



# PRELIMINARY

## MMF Pigtailed Negative Feedback Avalanche Diodes (NFAD)

### PNA-300-MM

#### 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, and the pigtail is 62.5/125 $\mu$ m multi-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-MM	Units
Detection area dimensions		$\varnothing 22$	$\mu$ m
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 $V_{op}$	$\gamma$	0.1 typical	V/K
Output pulse amplitude [3]	$V_{out}$	0.5 typical	mV

[1] At PDE = 10%

[2] Single photon level, FWHM

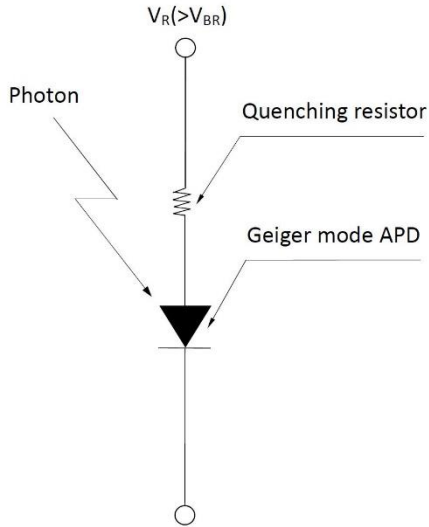
[3] 50 $\Omega$  termination, depends on PDE

#### 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

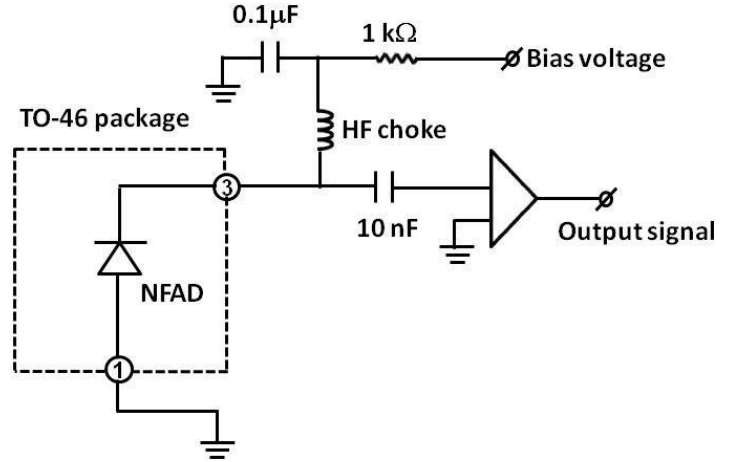
Operation beyond maximum ratings may cause permanent device damage.

#### 5. Principle Of Operation

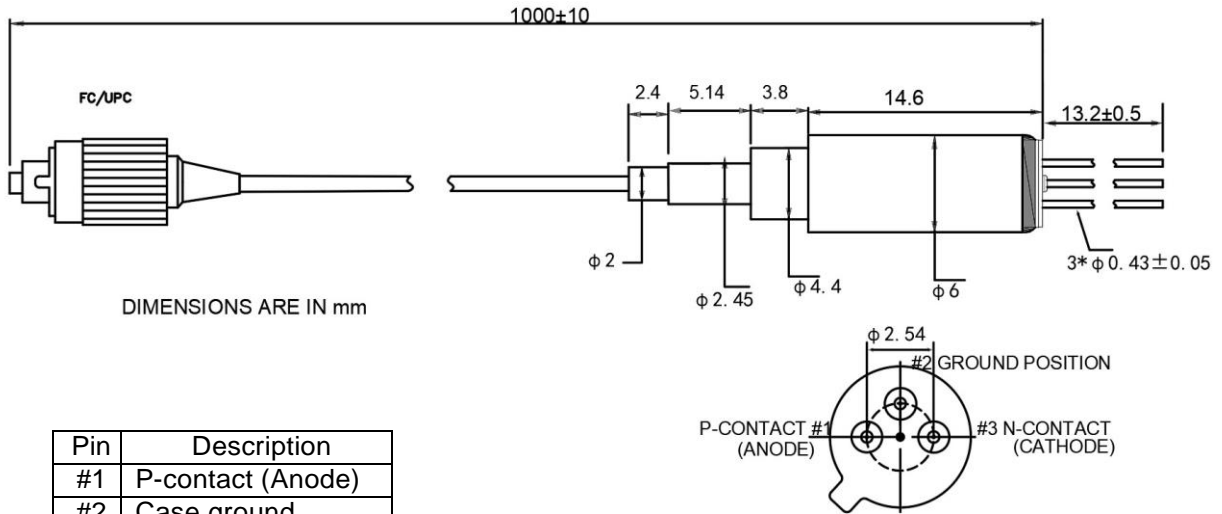


$V_R$  : Reverse voltage  
 $V_{BR}$  : Breakdown voltage

#### Typical Application Circuit: PNA-300-MM



## 6. Mechanical Specifications: PNA-300-MM



## 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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