

NIRDAPD TEC Series Discrete Amplification Photon Detector



Amplification Technologies NIRDAPD TEC series photodetector is a near infrared photodetector designed for wide-bandwidth analog detection of low-level light signals with sensitivity in the signal pulse that is unique for NIR analog detectors - down to a single photon.

The NIRDAPD TEC series takes advantage of the breakthrough Discrete Amplification (DA) method, developed and patented by Amplification Technologies, Inc. Use of DA technology allows high-quality internal amplification with high gain ($>10^5$), fast response (< 0.5 ns rise time) and an extremely low excess noise factor (< 1.05).

The photodetector is packaged in a hermetically sealed TO-8 package with a two-stage thermoelectric cooler. Used in conjunction with the DEM2DAPD10 series Evaluation Module, it can cool anywhere in the range of room temperature to -30°C .

The NIRDAPD TEC series photodetector is available in two different active area sizes: $80\mu\text{m}$ and $200\mu\text{m}$.

Key Features

Electro-optical

- Near infrared spectral response from 1000 to 1700 nm
- Fast response
- High gain
- Low noise-factor
- TEC cooling to -30°C

Applications

- LIDAR and environmental monitoring
- Spectroscopy and Instrumentation
- Fluorescence detection
- 3D Imaging
- Homeland security
- Biological Sensors
- Quantum Communications
- Night Vision

Specifications (at an operating temperature of -10°C)

Parameter	NIRDAPD TEC series		Unit
	80	200	
Active area diameter	80	200	μm
Spectral response range (λ)	950 – 1650		nm
Typical gain (M)	8x10 ⁴		-
Excess Noise Factor	< 1.05		-
Photon Detection Efficiency @1550 nm (PDE) ¹	8 – 16		%
Single Electron Response pulse width (FWHM)	0.6	0.7	ns
Typical dark count rate	1-10		Mcps
Operating bias	50 – 80		V

(1) Photon detection efficiency includes cross talk and afterpulsing.

TEC and Thermistor Characteristics

TEC Performance Values

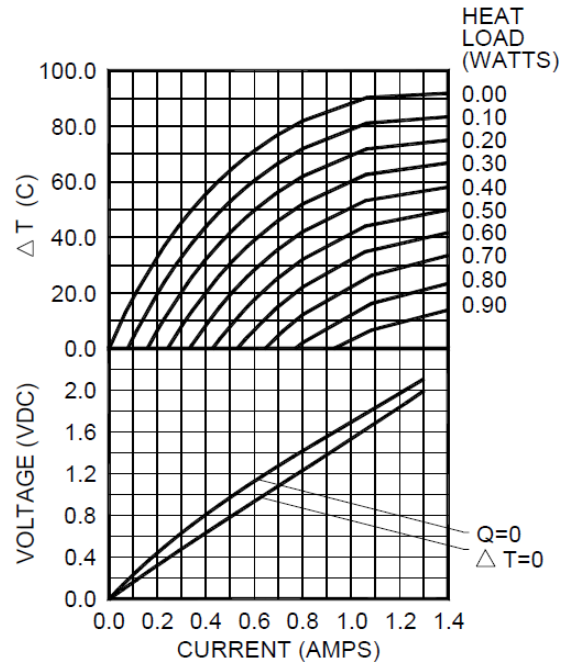
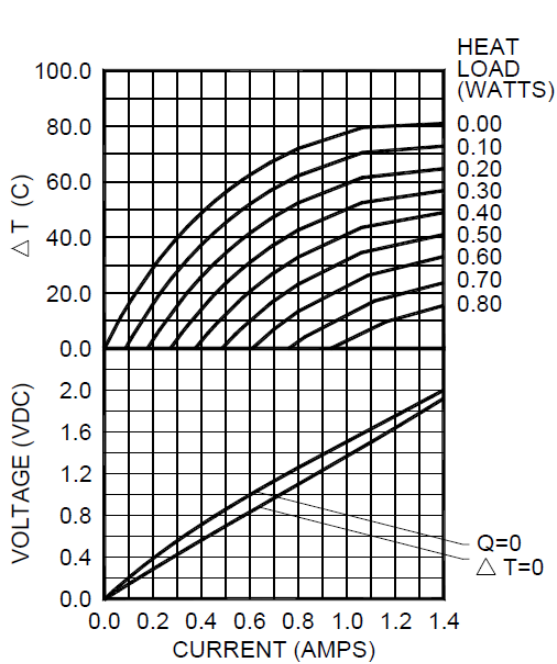
Hot Side Temperature (°C)	27°C	50°C
Δ T _{max} (°C at dry N ₂):	83	94
Q _{max} (W):	0.92	1.02
I _{max} (A):	1.4	1.3
V _{max} (V):	2.0	2.1
AC Resistance (Ω):	1.32	---

TEC Performance Curves

Environment: One atmosphere dry nitrogen

Hot Side Temperature: 27°C

Hot Side Temperature: 50°C



Operation Cautions

Note: The performance curves are obtained with optimal heat dissipation. Careful consideration should be taken to design a proper heat removal from the TO8 header.

For maximum reliability, storage and operation below 85°C in a non-condensing environment is recommended. To minimize thermal stress, use linear/proportional temperature control or a similar method rather than an ON/OFF method.

Thermistor Specification

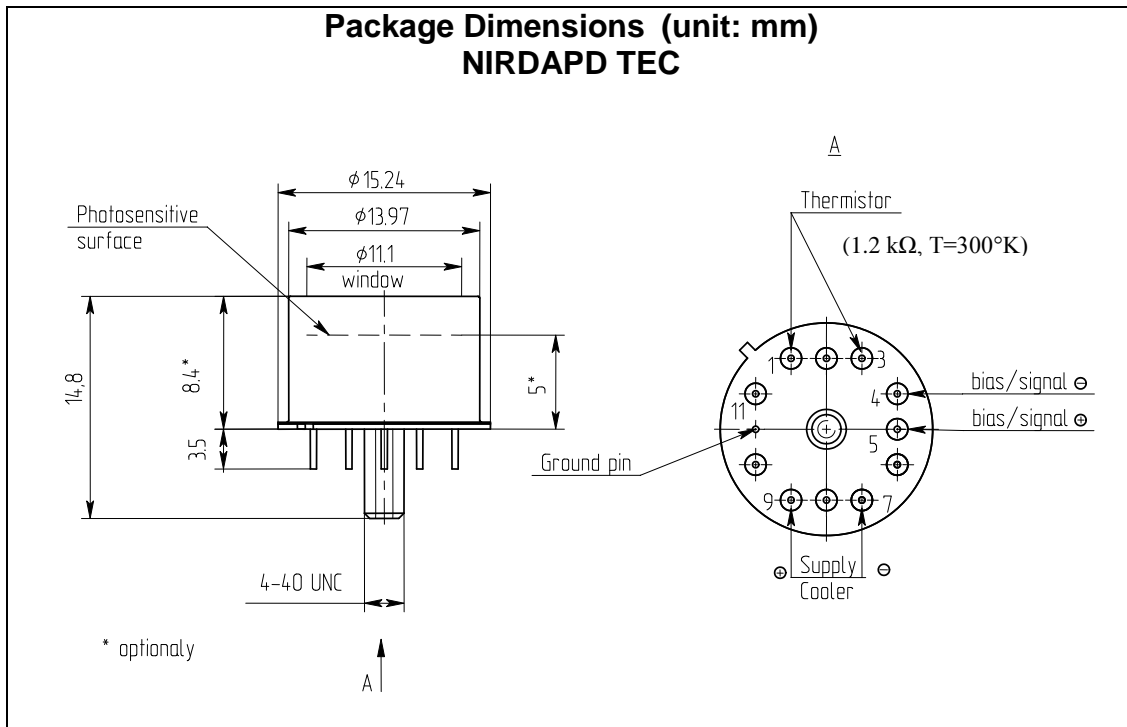
Temperature Range:	Nominal Resistance:	Accuracy:
-100 °C to 100 °C	1.25K Ohms @ 25°C	+/-30% @ 25°C

NIRDAPD TEC Series

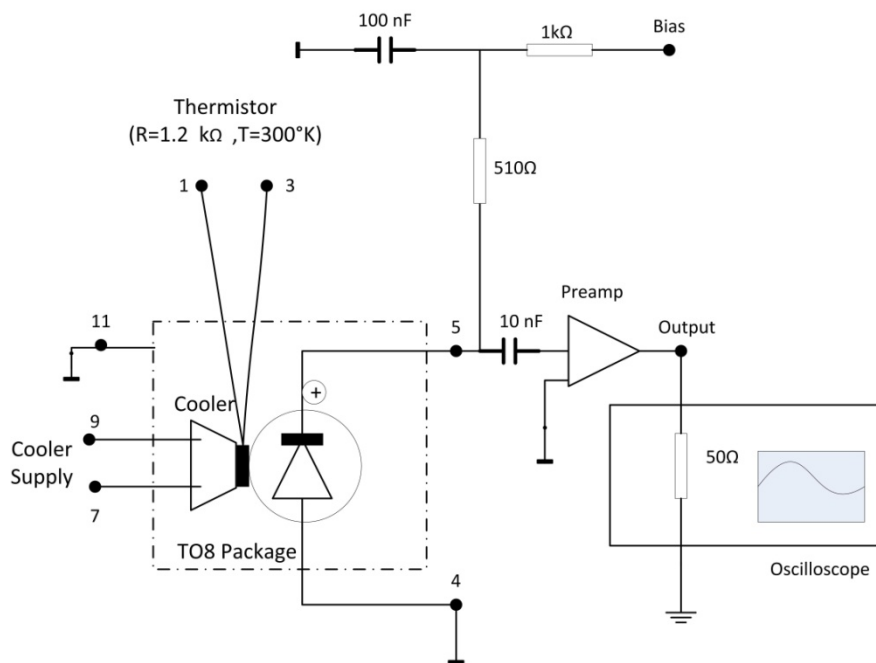
Nominal Thermistor Resistance Values

Temp. °C	Ohms	Temp. °C	Ohms	Temp. °C	Ohms
-100	794000	-30	11200	40	775
-95	547000	-25	8840	45	666
-90	381000	-20	7060	50	575
-85	268000	-15	5680	55	499
-80	191000	-10	4600	60	435
-75	137000	-5	3750	65	380
-70	99400	0	3080	70	334
-65	73000	5	2540	75	294
-60	54200	10	2110	80	260
-55	40700	15	1760	85	231
-50	30800	20	1480	90	206
-45	23600	25	1250	95	184
-40	18200	30	1060	100	165
-35	14200	35	905		

Package Mechanical Dimensions



Basic Connection Diagram for
NIRDAPD TEC Series



NIRDAPD TEC Series



Precautions for Use

These devices are ESD sensitive. Use of grounding straps, anti-static mats and other standard electrostatic discharge protective equipment and methods are recommended when handling or testing these devices.

Quality Vision

Amplification Technologies Inc is committed to providing products with the highest levels of quality and reliability using best available manufacturing processes. Our top priority is total customer satisfaction. Amplification Technologies Inc maintains a strict quality control program to ensure that all products meet or surpass published specifications.

Ordering Information

When ordering, please specify the following information: NIRDAPD TEC-XXX where XXX corresponds to the photodetector chip active area. Please call for other custom options such as custom chip active area, custom optical windows, etc.

Contact Information:

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