High resolution progressive scan monochrome CCD camera

(Frame shutter)

KP-F100B

Specifications (preliminary)

DWN	K. Ueno	Jan. 28. '02	1/15	Hitachi Kokusai Electric Inc. Tokyo Japan	
DSGN	K. Ueno	Jan. 28. '02			
CHKD	N. Fujimura	Jan. 28. '02			
APPD	N. Fujimura	Jan. 28. '02			

1. Outline

Hitachi's KP-F100B is a 2/3-inch size black and white CCD camera designed for high resolution and versatile functions. Progressive scan with full pixel independent readout and full frame shutter provide images of unparalleled quality at 15 frames per second non-interlaced output.
Effective picture elements number 1.45 million, while the broad array of functions includes digital output, multi-step electronic shutter, HD/VD external sync and frame on demand. The square lattice pixel format also provides excellent suitability for image processing applications.

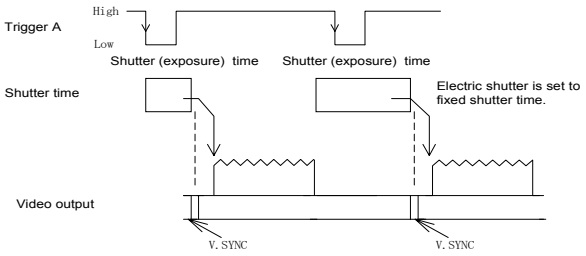
2. Outstanding features

(1) High resolution
High grade CCD with 1392 (H) × 1040 (V) effective pixels.
(2) Frame shutter
The frame shutter function improves vertical resolution of moving objects..
(3) Multistep electronic shutter
The shutter speed can be selected in 8 steps from 1/30th to 1/50,000th of a second.
(4) Frame on demand
An external trigger signal input can be used to capture an image at a desired timing for instant view or processing. The capture time can be adjusted by the trigger and shutter.
(5) The self-contained CPU permits using RS-232C control for setting each function. The functions can also be set from rear panel switches.
(6) Digital output
An EIA-644 digital output is provided.

3. Specifications

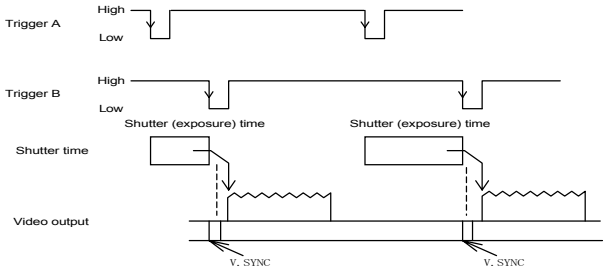
(1)	Pickup element	2/3-inch interline CCD
	Total pixels	1432 (H) × 1050(V)
	Effective pixels	1392 (H) × 1040 (V)
	Pixel pitch	6.45 (H) × 6.45 (V) μm (square lattice)
(2)	Imaging area	8.98 (H) × 6.71 (V) mm
(3)	Scanning system	Non-interlaced
(4)	Aspect ratio	4 :3
(5)	Frame rate	15frames/second (full pixel readout) 60fps (4×accelerated mode) Factory setting is 15 fps. Selected by rear panel switch.
(6)	Horizontal scanning frequency	16 kHz
(7)	Vertical scanning frequency	15 Hz
(8)	Synchronization	Internal/external (automatic switching)
(9)	Lens mount	C mount
(10)	Flange focal distance	17.526 mm
(11)	Video output	Digital output or analog output for image checking Analog output (option)
	Digital output	EIA-644
	Note: Maximum digital out cable length is 2 meters.	Data : single channel 10 bits, 28.64 MHz
(12)	External sync input	HD/VD negative Level: see page 11(External signal level) Input impedance: 1 kΩ Frequency deviation: ±1%
(13)	Electronic shutter speed	Selectable by external switches: Off (frame rate), 1/30, 1/125, 1/250, 1/1000, 1/2000, 1/4000, 1/10000 1/50000 second. Off: Normal exposure (frame rate) Set by external switch; factory setting is off (1/15 second).
(14)	Gamma compensation	$\gamma = 1$
(15)	Frame on demand	External switch setting on/off and modes (fixed shutter two trigger and one trigger). Factory setting is all off.

Fixed shutter mode



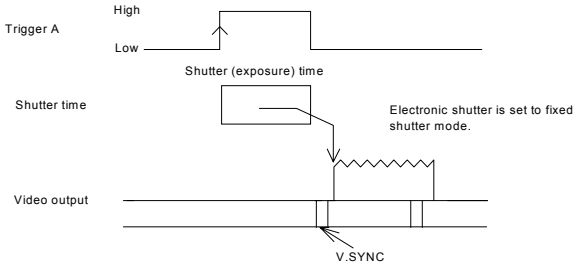
Fixed shutter mode

Two trigger mode



Two trigger mode

One trigger mode



(16)Power supply voltage	12 ± 1 VDC
(17) Current consumption	Approx. 330 mA
(18)Ambient, operating	0 to + 40 ℃(+32 to ; 104 F), less than 90 % RH
Ambient, storage	-10 to + 50 ℃(+14 to +122 F), less than 70 % RH

Note: If operated continuously, be sure to use at less than +40 ℃(104 F) for long term stable performance.

(19) Vibration endurance	29.42 m/s^2 (3 directions, 30 minutes each)
(20) Shock endurance	294.2 m/s^2 (vertical, horizontal, once each face)
(21) External dimensions	44 (W) × 44 (H) × 78 (D) mm
(22) Mass	Approx. 180 g

(23) RS-232C control

(a) Signal system

Control system	Start-stop synchronization system
Transmission rate	9600 bps
Data length	8 bits
Start bit	1
Stop bits	2
Parity	None
Bit transfer	LSB first

(b) Communications control system

Full control by remolte control software, data send/receive by text data transfer to camera microprocessor (BSC system handshake)

(C) Control items

1. Shutter speed (1/30, 1/125, 1/250, 1/1000, 1/2000, 1/4000, 1/10000,1/50000 second)
2. FD (frame on demand) On/off
3. Mode Fixed shutter, two trigger, one trigger
4. V-binning On/off
5. Gain Variable in 50 steps
6. Black level Variable in 50 steps
7. Input trigger Negative/Positive

4. Composition

(1) Camera (with infrared blocking filter)
(2) Operating instructions

5. Optional accessories

(1)	Tripod adaptor	TA-M1
(2)	12 pin plug	HR10A-10P-12S(01)
(3)	D. OUT connector (26 pins)	DX30AM-26P or equivalent
(4)	Junction box	JU-M1A JU-F1*
(5)	Dummy glass (AR coated)	ARC1214
(6)	Camera cable	

	Molded type	Assembly type	Shield type
2 m	C-201-KSM	C-201KS	C-201KSS
5 m	C-501KSM	C-501KS	C-501KSS
10 m	C-102KSM	C-102KS	C-102KSS

Note : Assembly type made to order
In Europe, use the Shield type

* 12-pin connector output pin differences

Pin	JU-F1	KP-F100B output
4	VIDEO 1	VIDEO
6	HD/TRIG-B	EXTHD
9	VIDEO 2	TRIG-B

6. DC input and sync connections

(1) Connections to DC IN and SYNC

Pin No.	Int. sync	Ext. sync			
		Ext. HD/VD	Frame on demand		
			Fixed shutter	Two trigger	One trigger
1	GND	GND	GND	GND	GND
2	+12V	+12V	+12V	+12V	+12V
3	GND	GND	GND	GND	GND
4	VIDEO	VIDEO	VIDEO	VIDEO	VIDEO
5	————	EXTHD (GND)	————	————	————
6	————	EXTHD (SIGNAL)	EXTHD (SIGNAL)	EXTHD (SIGNAL)	————
7	————	EXTVD (SIGNAL)	TRIG-A (SIGNAL)	TRIG-A (SIGNAL)	TRIG-A (SIGNAL)
8	————	————	————	TRIG-B (GND)	————
9	————	————	————	TRIG-B (SIGNAL)	————
10	GND	GND	GND	GND	GND
11	+12V	+12V	+12V	+12V	+12V
12	————	EXTVD (GND)	TRIG-A (GND)	TRIG-A (GND)	TRIG-A (GND)

Connector (camera side) : Hirose HR10A-10R-12PB(01)
Plug (matching cable plug) : Hirose HR10A-10P-12S (01)

(2) Signal connections to D. OUT (26 pin)

Pin No.	Signal	Pin No.	Signal	Pin No.	Signal	Pin No..	Signal
1	DATA 0-H	8	DATA 3-L	15	DATA 7-H	22	VD-L
2	DATA 0-L	9	DATA 4-H	16	DATA 7-L	23	HD-H
3	DATA 1-H	10	DATA 4-L	17	DATA 8-H	24	HD-L
4	DATA 1−L	11	DATA 5-H	18	DATA 8-L	25	CLK-H
5	DATA 2-H	12	DATA 5-L	19	DATA 9-H	26	CLK-L
6	DATA 2-L	13	DATA 6-H	20	DATA 9-L		
7	DATA 3-H	14	DATA 6-L	21	VD-H		

Connector (camera side) : Hirose DX10GM-26S or an equivalent
Plug(matching cable plug) : Hirose DX30AM-26P or an equivalent
Cover : Hirose DX30M-26CV or an equivalent

The digital out cable should be comprised of a twisted pair of wires having 100 Ω characteristic impedance and an outer sheath shield type conductor. Connect the shield (ground) of the digital out cable to the ground terminal of the video eqquipment, frame grabber, etc.

(3) Remote (RS-232C control) cable piv connections

(Connect the cable between the camera Remote connector and the personal computer serial interface connector (D-SUB 9 pin).

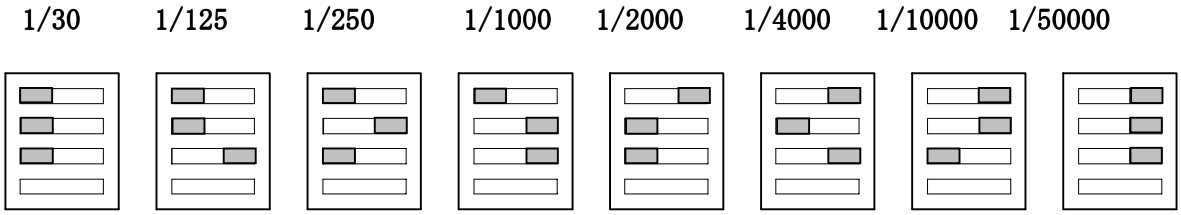
Pin no.	Signal name
1	-
2	RD
3	TD
4	Manual/remote
5	Ground
6	-

Connector (camera) HR10-7R-6SA (Hirose) or equivalent
Plug (cable matching plug) HR10A-7P-6P (Hirose) or equivalent
Notes: At the camera Remote plug, connect pin 4 Manual/remote and pin 5 ground.
At the computer serial interface connector (D-SUB), short pins 7 (RTS) and 8 (CTS).

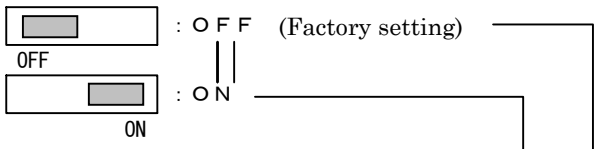
7. Rear panel switches

The rear panel includes switches for electronic shutter data, readout rate, and field on demand on/off and mode switches.

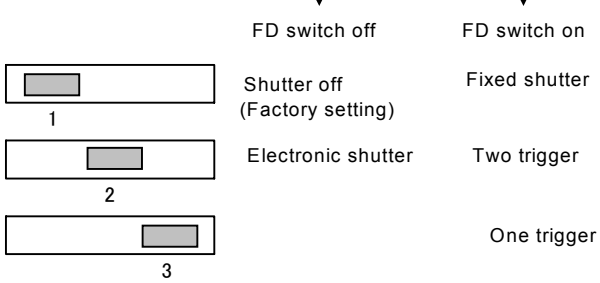
(1) Electronic shutter switches



(2)Frame on demand (FD) on/off switch



(3) Frame on demand mode switch



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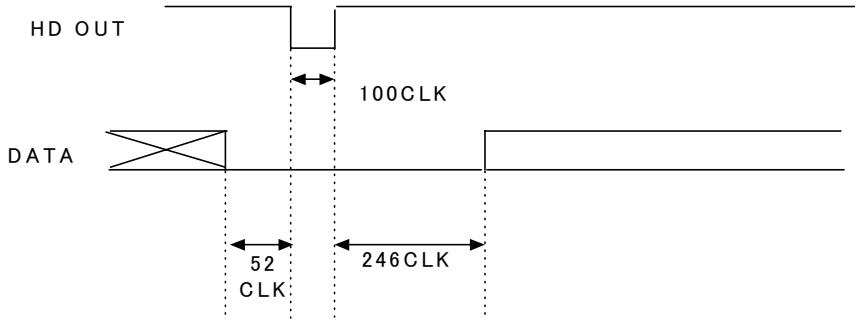
8. Input/output signal levels and timing

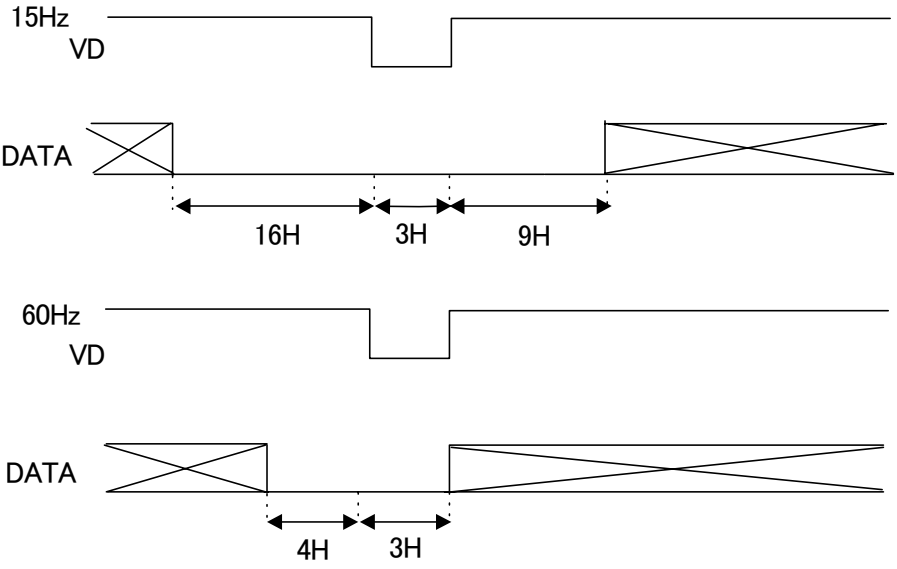
(1) Digital output

H sync phase relationship



HD OUT is obtained at EIA-644 rating from the digital connector pins 23 and 24.
HD=16kHz=1790CLK

V sync phase relationship



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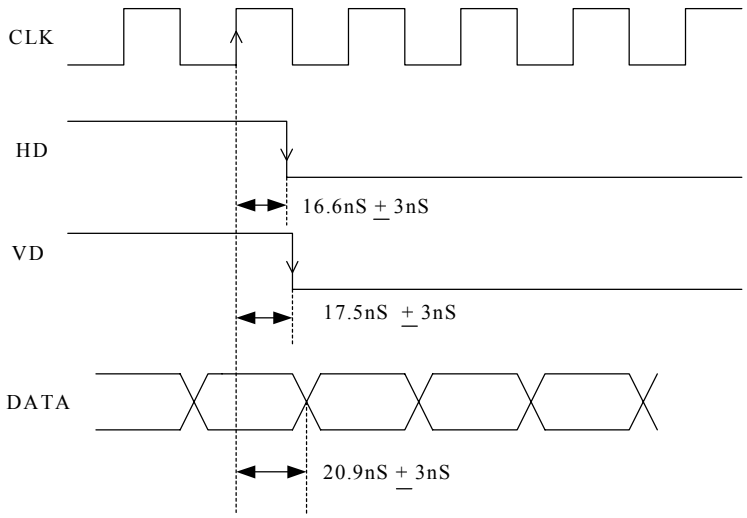
CLK,HD,VD,DATA phase relationship

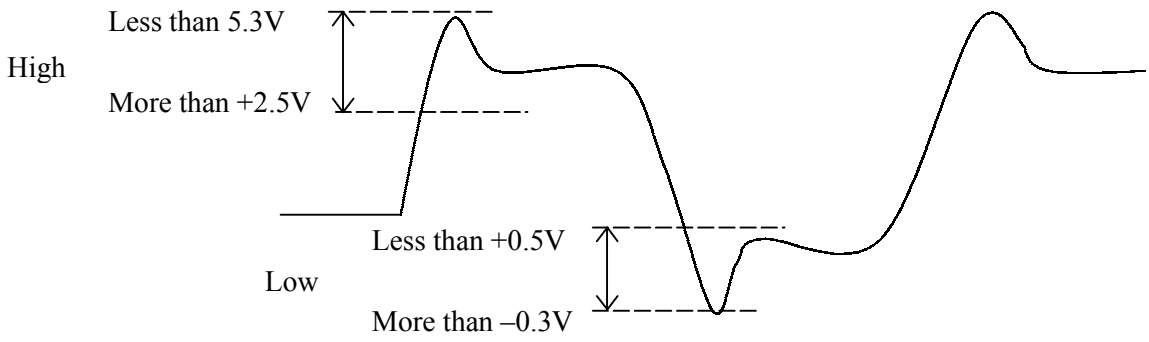


Level: EIA-644A (Hi: more than 1.41V, Low: less than 1.075V)

External signal level

Condition of external signal input

Ringing of external signal input(Trig-A / Trig-B / Ext-HD / Ext-VD) : 0.3V or less



External signal input waveform

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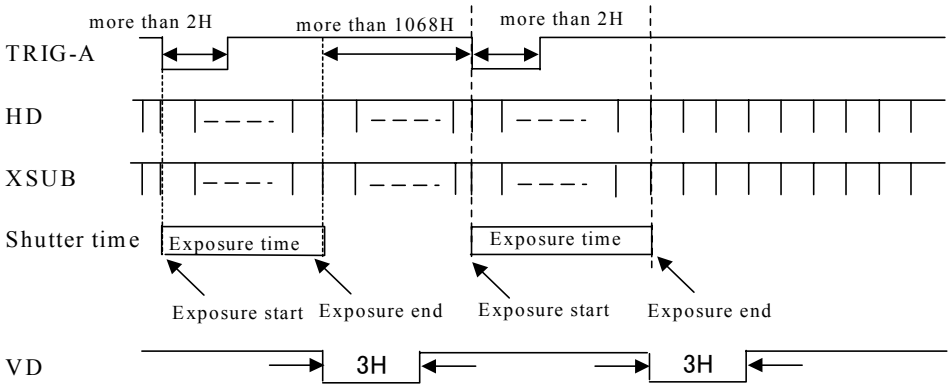
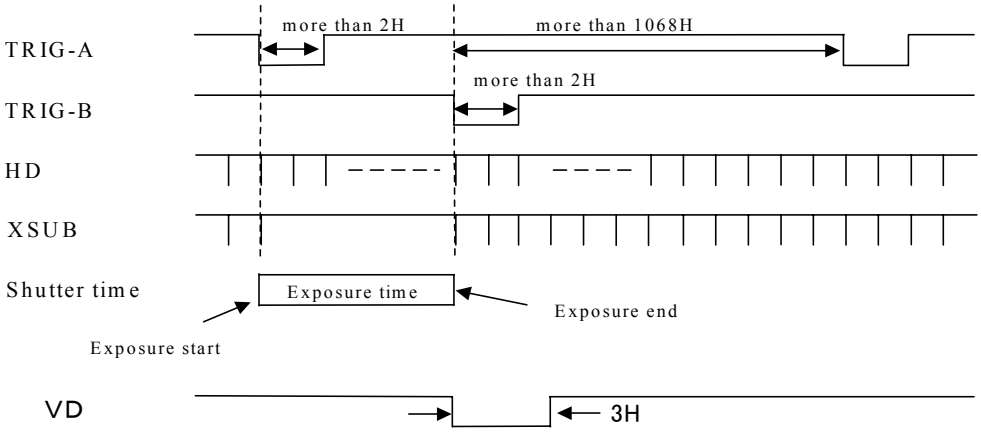
(2)TRIG-A input and HD & VD phase during Fixed shutter mode

TRIG-A level: see page 11(External signal level)



(3)TRIG-A & B input phase and HD & VD phase during Two trigger mode

TRIG-A & B level: see page 11(External signal level)



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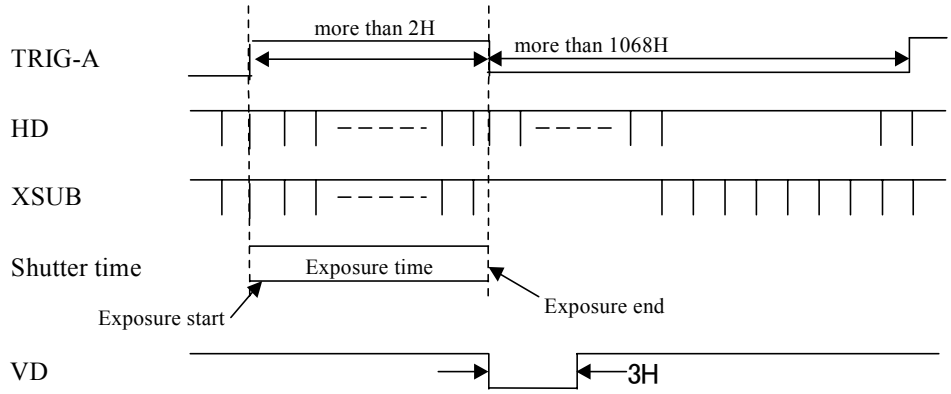
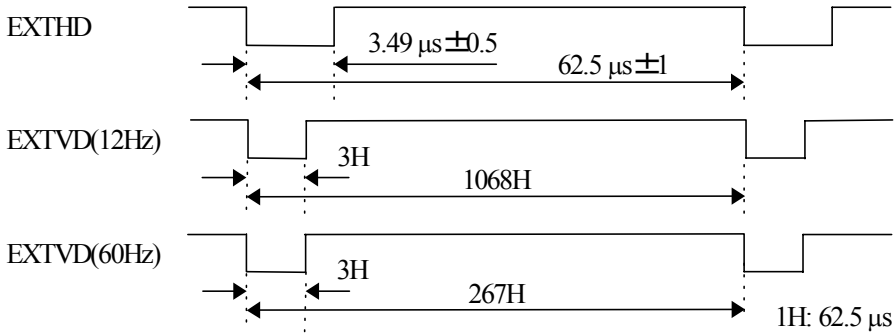
(4)One trigger mode

TRIG-A level: see page 11(External signal level)



(5) External HD & VD input levels and phase

level: see page 11(External signal level)



Align falling edges of external HD and VD.
VD output is delayed 2H compared to EXTVD

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Notice:
These specifications are subject to change without prior notice due to product improvement.
Confirm the most recent specifications at time of order.
Hitachi Denshi certifies this product complies with the standard warranty conditions of Hitachi Denshi, and that quality control is implemented to the extent required to comply with these conditions.

Warranty and service:

(1) The guarantee period is one year after the data purchase. However, the defects due to erroneous use or intentional act are excluded.
(2) As the defect after expiration of the guarantee period, where product repair is possible, repair will be performed at charge. .
(3) The present Warranty pertains only to the camera unit. Secondary malfunctions attributable to camera failure as well as expenses incurred by disassembly and reassembly of the related system, are beyond the scope of this Warranty.
(4) Compensation for loss of business, loss or damage to software, database and other contingent losses are beyond the scope of this Warranty.
(5) Hitachi Kokusai Electric Inc. is not liable for the losses caused when the equipment is used in a system, use for business trades, production process, medical fields, crime prevention applications, etc.
(6) 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.