

# Reflective Object Sensor

OPB708, OPB709,  
OPB740 Series, OPB740WZ Series



| Absolute Maximum Ratings ( $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)                                                                                                             |                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| Operating and Storage Temperature Range<br>OPB708, OPB709, OPB740, OPB741, OPB742, OPB743, OPB744, OPB745                                                                                         | -40 $^{\circ}\text{C}$ to +85 $^{\circ}\text{C}$     |
| OPB741WZ, OPB742WZ, OPB743WZ, OPB744WZ, OPB745WZ, OPB746WZ, OPB747WZ, OPB748WZ                                                                                                                    | -40 $^{\circ}\text{C}$ to +80 $^{\circ}\text{C}$     |
| Lead Soldering Temperature [1/16 inch (1.6mm) from the case for 5 sec. with soldering iron] <sup>(1)</sup>                                                                                        | 260 $^{\circ}\text{C}$                               |
| Input Diode (See OP165 (935 nm), OP265 (890 nm) or OVLA56CB8 (645 nm) for additional information)                                                                                                 |                                                      |
| Forward DC Current                                                                                                                                                                                | 40 mA                                                |
| Reverse DC Voltage                                                                                                                                                                                | 2 V                                                  |
| Power Dissipation <sup>(2)</sup>                                                                                                                                                                  | 100 mW                                               |
| Sensor Output (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  $^{\circ}\text{C}$  above 25  $^{\circ}\text{C}$ .

| Electrical Characteristics ( $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted) |                 |     |     |     |               |                      |
|-----------------------------------------------------------------------------------------|-----------------|-----|-----|-----|---------------|----------------------|
| SYMBOL                                                                                  | PARAMETER       | MIN | TYP | MAX | UNITS         | TEST CONDITIONS      |
| 645 nm LED (See OVLA56CB8 for generic information — for reference only)                 |                 |     |     |     |               |                      |
| $V_F$                                                                                   | Forward Voltage | -   | -   | 2.6 | V             | $I_F = 20\text{ mA}$ |
| $I_R$                                                                                   | Reverse Current | -   | -   | 100 | $\mu\text{A}$ | $V_R = 2\text{ V}$   |
| 890 nm LED (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 | $\mu\text{A}$ | $V_R = 2\text{ V}$   |
| 935 nm LED (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 | $\mu\text{A}$ | $V_R = 2\text{ V}$   |

## General Note

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OPB740 Series, OPB740WZ Series



| Electrical Characteristics (T <sub>A</sub> = 25 °C unless otherwise noted)                            |                                                                                                                                                                                                             |                                                                                      |                                                     |                                                                                   |       |                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SYMBOL                                                                                                | PARAMETER                                                                                                                                                                                                   | MIN                                                                                  | TYP                                                 | MAX                                                                               | UNITS | TEST CONDITIONS                                                                                                                                                                                                                          |
| <b>Output R<sub>BE</sub> Phototransistor</b> (See OP705 for general information — for reference only) |                                                                                                                                                                                                             |                                                                                      |                                                     |                                                                                   |       |                                                                                                                                                                                                                                          |
| V <sub>(BR)CEO</sub>                                                                                  | Collector-Emitter Breakdown Voltage                                                                                                                                                                         | 24                                                                                   | -                                                   | -                                                                                 | V     | I <sub>C</sub> = 100 µA                                                                                                                                                                                                                  |
| I <sub>CEO</sub>                                                                                      | Collector Dark Current                                                                                                                                                                                      | -                                                                                    | -                                                   | 100                                                                               | nA    | V <sub>CE</sub> = 10 V, I <sub>F</sub> = 0, E <sub>E</sub> = 0                                                                                                                                                                           |
| <b>Output Phototransistor</b> (See OP505 for general information — for reference only)                |                                                                                                                                                                                                             |                                                                                      |                                                     |                                                                                   |       |                                                                                                                                                                                                                                          |
| V <sub>(BR)CEO</sub>                                                                                  | Collector-Emitter Breakdown Voltage                                                                                                                                                                         | 30                                                                                   | -                                                   | -                                                                                 | V     | I <sub>C</sub> = 100 µA                                                                                                                                                                                                                  |
| V <sub>(BR)ECO</sub>                                                                                  | Emitter-Collector Breakdown Voltage                                                                                                                                                                         | 5                                                                                    | -                                                   | -                                                                                 | V     | I <sub>E</sub> = 100 µA                                                                                                                                                                                                                  |
| I <sub>CEO</sub>                                                                                      | Collector Dark Current                                                                                                                                                                                      | -                                                                                    | -                                                   | 100                                                                               | nA    | V <sub>CE</sub> = 10 V, I <sub>F</sub> = 0, E <sub>E</sub> = 0                                                                                                                                                                           |
| <b>Output Photodarlington</b> (See OP535 for general information — for reference only)                |                                                                                                                                                                                                             |                                                                                      |                                                     |                                                                                   |       |                                                                                                                                                                                                                                          |
| V <sub>(BR)CEO</sub>                                                                                  | Collector-Emitter Breakdown Voltage                                                                                                                                                                         | 15                                                                                   | -                                                   | -                                                                                 | V     | I <sub>C</sub> = 100 µA                                                                                                                                                                                                                  |
| V <sub>(BR)ECO</sub>                                                                                  | Emitter-Collector Breakdown Voltage                                                                                                                                                                         | 5                                                                                    | -                                                   | -                                                                                 | V     | I <sub>E</sub> = 100 µA                                                                                                                                                                                                                  |
| I <sub>CEO</sub>                                                                                      | Collector-Emitter Dark Current<br>OPB709, OPB745, OPB745WZ                                                                                                                                                  | -                                                                                    | -                                                   | 25                                                                                | µA    | V <sub>CE</sub> = 5 V, I <sub>F</sub> = 0, E <sub>E</sub> = 0                                                                                                                                                                            |
| <b>Coupled</b>                                                                                        |                                                                                                                                                                                                             |                                                                                      |                                                     |                                                                                   |       |                                                                                                                                                                                                                                          |
| V <sub>CE(SAT)</sub>                                                                                  | Saturation Voltage<br>OPB708<br>OPB709<br>OPB745, OPB745WZ                                                                                                                                                  | -<br>-<br>-                                                                          | -<br>-<br>-                                         | 0.40<br>1.10<br>1.10                                                              | V     | I <sub>F</sub> = 40 mA, I <sub>C</sub> = 3 µA, d = 0.15" <sup>(1)(2)</sup><br>I <sub>F</sub> = 40 mA, I <sub>C</sub> = 3 µA, d = 0.15" <sup>(1)(2)</sup><br>I <sub>F</sub> = 40 mA, I <sub>C</sub> = 400 µA, d = 0.15" <sup>(1)(2)</sup> |
| I <sub>C(ON)</sub> <sup>(1)(2)</sup>                                                                  | On-State Collector Current<br>OPB708<br>OPB709<br>OPB740, OPB740WZ<br>OPB741, OPB741W Z<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 <sub>CE</sub> = 5 V, I <sub>F</sub> = 40 mA ,<br>d = 0.15" (3.810 mm)                                                                                                                                                                  |
| I <sub>CX</sub> <sup>(3)</sup>                                                                        | 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             | µA    | V <sub>CC</sub> = 5 V, I <sub>F</sub> = 40 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<sub>E</sub> = 0).

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