# 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 \$\phi0.5\$ 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          |                  | -20 to +70 | °C   |

■ Electrical and optical characteristics (Ta=25 °C, Vcc=12 V, output terminated with 50 Ω)

| Parameter                 | Condition     | Тур.                  | Unit |
|---------------------------|---------------|-----------------------|------|
| Spectral response range   |               | 400 to 1000           | nm   |
| Active area               |               | φ0.5                  | mm   |
| Quantum efficiency        | λ=800 nm      | 70                    | %    |
| Cut-off frequency (-3 dB) | High band     | 1                     | GHz  |
|                           | Low band      | 50                    | kHz  |
| Detection sensitivity     | λ=800 nm      | 2.5 × 10 <sup>5</sup> | V/W  |
| Gain stability            | 25 °C ± 10 °C | ±5.0                  | %    |
| Noise level               | Dark state    | -48                   | dBm  |
| Output impedance          |               | 50                    | Ω    |
| VSWR *                    |               | 1.5                   | -    |
| Compression point at 1 dB |               | 3                     | μW   |

<sup>\*</sup> 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 exit and the VSWR is 0 (zero).

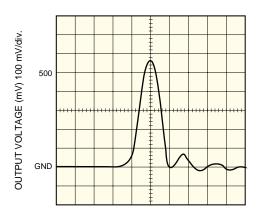
## ■ Signal connector

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

#### General specifications

| Contrai apcomoations |                            |              |      |
|----------------------|----------------------------|--------------|------|
| Parameter            | Condition                  | Value        | Unit |
| Supply voltage       |                            | +12 ± 0.1    | V    |
| Current consumption  |                            | 100          | mA   |
| Dimensional outline  | Excluding projecting parts | 28 × 50 × 60 | mm   |
| Weight               |                            | 120          | g    |

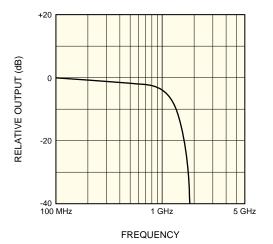
#### ■ Pulse response waveform



TIME 500 ps/div.

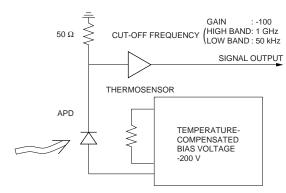
KACCB0050EA

#### ■ Frequency response



KACCB0051EB

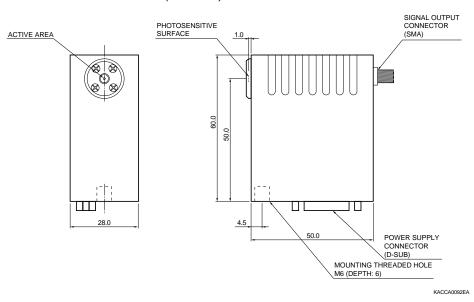
## ■ Block diagram

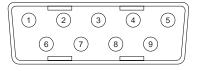


■ Dimensional outline (unit: mm)

KACCC0135EB

#### ■ 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

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