 2/25 4/3 25 2 22.1 2.74	Dimension 2/35 4/3 35 2 22.1 2.74	Dimension 2/50 4/3 50 2 22.1 2.74
Image size [Type] Forcal length [mm] Aperture [F/#] Image Circle [mm] Applicable Pixel Pitch [µm] Ext. Dimensions [mm]	Dimension 2/12 4/3 12 2 22.1 2.74 φ64 x 60	Dimension 2/18 4/3 18 2 22.1 2.74 φ63 x 61.2	Dimension 2/25 4/3 25 2 22.1 2.74 ϕ 64 x 60	A/3 35 2 22.1 2.74 φ64 x 70	Dimension 2/50 4/3 50 2 22.1 2.74 φ64 x 69(∞)

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





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

Outline View	LIGD) H.D65±± IDI 20.12.7 Effective depth 4 C-Mount C-Mount	(16D) H.D.=65±2
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	LM11	119TC	
Image size [Type]	4	1/3	
Magnification [X]	0.5	1.0	
Object side NA	$0.05 \sim 0.007$	0.1~0.014	
Work Distance [mm]	80	81.8	
Image Circle [mm]	2	23	
Applicable Pixel Pitch [µm]	3	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.



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 \leq 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.

□В

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 2×1 , binning 2×2 , 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.

ΞE

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 (y) characteristics

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

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.

ΠH

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.

ΠW

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.

ΠN

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.

0

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.



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.

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

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.

ΠL

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.

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.

ΠA

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



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.



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.



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