



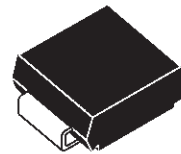
## FEATURES

- PEAK PULSE POWER : 1500 W (10/100µs)
- STAND OFF VOLTAGE RANGE :  
From 5V to 188V.
- UNI AND BIDIRECTIONAL TYPES
- LOW CLAMPING FACTOR
- FAST RESPONSE TIME

## DESCRIPTION

The SMCJ series are TRANSIL™ diodes designed specifically for protecting sensitive equipment against transient overvoltages.

Transil diodes provide high overvoltage protection by clamping action. Their instantaneous response to transient overvoltages makes them particularly suited to protect voltage sensitive devices such as MOS Technology and low voltage supplied IC's.



SMC  
(JEDEC DO-214AB)

## ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^{\circ}\text{C}$ )

| Symbol             | Parameter                                                          |                                                        | Value                | Unit                                     |
|--------------------|--------------------------------------------------------------------|--------------------------------------------------------|----------------------|------------------------------------------|
| $P_{PP}$           | Peak pulse power dissipation (see note 1)                          | $T_j \text{ initial} = T_{amb}$                        | 1500                 | W                                        |
| $P$                | Power dissipation on infinite heatsink                             | $T_{amb} = 50^{\circ}\text{C}$                         | 6.5                  | W                                        |
| $I_{FSM}$          | Non repetitive surge peak forward current for unidirectional types | $t_p = 10\text{ms}$<br>$T_j \text{ initial} = T_{amb}$ | 200                  | A                                        |
| $T_{stg}$<br>$T_j$ | Storage temperature range<br>Maximum junction temperature          |                                                        | - 65 to + 175<br>150 | $^{\circ}\text{C}$<br>$^{\circ}\text{C}$ |
| $T_L$              | Maximum lead temperature for soldering during 10 s.                |                                                        | 260                  | $^{\circ}\text{C}$                       |

**Note 1 :** For a surge greater than the maximum values, the diode will fail in short-circuit.

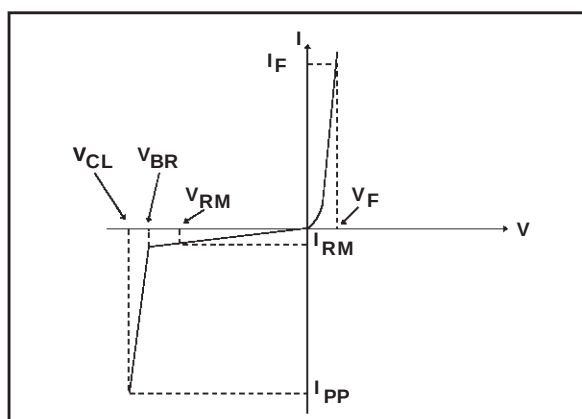
## THERMAL RESISTANCES

| Symbol        | Parameter                                                        | Value | Unit                 |
|---------------|------------------------------------------------------------------|-------|----------------------|
| $R_{th(j-l)}$ | Junction to leads                                                | 15    | $^{\circ}\text{C/W}$ |
| $R_{th(j-a)}$ | Junction to ambient on printed circuit on recommended pad layout | 75    | $^{\circ}\text{C/W}$ |

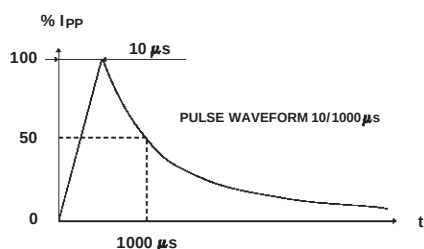
# SMCJxxxA-TR, CA-TR

## ELECTRICAL CHARACTERISTICS (T<sub>amb</sub> = 25°C)

| Symbol          | Parameter                         |
|-----------------|-----------------------------------|
| V <sub>RM</sub> | Stand-off voltage                 |
| V <sub>BR</sub> | Breakdown voltage                 |
| V <sub>CL</sub> | Clamping voltage                  |
| I <sub>RM</sub> | Leakage current @ V <sub>RM</sub> |
| I <sub>PP</sub> | Peak pulse current                |
| α <sub>T</sub>  | Voltage temperature coefficient   |
| V <sub>F</sub>  | Forward voltage drop              |



| Types          |       |               |       | I <sub>RM</sub> @ V <sub>RM</sub><br>max |     | V <sub>BR</sub> @ I <sub>R</sub><br>min<br>note2 |    | V <sub>CL</sub> @ I <sub>PP</sub><br>max<br>10/1000μs |      | V <sub>CL</sub> @ I <sub>PP</sub><br>max<br>8/20μs |      | α <sub>T</sub><br>max<br>note3 | C<br>typ<br>note4 |
|----------------|-------|---------------|-------|------------------------------------------|-----|--------------------------------------------------|----|-------------------------------------------------------|------|----------------------------------------------------|------|--------------------------------|-------------------|
| Unidirectional | Mark. | Bidirectional | Mark. | μA                                       | V   | V                                                | mA | V                                                     | A    | V                                                  | A    | 10 <sup>-4</sup> /°C           | pF                |
| SMCJ5.0A-TR    | FUA   | SMCJ5.0CA-TR  | FBA   | 800                                      | 5.0 | 6.4                                              | 10 | 9.2                                                   | 171  | 13.4                                               | 746  | 5.7                            | 9500              |
| SMCJ6.0A-TR    | FUB   | SMCJ6.0CA-TR  | FBB   | 800                                      | 6.0 | 6.7                                              | 10 | 10.3                                                  | 152  | 13.7                                               | 730  | 5.9                            | 9000              |
| SMCJ6.5A-TR    | FUC   | SMCJ6.5CA-TR  | FBC   | 500                                      | 6.5 | 7.2                                              | 10 | 11.2                                                  | 140  | 14.5                                               | 690  | 6.1                            | 8500              |
| SMCJ8.5A-TR    | FUD   | SMCJ8.5CA-TR  | FBD   | 5                                        | 8.5 | 9.4                                              | 1  | 14.4                                                  | 105  | 19.5                                               | 512  | 7.3                            | 7000              |
| SMC10A-TR      | FUF   | SMCJ10CA-TR   | FBF   | 5                                        | 10  | 11.1                                             | 1  | 17                                                    | 92   | 21.7                                               | 461  | 7.8                            | 6000              |
| SMCJ12A-TR     | FUH   | SMCJ12CA-TR   | FBH   | 5                                        | 12  | 13.3                                             | 1  | 19.9                                                  | 79   | 25.3                                               | 394  | 8.3                            | 5250              |
| SMCJ13A-TR     | FUI   | SMCJ13CA-TR   | FBI   | 1                                        | 13  | 14.4                                             | 1  | 21.5                                                  | 73   | 27.2                                               | 368  | 8.4                            | 5000              |
| SMCJ15A-TR     | FUJ   | SMCJ15CA-TR   | FBJ   | 1                                        | 15  | 16.7                                             | 1  | 24.4                                                  | 64   | 32.5                                               | 308  | 8.8                            | 4300              |
| SMCJ18A-TR     | FUL   | SMCJ18CA-TR   | FBL   | 1                                        | 18  | 20                                               | 1  | 29.2                                                  | 53   | 39.3                                               | 254  | 9.2                            | 3700              |
| SMCJ20A-TR     | FUM   | SMCJ20CA-TR   | FBM   | 1                                        | 20  | 22.2                                             | 1  | 32.4                                                  | 48   | 42.8                                               | 234  | 9.4                            | 3500              |
| SMCJ22A-TR     | FUN   | SMCJ22CA-TR   | FBN   | 1                                        | 22  | 24.4                                             | 1  | 35.5                                                  | 44   | 48.3                                               | 207  | 9.6                            | 3200              |
| SMCJ24A-TR     | FUO   | SMCJ24CA-TR   | FBO   | 1                                        | 24  | 26.7                                             | 1  | 38.9                                                  | 40   | 50                                                 | 200  | 9.6                            | 3050              |
| SMCJ26A-TR     | FUP   | SMCJ26CA-TR   | FBP   | 1                                        | 26  | 28.9                                             | 1  | 42.1                                                  | 37   | 53.5                                               | 187  | 9.7                            | 2900              |
| SMCJ28A-TR     | FUQ   | SMCJ28CA-TR   | FBQ   | 1                                        | 28  | 31.1                                             | 1  | 45.4                                                  | 34   | 59                                                 | 169  | 9.8                            | 2700              |
| SMCJ30A-TR     | FUR   | SMCJ30CA-TR   | FBR   | 1                                        | 30  | 33.3                                             | 1  | 48.4                                                  | 32   | 64.3                                               | 156  | 9.9                            | 2500              |
| SMCJ33A-TR     | FUS   | SMCJ33CA-TR   | FBS   | 1                                        | 33  | 36.7                                             | 1  | 53.3                                                  | 29   | 69.7                                               | 143  | 10.0                           | 2400              |
| SMCJ40A-TR     | FUU   | SMCJ40CA-TR   | FBU   | 1                                        | 40  | 44.4                                             | 1  | 64.5                                                  | 24   | 84                                                 | 119  | 10.1                           | 2050              |
| SMCJ48A-TR     | FUW   | SMCJ48CA-TR   | FBW   | 1                                        | 48  | 53.3                                             | 1  | 77.4                                                  | 20   | 100                                                | 100  | 10.3                           | 1800              |
| SMCJ58A-TR     | FUZ   | SMCJ58CA-TR   | FBZ   | 1                                        | 58  | 64.4                                             | 1  | 93.6                                                  | 16   | 121                                                | 83   | 10.4                           | 1550              |
| SMCJ60A-TR     | GUA   | SMCJ60CA-TR   | GBA   | 1                                        | 60  | 66.5                                             | 1  | 96.6                                                  | 15.7 | 125                                                | 81   | 10.5                           | 1520              |
| SMCJ70A-TR     | GUB   | SMCJ70CA-TR   | GBB   | 1                                        | 70  | 77.8                                             | 1  | 113                                                   | 13.9 | 146                                                | 69   | 10.5                           | 1350              |
| SMCJ85A-TR     | GUE   | SMCJ85CA-TR   | GBE   | 1                                        | 85  | 94.4                                             | 1  | 137                                                   | 11.5 | 178                                                | 56   | 10.6                           | 1150              |
| SMCJ100A-TR    | GUG   | SMCJ100CA-TR  | GBG   | 1                                        | 100 | 111                                              | 1  | 162                                                   | 9.7  | 212                                                | 47   | 10.7                           | 1000              |
| SMCJ130A-TR    | GUI   | SMCJ130CA-TR  | GBI   | 1                                        | 130 | 144                                              | 1  | 209                                                   | 7.5  | 265                                                | 38   | 10.8                           | 850               |
| SMCJ154A-TR    | GUL   | SMCJ154CA-TR  | GBL   | 1                                        | 154 | 171                                              | 1  | 246                                                   | 6.1  | 317                                                | 31.5 | 10.8                           | 725               |
| SMCJ170A-TR    | GUM   | SMCJ170CA-TR  | GBM   | 1                                        | 170 | 189                                              | 1  | 275                                                   | 5.7  | 353                                                | 28   | 10.8                           | 675               |
| SMCJ188A-TR    | GUN   | SMCJ188CA-TR  | GBN   | 1                                        | 188 | 209                                              | 1  | 328                                                   | 4.6  | 388                                                | 26   | 10.8                           | 625               |

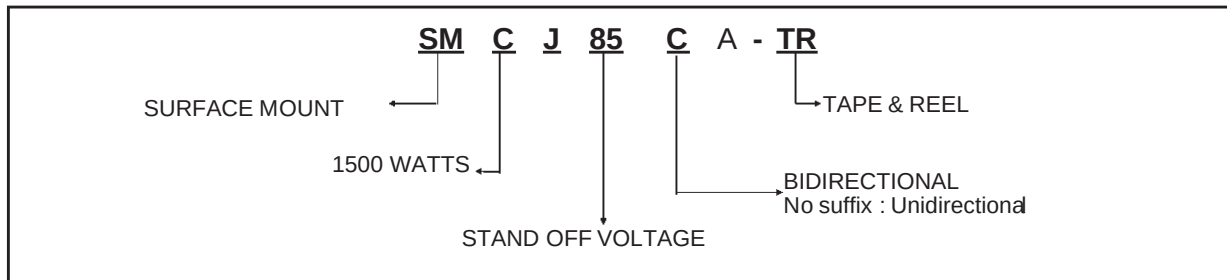
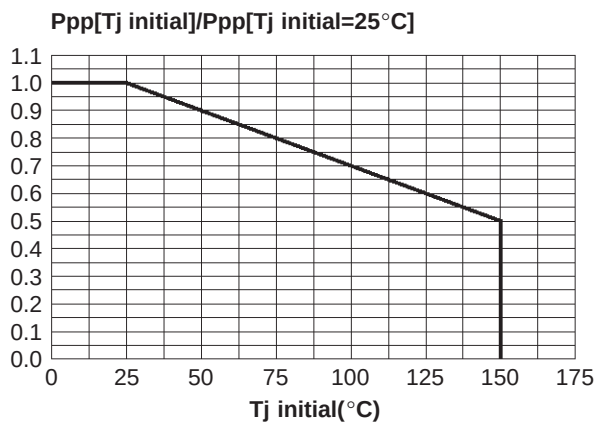
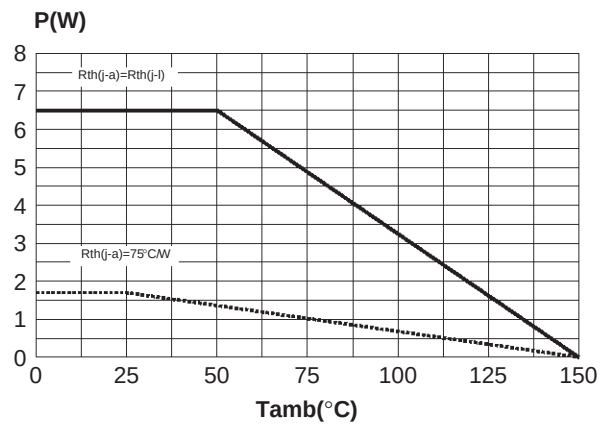
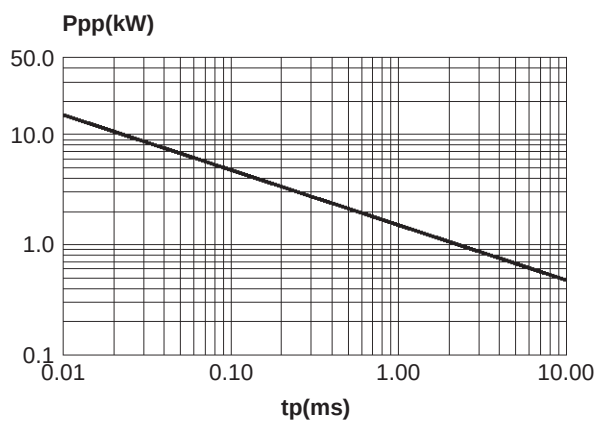
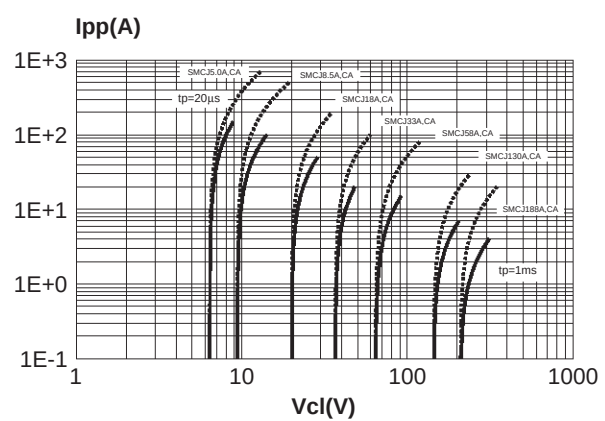


**Note 2 :** Pulse test : t<sub>p</sub> < 50 ms.

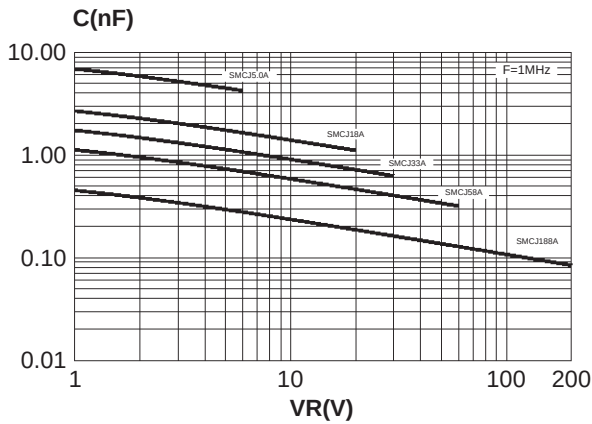
**Note 3 :** ΔV<sub>BR</sub> = α<sub>T</sub> \* (T<sub>amb</sub> - 25) \* V<sub>BR</sub>(25°C).

**Note 4 :** V<sub>R</sub> = 0 V, F = 1 MHz. For bidirectional types, capacitance value is divided by 2.

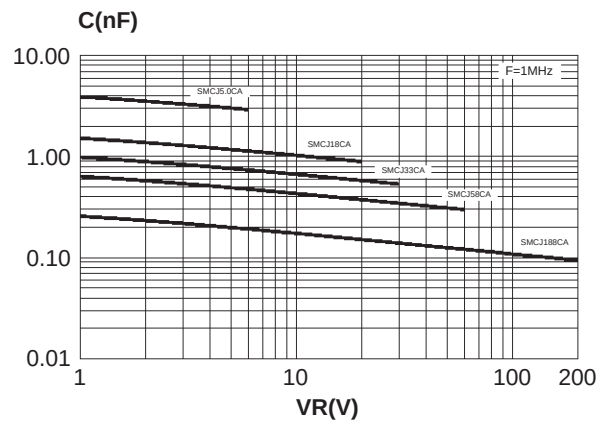
## ORDER CODE

**Fig. 1:** Peak power dissipation versus initial junction temperature.**Fig. 2:** Continuous power dissipation versus initial junction temperature.**Fig. 3:** Peak pulse power versus exponential pulse duration ( $T_j$  initial= $25^\circ\text{C}$ ).**Fig. 4:** Clamping voltage versus peak pulse current ( $T_j$  initial= $25^\circ\text{C}$ ). Exponential waveform  $t_p=20\mu\text{s}$  &  $t_p=1\text{ms}$ .

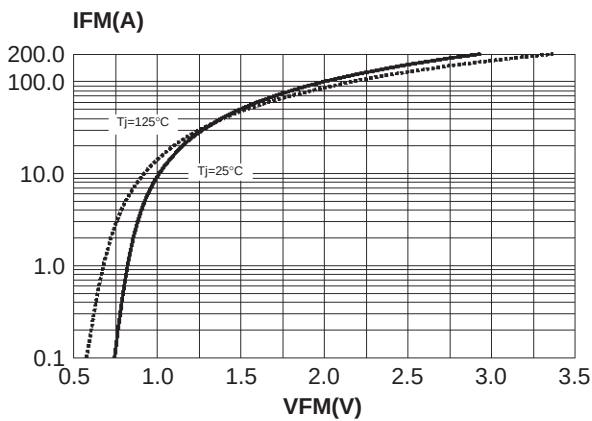
**Fig. 5-1:** Capacitance versus reverse applied voltage (typical values) (SMCJxxA serie).



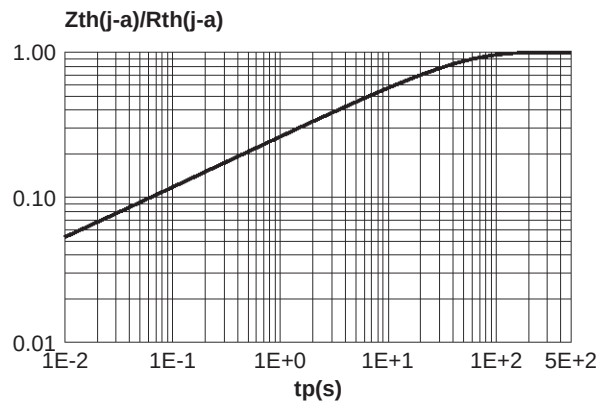
**Fig. 5-2:** Capacitance versus reverse applied voltage (typical values) (SMCJxxCA serie).



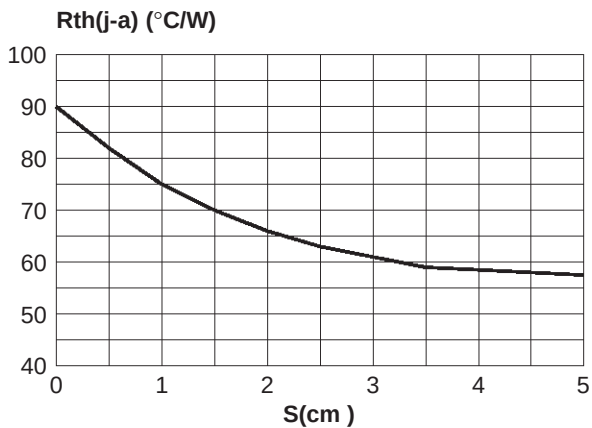
**Fig. 6:** Peak forward voltage drop versus peak forward current (typical values).



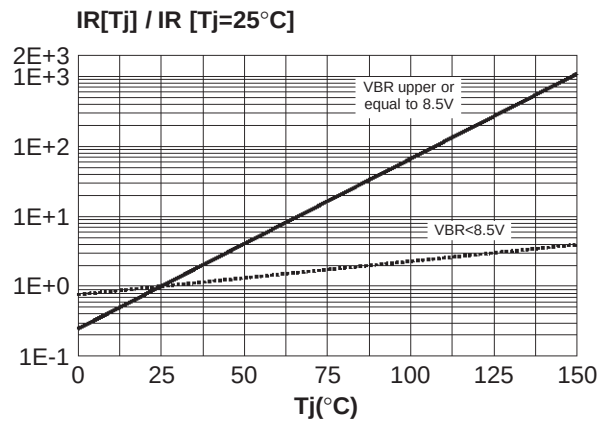
**Fig. 7:** Relative variation of thermal impedance junction to ambient versus pulse duration. (Printed circuit board FR4, S(Cu)=1cm<sup>2</sup>).



**Fig. 8:** Thermal resistance junction to ambient versus copper surface under each lead (Printed circuit board FR4, e(Cu)=35μm)



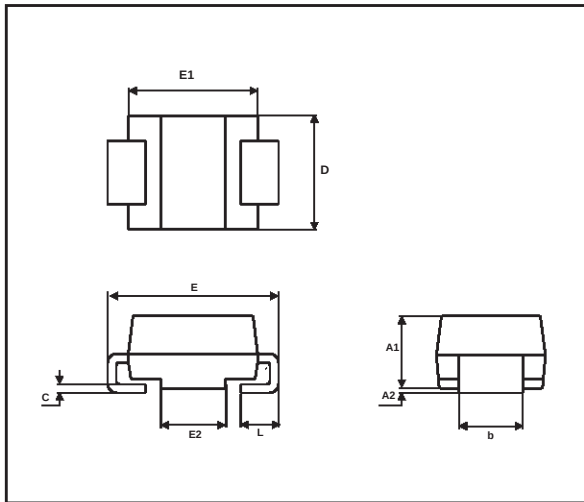
**Fig. 9:** Relative variation of leakage current versus junction temperature.



**MARKING** : Logo, Date Code, Type Code, Cathode Band (for unidirectional types only).

### PACKAGE MECHANICAL DATA

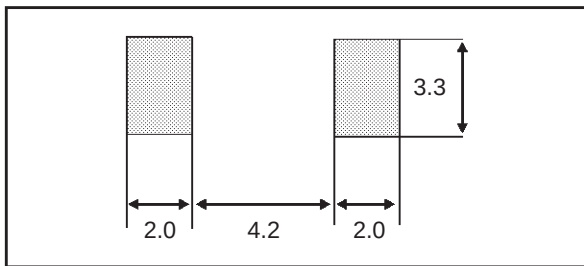
SMC (Plastic)



| REF. | DIMENSIONS  |      |        |       |
|------|-------------|------|--------|-------|
|      | Millimeters |      | Inches |       |
|      | Min.        | Max. | Min.   | Max.  |
| A1   | 1.90        | 2.45 | 0.075  | 0.096 |
| A2   | 0.05        | 0.20 | 0.002  | 0.008 |
| b    | 2.90        | 3.2  | 0.114  | 0.126 |
| c    | 0.15        | 0.41 | 0.006  | 0.016 |
| E    | 7.75        | 8.15 | 0.305  | 0.321 |
| E1   | 6.60        | 7.15 | 0.260  | 0.281 |
| E2   | 4.40        | 4.70 | 0.173  | 0.185 |
| D    | 5.55        | 6.25 | 0.218  | 0.246 |
| L    | 0.75        | 1.60 | 0.030  | 0.063 |

### FOOTPRINT DIMENSIONS (Millimeter)

SMC Plastic.



**Packaging** : standard packaging is in tape and reel.

**Weight** : 0.25 g

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied.

STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics

© 1999 STMicroelectronics - Printed in Italy - All rights reserved.

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - China - Finland - France - Germany - Hong Kong - India - Italy - Japan - Malaysia  
Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - U.S.A.

<http://www.st.com>