



General Description

The SPAD is an InGaAs/InP avalanche photodetector designed specifically for single photon counting applications. The device is intended for use at voltage biases above the breakdown voltage (in the so-called "Geiger mode") so that a single photon incident on the detector will give rise to a macroscopic current pulse. Combined with an appropriate pulse detection circuitry, this device allows for the detection of single photons in the wavelength range from 0.95 to 1.65 μ m.

The SPAD described in this datasheet is a back-illuminated device provided in a pigtailed 10 pin butterfly package with a single stage thermoelectric cooler.

Features

- Full series of package types
3pin TO46 6pin TO8-TEC 10pin mini Butterfly FC/PC SM or MM fiber
- High PDE
>20%@ afterpulsing less than2%
- To work well at gate control model
 \geq 100MHz or free space model
- Low DCE for high temperature
<2kHz @ 20% PDE @ 0°C @ 100MHz



Applications

- Quantum optics / Quantum computing
- Spectroscopy and fluorescence measurements
- 3D Lidar
- Medical

E / O Characteristics

Parameter Description		Test Conditions	Min.	Max.	Unit
Linear mode $T_c=23\pm 2^\circ\text{C}$	Breakdown voltage, V_{br}	$I_d=10\mu\text{A}$	50	80	V
	Responsivity, R_e	$\lambda=1.55\mu\text{m}, V_r=V_{br}-2\text{V}, \Phi_e=1\mu\text{W}$	8		A/W
	Total Dark Current, I_d	$V_r=V_{br}-2\text{V}, \Phi_e=0$		1	nA
	Capacitance, C_{tot}	$V_r=V_{br}-2\text{V}, f=1\text{MHz}$		0.25	pF
	Temperature dependence of V_{br} , η	$T_{op} = -40\sim +30^\circ\text{C}, I=10\mu\text{A}, \Phi_e=0$		0.15	V/ $^\circ\text{C}$
Geiger mode $T_{op}=0^\circ\text{C}$	Detection Efficiency, PDE	0.1ph/pulse, $\lambda=1.55\mu\text{m}$	20		%
	Dark Count Rate*, DCR	$f_g=100\text{MHz}, \text{PDE}=20\%$		10	kHz
	Afterpulsing, APP	$f_g=100\text{MHz}, \text{PDE}=20\%$		2.5	%

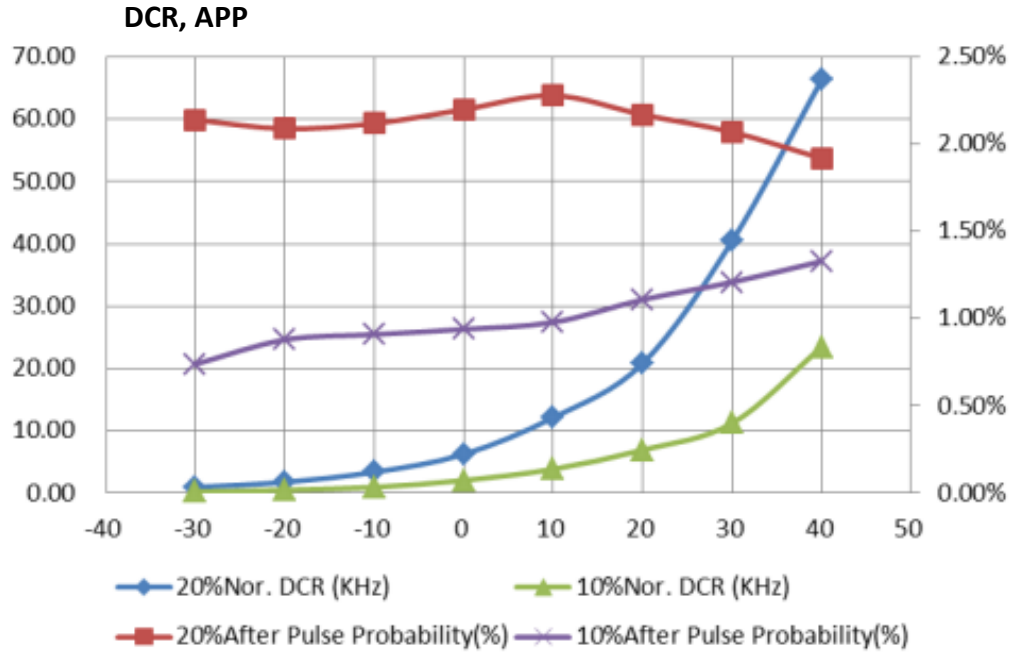
Custom options: DCR < 3kHz @ 0°C APP < 0,5% @ 0°C

Absolute Maximum Ratings

Item	Parameter	Value
Absolute Maximum Ratings	Storage Temperature, T_{stg}	$-50^\circ\text{C}\sim +85^\circ\text{C}$
	Working Temperature, T_c	$-50^\circ\text{C}\sim +80^\circ\text{C}$
	Solderable Temperature, T_{sld} (time)	260°C (10s)
	Revers Voltage, V_r	V_{br}
	Overbias Pulse Amplitude, V_g	10V
	Optical Power, Φ_e (Continuous Wave)	1mW
	Forward Current, I_f (Continuous Wave)	1mA
	ESD	$\geq 300\text{V}$



Typical Curves



Devices

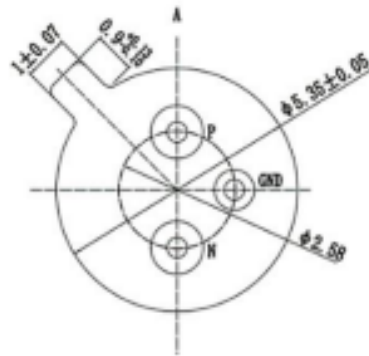
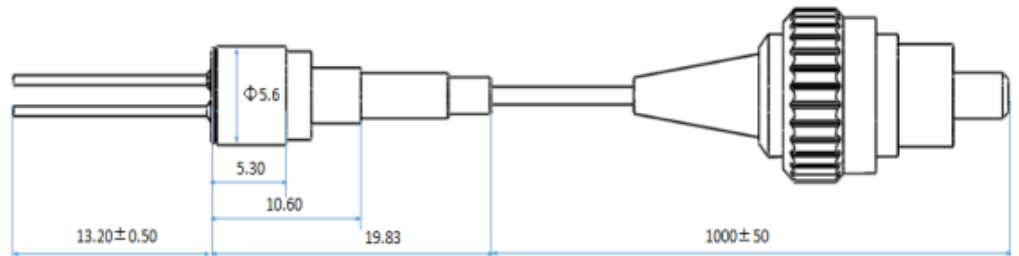
Name	Part No.	Drawing
InGaAs SPAD 3pin TO46 With fiber	PGA-284	
TEC InGaAs SPAD 6pin TO8 with fiber	PGA-285	
	PGA-286	
TEC InGaAs SPAD 10pin	PGA-287	

OEC YOUR PARTNER



Mechanical Dimension & Pin Layout

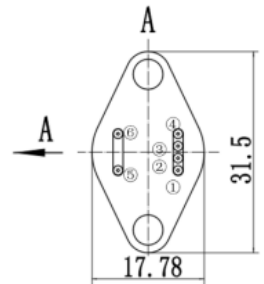
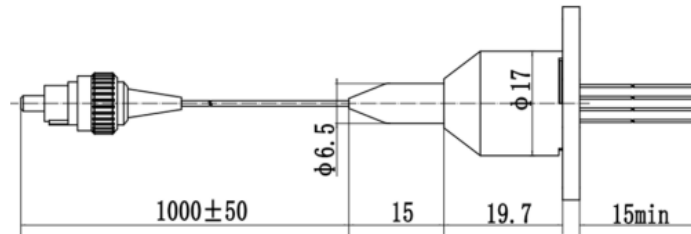
InGaAs SPAD 3pin TO46 Pigtailed Coaxial Type PGA-284



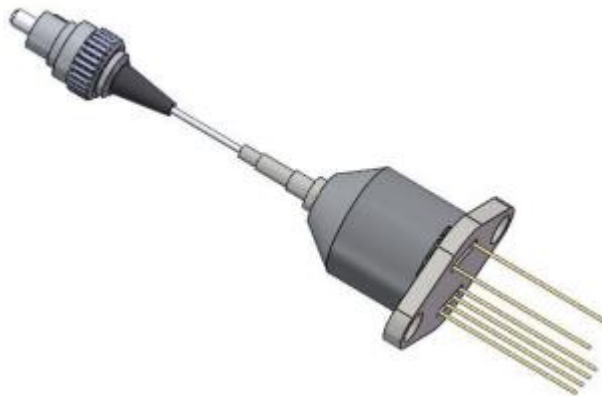
Bottom Layer



TEC Type of InGaAs SPAD 6pin TO8 Pigtailed Coaxial PGA-285



Unit: mm



PIN

①	APD -
②	NTC
③	NTC
④	APD +
⑤	TEC-
⑥	TEC+

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TEC Type of InGaAs SPAD 6pin TO8 Pigtailed Coaxial PGA-285

TEC & NTC Specifications

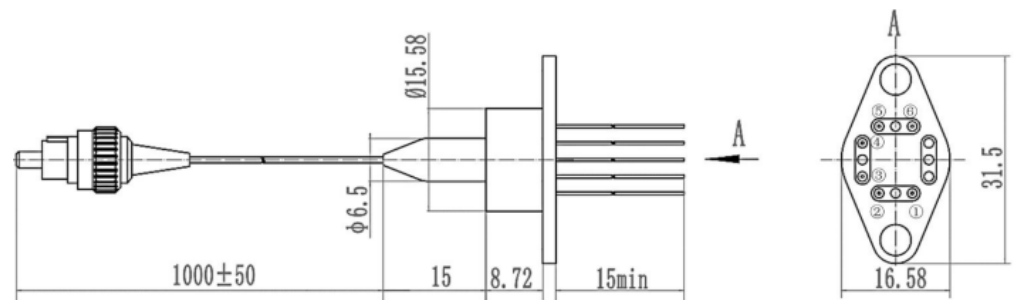
TEC (323k / N2)

Parameter	Unit	MAX
ΔT_{max}	K	113
Q_{max}	W	0.4
ΔI_{max}	A	0.7
U_{max}	V	4.3
ACR	Ohm	5.51

Thermistor 5 k Ω at 25°C

Thermistor Constant A = 1.2548E-03,
 B = 2.3738E-04,
 C = 1.3222E-07

TEC Type of InGaAs SPAD 6pin TO8 Pigtailed Coaxial PGA-286



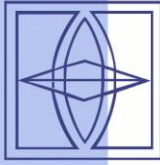
Unit: mm



PIN

①	TEC-
②	TEC+
③	APD +
④	APD -
⑤	NTC
⑥	NTC

OEC



Opto-Electronic
Components

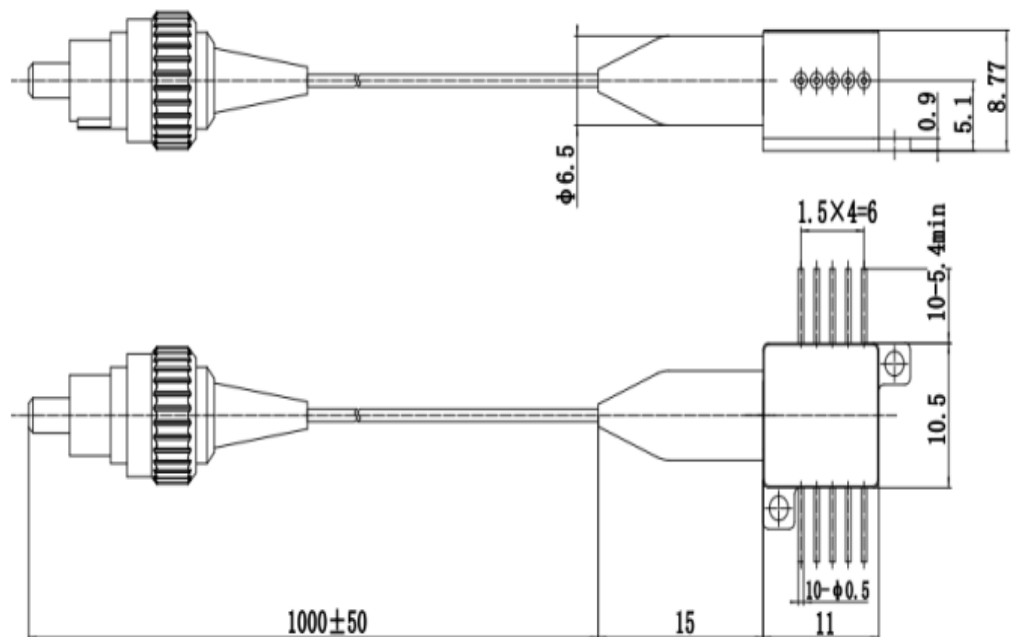
**TEC Type of InGaAs SPAD****6pin TO8****Pigtailed Coaxial****PGA-286****TEC & NTC Specifications**

TEC (323k / N2)

Parameter	Unit	MAX
ΔT_{max}	K	119
Q_{max}	W	0.8
ΔI_{max}	A	2.5
U_{max}	V	2.2
ACR	Ohm	0.78

Thermistor 5 k Ω at 25°C

Thermistor Constant A = 1.2548E-03,
 B = 2.3738E-04,
 C = 1.3222E-07

TEC type of InGaAs SPAD**10pin Butterfly package****PGA-287**

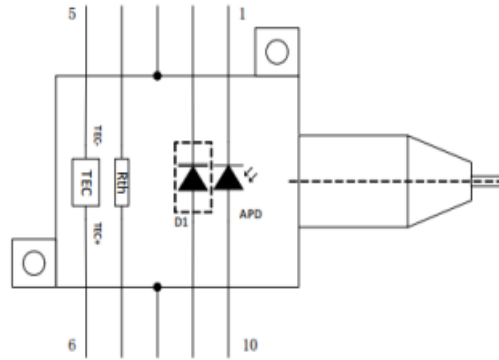
YOUR PARTNER



TEC type of InGaAs SPAD

10pin Butterfly package

PGA-287



Pin Number	Symbol	Description
1	APD_C	APD cathode
2	D1_C	Balance diode cathode
3	GND	Case ground
4	TH1	Thermistor terminal 1
5	TEC-	TEC negative terminal
6	TEC+	TEC positive terminal
7	TH2	Thermistor terminal 2
8	GND	Case ground
9	D1_A	Balance diode anode
10	APD_A	APD anode

TEC & NTC Specifications

TEC (323k / N2)

Parameter	Unit	MAX
ΔT_{max}	K	119
Q_{max}	W	0.8
ΔI_{max}	A	2.5
U_{max}	V	2.2
ACR	Ohm	0.78

Thermistor 5 k Ω at 25°C

Thermistor Constant A = 1.2548E-03,
 B = 2.3738E-04,
 C = 1.3222E-07

Information in this technical data sheet is believed to be correct and reliable. However, no responsibility is assumed for possible inaccuracies or omissions. Furthermore, specifications are subject to change without notice.