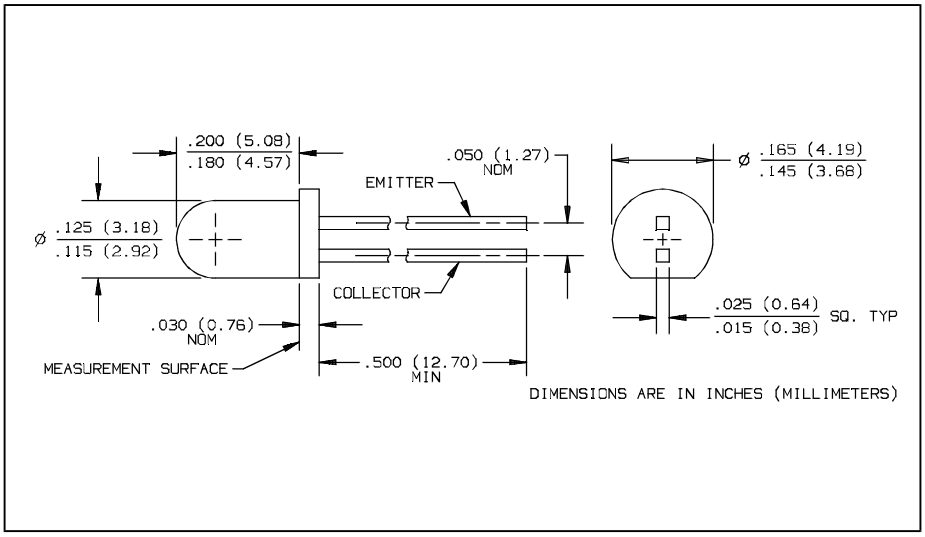
NPN Phototransistor with Base-Emitter Resistor Types OP705A, OP705B, OP705C, OP705D



Features

- Narrow receiving angle
- Variety of sensitivity ranges
- T-1 package style
- Small package size for space limited applications
- Base-emitter resistor provides ambient light protection

Description

The OP705 series devices consist of NPN silicon phototransistors molded in blue tinted epoxy packages. The narrow receiving angle provides excellent on-axis coupling. These devices are 100% production tested using infrared light for close correlation with Optek's GaAs and GaAlAs emitters.

The phototransistor has an internal base-emitter resistor which provides protection from low level ambient lighting conditions. This feature is also useful when the media being detected is semi-transparent to infrared light in interruptive applications.

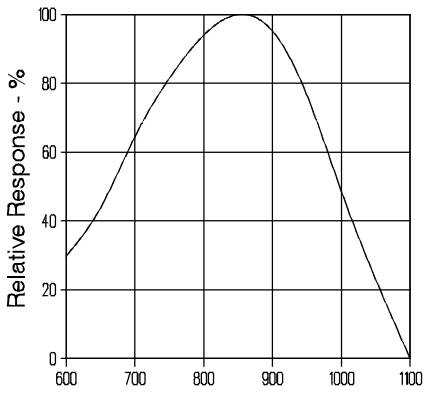
Absolute Maximum Ratings (T_A = 25° C unless otherwise noted)

Collector-Emitter Voltage	30 V
Emitter Reverse Current	10 mA
Collector DC Current	30 mA
Storage and Operating Temperature Range	-40° C to +100° C
Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 sec. with soldering iron]	260° C(1)
Power Dissipation	100 mW(2)

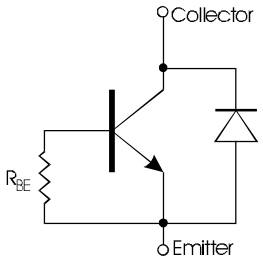
Notes:
(1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering. Max. 20 grams force may be applied to leads when soldering.
(2) Derate linearly 1.33 mW/° C above 25° C.
(3) Light source is an unfiltered GaAs LED with a peak emission wavelength of 935 nm and a radiometric intensity level which varies less than 10% over the entire lens surface of the phototransistor being tested.
(4) The knee point irradiance is defined as the irradiance required to increase $I_{C(ON)}$ to 50 mA.

Typical Performance Curves

Typical Spectral Response



Schematic



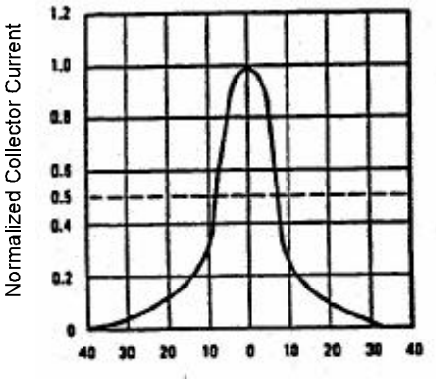
Types OP705A, OP705B, OP705C, OP705D

Electrical Characteristics (T_A = 25° C unless otherwise noted)

SYMBOL	PARAMETER		MIN	TYP	MAX	UNITS	TEST CONDITIONS
$I_{C(ON)}$	On-State Collector Current	OP705A OP705B OP705C OP705D	3.95 2.65 1.50 1.50		12.0 7.25 4.85 12.0	mA	V_{CE} = 5 V, E_e = .50 mW/cm^2(3)
E_{KP}	Knee Point Irradiance			.02		mW/cm^2	V_{CE} = 5 V(4)
I_{CEO}	Collector-Emitter Dark Current				100	nA	V_{CE} = 10 V, E_e = 0
I_{ECO}	Emitter-Reverse Current				100	µA	V_{EC} = 0.4 V
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage		30			V	I_C = 100 µA
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage				0.4	V	I_C = 250 µA, E_e = .50 mW/cm^2(3)

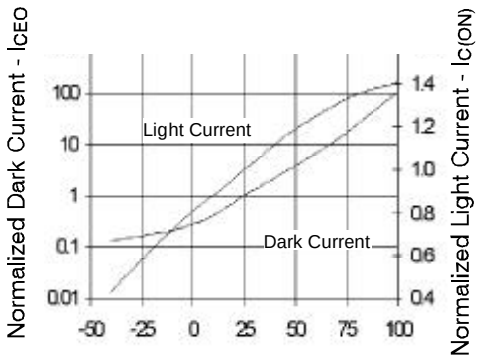
Typical Performance Curves

Normalized Collector Current vs. Angular Displacement



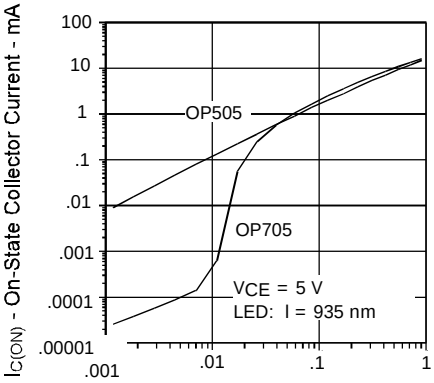
q - Angular Displacement - Deg.

Normalized Light and Dark Current vs. Ambient Temperature



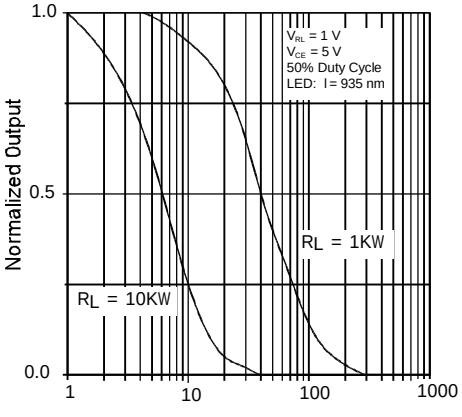
T_A - Ambient Temperature - °C

On-State Collector Current vs. Irradiance



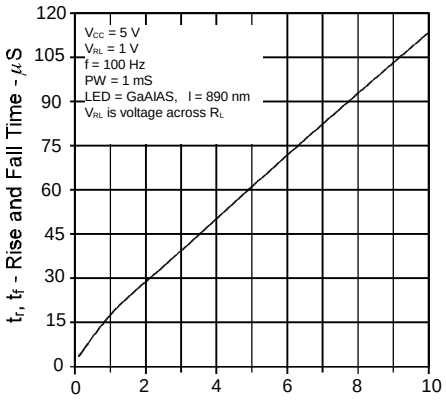
E_e - Irradiance - mW/cm2

Normalized Output vs. Frequency



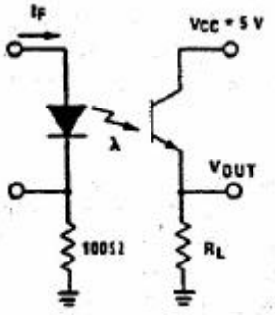
Frequency - KHz

Typical Rise and Fall Time vs. Load Resistance



R_L - Load Resistance - KW

Switching Time Test Circuit



Test Conditions:
Light source is pulsed LED with, t_r and t_f £ 500 ns.
I_F is adjusted for V_{OUT} = 1 Volt.

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