FAIRCHILD SEMICONDUCTOR®

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QRD1113/1114 Reflective Object Sensor

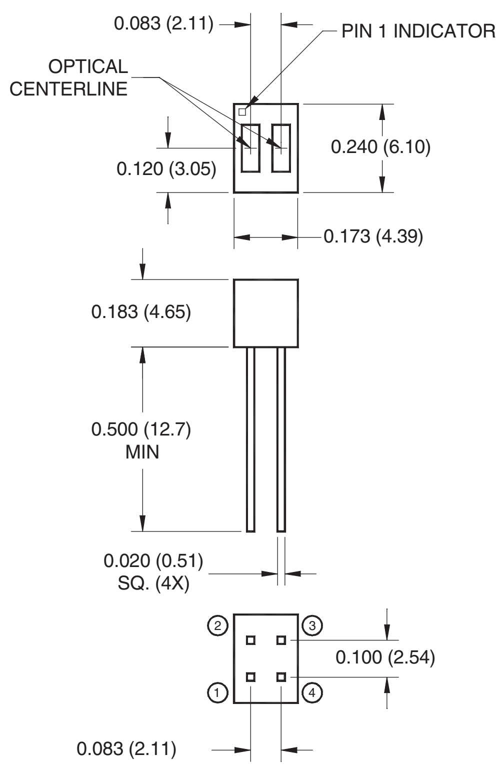
Features

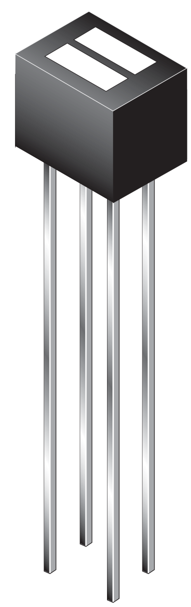
- Phototransistor Output
- No contact surface sensing
- Unfocused for sensing diffused surfaces
- Compact Package
- Daylight filter on sensor

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



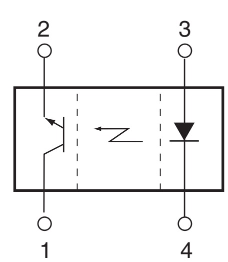


PIN 1 COLLECTOR
PIN 2 EMITTER
PIN 3 ANODE
PIN 4 CATHODE

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.

Schematic



Absolute Maximum Ratings (T_A = 25°C unless otherwise specified)

Parameter	Symbol	Rating	Units
Operating Temperature	T_{OPR}	-40 to +85	°C
Storage Temperature	T_{STG}	-40 to +100	°C
Lead Temperature (Solder Iron)(2,3)	T_{SOL-I}	240 for 5 sec	°C
Lead Temperature (Solder Flow)(2,3)	T_{SOL-F}	260 for 10 sec	°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°C)

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

Notes:

1. Derate power dissipation linearly 1.33 mW/°C above 25°C.
2. RMA flux is recommended.
3. Methanol or isopropyl alcohols are recommended as cleaning agents.
4. Soldering iron tip 1/16” (1.6 mm) minimum from housing.
5. As long as leads are not under any stress or spring tension.
6. D is the distance from the sensor face to the reflective surface.
7. Crosstalk (I_{CK}) is the collector current measured with the indicated current on the input diode and with no reflective surface.
8. 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

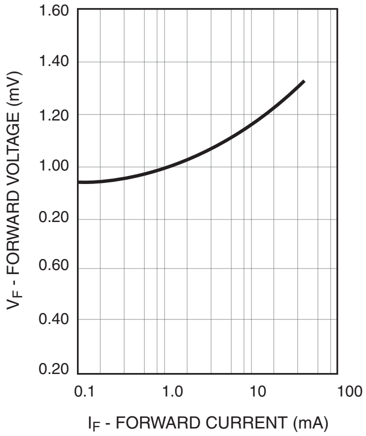


Fig. 2 Normalized Collector Current vs. Forward Current

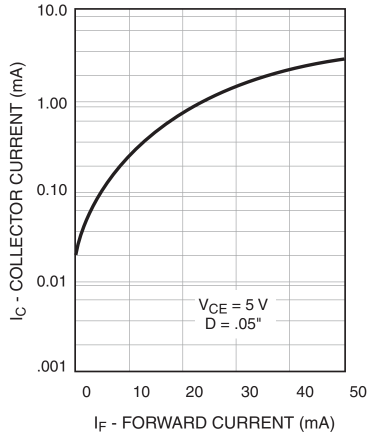


Fig. 3 Normalized Collector Current vs. Temperature

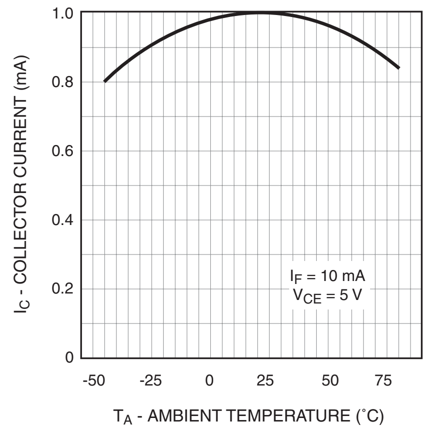


Fig. 4 Normalized Collector Dark Current vs. Temperature

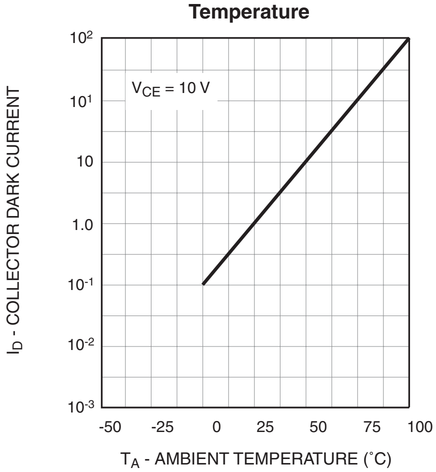
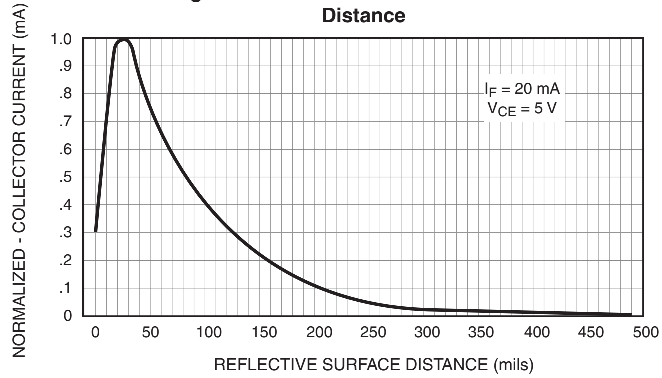


Fig. 5 Normalized Collector Current vs. Distance



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