FAIRCHILD

SEMICONDUCTOR®

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

0.083 (2.11)

PIN 1 INDICATOR

OPTICAL
CENTERLINE

0.240 (6.10)

0.120 (3.05)

0.173 (4.39)

0.183 (4.65)

0.500 (12.7)
MIN

0.020 (0.51)
SQ. (4X)

0.100 (2.54)

0.083 (2.11)

PIN 1 COLLECTOR   PIN 3 ANODE

PIN 2 EMITTER   PIN 4 CATHODE

Schematic

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.

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 $(T_A = 25°C)$

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

QRD1113/1114 Rev. 1.0.0

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