

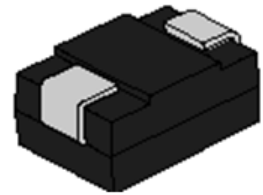


## SMDJ Series 3000W Transient Voltage Suppressor

Rev.3.1

### 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.



SMC

### FEATURES:

- ✧ Low profile package.
- ✧ Low inductance.
- ✧ Excellent clamping capability.
- ✧ 3000W peak pulse power capability at 10/1000 $\mu$ s waveform.
- ✧ Typical  $I_R$  less than 1 $\mu$ A above 14V.
- ✧ Fast response time: typically less than 1.0ps from 0V to  $V_{BR}$  min.
- ✧ High temperature to reflow soldering: 260 $^{\circ}$ C/40s at terminals.
- ✧ Plastic package has under writers laboratory flammability 94V-0.
- ✧ Meets MSL level 1, per J-STD020, LF maximum peak of 260 $^{\circ}$ C.
- ✧ For surface mounted applications in order to optimize board space.



Bi-directional



Uni-directional

Symbol

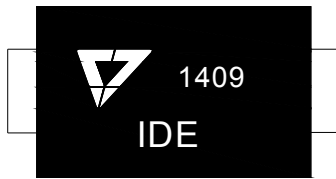
### ABSOLUTE MAXIMUM RATINGS( $T_A=25^{\circ}$ C, RH=45%-75%, unless otherwise noted)

| Parameter   | Symbol          | Value       | Unit           |
|---|-----------------|-------------|----------------|
| Storage and operating junction temperature range                      | $T_{STG}/ T_J$  | -55 to +150 | $^{\circ}$ C   |
| Steady state power dissipation at $T_L=75^{\circ}$ C                  | $P_{M(AV)}$     | 6.5         | W              |
| Peak pulse power dissipation on 10/1000 $\mu$ s waveform              | $P_{PP}$        | 3000        | W              |
| Maximum instantaneous forward voltage at 100A for unidirectional only | $V_F$           | 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          | $^{\circ}$ C/W |
| Typical thermal resistance junction to ambient                        | $R_{\theta JA}$ | 75          | $^{\circ}$ 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

## MARKING



IDE: Device Marking Code  
1409: In ninth week, 2014

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

| Part Number |           | Marking |     | V <sub>R</sub> | I <sub>R@V<sub>R</sub></sub> | V <sub>BR@I<sub>T</sub></sub> |        | I <sub>T</sub> | V <sub>C@I<sub>PP</sub></sub> | I <sub>PP</sub> <sup>①</sup> |
|-------------|-----------|---------|-----|----------------|------------------------------|-------------------------------|--------|----------------|-------------------------------|------------------------------|
| Uni-Polar   | Bi-Polar  | Uni     | Bi  | V              | μA                           | min(V)                        | max(V) | mA             | max(V)                        | A                            |
| SMDJ5.0A    | SMDJ5.0CA | HDE     | IDE | 5.0            | 800                          | 6.40                          | 7.00   | 10             | 9.2                           | 326.1                        |
| SMDJ6.0A    | SMDJ6.0CA | HDG     | IDG | 6.0            | 800                          | 6.67                          | 7.37   | 10             | 10.3                          | 291.3                        |
| SMDJ6.5A    | SMDJ6.5CA | HDK     | IDK | 6.5            | 500                          | 7.22                          | 7.98   | 10             | 11.2                          | 267.9                        |
| SMDJ7.0A    | SMDJ7.0CA | HDM     | IDM | 7.0            | 200                          | 7.78                          | 8.60   | 10             | 12.0                          | 250.0                        |
| SMDJ7.5A    | SMDJ7.5CA | HDP     | IDP | 7.5            | 100                          | 8.33                          | 9.21   | 1              | 12.9                          | 232.6                        |
| SMDJ8.0A    | SMDJ8.0CA | HDR     | IDR | 8.0            | 50                           | 8.89                          | 9.83   | 1              | 13.6                          | 220.6                        |
| SMDJ8.5A    | SMDJ8.5CA | HDT     | IDT | 8.5            | 20                           | 9.44                          | 10.40  | 1              | 14.4                          | 208.3                        |
| SMDJ9.0A    | SMDJ9.0CA | HDV     | IDV | 9.0            | 10                           | 10.00                         | 11.10  | 1              | 15.4                          | 194.8                        |
| SMDJ10A     | SMDJ10CA  | HDX     | IDX | 10             | 5                            | 11.10                         | 12.30  | 1              | 17.0                          | 176.5                        |
| SMDJ11A     | SMDJ11CA  | HDZ     | IDZ | 11             | 2                            | 12.20                         | 13.50  | 1              | 18.2                          | 164.8                        |
| SMDJ12A     | SMDJ12CA  | HEE     | IEE | 12             | 2                            | 13.30                         | 14.70  | 1              | 19.9                          | 150.8                        |
| SMDJ13A     | SMDJ13CA  | HEG     | IEG | 13             | 2                            | 14.40                         | 15.90  | 1              | 21.5                          | 139.5                        |
| SMDJ14A     | SMDJ14CA  | HEK     | IEK | 14             | 2                            | 15.60                         | 17.20  | 1              | 23.2                          | 129.3                        |
| SMDJ15A     | SMDJ15CA  | HEM     | IEM | 15             | 1                            | 16.70                         | 18.50  | 1              | 24.4                          | 123.0                        |
| SMDJ16A     | SMDJ16CA  | HEP     | IEP | 16             | 1                            | 17.80                         | 19.70  | 1              | 26.0                          | 115.4                        |
| SMDJ17A     | SMDJ17CA  | HER     | IER | 17             | 1                            | 18.90                         | 20.90  | 1              | 27.6                          | 108.7                        |
| SMDJ18A     | SMDJ18CA  | HET     | IET | 18             | 1                            | 20.00                         | 22.10  | 1              | 29.2                          | 102.7                        |
| SMDJ20A     | SMDJ20CA  | HEV     | IEV | 20             | 1                            | 22.20                         | 24.50  | 1              | 32.4                          | 92.6                         |
| SMDJ22A     | SMDJ22CA  | HEX     | IEX | 22             | 1                            | 24.40                         | 26.90  | 1              | 35.5                          | 84.5                         |
| SMDJ24A     | SMDJ24CA  | HEZ     | IEZ | 24             | 1                            | 26.70                         | 29.50  | 1              | 38.9                          | 77.1                         |
| SMDJ26A     | SMDJ26CA  | HFE     | IFE | 26             | 1                            | 28.90                         | 31.90  | 1              | 42.1                          | 71.3                         |
| SMDJ28A     | SMDJ28CA  | HFG     | IFG | 28             | 1                            | 31.10                         | 34.40  | 1              | 45.4                          | 66.1                         |
| SMDJ30A     | SMDJ30CA  | HFK     | IFK | 30             | 1                            | 33.30                         | 36.80  | 1              | 48.4                          | 62.0                         |
| SMDJ33A     | SMDJ33CA  | HFM     | IFM | 33             | 1                            | 36.70                         | 40.60  | 1              | 53.3                          | 56.3                         |

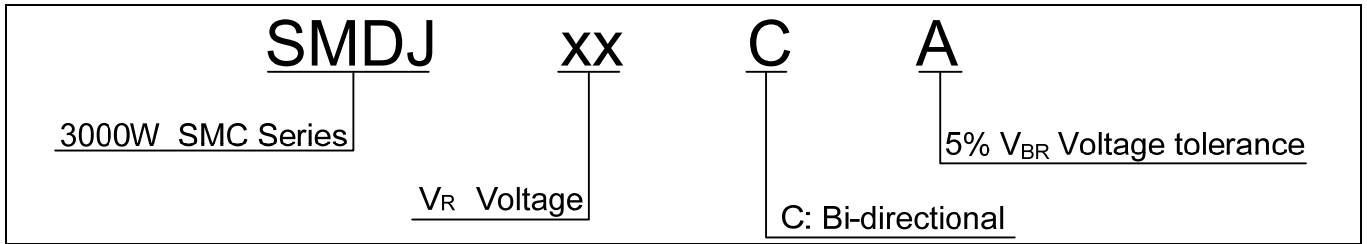
ELECTRICAL CHARACTERISTICS ( $T_A=25^{\circ}\text{C}$ , continued)

| Part Number |           | Marking |     | $V_R$ | $I_R@V_R$     | $V_{BR}@I_T$ |        | $I_T$ | $V_C@I_{PP}$ | $I_{PP}^{①}$ |
|-------------|-----------|---------|-----|-------|---------------|--------------|--------|-------|--------------|--------------|
| Uni-Polar   | Bi-Polar  | Uni     | Bi  | V     | $\mu\text{A}$ | min(V)       | max(V) | mA    | max(V)       | A            |
| SMDJ36A     | SMDJ36CA  | HFP     | IFP | 36    | 1             | 40.00        | 44.20  | 1     | 58.1         | 51.6         |
| SMDJ40A     | SMDJ40CA  | HFR     | IFR | 40    | 1             | 44.40        | 49.10  | 1     | 64.5         | 46.5         |
| SMDJ43A     | SMDJ43CA  | HFT     | IFT | 43    | 1             | 47.80        | 52.80  | 1     | 69.4         | 43.2         |
| SMDJ45A     | SMDJ45CA  | HFV     | IFV | 45    | 1             | 50.00        | 55.30  | 1     | 72.7         | 41.3         |
| SMDJ48A     | SMDJ48CA  | HFX     | IFX | 48    | 1             | 53.30        | 58.90  | 1     | 77.4         | 38.8         |
| SMDJ51A     | SMDJ51CA  | HFZ     | IFZ | 51    | 1             | 56.70        | 62.70  | 1     | 82.4         | 36.4         |
| SMDJ54A     | SMDJ54CA  | HGE     | IGE | 54    | 1             | 60.00        | 66.30  | 1     | 87.1         | 34.4         |
| SMDJ58A     | SMDJ58CA  | HGG     | IGG | 58    | 1             | 64.40        | 71.20  | 1     | 93.6         | 32.1         |
| SMDJ60A     | SMDJ60CA  | HGK     | IGK | 60    | 1             | 66.70        | 73.70  | 1     | 96.8         | 31.0         |
| SMDJ64A     | SMDJ64CA  | HGM     | IGM | 64    | 1             | 71.10        | 78.60  | 1     | 103.0        | 29.1         |
| SMDJ70A     | SMDJ70CA  | HGP     | IGP | 70    | 1             | 77.80        | 86.00  | 1     | 113.0        | 26.5         |
| SMDJ75A     | SMDJ75CA  | HGR     | IGR | 75    | 1             | 83.30        | 92.10  | 1     | 121.0        | 24.8         |
| SMDJ78A     | SMDJ78CA  | HGT     | IGT | 78    | 1             | 86.70        | 95.80  | 1     | 126.0        | 23.8         |
| SMDJ85A     | SMDJ85CA  | HGV     | IGV | 85    | 1             | 94.40        | 104.0  | 1     | 137.0        | 21.9         |
| SMDJ90A     | SMDJ90CA  | HGX     | IGX | 90    | 1             | 100.0        | 111.0  | 1     | 146.0        | 20.5         |
| SMDJ100A    | SMDJ100CA | HGZ     | IGZ | 100   | 1             | 111.0        | 123.0  | 1     | 162.0        | 18.5         |
| SMDJ110A    | SMDJ110CA | HHE     | IHE | 110   | 1             | 122.0        | 135.0  | 1     | 177.0        | 16.9         |
| SMDJ120A    | SMDJ120CA | HHG     | IHG | 120   | 1             | 133.0        | 147.0  | 1     | 193.0        | 15.5         |
| SMDJ130A    | SMDJ130CA | HHK     | IHK | 130   | 1             | 144.0        | 159.0  | 1     | 209.0        | 14.4         |
| SMDJ150A    | SMDJ150CA | HHM     | IHM | 150   | 1             | 167.0        | 185.0  | 1     | 243.0        | 12.3         |
| SMDJ160A    | SMDJ160CA | HHP     | IHP | 160   | 1             | 178.0        | 197.0  | 1     | 259.0        | 11.6         |
| SMDJ170A    | SMDJ170CA | HHR     | IHR | 170   | 1             | 189.0        | 209.0  | 1     | 275.0        | 10.9         |
| SMDJ180A    | SMDJ180CA | HHT     | IHT | 180   | 1             | 201.0        | 222.0  | 1     | 292.0        | 10.3         |
| SMDJ190A    | SMDJ190CA | HHV     | IHV | 190   | 1             | 211.0        | 234.0  | 1     | 307.0        | 9.7          |
| SMDJ200A    | SMDJ200CA | HHX     | IHX | 200   | 1             | 224.0        | 247.0  | 1     | 324.0        | 9.3          |
| SMDJ210A    | SMDJ210CA | HHZ     | IHZ | 210   | 1             | 233.0        | 258.0  | 1     | 337.0        | 8.8          |
| SMDJ220A    | SMDJ220CA | HIE     | IIE | 220   | 1             | 244.0        | 270.0  | 1     | 356.0        | 8.4          |

① Surge waveform:10/1000 $\mu\text{s}$  $V_R$ : Stand-off voltage -- Maximum voltage that can be applied $V_{BR}$ : Breakdown voltage $V_C$ : Clamping voltage -- Peak voltage measured across the suppressor at a specified  $I_{PP}$

$I_R$ : Reverse leakage current

ORDERING INFORMATION



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

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

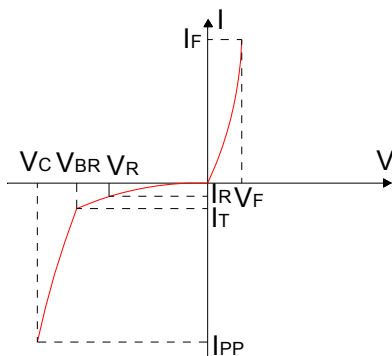


FIG.2:V- I curve characteristics (Bi-directional)

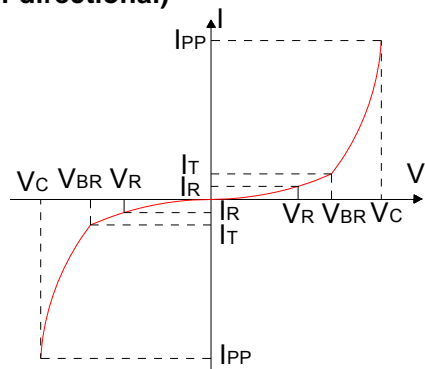


FIG.3: Pulse waveform

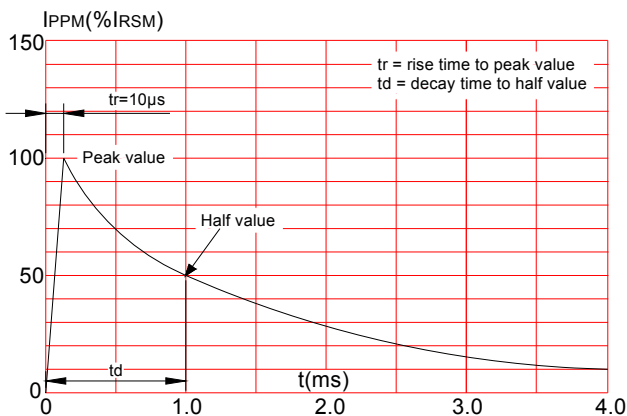
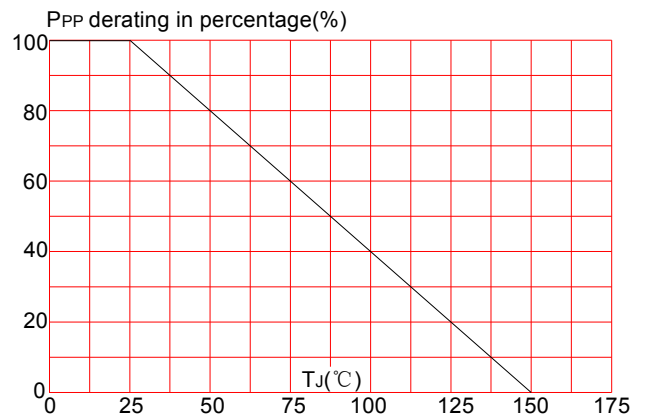
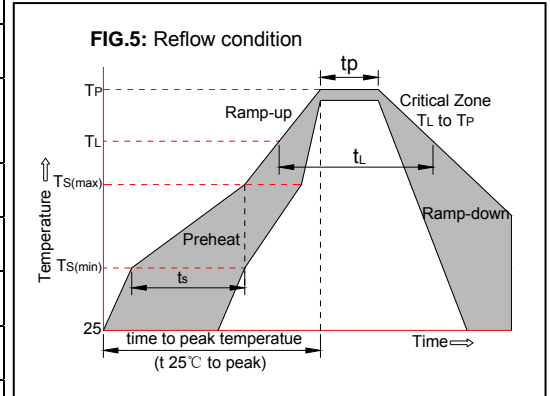


FIG.4: Pulse derating curve

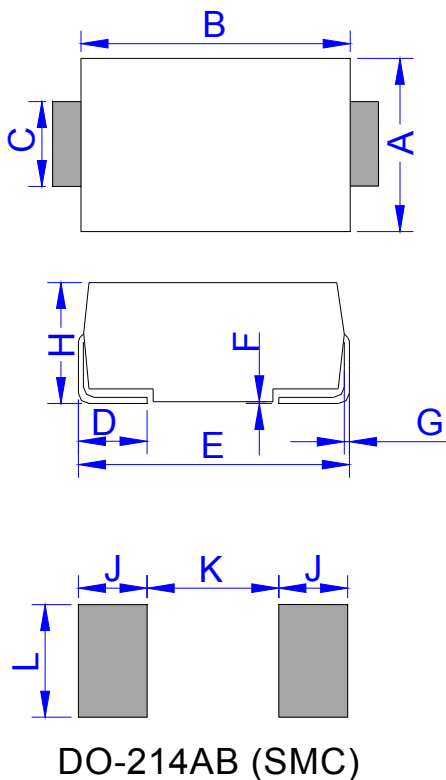


SOLDERING PARAMETERS

|  |                                   |                                 |
|--|-----------------------------------|---------------------------------|
| Reflow Condition                                       |                                   | Pb-Free assembly<br>(see FIG.5) |
| Pre Heat   | -Temperature Min ( $T_{s(min)}$ ) | +150°C                          |
|  | -Temperature Max( $T_{s(max)}$ )  | +200°C                          |
|  | -Time (Min to Max) (ts)           | 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. Max                  |
| Ramp-down Rate   |                                   | 6°C/sec. Max                    |
| Time 25°C to Peak Temp ( $T_p$ )                       |                                   | 8 min. Max                      |
| Do not exceed  |                                   | +260°C                          |

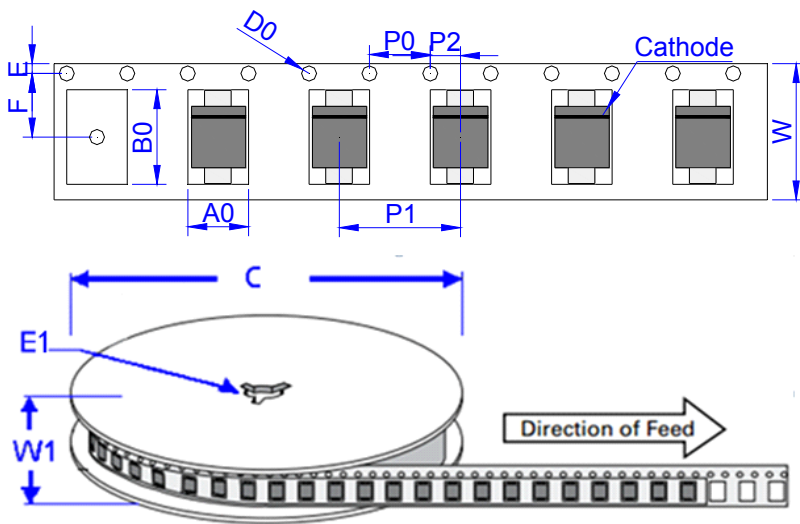


PACKAGE MECHANICAL DATA



| 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 (g/PCS) typ. | REEL (PCS) | PER CARTON (PCS) | REEL DIAMETERS (mm) |
|------------|--------------------------|------------|------------------|---------------------|
| SMDJxxA/CA | 0.262                    | 3,000      | 48,000           | 330                 |

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