

5. Specification

Model	CSB4000CL-10A	
Image sensor	CMOS Image sensor	
Total pixel	2048 (H) x 2048 (V)	
Active pixel	2008 (H) x 2047 (V)	
Pixel size	6.0 (H) x 6.0 (V) micro m	
Image area	12.048 x 12.282 mm	
Driving frequency	33.3333MHz	
Scanning line	2047 lines	
Scanning system	Progressive	
Flame rate	7.29 fps (Under Rolling shutter mode and all pixel's data read out mode)	
Sync system	Internal	
Aspect ratio	1:1	
Subject illumination	2000 lx, F4 (3100K)	(Exposure time: Approx. 16 ms)
Video output	Camera link (LVDS, 10bit, Pixel clock 33.3333MHz)	
S/N	47 dB (p-p) / rms	(Exposure time: Approx. 16 ms)
Control signal	Refer to COMMAND table	
Gamma	1.0 Fixed	
Electronic shutter	Shutter speed setting by any given timing through Camera Link communication command.	
Shutter mode	Global shutter / Rolling shutter	
Random Trigger Shutter	RTS operation is available by external trigger signal IN. Shutter speed preset or shutter speed control by pulse width is available. The exposure starts at shutter trigger rising edge and ends at shutter trigger falling edge under pulse width control for shutter speed.	
Power source	DC12V +/- 10% (Source ripple level 100mV(p-p) or less)	
Power consumption	Approx. 1.1W	
Ambient condition	Temperature: (Performance guaranteed) From 0 through 40 degrees Celsius (Operation guaranteed) From -10 through 50 degrees Celsius (Preservation) From -20 through 60 degrees Celsius Humidity: (Performance guaranteed) From 20 through 80 % (No condensing) (Operation guaranteed) From 20 through 80 % (No condensing) (Preservation) From 20 through 95 % or less (No condensing)	
Lens mount	C-mount TFL mount is also available by replacement of lens mount adapter. <u>In the use of the standard C-mount lens, a resolution and brightness on the periphery in the screen might be deteriorated, leading not to make full use of the capability of the camera's original performances. The use of TFL-mount lens or lens for line sensor is recommended for making full use of the capabilities of the performance.</u> <u>Please contact our sales person for your further detail.</u>	
Flange back	17.526 mm	
External dimension	54 (W) x 43 (H) x 59 (D) mm	(Without projection)
Weight	Approx. 160 g	
Electro-Magnetic Compatibility	(1) EMI(Electro-Magnetic Interference) EN50081-2(EN55011-A) adaptation (2) EMS(Electro-Magnetic Susceptibility) EN61000-6-2 adaptation	

* Please contact our sales person about interface specification.

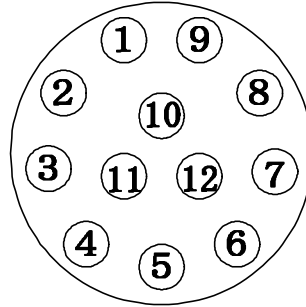
6. Connection

(1) DC IN

Connector (Camera side): HR10A-10R-12PB (Manufactured by HIROSE DENKI)

Plug (Cable side): HR10A-10P-12S (Manufactured by HIROSE DENKI)

Pin number	Signal name
1	GND
2	+12V
3	GND
4	N.C.
5	GND
6	N.C.
7	N.C.
8	GND
9	N.C.
10	N.C.
11	N.C.
12	GND



Rearview

(2) DATA IN/OUT

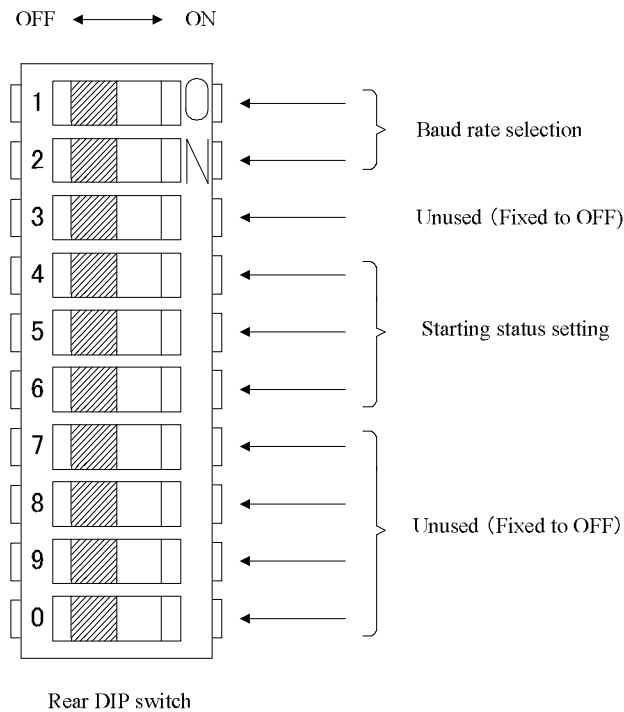
Connector (Camera side): 10226-2210VE (Manufactured by 3M)

Connector (Cable side): 10126-6000 (Manufactured by 3M)

PIN.	Signal Name	I/O	PIN.	Signal Name	I/O
1	GND		14	GND	
2	TX OUT 0-	OUT	15	TX OUT 0+	OUT
3	TX OUT 1-	OUT	16	TX OUT 1+	OUT
4	TX OUT 2-	OUT	17	TX OUT 2+	OUT
5	TX CLK OUT-	OUT	18	TX CLK OUT+	OUT
6	TX OUT 3-	OUT	19	TX OUT 3+	OUT
7	Ser TC(RxD)+	IN	20	Ser TC(RxD)-	IN
8	Ser TFG(TxD)-	OUT	21	Ser TFG(TxD)+	OUT
9	Trig-	IN	22	Trig+	IN
10	EXT AFR+	IN	23	EXT AFR-	IN
11	EXT SP-	IN	24	EXT SP+	IN
12	EXT VR +	IN	25	EXT VR -	IN
13	GND		26	GND	

7. DIP switch setting

The setting of each mode can be done with DIP switches located on the rear panel.



(1) Baud rate setting: Baud rate setting of camera IN /OUT

[1]	[2]	Baud rate
OFF	OFF	9600
ON	OFF	19200
OFF	ON	38400

(2) Starting status setting: Designate the memory page readout in starting up of a camera

[4]	[5]	[6]	Memory
OFF	OFF	OFF	0
ON	OFF	OFF	1
OFF	ON	OFF	2
ON	ON	OFF	3
OFF	OFF	ON	4
ON	OFF	ON	5
OFF	ON	ON	6
ON	ON	ON	7

8. Function

(1) Electronic shutter

The shutter-speed of CSB4000CL-10A is also manually adjustable. By manipulating the internal register setting value of CSB4000CL-10A, you can change the shutter-speed by user-defined setting value of 65.8 micro sec step.

- * The longer a user sets the exposure time, the more defective pixels on the image is outstanding. When you attach importance to image quality, it is recommendable to set the shutter speed at 30 msec or less.

(2) Random trigger shutter

Under the RTS mode, the camera can capture image at any user-defined timing with external trigger signal.

Under FIX mode, shutter speed can be set with the internal register setting value.

Under pulse mode, shutter speed can be set with the trigger pulse width.

You can change the polarity of trigger pulse with the internal register setting value.

- * Random trigger shutter function is available only under global shutter mode.

(3) Sub-sampling

Horizontal and vertical thinning-out reading is performed at every 1 line.

3 types of settings are available (1/2 horizontal only, 1/2 vertical only and 1/2 both).

This function can read out the full image at high speed while its resolution is deteriorated.

- * The combined use with WOI cannot be performed.

(4) Multi slope function

By changing a slope position with internal register setting value, you can set the sensitivity matching to the subject luminance.

Refer to the interface specifications for the details of the setting method separately.

(5) WOI (Window of interest)

Only user-defined area can be captured by designating of the horizontal and the vertical address.

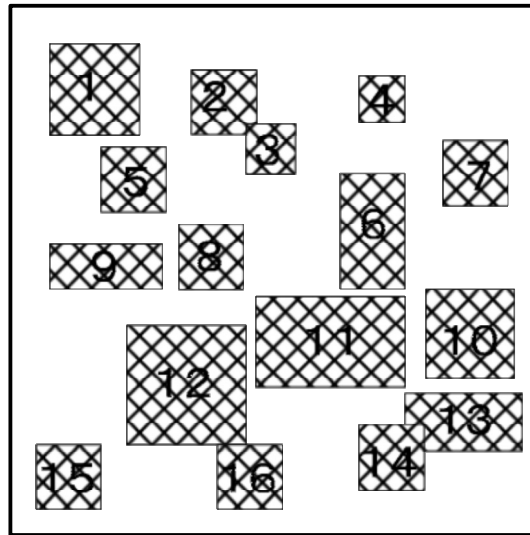
Up to 16 areas can be set in 1 screen.

This function can increase a frame rate because the area other than designated is not captured.

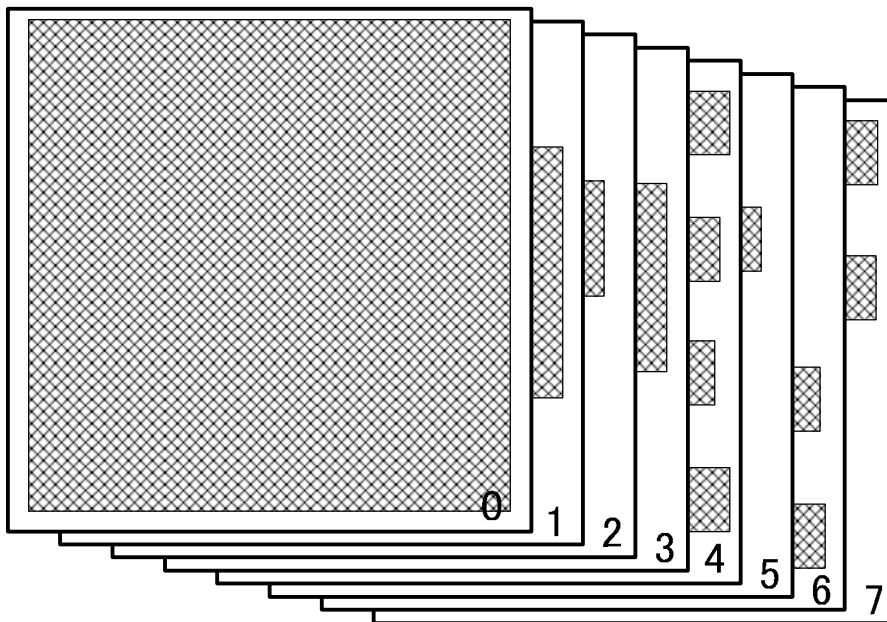
The minimum area size is 40 dot(H) x 1 dot(V).

Horizontal address can set up only even number.

The placement is available up to 16 windows in all active pixel area.

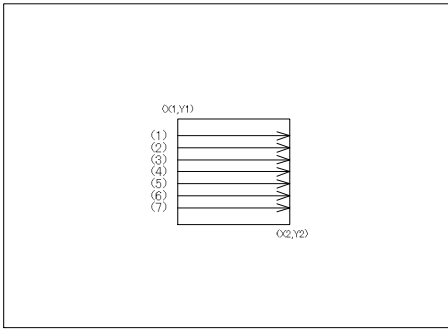


The setting of readout address is available up to 8 types.



User can reprogram all setting types from 0 through 7.

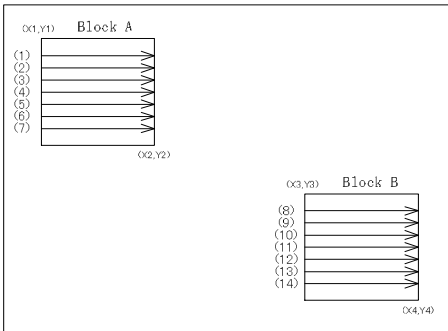
Practical operation example



In the case of only one readout area

A readout area can be designated by the start address (X1, Y1) and the end address (X2, Y2). The camera can read out the user-defined area through this function.

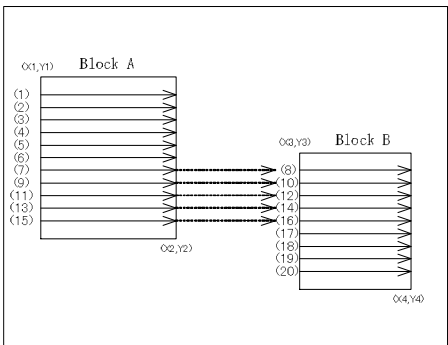
The each address is designated by the start address and lengths (pixel numbers) of “X” and “Y” directions.



In the case of more than two readout areas

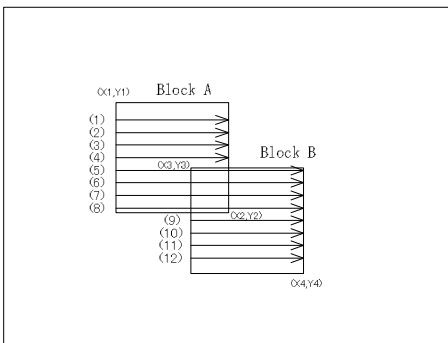
The area designated by the start address (X1, Y1) and the end address (X2, Y2) is read out first (block A in the left figure).

After reading out of block A, the next area designated by (X3, Y3) and (X4, Y4) is read out (block B in the left figure).



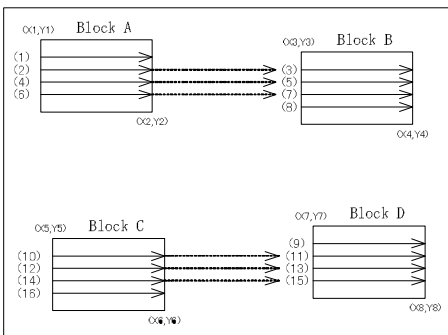
In the case of more than two readout areas which both comprise the same readout lines

The designated areas are read out in order of address from the start (X1, Y1) to the end (X4, Y4).



In the case of more than two readout areas overlapping each other

The designated areas are read out in order of address from the start (X1, Y1) to the end (X4, Y4).

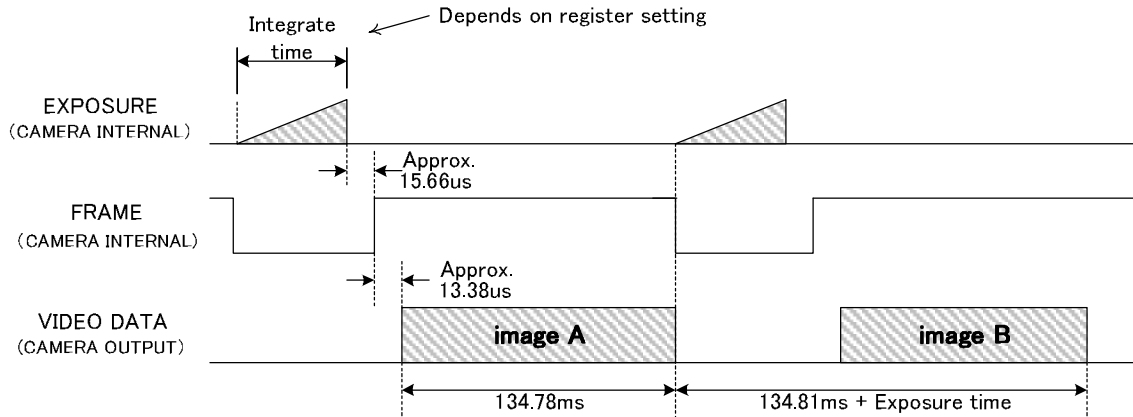


In the case of four readout areas

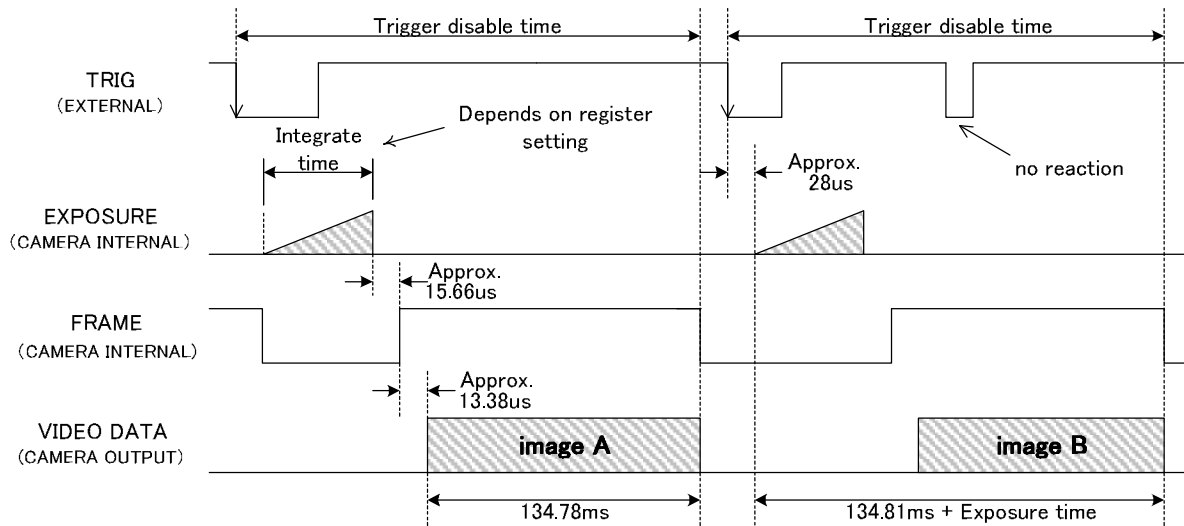
The designated areas are read out in order of address from start (X1, Y1) to the end (X8, Y8).

9. Timing Chart

(1) Normal shutter mode (in all pixel data readout)

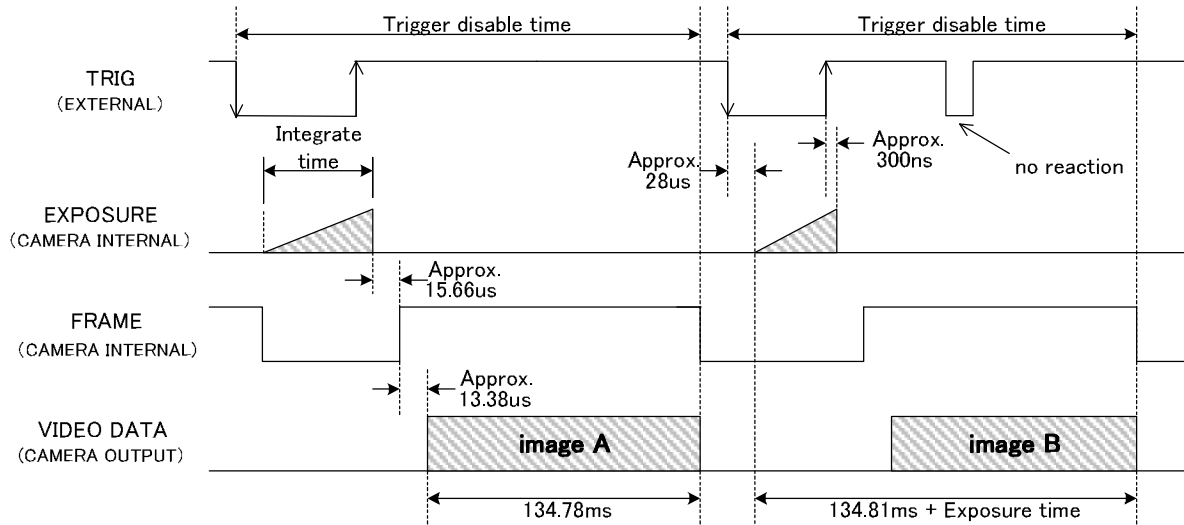


(2) Random Trigger Shutter mode (Fix mode)



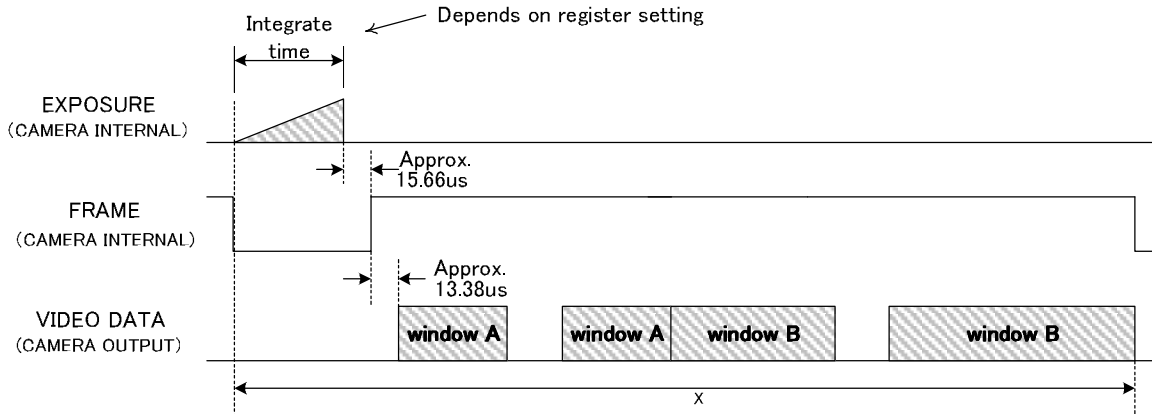
Shutter speed depends on the internal register setting value.
 After trigger IN, next trigger signal is not acceptable until the readout is completed.

(3) Random trigger shutter (pulse mode)



Shutter speed depends on the trigger pulse width.
 After trigger IN, next trigger signal is acceptable until the readout is completed.

(4) WOI (Window of interest)



10. COMMAND Table

Video level	Setup
Shutter	Shutter mode
	Shutter speed
Trigger	Polarity
	Enable/Disable
Multi slope	Knee point number
	Shutter speed of each slope
Window	Enable/Disable
	Starting coordinate
	Ending coordinate
Memory	Setting value readout
	Setting value storage
	Reset
Other	Video OUT bit width
	Sub Sampling
	Vendor name
	Model name