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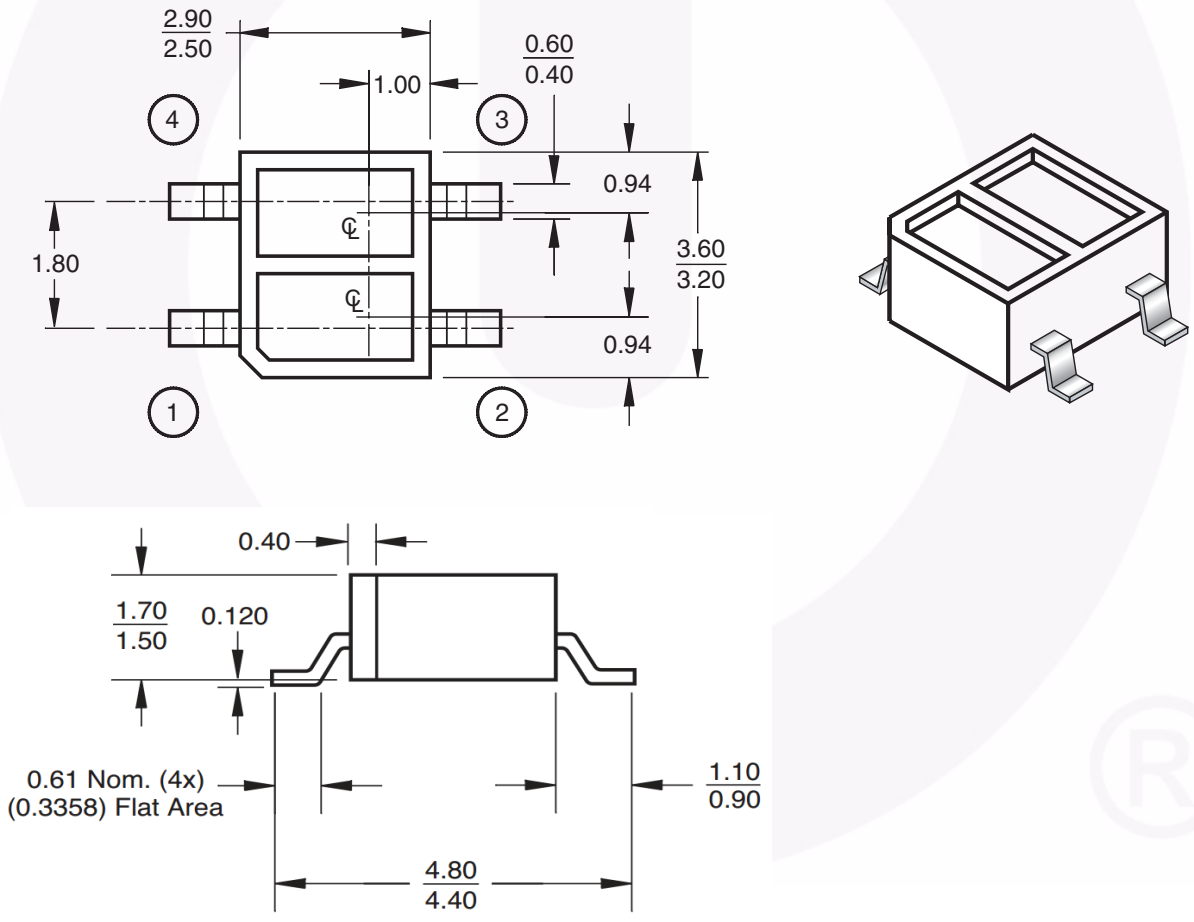
August 2011

# 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

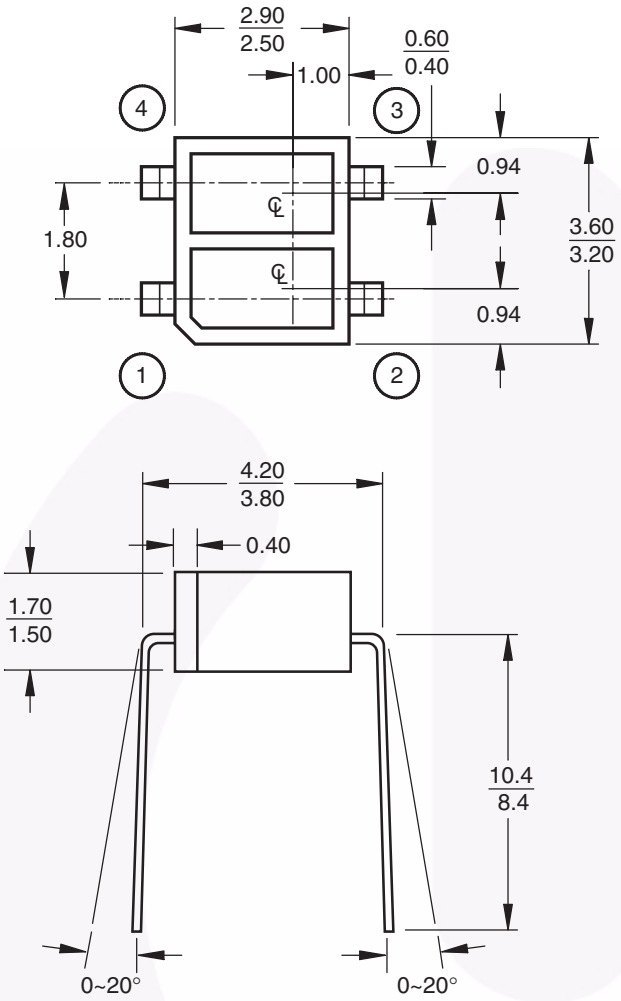


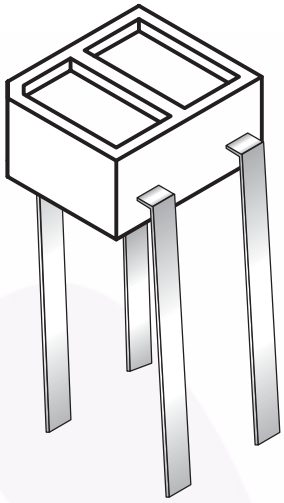

**Notes:**

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

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## QRE1113 Package Dimensions

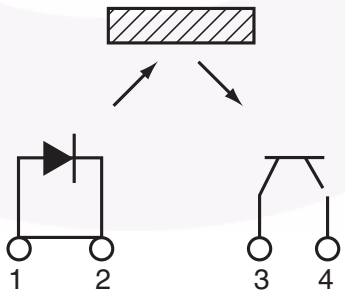


**Notes:**

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## Schematic




Pin 1: Anode
Pin 2: Cathode
Pin 3: Collector
Pin 4: Emitter

## 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.

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $T_{OPR}$ | Operating Temperature | -40 to +85 | °C |
| $T_{STG}$ | Storage Temperature | -40 to +90 | °C |
| $T_{SOL-I}$ | Soldering Temperature (Iron)(2,3,4) | 240 for 5 sec | °C |
| $T_{SOL-F}$ | Soldering Temperature (Flow)(2,3) | 260 for 10 sec | °C |
| **EMITTER** | | | |
| $I_F$ | Continuous Forward Current | 50 | mA |
| $V_R$ | Reverse Voltage | 5 | V |
| $I_{FP}$ | Peak Forward Current(5) | 1 | A |
| $P_D$ | Power Dissipation(1) | 75 | mW |
| **SENSOR** | | | |
| $V_{CEO}$ | Collector-Emitter Voltage | 30 | V |
| $V_{ECO}$ | Emitter-Collector Voltage | 5 | V |
| $I_C$ | Collector Current | 20 | mA |
| $P_D$ | Power Dissipation(1) | 50 | mW |

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

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **INPUT DIODE** | | | | | | |
| $V_F$ | Forward Voltage | $I_F$ = 20mA | | 1.2 | 1.6 | V |
| $I_R$ | Reverse Leakage Current | $V_R$ = 5V | | | 10 | µA |
| $\lambda_{PE}$ | Peak Emission Wavelength | $I_F$ = 20mA | | 940 | | nm |
| **OUTPUT TRANSISTOR** | | | | | | |
| $I_D$ | Collector-Emitter Dark Current | $I_F$ = 0mA, $V_{CE}$ = 20V | | | 100 | nA |
| **COUPLED** | | | | | | |
| $I_{C(ON)}$ | On-State Collector Current | $I_F$ = 20mA, $V_{CE}$ = 5V(6) | 0.10 | 0.40 | | mA |
| $I_{CX}$ | Cross-Talk Collector Current | $I_F$ = 20mA, $V_{CE}$ = 5V(7) | | | 1 | µA |
| $V_{CE\ (SAT)}$ | Saturation Voltage | | | | 0.3 | V |
| $t_r$ | Rise Time | $V_{CC}$ = 5V, $I_{C(ON)}$ = 100µA, $R_L$ = 1kΩ | | 20 | | µs |
| $t_f$ | Fall Time | | | 20 | | |

**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.
7. No reflective surface at close proximity.

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## Typical Performance Curves

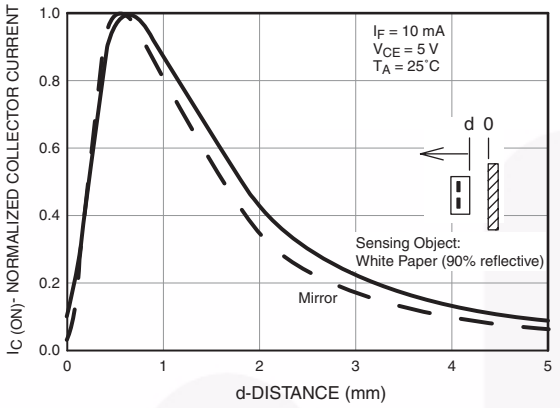



**Fig. 1 Normalized Collector Current vs. Distance between device and reflector**

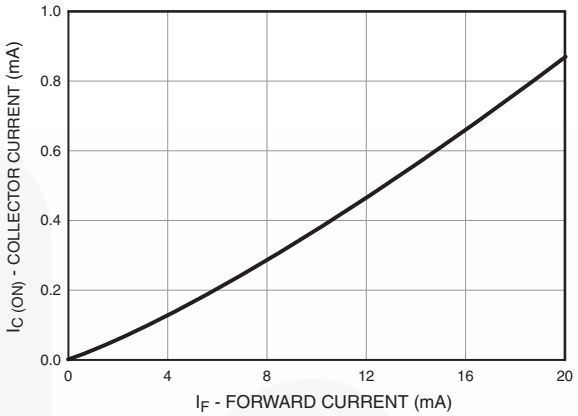



**Fig. 2 Collector Current vs. Forward Current**

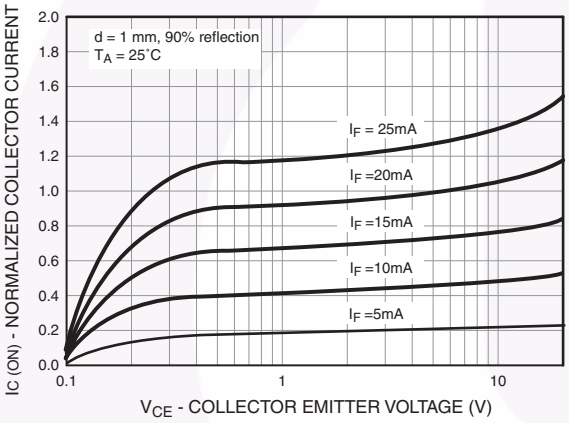



**Fig. 3 Normalized Collector Current vs. Collector to Emitter Voltage**

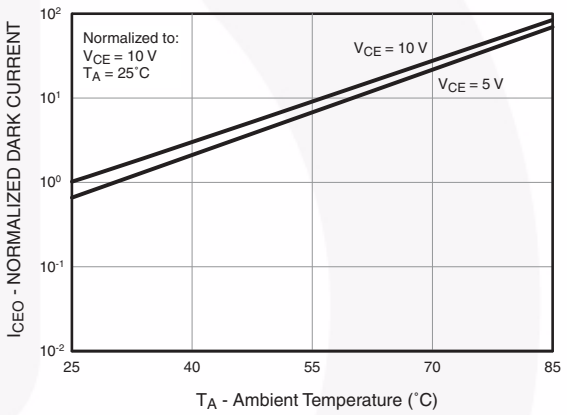



**Fig. 4 Collector Emitter Dark Current (Normalized) vs. Ambient Temperature**

## Typical Performance Curves (Continued)

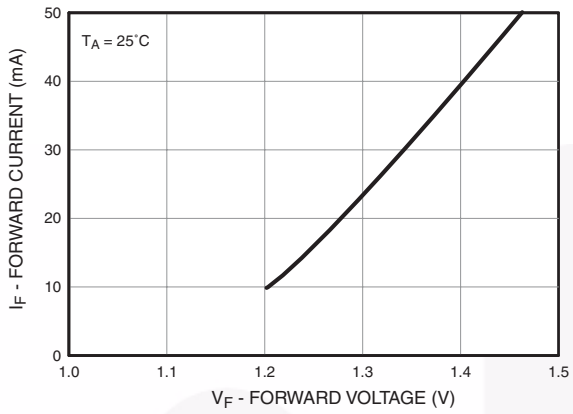



**Fig. 6 Forward Current vs. Forward Voltage**

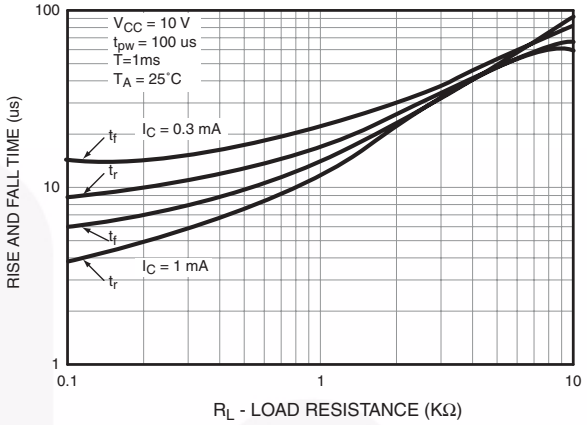



**Fig. 7 Rise and Fall Time vs. Load Resistance**

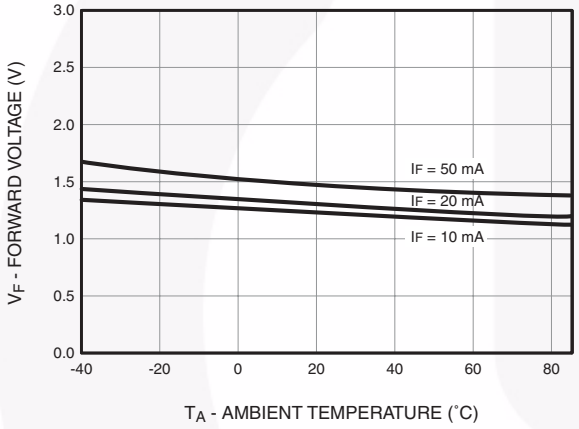



**Fig. 8 Forward Voltage vs. Ambient Temperature**

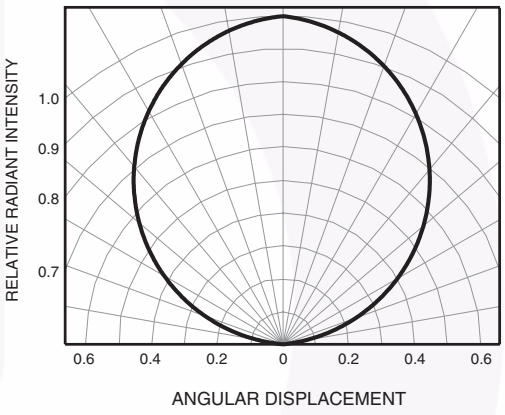
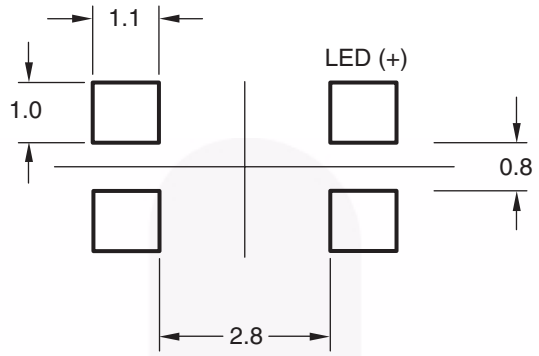


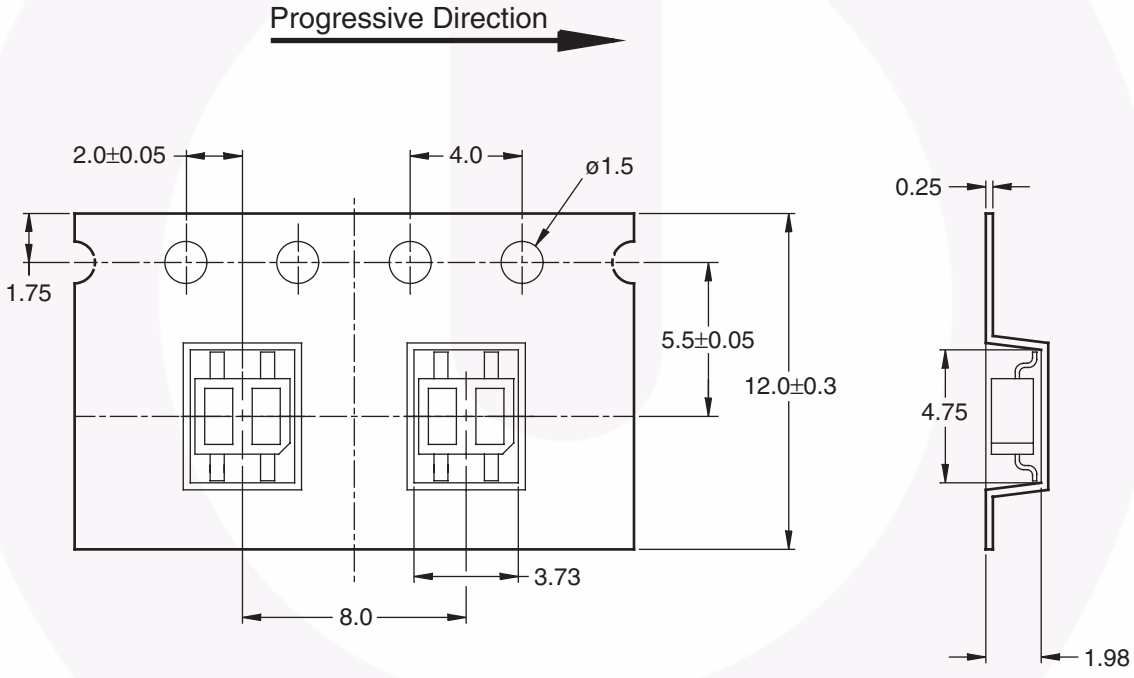

**Fig. 8 Radiation Diagram**

## Recommended Solder Screen Pattern for GR option (for reference only)



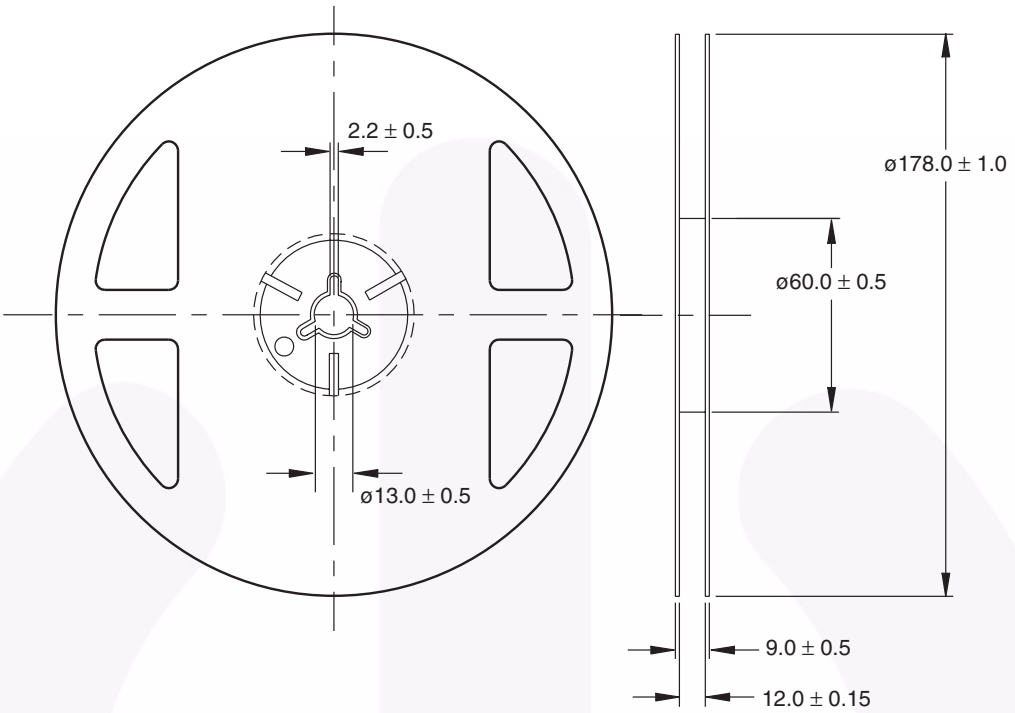

Dimensions in mm

## Taping Dimensions for GR option

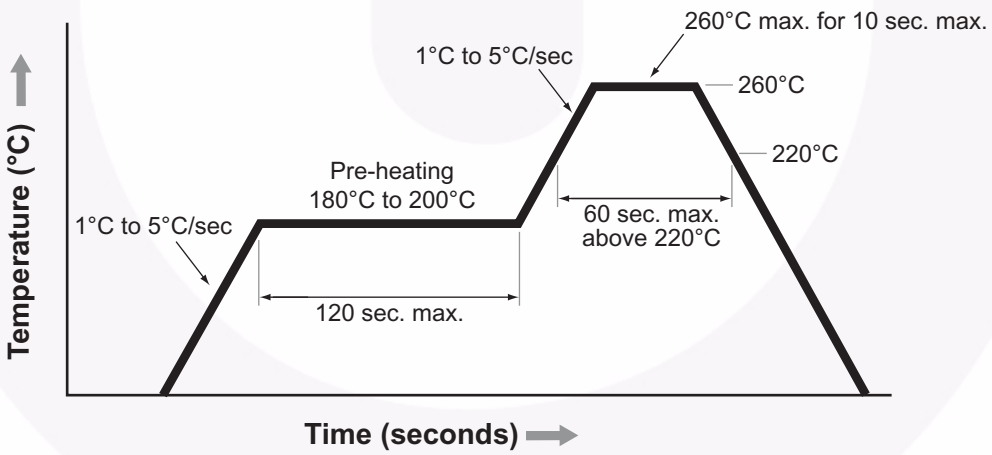



General tolerance ±0.1
Dimensions in mm

## Reel Dimensions




## Reflow Profile




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

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