



C12702 series

**Operates an APD with single 5 V supply  
(standard type, short-wavelength type)**

## Features

- **Includes a high-sensitivity APD**  
Uses a Hamamatsu high-sensitivity Si APD. Four types are available with different spectral response ranges and photosensitive areas.
- **High sensitivity detection board optimized for APD evaluation.**  
An APD and high-speed current-to-voltage amplifier circuit are mounted on a compact board. The high-speed current-to-voltage amplifier circuit features a low-noise configuration ideal for the APD signal readout and operates at high speeds yet with high sensitivity.
- **Easy handling**  
Single 5 V supply operation
- **Built-in temperature-compensated bias voltage circuit controls the bias voltage with a thermosensor to keep the APD gain constant. Gain is stabilized to as low as  $\pm 2.5\%$  Typ. at ambient temperatures of  $25 \pm 10$  °C. Ripple noise usually inherent to high voltage power supplies is also minimized.**
- **Compact and lightweight**  
The circuit board is no larger than business card size, and weighs only 37 g.
- **Low price**
- **Custom designed module available with different dimensions and specifications.**

## Applications

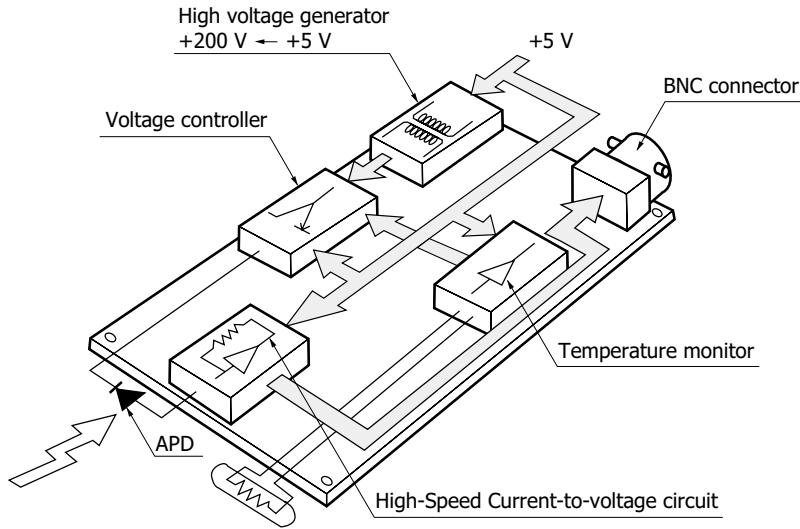
- APD evaluation
- Spatial light transmission
- Bar code readers
- Laser radars
- Optical rangefinders
- Optical communications

## Selection guide

Type no.	Photosensitive area (mm)	Frequency bandwidth -3 dB (Hz)	Type of APD	Peak sensitivity wavelength (nm)
C12702-03	$\phi 1.0$	4 k to 100 M	Standard type	800
C12702-04	$\phi 3.0$	4 k to 80 M		
C12702-11	$\phi 1.0$	4 k to 100 M	Short-wavelength type	620
C12702-12	$\phi 3.0$	4 k to 40 M		

Note: Gain (M) is preset to 30 prior to shipping.

**Block diagram**



KACCC0013EB

**Structure / Absolute maximum ratings**

Type No.	Photosensitive area (mm)	Supply voltage (V)					Current consumption (mA)		Board dimension (mm)	Output impedance (Ω)	Weight (g)	Absolute maximum ratings			
					Typ.	Max.	Supply voltage (V)	Maximum Incident light level (mW)				Operating temperature Topr (°C)	Storage temperature Tstg (°C)		
		Min.	Typ.	Max.											
C12702-03	φ1.0	+4.75	+5	+5.25	+50	+80	80 × 50 × 22	50	37	+7	10	0 to +60	-20 to +70		
C12702-04	φ3.0														
C12702-11	φ1.0														
C12702-12	φ3.0														

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.

**Electrical and optical characteristics (Typ. Ta=25 °C, Vcc=5 V, unless otherwise noted)**

■ Photoelectric converter section (APD)

Type No.	Spectral response range λ (nm)	Peak sensitivity wavelength λp (nm)	Photosensitivity S M=1 (A/W)		Temperature stability of gain*1 25 °C ± 10 °C, M=30 (%)	
			λ=800 nm	λ=620 nm	Typ.	Max.
			Typ.	Max.		
C12702-03	400 to 1000	800	0.5	-	±2.5	±5
C12702-04						
C12702-11	200 to 1000	620	-	0.42	±2.5	±5
C12702-12						

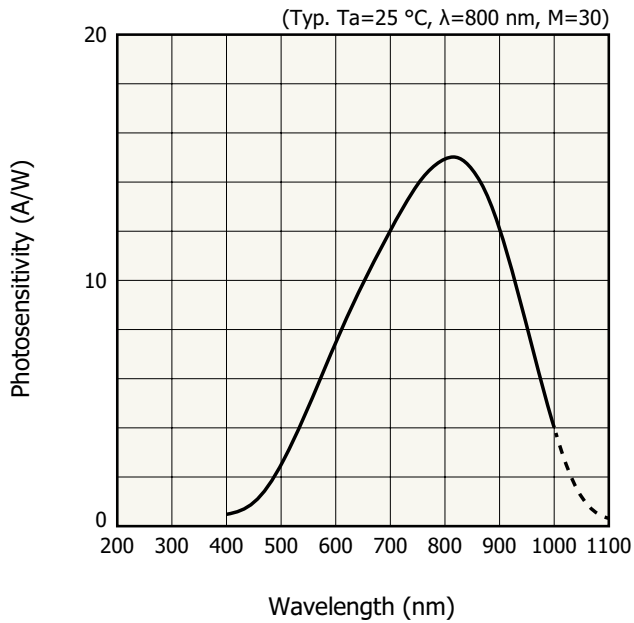
■ High-speed amplifier section

Type No	Cutoff frequency -3 dB				Noise equivalent power NEP (pW/Hz <sup>1/2</sup> )				Feedback resistance (kΩ)	Photoelectric sensitivity*1 including APD, M=30 (10 <sup>4</sup> V/W)			Minimum derrection limit (nW rms)		
	High band		Low band		λ=800 nm		λ=620 nm			Min.	Typ.	Max.	Min.	Typ.	Max.
	Min. (MHz)	Typ. (MHz)	Min. (kHz)	Typ. (kHz)	Typ.	Max.	Typ.	Max.							
C12702-03	90	100	3	4	0.3	0.6	-	-	9.1	-6.4	-6.8	-7.1	-	3.0	6.0
C12702-04	70	80			0.4	0.8	-	-	3.0	-2.1	-2.3	-2.4	-	3.6	7.2
C12702-11	90	100			-	-	0.5	1.0	3.9	-2.3	-2.5	-2.7	-	5.0	10.0
C12702-12	30	40			-	-	1.0	2.0	3.0	-1.8	-1.9	-2.0	-	6.3	12.6

\*1: Gain is preset to 30 prior to shipping.

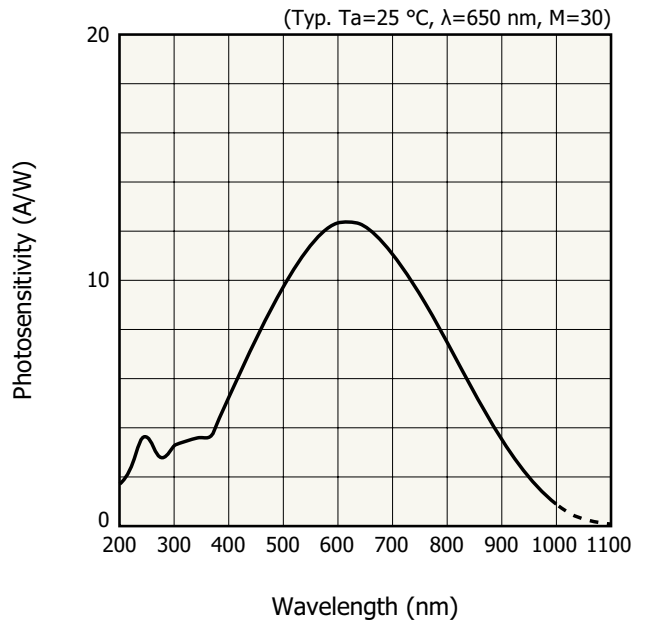
**Spectral response**

C12702-03/-04



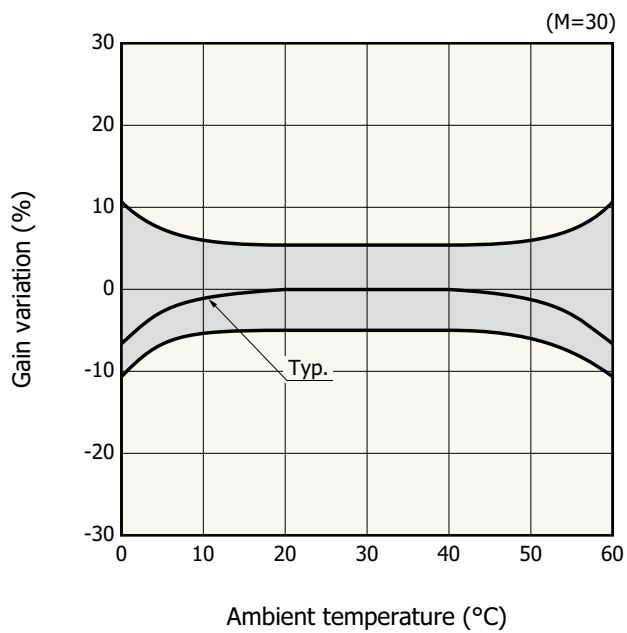
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C12702-11/-12



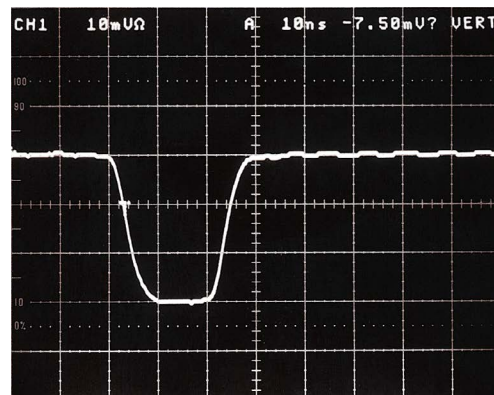
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**Gain temperature characteristic**



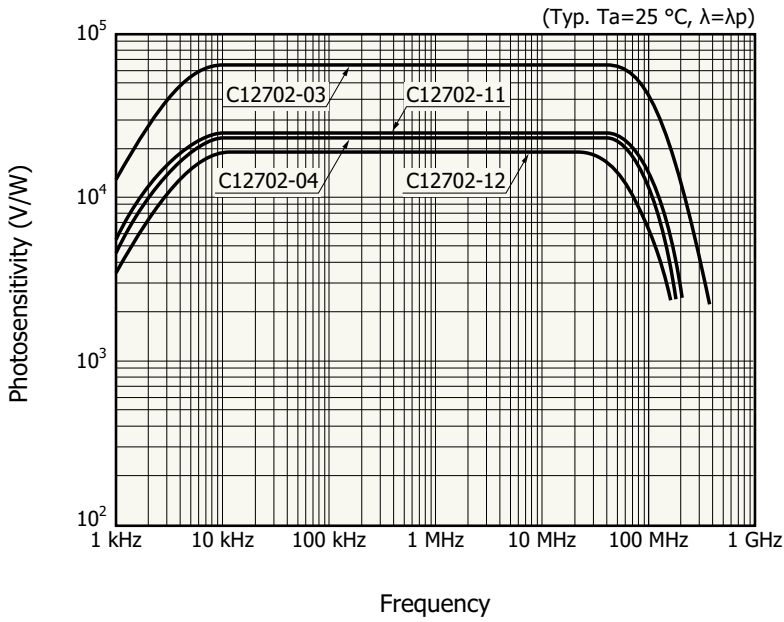
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**Response to stepped light input (C12702-03)**



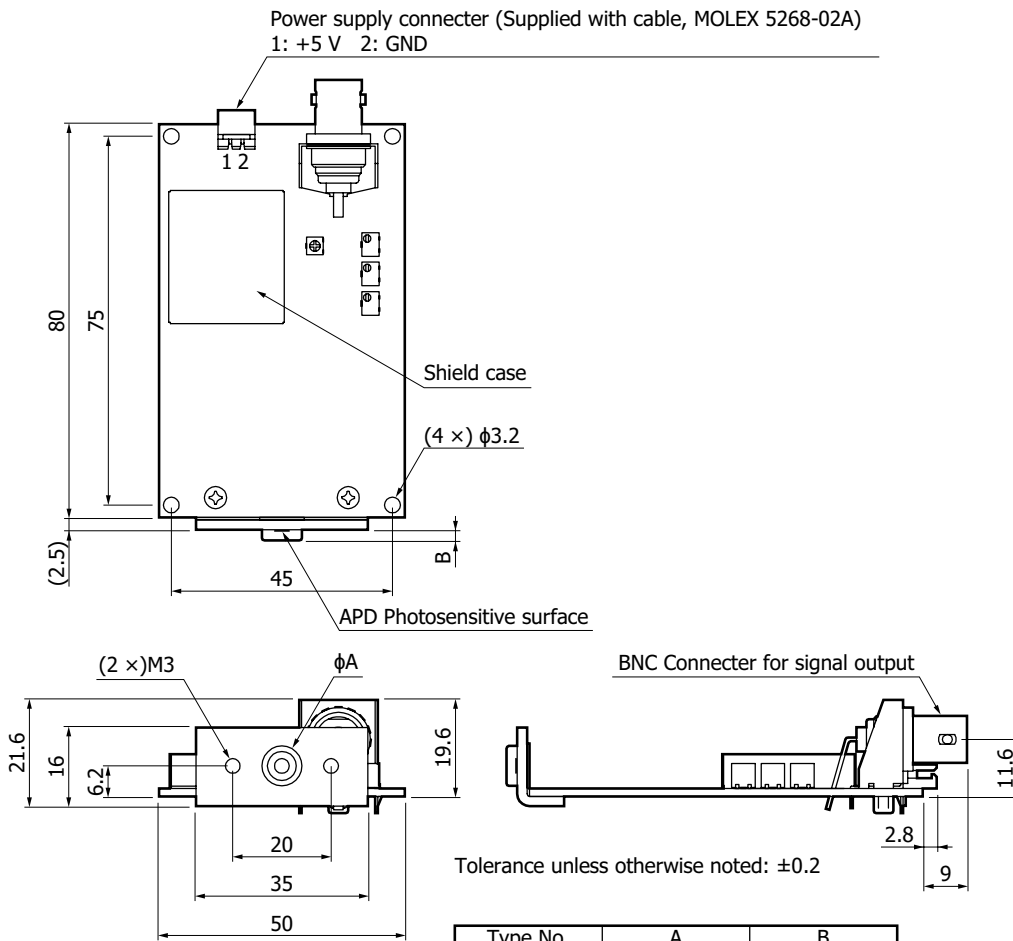
Ta=25 °C, gain M=30, input pulse width=20 ns  
X-axis: 10 ns/div., Y-axis: 10 mV/div.

**Frequency response**



KACCB0340EA

**Dimensional outline (unit: mm)**



Type No.	A	B
C12702-03	$4.7 \pm 0.1$	$0.9 \pm 0.2$
C12702-04	$8.1 \pm 0.1$	$1.6 \pm 0.2$
C12702-11	$4.7 \pm 0.1$	$0.8 \pm 0.2$
C12702-12	$8.1 \pm 0.1$	$1.6 \pm 0.2$

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**Accessories**

- Power supply cable
- CD-ROM (Instruction manual)

**Option (sold separately)**

Fiber adapter A8407/A8424 series

The A8407/A8424 series fiber adapters are designed to couple the APD module to an optical fiber. Two types are available for FC and SMA connectors. Using this adapter allows efficiently coupling the APD module to a GI-50/125 multi-mode fiber. This adapter screws on for easy attachment.

Note: Optical fiber is needed separately.



A8407 series (FC type)



A8424 series (SMA type)

APD module	Fiber adapter (FC type)	Fiber adapter (SMA type)
C12702-03	A8407-18	A8424-18
C12702-04	A8407-05A	A8424-05A
C12702-11	A8407-18	A8424-18
C12702-12	A8407-05A	A8424-05A

**Precaution**

- (1) A high voltage power supply is used in this product. Do not remove insulating material potted on the board to prevent possible danger.
- (2) Be sure to terminate the output with 50 Ω when using this product.

**Related information**

[www.hamamatsu.com/sp/ssd/doc\\_en.html](http://www.hamamatsu.com/sp/ssd/doc_en.html)

- Precautions
- Disclaimer

Information described in this material is current as of August 2023.

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