# Reflective Object Sensor

# QRD1113, QRD1114

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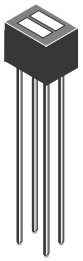


**REFLECTIVE RECTANGULAR SENSOR**
**CASE 100BY**

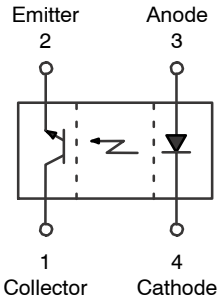
### Description

The QRD1113 and QRD1114 reflective sensors consist of an infrared emitting diode and an NPN silicon phototransistor mounted side by side in a black plastic housing. The on−axis radiation of the emitter and the on−axis response of the detector are both perpendicular to the face of the QRD1113 and QRD1114. The phototransistor responds to radiation emitted from the diode only when a reflective object or surface is in the field of view of the detector.

### Features

- Phototransistor Output
- No−Contact Surface Sensing
- Unfocused for Sensing Diffused Surfaces
- Compact Package
- Daylight Filter on Sensor
- This Device is Pb−Free and RoHS Compliant

### PIN ASSIGNMENT




### ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

## ABSOLUTE MAXIMUM RATINGS

(Values are at $T_A$ = 25°C unless otherwise specified)

| Symbol | Parameter | Min. | Unit |
|---|---|---|---|
| $T_{OPR}$ | Operating Temperature | −40 to +85 | °C |
| $T_{STG}$ | Storage Temperature | −40 to +100 | |
| $T_{SOL−I}$ | Lead Temperature (Solder Iron) (Notes 1, 2, 3) | 240 for 5 s | |
| $T_{SOL−F}$ | Lead Temperature (Solder Flow) (Notes 1, 2) | 260 for 10 s | |
| **EMITTER** | | | |
| $I_F$ | Continuous Forward Current | 50 | mA |
| $V_R$ | Reverse Voltage | 5 | V |
| $P_D$ | Power Dissipation | 100 | mW |
| **SENSOR** | | | |
| $V_{CEO}$ | Collector−Emitter Voltage | 30 | V |
| $V_{ECO}$ | Emitter−Collector Voltage | 5 | V |
| $P_D$ | Power Dissipation (Note 4) | 100 | mW |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

## ELECTRICAL/OPTICAL CHARACTERISTICS (Values are at $T_A$ = 25°C unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **INPUT (EMITTER)** | | | | | | |
| $V_F$ | Forward Voltage | $I_F$ = 20 mA | | | 1.7 | V |
| $I_R$ | Reverse Leakage Current | $V_R$ = 5 V | | | 100 | μA |
| $\lambda_{PE}$ | Peak Emission Wavelength | $I_F$ = 20 mA | | 940 | | nm |
| **OUTPUT (SENSOR)** | | | | | | |
| $BV_{CEO}$ | Collector−Emitter Breakdown | $I_C$ = 1 mA | 30 | | | V |
| $BV_{ECO}$ | Emitter−Collector Breakdown | $I_E$ = 0.1 mA | 5 | | | V |
| $I_D$ | Dark Current | $V_{CE}$ = 10 V, $I_F$ = 0 mA | | | 100 | nA |
| **COUPLED** | | | | | | |
| $I_{C(ON)}$ | QRD1113 Collector Current | $I_F$ = 20 mA, $V_{CE}$ = 5 V, D = 0.050 inch (Notes 5, 7) | 0.300 | | | mA |
| $I_{C(ON)}$ | QRD1114 Collector Current | | 1 | | | mA |
| $V_{CE(SAT)}$ | Collector Emitter Saturation Voltage | $I_F$ = 40 mA, $I_C$ = 100 μA, D = 0.050 inch (Notes 5, 7) | | | 0.4 | V |
| $I_{CX}$ | Cross Talk | $I_F$ = 20 mA, $V_{CE}$ = 5 V, $E_E$ = 0 (Note 6) | | 0.2 | 10.0 | μA |
| $t_r$ | Rise Time | $V_{CE}$ = 5 V, $R_L$ = 100 Ω, $I_{C(ON)}$ = 5 mA | | 10 | | μs |
| $t_f$ | Fall time | | | 50 | | μs |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

5. D is the distance from the sensor face to the reflective surface.
6. Crosstalk ($I_{CX}$) is the collector current measured with the indicated current on the input diode and with no reflective surface.
7. Measured using Eastman Kodak natural white test card with 90% diffused reflecting as a reflecting surface.

## ORDERING INFORMATION

| Part Number | Operating Temperature | Package | Top Mark | Packing Method |
|---|---|---|---|---|
| QRD1113 | −40 to +85°C | Reflective Rectangular Sensor PCB Mount | QRD1113 | Bulk |
| QRD1114 | −40 to +85°C | | QRD1114 | |

## TYPICAL PERFORMANCE CHARACTERISTICS

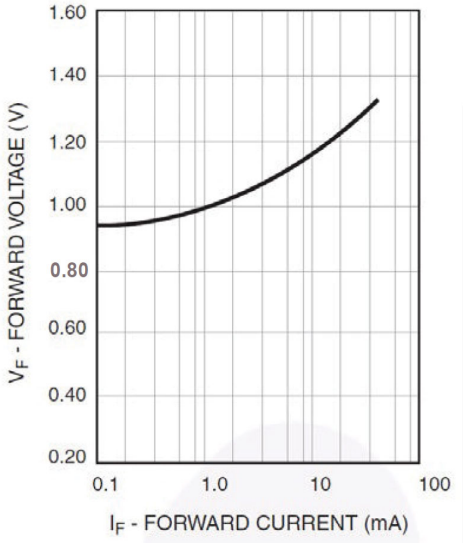



**Figure 1. Forward Voltage vs. Forward Current**

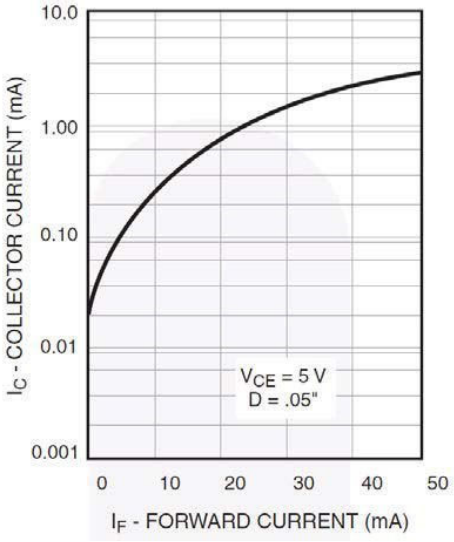



**Figure 2. Normalized Collector Current vs. Forward Current**

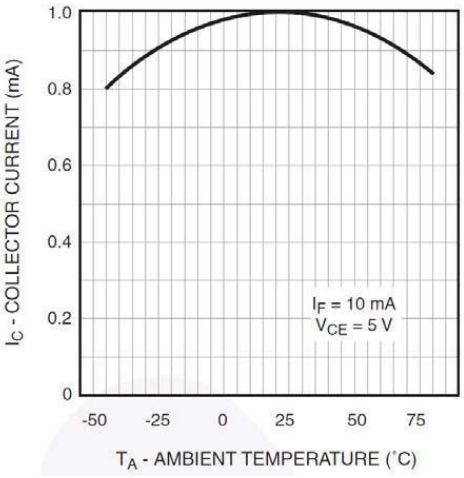



**Figure 3. Normalized Collector Current vs. Temperature**

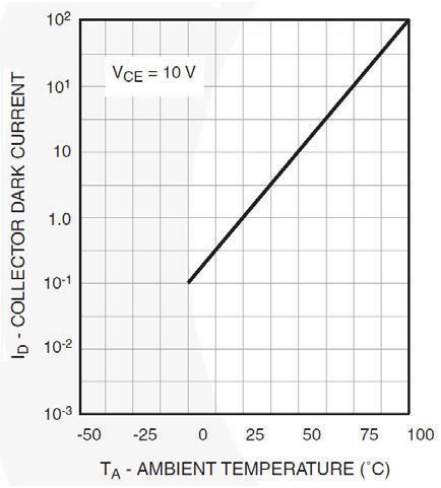



**Figure 4. Normalized Collector Dark Current vs. Temperature**

## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

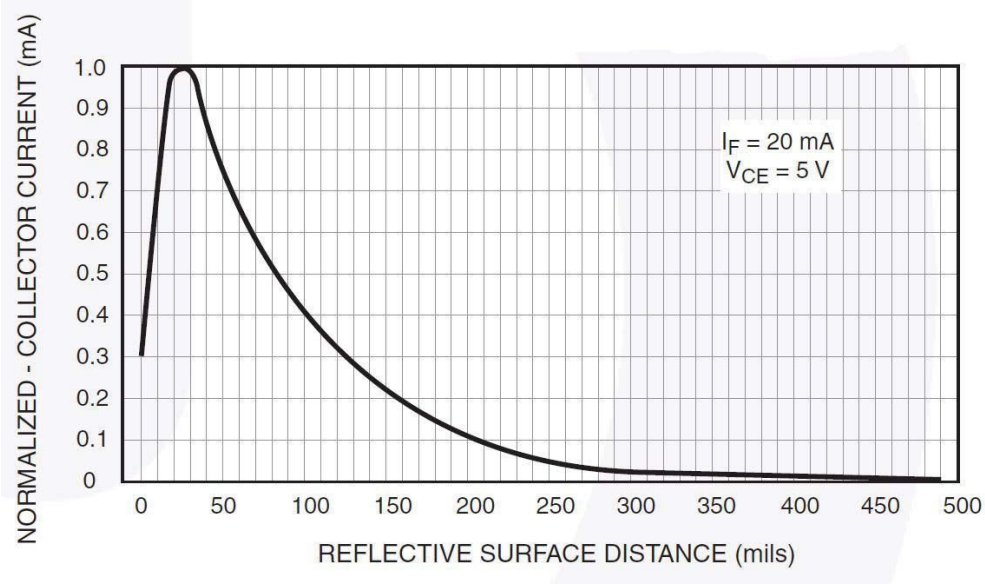
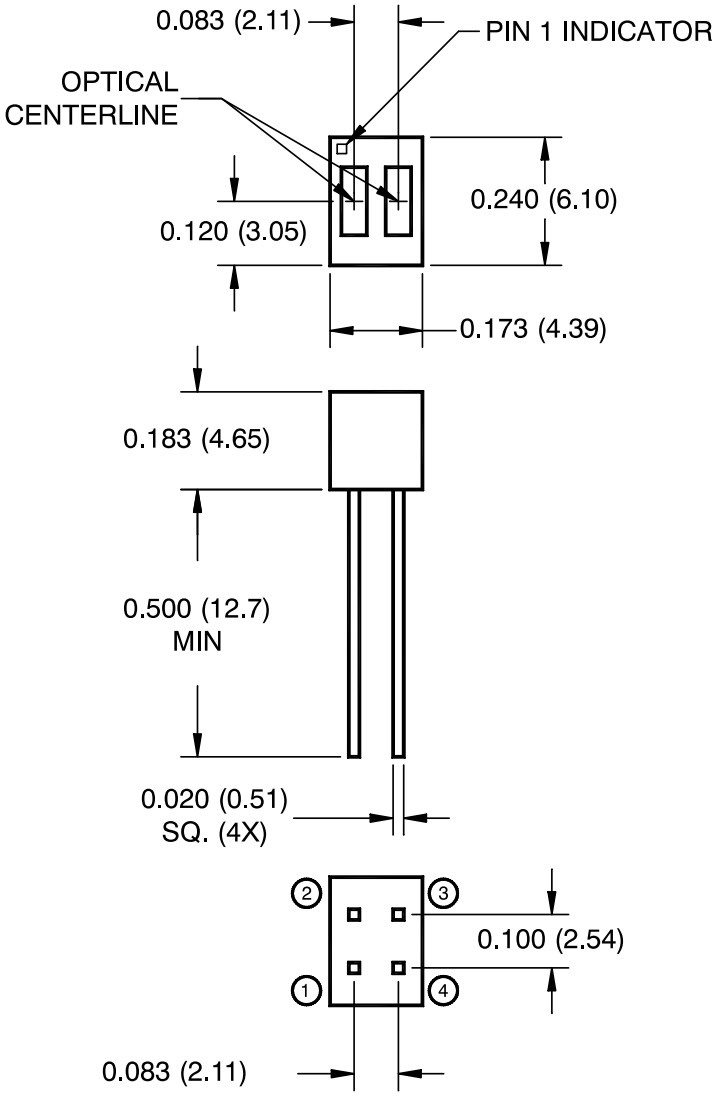



**Figure 5. Normalized Collector Current vs. Distance**

**REFLECTIVE RECTANGULAR SENSOR PCB MOUNT**
CASE 100BY
ISSUE O

DATE 30 SEP 2016




**Notes:**

1.Dimensions for all drawings are in inches (millimeters).

2. Tolerance of ± .010 (.25) on all non−nominal dimensions unless otherwise specified.

3.Pins 2 and 4 typically .050” shorter than pins 1 and 3.

4.Dimensions controlled at housing surface.

| | | |
|---|---|---|
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| **DESCRIPTION:** | **REFLECTIVE RECTANGULAR SENSOR PCB MOUNT** | **PAGE 1 OF 1** |

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