

HV-F22F
Color Camera
Specifications

1. Introduction

The Hitachi HV-F22F 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 an IEEE1394 digital output.

A newly developed 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 IEEE1394 interface reduces the system cost without an image capturing board and special connecting cable.

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) IEEE1394 interface

Based on uncompressed data protocol (IIDC 1394-based Digital Camera Specification Ver 1.30), suitable for image processing.

3) Various output format

Total 7 formats are available, such as the high quality picture format and the moving picture format for focus adjustment of lens, according to the usage and the situation.

High quality picture: SXGA(1360 x 1024) 7.5 fps

Moving picture: VGA (640 x 480) 30 fps

4) 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 newly developed 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.

5) C mount lens adapter

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

6) 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.
- The auto-knee function that varies the compression point of high brightness signal according to the incident light, and the dynamic chrome function that improve color fade of high brightness signal, provide high fidelity picture against even a high contrast scene.
- 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.

7) Auto shading correction (ASC)

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

8) Versatile CCD drive functions

- Output frame rate selectable.
- Video frame capture on demand using external trigger signal.
See detailed specifications item 6.
- Long integration mode.
- Auto electronic shutter (AES) mode for stabilized video level.

9) Versatile imaging functions

- Four application files.

User settings provided for sharpness(detail), masking, knee 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

10) LED indicators

Camera rear panel has two LED indicators for power on/off and IEEE1394 communication status.

3. Standard composition

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4. Specifications

1) Optical system	1/2-inch F1.6 prism
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)
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
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
15) Color bar	Full
16) Power supply voltage	12 VDC nominal (Stable operation from 10.5 to 15 VDC, without ripple and noise.)
17) Power consumption	Approx. 8W
18) Dimensions	65 (W) x 65 (H) x 130 (D) mm
19) Mass	Approx. 600 g (not including lens)
20) Recommended ambient temperature, operating	0 to +40
21) Recommended ambient temperature, storage	-20 to +60

5. Input and output signals

5.1 IEEE1394 (Video and control signals, power supply)

(If power is supplied from IEEE1394, check the power and voltage of the source.

If not matched, a separate power supply is required.)

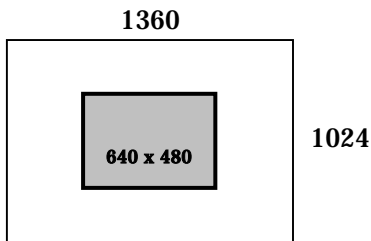
1) Transmit format

The frame rate is shown in the case of 1 camera and 1 PC.

Camera Mode		Frame Rate	bit/pixel	bit/ch	Format	Mode(ID)
SXGA (1280 x 960)	YUV	7.5	16	8	2	0
SXGA (1280 x 960)	RGB	7.5	24	8	2	1
VGA (640 x 480) <small>note2</small>	YUV	30	16	8	0	3
VGA (640 x 480) <small>note2</small>	RGB	30	24	8	0	4
SXGA (1360 x 1024)	YUV	7.5	16	8	7	2
SXGA (1360 x 1024)	RGB	7.5	24	8	7	4
SXGA (1360 x 1024)	RGB	1.875	48	10	7	6

Note2:

A VGA output format is extracted the center VGA size area from all the screens.



2) Transmit speed

· 400 Mbps

3) Connector type

· 6 pin bus powered type

5.2 DC IN and Sync I/O signals

1) Genlock input

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

2) External trigger input (Photo-coupler input)

- Trig in low 0 VDC, high 24 VDC

3) Strobe sync signal output

- Flash out low 0 VDC, high 5 VDC

4) Power supply input

(Supplied from higher voltage connector between IEEE1394 and DC in/Sync)

- 10.5 to 15 VDC , 8W

5.3 Trig in input signal

Only external trigger signal can be supplied even with BNC cable

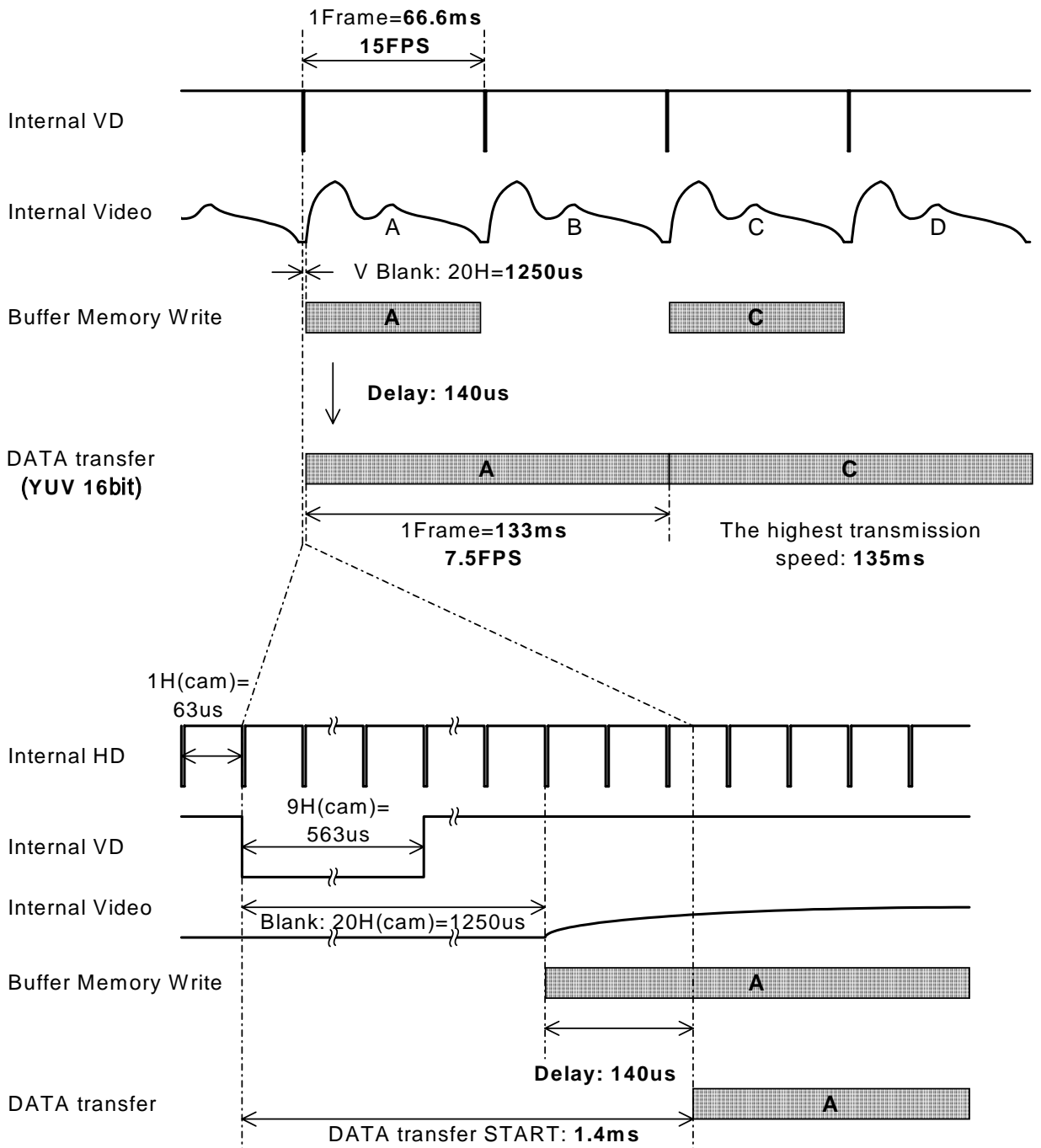
(Switched DC in/Sync by connector Trig in and command)

- Trig in low 0 VDC, high 2 to 5 VDC

6. Timing chart

6-1. Internal sync mode

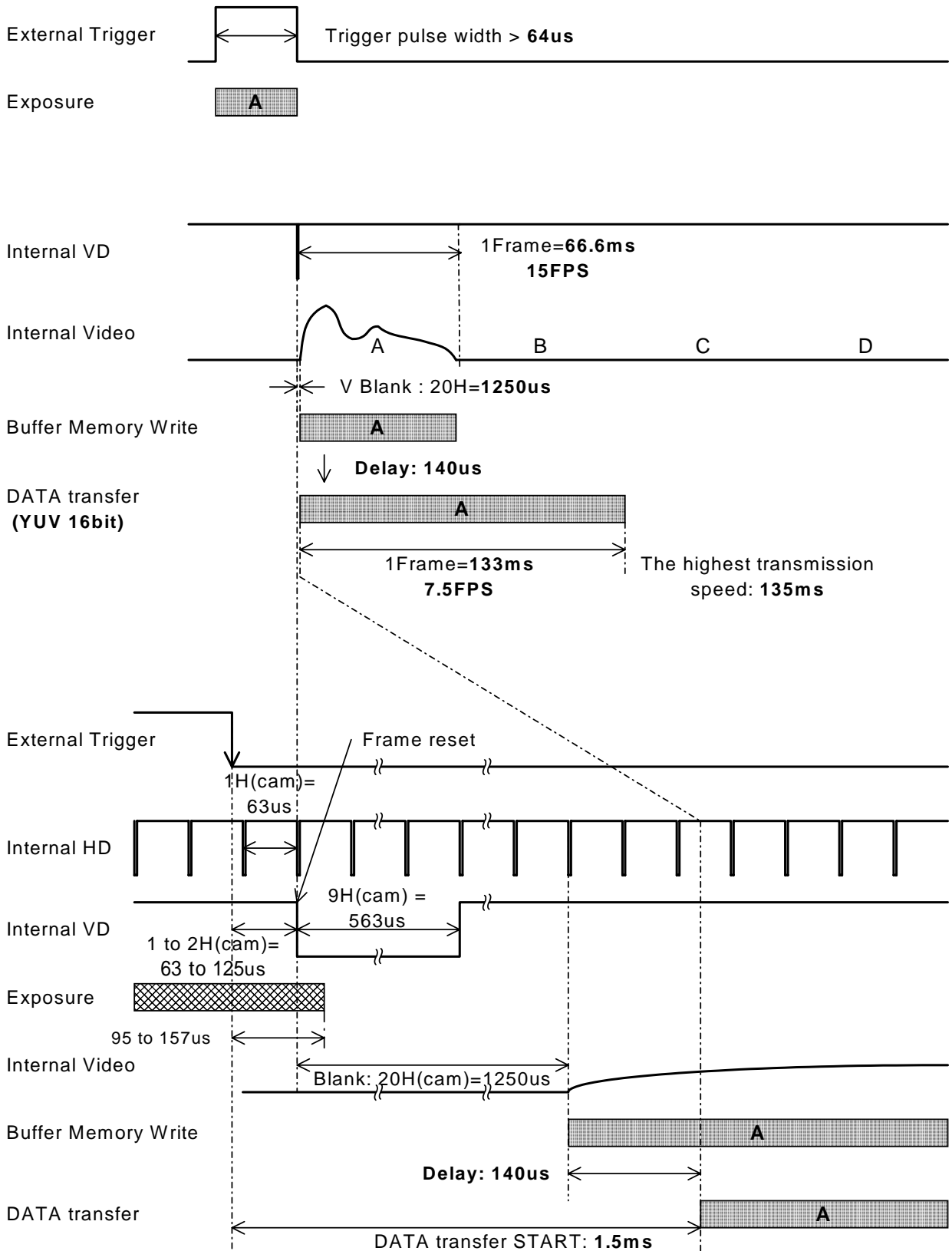
As for the data transfer, it is the timing chart when one camera and one PC are connected.



6-2. External trigger mode

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

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

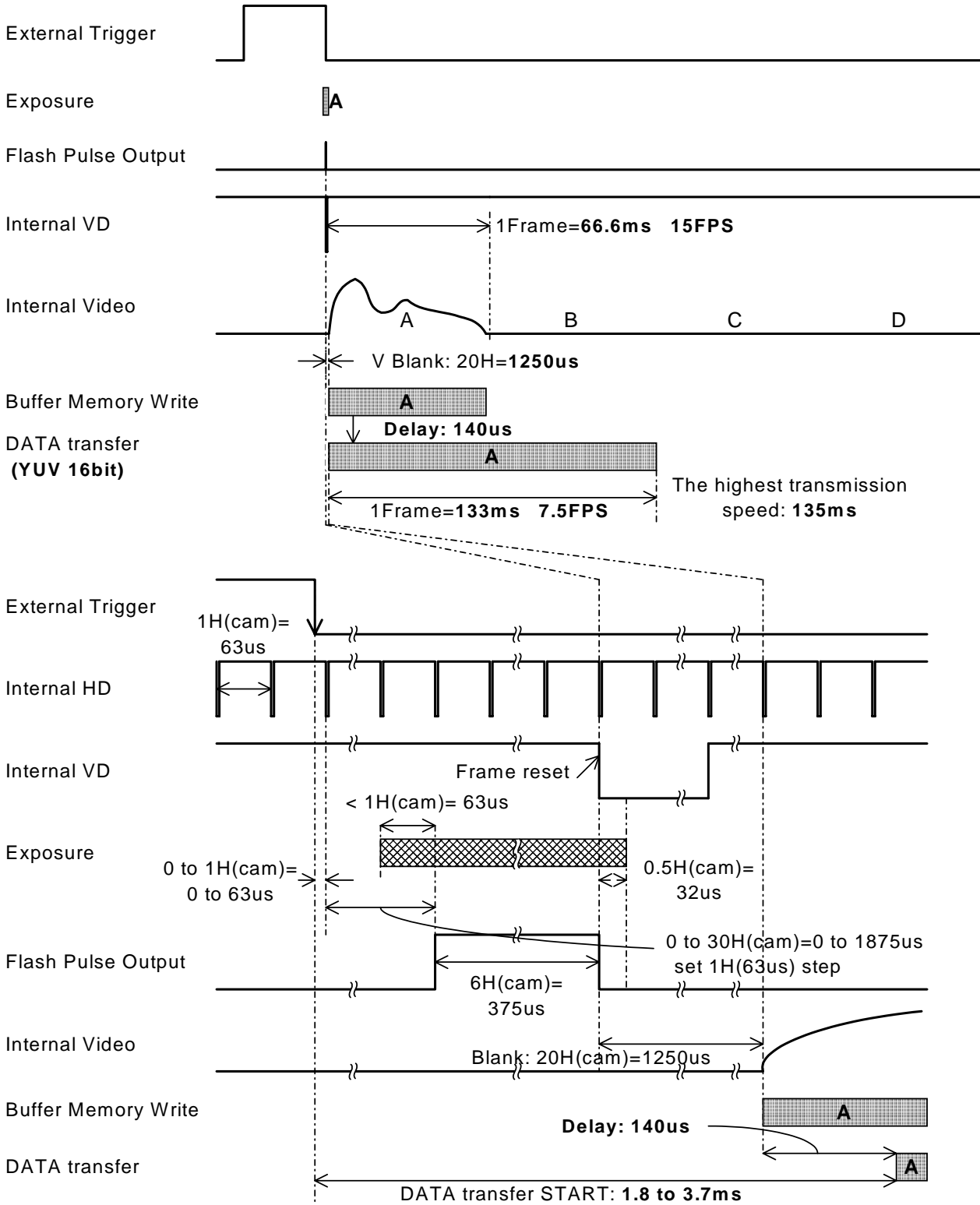


6-3.Flash pulse output

When the external trigger signal is input, a flash signal is output after the end of trigger signal

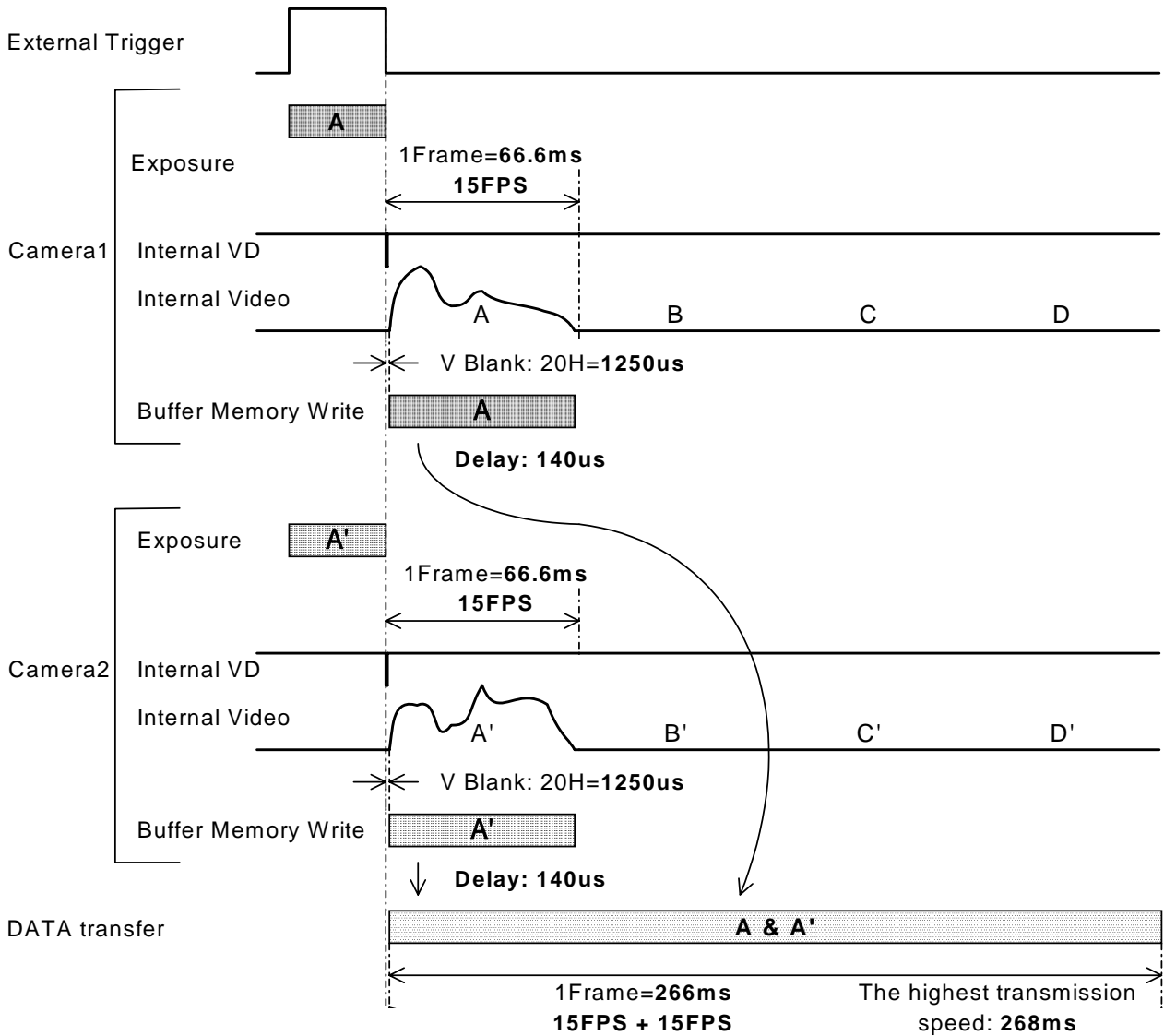
When the VD signal of the camera is reset after the end of flash signal, 1 frame image is output

The output timing of a flash signal against the trigger signal can be set on the camera



6-4. Data transfer timing in two camera connections

When these two cameras and one PC are connected with one IEEE1394 bus, the data transfer time is required about two times in 1 to 1 connection, because each two cameras transfer the data to PC.



7. Main connector pin arrangements

1) DC in/Sync connector

(HR10A-10R-12PB(01))

Pin No	Signal
1	GND
2	+12V IN
3	GND
4	FLASH OUT
5	GND
6	HD IN
7	VD IN
8	GND
9	TRIG HOT
10	TRIG COLD
11	+12V IN
12	GND

Plug: HR10A-10P-12S(01)

2) IEEE1394 connector

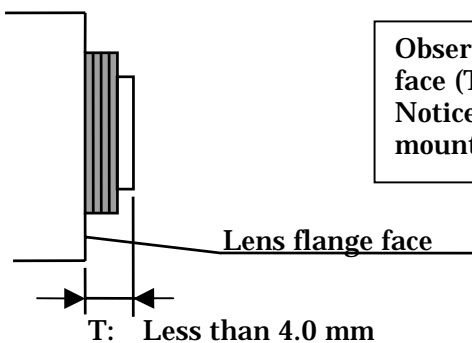
Pin No	Signal
1	+12V IN
2	GND
3	TPB-
4	TPB+
5	TPA-
6	TPA+

8. Main accessories

- 1) Power supply adapter
- 2) DC IN / SYNC cable
- 3) IEEE1394 cable
- 4) SDK (Software development kit)

9. 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.

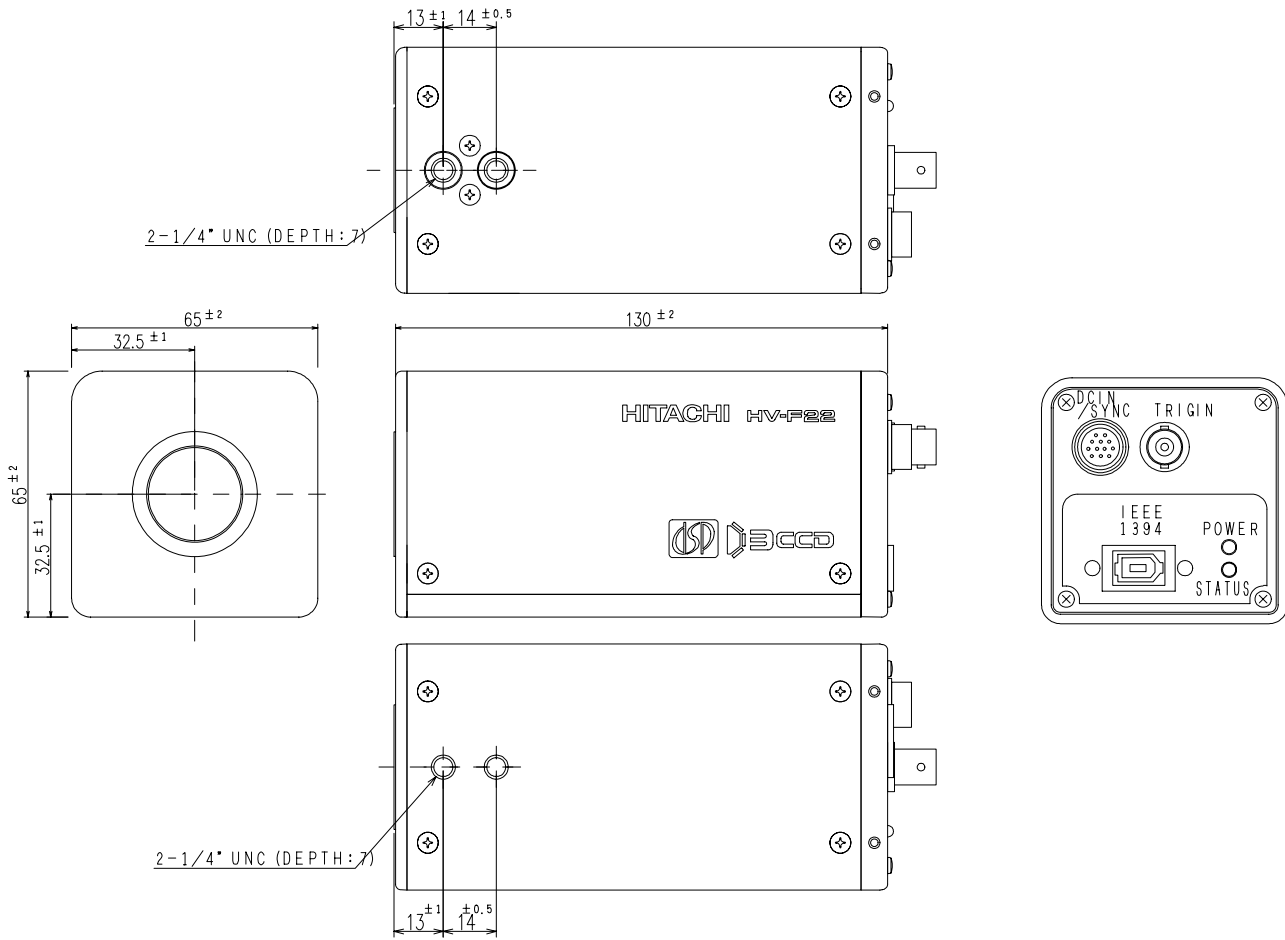
2) Choosing a lens

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.

10. External View



11. System diagram

