HAMAMATSU
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Amplifiers for infrared detector

C4159 series

Low noise amplifier for infrared detector (InAs, InSb, InAsSb, T2SL, InGaAs)

These are high gain and low noise amplifiers for Hamamatsu various infrared detectors. By connecting a detectior and supplying the power, analog voltage output can be obtained and the signal can be easily observed with a voltmeter or the like. Amplifiers that match the characteristics of infrared detectors are available.

Features

- **Voltage output for easy handling**
- **Conversion impedance: 3 ranges switchable**
- **Compact: business card size**

Applications

- **Spectrophotometers**
- **Radiation thermometers**
- **Laser power monitor**

Accessories

- **Instruction manual**
- **Power cable A4372-02**
  (one end with 4-pin connector for connection to amplifier and the other end unterminated, 2 m)

Required power supply specifications

- Output voltage: ±15 V ± 0.5
- Current capacity: 1.5 times or more of amplifier's maximum current consumption
- Ripple noise: 5 mVp-p or less
- Analog power supply only
  Recommended DC power supply: PW18-3AD (TEXIO)
  E3630A (Keysight Technologies)

Applicable detectors

Type no.	Applicable detectors*1 *2 *3	
C4159-01	InSb photovoltaic detectors (Dewar type)	P5968-060/-100
	InAsSb photovoltaic detectors (Non-cooled type)	P13243-022MS, P13894-011MA, P16112 series, P16113-011MN, P16114-011MN, P16612series, P16613-011CN, P16614-011CN, P16849 series
	InAsSb photovoltaic detectors (TE-cooled type)	P13243-122MS/-222MS, P13894-211MA
	Type II superlattice infrared detectors (Dewar type)	P15409-901
C4159-03	InGaAs PIN photodiodes	G12180 series, G12181 series, G12182 series, G12183 series
C4159-04	InSb photovoltaic detectors (Dewar type)	P5968-200
C4159-05	InAs photovoltaic detectors (Dewar type)	P7163
C4159-06	InAs photovoltaic detectors (TE-cooled type)	P10090-11/-21
C4159-07	InAs photovoltaic detectors (Non-cooled type)	P10090-01
	InAsSb photovoltaic detectors (TE-cooled type)	P11120-201, P12691-201G

*1: These amplifiers cannot operate multiple detectors.
*2: Consult us before purchasing if you want to use with a detector other than listed here.
*3: Consult us before purchasing if you want to use with a multi-element detector.

Absolute maximum ratings (Ta=25 °C)

Parameter	Value	Unit
Supply voltage	18.0 max.	V
Operating temperature*4	0 to +40	°C
Storage temperature*4	-20 to +70	°C

*4: No dew condensation
When there is a temperature difference between a product and the surounding area in high humidity environment, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in charactaristics and relaiablity.

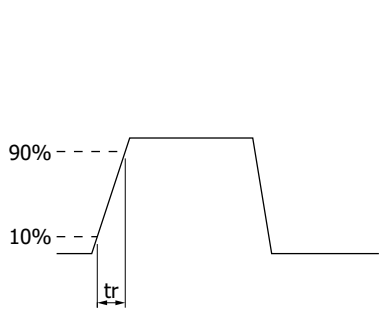
Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

Amplifiers for photovoltaic detectors (Typ.)

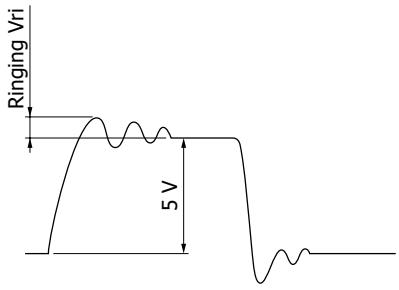
Parameter	C4159-01	C4159-04	C4159-05	C4159-06	C4159-07	Unit
Conversion impedance	10^8, 10^7, 10^6 (3 ranges switchable)	2×10^7, 2×10^6, 2×10^5 (3 ranges switchable)	10^8, 10^7, 10^6 (3 ranges switchable)	10^6, 10^5, 10^4 (3 ranges switchable)	10^6, 10^5, 10^4 (3 ranges switchable)	V/A
Frequency response (amplifier only, -3 dB)	DC to 100 kHz*5	DC to 45 kHz	DC to 15 kHz	DC to 100 kHz	DC to 100 kHz	-
Output impedance	50	50	50	50	50	Ω
Maximum output voltage (1 kΩ load)	+10	+10	+10	+10	+10	V
Output offset voltage	±5	±5	±10	±5	±5	mV
Equivalent input noise current*6 (f=1 kHz)	0.15 (10^8, 10^7 range) 0.65 (10^6 range)	0.55	0.15 (10^8, 10^7 range) 0.65 (10^6 range)	6	10	pA/Hz$^{1/2}$
Reverse voltage	Limited to 0 V operation. Cannot be applied from external unit.					-
External power supply*7	±15					V
Current consumption	+30, -10 max.			+30, -22 max.		mA

*5: When connected to a detector, frequency response becomes 60 kHz or less (ϕ0.6 mm: 60 kHz or less, ϕ1 mm: 25 kHz or less). Ringing occurs in the output if the rise time tr (10 to 90%) of incident light is approximately 100 µs or less. The ringing becomes larger as the rise time becomes shorter. However, ringing does not occur for sine wave light. (For information on the ringing specifications, see the figure below.)
*6: Input resistance: 1 MΩ (C4159-01/-04/-05), 500 Ω (C4159-06/-07)
*7: Recommended DC power supply (analog power supply): ±15 V
Current capacity: 1.5 times the maximum current consumption or more
Ripple noise: 5 mVp-p or less
Note: Output noise voltage = Equivalent input noise current × Conversion impedance
For information about accessories except for the amplifiers, refer to the datasheet "Accessories for infrared detector".

Ringing specifications



Incident light



Output waveform when tr=40 µs and photosensitive area is ϕ0.6 mm
Ringing Vri ≤ 1.5 V
Oscillating cycle ≤ 3 cycles

KIRDA0090EA

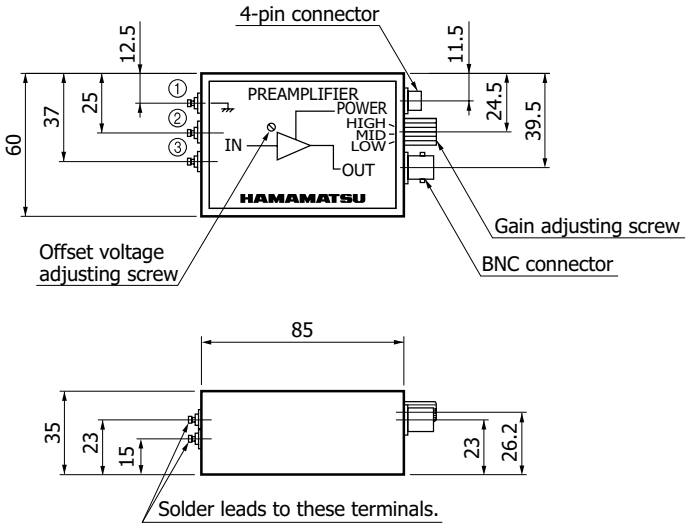
Amplifier for InGaAs PIN photodiodes (Typ.)

Parameter	C4159-03	Unit
Conversion impedance	10^7, 10^6, 10^5 (3 ranges switchable)	V/A
Frequency response (amp only, -3 dB)	DC to 15 kHz	-
Output impedance	50	Ω
Maximum output voltage (1 kΩ load)	+10	V
Output offset voltage	±5	mV
Equivalent input noise current (f=1 kHz)	2.5	pA/Hz$^{1/2}$
Reverse voltage	Can be applied from external unit.	-
External power supply*8	±15	V
Current consumption	±15 max.	mA

*8: Recommended DC power supply (analog power supply): ±15 V
Current capacity: More than 1.5 times the maximum current consumption
Ripple noise: 5 mVp-p or less

Dimensional outlines (unit: mm)

C4159-01/-03/-04/-05/-06/-07



Pin connections

① GND
② Cathode [input terminal (C4159-01/-04/-05/-06/-07)]
③ Anode [input terminal (C4159-03)]

Type no.	Weight
C4159-01/-03/-04/-05	320 g
C4159-06/-07	330 g

Tolerance unless otherwise noted: ±1
Note: Socket for lead attachment is not provided.
C4159-03: If no reverse bias is applied to a detector, connect the detector cathode to the amplifier GND.

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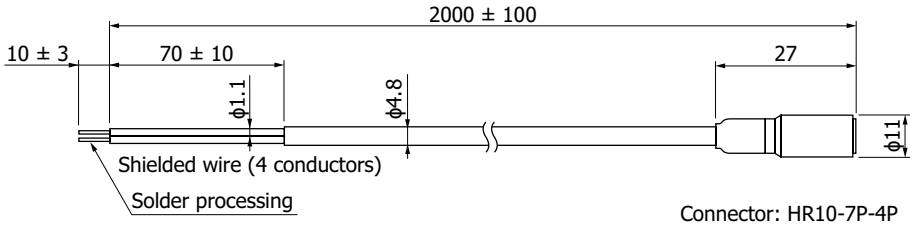
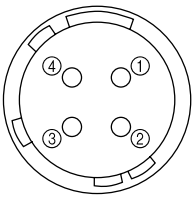
A4372-02



Connector: HR10-7P-4P
(made by Hirose Electric)



As viewed from connector side

Pin no.	Pin connection	Lead color
①	-Vs	Blue
②	GND	Black/white/blue stranded wire
③	GND	
④	+Vs	White

Tolerance unless otherwise noted: ±1

KIRDA0196EB

Related information

www.hamamatsu.com/sp/ssd/doc_en.html

■ Precautions
· Disclaimer
· Safety consideration
· Precautions / Compound opto-semiconductors (photosensors, light emitters)

■ Catalogs
· Selection guide / Infrared detectors
· Technical note / Compound semiconductor photosensors

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