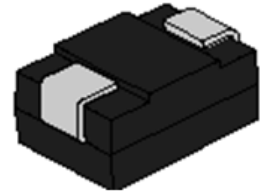


## DESCRIPTION:

TVS diodes can be used in a wide range of applications which like consumer electronic products, automotive industries, munitions, telecommunications, aerospace industries, and intelligent control systems.

## FEATURES:

- ✧ Low profile package.
- ✧ Low inductance.
- ✧ Excellent clamping capability.
- ✧ 3000W peak pulse power capability at 10/1000μs waveform.
- ✧ Typical  $I_R$  less than 1μA above 12V.
- ✧ Fast response time: typically less than 1.0ps from 0V to  $V_{BR}$  min.
- ✧ High temperature to reflow soldering: 260°C/40s at terminals.
- ✧ Plastic package has underwriters laboratory flammability 94V-0.
- ✧ Meets MSL level 1, per J-STD-020, LF maximum peak of 260°C.
- ✧ Terminal: solder plated, solderable per J-STD-002.
- ✧ For surface mounted applications in order to optimize board space.
- ✧ IEC61000-4-2 (ESD) ±30kV (air), ±30kV (contact).



SMC



Bi-directional



Uni-directional

Symbol

## ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ , RH=45%-75%, unless otherwise noted)

| Parameter                                                       | Symbol          | Value       | Unit |
|-----------------------------------------------------------------|-----------------|-------------|------|
| Storage and operating junction temperature range                | $T_{STG}/T_J$   | -55 to +150 | °C   |
| Peak pulse power dissipation at 10/1000μs waveform              | $P_{PP}$        | 3000        | W    |
| Steady state power dissipation at $T_L=75^\circ\text{C}$        | $P_{M(AV)}$     | 6.5         | W    |
| Maximum instantaneous forward voltage at 80A for unidirectional | $V_F$           | 5.0         | V    |
| Peak forward surge current, 8.3ms single half sine wave(Note 1) | $I_{FSM}$       | 300         | A    |
| Typical thermal resistance junction to lead                     | $R_{\theta JL}$ | 15          | °C/W |
| Typical thermal resistance junction to ambient                  | $R_{\theta JA}$ | 75          | °C/W |

### Notes:

1. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum

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

| Part Number |             | Marking |      | V <sub>R</sub> | I <sub>R</sub> @V <sub>R</sub> | V <sub>BR</sub> @I <sub>T</sub> |        | I <sub>T</sub> | V <sub>C</sub> @I <sub>PP</sub> | I <sub>PP</sub> <sup>①</sup> |
|-------------|-------------|---------|------|----------------|--------------------------------|---------------------------------|--------|----------------|---------------------------------|------------------------------|
| Uni-polar   | Bi-polar    | Uni     | Bi   | (V)            | max(μA)                        | min(V)                          | max(V) | mA             | V                               | A                            |
| 3.0SMC6.8A  | 3.0SMC6.8CA | A6V8    | C6V8 | 5.8            | 800                            | 6.45                            | 7.14   | 10             | 10.5                            | 285.7                        |
| 3.0SMC7.5A  | 3.0SMC7.5CA | A7V5    | C7V5 | 6.4            | 500                            | 7.13                            | 7.88   | 10             | 11.3                            | 265.5                        |
| 3.0SMC8.2A  | 3.0SMC8.2CA | A8V2    | C8V2 | 7.02           | 200                            | 7.79                            | 8.61   | 10             | 12.1                            | 247.9                        |
| 3.0SMC9.1A  | 3.0SMC9.1CA | A9V1    | C9V1 | 7.78           | 100                            | 8.65                            | 9.55   | 1              | 13.4                            | 223.9                        |
| 3.0SMC10A   | 3.0SMC10CA  | A10     | C10  | 8.55           | 50                             | 9.50                            | 10.50  | 1              | 14.5                            | 206.9                        |
| 3.0SMC11A   | 3.0SMC11CA  | A11     | C11  | 9.4            | 20                             | 10.50                           | 11.60  | 1              | 15.6                            | 192.3                        |
| 3.0SMC12A   | 3.0SMC12CA  | A12     | C12  | 10.2           | 10                             | 11.40                           | 12.60  | 1              | 16.7                            | 179.6                        |
| 3.0SMC13A   | 3.0SMC13CA  | A13     | C13  | 11.1           | 1                              | 12.40                           | 13.70  | 1              | 18.2                            | 164.8                        |
| 3.0SMC15A   | 3.0SMC15CA  | A15     | C15  | 12.8           | 1                              | 14.30                           | 15.80  | 1              | 21.2                            | 141.5                        |
| 3.0SMC16A   | 3.0SMC16CA  | A16     | C16  | 13.6           | 1                              | 15.20                           | 16.80  | 1              | 22.5                            | 133.3                        |
| 3.0SMC18A   | 3.0SMC18CA  | A18     | C18  | 15.3           | 1                              | 17.10                           | 18.90  | 1              | 25.2                            | 119.0                        |
| 3.0SMC20A   | 3.0SMC20CA  | A20     | C20  | 17.1           | 1                              | 19.00                           | 21.00  | 1              | 27.7                            | 108.3                        |
| 3.0SMC22A   | 3.0SMC22CA  | A22     | C22  | 18.8           | 1                              | 20.90                           | 23.10  | 1              | 30.6                            | 98.0                         |
| 3.0SMC24A   | 3.0SMC24CA  | A24     | C24  | 20.5           | 1                              | 22.80                           | 25.20  | 1              | 33.2                            | 90.4                         |
| 3.0SMC27A   | 3.0SMC27CA  | A27     | C27  | 23.1           | 1                              | 25.70                           | 28.40  | 1              | 37.5                            | 80.0                         |
| 3.0SMC30A   | 3.0SMC30CA  | A30     | C30  | 25.6           | 1                              | 28.50                           | 31.50  | 1              | 41.4                            | 72.5                         |
| 3.0SMC33A   | 3.0SMC33CA  | A33     | C33  | 28.2           | 1                              | 31.40                           | 34.70  | 1              | 45.7                            | 65.6                         |
| 3.0SMC36A   | 3.0SMC36CA  | A36     | C36  | 30.8           | 1                              | 34.20                           | 37.80  | 1              | 49.9                            | 60.1                         |
| 3.0SMC39A   | 3.0SMC39CA  | A39     | C39  | 33.3           | 1                              | 37.10                           | 41.00  | 1              | 53.9                            | 55.7                         |
| 3.0SMC43A   | 3.0SMC43CA  | A43     | C43  | 36.8           | 1                              | 40.90                           | 45.20  | 1              | 59.3                            | 50.6                         |
| 3.0SMC47A   | 3.0SMC47CA  | A47     | C47  | 40.2           | 1                              | 44.70                           | 49.40  | 1              | 64.8                            | 46.3                         |
| 3.0SMC51A   | 3.0SMC51CA  | A51     | C51  | 43.6           | 1                              | 48.50                           | 53.60  | 1              | 70.1                            | 42.8                         |
| 3.0SMC56A   | 3.0SMC56CA  | A56     | C56  | 47.8           | 1                              | 53.20                           | 58.80  | 1              | 77.0                            | 39.0                         |

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C, continued)

| Part Number |             | Marking |      | V <sub>R</sub> | I <sub>R</sub> @V <sub>R</sub> | V <sub>BR</sub> @I <sub>T</sub> |        | I <sub>T</sub> | V <sub>C</sub> @I <sub>PP</sub> | I <sub>PP</sub> <sup>①</sup> |
|-------------|-------------|---------|------|----------------|--------------------------------|---------------------------------|--------|----------------|---------------------------------|------------------------------|
| Uni-Polar   | Bi-Polar    | Uni     | Bi   | V              | max(μA)                        | min(V)                          | max(V) | mA             | V                               | A                            |
| 3.0SMC62A   | 3.0SMC62CA  | A62     | C62  | 53.0           | 1                              | 58.90                           | 65.10  | 1              | 85.0                            | 35.3                         |
| 3.0SMC68A   | 3.0SMC68CA  | A68     | C68  | 58.1           | 1                              | 64.60                           | 71.40  | 1              | 92.0                            | 32.6                         |
| 3.0SMC75A   | 3.0SMC75CA  | A75     | C75  | 64.1           | 1                              | 71.30                           | 78.80  | 1              | 103.0                           | 29.1                         |
| 3.0SMC82A   | 3.0SMC82CA  | A82     | C82  | 70.1           | 1                              | 77.90                           | 86.10  | 1              | 113.0                           | 26.5                         |
| 3.0SMC91A   | 3.0SMC91CA  | A91     | C91  | 77.8           | 1                              | 86.50                           | 95.50  | 1              | 125.0                           | 24.0                         |
| 3.0SMC100A  | 3.0SMC100CA | A100    | C100 | 85.5           | 1                              | 95.00                           | 105.0  | 1              | 137.0                           | 21.9                         |
| 3.0SMC110A  | 3.0SMC110CA | A110    | C110 | 94.0           | 1                              | 105.0                           | 116.0  | 1              | 152.0                           | 19.7                         |
| 3.0SMC120A  | 3.0SMC120CA | A120    | C120 | 102            | 1                              | 114.0                           | 126.0  | 1              | 165.0                           | 18.2                         |
| 3.0SMC130A  | 3.0SMC130CA | A130    | C130 | 111            | 1                              | 124.0                           | 137.0  | 1              | 179.0                           | 16.8                         |
| 3.0SMC150A  | 3.0SMC150CA | A150    | C150 | 128            | 1                              | 143.0                           | 158.0  | 1              | 207.0                           | 14.5                         |
| 3.0SMC160A  | 3.0SMC160CA | A160    | C160 | 136            | 1                              | 152.0                           | 168.0  | 1              | 219.0                           | 13.7                         |
| 3.0SMC170A  | 3.0SMC170CA | A170    | C170 | 145            | 1                              | 162.0                           | 179.0  | 1              | 234.0                           | 12.8                         |
| 3.0SMC180A  | 3.0SMC180CA | A180    | C180 | 154            | 1                              | 171.0                           | 189.0  | 1              | 246.0                           | 12.2                         |
| 3.0SMC200A  | 3.0SMC200CA | A200    | C200 | 171            | 1                              | 190.0                           | 210.0  | 1              | 274.0                           | 10.9                         |
| 3.0SMC220A  | 3.0SMC220CA | A220    | C220 | 185            | 1                              | 209.0                           | 231.0  | 1              | 328.0                           | 9.1                          |
| 3.0SMC250A  | 3.0SMC250CA | A250    | C250 | 214            | 1                              | 237.0                           | 263.0  | 1              | 344.0                           | 8.8                          |
| 3.0SMC300A  | 3.0SMC300CA | A300    | C300 | 256            | 1                              | 285.0                           | 315.0  | 1              | 414.0                           | 7.3                          |
| 3.0SMC350A  | 3.0SMC350CA | A350    | C350 | 300            | 1                              | 332.0                           | 368.0  | 1              | 482.0                           | 6.2                          |
| 3.0SMC400A  | 3.0SMC400CA | A400    | C400 | 342            | 1                              | 380.0                           | 420.0  | 1              | 548.0                           | 5.5                          |
| 3.0SMC440A  | 3.0SMC440CA | A440    | C440 | 376            | 1                              | 418.0                           | 462.0  | 1              | 602.0                           | 5.0                          |

① Surge waveform: 10/1000μs

V<sub>R</sub>: Stand-off voltage -- Maximum voltage that can be applied

V<sub>BR</sub>: Breakdown voltage

V<sub>C</sub>: Clamping voltage -- Peak voltage measured across the suppressor at a specified I<sub>PP</sub>

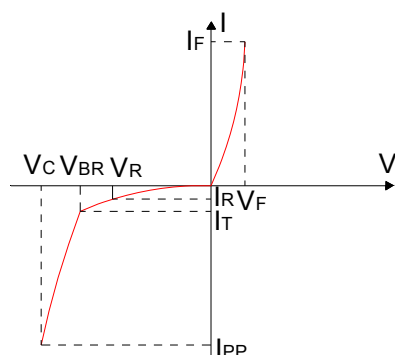
I<sub>R</sub>: Reverse leakage current

## ORDERING INFORMATION

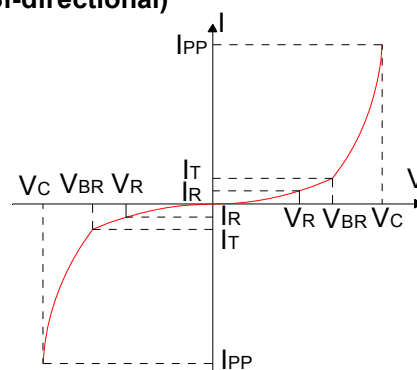
|                  |                  |                   |                               |
|------------------|------------------|-------------------|-------------------------------|
| <b>3.0SMC</b>    | <b>XX</b>        | <b>C</b>          | <b>A</b>                      |
| 3000W SMC Series | $V_{BR}$ Voltage | C: Bi-directional | 5% $V_{BR}$ Voltage tolerance |

## RATINGS AND V-I CHARACTERISTICS CURVES ( $T_A=25^\circ\text{C}$ , unless otherwise noted)

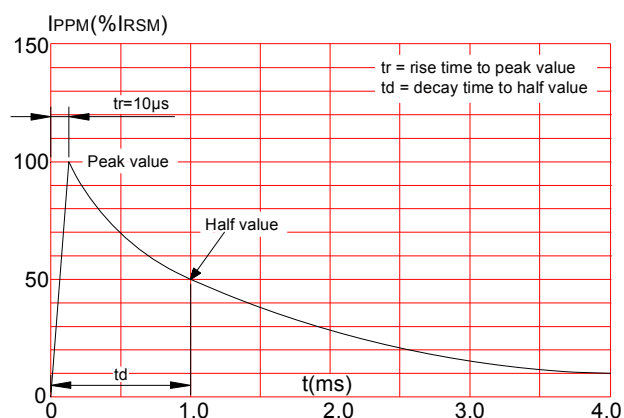
**FIG.1:V- I curve characteristics  
(Uni-directional)**



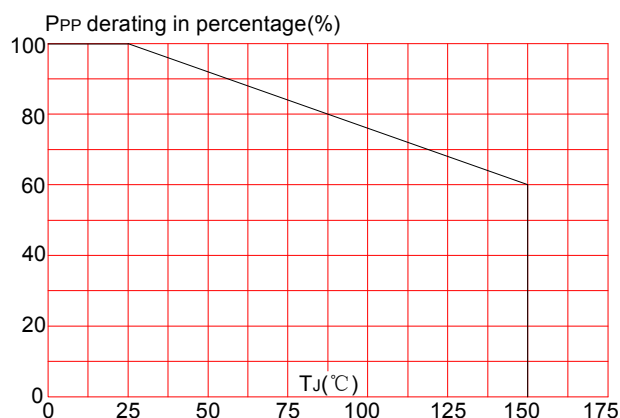
**FIG.2:V- I curve characteristics  
(Bi-directional)**



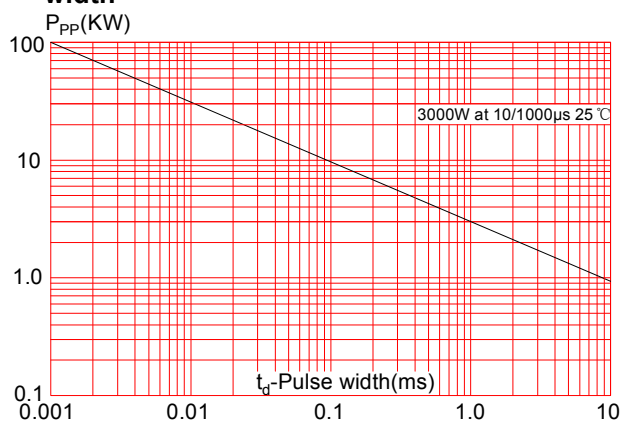
**FIG.3: Pulse waveform**



**FIG.4: Pulse derating curve**

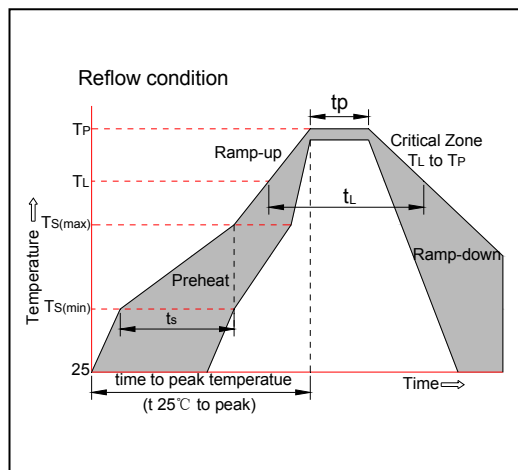


**FIG.5:Peak pulse power dissipation vs. pulse width**

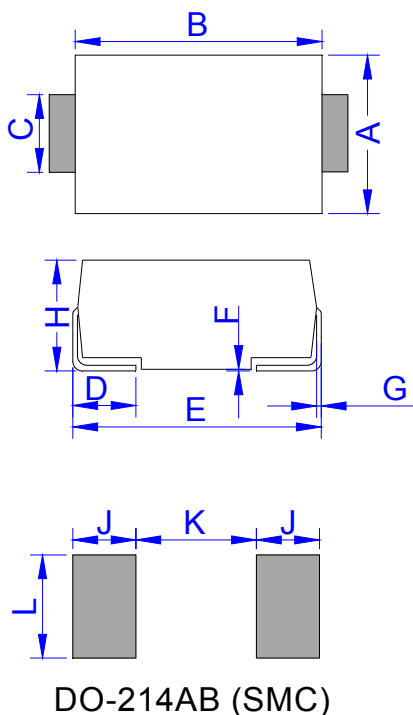


## SOLDERING PARAMETERS

| Reflow Condition                                       |                                   | Pb-Free assembly<br>(see figure at right) |
|--------------------------------------------------------|-----------------------------------|-------------------------------------------|
| Pre Heat                                               | -Temperature Min ( $T_{s(min)}$ ) | +150°C                                    |
|                                                        | -Temperature Max( $T_{s(max)}$ )  | +200°C                                    |
|                                                        | -Time (Min to Max) ( $t_s$ )      | 60-180 secs.                              |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak) |                                   | 3°C/sec. Max                              |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                   |                                   | 3°C/sec. Max                              |
| Reflow                                                 | -Temperature( $T_L$ )(Liquidus)   | +217°C                                    |
|                                                        | -Temperature( $t_L$ )             | 60-150 secs.                              |
| Peak Temp ( $T_P$ )                                    |                                   | +260(+0/-5)°C                             |
| Time within 5°C of actual Peak Temp ( $t_P$ )          |                                   | 20-40secs.                                |
| Ramp-down Rate                                         |                                   | 6°C/sec. Max                              |
| Time 25°C to Peak Temp ( $T_P$ )                       |                                   | 8 min. Max                                |
| Do not exceed                                          |                                   | +260°C                                    |



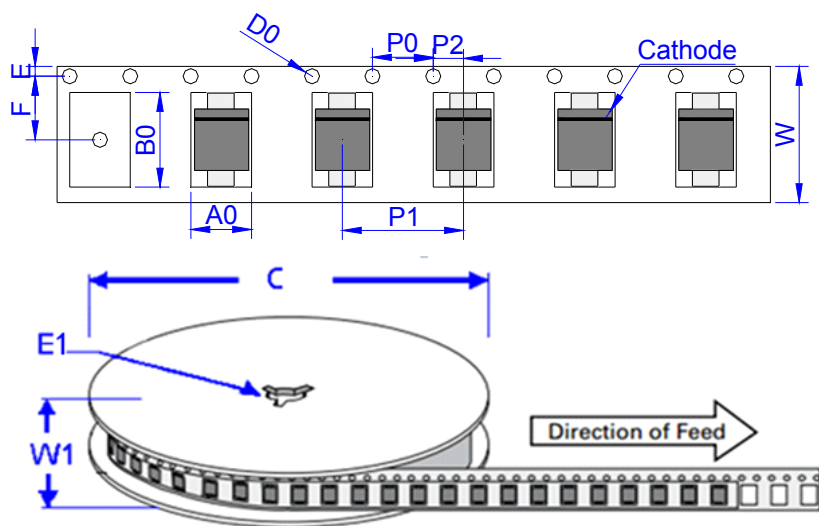
## PACKAGE MECHANICAL DATA



DO-214AB (SMC)

| Ref. | Dimensions  |       |        |       |
|------|-------------|-------|--------|-------|
|      | Millimeters |       | Inches |       |
|      | Min.        | Max.  | Min.   | Max.  |
| A    | 5.75        | 6.25  | 0.226  | 0.246 |
| B    | 6.90        | 7.40  | 0.272  | 0.291 |
| C    | 2.75        | 3.25  | 0.108  | 0.128 |
| D    | 0.95        | 1.52  | 0.037  | 0.060 |
| E    | 7.70        | 8.20  | 0.303  | 0.323 |
| F    | 0.051       | 0.203 | 0.002  | 0.008 |
| G    | 0.15        | 0.31  | 0.006  | 0.012 |
| H    | 2.15        | 2.62  | 0.085  | 0.103 |
| J    | 2.40        |       | 0.094  |       |
| K    |             | 4.20  |        | 0.165 |
| L    | 3.30        |       | 0.130  |       |

### TAPE AND REEL SPECIFICATION-SMC



| Ref. | Dimensions  |                |
|------|-------------|----------------|
|      | Millimeters | Inches         |
| A0   | 6.05 ± 0.3  | 0.238 ± 0.012  |
| B0   | 8.31 ± 0.3  | 0.327 ± 0.012  |
| C    | 330.0       | 13.0           |
| D0   | 1.55 ± 0.1  | 0.061 ± 0.004  |
| E    | 1.75 ± 0.2  | 0.069 ± 0.008  |
| E1   | 13.3 ± 0.3  | 0.524 ± 0.012  |
| F    | 7.50 ± 0.2  | 0.295 ± 0.008  |
| P0   | 4.00 ± 0.2  | 0.157 ± 0.008  |
| P1   | 8.00 ± 0.2  | 0.3145 ± 0.008 |
| P2   | 2.00 ± 0.2  | 0.079 ± 0.008  |
| W    | 16.0 ± 0.2  | 0.630 ± 0.008  |
| W1   | 19.7 ± 2.0  | 0.776 ± 0.079  |

| PART No.     | UNIT WEIGHT<br>(g/PCS) typ. | REEL<br>(PCS) | PER CARTON<br>(PCS) | DESCRIPTION       |
|--------------|-----------------------------|---------------|---------------------|-------------------|
| 3.0SMCxxA/CA | 0.262                       | 3,000         | 48,000              | 13 inch reel pack |