

General-Purpose Silicon Planar Phototransistor

Optoelectronic Products

FPT100/A/B FPT110/A/B

General Description

The FPT100 and FPT110 are 3-terminal npn Planar phototransistors with exceptionally stable characteristics and high illumination sensitivity. The availability of the base pin gives wide latitude for flexible circuit design. The case is a special plastic compound with transparent resin encapsulation that exhibits stable characteristics under high humidity conditions. The controlled sensitivities offered in the A and B versions give the circuit designer increased flexibility.

Exceptionally Stable Characteristics Controlled Sensitivities

Absolute Maximum Ratings

Maximum Temperature and Humidity

Storage Temperature	-55°C to +100°C
Operating Temperature	-55°C to +85°C
Pin Temperature (Soldering, 5 s)	260°C
Relative Humidity at 65°C	85%

Maximum Power Dissipation (Notes 1 and 2)

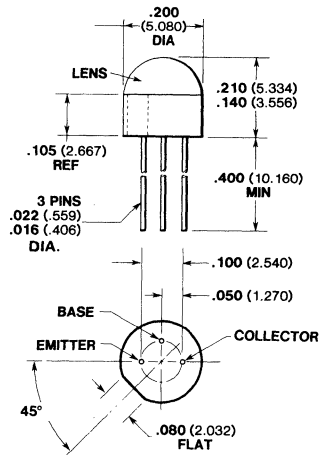
Total Dissipation at $T_C = 25^\circ\text{C}$	200 mW
Total Dissipation at $T_A = 25^\circ\text{C}$	100 mW

Maximum Voltages and Current (Note 5)

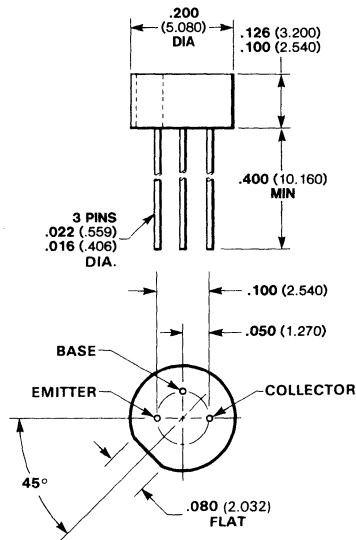
V_{CB} Collector-to-Base Voltage	50 V
V_{CE} Collector-to-Emitter Sustaining Voltage (Note 3)	30 V
I_C Collector Current	25 mA

Package Outlines

FPT100/A/B



FPT110/A/B



Notes

All dimensions in inches **bold** and millimeters (parentheses)
Tolerance unless specified = $\pm .015$ ($\pm .381$)

Typical Electrical Characteristics

FPT100/A/B FPT110/A/B

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

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_{CBO}	Collector Dark Current		0.25	25	nA	$V_{CB} = 10\text{ V}$ (Note 5)
I_{CBO}	Collector Dark Current		0.025	0.5	μA	$V_{CB} = 10\text{ V}$, $T_A = 65^\circ\text{C}$ (Note 5)
I_{CEO}	Collector Dark Current		2.0	100	nA	$V_{CE} = 5.0\text{ V}$ (Note 5)
R_{CB}	Responsivity (Tungsten)					
	FPT100/A/B	0.6	1.6		$\mu\text{A}/$	$V_{CB} = 10\text{ V}$
	FPT110/A/B	0.6	1.0		mW/cm^2	(Notes 3 and 8)
R_{CB}	Responsivity (GaAs)					
	FPT100/A/B	1.8	4.8		$\mu\text{A}/$	$V_{CB} = 10\text{ V}$
	FPT110/A/B	1.8	3.0		mW/cm^2	(Notes 4 and 8)
$I_{CE(I)}$	Photo Current (Tungsten)					
	FPT100/A/B	0.2	1.4		mA	$V_{CE} = 5.0\text{ V}$
	FPT110/A/B	0.2	0.88			$H = 5.0\text{ mW}/\text{cm}^2$ (Notes 3 and 7)
$I_{CE(I)}$	Photo Current (GaAs)					
	FPT100/A/B	0.6	4.2		mA	$V_{CE} = 5.0\text{ V}$
	FPT110/A/B	0.6	2.7			$H = 5.0\text{ mW}/\text{cm}^2$ (Notes 4 and 7)
t_r	Light Current Rise Time		2.8		μs	(Note 6)
t_f	Light Current Fall Time		2.8		μs	(Note 6)
$V_{CEO(sat)}$	Collector-to-Emitter Saturation Voltage					
	FPT100/A/B		0.16	0.3	V	$I_C = 500\text{ }\mu\text{A}$
	FPT110/A/B		0.16	0.33		$H = 20\text{ mW}/\text{cm}^2$
BV_{CBO}	Collector-to-Base Breakdown Voltage	50	120		V	$I_C = 100\text{ }\mu\text{A}$ (Note 5)
$V_{CEO(sus)}$	Collector-to-Emitter Sustaining Voltage	30	50		V	$I_C = 1.0\text{ mA}$ (pulsed) (Note 5)
BV_{ECO}	Emitter-to-Collector Breakdown		7.0		V	$I_E = 100\text{ }\mu\text{A}$ (Note 5)

The following values affect the A and B versions only:

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$I_{CE(I)}$	Photo Current (Tungsten Source)					
	FPT100A	1.0		3.0	mA	$V_{CE} = 5.0\text{ V}$ (Note 3)
	FPT110A	0.6		1.8		$H = 5.0\text{ mW}/\text{cm}^2$
$I_{CE(I)}$	Photo Current (Tungsten Source)					
	FPT100B	1.3		2.6	mA	$V_{CE} = 5.0\text{ V}$ (Note 3)
	FPT110B	0.8		1.6		$H = 5.0\text{ mW}/\text{cm}^2$

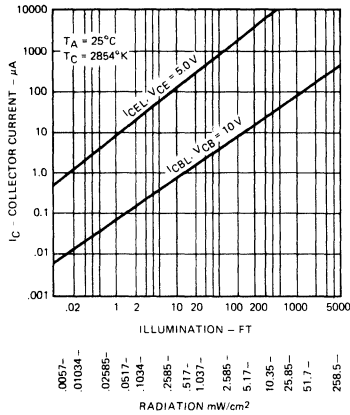
Notes

- These are steady-state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
- These ratings give a maximum junction temperature of 85°C and junction-to-case thermal resistance of $300^\circ\text{C}/\text{W}$ (derating factor of $3.33\text{ mW}/^\circ\text{C}$), and a junction-to-ambient thermal resistance of $600^\circ\text{C}/\text{W}$ (derating factor of $1.67\text{ mW}/^\circ\text{C}$).
- Measured at noted irradiance as emitted from a tungsten filament lamp at a color temperature of 2854°K . The effective photosensitive area is typically 1.25 mm^2 (FPT100A/B) and 0.78 mm^2 (FPT110A/B).
- These are values obtained at noted irradiance as emitted from a GaAs source at 900 nm .
- Measured with radiation flux intensity of less than $0.1\text{ }\mu\text{W}/\text{cm}^2$ over the spectrum from 100 to 1500 nm .
- 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: $I_{CE} = 4.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$, $R_L = 100\text{ }\Omega$, GaAs source.
- No electrical connection to base lead.
- No electrical connection to emitter lead.

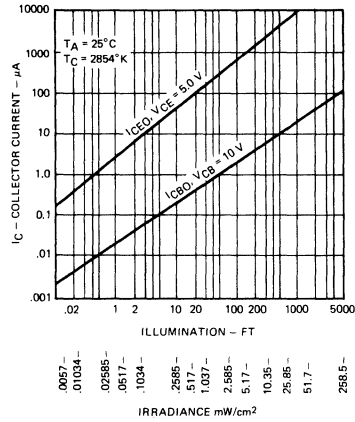
Typical Electrical Characteristic Curves

FPT100/A/B FPT110/A/B

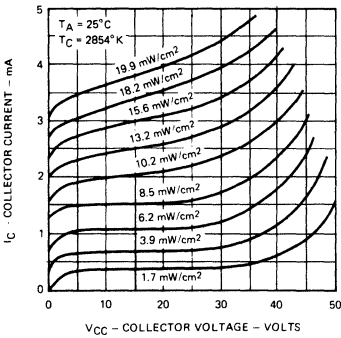
FPT100/A/B Photo Current Characteristics



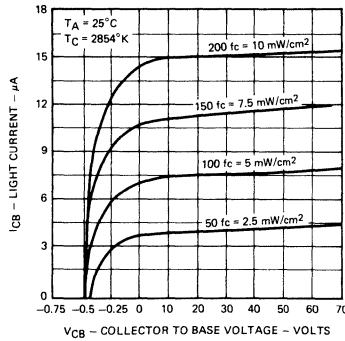
FPT110/A/B Photo Current Characteristics



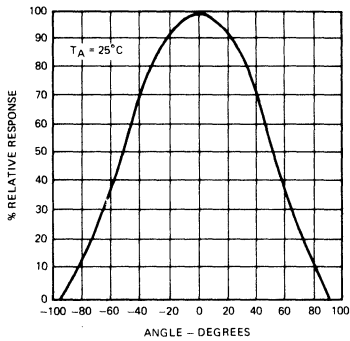
Collector Current vs Collector Voltage



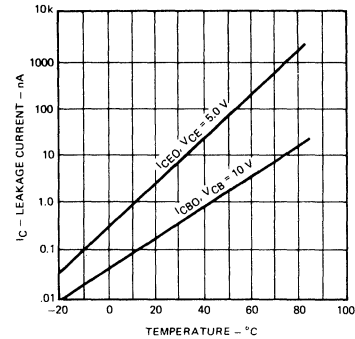
Collector Base Characteristics



Angular Response



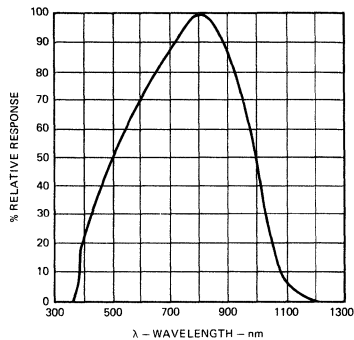
Collector Dark Current vs Temperature



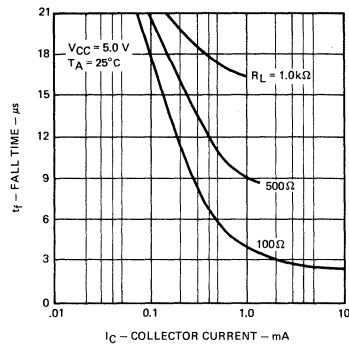
Typical Electrical Characteristic Curves Circuits

FPT100/A/B FPT110/A/B

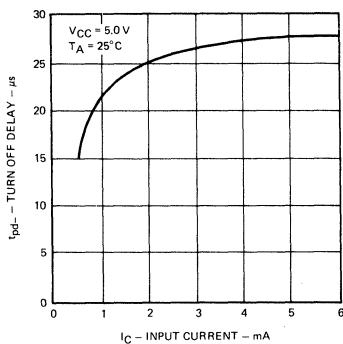
Spectral Characteristics



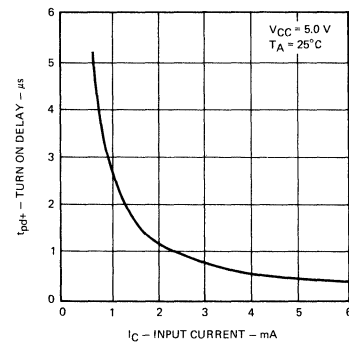
Rise And Fall Time vs Collector Current



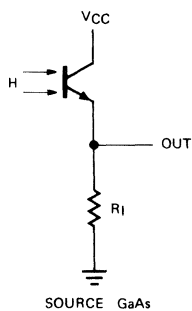
Turn-Off Delay Times For Circuit



Turn-On Delay Times For Circuit



Switching Circuit For Rise And Fall Times



Circuit For Turn-On And Turn-Off Data

