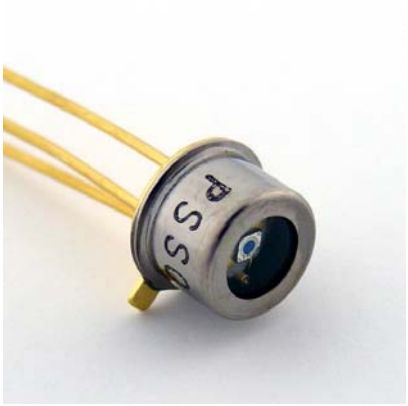
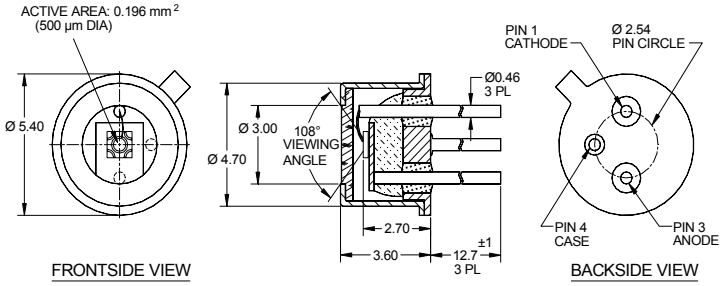
PACIFIC SILICON SENSOR Incorporated

# *Pacific Silicon Sensor Series 8 Data Sheet*
## Part Description AD500-8-TO52-S1
## Order # 06-016






## FEATURES
- ∅ 500 µm active area
- High gain at low bias voltage
- Fast rise time
- Low capacitance

## DESCRIPTION
0.196 mm$^2$ High Speed, High Gain Avalanche Photodiode with N on P construction. Hermetically packaged in a TO-52-S1 with a clear borosilicate glass window cap.

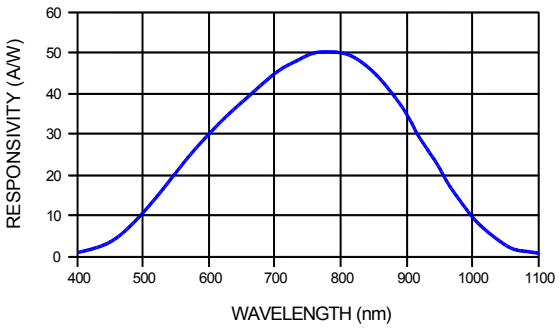
## APPLICATIONS
- High speed optical communications
- Laser range finder
- Medical equipment
- High speed photometry

RoHS COMPLIANT

## ABSOLUTE MAXIMUM RATING

| SYMBOL | PARAMETER | MIN | MAX | UNITS |
|---|---|---|---|---|
| $T_{STG}$ | Storage Temp | -55 | +125 | °C |
| $T_{OP}$ | Operating Temp | -40 | +100 | °C |
| $T_{SOLDERING}$ | Soldering Temp 10 seconds | | +260 | °C |
| | Electrical Power Dissipation @ 22°C | - | 100 | mW |
| | Optical Peak Value, once for 1 second | - | 200 | mW |
| $I_{PH}$ (DC) | Continuous Optical Operation | - | 250 | µA |
| $I_{PH}$ (AC) | Pulsed Signal Input 50 µs "on" / 1 ms "off" | - | 1 | mA |

## SPECTRAL RESPONSE at M = 100



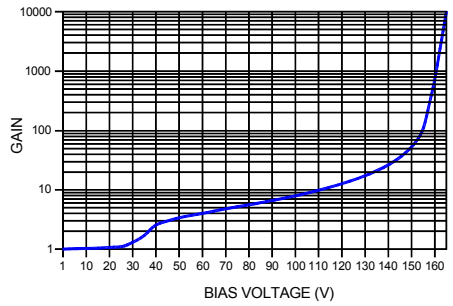

## ELECTRO-OPTICAL CHARACTERISTICS @ 22 °C

| SYMBOL | CHARACTERISTIC | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| $I_D$ | Dark Current | M = 100* | --- | 0.5 | 2.0 | nA |
| C | Capacitance | M = 100* | --- | 2.2 | --- | pF |
| $V_{BR}$ | Breakdown Voltage | $I_D$ = 2 µA | 80 | 200 | --- | V |
| | Temperature Coefficient of $V_{BR}$ | | 0.35 | 0.45 | 0.55 | V/K |
| | Responsivity | M = 100; = 0 V; λ = 800 nm | 45 | 50 | --- | A/W |
| $\Delta f_{3dB}$ | Bandwidth | -3dB | --- | 1.0 | --- | GHz |
| $t_r$ | Rise Time | | --- | 350 | --- | ps |
| | Optimum Gain | | 50 | 60 | --- | |
| | "Excess Noise" factor | M = 100 | --- | 2.2 | --- | |
| | "Excess Noise" index | M = 100 | --- | 0.2 | --- | |
| | Noise Current | M = 100 | --- | 1.0 | --- | pA/Hz$^{1/2}$ |
| | Max Gain | | 200 | --- | --- | |
| NEP | Noise Equivalent Power | M = 100; λ = 800 nm | --- | 2.0 X 10$^{-14}$ | --- | W/Hz$^{1/2}$ |

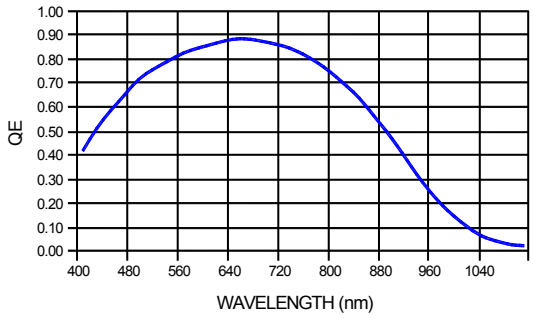
* Measurement conditions: Setup of photo current 10 nA at M = 1 and irradiated by a 680 nm, 60 nm bandwidth LED. Increase the photo current up to 1 µA, (M = 100) by internal multiplication due to an increasing bias voltage.

Disclaimer: Due to our policy of continued development, specifications are subject to change without notice.

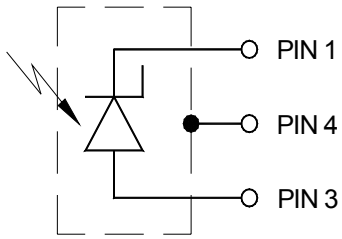
## TYPICAL GAIN vs BIAS VOLTAGE



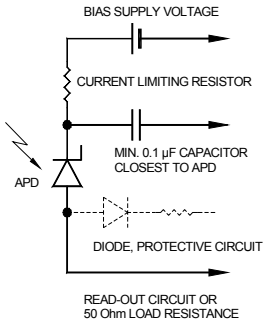

## QUANTUM EFFICIENCY for M = 1




## DEVICE SCHEMATIC




## SUGGESTED CIRCUIT SCHEMATIC




## APPLICATION NOTES

- Current should be limited by a protecting resistor or current limiting IC inside the power supply.
- Use of low noise read-out IC.
- For high gain applications (M>50) bias voltage should be temperature compensated.
- For low light level applications, blocking of ambient light should be used.

## HANDLING PRECAUTIONS:

- Soldering temperature - 260°C for 10 seconds max. The device must be protected against solder flux vapor.
- Minimum pin length - 2 mm
- ESD protection - Standard precautionary measures are sufficient.
- Storage - Store devices in conductive foam.
- Avoid skin contact with window.
- Clean window with Ethyl alcohol if necessary.
- Do not scratch or abrade window.

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