SPAD with TEC (Mini-flat)

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℃ (233.15K). It can be used for Quantum Key Distribution (QKD) receiver.

Features

- 10-pin mini-DIL butterfly type – Mini-flat Package
- Operation between 1000nm to 1700nm
- Single Photon Counting
- Low Dark Count
- Built-in TEC for Low noise operation
- Evaluation board and Heatsink (Optional)

Applications

- Single Photon Detector
- Quantum Key Distribution Receiver
- OTDR
- Gas Sensor and Bio-Medical Imaging
- Fluorescence Measurement
- Requires Single Photon Counting Application

Absolute Maximum Ratings (T_C=25℃, *unless otherwise specified)*

Parameters	Symbol	Rating	Unit
Reverse voltage	V_R	-0.5 to V_{BR}	V
Operating temperature range (Ambient)	T_{OPR}	-40 to 60	℃
Storage temperature range (Ambient)	T_{STG}	-40 to 85	℃
PD Reverse current	I_{MAX}	1	mA
PD Forward current	I_F	1	mA
Operating Bias voltage (V_{BR} according to operating temperature)	V_{OP}	V_{BR}+10V	V
Optical Peak Power at Damaged (@ Continuous wave)	D_L	1	mW
ESD Threshold level on PD bias	E_{PD}	150	V
ESD Threshold level on TEC, Thermistor	E_T	3000	V
Soldering Temperature	-	350℃, 3sec	

Electro-Optical Characteristics *(T_C=25°C, unless otherwise specified)*

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Spectral range response	SR		1000		1700	nm
Breakdown voltage	V_{BR}	I_d=10μA, T_C=23±2℃	60	75	90	V
Total dark current	I_D	$V_R=0.98V_{BR}$		1		nA
Capacitance	C_{PD}	f=1MHz, $V_{PD}=0.9V_{BR}$		0.1		pF
Quantum Efficiency	η	M=1, λ=1550nm		70		%
Temperature coefficient at V_{OP}	T_C	-40 to 85℃		0.11		V

Product Parameters *(T_C=-40°C, unless otherwise specified)*

Parameters	Symbol	Test Condition	Grade	Min.	Typ.	Max.	Unit
Photon Detection Efficiency	PDE	10MHz Gate[1)] 1550nm, 0.1ph/pulse[2)]	·		20		%
Dark Count Rate	DCR	@ PDE 20%	·		0.25	0.50	kHz
After Pulse Probability	APP		**Premium** **Standard**			2 6	% %
Timing Jitter	T_j		**Premium** **Standard**		90 120		ps ps

1) Gate Pulse width (FWHM): 2ns

2) Measured with Optical trigger: f=100kHz, Pulse width (FWHM): Typ. 160ps

**Measurement conditions and product specifications are subject to change without prior notice.*

TEC and Thermistor Characteristics *(T_C=25°C, unless otherwise specified)*

Type	Parameters	Value	Unit
TEC[1)]	△\T_{max}	116	K
	Q_{max}	0.7	W
	I_{max}	2.5	A
	U_{max}	2.0	V
	ACR	0.684	Ω
Thermistor	Temperature range	-40 to 125	℃
	Normal resistance	10k±1%	Ω
	Steinhart-Hart Equation Coefficient A	1.389E-3	·
	Steinhart-Hart Equation Coefficient B	1.924E-4	·
	Steinhart-Hart Equation Coefficient C	2.454E-7	·
	β Model Coefficient	3454.75	K

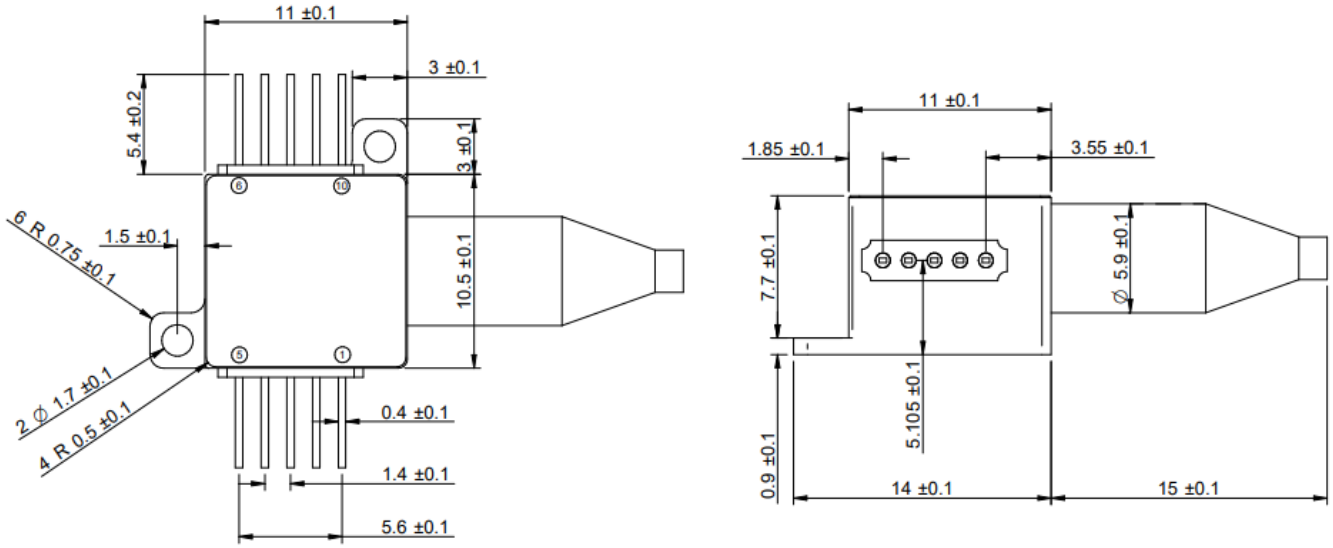
1) TEC performance data are given for 323K @ N2

Chip Dimension *(T_C=25°C, unless otherwise specified)*

Parameters	Value	Unit
Light Active Diameter	16	㎛
Light Receiving Area	24	㎛

Mechanical Specifications

Dimension and PIN configuration (unit: mm)



* The length of the pigtail fiber is about 1 m and has a black jacket.

No.	Symbol	Description (Top View)
1	A	SPAD Anode
2	N/C	No Connection
3	GND	Case Ground
4	TH	Thermistor (+)
5	TEC	TEC (+)
6	TEC	TEC (-)
7	TH	Thermistor
8	GND	Case Ground
9	N/C	No Connection
10.	C	SPAD Cathode

Precaution to use

The **WPGSTGMT Series** is sensitive to electrostatic discharge (ESD) and should be handled with appropriate caution.

Please use standard ESD protective equipment when handling this product.

Ordering information

Product Code	Grade	Fiber Type	Connector	Description
WGOTM20-S0	**Standard**	Single Mode Fiber	**FC/PC**	
WGOTM20-P0	**Premium**		**FC/PC**	
WGOTM22-S0	Standard		FC/APC	
WGOTM22-P0	Premium		FC/APC	
WSOTM35-S0	Standard	Multi-Mode Fiber 62.5	FC/PC	
WSOTM35-P0	Premium		FC/PC	
WSOTM35-S0	Standard		FC/APC	
WSOTM35-P0	Premium		FC/APC	
WSOTM56-S0	Standard	MMF105	FC/PC	
W9OTV01-P3	·	·	·	EVB with Heatsink Case