

# QRE1113, QRE1113GR, QRE1114GR

## 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 & QRE1114GR)
- Two Packaging Options:
  - ♦ Tube (QRE1113)
  - ♦ Tape and Reel (QRE1113GR & QRE1114GR)

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Symbol             | Parameter                                       | Value        | Unit             |
|--------------------|-------------------------------------------------|--------------|------------------|
| $T_{\text{OPR}}$   | Operating Temperature                           | -40 to +85   | $^\circ\text{C}$ |
| $T_{\text{STG}}$   | Storage Temperature                             | -40 to +90   | $^\circ\text{C}$ |
| $T_{\text{SOL-I}}$ | Soldering Temperature (Iron)<br>(Notes 2, 3, 4) | 240 for 5 s  | $^\circ\text{C}$ |
| $T_{\text{SOL-F}}$ | Soldering Temperature (Flow)<br>(Notes 3, 4)    | 260 for 10 s | $^\circ\text{C}$ |

### EMITTER

|          |                               |    |    |
|----------|-------------------------------|----|----|
| $I_F$    | Continuous Forward Current    | 50 | mA |
| $V_R$    | Reverse Voltage               | 5  | V  |
| $I_{FP}$ | Peak Forward Current (Note 5) | 1  | A  |
| $P_D$    | Power Dissipation (Note 1)    | 75 | mW |

### SENSOR

|                  |                            |    |    |
|------------------|----------------------------|----|----|
| $V_{\text{CEO}}$ | Collector-Emitter Voltage  | 30 | V  |
| $V_{\text{ECO}}$ | Emitter-Collector Voltage  | 5  | V  |
| $I_C$            | Collector Current          | 20 | mA |
| $P_D$            | Power Dissipation (Note 1) | 50 | mW |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Derate power dissipation linearly 1.00 mW/ $^\circ\text{C}$  above  $25^\circ\text{C}$ .
2. RMA flux is recommended.
3. Methanol or isopropyl alcohols are recommended as cleaning agents.
4. Soldering iron 1/16" (1.6 mm) from housing.
5. Pulse conditions:  $t_p = 100 \mu\text{s}$ ;  $T = 10 \text{ ms}$ .

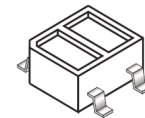
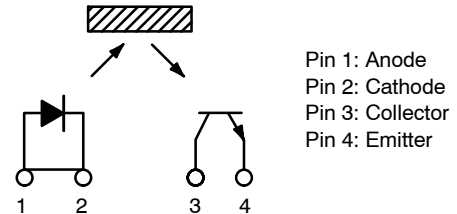
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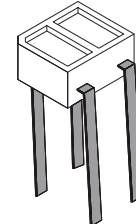


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REFLECTIVE RECTANGULAR SURFACE MOUNT  
CASE 100CY



REFLECTIVE RECTANGULAR THROUGH HOLE  
CASE 100AQ

### ORDERING INFORMATION

| Device                | Package                                | Shipping <sup>†</sup> |
|-----------------------|----------------------------------------|-----------------------|
| QRE1113               | Reflective Rectangular (Through Hole)  | 1600 / Tube           |
| QRE1113GR & QRE1114GR | Reflective Rectangular (Surface Mount) | 1000 / Tape & Reel    |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# QRE1113, QRE1113GR, QRE1114GR

## ELECTRICAL/OPTICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ 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            |

## OUTPUT TRANSISTOR

|       |                                |                                              |  |  |     |    |
|-------|--------------------------------|----------------------------------------------|--|--|-----|----|
| $I_D$ | Collector-Emitter Dark Current | $I_F = 0\text{ mA}$ , $V_{CE} = 20\text{ V}$ |  |  | 100 | nA |
|-------|--------------------------------|----------------------------------------------|--|--|-----|----|

## COUPLED

|               |                              |                                                                                         |                     |      |      |      |               |
|---------------|------------------------------|-----------------------------------------------------------------------------------------|---------------------|------|------|------|---------------|
| $I_{C(ON)}$   | On-State Collector Current   | $I_F = 20\text{ mA}$ , $V_{CE} = 5\text{ V}$ (Note 6)                                   | QRE1113 & QRE1113GR | 0.10 | 0.90 |      | mA            |
|               |                              |                                                                                         | QRE1114GR           | 0.30 |      | 0.60 | mA            |
| $I_{CX}$      | Cross-Talk Collector Current | $I_F = 20\text{ mA}$ , $V_{CE} = 5\text{ V}$ (Note 7)                                   |                     |      |      | 1    | $\mu\text{A}$ |
| $V_{CE(SAT)}$ | Saturation Voltage           | $I_F = 20\text{ mA}$ , $I_C = 50\text{ }\mu\text{A}$ (Note 6)                           |                     |      |      | 0.3  | V             |
| $t_r$         | Rise Time                    | $V_{CC} = 5\text{ V}$ , $I_{C(ON)} = 100\text{ }\mu\text{A}$ , $R_L = 1\text{ k}\Omega$ |                     | 20   |      |      | $\mu\text{s}$ |
| $t_f$         | Fall Time                    |                                                                                         |                     | 20   |      |      | $\mu\text{s}$ |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

6. Measured using an aluminum alloy mirror at  $d = 1\text{ mm}$ .

7. No reflective surface at close proximity.

## REFLOW PROFILE

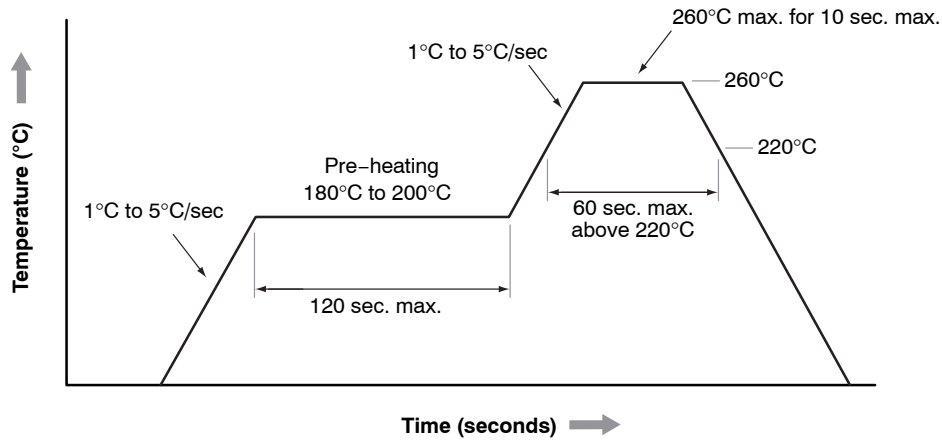
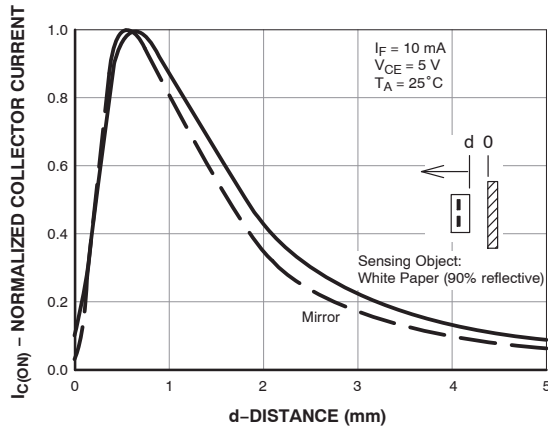


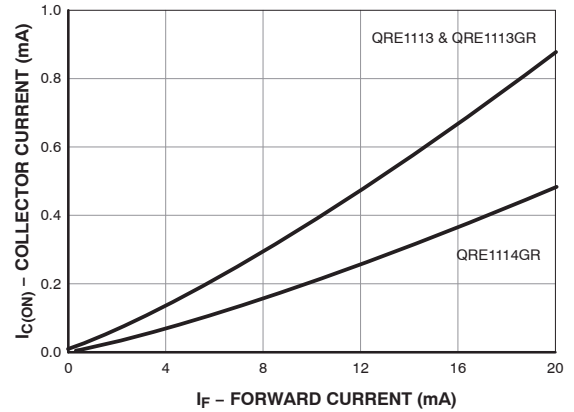
Figure 1. Reflow Profile

# QRE1113, QRE1113GR, QRE1114GR

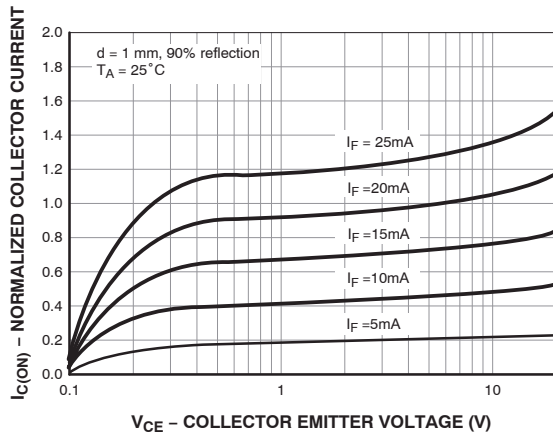
## TYPICAL PERFORMANCE CURVES



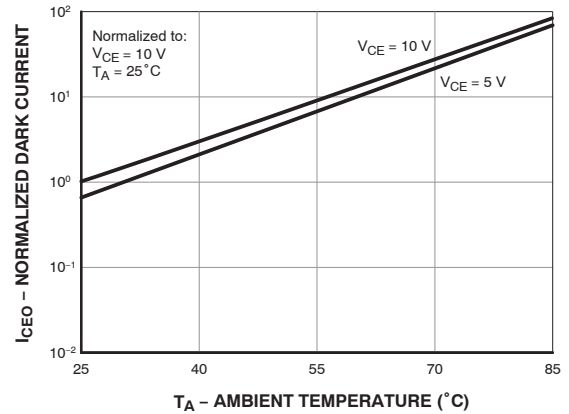
**Figure 2. Normalized Collector Current vs. Distance between Device and Reflector**



**Figure 3. Collector Current vs. Forward Current**



**Figure 4. Normalized Collector Current vs. Collector to Emitter Voltage**



**Figure 5. Collector Emitter Dark Current (Normalized) vs. Ambient Temperature**

# QRE1113, QRE1113GR, QRE1114GR

## TYPICAL PERFORMANCE CURVES (Continued)

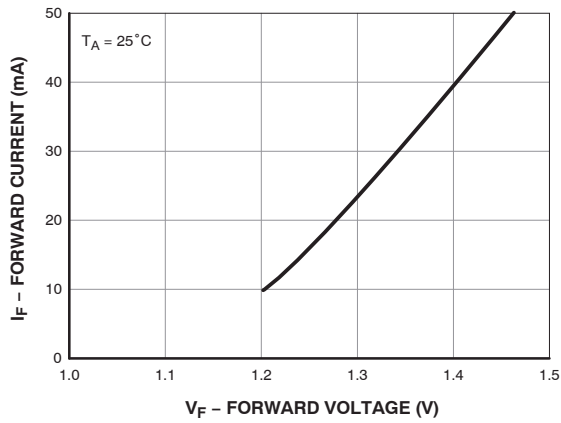


Figure 6. Forward Current vs. Forward Voltage

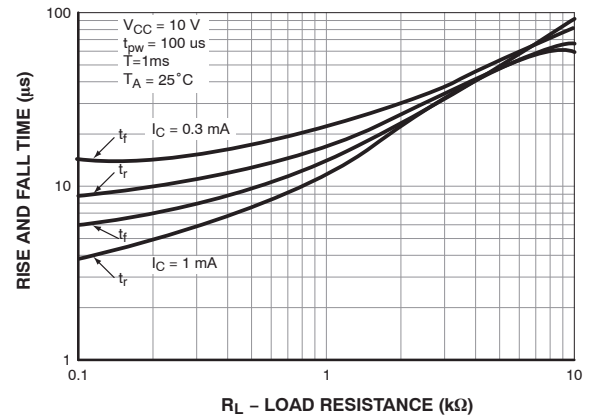


Figure 7. Rise and Fall Time vs. Load Resistance

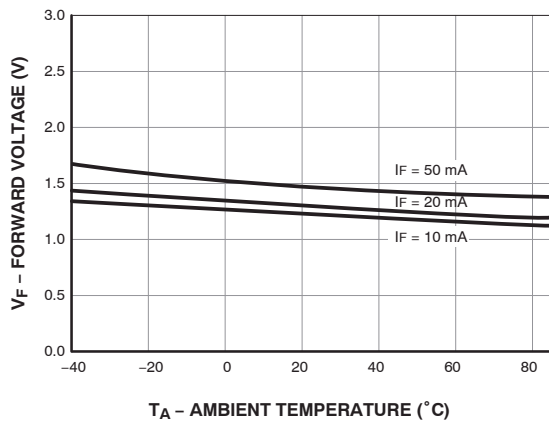


Figure 8. Forward Voltage vs. Ambient Temperature

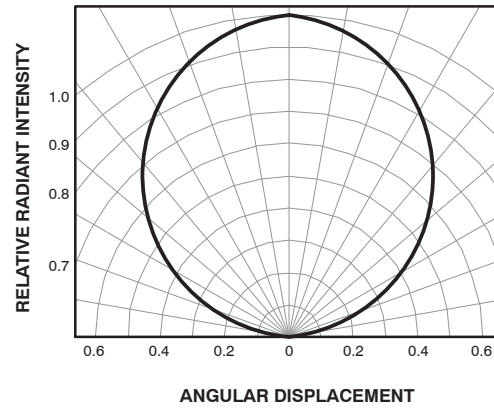


Figure 9. Radiation Diagram

# QRE1113, QRE1113GR, QRE1114GR

## TAPING DIMENSIONS FOR GR OPTION

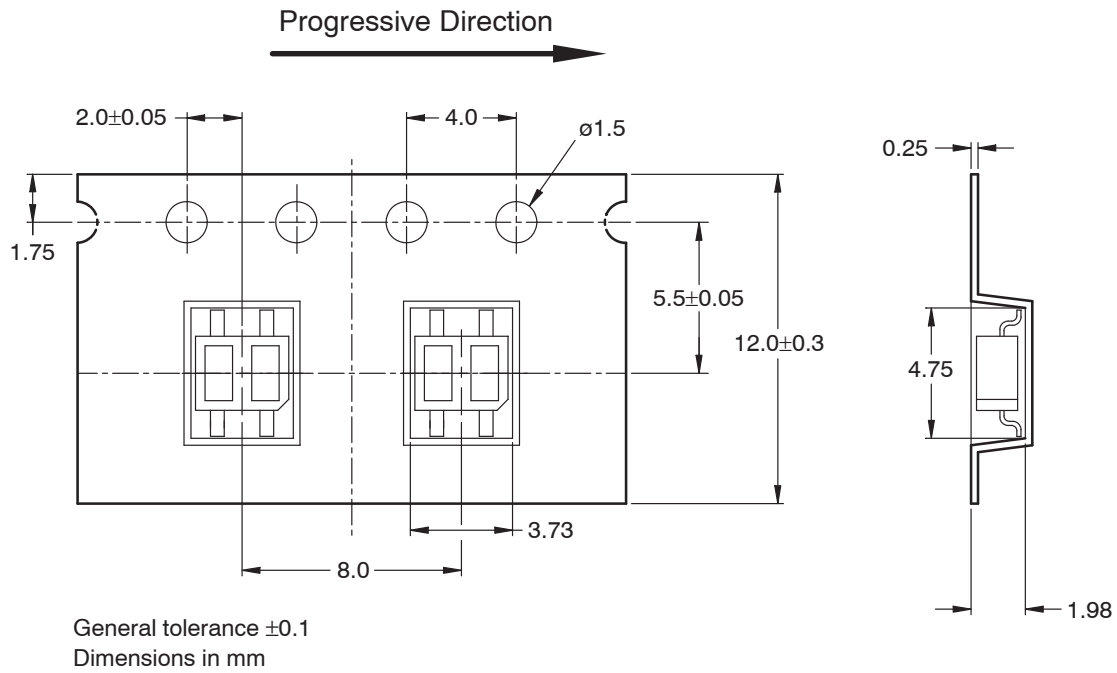


Figure 10. Taping Dimensions for GR Option

## REEL DIMENSIONS

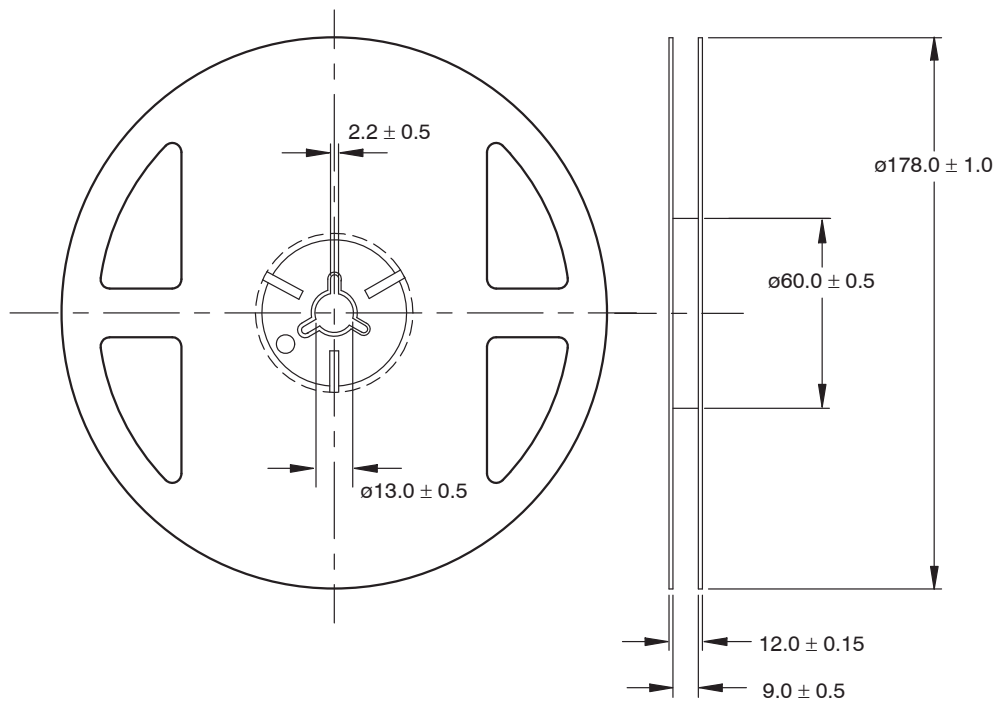


Figure 11. Reel Dimensions

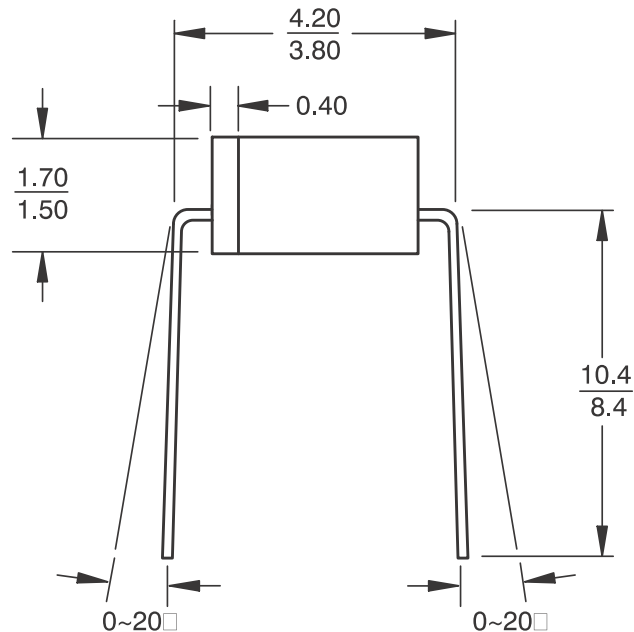
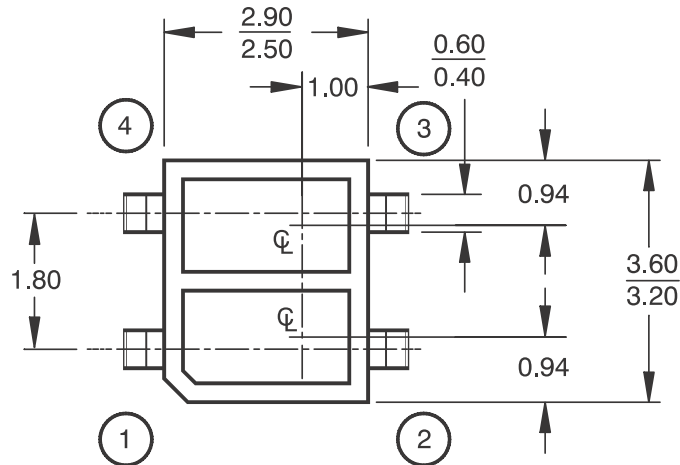
## QRE1113, QRE1113GR, QRE1114GR

### Precautionary Notes

1. Refer to application note AND8003/D, "Storage and Handling of Dry Packed Surface Mounted Devices" for details of handling procedure.
2. Product soldering terminals are silver plated and oxidization may occur with prolonged exposure to ambient environment. Oxidized terminal may have poor solderability performance. Keep unsealed devices in moisture barrier bag sealed with desiccant or in dry cabinet at <5% relative humidity.
3. Store PCB in sealed moisture barrier bag together with desiccant or store in dry cabinet at <5% relative humidity. Mounted device that has been exposed to ambient environment for long period of time may suffer moisture related damage if PCB is subjected to subsequent high temperature processes.

**REFLECTIVE RECTANGULAR THROUGH HOLE**  
CASE 100AQ  
ISSUE O

DATE 30 SEP 2016



**Notes:**

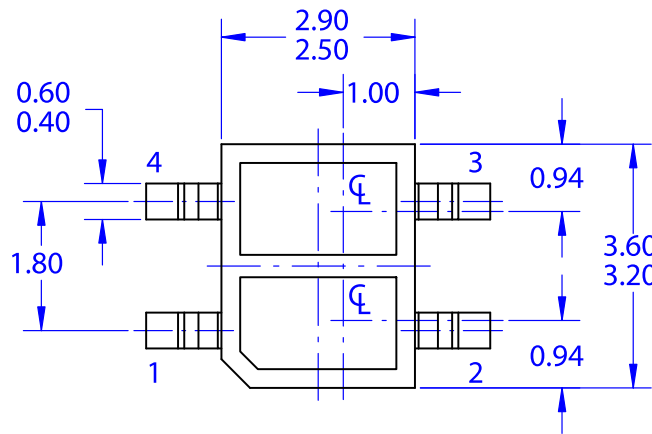
1. Dimensions for all drawings are in millimeters.
2. Tolerance of  $\pm 0.15$  mm on all non-nominal dimensions

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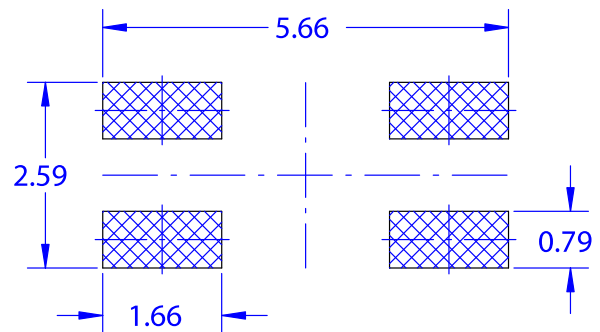
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CASE 100CY  
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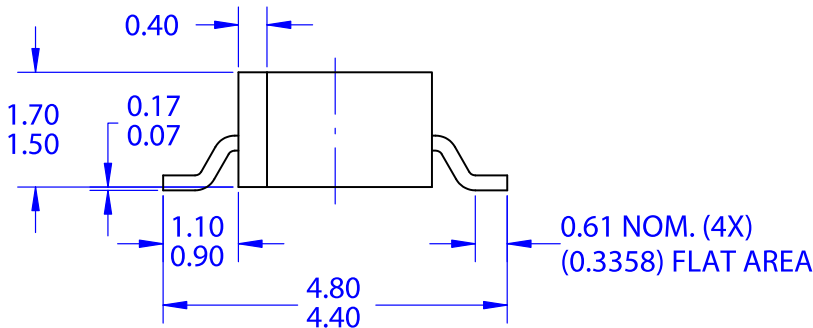
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TOP VIEW



LAND PATTERN RECOMMENDATION



SIDE VIEW

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