B/W CCD Camera
Model CS8541D Series
Specification

Contents

TOSHIBA TELI CORPORATION

D4118840D

1. Product Description

Model CS8541D is a separate type B/W CCD camera with a VGA format all-pixel-data readout CCD. This model has twice greater driving frequency of conventional cameras to achieve fast-speed data-processing. The model is suited for high-speed, high-resolution image processing use.
Camera head is compact, light-weight body is ideal for system integration.

2. Features

(1) Double-speed scan
This model reads out image-data twice as fast as conventional cameras do.

(2) All pixel's data readout
With its built-in all-pixel-data-readout CCD, this model can read out image-data just in approximately 1/60 sec. A frame-shutter reads out all data even under RTS (Random Trigger Shutter) mode.

(3) High vertical resolution
As all pixel's data are read out even under RTS mode (in 1/60 sec.), images with no deterioration in vertical resolution are obtained.

(4) Square grid pattern CCD
Pixel's in CCD are aligned in square grid pattern. This makes it easier to perform computation correctly for image processing use.

(5) External Sync.
The camera is switched over to external synchronization operation automatically when external HD signal is input.

(6) Random trigger shutter function
With a built-in RTS, the camera's CCD starts light-exposure in synchronization with external trigger signals. This function enables the camera to capture fast-moving subjects at constant position for precise image processing.

(7) Restart / Reset
Under the restart / reset mode, this model can capture images at an arbitrary timing cued by external VD signal.

(8) Multiple shutter
With this shutter, this model capture images at an arbitrary timing cued by external trigger signal, and then outputs video at an arbitrary timing cued by external VD signal.

(9) Partial-scan
Under the partial scan mode, only 1/2 or 1/4 screen center portion of image information is read out, resulting in a faster operation.

3. Configuration

(1) Camera head (Camera cable: Direct fixing) ····· 1
  (1-1) Cable fixing direction (viewed from rear)
    (a) CS8541DV -** V : Rear
    (b) CS8541DW -** W : Left
    (c) CS8541DX -** X : Down
    (d) CS8541DY -** Y : Right (Standard)
    (e) CS8541DZ -** Z : Up
  (1-2) Camera cable length (Item(1-1)-**)
    (a) 01: 1m (Standard)
    (b) 02: 2m
(2) Camera control unit
(3) Accessory
    Operation Manual (Japanese)····· 1
    Operation Manual (English)····· 1

4. Optional Accessories

(1) Dedicated lens (12-phi) f = 30mm, 17mm, 12mm, 6mm
(2) Camera adapter [Model name: CA170]
(3) DC IN / SYNC cable for CS8541D [Model name: CPRC8541P15-**,
    **:01(1m)-05(5m), *Combination with (2)]
(4) DC IN / SYNC conversion cable for CS8541D [Model name: CPRC8541J15-**,
    **:01(1m)-05(5m), *Combination with CPRC3700-02,03,05]

*Please contact your dealer / distributor for details of option units.

* Conformity of an option part and EMC conditions
About the conformity of the EMC standard of this machine, it has guaranteed in the conditions combined with the above-mentioned option part.
When used combining parts other than specification of our company, I ask you to have final EMC conformity checked of a visitor with a machine and the whole equipment.

5. Operation Mode

(1) GAIN selection (CCU rear-panel SW)
    Switches sensitivity setting
    (1-1) FIX ---------- Factory-prefixed gain
    (1-2) MANU---------- Gain is adjustable via the manual gain potentiometer (GAIN)

(2) Video output mode selection (CCU bottom-panel DIP SW)
    Switches video format
    (2-1) 1/60N : 1/60s--------- Non-interlace mode
    As all pixels are read out in 1/60s, you will get images with the higher V resolution
    (2-2) 1/120I : 1/120s--------2:1 interlace MIX mode
    As vertical pixels are added in readout, the sensitivity is same as that of 1/60s non-interlace mode during electronic shutter OFF. Twice greater sensitivity is obtained under shutter-speed range from 1/200 through 1/20000.

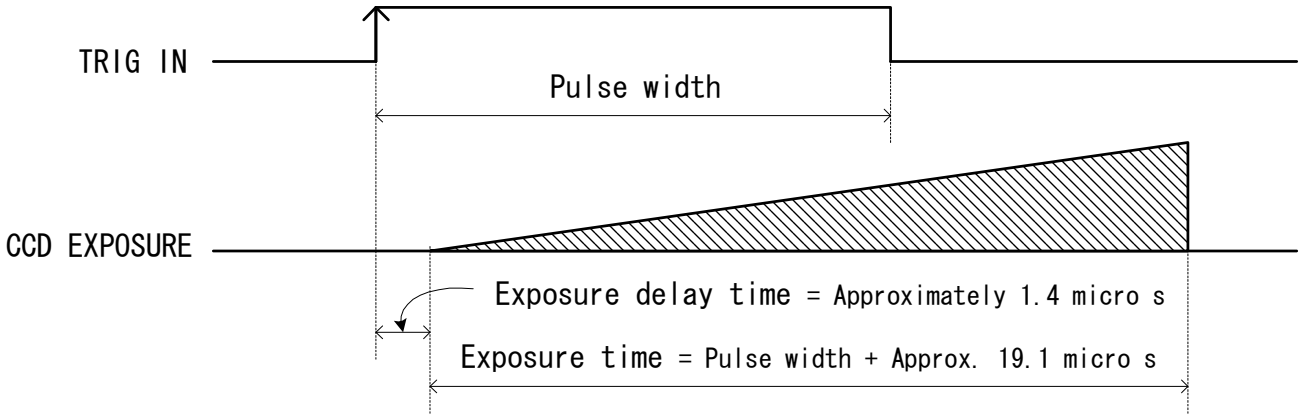
(3) TRIG selection (CCU bottom-panel DIP SW)
Switches TRIG input signal polarity used under RTS mode
(3-1) POSI ----------Positive polarity (rising edge detection)
(3-2) NEGA---------- Negative polarity (falling edge detection)

(4) RTS (Random Trigger Shutter) exposure selection (CCU bottom-panel DIP SW)
Switches light exposure mode under RTS mode
(4-1) FIX mode----------Bottom DIP SW
Exposure-time control via bottom-panel DIP switch
(4-2) PULSE W mode------TRIG signal pulse width control
Exposure-time control via TRIG signal pulse width

(5) Shutter mode selection (CCU bottom-panel DIP SW or TRIG signal IN [Automatic])
Switches shutter mode
(5-1) NOR mode ----------Normal electronic shutter
Exposure control via internal sync signal
8 positions, including OFF, 1/200s, 1/500s, 1/1000s, 1/2000s, 1/4000s, 1/8000s, 1/20000s
(5-2) RDM mode----------Random trigger shutter
Exposure control via ext. trigger or ext. sync input
Timing charts are shown below. (TRIG timing: Positive)
Notes: * RDM selection is automatic with TRIG status
** Neither under FIX nor PULSE W mode, RTS doesn't work if Electronic shutter speed SW is set in OFF position.

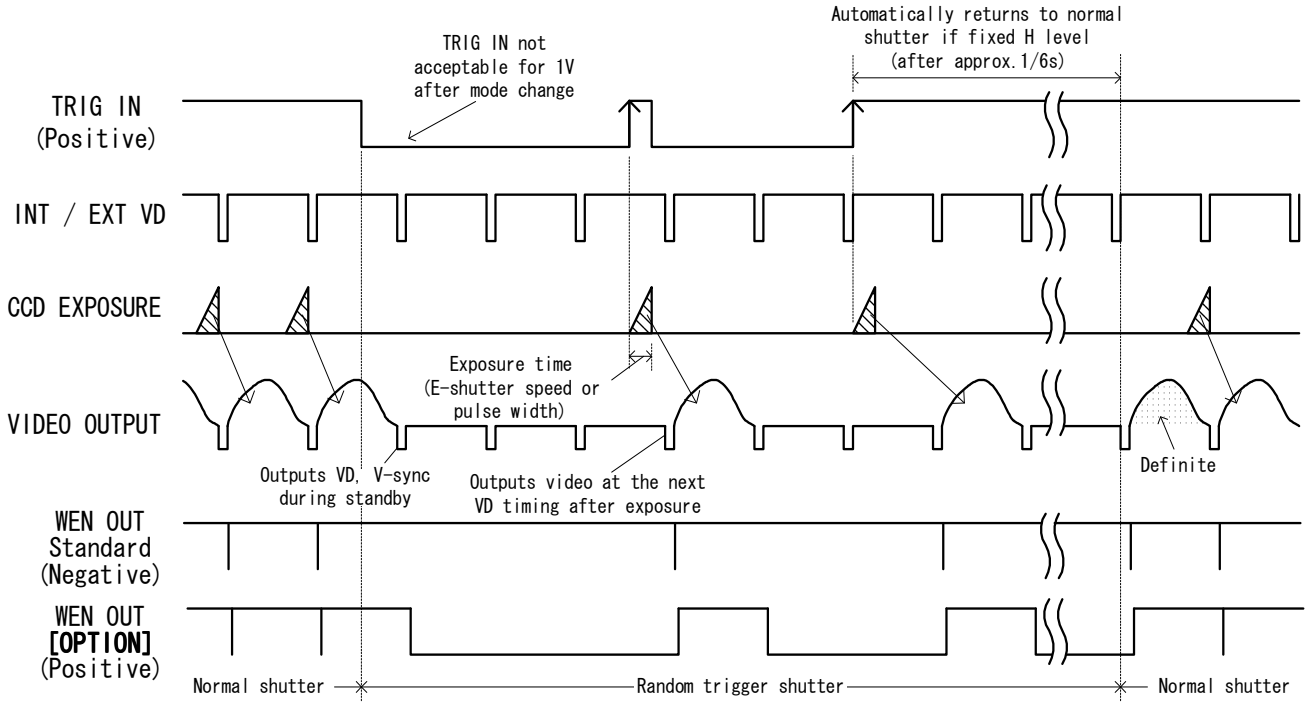
<Exposure time delay under RTS>
When the RTS is active, both in FIX mode and PULSE W mode, there is a time delay of approximately 1.4 micro s until the start of exposure after the rising edge of TRIG signal (positive).

<Exposure time under pulse width mode>
Under RTS pulse mode, the exposure time is determined by the pulse width. More exactly, the actual time is the pulse width plus approximately 19.1 micro s.

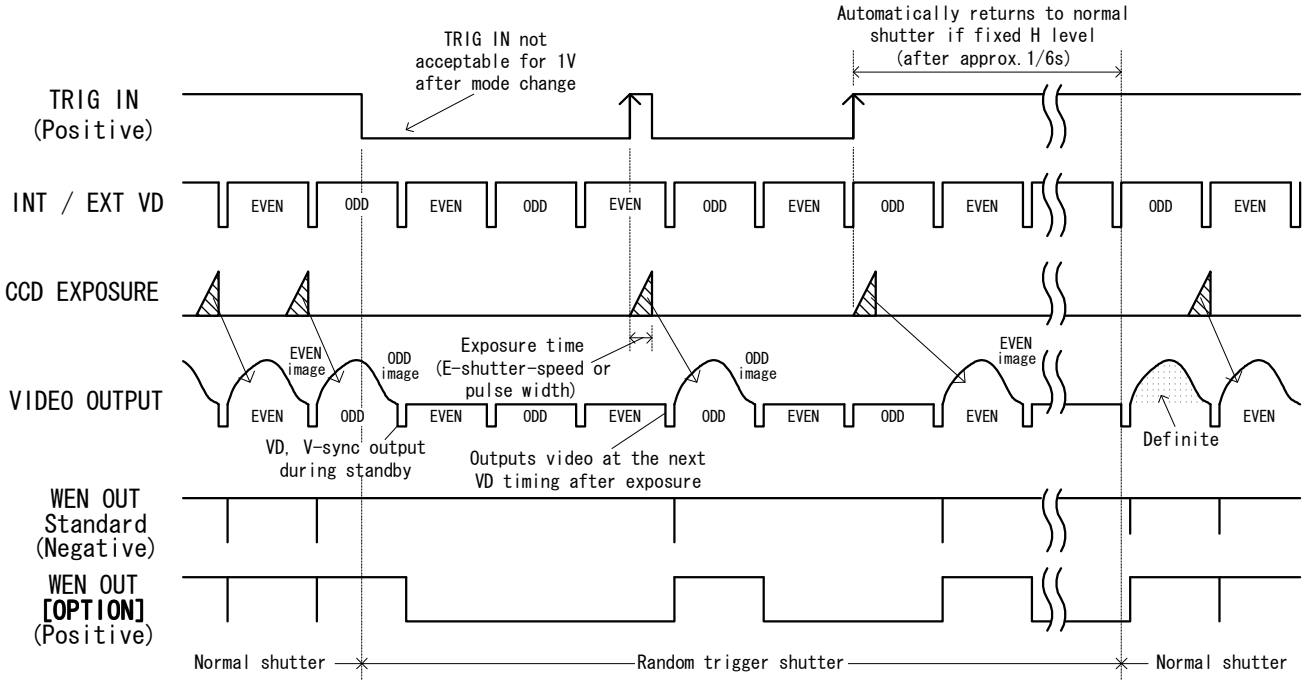


(a) Non-reset mode (Under internal sync / external sync --- Consecutive VD IN)
Exposure starts at the timing of TRIG signal IN. After each exposure is completed, the camera outputs video at each next VD IN timing.

<1/60s Non-interlace>



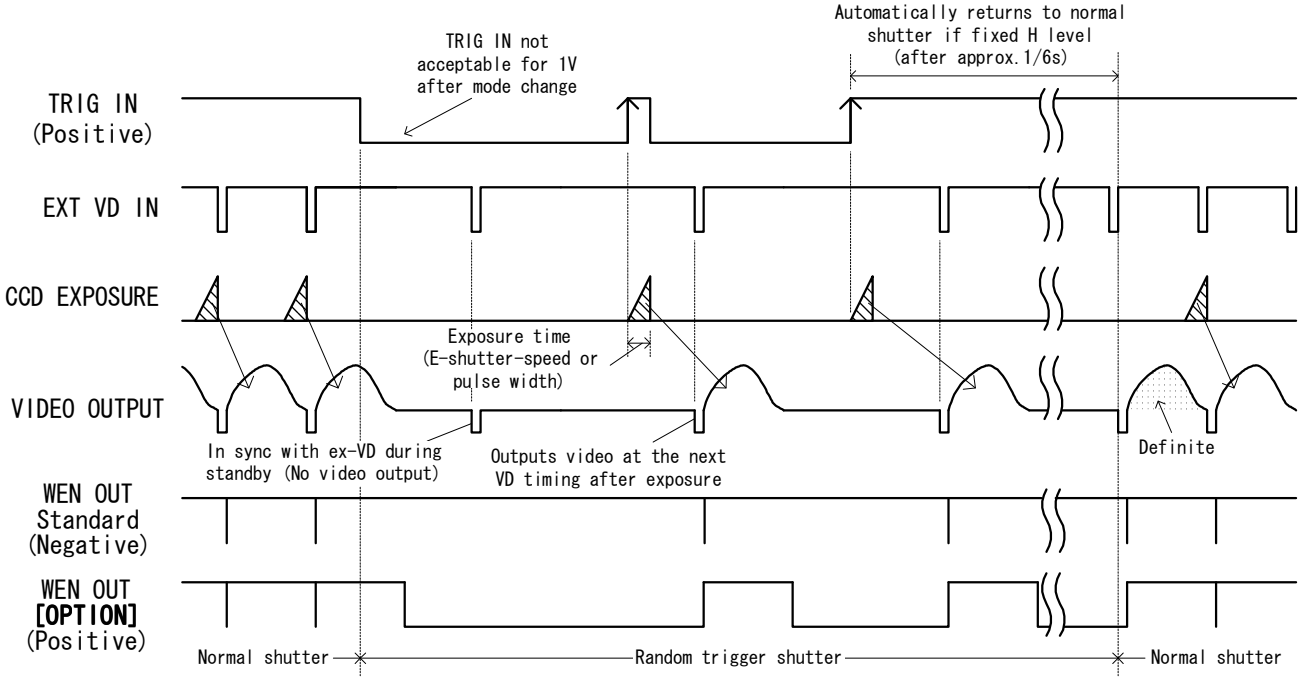
<1/120s 2:1 Interlace>



(b) Non-reset mode (Under external sync --- Single VD IN)

After TRIG IN and exposure, the camera goes into standby until next ext. VD IN.

<1/60s Non-interlace>

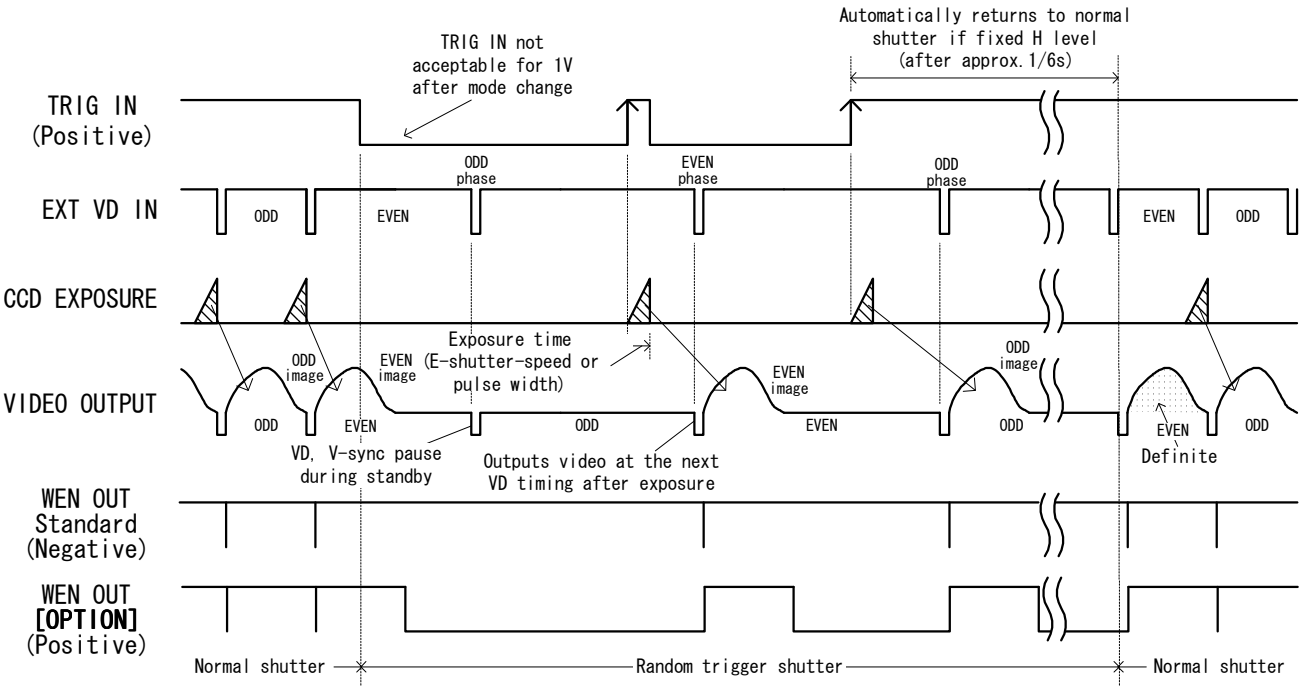


* Don't provide ext. VD IN during exposure.

** After automatic return, fix ext. VD IN at Hi.

<1/120s 2:1 Interlace>

Video output field (ODD/EVEN) is determined by ext. VD falling edge and ext. HD phase.



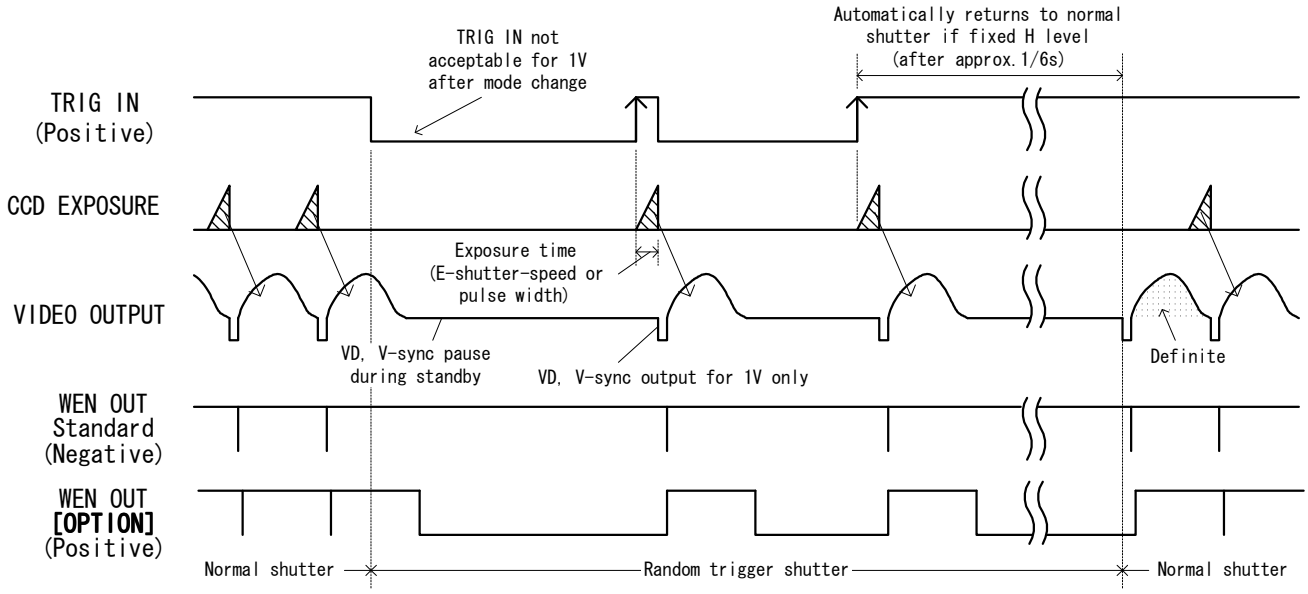
* Don't provide ext. VD IN during exposure.

** After automatic return, fix ext. VD IN at Hi.

(c) V-reset mode (Under internal sync / external sync --- No VD IN)

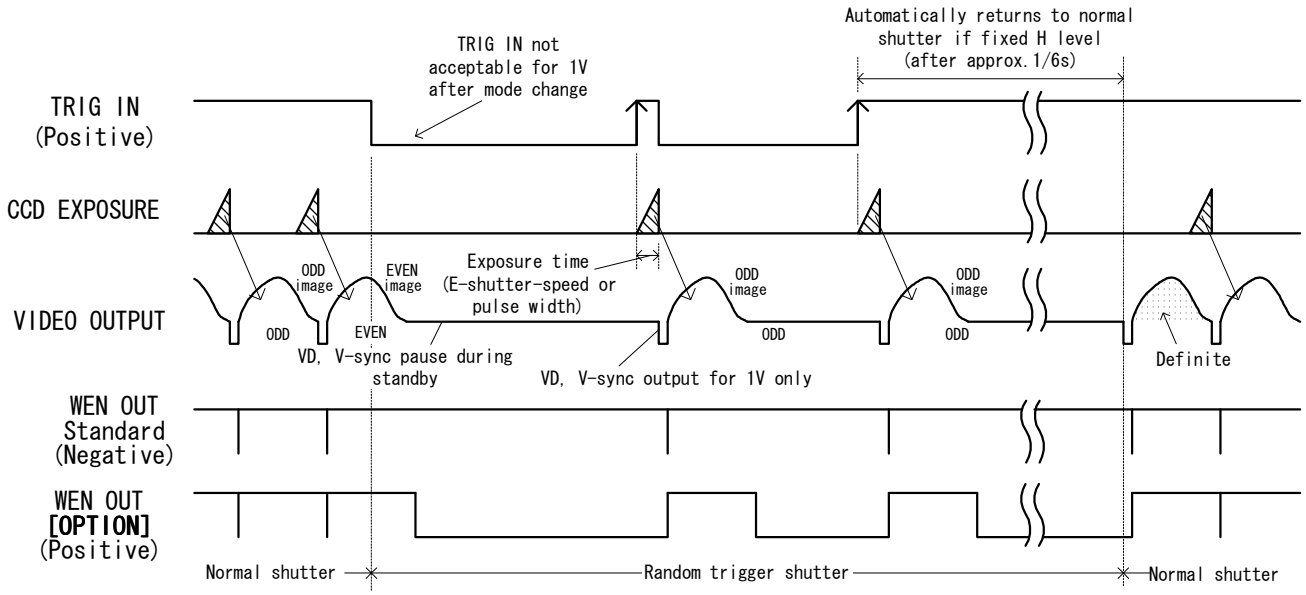
Exposure starts at the timing of TRIG signal IN. After each exposure is completed, the camera outputs video immediately by resetting VD. (HD is not reset)

<1/60s Non-interlace>



<1/120s 2:1 Interlace>

Irrespective of TRIG IN phase, the camera always outputs ODD field image.

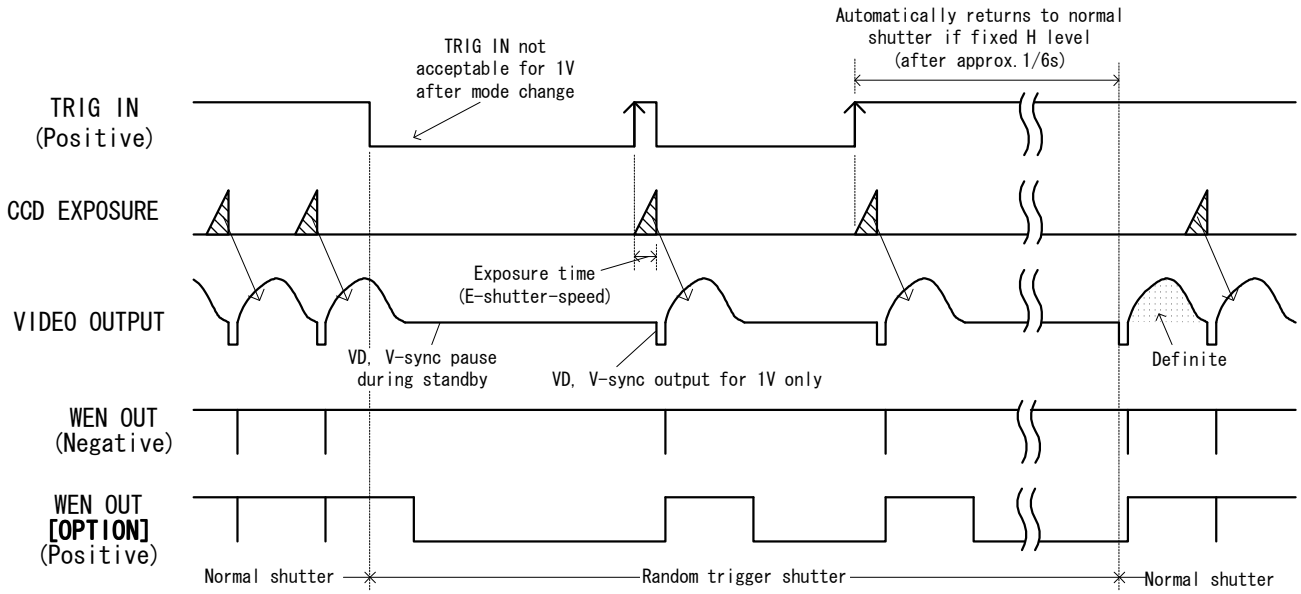


(d) SYNC reset mode (Under internal sync)

Exposure starts at TRIG signal input timing, resets HD, and outputs video immediately after exposure by resetting VD.

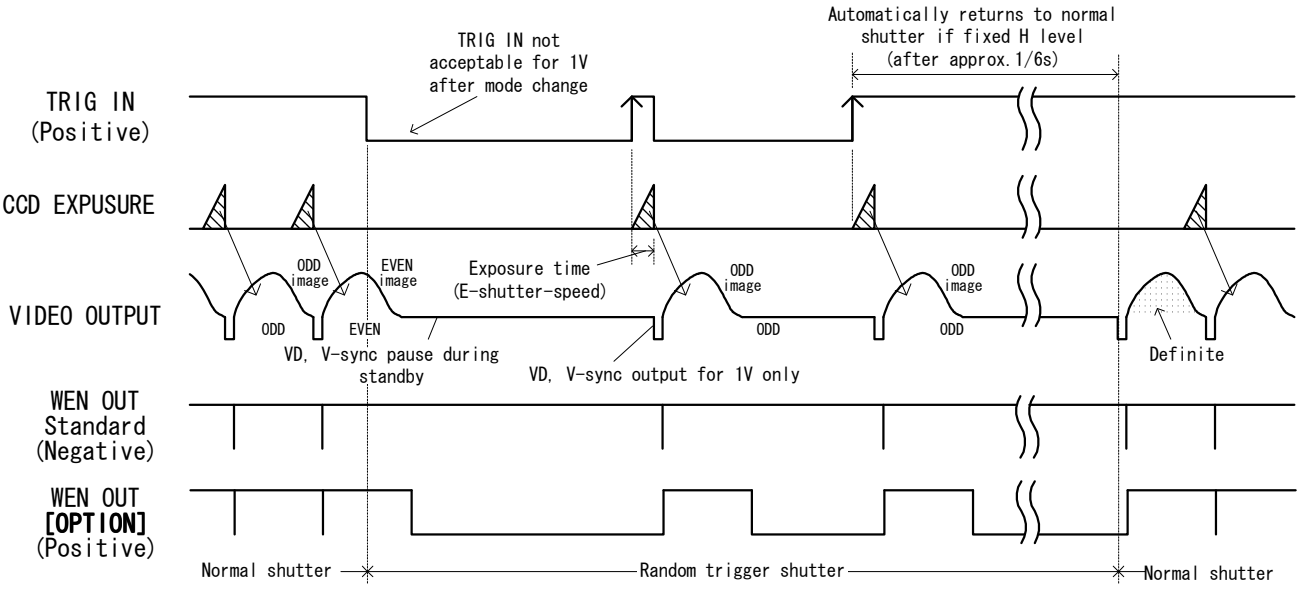
* Available under FIX mode only.

<1/60s Non-interlace>



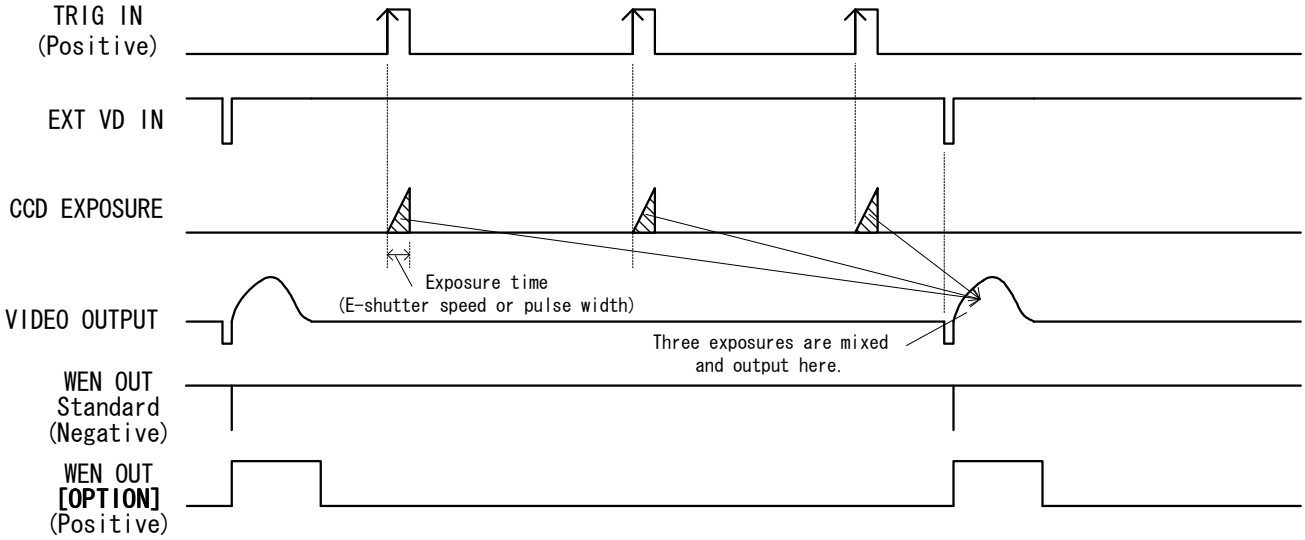
<1/120s 2:1 Interlace>

Irrespective of TRIG IN phase, the camera always outputs ODD field image.



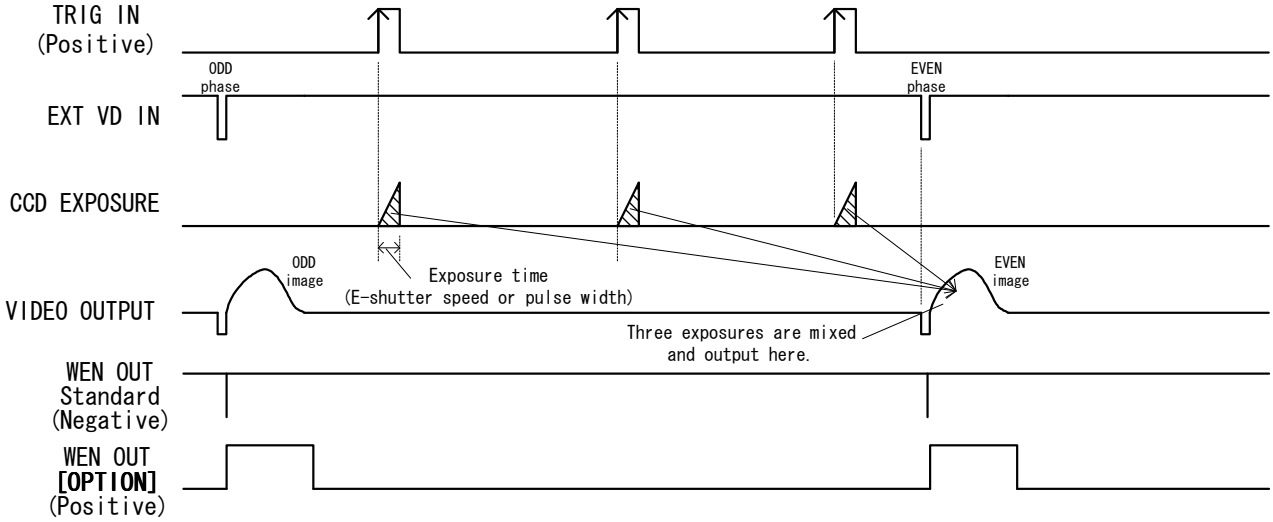
(5-3) MULTIPLE mode---------Multiple shutter operation is available by providing TRIG IN more than one time before ext. VD IN. (Non-reset mode, single VD, consecutive VD IN)

<1/60s Non-interlace>



<1/120s 2:1 Interlace>

Video output field (ODD/EVEN) is determined by ext. VD falling edge and ext. HD phase.



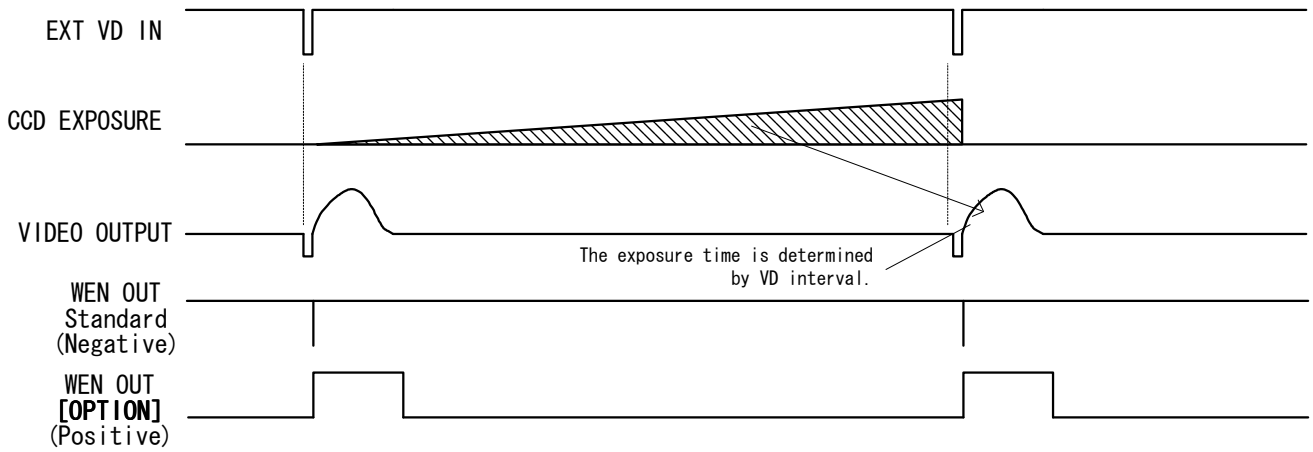
(5-4) Restart / Reset----------The restart / reset function is available with the ext.VD signal.
You can get an arbitrary slower shutter speed than normal shutter and random trigger shutter.
Here are some notes;

* The shutter speed (exposure time) is determined by ext. VD signal interval.

** This function is enabled when the rear-panel shutter speed DIP SW is OFF.

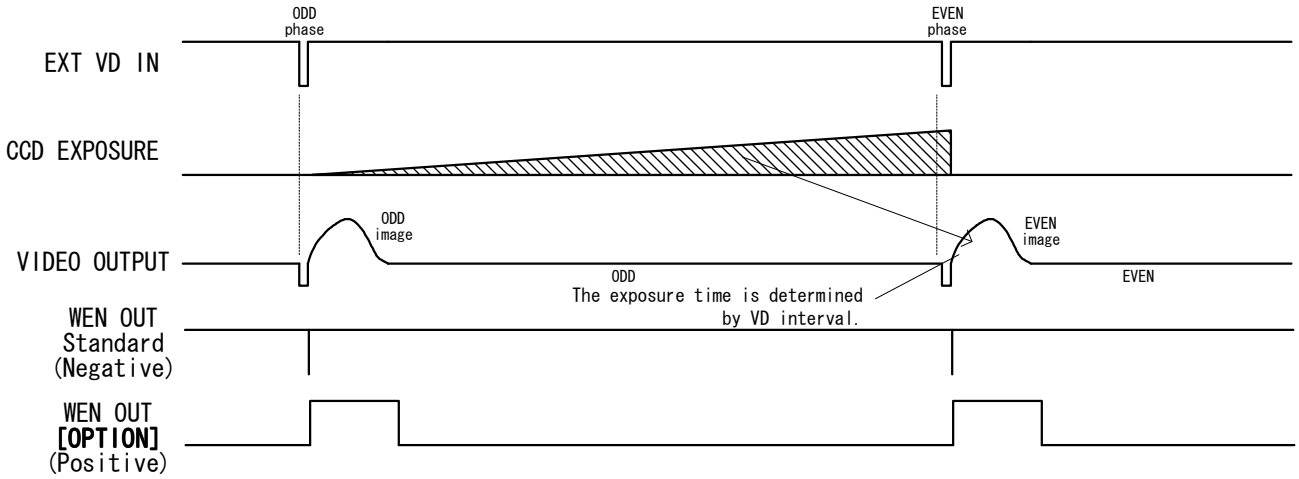
*** Supply consecutive VD.

<1/60s Non-interlace>



<1/120s 2:1 Interlace>

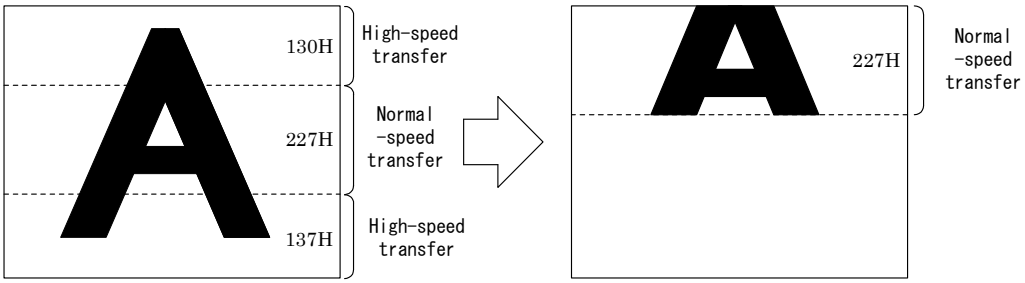
Video output field (ODD/EVEN) is determined by ext. VD falling edge and ext. HD phase.



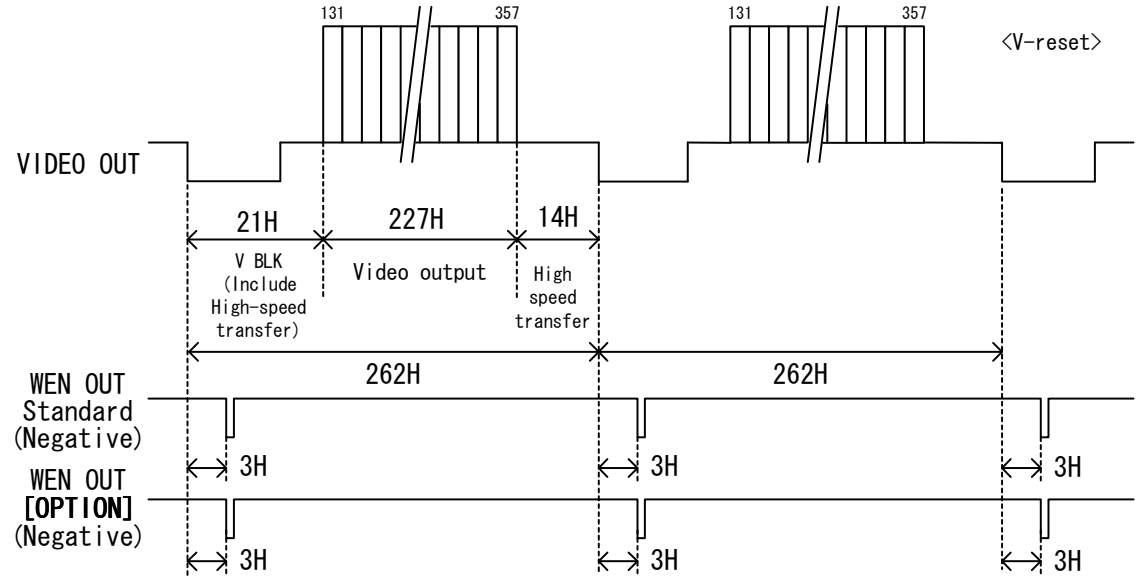
(6) Partial-scan mode selection (CCU bottom-panel DIP SW)
Switches partial-scan mode

Note: Sometimes phenomenon called as “whiteout” occurs at the top of the screen when there is strong incident light entering in the wide area of a CCD, however, this is not a malfunction. If this occurs, reduce the amount of incoming rays.

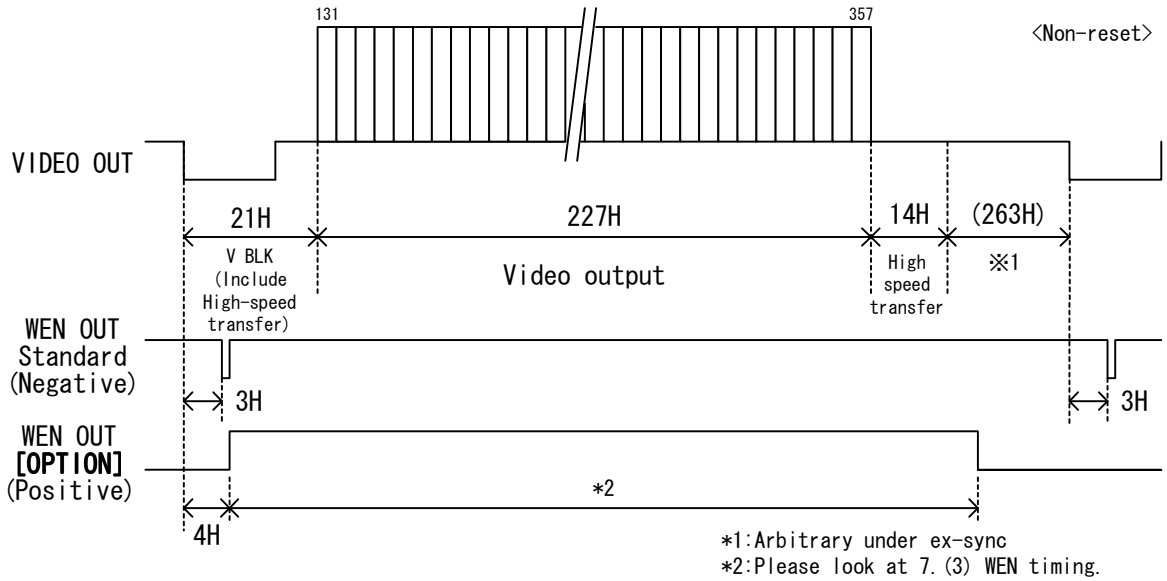
(6-1) 1/2 Partial-scan (Bottom-panel SW: 7-OFF, 8-ON) --- Screen center 1/2 readout
<1/60s Non-interlace>
Under 1/60s non-interlace mode, only the center portion of 227H out of the total effective lines 494H (excluding BLK time) is read out. Available both under external / internal mode.



<Under normal shutter (Electronic shutter OFF)>
Notes: * Under ext. sync, the ext. VD should be 1V = 262H.
** Under normal shutter, set the bottom-panel DIP SW #5, #6 in OFF.



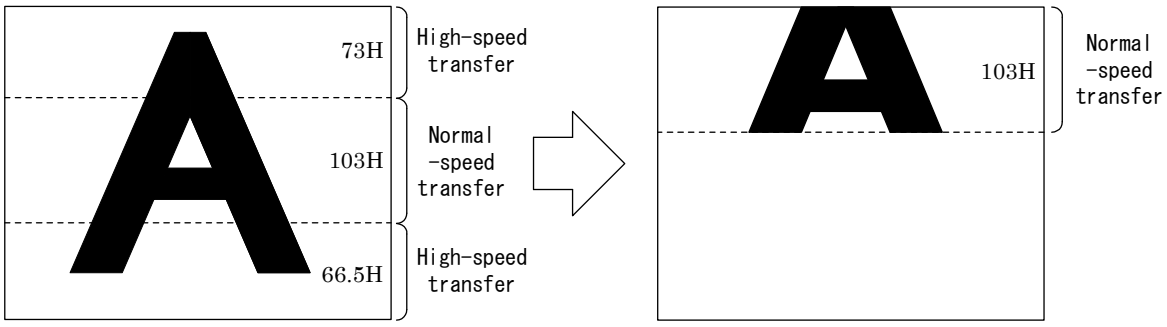
<Under other shutter modes>



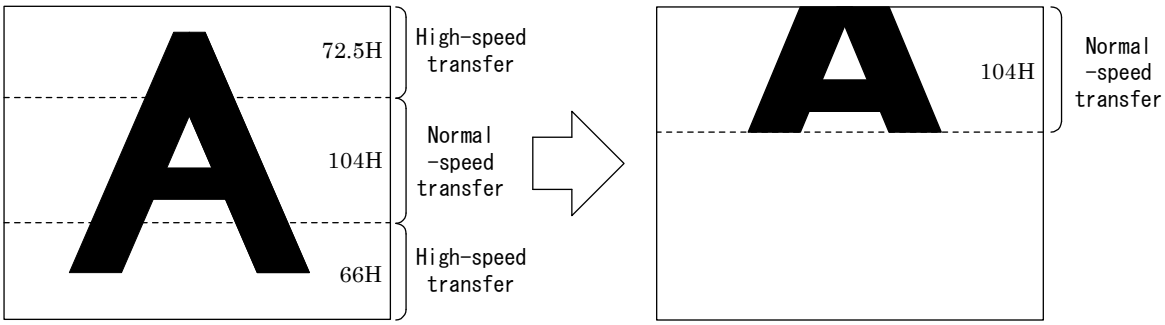
<1/120s 2:1 Interlace>

Under 1/120s interlace mode, only the center portion of 207H out of the total effective lines 485H (excluding BLK time) is read out. Available both under external / internal mode.

ODD field



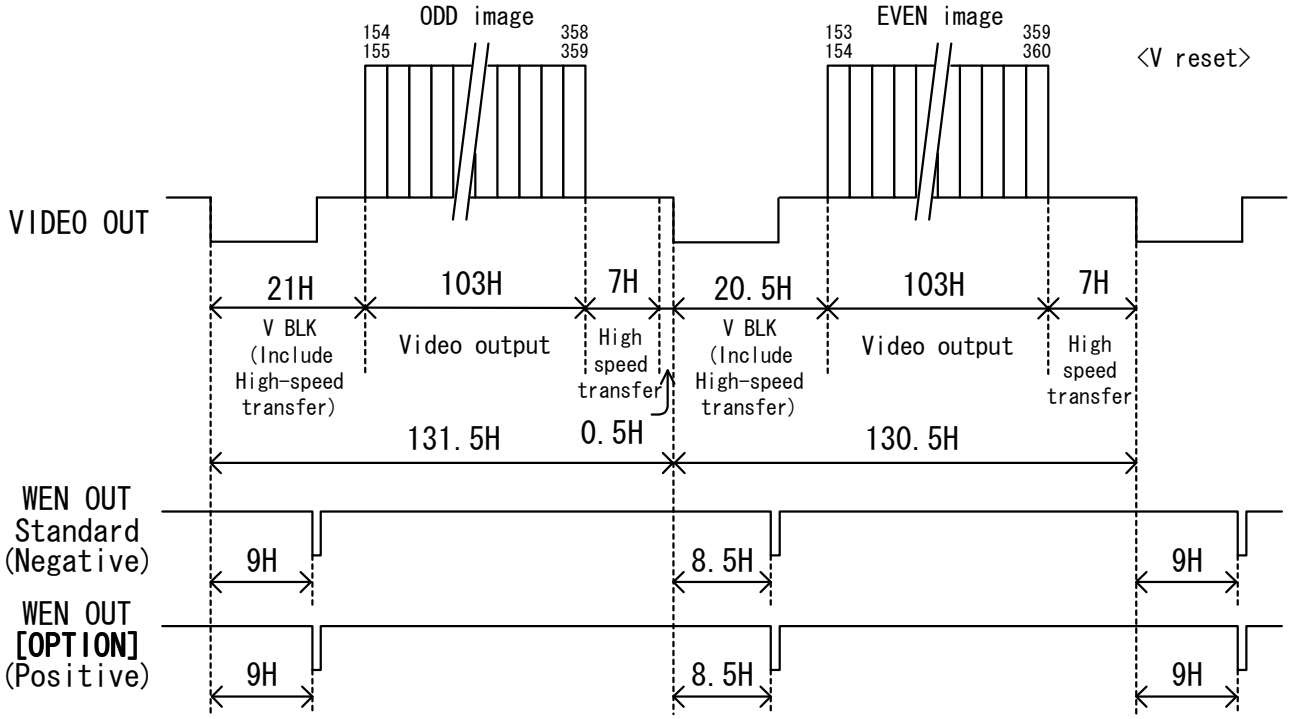
EVEN field



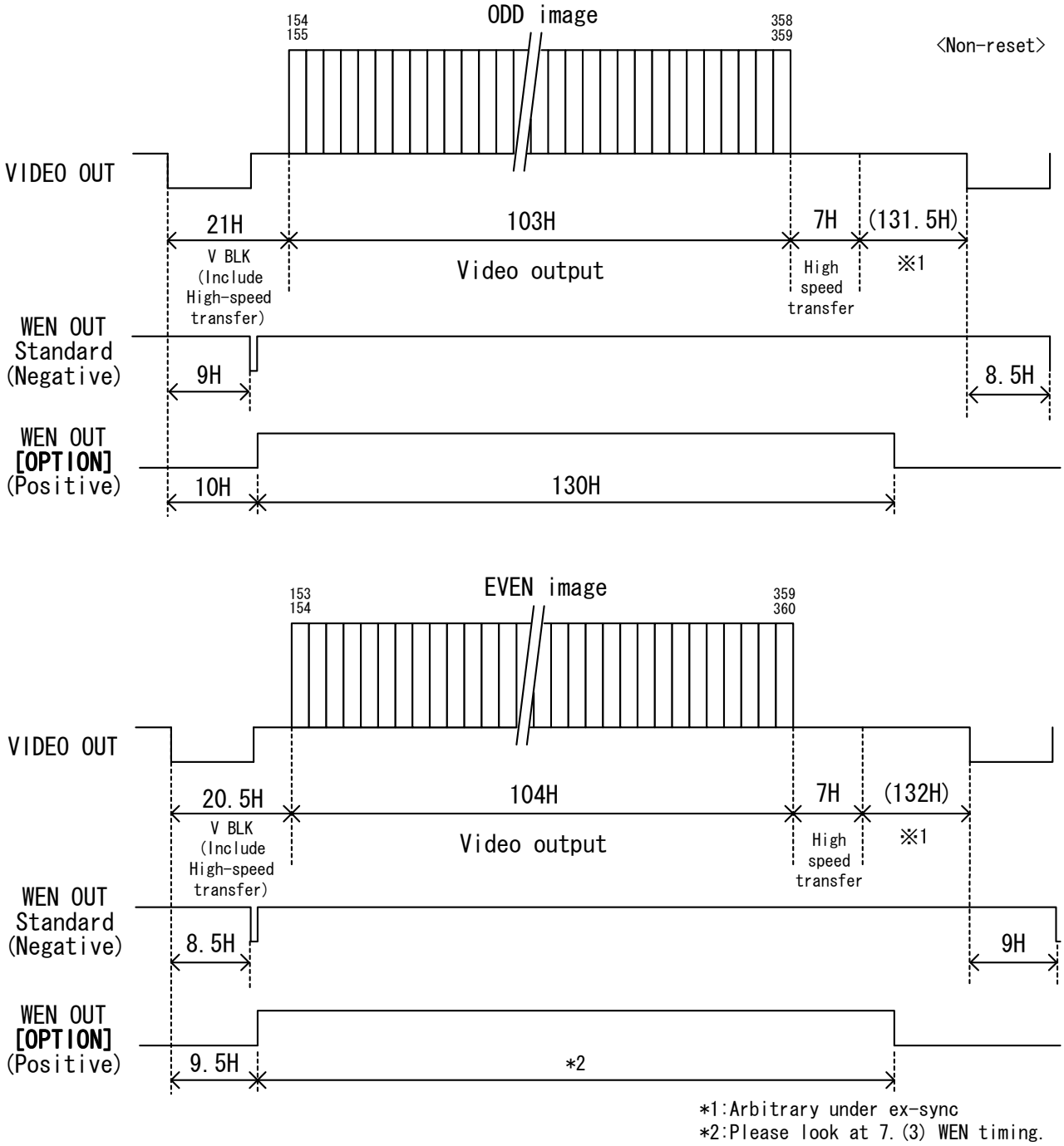
<Under normal shutter (Electronic shutter OFF)>

Notes: * Under ext. sync, the ext. VD should be 1V = 131.5H.

** Under normal shutter, set the bottom-panel DIP SW #5, #6 in OFF.



<Under other shutter modes>

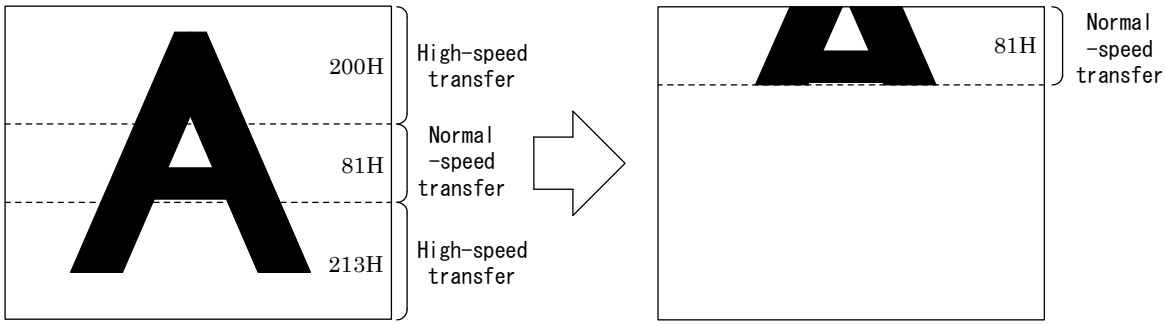


*1:Arbitrary under ex-sync
*2:Please look at 7.(3) WEN timing.

(6-2) 1/4 Partial-scan (Bottom-panel SW: 7-ON, 8-ON) --- Screen center 1/4 readout

<1/60s Non-interlace>

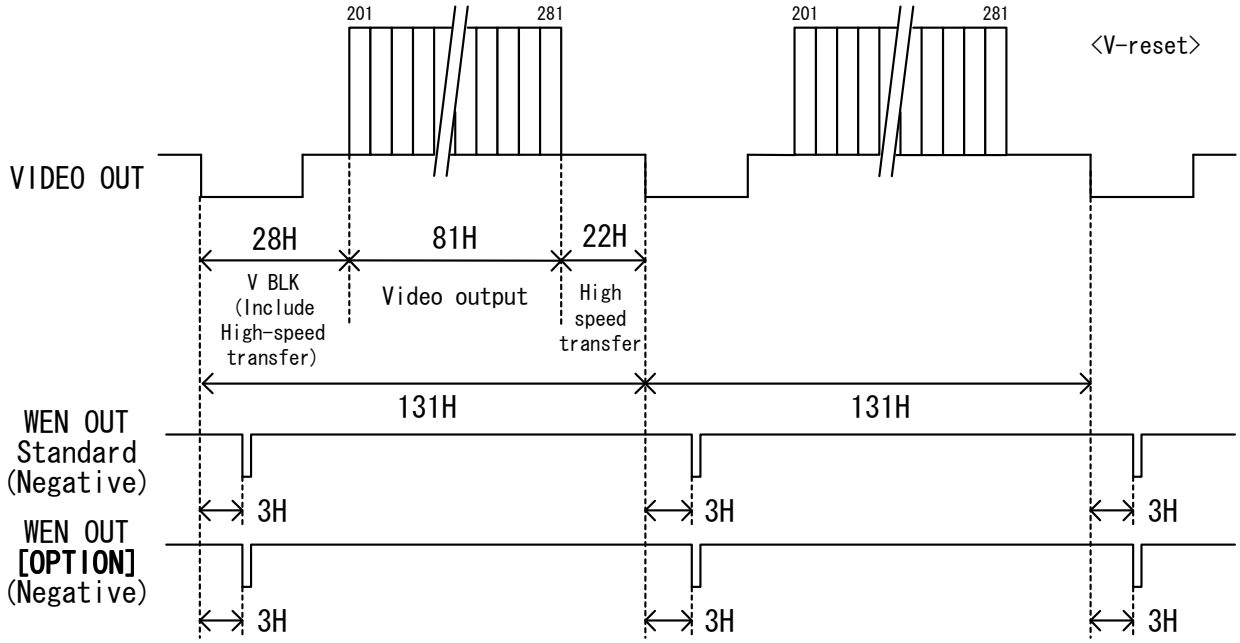
Under 1/60s non-interlace mode, only the center portion of 81H out of the total effective lines 494H (excluding BLK time) is read out. Available both under external / internal mode.



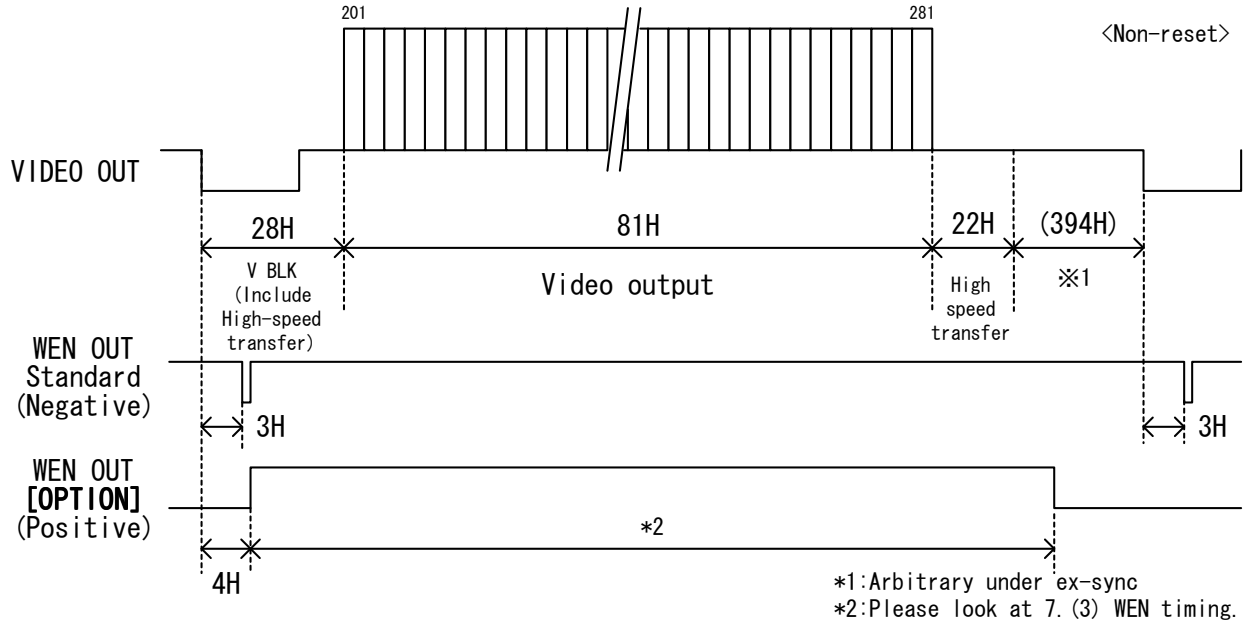
<Under normal shutter (Electronic shutter OFF)>

Notes: * Under ext. sync, the ext. VD should be 1V = 131H.

** Under normal shutter, set the bottom-panel DIP SW #5, #6 in OFF.



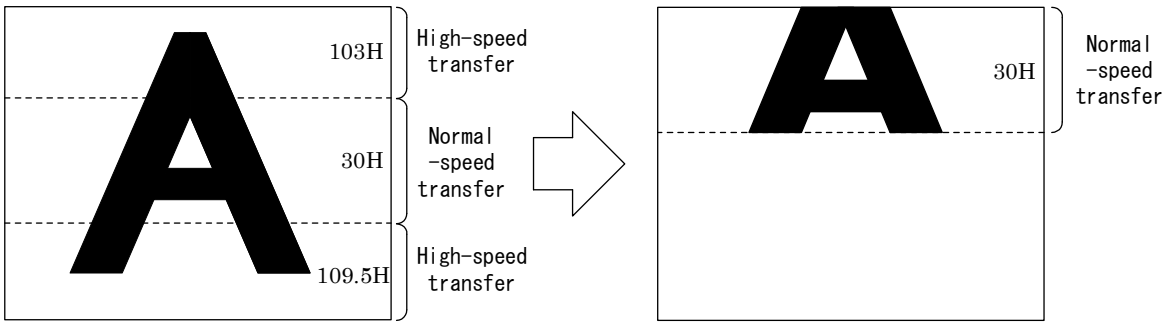
<Under other shutter modes>



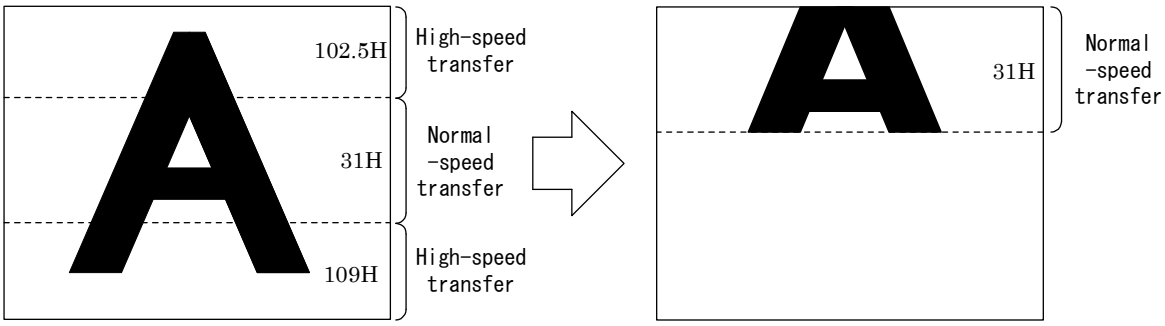
<1/120s 2:1 Interlace>

Under 1/120s interlace mode, only the center portion of 61H out of the total effective lines 485H (excluding BLK time) is read out. Available both under external / internal mode.

ODD field



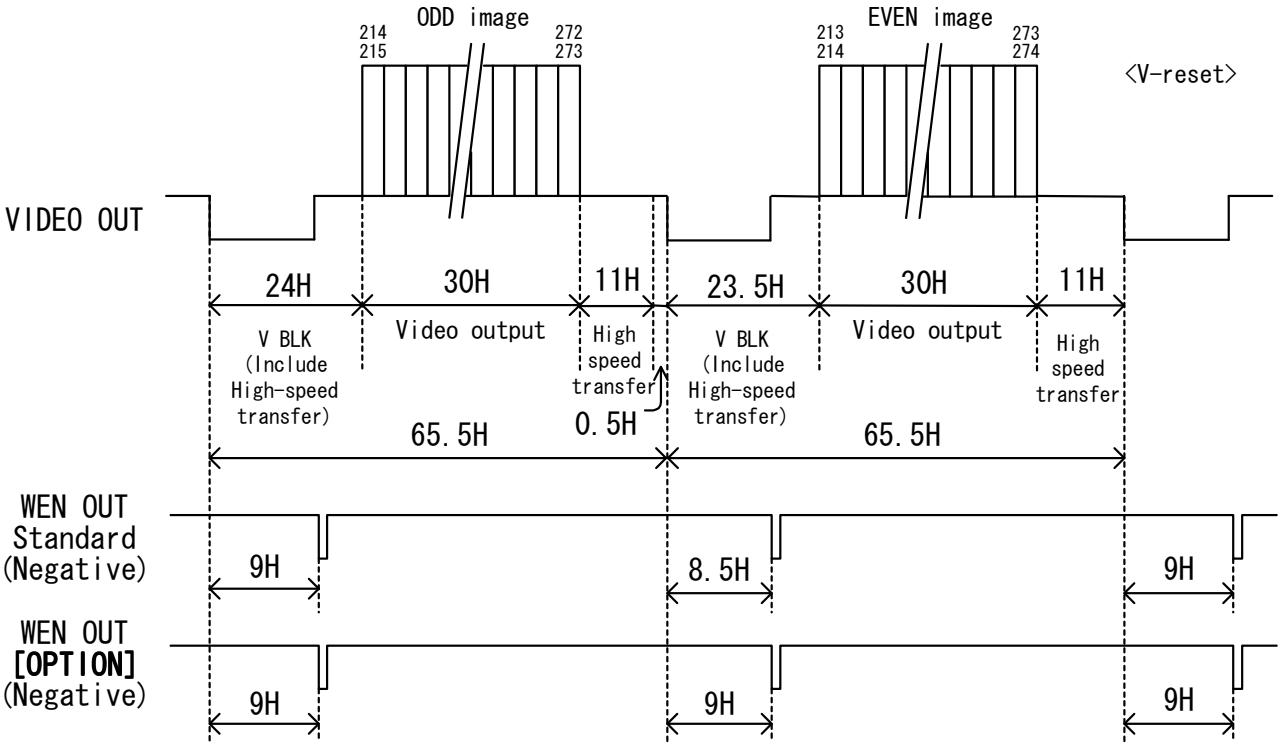
EVEN field



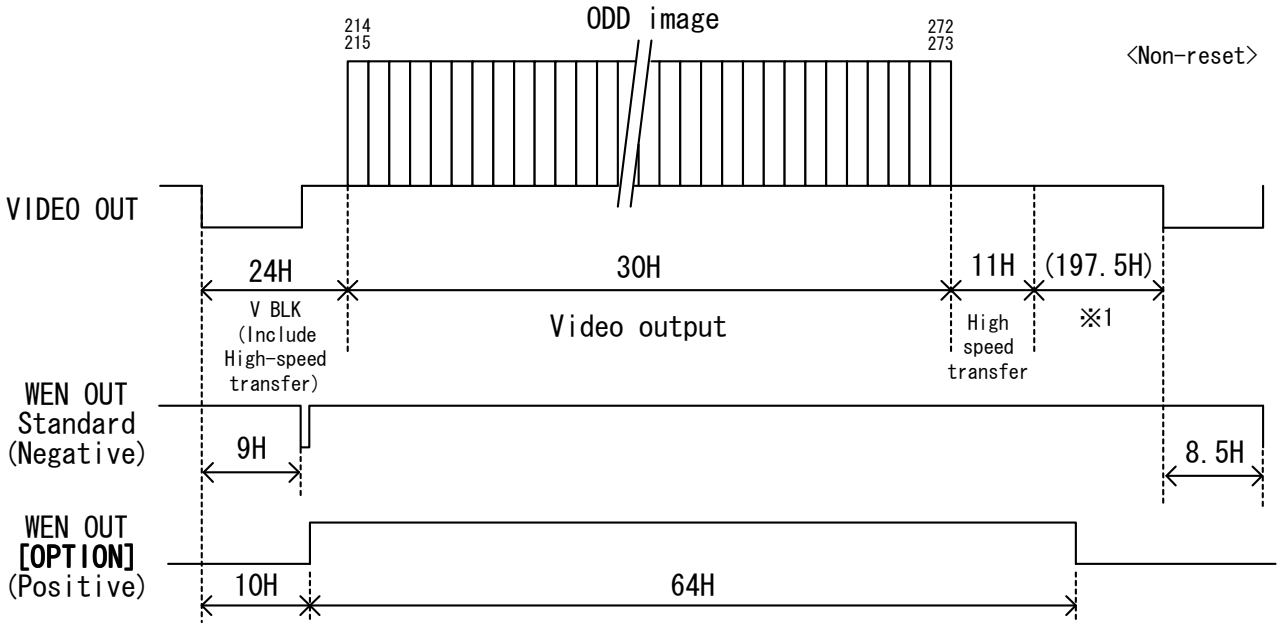
<Under normal shutter (Electronic shutter OFF)>

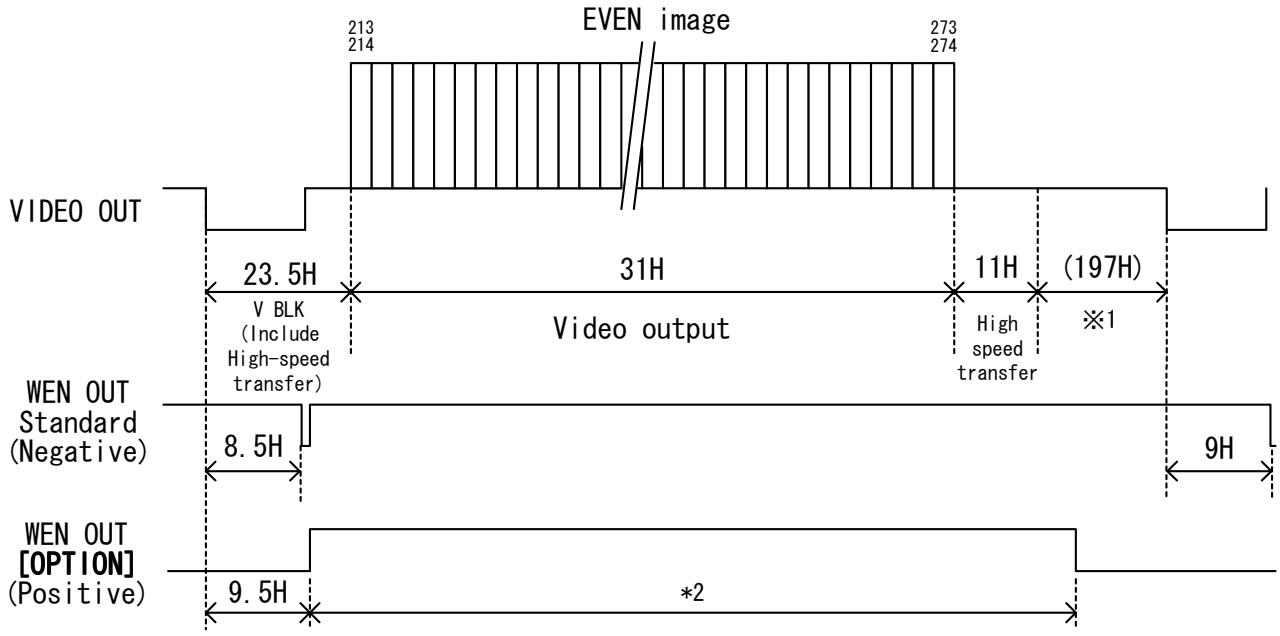
Notes: * Under ext. sync, the ext. VD should be 1V = 65.5H.

** Under normal shutter, set the bottom-panel DIP SW #5, #6 in OFF.



<Under other shutter modes>

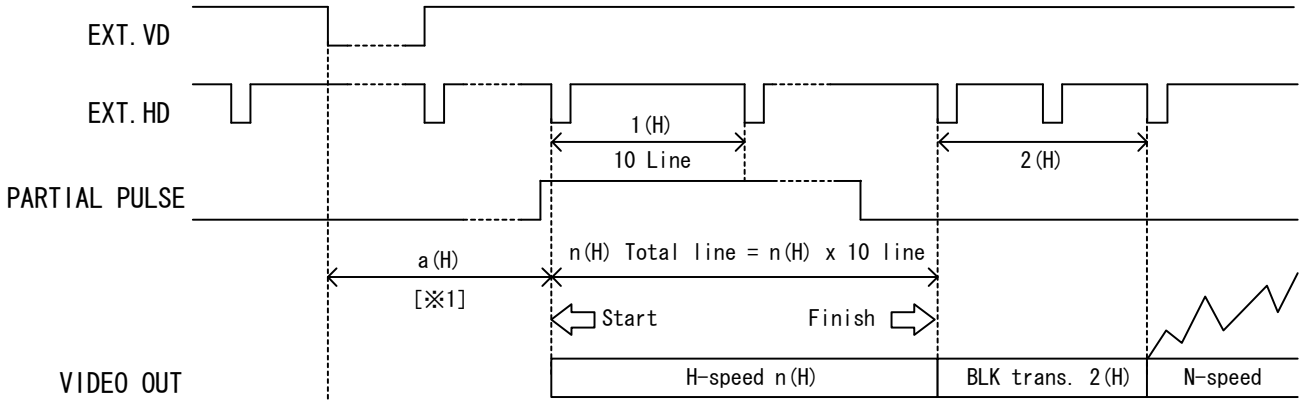




*1:Arbitrary under ex-sync
*2:Please look at 7.(3) WEN timing.

(6-3) Programmable partial **[Option]**

By designating the high-speed transfer portion with external PARTIAL signal input, the camera read out only the portion of CCD area necessary for your application. This is available under ext. sync.



[※1]	1/60s non-interlace	1/120s Interlace	
		1st field	2nd field
a(H)	6.0	12.0	11.5

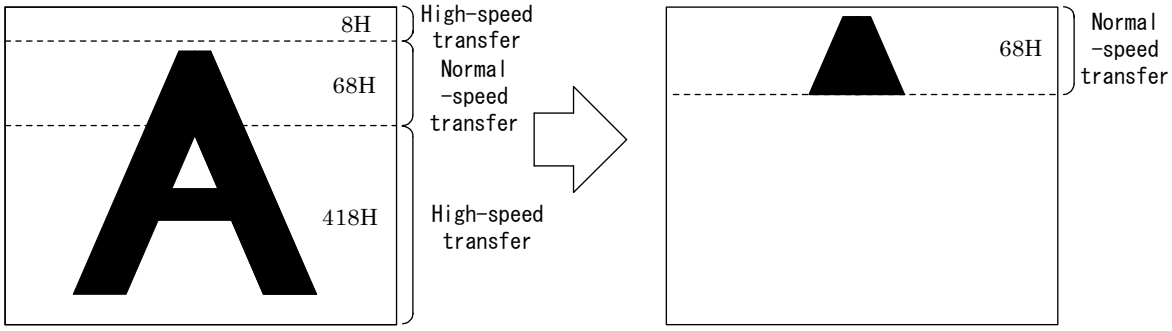
(Conditions)

- The starting point of external partial signal is [*1] from the falling edge of ext. VD.
- The external partial signal is controlled at each ext. HD falling edge. Set the start / finish of the external partial signal in 1H increments.
- The number of 1H high-speed transfer line is 10 lines. The actual lines are determined by the external partial signal "hi" length. (Minimum: 2H = 20 lines)
- After high-speed transfer, 2H is allocated to blank transfer period. Normal transfer starts at the next line.
- VIDEO OUT vertical blanking is;
  V. blanking = [*1](H) + n(H) + BLK transfer [2(H)] – 1H

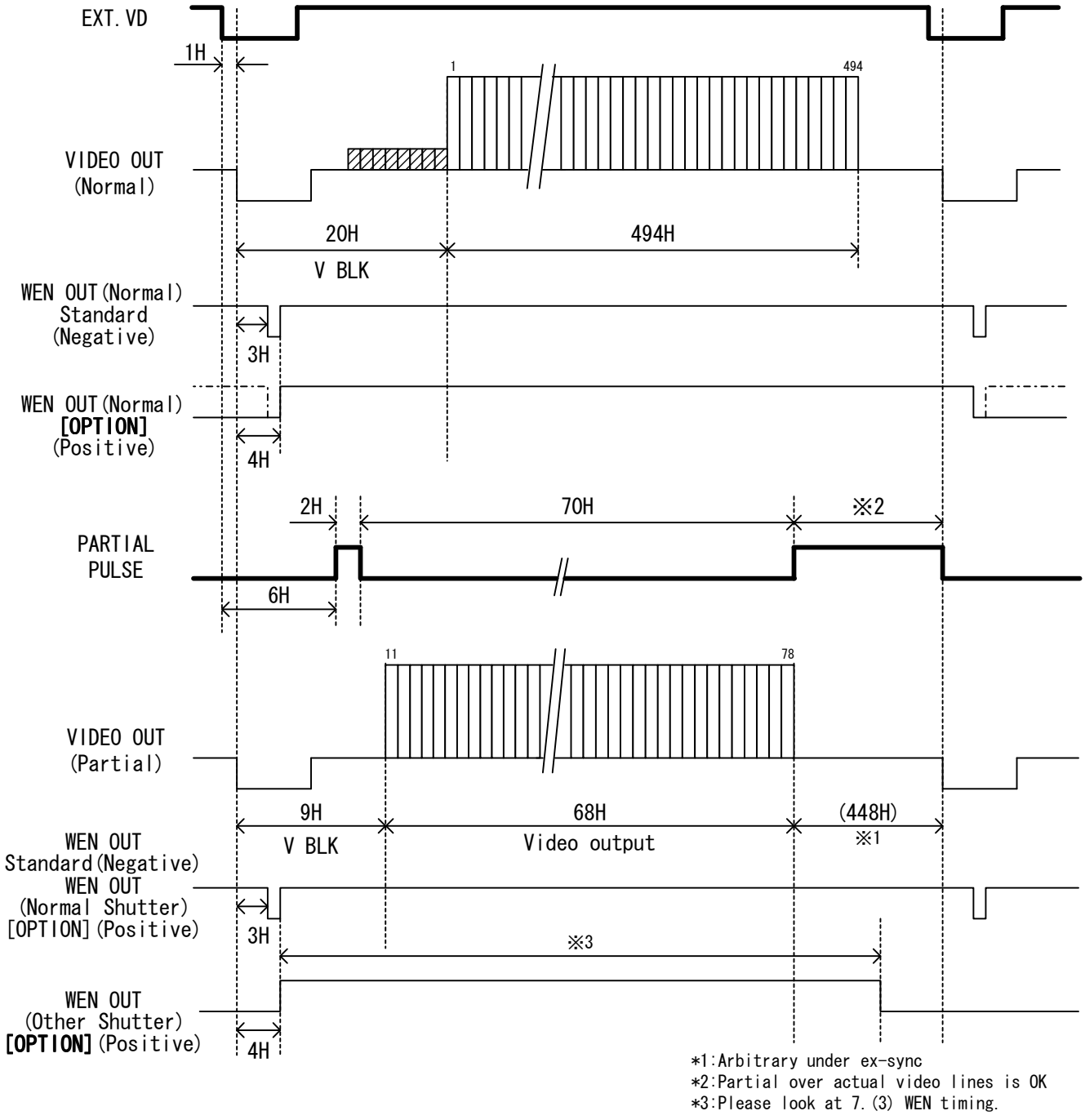
Example follows below.
(High-speed minimum 2H = 20 lines, Normal-speed 70 lines + BLK 2H)

Note: <u>Items shown as [Option] in this document is not included in your purchase as standard components. Contact our dealer / distributor for details.</u>

<1/60s Non-interlace>

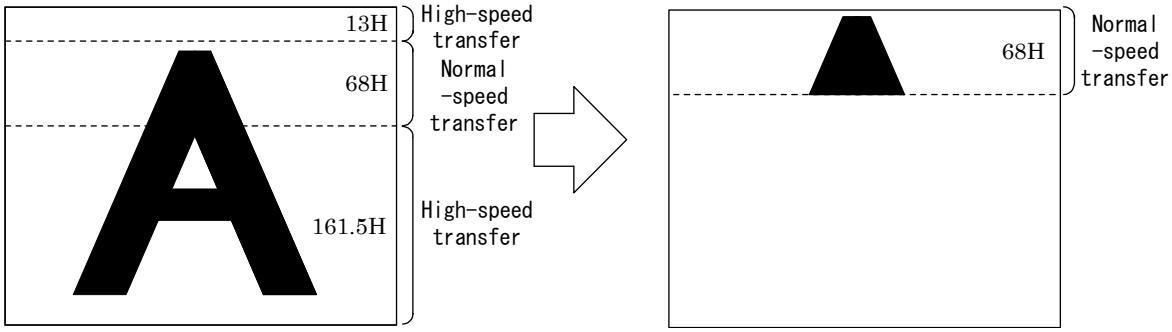


The timing is as follows;



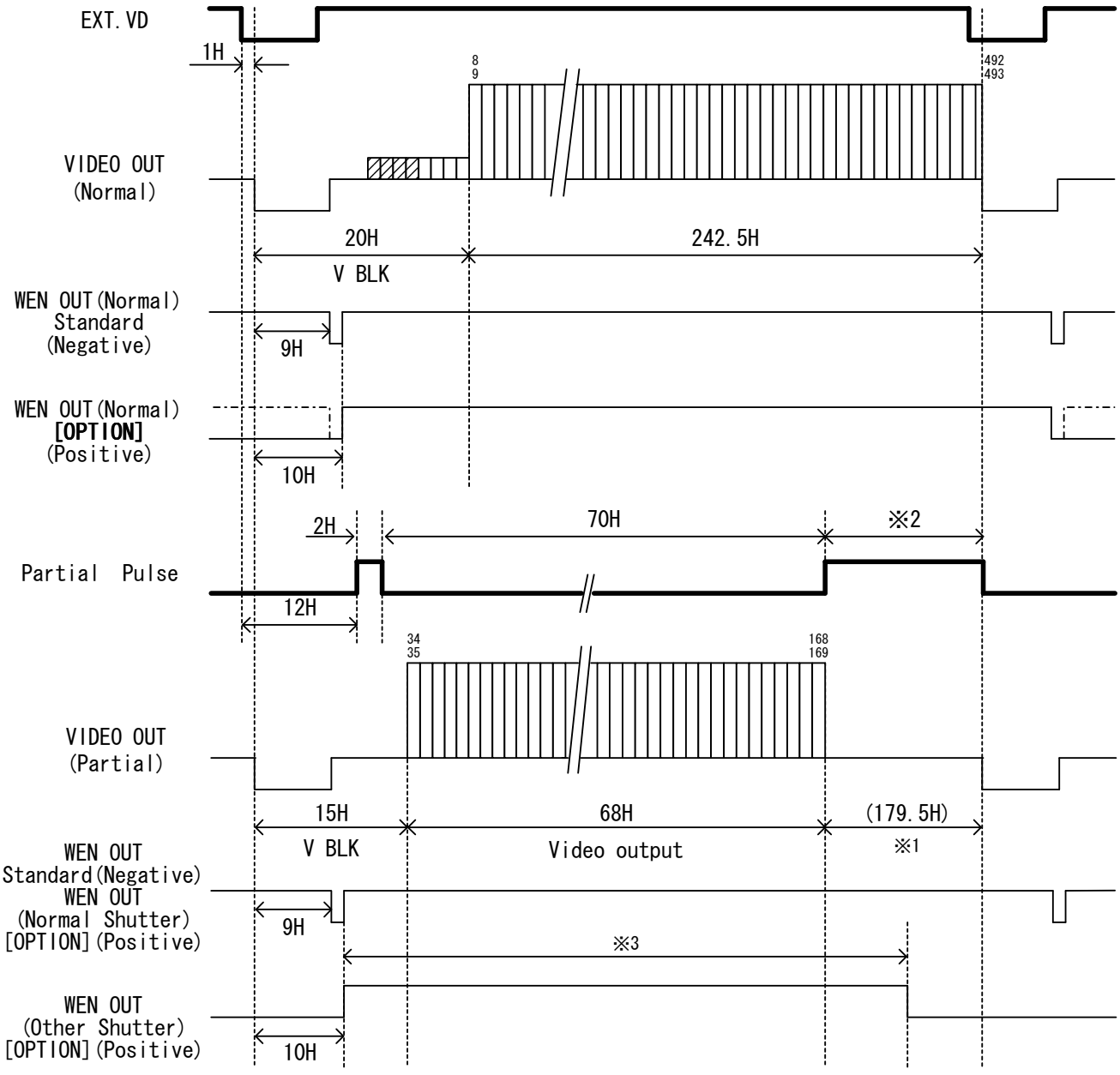
*1:Arbitrary under ex-sync
*2:Partial over actual video lines is OK
*3:Please look at 7.(3) WEN timing.

<1/120s 2:1 Interlace, ODD field>



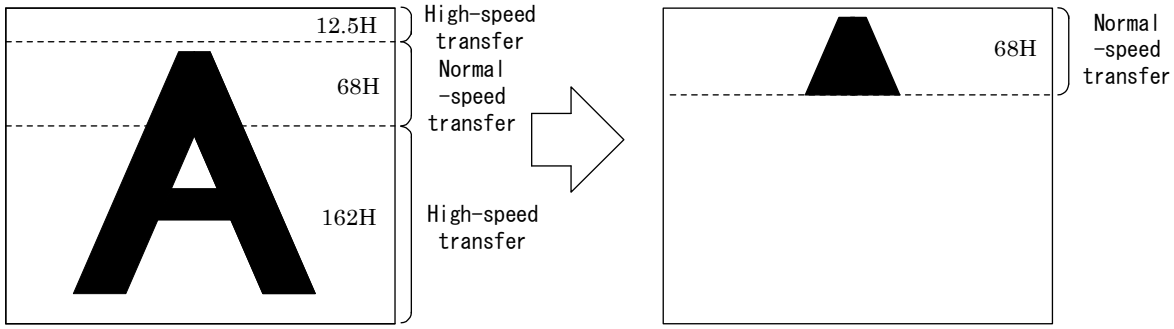
The timing is as follows;

ODD field



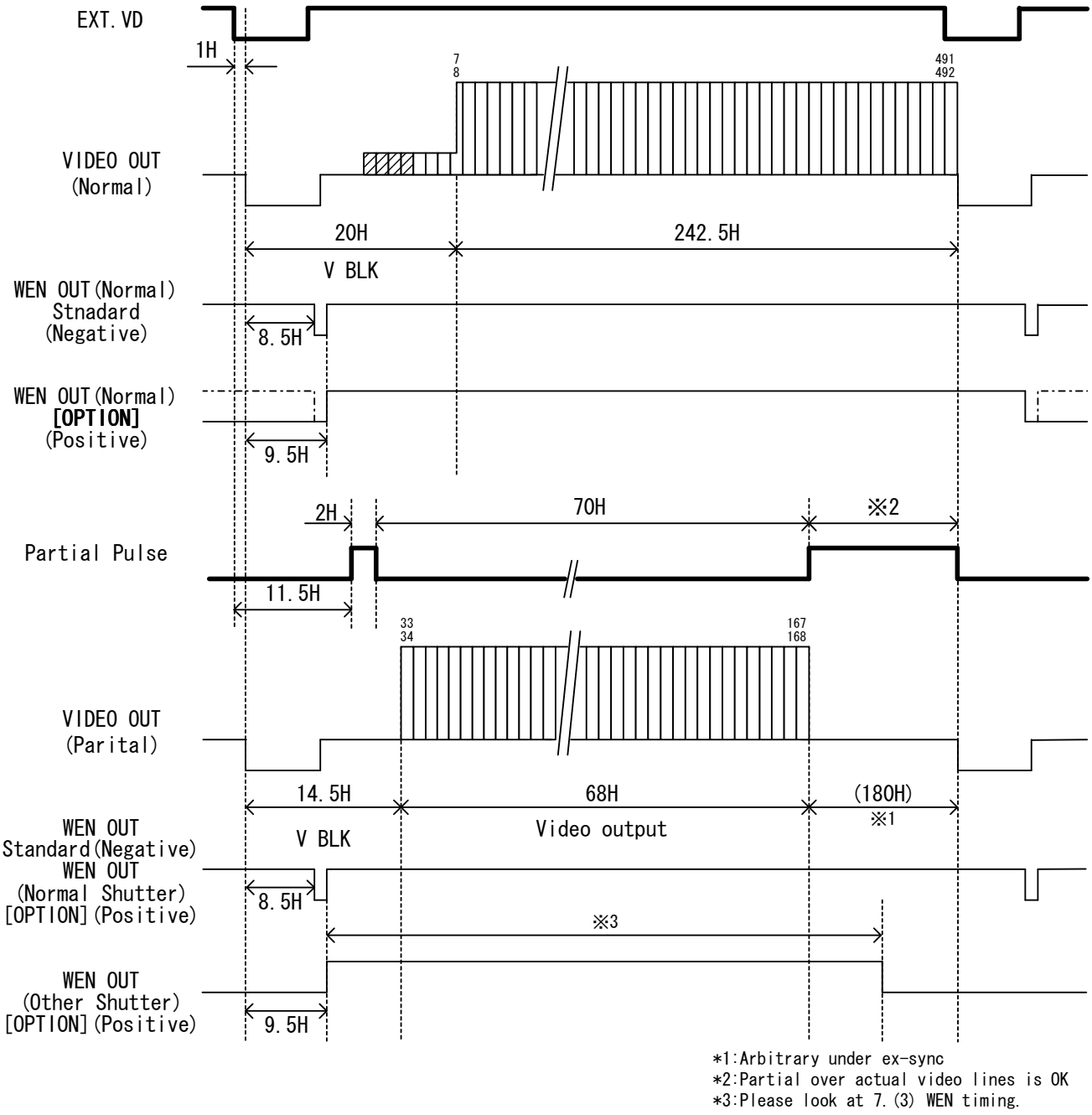
*1:Arbitrary under ex-sync
*2:Partial over actual video lines is OK
*3:Please look at 7.(3) WEN timing.

<1/120s 2:1 Interlace, EVEN field>



The timing is as follows;

EVEN field



*1:Arbitrary under ex-sync
*2:Partial over actual video lines is OK
*3:Please look at 7.(3) WEN timing.

6. Specifications

[Basic spec]

(1) Image sensor	All Pixel's Data Read-out Interline CCD
Total pixels	692(H) x 504(V)
Active pixel	659(H) x 494(V)
Video output pixels	648(H) x 494(V) (Under non-interlace)
	648(H) x 485(V) (Under interlace)
Scanning area	4.88(H) x 3.66(V) mm (=Equivalent to 1/3 type CCD size)
Unit cell size	7.4(H) x 7.4(V) μ m (Square-grid array)
(2) TV system	Special format (Non-conforming to EIA)
(3) Scanning lines	525 lines
(4) Interlace	1/60s Non-interlace mode
	1/120s 2:1 Interlace mode
	Switching via bottom-panel DIP SW
(5) Sync system	Internal/External automatic switch-over
(6) Aspect ratio	4:3
(7) Video output	VS 1.0V(p-p) / 75-ohm, DC coupled, 1 line
	DC/AC coupled [switching via internal SW]
(8) Resolution	485 TV lines (H)
	485 lines (350 TV lines)(V)
(9) S/N	Standard: 52dB(p-p)/rms (Initial factory setting)
(10) Illumination	Standard 400 lx (F5.6)
	Minimum 4 lx (F1.4) (GAIN MAX, Approx. 50% video output)
(11) Gain	FIX (Fixed) gain: Factory-shipped preset level
	MANU (Manual) gain: Setting through GAIN VR
	FIX / MANU switching via rear-panel SW
(12) Gamma correction	Gamma = 1 (Fixed)
(13) White-clip level	Approx. 857mV(p-p) (Excluding SYNC)
(14) Power source	DC12V +/- 10%
	Ripple voltage: 50mV(p-p) or less
(15) Power consumption	Approx. 3.0W
(16) Camera cable	1m

* Before connecting / disconnecting the connector, make sure the camera power is OFF to prevent a malfunction.

** Do NOT use in combination with camera head and CCU having the different serial number. To do so might cause not to make full use of the essential function of this camera.

[Internal sync spec]

(1) Base clock frequency	24.545MHz (1CLK) +/- 200ppm
(2) H sync frequency	31.468kHz (1H = 780CLK)
(3) V sync frequency	59.94Hz (Under non-interlace)
	119.88Hz (Under 2:1 interlace)

[External sync spec]

(1) Ext. sync input signal	HD/VD
(2) input level	From 2 through 4V (p-p)/10k-ohm
(3) Input impedance	75-ohm / High impedance (Switching via internal SW)
	(Initial factory setting: High)
(4) Interlace	1/60s non-interlace or 1/120s 2:1 interlace
(5) Polarity	Negative
(6) Pulse width	HD: 3.2 +/- 1 micro s (LOW)
	VD: From 125 through 400 micro s (LOW)
(7) Repeating frequency	f_H = 31.468kHz +/- 1%
	$f_V = f_H/262.5$ or $f_H/525$
(8) Phase difference	HD/VD: 0 +/- 5.0 micro s, 1/FH/2 +/- 5.0 micro s

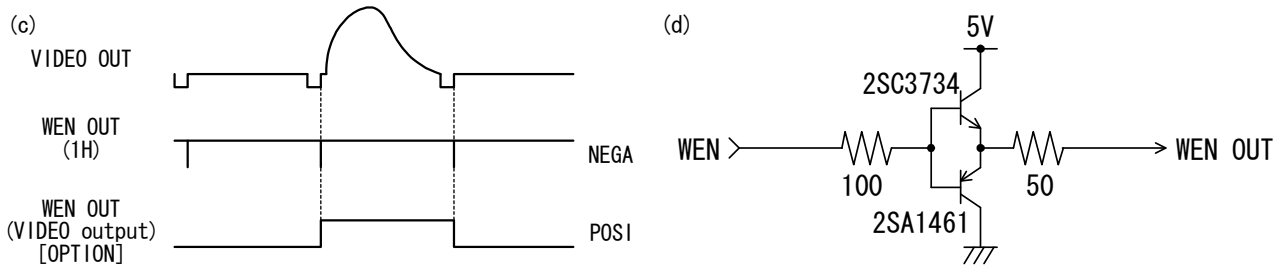
[Shutter trigger spec] Exposure-starting-cue signal in random trigger shutter mode

(1) Input level	LOW level: From 0 through 0.5V(p-p)
	HIGH level: From 4 through 5V(p-p)
(2) Input impedance	High impedance (10k-ohm)
(3) Capture timing	Rising edge detection (Positive) / Falling edge detection (Negative)
	(Switching via bottom-panel DIP SW)
	(Initial factory setting: Rising edge)
(4) Pulse width	Under DIP SW setting: Minimum 2 micro s, Maximum 1/6s
	Under PULSE W setting: Minimum 2 micro s, Maximum 1/8s

[Sync signal spec]

(1) WEN (Readout timing pulse)

(a) Output signal level	More than 4V(p-p)
(b) Polarity	Negative (Positive under VIDEO output mode **[Option]**)
(c) Pulse width	1H output (Available under VIDEO output mode **[Option]**)
(d) Output circuit	



(2) HD・VD pulse (Switching via internal SW／Initial factory setting: Input)

(a) Output signal level	More than 4V(p-p)
(b) Interlace	1/60s non-interlace or 1/120s 2:1 interlace
(c) Polarity	Negative
(d) Pulse width	HD : 3.18 ±0.1 micro s (LOW)
	VD : 286 ±1 micro s (LOW)

Note: <u>Items shown as [Option] in this document is not included in your purchase as standard components. Contact our dealer / distributor for details.</u>

[Electronic shutter spec]

(1) Normal shutter — Shutter-speed setting via bottom-panel SW (Initial: OFF)
8 steps selectable (= OFF, 1/200s, 1/500s, 1/1000s, 1/2000s, 1/4000s, 1/8000s, 1/20000s)

(2) RTS

(a) Operation mode

No.	Reset	Exposure	Sync
1	Non-reset	Bottom SW (FIX mode)	Internal
2			Consecutive HD / Consecutive VD IN
3			Consecutive HD / Single VD IN
4		TRIG pulse width (PULSE W mode)	Internal
5			Consecutive HD / Consecutive VD IN
6			Consecutive HD / Single VD IN
7	V-reset	Bottom SW (FIX mode)	Internal
8			Consecutive HD IN
9	SYNC reset		Internal
10	V reset	TRIG pulse width (PULSE W mode)	Internal
11			Consecutive HD IN

Notes : * RTS mode automatically switches over through TRIG IN
** Neither under FIX nor PULSE W mode, RTS doesn't work if Electronic shutter speed SW is set in OFF position.

(b) Multiple shutter — Multiple shutter via ext. trigger signal and ext. VD signal

Notes : * Operation like No.3, 6 above

(3) Restart / Reset — Restart / reset available via ext. VD signal

(Switching via bottom panel DIP SW, Initial OFF)

Notes : * The exposure-time (shutter-speed) is determined by ext.VD interval.
** Enabled when bottom-panel DIP SW OFF.
*** Provide Consecutive HD.

[Partial scan]

(1) Operation mode

No	Scan mode	Sync	Reset	E-shutter Normal	E-shutter RTS
1	1/2 partial	Internal	Non-reset	Enabled **[Option]**	Enabled
2			V-reset	Disabled	
3		Consecutive HD VD IN	Non-reset	Enabled **[Option]**	Enabled
4		Consecutive HD (VD) IN	V-reset	Disabled	
5	1/4 partial	Internal	Non-reset	Enabled **[Option]**	Enabled
6			V-reset	Disabled	
7		Consecutive HD VD IN	Non-reset	Enabled **[Option]**	Enabled
8		Consecutive HD (VD) IN	V-reset	Disabled	
9	Programmabl	Consecutive HD VD IN	Non-reset	Enabled **[Option]**	Enabled **[Option]**

Note: <u>Items shown as [Option] in this document is not included in your purchase as standard components. Contact our dealer / distributor for details.</u>

(2) Reset mode

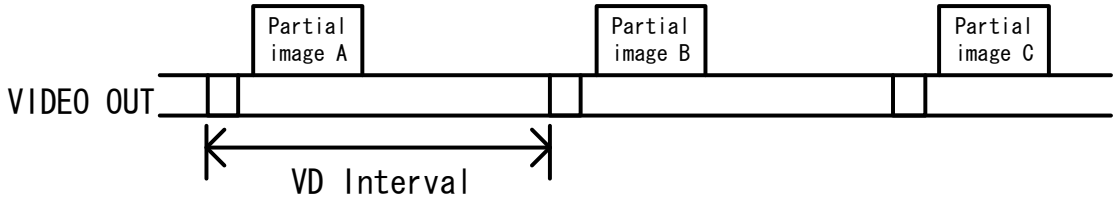
As shown in (1) above, non-reset and V-reset is available.

([Option]: Doesn't come as standard. Contact our dealer / distributor for details)

(a) Non-reset (Electronic shutter enabled)

VD doesn't get reset after video readout. The interval of VD signal is as follows.

	1/2 partial scan	1/4 partial scan
1/60s non-interlace	525H	525H
1/120s interlace	262.5H	262.5H

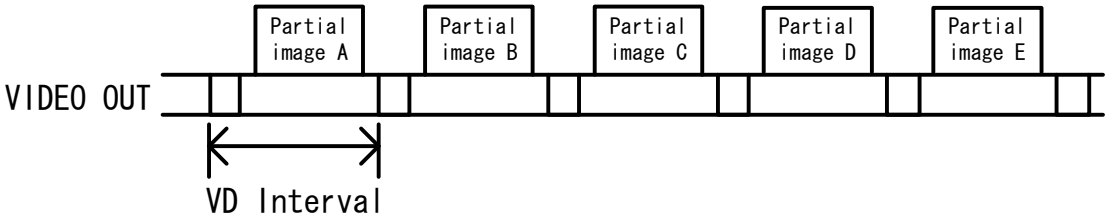


* Under normal shutter mode, when partial scan is set to non-reset, the electronic shutter is enabled. However, when the input interval of external VD is shorter than that of the above mentioned, be sure that the exposure time becomes shorter than the set time.

(b) V-reset (Electronic shutter disabled)

VD does get reset after video readout. Under internal sync, the interval of VD signal is as follows.

	1/2 partial scan	1/4 partial scan
1/60s non-interlace	262H	131H
1/120s interlace	131.5H	65.5H



(3) Partial signal **[Option]**

Programmable mode input signal

(a) Input level	LOW level: From 0 through 0.5V
	HIGH level: From 4 through 5V
(b) Input impedance	High impedance (10k-ohm)
(c) Polarity	Positive (Hi: High-speed transfer)

Note: Items shown as [Option] in this document is not included in your purchase as standard components. Contact our dealer / distributor for details.

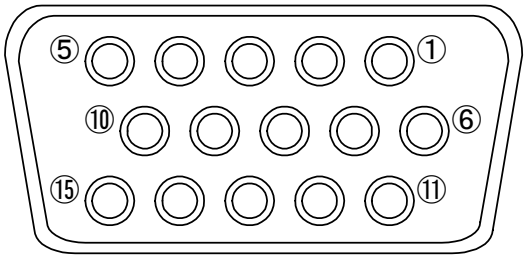
[Connector pin assignment]

(1) Compatible connector : D02-M15SAG-13L9 (Supplied by Japan Aviation Electronics Ind.)etc.

(2) Pin assignment

Pin No.	Signal	Signal **[Option]**
1	DC12V GND	←
2	DC12V	←
3	VIDEO GND	←
4	VIDEO OUT	←
5	GND	←
6	HD GND	←
7	HD IN	←
8	VD IN	←
9	VD GND	←
10	GND	←
11	N.C	PARTIAL IN
12	TRIG IN	←
13	TRIG GND	←
14	WEN OUT	←
15	GND	←

Connector pin layout



15pin female

Notes : * Before connecting / disconnecting the connector, make sure the camera power is OFF to prevent a malfunction.

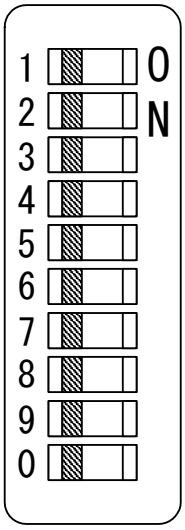
** For board connection, check compatibility.

Note: <u>Items shown as [Option] in this document is not included in your purchase as standard components. Contact our dealer / distributor for details.</u>

[Switch setting]

(1) CCU bottom-panel DIP SW

No.	Function	OFF	ON
1 2 3	E-shutter-speed	See shutter-speed table (Table 1)	
4	Video output	1/60s non-interlace	1/120s interlace
5 6	Shutter mode	See shutter-mode table (Table 3)	
7 8	Partial scan	See partial-scan table (Table 2)	
9	TRIG polarity	Positive (Rising edge)	Negative (Falling edge)
10	RTS Exposure	FIX mode	PULSE W mode



Notes : * Initial factory setting: All OFF
** Set No.9 OFF when TRIG IN OPEN.

(Table 1) Electronic shutter-speed

Shutter-speed	No.1	No.2	No.3
OFF	OFF	OFF	OFF
1/200s	ON	OFF	OFF
1/500s	OFF	ON	OFF
1/1000s	ON	ON	OFF
1/2000s	OFF	OFF	ON
1/4000s	ON	OFF	ON
1/8000s	OFF	ON	ON
1/20000s	ON	ON	ON

Notes : * Neither under FIX nor PULSE W mode, RTS doesn't work if Electronic shutter speed SW is set in OFF position.

(Table 2) Partial-scan

Partial scan	No.7	No.8
OFF	OFF	OFF
Not acceptable	ON	OFF
1/2 partial	OFF	ON
1/4 partial	ON	ON

(Table 3) Shutter-mode

Shutter mode		No.5	No.6	SYNC	
Random trigger	V reset	OFF	OFF	Internal sync	
	SYNC reset	ON	OFF		
	Non-reset	OFF	ON		
Not acceptable		ON	ON		
Random trigger	Non-reset (Multiple shutter)	OFF	OFF	Single VD	Ext. sync HD IN
	Non-reset	ON	OFF	Consecutive VD	
	V-reset	OFF	ON	No VD	
Restart / Reset		ON	ON	Single VD	

Notes : * Under normal shutter mode partial-scan, set No.5, 6 in OFF.
** Under PULSE W mode, SYNC reset is disabled.

(2) CCU rear-panel SW

Function	SW	Selected Function
GAIN selection (GAIN)	FIX	(Initial factory setting)
	MANU	Manual GAIN adjustable via GAIN potentiometer

(3) CCU internal SW-1

Function	SW	Selected Function
Ext SYNC IN impedance selection (HD/VD)	HIGH	High impedance (Initial factory setting)
	75 Ω	75-ohm

(4) CCU internal SW-2

Function	SW	Selected Function
Ext SYNC IN/OUT selection (HD/VD)	IN	IN (Initial factory setting)
	OUT	OUT

(5) CCU internal SW-3

Function	SW	Selected Function
Video OUT couple selection (DC/AC)	Clockwise	DC coupled OUT (Initial factory setting)
	Anticlockwise	AC coupled OUT

[Mechanical spec]

(1) External dimension — Refer to the attached external-view drawing

(2) Weight — Camera head: Approximately 19g (Excluding Camera cable)
CCU: Approximately 190g

(3) Lens mount — M10.5 (Pitch = 0.5)

(4) GND / insulation — Circuit GND - Chassis electrically conducted

[Ambient condition]

(1) Environment condition

Performance guaranteed — Temperature: From 0 through 40 °C
Humidity: From 30 through 90 % (No condensing)

Operation guaranteed — Temperature: From -5 through 50 °C
Humidity: From 10 through 90 % (No condensing)

Storage — Temperature: From -20 through 60 °C
Humidity: From 10 through 90 % (No condensing)

(2) EMC conditions (Electro-Magnetic Compatibility)

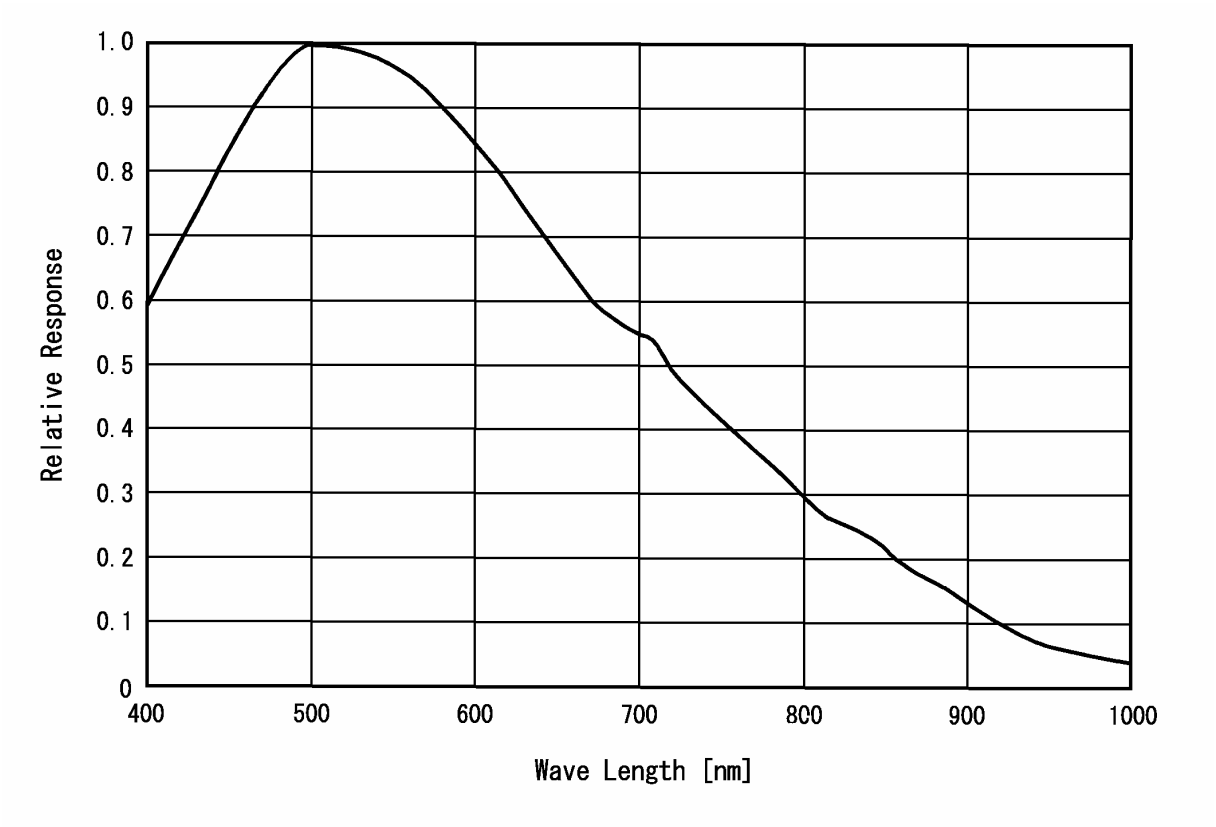
EMI（Electro-Magnetic Interference） EN61000－6－4（Examination level EN55011-A）Conformity

EMS（Electro-Magnetic Susceptibility） EN61000－6－2 Conformity

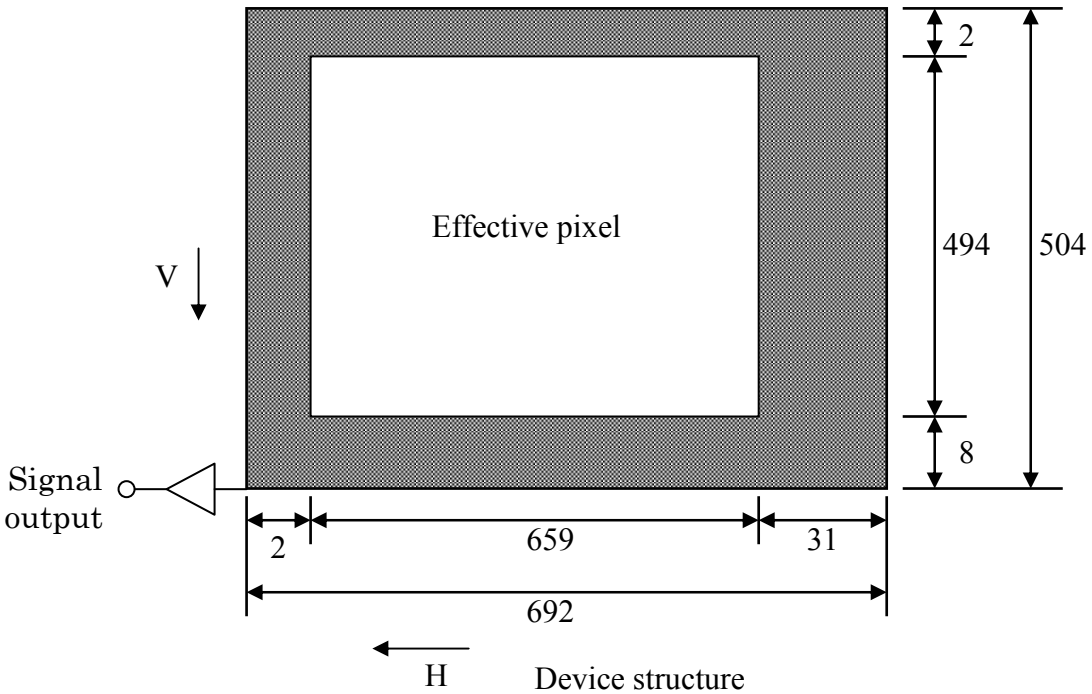
* Conformity of EMC conditions
About the conformity of the EMC standard of this machine, it has guaranteed in the conditions combined with the option part of the 4th clause.
When used combining parts other than specification of our company, I ask you to have final EMC conformity checked of a visitor with a machine and the whole equipment.

[Relative Spectrum Response]

*Including lens characteristics, Excluding light source characteristics



[Optical black characteristics]



Device structure

Total pixels : 692(H) x 504(V)

Effective pixels : 659(H) x 494(V)

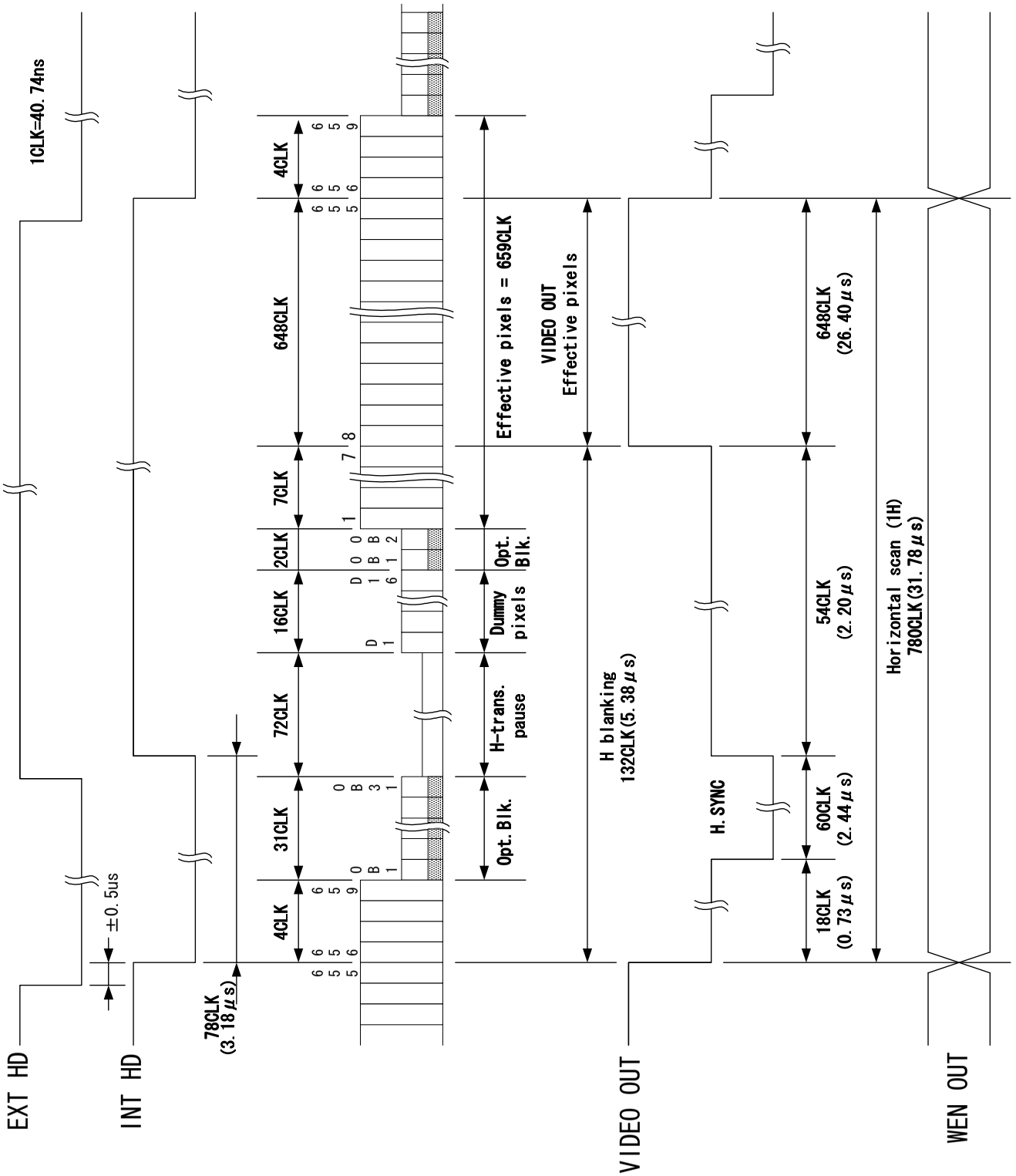
Optical black:

Horizontal : 2 pixels, 31 pixels

Vertical : 8 pixels, 2 pixels

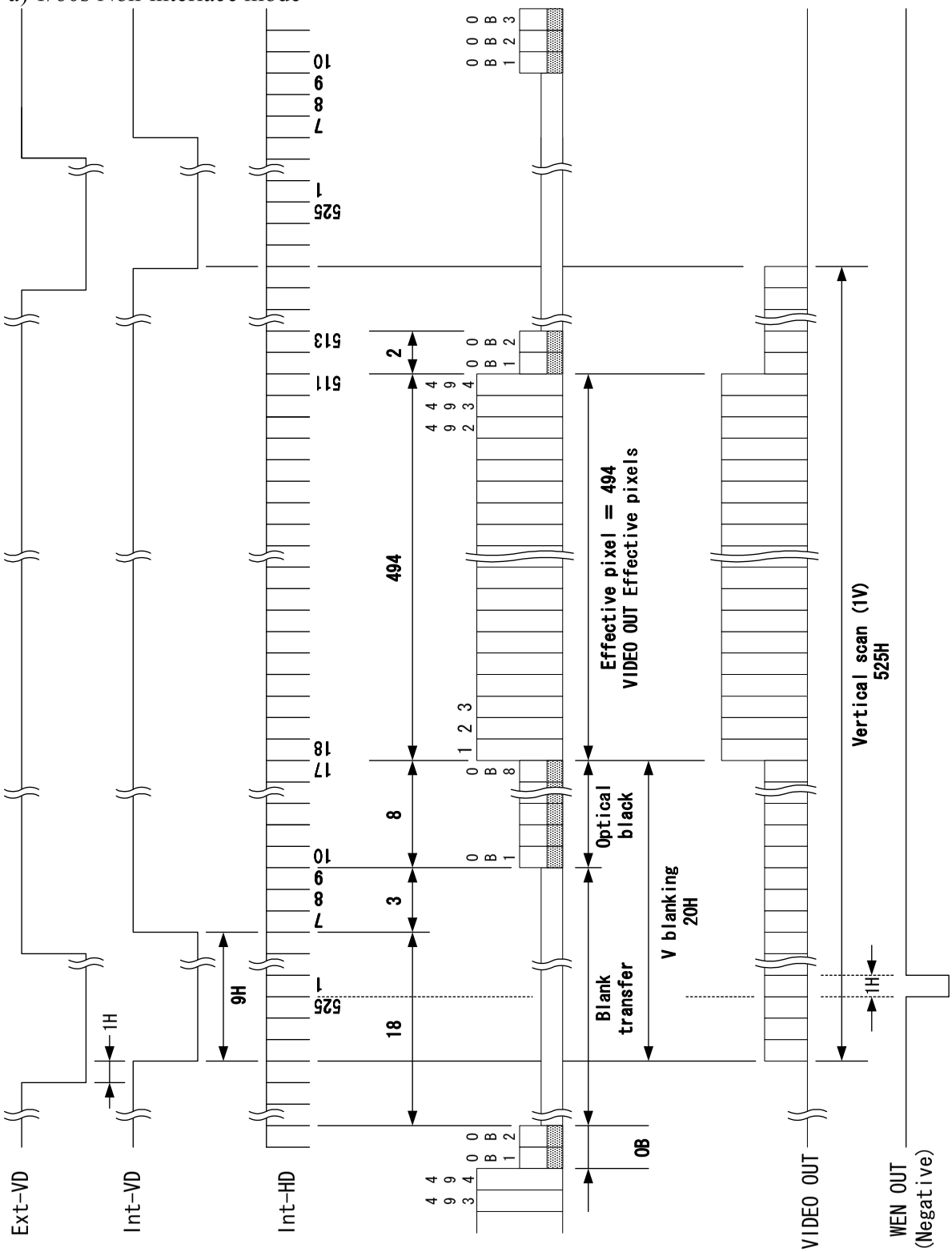
7. Output waveform timing chart

(1) Horizontal

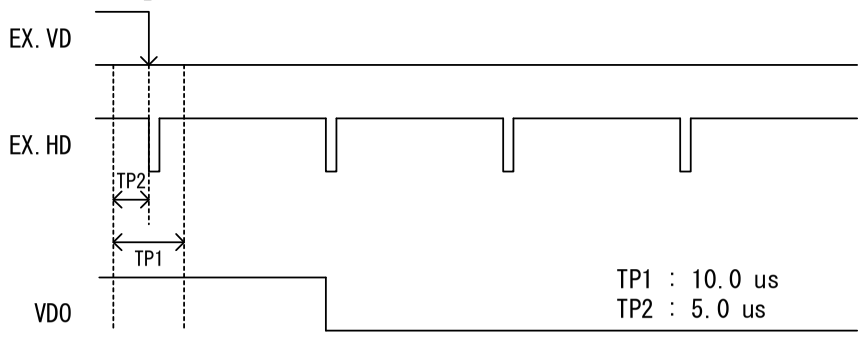


(2) Vertical

(2-a) 1/60s Non-interlace mode

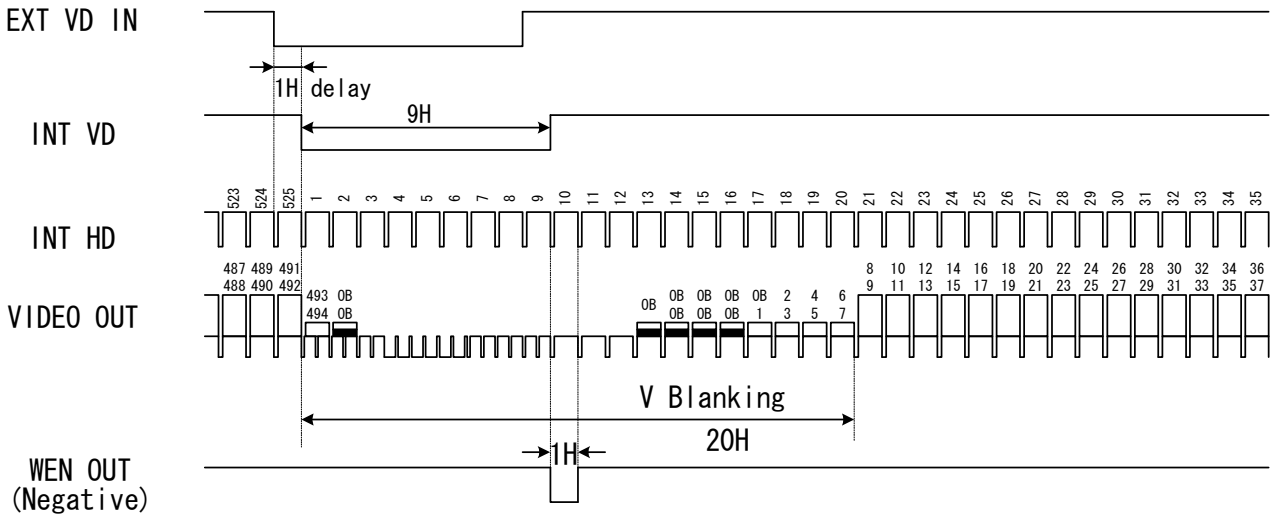


EXVD - EXHD phase difference

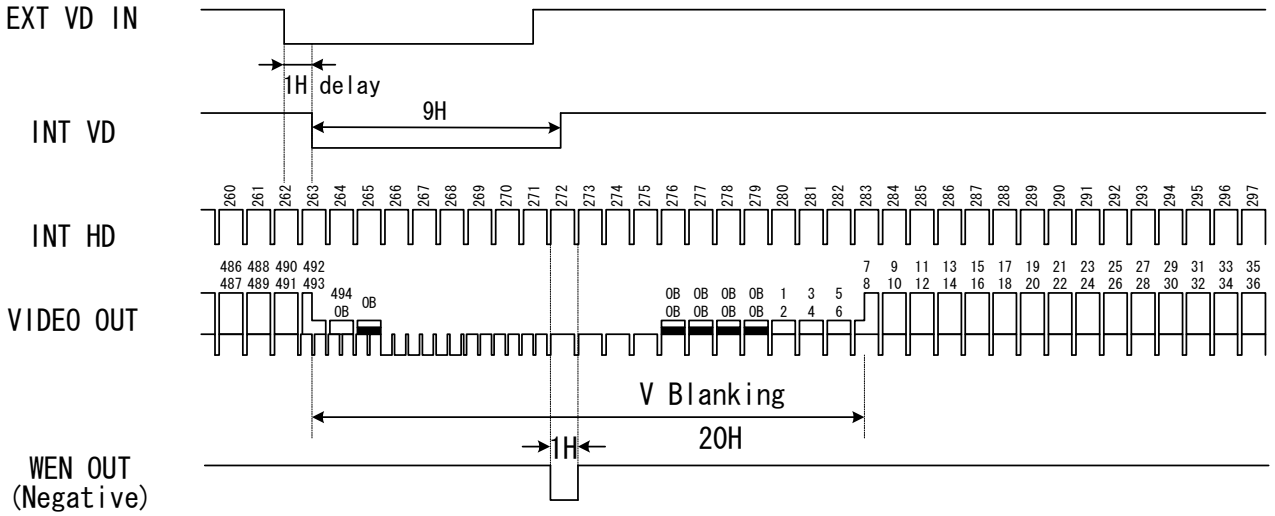


(2-b) 1/120s 2:1 Interlace mode

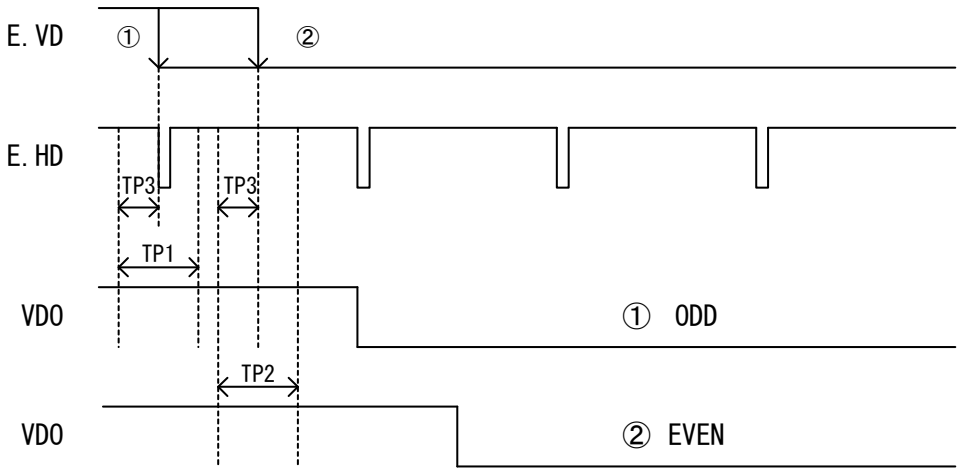
ODD (1st field)



EVEN (2nd field)



EXVD - EXHD phase difference

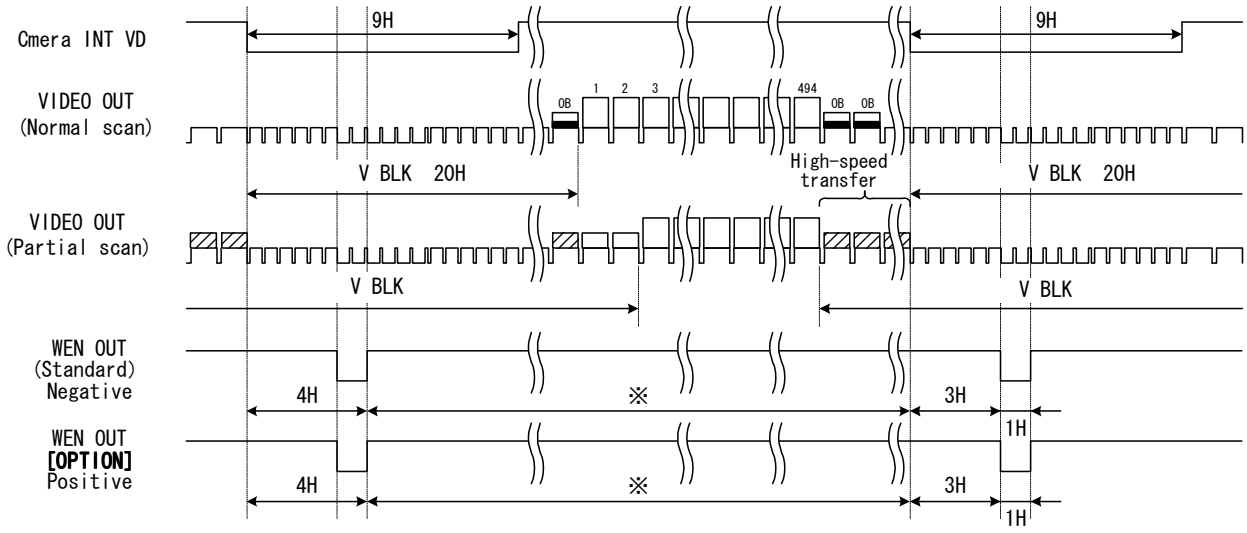


TP1 : ODD reset range 10.0 us
TP2 : EVEN reset range 10.0 us
TP3 : 5.0 us

(3) WEN timing

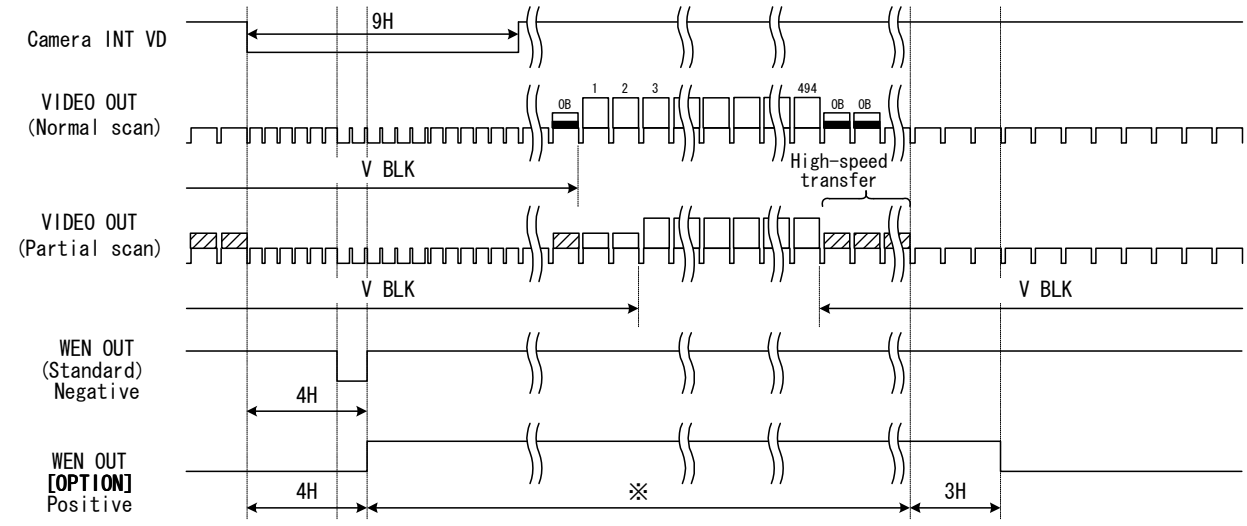
(3-a) 1/60s Non-interlace mode

☆WEN(Under normal shutter mode)



※ Normal scan : 521H
1/2 Partial scan : 258H
1/4 Partial scan : 127H
Programmable partial scan : Arbitrary **[OPTION]**

☆WEN(Under other shutter mode)



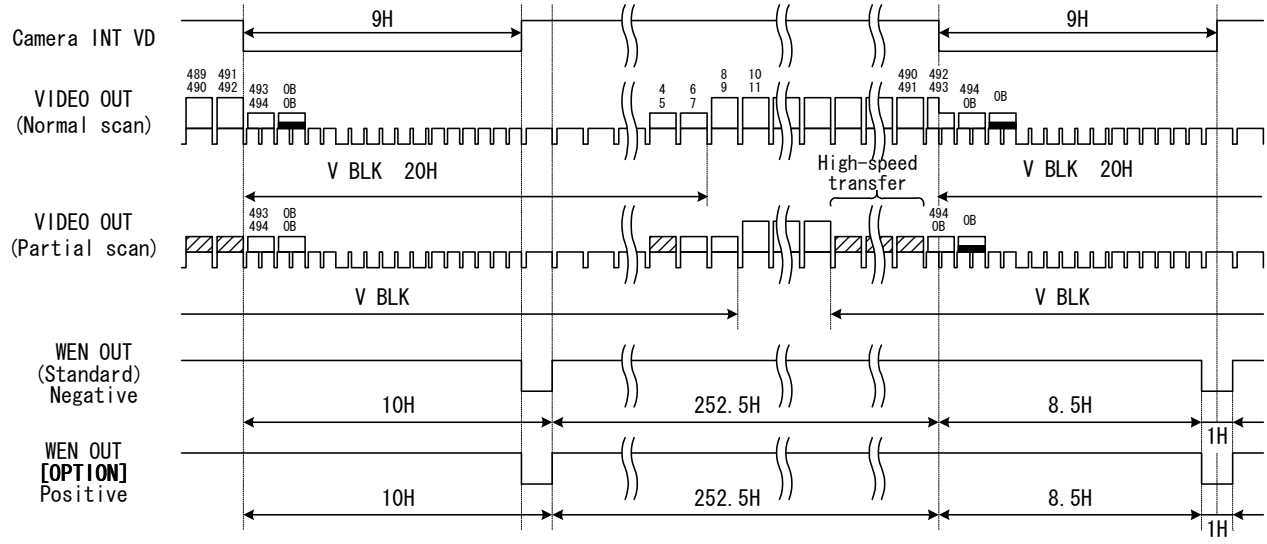
※As for WEN(Positive) of an option, Hi period changes with shutter modes of use.

(1) 1/2 Partial scan : 258H
1/4 Partial scan : 127H
Programmable partial scan : Arbitrary [OPTION]
・RDM mode V-reset mode(Under internal sync)
・RDM mode SYNC reset mode(Under internal sync)
・RDM mode Non-reset mode(Under External sync --- Single VD IN)
・RDM mode V-reset mode(Under External sync)

(2) 521H
・RDM mode Non-reset mode(Under internal sync)
・RDM mode Non-reset mode(Under External sync --- Consecutive VD IN)
・Restart / Reset

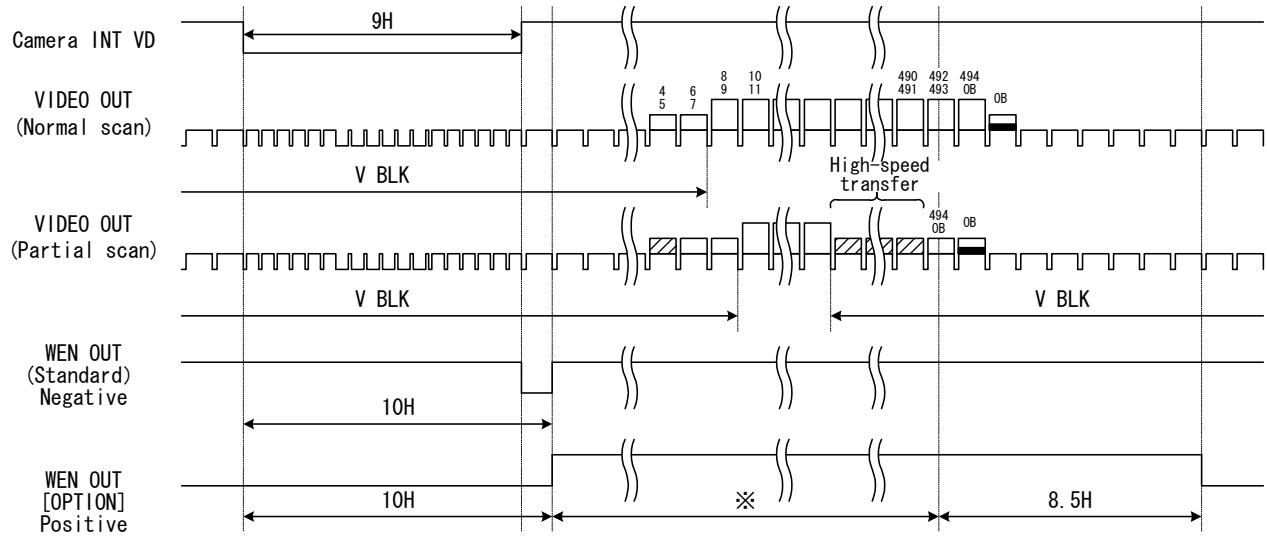
(3-b) 1/120s 2:1 Interlace mode [ODD field]

☆WEN(Under normal shutter mode)



※ Normal scan : 252.5H
1/2 Partial scan : 121.5H
1/4 Partial scan : 55.5H
Programmable partial scan : Arbitrary **[OPTION]**

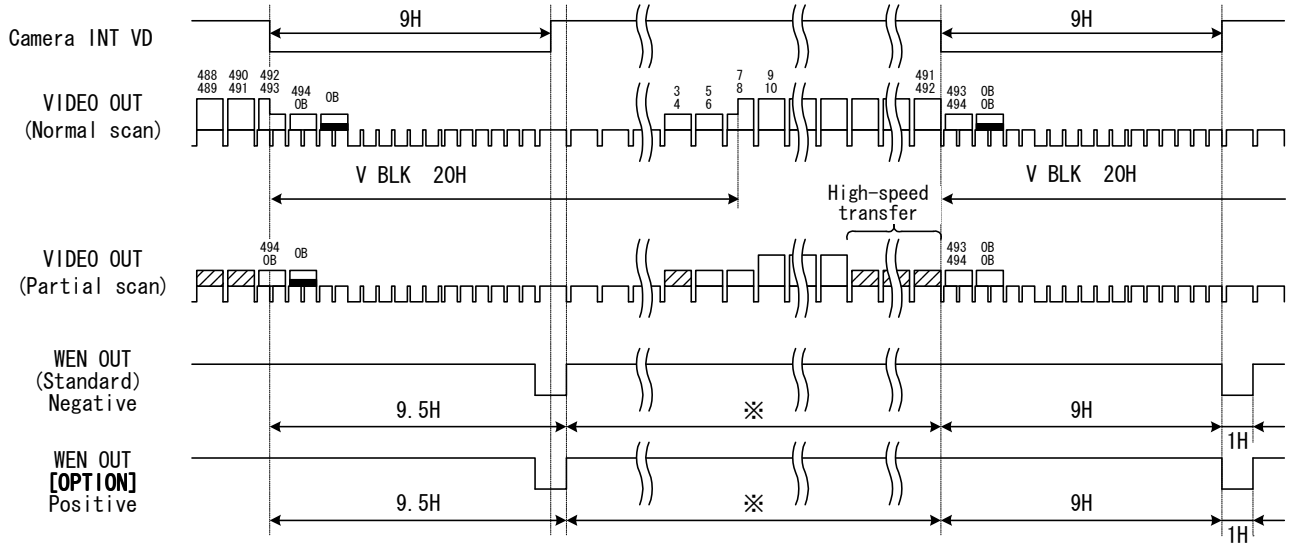
☆WEN(Under other shutter mode)



※As for WEN(Positive) of an option, Hi period changes with shutter modes of use.
(1) 1/2 Partial scan : 121.5H
1/4 Partial scan : 55.5H
Programmable partial scan : Arbitrary [OPTION]
・RDM mode V-reset mode(Under internal sync)
・RDM mode SYNC reset mode(Under internal sync)
・RDM mode Non-reset mode(Under External sync --- Single VD IN)
・RDM mode V-reset mode(Under External sync)
(2) 252.5H
・RDM mode Non-reset mode(Under internal sync)
・RDM mode Non-reset mode(Under External sync --- Consecutive VD IN)
・Restart / Reset

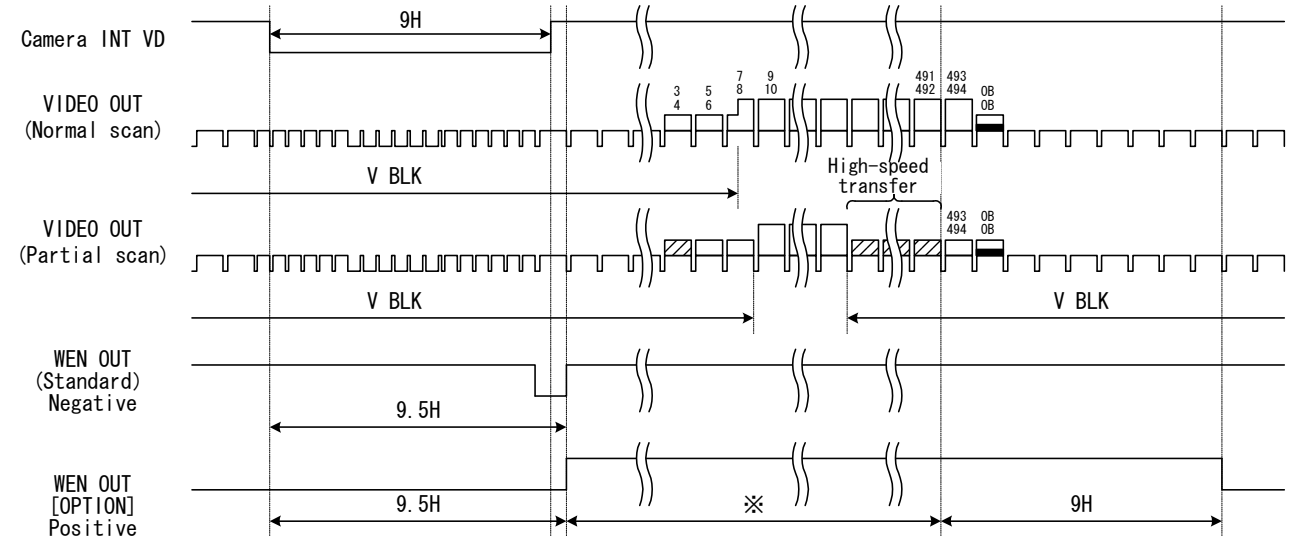
(3-c) 1/120s 2:1 Interlace mode [EVEN field]

☆WEN(Under normal shutter mode)



※ Normal scan : 253H
1/2 Partial scan : 122H
1/4 Partial scan : 56H
Programmable partial scan : Arbitrary **[OPTION]**

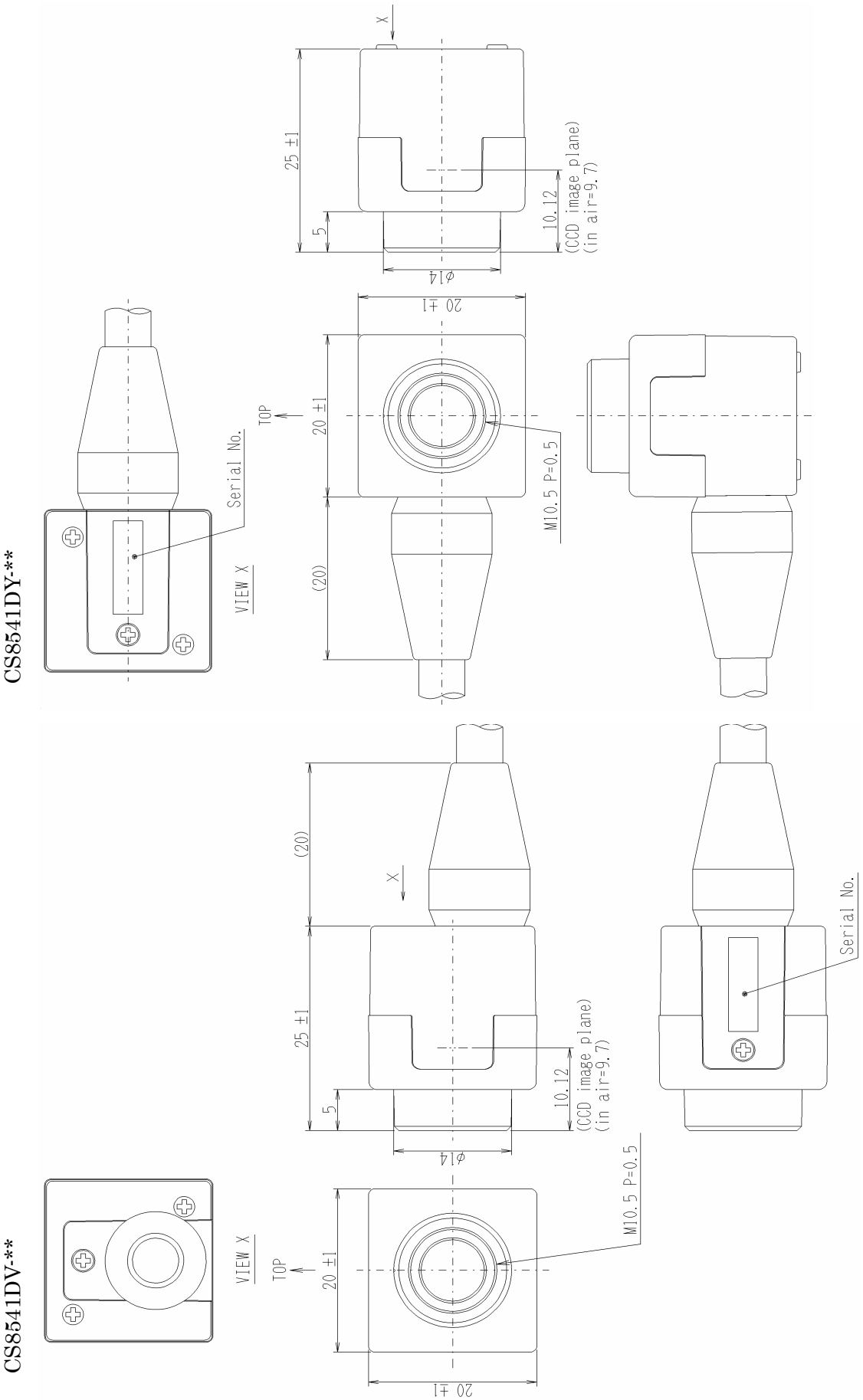
☆WEN(Under other shutter mode)



※As for WEN(Positive) of an option, Hi period changes with shutter modes of use.
(1) 1/2 Partial scan : 122H
1/4 Partial scan : 56H
Programmable partial scan : Arbitrary [OPTION]
・RDM mode Non-reset mode(Under External sync --- Single VD IN)
(2) 253H
・RDM mode Non-reset mode(Under internal sync)
・RDM mode Non-reset mode(Under External sync --- Consecutive VD IN)
・Restart / Reset

8. External-View Drawing

(1) Camera head external-view drawing



* Before connecting / disconnecting the connector, make sure the camera power is OFF to prevent a malfunction.

(2) CCU external-view drawing