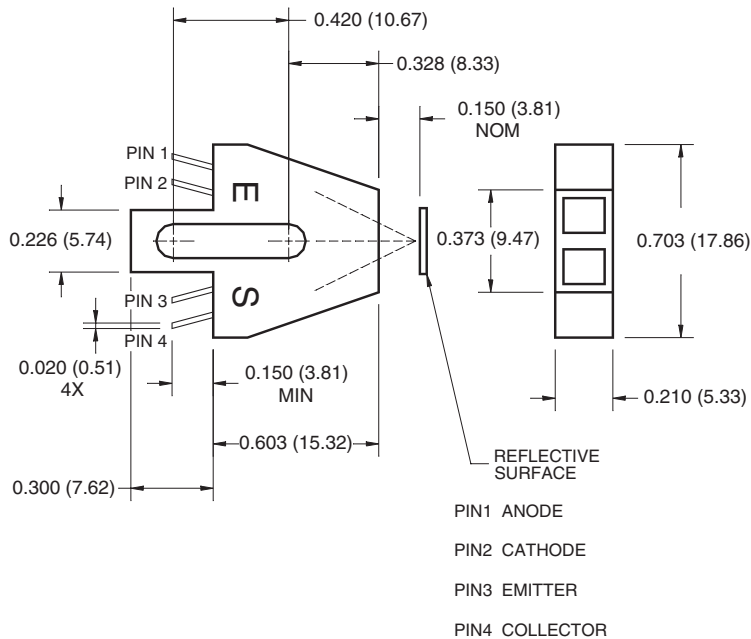
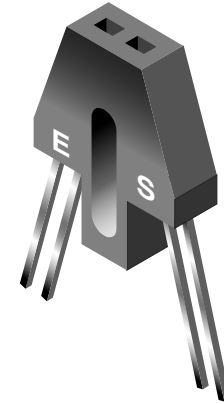


PACKAGE DIMENSIONS

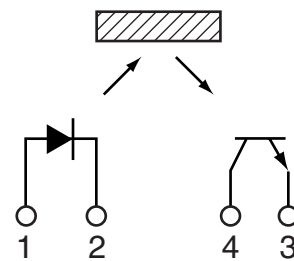


NOTES:

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



SCHEMATIC



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

QRB1113 QRB1114

| ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise specified) | | | |
|----------------------------------------------------------------------------------------|-------------|----------------|------------------|
| Parameter | Symbol | Rating | Units |
| Operating Temperature | T_{OPR} | -40 to +85 | $^\circ\text{C}$ |
| Storage Temperature | T_{STG} | -40 to +85 | $^\circ\text{C}$ |
| Soldering Temperature (Iron) ^(2,3,4) | T_{SOL-I} | 240 for 5 sec | $^\circ\text{C}$ |
| Soldering Temperature (Flow) ^(2,3) | T_{SOL-F} | 260 for 10 sec | $^\circ\text{C}$ |
| EMITTER | | | |
| Continuous Forward Current | I_F | 50 | mA |
| Reverse Voltage | V_R | 5 | V |
| Power Dissipation ⁽¹⁾ | 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 ⁽¹⁾ | P_D | 100 | mW |

NOTES

1. Derate power dissipation linearly 1.67 mW/ $^\circ\text{C}$ above 25 $^\circ\text{C}$.
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 ($T_A = 25^\circ\text{C}$) | | | | | | |
|------------------------------------------------------------------------|------------------------------------------------------------------------|----------------|------|------|------|---------------|
| Parameter | Test Conditions | Symbol | Min. | Typ. | Max. | Units |
| EMITTER | | | | | | |
| Forward Voltage | $I_F = 40\text{ mA}$ | V_F | — | — | 1.7 | V |
| Reverse Current | $V_R = 5.0\text{ V}$ | I_R | — | — | 100 | μA |
| Peak Emission Wavelength | $I_F = 20\text{ mA}$ | λ_{PE} | — | 940 | — | nm |
| SENSOR | | | | | | |
| Collector-Emitter Breakdown Voltage | $I_C = 1\text{ mA}$ | BV_{CEO} | 30 | — | — | V |
| Emitter-Collector Breakdown Voltage | $I_E = 0.1\text{ mA}$ | BV_{ECO} | 5 | — | — | V |
| Collector-Emitter Dark Current | $V_{CE} = 10\text{ V}, I_F = 0\text{ mA}$ | I_{CEO} | — | — | 100 | nA |
| COUPLED | | | | | | |
| On-state Collector Current | $I_F = 40\text{ mA}, V_{CE} = 5\text{ V}$ $D = .150^{(5,6)}$ | $I_{C(ON)}$ | 0.20 | — | — | mA |
| QRB1113 | | | 0.60 | — | — | |
| QRB1114 | | | | | | |
| Collector-Emitter Saturation Voltage | $I_F = 20\text{ mA}, I_C = 0.5\text{ mA}$ | $V_{CE(SAT)}$ | — | — | 0.4 | V |
| Rise Time | $V_{CE} = 5\text{ V}, R_L = 100\text{ V}$ $I_{C(ON)} = 5\text{ mA}$ | t_r | — | 8 | — | μs |
| Fall Time | | t_f | — | 8 | — | |
| Cross Talk | $I_F = 40\text{ mA}, V_{CE} = 5\text{ V}^{(7)}$ | I_{CX} | — | — | 1.00 | μA |

TYPICAL PERFORMANCE CURVES

Fig. 1 Forward Voltage vs. Forward Current

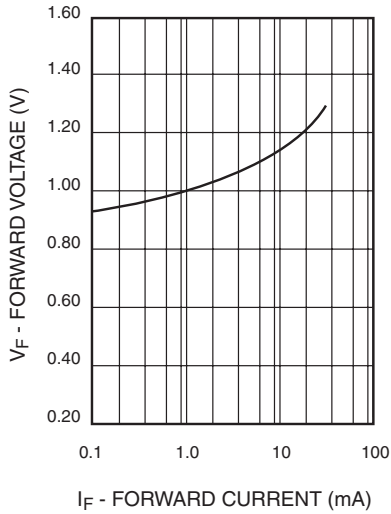


Fig. 2 Normalized Collector Current vs. Forward Current

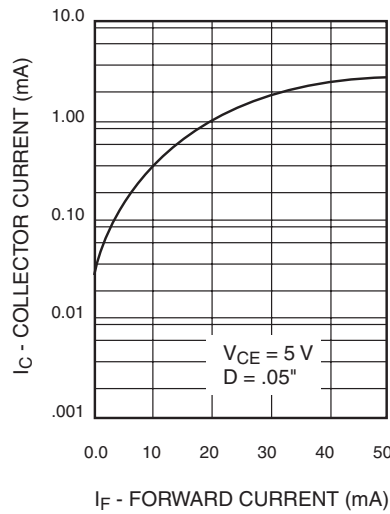


Fig. 3 Normalized Collector Current vs. Temperature

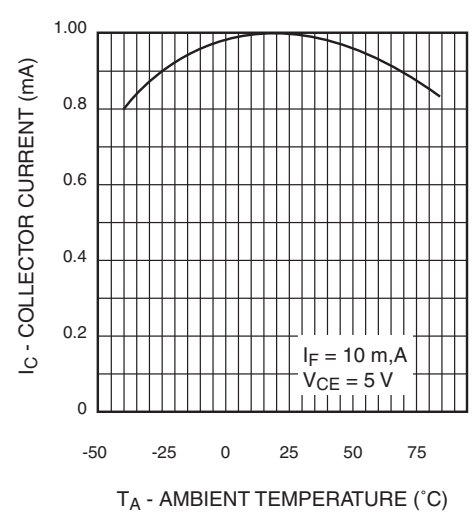


Fig. 4 Normalized Collector Dark Current vs. Temperature

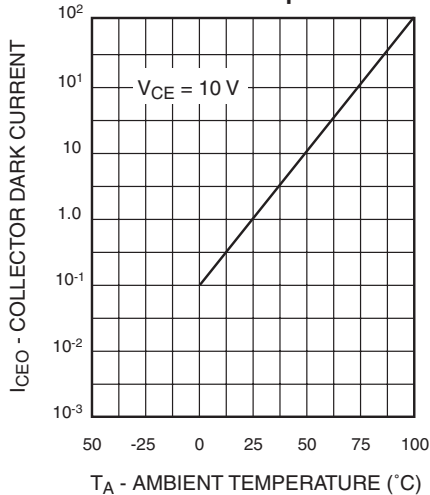
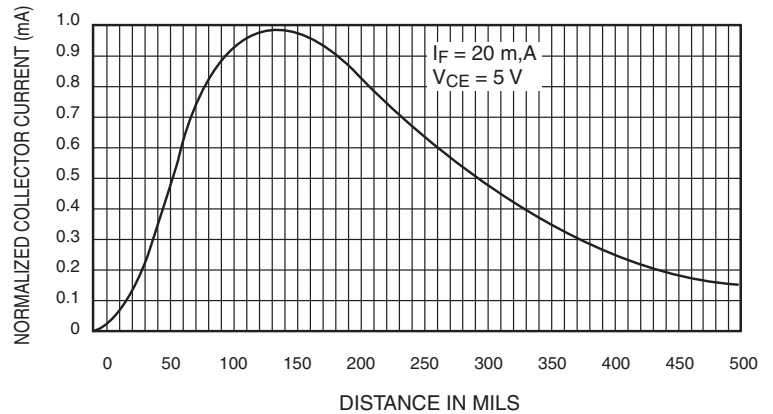


Fig. 5 Normalized Collector Current vs. Distance



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