PRELIMINARY DATASHEET

Cooled Single Photon Counting Avalanche Photodiode – Fiber Pigtailed

PGA-308

1. Product Description

The RMY Electronics SPAD is an InGaAs/InP avalanche photodetector (transferred technology from previous PrincetonLightwave Inc.) designed specifically for single photon counting applications. 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 0.95 to 1.6 µm.

The RMY SPAD described in this datasheet is a single mode fiber-pigtailed device provided in a standard three-stage TEC cooled 6 pin TO-8 can. Two Geiger mode test reports measured at a low rate 2MHz and a high rate 50MHz are available.

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

Parameter Description	Test Conditions	Specifications			Unit
		Min	Typical	Max	
Effective Optical Diameter		10		16	µm
Breakdown voltage, (V_b)	at I_d = 10 µA	50	70	90	V
Temperature dependence of V_b, γ	$\Delta V_b/\Delta T$, linear approximation		0.1		V/ºC
Quantum Efficiency, (QE)	1550 nm, M=1 (Linear mode) 1300 nm, M=1 (Linear mode)		60 75		%
Responsivity, (R)	1550 nm, M=1 (Linear mode) 1300 nm, M=1 (Linear mode)		0.75 0.75		A/W
Total Dark Current, (I_D)	M=10; primarily non-multiplied I_d		0.3		nA
Capacitance, (C)	M=10, 1 MHz		0.25		pF

3. Low Rate Geiger Mode Parameters (T_{OP}=223K, No blanking, 1550nm)

Test Conditions	Parameter Description	Parameter Definition	PGA-308 (PGA-308-TFT)		Unit
			Min	Max	
2MHz Repetition Rate Gating，1550nm 1MHz 0.1Photon/Pulse	Detection Efficiency(DE)	at DCR maximum	20		%
	Dark Count Rate(DCR)	at DE minimum		10	kHz
	Afterpulse Probability(APP)	at DE minimum		0.2%*	/Pulse

* Afterpulse Probability(APP) 0.2%/Pulse is equivalent to $4x10^{-4}$/Trigger

4. High Rate Geiger Mode Parameters (T_{OP}=223K, No blanking, 1550nm)

Test Conditions	Parameter Description	Parameter Definition	PGA-308 (PGA-308-TFT)		Unit
			Min	Max	
50MHz Repetition Rate Gating，1550nm 5MHz 0.1Photon/Pulse	Detection Efficiency(DE)	at DCR maximum	20		%
	Dark Count Rate(DCR)	at DE minimum		10	kHz
	Afterpulse Probability(APP)	at DE minimum		10%	/Pulse

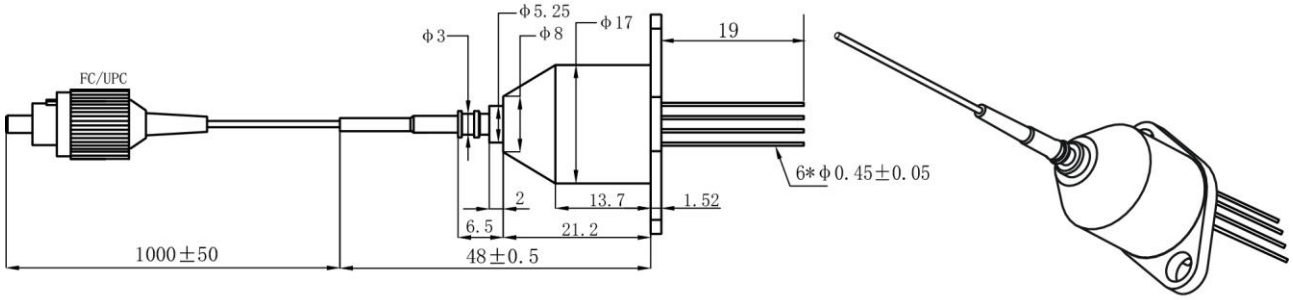
5. Absolute Maximum Ratings

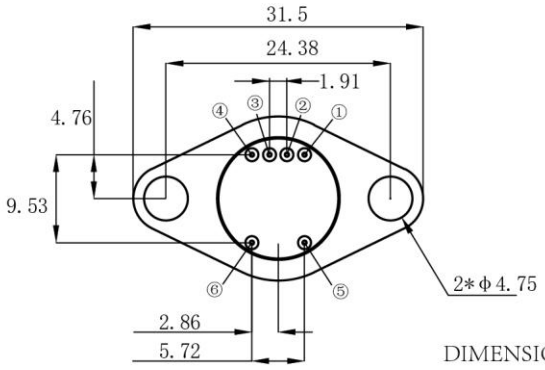
Parameter	Conditions	Max	Units
Forward Current	Continuous Bias	+1	mA
Forward Voltage	Continuous Bias	+1	V
Optical Power	Continuous Wave (CW)	1	mW
Reverse Current	Continuous Bias	-1	mA
Reverse Voltage	Continuous Bias	-(Vb+5)	V
Reverse Voltage	Pulsed (gated operation)	-(Vb+10)	V

Operation beyond maximum ratings may cause permanent device damage.

6. Mechanical Specifications

The PGA-308 is packaged in a standard 6 pin TO-8 header with a three stage thermo-electric cooler capable of cooling the APD from package temperature of 25°C to -50°C (223K). A single mode fiber (9/125 µm) pigtail with an FC/PC connector is coupled to the APD. Fiber length: 1.0±0.05m





DIMENSIONS ARE IN mm

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

5. 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.

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