

# Progressive scan monochrome CCD camera

## KP-F500PCL/SCL

### Specifications(Preliminary) Ver1.0

#### 1. General

Hitachi's KP-F500SCL/PCL is a 2/3-inch size black and white CCD camera designed for Versatile functions. Progressive scan with full pixel independent readout and full frame shutter provide images of unparalleled quality at 16 frames per second non-interlaced output. Effective picture elements number 5.05 million, while the broad array of functions includes digital output, multi-step electronic shutter, and frame on demand etc.

The square lattice pixel format also provides excellent suitability for image processing applications.

#### 2. Outstanding features

##### (1) High resolution

High grade CCD with 2456 (H) x 2058 (V) effective pixels.

##### (2) Small-sized camera

The camera has small SDR connector for digital outputs.

Therefore, the camera has the realization of small-sized shape of 44(W)x44(H)x43(D)mm.

##### (3) Frame shutter

The frame shutter function improves vertical resolution of moving objects.

##### (4) Multi-step electronic shutter

The shutter speed can be selected in 8 steps from 1/16th second to 1/50,000th second.

(Variable: 1/16th second to 1/100,000th second)

##### (5) 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.

##### (6) Various functions can be set by a remote control.

##### (7) Digital output

Camera Link

##### (8) Power supply of KP-F500PCL is input via Camera Link cable.

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## 3. Specifications

(1) Imaging device	2/3-inch interline CCD	A
Total pixels	2536 (H) x 2068(V)	
Effective pixels	2456 (H) x 2058(V)	
Active pixels	2448 (H) x 2050(V)	
Pixel size	3.45 (H) x 3.45 (V) $\mu\text{m}$ (square lattice)	
(2) Sensing area	9.93 (H) x 8.70 (V) mm	
(3) Scanning system	Progressive	
(4) Aspect ratio	4 : 3	B
(5) Frame rate	16frames/second (full pixel readout)	
(6) Horizontal drive frequency	64.000 MHz	
(7) Horizontal scanning frequency	33.264kHz	
(8) Vertical scanning frequency	16.00 Hz	
(9) Sync system	Internal/VD	
(10) Lens mount	C mount	
(11) Flange focal distance	17.526 mm	
(12) Video output	Digital output Camera Link Clk = 64MHz x 1ch or 32MHz x 2ch Maximum cable length: 10m	C
(13) VD reset	VD LVDS level, 35.79 Hz or less	
(14) Resolution	Horizontal/Vertical: 2000TV lines	
(15) Sensitivity	400 lx, F4, 3200 K	
(16) Minimum illumination	1.0 lx, F1.4, MAX GAIN, without IR cut filter	
(17) Signal noise to ratio	50 dB	
(18) Electronic shutter speed	1/16, 1/60, 1/125, 1/250, 1/1000, 1/2,000, 1/10,000, 1/50,000 second. Factory setting is off (1/16 second) or changeable by variable shutter (Minimum 1/100,000 second)	D
(19) Gamma compensation	$\gamma = 1$	
(20) Frame on demand	Remote setting (fixed shutter, one trigger and reset control mode). Factory setting is all off.	E
(21) Partial scan	Selectable start position and width of picture grabbing in 1H step.	
(22) Power supply voltage	12 $\pm$ 1 VDC	
(23) Current consumption	Approx. 330 mA (Approx. 4.0W)	

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(24) Ambient, operating	0 to + 40°C (+32 to ; 104 F), less than 90 % RH
Ambient, storage	-10 to + 50°C(+14 to +122 F), less than 70 % RH
Note: If operated continuously, be sure to use at less than +40°C(104 F) for long term stable performance.	
(25) Vibration endurance	68.65 m/s <sup>2</sup> (Acceleration: constant) (10 to 200Hz,sweep:10 min,XYZ,30 min)
(26) Shock endurance	490.3 m/s <sup>2</sup> (Drop test, once each top, bottom, left and right)
(27) External dimensions	44 (W) x 44 (H) x 43 (D) mm
(28) Mass	Approx. 130 g
(29) Remote control	
(a) Signal system	
Control system	Start-stop synchronization system
Transmission rate	9600 bps
Data length	8 bits
Start bit	1bit
Stop bit	1bit
Parity	None
Bit transfer	LSB first
(b) Communications control system	
Full control by remote control software, data send/receive by text data transfer to camera microprocessor (BSC system handshake)	
(c) Control items	
1. Shutter speed	1/16, 1/60, 1/125, 1/250, 1/1000, 1/2,000, 1/10,000, 1/50,000 second
2. Variable shutter	1/16 to 1/100,000 second
3. Mode	Fixed shutter, one trigger, reset control mode
4. Gain	0 to 18 dB(Approx. 0.0359 dB step)
5. VD/FVAL	Factory setting: VD
6. HD/LVAL	Factory setting: HD
7. 8bit/10bit/12bit/14bit	Factory setting: 14bit
8. HD reset/NON reset	Factory setting: HD reset
9. Partial scan mode	
10. Offset level	
11. Trigger pulse polarity	Factory setting: POS
12. Base/Medium configuration	

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## (2) Signal connection to DIGITAL OUT connector

## Connector1

Pin No.	Signal	Pin No.	Signal
1	+12V (KP-F500PCL)	14	GND
	GND (KP-F500SCL)		
2	TXOUT 0 (-)	15	TXOUT 0 (+)
3	TXOUT 1 (-)	16	TXOUT 1 (+)
4	TXOUT 2 (-)	17	TXOUT 2 (+)
5	TXCLKOUT (-)	18	TXCLKOUT (+)
6	TXOUT 3 (-)	19	TXOUT 3 (+)
7	RX (+) [ SERTC (+) ]	20	RX (-) [ SERTC (-) ]
8	TX (-) [ SERTFG (-) ]	21	TX (+) [ SERTFG (+) ]
9	TRIG-AVD (-) [ CC1 (-) ]	22	TRIG-AVD (+) [ CC1 (+) ]
10	TRIG-B (+) [ CC2 (+) ]	23	TRIG-B (-) [ CC2 (-) ]
11	NC [ CC3 (-) ]	24	NC [ CC3 (+) ]
12	NC [ CC4 (+) ]	25	NC [ CC4 (-) ]
13	GND	26	+12V (KP-F500PCL)
			GND (KP-F500SCL)

## Connector2

Pin No.	Signal	Pin No.	Signal
1	+12V (KP-F500PCL)	14	GND
	GND (KP-F500SCL)		
2	TYOUT 0 (-)	15	TYOUT 0 (+)
3	TYOUT 1 (-)	16	TYOUT 1 (+)
4	TYOUT 2 (-)	17	TYOUT 2 (+)
5	TYCLKOUT (-)	18	TYCLKOUT (+)
6	TYOUT 3 (-)	19	TYOUT 3 (+)
7	100Ω	20	terminated
8	TZOUT 0 (-)	21	TZOUT 0 (+)
9	TZOUT 1 (-)	22	TZOUT 1 (+)
10	TZOUT 2 (-)	23	TZOUT 2 (+)
11	TZCLKOUT (-)	24	TZCLKOUT (+)
12	TZOUT 3 (-)	25	TZOUT 3 (+)
13	GND	26	+12V (KP-F500PCL)
			GND (KP-F500SCL)

Connector (camera side)

Sumitomo 3M 1226-1100-00PL or equivalent

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- The digital out cable should be comprised of a twisted pair of wires having 100Ω 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 equipment, frame grabber, etc.
  - Tx: Transmit data from camera to PC
  - Rx: Transmit data from PC to camera
- (Note)  
Please do not unplug and insert cable(digital out cable) with a power supplied to a camera.

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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 Kokusai certifies this product complies with the standard warranty conditions of Hitachi Kokusai, and that quality control is implemented to the extent required to comply with these conditions.

**RoHS Compliant**  
 This product complies with the requirement of the RoHS(Restriction of the use of Certain Hazardous Substances in Electrical and Electronic Equipment) Directive 2002/95/EC

**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) 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.
- (7) In the case of camera trouble by miss wiring of cable, it will be considered as out of warranty.

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