

# TVS Diodes

Transient Voltage Suppression Diodes

SMCJ Series



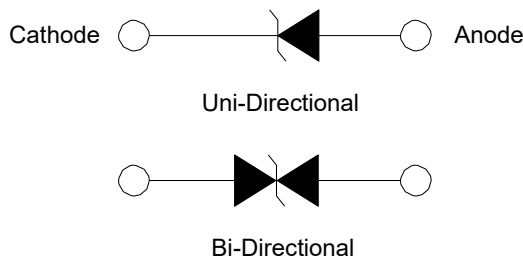
## Description

Transient Voltage Suppressor (TVS) is a circuit protection component that either attenuates (reduces) or filters a transient voltage spike (overvoltage), TVS diodes provide critical protection by going into avalanche breakdown within no more than a few nanoseconds after a strike, clamping the transient voltage, and routing its current to the ground.

## Applications

- Communication Equipment
- Security & Protection
- Industrial Control Equipment
- Power Supply
- Automotive Electronics
- New Energy
- Lightning Protection

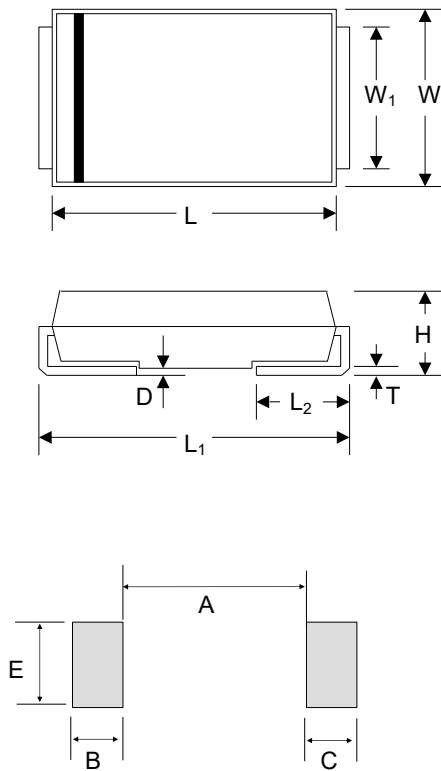
## Functional Diagram



## Features

- Low incremental surge resistance
- Excellent clamping capability
- Low profile package with built-in strain relief
- Typical  $I_R$  less than 1.0  $\mu A$  above 12 V
- 1500 W peak pulse power capability with a 10/1000  $\mu S$  Waveform, repetition rate (duty cycle): 0.01%
- For surface mounted applications to optimize board space
- Typical failure mode is short from over-specified voltage or current
- IEC 61000-4-2 ESD 30 kV (Air), 30 kV (Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- Very fast response time
- Glass passivated chip junction
- High temperature to reflow soldering guaranteed: 260  $^{\circ}C/30sec$
- $V_{BR} @ T_J = V_{BR@25^{\circ}C} \times (1 + \alpha_T \times (T_J - 25))$   
( $\alpha_T$ : Temperature Coefficient, typical value is 0.1%)
- Plastic package is flammability rated V-0 per Underwriters Laboratories
- Meet MSL level1, per J-STD-020
- Matte tin lead-free plated
- Halogen free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)

Package Outline Dimensions (DO-214AB)



Mounting Pad Layout

| Symbol         | Millimeters |       | Inches |       |
|----------------|-------------|-------|--------|-------|
|                | Min.        | Max.  | Min.   | Max.  |
| L              | 6.600       | 7.110 | 0.260  | 0.280 |
| W              | 5.590       | 6.220 | 0.220  | 0.245 |
| W <sub>1</sub> | 2.900       | 3.200 | 0.114  | 0.126 |
| H              | 2.060       | 2.620 | 0.079  | 0.103 |
| T              | 0.1520      | 0.305 | 0.006  | 0.012 |
| L <sub>1</sub> | 7.750       | 8.130 | 0.305  | 0.320 |
| L <sub>2</sub> | 0.760       | 1.520 | 0.030  | 0.060 |
| D              | -           | 0.203 | -      | 0.008 |
| A              | -           | 4.200 | -      | 0.165 |
| B              | 2.400       | -     | 0.094  | -     |
| C              | 2.400       | -     | 0.094  | -     |
| E              | 3.300       | -     | 0.129  | -     |

## Maximum Ratings and Characteristics

(Ratings at 25 °C ambient temperature unless otherwise specified.)

| Parameter                                                                                                                         | Symbol           | Value      | Unit   |
|-----------------------------------------------------------------------------------------------------------------------------------|------------------|------------|--------|
| Peak Power Dissipation with a 10/1000 $\mu$ S waveform <sup>(1)(2)</sup> (Fig.1)-Single Die Parts                                 | P <sub>PPM</sub> | 1500       | W      |
| Peak Pulse Power Dissipation(Fig.2) by 10/1000 $\mu$ S Test Waveform <sup>(1)(2)</sup> (Fig.4) - Stacked Die Parts <sup>(5)</sup> | P <sub>PPM</sub> | 2000       | W      |
| Peak Power Dissipation on Infinite Heat Sink at T <sub>L</sub> =50 °C                                                             | P <sub>D</sub>   | 6.5        | W      |
| Peak Forward Surge Current,8.3 ms single half sinewave superimposed on rated load (JEDEC Method) <sup>(3)</sup>                   | I <sub>FSM</sub> | 200        | A      |
| Maximum Instantaneous Forward Voltage at 100 A for Unidirectional Only <sup>(4)</sup>                                             | V <sub>F</sub>   | 3.5/5.0    | V      |
| Operating Temperature Range                                                                                                       | T <sub>J</sub>   | -65 to 150 | °C     |
| Storage Temperature Range                                                                                                         | T <sub>STG</sub> | -65 to 175 | °C     |
| Typical Thermal Resistance Junction to Lead                                                                                       | R <sub>θJL</sub> | 15         | °C / W |
| Typical Thermal Resistance Junction to Ambient                                                                                    | R <sub>θJA</sub> | 75         | °C / W |

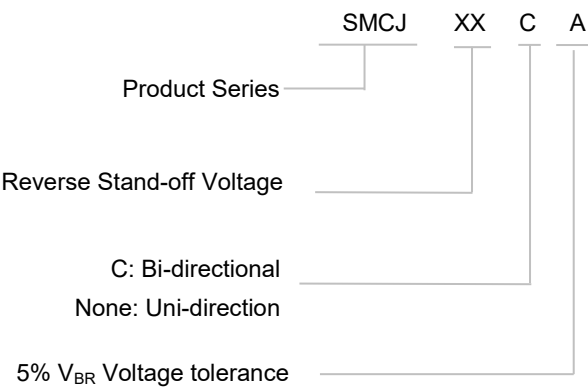
### Notes

1. Non-repetitive current pulse, per Fig. 4 and derated above T<sub>J</sub>(initial)=25 °C per Fig. 3.
2. Mounted on 8.0 mm<sup>2</sup> land areas.
3. Measured of 8.3 ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minute maximum.
4. V<sub>F</sub> < 3.5 V for single die parts and V<sub>F</sub> < 5.0 V for stacked-die parts.

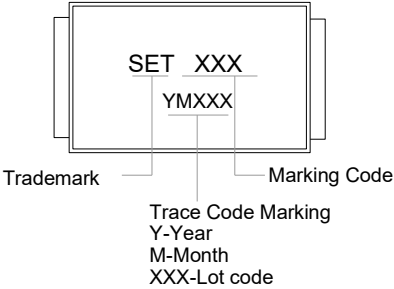
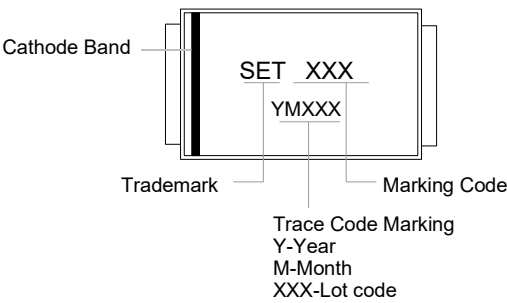
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Part Numbering System



Marking



## Glossary

| Item             | Description                                                                                                                                                                                                                                            |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $V_C$            | <b>Clamping Voltage</b><br>Voltage across TVS in a region of low differential resistance that serves to limit the voltage across the device terminals.                                                                                                 |
| $V_R$            | <b>Reverse Stand-off Voltage</b><br>Maximum voltage that can be applied to the TVS without operation.<br>NOTE : It is also shown as $V_{WM}$ (maximum working voltage (maximum d.c. voltage)) and known as rated stand-off voltage ( $V_{SO}$ ).       |
| $I_R$            | <b>Reverse Leakage Current</b><br>Current measured at $V_R$ .<br>NOTE : Also shown as $I_D$ for stand-by current.                                                                                                                                      |
| $V_{BR}$         | <b>Breakdown Voltage</b><br>Voltage across TVS at a specified current $I_T$ in the breakdown region.                                                                                                                                                   |
| $I_{PPM}$        | <b>Rated Random Recurring Peak Impulse Current</b><br>Maximum-rated value of random recurring peak impulse current that may be applied to a device.                                                                                                    |
| $P_{M(AV)}$      | <b>Rated Average Power Dissipation</b><br>Maximum-rated value of power dissipation resulting from all sources, including transients and standby current, averaged over a short period of time.                                                         |
| $P_{PPM}$        | <b>Rated Random Recurring Peak Impulse Power Dissipation</b><br>Maximum-rated value of the product of rated random recurring peak impulse current ( $I_{PPM}$ ) multiplies by specified maximum clamping voltage ( $V_C$ ).                            |
| $C_J$            | <b>Capacitance</b><br>Capacitance across the TVS measured at a specified frequency and voltage.                                                                                                                                                        |
| $V_{FS}$         | <b>Peak Forward Surge Voltage</b><br>Peak voltage across an TVS for a specified forward surge current ( $I_{FS}$ ) and time duration.<br>NOTE : Also shown as $V_F$ .                                                                                  |
| $I_{FS}$         | <b>Forward Surge Current</b><br>Pulsed current through TVS in the forward conducting region.<br>NOTE : Also shown as $I_F$ .                                                                                                                           |
| $\alpha_{V(BR)}$ | <b>Temperature Coefficient of Breakdown Voltage</b><br>The change of breakdown voltage divided by the change of temperature.                                                                                                                           |
| $I_{PP}$         | <b>Peak pulse Current</b><br>Peak pulse current value applied across the TVS to determine the clamping voltage $V_C$ for a specified wave shape.                                                                                                       |
| $I_T$            | <b>Pulsed D.C. Test Current</b><br>Test current for measurement of the breakdown voltage $V_{BR}$ . This is defined by the manufacturer and usually given in milliamperes with a pulse duration of less than 40 ms.<br>NOTE : Also shown as $I_{BR}$ . |

—(GB-T 18802.321 / IEC 61643-321 / JESD210A)

## TVS Diodes

Transient Voltage Suppression Diodes

SMCJ Series

Electrical Characteristics (T<sub>A</sub>=25 °C unless otherwise noted )Table 1

| Part Number |           | Device Marking Code |     | Breakdown Voltage<br>V <sub>BR</sub> @I <sub>T</sub> |      | Test Current<br>I <sub>T</sub> | Reverse Stand-off Voltage<br>V <sub>R</sub> | Max. Reverse Leakage<br>I <sub>R</sub> @V <sub>R</sub> | Max. Peak Pulse Current<br>I <sub>PPM</sub> | Max. Clamping Voltage<br>V <sub>C</sub> @I <sub>PPM</sub> |
|-------------|-----------|---------------------|-----|------------------------------------------------------|------|--------------------------------|---------------------------------------------|--------------------------------------------------------|---------------------------------------------|-----------------------------------------------------------|
|             |           |                     |     | Min                                                  | Max  |                                |                                             |                                                        |                                             |                                                           |
| Uni         | Bi        | Uni                 | Bi  | (V)                                                  |      | (mA)                           | (V)                                         | (μA)                                                   | (A)                                         | (V)                                                       |
| SMCJ5.0A    | SMCJ5.0CA | GDE                 | BDE | 6.4                                                  | 7.0  | 10                             | 5                                           | 800                                                    | 163                                         | 9.2                                                       |
| SMCJ6.0A    | SMCJ6.0CA | GDG                 | BDG | 6.67                                                 | 7.37 | 10                             | 6                                           | 800                                                    | 145.7                                       | 10.3                                                      |
| SMCJ6.5A    | SMCJ6.5CA | GDK                 | BDK | 7.22                                                 | 7.98 | 10                             | 6.5                                         | 500                                                    | 134                                         | 11.2                                                      |
| SMCJ7.0A    | SMCJ7.0CA | GDM                 | BDM | 7.78                                                 | 8.6  | 10                             | 7                                           | 200                                                    | 125                                         | 12                                                        |
| SMCJ7.5A    | SMCJ7.5CA | GDP                 | BDP | 8.33                                                 | 9.21 | 1                              | 7.5                                         | 100                                                    | 116.3                                       | 12.9                                                      |
| SMCJ8.0A    | SMCJ8.0CA | GDR                 | BDR | 8.89                                                 | 9.83 | 1                              | 8                                           | 50                                                     | 110.3                                       | 13.6                                                      |
| SMCJ8.5A    | SMCJ8.5CA | GDT                 | BDT | 9.44                                                 | 10.4 | 1                              | 8.5                                         | 20                                                     | 104.2                                       | 14.4                                                      |
| SMCJ9.0A    | SMCJ9.0CA | GDV                 | BDV | 10                                                   | 11.1 | 1                              | 9                                           | 10                                                     | 97.4                                        | 15.4                                                      |
| SMCJ10A     | SMCJ10CA  | GDX                 | BDX | 11.1                                                 | 12.3 | 1                              | 10                                          | 5                                                      | 88.3                                        | 17                                                        |
| SMCJ11A     | SMCJ11CA  | GDZ                 | BDZ | 12.2                                                 | 13.5 | 1                              | 11                                          | 1                                                      | 82.5                                        | 18.2                                                      |
| SMCJ12A     | SMCJ12CA  | GEE                 | BEE | 13.3                                                 | 14.7 | 1                              | 12                                          | 1                                                      | 75.4                                        | 19.9                                                      |
| SMCJ13A     | SMCJ13CA  | GEG                 | BEG | 14.4                                                 | 15.9 | 1                              | 13                                          | 1                                                      | 69.8                                        | 21.5                                                      |
| SMCJ14A     | SMCJ14CA  | GEK                 | BEK | 15.6                                                 | 17.2 | 1                              | 14                                          | 1                                                      | 64.7                                        | 23.2                                                      |
| SMCJ15A     | SMCJ15CA  | GEM                 | BEM | 16.7                                                 | 18.5 | 1                              | 15                                          | 1                                                      | 61.5                                        | 24.4                                                      |
| SMCJ16A     | SMCJ16CA  | GEP                 | BEP | 17.8                                                 | 19.7 | 1                              | 16                                          | 1                                                      | 57.7                                        | 26                                                        |
| SMCJ17A     | SMCJ17CA  | GER                 | BER | 18.9                                                 | 20.9 | 1                              | 17                                          | 1                                                      | 54.4                                        | 27.6                                                      |
| SMCJ18A     | SMCJ18CA  | GET                 | BET | 20                                                   | 22.1 | 1                              | 18                                          | 1                                                      | 51.4                                        | 29.2                                                      |
| SMCJ20A     | SMCJ20CA  | GEV                 | BEV | 22.2                                                 | 24.5 | 1                              | 20                                          | 1                                                      | 46.3                                        | 32.4                                                      |
| SMCJ22A     | SMCJ22CA  | GEX                 | BEX | 24.4                                                 | 26.9 | 1                              | 22                                          | 1                                                      | 42.3                                        | 35.5                                                      |
| SMCJ24A     | SMCJ24CA  | GEZ                 | BEZ | 26.7                                                 | 29.5 | 1                              | 24                                          | 1                                                      | 38.6                                        | 38.9                                                      |
| SMCJ26A     | SMCJ26CA  | GFE                 | BFE | 28.9                                                 | 31.9 | 1                              | 26                                          | 1                                                      | 35.7                                        | 42.1                                                      |
| SMCJ28A     | SMCJ28CA  | GFG                 | BFG | 31.1                                                 | 34.4 | 1                              | 28                                          | 1                                                      | 33.1                                        | 45.4                                                      |
| SMCJ30A     | SMCJ30CA  | GFK                 | BFK | 33.3                                                 | 36.8 | 1                              | 30                                          | 1                                                      | 31                                          | 48.4                                                      |
| SMCJ33A     | SMCJ33CA  | GFM                 | BFM | 36.7                                                 | 40.6 | 1                              | 33                                          | 1                                                      | 28.2                                        | 53.3                                                      |
| SMCJ36A     | SMCJ36CA  | GFP                 | BFP | 40                                                   | 44.2 | 1                              | 36                                          | 1                                                      | 25.9                                        | 58.1                                                      |
| SMCJ40A     | SMCJ40CA  | GFR                 | BFR | 44.4                                                 | 49.1 | 1                              | 40                                          | 1                                                      | 23.3                                        | 64.5                                                      |
| SMCJ43A     | SMCJ43CA  | GFT                 | BFT | 47.8                                                 | 52.8 | 1                              | 43                                          | 1                                                      | 21.7                                        | 69.4                                                      |
| SMCJ45A     | SMCJ45CA  | GFV                 | BFV | 50                                                   | 55.3 | 1                              | 45                                          | 1                                                      | 20.6                                        | 72.7                                                      |
| SMCJ48A     | SMCJ48CA  | GFX                 | BFX | 53.3                                                 | 58.9 | 1                              | 48                                          | 1                                                      | 19.4                                        | 77.4                                                      |

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| Part Number |           | Device Marking Code |     | Breakdown Voltage $V_{BR}@I_T$ |      | Test Current $I_T$ | Reverse Stand-off Voltage $V_R$ | Max. Reverse Leakage $I_R@V_R$ | Max. Peak Pulse Current $I_{PPM}$ | Max. Clamping Voltage $V_C@I_{PPM}$ |
|-------------|-----------|---------------------|-----|--------------------------------|------|--------------------|---------------------------------|--------------------------------|-----------------------------------|-------------------------------------|
|             |           |                     |     | Min                            | Max  |                    |                                 |                                |                                   |                                     |
| Uni         | Bi        | Uni                 | Bi  | (V)                            |      | (mA)               | (V)                             | ( $\mu$ A)                     | (A)                               | (V)                                 |
| SMCJ51A     | SMCJ51CA  | GFZ                 | BFZ | 56.7                           | 62.7 | 1                  | 51                              | 1                              | 18.2                              | 82.4                                |
| SMCJ54A     | SMCJ54CA  | GGE                 | BGE | 60                             | 66.3 | 1                  | 54                              | 1                              | 17.3                              | 87.1                                |
| SMCJ58A     | SMCJ58CA  | GGG                 | BGG | 64.4                           | 71.2 | 1                  | 58                              | 1                              | 16.1                              | 93.6                                |
| SMCJ60A     | SMCJ60CA  | GGK                 | BGK | 66.7                           | 73.7 | 1                  | 60                              | 1                              | 15.5                              | 96.8                                |
| SMCJ64A     | SMCJ64CA  | GGM                 | BGM | 71.1                           | 78.6 | 1                  | 64                              | 1                              | 14.6                              | 103                                 |
| SMCJ70A     | SMCJ70CA  | GGP                 | BGP | 77.8                           | 86   | 1                  | 70                              | 1                              | 13.3                              | 113                                 |
| SMCJ75A     | SMCJ75CA  | GGR                 | BGR | 83.3                           | 92.1 | 1                  | 75                              | 1                              | 12.4                              | 121                                 |
| SMCJ78A     | SMCJ78CA  | GGT                 | BGT | 86.7                           | 95.8 | 1                  | 78                              | 1                              | 11.9                              | 126                                 |
| SMCJ85A     | SMCJ85CA  | GGV                 | BGV | 94.4                           | 104  | 1                  | 85                              | 1                              | 11                                | 137                                 |
| SMCJ90A     | SMCJ90CA  | GGX                 | BGX | 100                            | 111  | 1                  | 90                              | 1                              | 10.3                              | 146                                 |
| SMCJ100A    | SMCJ100CA | GGZ                 | BGZ | 111                            | 123  | 1                  | 100                             | 1                              | 9.3                               | 162                                 |
| SMCJ110A    | SMCJ110CA | GHE                 | BHE | 122                            | 135  | 1                  | 110                             | 1                              | 8.5                               | 177                                 |
| SMCJ120A    | SMCJ120CA | GHG                 | BHG | 133                            | 147  | 1                  | 120                             | 1                              | 7.8                               | 193                                 |
| SMCJ130A    | SMCJ130CA | GHK                 | BHK | 144                            | 159  | 1                  | 130                             | 1                              | 7.2                               | 209                                 |
| SMCJ150A    | SMCJ150CA | GHM                 | BHM | 167                            | 185  | 1                  | 150                             | 1                              | 6.2                               | 243                                 |
| SMCJ160A    | SMCJ160CA | GHP                 | BHP | 178                            | 197  | 1                  | 160                             | 1                              | 5.8                               | 259                                 |
| SMCJ170A    | SMCJ170CA | GHR                 | BHR | 189                            | 209  | 1                  | 170                             | 1                              | 5.5                               | 275                                 |
| SMCJ180A    | SMCJ180CA | GHT                 | BHT | 201                            | 222  | 1                  | 180                             | 1                              | 5.1                               | 292                                 |
| SMCJ200A    | SMCJ200CA | GHV                 | BHV | 224                            | 247  | 1                  | 200                             | 1                              | 4.6                               | 324                                 |
| SMCJ220A    | SMCJ220CA | GHX                 | BHX | 246                            | 272  | 1                  | 220                             | 1                              | 4.2                               | 356                                 |
| SMCJ250A    | SMCJ250CA | GHZ                 | BHZ | 279                            | 309  | 1                  | 250                             | 1                              | 3.7                               | 405                                 |
| SMCJ300A    | SMCJ300CA | GJE                 | BJE | 335                            | 371  | 1                  | 300                             | 1                              | 3.1                               | 486                                 |
| SMCJ350A    | SMCJ350CA | GJG                 | BJG | 391                            | 432  | 1                  | 350                             | 1                              | 2.6                               | 567                                 |
| SMCJ400A    | SMCJ400CA | GJK                 | BJK | 447                            | 494  | 1                  | 400                             | 1                              | 2.3                               | 648                                 |
| SMCJ440A    | SMCJ440CA | GJM                 | BJM | 492                            | 543  | 1                  | 440                             | 1                              | 2.1                               | 713                                 |

Notes:

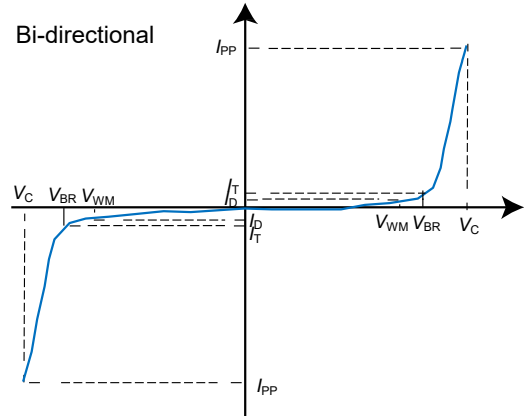
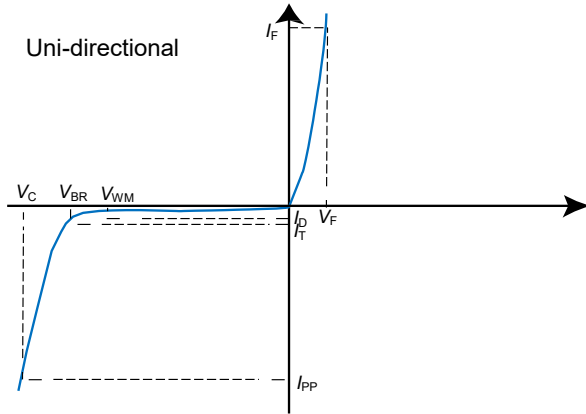
- For bidirectional type having  $V_{BR}$  of 10 volts and less, the  $I_R$  should be doubled.
- For parts without A in the PN , the  $V_{BR}$  tolerance is  $\pm 10\%$  and  $V_C$  is 5% higher than parts with A .The parts without A are currently available, but not recommended for new designs. The parts with A are preferred.

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## I-V Curve Characteristics



## Performance Curve for Reference ( $T_A=25^\circ\text{C}$ unless otherwise noted)

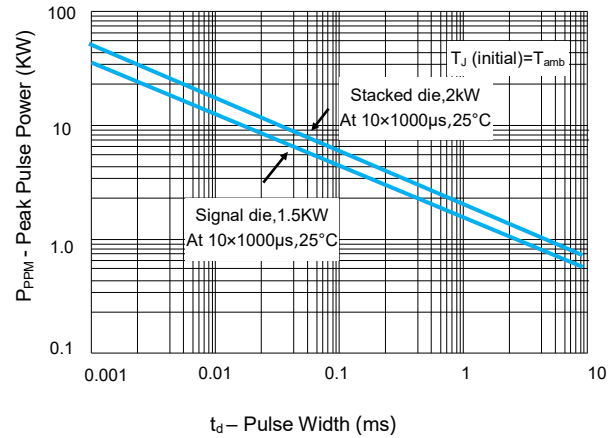
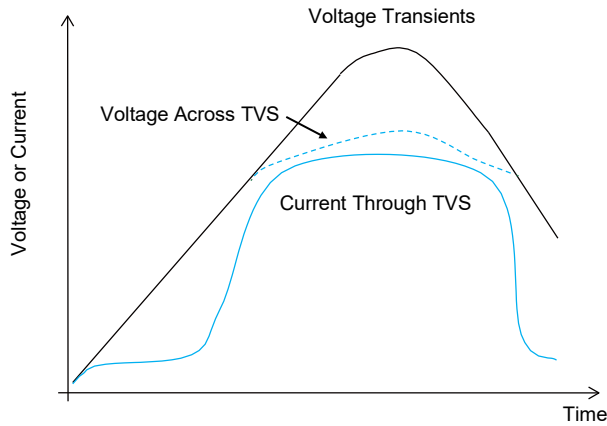


FIGURE 1 TVS Transients Clamping Waveform

FIGURE 2 Peak Pulse Power Rating Curve

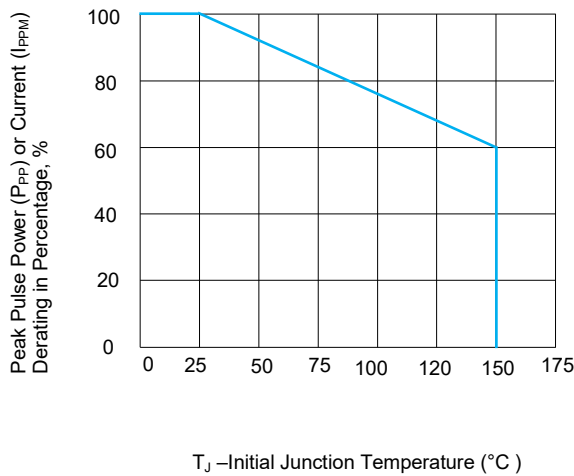


FIGURE 3 Peak Pulse Power Derating Curve

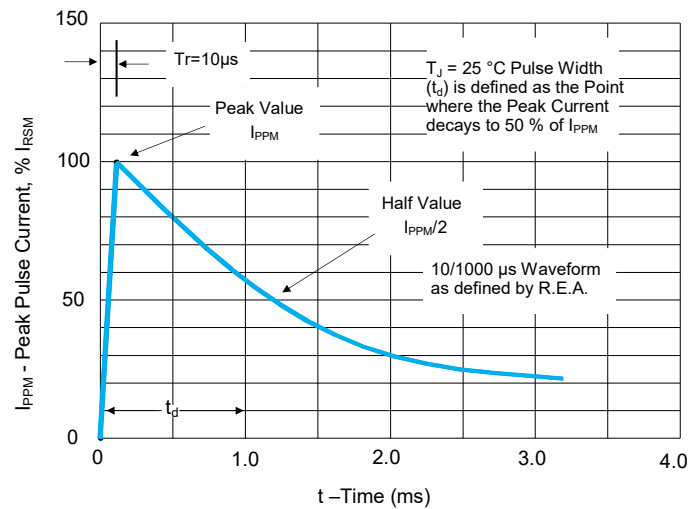


FIGURE 4 Pulse Waveform



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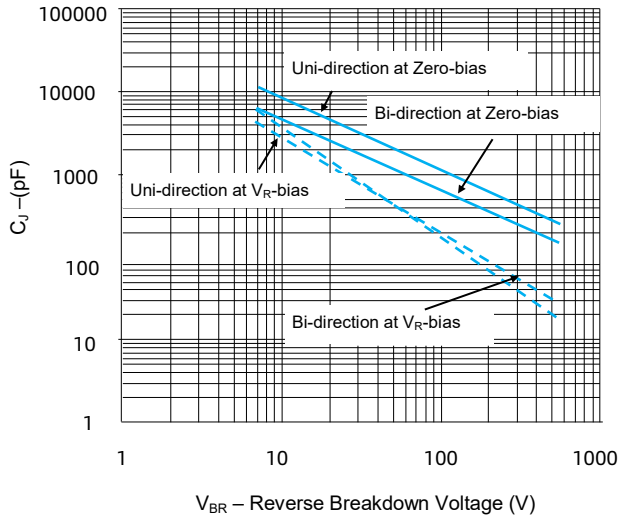


FIGURE 5 Typical Junction Capacitance

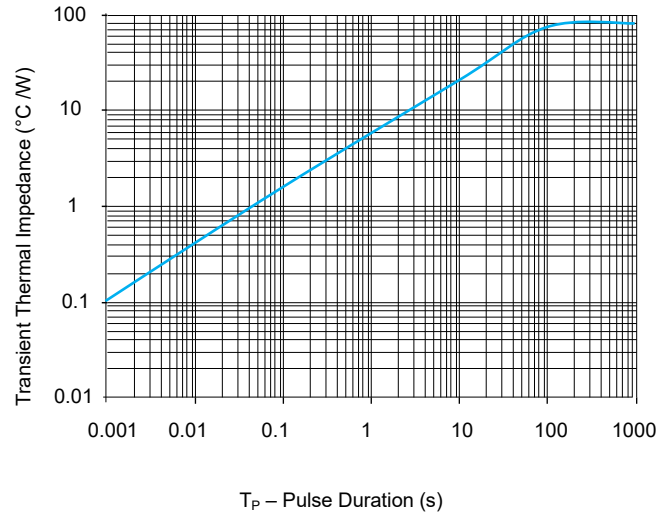


FIGURE 6 Typical Transient Thermal Impedance

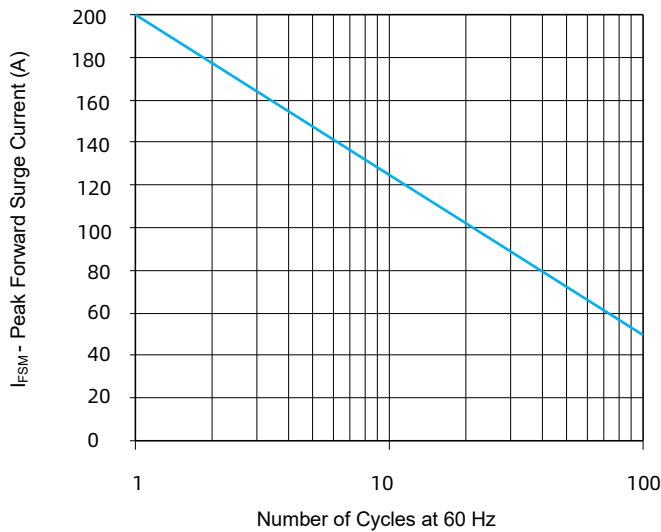


FIGURE 7 Maximum Non-Repetitive Forward Surge Current  
Uni-Directional only

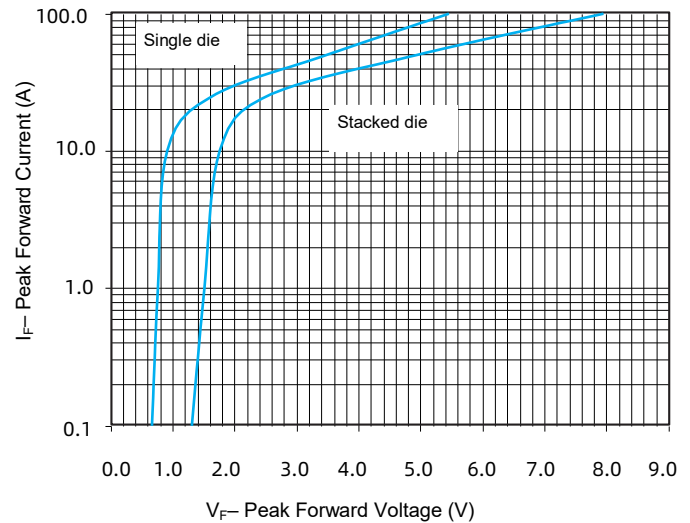


FIGURE 8 Peak Forward Drop vs Peak Forward Current  
(Typical Values)

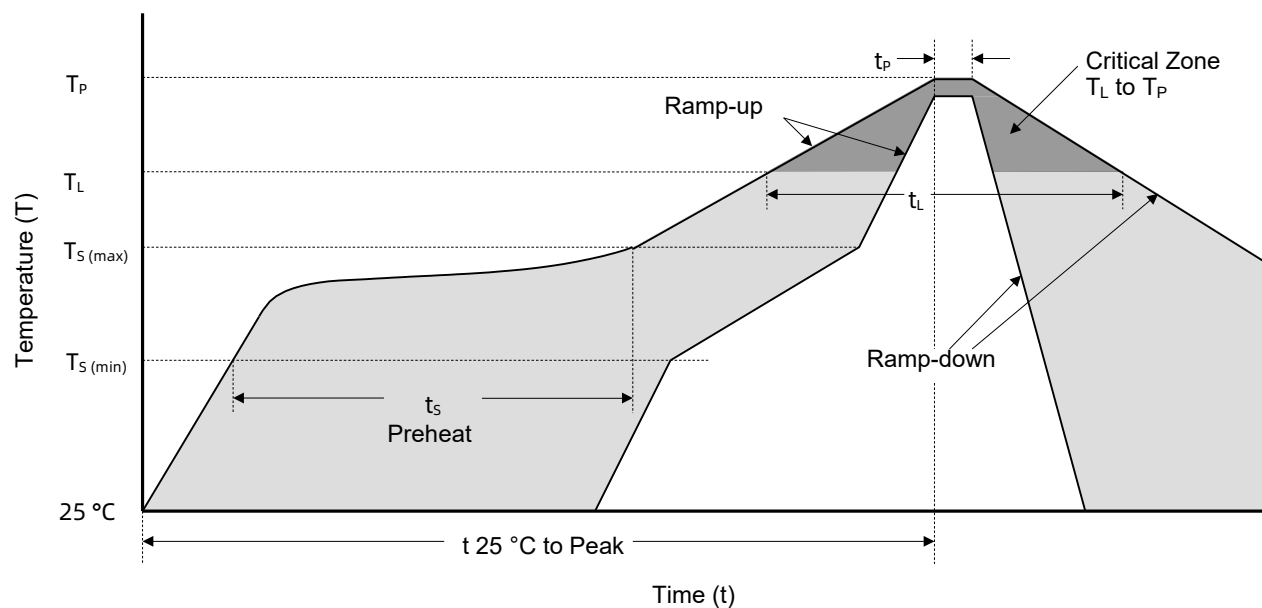
## Environmental Specifications

|                     |                           |
|---------------------|---------------------------|
| High Temp. Storage  | JESD22-A103               |
| HTRB                | JESD22-A108               |
| MSL                 | JESDEC-J-STD-020, Level 1 |
| Temperature Cycling | JESD22-A104               |
| H3TRB               | JESD22-A101               |
| RSH                 | JESD22-A111               |

## Physical Specifications

|          |                                                                   |
|----------|-------------------------------------------------------------------|
| Weight   | 0.007 ounce, 0.21 grams                                           |
| Case     | JESD22DO214AB. Molded plastic body over glass passivated junction |
| Polarity | Color band denotes positive end (cathode) except Bidirectional    |
| Terminal | Matte Tin-plated leads, Solderability per JESD22-B102             |

## Soldering Parameters



Reflowing Condition

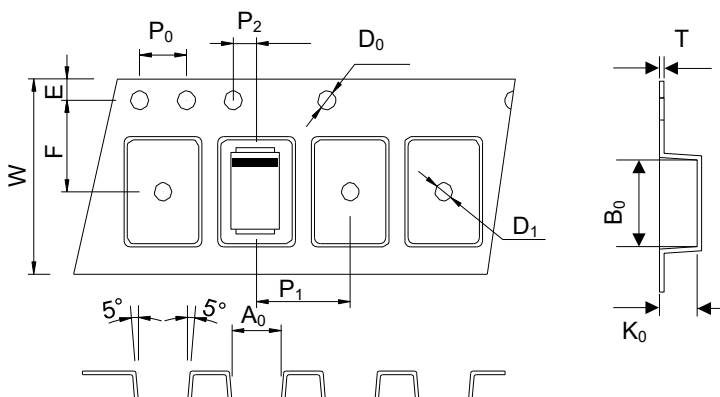
| Reflow Soldering Parameters                              |                                  | Lead-Free Assembly      |
|----------------------------------------------------------|----------------------------------|-------------------------|
| Pre-heat                                                 | Temperature Min ( $T_{S(min)}$ ) | 150 °C                  |
|                                                          | Temperature Max ( $T_{S(max)}$ ) | 200 °C                  |
|                                                          | Time (min to max) ( $t_s$ )      | 60 ~ 120 seconds        |
| Average Ramp Up Rate (Liquidus Temp ( $T_L$ ) to Peak)   |                                  | 3 °C / second max.      |
| $T_{S(max)}$ to $T_L$ Ramp-up Rate                       |                                  | 3 °C / second max.      |
| Reflow                                                   | Temperature ( $T_L$ ) (Liquidus) | 217 °C                  |
|                                                          | Time (min to max) ( $t_L$ )      | 60 ~ 150 seconds        |
| Peak Temperature ( $T_P$ )                               |                                  | 260 <sup>+0/-5</sup> °C |
| Time of within 5 °C of Actual Peak Temperature ( $t_p$ ) |                                  | 20 ~ 40 seconds         |
| Ramp-down Rate                                           |                                  | 6 °C / second max.      |
| Time from 25 °C to Peak Temperature                      |                                  | 8 Minutes max.          |
| Do Not Exceed                                            |                                  | 260 °C                  |

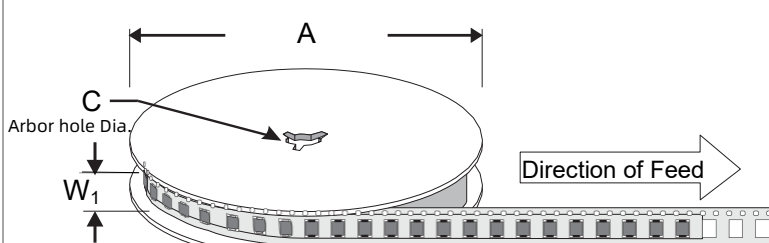
# TVS Diodes

Transient Voltage Suppression Diodes

SMCJ Series

## Packaging Information

| Tape                                                                              |  | Symbol         | Dimension (mm)       |
|-----------------------------------------------------------------------------------|--|----------------|----------------------|
|  |  | W              | 16.00 + 0.3 / - 0.10 |
|                                                                                   |  | P <sub>0</sub> | 4.00 ± 0.10          |
|                                                                                   |  | P <sub>1</sub> | 8.00 ± 0.10          |
|                                                                                   |  | P <sub>2</sub> | 2.00 ± 0.10          |
|                                                                                   |  | D <sub>0</sub> | 1.55 ± 0.05          |
|                                                                                   |  | D <sub>1</sub> | 1.55 ± 0.05          |
|                                                                                   |  | E              | 1.75 ± 0.10          |
|                                                                                   |  | F              | 7.50 ± 0.10          |
|                                                                                   |  | A <sub>0</sub> | 6.15 ± 0.10          |
|                                                                                   |  | B <sub>0</sub> | 8.30 ± 0.10          |
|                                                                                   |  | K <sub>0</sub> | 2.48 ± 0.10          |
|                                                                                   |  | T              | 0.30 ± 0.05          |

| Reel Size                                                                           | 13" Reel       |         |
|-------------------------------------------------------------------------------------|----------------|---------|
|  | A              | 330 mm  |
|                                                                                     | C              | 13.2 mm |
|                                                                                     | W <sub>1</sub> | 16.4 mm |

| Part Number | Package  | QTY (Reel) | Packaging Option                  | Packaging Specification |
|-------------|----------|------------|-----------------------------------|-------------------------|
| SMCJxxx     | DO-214AB | 3000 PCS   | Tape & Reel – 16 mm tape/13" reel | EIA STD RS-481          |



# ATTENTION

## Usage

- 1.TVS must be operated in the specified ambient temp.
- 2.Do not clean the TVS with strong polar solvent such as ketone, esters, benzene and halogenated hydrocarbon, to avoid damaging the encapsulating layer.
- 3.Please do not apply severe vibration, shock or pressure to TVS, to avoid element cracking.

## Replacement

- 1.If TVS is visually damaged, please replace it.
- 2.TVS is a non-repairable product. For safety sake, please use equivalent TVS for replacement.

## Storage

- 1.Storage Temp. Range: (-55 to 150) °C.
- 2.Do not store the TVS at the high temp., high humidity or corrosive gas environment, to avoid influencing the solder- ability of the lead wires. The product shall be used up within 1 year after receiving the goods.

## Environmental Conditions

- 1.TVS should not be exposed to the open air, nor direct sunshine.
- 2.TVS should avoid rain, water vapor or other condition of high temp. and high humidity.
- 3.TVS should avoid sand dust, salt mist, or other harmful gases.

## Max. Typical Capacitance of TVS

The typical capacitance of TVS is listed in the specifications. Designers may refer to it when designing TVS in High frequency circuit.

## Installation Mechanical Stress

- 1.Do not knock TVS when installing, to avoid mechanical damage.
- 2.Please do not apply severe vibration, shock or pressure to TVS, to avoid surface resin or element cracking.