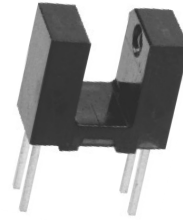


# Slotted Optical Switch

## OPB610, OPB620, OPB621



### Features:

- Non-contact switching
- Printed circuit board mounting
- Enhanced signal to noise ratio
- PIN photodiode sensor for high speed (OPB621)
- Lead centers: 0.275: (OPB61\_) / 0.320" (OPB62\_)

### Description:

The **OPB610** and **OPB620** slotted optical switches consist of an infrared emitting diode and an NPN silicon phototransistor with an enhanced low current roll-off to improve contrast ratio and immunity to background irradiance.

The **OPB621** slotted optical switch consists of an infrared emitting diode and a PIN photodiode with a polysulfone housing that is opaque to visible light, but transmissive to infrared. The low  $t_r/t_f$  of the PIN photodiode is ideal for high-speed operation. The sensitivity to ambient radiation is minimized.

For application information, See Application Bulletins 248 and 213.

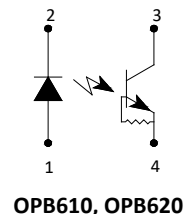
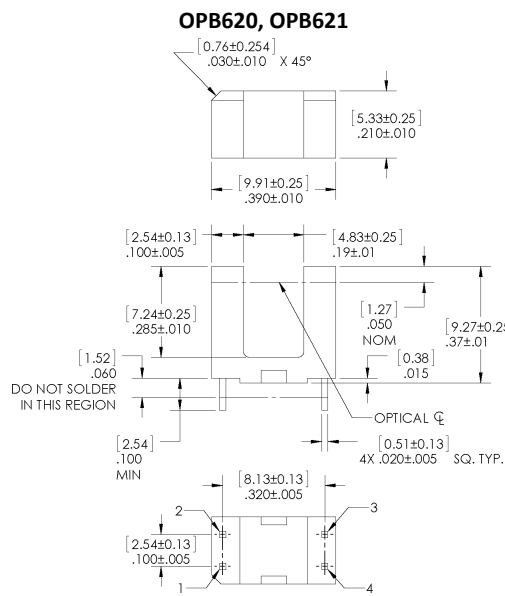
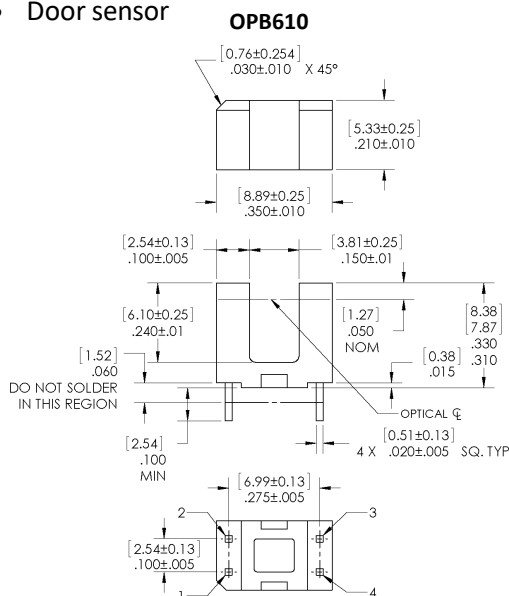
Custom electrical, wire and cabling and connectors are available. Contact your local representative or OPTEK for more information.

### Applications:

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

### Ordering Information

| Ordering Information |                     |                |                    |                           |                       |
|----------------------|---------------------|----------------|--------------------|---------------------------|-----------------------|
| Part Number          | LED Peak Wavelength | Sensor         | Slot Width / Depth | Aperture Emitter / Sensor | Lead Length / Spacing |
| OPB610               | 890 nm              | Rbe Transistor | 0.150" / 0.240"    | 0.06" / 0.06"             | 0.100" / 0.275"       |
| OPB620               |                     | Rbe Transistor | 0.190" / 0.285"    |                           | 0.100" / 0.320"       |
| OPB621               |                     | Diode          |                    |                           |                       |



RoHS

DIMENSIONS ARE IN:

[MILLIMETERS]

INCHES

| Pin # | LED     | Pin # | Transistor / Diode  |
|-------|---------|-------|---------------------|
| 1     | Anode   | 4     | Emitter / Anode     |
| 2     | Cathode | 3     | Collector / Cathode |

### General Note

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## Electrical Specifications

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

|                                                                                                             |                   |
|-------------------------------------------------------------------------------------------------------------|-------------------|
| Storage and Operating Temperature Range                                                                     | -40° C to +100° C |
| Lead Soldering Temperature [1/16 inch (1.6 mm) from the case for 5 sec. with soldering iron] <sup>(1)</sup> | 260° C            |
| <b>Input Diode</b>                                                                                          |                   |
| Forward DC Current                                                                                          | 50 mA             |
| Peak Forward Current (1 µs pulse width, 300 pps)                                                            | 3 A               |
| Reverse DC Voltage                                                                                          | 3 V               |
| Power Dissipation <sup>(2)</sup>                                                                            | 100 mW            |
| <b>Output Photodiode (OPB621)</b>                                                                           |                   |
| Reverse Breakdown Voltage                                                                                   | 60 V              |
| Power Dissipation <sup>(2)</sup>                                                                            | 100 mW            |
| <b>Output Phototransistor (OPB610, OPB620)</b>                                                              |                   |
| Collector-Emitter Voltage                                                                                   | 24 V              |
| Emitter-Reverse Current                                                                                     | 10 mA             |
| Collector DC Current                                                                                        | 30 mA             |
| Power Dissipation <sup>(3)</sup>                                                                            | 200 mW            |

#### Notes:

- (1) RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering. A maximum of 20 grams force may be applied to leads when soldering.
- (2) Derate linearly 1.07 mW/° C above 25° C.
- (3) Derate linearly 2.4 mW/° C above 25° C.
- (4) Plastic body is soluble in chlorinated hydrocarbons and ketones. It is recommended that a trial exposure to flux & cleaning chemicals is performed to ensure sensor is not damaged.

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# Slotted Optical Switch

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## Electrical Specifications

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

| SYMBOL                                         | PARAMETER                            | MIN  | TYP | MAX  | UNITS         | TEST CONDITIONS                                               |
|------------------------------------------------|--------------------------------------|------|-----|------|---------------|---------------------------------------------------------------|
| <b>Input Diode</b>                             |                                      |      |     |      |               |                                                               |
| $V_F$                                          | Forward Voltage                      | 1.0  | -   | 1.6  | V             | $I_F = 10 \text{ mA}$                                         |
|                                                | OPB610, OPB620                       | 1.15 | -   | 1.45 | V             | $I_F = 10 \text{ mA}$                                         |
| $I_R$                                          | Reverse Current                      | -    | -   | 100  | $\mu\text{A}$ | $V_R = 3 \text{ V}$                                           |
| <b>Output Phototransistor (OPB610, OPB620)</b> |                                      |      |     |      |               |                                                               |
| $V_{(BR)CEO}$                                  | Collector-Emitter Breakdown Voltage  | 24   | -   | -    | V             | $I_C = 100 \mu\text{A}$                                       |
| $BV_{ECO}$                                     | Emitter-Collector Breakdown Voltage  | 0.4  | -   | -    | V             | $I_{CE} = 100 \mu\text{A}$                                    |
| $I_{CEO}$                                      | Collector-Emitter Dark Current       | -    | -   | 100  | nA            | $V_{CE} = 5 \text{ V}$                                        |
| <b>Output Photodiode (OPB621)</b>              |                                      |      |     |      |               |                                                               |
| $I_D$                                          | Dark Current                         | -    | -   | 65   | nA            | $V_R = 30 \text{ V}$ , $E_E = 0 \text{ mW}$                   |
| $V_{(BR)R}$                                    | Reverse Breakdown Voltage            | 60   | -   | -    | V             | $I_R = 100 \mu\text{A}$ , $E_E = 0 \text{ mW}$                |
| $V_F$                                          | Forward Voltage                      | -    | -   | 1.0  | V             | $I_F = 1 \text{ mA}$ , $E_E = 0 \text{ mW}$                   |
| <b>Combined</b>                                |                                      |      |     |      |               |                                                               |
| $V_{SAT}$                                      | Collector-Emitter Saturation Voltage | -    | -   | 0.4  | V             | $I_F = 5 \text{ mA}$ , $I_C = 100 \mu\text{A}$                |
| $I_{C(ON)}$                                    | On-State Collector/Diode Current     | 1    | -   | -    | mA            | $I_F = 5 \text{ mA}$ , $V_{CE} = 5 \text{ V}$ (gap unblocked) |
|                                                | OPB610, OPB620                       | 9    | -   | 90   | $\mu\text{A}$ | $V_R = 5 \text{ V}$ , $I_F = 20 \text{ mA}$ (gap unblocked)   |
|                                                | OPB621                               |      |     |      |               |                                                               |

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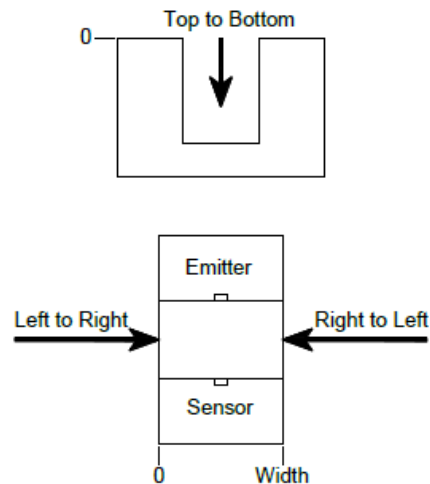
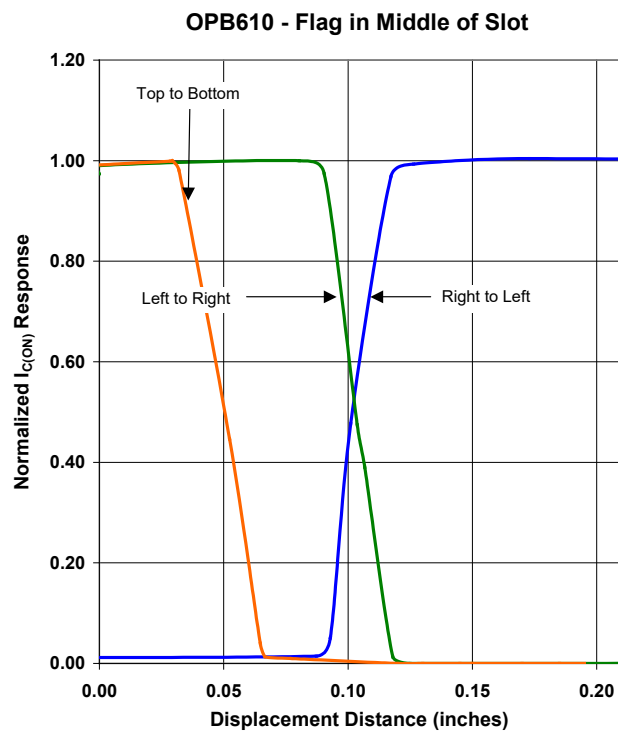
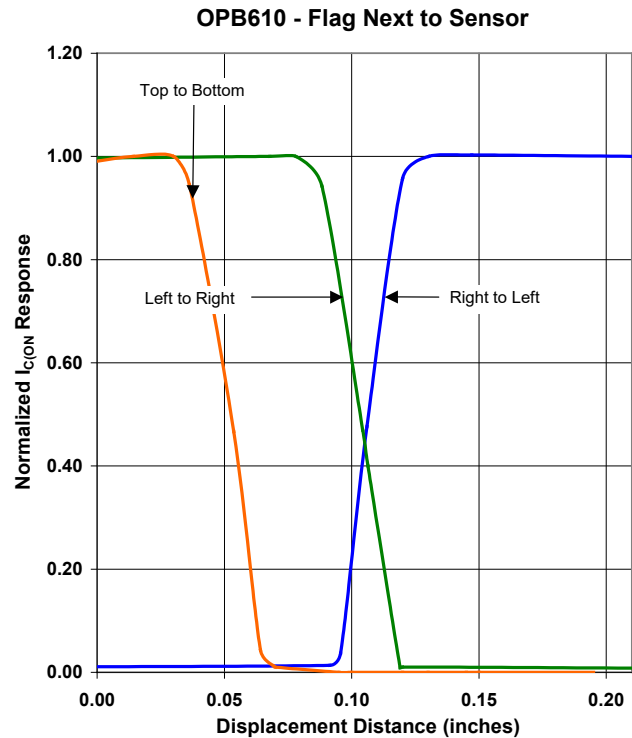
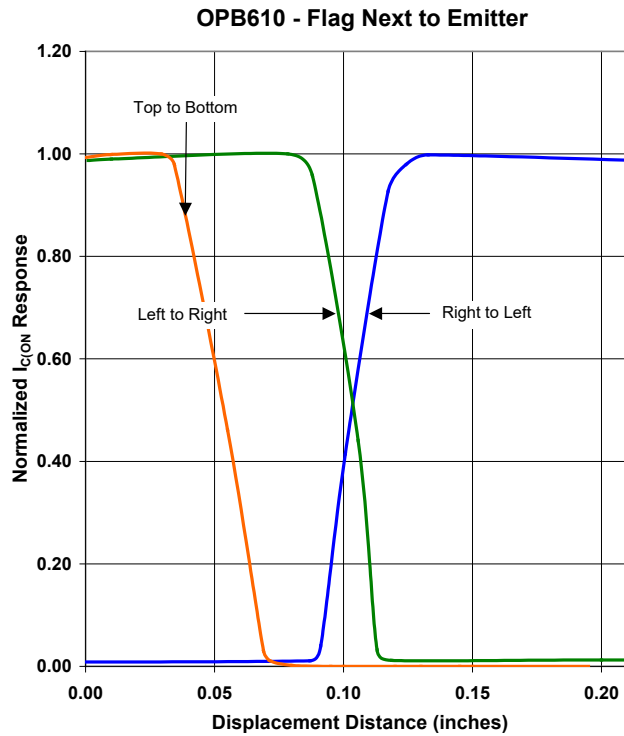
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# Slotted Optical Switch

OPB610, OPB620, OPB621



## Typical Performance



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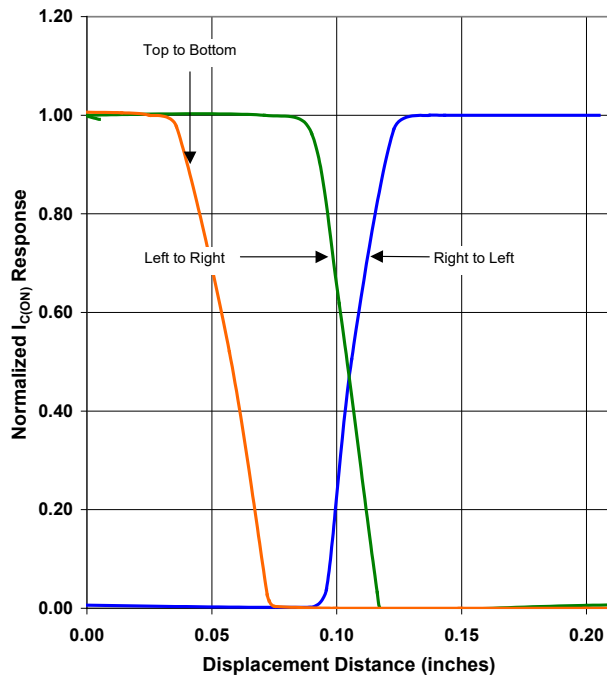
# Slotted Optical Switch

OPB610, OPB620, OPB621

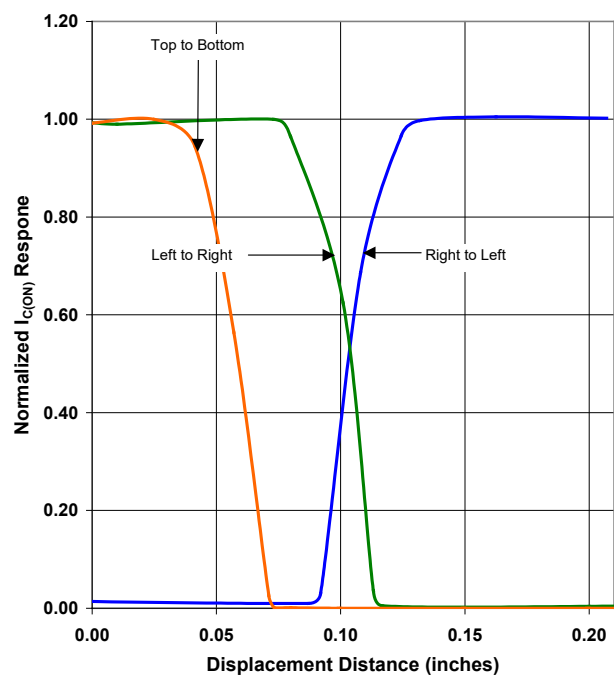


## Typical Performance

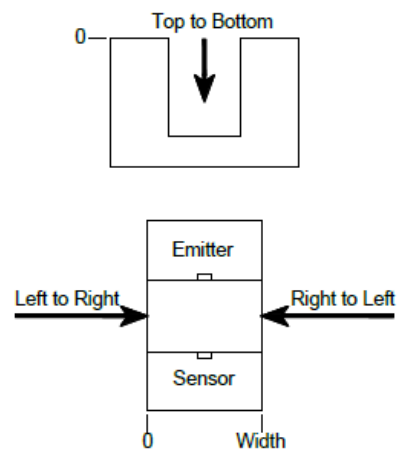
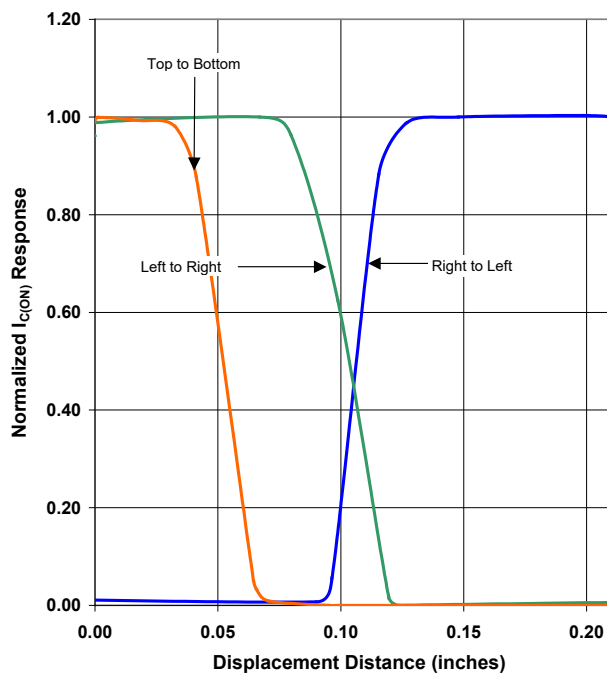
OPB620 - Flag Next to Emitter



OPB620 - Flag Next to Sensor



OPB620 - Flag in Middle of Slot



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# Slotted Optical Switch

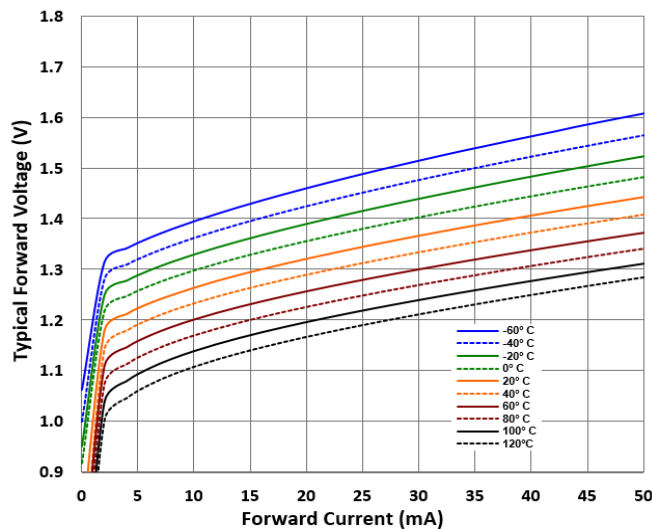
OPB610, OPB620, OPB621



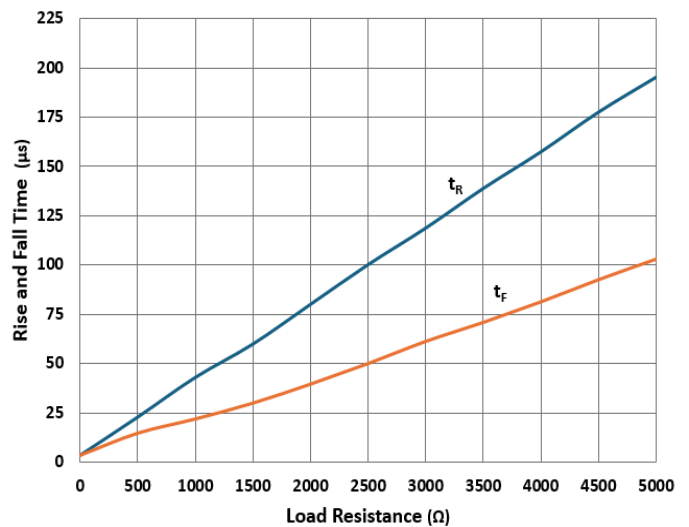
## Typical Performance

OPB610 OPB620

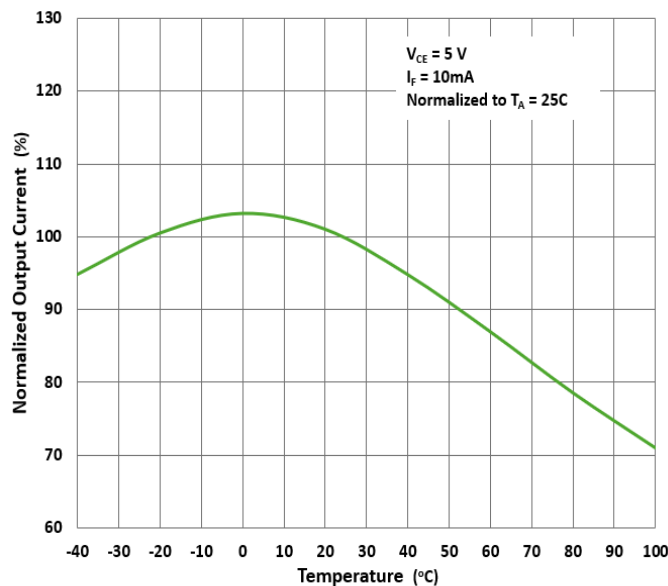
LED Forward Voltage vs  $I_F$  vs Temperature



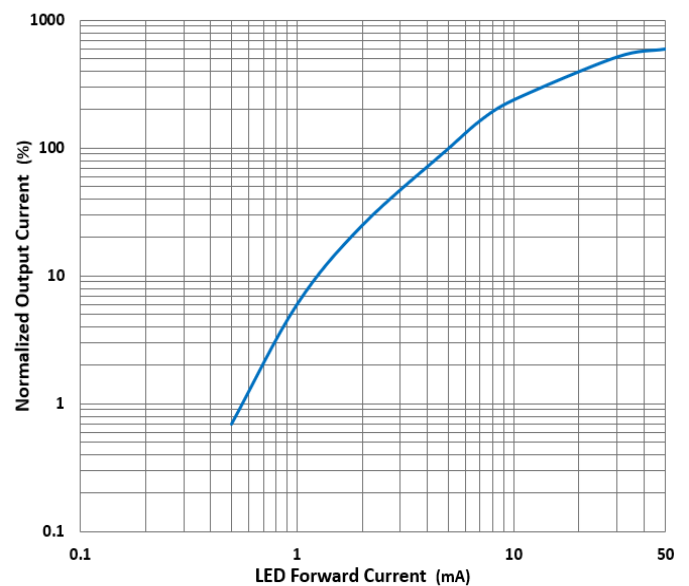
Rise and Fall Time vs Load Resistance



Output Current vs Temperature



Output Current vs LED Current



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