

APD module

C5331 series

Operates an APD with single 5 V supply



Features

- Choice of high sensitivity APDs
A total of 11 types are available, including 6 types of 800 nm band APDs with active areas from $\phi 0.2$ to $\phi 5$ mm, 3 types of short-wavelength APDs with active areas from $\phi 1$ to $\phi 5$ mm, and FC connector types.
- 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 $25 \pm 10^\circ\text{C}$. 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 52 g.
- Low price
- Custom devices available with different dimensions and specifications

Applications

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

Selection guide

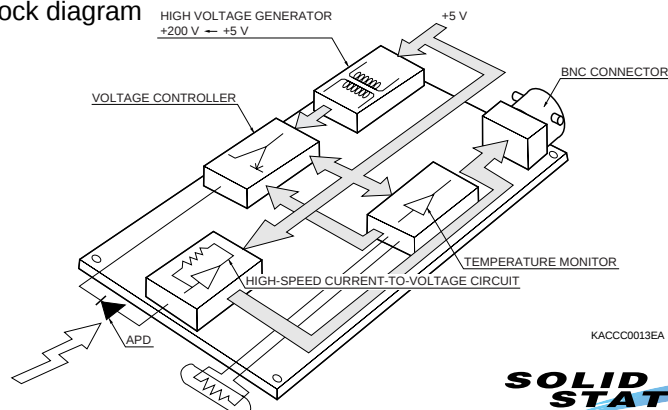
Type No.	Active area (mm)	Frequency bandwidth -3 dB (Hz)	Type of APD	Peak sensitivity wavelength (nm)
C5331	φ1.5	4 k to 100 M	Standard type	800
C5331-30 *1				
C5331-01	φ0.2			
C5331-31 *2				
C5331-02				
C5331-03	φ1.0			
C5331-04	φ3.0	4 k to 80 M		
C5331-05	φ5.0	4 k to 50 M		
C5331-11	φ1.0	4 k to 100 M	Short-wavelength type	620
C5331-12	φ3.0	4 k to 40 M		
C5331-13	φ5.0	4 k to 20 M		

*1: C5331 + FC connector

*2: C5331-01 + FC connector with lens
(compatible with GI 50/125 fiber)

Note: Gain is preset to 30 prior to shipping.

Block diagram



SOLID STATE DIVISION

■ General ratings / Absolute maximum ratings

Type No.	Active area (mm)	Supply voltage			Current consumption		Board dimension (mm)	Output impedance (Ω)	Weight (g)	Absolute maximum ratings			
		Min. (V)	Typ. (V)	Max. (V)	Typ. (mA)	Max. (mA)				Supply voltage (V)	Maximum incident light level (mW)	Operating temperature Topr (°C)	Storage temperature Tstg (°C)
C5331	φ1.5	+4.75	+5	+5.25	+50	+80	80 × 50 × 23	50	52	+7	10	0 to +60	-20 to +70
C5331-30													
C5331-01													
C5331-31	φ0.2												
C5331-02	φ0.5												
C5331-03	φ1.0												
C5331-04	φ3.0												
C5331-05	φ5.0												
C5331-11	φ1.0												
C5331-12	φ3.0												
C5331-13	φ5.0												

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

Photoelectric converter section (APD)

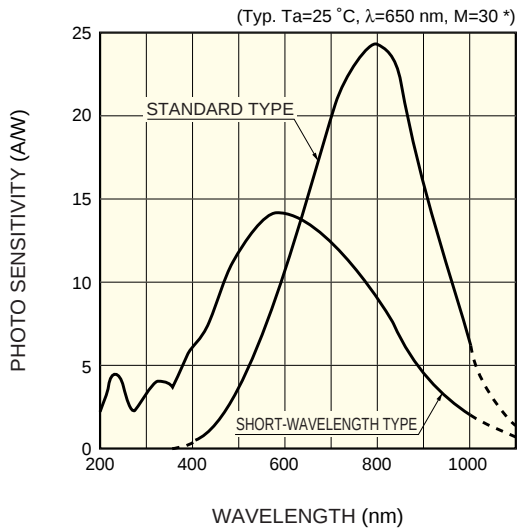
Type No.	Spectral response range λ (nm)	Peak sensitivity wavelength λp (nm)	Photo sensitivity S		Temperature stability of gain *3 25 °C ± 10 °C, Gain=30	
			λ=800 nm, Gain=1 (A/W)	λ=620 nm, Gain=1 (A/W)	Typ. (%)	Max. (%)
C5331	400 to 1000	800	0.5	-	±2.5	±5
C5331-30						
C5331-01						
C5331-31						
C5331-02						
C5331-03						
C5331-04						
C5331-05						
C5331-11	200 to 1000	620	-	0.42		
C5331-12						
C5331-13						

High-speed amplifier section

Type No.	Cut-off frequency -3 dB				NEP				Feedback resistance	Photoelectric sensitivity *3 including APD, gain=30		
	High band		Low band		$\lambda=800\text{ nm}$		$\lambda=620\text{ nm}$			Min. (10^4V/W)	Typ. (10^4V/W)	Max. (10^4V/W)
	Min. (MHz)	Typ. (MHz)	Min. (kHz)	Typ. (kHz)	Typ. ($\text{pW/Hz}^{1/2}$)	Max. ($\text{pW/Hz}^{1/2}$)	Typ. ($\text{pW/Hz}^{1/2}$)	Max. ($\text{pW/Hz}^{1/2}$)				
C5331	90	100	3	4	0.3	0.6	-	-	6.2	-4.3	-4.5	-4.7
C5331-30							-	-				
C5331-01	90	100			0.3	0.6	-	-	10	-7.1	-7.5	-7.9
C5331-31							-	-				
C5331-02	90	100			0.3	0.6	-	-	10	-7.1	-7.5	-7.9
C5331-03	90	100			0.3	0.6	-	-	9.1	-6.4	-6.75	-7.1
C5331-04	70	80			0.4	0.8	-	-	3.0	-2.1	-2.3	-2.4
C5331-05	40	50			0.7	1.4	-	-	1.1	-0.7	-0.75	-0.79
C5331-11	90	100			-	-	0.5	1.0	3.9	-2.3	-2.46	-2.7
C5331-12	30	40			-	-	1.3	2.6	2.0	-1.1	-1.26	-1.4
C5331-13	10	20			-	-	1.7	3.4	1.1	-0.65	-0.69	-0.75

*3: Gain is preset to 30 prior to shipping.

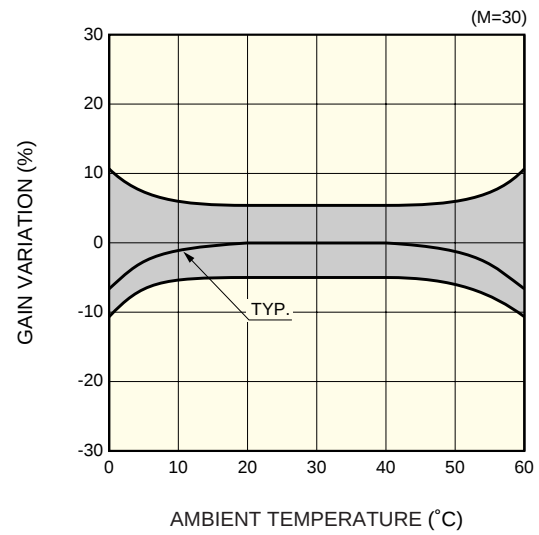
■ Spectral response



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

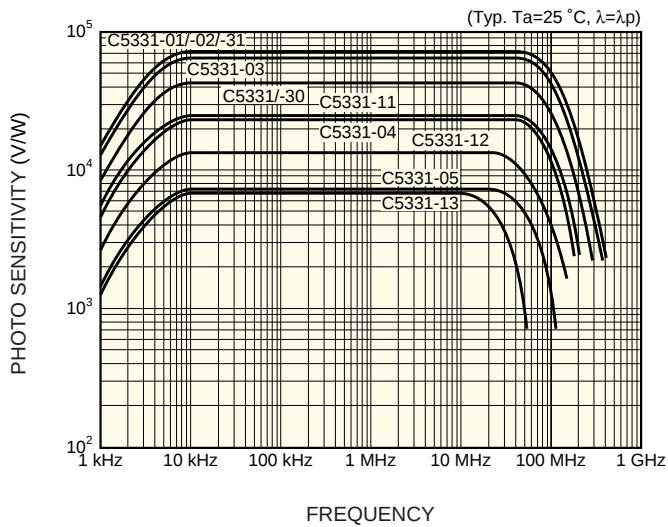
KAPD0051EA

■ Gain temperature characteristic



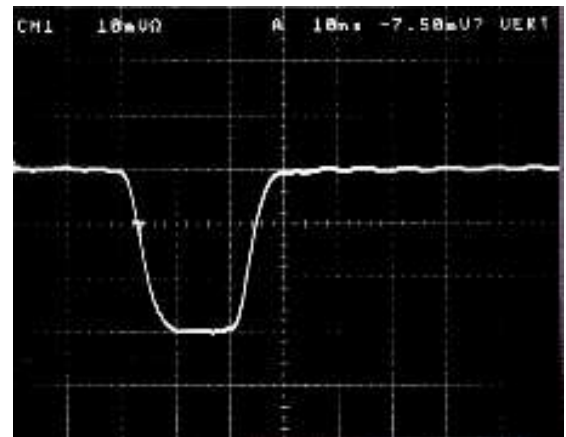
KACCB0020EB

■ Frequency response



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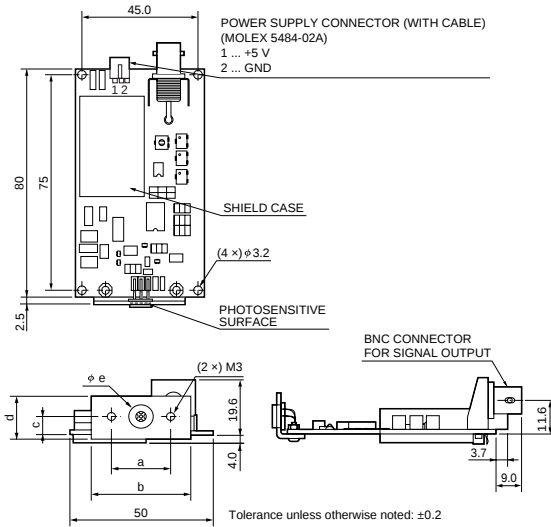
■ Response to stepped light input (C5331-03)



$T_a=25\text{ }^{\circ}\text{C}$, gain $M=30$, input pulse width= $20\text{ }\mu\text{s}$
X-axis: 10 ns/div. , Y-axis: 10 mV/div.

■ Dimensional outlines (unit: mm)

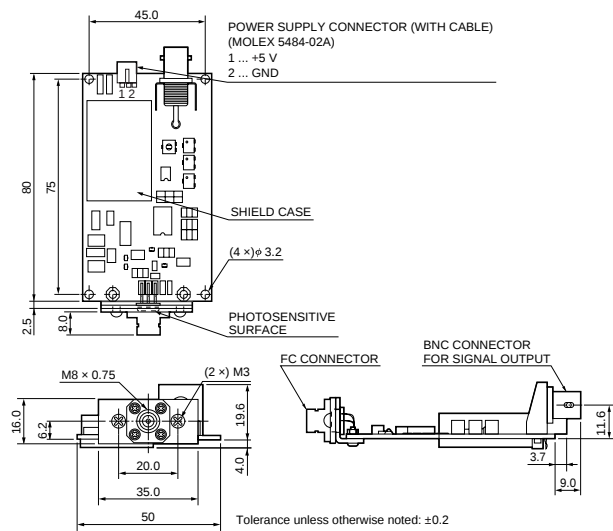
C5331-01/-02/-03/-04/-05/-11/-12/-13



Type No.	a	b	c	d	e
C5331					8.2 ± 0.1
C5331-01	20	35	6.2	16	4.7 ± 0.1
C5331-02					4.7 ± 0.1
C5331-03					4.7 ± 0.1
C5331-04					8.1 ± 0.1
C5331-05	25	40	8.6	20	12.35 ± 0.1
C5331-11	20	35	6.2	16	4.7 ± 0.1
C5331-12					8.1 ± 0.1
C5331-13	25	40	8.6	20	12.35 ± 0.1

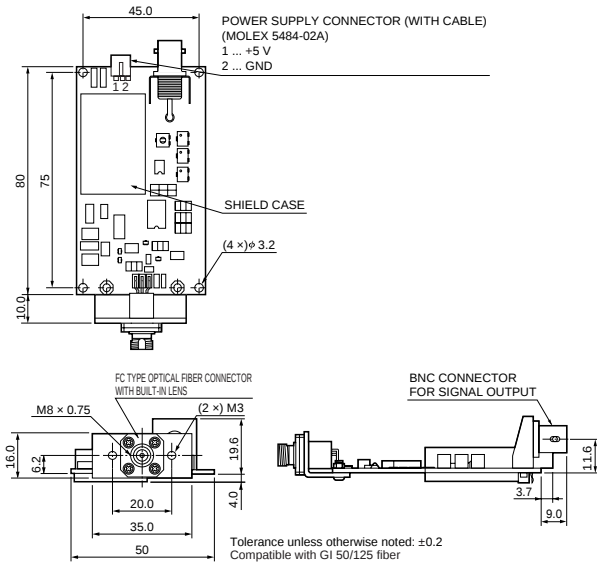
KACCA0013EC

C5331-30



KACCA0093EA

C5331-31



KACCA0094EA

■ Attachment adapters for FC and SMA connectors

APD module	FC adapter	SMA adapter
C5331-01	A8407-18	A8424-18
C5331-02	A8407-18	A8424-18
C5331-03	A8407-18	A8424-18
C5331-04	A8407-05A	A8424-05A
C5331-05	A8407-08	-
C5331-11	A8407-18	A8424-18
C5331-12	A8407-05A	A8424-05A
C5331-13	A8407-08	-
C5460	A8407-05	A8424-05
C5460-01	A8407-05A	A8424-05A

- (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.

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