



PRELIMINARY

Coaxial Negative Feedback Avalanche Diodes (NFAD)

PNA-200

1. Product Features

- **Single photon sensitivity**
- **SWIR (1000 – 1700nm) response**
- **High gain and low noise**
- **Fast response with precise timing**

RMY's PNA-200 NFAD (transferred technology from previous Princeton Lightwave Inc.) is a new type of photon-counting device with 3-pin TO-46 package, consisting of InGaAs/InP avalanche diodes chip with monolithically integrated negative feedback. This integration approach of negative feedback resistors provides stable high-performance single photon response in Geiger mode operation, Leveraging the best-in-class performance of RMY's single photon avalanche diode (SPAD) technology. RMY's NFAD has excellent photon-counting capability in the shortwave infrared (SWIR) band, with high internal gain (10^5 to 10^6) and low dark count rate. The detector also has fast response coupled with excellent time resolution.

2. Applications

- **Laser Radar (LADAR) and Ranging**
- **Free-space optical communications**
- **Fluorescence measurements**
- **Environmental analysis**
- **Biomedical devices**

3. Typical Performance Specifications

Operating conditions: device temperature $T = 240$ K; reverse-biased

Parameter Description	Symbol	PNA-200	Units
Detection area dimensions		Ø32	µm
Spectral response range		1020 - 1650	nm
Photon detection efficiency	PDE	Min 10	%
Operating voltage	V_{op}	70 - 85	V
Dark count rate (PDE 10%)	DCR	Max 50	kHz
Terminal capacitance	C_t	0.4	pF
Timing jitter [1]	TJ	300 - 400	ps
Temperature coefficient of V_{op}	γ	0.1	V/K
Output pulse amplitude [2]	V_{out}	0.5 - 1.5	mV

Note: Typical value achieved by design, not tested on shipped product.

[1] Single photon level, FWHM

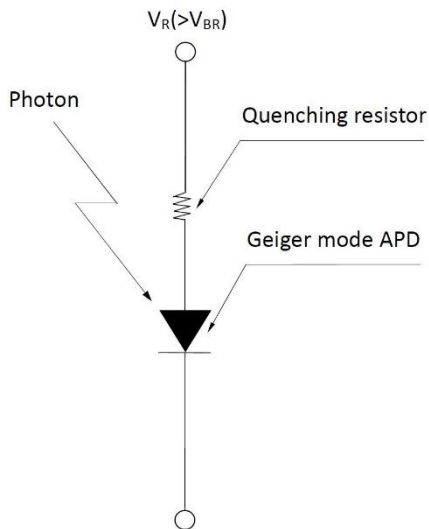
[2] 50Ω termination, depends on PDE

4. 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	-(V _b +5)	V
Reverse Voltage	Pulsed (gated operation)	-(V _b +10)	V

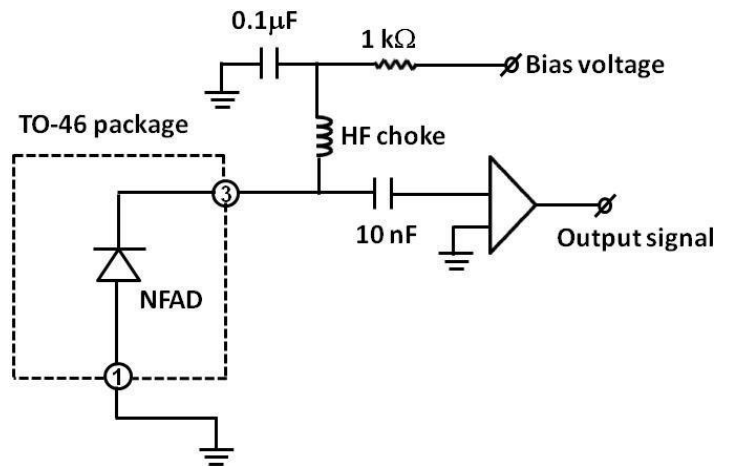
Operation beyond maximum ratings may cause permanent device damage.

5. Principle Of Operation

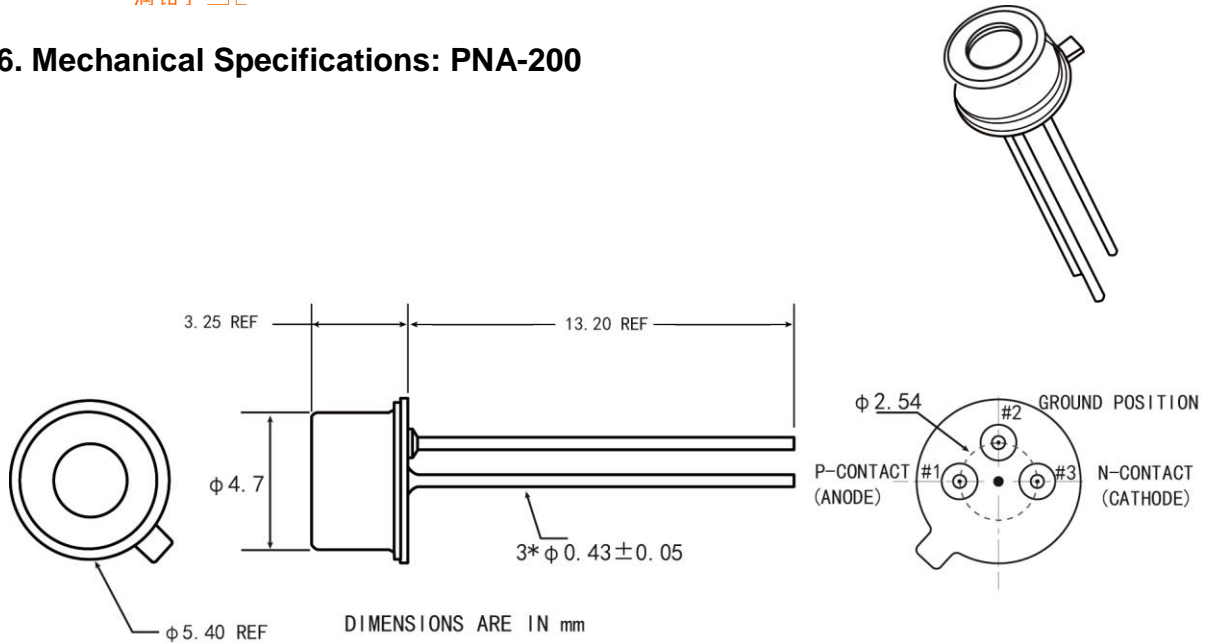


V_R : Reverse voltage
V_{BR} : Breakdown voltage

Typical Application Circuit: PNA-200



6. Mechanical Specifications: PNA-200



7. Product Handling

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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