

## 1. General description

SMBJ series, 600W transient voltage suppressor (TVS) in SMB package, designed to protect electronic circuit which induced by lightning surge or other transient voltage situation.

## 2. Features and benefits

- Peak pulse power 600W @ 10/1000 $\mu$ s waveform
- Excellent clamping capability
- Low incremental surge resistance
- Surface mount package for easy assembly and board space saving
- Typical  $I_R < 1\mu A$  When  $V_R > 12V$
- Fast response time: Typically less than 1.0ps from 0V to BV min
- IEC 61000-4-2 ESD 30kV (Air), 30kV (Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- High temperature to reflow soldering guaranteed: 260°C/10sec
- Meet UL94V-0 flammability classification which guaranteed by mold compound
- Meet MSL level1, per J-STD-020
- Lead free lead finish
- Halogen free and RoHS compliant



Bi-directional



Uni-directional

## 3. Applications

- Power supply protection
- Industrial application
- Power management
- I/O interface protection



## 4. Ordering information

| Type number   | Package name | Orderable part number | Packing method | Small packing quantity | Package version | Package issue date |
|---------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| SMBJxxxXX     | SMB          | SMBJxxxXXJ            | Tape and reel  | 3000                   | SMBJ            | 18-Oct-2020        |
| eg. SMBJ5.0CA | SMB          | SMBJ5.0CAJ            | Tape and reel  | 3000                   | SMBJ            | 18-Oct-2020        |

## 5. Absolute maximum ratings

In accordance with the Absolute Maximum Rating System (IEC 60134).

$T_j = 25^\circ C$  unless otherwise specified.

| Symbol                         | Parameter                      | Conditions                                                                                                       | Values     | Unit       |
|--------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------|------------|------------|
| <b>Absolute maximum rating</b> |                                |                                                                                                                  |            |            |
| $P_{PPM}$                      | peak pulse power               | [1]                                                                                                              | 600        | W          |
| $P_{M(AV)}$                    | steady state power dissipation | on infinite heatsink at $T_a = 50^\circ C$                                                                       | 5          | W          |
| $I_{FSM}$                      | peak forward surge current     | $t_p = 8.3$ ms; single half sine-wave pulse; duty cycle = 4 pulses per minute maximum; unidirectional units only | 100        | A          |
| $V_F$                          | forward on-state voltage       | $I_F = 50$ A; unidirectional units only                                                                          | 3.5        | V          |
| $T_{stg}$                      | storage temperature range      |                                                                                                                  | -65 to 150 | $^\circ C$ |
| $T_j$                          | operating temperature range    |                                                                                                                  | -65 to 150 | $^\circ C$ |

[1] In accordance with IEC 61643-321 (10/1000  $\mu$ s current waveform).

## 6. Characteristics

$T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified.

| PN<br>(Uni) | PN<br>(Bi) | Reverse<br>Stand off<br>Voltage<br>$V_R$<br>(V) | Breakdown<br>Voltage $V_{BR}$ @<br>$I_T$<br>(V) |       | Test<br>current<br>$I_T$<br>(mA) | Max.<br>Clamping<br>Voltage $V_C$<br>@ $I_{PP}$<br>(V) | Max. Peak<br>Pulse<br>Current<br>$I_{PP}$<br>(A) | Maximum<br>Reverse<br>Leakage<br>$I_R$ @ $V_R$<br>( $\mu$ A) | Marking |        |
|-------------|------------|-------------------------------------------------|-------------------------------------------------|-------|----------------------------------|--------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------|---------|--------|
|             |            |                                                 | Min                                             | Max   |                                  |                                                        |                                                  |                                                              | Uni     | Bi     |
| SMBJ5.0A    | SMBJ5.0CA  | 5                                               | 6.45                                            | 6.98  | 10                               | 9.2                                                    | 65.3                                             | 400                                                          | B005AJ  | B005CJ |
| SMBJ6.0A    | SMBJ6.0CA  | 6                                               | 6.8                                             | 7.32  | 10                               | 10.3                                                   | 58.3                                             | 400                                                          | B006AJ  | B006CJ |
| SMBJ6.5A    | SMBJ6.5CA  | 6.5                                             | 7.27                                            | 7.92  | 10                               | 11.2                                                   | 53.6                                             | 250                                                          | B06FAJ  | B06FCJ |
| SMBJ7.0A    | SMBJ7.0CA  | 7                                               | 7.82                                            | 8.57  | 10                               | 12                                                     | 50                                               | 100                                                          | B007AJ  | B007CJ |
| SMBJ8.0A    | SMBJ8.0CA  | 8                                               | 8.95                                            | 9.76  | 1                                | 13.6                                                   | 44.2                                             | 50                                                           | B008AJ  | B008CJ |
| SMBJ9.0A    | SMBJ9.0CA  | 9                                               | 10.1                                            | 11    | 1                                | 15.4                                                   | 39                                               | 10                                                           | B009AJ  | B009CJ |
| SMBJ10A     | SMBJ10CA   | 10                                              | 11.21                                           | 12.19 | 1                                | 17                                                     | 35.3                                             | 5                                                            | B010AJ  | B010CJ |
| SMBJ11A     | SMBJ11CA   | 11                                              | 12.32                                           | 13.38 | 1                                | 18.2                                                   | 33                                               | 1                                                            | B011AJ  | B011CJ |
| SMBJ12A     | SMBJ12CA   | 12                                              | 13.43                                           | 14.57 | 1                                | 19.9                                                   | 30.2                                             | 1                                                            | B012AJ  | B012CJ |
| SMBJ13A     | SMBJ13CA   | 13                                              | 14.54                                           | 15.76 | 1                                | 21.5                                                   | 28                                               | 1                                                            | B013AJ  | B013CJ |
| SMBJ14A     | SMBJ14CA   | 14                                              | 15.75                                           | 17.04 | 1                                | 23.2                                                   | 25.9                                             | 1                                                            | B014AJ  | B014CJ |
| SMBJ15A     | SMBJ15CA   | 15                                              | 16.86                                           | 18.34 | 1                                | 24.4                                                   | 24.6                                             | 1                                                            | B015AJ  | B015CJ |
| SMBJ16A     | SMBJ16CA   | 16                                              | 17.97                                           | 19.52 | 1                                | 26                                                     | 23.1                                             | 1                                                            | B016AJ  | B016CJ |
| SMBJ17A     | SMBJ17CA   | 17                                              | 19.08                                           | 20.72 | 1                                | 27.6                                                   | 21.8                                             | 1                                                            | B017AJ  | B017CJ |
| SMBJ18A     | SMBJ18CA   | 18                                              | 20.19                                           | 21.9  | 1                                | 29.2                                                   | 20.6                                             | 1                                                            | B018AJ  | B018CJ |
| SMBJ20A     | SMBJ20CA   | 20                                              | 22.41                                           | 24.28 | 1                                | 32.4                                                   | 18.6                                             | 1                                                            | B020AJ  | B020CJ |
| SMBJ22A     | SMBJ22CA   | 22                                              | 24.63                                           | 26.66 | 1                                | 35.5                                                   | 16.9                                             | 1                                                            | B022AJ  | B022CJ |
| SMBJ24A     | SMBJ24CA   | 24                                              | 26.95                                           | 29.23 | 1                                | 38.9                                                   | 15.5                                             | 1                                                            | B024AJ  | B024CJ |
| SMBJ26A     | SMBJ26CA   | 26                                              | 29.12                                           | 31.67 | 1                                | 42.1                                                   | 14.3                                             | 1                                                            | B026AJ  | B026CJ |
| SMBJ28A     | SMBJ28CA   | 28                                              | 31.33                                           | 34.16 | 1                                | 45.4                                                   | 13.3                                             | 1                                                            | B028AJ  | B028CJ |
| SMBJ30A     | SMBJ30CA   | 30                                              | 33.55                                           | 36.54 | 1                                | 48.4                                                   | 12.4                                             | 1                                                            | B030AJ  | B030CJ |
| SMBJ33A     | SMBJ33CA   | 33                                              | 36.98                                           | 40.3  | 1                                | 53.3                                                   | 11.3                                             | 1                                                            | B033AJ  | B033CJ |
| SMBJ36A     | SMBJ36CA   | 36                                              | 40.3                                            | 43.9  | 1                                | 58.1                                                   | 10.4                                             | 1                                                            | B036AJ  | B036CJ |
| SMBJ40A     | SMBJ40CA   | 40                                              | 44.7                                            | 48.8  | 1                                | 64.5                                                   | 9.3                                              | 1                                                            | B040AJ  | B040CJ |
| SMBJ43A     | SMBJ43CA   | 43                                              | 48.2                                            | 52.4  | 1                                | 69.4                                                   | 8.7                                              | 1                                                            | B043AJ  | B043CJ |
| SMBJ45A     | SMBJ45CA   | 45                                              | 50.4                                            | 54.9  | 1                                | 72.7                                                   | 8.3                                              | 1                                                            | B045AJ  | B045CJ |
| SMBJ48A     | SMBJ48CA   | 48                                              | 53.7                                            | 58.5  | 1                                | 77.4                                                   | 7.8                                              | 1                                                            | B048AJ  | B048CJ |
| SMBJ51A     | SMBJ51CA   | 51                                              | 57.1                                            | 62.3  | 1                                | 82.4                                                   | 7.3                                              | 1                                                            | B051AJ  | B051CJ |
| SMBJ54A     | SMBJ54CA   | 54                                              | 60.5                                            | 65.8  | 1                                | 87.1                                                   | 6.9                                              | 1                                                            | B054AJ  | B054CJ |
| SMBJ58A     | SMBJ58CA   | 58                                              | 64.9                                            | 70.7  | 1                                | 93.6                                                   | 6.5                                              | 1                                                            | B058AJ  | B058CJ |
| SMBJ60A     | SMBJ60CA   | 60                                              | 67.2                                            | 73.2  | 1                                | 96.8                                                   | 6.2                                              | 1                                                            | B060AJ  | B060CJ |
| SMBJ64A     | SMBJ64CA   | 64                                              | 71.6                                            | 78    | 1                                | 103                                                    | 5.9                                              | 1                                                            | B064AJ  | B064CJ |
| SMBJ70A     | SMBJ70CA   | 70                                              | 78.4                                            | 85.4  | 1                                | 113                                                    | 5.3                                              | 1                                                            | B070AJ  | B070CJ |
| SMBJ75A     | SMBJ75CA   | 75                                              | 83.9                                            | 91.5  | 1                                | 121                                                    | 5                                                | 1                                                            | B075AJ  | B075CJ |
| SMBJ78A     | SMBJ78CA   | 78                                              | 87.4                                            | 95.1  | 1                                | 126                                                    | 4.8                                              | 1                                                            | B078AJ  | B078CJ |
| SMBJ85A     | SMBJ85CA   | 85                                              | 95.1                                            | 103.3 | 1                                | 137                                                    | 4.4                                              | 1                                                            | B085AJ  | B085CJ |



Fig. 1. I-V curve characteristics; Uni-directional

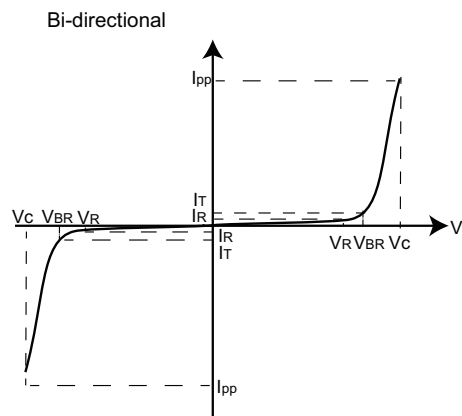


Fig. 2. I-V curve characteristics; Bi-directional



Fig. 3. Peak pulse power derating curve

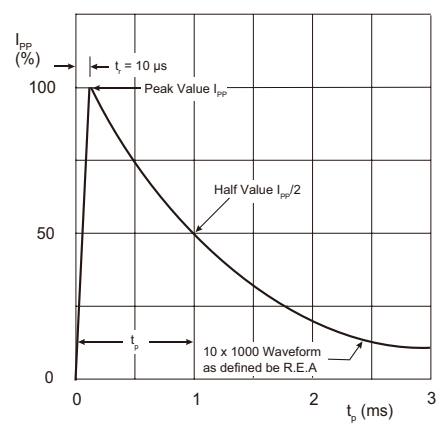


Fig. 4. Pulse waveform

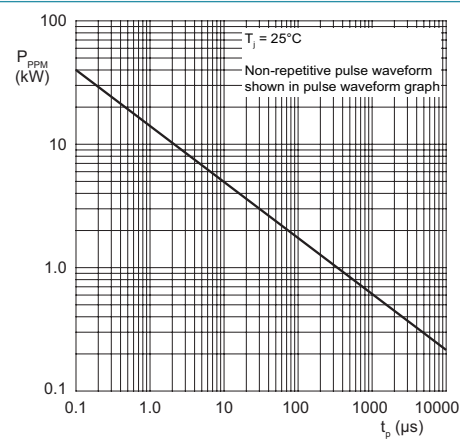


Fig. 5. Peak pulse power rating curve

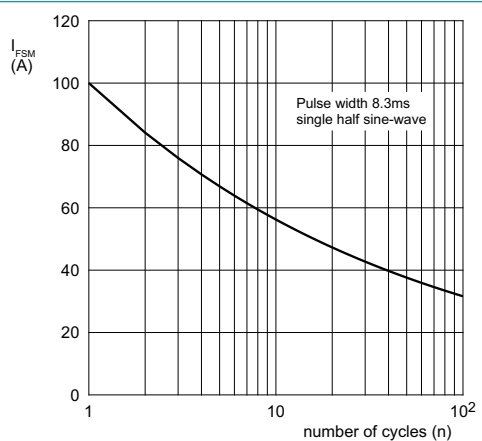
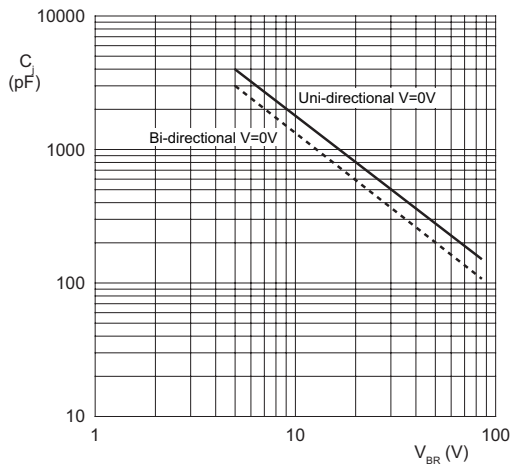
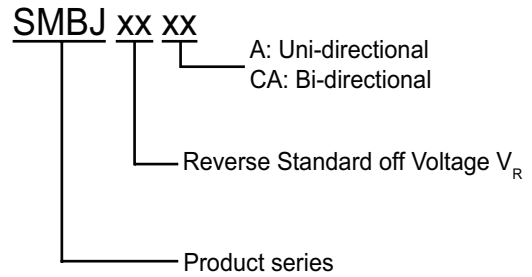


Fig. 6. Maximum non-repetitive surge current



**Fig. 7. Typical junction capacitance**



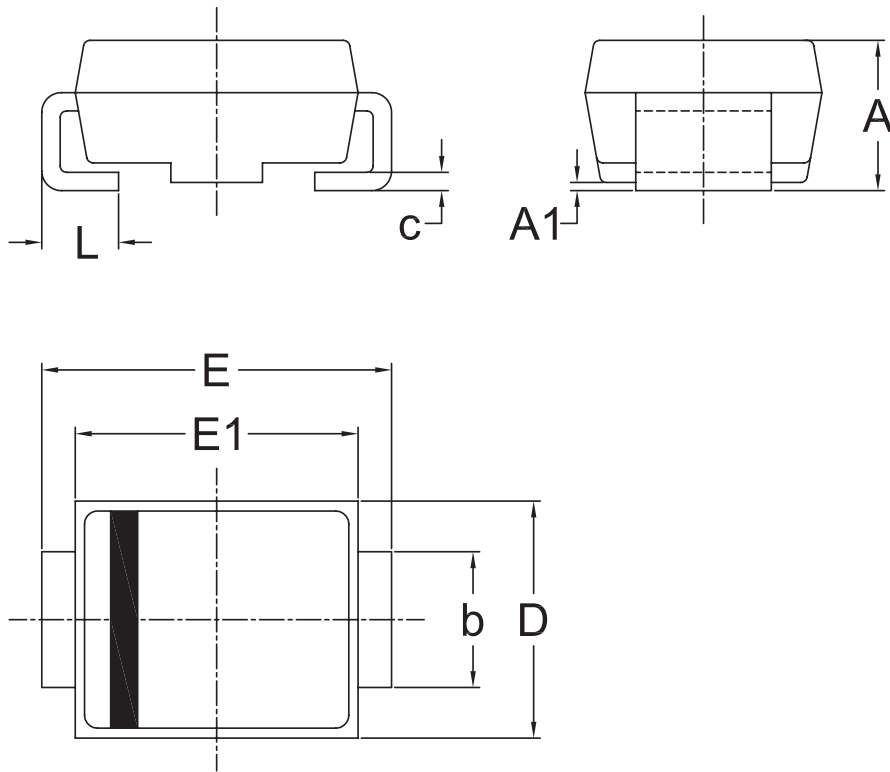
**Fig. 8. Part numbering**



**Fig. 9. Part marking**

**7. Package outline**

SMB



| UNIT | A   | A1   | b    | c    | D    | E    | E1   | L    |      |
|------|-----|------|------|------|------|------|------|------|------|
| mm   | Max | 2.50 | 0.30 | 2.15 | 0.25 | 3.75 | 5.54 | 4.65 | 1.50 |
|      | Min | 2.00 | 0.00 | 1.85 | 0.15 | 3.45 | 5.04 | 4.35 | 0.80 |

Remark: Dimensions D and E1 do not include mold flash & gate remain.

## 8. Legal information

### Data sheet status

| Document status [1][2]         | Product status [3] | Definition                                                                            |
|--------------------------------|--------------------|---------------------------------------------------------------------------------------|
| Objective [short] data sheet   | Development        | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification      | This document contains data from the preliminary specification.                       |
| Product [short] data sheet     | Production         | This document contains the product specification.                                     |

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- [2] The term 'short data sheet' is explained in section "Definitions".
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