DESCRIPTION

The QRB1113/1114 consists of an infrared emitting diode and an NPN silicon phototransistor mounted side by side on a converging optical axis in a black plastic housing. The phototransistor responds to radiation from the emitting diode only when a reflective object passes within its field of view. The area of the optimum response approximates a circle .200" in diameter.

FEATURES

- No contact surface sensing
- Phototransistor output
- Focused for sensing specular reflection
- Daylight filter on photosensor
- Dust cover

NOTES:
1. Dimensions for all drawings are in inches (mm).
2. Tolerance of ± .010 (.25) on all non-nominal dimensions unless otherwise specified.
# Phototransistor Reflective Object Sensor

## Absolute Maximum Ratings

**Parameter** | **Symbol** | **Rating** | **Units**
--- | --- | --- | ---
Operating Temperature | $T_{OPR}$ | -40 to +85 | °C
Storage Temperature | $T_{STG}$ | -40 to +85 | °C
Soldering Temperature (Iron) | $T_{SOL-I}$ | 240 for 5 sec | °C
Soldering Temperature (Flow) | $T_{SOL-F}$ | 260 for 10 sec | °C

### Emitter
- Continuous Forward Current | $I_F$ | 50 | mA
- Reverse Voltage | $V_R$ | 5 | V
- Power Dissipation | \(P_D\) | 100 | mW

### Sensor
- Collector-Emitter Voltage | $V_{CEO}$ | 30 | V
- Emitter-Collector Voltage | $V_{ECO}$ | 4.5 | V
- Collector Current | — | 20 | mA
- Power Dissipation | \(P_D\) | 100 | mW

### Notes
1. Derate power dissipation linearly 1.67 mW/°C above 25°C.
2. RMA flux is recommended.
3. Methanol or isopropyl alcohols are recommended as cleaning agents.
4. Soldering iron 1/16” (1.6mm) minimum from housing.
5. D is the distance from the assembly face to the reflective surface.
6. Measured using an Eastman Kodak neutral test card with 90% diffused reflecting surface.
7. Cross talk is the photo current measured with current to the input diode and no reflecting surface.

## Electrical/Optical Characteristics

**Parameter** | **Test Conditions** | **Symbol** | **Min.** | **Typ.** | **Max.** | **Units**
--- | --- | --- | --- | --- | --- | ---
**Emitter**
- Forward Voltage | $I_F = 40$ mA | $V_F$ | — | — | 1.7 | V
- Reverse Current | $V_R = 5.0$ V | $I_R$ | — | — | 100 | µA
- Peak Emission Wavelength | $I_F = 20$ mA | $\lambda_{PE}$ | — | 940 | — | nm

**Sensor**
- Collector-Emitter Breakdown Voltage | $I_C = 1$ mA | $BV_{CEO}$ | 30 | — | — | V
- Emitter-Collector Breakdown Voltage | $I_E = 0.1$ mA | $BV_{ECO}$ | 5 | — | — | V
- Collector-Emitter Dark Current | $V_{CE} = 10$ V, $I_F = 0$ mA | $I_{CEO}$ | — | — | 100 | nA

**Coupled**
- On-state Collector Current | $I_F = 40$ mA, $V_{CE} = 5$ V, $D = .150^{(6,6)}$ | $I_{C(ON)}$ | 0.20 | — | — | mA
- Collector-Emitter Saturation Voltage | $I_F = 20$ mA, $I_C = 0.5$ mA | $V_{CE (SAT)}$ | — | — | 0.4 | V
- Rise Time | $V_{CE} = 5$ V, $R_L = 100$ V, $I_{C(ON)} = 5$ mA | $t_r$ | — | 8 | — | µs
- Fall Time | — | $t_f$ | — | 8 | — | µs
- Cross Talk | $I_F = 40$ mA, $V_{CE} = 5$ V | $I_{CX}$ | — | 1.00 | — | µA
TYPICAL PERFORMANCE CURVES

Fig. 1  Forward Voltage vs. Forward Current

Fig. 2  Normalized Collector Current vs. Forward Current

Fig. 3  Normalized Collector Current vs. Temperature

Fig. 4  Normalized Collector Dark Current vs. Temperature

Fig. 5  Normalized Collector Current vs. Distance
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PHOTOTRANSISTOR

REFLECTIVE OBJECT SENSOR

QRB1113    QRB1114
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