Toshiba Teli's proud
USB3 Industrial Camera
BU / DU / DDU Series

USB3 VISION

High reliablility & resolution

6.5 MP — **DU657M Series** Teli Original

12.3 MP — **DU1207M Series** Sony IMX253 **Pregius**

Dual USB3 models

NEW 12.3 MP — **DDU1207M Series** Sony IMX253 **Pregius**

COMING SOON 16 MP — **DDU1607M Series** OnSemi XGS 16000

Small & Low resolution

NEW 0.4 MP — **BU040M Series** Sony IMX287 **Pregius**

1.3 MP — **BU132M** e2v EV76C560

NEW 1.6 MP — **BU160M Series** Sony IMX273 **Pregius**

2.2 MP — **BU205M** CMOSIS CMV2000

2.3 MP — **BU238M Series** Sony IMX174 **Pregius**

Small & Middle resolution

3.1 MP — **BU302M Series** Sony IMX252 **Pregius**

4.2 MP — **BU406M Series** CMOSIS CMV4000

5 MP — **BU505M Series** Sony IMX250 **Pregius**

Small & High resolution

12.3 MP — **BU1207M Series** Sony IMX253 **Pregius**

COMING SOON 24.5 MP — **BU2409M Series** Sony IMX540 **Pregius S**

CCD models

0.3 MP — **BU030/BU031 Series** Sony CCD

1.3 MP — **BU130 Series** Sony CCD

Rolling shutter models

6.2 MP — **BU602M Series** Sony IMX178 **STARVIS**

12 MP — **BU1203M Series** Sony IMX226 **STARVIS**

BU Series — USB3.1 Gen1 (USB3.0)

- "Teli Core Technology" Inside
- CCD/CMOS Image sensor
- USB3 Micro B connector
- LED Status indicator
- e-CON 4 pin connector
- Trigger input / GPIO
- Screw lock

Japanese Design Registration: No. 1462541

DU Series — USB3.1 Gen1 (USB3.0)

- "Teli Core Technology" Inside
- CCD/CMOS Image sensor
- USB3 Micro B connector
- LED Status indicator
- Trigger input / GPIO
- e-CON 4 pin connector
- Screw lock

DDU Series — USB3.1 Gen1 (USB3.0) **Dual USB3**

- "Teli Core Technology" Inside
- CCD/CMOS Image sensor
- USB3 Micro B connector
- LED Status indicator
- Round type 6 pin connector
- Trigger input / GPIO
- e-CON 4 pin connector
- Trigger input / GPIO
- Screw lock

Toshiba Teli Corporation
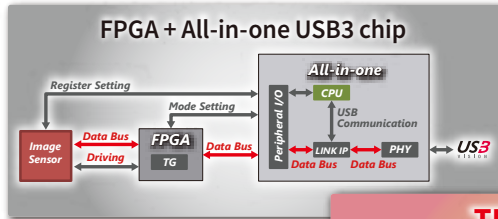
https://www.toshiba-teli.co.jp/en/

Toshiba Teli USB3 Camera BU Series

Featuring TELI original IP "TELI Core Technology"

- Achieved high integration with TELI's original technology.
- Shorten the response time !
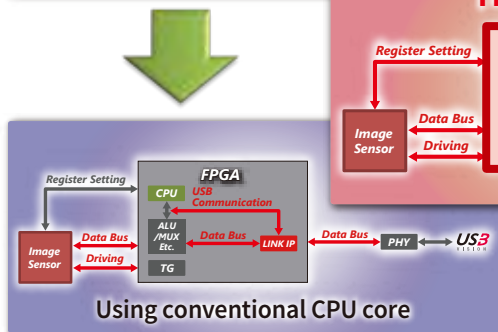

FPGA + All-in-one USB3 chip
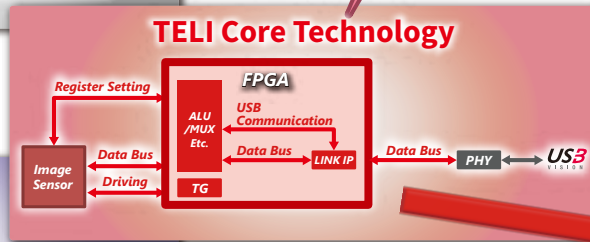
All-in-one

Teli Core Technology

Downsizing, High integration

All hardware processing with no CPU and no Firmware !

Downsizing and super high speed response by high integration !

TELI Core Technology

Using conventional CPU core

Downsizing, High integration

— Firmware process
— Hardware process
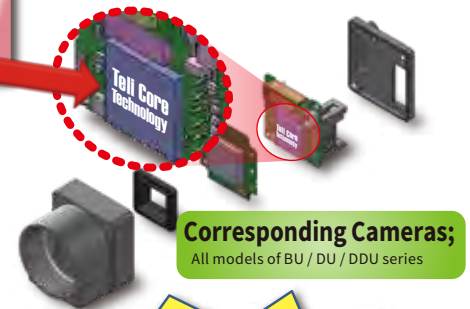
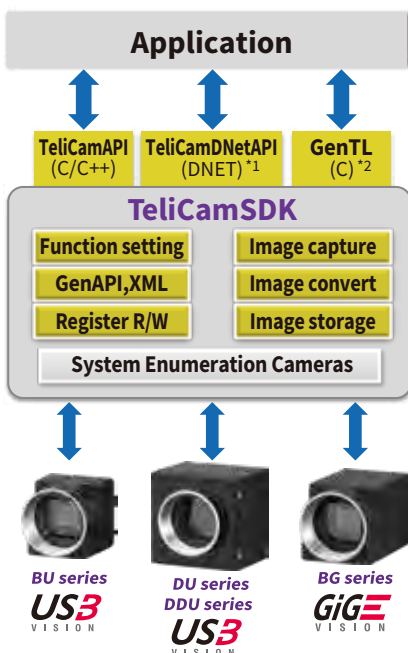**Corresponding Cameras;**
All models of BU / DU / DDU series

Overwhelming high speed processing !

Access response (Average) PC (Board) side host controller : Intel / Renesas

Command	Teli Core Technology	Geniric USB IP	All-in-one USB chip
	100 times faster →		
	10 times faster →		
Read register	2.2 / 5 µs	40.8 / 44.6 µs	223 / 546 µs
Software trigger (write register)	2.2 / 5.4 µs	46.9 / 71.0 µs	314 / 324 µs

* Comparison value of read register access response with 'All-in-one USB chip' built-in model.

TeliCamSDK

Application

TeliCamAPI (C/C++)	TeliCamDNetAPI (DNET) *1	GenTL (C) *2

TeliCamSDK

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

System Enumeration Cameras

- Easy to capture image
- GEN<i>CAM available
- Varieties of functions for easy programming
- Abundant sample code
- Easy to understand manuals
- Unified SDK for USB3 & GigE

Package composition of TeliCamSDK

Driver	Library
Sample code	Viewer
Setting tools	Instruction manual

* TeliCamSDK contains the components necessary for application development.

OS*4 Distribution	Windows			Linux							
				Intel / AMD							
	7	8.1	10	Ubuntu			Debian 8.1.0 amd64	CentOS 7.3 amd64	Fedora 27 amd64	ARM
				14.04 LTS amd64	16.04 LTS amd64	18.04 LTS amd64				
Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

TeliCamSDK for Linux supported ARM architectures.
  - Jetson TK1 / Jetson TX2 / Jetson nano / Odroid XU4 (*5) / Raspberry pi 3 (*5, *6)

*1: for Windows / *2: USB only / *3: Corresponds to old version / *4: Please contact us for other OS and distributions. / *5: With a GigE Vision camera, image might be missed depending on PC specifications. / *6: USB3 Vision camera cannot be used.

BU series
US3 VISION

DU series
DDU series
US3 VISION

BG series
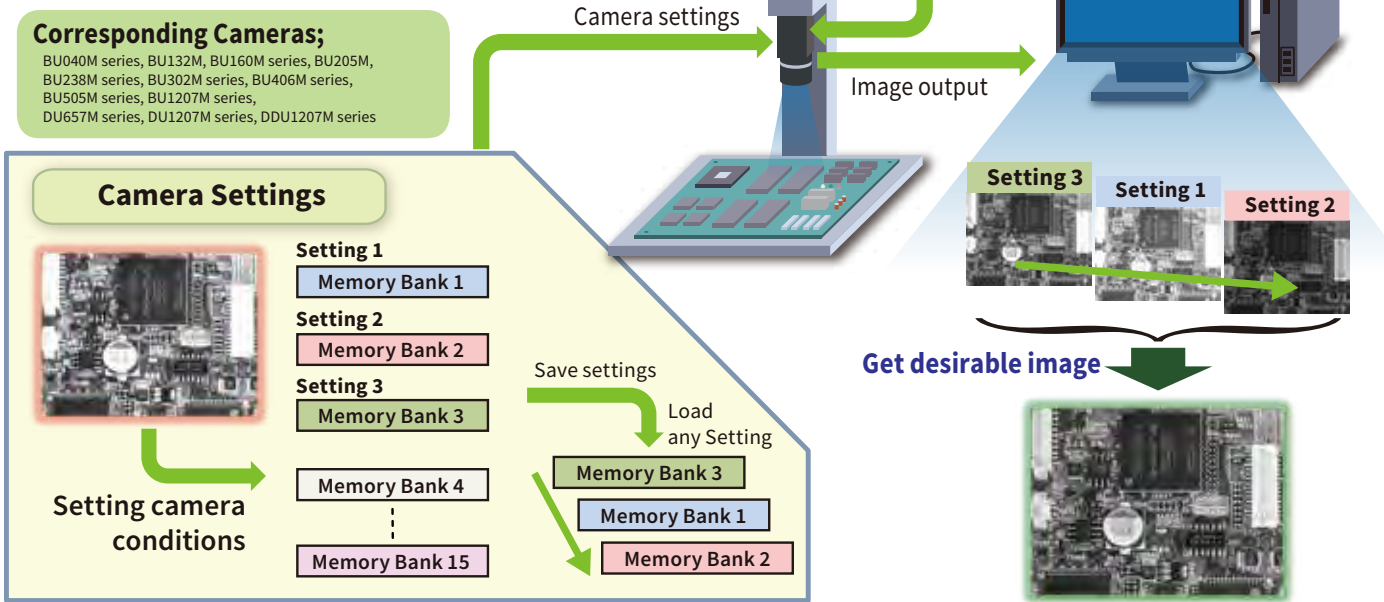GigE VISION

/ DU Series / DDU Series

Sequential Shutter mode + Bulk Trigger mode

- Output several images of different setting with one trigger pulse.
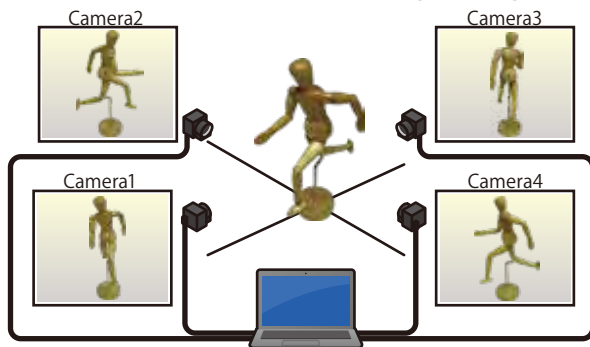- Easy to capture the images for desirable inspection.

Corresponding Cameras;
BU040M series, BU132M, BU160M series, BU205M,
BU238M series, BU302M series, BU406M series,
BU505M series, BU1207M series,
DU657M series, DU1207M series, DDU1207M series

Camera settings

Ext. Trigger in

Image output

Setting 3   Setting 1   Setting 2

Get desirable image

Camera Settings

Setting 1
Memory Bank 1
Setting 2
Memory Bank 2
Setting 3
Memory Bank 3

Memory Bank 4
⋮
Memory Bank 15

Setting camera conditions

Save settings

Load any Setting

Memory Bank 3
Memory Bank 1
Memory Bank 2

Bus Synchronization

- Fully synchronized exposure timing among several cameras.*

Camera2   Camera3
Camera1   Camera4

Corresponding Cameras;
BU030 series, BU031, BU130 series,
BU040M series, BU160M series, BU205M,
BU238M series, BU302M series, BU406M series,
BU505M series, BU1207M series,
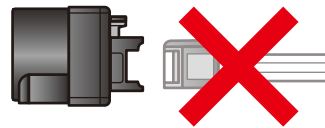DU657M series, DU1207M series, DDU1207M series

No cable needed for 'Trigger in' !

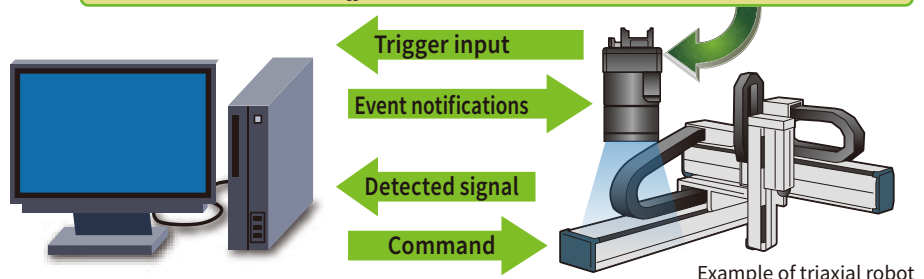**Example;**
- **Stereo camera**
- **Motion capture**

* The time stamp in the USB bus is used. The camera with same time stamp can synchronize.

Event Notifications

- Camera notifies status information via event packet !
- Event notice without delay by the **Teli Core Technology**.
- Rendering great service to vision systems with high speed as its important feature.

Corresponding Cameras;
BU series all models,
DU series all models, DDU series all models

1	FrameTrigger	- Reception of Frame Start Trigger	4	FrameTransferStart	- Start of transferring Streaming Data	7	ExposureEnd	- End of Exposure
2	FrameTriggerError	- Rejection of Frame Start Trigger	5	FrameTransferEnd	- End of transferring Streaming Data	8	Timer0Start	- Start of Timer "0"
3	FrameTriggerWait	- Start of waiting for Frame Start Trigger	6	ExposureStart	- Start of Exposure	9	Timer0End	- End of Timer "0"

Trigger input

Event notifications

Detected signal

Command

Example of triaxial robot

Specifications

MODEL*1	DU657M	DU657MC	DU1207MG	DU1207MCG DU1207MCF	DDU1207MG	DDU1207MCG DDU1207MCF	DDU1607MG	DDU1607MCG DDU1607MCF
B/W or COLOR	B/W	COLOR	B/W	COLOR	B/W	COLOR	B/W	COLOR
Pixels	6.5M		12.3M		12.3M		16M	
Imager model	TELI Original 6.5M		Sony IMX253		Sony IMX253		OnSemi XGS 16000	
Imager size/type*2	1.1 type GS-CMOS		1.1 type GS-CMOS		1.1 type GS-CMOS		1.1 type GS-CMOS	
Resolution	2,560 x 2,560		4,096 x 3,000		4,096 x 3,000		4,000 x 4,000	
Frame rate	55 fps		32 fps	31 fps	62 fps	62 fps	45 fps	45 fps
Pixel size	5.0 x 5.0 µm		3.45 x 3.45 µm		✓		3.20 x 3.20 µm	
Bus synchronization	✓		✓		✓		✓	
Bulk trigger	✓		✓		✓		✓	
Image buffer	64MB		256MB		256MB		256MB	
Sequential shutter	✓		✓		✓		✓	
Short exposure mode*3	-		✓		(Planning)		-	
Product availability (CY)	Available		Available		Available		(Developping)	

MODEL*1	BU040MG	BU040MCG BU040MCF	BU132M	BU160MG	BU160MCG BU160MCF	BU205M	BU238M	BU238MC BU238MCF	BU302MG	BU302MCG BU302MCF
B/W or COLOR	B/W	COLOR	B/W	B/W	COLOR	B/W	B/W	COLOR	B/W	COLOR
Pixels	0.4M		1.3M	1.6M		2.2M	2.3M		3.1M	
Imager model	Sony IMX287		e2v EV76C560	Sony IMX273		CMOSIS CMV2000	Sony IMX174		Sony IMX252	
Imager size/type*2	1/2.9 type GS-CMOS		1/1.8 type GS-CMOS	1/2.9 type GS-CMOS		2/3 type GS-CMOS	1/1.2 type GS-CMOS		1/1.8 type GS-CMOS	
Resolution	720 x 540		1,280 x 1,024	1,440 x 1,080		2,048 x 1,088	1,920 x 1,200		2,048 x 1,536	
Frame rate	523 fps		60 fps	240 fps		170 fps	165 fps		120 fps	
Pixel size	6.90 x 6.90 µm		5.3 x 5.3 µm	3.45 x 3.45 µm		5.5 x 5.5 µm	5.86 x 5.86 µm		3.45 x 3.45 µm	
Bus synchronization	✓		-	✓		✓	✓		✓	
Bulk trigger	✓		✓	✓		✓	✓		✓	
Image buffer	256MB		256MB	256MB		256MB	256MB		256MB	
Sequential shutter	✓		✓	✓		✓	✓		✓	
Short exposure mode*3	✓		-	✓		-	-		✓	
Product availability (CY)	Available		Available	Available		Available	Available		Available	

MODEL*1	BU406M BU406MN	BU406MC BU406MCF	BU505MG	BU505MCG BU505MCF	BU1207MG	BU1207MCG BU1207MCF	BU2409MG	BU2409MCG BU2409MCF
B/W or COLOR	B/W	COLOR	B/W	COLOR	B/W	COLOR	B/W	COLOR
Pixels	4.2M		5M		12.3M		24.5M	
Imager model	CMOSIS CMV4000		Sony IMX250		Sony IMX253		Sony IMX540	
Imager size/type*2	1.0 type GS-CMOS		2/3 type GS-CMOS		1.1 type GS-CMOS		1.2 type GS-CMOS	
Resolution	2,048 x 2,048		2,448 x 2,048		4,096 x 3,000		5,320 x 4,600	
Frame rate	90 fps		75 fps		31 fps		TBD fps	
Pixel size	5.5 x 5.5 µm		3.45 x 3.45 µm		3.45 x 3.45 µm		2.74 x 2.74 µm	
Bus synchronization	✓		✓		✓		✓	
Bulk trigger	✓		✓		✓		✓	
Image buffer	256MB		256MB		256MB		256MB	
Sequential shutter	✓		✓		✓		✓	
Short exposure mode*3	-		✓		(Planning)		(Planning)	
Product availability (CY)	Available		Available		Available		(Developping)	

MODEL*1	BU030	BU030C BU030CF	BU031	BU130	BU602M	BU602MC BU602MCF	BU1203MC BU1203MCF
B/W or COLOR	B/W	COLOR	B/W	B/W	B/W	COLOR	COLOR
Pixels	0.3M		0.3M	1.3M	6.2M		12M
Imager model	Sony ICX424A		Sony ICX414A	Sony ICX445A	Sony IMX178		Sony IMX226
Imager size/type*2	1/3 type CCD		1/2 type CCD	1/3 type CCD	1/1.8 type RS-CMOS		1/1.7 type RS-CMOS
Resolution	640 x 480		640 x 480	1,280 x 960	3,072 x 2,048		4,000 x 3,000
Frame rate	125 fps		125 fps	30 fps	60 fps		30 fps
Pixel size	7.4 x 7.4 µm		9.9 x 9.9 µm	3.75 x 3.75 µm	2.40 x 2.40 µm		1.85 x 1.85 µm
Bus synchronization	✓		✓	✓	-		-
Bulk trigger	✓		✓	✓	-		-
Image buffer	-		-	-	256MB		256MB
Sequential shutter	-		-	-	-		-
Short exposure mode*3	-		-	-	-		-
Product availability (CY)	Available		Available	Available	Available		Available

*1 : MODEL suffix   C/MC: without IR-cut filter, CF/MCF: with IR-cut filter, G/CG: with Dust-proof Glass
*2 : Imager type   GS-CMOS: Global shutter type CMOS sensor, RS-CMOS: Rolling shutter type CMOS sensor
*3 : Short exposure mode   The mode to switch it for short time exposure (1.1µs or more) by enhancing electronic shutter. (Contact for details)

⚠ Notes on Safety

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

Toshiba Teli Corporation

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

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