QRE1113GR
SMT Reflective Object Sensor

Features
■ Phototransistor output
■ Tape and reel packaging
■ No contact surface sensing
■ Miniature package
■ Lead form style: Gull Wing

Package Dimensions

![Package Diagram]

Schematic

![Schematic Diagram]

Notes:
1. Dimensions for all drawings are in millimeters.
2. Tolerance of ±0.15mm on all non-nominal dimensions
**Absolute Maximum Ratings (T_A = 25°C unless otherwise specified)**

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Rating</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>T_OP</td>
<td>Operating Temperature</td>
<td>-40 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>T_STG</td>
<td>Storage Temperature</td>
<td>-40 to +90</td>
<td>°C</td>
</tr>
<tr>
<td>T_SOL-I</td>
<td>Soldering Temperature (Iron)(2,3,4)</td>
<td>240 for 5 sec</td>
<td>°C</td>
</tr>
<tr>
<td>T_SOL-F</td>
<td>Soldering Temperature (Flow)(2,3)</td>
<td>260 for 10 sec</td>
<td>°C</td>
</tr>
</tbody>
</table>

**EMITTER**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>I_F</td>
<td>Continuous Forward Current</td>
<td>I_F = 20mA</td>
<td>1.2</td>
<td>1.6</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>V_R</td>
<td>Reverse Voltage</td>
<td>V_R = 5V</td>
<td>10</td>
<td>µA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I_FP</td>
<td>Peak Forward Current(5)</td>
<td>I_F = 20mA</td>
<td>940</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P_D</td>
<td>Power Dissipation(1)</td>
<td></td>
<td></td>
<td>75</td>
<td>mW</td>
<td></td>
</tr>
</tbody>
</table>

**SENSOR**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_CEO</td>
<td>Collector-Emitter Voltage</td>
<td>V_CE = 20V, I_C = 0mA</td>
<td>100</td>
<td>nA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V_ECO</td>
<td>Emitter-Collector Voltage</td>
<td></td>
<td>5</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I_C</td>
<td>Collector Current</td>
<td></td>
<td>20</td>
<td>mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P_D</td>
<td>Power Dissipation(1)</td>
<td></td>
<td>50</td>
<td>mW</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Electrical/Optical Characteristics (T_A = 25°C unless otherwise specified)**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_F</td>
<td>Forward Voltage</td>
<td>I_F = 20mA</td>
<td>1.2</td>
<td>1.6</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>I_R</td>
<td>Reverse Leakage Current</td>
<td>V_R = 5V</td>
<td>10</td>
<td>µA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>λ_PE</td>
<td>Peak Emission Wavelength</td>
<td>I_F = 20mA</td>
<td>940</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**OUTPUT TRANSISTOR**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>I_D</td>
<td>Collector-Emitter Dark Current</td>
<td>V_CE = 20V, I_F = 0mA</td>
<td>100</td>
<td>nA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COUPLED**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>I_C(ON)</td>
<td>On-State Collector Current</td>
<td>I_F = 20mA, V_CE = 5V(6)</td>
<td>0.10</td>
<td>0.40</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>V_CE(SAT)</td>
<td>Saturation Voltage</td>
<td></td>
<td></td>
<td>0.3</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>t_r</td>
<td>Rise Time</td>
<td>V_CC = 5V, I_C(ON) = 100µA, R_L = 1kΩ</td>
<td>20</td>
<td>µs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t_f</td>
<td>Fall Time</td>
<td></td>
<td></td>
<td>20</td>
<td>µs</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. Derate power dissipation linearly 1.00mW/°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) from housing.
5. Pulse conditions: tp = 100µs; T = 10ms.
6. Measured using an aluminum alloy mirror at d = 1mm.
Typical Performance Curves

Fig. 1 Normalized Collector Current vs. Distance between device and reflector

Fig. 2 Collector Current vs. Forward Current

Fig. 3 Collector Current vs. Collector to Emitter Voltage

Fig. 4 Collector Emitter Dark Current (Normalized) vs. Ambient Temperature
Typical Performance Curves (Continued)

**Fig. 6** Forward Current vs. Forward Voltage

**Fig. 7** Rise and Fall Time vs. Load Resistance

**Fig. 8** Forward Voltage vs. Ambient Temperature

**Fig. 8** Radiation Diagram
Taping Dimensions

General tolerance ±0.1
Dimensions in mm
TRADEMARKS
The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

ACEX®
Build it Now™
CorePLUS™
CROSSVOLT™
CTL™
Current Transfer Logic™
EcoSPARK®
EZSWITCH™ *

Fairchild®
Fairchild Semiconductor®
FACT Quiet Series™
FACT®
FAST®
FastvCore™
FlashWriter® *

FPS™
FRFET®
Global Power Resource™
Green FPS™
Green FPS™ e-Series™
GTO™
i-Lo™
IntelliMAX™
ISOLANAR™
MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MillerDrive™
Motion-SPM™
OPTOLOGIC®
OPTOPLANAR®

PDP-SPM™
Power220®
POWEREDGE®
Power-SPM™
PowerTrench®
Programmable Active Droop™
QFET®
QS™
QT Optoelectronics™
Quiet Series™
RapidConfigure™
SMART START™
SPM®
STEALTH™
SuperFET™
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8

SupreMOS™
SyncFET™

The Power Franchise®
TinyBoost™
TinyBuck™
TinyLogic®
TINYOPTO®
TinyPower™
TinyPWM™
TinyWire™
μSerDes™
UHC®
Ultra FRFET™
UniFET™
VCX™

* EZSWITCH™ and FlashWriter® are trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER
FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY
FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:
1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS
Definition of Terms

<table>
<thead>
<tr>
<th>Datasheet Identification</th>
<th>Product Status</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advance Information</td>
<td>Formative or In Design</td>
<td>This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.</td>
</tr>
<tr>
<td>Preliminary</td>
<td>First Production</td>
<td>This datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.</td>
</tr>
<tr>
<td>No Identification Needed</td>
<td>Full Production</td>
<td>This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.</td>
</tr>
<tr>
<td>Obsolete</td>
<td>Not In Production</td>
<td>This datasheet contains specifications on a product that has been discontinued by Fairchild Semiconductor. The datasheet is printed for reference information only.</td>
</tr>
</tbody>
</table>