

Ø ENSET

PIN 10 DP

PLANAR DIFFUSED
PHOTODIODE SERIE

DATA SHEET 9F00

UNITED DETECTOR



TECHNOLOGY INC.

PLANAR DIFFUSED SILICON PIN PHOTODIODES

DESCRIPTION

These devices represent the state of the art in planar diffused silicon photodiode light sensors. They are all low leakage, low noise, high impedance, wide spectral range devices of a quality suitable for instrument use.

The "D" series is comprised of the following: PIN-3D, PIN-5D, PIN-6D, PIN-10D. This series is optimized for a voltage biased mode of operation (photoconductive), which is required for fast response (less than 750ns). These devices are particularly suited for AC light signals.

The "DP" series is comprised of the following: PIN-3DP, PIN-5DP, PIN-6DP, and PIN-10DP. This series is optimized for an unbiased mode of operation (photovoltaic). Because of their high zero bias impedance, these devices are ideally suited for coupling to an op amp in the current mode. In this photodiode/op amp mode, dc light level changes of up to ten decades can be linearly detected and converted to an output voltage. These devices are particularly suited for DC light signals.

The PIN-3D and PIN-3DP have .03 cm² active areas and are hermetically sealed in a TO-18 housing. The PIN-5D and PIN-5DP have .05 cm² active areas and are hermetically sealed in a TO-5 housing. The PIN-6D and PIN-6DP have .20 cm² active areas and are hermetically sealed in a TO-8 can. The PIN-10D and PIN-10DP have 1 cm² active areas and are sealed in a 1" O. D. metal housing with BNC output connectors.

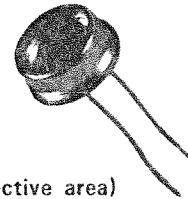
ENSET
Laboratoire de Physique



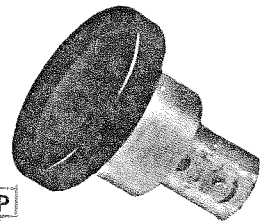
PIN-3D
and
PIN-3DP
(.03 cm² active area)



PIN-5D
and
PIN-5DP
(.05 cm² active area)



PIN-6D
and
PIN-6DP
(.2 cm² active area)



PIN-10D
and
PIN-10DP
(1.0 cm² active area)

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Cellule Photovoltaïque →

FEATURES

"D" Series

- Voltage Biased Operation (photoconductive)
- Fast Response Time
- Low Capacity
- Low Noise
- Low Dark Current

"DP" Series

- Zero Voltage Bias Operation (photovoltaic)
- Optimized for op amp hook-up
- Ultra High Impedance
- Ultra Low 1/f noise
- Ten Decade Output Linearity with DC light inputs

UNITED DETECTOR TECHNOLOGY INC.

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OPTICAL/ELECTRICAL CHARACTERISTICS "D" SERIES

23°C Ambient	PIN-3D			PIN-5D			PIN-6D			PIN-10D			Units	
	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max		
Responsivity (10 Volt, 850nm)	.3	.4	.5	.3	.4	.5	.3	.4	.5	.3	.4	.5	A/W	
Capacity (10 Volts)	9	10	12	10	15	20	40	60	80	300	350	400	p ^f	
(50 Volts)	4	6	8	5	7	10	20	30	40	150	190	250	p ^f	
Dark Current (10 Volts)		.02	.05		.1	.25		.3	.4		.5	1.5	μA	
N. E. P. (AC, 1KHz, .85μ)		2x10 ⁻¹³			5x10 ⁻¹³			8x10 ⁻¹³			10 ⁻¹²			$\frac{\text{Watt}}{\text{VHZ}}$
Response Time (to 67%) (50 Ω , 50v, 900nm)		15	25		15	25		15	25		25	50	ns	
Breakdown Volts	50	@10μA		50	@15μA		50	@20μA		50	@50μA		Volt	
Active Area		.032			.051			.203			1.00		cm ²	
Active Size		.050			.100			.200			.444		in.	
		x.100			Dia			Dia			Dia			
Maximum Light Power Density			50			50			50			50	mw/cm ²	
Temp. Range (operate)	-55		125	-55		125	-55		125	0		70	°C	
(storage)	-55		150	-55		150	-55		150	0		70	°C	

"DP" SERIES

23°C Ambient	PIN-3DP			PIN-5DP			PIN-6DP			PIN-10DP			Units	
	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max		
Responsivity, 850nm (PV op amp)	.3	.35	.45	.3	.35	.45	.3	.35	.45	.3	.35	.45	A/W	
Capacity (PV, op amp)	250	300	350	450	500	575	1700	1800	2000	2200	2400	2800	p ^f	
Source Resistance (PV, op amp)	100	300		40	50		20	40		.5	2		megohm	
N. E. P. (DC, PV, 850nm)		2x10 ⁻¹³			5x10 ⁻¹³			8x10 ⁻¹³			10 ⁻¹²			$\frac{\text{Watt}}{\text{VHZ}}$
Response Time (to 67%) (PV, op amp, 900nm)		1000			1000			1000			1000		ns	
Breakdown Volts (10μa)	5			5			5			5			Volt	
Active Area		.032			.051			.203			1.00		cm ²	
Active Size		.050			.100			.200			.444		in.	
		x.100			Dia			Dia			Dia		in.	
Maximum Light Power Density			10			10			10			10	mw/cm ²	
Temp. Range (operate)	-55		125	-55		125	-55		125	0		70	°C	
(storage)	-55		150	-55		150	-55		150	0		70	°C	

Note 1: (PV, op amp) - refers to zero voltage bias with coupling to a current mode op amp.

Note 2: See Typical Hookups on data sheet back side for measurement setup.

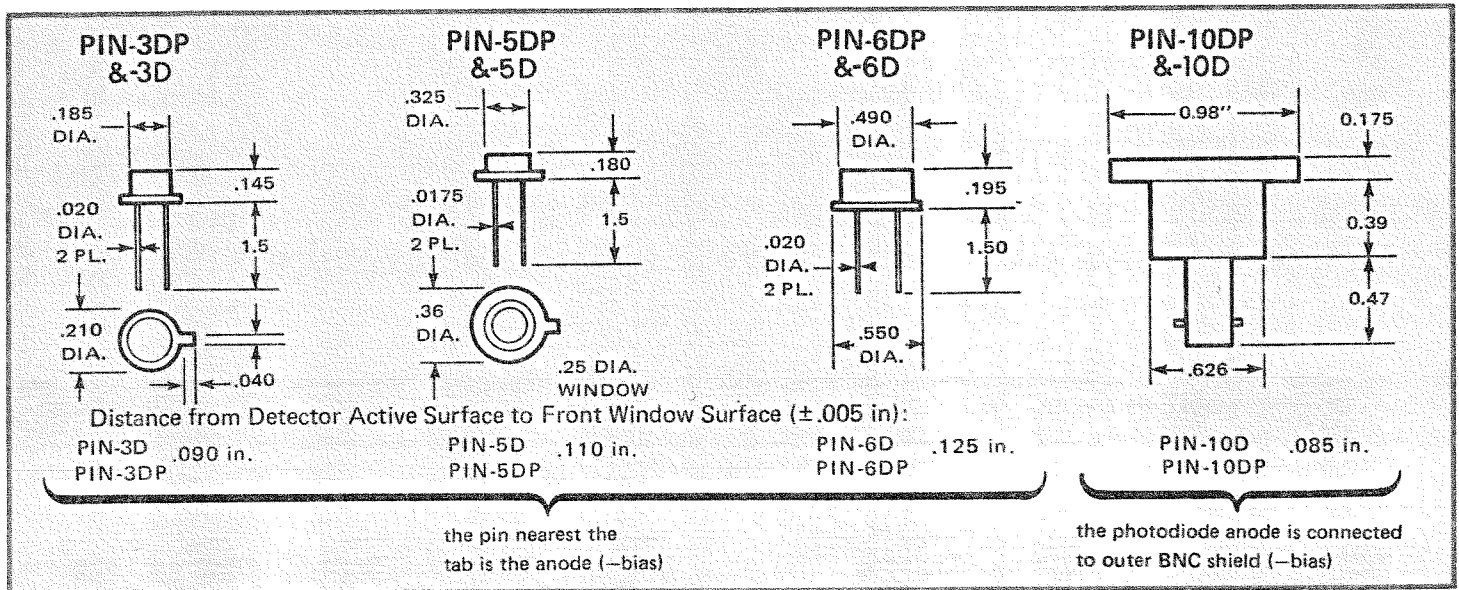
Note 3: For a complete relative spectral response see back side of data sheet.

Note 4: Typical characteristics represent approximately 50% of the total yield. Detectors can be source selected for a particular spec. at an increase in price.



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MECHANICAL CHARACTERISTICS "D" AND "DP" SERIES

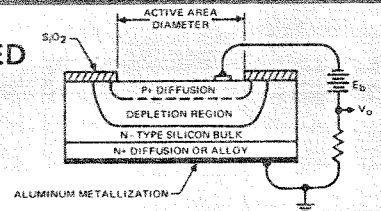


CONSTRUCTION

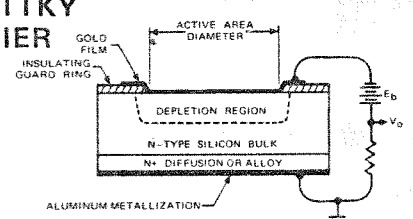
A PIN photodiode is one in which a heavily doped p region and a heavily doped n region are separated by a lightly doped "i" region. This "i" region resistivity can range from 10 ohm cm to 100,000 ohm cm, the p and n region resistivities being less than 1 ohm cm. The output from this two terminal sensor is a current whose value is proportional to the input light power. There are different ways to optimize the performance of PIN photodiodes. The "D" series is optimized for voltage biased operation, featuring high breakdown voltage and low capacitance. The "DP" series is optimized for unbiased operation (photovoltaic) into a current mode op amp, featuring high detector resistance and, thereby, linear light sensing over ten decades.

UDT also manufactures a complete line of SCHOTTKY Silicon photodiodes. These devices are recommended when high blue response (less than 500nm), fast response time (less than 25 ns) or large areas (greater than 1cm²) are required. They are not recommended for high temperature operation (greater than 160°F) or high light level operation (greater than 2 mw).

PLANAR DIFFUSED



SCHOTTKY BARRIER



APPLICATIONS

"D" Series

- Laser Ranges
- OCR Scanners
- GaAs Pulse Detector
- Production Line Sorting

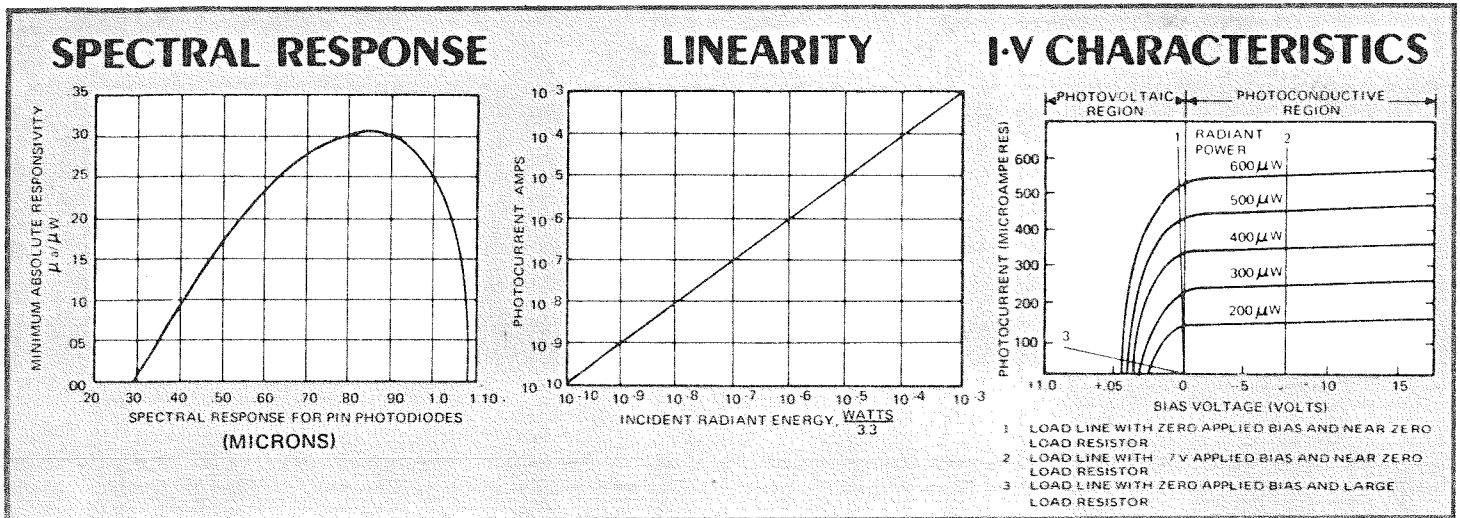
"DP" Series

- Colorimeters
- Photometers
- Densitometers
- Radiometers

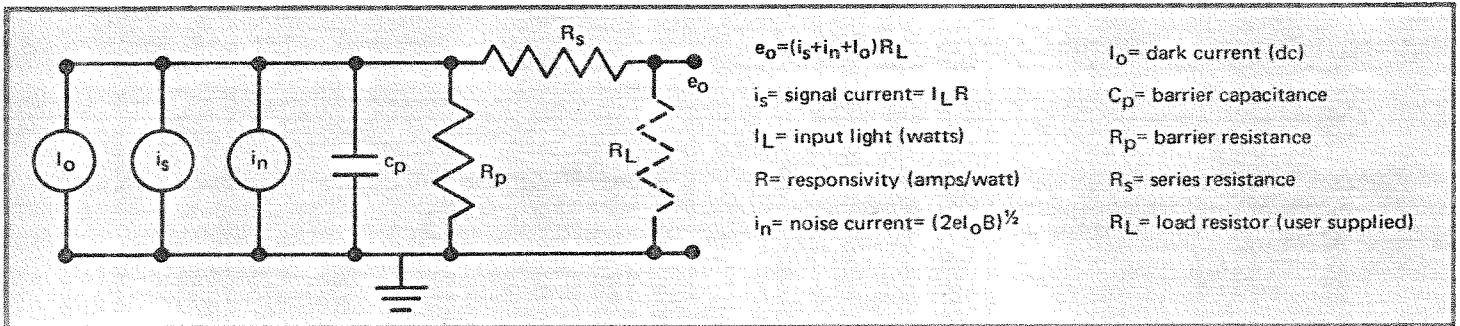
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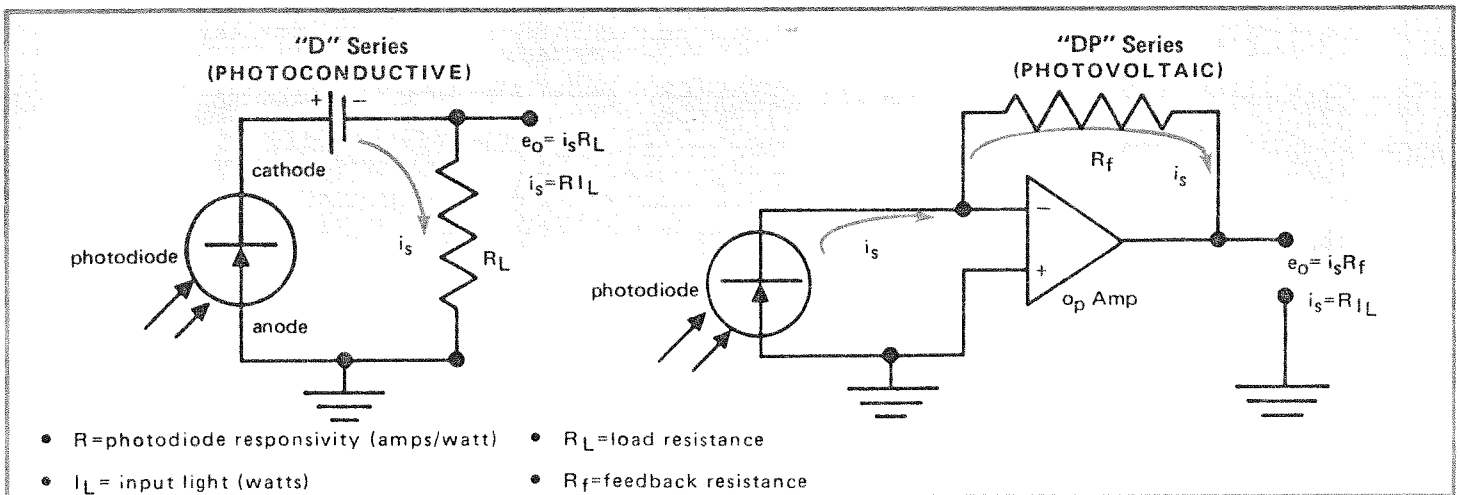
PLANAR DIFFUSED SILICON PIN PHOTODIODES (all models)



EQUIVALENT CIRCUIT (all models)



TYPICAL HOOKUPS



SPECIALS

UDT's unique capability in both planar diffused and Schottky junction technology offers the customer the flexibility of having a custom detector optimized for the intended application. Multiple array geometries can be fabricated with elements as small as .001" x .005" or as large as 1/2" x 10". Custom hybridization of photodiode/op amp combinations, either single element or array, is available from UDT. Send us your requirement, we will send our recommendations and quote.



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