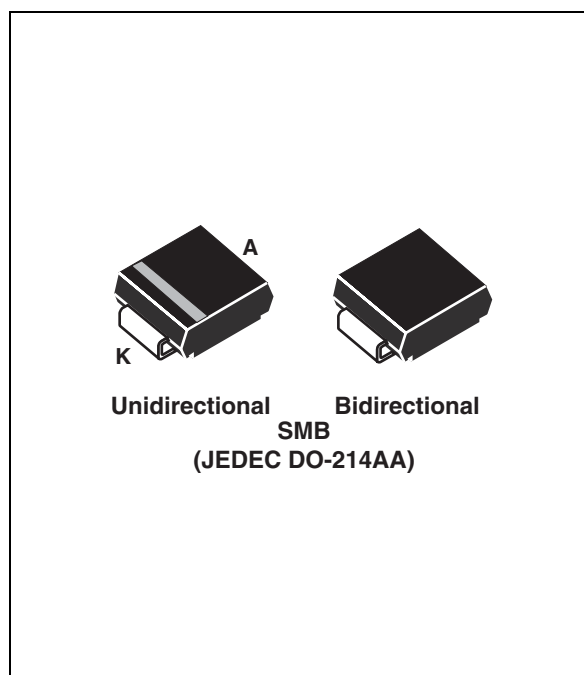


### Features

- Peak pulse power:
  - 600 W (10/1000  $\mu$ s)
  - 4 kW (8/20  $\mu$ s)
- Breakdown voltage range: from 6.8 V to 220 V
- Unidirectional and bidirectional types
- Low leakage current:
  - 0.2  $\mu$ A at 25 °C
  - 1  $\mu$ A at 85 °C
- Operating  $T_{j\max}$ : 150 °C
- High power capability at  $T_{j\max}$ :
  - 515 W (10/1000  $\mu$ s)
- JEDEC registered package outline

### Complies with the following standards

- IEC 61000-4-2 level 4:
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- IEC 61000-4-5
- MIL STD 883G, method 3015-7: class 3B:
  - 25 kV HBM (human body model)
- UL 497B, file number: QVGQ2.E136224
- Resin meets UL 94, V0
- MIL-STD-750, method 2026 solderability
- EIA STD RS-481 and IEC 60286-3 packing
- IPC 7531 footprint



### Description

The SM6T Transil series has been designed to protect sensitive equipment against electrostatic discharges according to IEC 61000-4-2 and MIL STD 883, method 3015, and electrical overstress according to IEC 61000-4-4 and 5. These devices are more generally used against surges below 600 W (10/1000  $\mu$ s).

Planar technology makes these devices suitable for high-end equipment and SMPS where low leakage current and high junction temperature are required to provide reliability and stability over time.

SM6T are packaged in SMB (SMB footprint in accordance with IPC 7531 standard).

**TM:** Transil is a trademark of STMicroelectronics

# 1 Characteristics

Table 1. Absolute maximum ratings

| Symbol           | Parameter                                           |                                           | Value      | Unit |
|------------------|-----------------------------------------------------|-------------------------------------------|------------|------|
| P <sub>PP</sub>  | Peak pulse power dissipation <sup>(1)</sup>         | T <sub>j</sub> initial = T <sub>amb</sub> | 600        | W    |
| T <sub>stg</sub> | Storage temperature range                           |                                           | -65 to 150 | °C   |
| T <sub>j</sub>   | Operating junction temperature range                |                                           | -55 to 150 |      |
| T <sub>L</sub>   | Maximum lead temperature for soldering during 10 s. |                                           | 260        |      |

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

Table 2. Thermal resistance

| Symbol               | Parameter                                                        | Value | Unit |
|----------------------|------------------------------------------------------------------|-------|------|
| R <sub>th(j-l)</sub> | Junction to leads                                                | 20    | °C/W |
| R <sub>th(j-a)</sub> | Junction to ambient on printed circuit on recommended pad layout | 100   | °C/W |

Figure 1. Electrical characteristics - definitions

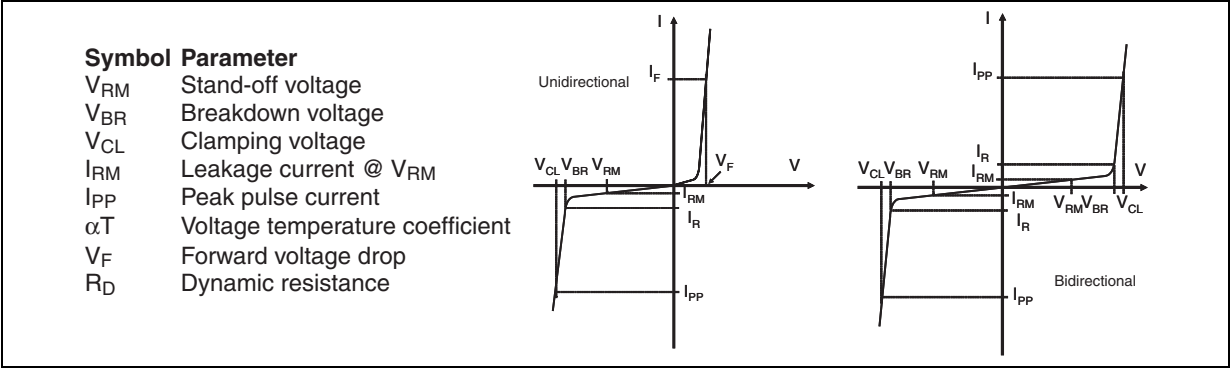


Figure 2. Pulse definition for electrical characteristics

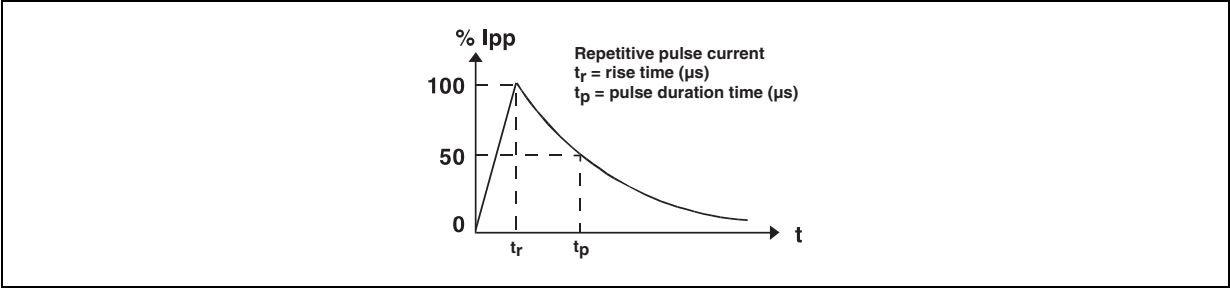


Table 3. Electrical characteristics, parameter values ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )

| Order code  | $I_{RM} \text{ max}@V_{RM}$ |                       |      | $V_{BR} @I_R^{(1)}$ |     |      |    | $V_{CL} @I_{PP}$<br>10/1000 $\mu\text{s}$ |                  | $R_D$<br>10/1000 $\mu\text{s}$ | $V_{CL} @I_{PP}$<br>8/20 $\mu\text{s}$ |                  | $R_D$<br>8/20 $\mu\text{s}$ | $\alpha T^{(2)}$         |
|-------------|-----------------------------|-----------------------|------|---------------------|-----|------|----|-------------------------------------------|------------------|--------------------------------|----------------------------------------|------------------|-----------------------------|--------------------------|
|             | 25 $^{\circ}\text{C}$       | 85 $^{\circ}\text{C}$ |      | min                 | typ | max  |    | max                                       |                  |                                | max                                    |                  |                             | max                      |
|             | $\mu\text{A}$               |                       | V    | V                   |     |      | mA | V <sup>(3)</sup>                          | A <sup>(4)</sup> | $\Omega$                       | V <sup>(3)</sup>                       | A <sup>(4)</sup> | $\Omega$                    | 10-4/ $^{\circ}\text{C}$ |
| SM6T6V8A/CA | 20                          | 50                    | 5.8  | 6.45                | 6.8 | 7.14 | 10 | 10.5                                      | 57               | 0.059                          | 13.4                                   | 298              | 0.021                       | 5.7                      |
| SM6T7V5A/CA | 20                          | 50                    | 6.4  | 7.13                | 7.5 | 7.88 | 10 | 11.3                                      | 53               | 0.065                          | 14.5                                   | 276              | 0.024                       | 6.1                      |
| SM6T10A/CA  | 20                          | 50                    | 8.55 | 9.5                 | 10  | 10.5 | 1  | 14.5                                      | 41               | 0.098                          | 18.6                                   | 215              | 0.038                       | 7.3                      |
| SM6T12A/CA  | 0.2                         | 1                     | 10.2 | 11.4                | 12  | 12.6 | 1  | 16.7                                      | 36               | 0.114                          | 21.7                                   | 184              | 0.049                       | 7.8                      |
| SM6T15A/CA  | 0.2                         | 1                     | 12.8 | 14.3                | 15  | 15.8 | 1  | 21.2                                      | 28               | 0.193                          | 27.2                                   | 147              | 0.078                       | 8.4                      |
| SM6T18A/CA  | 0.2                         | 1                     | 15.3 | 17.1                | 18  | 18.9 | 1  | 25.2                                      | 24               | 0.263                          | 32.5                                   | 123              | 0.111                       | 8.8                      |
| SM6T22A/CA  | 0.2                         | 1                     | 18.8 | 20.9                | 22  | 23.1 | 1  | 30.6                                      | 20               | 0.375                          | 39.3                                   | 102              | 0.159                       | 9.2                      |
| SM6T24A/CA  | 0.2                         | 1                     | 20.5 | 22.8                | 24  | 25.2 | 1  | 33.2                                      | 18               | 0.444                          | 42.8                                   | 93               | 0.189                       | 9.4                      |
| SM6T27A/CA  | 0.2                         | 1                     | 23.1 | 25.7                | 27  | 28.4 | 1  | 37.5                                      | 16               | 0.569                          | 48.3                                   | 83               | 0.240                       | 9.6                      |
| SM6T30A/CA  | 0.2                         | 1                     | 25.6 | 28.5                | 30  | 31.5 | 1  | 41.5                                      | 14.5             | 0.690                          | 53.5                                   | 75               | 0.293                       | 9.7                      |
| SM6T33A/CA  | 0.2                         | 1                     | 28.2 | 31.4                | 33  | 34.7 | 1  | 45.7                                      | 13.1             | 0.840                          | 59.0                                   | 68               | 0.357                       | 9.8                      |
| SM6T36A/CA  | 0.2                         | 1                     | 30.8 | 34.2                | 36  | 37.8 | 1  | 49.9                                      | 12               | 1.01                           | 64.3                                   | 62               | 0.427                       | 9.9                      |
| SM6T39A/CA  | 0.2                         | 1                     | 33.3 | 37.1                | 39  | 41.0 | 1  | 53.9                                      | 11.1             | 1.16                           | 69.7                                   | 57               | 0.504                       | 10.0                     |
| SM6T56A/CA  | 0.2                         | 1                     | 47.6 | 53.2                | 56  | 58.8 | 1  | 76.6                                      | 7.8              | 2.28                           | 100                                    | 40               | 1.030                       | 10.0                     |
| SM6T68A/CA  | 0.2                         | 1                     | 58.1 | 64.6                | 68  | 71.4 | 1  | 92                                        | 6.5              | 3.17                           | 121                                    | 33               | 1.503                       | 10.4                     |
| SM6T75A/CA  | 0.2                         | 1                     | 64.1 | 71.3                | 75  | 78.8 | 1  | 103                                       | 5.8              | 4.17                           | 134                                    | 30               | 1.84                        | 10.5                     |
| SM6T100A/CA | 0.2                         | 1                     | 85.5 | 95.0                | 100 | 105  | 1  | 137                                       | 4.4              | 7.27                           | 178                                    | 22.5             | 3.24                        | 10.6                     |
| SM6T150A/CA | 0.2                         | 1                     | 128  | 143                 | 150 | 158  | 1  | 207                                       | 2.9              | 16.9                           | 265                                    | 15               | 7.13                        | 10.8                     |
| SM6T200A/CA | 0.2                         | 1                     | 171  | 190                 | 200 | 210  | 1  | 274                                       | 2.2              | 29.1                           | 353                                    | 11.3             | 12.7                        | 10.8                     |
| SM6T220A/CA | 0.2                         | 1                     | 188  | 209                 | 220 | 231  | 1  | 328                                       | 2                | 48.5                           | 388                                    | 10.3             | 15.2                        | 10.8                     |

1. Pulse test :  $t_p < 50\text{ ms}$ 2. To calculate  $V_{BR}$  versus junction temperature, use the following formula:  $V_{BR} @ T_J = V_{BR} @ 25^{\circ}\text{C} \times (1 + \alpha T \times (T_J - 25))$ .3. To calculate maximum clamping voltage at other surge level, use the following formula:  $V_{CL} = R_D \times I_{PP} + V_{BRmax}$ .

4. Surge capability given for both directions for unidirectional and bidirectional types.

Figure 3. Peak power dissipation versus initial junction temperature

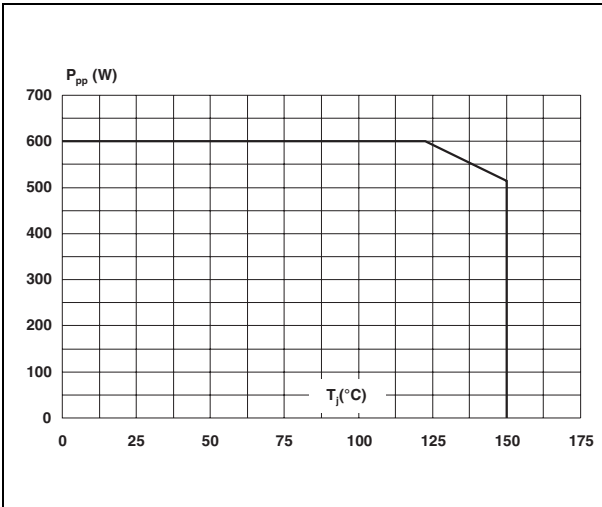


Figure 4. Peak pulse power versus exponential pulse duration

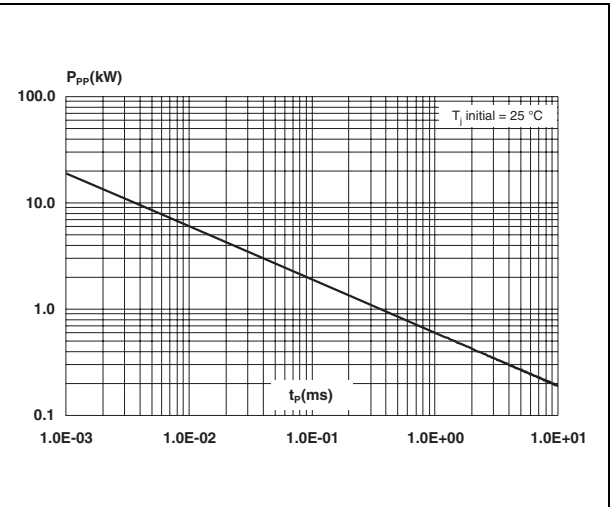
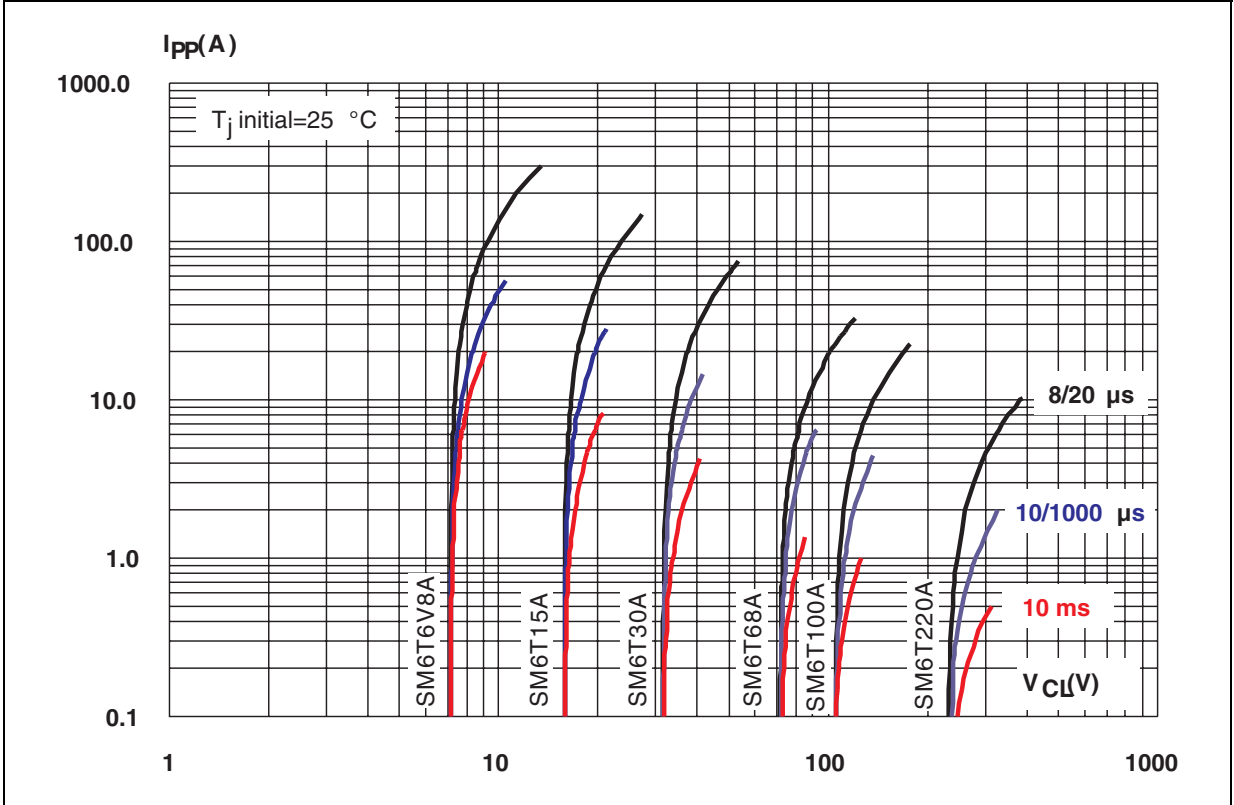
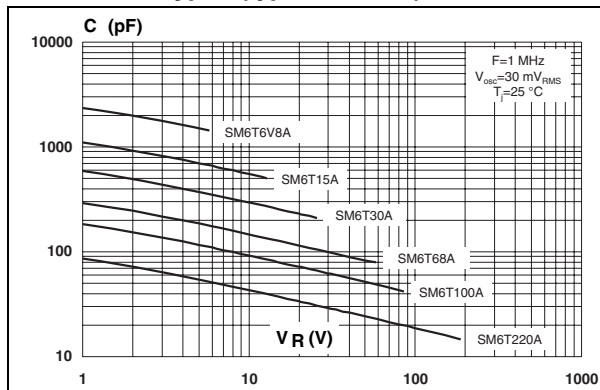


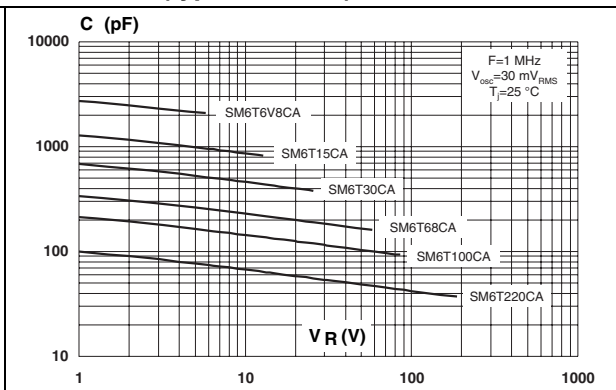
Figure 5. Clamping voltage versus peak pulse current (maximum values)



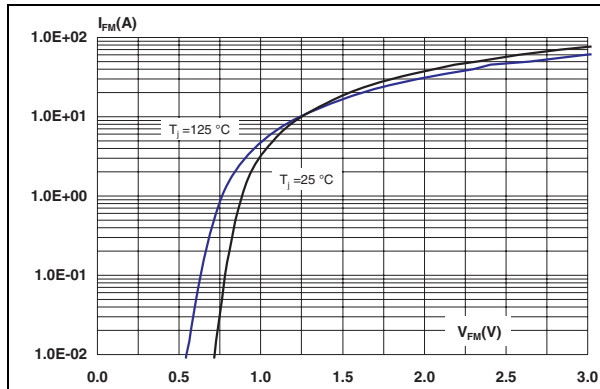
**Figure 6. Capacitance versus reverse applied voltage for unidirectional types (typical values)**



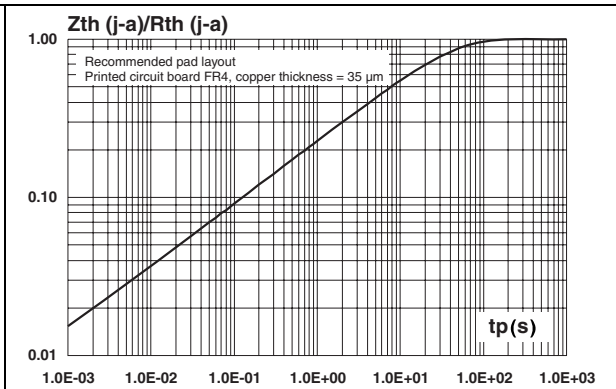
**Figure 7. Capacitance versus reverse applied voltage for bidirectional types (typical values)**



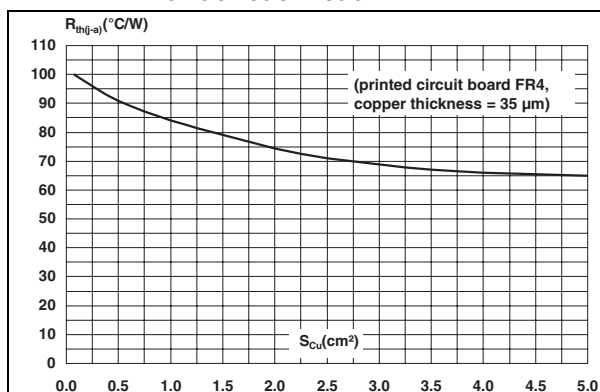
**Figure 8. Peak forward voltage drop versus peak forward current (typical values)**



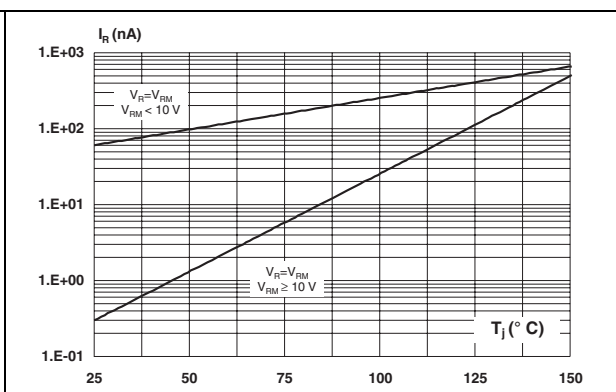
**Figure 9. Relative variation of thermal impedance junction to ambient versus pulse duration**



**Figure 10. Thermal resistance junction to ambient versus copper surface under each lead**

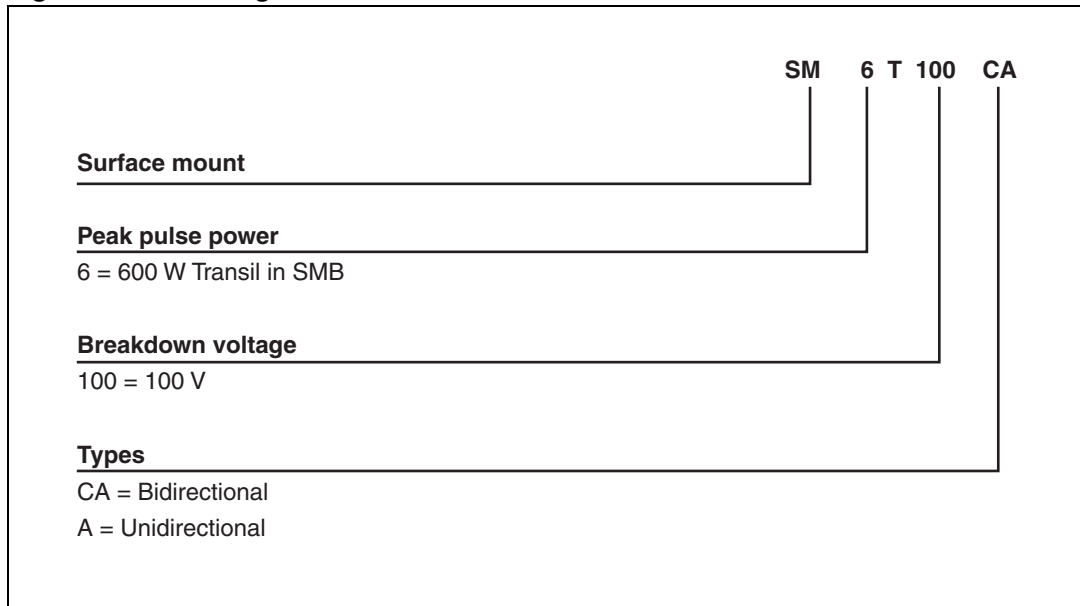


**Figure 11. Leakage current versus junction temperature (typical values)**



## 2 Ordering information scheme

Figure 12. Ordering information scheme



### 3 Packaging information

- Case: JEDEC DO-214AA molded plastic over planar junction
- Terminals: solder plated, solderable as per MIL-STD-750, Method 2026
- Polarity: for unidirectional types the band indicates cathode
- Flammability: epoxy meets UL 94, V0
- RoHS package

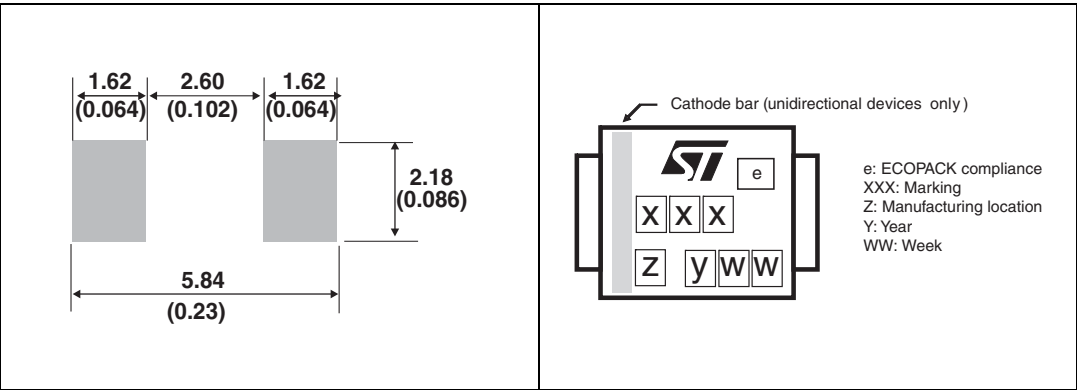
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

**Table 4. SMB dimensions**

| 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    | 1.95        | 2.20 | 0.077  | 0.087 |
| c    | 0.15        | 0.40 | 0.006  | 0.016 |
| D    | 3.30        | 3.95 | 0.130  | 0.156 |
| E    | 5.10        | 5.60 | 0.201  | 0.220 |
| E1   | 4.05        | 4.60 | 0.159  | 0.181 |
| L    | 0.75        | 1.50 | 0.030  | 0.059 |

**Figure 13. SMB footprint dimensions in mm (inches)**

**Figure 14. Marking layout<sup>(1)</sup>**



1. Marking layout can vary according to assembly location.

**Table 5. Marking**

| Order code | Marking | Order code | Marking |
|------------|---------|------------|---------|
| SM6T6V8A   | DE      | SM6T6V8CA  | LE      |
| SM6T7V5A   | DG      | SM6T7V5CA  | LG      |
| SM6T10A    | DP      | SM6T10CA   | LP      |
| SM6T12A    | DT      | SM6T12CA   | LT      |
| SM6T15A    | DX      | SM6T15CA   | LX      |
| SM6T18A    | EE      | SM6T18CA   | ME      |
| SM6T22A    | EK      | SM6T22CA   | MK      |
| SM6T24A    | EM      | SM6T24CA   | MM      |
| SM6T27A    | EP      | SM6T27CA   | MP      |
| SM6T30A    | ER      | SM6T30CA   | MR      |
| SM6T33A    | ET      | SM6T33CA   | MT      |
| SM6T36A    | EV      | SM6T36CA   | MV      |
| SM6T39A    | EX      | SM6T39CA   | MX      |
| SM6T56A    | FL      | SM6T56CA   | NL      |
| SM6T68A    | FQ      | SM6T68CA   | NQ      |
| SM6T75A    | FS      | SM6T75CA   | NS      |
| SM6T100A   | FY      | SM6T100CA  | NY      |
| SM6T150A   | GL      | SM6T150CA  | OL      |
| SM6T200A   | GU      | SM6T200CA  | OU      |
| SM6T220A   | GW      | SM6T220CA  | OW      |

## 4 Ordering information

**Table 6. Ordering information**

| Order code                 | Marking                               | Package | Weight | Base qty | Delivery mode |
|----------------------------|---------------------------------------|---------|--------|----------|---------------|
| SM6TxxxA/CA <sup>(1)</sup> | See <a href="#">Table 5 on page 8</a> | SMB     | 0.11 g | 2500     | Tape and reel |

1. Where xxx is nominal value of  $V_{BR}$  and A or CA indicates unidirectional or bidirectional version. See [Table 3](#) for list of available devices and their order codes

## 5 Revision history

**Table 7. Document revision history**

| Date        | Revision | Changes                                                                                                                                                                             |
|-------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| August-2001 | 4A       | Previous update.                                                                                                                                                                    |
| 15-Sep-2004 | 5        | 1. Types table parameters on page 2: $I_{RM}$ @ $T_j = 85^\circ\text{C}$ condition added<br>2. $I_{RM}$ max values changed                                                          |
| 26-Mar-2008 | 6        | Reformatted to current standard. SMB dimensions and footprint updated. Maximum junction temperature replaced with operating junction temperature range in <a href="#">Table 1</a> . |
| 25-May-2009 | 7        | Reformatted to current standard. Added standards compliance information on page 1. Added device SM6T56 to <a href="#">Table 3</a> . Updated all characteristic curves.              |
| 17-Sep-2009 | 8        | Document updated for low leakage current.                                                                                                                                           |
| 20-Oct-2010 | 9        | Updated <a href="#">Figure 13</a> .                                                                                                                                                 |

**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2010 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.