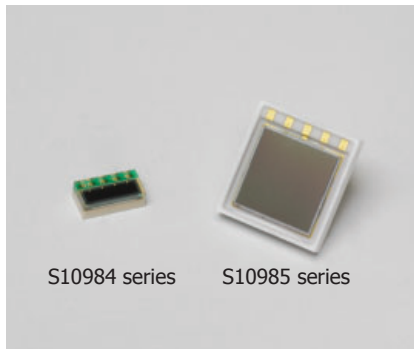


# MPPC<sup>®</sup> (multi-pixel photon counter)



S10984/S10985 series

## New type of Si photon-counting device, Array type (1 × 4 ch, 2 × 2 ch)

The MPPC is a new type of photon-counting device made up of multiple APD (avalanche photodiode) pixels operated in Geiger mode. The MPPC is an opto-semiconductor device with excellent photon-counting capability and which also possesses great advantages such as low voltage operation and insensitivity to magnetic fields.

### Features

- Excellent photon-counting capability (excellent detection efficiency versus number of incident photons)
- Room temperature operation
- Low bias (below 100 V) operation
- High gain: 10<sup>5</sup> to 10<sup>6</sup>
- Insensitive to magnetic fields
- Excellent time resolution
- Compact size
- Simple readout circuit operation

### Applications

- HEP calorimeter
- Biological flow cytometry
- Environmental analysis
- PET

### Selection guide

Parameter	Symbol	S10984			S10985			Unit
		-025P	-050P	-100P	-025C	-050C	-100C	
Number of channels	-	4 (1 × 4)			4 (2 × 2)			ch
Effective active area / channel	-	1 × 1			3 × 3			mm
Number of pixels / channel	-	1600	400	100	14400	3600	900	-
Pixel size	-	25 × 25	50 × 50	100 × 100	25 × 25	50 × 50	100 × 100	μm

### Absolute maximum ratings

Parameter	Symbol	Value	Unit
Operating temperature	T <sub>opr</sub>	0 to 40	°C
Storage temperature	T <sub>stg</sub>	-20 to 60	°C

Electrical and optical characteristics (Typ. Ta=25 °C, unless otherwise noted)

Parameter	Symbol	S10984			S10985			Unit
		-025P	-050P	-100P	-025C	-050C	-100C	
Fill factor *1	-	30.8	61.5	78.5	30.8	61.5	78.5	%
Spectral response range	$\lambda$	320 to 900			320 to 900			nm
Peak sensitivity wavelength	$\lambda_p$	440			440			nm
Operating voltage range	-	$70 \pm 10$ *2			$70 \pm 10$ *2			V
Dark count / channel *3	Typ.	300	400	600	4000	6000	8000	kcps
	Max.	600	800	1000	8000	10000	12000	kcps
Terminal capacitance/channel	Ct	35			320			pF
Temperature coefficient of reverse voltage	-	56			56			mV/°C
Gain	M	$2.75 \times 10^5$	$7.5 \times 10^5$	$2.4 \times 10^6$	$2.75 \times 10^5$	$7.5 \times 10^5$	$2.4 \times 10^6$	-

\*1: Ratio of the active area of a pixel to the entire area of the pixel

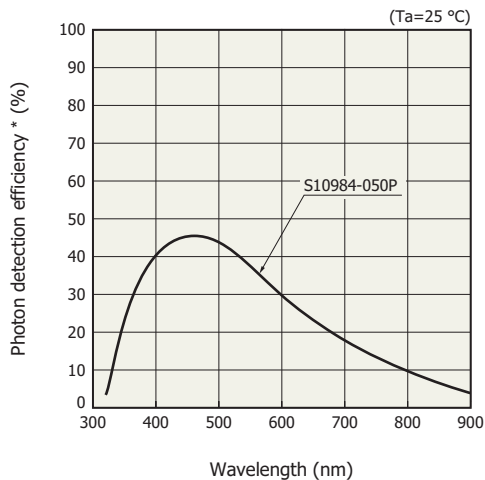
\*2: For the recommended operating voltage of each product, refer to the data attached to each product.

\*3: 0.5 p.e. (threshold level)

Note: Each value was measured at recommended operating voltage.

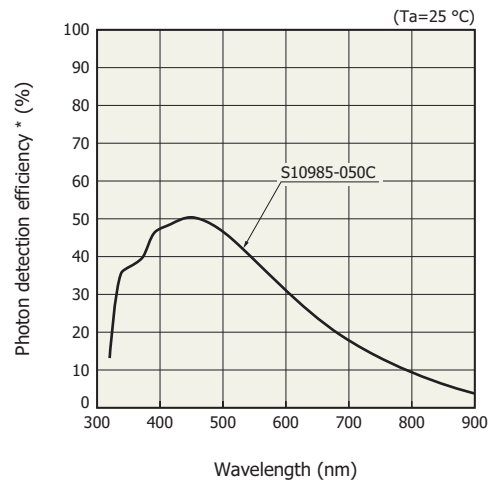
The last letter of each type number indicates package materials (P: SMD, C: ceramic).

Photon detection efficiency (PDE) vs. wavelength (typical example)



\* Photon detection efficiency includes effects of crosstalk and afterpulses.

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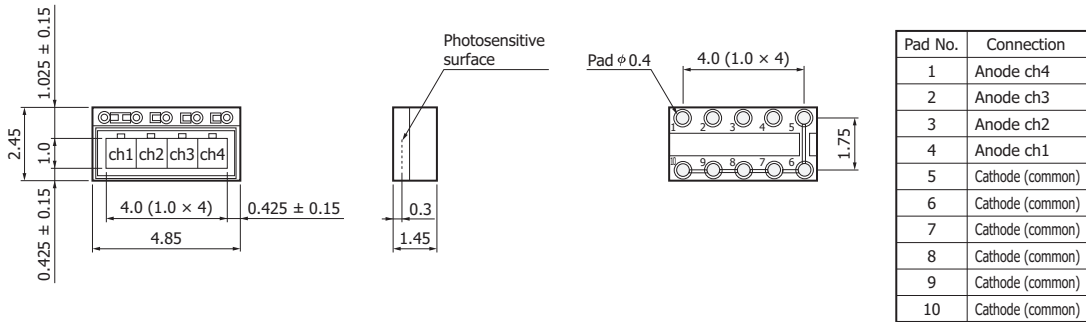


\* Photon detection efficiency includes effects of crosstalk and afterpulses.

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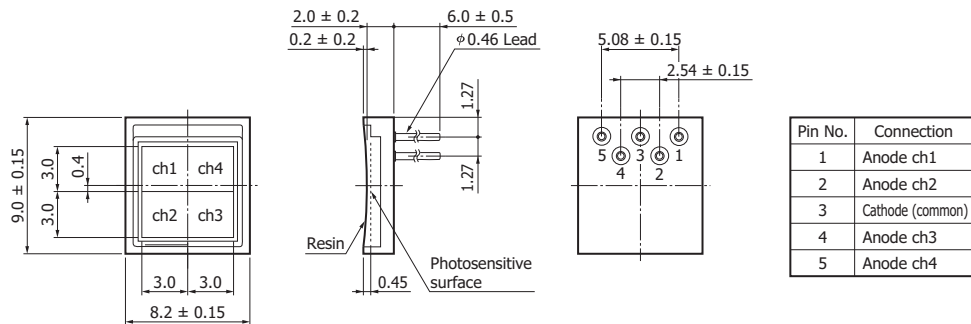
Dimensional outlines (unit: mm)

S10984 series



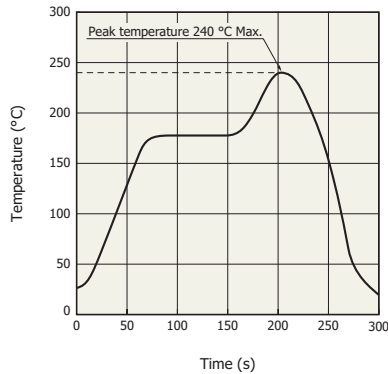
KAPDA0126EA

S10985 series



KAPDA0127EA

Recommended solder reflow condition (S10984-025P/-050P/-100P)



KAPDB0169EA

- After unpacking, store this device in an environment at a temperature of 25 °C and a humidity below 60%, and perform reflow soldering on this device within 24 hours.
- Thermal stress applied to the device during reflow soldering differs depending on the PC boards and reflow oven being used.
- When setting the reflow conditions, make sure that the reflow soldering process does not degrade device reliability.

## ⚠ Precautions for use

- Sensor types with a pixel size of 100 μm are vulnerable to static electricity. If this may create problems, take the following measures:
  - Wear anti-static gloves when handling the sensors. Also wear anti-static clothing and a grounded wrist band to prevent damage by static electricity generated from friction.
  - Avoid directly placing the sensors on a workbench or floor where static electricity might be charged.
  - Provide ground connection to the work table and work floor to discharge static electricity.
  - Ground the tools used to handle the sensors, such as tweezers and soldering irons.
- Install an appropriate protection circuit for the power supply, equipment, and measuring instrument according to the application, in order to prevent overvoltage and overcurrent damage.
- Recommended soldering conditions (S10985 series)
  - Temperature of soldering iron tip: 350 °C Max.
  - Soldering time: 3 s Max.
  - Soldering Point: at least 1 mm away from the root of the terminal
  - Times: once

Information furnished by HAMAMATSU is believed to be reliable. However, no responsibility is assumed for possible inaccuracies or omissions.

Specifications are subject to change without notice. No patent rights are granted to any of the circuits described herein.

Type numbers of products listed in the specification sheets or supplied as samples may have a suffix "(X)" which means tentative specifications or a suffix "(Z)" which means developmental specifications. ©2010 Hamamatsu Photonics K.K.

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HAMAMATSU PHOTONICS K.K., Solid State Division

1126-1 Ichino-cho, Higashi-ku, Hamamatsu City, 435-8558 Japan, Telephone: (81) 53-434-3311, Fax: (81) 53-434-5184

U.S.A.: Hamamatsu Corporation: 360 Foothill Road, P.O.Box 6910, Bridgewater, N.J. 08807-0910, U.S.A., Telephone: (1) 908-231-0960, Fax: (1) 908-231-1218

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49) 8152-375-0, Fax: (49) 8152-265-8

France: Hamamatsu Photonics France S.A.R.L.: 19, 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

United Kingdom: Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Tewin Road, Welwyn Garden City, Hertfordshire AL7 1BW, United Kingdom, Telephone: (44) 1707-294888, Fax: (44) 1707-325777

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

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