

# QRD1313 Reflective Object Sensor

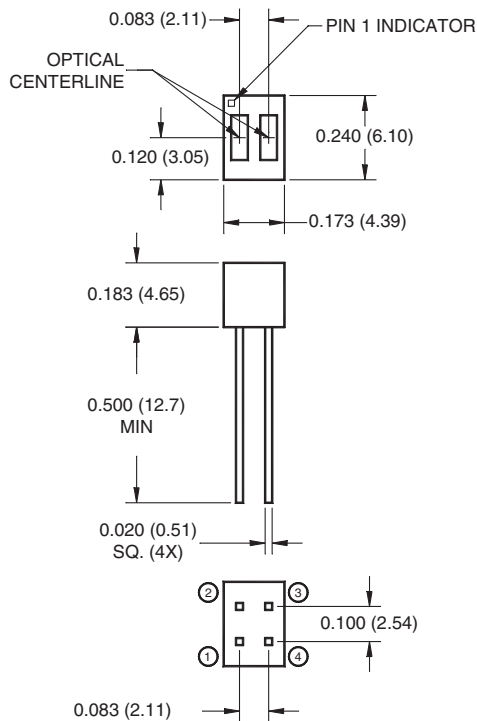
## Features

- Photodarlington output
- Unfocused for sensing diffused surfaces
- Low cost plastic housing
- Designed for paper path and other non-contact surface sensing

## Description

The QRD1313 reflective sensor consists of an infrared emitting diode and an NPN silicon photodarlington 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 QRD1313. The photodarlington responds to radiation emitted from the diode only when a reflective object or surface is in the field of view of the detector.

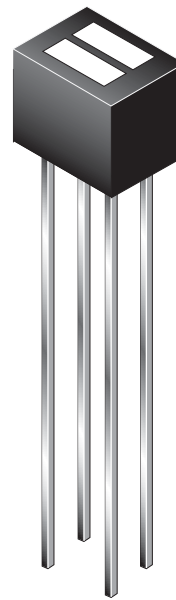
## Package Dimensions



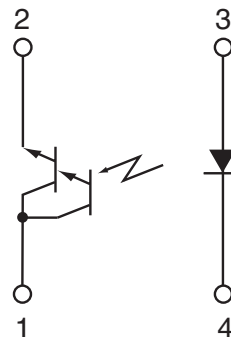
PIN 1 COLLECTOR	PIN 3 ANODE
PIN 2 EMITTER	PIN 4 CATHODE

### NOTES:

1. Dimensions for all drawings are in inches (millimeters).
2. Tolerance of  $\pm .010$  (.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.



## Schematic



**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 +100	$^\circ\text{C}$
Lead Temperature (Iron) <sup>(2,3,4)</sup>	$T_{SOL-I}$	240 for 5 sec	$^\circ\text{C}$
Lead Temperature (Flow) <sup>(2,3)</sup>	$T_{SOL-F}$	260 for 10 sec	$^\circ\text{C}$
<b>Emitter</b>			
Continuous Forward Current	$I_F$	50	mA
Reverse Voltage	$V_R$	5	V
Power Dissipation <sup>(1)</sup>	$P_D$	100	mW
<b>Sensor</b>			
Collector-Emitter Voltage	$V_{CEO}$	15	V
Emitter-Collector Voltage	$V_{ECO}$	5	V
Power Dissipation <sup>(1)</sup>	$P_D$	100	mW

## NOTES:

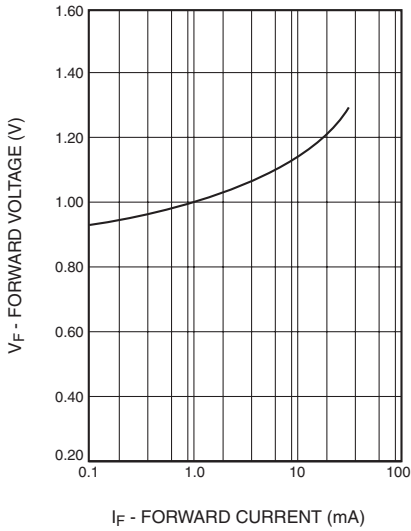
- Derate power dissipation linearly 1.33 mW/ $^\circ\text{C}$  above  $25^\circ\text{C}$ .
- RMA flux is recommended.
- Soldering iron tip 1/16" (1.6 mm) minimum from housing.
- As long as leads are not under any stress or spring tension.
- D is the distance from the sensor face to the reflective surface.
- Crosstalk ( $I_{CK}$ ) is the collector current measured with the indicated current on the input diode and with no reflective surface.
- Measured using Eastman Kodak neutral white test card with 90% diffused reflecting as a reflecting surface.

**Electrical / Optical Characteristics** ( $T_A = 25^\circ\text{C}$ )

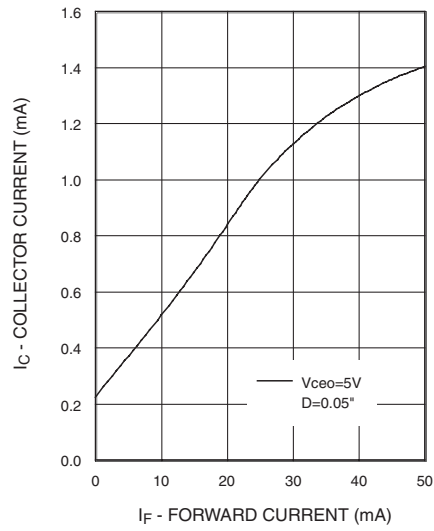
Parameter	Test Conditions	Symbol	Min	Typ	Max	Units
<b>Input (Emitter)</b>						
Forward Voltage	$I_F = 20\text{ mA}$	$V_F$	—	—	1.7	V
Reverse Leakage Current	$V_R = 2\text{ V}$	$I_R$	—	—	100	$\mu\text{A}$
<b>Output (Sensor)</b>						
Emitter to Collector Breakdown	$I_E = 100\ \mu\text{A}$ , $E_e = 0$	$BV_{ECO}$	5	—	—	V
Collector to Emitter Breakdown	$I_C = 100\ \mu\text{A}$ , $E_e = 0$	$BV_{CEO}$	15	—	—	V
Collector to Emitter Leakage	$V_{CE} = 5\text{ V}$ , $E_e = 0$	$I_{CEO}$	—	—	250	nA
<b>Coupled</b>						
On-State Collector Current <sup>(5,7)</sup>	$I_F = 20\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $D = .050"$	$I_{C(ON)}$	10.0	—	—	mA
Crosstalk <sup>(8)</sup>	$I_F = 20\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ , $E_e = 0$	$I_{CK}$	—	—	10	$\mu\text{A}$
Saturation Voltage <sup>(5,7)</sup>	$I_F = 20\text{ mA}$ , $I_C = 2\text{ mA}$ , $D = .050"$	$V_{CE(SAT)}$	—	—	1.10	V

## Typical Performance Curves

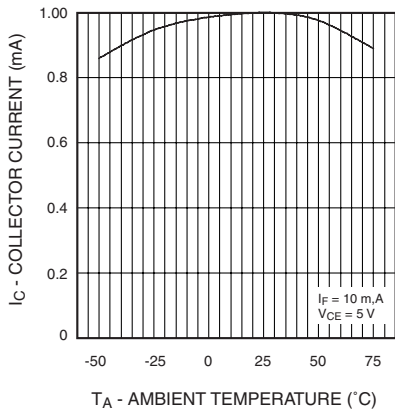
**Fig. 1 Forward Voltage vs. Forward Current**



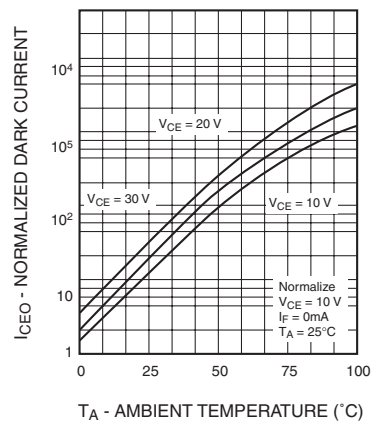
**Fig. 2 Normalized Collector Current vs. Forward Current**



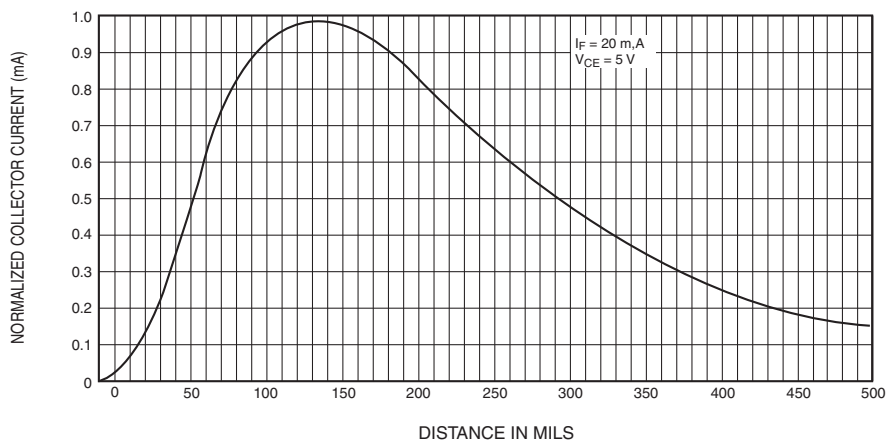
**Fig. 3 Normalized Collector Current vs. Temperature**



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



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



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