High-Sensitivity Silicon Phototransistors

Optoelectronic Products

FPT120/A/B/C FPT130/A/B

General Description

The FPT120/A/B/C and FPT130/A/B are silicon nitride protected npn Planar phototransistors with exceptionally stable characteristics and high illumination-sensitivity. The case is made of a special plastic compound with transparent resin encapsulation. The controlled sensitivities offered in the A, B and C versions give the circuit designer increased flexibility.

High Illumination Sensitivity
Availability Of Base Pins For Flexible Circuit Design

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 (Note 1)

Total Dissipation at T_C = 25°C	200 mW
Derate Linearly from 25°C	3.33 mW/°C
Total Dissipation at T_A = 25°C	100 mW
Derate Linearly from 25°C	1.67 mW/°C

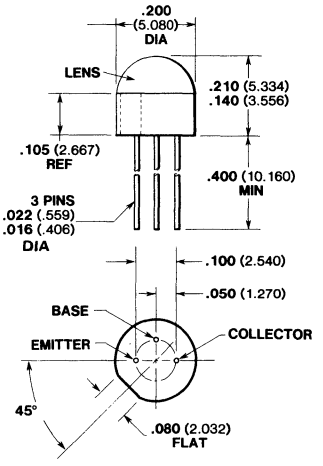
Maximum Voltage and Currents

$V_{CE(sus)}$	Collector-to-Emitter Sustaining Voltage (Note 4)	20 V
I_C	Collector Current	25 mA

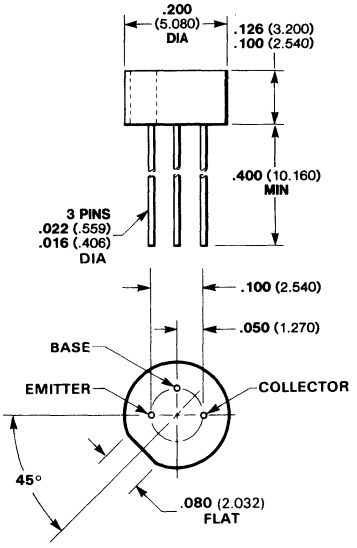
Package Outlines

FPT120/A/B/C

PHYSICAL DIMENSIONS



FPT130/A/B



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

Typical Electrical Characteristics

FPT120/A/B/C FPT130/A/B

Electrical Characteristics $T_A = 25°C$

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$V_{CEO(sus)}$	Collector-to-Emitter Sustaining Voltage (Note 4)	20	50		V	I_C = 1 mA (Pulsed)
BV_{ECO}	Emitter-to-Collector Breakdown Voltage (Note 4)		5.0		V	I_{EC} = 100 μA
$V_{CE(sat)}$	Collector-to-Emitter Saturation Voltage, Tungsten Source (Note 2)		0.25	0.55	V	I_C = 1 mA, H = 20 mW/cm²
I_{CEO}	Collector Dark Current (Note 4)		10	100	nA	V_{CE} = 5.0 V
$I_{CE(lt)}$	Photo Current, Tungsten Source (Note 2)				mA	V_{CE} = 5.0 V,
	FPT120	2.0	7.5			H = 5 mW/cm²
	FPT120A (Note 6)	7.5		22.5		
	FPT120B (Note 6)	10		20		
	FPT120C (Note 6)	16		25		
	FPT130	2.0	4.5			
	FPT130A (Note 7)	4.5		13.5		
	FPT130B (Note 7)	6.0		12		
$I_{CE(lt)}$	Photo Current, GaAs Source (Note 3)				mA	V_{CE} = 5.0 V,
	FPT120	0.7	4.5			H = 1 mW/cm²
	FPT130	0.7	2.7			
t_r	Light Current Rise Time (Note 5)		18		μs	
t_f	Light Current Fall Time (Note 5)		18		μs	

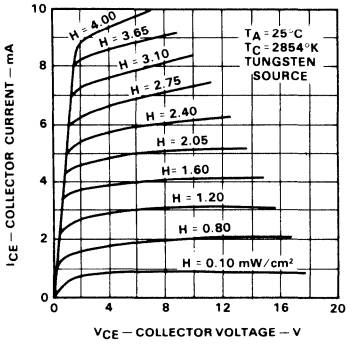
Notes

1. These are steady-state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
2. 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 (FPT120A/B) and 0.78 mm² (FPT130A/B).
3. These are values obtained at noted irradiance as emitted from a GaAs source at 900 nm.
4. Measured with radiation flux intensity of less than 0.1 μW/cm² over the spectrum from 100-1500 nm.
5. 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} = 5.0 V, I_{CC} = 4.0 mA, R_L = 100 Ω, GaAs source.
6. Same electrical characteristics as FPT120 except for $I_{CE(lt)}$.
7. Same electrical characteristics as FPT130 except for $I_{CE(lt)}$.

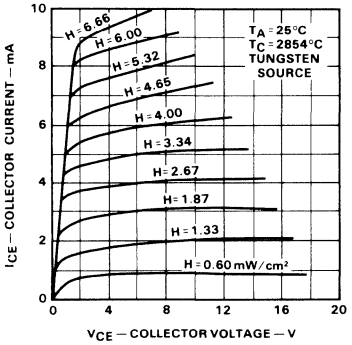
Typical Electrical Characteristic Curves

FPT120/A/B/C FPT130/A/B

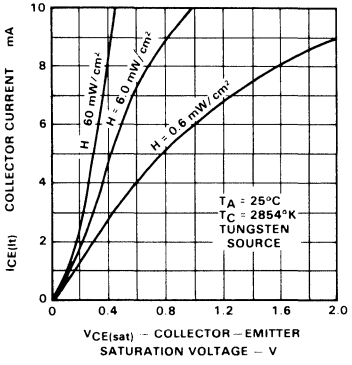
FPT120/A/B/C Collector Current vs Collector Voltage



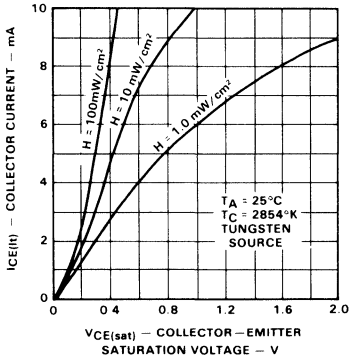
FPT130/A/B/C Collector Current vs Collector Voltage



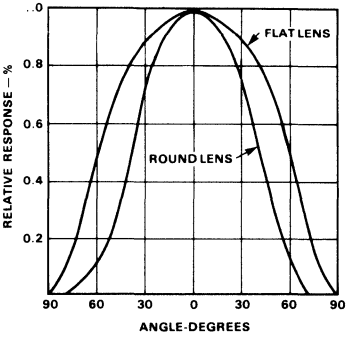
Collector-Emitter Saturation Voltage vs Collector Current



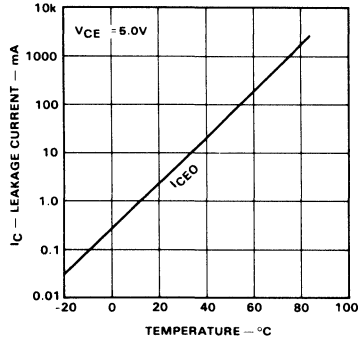
Collector-Emitter Saturation Voltage vs Collector Current



Angular Response

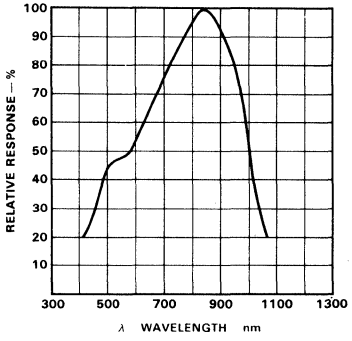


Collector Dark Current vs Temperature



Typical Electrical Characteristic Curves (Cont'd)

Relative Spectral Response



Rise And Fall Time vs Collector Current

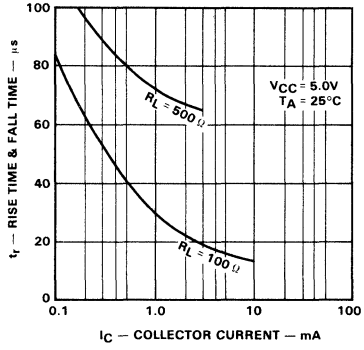
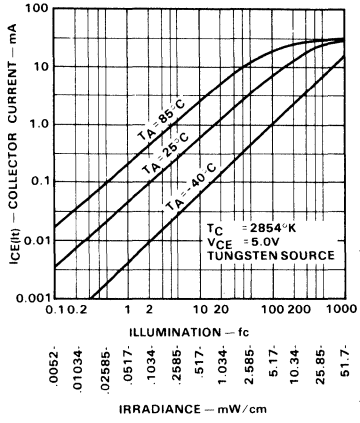


Photo Current Characteristics



Switching Time Measurement Circuit