VISION:elite™

5M Pixel B/W Gig-E Camera

VCC-G60FV11GE

Product Specification
& Operational Manual

CIS Corporation

Table of Contents

1. Scope of Application

This is to describe VCC-G60FV11GE, 5M pixels Gig-E 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℃ to +40℃)
    - 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.
- The voltage ripple of camera power DC +12V±10% shall be within ±50mV.   Improper power supply voltage may cause noises on the video signals.
- The rising time of camera power supply voltage shall be less than +10V, Max 60ms.   Please avoide noises like chattering when rising.

● 2ch output, separated into right and left, CCD is utilized for VCC-G60FV11GE.   Image signals for right half screen and left half screen are output via each independent circuit.   Therefore, differences between right screen and left screen could be seen depending on the usage conditions (shooting conditions /temeperature conditions and so on).   CIS trys its best to adjust this differences but please be noted it would not be perfect.
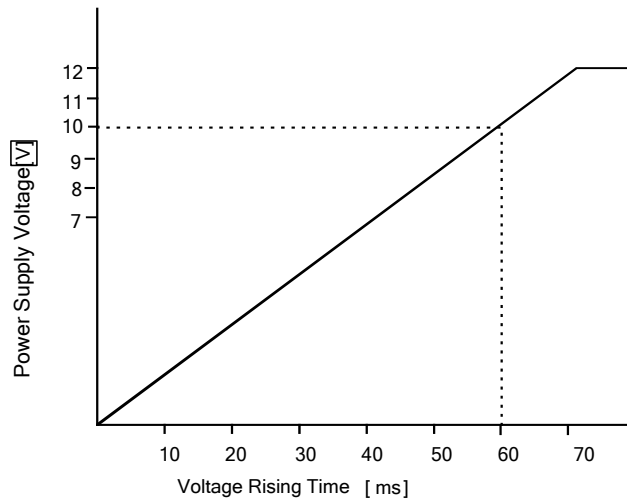
In case of abnormal operation, contact the distributor from whom you purchased the product.

3.   Product Outline

VCC-G60FV11GE is a Gigabit Ethernet interfaced, high-resolution industrial black and white video camera module utilizing a 2/3 type PS IT CCD.   5M pixels CCD image sensor with on-chip micro-lenses realizes high sensitivity and high resolution.   At Full Frame Scan Mode, entire pixels can be read out within approx. 1/15s.

Features
☐   High speed communication, maximum 108MB/s.   (Comform to 1000BASE-T)
☐   The maximum transmission distance is approx. 100m with cable more than CAT5e.
☐   Camera settings can be set via LAN.
☐   Software trigger input via LAN or hardware trigger input via 12pin connector at rear is selectable.
☐   Shutter speed can be set from 1/15sec ～ 1/30,000sec by 1H.
☐   At partial scan mode, both capturing start position and capturing width can be set by 3H.

Bundled Items
☐   Camera
☐   iPORT Software Development Kit 2.4.1 build 921. ※
☐   Gig-E Camera Control Software (CamCtlSetup.exe). ※
☐   Start up manual ※
※   Please ask for the details or download it from our web.
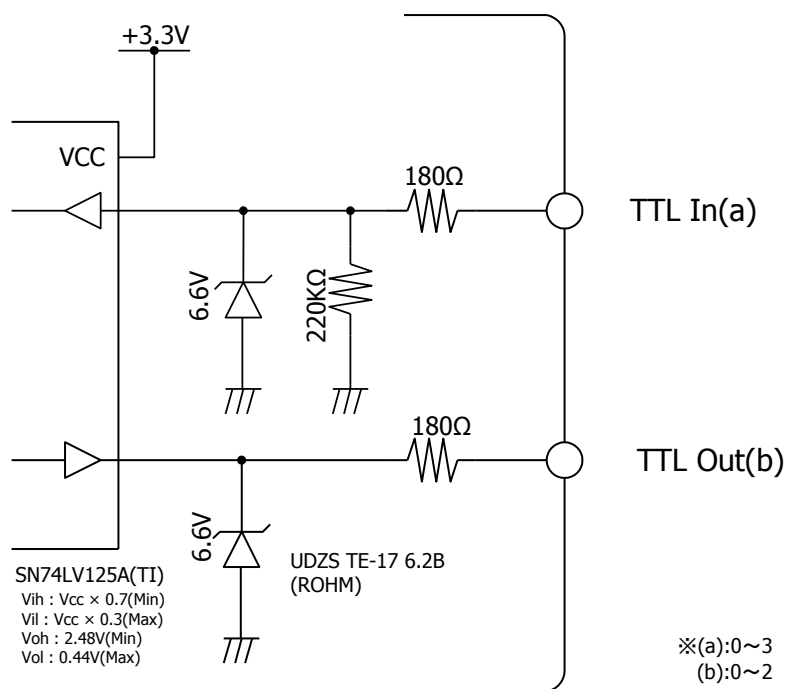
4. Specification

4.1. General Specification

Item		Specification
Pickup device	Device Type	2/3 type Interline Transfer B/W CCD, Sony ICX625ALA
	Effective Pixel Number	2456 (H) x 2058 (V)
	Unit Cell Size	3.45 μ m (H) x 3.45 μ m (V)
	Chip Size	9.93mm (H) x 8.70mm (V)
Videooutput frequency	Pixel Clock	60 MHz
	Horizontal Frequency	31.185 KHz Pixel Clock: 1924CLK
	Vertical Frequency	Full Frame Scan Mode: 2079 lines, approx 15.000Hz
Sync. system	Internal Sync. System	
Video output standard	Gigabit Ethernet (Comform to 1000BASE-T) Trasferring speed: 108MB/s (max)	
Resolution	2058 TV lines	
Resolving power	8bit / 10bit (Note; Real time output is invalid at 10 bit output.)	
Sensitivity	F 5.6 400 lx (Shutter speed 1/15s, Gain 0dB)	
Minimum illumination	F 1.4 1 lx (Shutter speed 1/15s, Gain Max +18dB)	
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 $\pm$ 10% (Max voltage not to exceed +15V)	
Power consumption	5.8 W (At DC +12V IN, normal mode, and full frame scan mode) 6.0W (At DC +12V IN, normal mode, and partial scan mode)	
Dimension	Refer to overall dimension drawing (Clause 12) 55mm x 55mm x 60mm (excluding projection)	
Mass	Approx. 190 g	
Lens mount	C mount (Refer to overall dimension drawing)	
Optical axis accuracy	Refer to drawing for CCD Optical Axis Accuracy (Clause 11)	
Gain variable range	0～+12dB (Analog Gain; over 0dB～+6dB, Digital Gain; 0dB～+6dB)	
Shutter speed variable range	1/15s (Off) ～1/30000s	
Trigger shutter mode	・Standard Trigger Mode ・Pulse Width Trigger Mode	

Item	Specification		
Safety/Quality standards	UL: Conform to UL Standard including materials and others. RoHS: Conform to RoHS CE: EN 55022:2006 (Class A) for Emission EN 61000-6-2:2005 for Immunity FCC: 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 mulfunction shall be occurred with 980m/s^2 (100G) for ±X, ±Y, and ±Z, 6 directions. (without package)	
Operation environment	Temperature	Performance guaranteed temperature: 0℃～+40℃ Camera operation guaranteed temeprature: -5℃～+45℃ ※ All the specifications specified in this manual is guaranteed under performance guaranteed temperature. ※All the camera functions operate normally under operation guaranteed temperature	
	Humidity	RH 20～80% with no condensation	
Storage environment	Temperature	-25℃ ～ +60℃	
	Humidity	RH 20～80% with no condensation	
Recommended System	LAN Card	Intel PRO/1000 series	
	LAN Cable	MOD-YSP-A1AS-SP series (Honda Tsushin Kogyo)	
		MV series (CEI)	
	OS	Windows XP, Windows VISTA	
	Memory	Over 512 MB (over 1GB recommeded)	

4.2. Camera Output Signal Specification

Item		Specification	
Video output data	Video out	2456 (H) x 2058 (V)	At Full Frame Scan Mode
		60MHz 2Tap output	
Sync. Signal I/O	LVAL output	LVTTL (3.3V Output)	HR10-10R-12PA
	FVAL output	LVTTL (3.3V Output)	※ Output pin assignment is set via iPort SDK. Please refer to our VCC-G60/F60 GE series startup manual, section 5.7. Trigger Mode.
	DVAL output	LVTTL (3.3V Output)	
	SP (Exposure Signal)	LVTTL (3.3V Output)	
Trigger input	Polarity	POSI/NEGA Selectable	
	Trigger Pulse width	Min. over 2 HD ～ Max. under 4158 HD	
	Hardware Trigger input	LVTTL (5.0V Tolerant)	HR10-10R-12PA
	Software Trigger input	RJ-45	
Video output signal	White Clip Level	Digital 8bit	: FFh
	Setup Level	Digital 8bit	: 08h±04h
	Dark Shading	Digital 8bit	: Under 08h for both horizontal and vertical (Conditions: Gain 0dB)
	Leval differences between right and left	Digital 8 bit	: Under 03h (Conditions: Gain 0dB)

※   5 secounds shall be waited after turning on power to get proper camera operation.

+3.3V

VCC

180Ω

TTL In(a)

6.6V   220KΩ

180Ω

TTL Out(b)

6.6V

SN74LV125A(TI)
Vih : Vcc × 0.7(Min)
Vil : Vcc × 0.3(Max)
Voh : 2.48V(Min)
Vol : 0.44V(Max)

UDZS TE-17 6.2B
(ROHM)

※(a):0～3
   (b):0～2
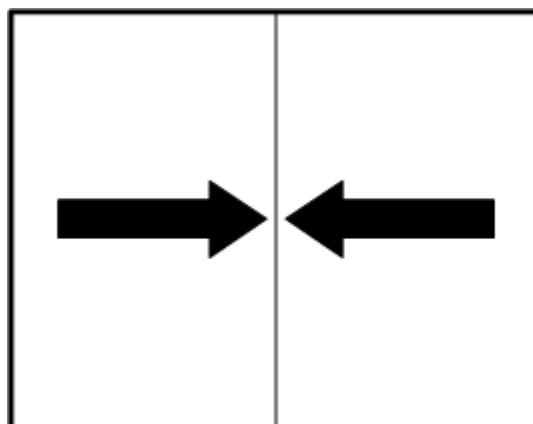
12 pins circular connector at rear GPIO interface

4.3. CCD Spectral Response (Representative Value)

※ Lens charcteristics and luminous source charcteristics are not considered.
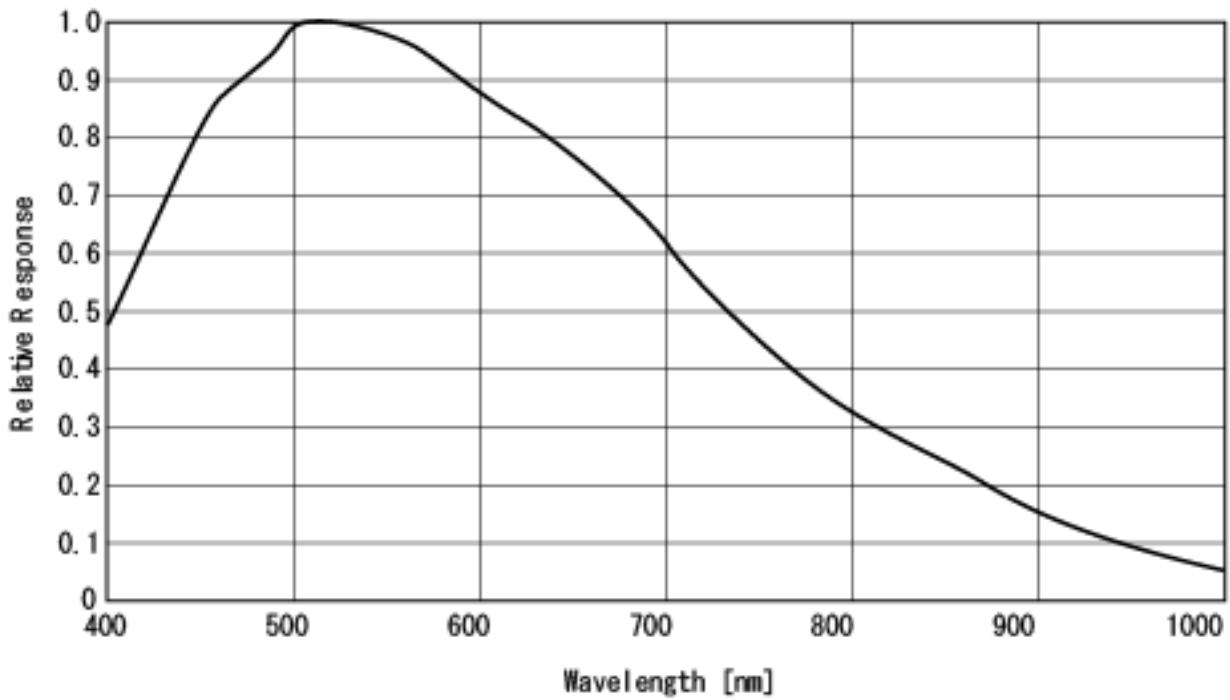
4.4. Image output format (Coyote Application Setting)

・ 2-Taps , Segmented, Dual Left + Right   Inverted Output
・ Area of interest   Width : 2456   Height : 2058   Offset X : 0   Offset   Y : 12

5. Function Settings

Camera functions can be set with serial communications.

| Function	Address	Data	
Gain	001	0:	0 dB: Analog Fixed Gain
		1:	+3 dB: Analog Fixed Gain
		2:	+6 dB: Analog Fixed Gain
		3:	+12 dB: Analog Gain (+6dB) + Digital Gain (+6dB)
		4:	Manual Gain (Refer to Address 005, 006, 007, and 008)
E-Shutter	002	0:	1/15s(Off)
		1:	1/30s
		2:	1/60s
		3:	1/90s
		4:	1/120s
		5:	1/150s
		6:	1/200s
		7:	1/250s
		8:	1/500s
		9:	1/750s
		10:	1/1000s
		11:	1/2000s
		12:	1/5000s
		13:	1/10000s
		14:	1/15000s
		15:	1/30000s
		16:	Manual Shutter (Refer to Address 009 & 010)
Trigger Mode	004	0:	Normal Mode (Trigger Mode Off)
		1:	Standard Trigger Mode (Shutter speed can be set with address 002.)
		2:	Pulse Width Trigger Mode (Shutter speed can be set with trigger pulse width.)
Manual Analog Gain (Right)	005&006	0〜512:	0: 0dB〜512: over +12dB (Log Linear) ※ Set the address 001 data to 004.
Manual Analog Gain (Left)	007&008	0〜512:	0: 0dB〜512: over +12dB (Log Linear) ※ Set the address 001 data to 004.
Manual Shutter Control	009&010	0〜2078:	1/15s (Off)から1/36058s ※ Set the address 002 data to 016. Address 009 MSB and address 010 LSB makes total 16 bit. Shutter speed = (2078-(009&010)) x 32.07μs + 27.73μs Max data = 2078
Trigger Polarity	011	0:	Positive Input
		1:	Negative Input
Output Data Select	013	0:	8bit Output Data
		1:	10bit Output Data
Gamma Mode	014	0:	Gamma Off (1.0)
		1:	Gamma On
Partial Scan Mode	015	0:	Full Frame Scan Mode
		1:	Partial Scan Mode

Function	Address	Data	
Partial Scan Start Position	016&017	0～685:	Set the address 015 data to 001. Address 016 MSB and address 017 LSB makes total 16 bit. Start Position: 3 H/step Min Data: 0 (0H)/Max Data : 685 (2055 H) Start Position (016&017)+ Effective Line (019&020) <= 685
Partial Scan Effective Line	019&020	0～684:	Set the address 015 data to 001. Address 019 MSB and address 020 LSB makes total 16 bit. Effective Line: 3 H /step Min Data: 0 (3 H)/Max Data : 685 (2058 H) Start Position (016&017)+ Effective Line (019&020) <= 685
Partial Scan Total Line	021&022	0～2078:	Read Only Total line number at Partial Scan Mode or Full Frame Scan Mode minus 1 is set
Manual Digital Gain (Right)	126&127	256 ～ 512:	256: x1(0dB)～512: x2(+6dB) ※ Set address 001 data to 004.
Manual Digital Gain (Left)	128&129	256 ～ 512:	256: x1(0dB)～512: x2(+6dB) ※ Set address 001 data to 004.
Data Save	255	Input 083 or 053 to save the data in EEP-ROM.	

Note: When setting the data with 2 Byte, High Byte shall be set first, then Low Byte to the next.

The camera rewrites the internal resister when receiving Low Byte.

6. External Connector Pin Assignment

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

Pin No.		Signals which can be controlled by GigE Camera Control Software
1	GND	
2	Power In DC +12V	
3	TTL In3 (LVTTL Input 5V Tolerant)	Trigger Input
4	TTL Out2 (LVTTL 3.3V Output)	LVAL, FVAL, DVAL ,SP(Exposure)　Output
5	GND	
6	TTL In2 (LVTTL input 5V Tolerant)	Trigger Input
7	TTL Out1 (LVTTL 3.3V Output)	LVAL, FVAL, DVAL ,SP(Exposure)　Output
8	TTL In1 (LVTTL input 5V Tolerant)	Trigger Input
9	TTL Out0 (LVTTL 3.3V Output)	LVAL, FVAL, DVAL ,SP(Exposure)　Output
10	TTL In0 (LVTTL Input 5V Tolerant)	Trigger Input
11	NC	
12	NC	
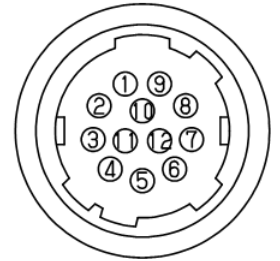
   TTL In(a)　a:0～3・・・Trigger Input etc.
        TTL Out(b) b:0～2・・・LVAL, FVAL, DVAL, SP, Pulse Generator etc.
        ※　Pin assignment and functions can be set arbitrarily via iPORT software.
        Please refer to iPORT.Software.Coyote.pdf　　in￥Program Files￥Pleora Technologies Inc￥iPORT Software￥Documentation.

6.2.   RJ-45 Gigabit Ethernet Connector MOD-YSJ88DA03C-CN+ (HONDA TSUSHIN KOGYO CO., LTD)

LINK(Green LED)   ACT(Yellow LED)
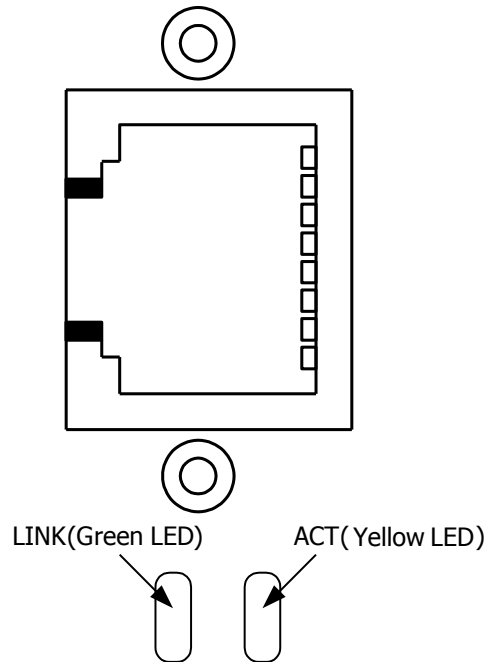
LINK LED: Lighting-off   ・・・Unconnected to LAN

                Lighting-on   ・・・Connected to LAN

                Blinking   ・・・Transmitting the data
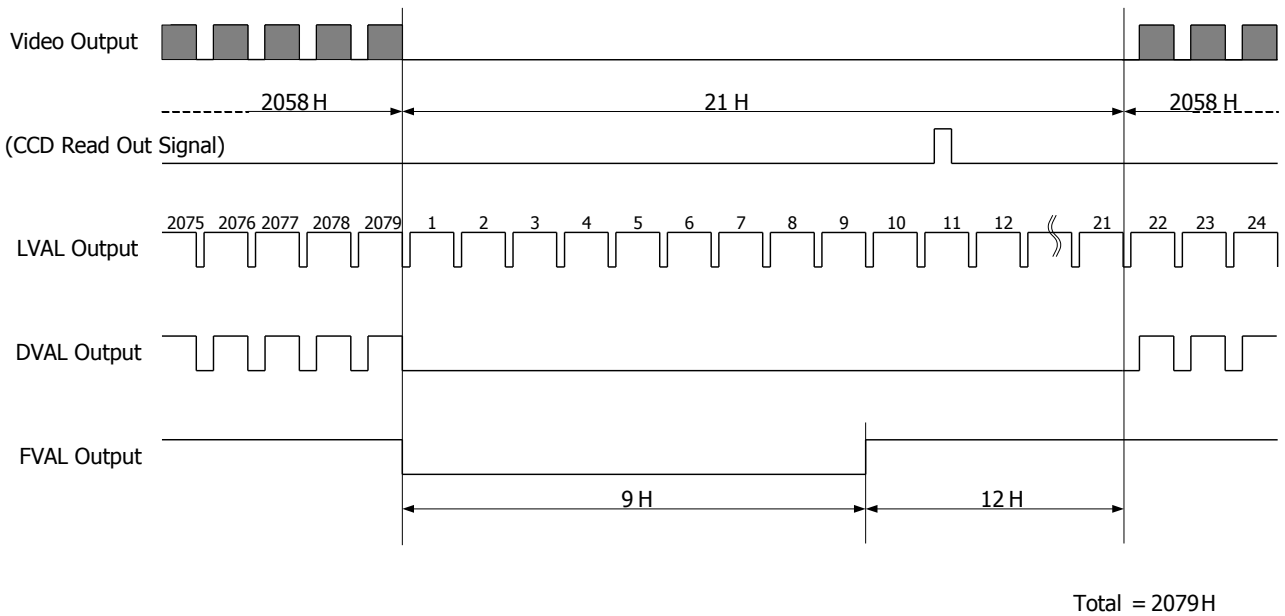
ACT LED: Lighting-off   ・・・Unconnected or connected with 10Mbps/100Mbps

                Lighting-on   ・・・Connected with 1000Mbps

7. Timing Chart

### 7.1. Horizontal Synchronous Signals Timing

CLK＝60MHz
2 Tap Output
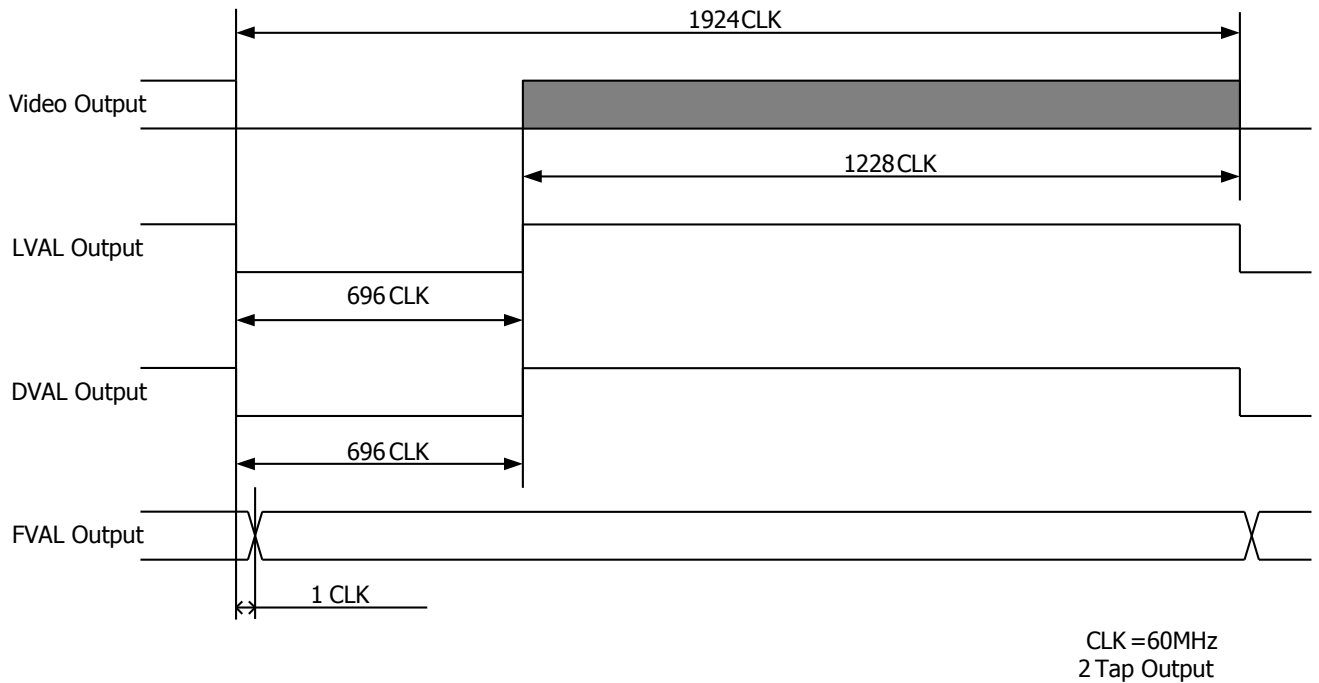
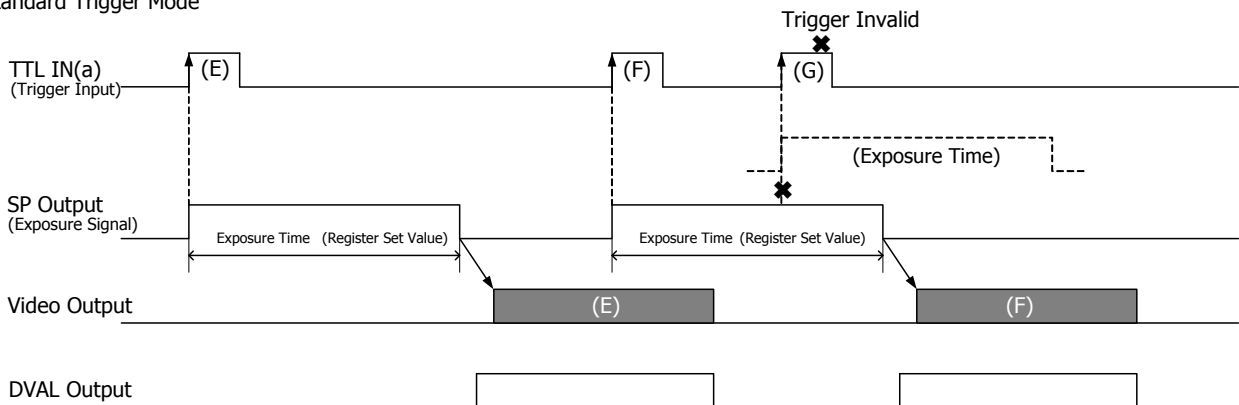### 7.2. Full Frame Scan Mode Timing

Total ＝2079H

7.3.   Standard Trigger Mode Timing

☐ Trigger operation is CLK sync, V-Sync Reset.

    Delay time, from detecting the trigger edge to the start of exposure, is 1.40 μ s at RAW mode.

☐ Trigger input can be accepted even when the camera is outputting video signals.   However, a shutter

    timing, to start the next video output before completion of transferring video output for the prior signals,

    can not be worked.   To input trigger signals when the camera is outputting video signals for the prior

    signals, it shall be synchronized with the down edge of camera LVAL output.

☐ Trigger input during the execution of exposure (exposure time) shall be ignored.   (Refer to the "G" below.)

CLK60MHz
ⓐ 1.40μ s
ⓑ nHD × 32.07μ s+27.73μ s

※(a):0～3
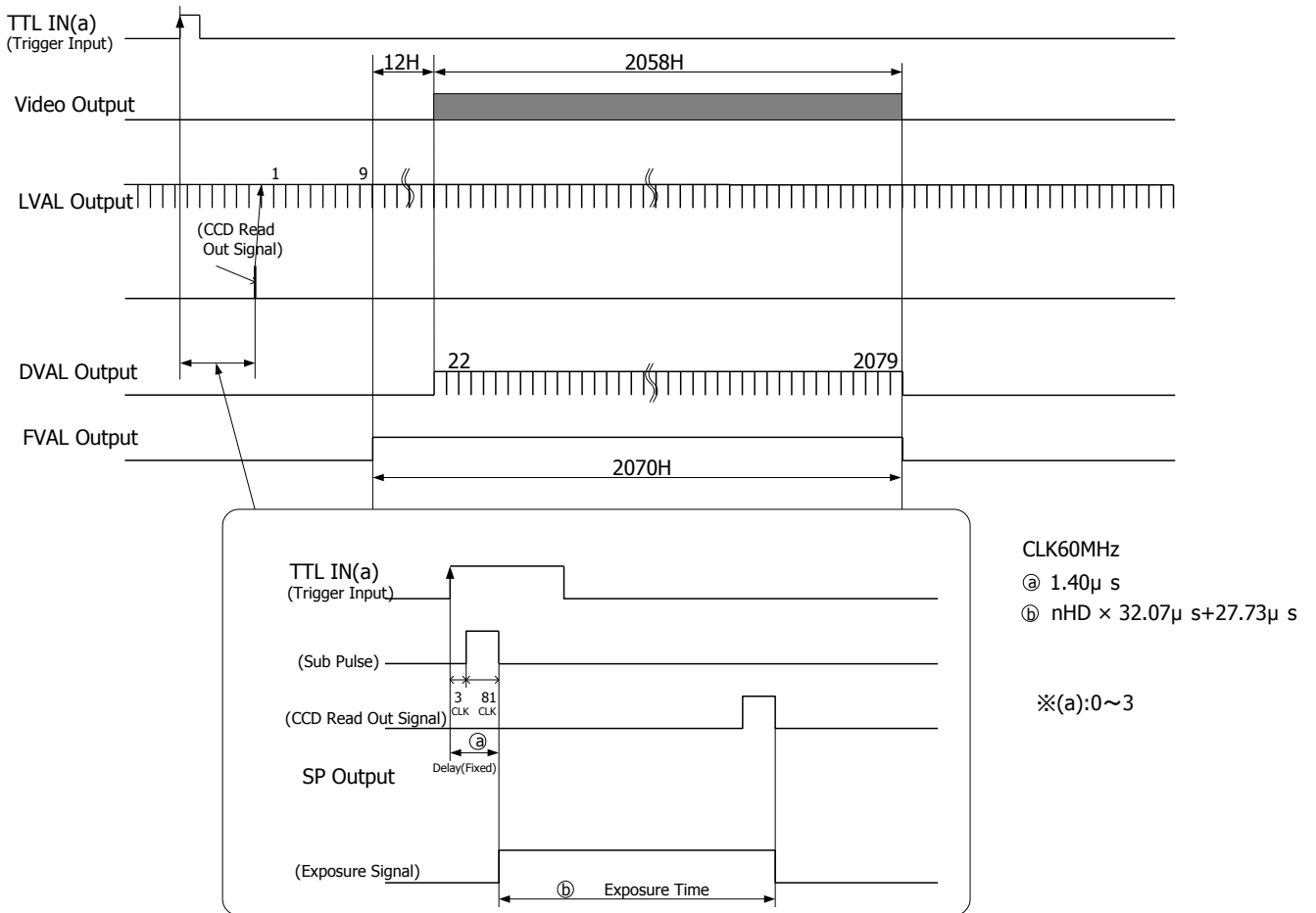
Standard Trigger Mode

7.4. Pulse Width Trigger Timing

☐ Trigger operation is CLK sync, V-Sync Reset.

   Delay time, from detecting the trigger edge to the start of exposure, is 1.40 μ s.   Delay time, from detecting the trigger edge to completion of exposure, is 29.13 μ s.

☐ Trigger input can be accepted even when the camera is outputting video signals.   However, a shutter timing, to start the next video output before completion of transferring video output for the prior signals, can not be worked.   Please refer to the "C" below.   To input trigger signals when the camera is outputting video signals for the prior signals, it shall be synchronized with the down edge of camera LVAL output.
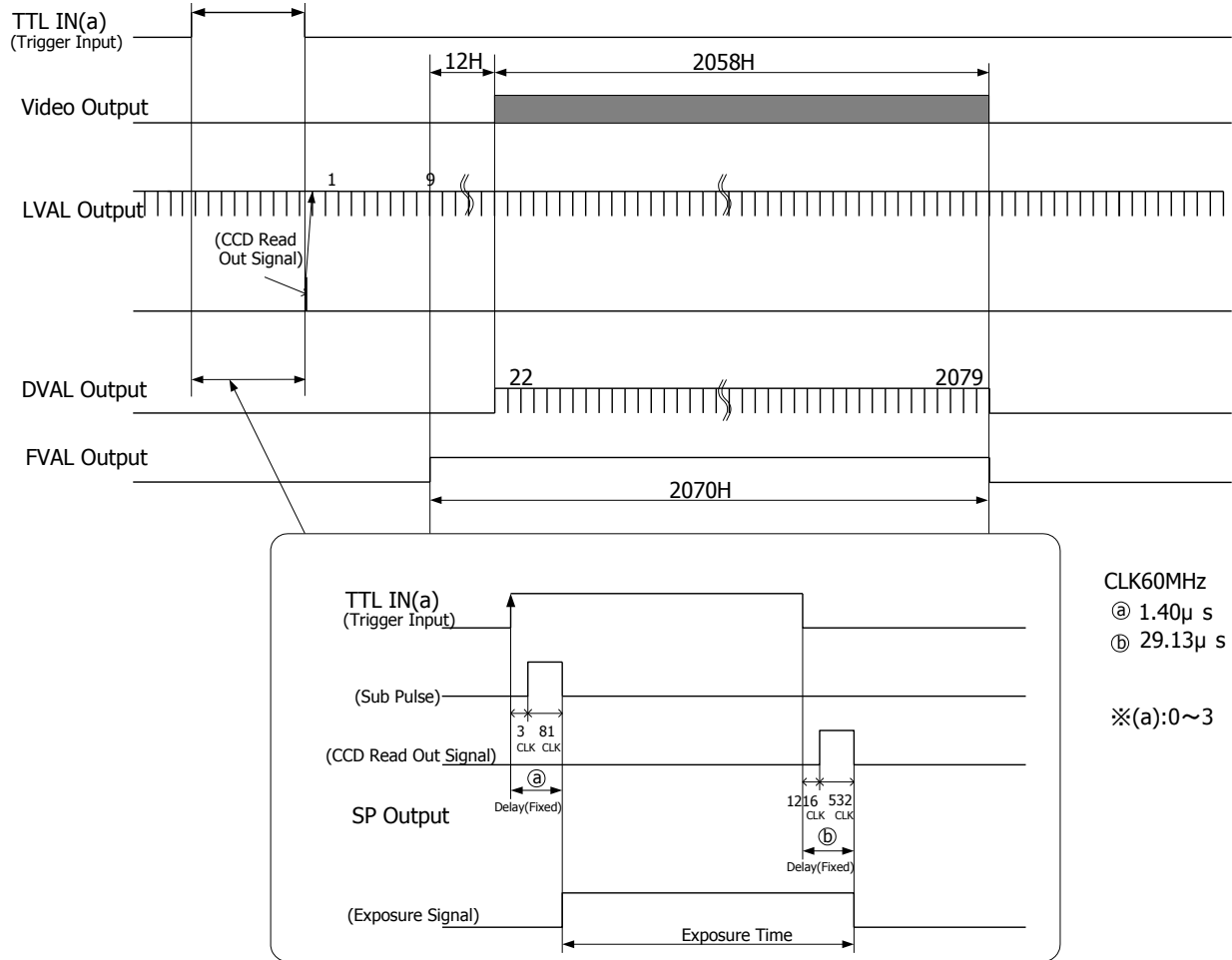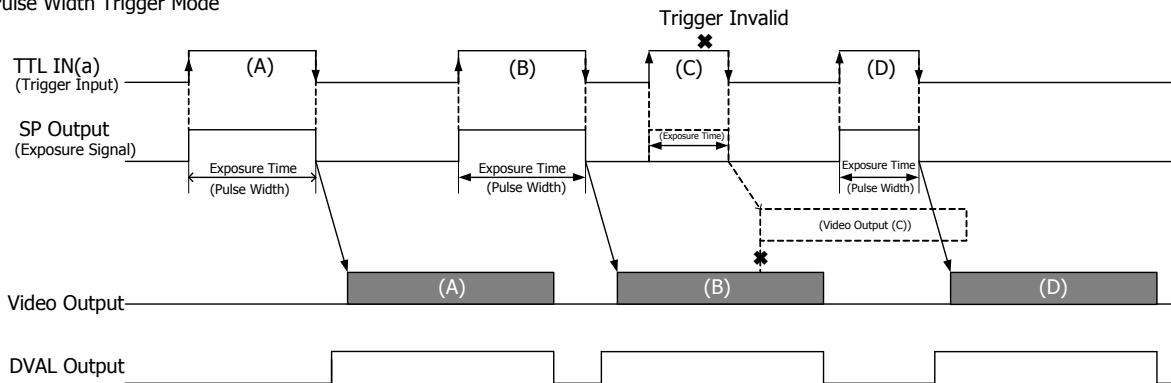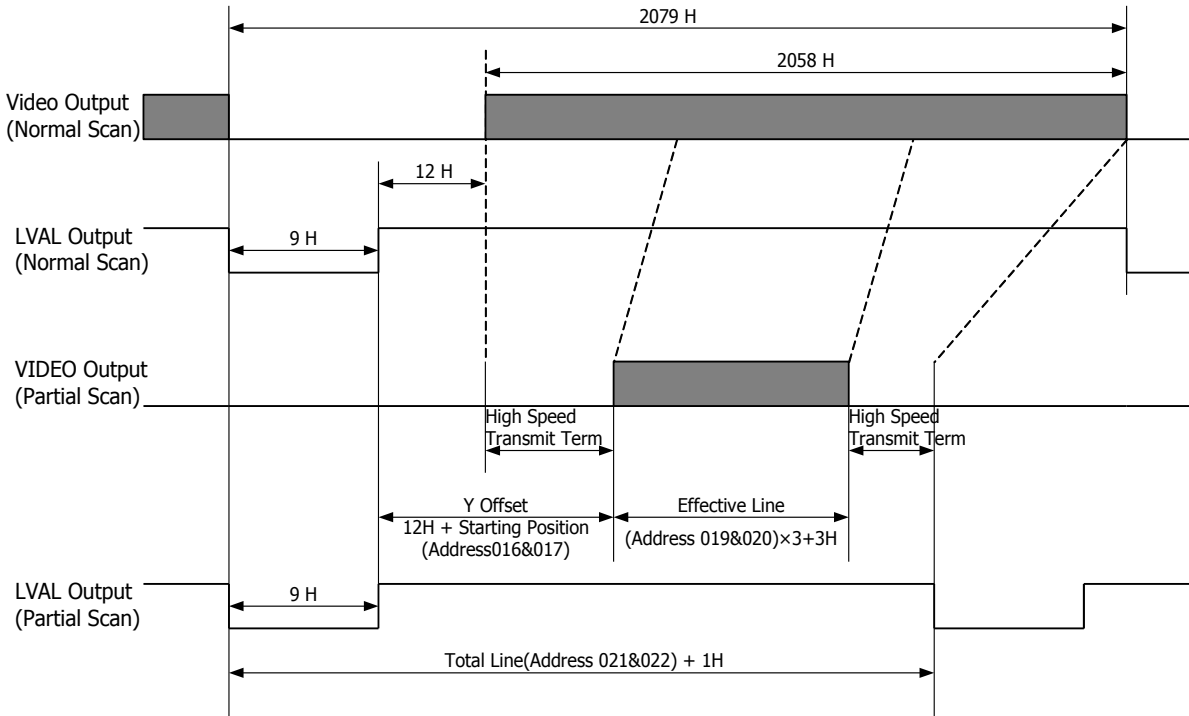
8.   Partial Scan Mode Details

Capturing start position and capturing width can be set by 3H via LAN.

Reading out position register (Address 016 & 017): 0(0H) ～ 685(2055H) 3H/step
Effective line register (Address 019 & 020): 0(3H) ～ 685(2058H) 3H/step
Total line register (Address 021 & 022): 706Lines + (Effective line register × 2) + 2 (Read Only)

Note: Reading out position and effective line shall meet the following condition.
Reading out position register + Effective line register = < 685
Otherwise, the value, **685 − reading out position register**, will be set to the effective line register.

<Example 1>   Conditions: Reading out position register (Address 016 & 017) = 000

Effective line register (Address 019&020)	Effective Lines	Total Lines register + 1 H	Frame rate
0	3 H	709 H	44 fps
.	.	.	.
159	480 H	1027 H	30 fps
.	.	.	.
255	768 H	1219 H	26 fps
.	.	.	.
341	1026 H	1391 H	22 fps
.	.	.	.
399	1200 H	1507 H	21 fps
.	.	.	.
685	2058 H	2079 H	15 fps

9.   Remote Interface Function

Through LAN, the camera can be controlled.

(1)   The settings for RS-232C

Baud rate	:	9600bps
Data	:	8bit
Stop bit	:	1bit
Parity	:	None
XOn/XOff	:	Not controlled

(2)   Control code
・ The total control code is 14 bits, 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	7th Byte	8	9	10	11	12	13	14
Camera No.						Process code	Remote controller address			Remote controller data			CR
000000: fixed						"R" Read mode "W" Write mode "C" Camera mode	Please refer to the address table of Section 5. Function Settings.			000～255			0 Dh

Camera No. is fixed with 6 bite numerical strings, "000000".

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 11th ～13th, since a command shall consists 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, please refer to Section 5. Function 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 write 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 at read control mode.
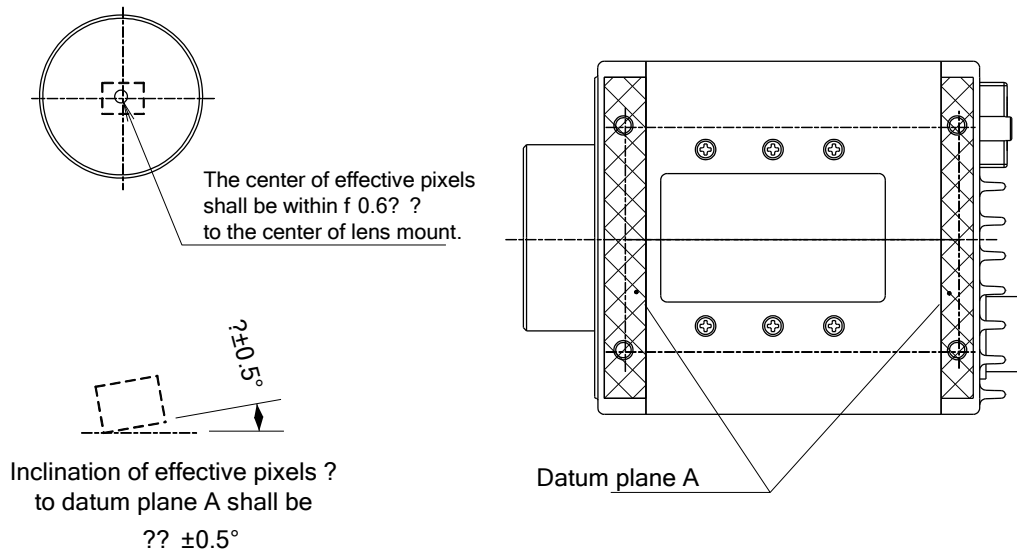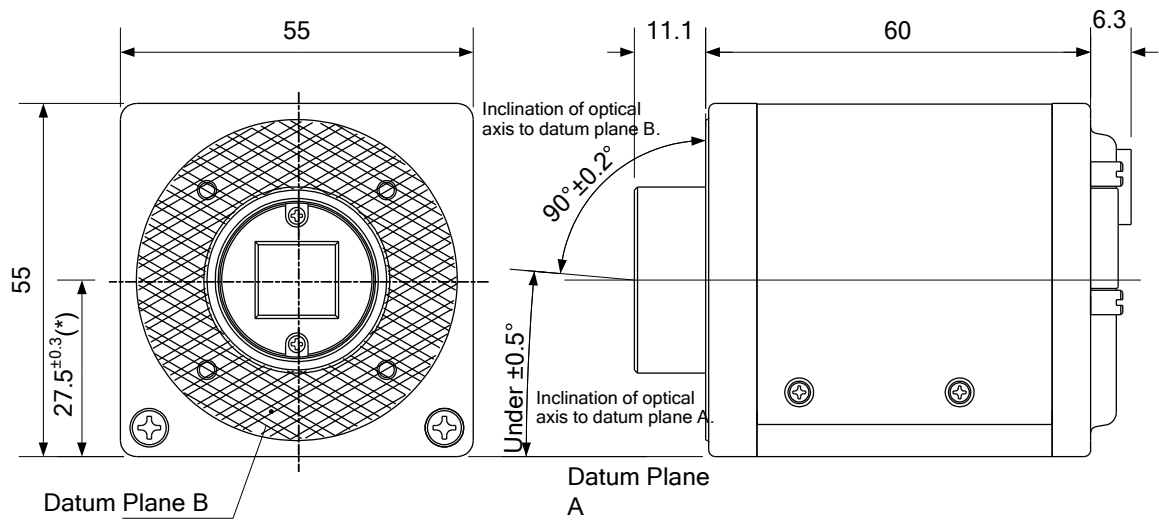
CR

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

※ Note: When setting the data with 2 Byte, High Byte shall be set first, then Low Byte to the next. The camera rewrites the internal resister when receiving Low Byte.

10. Initial Settings

Function	Address	Data
Gain	001	0: 0dB
E-Shutter	002	0: 1/15s (Off)
Trigger Mode	004	0: Normal Mode (Trigger Mode Off)
Trigger Polarity	011	0: Positive Input
Output Data Select	013	0: 8 bit Output Data
Partial Scan Mode	015	0: Full Frame Scan Mode
Partial Scan Total Lines	021 & 022	2078: Read Only

11. CCD Optical Axis Accuracy

55

55

27.5$^{\pm0.3}$(*)

Datum Plane B

11.1   60   6.3

Inclination of optical axis to datum plane B.

90°±0.2°

Under ±0.5°

Inclination of optical axis to datum plane A.

Datum Plane A

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

Datum plane A

?±0.5°

Inclination of effective pixels ? to datum plane A shall be

?? ±0.5°
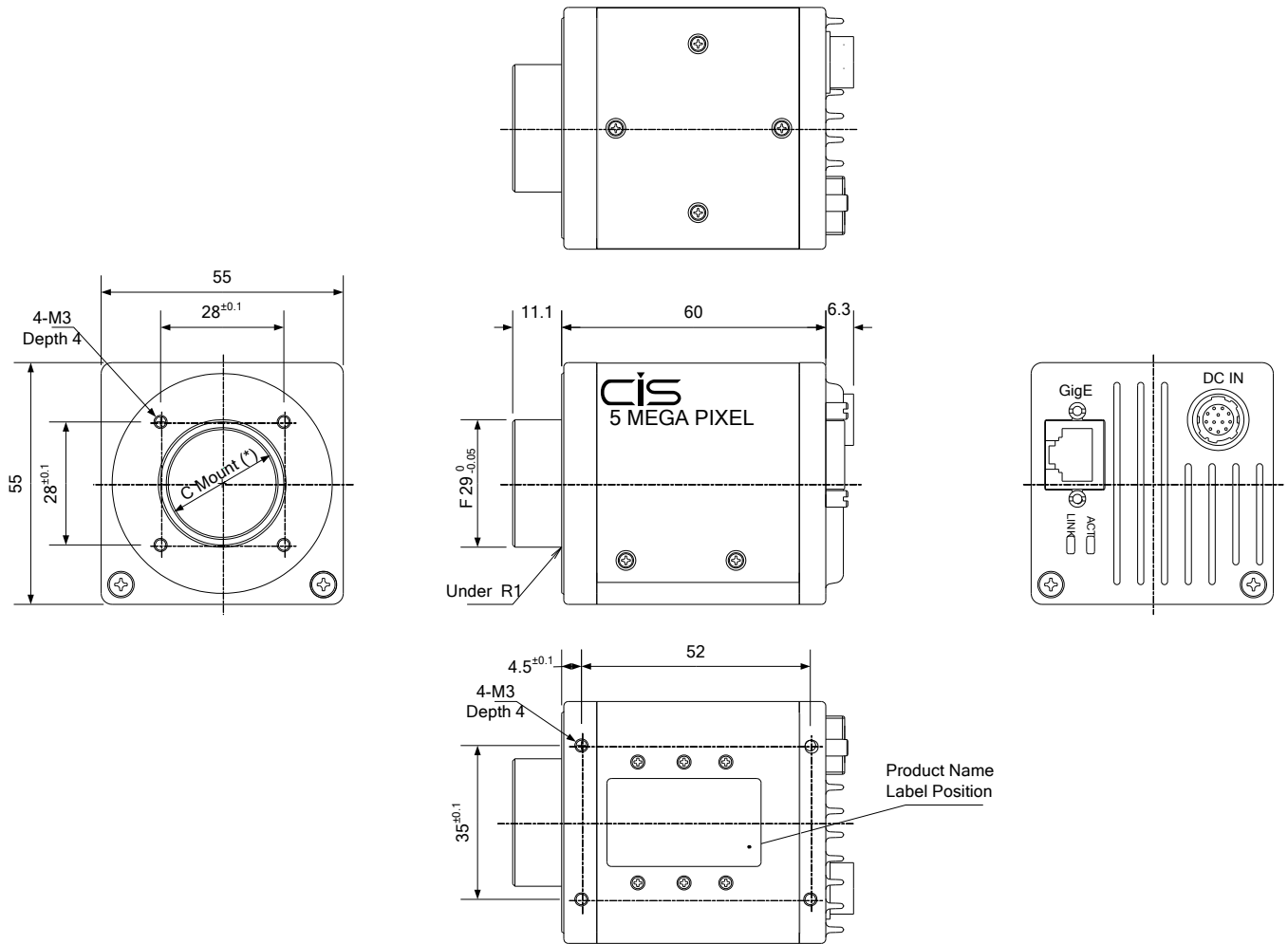
*)Dimensions from datum plane A to the center of lens mount.

910-003-00-00

(Unit:mm)
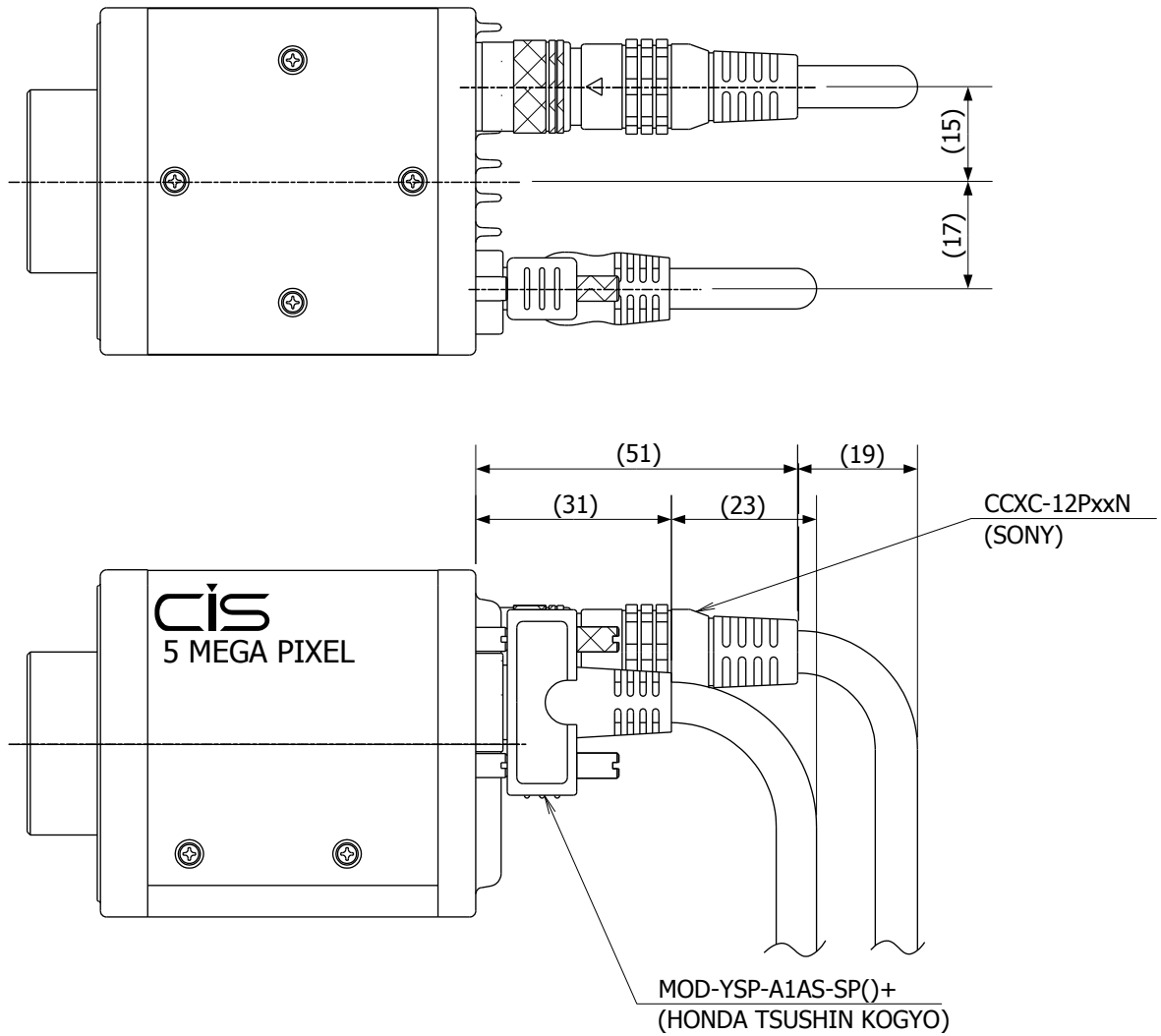
19

12. Dimensions

*1) C Mount screws comply with ANSI/ASME B1.1, 1-32UN(2B).

*2) Screw length from C mount lens surface shall be under 6mm. And protruding portion shall be
     lesss than 10mm.

999-500-00-00(1/2)

(Unit:mm)

CCXC-12PxxN
(SONY)

MOD-YSP-A1AS-SP()+
(HONDA TSUSHIN KOGYO)

Cable Reference Drawing

999-500-00-00(2/2)
(Unit:mm)

13. 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.

14.   CCD Pixel Defect

   CIS compensates the noticeable CCD pixel defects found at the shipping inspection prior to our shipment.
   On very rare occasions, however, CCD pixel defects might be noted with time of usage of the products.
   Cause of the CCD pixel defects is the characteristic phenomenon of CCD itself and CIS is exempted from
   taking any responsibilities for them.
   Should you have any questions on CCD pixel defects compensation, please contact us.

15.   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.