



## UNI-AND BIDIRECTIONAL TRANSIENT VOLTAGE SUPPRESSORS

- HIGH SURGE CAPABILITY :  
600 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



### SURFACE MOUNT TRANSIL FEATURES

- A PERFECT PICK AND PLACE BEHAVIOUR
- AN EXCELLEN 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.

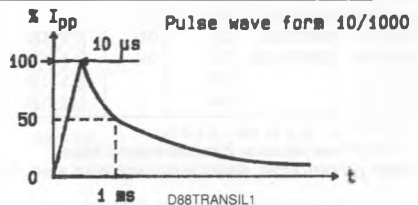
### ABSOLUTE RATINGS (limiting values)

| Symbol             | Parameter  | Value                                | Unit     |
|--------------------|--|--------------------------------------|----------|
| $P_D$              | Peak Pulse Power for 1 ms Exponential Pulse                        | $T_j$ Initial = 25 °C<br>See note 1  | 600<br>W |
| $P$                | Power Dissipation on Infinite Heatsink                             | $T_{amb} = 25$ °C                    | 1.2<br>W |
| $I_{FSM}$          | Non Repetitive Surge Peak Forward Current for Unidirectional Types | $T_j$ Initial = 25 °C<br>$t = 10$ ms | 50<br>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<sub>j</sub> = 25 °C)

| Symbol                | Parameter                                    | Value                |           |
|-----------------------|--|----------------------|-----------|
| V <sub>RM</sub>       | Stand-off Voltage                            | See tables           |           |
| V <sub>(BR)</sub>     | Breakdown Voltage                            |                      |           |
| V <sub>(CL)</sub>     | Clamping Voltage                             |                      |           |
| I <sub>PP</sub>       | Peak Pulse Current                           |                      |           |
| α <sub>T</sub>        | Temperature Coefficient of V <sub>(BR)</sub> |                      |           |
| C                     | Capacitance                                  |                      |           |
| t <sub>clamping</sub> | Clamping Time (0 volt to V <sub>(BR)</sub> ) | Unidirectional Types | 1 ps max. |
|                       |  | Bidirectional Types  | 5 ns max. |

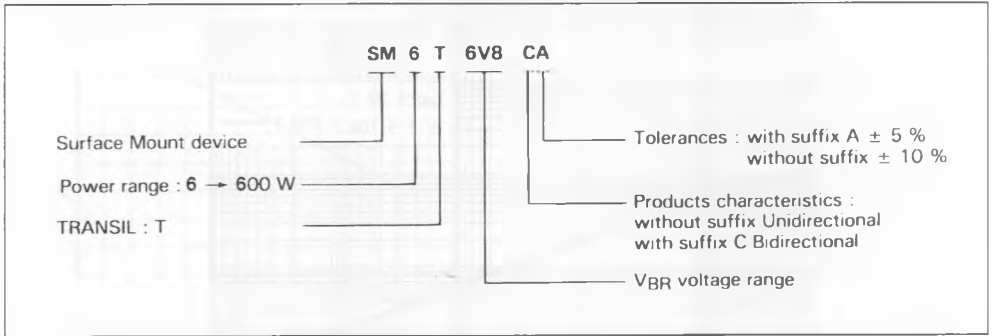
| Types          |               | Marking        |               | I <sub>RM</sub> @ V <sub>RM</sub> max. |      | V <sub>(BR)</sub> * @ I <sub>R</sub> |      |      | V <sub>(CL)</sub> @ I <sub>PP</sub> max. |           | V <sub>(CL)</sub> @ I <sub>PP</sub> max. |              | α <sub>T</sub> max. | C** typ. V <sub>R</sub> =0 f=1MHz |      |
|----------------|---------------|----------------|---------------|--|------|--------------------------------------|------|------|--|-----------|--|--------------|---------------------|-----------------------------------|------|
| Unidirectional | Bidirectional | Unidirectional | Bidirectional | (μA)                                   | (V)  | min.                                 | nom. | max. | (mA)                                     | (V)       | (A)                                      | (V)          | (A)                 | (10 <sup>-4</sup> /°C)            | (pF) |
|                |               |                |               |  |      |                                      |      |      |  | 1 ms expo |  | 8-20 μs expo |                     |                                   |      |
| SM6T6V8        | SM6T6V8C      | DD             | LD            | 1000                                   | 5.5  | 6.12                                 | 6.8  | 7.48 | 10                                       | 10.8      | 55                                       | 14           | 250                 | 5.7                               | 4000 |
| SM6T6V8A       | SM6T6V8CA     | DE             | LE            | 1000                                   | 5.8  | 6.45                                 | 6.8  | 7.14 | 10                                       | 10.5      | 57                                       | 13.4         | 261                 | 5.7                               | 4000 |
| SM6T7V5        | SM6T7V5C      | DF             | LF            | 500                                    | 6.05 | 6.75                                 | 7.5  | 8.25 | 10                                       | 11.7      | 51                                       | 15.2         | 230                 | 6.1                               | 3700 |
| SM6T7V5A       | SM6T7V5CA     | DG             | LG            | 500                                    | 6.4  | 7.13                                 | 7.5  | 7.88 | 10                                       | 11.3      | 53                                       | 14.5         | 241                 | 6.1                               | 3700 |
| SM6T10         | SM6T10C       | DN             | LN            | 10                                     | 8.1  | 9.0                                  | 10   | 11   | 1  | 15        | 40                                       | 19.5         | 369                 | 7.3                               | 2800 |
| SM6T10A        | SM6T10CA      | DP             | LP            | 10                                     | 8.55 | 9.5                                  | 10   | 10.5 | 1  | 14.5      | 41                                       | 18.6         | 387                 | 7.3                               | 2800 |
| SM6T12         | SM6T12C       | DS             | LS            | 5                                      | 9.72 | 10.8                                 | 12   | 13.2 | 1  | 17.3      | 35                                       | 22.7         | 317                 | 7.8                               | 2300 |
| SM6T12A        | SM6T12CA      | DT             | LT            | 5                                      | 10.2 | 11.4                                 | 12   | 12.6 | 1  | 16.7      | 36                                       | 21.7         | 332                 | 7.8                               | 2300 |
| SM6T15         | SM6T15C       | DW             | LW            | 5                                      | 12.1 | 13.5                                 | 15   | 16.5 | 1  | 22        | 27.5                                     | 28.4         | 254                 | 8.4                               | 1900 |
| SM6T15A        | SM6T15CA      | DX             | LX            | 5                                      | 12.8 | 14.3                                 | 15   | 15.8 | 1  | 21.2      | 28                                       | 27.2         | 265                 | 8.4                               | 1900 |
| SM6T18         | SM6T18C       | ED             | MD            | 5                                      | 14.5 | 16.2                                 | 18   | 19.8 | 1  | 26.5      | 22.5                                     | 34           | 212                 | 8.8                               | 1600 |
| SM6T18A        | SM6T18CA      | EE             | ME            | 5                                      | 15.3 | 17.1                                 | 18   | 18.9 | 1  | 25.2      | 24                                       | 32.5         | 222                 | 8.8                               | 1600 |
| SM6T22         | SM6T22C       | EH             | MH            | 5                                      | 17.8 | 19.8                                 | 22   | 24.2 | 1  | 31.9      | 18.5                                     | 41.2         | 175                 | 9.2                               | 1350 |
| SM6T22A        | SM6T22CA      | EK             | MK            | 5                                      | 18.8 | 20.9                                 | 22   | 23.1 | 1  | 30.6      | 20                                       | 39.3         | 183                 | 9.2                               | 1350 |
| SM6T24         | SM6T24C       | EL             | ML            | 5                                      | 19.4 | 21.6                                 | 24   | 26.4 | 1  | 34.7      | 17.5                                     | 44.9         | 160                 | 9.4                               | 1250 |
| SM6T24A        | SM6T24CA      | EM             | MM            | 5                                      | 20.5 | 22.8                                 | 24   | 25.2 | 1  | 33.2      | 18                                       | 42.8         | 168                 | 9.4                               | 1250 |
| SM6T27         | SM6T27C       | EN             | MN            | 5                                      | 21.8 | 24.3                                 | 27   | 29.7 | 1  | 39.1      | 15.5                                     | 50.5         | 143                 | 9.6                               | 1150 |
| SM6T27A        | SM6T27CA      | EP             | MP            | 5                                      | 23.1 | 25.7                                 | 27   | 28.4 | 1  | 37.5      | 16                                       | 48.3         | 149                 | 9.6                               | 1150 |
| SM6T30         | SM6T30C       | EQ             | MQ            | 5                                      | 24.3 | 27                                   | 30   | 33   | 1  | 43.5      | 13.5                                     | 56.1         | 128                 | 9.7                               | 1075 |
| SM6T30A        | SM6T30CA      | ER             | MR            | 5                                      | 25.6 | 28.5                                 | 30   | 31.5 | 1  | 41.4      | 14.5                                     | 53.5         | 134                 | 9.7                               | 1075 |
| SM6T33         | SM6T33C       | ES             | MS            | 5                                      | 26.8 | 29.7                                 | 33   | 36.3 | 1  | 47.7      | 12.5                                     | 61.7         | 117                 | 9.8                               | 1000 |
| SM6T33A        | SM6T33CA      | ET             | MT            | 5                                      | 28.2 | 31.4                                 | 33   | 34.7 | 1  | 45.7      | 13.1                                     | 59           | 122                 | 9.8                               | 1000 |
| SM6T36         | SM6T36C       | EU             | MU            | 5                                      | 29.1 | 32.4                                 | 36   | 39.6 | 1  | 52        | 11.5                                     | 67.3         | 107                 | 9.9                               | 950  |
| SM6T36A        | SM6T36CA      | EV             | MV            | 5                                      | 30.8 | 34.2                                 | 36   | 37.8 | 1  | 49.9      | 12                                       | 64.3         | 112                 | 9.9                               | 950  |
| SM6T39         | SM6T39C       | EW             | MW            | 5                                      | 31.6 | 35.1                                 | 39   | 42.9 | 1  | 56.4      | 10.6                                     | 73           | 99                  | 10.0                              | 900  |
| SM6T39A        | SM6T39CA      | EX             | MX            | 5                                      | 33.3 | 37.1                                 | 39   | 41   | 1  | 53.9      | 11.1                                     | 69.7         | 103                 | 10.0                              | 900  |
| SM6T68         | SM6T68C       | FP             | NP            | 5                                      | 55.1 | 61.2                                 | 68   | 74.8 | 1  | 98        | 6.1                                      | 127          | 57                  | 10.4                              | 625  |
| SM6T68A        | SM6T68CA      | FQ             | NQ            | 5                                      | 58.1 | 64.6                                 | 68   | 71.4 | 1  | 92        | 6.5                                      | 121          | 59.5                | 10.4                              | 625  |
| SM6T100        | SM6T100C      | FX             | NX            | 5                                      | 81   | 90                                   | 100  | 110  | 1  | 144       | 4.2                                      | 187          | 38.5                | 10.6                              | 500  |
| SM6T100A       | SM6T100CA     | FY             | NY            | 5                                      | 85.5 | 95                                   | 100  | 105  | 1  | 137       | 4.4                                      | 178          | 40.5                | 10.6                              | 500  |
| SM6T150        | SM6T150C      | GK             | OK            | 5                                      | 121  | 135                                  | 150  | 165  | 1  | 215       | 2.8                                      | 277          | 26                  | 10.8                              | 400  |
| SM6T150A       | SM6T150CA     | GL             | OL            | 5                                      | 128  | 143                                  | 150  | 158  | 1  | 207       | 2.9                                      | 265          | 27.2                | 10.8                              | 400  |
| SM6T200        | SM6T200C      | GT             | OT            | 5                                      | 162  | 180                                  | 200  | 220  | 1  | 287       | 2.1                                      | 370          | 19.4                | 10.8                              | 350  |
| SM6T200A       | SM6T200CA     | GU             | OU            | 5                                      | 171  | 190                                  | 200  | 210  | 1  | 274       | 2.2                                      | 353          | 20.4                | 10.8                              | 350  |
| SM6T220        |               | GV             |               | 5                                      | 178  | 198                                  | 220  | 242  | 1  | 316       | 1.9                                      | 406          | 17.7                | 10.8                              | 330  |
| SM6T220A       |               | GW             |               | 5                                      | 188  | 209                                  | 220  | 231  | 1  | 301       | 2  | 388          | 18.6                | 10.8                              | 330  |

\* Pulse test t<sub>p</sub> ≤ 50 ms δ < 2 %.

\*\* Divide these values by 2 for bidirectional types.

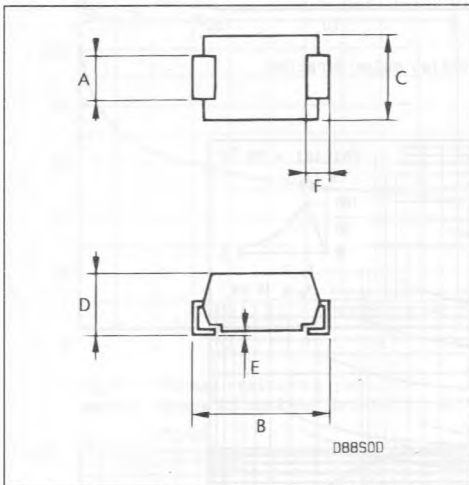
For bidirectional types, electrical characteristics apply in both directions.

**ORDER CODE**



**PACKAGE MECHANICAL DATA**

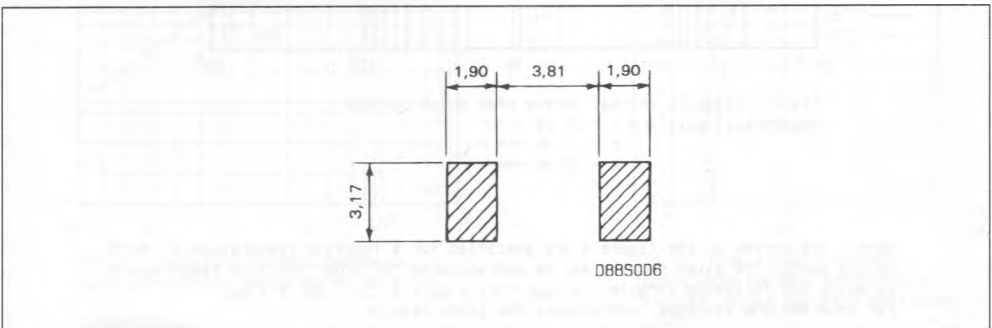
SOD 6 Plastic



| 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)**



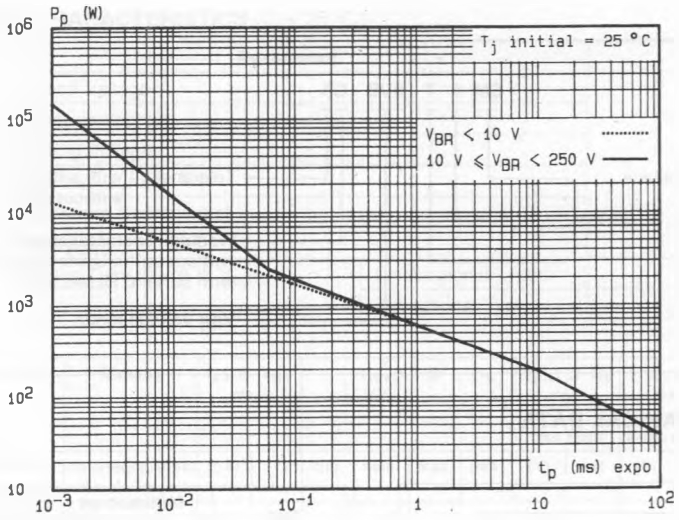


Fig. 1 - Peak pulse power versus exponential pulse duration.

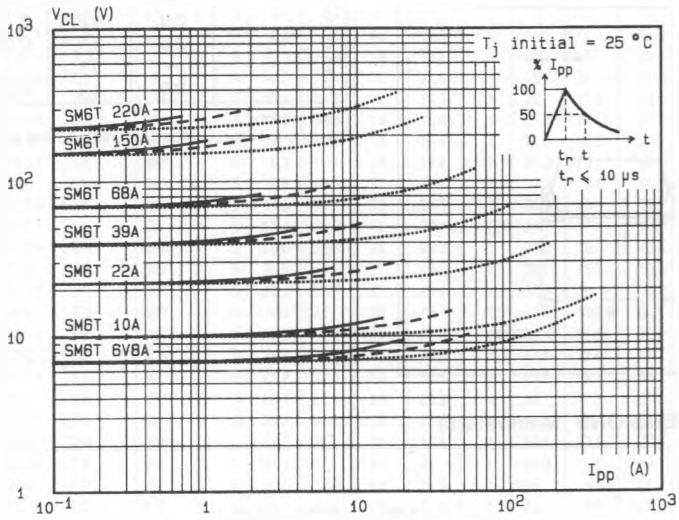


Fig.2 - Clamping voltage versus peak pulse current.  
 exponential waveform  $t = 20 \mu s$  .....  
 $t = 1 ms$  ----  
 $t = 10 ms$  ——

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.

D88SM6TP4

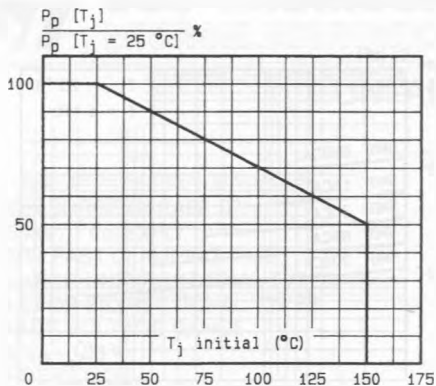


Fig.3 - Allowable power dissipation versus junction temperature.

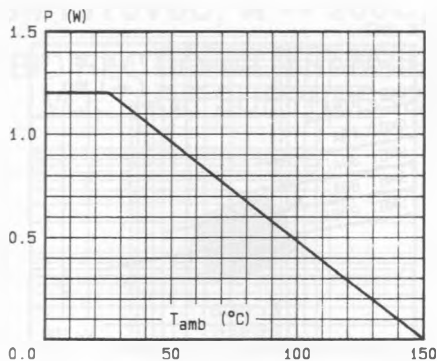


Fig.4 - Power dissipation versus ambient temperature.

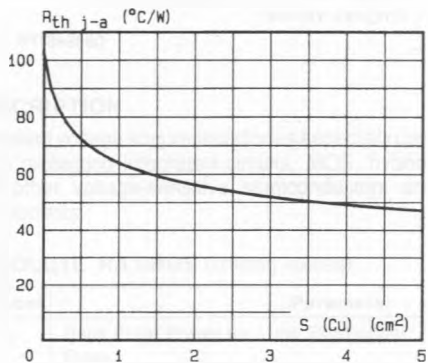


Fig.5 - Thermal resistance junction-ambient versus Cu surface (printed circuit).

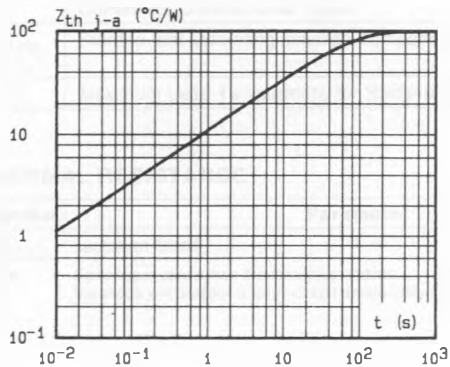


Fig.6 - Transient thermal impedance junction-ambient versus pulse duration.

D88SM6TP5

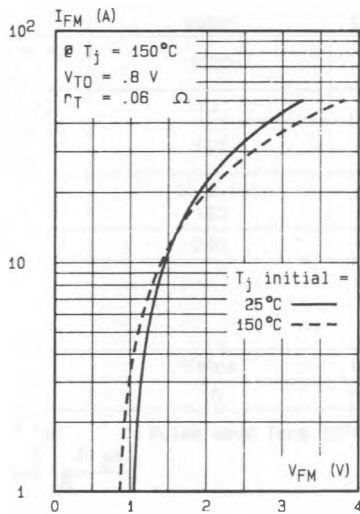


Fig.7 - Peak forward current versus peak forward voltage drop (typical values for unidirectional types).

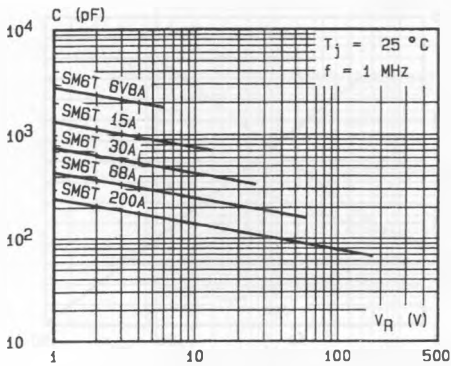


Fig.8a - Capacitance versus reverse applied voltage for unidirectional types (typical values).

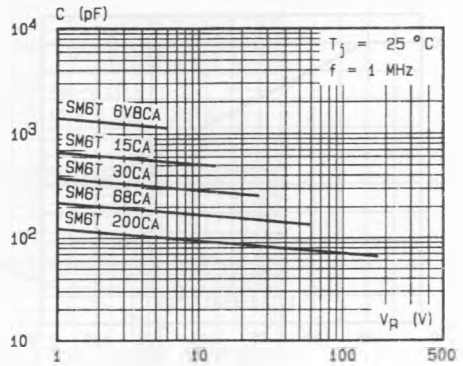


Fig.8b - Capacitance versus reverse applied voltage for bidirectional types (typical values).

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