PRELIMINARY

Coaxial Single Photon Avalanche Diode (SPAD)

PGA-246

1. Product Description

The RMY SPAD is an InGaAs/InP avalanche photodetector (transferred technology from previous Princeton Lightwave Inc.) 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 appropriate pulse detection circuitry, this device allows for the detection of single photons in the wavelength range from 0.95 to 1.65μm.

The RMY SPAD described in this datasheet is a back-illuminated device provided in a standard TO-46 can with a window cap,16μm diameter chip is inside.

2. Performance Specifications

Parameter Description	Test Conditions	Specifications			Unit
		Min	Typ	Max	
Linear Mode Parameters (case temperature 295K, all voltages and currents are reverse biased)					
Breakdown voltage, V_b	I_d = 10 uA	50	70	90	V
Temperature dependence of V_b, γ	$\Delta V_b/\Delta T$, linear approximation		0.1		V/ºC
Total Dark Current, I_d	M=10; primarily non-multiplied I_d		0. 3		nA
Capacitance, C	M=10, 1 MHz		0.25		pF
Geiger Mode Parameters (1550 nm**)**					
Dark Count Rate, DCR[1]	case temperature 233 K, at DE min			5	kHz
Detection Efficiency, DE [1]	case temperature 233 K, at DCR max	20			%
Afterpulse, AP[1]	case temperature 233 K, at DCR max		$2.5X10^{-4}$		

[1] Typical value achieved by design, not tested on shipped product.

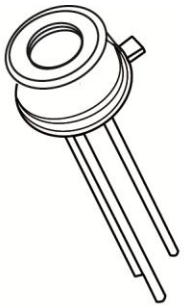
3. Maximum Ratings

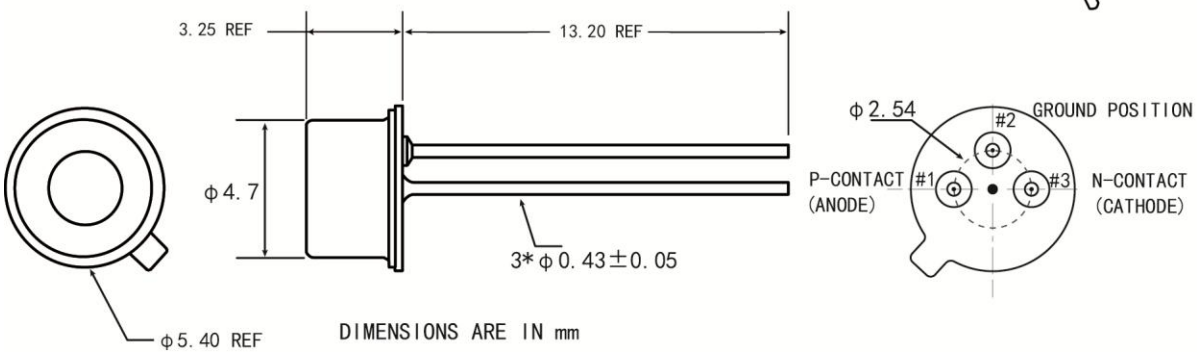
Parameter	Conditions	Min.	Max.	Units
Forward Current	Continuous bias		+1	mA
Forward Voltage	Continuous bias		+1	V
Reverse Current	Continuous bias		-1	mA
Reverse Voltage	Continuous bias		-(V_b+5)	V
Reverse Voltage	Pulsed (gated operation)		-(V_b+10)	V
Optical Power	Continuous wave (CW)		1	mW
Case Temperature		-60	65	°C

Maximum ratings indicate conditions that the device can be exposed for short periods of time without damage. Although InGaAs SPADs are sometimes operated at temperatures below -60 °C, these devices have not yet been tested to establish their reliability characteristics at very low temperatures and under extreme conditions of thermal cycling.

4. Mechanical Specifications

The TO-46 package contains the back-illuminated SPAD on a custom submount and is hermetically sealed with a flat window cap. Anode and cathode leads are isolated from the case ground.





TO-46 Pin-out

Pin	Description
#1	P-contact (Anode)
#2	Case Ground
#3	N-contact (Cathode)

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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