

HITACHI

KP-F1A
**Progressive Scan
B/W CCD Camera
Operation Guide**

Apr 2003

Ver 1.1

Hitachi Kokusai Electric Inc.

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1. General

The KP-F1A is a monochrome (black and white) frame shutter camera utilizing a 1/2-inch full pixel readout CCD.

The image output is 30 frame (CCIR: 25 frame) Non-interlace (progressive scan: PS) single line.

KP-F1AN: EIA

KP-F1AP: CCIR

2. Composition

- 1) Black and white camera (With IR cut filter) 1
- 2) Operation manual..... 1

3. Specifications

- | | |
|-----------------------------|--|
| 1) Imaging device | 1/2 inch progressive scan interline CCD |
| Total pixels | EIA: 692(H) × 504(V)
CCIR: 823(H) × 592(V) |
| Effective pixels | EIA: 659(H) × 494(V)
CCIR: 782(H) × 582(V) |
| Pixel size | EIA: 9.9(H) × 9.9(v)μm
CCIR: 8.3(H) × 8.3(v)μm |
| 2) Sensing area | EIA: 6.52(H) × 4.89(V)mm
CCIR: 6.49(H) × 4.83(V)mm |
| 3) Scanning system | Progressive scan (30 frame)(CCIR: 25 frame) |
| 4) Lens attachment | C mount |
| 5) Flange back | 17.526 mm (not adjustable) |
| 6) Hor. scanning frequency | EIA: 15.734 kHz
CCIR: 15.625 kHz |
| 7) Vert. scanning frequency | EIA: 29.97 Hz
CCIR: 25 Hz |
| 8) Sync system | Internal/ External trigger (Internal switch) |
| 9) Video output | 1.0 Vp-p, 75Ω, unbalanced, single line
Video component : 0.7 Vp-p
Sync component : 0.3 Vp-p negative |

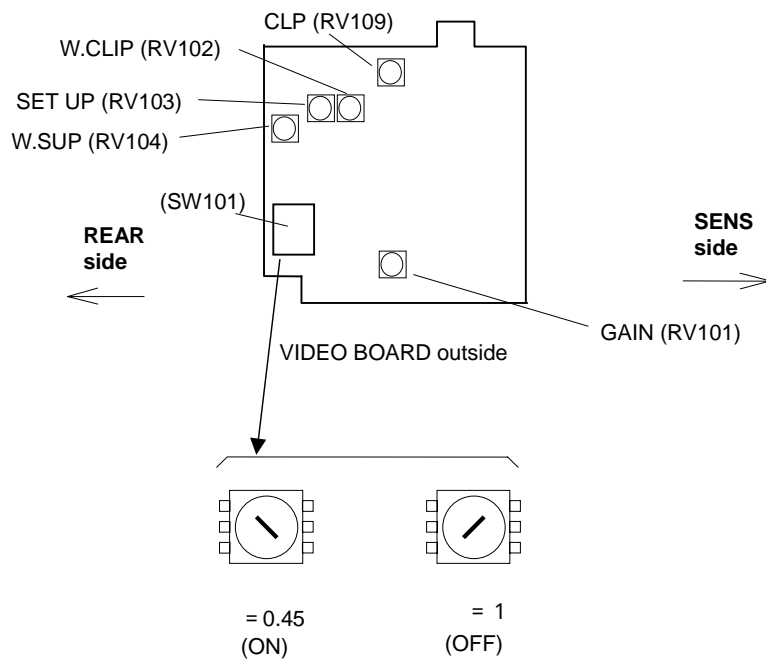
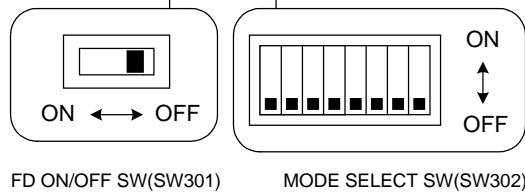
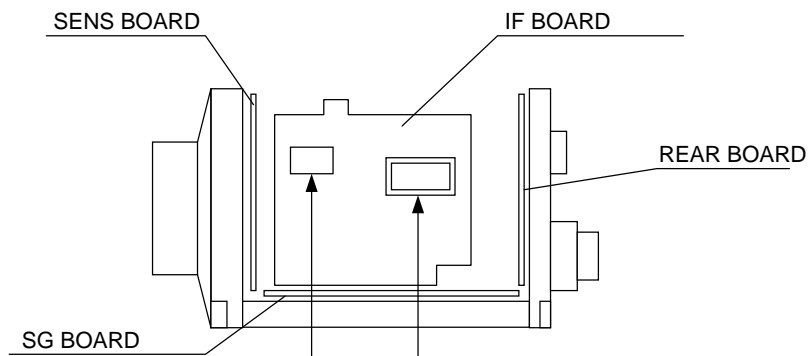
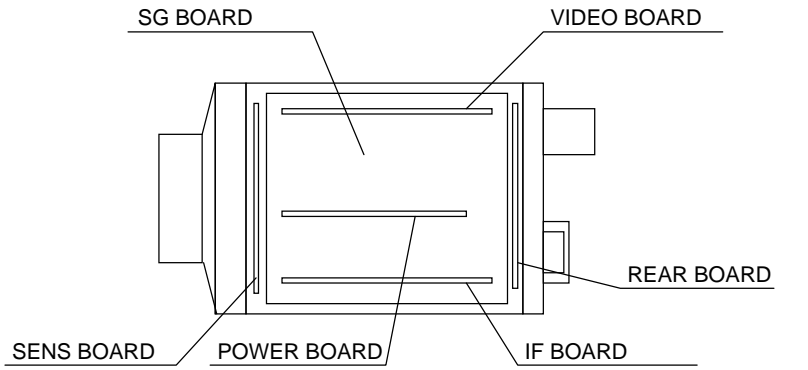
10) Resolution	EIA: 500(H) × 485(V) TV lines CCIR: 580(H) × 575(V) TV lines
8) Sensitivity	400 lux, F8, 3200 K
9) Minimum object illumination	3 lux, F1.4, AGC and gamma on, Without infrared cut filter
10) Signal to noise ratio	60 dB
11) Electronic shutter	Internal switch settings for off (Standard exposure), 1/100(EIA), 1/120(CCIR), 1/125, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000 second. Factory setting is off.
12) Gamma correction	Internal switch setting for 1 or compensate. Factory setting is 1(off).
13) Sensitivity selection	Exterior switch for fixed, AGC, manual. Factory setting is Fix (fixed gain).
14) Frame on demand	Internal on/off switch. Selectable One trigger, Two trigger and fixed shutter modes. Factory setting is off.
15) Power supply voltage	12 ± 1 VDC
16) Power consumption	Approx. 2.4 W
17) Ambient temperature and humidity	Operating -10 to 50 RH less than 90 % Storage -20 to 60 RH less than 70 %

Caution: For continued stable operation, the camera should be used under 40 °C or less when it is used continuously for extended period of time.

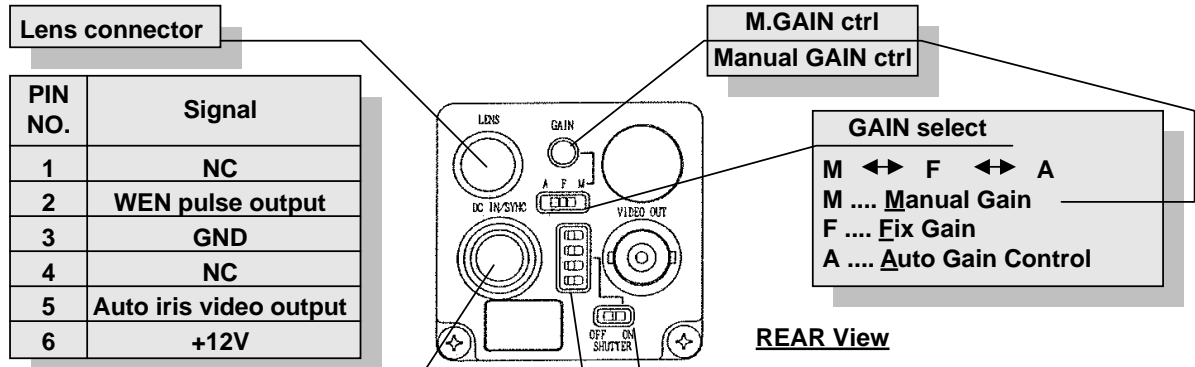
18) Anti-vibration	68.6m/s ² (10 to 60Hz, amplitude: 0.98mm constant, 60 to 200Hz, amplitude: variable) (10 to 150Hz, sweep:1 min., XYZ, 30 min.)
19) Resistance to shock	686m/s ² (Drop test, once each top, bottom, left and right)
20) Dimensions	44(W) × 44(H) × 67(L)mm
21) Mass	150g approx.

4 Adjustment

TOP VIEW



4.Adjustment



VIDEO OUT/DC IN/SYNC CN

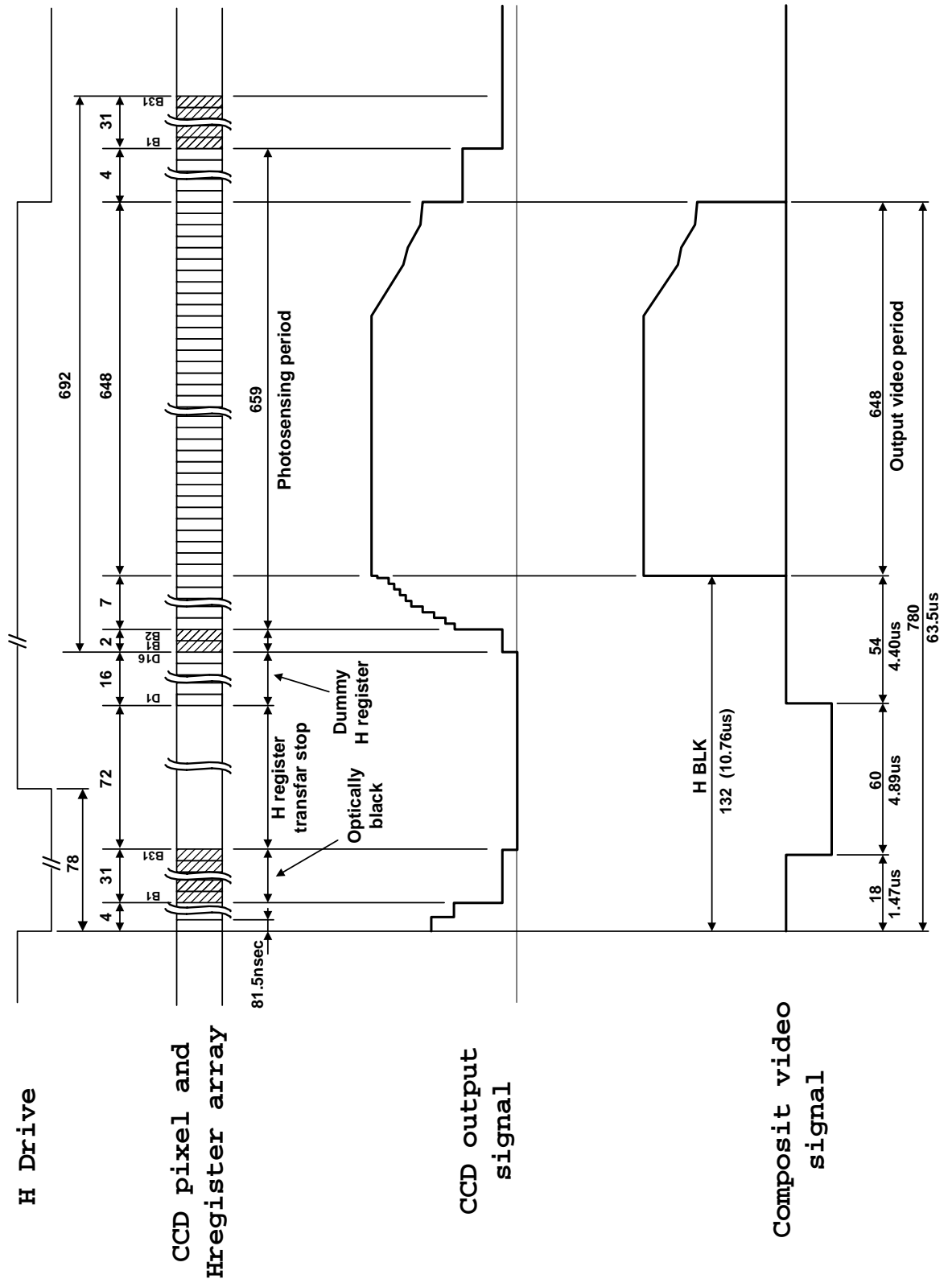
PIN NO.	Internal sync mode	External trigger mode		
		Frame on demand		
		ONE trigger	TWO trigger	Fixed shutter
1	GND	GND	GND	GND
2	+12V	+12V	+12V	+12V
3	GND(Vout)	GND(Vout)	GND(Vout)	GND(Vout)
4	Vout	Vout	Vout	Vout
5	-	(GND)	GND(Trig B)	-
6	-	(HD IN)	Trigger B IN	-
7	-	Trigger A IN	Trigger A IN	Trigger A IN
8	-	-	-	-
9	-	-	-	-
10	GND	GND	GND	GND
11	+12V	+12V	+12V	+12V
12	-	GND(Trig A)	GND(Trig A)	GND(Trig A)

E.SHUTTER ON			
	OFF		1/1000S
	1/100S 1/120S		1/2000S
	1/125S		1/4000S
	1/250S		1/10000S
	1/500S		

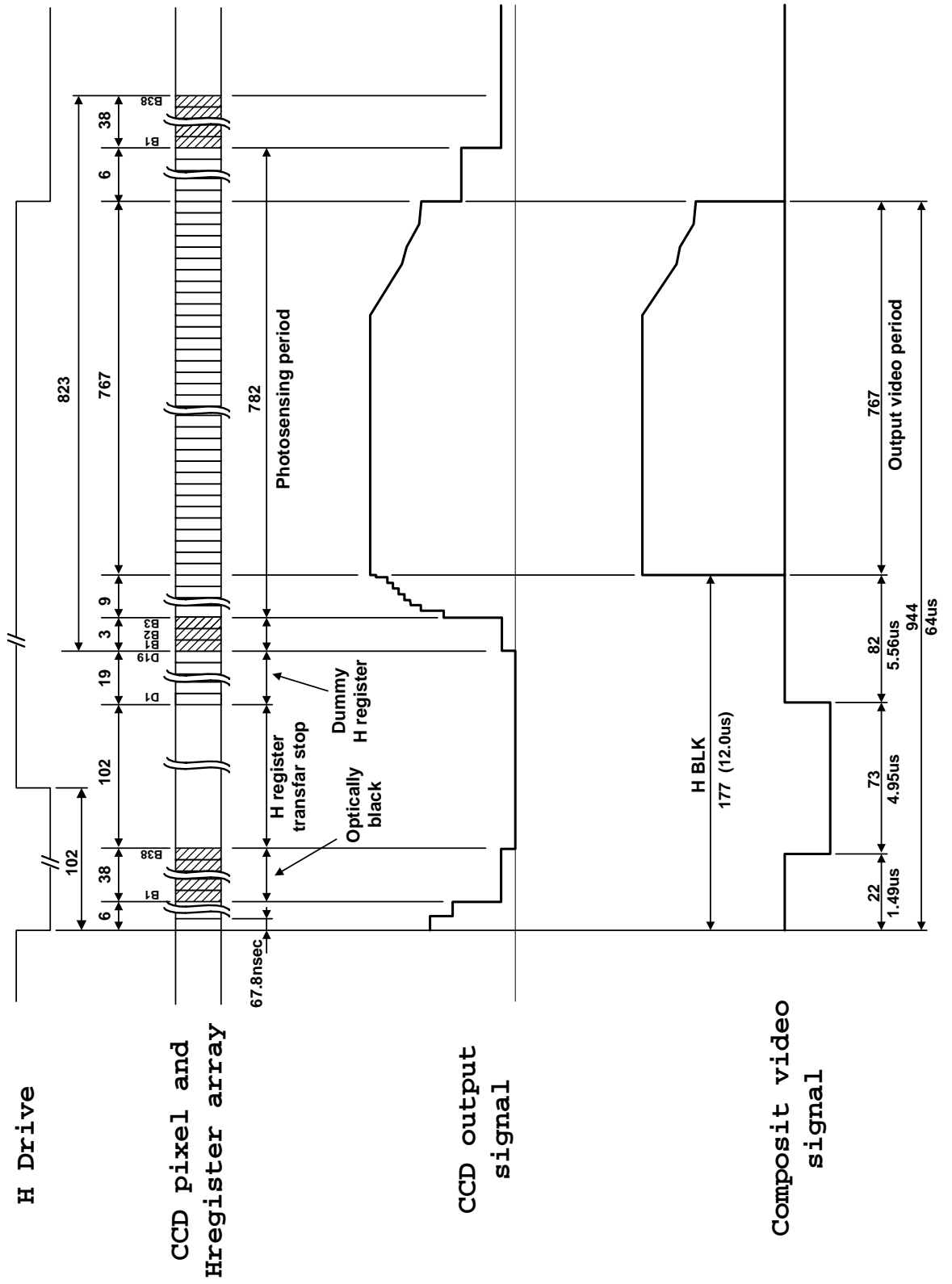
Note: The video signal can not be fed simultaneously from both the VIDEO OUT connector and the DC IN/SYNC connector. If both the outputs are connected simultaneously, a proper picture can not be obtained.

5 Timing chart

KP-F1AN CCD OUTPUT WAVE TIMING CHART

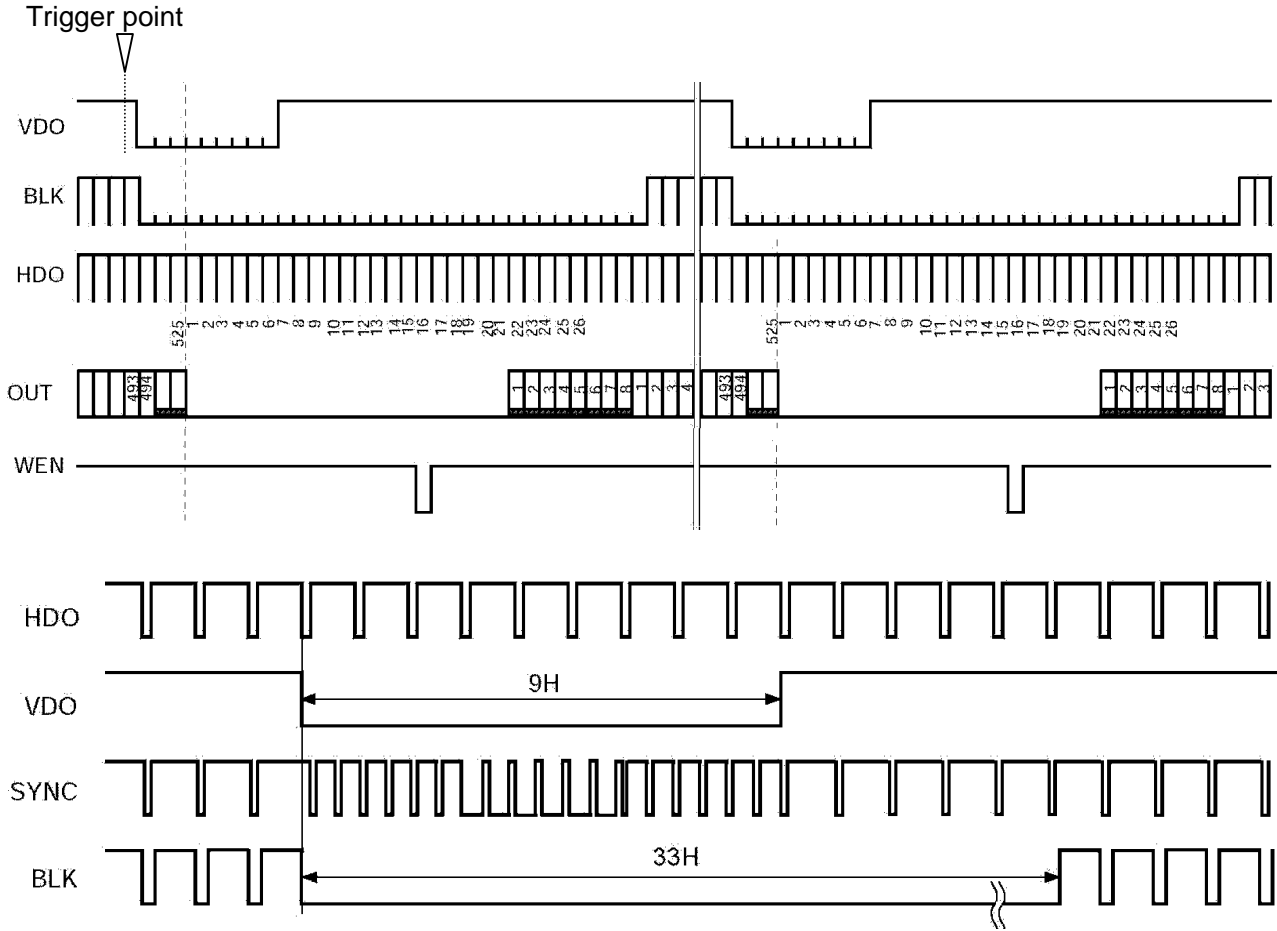


KP-F1AP CCD OUTPUT WAVE TIMING CHART

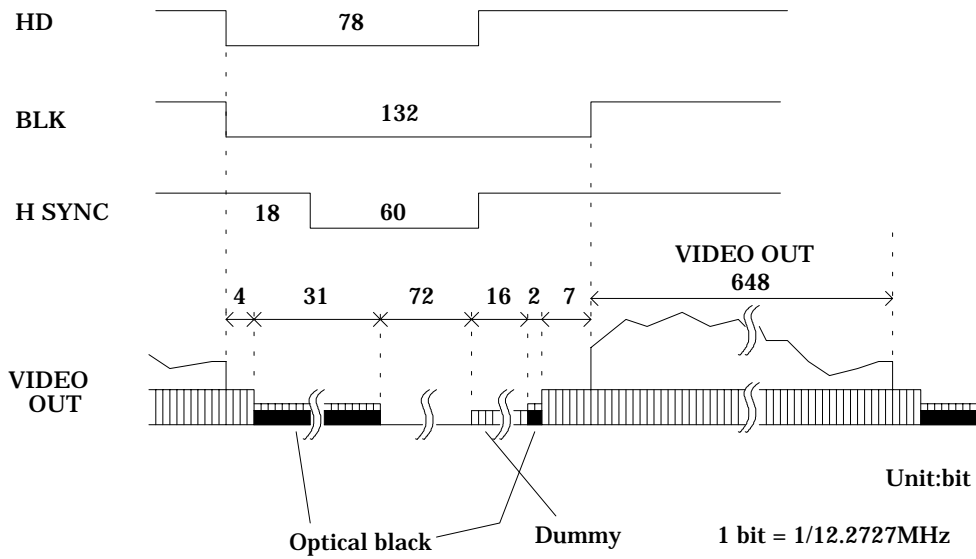


KP-F1AN

1) Vertical timing

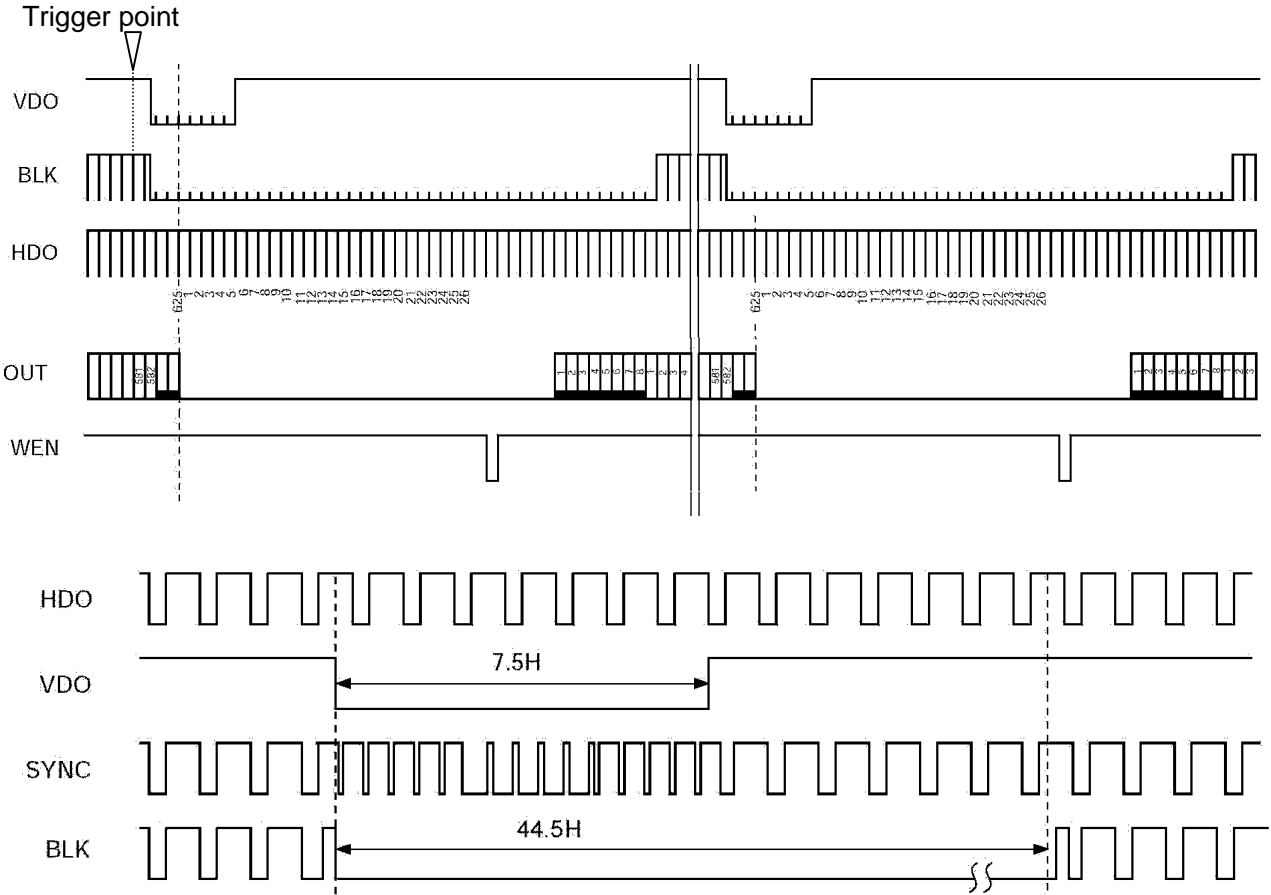


2) Horizontal timing

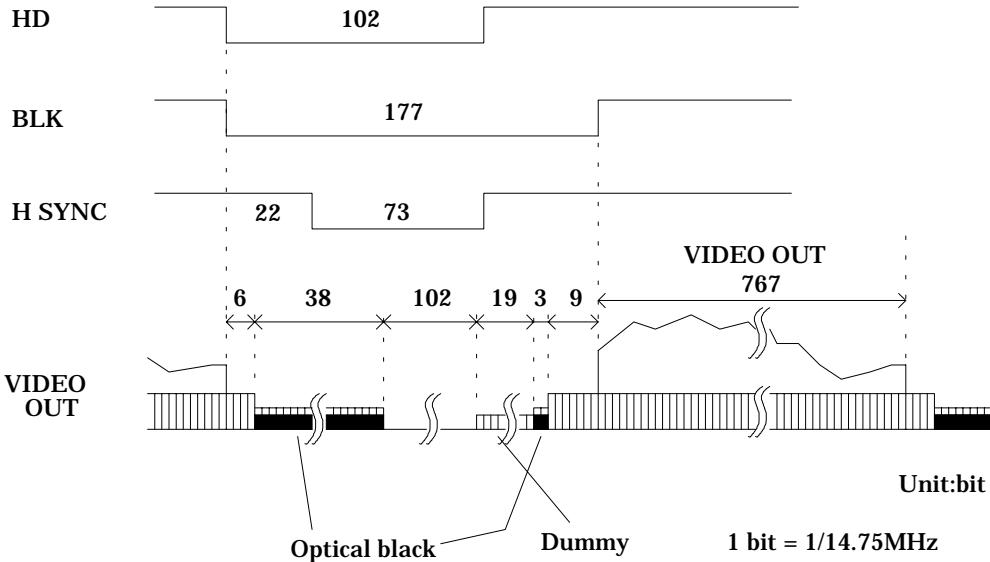


KP-F1AP

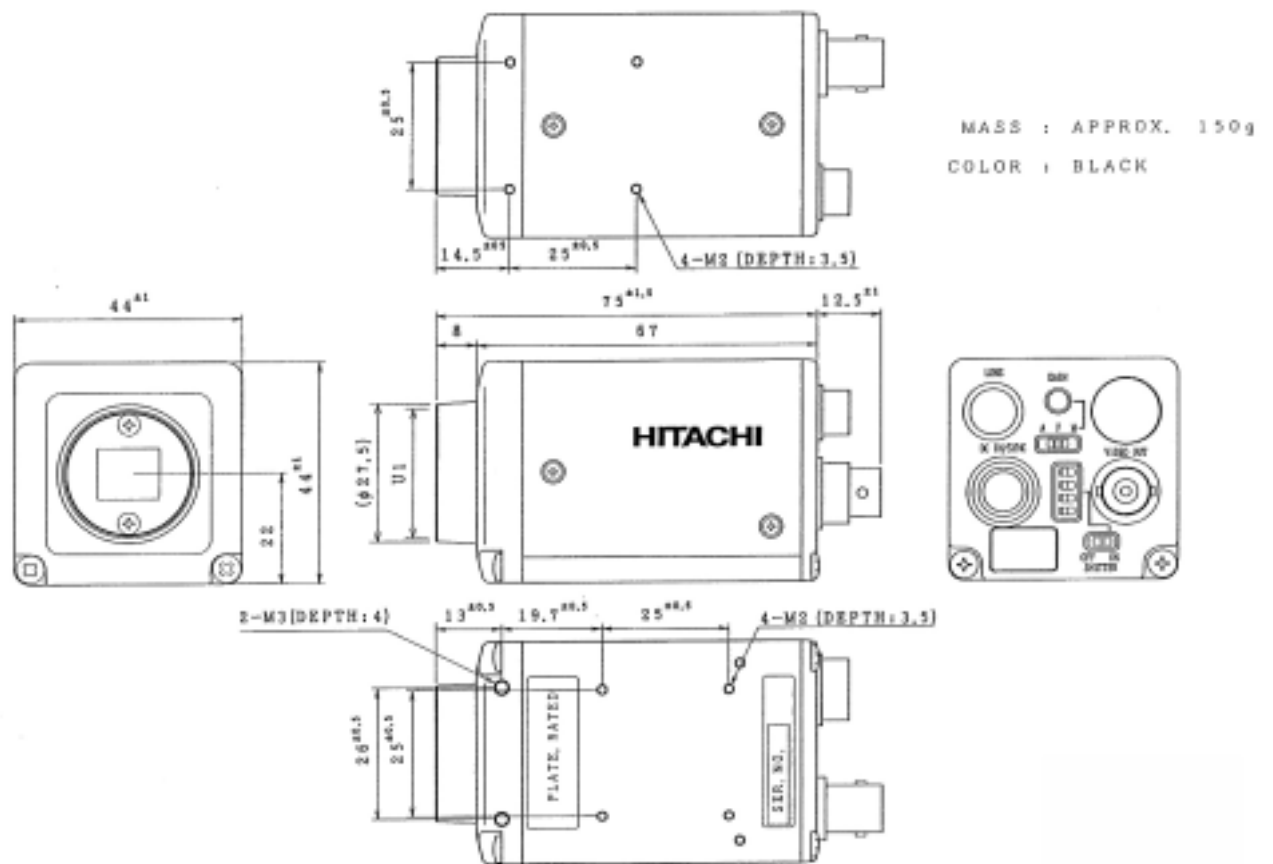
1) Vertical timing



2) Horizontal timing



6 External view



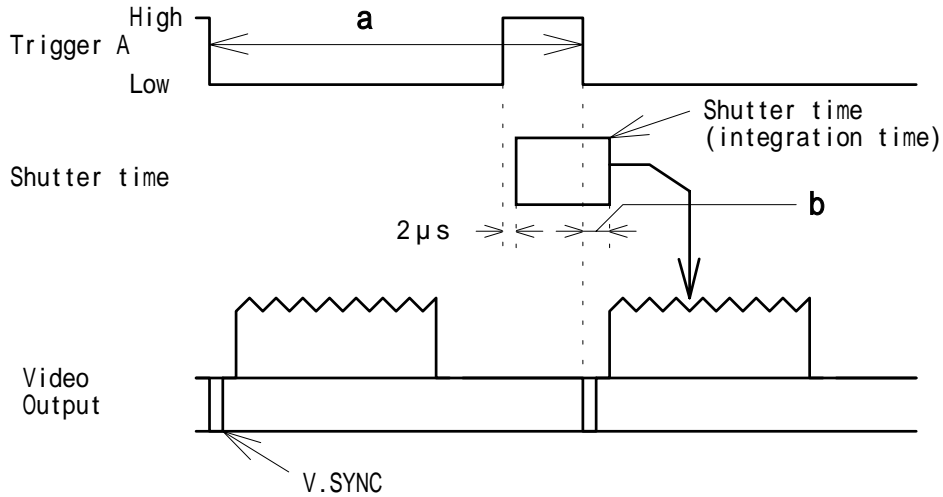
Dimensions

7. Frame on demand

- ONE trigger mode

At a signal trigger pulse input (Trigger A), exposure starts at the pulse edge and ends at the pulse falling edge. The vertical sync is reset and the video output is obtained immediately.

The pulse width equals the exposure time.



Trigger specifications

5Vp-p +0.5/-1.0Vp-p

Impedance: 1k ohms

a: 1frame or more N: 33.4ms or more

P: 40ms or more

b: Fixed exposure period N: 1250.1us

P: 2027.3us

High period 8us or more

Note: Use a sync signal free of noise.

When you operate external synchronization.

Horizontal drive signal specification

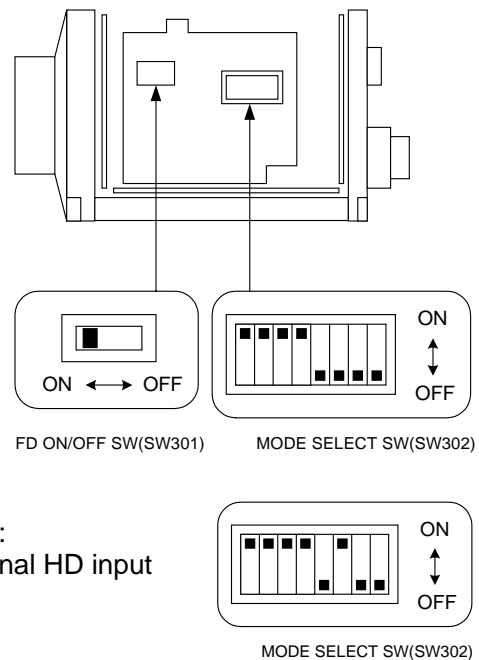
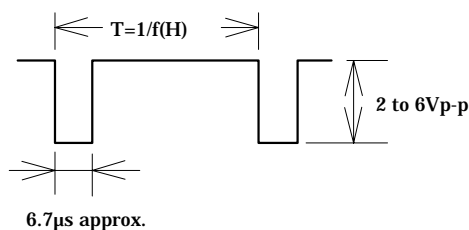
N: $f(H) = 15.734 \text{ kHz} \pm 1 \%$

P: $f(H) = 15.625 \text{ kHz} \pm 1 \%$

2 to 6Vp-p negative

Input impedance 1k ohms

Horizontal drive signal(HD)

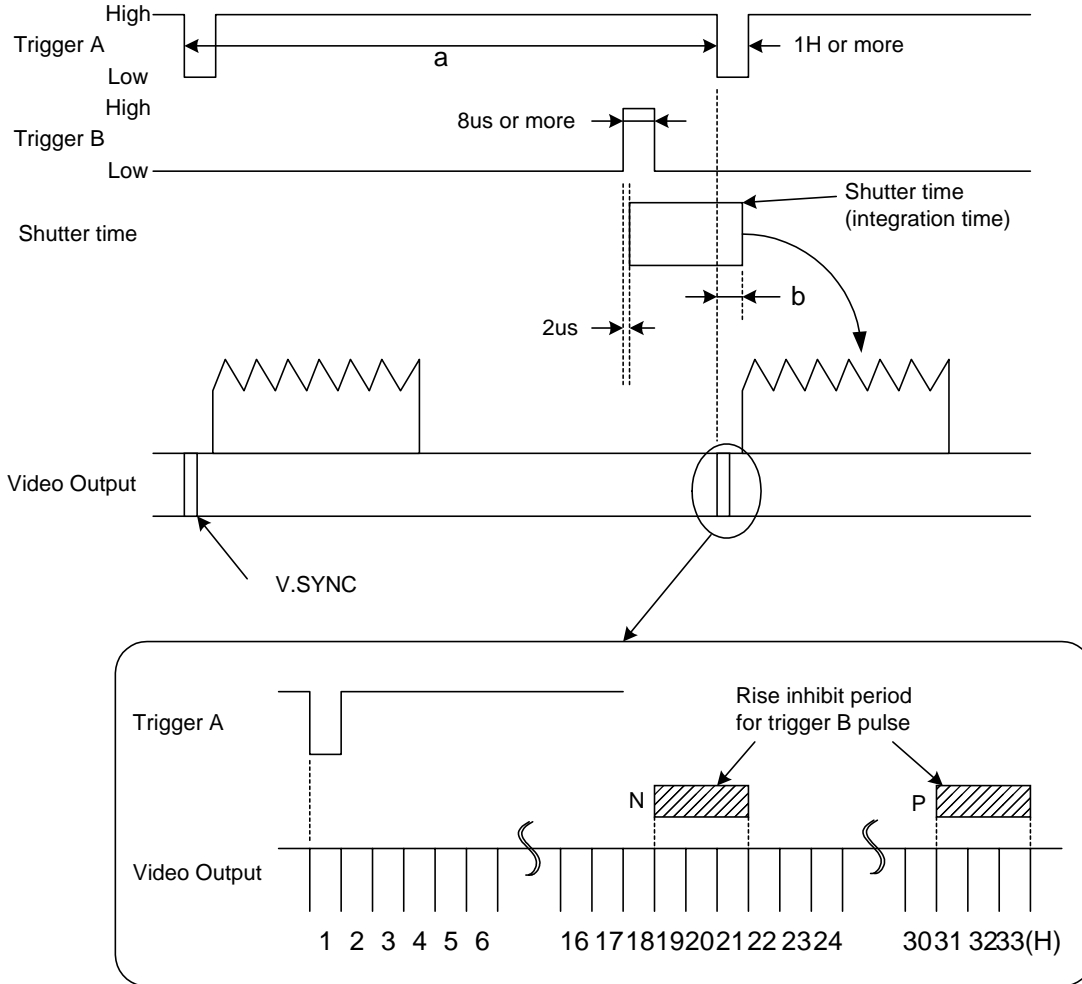


7. Frame on demand

- TWO trigger mode

Two trigger pulse are input. Exposure starts at the Trigger B pulse rising edge and ends at the Trigger A pulse falling edge. The vertical sync is reset and the video output is obtained immediately.

The interval between the two trigger pulse equals the exposure time.



Trigger specifications

5Vp-p +0.5/-1.0Vp-p

Impedance: 1k ohms

Trigger A: Low period: N: 63.5us or more

P: 64us or more

a: 1frame or more

N: 33.4ms or more

P: 40ms or more

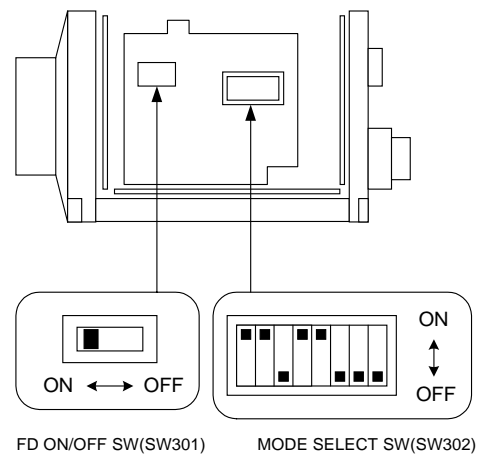
b: Fixed exposure period

N: 1250.1us

P: 2027.3us

Trigger B: Low period: Not specified

High period: 8us or more

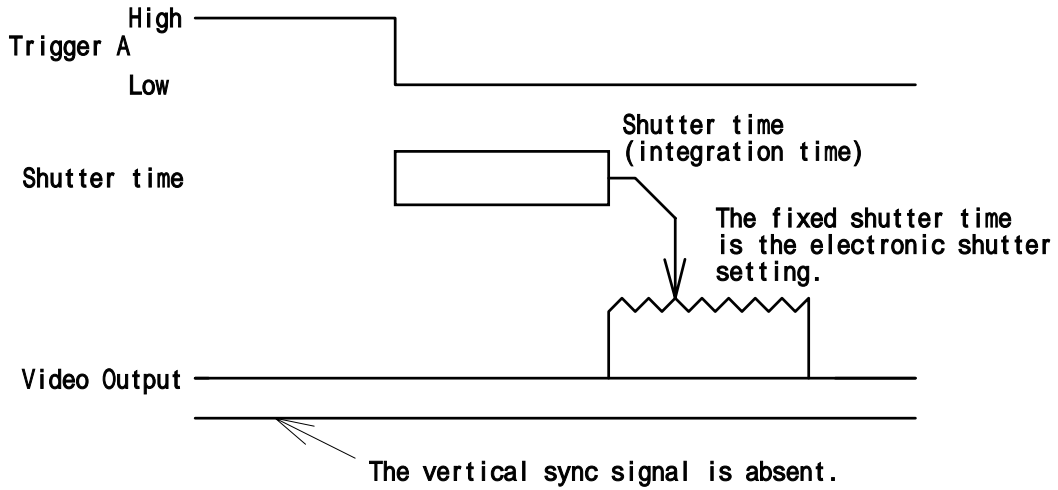


Note: Use a sync signal free of noise.

- Fixed shutter mode

At a signal trigger pulse input (Trigger A), exposure starts at the pulse falling edge. The camera electronic shutter switch sets the exposure time. The video output is obtained immediately after the end of fixed exposure.

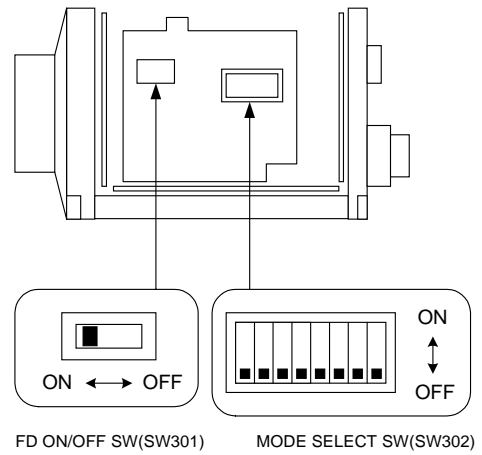
In this mode, the vertical sync signal is absent from the video output.



Note: Trigger input can not be applied to fields of the video output where a picture is produced (a normal picture will not be obtained).

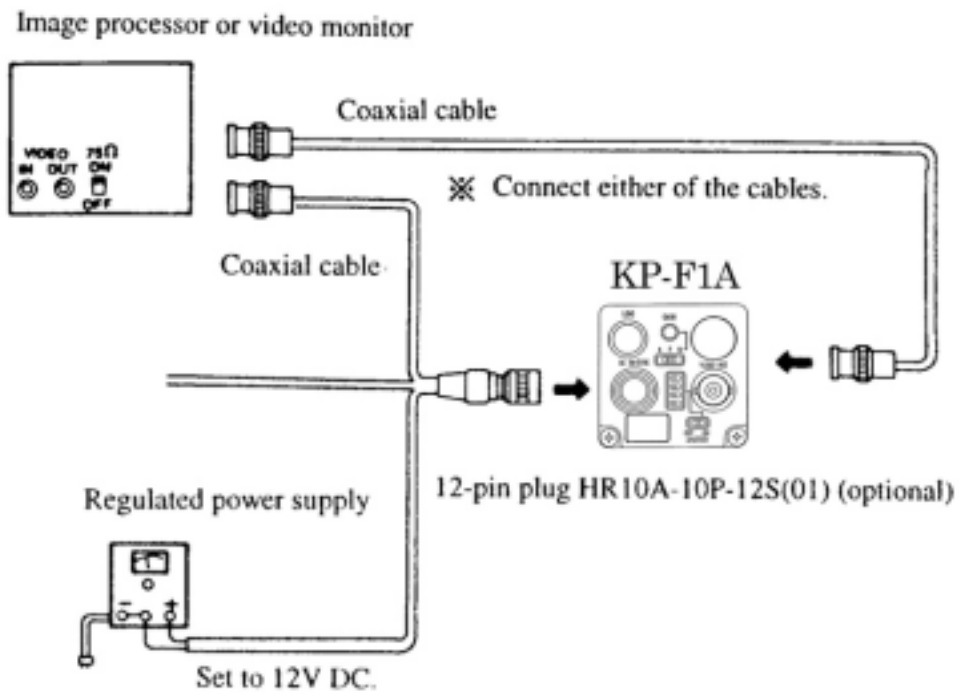
Use a sync signal free of noise.

Trigger specifications
 5Vp-p +0.5/-1.0Vp-p
 Impedance: 1k ohms
 High period 8us or more

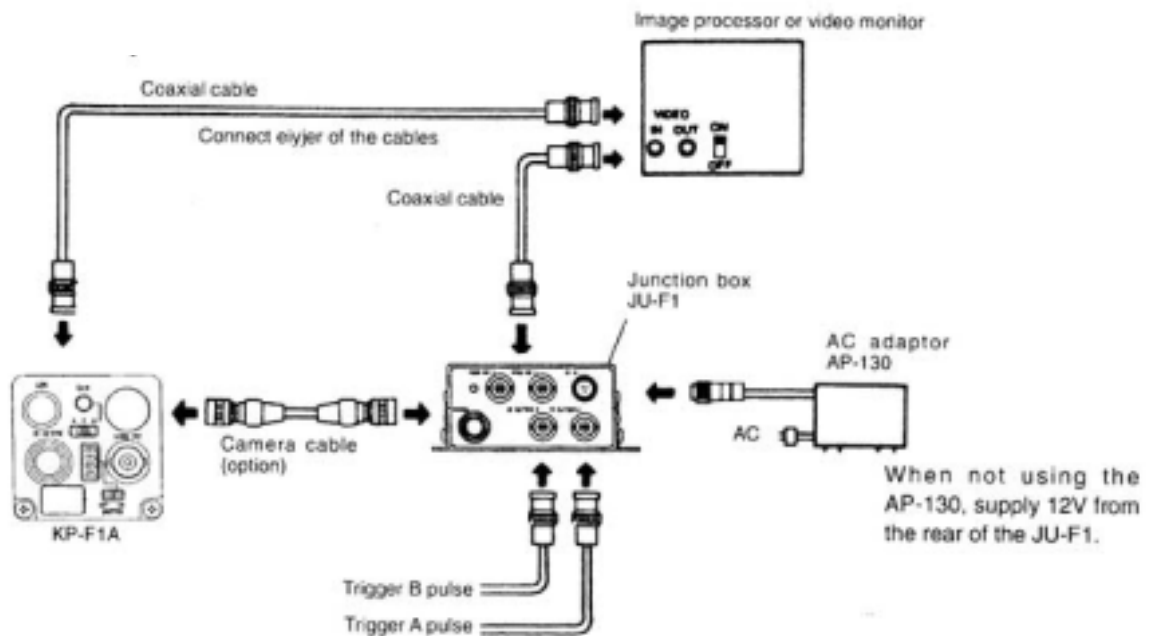


8. Connect cables

1) Basic connection



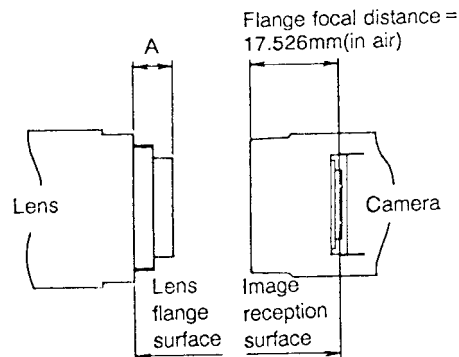
3) Connection of options



9. Optical system

1) Flange focal

- Image size: 1/2-inch
- The flange focal distance is 17.526mm(in air).
- Flange focal distance cannot be adjusted.



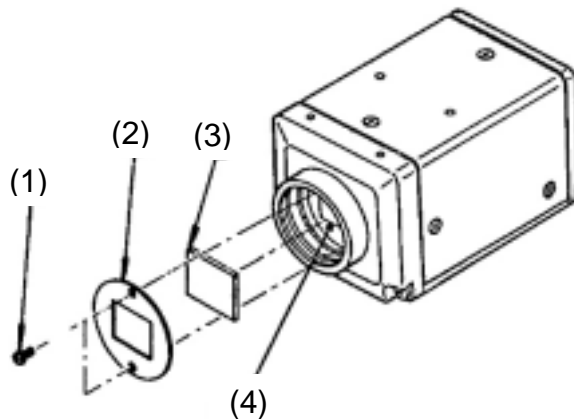
Note:

Select such a lens as the length (A) from the flange surface of the lens to the end of the screw side is 8mm or less.

2) Optical filler

This camera is provided with an IR cut filter.

IR cut filter removal



- Remove two screws (1) shown in Fig., and filter holder (2) will come off.
- Remove the IR cut filter (3) from filter frame (4).
- Reinstall and secure filter holder (2) with two screws (1).

Caution

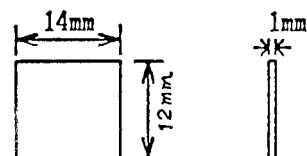
Prior to removing the optical filter, be sure to turn off the power.

IR cut filter IRC650

Dimensions: 14 x 12 x 1.0t

Part code: XMD0006

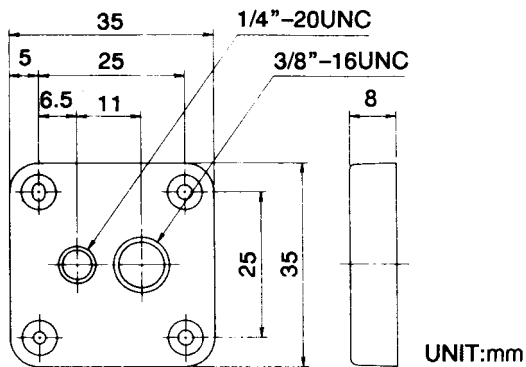
External view



10. Optional

1) Tripod adaptor

TA-M1



Secure the adaptor to camera mounting holes B, using four supplied screws (M2x5).

Note:

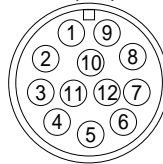
If the screws are too long, they will cause trouble to the camera.

Be sure to check the length before use.

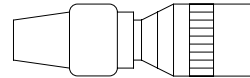
2) Plug

DC IN/SYNC

HR10A-10P-12S (01) Product code: 23810AX

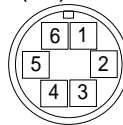


Viewed from this side

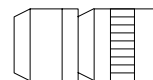


Lens

HR10A-7P-6P (01) Parts code: JMH0092



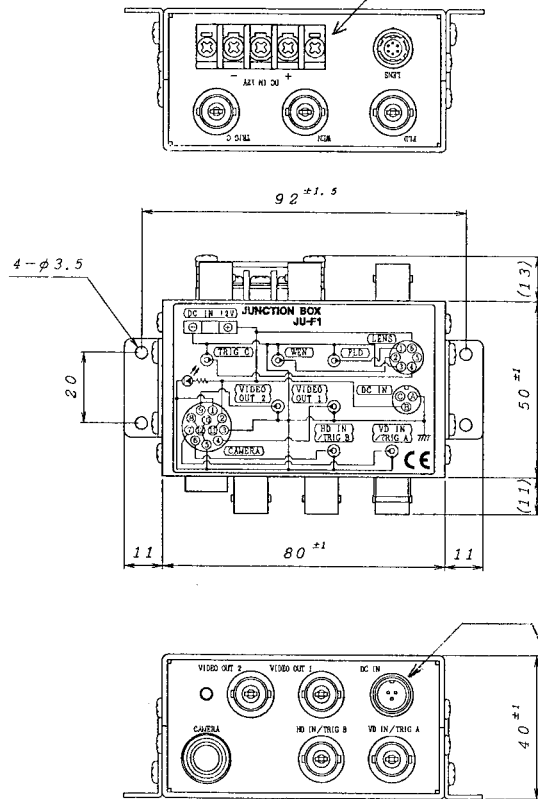
Viewed from this side



3) Junction box

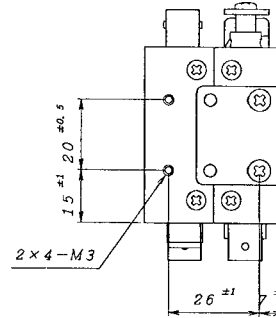
JU-F1 Product code: 23832AX (and JU-M1A)

Connect power supply to these terminal when the AP-130 is not used.



Notes :

- Supply voltage ranged 11 to 13 V.
- Make sure voltage polarity before connection of an external power supply.
- Use an external power supply other than the AP-130 at your own risk.

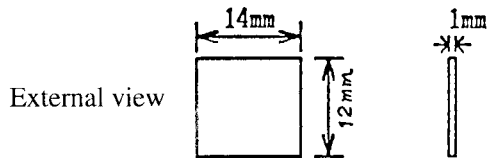


MASS : APPROX. 200g
UNIT : mm

Connects the AC adaptor AP-130

4) Dummy glass

ARC1214 Parts code: XMD0009



5) Camera cables

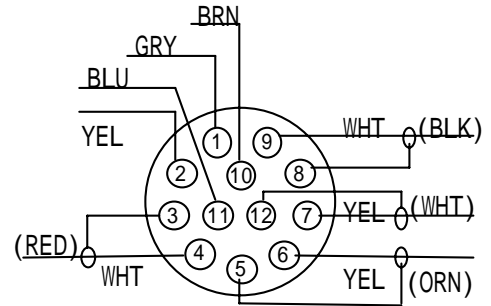
	Mould type	Assy type	Shielded type
2m	C-201KSM(23861AX)	C-201KS(23856AX)	C-201KSS(23872AX)
5m	C-501KSM(23862AX)	C-501KS(23857AX)	C-501KSS(23873AX)
10m	C-102KSM(23863AX)	C-102KS(23858AX)	C-102KSS(23874AX)

Specify assembly or shielded type at time of order.

(): Product code

10. Optional

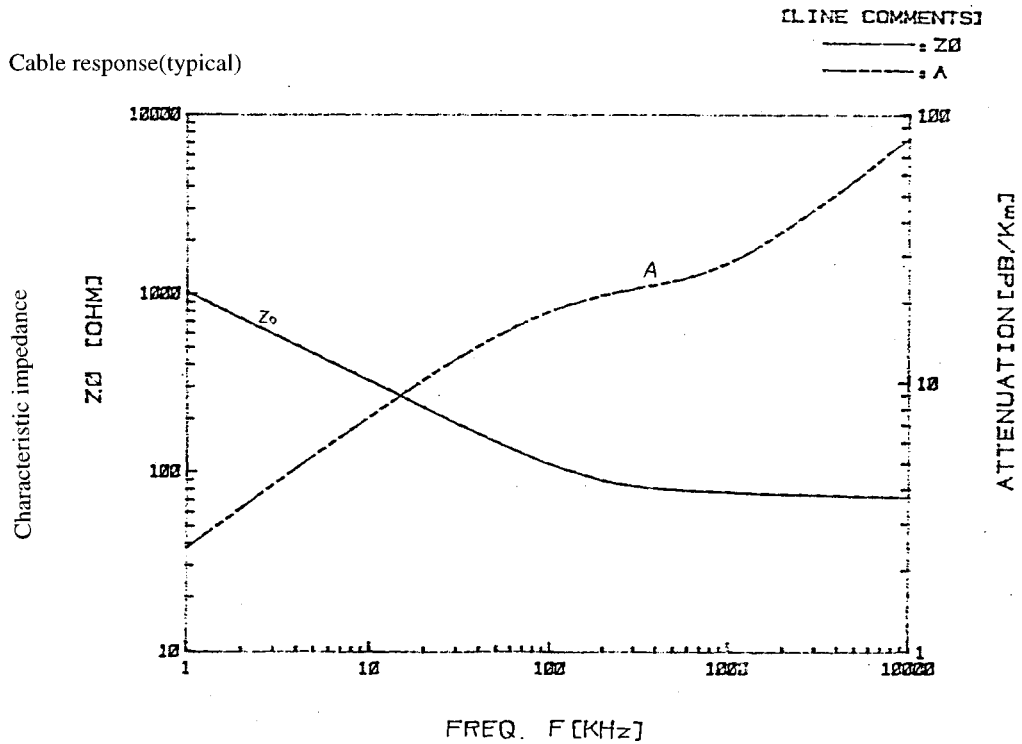
- Voltage drop due to a cable is about 0.01V per meter.
- The H phase delays by about 5ns per meter.
- When using a cable only to supply power, use the C-201KSM (2m) cable.



- Attenuation of video signal due to used cable
Attenuation due to optional cables C-501KSM and C-102KSM is shown below.
Attenuation is proportionate to the cable length.
Characteristic impedance is kept at constant even at cable length change.

	Cable length	Attenuation at 4MHz	Attenuation at 7MHz
		50dB/Km	70dB/Km
Attenuation due to cable length(dB)	1m	0.05	0.07
	2m	0.1	0.14
	5m	0.25	0.35
	10m	0.5	0.7

The video bandwidth obtained by the KP-F1A is up to approximately 6MHz.



11. Notes to users

- ◆ Power supply
 - Connect a 12V DC voltage (11 to 13V) from an external regulated DC power supply.
 - Use a stable power supply without ripple and noise.
 - Prior to turning on the power switch , check that the polarities of the power cable are correct , referring to the connection diagram

- ◆ To protect CCD (sensor)
 - Do not touch the glass surface of the CCD sensor to avoid deterioration in picture quality due to dirt and scratches.
 - If the glass surface of the sensor should become dusty or dirty , remove dust or dirt carefully with a cotton-tipped applicator. Do not wipe the surface with dry cloth or paper tissue to avoid possible damage to the glass surface by static electricity.

- ◆ Protection of camera
 - Do not use or store the camera under direct sunlight , at a place exposed to rain or snow , or at a place where flammable or corrosive gas is present.
 - When housing the camera in a camera case , use the utmost care regarding rise of internal temperature.

When casing the camera , the temperature normally rises by 10 to 20 , compared with the outside air temperature. The camera operates in the temperature range from -5 to 45 . If the camera is used or left in high temperature environment for hours, the life of the camera may be shortened.
 - Do not drop the camera. Do not apply strong shock or vibration to the camera.
 - Before connecting or disconnecting a connector, turn off the camera and be sure to hold connector body to connect or disconnect the connector.

- ◆ Camera arrangement
 - Mutual interference noise can occur if multiple cameras are arranged in close proximity. Separate the cameras to the extent possible.

When camera units are installed directly into other equipment, external noise can prevent a normal picture. In such cases, shield the camera units.

The camera can be damaged by static electricity. Use ample care when installing and arranging.

- ◆ Auto electric shutter
 - In regions using 50 Hz power line frequency, flicker can appear on the monitor screen from light sources such as fluorescent or mercury. In such cases, release the auto electronic shutter.

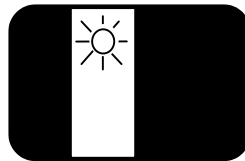
◆ Phenomena inherent to CCD imaging device

Following are phenomena inherent to a CCD imaging device , and not defects.

- Smear and blooming

When strong light (lamp , fluorescent lamp , reflected light , etc.) is shot , pale bands are displayed vertically above and below the light.

In this case , change the angle of the camera so that such strong light does not enter the camera through the lens.



- Fixed pattern noise

When the camera is operated in a high temperature , fixed pattern noise may appear on the entire screen.

The higher the sensitivity of camera , the more this fixed pattern noise appears.

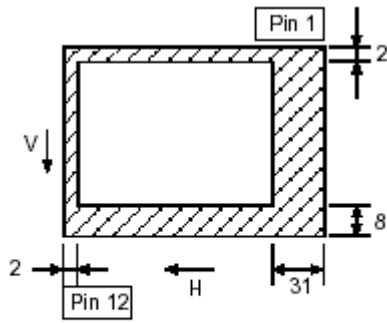
- Moire

When fine patterns are shot , moire may be displayed.

- The CE mark is required when exporting to Europe. Obtain the necessary authorization for the customer's system. Enclose the camera in a shielded case and use shielded cable.

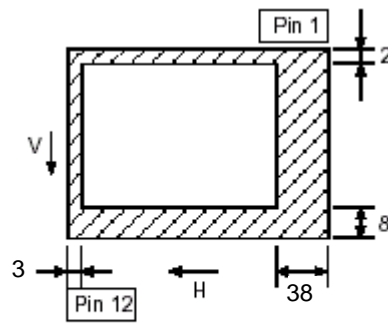
Image sensor

Optical black position)



Optical black position
(Top View)

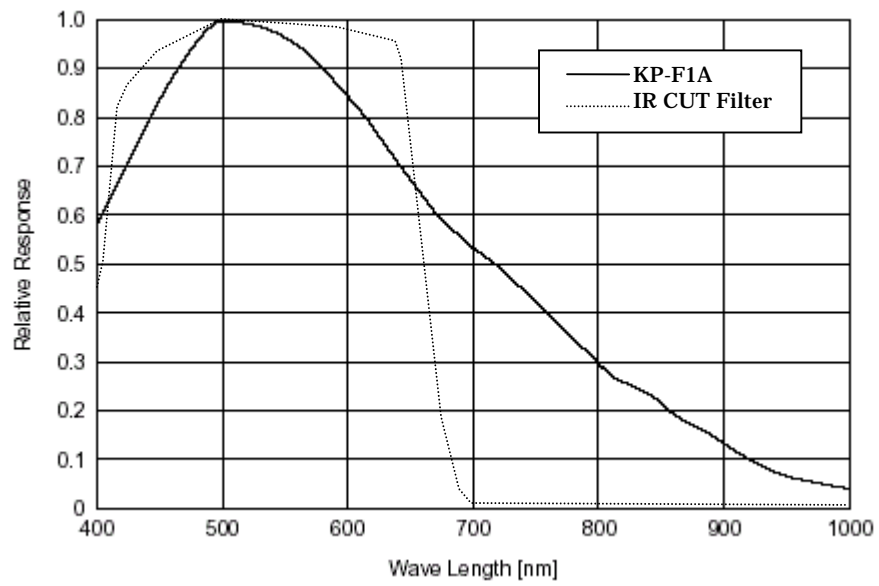
KP-F1AN



Optical black position
(Top View)

KP-F1AP

Spectral sensitivity (typical example)



Caution	
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The specifications of this equipment are subject to change without notice for improvement.
Prior to placing your order , be sure to confirm that these specifications are the latest ones.
Hitachi Kokusai Electric guarantee that the equipment shipped from our factory conforms to the Hitachi Kokusai Electric's standard warranty conditions and perform quality control within the range necessary to perform the warranty.

Warranty and After-sales Service	
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- (1) The guarantee period is one year after the date of purchase. However , the defects due to erroneous use or intentional act are excluded.
- (2) As the defect after expiration of the guarantee period , Hitachi Kokusai Electric will repair the equipment if the intended function is restored by the repair work , and the cost is changed to a customer.
- (3) Hitachi Kokusai Electric is not liable for the losses caused when the equipment is used in a system used for business trades , production process , medical fields , crime prevention applications , etc.
- (4) The parts used in the equipment have their respective lives. The lives of such parts will be shortened under the environments of high temperature or high humidity. When the stable operation is required for a long time , it is recommended to perform periodical maintenance and inspection every year or every two years.