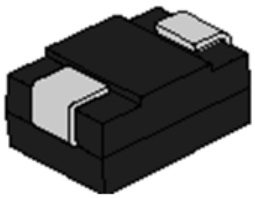
## 1.5SMC Series 1500W Transient Voltage Suppressor

Rev.4.5

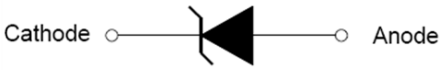
### DESCRIPTION:

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

Bi-directional




Uni-directional

Symbol

### FEATURES:

- ✧ Low profile package.
- ✧ Low inductance.
- ✧ Excellent clamping capability.
- ✧ 1500W 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℃/40s at terminals.
- ✧ Plastic package has under writers laboratory flammability 94V-0.
- ✧ Meets MSL level 1, per J-STD-020, LF maximum peak of 260℃.
- ✧ 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).

### ABSOLUTE MAXIMUM RATINGS ($T_A$=25℃, RH=45%-75%, unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Storage and operating junction temperature range | $T_{STG}/T_J$ | -55 to +150 | ℃ |
| Peak pulse power dissipation at 10/1000μs waveform | $P_{PP}$ | 1500 | W |
| Steady state power dissipation at $T_L$=75℃ | $P_{M(AV)}$ | 6.5 | 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) | $I_{FSM}$ | 200 | A |
| Typical thermal resistance junction to lead | $R_{\theta JL}$ | 15 | ℃/W |
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 75 | ℃/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


6V8C: Device Marking Code
1409: In ninth week, 2014

## ELECTRICAL CHARACTERISTICS ($T_A$=25℃)

| 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 | max(μA) | min(V) | max(V) | mA | max(V) | A |
| 1.5SMC6.8A | 1.5SMC6.8CA | 6V8A | 6V8C | 5.8 | 300 | 6.45 | 7.14 | 10 | 10.5 | 144.8 |
| 1.5SMC7.5A | 1.5SMC7.5CA | 7V5A | 7V5C | 6.4 | 150 | 7.13 | 7.88 | 10 | 11.3 | 132.8 |
| 1.5SMC8.2A | 1.5SMC8.2CA | 8V2A | 8V2C | 7.02 | 100 | 7.79 | 8.61 | 10 | 12.1 | 124.0 |
| 1.5SMC9.1A | 1.5SMC9.1CA | 9V1A | 9V1C | 7.78 | 50 | 8.65 | 9.55 | 1 | 13.4 | 112.0 |
| 1.5SMC10A | 1.5SMC10CA | 10A | 10C | 8.55 | 10 | 9.50 | 10.50 | 1 | 14.5 | 103.5 |
| 1.5SMC11A | 1.5SMC11CA | 11A | 11C | 9.4 | 5 | 10.50 | 11.60 | 1 | 15.6 | 96.2 |
| 1.5SMC12A | 1.5SMC12CA | 12A | 12C | 10.2 | 5 | 11.40 | 12.60 | 1 | 16.7 | 89.8 |
| 1.5SMC13A | 1.5SMC13CA | 13A | 13C | 11.1 | 1 | 12.40 | 13.70 | 1 | 18.2 | 82.5 |
| 1.5SMC15A | 1.5SMC15CA | 15A | 15C | 12.8 | 1 | 14.30 | 15.80 | 1 | 21.2 | 70.8 |
| 1.5SMC16A | 1.5SMC16CA | 16A | 16C | 13.6 | 1 | 15.20 | 16.80 | 1 | 22.5 | 66.7 |
| 1.5SMC18A | 1.5SMC18CA | 18A | 18C | 15.3 | 1 | 17.10 | 18.90 | 1 | 25.2 | 59.6 |
| 1.5SMC20A | 1.5SMC20CA | 20A | 20C | 17.1 | 1 | 19.00 | 21.00 | 1 | 27.7 | 54.2 |
| 1.5SMC22A | 1.5SMC22CA | 22A | 22C | 18.8 | 1 | 20.90 | 23.10 | 1 | 30.6 | 49.1 |
| 1.5SMC24A | 1.5SMC24CA | 24A | 24C | 20.5 | 1 | 22.80 | 25.20 | 1 | 33.2 | 45.2 |
| 1.5SMC27A | 1.5SMC27CA | 27A | 27C | 23.1 | 1 | 25.70 | 28.40 | 1 | 37.5 | 40.0 |
| 1.5SMC30A | 1.5SMC30CA | 30A | 30C | 25.6 | 1 | 28.50 | 31.50 | 1 | 41.4 | 36.3 |
| 1.5SMC33A | 1.5SMC33CA | 33A | 33C | 28.2 | 1 | 31.40 | 34.70 | 1 | 45.7 | 32.9 |
| 1.5SMC36A | 1.5SMC36CA | 36A | 36C | 30.8 | 1 | 34.20 | 37.80 | 1 | 49.9 | 30.1 |
| 1.5SMC39A | 1.5SMC39CA | 39A | 39C | 33.3 | 1 | 37.10 | 41.00 | 1 | 53.9 | 27.9 |
| 1.5SMC43A | 1.5SMC43CA | 43A | 43C | 36.8 | 1 | 40.90 | 45.20 | 1 | 59.3 | 25.3 |
| 1.5SMC47A | 1.5SMC47CA | 47A | 47C | 40.2 | 1 | 44.70 | 49.40 | 1 | 64.8 | 23.2 |
| 1.5SMC51A | 1.5SMC51CA | 51A | 51C | 43.6 | 1 | 48.50 | 53.60 | 1 | 70.1 | 21.4 |
| 1.5SMC56A | 1.5SMC56CA | 56A | 56C | 47.8 | 1 | 53.20 | 58.80 | 1 | 77.0 | 19.5 |

## ELECTRICAL CHARACTERISTICS ($T_A$=25℃, 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 | max(μA) | min(V) | max(V) | mA | max(V) | A |
| 1.5SMC62A | 1.5SMC62CA | 62A | 62C | 53.0 | 1 | 58.90 | 65.10 | 1 | 85.0 | 17.7 |
| 1.5SMC68A | 1.5SMC68CA | 68A | 68C | 58.1 | 1 | 64.60 | 71.40 | 1 | 92.0 | 16.4 |
| 1.5SMC70A | 1.5SMC70CA | 70A | 70C | 59.9 | 1 | 66.50 | 73.50 | 1 | 100.0 | 15.0 |
| 1.5SMC75A | 1.5SMC75CA | 75A | 75C | 64.1 | 1 | 71.30 | 78.80 | 1 | 103.0 | 14.6 |
| 1.5SMC82A | 1.5SMC82CA | 82A | 82C | 70.1 | 1 | 77.90 | 86.10 | 1 | 113.0 | 13.3 |
| 1.5SMC91A | 1.5SMC91CA | 91A | 91C | 77.8 | 1 | 86.50 | 95.50 | 1 | 125.0 | 12.0 |
| 1.5SMC100A | 1.5SMC100CA | 100A | 100C | 85.5 | 1 | 95.00 | 105.0 | 1 | 137.0 | 11.0 |
| 1.5SMC110A | 1.5SMC110CA | 110A | 110C | 94.0 | 1 | 105.0 | 116.0 | 1 | 152.0 | 10.0 |
| 1.5SMC120A | 1.5SMC120CA | 120A | 120C | 102 | 1 | 114.0 | 126.0 | 1 | 165.0 | 9.1 |
| 1.5SMC130A | 1.5SMC130CA | 130A | 130C | 111 | 1 | 124.0 | 137.0 | 1 | 179.0 | 8.4 |
| 1.5SMC150A | 1.5SMC150CA | 150A | 150C | 128 | 1 | 143.0 | 158.0 | 1 | 207.0 | 7.3 |
| 1.5SMC160A | 1.5SMC160CA | 160A | 160C | 136 | 1 | 152.0 | 168.0 | 1 | 219.0 | 6.9 |
| 1.5SMC170A | 1.5SMC170CA | 170A | 170C | 145 | 1 | 162.0 | 179.0 | 1 | 234.0 | 6.5 |
| 1.5SMC180A | 1.5SMC180CA | 180A | 180C | 154 | 1 | 171.0 | 189.0 | 1 | 246.0 | 6.1 |
| 1.5SMC200A | 1.5SMC200CA | 200A | 200C | 171 | 1 | 190.0 | 210.0 | 1 | 274.0 | 5.5 |
| 1.5SMC220A | 1.5SMC220CA | 220A | 220C | 185 | 1 | 209.0 | 231.0 | 1 | 328.0 | 4.6 |
| 1.5SMC250A | 1.5SMC250CA | 250A | 250C | 214 | 1 | 237.0 | 263.0 | 1 | 344.0 | 4.4 |
| 1.5SMC300A | 1.5SMC300CA | 300A | 300C | 256 | 1 | 285.0 | 315.0 | 1 | 414.0 | 3.7 |
| 1.5SMC350A | 1.5SMC350CA | 350A | 350C | 300 | 1 | 332.0 | 368.0 | 1 | 482.0 | 3.2 |
| 1.5SMC400A | 1.5SMC400CA | 400A | 400C | 342 | 1 | 380.0 | 420.0 | 1 | 548.0 | 2.8 |
| 1.5SMC440A | 1.5SMC440CA | 440A | 440C | 376 | 1 | 418.0 | 462.0 | 1 | 602.0 | 2.5 |
| 1.5SMC480A | 1.5SMC480CA | 480A | 480C | 408 | 1 | 456.0 | 504.0 | 1 | 658.0 | 2.3 |

① Surge waveform: 10/1000μs

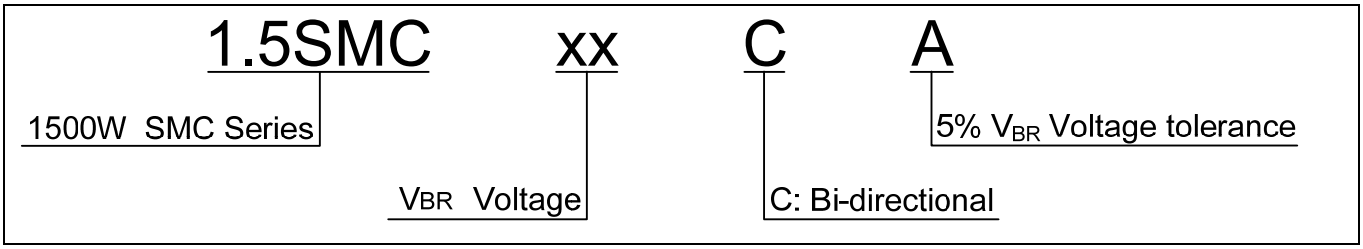
$V_R$: Stand-off voltage -- Maximum voltage that can be applied

$V_{BR}$: 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℃, unless otherwise noted)

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

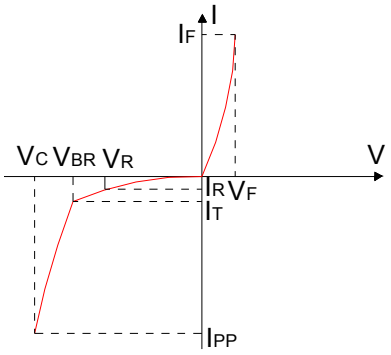



**FIG.2:V- I curve characteristics (Bi-directional)**

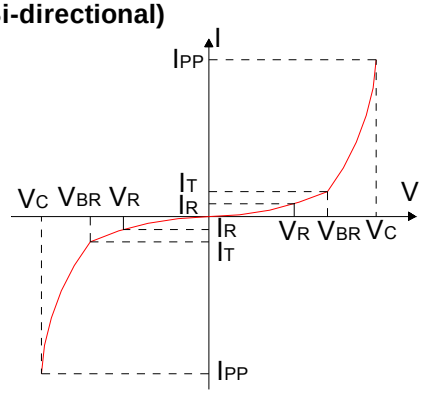



**FIG.3: Pulse waveform**

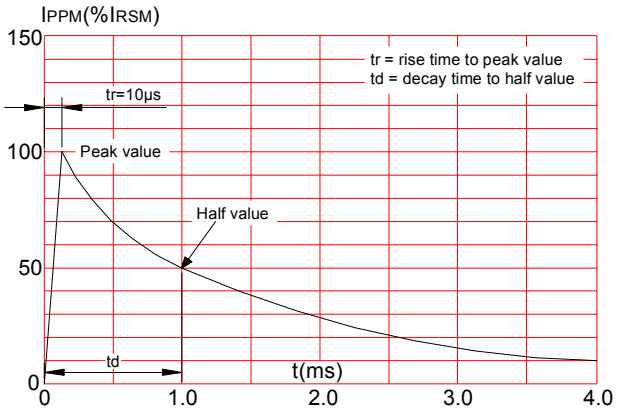



**FIG.4: Pulse derating curve**

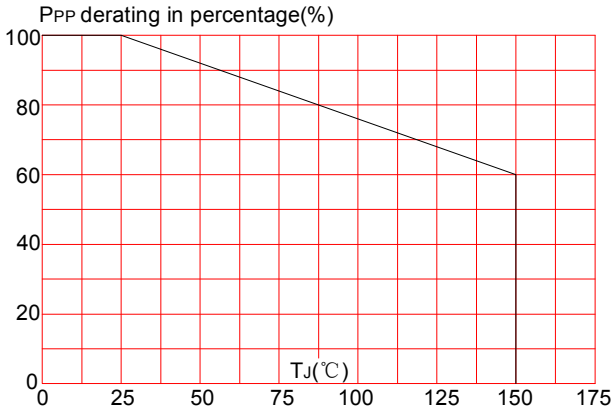
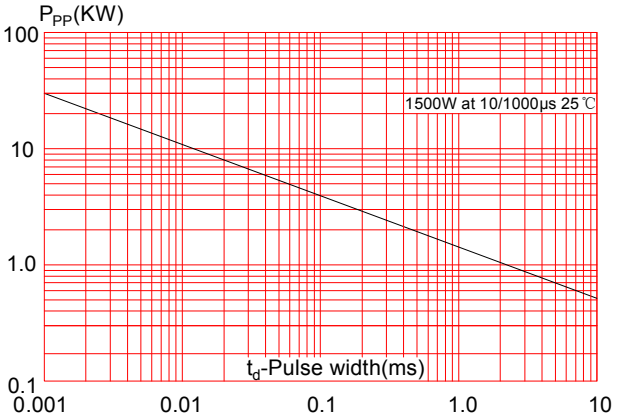
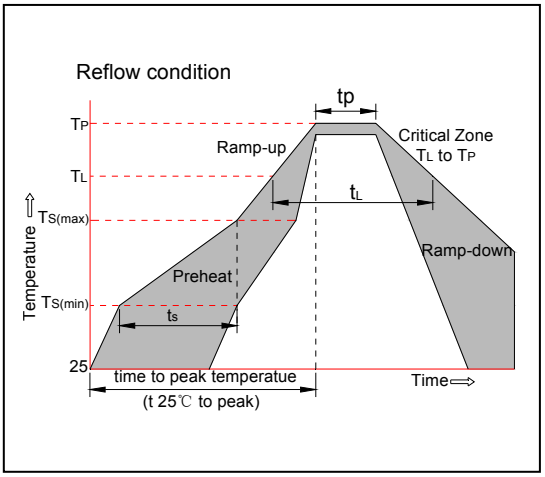



**FIG.5:Peak pulse power dissipation vs. pulse width**

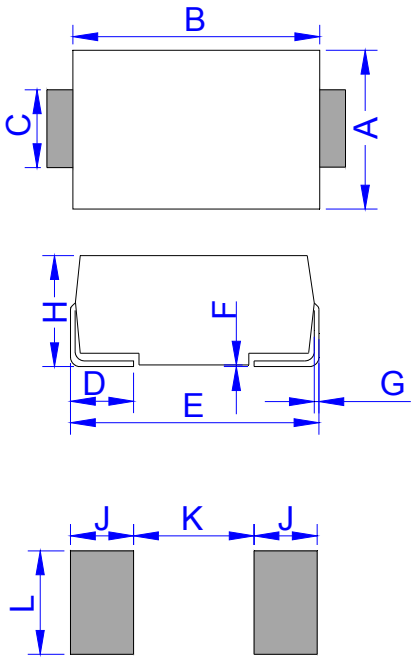


## SOLDERING PARAMETERS

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



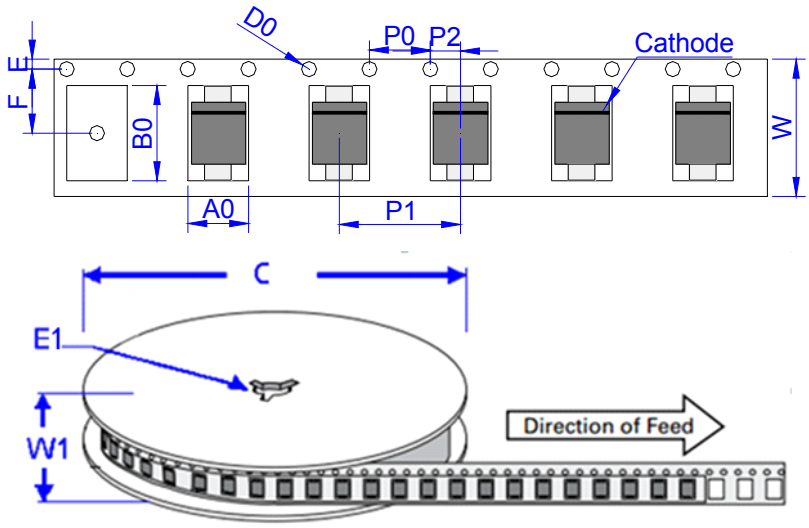

## PACKAGE MECHANICAL DATA




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 (g/PCS) typ. | REEL (PCS) | PER CARTON (PCS) | DESCRIPTION |
|---|---|---|---|---|
| 1.5SMCxxA/CA | 0.256 | 3,000 | 48,000 | 13 inch reel pack |

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