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FAIRCHILD SEMICONDUCTOR®

October 2009

# QVE00118
# Phototransistor Optical Interrupter Switch

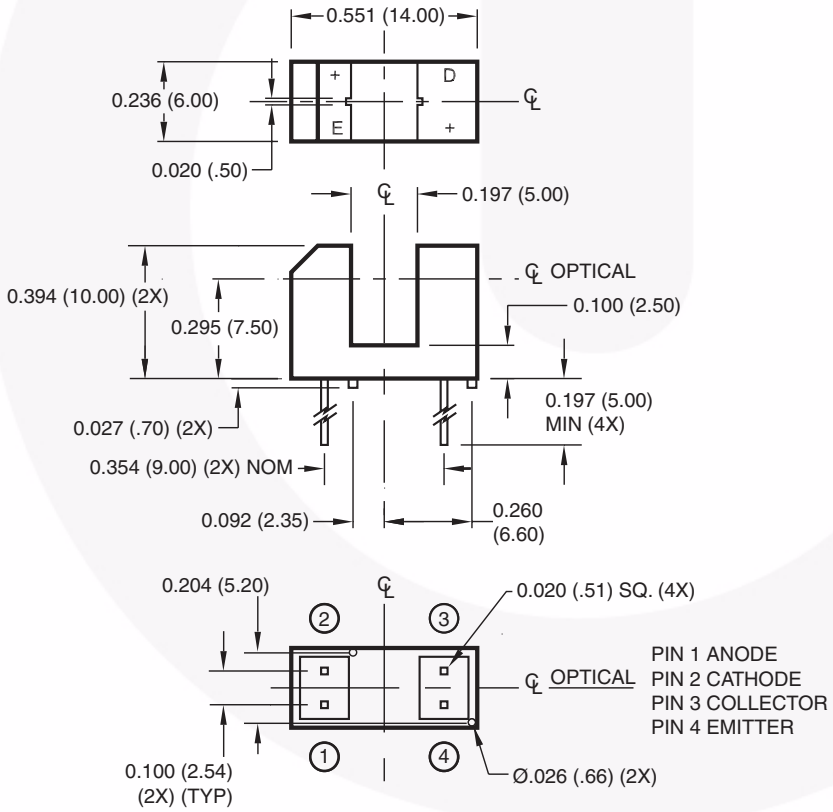
## Features

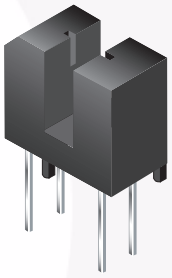
- No contact sensing
- 5mm gap
- 0.5mm aperture width
- Low profile
- PCB mount
- Transistor output

## Description

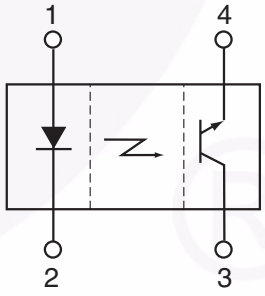
The QVE00118 consists of an infrared light emitting diode coupled to an NPN silicon phototransistor packaged into an injection molded housing. The housing is designed for wide-gap, non-contact sensing.

## Package Dimensions



## Schematic




**Notes:**

1. Dimensions for all drawings are in inches (millimeters).
2. Tolerance of ± .010 (.25) on all non-nominal dimensions unless otherwise specified.

## Absolute Maximum Ratings (TA = 25°C unless otherwise specified)

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $T_{OPR}$ | Operating Temperature | -55 to +100 | °C |
| $T_{STG}$ | Storage Temperature | -55 to +100 | °C |
| $T_{SOL-I}$ | Soldering Temperature (Iron)(2)(3) | 240 for 5 sec | °C |
| $T_{SOL-F}$ | Soldering Temperature (Flow)(2)(3) | 260 for 10 sec | °C |
| **EMITTER** | | | |
| $I_F$ | Continuous Forward Current | 50 | mA |
| $V_R$ | Reverse Voltage | 5 | V |
| $P_D$ | Power Dissipation(1) | 100 | mW |
| **SENSOR** | | | |
| $V_{CEO}$ | Collector-Emitter Voltage | 30 | V |
| $V_{ECO}$ | Emitter-Collector Voltage | 4.5 | V |
| $I_C$ | Collector Current | 20 | mA |
| $P_D$ | Power Dissipation(1) | 100 | mW |

**Notes:**

1. Derate power dissipation linearly, on each component, 1.33mW/°C above 25°C.
2. RMA flux is recommended.
3. Methanol or isopropyl alcohols are recommended as cleaning agents.
4. Soldering iron tip 1/16” (1.6mm) from housing.

## Electrical/Optical Characteristics ($T_A$ = 25°C)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **EMITTER** | | | | | | |
| $V_F$ | Forward Voltage | $I_F$ = 20mA | | 1.2 | 1.5 | V |
| $I_R$ | Reverse Current | $V_R$ = 4V | | | 10 | µA |
| $I_{PE}$ | Peak Emission Wavelength | $I_F$ = 20mA | | 940 | | nm |
| **SENSOR** | | | | | | |
| $I_D$ | Dark Current | $V_{CE}$ = 10V, $I_F$ = 0mA | | | 200 | nA |
| **COUPLED** | | | | | | |
| $I_{C(ON)}$ | Collector Current | $I_F$ = 20mA, $V_{CE}$ = 10V | 0.5 | | 14 | mA |
| $V_{CE\ (SAT)}$ | Collector Emitter Saturation Voltage | $I_F$ = 20mA, $I_C$ = 0.1mA | | | 0.4 | V |
| $t_r$ | Rise Time | $V_{CC}$ = 5V, $R_L$ = 100Ω, | | 4 | | µs |
| $t_f$ | Fall Time | $I_C$ = 5mA | | 4 | | µs |

## Typical Performance Characteristics

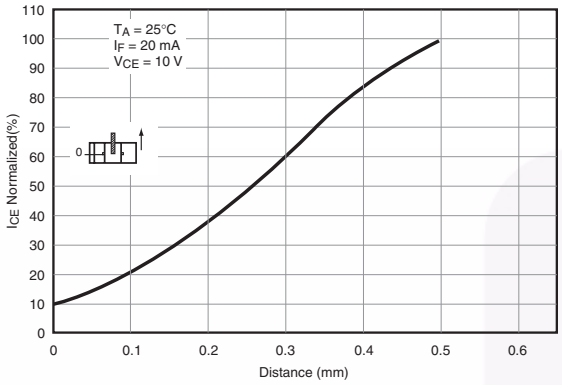



**Fig. 1 Collector Current vs. Shield distance**

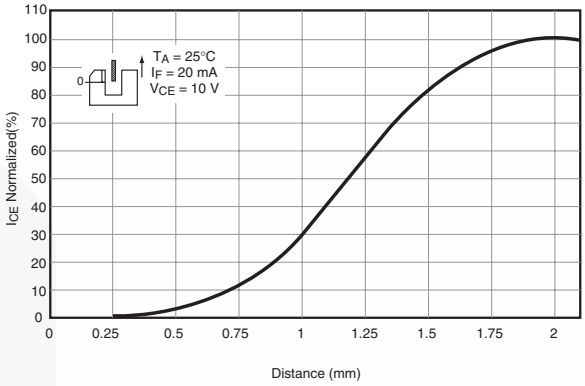



**Fig. 2 Collector Current vs. Shield distance**

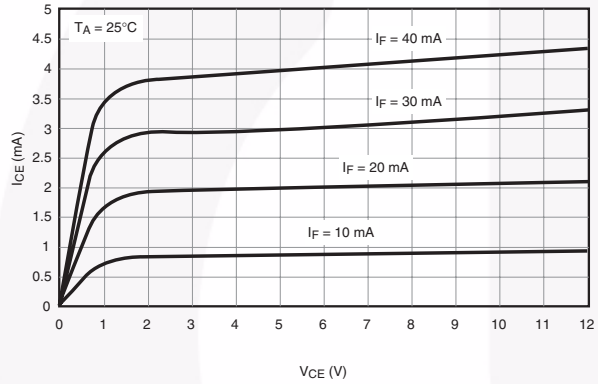



**Fig. 3 Collector-Emitter Voltage vs. Collector Current**

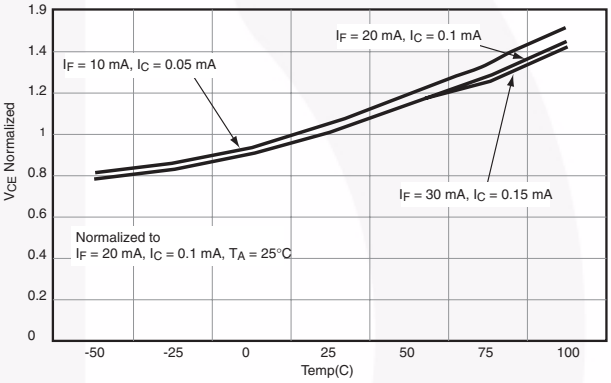



**Fig. 4 Collector-Emitter Voltage vs. Temperature**

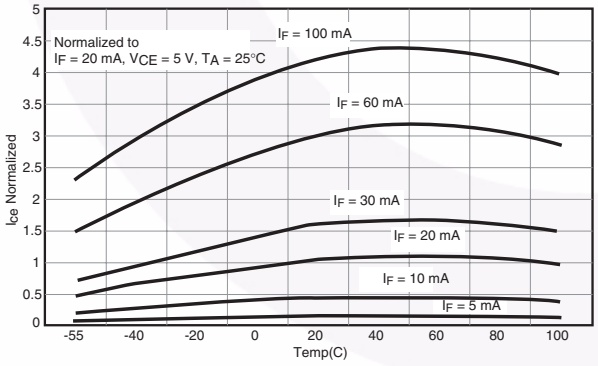



**Fig. 5 Collector Current vs. Temperature**

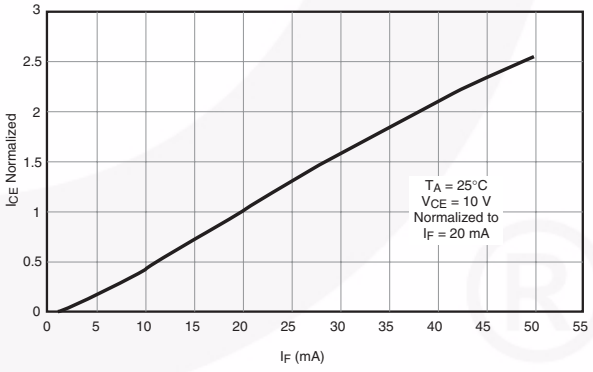



**Fig. 6 Collector Current vs. Forward Current**

## Typical Performance Characteristics (Continued)

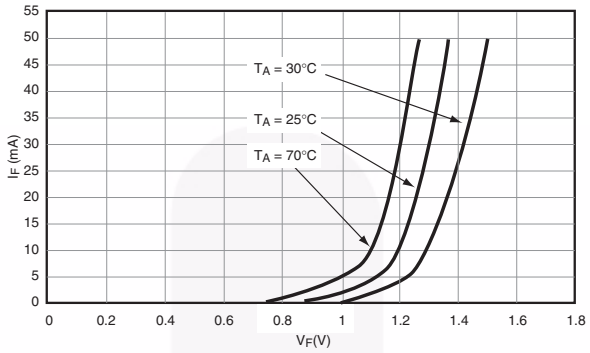



**Fig. 7 Forward Voltage vs. Forward Current**

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