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May 2015

QSE133 — Plastic Silicon Infrared Phototransistor

# QSE133 Plastic Silicon Infrared Phototransistor

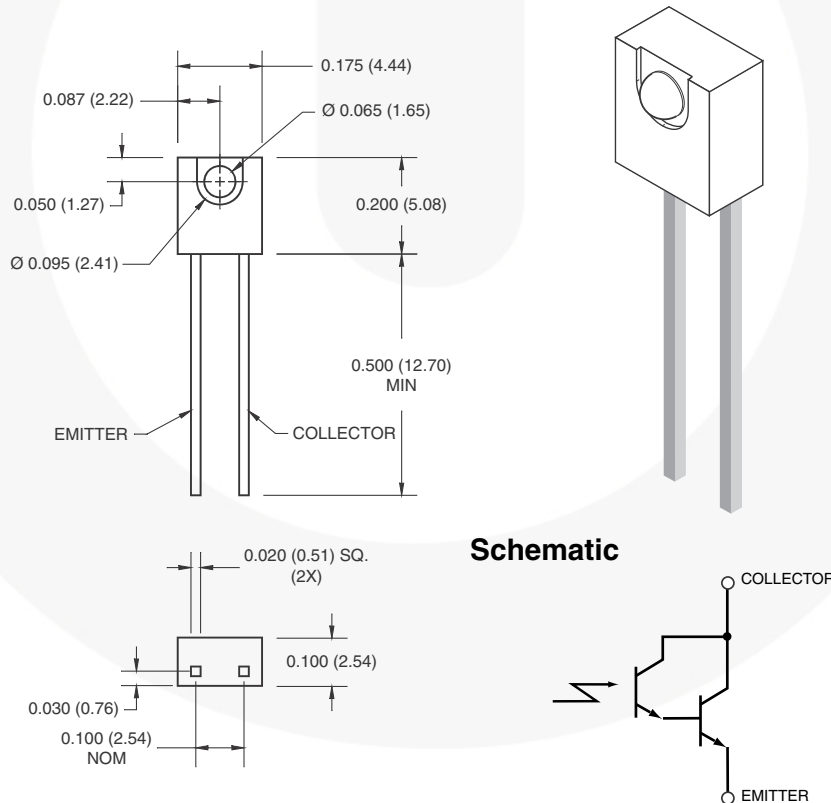
## Features

- NPN Silicon Phototransistor
- Package Type: Sidelooker
- Medium Wide Reception Angle, 50°
- Package Material and Color: Black Epoxy
- Matched Emitter: QEE113
- Daylight Filter
- High Sensitivity
- Yellow dot marking on the top side

## Description

The QSE133 is a silicon photodarlington encapsulated in a wide angle, infrared transparent, black plastic side-looker package.

## Package Dimensions<sup>(1, 2)</sup>



## Notes:

1. Dimensions for all drawings are in inches (mm).
2. Tolerance of  $\pm 0.010$  (0.25) on all non-nominal dimensions unless otherwise specified.

## Absolute Maximum Ratings

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. Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol             | Parameter   | Value          | Unit             |
|--------------------|---|----------------|------------------|
| $T_{\text{OPR}}$   | Operating Temperature                             | -40 to +100    | $^\circ\text{C}$ |
| $T_{\text{STG}}$   | Storage Temperature                               | -40 to +100    | $^\circ\text{C}$ |
| $T_{\text{SOL-I}}$ | Soldering Temperature (Iron) <sup>(4, 5, 6)</sup> | 240 for 5 sec  | $^\circ\text{C}$ |
| $T_{\text{SOL-F}}$ | Soldering Temperature (Flow) <sup>(4, 5)</sup>    | 260 for 10 sec | $^\circ\text{C}$ |
| $V_{\text{CE}}$    | Collector Emitter Voltage                         | 30             | V                |
| $V_{\text{EC}}$    | Emitter Collector Voltage                         | 5              | V                |
| $P_{\text{D}}$     | Power Dissipation <sup>(3)</sup>                  | 100            | mW               |

### Notes:

- Derate power dissipation linearly 1.33 mW/ $^\circ\text{C}$  above  $25^\circ\text{C}$ .
- RMA flux is recommended.
- Methanol or isopropyl alcohols are recommended as cleaning agents.
- Soldering iron 1/16" (1.6mm) minimum from housing.

## Electrical / Optical Characteristics

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

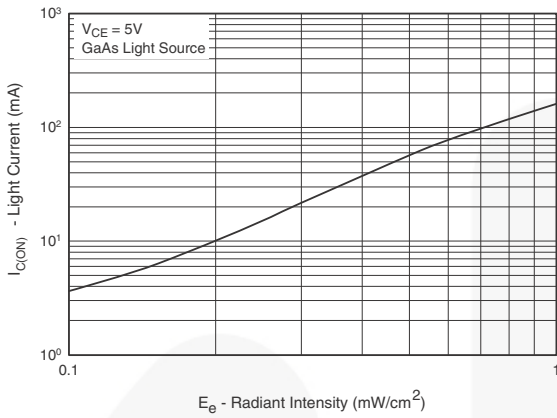
| Symbol                | Parameter                                 | Conditions  | Min. | Typ.     | Max. | Unit          |
|-----------------------|---|---|------|----------|------|---------------|
| $\lambda_{\text{PS}}$ | Peak Sensitivity                          |   |      | 880      |      | nm            |
| $\Theta$              | Reception Angle                           |   |      | $\pm 25$ |      | $^\circ$      |
| $I_{\text{CEO}}$      | Collector Emitter Dark Current            | $V_{\text{CE}} = 10 \text{ V}, E_e = 0$   |      |          | 100  | nA            |
| $BV_{\text{CEO}}$     | Collector-Emitter Breakdown               | $I_{\text{C}} = 1 \text{ mA}$   | 30   |          |      | V             |
| $BV_{\text{ECO}}$     | Emitter-Collector Breakdown               | $I_{\text{E}} = 100 \mu\text{A}$  | 5    |          |      | V             |
| $I_{\text{C(ON)}}$    | On-State Collector Current <sup>(7)</sup> | $E_e = 0.25 \text{ mW/cm}^2, V_{\text{CE}} = 5 \text{ V}$                                     | 9.0  |          |      | mA            |
| $V_{\text{CE(SAT)}}$  | Saturation Voltage <sup>(7)</sup>         | $E_e = 0.5 \text{ mW/cm}^2, I_{\text{C}} = 0.4 \text{ mA}$                                    |      |          | 1.0  | V             |
| $t_{\text{r}}$        | Rise Time                                 | $I_{\text{C}} = 0.15 \text{ mA}, V_{\text{CC}} = 5 \text{ V},$<br>$R_{\text{L}} = 100 \Omega$ |      | 20       |      | $\mu\text{s}$ |
| $t_{\text{f}}$        | Fall Time                                 |   |      | 50       |      | $\mu\text{s}$ |

### Note:

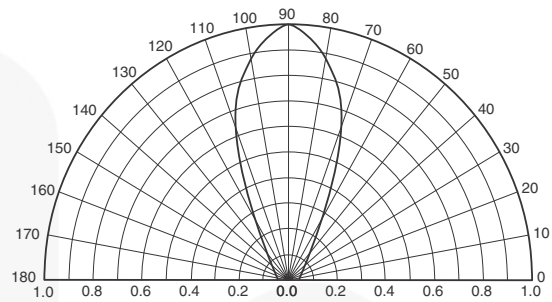
- $\lambda = 880 \text{ nm}$  (AlGaAs)



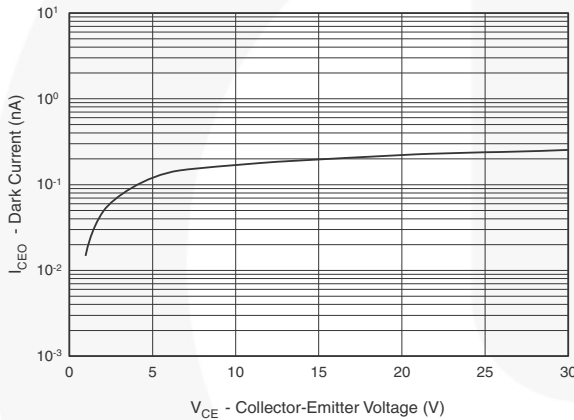
## Typical Performance Characteristics



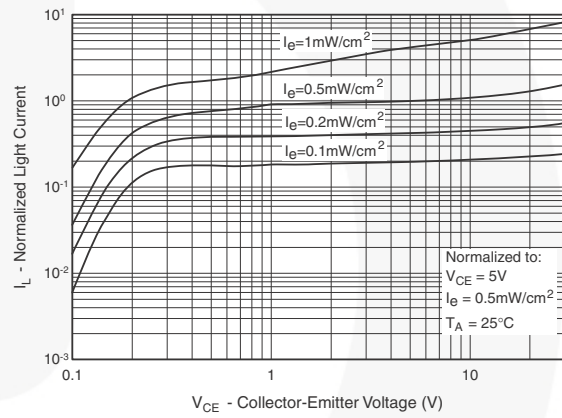
**Figure 1. Light Current vs. Radiant Intensity**



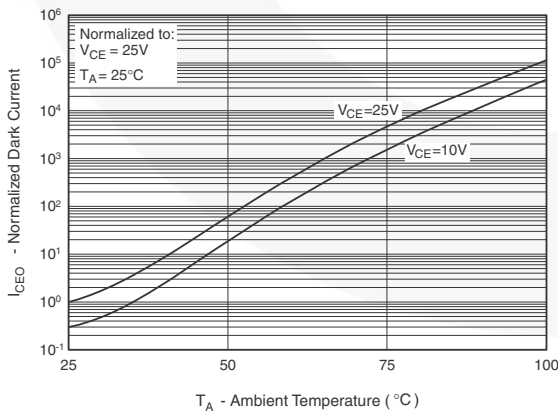
**Figure 2. Angular Response Curve**



**Figure 3. Dark Current vs. Collector - Emitter Voltage**



**Figure 4. Light Current vs. Collector - Emitter Voltage**




**Figure 5. Dark Current vs. Ambient Temperature**





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