



# **B/W CCD Camera CleverDragon series CSCV125BC3 Specification**

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**TOSHIBA TELI CORPORATION**

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## RESTRICTION FOR USE

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- 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.
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- 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.
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- 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
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## CASES FOR INDEMNITY (LIMITED WARRANTY)

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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.
  - About the item which does not have a publication in the specifications and manual of this product, it considers as the outside for a guarantee.
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## NOTES ON USING THIS PRODUCT

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- **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.

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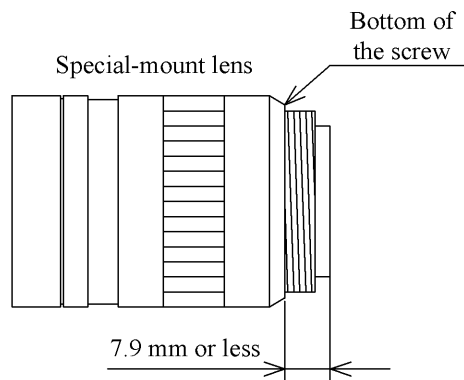
- **Environmental operating conditions**

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.

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- **About lens mount**

As for the Special-mount lens used combining this camera, the projection distance from bottom of the screw should use 7.9mm or less.



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- **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 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 lighting 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.

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- **About camera cable**

The connector of the camera is in “Screw-coupling” lock structure. Improper cramping might cause image noise. Be sure to give it a good cramping to avoid noise. If bright 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.

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- **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.

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- **Occurrence of moiré**

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

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- **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.

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- **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.

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- **Turn OFF the power in the case of connection**

Turn OFF the power in the case of connection of connection camera cable.

Otherwise, an electric shock or a malfunction may occur.

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- **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.

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.



”This symbol is applicable for EU member states only”

## **1. Overview**

CleverDragon series CSCV125BC3 is an integrated type B/W CCD camera with a VGA format all-pixel-data readout CCD. The model is suited for high-resolution image processing use. Its compact, light-weight body is ideal for system integration.

## **2. Features**

### (1) Quadruple-speed reading

CSCV125BC3 reads image data 4 times faster than the conventional CCD camera.

### (2) All-pixel reading

The all-pixel reading system allows the CSCV125BC3 to read all pixels in just 1/125 second.

CSCV125BC3 is equipped with a full-frame shutter that allows all-pixel reading even during shutter operations.

### (3) Full-frame shutter

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

### (4) Tetragonal lattice layout

The tetragonal lattice layout of CCD pixels facilitates computation for image processing.

### (5) Camera Link interface (Power supply type)

By using a Camera Link-capable frame grabber board to which power can be supplied, high-speed transfer of captured images to a PC as well as various types of camera control from the PC are allowed. Power can also be supplied to the camera with only one cable.

### (6) Random trigger shutter function

CSCV125BC3 is equipped with a random trigger shutter, which starts exposure synchronized with external trigger signals. Fast-moving objects can thus be captured in place, which ensures accurate image processing.

### (7) Restart-Reset

Images can be shot and fetched at arbitrary timing based on external VD signal input.

### (8) Partial scan

Further speed-up is possible because ranges except the range of the image output that the user set are not read.

### (9) Ultra-compact and lightweight main unit

The space-saving ultra-compact and lightweight camera has excellent resistance against vibration and impact.

### (10) RoHS compliant

CleverDragon series are complied with EU RoHS.

The design and specifications is subject to change without notice.  
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### **3. Configuration**

- (1) Camera body ..... 1
- (2) Accessory
  - Instruction Manual (Japanese) ..... 1
  - Instruction Manual (English) ..... 1

### **4. Optional parts**

- (1) Camera mounting kit: CPT8560

\*Contact your dealer / distributor for details of option units.

\*Application software is not supplied as a standard item.

### **5. Functions**

#### 5-1. Serial communication control

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

- (1) Setup addition Value
  - 10bit: -50 to +255 [digit]
  - 8bit: -12 to +63 [digit]
- (2) Gain setting
  - 6 to approx. +18 [dB]
- (3) Shutter speed setting
  - 8 to 1/100,000 [sec]
- (4) Random trigger shutter setting
  - ON / OFF
  - \* It is effective when a Restart/Reset is OFF.
  - Trigger / VD signal polarity
    - Positive / Negative
  - Random trigger mode
    - Pulse width mode / FIX mode
- (5) Restart Reset
  - ON / OFF
  - \* It is effective when a Random shutter mode is OFF.
- (6) Partial scan
  - A setup of an image output starting position and width.
  - \* Width cannot be set as 120H or less.
- (7) Setting storage memory
  - 8 Banks
- (8) Image output
  - ON / OFF
  - Output bit
    - 8 bit / 10 bit

This camera can supply a power supply from a camera link cable.

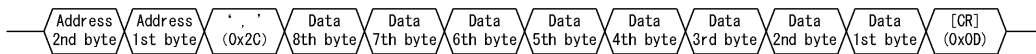
- 1pin /26 pin
  - +12V +/- 10% (Ripple level: 50mVp-p or less)

## 5-2. Command communication protocol

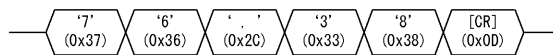
The command communication protocol is the TELI standard method (method which parameters are set in the registers in the camera). In command send/receive operation, hexadecimal address and data are converted to ASCII data. All ASCII data alphabetic characters used are uppercase characters.

### (1) Writing to registers

To write data in a register, send a command, as follows. (Address' max-length is 2 bytes, and Data's max-length is 8 bytes)

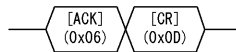


For example, to write data 0x38 to address 0x76, send a command, as follows:

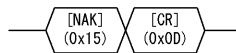


The camera responds to the write command with No Error (ACK) or Error (NAK), as follows:

No Error (ACK):



Error (NAK):

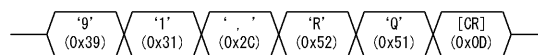


\* A partial scan needs two kinds of data. In addition, a setup to the register of address 0xC0 is required.

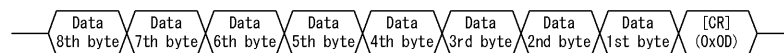
### (2) Reading the registers

To read data from a register, send '(', (comma)', 'R', 'O' and [CR] code following the address.

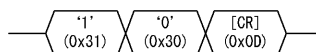
For example, to read data in address 0x91, send a command, as follows:



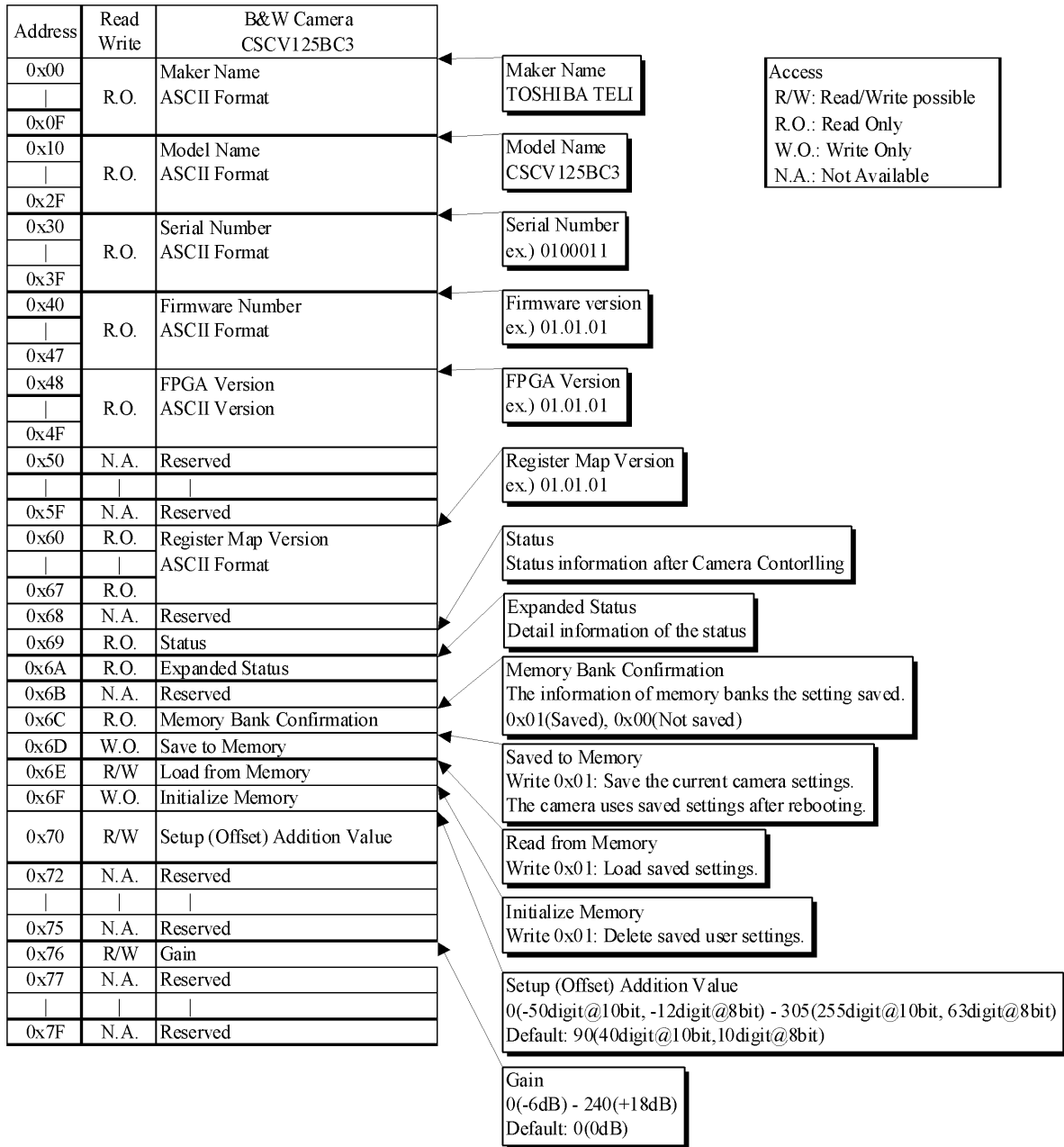
The camera responds to the read request, as follows (Data's max-length is 8 bytes).



Actually, the camera responds to the read request as minimum data length: For example, to read data 0x10 to address 0x91, the camera responds as follows:



### (3) Register map



Adress	Read Write	B/W Camera CSCV125BC3	
0x80	R.O.	Frame Rate	Horizontal Resolution 648 (fixed) Default: 648
0x82	R.O.	Horizontal Resolution	
0x84	R.O.	Vertical Resolution	
0x86	R/W	Output Control	Output Control 0(OFF)/1(ON) Default: 1(ON)
0x87	R/W	Output Bit	
0x88	N.A.	Reserved	Vertical Resolution Normal: 494 Partial Scan: 120 - 494 Default: 494(Normal)
0x8F	N.A.	Reserved	
0x90	R/W	Scan Mode	Output Bit 8(8bit)/10(10bit) Default: 8(8bit)
0x91	R/W	Shutter Mode	Scan Mode 0(Normal)/1(Partial) Default: 0(Normal)
0x92	R/W	Random Trigger Shutter Mode	
0x93	R/W	Trigger Polarity	Shutter Mode 0(Normal)/1(Random Trigger)/2(Restart-Reset) Default: 0(Normal)
0x94	N.A.	Reserved	
0x9F	N.A.	Reserved	Random Trigger Mode 0(FIX Mode)/1(Pulse Width Mode) Default: 0(FIX Mode)
0xA0	R/W	Shutter Speed (denominator)	
0xA4	R/W	Shutter Speed (numerator)	Trigger Polarity 0(Negative) / 1(Positive) Default: 0(Negative)
0xA5	N.A.	Reserved	
0xBF	N.A.	Reserved	Shutter Speed (denominator) 1 - 100000 Default: 125(1/125s)
0xC0	W.O.	Partial Scan Update	
0xC1	N.A.	Reserved	Shutter Speed (numerator) 1 - 255 Default: 1(1/125s)
0xC2	N.A.	Reserved	
0xC3	N.A.	Reserved	Partial Scan Update Write 0x01: Update registers related with partial scan
0xC4	R/W	Video Start Line @Partial Scan	
0xC5	N.A.	Reserved	Video Start Line @Partial Scan 0 - 374 Default: 0
0xC6	N.A.	Reserved	
0xC8	R/W	Video Width @Partial Scan	Video Width @Partial Scan 120 - 494 Default: 494
0xCA	N.A.	Reserved	
0xFF	N.A.	Reserved	

## 6. Specifications

### [Electrical specification]

(1) Image sensor	All-pixel-data-readout interline transfer CCD
·Total pixels	692 (H) x 504 (V)
·Effective pixels	659 (H) x 494 (V)
·Video output effective pixels	648 (H) x 494 (V)
·Scanning area	4.88 mm (H) x 3.66 mm (V) (= Equivalent to 1/3" type CCD size)
·Unit sell size	7.40 $\mu$ m (H) x 7.40 $\mu$ m (V) (Square grid)
(2) Scan method	Progressive scan
(3) Synchronization method	Internal synchronization
(4) Aspect ratio	4:3
(5) Video output	Compliant with Camera Link standard version 1.2
- Data	10 / 8 bit switching (Factory default: 8 bit)
- Readout mode	
All pixel readout (default)	648 (H) x 494 (V) [Approx. 126.2 fps]
Partial scan (ex.1)	648 (H) x 120 (V) [395.8 fps] (The central value at normal scan)
(ex.2)	648 (H) x 240 (V) [234.9 fps] (The central value at normal scan)
(ex.3)	648 (H) x 480 (V) [129.5 fps] (The central value at normal scan)
	- Minimum video output lines: 120, minimum step: 1 line
(6) Sensitivity	850 lx, F5.6 (Fixed gain)
(7) Minimum subject illuminance	8 lx, F1.4 (Gain: 10dB, Video level: 50%)
(8) Gain	- 6 to Approx. +18dB [Factory default: 0dB]
(9) Setup Level	
(Factory default)	10+/- 5[digit] (8bit/close light) / 40+/- 20[digit] (10bit/close light)
(Addition value)	-12 to +63[digit] (8bit/305step) / -50 to +255[digit] (10bit/305step)
(10) Gamma correction	OFF ( $\gamma$ =1.0 fixed)
(11) Power supply voltage	DC+12V +/- 10% (Ripple level: 50mVp-p or less)
(12) Power consumption	1.83 [W] (Max.)

### [Electronic shutter signal specification]

- |                            |  |
|----------------------------|--|
| (1) Shutter speed          | 8/1 to 1/100,000 [sec]                                 |
| (2) Random trigger shutter | ON / OFF switching (Factory default: OFF)              |
| Fixed mode                 | The exposure time depends on the shutter speed setting |
| Pulse width mode           | The exposure time depends on the pulse width           |
| (3) Restart-Reset          | ON / OFF switching (Factory default: OFF)              |
|                            | The exposure time depends on the period of Ext. VD.    |

\* When you set the exposure time longer than approximately 1 second, white spots and the unevenness in highlight portion might occasionally be observed on screen. This phenomenon is due to the characteristics of the CCD image-pickup device, and do not reflect performance error in the pickup device or CCD camera itself.

### [Internal sync signal specification]

- |                               |   |
|-------------------------------|---|
| (1) Driving frequency         | 49.090902 MHz (1clk) +/-100ppm                          |
| (2) Horizontal sync frequency | 62.937 kHz (1H = 780 clk)                               |
| (3) Vertical sync frequency   | 126.26 Hz (Maximum frequency on all pixel readout mode) |

### [Input signal specification]

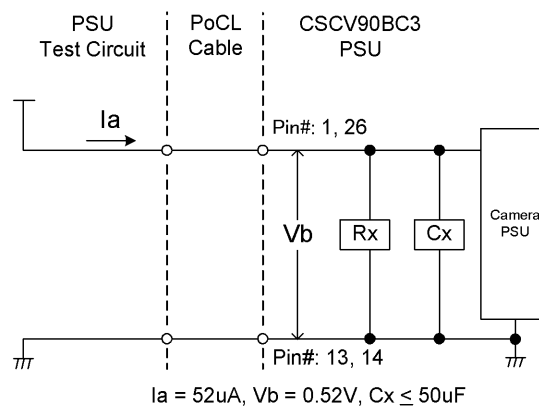
- |               |   |
|---------------|---|
| (1) TRIG / VD | Camera Link interface input: CC1                          |
| - Polarity    | Positive / Negative switching (Factory default: Negative) |
| - Pulse width | 2 $\mu$ s (Min.)  |

### Notes of trigger mode or Restart-Reset mode

When the trigger signal (TRIG/VD) is noisy, there is a possibility of causing the malfunction. In this case, please input a proper trigger signal (TRIG/VD).

### [Camera PSU input impedance]

$C_i \leq 57\mu\text{F}$  (Max.),  $R_x = 10\text{k}\Omega$  +/- 10%



### [Machine externals specification]

(1) Lens mount C-mount

\*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 the ghost, aberration and others. When you check the combination between the lens and camera, be sure to use the lens you actually use.

\*Install a lens, its dimension of protrusion from flange is equal to less than 7.9 mm. If a lens dose not stand to this condition, its might not be installed to this camera.

(2) Flange back 17.526 mm

(3) Dimensions 29mm(W) x 29mm(H) x 26.5mm(D)

\*Not including protrusion

(4) Mass Approx. 40g

(5) Camera body grounding 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) Operation guaranteed Temperature -5 to 45 °C  
Humidity 90% or less (no condensation)

(3) Storage Temperature -20 to 60 °C  
Humidity 95% or less (no condensation)

(4) EMC conditions (Electro-Magnetic Compatibility)

EMI (Electro-Magnetic interference) EN61000-6-4: 2007 conformity

EMS (Electro-Magnetic susceptibility) EN61000-6-2: 2005 conformity

(5) FCC FCC Sub part15 class A conformity

**\*About the Conformity of EMC standard of this camera, it has guaranteed in the conditions combined with our system condition. When used combined parts other than specification of our company, I ask you to have final EMC conformity checked of a visitor with a machine and the whole equipment.**

### [Communication specification]

(1) Communication speed 9600bps (Fixes)

(2) Start bit 1

(3) Data bit 8

(4) Parity None

(5) Stop bit 1

(6) Handshake None

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### [Connector pin assignment]

#### (1) Camera Link connector

Connector model: HDR-EC26FDTG2+ (Manufactured by HONDA)

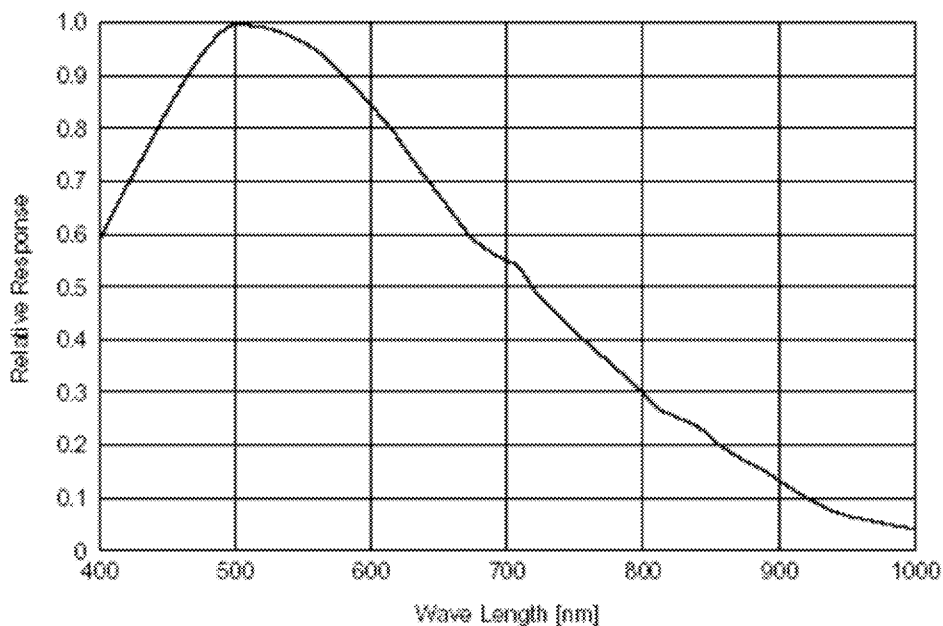
Pin assignment:

Pin #	I/O	Signal name	Pin #	I/O	Signal name
1	-	+12V	14	-	GND
2	O	TxOUT0-	15	O	Tx OUT0+
3	O	TxOUT1-	16	O	Tx OUT1+
4	O	TxOUT2-	17	O	Tx OUT2+
5	O	TxCLK OUT-	18	O	Tx CLK OUT+
6	O	TxOUT3-	19	O	Tx OUT3+
7	I	SerTC(RxD)+	20	I	SerTC(RxD)-
8	O	SerTFG(TxD)-	21	O	SerTFG(TxD)+
9	I	CC1(TRIG/VD)-	22	I	CC1(TRIG/VD)+
10	I	CC2+	23	I	CC2-
11	I	CC3-	24	I	CC3+
12	I	CC4+	25	I	CC4-
13	-	GND	26	-	+12V

\*Please confirm the power supply of the camera cuts when the connector is connected or pulls out.  
It causes the breakdown etc.

### [Typical Spectral Response]

\*The lens characteristics and light source characteristics are not reflected in table.



## 7. Timing chart

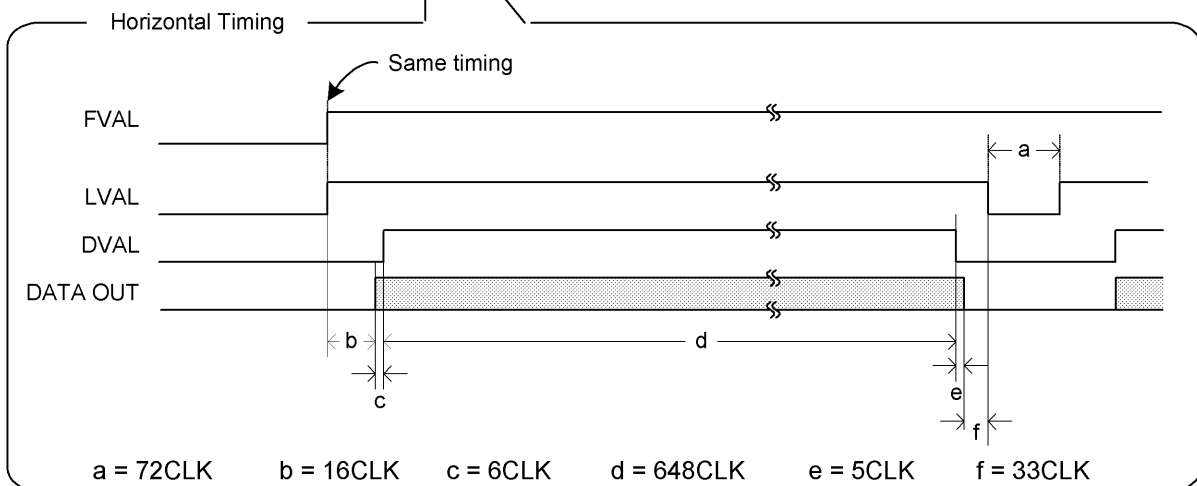
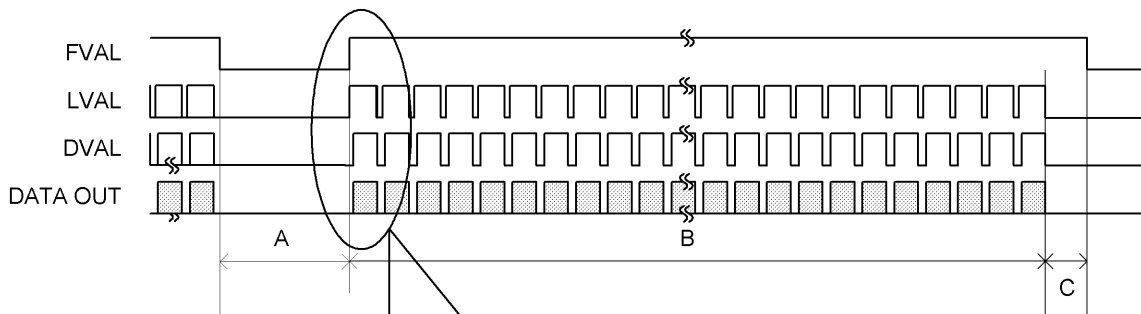
### 7-1. Normal scan

All pixels are read out in approx. 1/126.2s, you will get images with the higher V resolution (You have to change the shutter speed to 1/126.2s or shorter.)

Vertical Timing (1/125sec Shutter Speed on all Normal Scan mode)

A = approx. 155us      B = approx. 7.86ms (494H-72CLK)      C = approx. 1.47us

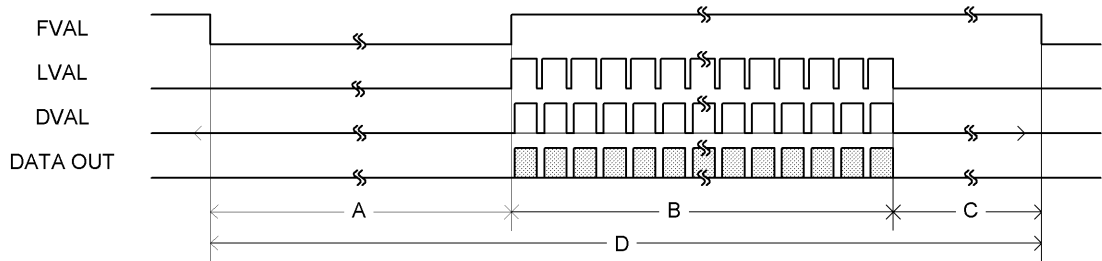
1frame = A + B + C = approx. 8.02ms      \*1H = 780CLK



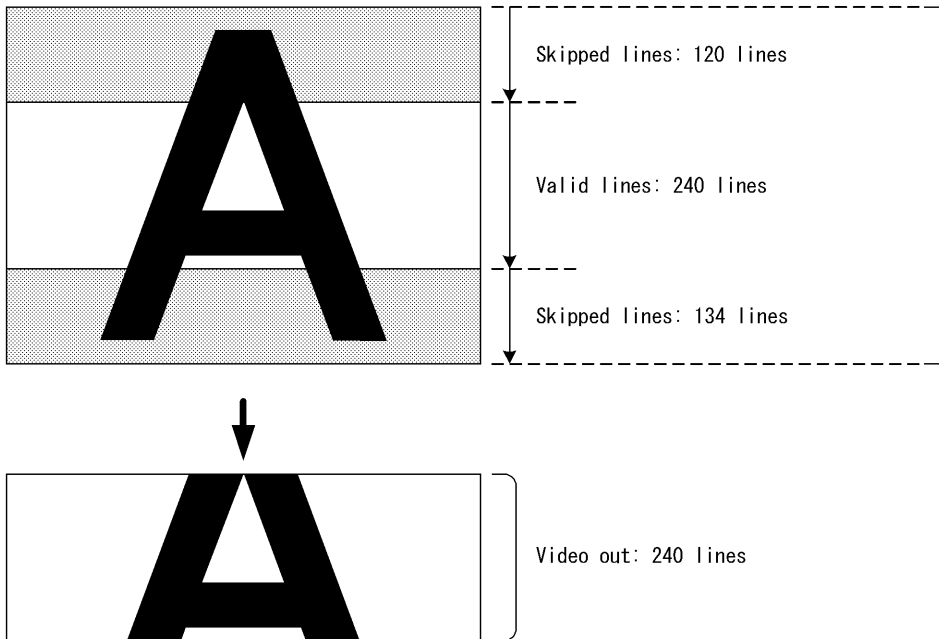
7-2. Partial scan

Ranges except the range of the image output that the user set are not read. Partial scan setting procedure is following:

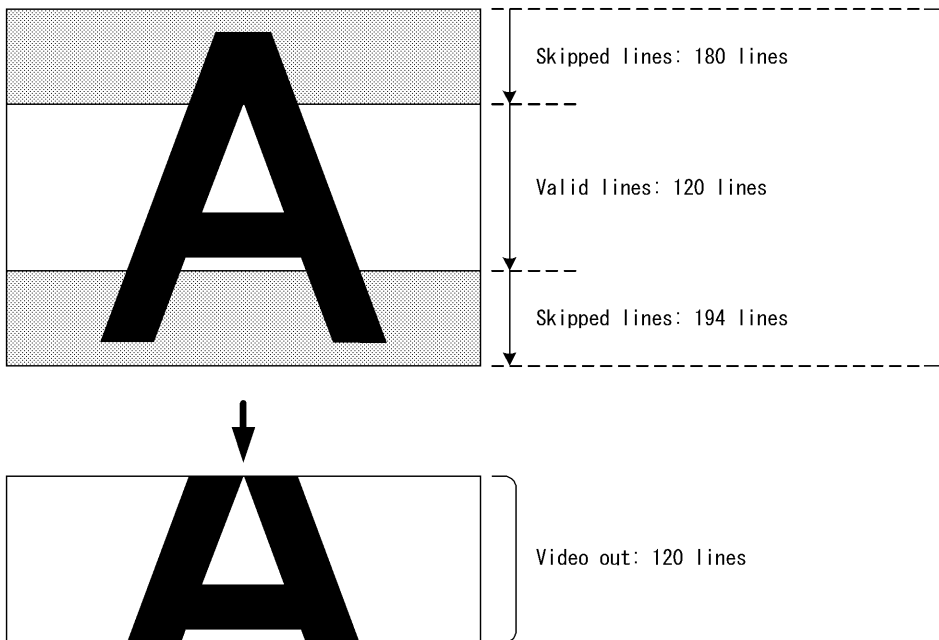
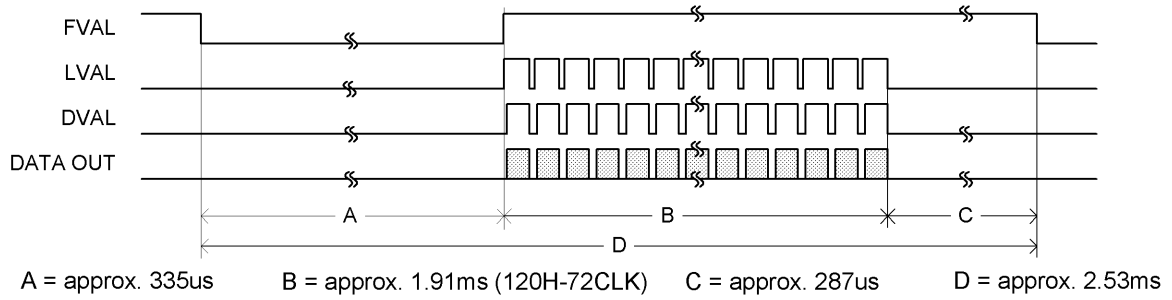
ex. 1) Video start Line = 120, Video width = 240 (maximum speed on all pixel readout mode)



A = approx. 247us      B = approx. 3.82ms ( 240H-72CLK )      C = approx. 198us      D = approx. 4.26ms



ex. 2) Video start Line = 180, Video width = 120 (maximum speed on all pixel readout mode)



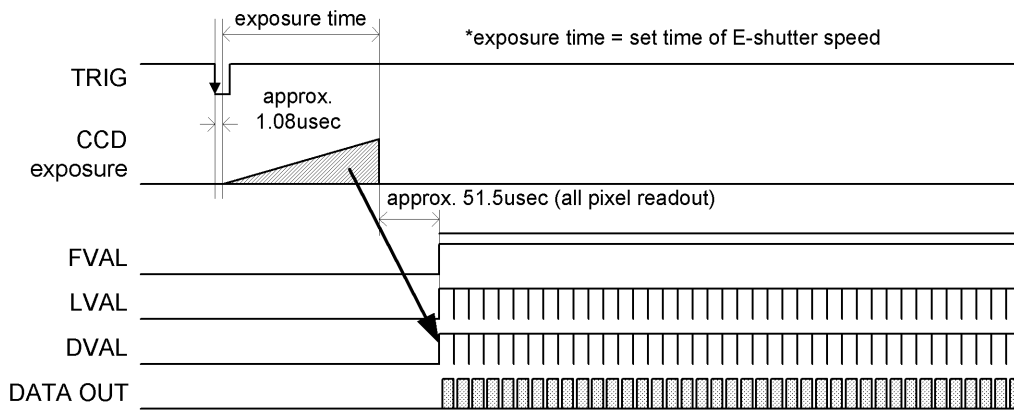
### 7-3. Random trigger shutter

In the random shutter trigger mode, you can shoot and grab an image at an arbitrary timing by trigger signal input from the external. (This function cannot be used simultaneously with Restart-Reset mode.)

- External trigger signals can be input from the camera link I/F CC1.
- 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.

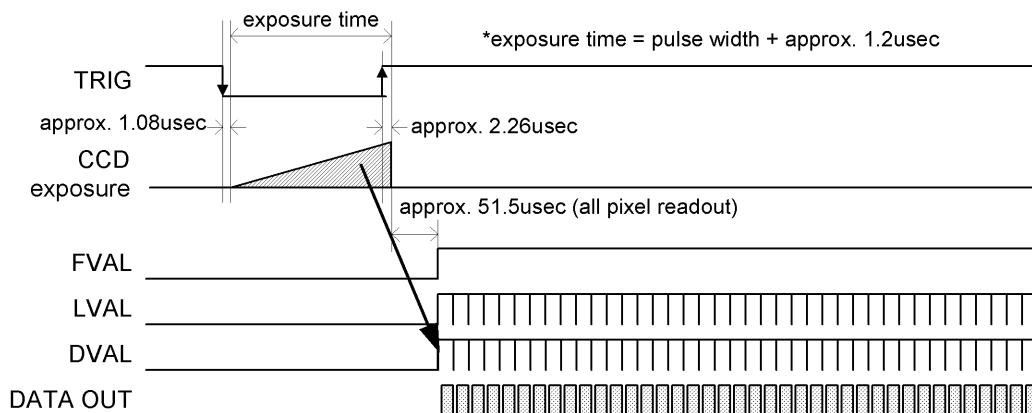
#### 7-3-1. Fixed mode

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



#### 7-3-2. Pulse width mode (Trigger signal polarity: Negative)

The exposure time is determined by the pulse width.



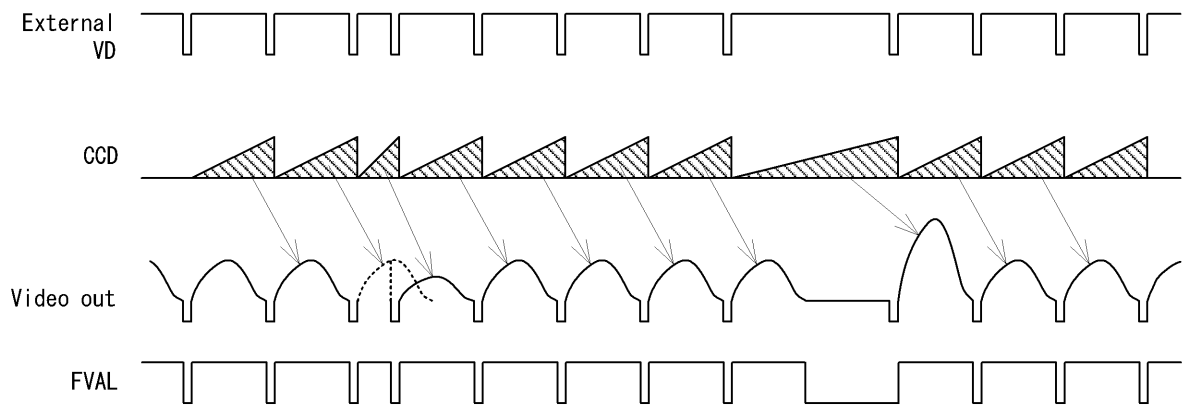
### 7-3-3. Restart-Reset

The restart / reset function is available with the ext. VD signal. You can get an arbitrary shutter speed than normal shutter and random shutter trigger shutter.

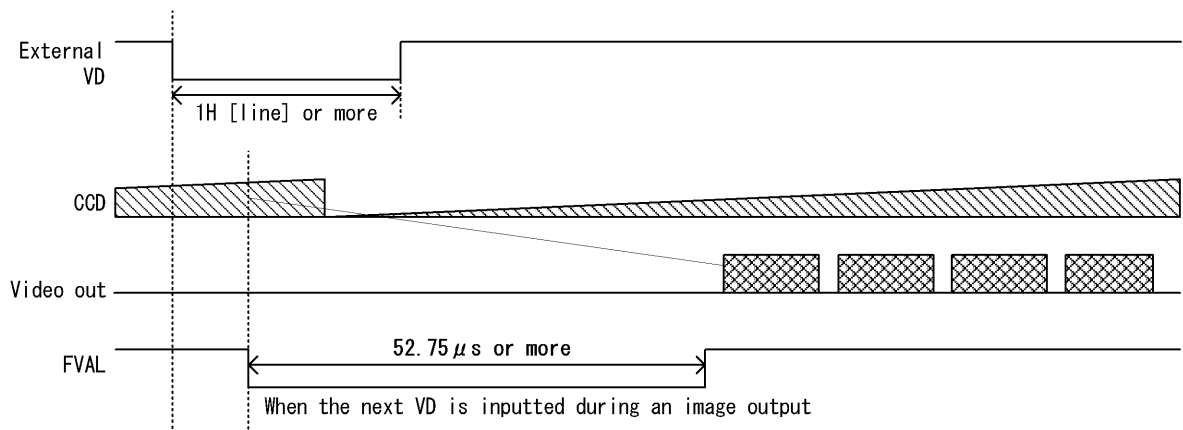
(This function cannot be used simultaneously with Random trigger shutter mode.)

- External VD signals can be input from the camera link I/F CC1.
- If polarity is set to negative polarity, exposure starts at the falling edge of the trigger.
- The shutter speed (exposure time) is determined by ext. VD signal interval.

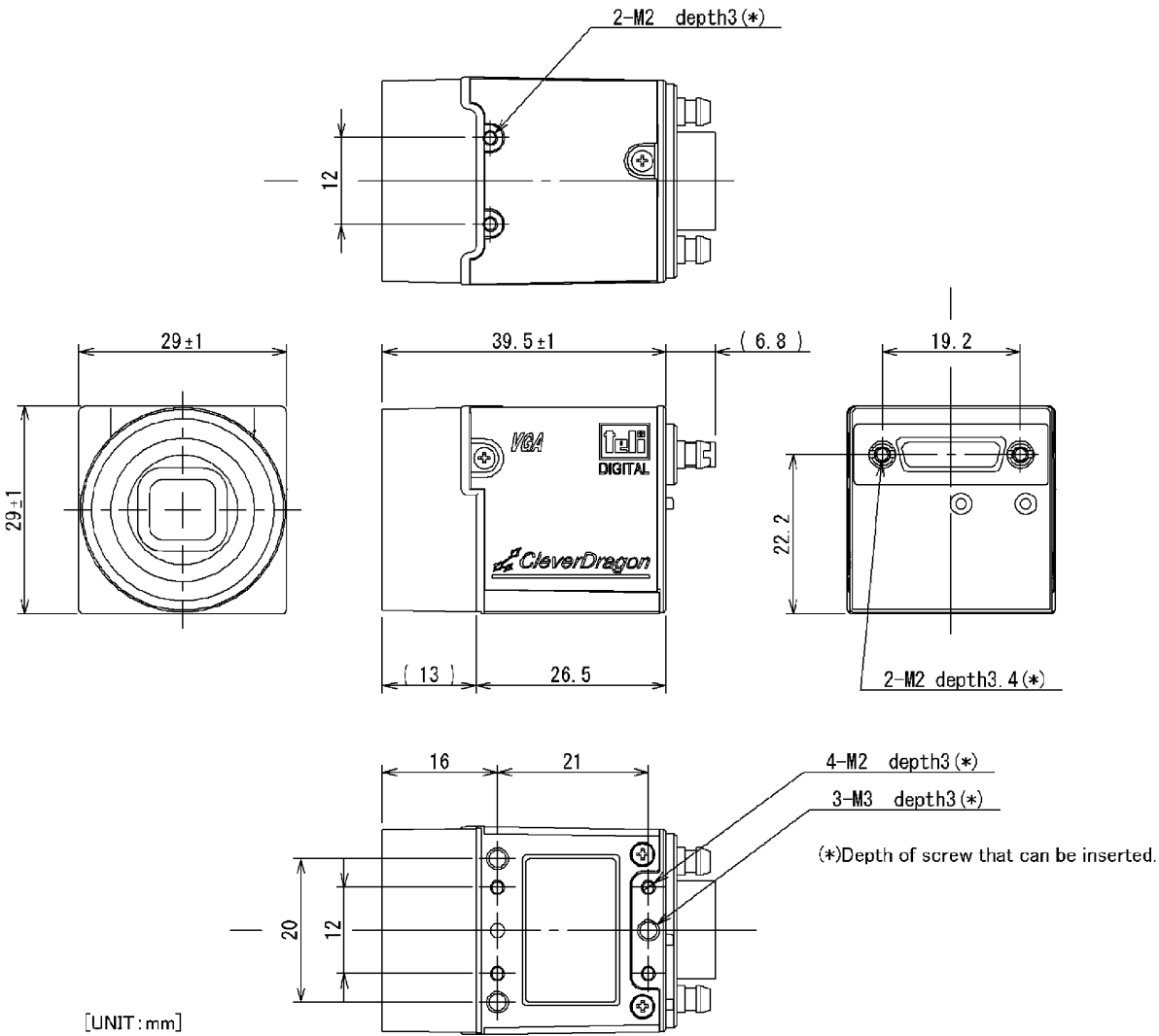
#### (1) Vertical timing



#### (2) Horizontal timing



# 8. Outline Drawing



The design and specifications is subject to change without notice.  
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## **9. Guarantee**

The term of a guarantee is one year after the product delivery.

If by any chance trouble by responsibility of our company occurs before an above period, TELI repairs it free of charge.

- During terms of a guarantee, when the trouble cause is the case of below, TELI charges the repair costs.

- (1) Troubles and the damages that causes by misuse, unsuitable repair or remodeling.
- (2) Distribution hazards like drops and vibrations after purchase, troubles and damages by transportation.
- (3) Troubles and damages by fire, natural calamity (earthquake, storm and flood damage, thunderbolt), damages from salty breeze, gas harm, abnormal voltage.

## **10. Repair**

### 10-1. Condition for repair

Basically, has to return it to our company when the user requests us to repair product.

Beside that, customer should pay these expenses (travel expenses, camera disassembly technology costs) of both customer and end user. Also customer should pay in themselves costs for return camera to us.

### 10-2. The period of repairing product

- (1) Repair free of charge    Refer to Clause 9.
- (2) Charged repair        Basically, repair period is 7 years after the last production end of products.



## **TOSHIBA TELI CORPORATION**

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**Distributor**

- This product must be classified for disposal according to the laws of each country and municipal laws.
  - Information contained in this document is subject to change without prior notice.
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