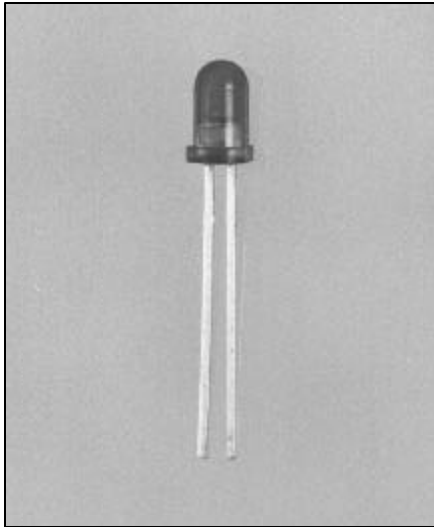
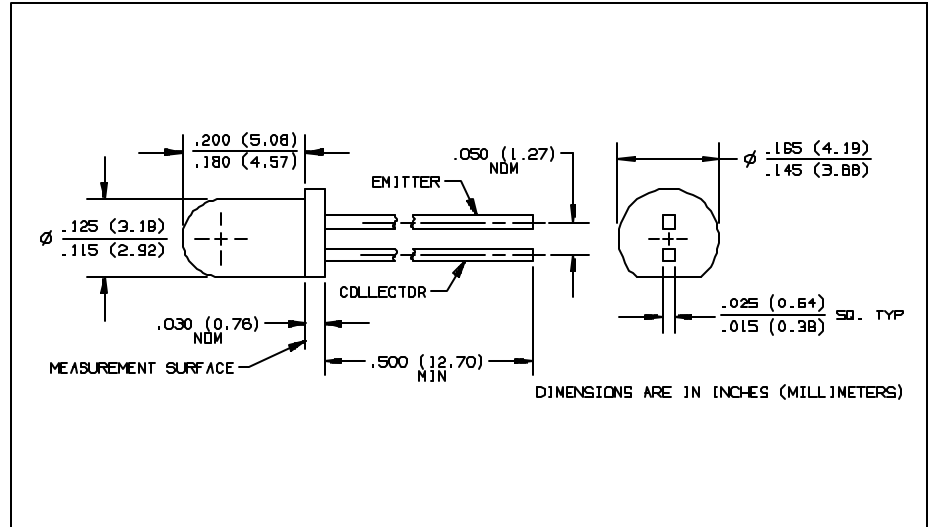


# NPN Phototransistor with Base-Emitter Resistor Types OP705A, OP705B, OP705C, OP705D



## 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.

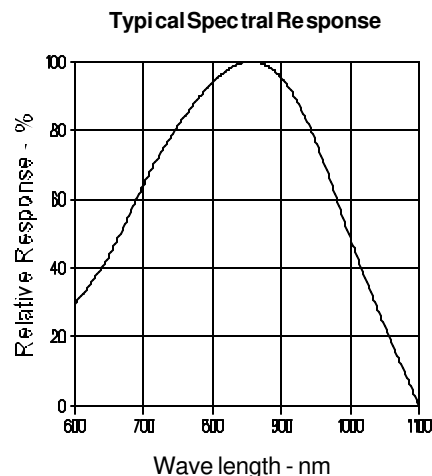
## Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

|                                                                                          |                                             |
|------------------------------------------------------------------------------------------|---------------------------------------------|
| Collector-Emitter Voltage                                                                | 30 V                                        |
| Emitter Reverse Current                                                                  | 10 mA                                       |
| Collector DC Current                                                                     | 30 mA                                       |
| Storage and Operating Temperature Range                                                  | $-40^\circ\text{C}$ to $+100^\circ\text{C}$ |
| Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 sec. with soldering iron] | $260^\circ\text{C}^{(1)}$                   |
| Power Dissipation                                                                        | 100 mW <sup>(2)</sup>                       |

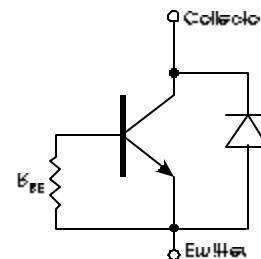
## NOTES:

- (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  $1.33\text{ mW}/^\circ\text{C}$  above  $25^\circ\text{C}$ .
- (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  $50\mu\text{A}$ .

## Typical Performance Curves



## Schematic



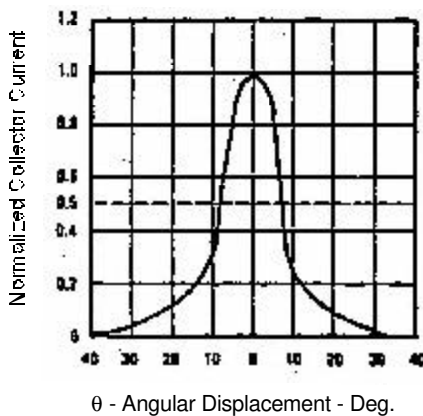
# Types OP705A, OP705B, OP705C, OP705D

Electrical Characteristics ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

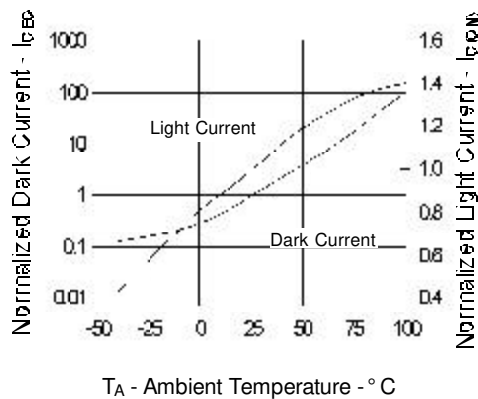
| SYMBOL        | PARAMETER                                                          | MIN                          | TYP | MAX                          | UNITS            | TEST CONDITIONS                                                |
|---------------|--------------------------------------------------------------------|------------------------------|-----|--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

## Typical Performance Curves

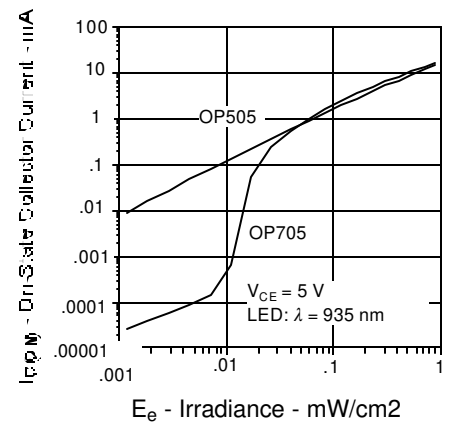
Normalized Collector Current



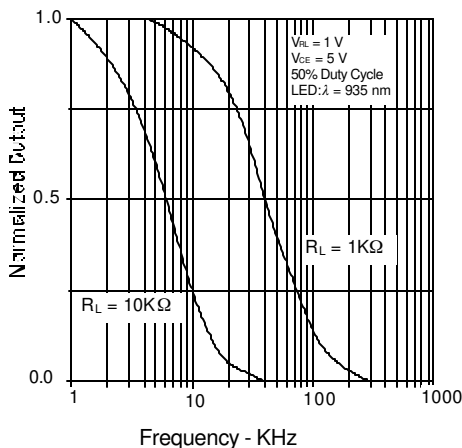
Normalized Light and Dark Current vs. Ambient Temperature



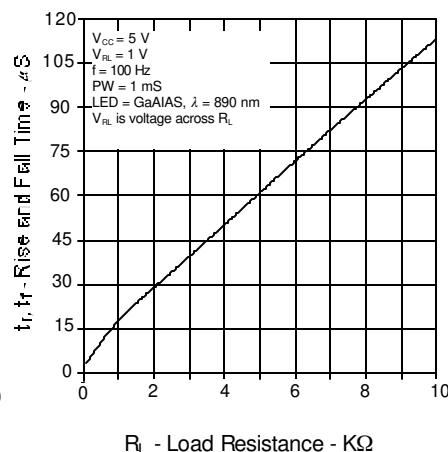
On-State Collector Current vs. Irradiance



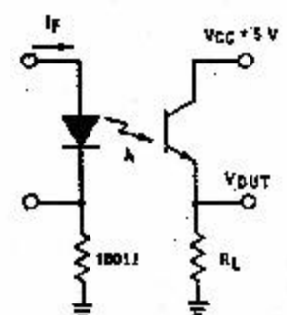
Normalized Output vs. Frequency



Typical Rise and Fall Time vs. Load Resistance



Switching Time Test Circuit



### Test Conditions:

Light source is pulsed LED with,  $t_r$  and  $t_f \leq 500\text{ ns}$ .  
 $I_F$  is adjusted for  $V_{OUT} = 1\text{ Volt}$ .

Op tek reserves the right to make changes at any time in or der to im prove de sign and to sup ply the best prod uct pos si ble.

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