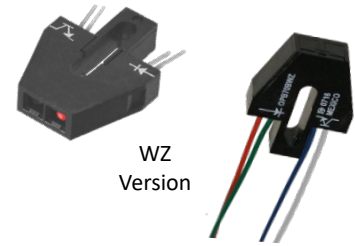


Reflective Object Sensor

OPB703 through OPB705,
OPB703WZ through OPB705WZ,
OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ



Features:

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

Description:

The **OPB703**, **OPB704** and **OPB705** consist of an Infrared (890 nm) Light Emitting Diode (LED) and an NPN silicon Phototransistor, mounted side-by-side on converging optical axes in a black plastic housing and are designed for printed circuit board mounting. The **OPB703WZ**, **OPB704WZ** and **OPB705WZ** are designed for remote mounting utilizing interconnect wires of UL rated #26 AWG, 24" (61.0 cm) minimum length, stripped and tinned.

The **OPB70AWZ** consists of an Infrared (890 nm) Light Emitting Diode (LED) and a NPN silicon Photodarlington, mounted side-by-side on converging optical axes in a black plastic housing and is designed for remote mounting utilizing interconnect wires of UL rated #26 AWG, 24" (61.0 cm) minimum length, stripped and tinned.

The **OPB70DWZ through OPB70FWZ** consist of a Visible (Red 660 nm) Light Emitting Diode (LED) and a NPN silicon Phototransistor or Rbe Phototransistor, mounted side-by-side on converging optical axes in a black plastic housing and are designed for remote mounting utilizing interconnect wires of UL rated #26 AWG, 24" (61.0 cm) minimum length, stripped and tinned.

Various lens options are available: No lens for the (**OPB703**, **OPB703WZ**), blue window for dust protection for the (**OPB704**, **OPB704WZ**) and aperture lens for improved resolution for the (**OPB705**, **OPB705WZ**, **OPB70AWZ**, **OPB70DWZ**). The **OPB704GWZ** offers excellent protection for dirty environments.

The phototransistor responds to illumination from the emitter when a reflective object passes within the field of view centered typically at 0.15" (3.8 mm).

Custom electrical, wire, cabling and connectors are available. Contact your local representative or OPTEK for more information.

For application information, refer to Application Bulletins 248 and 213.

Applications:

- Non-contact reflective object sensor
- Assembly line automation
- Machine automation
- Machine safety
- End of travel sensor
- Door sensor
- Mark Detection
- Office Equipment
- Gaming Equipment

Ordering Information				
Part	LED Peak	Detector	Optical Cover	Lead or Wire
OPB703	890 nm	Transistor	None	0.160" Leads
OPB703WZ				24" / #26 AWG Wire
OPB704			Blue Window	0.160" Leads
OPB704WZ				24" / #26 AWG Wire
OPB704GWZ				24" / #26 AWG Wire
OPB705			Aperture	0.160" Leads
OPB705WZ				24" / #26 AWG UL Rated Wire
OPB70AWZ				
OPB70DWZ	Transistor			
OPB70EWZ	Rbe Transistor	Clear Window		
OPB70FWZ	Transistor			



RoHS

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Reflective Object Sensor

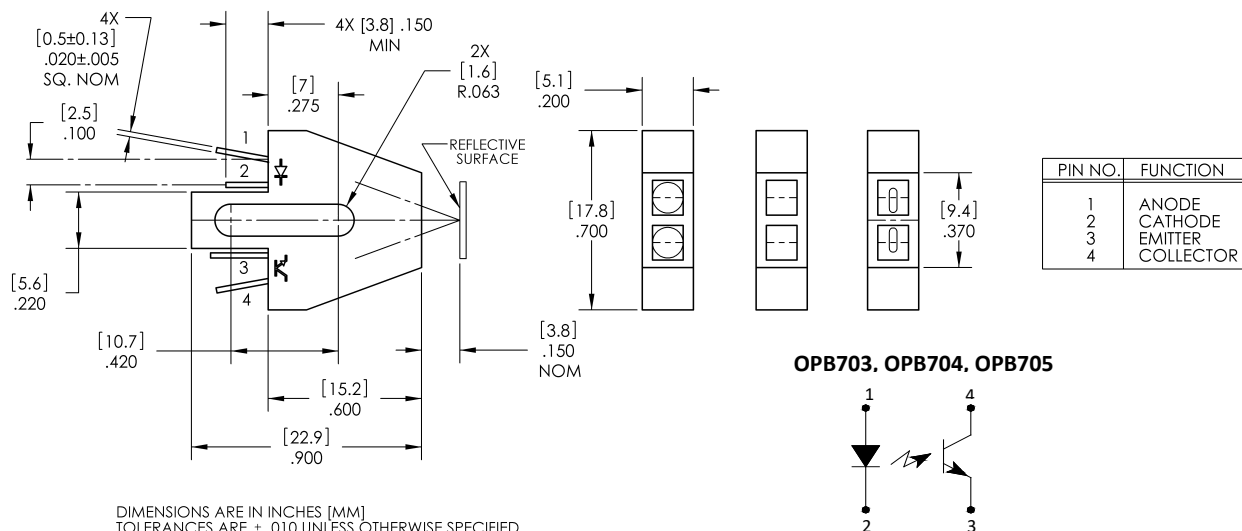
OPB703 through OPB705,

OPB703WZ through OPB705WZ,

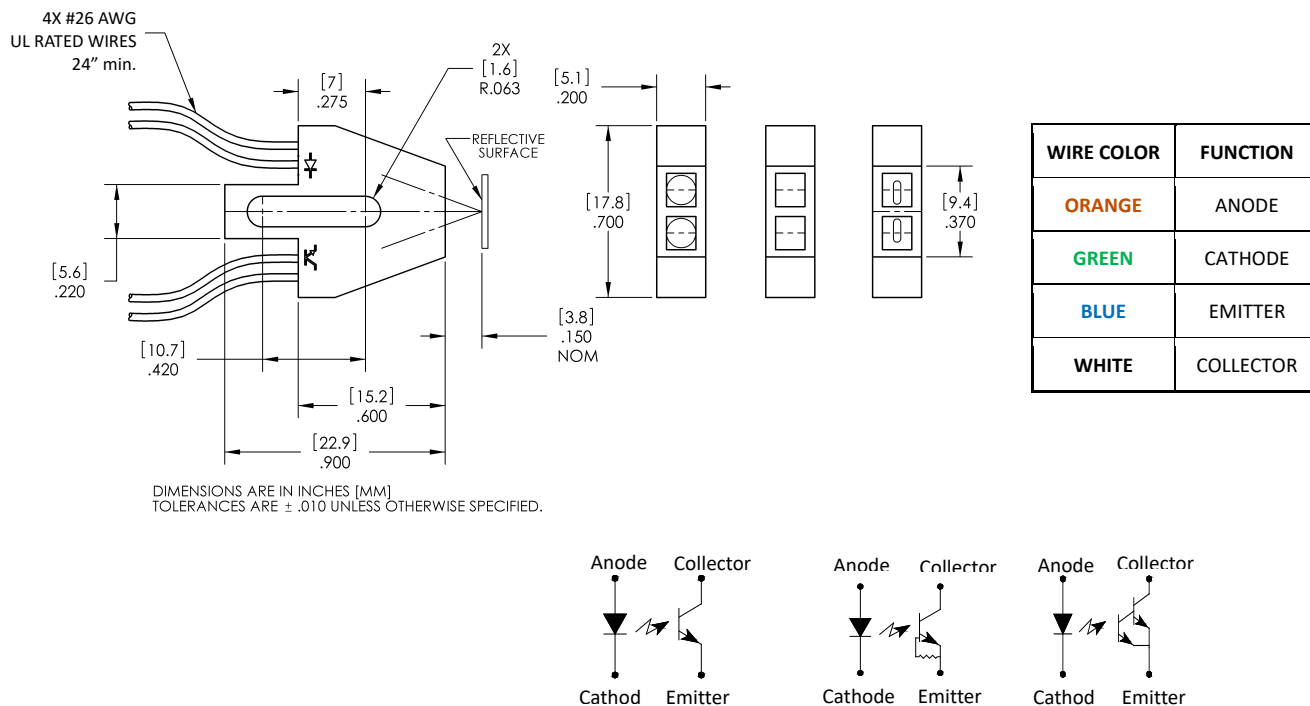
OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ



OPB703, OPB704, OPB705



OPB703WZ, OPB704WZ, OPB705WZ, OPB70AWZ, OPB70DWZ



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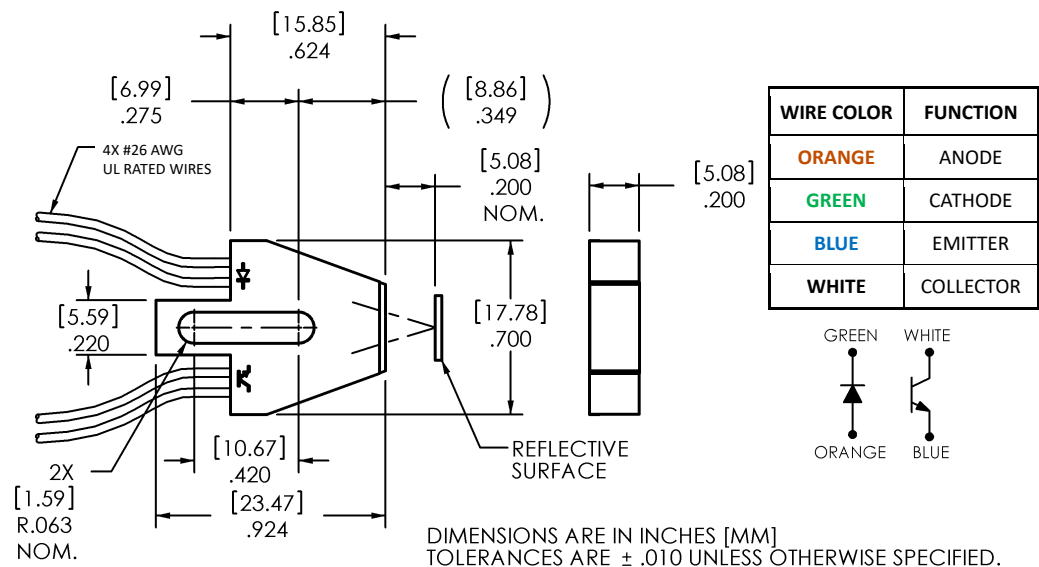
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Reflective Object Sensor

OPB703 through OPB705,
OPB703WZ through OPB705WZ,
OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ



OPB704GWZ



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Reflective Object Sensor

OPB703 through OPB705,
OPB703WZ through OPB705WZ,
OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ



Electrical Specifications

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

Storage and Operating Temperature Range	-40° C to +80° C
Lead Soldering Temperature [1/16 inch (1.6 mm) from the case for 5 sec. with soldering iron] ⁽¹⁾	240° C
Input Diode	
Forward DC Current	40 mA
Reverse DC Voltage	2 V
Power Dissipation ⁽²⁾	100 mW
Output Photodetector	
Collector-Emitter Voltage	30 V
Phototransistor	15 V
Photodarlington	5 V
Emitter-Collector Voltage	5 V
Collector DC Current	25 mA
Power Dissipation ⁽²⁾	100 mW

Notes:

- (1) RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering.
- (2) For OPB703, OPB704 and OPB705, derate linearly 1.45 mW/° C above 25° C.
- (3) For OPB703WZ, OPB704WZ, OPB705WZ, OPB704GWZ, OPB70AWZ, OPB70DWZ, OPB70EWZ, and OPB70FWZ derate linearly 1.50 mW/° C above 25° C.

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Reflective Object Sensor

OPB703 through OPB705,
OPB703WZ through OPB705WZ,
OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ



Electrical Specifications

Electrical Characteristics ($T_A = 25^\circ \text{C}$ unless otherwise noted)
(OPB703, OPB703WZ, OPB704, OPB704WZ, OPB705, OPB705WZ, OPB704GWZ)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Input Diode						
V_F	Forward Voltage	1.0	-	1.7	V	$I_F = 40 \text{ mA}$
I_R	Reverse Current	-	-	100	μA	$V_R = 2 \text{ V}$
Output Phototransistor						
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	30	-	-	V	$I_{CE} = 100 \mu\text{A}$
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage	5	-	-	V	$I_{EC} = 100 \mu\text{A}$
I_{CEO}	Collector Dark Current	-	-	250	nA	$V_{CE} = 10 \text{ V}, I_F = 0, E_E = 0$
Coupled						
$I_{C(ON)}$	On-State Collector Current ⁽⁴⁾⁽⁶⁾				mA	$V_{CE} = 5 \text{ V}, I_F = 40 \text{ mA}, d = 0.15''$
	OPB703, OPB703WZ	0.30	-	2.5		
	OPB704, OPB704WZ	0.20	-	2.5		
	OPB705, OPB705WZ	0.15	-	1.0		
	OPB704GWZ	0.50	-	6.0		$V_{CE} = 5 \text{ V}, I_F = 40 \text{ mA}, d = 0.20''$
I_{CX}	Crosstalk ⁽⁵⁾				μA	$V_{CE} = 5 \text{ V}, I_F = 40 \text{ mA}$
	OPB703, OPB703WZ	-	-	20		
	OPB704, OPB704WZ	-	-	20		
	OPB705, OPB705WZ	-	-	10		
	OPB704GWZ	-	-	100		

Notes:

- (1) RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering.
- (2) For OPB703, OPB704 and OPB705, derate linearly $1.45 \text{ mW}/^\circ \text{C}$ above 25°C .
- (3) For OPB703WZ, OPB704WZ, OPB705WZ, OPB704GWZ, OPB70AWZ, OPB70DWZ, OPB70EWZ, and OPB70FWZ derate linearly $1.50 \text{ mW}/^\circ \text{C}$ above 25°C .
- (4) The distance from the assembly face to the reflective surface is d .
- (5) Crosstalk (I_{CX}) is the collector current measured with the indicated current in the input diode and with no reflecting surface.
- (6) Measured using Eastman Kodak neutral white test card with 90 % diffuse reflectance as a reflecting surface. Reference: Eastman Kodak, Catalog # E 152 7795.
- (7) All parameters tested using pulse techniques.

General Note

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Reflective Object Sensor

OPB703 through OPB705,
OPB703WZ through OPB705WZ,
OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ



Electrical Specifications

Electrical Characteristics ($T_A = 25^\circ \text{C}$ unless otherwise noted)
(OPB70AWZ)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Input Diode						
V_F	Forward Voltage	1.0	-	1.7	V	$I_F = 40 \text{ mA}$
I_R	Reverse Current	-	-	100	μA	$V_R = 2 \text{ V}$
Output Photodarlington						
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	15	-	-	V	$I_{CE} = 1.0 \text{ mA}$, $E_E = 0$
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage	5	-	-	V	$I_{EC} = 100 \mu\text{A}$, $E_E = 0$
I_{CEO}	Collector Dark Current	-	-	250	nA	$V_{CE} = 10 \text{ V}$, $I_F = 0$, $E_E = 0$
Coupled						
$I_{C(ON)}^{(1)(3)}$	On-State Collector Current	5.0	-	26.0	mA	$V_{CE} = 5 \text{ V}$, $I_F = 40 \text{ mA}$, $d = 0.15''$
$V_{(SAT)}^{(1)(3)}$	Saturation Voltage	-	-	1.15	V	$I_{CV} = 400 \mu\text{A}$, $I_F = 40 \text{ mA}$, $d = 0.15''$
$I_{CX}^{(2)}$	Crosstalk	-	-	25	μA	$V_{CE} = 5 \text{ V}$, $I_F = 40 \text{ mA}$

Notes:

- (1) The distance from the assembly face to the reflective surface is d .
- (2) Crosstalk (I_{CX}) is the collector current measured with the indicated current in the input diode and with no reflecting surface.
- (3) Measured using Eastman Kodak neutral white test card with 90 % diffuse reflectance as a reflecting surface. Reference: Eastman Kodak, Catalog # E 152 7795.

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Reflective Object Sensor

OPB703 through OPB705,
OPB703WZ through OPB705WZ,
OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ



Electrical Specifications

Electrical Characteristics ($T_A = 25^\circ \text{C}$ unless otherwise noted)
(OPB70EWZ)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Input Diode						
V_F	Forward Voltage	1.0	-	2.6	V	$I_F = 40 \text{ mA}$
I_R	Reverse Current	-	-	100	μA	$V_R = 2 \text{ V}$
Output Phototransistor						
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	30	-	-	V	$I_{CE} = 100 \mu\text{A}$, $I_F = 0$, $E_E = 0$
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage	0.4	-	-	V	$I_{EC} = 100 \mu\text{A}$, $I_F = 0$, $E_E = 0$
I_{CEO}	Collector Dark Current	-	-	100	nA	$V_{CE} = 10 \text{ V}$, $I_F = 0$, $E_E = 0$
Coupled						
$I_{C(ON)}^{(1)(3)}$	On-State Collector Current	.25	-	2.5	mA	$V_{CE} = 5 \text{ V}$, $I_F = 40 \text{ mA}$, $d = 0.15''$
$V_{(SAT)}^{(1)(3)}$	Saturation Voltage	.25	-	2.5	mA	$V_{CE} = 5 \text{ V}$, $I_F = 40 \text{ mA}$, $d = 0.15''$
$I_{CX}^{(2)}$	Crosstalk	-	-	0.4	V	$I_C = 100 \mu\text{A}$, $I_F = 40 \text{ mA}$, $d = 0.15''$

Notes:

- (1) The distance from the assembly face to the reflective surface is d .
- (2) Crosstalk (I_{CX}) is the collector current measured with the indicated current in the input diode and with no reflecting surface.
- (3) Measured using Eastman Kodak neutral white test card with 90 % diffuse reflectance as a reflecting surface. Reference: Eastman Kodak, Catalog # E 152 7795.

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Reflective Object Sensor

OPB703 through OPB705,
OPB703WZ through OPB705WZ,
OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ



Electrical Specifications

Electrical Characteristics ($T_A = 25^\circ \text{C}$ unless otherwise noted)
(OPB70DWZ and OPB70FWZ)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Input Diode						
V_F	Forward Voltage	-	-	2.6	V	$I_F = 40 \text{ mA}$
I_R	Reverse Current	-	-	100	μA	$V_R = 2 \text{ V}$
Output Phototransistor						
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	30	-	-	V	$I_{CE} = 100 \mu\text{A}$, $I_F = 0$, $E_E = 0$
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage	5.0	-	-	V	$I_{EC} = 100 \mu\text{A}$, $I_F = 0$, $E_E = 0$
I_{CEO}	Collector Dark Current	-	-	250	nA	$V_{CE} = 10 \text{ V}$, $I_F = 0$, $E_E = 0$
Coupled						
$I_{C(ON)}^{(1)(3)}$	On-State Collector Current	OPB70DWZ	.10	-	1.5	$V_{CE} = 5 \text{ V}$, $I_F = 40 \text{ mA}$, $d = 0.15''$
		OPB70FWZ	.25	-	3.5	
$V_{(SAT)}^{(1)(3)}$	Saturation Voltage	-	-	0.4	V	$I_{C(ON)} = 100 \mu\text{A}$, $I_F = 40 \text{ mA}$, $d = 0.15''$
$I_{CX}^{(2)}$	Crosstalk	-	-	5.0	μA	$V_{CE} = 5 \text{ V}$, $I_F = 40 \text{ mA}$

Notes:

- (1) The distance from the assembly face to the reflective surface is d .
- (2) Crosstalk (I_{CX}) is the collector current measured with the indicated current in the input diode and with no reflecting surface.
- (3) Measured using Eastman Kodak neutral white test card with 90 % diffuse reflectance as a reflecting surface. Reference: Eastman Kodak, Catalog # E 152 7795.

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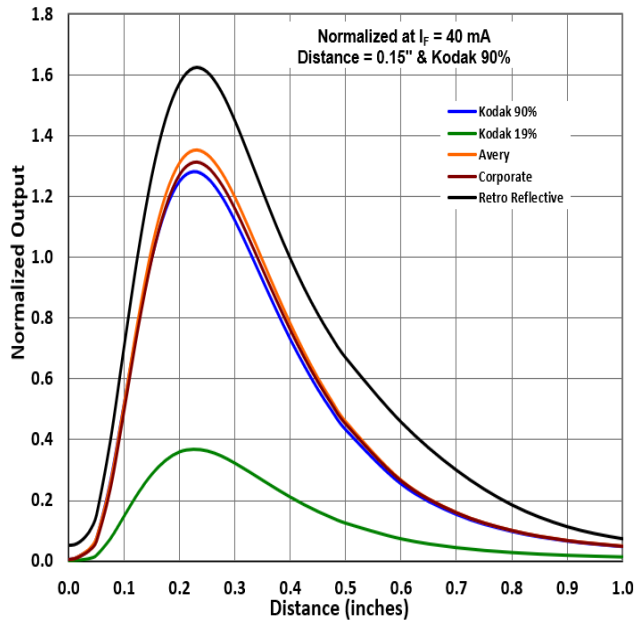
Reflective Object Sensor

OPB703 through OPB705,
OPB703WZ through OPB705WZ,
OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ

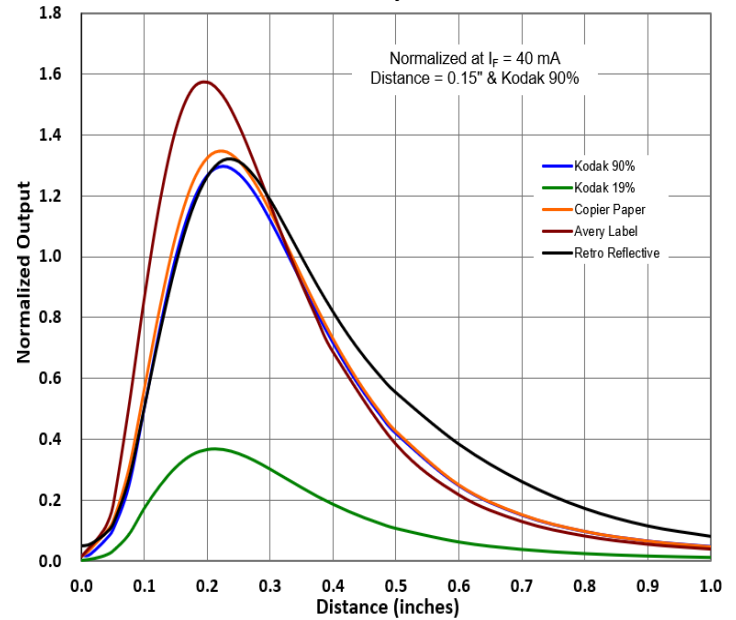


Typical Performance

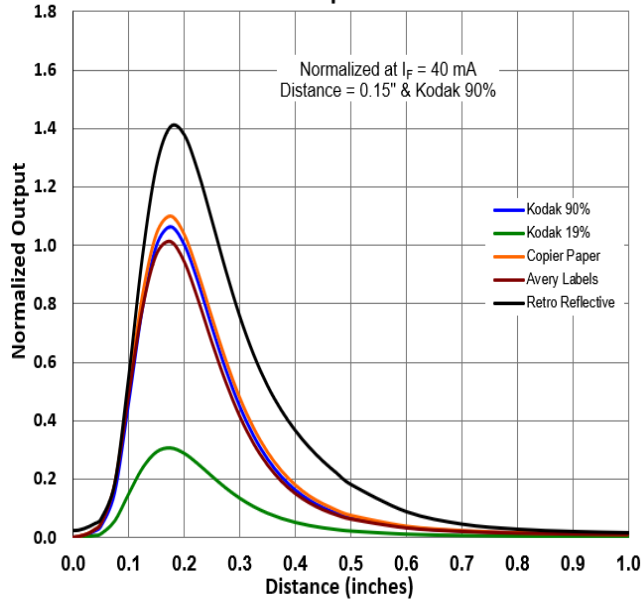
OPB703 - Output vs Distance



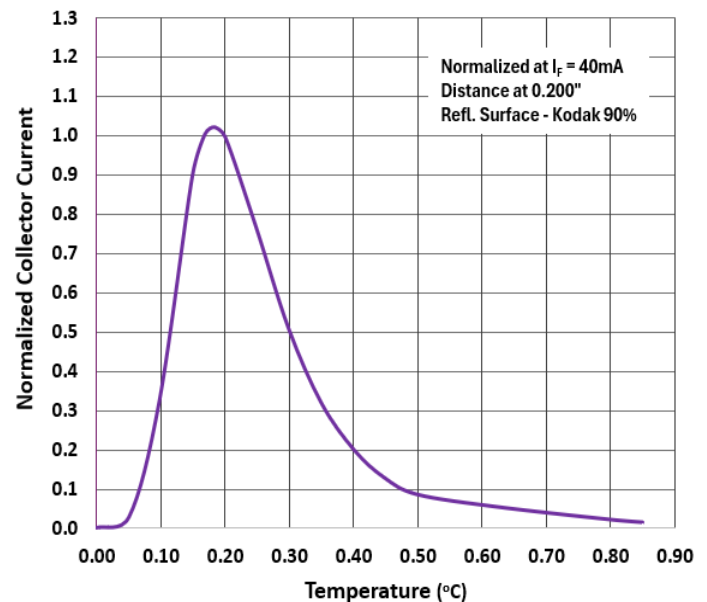
OPB704 - Output vs Distance



OPB705 - Output vs Distance



OPB704GWZ Collector Current vs Object Distance



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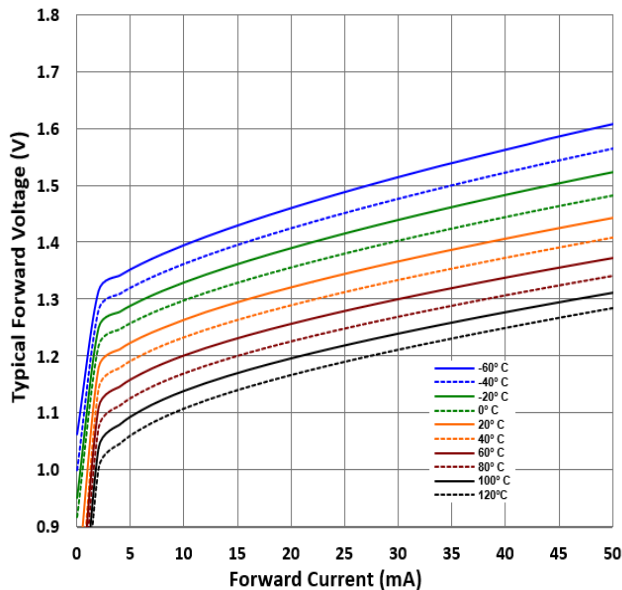
Reflective Object Sensor

OPB703 through OPB705,
OPB703WZ through OPB705WZ,
OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ

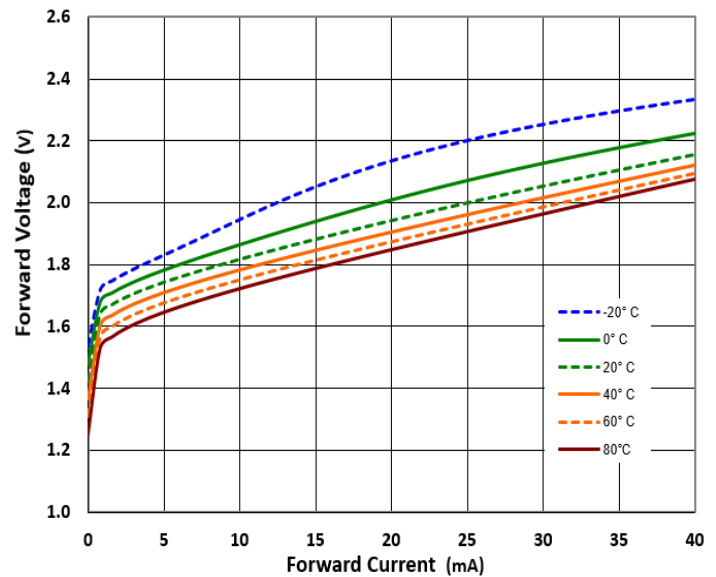


Typical Performance

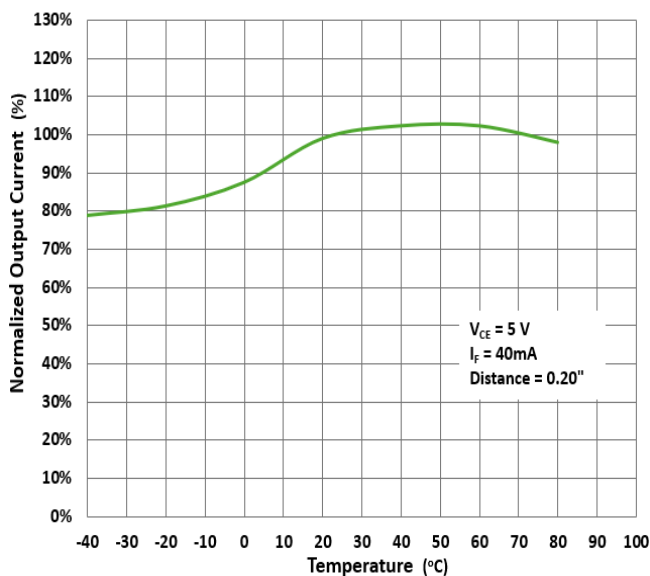
890nm LED Forward Voltage vs I_F vs Temp



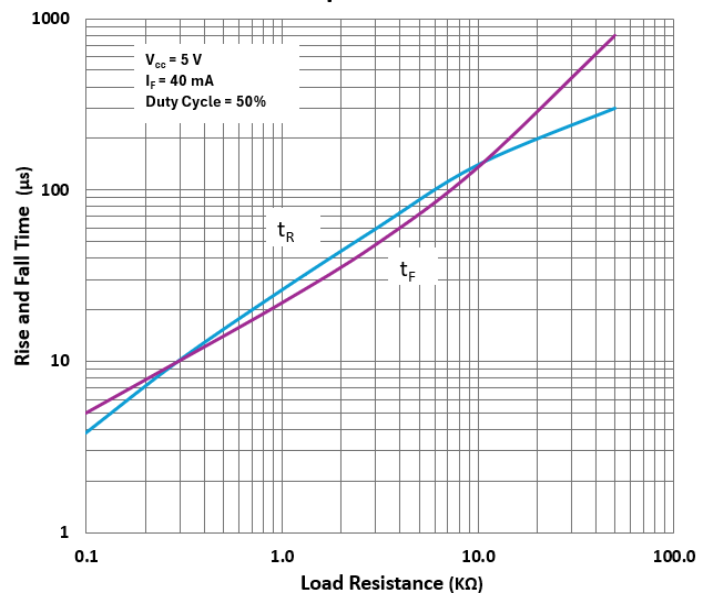
660nm LED Forward Voltage vs Current vs Temp



Collector Current vs Temperature



Transistor Output - Rise and Fall Time



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