PRELIMINARY DATASHEET

Cooled Single Photon Counting Avalanche Photodiode – MMF Fiber Pigtailed

PGA-308-MM

1. Product Description

The RMY Electronics SPAD is an InGaAs/InP avalanche photodetector (transferred technology from previous PrincetonLightwave Inc.) designed specifically for the applications of single photon counting. The device is intended for use at pulsed 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 appropriate pulse detection circuitry, this device allows for the detection of single photons in the wavelength range from 1.0 to 1.6μm.

The RMY SPAD described in this datasheet is a back-illuminated device with 16μm diameter chip, provided in a standard three-stage TEC cooled 6 pin TO-8 can pigtailed with a GI 62.5/125μm multi-mode fiber.

2. Linear Mode Parameters (T_{OP}=298K, all voltages and currents are reverse biased)

Parameter Description	Test Conditions	Specifications			Unit
		Min	Typical	Max	
Breakdown voltage (V_b)	at I_d = 10μA	50	70	90	V
Temperature dependence of V_b	$\Delta V_b/\Delta T$, linear approximation		0.1		V/°C
Total Dark Current (I_D)	M=10; primarily non-multiplied I_d		0.3		nA
Capacitance (C)	M=10, 1MHz		0.25		pF

3. Low Rate Geiger Mode Parameters (T_{OP}=223K, No blanking)

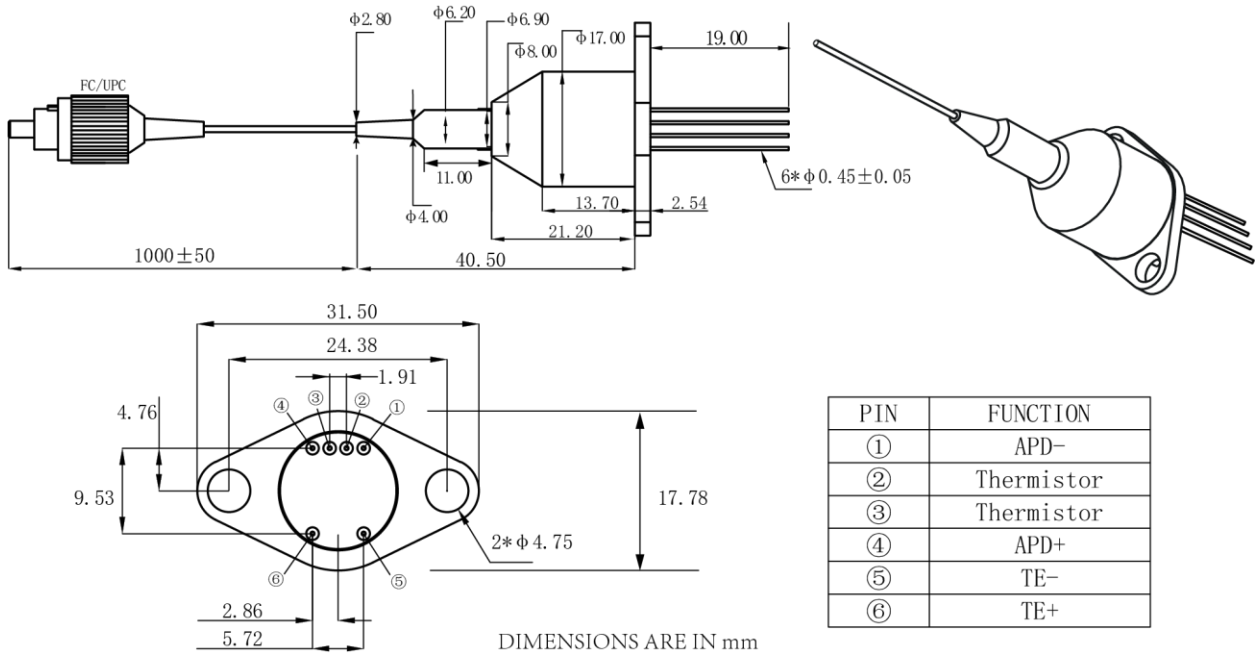
Test Conditions	Parameter Description	Parameter Definition	PGA-308-MM		Unit
			Min	Max	
2MHz Rate Gating 1550nm 1MHz 0.1Photon/Pulse	Detection Efficiency (DE)	at DCR maximum	20		%
	Dark Count Rate (DCR)	at DE minimum		1	kHz
	Afterpulse Probability (APP)	at DE minimum		0.05%	/Pulse

4. High Rate Geiger Mode Parameters (T_{OP}=223K, No blanking)

Test Conditions	Parameter Description	Parameter Definition	PGA-308-MM		Unit
			Min	Max	
100MHz Rate Gating 1550nm 10MHz 0.1Photon/Pulse	Detection Efficiency (DE)	at DCR maximum	20		%
	Dark Count Rate (DCR)	at DE minimum		1	kHz
	Afterpulse Probability (APP)	at DE minimum		2%	/Pulse

5. Mechanical Specifications

The PGA-308-MM is packaged in a standard 6 pin TO-8 header with a three stage thermo-electric cooler capable of cooling the SPAD from package room temperature of 25°C to -50°C (223K). A GI 62.5/125µm multi-mode fiber pigtail with a FC/UPC connector is coupled to the SPAD.



PIN	FUNCTION
①	APD−
②	Thermistor
③	Thermistor
④	APD+
⑤	TE−
⑥	TE+

TEC SPECIFICATIONS

Parameter	Conditions	Max	Units
TEC Current	-	1.5	A
TEC Voltage	-	1.9	V
TEC deltaT	Device case at 298K	77	°C

Thermistor = 2.20KΩ at 298K, 291.75KΩ at 223K
Steinhart-Hart Thermistor Constants: A=1.629E-03; B=2.242E-04; C=4.316E-09

6. Absolute Maximum Ratings

Parameter	Conditions	Max	Units
Forward Current	Continuous Bias	+1	mA
Forward Voltage	Continuous Bias	+1	V
Optical Power	Continuous Wave (CW)	1	mW
Reverse Current	Continuous Bias	-1	mA
Reverse Voltage	Continuous Bias	-(Vb+5)	V
Reverse Voltage	Pulsed (gated operation)	-(Vb+10)	V

Operation beyond maximum ratings may cause permanent device damage.

7. Product Handling

These avalanche photodiodes are sensitive to electrostatic discharge (ESD) and should be handled with appropriate caution, including the use of ESD protective equipment such as grounding straps and anti-static mats.

Beijing RMY Electronics Ltd.
RMY Electronics (Hong Kong) Ltd
Http://www.RMYelectronics.com/english

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