HAMAMATSU
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APD modules

C12702 series



Operates an APD with single 5 V supply (Standard type, Short-wavelengh 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

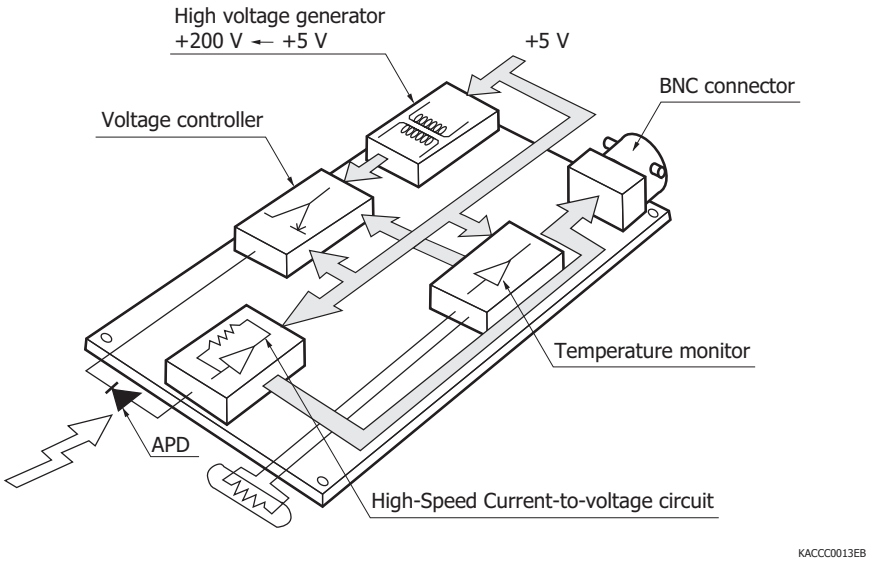
- **APD evaluation**
- **Spatial light transmission**
- **Bar code readers**
- **Laser radars**
- **Optical rangefinders**
- **Optical communications**

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.

Block diagram



Structure / Absolute maximum ratings

Type No.	Photosensitive area	Supply voltage (V)			Current consumption (mA)		Board dimension	Output impedance	Weight	Absolute maximum ratings			
										Supply voltage	Maximum Incident light level	Operating temperature Topr	Storage temperature Tstg
	(mm)	Min.	Typ.	Max.	Typ.	Max.	(mm)	(Ω)	(g)	(V)	(mW)	(°C)	(°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)

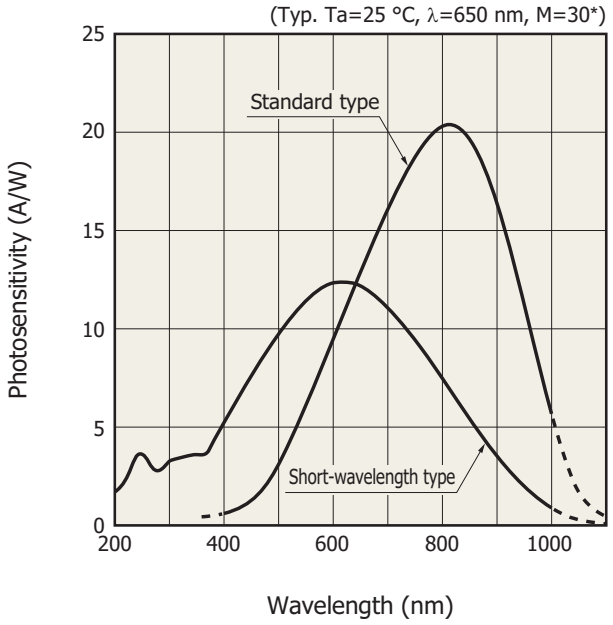
Type No.	Spectral response range λ	Peak sensitivity wavelength λp	Photosensitivity S M=1 (A/W)		Temperature stability of gain*1 25 °C ± 10 °C, M=30 (%)	
	(nm)	(nm)	λ=800 nm	λ=620 nm	Typ.	Max.
C12702-03	400 to 1000	800	0.5	-	±2.5	±5
C12702-04						
C12702-11	200 to 1000	620	-	0.42		
C12702-12						

■ High-speed amplifier section

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

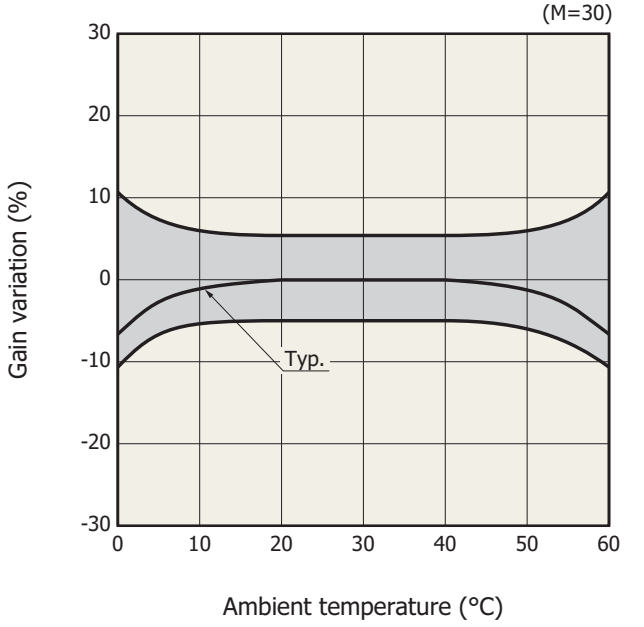
Spectral response



* Measured at a reverse voltage giving a gain of 30.
Incident light is 650 nm.

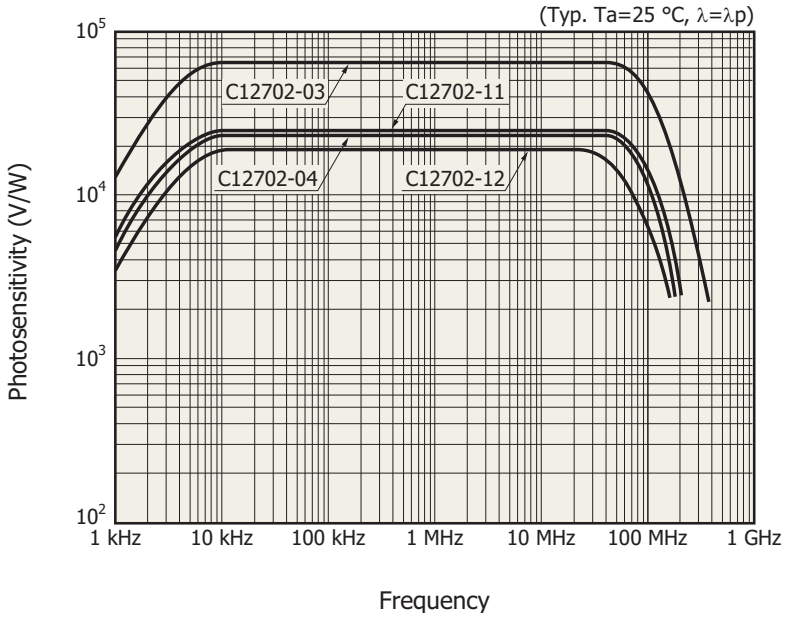
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Gain temperature characteristic



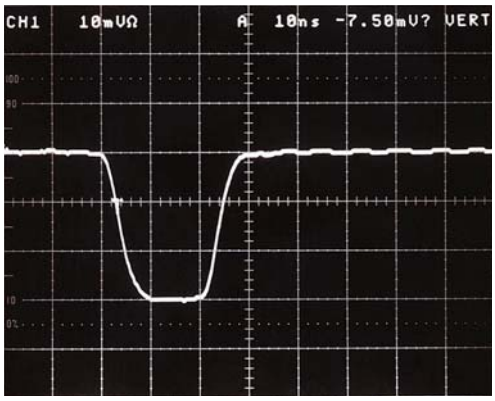
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Frequency response



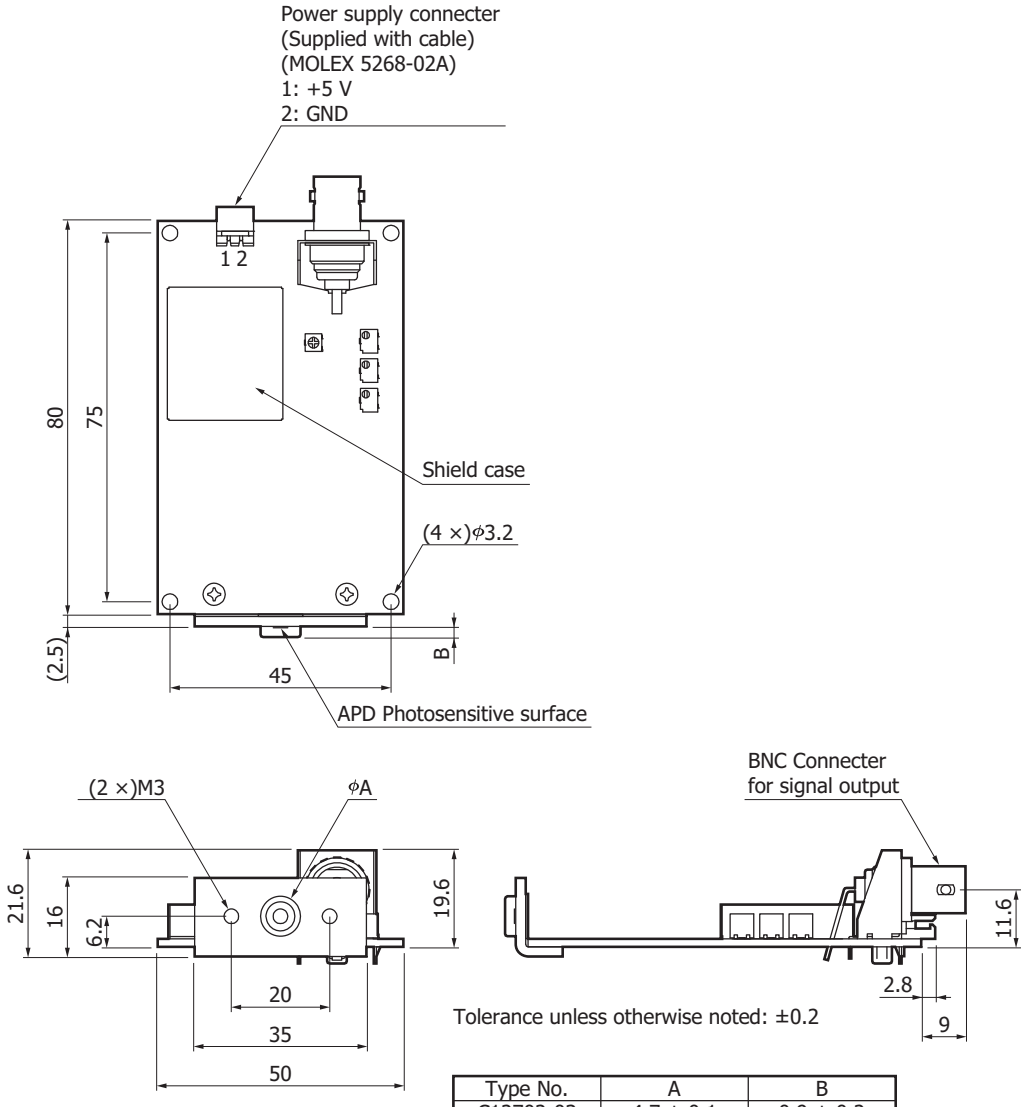
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Response to stepped light input (C12702-03)



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

Dimensional outline (unit: mm)



Tolerance unless otherwise noted: ±0.2

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

KACCA0324EA

Accessories

· Power supply cable
· Instruction manual

Option (sold separately)

Attachment adapters for FC and SMA connectors

APD module	FC adapter	SMA adapter
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

· Notice

Information described in this material is current as of December, 2013.
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.
Type numbers of products listed in the delivery specification sheets or supplied as samples may have a suffix "(X)" which means preliminary specifications or a suffix "(Z)" which means developmental 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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Cat. No. KACC1214E01 Dec. 2013 DN