

## 1. General description

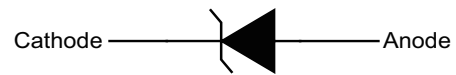
SMAJ series, 400W transient voltage suppressor (TVS) in SMA package, designed to protect electronic circuit which induced by lightning surge or other transient voltage situation.

## 2. Features and benefits

- Peak pulse power 400W @ 10/1000µs 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 |
|---------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| SMAJxxxXX     | SMA          | SMAJxxxXXJ            | Tape and reel  | 5000                   | SMAJ            | 18-Oct-2020        |
| eg. SMAJ5.0CA | SMA          | SMAJ5.0CAJ            | Tape and reel  | 5000                   | SMAJ            | 18-Oct-2020        |

## 5. Absolute maximum ratings

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

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

| Symbol                         | Parameter                      | Conditions   | Values     | Unit |
|--------------------------------|--------------------------------|--|------------|------|
| <b>Absolute maximum rating</b> |                                |  |            |      |
| $P_{PPM}$                      | peak pulse power               | [1]  | 400        | W    |
| $P_{M(AV)}$                    | steady state power dissipation | on infinite heatsink at $T_a = 50\text{ °C}$   | 3.3        | W    |
| $I_{FSM}$                      | peak forward surge current     | $t_p = 8.3\text{ ms}$ ; single half sine-wave pulse; duty cycle = 4 pulses per minute maximum; unidirectional units only | 60         | A    |
| $V_F$                          | forward on-state voltage       | $I_F = 35\text{ A}$ ; unidirectional units only  | 3.5        | V    |
| $T_{stg}$                      | storage temperature range      |  | -65 to 150 | °C   |
| $T_j$                          | operating temperature range    |  | -65 to 150 | °C   |

[1] In accordance with IEC 61643-321 (10/1000 µs 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     |
| SMAJ5.0A    | SMAJ5.0CA  | 5   | 6.45  | 6.98  | 10                               | 9.2  | 43.5   | 400  | A005AJ  | A005CJ |
| SMAJ6.0A    | SMAJ6.0CA  | 6   | 6.8   | 7.32  | 10                               | 10.3   | 38.8   | 400  | A006AJ  | A006CJ |
| SMAJ6.5A    | SMAJ6.5CA  | 6.5   | 7.27  | 7.92  | 10                               | 11.2   | 35.7   | 250  | A06FAJ  | A06FCJ |
| SMAJ7.0A    | SMAJ7.0CA  | 7   | 7.82  | 8.57  | 10                               | 12   | 33.3   | 100  | A007AJ  | A007CJ |
| SMAJ8.0A    | SMAJ8.0CA  | 8   | 8.95  | 9.76  | 1                                | 13.6   | 29.4   | 50   | A008AJ  | A008CJ |
| SMAJ9.0A    | SMAJ9.0CA  | 9   | 10.1  | 11    | 1                                | 15.4   | 26   | 10   | A009AJ  | A009CJ |
| SMAJ10A     | SMAJ10CA   | 10  | 11.21   | 12.19 | 1                                | 17   | 23.5   | 5  | A010AJ  | A010CJ |
| SMAJ11A     | SMAJ11CA   | 11  | 12.32   | 13.38 | 1                                | 18.2   | 22   | 1  | A011AJ  | A011CJ |
| SMAJ12A     | SMAJ12CA   | 12  | 13.43   | 14.57 | 1                                | 19.9   | 20.1   | 1  | A012AJ  | A012CJ |
| SMAJ13A     | SMAJ13CA   | 13  | 14.54   | 15.76 | 1                                | 21.5   | 18.6   | 1  | A013AJ  | A013CJ |
| SMAJ14A     | SMAJ14CA   | 14  | 15.75   | 17.04 | 1                                | 23.2   | 17.2   | 1  | A014AJ  | A014CJ |
| SMAJ15A     | SMAJ15CA   | 15  | 16.86   | 18.34 | 1                                | 24.4   | 16.4   | 1  | A015AJ  | A015CJ |
| SMAJ16A     | SMAJ16CA   | 16  | 17.97   | 19.52 | 1                                | 26   | 15.4   | 1  | A016AJ  | A016CJ |
| SMAJ17A     | SMAJ17CA   | 17  | 19.08   | 20.72 | 1                                | 27.6   | 14.5   | 1  | A017AJ  | A017CJ |
| SMAJ18A     | SMAJ18CA   | 18  | 20.19   | 21.9  | 1                                | 29.2   | 13.7   | 1  | A018AJ  | A018CJ |
| SMAJ20A     | SMAJ20CA   | 20  | 22.41   | 24.28 | 1                                | 32.4   | 12.3   | 1  | A020AJ  | A020CJ |
| SMAJ22A     | SMAJ22CA   | 22  | 24.63   | 26.66 | 1                                | 35.5   | 11.3   | 1  | A022AJ  | A022CJ |
| SMAJ24A     | SMAJ24CA   | 24  | 26.95   | 29.23 | 1                                | 38.9   | 10.3   | 1  | A024AJ  | A024CJ |
| SMAJ26A     | SMAJ26CA   | 26  | 29.12   | 31.67 | 1                                | 42.1   | 9.5  | 1  | A026AJ  | A026CJ |
| SMAJ28A     | SMAJ28CA   | 28  | 31.33   | 34.16 | 1                                | 45.4   | 8.8  | 1  | A028AJ  | A028CJ |
| SMAJ30A     | SMAJ30CA   | 30  | 33.55   | 36.54 | 1                                | 48.4   | 8.3  | 1  | A030AJ  | A030CJ |
| SMAJ33A     | SMAJ33CA   | 33  | 36.98   | 40.3  | 1                                | 53.3   | 7.5  | 1  | A033AJ  | A033CJ |
| SMAJ36A     | SMAJ36CA   | 36  | 40.3  | 43.9  | 1                                | 58.1   | 6.9  | 1  | A036AJ  | A036CJ |
| SMAJ40A     | SMAJ40CA   | 40  | 44.7  | 48.8  | 1                                | 64.5   | 6.2  | 1  | A040AJ  | A040CJ |
| SMAJ43A     | SMAJ43CA   | 43  | 48.2  | 52.4  | 1                                | 69.4   | 5.8  | 1  | A043AJ  | A043CJ |
| SMAJ45A     | SMAJ45CA   | 45  | 50.4  | 54.9  | 1                                | 72.7   | 5.5  | 1  | A045AJ  | A045CJ |
| SMAJ48A     | SMAJ48CA   | 48  | 53.7  | 58.5  | 1                                | 77.4   | 5.2  | 1  | A048AJ  | A048CJ |
| SMAJ51A     | SMAJ51CA   | 51  | 57.1  | 62.3  | 1                                | 82.4   | 4.9  | 1  | A051AJ  | A051CJ |
| SMAJ54A     | SMAJ54CA   | 54  | 60.5  | 65.8  | 1                                | 87.1   | 4.6  | 1  | A054AJ  | A054CJ |
| SMAJ58A     | SMAJ58CA   | 58  | 64.9  | 70.7  | 1                                | 93.6   | 4.3  | 1  | A058AJ  | A058CJ |
| SMAJ60A     | SMAJ60CA   | 60  | 67.2  | 73.2  | 1                                | 96.8   | 4.1  | 1  | A060AJ  | A060CJ |
| SMAJ64A     | SMAJ64CA   | 64  | 71.6  | 78    | 1                                | 103  | 3.9  | 1  | A064AJ  | A064CJ |
| SMAJ70A     | SMAJ70CA   | 70  | 78.4  | 85.4  | 1                                | 113  | 3.5  | 1  | A070AJ  | A070CJ |
| SMAJ75A     | SMAJ75CA   | 75  | 83.9  | 91.5  | 1                                | 121  | 3.3  | 1  | A075AJ  | A075CJ |
| SMAJ78A     | SMAJ78CA   | 78  | 87.4  | 95.1  | 1                                | 126  | 3.2  | 1  | A078AJ  | A078CJ |
| SMAJ85A     | SMAJ85CA   | 85  | 95.1  | 103.3 | 1                                | 137  | 2.9  | 1  | A085AJ  | A085CJ |

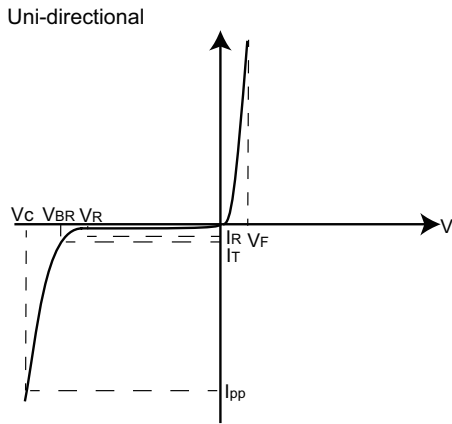


Fig. 1. I-V curve characteristics; Uni-directional

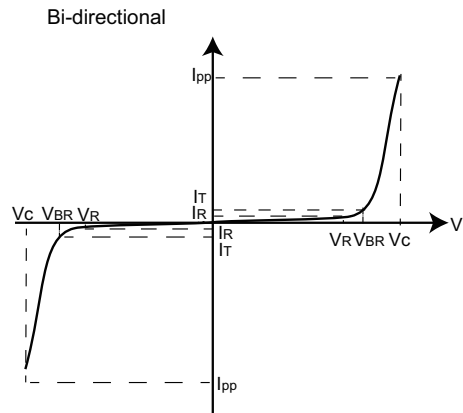


Fig. 2. I-V curve characteristics; Bi-directional

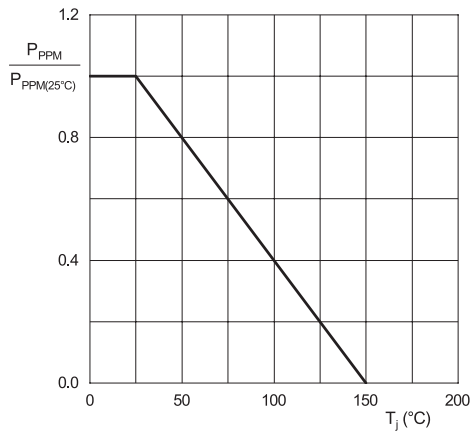


Fig. 3. Peak pulse power derating curve

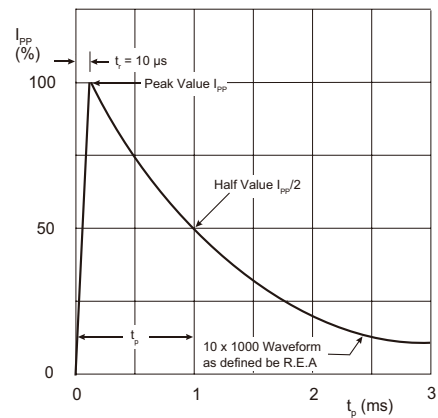


Fig. 4. Pulse waveform

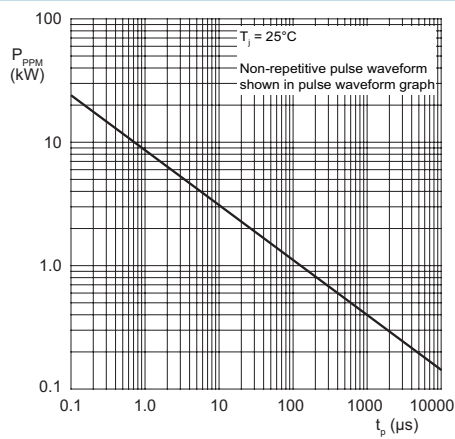


Fig. 5. Peak pulse power rating curve

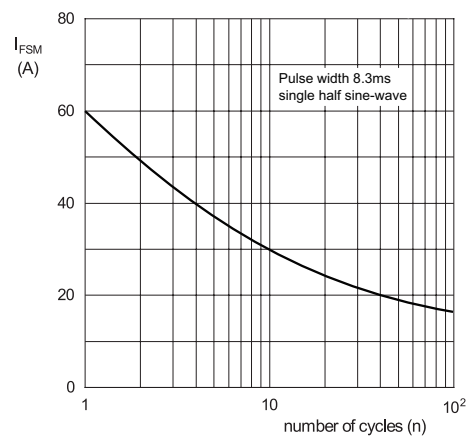


Fig. 6. Maximum non-repetitive surge current

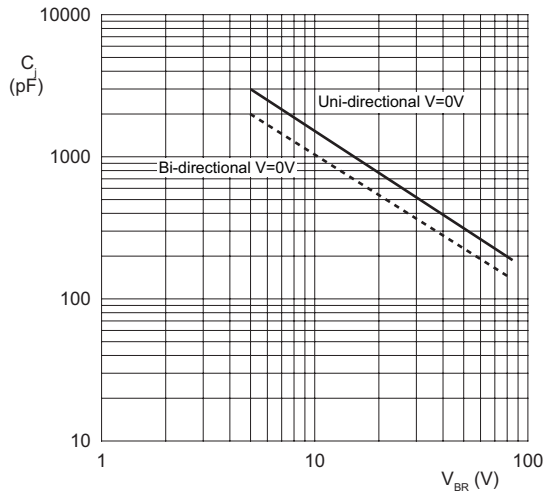


Fig. 7. Typical junction capacitance

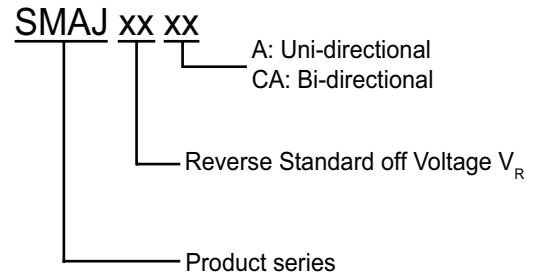


Fig. 8. Part numbering

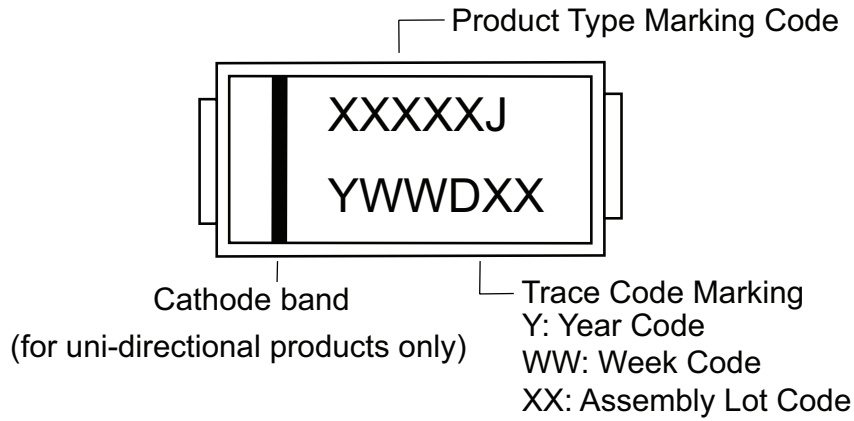
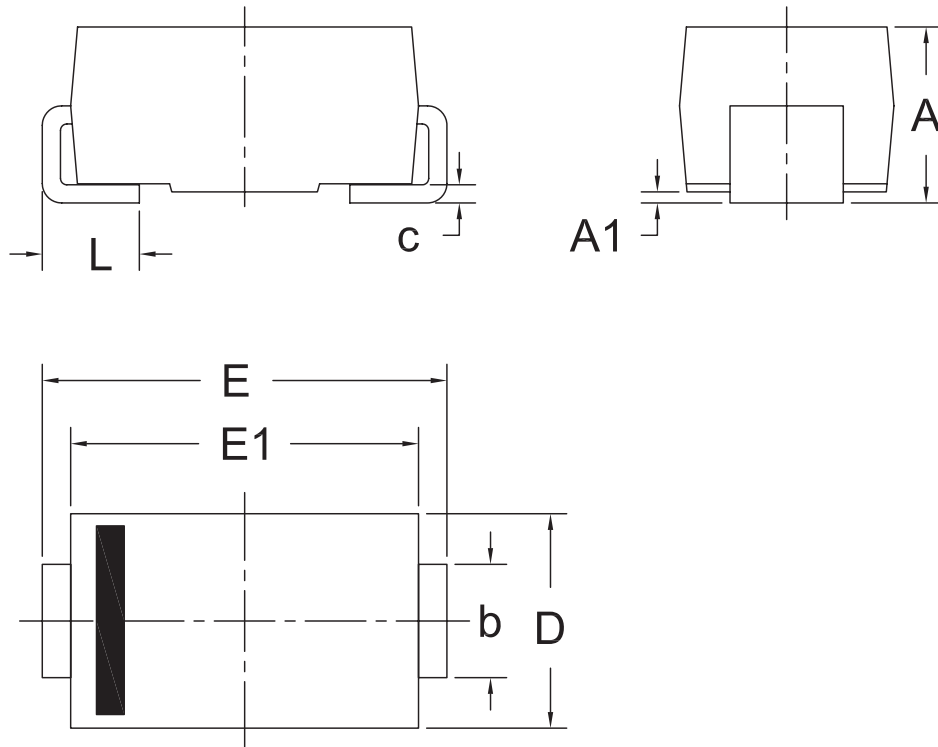


Fig. 9. Part marking

**7. Package outline**

SMA



| UNIT | A   | A1   | b    | c    | D    | E    | E1   | L    |      |
|------|-----|------|------|------|------|------|------|------|------|
| mm   | Max | 2.45 | 0.20 | 1.65 | 0.25 | 2.85 | 5.25 | 4.55 | 1.55 |
|      | Min | 1.95 | 0.10 | 1.35 | 0.15 | 2.55 | 4.75 | 4.25 | 0.85 |

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.                                     |

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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