The C9100 cameras bring together all the advantages of the latest Electron Multiplication CCDs with Hamamatsu engineering. High gain, good signal to noise, resolution and speed are combined with a proprietary hermetic vacuum chamber evacuated to $10^{-8}$ Torr. High vacuum, deep cooling and specially designed electronics combine to reduce camera noise before the gain multiplication process begins. Using on-chip electron gain multiplication and deep cooling, the signal level can be greatly increased relative to the camera noise; providing a relative read noise of less than one electron at high gain levels. Depending on the model, gain factors up to 800 times or 2000 times are possible while still operating at 30 frames per second at full spatial resolution and 14 bit digitization. Frame rates of 250 frames per second or greater are possible by using the binning and sub-array features of the C9100 cameras.

The C9100 series cameras are recommended for any application requiring, speed, signal to noise, dynamic range and resolution at low light levels.

**SYSTEM CONFIGURATION**

![System Configuration Diagram]

The C9100 camera outputs data is transmitted via a Camera Link interface.
<table>
<thead>
<tr>
<th><strong>SPECIFICATIONS</strong></th>
</tr>
</thead>
</table>

Type number: C9100-02  C9100-12

**Camera head type**
- Hermetic vacuum-sealed air-cooled head
- Backthinned Frame transfer CCD

**Circulating water cooler**
- No

**Mechanical shutter**
- None

**Imaging device**
- Frame transfer CCD
- Backthinned Frame transfer CCD

**Effective no. of pixels**
- C9100-02: 1000 (H) x 1000 (V)
- C9100-12: 512 (H) x 512 (V)

**Cell size**
- 8 µm (H) x 8 µm (V)
- 16 µm (H) x 16 µm (V)

**Effective area**
- C9100-02: 6.0 mm (H) x 8.0 mm (V)
- C9100-12: 13 µm (H) x 18.192 mm (V)

**Pixel clock rate**
- C9100-02: 35 MHz/pixel
- C9100-12: 11 MHz/pixel

**Frame rate***
<table>
<thead>
<tr>
<th>Binning</th>
<th>C9100-02</th>
<th>C9100-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x 1</td>
<td>30.6 frame/s</td>
<td>35.8 frame/s</td>
</tr>
<tr>
<td>2 x 2</td>
<td>57.9 frame/s</td>
<td>66.9 frame/s</td>
</tr>
<tr>
<td>4 x 4</td>
<td>104.6 frame/s</td>
<td>118.2 frame/s</td>
</tr>
<tr>
<td>8 x 8</td>
<td>175.1 frame/s</td>
<td>191.6 frame/s</td>
</tr>
<tr>
<td>16 x 16</td>
<td>264.1 frame/s</td>
<td>277.0 frame/s</td>
</tr>
</tbody>
</table>

**Readout noise (r.m.s.)**
- Type number: C9100-02
- at EM-gain min.: 30 electrons
- at EM-gain max.: 100 electrons

**Full well capacity**
- typ.: 70,000 electrons
- typ.: 400,000 electrons

**Electron multiplier gain max.**
- typ.: 800
- typ.: 2000

**Cooling method**
- Forced-air peltier cooling with hermetic sealing**

**Cooling temperature**
- -50 °C

**A/D converter**
- 14 bit

**Output signal / External control**
- Camera Link

**Exposure time**
- typ.: 100 µs to 10 s
- typ.: 27.1 ms to 10 s

**Electronic shutter**
- Yes
- No

**External trigger**
- Yes

**Offset enhancement**
- Yes

**Contrast enhancement**
- No

**Lens mount**
- C-mount

**Power requirements**
- DC +12 V

**Power consumption**
- typ.: approx. 60 VA

**Ambient storage temperature**
- -10 °C to +50 °C

**Ambient operating temperature**
- 0 °C to +40 °C

**Operating/storage humidity**
- 70% max. (with no condensation)

**Backthinned Frame transfer CCD**
- Effective vertical width (Sub-array)

### OPTIONAL
- Power supply unit: A3472-07
  - Line voltage: 100 to 240V AC input
  - Output voltage: DC +12V
  - Dimension: 182 mm (W) x 240 mm (D) x 60 mm(H)

- Power cable: A9189-05

**C9100-02**

<table>
<thead>
<tr>
<th>Frame rate (frame/s)</th>
<th>Effective vertical width (Sub-array)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x 1</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>8 x 8</td>
<td>175.1</td>
</tr>
<tr>
<td>16 x 16</td>
<td>264.1</td>
</tr>
</tbody>
</table>

**C9100-12**

<table>
<thead>
<tr>
<th>Frame rate (frame/s)</th>
<th>Effective vertical width (Sub-array)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x 1</td>
<td>35.8</td>
</tr>
<tr>
<td>2 x 2</td>
<td>71.6</td>
</tr>
<tr>
<td>4 x 4</td>
<td>141.2</td>
</tr>
<tr>
<td>8 x 8</td>
<td>226.4</td>
</tr>
</tbody>
</table>

**DIMENSIONAL OUTLINES (Unit: mm)**

- (Weight: approx. 2.5 kg)

**OPTIONAL**

- Power supply unit: A3472-07
  - Line voltage: 100 to 240V AC input
  - Output voltage: DC +12V
  - Dimension: 182 mm (W) x 240 mm (D) x 60 mm(H)

- Power cable: A9189-05

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Cat. No. SICS1123601

NOV/2003 HPK

Created in Japan (PDF)