SONY

A-B2W-100-**12** (1)

CCD Black-and-White Video Camera Module

Technical Manual

XC-HR50

Table of Contents

Overview

Mode Settings

Specifications

Appendix

Overview

The XC-HR50 is a black-and-white video camera module using a CCD (Charge Coupled Device) image sensor.

Features

High image quality

The 330,000-pixel VGA-compatible CCD image sensor delivers detailed images with the equivalent of VGA resolution (648 × 494 pixels). The CCD has square pixels, eliminating the need for aspect ratio conversion.

Various mode settings

Rear panel switches allow the following mode settings.
- Gain: Fixed/Manual
- Read mode: Normal (60 fps)/Bining (120 fps)
- High-rate scan
- Synchronized input/output
- 75Ω termination
- Shutter modes: Normal/Trigger shutter
- Shutter speed

External synchronization

The camera module automatically determines whether to operate in interlace or non-interlace mode from HD (horizontal drive) and VD (vertical drive) signals input for external synchronization.

External sync signal output

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

Electronic shutter

You can choose from FL (flickerless) mode and a wide range of image speeds (1/125 to 1/30,000 s) for the best match to shooting conditions.

External trigger shutter function (1/4 to 1/100,000 s)

You can obtain a freeze picture by inputting an external trigger. This function is useful for shooting a fast-moving object clearly.

High-rate scan

By limiting the number of effective image output lines, you can obtain image output at high frame rates, suitable for high-speed image processing.

Bining function

Video signals combining vertically adjacent pixels can be obtained at 120 fps.

Mounting holes

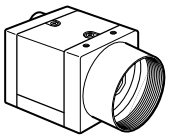
Mounting screw holes are provided on the reference plane on the lower surface of the body, allowing mounting for minimum deviation in the optical axis.

Compliant with new EIAJ 12-pin connector pin assignments

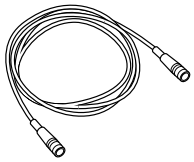
The new pin arrangement adds pin assignments for trigger pulses and WEN signals.

System Components

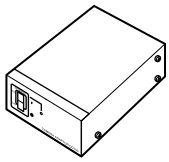
The XC-HR50 Video Camera Module system comprises the following components.



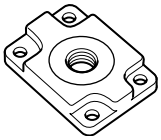
Video camera module
XC-HR50



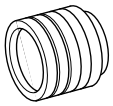
Camera cables
CCXC-12P02N(2 m)
CCXC-12P05N(5 m)
CCXC-12P10N(10 m)
CCXC-12P25N(25 m)



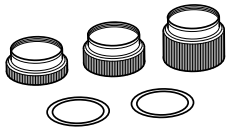
Camera adaptor
DC-700/700CE



Tripod adaptor
VCT-333I
(Insulated type)

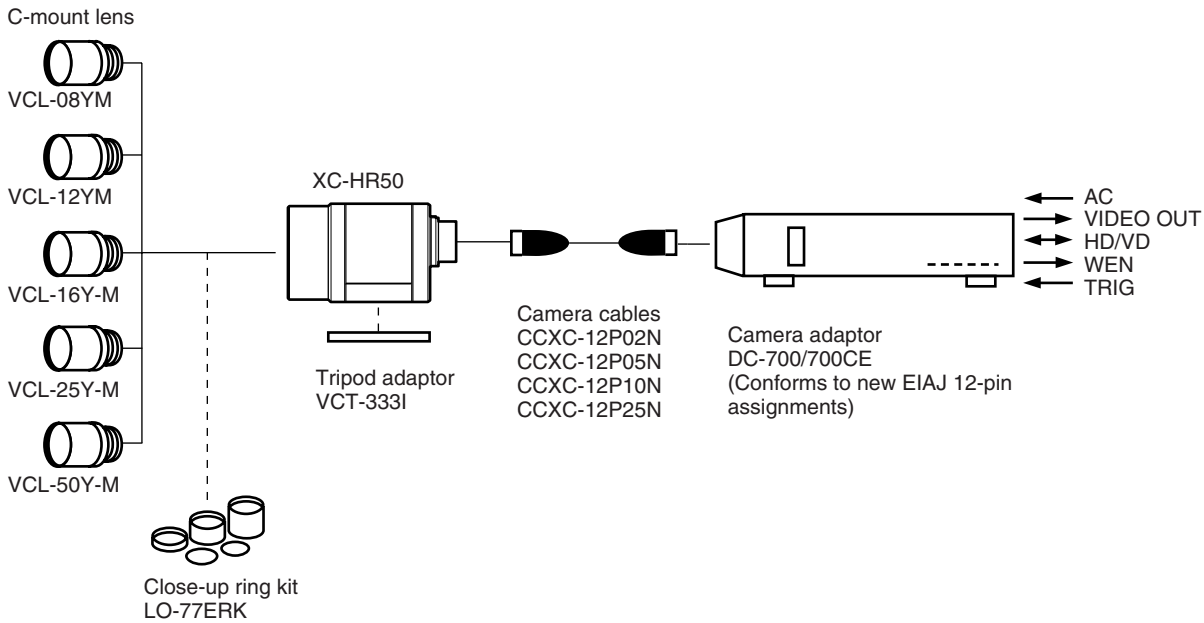


C-mount lens
VCL-50Y-M
VCL-25Y-M
VCL-16Y-M
VCL-12YM
VCL-08YM



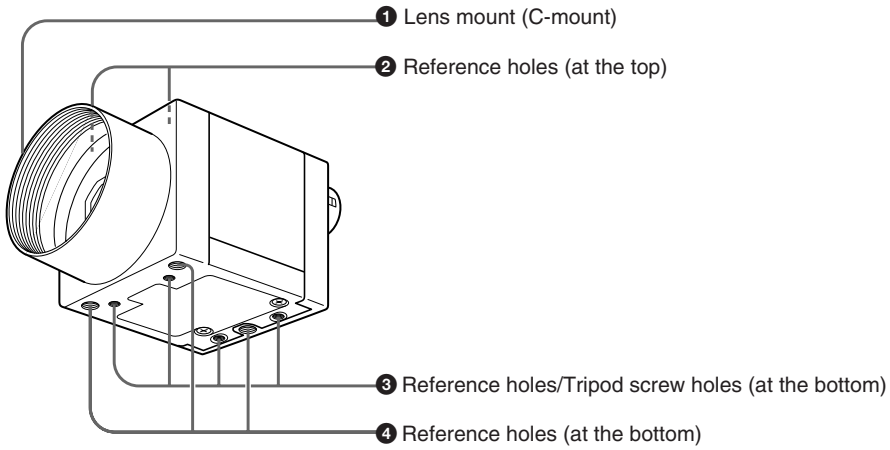
Close-up ring kit
LO-77ERK

Connection Diagram



Location and Function of Parts and Controls

Front/Top/Bottom



❶ Lens mount (C-mount)
Attach any C-mount lens, such as the VCL-12YM standard lens, or other optical equipment.

Note

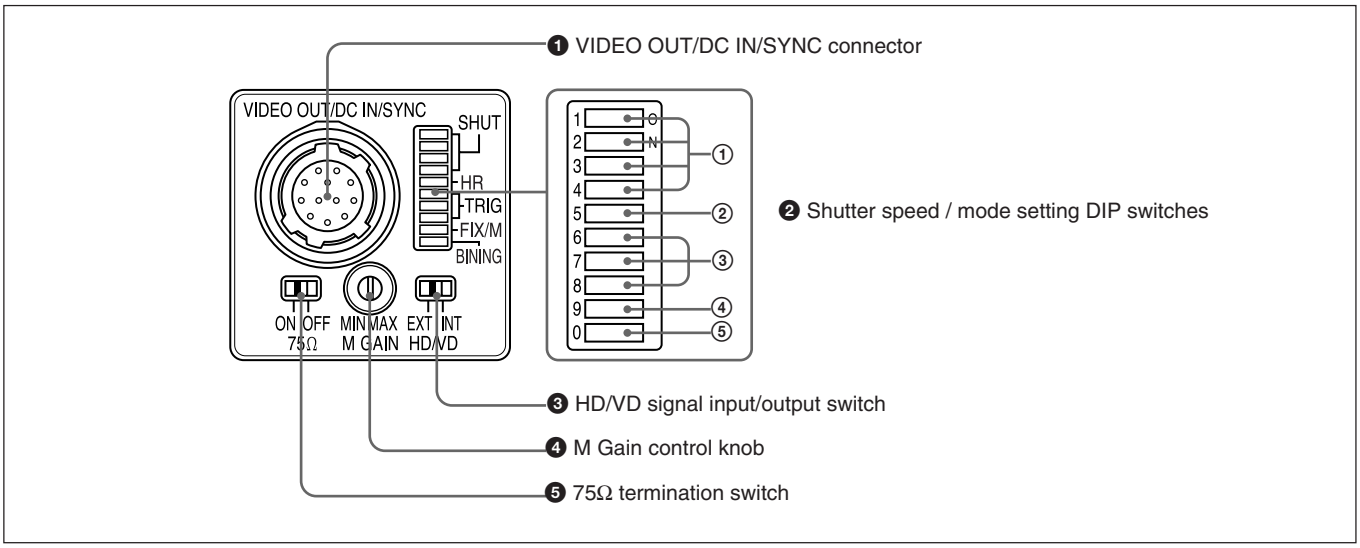
The lens must not project more than 7 mm (9/32 inch) from the lens mount.

❷ 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.

❸ 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-333I tripod adaptor using the reference holes on the bottom of the camera.

❹ Reference 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.

Rear Panel



Note

Be sure to turn the power off before making switch settings.

❶ VIDEO OUT/DC IN/SYNC (video output/DC power/sync input signal)connector (12-pin connector)

Connect a CCXC-12P05N camera cable to this connector to obtain power from the +12V DC power supply and also to enable 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 (HD/VD signals).

❷ Shutter speed/Mode setting DIP switch

① Shutter speed (bits 1-4)

Set an appropriate shutter speed (factory setting: OFF).

② High-rate scan mode switch (bit 5)

The factory setting of this switch is high-rate scan OFF. If you turn this switch ON to use high-rate scan mode, you also need to make pulse rate settings.

For more information, see "To Use High-rate Scan Mode (A) (page 14)" or "To Use High-rate Scan Mode (B)" (page 18).

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

By inputting an external restart/reset signal, you can capture the information of single screens at arbitrary timing. By inputting an external trigger signal, you can capture fast-moving objects at precise locations. The factory settings for these switches are for normal operation (restart/reset and external trigger shutter OFF).

For more information, see "Restart/Reset" (page 13) and "External Trigger Shutter" (page 16).

④ Gain switch (bit 9)

This switch selects FIX (fixed) or MANUAL (manual adjustment) (factory setting: FIX (left side)).

⑤ Bining mode switch (bit 0)

Switches the video signal output mode between bining OFF and bining ON (factory setting: OFF).

For more information, see "Video Output Modes" (page 10).

❸ 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).

Note

Even when the switch is set to EXT, the camera module operates in internal synchronization mode unless an external HD signal is input. In this case, however, the camera module will not output internal sync signals.

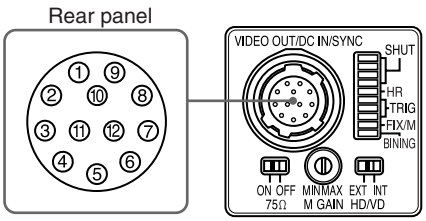
❹ M Gain (Manual Gain) control knob

If you have selected MANUAL (manual adjustment) with DIP switch ④, this knob adjusts the gain.

❺ 75Ω termination switch

Turn this to OFF when not terminating the external sync signal (factory setting: ON).

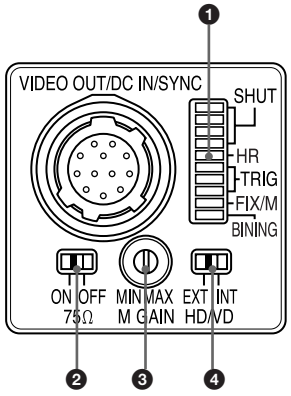
VIDEO OUT/DC IN/SYNC connector pin assignments



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

* Common ground for pins 7, 10, and 11

Factory mode settings of rear panel



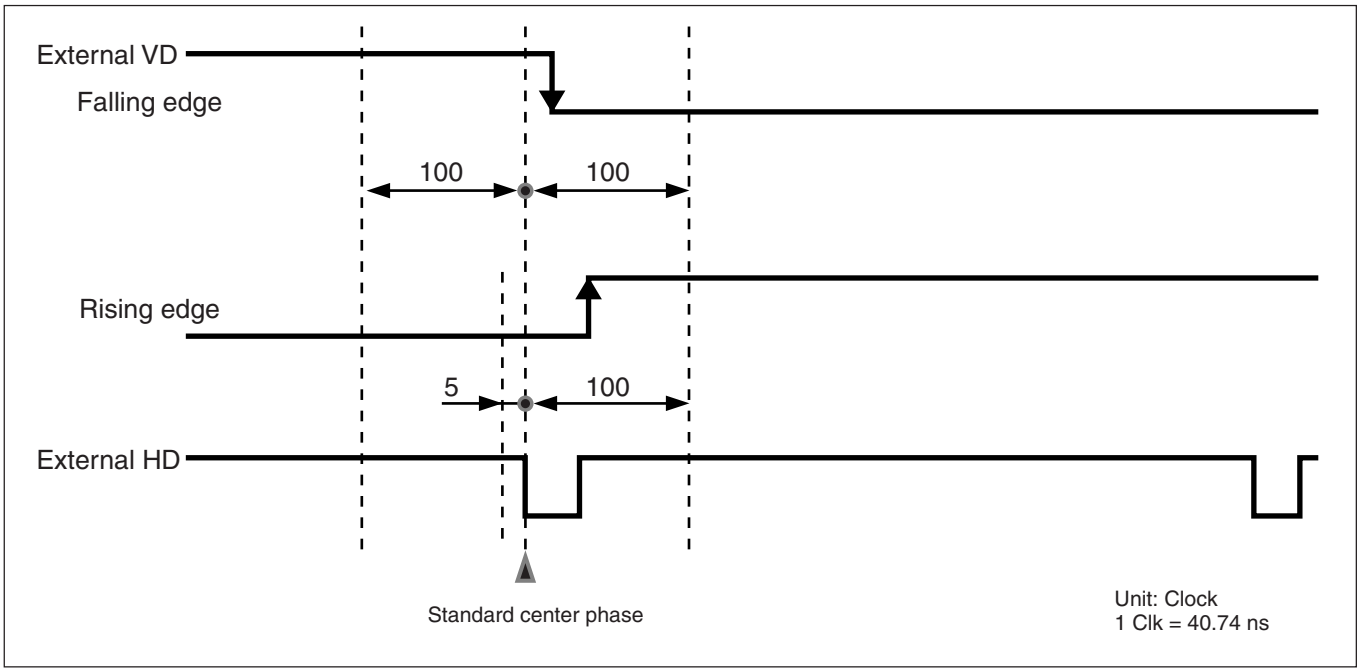
Number	Switch name	Factory mode setting
❶	Shutter speed and mode setting DIP switches	All bits are OFF (left).
❷	75Ω termination switch	ON
❸	M GAIN control knob	–*
❹	HD/VD signal input/output switch	EXT

* This unit is shipped from the factory with the gain switch (DIP switch 9) being set to “FIX”, so the M GAIN control knob is not operative unless the switch setting is changed. When the gain switch (DIP switch 9) is set to MANUAL, you can rotate this knob to adjust gain over the range 0 to 18 dB.

Mode Settings

Input/Output Specifications

External HD/VD Input Phase Specifications



Make sure that the external HD and VD phases against the standard center phase are as shown in the figure.

External VD falling edge: Input within 100 Clk before or after the standard center phase.

External VD rising edge: Input within 5 Clk before or 100 Clk after the standard center phase. (The rising edge is used only in high-rate scan mode.)

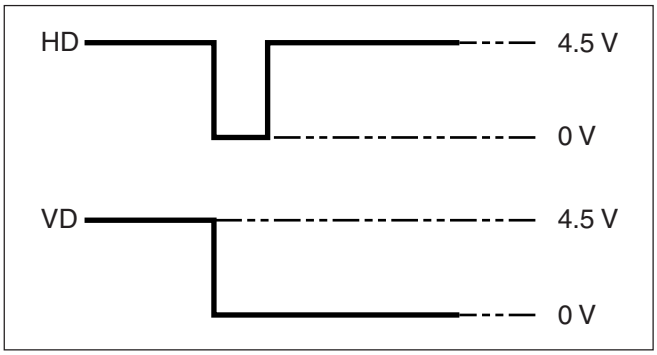
Note that input outside the specified ranges can lead to internal reset instability and high-rate interval instability.

When you restart/reset the camera or operate the camera by inputting an external trigger shutter pulse, the V sync signal for the image is output about 1 H later from the external VD.

During normal operation: HD phase 31.78 µs, VD phase 16.68 ms/8.357 ms (bining ON/OFF) continuous.
Phase timing is as shown above (falling edge only applied).

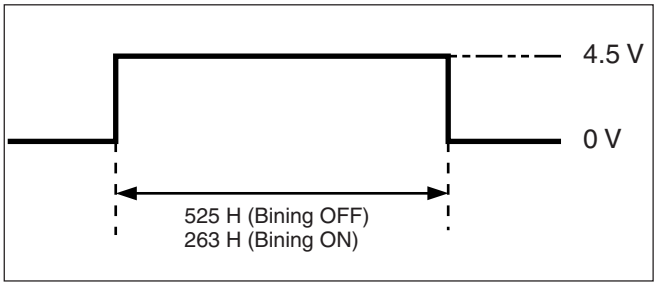
During restart/reset or external trigger shutter mode operation: HD phase 31.78 µs continuous. VD (reset) any timing where HD phase is within range shown above.

HD/VD Output Specifications



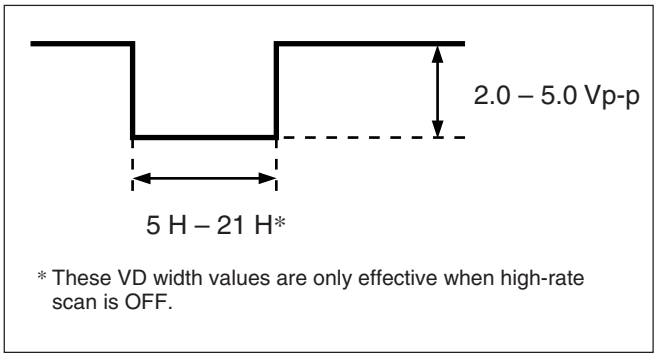
The amplitude level is the typical value when terminated with 10 kΩ. External HD and VD can be output when you set the INT/EXT switch to INT.

WEN Output Specifications



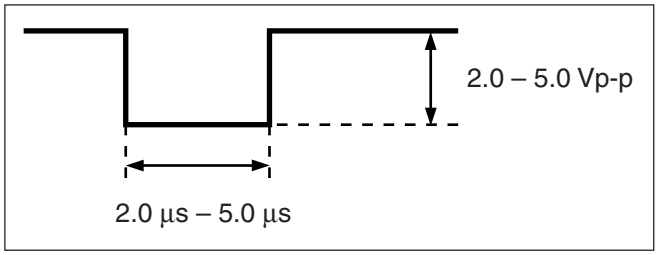
The amplitude level is the typical value when terminated with 10 kΩ.
The pulse width is undefined during high-rate scan mode, but WEN rising edge is always synchronized with internal VD at the start of image output.

VD Input Specifications



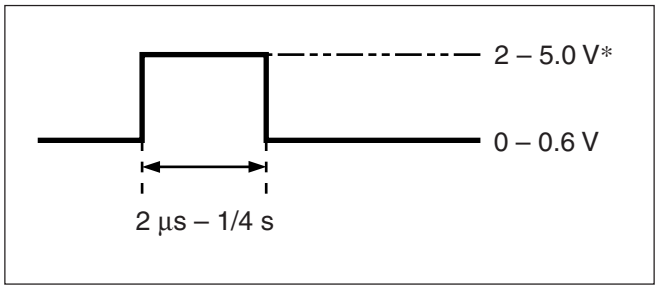
- Input impedance: 75Ω or 10 kΩ or more.
- Input amplitude 2.0 to 5.0 Vp-p (for both 75Ω termination ON and OFF).
- The voltage and pulse width used are as measured at pin 7 of the 12-pin multi-connector on the rear panel.

HD Input Specifications



- Input impedance: 75Ω or 10 kΩ or more.
- Input amplitude 2.0 to 5.0 Vp-p (for both 75Ω termination ON and OFF)
- The voltage and pulse width used are as measured at pin 6 of the 12-pin multi-connector on the rear panel.

Trigger Pulse Specifications

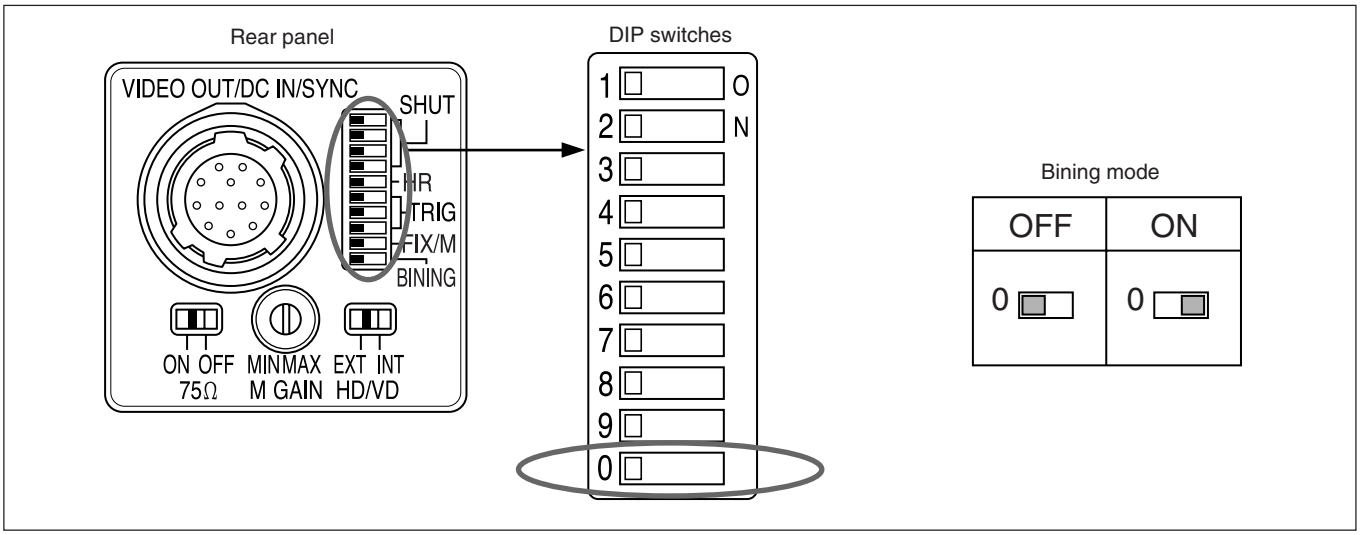


- Input impedance: 10 kΩ or more.
- The voltage and pulse width used are measured at pin 11 of the 12-pin multi-connector on the rear panel.

* The allowable pulse amplitude range differs with the serial number of the unit as follows.
Serial number 100100 or smaller: 4.2 to 5.0 V
Serial number 100101 or greater: 2 - 5.0 V

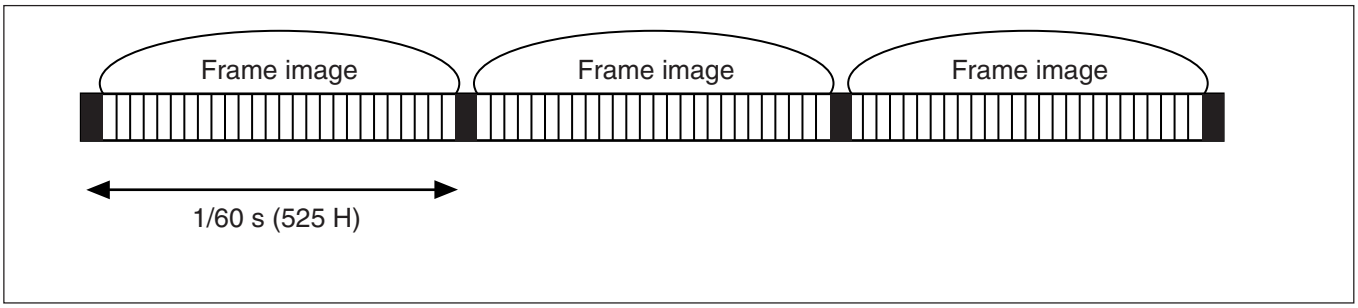
Video Output Modes

This unit has two video signal output modes. Select the mode with the bining mode switch (DIP switch 0) on the rear panel.



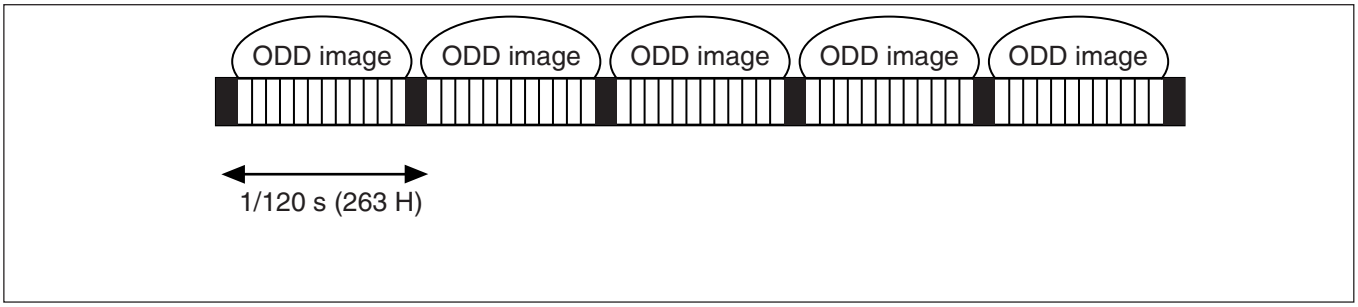
Bining OFF

Signals for each independent pixel are output from the VIDEO OUT connector every 1/60 s (line sequential output).
External synchronization is possible by external HD/VD.



Bining ON

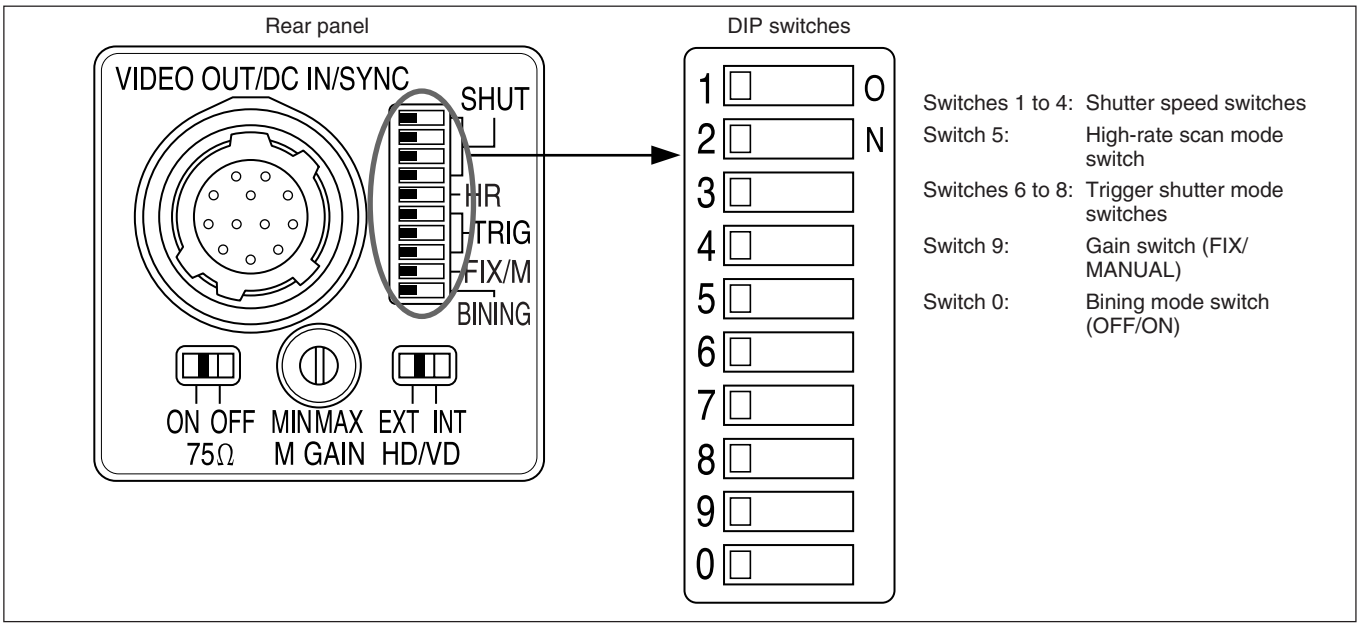
Mixed signals for vertically adjacent pixels are output from the VIDEO OUT connector every 1/120 s.
External synchronization is possible by external HD/VD.



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



* The electronic shutter cannot be used in restart/reset mode. High-rate scan can be used in restart/reset mode and in external trigger shutter mode 1.

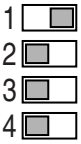
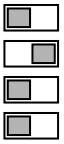
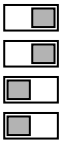
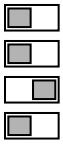
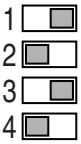
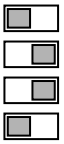
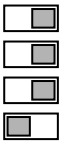
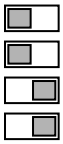
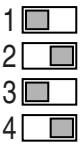
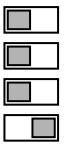
Normal Shutter

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

Normal Shutter	Other modes*
8	8

* "Other modes" refers to restart/reset mode and external trigger shutter mode.

Normal shutter speed settings

1/125	1/250	1/500	1/1000
			
1/2000	1/4000	1/10000	1/15000
			
1/30000	1/100		
			

(Unit: seconds)

External Trigger Shutter

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

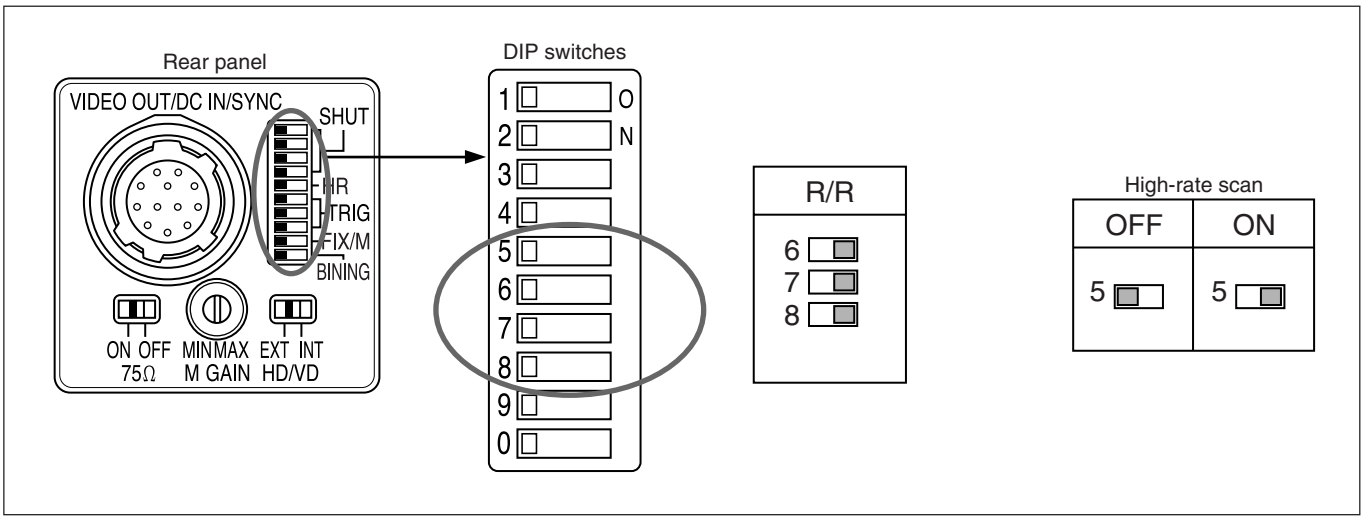
For more information, see "External Trigger Shutter" (page 16).

Restart/Reset

To Set Restart/Reset Mode

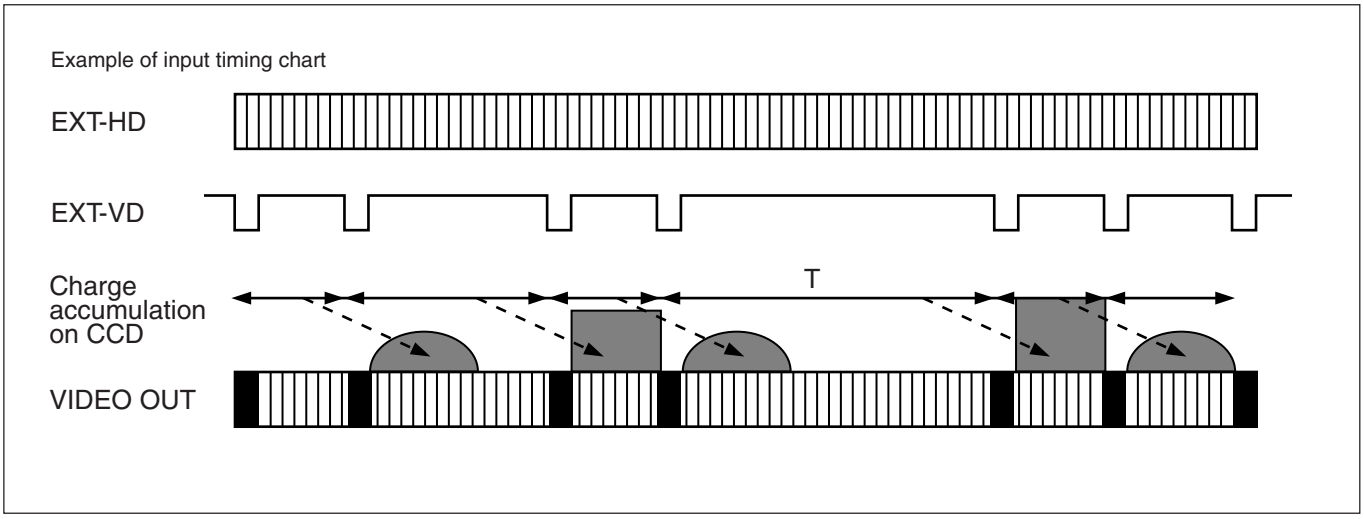
This mode allows you to capture the information on single screens at any time by externally inputting restart/reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.

To use restart/reset mode and high-rate scan mode simultaneously, set the high-rate scan mode switch (5) to ON (right side).



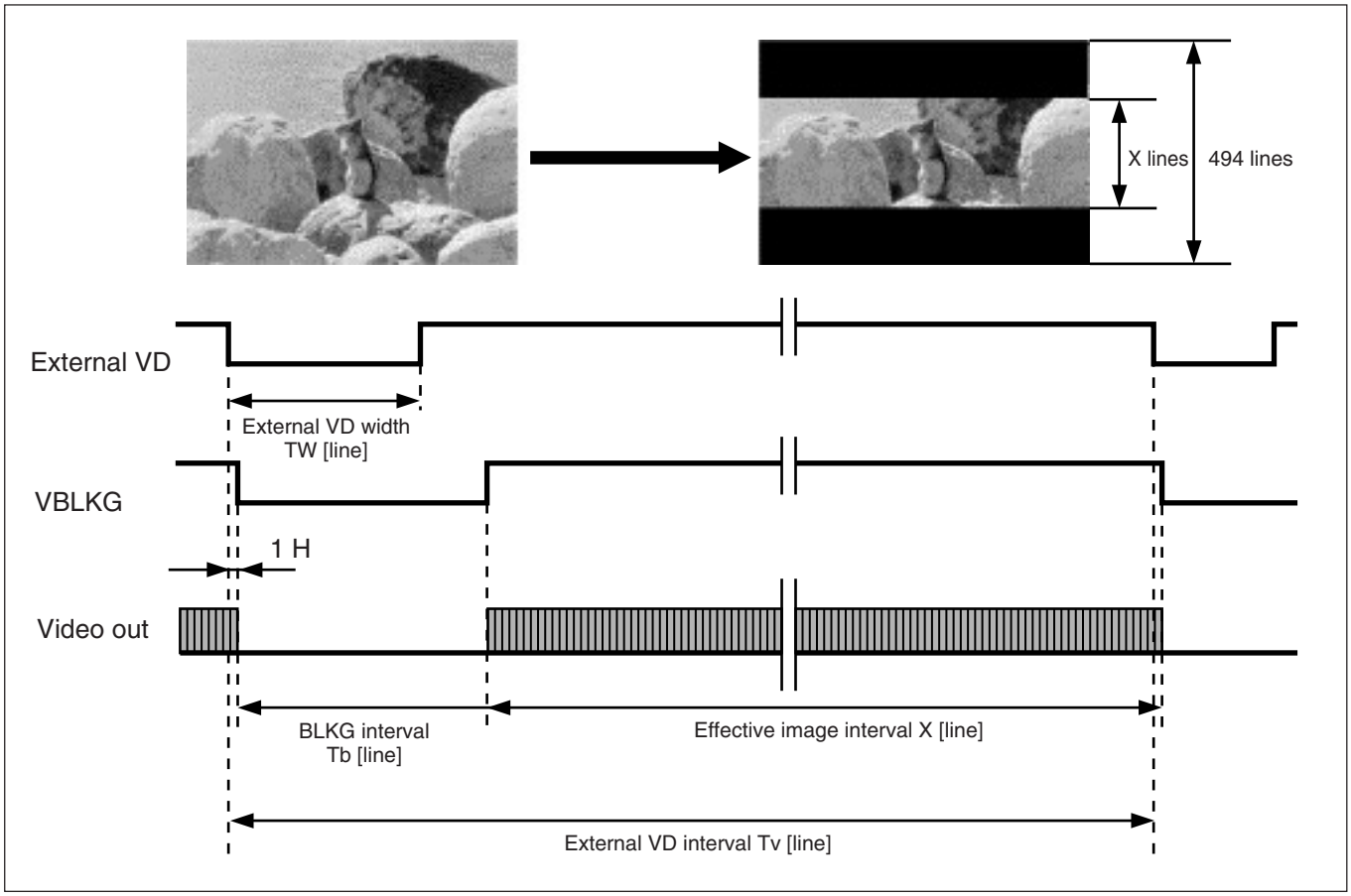
Long exposure

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.



To Use High-rate Scan Mode (A)

As shown in the table below, you can increase the frame rate by setting the high-rate scan mode switch and the external VD width and frequency. The image obtained is centered as shown below.



Note

In Restart/Reset mode, video out signals are output about 1 H later than the external VD.

Bining OFF mode

VD interval Tv [line]	External VD width Tw [line]	Effective lines X [line]	BLKG interval Tb [line]	Frame rate [frame/s]
525 (16.7 ms)	High-rate scan OFF	494 (16.0 ms)*	20 (0.636 ms)	59.9
262 (8.33 ms)	12	239 (7.59 ms)	23 (0.731 ms)	120
175 (5.56 ms)	16	148 (4.70 ms)	27 (0.858 ms)	180
131 (4.16 ms)	18	102 (3.24 ms)	29 (0.922 ms)	240

* Because the CCD has 494 vertical effective pixels, 11 lines of invalid pixels are output at the end of the image when high-rate scan is OFF. (VD interval 525 – effective pixels 494 – BLKG segment 20 = 11 invalid pixels)

Bining ON mode

VD interval Tv [line]	External VD width Tw [line]	Effective lines* X [line]	BLKG interval Tb [line]	Frame rate [frame/s]
263 (8.36 ms)	High-rate scan OFF	241 (7.66 ms)	20 (0.636 ms)	120
175 (5.56 ms)	9	155 (4.93 ms)	20 (0.636 ms)	180
131 (4.16 ms)	13	107 (3.40 ms)	24 (0.763 ms)	240
87 (2.76 ms)	17	59 (1.87 ms)	28 (0.890 ms)	362

- The shaded parts of the tables are items that you set or input yourself.
- The number of effective lines with high-rate scan set to ON is determined by the formula shown below.
  Under the condition that Tb = 20 when Tw 9, and
  Tb = Tw + 11 when Tw > 9,

  X = Tv – Tb

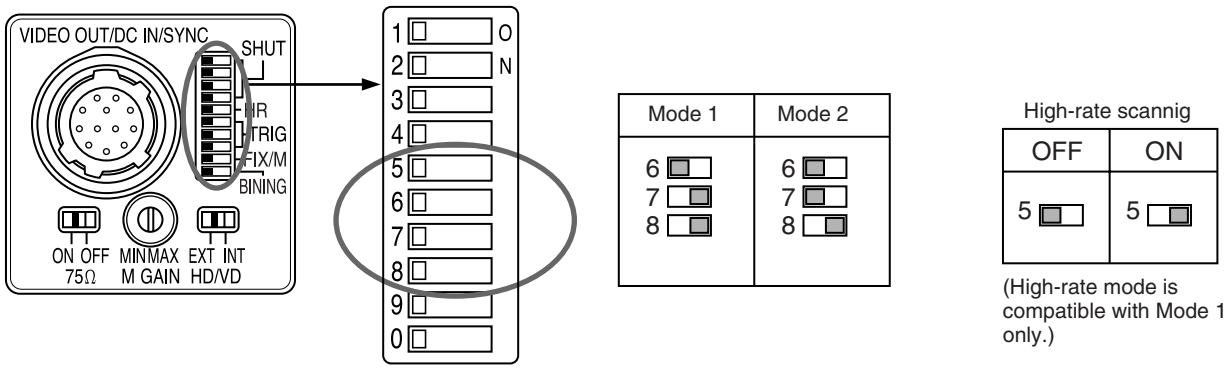
  where Tb: BLKG interval [line]
  Tw: External VD width [line]
  Tv: VD interval [line]

  Note that there is no difference in the number of effective lines between Bining ON and Bining OFF.

External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture first-moving objects clearly.
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.



Mode 1	Mode 2
6 ■	6 ■
7 □	7 □
8 □	8 □

High-rate scannig

OFF	ON
5 ■	5 □

(High-rate mode is compatible with Mode 1 only.)

Note

High-rate scan mode cannot be used while in external trigger shutter mode 2.

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.
  * External or internal synchronization is selected automatically depending on the presence or absence of external HD input.

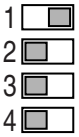
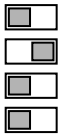
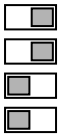
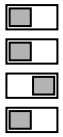
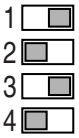
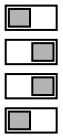
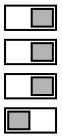
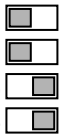
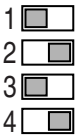
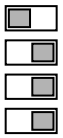
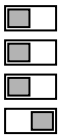
- **Mode 2 (Reset mode)**
  In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

To Set the External Trigger Shutter

There are two ways to set the shutter speed.

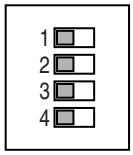
Using the DIP switches on the rear panel
For shutter speeds, see the following table.

Mode 1 (Non-reset mode)/Mode 2 (Reset mode)

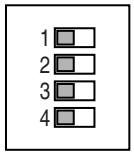
1/125	1/250	1/500	1/1000
			
1/2000	1/4000	1/10000	1/25000
			
1/50000	1/100000	1/100	(Unit: second)
			

Using trigger pulse width
Set all DIP switches (1 to 4 on the rear panel) to OFF. You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 μsec to 250 msec.
Exposure time = Trigger pulse width + 6 μsec

Mode 1 (Non-reset mode)



Mode 2 (Reset mode)



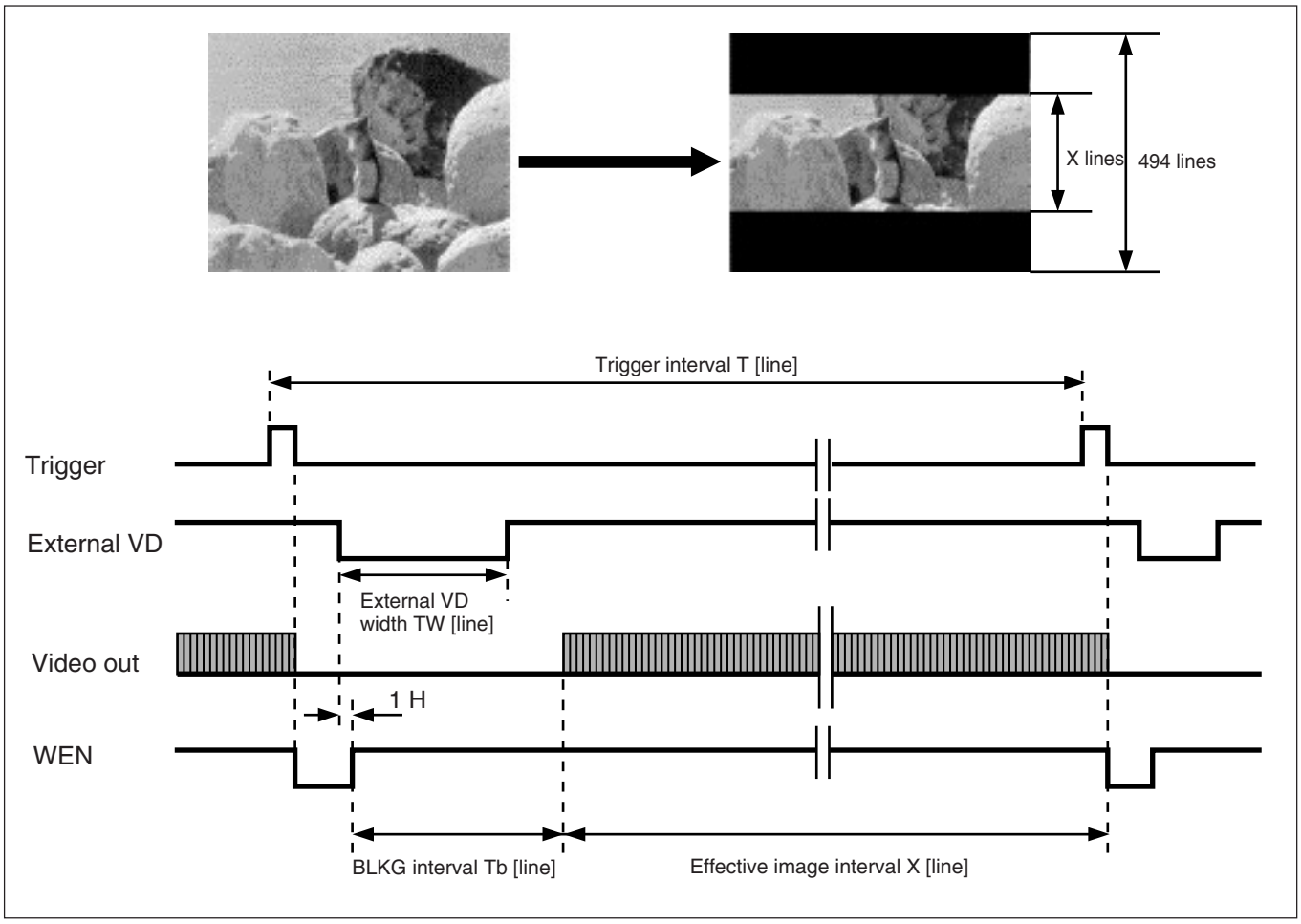
Note

An incorrect video signal will be output if you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely.

To Use High-rate Scan Mode (B)

In external trigger shutter mode 1, you can increase the rate by setting the shutter speed to the trigger pulse width, and setting the high-rate scan mode switch on the rear panel, the trigger interval, the external VD phase and the external VD width.
The image is centered as shown below.

Input of the trigger falling edge terminates the image output.
Note that input of a trigger pulse is needed in the effective image interval to control the ending of image output, and this affects the image at the trigger rising edge.



Notes

- In trigger shutter mode, video out signals are output about 1 H later than the external VD.
- In high-rate scan mode, image output and WEN rising edge are always synchronized, but WEN width becomes undefined. High-rate scan mode cannot be used in external trigger shutter mode 2.

Bining OFF mode

Trigger interval T [line]	External VD width Tw [line]	Effective lines X [line]	BLKG interval Tb [line]	Frame rate [frame/s]
525 (16.7 ms)	High-rate scan OFF	494 (16.0 ms)*	20 (0.636 ms)	59.9
262 (8.33 ms)	12	237 (7.53 ms)	23 (0.731 ms)	120
175 (5.56 ms)	16	146 (4.64 ms)	27 (0.858 ms)	180
131 (4.16 ms)	18	100 (3.18 ms)	29 (0.922 ms)	240

* Because the CCD has 494 vertical effective pixels, 11 lines of invalid pixels are output at the end of the image when high-rate scan is OFF. (VD interval 525 - effective pixels 494 - BLKG segment 20 = 11 invalid pixels)

Bining ON mode

Trigger interval T [line]	External VD width Tw [line]	Effective lines* X [line]	BLKG interval Tb [line]	Frame rate [frame/s]
263 (8.36 ms)	High-rate scan OFF	241 (7.66 ms)	20 (0.636 ms)	120
175 (5.56 ms)	9	153 (4.86 ms)	20 (0.636 ms)	180
131 (4.16 ms)	13	105 (3.34 ms)	24 (0.763 ms)	240

- The shaded parts of the tables are items that you set or input yourself.
- The table is an example in external trigger shutter mode 1 where the trigger pulse width is 100 µs, and the time from the trigger rising edge to external VD falling edge is about 1 H (31.78 µs). In this case, about 3 lines at the end of the effective image segment are affected by trigger input.
- The number of effective lines with high-rate scan set to ON is determined by the formula shown below.
  Under the condition that Tb = 20 when Tw 9, and
  Tb = Tw + 11 when Tw > 9,

  $X = T - Tb - 2$

  where Tb: BLKG interval [line]
  Tw: External VD width [line]
  T: Triger interval [line]
  2: Ineffective interval [H] caused by trigger input

  Note that there is no difference in the number of effective lines between Bining ON and Bining OFF.

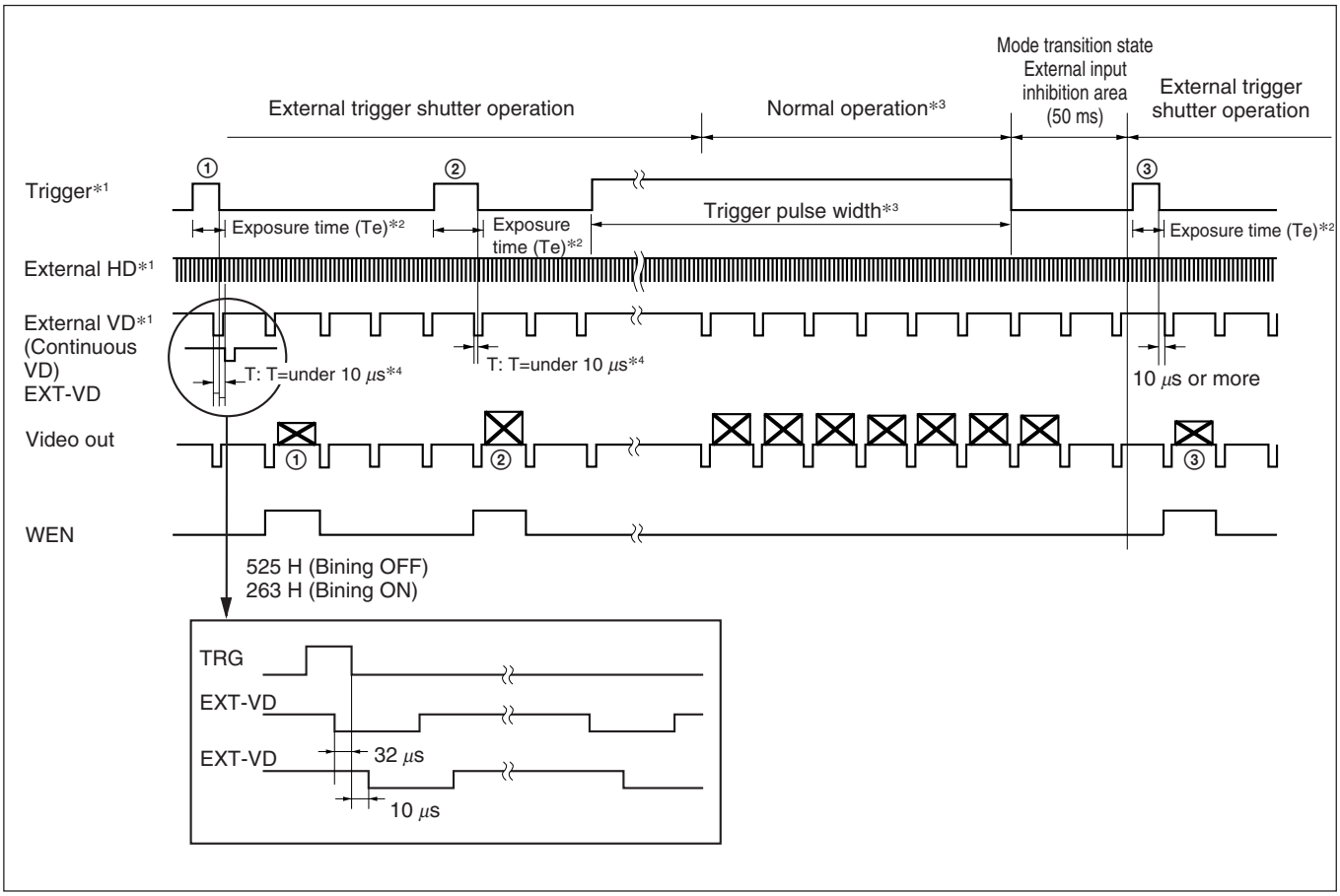
Timing Chart

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 = Trigger pulse width + 6 μsec
(The effective trigger pulse width for the external trigger shutter operation is between 2 μs and 1/4 s.)

*3 Normal operation is resumed when the trigger pulse width is 1/3 s or more. 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 If there is a falling edge on the external VD within a period of +10 μs 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).

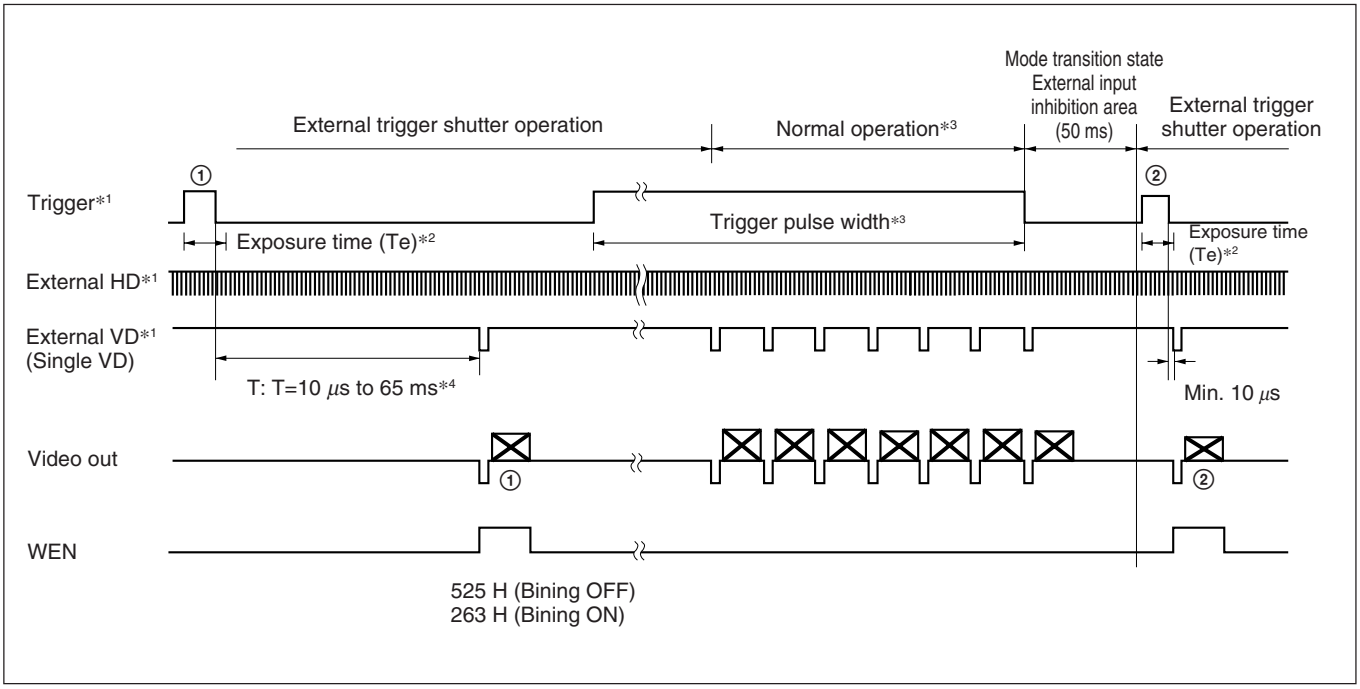
Note

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 (Te)
Te = Trigger pulse width + 6 μsec
(The effective trigger pulse width for the external trigger shutter operation is between 2 μs and 1/4 s.)

*3 Normal operation is resumed when the trigger pulse width is 1/3 s or more. 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.

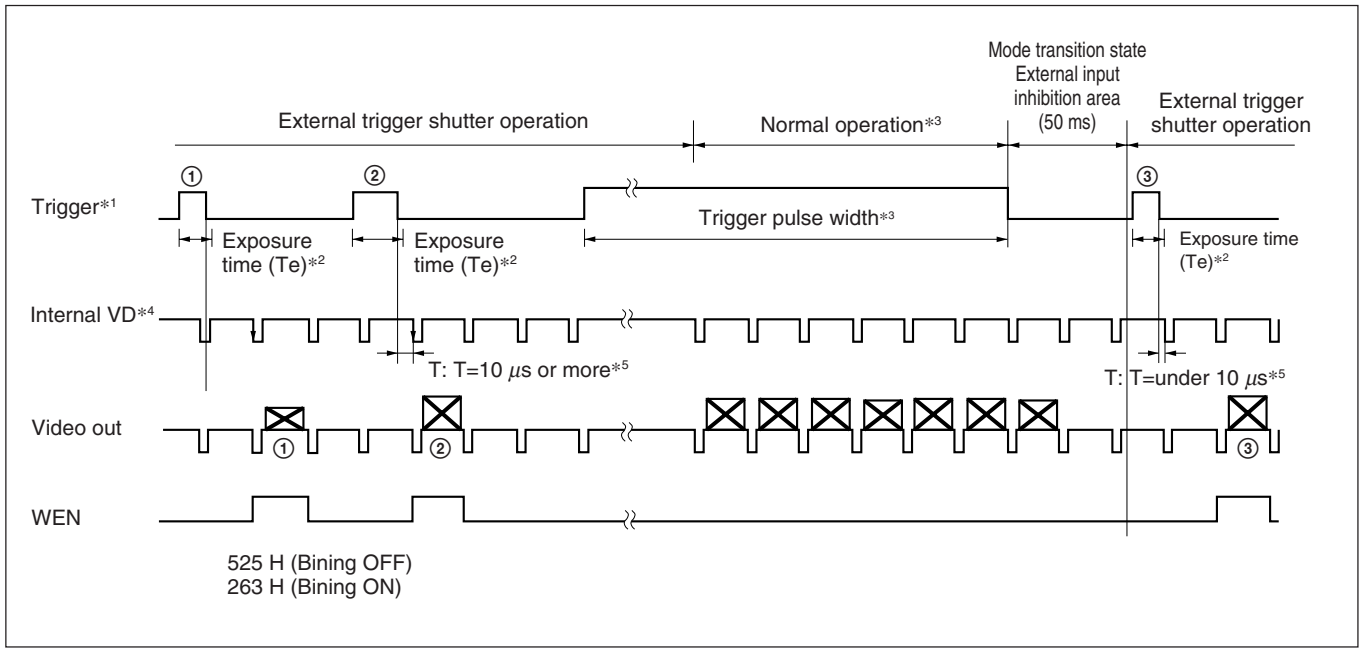
*4 Input the external VD within the period of 10 μs to 65 ms after the trigger falling edge (① and ② in the figure). There is no guarantee of operation for any other input. If an invalid signal is input, the input is changed to a valid signal and, after several V signals, normal operation resumes.

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 (Te)
Te = Trigger pulse width + 6 μs
(The effective trigger pulse width for the external trigger shutter operation is between 2 μs and 1/4 s.)

*3 Normal operation is resumed when the trigger pulse width is 1/3 s or more. 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 The internal VD signals are output as long as there is no external input and the HD/VD signal I/O 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 μs, 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 internal VD falling edge and the beginning of the equivalent pause in the V period of the SYNC have the same phase.)

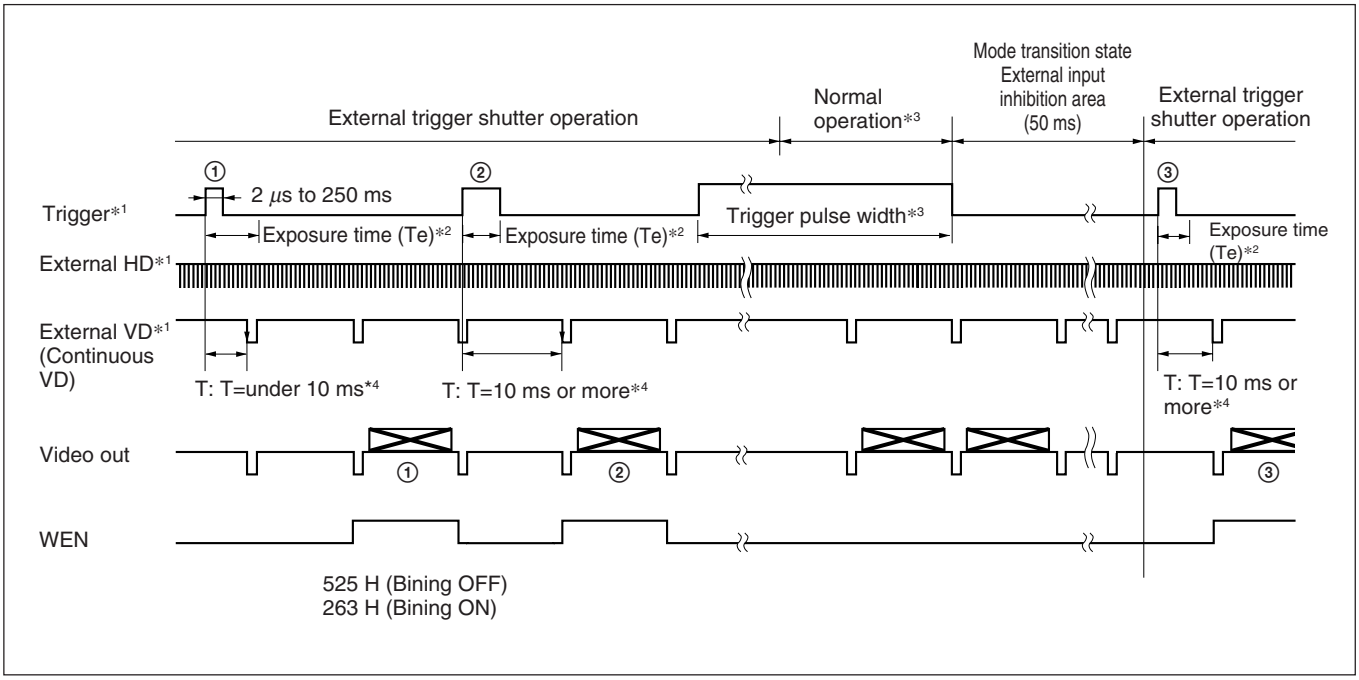
Note

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. Make sure to input both HD and VD signals.

*2 The exposure time (Te) is determined by the setting of DIP switches.
For details, see page 17.

*3 Normal operation is resumed when the trigger pulse width is 1/3 s or more. 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 An image is output when an external VD signal falls 10 ms 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 ms, 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.

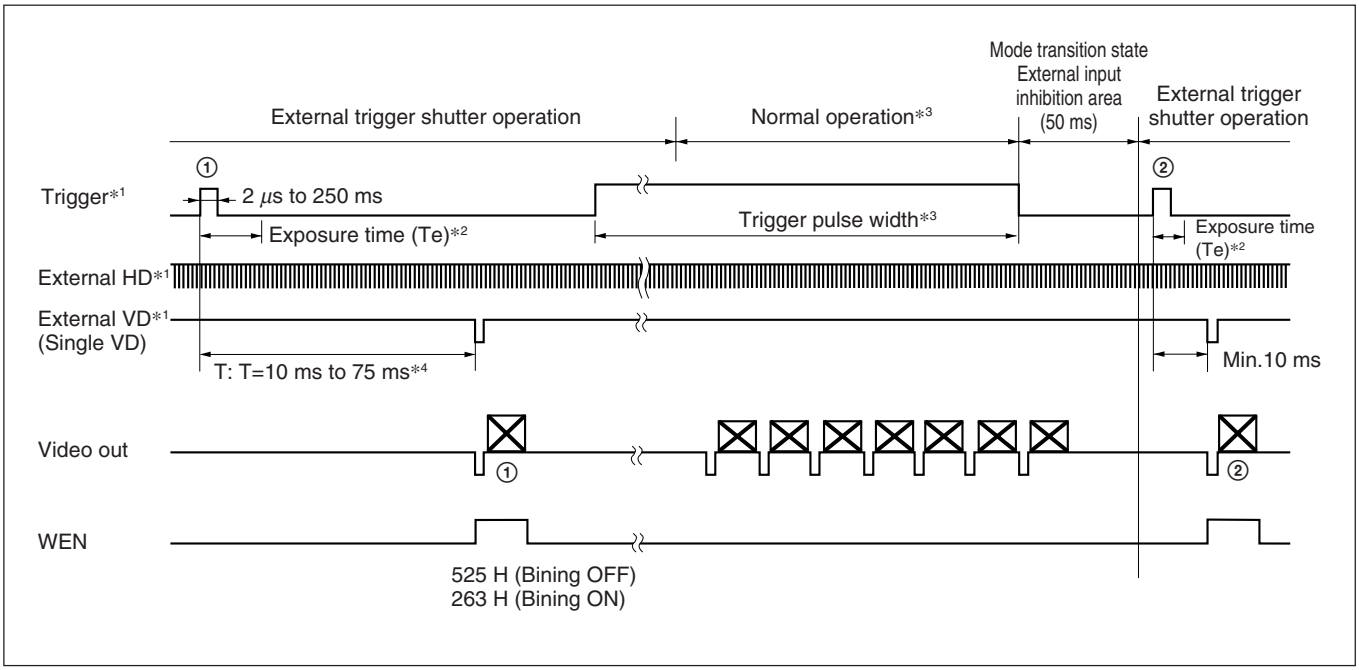
Note

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 (Te) is determined by the setting of the DIP switches.
For details, see page 17.

*3 Normal operation is resumed when the trigger pulse width is 1/3 s or more. 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.

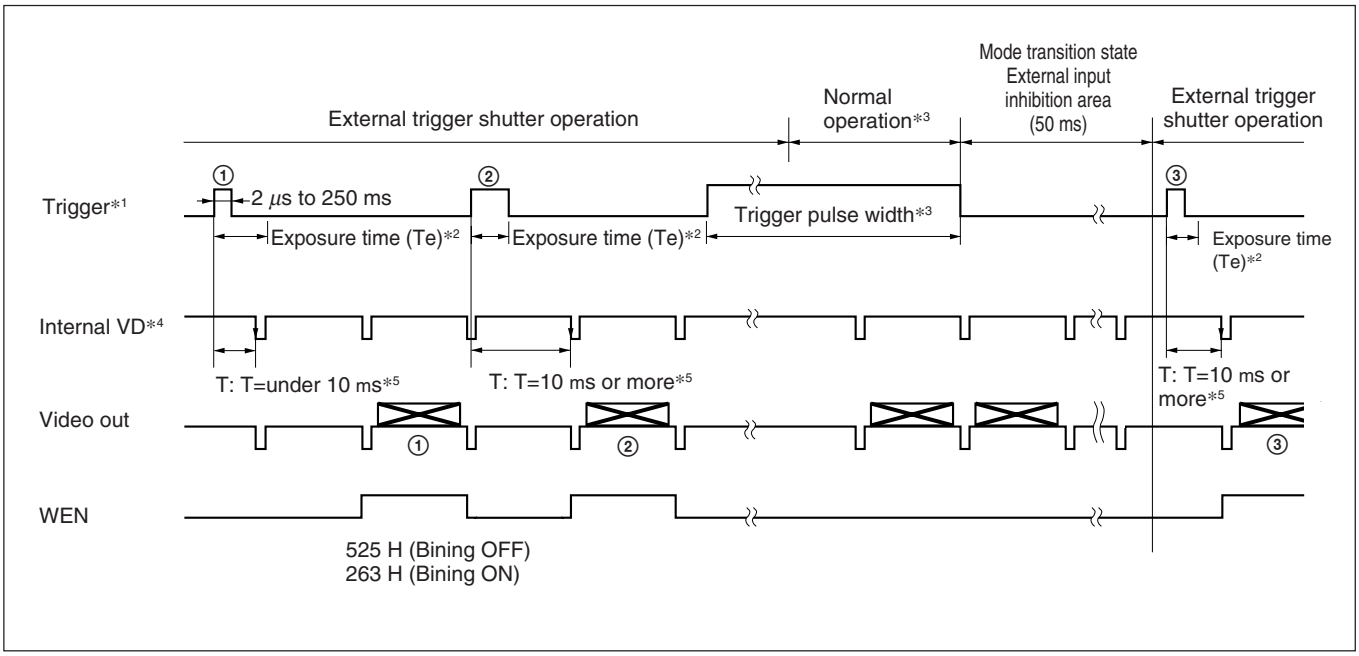
*4 Input the external VD within the period of 10 ms to 75 ms after the trigger rising edge (① and ② in the figure). There is no guarantee of operation for any other input. If an invalid signal is input, the input is changed to a valid signal, and after several V signals, normal operation resumes.

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 (Te) is determined by the setting of the DIP switches.
For details, see page 17.

*3 Normal operation is resumed when the trigger pulse width is 1/3 s or more. 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 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.

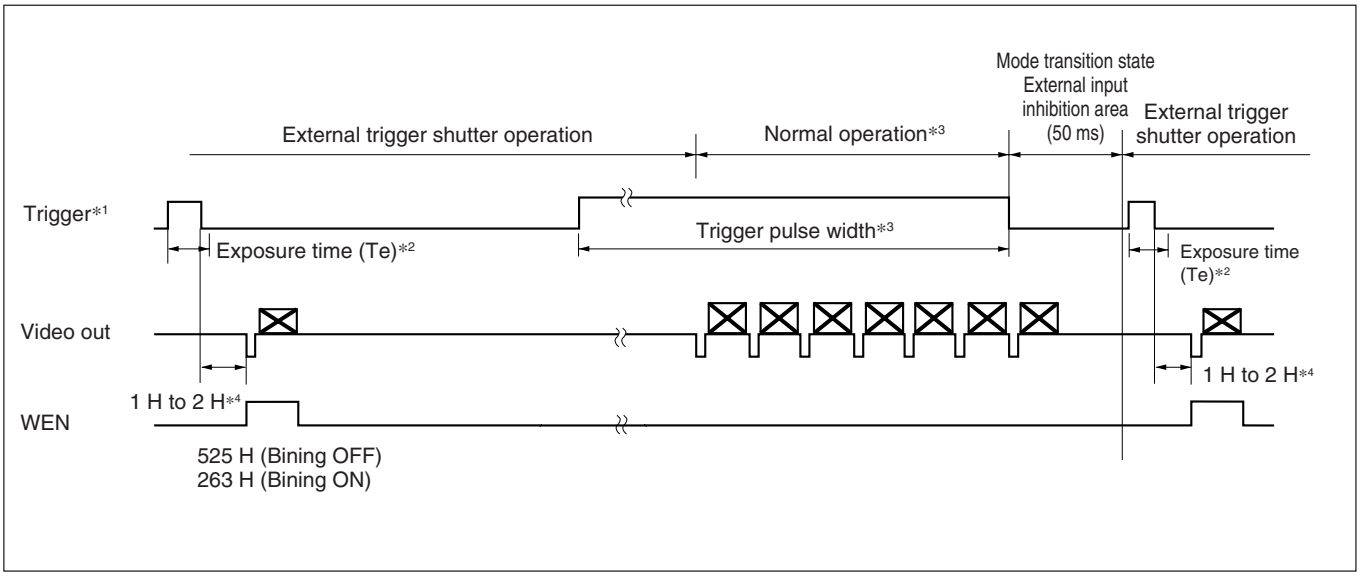
*5 An image is output when an internal VD signal falls 10 ms or more after a trigger pulse rises (② and ③ in the figure). If the period from the trigger rising edge to the internal VD falling edge (T in the figure) is under 10 ms, it is not defined whether the image is output for the external VD falling 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 internal VD falling edge and the beginning of the equivalent pause in the V period of the SYNC have the same phase.)

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.

*2 Exposure time (Te)
Te = Trigger pulse width + 6 μsec
(The effective trigger pulse width for the external trigger shutter operation is between 2 μs and 1/4 s.)

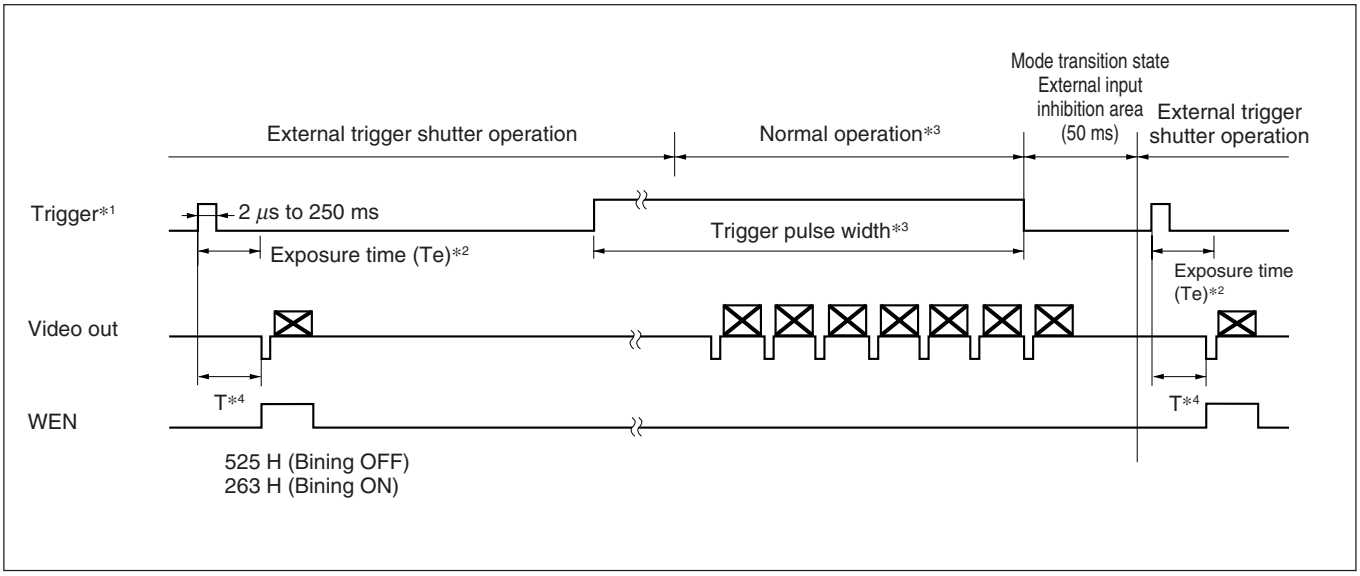
*3 Normal operation is resumed when the trigger pulse width is 1/3 s or more. The trigger falling edge restores external trigger shutter operation. At this time, the 50 ms after the falling edge of the trigger pulse is an external trigger input inhibition area. There is no guarantee of operation for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

*4 A VD signal is generated after 1 H to 2 H from the trigger falling edge, then the image is output synchronized with the VD generation.

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.

*2 The exposure time (Te) is determined by the setting of the DIP switches.
For details, see page 17.

*3 Normal operation is resumed when the trigger pulse width is 1/3 s or more. 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 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

Main Specifications

Image pickup system

Image pickup device
: 1/3 type interline transfer CCD

Number of effective pixels
: 659 × 494 (H/V)

Optical black
: 33 pixels per horizontal scan line

CCD vertical driving frequency
: 31.468 kHz ±1%

CCD horizontal driving frequency
: 24.5454 MHz

Cell size
: 7.4 × 7.4 µm (H/V)

Chip size
: 5.84 × 4.94 mm (H/V)

Optical and other systems

Lens mount
: C-mount

Flange back
: 17.526 mm

Synchronization system
: Internal/External (automatically switched according to input signal)

External synchronization input/output
: HD/VD (HD/VD level: 2 to 5 Vp-p)

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

H Jitter
: Less than 20 ns

Scan lines
: 525-line/263-line (Normal mode/Bining mode)

Scanning system
: Non-interlace

Video output
: 1.0 Vp-p, sync negative, 75Ω, unbalanced

Output signal frequency
: 59.94 Hz/119.88 Hz (Normal mode/Bining mode)

Effective lines
: 648 × 494 (H/V)

Horizontal resolution
: 500 TV lines

Sensitivity
: F5.6 (400 lx with FIX Gain)

Minimum illumination
: 1 lx (with gain manually adjusted to maximum, F1.4)

Video S/N ratio
: 58 dB

Gain
: Fixed/Manually adjustable

Gamma compensation
: 1 (fixed)

White clip
: 820 mV ±70 mV

Read mode
: Normal mode/Bining mode

Shutter
: External trigger shutter

Shutter speed
: External trigger shutter: 1/4 to 1/100,000 s

Power requirements
: +12 V DC (range: +10.5 to +15 V)

Power consumption
: 1.8 W

Operating temperature
: –5 to +45 °C (23 to 113 °F)

Storage temperature
: –30 to +60 °C (–22 to +140 °F)

Operating humidity
: 20 to 80% (no condensation)

Storage humidity
: 20 to 95% (no condensation)

Vibration resistance
: 10 G (20 to 200 Hz)

Shock resistance
: 70 G

External dimensions (w/h/d)
: 29 × 29 × 30 mm (1 3/16 × 1 3/16 × 1 3/16 inches)

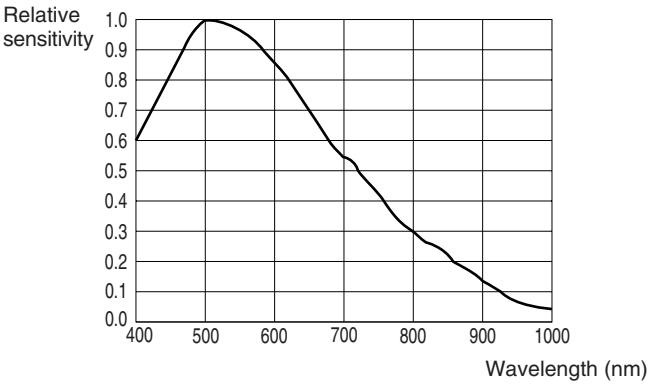
Mass
: 50 g (1 oz)

MTBF
: 88,044 hours (about 10.1 years)

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

Design and specifications are subject to change without notice.

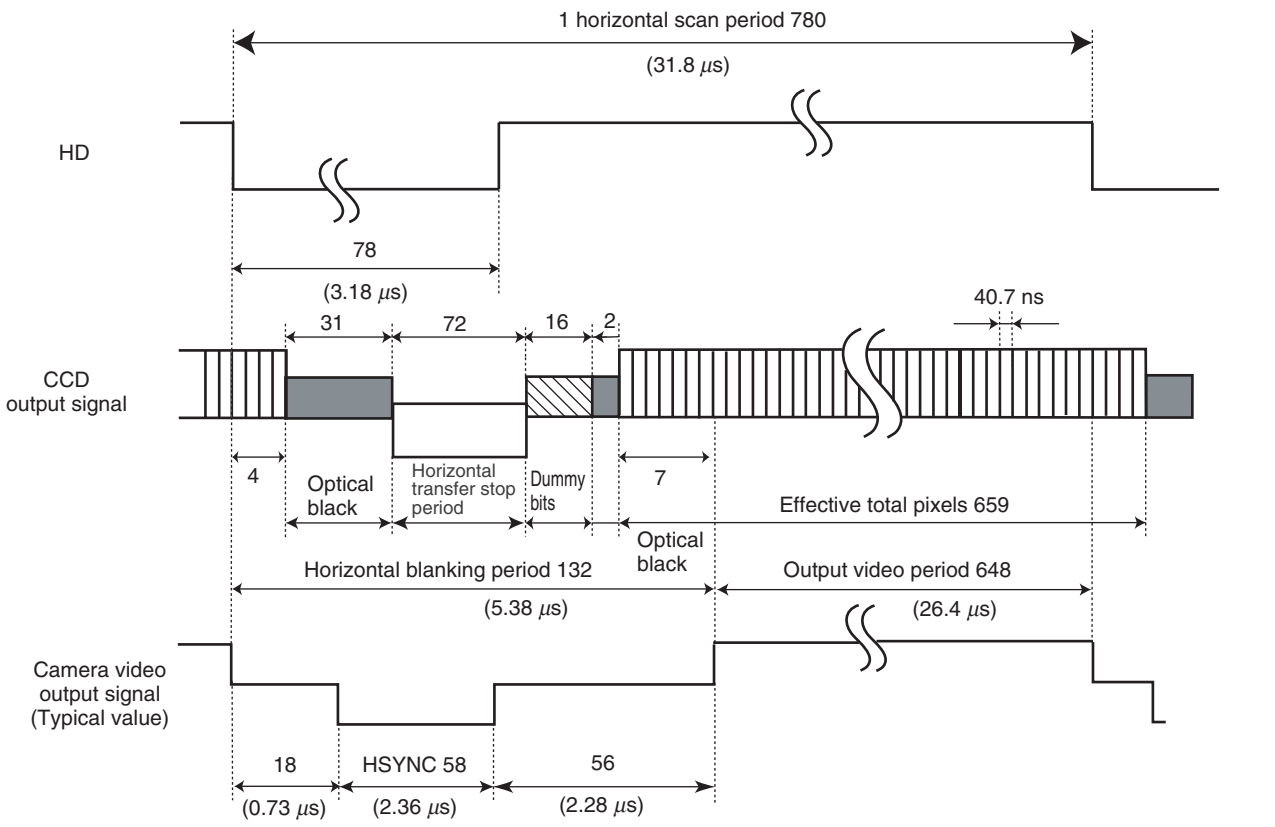
Spectral Sensitivity Characteristics (Typical Values)



(Lens characteristics included, and light source characteristics excluded.)

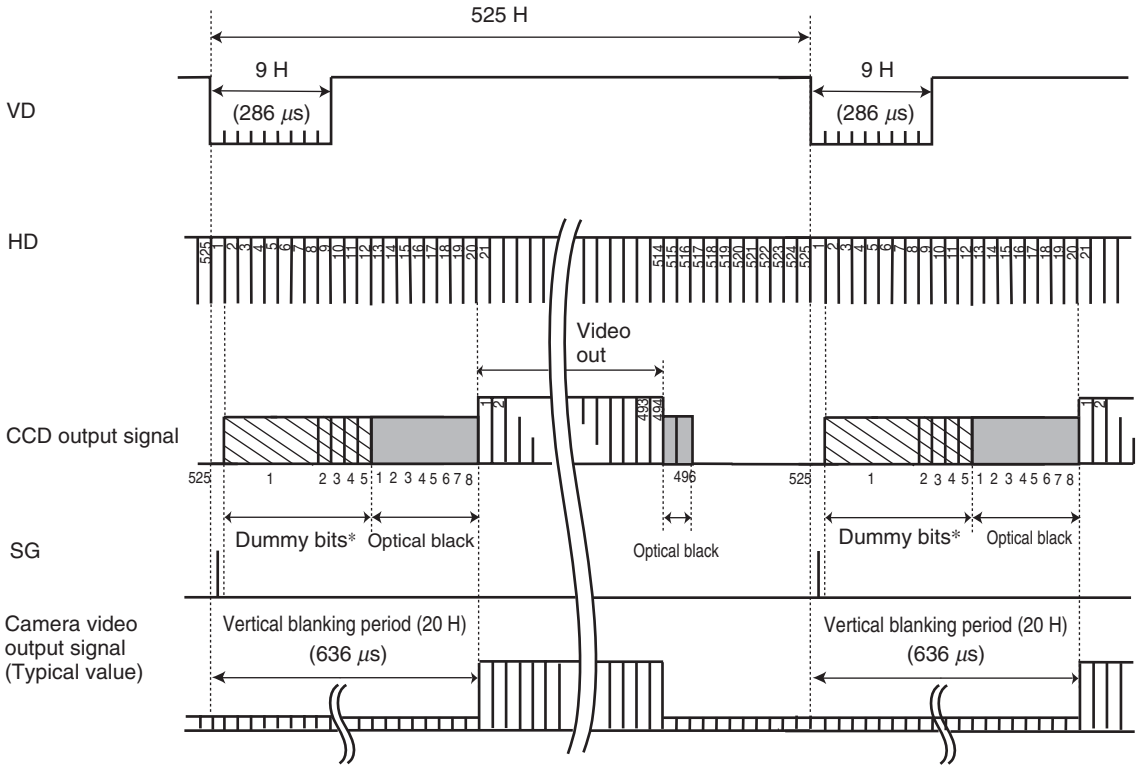
CCD Output Waveform Timing Chart

Horizontal Output Waveform Timing Chart



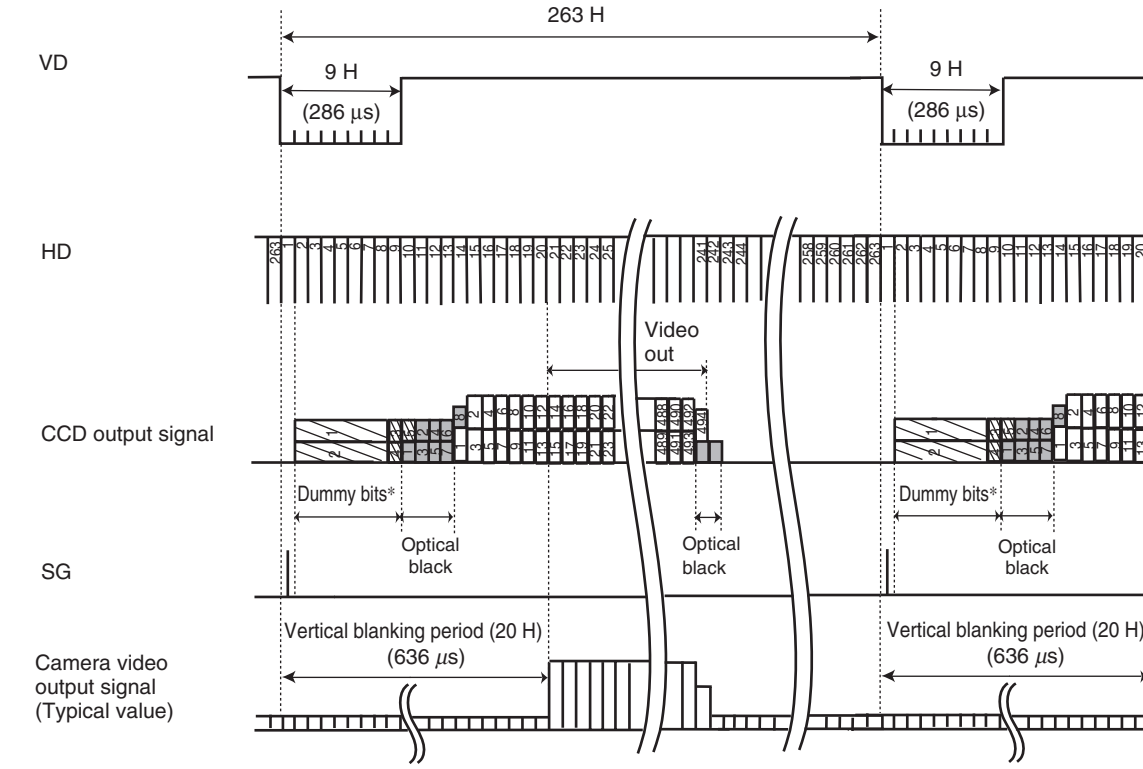
Values without units indicate the clock counts.

Vertical Output Waveform Timing Chart (Bining OFF)



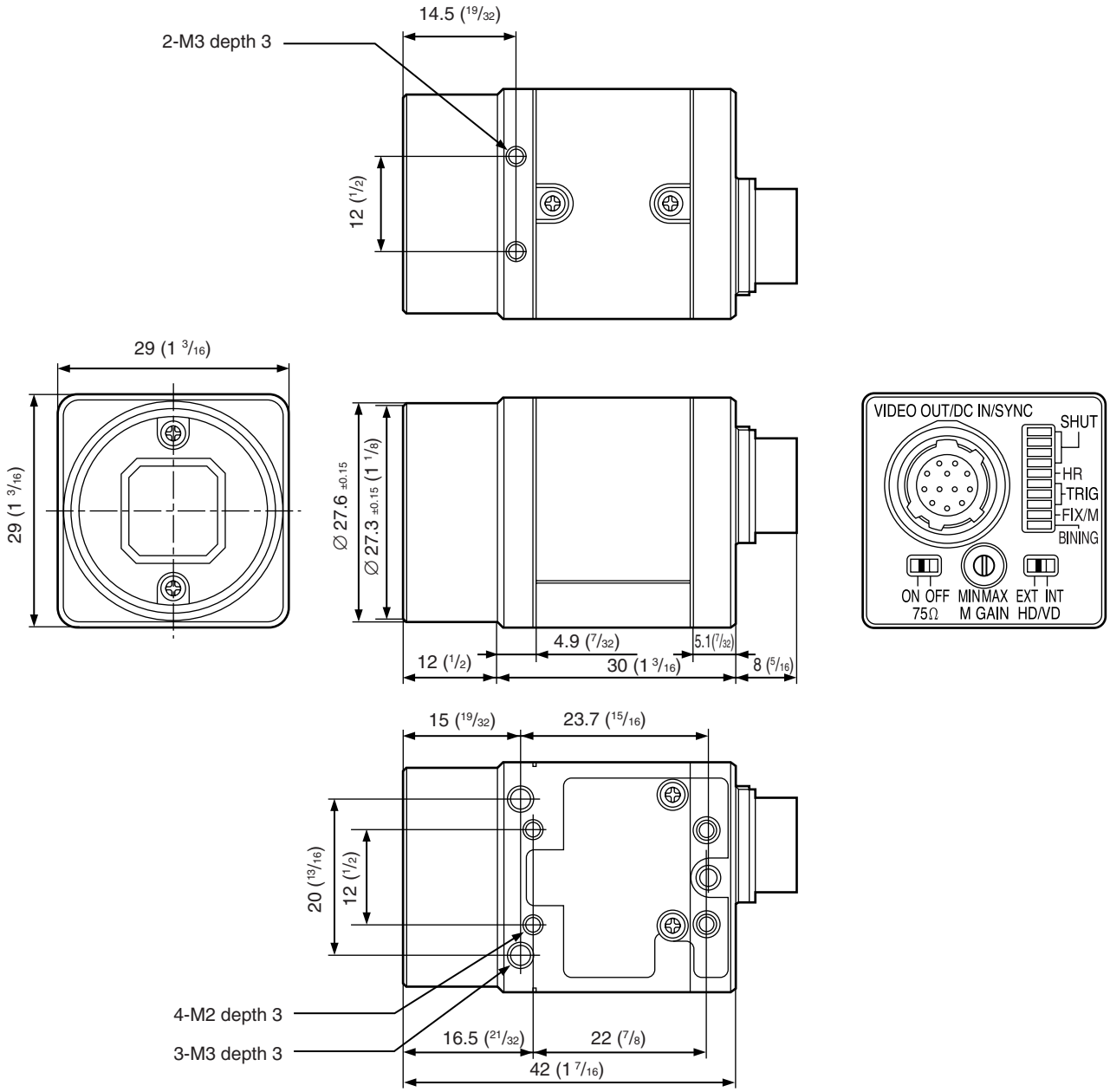
The transfer stop period is included in the dummy bits.

Vertical Output Waveform Timing Chart (Bining ON)



The transfer stop period is included in the dummy bits.

Dimensions



Unit: mm (inches)

Appendix

Available Accessory Lenses

The following shows the specifications of the available accessory lenses.

List of C-Mount Lens

Model name		VCL-08YM	VCL-12YM	VCL-16Y-M	VCL-25Y-M	VCL-50Y-M
Focal distance (mm) (inches)		8 (11/32)	12 (1/2)	16 (21/32)	25 (1)	50 (2)
Maximum aperture ratio		1:1.4	1:1.8	1:1.4	1:1.6	1:2.8
Operation	Iris	Manual				
	Focus	Manual				
Field angle (Horizontal × Vertical)	1/2 type CCD	42.6° × 32.6°	29.6° × 22.4°	22.6° × 17.0°	14.6° × 11.0°	7.3° × 5.5°
MOD* (mm) (inches)		207 (8 1/4)	208 (8 1/4)	289 (11 1/2)	204 (8 1/8)	438 (17 1/4)
Image pickup range during maximum proximity (Horizontal × Vertical) (mm) (inches)		182.9 × 137.2 (7 1/4 × 5 1/2)	127 × 95 (5 × 3 3/4)	121 × 91 (4 7/8 × 3 5/8)	52.7 × 39.8 (2 1/8 × 1 5/8)	49.8 × 37.3 (2 × 1 1/2)
Back focus		11.54 mm (15/32 inches)	10.99 mm (7/16 inches)	12.50 mm (1/2 inches)	11.60 mm (15/32 inches)	22.10 mm (7/8 inches)
Flange back		17.526 mm (23/32 inches)	17.526 mm (23/32 inches)	17.526 mm (23/32 inches)	17.526 mm (23/32 inches)	17.526 mm (23/32 inches)
Weight		40 g (1 oz)	40 g (1 oz)	50 g (2 oz)	42 g (1 oz)	50 g (2 oz)

* MOD: Minimum Object Distance between the tip of the lens body and the object.

Sony reserves the right to change specifications of the products and discontinue products without notice.
Technical information contained herein is for reference only and does not convey any license by any implication or otherwise under any intellectual property right or other right of Sony or third parties.
Sony cannot assume responsibility for any right infringements arising out of the use of this information.