FAIRCHILD SEMICONDUCTOR®

November 2010

# QVE00033
# Phototransistor Optical Surface Mount Interrupter Switch

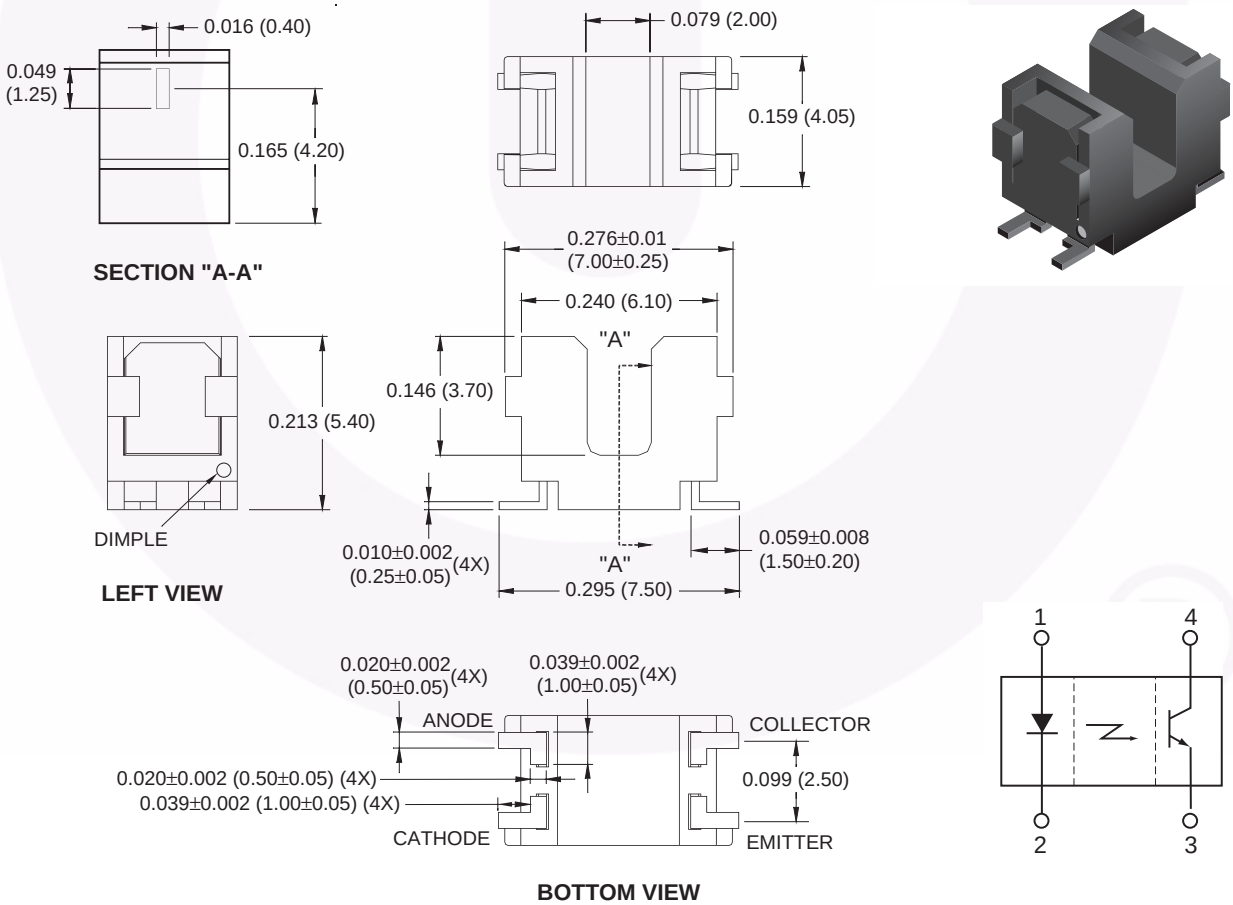
## Features

- No contact switching
- Transistor Output
- Compact surface mount package
- Opaque black plastic housing
- 2mm wide slot
- 0.4 mm aperture width
- Tape and reel
- Reflow conditions:
  Preheat = 160°C for 120 seconds
  Reflow = 200°C for 60 seconds (peak = 240°C)
- HL-94V-0 housing

## Description

The QVE00033 is a miniature slotted optical switch designed for surface mount applications. It consists of a GaAs LED and a silicon phototransistor facing each other across a 2mm gap, and packaged in a temperature resistant black plastic housing.

## Package Dimension




**Note:**

1. Dimensions for all drawings are in inches (millimeters). Tolerance ±0.005" (0.127mm) unless othewise specified.

## Absolute Maximum Ratings ($T_A$ = 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)[2,3,4] | 240 for 5 sec. | °C |
| $T_{SOL-F}$ | Soldering Temperature (Flow)[2,3] | 260 for 10 sec. | °C |
| $P_{TOT}$ | Total Power Dissipation | 100 | mW |
| **EMITTER** | | | |
| $I_F$ | Continuous Forward Current | 50 | mA |
| $V_R$ | Reverse Voltage | 6 | V |
| $P_D$ | Power Dissipation[1] | 75 | 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] | 75 | mW |

**Notes:**

1. Derate power dissipation linearly 1.00mW/°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 unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **EMITTER** | | | | | | |
| $V_F$ | Forward Voltage | $I_F$ = 20mA | | 1.2 | 1.4 | V |
| $I_R$ | Reverse Current | $V_R$ = 4V | | | 10 | µA |
| $I_{PE}$ | Peak Emission Wavelength | $I_F$ = 20mA | | 940 | | nm |
| **SENSOR** | | | | | | |
| $I_{CEO}$ | Dark Current | $V_{CE}$ = 20V, $I_F$ = 0mA | | | 100 | nA |
| **COUPLED** | | | | | | |
| $I_{C(ON)}$ | Collector Current | $I_F$ = 5mA, $V_{CE}$ = 5V | 100 | | 600 | µA |
| $V_{CE\ (SAT)}$ | Collector Emitter | $I_F$ = 10mA, $I_C$ = 40µA | | | 0.4 | V |
| $t_r$ | Rise Time | $V_{CC}$ = 5V, $R_L$ = 1000Ω, $I_C$ = 100µA | | 7 | 150 | µs |
| $t_f$ | Fall Time | | | 7 | 150 | µs |

## Typical Performance Characteristics

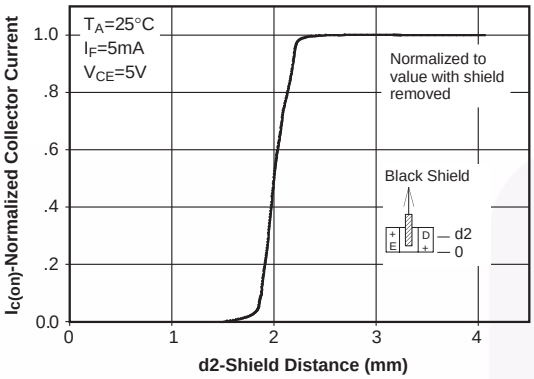



**Figure 1. Normalized Collector Current Vs. Shield Distance**

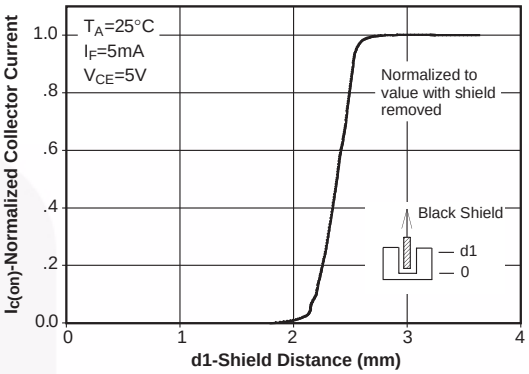



**Figure 2. Normalized Collector Current Vs. Shield Distance**

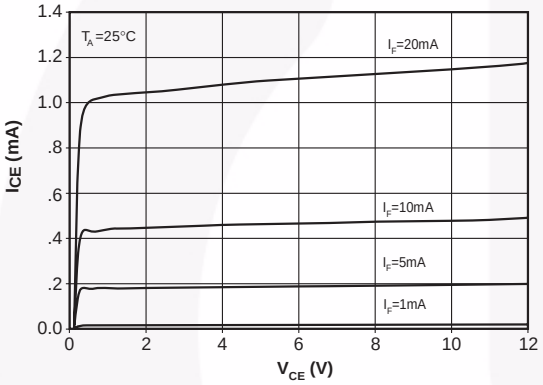



**Figure 3. Collector Current Vs. Collector-Emitter Voltage**

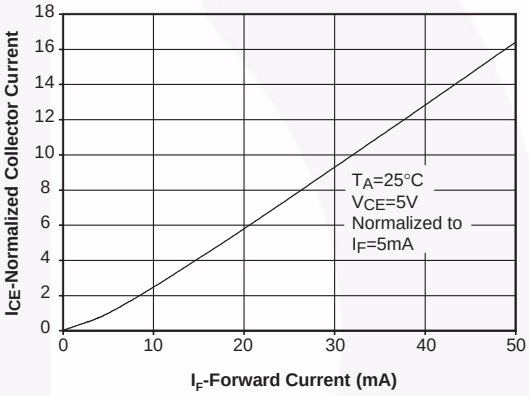



**Figure 4. Normalized Collector Current Vs. Forward Current**

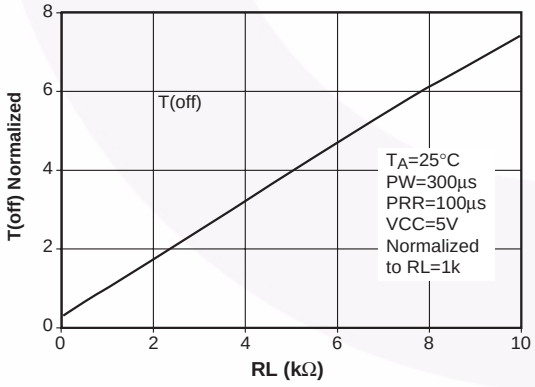



**Figure 5. Rise Time vs. Load Resistance**

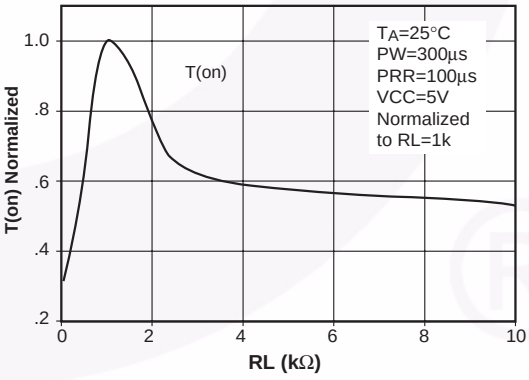
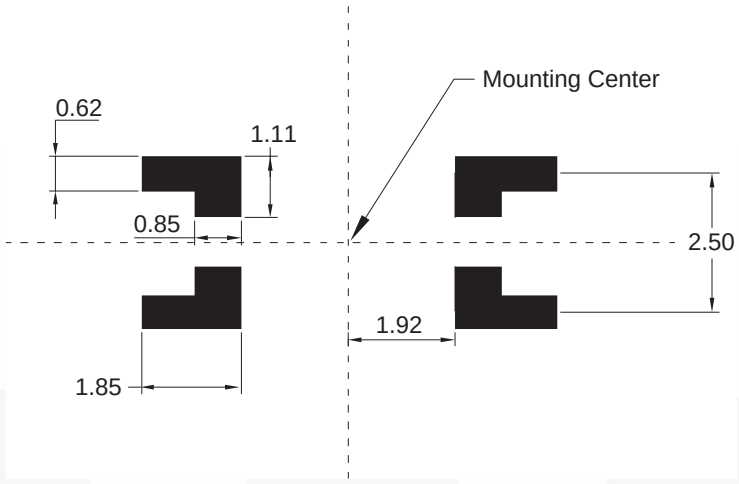
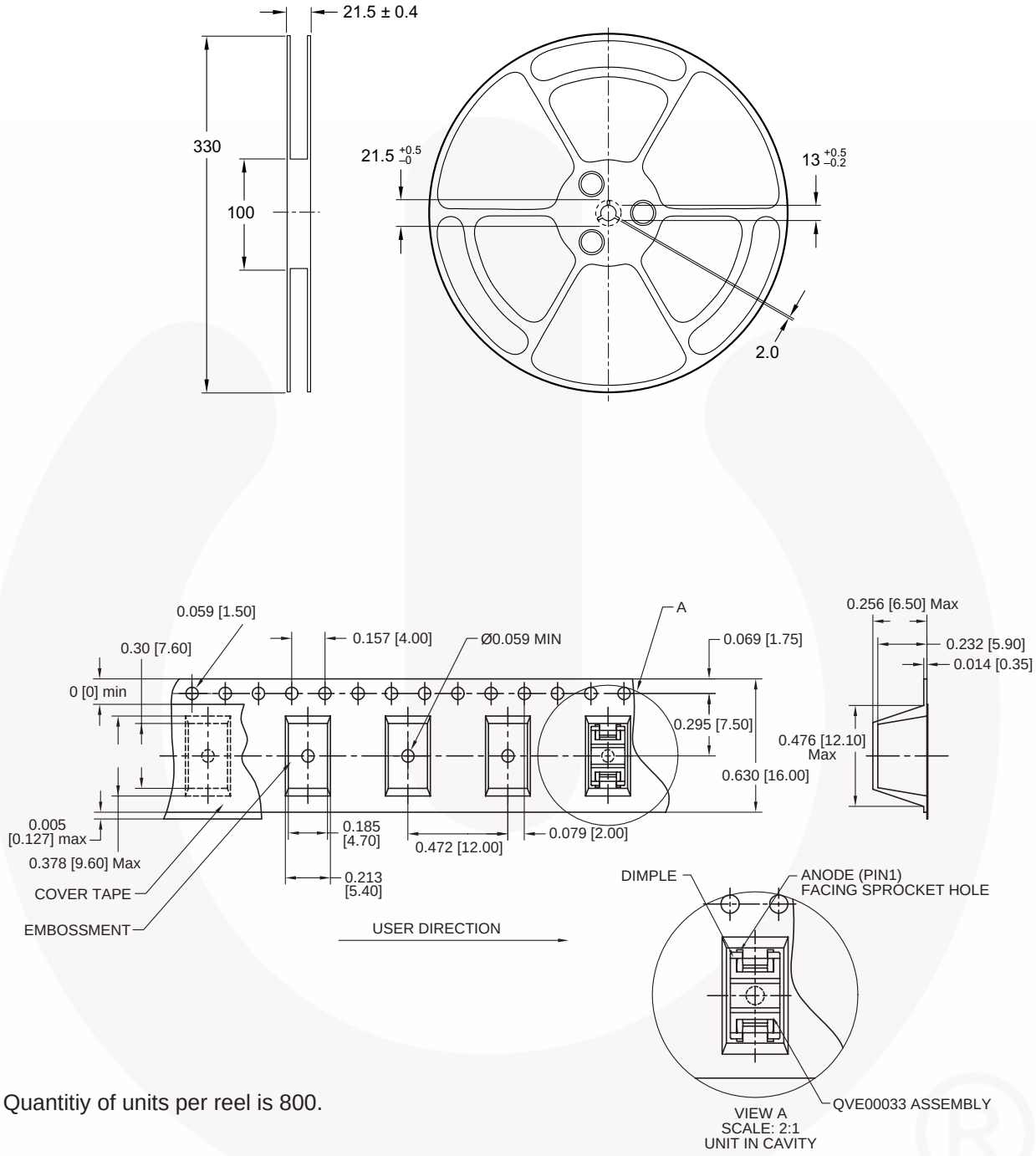



**Figure 6. Fall Time vs. Load Resistance**

## Recommended Printed Circuit Board Pattern (For Reference Only)



## Tape and Reel Dimensions




Quantitiy of units per reel is 800.

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