SGS-THOMSON MICROELECTRONICS

# SM4T6V8, A → 220, A
# SM4T6V8C, A → 200C, A

## UNI-AND BIDIRECTIONAL TRANSIENT VOLTAGE SUPPRESSORS

- HIGH SURGE CAPABILITY :
  400 W / 1 ms EXPO
- VERY FAST CLAMPING TIME :
  1 ps FOR UNIDIRECTIONAL TYPES
  5 ns FOR BIDIRECTIONAL TYPES
- LARGE VOLTAGE RANGE :
  5.5 V → 188 V
- ORDER CODE :
  TYPE NUMBER FOR UNIDIRECTIONAL TYPES, TYPE NUMBER + SUFFIX C FOR BIDIRECTIONAL TYPES

**SOD 6**
(Plastic)

### SURFACE MOUNT TRANSIL FEATURES

- A PERFECT PICK AND PLACE BEHAVIOUR
- AN EXCELLENT ON BOARD STABILITY
- A FULL COMPATIBILITY WITH BOTH GLUING AND PASTE SOLDERING TECHNOLOGIES
- BODY MARKED WITH TYPE CODE AND LOGO
- STANDARD PACKAGING : 12 mm TAPE (EIA STD. RS481)
- TINNED COPPER LEADS
- HIGH TEMPERATURE RESISTANT RESIN

### DESCRIPTION

Transient voltage suppressor diodes especially useful in protecting integrated circuits, MOS, hybrids and other voltage-sensitive semiconductors and components.

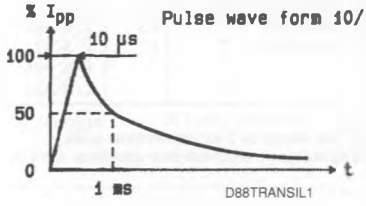
### ABSOLUTE RATINGS (limiting values)

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $P_p$ | Peak Pulse Power for 1 ms Exponential Pulse | $T_j$ Initial = 25 °C See note 1 | 400 | W |
| P | Power Dissipation on Infinite Heatsink | $T_{amb}$ = 25 °C | 1.2 | W |
| $I_{FSM}$ | Non Repetitive Surge Peak Forward Current for Unidirectional Types | $T_j$ Initial = 25 °C t = 10 ms | 50 | A |
| $T_{stg}$<br>$T_j$ | Storage and Operating Junction Temperature Range | | – 65 to 175<br>150 | °C<br>°C |
| $T_L$ | Maximum Lead Temperature for Soldering During 10 s | | 260 | °C |

### THERMAL RESISTANCE

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{th(j-l)}$ | Junction-leads | 20 | °C/W |

**Note :** 1. For surges upper than the maximum values, the diode will present a short-circuit anode-cathode.



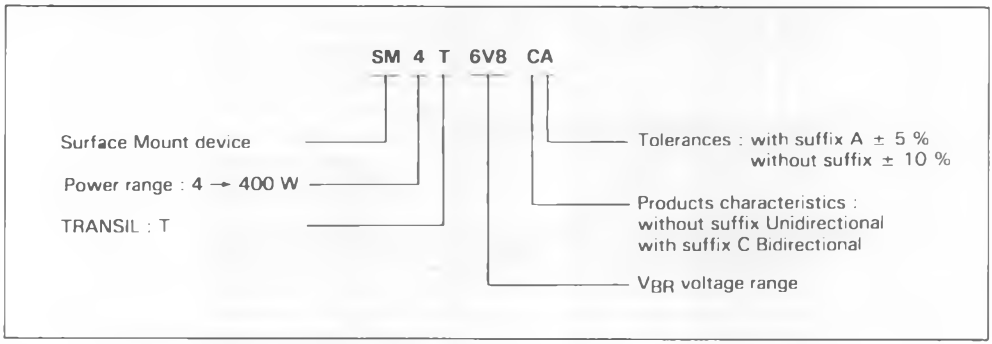
## ELECTRICAL CHARACTERISTICS ($T_j$ = 25 °C)

| Symbol | Parameter | | Value |
|---|---|---|---|
| $V_{RM}$ | Stand-off Voltage | | See tables |
| $V_{(BR)}$ | Breakdown Voltage | | |
| $V_{(CL)}$ | Clamping Voltage | | |
| $I_{pp}$ | Peak Pulse Current | | |
| $\alpha_T$ | Temperature Coefficient of $V_{(BR)}$ | | |
| C | Capacitance | | |
| $t_{clamping}$ | Clamping Time (0 volt to $V_{(BR)}$) | Unidirectional Types | 1 ps max. |
| | | Bidirectional Types | 5 ns max. |

| Types | | Marking | | $I_{RM}$ @ $V_{RM}$ max. | | $V_{(BR)}$* @ $I_R$ (V) | | | | $V_{(CL)}$ @ $I_{pp}$ max. 1ms expo | | $V_{(CL)}$ @ $I_{pp}$ max. 8-20µs expo | | $\alpha_T$ max. | C** typ. $V_R$=0 f=1MHz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unidirectional | Bidirectional | Unidirectional | Bidirectional | (µA) | (V) | min. | nom. | max. | (mA) | (V) | (A) | (V) | (A) | ($10^{-4}$/°C) | (pF) |
| SM4T6V8 | SM4T6V8C | QD | VD | 1000 | 5.5 | 6.12 | 6.8 | 7.48 | 10 | 10.8 | 37 | 14 | 164 | 5.7 | 3500 |
| SM4T6V8A | SM4T6V8CA | QE | VE | 1000 | 5.8 | 6.45 | 6.8 | 7.14 | 10 | 10.5 | 38 | 13.4 | 174 | 5.7 | 3500 |
| SM4T7V5 | SM4T7V5C | QF | VF | 500 | 6.05 | 6.75 | 7.5 | 8.25 | 10 | 11.7 | 34 | 15.2 | 151 | 6.1 | 3100 |
| SM4T7V5A | SM4T7V5CA | QG | VG | 500 | 6.4 | 7.13 | 7.5 | 7.88 | 10 | 11.3 | 35.4 | 14.5 | 160 | 6.1 | 3100 |
| SM4T10 | SM4T10C | QN | VN | 10 | 8.1 | 9 | 10 | 11 | 1 | 15 | 27 | 19.5 | 246 | 7.3 | 2000 |
| SM4T10A | SM4T10CA | QP | VP | 10 | 8.55 | 9.5 | 10 | 10.5 | 1 | 14.5 | 27.6 | 18.6 | 258 | 7.3 | 2000 |
| SM4T12 | SM4T12C | QS | VS | 5 | 9.72 | 10.8 | 12 | 13.2 | 1 | 17.3 | 23.1 | 22.7 | 211 | 7.8 | 1550 |
| SM4T12A | SM4T12CA | QT | VT | 5 | 10.2 | 11.4 | 12 | 12.6 | 1 | 16.7 | 24 | 21.7 | 221 | 7.8 | 1550 |
| SM4T15 | SM4T15C | QW | VW | 5 | 12.1 | 13.5 | 15 | 16.5 | 1 | 22 | 18.2 | 28.4 | 169 | 8.4 | 1200 |
| SM4T15A | SM4T15CA | QX | VX | 5 | 12.8 | 14.3 | 15 | 15.8 | 1 | 21.2 | 19 | 27.2 | 176 | 8.4 | 1200 |
| SM4T18 | SM4T18C | RD | UD | 5 | 14.5 | 16.2 | 18 | 19.8 | 1 | 26.5 | 15.1 | 34 | 141 | 8.8 | 975 |
| SM4T18A | SM4T18CA | RE | UE | 5 | 15.3 | 17.1 | 18 | 18.9 | 1 | 25.2 | 16 | 32.5 | 148 | 8.8 | 975 |
| SM4T22 | SM4T22C | RH | UH | 5 | 17.8 | 19.8 | 22 | 24.2 | 1 | 31.9 | 12.5 | 41.2 | 116 | 9.2 | 800 |
| SM4T22A | SM4T22CA | RK | UK | 5 | 18.8 | 20.9 | 22 | 23.1 | 1 | 30.6 | 13 | 39.3 | 122 | 9.2 | 800 |
| SM4T24 | SM4T24C | RL | UL | 5 | 19.4 | 21.6 | 24 | 26.4 | 1 | 34.7 | 11.5 | 44.9 | 107 | 9.4 | 725 |
| SM4T24A | SM4T24CA | RM | UM | 5 | 20.5 | 22.8 | 24 | 25.2 | 1 | 33.2 | 12 | 42.8 | 112 | 9.4 | 725 |
| SM4T27 | SM4T27C | RN | UN | 5 | 21.8 | 24.3 | 27 | 29.7 | 1 | 39.1 | 10.2 | 50.5 | 95 | 9.6 | 625 |
| SM4T27A | SM4T27CA | RP | UP | 5 | 23.1 | 25.7 | 27 | 28.4 | 1 | 37.5 | 10.7 | 48.3 | 99 | 9.6 | 625 |
| SM4T30 | SM4T30C | RQ | UQ | 5 | 24.3 | 27 | 30 | 33 | 1 | 43.5 | 9.2 | 56.1 | 86 | 9.7 | 575 |
| SM4T30A | SM4T30CA | RR | UR | 5 | 25.6 | 28.5 | 30 | 31.5 | 1 | 41.5 | 9.6 | 53.5 | 90 | 9.7 | 575 |
| SM4T33 | SM4T33C | RS | US | 5 | 26.8 | 29.7 | 33 | 36.3 | 1 | 47.7 | 8.4 | 61.7 | 78 | 9.8 | 510 |
| SM4T33A | SM4T33CA | RT | UT | 5 | 28.2 | 31.4 | 33 | 34.7 | 1 | 45.7 | 8.8 | 59 | 81.5 | 9.8 | 510 |
| SM4T36 | SM4T36C | RU | UU | 5 | 29.1 | 32.4 | 36 | 39.6 | 1 | 52 | 7.7 | 67.3 | 71 | 9.9 | 480 |
| SM4T36A | SM4T36CA | RV | UV | 5 | 30.8 | 34.2 | 36 | 37.8 | 1 | 49.9 | 8 | 64.3 | 74.5 | 9.9 | 480 |
| SM4T39 | SM4T39C | RW | UW | 5 | 31.6 | 35.1 | 39 | 42.9 | 1 | 56.4 | 7.1 | 73 | 66 | 10.0 | 450 |
| SM4T39A | SM4T39CA | RX | UX | 5 | 33.3 | 37.1 | 39 | 41 | 1 | 53.9 | 7.4 | 69.7 | 69 | 10.0 | 450 |
| SM4T68 | SM4T68C | SN | WN | 5 | 55.1 | 61.2 | 68 | 74.8 | 1 | 98 | 4.1 | 127 | 38 | 10.4 | 270 |
| SM4T68A | SM4T68CA | SP | WP | 5 | 58.1 | 64.6 | 68 | 71.4 | 1 | 92 | 4.3 | 121 | 39.5 | 10.4 | 270 |
| SM4T100 | SM4T100C | SW | WW | 5 | 81 | 90 | 100 | 110 | 1 | 144 | 2.8 | 187 | 25.5 | 10.6 | 200 |
| SM4T100A | SM4T100CA | SX | WX | 5 | 85.5 | 95 | 100 | 105 | 1 | 137 | 2.9 | 178 | 27 | 10.6 | 200 |
| SM4T150 | SM4T150C | TH | XH | 5 | 121 | 135 | 150 | 165 | 1 | 215 | 1.9 | 277 | 17.3 | 10.8 | 145 |
| SM4T150A | SM4T150CA | TK | XK | 5 | 128 | 143 | 150 | 158 | 1 | 207 | 2 | 265 | 18.1 | 10.8 | 145 |
| SM4T200 | SM4T200C | TS | XS | 5 | 162 | 180 | 200 | 220 | 1 | 287 | 1.4 | 370 | 13 | 10.8 | 120 |
| SM4T200A | SM4T200CA | TT | XT | 5 | 171 | 190 | 200 | 210 | 1 | 274 | 1.5 | 353 | 13.6 | 10.8 | 120 |
| SM4T220 | | TU | | 5 | 178 | 198 | 220 | 242 | 1 | 315 | 1.3 | 406 | 11.8 | 10.8 | 110 |
| SM4T220A | | TV | | 5 | 188 | 209 | 220 | 231 | 1 | 301 | 1.4 | 388 | 12.4 | 10.8 | 110 |

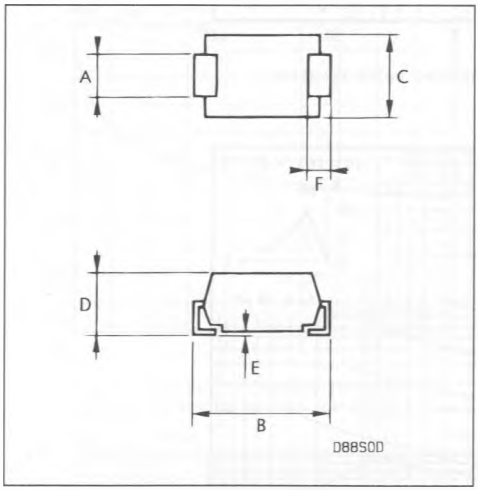
* Pulse test $t_p \leq 50$ ms $\delta < 2$ %.
** Divide these values by 2 for bidirectional types.
For bidirectional types, electrical characteristics apply in both directions.

## ORDER CODE




## PACKAGE MECHANICAL DATA

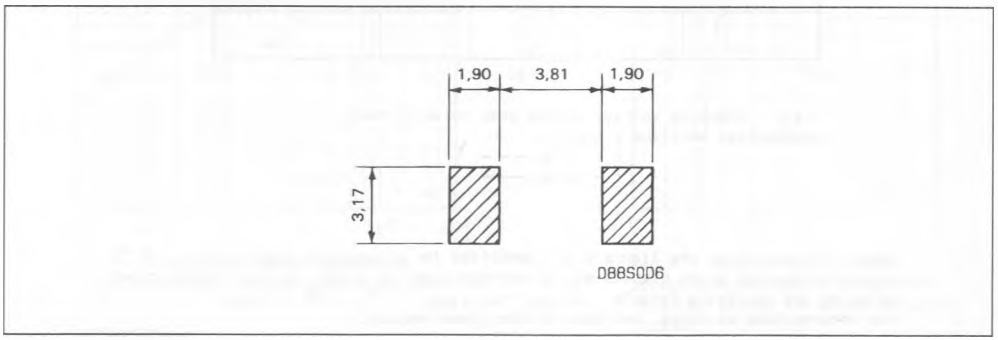
SOD 6 Plastic




| Ref. | Millimetres | | Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 2.8 | 3.2 | 0.110 | 0.126 |
| B | 6.0 | 6.4 | 0.236 | 0.252 |
| C | 3.8 | 4.2 | 0.150 | 0.165 |
| D | 2.5 | 3.1 | 0.098 | 0.122 |
| E | – | 0.1 | – | 0.004 |
| F | 0.9 | 1.3 | 0.035 | 0.051 |

Laser marking.
The logo indicates cathode for unidirectional types.

## FOOT PRINT DIMENSIONS (Millimeters)



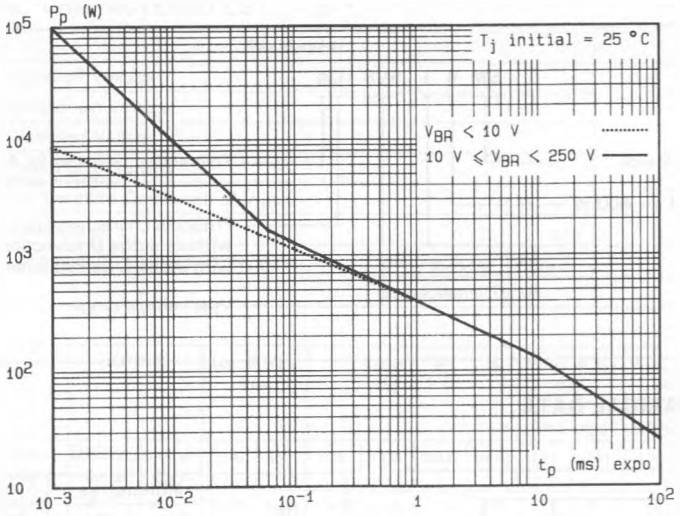



Fig.1 - Peak pulse power versus exponential pulse duration.

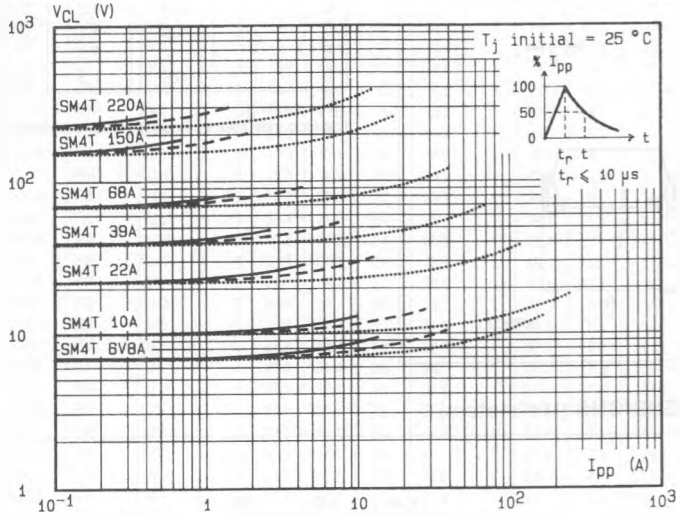



Fig.2 - Clamping voltage versus peak pulse current.
exponential waveform t = 20 µs ·····
t = 1 ms – – –
t = 10 ms ——

Note : The curves of the figure 2 are specified for a junction temperature of 25 °C before surge. The given results may be extrapolated for other junction temperatures by using the following formula : $\Delta V_{(BR)} = \alpha_T (V_{(BR)}) \times [T_j - 25] \times V_{(BR)}$
For intermediate voltages, extrapolate the given results.

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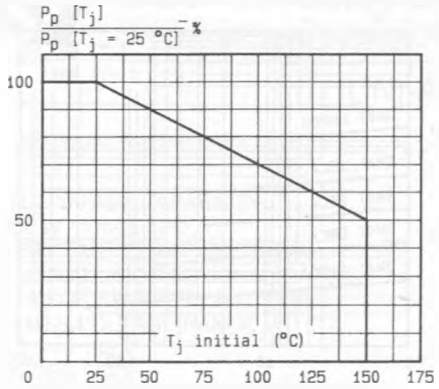


Fig.3 - Allowable power dissipation versus junction temperature.

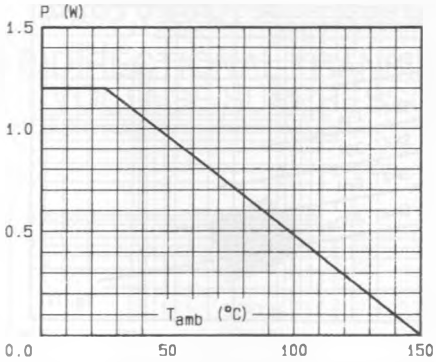


Fig.4 - Power dissipation versus ambient temperature.

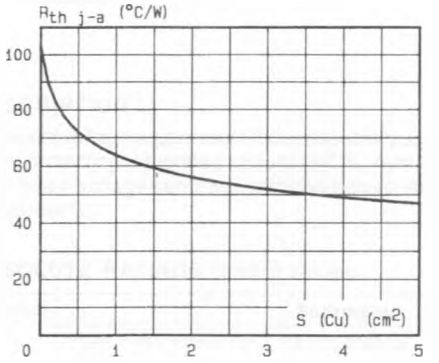


Fig.5 - Thermal resistance junction-ambient versus Cu surface (printed circuit).

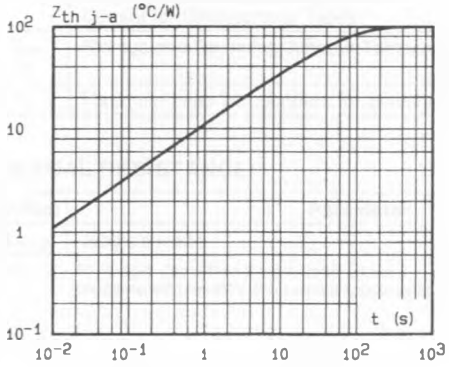


Fig.6 - Transient thermal impedance junction-ambient versus pulse duration.

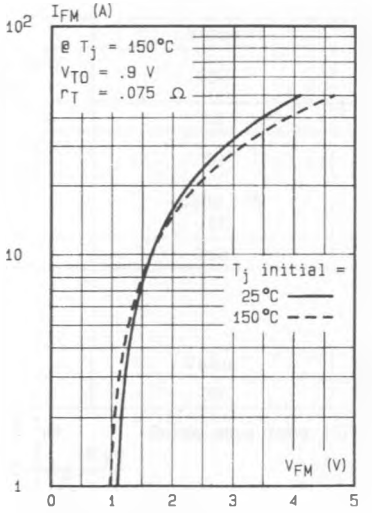


Fig.7 - Peak forward current versus peak forward voltage drop (typical values for unidirectional types).

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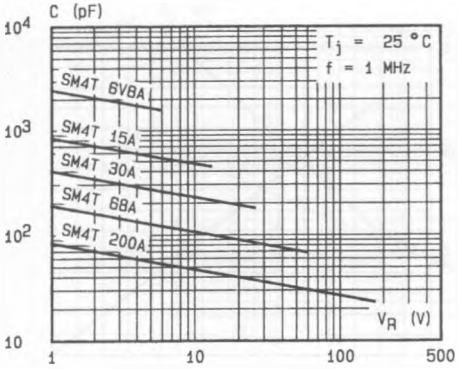


Fig.8a - Capacitance versus reverse applied voltage for unidirectional types (typical values).

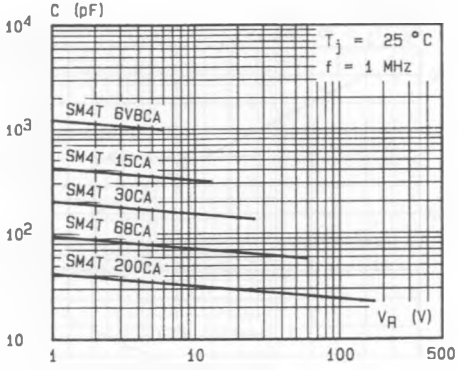


Fig.8b - Capacitance versus reverse applied voltage for bidirectional types (typical values).

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