

# APD module C5658

Detects optical signals at 1 GHz, with high sensitivity



APD module C5658 is a highly sensitive photodetector consisting of a Si APD (avalanche photodiode), a bias power supply and a low-noise amplifier, all integrated into a compact case. The APD used has an effective active area of  $\phi 0.5$  mm to allow efficient coupling to a light beam in applications such as spatial light transmission. The APD internally multiplies the photocurrent to produce an ample gain (set to 100 times for C5658) and also features high-speed response, achieving detection limits up to 1 GHz wideband and -48 dBm (16 nWr.m.s.) noise level in combination with the low-noise amplifier. C5658 also incorporates a thermosensor and a temperature-compensated bias power supply necessary for stable operation of the APD. Highly sensitive optical measurements can be made just by supplying +12 V to C5658.

## Features

- High-speed response and high sensitivity
- Flat frequency characteristics
- Compact and lightweight
- Single power supply operation

## Applications

- Laser radar
- Spatial light transmission
- Optical rangefinder

### Absolute maximum ratings

Parameter	Condition	Value	Unit
Supply voltage		+13.5	V
Maximum incident light level	Continuous input	10	mW
Operating temperature		0 to +50	°C
Storage temperature		-30 to +80	°C

### Electrical and optical characteristics (Ta=25 °C, Vcc=12 V, output terminated with 50 $\Omega$ )

Parameter	Condition	Typ.	Unit
Spectral response range		400 to 1000	nm
Active area		$\phi 0.5$	mm
Quantum efficiency	$\lambda=800$ nm	70	%
Cut-off frequency (-3 dB)	High band	1	GHz
	Low band	1	MHz
Detection sensitivity	$\lambda=800$ nm	$2.5 \times 10^5$	V/W
Gain stability	25 °C $\pm$ 10 °C	$\pm 5.0$	%
Noise level	Dark state	-48	dBm
Output impedance		50	$\Omega$
VSWR *		1.5	-
Compression point at 1 dB		3	$\mu$ W

\* VSWR (Voltage Standing Wave Ratio)

If internal matching of elements on a signal transmission line (matching between element input/output impedance and signal line impedance) is poor, signal reflections occur that generate standing waves on the signal line. The VSWR is the ratio of standing wave maximum amplitude (V Max.) to minimum amplitude (V Min.) and indicates how well the impedance is internally matched. When this internal matching is complete, no standing waves exist and the VSWR is 0 (zero).

### Signal connector

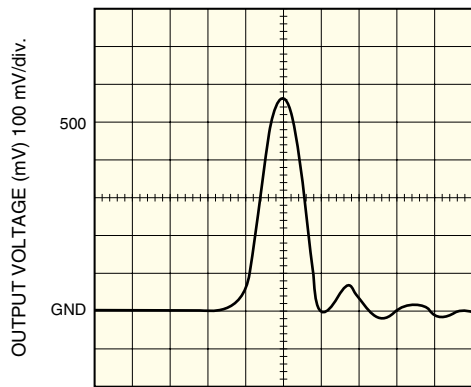
Parameter	Standard
Signal output	SMA
Power supply connector	D-sub 9 pin

### General specifications

Parameter	Condition	Value	Unit
Supply voltage		+12 $\pm$ 0.1	V
Current consumption		100	mA
Dimensional outline	Excluding projecting parts	28 $\times$ 50 $\times$ 60	mm
Weight		120	g

**SOLID  
STATE** DIVISION

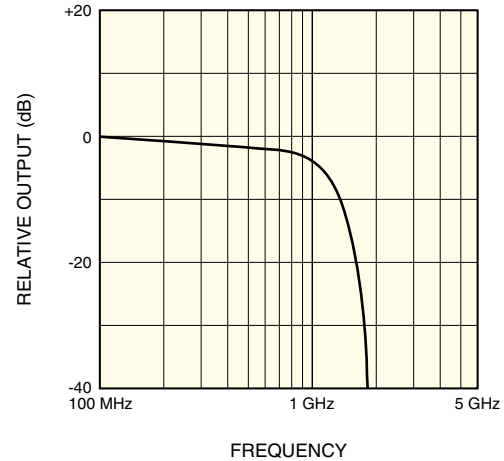
### ■ Pulse response waveform



TIME 500 ps/div.

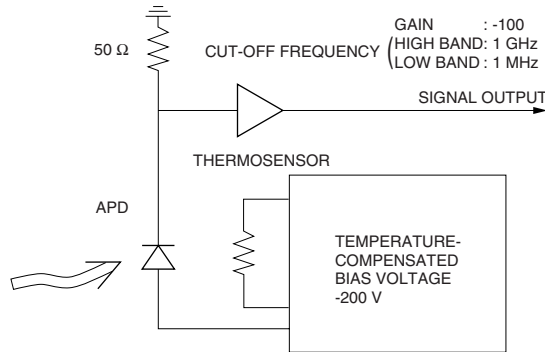
KACCB0050EA

### ■ Frequency response



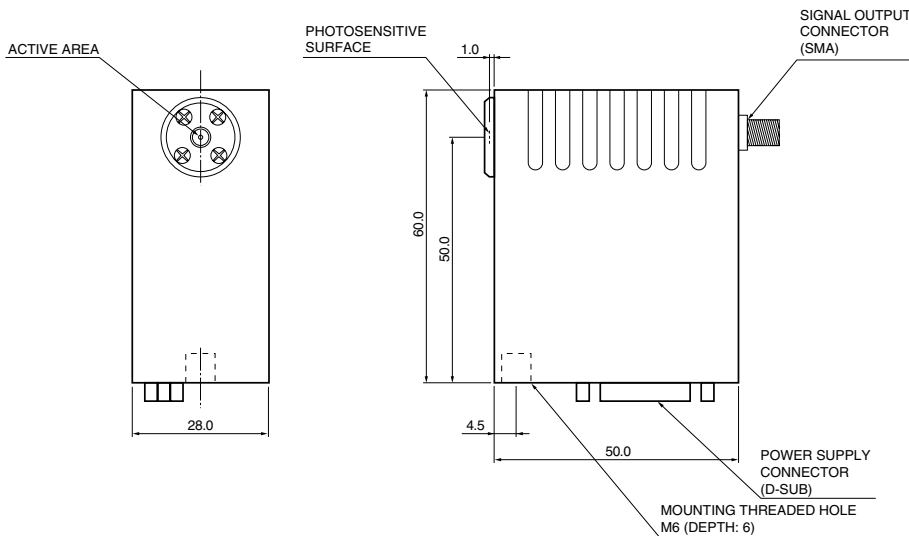
KACCB0051EB

### ■ Block diagram



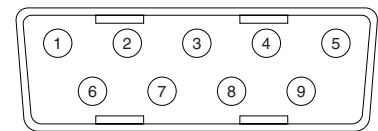
KACCC0135EA

### ■ Dimensional outline (unit: mm)



KACCA0092EA

### ■ Pin connection



KACCC0134EA

Pin No.	Signal
1	+12 V
2	NC
3	GND
4	NC
5	NC
6	NC
7	NC
8	NC
9	NC

Mating connector (supplied):

DE-9S (made by JAE) or equivalent

**HAMAMATSU**

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. ©2001 Hamamatsu Photonics K.K.

HAMAMATSU PHOTONICS K.K., Solid State Division

1126-1 Ichino-cho, Hamamatsu City, 435-8558 Japan, Telephone: (81) 053-434-3311, Fax: (81) 053-434-5184, <http://www.hamamatsu.com>

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) 08152-3750, Fax: (49) 08152-2658

France: Hamamatsu Photonics France S.A.R.L.: 8, 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

Cat. No. KACC1023E01  
Mar. 2001 DN