



Analog I/F
29mm Cubic XGA
Analog B/W Camera
VCC-G20X30B

Product Specification
& Operational Manual

CIS Corporation

Table of Contents

1. SCOPE OF APPLICATION	3
2. HANDLING PRECAUTIONS	3
3. PRODUCT OUTLINE.....	4
4. SPECIFICATION	5
4.1. GENERAL SPECIFICATION.....	5
4.2. CAMERA INPUT/OUTPUT SIGNAL SPECIFICATION	7
4.3. CCD SPECTRAL RESPONSE (REPRESENTATIVE VALUE).....	8
5. FUNCTION SETTINGS.....	9
6. EXTERNAL CONNECTOR PIN ASSIGNMENT	14
7. TIMING CHART	15
7.1. HORIZONTAL TIMING.....	15
7.2. VERTICAL TIMING.....	15
7.2.1. Full Frame Scan Mode	15
7.2.2. Binning Scan Mode.....	15
7.2.3. 1/2 Partial Scan Mode.....	16
7.2.4. 1/4 Partial Scan Mode.....	16
8. CCD OPTICAL ACCURACY.....	17
9. DIMENSIONS	18
10. CASES FOR INDEMNITY (LIMITED WARRANTY)	19
11. CCD PIXEL DEFECT	19
12. PRODUCT SUPPORT	19

1. Scope of Application

This is to describe VCC-G20X30B, XGA B/W CCD camera. All specifications contained herein are subject to change without prior notice. Reproduction in whole or in part is prohibited.

2. Handling Precautions

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 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°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.
- 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.
- The voltage ripple of camera power DC $+12\text{V}\pm 10\%$ shall be within $\pm 50\text{mV}$. Improper power supply voltage may cause noises on the video signals.

In case of abnormal operation, contact the distributor from whom you purchased the product.

3. Product Outline

VCC-G20X30B is a high-resolution industrial B/W camera module utilizing a 1/3-inch PS IT CCD. 800K pixels CCD image sensor with on-chip micro-lenses realizes high sensitivity and high resolution.

Key Features

- HD/VD sync input or Trigger input are valid.
- 1/60s ~ 1/10,000s , 8 steps fixed shutter speed can be set by rear switch.
9 μ s ~ 250ms shutter speed can be set by pulse width trigger shutter mode.
- Restart Rest mode to enable long time exposure can be set.
- Full Frame Scan Mode and Binning Scan Mode available.
- 1/2 Partial scan mode, 1/4 Partial scan mode are available.
- Frame rates can be changed by the input level to 9pins circular connector at rear.
- Only 29mm cubic in size (excluding projection), light weight 45g, and speed makes it a best match for use in embedded systems.

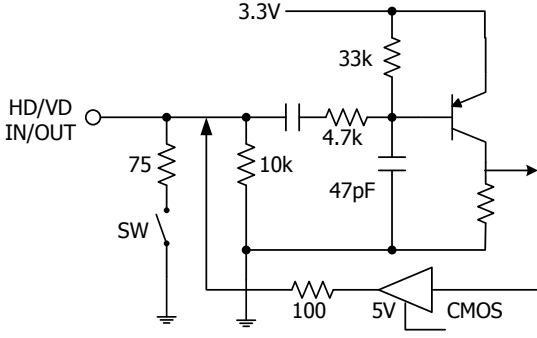
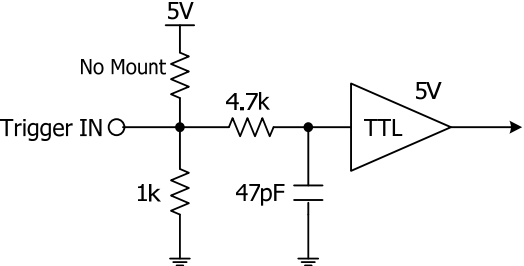
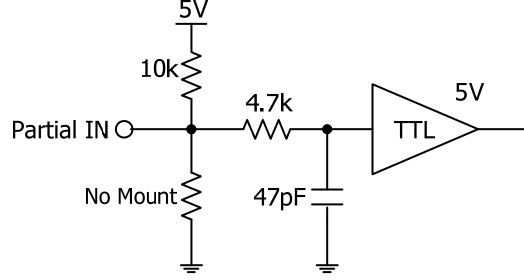
4. Specification

4.1. General Specification

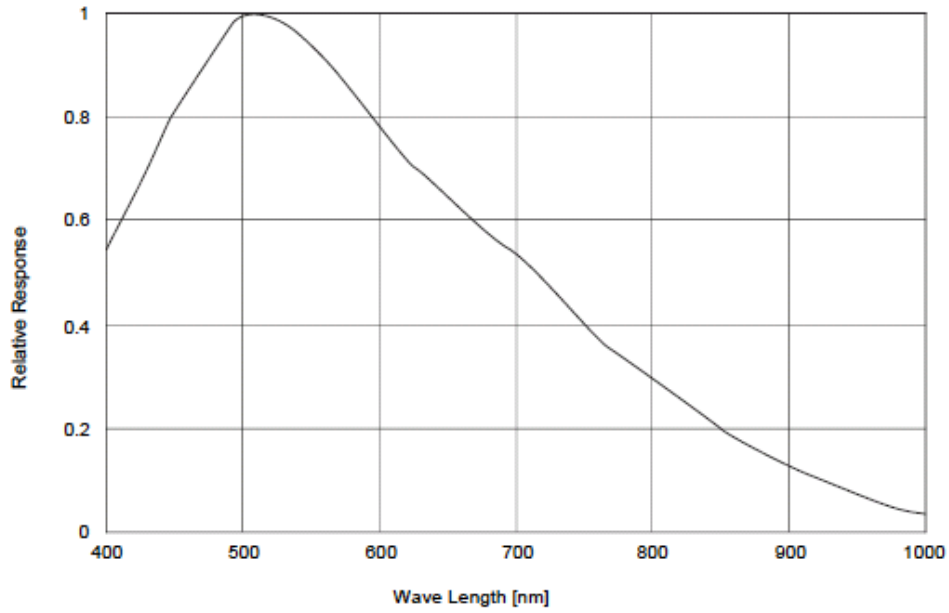
Item	Specification			
Pickup device	Device Type	1/3" Interline Transfer B/W CCD, Sony ICX204AL		
	Effective Pixel Number	1034(H) × 779(V)		
	Unit Cell Size	4.65μm(H) × 4.65μm(V)		
	Chip Size	5.80mm(H) × 4.92mm(V)		
Video output frequency	Pixel Clock	30 MHz		
	Horizontal Frequency	23.622 kHz	Pixel Clock 1270CLK	
	Vertical Frequency	Full Frame Scan Mode		
		Scanning lines	796 H	29.68 Hz
		Binning Scan Mode		
		Scanning lines	398 H	59.35 Hz
	1/2 Partial Scan Mode			
		Scanning lines	398 H	59.35 Hz
1/4 Partial Scan Mode				
	Scanning lines	199 H	118.7 Hz	
Sync. system	Internal sync & HD/VD external sync (Internal/External recognized automatically)			
Video output standard	Analog VS output			
Resolution	768 TV lines			
Sensitivity	F5.6 400 lx (Shutter speed 1/30s, Gain 0dB, 3200K)			
Minimum illumination	F1.4 1.5 lx (Shutter speed 1/30s, max Gain VS 50IRE)			
S/N ratio	52dB			
Dust or stains in optical system	No dust or stain shall be detected on the testing screen with setting the camera aperture at F16.			
Power requirements	DC +12V ± 10%			
Power consumption	1.4 W typ (max. 1.7W) at DC +12V IN			
Dimension	Refer to overall dimension drawing (Clause 9) 29mm x 29mm x 29mm (excluding projection)			
Mass	Approx. 45 g			
Lens mount	C mount (Refer to overall dimension drawing)			
Optical axis accuracy	Refer to drawing for CCD Optical Axis Accuracy (Clause 8)			
Gain variable range	0~12dB (over guaranteed value)			
Gamma	1 (fixed)			

Item	Specification		
Shutter speed variable range	<Normal Shutter Mode> OFF(1/30), 1/125, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000s <Trigger Shutter Mode> OFF(1/60), 1/125, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000s Pulse Width: 9μ~250ms		
Shutter Mode	Normal Shutter Mode, Restart/Reset Mode, Fixed Trigger Shutter Mode, and Pulse Width Trigger Shutter Mode		
Safety/Quality standards	UL: Conform to UL Standard including materials and others. RoHS: Conform to RoHS CE: Conform to EN55022:2010 (Class B) for Emission Conform to EN61000-6-2:2005 for Immunity To be applied 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.		
Durability	Vibration	Acceleration	98 m/s ² (10.0G)
		Frequency	20~200 Hz
		Direction	XYZ 3 directions
		Testing time	120 min for each direction
	Shock	No malfunction shall be occurred with 980m/s ² (100G) for ±X, ±Y, ±Z, 6 directions. (without package)	
Operation environment	Temperature	Operation guaranteed: -5°C~+45°C Performance guaranteed: 0°C~+40°C	
	Humidity	RH 20~80% with no condensation	
Storage environment	Temperature	-25°C ~ +60°C	
	Humidity	RH 20~80% with no condensation	

4.2. Camera Input/Output Signal Specification

Item	Specification
Video output	Effective output: 1024(H) × at full frame scan mode 768(V)
Sync signals Input /Output	Input signal level: 2~5Vp-p TTL Input Input impedance: 10kΩ/75Ω (Refer to the below, SW selection) Allowable frequency deviation: 28 ~ 31MHz Phase difference: HD/VD: under 0±5μs Jitter: under 20ns 
Trigger input	Polarity: Positive Input signal level: Low 0.5V (max), High 2.5~5V Input impedance: 1 kΩ Trigger input width: 4μs ~ 250ms 
Partial Input	Input signal level: Low 0.5V (max) High 2.5~5V Input impedance: 10kΩ (Pull Up) 
Video signal	VS output 1.0V (p-p), Sync. Negative, 75Ω unbalanced White clip level: 820 ± 70 mVp-p Setup level: 20 ± 15 mVp-p (Gain 0dB) SYNC level: 290 ± 50 mVp-p

4.3. CCD Spectral Response (Representative Value)



5. Function Settings

1	●		ES2	} ◇Shutter speed 8 steps OFF(1/30) or 1/60 ~ 1/10000s Trigger pulse width : 9µs ~ 250ms
2	●		ES1	
3	●		ES0	
4	●		Binning	◇Binning Scan mode ON/OFF
5	●		Mode2	} ◇Shutter mode Normal Shutter mode, Restart Reset mode, and Trigger Shutter mode
6	●		Mode1	
7	●		Mode0	
8	●		75ohm	◇HD/VD Input impedance 10kΩ/75Ω
9	●		Partial	◇Partial Scan mode ON/OFF
10		●	IN/OUT	◇HD/VD Input/Output

↑
OFF
● indicates initial setting.

Shutter speed settings

ES2	ES1	ES0	Shutter speed	Actual Time	
				Normal Shutter mode	Trigger Shutter mode
SW1	SW2	SW3			
OFF	OFF	OFF	OFF(1/30s) Or 1/60s	33.3 ms	17.0 ms
OFF	OFF	ON	1/125 s	8.0 ms	8.1 ms
OFF	ON	OFF	1/250 s	4.0 ms	4.1 ms
OFF	ON	ON	1/500 s	2.0 ms	2.0 ms
ON	OFF	OFF	1/1000 s	996µs	1.0 ms
ON	OFF	ON	1/2000 s	489µs	505µs
ON	ON	OFF	1/4000 s	236µs	248µs
ON	ON	ON	1/10000 s	110µs	118µs

※ At trigger shutter mode, shutter speed can be set by triggerpulse width.

■ Indicates initial setting position.

Shutter mode settings

Mode2	Mode1	Mode0	Setting mode
SW5	SW6	SW7	
OFF	OFF	OFF	Normal shutter mode
OFF	ON	ON	Restart reset mode
ON	OFF	OFF	Fixed trigger shutter mode (SYNC reset mode)
ON	OFF	ON	Fixed trigger shutter mode (SYNC non reset mode)
ON	ON	OFF	Pulse width trigger shutter mode (SYNC reset mode)
ON	ON	ON	Pulse width trigger shutter mode (SYNC non reset mode)

※ Do not set other than the above settings.

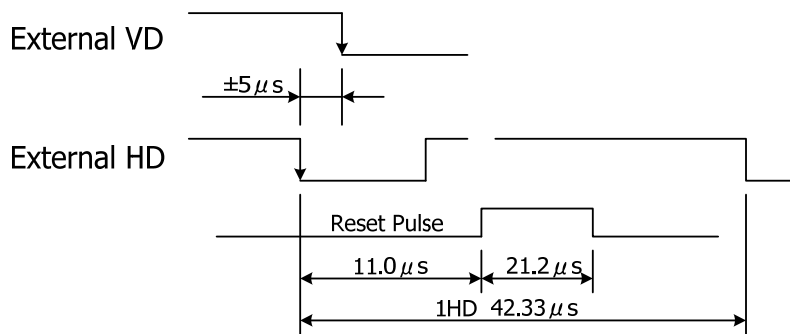
■ Indicates initial setting position.

Table of Settings

Operational mode	Normal Shutter mode	Restart Reset mode	Fixed & Pulse width trigger shutter mode (SYNC reset)	Fixed & Pulse width trigger shutter mode (SYNC non reset)
Function				
Shutter speed set by fixed switch.	○	×	○	○
Shutter speed set by trigger pulse width.	×	×	○	○
Full frame scan mode	○	○	○	○
Binning scan mode	○	○	○	○
1/2, 1/4 partial scan mode	○	○	○	○
HD/VD Input	○	○	○HD	○
HD/VD Output	○	×	○	×

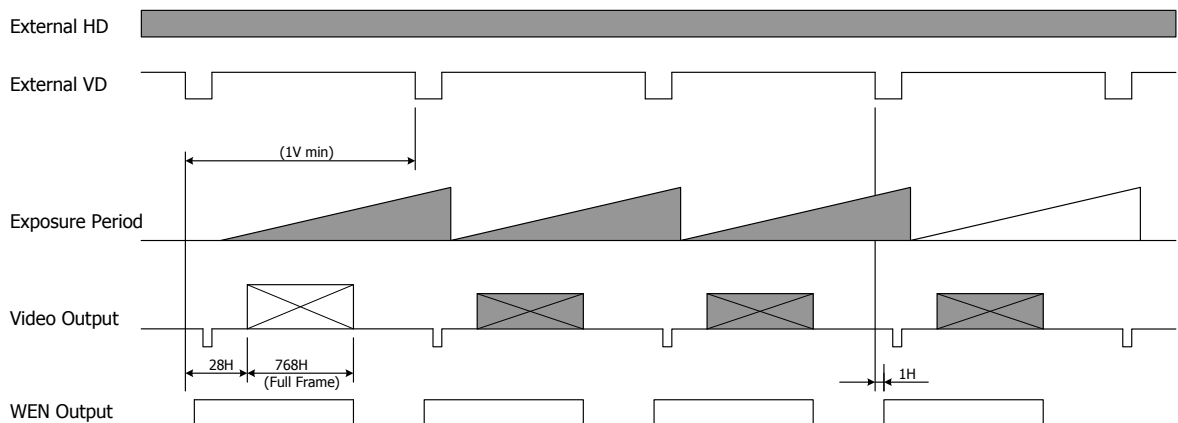
Normal Shutter Mode

Video outputs are read out consecutively. With shutter function, clear image of the rapidly moving object can be captured. When adding external sync input, please follow the external HD/VD input conditions shown below.



Restart-Reset Mode

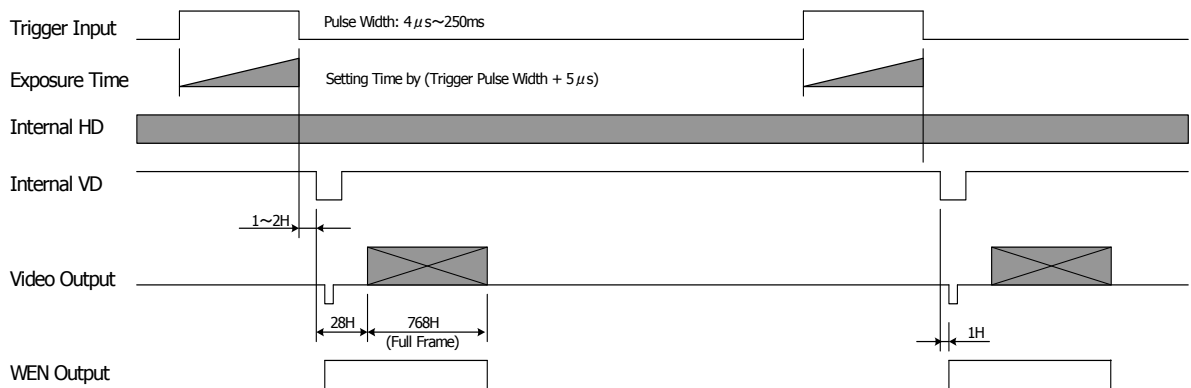
With adding EXT VD input at random timing with over 1 VD, and adding external HD input, data for one screen image is read out. This function is useful when sensitivity with regular exposure time is not sufficient or when indicating the locus of moving object.



Fixed & Pulse Width Trigger Shutter Mode (Sync Reset Mode)

After completion of exposure, internal VD signals are reset and the video will be output 1~2H later. Internal VD, Composit SYNC, and WEN are output as one-to-one correspondence to the trigger input so that images can be captured by any of those output signals. Generally, HD/VD sync signals are unnecessary but with external HD signals input, the signals can be synchronized with internal HD.

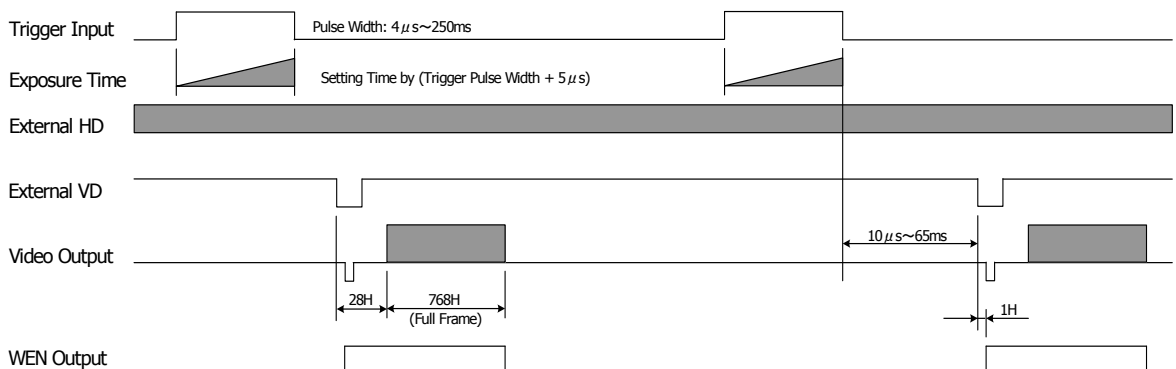
Exposure time =
 Set value by switch SW1 ~ SW3: 1/60 ~ 1/10000s
 Set value by trigger pulse width: 9 μs ~ 250ms (Actual time = trigger pulse width + 5 μs)



Fixed & Pulse Width Trigger Shutter Mode (Sync Non-Reset Mode)

After completion of exposure, with single external VD input, video can be output from that position. The single external VD shall be input during the period from 10 μs ~ 65ms after completion of exposure time. External VD input, Composite SYNC output, and WEN output are one-to-one correspondence so that images can be captured with any signals.

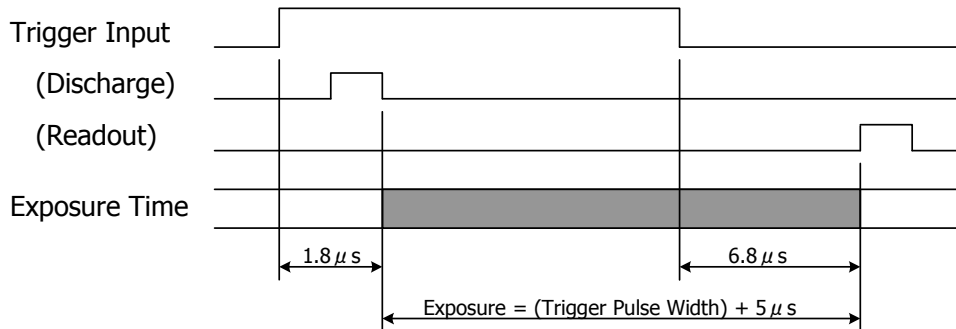
Exposure time =
 Set value by switch SW1 ~ SW3: 1/60 ~ 1/10000s
 Set value by trigger pulse width: 9 μs ~ 250ms (Actual time = trigger pulse width + 5 μs)



Caution 1: When the next trigger is input before the completion of video signals output for the prior trigger, the images could be improper.

Caution 2: Smear or blooming could occur when strong incident light is extensively illuminated, with setting the electric shutter at high speed. To avoid this smear or blooming, lower the volume of incident light or use a stroboscopic light source to control the light volume.

Caution 3: Please refer to the exposure timing chart below for the actual timing to start exposure after adding trigger input, and for the actual timing to complete exposure at pulse width trigger shutter operation.



Scan Mode Settings

Scan 1	Scan 0	Setting Mode
SW9	SW4	
OFF	OFF	Full Frame Scan Mode
OFF	ON	Binning Scan Mode
ON	OFF	1/2 Partial Scan Mode
ON	ON	1/4 Partial Scan Mode

Scan modes chart

Scan Mode	Frame (fps)	Scanning lines (Lines)	Blanking Lines (Lines)	Video output lines (Lines)
Full Frame Scan Mode	29.68	796	28	768
Binning Scan Mode	59.35	398	208	370
1/2 Partial Scan Mode	59.35	398	33	348
1/4 Partial Scan Mode	118.7	199	38	136

Changing the scan settings

Scan settings shall be changed basically by the settings of camera switch SW9 and SW4 at rear, but it can be also changed by the input level of No. 9pins of the circular connector.

However, please be noted that SW9 switch at rear and No.9pins (Partial IN) of the 12pins circular connector are in common spec and either one shall be used. Please refer to the below for the truth value.

High Level (2.5~5V) SW9: OFF and Partial IN: 'H'		Low Level (Max 0.5V) SW9: ON or Partial IN: 'L'
At SW4 OFF		
Full Frame Scan Mode	↔	1/2 Partial Scan Mode
At SW4 ON		
Binning Scan Mode	↔	1/4 Partial Scan Mode

Changing 75ohm HD/VD input impedance

SW8 OFF HD/VD input impedance 10k Ω
 ON HD/VD input impedance 75 Ω

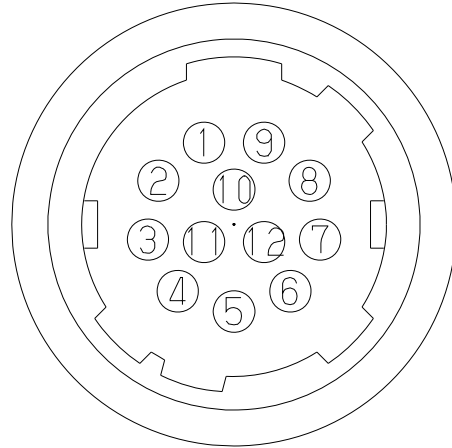
Changing HD/VD input and output

SW10 OFF HD/VD output
 ON HD/VD input (Internal/External sync is recognized automatically.)
 Indicates the factory setting position

6. External Connector Pin Assignment

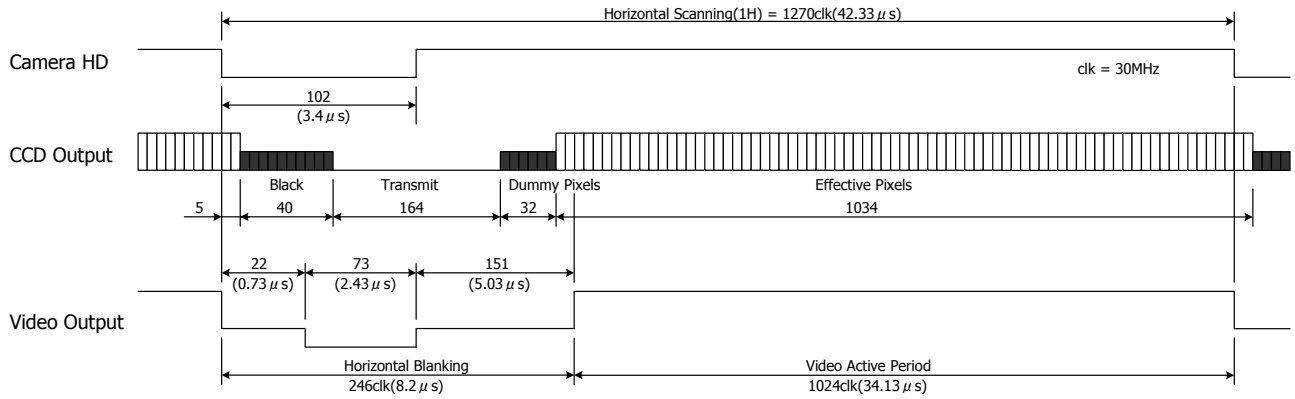
12pins Circular Connector SNH-10-12(RPCB) (SAMWOO)

Pin No.	
1	GND
2	Power IN +12V
3	GND
4	Video Out
5	GND
6	HD In/Out
7	VD In/Out
8	GND
9	Partial IN
10	WEN Out
11	Trigger In
12	GND



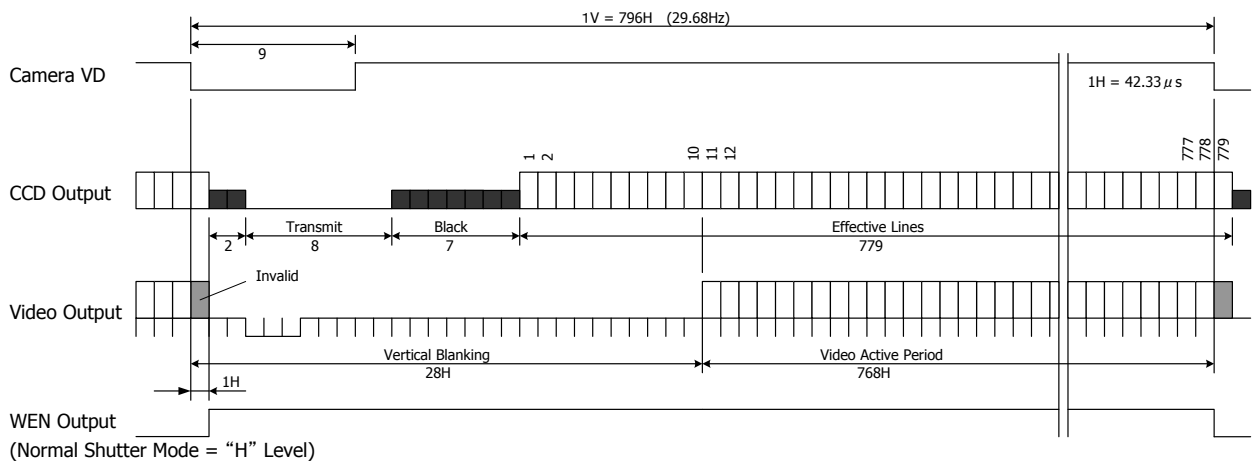
7. Timing Chart

7.1. Horizontal Timing

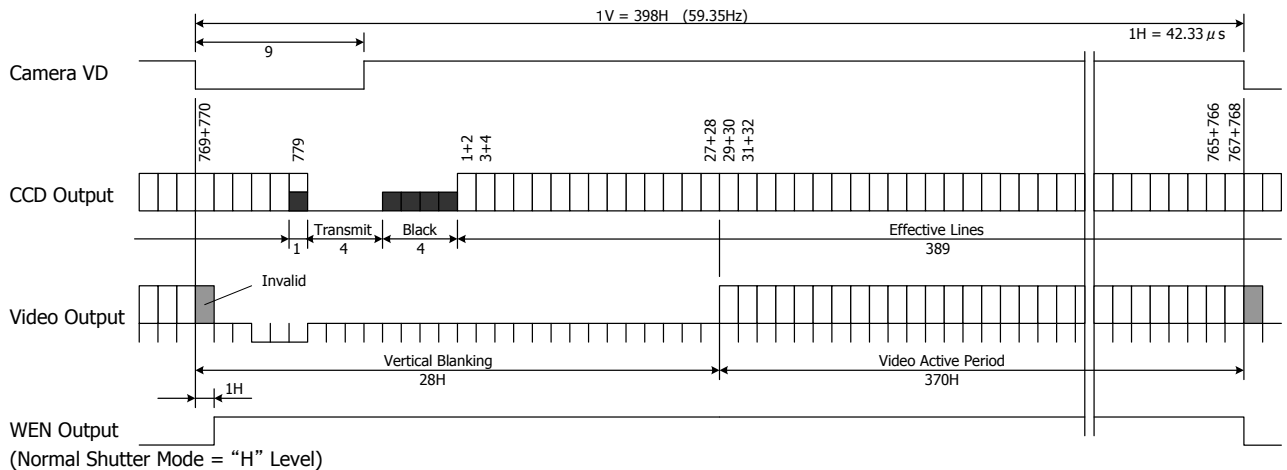


7.2. Vertical Timing

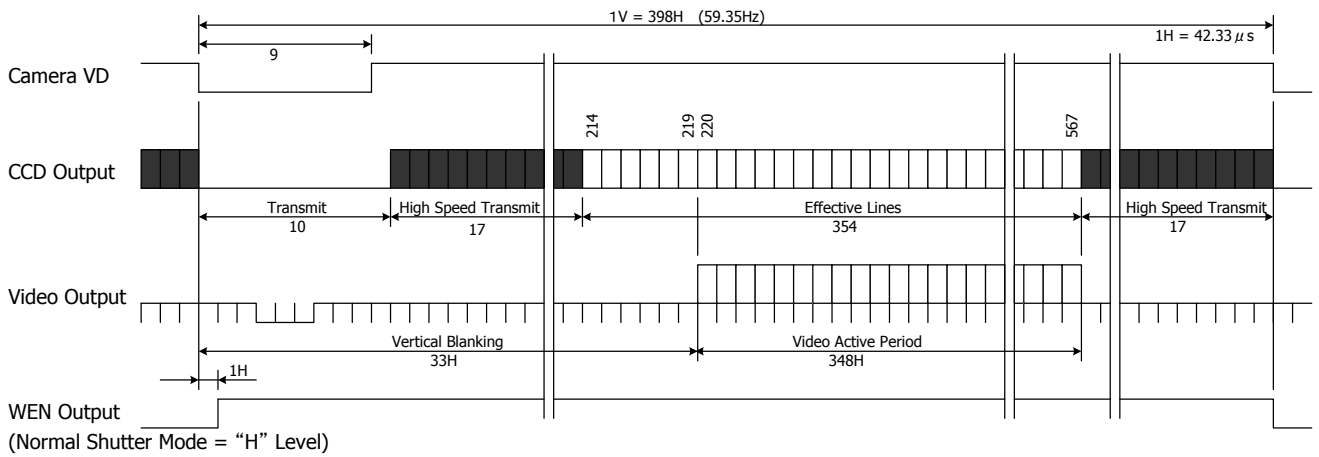
7.2.1. Full Frame Scan Mode



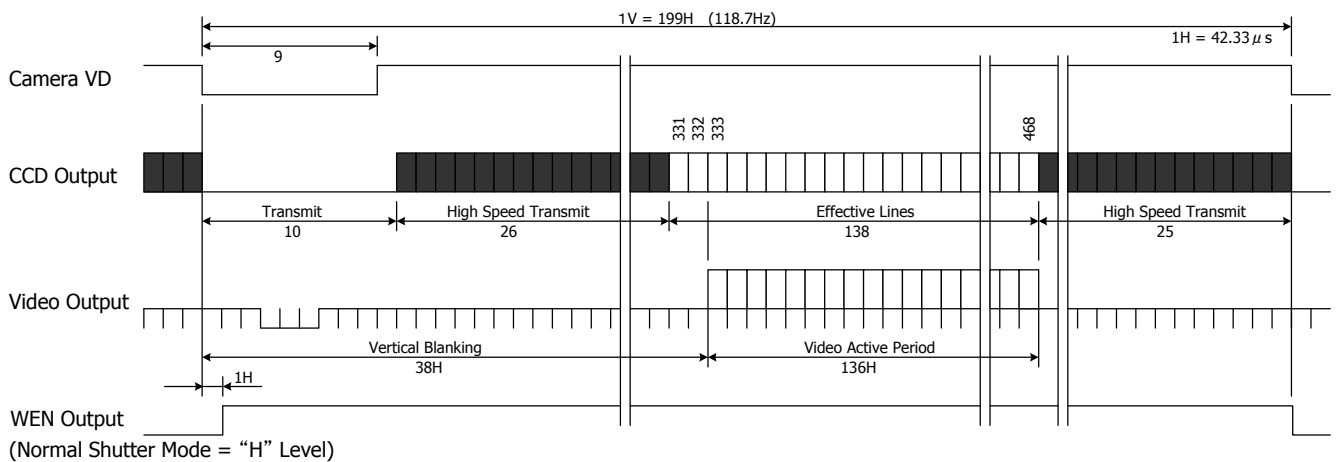
7.2.2. Binning Scan Mode



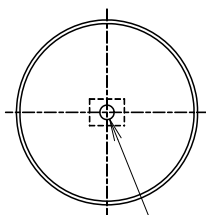
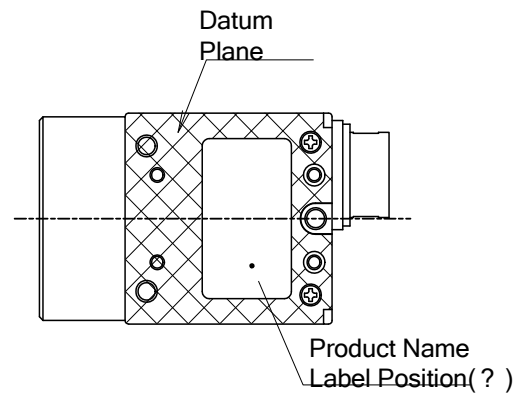
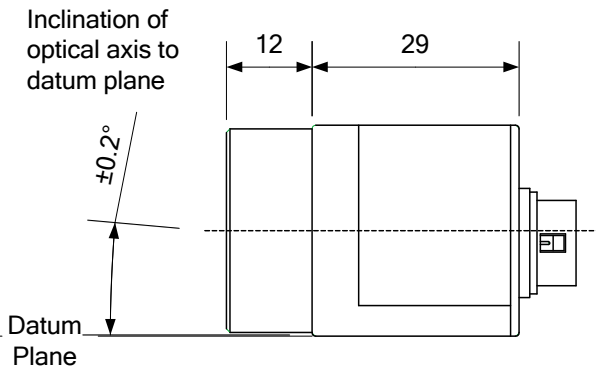
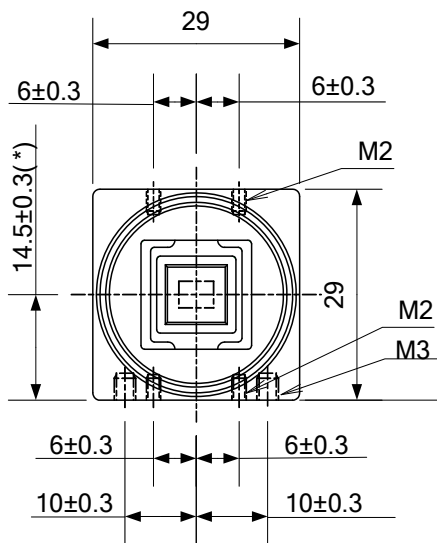
7.2.3. 1/2 Partial Scan Mode



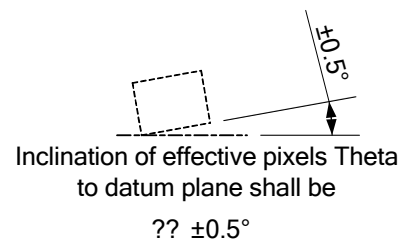
7.2.4. 1/4 Partial Scan Mode



8. CCD Optical Accuracy



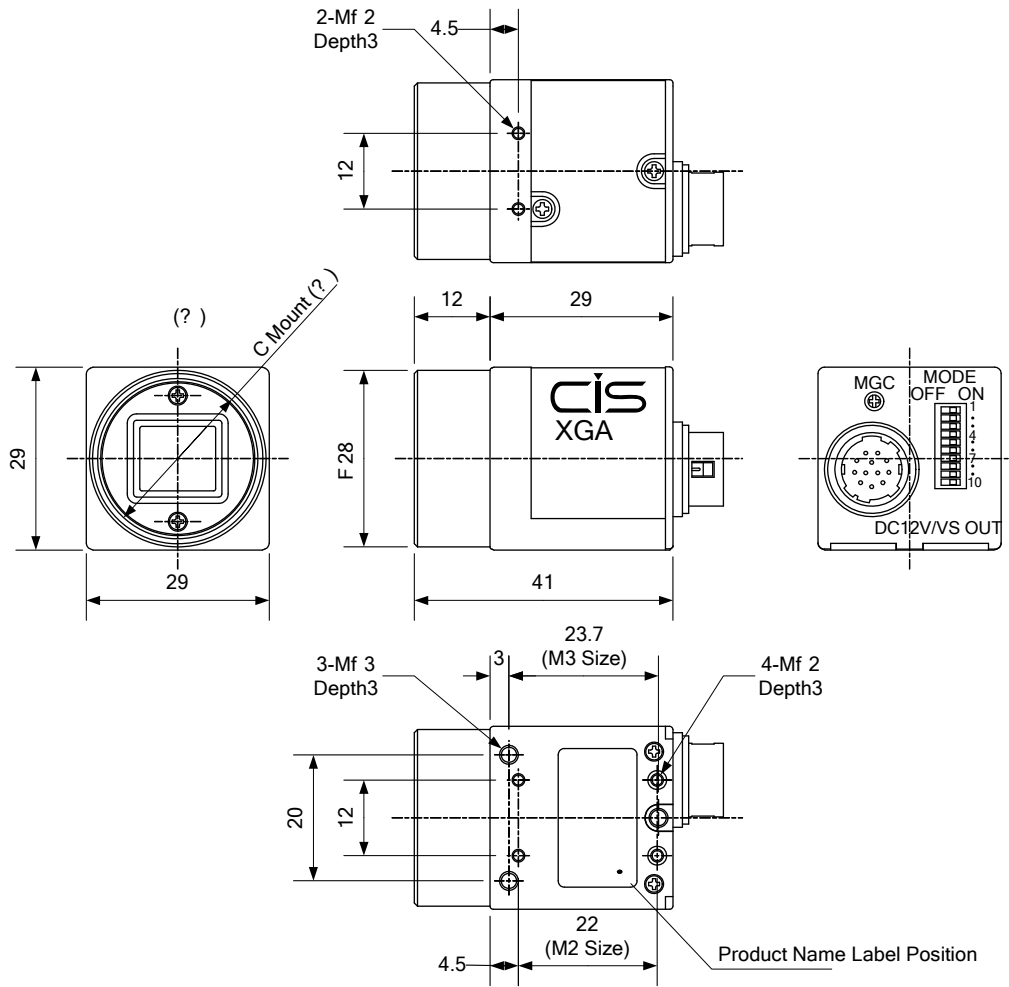
The center of effective pixels shall be within ± 0.6 to the center of lens mount.



(*) Dimension from datum plane to the center of lens mount.

910-015-00-00
(Unit : mm)

9. Dimensions



? : C mount screws comply with ANSI/ASME B1.1, 1-32UN (2B).

? : Screw length from C mount lens surface shall be under 6mm and the protruding portion shall be less than 10mm.

999-534-00-00

(Unit:mm)

10. 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.

11. CCD Pixel Defect

After delivery, on the rare occasion, CCD pixel defects might be noted with time of usage of the products. The cause of the CCD pixel defects is the characteristic phenomenon of CCD itself and CIS shall be exempted from taking responsibility on it.

12. Product Support

When defects or malfunction of our products occur, and if you would like us to investigate on the cause and repair, please contact your distributors you purchased from to consult and coordinate.