

High dynamic range and low smear digital camera having sensitivity to near infrared rays

PROGRESSIVE SCAN CAMERA FC1500(15frame/sec)

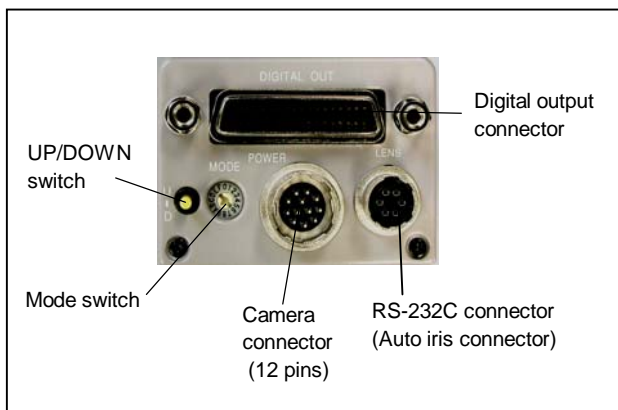


Usage

- Inputting equipment for ITS such as passing through vehicle number
 - Vehicle number capture device for parking control
 - Input device for high resolution electronics shutter image processor
 - LSI related device usage such as stepper
 - Microscope usage
- Miscellaneous overall devices required image processing connecting to computer

Description for panel at backside of camera

Connectors for digital cable and camera cable are provided on panel at backside together with electronic shutter mode and speed change switches



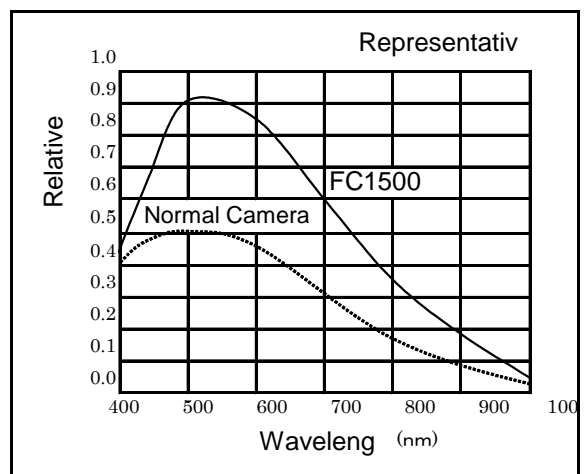
Outline

- This camera is square pixel array progressive scanning type CCD video camera whose size is 2/3 inch and having sensitivity even near infrared area.
- More than doubled dynamic range comparing with conventional camera is available. Signals for all pixels are outputted by all pixels independent read out (full frame) method that smear reduction is realized as small as one-third comparing with conventional camera.
- Required full frame static image can be obtained because random electronic shuttering is possible.
- Capture board utilized personal computer makes control easy because inner circuit of camera is processed digitally using built-in CPU.
- Optimum condition responding to required usage is available because waveform shaping can be control remotely using RS-232C.

Features

- The first high-resolution camera having sensitivity near infrared area.
- High-resolution full frame shutter that is all pixels read out.
- High-resolution camera having valid pixel 1.45 million [1392(H) x 1040(V)].
- 10 bit RS644 and analogue output for monitor are provided for video output.
- Capability to display by standard television monitor because image is outputted in 256 lines and 60 frames per second.
- Aspect ratio is 4:3 and array is square pixel.
- High sensitivity and low smear are realized.

Spectral sensitivity characteristic



Specifications

Scanning method	2/3 inch progressive scanning inter line transfer
Total pixels number	1434(H) x 1050(V)
Effective pixel number	1392(H) x 1040(V) square grid array
Chip size	10.2mm(H) x 8.3mm(V)
Unit size	6.45 μ m x 6.45 μ m
Read out scanning	Horizontal scanning frequency fH = 16.0KHz Vertical scanning frequency fV = 15Hz Pixel clock frequency fCLK = 28.636MHz
External synchronization	EXT.HD=16.0KHz EXT.VD=15Hz
Horizontal resolution	1392 pixels
Vertical resolution	1040 lines
Video output signal	Progressive scanning: 15 frame/sec Analogue output: 1Vpp 75 Ω unbalance Digital output: 10 bit, RS644 differential output, 100 Ω load
Electronics shutter	1/12000 sec ~ 1/15 sec. Continuous and random shutter are possible Long time exposure is possible when pulse width control is implemented in random shutter mode.
Minimum subject luminous intensity	0.5Lux F1.4
S/N	More than 50dB (AGC=OFF)
Sensitivity	50Lux F4
Gamma	1
Lens mount	C mount
Electronic shutter	1/10000 to 1/15 second, continuous shutter, and random shutter are changeable. Long time exposure is possible when pulse width control is implemented in random shutter mode.
Power source	DC 12V±10% and 400mA (max.)
Operation temperature range	0°C ~ 40°C (Shall be free from dew condensation and frost.)
Storage temperature range	-30 ~ 60 (Shall be free from dew condensation and frost.)
Anti-shock	70G
Anti-vibration	7G
External dimension	46(W) x 33(H) x 92(L) (excluding connector)
Weight	About 330g

(Note)

Timing chart is listed in Instruction Manual.

Please understand that specification is subjected to revision without advance notice.

Operation mode setting



Operation mode can be changed using mode switch on back panel

Setting of camera at the time factory shipped is as following.	
Shutter method	Continuous
Classification of shutter time	High speed
Scanning method	Normal speed
Gain setting	Factory specified value
Offset	Factory specified value

Operation mode setting item

Setting items of operation mode are classified into following two groups.

Group 1: Turn on power source normally and set mode switch selecting from A to C.

Position of mode switch	Change content	UP/OWN switch	
		UP operation	DOWN operation
A	Changeover of continuous shutter/random shutter	Continuous shutter	Random shutter
B	Gain change	Gain increase	Gain decrease
C	Offset change	Offset increase	Offset decrease

Group 2: Set mode switch to A position in advance and turn on power source of camera with pushing up or pushing down UP/DOWN switch lever to make setting.

Position of mode switch	Change content	UP/DOWN switch	
		UP operation	DOWN operation
6	Normal scanning/4 pixels skip scanning change	Normal scanning	4 pixels skip scanning
7	Change of normal scanning/2 lines add scanning	Normal scanning	2 lines add scanning

Setting of program page

Writing into RAM (non-volatile memory) and reading out of setting value from "D" to "F" are possible.

Program page	
Shutter method	= Continuous / random
Classification of shutter time	= High speed / low speed
Scanning method 1	= Normal / 4 times speed
Scanning method 2	= Normal / 2 lines addition
Gain set value	= Memorizing as internal value
Offset	= Memorizing as internal value

Shutter speed setting

Shutter is operated by shutter time shown in following table when camera is started (turning on of power source) with mode switch position "0" to "9".

SW	Shutter time	
0	Without shutter (1/15second)	
1	1/12000 second (1H)	
2	1/5000 second (3H)	
3	1/2000 second (8H)	
4	1/1000 second (16H)	
5	1/500 second (32H)	
6	1/250 second (64H)	
7	1/125 second (128H)	
8	1/60 second (256H)	
9	1/30 sec. (532H)/continuous	Pulse width control time/random
A	"A" ~ "F" is position to use operation mode setting and program page setting. Refer to Instruction Manual for operation mode setting and program page setting.	
B		
C		
D		
E		
F		

Explanation of electronic shutter operation mode

Shutter method	Without shutter	No electronic shutter is used. Exposure time of image pick up element becomes one frame time. Exposure is executed every frame continuously.
	Continuous shutter	Exposure is repeated without relation with external trigger input. Repeated pitch becomes each frame.
	Random shutter	Electronic shutter is released every external trigger is applied. Shortest repeating pitch is [Exposure time + one frame time].
Classification of shutter time	Normal shutter	Shutter time less than one frame is used. Shutter time settings are possible in 9 steps for continuous shutter and in 8 steps for fixed length.
	Pulse width control	Shutter time corresponding to pulse width (L time) inputted from external trigger can be released only when random shutter time is set. Shutter time is set in the unit of nH (n is integer more than 1 and H is horizontal synchronized time). Shutter time longer than one frame also can be set.
Scanning method 1	Normal scanning	Each frame read out is executed in 15Hz.
	4 pixels skip scanning	Each frame read out is executed in 60Hz.
Scanning method 2	Normal scanning	Each frame read out is executed in 15Hz.
	2 lines add scanning	Each frame read out is executed in 30Hz.

Automatic load at power source

Setting content of program page from "D" to "F" are automatically loaded by position of mode switch at the time power source is turned on and operation is determined.

Relation between mode switch position and program page are shown in following table.

Position of mode switch	Program page automatically loaded
0 to C	Program page F
D	Program page D
E	Program page E
F	Program page F

RS232C communication setting

Baud rate:	9600bps
Data:	8bit/character
Stop bit	2 stop bit
Parity:	None
XON/XOFF	No control

Available communication item

Initialization of page memory

Report of camera operation and setting state

Gain setting (MGC, AGC, VRT, VRB, offset)

Shutter mode, shutter exposure time setting (random shutter, continuous shutter, high speed shutter, normal scanning, 4 pixels skip scanning, exposure time)

Analogue image signal setting (setup and white clip)

Setting to shutter switch number

Memorizing and read out of operation mode

Comparison of smear

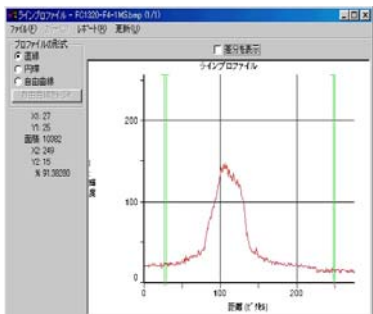
Smear level of FC1500 is lower by 1/3 and additionally dynamic range is as broad as double comparing with normal high pixel progressive camera.



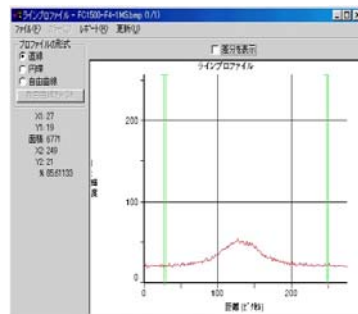
1.30 million pixel progressive camera



FC1500



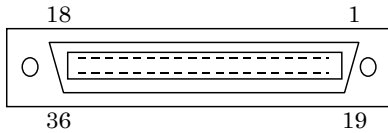
Smear level of 1.30 million pixel's normal camera under immediate under lamp



Smear level of FC1500 under immediate under lamp

Connection

Digital output connector (HRS DX10A-36S) for camera

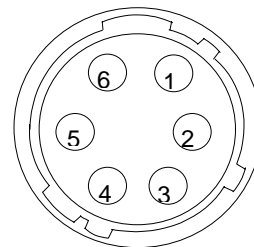


RS232C connector (HRS HR-10A-7R-6SB)

Relation between pin layout and signal of RS232C (6 pins) is shown as following.

This connector is also used for iris lens connector.

Pin no.	Signal name	I/O	Pin no.	Signal name	I/O
1	CLK+	Out	2	CLK-	Out
3	LDV+	Out	4	LDV-	Out
5	FDV+	Out	6	FDV-	Out
7	GND		8	GND	
9	NC		10	NC	
11	NC		12	BUSY	Out
13	NC		14	Vinit	In
15	DO0+	Out	16	DO0-	Out
17	DO1+	Out	18	DO1-	Out
19	DO2+	Out	20	DO2-	Out
21	DO3+	Out	22	DO3-	Out
23	DO4+	Out	24	DO4-	Out
25	DO5+	Out	26	DO5-	Out
27	DO6+	Out	28	DO6-	Out
29	DO7+	Out	30	DO7-	Out
31	DO8+	Out	32	DO8-	Out
33	DO9+	Out	34	DO9-	Out
35	GND		36	GND	



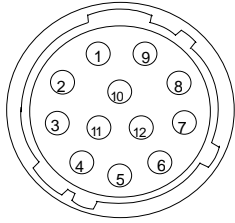
(Pin layout viewed from outside of camera.)

Pin No.	Signal name
1	RXD
2	GND
3	Video output
4	+12V
5	RTS
6	TXD

- CLK Pixel clock
- LDV Line timing signal
- FDV Field timing signal
- CO0 to DO9 Digital video output (10 bit)
- Vinit External trigger input
- BUSY Busy signal

Camera connector (HRS HR-10A-10R-12PB)

Relation between pin layout and signal of camera is shown as following. Use this cable less than 25m.



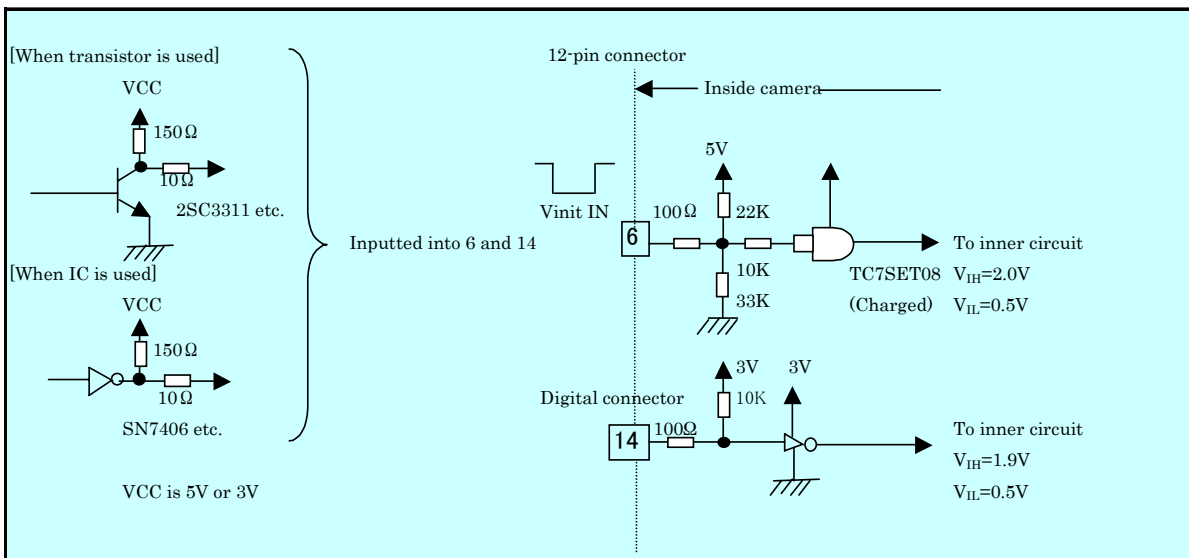
(Pin layout viewed from outside of camera.)

Pin No.	Signal name	Content	I/O
1	GND	Ground for power source	
2	+12V	DC power source input	IN
3	GND	Ground for signal	
4	VIDEO	Video output	OUT
5	GND	Ground for signal	
6	Vinit	External trigger input 1	IN
7	Ext-VD	External VD input	
8	GND	Ground for signal	
9	Ext-HD	External HD input	IN
10	GND	Ground for signal	
11	STRB	Stroboscope output	OUT
12	GND	Ground for signal	

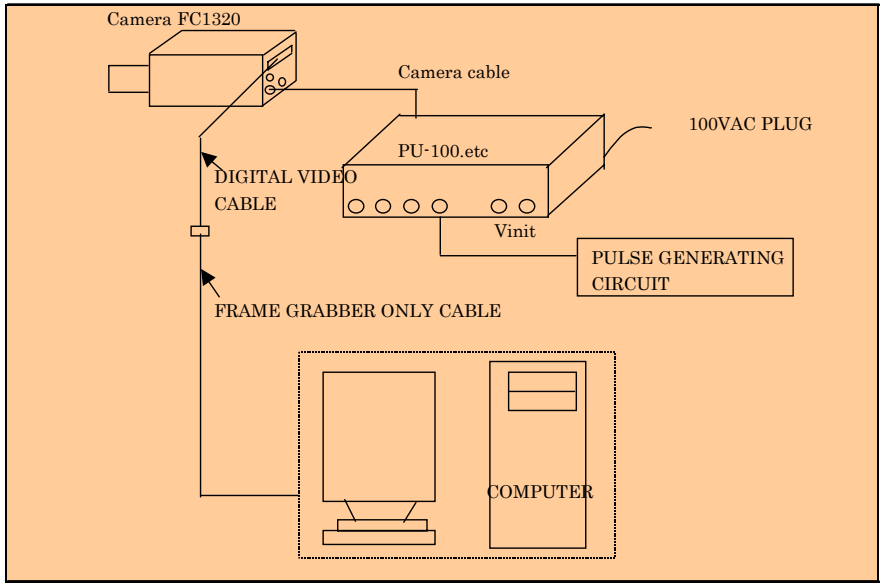
Stroboscope output ... TTL level

PlugHR10A-10P-12S made by HIROSE Electric Co., Ltd. is complied with standard

Vinit input circuit example

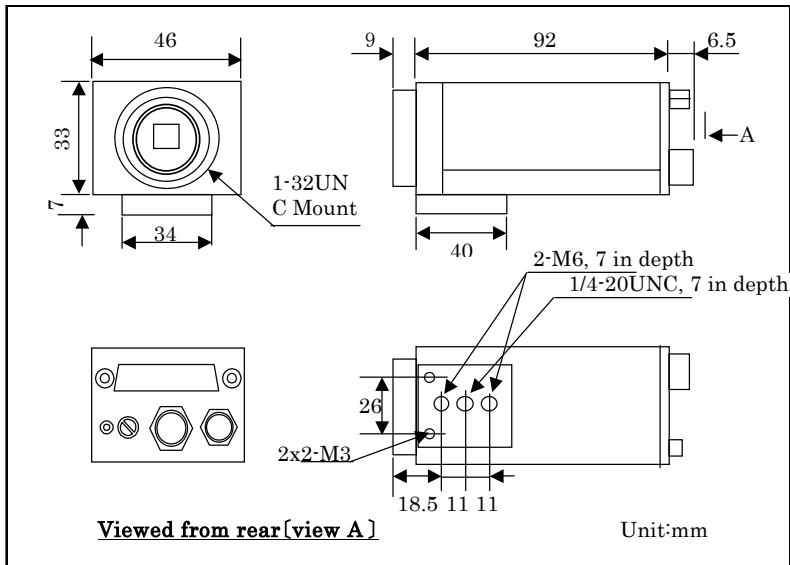


Connection



(Note)

1. Two inputting methods for random trigger (Vinit) are available as shown in above figure: inputting from camera power source side and image processing device (frame grabber). Please inquire us because in these case cable is different.
2. Peripheral devices shown in above are all optional excluding camera.



□ Specifications are subject to change without notice for revision

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