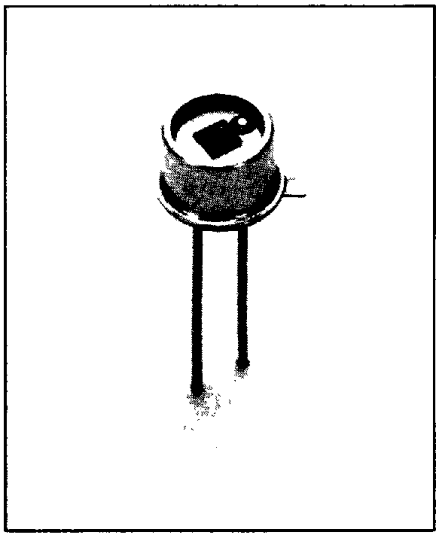
SIEMENS

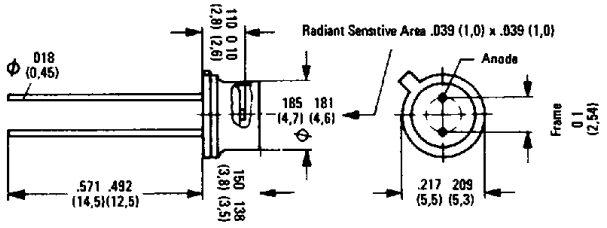
T-41-50

SFH202
SFH202a

PIN PHOTODIODE



Package Dimensions in Inches (mm)



FEATURES

- **TO-18 Hermetic Package**
- **Flat Glass Lens**
- **For Fiber Optic Communications**

DESCRIPTION

SFH202 and SFH202a are planar silicon PIN-photo diodes. The case (18A2 DIN 41876 —similar to TO-18) has a flat glass lens top. The cathode is electrically connected to the case. The diode is a receiver with high operating frequency, very low reverse current, and fast switching time. Because of the flat lens, the diode is especially suitable for use with fiber optic cables, up to 560 Mbits.

Maximum Ratings

Reverse Voltage (V_R)	50 V
Storage Temperature Range(T_S	-40 to +80°C
Junction Temperature (T_j)	80°C

Characteristics (T_{amb} = 25°C)

Wavelength of Max Photosensitivity	λ_{Smax}	850	nm
Radiant Sensitive Area	A	1	mm²
Dark Current (V_R = 20 V, E = 0)	I_R	1 (≤5)	nA
Spectral Sensitivity (λ = 850 nm)	S_λ	0.55	A/W
(λ = 950 nm)	S_λ	0 45 (≥0 35)	A/W
Quantum Yield (Electrons per photon)			Electrons / Photon
(λ = 850 nm)	η	0 80	
Rise Time of the Photocurrent			
SFH202 (R_L = 50Ω, V_R = 20 V, λ = 900 nm)	t_r	0 5 (≤1)	ns
SFH202a (R_L = 50Ω, V_R = 50 V, λ = 850 nm)	t_r	3	ns
Cut-off Frequency (R_L = 50Ω, V_R = 20)			
SFH202 (λ = 900 nm)	f_g	500	MHz
SFH202a (λ = 850 nm)	f_g	200	MHz
Capacitance			
(V_R = 0 V)	C_0	13	pF
(V_R = 1 V)	C_1	7	pF
(V_R = 12 V)	C_{12}	3 3	pF
(V_R = 20 V)	C_{20}	3	pF
Temperature Coefficient for I_P	TK	0 2	%/K
Noise Equivalent Power (V_R = 20 V)	NEP	3 3 × 10^{-14}	W / √Hz
Detection Limit	D*	3 1 × 10^{12}	cm √Hz / W

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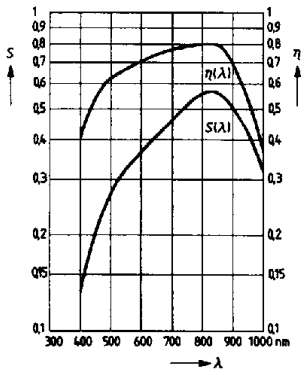
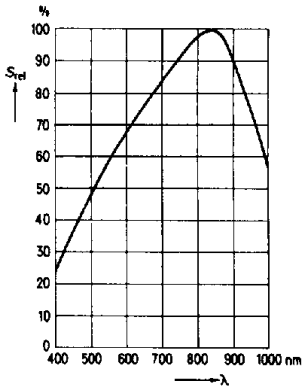
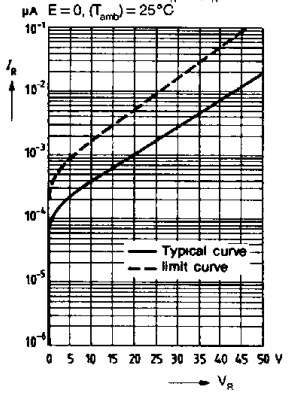
Spectral sensitivity $S = f(\lambda)$
and quantum yield $\eta = f(\lambda)$
in electrons per photon



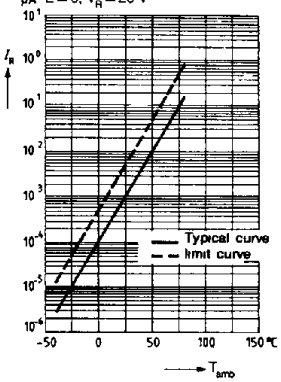
Relative spectral sensitivity
$S_{rel} = f(\lambda)$



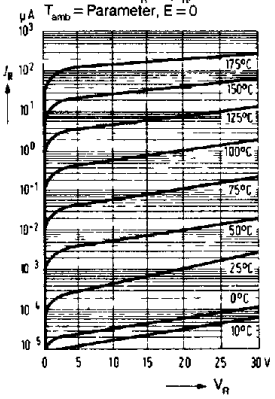
Forward current $I_R = f(V_R)$
μA $E = 0$, $(T_{amb}) = 25°C$



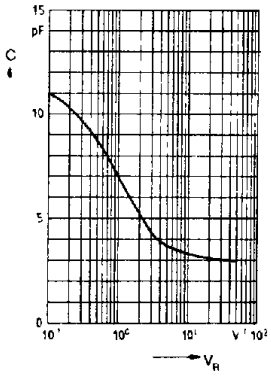
Dark current $I_P = (T_{amb})$
μA $E = 0$, $V_R = 20$ V



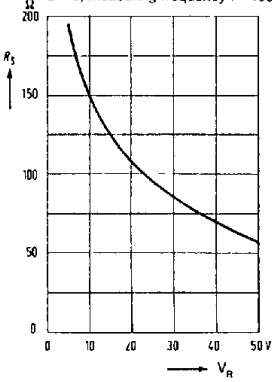
Dark current $I_R = f(V_R)$
μA T_{amb} = Parameter, $E = 0$



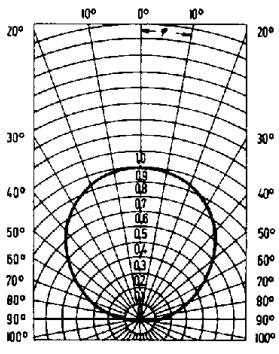
Junction capacitance $C = f(V_R)$
$E = 0$ measuring frequency $f = 1$ MHz



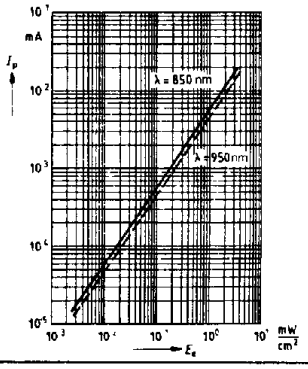
Series resistance $R_S = f(V_R)$
$E = 0$, measuring frequency $f = 100$ MHz



Directional characteristic $S_{rel} = f(\varphi)$



Photocurrent $I_P = f(E_V)$



Fiber Optic Devices

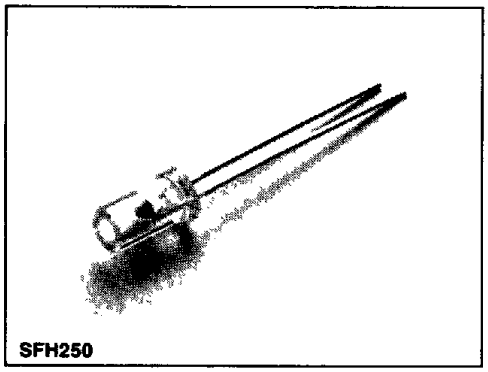
SIEMENS

SFH250
WITH IR FILTER SFH250F

PLASTIC FIBER OPTIC PHOTODIODE DETECTOR

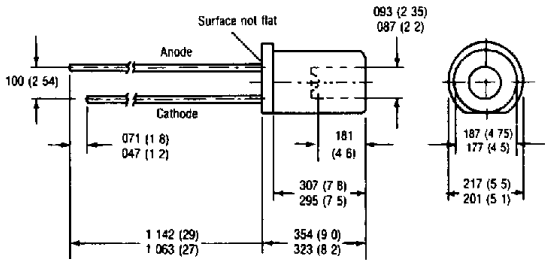
T-41-50

Preliminary Data Sheet



SFH250

Package Dimensions in Inches (mm)



FEATURES

- **2.3 mm Aperture Holds Standard 1000 Micron Plastic Fiber**
- **No Fiber Stripping Required**
- **Daylight Rejection Filter (SFH250F)**
- **High Reliability**
- **Low Noise**
- **Fast Switching Times**
- **Low Capacitance**
- **Very Good Linearity**
- **Sensitive in the Visible (SFH250) and Near IR Range (SFH250 & 250F)**
- **Molded Microlens for Efficient Coupling**

DESCRIPTION

The SFH250/250F are fast silicon PIN photodiodes in a low cost plastic package for use in short distance data transmission using 1000 micron plastic fibers Both come in a 5 mm (T1¾) plastic package featuring a tubular aperture which is wide enough to accommodate fiber and cladding A microlens on the bottom of the aperture improves the light coupling efficiency of the fiber output into the photodiode

The SFH250 has a clear plastic housing; the SFH250F has a black plastic housing.

Typical applications include automotive wiring, isolation interconnects, medical instruments, robotics, electronic games, and copy machines

For application information see Appnote 40

Maximum Ratings

Operating and Storage Temperature Range (T)	-55 to +100°C
Soldering Temperature (Distance from solder to package = 2 mm)	
Dip Soldering Time, $t \leq 5$ sec (T_S)	260°C
Reverse Voltage (V_R)	30 V
Power Dissipation (P_{TOT})	100 mW
Thermal Resistance ($R_{TH JA}$)	750 K/W

Characteristics ($T_{amb} = 25°C$)

Wavelength of Max Photosensitivity			
SFH250	λ_{MAX}	850	nm
SFH250F	λ_{MAX}	900	nm
Spectral Range of Photosensitivity ($S = 10\%$ of S_{MAX})			
SFH250	λ	400 to 1100	nm
SFH250F	λ	800 to 1100	nm
Dark Current ($V_R = 20$ V)	I_R	1 (≤ 10)	nA
Quantum Efficiency ($\lambda = 850$ nm)	η	0 89	Electrons / Photon
Rise and Fall Time of the Photocurrent from 10% to 90%, respectively and from 90% to 10% of its Peak Value ($R_L = 50\Omega$ $V_R = 30$ V, $\lambda = 880$ nm)	t_R, t_F	10	ns
Capacitance ($V_R = 0$ V, f = 1 MHz, $E_V = 0$ lx)	C_0	11	pF
Noise Equivalent Power	NEP	$2\,9 \times 10^{-14}$	$\frac{W}{\sqrt{Hz}}$
Detection Limit ($V_R = 20$ V)	D_L	$3\,5 \times 10^{12}$	$\frac{cm\sqrt{Hz}}{W}$
Photocurrent ($V_R = 5$ V) (Note 1)			
SFH250/250F $\lambda = 950$ nm	I_{PH}	4 0	µA
SFH250 $\lambda = 660$ nm	I_{PH}	3 0	µA

[1] Photocurrent generated at 10 µW light incidence through plastic 1000 micron fiber (distance lens fiber $\leq 0\,1$ mm fiber type ESKA EH4001 fiber face polished)

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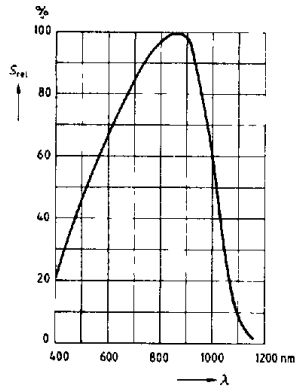
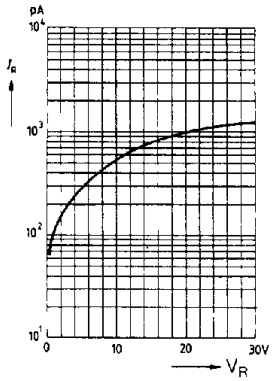
SFH250

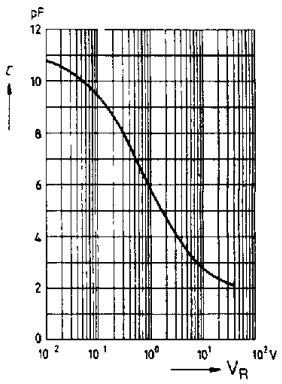
Relative spectral sensitivity
$S_{rel} = f(\lambda)$



Dark current $I_R = f(V_R)$
$T_{amb} = 25°C$



Capacitance $C = f(V_R)$
$T_{amb} = 25°C$



Fiber Optic Devices