# Hitachi Kokusai Electric Inc.

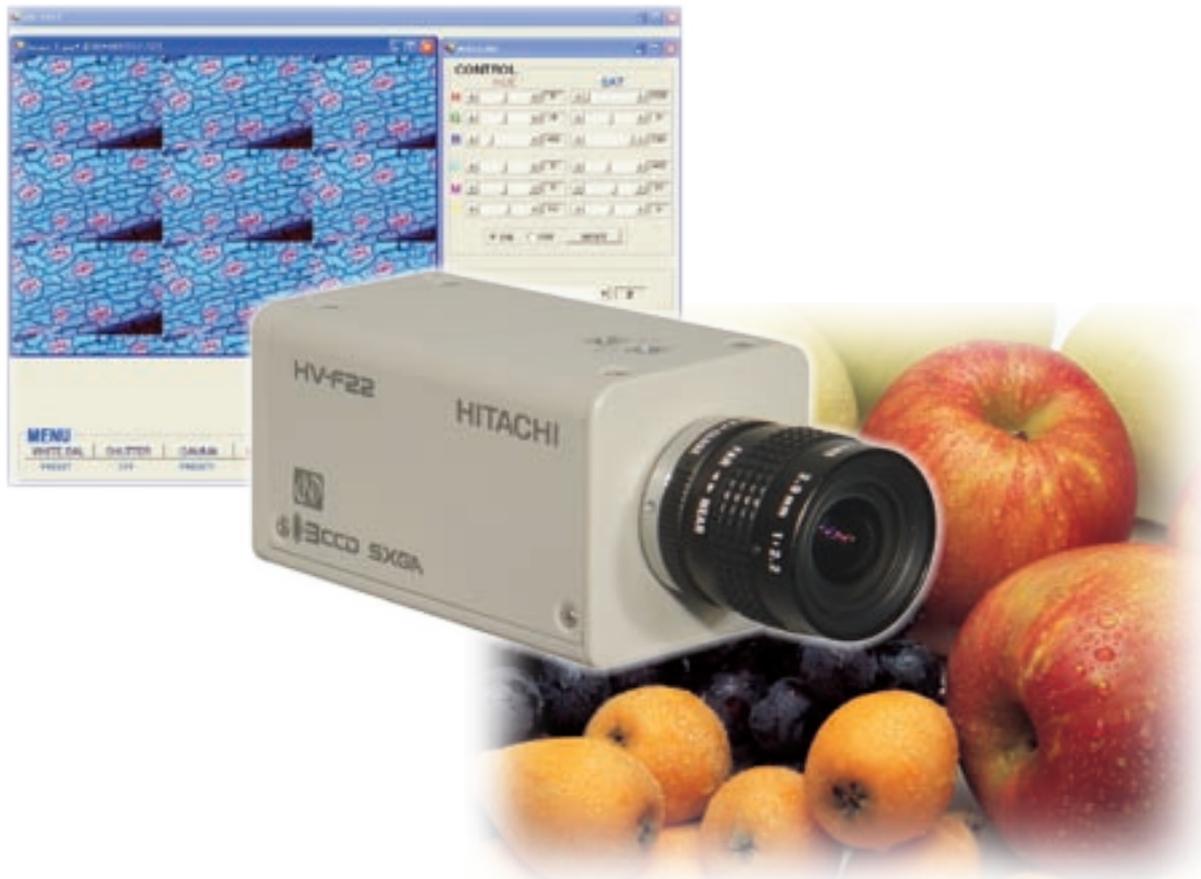**HITACHI**

**High precision digital processing**

## 3CCD progressive scan color camera
# HV-F31/F22

IEEE 1394

camera link



## Outline

**Camera Link**
HV-F31CL : 1/3" XGA (1024×768)
30 frame/second
HV-F22CL : 1/2" SXGA (1360×1024)
15 frame/second

**IEEE1394**
HV-31F : 1/3" XGA (1024×768)
7.5 frame/second (RGB)
HV-22F : 1/2" SXGA (1360×1024)
7.5 frame/second (RGB)

## Features

- Excellent color in image capture

- High resolution

- Auto shading correction

- Independent six color adjustment

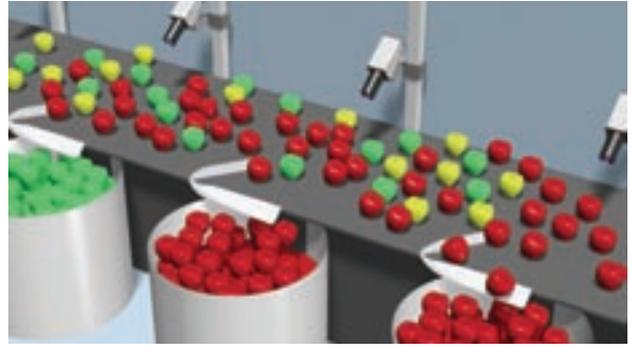- IEEE1394 IIDC(Ver. 1.30) / Camera Link

# Example Applications

HV-F31 and HV-F22 are designed for a wide range of applications.

**■ Printing Check**  Detection of uneven printing



**■ Fruit Check**  Check on fruit damage and ripening



**■ Car Body Coating**  Check on uneven coating and scratches



**■ Biological Microscope**  Observation of cells
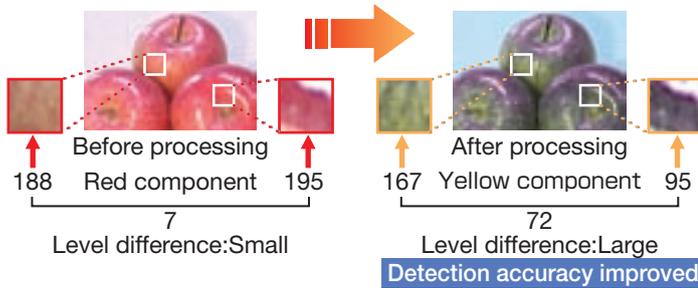


# Merits of 3-CCD Camera

## Color Detection
## (optimum for check on uneven printing and fruits)

Subtle color differences are detectable by processing (emphasis or subtraction) of a specific color using 6-color independent masking.

• Example of improved detection accuracy on apple ripening level

Comparison after subtraction of a red component and emphasis of a yellow component



Before processing
188  Red component  195
7
Level difference:Small

After processing
167  Yellow component  95
72
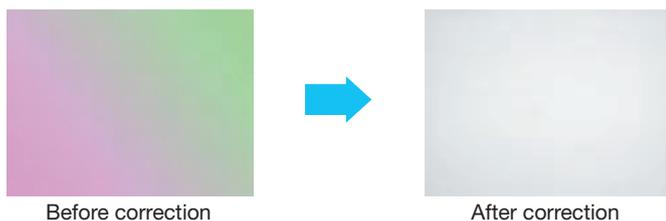Level difference:Large
Detection accuracy improved

(Note) This camera is not used for output of the above numeral (resolution in 8bit). It is output of a processed image.
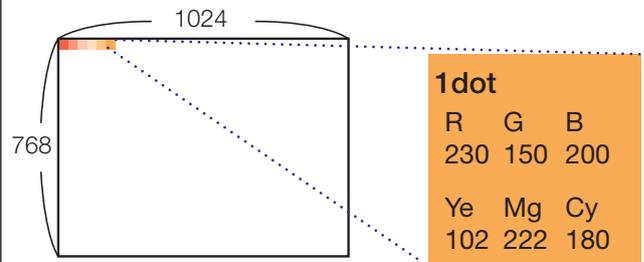
• Because arithmetic operation is performed inside the camera, it will not apply a load to the CPU of equipment, so high-speed image processing is ensured.

### 6color Independent Masking



1024
768

**1dot**

| R | G | B |
|-----|-----|-----|
| 230 | 150 | 200 |

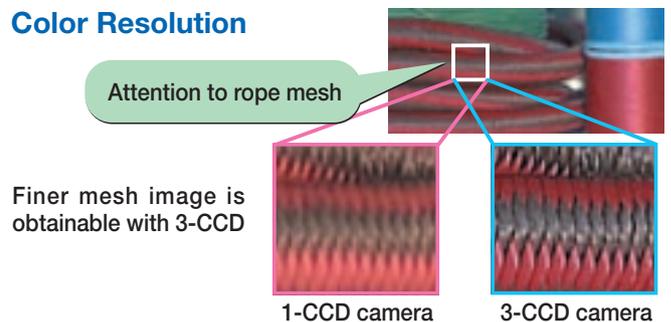| Ye | Mg | Cy |
|-----|-----|-----|
| 102 | 222 | 180 |

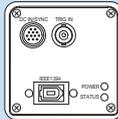Each color of R,G,B,Ye,Mg and Cy can be represented and changed as an independent numeric value.

Colors are freely changeable and the foloowing are available.

● Detection of a specific color
 · Natural color reproduction
 · Red alone changed



## Auto Shading

Color shading (uneven color) due to lens and lighting can be automatically corrected.



Before correction          After correction

## Color Resolution



Attention to rope mesh

Finer mesh image is obtainable with 3-CCD

1-CCD camera          3-CCD camera

## Comparison of Interfaces

|  | HV-F31CL/F22CL | HV-F31F/F22F |
|---|---|---|
| Interface | Camera Link | IEEE1394 |
| Cable length | 10m | 4.5m |
| Connector | 26P×2(medium configuration)<br>※ Base configuration applicable | 6Pin(with lock) |
| Transmissible Data volume | 900Mbps(medium configuration)<br>700Mbps(base configuration) | 400Mbps |
| Remote control | CameraLink API | IIDC |
| Rear view |  |  |

Caution  For power supply from IEEE1394, contact the sales representative.

## IEEE1394

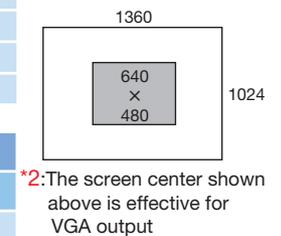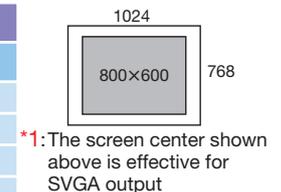■ **Features**
- Direct PC connection without using a frame grabber board
- Small-diameter cable
- Multiple cameras connectable by use of hub

■ **Specifications**
- Compatible OHCI, 400Mbps
- Non-compression
- Conforming with IIDC1.3

## Transmission Format

The HV-F31F/F22F cameras allow transmission of an image with its size changed by remote operation.

### HV-F31F

| Camera mode | | Frame Rate | bit/pixel | bit/ch |
|---|---|---|---|---|
| XGA(1024×768) | YUV | 15 | 16 | 8 |
| | RGB | 7.5 | 24 | 8 |
| SVGA(800×600)<br>*1 | YUV | 30 | 16 | 8 |
| | RGB | 15 | 24 | 8 |
| XGA(1024×768) | RGB | 3.75 | 48 | 10 |

### HV-F22F

| Camera mode | | Frame Rate | bit/pixel | bit/ch |
|---|---|---|---|---|
| SXGA(1280×960) | YUV | 7.5 | 16 | 8 |
| | RGB | 7.5 | 24 | 8 |
| VGA(640×480)<br>*2 | YUV | 30 | 16 | 8 |
| | RGB | 30 | 24 | 8 |
| SXGA(1360×1024) | YUV | 7.5 | 16 | 8 |
| | RGB | 7.5 | 24 | 8 |
| | RGB | 1.875 | 48 | 10 |



*1: The screen center shown above is effective for SVGA output



### HV-F31CL

| Camera mode | | Frame Rate | bit/pixel | bit/ch |
|---|---|---|---|---|
| XGA(1024×768) | RGB | 30 | 30 | 10 |

### HV-F22CL

| Camera mode | | Frame Rate | bit/pixel | bit/ch |
|---|---|---|---|---|
| SXGA(1360×1024) | RGB | 15 | 30 | 10 |

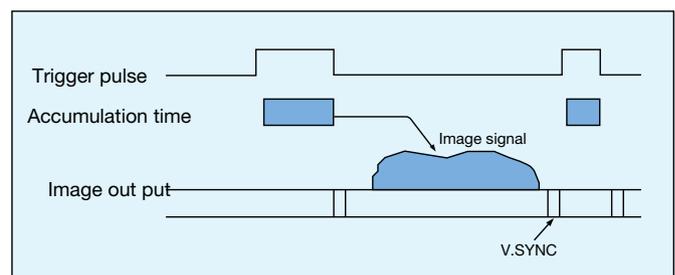*2: The screen center shown above is effective for VGA output

## Application

Various camera functions, such as a Shutter, Gamma, Masking, etc, are available for adjustment through the easy to use GUI software which is included with the camera.
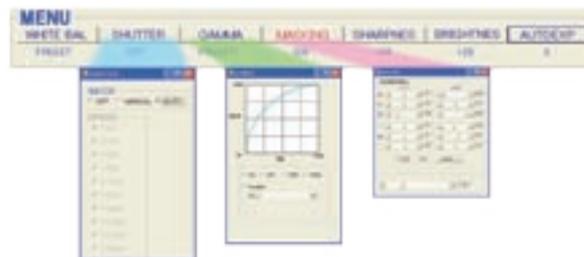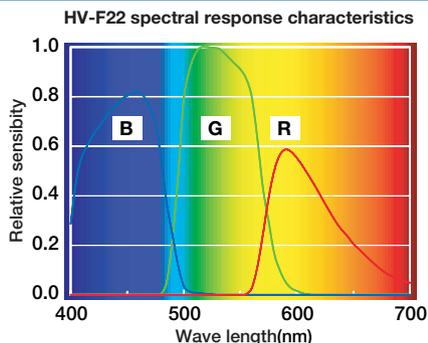


## Frame On-demand function

An image can be acquired at a desired timing by external input of a trigger signal.

•One-trigger mode
When a single trigger pulse is input, exposure will start at the rising edge of the pulse and will end at the falling edge. Then, V.SYNC will be reset immediately followed by output of the image. Pulse width corresponds to the exposure time

## RGB spectral response characteristics

**HV-F22 spectral response characteristics**



Relative sensibity (y-axis: 0.0, 0.2, 0.4, 0.6, 0.8, 1.0)
Wave length(nm) (x-axis: 400, 500, 600, 700)
B  G  R

## Pin arrangement

### ■ Camera Link (HV-F31CL/F22CL)

13 ─ 1  13 ─ 1
26 ─ 14  26 ─ 14

**3M 10226-2200VE**

#### connector1

| 1 | GND | 14 | GND |
|---|---|---|---|
| 2 | X0- | 15 | X0+ |
| 3 | X1- | 16 | X1+ |
| 4 | X2- | 17 | X2+ |
| 5 | Xclk- | 18 | Xclk+ |
| 6 | X3- | 19 | X3+ |
| 7 | SerTC+ | 20 | SerTC- |
| 8 | SerTFG- | 21 | SerTFG+ |
| 9 | ExtVD[CC1]- | 22 | ExtVD[CC1]+ |
| 10 | Trig[CC2]+ | 23 | Trig[CC2]- |
| 11 | ExtHD[CC3]- | 24 | ExtHD[CC3]+ |
| 12 | NC[CC4]+ | 25 | NC[CC4]- |
| 13 | GND | 26 | GND |

#### connector2

| 1 | GND | 14 | GND |
|---|---|---|---|
| 2 | Y0- | 15 | Y0+ |
| 3 | Y1- | 16 | Y1+ |
| 4 | Y2- | 17 | Y2+ |
| 5 | Yclk- | 18 | Yclk+ |
| 6 | Y3- | 19 | Y3+ |
| 7 | NC | 20 | NC |
| 8 | NC | 21 | NC |
| 9 | NC | 22 | NC |
| 10 | NC | 23 | NC |
| 11 | NC | 24 | NC |
| 12 | NC | 25 | NC |
| 13 | GND | 26 | GND |

### ■ IEEE1394
(HV-F31F/F22F)
molex 55395-0611

2 4 6 / 1 3 5

| 1 | +12V IN |
|---|---|
| 2 | GND |
| 3 | TPB− |
| 4 | TPB+ |
| 5 | TPA− |
| 6 | TPA+ |

### ■ 12pin(common)
HIROSE
HR10A-10R-12PB(01)

| 1 | GND | 7 | VD IN |
|---|---|---|---|
| 2 | +12V IN | 8 | GND |
| 3 | GND | 9 | TRIG(H) |
| 4 | FLASH OUT | 10 | TRIG(C) |
| 5 | GND | 11 | +12V IN |
| 6 | HD IN | 12 | GND |

## When using lens

**Caution !**
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.
T≦4.2mm (HV-F31)  T≦ ГГ4.0mm(HV-F22)

Lens flange face
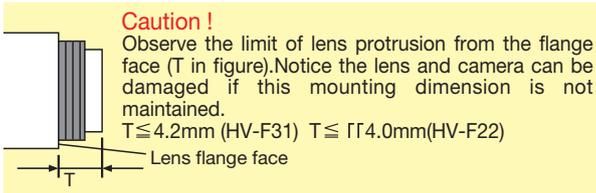
## Specifications

| | HV-F31 | HV-F22 |
|---|---|---|
| Frame rate | 30f/s(F31CL)15f/s(F31F) | 15f/s(F22CL)7.5f/s(F22F) |
| Pixel Clock | 28.8MHz | |
| CCD | 1/3" | 1/2" |
| Imaging area | 4.76(H)×3.57(V) mm | 6.32(H)×4.76(V) mm |
| Effective pixels | 1024(H)×768(V) | 1360(H)×1024(V) |
| Unit cell size | 4.65(H)×4.65(V)um Square pixel | |
| Gain | AGC(0～+12dB) | |
| Trigger | One trigger mode | |
| Shutter | 1/100,000～1/30～4(seconds) | 1/100,000～1/15～4(seconds) |
| Ambient | operating 0～+40℃(+32 °F to +104° F) | |
| Vibration | 29  m/s2 (3 G) | |
| Shock | 490 m/s2 (50 G) | |
| Power supply | 12V nominal  Approx.9W | |
| Dimensions | 65(W)×65(H)×130(D) mm | |
| Mass | Approx. 600 g (21 oz) (not including lens) | |

## Dimension

※All models common dimension



20  14
2-1/4"UNC(DEPTH:7)
32.5  65  130
65  32.5
HITACHI  HV-F22
3CCD SXGA
2-1/4"UNC(DEPTH:7)
20  14
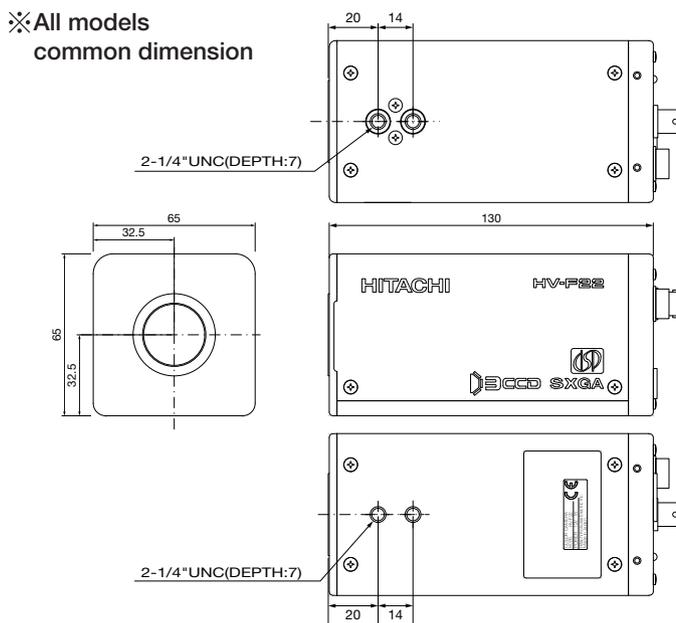
## Standard Composition

Camera ....................................1
Operation Manual ...................1
Sample Software ....................1
　(CD-ROM)

## Optional Accessories

IEEE1394Cable　......................1
Junction Box　.......................1
　(JU-M1A)

⚠ **CAUTION :** To ensure safe operation, please read the instruction manual before using this product.

These Specifications are subject to change without notice.

# Hitachi Kokusai Electric Inc.

**DV-E415** Printed in Japan (K) '04-05