IMAGE INTENSIFIER UNITS
C9548 SERIES

OVERVIEW

Image intensifiers (I. I.) are devices capable of intensifying an image at high gain and high-speed gating (electronic shutter operation). This allows them to capture "instantaneous images" of ultra-fast phenomena that occur in extremely short periods of time.

The C9548 series is an I.I. unit which is suitable for PIV application. It has a built-in pulse generator to allow multi-exposure (burst) operation.

By using a relay lens, the C9548 series can be easily connected to various cameras or high-speed cameras. The I.I. gain, gate width and delay time can be controlled and set from a PC through the RS-232C interface. (The I.I. gain can also be controlled and set from the remote controller.)

FEATURES

- Maximum repetition frequency: 200 kHz
- High-speed gating: 10 ns minimum
- Built-in pulse generator
- Multi-exposure
- High performance image intensifier
  - High quantum efficiency in visible range: GaAsP photocathode
  - Wide spectral response range from UV to near IR: Multialkali photocathode
  - High sensitivity from visible range to near IR: GaAs photocathode
- Be equipped with over light protection

APPLICATIONS

- Analysis of high-speed phenomenon
  - PIV / Engine combustion state
  - Plasma emission / Discharge / Flow / Spray and so on.
- Observation of high speed maneuvering-vehicle
  - Flow observation of microparticle, gas, liquid, etc.
### Specifications

#### Photocathode sensitivity
- **Luminous sensitivity (Typ.)**: C9548-01 650, C9548-02 230, C9548-03 150, C9548-04 1100 μA/lm
- **Radiant sensitivity (Typ.)**: C9548-01 192, C9548-02 53, C9548-03 47, C9548-04 147 mA/W
- **Quantum efficiency (Typ.)**: C9548-01 45, C9548-02 15, C9548-03 14, C9548-04 22 %

#### Photocathode
- **Effective diameter**: 25 mm
- **Window material**: Borosilicate glass, Synthetic silica, Borosilicate glass
- **Photocathode material**: GaAsP, Multialkali, GaAs
- **Spectral response**: From 280 to 720 nm, 185 to 900 nm, 370 to 920 nm
- **Peak wavelength**: 530 to 430 nm, 430 to 800 nm

#### Input mount (Lens mount)
- **F-mount (C-mount selectable)**

#### Phosphor screen
- **Window material**: FOP

#### Decay time
- **See [Phosphor screen decay characteristics]**

#### Gate Specifications
- **Monitoring Time**: 200 kHz (protection circuit incorporated)
- **Pulse Width**: 10 ns to 9.99 ms
- **Output Level**: 2 V positive logic
- **Gate Time**: 10 ns to 9.99 ms
- **Output Impedance**: 200 Ω

#### Protective Functions
- **Repetition rate**: Max. 200 kHz
- **Excessive light protection**: Red LED flashes *
- **Warning**: Red LED is lit continuously *
- **Shut off**: Reset switch on the remote controller or sending command via RS-232C interface

#### Gate Specifications (Built-in pulse generator)
- **Operation Mode**: Normal (continuous) mode / Single gate mode / Burst gate mode
- **Gate time**: 10 ns to 9.99 ms
- **Pulse Interval (Min.)**: 500 ns
- **Number of Exposures (Max.)**: 1
- **Exposure Time (Max.)**: 10 ns
- **Repetition Cycle (Min.)**: 100 μs
- **Gate Trigger Input Level**: TTL positive logic
- **Input Impedance**: 1 kΩ
- **Gate Output Basic Delay Time**: 92 ± 2 ns
- **Gate Jitter (Max.)**: 2 ns (10 ns maximum when gate time is set to 10 μs or more)
- **Gate Output Level**: 2 V positive logic
- **Gate Time Pulse Width**: Gate time width (FWHM)

#### Time Sequence

**NOTE:**
- * Settable at figure of 3 digits.
- Effective output area is 16 mm × 16 mm. Take the effective area of the camera and reduction rate of the relay lens to be used into account.
- Input illuminance (or irradiance) required to produce a luminous emittance from the phosphor screen, which is equal to that obtained when no light is incident on the photocathode. This indicates the lower limit of detectable illuminance (or irradiance) level of an image intensifier.
- During normal (continuous) mode at maximum gain
- No condensation

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**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>C9548-01</th>
<th>C9548-02</th>
<th>C9548-03</th>
<th>C9548-04</th>
<th>C9548-05</th>
<th>C9548-06</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>Photocathode sensitivity</td>
<td>Luminous sensitivity (Typ.)</td>
<td>650</td>
<td>230</td>
<td>150</td>
<td>1100</td>
<td>μA/lm</td>
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<td></td>
<td>Radiant sensitivity (Typ.)</td>
<td>192</td>
<td>53</td>
<td>47</td>
<td>147</td>
<td>mA/W</td>
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<td></td>
<td>Quantum efficiency (Typ.)</td>
<td>45</td>
<td>15</td>
<td>14</td>
<td>22</td>
<td>%</td>
<td></td>
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<tr>
<td>Photocathode</td>
<td>Effective diameter</td>
<td>25 mm</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Window material</td>
<td>Borosilicate glass, Synthetic silica, Borosilicate glass</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Photocathode material</td>
<td>GaAsP, Multialkali, GaAs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spectral response</td>
<td>From 280 to 720 nm, 185 to 900 nm, 370 to 920 nm</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Peak wavelength</td>
<td>530 to 430 nm, 430 to 800 nm</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input mount (Lens mount)</td>
<td>F-mount (C-mount selectable)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phosphor screen</td>
<td>Window material</td>
<td>FOP</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td>Phosphor material</td>
<td>P46 (P24 or P43 selectable)</td>
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<td></td>
<td>Decay time</td>
<td>See [Phosphor screen decay characteristics]</td>
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<td></td>
<td></td>
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<tr>
<td>Gain</td>
<td>Luminous gain (Typ.)</td>
<td>6.0 × 10^4</td>
<td>1.5 × 10^4</td>
<td>3.3 × 10^4</td>
<td>1.0 × 10^4</td>
<td>9.9 × 10^3</td>
<td>2.6 × 10^3</td>
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<tr>
<td></td>
<td>Radiant emittance gain (Typ.)</td>
<td>1.3 × 10^4</td>
<td>1.0 × 10^4</td>
<td>2.0 × 10^4</td>
<td>7.0 × 10^4</td>
<td>2.7 × 10^3</td>
<td>6.6 × 10^3</td>
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<tr>
<td>Equivalent background input (EBI)</td>
<td>Luminous (Typ.)</td>
<td>3 × 10^{-12}</td>
<td>1 × 10^{-11}</td>
<td>2 × 10^{-11}</td>
<td>im/cm^2</td>
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<tr>
<td></td>
<td>Radiant (Typ.)</td>
<td>8 × 10^{-15}</td>
<td>3 × 10^{-14}</td>
<td>4 × 10^{-14}</td>
<td>W/cm^2</td>
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<td>Limiting resolution (Typ.)</td>
<td>51</td>
<td>45</td>
<td>57</td>
<td>51</td>
<td>51</td>
<td>45</td>
<td>Lp/mm</td>
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<tr>
<td>Maximum input light level (Typ.)</td>
<td>2.1 × 10^{-2}</td>
<td>8.4 × 10^{-2}</td>
<td>3.8 × 10^{-2}</td>
<td>1.3 × 10^{-2}</td>
<td>1.3 × 10^{-2}</td>
<td>4.8 × 10^{-2}</td>
<td>lx</td>
</tr>
<tr>
<td></td>
<td>Radiant (Typ.)</td>
<td>1.6 × 10^{-9}</td>
<td>1.9 × 10^{-11}</td>
<td>9.5 × 10^{-4}</td>
<td>2.7 × 10^{-11}</td>
<td>7.0 × 10^{-9}</td>
<td>2.9 × 10^{-11}</td>
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<td>Average of Max. phosphor screen brightness</td>
<td>10 cd/m^2</td>
<td></td>
<td></td>
<td></td>
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<td>Power requirement</td>
<td>100 to 240 V</td>
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<td>Power consumption (Max.)</td>
<td>12</td>
<td>14.4</td>
<td>12</td>
<td>14.4</td>
<td>12</td>
<td>14.4</td>
<td>W</td>
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<td>Operating ambient temperature</td>
<td>0 to +40 °C</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Storage temperature</td>
<td>-20 to +50 °C</td>
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<tr>
<td>Operating and storage humidity</td>
<td>Below 70 %</td>
<td></td>
<td></td>
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</tbody>
</table>

**NOTE:**
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- **Gate Time Pulse Width**: Gate time width (FWHM)
- **Gate Time Monitor Pulse**: 10 ns to 9.99 ms

**NOTE:**
- *The LED on near of head can be turned out by control software.

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**TIME SEQUENCE**
**CHARACTERISTICS**

- **Typical Spectral Response (Typ.)**
- **Typical Phosphor Screen Spectral Emission (Typ.)**
- **Typical Phosphor Screen Decay Characteristics (Typ.)**

**DIMENSIONAL OUTLINES** (Unit: mm)

- **Head (F-mount Type)**
- **Remote Controller**
- **Relay Lens Adapter A9549 (Sold Separately)**

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**SETUP EXAMPLE WITH OPTICAL ACCESSORIES**

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**NOTE:**
- Select C-mount or F-mount at ordering.
- Supported high-speed cameras depend on the readout frame rate. Please be sure to consult us. Check the input mount of the high-speed camera. The A2095 is needed in front of the high-speed camera when the camera has a C-mount input port.

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![Diagram](https://example.com/diagram.png)

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