Texas Optoelectronics, Inc.

TIED69
Avalanche Photodiode

DESCRIPTION

The TIED69 is a high-speed, high-resistivity photodiode. It is designed to operate in the reverse-voltage avalanche region just below the breakdown voltage. This results in a photocurrent signal gain of a magnitude dependent on the reverse voltage. The signal gain ahead of the input noise of typical amplifiers provides for enhancement of the signal-to-noise ratio in most optical receiver systems. The TIED69 is similar to TIED56 and TIED59 except that it has a larger active area.

FEATURES

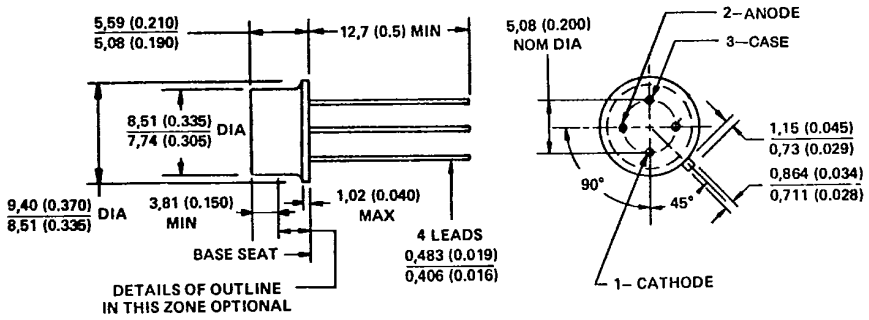
- Useful from Audio to Microwave Frequencies
- Typical Photocurrent Gain > 600
- Active Area of 1.8×10^{-2} cm^2 (Diameter = 60 Mils)
- Typical System Noise Equivalent Power of 10^{-13}W/$\sqrt{\text{Hz}}$ at 30 MHz Bandwidth with TIEF151 Amplifier

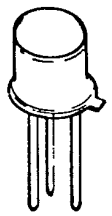
MECHANICAL DATA

The device is in a hermetically sealed welded case similar to, but slightly shorter than JEDEC TO-39. The window is borosilicate glass. Its nominal dimensions are: diameters, 6,6 mm (0.260 inch); thickness, 1.5 mm (0.060 inch); and distance from front surface of the window to the active area, 1,9 mm (0.075 inch).

PACKAGE CONFIGURATION

The Active Elements are Electrically Isolated from the Case





All Linear Dimensions are in Millimeters and Parenthetically in Inches

ABSOLUTE MAXIMUM RATINGS

Continuous Power Dissipation at (or below) 25°C Case Temperature (See Note 1) ..... 100 mW
Storage Temperature Range ..... -65°C to 150°C
Lead Temperature 1,6 mm (1/16 inch) from Case for 10 Seconds ..... 230°C

NOTE 1: Derate linearly to 125°C case temperature at the rate of 1 mW/°C.

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ELECTRO-OPTICAL CHARACTERISTICS (T_C = 25°C)

PARAMETER		TEST CONDITIONS‡	MIN	TYP	MAX	UNIT
Breakdown Voltage, $V_{(BR)}$		I_R = 100 μA, E_e = 0	155	170	185	V
Dark Current†	Bulk	M = 100, E_e = 0		140	700	pA
	Surface	M = 100, E_e = 0		3.5	40	nA
Temperature Coefficient of Breakdown Voltage, αV(BR)		I_R = 100 μA, Ee = 0, See Note 2		200		mV/°C
Photocurrent Gain at Avalanche Noise Threshold, M_T		λ = 900 nm See Note 3	200	>600		
Total Capacitance, C_T		V_R = 100 V, f = 1 MHz		30	45	pF
Series Resistance		f = 0.9 GHz		5		Ω
Radiant Responsivity, R_e		λ = 900 nm, M = 100, f_{mod} = 15 MHz, $\Phi_e \leq$ 0.1 mW		20		A/W
		λ = 900 nm, M = 1, f_{mod} = 10 MHz, $\Phi_e \leq$ 0.1 mW	0.15			

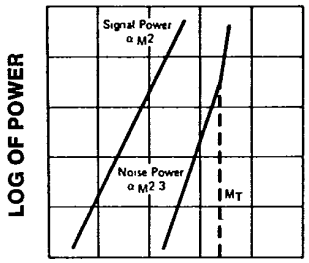
† Dark current is the sum of surface current and gain M times the bulk current.
‡ E_e is the incident radiant power per unit area.
NOTES: 2. Temperature coefficient is determined by the formula:

$$\alpha V_{(BR)} = \frac{V_{(BR)} @ 125°C - V_{(BR)} @ -55°C}{125°C - (-55°C)}$$

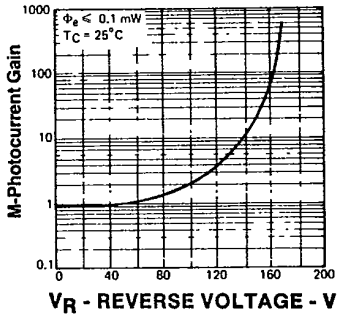
3. Gain M_T is measured at the reverse voltage at which the noise deviates from the theoretical linear characteristic. Radiant flux is as required to give a photocurrent of 0.1 nA rms at V_R = 40 V.

TYPICAL CHARACTERISTICS

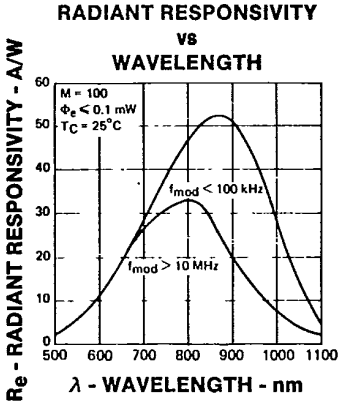
SIGNAL POWER AND NOISE POWER vs PHOTOCURRENT GAIN



PHOTOCURRENT GAIN vs REVERSE VOLTAGE



RADIANT RESPONSIVITY vs WAVELENGTH



TOTAL CAPACITANCE vs REVERSE VOLTAGE