General-Purpose Silicon Planar Phototransistor

FPT100/A/B FPT110/A/B

Optoelectronic Products

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)

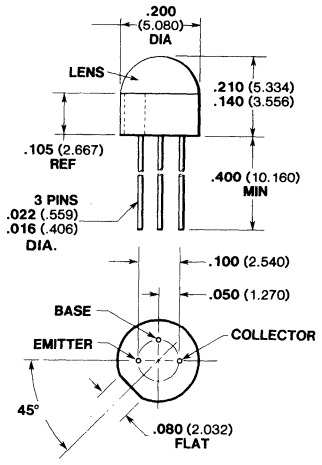
Total Dissipation at T_C = 25°C	200 mW
Total Dissipation at T_A = 25°C	100 mW

Maximum Voltages and Current (Note 5)

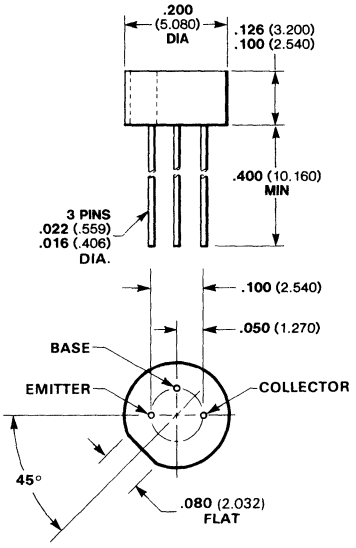
V_{CB}	Collector-to-Base Voltage	50 V
V_{CE}	Collector-to-Emitter Sustaining Voltage (Note 3)	30 V
I_C	Collector Current	25 mA

Package Outlines

FPT100/A/B



FPT110/A/B



Notes
All dimensions in inches **bold** and millimeters (parentheses)
Tolerance unless specified = ±.015 (±.381)

Typical Electrical Characteristics

FPT100/A/B FPT110/A/B

Electrical Characteristics T_A = 25°C unless otherwise noted

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_{CBO}	Collector Dark Current		0.25	25	nA	V_{CB} = 10 V (Note 5)
I_{CBO}	Collector Dark Current		0.025	0.5	μA	V_{CB} = 10 V, T_A = 65°C (Note 5)
I_{CEO}	Collector Dark Current		2.0	100	nA	V_{CE} = 5.0 V (Note 5)
R_{CB}	Responsivity (Tungsten)					
	FPT100/A/B	0.6	1.6		μA/	V_{CB} = 10 V
	FPT110/A/B	0.6	1.0		mW/cm²	(Notes 3 and 8)
R_{CB}	Responsivity (GaAs)					
	FPT100/A/B	1.8	4.8		μA/	V_{CB} = 10 V
	FPT110/A/B	1.8	3.0		mW/cm²	(Notes 4 and 8)
$I_{CE(lt)}$	Photo Current (Tungsten)					
	FPT100/A/B	0.2	1.4		mA	V_{CE} = 5.0 V
	FPT110/A/B	0.2	0.88			H = 5.0 mW/cm² (Notes 3 and 7)
$I_{CE(lt)}$	Photo Current (GaAs)					
	FPT100/A/B	0.6	4.2		mA	V_{CE} = 5.0 V
	FPT110/A/B	0.6	2.7			H = 5.0 mW/cm² (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 μA
	FPT110/A/B		0.16	0.33		H = 20 mW/cm²
BV_{CBO}	Collector-to-Base Breakdown Voltage	50	120		V	I_C = 100 μA (Note 5)
$V_{CEO(sus)}$	Collector-to-Emitter Sustaining Voltage	30	50		V	I_C = 1.0 mA (pulsed) (Note 5)
BV_{ECO}	Emitter-to-Collector Breakdown		7.0		V	I_E = 100 μA (Note 5)

The following values affect the A and B versions only:

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$I_{CE(lt)}$	Photo Current (Tungsten Source)					V_{CE} = 5.0 V
	FPT100A	1.0		3.0	mA	(Note 3)
	FPT110A	0.6		1.8		H = 5.0 mW/cm²
$I_{CE(lt)}$	Photo Current (Tungsten Source)					V_{CE} = 5.0 V
	FPT100B	1.3		2.6	mA	(Note 3)
	FPT110B	0.8		1.6		H = 5.0 mW/cm²

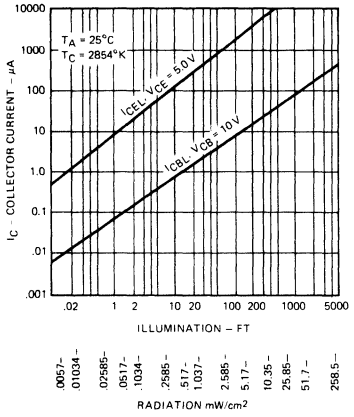
Notes

1. These are steady-state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
2. These ratings give a maximum junction temperature of 85°C and junction-to-case thermal resistance of 300°C/W (derating factor of 3.33 mW/°C), and a junction-to-ambient thermal resistance of 600°C/W (derating factor of 1.67 mW/°C).
3. 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 mm² (FPT100A/B) and 0.78 mm² (FPT110A/B).
4. These are values obtained at noted irradiance as emitted from a GaAs source at 900 nm.
5. Measured with radiation flux intensity of less than 0.1 μW/cm² over the spectrum from 100 to 1500 nm.
6. 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 mA, V_{CE} = 5.0 V, R_L = 100 Ω, GaAs source.
7. No electrical connection to base lead.
8. No electrical connection to emitter lead.

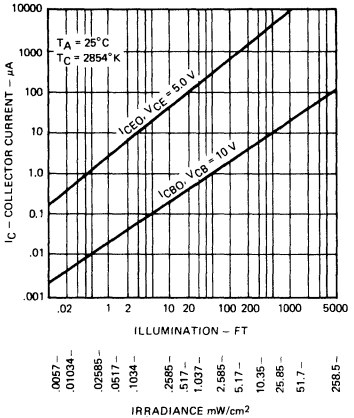
Typical Electrical Characteristic Curves

FPT100/A/B
FPT110/A/B

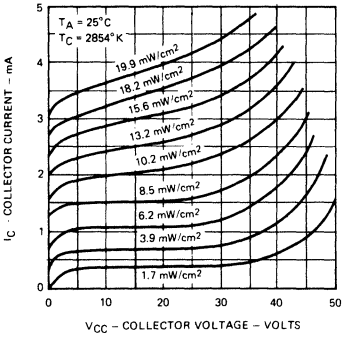
FPT100/A/B Photo Current Characteristics



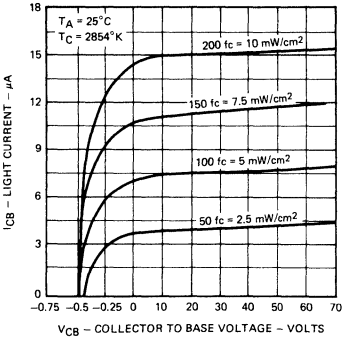
FPT110/A/B Photo Current Characteristics



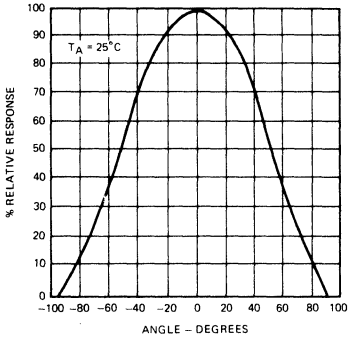
Collector Current vs Collector Voltage



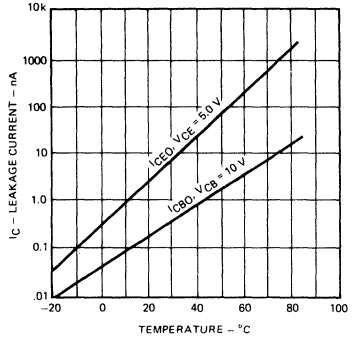
Collector Base Characteristics



Angular Response



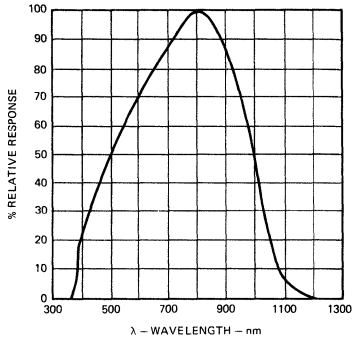
Collector Dark Current vs Temperature



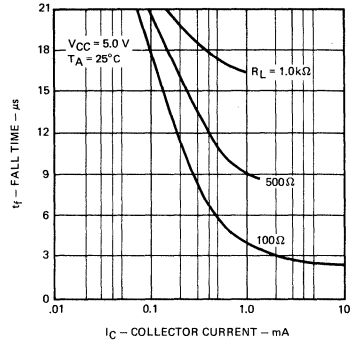
Typical Electrical Characteristic Curves Circuits

FPT100/A/B FPT110/A/B

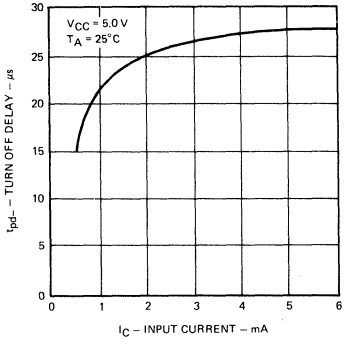
Spectral Characteristics



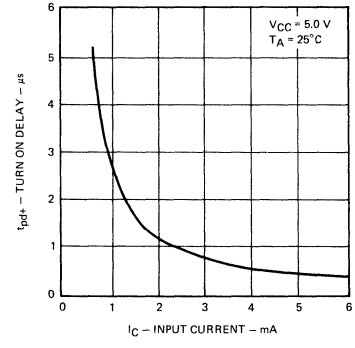
Rise And Fall Time vs Collector Current



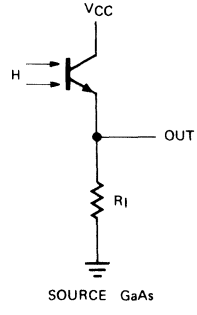
Turn-Off Delay Times For Circuit



Turn-On Delay Times For Circuit



Switching Circuit For Rise And Fall Times



Circuit For Turn-On And Turn-Off Data