



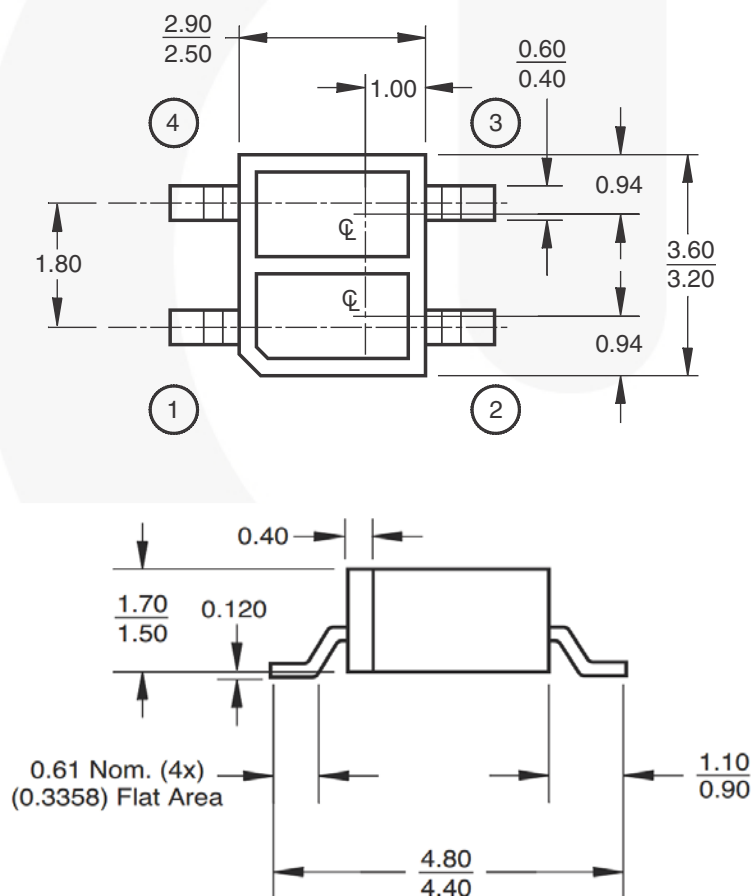
July 2015

## 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)

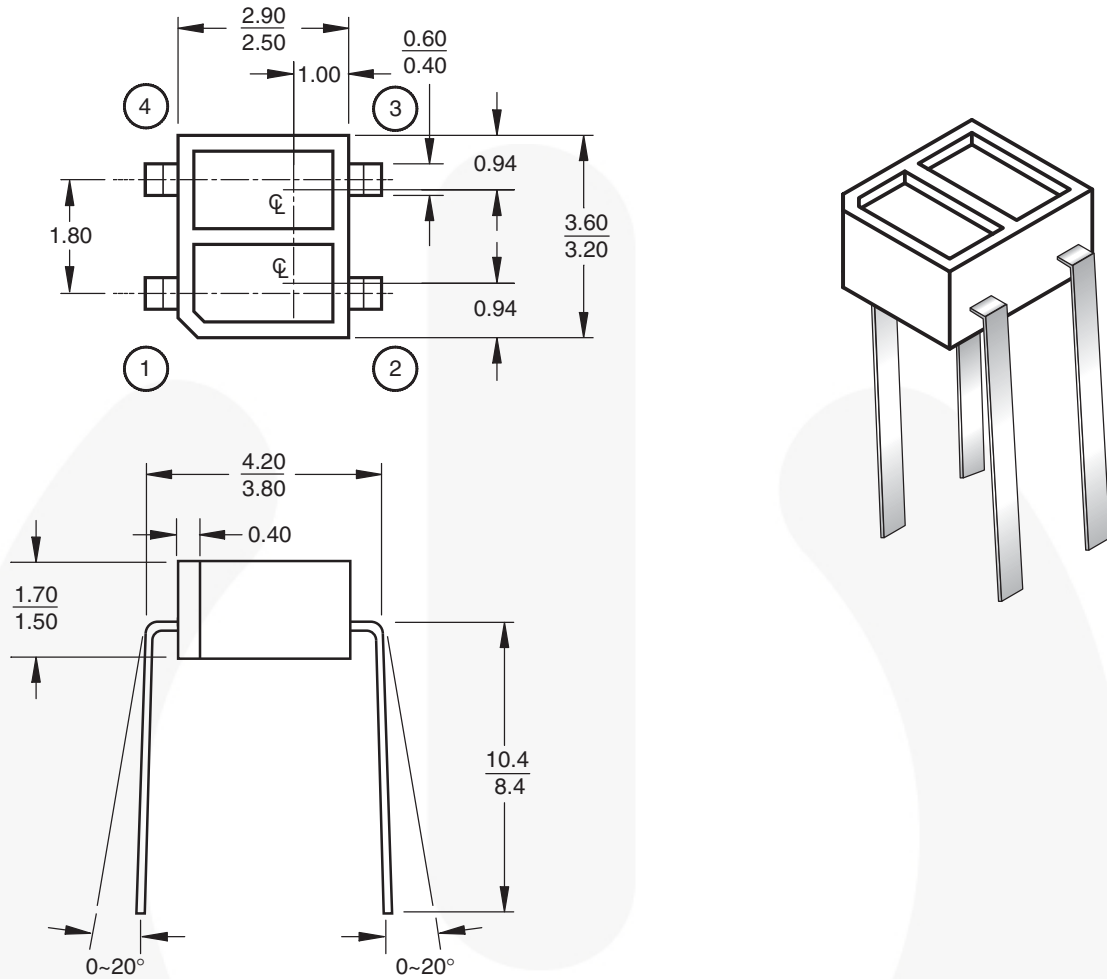
### QRE1113GR Package Dimensions<sup>(1, 2)</sup>



### Notes:

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

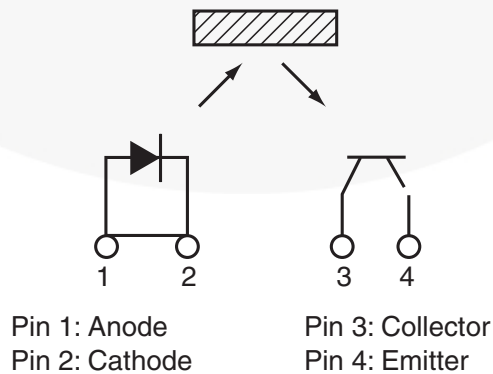
## QRE1113 Package Dimensions<sup>(3, 4)</sup>



### Notes:

3. Dimensions for all drawings are in millimeters.
4. Tolerance of  $\pm 0.15$  mm on all non-nominal dimensions.

## Schematic



## Absolute Maximum Ratings

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

| Symbol         | Parameter                                         | Value          | Unit             |
|----------------|---------------------------------------------------|----------------|------------------|
| $T_{OPR}$      | Operating Temperature                             | -40 to +85     | $^\circ\text{C}$ |
| $T_{STG}$      | Storage Temperature                               | -40 to +90     | $^\circ\text{C}$ |
| $T_{SOL-I}$    | Soldering Temperature (Iron) <sup>(6, 7, 8)</sup> | 240 for 5 sec  | $^\circ\text{C}$ |
| $T_{SOL-F}$    | Soldering Temperature (Flow) <sup>(7, 8)</sup>    | 260 for 10 sec | $^\circ\text{C}$ |
| <b>EMITTER</b> |                                                   |                |                  |
| $I_F$          | Continuous Forward Current                        | 50             | mA               |
| $V_R$          | Reverse Voltage                                   | 5              | V                |
| $I_{FP}$       | Peak Forward Current <sup>(9)</sup>               | 1              | A                |
| $P_D$          | Power Dissipation <sup>(5)</sup>                  | 75             | mW               |
| <b>SENSOR</b>  |                                                   |                |                  |
| $V_{CEO}$      | Collector-Emitter Voltage                         | 30             | V                |
| $V_{ECO}$      | Emitter-Collector Voltage                         | 5              | V                |
| $I_C$          | Collector Current                                 | 20             | mA               |
| $P_D$          | Power Dissipation <sup>(5)</sup>                  | 50             | mW               |

## Electrical / Optical Characteristics

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

| Symbol                   | Parameter                      | Conditions                                                                          | Min. | Typ. | Max. | Unit          |
|--------------------------|--------------------------------|-------------------------------------------------------------------------------------|------|------|------|---------------|
| <b>INPUT DIODE</b>       |                                |                                                                                     |      |      |      |               |
| $V_F$                    | Forward Voltage                | $I_F = 20\text{ mA}$                                                                |      | 1.2  | 1.6  | V             |
| $I_R$                    | Reverse Leakage Current        | $V_R = 5\text{ V}$                                                                  |      |      | 10   | $\mu\text{A}$ |
| $\lambda_{PE}$           | Peak Emission Wavelength       | $I_F = 20\text{ mA}$                                                                |      | 940  |      | nm            |
| <b>OUTPUT TRANSISTOR</b> |                                |                                                                                     |      |      |      |               |
| $I_D$                    | Collector-Emitter Dark Current | $I_F = 0\text{ mA}, V_{CE} = 20\text{ V}$                                           |      |      | 100  | nA            |
| <b>COUPLED</b>           |                                |                                                                                     |      |      |      |               |
| $I_{C(ON)}$              | On-State Collector Current     | $I_F = 20\text{ mA}, V_{CE} = 5\text{ V}^{(10)}$                                    | 0.10 | 0.40 |      | mA            |
| $I_{CX}$                 | Cross-Talk Collector Current   | $I_F = 20\text{ mA}, V_{CE} = 5\text{ V}^{(11)}$                                    |      |      | 1    | $\mu\text{A}$ |
| $V_{CE(SAT)}$            | Saturation Voltage             |                                                                                     |      |      | 0.3  | V             |
| $t_r$                    | Rise Time                      | $V_{CC} = 5\text{ V}, I_{C(ON)} = 100\text{ }\mu\text{A}, R_L = 100\text{ k}\Omega$ |      | 20   |      | $\mu\text{s}$ |
| $t_f$                    | Fall Time                      |                                                                                     |      | 20   |      | $\mu\text{s}$ |

### Notes:

- Derate power dissipation linearly 1.00 mW/ $^\circ\text{C}$  above  $25^\circ\text{C}$ .
- RMA flux is recommended.
- Methanol or isopropyl alcohols are recommended as cleaning agents.
- Soldering iron 1/16" (1.6mm) from housing.
- Pulse conditions:  $t_p = 100\text{ }\mu\text{s}$ ;  $T = 10\text{ ms}$ .
- Measured using an aluminum alloy mirror at  $d = 1\text{ mm}$ .
- No reflective surface at close proximity.

## Typical Performance Curves

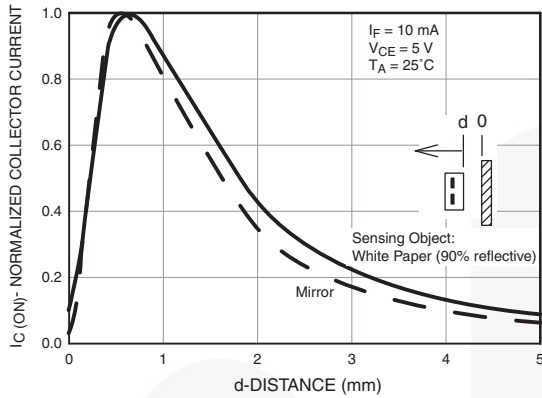


Fig. 1 Normalized Collector Current vs. Distance between device and reflector

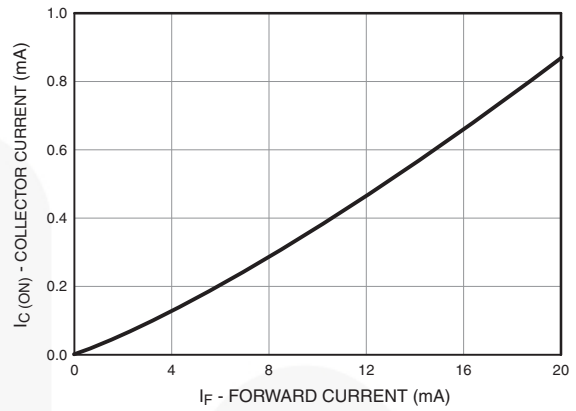


Fig. 2 Collector Current vs. Forward Current

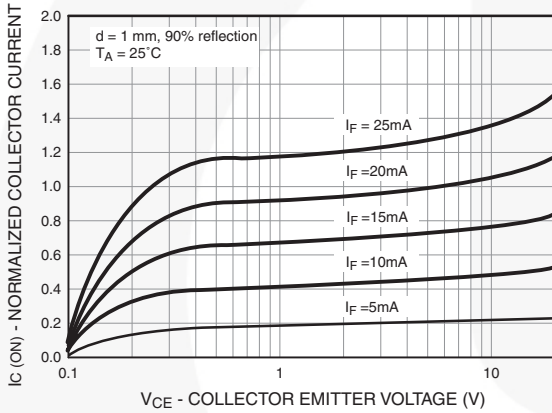


Fig. 3 Normalized Collector Current vs. Collector to Emitter Voltage

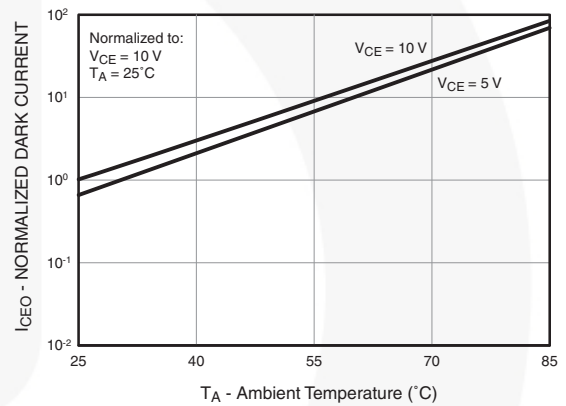


Fig. 4 Collector Emitter Dark Current (Normalized) vs. Ambient Temperature

## Typical Performance Curves (Continued)

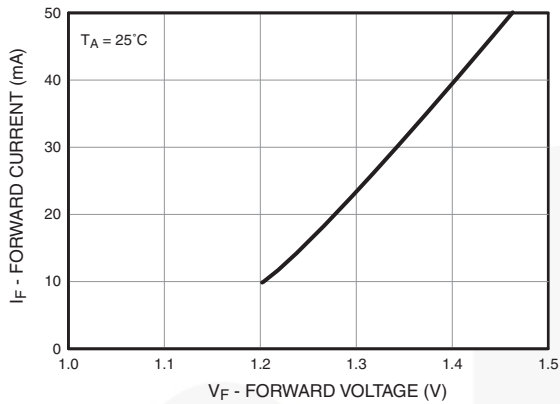


Fig. 6 Forward Current vs. Forward Voltage

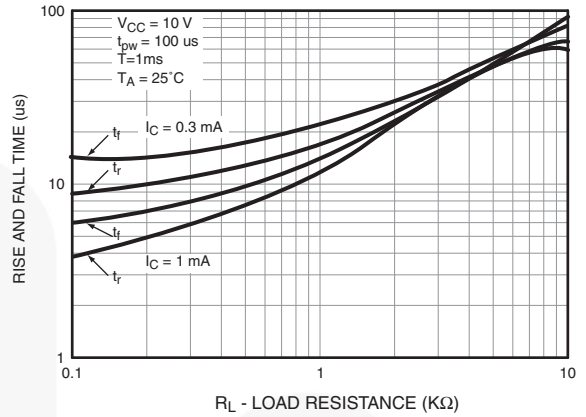


Fig. 7 Rise and Fall Time vs. Load Resistance

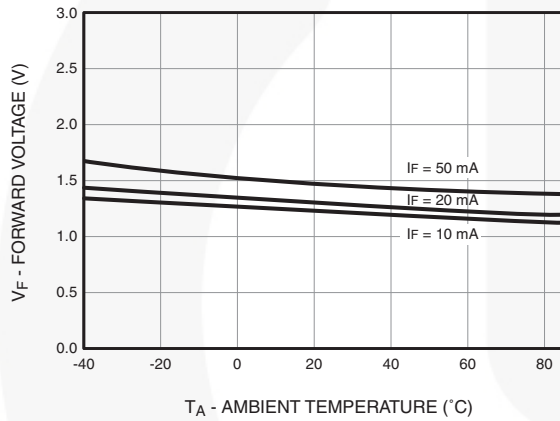


Fig. 8 Forward Voltage vs. Ambient Temperature

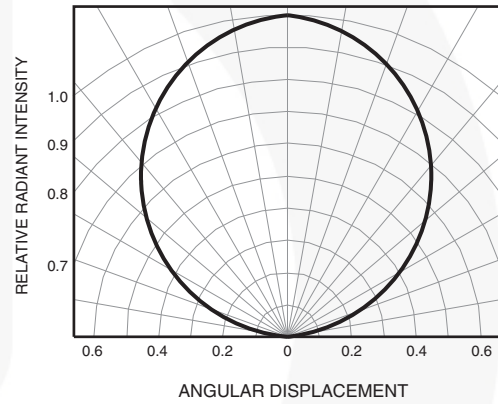
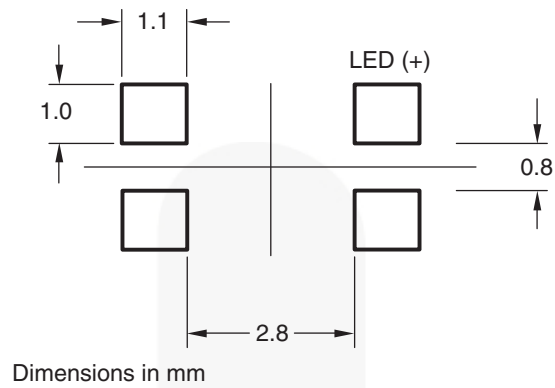
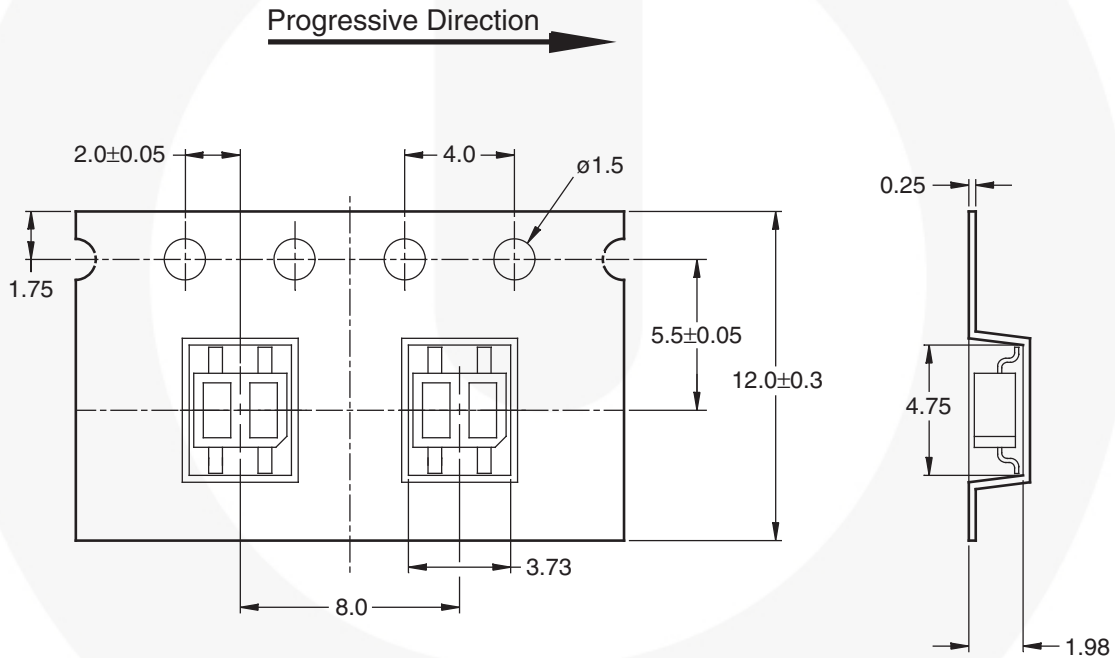


Fig. 8 Radiation Diagram

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

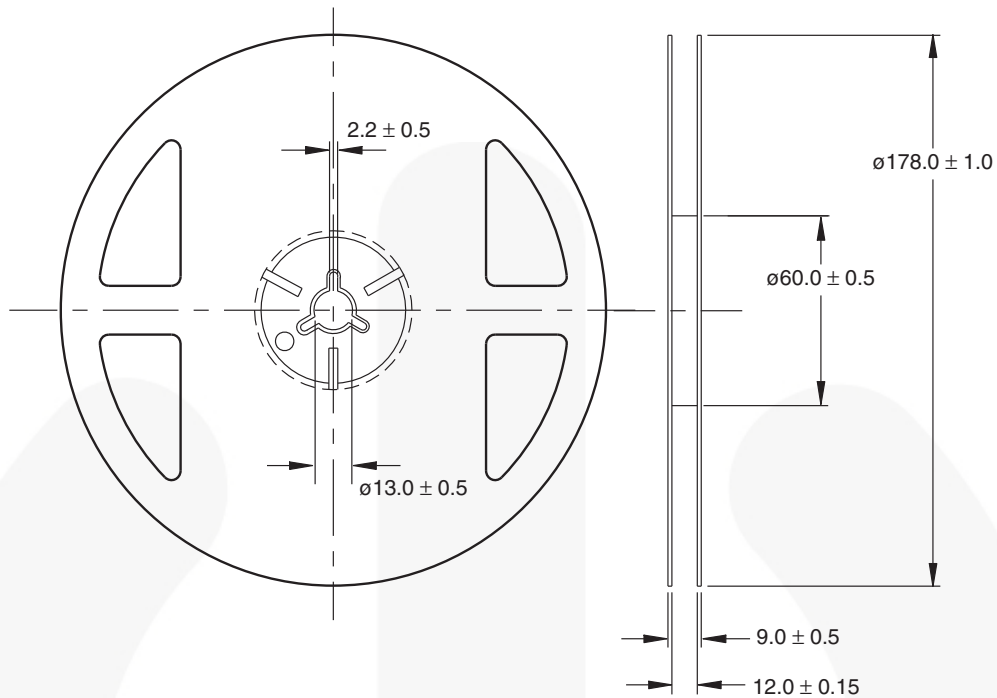


## Taping Dimensions for GR option

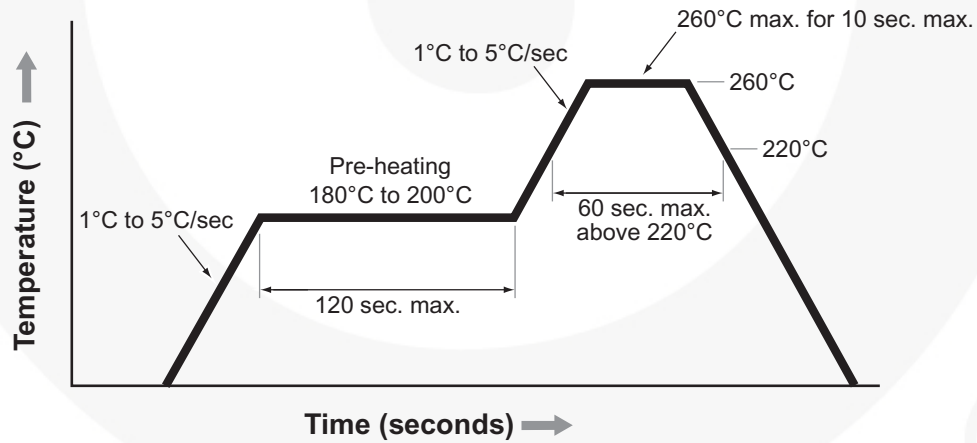


General tolerance  $\pm 0.1$   
Dimensions in mm

## Reel Dimensions



## Reflow Profile



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



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Rev. 175

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