General-Purpose Silicon Phototransistors

Optoelectronic Products

FPT131 FPT136

General Description

The FPT131 and FPT136 are 3-terminal npn Planar phototransistors with exceptionally stable characteristics and high illumination sensitivity. The availability of the base pins 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.

High Illumination Sensitivity
Availability Of Base Pins For Flexible Circuit Design
Low Cost

Absolute Maximum Ratings

Maximum Temperature and Humidity

Storage Temperature	−55°C to +100°C
Operating Temperature	−55°C to +85°C
Pin Temperature (Soldering, 10 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

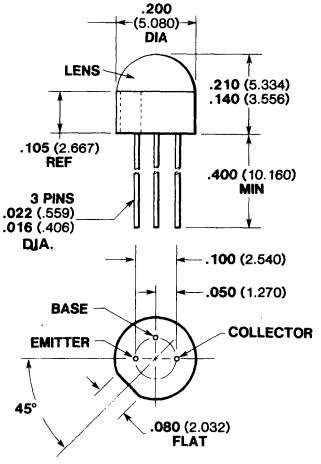
Maximum Voltages and Current (Note 4)

V_{CB}	Collector-to-Base Voltage	20 V
$V_{CE(sus)}$	Collector-to-Emitter Sustaining Voltage (Note 4)	15 V
I_C	Collector Current	25 mA

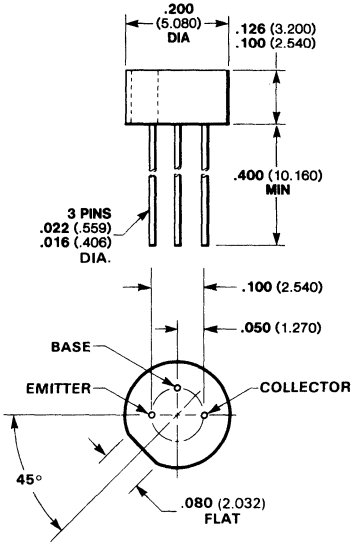
Package Outlines

FPT131

PHYSICAL DIMENSIONS



FPT136



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

Typical Electrical Characteristics

FPT131
FPT136

Electrical Characteristics $T_A = 25°C$

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$V_{CEO(sus)}$	Collector-to-Emitter Sustaining Voltage (Note 4)	15	50		V	I_C = 1.0 mA (Pulsed)
BV_{CBO}	Collector-to-Base Breakdown Voltage (Note 4)	20	120		V	I_C = 100 μA
BV_{ECO}	Emitter-to-Collector Breakdown Voltage (Note 4)		7.0		V	I_{EC} = 100 μA
$V_{CE(sat)}$	Collector-to-Emitter Saturation Voltage		0.16	0.7	V	I_C = 500 μA H = 20 mW/cm²
I_{CEO}	Collector Dark Current (Note 4)		10	500	nA	V_{CE} = 5.0 V
I_{CBO}	Collector Dark Current (Note 4)		0.25		nA	V_{CB} = 10 V
$I_{CE(lt)}$	Photo Current, Tungsten (Notes 2 and 6)					
	FPT131	0.1	1.4		mA	V_{CE} = 5.0 V
	FPT136	0.1	0.88			H = 5.0 mW/cm²
$I_{CE(lt)}$	Photo Current, GaAs (Notes 3 and 6)					
	FPT131	0.2	4.2		mA	V_{CE} = 5.0 V
	FPT136	0.2	2.7			H = 5.0 mW/cm²
t_r	Light Current Rise Time (Note 5)		2.8		μs	
t_f	Light Current Fall Time (Note 5)		2.8		μs	
R_{CB}	Responsivity, Tungsten (Notes 2 and 7)					
	FPT131		1.6		μA/	V_{CB} = 10 V
	FPT136		1.0		mW/cm²	
R_{CB}	Responsivity, GaAs (Notes 3 and 7)					
	FPT131		4.8		μA/	V_{CB} = 20 V
	FPT136		3.0		mW/cm²	

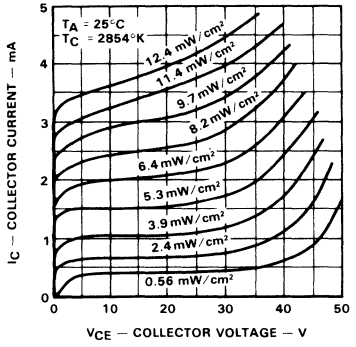
Notes

1. These are steady-state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
2. 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 (FPT131) and 0.78 mm² (FPT136).
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: I_{CE} = 4.0 mA, V_{CE} = 5.0 V, R_L = 100 Ω, GaAs source.
6. No electrical connection to base pin.
7. No electrical connection to emitter pin.

Typical Electrical Characteristic Curves

FPT131
FPT136

FPT131 Collector Current vs Collector Voltage



FPT136 Collector Current vs Collector Voltage

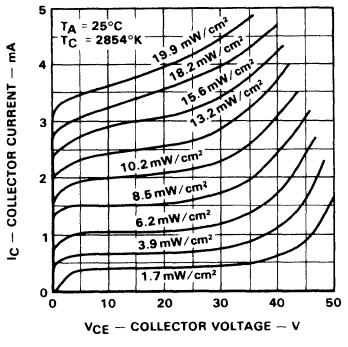
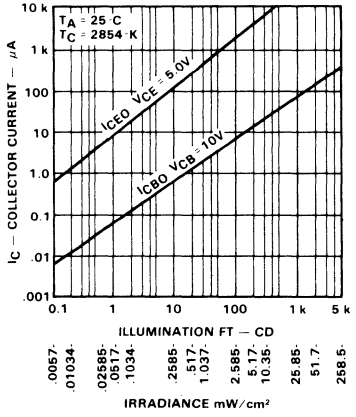
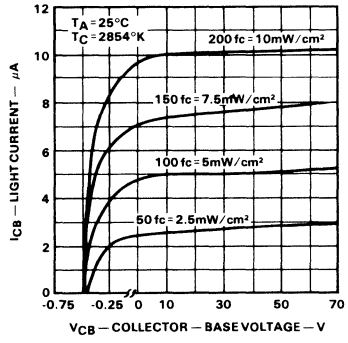


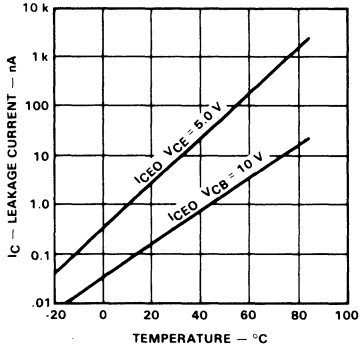
Photo Current Characteristics



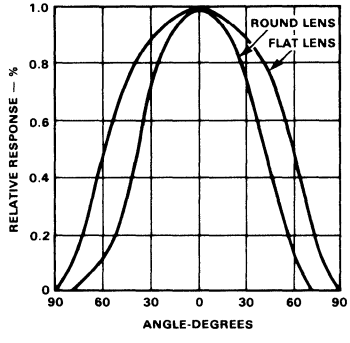
Collector Base Characteristics



Collector Dark Current vs Temperature

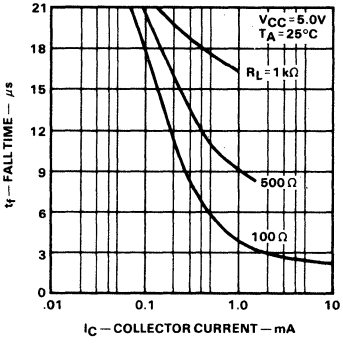


Angular Response

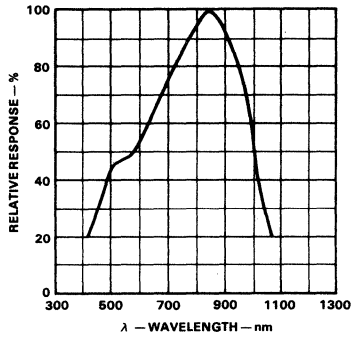


Typical Electrical Characteristic Curves (Cont'd)

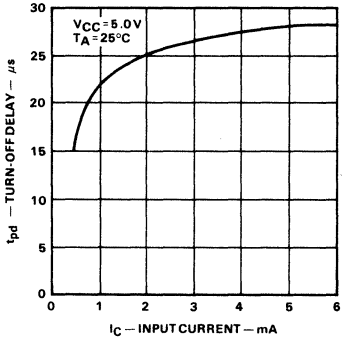
Rise And Fall Time vs Collector Current



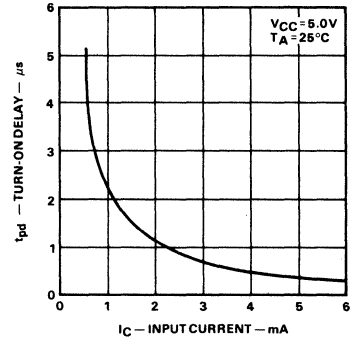
Relative Spectral Response



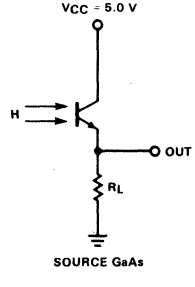
Turn-Off Times For Circuit Shown



Turn-On Delay Times For Circuit Shown



Switching Circuit For Rise And Fall Times



Circuit For Turn-On And Turn-Off Data