



PRELIMINARY

Pigtailed Negative Feedback Avalanche Diodes (NFAD)

PNA-300-SM

1. Product Features

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

RMY's PNA-300 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 diode 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. The pigtail is SMF-28 single mode fiber.

2. Applications

- **Laser Radar (LADAR) and Ranging**
- **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-300-SM	Units
Detection area dimensions		$\varnothing 22$	μm
Spectral response range		1020 - 1650	nm
Photon detection efficiency	PDE	Min 10	%
Operating voltage (10% PDE)	V_{op}	70 - 85	V
Dark count rate [1]	DCR	Max 30	kHz
Terminal capacitance	C_t	0.4 typical	pF
Timing jitter [2]	TJ	300 typical	ps
Temperature coefficient of V_{op}	γ	0.1 typical	V/K
Output pulse amplitude [3]	V_{out}	0.5 typical	mV

[1] At PDE = 10%

[2] Single photon level, FWHM

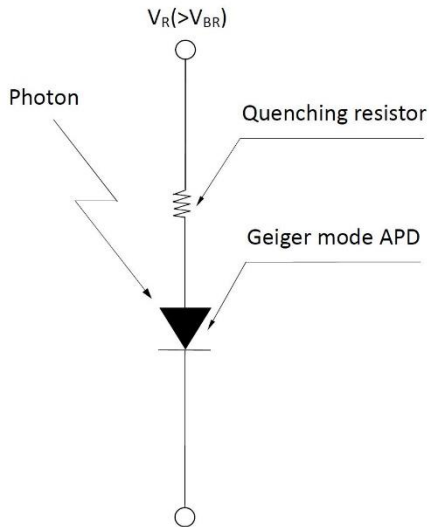
[3] 50 Ω termination, depends on PDE

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

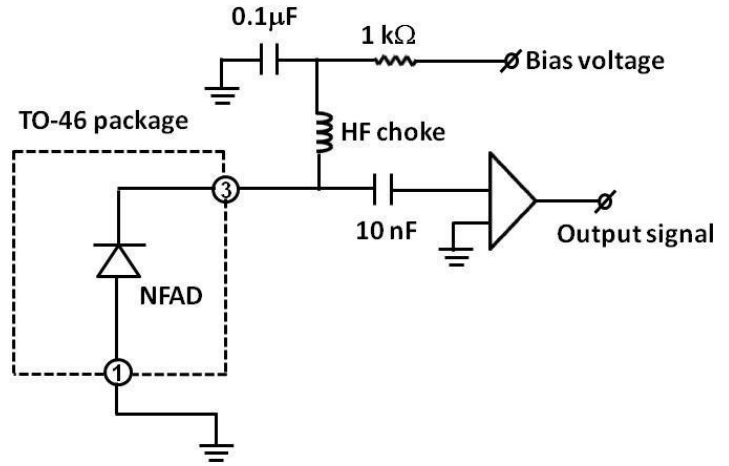
Operation beyond maximum ratings may cause permanent device damage.

5. Principle Of Operation

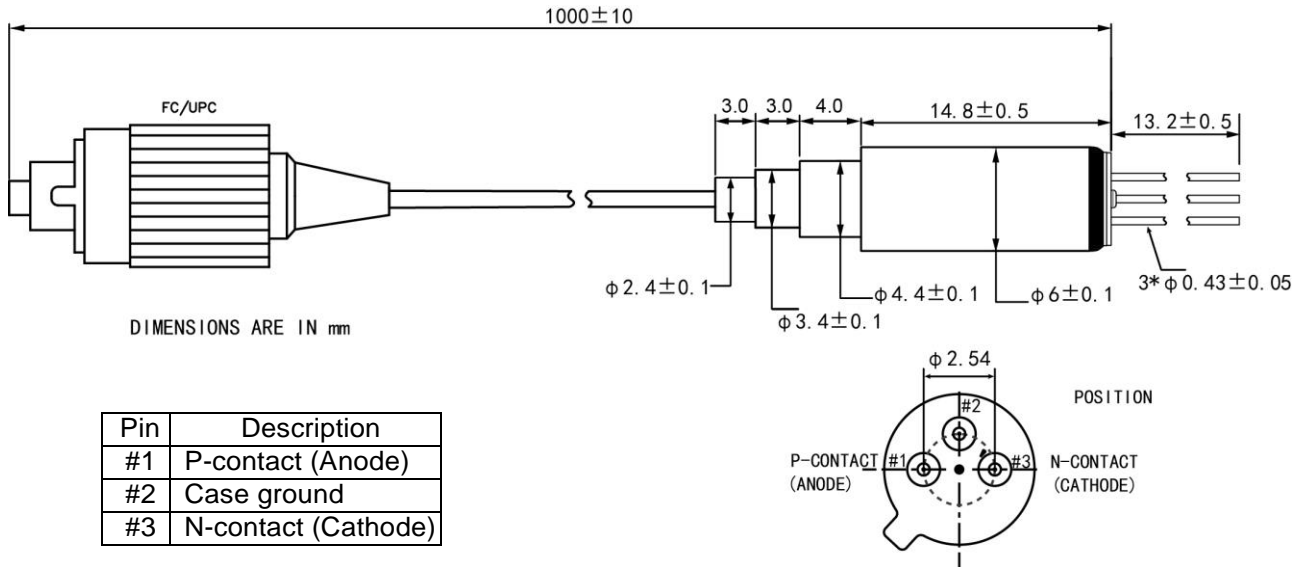


V_R : Reverse voltage
V_{BR} : Breakdown voltage

Typical Application Circuit: PNA-300-SM



6. Mechanical Specifications: PNA-300-SM



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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