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QRE1113, QRE1113GR
Miniature Reflective Object Sensor

Features
- Phototransistor Output
- No Contact Surface Sensing
- Miniature Package
- Lead Form Style: Gull Wing
- Two Leadform Options: Through Hole (QRE1113) SMT Gull Wing (QRE1113GR)
- Two Packaging Options: Tube (QRE1113) Tape and Reel (QRE1113GR)

QRE1113GR Package Dimensions

NOTES:
A. NO INDUSTRY STANDARD APPLIES TO THIS PACKAGE
B. ALL DIMENSIONS ARE IN MILLIMETERS
C. TOLERANCE OF ±0.15MM ON ALL NON-NOMINAL DIMENSIONS
D. DRAWING FILENAME: MKT-ARU313Arev2
QRE1113 Package Dimensions\(^{(1, 2)}\)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>1.00</td>
<td>2.50</td>
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<tr>
<td>2.90</td>
<td>0.60</td>
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<tr>
<td>0.40</td>
<td>0.94</td>
</tr>
<tr>
<td>1.80</td>
<td>3.60</td>
</tr>
<tr>
<td>3.20</td>
<td>8.4</td>
</tr>
<tr>
<td>1.70</td>
<td>10.4</td>
</tr>
<tr>
<td>1.50</td>
<td>3.80</td>
</tr>
<tr>
<td>0.40</td>
<td>4.20</td>
</tr>
</tbody>
</table>

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

Schematic

Pin 1: Anode
Pin 2: Cathode
Pin 3: Collector
Pin 4: Emitter
Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be opera-
ble above the recommended operating conditions and stressing the parts to these levels is not recommended. In addi-
tion, extended exposure to stresses above the recommended operating conditions may affect device reliability. The
absolute maximum ratings are stress ratings only. Values are at $T_A = 25^\circ C$ unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</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)$^{(4,5,6)}$</td>
<td>240 for 5 sec</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{SOL-F}$</td>
<td>Soldering Temperature (Flow)$^{(5,6)}$</td>
<td>260 for 10 sec</td>
<td>°C</td>
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</tbody>
</table>

**EMITTER**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_F$</td>
<td>Continuous Forward Current</td>
<td></td>
<td>50</td>
<td>mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_R$</td>
<td>Reverse Voltage</td>
<td></td>
<td>5</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{FP}$</td>
<td>Peak Forward Current$^{(7)}$</td>
<td></td>
<td>1</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$P_D$</td>
<td>Power Dissipation$^{(3)}$</td>
<td></td>
<td>75</td>
<td>mW</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SENSOR**

<table>
<thead>
<tr>
<th>Symbol</th>
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<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>$V_{CEO}$</td>
<td>Collector-Emitter Voltage</td>
<td></td>
<td>30</td>
<td>V</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$^{(3)}$</td>
<td></td>
<td>50</td>
<td>mW</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Electrical / Optical Characteristics

Values are at $T_A = 25^\circ C$ unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_F$</td>
<td>Forward Voltage</td>
<td>$I_F = 20 mA$</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>$V_R = 5 V$</td>
<td></td>
<td>10</td>
<td>μA</td>
<td></td>
</tr>
<tr>
<td>$\lambda_{PE}$</td>
<td>Peak Emission Wavelength</td>
<td>$I_F = 20 mA$</td>
<td>940</td>
<td></td>
<td>nm</td>
<td></td>
</tr>
</tbody>
</table>

**OUTPUT TRANSISTOR**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_D$</td>
<td>Collector-Emitter Dark Current</td>
<td>$I_F = 0 mA$, $V_{CE} = 20 V$</td>
<td></td>
<td>100</td>
<td>nA</td>
<td></td>
</tr>
</tbody>
</table>

**COUPLED**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_{C(ON)}$</td>
<td>On-State Collector Current</td>
<td>$I_F = 20 mA$, $V_{CE} = 5 V$$^{(8)}$</td>
<td>0.10</td>
<td>0.40</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>$I_{CX}$</td>
<td>Cross-Talk Collector Current</td>
<td>$I_F = 20 mA$, $V_{CE} = 5 V$$^{(9)}$</td>
<td></td>
<td>1</td>
<td>μA</td>
<td></td>
</tr>
<tr>
<td>$V_{CE(SAT)}$</td>
<td>Saturation Voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$t_r$</td>
<td>Rise Time</td>
<td>$V_{CC} = 5 V$, $I_{C(ON)} = 100 \mu A$, $R_L = 100 k\Omega$</td>
<td></td>
<td>20</td>
<td>μs</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:

3. Derate power dissipation linearly 1.00 mW/°C above 25°C.
4. RMA flux is recommended.
5. Methanol or isopropyl alcohols are recommended as cleaning agents.
6. Soldering iron 1/16" (1.6mm) from housing.
7. Pulse conditions: $t_p = 100 \mu s$, $T = 10 ms$.
8. Measured using an aluminum alloy mirror at $d = 1 mm$.
9. 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
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 for GR option

Progressive Direction

2.0 ± 0.05

4.0

0.25

5.5 ± 0.05

12.0 ± 0.3

8.0

3.73

µ1.5

1.75

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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<th>Product Status</th>
<th>Definition</th>
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<tbody>
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<td>Formative / In Design</td>
<td>Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.</td>
</tr>
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