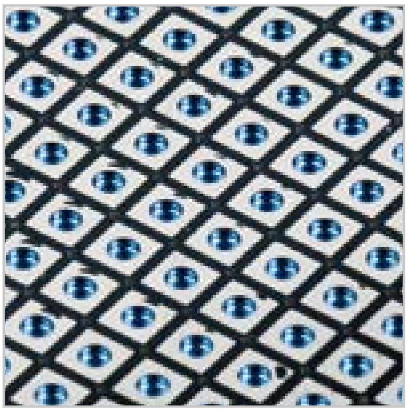
PRELIMINARY

UV-Enhanced Silicon Avalanche Photodiode SUR-Series



Description

The SUR-Series is based on a silicon "reach-through" structure with high sensitivity in the DUV/UV wavelength range. Many applications particularly in the medical and bio-medical fields require highly sensitive detectors in the short wavelength range for fluorescent measurements, analytical equipment or scintillation. The benefit of the SUR-Series is an extremely high sensitivity and low noise performance operating in the blue wavelength range and superior to any similar detector available presently on the market.

An important additional advantage of the new reach-through APD is its unmatched noise and sensitivity performance over the widest commercially available wavelength range, from 260 nm to 1000 nm. The diameter of the active area is 0.5 mm. The SUR-Series will be delivered in a special, hermetical sealed TO-46 package optimized for the UV wavelength range.

Features

- Very high quantum efficieny at DUV / UV
- Low noise
- 500 µm diameter active area
- UV optimized hermetical package

Applications

- Fluorescent measurements
- Analytical equipment
- Medical
- Scintillation
- High speed photometry

01/20 / V09 / IF / lc-apd/sur-series

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Absolute Maximum Ratings

	SUR500X			
	Min	Typ	Max	Units
Storage temperature	-55		100	°C
Operating temperature*	-40		85	°C
Reverse current peak value (CW operation)			200	µA
Reverse current peak value (1 sec duration)			1	mA
Forward current I_F at 25 °C average value (CW operation)			5	mA
Forward current I_F at 25 °C peak value (1 sec duration)			50	mA
Max. total power dissipation			60	mW
Soldering (for 15 sec.)			260	°C

* Extended operating temperature range possible for special design considerations

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Electrical Characteristics

	SUR500X			
	Min	Typ	Max	Units
Wavelength range	260		1000	nm
Active area diameter		0.5		mm
Breakdown voltage @ Id = 10 µA	100	200	300	V
Responsivity @ M = 100				
260 nm		21		A/W
300 nm		22		A/W
350 nm		25		A/W
400 nm		28		A/W
650 nm		44		A/W
NEP @ M = 100				
280 nm		22		fW/sqrt (Hz)
300 nm		20		fW/sqrt (Hz)
350 nm		18		fW/sqrt (Hz)
400 nm		16		fW/sqrt (Hz)
Temperature coefficient @ M = 100		0.9		V/K
Dark current, Id @ M = 100		200		pA
Noise current @ M = 100		0.5		pA/sqrt (Hz)
Capacitance @ M = 100		1.4		pF
Rise time @ M = 100 & 400 nm & RL = 50 Ohms		2		nsec
Cut-off frequency @ M = 100		150		MHz

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Fig. 1: Responsivity vs. Noise Relationship

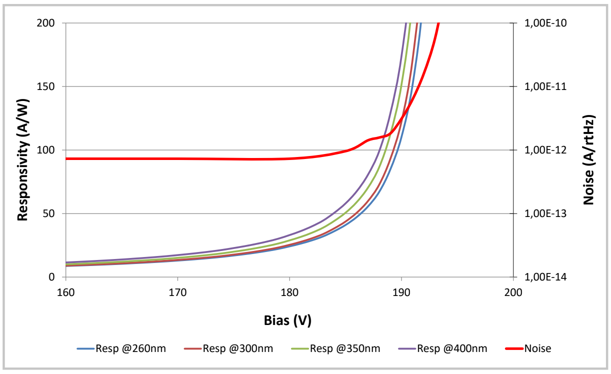


Fig. 2: Responsivity vs. Bias for 405 nm and 905 nm

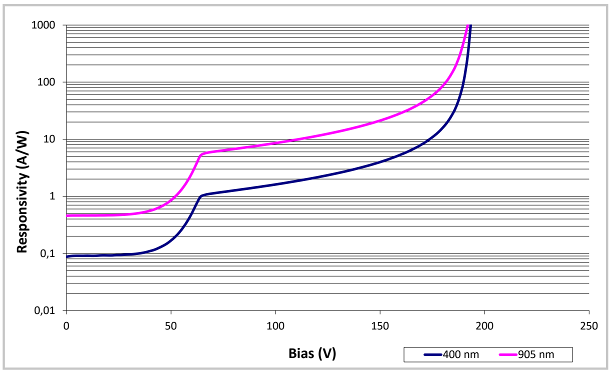


Fig. 3: Typical Capacitance vs. Bias Voltage

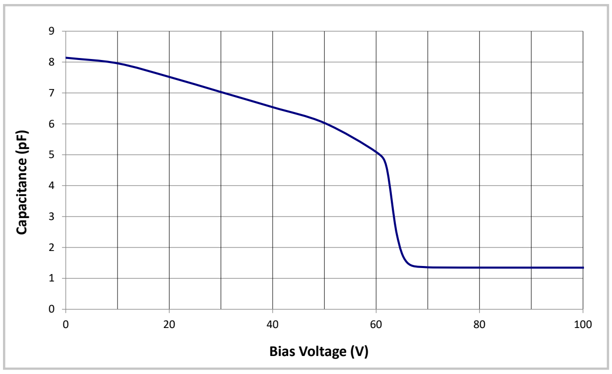


Fig. 4: Spectral vs. Gain

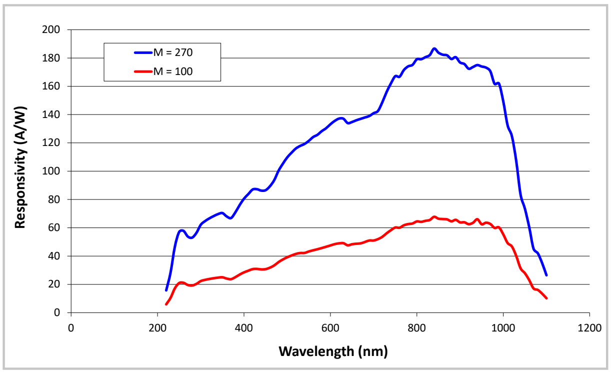


Fig. 5: Current vs. Bias Voltage Wavelength = 260 nm

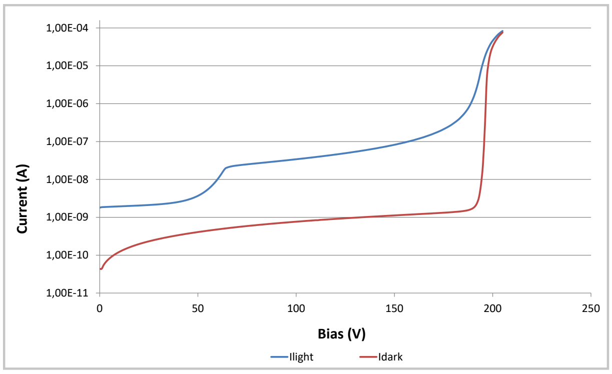
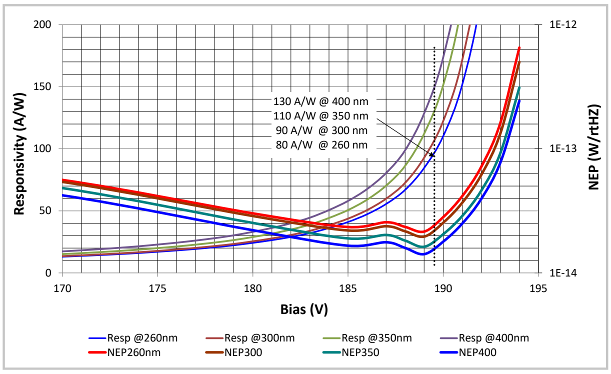


Fig. 6: NEP vs. Bias Voltage (I_{ph} = 0)



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Product Number Designations

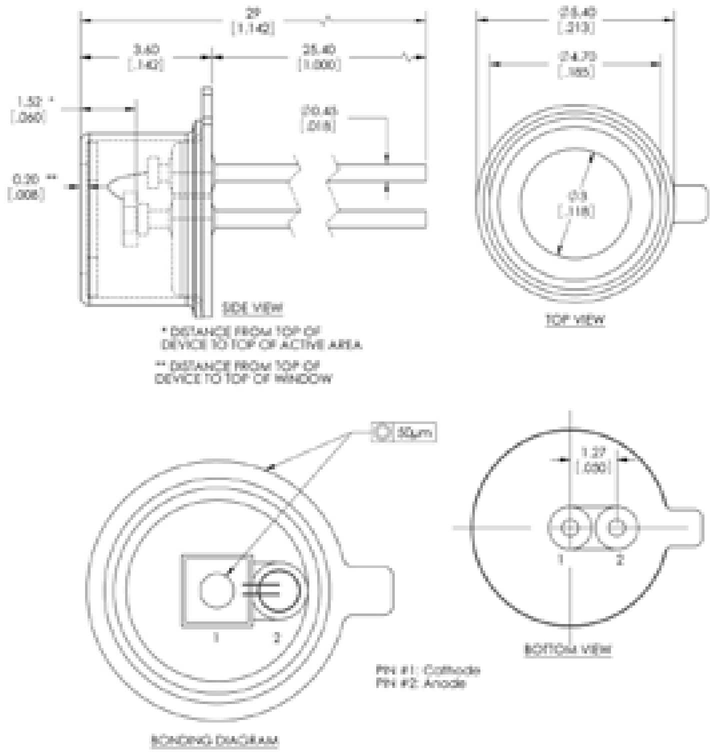
S	U	R		5	0	0			

Diameter
500 = 500 µm

Package Style
S8 = TO-46 (2 pin)
T6 = TO-37 (3 with TEC)
T8 = TO-8 (with 2 stg. TEC)

Package Drawings

Package S8 TO-46 (2 pin)



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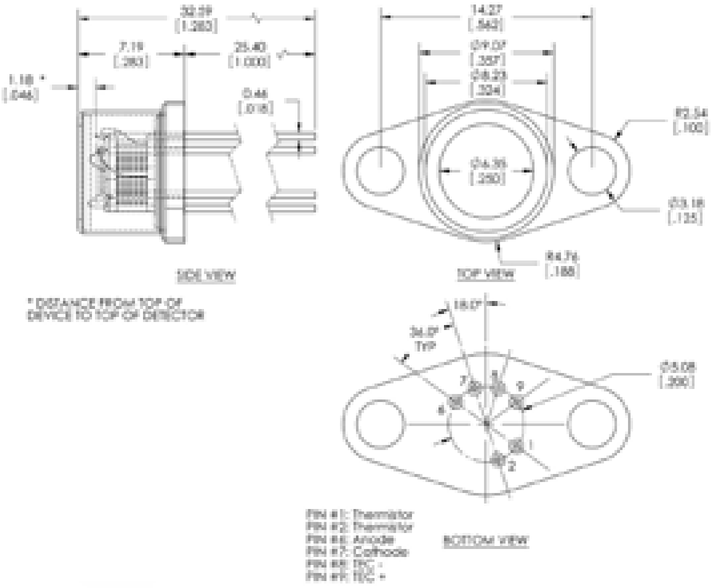
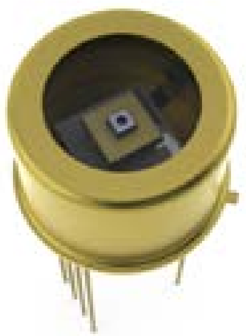
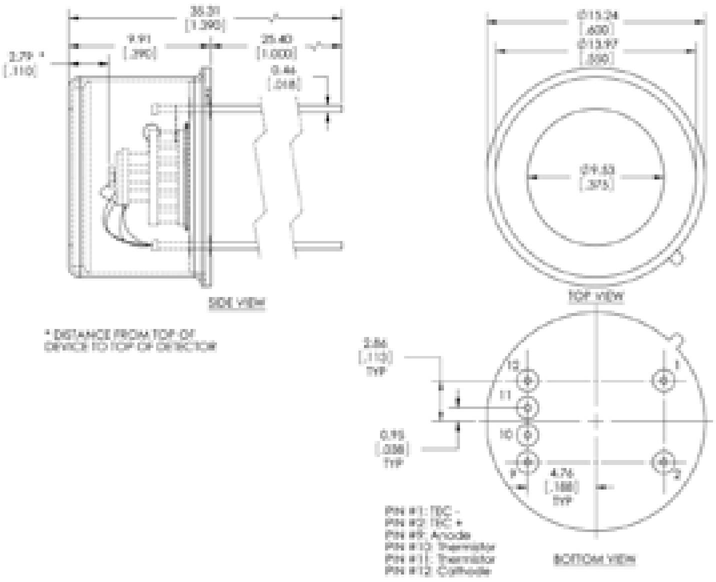
Package Drawings

Package T6 TO-37 (with TEC)



Package T8 TO-8 (with TEC)





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Cooled Versions

The one stage or two stage thermoelectrically cooled APD can be used for different reasons:

- To reduce the thermal noise for very weak signal detection. The one stage TEC (SUR500T6) has been design to operate the APD down to 0 °C whereas the two stage TEC (SUR500T8) version can be operated at −18 °C when the ambient the ambient temperature is 22 °C.
- To maintain a constant APD temperature irrespective of the ambient temperature. Because APD breakdown voltage decreases with temperature, the TE cooler allows a single operating voltage. Also, this configuration allows constant APD performance over an extended ambient temperature range

The integrated thermistor can be used to monitor the APD temperature and can be used to implement a TE cooler feedback loop to keep the APD at a constant temperature or/and to implement a temperature compensation on the APD bias voltage. A proper heat-sink is required to dissipate the heat generated by the APD and the TE cooler.

Product Changes

Ordering Information

Products can be ordered directly from LASER COMPONENTS or its representatives. For a complete listing of representatives, visit our website at www.lasercomponents.com

Custom designed products are available on request.

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