

1

2

3

4

A

B

C

D

E

F

HV-F22GV
 Color Camera
 Specifications
 (Tentative)

DWN	H. Kosaka	07-05-09	HV-F22GV Color Camera Specification (1/13) (Tentative)	Hitachi Kokusai Electric Inc. Tokyo Japan	
DSGN	S. Ikeda	07-05-09			
CHKD	S. Ikeda	07-05-09			
APPD	K. Yamauchi	07-05-09			

1

2

3

1. Introduction

The Hitachi HV-F22GV is a SXGA high precision 3CCD progressive scan color camera, which has single chip digital processing LSI, a C mount prism, three 1/2-inch 1,450,000 pixels square CCDs, and a GigE Vision interface.

A multi-functional LSI use the accurate 14 bit digital processing technology, which performs the high picture quality signal processing and the picture compensating functions, beyond the capability of the other conventional analog cameras.

The GigE Vision is a communication interface for machine vision applications based on the ubiquitous Gigabit Ethernet technology. It allows for easy interfacing between the GigE Vision device and a network card using standard CAT-6 cable supported by Ethernet. The camera can transfer broad band digital data between a camera and a processing PC approximately 100m by using the GigE Vision interface.

2. Features

1) High resolution

The 1/2 inch 1,450,000 pixels progressive scan CCD and the accurate CCD matching technology achieves a high-resolution image of 1360 H x 1024 V (SXGA).

2) GigE Vision interface

Based on the GigE Vision, which transfers digital video signal of uncompressed 24 bits RGB and a camera control signal.

Note 1 : A Gigabit Ethernet card needs using a Intel chip set.

If using a Gigabit Ethernet card by another chip set, then it effects bad performance.

Note 2 : Cables need upper compatible of CAT-5e or CAT-6.

If using the different category cables on the same network, then it effects less performance of the data transfer. Therefore, the same category cables are recommended for the same network.

3) Camera signal processor is single chip LSI.

The Hitachi's most advanced technology (0.18 um design process, 1.8V internal core drive voltage) produces a single ultra LSI chip (3 million gates), and contributes to the downsizing and the low power of the camera.

In addition, the 12-bit A/D converter and 14 bit internal processor provide high S/N and wide dynamic range.

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4) C mount lens adapter

The de facto industry standard C mount lens adapter allows choosing from a various type of lenses and optical systems.

Note : Refer to the item 10.

5) Digital processing for various picture quality enhancements

- Independent six colors masking is the Hitachi innovation for optimizing color balance. The saturation and the hue of 6 colors (Red, Blue, Green, Cyan, Magenta and Yellow) are adjusted independently to deliver the best color in image capture, microscope and other applications.
- Variable sharpness (detail) width function optimizes the width of image contours. The bold contours show the picture clear, while the thin contours show it natural.

6) Auto shading correction (ASC)

Color shading due to the aberration of C mount lens is automatically compensated (reduced).

7) Versatile CCD drive functions

- Video frame capture on demand using external trigger signal.
See detailed specifications item 7.
- Long integration mode.
- Auto electronic shutter (AES) mode for stabilized video level.

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8) Versatile imaging functions

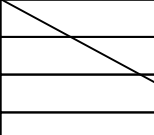
- Four application files.
User settings provided for sharpness(detail), masking etc.
- Scene color temperature is detected in dynamic for automatic white balance adjustment.
By varying the detection area in a scene, the whole white balance can be controlled in only the area. Thus, even if a light source of a different color temperature enters the scene (e.g., situation often occurs in a retail showroom suddenly exposed to outdoor lighting when the entrance door opens), white balance is not severely disturbed.
- Auto exposure (ALC : auto level control)
Light strength is measured in divided 64 areas, combined with continued control of AGC and AES, to provide extremely wide response to light variations. The fine level and peak or average of ALC response can be set from menu.
- Focus data output (serial data)
- Two mode gain control
AGC or user-programmable gain in 1 dB steps
- Contrast function
- Flare compensation
- Master black, R/B black, and R/B gain are variable.
- Color bar
- Selectable negative/positive image

9) LED indicator

Camera rear panel has a LED indicator for power on/off.
The RJ-45 connector has 2 LED indicator for a communication status.

3. Standard composition

3.1	HV-F22GV camera	1
3.2	Accessories		
1)	Lens mount sheet	1
2)	DC IN/SYNC connector plug (HR10A-10P-12S)	1
3)	CD-ROM	1
	(includes a camera control software for evaluation and a supplement manual)		
4)	Operation manual	1

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A
B
C
D
E
F

4. Specifications

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|-----|--|---|---|
| 1) | Optical system | 1/2-inch F1.6 prism | A |
| 2) | Imaging system | RGB 3 CCD | |
| 3) | Imaging device | 1/2-inch interline CCD | |
| | Total pixels | 1392 (H) x 1050 (V) | |
| | Effective pixels | 1360 (H) x 1024 (V) | |
| | Effective image area | 6.32 (H) x 4.76(V) mm | |
| 4) | Scanning system | Progressive scan | |
| 5) | Sync system | Internal/external (automatically switched by HD/VD) | B |
| 6) | Standard sensitivity | 2000 lx, F8 (at 1/30s shutter speed) | |
| 7) | Gamma correction | 0.45/1.0 (on/off) | |
| 8) | Picture distortion | Full screen 0% (not including lens response) | |
| 9) | Registration | Full screen 0.05% (not including lens response) | |
| 10) | Vertical contour correction | 2H | |
| 11) | Lens mount | C mount (flangeback: 17.526 mm in air) | |
| 12) | Sensitivity selection | AGC (0 to +12 dB) or 1 dB steps | |
| 13) | Sharpness(detail) control functions | Level, width | C |
| 14) | CCD drive functions | | |
| | Variable shutter mode | : 1/15 to approx. 1/100,000 second | |
| | AES mode | : Off to approx. 1/100,000 second | |
| | Long time integration mode | : 1/15 to approx. 4 seconds in 1 frame steps | |
| 16) | Color bar | Full | |
| 17) | Power supply voltage | 12 VDC nominal
(Stable operation from 10.5 to 15 VDC, without ripple and noise.) | D |
| 18) | Power consumption | Approx. 8.0 W | |
| 19) | Dimensions | 65 (W) x 65 (H) x 141 (D) mm | |
| 20) | Mass | Approx. 600 g (not including lens) | |
| 21) | Recommended ambient temperature, operating | 0 to +40 | |
| 22) | Recommended ambient temperature, storage | -20 to +60 | E |

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5. Input and output signals

5.1 RJ-45 connector

1) Conformance standard

The target plans the standards of the GigE Vision.

2) Data on the Ethernet packets

The Ethernet packets are overlapping following data.

Video signal output of 24 bits of a uncompressed RGB.

Camera control signal input and output of the RS-232C protocol. ^(Note 1)

5.2 DC IN/SYNC connector

1) External sync input ^(Note 2)

• HD/VD 2 to 5 Vp-p, negative polarity

2) External trigger input (Photo-coupler input) ^(Note 3)

• Trig in low 0 VDC, high 3 to 24 VDC

3) Strobe sync signal output

• Flash out low 0 VDC, high 5 VDC

4) Power supply input

• 10.5 to 15 VDC , 8.0W

5) Camera control signal input/output ^(Note 1)

• RS-232C protocol

• RXD input level: low -3 to -15 V, high 3 to 15 V

• TXD output level: low -5 to -9 V, high 5 to 9 V

5.3 TRIG IN connector ^(Note 3)

Only external trigger signal can be supplied even with BNC cable

(Switched DC in/Sync by connector Trig in and command)

• Trig in low 0 VDC, high 2 to 5 VDC

(Note 1) Either RJ-45 connector or DC IN/SYNC connector are available for camera control signal input/output (selectable by internal switch).

(Note 2) When camera control signal input/output is used via DC IN/SYNC connector, external sync input is unavailable.

Refer to the item 6.

Horizontal frequency (HD) : 16.09 kHz of 1790 pixel clocks.

Vertical frequency (VD) : 15.06 Hz of 1068 lines.

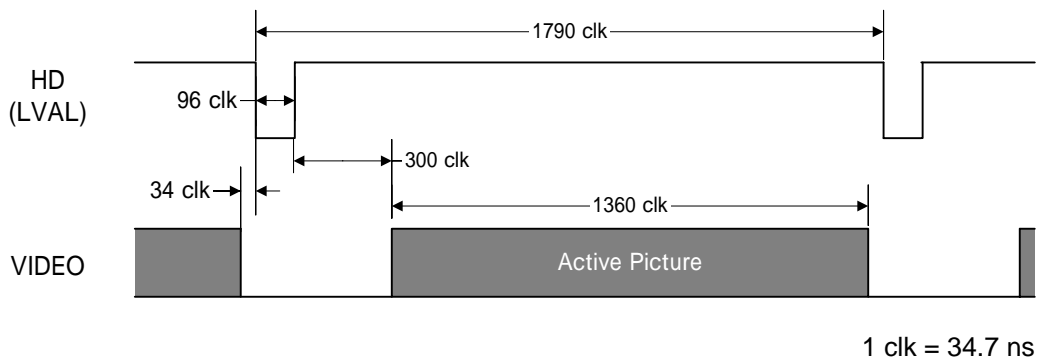
Pixel clock : 28.8 MHz

(Note 3) Only one input is available for external trigger among DC IN/SYNC and TRIG IN.

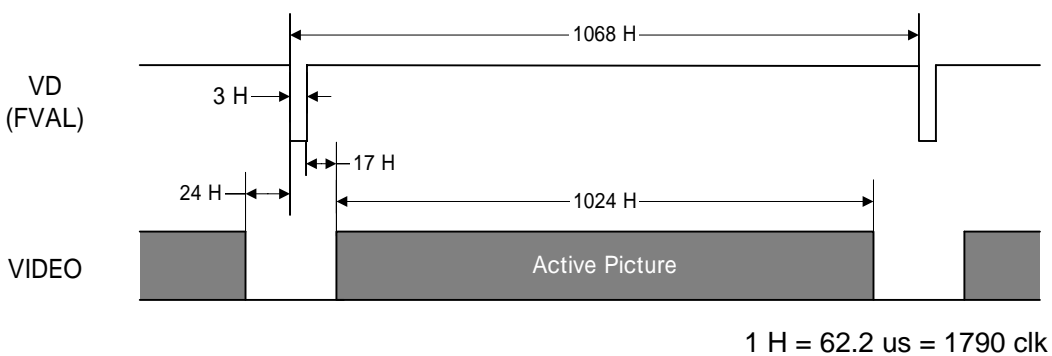
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6. Camera Link output timing chart

6.1 Horizontal sync and video timing



6.2 Vertical sync and video timing



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HV-F22GV
Color Camera
Specification (7/13)
(Tentative)

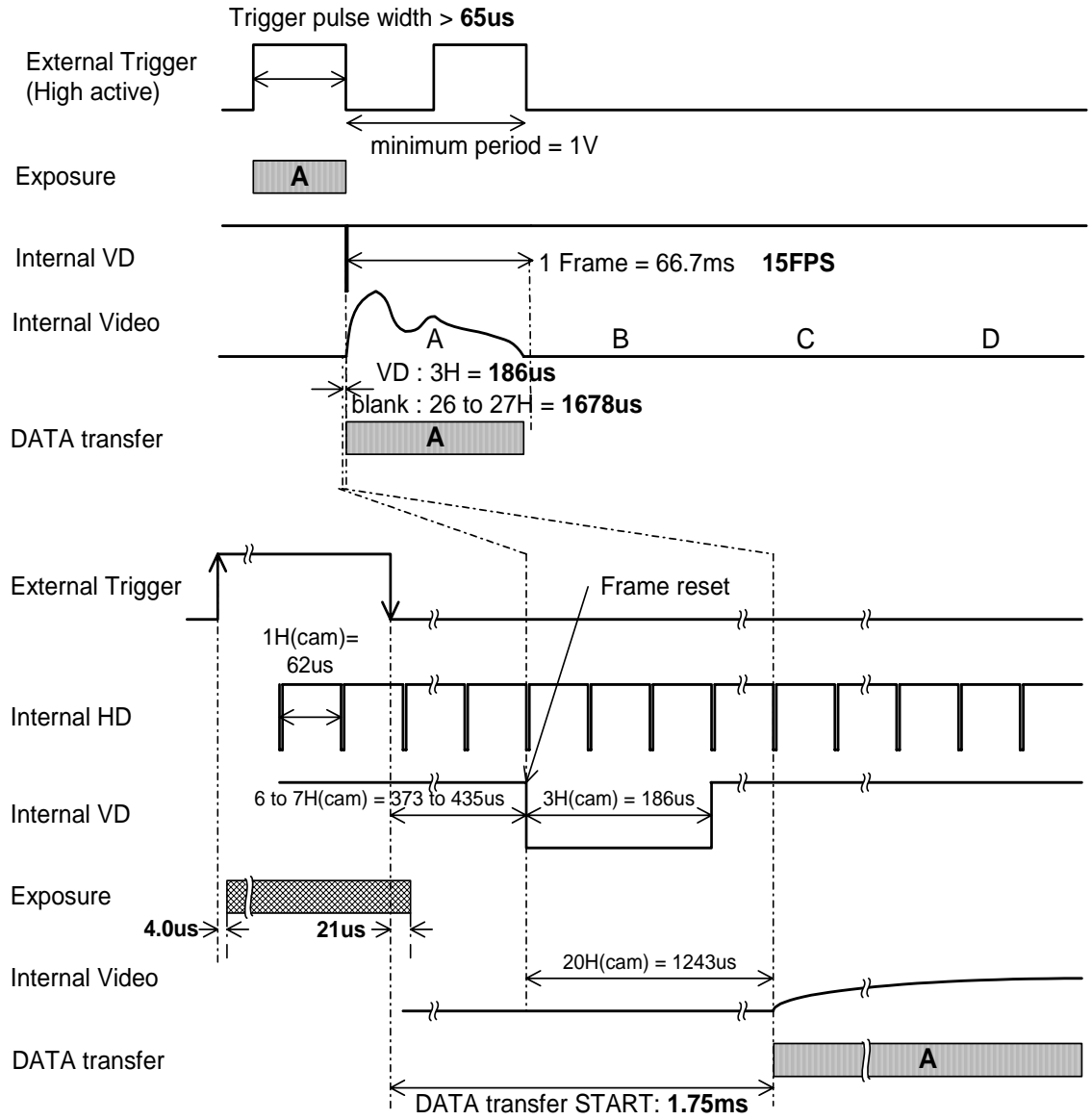
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7. External Trigger timing chart

7.1. Pulse width control exposure mode

The exposure time is controlled by the width of external trigger, and 1 frame image is output when the reset timing of VD signals.

The minimum exposure time is 1/ 10,000 seconds even with minimum trigger width.



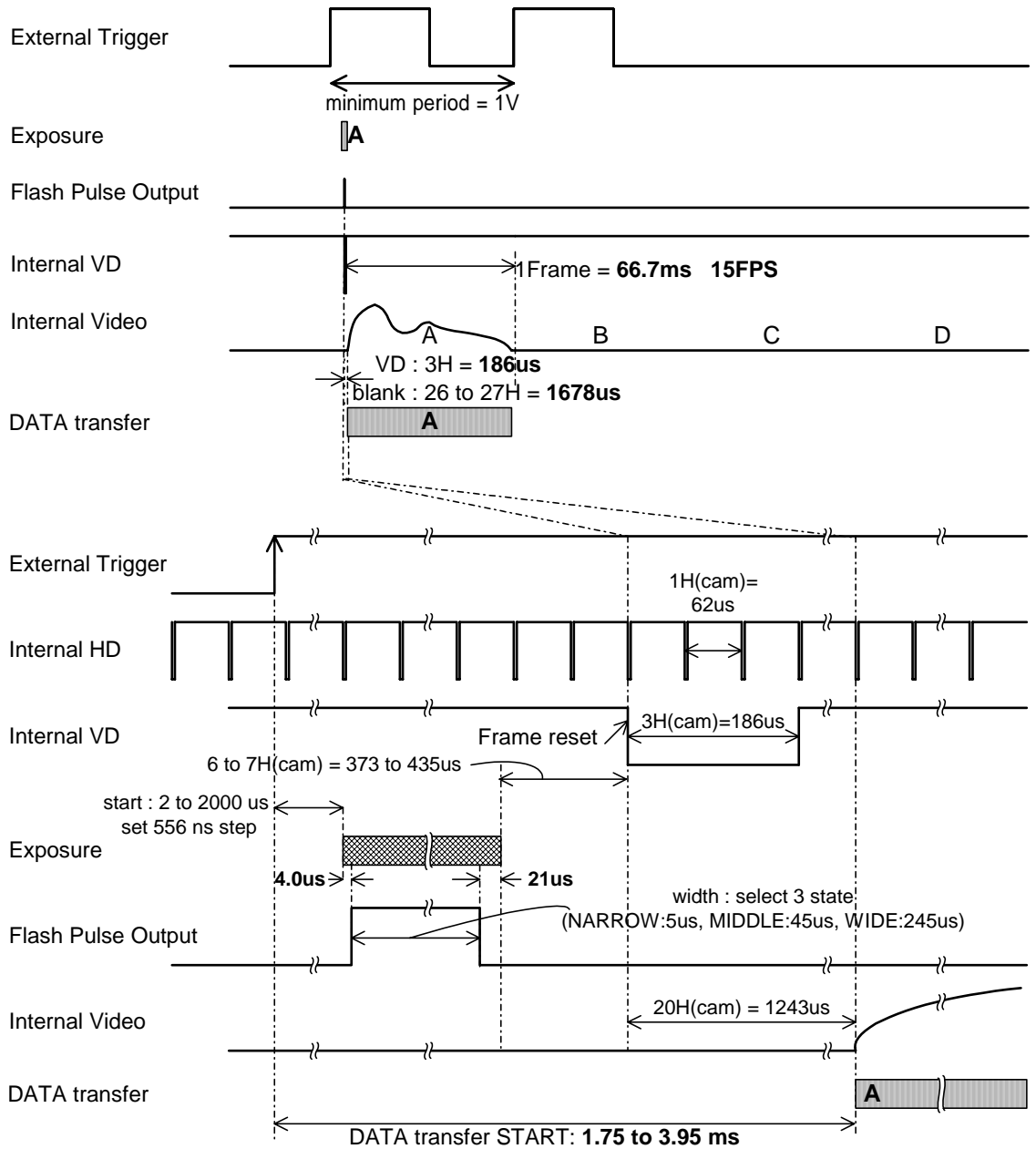
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Color Camera
Specification (8/13)
(Tentative)

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7.2. Pre-selected exposure mode

When the external trigger signal is input, a flash signal is output after the end of trigger signal. When the VD signal of the camera is reset after the end of flash signal, 1 frame image is output. The output timing of a flash signal against the trigger signal can be set on the camera



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HV-F22GV
Color Camera
Specification (9/13)
(Tentative)

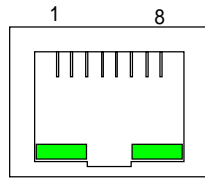
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8. Main connector pin arrangements

1) RJ-45 connector

Use connector: XRJV-S-01-8-8 (XMULTIPLE)

Recommended LAN cable : CAT-5e or CAT-6



Ethernet		
Pin	Signal Name	Function
1	TRD+A	Data line A Hot (Transmission and Receive)
2	TRD-A	Data line A Cold (Transmission and Receive)
3	TRD+B	Data line B Hot (Transmission and Receive)
4	TRD+C	Data line C Hot (Transmission and Receive)
5	TRD-C	Data line C Cold (Transmission and Receive)
6	TRD-B	Data line B Cold (Transmission and Receive)
7	TRD+D	Data line D Hot (Transmission and Receive)
8	TRD-D	Data line D Cold (Transmission and Receive)

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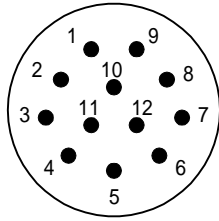
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2) DC IN / SYNC connector

Use connector: HR10A-10R-12PB(01) (HIROSE) or equivalent

Matching plug: HR10A-10P-12S(01) (HIROSE) or equivalent



DC IN / SYNC		
Pin	Signal Name	Function
1	GND	Ground
2	+12V IN	Power supply
3	GND	Ground
4	FLASH OUT	Strobe sync signal output
5	GND	Ground
6	HD IN / TXD	External HD sync input / Camera control output ^(Note)
7	VD IN / RXD	External VD sync input / Camera control input ^(Note)
8	GND	Ground
9	TRIG (H)	Photo coupler input (Hot)
10	TRIG (C)	Photo coupler input (Cold)
11	+12V IN	Power supply
12	GND	Ground

(Note) Either external sync input or camera control input/output are selectable by internal switch.

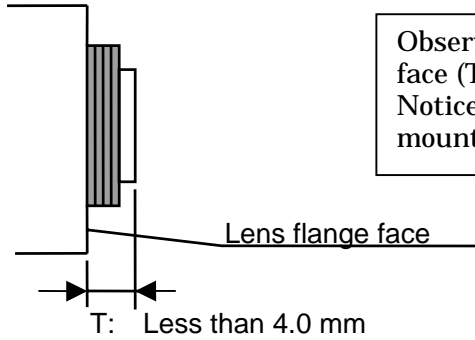
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9. Optional main accessories

- 1) Power supply adapter
- 2) DC IN / SYNC cable
- 3) Junction box JU-M1A

10. Cautions in using lens

- 1) Lens protrusion from flange face (T)



Observe the limit of lens protrusion from the flange face (T in figure). Notice the lens and camera can be damaged if this mounting dimension is not maintained.

- 2) Choosing a lens

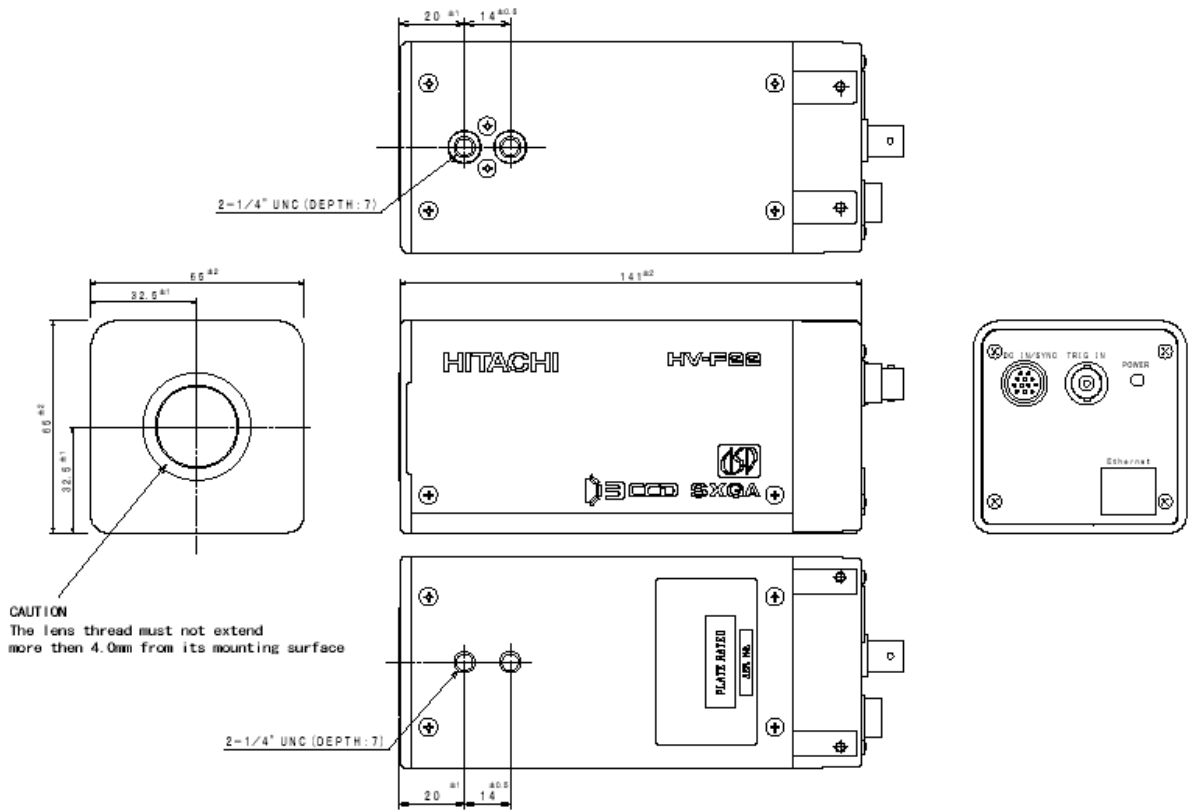
The proper lens is important for obtaining the best camera performance.

When choosing a lens, check with the lens maker and note the following points.

- Size should be for 1/2-inch. If too large (such as 2/3 inch) ghosting can appear in the scene.
- Vertical color shading can occur with a lens of short exit pupil.
- When used with the iris nearly fully open, shading and flare can detract from image quality.

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11. External View



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2

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A

B

C

D

E

F