

PRELIMINARY

Cooled Negative Feedback Avalanche Diodes (NFAD)

PNA-208-32u

1. Product Features

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

RMY's PNA-208-32u NFAD (transferred technology from previous Princeton Lightwave Inc.) is a new type of photon-counting device in a standard three-stage cooled 6 pin TO-8 can, consisting of InGaAs/InP avalanche diode chip with monolithically integrated negative feedback. This integration approach of negative feedback resistor 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 (10⁵ to 10⁶) and low dark count rate. The detector also has fast response coupled with excellent time resolution.

2. Applications

- Laser Radar (LADAR) and Rangefinding
- 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-208-32u	Units
Detection area dimensions		Ø32	μm
Spectral response range		1020 - 1650	nm
Photon detection efficiency	PDE	Min 10	%
Operating voltage	Vop	70 - 90	V
Dark count rate (PDE 10%)	DCR	Max 50	kHz
Terminal capacitance	Ct	0.4	pF
Timing jitter [1]	TJ	300 - 400	ps
Temperature coefficient of Vop	Y	0.1	V/K
Output pulse amplitude [2]	Vout	0.5 - 1.5	mV

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

[2] 50 Ω termination, depends on PDE

^[1] Single photon level, FWHM



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	-(Vb+5)	V
Reverse Voltage	Pulsed (gated operation)	-(Vb+10)	V

Operation beyond maximum ratings may cause permanent device damage.

5. TEC Specifications

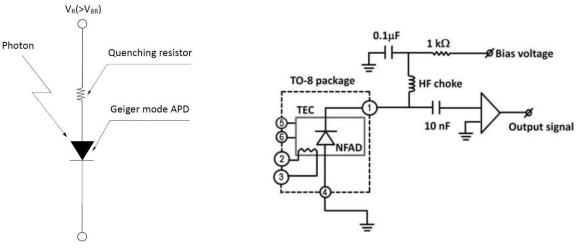
Parameter	Conditions	Мах	Units
TEC Current		1.5	A
TEC Voltage		1.9	V
TEC deltaT	Device case at 298K	77	°C

Thermistor = 2.20K Ω at 298K, 291.75K Ω at 223K

Steinhart-Hart Thermistor Constants: A=1.629E-03; B=2.242E-04; C=4.316E-09

6. Principle Of Operation

Typical Application Circuit: PNA-208-32u

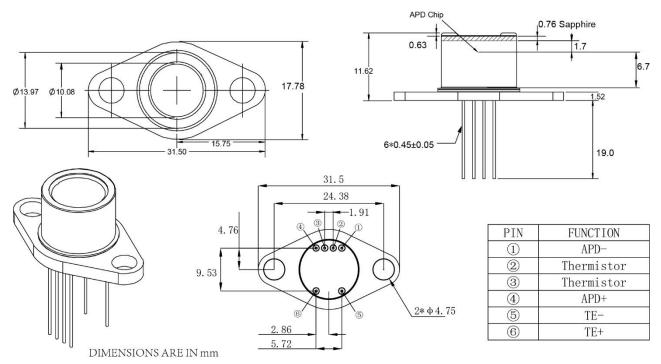


V_R : Reverse voltage V_{BR} : Breakdown voltage



7. Mechanical Specifications: PNA-208-32u

The PNA-208-32u 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).



8. 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 antistatic mats.

> Beijing RMY Electronics Ltd. RMY Electronics (Hong Kong) Ltd. www.RMYelectronics.com/english

RMY Electronics Limited Subject to change without notice