

# HAMAMATSU

DATA SHEET

## Electron Bombardment CCD Cameras C7190



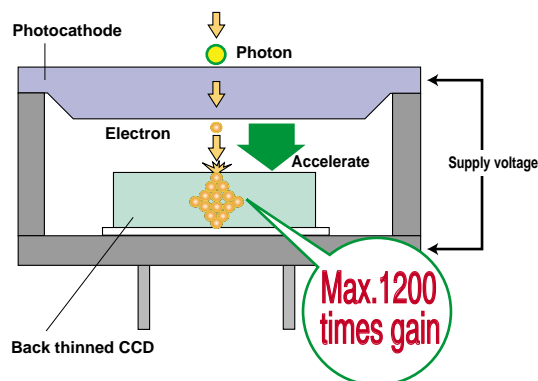
C7190-11W, -12W, -13W



C7190-21, -23

Hamamatsu EB-CCD cameras use an innovative high gain sensor that puts advanced technology to work to obtain high gain images in very low light. This technology involves a special vacuum chamber in which electrons generated at the photocathode are accelerated by a high potential into a newly developed, back thinned, back illuminated CCD. This direct bombardment of the CCD by accelerated electrons provides high gain, high resolution images, with none of the problems associated with Micro Channel Plates which are used in other devices. The sensor in the EB-CCD is driven by low noise circuits and features MPP (Multi Pin Phase) technology to achieve good S/N ratios at high gain conditions and a long service life. Two different implementations of this technology are available. We offer a selection between a video rate camera with both analog and 10 bit digital output at 30 fps and a higher precision but slower frame rate model with software selectable 10 and 12 bit digitizers included. A selection of photocathode materials is available for tailoring these cameras to almost any application. This new technology is ideal for demanding applications such as genetic and bioscience research, materials research, laminar flow applications, and many physical sciences requiring the rapid acquisition of images at low light levels.

### SENSOR STRUCTURE



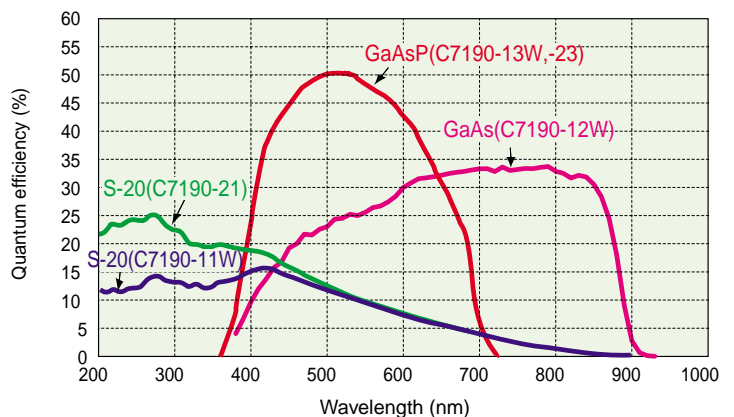
### FEATURES

- Amplification gain of up to 1200 times (C7190-11W, -12W, -13W)
- High S/N Ratio
- Ultra-high sensitivity
- Two types are available

Dual scan digital type : C7190-11W, -12W, -13W

Video rate digital type : C7190-21, -23

### SPECTRAL RESPONSE CHARACTERISTICS



\* This is typical, not guaranteed.

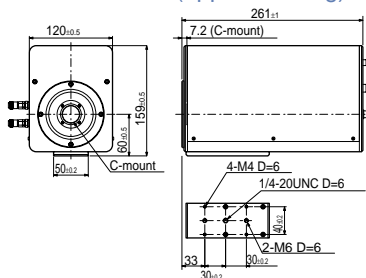
## SPECIFICATIONS

| Type. Number            | C7190-11W   | C7190-12W | C7190-13W | C7190-21   | C7190-23         |
|-------------------------|---|-----------|-----------|--|------------------|
| CCD Structure           | Back thinned full frame transfer CCD  |           |           | Back thinned frame transfer CCD  |                  |
| Total no. of pixels     | 512(H) × 512(V)   |           |           | 680(H) × 1000(V)   |                  |
| Effective no. of pixels | 512(H) × 512(V)   |           |           | 658(H) × 490(V)  |                  |
| Cell size               | 24 μm × 24 μm   |           |           | 14 μm × 14 μm  |                  |
| Effective area          | 12.3 mm × 12.3 mm / 1-inch format   |           |           | 8.96 mm × 6.72 mm / 2/3-inch format  |                  |
| Readout noise           | 15 electrons r.m.s. (slow scan)   |           |           | —  |                  |
| Full well capacity      | 150,000 electrons (typ.)  |           |           | 65,000 electrons (typ.)  |                  |
| CCD Dark current        | 8 electrons/pixel/sec at -25 °C   |           |           | —  |                  |
| Frame rate              | Slow scan: 3 Hz<br>High scan: 5 Hz  |           |           | Non-interlace 30 Hz<br>Interlace 60 Hz   |                  |
| A/D converter           | Slow scan: 12 bit<br>High scan: 12 bit  |           |           | 10 bit   |                  |
| Gate function           | 10 μsec   |           |           | —  |                  |
| Gain                    | to 1200 times   |           |           | 600 to 700 times   | 200 to 250 times |
| Sensitivity control     | Possible  |           |           | Possible   |                  |
| System gain             | Low: 36 electrons/count<br>High: 15 electrons/count<br>Super High: 4 electrons/count                  |           |           | —  |                  |
| Cooling temperature     | -25 °C  |           |           | Ambient temperature  |                  |
| Photocathode            | S-20  | GaAs      | GaAsP     | S-20   | GaAsP            |
| Sensor structure        | Proximity focused type  |           |           | Proximity focused type   |                  |
| Data output             | RS-422 digital out  |           |           | RS-644 digital out and RS-170A out, SCSI out (optional)  |                  |
| Camera controller       | RS-232C   |           |           | RS-232C and SCSI (optional)  |                  |
| Functions               | <ul style="list-style-type: none"> <li>• Dual mode readout</li> <li>• Contrast enhancement</li> </ul> |           |           | <ul style="list-style-type: none"> <li>• Contrast enhancement</li> <li>(Note: The following functions are not effective with RS-644 digital output)</li> <li>• Real time background subtraction</li> <li>• Recursive filter</li> <li>(2, 4, 8, 16, 32, 64 frame selectable)</li> </ul> |                  |

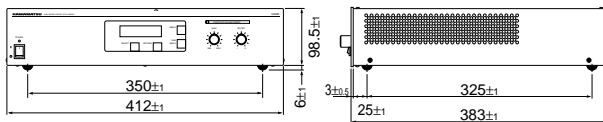
## DIMENSIONAL OUTLINES (Unit: mm)

### ● C7190-11W, -12W, -13W

- Camera head (approx. 4.5 Kg)

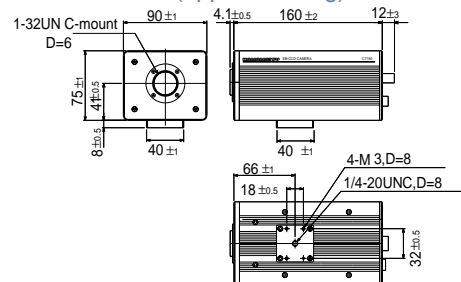


- Camera controller (approx. 10 Kg)

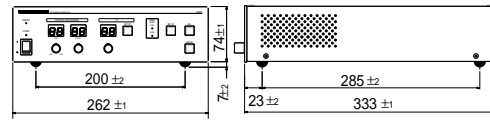


### ● C7190-21, -23

- Camera head (approx. 1.4 Kg)



- Camera controller (approx. 4.6 Kg)



★ Product and software package names noted in this documentation are trademarks or registered trademarks of their respective manufacturers.

- Subject to local technical requirements and regulations, availability of products included in this promotional material may vary. Please consult with our sales office.
- Information furnished by HAMAMATSU is believed to be reliable. However, no responsibility is assumed for possible inaccuracies or omissions.

Specifications and external appearance are subject to change without notice.

© 2002 Hamamatsu Photonics K.K.

# HAMAMATSU

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

HAMAMATSU PHOTONICS K.K., Systems Division  
812 Joko-cho, Hamamatsu City, 431-3196, Japan, Telephone: (81)53-431-0124, Fax: (81)53-435-1574, E-mail: [export@sys.hpk.co.jp](mailto:export@sys.hpk.co.jp)

U.S.A. and Canada: Hamamatsu Photonic Systems: 360 Foothill Road, Bridgewater, N.J. 08807-0910, U.S.A., Telephone: (1)908-231-1116, Fax: (1)908-231-0852, E-mail: [usa@hamamatsu.com](mailto: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](mailto:info@hamamatsu.de)

France: Hamamatsu Photonics France S.A.R.L.: 8, 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](mailto: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](mailto: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](mailto: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](mailto:info@hamamatsu.it)

Cat. No. SICS1050E07  
DEC/2002 HPK  
Created in Japan (PDF)