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Digital Interface Cameras

About Digital Interface

GigE Vision (Gigabit Ethernet interface)

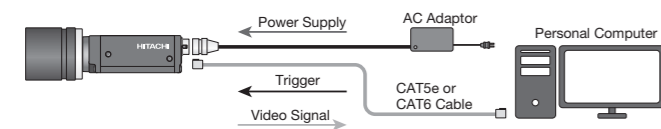
Direct connection is possible to PC by the Gigabit Ethernet cable. This cable is less bulky compared with parallel digital output cabling. GigE Cable length can be extended to maximum 100m without hub and switcher. Based on Industrial camera interface standard GigE Vision, a maximum of 1Gbps high speed data transmission is available and suitable for image processing. Development of camera control system is easy because industrial camera control API "GenICam" lead EMVA (European Machine Vision Association). Power can be supplied via Ethernet cable for PoE enabled models (Power over Ethernet).

Applicable Models (PoE Enabled): KP-F21GV, KP-F31GV, KP-FM200GV, KP-FMD200GV, KP-F510GV, KP-FD510GV, HV-F202GV, KP-F500GV, KP-F202GV, KP-F145GV, KP-F140GV, KP-F83GV, KP-F33GV, KP-FD500GV, KP-FD202GV, KP-FD140GV, KP-FD83GV, KP-FD33GV

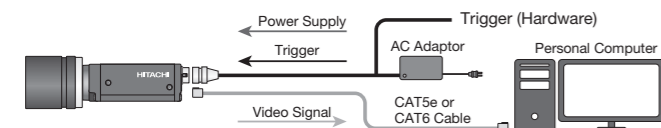
Applicable Models (PoE Non-enabled): HV-F22GV

System Configuration (example)

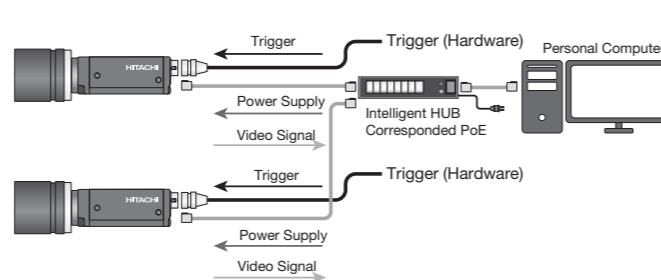
• Direct Connection to PC and Triggered via Ethernet (Software Trigger)



• Direct Connection to PC and Triggered via Multi-connector (Hardware Trigger)



• Connection Via HUB/Switcher to PC and Power Supply via the Ethernet (PoE)



Digital Interface Cameras

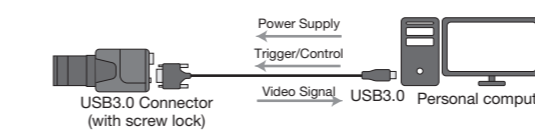
About Digital Interface

USB3 Vision

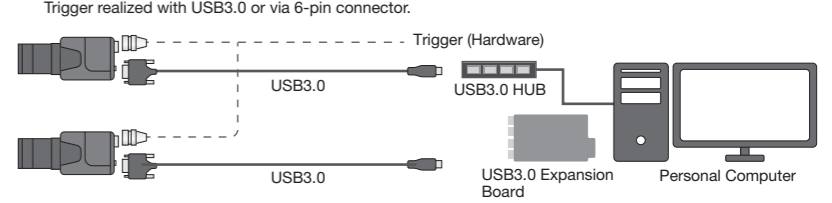
USB3 Vision is the next standard generation for industrial camera interface from the AIA (Automated Image Association), that makes use of the USB3 connector on a PC, to achieve transmission speeds equivalent to the Medium Configuration of Camera Link. USB3 has about 10 times the bandwidth of USB2 and offers a simple and reliable low cost two way transmission system between the camera and the PC. An industrial style screw lock connector provides a reliable plug-and-play connection while providing camera power. Reduced CPU loads due to DMA allow acquisition of stable images with low latency.

Applicable Models: KP-F21UB, KP-F31UB, KP-FM200UB, KP-FMD200UB, KP-F510UB, KP-FD510UB

• Simple Connection example



• Connection example of multiple Cameras using the expansion board or USB3.0 HUB



Camera Link

Camera link is an AIA imaging standard for serial digital interface between a camera and a frame grabber. Camera Link is available in Base, Medium or Full configurations depending on the camera resolution, bit depth and frame rate. In addition there are several different types of Camera Link interfaces including normal, Mini CL, PoCL for power over Camera Link, and PoCL Lite for reduced connector and cable size.

Applicable Models

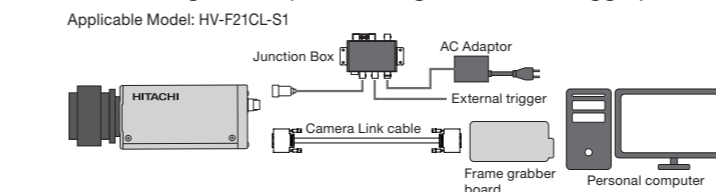
Model	Type of CameraLink	Configuration
KP-F520WCL	Mini CL (Auto Selection of PoCL or non-PoCL)	Base
KP-FD510WCL		Base
KP-F500WCL		Medium
KP-FR500WCL		Base
KP-F145WCL		Base
KP-FM400WCL		Base
KP-FM200WCL		Medium
KP-FMR400WCL		Full
KP-FD500PCL		Base
KP-FD202PCL		Medium
KP-FD140PCL	Mini CL (PoCL)	Base
KP-FM200PCL		Medium
KP-FM100PCL		Full
KP-FMD200PCL		Base
KP-FMD100PCL		Medium
KP-F230PCL		Full
KP-F200PCL		Base

Model	Type of CameraLink	Configuration
KP-F200PCL	Mini CL (PoCL)	Base
KP-F80PCL		Base
KP-F31PCL		Medium
KP-F30PCL		Full
KP-FR230PCL		Base
KP-FR200PCL		Medium
KP-FR80PCL		Full
KP-FR31PCL		Base
KP-FR30PCL		Medium
KP-FBR30PCL		Full
KP-FM1200CL	Mini CL (Non-PoCL)	Base/Medium/Full
KP-FD500SCL		Base
KP-FD202SCL		Medium
KP-FD140SCL		Full
KP-F230SCL	Mini CL (Non-PoCL)	Base
KP-F200SCL		Medium

Model	Type of CameraLink	Configuration
KP-F80SCL	Mini CL (Non-PoCL)	Base
KP-F31SCL		Base
KP-F30SCL		Medium
KP-FR230SCL		Base
KP-FR200SCL		Medium
KP-FR80SCL		Full
KP-FR31SCL		Base
KP-FR30SCL		Medium
KP-FBR30SCL		Full
KP-FMR830CL		Full
HV-F202SCL	PoCL-Lite	Base/Medium
KP-F200Lite		Base
KP-F80Lite		Medium
KP-F30Lite		Full
KP-FM30Lite	PoCL-Lite	Base
KP-FBM30Lite		Medium
HV-F22CL-S1	Camera Link	Base

System Configuration for Camera Link normal (example)

• Base Configuration (When using an external trigger)



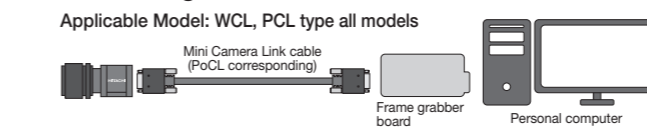
Mini CL

By adopting a Camera Link digital interface, high speed video data transfer is possible. Furthermore, by adopting the small connector (SDR) of a Mini Camera Link standard, the size of the camera has been reduced.

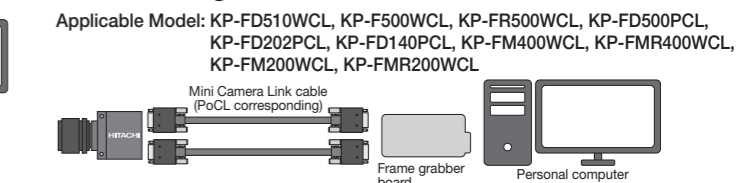
The PoCL version is connected by a single (PoCL) Mini Camera Link cable directly to a frame grabber supporting PoCL. Simple systems construction is possible.

System Configuration for PoCL (example)

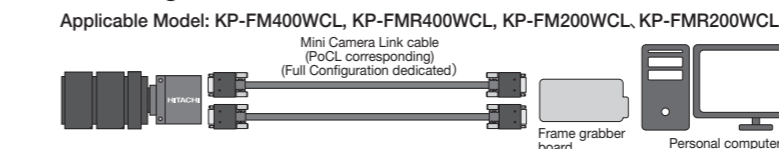
• Base Configuration



• Medium Configuration



• Full Configuration



Digital Interface Cameras

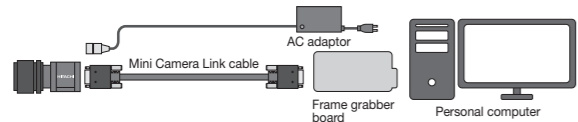
About Digital Interface

Mini CL

System Configuration for Non-PoCL (example)

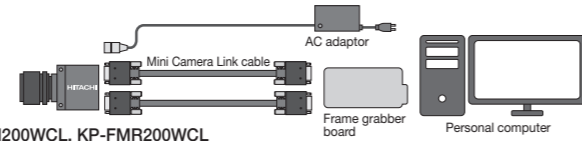
Base Configuration

Applicable Model: WCL, SCL type all models, KP-FM1200CL, KP-FMR830CL



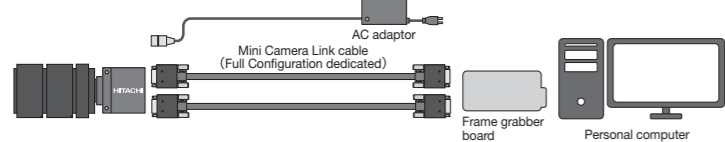
Medium Configuration

Applicable Model: KP-FM1200CL, KP-FD510WCL, KP-F500WCL, KP-FR500WCL, KP-FD500SCL, KP-FD202SCL, KP-FD140SCL, KP-FM400WCL, KP-FMR400WCL, KP-FM200WCL, KP-FMR200WCL



Full Configuration

Applicable Model: KP-FM1200CL, KP-FM400WCL, KP-FMR400WCL, KP-FM200WCL, KP-FMR200WCL

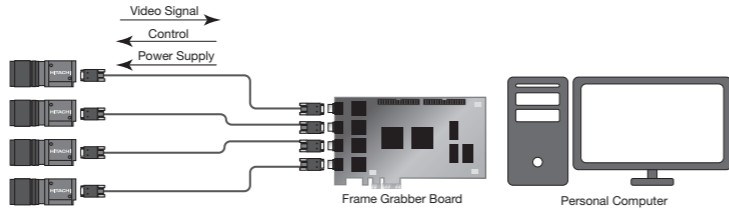


PoCL-Lite

PoCL Lite features a smaller Camera Link connector reducing the pin count from 26 pins to 14 pins along with a smaller cable which allows smaller camera size and more connectors on the frame grabber board allowing the support of up to four cameras by a single frame grabber board. PoCL-Lite supports Base Camera Link configuration and provides power to the camera over the interface along with serial camera data for image and camera control.

Applicable Models: KP-F200Lite, KP-F80Lite, KP-F30Lite, KP-FM30Lite, KP-FBM30Lite

System Configuration (Four camera connection example)

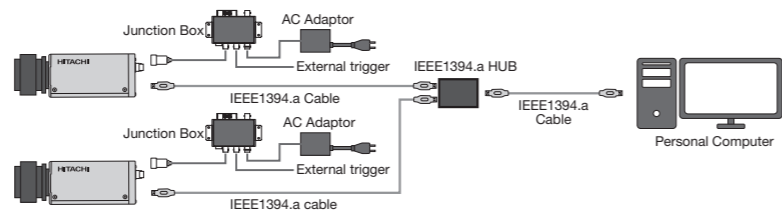


IEEE1394.a

IEEE1394.a, also known as FireWire, is a camera interface standard to a PC that provides image and camera control over a serial data link. The included software allows the user to view the camera image as well as to control the camera parameters over the serial interface.

Applicable Models: HV-F21F

System Configuration (example)



Main Features

A variety of interface

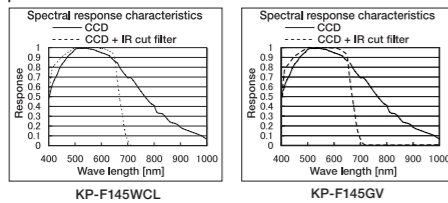
By a variety of interfaces, it is adaptable to a variety of systems.

GigE Vision	-GV models
USB3 Vision	-UB models
Mini Camera Link	Auto Selection of PoCL or non-PoCL
	PoCL
Camera Link	-PCL models
	Non-PoCL
PoCL-Lite	-CL models
Camera Link	-Lite models
IEEE-1394.a	-F models

Near infrared sensitivity

Extended spectral response allows use of the camera in the near infrared region.

Applicable models:
KP-F145WCL,
KP-F145GV



Raw Data Output (KP-FRxxx Models)

The FR series of cameras use a CCD with an RGB primary color mosaic filter, outputting the image data in a RAW format with minimal processing in order to achieve higher frame rates as compared to a normal color camera. External image processing and software is required to produce a proper color picture.

High color fidelity (KP-FDxxx/KP-FMDxxx Models)

RGB primary color mosaic filter achieve high color fidelity.

High resolution & high speed

High resolution combined with high frame rates is possible with this series of cameras. Can be used for high-precision and high-speed image processing in many applications.

280 fps	2.23 Mpixel: KP-FM200WCL/FMR200WCL
150 fps	4.19 Mpixel: KP-FM400WCL/FMR400WCL
125 fps	VGA: KP-F31UB/F21UB/F31GV/F21GV
120 fps	VGA: KP-F31PCL/F31SCL/FR31PCL/FR31SCL
90 fps	VGA: KP-FM30Lite/FBM30Lite/F33GV/FD33GV
61 fps	SXGA: KP-FM100PCL
60 fps	VGA: KP-F30PCL/F30SCL/FR30PCL/FR30SCL/FBR30PCL/FBR30SCL/F30Lite
53 fps	12.58 Mpixel: KP-FM1200CL, UXGA: KP-FM200PCL/FM200UB/FMD200UB/FM200GV
36 fps	XGA: KP-F80PCL/F80SCL/F80Lite/F83GV/FD83GV
30 fps	SXGA: KP-F145WCL/FD140PCL/FD140SCL/FMD100PCL/F145GV/F140GV/FD140GV UXGA: KP-F230PCL/F230SCL/FD202PCL/FD202SCL/FMD200GV/F202GV/FD202GV, HV-F202SCL
28 fps	UXGA: HV-F202GV
20 fps	UXGA: KP-FMD200PCL
18 fps	5.05 Mpixel: KP-F520WCL//F510UB/FD510UB/F510GV
16 fps	5.05 Mpixel: KP-F500WCL/FR500WCL/F500GV
15 fps	UXGA: KP-F200PCL/F200SCL/FR200PCL/FR200SCL/F200Lite SXGA: HV-F22CL-S1/F22GV
12 fps	5.05 Mpixel: KP-FD510WCL/FD510SCL/FD500SCL
9 fps	5.05 Mpixel: KP-FD510GV/FD500GV
7.5 fps	SXGA: HV-F22F

Four-sided attachment mechanism

Applicable Models: KP-F520WCL/FM200PCL/FMD200PCL/FM100PCL/FMD100PCL/FM1200CL

Can be attached four-side of the camera, making it suitable for camera installation of the narrow portion.

Digital Interface Cameras

Main Features

Compact and lightweight

Compact models featuring a size of 21.5(W) x 21.5 (H) x 21.5 (D) with a PoCL-Lite, Mini Camera Link (PoCL), or USB3 Vision interfaces are available.

	Dimensions WxHxDmm (Not including protrusions and lens)	Models
	1CCD (CMOS) Models	21.5 x 21.5 x 21.5
29 x 29 x 20		KP-FM200PCL/FMD200PCL/FM100PCL/FMD100PCL/FM200UB/ FMD200UB/F31UB/F21UB
29 x 29 x 29		KP-F520WCL/F200PCL/F200SCL/F80PCL/F80SCL/F30PCL/F30SCL/FR200PCL/FR200SCL/FR80PCL/FR80SCL/FR30PCL/FR30SCL/F200Lite/F80Lite/F30Lite/510UB/FD510UB
29 x 29 x 35		KP-F510GV/FD510GV/FM200GV/FMD200GV/F31GV/F21GV
29 x 29 x 38		KP-F230PCL/F230SCL/F31PCL/F31SCL/FR230PCL/FR230SCL/FR31PCL/FR31SCL
44 x 44 x 41		KP-FD510WCL/F500WCL/F145WCL/FR500WCL/FD500PCL/FD500SCL/FD202PCL/FD202SCL/FD140PCL/FD140SCL/FM400WCL/FM200WCL/FMR400WCL/FMR200WCL
55 x 55 x 45		KP-FM1200CL
44 x 29 x 72		KP-F500GV/F202GV/F145GV/F140GV/F83GV/F33GV/FD500GV/ FD202GV/FD140GV/FD83GV/FD33GV
12 x 12.5 x 47.5		Camera Head: KP-FBR30PCL/FBR30SCL
3CCD Models	55 x 55 x 89	KP-F202SCL
	65 x 65 x 130	HV-F22CL-S1, HV-F22F
	65 x 65 x 141	HV-F22GV

Frame Shutter

Higher vertical resolution for moving objects.

Multi-step Shutter

Electronic shutter is provided with multi-step or variable speed.

Frame on Demand

A one-trigger and fixed-shutter mode of frame-on-demand are provided allowing precise timing and exposure for image capture.

Remote Control

Through the digital interface, various setting such as shutter, mode, gain, partial scan, bit depth, etc can be adjusted.

Partial Scan

The vertical startposition and number of lines can be adjusted. Higher frame rates are possible by using partial scan mode. (KP-FM1200CL can be set eight area) (KP-FM200PCL/FMD200PCL/FM100PCL/FMD100PCL/FM200UB/FM200GV/FMD200UB/FMD200GV: The start position and area of H and V direction can be set in one pixel spacing.)

Cropping mode

Applicable Models: KP-FM200PCL/FMD200PCL

A user selectable cropping area featuring reduced resolution (VGA/XGA/SXGA) can be selected to increase the camera frame rate. The KP-FM200PCL can operate at 130 f/s in the VGA mode.

Vertical subsampling modes

Applicable Models: KP-FM1200CL/FM400WCL/FM200WCL/FMR400WCL/KP-FMR200WCL

Enables high-speed readout by vertical decimation of 2 to 10 times

Vertical 2 pixels additional Modes

Applicable Models: KP-F520WCL/F500WCL/F145WCL/F230PCL/F230SCL/F31PCL/F31SCL

Enables high-speed readout by the vertical 2 pixels addition mode

Temperature detection output

Applicable Models: KP-F520WCL

The internal temperature of the camera can be read.

White spot detecting and correction

White spots that result from radiation or high temperature can be detected and corrected.

Knee adjustment

Applicable Models: KP-F520WCL, FD Model, FMD model, -GV Model, -UB Model, 3CCD model

Gamma adjustment

Applicable Models:

Manual variable: KP-F520WCL, 3CCD model

Correction by LUT: KP-FD510WCL/FD202PCL/FD202SCL/FD140PCL/FD140SCL /FMD200PCL/FMD100PCL, -UB model, -GV model

FLASH output

Applicable Models: KP-F520WCL, -UB model, -GV model

The camera has an output-signal to control and synchronize an external flash to the camera exposure.

Selectable White Balance Adjustment

Applicable Models: (KP-FDXXX/FMDxxx Models, 3CCD Models)

Selectable white balance adjustment method of ATW (auto-tracking), Manual (manual setting of R and B gain) or one-time (one-time auto adjustment).

6-Vector Independent Masking

Applicable Models: (KP-FDXXX/FMDxxx Models, 3CCD Models)

A 6-Vector color correction can be selected, allowing independent adjustment of the hue and saturation of the primary R,G,B, and complementary Cy, Mg, and Ye vectors, for accurate color reproduction of difficult objects.

Selectable bit depth

Bit Depth	Applicable models
8 / 10 / 12	KP-F500WCL/FR500WCL/F145WCL/F510UB/FM200UB/F31UB/F21UB/F500GV/F202GV/F145GV//F140GV/F83GV/F33GV
8 / 16	KP-F510GV/FM200GV/F31GV/F21GV
8 / 10	KP-FM1200CL/F520WCL/FM400WCL/FM200WCL/F500WCL/ F145WCL/FMR400WCL/FMR200WCL/FM200PCL/FM100PCL/ F230PCL/F230SCL/F200PCL/F200SCL/F80PCL/F80SCL/ F31PCL/F31SCL/F30PCL/F30SCL/FR230PCL/FR230SCL/ FR200PCL/FR200SCL/FR80PCL/FR80SCL/FR31PCL/FR31SCL/ FR30PCL/FR30SCL/FBR30PCL/FBR30SCL/F200Lite/F80Lite/ F30Lite/FM30Lite/FBM30Lite
24 / 48	KP-FD510GV/FMD200GV
24 / 30 / 36	KP-FD510WCL/FD500PCL/FD500SCL/FD202PCL/FD202SCL/ FD140PCL/FD140SCL/FD510UB/FMD200UB/FD500GV/ FD202GV/FD140GV/ FD83GV/FD33GV/F202SCL/F202GV
24 / 30	HV-F22F
24	KP-FMR830CL/FMD200PCL/FMD100PCL, HV-F22CL-S1/F22GV

Features for 3CCD Models

Adjustable sharpness (DTL) width

Sharpness (DTL) width is adjustable. A feeling of natural definition is provided when set a lower sharpness. A higher setting results in an image with enhanced contours.

Auto shading (ASC)

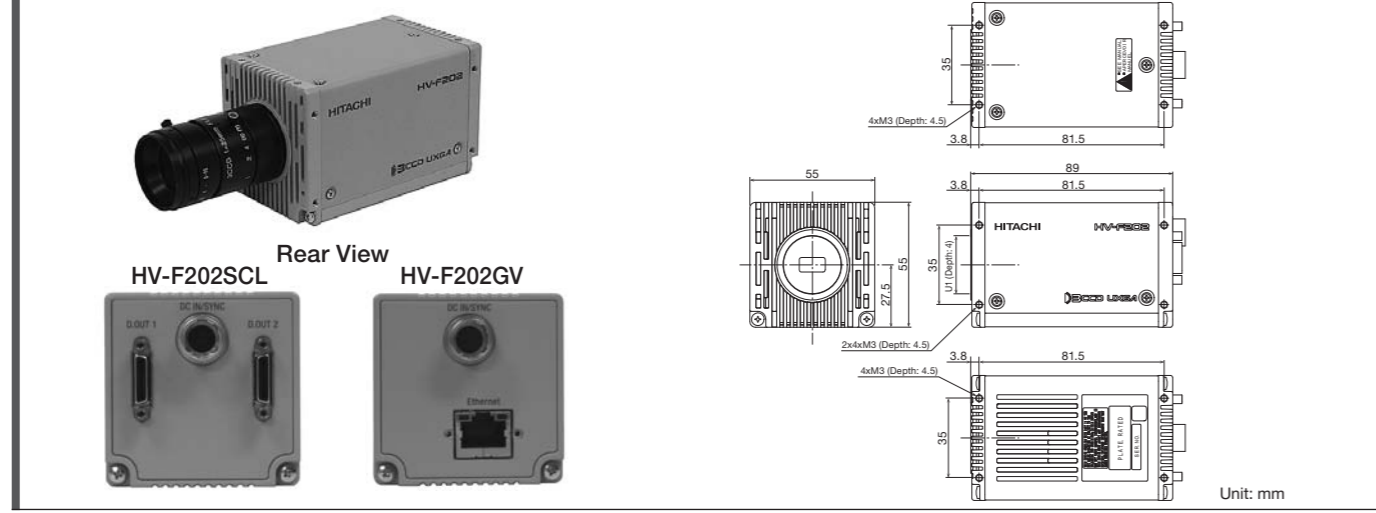
Color shading (non-uniformity of color distribution) due to lens and lighting can be corrected automatically.

Versatile imaging functions

- Long time integration mode.
- Four application files.
Four different complete camerasetups can be stored and recalled.
- Realtime automatic white balance function (ATW)
Changements in the colortemperature of the of the illumination can be adjusted automatically.
- Auto exposure (ALC: auto level control)
The ALC examines and uses 64 separate areas of the image to continuously control the AGC and AES, providing extremely wide response to variations in light. Peak or Average ALC response can be selected from the camera menu.
- Two mode gain control
AGC or user-programmable gain in 1 dB steps.
- Master black, R/B black, and R/B gain are adjustable.

Digital Interface Cameras

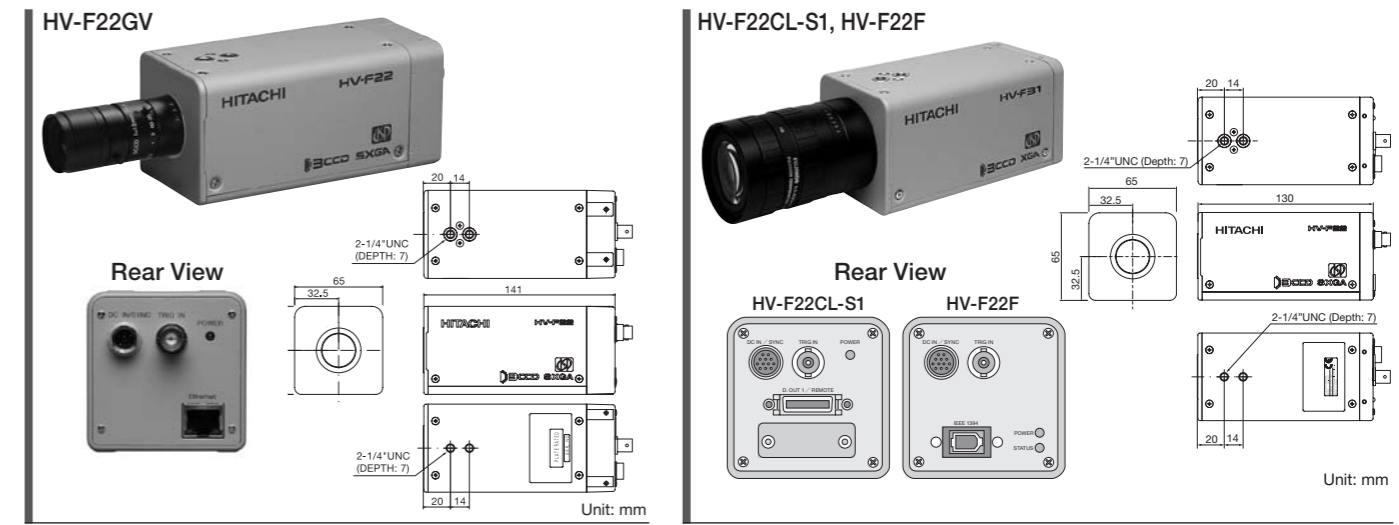
HV-F202GV	GigE Vision	3CCD Color (RGB/YUV)	1/1.8" CCD	UXGA (1.92M pixels) (1600 x 1200)	Max.28 frames per sec. (YUV 24 bits)	55(W) x 55(H) x 89(D) mm
HV-F202SCL	MiniCL (Non-PoCL)	3CCD Color (RGB)	1/1.8" CCD		Max.30 frames per sec.	



		HV-F202GV	HV-F202SCL		
Imaging device	Effective pixels	1/1.8-inch progressive scan interline CCD (R, G, B 3 CCD)			
	Pixel size	1600(H) x 1200(V)			
	Optical system	4.4 μm(H) x 4.4 μm(V) (Square pixel)			
	Optical system	1/1.8-inch F1.8 prism			
Scanning area		7.04 mm(H) x 5.28 mm(V)			
Scanning system		Progressive			
Sync system		Internal / VD external			
Lens mount		C-mount			
Flange focal distance		17.526 mm			
Video output		Gigabit Ethernet IEEE802.3ab (1000BASE-T) GigE Vision Support GenICam Support RGB (24 bit/30 bit/ 36 bit), RAW (24 bit/30 bit/ 36 bit), YUV (24 bit/30 bit/ 36 bit)		Camera Link support Base Configuration / Medium Configuration Base Configuration: RGB 24bit Medium Configuration: RGB 30bit / RGB 36bit	
Frame rate	RGB	Frame rate (frames per second)			30 frames per second
		24 bit	30 bit	36 bit	
	YUV				
	28	18	18		
Sensitivity		2000 lx, F5.6, 3200K (at 1/30 second shutter)			
Electric shutter		OFF / Auto(AES) / Manual (Variable)			
Electric shutter	Variable	1/30 to 1/100,000 second			
	AES	1/30 to 1/100,000 second			
	Long time integration	1/30 to approx. 4 second (1 frame step)			
External trigger	Mode	Fixed shutter, One trigger, VD sync reset			
	Input	Via Gigabit Ethernet cable or DC IN/SYNC connector		Via Camera Link cable (CC1) or DC IN/SYNC connector	
	Input level	5 Vp-p ±0.5 V			
External sync signal (Strobe out)		VD output, Flash out			
Registration		Full Screen: 0.05% (except lens characteristics)			
Vertical Sharpness		2H			
White balance		Manual / One-push auto / Continuous auto			
Gain		Manual: 0 to +12 dB, AGC: 0 to +12 dB (with limit setting)			
Gamma		0.45 / 1.0 / LUT (Look up table: user customizable)			
Color masking		OFF/ON (6 color independent masking)			
Sharpness		Sharpness (DTL) level, Sharpness (DTL) width			
Paint black		Adjustable			
Black level		Adjustable			
Knee		Adjustable (Knee point and knee slope)			
Power supply		DC+12 V ±1 V (from DC IN / SYNC connector), 48V (PoE)		DC+12 V ±1 V (from DC IN / SYNC connector)	
Power consumption		Approx. 7.8 W (DC+12 V)		Approx. 7.2 W (DC+12 V)	
Ambient temperature	Operating	0 °C to +40 °C (without dew condensation)			
	Storage	-20 °C to +60 °C			
Vibration endurance		10 to 200 Hz 24.5 m/s ²			
Shock endurance		392 m/s ²			
External dimensions		55(W) x 55(H) x 89(D) mm (not including lens and protrusions)			
Mass		Approx. 350 g (without lens)			

Digital Interface Cameras

HV-F22GV	GigE Vision	3CCD Color (RGB)	1/2" CCD	SXGA (1.39 M pixels)(1360 x 1024)	Max.15 frames per sec.	65(W) x 65(H) x 141(D) mm
HV-F22CL-S1	CameraLink	3CCD Color (RGB)	1/2" CCD			
HV-F22F	IEEE1394.a	3CCD Color (RGB/YUV)	1/2" CCD	SXGA (1.39 M pixels) (1360 x 1024)	Max. 7.5 frames per sec.	65(W) x 65(H) x 130(D) mm



		HV-F22GV	HV-F22CL-S1	HV-F22F
Imaging device	Effective pixels	1/2-inch progressive scan interline CCD (R, G, B 3 CCD)		
	Pixel size	1360(H) x 1024(V)		
	Optical system	4.65 μm(H) x 4.65 μm(V) (Square pixel)		
	Optical system	1/2-inch F1.6 prism		
Scanning area		6.32 mm (H) x 4.76 mm(V)		
Scanning system		Progressive		
Sync system		Internal / VD external		
Lens mount		C-mount		
Flange focal distance		17.526 mm		
Video output	Interface	Gigabit Ethernet IEEE802.3ab (1000BASE-T) GigE Vision Support GenICam Support RGB (24 bit)	Camera Link Base Configuration	IEEE1394.a
	Output Data	RGB 24 bit	RGB 24 bit	RGB 16/24 bit YUV 16/24/48 bit
	Image Size	1360(H) x 1024(V)		
	Frame rate	15 frames per second		7.5 frames per second
Sensitivity		2000 lx, F8, 3200K (at 1/30 second shutter)		
Electric shutter		OFF / Auto(AES) / Manual (Variable)		
Electric shutter	Variable	1/15 to 1/100,000 second		
	AES	1/15 to 1/100,000 second		
	Long time integration	1/15 to approx. 4 second (1 frame step)		
External trigger	Mode	Fixed shutter, One trigger, VD sync reset		
	Input	Via Gigabit Ethernet cable or DC IN/SYNC connector	Via Camera Link cable, DC IN/SYNC connector or BNC connector	Via DC IN/SYNC connector or BNC connector
	Input level	Low: 0 V DC, High: 3 to 24 V DC		
External sync signal (Strobe out)		Flash out		
Screen distortion		All Screen: 0% (except lens characteristics)		
Registration		Full Screen: 0.05% (except lens characteristics)		
Vertical Sharpness		2H		
White balance		Manual / One-push auto / Continuous auto		
Gain		Manual: 0 to +12 dB, AGC: 0 to +12 dB (with limit setting)		
Gamma		0.45 / 1.0 / LUT (Look up table: user customizable)		
Color masking		OFF/ON (6 color independent masking)		
Sharpness		Sharpness (DTL) level, Sharpness (DTL) width		
Paint black		Adjustable		
Black level		Adjustable		
Knee		Adjustable (Knee point and knee slope)		
Power supply		DC+12 V (10.5 V to 15 V DC without ripple)		
Power consumption		Approx. 9.0 W (DC+12 V)	Approx. 6.5 W (DC+12 V)	Approx. 8.5 W (DC+12 V)
Ambient temperature	Operating	0 °C to +40 °C		
	Storage	-20 °C to +60 °C		
Vibration endurance		10 to 200 Hz 24.5 m/s ²		
Shock endurance		392 m/s ²		
External dimensions		65(W) x 65(H) x 141(D) mm (not including lens and protrusions)		65(W) x 65(H) x 130(D) mm (not including lens and protrusions)
Mass		Approx. 600 g (without lens)		

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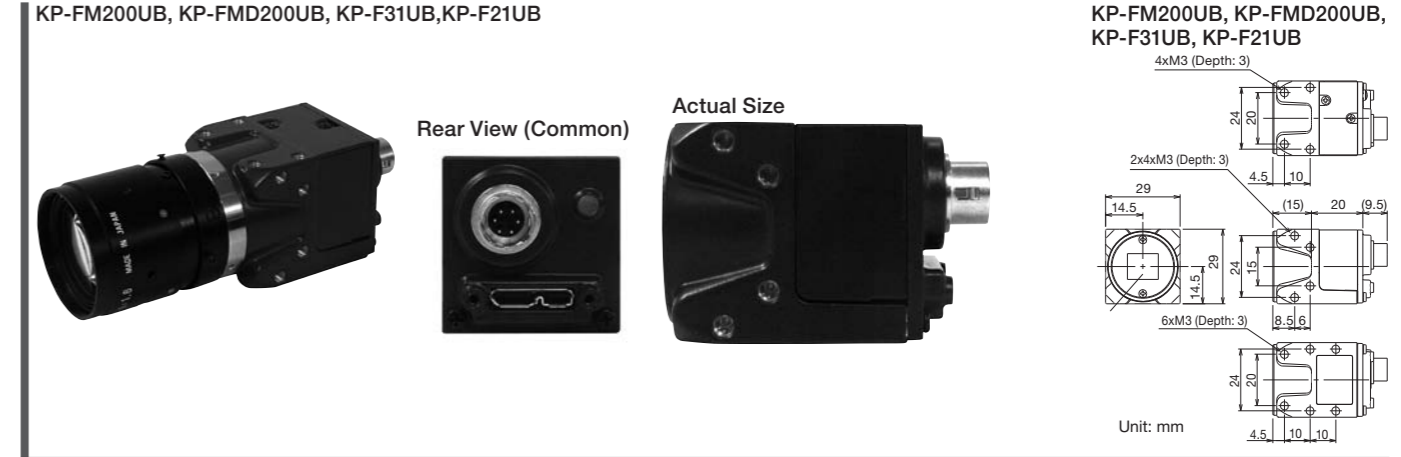
KP-FD510GV	GigE Vision	1CCD Color (RGB/YUV/RAW)	2/3" CCD	5.05 M Pixels (2456 x 2058)	Max. 9 frames per sec. (YUV) Max. 7 frames per sec. (RGB)	29(W) x 29(H) x 35(D) mm
KP-F510GV		1CCD Black & White			Max. 18 frames per sec.	
KP-FMD200GV		1CMOS Color (RGB/YUV/RAW)	1/1.8" CMOS	UXGA (1.92 M Pixels) (1600 x 1200)	Max. 30 frames per sec. (YUV) Max. 18 frames per sec. (RGB)	
KP-FM200GV		1CMOS Black & White			Max. 53 frames per sec.	
KP-F31GV		1CCD Black & White	1/3" CCD	VGA (0.32 M Pixels) (652 x 490)	Max. 125 frames per sec.	
KP-F21GV		1CCD Black & White	1/2" CCD			



	KP-FD510GV KP-F510GV	KP-FMD200GV KP-FM200GV	KP-F31GV	KP-F21GV
Imaging device	2/3-inch CCD	1/1.8-inch CMOS	1/3-inch CCD (ICX424AL)	1/2-inch CCD (ICX414AL)
Effective pixels	2456(H) x 2058(D)	1600(H) x 1200(D)	659(H) x 494(D)	
Pixel size	3.45 μm(H) x 3.45 μm(V) (Square pixel)	4.5 μm(H) x 4.5 μm(V) (Square pixel)	7.4 μm(H) x 7.4 μm(V) (Square pixel)	9.9 μm(H) x 9.9 μm(V) (Square pixel)
Color filter (FD/FMD model)	RGB primary color mosaic filter		-	-
Scanning area	8.47 mm(H) x 7.10 mm(V)	7.2 mm(H) x 5.4 mm(V)	4.88 mm(H) x 3.66 mm(V)	6.52 mm(H) x 4.89 mm(V)
Scanning system	Progressive			
Sync system	Internal			
Lens mount	C-mount (Flange focal distance: 17.526 mm)			
Video output	Interface	Gigabit Ethernet		
	Protocol	GigE Vision compliant		
	Image format	KP-F510GV/FM200GV: Mono 8/16 bit KP-FD510GV/FMD200GV: RGB 24/48 bit, YUV(4:2:2) 16/32 bit RAW 8/10 bit, Mono 8/16 bit	Mono 8/16 bit	
	Image size	2448(H) x 2050(D)	1600(H) x 1200(D)	652(H) x 490(D)
Frame rate	KP-FD510GV: 9 frames per second (YUV) 7 frames per second (RGB)	KP-FMD200GV: 30 frames per second (YUV) 18 frames per second (RGB)	125 frames per second	
	KP-F510GV: 18 frames per second	KP-FM200GV: 53 frames per second		
Sensitivity	KP-FD510GV: 2000 lx, F5.6, 3200K KP-F510GV: 400 lx, F6, 3200K	KP-FMD200GV: 2000 lx, F5.6, 3200K KP-FM200GV: 500 lx, F5.6, 3200K	550 lx, F4, 3200K	
S/N	50 dB	45 dB	50 dB	
Electric shutter	Mode	OFF / Auto (AES) / Manual (PRESET or VARIABLE), OFF is normal exposure (frame rate)		
	PRESET	1/60, 1/100, 1/200, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/50000 second	1/125, 1/200, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/50000 second	
	VARIABLE	10 to 1/100,000 second	1 to 1/100,000 second	
External trigger	Mode	Fixed shutter (9 steps or Variable)		
	Input	Via Gigabit Ethernet cable (Software trigger), 6-pin connector (Hardware trigger)		
External sync signal	VD output: 5 Vp-p ±0.3 V, Strobe out: 5 Vp-p ±0.3 V			
Partial scan	Selectable start position and width of picture grabbing in 1H step	Selectable start position and width of picture grabbing in 1 pixel step	Selectable start position and width of picture grabbing in 1H step	
Binning mode	OFF/ON (Vertical)			
ALC (Auto level control)	Adjustable for video level			
White balance (FD/FMD model)	ATW / MANUAL / One-Push		-	
Color masking (FD/FMD model)	OFF / ON (6 vector independent masking)		-	
Gain	0 to 18 dB by 0.1 dB steps			
Gamma	OFF (γ=1) / LUT (0.45 to 1)			
Image adjustment function	Sharpness, Black level, Knee			
Power supply	DC +12 to 24 V ±1 V (via 6 pin connector), 48V(PoE)			
Power consumption	Approx. 5.3 W (440 mA)	Approx. 4.2 W (350 mA)	Approx. 4.3 W (360 mA)	
Ambient temperature	Performance	0 °C to +40 °C / 90 %RH or less		
	Operation	-10 °C to +50 °C / 90 %RH or less		
	Storage	-20 °C to +60 °C / 70 %RH or less (without dew condensation)		
Vibration endurance	15 to 200 to 15 Hz (98.6 m/S ²), 10 minutes for each 3 axis			
Shock endurance	490.3 m/s ² (Once for each side of top, under, left and right)			
External dimensions	29(W) x 29(H) x 35(D) mm (not including lens and protrusions)			
Mass	Approx. 70 g (without lens)			

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KP-FD510UB	USB3 Vision	1CCD Color (RGB/YUV/RAW)	2/3" CCD	5.05 M Pixels (2456 x 2058)	Max. 18 frames per sec. (YUV) Max. 12 frames per sec. (RGB)	29(W) x 29(H) x 29(D) mm
KP-F510UB		1CCD Black & White			Max. 18 frames per sec.	
KP-FMD200UB		1CMOS Color (RGB/YUV/RAW)	1/1.8" CMOS	UXGA (1.92 M Pixels) (1600 x 1200)	Max. 53 frames per sec.	
KP-FM200UB		1CMOS Black & White				
KP-F31UB		1CCD Black & White	1/3" CCD	VGA (0.32 M Pixels) (652 x 490)	Max. 125 frames per sec.	
KP-F21UB		1CCD Black & White	1/2" CCD			



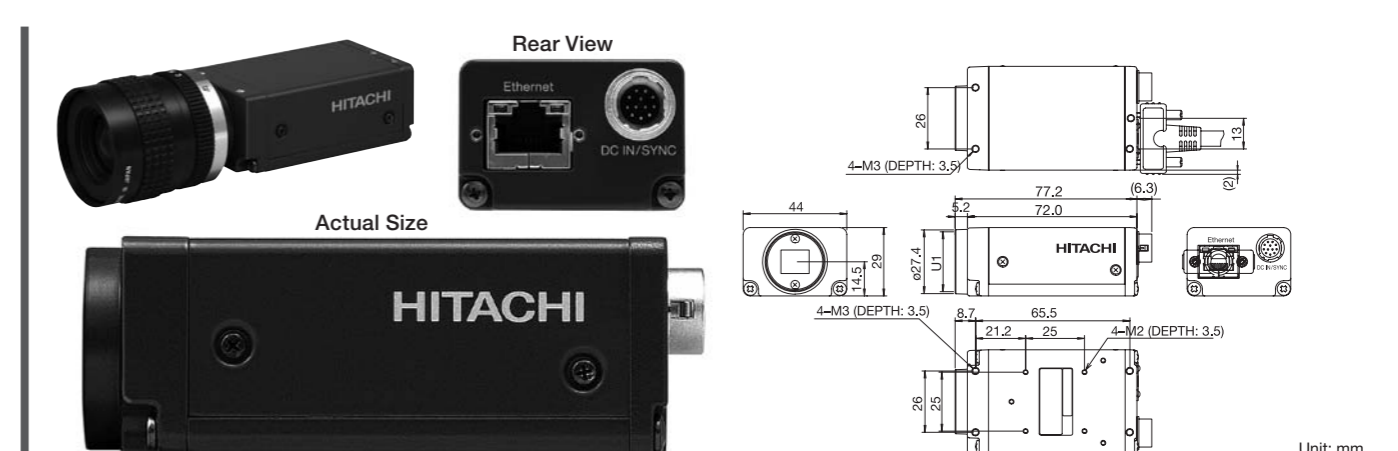
	KP-FD510UB KP-F510UB	KP-FMD200UB KP-FM200UB	KP-F31UB	KP-F21UB
Imaging device	2/3-inch CCD	1/1.8-inch CMOS	1/3-inch CCD (ICX424AL)	1/2-inch CCD (ICX414AL)
Effective pixels	2456(H) x 2058(D)	1600(H) x 1200(D)	656(H) x 494(D)	
Pixel size	3.45 μm(H) x 3.45 μm(V) (Square pixel)	4.5 μm(H) x 4.5 μm(V) (Square pixel)	7.4 μm(H) x 7.4 μm(V) (Square pixel)	9.9 μm(H) x 9.9 μm(V) (Square pixel)
Color filter	RGB primary color mosaic filter (KP-FD510UB/FMD200UB)			
Scanning area	8.47 mm(H) x 7.10 mm(V)	7.2 mm(H) x 5.4 mm(V)	4.88 mm(H) x 3.66 mm(V)	6.52 mm(H) x 4.89 mm(V)
Scanning system	Progressive			
Sync system	Internal			
Lens mount	C-mount (Flange focal distance: 17.526 mm)			
Video output	Interface	USB 3.0 Interface		
	Protocol	USB3 Vision compliant		
	Image format	KP-FD510UB/FMD200UB: RGB 24/30/36 bit, YUV(4:2:2) 24/30/36 bit RAW 8/10/12bit, Mono 8/10/12bit	Mono 8/10/12 bit	
	Image size	2456(H) x 2058(D)	1600(H) x 1200(D)	652(H) x 490(D)
Frame rate	KP-FD510UB: 18 frames per second (YUV) 12 frames per second (RGB)	53 frames per second	125 frames per second	
	KP-F510UB: 18 frames per second			
Sensitivity	KP-F510UB: 400 lx, F8, 3200K KP-FD510UB: 2000 lx, F5.6, 3200K	KP-FM200UB: 500 lx, F5.6, 3200K KP-FMD200UB: 2000 lx, F5.6, 3200K	550 lx, F4, 3200K	
S/N	50 dB	45 dB	50 dB	
Electric shutter	Mode	OFF / Auto (AES) / Manual (PRESET or VARIABLE), OFF is normal exposure (frame rate)		
	PRESET	1/60, 1/100, 1/200, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/50000 second	1/125, 1/200, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/50000 second	
	VARIABLE	10 to 1/100,000 second	1 to 1/100,000 second	
External trigger	Mode	Fixed shutter (9 steps or Variable)		
	Input	Via USB3.0 cable (Software trigger), 6-pin connector (Hardware trigger)		
External sync signal	VD output: 5 Vp-p ±0.3 V, Strobe out: 5 Vp-p ±0.3 V			
Partial scan	Selectable start position and width of picture grabbing in 1H step	Selectable start position and width of picture grabbing in 1 pixel step	Selectable start position and width of picture grabbing in 1H step	
Binning mode	OFF/ON (Vertical)			
ALC (Auto level control)	Adjustable for video level			
White balance (FD/FMD model)	ATW / MANUAL / One-Push		-	
Color masking (FD/FMD model)	OFF / ON (6 vector independent masking)		-	
Gain	0 to 18 dB by 0.1 dB steps			
Gamma	OFF (γ=1) / LUT (0.45 to 1)			
Image adjustment function	Sharpness, Black level, Knee			
Power supply	DC +5 V ±5 % (via USB3.0 cable)			
Power consumption	Approx. 4 W (800 mA)	Approx. 1.6 W (320 mA)	Approx. 2.5 W (500 mA)	
Ambient temperature	Performance	0 °C to +40 °C / 90 %RH or less		
	Operation	-10 °C to +50 °C / 90 %RH or less		
	Storage	-20 °C to +60 °C / 70 %RH or less (without dew condensation)		
Vibration endurance	15 to 200 to 15 Hz (98.6 m/S ²), 10 minutes for each 3 axis			
Shock endurance	490.3 m/s ² (Once for each side of top, under, left and right)			
External dimensions	29(W) x 29(H) x 29(D) mm (not including lens and protrusions)		29(W) x 29(H) x 20(D) mm (not including lens and protrusions)	
Mass	Approx. 60 g (without lens)		Approx. 45 g (without lens)	

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KP-FD500GV	GigE Vision	1CCD Color (RGB/YUV/RAW)	2/3"	5.05 M Pixels (2456 x 2058)	Max. 9 frames per sec. (YUV)	44(W) x 29(W) x 72(D) mm
KP-F500GV		1CCD Black & White	CCD		Max. 16 frames per sec.	
KP-FD202GV		1CCD Color (RGB/YUV/RAW)	1/1.8"	UXGA (2.01 M Pixels) (1628 x 1236)	Max. 30 frames per sec. (RAW)	
KP-F202GV		1CCD Black & White	CCD		Max. 30 frames per sec.	
KP-F145GV		1CCD Black & White (Near infrared sensitivity)	2/3"	SXGA (1.45 M Pixels) (1392 x 1040)	Max. 30 frames per sec.	
KP-FD140GV		1CCD Color (RGB/YUV/RAW)	1/2"		Max. 30 frames per sec. (YUV)	
KP-F140GV		1CCD Black & White	CCD		Max. 30 frames per sec.	
KP-FD83GV		1CCD Color (RGB/YUV/RAW)	1/3"	XGA (0.81 M Pixels) (1034 x 779)	Max. 36 frames per sec.	
KP-F83GV		1CCD Black & White			Max. 36 frames per sec.	
KP-FD33GV		1CCD Color (RGB/YUV/RAW)			Max. 90 frames per sec.	
KP-F33GV	1CCD Black & White	CCD	VGA (0.33 M Pixels) (659 x 494)	Max. 90 frames per sec.		

		KP-FD500GV KP-F500GV	KP-FD202GV KP-F202GV	KP-F145GV
Imaging device		2/3-inch progressive scan interline CCD (KP-FD500GV: ICX625AQ, KP-F500GV: ICX625ALA)	1/1.8-inch progressive scan interline CCD (KP-FD202GV: ICX274AQ, KP-F202GV: ICX274A)	2/3-inch progressive scan interline CCD (ICX285AL)
	Total pixels	2536(H) x 2068(V)	1688(H) x 1248(V)	1432(H) x 1050(V)
	Effective pixels	2456(H) x 2058(V)	1628(H) x 1236(V)	1392(H) x 1040(V)
	Pixel size	3.45 μm(H) x 3.45 μm(V) (Square pixel)	4.4 μm(H) x 4.4 μm(V) (Square pixel)	6.45 μm(H) x 6.45 μm(V) (Square pixel)
	Color filter (FD Model)	RGB primary color mosaic filter		
Scanning area		8.45 mm(H) x 7.07 mm(V)	7.13 mm(H) x 5.37 mm(V)	8.98 mm(H) x 6.71 mm(V)
Scanning system		Progressive		
Sync system		Internal / external		
Lens mount		C-mount (Flange focal distance: 17.526 mm)		
Video output	Interface	Gigabit Ethernet		
	Protocol	GigE Vision compliant		
	Transfer rate	1 Gbps		
	Image format	KP-FD500GV/FD202GV: RGB 8/10/12 bit, YUV 8/10/12 bit, RAW 8/10/12 bit, MONO 8/10/12 bit		MONO 8/10/12 bit
	Image size	2448(H)x 2050(V)	1620(H)x 1220(V)	1360(H)x 1024(V)
	Frame rate	Full pixel readout KP-F500GV: 16 frames per second KP-FD500GV: 9 frames per second (YUV 8 bit, RAW 8/10/12 bit) 7 frames per second (RGB 8 bit, YUV 10/12 bit) 5 frames per second (RGB 10 bit) 3 frames per second (RGB 12 bit)	Full pixel readout KP-F202GV: 30 frames per second KP-FD202GV: 28 frames per second (RAW 8 bit) 28 frames per second (YUV 8 bit, RAW 10/12 bit) 18 frames per second (RGB 8 bit, YUV 10/12 bit) 12 frames per second (RGB 10 bit) 9 frames per second (RGB 12 bit)	30 frames per second
Sensitivity		KP-FD500GV: 2000 lx, F11, 3200K KP-F500GV: 400 lx, F11, 3200K	KP-FD202GV: 2000 lx, F5.6, 3200K KP-F202GV: 2000 lx, F11, 3200K	400 lx, F4, 3200K
Electric shutter		OFF/Auto (AES) / Manual (PRESET or VARIABLE), OFF is normal exposure (frame rate)		
	PRESET	1/9(KP-FD500GV), 1/16(KP-F500GV), 1/60, 1/100, 1/250, 1/1000, 1/2000, 1/10000, 1/50000 second	1/30, 1/60, 1/100, 1/250, 1/1000, 1/2000, 1/10000, 1/50000 second	
	VARIABLE	From 10 second to approx. 1/100000 second		
External trigger	Mode	Fixed shutter, One trigger, VD Sync, Reset control		
	Input	Via Gigabit Ethernet cable (Software trigger), 12-pin connector (Hardware trigger)		
	Input level	+5 to 24 V		
External sync signal	VD output	5 Vp-p ±0.3 V		
	Strobe out	5 Vp-p ±0.3 V		
Binning mode (No FD model)		OFF / ON		
Partial scan		Grabbing image area is adjustable at 2 pixel step. Frame rate improves when vertical size is reduced.		
ALC (Auto level control)		Adjustable for video level		
White balance (FD model)		ATW/MANUAL/One-push		
Gain		Auto / Manual (0 dB to 12 dB)	Auto / Manual (0 dB to 18 dB)	
Gamma		OFF(γ=1)/LUT		
Image adjustment function		Sharpness, Black level		
Power supply		DC+12 V ±1 V (input from 12-pin connector), 48 V (PoE)		
Power consumption	Normal	KP-FD500GV: Approx. 7.5 W (Approx. 625 mA) KP-F500GV: Approx. 7.8 W (Approx. 650 mA)	KP-FD202GV: Approx. 7.8 W (Approx. 650 mA) KP-F202GV: Approx. 7.5 W (Approx. 625 mA)	Approx. 6.0 W (Approx. 500 mA)
	Partial scan	KP-FD500GV: Approx. 7.8 W (Approx. 650mA) KP-F500GV: Approx. 8.4W (Approx. 700mA) (at 2 pixel height)	KP-FD202GV: Approx. 8.5W (Approx. 710mA) KP-F202GV: Approx. 8.4W (Approx. 700mA) (at 2 pixel height)	Approx. 6.6W (Approx. 550mA) (at 2 pixel height)
Ambient temperature	Performance	0 °C to +40 °C / 90 %RH or less		
	Operating	-10 °C to +50 °C / 90 %RH or less		
	Storage	-20 °C to +60 °C / 70 %RH or less (without dew condensation)		
Vibration endurance		15 to 200 to 15 Hz (98.6m/S ²), 10 minutes for each 3 axis		
Shock endurance		490.3 m/s ² (Once for each side of top, under, left and right)		
External dimensions		44(W) x 29(H) x 72(D) mm (not including lens and protrusions)		
Mass		Approx. 140 g (without lens)		

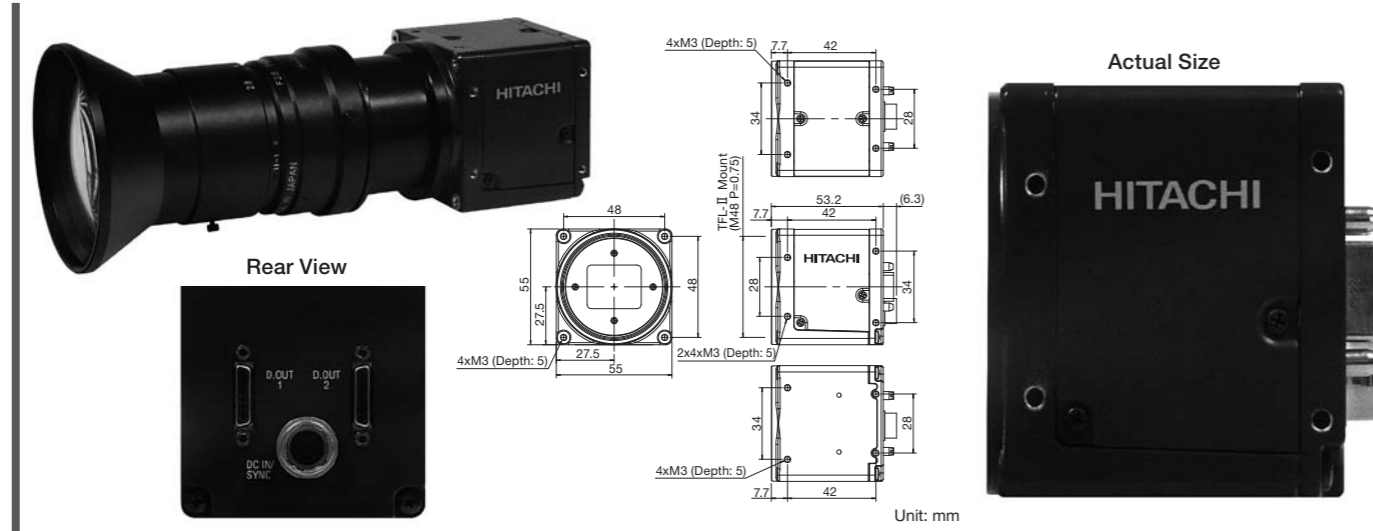
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		KP-FD140GV KP-F140GV	KP-FD83GV KP-F83GV	KP-FD33GV KP-FD33GV
Imaging device		1/2-inch progressive scan interline CCD (KP-FD140GV: ICX267AK, KP-F140GV: ICX267AL)	1/1.8-inch progressive scan interline CCD (KP-FD83GV: ICX204AK, KP-F83GV: ICX204AL)	1/3-inch progressive scan interline CCD (KP-FD33GV: ICX424AQ, KP-F33GV: ICX424AL)
	Total pixels	1434(H) x 1050(V)	1077(H) x 788(V)	692(H) x 504(V)
	Effective pixels	1392(H) x 1040(V)	1034(H) x 779(V)	659(H) x 494(V)
	Pixel size	4.65 μm(H) x 4.65 μm(V) (Square pixel)		7.4 μm(H) x 7.4 μm(V) (Square pixel)
	Color filter (FD Model)	RGB primary color mosaic filter		
Scanning area		6.32 mm(H) x 4.76 mm(V)	4.76 mm(H) x 3.57 mm(V)	4.88 mm(H) x 3.66 mm(V)
Scanning system		Progressive		
Sync system		Internal / external		
Lens mount		C-mount (Flange focal distance: 17.526 mm)		
Video output	Interface	Gigabit Ethernet		
	Protocol	GigE Vision compliant		
	Transfer rate	1 Gbps		
	Image format	KP-FD140GV/FD83GV/FD33GV: RGB 8/10/12 bit, YUV 8/10/12 bit, RAW 8/10/12 bit, MONO 8/10/12 bit		MONO 8/10/12 bit
	Image size	1360(H) x 1024(V)	1024(H) x 768(V)	659(H) x 492(V)
	Frame rate	Full pixel readout KP-F140GV: 30 frames per second KP-FD140GV: 30 frames per second (YUV 8 bit, RAW 8/10/12 bit) 26 frames per second (RGB 8 bit, YUV 10/12 bit) 18 frames per second (RGB 10 bit) 13 frames per second (RGB 12 bit)	Full pixel readout KP-F83GV: 36 frames per second KP-FD83GV: 36 frames per second (RGB 8 bit, YUV 8/10/12 bit, RAW 8/10/12 bit) 35 frames per second (RGB 10 bit) 24 frames per second (RGB 12 bit)	Full pixel readout KP-F33GV: 90 frames per second KP-FD33GV: 90 frames per second (RGB 8 bit, YUV 8/10/12 bit, RAW 8/10/12 bit) 85 frames per second (RGB 10 bit) 55 frames per second (RGB 12 bit)
Sensitivity		KP-FD140GV/FD83GV/FD33GV: 2000 lx, F5.6, 3200K KP-F140GV/F83GV/F33GV: 2000 lx, F11, 3200K		
Electric shutter		OFF/Auto (AES) / Manual (PRESET or VARIABLE), OFF is normal exposure (frame rate)		
	PRESET	1/30, 1/60, 1/100, 1/250, 1/1000, 1/2000, 1/10000, 1/50000 second	1/36, 1/60, 1/100, 1/250, 1/1000, 1/2000, 1/10000, 1/50000 second	1/90, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000, 1/50000 second
	VARIABLE	From 10 second to approx. 1/100000 second		
External trigger	Mode	Fixed shutter, One trigger, VD Sync, Reset control		
	Input	Via Gigabit Ethernet cable (Software trigger), 12-pin connector (Hardware trigger)		
	Input level	+5 to 24 V		
External sync signal	VD output	5 Vp-p ±0.3 V		
	Strobe out	5 Vp-p ±0.3 V		
Binning mode (No FD model)		OFF / ON		
Partial scan		Grabbing image area is adjustable at 2 pixel step. Frame rate improves when vertical size is reduced.		
ALC (Auto level control)		Adjustable for video level		
White balance (FD model)		ATW/MANUAL/One-push		
Gain		Auto / Manual (0 dB to 12 dB)	Auto / Manual (0 dB to 18 dB)	
Gamma		OFF(γ=1)/LUT		
Image adjustment function		Sharpness, Black level		
Power supply		DC+12 V ±1 V (input from 12-pin connector), 48 V (PoE)		
Power consumption	Normal	KP-FD140GV: Approx. 6.0 W (Approx. 500 mA) KP-F140GV: Approx. 5.5 W (Approx. 450 mA)	KP-FD83GV: Approx. 4.3 W (Approx. 360 mA) KP-F83GV: Approx. 4.1 W (Approx. 340 mA)	KP-FD33GV: Approx. 4.7 W (Approx. 390 mA) KP-F33GV: Approx. 4.3 W (Approx. 360 mA)
	Partial scan	KP-FD140GV: Approx. 7.0 W (Approx. 580 mA) KP-F140GV: Approx. 6.5 W (Approx. 540 mA) (at 2 pixel height)	KP-FD83GV: Approx. 4.7 W (Approx. 390 mA) KP-F83GV: Approx. 4.8 W (Approx. 400 mA) (at 2 pixel height)	KP-FD33GV: Approx. 5.2 W (Approx. 430 mA) KP-F33GV: Approx. 5.0 W (Approx. 420 mA) (at 2 pixel height)
Ambient temperature	Performance	0 °C to +40 °C / 90 %RH or less		
	Operating	-10 °C to +50 °C / 90 %RH or less		
	Storage	-20 °C to +60 °C / 70 %RH or less (without dew condensation)		
Vibration endurance		15 to 200 to 15 Hz (98.6m/S ²), 10 minutes for each 3 axis		
Shock endurance		490.3 m/s ² (Once for each side of top, under, left and right)		
External dimensions		44(W) x 29(H) x 72(D) mm (not including lens and protrusions)		
Mass		Approx. 140 g (without lens)		

Digital Interface Cameras

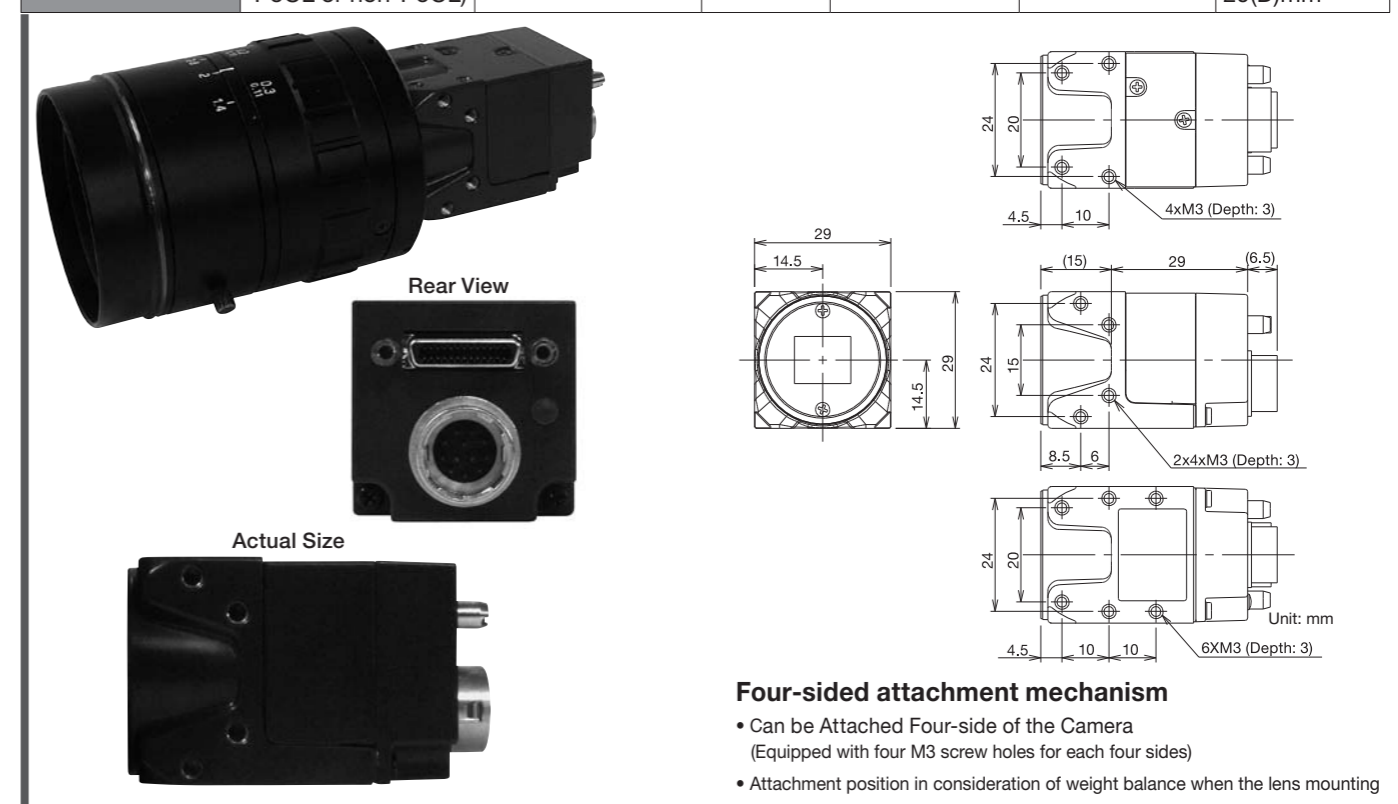
KP-FM1200CL	Mini CL (non-PoCL)	1CMOS Black & White	1.7" CMOS	12.58 M pixels (4096 x 3072)	Max. 53 frames per sec.	55(W) x 55(H) x 45(D) mm
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Imaging device		1.7-inch global shutter system CMOS (CMV12000)	
Effective pixels		4096(H) x 3072(V)	
Pixel size		5.5 μm(H) x 5.5 μm(V) (square lattice)	
Sensing area		22.5 mm (H) x 16.9 mm (V)	
Scanning system		Progressive	
Aspect ratio		4 : 3	
Frame rate (Max.)		53 frames per second (full pixel readout)	
Horizontal drive frequency		42.0000 MHz	
Horizontal Scanning frequency		Full configuration (84 MHz): 162.79 kHz Medium configuration (84 MHz): 81.396 kHz Base configuration (84 MHz): 40.698 kHz	Full configuration (42 MHz): 81.396 kHz Medium configuration (42 MHz): 40.698 kHz Base configuration (42 MHz): 30.348 kHz
Vertical Scanning frequency		Full configuration (84 MHz): 52.752 Hz Medium configuration (84 MHz): 26.426 Hz Base configuration (84 MHz): 13.226 Hz	Full configuration (42 MHz): 26.426 Hz Medium configuration (42 MHz): 13.226 Hz Base configuration (42 MHz): 6.615 Hz
Vertical subsampling Modes		OFF (1 times) / 2 times / 3 times / 4 times / 5 times / 6 times / 7 times / 8 times / 9 times / 10 times	
Sync system		Internal	
Lens mount		TFL-II Mount (Flange focal distance = 17.5 mm), (F-mount adaptor: Option)	
Video output		Base configuration 2TAP (84 MHz or 42 MHz) Medium configuration 4TAP (84 MHz or 42 MHz) Full configuration 8TAP (84 MHz or 42 MHz) Output image size: 4096(H)x3072(V)(pixel readout)	
Resolution		Horizontal/Vertical: 3000 TV lines	
Sensitivity		400 lx, F5.6, 3200 K (Exposure time: 100μs)	
S/N		48 dB	
Electric shutter		OFF, 1/13, 1/100, 1/250, 1/500, 1/1000, 1/2000, 1/10000, 1/50000 second OFF is normal exposure (frame rate) or changeable by variable shutter (40.5 μs to 1.0 s, 49.1 μs step)	
Gain		1 to 4 times	
Offset level		0/255 to 127/255	
Gamma		γ=1	
Frame on demand	Mode	Fixed shutter (8 steps or variable), ONE trigger mode	
	Trigger input	Camera Link (CC1) or DCIN/SYNC connector	
Partial scan		Selectable start position and height of picture grabbing in 4H step, Up to 8 areas can be set	
Pulse output		OFF/FLASH OUT/VD OUT	
Power supply voltage		12 ± 1 VDC	
Current consumption		Approx. 330 mA (approx. 4 W)	
Ambient temperature	Performance	0 to +40 °C (+32 to +104 °F), less than 90 % RH	
	Operation	-10 to +50 °C (+14 to 122 °F), less than 90 % RH	
	Storage	-20 to +60 °C (-4 to 140 °F), less than 70 % RH (without dew condensation)	
Vibration endurance		10 to 55 Hz (2.37 to 71.7 m/S ²), Sweep 1 minute, 30 minutes for each 3 axis	
Shock endurance		490.3 m/s ² (Once for each side of top, under, left and right)	
External dimensions		55 (W) x 55 (H) x 45 (D) mm (Not including mount protrusions)	
Mass		Approx. 250 g	

Digital Interface Cameras

KP-F520WCL	Mini CL (Auto Selection of PoCL or non-PoCL)	1CCD Black & White	2/3" CCD	5.05 M Pixels (2456 x 2058)	Max. 18 frames per sec.	29(W) x 29(H) x 29(D)mm
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Four-sided attachment mechanism

- Can be Attached Four-side of the Camera
(Equipped with four M3 screw holes for each four sides)
- Attachment position in consideration of weight balance when the lens mounting

Imaging device		2/3-inch progressive scan interline CCD	
Total pixels		2530(H) x 2068(V)	
Effective pixels		2456(H) x 2058(V)	
Pixel size		3.45 μm (H) x 3.45 μm (V) (square lattice)	
Sensing area		8.47 mm (H) x 7.10 mm (V)	
Scanning system		Progressive	
Aspect ratio		5 : 4	
Frame rate		18 frames per second (full pixel readout)	
Horizontal drive frequency		72.0000 MHz	
Horizontal Scanning frequency		37.422 kHz	
Vertical Scanning frequency		18.00 Hz 45.046 Hz (vertical 2 pixel addition)	
Sync system		Internal	
Lens mount		C-mount (Flange focal distance = 17.526 mm)	
Video output		Camera Link Base configuration: 72.000 MHz x 2TAP 8 bit / 10 bit Output image size: 2456(H) x 2058(V) (full pixel readout)	
Resolution		Horizontal / Vertical: 2000 TV Line	
Sensitivity		400 lx, F8 3200K	
Minimum illumination		1.0 lx (F1.4, MAX GAIN)	
Signal noise to ratio		50 dB	
Electric shutter		OFF, 1/18, 1/60, 1/100, 1/250, 1/1000, 1/2000, 1/10000, 1/50000 second OFF is normal exposure (frame rate) or changeable by variable shutter (Minimum 1/100000 second)	
Gamma		γ=1 or Variable	
Frame on demand	Mode	Fixed shutter mode (8 steps or variable), ONE trigger mode, VD reset mode	
	Trigger input	Camera Link (CC1) or DCIN/SYNC connector	
Partial scan		Selectable start position and height of picture grabbing in 1H step.	
Pulse output		OFF, FLASH OUT or VD OUT	
Image adjustmant function		White flaw correction, Left and right balance adjustment, Knee adjustmant	
Power supply voltage		12 ± 1 VDC	
Current consumption		Approx. 265 mA (Approx. 3.18 W)	
Ambient temperature	Performance	0 to +40 °C (+32 to +104 °F), less than 90 % RH	
	Operation	-10 to +50 °C (+14 to +122 °F), less than 90 % RH	
	Storage	-20 to +60 °C (-4 to +140 °F), less than 70 % RH (without dew condensation)	
Vibration endurance		10 to 55 Hz (2.37 to 71.7 m/S ²), Sweep 1 minute, 30 minutes for each 3 axis	
Shock endurance		490.3 m/s ² (Once for each side of top, under, left and right)	
External dimensions		29 (W) x 29 (H) x 29 (D) mm (not including mount protrusions)	
Mass		Approx. 50 g	

Digital Interface Cameras

KP-FD510WCL	Mini CL (Auto Selection of PoCL or non-PoCL)	1CCD Color (RGB)	2/3" CCD	5.05 M Pixels (2456 x 2058)	Max. 12 frames per sec.	44(W) x 44(H) x 41(D) mm
KP-FR500WCL		1CCD Color (RAW)			Max. 16 frames per sec.	
KP-F500WCL		1CCD Black & White				
KP-FD500PCL/SCL	PCL: Mini CL(PoCL)	1CCD Color (RGB)	1/1.8" CCD	UXGA(2.01M Pixels) (1628 x 1236)	Max. 30 frames per sec.	
KP-FD202PCL/SCL			SCL: Mini CL(Non-PoCL)	1/2" CCD		
KP-FD140PCL/SCL	Mini CL (Auto Selection of PoCL or non-PoCL)	1CCD Black & White (Near infrared sensitivity)	2/3" CCD			

KP-FD510WCL



KP-F500WCL, KP-FR500WCL, KP-FD500PCL/SCL, KP-F145WCL



KP-FD202PCL/SCL, KP-FD140PCL/SCL



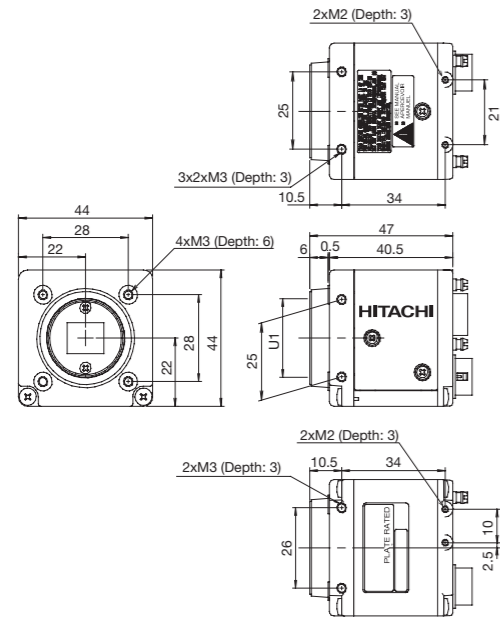
Rear View



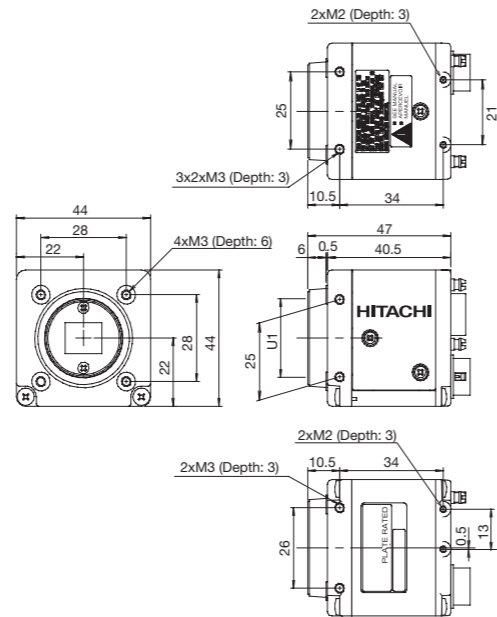
Actual Size



KP-F500WCL, KP-FR500WCL, KP-FD500PCL/SCL, KP-F145WCL, KP-FD202PCL/SCL, KP-FD140PCL/SCL



KP-FD510WCL



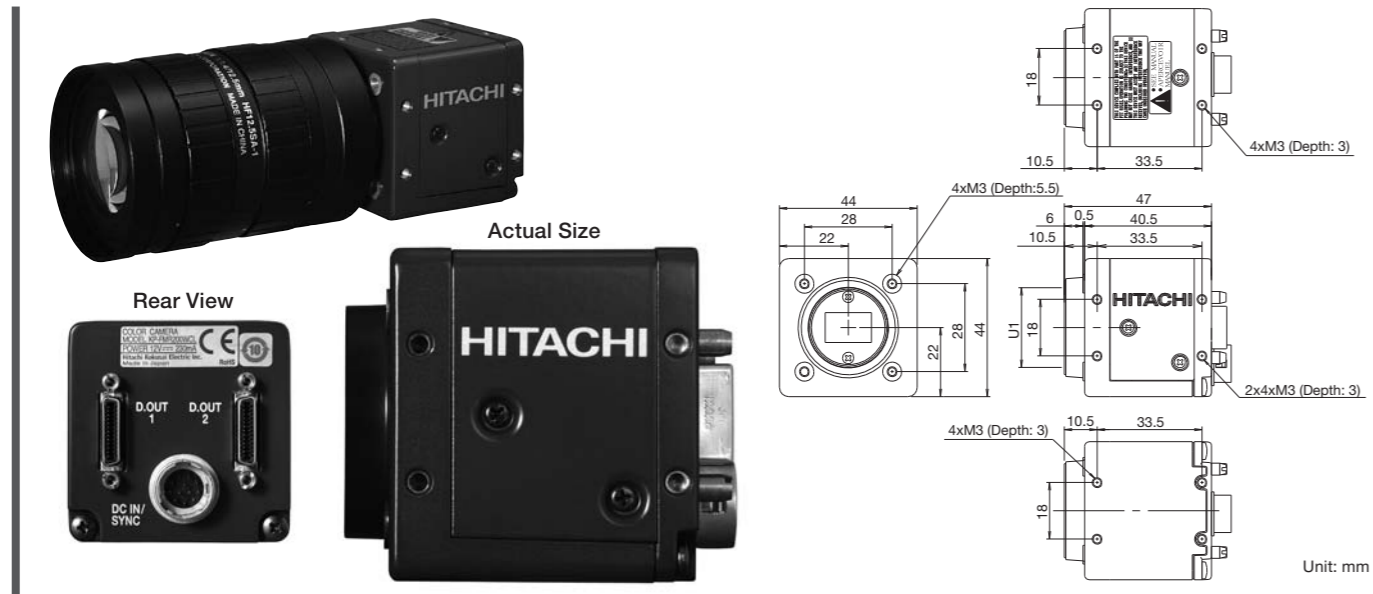
Unit: mm

Digital Interface Cameras

	KP-FD510WCL KP-FD500PCL/SCL	KP-FR500WCL KP-F500WCL	KP-FD202PCL/SCL	KP-FD140PCL/SCL	KP-145WCL	
Imaging device	2/3-inch progressive scan interline CCD (ICX625AQ)		1/1.8-inch progressive scan interline CCD (ICX274AQ)	1/2-inch progressive scan interline CCD (ICX267AK)	2/3-inch progressive scan interline CCD (ICX285AL)	
	Total pixels	2536(H) x 2068(V)	1688(H) x 1248(V)	1434 (H) x 1050 (V)	1432 (H) x 1050 (V)	
	Effective pixels	2448(H) x 2050(V)	2456 (H) x 2058 (V)	1628(H) x 1236(V)	1392 (H) x 1040 (V)	1392 (H) x 1040 (V)
	Pixel size	3.45 μm (H) x 3.45 μm (V) (square lattice)		4.4 μm (H) x 4.4 μm (V) (square lattice)	4.65 μm (H) x 4.65 μm (V) (square lattice)	
	Color filter (FR/FD model)	RGB primary color mosaic filter		-		
Sensing area	8.45 mm (H) x 7.07 mm (V)	8.47 mm (H) x 7.10 mm (V)	7.13 mm (H) x 5.37 mm (V)	6.32 mm (H) x 4.76 mm (V)	8.98 mm (H) x 6.71 mm (V)	
Scanning system	Progressive					
Aspect ratio	5 : 4		4 : 3			
Frame rate	12 frames per second (full pixel readout)		16 frames per second (full pixel readout) 32 frames per second (vertical 2 pixel addition) FR model: No vertical 2 pixel addition	30 frames per second (full pixel readout)		
	30 frames per second (full pixel readout)		30 frames per second (full pixel readout)		30 frames per second (full pixel readout) 60 frames per second (vertical 2 pixel addition)	
Horizontal drive frequency	48.0000 MHz	64.0000 MHz	72.0000 MHz	57.6000 MHz		
Horizontal Scanning frequency	24.922 kHz	33.264	37.5 kHz	32.179 kHz		
Vertical Scanning frequency	11.99 Hz		16.00 Hz (full pixel readout) 31.98 Hz (vertical 2 pixel addition mode) FR model: No vertical 2 pixel addition	29.95 Hz		
			30.13 Hz		30.03 Hz (full pixel readout) 59.95 Hz (vertical 2 pixel addition mode)	
Sync system	Internal					
Lens mount	C-mount (Flange focal distance = 17.526 mm)					
Video output	Interface/Protocol	Camera Link 64.0000 MHz Base configuration (1ch: SDR connector x 1pc.) Medium configuration (2ch: SDR connector x 2pcs)	Camera Link 64.0000 MHz x 2TAP Medium configuration: 32.0000 MHz x 4TAP	Camera Link 72.0000 MHz	Camera Link 57.6000 MHz	Camera Link 28.8000 MHz x 2TAP
	Output format	24 bits (Base configuration) 30 bits (Medium configuration) 36 bits (Medium configuration)	8 bit / 10 bit / 12 bit	24 bits (Base configuration) 30 bits (Medium configuration) 36 bits (Medium configuration)		8 bit / 10 bit / 12 bit
	Output image size	2448 (H) x 2050 (V) (full pixel readout)	2456(H) x 2058(V) (full pixel readout)	1620(H) x 1220(V) (full pixel readout)	1360(H) x 1024(V) (full pixel readout)	1392(H) x 1040(V) (full pixel readout)
Sensitivity	2000 lx, F11, 3200 K	500 lx, F11, 3200 K FR Model: 2000 lx, F8, 3200K	2000 lx, F5.6, 3200 K		400 lx, F8, 3200 K	
Minimum illumination	5 lx (F1.4, MAX GAIN)	1.0 lx (F1.4, MAX GAIN) FR model: 15 lx (F1.4 GAIN MAX)	10 lx (F1.4, MAX GAIN)		2.0 lx (F1.4, MAX GAIN)	
Signal noise to ratio	48 dB					
Electric shutter	OFF, 1/12, 1/60, 1/100, 1/250, 1/1000, 1/2000, 1/10000, 1/50000 second OFF is normal exposure (frame rate) or changeable by variable shutter (from 10 to 1/100000 second)		OFF, 1/16, 1/60, 1/100, 1/250, 1/1000, 1/2000, 1/10000, 1/50000 second OFF is normal exposure (frame rate) or changeable by variable shutter (from 10 to 1/100000 second)		OFF, 1/30, 1/60, 1/100, 1/250, 1/1000, 1/2000, 1/10000, 1/50000 second. OFF is normal exposure (frame rate) or changeable by variable shutter (from 10 to 1/100000 second)	
Frame on demand	Mode	(A) Fixed shutter mode (8 steps or variable) (B) ONE trigger mode (C) VD reset mode Trigger input: Camera Link (CC1) or DCIN/SYNC connector				
	Trigger input	Camera Link (CC1) or DCIN/SYNC connector				
Partial scan	Selectable start position and height of picture grabbing in 1H step.					
ALC (Auto level control)	Mode: AGC (Auto gain control), AES (Auto electric shutter), AGC & AES Video Level: Adjustable	-	Mode: AGC (Auto gain control), AES (Auto electric shutter), AGC & AES Video Level: Adjustable		-	
Gain	Auto/Manual (0 to +12 dB) (Approx. 0.0358 dB step)	Auto/Manual (0 to +18dB) (Approx. 0.0358 dB step)	Auto/Manual (0 to +18 dB) (Approx. 0.0358 dB step)		Auto/Manual (+6 to +18 dB) (Approx. 0.0358 dB step)	
White balance	ATW / MANUAL / One-push	-	ATW / MANUAL / One-push		-	
Gamma	OFF (γ=1) / LUT	γ=1	OFF (γ=1) / LUT		γ=1	
Color masking	OFF / ON (6 vector independent masking)	-	OFF / ON (6 vector independent masking)		-	
Paint black	Adjustable	-	Adjustable		-	
Sharpness	Adjustable	-	Adjustable		-	
Brightness	Adjustable	-	Adjustable		-	
Knee	Adjustable	-	Adjustable		-	
Power supply voltage	12 ± 1 VDC					
Current consumption	Approx. 310 mA (Approx. 3.7 W)	Approx. 260 mA (Approx. 3.1 W) *MAX partial scan 1H: Approx. 330 mA (Approx. 4.0 W)	Approx. 340 mA (Approx. 4.1 W) *MAX partial scan 1H: Approx. 415 mA (Approx. 5.0 W)	Approx. 300 mA (Approx. 3.6 W)	Approx. 230 mA (Approx. 2.8 W) *MAX partial scan 1H: Approx. 350 mA (Approx. 4.2 W)	
Ambient temperature	Performance	0 to +40 °C (+32 to +104 °F), less than 90 % RH				
	Operation	-10 to +50 °C (+14 to +122 °F), less than 90 % RH				
	Storage	-20 to +60 °C (-4 to +140 °F), less than 70 % RH (without dew condensation)				
Vibration endurance	10 to 55 Hz (2.37 to 71.7 m/S ²), Sweep 1 minute, 30 minutes for each 3 axis					
Shock endurance	490.3 m/s ² (Once for each side of top, under, left and right)					
External dimensions	44 (W) x 44 (H) x 41 (D) mm (not including mount protrusions)					
Mass	Approx. 110 g					

Digital Interface Cameras

KP-FMR400WCL	Mini CL (Auto Selection of PoCL or non-PoCL)	1CMOS Color (RAW)	1" CMOS	4.19 M pixels (2048 x 2048)	Max. 150 frames per sec.	44(W) x 44(H) x 41(D)mm
KP-FM400WCL		1CMOS Black & White				
KP-FMR200WCL		1CMOS Color (RAW)	2/3" CMOS	2.23 M pixels (2048 x 1088)	Max. 280 frames per sec.	
KP-FM200WCL		1CMOS Black & White				



	KP-FMR400WCL	KP-FM400WCL	KP-FMR200WCL	KP-FM200WCL
Imaging device	1-inch global shutter CMOS (CMV4000)		2/3-inch global shutter CMOS (CMV2000)	
Effective pixels	2048 (H) x 2048 (V)		2048 (H) x 1088 (V)	
Pixel size	5.5 μm (H) x 5.5 μm (V) (square lattice)			
Color filter	RGB primary color mosaic filter	-	RGB primary color mosaic filter	-
Sensing area	11.264 mm (H) x 11.264 mm (V)		11.264 mm (H) x 5.984 mm (V)	
Scanning system	Progressive			
Aspect ratio	1 : 1		2 : 1	
Frame rate	150 frames per second (full pixel readout)		280 frames per second (full pixel readout)	
Pixel frequency	40.0000 MHz			
Horizontal scanning frequency	Full configuration: 310.078 kHz (80 MHz), 155.039 kHz (40 MHz) Base configuration: 77.519 kHz (80 MHz), 38.759 kHz (40 MHz)		Medium configuration: 155.039 kHz (80 MHz), 77.519 kHz (40 MHz)	
Vertical scanning frequency	Full configuration: 150.523 Hz (80 MHz), 75.445 Hz (40 MHz) Medium configuration: 75.445 Hz (80 MHz), 37.768 Hz (40 MHz) Base configuration: 37.768 Hz (80 MHz), 18.896 Hz (40 MHz)		Full configuration: 281.889 Hz (80 MHz), 141.588 Hz (40 MHz) Medium configuration: 141.588 Hz (80 MHz), 70.956 Hz (40 MHz) Base configuration: 70.956 Hz (80 MHz), 35.519 Hz (40 MHz)	
Sync system	Internal			
Lens mount	C-mount (Flange focal distance = 17.526 mm)			
Video output	Digital output (Camera Link) Base configuration 2TAP (80 MHz or 40 MHz) Medium configuration 4TAP (80 MHz or 40 MHz) Full configuration 8TAP (80 MHz or 40 MHz) Output image size: 2048(H) x 2048(V) (full pixel readout)		Digital output (Camera Link) Base configuration 2TAP (80 MHz or 40 MHz) Medium configuration 4TAP (80 MHz or 40 MHz) Full configuration 8TAP (80 MHz or 40 MHz) Output image size: 2048(H) x 1088(V) (full pixel readout)	
Resolution	Horizontal/Vertical: 1400 TV lines		Horizontal/Vertical: 1000 TV lines	
Sensitivity	2000 lx, F16, 3200K	400 lx, F8, 3200K	400 lx, F11, 3200 K	400 lx, F5.6, 3200 K
Signal noise to ratio	48 dB			
Electric shutter	OFF, 1/38, 1/100, 1/250, 1/500, 1/1000, 1/2000, 1/10000, 1/50000 second OFF is normal exposure (frame rate) or changeable by variable shutter (16.125 μs to 211367 μs)		OFF, 1/71, 1/100, 1/250, 1/500, 1/1000, 1/2000, 1/10000, 1/50000 second. OFF is normal exposure (frame rate) or changeable by variable shutter (16.125 μs to 211367 μs)	
Gamma	γ = 1			
Frame on demand	Mode (A) Fixed shutter mode (8 steps or variable), (B) ONE trigger mode, (C) Burst trigger mode			
Trigger input	Camera Link (CC1) or DCIN/SYNC connector			
Partial scan	Selectable start position and height of picture grabbing in 1H step.			
Power supply voltage	12 ± 1 VDC			
Current consumption	Approx. 230 mA (Approx. 2.76 W)			
Ambient temperature	Performance 0 to +40 °C (+32 to +104 °F), less than 90 % RH			
	Operation 10 to +50 °C (+14 to 122 °F), less than 90 % RH			
	Storage -20 to +60 °C (-4 to 140 °F), less than 70 % RH (without dew condensation)			
Vibration endurance	10 to 55 Hz (2.37 to 71.7 m/S ²), Sweep 1 minute, 30 minutes for each 3 axis			
Shock endurance	490 m/s ²			
External dimensions	44 (W) x 44 (H) x 41 (D) mm (Not including mount protrusions)			
Mass	Approx. 130 g			

Digital Interface Cameras

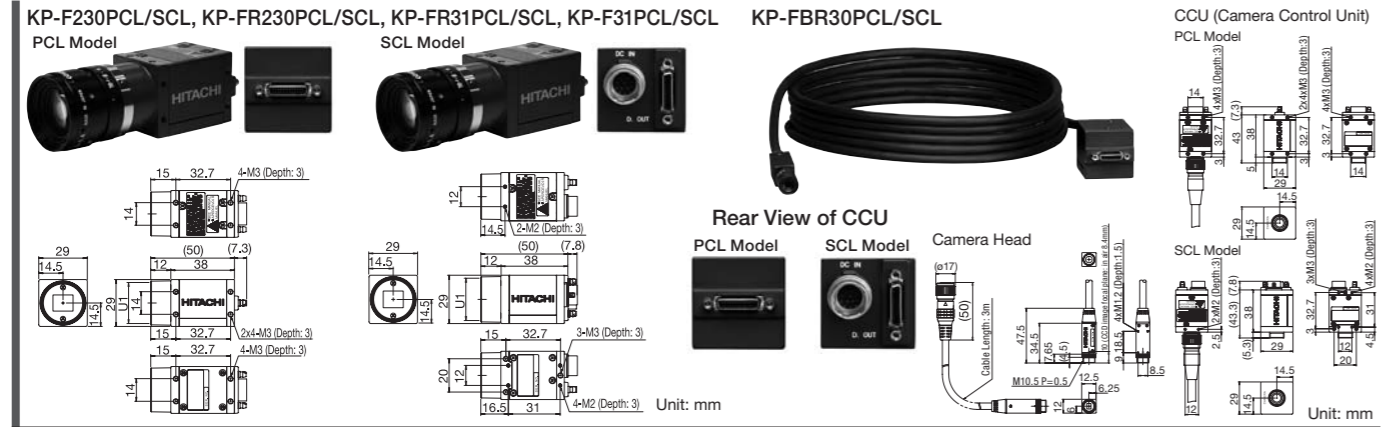
KP-FMD200PCL	Mini CL (PoCL)	1CMOS Color (RGB)	UXGA(1.92 M pixel) (1600 x 1200)	Max. 20 frames per sec.	29(W) x 29(H) x 20(D) mm
KP-FM200PCL		1CMOS Black & White			
KP-FMD100PCL		1CMOS Color (RGB)	SXGA(1.31 M pixel) (1280 x 1024)	Max. 30 frames per sec.	
KP-FM100PCL		1CMOS Black & White			



	KP-FMD200PCL	KP-FM200PCL	KP-FMD100PCL	KP-FM100PCL
Imaging device	1/1.8-inch CMOS	1/1.8-inch CMOS	1/1.8-inch CMOS	1/1.8-inch CMOS
Effective pixels	1600(H) x 1200(V)		1280 (H) x 1024 (V)	
Pixel size	4.5 μm(H) x 4.5 μm(V)(square lattice)			
Color filter	RGB primary color mosaic filter	-	RGB primary color mosaic filter	-
Sensing area	7.2 mm (H) x 5.4 mm (V)		6.78 mm (H) x 5.43 mm (V)	
Scanning system	Progressive			
Aspect ratio	4 : 3		5 : 4	
Frame rate	20 frames per second (full pixel readout)	53 frames per second (full pixel readout)	30 frames per second (full pixel readout)	61 frames per second (full pixel readout)
Horizontal Drive Frequency	42 MHz	114 MHz	42 MHz	114 MHz
Horizontal scanning frequency	23.848 kHz	64.773 kHz	32.012 kHz	63.616 kHz
Vertical scanning frequency	19.563 Hz	53.180 Hz	30.72 Hz	61.052 Hz
Sync system	Internal			
Lens mount	C-mount (Flange focal distance = 17.526 mm)			
Video output	Digital output (CameraLink) (PoCL)			
	Base configuration: 42.0000 MHz	Base configuration: 57.0000 MHz x 2 TAP	Base configuration: 42.0000 MHz	Base configuration: 57.0000 MHz x 2 TAP
	24 bits	8 bits / 10 bits	24 bits	8 bits / 10 bits
	Output image size: 1600 (H) x 1200 (V) (full pixel readout)		Output image size: 1280 (H) x 1024 (V) (full pixel readout)	
Sensitivity	2000lx, F5.6, 3200K	400lx, F2.8, 3200K	2000lx, F8, 3200K	400lx, F4, 3200K
S/N	45 dB			
Electric shutter	OFF, 1/60, 1/100, 1/250, 1/1000, 1/2000, 1/4000, 1/10000, 1/50000 OFF is normal exposure (frame rate) or changeable by variable shutter (Minimum 1/100000 second)			
Gamma	γ = 1			
Frame on demand	Mode Fixed shutter mode (8 steps or variable),			
Trigger input	Camera Link (CC1)			
Partial scan	Selectable start position and height of picture grabbing in 1 pixel step.(Minimum area :20x20 pixels)			
Gain	Digital: 1 to 2 times (128 steps) Analog: 1/1.33/2 times			
Power supply voltage	12 ± 1 VDC			
Current consumption	Approx. 80mA (Approx. 0.96W)			
Ambient temperature	Performance 0 to +40 °C (+32 to +104 °F), less than 90 % RH			
	Operation 10 to +50 °C (+14 to 122 °F), less than 90 % RH			
	Storage -20 to +60 °C (-4 to 140 °F), less than 70 % RH (without dew condensation)			
Vibration endurance	10 to 200 Hz (98 m/S ²), Sweep 10 minute, 30 minutes for each 3 axis			
Shock endurance	686 m/s ² (Once for each side of top, under, left and right)			
External dimensions	29(W) x 29(H) x 20(D) mm (Not including mount protrusions)			
Mass	Approx. 35 g			

Digital Interface Cameras

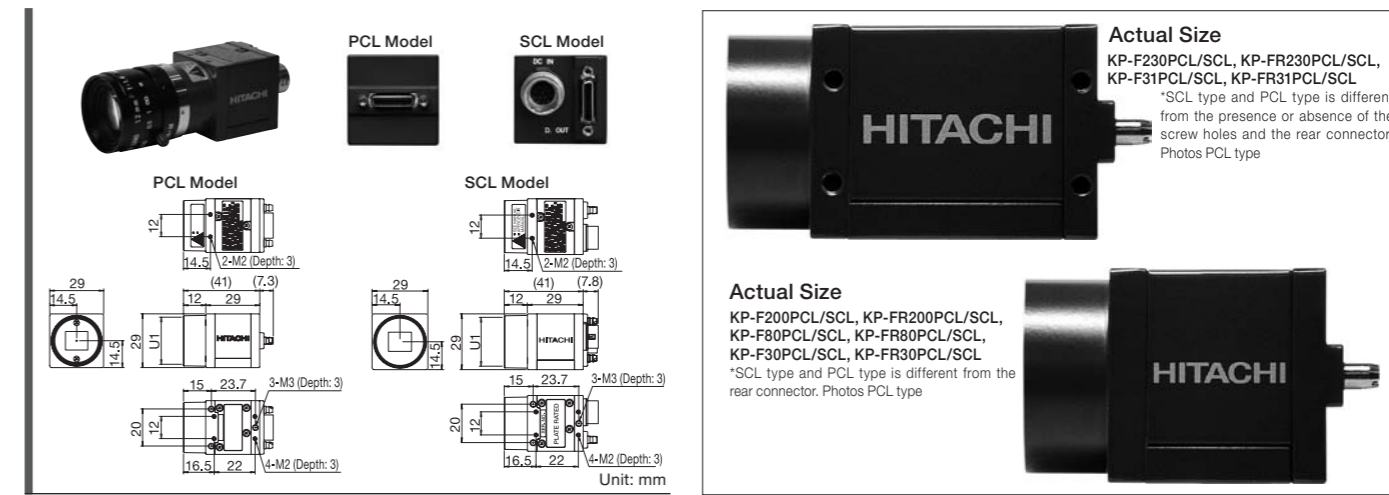
KP-FR230PCL/SCL	PCL: Mini CL(PoCL)	1CCD Color(RAW)	1/1.8" CCD	UXGA (2.01 M pixels) (1628 x 1236)	Max. 30 frames per sec.	29(W) x 29(W) x 38(D) mm
KP-F230PCL/SCL		1CCD Black & White				
KP-FR31PCL/SCL	SCL: Mini CL (Non-PoCL)	1CCD Color(RAW)	1/3" CCD	VGA (0.33 M Pixels) (659 x 494)	Max. 120 frames per sec.	Camera Head: 12(W) x 12.5(H) x 47.5(L)mm
KP-F31PCL/SCL		1CCD Black & White			Max. 60 frames per sec.	
KP-FBR30PCL/SCL		1CCD Color(RAW)				



		KP-FR230SCL/PCL KP-F230SCL/PCL	KP-FR31SCL/PCL KP-F31SCL/PCL	KP-FBR30SCL/PCL
Imaging device	Total pixels	1/1.8-inch interline CCD (ICX274AL)	1/3-inch interline CCD (ICX424AL)	
	Effective pixels	1688 (H) x 1248 (V)	692 (H) x 504 (V)	
	Pixel size	4.4 μm (H) x 4.4 μm (V) (square lattice)	7.4 μm (H) x 7.4 μm (V) (square lattice)	
	Color filter (FR Model)	RGB primary color mosaic filter		
Sensing area		7.16 mm (H) x 5.44 mm (V)	4.88 mm (H) x 3.66 mm (V)	
Scanning system		Progressive		
Aspect ratio		4 : 3		
Frame rate		30 frames per second(full pixel readout) 54 frames per second (vertical 2 pixel addition) FR model: No vertical 2 pixel addition	120 frames per second (full pixel readout) 219 frames per second(vertical 2 pixel addition) FR model: No vertical 2 pixel addition	60 frames per second (full pixel readout)
Horizontal drive frequency		72.0000 MHz	49.090902 MHz	25.5454 MHz
Horizontal scanning frequency		37.5 kHz , 33.898 kHz (vertical 2 pixel addition)	62.937 kHz, 57.618 kHz (vertical 2 pixel addition)	31.468 kHz
Vertical scanning frequency		29.95 Hz (full pixel readout) 54.06 Hz (vertical 2 pixel addition mode) FR model: No vertical 2 pixel addition	119.88 Hz (full pixel readout) 219.08 Hz (vertical 2 pixel addition mode) FR model: No vertical 2 pixel addition	59.94 Hz
Sync system		Internal		
Lens mount		C-mount (Flange focal distance = 17.526 mm)		Special mount (Flange focal distance = 8.4 mm)
Video output		Digital output (Camera Link) Base configuration: 36.0000 MHz x 2 TAP (Maximum cable length is 10 m) Output image size: 1628 (H) x 1236 (V) (full pixel readout)	Digital output (Camera Link) Base configuration: 24.545451 MHz x 2 TAP (Maximum cable length is 10 m) Output image size: 659 (H) x 494 (V) (full pixel readout)	Digital output (Camera Link) Base configuration: 24.5454 MHz (Maximum cable length is 10 m) Output image size: 659 (H) x 494 (V) (full pixel readout)
Resolution		Horizontal / Vertical: 1200 TV lines		Horizontal: 500 TV lines / Vertical: 490 TV lines
Sensitivity		500 lx, F5.6, 3200 K FR Model: 2000 lx, F5.6, 3200 K	550 lx, F4, 3200 K FR Model: 2000 lx, F4, 3200 K	2000 lx, F4, 3200 K
Minimum illumination		3.9 lx (F1.4, MAX GAIN) FR Model: 20 lx (F1.4, MAX GAIN)	8.6 lx (F1.4, MAX GAIN) FR Model: 35 lx (F1.4, MAX GAIN)	35 lx (F1.4, MAX GAIN)
Signal noise to ratio		45 dB		50 dB
Electric shutter		OFF, 1/30, 1/60, 1/125, 1/250, 1/1000, 1/2000, 1/10000, 1/50000 second OFF is normal exposure (frame rate) or changeable by variable shutter (minimum 1/100000 second)	OFF, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000, 1/50000 second OFF is normal exposure (frame rate) or changeable by variable shutter (minimum 1/100000 second)	OFF, 1/60, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000, 1/50000 second OFF is normal exposure (frame rate) or changeable by variable shutter (minimum 1/100000 second)
Gamma		γ = 1		
Frame on demand	Mode	(A) Fixed shutter mode (8 steps or variable) (B) ONE trigger mode		
	Trigger input	Camera Link (CC1)		
Partial scan		Selectable start position and height of picture grabbing in 1H step.		
Power supply voltage		12 ± 1 VDC		
Current consumption		Approx. 270 mA (approx. 3.2 W) *MAX partial scan 1H: Approx. 360 mA (approx. 4.3 W)	Approx. 190 mA (approx. 2.3 W) *MAX partial scan 1H: Approx. 230 mA (approx. 2.8 W)	Approx. 200 mA (approx. 2.4 W) *MAX partial scan 1H: Approx. 250 mA (approx. 3.0 W)
Ambient temperature	Performance	0 to +40 °C (+32 to +104 °F), less than 90 % RH		
	Operation	-10 to +50 °C (+14 to 122 °F), less than 90 % RH		
	Storage	-20 to +60 °C (-4 to 140 °F), less than 70 % RH (without dew condensation)		
Vibration endurance		10 to 200 Hz (98 m/s ²), Sweep 10 minute, 30 minutes for each 3 axis		
Shock endurance		686 m/s ² (Once for each side of top, under, left and right)		
External dimensions		29 (W) x 29 (W) x 38 (D) mm (Not including protrusions)		Head: 12 (W) x 12.5 (H) x 47.5 (D) mm CCU: 29 (W) x 29 (H) x 38 (D) mm
Mass		Approx. 50 g		

Digital Interface Cameras

KP-FR200PCL/SCL	PCL: Mini CL(PoCL)	1CCD Color(RAW)	1/1.8" CCD	UXGA(2.01 M pixel) (1628 x 1236)	Max. 15 frames per sec.	29(W) x 29(W) x 29(D) mm
KP-F200PCL/SCL		1CCD Black & White				
KP-FR80PCL/SCL	SCL: Mini CL (Non-PoCL)	1CCD Color(RAW)	1/3" CCD	XGA(0.81 M pixel) (1034 x 779)	Max. 26 frames per sec.	
KP-F80PCL/SCL		1CCD Black & White			Max. 60 frames per sec.	
KP-FR30PCL/SCL		1CCD Color(RAW)				
KP-F30PCL/SCL		1CCD Black & White		VGA(0.33M pixel) (659 x 494)		

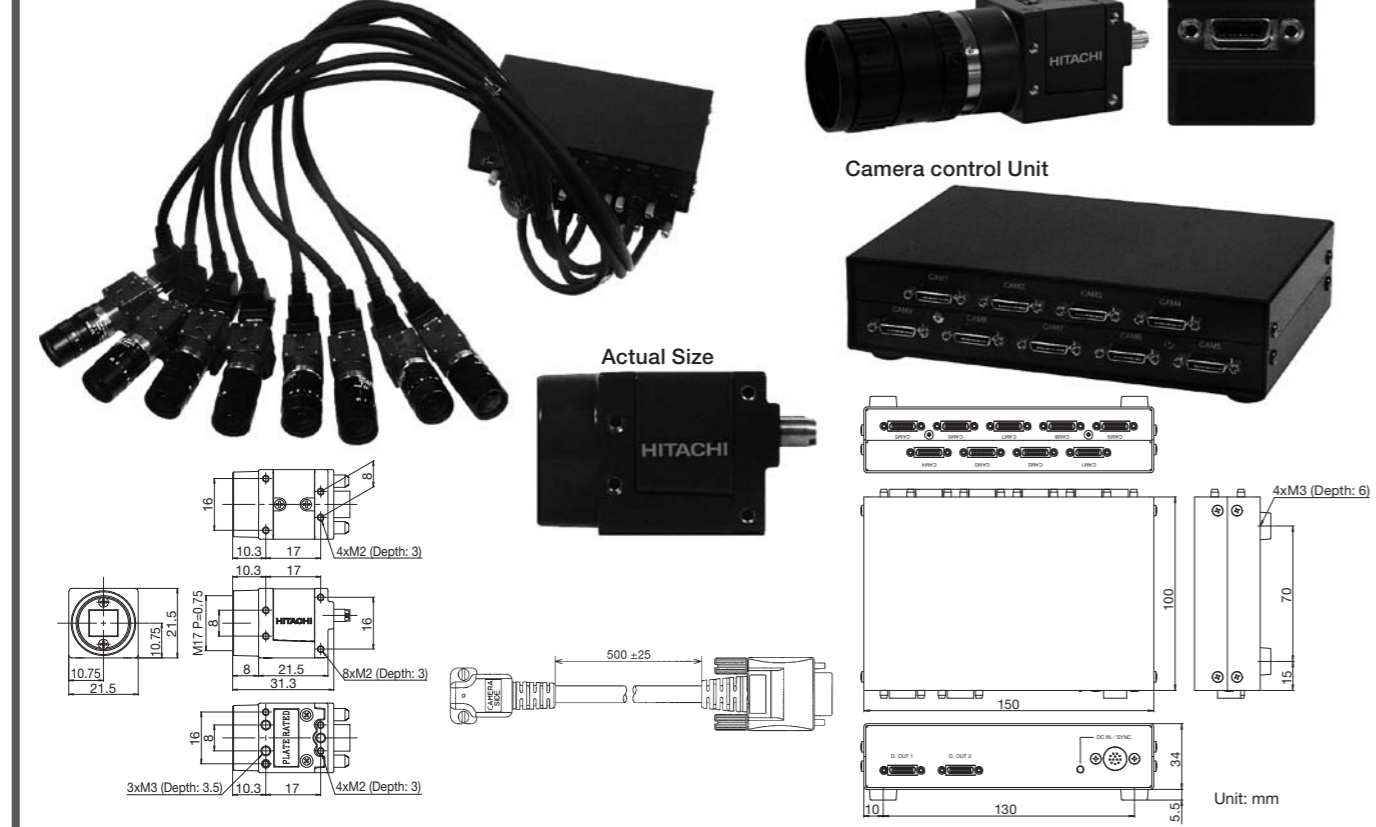


		KP-FR200PCL/SCL KP-F200PCL/SCL	KP-FR80PCL/SCL KP-F80PCL/SCL	KP-FR30PCL/SCL KP-F30PCL/SCL
Imaging device	Total pixels	1/1.8-inch interline CCD (ICX274AL)	1/3-inch interline CCD (ICX204AL)	1/3-inch interline CCD (ICX424AL)
	Effective pixels	1688 (H) x 1248 (V)	1077 (H) x 788 (V)	692 (H) x 504 (V)
	Pixel size	4.4 μm (H) x 4.4 μm (V) (square lattice)	4.65 μm (H) x 4.65 μm (V) (square lattice)	7.4 μm (H) x 7.4 μm (V) (square lattice)
	Color filter (FR Model)	RGB primary color mosaic filter		
Sensing area		7.16 mm (H) x 5.44 mm (V)	4.76 mm (H) x 3.57 mm (V)	4.88 mm (H) x 3.66 mm (V)
Scanning system		Progressive		
Aspect ratio		4 : 3		
Frame rate		15 frames per second (full pixel readout)	36 frames per second (full pixel readout)	60 frames per second (full pixel readout)
Horizontal drive frequency		36.0000 MHz		25.5454 MHz
Horizontal scanning frequency		18.75 kHz	28.346 kHz	31.468 kHz
Vertical scanning frequency		14.97 Hz	35.79 Hz	59.94 Hz
Sync system		Internal		
Lens mount		C-mount (Flange focal distance =17.526 mm)		
Video output		Digital output (Camera Link) Base configuration: 36.0000 MHz (Maximum cable length is 10 m) Output image size: 1628 (H) x 1236 (V) (full pixel readout)	Digital output (Camera Link) Base configuration: 36.0000 MHz (Maximum cable length is 10 m) Output image size: 1024 (H) x 768 (V) (full pixel readout)	Digital output (Camera Link) Base configuration: 24.5454 MHz (Maximum cable length is 10 m) Output image size: 659 (H) x 494 (V) (full pixel readout)
Resolution		Horizontal / Vertical: 1200 TV lines		Horizontal / Vertical: Approx. 800 TV lines
Sensitivity		400 lx, F4, 3200 K FR model: 2000 lx, F8, 3200 K	400 lx, F2.8, 3200 K FR model: 2000 lx, F4, 3200 K	400 lx, F4, 3200 K FR model: 2000 lx, F5.6, 3200 K
Minimum illumination		1.0 lx (F1.4, MAX GAIN, without IR cut filter) FR model: 5.0 lx (F1.4, MAX GAIN)	1.0 lx (F1.4, MAX GAIN, without IR cut filter) FR model: 20 lx (F1.4, MAX GAIN)	1.0 lx (F1.4, MAX GAIN, without IR cut filter) FR model: 10 lx (F1.4, MAX GAIN)
Signal noise to ratio		50 dB		
Electric shutter		OFF, 1/15, 1/60, 1/125, 1/250, 1/1000, 1/2000, 1/10000, 1/50000 second OFF is normal exposure (frame rate) or changeable by variable shutter (minimum 1/100000 second)	OFF, 1/36, 1/60, 1/125, 1/250, 1/1000, 1/2000, 1/10000, 1/50000 second OFF is normal exposure (frame rate) or changeable by variable shutter (minimum 1/100000 second)	OFF, 1/60, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000, 1/50000 second OFF is normal exposure (frame rate) or changeable by variable shutter (minimum 1/100000 second)
Gamma		γ = 1		
Frame on demand	Mode	(A) Fixed shutter mode (8 steps or variable) (B) ONE trigger mode (C) VD reset mode	(A) Fixed shutter mode (8 steps or variable) (B) ONE trigger mode (C) VD reset mode	(A) Fixed shutter mode (8 steps or variable) (B) ONE trigger mode (C) Reset control mode (D) VD reset mode
	Trigger input	Camera Link (CC1) *When Reset control mode CC1 and CC2 are used		
Partial scan		Selectable start position and height of picture grabbing in 1H step.		
Power supply voltage		12 ± 1 VDC		
Current consumption		Approx. 170 mA (approx. 2.1 W)	Approx. 120 mA (approx. 1.5 W)	Approx. 120 mA (approx. 1.5 W)
Ambient temperature	Performance	0 to +40 °C (+32 to +104 °F), less than 90 % RH		
	Operation	10 to +50 °C (+14 to 122 °F), less than 90 % RH		
	Storage	-20 to +60 °C (-4 to 140 °F), less than 70 % RH (without dew condensation)		
Vibration endurance		10 to 200 Hz (98 m/s ²), Sweep 10 minute, 30 minutes for each 3 axis		
Shock endurance		686 m/s ² (Once for each side of top, under, left and right)		
External dimensions		29 (W) x 29 (W) x 29 (D) mm (Not including protrusions)		
Mass		Approx. 50 g		

Digital Interface Cameras

KP-FMR830CL	Between the control unit and cameras: PoCL-Lite Composite image output from the control unit: Mini CL (Non-PoCL)	Cameras: 1CMOS Color (RAW) Composite image: Color (RGB)	1/3" CMOS	Cameras(Per Single camera): VGA(640 x 480) Composite image (by 8 pieces of camera): (640 x 3840)	Composite image Readout: Max. 30 frames per sec.	One Camera: 21.5(W)× 21.5(H)× 21.5(D)mm
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Output at 30fps (640 × 3840 pixels) by combining the color image of camera 8 units (VGA).



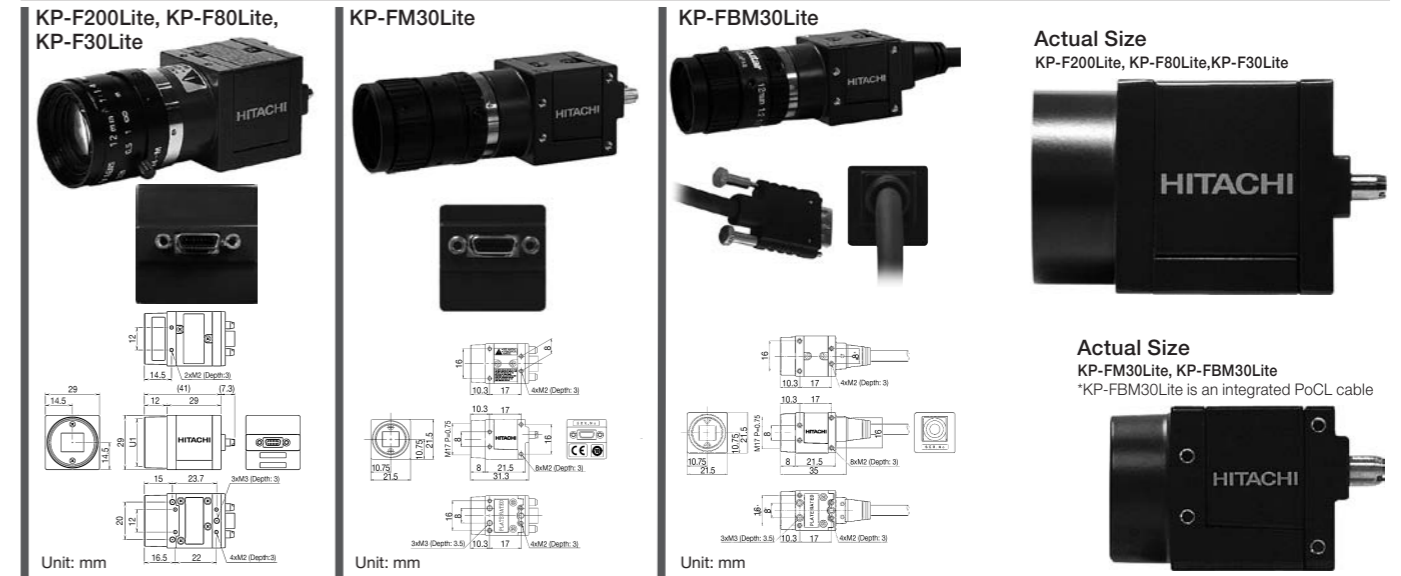
MR-FMR30Lite (Camera) (Per unit)	
Imaging device	1/3-inch CMOS
Effective pixels	752 (H) x 480 (V)
Pixel size	6.0 μm (H) x 6.0 μm (V) (square lattice)
Color filter	RGB primary color mosaic filter
Sensing area	4.51 mm (H) x 2.88 mm (V)
Scanning system	Progressive
Frame rate	90 frames per second (full pixel readout)
Horizontal drive frequency	36.818 MHz
Horizontal scanning frequency	45.29 kHz
Vertical scanning frequency	90 Hz
Sync system	Internal
Lens mount	NF-mount (Flange focal distance = 12 mm)
Video output	Digital output (Between the camera and the CCU): PoCL-Lite: 36.818 MHz Output image size: 752 (H) x 480 (V) (full pixel readout)
Resolution	Horizontal / Vertical: 480 TV lines
Sensitivity	500 lx, F4, 3200K
Minimum illumination	32 lx (F1.4, MAX GAIN)
Signal noise to ratio	50 dB
Electric shutter	OFF 1/90, 1/100, 1/250, 1/500, 1/1000, 1/2000, 1/10000 second. OFF is normal exposure (frame rate) or changeable by variable shutter (Minimum 1/20000 second, Maximum 1/90 second)
Frame on demand	Fixed shutter (7 steps or variable)
Power supply voltage	12 ± 1 VDC
Current consumption	Approx. 80 mA (Approx. 0.96 W)
Ambient temperature	Performance: 0 to +40 °C (+32 to +104 °F), less than 90 % RH Operation: -10 to +50 °C (+14 to 122 °F), less than 90 % RH Storage: -20 to +60 °C (-4 to 140 °F), less than 70 % RH (without dew condensation)
Vibration endurance	15 to 200 Hz (98 m/s ²), Sweep 10 minute, 30 minutes for each 3 axis
Shock endurance	700 m/s ² (Once for each side of top, under, left and right)
External dimensions	150 (W) x 34 (W) x 100 (D) mm (Not including protrusions)
Mass	Approx. 20 g

MR-830CCU (Camera Control Unit)	
Video output	CameraLink: 80MHz Base configuration: 24bit (R:8bit G:8bit B:8bit) Output image size: 640(H) x 3840(V) (full pixel readout), 640(H) x 480(V) x Camera 8 units *Upper and lower boundary line (1 line and 480 line) of each camera is not used, please use the cut out within the 478 line
Frame rate	30 frames per second
I/O signal	Trigger input: Input from Camera Link connector: LVDS level Input from DCIN/SYNC connector: High: +2.5 to +5.0 V Low: 0 to +0.3 V FVAL output: High: +5 V Low: 0 V
Power supply voltage	DC12 V ± 1 V
Current consumption	Approx. 1.25 mA (Approx. 15 W) (eight cameras connection)
Ambient temperature	Performance: 0 to +40 °C (+32 to +104 °F), less than 90 % RH Operation: -10 to +50 °C (+14 to 122 °F), less than 90 % RH Storage: -20 to +60 °C (-4 to 140 °F), less than 70 % RH (without dew condensation)
Vibration endurance	15 to 200 Hz (98 m/s ²). Sweep 10 minute, 30 minutes for each 3 axis
Shock endurance	700 m/s ² (Once for each side of top, under, left and right)
External dimensions	150 (W) x 34 (W) x 100 (D) mm (Not including protrusions)
Mass	Approx. 570 g

Component		
KP-FMR830CL		
Products	Model	Quantity
Camera	MR-FM30Lite	8
PoCL-Lite cable (Camera connection: Right Angle type) (Cable length: 500mm)	MR-050Lite	8
Camera control unit	MR-830CCU	1

Digital Interface Cameras

KP-F200Lite	PoCL-Lite	1/1.8" CCD	UXGA(2.01 M pixel)(1628 x 1236)	Max. 15 frames per sec.	29(W)×29(H)× 29(D)mm
KP-F80Lite		1/3" CCD	XGA(0.81 M pixel)(1034 x 779)	Max. 36 frames per sec.	
KP-F30Lite		1/3" CCD	VGA(0.33 M pixel)(659 x 494)	Max. 60 frames per sec.	
KP-FM30Lite	PoCL-Lite	1CMOS	VGA(0.36 M pixel)(752 x 480)	Max. 90 frames per sec.	21.5(W)×21.5(H)×21.5(D)mm KP-FBM30Lite is an integrated cable
KP-FBM30Lite		1/3" CMOS			



	KP-F200Lite	KP-F80Lite	KP-F30Lite	KP-FM30Lite KP-FBM30Lite
Imaging device	1/1.8-inch interline CCD (ICX274AL)	1/3-inch interline CCD (ICX204AL)	1/3-inch interline CCD (ICX424AL)	1/3-inch CMOS
Total pixels	1688 (H) x 1248 (V)	1077 (H) x 788 (V)	692 (H) x 504 (V)	-
Effective pixels	1628 (H) x 1236 (V)	1034 (H) x 779 (V)	659 (H) x 494 (V)	752 (H) x 480 (V)
Pixel size	4.4 μm (H) x 4.4 μm (V) (square lattice)	4.65 μm (H) x 4.65 μm (V) (square lattice)	7.4 μm (H) x 7.4 μm (V) (square lattice)	6.0 μm (H) x 6.0 μm (V) (square lattice)
Sensing area	7.16 mm (H) x 5.44 mm (V)	4.76 mm (H) x 3.75 mm (V)	4.88 mm (H) x 3.66 mm (V)	4.51 mm (H) x 2.88 mm (V)
Scanning system	Progressive			
Aspect ratio	4 : 3			5 : 3
Frame rate	15 frames per second (full pixel readout)	36 frames per second (full pixel readout)	60 frames per second (full pixel readout)	90 frames per second (full pixel readout)
Horizontal drive frequency	36.0000 MHz	36.0000 MHz	24.5454 MHz	36.818 MHz
Horizontal scanning frequency	18.75 kHz (full pixel readout)	28.346 kHz (full pixel readout)	31.468 kHz (full pixel readout)	45.29 kHz (full pixel readout)
Vertical scanning frequency	14.97 Hz (full pixel readout)	35.79 Hz (full pixel readout)	59.94 Hz (full pixel readout)	90 Hz
Sync system	Internal			
Lens mount	C-mount (Flange focal distance = 17.526 mm)			NF-mount (Flange focal distance = 12 mm)
Video output	Digital output (PoCL-Lite) Base configuration: 36.0000 MHz (Maximum cable length is 10 m) Output image size: 1628 (H) x 1236 (V) (full pixel readout)	Digital output (PoCL-Lite) Base configuration: 36.0000 MHz (Maximum cable length is 10 m) Output image size: 1024 (H) x 768 (V) (full pixel readout)	Digital output (PoCL-Lite) Base configuration: 24.5454 MHz (Maximum cable length is 10 m) Output image size: 659 (H) x 494 (V) (full pixel readout)	Digital output (PoCL-Lite) Base configuration: 36.8184 MHz (Maximum cable length is 10 m) (KP-FBM30Lite: Cable length is 2 m) Output image size: 752 (H) x 480 (V) (full pixel readout)
Resolution	Horizontal / Vertical: 1200 TV lines	Horizontal / Vertical: 800 TV lines	Horizontal: 500 TV lines / Vertical: 490 TV lines	Horizontal / Vertical: 480 TV lines
Sensitivity	400 lx, F5.6, 3200 K	400 lx, F4, 3200 K	400 lx, F5.6, 3200 K	400 lx, F2.8, 3200 K
Minimum illumination	1.0 lx (F1.4, MAX GAIN)			
Signal noise to ratio	50 dB			
Electric shutter	OFF 1/15, 1/60, 1/125, 1/250, 1/1000, 1/2000, 1/10000, 1/50000 second. OFF is normal exposure (frame rate) or changeable by variable shutter (Minimum 1/100000 second)	OFF 1/36, 1/60, 1/125, 1/250, 1/1000, 1/2000, 1/10000, 1/50000 second. OFF is normal exposure (frame rate) or changeable by variable shutter (Minimum 1/100000 second)	OFF 1/60, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000, 1/50000 second. OFF is normal exposure (frame rate) or changeable by variable shutter (Minimum 1/100000 second)	OFF 1/90, 1/100, 1/250, 1/500, 1/1000, 1/2000, 1/10000 second. OFF is normal exposure (frame rate) or changeable by variable shutter (Minimum 1/100000 second)
Gamma	γ = 1			
Frame on demand	(A) Fixed shutter (8 steps or variable) (B) ONE trigger mode (C) VD reset mode			Fixed shutter (7 steps or variable)
Partial scan	Selectable start position and height of picture grabbing in 1H step.			
Power supply voltage	12 ± 1 VDC			
Current consumption	Approx. 170 mA (Approx. 2.1 W)	Approx. 120 mA (Approx. 1.5 W)	Approx. 80 mA (Approx. 0.96 W)	
Ambient temperature	Performance: 0 to +40 °C (+32 to +104 °F), less than 90 % RH Operation: -10 to +50 °C (+14 to 122 °F), less than 90 % RH Storage: -20 to +60 °C (-4 to 140 °F), less than 70 % RH (without dew condensation)			
Vibration endurance	10 to 200 Hz 98 m/s ²			
Shock endurance	686 m/s ²			
External dimensions	29 (W) x 29 (W) x 29 (D) mm (Not including protrusions)			21.5 (W) x 21.5 (W) x 21.5 (D) mm (Not including protrusions) (Not including cable for KP-FBM30Lite)
Mass	Approx. 50 g			Approx. 20 g (Not including cable for KP-FBM30Lite)