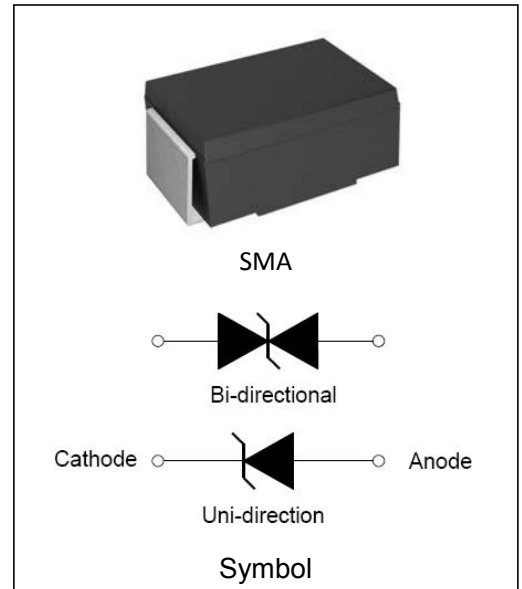


DESCRIPTION:

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.



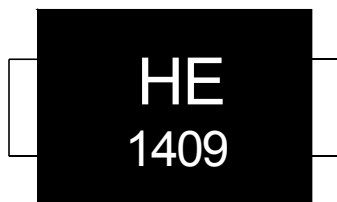
FEATURES:

- ✧ Glass passivated or planar junction.
- ✧ Excellent clamping capability.
- ✧ Repetition rate (duty cycle): 0.01%.
- ✧ Typical I_R less than $1\mu A$ above 10V.
- ✧ Low profile package and low inductance.
- ✧ 400W Peak Pulse power capability at $10 \times 1000\mu s$ waveform.
- ✧ Fast response time: typically less than 1.0ps from 0V to V_{BR} min.
- ✧ High temperature soldering: $260^\circ C/10s$ at terminals.
- ✧ Plastic package has Underwriters Laboratory Flammability 94V-0.
- ✧ For surface mounted applications in order to optimize board space.

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

| Parameter | Symbol | Value | Unit |
|---|-------------|-------------|------------|
| Storage temperature range | T_{stg} | -55 to +150 | $^\circ C$ |
| Operating junction temperature range | T_j | -55 to +150 | $^\circ C$ |
| Steady state power dissipation at $T_L=75^\circ C$ | $P_{M(AV)}$ | 3.3 | W |
| Peak pulse power dissipation on 10/1000 μs waveform | P_{PP} | 400 | W |
| Maximum Instantaneous Forward Voltage at 30A for Unidirectional | V_F | 5.0 | V |

MARKING



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

ELECTRICAL CHARACTERISTICS (T_A=25°C)

| Part Number | | Marking | | V _R | I _R @ V _R | V _{BR} @I _T | | I _T | V _C @I _{PP} | I _{PP} ® |
|-------------|-----------|---------|----|----------------|------------------------------------|---------------------------------|--------|----------------|---------------------------------|-------------------|
| Uni-Polar | Bi-Polar | Uni | Bi | V | µA | min(V) | max(V) | mA | max(V) | A |
| SMAJ5.0A | SMAJ5.0CA | HE | TE | 5.0 | 800 | 6.40 | 7.00 | 10 | 9.2 | 43.5 |
| SMAJ6.0A | SMAJ6.0CA | HG | TG | 6.0 | 800 | 6.67 | 7.37 | 10 | 10.3 | 38.8 |
| SMAJ6.5A | SMAJ6.5CA | HK | TK | 6.5 | 500 | 7.22 | 7.98 | 10 | 11.2 | 35.7 |
| SMAJ7.0A | SMAJ7.0CA | HM | TM | 7.0 | 200 | 7.78 | 8.60 | 10 | 12.0 | 33.3 |
| SMAJ7.5A | SMAJ7.5CA | HP | TP | 7.5 | 100 | 8.33 | 9.21 | 1 | 12.9 | 31.0 |
| SMAJ8.0A | SMAJ8.0CA | HR | TR | 8.0 | 50 | 8.89 | 9.83 | 1 | 13.6 | 29.4 |
| SMAJ8.5A | SMAJ8.5CA | HT | TT | 8.5 | 10 | 9.44 | 10.40 | 1 | 14.4 | 27.8 |
| SMAJ9.0A | SMAJ9.0CA | HV | TV | 9.0 | 5 | 10.00 | 11.10 | 1 | 15.4 | 26.0 |
| SMAJ10A | SMAJ10CA | HX | TX | 10.0 | 1 | 11.10 | 12.30 | 1 | 17.0 | 23.5 |
| SMAJ11A | SMAJ11CA | HZ | TZ | 11.0 | 1 | 12.20 | 13.50 | 1 | 18.2 | 22.0 |
| SMAJ12A | SMAJ12CA | IE | UE | 12.0 | 1 | 13.30 | 14.70 | 1 | 19.9 | 20.1 |
| SMAJ13A | SMAJ13CA | IG | UG | 13.0 | 1 | 14.40 | 15.90 | 1 | 21.5 | 18.6 |
| SMAJ14A | SMAJ14CA | IK | UK | 14.0 | 1 | 15.60 | 17.20 | 1 | 23.2 | 17.3 |
| SMAJ15A | SMAJ15CA | IM | UM | 15.0 | 1 | 16.70 | 18.50 | 1 | 24.4 | 16.4 |
| SMAJ16A | SMAJ16CA | IP | UP | 16.0 | 1 | 17.80 | 19.70 | 1 | 26.0 | 15.4 |
| SMAJ17A | SMAJ17CA | IR | UR | 17.0 | 1 | 18.90 | 20.90 | 1 | 27.6 | 14.5 |
| SMAJ18A | SMAJ18CA | IT | UT | 18.0 | 1 | 20.00 | 22.10 | 1 | 29.2 | 13.7 |
| SMAJ20A | SMAJ20CA | IV | UV | 20.0 | 1 | 22.20 | 24.50 | 1 | 32.4 | 12.4 |
| SMAJ22A | SMAJ22CA | IX | UX | 22.0 | 1 | 24.40 | 26.90 | 1 | 35.5 | 11.3 |
| SMAJ24A | SMAJ24CA | IZ | UZ | 24.0 | 1 | 26.70 | 29.50 | 1 | 38.9 | 10.3 |
| SMAJ26A | SMAJ26CA | JE | VE | 26.0 | 1 | 28.90 | 31.90 | 1 | 42.1 | 9.5 |
| SMAJ28A | SMAJ28CA | JG | VG | 28.0 | 1 | 31.10 | 34.40 | 1 | 45.4 | 8.8 |
| SMAJ30A | SMAJ30CA | JK | VK | 30.0 | 1 | 33.30 | 36.80 | 1 | 48.4 | 8.3 |
| SMAJ33A | SMAJ33CA | JM | VM | 33.0 | 1 | 36.70 | 40.60 | 1 | 53.3 | 7.5 |
| SMAJ36A | SMAJ36CA | JP | VP | 36.0 | 1 | 40.00 | 44.20 | 1 | 58.1 | 6.9 |
| SMAJ40A | SMAJ40CA | JR | VR | 40.0 | 1 | 44.40 | 49.10 | 1 | 64.5 | 6.2 |
| SMAJ43A | SMAJ43CA | JT | VT | 43.0 | 1 | 47.80 | 52.80 | 1 | 69.4 | 5.8 |
| SMAJ45A | SMAJ45CA | JV | VV | 45.0 | 1 | 50.00 | 55.30 | 1 | 72.7 | 5.5 |
| SMAJ48A | SMAJ48CA | JX | VX | 48.0 | 1 | 53.30 | 58.90 | 1 | 77.4 | 5.2 |
| SMAJ51A | SMAJ51CA | JZ | VZ | 51.0 | 1 | 56.70 | 62.70 | 1 | 82.4 | 4.9 |

ELECTRICAL CHARACTERISTICS (T_A=25°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 | μA | min(V) | max(V) | mA | max(V) | A |
| SMAJ54A | SMAJ54CA | RE | WE | 54.0 | 1 | 60.00 | 66.30 | 1 | 87.1 | 4.6 |
| SMAJ58A | SMAJ58CA | RG | WG | 58.0 | 1 | 64.40 | 71.20 | 1 | 93.6 | 4.3 |
| SMAJ60A | SMAJ60CA | RK | WK | 60.0 | 1 | 66.70 | 73.70 | 1 | 96.8 | 4.1 |
| SMAJ64A | SMAJ64CA | RM | WM | 64.0 | 1 | 71.10 | 78.60 | 1 | 103.0 | 3.9 |
| SMAJ70A | SMAJ70CA | RP | WP | 70.0 | 1 | 77.80 | 86.00 | 1 | 113.0 | 3.6 |
| SMAJ75A | SMAJ75CA | RR | WR | 75.0 | 1 | 83.30 | 92.10 | 1 | 121.0 | 3.3 |
| SMAJ78A | SMAJ78CA | RT | WT | 78.0 | 1 | 86.70 | 95.80 | 1 | 126.0 | 3.2 |
| SMAJ85A | SMAJ85CA | RV | WV | 85.0 | 1 | 94.40 | 104.0 | 1 | 137.0 | 2.9 |
| SMAJ90A | SMAJ90CA | RX | WX | 90.0 | 1 | 100.0 | 111.0 | 1 | 146.0 | 2.8 |
| SMAJ100A | SMAJ100CA | RZ | WZ | 100.0 | 1 | 100.0 | 111.0 | 1 | 162.0 | 2.5 |
| SMAJ110A | SMAJ110CA | SE | XE | 110.0 | 1 | 111.0 | 123.0 | 1 | 177.0 | 2.3 |
| SMAJ120A | SMAJ120CA | SG | XG | 120.0 | 1 | 122.0 | 135.0 | 1 | 193.0 | 2.1 |
| SMAJ130A | SMAJ130CA | SK | XK | 130.0 | 1 | 133.0 | 147.0 | 1 | 209.0 | 1.9 |
| SMAJ150A | SMAJ150CA | SM | XM | 150.0 | 1 | 144.0 | 159.0 | 1 | 243.0 | 1.7 |
| SMAJ160A | SMAJ160CA | SP | XP | 160.0 | 1 | 167.0 | 185.0 | 1 | 259.0 | 1.6 |
| SMAJ170A | SMAJ170CA | SR | XR | 170.0 | 1 | 178.0 | 197.0 | 1 | 275.0 | 1.5 |
| SMAJ180A | SMAJ180CA | ST | XT | 180.0 | 1 | 189.0 | 209.0 | 1 | 292.0 | 1.4 |
| SMAJ200A | SMAJ200CA | SX | XX | 200.0 | 1 | 201.0 | 222.0 | 1 | 324.0 | 1.3 |
| SMAJ220A | SMAJ220CA | ZE | YE | 220.0 | 1 | 211.0 | 234.0 | 1 | 356.0 | 1.1 |
| SMAJ250A | SMAJ250CA | ZG | YG | 250.0 | 1 | 224.0 | 247.0 | 1 | 405.0 | 1.0 |
| SMAJ300A | SMAJ300CA | ZK | YK | 300.0 | 1 | 233.0 | 258.0 | 1 | 486.0 | 0.8 |
| SMAJ350A | SMAJ350CA | ZM | YM | 350.0 | 1 | 391.0 | 432.0 | 1 | 567.0 | 0.7 |
| SMAJ400A | SMAJ400CA | ZP | YP | 400.0 | 1 | 447.0 | 494.0 | 1 | 648.0 | 0.6 |
| SMAJ440A | SMAJ440CA | ZR | YR | 440.0 | 1 | 492.0 | 543.0 | 1 | 713.0 | 0.6 |

① Surge waveform: 10/1000μs

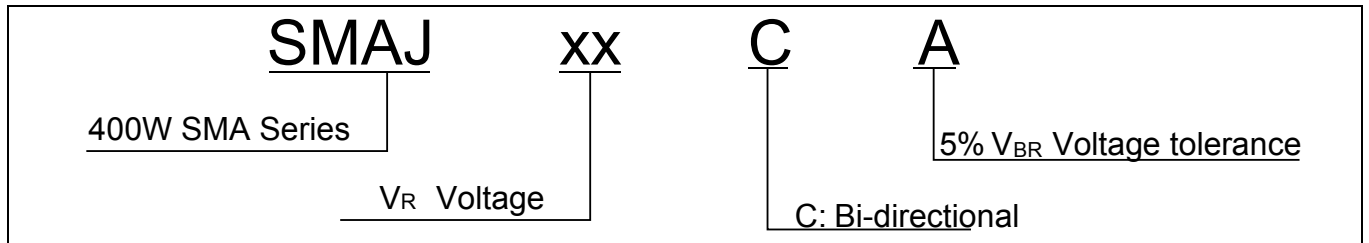
V_R: Stand-off Voltage -- Maximum voltage that can be applied

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 ($T_A=25^\circ\text{C}$, unless otherwise noted)

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

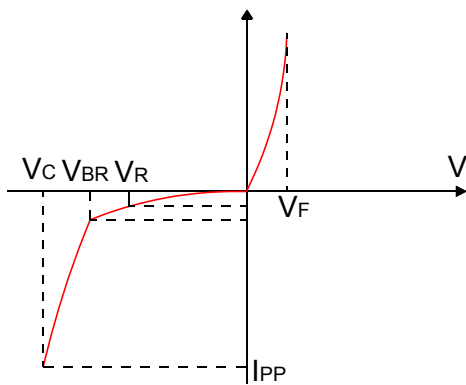


FIG.2:V- I curve characteristics (Bi-directional)

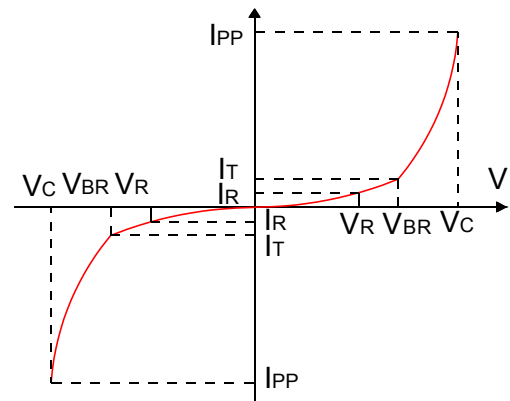


FIG.3: Pulse waveform

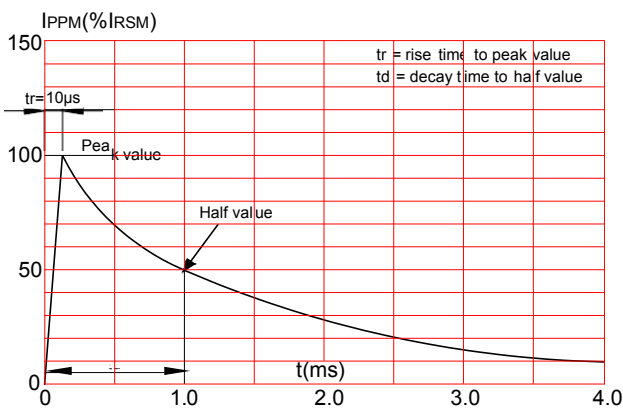
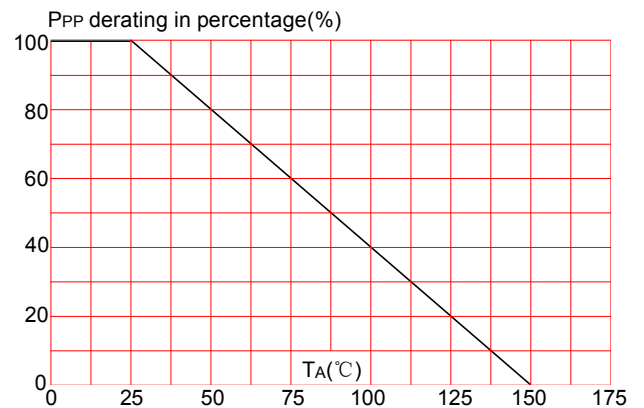
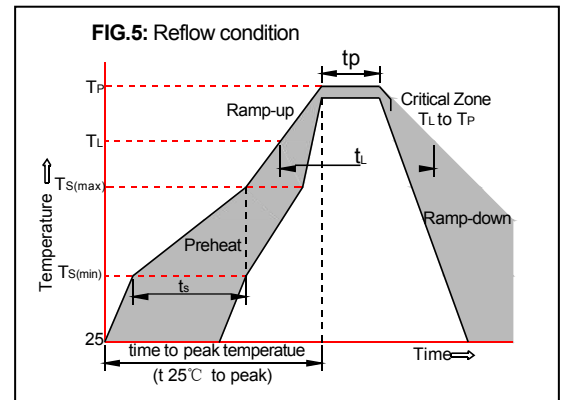


FIG.4: Pulse derating curve

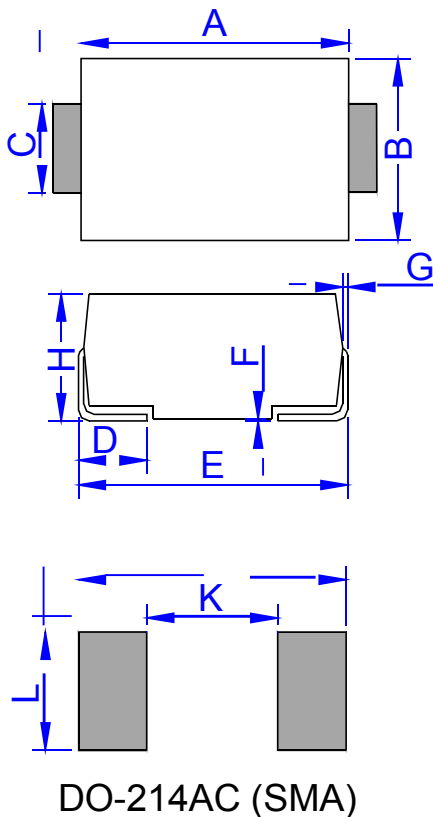


SOLDERING PARAMETERS

| | | |
|---|-----------------------------------|---------------------------------|
| Reflow Condition | | Pb-Free assembly (see FIG.5) |
| 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 (Liquid us 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)(Liquid us) | +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) | | 30 secs. Max |
| Ramp-down Rate | | 6°C/sec. Max |
| Time 25°C to Peak Temp (T_p) | | 8 min. Max |
| Do not exceed | | +260°C |

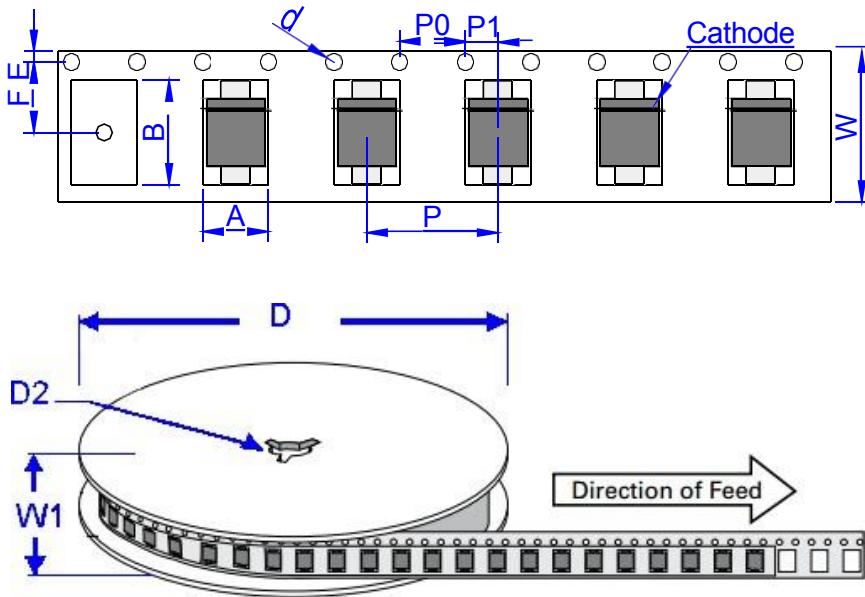


PACKAGE MECHANICAL DATA



| Ref. | Dimensions | | | |
|------|-------------|-------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.25 | 4.65 | 0.167 | 0.183 |
| B | 2.50 | 2.90 | 0.098 | 0.114 |
| C | 1.35 | 1.65 | 0.053 | 0.065 |
| D | 0.76 | 1.52 | 0.030 | 0.060 |
| E | 4.93 | 5.28 | 0.194 | 0.208 |
| F | 0.051 | 0.203 | 0.002 | 0.008 |
| G | 0.15 | 0.31 | 0.006 | 0.012 |
| H | 1.98 | 2.41 | 0.078 | 0.095 |
| J | 6.80 | | 0.268 | |
| K | | 2.60 | | 0.102 |
| L | 2.40 | | 0.094 | |

TAPE AND REEL SPECIFICATION-SMA



| Ref. | Dimensions | |
|------|-------------|---------------|
| | Millimeters | Inches |
| A | 2.79 ± 0.3 | 0.110 ± 0.012 |
| B | 5.33 ± 0.3 | 0.210 ± 0.012 |
| d | 1.5 ± 0.1 | 0.059 ± 0.004 |
| D | 330.0 | 13.0 |
| D2 | 13 ± 1 | 0.512 ± 0.039 |
| E | 1.5 ± 0.2 | 0.059 ± 0.008 |
| F | 5.65 ± 0.2 | 0.222 ± 0.008 |
| P | 4.0 ± 0.2 | 0.157 ± 0.008 |
| P0 | 4.0 ± 0.2 | 0.157 ± 0.008 |
| P1 | 2.0 ± 0.2 | 0.079 ± 0.008 |
| W | 12.0 ± 0.2 | 0.472 ± 0.008 |
| W1 | 16.8 ± 2.0 | 0.661 ± 0.079 |

| OUTLINE | REEL (PCS) | PER CARTON (PCS) | REEL DIAMETERS (mm) |
|---------|------------|------------------|---------------------|
| TAPING | 5,000 | 80,000 | 330 |

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