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**SONY**

**CCD B/W CAMERA MODULE**

**XC-ES50/50CE**  
**XC-ES30/30CE**  
**XC-EI50/50CE**  
**XC-EI30/30CE**



# *User's Guide*

**(Ver. 1.0) — English —**

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## OUTLINE

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The XC-ES30/30CE, XC-ES50/50CE, XC-EI30/30CE, and XC-EI50/50CE are industrial black-and-white video camera modules, each using a 1/3- or 1/2-inch IT CCD. The 1/3- and 1/2-inch C mount commonly used in industrial applications implements compact size and lightweight. Switching of each mode on the rear panel, which has been installed from the XC-ST series, is followed to provide improved operability. The XC-EI series uses a CCD which is sensitive on a near infrared area to capture a clear image even in low-intensity illumination. As with the existing devices, the XC-ES30/30CE, XC-ES50/50CE, XC-EI30/30CE, and XC-EI50/50CE incorporate significant shock and vibration resistance to support installation on FA equipment.

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## MAIN FEATURES

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### ■ 1/3" and 1/2" IT CCD

A CCD sensitive on a near infrared area is used for the XC-EI series.

### ■ External trigger shutter function

(XC-ES50/ES30, XC-EI50/EI30: 1/4 to 1/10,000 seconds,  
XC-ES50CE/ES30CE, XC-EI50CE/EI30CE: 1/4 to 1/8,000 seconds)

### ■ Restart Reset (R.R) function

Inputting HD and VD signals (2 VD or more) continuously from the outside can catch one image at arbitrary time and control the stored CCD.

This function is used for long exposures and strobe with frame image output.

### ■ Synchronization system: Internal/external HD/VD

Inputting an HD/VD signal from the outside automatically establishes external synchronization.

This function is effective for controlling multiple cameras efficiently from the external system.

### ■ Setting each mode on rear panel

The setting of each mode can be changed by the DIP switch.

Almost all switches are located on the rear panel. This feature permits easy setting after equipment is installed.

### ■ Compact and lightweight

Compared to the existing devices, the size and weight are reduced widely.

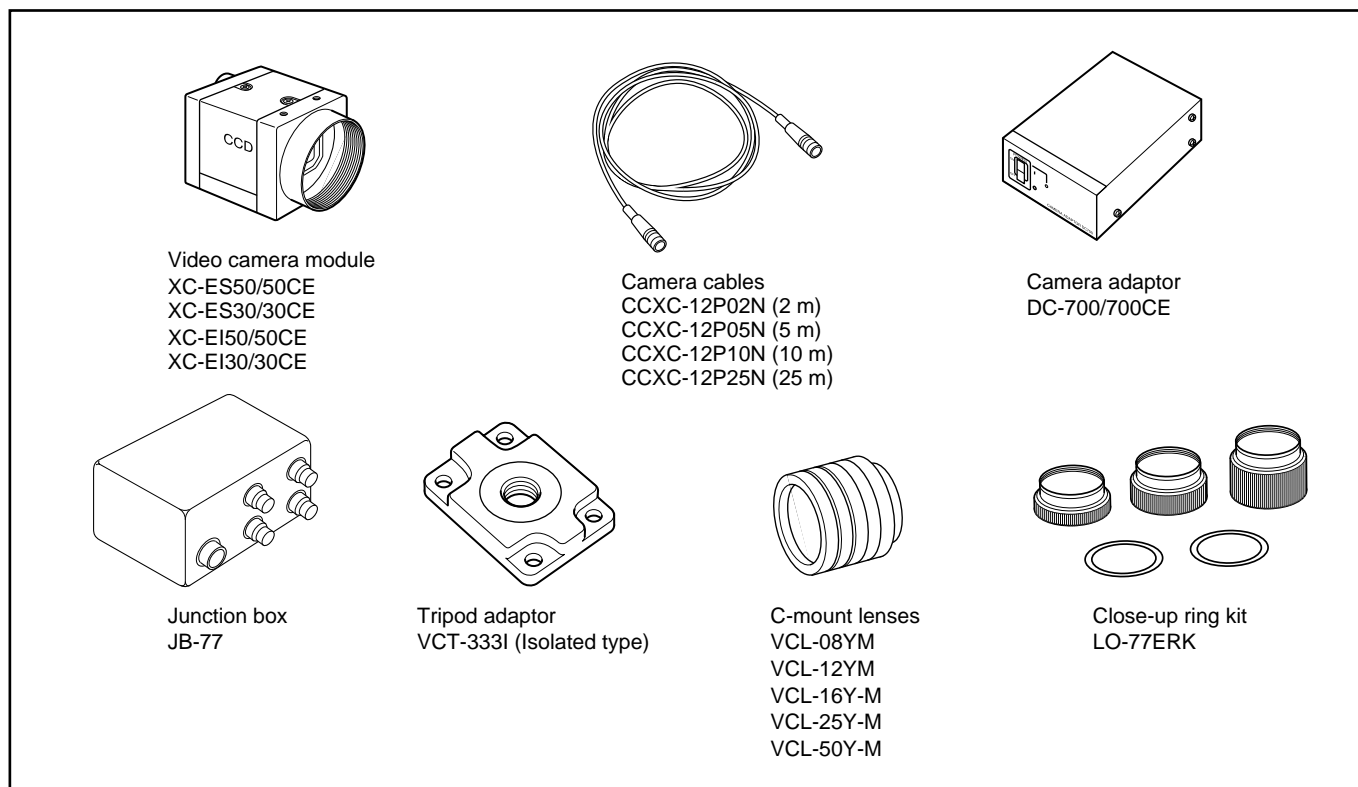
Each of the XC-ES30/30CE, XC-ES50/50CE, XC-EI30/30CE, and XC-EI50/50CE can be used in applications using two-piece cameras.

### ■ C-mount

### ■ Excellent shock and vibration resistance

## SYSTEM CONFIGURATION

The components making up the system based on XC-E series video camera are as follows.



## SPECIFICATIONS COMPARISON

|                            | XC-ST50   | XC-ES50  | XC-EI50  | XC-ST30   | XC-ES30   | XC-EI30   |
|----------------------------|---|--|--|---|---|---|
| Image pickup device        | 1/2"IT CCD  |  |  | 1/3"IT CCD  |   |   |
| Number of effective pixels | 768 (H) ×494 (V)                                    |  |  | 768 (H) ×494 (V)                                    |   |   |
| Lens mount                 | C mount   |  |  | C mount   |   |   |
| Scanning system            | 2:1 interlaced                                      |  |  | 2:1 interlaced                                      |   |   |
| Sensitivity                | 400 lx F8<br>(γ=ON, 0dB)                            | 400 lx F5, 6<br>(γ=ON, Min Gain IR<br>without IR cut filter) | 400 lx F11<br>(γ=ON, Min Gain IR<br>without IR cut filter) | 400 lx F8<br>(γ=ON, 0dB)                            | 400 lx F8<br>(γ=ON, Min Gain IR<br>without IR cut filter) | 400 lx F8<br>(γ=ON, Min Gain IR<br>without IR cut filter) |
| Minimum<br>illuminance *   | 0.3 lx  | 0.3 lx   | 0.1 lx   | 0.3 lx  |   | 0.2 lx  |
| Normal shutter             | 1/100 to 1/10,000 seconds                           |  |  | 1/100 to 1/10,000 seconds                           |   |   |
| External trigger shutter   | 1/4 to 1/10,000 seconds                             |  |  | 1/4 to 1/10,000 seconds                             |   |   |
| Dimensions                 | 44 (W) ×29 (H) ×57.5 (D) mm                         | 29 (W) ×29 (H) ×32 (D) mm                                    |  | 44 (W) ×29 (H) ×57.5 (D) mm                         | 29 (W) ×29 (H) ×32 (D) mm                                 |   |
| Mass                       | 105 g   | 50 g (approx.)   |  | 105 g   | 50 g (approx.)  |   |
| 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) |   |   |

\*F1.4,  $\gamma$ =ON, MAX GAIN

# MAIN SPECIFICATIONS

## Image pickup device

XC-ES50/50CE, XC-EI50/50CE:  
1/2-inch interline transfer CCD

XC-ES30/30CE, XC-EI30/30CE:  
1/3-inch interline transfer CCD

## Number of effective pixels

XC-ES50/EI50, XC-ES30/EI30:  
768 (H)×494 (V)

XC-ES50CE/EI50CE, XC-ES30CE/EI30CE:  
752 (H)×582 (V)

## CCD horizontal driving frequency

XC-ES50/EI50, XC-ES30/EI30:  
14.318 MHz

XC-ES50CE/EI50CE, XC-ES30CE/EI30CE:  
14.187 MHz

## CCD vertical driving frequency

XC-ES50/EI50, XC-ES30/EI30:  
15.734 kHz

XC-ES50CE/EI50CE, XC-ES30CE/EI30CE:  
15.625 kHz

**Signal system** EIA/CCIR

## Cell size

XC-ES50/EI50: 8.4 (H)×9.8 (V) μm

XC-ES50CE/EI50CE: 8.6 (H)×8.3 (V) μm

XC-ES30/EI30: 6.35 (H)×7.4 (V) μm

XC-ES30CE/EI30CE: 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 Vp-p)  
★ Automatically selected according to the existence of an input signal when the selection switch on the rear panel is set to EXT.

## Allowable frequency deviation of external synchronization

± 1 %  
(in horizontal synchronous frequency)

**Jitter** Within ± 50 nsec

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

## Horizontal resolution

XC-ES50/EI50, XC-ES30/EI30: 570 TV lines

XC-ES50CE/EI50CE, XC-ES30CE/EI30CE:  
560 TV lines

## Sensitivity

XC-ES50/50CE: 400 lx F5.6 (γ=ON, MIN Gain, without IR cut filter)

XC-ES30/30CE: 400 lx F4 (γ=ON, MIN Gain, without IR cut filter)

XC-EI50/50CE: 400 lx F11 (γ=OFF, MIN Gain, without IR cut filter)

XC-EI30/30CE: 400 lx F8 (γ=ON, MIN Gain, without IR cut filter)

**S/N ratio** 60dB

## Minimum illuminance

XC-ES50/50CE, XC-ES30/30CE:  
0.3 lx (F1.4 γ=ON, MAX Gain, without IR cut filter)

XC-EI50/50CE: 0.1 lx (F1.4 γ=ON, MAX Gain, without IR cut filter)

XC-EI30/30CE: 0.2 lx (F1.4 γ=ON, MAX Gain, without IR cut filter)

**Gain** AGC/Manual (Can be selected using the switch on the rear panel.)

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

## Electronic shutter

XC-ES50/EI50, XC-ES30/EI30:  
1/100 to 1/10,000 seconds

XC-ES50CE/EI50CE, XC-ES30CE/EI30CE:  
1/120 to 1/10,000 seconds

## External trigger shutter

XC-ES50/EI50, XC-ES30/EI30:  
1/4 to 1/10,000 seconds

XC-ES50CE/EI50CE, XC-ES30CE/EI30CE:  
1/4 to 1/8,000 seconds

★ Set using the DIP switch on the rear panel, or variable with the trigger pulse width.

**Supply voltage** +12 VDC (+9.0V to 16V)

## Power consumption

XC-ES30/30CE, XC-EI30/30CE: 1.4W

XC-ES50/50CE, XC-EI50/50CE: 1.6W

**Operating temperature** -5 °C to +45 °C

**Storage temperature** -20 °C to +60 °C

## Performance assurance temperature

0 °C to +30 °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)

## MAIN SPECIFICATIONS

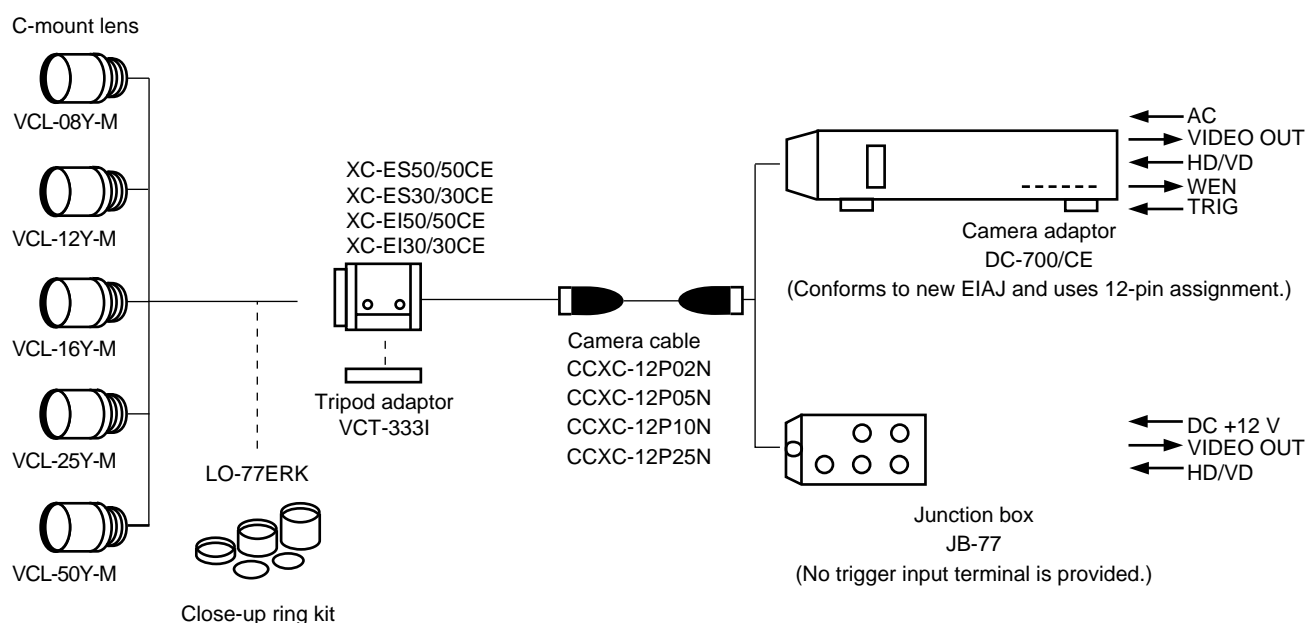
|                           |   |
|---------------------------|---|
| <b>Shock resistance</b>   | 70G   |
| <b>Outside dimensions</b> | 29 (W) × 29 (H) × 32 (D) mm   |
| <b>Weight</b>             | 50 g  |
| <b>Standards</b>          | UL1492, FCC Class A Digital Device, and CE (EN50081-2 + EN50082-2)  |
| <b>Other</b>              | Restart Reset function<br>Frame or field integration can be selected.<br>Conforms to new EIAJ and uses 12-pin assignment. |
| <b>Accessories</b>        | Lens mount cap (1)<br>Instruction Manual (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.

## CONNECTION DIAGRAM



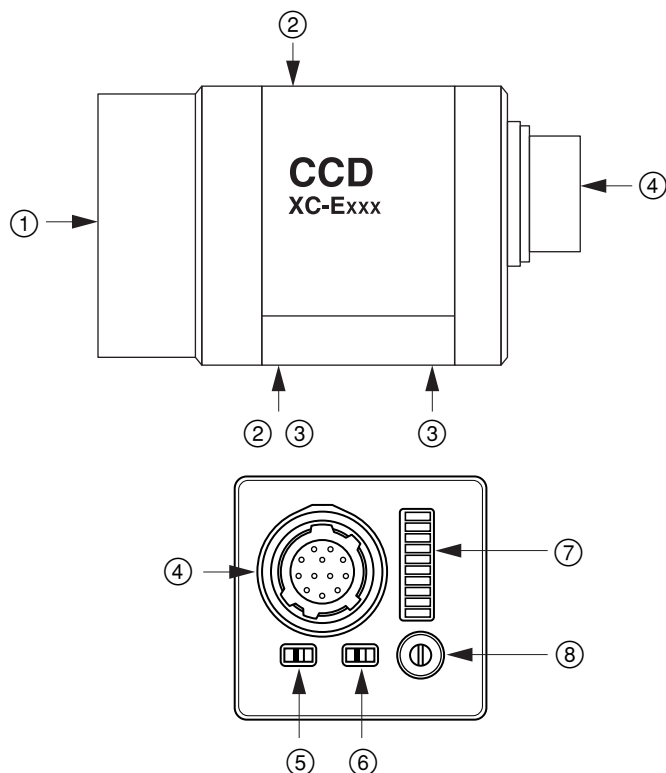
**Note** : All functions of the XC-ES50/50CE, XC-ES30/30CE, XC-EI50/50CE, XC-EI30/30CE cannot be used when using DC-777/CE, DC-77RR/CE, and JB-77 is used. Refer to the table shown below.

| XC-ES50/50CE<br>XC-ES30/30CE<br>XC-EI50/50CE<br>XC-EI30/30CE | JB-77 |
|--|-------|
| Normal   | ○     |
| Normal shutter   | ○     |
| Restart Reset (R.R)  | ○     |
| Restart Reset (R.R)<br>+ shutter                             | ○     |
| External trigger shutter                                     | ×     |

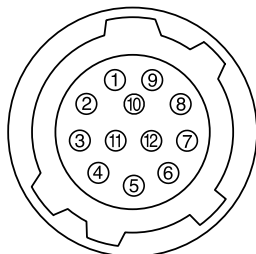
○: Can be used.  
×: Cannot be used.

# LOCATION OF PARTS AND OPERATION

## XC-ES50/50CE • XC-ES30/30CE XC-EI50/50CE • XC-EI30/30CE



④ 12-pin multi-connector



| Pin No. | External HD/VD synchronization | Internal HD/VD synchronization |
|---------|--------------------------------|--------------------------------|
| 1       | GND                            | GND                            |
| 2       | +12 V                          | +12 V                          |
| 3       | GND                            | GND                            |
| 4       | VIDEO output                   | VIDEO output                   |
| 5       | GND                            | GND                            |
| 6       | External HD input              | Internal HD output             |
| 7       | *1 External VD input           | Internal VD output             |
| 8       | GND                            | GND                            |
| 9       | —                              | —                              |
| 10      | *2 WEN output                  | *2 WEN output                  |
| 11      | TRIG input                     | TRIG input                     |
| 12      | GND                            | GND                            |

\*1: An input VD signal is required when the restart/reset mode is used.

\*2: A WEN output signal is valid only in the external trigger shutter mode.

### • Factory-setting mode of rear panel

| Corresponding No. | Switch  | Factory-setting mode |
|-------------------|---|----------------------|
| ⑤                 | 75 Ω termination selector switch                  | ON                   |
| ⑥                 | HD/VD input-output selector switch                | EXT                  |
| ⑦                 | Shutter speed/mode setting DIP switch             |                      |
|                   | Switches 1 to 4: Select the shutter speed.        | OFF                  |
|                   | Switch 5: Selects the frame or field integration. | FRAME                |
|                   | Switches 6 to 8: Select the trigger shutter mode. | Normal               |
|                   | Switch 9: Selects correction on/off.              | OFF                  |
|                   | Switch 0: Selects the gain.                       | Manual               |
| ⑧                 | Volume control switch                             | Mechanical center    |

- ① Lens mount section (C mount)  
A commercial C-mount lens as well as a Sony standard lens can be used.
- ② Camera mounting reference hole (top)  
These screw holes are positioned with high precision related to CCD sensor.
- ③ Camera mounting reference hole/Screw hole for tripod adaptor mounting (bottom)
- ④ 12-pin multi-connector  
DC IN/HD/VD (DC power/sync signal input) VIDEO OUT terminal
- ⑤ 75 Ω termination selector switch
- ⑥ HD/VD input-output selector switch
- ⑦ Shutter speed/mode setting DIP switch  
Switches 1 to 4:  
Select the shutter speed.  
Switch 5: Selects the frame or field integration.  
Switches 6 to 8:  
Select the trigger shutter mode.  
Switch 9: Selects γ correction on/off.  
Switch 0: Selects the gain.
- ⑧ Volume control switch  
This switch can be changed in the range of Switch 0 to 18 dB when the GAIN switch is set to "M".  
\*During factory setting, this switch is adjusted to the mechanical center.

### Note

When setting DIP switch 5 to the frame integration, set the volume control switch 8 to the MAX side from the mechanical center (because of CCD characteristics).

# PHASE CONDITIONS OF EXTERNAL SYNCHRONIZATION

## External synchronization for each mode

- For normal video/normal shutter

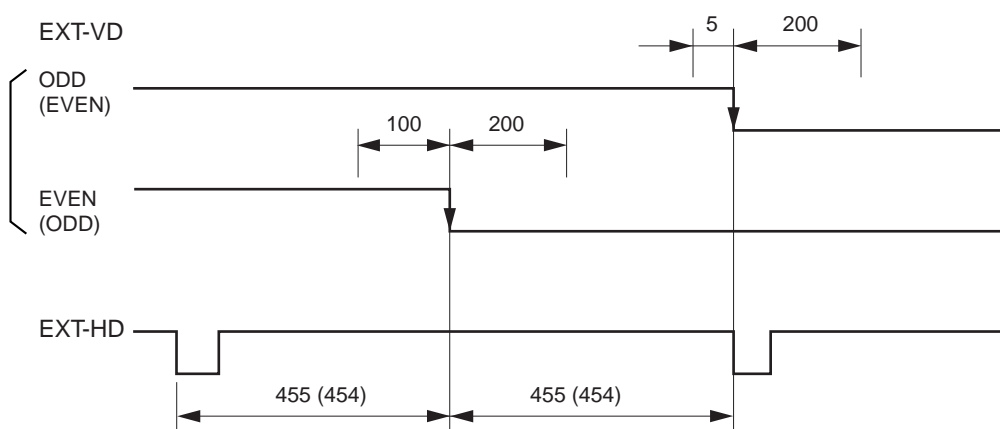
Continuous HD/VD signal (should conform to EIA and CCIR frequencies in the timing shown in the figure below.)

- For Restart Reset (RR)/external trigger shutter

Continuous HD signal. The phase between VD (reset) and HD signals is as specified in the figure below in any timing.

## Phase conditions

The phase relation between external input HD and VD signals should be set as shown below with respect to the specified center phase.



Unit: Clock

1 CLK = 69.84 n sec  
(XC-ES50/ES30, XC-EI50/EI30)  
70.48 n sec  
(XC-ES50CE/ES30CE, XC-EI50CE/EI30CE)

The operation in parentheses refers to XC-ES50CE/ES30CE and XC-EI50CE/EI30CE.

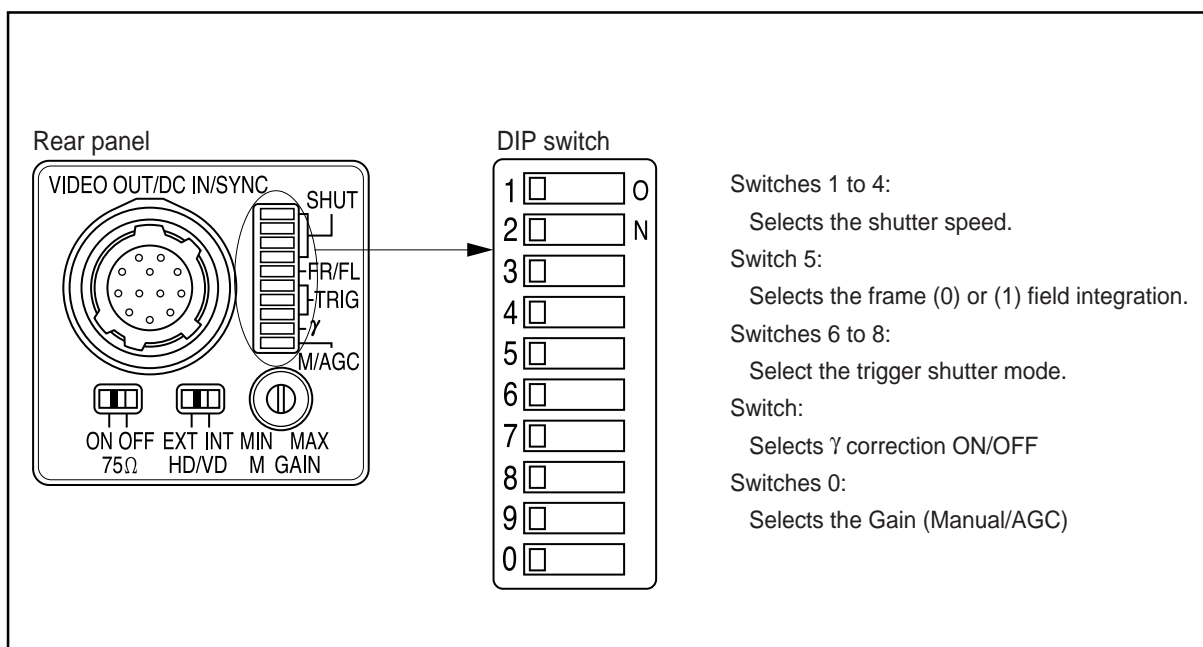
**Note** : The synchronized VD signals are delayed for 1H at HD/VD external synchronization mode, while there is no VD signal delay at VS external synchronization mode.



## ELECTRONIC SHUTTER

Two types of electronic shutter are provided “normal shutter and external trigger shutter”.  
The electronic shutter speed and type can be set using the DIP switch on the rear panel.

### DIP switch on the rear panel



### Normal shutter

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

#### Setting of normal shutter speed

| Switch | Shutter Off         | 1/125 | 1/250 | 1/500 | 1/1000 | 1/2000 | 1/4000 | 1/8000(CCIR)<br>1/10000(EIA) | *Flickerless |
|--------|---------------------|-------|-------|-------|--------|--------|--------|------------------------------|--------------|
| 1      | 0                   | 1     | 0     | 1     | 0      | 1      | 0      | 1                            | —            |
| 2      | 0                   | 0     | 1     | 1     | 0      | 0      | 1      | 1                            | —            |
| 3      | 0                   | 0     | 0     | 0     | 1      | 1      | 1      | 1                            | —            |
| 4      | 0                   | 0     | 0     | 0     | 0      | 0      | 0      | 0                            | 1            |
| 5      | Frame: 0 / Field: 1 |       |       |       |        |        |        |                              |              |
| 6      | —                   | —     | —     | —     | —      | —      | —      | —                            | —            |
| 7      | —                   | —     | —     | —     | —      | —      | —      | —                            | —            |
| 8      | 0                   | 0     | 0     | 0     | 0      | 0      | 0      | 0                            | 0            |

\* In the flickerless mode, the normal shutter speed is 1/100 sec for XC-ES50/ES30 and XC-EI50/EI30 (EIA) and 1/120 sec for XC-ES50CE/ES30 CE and XC-EI50CE/EI30CE (CCIR).

1: ON  
0: OFF  
—: Any

**Note** : It is recommended to set DIP switch 5 for field selection. (The field selection is about two times in sensitivity as high as the frame selection.)

## ELECTRONIC SHUTTER

### External trigger shutter

These modes are used to capture one image (one field) per trigger pulse.

Set DIP switches 6, 7, and 8 on the rear panel to mode 1 or 2. (Refer to the table below.)

When the trigger pulse width is 1/3 sec or more, the output signal is switched to a normal video signal.

There are two modes for timing in which a video signal is 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.

- A video signal is synchronized with the external VD signal when an external HD/VD signal is input.
- A 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 video signal is output from a trigger pulse after a certain period of time.

Video sync is always fixed with odd field for XC-ST70 and even field for XC-ST70CE.

★ For more details of each timing chart, refer to pages 16 to 23.

### ◇ Setting of external trigger shutter speed

There are two ways to set the shutter speed.

Mode 1 (Non-reset mode)

| Switch | *1/100              | 1/125 | 1/250 | 1/500 | 1/1000 | 1/2000 | 1/4000 | **1/10000 |
|--------|---------------------|-------|-------|-------|--------|--------|--------|-----------|
| 1      | —                   | 1     | 0     | 1     | 0      | 1      | 0      | 1         |
| 2      | —                   | 0     | 1     | 1     | 0      | 0      | 1      | 1         |
| 3      | —                   | 0     | 0     | 0     | 1      | 1      | 1      | 1         |
| 4      | 1                   | 0     | 0     | 0     | 0      | 0      | 0      | 0         |
| 5      | Frame: 0 / Field: 1 |       |       |       |        |        |        |           |
| 6      | 0                   | 0     | 0     | 0     | 0      | 0      | 0      | 0         |
| 7      | 1                   | 1     | 1     | 1     | 1      | 1      | 1      | 1         |
| 8      | 1                   | 1     | 1     | 1     | 1      | 1      | 1      | 1         |
| 9      | —                   | —     | —     | —     | —      | —      | —      | —         |
| 0      | —                   | —     | —     | —     | —      | —      | —      | —         |

Mode 2 (Reset mode)

| Switch | *1/100              | 1/125 | 1/250 | 1/500 | 1/1000 | 1/2000 | 1/4000 | **1/10000 |
|--------|---------------------|-------|-------|-------|--------|--------|--------|-----------|
| 1      | —                   | 1     | 0     | 1     | 0      | 1      | 0      | 1         |
| 2      | —                   | 0     | 1     | 1     | 0      | 0      | 1      | 1         |
| 3      | —                   | 0     | 0     | 0     | 1      | 1      | 1      | 1         |
| 4      | 1                   | 0     | 0     | 0     | 0      | 0      | 0      | 0         |
| 5      | Frame: 0 / Field: 1 |       |       |       |        |        |        |           |
| 6      | 0                   | 0     | 0     | 0     | 0      | 0      | 0      | 0         |
| 7      | 0                   | 0     | 0     | 0     | 0      | 0      | 0      | 0         |
| 8      | 1                   | 1     | 1     | 1     | 1      | 1      | 1      | 1         |
| 9      | —                   | —     | —     | —     | —      | —      | —      | —         |
| 0      | —                   | —     | —     | —     | —      | —      | —      | —         |

★ The external trigger shutter speed is set to 1/100 sec for XC-ES50/ES30, XC-EI50/EI30 (EIA) and 1/120 sec for XC-ES50CE/ES30CE, XC-EI50CE/EI30CE (CCIR).

★★ The external trigger shutter speed is set to 1/10000 sec for XC-ES50/ES30, XC-EI50/EI30 (EIA) and 1/8000 sec for XC-ES50CE/ES30CE, XC-EI50CE/EI30CE (CCIR).

1: ON  
0: OFF  
—: Any

- **Using DIP switch on the rear panel**

## ELECTRONIC SHUTTER

### • Using trigger pulse width

- Set DIP switches 1 to 4 on the rear panel to 0.
- An arbitrary shutter speed can be obtained by setting the trigger pulse width to the range of 2  $\mu\text{sec}$  to 250 msec.

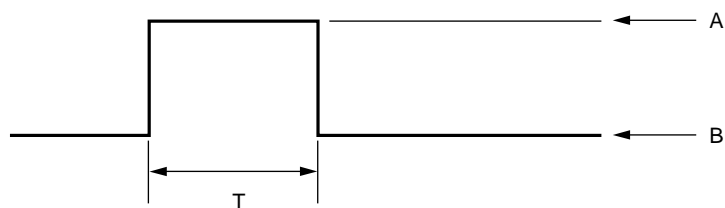
| Switch | Mode 1<br>(Non-reset mode) | Mode 2<br>(Reset mode) |
|--------|----------------------------|------------------------|
| 1      | 0                          | 0                      |
| 2      | 0                          | 0                      |
| 3      | 0                          | 0                      |
| 4      | 0                          | 0                      |
| 5      | Frame: 0 / Field: 1        |                        |
| 6      | 0                          | 0                      |
| 7      | 1                          | 0                      |
| 8      | 1                          | 1                      |
| 9      | 0                          | 0                      |
| 0      | 0                          | 0                      |

1: ON  
0: OFF

$$\text{Exposure time} = \text{Trigger pulse width} + 97 \mu\text{sec (EIA)} \\ 120 \mu\text{sec (CCIR)}$$

**Note** : 1. It is recommended to set DIP switch 5 for field selection.  
(The field selection is about two times in sensitivity as high as the frame selection.)  
2. After a trigger pulse is input, a new trigger pulse must not be input before the video signal obtained by the trigger pulse has been output.

### ◇ Specifications of trigger pulse



A: 4 to 5.0 V

B: 0 to 1.0 V

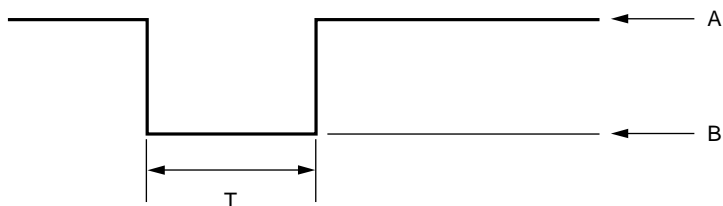
T: 2  $\mu\text{s}$  to 1/4 s

T: 2  $\mu\text{s}$  to 1/4 s, 100  $\mu\text{s}$  to 1/4 s when setting the shutter speed using DIP switch

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

## ELECTRONIC SHUTTER

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



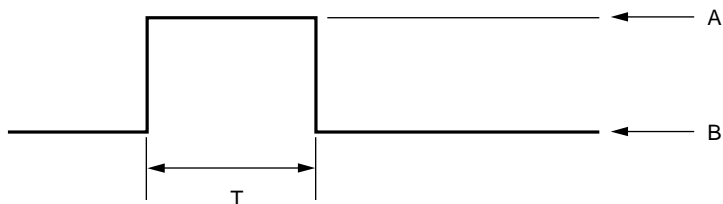
A: 4.0 to 5.0 V

B: 0 to 2.0 V

T: 2  $\mu$ s to 1/4 s, 100  $\mu$ s to 1/4 s when setting the shutter speed using DIP switch

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

### ◇ Specifications of WEN (Write ENable Pulse)



A: 5.0 V

B: 0 V

T: 15.875 ms (XC-ST70), 18.752 ms (XC-ST70CE)

- \* Output impedance: 10 k $\Omega$  or more

## RESTART RESET (R.R)

The information on one screen can be extracted at any time by inputting a restart/reset signal (HD/VD) from the outside. To enter this mode, set DIP switches 6, 7, and 8 on the rear panel of a camera as shown in the table below. The setting is especially effective for the following operation.

| Switch | Restart Reset (R.R) |
|--------|---------------------|
| 1      | 0                   |
| 2      | 0                   |
| 3      | 0                   |
| 4      | 0                   |
| 5      | 0                   |
| 6      | 1                   |
| 7      | 1                   |
| 8      | 1                   |
| 9      | 0                   |
| 0      | 0                   |

1: ON  
0: OFF

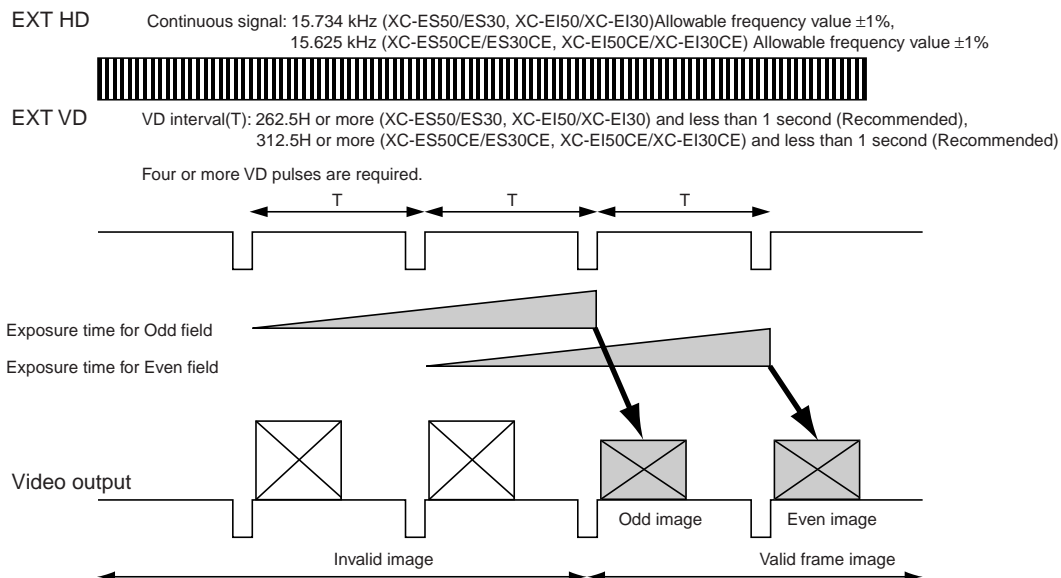
### ◇ Long exposure

A high-sensitivity image is obtained by extending the exposure time of the CCD when satisfactory sensitivity cannot be obtained under other operating conditions or when observing the trail of a moving object.

The exposure time is determined by the VD interval (T) period between external VD pulses as follows.

#### • Timing and conditions

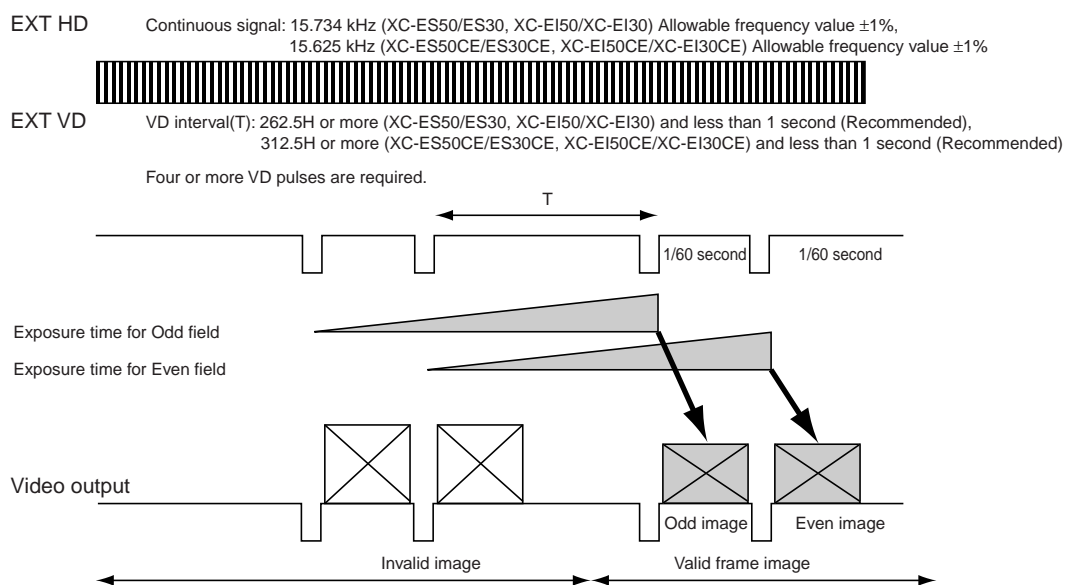
##### Example 1 of Long exposure



Odd and even fields are determined by the phase of the EXT HD/VD signal input from the outside.

## RESTART RESET (R.R)

### Example 2 of long exposure



Odd and even fields are determined by the phase of the EXT HD/VD signal input from the outside.

# FRAME IMAGE OUTPUT WITH STROBE LIGHT

A full frame image with vertical resolution of 485 lines (XC-ST70) or 575 lines (XC-ST70CE) can be obtained with a strobe light by firing the strobe when the exposure time of the two fields overlap.

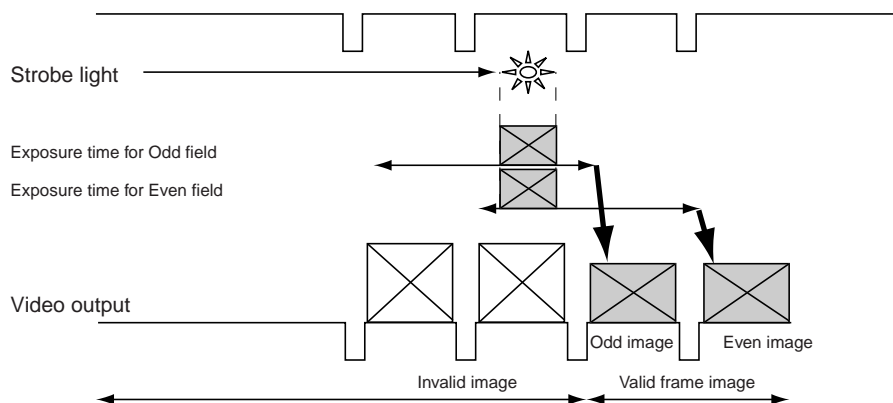
## Timing and conditions

<Timing chart by restart/reset>

EXT HD Continuous signal: 15.734 kHz (XC-ES50/ES30, XC-EI50/XC-EI30) Allowable frequency value  $\pm 1\%$ ,  
15.625 kHz (XC-ES50CE/ES30CE, XC-EI50CE/XC-EI30CE) Allowable frequency value  $\pm 1\%$



EXT VD VD : XC-ES50/ES30, XC-EI50/XC-EI30 (1/60sec), XC-ES50CE/ES30CE, XC-EI50CE/XC-EI30CE (1/50sec)  
Four or more VD pulses are required.



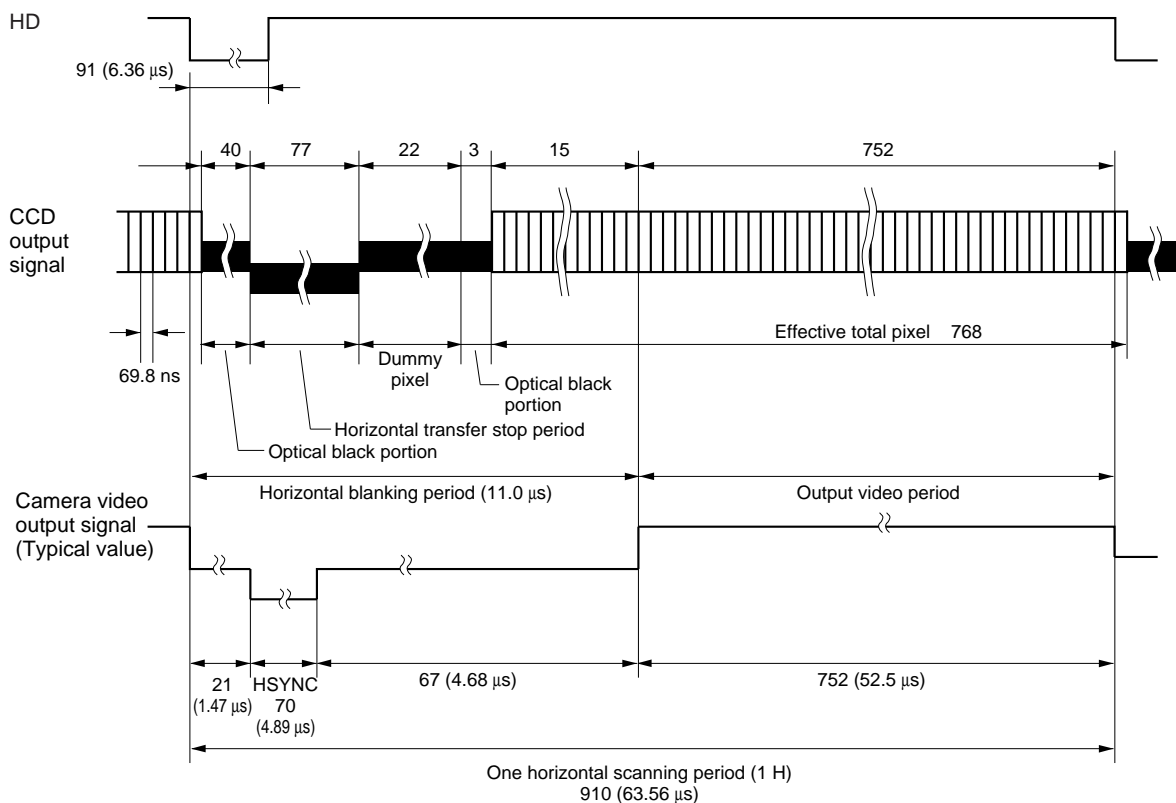
Odd and even fields are determined by the phase of the EXT HD/VD signal input from the outside.

Avoid lighting the scene during the light-emitting inhibit zone defined below. (The field is transferred to the storage area of the CCD, so it can be read out.)

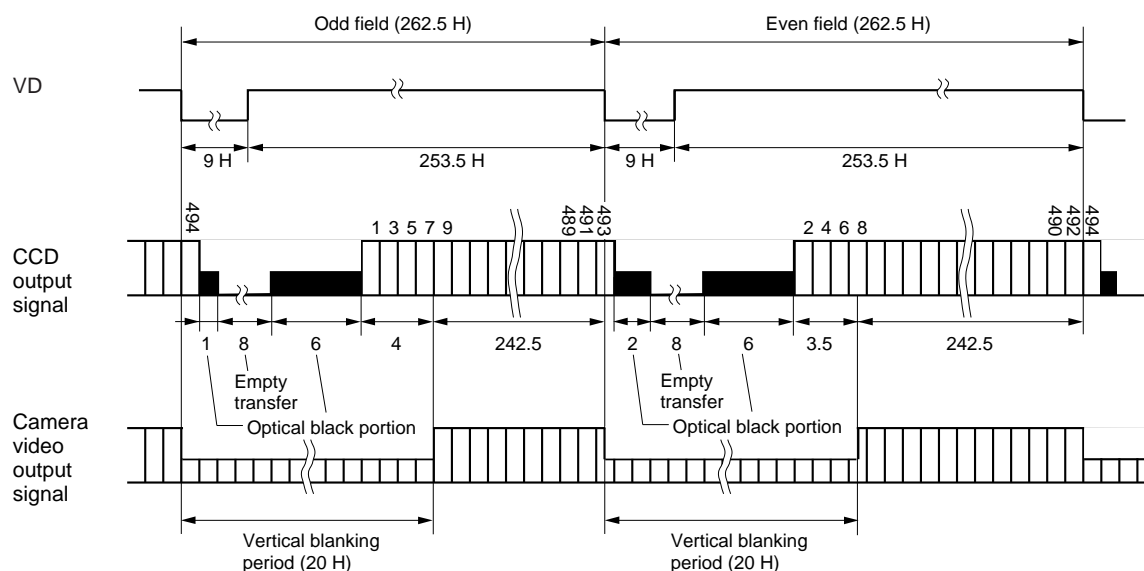
**Note** : For best performance, it is recommended not to flash between VD and VD + 10H (XC-ES50/ES30, XC-EI50/EI30)/  
16H (XC-ES50CE/ES30CE, XC-EI50CE/EI30CE).

# OUTPUT WAVEFORM TIMING CHART (XC-ES50/EI50/ES30/EI30(EIA))

## ◇ Timing chart of horizontal output waveform



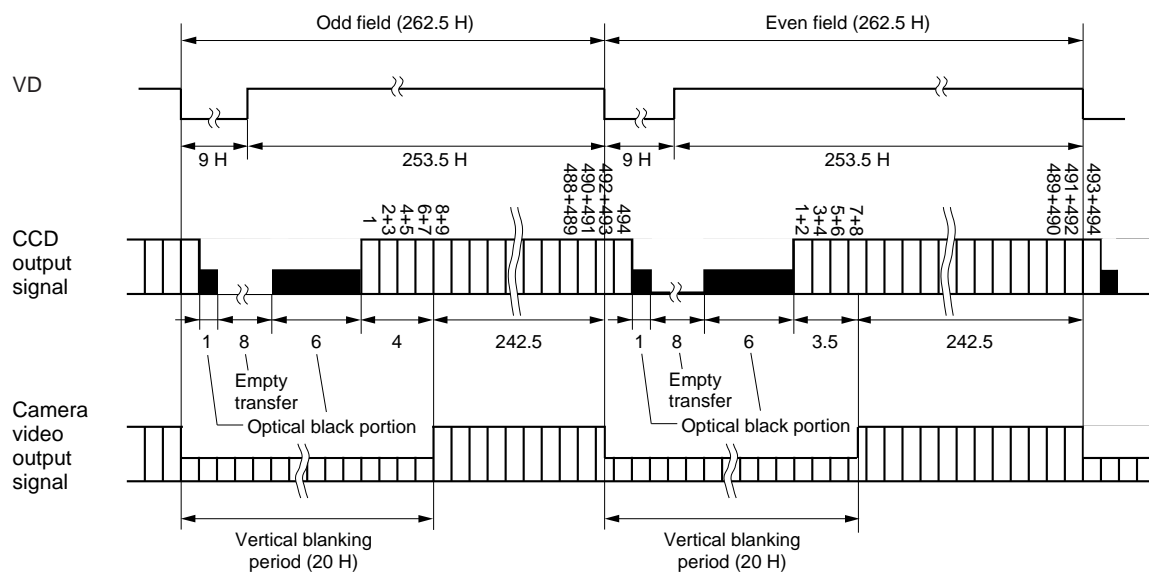
## ◇ Timing chart of vertical output waveform (2:1 interlaced frame integration)





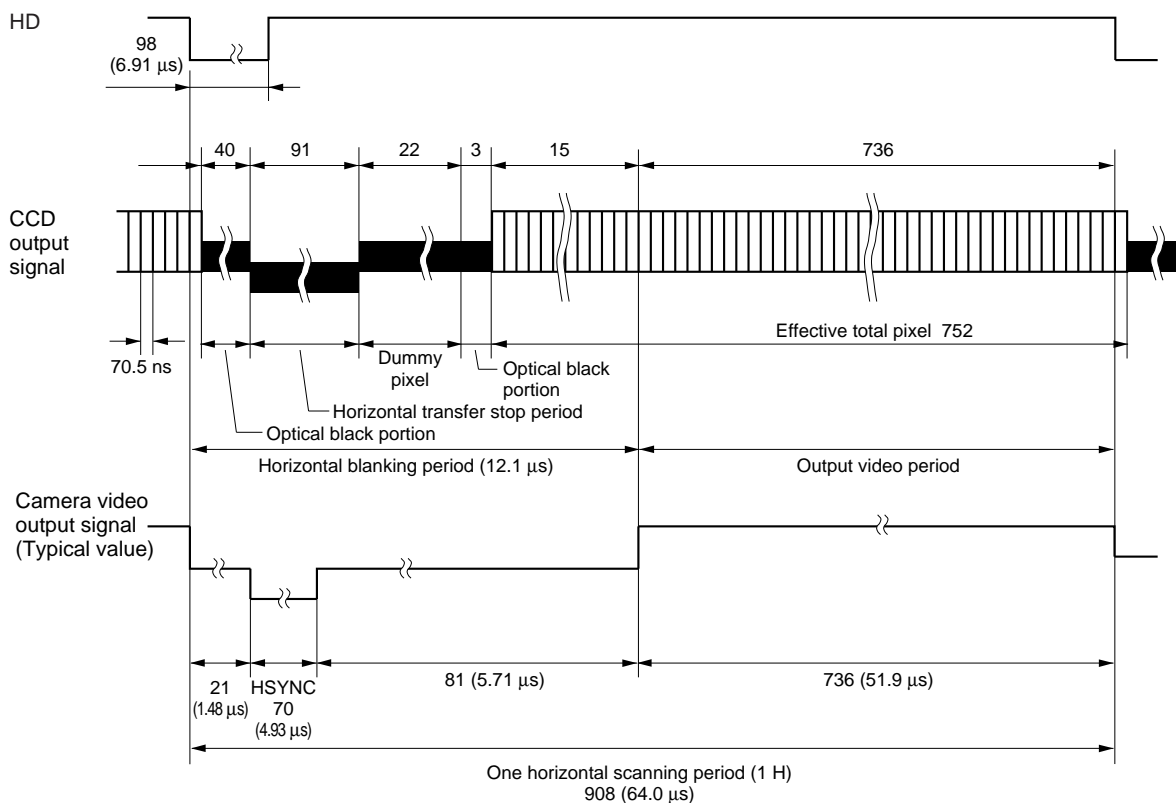
## OUTPUT WAVEFORM TIMING CHART (XC-ES50/EI50/ES30/EI30(EIA))

### ◇ Timing chart of vertical output waveform (2:1 interlaced field integration)

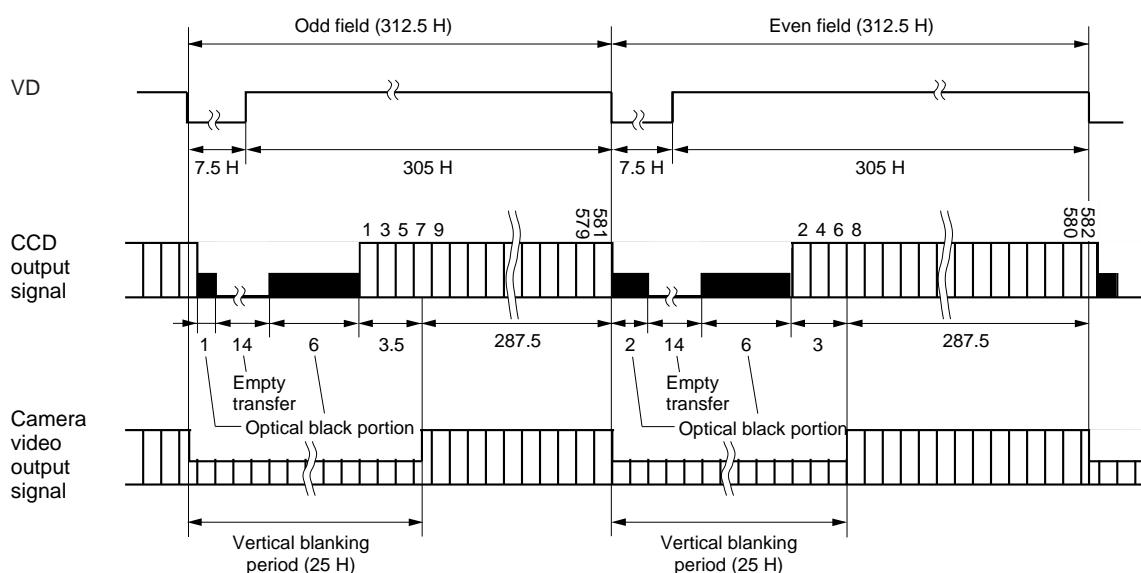


## OUTPUT WAVEFORM TIMING CHART (XC-ES50CE/EI50CE/ES30CE/EI30CE (CCIR))

### ◇ Timing chart of horizontal output waveform

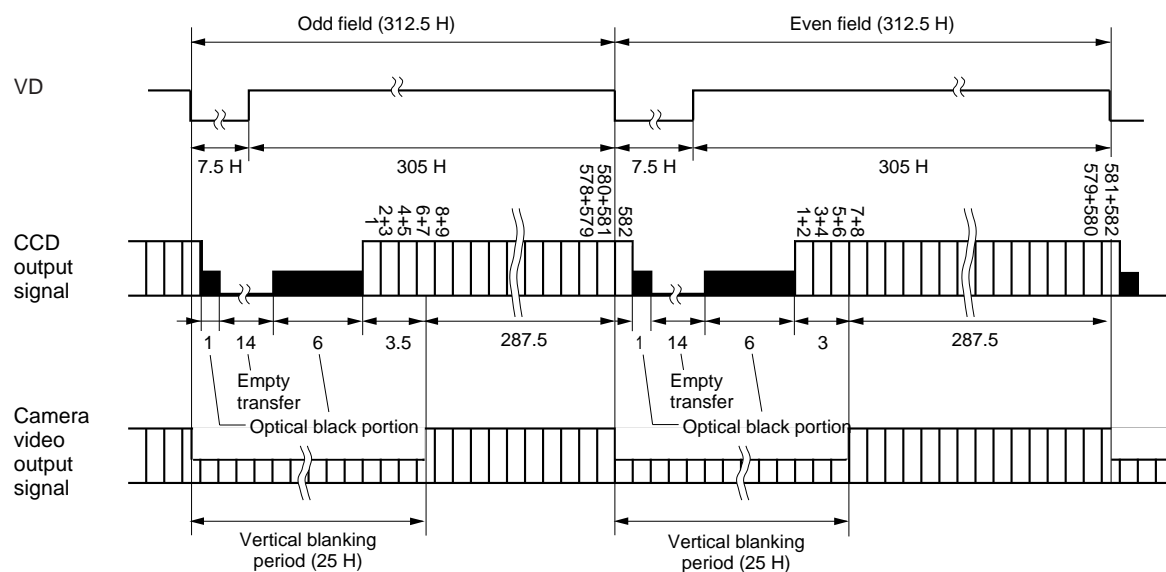


### ◇ Timing chart of vertical output waveform (2:1 interlaced frame integration)



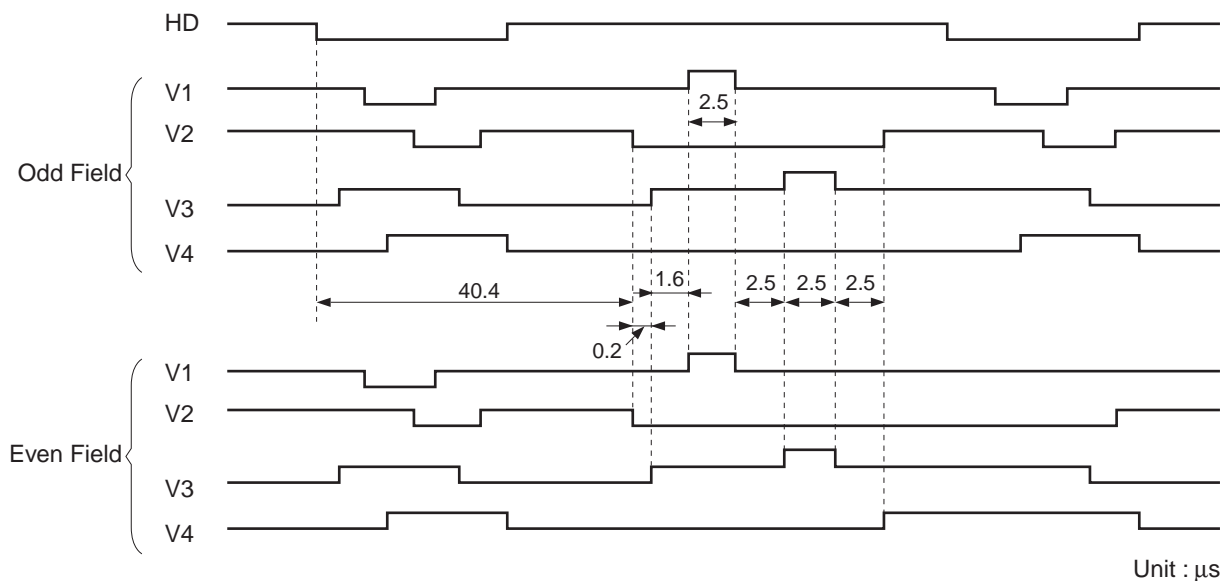
## OUTPUT WAVEFORM TIMING CHART (XC-ES50CE/EI50CE/ES30CE/EI30CE (CCIR))

### ◇ Timing chart of vertical output waveform (2:1 interlaced field integration)

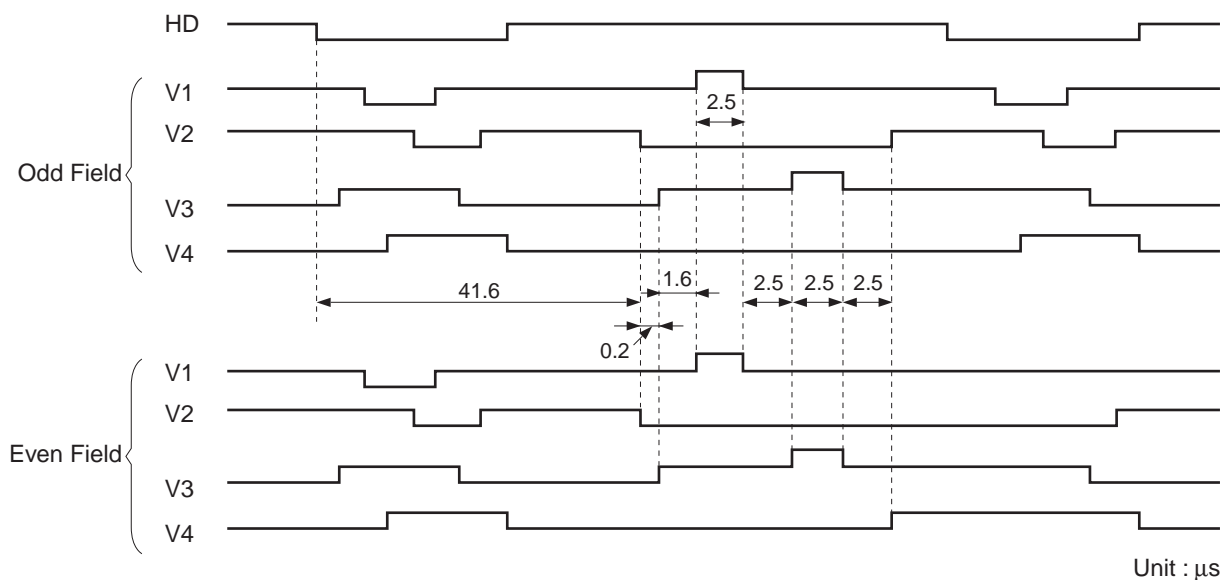


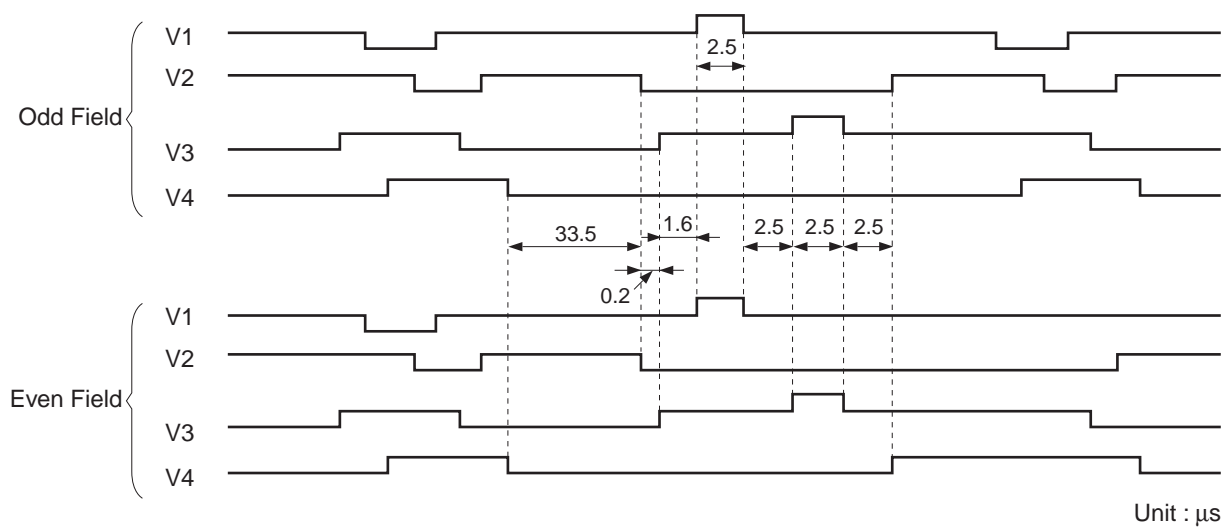
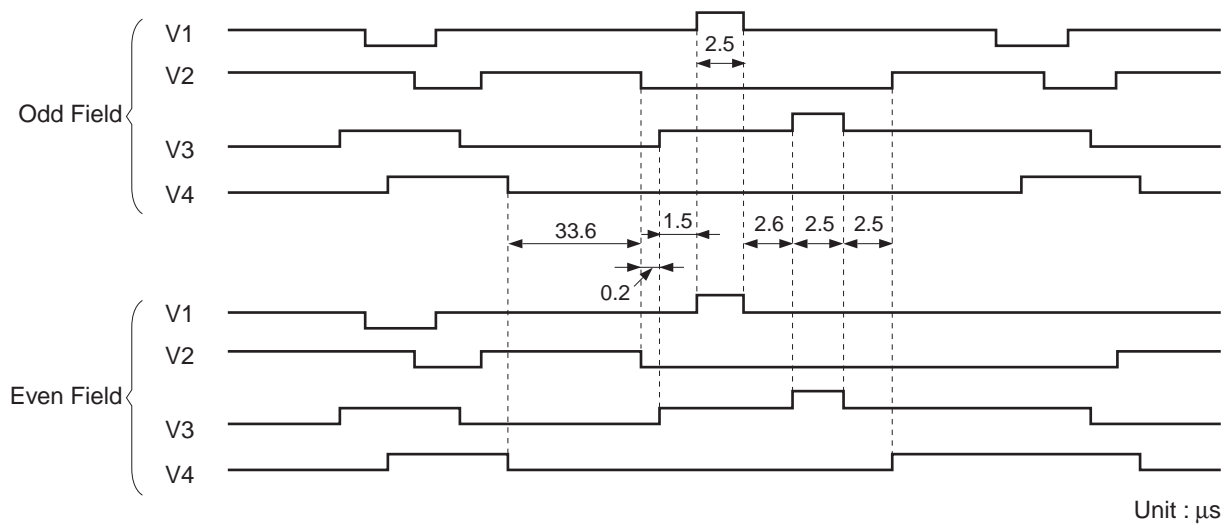
# SENSOR READ CLOCK TIMING CHART

## XC-ES30



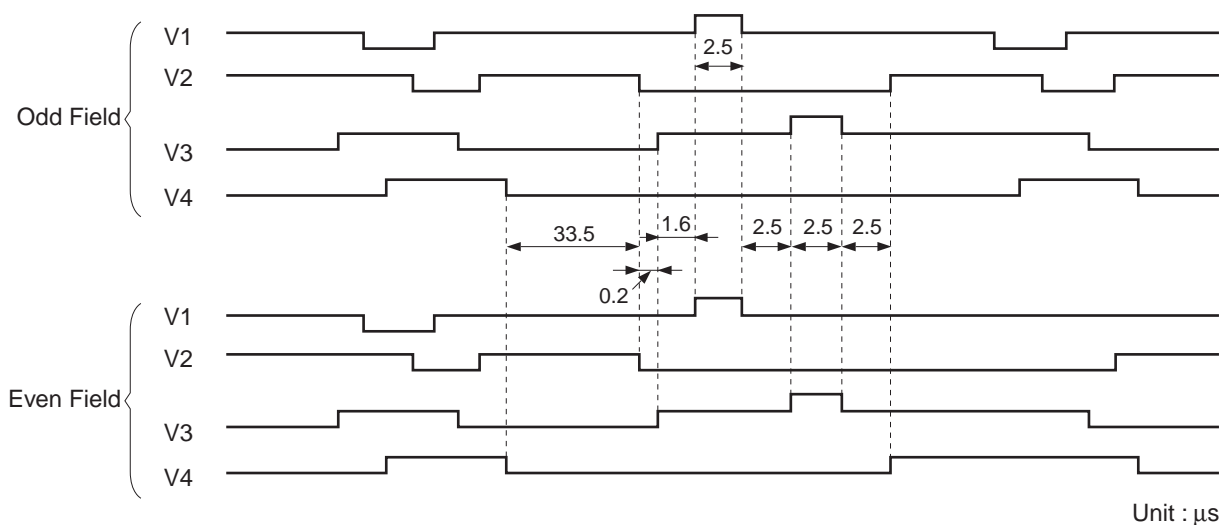
## XC-ES30CE



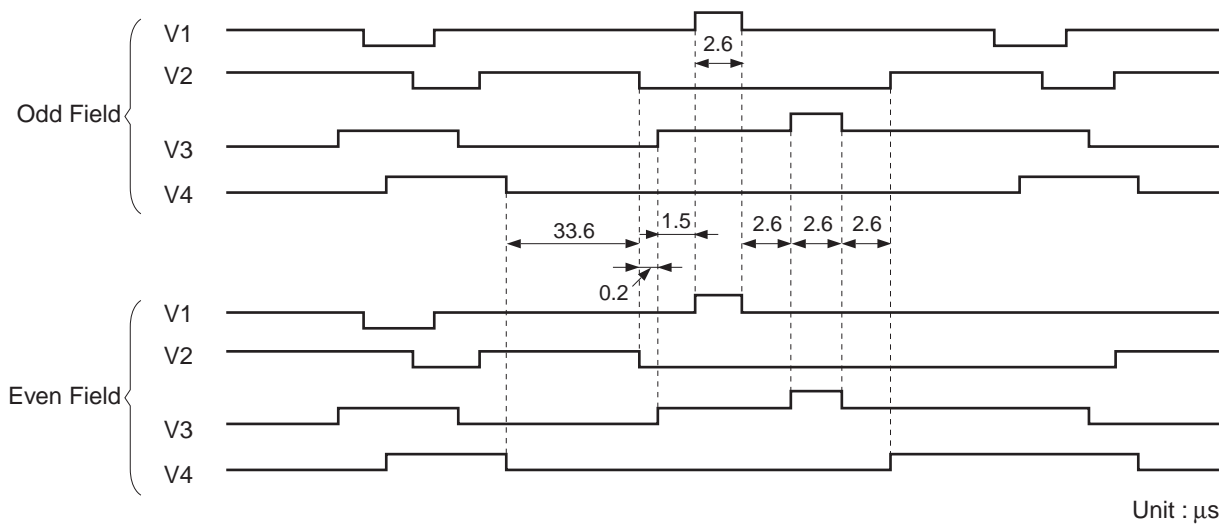
**SENSOR READ CLOCK TIMING CHART****XC-ES50****XC-ES50CE**

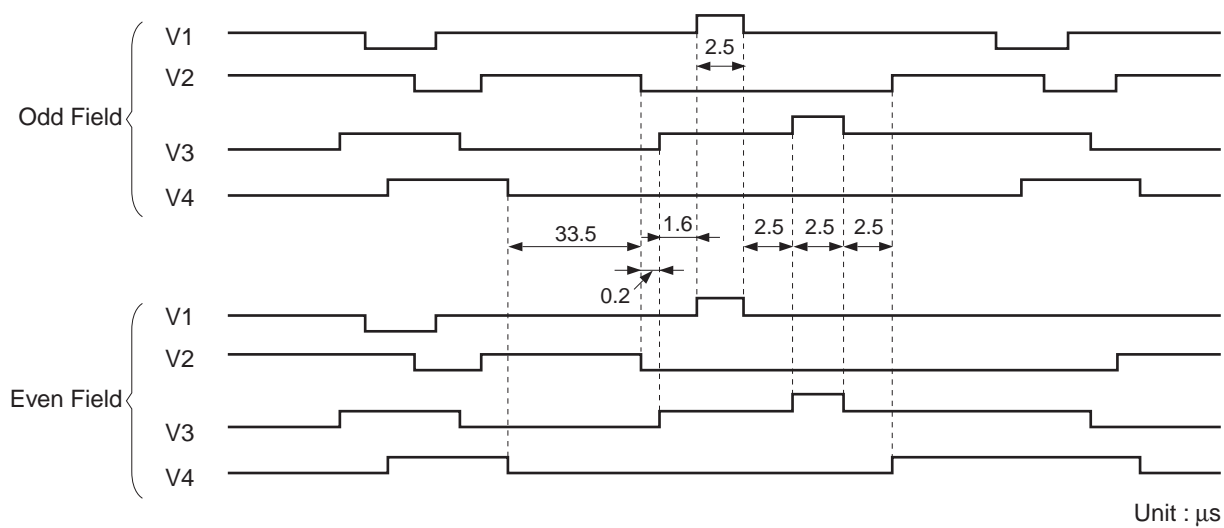
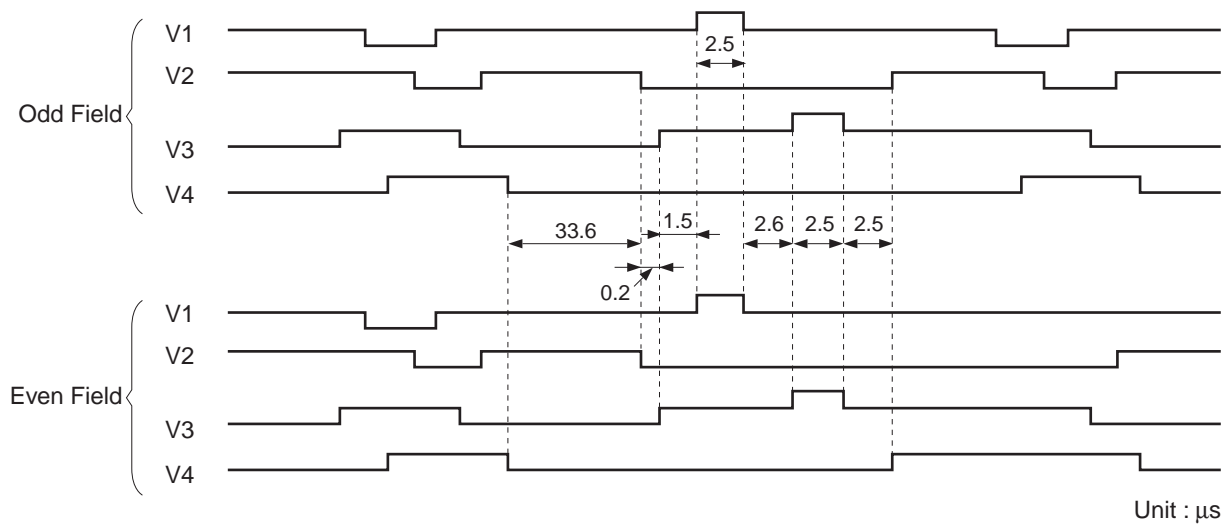
## SENSOR READ CLOCK TIMING CHART

### XC-EI30



### XC-EI30CE



**SENSOR READ CLOCK TIMING CHART****XC-EI50****XC-EI50CE**

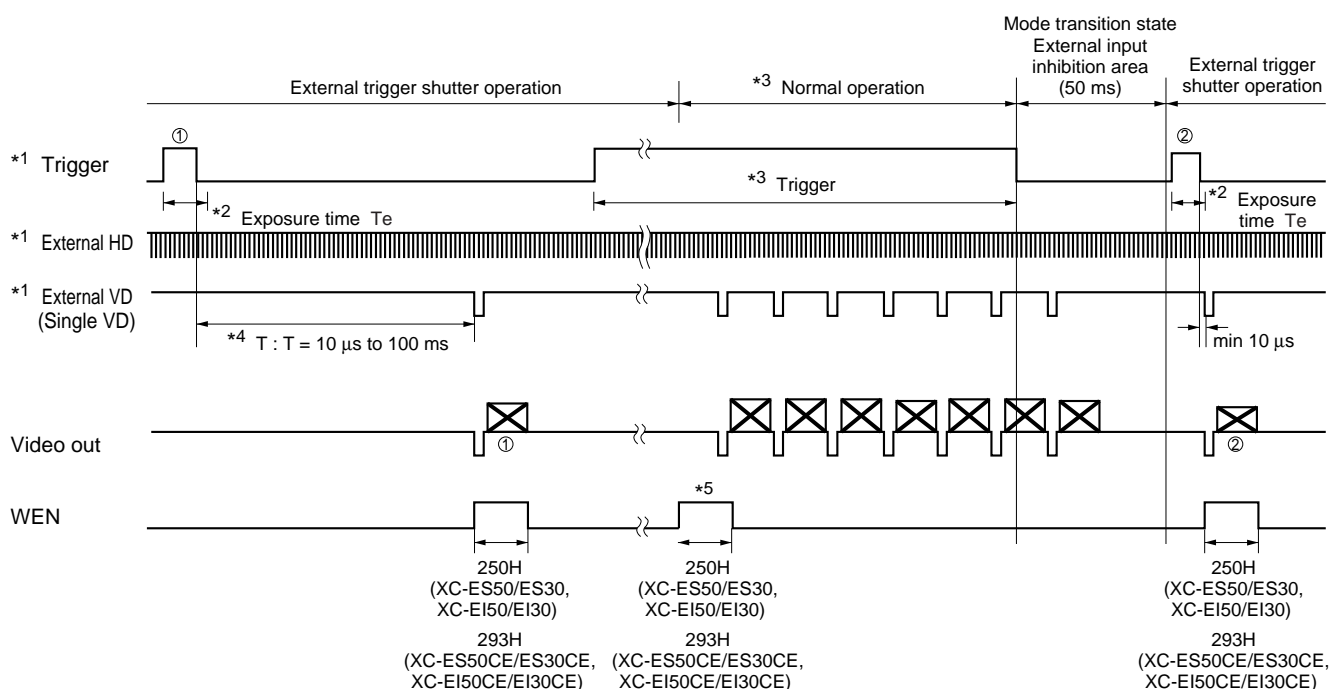




## TIMING CHART OF EXTERNAL TRIGGER SHUTTER - MODE 1 (NON-RESET MODE)

### ■ For setting the shutter speed using TRG width

#### ◇ HD/VD input



#### • Continuous HD input and single VD input

- ★1: This is a signal input from the outside. Be sure to input both HD and VD signals in this case. Make the phase of the VD signal coincide with the falling edge of the HD signal during input operation.
- ★2: Exposure time  $T_e$ 

$$T_e = \text{Trigger width} + 97 \mu\text{s} \text{ (XC-ES50/ES30, XC-EI50/EI30),}$$

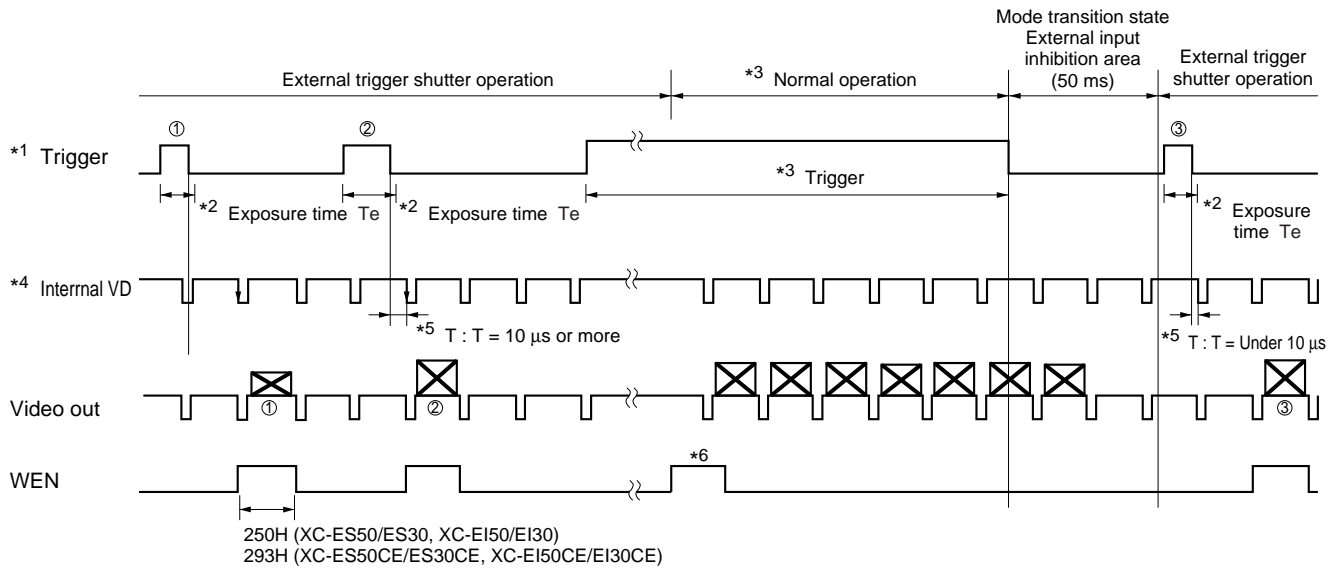
$$T_e = \text{Trigger width} + 120 \mu\text{s} \text{ (XC-ES50CE/ES30CE, XC-EI50CE/EI30CE)}$$
 (The trigger width should be between 2  $\mu$ s and 1/4 s)
- ★3: The normal operation state is engaged when the trigger high period exceeds 1/3 sec. After that the external trigger shutter operation is engaged when the trigger pulse goes "low". In this case, the area between the falling edge of a trigger pulse and the subsequent 50 ms period is an external trigger input inhibition area. During the trigger inhibit period, an input trigger may be missed.
- ★4: Be sure to input an external VD signal between 10  $\mu$ s and 75 ms from the falling edge of a trigger pulse (as shown by ① and ② in the figure). For the input (except described above), the operation cannot be ensured. If the external VD signal is not input under the prescribed conditions, the normal operation is engaged several V after a change in input operation under the prescribed conditions.
- ★5: When the external trigger shutter mode changes into the normal operation mode, one WEN signal is output.

**Note** : An image is superimposed when the next exposure ends before the previous image is output.

## TIMING CHART OF EXTERNAL TRIGGER SHUTTER - MODE 1 (NON-RESET MODE)

### ■ For setting the shutter speed using TRG width

#### ◇ No HD/VD input (Internal synchronization)



★1: This is a signal input from the outside.

★2: Exposure time  $T_e$   $T_e = \text{Trigger width} + 97 \mu\text{s}$  (XC-ES50/ES30, XC-EI50/EI30),  
 $T_e = \text{Trigger width} + 120 \mu\text{s}$  (XC-ES50CE/ES30CE, XC-EI50CE/EI30CE)

★3: The normal operation state is engaged when the high period exceeds 1/3 sec. After that, the external trigger shutter operation is engaged when the trigger pulse goes "low". In this case, the area between the falling edge of a trigger pulse and the subsequent 50 ms period is an external input inhibition area. During the trigger inhibit period, an input trigger may be missed.

★4: An internal VD signal is output by setting the INT/EXT switch on the rear panel to INT.

★5: During external trigger shutter operation, an image is output when an internal VD signal falls after a trigger pulse falls (as shown by ① and ② in the figure). However, if the time (T in the figure) between the falling edges of a trigger pulse and internal VD signal is under  $10 \mu\text{s}$ , an image is output when the internal VD signal or the next internal VD signal falls (as shown by ③ in the figure). (In this case, an image is output when the next internal VD signal falls.) An image and WEN signal are always output together. For more details, refer to the WEN signal. (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.

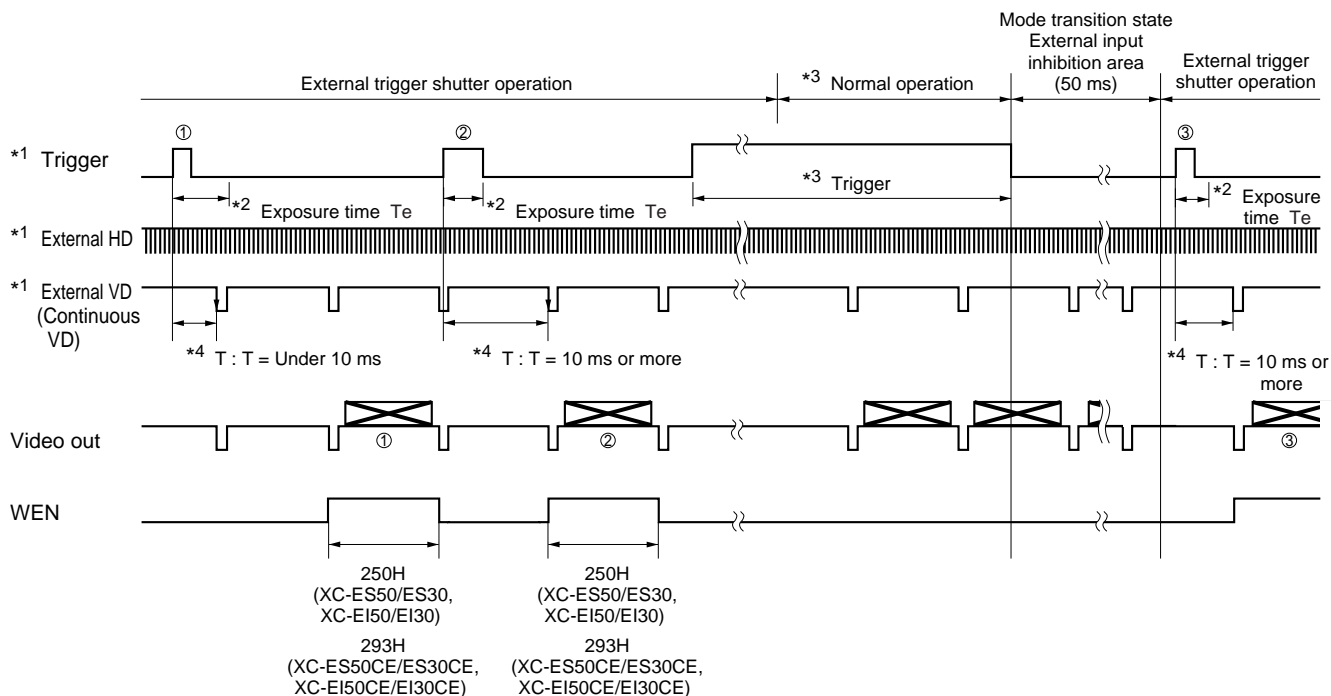
**Note** : An image is superimposed when the next exposure ends before the previous image is output.

## TIMING CHART OF EXTERNAL TRIGGER SHUTTER - MODE 1 (NON-RESET MODE)

### ■ For setting the shutter speed using DIP switch

#### ◇ HD/VD input

##### • Continuous HD/VD input



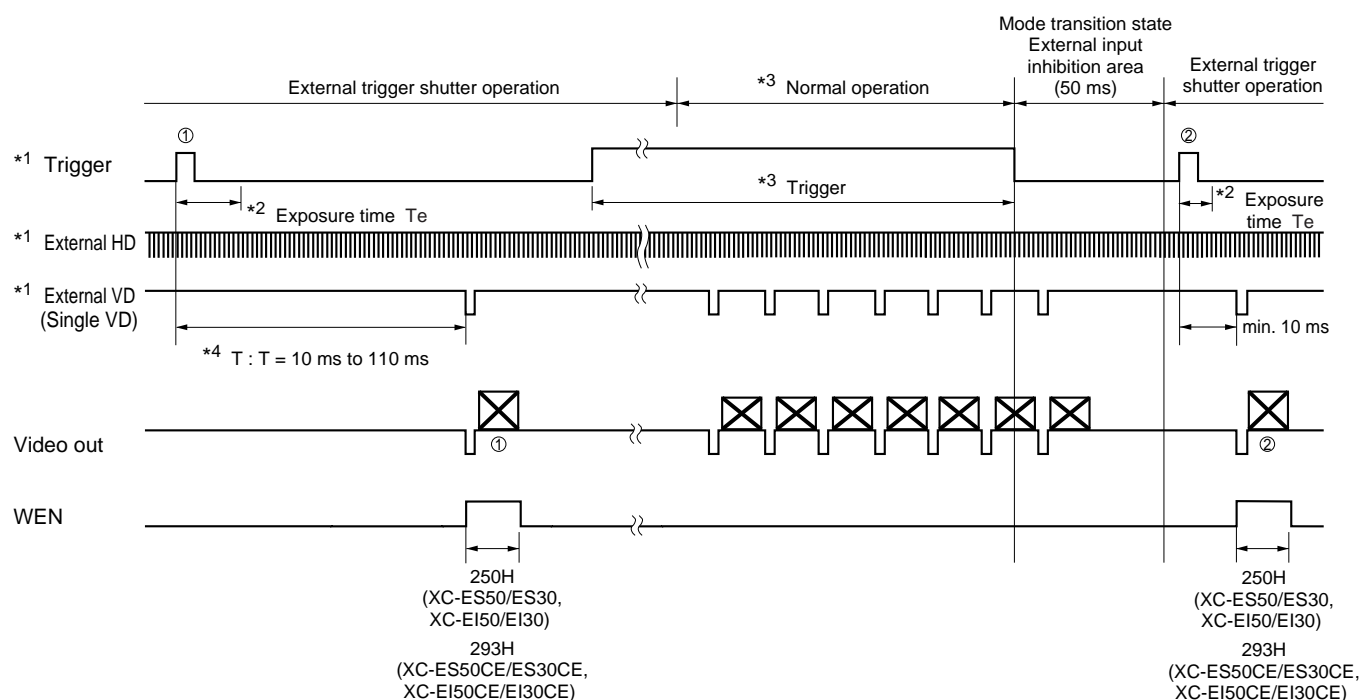
**Note** : An image is superimposed when the next exposure ends before the previous image is output.

## TIMING CHART OF EXTERNAL TRIGGER SHUTTER - MODE 1 (NON-RESET MODE)

### ■ For setting the shutter speed using DIP switch

#### ◇ HD/VD input

- Continuous HD input and single VD input



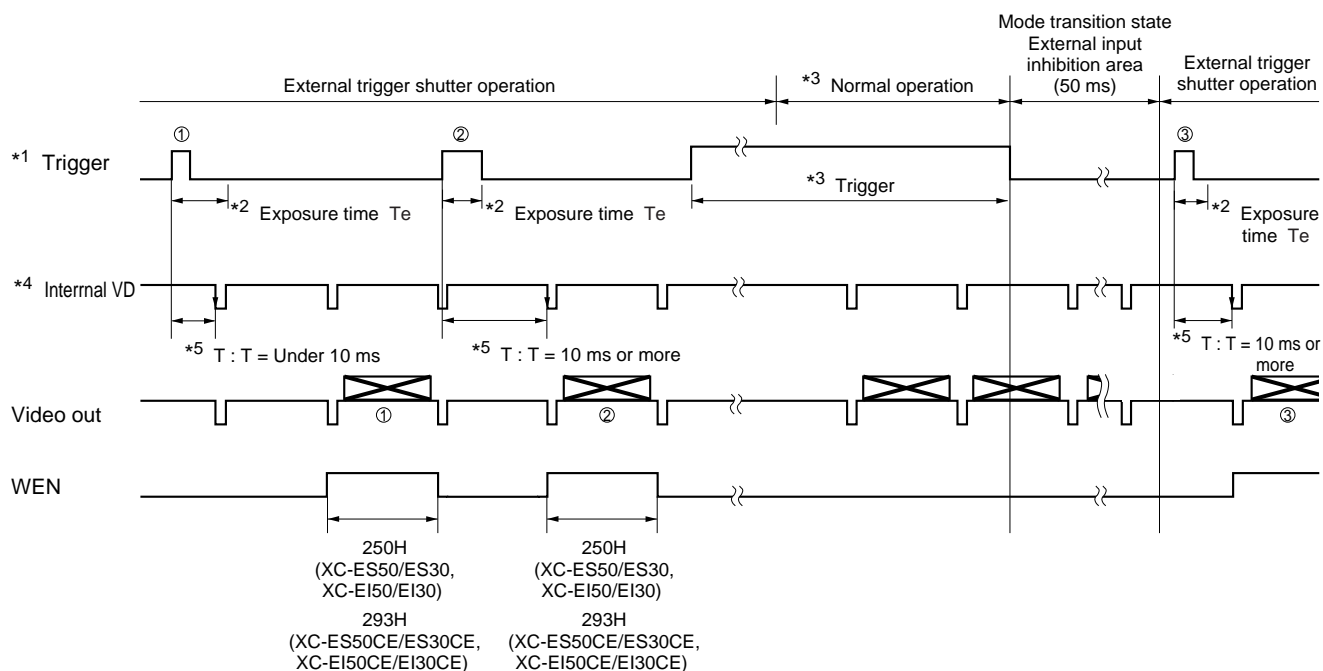
- \*1: This is a signal input from the outside. Be sure to input both HD and VD signals. Make the phase of the VD signal coincide with the falling edge of the HD signal.
- \*2: As shown in the table on page 7, exposure time  $T_e$  is determined by the setting of a DIP switch.
- \*3: The normal operation state is engaged when the high period exceeds 1/3 sec. After that, the external trigger shutter operation is engaged when the trigger pulse goes "low". In this case, the area between the falling edge of a trigger pulse and the subsequent 50 ms period is an external input inhibition area. During the trigger inhibit period, an input trigger may be missed.
- \*4: Be sure to input an external VD signal for 10 ms to 75 ms from the rising edge of a trigger pulse (as shown by ① and ② in the figure). For the input except described above, the operation cannot be ensured. If the external VD signal is not input under the prescribed conditions, the normal operation is engaged several V after a change in input operation under the prescribed conditions.

**Note** : An image is superimposed when the next exposure ends before the previous image is output.

## TIMING CHART OF EXTERNAL TRIGGER SHUTTER - MODE 1 (NON-RESET MODE)

### ■ For setting the shutter speed using DIP switch

#### ◇ No HD/VD input (Internal synchronization)



★1: This is a signal input from the outside.

★2: As shown in the table on page 7, exposure time  $T_e$  is determined by the setting of a DIP switch.

★3: The normal operation state is engaged when the high period exceeds 1/3 sec. After that, the external trigger shutter operation is engaged when the trigger pulse goes "low". In this case, the area between the falling edge of a trigger pulse and the subsequent 50 ms period is an external input inhibition area. During the trigger inhibit period, an input trigger may be missed.

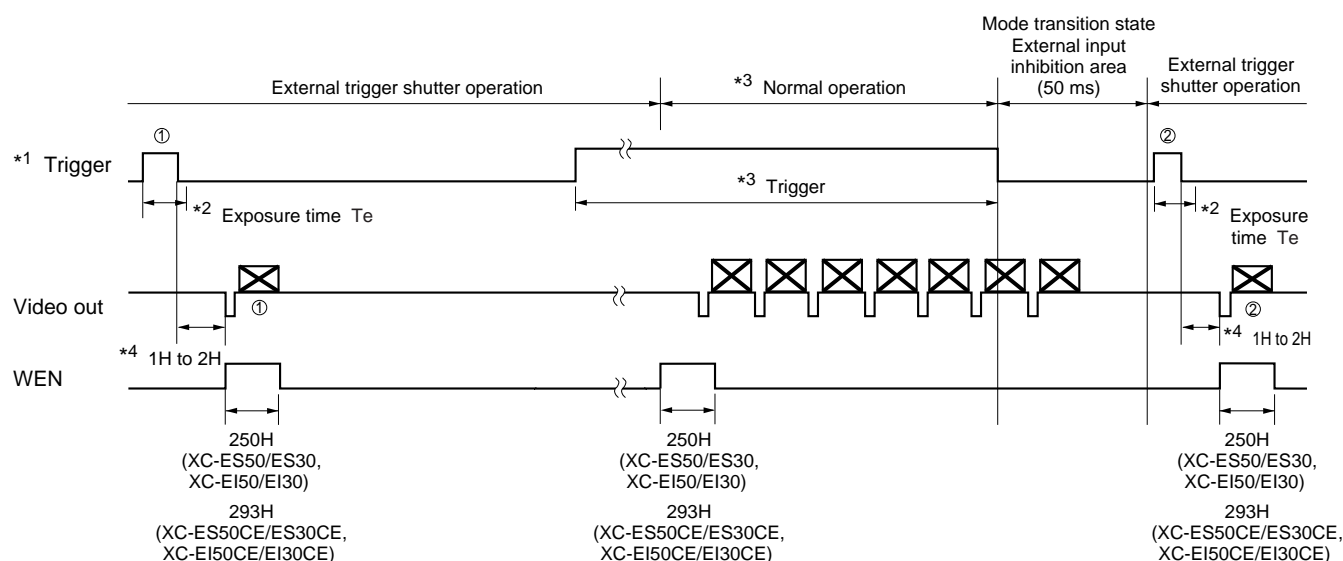
★4: An internal VD signal is output by setting the INT/EXT switch on the rear panel to INT.

★5: An image is output when an internal VD signal falls 10 ms or more after a trigger pulse rises (as shown by ② and ③ in the figure). If the time ( $T$  in the figure) between the falling edges of a trigger pulse and internal VD signal is under 10 ms, an image is output when the internal VD signal or the next internal VD signal falls (as shown by ① in the figure). In this case, an image is output when the next internal VD signal falls. An image and WEN signal are always output together. For more details, refer to the WEN signal. (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 superimposed when the next exposure ends before the previous image is output.

## TIMING CHART OF EXTERNAL TRIGGER SHUTTER - MODE 2 (RESET MODE)

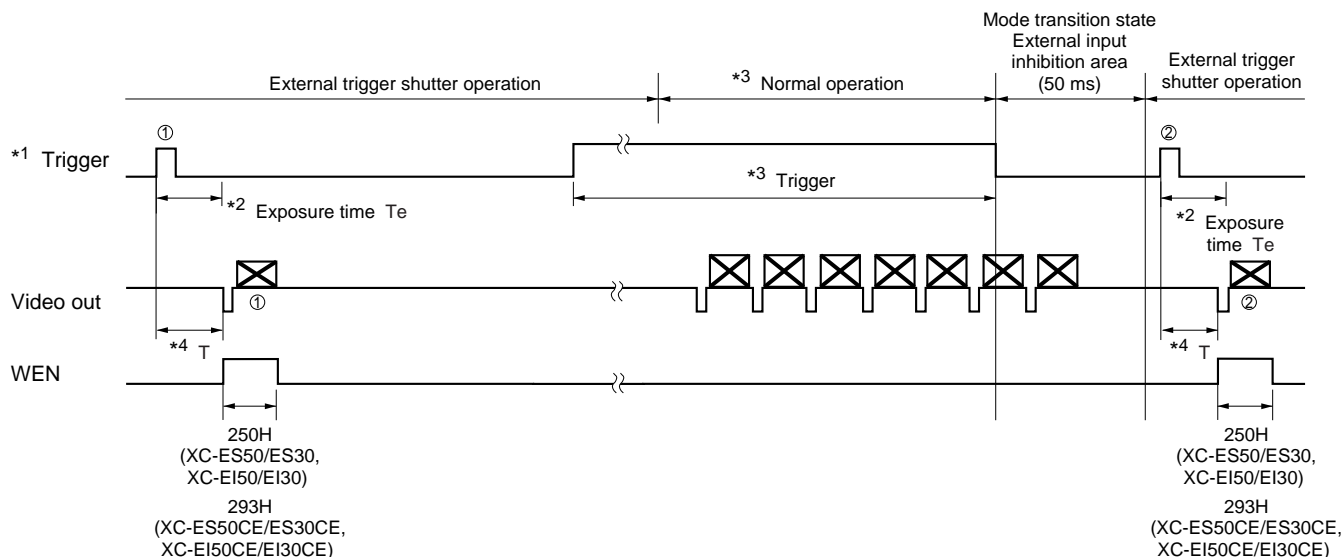
### ■ For setting the shutter speed using TRG width



- \*1: This is a signal input from the outside. 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  $T_e$      $T_e = \text{Trigger width} + 97 \mu\text{s}$  (XC-ES50/ES30, XC-EI50/EI30),  
 $T_e = \text{Trigger width} + 120 \mu\text{s}$  (XC-ES50CE/ES30CE, XC-EI50CE/EI30CE)  
 (The trigger width should be between 2  $\mu\text{s}$  and 1/4 s)
- \*3: The normal operation state is engaged when the high period exceeds 1/3 sec. After that, the external trigger shutter operation is engaged when the trigger pulse goes "low". In this case, the area between the falling edge of a trigger pulse and the subsequent 50 ms period is an external input inhibition area. During the trigger inhibit period, an input trigger may be missed.
- \*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.

## TIMING CHART OF EXTERNAL TRIGGER SHUTTER - MODE 2 (RESET MODE)

### ■ For setting the shutter speed using DIP switch



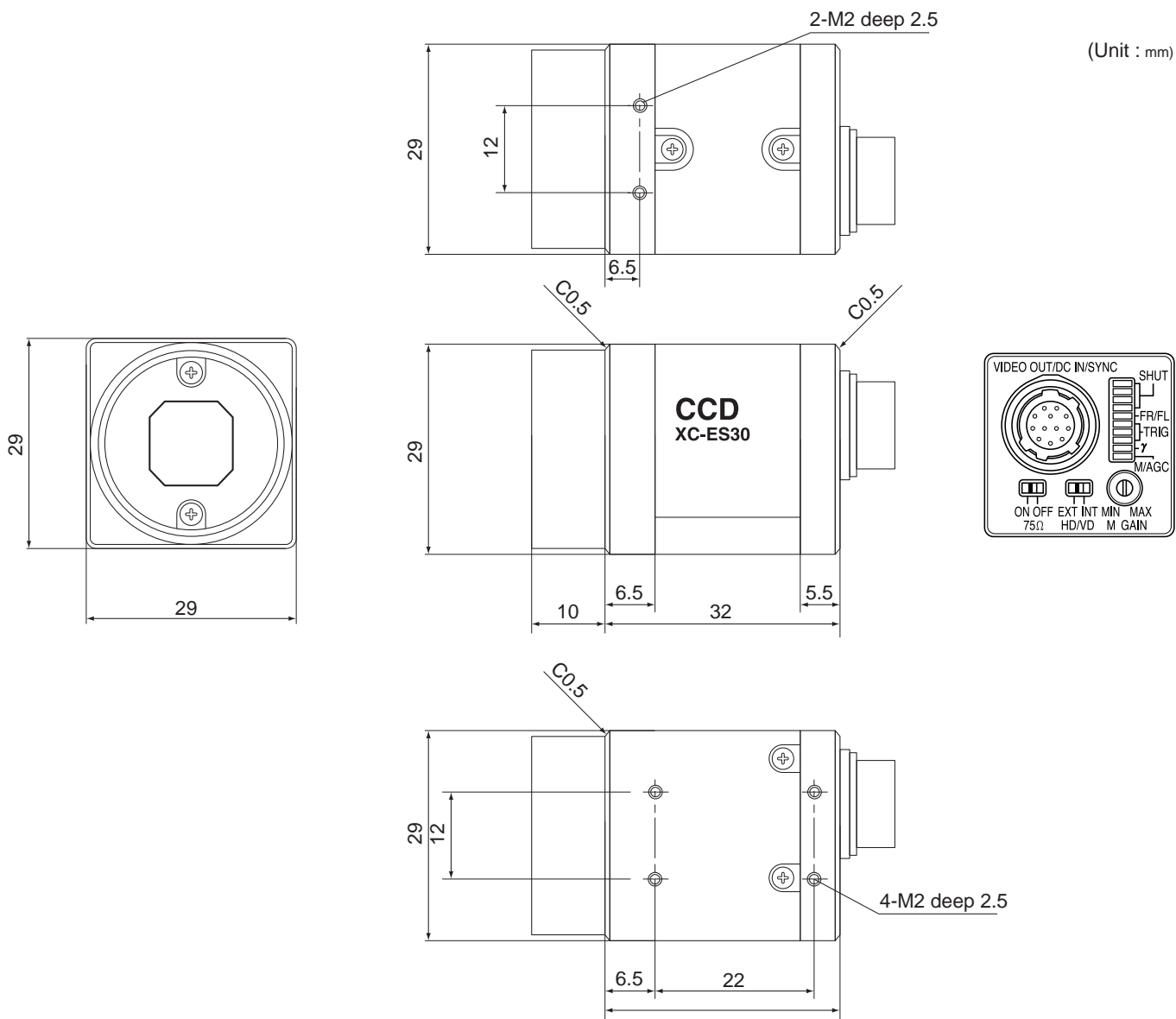
- \*1: This is a signal input from the outside. The trigger interval should be shutter speed (DIP switch) + 1 field + 2H period or more. The trigger interval shorter than described above cannot be ensured. If a trigger pulse is not input under the prescribed conditions, the normal operation is engaged several V after a change in input operation under the prescribed conditions.
- \*2: As shown in the table on page 7, exposure time  $T_e$  is determined by the setting of a DIP switch.
- \*3: The normal operation state is engaged when the high period exceeds 1/3 sec. After that, the external trigger shutter operation is engaged when the trigger pulse goes "low". In this case, the area between the falling edge of a trigger pulse and the subsequent 50 ms period is an external input inhibition area. During the trigger inhibit period, an input trigger may be missed.
- \*4: After a period set by a DIP switch from the rising edge of the trigger, an image is output.

## DIMENSIONS

■ XC-ES50/50CE, XC-EI50/EI50CE

## **XC-ES30/30CE, XC-EI30/EI30CE**

**(XC-ES30 model)**

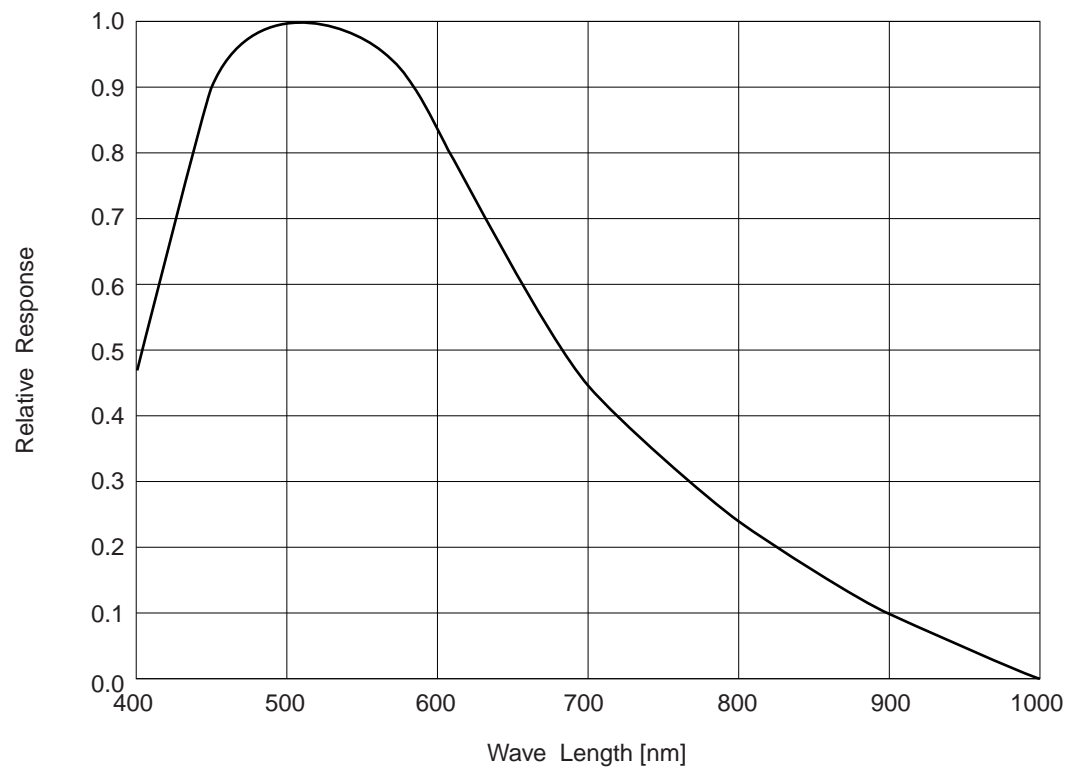




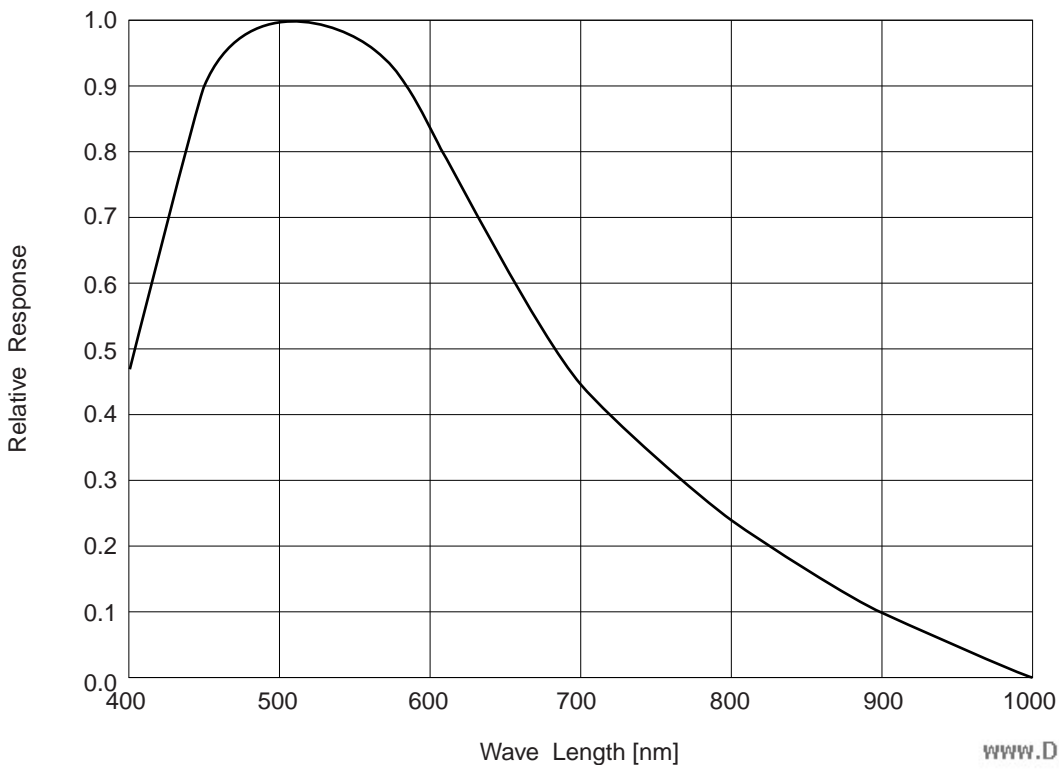
# SPECTRAL RESPONSE CHARACTERISTICS

(Typical Value)

XC-ES30



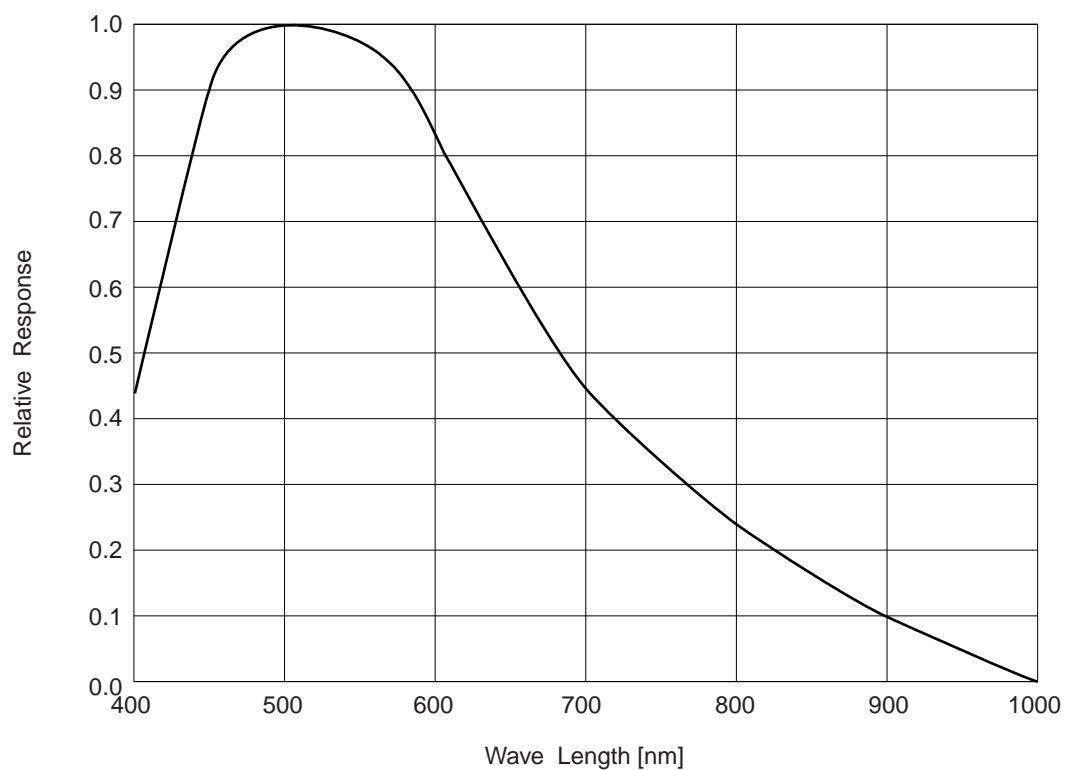
XC-ES30CE



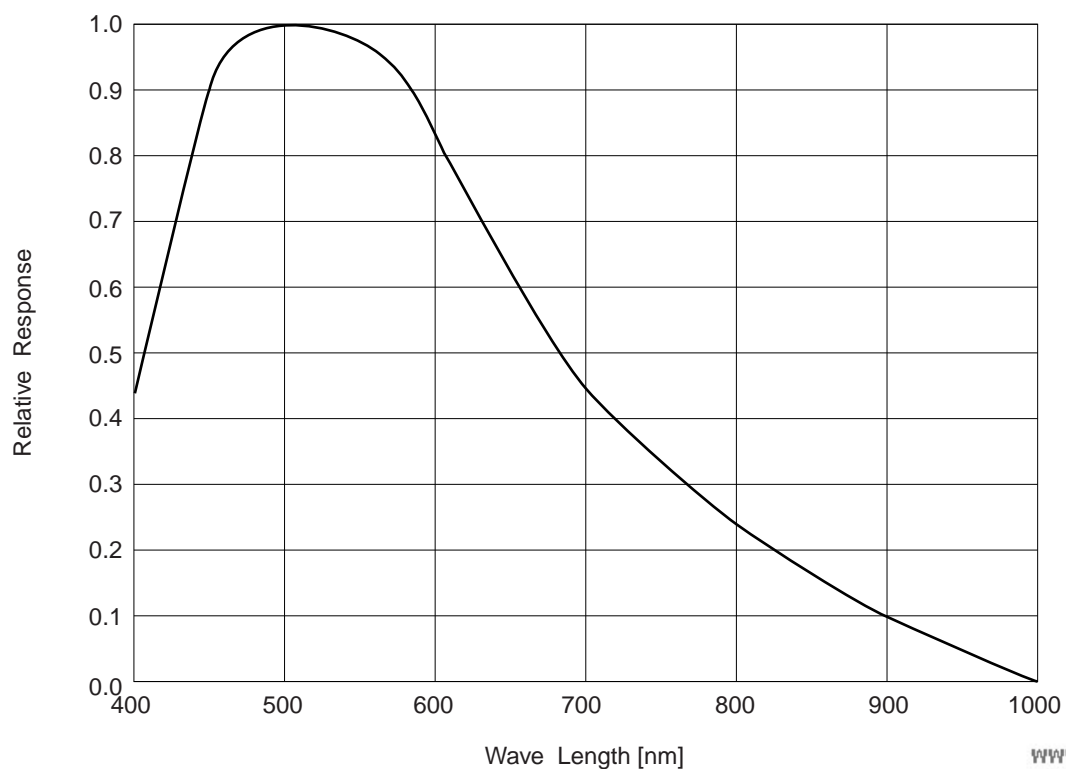
## SPECTRAL RESPONSE CHARACTERISTICS

(Typycal Value)

### XC-ES50



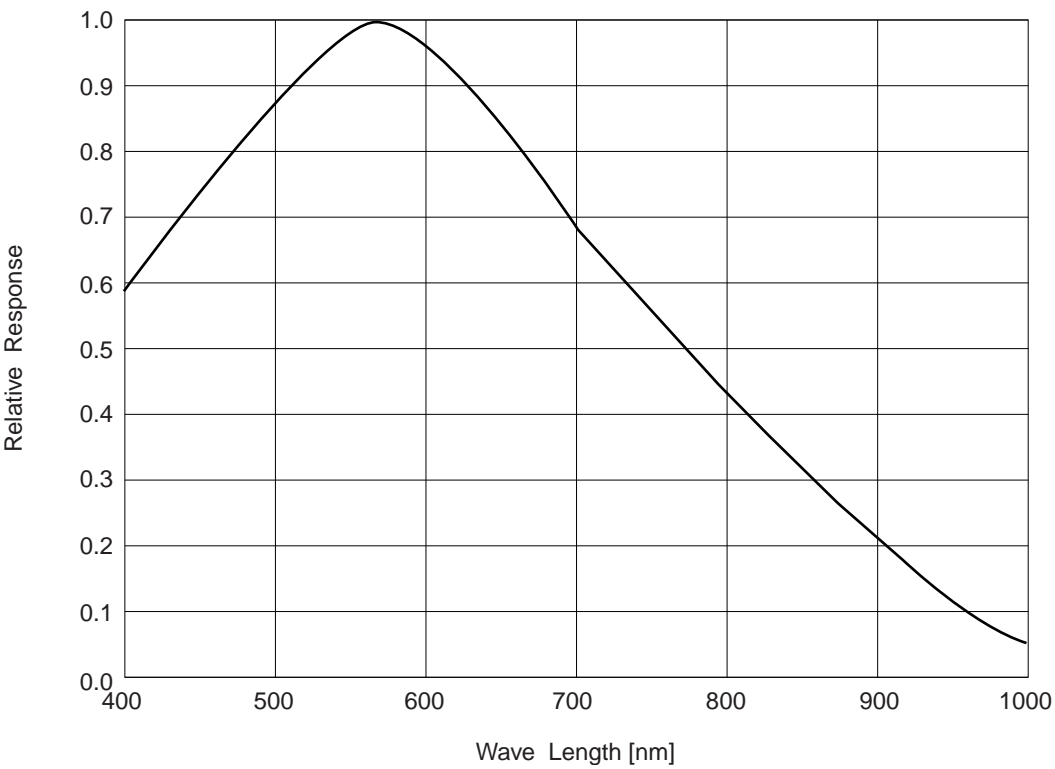
### XC-ES50CE



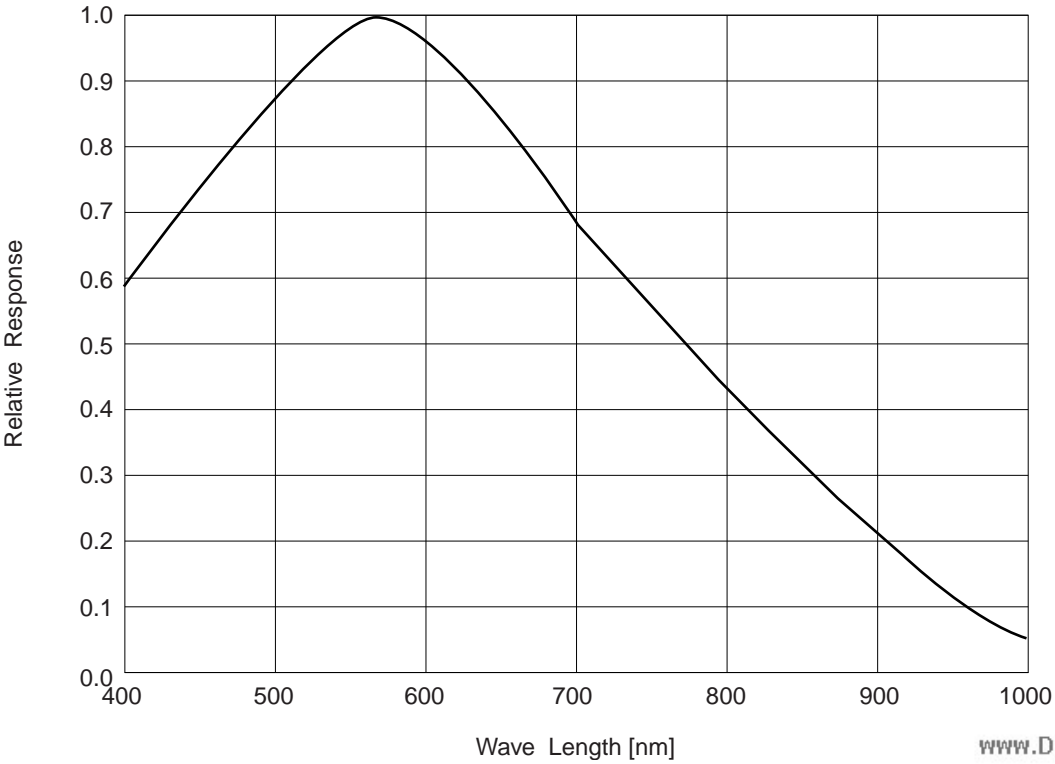
**SPECTRAL RESPONSE CHARACTERISTICS**

(Typycal Value)

XC-EI30



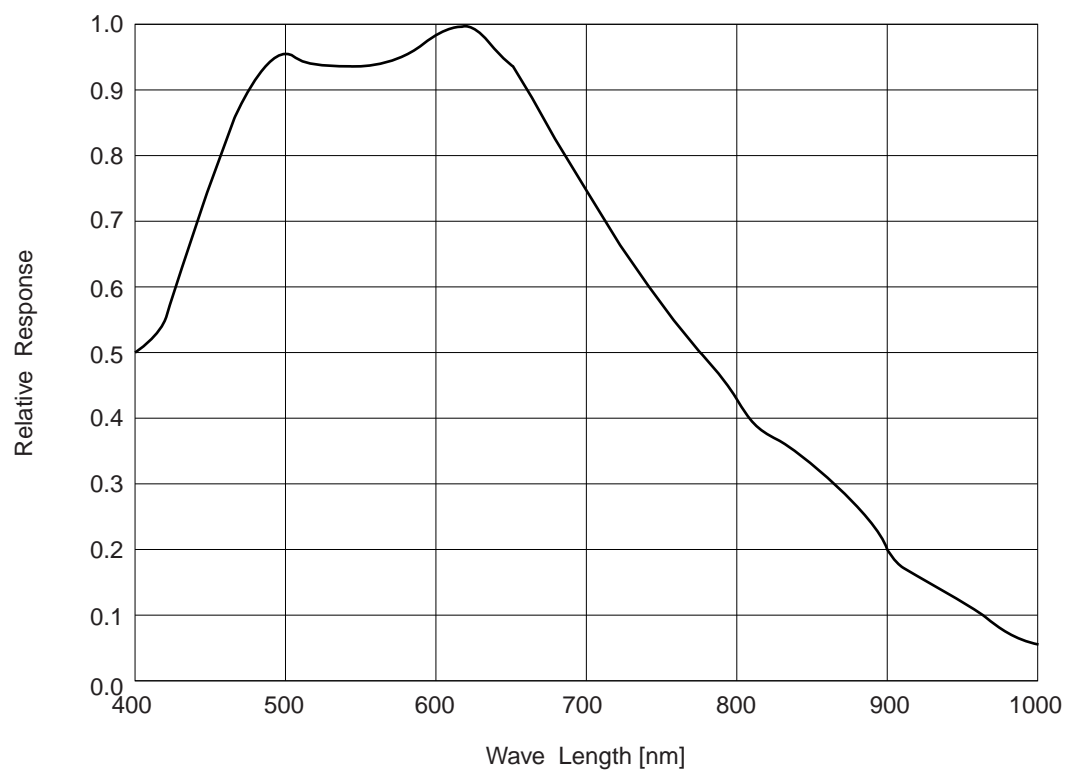
XC-EI30CE



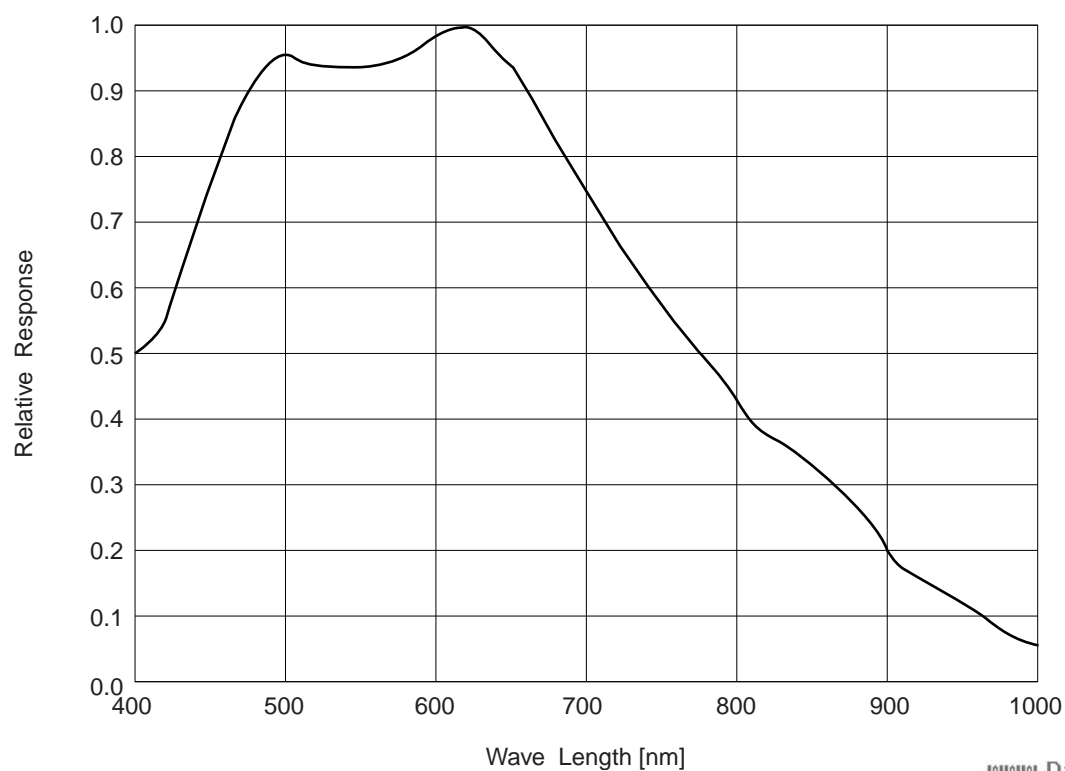
## SPECTRAL RESPONSE CHARACTERISTICS

(Typical Value)

### XC-EI50



### XC-EI50CE



## VARIOUS LENS SELECTION

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

### ■ XC-ES50/50CE, XC-ES30/30CE

#### XC-EI50/50CE, XC-EI30/30CE 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<br>(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<br>maximum proximity<br>(horizontal × vertical) (mm) | XC-ES50/EI50     | 181×132.8   | 125.2×92.1  | 119.4×88.5  | 52.1×38.8   | 49.2×37   |
|  | XC-ES50CE/EI50CE | 181.3×133.3 | 125.5×92.5  | 119.6×88.8  | 52.1×38.9   | 49.7×37.1 |
|  | XC-ES30/EI30     | 136.8×100   | 94.7×69.6   | 90×66.8     | 39.4×29.3   | 37.2×27.9 |
|  | XC-ES30CE/EI30CE | 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       | 12.50       | 11.60       | 22.10     |
| 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

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Fax: +81-46-230-6243

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Fax: +1-416-497-1774

**XC-ES50/50CE**  
**XC-ES30/30CE**  
**XC-EI50/50CE**  
**XC-EI30/30CE**



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<http://www.pro.sony-europe.com/ISP>

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