

QRD1113/1114 Reflective Object Sensor

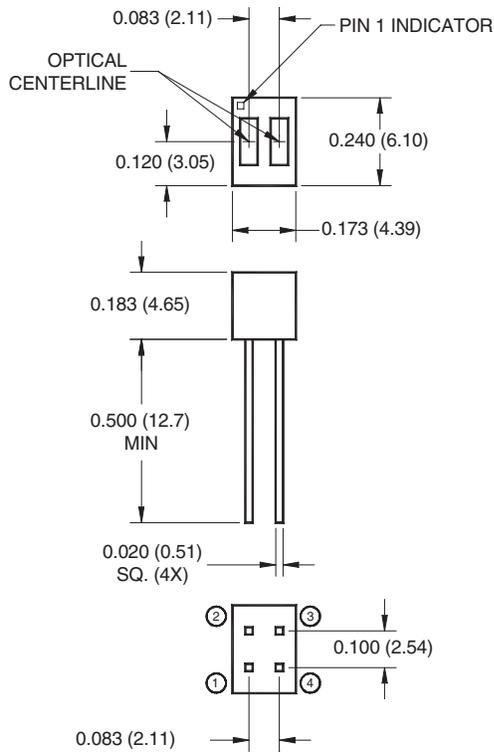
Features

- 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



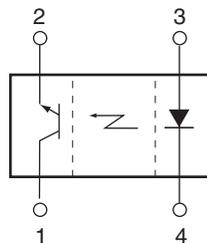
PIN 1 COLLECTOR PIN 3 ANODE
PIN 2 EMITTER PIN 4 CATHODE

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) ^(2,3)	T_{SOL-I}	240 for 5 sec	$^\circ\text{C}$
Lead Temperature (Solder 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}		V
Power Dissipation ⁽¹⁾	P_D	100	mW

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

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

Notes:

- Derate power dissipation linearly 1.33 mW/ $^\circ\text{C}$ above 25°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

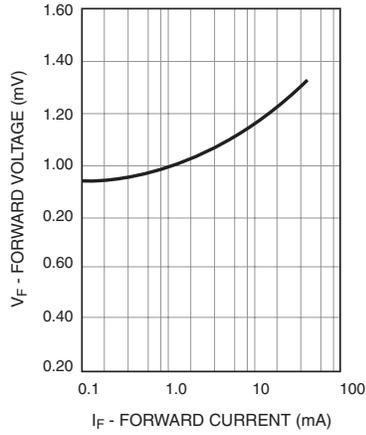


Fig. 2 Normalized Collector Current vs. Forward Current

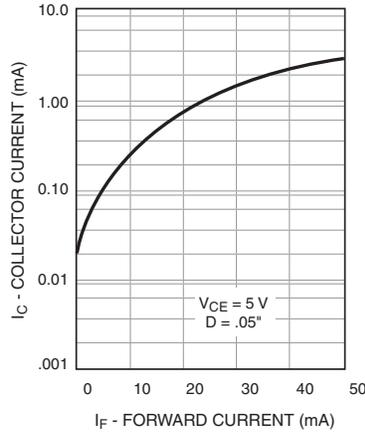


Fig. 3 Normalized Collector Current vs. Temperature

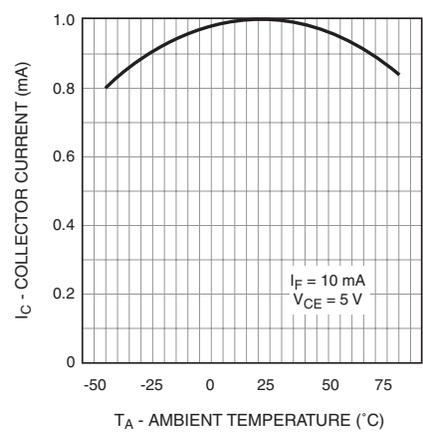


Fig. 4 Normalized Collector Dark Current vs. Temperature

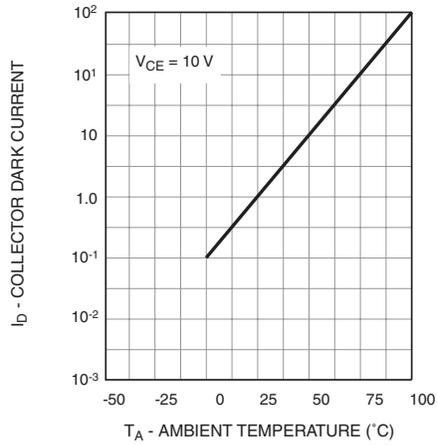
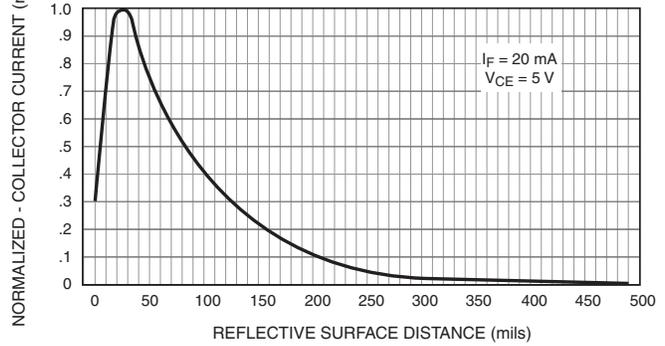


Fig. 5 Normalized Collector Current vs. Distance



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Rev. I20