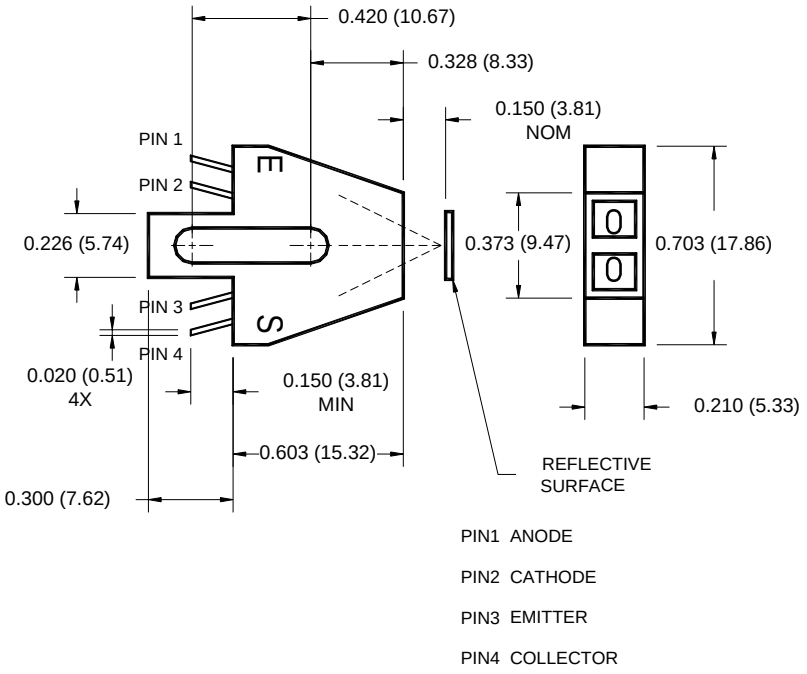
FAIRCHILD
SEMICONDUCTOR®

PHOTOTRANSISTOR OPTICAL INTERRUPTER SWITCH

QRC1113

PACKAGE DIMENSIONS



PIN1 ANODE

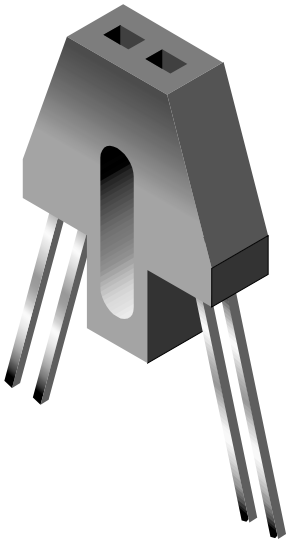
PIN2 CATHODE

PIN3 EMITTER

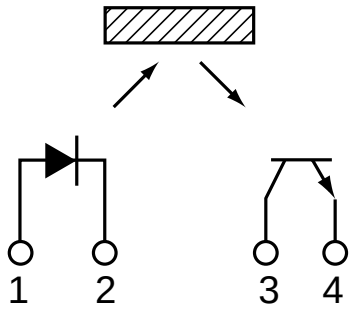
PIN4 COLLECTOR

NOTES:

1. Dimensions for all drawings are in inches (mm).
2. Tolerance of ± .010 (.25) on all non-nominal dimensions unless otherwise specified.



SCHEMATIC



DESCRIPTION

The QRC1113 consists of an infrared emitting diode and an NPN silicon phototransistor mounted side by side on a converging optical axis in a black plastic housing. The phototransistor responds to radiation from the emitting diode only when a reflective object passes within its field of view. The area of the optimum response approximates a circle .200” in diameter.

FEATURES

- Phototransistor output
- High sensitivity
- Low cost plastic housing

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QRC1113

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 +85	°C
Soldering Temperature (Iron)(2,3,4)	T_{SOL-I}	240 for 5 sec	°C
Soldering 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}	30	V
Emitter-Collector Voltage	V_{ECO}	5	V
Collector Current	I_C	20	mA
Power Dissipation(1)	P_D	100	mW

NOTES
1. Derate power dissipation linearly 1.67 mW/°C above 25°C.
2. RMA flux is recommended.
3. Methanol or isopropyl alcohols are recommended as cleaning agents.
4. Soldering iron 1/16" (1.6mm) minimum from housing.
5. D is the distance from the assembly face to the reflective surface.
6. Cross talk is the photo current measured with current to the input diode and no reflecting surface.
7. Measured using an Eastman Kodak neutral test card with 90% diffused reflecting surface.

ELECTRICAL / OPTICAL CHARACTERISTICS (T_A = 25°C)

PARAMETER	TEST CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
EMITTER Forward Voltage	I_F = 40 mA	V_F	—	—	1.7	V
Reverse Current	V_R = 2.0 V	I_R	—	—	100	µA
Peak Emission Wavelength	I_F = 20 mA	λ_{PE}	—	940	—	nm
SENSOR Collector-Emitter Breakdown Voltage	I_C = 1 mA	BV_{CEO}	30	—	—	V
Emitter-Collector Breakdown Voltage	I_E = 0.1 mA	BV_{ECO}	5	—	—	V
Collector-Emitter Dark Current	V_{CE} = 10 V, I_F = 0 mA	I_{CEO}	—	—	100	nA
COUPLED On-state Collector Current	I_F=40mA,V_{CE}=5V,D =.150"(5,7)	$I_{C(ON)}$	0.20	—	—	mA
Collector-Emitter Saturation Voltage	I_F = 40 mA, I_C = 0.1 mA D = .150"(5,7)	$V_{CE\ (SAT)}$	—	—	0.4	V
Rise Time	V_{CE} = 5 V, R_L = 100 Ω	t_r	—	8	—	µs
Fall Time	$I_{C(ON)}$ = 5 mA	t_f	—	8	—	µs
Crosstalk	I_F = 40 mA, V_{CE} = 5 V(6)	I_{CX}	—	—	1.00	µA

TYPICAL PERFORMANCE CURVES

Fig. 1 Forward Voltage vs. Forward Current

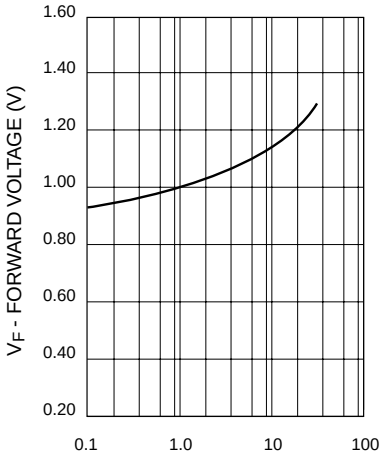


Fig. 2 Normalized Collector Current vs. Forward Current

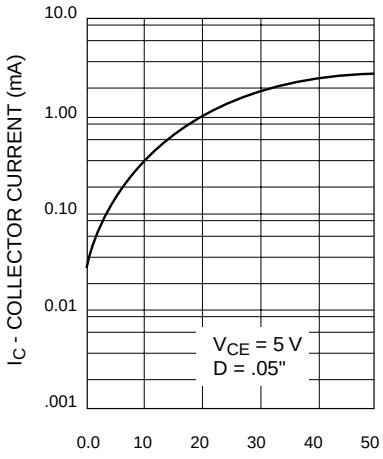


Fig. 3 Normalized Collector Current vs. Temperature

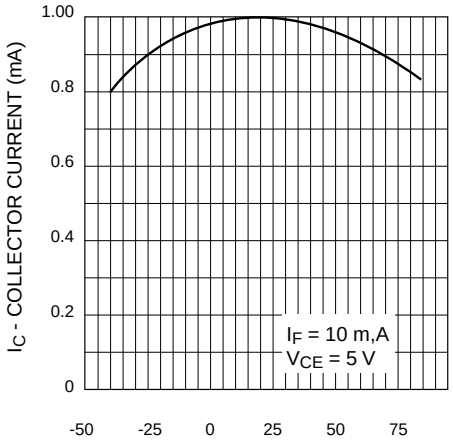


Fig. 4 Normalized Collector Dark Current vs. Temperature

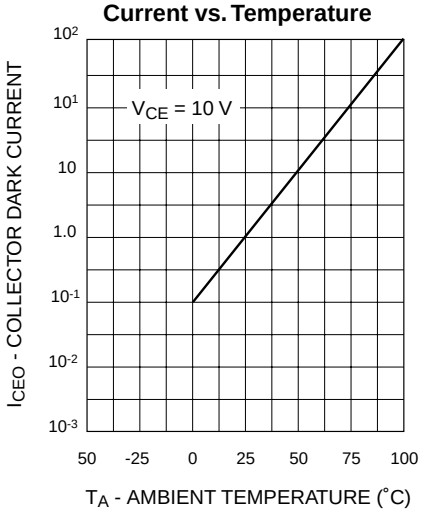
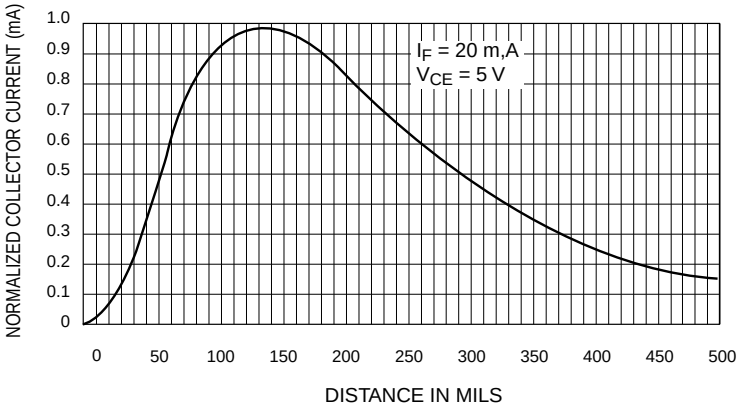


Fig. 5 Normalized Collector Current vs. Distance



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