March 2005

QRD1313
Reflective Object Sensor

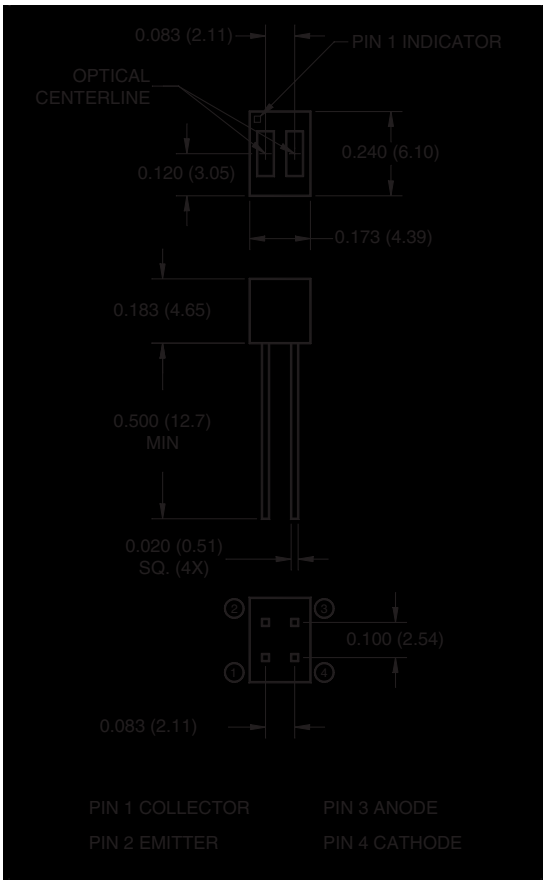
Features

- 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.

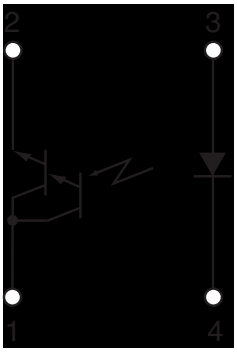
Package Dimensions



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 (Iron)(2,3,4)	T_{SOL-I}	240 for 5 sec	°C
Lead Temperature (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}	15	V
Emitter-Collector Voltage	V_{ECO}	5	V
Power Dissipation(1)	P_D	100	mW

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

Electrical / Optical Characteristics (T_A =25°C)

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

Typical Performance Curves

Fig. 1 Forward Voltage vs. Forward Current

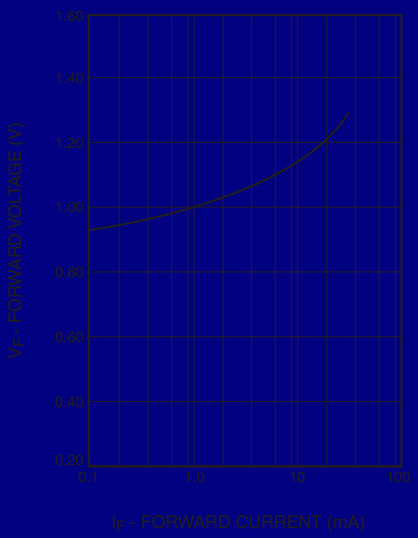


Fig. 2 Normalized Collector Current vs. Forward Current

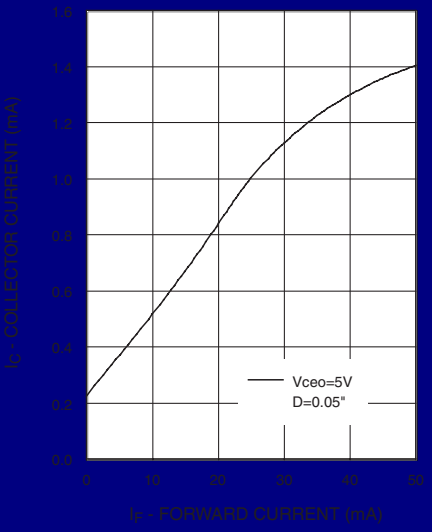


Fig. 3 Normalized Collector Current vs. Temperature

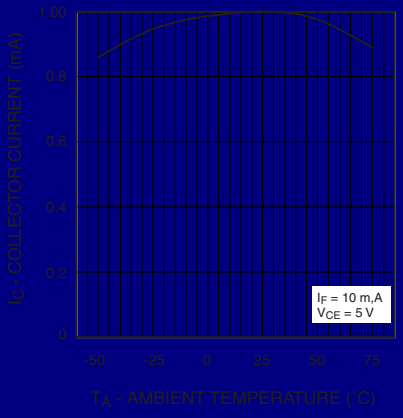


Fig. 4 Normalized Collector Dark Current vs. Temperature

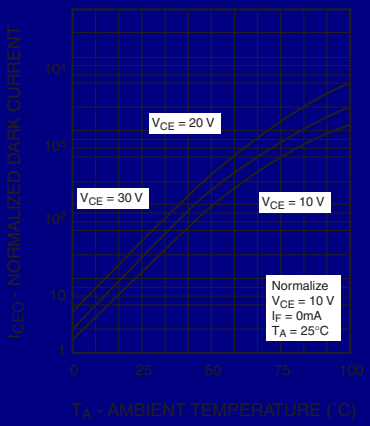


Fig. 5 Normalized Collector Current vs. Distance