

# Reflective Object Sensor

OPB708, OPB709

OPB740 Series, OPB740WZ Series



## Features:

- Focused for maximum sensitivity
- Phototransistor or photodarlington output
- Crosstalk does not exceed specified ICEO
- 24" (610 mm) wire length
- 26 AWG wire size

## Description:

Each reflective object sensor in the **OPB708, OPB709, OPB740** through **OPB746** and **OPB740WZ** through **OPB746WZ** series consists of an infrared emitting diode and a NPN silicon phototransistor or a photodarlington. The **OPB747WZ** and **OPB748WZ** consist of a Red visible LED and a low light level rejection ( $R_{BE}$ ) NPN silicon phototransistor. The Red LED allows better contrast ratio when detecting Black marks on a White surface. All these devices are mounted side-by-side on converging optical axes in a black plastic housing focusing on a small area and depth of field.

**OPB7 \_\_ WZ** series are wired (UL approved wire) devices that offer various lens options, including no windows, blue polysulfone windows for dust protection or opaque aperture windows with offset openings for improved target resolution.

On each sensor included in this data sheet, the photosensor responds to radiation only when a reflective object passes within its field of view.

Custom IC(ON) current binning, special wire lengths and connectorization is available through your OPTEK rep.

## Applications:

- Non-contact reflective object sensor
- Assembly line automation
- Machine automation
- Machine safety
- End of travel sensor
- Door sensor
- Thermal Paper Mark

**CONTAINS POLYSULFONE**  
 To avoid stress cracking, we suggest using ND Industries' **Vibra-Tite** for thread-locking. **Vibra-Tite** evaporates fast without causing structural failure in OPTEK's molded plastics.  
**Applies to: OPB460, OPB470, OPB480, OPB490.**



| Part Number | LED Peak Wavelength | Sensor            | Reflection Distance Inch (mm)                                  | Lead Length/Wire Type |  |
|-------------|---------------------|-------------------|----------------------------------------------------------------|-----------------------|--|
| OPB708      | 935 nm              | Transistor        | Min=0.08" [2.04mm]<br>Typ=0.15" [3.81mm]<br>Max=0.30" [7.62mm] | 0.150" Minimum        |  |
| OPB709      |                     | Darlington        |                                                                |                       |  |
| OPB740      | 890 nm              | Transistor        |                                                                |                       |  |
| OPB741      |                     |                   |                                                                |                       |  |
| OPB742      |                     |                   |                                                                |                       |  |
| OPB743      |                     |                   |                                                                |                       |  |
| OPB744      |                     | Darlington        |                                                                |                       |  |
| OPB745      |                     |                   |                                                                |                       |  |
| OPB740WZ    |                     |                   |                                                                |                       |  |
| OPB741WZ    |                     |                   |                                                                |                       |  |
| OPB742WZ    | Transistor          | 24" / 26 AWG Wire |                                                                |                       |  |
| OPB743WZ    |                     |                   |                                                                |                       |  |
| OPB744WZ    |                     |                   |                                                                |                       |  |
| OPB745WZ    |                     |                   |                                                                |                       |  |
| OPB746WZ    | 935 nm              |                   |                                                                | $R_{BE}$ Transistor   |  |
| OPB747WZ    | 645nm               |                   |                                                                |                       |  |
| OPB748WZ    |                     |                   | Transistor                                                     |                       |  |

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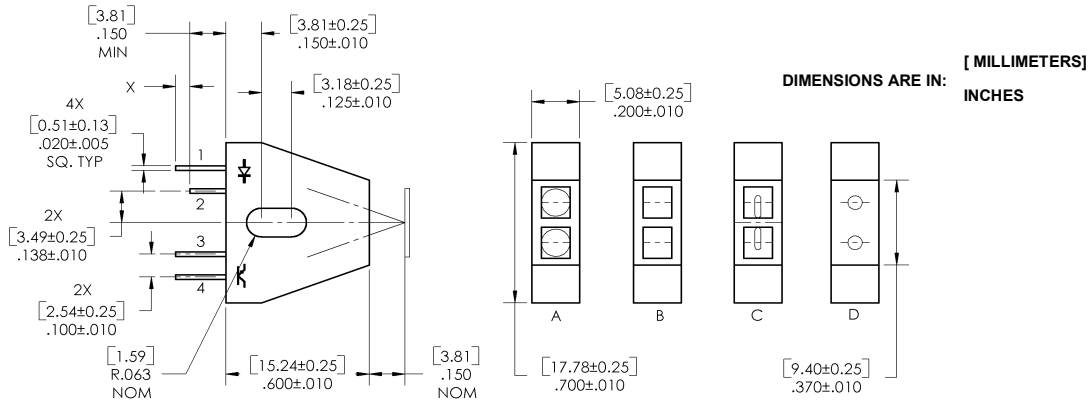
# Reflective Object Sensor

OPB708, OPB709

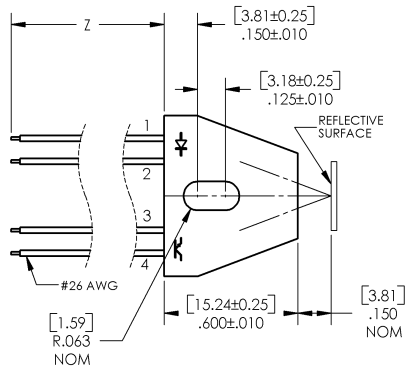
OPB740 Series, OPB740WZ Series



**OPB708, OPB709, OPB740, OPB741,  
OPB742, OPB743, OPB744, OPB745**



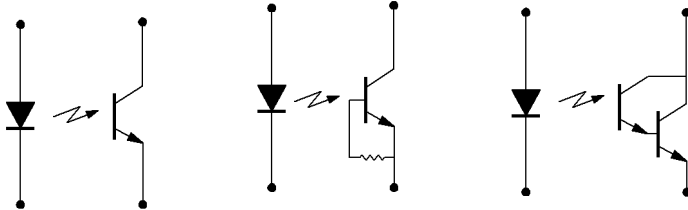
**OPB740WZ, OPB741WZ, OPB742WZ, OPB743WZ,  
OPB744WZ, OPB745WZ, OPB746WZ, OPB747WZ,  
OPB748WZ**



**OPB708  
OPB740 thru OPB744  
OPB740WZ thru OPB744WZ**

**OPB746WZ,  
OPB747WZ,  
OPB748WZ**

**OPB709,  
OPB745,  
OPB745WZ**



| Color-PIN # | LED     | Color-PIN # | Transistor |
|-------------|---------|-------------|------------|
| Orange-1    | Anode   | White-4     | Collector  |
| Green-2     | Cathode | Blue-3      | Emitter    |

| Package Style |                    |
|---------------|--------------------|
| Part Number   | Lens Configuration |
| OPB708        | D - No windows     |
| OPB709        | D - No windows     |
| OPB740        | A - No windows     |
| OPB740WZ      | A - No windows     |
| OPB741        | B - Blue windows   |
| OPB741WZ      | B - Blue windows   |
| OPB742        | C - Offset windows |
| OPB742WZ      | C - Offset windows |
| OPB743        | A - No windows     |
| OPB743WZ      | A - No windows     |
| OPB744        | B - Blue windows   |
| OPB744WZ      | B - Blue windows   |
| OPB745        | C - Offset windows |
| OPB745WZ      | C - Offset windows |
| OPB746WZ      | B - Blue windows   |
| OPB747WZ      | C - Offset windows |
| OPB748WZ      | C - Offset windows |

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# Reflective Object Sensor

OPB708, OPB709

OPB740 Series, OPB740WZ Series



| Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise noted)                                                                                                                      |                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| Operating and Storage Temperature Range<br>OPB708, OP709, OPB740, OPB741, OPB742, OPB743, OPB744, OPB745                                                                                         | -40° C to +85° C                                     |
| OPB741WZ, OPB742WZ, OPB743WZ, OPB744WZ, OPB745WZ, OPB746WZ, OPB747WZ, OPB748WZ                                                                                                                   | -40° C to +80° C                                     |
| Lead Soldering Temperature [1/16 inch (1.6mm) from the case for 5 sec. with soldering iron] <sup>(1)</sup>                                                                                       | 260°C                                                |
| <b>Input Diode</b> (See OP165 (935 nm), OP265 (890 nm) or OVLAS6CB8 (645 nm) for additional information)                                                                                         |                                                      |
| Forward DC Current                                                                                                                                                                               | 40 mA                                                |
| Reverse DC Voltage                                                                                                                                                                               | 2 V                                                  |
| Power Dissipation <sup>(2)</sup>                                                                                                                                                                 | 100 mW                                               |
| <b>Sensor Output</b> (See OP505 (Transistor), OP705 ( $R_{BE}$ Transistor) or OP535 (Darlington) for additional Information)                                                                     |                                                      |
| Collector-Emitter Voltage<br>OPB708<br>OPB709<br>OPB740, OPB741, OPB742, OPB743, OPB744<br>OPB740WZ, OPB741WZ, OPB742WZ, OPB743WZ, OPB744WZ OPB748WZ<br>OPB745<br>OPB745WZ<br>OPB746WZ, OPB747WZ | 30 V<br>15 V<br>30 V<br>30 V<br>15 V<br>15 V<br>24 V |
| Emitter-Collector Voltage<br>OPB708 through OPB745, OPB748<br>OPB746 through OPB747                                                                                                              | 5.0 V<br>0.4 V                                       |
| Power Dissipation <sup>(2)</sup>                                                                                                                                                                 | 100 mW                                               |

Notes:

1. RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering.
2. Derate linearly 1.33 mW° C above 25° C.

| Electrical Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise noted)  |                 |     |     |     |               |                      |
|--------------------------------------------------------------------------------|-----------------|-----|-----|-----|---------------|----------------------|
| SYMBOL                                                                         | PARAMETER       | MIN | TYP | MAX | UNITS         | TEST CONDITIONS      |
| <b>645 nm LED</b> (See OVLAS6CB8 for generic information — for reference only) |                 |     |     |     |               |                      |
| $V_F$                                                                          | Forward Voltage | -   | -   | 2.6 | V             | $I_F = 20\text{ mA}$ |
| $I_R$                                                                          | Reverse Current | -   | -   | 100 | $\mu\text{A}$ | $V_R = 2\text{ V}$   |
| <b>890 nm LED</b> (See OP265 for additional information — for reference only)  |                 |     |     |     |               |                      |
| $V_F$                                                                          | Forward Voltage | -   | -   | 1.8 | V             | $I_F = 40\text{ mA}$ |
| $I_R$                                                                          | Reverse Current | -   | -   | 100 | $\mu\text{A}$ | $V_R = 2\text{ V}$   |
| <b>935 nm LED</b> (See OP165 for additional information — for reference only)  |                 |     |     |     |               |                      |
| $V_F$                                                                          | Forward Voltage | -   | -   | 1.7 | V             | $I_F = 40\text{ mA}$ |
| $I_R$                                                                          | Reverse Current | -   | -   | 100 | $\mu\text{A}$ | $V_R = 2\text{ V}$   |

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# Reflective Object Sensor

OPB708, OPB709

OPB740 Series, OPB740WZ Series



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

| SYMBOL                                                                                                     | PARAMETER                                                                                                                                                                                                  | MIN                                                                                  | TYP                                                 | MAX                                                                               | UNITS         | TEST CONDITIONS                                                            |
|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------|
| <b>Output <math>R_{BE}</math> Phototransistor</b> (See OP705 for general information — for reference only) |                                                                                                                                                                                                            |                                                                                      |                                                     |                                                                                   |               |                                                                            |
| $V_{(BR)CEO}$                                                                                              | Collector-Emitter Breakdown Voltage                                                                                                                                                                        | 24                                                                                   | -                                                   | -                                                                                 | V             | $I_C = 100\ \mu\text{A}$                                                   |
| $I_{CEO}$                                                                                                  | Collector Dark Current                                                                                                                                                                                     | -                                                                                    | -                                                   | 100                                                                               | nA            | $V_{CE} = 10\ \text{V}, I_F = 0, E_E = 0$                                  |
| <b>Output Phototransistor</b> (See OP505 for general information — for reference only)                     |                                                                                                                                                                                                            |                                                                                      |                                                     |                                                                                   |               |                                                                            |
| $V_{(BR)CEO}$                                                                                              | Collector-Emitter Breakdown Voltage                                                                                                                                                                        | 30                                                                                   | -                                                   | -                                                                                 | V             | $I_C = 100\ \mu\text{A}$                                                   |
| $V_{(BR)ECO}$                                                                                              | Emitter-Collector Breakdown Voltage                                                                                                                                                                        | 5                                                                                    | -                                                   | -                                                                                 | V             | $I_E = 100\ \mu\text{A}$                                                   |
| $I_{CEO}$                                                                                                  | Collector Dark Current                                                                                                                                                                                     | -                                                                                    | -                                                   | 100                                                                               | nA            | $V_{CE} = 10\ \text{V}, I_F = 0, E_E = 0$                                  |
| <b>Output Photodarlington</b> (See OP535 for general information — for reference only)                     |                                                                                                                                                                                                            |                                                                                      |                                                     |                                                                                   |               |                                                                            |
| $V_{(BR)CEO}$                                                                                              | Collector-Emitter Breakdown Voltage                                                                                                                                                                        | 15                                                                                   | -                                                   | -                                                                                 | V             | $I_C = 100\ \mu\text{A}$                                                   |
| $V_{(BR)ECO}$                                                                                              | Emitter-Collector Breakdown Voltage                                                                                                                                                                        | 5                                                                                    | -                                                   | -                                                                                 | V             | $I_E = 100\ \mu\text{A}$                                                   |
| $I_{CEO}$                                                                                                  | Collector-Emitter Dark Current<br>OPB709, OPB745, OPB745WZ                                                                                                                                                 | -                                                                                    | -                                                   | 25                                                                                | $\mu\text{A}$ | $V_{CE} = 5\ \text{V}, I_F = 0, E_E = 0$                                   |
| <b>Coupled</b>                                                                                             |                                                                                                                                                                                                            |                                                                                      |                                                     |                                                                                   |               |                                                                            |
| $V_{CE(SAT)}$                                                                                              | Saturation Voltage<br>OPB708<br>OPB709                                                                                                                                                                     | -<br>-                                                                               | -<br>-                                              | 0.40<br>1.10                                                                      | V             | $I_F = 40\ \text{mA}, I_C = 3\ \mu\text{A}, d = 0.15''^{(1)(2)}$           |
| $I_{C(ON)}^{(1)(2)}$                                                                                       | On-State Collector Current<br>OPB708<br>OPB709<br>OPB740, OPB740WZ<br>OPB741, OPB741WZ<br>OPB742, OPB742WZ<br>OPB743, OPB743WZ<br>OPB744, OPB744WZ<br>OPB745, OPB745WZ<br>OPB746WZ<br>OPB747WZ<br>OPB748WZ | 0.01<br>1.00<br>0.05<br>0.05<br>0.01<br>0.20<br>0.20<br>5.00<br>0.50<br>0.01<br>0.01 | -<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>- | 3.00<br>-<br>2.50<br>2.50<br>0.70<br>2.00<br>2.00<br>26.0<br>2.50<br>0.70<br>0.70 | mA            | $V_{CE} = 5\ \text{V}, I_F = 40\ \text{mA}, d = 0.15'' (3.810\ \text{mm})$ |
| $I_{CX}^{(3)}$                                                                                             | Crosstalk<br>OPB708, OPB709,<br>OPB740, OPB740WZ<br>OPB741, OPB741WZ<br>OPB742, OPB742WZ<br>OPB743, OPB743WZ<br>OPB744, OPB744WZ<br>OPB745, OPB745WZ<br>OPB746WZ<br>OPB747WZ<br>OPB748WZ                   | -<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-                                  | -<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>- | -<br>10.0<br>10.0<br>1.0<br>20.0<br>20.0<br>25.0<br>1.0<br>1.0<br>1.0             | $\mu\text{A}$ | $V_{CC} = 5\ \text{V}, I_F = 40\ \text{mA}$                                |

**Notes:**

- The distance from the assembly face to the reflective surface is "d".
- Reflective surface is Eastman Kodak (Catalog #190 3061) neutral white test card with 90% diffuse reflectance as a reflecting surface.
- Crosstalk is the photocurrent measured with current to the input diode, no reflective surface and no ambient light ( $E_E = 0$ ).

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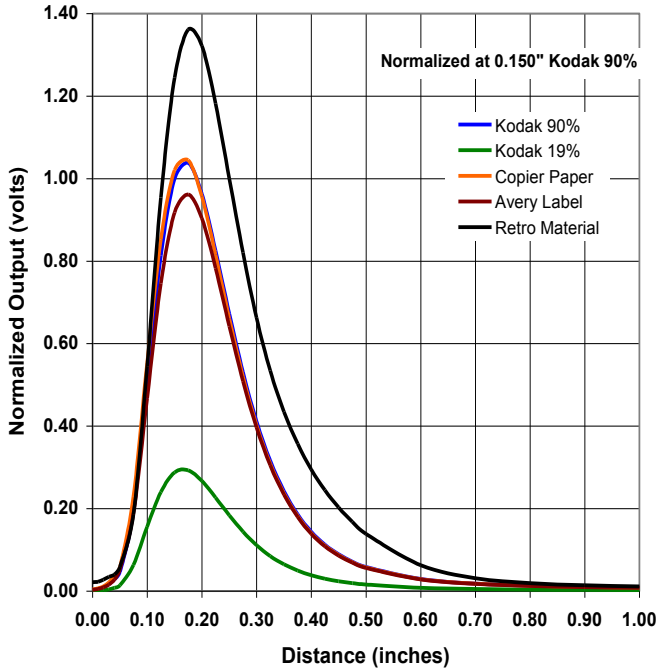
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OPB708, OPB709

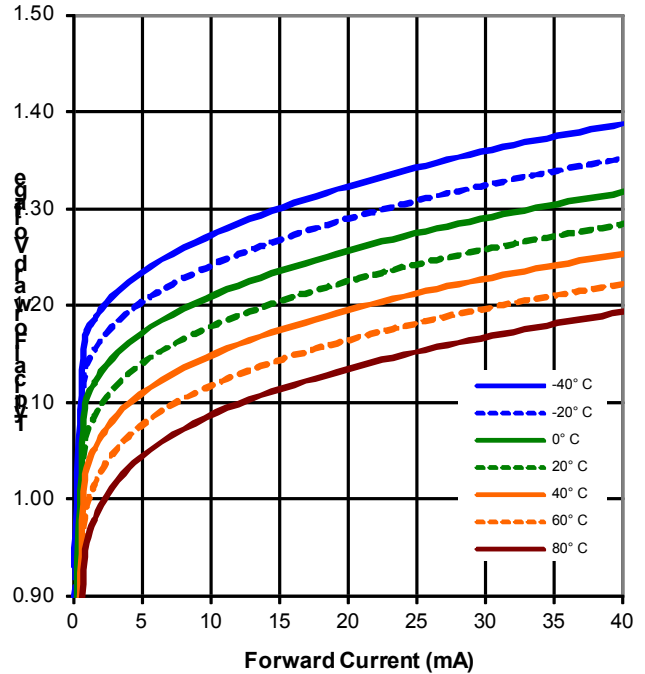
OPB740 Series, OPB740WZ Series



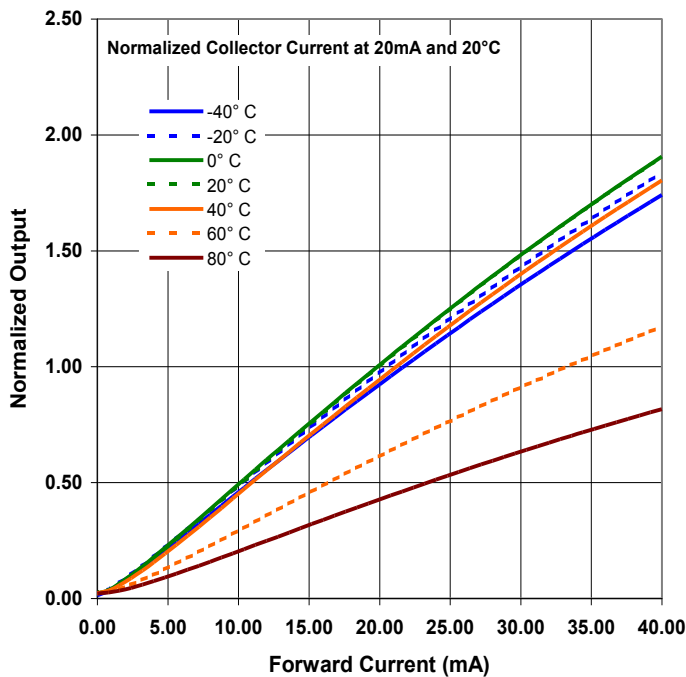
**Transistor Output vs Distance**



**LED Forward Voltage vs Forward Current vs Temperature**



**Transistor Output vs Forward Current vs Temperature**



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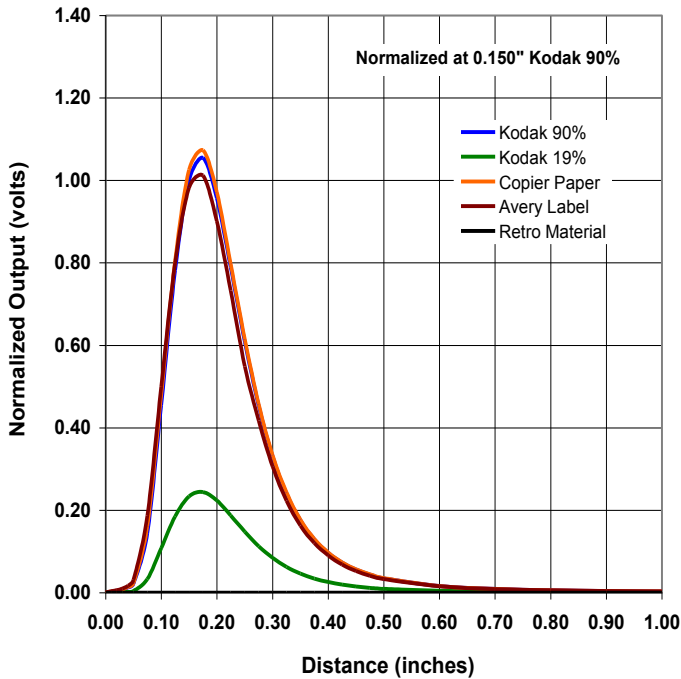
# Reflective Object Sensor

OPB708, OPB709

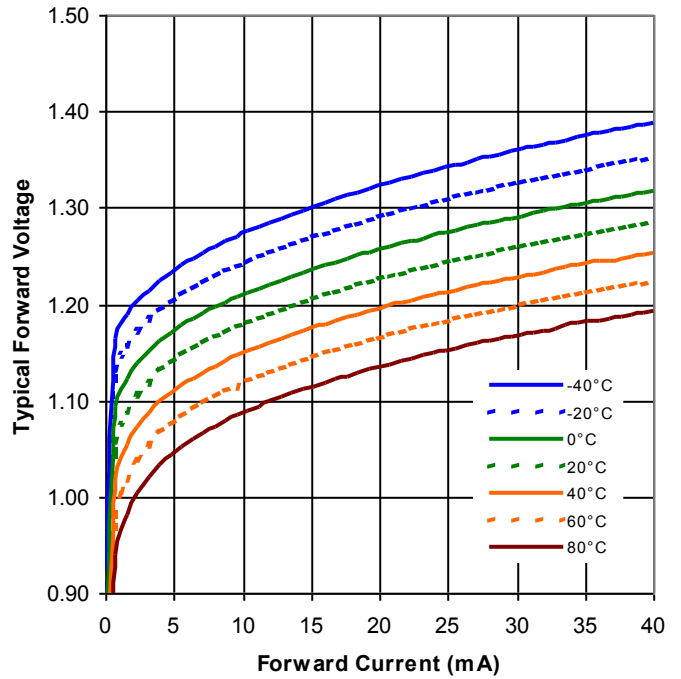
OPB740 Series, OPB740WZ Series



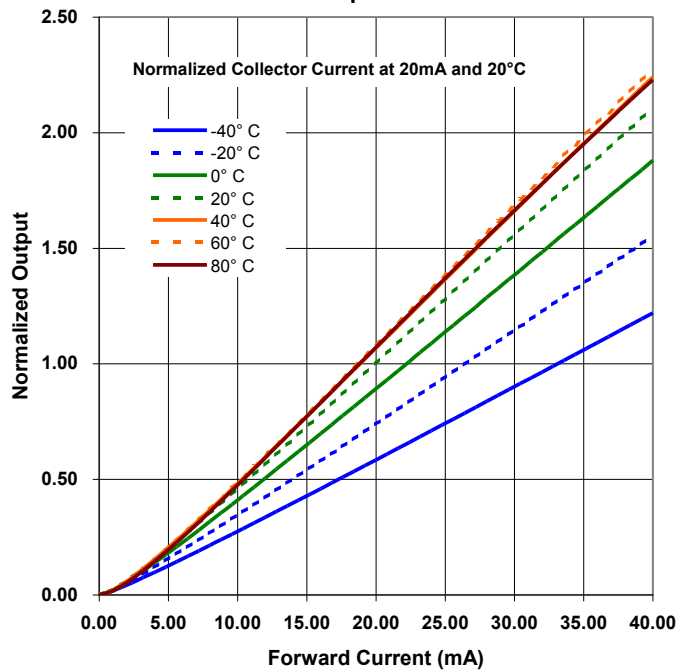
**Darlington Output vs Distance**



**LED Forward Voltage vs Forward Current vs Temperature**



**Darlington Output vs Forward Current vs Temperature**



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