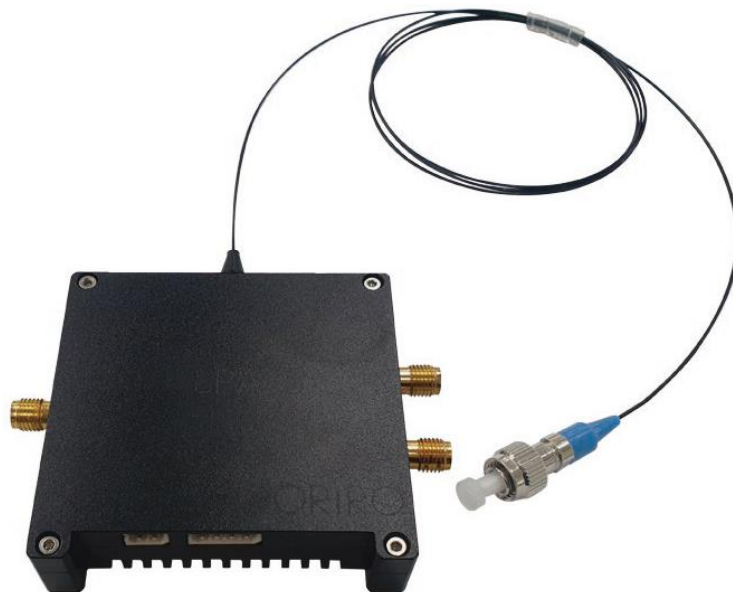


SPAD with TEC

(Pigtailed 10 pin Mini-Flat type Single Photon Avalanche Diode)



(SPAD with TEC Mini-Flat Type)



(SPAD with TEC Mini-Flat Type installed on Evaluation Board in Heatsink-integrated Case)

Contents

General Description 3

Electro-Optical Characteristics 4

Mechanical Dimension & Pin Layout 5

Other Requirements 6

General Description

This InGaAs/InP Geiger-Mode APD device was specially designed and fabricated for the use of single photon avalanche detection (SPAD) with **internal cooling systems**. It can be operated at the voltage above breakdown for short period, which is called by “Geiger-mode” or “Gated mode” operation. Ultra low noise operation is possible at the temperature of -40°C. It can be used for quantum key distribution (QKD) receiver.

Features

- Low capacitance less than 0.3 pF and high speed
- Operation between 1100 nm and 1600 nm
- Coaxial type pigtail
- Low noise
- 10-pin Butterfly type Mini-Flat package
- Built in 3-stage cooling system
- Evaluation Board & Heat Sink (**Optional**)

Applications

- Special application such as QKD, OTDR etc, which requires single photon counting application.

Absolute Maximum Ratings

Parameter	Conditions	Rating(Max.)	Unit
Forward Current	Continuous bias	1	mA
Forward Voltage	Continuous bias	1	V
Reverse Current	Continuous bias	1	mA
Reverse Voltage	Continuous bias	V_{BR}	V
	RF Bias (gated mode)	$V_{BR} + 10$	V
Optical Input Power	Continuous wave	1	mW
TEC Current	@27°C, Vacuum	2.6	A
TEC Voltage	@27°C, Vacuum	2.0	V
Thermistor	@25°C	10	kΩ
Storage Temperature	-	-40 to +85	°C

Table 1. Absolute Maximum Ratings

Electro-Optical Characteristics

Inspection sheet shall be appended to products when they are delivered. Test report shall be submitted in papers and in electronic media. It shall contain the major in following items.

Optical Characteristics (Tc=25°C)

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Breakdown Voltage	V_{BR}	$I_D=100\mu A$	60	70	80	V
Total dark current	I_D	$V_R = 0.98V_{BR}$		1		nA
Capacitance	C_{PD}	$f = 1MHz,$ $V_{PD} = 0.9V_B$		0.1		pF
Quantum efficiency	η	$M=1, 1550nm$		70		%
Optical Wavelength Range	λ	-	1100		1600	nm
Responsivity	R	$\lambda = 1550nm, M=1$	0.7	0.8		A/W
Temperature coefficient of V_{BR}	Γ	$\Delta V_{BR}/\Delta T$		0.11		V/°C

Table 2. Optical Characteristics

Optical Characteristics (Tc= -40°C)

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
AfterPulse Probability	APP	10MHz Gate Frequency 2ns Gate Pulse 20% PDE			10	%
Dark count rate	DCR	10MHz Gate Frequency 2ns Gate Pulse 20% PDE		0.5		KHz
Photon Detection Efficiency	PDE	10MHz Gate Frequency 2ns Gate Pulse		20		%

Table 3. Optical Characteristics at GM operation

Mechanical Dimension & Pin Layout

(Unit : mm)

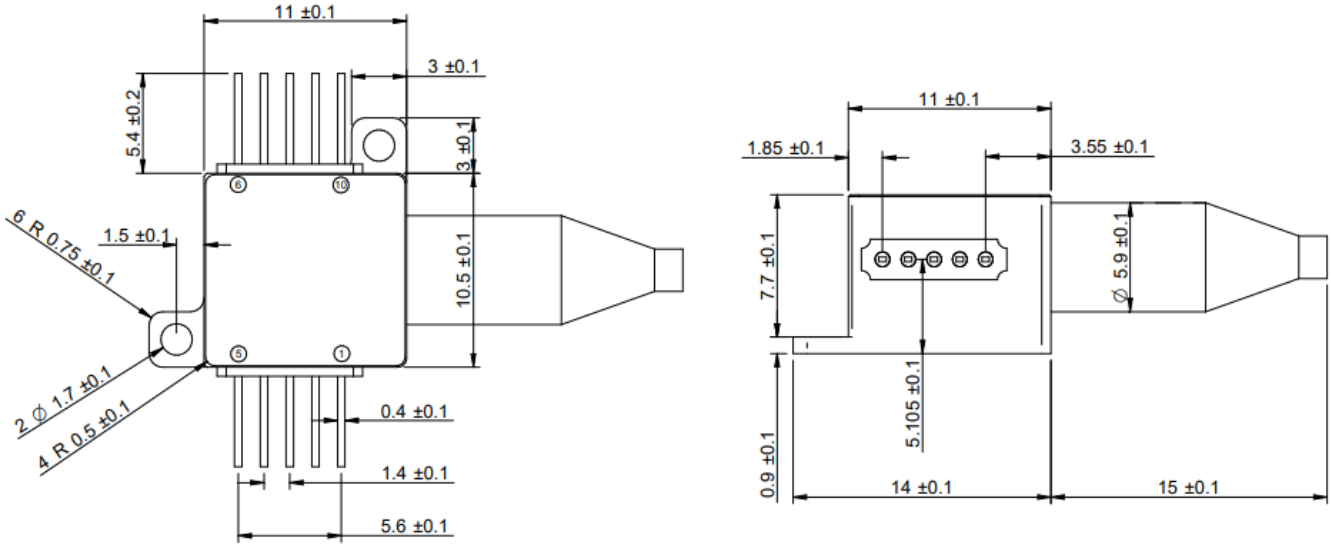


Figure 1. Mechanical Dimension

* Fiber length : 1m (Standard) , Connector : FC-PC (Standard)

No.	Symbol	I/O	Description (Top View)
1	A	-	APD Anode
2	N/C	-	N/C
3	GND	-	Case Ground
4	TH	-	Thermistor1
5	TEC	-	TEC(+)
6	TEC	-	TEC(-)
7	TH	-	Thermistor2
8	GND	-	Case Ground
9	N/C	-	N/C
10	C	-	APD Cathode

Table 4. PIN Configuration

Other Requirements

Precautions for use

This device is susceptible to damage as a result of ESD(electrostatic discharge). Use of ground straps, anti-static mats, and other standard ESD protective equipment is recommended when handling or testing an InGaAs PIN/APD or any other junction photodiode. Soldering temperature of the leads should not exceed 350°C for more than 3 seconds.

Ordering Information

WPGSTGMTMSFNP (SPAD with TEC Mini-Flat Type)

WPGSTGMTVSFPEP (SPAD with TEC Mini-Flat Type installed on Evaluation Board in Heatsink-integrated Case)