

# Near-violet camera

## CS3930UV

### Product Specification

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**TOSHIBA TELI CORPORATION**

# 1. Product Description

Model CS3930UV 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 sensitivity of this model is also positioned in the near-ultraviolet region. 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 sensitivity of this model is positioned in the near-ultraviolet region 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 1/7.62s. 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 the shutter speed by trigger pulse width arbitrarily.

### (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. Composition

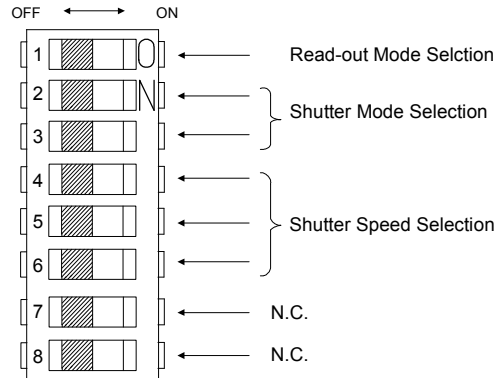
- (1) Camera body ..... 1
- (2) Operation Manual ..... 1

## 4. Option

- (1) DC IN cable
- (2) Digital video cable
- (3) 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.



**\* Turn OFF (Initial Configuration) DIP7 and DIP8.**

### (1) Read-Out Mode Setting

SW1 DIP1 (Initial-Factory-Setting : OFF)

<b>OFF</b>	7.62Hz All Pixel Data Read-Out Mode (FINE) ※1
<b>ON</b>	30Hz High-speed Draft Mode (DRAFT) ※2※3

- \*1 All pixel's data are read out just in approximately 1/7.62s 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 1/30s under this mode. This read-out mode make a point on the function of processing speed than the one of vertical resolution.
- \*3 As this camera does not meet the specification sufficiently, for example striking white spot in Draft mode, it is not suitable for image processing (digital processing).

Use this for monitoring.

## (2) Shutter Mode Setting

SW1 DIP2 and DIP3

(Initial-Factory-Setting : Both DIPs are OFF)

2	3	Shutter Mode
OFF	OFF	Shutter OFF
ON	OFF	Normal Electronic Shutter
OFF	ON	Random Trigger Shutter Pulse Mode
ON	ON	Random Trigger Shutter Fix Mode

## (3) Shutter Speed Setting

SW1 DIP4, DIP5 and DIP6

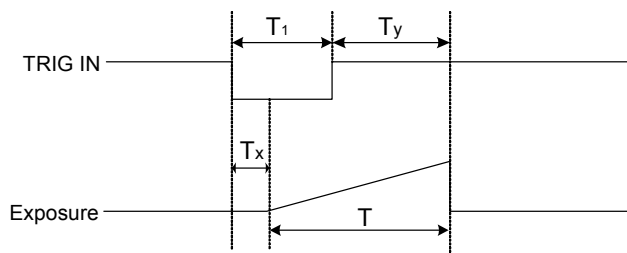
(Initial-Factory-Setting : All DIPs are OFF)

4	5	6	Shutter Speed
OFF	OFF	OFF	1/30
ON	OFF	OFF	1/60
OFF	ON	OFF	1/125
ON	ON	OFF	1/250
OFF	OFF	ON	1/1000
ON	OFF	ON	1/2000
OFF	ON	ON	1/4000
ON	ON	ON	1/10000

## (4) Random Trigger Shutter Pulse Control

The camera goes into 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. Be sure to set the pulse width longer than 50μs.



$$\text{Exposure time } T = (T_1 - T_x) + T_y$$

$T_x$  : Fixed Delay (Approx. 5μs)

$T_y$  : Fixed Delay (Approx. 45μs)

Be sure to set  $T_1$  longer than approx. 50μs.

## 6. Interface

### (1)DC IN

Connector (Camera side) ; HR-10A-7R-6PB\*

Plug (Cable side) ; HR-10A-7P-6S\*

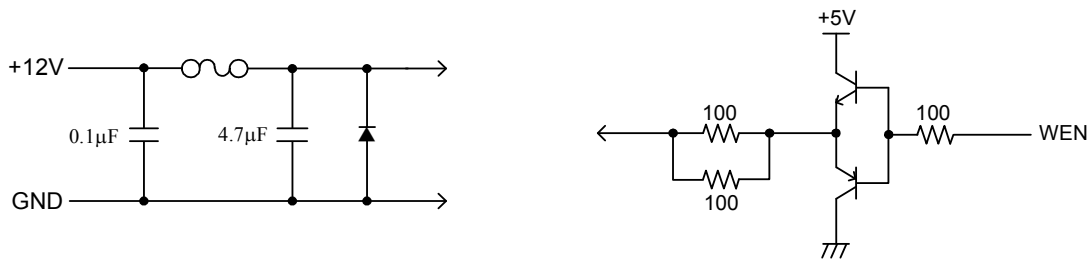
\* Manufactured by Hirose Electric co., ltd.

PIN No.	Signal Name
1	NC
2	GND
3	GND
4	TRIG
5	WEN*
6	+12V

\*WEN: Read-out timing pulse at Random Trigger Shutter mode.

(References)

Circuits of +12V input and WEN output are shown below.



### (2)DATA OUT

Connector (Camera side) ; DX10A-28S\*

Connector (Cable side) ; DX30A-28P\*

Hood (Cable Side) ; DX-28-CV1\*

\* Manufactured by Hirose Electric co., ltd.

Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	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

DATA0 : LSB DATA9 : MSB

## 7. Specification

<b>(1)Image sensor</b>	Solid state image sensor in all pixel data read-out interline CCD
Optical size	1/2 inch equivalent
Total pixel	1434 (H) × 1050 (V)
Active pixel	1392 (H) × 1040 (V)
Unit cell size	4.65μm (H) × 4.65μm (V)
Scanning area	7.66mm (H) × 6.2mm (V)
<b>(2)Scanning system</b>	Non-interlace
<b>(3)Scanning frequency</b>	Horizontal; 7.99kHz Vertical ; 7.62Hz (FINE) ; 29.96Hz (DRAFT)
<b>(4)Sync system</b>	Internal Synchronization
<b>(5)Sensitivity</b>	100lx, F4 (Color temp. 3200K)
<b>(6)S/N</b>	50dB (Initial-factory-setting)
<b>(7)Video output</b>	Digital output TIA/EIA-644 Data ; 10bit (14.318MHz)
<b>(8)Input signal</b>	
TRIG	
Input level	Low Level ; 0 ~ 1.0V / 10kΩ High Level ; 4.0 ~ 5.0V / 10kΩ
Polarity	Negative
Pulse width	50μs or more
<b>(9)Output signal</b>	
HD	
Output level	±345mV
System	TIA/EIA-644
Polarity	Negative
Pulse width	6.70±0.1μs
Repeating frequency	7.99kHz
VD	
Output level	±345mV
System	TIA/EIA-644
Polarity	Negative
Pulse width	1125±2μs
Repeating frequency	7.62Hz
CLK	
Output level	±345mV
System	TIA/EIA-644
Repeating frequency	14.318MHz

WEN

Output level 4.5±0.5V(p-p)  
Polarity Positive  
Pulse width 1H (125±1μs)

**(10)Electronic shutter**

Fix mode 8 scales (1/10,000s ~ 1/30s)  
Pulse mode Exposure time determined by pulse width

**(11)Gamma correction**

OFF ( $\gamma = 1.0$ ) fixed

**(12)Power source**

Power capacity DC12V±10%  
Current capacity 0.9A or more  
Ripple voltage 50mV(p-p) or less  
Power connector DC IN connector  
(HR10A-7P-6S : manufactured by Hirose Electric co., ltd.)

**(13)Power consumption**

Approx. 2.4W

**(14)Ambient condition**

Performance guaranteed  
Temperature 0 ~ 40 °C  
Humidity 30 ~ 90 % (No condensing)  
Operation guaranteed  
Temperature -5 ~ 45 °C  
Humidity 25 ~ 90 % (No condensing)

**(15)Standard**

FCC class A  
CE (EN50081-2 + EN50082-2)

**(16)Lens mount**

C mount

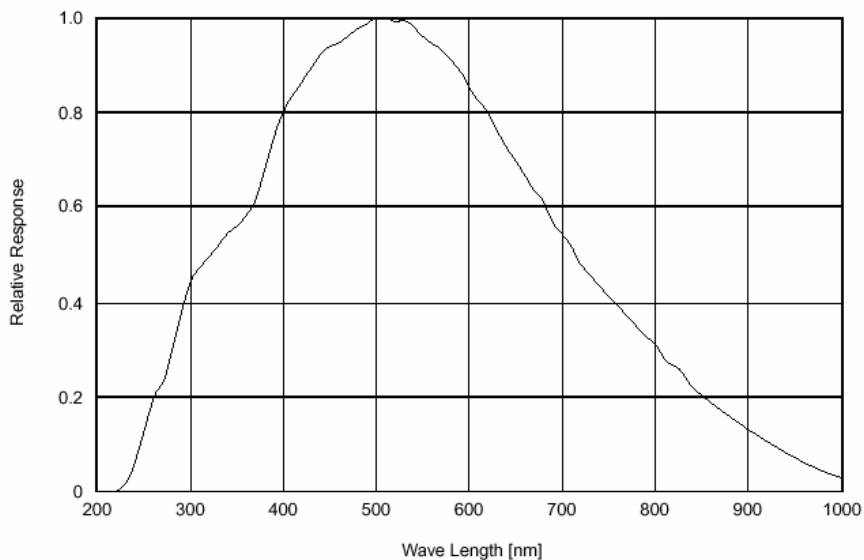
**(17)External dimension**

44(W) × 29(H) × 88(D) mm

**(18)Weight**

Approx. 150g

**(19)Spectrum response characteristics**



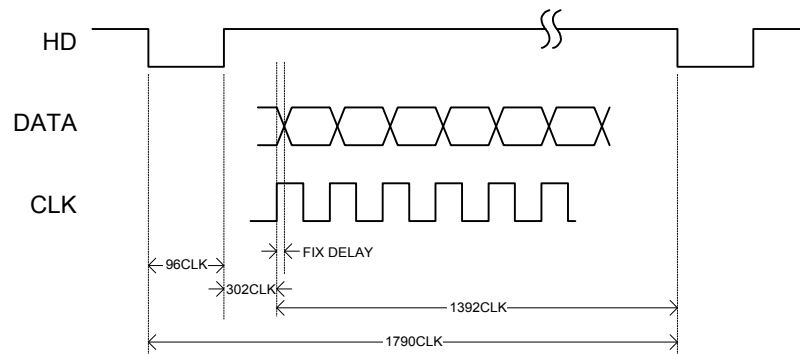
## 8. Timing chart

### (1) Digital output

TIA/EIA-644 (LVDS)

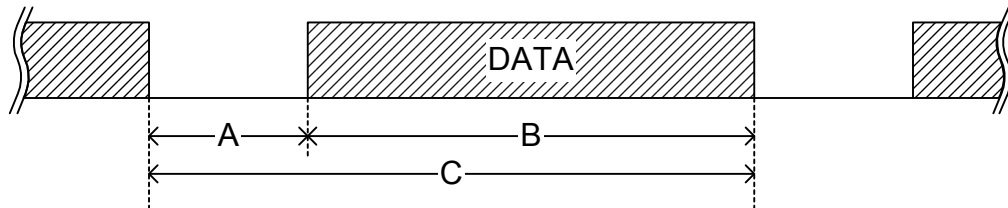
Driver output voltage :  $\pm 345\text{mV}$  (Difference output) /  $100\Omega$

#### H rate



Total clock counts : 1790 CLK / 1H  
 DATA counts : 1392 CLK / 1H  
 CLK : 69.8 ns

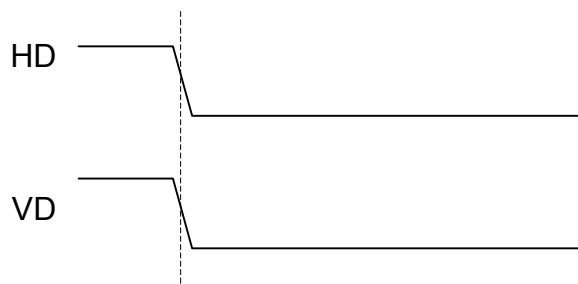
#### V rate



	7.62Hz All pixels data read-out mode (FINE)	30Hz High-speed draft mode (DRAFT)
A	9H	7H
B	1040H	260H
C	1049H = 7.62Hz	267H = 29.96Hz

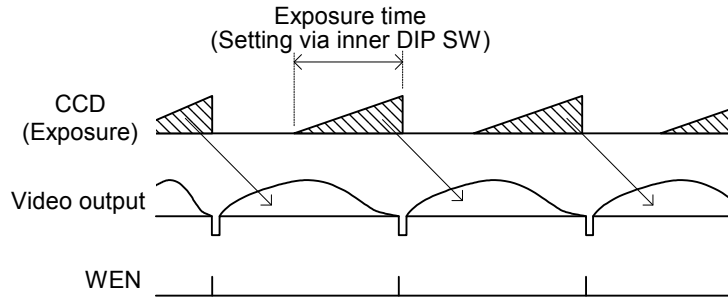
#### HD, VD output phase lag

No phase lag (Normal electronic shutter mode / Random trigger shutter mode)



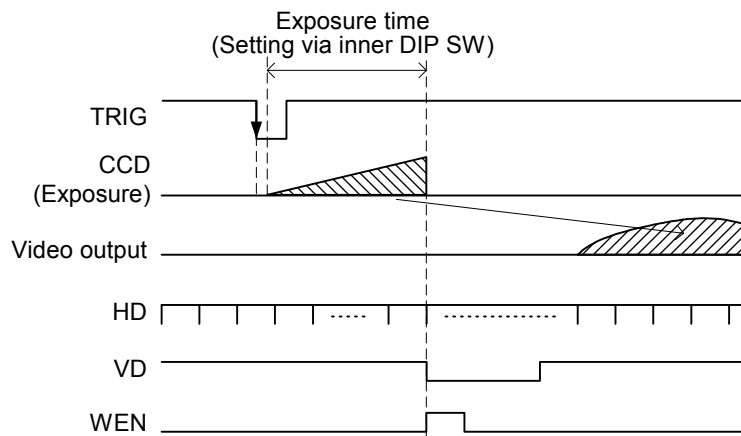
## (2) Video output timing

### Under normal operation (Electronic shutter)

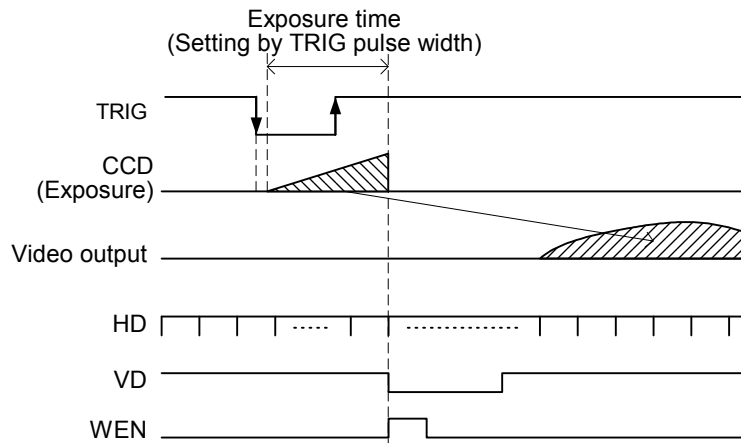


### Random trigger shutter mode

#### Fixed speed mode



#### Pulse mode



# 9. External-view Drawing

