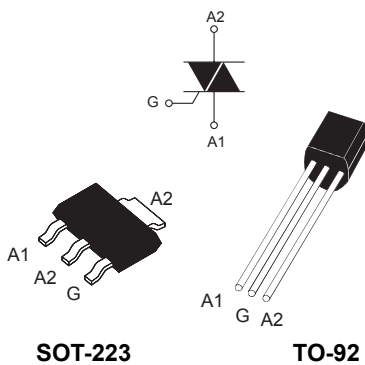
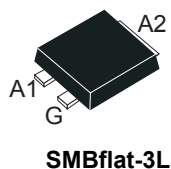


Standard 1 A Triacs



SOT-223

TO-92



SMBflat-3L

Features

- On-state rms current, $I_{T(RMS)}$ 1 A
- Repetitive peak off-state voltage, V_{DRM}/V_{RRM} 600 or 800 V
- Triggering gate current, $I_{GT(Q1)}$ 3 to 25 mA

Applications

- AC switching
- Home appliances

Description

The Z01 series is suitable for general purpose AC switching applications. These devices are typically used in applications such as home appliances (electrovalve, pump, door lock, small lamp control), fan speed controllers,...

Different gate current sensitivities are available, allowing optimized performance when driven directly through microcontroller.

Product status link

[Z01](#)

Product summary

| | |
|-------------------|------------|
| $I_{T(RMS)}$ | 1 A |
| V_{DRM}/V_{RRM} | 600, 800 V |
| $I_{GTstandard}$ | 3 to 25 mA |

1 Characteristics

Table 1. Absolute maximum ratings

| Symbol | Parameters | Value | Unit | |
|--------------|---|--|-------------|-------------|
| $I_{T(RMS)}$ | RMS on-state current (full sine wave) | SOT-223 $T_{tab} = 90\text{ °C}$ | 1 | A |
| | | TO-92 $T_L = 50\text{ °C}$ | | |
| | | SMBflat-3L $T_{tab} = 107\text{ °C}$ | | |
| I_{TSM} | Non repetitive surge peak on-state current (full cycle, T_j initial = 25 °C) | F = 50 Hz $t_p = 20\text{ ms}$ | 8 | A |
| | | F = 60 Hz $t_p = 16.7\text{ ms}$ | 8.5 | |
| I^2t | I^2t value for fusing | $t_p = 10\text{ ms}$ | 0.35 | A^2s |
| di/dt | Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100\text{ ns}$ | F = 120 Hz $T_j = 125\text{ °C}$ | 20 | $A/\mu s$ |
| I_{GM} | Peak gate current | $t_p = 20\text{ }\mu s$ $T_j = 125\text{ °C}$ | 1 | A |
| $P_{G(AV)}$ | Average gate power dissipation | $T_j = 125\text{ °C}$ | 1 | W |
| T_{stg} | Storage junction temperature range | | -40 to +150 | $^{\circ}C$ |
| T_j | Operating junction temperature range | | -40 to +125 | $^{\circ}C$ |

Table 2. Electrical characteristics ($T_j = 25\text{ °C}$, unless otherwise specified)

| Symbol | Parameters | Quadrant | | Value | | | | Unit |
|-------------------|--|--------------|------|-------|----|----|-----|-----------|
| | | | | Z01 | | | | |
| | | | | 03 | 07 | 09 | 10 | |
| $I_{GT}^{(1)}$ | $V_D = 12\text{ V}$, $R_L = 30\text{ }\Omega$ | I - II - III | Max. | 3 | 5 | 10 | 25 | mA |
| | | IV | | 5 | 7 | 10 | 25 | |
| V_{GT} | | All | Max. | 1.3 | | | | V |
| V_{GD} | $V_D = V_{DRM}$, $R_L = 3.3\text{ k}\Omega$, $T_j = 125\text{ °C}$ | All | Min. | 0.2 | | | | V |
| $I_H^{(2)}$ | $I_T = 50\text{ mA}$ | | Max. | 7 | 10 | 10 | 25 | mA |
| I_L | $I_G = 1.2 I_{GT}$ | I - III - IV | Max. | 7 | 10 | 15 | 25 | mA |
| | | II | Max. | 15 | 20 | 25 | 50 | |
| $dV/dt^{(2)}$ | $V_D = 67\% V_{DRM}$ gate open, $T_j = 110\text{ °C}$ | | Min. | 10 | 20 | 50 | 100 | $V/\mu s$ |
| $(dV/dt)_c^{(2)}$ | $(di/dt)_c = 0.44\text{ A/ms}$, $T_j = 110\text{ °C}$ | | Min. | 0.5 | 1 | 2 | 5 | $V/\mu s$ |

1. Minimum I_{GT} is guaranteed at 5% of I_{GT} max.

2. For both polarities of A2 referenced to A1

Table 3. Static electrical characteristics

| Symbol | Test conditions | T_j | | Value | Unit |
|------------------------|--|--------|------|-------|------|
| $V_T^{(1)}$ | $I_{TM} = 1.4 \text{ A}$, $t_p = 380 \mu\text{s}$ | 25 °C | Max. | 1.60 | V |
| $V_{TO}^{(1)}$ | Threshold on-state voltage | 125 °C | Max. | 0.95 | V |
| R_d | Dynamic resistance | 125 °C | Max. | 400 | mΩ |
| I_{DRM} I_{RRM} | $V_{DRM} = V_{RRM}$ | 25 °C | Max. | 5 | μA |
| | | 125 °C | | 0.5 | mA |

1. For both polarities of A2 referenced to A1

Table 4. Thermal resistance

| Symbol | Parameters | | Max. value | Unit |
|---------------|--|------------|------------|------|
| $R_{th(j-t)}$ | Max. junction to tab (AC) | SOT-223 | 25 | °C/W |
| | | SMBflat-3L | 14 | |
| $R_{th(j-l)}$ | Max. junction to lead (AC) | TO-92 | 60 | |
| $R_{th(j-a)}$ | Junction to ambient ($S^{(1)} = 5 \text{ cm}^2$) | SOT-223 | 60 | |
| | | SMBflat-3L | 75 | |
| | Junction to ambient | TO-92 | 150 | |

1. Copper surface under tab.

1.1 Characteristics (curves)

Figure 1. Maximum power dissipation versus on-state RMS current (full cycle)

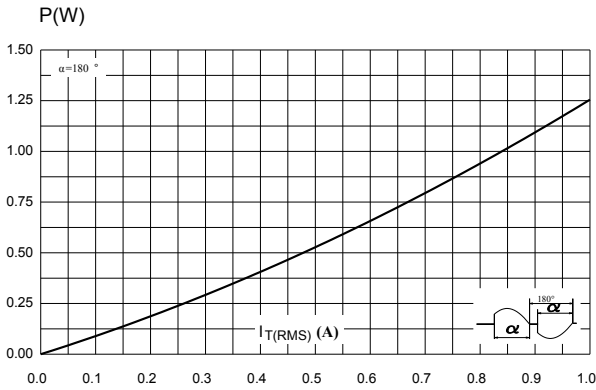


Figure 2. RMS on-state current versus lead (TO-92) or tab (SOT-223, SMBflat-3L) temperature (full cycle)

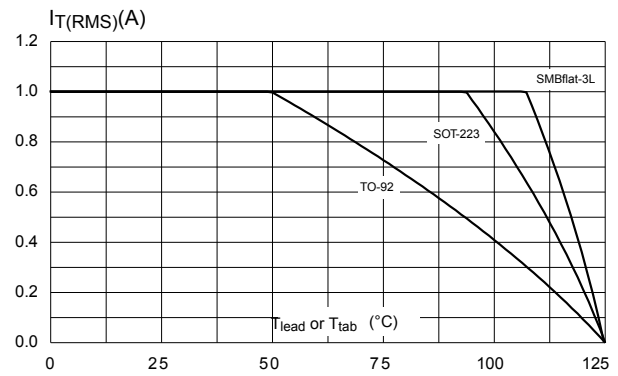


Figure 3. On-state rms current versus ambient temperature (free air convection full cycle)

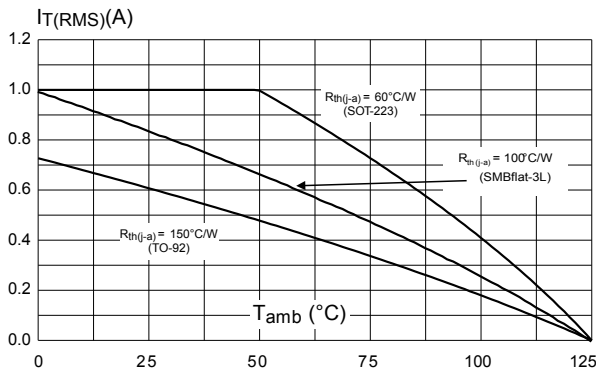


Figure 4. Relative variation of thermal impedance versus pulse duration ($Z_{th(j-a)}$)

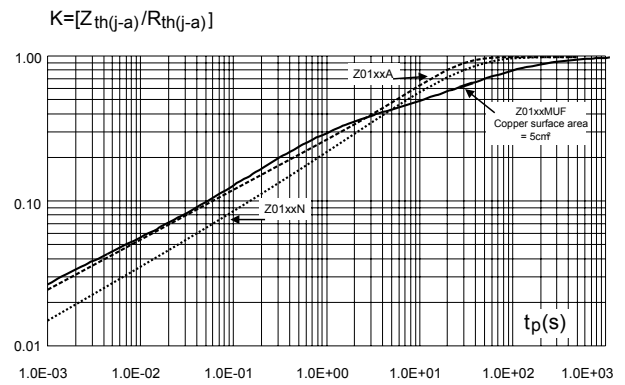


Figure 5. Relative variation of holding current and latching current versus junction temperature (typ. values)

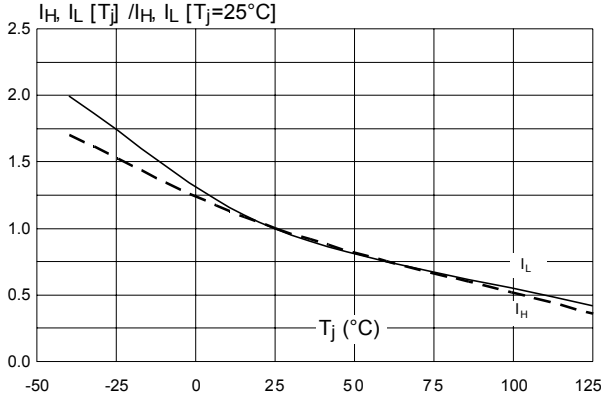


Figure 6. Relative variation of gate trigger current (I_{GT}) and voltage (V_{GT}) versus junction temperature

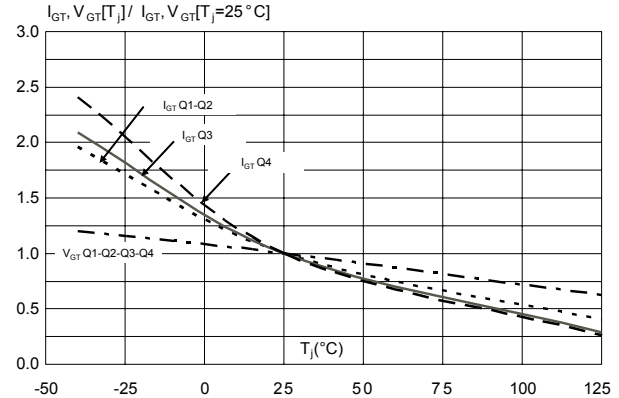


Figure 7. Surge peak on-state current versus number of cycles

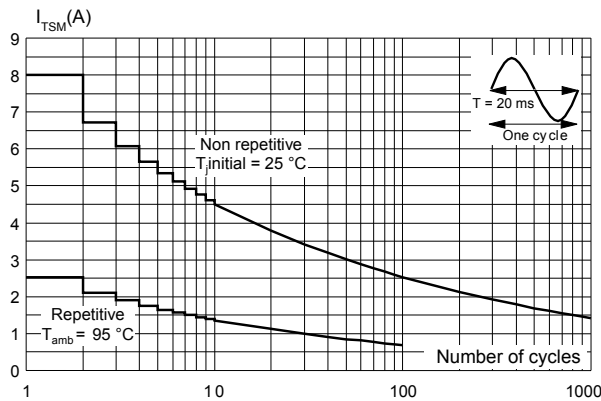


Figure 8. Non-repetitive surge peak on-state current and corresponding value of I^2t sinusoidal pulse width

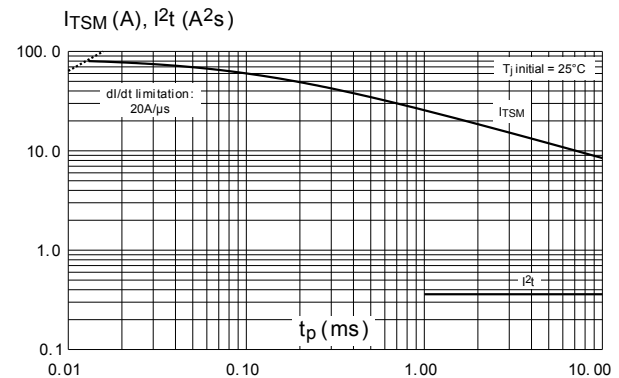


Figure 9. On-state characteristics (maximum values) ($I_{TM} = f(V_{TM})$)

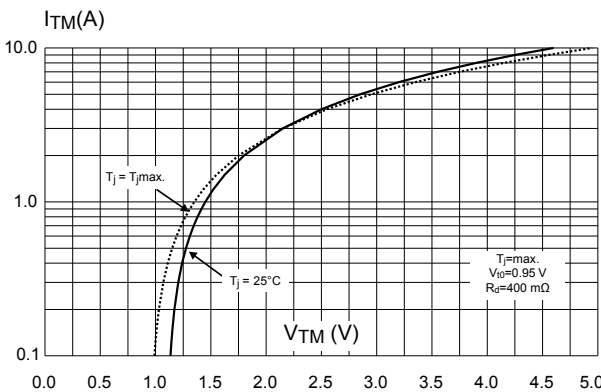


Figure 10. Relative variation of critical rate of decrease of main current (dI/dt) versus junction temperature

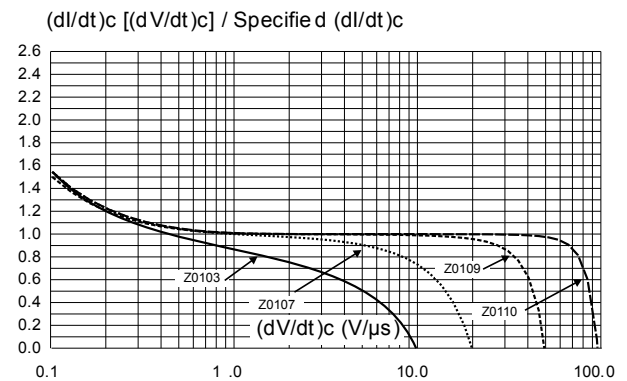


Figure 11. Relative variation of critical rate of decrease of main current (dI/dt) versus junction temperature

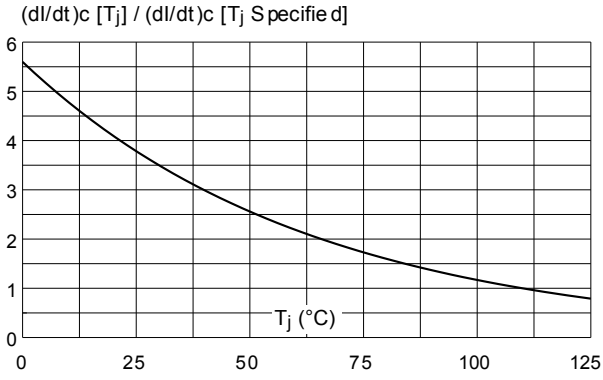


Figure 12. SOT-223 and SMBflat-3L thermal resistance junction to ambient versus copper surface under case

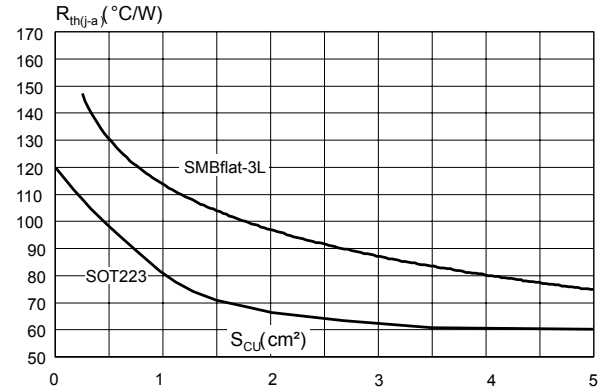
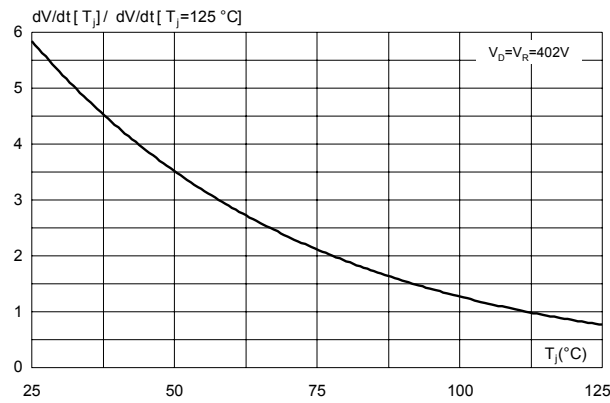


Figure 13. Relative variation of static dV/dt immunity versus junction temperature (gate open)



2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

2.1 SOT-223 package information

- Epoxy meets UL94, V0
- Lead free plating + halogen-free molding resin

Figure 14. SOT-223 package outline

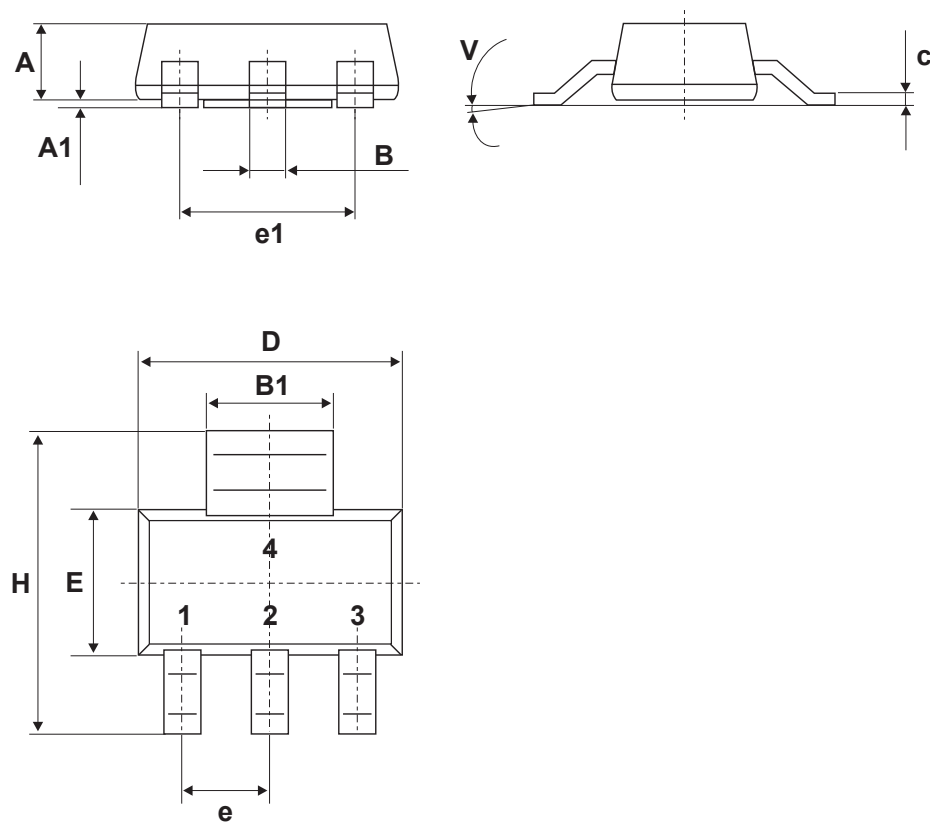
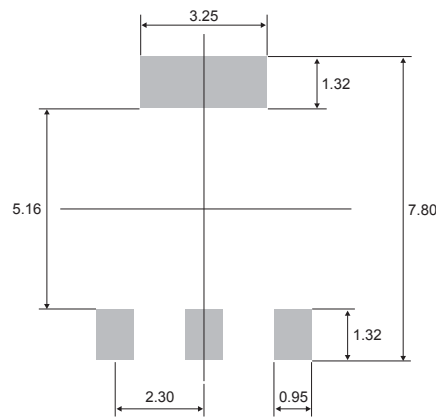


Table 5. SOT-223 package mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|------|------|-----------------------|--------|--------|
| | Millimeters | | | Inches ⁽¹⁾ | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | | 1.80 | | | 0.0709 |
| A1 | | 0.02 | 0.10 | | 0.0008 | 0.0039 |
| B | 0.60 | 0.70 | 0.85 | 0.024 | 0.0276 | 0.0335 |
| B1 | 2.90 | 3.00 | 3.15 | 0.114 | 0.1181 | 0.1240 |
| c | 0.24 | 0.26 | 0.35 | 0.009 | 0.0102 | 0.0138 |
| D | 6.30 | 6.50 | 6.70 | 0.248 | 0.2559 | 0.2638 |
| e | | 2.3 | | | 0.0906 | |
| e1 | | 4.6 | | | 0.1811 | |
| E | 3.30 | 3.50 | 3.70 | 0.130 | 0.1378 | 0.1457 |
| H | 6.70 | 7.00 | 7.30 | 0.264 | 0.2756 | 0.2874 |
| V | 10° max. | | | | | |

1. Inches only for reference

Figure 15. SOT-223 footprint (dimensions in mm)


2.2 TO-92 package information

- Epoxy meets UL94, V0
- Lead free plating + halogen-free molding resin

Figure 16. TO-92 package outline

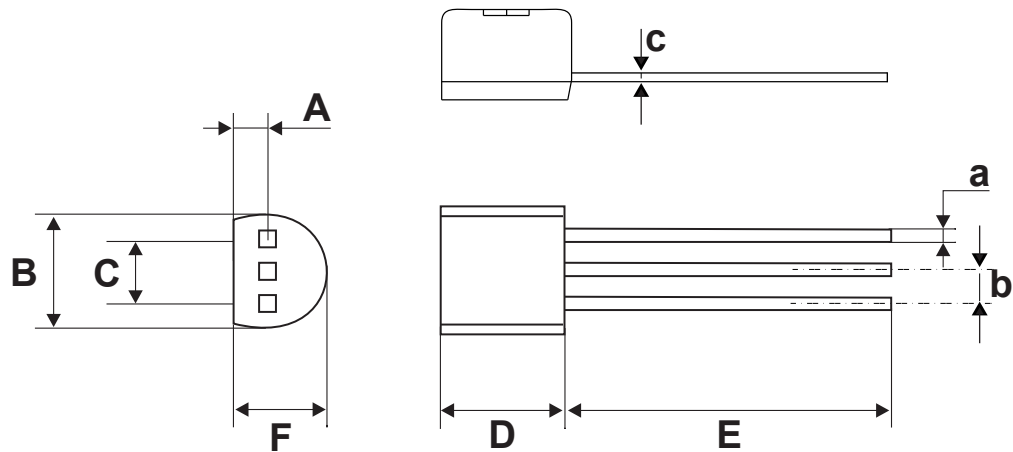


Table 6. TO-92 package mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|------|------|-----------------------|--------|--------|
| | Millimeters | | | Inches ⁽¹⁾ | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | 1.35 | | | 0.0531 | |
| B | | | 4.70 | | | 0.1850 |
| C | | 2.54 | | | 0.1000 | |
| D | 4.40 | | | 0.1732 | | |
| E | 12.70 | | | 0.5000 | | |
| F | | | 3.70 | | | 0.1457 |
| a | | | 0.50 | | | 0.0197 |
| b | | 1.27 | | | 0.500 | |
| c | | | 0.48 | | | 0.0189 |

1. Inches dimensions given for information

2.3 SMBflat-3L package information

- Epoxy meets UL94, V0
- Lead-free package

Figure 17. SMBflat-3L package outline

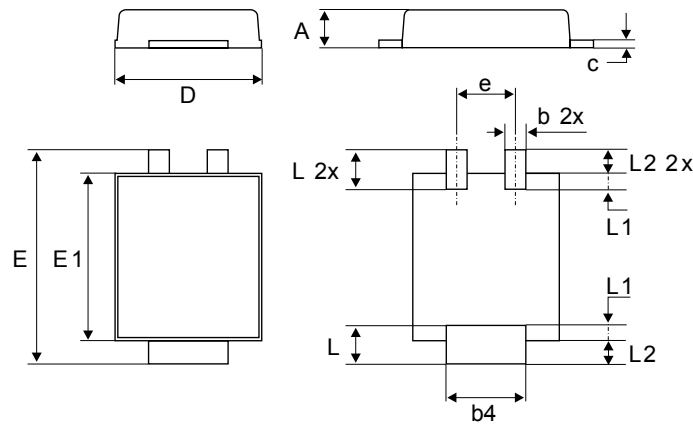


Table 7. SMBflat-3L mechanical data

| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.90 | | 1.10 | 0.035 | | 0.044 |
| b | 0.35 | | 0.65 | 0.014 | | 0.026 |
| b4 | 1.95 | | 2.20 | 0.070 | | 0.087 |
| c | 0.15 | | 0.40 | 0.005 | | 0.016 |
| D | 3.30 | | 3.95 | 0.129 | | 0.156 |
| E | 5.10 | | 5.60 | 0.200 | | 0.221 |
| E1 | 4.05 | | 4.60 | 0.159 | | 0.182 |
| L | 0.75 | | 1.50 | 0.029 | | 0.060 |
| L1 | | 0.40 | | | 0.016 | |
| L2 | | 0.60 | | | 0.024 | |
| e | | 1.60 | | | 0.063 | |

Figure 18. Footprint recommendations, dimensions in mm (inches)

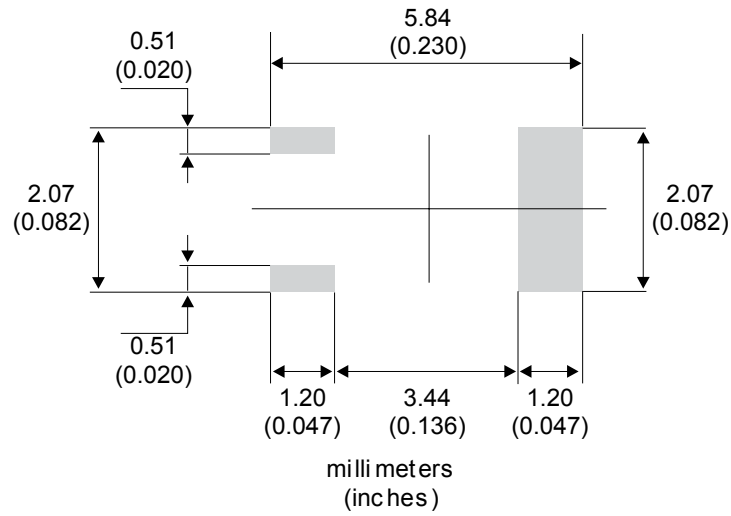
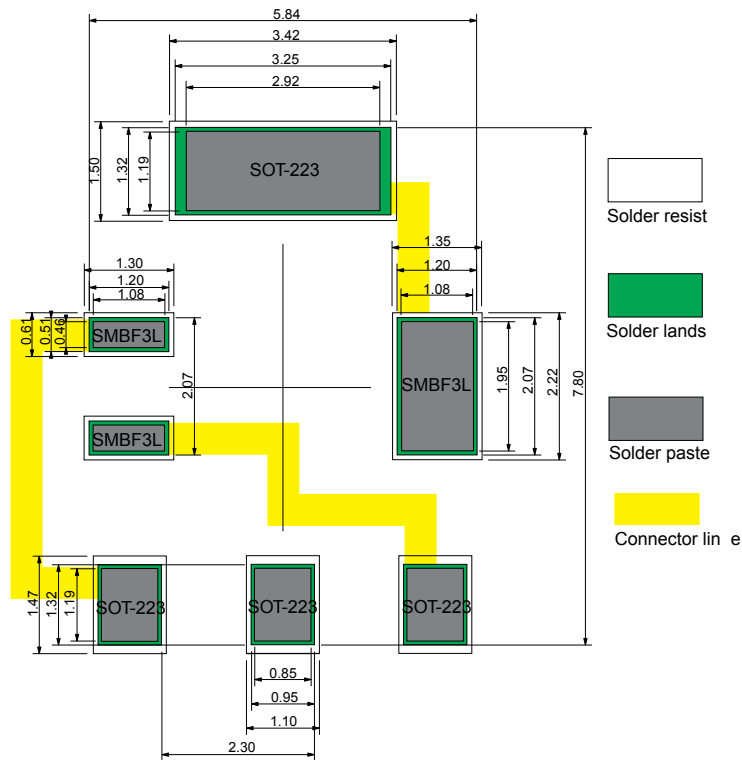
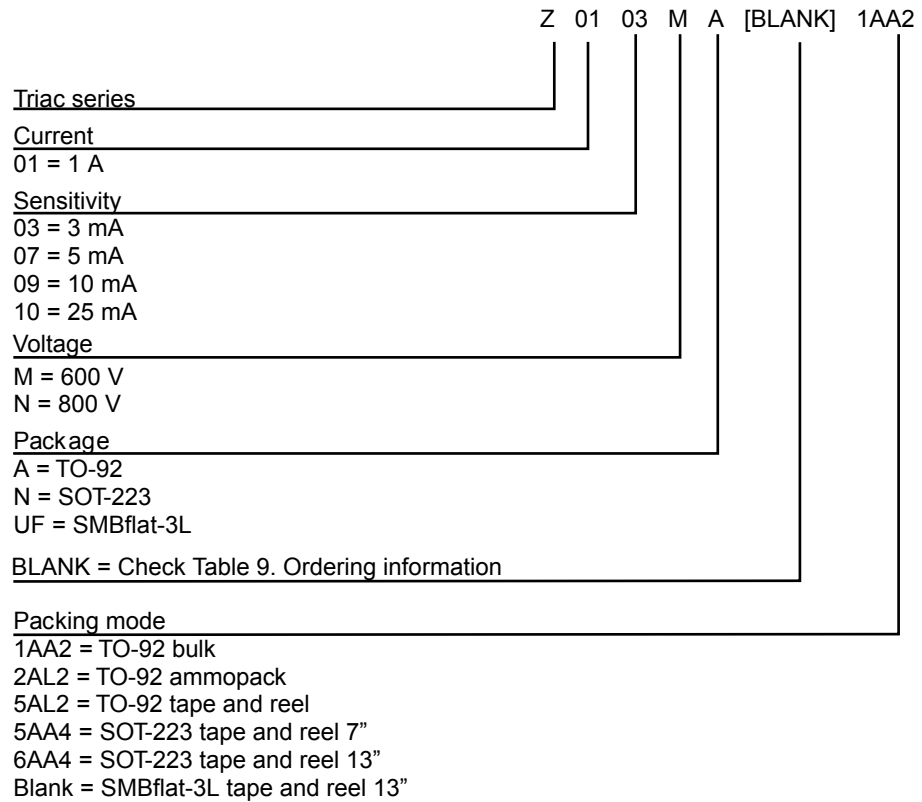


Figure 19. Footprint and connectors for SOT-223 or SMBflat-3L (dimensions in mm)



3 Ordering information

Figure 20. Ordering information scheme



3.1 Product selector

Table 8. Product selector

| Part Number | | Sensitivity | Type | Package |
|-------------|---------|-------------|----------|------------|
| 600 | 800 | | | |
| Z0103MA | Z0103NA | 3 mA | Standard | TO-92 |
| Z0103MN | Z0103NN | | | SOT-223 |
| Z0107MA | Z0107NA | 5 mA | | TO-92 |
| Z0107MN | Z0107NN | | | SOT-223 |
| Z0109MA | Z0109NA | 10 mA | | TO-92 |
| Z0109MN | Z0109NN | | | SOT-223 |
| Z0110MA | Z0110NA | 25 mA | | TO-92 |
| Z0110MN | Z0110NN | | | SOT-223 |
| Z0103MUF | | 3 mA | | SMBflat-3L |
| Z0107MUF | | 5 mA | | |
| Z0109MUF | | 10 mA | | |

3.2 Ordering information

Table 9. Ordering information

| Order code ⁽¹⁾ | Marking ⁽¹⁾ | Package | Weight | Base qty. | Delivery mode | | |
|---------------------------|------------------------|---------|--------|------------|---------------|----------|------|
| Z01xyA 1AA2 | Z01xyA | TO-92 | 0.2 g | 2500 | Bulk | | |
| Z01xyA 2AL2 | | | | 2000 | Ammopack | | |
| Z01xyA 5AL2 | | | | 2000 | Tape and reel | | |
| Z0103yN 5AA4 | Z3y | SOT-223 | 0.12 g | 1000 | | | |
| Z0103MN 6AA4 | Z3M | | | 4000 | | | |
| Z0107yN 5AA4 | Z7y | | | 1000 | | | |
| Z0107MN 6AA4 | Z7M | | | 4000 | | | |
| Z0109yN 5AA4 | Z9y | | | 1000 | | | |
| Z0109NN6AA4 | Z9N | | | 4000 | | | |
| Z0103MUF | Z3M | | | SMBflat-3L | | 46.78 mg | 5000 |
| Z0107MUF | Z7M | | | | | | 5000 |
| Z0109MUF | Z9M | | | | | | 5000 |

1. xx = sensitive, y = voltage, and check [Figure 20. Ordering information scheme](#).

Revision history

Table 10. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| Oct-2001 | 4 | Last update. |
| 10-Feb-2005 | 5 | Package: TO-92 tape and reel delivery mode 5AL2 added. |
| 09-May-2005 | 6 | Table 4 on page 2: typo. mistake corrected 1. (dV/dt)c instead of (dI/dt)c 2. V/μs unit instead of A/ms |
| 21-Apr-2006 | 7 | Reformatted to current standard. Table 2 on page 2: Typo corrected. Values for IGT split into two separate rows. |
| 10-Oct-2010 | 8 | Table 2: modified test conditions for (dV/dt)c. Changed "ambient" to "lead or tab" in Figure 2. |
| 20-Oct-2010 | 9 | Package: SOT-223 13" tape and reel added = 6AA4. |
| 14-Dec-2010 | 10 | Added package SMBflat-3L. Updated dimensions in Table 6. Updated Figure 3 and Figure 12. Updated Table 5: Product Selector. |
| 02-May-2019 | 11 | Updated Table 9. Ordering information . Minor text changed. |