

EM-TDI CCD Camera C9100-03

Electron Multiplying TDI CCD Camera



The C9100-03 is a unique EM (Electron Multiplying) CCD camera with TDI readout mode. The combination of this EM and TDI (Time Delay Integration) technology enables seamless high speed scanning for ultra low light objects.

Significant performance of high gain, excellent signal to noise ratio, high resolution and high speed are combined with a proprietary hermetic vacuum chamber evacuated to approx. 1.3×10^{-6} Pa (10^{-8} Torr).

Furthermore, the camera controls cooling temperature stably at -50 °C even when the ambient temperature is fluctuated from 0 °C to $+40$ °C.

This stable cooling temperature contributes to the uniform electron multiplying factor. 2000 times gain factor is possible while operating at 30.9 kHz line rate and 14 bit digitization.

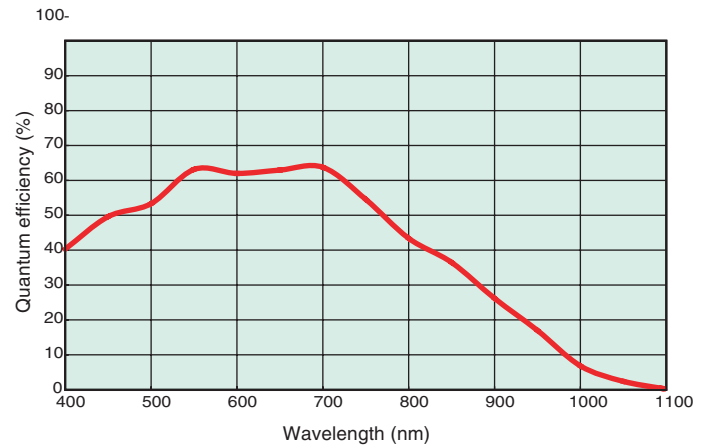
Integration of the high vacuum, stable deep cooling and optimally designed electronics enables to minimize the camera noise. The readout noise of this camera is less than one electron at maximum EM gain. In addition to that integration of on-chip EM gain feature and stable deep cooling performance contribute to increase signal level significantly against camera noise.

The C9100-03 is recommended for any application requiring, high speed, high sensitivity and high resolution imaging under ultra low light condition.

FEATURES

- TDI mode and Area mode in one camera
- Resolution 1000(H) × 1000(V)
- Pixel clock 35 MHz
- Line rate up to 30.9 kHz in TDI mode
- High EM gain (2000x)
- 14 bit A/D converter
- Stable cooling at -50 °C
- Electrical shutter
- Cyclic trigger

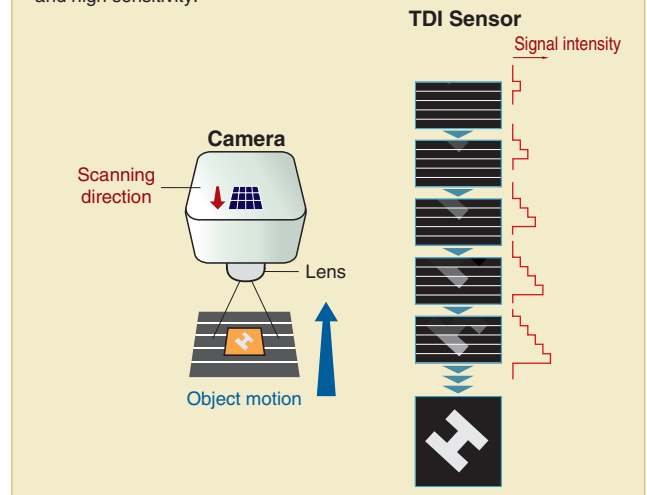
SPECTRAL RESPONSE



★ This is typical, not guaranteed.

Perfectly seamless image acquisition with high sensitivity and high-speed

TDI (Time Delay Integration) is a particular readout method of the CCD. When charges are readout from the CCD, the CCD vertically transfers the charges line by line. If the charge transferring speed and the object moving speed are matched perfectly, it enables exposure time for the moving object to be as long as the charge transferring time of the vertical stages in the CCD. This method is called TDI, the technology enables to capture image of moving object with high speed and high sensitivity.



APPLICATIONS

- High speed and high resolution scanning for low light application e.g. Ultra low light fluorescence imaging
- Continuous imaging for moving object, flowing material and large size sample

SPECIFICATIONS

Type number	C9100-03	
Camera head type	Hermetic vacuum-sealed air-cooled head	
Imaging device	Frame Transfer CCD	
Effective number of pixels	1000 (H) × 1000 (V)	
Cell size	8 μm (H) × 8 μm (V)	
Effective area	8.0 mm (H) × 8.0 mm (V)	
Pixel clock rate	35 MHz/pixel	
Readout noise (r.m.s.) (typ.)	at EM-gain min.	10 electrons
	at EM-gain max.	< 1 electrons
Full well capacity (typ.)	70000 electrons	
Electron Multiplying gain max.	2000 times (*1)	
Cooling method	Forced-air peltier cooling with hermetic sealing(*2)	
Cooling temperature	Absolute and stabilized to - 50 °C (at ambient room temperature 0 °C to + 40 °C)	
A/D converter	14 bit	
Output signal / External control	Camera Link	
Offset enhancement	Yes	
Lens mount	C-mount	
Power requirements	DC +12 V	
Power consumption	Approx. 60 W / A	
Ambient storage temperature	- 10 °C to + 50 °C	
Ambient operating temperature	0 °C to + 40 °C	
Ambient operating/storage humidity	70 % max. (with no condensation)	

(*1) Even with electron multiplying gain maximum, dark signal is kept low level for low light imaging.
 (*2) The hermetic sealed head maintains a high degree of vacuum approx. 1.3×10^{-6} Pa (10^{-8} Torr), without re-evacuation.

● TDI mode

Line rate	TDI	30.9 kHz to 15.4 kHz
	TDI extended mode	15.9 kHz to 0.1 kHz
External trigger	Yes	

● Area mode

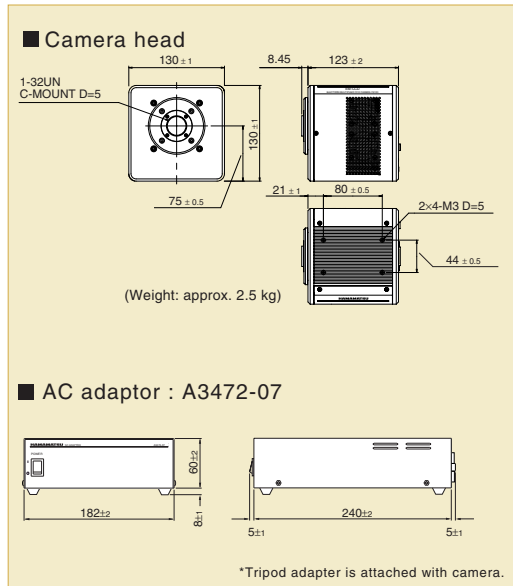
Maximum frame rate	30.1 frame/s
Exposure time	100 μs to 10 s
Electronic shutter	Yes
External trigger	Edge, level, synchronous
Integration timing output (*3)	Yes

(*3) Integration timing output feature is available in internal mode only.

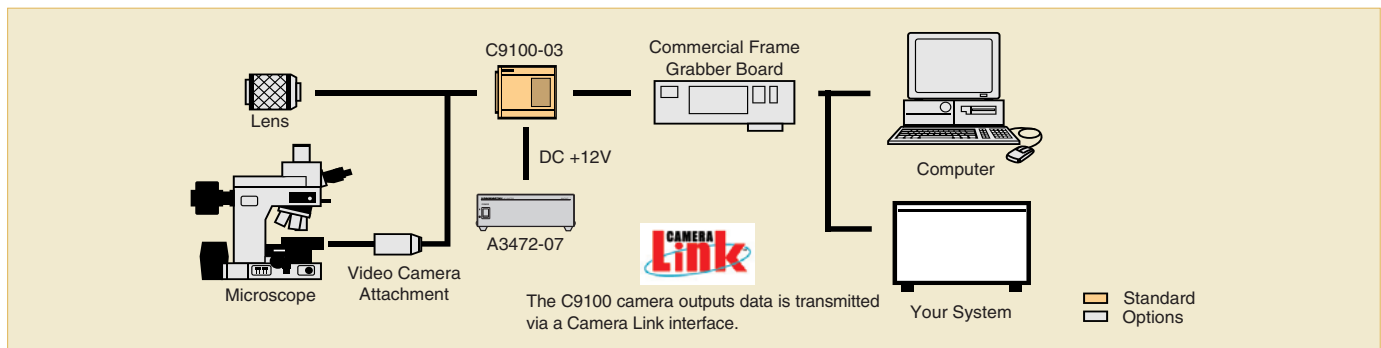
OPTIONS

- **Camera cable: A9189-05** (5 m)
- **External trigger cable: A9967-05** (5 m)
- **AC adaptor: A3472-07**
 Line voltage: AC 100 V to AC 240 V input
 Output voltage: DC +12 V
 Dimension: 182 mm (W) × 240 mm (D) × 60 mm (H)

DIMENSIONAL OUTLINES (Unit : mm)



SYSTEM CONFIGURATION



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Homepage Address <http://www.hamamatsu.com>

HAMAMATSU PHOTONICS K.K., Systems Division

812 Joko-cho, Higashi-ku, Hamamatsu City, 431-3196, Japan, Telephone: (81)53-431-0124, Fax: (81)53-435-1574, E-mail: export@sys.hpk.co.jp

U.S.A. and Canada: Hamamatsu Corporation, 360 Foothill Road, Bridgewater, N.J. 08807-0910, U.S.A., Telephone: (1) 908-231-0960, Fax: (1) 908-231-0852, E-mail: usa@hamamatsu.com

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-2658, E-mail: info@hamamatsu.de

France: Hamamatsu Photonics France S.A.R.L.: 19, Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10, E-mail: infos@hamamatsu.fr

United Kingdom: Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BW, U.K., Telephone: (44) 1707-294888, Fax: (44) 1707-325777, E-mail: info@hamamatsu.co.uk

North Europe: Hamamatsu Photonics Norden AB: Smidesvägen 12, SE-171-41 Solna, Sweden, Telephone: (46)8-509-031-00, Fax: (46)8-509-031-01; E-mail: info@hamamatsu.se

Italy: Hamamatsu Photonics Italia S.R.L.: Strada della Moia, 1/E 20020 Arese (Milano), Italy, Telephone: (39)02-935 81 733, Fax: (39)02-935 81 741, E-mail: info@hamamatsu.it

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