

Near-Ultraviolet Camera

Model CS3930UV

Ver.1.0

Specification

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TOKYO ELECTRONIC INDUSTRY CO., LTD.

1. Product Description

Model CS3910H is an integrated (one-body) type B/W CCD camera employing a 1/2" type all-pixel-data-read-out CCD, featuring ultra-high resolution of active 1,450,000 pixels.

Other than the conventional visible-light region, the CCD integrated in this model has a near-ultraviolet region sensitivity. Through the use of short wavelength characteristics of the near-ultraviolet light, this model is suitable for capturing clear image such as the surface variations of micro objects.

2. Features

(1) Ultra-high Resolution

CS3930UV features an ultra-high picture resolution through the adoption of a MEGA-pixel CCD (Total pixel counts: 1,500,000 Active pixel counts: 1,450,000 [1,392 (H) × 1,040 (V)]).

(2) Near-ultraviolet sensitivity

The CCD integrated in this model has a near-ultraviolet region sensitivity other than the conventional visible-light region. This function enables the camera to capture clear image such as the surface variations of micro objects through the use of short wavelength characteristics.

(3) All pixel's data read out

With its built-in all pixel-data-readout CCD, this model can read out image-data just in approximately 1/7.5 seconds. A frame-shutter reads out all data even under RTS mode.

(4) Random Trigger Shutter

Random trigger shutter, which starts light-exposure in synchronization with external trigger signal, is built in. This function enables the camera to capture images at any given timing. Shutter speed is selectable among 8 scales, from 1/30s through 1/10000s. This function also enables the camera to set arbitrarily the shutter speed by trigger pulse width.

(5) Digital Output

Other than conventional analog output, digital output (EIA-644 single channel 10 bit) is also available.

(6) Square-grid Pattern CCD

Pixels in this CCD are aligned in square grid pattern. This makes it easier to perform computation correctly for image processing use.

3. Configuration

- (1) Camera body 1
- (2) Operation Manual 1

4. Option

- (1) Connection cable (DC IN cable, Digital video cable)
- (2) Camera mounting kit

5. Function

Setting of each mode can be done with inner DIP switches. To select modes, slide DIP switches numbered 1 through 8. The status is OFF when SW is in left position, ON when in right position.

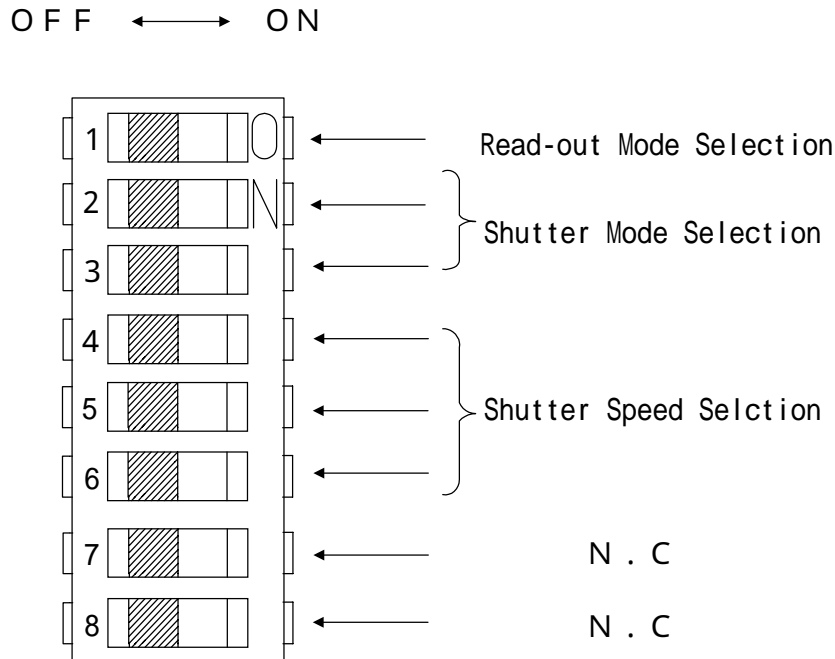


Figure 1: Inner DIP switch

(1) Read-Out Mode Setting (SW1 DIP1) (Initial-Factory-Setting: OFF)

- ON: 7.5Hz All Pixel Data Read-Out Mode (FINE) *1
 OFF: 30Hz High-speed Draft Mode (DRAFT) *2

*1: All pixel's data are read out just in approximately 1/7.5 seconds under non-interlace mode. As all pixel's data signal in the same exposure period are read out simultaneously, the camera is suitable for capturing high-resolution image .

*2: The only 2 lines out of 8 lines are output (The 2 lines are shown as the 1st and 4th lines, or the 9th and 12th lines and so on). Total active area is scanned in approximately 1/30 seconds under this mode. This readout mode makes a point on the function of processing speed than the one of vertical resolution.

(2) Shutter mode setting(SW1 DIP2&3) (Initial-Factory-Setting: DIP2&3 OFF)

DIP2	DIP3	Shutter Mode
OFF	OFF	Shutter OFF
ON	OFF	Normal Electronic Shutter
OFF	ON	RTS Pulse Mode
ON	ON	RTS Fix Mode

(3) Shutter Speed Setting (SW1 DIP4, 5&6) (Initial-Factory-Setting: DIP4, 5&6 OFF)

DIP4	DIP5	DIP6	Shutter Speed
OFF	OFF	OFF	1/30s
ON	OFF	OFF	1/60s
OFF	ON	OFF	1/125s
ON	ON	OFF	1/250s
OFF	OFF	ON	1/1000s
ON	OFF	ON	1/2000s
OFF	ON	ON	1/4000s
ON	ON	ON	1/10000s

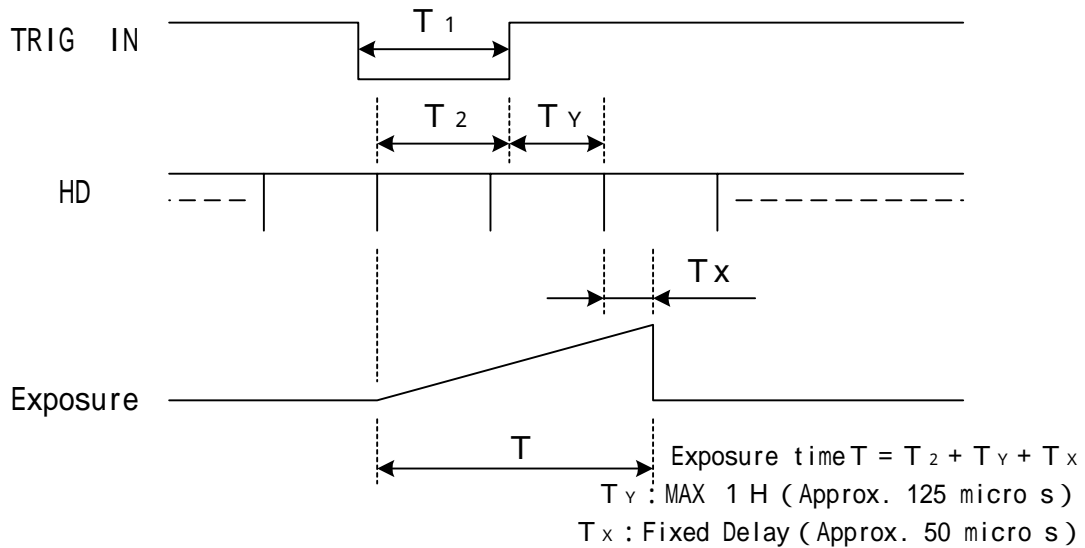
(4) RTS (Random Trigger Shutter) Pulse Control

The camera goes into RTS (Random Trigger Shutter) mode when TRIG terminal voltage is in HIGH (1V or more), and starts light-exposure at the falling edge timing.

The exposure-time is determined by pulse width. Exposure-time control is done in steps of 1H unit. Be sure to set the pulse width longer than 1H (approximately 125 micro s).

After video-output, it goes back into normal operation if TRIG terminal voltage stays in LOW, regardless of whether RTS mode is set in ON or OFF.

Make sure to be set the switches to “RTS pulse mode” or “RTS fix mode” when the ON/OFF setting of RTS mode is done by TRIG pulse.



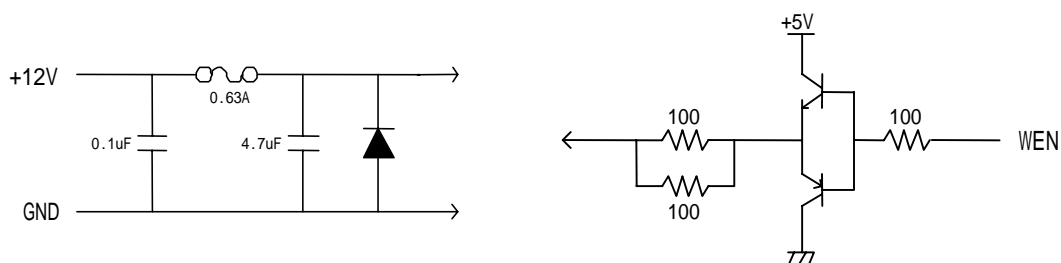
6. Interface

(1) DC IN

Connector (Camera side): HR10A-7R-6PB (Manufactured by HIROSE DENKI)

Plug (Cable side): HR10A-7P-6S (Manufactured by HIROSE DENKI)

Pin number	Signal name
1	NC
2	GND
3	GND
4	TRIG
5	WEN
6	+12V



(2) DATA OUT

Connector (Camera side): DX10A-28S

Connector (Cable side): DX30A-28P

DX-28-CV1 (Cover)

DATA0: LSB

DATA9: MSB

Pin.	Signal name	Pin.	Signal name	Pin.	Signal name	Pin.	Signal name
1	DATA0-H	8	DATA3-L	15	DATA7-H	22	VD-L
2	DATA0-L	9	DATA4-H	16	DATA7-L	23	HD-H
3	DATA1-H	10	DATA4-L	17	DATA8-H	24	HD-L
4	DATA1-L	11	DATA5-H	18	DATA8-L	25	CLK-H
5	DATA2-H	12	DATA5-L	19	DATA9-H	26	CLK-L
6	DATA2-L	13	DATA6-H	20	DATA9-L	27	TRIG IN
7	DATA3-H	14	DATA6-L	21	VD-H	28	GND

7. Specification

Model	CS3930UV
Image sensor	Solid state image sensor in all pixel data read-out interline CCD
Optical size	1/2 inch equivalent
Total pixel	1434 (H) X 1050 (V)
Active pixel	1392 (H) X 1040 (V) (Square grid pattern)
Unit cell size	4.65 micro m (H) X 4.65 micro m (V)
Scanning area	7.6 mm (H) X 6.2 mm (V)
Scanning system	Non-interlace
Scanning frequency	7.99kHz(H) 7.62Hz(V) (All pixel data read-out mode) or 29.96Hz(V) (High-speed draft mode)
Sync system	Internal synchronization
Sensitivity	100 1x, F4 (Color temperature 3200K)
S/N	50dB (Electronic shutter OFF, FINE)
Video output	Digital output: TIA/EIA-644 Data: 10bit (14.318MHz)
Input signal	
TRIG	
Input level	4.0 +/- 0.5V(p-p) / 10k-ohm
Pulse width	1H or more
Output signal	
HD	
Output level	+/- 345mV
System	TIA/EIA-644
Polarity	Negative
Pulse width	6.70 +/- 0.1 micro s
Repeating frequency	7.99kHz
VD	
Output level	+/- 345mV
System	TIA/EIA-644
Polarity	Negative
Pulse width	1125 +/- 2 micro s
Repeating frequency	7.62Hz

CLK	
Output level	+/- 345mV
System	TIA/EIA-644
Repeating frequency	14.318MHz
WEN	(Read-out timing pulse under RTS mode)
Output level	4.5 +/- 0.5V(p-p)
Polarity	Positive
Pulse width	1H (125 +/- 1 micro s)
Electronic shutter	FIX mode --- 8 scales (from 1/10.000s to 1/30 s) Pulse mode --- Exposure-time determined by pulse width
Gamma correction	OFF (Gamma=1.0) Fixed
Power source	
Power capacity	DC12V plus-minus 10 percent
Current capacity	0.9A or more
Ripple voltage	50mV(p-p) or less
Power connector	DC IN connector (HR10A-7P-6S: Manufactured by HIROSE DENKI)
Power consumption	Approx. 3.0W
Ambient condition	
Performance guaranteed	Temperature : From 0 through 40 degree Celsius Humidity : From 10 through 90 percent (No condensing)
Operation guaranteed	Temperature : From -5 through 45 degree Celsius Humidity : From 25 through 90 percent (No condensing)
Lens mount	C mount
External dimension	44 (W) X 29 (H) X 88 (D) mm
Weight	Approx. 150g
Spectrum response characteristics	

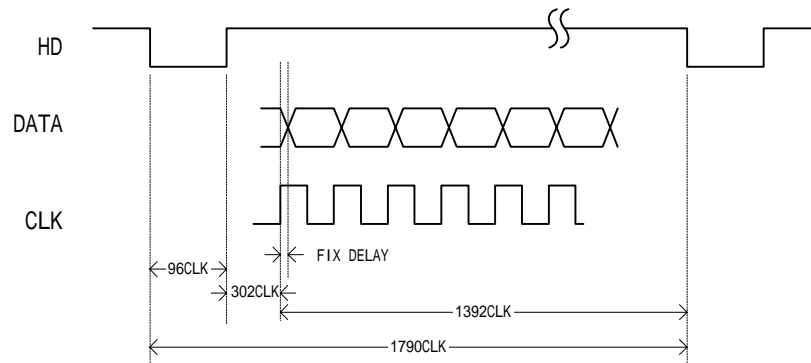
8. Timing chart

8.1 Digital output

TIA/EIA-644 (LVDS)

Driver output voltage: +/- 345mV (Difference output) / 100 ohm

(a) H rate

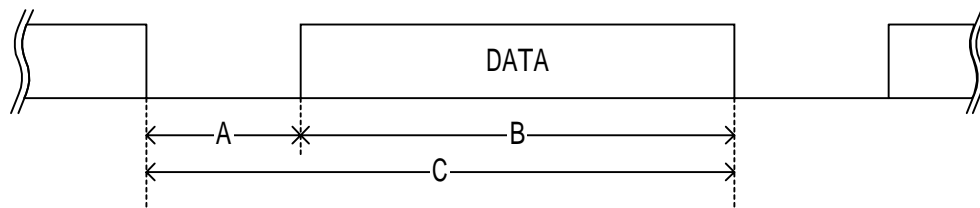


Total clock counts: 1790CLK / 1H

DATA counts: 1392CLK / 1H

CLK 69.8ns

(b) V rate



All pixels data readout mode (FINE)

A = 9H

B = 1040H

C = 1049H = 7.62Hz

High-speed draft mode (DRAFT)

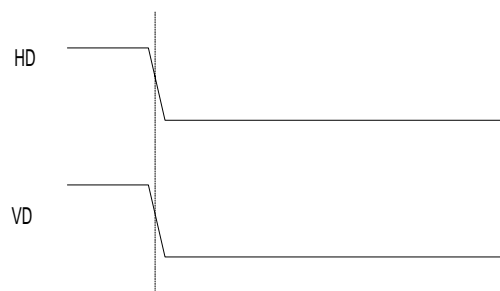
A = 7H

B = 260H

C = 267H = 29.96Hz

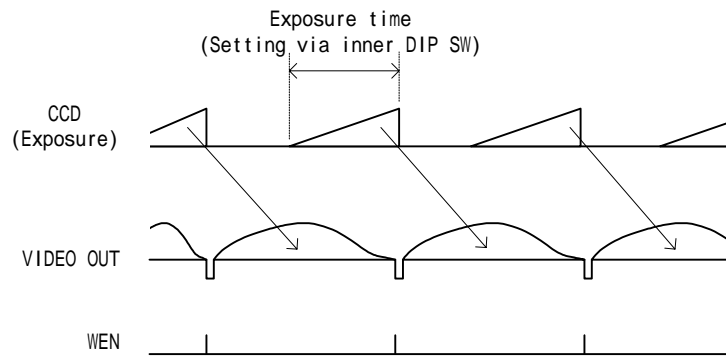
(c) HD, VD output phase lag (Normal electronic shutter)

--- No phase lag



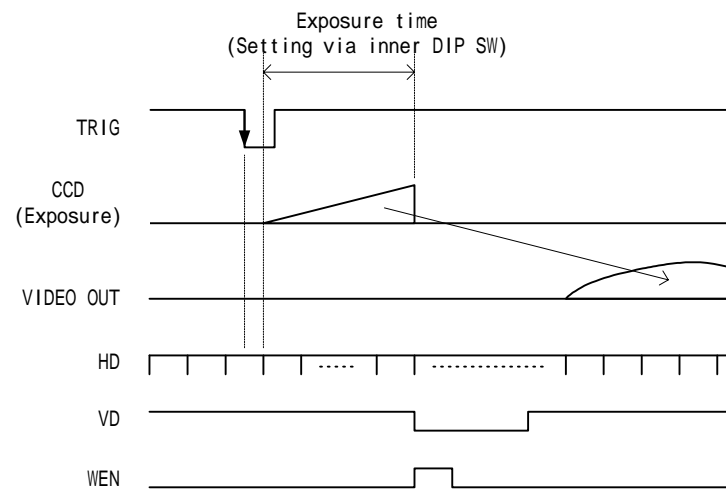
8.2 Video output timing

(a) Under normal operation (Electronic shutter)

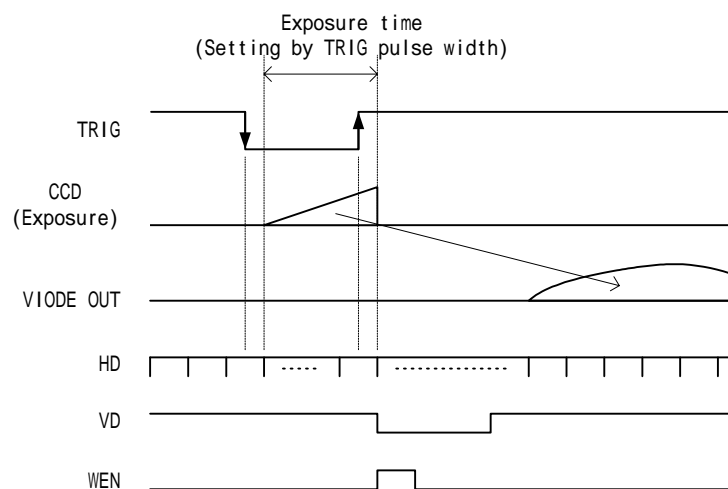


(b) Random trigger shutter mode

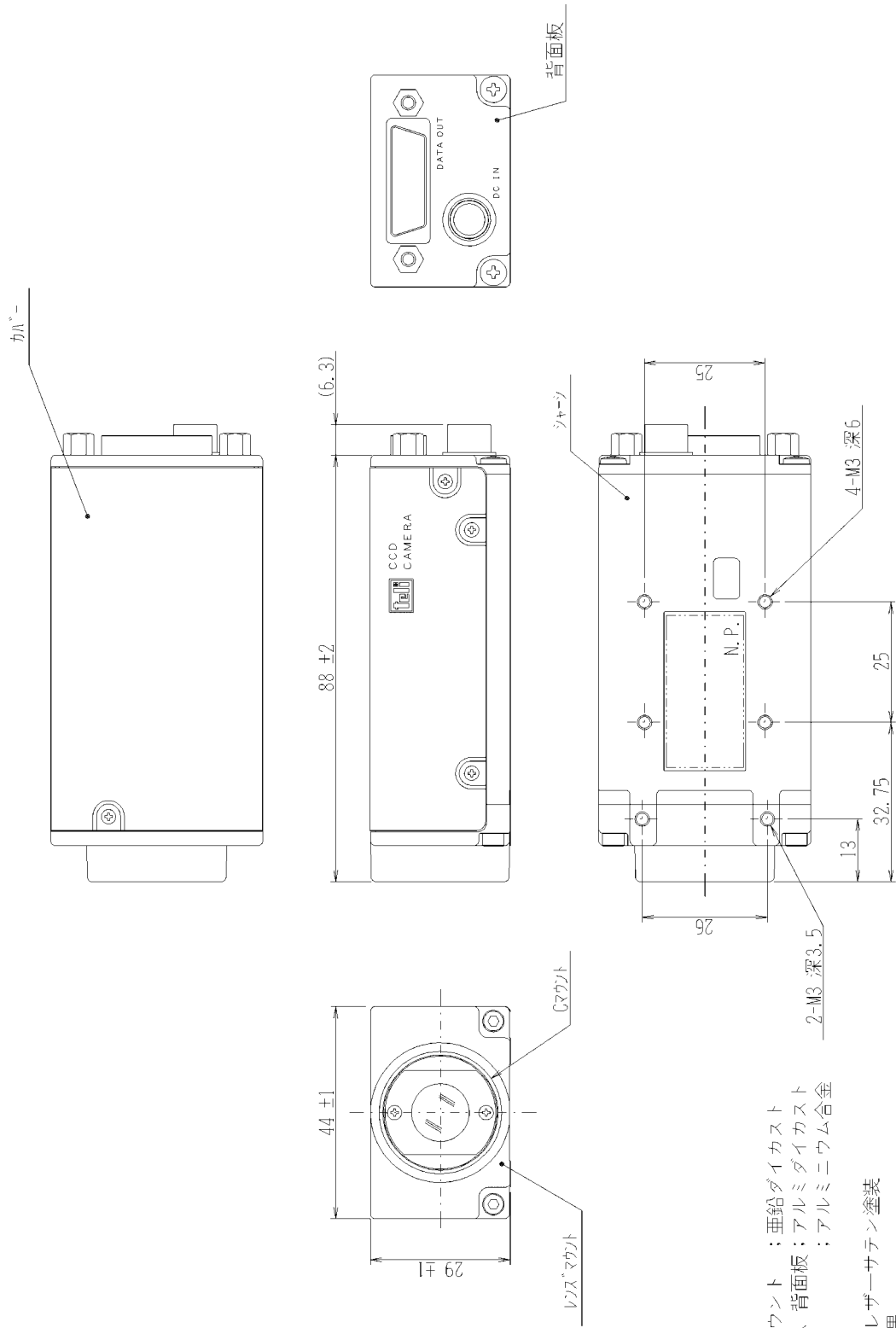
-1. Fixed speed mode



-2. Pulse mode



9. External-view Drawing



仕様
材質
レンズマウント : 亜鉛ダイカスト
レンズ、背面板 : アルミダイカスト
シャーシ : アルミニウム合金
カバー : アルミニウム合金
処理
塗装 : レザーサテン塗装
塗装色 : 黒