



High-Resolution CCD Color Camera CleverDragon Series CSCQS15CC23

Instruction Manual

Thank you for purchasing our product.

Before using this CCD color camera, please read through this instruction manual carefully in order to use this product correctly and safely.

After reading, keep this instruction manual handy so that you can refer to, whenever you need it.

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TOSHIBA TELI CORPORATION

Safety Precautions

Before using this product, read these safety precautions carefully. Important information is shown in this Instruction Manual to protect users from bodily injuries and property damages, and to enable them to use the product safely and correctly.

Please be sure to thoroughly understand the meanings of the following signs and symbols before reading the main text that follow, and observe the instructions given herein.

[Definition of Safety Signs]



Safety Signs	Description
 WARNING	Indicates a potentially hazardous situation that may result in death or serious injury (*1) in the event of improper handling.
 CAUTION	Indicates a potentially hazardous situation that may result in light to moderate injuries (*2) or only in property damage (*3) in the event of improper handling.

Notes *1: "Serious injury" refers to cases of loss of eyesight, wounds, burns (high or low temperature), electric shock, broken bones, poisoning, etc., which leave after-effects or which require hospitalization or a long period of outpatient treatment of cure.

*2: "Light to moderate injuries" refers to injuries, burns, electric shock etc. that do not require hospitalization or long-term treatment.

*3: "Property damage" refers to cases of extensive damage involving damage to buildings, equipment, farm animals, pet animals and other belongings.

[Explanation of Safety Symbols]

Safety Symbols	Description
 PROHIBITED	This sign indicates PROHIBITION (Do not). The content of prohibition is shown by a picture or words beside the symbol.
 MANDATORY	This sign indicates MANDATORY ACTION (You are required to do). The content of action is shown by a picture or words beside the symbol.

[General Handling]


WARNING



unplug

- **Immediately cease use of the equipment in the event of abnormality or malfunction.**

If abnormal conditions are present, such as smoke, a burning smell, ingress of water or foreign matter, or if the equipment is dropped or malfunctions, fire or electric shock may result.

If such abnormalities occur, disconnect the power plug from the outlet and contact your sales representative.



Do not get wet

- **Do not use the equipment in locations subject to water splashes.**

Otherwise, fire or electric shock may result.



Never pull apart

- **Do not disassemble, repair, or modify the equipment.**

Otherwise, fire or electric shock may result.

For internal repair, inspection, or cleaning, contact your sales representative.



Avoid

- **Do not place anything on the equipment.**

If metallic objects, liquid, or other foreign matter enters the equipment, fire or electric shock may result.



Avoid

- **Do not install the equipment in an unstable or inclined location or locations subject to vibration or impact.**

Otherwise, the equipment may topple over and cause personal injury.



Do not touch

- **During an electrical storm, do not touch the power cord or connection cable.**

Otherwise, an electric shock may result.



Instruction

- **Use the specified voltage.**

Use of an unspecified voltage may result in fire or electric shock.



Avoid

- **Do not be handled roughly, damaged, fabricated, bent forcefully, pulled, twisted, bundled, placed under heavy objects or heated the power cord, connection cable.**

Otherwise, fire or electric shock may result.

[General Handling]

 **CAUTION**



Instruction

● Observe the following when installing the equipment:

- Do not cover the equipment with a cloth, etc.
- Do not place the equipment in a narrow location where heat is likely to accumulate. Otherwise, heat will accumulate inside the equipment, possibly resulting in a fire.



Avoid

- Do not place the equipment in locations subject to high moisture, oil fumes, steam, or dust.**
-
- Otherwise, fire or electric shock may result.



Avoid

- Do not install the equipment in locations exposed to direct sunlight or humidity.**
-
- Otherwise, the internal temperature of the equipment will rise, which may cause a fire.



Instruction

● Use only specified DC power cables and connection cables.

Otherwise, fire or electric shock may result.



Instruction

● When performing connection, turn off power.

When connecting the power cable or connection cable, turn off the equipment power. Otherwise, fire or electric shock may result.



Instruction

● Contact your sales representative to request periodic inspection and cleaning (every approx. five years).

Accumulation of dust inside the equipment may result in fire or electric shock. For inspection and cleaning costs, contact your sales representative.

CASES FOR INDEMNITY (LIMITED WARRANTY)

We shall be exempted from taking responsibility and held harmless for damage or losses incurred by the user in the following cases.

- In the case damage or losses are caused by fire, earthquake, or other acts of God, acts by a third party, deliberate or accidental misuse by the user, or use under extreme operating conditions.
 - In the case of indirect, additional, consequential damages (loss of business interests, suspension of business activities) are incurred as result of malfunction or non-function of the equipment, we shall be exempted from responsibility for such damages.
 - In the case damage or losses are caused by failure to observe the information contained in the instructions in this instruction manual and specifications.
 - In the case damage or losses are caused by use contrary to the instructions in this instruction manual and specifications.
 - In the case damage or losses are caused by malfunction or other problems resulting from use of equipment or software that is not specified.
 - In the case damage or losses are caused by repair or modification conducted by the customer or any unauthorized third party (such as an unauthorized service representative).
 - Expenses we bear on this product shall be limited to the individual price of the product.
-

RESTRICTION FOR USE

- Should the equipment be used in the following conditions or environments, give consideration to safety measures and inform us of such usage:
 1. Use of the equipment in the conditions or environment contrary to those specified, or use outdoors.
 2. Use of the equipment in applications expected to cause potential hazard to people or property, which require special safety measures to be adopted.
 - This product can be used under diverse operating conditions. Determination of applicability of equipment or devices concerned shall be determined after analysis or testing as necessary by the designer of such equipment or devices, or personnel related to the specifications. Such designer or personnel shall assure the performance and safety of the equipment or devices.
 - This product is not designed or manufactured to be used for control of equipment directly concerned with human life (*1) or equipment relating to maintenance of public services/functions involving factors of safety (*2). Therefore, the product shall not be used for such applications.

(*1): Equipment directly concerned with human life refers to.

 - Medical equipment such as life-support systems, equipment for operating theaters.
 - Exhaust control equipment for exhaust gases such as toxic fumes or smoke.
 - Equipment mandatory to be installed by various laws and regulations such as the Fire Act or Building Standard Law
 - Equipment related to the above

(*2) :Equipment relating to maintenance of public services/functions involving factors of safety refers to.

 - Traffic control systems for air transportation, railways, roads, or marine transportation
 - Equipment for nuclear power generation
 - Equipment related to the above
-

Notes on using this product

- **Handle carefully**

Do not drop the equipment or allow it to be subject to strong impact or vibration, as such action may cause malfunctions. Further, do not damage the connection cable, since this may cause wire breakage.

- **Environmental operating conditions**

Do not use the product in locations where the ambient temperature or humidity exceeds the specifications. Otherwise, image quality may be degraded or internal components may be adversely affected. In particular, do not use the product in areas exposed to direct sunlight. Moreover, during shooting under high temperatures, vertical stripes or white spots (noise) may be produced, depending on the subject or camera conditions (such as increased gain). However, such phenomena are not malfunctions.

- **Check a combination with the lens**

Depending on the lens and lighting you use, an image is reflected as a ghost in the imaging area. However, this is not because of a fault of the camera.

In addition, depending on the lens you use, the performance of the camera may not be brought out fully due to deterioration in resolution and brightness in the peripheral area, aberration and others.

Be sure to check a combination with the camera by using the lens and lightning you actually use.

When installing a lens in the camera, make sure carefully that it is not tilted.

In addition, use a mounting screw free from defects and dirt. Otherwise, the camera may be unable to be removed.

- **Do not shoot under intense light.**

Avoid intense light such as spot lights on part of the screen because it may cause blooming or smears. If intense light falls on the screen, vertical stripes may appear on the screen, but this is not a malfunction.

- **About the difference between the right and on the left of an image output screen.**

As for CCD used with this camera, the left half and the right half of the screen are independently output (2ch output method). Therefore, It is not failure, although a level difference may be visible to an image on either side or a boundary line may be visible to middle of the screen bordering on middle of the screen with the setting mode of a camera.

- **Occurrence of moiré**

If you shoot thin stripe patterns, moiré patterns (interference fringes) may appear. This is not a malfunction.

- **Occurrence of noise on the screen**

If an intense magnetic or electromagnetic field is generated near the camera or connection cable, noise may be generated on the screen. If this occurs, move the camera or the cable.

- **Handling of the protective cap**

If the camera is not in use, attach the lens cap to the camera to protect the image pickup surface.

- **If the equipment is not to be used for a long duration**

Turn off power to the camera for safety.

- **Maintenance**

Turn off power to the equipment and wipe it with a dry cloth.

If it becomes severely contaminated, gently wipe the affected areas with a soft cloth dampened with diluted neutral detergent. Never use alcohol, benzene, thinner, or other chemicals because such chemicals may damage or discolor the paint and indications.

If the image pickup surface becomes dusty, contaminated, or scratched, consult your sales representative.


● Disposal

When disposing of the camera, it may be necessary to disassemble it into separate parts, in accordance with the laws and regulations of your country and/or municipality concerning environmental contamination.

Following information is only for EU-member states:

The use of the symbol indicates that this product may not be treated as household waste. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. For more detailed information about the take-back and recycling of this product, please contact your supplier where you purchased the product.



 <p>中华人民共和国 环保使用期限</p>	<p>环保使用期限标识，是根据电子信息产品污染控制管理办法以及，电子信息产品污染控制标识要求(SJ/T11364-2006)、电子信息产品环保使用期限通则，制定的适用于中国境内销售的电子信息产品的标识。</p> <p>电子信息产品只要按照安全及使用说明内容，正常使用情况下，从生产月期算起，在此期限内，产品中含有的有毒有害物质不致发生外泄或突变，不致对环境造成严重污染或对其人身、财产造成严重损害。</p> <p>产品正常使用后，要废弃在环保使用年限内或者刚到年限的产品时，请根据国家标准采取适当的方法进行处置。</p> <p>另外，此期限不同于质量/功能的保证期限。</p> <p>The Mark and Information are applicable for People's Republic of China only.</p>
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<产品中有毒有害物质或元素的名称及含量>



部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
相机本体	×	○	○	○	○	○

○：表示该有毒有害物质在该部件所有均质材料中的含量均在电子信息产品中有毒有害物质的限量要求标准规定的限量要求(SJ/T11363-2006)以下

×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出电子信息产品中有毒有害物质的限量要求标准规定的限量要求(SJ/T11363-2006)

This information is applicable for People's Republic of China only.

リサイクルに関する情報 (包装物)
有关再利用的信息 (包装物)
Information on recycling of wrapping composition

<p>箱／箱子／Box</p>  <p>段ボール 瓦楞纸板 Corrugated cardboard</p>	<p>内部緩衝材料・袋 内部缓冲材料・袋 Internal buffer materials・Bag</p>  <p>LDPE</p>
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1. Overview

This CCD Color camera is a high-resolution camera that features all pixel readout mode 2/3 CCD.

2. Features

(1) High resolution

Bayer array high pixel density CCD (number of effective pixels 5.05 M, number of total pixels 5.24 M) is used.

(2) Square grids

The CCD pixels arrayed in square grids facilitates computation for image processing.

(3) Full-frame shutter

Since all pixels are output even by shutter operation, high resolution can be achieved, without deteriorating the vertical resolution.

(4) Camera link interface

The interface of image output and the camera control adopts the Camera Link standard.

When you use frame grabber board for the camera link, high-speed image transfer and various controls to PC are possible.

(5) All-pixel readout mode (normal mode)

All pixel signals (in the effective area) are output in approximately 1/15 second.

(6) Programmable partial scan mode

Partial scan within the range arbitrary from 100 lines to 2456 lines is possible.

(7) High-speed draft readout mode

By reading 4 lines from every 16 lines, all signals in the effective area are output in approximately in 1/37.1 second.

(8) Random trigger shutter

By external trigger signal input, the shot image can be grabbed at an arbitrary timing.

(9) Multiple-shutter

By external trigger signal input, the shot image can be grabbed at an arbitrary timing and the accumulated shot images can be output at an arbitrary timing.

3. Configuration

(1) Camera body	1
(2) Accessories	
Instruction Manual (Japanese)	1
Instruction Manual (English)	1

4. Optional parts

- | | |
|-------------------------|--------------------------------|
| (1) I/O cable | Model name: CPRC3700-** |
| (2) Camera Link cable | Model name: 14B26-SZLB-***-0LC |
| (3) Camera mounting kit | Model name: CPT4000F |
| (4) Camera adapter | Model name: CA130C |

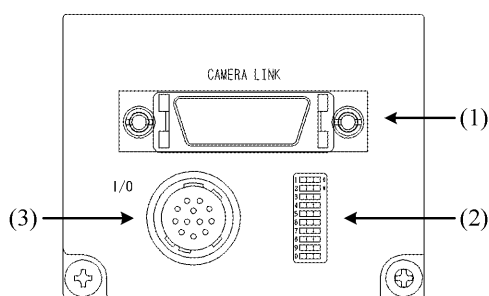
*NOTE: Application software is not supplied as a standard item.

Notes on optional parts and compliance with safety standard conditions:

We assure the compliance of this camera with the safety standard when it is used in combination with the optional parts listed above.

If you use the camera in combination with parts other than specified by our company, you are responsible for finally confirming the compliance with the safety standard by using the entire machine/equipment.

5. Name of Each Parts



- (1) Video output/controlling connector (Camera Link Base Configuration) CAMERA LINK
Outputs video signals and VALID, based on the camera link standard LVDS.
This connector is connected to the frame grabber board, image processing device and others.
• Connector model: DR 26-PIN connector 10226-2210PE (manufactured by 3M).

Pin No.	I/O	Signal Name	Pin No.	I/O	Signal Name
1	-	GND	14	-	GND
2	O	Tx OUT0-	15	O	Tx OUT0+
3	O	Tx OUT1-	16	O	Tx OUT1+
4	O	Tx OUT2-	17	O	Tx OUT2+
5	O	Tx CLK OUT-	18	O	Tx CLK OUT+
6	O	Tx OUT3-	19	O	Tx OUT3+
7	I	Ser TC (RxD) +	20	I	Ser TC (RxD) -
8	O	Ser TFG (TxD) -	21	O	Ser TFG (TxD) +
9	I	CC1 (TRIG) -	22	I	CC1 (TRIG) +
10	I	CC2 (MULTI) +	23	I	CC2 (MULTI) -
11	I	CC3-	24	I	CC3+
12	I	CC4+	25	I	CC4-
13	-	GND	26	-	GND

(2) DIP switches

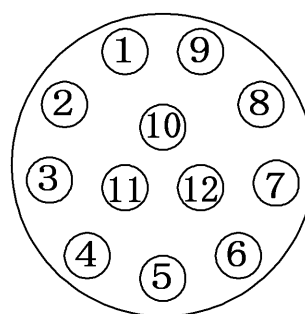
Used for various setting. For more information how to set the dip switches, see Chapter 8 "Dip Switch Setting" (on page 5).

(3) Connector for power supply and sync signal input/output I/O

This is a terminal used for power supply to the camera. This connector is connected to the power supply unit. In addition, this connector is used for sync signal (VD, Exposure signal) output and external trigger signal input.

- Connector (Camera side) : HR10A-10R-12PB(71) (Manufactured by HIROSE DENKI)
- Plug (Cable side) : HR10A-10P-12S(73) (Manufactured by HIROSE DENKI) or equivalents

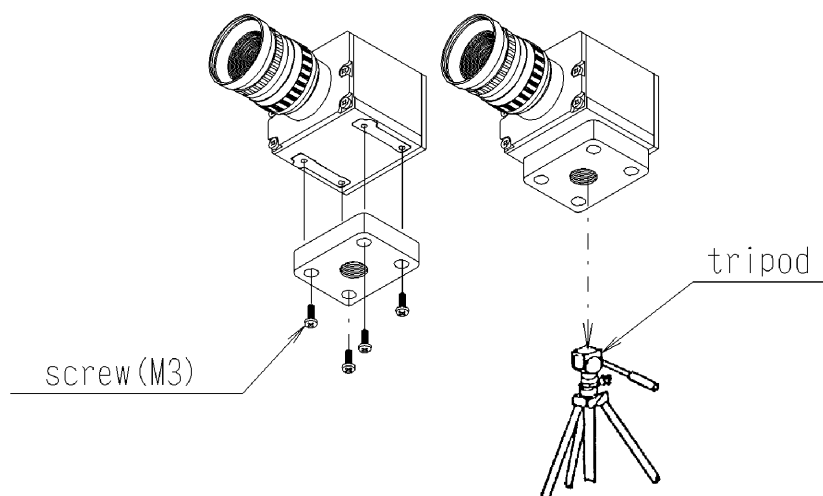
Pin No.	I/O	Signal Name
1	-	GND
2	I	+12V
3	-	GND
4	-	N.C.
5	-	GND
6	-	N.C.
7	O	VD
8	-	GND
9	-	N.C.
10	O	EXPOSURE
11	-	TRIG
12	-	GND



Rearview

6. Installing the camera

- (1) When you fix the camera with a tripod stand screw (1/4-20UNC), use an optional mounting tab.

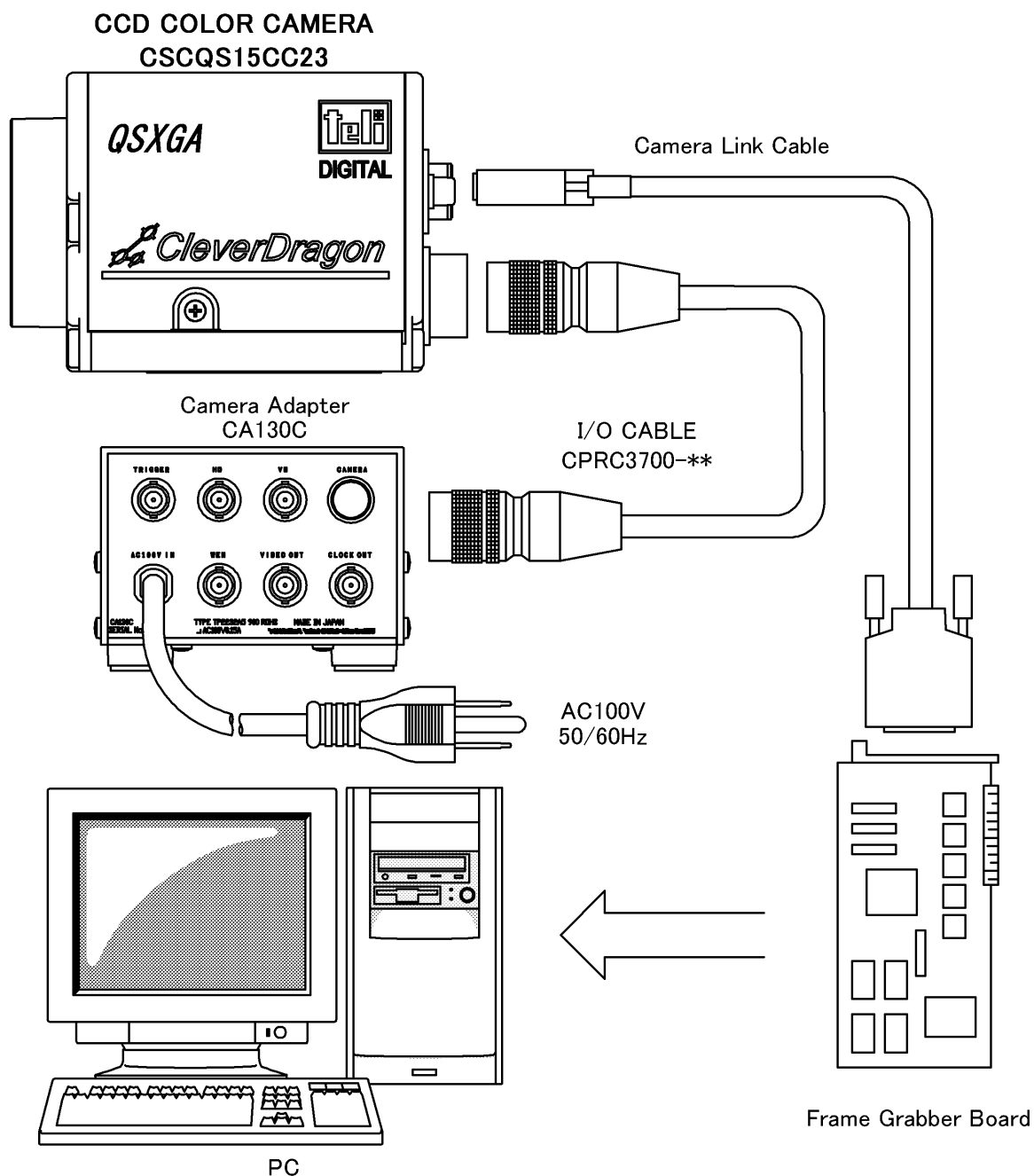


- (2) When you fix the camera by using the mounting screw hole on the camera body, use an M3 screw (6 mm or less for the portion to be inserted into the inside of the camera body).

7. Connection

Connect this camera as shown in the figure below.

(The figure below shows an example of connection. For details, contact our sales representative.)



Notes on frame grabber board:

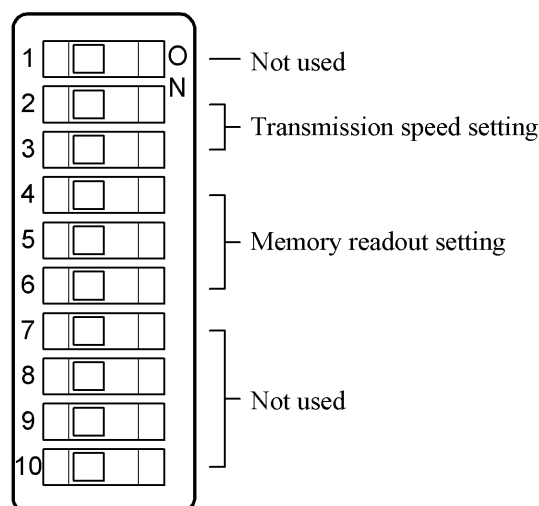
How to connect a frame grabber board with PC and how to set the frame grabber board differ depending on the frame grabber board you use.

For details, refer to the instruction manual of the relevant frame grabber board.

8. DIP switch setting

By using the DIP switches on the back surface of the camera body, you can set serial transmission speed and memory readout for when the power supply is turned on.

If you change the switch setting after the power supply is turned on, the change is not reflected.



(1) Transmission speed setting

You can set the speed of serial transmission by camera link.

SW2	SW3	Transmission speed
OFF	OFF	9600 bps
ON	OFF	19200 bps
OFF	ON	38400 bps
ON	ON	57600 bps

(2) Memory readout setting

You can set the number of the setting value saving memory bank to be called when the power supply is turned on. The memory consists of 8 banks.

SW4	SW5	SW6	Memory number
OFF	OFF	OFF	1
ON	OFF	OFF	2
OFF	ON	OFF	3
ON	ON	OFF	4
OFF	OFF	ON	5
ON	OFF	ON	6
OFF	ON	ON	7
ON	ON	ON	8

9. Functions

By accessing the camera register published on the camera link I/F, you can control/set each function.

Since access to the camera register is performed via the frame grabber board, the controlling and setting methods differ depending on the frame grabber board you use. For details, refer to the instruction manual of the relevant frame grabber board or contact our sales representative.

9.1 Explanation of Each Function

(1) Readout mode

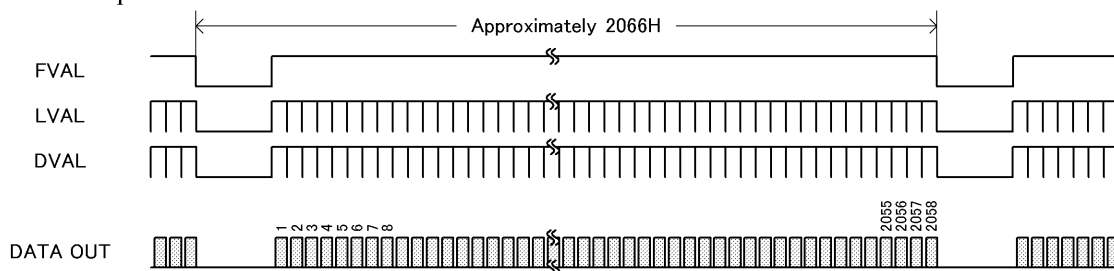
Video is output from the camera link connector. The output video can be grabbed by the frame grabber board.

The frame rate and resolution of output images that this model supports are as follows:

- 1) All pixel readout : Approximately 15 fps / 2448(H) x 2058(V)
- 2) High-speed draft readout : Approximately 37.2 fps / 2448(H) x 254(V)
- 3) Partial scan : Approximately 52 to 15 fps / 2448(H) x 100(V) to 2058(V)

1) All pixel readout

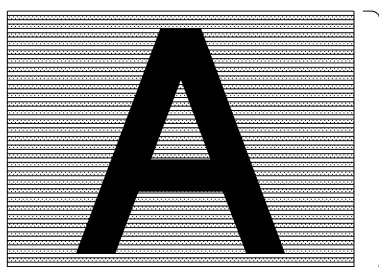
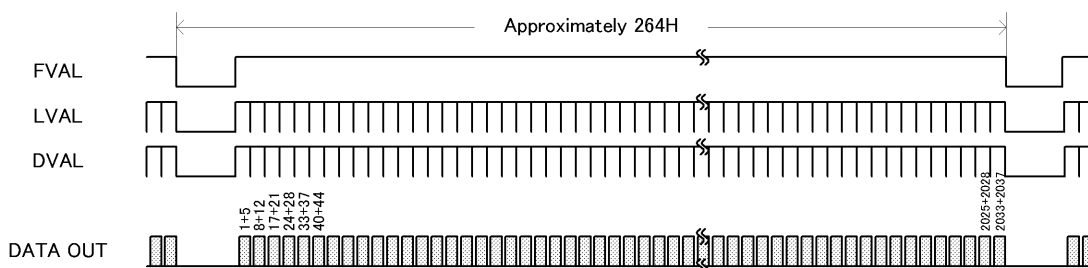
Reads out all pixels in about 1/15 second.



2) High-speed draft readout

By reading 4 lines out of every 16 lines, reads out the whole valid area in approximately 1/37.2 seconds.

Control and setting of functions can be done by accessing the cam. When the frame rate of a partial scanning exceeds it when the shutter mode is switched from normality (internal synchronization) or the partial scanning mode to the draft mode, more high-speed than the setting of the speed of the shutter it is changed at the speed of the shutter matched to the frame rate.



Reading 4 lines out of every 16 lines in the inside of a total of 2058 lines



Effective lines : 254 lines

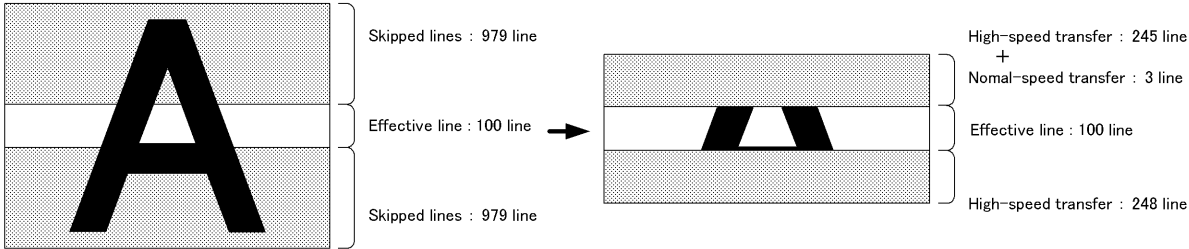
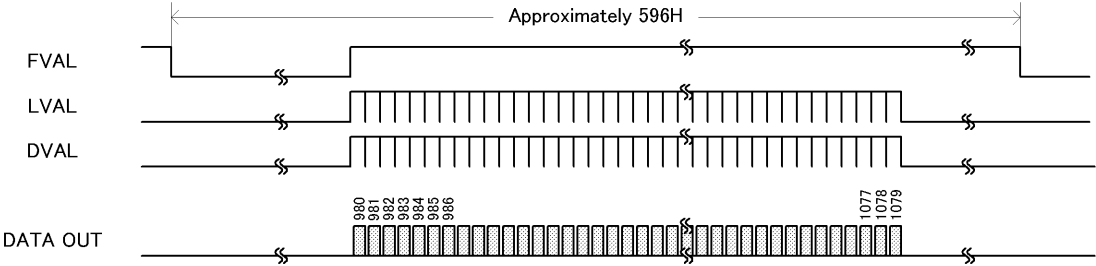
3) Programmable partial scan

A range arbitrary from 100 lines to 2058 lines can be read. The frame rate can be raised to 52 fps or less by skipping it at high speed excluding an effective area.

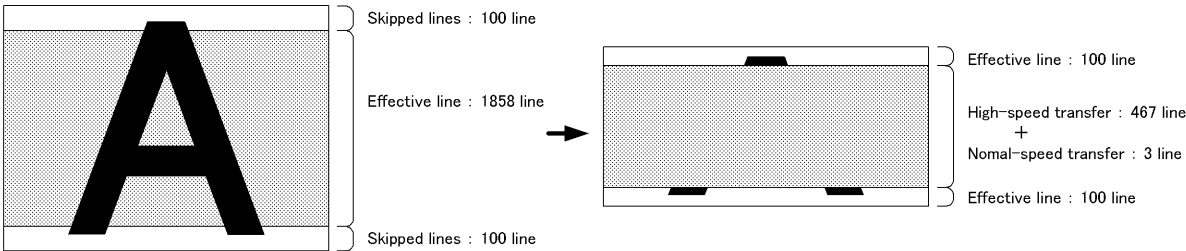
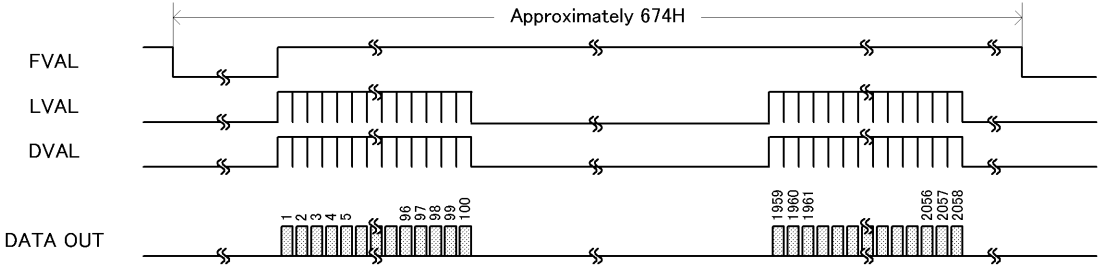
When the frame rate of a partial scanning exceeds it when the shutter mode is switched from normality (internal synchronization) to the partial scanning mode, more high-speed than the setting of the speed of the shutter it is changed at the speed of the shutter matched to the frame rate.

- Starting position (Partial V Start1,2) of an effective line can be set.
- Number (Partial Height1,2) of effective lines can be set.

Example: (Partial V Start1, Partial Height1) = 100 effective lines and start 980 line eyes(center partial)
 (Partial V Start2, Partial Height2) = 0 effective lines and start 0 line eyes(center partial)



Example: (Partial V Start1, Partial Height1) = 100 effective lines and start 1 line eyes(center partial)
 (Partial V Start2, Partial Height2) = 100 effective lines and start 1959 line eyes(center partial)



(2) Output format

You can set RGB(24bit) / RAW (12bit / 10bit / 8bit) output. The initial factory setting is RGB(24bit) output.

(3) Setup

When shipping it, the pedestal is set to 16LSB (264LSB at RAW12bit). By adjusting the setting value of the command status register of the camera link interface, you can set the pedestal in 529 steps in the range between 0 and 528LSB (at RAW12bit).

(4) Gain: You can set Gain (video gain).

When shipping it, the gain is set to 0dB. By adjusting the setting value of the command status register of the camera link interface, you can set the gain in 61 steps in the range between 0 and +6dB.

(5) White Balance

1) OPWB (one-push auto white balance)

When you execute OPWB, the white balance is automatically adjusted. After automatic adjustment, the adjusted white balance is held. Execute OPWB, with a white subject picked up on the entire screen.

2) MANUAL (manual white balance)

In the manual white balance mode, the white balance can be adjusted manually in two ways: by preset setting or by user setting (the user sets the R-gain and B-gain individually).

The preset setting can be selected from 6 fixed color temperatures (3000 K, 3700 K, 4000 K, 4500 K, 5500 K and 6500 K)

If you want to adjust the white balance more accurately, enter the user manual setting mode and set R-gain and B-gain individually.

(6) Gamma / LUT (Look up Table)

You can set gamma correction OFF($\gamma=1$), PRESET($\gamma=0.65$ equivalent) and USER(LUT).

The initial factory setting is PRESET.

(7) Masking

You can set masking correction ON/OFF. When masking correction is ON, the hue of images is corrected so that it will be natural. Moreover, an original color making is possible by the change of six parameters (R(r-g),R(r-b),G(g-r),G(g-b),B(b-r),B(b-g)).

The initial factory setting is OFF

(8) Calibration

As for CCD used with this camera, the left half and the right half of the screen are independently output (2ch output method). It is possible to do by selecting a right and left level difference by this from manual correction (MANUAL), automatic correction (AUTO), and one push correction (ONE PUSH).

The initial factory setting is AUTO

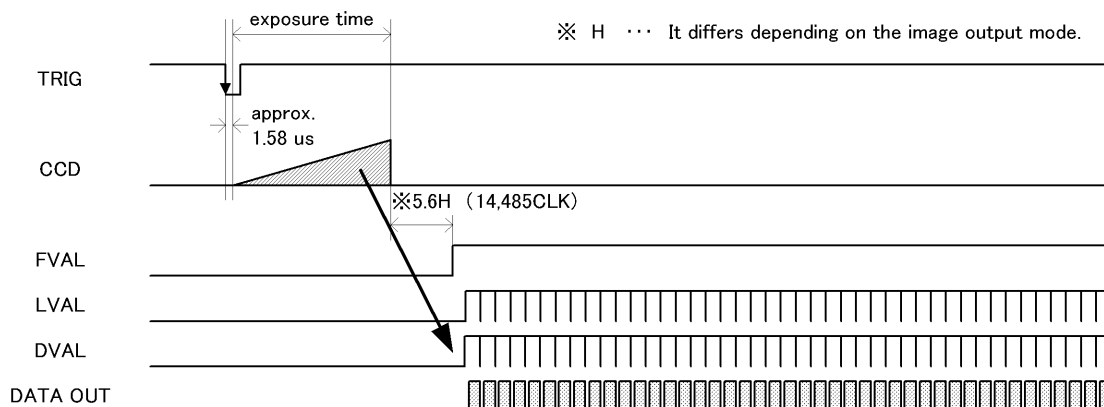
(9) Random trigger shutter

In the random trigger shutter mode, you can shoot and grab an image at an arbitrary timing by trigger signal input from the external.

- External trigger signals can be input either from the camera link I/F CC1 or I/O connector.
- If polarity is set to negative polarity, exposure starts at the falling edge of the trigger.
- The random trigger shutter of this camera can be operated in two types of mode: fixed mode and pulse width mode. How to determine the exposure time differs depending on the mode.

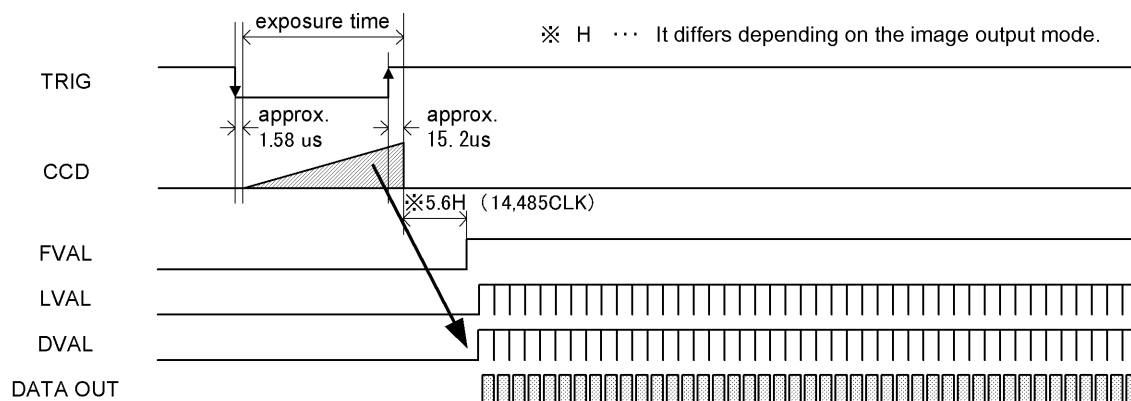
1) Fixed mode

- The exposure time is determined by the setting value for the shutter speed.



2) Pulse width mode

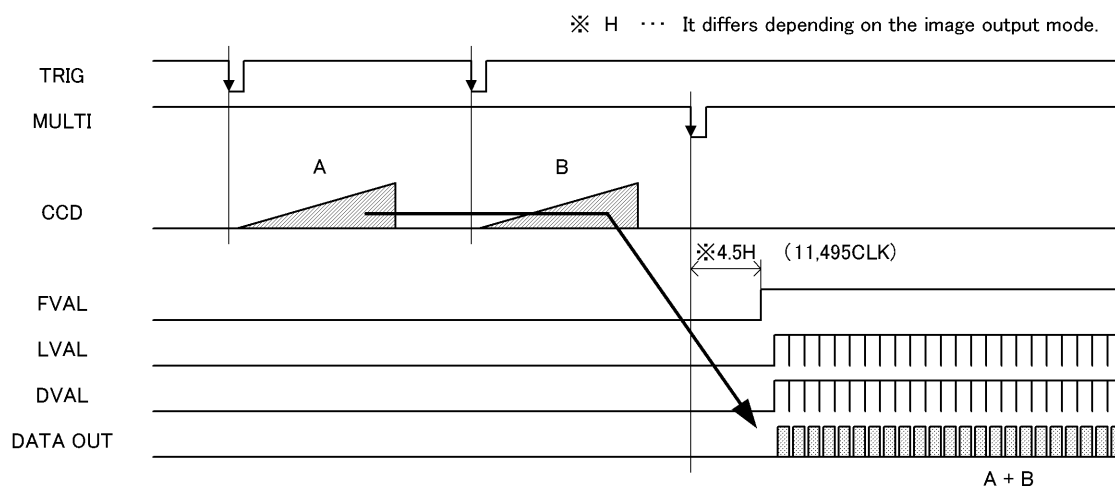
- The exposure time is determined by the pulse width (exposure time = pulse width + approximately 14μs).
- Set a pulse width of 1H (approximately 32.1μs) or more.



(10) Multiple-shutter mode

In the multiple-shutter mode, video is output in sync with a MULTI signal from the external after the end of exposure time.

- Valid only when the random trigger shutter mode is ON.
- MULTI signals can be input from the camera link I/F CC2.
- If exposure is executed several times before MULTI signal input, the images are output superposed.
- The exposure time is determined by the random trigger shutter mode setting and its determination method.
- The pulse width must be set to negative polarity and 32.1 μ s to 10 ms.

**Notes on multiple-shutter:**

An image has been stored to CCD device until a MULTI signal is inputted and it begins to read out image after CCD is exposed. Therefore, an image may degenerate step by step when an image is stored to CCD device for a long time.

And, Electric charge is superimposed in CCD device when the multiplex exposure. Therefore, CCD will flood with electric charge when electric charge is over superimposed in CCD device. Consequently vertical stripes noise will appear. At that time please stop using spotlight and dimmer for example close the iris.

(11) Setting value memory

Each setting value can be saved in the memory inside the camera.

- The contents of the memory is held even after the power supply is turned off.
- The memory consists of 8 banks. For each table, you can save/readout the setting value independently, as well as reset the setting value to the initial factory setting.
- You can set the number of the memory bank to be read out when the power supply is turned on, by using the relevant dip switch on the back surface of the main body.

9.2 Error status

If NAK is returned to the sent command, you can obtain detailed information on the error by accessing the status register.

Error type	Details of error	Status code	
		Status Code	Expansion Status
No Error	The previous communication was executed normally.	0x00	0x00
Communication Error	A hardware error was detected.	0x01	0x01
	A format of the command is uncertain.		0x02
	Uncertain error		0x09
Register Error	A specified address is invalid.	0x02	0x04
	A set data is invalid.		0x05
Mode Setting Error	Disagreement of shutter mode.	0x03	0x06
	Disagreement of scanning mode.		0x07
	Disagreement of other modes.		0x08
Hardware Error	It failed in the access of the device..	0x04	0x03
	Uncertain error		0x09

10. Before determining it as being a fault

If any trouble occurs in use, check the following first.

If the trouble persists, contact your distributor or our sales representatives.

Phenomena	Check item
Cannot turn on power	- Check the connection of the camera adapter and power cable.
Shooting image is not displayed	<ul style="list-style-type: none"> - Check the connection of the camera link cable and camera cable. - Check that the camera register settings are correct. - Check that the dip switch settings are correct. - Check that lens aperture is not closed. - Check that the grabber board is installed and set up correctly.
Frame drop occurs on shooting image	<ul style="list-style-type: none"> - In the PCI bus system, a frame dropping may occur because the transfer rate is too slow for the amount of data to be transferred. Ensure that no frame dropping occurs with a grabber board and PC for PCI Express x4. - If more than one boards are installed in the PCI slots, remove the other boards.
Shooting image remains still	<ul style="list-style-type: none"> - Check that the camera is not in the random trigger mode. - Check the setting of the grabber board. - Check the connection of the camera link cable.
Cannot control camera from PC	<ul style="list-style-type: none"> - Check the connection of the camera link cable. - Check the dip switch setting (communication speed setting). - Check that the grabber board is installed and set up correctly.

11. Specifications

[Electrical specification]

(1) Imager	Interline CCD
•Number of total pixels	2536 (H) x 2068 (V)
•Number of effective pixels	2456 (H) x 2058 (V)
•Number of picture output effective pixels	2448 (H) x 2058 (V)
•Pixel size	3.45 μ m (H) x 3.45 μ m (V)
•Optical size	2/3 type
(2) Scan method	Progressive
(3) Aspect ratio	6:5
(4) Synchronization method	Internal synchronization
(5) Standard subject illuminance	1800 lx, F8, 5100 K
(6) Minimum subject illuminance	14 lx (F1.4, GAIN MAX, all pixel readout, video level 50 %, $\gamma=0.65$ equivalent)
(7) Video output	Compliant with the camera link standard. Base configuration 1tap
•Data	RGB 24bit / RAW 12bit / RAW 10bit / RAW 8bit switching (initial factory setting: RGB)
•Readout mode	
All pixel readout	Approximately 15 fps / 2448 (H) x 2058 (V)
High-speed draft readout	Approximately 37.2 fps / 2448 (H) x 254(V)
Partial scan	Approximately 15 fps to 52fps / 2448(H) x 100 to 2058(V)

About an image output:

As for CCD used with this camera, the left half and the right half of the screen are independently output (2ch output method). Therefore, It is not failure, although a level difference may be visible to an image on either side or a boundary line may be visible to middle of the screen bordering on middle of the screen with the setting mode of a camera.

(8) Gain	0 to +6dB (61 levels) (initial factory setting: 0 dB)
(9) Setup	0 to 33(528) LSB (RAW 12bit) (529 levels) (initial factory setting: 16(264) LSB (calculated value))
(10) White balance	OPWB/MANUAL switching (initial factory setting: MANUAL)
Effective range	2400 K to 9000 K
•OPWB	
Effective area	Full screen
•MANUAL	
Preset value	3000 K, 3700 K, 4000 K, 4500 K, 5500 K, 6500 K
User setting	R-gain and B-gain can be set independently.
(11) Gamma correction	OFF($\gamma=1.0$) / PRESET($\gamma=0.65$) / USER(LUT) switching (initial factory setting: PRESET)
(12) Masking correction	ON(Six points can be corrected)/OFF switching (initial factory setting: OFF)
(13) Calibration	MANUAL / AUTO / ONEPUSH switching (initial factory setting: AUTO)
(14) Power supply voltage	DC12 V (DC10V to DC13.2V) (ripple 50 mV(p-p) or less)
(15) Power consumption	Approximately 4.8 W

[Electronic shutter specification]

- | | |
|----------------------------|---|
| (1) Shutter speed | |
| •Readout mode | |
| All pixel readout | 2 to 1/20,000 s |
| Partial scan | 2 to 1/20,000 s |
| High-speed draft readout | 2 to 1/20,000 s |
| (2) Random trigger shutter | ON/OFF switching (initial factory setting: OFF) |
| •Fixed mode | The exposure time depends on the shutter speed setting. |
| •Pulse width mode | The exposure time depends on the pulse width. |
| (3) Multiple-shutter | ON/OFF switching (initial factory setting: OFF) |
| | Exposure by TRIG input, readout by MULTI input |
| | * Enabled when random trigger shutter is ON. |

[Internal sync signal specification]

- | | |
|---------------------------|------------------------|
| (1) Driving frequency | 80.000 MHz |
| (2) Scanning frequency | |
| •Readout mode | |
| All pixel readout | Horizontal 31.185 kHz |
| | Vertical 15.095 Hz |
| High-speed draft readout | Horizontal 9.821 kHz |
| | Vertical 37.158 Hz |
| Programmable partial scan | Horizontal 31.185 kHz |
| | Vertical Arbitrariness |

[Input signal specification]

- | | |
|---------------------------|---|
| (1) TRIG | Camera link I/F and I/O connector input |
| •Signal level (I/O input) | TTL level |
| •Polarity | Positive/Negative polarity switching possible (initial factory setting: Negative) |
| •Pulse width | 32.1 μ s or more |
| (2) MULTI | Camera link I/F input |
| •Polarity | Negative polarity |
| •Pulse width | 32.1 μ s to 10 ms |

[Output signal specification]

- | | |
|--------------------------------|----------------------|
| (1) VD | I/O connector output |
| •Signal level | 4 V (p-p) |
| •Polarity | Negative polarity |
| (2) EXPOSURE (Exposure period) | I/O connector output |
| •Signal level | 4 V (p-p) |
| •Polarity | Negative polarity |

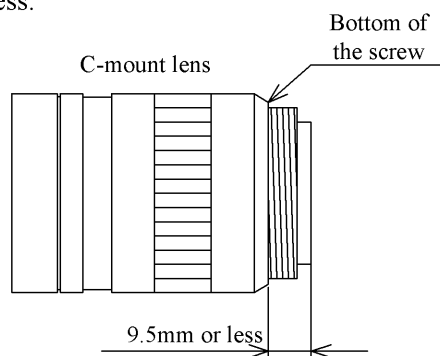
[Dimensions]

- (1) Lens mount C-mount

Notes on combination of C-mount lens:

Depending on the lens you use, the performance of the camera may not be brought out fully due to the deterioration in resolution and brightness in the peripheral area, occurrence of a ghost, aberration and others. When you check the combination between the lens and camera, be sure to use the lens you actually use.

As for the C-mount lens used combining this camera, the projection distance from bottom of the screw should use 9.5mm or less.



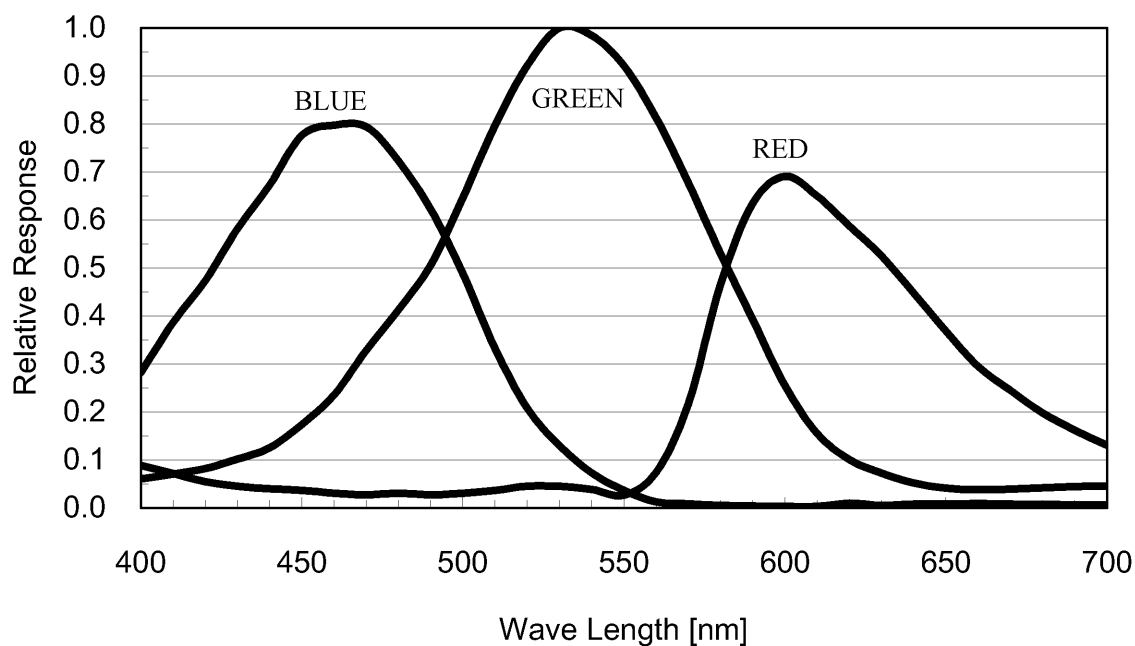
- (2) Flange back 17.526 mm
 (3) Dimensions 54 mm (W) x 43 mm (H) x 69 mm (D)
 (4) Mass Approximately 190 g
 (5) Camera body grounding: insulation status
 Conductive between circuit GND and camera body

[Operating ambient conditions]

- (1) Performance assurance Temperature : 0 to 40°C
 Humidity : 10 to 90% (no condensation)
 (2) Operating assurance Temperature : -5 to 45°C
 Humidity : 10 to 90% (no condensation)
 (3) Storage environment Temperature : -20 to 60°C
 Humidity : 10 to 90% (no condensation)

[Typical spectral response]

The lens characteristics and light source characteristics is not reflected in table.

**[Applicable safety standards]**

- | | |
|--|---------------------|
| (1) EMC (Electro-Magnetic Compatibility) | |
| EMI (Electro-Magnetic Interference) | :EN61000-6-4 / 2001 |
| EMS (Electro-Magnetic Susceptibility) | :EN61000-6-2 / 2001 |

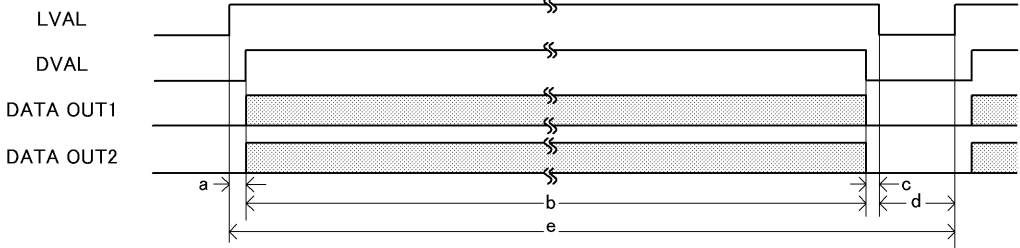
[Communication specification]

- | | |
|-------------------------|----------------------------|
| (1) Communication speed | 9600/19200/38400/57600 bps |
| (2) Start bit | 1 |
| (3) Data bit | 8 |
| (4) Parity bit | None |
| (5) Stop bit | 1 |
| (6) Handshake | None |

[Timing chart]

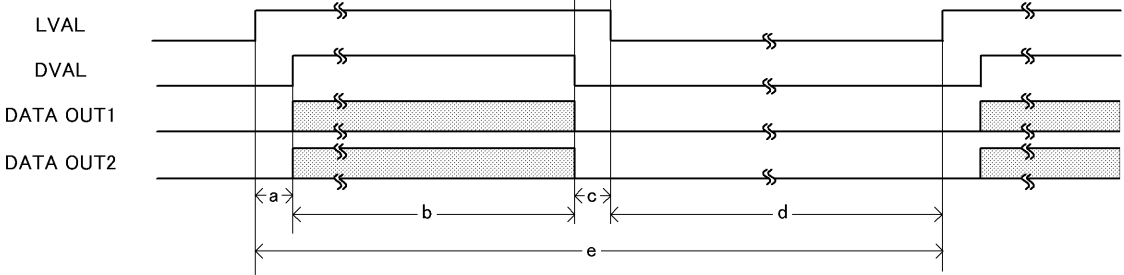
(1) Horizontal timing

1) All pixel readout, Partial scan



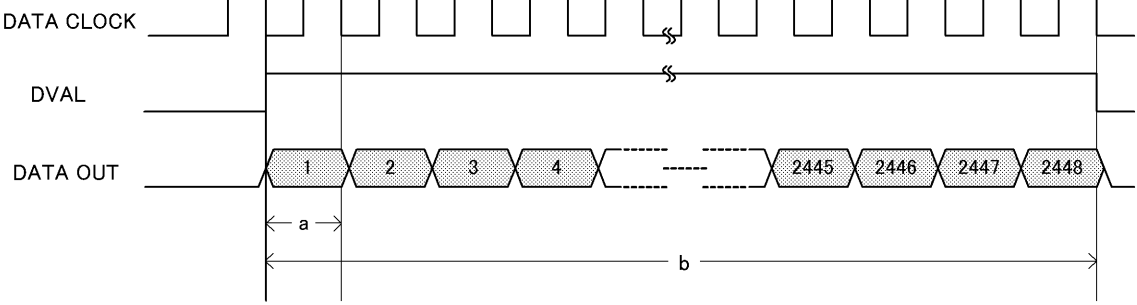
a = 45CLK b = 2448CLK c = 44CLK d = 28 or 29CLK e = 2565 or 2566CLK

2) High-speed draft readout



a = 45CLK b = 2448CLK c = 44CLK d = 5608 or 5609CLK e = 8145 or 8146CLK

3) CLK late

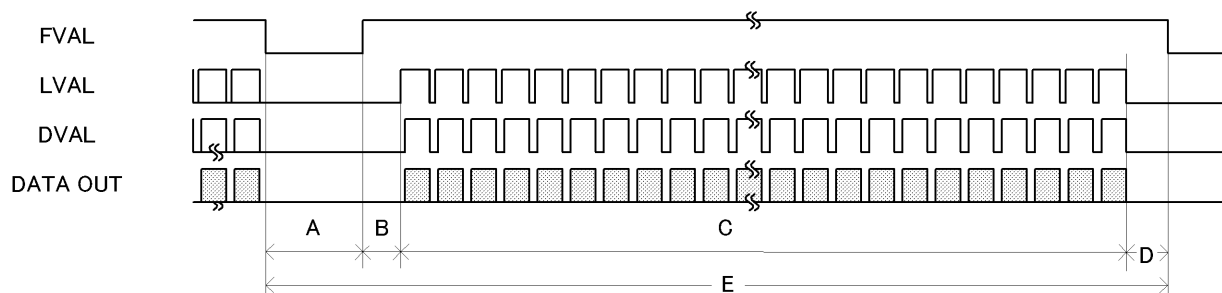


a = 12.5ns
(80.0MHz) b = 30.6us

(2) Vertical timing

1) All pixel readout * ex) shutter mode : Shutter off

The period of A/C depend on the shutter speed.



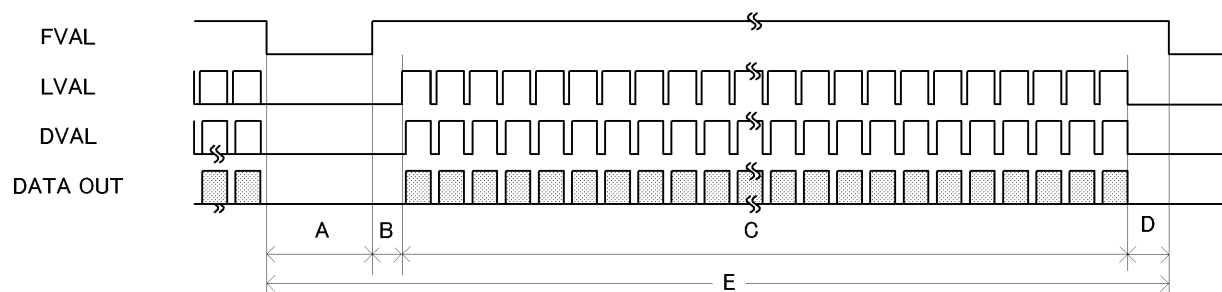
A = approx. 205us (RAW) or approx. 189us(RGB) B = 1H (RAW) or 2H (RGB) C = 2058H-29CLK

D = approx. 17.0us (RAW) or 0.0us(RGB) E = A+B+C+D

(1H: 2565CLK ; The period of A becomes long for 1/15.1s shutter speed or more.)

2) High-speed draft readout * ex) shutter mode : Shutter off

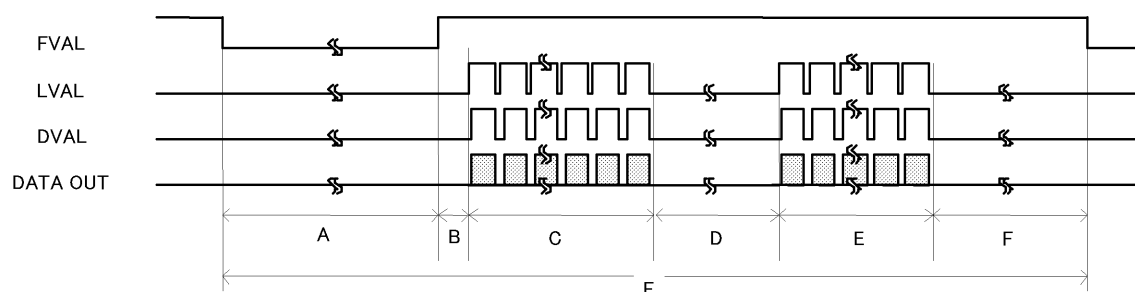
The period of A/C depend on the shutter speed.



A = approx. 0.97ms B=1H(RAW) or 2H (RGB) C = [254H(RAW)] or [253H(RGB)]-5609CLK D = approx. 48.8us

E = A+B+C+D (1H: 8146CLK ; The period of A becomes long for 1/37.1s shutter speed or more.)

3) Partial scan



A = 480 × (Partial V Start1 + 7) + 7616 B = 1924 (RAW) or 3848(RGB)

C = 1924 × Partial height1 - 615

D = 480 × {Partial V Start2 - (Partial V Start1 + Partial height2 + 3) } + 7831

E = 1924 × Partial height2 - 615

F = 480 × { 2060 - (Partial V Start2 + Partial height2) } - [1924 (RGB)]

When 1.33 is multiplied respectively of A to F, the number of CLK is calculated.

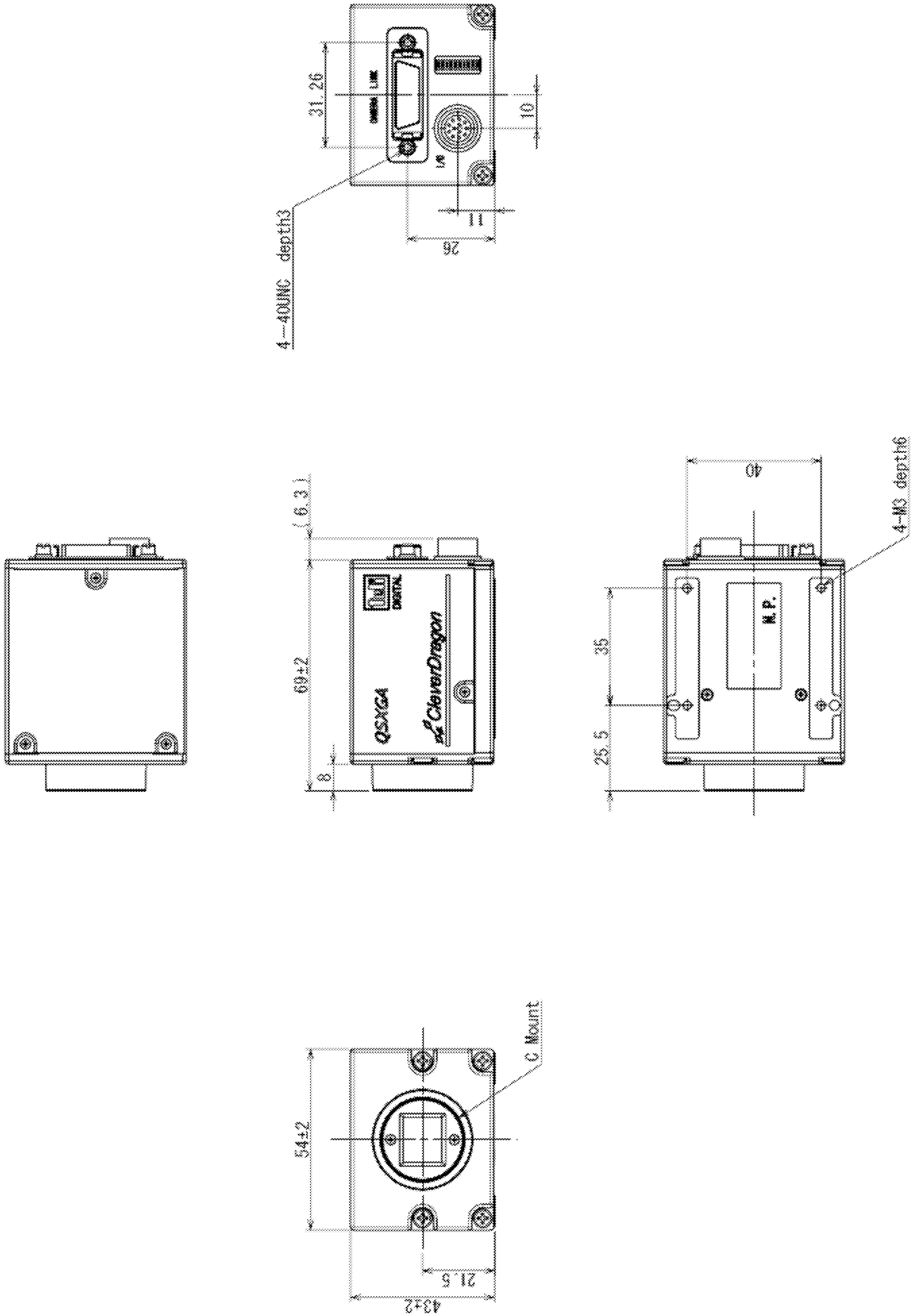
12. Recommended Frame Grabber Board - Input Module

Manufacturer Name	Model Name
DALSA CORECO	X64 Xcelera-CL PX4

* As of April, 2008

* Supported functions and control methods may vary depending on the board. For details, contact our sales representatives.

13. Outline Drawing





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Distributor

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 - Information contained in this document is subject to change without prior notice.
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