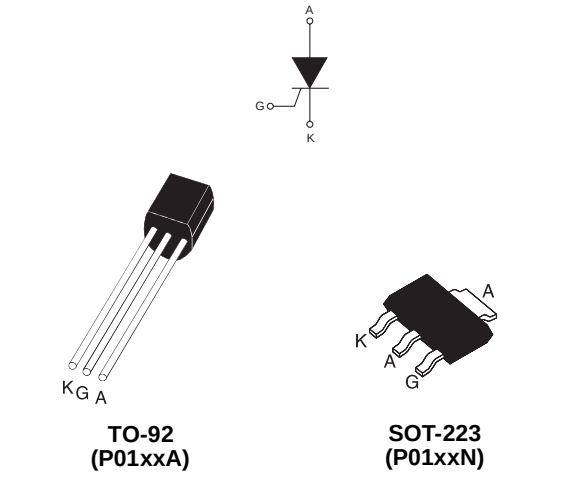
# P01 Series

**SENSITIVE**

## 0.8A SCRs

### MAIN FEATURES:

| Symbol | Value | Unit |
|---|---|---|
| $I_{T(RMS)}$ | 0.8 | A |
| $V_{DRM}/V_{RRM}$ | 400 and 600 | V |
| $I_{GT}$ | 5 to 200 | µA |




**TO-92 (P01xxA)** **SOT-223 (P01xxN)**

### DESCRIPTION

Thanks to highly sensitive triggering levels, the P01 SCR series is suitable for all applications where available gate current is limited, such as ground fault circuit interruptors, pilot circuits in solid state relays, stand-by mode power supplies, smoke and alarm detectors.
Available in through-hole or surface mount packages, the voltage capability of this series has been upgrated since its introduction, to reach 600 V.

### ABSOLUTE RATINGS (limiting values)

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $I_{T(RMS)}$ | RMS on-state current (180° conduction angle) | TO-92 | Tl = 55°C | 0.8 | A |
| | | SOT-223 | Tamb = 70°C | | |
| $IT_{(AV)}$ | Average on-state current (180° conduction angle) | TO-92 | Tl = 55°C | 0.5 | A |
| | | SOT-223 | Tamb = 70°C | | |
| $I_{TSM}$ | Non repetitive surge peak on-state current | tp = 8.3 ms | Tj = 25°C | 8 | A |
| | | tp = 10 ms | | 7 | |
| $I^2t$ | $I^2t$ Value for fusing | tp = 10ms | Tj = 25°C | 0.24 | $A^2S$ |
| dI/dt | Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , tr ≤ 100 ns | F = 60 Hz | Tj = 125°C | 50 | A/µs |
| $I_{GM}$ | Peak gate current | tp = 20 µs | Tj = 125°C | 1 | A |
| $P_{G(AV)}$ | Average gate power dissipation | | Tj = 125°C | 0.1 | W |
| $T_{stg}$<br>Tj | Storage junction temperature range<br>Operating junction temperature range | | | - 40 to + 150<br>- 40 to + 125 | °C |

## ELECTRICAL CHARACTERISTICS (Tj = 25°C, unless otherwise specified)

| Symbol | Test Conditions | | | P01xx | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | 02 | 11 | 18 | |
| $I_{GT}$ | $V_D$ = 12 V $R_L$ = 140 Ω | | MIN. | - | 4 | 0.5 | µA |
| | | | MAX. | 200 | 25 | 5 | |
| $V_{GT}$ | | | MAX. | 0.8 | | | V |
| $V_{GD}$ | $V_D = V_{DRM}$ $R_L$ = 3.3 kΩ $R_{GK}$ = 1 kΩ | Tj = 125°C | MIN. | 0.1 | | | V |
| $V_{RG}$ | $I_{RG}$ = 10 µA | | MIN. | 8 | | | V |
| $I_H$ | $I_T$ = 50 mA $R_{GK}$ = 1 kΩ | | MAX. | 5 | | | mA |
| $I_L$ | $I_G$ = 1 mA $R_{GK}$ = 1 kΩ | | MAX. | 6 | | | mA |
| dV/dt | $V_D$ = 67 % $V_{DRM}$ $R_{GK}$ = 1 kΩ | Tj = 125°C | MIN. | 75 | 80 | 75 | V/µs |
| $V_{TM}$ | $I_{TM}$ = 1.6 A tp = 380 µs | Tj = 25°C | MAX. | 1.95 | | | V |
| $V_{t0}$ | Threshold voltage | Tj = 125°C | MAX. | 0.95 | | | V |
| $R_d$ | Dynamic resistance | Tj = 125°C | MAX. | 600 | | | mΩ |
| $I_{DRM}$ $I_{RRM}$ | $V_{DRM} = V_{RRM}$ = 400 V $R_{GK}$ = 1 kΩ | Tj = 25°C | MAX. | 1 | | | µA |
| | $V_{DRM} = V_{RRM}$ = 600 V $R_{GK}$ = 1 kΩ | | | 10 | | | µA |
| | $V_{DRM} = V_{RRM}$ $R_{GK}$ = 1 kΩ | Tj = 125°C | MAX. | 100 | | | µA |

## THERMAL RESISTANCES

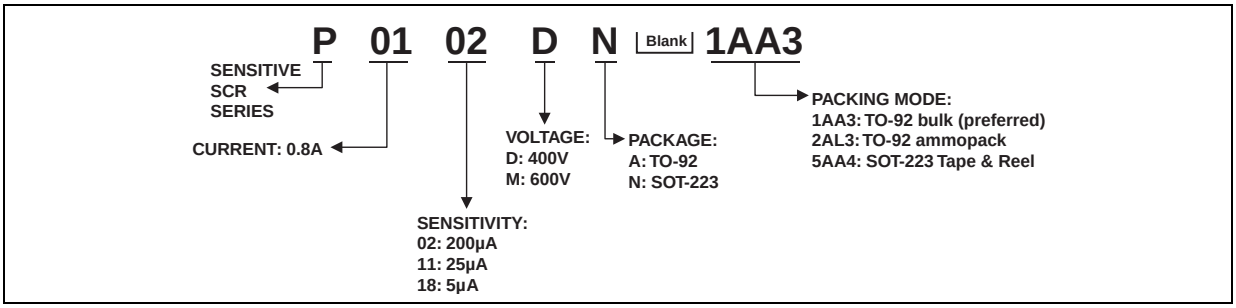
| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $R_{th(j-i)}$ | Junction to case (DC) | | TO-92 | 80 | °C/W |
| $R_{th(j-t)}$ | Junction to tab (DC) | | SOT-223 | 30 | °C/W |
| $R_{th(j-a)}$ | Junction to ambient | | TO-92 | 150 | |
| | | S = 5 $cm^2$ | SOT-223 | 60 | |

S = Copper surface under tab

## PRODUCT SELECTOR

| Part Number | Voltage | | Sensitivity | Package |
|---|---|---|---|---|
| | 400 V | 600 V | | |
| P0102DA | X | | 200 µA | TO-92 |
| P0102DN | X | | 200 µA | SOT-223 |
| P0102MA | | X | 200 µA | TO-92 |
| P0102MN | | X | 200 µA | SOT-223 |
| P0111DA | X | | 25 µA | TO-92 |
| P0111DN | X | | 25 µA | SOT-223 |
| P0111MA | | X | 25 µA | TO-92 |
| P0111MN | | X | 25 µA | SOT-223 |
| P0118DA | X | | 5 µA | TO-92 |
| P0118DN | X | | 5 µA | SOT-223 |
| P0118MA | | X | 5 µA | TO-92 |
| P0118MN | | X | 5 µA | SOT-223 |

## ORDERING INFORMATION




## OTHER INFORMATION

| Part Number | Marking | Weight | Base Quantity | Packing mode |
|---|---|---|---|---|
| P01xxyA 1AA3 | P01xxyA | 0.2 g | 2500 | Bulk |
| P01xxyA 2AL3 | P01xxyA | 0.2 g | 2000 | Ammopack |
| P0102yN 5AA4 | P2y | 0.12 g | 1000 | Tape & reel |
| P0111yN 5AA4 | P1y | 0.12 g | 1000 | Tape & reel |
| P0118yN 5AA4 | P8y | 0.12 g | 1000 | Tape & reel |

**Note**: xx = sensitivity, y = voltage

**Fig. 1:** Maximum average power dissipation versus average on-state current.

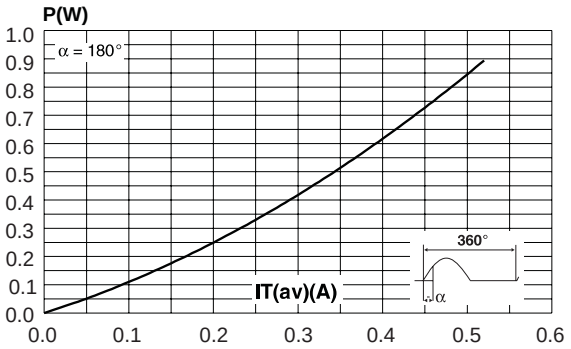



**Fig. 2-1:** Average and D.C. on-state current versus lead temperature.

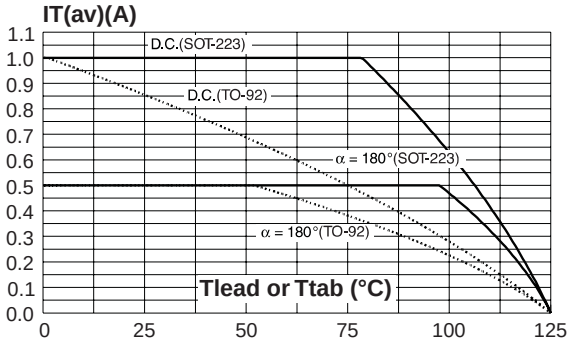



**Fig. 2-2:** Average and D.C. on-state current versus ambient temperature (device mounted on FR4 with recommended pad layout for SOT-223).

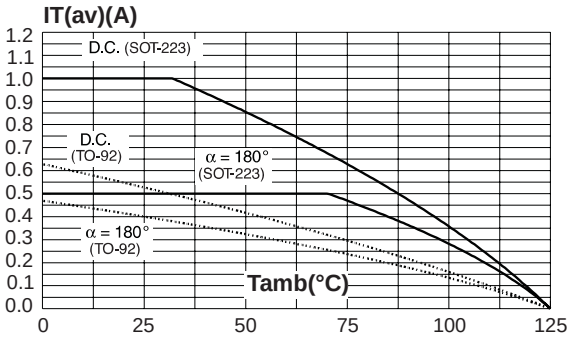



**Fig. 3:** Relative variation of thermal impedance junction to ambient versus pulse duration.

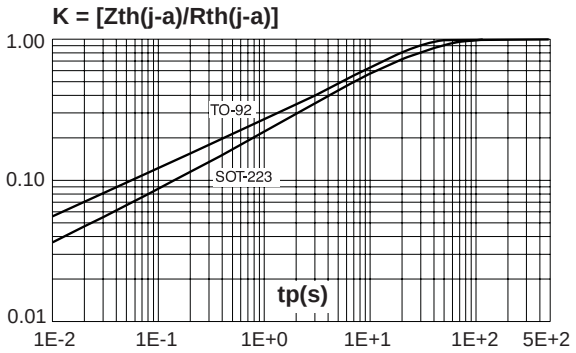


**Fig. 4:** Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values).

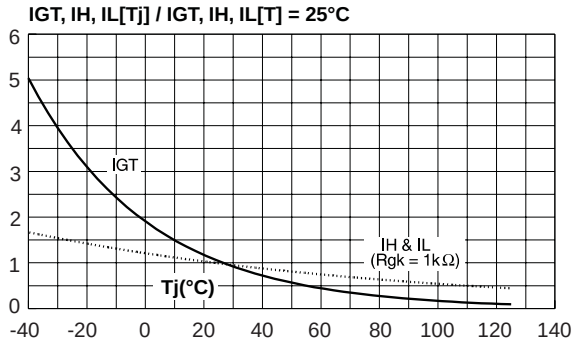



**Fig. 5:** Relative variation of holding current versus gate-cathode resistance (typical values).

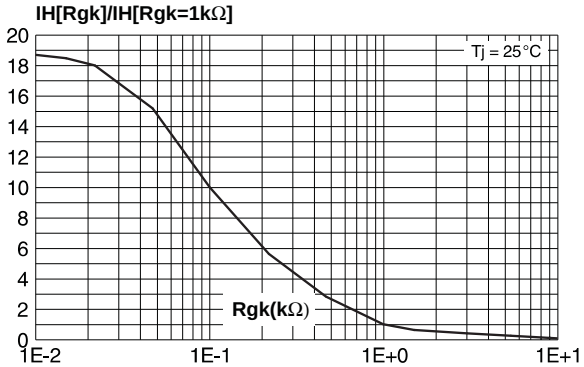



**Fig. 6:** Relative variation of dV/dt immunity versus gate-cathode resistance (typical values).

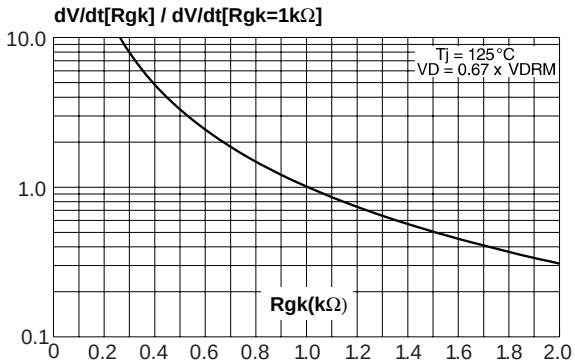



**Fig. 7:** Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values).

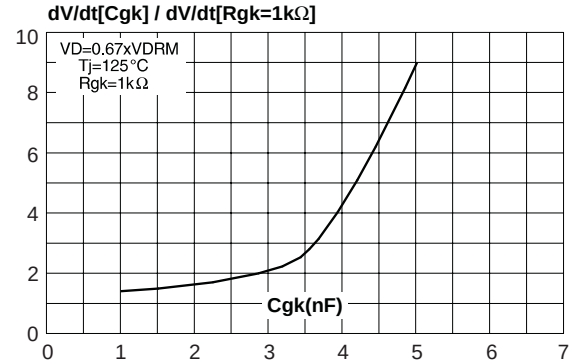



**Fig. 8:** Surge peak on-state current versus number of cycles.

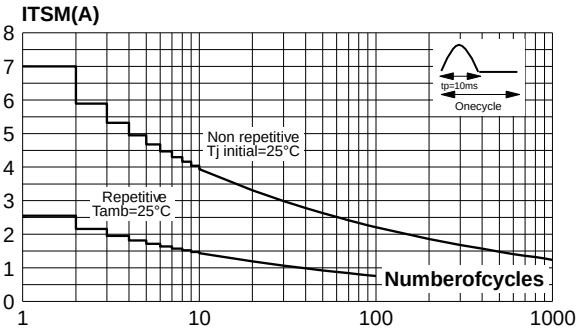



**Fig. 9:** Non-repetitive surge peak on-state current for a sinusoidal pulse with width tp < 10 ms, and corresponding value of I²t.

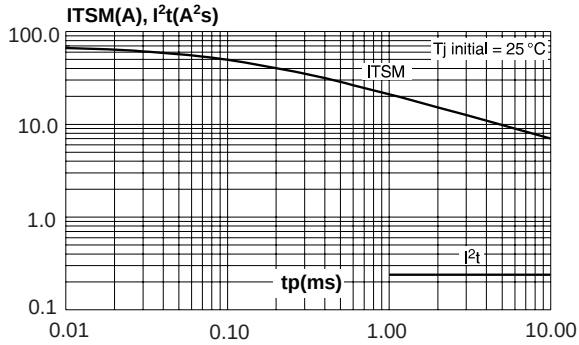


**Fig. 10:** On-state characteristics (maximum values).

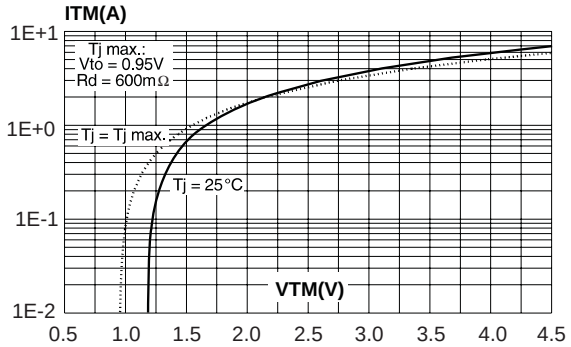
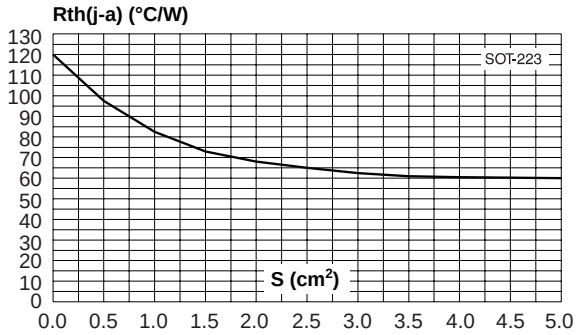
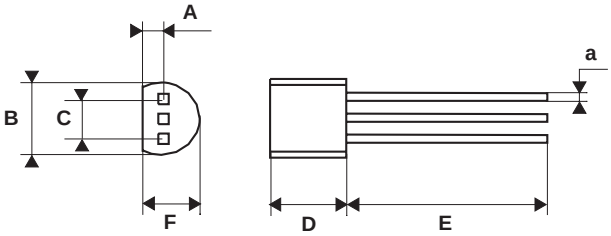



**Fig. 11:** SOT-223 Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness: 35 µm).




## PACKAGE MECHANICAL DATA

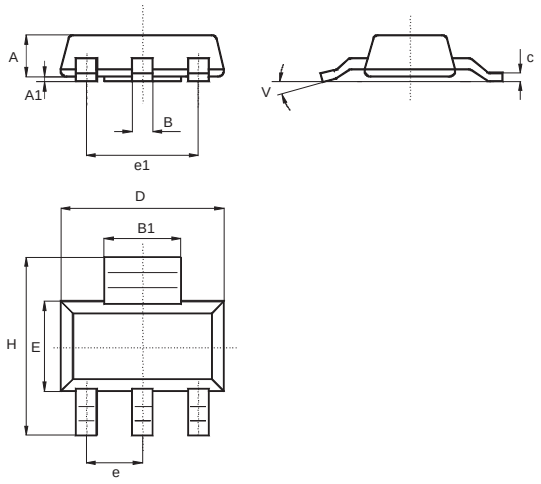
TO-92 (Plastic)




| REF. | DIMENSIONS | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | 1.35 | | | 0.053 | |
| B | | | 4.70 | | | 0.185 |
| C | | 2.54 | | | 0.100 | |
| D | 4.40 | | | 0.173 | | |
| E | 12.70 | | | 0.500 | | |
| F | | | 3.70 | | | 0.146 |
| a | | | 0.50 | | | 0.019 |

## PACKAGE MECHANICAL DATA

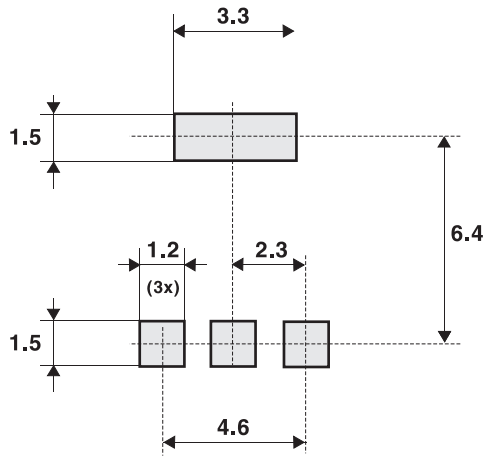
SOT-223 (Plastic)




| REF. | DIMENSIONS | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | | 1.80 | | | 0.071 |
| A1 | 0.02 | | 0.1 | 0.0008 | | 0.004 |
| B | 0.60 | 0.70 | 0.85 | 0.024 | 0.027 | 0.034 |
| B1 | 2.90 | 3.00 | 3.15 | 0.114 | 0.118 | 0.124 |
| c | 0.24 | 0.26 | 0.35 | 0.009 | 0.010 | 0.014 |
| D | 6.30 | 6.50 | 6.70 | 0.248 | 0.256 | 0.264 |
| e | | 2.3 | | | 0.090 | |
| e1 | | 4.6 | | | 0.181 | |
| E | 3.30 | 3.50 | 3.70 | 0.130 | 0.138 | 0.146 |
| H | 6.70 | 7.00 | 7.30 | 0.264 | 0.276 | 0.287 |
| V | 10° max | | | | | |

## FOOTPRINT DIMENSIONS (in millimeters)

SOT-223 (Plastic)




Recommended soldering pattern SOT223

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