QRE1113, QRE1113GR
Minature Reflective Object Sensor

Features
■ Phototransistor output
■ No contact surface sensing
■ Miniature package
■ Lead form style: Gull Wing
■ Two leadform options: Through hole (QRE1113)
  SMT gullwing (QRE1113GR)
■ Two packaging options: Tube (QRE1113)
  Tape and reel (QRE1113GR)

QRE1113GR Package Dimensions

Notes:
1. Dimensions for all drawings are in millimeters.
2. Tolerance of ±0.15mm on all non-nominal dimensions
QRE1113 Package Dimensions

Notes:
1. Dimensions for all drawings are in millimeters.
2. Tolerance of ±0.15mm on all non-nominal dimensions

Schematic

Pin 1: Anode
Pin 2: Cathode
Pin 3: Collector
Pin 4: Emitter
**Absolute Maximum Ratings** \( (T_A = 25^\circ C \text{ unless otherwise specified}) \)

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_{OPR})</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>
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<tr>
<td>(T_{SOL-F})</td>
<td>Soldering Temperature (Flow)(^{(2,3)})</td>
<td>260 for 10 sec</td>
<td>°C</td>
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**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>
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</thead>
<tbody>
<tr>
<td>(I_F)</td>
<td>Continuous Forward Current</td>
<td>(I_F = 20\ mA)</td>
<td>1.2</td>
<td>1.6</td>
<td>V</td>
<td></td>
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<tr>
<td>(V_R)</td>
<td>Reverse Voltage</td>
<td>(V_R = 5\ V)</td>
<td>10</td>
<td>μA</td>
<td></td>
<td></td>
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<tr>
<td>(I_{FP})</td>
<td>Peak Forward Current(^{(5)})</td>
<td>(I_F = 20\ mA)</td>
<td>940</td>
<td>nm</td>
<td></td>
<td></td>
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<tr>
<td>(P_D)</td>
<td>Power Dissipation(^{(1)})</td>
<td></td>
<td>75</td>
<td>mW</td>
<td></td>
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**SENSOR**

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<tr>
<th>Symbol</th>
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<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
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<tbody>
<tr>
<td>(V_{CEO})</td>
<td>Collector-Emitter Voltage</td>
<td></td>
<td>30</td>
<td></td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>(V_{ECO})</td>
<td>Emitter-Collector Voltage</td>
<td></td>
<td>5</td>
<td></td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>(I_C)</td>
<td>Collector Current</td>
<td>(I_F = 20\ mA), (V_{CE} = 20\ V)</td>
<td>20</td>
<td></td>
<td>mA</td>
<td></td>
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<tr>
<td>(P_D)</td>
<td>Power Dissipation(^{(1)})</td>
<td></td>
<td>50</td>
<td></td>
<td>mW</td>
<td></td>
</tr>
</tbody>
</table>

**Electrical/Optical Characteristics** \( (T_A = 25^\circ C \text{ unless otherwise specified}) \)

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<tr>
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<th>Max.</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>(V_F)</td>
<td>Forward Voltage</td>
<td>(I_F = 0\ mA, \ V_{CE} = 20\ V)</td>
<td>100</td>
<td></td>
<td>nA</td>
<td></td>
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<tr>
<td>(I_R)</td>
<td>Reverse Leakage Current</td>
<td>(V_R = 5\ V)</td>
<td>0.10</td>
<td>0.40</td>
<td>mA</td>
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<tr>
<td>(\lambda_{PE})</td>
<td>Peak Emission Wavelength</td>
<td>(I_F = 20\ mA)</td>
<td>1</td>
<td></td>
<td>μA</td>
<td></td>
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<tr>
<td>(V_{CE\ (SAT)})</td>
<td>Saturation Voltage</td>
<td>(V_{CC} = 5\ V, I_{C\ (ON)} = 100\ μA, R_L = 1\ kΩ)</td>
<td>0.3</td>
<td></td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>(t_r)</td>
<td>Rise Time</td>
<td></td>
<td>20</td>
<td></td>
<td>μs</td>
<td></td>
</tr>
<tr>
<td>(t_f)</td>
<td>Fall Time</td>
<td></td>
<td>20</td>
<td></td>
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**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: \(t_p = 100\ μs; \ T = 10\ ms\).
6. Measured using an aluminum alloy mirror at \(d = 1\ mm\).
7. No reflective surface at close proximity.
Typical Performance Curves

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

Fig. 2 Collector Current vs. Forward Current

Fig. 3 Normalized Collector Current vs. Collector to Emitter Voltage

Fig. 4 Collector Emitter Dark Current (Normalized) vs. Ambient Temperature

- Sensing Object: White Paper (90% reflective)
- Normalization: $V_{CE} = 10\,\text{V}$, $T_A = 25\,\text{°C}$
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
Recommended Solder Screen Pattern for GR option (for reference only)

Dimensions in mm

Taping Dimensions for GR option
Progressive Direction

General tolerance ±0.1
Dimensions in mm
Reel Dimensions

Reflow Profile

Note: Reflow soldering should not be done more than twice.
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