

Industrial B&W CCD Camera **STC-400, STC-400L, STC-SS400 Series** **Operating Manual**





The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

For U.S.A.

Warning:

This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the instruction manual, may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

For Canada

Warning:

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

WARNING:

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

Table of Contents

Precaution	4
1. Preface	4
2. Contents of Box	5
3. Features	5
4. Camera Specifications	6
5. Major Operating Controls and Functions	7
5.1 Camera Board Layout	10
5.2 Rear Panel	10
5.3 12 Pin Connector Pin-Out	11
5.4 Internal Switches	11
6. CCD Pixel Configuration	13
7. Sync. Output Timing Chart	15
8. External Sync. Input Pulse	15
9. CCD Spectrum Response Curve	16
10. Optional Components and Use	16
11. Dimensions	17
12. STC-400 Series Product Family	20



Precaution

- Handle the camera with care. Do not abuse the camera. Avoid striking or shaking it. Improper handling or storage could damage the camera.
- Do not pull or damage camera cable.
- During camera use, do not wrap the camera unit in any material. This will cause the internal temperature of the unit to increase.
- Do not operate camera in wet areas and do not expose camera to moisture.
- Do not operate camera beyond its maximum operating temperature, humidity and power source ratings.
- To prevent dust or contamination from entering the CCD or filter area, which could scratch or damage this area, keep lens or lens cap on camera when camera is not in use.
- Do not expose the camera to the following conditions:
 - Wet, moist and/or high humidity areas
 - Hot direct sunlight
 - High temperature areas
 - Near objects that release strong magnetic or electric fields
 - Strong vibration
- When cleaning the camera, use a soft cloth to clean the external areas of the camera. Use a pressured air spray to clean the surface of the glass. Do not scratch the surface of the glass.
- Use only a REGULATED POWER SUPPLY and supply the power with the specified voltage.

1. Preface

This camera is designed for visual measurement and microscopic applications. Its very small package design allows it to be installed in very limited spaces. The video output signal is obtained simply by applying 12Vdc power supply. Various combinations of performance parameters can be obtained by setting the internal switches. These settings will enable the camera to be suitable for many different applications.

2. Contents of Box

a. Contents of box

<u>Content</u>	<u>QTY</u>
Camera	1
Application Manual	1

b. Optional parts

Power connector (HR-10A-10P-12S)
Power connector and cables assembly
(2m:10W-02, 3m:10W-03, 5m:10W-05, 10m:10W-10)
Tripod adapter with 1/4" 20 UNC screw thread hole (TP-300)

3. Features

The STC-400 Series is a collection of products to fit a wide variety of applications. The STC-400 Series comes in 1/3" and 1/2" CCD formats and in compact, remote head, and "L" shaped camera housings. With selectable shutter speeds from 1/60th to 1/10,000th of a second, the STC-400 can capture scenes and virtually and speed crisply and clearly.

- **High picture quality**
1/2" 380,000 pixel CCD (EIA) or 440,000 pixel CCD (CCIR). High resolution picture of 570H x 485V TV line (EIA) or 560H x 575V TV line (CCIR) at frame accumulation mode.
- **Extremely small size**
31(W) x 29(H) x 73(D) mm, Weight 85g (STC-400/405)
(1.22"(W) x 1.14"(H) x 2.87"(D)), Weight 3.0 oz (STC-400/405)
31(W) x 45(H) x 87(D) mm, Weight 100g (STC-400L/405L)
(1.22"(W) x 1.77"(H) x 3.43"(D)), Weight 3.5 oz (STC-400L/405L)
- **Clock Output**
14.31818MHz (EIA), 14.1875MHz (CCIR) pixel clock output.
- **Electronic shutter**
Highest shutter speed of 1/10,000 sec. For clear image of high speed moving target.
- **Gamma**
0.45 or 1 switchable.
- **Gain switch**
Gain is selectable from 0 to 25dB via the rear panel switches.
- **Accumulation mode switching**
Field or frame accumulation mode is selectable by the internal switch.

4. Camera Specifications

Signal Format:	EIA (STC-400, STC-410, STC-400L, STC-410L) CCIR (STC-405, STC-415, STC-405L, STC-415L)
Image Sensor:	1/2" IT CCD (STC-400, STC-405) 1/3" IT CCD (STC-410, STC-415)
Total Picture Element:	EIA: 811(H) x 508(V) CCIR: 795(H) x 596(V)
Effective Picture Element:	EIA: 768(H) x 494(V) CCIR: 752(H) x 582(V)
Chip Size:	7.95mm(H) x 6.45mm(V)
Cell Size:	EIA: 8.40µm(H) x 9.80µm(V) CCIR: 8.60µm(H) x 8.30µm(V)
Optical Black:	Horizontal, Front: 3 pixel, Back: 40 pixel Vertical, Front: 12 pixel, Back: 2 pixel
Scanning Area:	EIA: 6.45mm(H) x 4.84mm(V) CCIR: 6.46mm(H) x 4.83mm(V)
Sync. System:	Internal/External (Auto switching)
Scanning System:	2:1 interlace
Horizontal Resolution:	EIA: 570 TVL CCIR: 560 TVL
Vertical Resolution:	EIA: Frame accumulation: 485TVL Field: accumulation: 350TVL CCIR: Frame accumulation: 575TVL Field: accumulation: 410TVL
S/N Ratio:	56dB ($f_A=Off$, Gain=0dB)
Minimum Illumination:	0.05 Lux @ F1.2
Video Out:	1 Vp-p / 75Ω
Power Voltage:	10 - 12Vdc
Power Consumption:	Approximately 180mA
Operating Temperature:	-10°C ± 45°C (14°F ± 113°F)

STC-400 Series



- STC-400 is 1/2", STC-410 is 1/3"
- B/W 768(H) x 494(V) IT CCD
- Available in EIA & CCIR Formats
- 570 TV Lines Horizontal Resolution
- 2:1 Interlace
- Field/Frame Integration
- Sync: Internal/External
- Gamma 0.45, 1.0 Switchable
- Pixel Clock Out
- Gain: Fixed/Manual (0-25dB)
- >56dB S/N Ratio (Gain Off)
- Fixed Shutter (8 steps) 1/60 (1/50) to 1/10,000 second
- Minimum Illumination 0.05 Lux @ F1.2, Gain ON, 50 IRE
- Available with or without I/R Filter
- C-Mount Lens Mount
- Dimensions: 31(W) x 29(H) x 73(D)mm
(1.24" x 1.16" x 2.92")
- 12V DC Power

STC-SS400 Series



- STC-400L is 1/2", STC-410L is 1/3"
- Same basic features and specifications as STC-400 Series
- C-Mount Lens Mount
- Dimensions: 31(W) x 45(H) x 73(D)mm
(1.24" x 1.8" x 2.92")

STC-SS400 Series



- STC-SS400 is 1/2", STC-SS410 is 1/3"
- Same basic features and specifications as the STC-400 Series
- C-Mount Lens Mount
- Head Dimensions: 31(W) x 29(H) x 38(D)mm
(1.24" x 1.16" x 1.52")

Image Related Specifications:

Accumulation mode	Frame / field (Internal switch switchable, Factory set up=Field)
γ Correction Gain	0.45 / 1 (Internal switch switchable, Factory set up=1) Fixed/Manual (0dB – 25dB) switchable

Shutter speed:

EIA: 1/60, 1/100, 1/250, 1/500, 1/1000, 1/2000, 1/4000,
1/10000 (Factory set up=1/60)

CCIR: 1/50, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/4000,
1/10000 (Factory set up=1/50)

Sync. Related Specifications:

Internal Sync. Mode:

Original clock frequency:

EIA: 28.63636MHz

CCIR: 28.37500MHz

H. Sync. Frequency:

EIA: 15.734KHz

CCIR: 15.625KHz

V. Sync. Frequency:

EIA: 59.94Hz

CCIR: 50.00Hz

External Sync. Mode:

Input Signals:

HD/VD (2Lines)

Note: Requires 2 line inputs to select external sync.mode.

Input Signal Level:

HD/VD 2 – 5Vp-p Negative polarity

Switchable 75 Ω or High Impedance

H. Sync. Allowance:

EIA: 15.734kHz \pm 1.0%

CCIR: 15.625kHz \pm 1.0%

Sync. Output Signal:

HD: 2 - 5Vp-p
VD: 2 - 5Vp-p
Clock: 2.5Vp-p/75Ω
EIA: 14.31818MHz
CCIR: 14.1875MHz

External Output Connector:

Hirose 12P connector (HR10-10R-12PA)

Mechanical Specifications

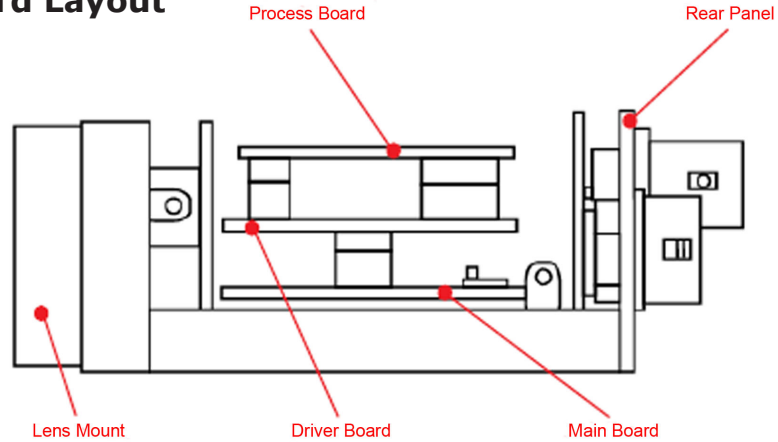
Lens Mount	C-mount
Optical Center Allowance	Less than $\pm 10\%$
Case Color	Black
Dimensions (excluding camera mount, connectors and lens)	
STC-400/405	31(W) x 29(H) x73(D)mm (1.24" x 1.16" x 2.92")
STC-400L/405L	31(W) x 45(H) x87(D)mm (1.24" x 1.8" x 3.48")
Weight	
STC-400/405	85g (3 oz.)
STC-400L/405L	100g (3.53 oz.)
Vibration Resistance	7G

5. Major Operating Controls and Functions

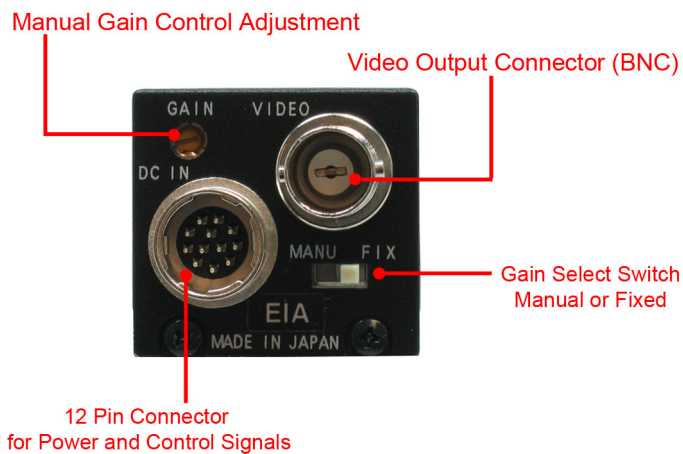
Important Note: There must be NO POWER to the camera when removing the cover.

Please remove the cover. The following diagram shows the internal structure of the camera. Disconnect power before opening the camera or removing the cover.

5.1) Camera Board Layout



5.2) Rear Panel



- **12-Pin Connector for Power and Control Signals**
Connector for power, external sync signals, and video output. This connector is usually connected to the power supply, sync signal generator (or sync source), and video monitor. Please see following page for the 12-Pin connector's pin assignments.
- **Manual Gain Control Adjustment**
When the Gain Select Switch is in the "Manual" mode, this gain of the video amplifier is adjusted by turning this adjustment. The user can adjust the gain of the camera from 0 to 25 dB as desired.
- **Gain Select Switch (Manual or Fixed)**
Manual gain mode is selected by setting this switch to the left. Fixed gain is selected by setting this switch to the right (factory setting default). Manual gain value is set by the (B) "Manual Gain Control Adjustment" (See Above).
- **Video Output Connector (BNC)**
Video signal output connector for the camera's composite monochrome signal.

5.3) 12-Pin Connector Pin-Out

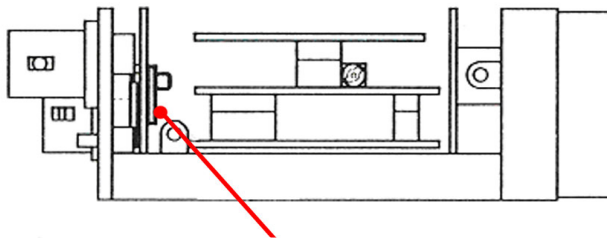


Note: The mating connector is the Hirose HR10A-10P-12S

Pin No.	Internal Sync	External Sync
1	GND	GND
2	+12Vdc	+12Vdc
3	Video GND	Video GND
4	Video Out	Video Out
5	HD GND	HD GND
6	HD Out	HD In
7	VD Out	VD In
8	Clock GND	Clock GND
9	Clock Out	Clock Out
10	GND	GND
11	+12Vdc	+12Vdc
12	VD GND	VD GND

5.4) Internal Switches

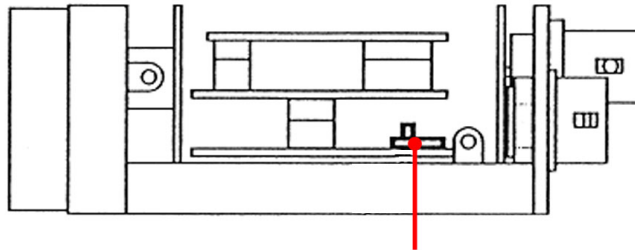
A) Impedance Switch of HD/VD Signals



Impedance Switch of HD/VD Signals

Up: 75Ω
 Down: High Impedance

B) Synchronization Selection (Internal/External) Switch

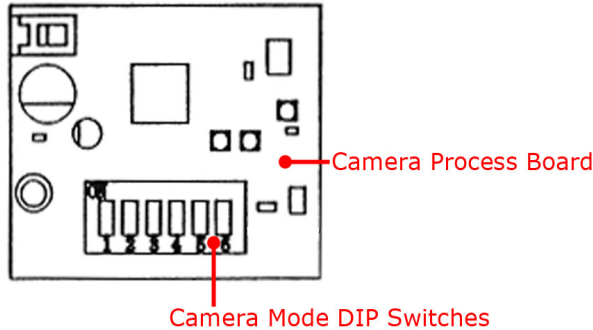


Sync Selection Switch

Left Position
 (Towards the Front of Camera):
 Internal Sync. Mode
Right Position
 (Towards the Rear of Camera):
 External Sync. Mode

Note: When this switch is set at the external mode position, camera detects existence of external sync. input signal. If there is no external sync. input signal, the camera switches to internal sync. mode automatically.

C) Camera Mode/Operation Switch



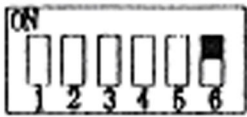
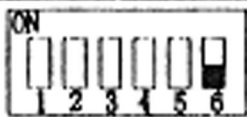
(1) Frame Integration Mode

Mode	Shutter Speed		Switch Settings				
	EIA	CCIR	SW1	SW2	SW3	SW4	SW5
Frame	1/30	1/25	Either	Either	Either	ON	ON
Frame	1/60	1/50	OFF	OFF	OFF	OFF	ON
Frame	1/100	1/120	ON	OFF	OFF	OFF	ON
Frame	1/250	1/250	OFF	ON	OFF	OFF	ON
Frame	1/500	1/500	ON	ON	OFF	OFF	ON
Frame	1/1,000	1/1,000	OFF	OFF	ON	OFF	ON
Frame	1/2,000	1/2,000	ON	OFF	ON	OFF	ON
Frame	1/4,000	1/4,000	OFF	ON	ON	OFF	ON
Frame	1/10,000	1/10,000	ON	ON	ON	OFF	ON

(2) Field Integration Mode

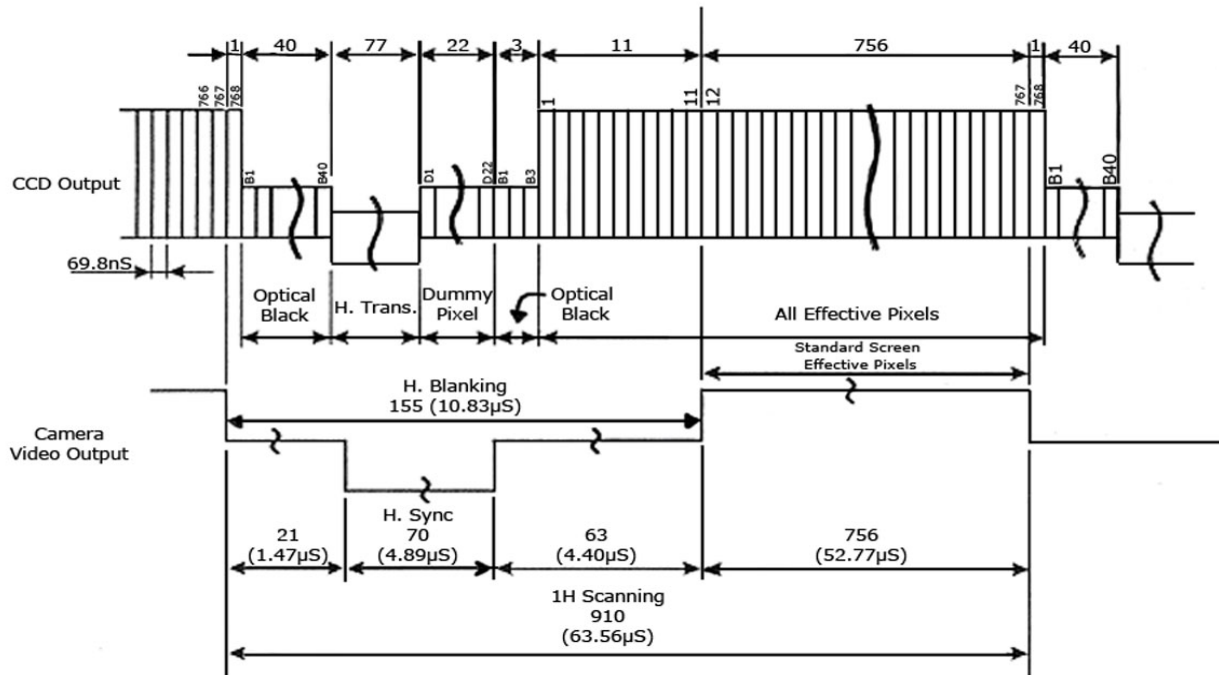
Mode	EIA	CCIR	SW1	SW2	SW3	SW4	SW5
Frame	1/60	1/50	Either	Either	Either	ON	OFF
Frame	1/60	1/50	OFF	OFF	OFF	OFF	OFF
Frame	1/100	1/120	ON	OFF	OFF	OFF	OFF
Frame	1/250	1/250	OFF	ON	OFF	OFF	OFF
Frame	1/500	1/500	ON	ON	OFF	OFF	OFF
Frame	1/1,000	1/1,000	OFF	OFF	ON	OFF	OFF
Frame	1/2,000	1/2,000	ON	OFF	ON	OFF	OFF
Frame	1/4,000	1/4,000	OFF	ON	ON	OFF	OFF
Frame	1/10,000	1/10,000	ON	ON	ON	OFF	OFF

(3) Gama Setting (1.0 or 0.45)

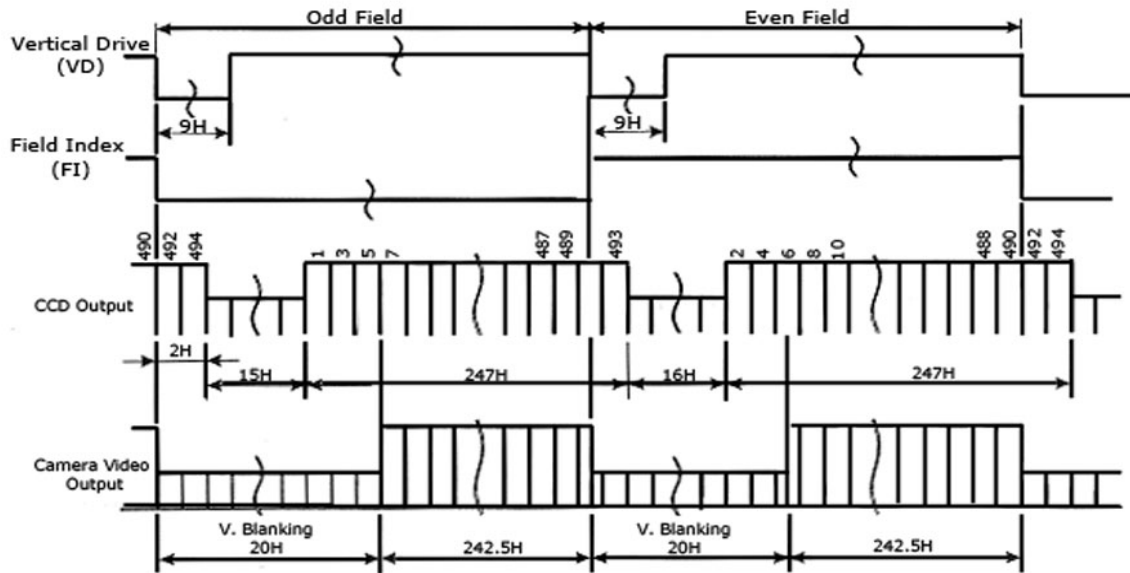
$\gamma = 1$	SW6 = ON	
$\gamma = 0.45$	SW6 = OFF	

6. CCD Pixel Configuration

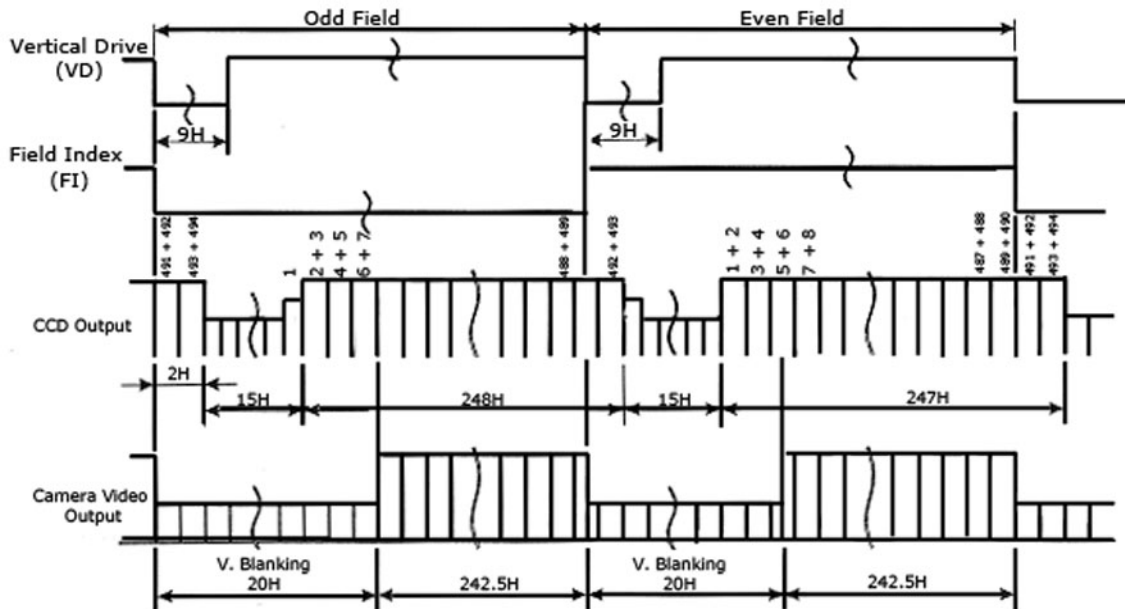
(A) Horizontal Pixel Configuration



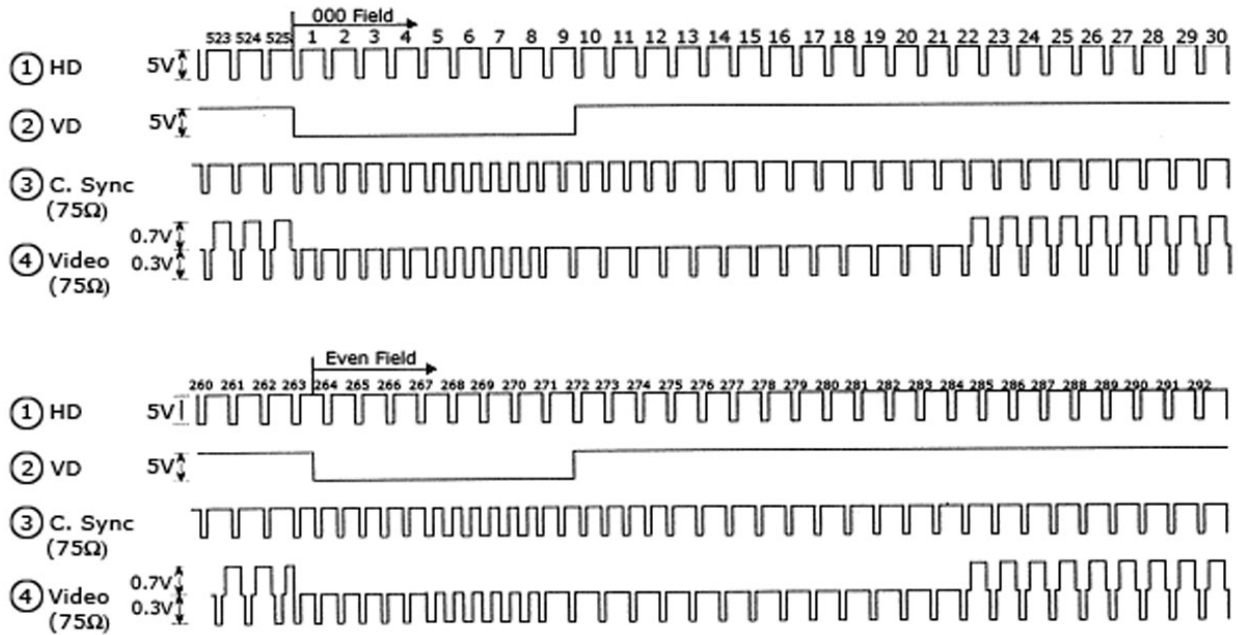
(B) Vertical Pixel Configuration - 2:1 Interlace, Frame Accumulation



(C) Vertical Pixel Configuration - 2:1 Interlace, Field Accumulation

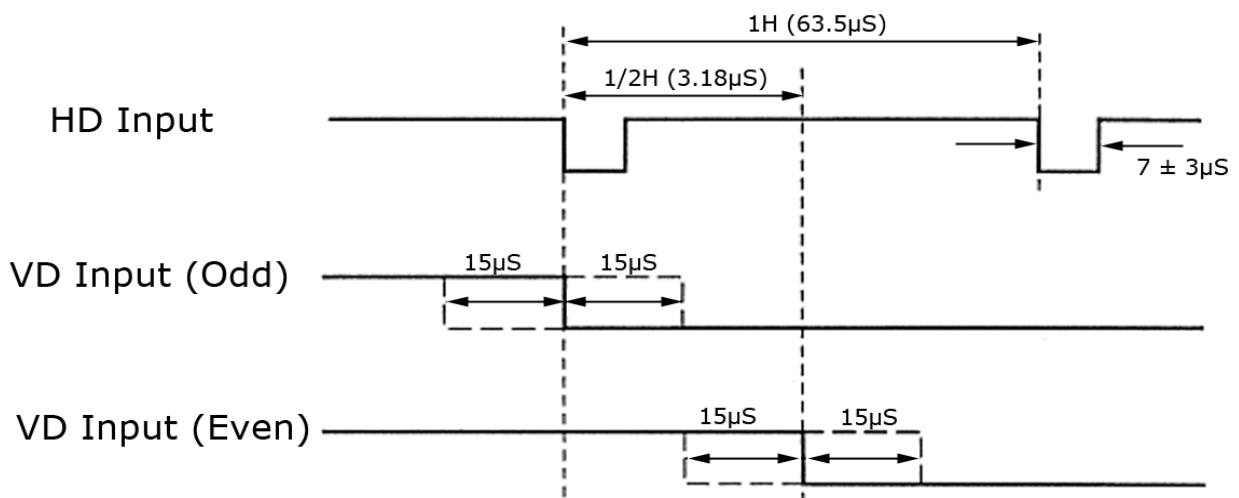


7. Sync Output Timing Chart

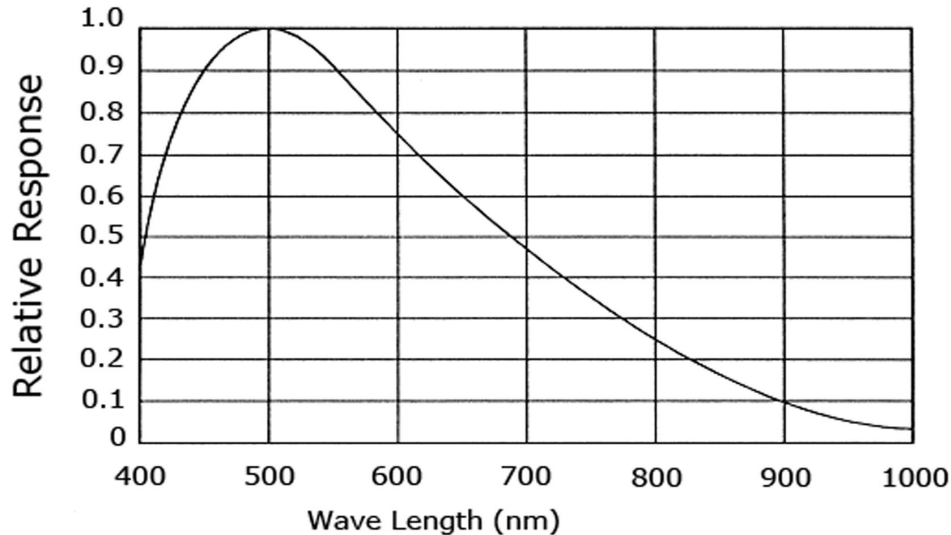


8. External Sync Input Pulse

HD/VD Input Pulse Requirements: 75Ω: $4 \pm 1V_{p-p}$
 High Impedance (10KΩ): $5 \pm 5V_{p-p}$



9. CCD Spectrum Response Curve



10. Optional Components and Use

IR Cut Filter

When the camera is aimed toward a strong light source such as sun or fluorescent light, usually vertical smear appears in the screen. This is a typical phenomenon of interline transfer type CCD. IR cut filter is an effective device to reduce this smear. IR cut filter built-in models are also available.



Power Connector

The mating connector for "12-Pin Connector for power and control signal" (Hirose: HR10A-10P-12S) is available as an optional part. Please wire all necessary connections according to 6-2.



Pre-Wired Power Connector

The above mating connector with pre-wired cables is also available as an optional part. This makes connection works to external devices easier.



Tripod Adapter

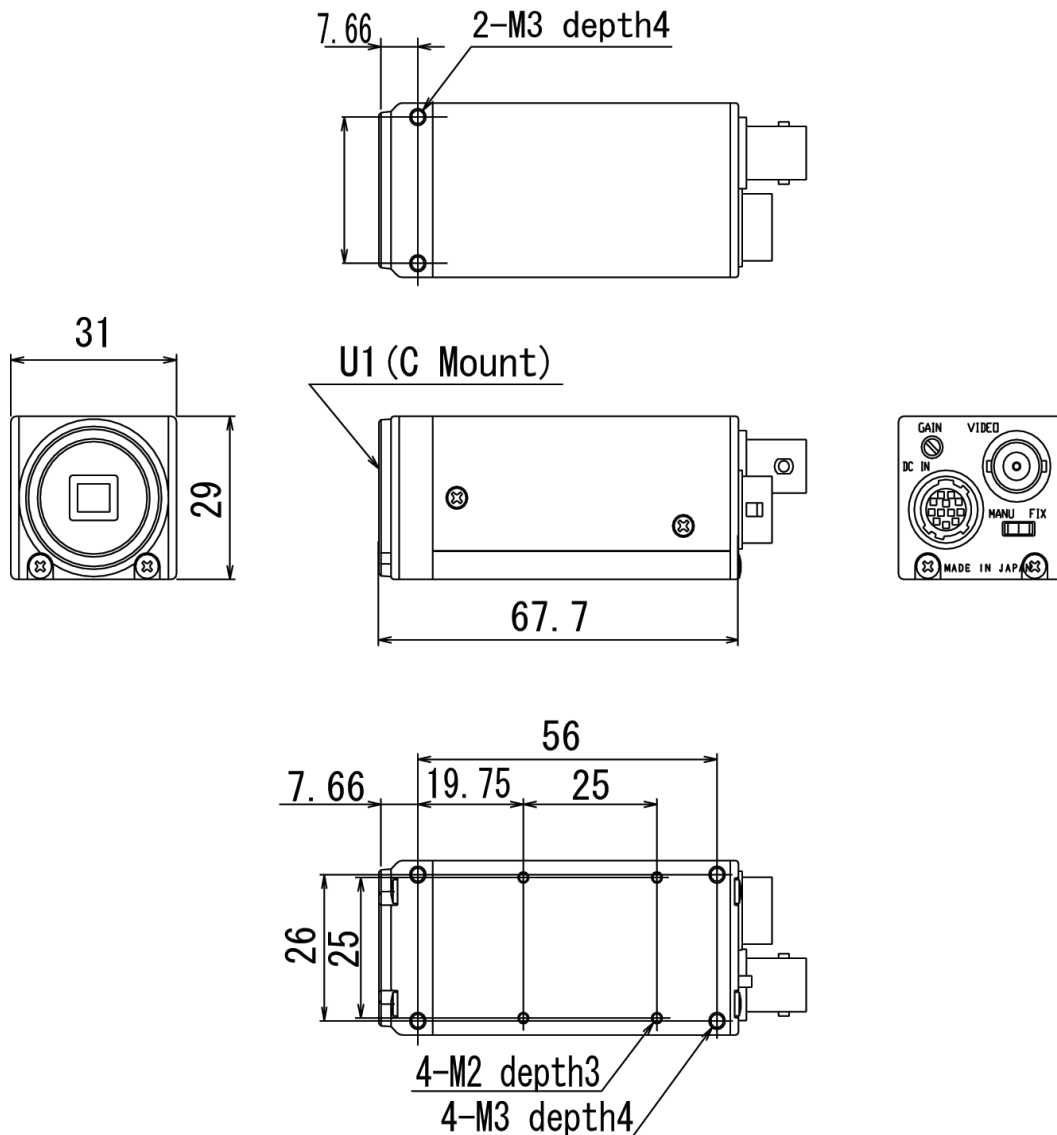
For easy camera installation, an optional adapter with 1/4" 20 UNC screw thread hole is available. With this adapter, the camera can be installed to standard tripod or other standard camera mounts.

Note:

1. Requires four (4) each M2 screws to mount the TP-300 to the bottom of the camera. (comes with TP-300 when purchased through SenTech)
2. Maximum length of the four screws must be 7mm

11. Dimensions

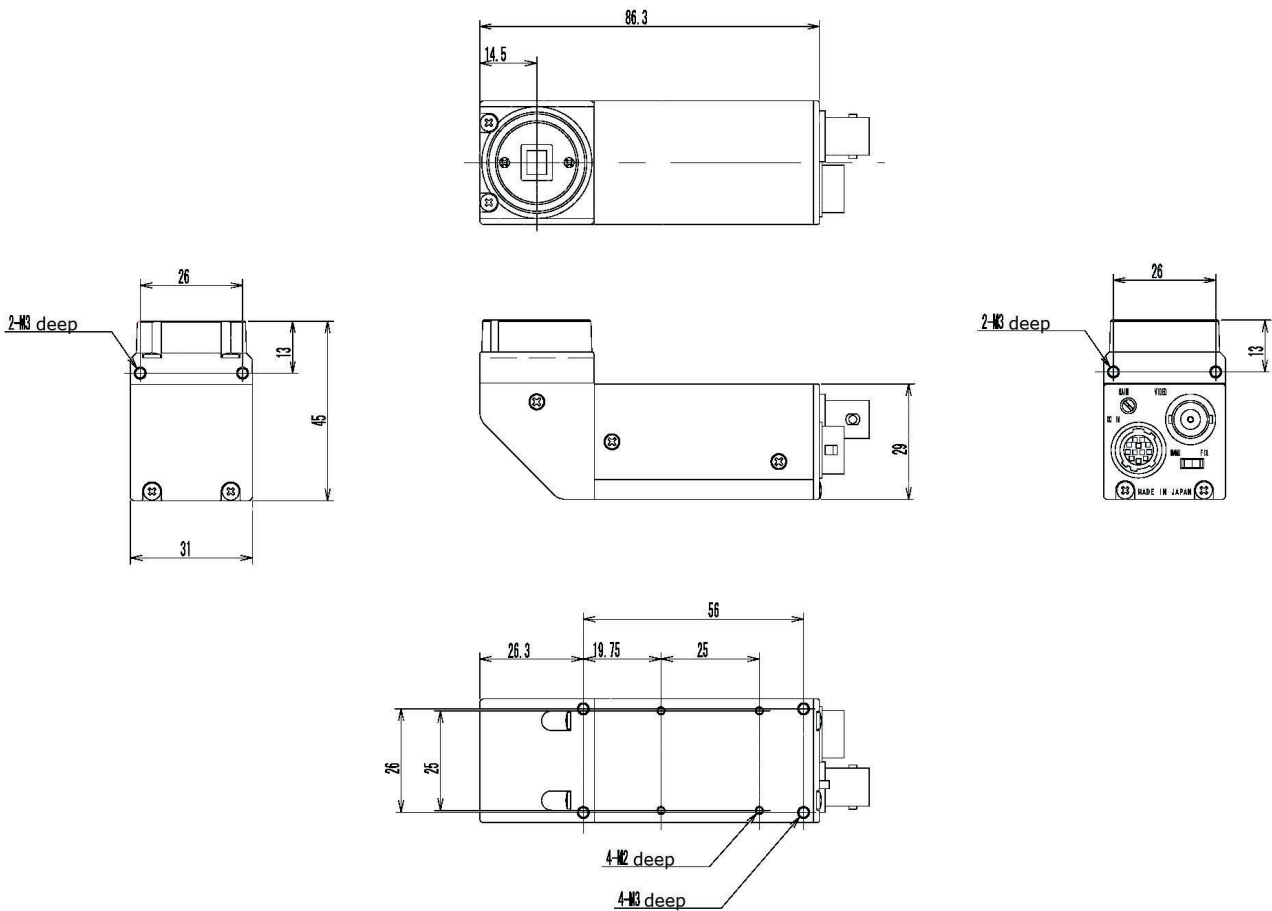
STC-400



Note: Measurements are given in mm

11. Dimensions (Continued)

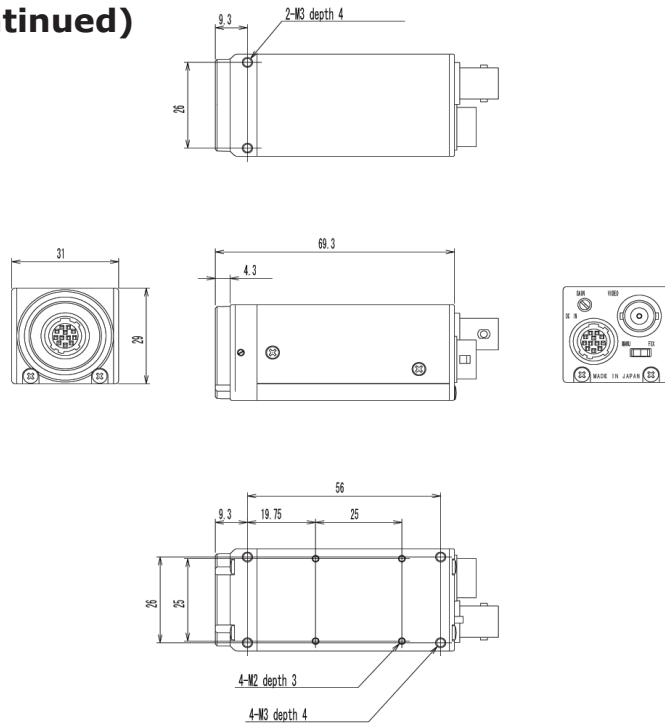
STC-400L



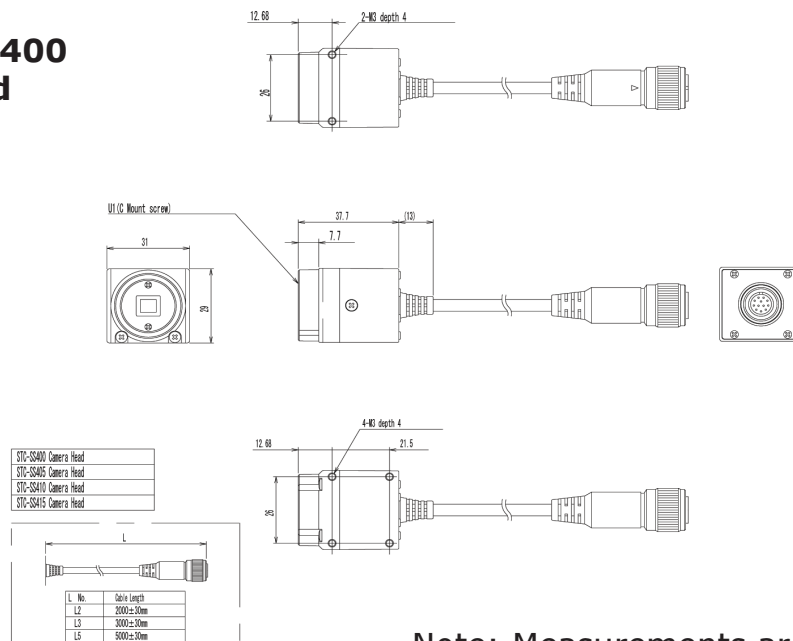
Note: Measurements are given in mm

11. Dimensions (Continued)

STC-SS400 CCU




STC-SS400 Head



Note: Measurements are given in mm

12. STC-400 Series Product Family

Series	Model	Product Description	
 <p>STC-400</p>	STC-400HOL	EIA, 1/2" Monochrome Hi-Resolution CCD	
	STC-410HOL	EIA, 1/3" Monochrome Hi-Resolution CCD	
	STC-405HOL	CCIR, 1/2" Monochrome Hi-Resolution CCD	
	STC-415HOL	CCIR, 1/3" Monochrome Hi-Resolution CCD	
	STC-400A	EIA, 1/2" Monochrome Hi-Resolution CCD w/IR Cut Filter	
	STC-410A	EIA, 1/3" Monochrome Hi-Resolution CCD w/IR Cut Filter	
	STC-405A	CCIR, 1/2" Monochrome Hi-Resolution CCD w/IR Cut Filter	
	STC-415A	CCIR, 1/3" Monochrome Hi-Resolution CCD w/IR Cut Filter	
	 <p>STC-400L</p>	STC-400L	EIA, 1/2" Monochrome Hi-Resolution CCD "L" Shaped
		STC-410L	EIA, 1/3" Monochrome Hi-Resolution CCD "L" Shaped
STC-405L		CCIR, 1/2" Monochrome Hi-Resolution CCD "L" Shaped	
STC-415L		CCIR, 1/3" Monochrome Hi-Resolution CCD "L" Shaped	
 <p>STC-SS400</p>		STC-SS400	EIA, 1/2" Monochrome Hi-Resolution CCD Remote Head (Back*)
	STC-BS400	EIA, 1/2" Monochrome Hi-Resolution CCD Remote Head (Bottom*)	
	STC-LS400	EIA, 1/2" Monochrome Hi-Resolution CCD Remote Head (Left*)	
	STC-RS400	EIA, 1/2" Monochrome Hi-Resolution CCD Remote Head (Right*)	
	STC-TS400	EIA, 1/2" Monochrome Hi-Resolution CCD Remote Head (Top*)	
	STC-SS405	CCIR, 1/2" Monochrome Hi-Resolution CCD Remote Head (Back*)	
	STC-BS405	CCIR, 1/2" Monochrome Hi-Resolution CCD Remote Head (Bottom*)	
	STC-LS405	CCIR, 1/2" Monochrome Hi-Resolution CCD Remote Head (Left*)	
	STC-RS405	CCIR, 1/2" Monochrome Hi-Resolution CCD Remote Head (Right*)	
	STC-TS405	CCIR, 1/2" Monochrome Hi-Resolution CCD Remote Head (Top*)	
	STC-SS410	EIA, 1/3" Monochrome Hi-Resolution CCD Remote Head (Back*)	
	STC-BS410	EIA, 1/3" Monochrome Hi-Resolution CCD Remote Head (Bottom*)	
	STC-LS410	EIA, 1/3" Monochrome Hi-Resolution CCD Remote Head (Left*)	
	STC-RS410	EIA, 1/3" Monochrome Hi-Resolution CCD Remote Head (Right*)	
	STC-TS410	EIA, 1/3" Monochrome Hi-Resolution CCD Remote Head (Top*)	
	STC-SS415	CCIR, 1/3" Monochrome Hi-Resolution CCD Remote Head (Back*)	
	STC-BS415	CCIR, 1/3" Monochrome Hi-Resolution CCD Remote Head (Bottom*)	
	STC-LS415	CCIR, 1/3" Monochrome Hi-Resolution CCD Remote Head (Left*)	
	STC-RS415	CCIR, 1/3" Monochrome Hi-Resolution CCD Remote Head (Right*)	
	STC-TS415	CCIR, 1/3" Monochrome Hi-Resolution CCD Remote Head (Top*)	
		(*=Cable Orientation in Relation to the Remote Head)	
OEM		Special OEM versions of the STC-400 series are available, Please contact Sentech for more details and information	