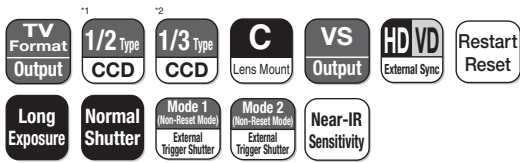


# XC-EI50/EI50CE XC-EI30/EI30CE



\*1: XC-EI50/EI50CE  
\*2: XC-EI30/EI30CE



Connection Diagram **P96**



## Outline

Like the XC-EI50/EI50CE and XC-EI30/EI30CE, the XC-ES50/ES30 is compact and lightweight and offers near-infrared sensitivity.

Extremely sharp images can be obtained when used under red LED illumination or in near-infrared light, such as in funduscopes.

## Features

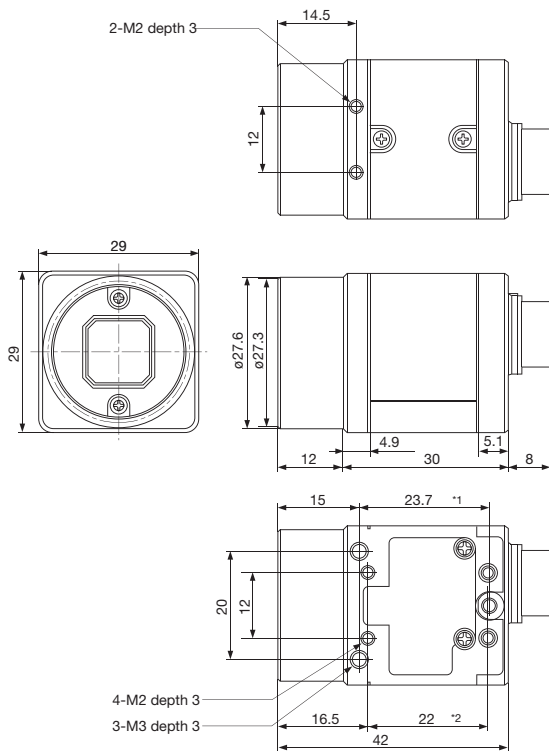
- XC-EI50/EI50CE: 1/2 type interline CCD
- XC-EI30/EI30CE: 1/3 type interline CCD
- Near-IR sensitivity
- High sensitivity: F1.4  
XC-EI50/EI50CE: 0.1 lx  
XC-EI30/EI30CE: 0.2 lx
- High S/N ratio: 60 dB
- Electronic shutter function (1/100 to 1/10,000 s)
- External trigger shutter function (1/4 to 1/10,000 s)
- 2:1 Interlaced/non-interlaced
- Frame/Field accumulation
- Restart/Reset function
- Sync system: Internal/external (HD/VD)
- High shock and vibration resistance

## Accessories

- Compact camera adaptor
  - DC-700/700CE
- 12-pin camera cable (CE standard)
  - CCXC-12P02N (2 m)
  - CCXC-12P05N (5 m)
  - CCXC-12P10N (10 m)
  - CCXC-12P25N (25 m)
- Tripod adaptor
  - VCT-333I

## Dimensions

Camera body of all XC-E models



Unit: mm

\*1: M3 screw size  
\*2: M2 screw size

### Notice

From January 2005, the outside dimensions of XC-E series consoles will be changed to the same dimensions of XC-HR series consoles.

For the new outside dimensions, see page 86.

The outside dimensions will be changed from the following serial numbers.

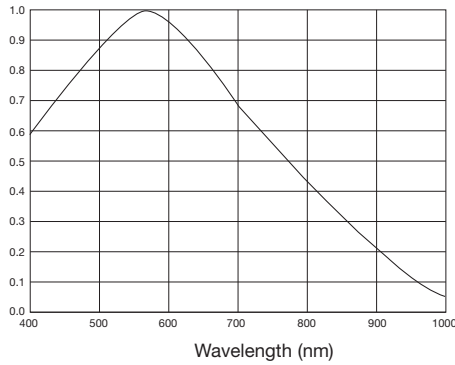
- XC-ES50/XC-ES30: 250001
- XC-ES50CE/ES30CE: 550001
- XC-ES51:150001
- XC-ES51CE:450001

# Spectral Sensitivity Characteristics

## • XC-EI30

(Typical Values)

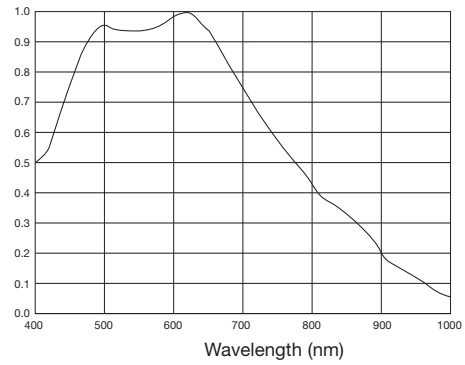
Relative sensitivity



## • XC-EI50

(Typical Values)

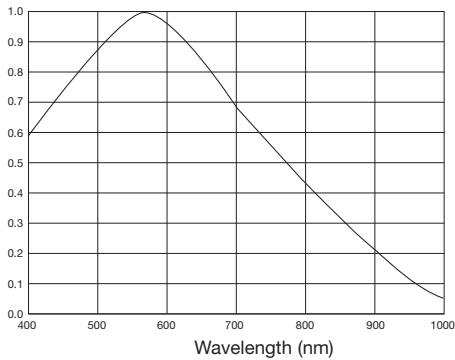
Relative sensitivity



## • XC-EI30CE

(Typical Values)

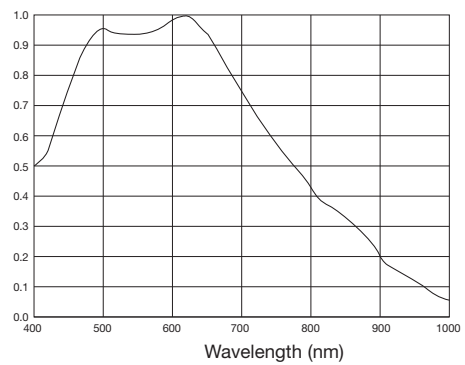
Relative sensitivity



## • XC-EI50CE

(Typical Values)

Relative sensitivity



(Lens characteristics and light source characteristics excluded.)

# Specifications

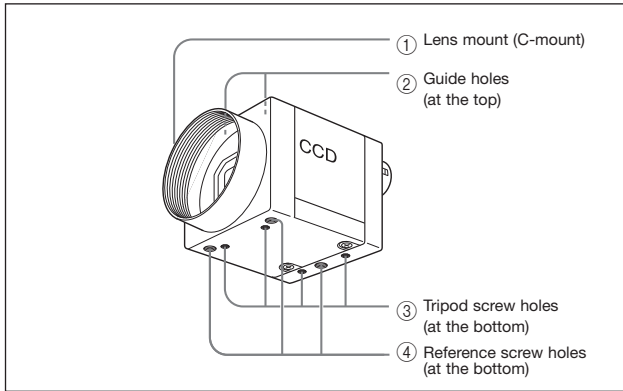
	XC-EI50	XC-EI50CE	XC-EI30	XC-EI30CE
Image device	1/2 type IT CCD		1/3 type IT CCD	
Signal system	EIA	CCIR	EIA	CCIR
Effective picture elements (H) × (V)	768 × 494	752 × 582	768 × 494	752 × 582
Effective lines (H) × (V)	752 × 485	736 × 575	752 × 485	736 × 575
Cell size (H) × (V)	8.4 μm × 9.4 μm	8.6 μm × 8.3 μm	6.35 μm × 7.4 μm	6.5 μm × 6.25 μm
Horizontal frequency	15.734 kHz	15.625 kHz	15.734 kHz	15.625 kHz
Vertical frequency	59.94 Hz	50 Hz	59.94 Hz	50 Hz
Lens mount	C mount			
Sync system	Internal/External (auto)			
External sync system input/output <sup>1</sup>	HD/VD (HD/VD level: 2 to 5 Vp-p)			
External sync frequency	±1% (in horizontal sync frequency)			
Jitter	less than ±20 nsec			
Scanning system	525 lines 2:1 Interlaced (automatic switching according to input signal)			
Video output	1.0 Vp-p, negative, 75 Ω unbalanced			
Horizontal resolution	570 TV lines	560 TV lines	570 TV lines	560 TV lines
Sensitivity	400 lx F11 (γ=ON, MIN GAIN, without IR cut filter)		400 lx F8 (γ=ON, MIN GAIN, without IR cut filter)	
Minimum illumination <sup>2</sup>	0.1 lx		0.2 lx	
S/N ratio	60 dB			
Gain	AGC/Manual (adjustable on the rear panel)			
Gamma	ON/OFF (adjustable on the rear panel)			
Normal shutter	1/100 to 1/10,000 s	1/120 to 1/10,000 s	1/100 to 1/10,000 s	1/120 to 1/10,000 s
External trigger shutter <sup>3</sup>	1/4 to 1/10,000 s	1/4 to 1/8,000 s	1/4 to 1/10,000 s	1/4 to 1/8,000 s
Power requirements	DC 12 V (+9 to 16 V)			
Power consumption	1.6 W		1.4 W	
Dimension	29(W) × 29(H) × 30(D) mm (not including projecting parts)			
Mass	Approx. 50 g			
Operating temperature/humidity	-5°C to +45°C / 20 to 80% (no condensation)			
Storage temperature/humidity	-20°C to +60°C / 20 to 95% (no condensation)			
Performance guarantee temperature	0 to +40°C			
Vibration resistance	10 G (20 to 200 Hz 20 minutes for each direction-x, y, z)			
Shock resistance	70 G			
MTBF	126,469 hours (Approx. 14.4 years)			
Regulatory compliance	UL1492, FCC/ICES-003 : ClassB, CE : EN61326, AS/NZ : EN61326			
Supplied accessories	Lens mount cap (1), Operating instructions (1)			

<sup>1</sup> Automatic switching in response to the presence of an input signal when the VS switch on the rear panel is set to EXT.

<sup>2</sup> F1.4, AGC ON, without IR cut filter

<sup>3</sup> Using Dip switch on the rear panel or Using trigger pulse width

## Location and Function of Parts and Controls

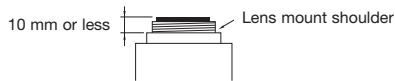


### ① Lens mount section (C mount)

A commercial C-mount lens or other optical equipment.

#### Note

Be sure that the lens does not project more than 10 mm from the lens mount.



### ② Guide holes (at the top)

These screw holes help to lock the camera module.

### ③ Tripod screw holes (at the bottom)

These four screw holes on the bottom are for installing the camera module on a tripod. To install on a tripod, you will need to install the VCT-3331 tripod adaptor using these holes on the bottom of the camera.

### ④ Reference 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.

### ① 12-pin multi-connector

DC IN/HD/VD (DC power/sync signal input) VIDEO OUT terminal.

### ② 75Ω termination selector switch

### ③ HD/VD input-output selector switch

### ④ Shutter speed/mode setting DIP switch

### ⑤ 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

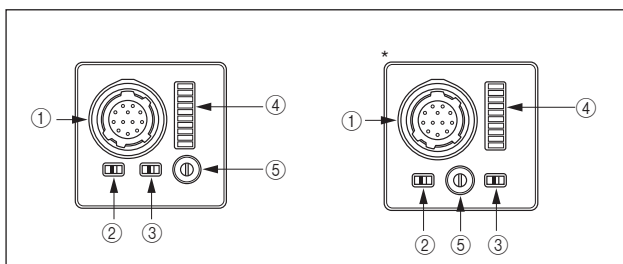
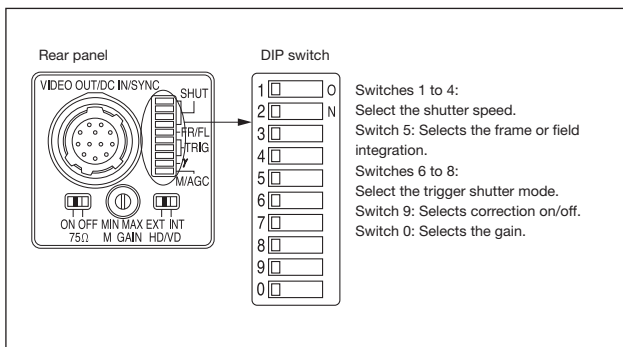
When setting DIP switch 5 to the frame integration, set the volume control switch 5 to the MAX side from the mechanical center (because of CCD characteristics).

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

## Factory Mode Settings of Rear Panel

No.	Switch	Factory-setting mode
②	75Ω termination selector switch	ON
③	HD/VD input-output selector switch	EXT
④	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
⑤	Volume control switch	Mechanical center

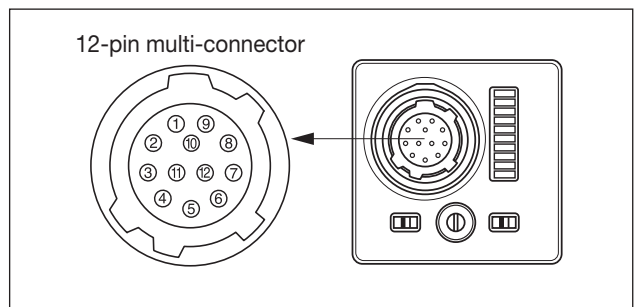
## Rear Panel



\* The rear panel is different for the serial numbers shown below.

XC-ES50/ES30 : 200001  
XC-ES50CE/ES30CE : 500001

## Connector Pin Assignments



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.

## 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

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"/>
9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>
0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>
1/2000	1/4000	1/10000 (EIA) 1/8000 (CCIR)	*Flickerless (EIA: 1/100 CCIR: 1/120)	
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"/>	
9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>	
0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>	

(Unit: seconds)

\* 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).

### 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.)

## 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.

### Setting of external trigger shutter speed

There are two ways to set the shutter speed.

Mode 1 (Non-reset mode)				Mode 2 (Reset mode)			
**1/100 (EIA) 1/120 (CCIR)	1/125	1/250	1/500	**1/100 (EIA) 1/120 (CCIR)	1/125	1/250	1/500
1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	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"/>	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"/>	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"/>	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"/>	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"/>	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"/>	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"/>	8 <input type="checkbox"/>	8 <input type="checkbox"/>	8 <input type="checkbox"/>
9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>
0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>
1/1000	1/2000	1/4000	**1/10000 (EIA) 1/8000 (CCIR)	1/1000	1/2000	1/4000	**1/10000 (EIA) 1/8000 (CCIR)
1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	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"/>	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"/>	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"/>	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"/>	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"/>	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"/>	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"/>	8 <input type="checkbox"/>	8 <input type="checkbox"/>	8 <input type="checkbox"/>
9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>	9 <input type="checkbox"/>
0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>	0 <input type="checkbox"/>

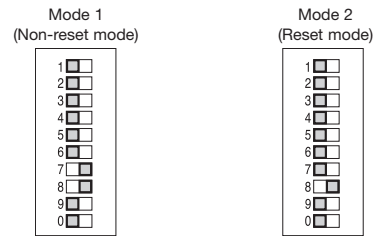
(Unit: second)

\* The external trigger shutter speed is set to 1/100 sec for XC-EI50/EI30 (EIA) and 1/120 sec for XC-EI50CE/EI30CE (CCIR).

\*\* The external trigger shutter speed is set to 1/10000 sec for XC-EI50/EI30 (EIA) and 1/8000 sec for XC-EI50CE/EI30CE (CCIR).

### 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 msec to 250 msec.



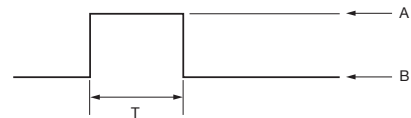
$$\text{Exposure time} = \text{Trigger pulse width} + 97 \mu\text{sec (EIA)}$$

$$120 \mu\text{sec (CCIR)}$$

### 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 μs to 1/4 s

T: 2 μs to 1/4 s, 100 μs to 1/4 s when setting the shutter speed using DIP switch  
\* Input impedance: 10 kΩ or more

\* The voltage and pulse width used are measured at pin 11 of a 12-pin multi-connector on the rear panel.

## Restart/Reset

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.

