



English

**VISION:elite™**  
UXGA Color Camera  
72MHz Pixel Clock Camera Link

**VCC-F32U29CL**

**Product Specification**  
**& Operation Manual**

**CIS Corporation**

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## 1. Scope of Application

This is to describe VCC-F32U29CL Camera Link Color CCD Camera. All specifications contained herein are subject to change without prior notice. Reproduction in whole or in part is prohibited.

## 2. Notice

The camera must not be used for any nuclear equipments or aerospace equipments with which mechanical failure or malfunction could result in serious bodily injury or loss of human life.

Our warranty does not apply to damages or defects caused by irregular and/or abnormal use of the product. Please refer to Clause 13. Handling Precautions.

## 3. Product Outline

VCC-F32U29CL is a high-resolution industrial color digital video camera module utilizing a 1/1.8 inch PS IT CCD. 2M CCD image sensor with on-chip micro-lenses realizes high sensitivity and high resolution.

### Key Features

#### □ Electronic shutter

Electronic shutter speed switchable by rear panel switch

OFF (1/30s) ~ 1/10,000s : 8 steps

OFF (1/30s) ~ 1/1.875s : 5 steps (Slow shutter)

Electronic shutter switchable by trigger pulse width

Approx. 1/2s ~ 1/10,000s

#### □ Video frame rates

The followings are for both normal mode and trigger mode.

Progressive Scan : 30 fps

Partial Scan (initial setting : 58 fps) : 74 fps ~ 41 fps (switchable)

#### □ Input trigger

The input trigger inputted during the execution of prior trigger shall be ignored.

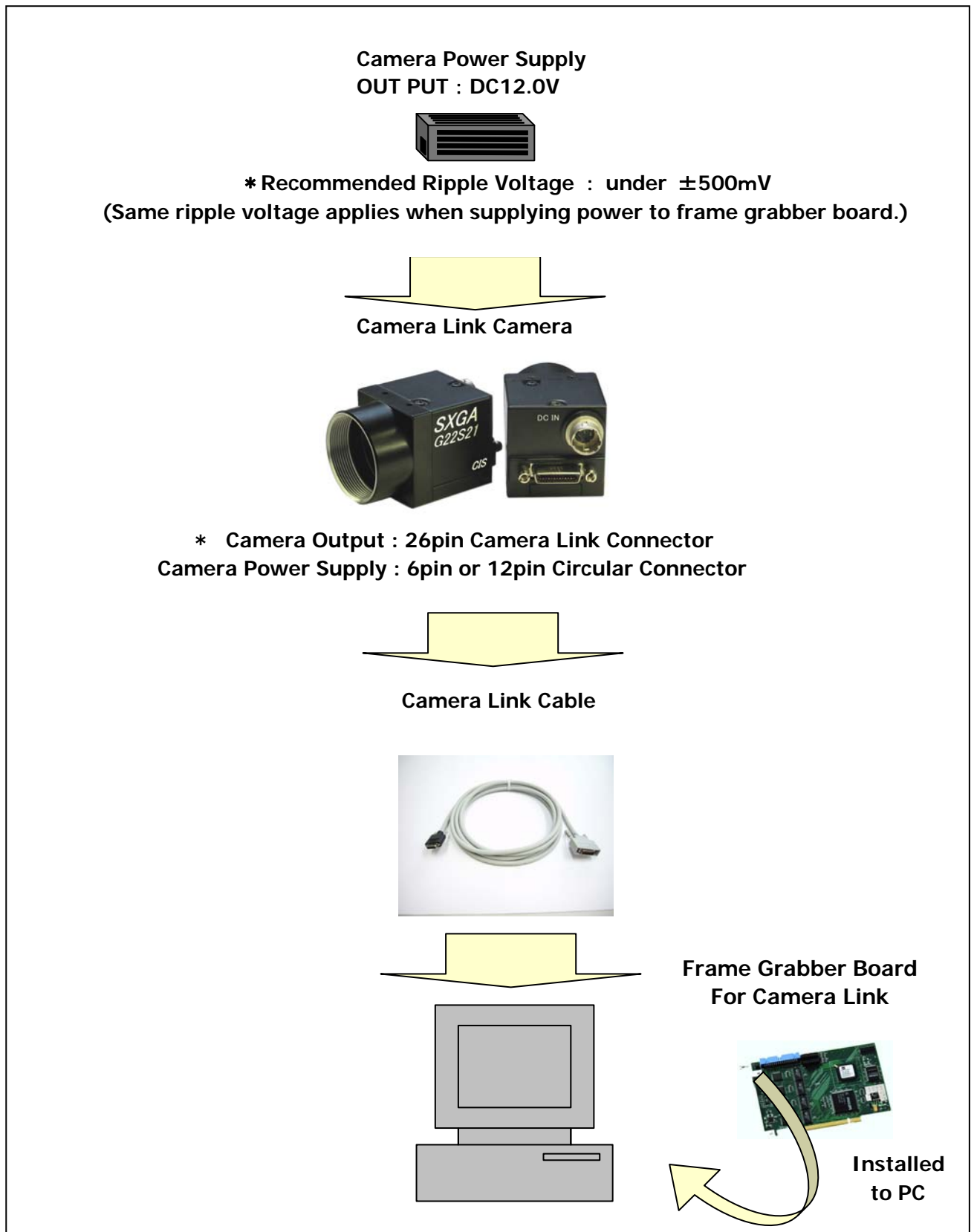
Ex. When the shutter speed is set to 1/1,000sec, signal read out period will be over 34.39ms.

(Exposure time 1ms + video out 33.39ms.)

#### □ Camera Link

By use of dedicated cable, VCC-F32U29CL can be connected to Camera Link capture board.

#### 4. System Connection Diagram



## 5. Specification

## 5.1. General Specification

Item	Specification	Remarks
Power consumption	4.0 W	
Power requirements	DC+12V $\pm$ 10% (Max voltage not to exceed 15V)	
Operation environment	(Performance Guaranteed) 0°C~+40°C with RH 20~80% (Operation Guaranteed) -5°C~+45°C with RH 20~80% Note: No condensation	
Storage environment	-25 to +60°C with RH 20~80% Note: No condensation	
Mass	140g	
Dimension	Refer to overall dimension drawing (Clause 11) (W: 44mm, H: 29mm, D: 71.5mm)	
Lens mount	C mount (Flange back : 17.526mm (fixed))	
Back Focus	10.99mm	
Optical axis accuracy	Image center $\leq \pm 0.1$ mm	
Video output signal	Digital RGB 24bit	Camera Link Output
	Digital RAW 8bit / 10 bit (Selectable)	
Pick up device	1/1.8" Interline Transfer Color CCD (R,G,B primary color mosaic filter) Total Pixel number; 1628(H) x 1248(V) approx. 2.03M pixels Effective pixels number; 1620(H) x 1220(V) approx. 1.98M pixels Unit cell size; 4.4 $\mu$ m(H) x 4.4 $\mu$ m(V) Square pixel	ICX274AQ (SONY) Progressive Scan
Sync. & Trigger system	(1) Standard operation mode (Int. sync system) (2) HD/VD Ext. sync. Frequency allowance $\pm 1$ % Jitter less than 20ns (3) Ext. trigger: trigger input port (Camera Link connector input or 12pin circular connector) • Standard trigger operation mode • Trigger pulse width operation mode • Standard trigger operation mode (Slow shutter)	12pin circular connector

I t e m	Specification			Remarks
Scanning system Interlace scan	1/30sec Horizontal frequency Vertical frequency Pixel clock	Progressive scan 37.50 KHz 29.95 Hz 72 MHz	(Standard mode)	1920 PCLK 1252 HD
Partial Scan	Off (Full Image) Partial Scan	V. Scanning Lines 1,252 Lines 652 Lines	Rate 30fps 58fps	V. Effective lines 1,220 Lines 482 Lines (Initial)
		Min. 508 Lines Max. 924 Lines	74fps 41fps	302 Lines 822Lines Setting range
Sensitivity	More than F5.6 at 2000 lx (at 1/30sec exposure, GAIN 0dB)			
Min. illumination	F1.4 4 lx (at 1/30sec exposure, GAIN 12dB, VS 50IRE)			

## 5.2. Camera Output Signal Specification

Item	Specification		Remarks
Horizontal resolution	800 TV lines (RGB output)		
	1,000 TV lines (RAW output)		
Sync. signal I/O	(1) LVAL output: Polarity Negative (2) FVAL output: Polarity Negative (3) DVAL output: BLK output (Effective image area) Polarity Positive		Camera Link Connector
	(1) HD/VD input; Polarity Negative (Ext. Sync. mode) Input signal level 2~5Vp-p (HD/VD signals: not to contain undesirable noise such as chattering, etc.) (2) HD/VD output; Polarity Negative (Int. sync. mode) (3) WEN output; Exposure selectable: Single Pulse VD / FVAL (Ext. trigger mode) * Refer to Clause 7.4 (I/O circuits for HD / VD / trigger at 12 pins circular connector)		12 pins circular connector  (Refer to address 055)
Trigger input	Input signal; Polarity Selectable		(Refer to address 011)
	Input signal level	Input signal level; 2~5Vp-p, TTL input Trigger signal: not to contain undesirable noise such as chattering.	12pin circular connector
		CC 1 input	Camera link connector
	Min. Trigger pulse width $\geq 1\text{HD}$		
Video output signal	Setup level : 4 $\pm$ 2 (Hex) to 8bit video output (00-FF Hex)		

Item	Specification	Remarks
Shutter	(1) Standard mode OFF(1/30), 1/60, 1/90, 1/120, 1/500, 1/1,000, 1/5,000, 1/10,000 sec OFF(1/58), 1/60, 1/90, 1/120, 1/500, 1/1,000, 1/5,000, 1/10,000 sec	(Standard mode) (Partial scan mode)
	(2) The fixed shutter speeds trigger operation with switch control 1/30, 1/60, 1/90, 1/120, 1/500, 1/1,000, 1/5,000, 1/10,000 sec 1/58 1/60, 1/90, 1/120, 1/500, 1/1,000, 1/5,000, 1/10,000 sec	(Standard mode) (Partial scan mode)
	(3) Trigger pulse width mode 1/4 ~1/10,000 sec (1H step trigger pulse width control mode)	
	(4) Standard trigger mode (Slow shutter) 1/30, 1/15, 1/7.5, 1/3.75, 1/1.875 sec 1/58, 1/29, 1/14.5, 1/7.25, 1/3.625 sec	
	(5) * Jitter between Int. HD & Trigger will cause 1H fluctuation of exposure time. To avoid the fluctuation, please synchronize with EXT. HD.	
Gain	0dB, +6dB, MANUAL (0~max +12dB) Performance guaranteed range; 0~+6dB When gain setting is more than +6dB, noise may become visible such as Vertical stripes, beat noise, shading, etc.	
White Balance	3200° K, 5600° K, Manual (2600° K~ 9000° K)	RGB output mode only
$\gamma$ (Gamma correction)	OFF ( $\gamma = 1.0$ ), ON ( $\gamma = 0.45$ ); selectable (option)	
Remote control	With Camera Link connector input or 12pin Circular connector input, the camera can be remote controlled. When the camera is remote controlled via 12 pin circular connector, neither HD nor VD is valid.	

## 5.3. Camera Link Connector Bit Assignment (Base Configuration)

RGB Data output: 8 bit output (No.8 SW on the rear panel: On)

Port/bit	24 bit RGB	Port/bit	24 bit RGB	Port/bit	24 bit RGB
Port A0	R0	Port B0	G0	Port C0	B0
Port A1	R1	Port B1	G1	Port C1	B1
Port A2	R2	Port B2	G2	Port C2	B2
Port A3	R3	Port B3	G3	Port C3	B3
Port A4	R4	Port B4	G4	Port C4	B4
Port A5	R5	Port B5	G5	Port C5	B5
Port A6	R6	Port B6	G6	Port C6	B6
Port A7	R7	Port B7	G7	Port C7	B7

RAW Data output: 8 bit output (No.8 & No.9 SW on the rear panel: Off)

Port/bit	8bit×3	Port/bit	8bit×3	Port/bit	8bit×3
Port A0	D0	Port B0	D0	Port C0	D0
Port A1	D1	Port B1	D1	Port C1	D1
Port A2	D2	Port B2	D2	Port C2	D2
Port A3	D3	Port B3	D3	Port C3	D3
Port A4	D4	Port B4	D4	Port C4	D4
Port A5	D5	Port B5	D5	Port C5	D5
Port A6	D6	Port B6	D6	Port C6	D6
Port A7	D7	Port B7	D7	Port C7	D7

※ The same signals are output through 3 taps. (8bit x 3, Port A=B=C)

10 bit output mode (No. 8 SW off & No.9 SW on)

Port/bit	8bit×3	Port/bit	8bit×3	Port/bit	8bit×3
Port A0	D0	Port B0	D8	Port C0	D0
Port A1	D1	Port B1	D9	Port C1	D1
Port A2	D2	Port B2	nc	Port C2	D2
Port A3	D3	Port B3	Nc	Port C3	D3
Port A4	D4	Port B4	D8	Port C4	D4
Port A5	D5	Port B5	D9	Port C5	D5
Port A6	D6	Port B6	nc	Port C6	D6
Port A7	D7	Port B7	nc	Port C7	D7

※ The same signals are output through 2 taps (10bit x 2).

## 5.4. Function Settings

Camera functions can be set with serial data communication.

Function	Address	Data	Remarks
LOC/REM	000	0: Local (Camera SW) Control 1: Remote Control	F, G
Gain	001	0: 0dB 1: 0dB 2: +6dB 3: +12dB 4: Manual Gain (Refer to address 008)	F, G
E-Shutter Position	002	0~7: (For the details, refer to 7.1.1. Shutter setting.) 8~15: - 16: Manual Shutter (Refer to address 009 & 010)	F, G
White Balance	003	0: 2600° K 1: 3200° K 2: 5600° K 3: 9000° K 4: Manual White Balance (Refer to address 006 & 007)	F
Trigger Mode	004	0: Standard Mode 1: Standard Trigger Mode 2: Pulse Width Trigger Mode 3: Standard Trigger Mode (Slow Shutter)	F, G Initial setting (0)
SCAN Mode	005	0 : Standard Scan Mode 1 : Partial Scan Mode	F, G Initial setting (0)
Manual Gain R	006	R Gain 64~255 ※Valid when address 003 data is 4 (manual).	F
Manual Gain B	007	B Gain 64~255 ※Valid when address 003 data is 4 (manual)	F
Manual Gain	008	0~255: +0dB~+12dB ※Valid when address 001 data is 4 (manual)	F, G
Manual Shutter	009 & 010	<ul style="list-style-type: none"> <li>• Standard Scan Mode (Address 005:0) 0~max 1251 (max address 009:4 address 010:227) Shutter Speed = <math>1 / ((1251 - \text{DATA}) * 26.67\mu\text{s} + 13.33\mu\text{s})</math></li> <li>• Partial Scan Mode (address 005:1) 0~max (address 052 &amp; 053-1) Shutter Speed = <math>1 / ((\text{address } 052 \text{ \&amp; } 053-1) - \text{DATA}) * 26.67\mu\text{s} + 13.33\mu\text{s}</math></li> </ul> Address 009 MSB and address 010 LSB make 10 bits in total.	F, G

Function	Address	Data	Remarks
Trigger Neg./Pos.	011	0: Trigger positive, 1: Trigger negative	F, G Initial setting (0)
Trigger INPUT	012	0: Channel Link, 1: 12Pin	F, G Initial setting (0)
8bit/10bit	013	0: 8bit, 1: 10bit ※Valid when data of address 018 is 0 (RAW).	F (RAW), G Initial setting (0)
Gamma correction	014	0: $\gamma = 1.0$ (OFF), 1: $\gamma = 0.45$ (ON) (option)	F, G Initial setting (0)
NO Function	015	Not assigned	
Aperture	016	0: Aperture Off, 1-3: Aperture On	G Initial setting (0)
NO Function	017	Not assigned	
RGB/RAW	018	0: RAW 1: RGB	F Initial setting (1)
NO Function	019	Not assigned	
HD In/Out	020	0: HD, VD output, 1: HD,VD input	F, G Initial setting (0)
8 bit Format	021	0 : 9-2bit(upper), 1: 8-1bit(mid), 2: 7-0bit(lower)	F (RAW), G Initial setting (0)
Cursor ON/OFF	022	0: OFF, 1: ON	F (RAW), G Initial setting (0)
Cursor H address	023 & 024	Cursor H address (023: H Byte 024: L Byte)	F (RAW), G
Cursor H address	025 & 026	Cursor H address (025: H Byte 026: L Byte)	F (RAW), G
NO Function	027-047	Not assigned	

Remarks F ... F32 Only for color camera series.

G ... G32 Only for mono chrome camera series.

Function	Address	Data	Remarks
Partial Scan Effective lines	048&049	Partial Scan Effective line number (048: V Byte 049: L Byte) 302 Line + 5 *set data (0~max 104) : min 302Line ~ max822Line Initial setting: 0, 36 (482 Line)	F, G <b>(5 Line/step)</b>
Partial Scan Starting position	050&051	Partial Scan Starting position (050: V Byte 051: L Byte) : min 0~max 185 - ( data of address 048 & 049) Initial setting: 0, 77	F, G <b>(5 Line/step)</b>
Partial Scan Total lines	052&053	Partial Scan Total lines (052: V Byte 051: L Byte) 508 Line + 4*(Data of 048 & 049) : min 508 Line ~ max 924 Line Initial setting: 2,140(652 Line)	F, G
NO Function	054	Not assigned	
WEN Format	055	0: VD (9H) 1: FVAL 2: EXPOSURE 3: -	F, G Initial Setting (0)
Output Polarity	056	0: Standard 1: Invert	F, G Initial Setting (0)
Partial Scan Blanking	057	0: Standard 1: 35 Lines Blanking * Valid when address 005 is 1.	F, G Initial setting (0)
NO Function	058-062	Not assigned	
Data Saving	063	To save data to EEPROM, Input"083". (Note) Camera inner SW104-2 shall be ON to save the data to EEPROM.	

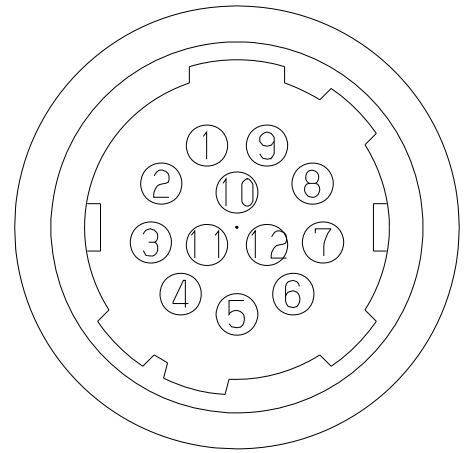
Remark F ... F32 Only for color camera series

G ... G32 Only for mono chrome camera series

## 6. External Connector Pin Assignment

### 6.1. 12 pins Circular Connector HR10-10R-12PA (73)

Pin No.	
1	GND
2	POWER IN DC +12V
3	GND
4	NC
5	GND
6	HD IN/OUT (RS232C RXD)
7	VD IN/OUT (RS232C TXD)
8	GND
9	NC
10	WEN OUT
11	TRG IN
12	GND



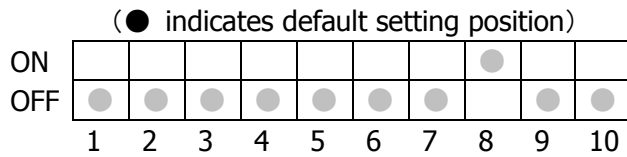
※It is possible to change the HD, VD I/O pins into port RS232C RXD TXD for the remote communication. (optional feature)

### 6.2. 26 Pins Compact Camera Link Compatible Connector (3M)

Signal	Specification	
LVAL	HD	
FVAL	VD	
DVAL	Composite Blanking (Effective image area)	
SP	—	
Signal	Camera Link Pin No.	Specification
XCLK-	5	CLK OUT
XCLK+	18	
SerTC+	7	RS232C RXD (Serial to camera)
SerTC-	20	
SerTFG+	8	RS232C TXD (Serial to frame grabber)
SerTFG-	21	
CC1-	9	TRG IN
CC1+	22	
CC2+	10	No Function
CC2-	23	
CC3-	11	No Function
CC3+	24	
CC4+	12	No Function
CC4-	25	

## 7. Switch Settings, Adjustment Potentiometer Specifications

### 7.1. Rear Panel Switch Function 10bit DIP-SW



- 1 E0
  - 2 E1
  - 3 E2
  - 4 MODE0
  - 5 MODE1
  - 6 SCAN
  - 7 NC
  - 8 RGB/RAW
  - 9 10bit/8bit
  - 10 IN/OUT
- ◇ Electronic shutter speed (3bit)
  - ◇ trigger mode (2bit)  
0:standard mode 1:standard trigger mode 2:trigger mode  
3:standard trigger mode (slow shutter)
  - ◇ Partial scan selection (1bit) OFF: 30fps ON: 58fps
  - ◇ Not assigned
  - ◇ RGB/RAW selection (1bit) OFF: RAW ON:RGB
  - ◇ 8Bit/10BIT selection (1bit) OFF: 8bit ON:10bit
  - ◇ HD/VD Input, Output selection (1bit) Hirose 12Pins Circular type connector (6,7pin)

#### 7.1.1. Shutter Speed Settings (Rear panel SW1: E0, SW2: E1, SW2: E2)

##### (1) Standard mode (Internal sync. · External sync.)

###### (Standard mode)

E0 1	E1 2	E2 3	Shutter speed	Real time
OFF	OFF	OFF	OFF (1/30) sec	33.37 ms
ON	OFF	OFF	1/60 sec	16.68 ms
OFF	ON	OFF	1/90 sec	11.11 ms
ON	ON	OFF	1/120 sec	8.33 ms
OFF	OFF	ON	1/500 sec	2.01 ms
ON	OFF	ON	1/1000 sec	1.00 ms
OFF	ON	ON	1/5000 sec	0.20 ms
ON	ON	ON	1/10000 sec	0.09 ms

###### (Partial scan mode)

E0 1	E1 2	E2 3	Shutter speed	Real time
OFF	OFF	OFF	OFF (1/58) sec	17.39 ms
ON	OFF	OFF	1/60 sec	16.68 ms
OFF	ON	OFF	1/90 sec	11.11 ms
ON	ON	OFF	1/120 sec	8.33 ms
OFF	OFF	ON	1/500 sec	2.01 ms
ON	OFF	ON	1/1000 sec	1.01 ms
OFF	ON	ON	1/5000 sec	0.20 ms
ON	ON	ON	1/10000 sec	0.09 ms

##### (2) Standard trigger mode

###### (Standard mode)

E0 1	E1 2	E2 3	Shutter speed	Real time
OFF	OFF	OFF	1/30 sec	33.37 ms
ON	OFF	OFF	1/60 sec	16.68 ms
OFF	ON	OFF	1/90 sec	11.11 ms
ON	ON	OFF	1/120 sec	8.33 ms
OFF	OFF	ON	1/500 sec	2.01 ms
ON	OFF	ON	1/1000 sec	1.00 ms
OFF	ON	ON	1/5000 sec	0.20 ms
ON	ON	ON	1/10000 sec	0.09 ms

###### (Partial scan mode)

E0 1	E1 2	E2 3	Shutter speed	Real time
OFF	OFF	OFF	1/58 sec	17.39 ms
ON	OFF	OFF	1/60 sec	16.68 ms
OFF	ON	OFF	1/90 sec	11.11 ms
ON	ON	OFF	1/120 sec	8.33 ms
OFF	OFF	ON	1/500 sec	2.01 ms
ON	OFF	ON	1/1000 sec	1.01 ms
OFF	ON	ON	1/5000 sec	0.20 ms
ON	ON	ON	1/10000 sec	0.09 ms

## (3) Standard trigger mode (Slow shutter)

(Standard mode)

E0 1	E1 2	E2 3	Shutter speed	Real time
OFF	OFF	OFF	1/30 sec	33.37 ms
ON	OFF	OFF	1/15 sec	66.74 ms
OFF	ON	OFF	1/7.5 sec	133.48 ms
ON	ON	OFF	1/3.75 sec	266.96 ms
OFF	OFF	ON	1/1.875 sec	533.92 ms
ON	OFF	ON	1/30 sec	33.37 ms
OFF	ON	ON	1/30 sec	33.37 ms
ON	ON	ON	1/30 sec	33.37 ms

(Partial scan mode)

E0 1	E1 2	E2 3	Shutter speed	Real time
OFF	OFF	OFF	1/58 sec	17.39 ms
ON	OFF	OFF	1/ 36.5 sec	34.77 ms
OFF	ON	OFF	1/ 18.25 sec	69.55 ms
ON	ON	OFF	1/9.125 sec	139.09 ms
OFF	OFF	ON	1/4.563 sec	278.19 ms
ON	OFF	ON	1/ 73 sec	17.39 ms
OFF	ON	ON	1/ 73 sec	17.39 ms
ON	ON	ON	1/ 73 sec	17.39 ms

## (4) Pulse width trigger mode

In this trigger mode, shutter speed is set by the trigger pulse width.

The trigger pulse width must be set within 1H to 1/2 sec.

1HD step fine shutter speed setting is available.

The following formula can be used to calculate approximate exposure time.

$$\text{exposure time} = \text{trigger pulse width (nHD)} + 12.43\mu\text{s} \quad (\text{HD} = 24.86\mu\text{s})$$

Be sure to input HD sync signal, otherwise both 1HD of exposure starting point and the exposure time will be fluctuated by 1HD if a jitter occurs between trigger input and internal sync.

## 7.1.2. Operation Mode Settings (Rear panel SW4: MODE0, SW5: MODE1)

MODE0	MODE1	Setting mode
OFF	OFF	Standard mode (Internal sync.)
ON	OFF	Standard trigger mode
OFF	ON	Trigger pulse width mode
ON	ON	Standard trigger mode (Slow shutter)

## Function table

Function	Standard mode	Standard trigger mode	Trigger pulse width mode	Standard trigger mode (Slow shutter)
Fixed shutter speeds	Yes	Yes	× ※1	Yes
Partial scan mode ※2	Yes	Yes	Yes	Yes
External sync.	Yes HD/VD	Yes HD	Yes HD	Yes HD

※1 The shutter speed equals to the trigger pulse width.

## Standard mode

Standard mode means progressive scan, 38fps, and invalid trigger shutter.

In the standard mode and partial scan mode, external HD/VD sync input can be operated.

## Standard trigger mode/Standard trigger mode (Slow shutter)

In these modes, the shutter speeds are controlled by the fixed switches on the rear panel.

HD sync input is enabled.

Jitter between Int. HD and Trigger will cause 1HD fluctuation in exposure time.

To avoid this fluctuation, please synchronize with EXT. HD. Note that the trigger pulse width must be over 1 HD.

7.1.3. Partial Scan Setting Switch (Rear Panel SW: 6 SCAN)

SCAN	Scanning mode	V Scanning lines	Rate	V Effective lines
OFF	Full pixels	1252 Lines	30 fps	1220 Lines
ON	Partial scan mode	652 Lines	58 fps	482 Lines

Partial scan is the mode, which increases the frame rate by reducing the number of read-out vertical lines.

The upper part and the lower part of the image are omitted, and only the central portion of the vertical lines is read out. When gain is set at over +6dB, V shading may become visible.

V-Shading portion can be deleted by setting data "1" to address 057 which eliminates the top 35 lines.

Effective lines setting and readout position in partial scan mode

(1) In partial scan mode, effective lines and readout position can be set with remote control.

(a) Effective lines setting: By setting address 049, 302 line to 822 line can be set per 5 lines steps.

Address 049 Set value	Effective lines	TOTAL Lines (Address 052&053:Read only)	Frame Rate
0	302	508	74fps
1	307	512	73fps
·	·	·	·
·	·	·	·
·	·	·	·
104	822	924	41fps

↓	↓	↓
X: min0 ~ max104	302+5*X	508+4*X

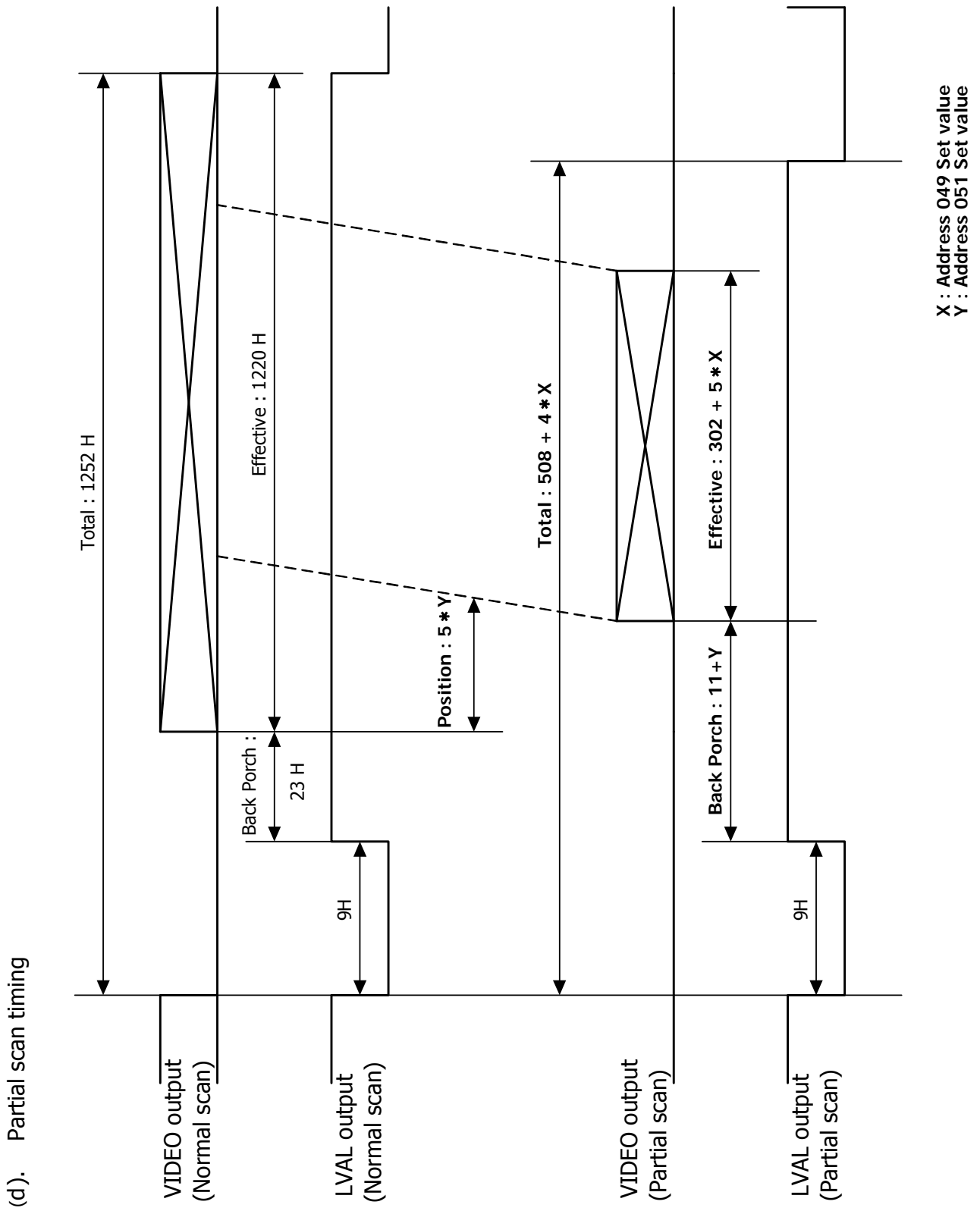
(b) Readout position setting: By setting address 051, every 5 lines steps can be set from the top.

Address 051
Min 0 ~ Max185-X (address 049)

< Setting example >

- Q. Need to readout effective 600 vertical lines from the 100<sup>th</sup> line.
- A. (1) address 000:1... Remote control  
 (2) address 005:1... Partial SCAN mode  
 (3) address 049:60... Effective line setting((600-302)/5): Actual number of effective lines is 602.  
 (4) address 051:20... Readout position setting (100/5)  
 (5) address 063:83 ... Data saving (If necessary)  
 (Camera internal SW104-2 shall be ON to save data)

(d) Partial Scan Timing



## 7.1.4. (Rear Panel SW7: - )

	NC

## 7.1.5. RGB / RAW Selection Switch (Rear panel SW8: RGB/RAW)

RGB/RAW	RGB / RAW selection
OFF	RAW output
ON	RGB output

## 7.1.6. RAW 8 bit / 10bit Selection Switch (Rear Panel SW9:8Bit/10Bit)

8bit/10bit	RAW 8 bit / 10 bit output selection
OFF	RAW 8 bit output
ON	RAW 10 bit output

※ Valid only when RAW output (SW8:OFF) is set.

## 7.1.7. HD / VD Input / Output Selection Switch (Rear panel SW10: IN/OUT)

IN/OUT	HD/VD Input Output selection
OFF	HD, VD output
ON	HD, VD input (Ext. Sync. mode)

※ This is the selection of 6pin(HD), 7pin(VD) of the circular type 12pins connector on the rear panel.

## 7.1.8. WEN (Write Enable) Signal Output

WEN signal is output through 10 pin of circular connector when video signal is output in the trigger mode. By setting the data of address 055, WEN signal format can be changed.

Data : 0 . . . single pulse VD (9H pulse width) (default setting)  
 : 1 . . . FVAL (Frame enable)  
 : 2 . . . Exposure  
 : 3 . . . not assigned

\* By adjusting the phase, the necessary amount of illumination can be reduced, incoming light overexposure time can be eliminated, and consequently, amount of smear can be reduced.

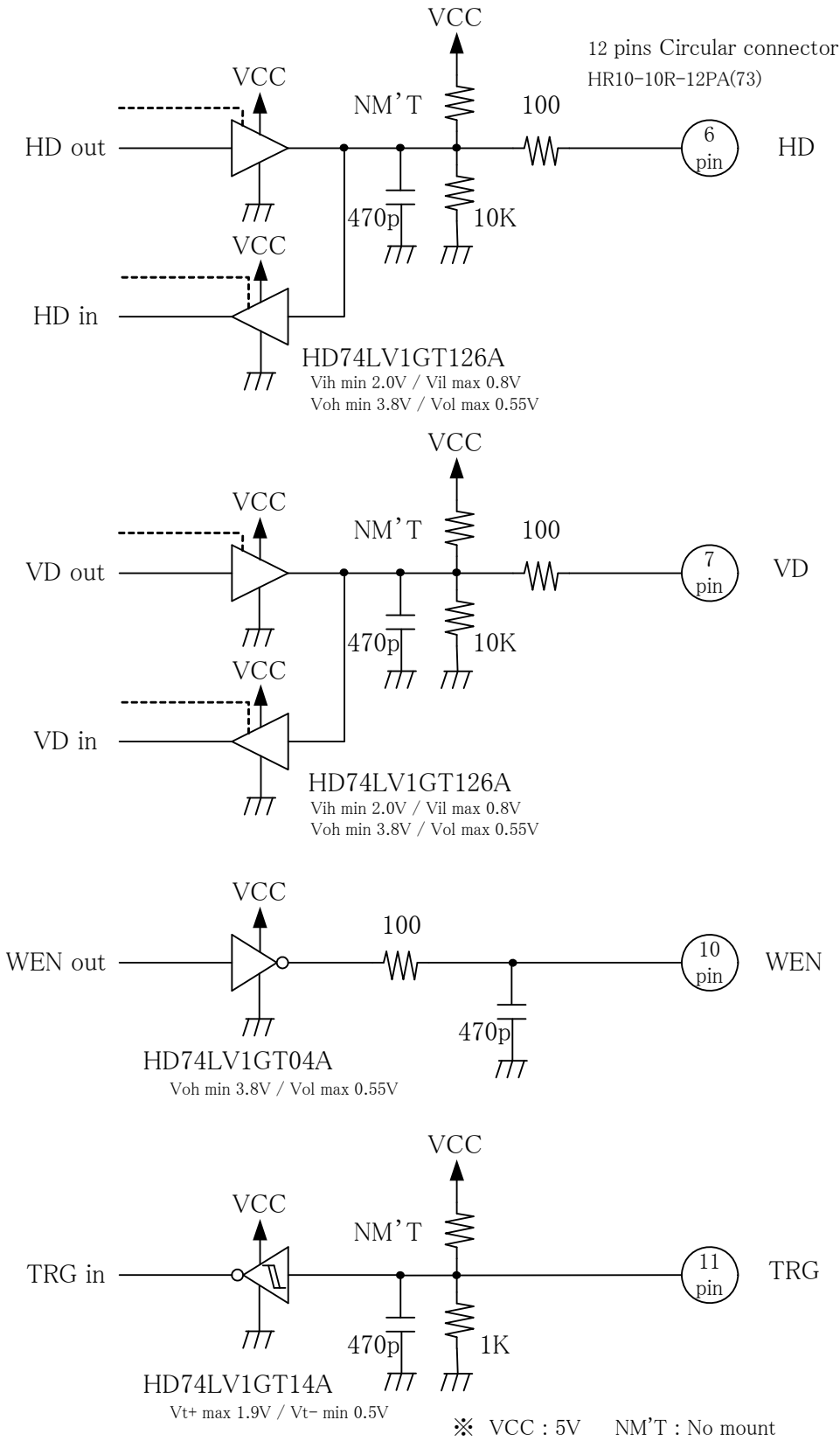
## 7.2. 12 Turn Rotary Potentiometer for Manual Gain Adjustment

Adjustment range : -1dB ~ max +12dB

(The performance guarantee range : 0 ~ +6dB. When Gain is set over +6dB, artifacts such as vertical stripe, beat noise, and shading may become visible.)



7.4. HD/VD Trigger Input/Output Circuit of 12pin Circular Connector



Please refer to the manufacturer's data sheets for the characteristics of component parts.

## 7.5. Remote Interface Function

Through RS-232C interface, the camera can be controlled by external PC.

(1) The settings for RS-232C are as follows.

Baud rate: 9600bps  
 Data: 8 bits  
 Stop bit: 1bit  
 Parity: None  
 XON/XOFF: Not controlled

(2) Control code

- The total control code is 14bits which conforms to ASCII code.
- The control code consists of camera No, process code, remote controller address, remote controller data, and CR. Execute Read/Write through PC, and the camera will reply the data.

1	2	3	4	5	6	7 <sup>th</sup> Byte	8	9	10	11	12	13	14
Camera No.						Process code	Remote controller address			Remote controller data			CR
00000: Common to the all cameras						"R" Read mode	Refer to the address table of 5.4 function setting			000~255			0 Dh
000001~ZZZZZZ: Camera No of individual camera						"W" Write mode							
						"C" Camera mode							

Camera No shall consist of 6 bytes of characters/numeric strings. Send the individual camera number code or common number code, "000000". The reply data from the camera shall contain the registered number for that camera.

### Process code

Input any one of R, W, or C to the process code. R (read mode) is to read the data of remote controller address. Please be noted to set any dummy data (000~255) to 11<sup>th</sup> ~ 13<sup>th</sup>, since a command shall consist of 14 bytes.

W (write mode) is to write the data to the remote controller address. Please be noted that the data cannot be saved into EEPROM of the camera. (Reboot the camera, and the data is reset to the initial setting.) To save the data into EEPROM, set camera internal switch, SW104-2, ON, and send the save data, "83", into the address 064.

**Note; Once the data was saved into EEPROM, it may not be reset to the initial settings.**

C is the code to send the data back from the camera.

**Note; Do not set code C when sending the data from PC side.**

Remote controller address

**Note; Do not save the data into the address other than specified, since it may cause the damages or malfunction of the camera.**

Remote controller data

Set the decimal number (000~255) for the remote controller data. Please be noted to set any dummy data in read control mode.

CR

Be sure to input "CR" to confirm the end of the command.

### (3) Setting Example

Set Gain to +6dB with remote control function.

Step 1 Set the camera to "000000"(assign the common camera number).  
Write "1" into address "000" to set the camera into remote control mode.  
Please be noted that the camera control switch becomes invalid in remote control mode.

Code from the PC: "000000W000001CR"

Step 2 Set Gain to +6dB.

Code from the PC: "000000W001002CR"

## 8. Safety/Quality Standards

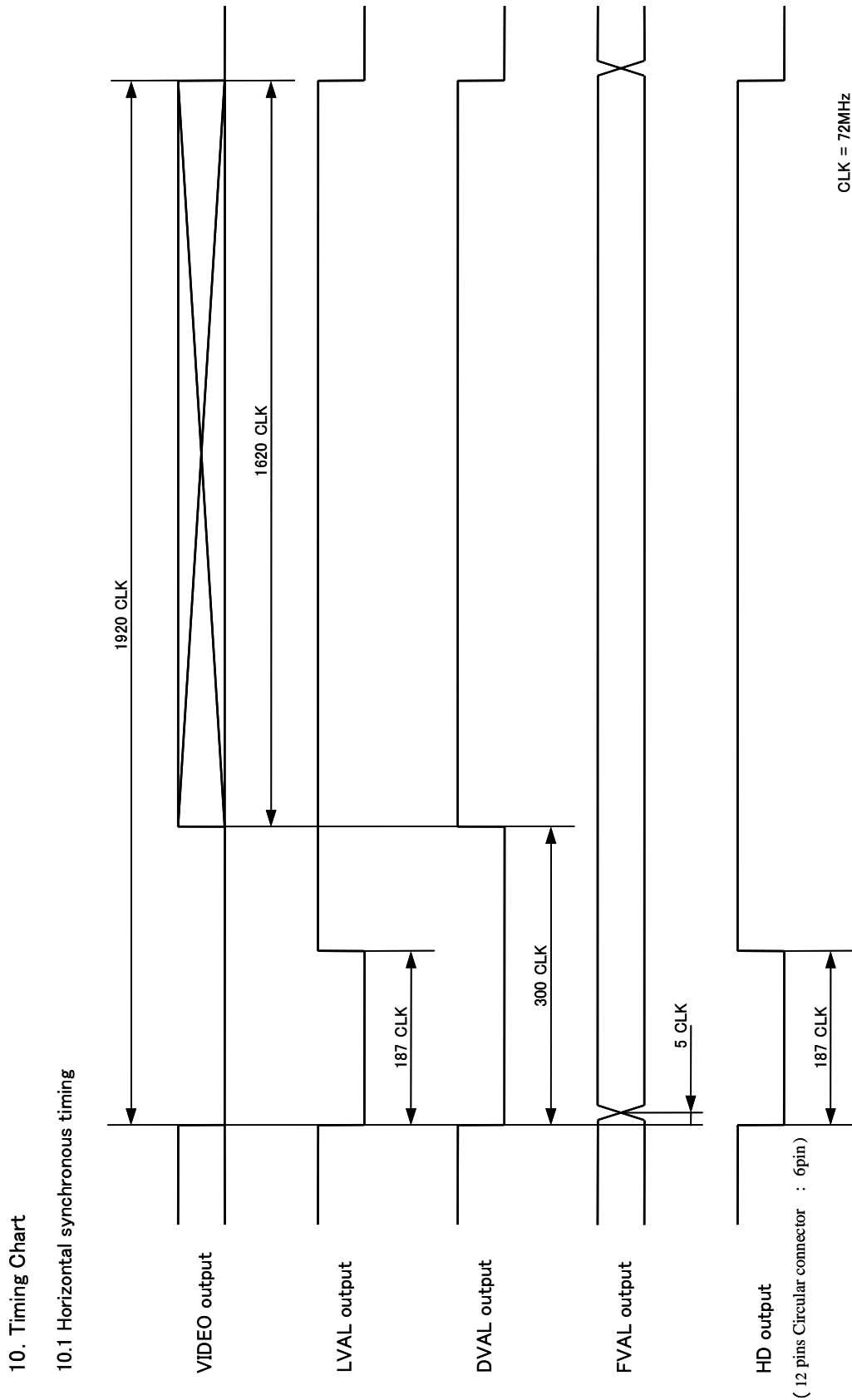
- UL Standard  
Conform to UL Standard including materials and others.
- CE Marking  
Conform to EN50081-2 (Emission)  
Conform to EN50082-2 (Immunity)
- RoHS  
Conform to RoHS.
- FCC Compliance Conform to FCC Class A Digital Device  
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## 9. Durability

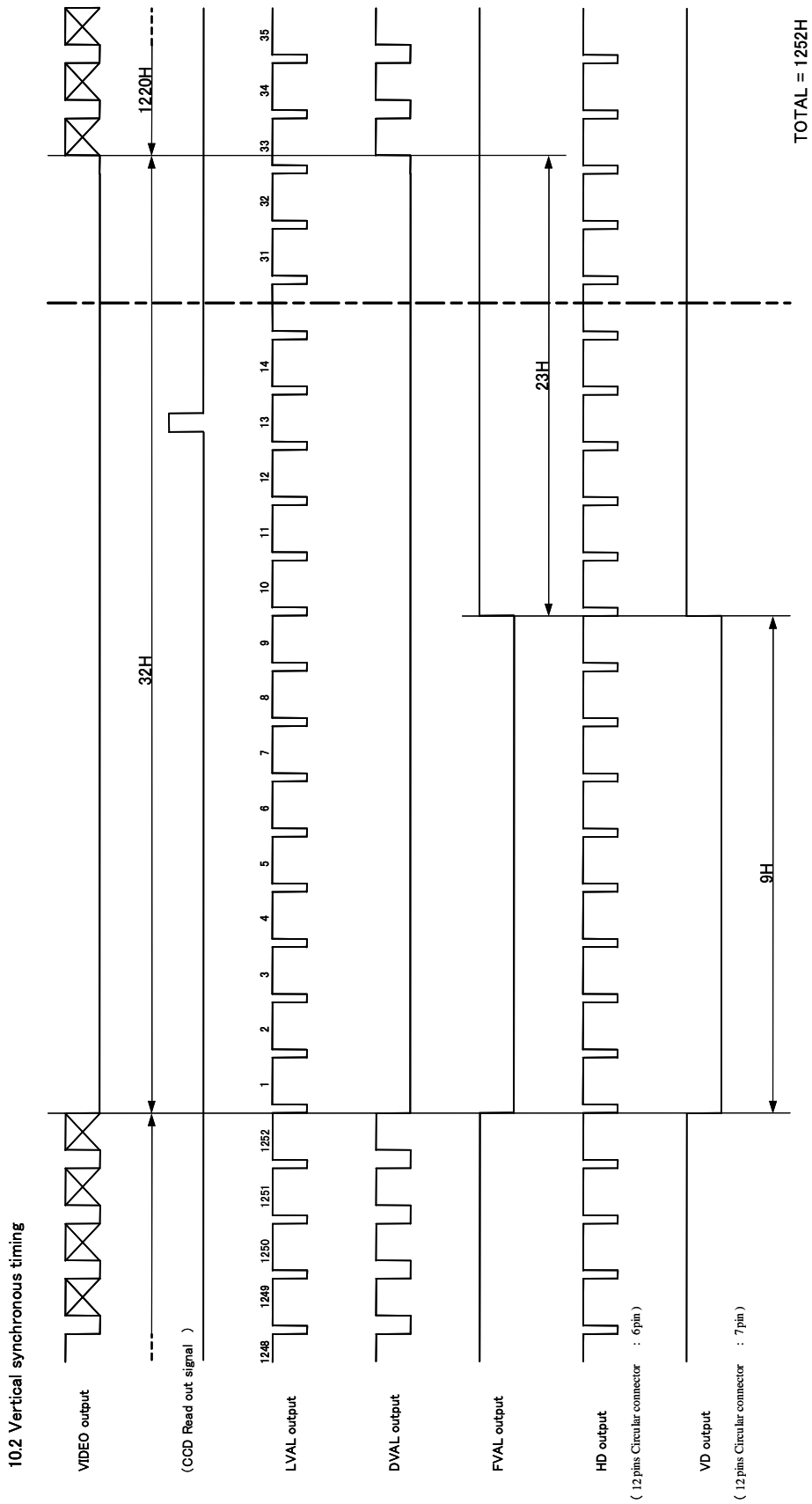
I t e m	Specification	Remarks
Vibration resistance	Acceleration            68.6 m/s <sup>2</sup> (7.0G) Vibration frequency    11~200Hz Sine wave Sweep interval            300sec Direction                    X Y Z 3 directions Testing time                10min for each direction  No malfunction shall occur after testing the above.	
Shock resistance	Acceleration            490 m/s <sup>2</sup> (50G) Direction                    6 direction	Without package
Operation temperature	-5°C~+45°C with RH 20~80% (No condensation)  a) Leave the camera for 1 hour at the highest operation temperature (no condensation), turn on the power, and then the camera shall operate and meet the specifications.  b) Leave the camera for 1 hour at the lowest operation temperature (no condensation), turn on the power, and then the camera shall operate and meet the specifications.	

10. Timing Chart

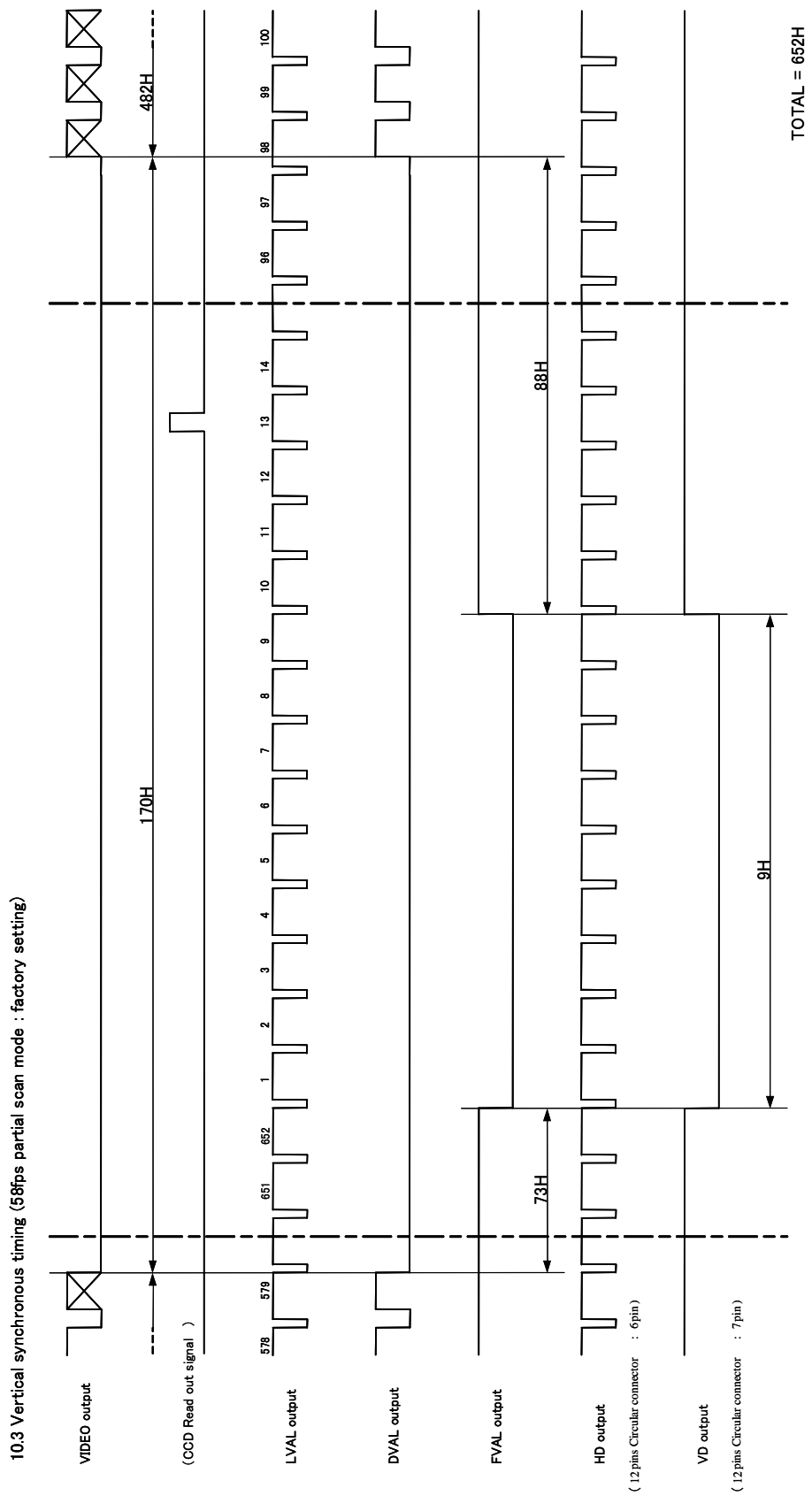
10.1. Horizontal Synchronous Timing



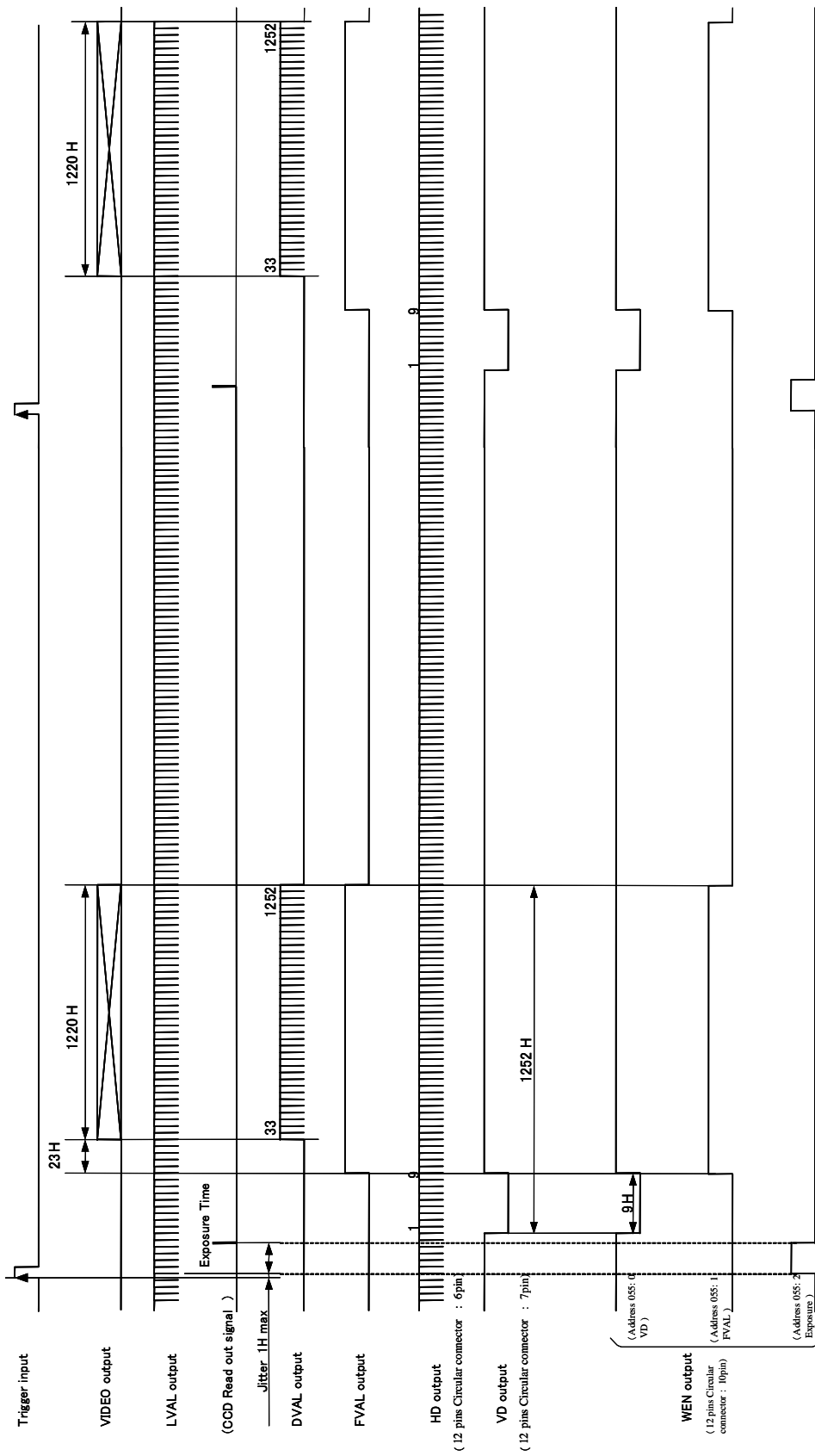
10.2. Vertical Synchronous Timing



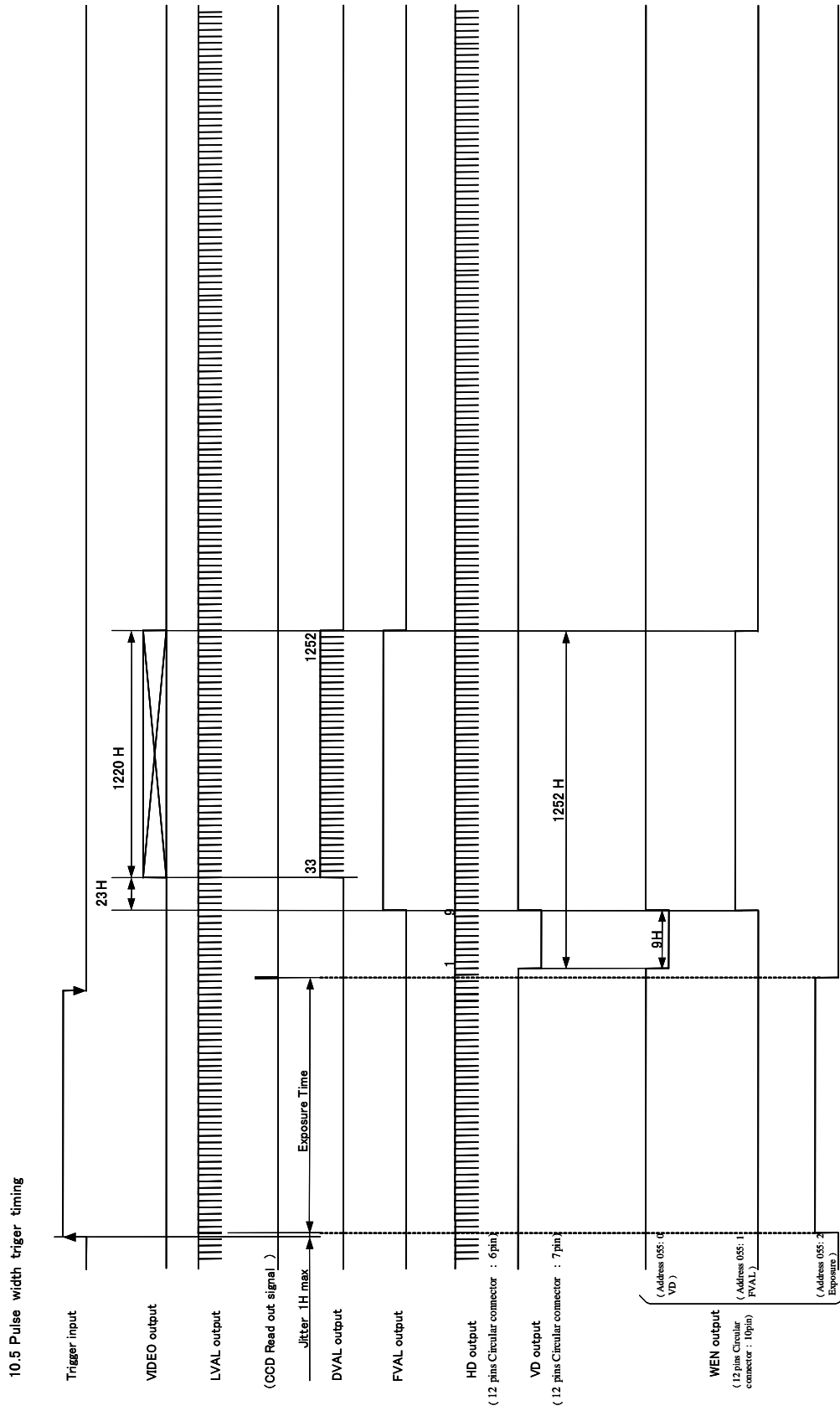
10.3. Vertical Synchronous Timing (58fps partial scan mode: initial setting)



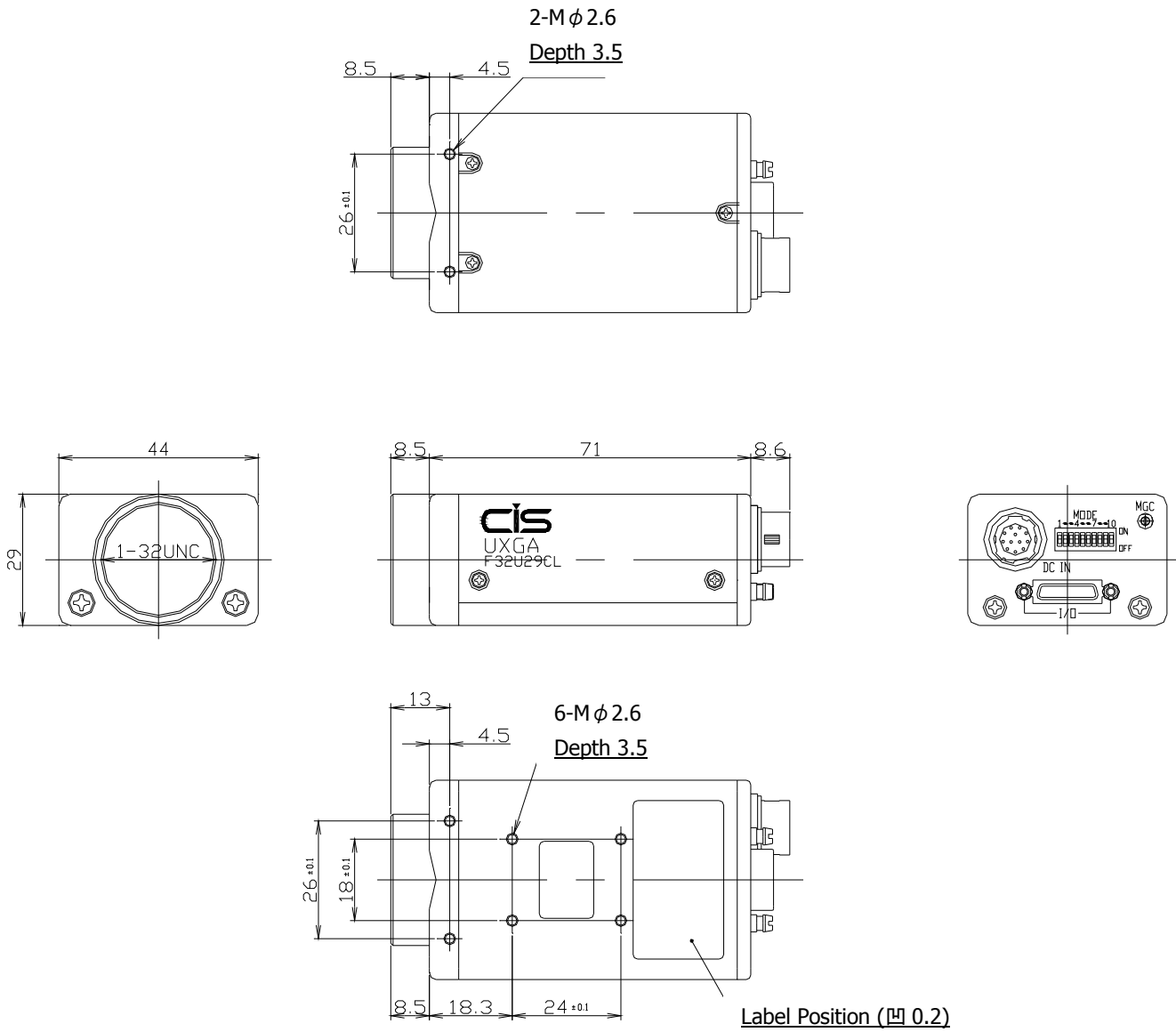
10.4. Standard Trigger Timing



10.5. Pulse Width Trigger Timing



11. Dimensions



999-424-00-00

## 12. Cases for Indemnity (Limited Warranty)

We shall be exempted from taking responsibility and held harmless for damage or losses incurred by the user in the following cases.

- In case damage or losses are caused by fire, earthquake, or other acts of God, acts by third party, deliberate or accidental misuse by the user, or use under extreme operating conditions.
- In case indirect, additional, consequential damages (loss of business interests, suspension of business activities) are incurred as result of malfunction or non-function of the equipment, we shall be exempted from responsibility for such damages.
- In case damage or losses are caused by failure to observe the information contained in the instructions in this product specification & operation manual.
- In case damage or losses are caused by use contrary to the instructions in this product specification & operation manual.
- In case damage or losses are caused by malfunction or other problems resulting from use of equipment or software that is not specified.
- In case damage or losses are caused by repair or modification conducted by the customer or any unauthorized third party (such as an unauthorized service representative).
- Expenses we bear on this product shall be limited to the individual price of the product.

## 13. Handling Precautions

**【Important】** Please observe all warnings and cautions stated below.

Our warranty does not apply to damages or malfunctions caused by neglecting these precautions.

- Do not use or store the camera in the following extreme conditions:
  - Extremely dusty or humid places.
  - Extremely hot or cold places (operating temperature  $-5^{\circ}\text{C}$  to  $+45^{\circ}\text{C}$ )
  - Close to generators of powerful electromagnetic radiation such as radio or TV transmitters.
  - Places subject to fluorescent light reflections.
  - Places subject to unstable (flickering, etc.) lighting conditions.
  - Places subject to strong vibration.
- Remove dust or dirt on the surface of the lens with a blower.
- Do not apply excessive force or static electricity that could damage the camera.
- Do not shoot direct images that are extremely bright (e.g., light source, sun, etc.), and when camera is not in use, put the lens cap on.
- Follow the instructions in Chapter 6, "External connector pin assignment" for connecting the camera. Improper connection may cause damages not only to the camera but also to the connected devices.
- Confirm the mutual ground potential carefully and then connect the camera to monitors or computers. AC leaks from the connected devices may cause damages or destroy the camera.
- Do not apply excessive voltage.(Use only the specified voltage.) Unstable or improper power supply voltage may cause damages or malfunction of the camera.
- Make sure that the camera and peripheral equipments are properly connected before turning the camera on. Especially in INT/EXT sync signal settings, improper connection may cause damages to the camera and the connected devices.
- VCC-F32U29CL can be connected to a capture board for Camera Link by use of dedicated cable.
- In case of abnormal operation, contact the distributor from whom you purchased the product.