

# PHOTODIODES WITH PREAMP, SC TYPE MODULE, PIG-TAIL MODULE

## Gbps (gigabits per second) receiver/emitter devices



### FEATURES

#### Receivers

- High-speed response: 1 Gbps/2.5 Gbps
- Suited for 0.8  $\mu\text{m}$  or 1.3/1.55  $\mu\text{m}$  wavelengths
- Integrated with preamplifier
- Available in TO-18 style metal package, SC receptacle module and pig-tail module

#### Emitters

- High-speed response: 2.5 Gbps
- 1.3  $\mu\text{m}$  wavelength operation
- Pig-tail configuration
- Compatible with single-mode optical fiber
- Fabry-Perot laser diode

### APPLICATIONS

- Optical fiber communications
- Fiber channel
- HDTV
- Gigabit Ethernet
- SDH

Hamamatsu provides a wide variety of receiver/emitter devices operating at data rates of Gbps (gigabits per second), developed specifically for high-speed optical fiber communications and data links. Receiver devices can be chosen from high-speed silicon photodiodes or InGaAs photodiodes integrated with a preamplifier, making them suitable for 0.8, 1.3 and 1.55  $\mu\text{m}$  wavelength bands. These receiver devices are available in TO-18 style metal packages, SC receptacle modules and pig-tail modules.

The emitter module consists of a high-speed Fabry-Perot laser diode optimized for 1.3  $\mu\text{m}$  wavelength and are available in pig-tail modules using a single-mode optical fiber.

A combination of these receiver/emitter devices allows high-speed optical fiber communications and data links with low noise and wide dynamic range.

| Type No. | Wavelength Receiver/Emitter          | Bandwidth (Data Rate) | Supply Voltage | Output       | Package       | Window |
|----------|--------------------------------------|-----------------------|----------------|--------------|---------------|--------|
| S7861    | 0.8 $\mu\text{m}$ band receiver      | 1 Gbps                | 3.3 to 5 V     | Differential | Metal         | Flat   |
| S7861-02 |                                      |                       |                |              |               | Lens   |
| G7871    | 1.3/1.55 $\mu\text{m}$ band receiver | 1 Gbps                | 3.3 to 5 V     | Differential | Metal         | Flat   |
| G7871-02 |                                      |                       |                |              |               | Lens   |
| G7881    |                                      | 1 Gbps                | 3.3 to 5 V     | Differential | SC receptacle | -      |
| G7882    |                                      | 2.5 Gbps              | 5 V            | Single-ended | Pig-tail      |        |
| L7892    | 1.3 $\mu\text{m}$ band emitter       | 2.5 Gbps              | -              | -            | Pig-tail      |        |

## 0.8 $\mu\text{m}$ Receivers

### FEATURES

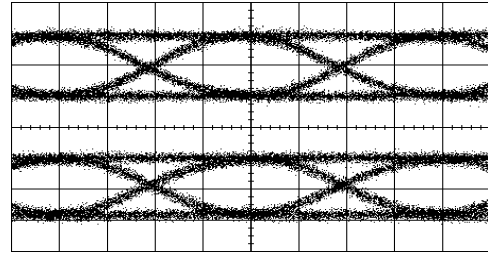
- High speed: 1 Gbps
- Integrated with trans-impedance amplifier
- Operation on 3.3 V supply voltage
- Differential output
- Wide dynamic range (-22 to +3 dBm)
- Metal package

### APPLICATIONS

- Optical fiber communications
- Fiber channel
- Gigabit Ethernet

### ■ Eye Diagram

1.25 Gbps, Pin= -17 dBm, Vcc=3.3 V  
20 mV/div., 200 ps/div.



### ■ ABSOLUTE MAXIMUM RATINGS (Ta=25 °C)

| Parameter             | Symbol | Value      | Unit |
|-----------------------|--------|------------|------|
| Supply Voltage        | Vcc    | -0.3, +5.5 | V    |
| Operating Temperature | Topr   | -20 to +70 | °C   |
| Storage Temperature   | Tstg   | -40 to +85 | °C   |

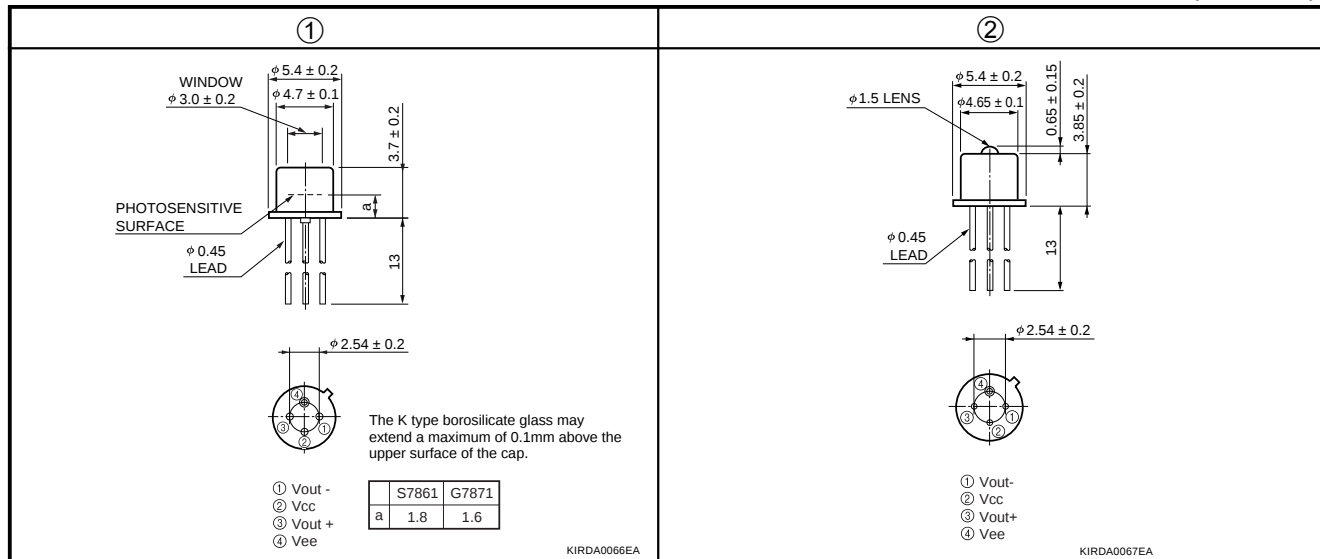
### ■ ELECTRICAL AND OPTICAL CHARACTERISTICS

(Typ. Ta=25 °C, Vcc=3.3 V, 5 V, Vee=0 V, RL=50  $\Omega$ ,  $\lambda$ =840 nm, unless otherwise specified)

| Parameter             | Symbol | Conditions              | S7861          | S7861-02       | Unit |
|-----------------------|--------|-------------------------|----------------|----------------|------|
| Package               | -      |                         | Metal          |                | -    |
| Window                | -      |                         | Flat           | Lens           | -    |
| Dimensional Outline   | -      |                         | See drawing ①. | See drawing ②. | -    |
| Active Area           | -      |                         | $\phi 0.2$     |                | mm   |
| Photosensitivity      | S      | Pin=-17 dBm             | 1              |                | V/mW |
| Supply Current        | Icc    | Dark state RL= $\infty$ | 35 *           |                | mA   |
| Output Bias Voltage   | Vo     | Dark state RL= $\infty$ | Vcc - 1.7      |                | V    |
| Rise Time             | tr     |                         | 300            |                | ps   |
| Bandwidth (data rate) | B      |                         | 1              |                | Gbps |

\* Output: Capacitive coupling

(Unit: mm)



## 1.3 $\mu\text{m}$ /1.55 $\mu\text{m}$ Receivers

### FEATURES

- High speed  
G7871 series, G7881: 1 Gbps  
G7882 : 2.5 Gbps
- Integrated with trans-impedance amplifier
- Operation on 3.3 V supply voltage (G7871 series, G7881)
- Differential output (G7871 series, G7881)
- Wide dynamic range  
G7871 series, G7881: -26 to -1 dBm  
G7882 : -22 to -2 dBm
- Available in metal packages, SC receptacle and pig-tail

### APPLICATIONS

- Optical fiber communications
- Fiber channel
- Gigabit Ethernet
- HDTV
- SDH

### ■ ABSOLUTE MAXIMUM RATINGS (Ta=25 °C)

| Parameter             | Symbol | Value      | Unit |
|-----------------------|--------|------------|------|
| Supply Voltage        | Vcc    | -0.3, +5.5 | V    |
| Operating Temperature | Topr   | -20 to +70 | °C   |
| Storage Temperature   | Tstg   | -40 to +85 | °C   |

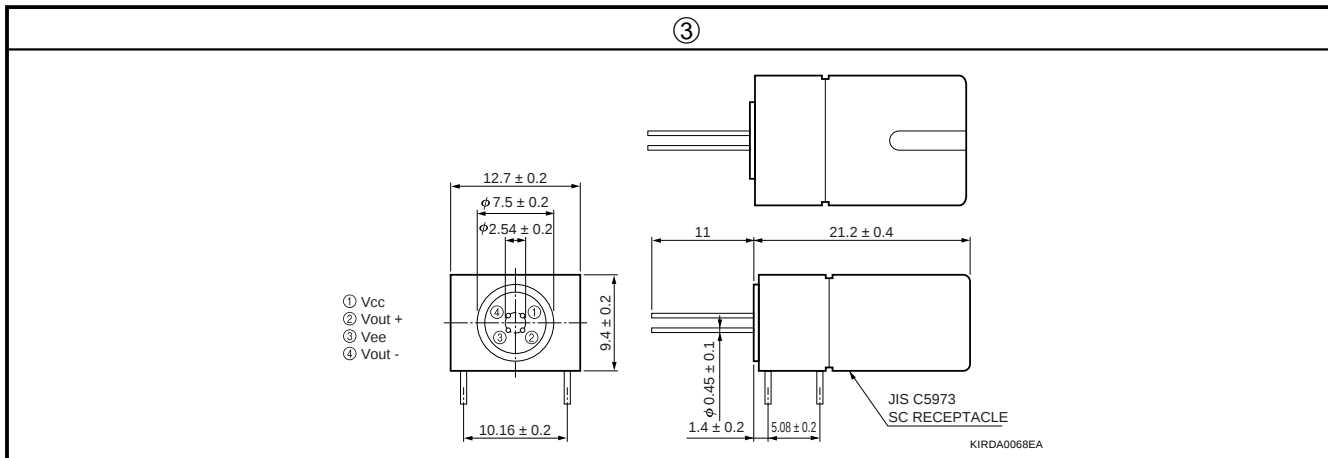
### ■ ELECTRICAL AND OPTICAL CHARACTERISTICS

(Typ. Ta=25 °C, Vcc=5 V, Vee=0 V, RL=50  $\Omega$ ,  $\lambda$ =1310 nm, unless otherwise specified)

| Parameter             | Symbol | Conditions              | G7871       | G7871-02 | G7881         | G7882    | Unit |
|-----------------------|--------|-------------------------|-------------|----------|---------------|----------|------|
| Package               | -      |                         | Metal       |          | SC receptacle | Pig-tail | -    |
| Window                | -      |                         | Flat        | Lens     | -             | -        | -    |
| Dimensional Outline   | -      |                         | ① (p. 2)    | ② (p. 2) | ③             | ④ (p. 4) | -    |
| Active Area           | -      |                         | $\phi 0.08$ |          | $\phi 0.08$   |          | mm   |
| Supply Voltage        | Vcc    |                         | 3.3, 5      |          | 5             |          | V    |
| Photosensitivity      | S      |                         | 3           |          | 0.5           |          | V/mW |
| Supply Current        | Icc    | Dark state RL= $\infty$ | 35 *        |          | 30 *          |          | mA   |
| Output Bias Voltage   | Vo     | Dark state RL= $\infty$ | Vcc - 1.7   |          | 3.0           |          | V    |
| Rise Time             | tr     |                         | 250         |          | 180           |          | ps   |
| Bandwidth (data rate) | B      |                         | 1           |          | 2.5           |          | Gbps |

\* Output: Capacitive coupling

(Unit: mm)

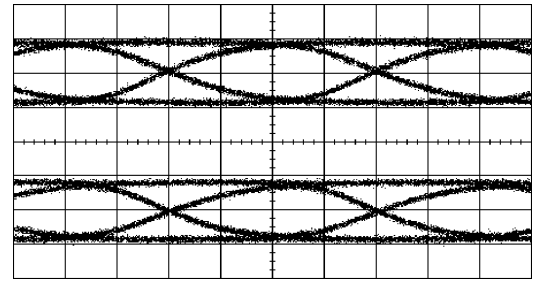


### ■ Eye Diagram

G7871 series, G7881

1.25 Gbps, Pin= -20 dBm, Vcc=3.3 V

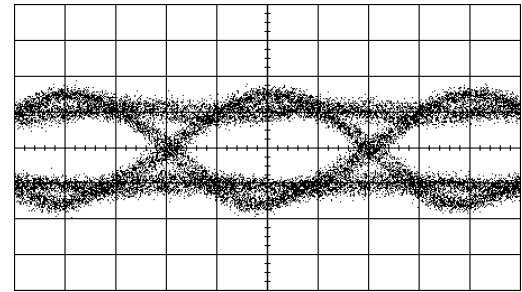
50 mV/div., 200 ps/div.



G7882

2.5 Gbps, Pin= -20 dBm, Vcc=5 V

5 mV/div., 100 ps/div.



## 1.3 μm Emitter

### FEATURES

- High speed: 2.5 Gbps
- Pig-tail configuration
- Single-mode optical fiber with SC connector
- Fabry-Perot laser diode

### APPLICATIONS

- Optical fiber communications
- Fiber channel
- Gigabit Ethernet
- HDTV
- SDH

### ■ ABSOLUTE MAXIMUM RATINGS (Ta=25 °C)

| Parameter             | Symbol | L7892                                 | Unit |
|-----------------------|--------|---------------------------------------|------|
| Forward Current (LD)  | IF     | Ith + 16 (CW),<br>Ith + 32 (pulse *2) | mA   |
| Reverse Voltage (LD)  | VR     | 2.0                                   | V    |
| Reverse Voltage (PD)  | VRm    | 20                                    | V    |
| Operating Temperature | Topr   | -20 to +70                            | °C   |
| Storage Temperature   | Tstg   | -40 to +70                            | °C   |

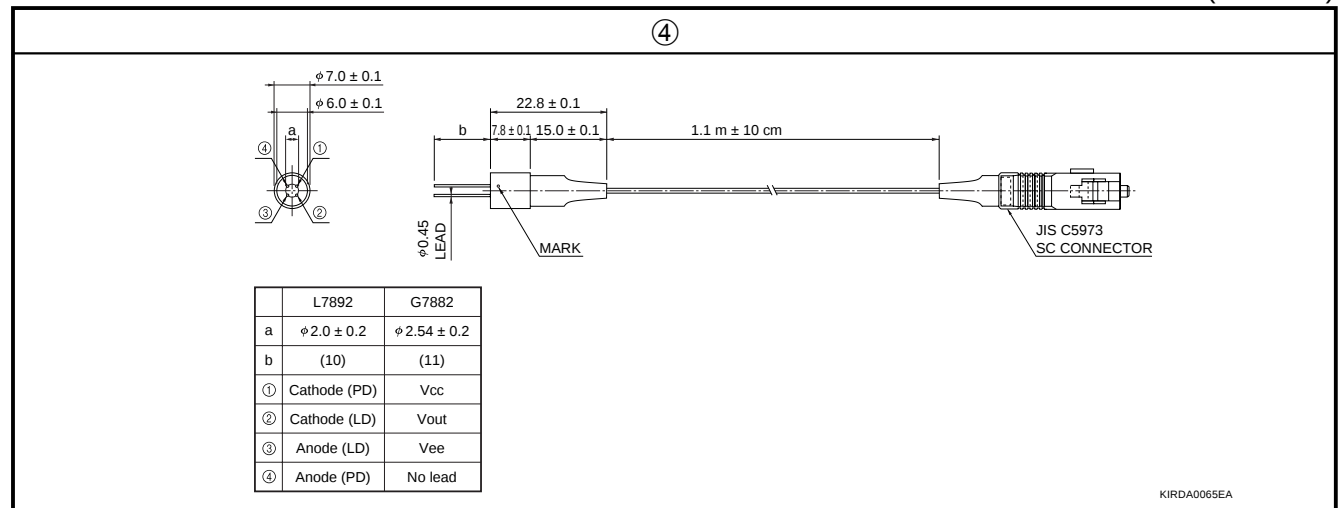
\*2: Duty ratio 50 %

### ■ ELECTRICAL AND OPTICAL CHARACTERISTICS

(Typ. Ta=25 °C, IF=Ith+10 mA, unless otherwise specified)

| Parameter                | Symbol | L7892          | Unit |
|--------------------------|--------|----------------|------|
| Package                  | -      | Pig-tail       | -    |
| Dimensional Outline      | -      | See drawing ④. | -    |
| Forward Voltage          | VF     | 1.1            | V    |
| Threshold Current        | Ith    | 9              | mA   |
| Fiber End Output         | PF     | 0.3            | mW   |
| Peak Emission Wavelength | λp     | 1.31           | μm   |
| Rise Time                | tr     | 150            | ps   |
| Monitor Current (PD)     | Im     | 0.6            | mA   |
| Bandwidth (Data Rate)    | B      | 2.5            | Gbps |

(Unit: mm)

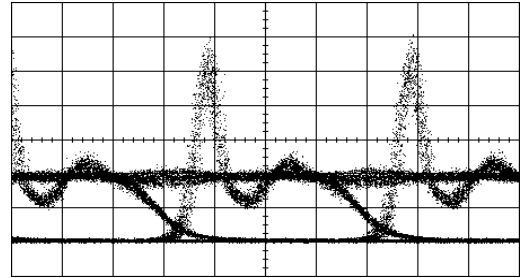


### ■ Eye Diagram

L7892

2.5 Gbps, Ib=Ith, Imod=20 mA

300 μW/div., 100 ps/div.



2.5 Gbps, Ib=Ith, Imod=20 mA

200 μW/div., 100 ps/div.

1.866 GHz 4th Order-Bessel filter is used.

Eye mask: ITU-T mask

