

Reflective Object Sensor

QRD1113, QRD1114

Description

The QRD1113 and QRD1114 reflective sensors consist of an infrared emitting diode and an NPN silicon phototransistor 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 and QRD1114. The phototransistor responds to radiation emitted from the diode only when a reflective object or surface is in the field of view of the detector.

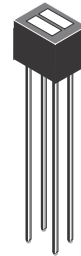
Features

- Phototransistor Output
- No-Contact Surface Sensing
- Unfocused for Sensing Diffused Surfaces
- Compact Package
- Daylight Filter on Sensor
- This Device is Pb-Free and RoHS Compliant



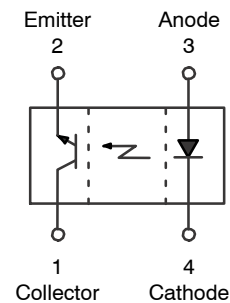
ON Semiconductor®

www.onsemi.com



**REFLECTIVE RECTANGULAR SENSOR
CASE 100BY**

PIN ASSIGNMENT



ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

QRD1113, QRD1114

ABSOLUTE MAXIMUM RATINGS

(Values are at $T_A = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Min.	Unit
T_{OPR}	Operating Temperature	-40 to +85	°C
T_{STG}	Storage Temperature	-40 to +100	
$T_{\text{SOL-I}}$	Lead Temperature (Solder Iron) (Notes 1, 2, 3)	240 for 5 s	
$T_{\text{SOL-F}}$	Lead Temperature (Solder Flow) (Notes 1, 2)	260 for 10 s	

EMITTER

I_F	Continuous Forward Current	50	mA
V_R	Reverse Voltage	5	V
P_D	Power Dissipation	100	mW

SENSOR

V_{CEO}	Collector-Emitter Voltage	30	V
V_{ECO}	Emitter-Collector Voltage	5	V
P_D	Power Dissipation (Note 4)	100	mW

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. RMA flux is recommended.
2. Methanol or isopropyl alcohols are recommended as cleaning agents.
3. Soldering iron tip 1/16 inch (1.6 mm) minimum from housing.
4. Derate power dissipation linearly 1.33 mW/°C.

ELECTRICAL/OPTICAL CHARACTERISTICS (Values are at $T_A = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
--------	-----------	-----------------	------	------	------	------

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	$V_{\text{CE}} = 10 \text{ V}, I_F = 0 \text{ mA}$			100	nA

COUPLED

$I_{\text{C(ON)}}$	QRD1113 Collector Current	$I_F = 20 \text{ mA}, V_{\text{CE}} = 5 \text{ V}, D = 0.050 \text{ inch}$ (Notes 5, 7)	0.300			mA
$I_{\text{C(ON)}}$	QRD1114 Collector Current		1			mA
$V_{\text{CE(SAT)}}$	Collector Emitter Saturation Voltage	$I_F = 40 \text{ mA}, I_C = 100 \mu\text{A}, D = 0.050 \text{ inch}$ (Notes 5, 7)			0.4	V
I_{CX}	Cross Talk	$I_F = 20 \text{ mA}, V_{\text{CE}} = 5 \text{ V}, E_E = 0$ (Note 6)		0.2	10.0	μA
t_r	Rise Time	$V_{\text{CE}} = 5 \text{ V}, R_L = 100 \Omega, I_{\text{C(ON)}} = 5 \text{ mA}$		10		μs
t_f	Fall time			50		μs

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

5. D is the distance from the sensor face to the reflective surface.
6. Crosstalk (I_{CX}) is the collector current measured with the indicated current on the input diode and with no reflective surface.
7. Measured using Eastman Kodak natural white test card with 90% diffused reflecting as a reflecting surface.

ORDERING INFORMATION

Part Number	Operating Temperature	Package	Top Mark	Packing Method
QRD1113	-40 to +85°C	Reflective Rectangular Sensor PCB Mount	QRD1113	Bulk
QRD1114	-40 to +85°C		QRD1114	

TYPICAL PERFORMANCE CHARACTERISTICS



Figure 1. Forward Voltage vs. Forward Current

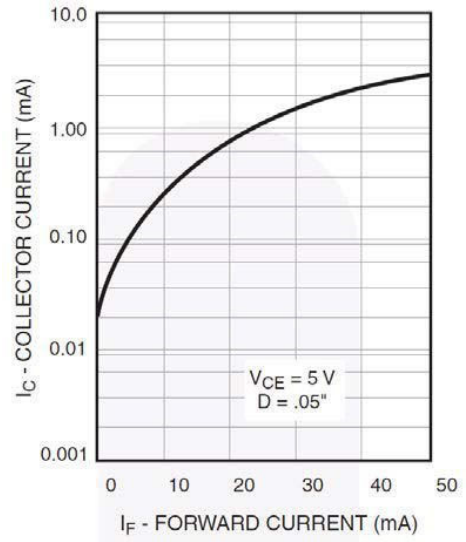


Figure 2. Normalized Collector Current vs. Forward Current

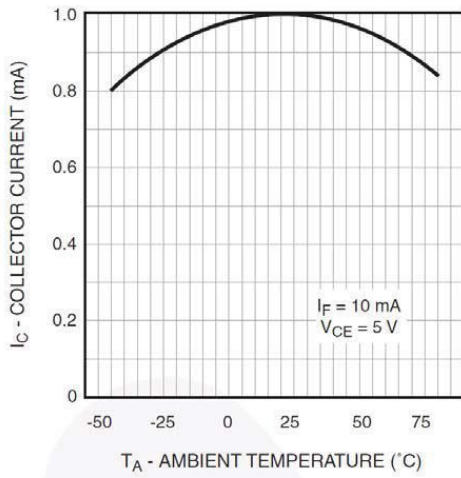


Figure 3. Normalized Collector Current vs. Temperature

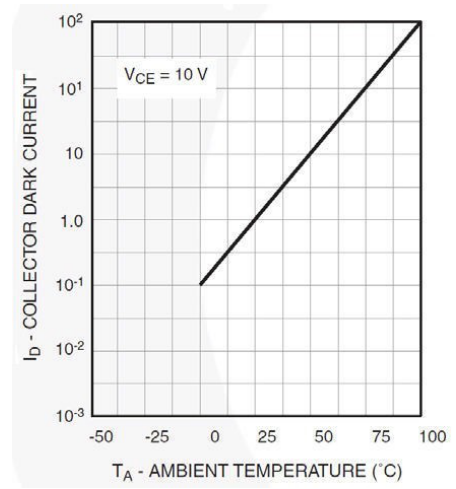


Figure 4. Normalized Collector Dark Current vs. Temperature

QRD1113, QRD1114

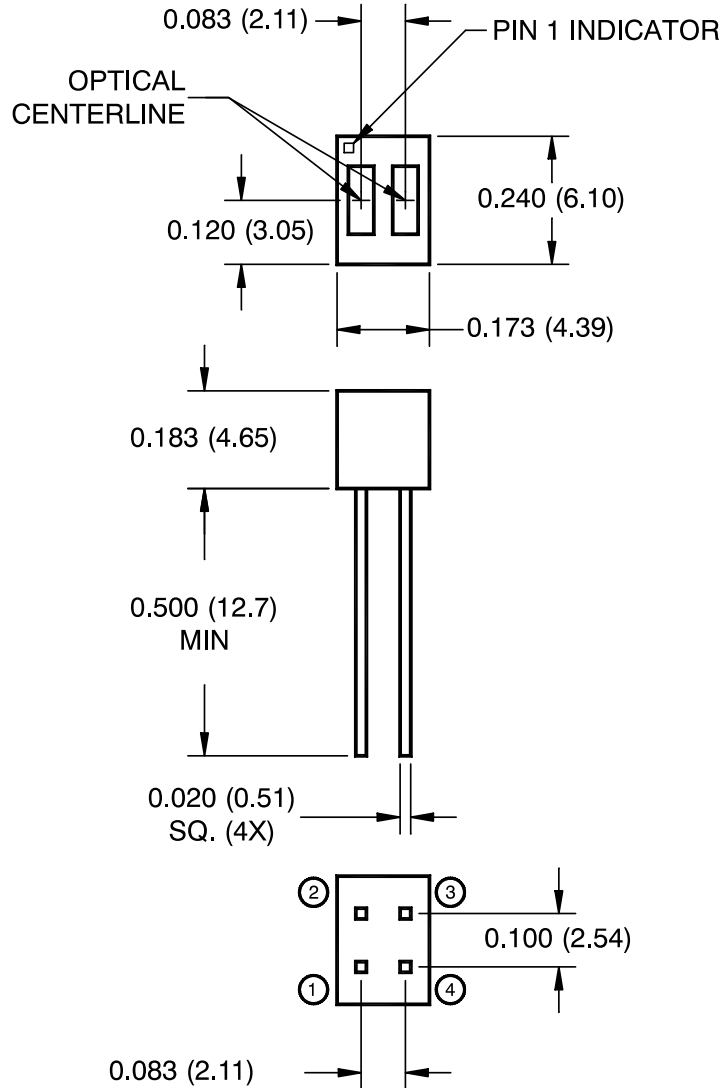
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



Figure 5. Normalized Collector Current vs. Distance

REFLECTIVE RECTANGULAR SENSOR PCB MOUNT
CASE 100BY
ISSUE 0


DATE 30 SEP 2016



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.

DOCUMENT NUMBER:	98AON13408G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	REFLECTIVE RECTANGULAR SENSOR PCB MOUNT	PAGE 1 OF 1

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales