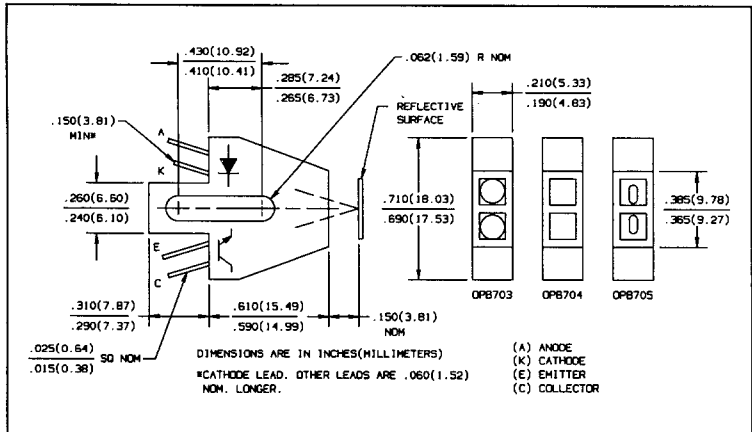
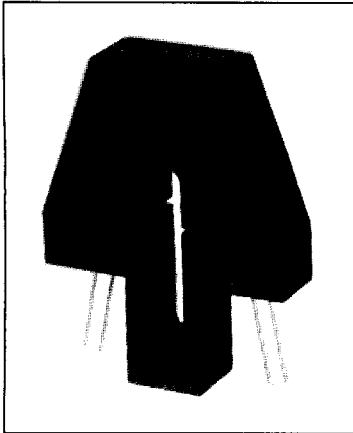


# Reflective Object Sensors

## Types OPB703, OPB704, OPB705



### Features

- Phototransistor output
- High sensitivity
- Low cost plastic housing
- Available with lenses for dust protection and ambient light filtration

### Description

The OPB703, OPB704 and OPB705 each consist of an infrared emitting diode and an NPN silicon phototransistor mounted side-by-side on converging optical axes in a black plastic housing. The phototransistor responds to radiation from the emitter only when a reflective object passes within its field of view. Various options allow no lens, blue polysulfone lens for dust protection or offset lens for improved resolution.

### Replaces

OPB703 = KR8800  
OPB704 = KR8801 and OPB703A  
OPB705 = KR8802

### Absolute Maximum Ratings (T<sub>A</sub> = 25°C unless otherwise noted)

Storage and Operating Temperature . . . . . -40°C to +85°C  
Lead Soldering Temperature [1/16 inch (1.6mm) from case for 5 sec. with soldering iron] . . . . . 240°C<sup>(1)</sup>

### Input Diode

Forward DC Current . . . . . 40mA  
Reverse DC Voltage . . . . . 2.0V  
Power Dissipation . . . . . 100mW<sup>(2)</sup>

### Output Phototransistor

Collector-Emitter Voltage . . . . . 30V  
Emitter-Collector Voltage . . . . . 5.0V  
Collector DC Current . . . . . 25mA  
Power Dissipation . . . . . 100mW<sup>(2)</sup>

### Notes:

- (1) RMA flux is recommended. Duration can be extended to 10 sec. max when flow soldering.
- (2) Derate linearly 1.67mW/°C above 25°C.
- (3) d is the distance from the assembly face to the reflective surface.
- (4) Lower curve is based on a calculated worst case condition rather than the conventional -2σ limit.
- (5) All parameters tested using pulse technique.
- (6) Crosstalk is the photocurrent measured with current to the input diode and no reflecting surface.
- (7) Measured using Eastman Kodak neutral white test card with 90% diffuse reflectance as a reflecting surface.

### DESCRIPTION

OPB703	No Lens
OPB704	Blue Polysulfone Lens
OPB705	Offset Lens

# Type OPB701, OPB701AL

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

SYMBOL	PARAMETER	MIN	MAX	UNITS	TEST CONDITIONS
<b>Input Diode</b>					
$V_F$	Forward Voltage		1.70	V	$I_F = 50\text{mA}$
$I_R$	Reverse Current		100	$\mu\text{A}$	$V_R = 2.0\text{V}$

## Output Photodarlington

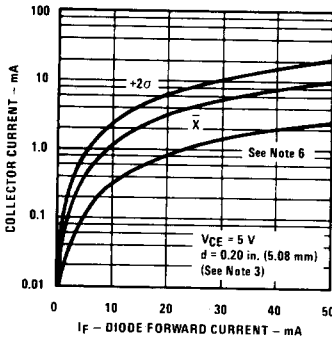
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	15		V	$I_C = 100\mu\text{A}$
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage	5.0		V	$I_E = 100\mu\text{A}$
$I_{CEO}$	Collector Dark Current		1.00	$\mu\text{A}$	$V_{CE} = 10.0\text{V}$ , $I_F = 0$ , $E_a \leq 0.100\mu\text{W}/\text{cm}^2$

## Combined

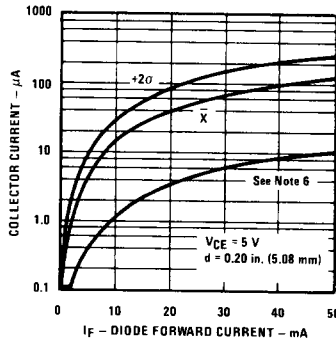
$I_{C(ON)}$	On-State Collector Current	2.0		mA	$V_{CE} = 5.0\text{V}$ , $I_F = 40\text{mA}$ , $d = 0.200\text{ in. (5.08mm)}$ <sup>(3)(5)</sup>
$I_{CX}$	Crosstalk		2.0	$\mu\text{A}$	$V_{CE} = 5.0\text{V}$ , $I_F = 40\text{mA}$ , No Reflecting Surface <sup>(4)</sup>
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage		1.10	V	$I_F = 40\text{mA}$ , $I_C = 1.0\text{mA}$ , $d = 0.200\text{ in. (5.08mm)}$ <sup>(3)(5)</sup>

## Typical Performance Curves

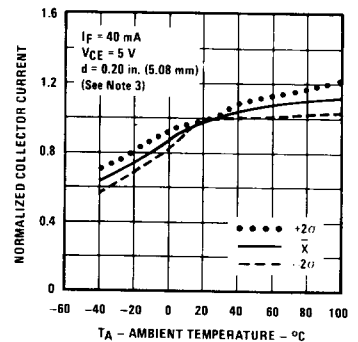
Reflective Surface Collector Current vs. Diode Forward Current



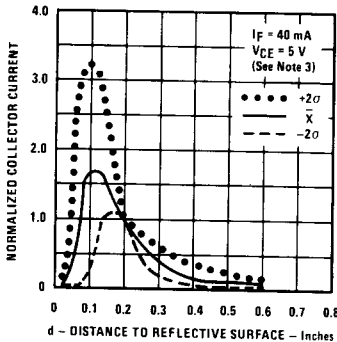
Diffused Surface Collector Current vs. Diode Forward Current



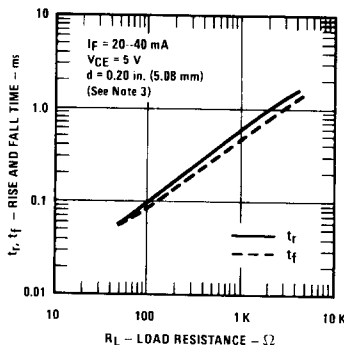
Normalized Collector Current vs. Ambient Temperature



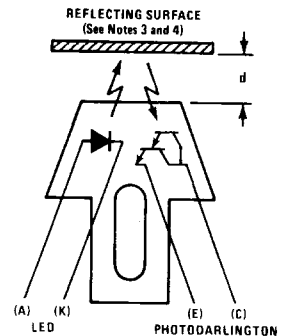
Normalized Collector Current vs. Object Distance



Rise and Fall Time vs. Load Resistance



Test Condition



Optek reserves the right to make changes at any time in order to improve design and to supply the best product possible.

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# Types OPB703, OPB704, OPB705

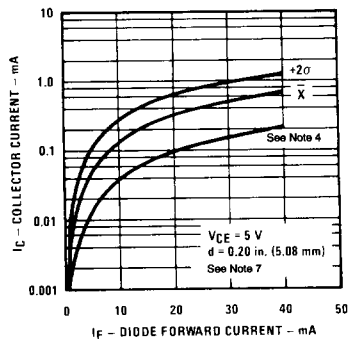
Electrical Characteristics ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

REFLECTIVE OBJECT SENSORS

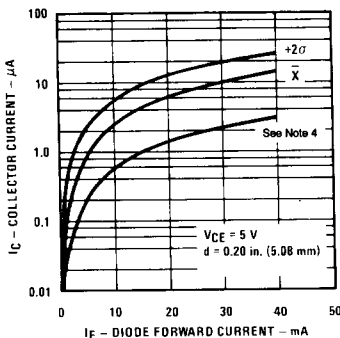
SYMBOL	PARAMETER	MIN	MAX	UNITS	TEST CONDITIONS
<b>Output Diode</b>					
$V_F$	Forward Voltage		1.70	V	$I_F = 40\text{ mA}$
$I_R$	Reverse Current		100	$\mu\text{A}$	$V_R = 2.0\text{ V}$
<b>Output Phototransistor</b>					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	30		V	$I_{CE} = 100\ \mu\text{A}$
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage	5.0		V	$I_{EC} = 100\ \mu\text{A}$
$I_{CEO}$	Collector Dark Current		100	nA	$V_{CE} = 10.0\text{ V}, I_F = 0, E_B = 0$
<b>Combined</b>					
$I_{C(ON)}$	On-State Collector Current	OPB703 OPB704 OPB705	200 200 100	$\mu\text{A}$ $\mu\text{A}$ $\mu\text{A}$	$V_{CE} = 5.0\text{ V}, I_F = 40\text{ mA}, d = 0.15\text{ inch (3.81 mm)}$ <sup>(3)(7)</sup>
$I_{CX}$	Crosstalk	OPB703 OPB704 OPB705	20 20 10	$\mu\text{A}$ $\mu\text{A}$ $\mu\text{A}$	$V_{CE} = 5.0\text{ V}, I_F = 40\text{ mA}$ <sup>(6)</sup>

## Typical Performance Curves

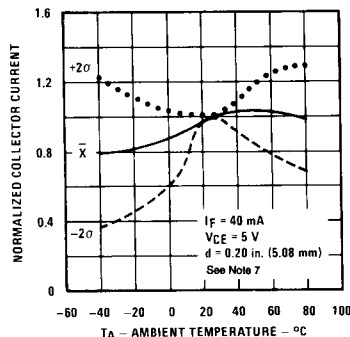
**Reflective Surface Collector Current vs. Diode Forward Current**



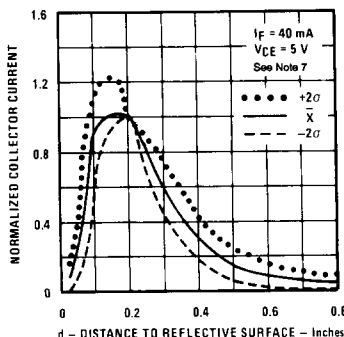
**Diffused Surface Collector Current vs. Diode Forward Current**



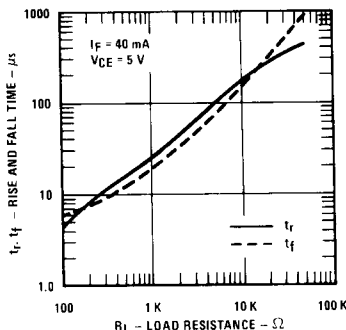
**Normalized Collector Current vs. Ambient Temperature**



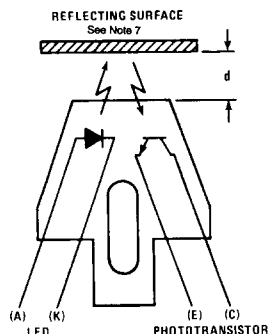
**Normalized Collector Current vs. Object Distance**



**Rise and Fall Time vs. Load Resistance**



**Test Condition**



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