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APD modules

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 ±2.5 % Typ. at ambient temperatures of 25 ±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**

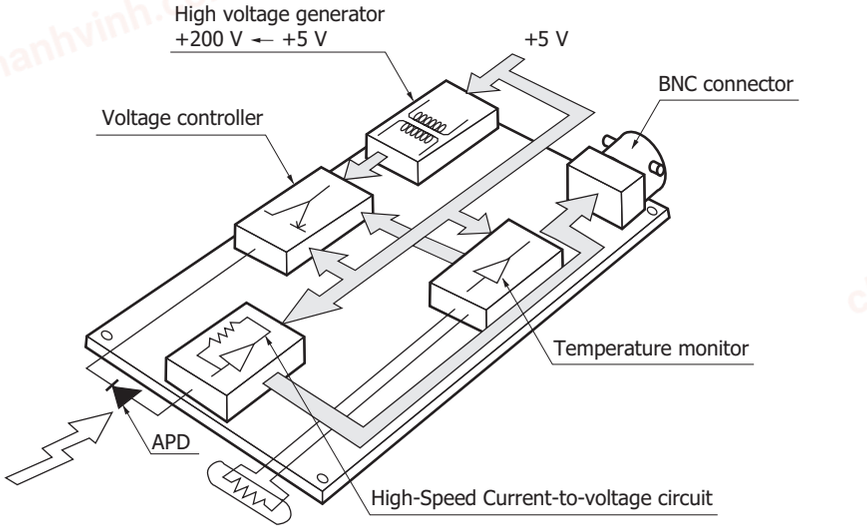
Selection guide

Type no.	Photosensitive area (mm)	Frequency bandwidth -3 dB (Hz)	Type of APD	Peak sensitivity wavelength (nm)
C12702-03	ϕ1.0	4 k to 100 M	Standard type	800
C12702-04	ϕ3.0	4 k to 80 M		
C12702-11	ϕ1.0	4 k to 100 M	Short-wavelength type	620
C12702-12	ϕ3.0	4 k to 40 M		

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

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Block diagram



Structure / Absolute maximum ratings

Type No.	Photosensitive area (mm)	Supply voltage (V) Min.	Typ.	Max.	Current consumption (mA) Typ.	Max.	Board dimension (mm)	Output impedance (Ω)	Weight (g)	Absolute maximum ratings: Supply voltage (V)	Maximum Incident light level (mW)	Operating temperature Topr (°C)	Storage temperature Tstg (°C)
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) λ=800 nm	λ=620 nm	Temperature stability of gain*1 25 °C ± 10 °C, M=30 (%) Typ.	Max.
C12702-03	400 to 1000	800	0.5	-	±2.5	±5
C12702-04						
C12702-11	200 to 1000	620	-	0.42		
C12702-12						

■ High-speed amplifier section

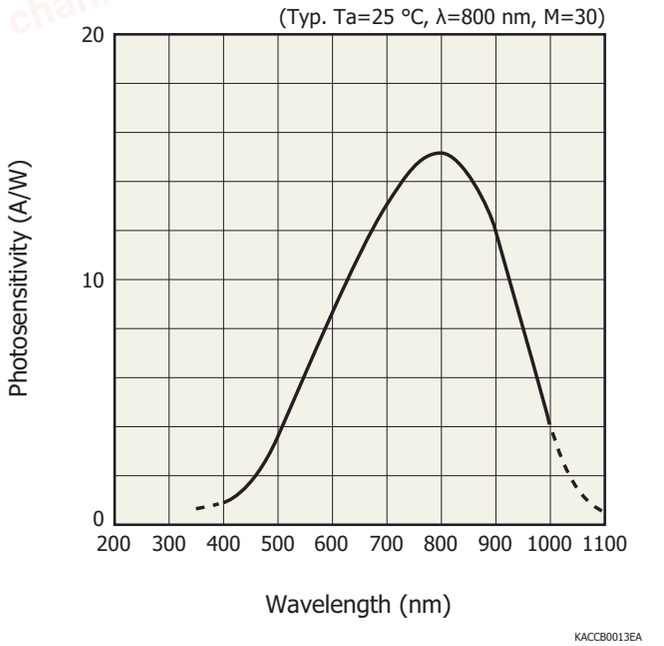
Type No	Cutoff frequency -3 dB: High band Min. (MHz)	High band Typ. (MHz)	Low band Min. (kHz)	Low band Typ. (kHz)	Noise equivalent power NEP (pW/Hz$^{1/2}$): λ=800 nm Typ.	λ=800 nm Max.	λ=620 nm Typ.	λ=620 nm Max.	Feed-back resis-tance (kΩ)	Photoelectric sensitivity*1 including APD, M=30 (10^4 V/W) Min.	Typ.	Max.	Minimum derection limit (nW rms) Min.	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.

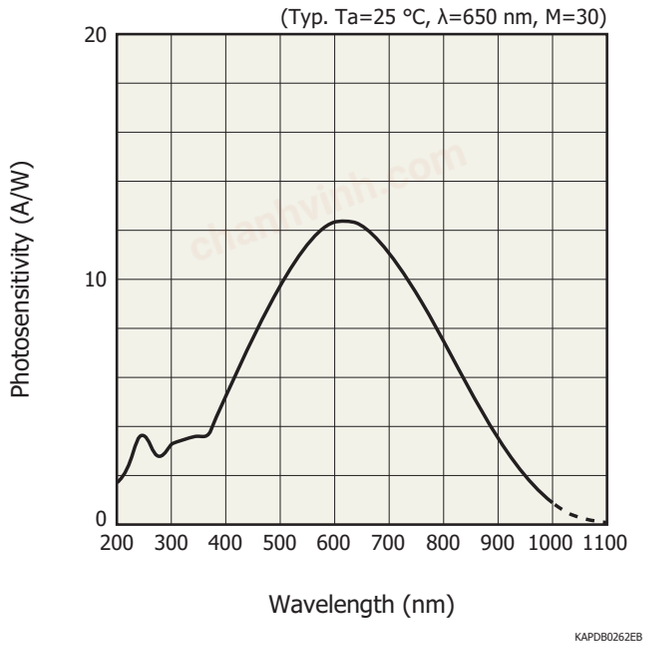
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Spectral response

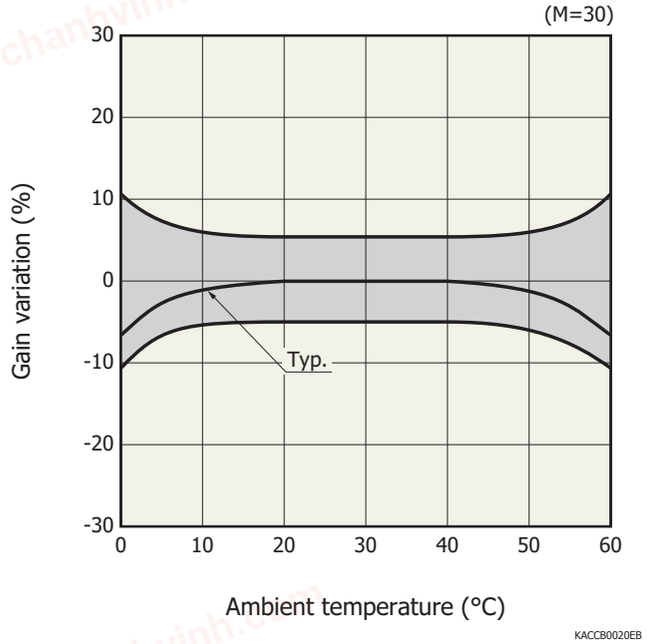
C12702-03/-04



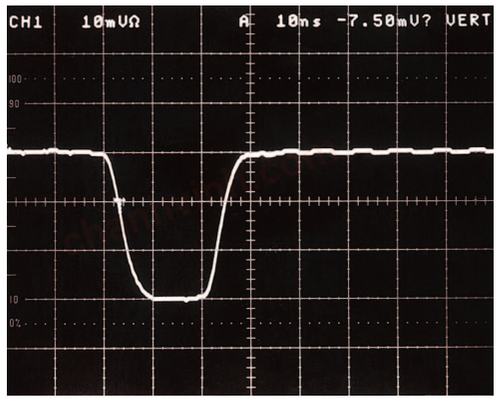
C12702-11/-12



Gain temperature characteristic



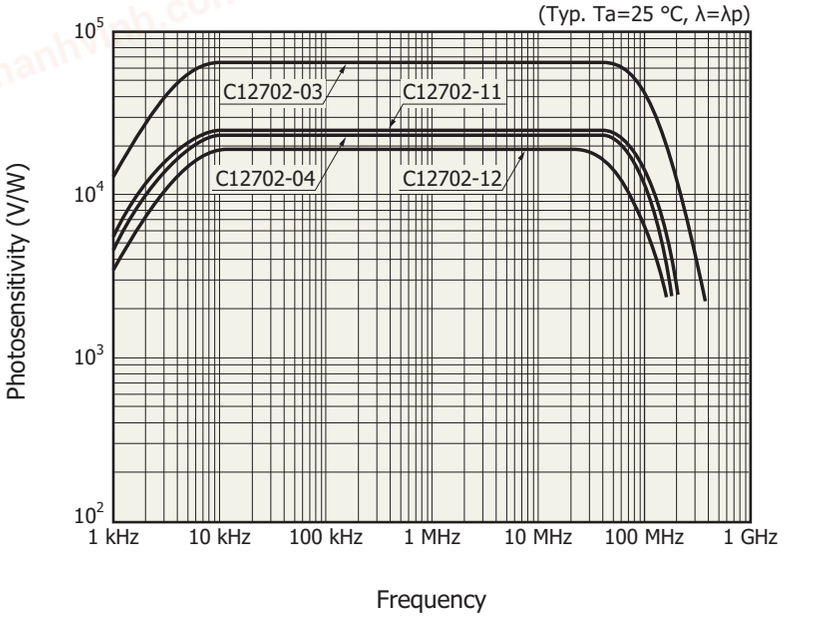
Response to stepped light input (C12702-03)



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

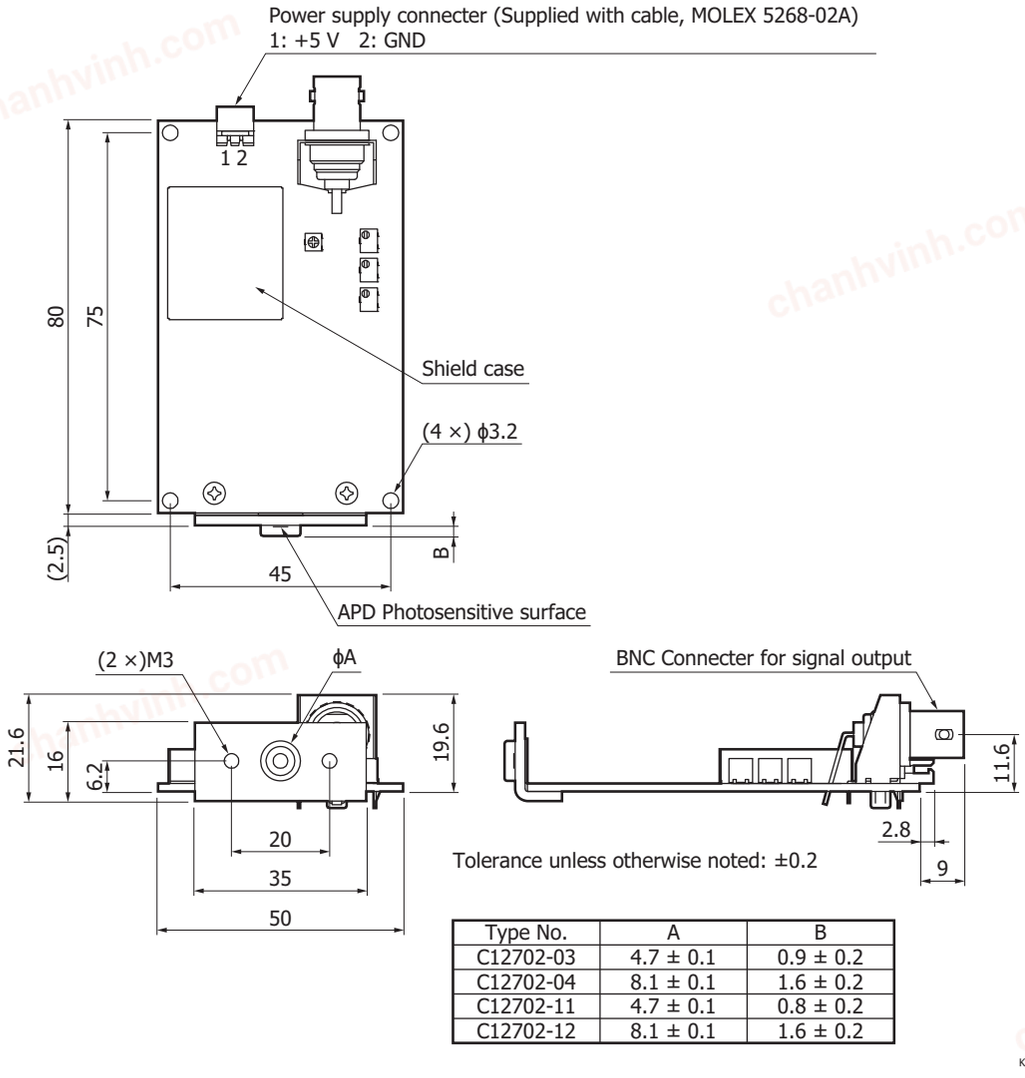
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Frequency response



KACCB0340EA

Dimensional outline (unit: mm)



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

KACCA0324EB

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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

■ Precautions

· Disclaimer

Information described in this material is current as of September 2017.
Product specifications are subject to change without prior notice due to improvements or other reasons. This document has been carefully prepared and the information contained is believed to be accurate. In rare cases, however, there may be inaccuracies such as text errors. Before using these products, always contact us for the delivery specification sheet to check the latest specifications.
The product warranty is valid for one year after delivery and is limited to product repair or replacement for defects discovered and reported to us within that one year period. However, even if within the warranty period we accept absolutely no liability for any loss caused by natural disasters or improper product use.
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