12-Element Phototransistor Card Reader Array

Optoelectronic Products

FPA710 FPA710A

General Description

The FPA710 and FPA710A are 12-element npn Planar phototransistor arrays with exceptionally stable characteristics and high illumination sensitivity. Each transistor is electrically isolated and mounted on 250 mil centers. The case is a plastic compound with transparent resin encapsulation that exhibits stable characteristics under high humidity conditions.

High Illumination Sensitivity
Especially Designed For Punched Or Marked Card Reading And Optical Encoder Applications

Absolute Maximum Ratings

Maximum Temperatures and Humidity

Storage Temperature	−40°C to +100°C
Operating Temperature	−40°C to +85°C
Pin Temperature (Soldering, 10 s)	260°C
Relative Humidity at 65°C	85%

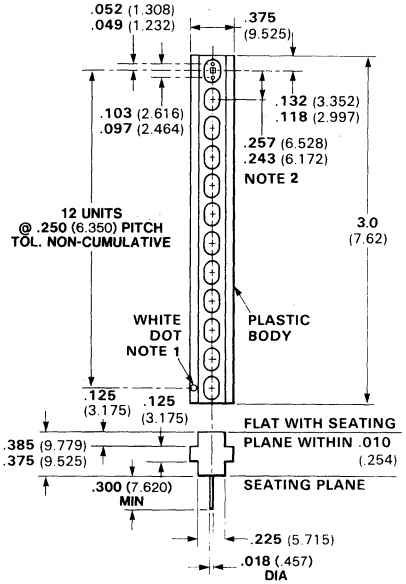
Maximum Power Dissipation per Cell

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	133 mW
Derate Linearly from 25°C	2.22 mW/°C

Maximum Voltages and Currents (Note 1)

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

Package Outline



Notes

1. Emitter terminal side of phototransistor (sensor array) or anode terminal side of diode (source array) defined by white dot.
2. The center of each element is aligned to ±.010" along the length and ±.005" across the width.
3. All dimensions in inches **bold** and millimeters (parentheses).
4. Tolerance unless specified = **±0.15** (0.381).
5. Other packages following.

Typical Electrical Characteristics

FPA710
FPA710A

Electrical Characteristics $T_A = 25°C$

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$V_{CEO(sus)}$	Collector-to-Emitter Sustaining Voltage (Note 2)	20	35		V	I_C = 1.0 mA, pulsed
BV_{ECO}	Emitter-to-Collector Breakdown Voltage (Note 2)		7.0		V	I_{EC} = 100 μA
$V_{CE(sat)}$	Collector-to-Emitter Saturation Voltage		0.16	0.33	V	I_C = 500 μA, H = 20 mW/cm²
I_{CEO}	Collector Dark Current (Note 2)		4.0	100	nA	V_{CE} = 5.0 V
$I_{CE(It)}$	Photo Current, Tungsten Source (Note 3)	200	750		μA	V_{CE} = 5.0 V, H = 5 mW/cm²
$I_{CE(It)}$	Photo Current, Tungsten Source (Note 3)		1.75		mA	V_{CE} = 5.0 V, H = 10 mW/cm²
$I_{CE(It)}$	Photo Current, GaAs Source (Note 4)		2.25		mA	V_{CE} = 5.0 V, H = 5 mW/cm²
t_r	Light Current Rise Time (Note 6)		4.0		μs	GaAs,
t_f	Light Current Fall Time (Note 6)		4.0		μs	I_C = 2.0 mA, R_L = 100 Ω, V_{CC} = 5.0 V
S_{min}/S_{max}	Matching Factor (Notes 3 and 5)					
	FPA710	0.5	0.65	1.0		V_{CE} = 5.0 V, H = 5 mW/cm²
	FPA710A	0.75	0.85	1.0		

Notes
1. These are steady-state limits. The factory should be consulted on applications involving pulsed or low duty cycle operation.
2. Measured with radiation flux intensity of less than 0.1 μW/cm² over the spectrum from 0.1 micron to 1.5 microns.
3. Measured at noted irradiance as emitted from a tungsten lamp at a color temperature of 2854°K. The effective photosensitive area is (0.8 mm²). Illuminance (in lumens/ft²) = irradiance H (in mW/cm²) × 20 at a color temperature of 2854°K.
4. Measured at an irradiance of 5.0 mW/cm² as emitted from a gallium arsenide diode.
5. Matching factor is the ratio of minimum sensitivity to maximum sensitivity of any two cells.
6. Rise time is defined as the time required for I_{CE} to rise from 10% to 90% of the peak value. Fall time is defined as the time required for I_{CE} to decrease from 90% to 10% of peak value.

Photo Current Characteristics

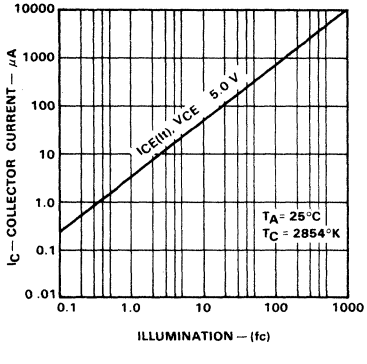
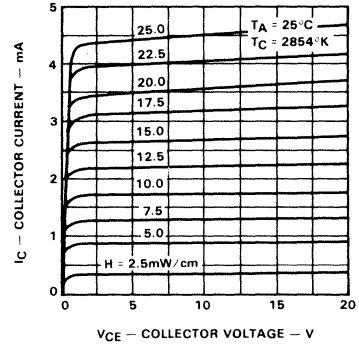


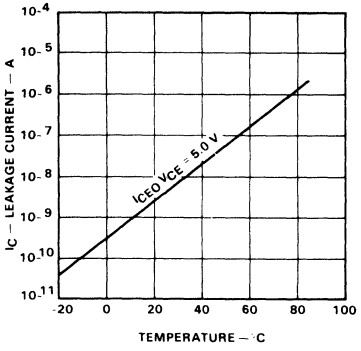
Photo Current vs Collector Voltage



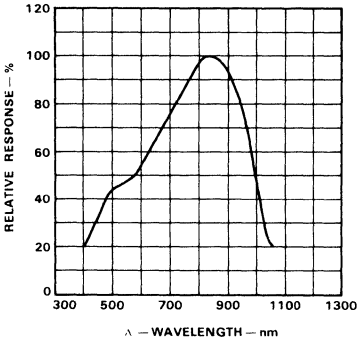
Typical Electrical Characteristic Curves

FPA710
FPA710A

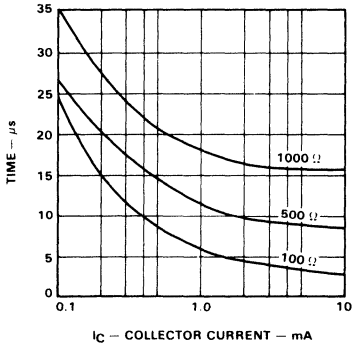
Collector Dark Current vs Temperature



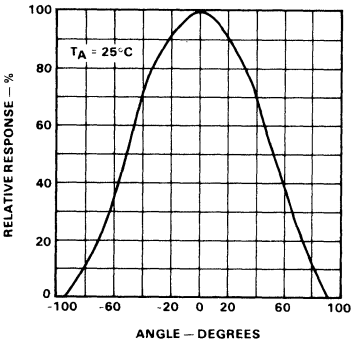
Relative Spectral Response



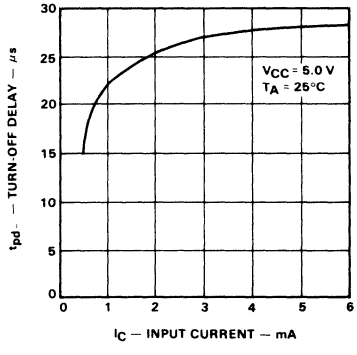
Rise And Fall Time vs Collector Current



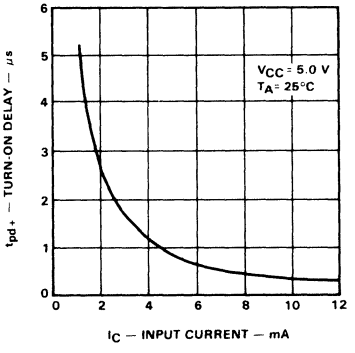
Angular Response



Turn-Off Delay Times



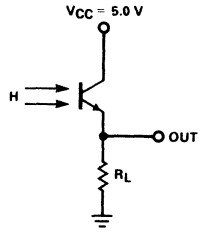
Turn-On Delay Times



Switching Test Circuits

FPA710 FPA710A

Rise And Fall Times



SOURCE GaAS

Turn-On And Turn-Off Delay