

CCD Black-and-White Video Camera Module

Technical Manual



**XC-ST51/ST51CE
XC-ST50/ST50CE
XC-ST30/ST30CE**

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Overview

The XC-ST series is a monochrome video camera module using an interline transfer CCD (Charge Coupled Device) solid state image sensor.

Features

High image quality

The interline transfer CCD provides a high-resolution image with 768 (H) × 494 (V) pixels (XC-ST51/ST50/ST30) or 752 (H) × 582 (V) pixels (XC-ST51CE/ST50CE/ST30CE).

Various mode settings

Rear panel switches allow the following mode settings.

- Gain: Auto/Fixed/Manual
- γ compensation
- Synchronized input/output
- Potential accumulation: FRAME/FIELD
- 75 Ω termination
- Trigger pulse polarity: +/-
- Shutter speed: Normal/Trigger shutter

External synchronization

HD (horizontal drive), VD (vertical drive) signals:

The camera module automatically determines whether to operate in interlace or noninterlace mode from the HD and VD signals input for external synchronization.

VS (Video/Sync) signals: External synchronization with a video or composite sync signal. (The unit switches automatically between HD/VD and VS synchronization.)

Internal sync signal output

You can output the HD and VD signals from the 12-pin connector by changing the rear panel switch.

Electronic shutter function

Shutter speed can be selected from a wide range (1/125 to 1/10000 sec.) or in flickerless (FL) mode.

Body fixing

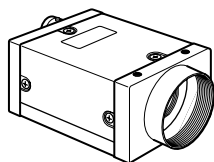
These mounting screw holes are provided in the reference plane on the lower surface of the body, allowing mounting with the absolute minimum deviation of the optical axis.

The connector complies with the new EIAJ 12-pin pin assignment.

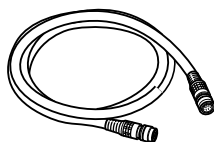
The new pin arrangement allows the connector to accept a trigger pulse and a WEN signal.

System Components

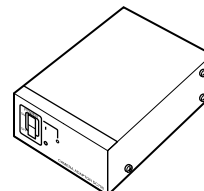
The followings are the components making up the system based on XC-ST51/ST51CE, XC-ST50/ST50CE, and XC-ST30/ST30CE Video Camera Module.



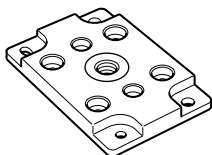
Video camera module
XC-ST51/ST51CE
XC-ST50/ST50CE
XC-ST30/ST30CE



Camera cables
CCXC-12P02N (2 m)
CCXC-12P05N (5 m)
CCXC-12P10N (10 m)
CCXC-12P25N (25 m)



Camera adaptor
DC-700/700CE



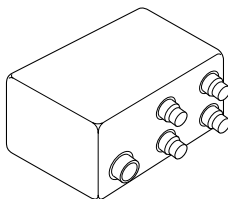
Tripod adaptor
VCT-ST70I (Isolated type)



C-mount lenses
VCL-50Y-M
VCL-25Y-M
VCL-16Y-M
VCL-12YM
VCL-08YM

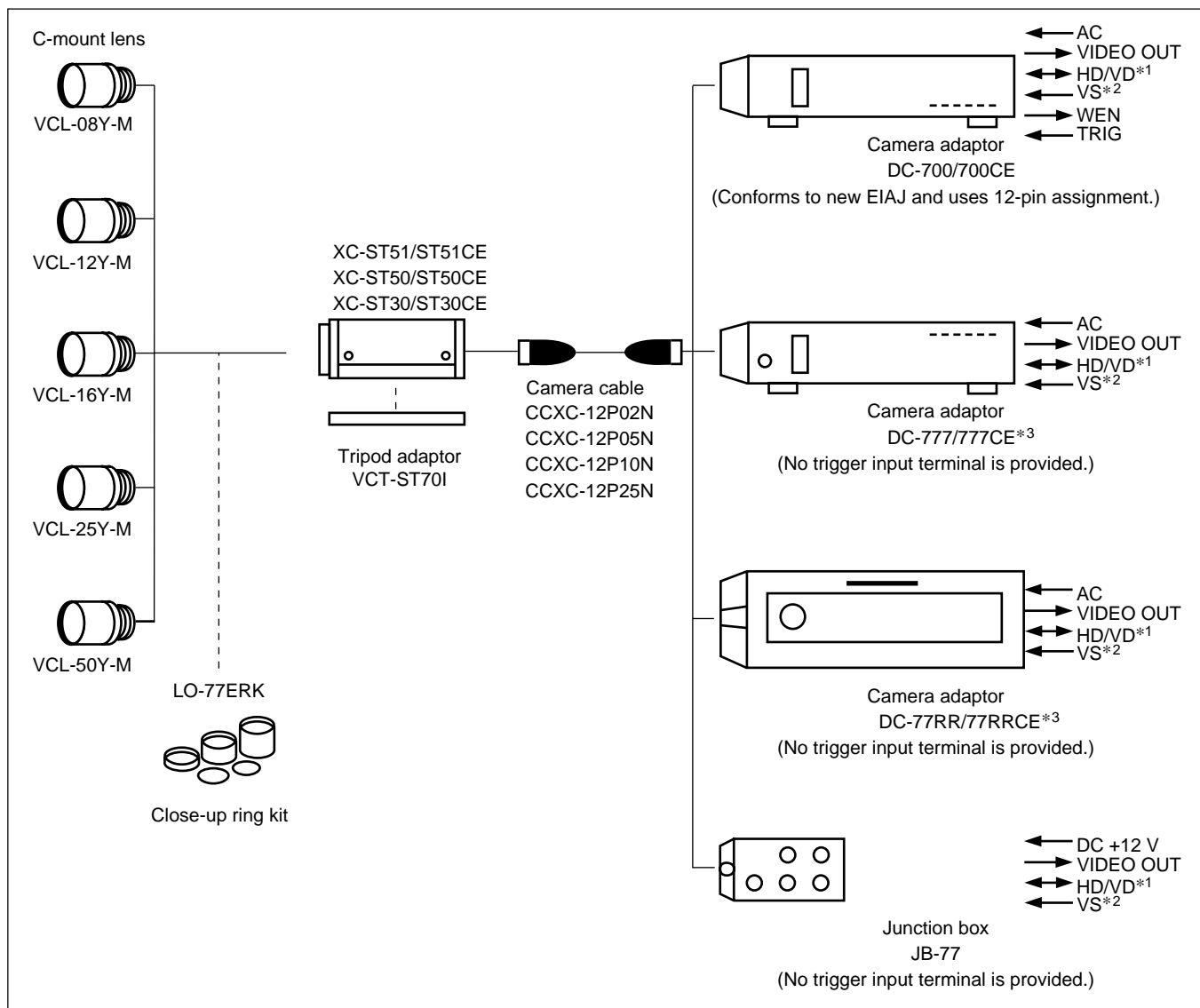


Close-up ring kit
LO-77ERK



Junction box
JB-77

Connection Diagram



*1: An HD/VD signal cannot be used simultaneously with a VS signal.
 *2: A VS signal cannot be used simultaneously with an HD/VD signal.
 *3: Production and sale have been discontinued.

Note

Not all functions of the XC-ST51/ST51CE, XC-ST50/ST50CE and XC-ST30/ST30CE can be used when using DC-777/777CE, DC-77RR/77RRCE, and JB-77.

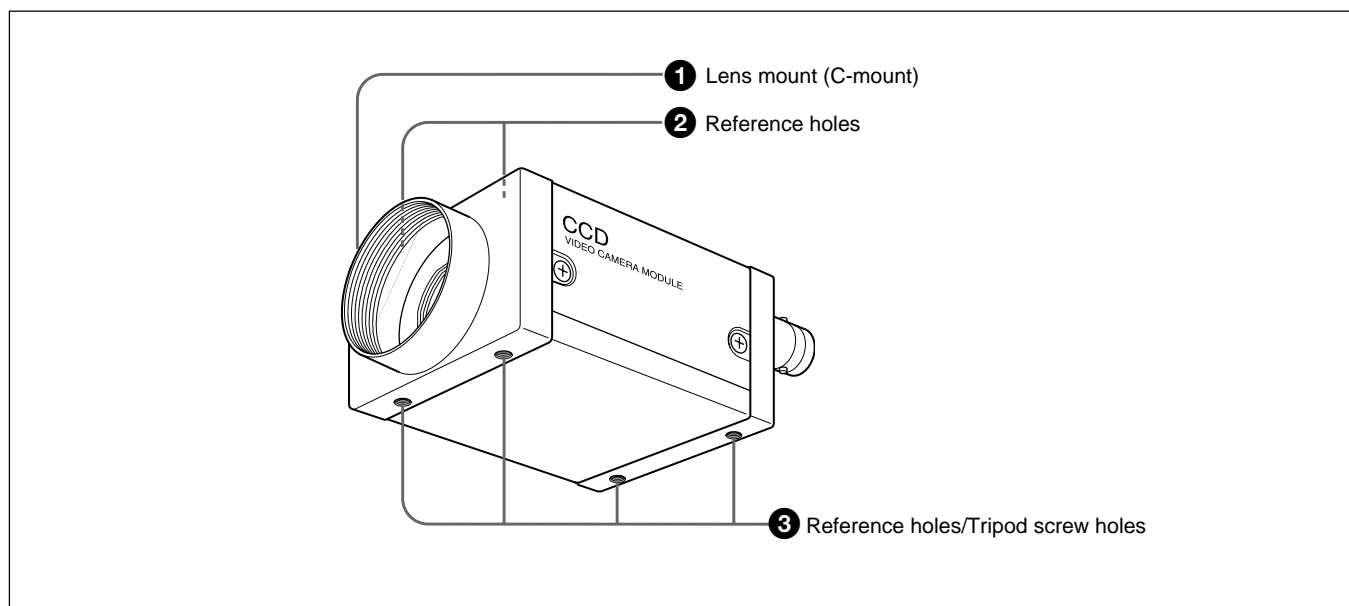
Refer to the table shown below.

XC-ST51/ST51CE XC-ST30/ST30CE XC-ST50/ST50CE	DC-777/777CE	DC-77RR/77RRCE	JB-77
Normal	○	○	○
Normal shutter	○	○	○
Restart/Reset	○	○	○
Restart/Reset + shutter	○	○	○
External trigger shutter	×	×	×

○ : Can be used.
 × : Cannot be used.

Location and Function of Parts and Controls

Front/Top/Bottom



1 Lens mount (C-mount)

Attach any C-mount lens or other optical equipment.

Note

The lens must not project more than 7 mm (9/32 inch) from the lens mount.

2 Reference holes (at the top)

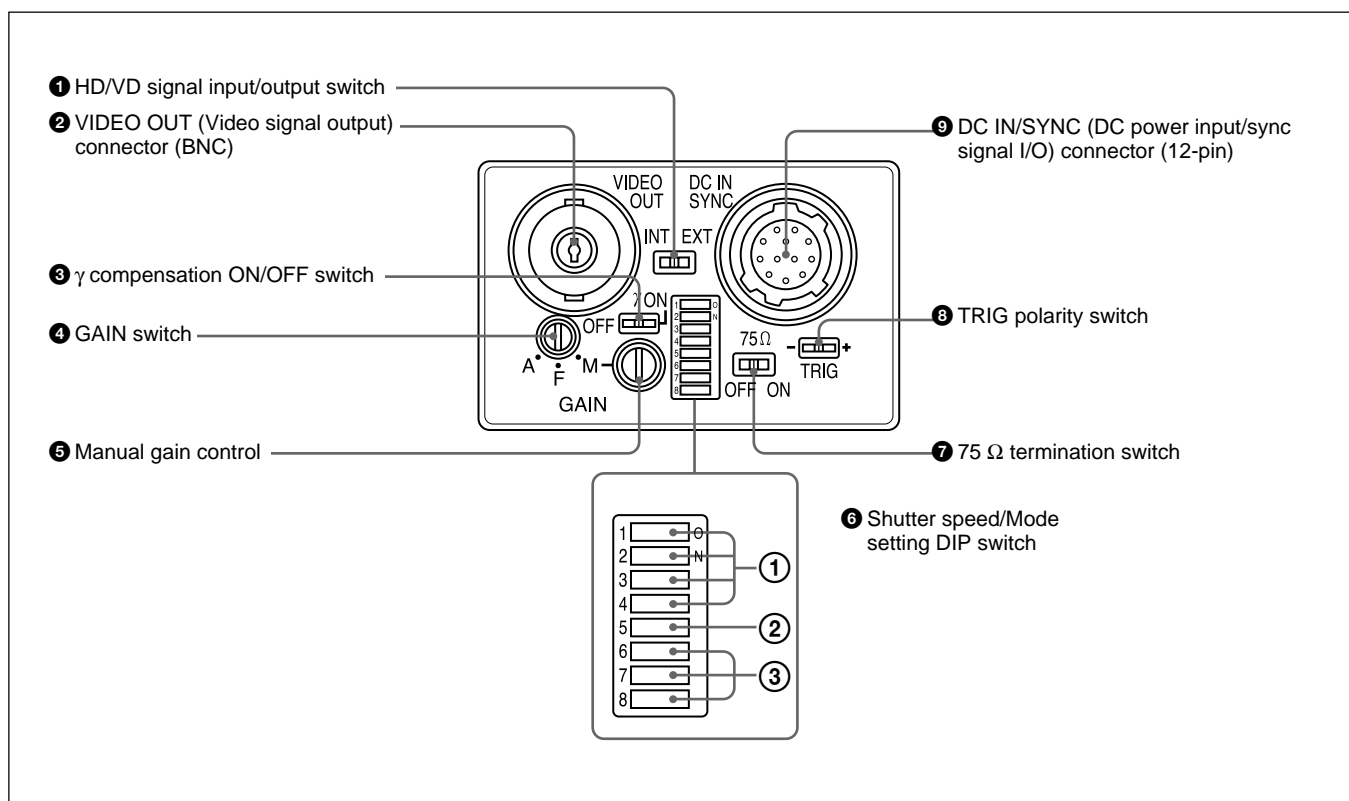
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

3 Reference holes/Tripod screw holes (at the bottom)

These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

You can install the camera on a tripod. To install on a tripod, you will need to install the VCT-ST70I tripod adaptor using the reference holes on the bottom of the camera.

Rear Panel



① HD/VD signal input/output switch

Set the switch to INT to output HD/VD signals from the camera module.

Set the switch to EXT to input HD/VD signals from an external unit. (Factory setting: EXT)

② VIDEO OUT (Video signal output) connector (BNC)

You can use this connector for video signal output from the camera module.

③ γ compensation ON/OFF switch

Turn on this switch for γ compensation. (Factory setting: OFF)

④ GAIN switch

This switch selects AGC (A), fixed gain (F), or manual gain control (M). (Factory setting: F)

⑤ Manual gain control

Adjust the gain using this control. GAIN switch ④ must have been set to M (Manual).

⑥ Shutter speed/Mode setting DIP switch

① Shutter speed (bits 1 – 4)

Set an appropriate shutter speed. (Factory setting: Shutter off)

② Potential accumulation mode (bit 5)

Factory setting: FRAME

③ Restart reset/External trigger shutter mode switch (bits 6 – 8)

Factory setting: Normal

Notes

- Do not use any other settings for Restart reset/ External trigger shutter mode except those shown in page 12. Using other settings may cause the camera to malfunction.
- If you set the External trigger shutter mode, set 0 in bits 1 – 4.

⑦ 75 Ω termination switch

Turn off if you do not terminate. (Factory setting: ON)

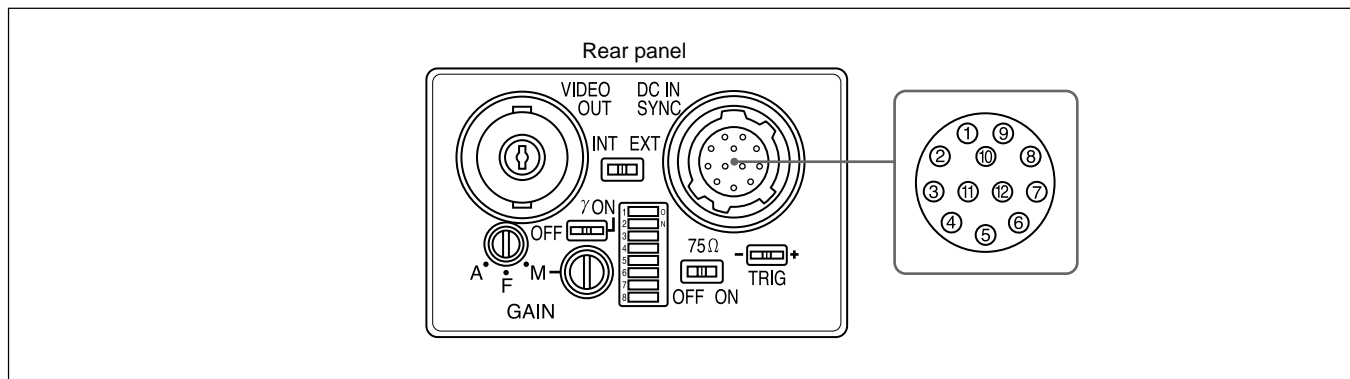
⑧ TRIG polarity switch

Select + or – according to the trigger pulse input from an external unit. (Factory setting: +)

⑨ DC IN/SYNC (DC power input/sync signal I/O) connector (12-pin)

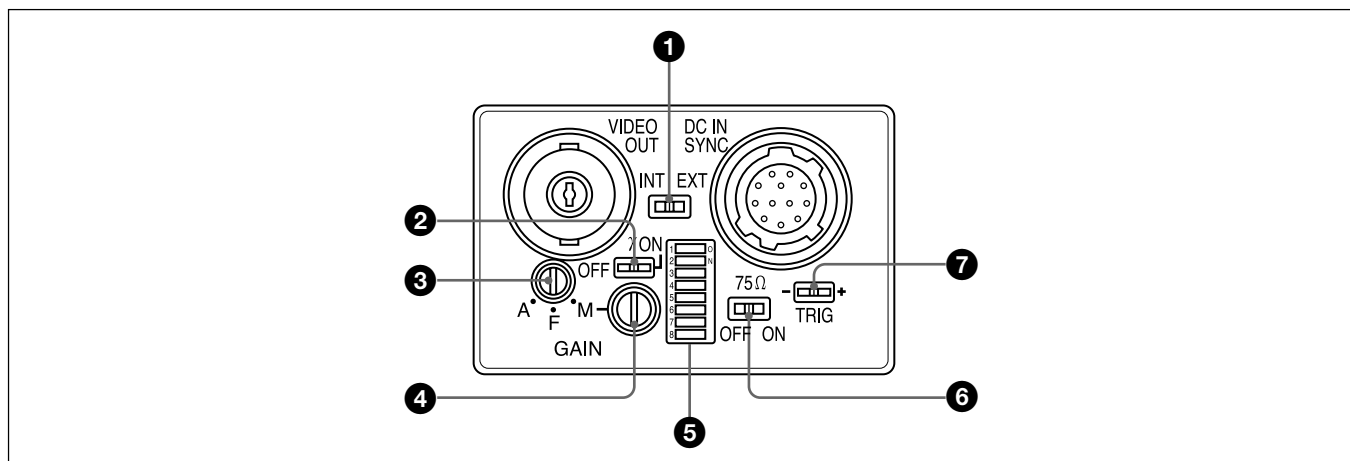
Connect a CCXC-12P05N camera cable to this connector the +12 V DC power supply and the video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronized with the external sync signals.

DC IN/SYNC connector pin assignments



Pin No.	Camera sync output	External mode (HD/VD)	External mode (VS)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output 1 (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output 1 (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	—	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	—	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	VS input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—	—
9	—	—	—	—	—
10	—	—	—	—	WEN output (Signal)
11	—	—	—	—	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	VS input (Ground)	Reset (Ground)	Reset (Ground)*

Factory mode settings of rear panel



No.	Switch	Factory setting mode
1	HD/VD signal input/output switch	EXT
2	γ compensation ON/OFF switch	OFF
3	GAIN switch	F
4	Manual gain control	— ¹⁾
5	Shutter speed/Mode setting DIP switches	Shutter speed (bits 1 – 4)
		Potential accumulation mode (bit 5)
		Restart reset/External trigger shutter mode switch (bits 6 – 8)
6	75 Ω termination switch	ON
7	TRIG polarity switch	+

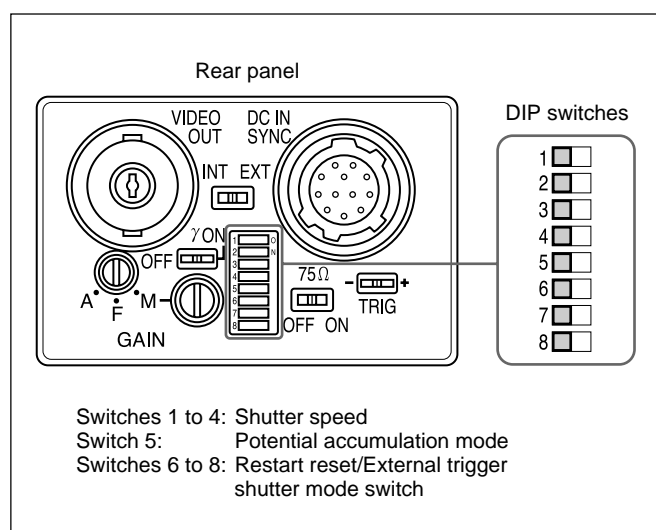
¹⁾ This unit is shipped from the factory with the GAIN switch being set to F (fix), so the Manual gain control knob is not operative unless the switch setting is changed. When the GAIN switch is set to M (manual), you can rotate this knob to adjust gain over the range 0 to 18 dB.

Mode Settings

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.

DIP Switches on the Rear Panel



Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal shutter speed settings

Shutter OFF	1/125	1/250	1/500	1/1000
1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
2 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>
3 <input type="checkbox"/>	3 <input type="checkbox"/>	3 <input type="checkbox"/>	3 <input type="checkbox"/>	3 <input type="checkbox"/>
4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>
5 <input type="checkbox"/>	5 <input type="checkbox"/>	5 <input type="checkbox"/>	5 <input type="checkbox"/>	5 <input type="checkbox"/>
6 <input type="checkbox"/>	6 <input type="checkbox"/>	6 <input type="checkbox"/>	6 <input type="checkbox"/>	6 <input type="checkbox"/>
7 <input type="checkbox"/>	7 <input type="checkbox"/>	7 <input type="checkbox"/>	7 <input type="checkbox"/>	7 <input type="checkbox"/>
8 <input type="checkbox"/>	8 <input type="checkbox"/>	8 <input type="checkbox"/>	8 <input type="checkbox"/>	8 <input type="checkbox"/>
1/2000	1/4000	1/10000	Flickerless ¹⁾ 1/100 (EIA) 1/120 (CCIR)	
1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	
2 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>	
3 <input type="checkbox"/>	3 <input type="checkbox"/>	3 <input type="checkbox"/>	3 <input type="checkbox"/>	
4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>	
5 <input type="checkbox"/>	5 <input type="checkbox"/>	5 <input type="checkbox"/>	5 <input type="checkbox"/>	
6 <input type="checkbox"/>	6 <input type="checkbox"/>	6 <input type="checkbox"/>	6 <input type="checkbox"/>	
7 <input type="checkbox"/>	7 <input type="checkbox"/>	7 <input type="checkbox"/>	7 <input type="checkbox"/>	
8 <input type="checkbox"/>	8 <input type="checkbox"/>	8 <input type="checkbox"/>	8 <input type="checkbox"/>	

(Unit: seconds)

1) If you set the mode to flickerless, the positions of DIP switches 1 to 3 are optional.

Note

The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.

External Trigger Shutter

By inputting an external trigger pulse, the camera is able to capture fast-moving objects clearly.

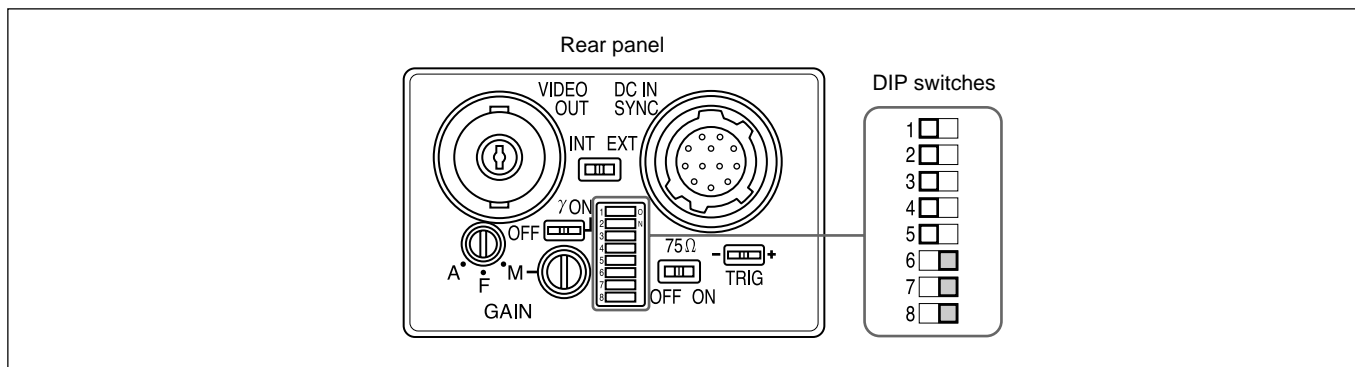
For more information, see "External Trigger Shutter" (page 12).

Restart/Reset

To Set Restart/Reset Mode

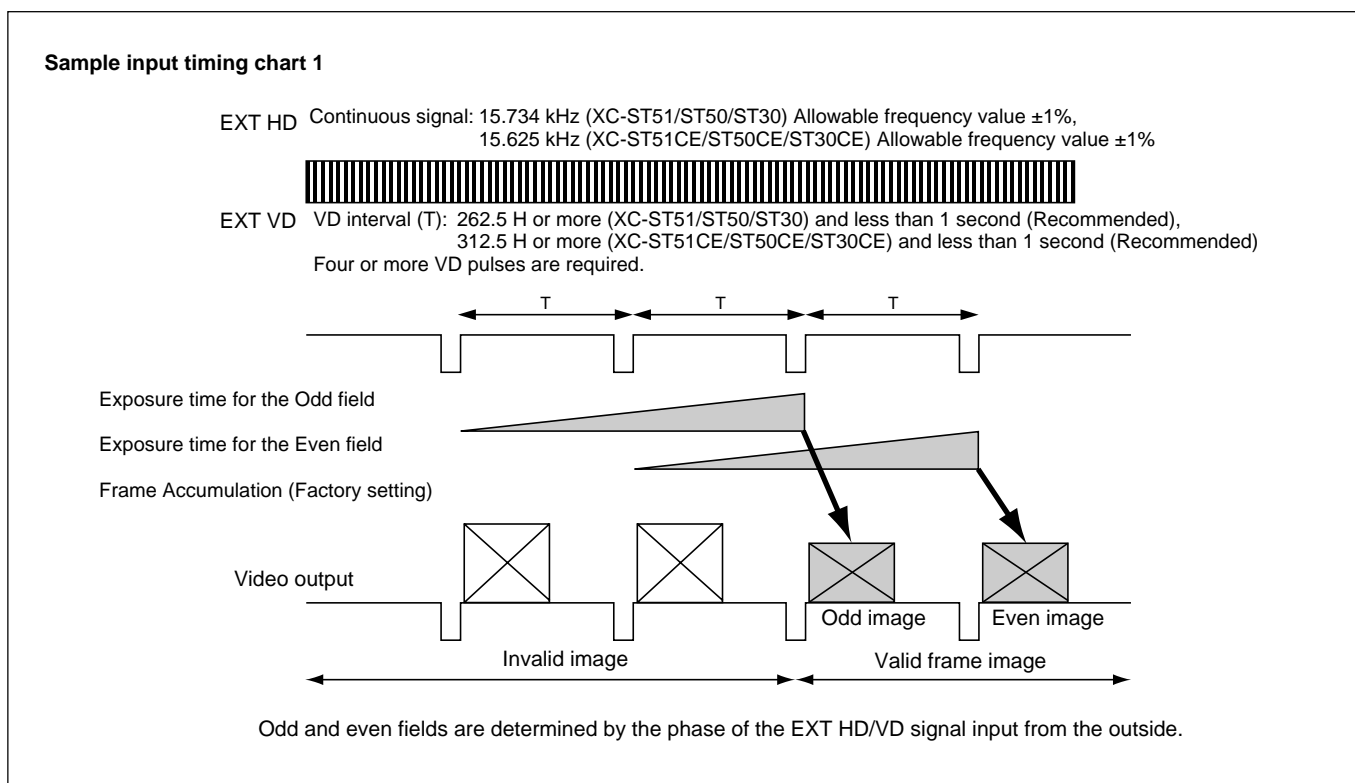
The information on one screen can be extracted at any time by externally inputting Restart/Reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.

The Reset/Restart mode is especially effective for frame image output with long exposure or a strobe light.

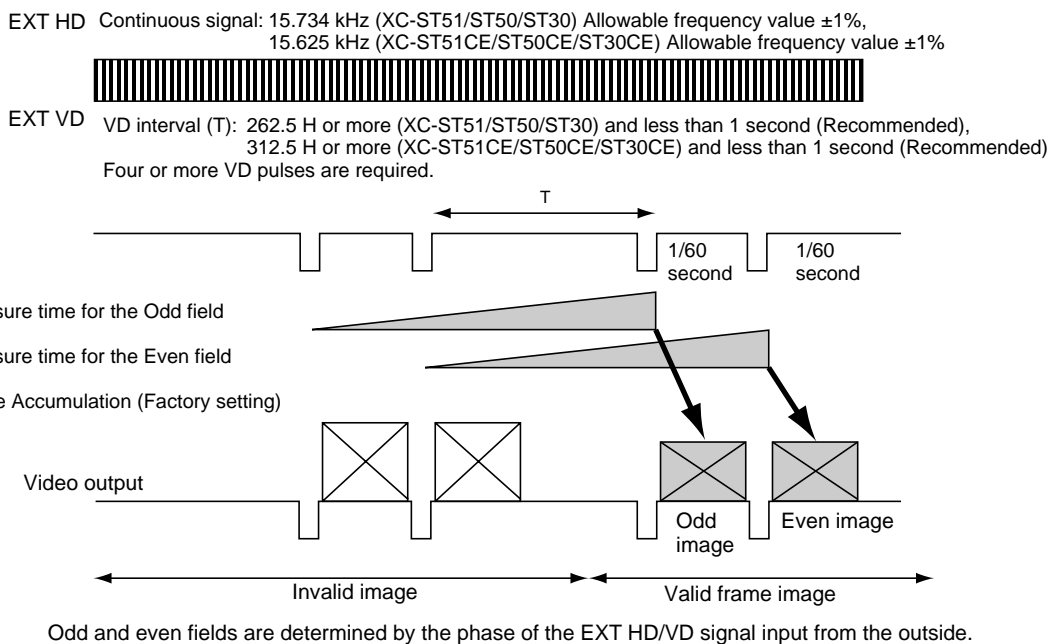


Long exposure

The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.



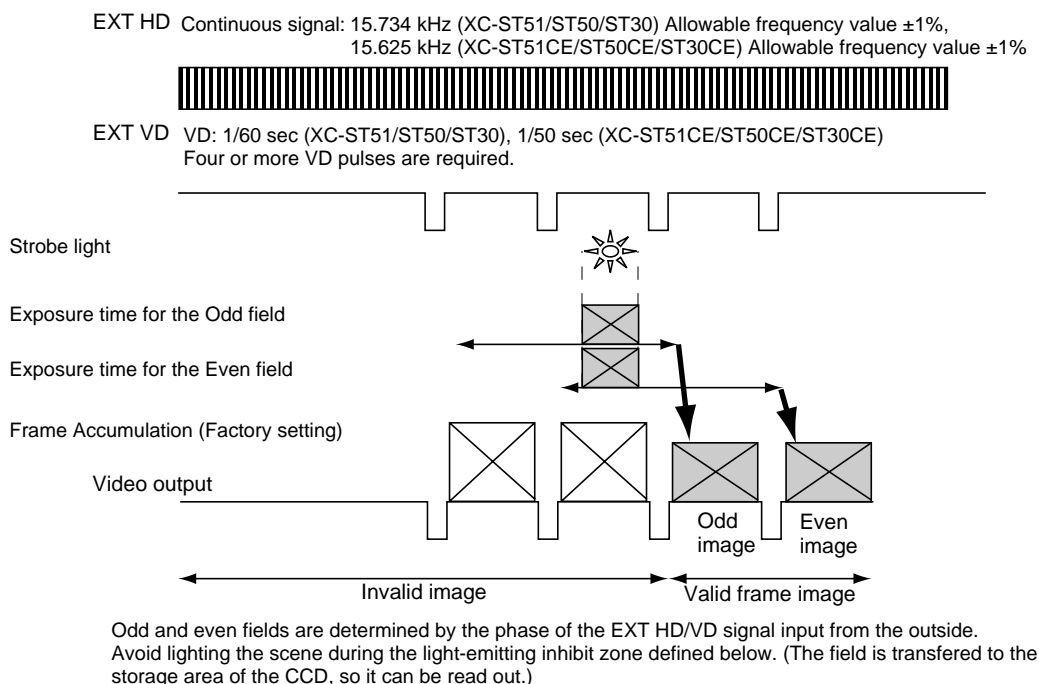
Sample input timing chart 2



Frame image output with a strobe light

The factory setting for this camera is Frame Accumulation. The images obtained when the normal continuous shutter or trigger shutter is used are field images (vertical resolution: 243 lines).
Using a strobe light and Restart/Reset mode, you can obtain bright frame images by synchronizing any strobe light. (Vertical resolution: 485 lines).

Sample input timing chart



Note

For best performance, it is recommended that you not flash between VD and VD + 10 H (XC-ST51/ST50/ST30)/16 H (XC-ST51CE/ST50CE/ST30CE).

External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture fast-moving objects clearly with precise timing.

Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2.

When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

There are two modes for the timing in which video signals are obtained.

• **Mode 1 (Non-reset mode)**

In this mode, a video signal synchronized with a VD signal is output after a trigger pulse is input.

- The video signal is synchronized with the external VD signal when an external HD/VD signal is input.
- The video signal is synchronized with an internal VD signal when no external HD/VD signal is input.

• **Mode 2 (Reset mode)**

In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

For details on the timing charts, see “Timing Chart” on page 14 to 21.

To Set the External Trigger Shutter

There are two ways to set the shutter speed.

Using the DIP switches on the rear panel

For shutter speeds, see the following table.

Mode 1 (Non-reset mode)

1/100 (EIA) 1/120 (CCIR)	1/125	1/250	1/500
1 <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/>
2 <input type="checkbox"/> <input type="checkbox"/>	2 <input type="checkbox"/> <input type="checkbox"/>	2 <input type="checkbox"/> <input type="checkbox"/>	2 <input type="checkbox"/> <input type="checkbox"/>
3 <input type="checkbox"/> <input type="checkbox"/>	3 <input type="checkbox"/> <input type="checkbox"/>	3 <input type="checkbox"/> <input type="checkbox"/>	3 <input type="checkbox"/> <input type="checkbox"/>
4 <input type="checkbox"/> <input type="checkbox"/>	4 <input type="checkbox"/> <input type="checkbox"/>	4 <input type="checkbox"/> <input type="checkbox"/>	4 <input type="checkbox"/> <input type="checkbox"/>
5 <input type="checkbox"/> <input type="checkbox"/>	5 <input type="checkbox"/> <input type="checkbox"/>	5 <input type="checkbox"/> <input type="checkbox"/>	5 <input type="checkbox"/> <input type="checkbox"/>
6 <input type="checkbox"/> <input type="checkbox"/>	6 <input type="checkbox"/> <input type="checkbox"/>	6 <input type="checkbox"/> <input type="checkbox"/>	6 <input type="checkbox"/> <input type="checkbox"/>
7 <input type="checkbox"/> <input type="checkbox"/>	7 <input type="checkbox"/> <input type="checkbox"/>	7 <input type="checkbox"/> <input type="checkbox"/>	7 <input type="checkbox"/> <input type="checkbox"/>
8 <input type="checkbox"/> <input type="checkbox"/>	8 <input type="checkbox"/> <input type="checkbox"/>	8 <input type="checkbox"/> <input type="checkbox"/>	8 <input type="checkbox"/> <input type="checkbox"/>
1/1000	1/2000	1/4000	1/10000 (EIA) 1/8000 (CCIR)
1 <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/>
2 <input type="checkbox"/> <input type="checkbox"/>	2 <input type="checkbox"/> <input type="checkbox"/>	2 <input type="checkbox"/> <input type="checkbox"/>	2 <input type="checkbox"/> <input type="checkbox"/>
3 <input type="checkbox"/> <input type="checkbox"/>	3 <input type="checkbox"/> <input type="checkbox"/>	3 <input type="checkbox"/> <input type="checkbox"/>	3 <input type="checkbox"/> <input type="checkbox"/>
4 <input type="checkbox"/> <input type="checkbox"/>	4 <input type="checkbox"/> <input type="checkbox"/>	4 <input type="checkbox"/> <input type="checkbox"/>	4 <input type="checkbox"/> <input type="checkbox"/>
5 <input type="checkbox"/> <input type="checkbox"/>	5 <input type="checkbox"/> <input type="checkbox"/>	5 <input type="checkbox"/> <input type="checkbox"/>	5 <input type="checkbox"/> <input type="checkbox"/>
6 <input type="checkbox"/> <input type="checkbox"/>	6 <input type="checkbox"/> <input type="checkbox"/>	6 <input type="checkbox"/> <input type="checkbox"/>	6 <input type="checkbox"/> <input type="checkbox"/>
7 <input type="checkbox"/> <input type="checkbox"/>	7 <input type="checkbox"/> <input type="checkbox"/>	7 <input type="checkbox"/> <input type="checkbox"/>	7 <input type="checkbox"/> <input type="checkbox"/>
8 <input type="checkbox"/> <input type="checkbox"/>	8 <input type="checkbox"/> <input type="checkbox"/>	8 <input type="checkbox"/> <input type="checkbox"/>	8 <input type="checkbox"/> <input type="checkbox"/>

(Unit: second)

Mode 2 (Reset mode)

1/100 (EIA) 1/120 (CCIR)	1/125	1/250	1/500
1 <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/>
2 <input type="checkbox"/> <input type="checkbox"/>	2 <input type="checkbox"/> <input type="checkbox"/>	2 <input type="checkbox"/> <input type="checkbox"/>	2 <input type="checkbox"/> <input type="checkbox"/>
3 <input type="checkbox"/> <input type="checkbox"/>	3 <input type="checkbox"/> <input type="checkbox"/>	3 <input type="checkbox"/> <input type="checkbox"/>	3 <input type="checkbox"/> <input type="checkbox"/>
4 <input type="checkbox"/> <input type="checkbox"/>	4 <input type="checkbox"/> <input type="checkbox"/>	4 <input type="checkbox"/> <input type="checkbox"/>	4 <input type="checkbox"/> <input type="checkbox"/>
5 <input type="checkbox"/> <input type="checkbox"/>	5 <input type="checkbox"/> <input type="checkbox"/>	5 <input type="checkbox"/> <input type="checkbox"/>	5 <input type="checkbox"/> <input type="checkbox"/>
6 <input type="checkbox"/> <input type="checkbox"/>	6 <input type="checkbox"/> <input type="checkbox"/>	6 <input type="checkbox"/> <input type="checkbox"/>	6 <input type="checkbox"/> <input type="checkbox"/>
7 <input type="checkbox"/> <input type="checkbox"/>	7 <input type="checkbox"/> <input type="checkbox"/>	7 <input type="checkbox"/> <input type="checkbox"/>	7 <input type="checkbox"/> <input type="checkbox"/>
8 <input type="checkbox"/> <input type="checkbox"/>	8 <input type="checkbox"/> <input type="checkbox"/>	8 <input type="checkbox"/> <input type="checkbox"/>	8 <input type="checkbox"/> <input type="checkbox"/>
1/1000	1/2000	1/4000	1/10000 (EIA) 1/8000 (CCIR)
1 <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/>
2 <input type="checkbox"/> <input type="checkbox"/>	2 <input type="checkbox"/> <input type="checkbox"/>	2 <input type="checkbox"/> <input type="checkbox"/>	2 <input type="checkbox"/> <input type="checkbox"/>
3 <input type="checkbox"/> <input type="checkbox"/>	3 <input type="checkbox"/> <input type="checkbox"/>	3 <input type="checkbox"/> <input type="checkbox"/>	3 <input type="checkbox"/> <input type="checkbox"/>
4 <input type="checkbox"/> <input type="checkbox"/>	4 <input type="checkbox"/> <input type="checkbox"/>	4 <input type="checkbox"/> <input type="checkbox"/>	4 <input type="checkbox"/> <input type="checkbox"/>
5 <input type="checkbox"/> <input type="checkbox"/>	5 <input type="checkbox"/> <input type="checkbox"/>	5 <input type="checkbox"/> <input type="checkbox"/>	5 <input type="checkbox"/> <input type="checkbox"/>
6 <input type="checkbox"/> <input type="checkbox"/>	6 <input type="checkbox"/> <input type="checkbox"/>	6 <input type="checkbox"/> <input type="checkbox"/>	6 <input type="checkbox"/> <input type="checkbox"/>
7 <input type="checkbox"/> <input type="checkbox"/>	7 <input type="checkbox"/> <input type="checkbox"/>	7 <input type="checkbox"/> <input type="checkbox"/>	7 <input type="checkbox"/> <input type="checkbox"/>
8 <input type="checkbox"/> <input type="checkbox"/>	8 <input type="checkbox"/> <input type="checkbox"/>	8 <input type="checkbox"/> <input type="checkbox"/>	8 <input type="checkbox"/> <input type="checkbox"/>

(Unit: second)

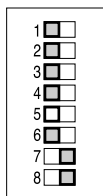
Note

The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.

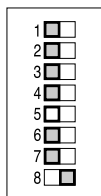
Using trigger pulse width

Set all DIP switches (1 to 4 on the rear panel) to 0. You can obtain an arbitrary shutter speed by setting the trigger pulse width within the range of 2 μ sec to 250 msec.

Mode 1 (Non-reset mode)



Mode 2 (Reset mode)



$$\text{Exposure time} = \text{Trigger pulse width} + 97 \mu\text{sec (EIA)}$$

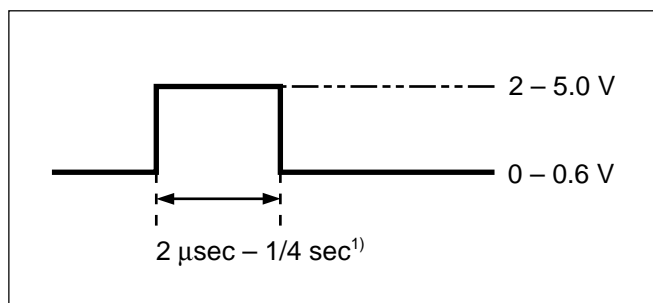
$$\text{Trigger pulse width} + 120 \mu\text{sec (CCIR)}$$

Notes

- The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.
- If you input another trigger pulse before the video signal output for the previous trigger pulse is completely output, an incorrect video signal will be output.

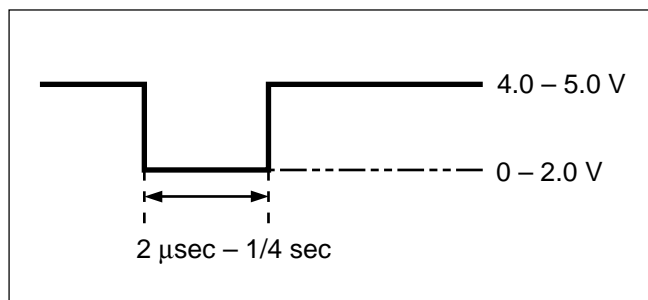
Specifications of trigger pulse

When using a trigger pulse like shown below, set the TRIG polarity selector switch on the rear panel to + :



1) If you set the trigger pulse with the DIP switches, use the 100 msec to 1/4 sec pulse width.

When using a trigger pulse like shown below, set the TRIG polarity selector switch on the rear panel to - :



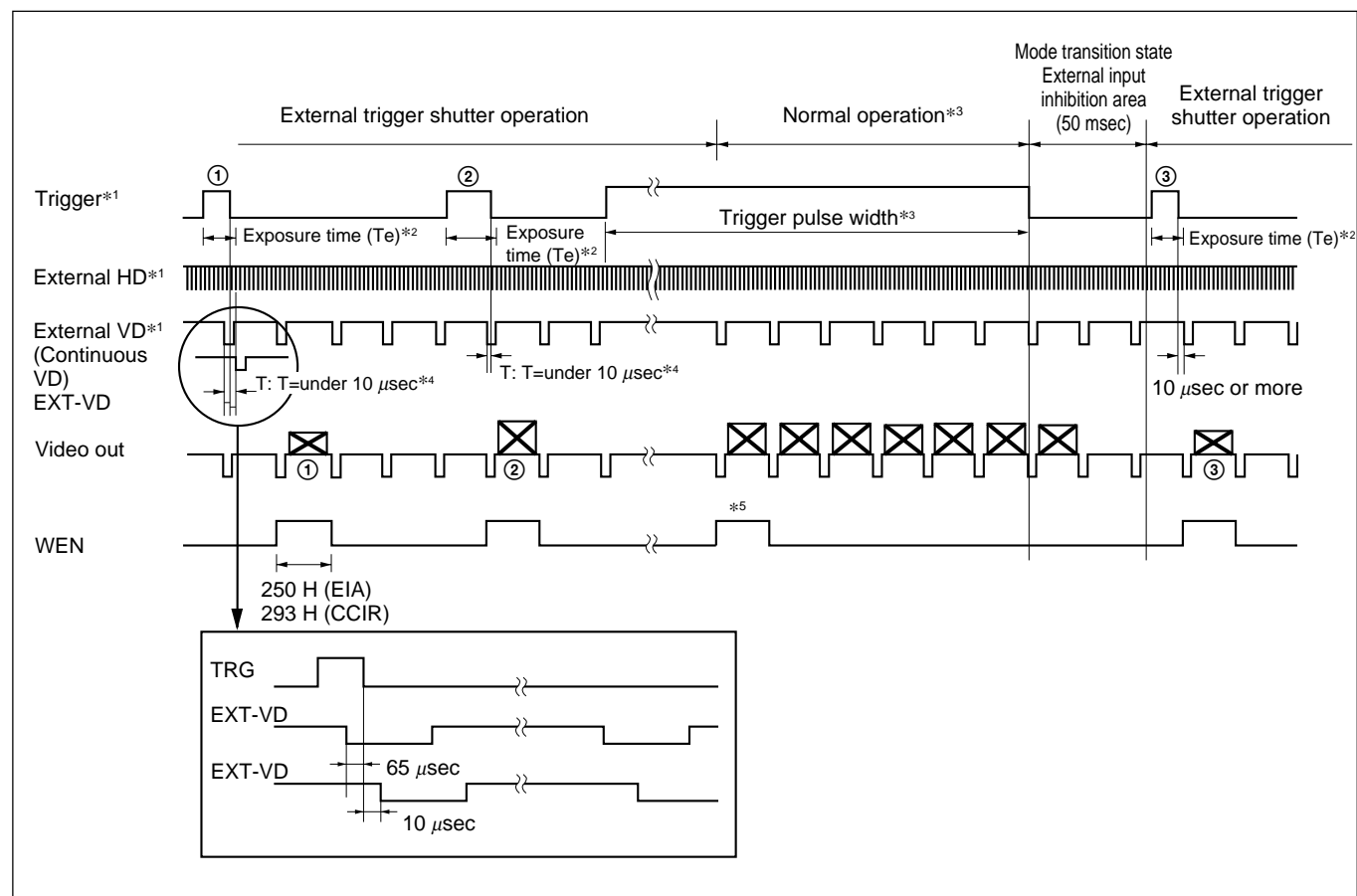
- Input impedance: 10 k Ω or more.
- The voltage and pulse width used are measured at pin 11 of a 12-pin multi-connector on the rear panel.

Timing Chart

When set to Mode 1 (Non-reset mode)

Setting the shutter speed using trigger pulse width

- ◆ HD/VD input
 - Continuous VD input



*1 This is an external input signal. Make sure to input both HD and VD signals.

*2 Exposure time (Te)

$$Te = \text{Trigger pulse width} + 97 \mu\text{sec (EIA)}$$

$$Te = \text{Trigger pulse width} + 120 \mu\text{sec (CCIR)}$$

(The effective trigger pulse width for the external trigger shutter operation is between 2 μsec and 1/4 sec.)

*3 Normal operation is resumed when the trigger pulse width is 1/3 sec or more. The trigger falling edge restores external trigger shutter operation. At this time, the 50 msec after the falling edge of the trigger pulse is an external trigger input inhibition area. There is no guarantee of operation for any trigger input in this period.

*4 If there is a falling edge on the external VD within a period of -65 to +10 μsec from the falling trigger edge (1) and (2) in the figure), it is not defined whether the image is output for the external VD falling edge or the image is output for the next external VD falling edge. (1) in the figure shows that the image is output for the next external VD. (2) shows the image for the external VD.) In this case, see WEN since output of the image and WEN make up a pair. In any other case, the image is output for the external VD falling edge after the trigger falling edge (3) in the figure).

*5 When the external trigger shutter mode changes into the normal operation mode, one WEN signal is output.

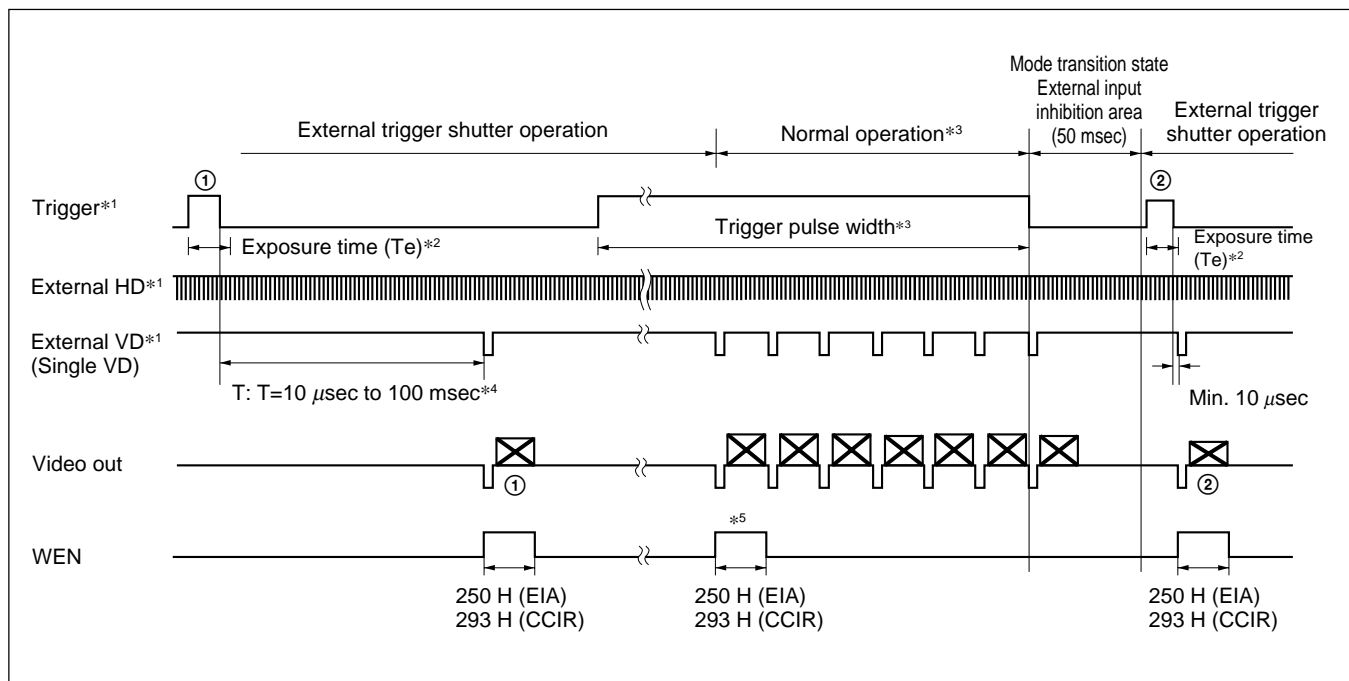
Note

An image is not output correctly when the next trigger is input before the image for the previous trigger has been output.

Setting the shutter speed using trigger pulse width

◆ HD/VD input

• Continuous HD input/Single VD input



*1 This is an external input signal. Make sure to input both HD and VD signals in this case. Input the signal so that the VD phase aligns with the HD falling edge.

*2 Exposure time (T_e)
 $T_e = \text{Trigger pulse width} + 97 \mu\text{sec (EIA)}$
 $T_e = \text{Trigger pulse width} + 120 \mu\text{sec (CCIR)}$
 (The effective trigger pulse width for the external trigger shutter operation is between 2 μsec and 1/4 sec.)

*3 Normal operation is resumed when the trigger pulse width is 1/3 sec or more. (During this period, if you input VD signals continuously, an image will be output.) The trigger falling edge restores external trigger shutter operation. At this time, the 50 ms after the falling edge of the trigger pulse is an external trigger input inhibition area. There is no guarantee of operation for any trigger input in this period.

*4 Input the external VD within the period of 10 μsec to 100 msec after the trigger falling edge (① and ② in the figure). There is no guarantee of operation for any other input. If an invalid signal is input, the input is changed to a valid signal and, after several V signals, normal operation resumes.

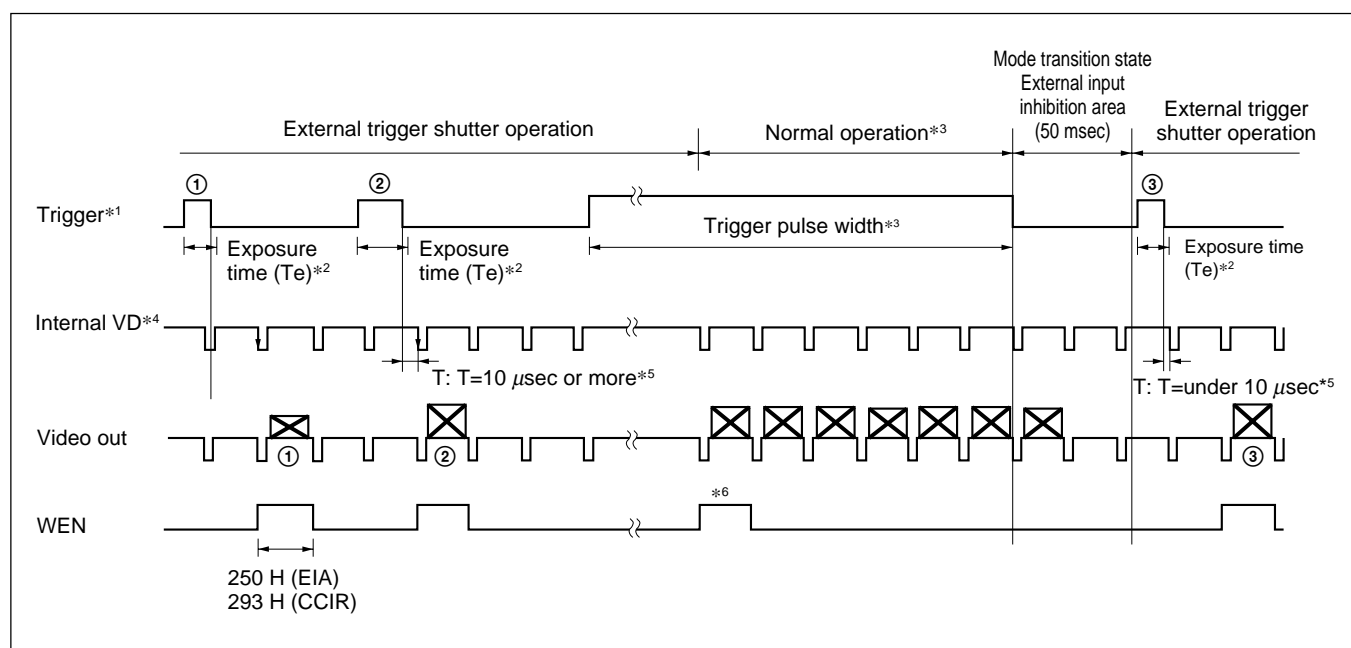
*5 When the external trigger shutter mode changes into the normal operation mode, one WEN signal is output.

Note

Make sure that the trigger signal and the VD signal make up a pair.
 An image is not output correctly when the next trigger is input before the image for the previous trigger has been output.

Setting the shutter speed using trigger pulse width

◆ No HD/VD input (Internal synchronization)



*1 This is an external input signal.

*2 Exposure time (T_e)

$$T_e = \text{Trigger pulse width} + 97 \mu\text{sec (EIA)}$$

$$T_e = \text{Trigger pulse width} + 120 \mu\text{sec (CCIR)}$$

(The effective trigger pulse width for the external trigger shutter operation is between 2 μ sec and 1/4 sec.)

*3 Normal operation is resumed when the trigger pulse width is 1/3 sec or more. The trigger falling edge restores external trigger shutter operation. At this time, the 50 msec after the falling edge of the trigger pulse is an external trigger input inhibition area. There is no guarantee of operation for any trigger input in this period.

*4 The internal VD signals are output as long as there is no external input and the HD/VD signal input/output switch on the rear panel is set to INT.

*5 In external trigger operation, the image is output for the internal VD falling edge after the trigger falling edge (① and ② in the figure). If the period from the trigger falling edge to the internal VD falling edge (T in the figure) is under 10 μ sec, it is not defined whether the image is output for the internal VD falling edge or the image is output for the next internal VD falling edge. (③ in the figure shows that the image is output for the next internal VD). In this case, see WEN since the image and WEN make up a pair. (The falling edge of an internal VD signal is the same in phase as the beginning of an equalizing pulse in a SYNC V area.)

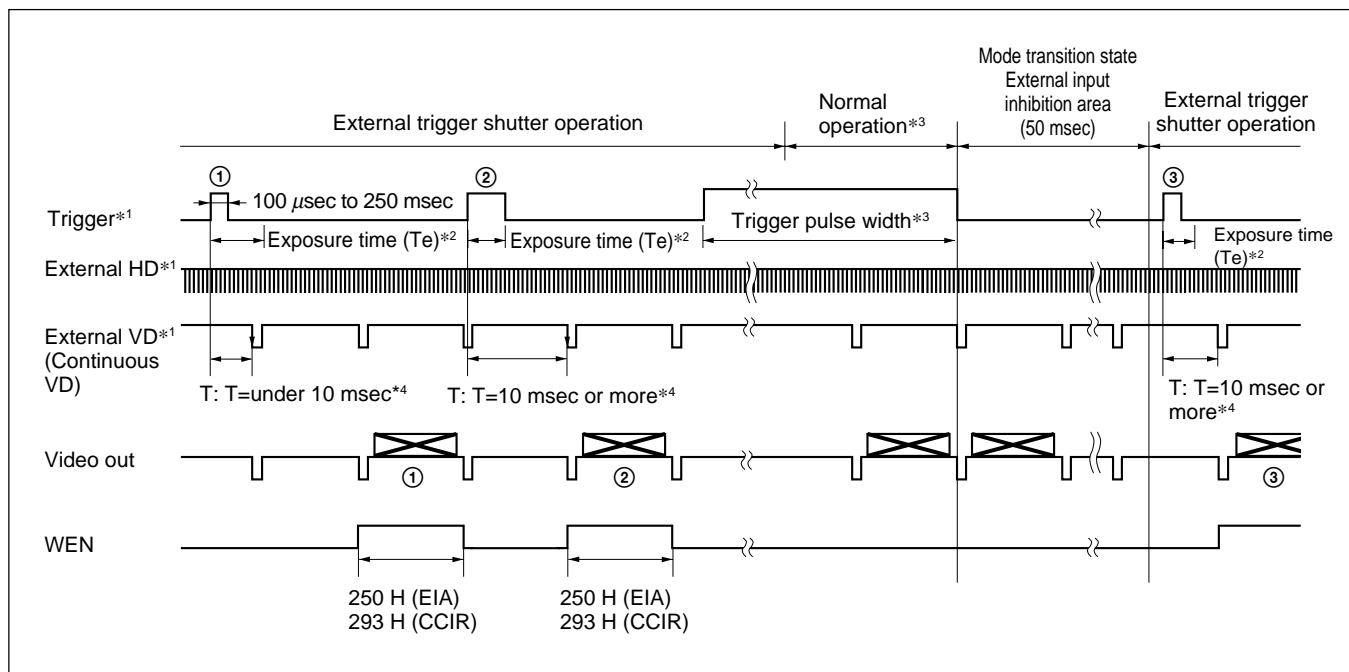
*6 When the external trigger shutter mode changes into the normal operation mode, one WEN signal is output.

Note

An image is not output correctly when the next trigger is input before the image for the previous trigger has been output.

Setting the shutter speed using DIP switches

- ◆ HD/VD input
 - Continuous VD input



*1 This is an external input signal. The period of a continuous VD signal is prescribed as one field. Make sure to input both HD and VD signals.

*2 The exposure time (T_e) is determined by the setting of DIP switches.
For details, see page 12.

*3 Normal operation is resumed when the trigger pulse width is 1/3 sec or more. The trigger falling edge restores external trigger shutter operation. At this time, the 50 msec after the falling edge of the trigger pulse is an external trigger input inhibition area. There is no guarantee of operation for any trigger input in this period.

*4 An image is output when an external VD signal falls 10 msec or more after a trigger pulse rises (② and ③ in the figure). If the period from the trigger rising edge to the external VD falling edge (T in the figure) is under 10 msec, it is not defined whether the image is output for the external VD falling edge or the image is output for the next external VD falling edge. (① in the figure shows that the image is output for the next external VD). In this case, see WEN since the image and WEN make up a pair.

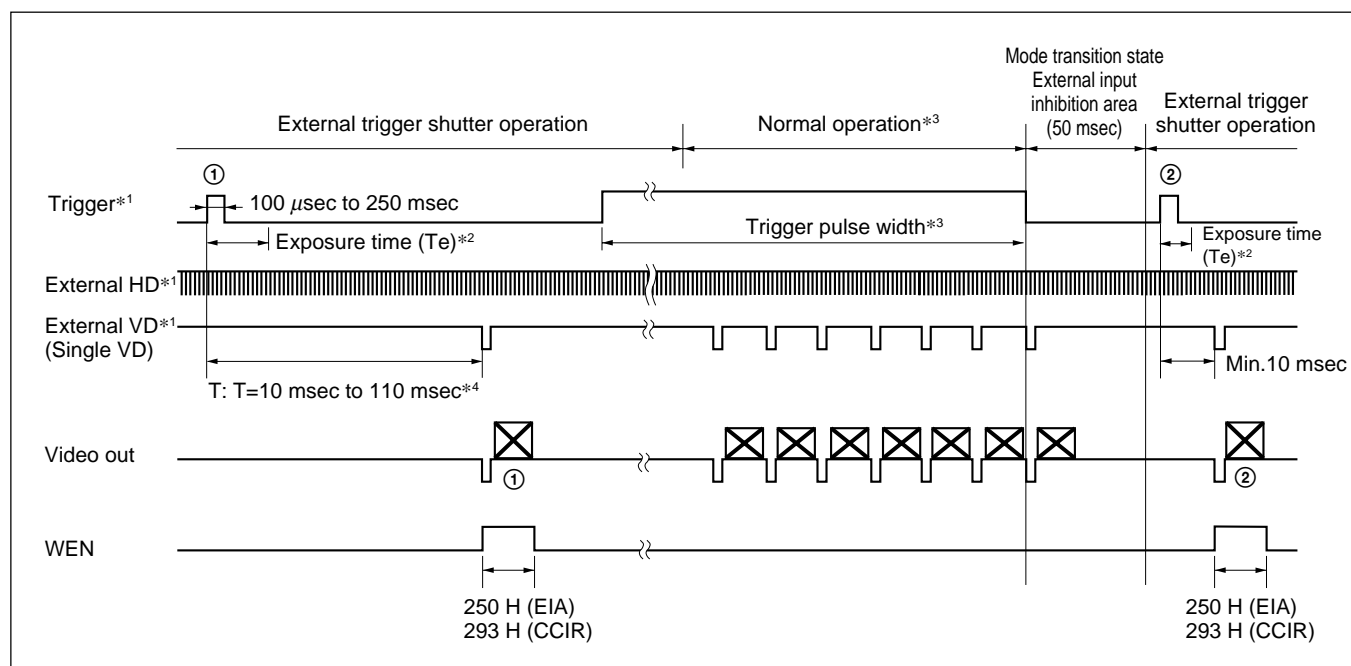
Note

An image is not output correctly when the next trigger is input before the image for the previous trigger has been output.

Setting the shutter speed using DIP switches

◆ HD/VD input

• Continuous HD input/Single VD input



*1 This is an external input signal. Make sure to input both HD and VD signals in this case. Input the signal so that the VD phase aligns with the HD falling edge.

*2 The exposure time (T_e) is determined by the setting of the DIP switches.
For details, see page 12.

*3 Normal operation is resumed when the trigger pulse width is 1/3 sec or more. (During this period, if you input VD signals continuously, an image will be output.) The trigger falling edge restores external trigger shutter operation. At this time, the 50 msec after the falling edge of the trigger pulse is an external trigger input inhibition area. There is no guarantee of operation for any trigger input in this period.

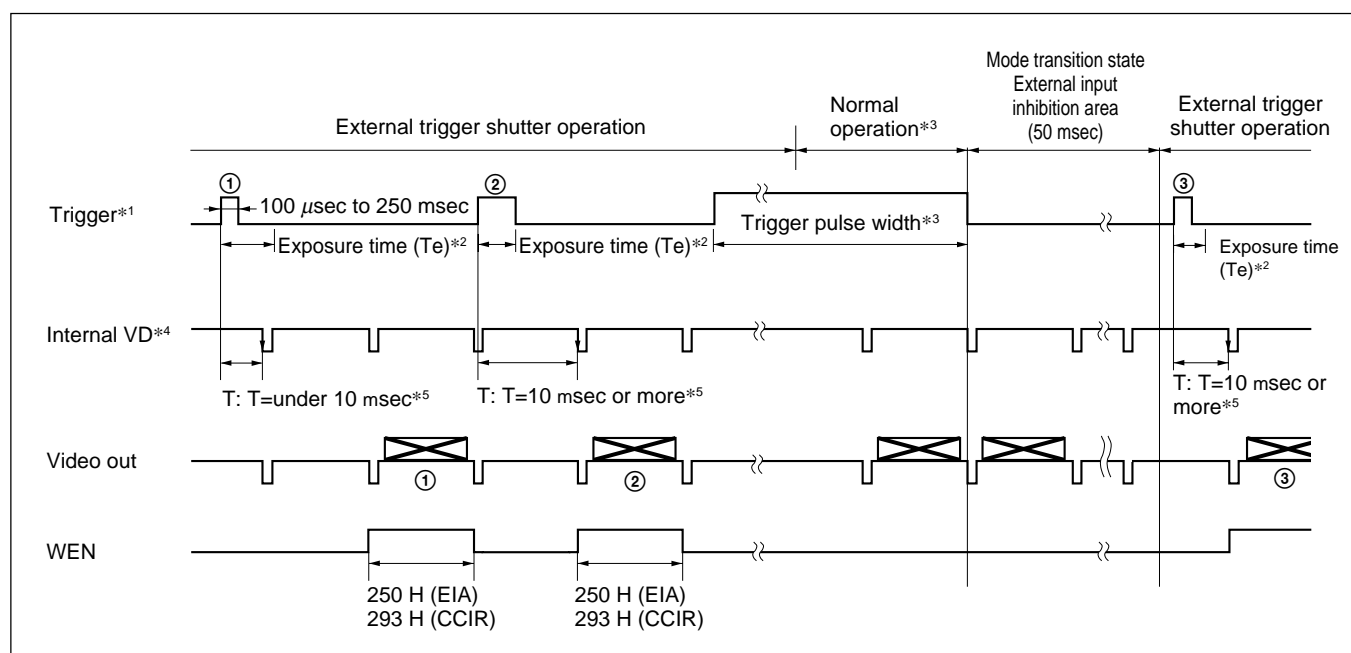
*4 Input the external VD within the period of 10 msec to 110 msec after the trigger rising edge (1) and (2) in the figure). There is no guarantee of operation for any other input. If an invalid signal is input, the input is changed to a valid signal, and after several V signals, normal operation resumes.

Note

Make sure that the trigger signal and the VD signal make up a pair.
An image is not output correctly when the next trigger is input before the image for the previous trigger has been output.

Setting the shutter speed using DIP switches

◆ No HD/VD input (Internal synchronization)



*1 This is an external input signal.

*2 The exposure time (T_e) is determined by the setting of the DIP switches.
For details, see page 12.

*3 Normal operation is resumed when the trigger pulse width is 1/3 sec or more. The trigger falling edge restores external trigger shutter operation. At this time, the 50 msec after the falling edge of the trigger pulse is an external trigger input inhibition area. There is no guarantee of operation for any trigger input in this period.

*4 The internal VD signals are output as long as there is no external input and the HD/VD signal input/output switch on the rear panel is set to INT.

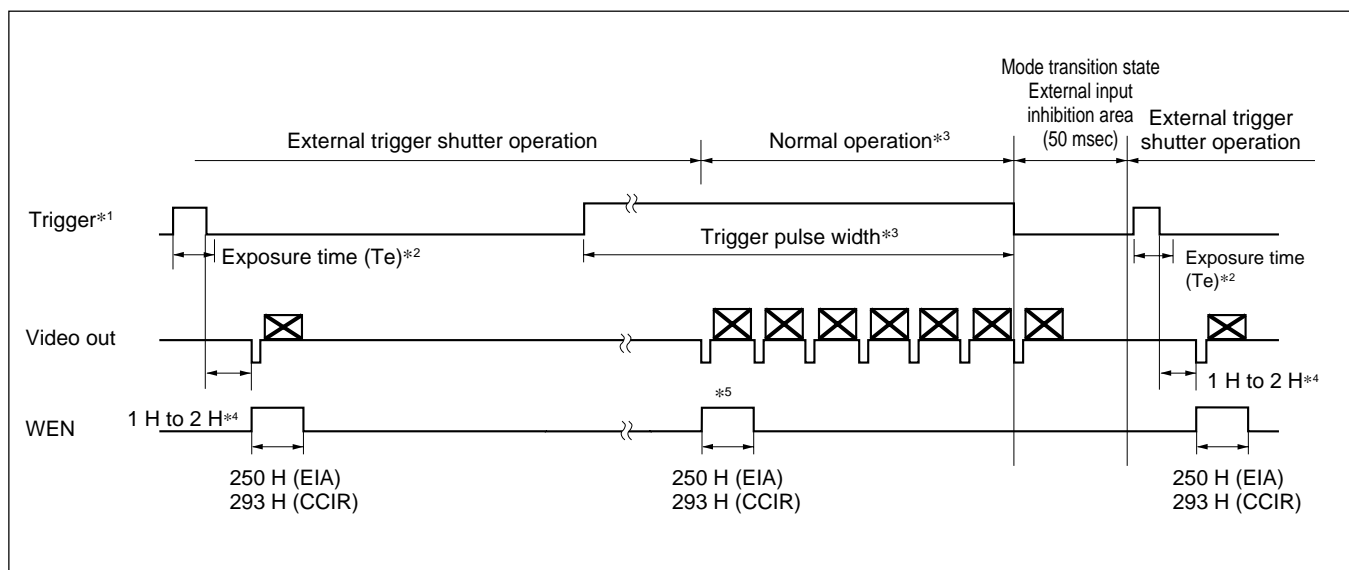
*5 An image is output when an internal VD signal falls 10 msec or more after a trigger pulse rises (② and ③ in the figure). If the period from the trigger rising edge to the internal VD falling edge (T in the figure) is under 10 msec, it is not defined whether the image is output for the external VD falling edge or the image is output for the next external VD falling edge. (① in the figure shows that the image is output for the next internal VD). In this case, see WEN since the image and WEN make up a pair. (The falling edge of an internal VD signal is the same in phase as the beginning of an equalizing pulse in a SYNC V area.)

Note

An image is not output correctly when the next trigger is input before the image for the previous trigger has been output.

When set to Mode 2 (Reset mode)

Setting the shutter speed using trigger pulse width



*1 This is an external input signal. The trigger interval should be trigger pulse width + 1 field + 2H period or more. The trigger interval shorter than described above cannot be ensured. If a trigger pulse is not input under the prescribed conditions, the normal operation is ensured several V after a change in input operation under the prescribed conditions.

*2 Exposure time (Te)
 $Te = \text{Trigger pulse width} + 97 \mu\text{sec (EIA)}$
 $Te = \text{Trigger pulse width} + 120 \mu\text{sec (CCIR)}$
 (The effective trigger pulse width for the external trigger shutter operation is between 2 μsec and 1/4 sec.)

*3 Normal operation is resumed when the trigger pulse width is 1/3 sec or more. The trigger falling edge restores external trigger shutter operation. At this time, the 50 msec after the falling edge of the trigger pulse is an external trigger input inhibition area. There is no guarantee of operation for any trigger input in this period.

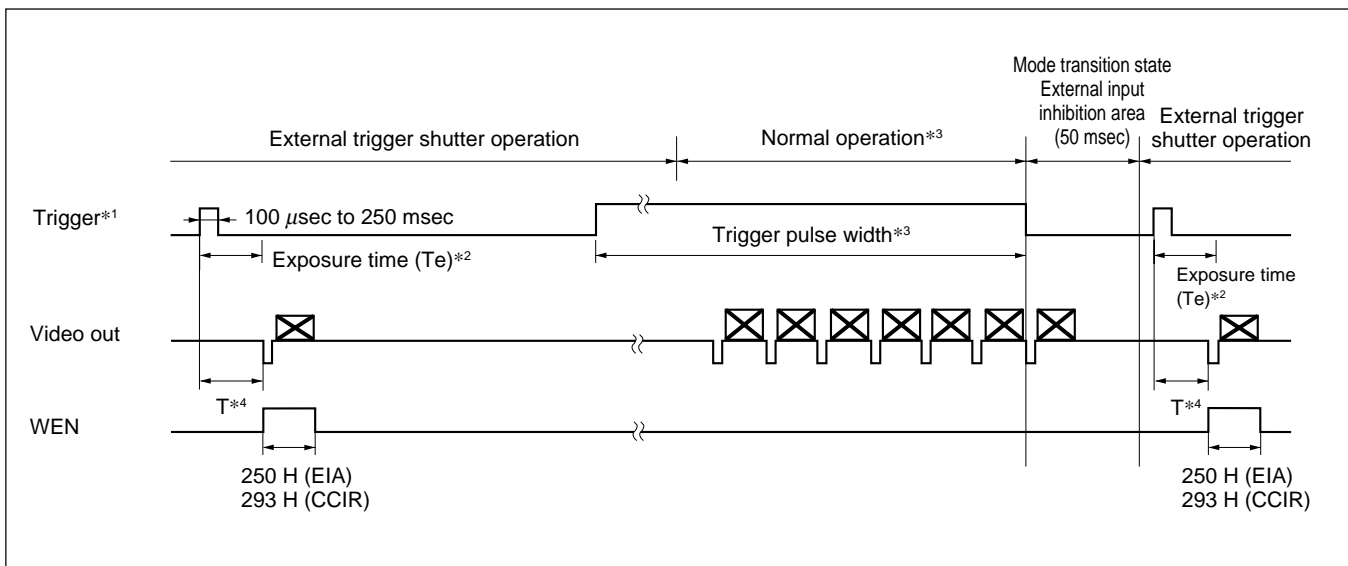
*4 A VD signal is generated 1H to 2H after a trigger pulse falls, and an image is output in synchronization with the VD signal.

*5 When the external trigger shutter mode changes into the normal operation mode, a WEN signal is output.

Note

An image is not output correctly when the next trigger is input before the image for the previous trigger has been output.

Setting the shutter speed using the DIP switches



*1 This is an external input signal. The trigger interval should be shutter speed (DIP switch) + 1 field + 2H period or more. The trigger interval shorter than described above cannot be ensured. If a trigger pulse is not input under the prescribed conditions, the normal operation is engaged several V after a change in input operation under the prescribed conditions.

*2 The exposure time (Te) is determined by the setting of the DIP switches.
For details, see page 12.

*3 Normal operation is resumed when the trigger pulse width is 1/3 sec or more. The trigger falling edge restores external trigger shutter operation. At this time, the 50 msec after the falling edge of the trigger pulse is an external trigger input inhibition area. There is no guarantee of operation for any trigger input in this period.

*4 The image is output at the shortest timing from the trigger rising edge according to the DIP switch setting.

Note

An image is not output correctly when the next trigger is input before the image for the previous trigger has been output.

Specifications

Specification Comparison

	XC-ST51	XC-ST50	XC-75	XC-ST30	XC-73
Image device	1/2-inch interline transfer CCD	1/2-inch interline transfer CCD	1/2-inch interline transfer CCD	1/3-inch interline transfer CCD	1/3-inch interline transfer CCD
Effective picture elements	768 (H) × 494 (V)	768 (H) × 494 (V)	768 (H) × 494 (V)	768 (H) × 494 (V)	768 (H) × 494 (V)
Lens mount	C mount	C mount	C mount	C mount	C mount
Scanning system	2:1 interlaced	2:1 interlaced	2:1 interlaced	2:1 interlaced	2:1 interlaced
Sensitivity	400 lx F11	400 lx F8	400 lx F4	400 lx F8	400 lx F4
Minimum illuminance	0.2 lx	0.3 lx	3.0 lx	0.3 lx	3.0 lx
S/N ratio	60 dB	60 dB	56 dB	56 dB	56 dB
Normal shutter	1/100 to 1/10,000	1/100 to 1/10,000	1/100 to 1/10,000	1/100 to 1/10,000	1/100 to 1/10,000
External trigger shutter	1/4 to 1/10,000 Can be changed by the trigger pulse width or setting of the DIP switches.	1/4 to 1/10,000 Can be changed by the trigger pulse width or setting of the DIP switches.	1/100 to 1/1,600 Can be changed by the trigger and VD. Internal setting needs to be changed.	1/4 to 1/10,000 Can be changed by the trigger pulse width or setting of the DIP switches.	1/100 to 1/1,600 Can be changed by the trigger and VD. Internal setting needs to be changed.
Dimensions	44 (W) × 29 (H) × 57.5 (D) mm	44 (W) × 29 (H) × 57.5 (D) mm	44 (W) × 29 (H) × 71 (D) mm	44 (W) × 29 (H) × 57.5 (D) mm	44 (W) × 29 (H) × 71 (D) mm
Mass	110 g	110 g	140 g	110 g	140 g
Shock resistance	10G (in the X, Y, and Z directions at 20 to 200 Hz)	10G (in the X, Y, and Z directions at 20 to 200 Hz)	7G (in the X, Y, and Z directions at 11 to 200 Hz)	10G (in the X, Y, and Z directions at 20 to 200 Hz)	7G (in the X, Y, and Z directions at 11 to 200 Hz)

Main Specifications

Items without specific conditions indicated are the values set at the factory.

Image pickup device

XC-ST51/ST51CE:

1/2-inch interline transfer CCD

XC-ST50/ST50CE:

1/2-inch interline transfer CCD

XC-ST30/ST30CE:

1/3-inch interline transfer CCD

Number of effective pixels

XC-ST51/ST50/ST30:

768(H) × 494(V)

XC-ST51CE/ST50CE/ST30CE:

752(H) × 582(V)

CCD horizontal driving frequency

XC-ST51/ST50/ST30:

14.318 MHz

XC-ST51CE/ST50CE/ST30CE:

14.187 MHz

CCD vertical driving frequency

XC-ST51/ST50/ST30:

15.734 kHz

XC-ST51CE/ST50CE/ST30CE:

15.625 kHz

Signal system EIA/CCIR

Cell size

XC-ST51/ST50:

8.4(H) × 9.8(V) μm

XC-ST51CE/ST50CE:

8.6(H) × 8.3(V) μm

XC-ST30: 6.35(H) × 7.4(V) μm

XC-ST30CE: 6.5(H) × 6.25(V) μm

Lens mount C mount

Flange back 17.526 mm

Synchronization system

Internal/external (Selected automatically)

External sync input/output
 HD/VD (2 to 5 V_{p-p})
 VS (Sync level: 0.3 V_{p-p}+0.3V)
 * Automatically selected according to the existence of an input signal when the HD/VD signal input/output switch on the rear panel is set to EXT.

Allowable frequency deviation of external synchronization
 ± 1 % (in horizontal synchronous frequency)

Jitter Within ± 20 nsec

Scanning system 2:1 interlaced
 Non-interlaced (during external sync input)

Horizontal resolution
 XC-ST51/ST50/ST30:
 570 TV lines
 XC-ST51CE/ST50CE/ST30CE:
 560 TV lines

Sensitivity
 XC-ST51/ST51CE:
 400 lx F11 (r=ON, 0 dB)
 XC-ST50/ST50CE:
 400 lx F8 (r=ON, 0 dB)
 XC-ST30/ST30CE:
 400 lx F5.6 (r=ON, 0 dB)

S/N ratio
 XC-ST51/ST50:
 60 dB
 XC-ST51CE/ST50CE:
 58 dB
 XC-ST30/ST30CE:
 56 dB/54 dB

Minimum illuminance
 XC-ST51/ST51CE:
 0.2 lx (F1.4, AGC ON)
 XC-ST50/ST50CE/ST30/ST30CE:
 0.3 lx (F1.4, AGC ON)

Gain A (Auto)/F (Fix)/M (Manual)
 (Can be selected using the GAIN switch on the rear panel.)

Gamma correction
 ON/OFF (Can be selected using the γ compensation ON/OFF switch on the rear panel.)

Electronic shutter
 XC-ST51/ST50/ST30: 1/100 to 1/10,000 seconds
 XC-ST51CE/ST50CE/ST30CE: 1/120 to 1/10,000 seconds

External trigger shutter
 XC-ST51/ST50/ST30:
 1/4 to 1/10,000 seconds
 XC-ST51CE/ST50CE/ST30CE:
 1/4 to 1/8,000 seconds
 * Set using the DIP switch on the rear panel, or continuously variable with the trigger pulse width.

Supply voltage +12 VDC (+10.5 V to 15V)

Power consumption
 XC-ST51/ST51CE/ST50/ST50CE:
 2.0 W
 XC-ST30/ST30CE:
 1.9 W

Operating temperature
 -5 °C to +45 °C

Storage temperature
 -30 °C to +60 °C

Performance assurance temperature
 0 °C to +40 °C

Operating humidity
 20 to 80 % (Non-condensing)

Storage humidity 20 to 95 % (Non-condensing)

Vibration resistance
 10G (For 20 minutes in the X, Y, and Z directions at 20 to 200 Hz)

Shock resistance 70G

Outside dimensions
 44(W) × 29(H) × 57.5(D) mm

Weight 110 g

Standards UL6500, FCC Class B Digital Device, and CE (EN61326)

Other Restart/Reset function
 Frame or field integration can be selected.
 Conforms to new 12-pin EIAJ assignment.

Accessories Lens mount cap (1)
 Operating Instructions (1)

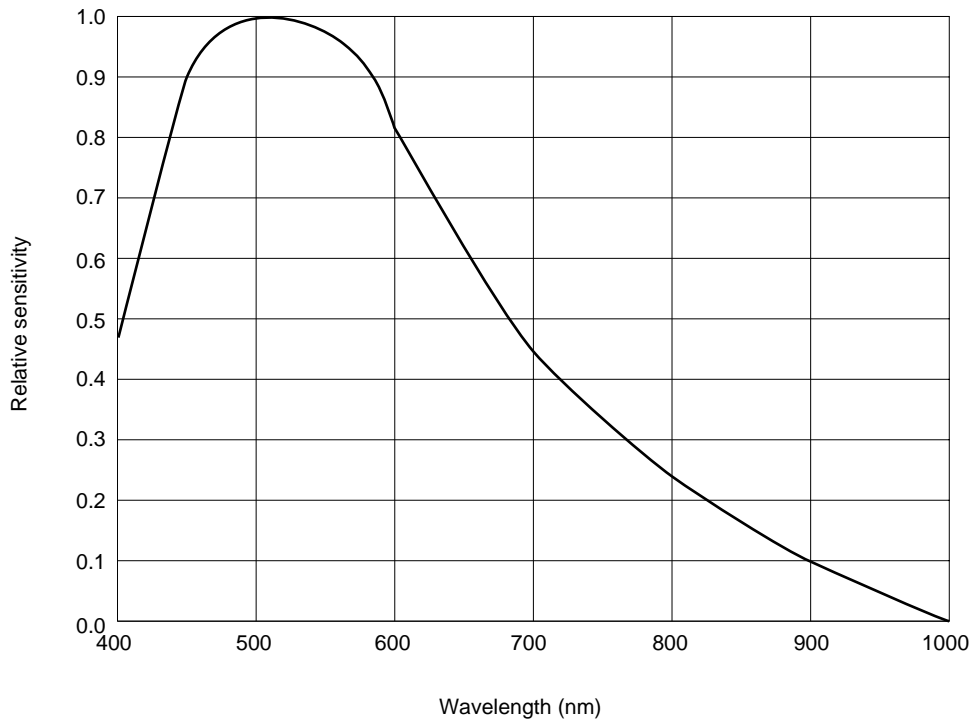
External synchronization for each mode

Mode		Internal sync	External sync	
			HD/VD	VS
Normal		○	○	○
Normal shutter		○	○	○
External trigger shutter	Mode 1	○	○	×
	Mode 2	Trigger signal generates an internal VD (single) signal.	×	×
Restart/Reset		×	○	×

○: Can be used.
 ×: Cannot be used.

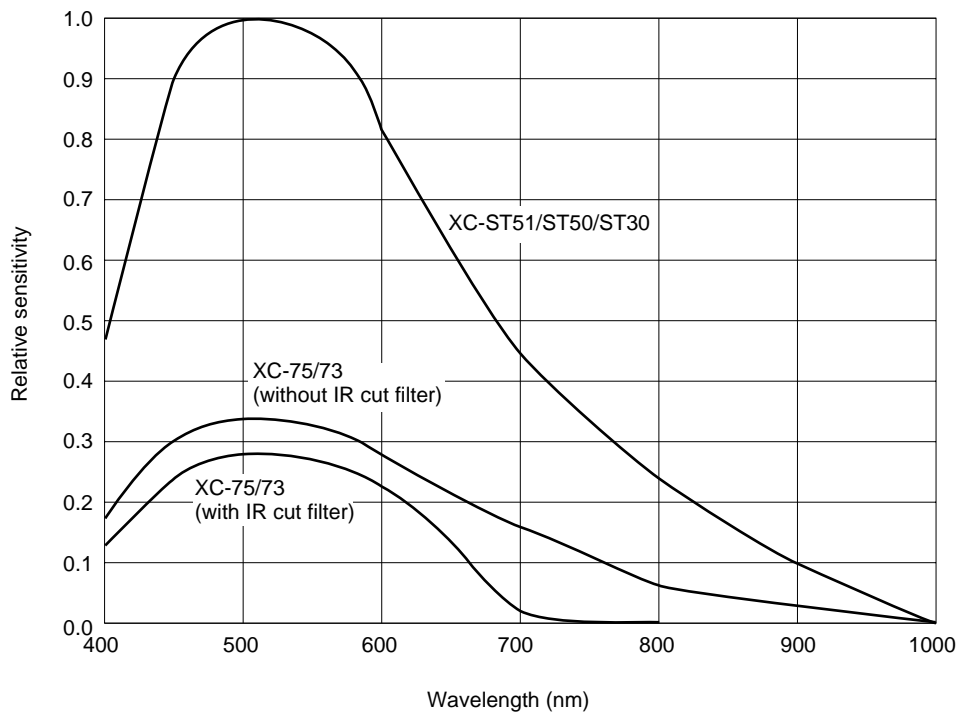
Spectral Response Characteristics (Typical Value)

XC-ST51/ST50/ST30



Comparison of Spectral Response Characteristics (Typical Value)

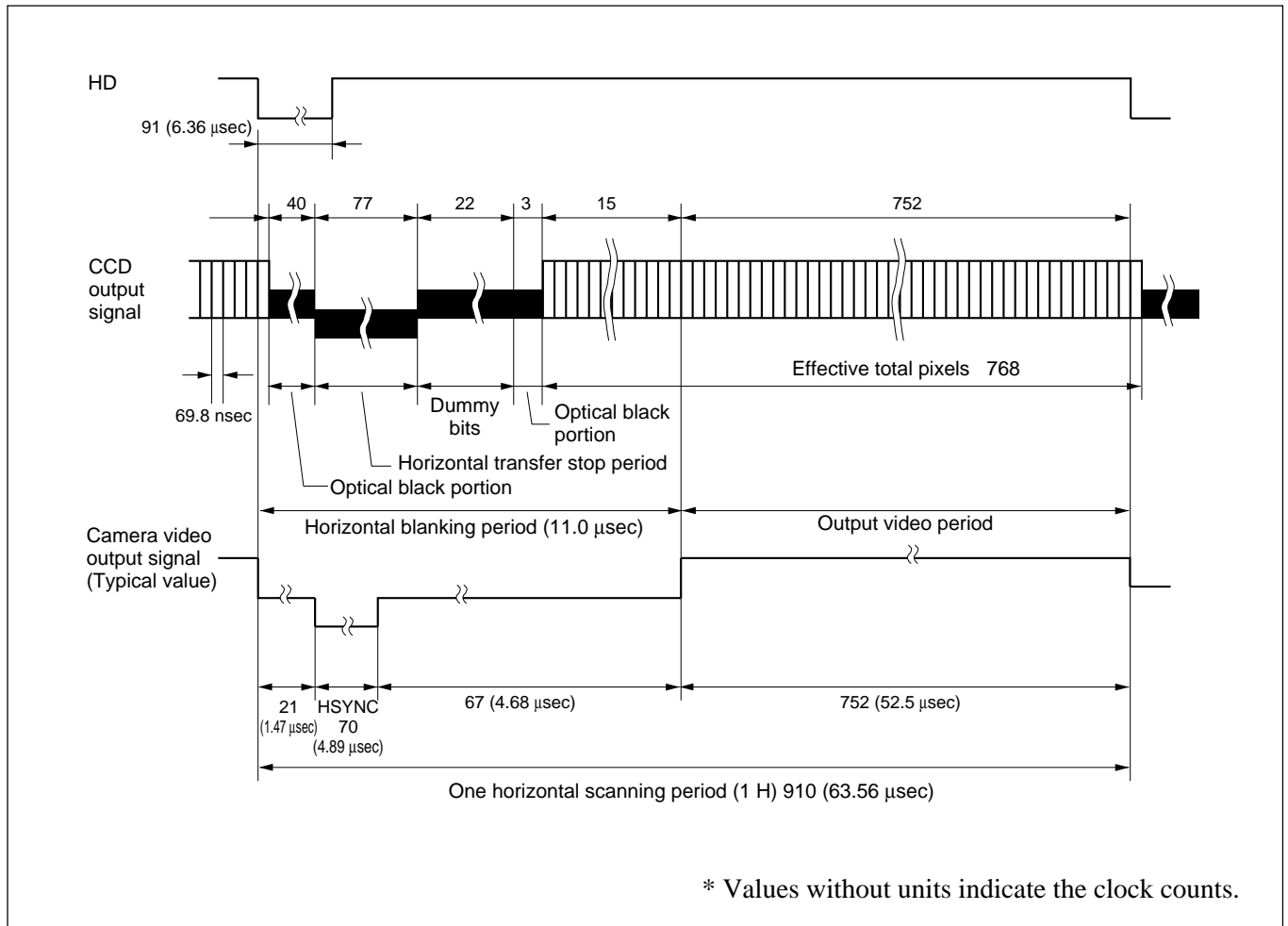
XC-75/73 and XC-ST51/ST50/ST30



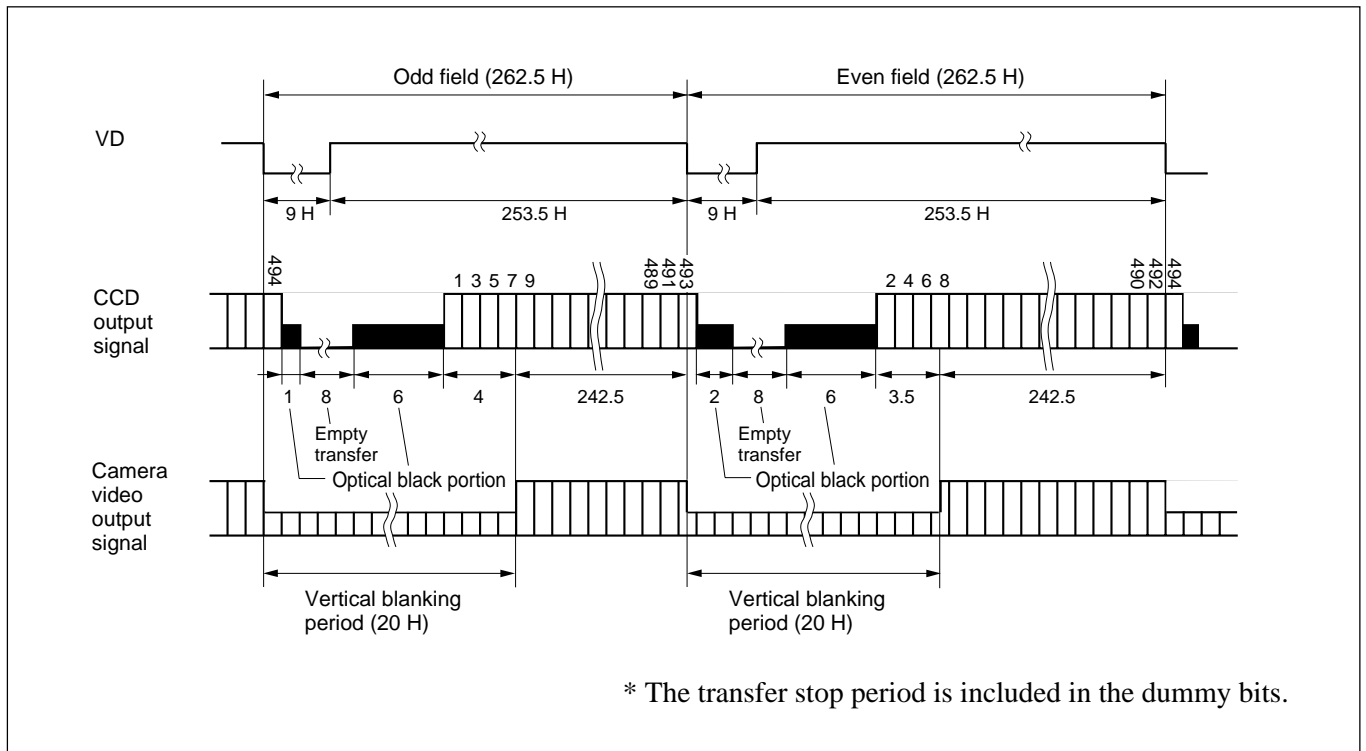
CCD Output Waveform Timing Chart

XC-ST51/ST50/ST30

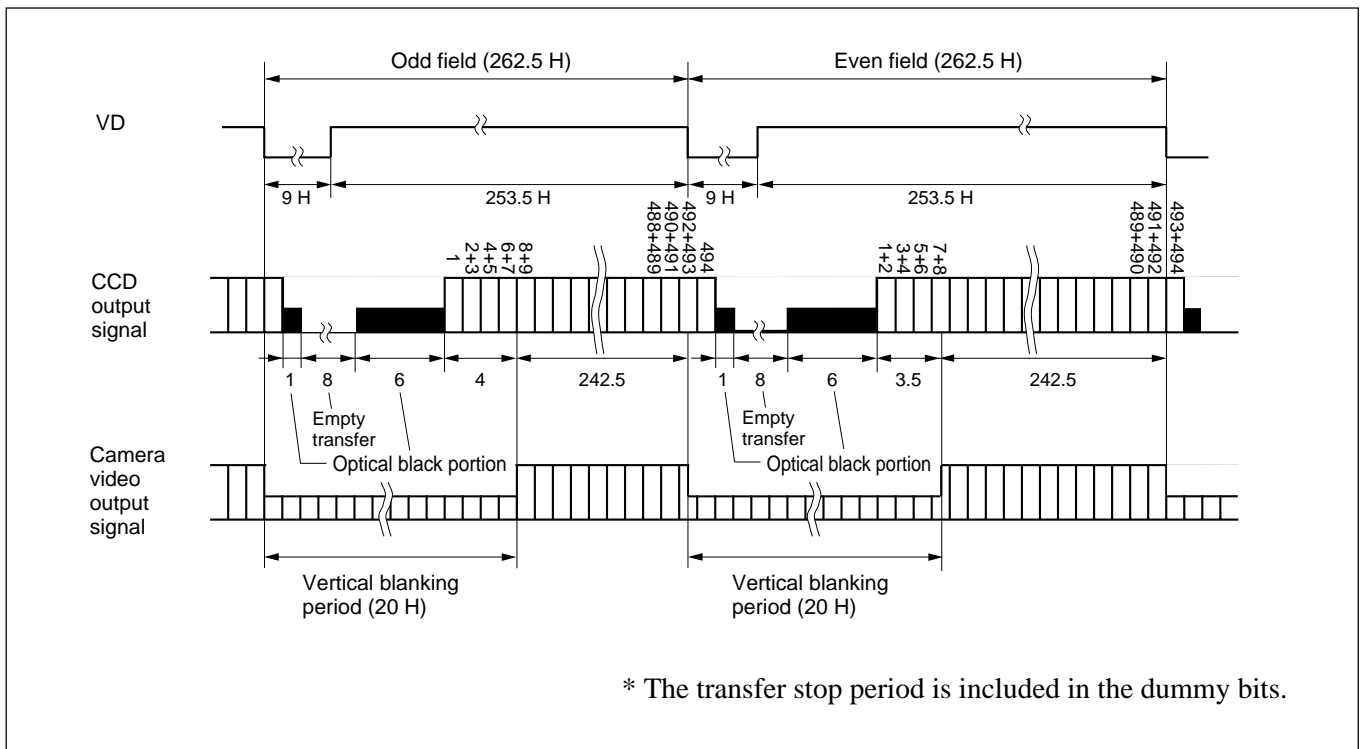
Horizontal Output Waveform Timing Chart



Vertical Output Waveform Timing Chart (2:1 interlaced frame accumulation)

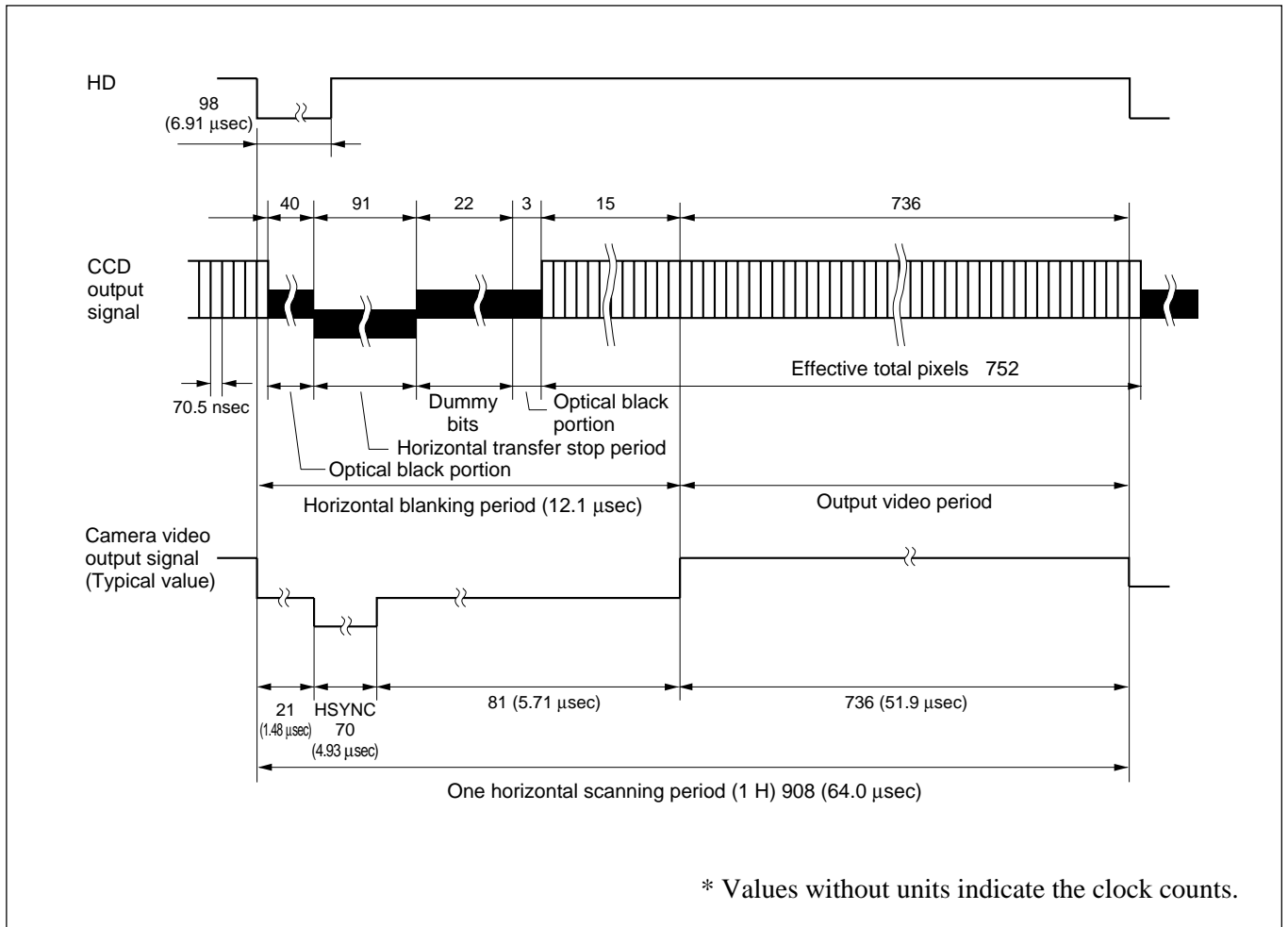


Vertical Output Waveform Timing Chart (2:1 interlaced field accumulation)

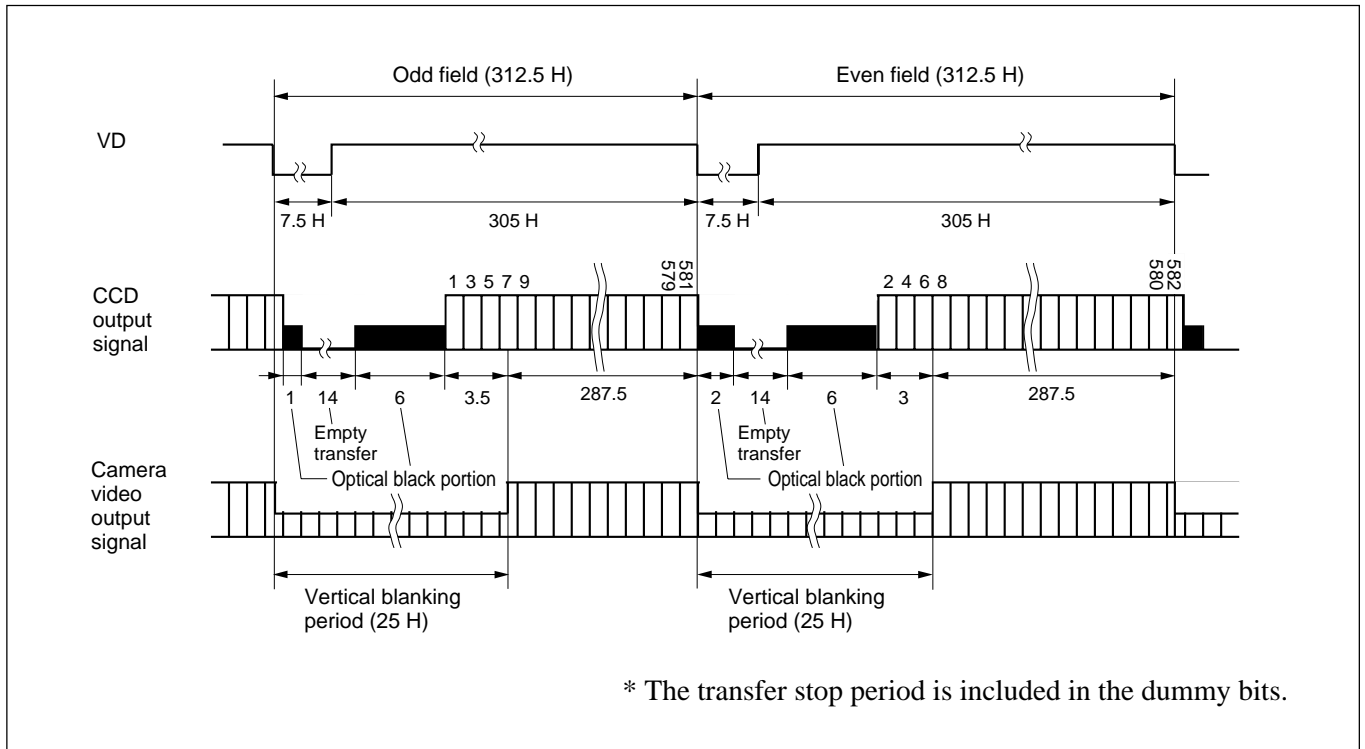


XC-ST51CE/ST50CE/ST30CE

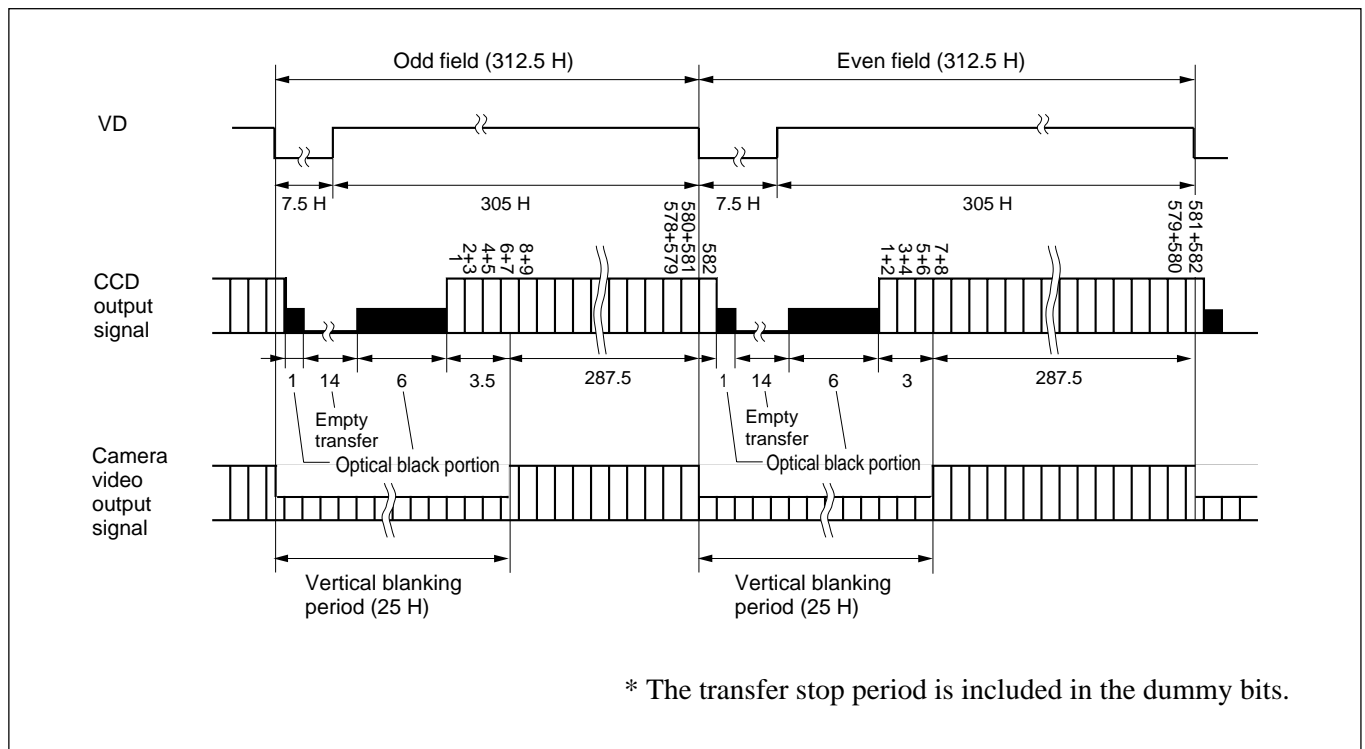
Horizontal Output Waveform Timing Chart



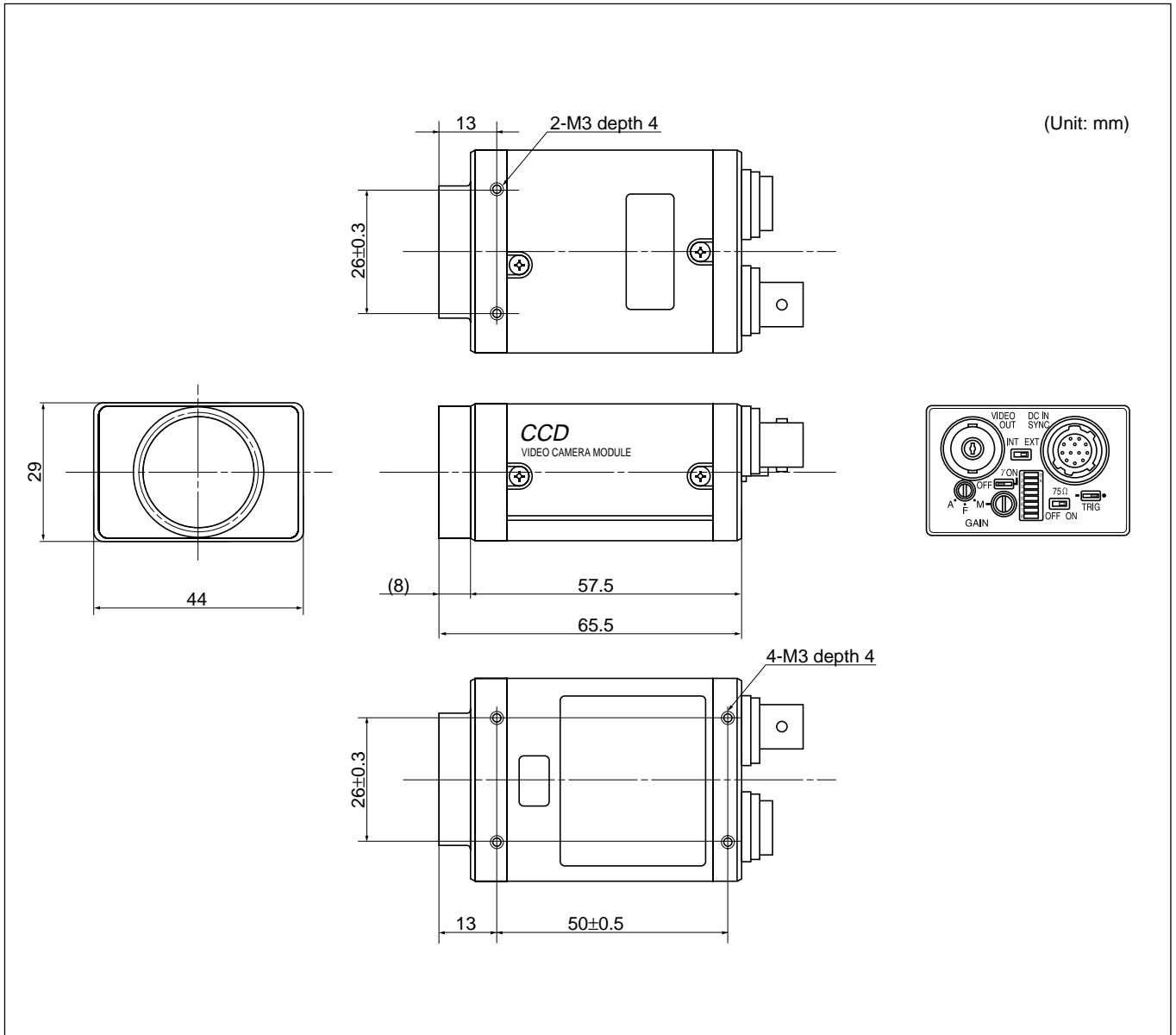
Vertical Output Waveform Timing Chart (2:1 interlaced frame accumulation)



Vertical Output Waveform Timing Chart (2:1 interlaced field accumulation)



Dimensions



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Various Lens Selection

The following shows the various lens specifications of the accessories available.

XC-ST51/ST51CE, XC-ST50/ST50CE and XC-ST30/ST30CE compatibility

List of C-Mount Lens

Model name		VLC-08YM	VLC-12YM	VLC-16Y-M	VLC-25Y-M	VLC-50Y-M
Focal distance (mm)		8	12	16	25	50
Maximum aperture ratio		1: 1.4	1: 1.8	1: 1.4	1: 1.6	1: 2.8
Operation	Iris	Manual	Manual	Manual	Manual	Manual
	Focus	Manual	Manual	Manual	Manual	Manual
Field angle (Horizontal x vertical)	1/2" CCD	42.6°×32.6°	29.6°×22.4°	22.6°×17.0°	14.6°×11.0°	7.3°×5.5°
	1/3" CCD	32.6°×24.8°	22.4°×16.9°	17.0°×12.8°	11.0°×8.2°	5.5°×4.1°
MOD (mm)		207	208	289	204	438
Image pickup range during maximum proximity (horizontal × vertical) (mm)	XC-ST51/ST50	181×132.8	125.2×92.1	119.4×88.5	52.1×38.8	49.2×37
	XC-ST51CE/ST50CE	181.3×133.3	125.5×92.5	119.6×88.8	52.1×38.9	49.7×37.1
	XC-ST30	136.8×100	94.7×69.6	90×66.8	39.4×29.3	37.2×27.9
	XC-ST30CE	137×100.3	94.8×69.6	90.4×66.9	39.4×29.3	37.5×27.9
Back focus (mm)		11.54	10.99	12.5	11.6	22.1
Flange back (mm)		17.526	17.526	17.526	17.526	17.526
Mass (g)		40	40	50	42	50

MOD: Minimum object distance between the tip of the lens body and the object