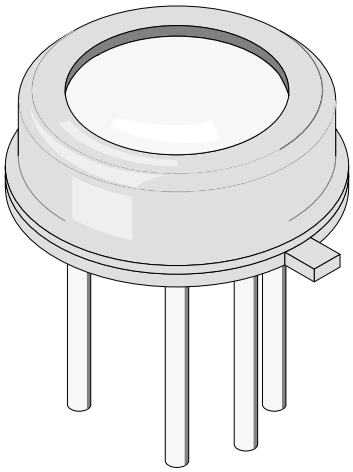
Silicon PIN Photo Quadrant Detector

Description

S239P is a monolithic silicon PIN photodiode array in a quadrant configuration.
Four photodiodes on a single chip with a common cathode and separated by only 10æm are mounted in a hermetically sealed TO–5 case with a high precision flat glass window.
The total chip measures 3mm by 3mm, where each photodiode has a radiant sensitive area of 1.3mm by 1.3mm.



Features

- Four monolithic PIN photodiodes
- Hermetically sealed case
- Flat optical window
- Wide angle of half sensitivity $\varphi = \pm 55^\circ$
- Low crosstalk
- Metalurgical separation: 10 ± 1 µm

Applications

Precision positioning in µm–range for:
Laser alignment; machine tool alignment; optical surveying

Absolute Maximum Ratings

T_{amb} = 25°C

Parameter	Test Conditions	Symbol	Value	Unit
Reverse Voltage		V_R	20	V
Power Dissipation	$T_{amb} \leqq 50$ ˚C	P_V	300	mV
Junction Temperature		T_j	125	˚C
Storage Temperature Range		T_{stg}	–55...+125	˚C
Soldering Temperature	t ≦ 5 s	T_{sd}	260	˚C
Thermal Resistance Junction/Ambient		R_{thJA}	250	K/W

Basic Characteristics (Single Diodes)

T_{amb} = 25°C

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Forward Voltage	I_F = 50 mA	V_F		0.7	1.0	V
Breakdown Voltage	I_R = 100 µA, E = 0	$V_{(BR)}$	20			V
Reverse Dark Current	V_R = 12 V, E = 0	I_{ro}		1	25	nA
Diode Capacitance	V_R = 12 V, f = 1 MHz, E = 0	C_D		16		pF
Dark Resistance	V_R = 10mV, E = 0, f = 0	R_D		1		GΩ
Resistance Cross Coupling between Quadrants	V_R=12 V	R_c	30			MΩ
Capacitance Cross Coupling between Quadrants	V_R=12 V	C_c			30	pF
Reverse Light Current	E_e = 1 mW/cm^2, λ = 870 nm, V_R = 12V	I_{ra}	10	15		µA
Reverse Light Current	E_e = 1 mW/cm^2, λ = 950 nm, V_R = 12V	I_{ra}		14		µA
Absolute Spectral Sensitivity	V_R = 12V, λ = 870nm	s(λ)		0.50		A/W
Matching Factor between Four Quadrants		s_{min}/s_{max}	0.8		1	
Angle of Half Sensitivity		φ		±55		deg
Wavelength of Peak Sensitivity		λ_p		930		nm
Range of Spectral Bandwidth		$\lambda_{0.5}$		600...1040		nm
Responsivity Variation accross the Active Areas		η		2		%
Noise Equivalent Power	V_R=12V, λ=870nm	NEP		$4x10^{-14}$		W/√ Hz
Detectivity	V_R=12V, λ=870nm	D^*		$7.5x10^{12}$		cm√Hz/ W
Rise Time	V_R=12V, R_L=1kΩ, λ=830nm	t_r		150		ns
Fall Time	V_R=12V, R_L=1kΩ, λ=830nm	t_f		150		ns

Typical Characteristics (T_{amb} = 25°C unless otherwise specified)

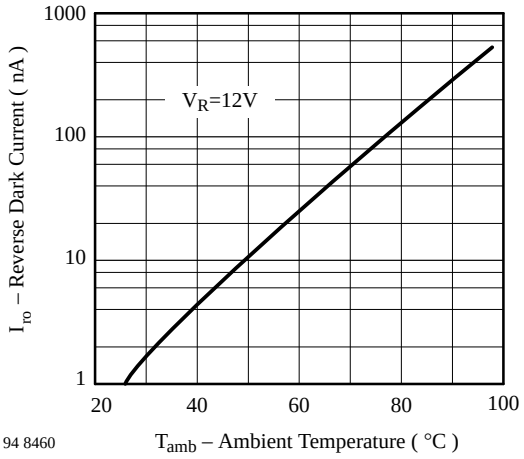


Figure 1 : Reverse Dark Current vs. Ambient Temperature

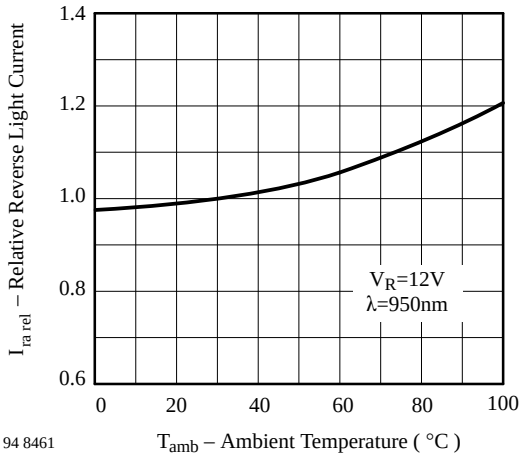


Figure 2 : Relative Reverse Light Current vs. Ambient Temperature

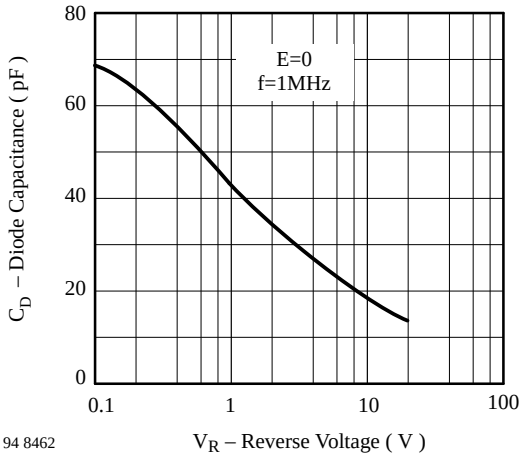


Figure 3 : Diode Capacitance vs. Reverse Voltage

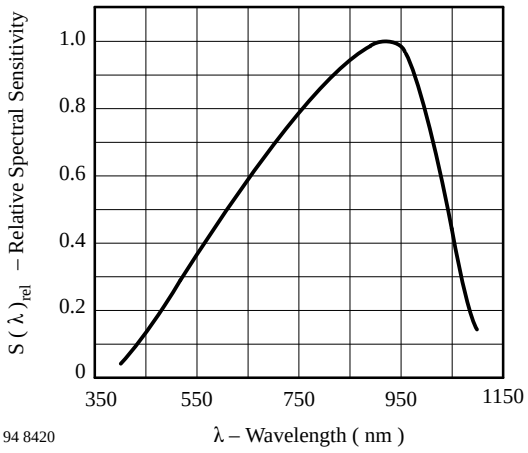


Figure 4 : Relative Spectral Sensitivity vs. Wavelength

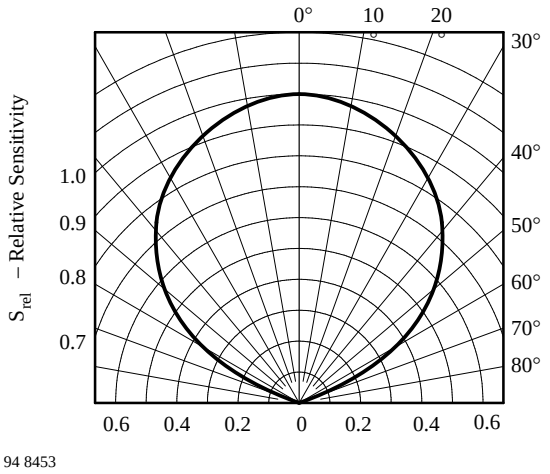
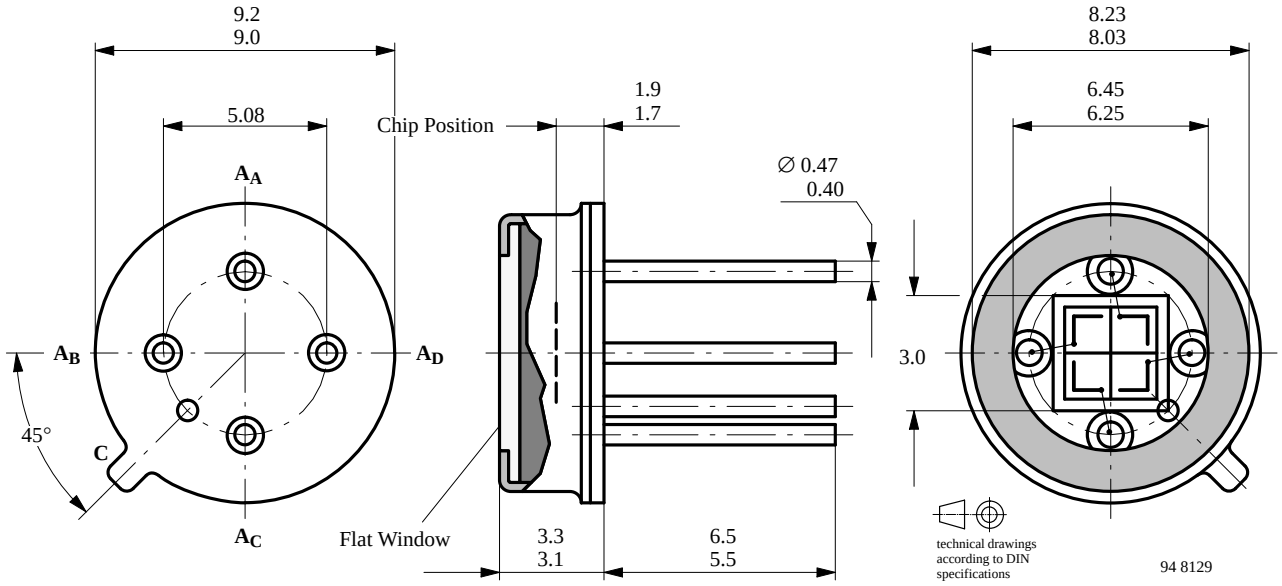


Figure 5 : Relative Radiant Sensitivity vs. Angular Displacement

Dimensions in mm



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