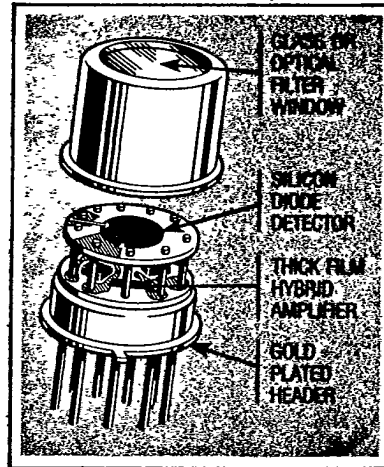


PHOTO DETECTOR WITH AMPLIFIER

**CUSTOM OPTICAL FILTERS AVAILABLE
INCLUDING NARROW BANDPASS
AND PHOTOPIC**

DEVAR, Inc. TYPE 529 SERIES



The Devar type 529 optical detectors are unique transducers, converting incident radiometric optical power into electronic power, current or voltage. Power gains of 10^8 are readily achieved. Standard units offer useful optical bandwidths from wave lengths (λ) of 400 nanometers (near UV) through the visible to 1100 nanometers in the near infra red. Extended response, either side is available with special detectors.

This series of detectors is designed for very high optical sensitivity (down to 10^{-11} watts), and medium frequency electronic bandwidth. 529's are really an electro-optical transducer and preamplifier combined in a miniature T0-5, hermetically sealed, integrated circuit package, built to military standard practices.

Fig. 1 GENERAL SCHEMATIC

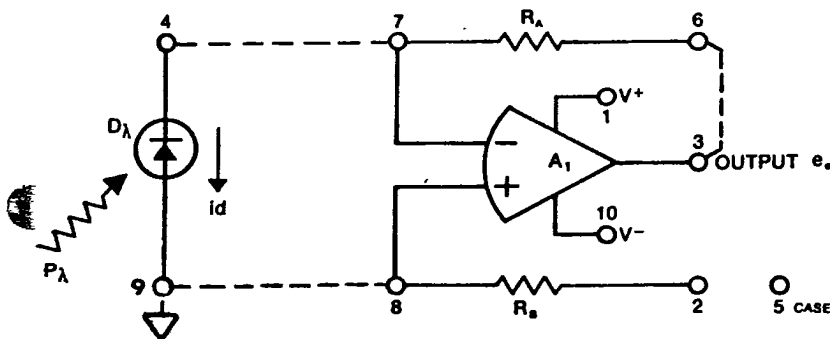


Fig. 1 shows the schematic with pin numbers. The essential elements are: detector, amplifier, and gain resistors. (Dotted lines show typical hook-up.)

1. Silicon Photodiode (D_λ). It is an extremely linear current source (over 10 decades), in response to incident optical power, P_λ .

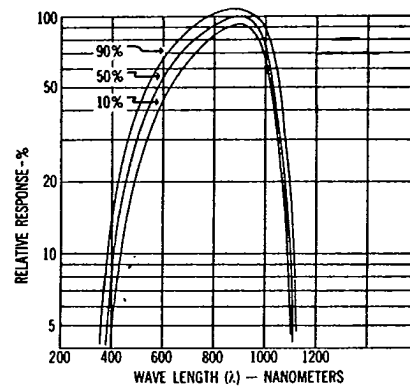
Two different size diodes are available, with characteristics shown in Table I.

2. A high gain, high input impedance operational amplifier, A_1 , of predictable behavior, generally operated from dual supplies. Characteristics are shown in Table II.

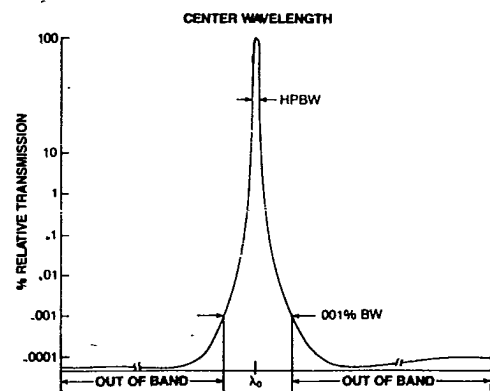
3. Two equal value resistors, (R_A , R_B) useful in setting gain (and in other ways), are connected to the (+) and (-) input terminals of A_1 . They are available in two standard values (2×10^6 , and $1 \times 10^5 \Omega$). Nominal tolerance is 20%. Differential tolerance is 10%.

The first objective of the 529 is to combine these four high impedance elements in close proximity within a shielded (metal) package, to reduce external noise pickup. Otherwise, external noise would determine the achievable "signal to noise" ratio, not the components themselves.

The second objective is to provide a very flexible pin-out arrangement, whereby, the elements may be externally connected to achieve a variety of circuit forms, allowing gain, bandwidth, and dark offset to be easily controlled by the user.



SPECTRAL RESPONSIVITY DISTRIBUTION.



TYPICAL FILTER OPTION
CENTER WAVELENGTH ACCURACY ± 1.5 NM

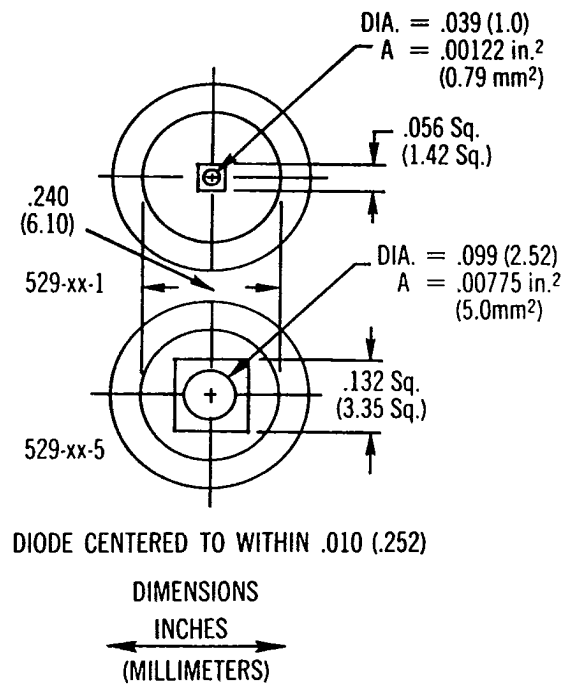
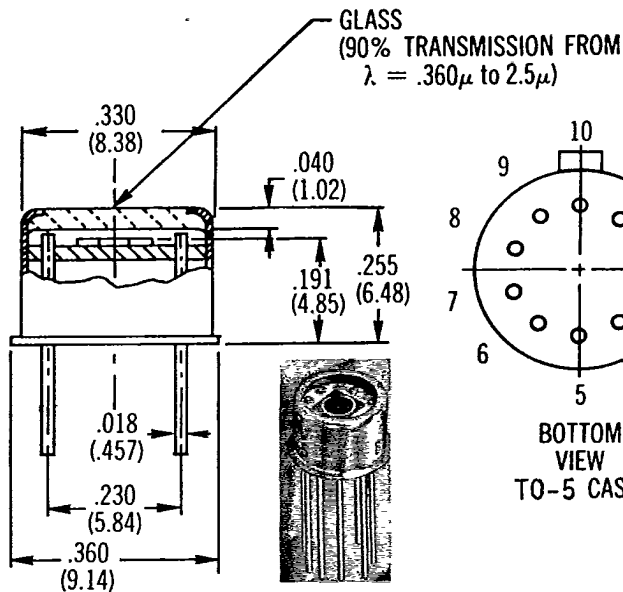
ORDER OPTIONS:

| Part Number | R_A , R_B | Diode Area |
|-------------|----------------------|--------------------|
| 529-2-1 | 2×10^6 Ohms | 0.8mm ² |
| 529-2-5 | 2×10^6 Ohms | 5.0mm ² |
| 529-01-1 | 100K Ohms | 0.8mm ² |
| 529-01-5 | 100K Ohms | 5.0mm ² |

PHOTO DETECTOR WITH AMPLIFIER

T-41-67

TYPE 529 SERIES

Photodiode Characteristics: ($V_d = 0V$, $T_A = 25^\circ C$, unless noted)

| PARAMETER | SYMBOL | -1 | -5 | UNITS | CONDITIONS |
|---------------------------|------------------|----------------------|----------------------|---------------------------------------|---------------------------------------|
| Diode Responsivity | $K\lambda$ | 0.6 | 0.6 | $\frac{\text{Amperes}}{\text{Watts}}$ | $\lambda = 0.9 \times 10^{-6}$ Meters |
| Luminous Responsivity | $K\lambda_{(L)}$ | 8.5 | 8.5 | mA/lm | $T_s = 2854^\circ K$ |
| Resistance | R_d | 140×10^6 | 50×10^6 | Ohms | |
| Capacitance | C_d | 15×10^{-12} | 45×10^{-12} | Farads | |
| Dark Current | I_d | 2×10^{-9} | 5×10^{-9} | Amperes | $V_d = -15$ Volts |
| Active Area | A_d | 0.8 | 5.0 | mm ² | |
| Active Dia. | ϕ_d | 1.0 | 2.52 | mm | |
| Reverse Bias Voltage | $-V_d$ | 0-45 | 0-45 | Volts | Limits |
| Max. Allowable Irradiance | I_{max} | .03 | .03 | $\frac{\text{Watts}}{\text{mm}^2}$ | Steady State |

Amplifier Characteristics: ($V_s = \pm 15V$, $T_A = 25^\circ C$, unless noted)

| PARAMETER | SYMBOL | VALUE — 80 PERCENTILE | UNITS | CONDITIONS |
|---|----------------------------------|-------------------------|----------------|------------------------------|
| Input Bias Current | I_B | 2×10^{-9} | Amperes | |
| vs. Temp. | dI_B/dT | -1×10^{-11} | A/ $^\circ C$ | |
| Input Offset Voltage | E_{os} | $\pm 5 \times 10^{-3}$ | Volts | |
| vs. Temp. | dE_{os}/dT | $\pm 10 \times 10^{-6}$ | V/ $^\circ C$ | |
| Open Loop Unity Gain Cross Over Frequency | f_x | 2×10^6 | Hz | Small Signal |
| Slew Rate Limit | de_o/dT | 5×10^5 | V/Sec. | $e_o = 20V$ P-P |
| Output: Current | I_o | $\pm 5 \times 10^{-3}$ | Amperes | $R_L = 2 \times 10^3 \Omega$ |
| Voltage | V_o | ± 10 | Volts | $R_L = 2 \times 10^3 \Omega$ |
| Supply: Current | $\pm I_s$ | 1×10^{-3} | Amperes | $V_s = \pm 3$ to 18V |
| Voltage | $\pm V_s$ Min. $\pm V_s$ Max. | 3 18 | Volts Volts | |
| Input Resistance | R_i | 40×10^6 | Ohms | |

TABLE 1

TABLE 2

ADDITIONAL APPLICATION NOTES AVAILABLE

FOR MORE INFORMATION CONTACT:

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