

Hermetic TO-18

Silicon Phototransistors

Optoelectronic Products

FPT500, FPT500A
FPT520, FPT520A
FPT540, FPT540A

General Description

FPT500/FPT520/FPT540 are nitride-passivated npn Planar silicon phototransistors. These devices are packaged in a TO-18 style, hermetically sealed package with lens cap. For most applications two pins are used (collector and emitter pins). The availability of the base pin gives wide latitude for flexible circuit design. Phototransistors can be used as photodiodes (collector-base) which have excellent photo current linearity (for analog applications).

High Illumination Sensitivity
Exceptionally Stable Characteristics
Large Range of Controlled Sensitivities
Hermetic Metal Package
High Operating Temperature

Absolute Maximum Ratings

Maximum Temperature and Humidity

Storage Temperature	-65°C to +200°C
Operating Temperature	-55°C to +150°C
Pin Temperature (Soldering, 5 s)	260°C
Relative Humidity at 65°C	85%

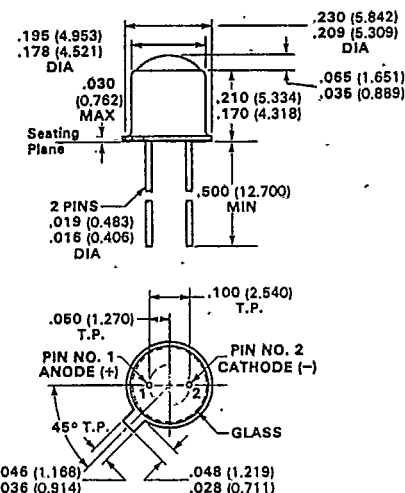
Maximum Power Dissipation

Total Dissipation at $T_C = 25^\circ\text{C}$	600 mW
Derate Linearly from 25°C	4.8 mW/°C
Total Dissipation at $T_A = 25^\circ\text{C}$	300 mW
Derate Linearly from 25°C	2.4 mW/°C

Maximum Voltages and Currents

V_{CB}	Collector-to-Base Voltage	
	FPT500/FPT500A	60 V
	FPT520/FPT520A	50 V
	FPT540/FPT540A	30 V
$V_{CE(sus)}$	Collector-to-Emitter Sustaining Voltage	
	FPT500/FPT500A	45 V
	FPT520/FPT520A	30 V
	FPT540/FPT540A	12 V
I_C	Collector Current	50 mA

Package Outline



Notes

All dimensions in inches bold and millimeters (parentheses)
Tolerance unless specified = ± 0.015 ($\pm .381$)

Typical Electrical Characteristics

FPT500, FPT500A
FPT520, FPT520A
FPT540, FPT540A

Electrical Characteristics $T_A = 25^\circ\text{C}$

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$V_{CE(sus)}$	Collector-to-Emitter Sustaining Voltage FPT500/FPT500A FPT520/FPT520A FPT540/FPT540A	45 30 12	60 60 30		V	$I_C = 1.0\text{ mA}$ (Note 3)
V_{CBO}	Collector-to-Base Voltage FPT500/FPT500A FPT520/FPT520A FPT540/FPT540A	60 50 30	100 80 50		V	$I_C = 100\text{ }\mu\text{A}$ (Note 3)
V_{EBO}	Emitter-to-Collector Voltage FPT500/FPT500A FPT520/FPT520A FPT540/FPT540A		10 10 7.0		V	$I_E = 100\text{ }\mu\text{A}$ (Note 3)
$V_{CE(sat)}$	Collector-to-Emitter Saturation Voltage FPT500/FPT500A FPT520/FPT520A FPT540/FPT540A		0.16 0.16 0.25	0.33 0.33 0.55	V	$I_C = 500\text{ }\mu\text{A}$ (Note 1) $H = 2.0\text{ mW/cm}^2$ $I_C = 1.0\text{ mA}$ (Note 1) $H = 2.0\text{ mW/cm}^2$
I_{CEO}	Collector Dark Current		10	100	nA	$V_{CE} = 5.0\text{ V}$ (Note 3)
I_{CBO}	Collector Dark Current		0.25	25	nA	$V_{CB} = 10\text{ V}$ (Note 3)
$I_{CB(II)}$	Photo Current		10		μA	$V_{CB} = 5.0\text{ V}$ (Note 6) $H = 1.0\text{ mW/cm}^2$
θ_{50}	50% Angular Response		15		degrees	
t_r	Light Current Rise Time FPT500/FPT500A FPT520/FPT520A FPT540/FPT540A		3.0 8.0 18		μs	(Note 4)
t_f	Light Current Fall Time FPT500/FPT500A FPT520/FPT520A FPT540/FPT540A		3.0 8.0 18		μs	(Note 4)
$I_{CE(II)}$	Photo Current (Tungsten) FPT500 FPT500A FPT520 FPT520A FPT540 FPT540A	1.0 2.0 5.0 6.0 8.0 10	3.0 8.0 15	6.0 18 30	mA	$V_{CE} = 5.0\text{ V}$ $H = 1.0\text{ mW/cm}^2$ (Notes 1, 5)
$I_{CE(II)}$	Photo Current (GaAs) FPT500 FPT520 FPT540	3.0 10 16	6.0 24 30		mA	$V_{CE} = 5.0\text{ V}$ $H = 1.0\text{ mW/cm}^2$ (Notes 2, 5)

Notes

1. Measured at noted irradiance as emitted from a Tungsten filament lamp at a color temperature of 2854°K . The effective photosensitive area is typically 7 mm^2 .
2. These are values obtained at noted irradiance as emitted from a GaAs source at 900 nm .
3. Measured with radiation flux intensity of less than $0.1\text{ }\mu\text{W/cm}^2$ over the spectrum from $100\text{--}1500\text{ nm}$.
4. Rise time is defined as the time required for I_{CE} to rise from 10% to 90% of peak value. Fall time is defined as the time required for I_{CE} to decrease from 90% to 10% of peak value. Test conditions are: $V_{CE} = 10\text{ V}$, $I_{CC} = 10\text{ mA}$, $R_L = 100\text{ }\Omega$, GaAs source.
5. No electrical connection to base pin.
6. No electrical connection to emitter pin.

