

# QRD1113/1114 Reflective Object Sensor

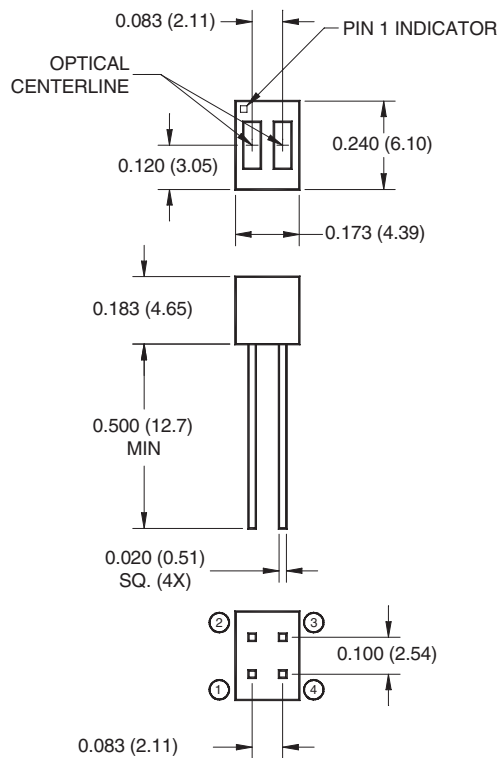
## Features

- Phototransistor Output
- No contact surface sensing
- Unfocused for sensing diffused surfaces
- Compact Package
- Daylight filter on sensor

## Description

The QRD1113/14 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 QRD1113/14. 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.

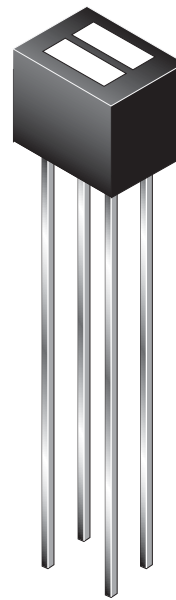
## Package Dimensions



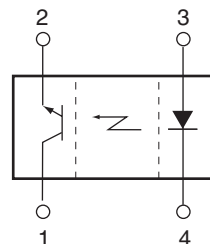
PIN 1 COLLECTOR      PIN 3 ANODE  
PIN 2 EMITTER        PIN 4 CATHODE

### 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 (Solder Iron) <sup>(2,3)</sup>	$T_{SOL-I}$	240 for 5 sec	$^\circ\text{C}$
Lead Temperature (Solder 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	$V_{CEO}$	30	V
Emitter-Collector Voltage	$V_{ECO}$		V
Power Dissipation <sup>(1)</sup>	$P_D$	100	mW

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

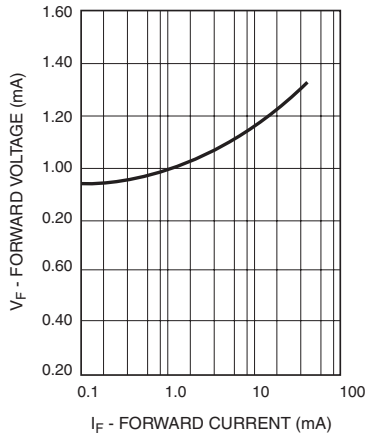
Parameter	Test Conditions	Symbol	Min	Typ	Max	Units
<b>Input (Emitter)</b>						
Forward Voltage	$I_F = 20\text{ mA}$	$V_F$	—	—	1.7	V
Reverse Leakage Current	$V_R = 5\text{ V}$	$I_R$	—	—	100	$\mu\text{A}$
Peak Emission Wavelength	$I_F = 20\text{ mA}$	$\lambda_{PE}$	—	940	—	nm
<b>Output (Sensor)</b>						
Collector-Emitter Breakdown	$I_C = 1\text{ mA}$	$BV_{CEO}$	30	—	—	V
Emitter-Collector Breakdown	$I_E = 0.1\text{ mA}$	$BV_{ECO}$	5	—	—	V
Dark Current	$V_{CE} = 10\text{ V}, I_F = 0\text{ mA}$	$I_D$	—	—	100	nA
<b>Coupled</b>						
QRD1113 Collector Current	$I_F = 20\text{ mA}, V_{CE} = 5\text{ V}, D = .050^{(6, 8)}$	$I_{C(ON)}$	0.300	—	—	mA
QRD1114 Collector Current	$I_F = 20\text{ mA}, V_{CE} = 5\text{ V}, D = .050^{(6, 8)}$	$I_{C(ON)}$	1	—	—	mA
Collector Emitter Saturation Voltage	$I_F = 40\text{ mA}, I_C = 100\text{ }\mu\text{A}, D = .050^{(6, 8)}$	$V_{CE(SAT)}$	—	—	0.4	V
Cross Talk	$I_F = 20\text{ mA}, V_{CE} = 5\text{ V}, E_E = 0^{(7)}$	$I_{CX}$	—	.200	10	$\mu\text{A}$
Rise Time	$V_{CE} = 5\text{ V}, R_L = 100\text{ }\Omega, I_{C(ON)} = 5\text{ mA}$	$t_r$	—	10	—	$\mu\text{s}$
Fall Time		$t_f$	—	50	—	$\mu\text{s}$

**NOTES:**

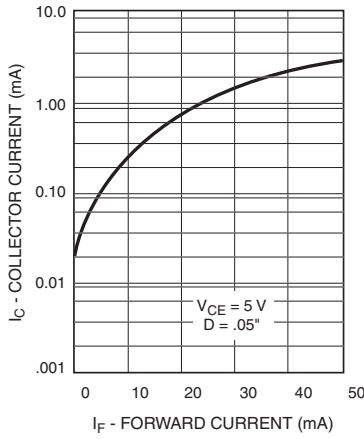
- Derate power dissipation linearly 1.33 mW/ $^\circ\text{C}$  above  $25^\circ\text{C}$ .
- RMA flux is recommended.
- Methanol or isopropyl alcohols are recommended as cleaning agents.
- Soldering iron tip 1/16" (1.6 mm) minimum from housing.
- As long as leads are not under any stress or spring tension.
- 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.

## Typical Performance Curves

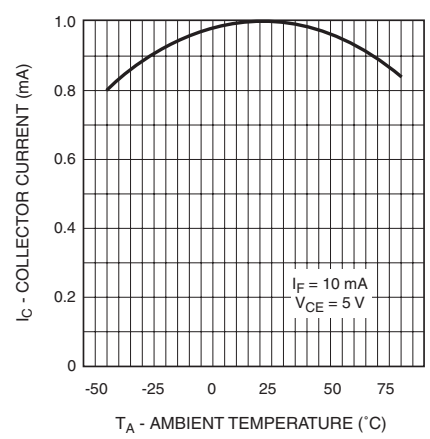
**Fig. 1 Forward Voltage vs. Forward Current**



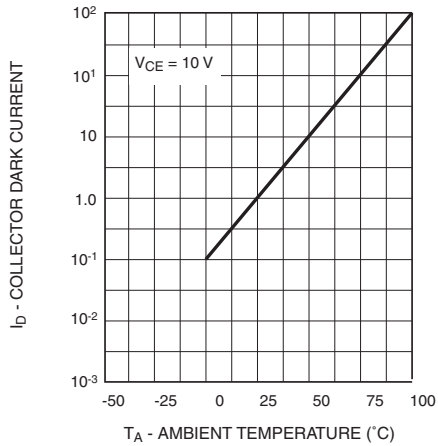
**Fig. 2 Normalized Collector Current vs. Forward Current**



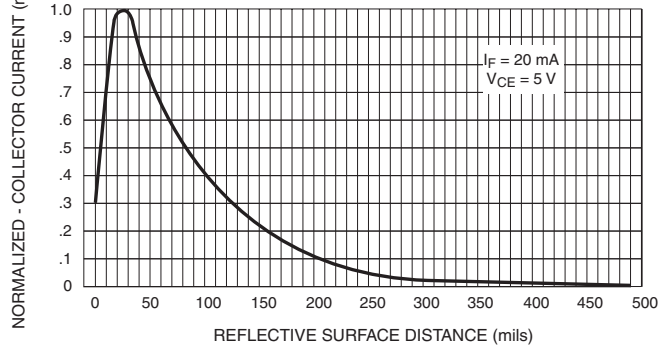
**Fig. 3 Normalized Collector Current vs. Temperature**



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



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



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CROSSVOLT™	GlobalOptoisolator™	MicroFET™	PowerTrench®	SuperSOT™-6
DOME™	GTO™	MicroPak™	QFET®	SuperSOT™-8
EcoSPARK™	HiSeC™	MICROWIRE™	QS™	SyncFET™
E <sup>2</sup> C MOS™	IC™	MSX™	QT Optoelectronics™	TinyLogic®
EnSigna™	i-Lo™	MSXPro™	Quiet Series™	TINYOPTO™
FACT™	ImpliedDisconnect™	OCX™	RapidConfigure™	TruTranslation™
FACT Quiet Series™		OCXPro™	RapidConnect™	UHC™
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