

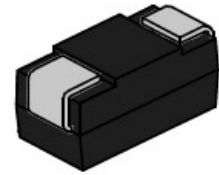


SMAJxx(C)A-AU Series 400W Transient Voltage Suppressor

Rev.1.0

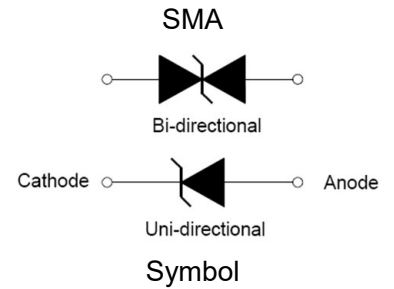
DESCRIPTION

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



FEATURES

- ✧ Low profile package.
- ✧ Low inductance.
- ✧ Excellent clamping capability.
- ✧ 400W peak pulse power capability at 10/1000μs waveform.
- ✧ Typical I_R less than 1μA above 10V.
- ✧ 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.
- ✧ IEC61000-4-2 (ESD) ±30kV (air), ±30kV (contact).
- ✧ UL 497B item recognized. (File No.:E480698).
- ✧ For surface mounted applications in order to optimize board space.
- ✧ High reliability application and automotive grade (AEC-Q101 qualified).



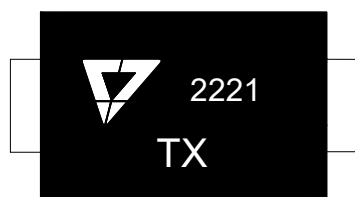
ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ\text{C}$, RH=45%-75%, unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|-----------------|-------------|------|
| Storage and operating junction temperature range | T_{STG}/T_J | -55 to +150 | °C |
| Steady state power dissipation at $T_L=75^\circ\text{C}$ | $P_{M(AV)}$ | 3.3 | W |
| Peak pulse power dissipation at 10/1000μs waveform | P_{PP} | 400 | W |
| Maximum instantaneous forward voltage at 30A for unidirectional | V_F | 5.0 | V |
| Peak forward surge current, 8.3ms single half sine wave(Note 1) | I_{FSM} | 60 | A |
| Typical thermal resistance junction to lead | $R_{\theta JL}$ | 30 | °C/W |
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 120 | °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



TX: Device Marking Code
2221: the 21th week, 2022

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

| Part Number | | Marking | | V_R | $I_R@V_R$ | $V_{BR}@I_T$ | | I_T | $V_C@I_{PP}$ | $I_{PP}^{\textcircled{1}}$ |
|-------------|-------------|---------|----|-------|--------------------------|--------------|--------|-------|--------------|----------------------------|
| Uni-polar | Bi-polar | Uni | Bi | V | max (μA) | min(V) | max(V) | mA | max(V) | A |
| SMAJ10A-AU | SMAJ10CA-AU | HX | TX | 10.0 | 2 | 11.10 | 12.30 | 1 | 17.0 | 23.5 |
| SMAJ11A-AU | SMAJ11CA-AU | HZ | TZ | 11.0 | 1 | 12.20 | 13.50 | 1 | 18.2 | 22.0 |
| SMAJ12A-AU | SMAJ12CA-AU | IE | UE | 12.0 | 1 | 13.30 | 14.70 | 1 | 19.9 | 20.1 |
| SMAJ13A-AU | SMAJ13CA-AU | IG | UG | 13.0 | 1 | 14.40 | 15.90 | 1 | 21.5 | 18.6 |
| SMAJ14A-AU | SMAJ14CA-AU | IK | UK | 14.0 | 1 | 15.60 | 17.20 | 1 | 23.2 | 17.3 |
| SMAJ15A-AU | SMAJ15CA-AU | IM | UM | 15.0 | 1 | 16.70 | 18.50 | 1 | 24.4 | 16.4 |
| SMAJ16A-AU | SMAJ16CA-AU | IP | UP | 16.0 | 1 | 17.80 | 19.70 | 1 | 26.0 | 15.4 |
| SMAJ17A-AU | SMAJ17CA-AU | IR | UR | 17.0 | 1 | 18.90 | 20.90 | 1 | 27.6 | 14.5 |
| SMAJ18A-AU | SMAJ18CA-AU | IT | UT | 18.0 | 1 | 20.00 | 22.10 | 1 | 29.2 | 13.7 |
| SMAJ20A-AU | SMAJ20CA-AU | IV | UV | 20.0 | 1 | 22.20 | 24.50 | 1 | 32.4 | 12.4 |
| SMAJ22A-AU | SMAJ22CA-AU | IX | UX | 22.0 | 1 | 24.40 | 26.90 | 1 | 35.5 | 11.3 |
| SMAJ24A-AU | SMAJ24CA-AU | IZ | UZ | 24.0 | 1 | 26.70 | 29.50 | 1 | 38.9 | 10.3 |
| SMAJ26A-AU | SMAJ26CA-AU | JE | VE | 26.0 | 1 | 28.90 | 31.90 | 1 | 42.1 | 9.5 |
| SMAJ28A-AU | SMAJ28CA-AU | JG | VG | 28.0 | 1 | 31.10 | 34.40 | 1 | 45.4 | 8.8 |
| SMAJ30A-AU | SMAJ30CA-AU | JK | VK | 30.0 | 1 | 33.30 | 36.80 | 1 | 48.4 | 8.3 |
| SMAJ33A-AU | SMAJ33CA-AU | JM | VM | 33.0 | 1 | 36.70 | 40.60 | 1 | 53.3 | 7.5 |
| SMAJ36A-AU | SMAJ36CA-AU | JP | VP | 36.0 | 1 | 40.00 | 44.20 | 1 | 58.1 | 6.9 |
| SMAJ40A-AU | SMAJ40CA-AU | JR | VR | 40.0 | 1 | 44.40 | 49.10 | 1 | 64.5 | 6.2 |
| SMAJ43A-AU | SMAJ43CA-AU | JT | VT | 43.0 | 1 | 47.80 | 52.80 | 1 | 69.4 | 5.8 |
| SMAJ45A-AU | SMAJ45CA-AU | JV | VV | 45.0 | 1 | 50.00 | 55.30 | 1 | 72.7 | 5.5 |
| SMAJ48A-AU | SMAJ48CA-AU | JX | VX | 48.0 | 1 | 53.30 | 58.90 | 1 | 77.4 | 5.2 |
| SMAJ51A-AU | SMAJ51CA-AU | 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 | max (μA) | min(V) | max(V) | mA | max(V) | A |
| SMAJ54A-AU | SMAJ54CA-AU | RE | WE | 54.0 | 1 | 60.00 | 66.30 | 1 | 87.1 | 4.6 |
| SMAJ58A-AU | SMAJ58CA-AU | RG | WG | 58.0 | 1 | 64.40 | 71.20 | 1 | 93.6 | 4.3 |
| SMAJ60A-AU | SMAJ60CA-AU | RK | WK | 60.0 | 1 | 66.70 | 73.70 | 1 | 96.8 | 4.1 |
| SMAJ64A-AU | SMAJ64CA-AU | RM | WM | 64.0 | 1 | 71.10 | 78.60 | 1 | 103.0 | 3.9 |
| SMAJ70A-AU | SMAJ70CA-AU | RP | WP | 70.0 | 1 | 77.80 | 86.00 | 1 | 113.0 | 3.6 |
| SMAJ75A-AU | SMAJ75CA-AU | RR | WR | 75.0 | 1 | 83.30 | 92.10 | 1 | 121.0 | 3.3 |
| SMAJ78A-AU | SMAJ78CA-AU | RT | WT | 78.0 | 1 | 86.70 | 95.80 | 1 | 126.0 | 3.2 |
| SMAJ85A-AU | SMAJ85CA-AU | RV | WV | 85.0 | 1 | 94.40 | 104.0 | 1 | 137.0 | 2.9 |
| SMAJ90A-AU | SMAJ90CA-AU | RX | WX | 90.0 | 1 | 100.0 | 111.0 | 1 | 146.0 | 2.8 |
| SMAJ100A-AU | SMAJ100CA-AU | RZ | WZ | 100.0 | 1 | 111.0 | 123.0 | 1 | 162.0 | 2.5 |
| SMAJ110A-AU | SMAJ110CA-AU | SE | XE | 110.0 | 1 | 122.0 | 135.0 | 1 | 177.0 | 2.3 |
| SMAJ120A-AU | SMAJ120CA-AU | SG | XG | 120.0 | 1 | 133.0 | 147.0 | 1 | 193.0 | 2.1 |
| SMAJ130A-AU | SMAJ130CA-AU | SK | XK | 130.0 | 1 | 144.0 | 159.0 | 1 | 209.0 | 1.9 |
| SMAJ150A-AU | SMAJ150CA-AU | SM | XM | 150.0 | 1 | 167.0 | 185.0 | 1 | 243.0 | 1.7 |
| SMAJ160A-AU | SMAJ160CA-AU | SP | XP | 160.0 | 1 | 178.0 | 197.0 | 1 | 259.0 | 1.6 |
| SMAJ170A-AU | SMAJ170CA-AU | SR | XR | 170.0 | 1 | 189.0 | 209.0 | 1 | 275.0 | 1.5 |
| SMAJ180A-AU | SMAJ180CA-AU | ST | XT | 180.0 | 1 | 201.0 | 222.0 | 1 | 292.0 | 1.4 |
| SMAJ200A-AU | SMAJ200CA-AU | SX | XX | 200.0 | 1 | 224.0 | 247.0 | 1 | 324.0 | 1.3 |
| SMAJ220A-AU | SMAJ220CA-AU | ZE | YE | 220.0 | 1 | 246.0 | 272.0 | 1 | 356.0 | 1.1 |
| SMAJ250A-AU | SMAJ250CA-AU | ZG | YG | 250.0 | 1 | 279.0 | 309.0 | 1 | 405.0 | 1.0 |
| SMAJ300A-AU | SMAJ300CA-AU | ZK | YK | 300.0 | 1 | 335.0 | 371.0 | 1 | 486.0 | 0.8 |
| SMAJ350A-AU | SMAJ350CA-AU | ZM | YM | 350.0 | 1 | 391.0 | 432.0 | 1 | 567.0 | 0.7 |
| SMAJ400A-AU | SMAJ400CA-AU | ZP | YP | 400.0 | 1 | 447.0 | 494.0 | 1 | 648.0 | 0.6 |
| SMAJ440A-AU | SMAJ440CA-AU | ZR | YR | 440.0 | 1 | 492.0 | 543.0 | 1 | 713.0 | 0.6 |

① Surge waveform: 10/1000μs

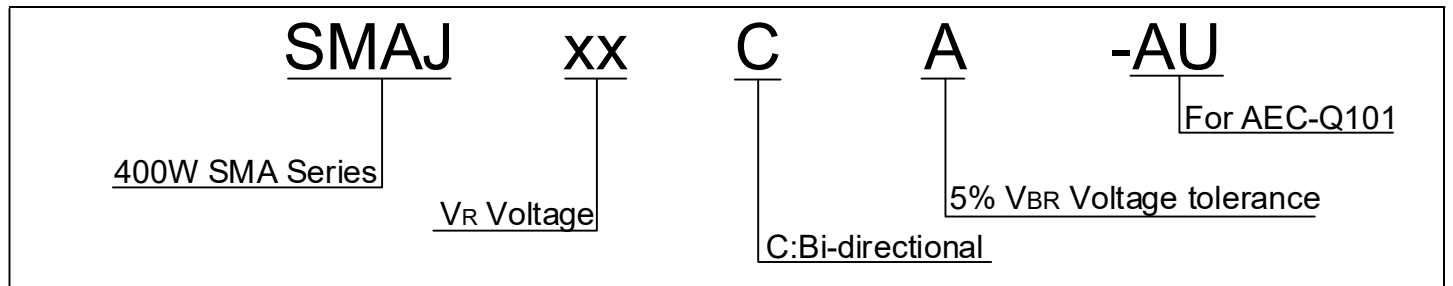
V_R: Stand-off voltage –Maximum voltage that can be applied

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

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

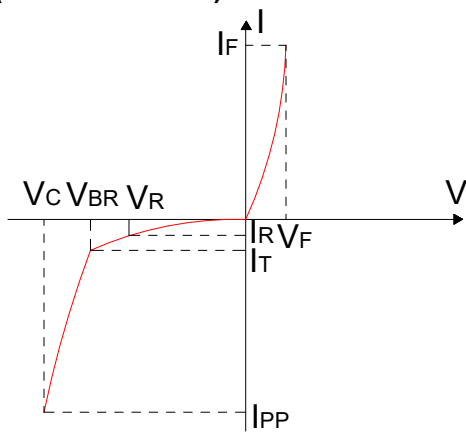


FIG.2:V- I curve characteristics (Bi-directional)

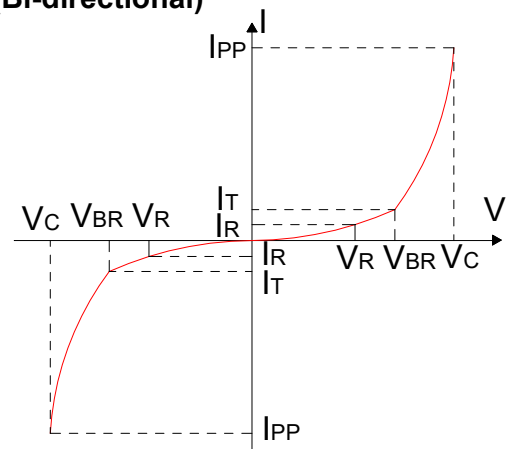


FIG.3: Pulse waveform

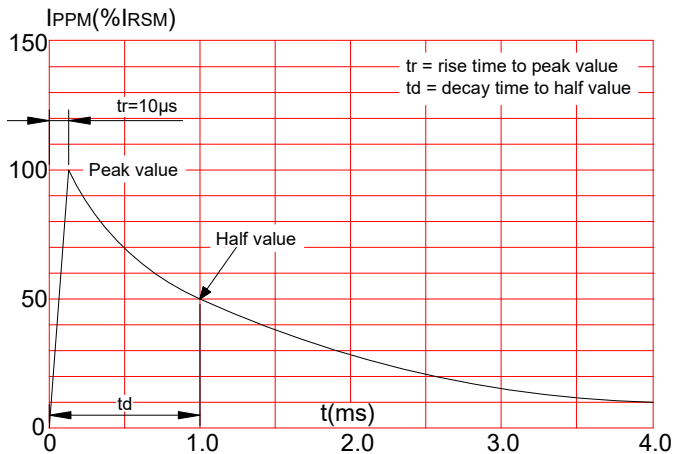


FIG.4: Pulse derating curve

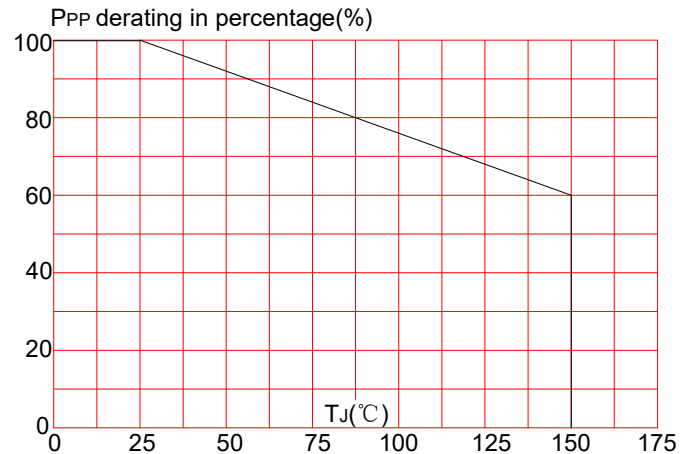
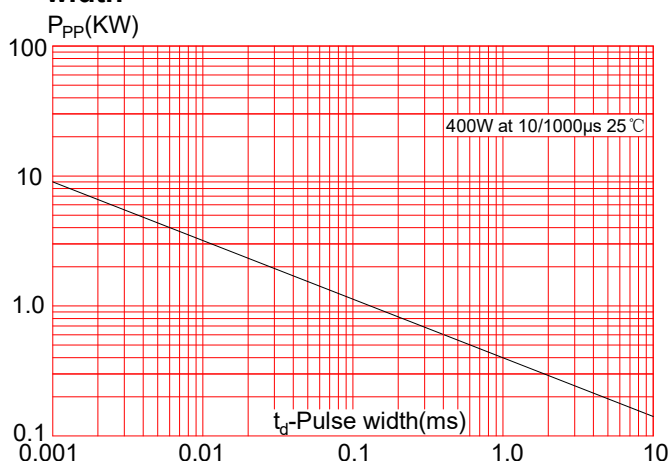
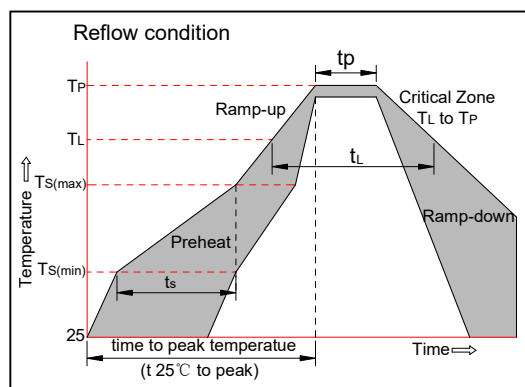


FIG.5: Peak pulse power dissipation vs. pulse width

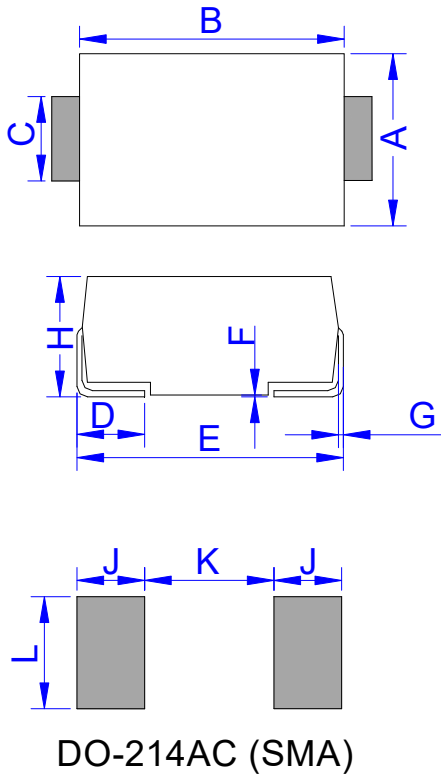


SOLDERING PARAMETERS

| | | |
|--|-----------------------------------|---|
| Reflow Condition | | Pb-Free assembly (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 |

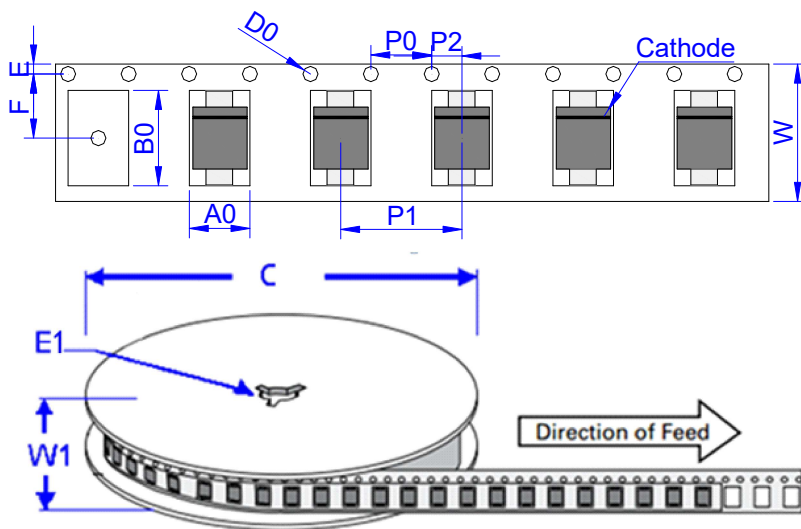


PACKAGE MECHANICAL DATA



| Ref. | Dimensions | | | |
|------|-------------|-------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 2.60 | 3.00 | 0.102 | 0.118 |
| B | 4.15 | 4.65 | 0.163 | 0.183 |
| C | 1.25 | 1.65 | 0.049 | 0.065 |
| D | 0.95 | 1.52 | 0.037 | 0.060 |
| E | 4.90 | 5.30 | 0.193 | 0.209 |
| F | 0.051 | 0.203 | 0.002 | 0.008 |
| G | 0.15 | 0.31 | 0.006 | 0.012 |
| H | 2.00 | 2.44 | 0.079 | 0.096 |
| J | 2.00 | | 0.079 | |
| K | | 2.30 | | 0.091 |
| L | 1.80 | | 0.071 | |

TAPE AND REEL SPECIFICATION-SMA



| Ref. | Dimensions | |
|------|-------------|---------------|
| | Millimeters | Inches |
| A0 | 2.79 ± 0.3 | 0.110 ± 0.012 |
| B0 | 5.33 ± 0.3 | 0.210 ± 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 | 5.5 ± 0.2 | 0.217 ± 0.008 |
| P0 | 4.00 ± 0.2 | 0.157 ± 0.008 |
| P1 | 4.00 ± 0.2 | 0.157 ± 0.008 |
| P2 | 2.00 ± 0.2 | 0.079 ± 0.008 |
| W | 12.0 ± 0.2 | 0.472 ± 0.008 |
| W1 | 15.7 ± 2.0 | 0.618 ± 0.079 |

| PART No. | UNIT WEIGHT (g/PCS) typ. | REEL (PCS) | PER CARTON (PCS) | DESCRIPTION |
|---------------|--------------------------|------------|------------------|-------------------|
| SMAJxxA/CA-AU | 0.067 | 7,500 | 120,000 | 13 inch reel pack |

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