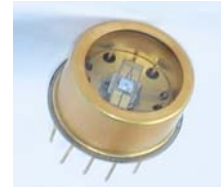


### DAPD TO8 Series Thermoelectrically Cooled Discrete Amplification Photon Detector



Amplification Technologies DAPD TO8 series photodetector is a wide spectral range high-speed photodetector designed for analog detection of extremely low-level light signals (in the range from one photon to several thousand photons).

The DAPD TO8 series takes advantage of the breakthrough Discrete Amplification (DA) method of amplifying low level electrical signal using multi-channel amplification, developed and patented by Amplification Technologies. Use of DA technology in a photodetector for internal amplification allows proportional detection of a light signal with very high gain ( $>1E5$ ), fast response ( $< 0.5$  ns rise time) and negligible excess noise factor ( $< 1.05$ ).

The design of the DAPD TO8 series photodetector was developed to provide both high Photon Detection Efficiency (PDE  $> 30\%$ ) and a wide dynamic range. Its fill factor is greater than 60% while its density of pixels is greater than 3000 pixel/mm<sup>2</sup>.

The photodetector is packaged in a hermetically sealed TO-8 package with a two-stage thermoelectric cooler. Used in conjunction with the DAPD2DAPD10 series Evaluation Module, it can cool anywhere in the range of room temperature to  $-30^{\circ}$  C. The DAPD TO8 series photodetector is available in four different active area sizes ranging from 0.18mm to 1.0mm.

## Key Features

### Electro-optical

- Wide and flat spectral response from UV to near IR
- High PDE at wide dynamic range
- Fast response
- High voltage and thermal stability
- High gain
- Low noise-factor

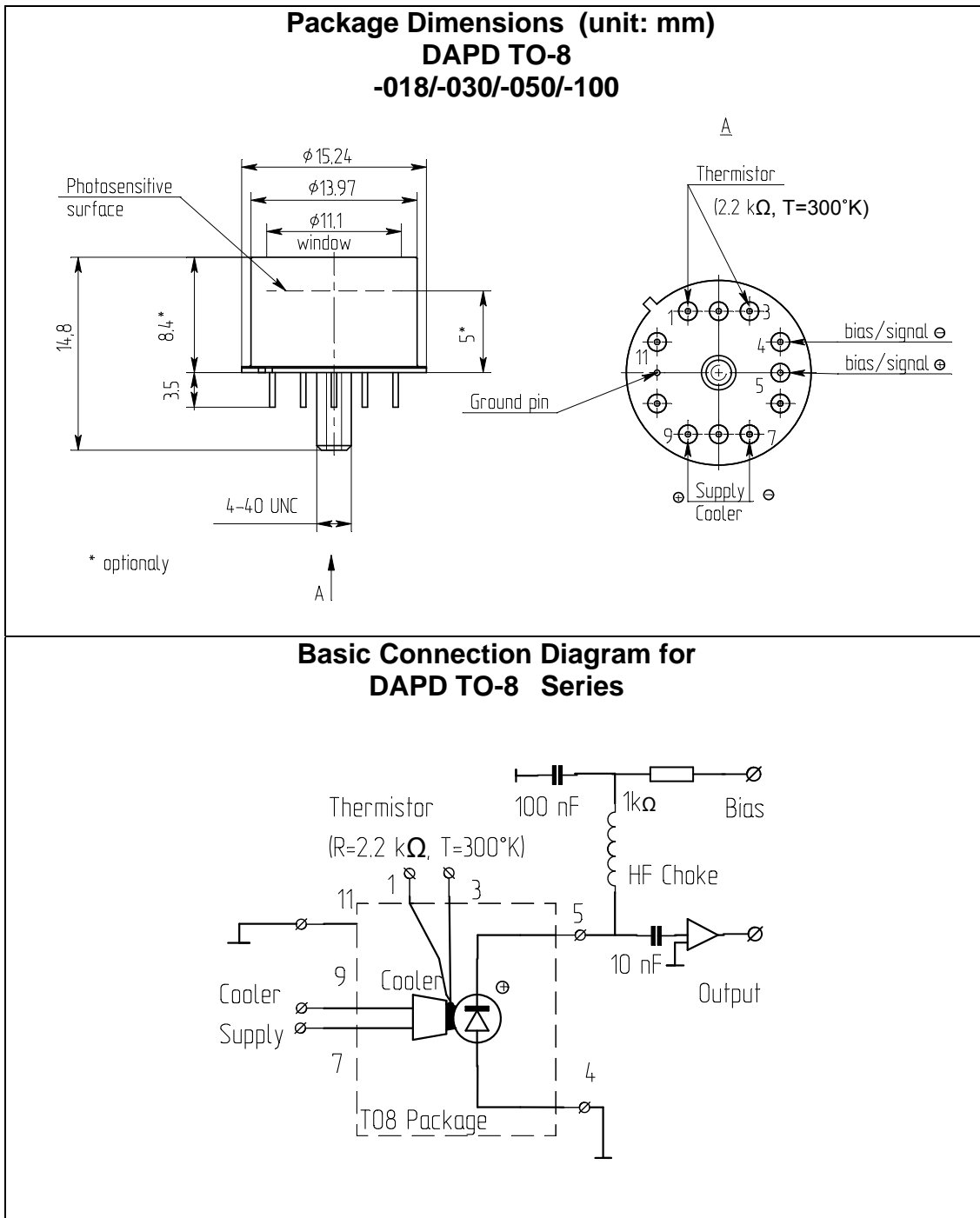
### Applications

- Medical imaging & fluorescence detection
- Spectroscopy and Instrumentation
- Homeland security
- Lidar and environmental monitoring
- High energy physics
- Biological Sensors
- Confocal microscopy
- Flow cytometry

**Specifications** (at a cooling temperature of  $-30^{\circ}\text{C}$ )

Parameter	DAPD TO8 series				Unit
	-018	-030	-050	-100	
Active area diameter	0.18	0.30	0.50	1.00	mm
Number of pixels (typical)	110	280	740	2900	-
Photon Detection Efficiency @440 nm (PDE) <sup>1</sup> no less than	30 - 40				%
Spectral response range ( $\lambda$ )	350 - 950				nm
Single Electron Response pulse width (FWHM) <sup>2</sup>	0.6	0.7	0.8	1.2	ns
Single Electron Response output voltage <sup>2</sup>	20 – 50	15 – 40	10 – 30	10 – 20	mV
Typical gain (M)	$3 \times 10^5$				-
Excess Noise Factor	< 1.05				-
Typical time resolution (FWHM)	230	230 - 260			ps
Typical dark count equivalent noise @5 ns gate, rms; not more than	0.03	0.05	0.07	0.14	electron
Terminal capacitance	3	5	7	16	pF
Typical temperature coefficient of operating bias	25				mV/ $^{\circ}\text{C}$
Operating bias	40 - 60				V
Temperature range of the sensor	from +25 to -30				$^{\circ}\text{C}$

(1) Photon detection efficiency includes cross-talk and afterpulsing.  
 (2) With use of external amplifier Mini- Circuits ZX60 – 4016E – S+.



### Precautions for Use

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: DAPD TO8-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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