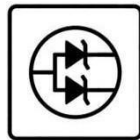
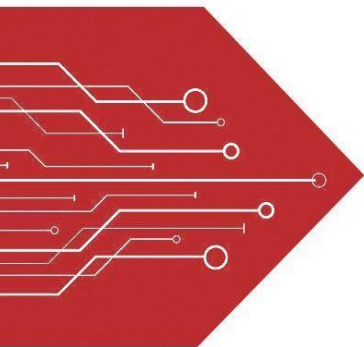


MSKSEMI

SEMICONDUCTOR



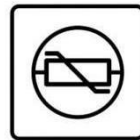
ESD



TVS



TSS



MOV



GDT

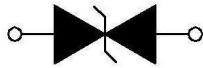


PLED

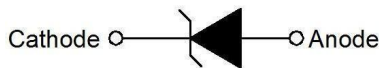
Product data sheet



SMA



Bi-directional



Un-directional

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.

Mechanical Characteristics

Package: SMA/DO-214AC

- Case Material: "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Polarity: Color band denotes cathode except bi-directional models
- Weight: 0.07g
- Terminal Connections: See Diagram Below
- Marking Information: See Below

Features

- Glass passivated or planar junction
- Excellent clamping capability
- Repetition rate (duty cycle): 0.01%
- Low profile package and low inductance
- Fast response time: typically less than 1.0ps from 0V to V_{BRmin} .
- High temperature soldering: 260°C/10s at terminals.
- For surface mounted applications in order to optimize board space.
- UL Certificate #E504113

Applications

- I/O Interface.
- Power lines
- Automotive and Telecommunication

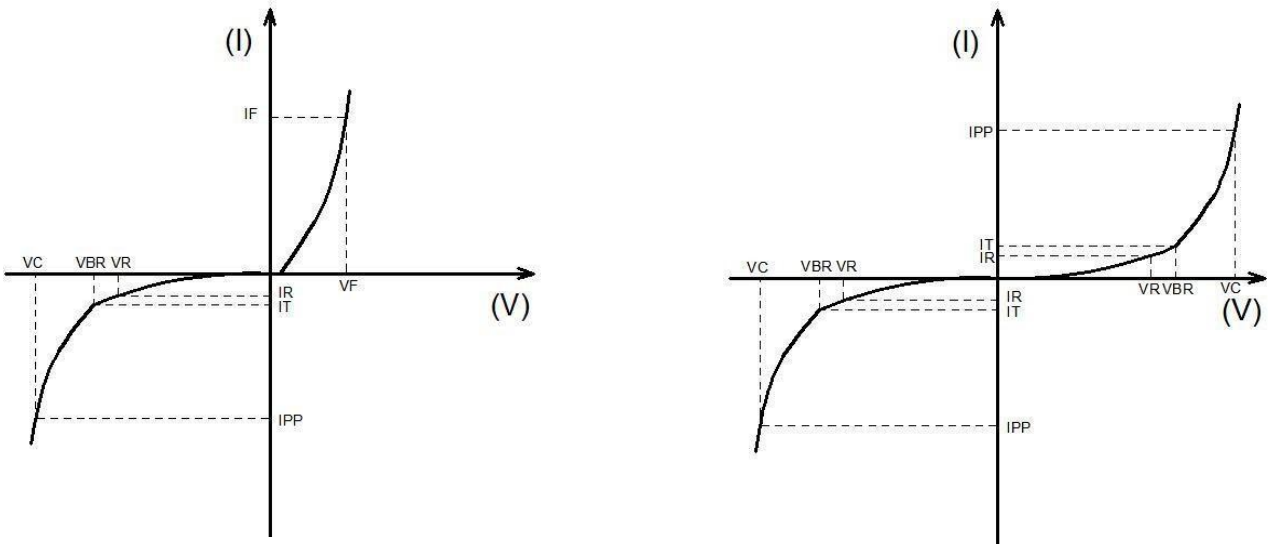
Industrial Electronics

Absolute Maximum Ratings(T=25°C, RH=45%-75%, unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|--|-------------|-------------|------|
| Peak pulse power dissipation on 10/1000µs waveform | P_{PP} | 400 | W |
| Steady state power dissipation at $T_L=75^\circ\text{C}$ | $P_{M(AV)}$ | 1.0 | W |
| Operating junction temperature range | T_j | -55 to +125 | °C |
| Storage temperature range | T_{stg} | -55 to +150 | °C |

Ratings And V-I Characteristics Curves (T=25°C, unless otherwise noted)

FIG1: V-I cure characteristics



| Symbol | Parameter |
|----------|------------------------------------|
| I_F | Mean Forward Current |
| V_F | Maximum Forward Voltage @ I_F |
| V_R | Peak Reverse Working Voltage |
| I_R | Reverse Leakage Current @ V_R |
| V_{BR} | Breakdown Voltage @ I_T |
| I_T | Test Current |
| I_{PP} | Maximum Reverse Peak Pulse Current |
| V_C | Clamping Voltage @ I_{PP} |

Electrical Characteristics (T=25°C)

| 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 |
| SMAJ3.3A | / | SMAJ3.3A | / | 3.3 | 200 | 5.2 | 6 | 10 | 8.0 | 50.00 |
| SMAJ5.0A | SMAJ5.0CA | SMAJ5.0A | SMAJ5.0CA | 5.0 | 800 | 6.40 | 7.00 | 10 | 9.2 | 43.48 |
| SMAJ6.0A | SMAJ6.0CA | SMAJ6.0A | SMAJ6.0CA | 6.0 | 800 | 6.67 | 7.37 | 10 | 10.3 | 38.84 |
| SMAJ6.5A | SMAJ6.5CA | SMAJ6.5A | SMAJ6.5CA | 6.5 | 500 | 7.22 | 7.98 | 10 | 11.2 | 35.72 |
| SMAJ7.0A | SMAJ7.0CA | SMAJ7.0A | SMAJ7.0CA | 7.0 | 200 | 7.78 | 8.60 | 10 | 12.0 | 33.34 |
| SMAJ7.5A | SMAJ7.5CA | SMAJ7.5A | SMAJ7.5CA | 7.5 | 100 | 8.33 | 9.21 | 1 | 12.9 | 31.01 |
| SMAJ8.0A | SMAJ8.0CA | SMAJ8.0A | SMAJ8.0CA | 8.0 | 50 | 8.89 | 9.83 | 1 | 13.6 | 29.42 |
| SMAJ8.5A | SMAJ8.5CA | SMAJ8.5A | SMAJ8.5CA | 8.5 | 20 | 9.44 | 10.40 | 1 | 14.4 | 27.78 |
| SMAJ9.0A | SMAJ9.0CA | SMAJ9.0A | SMAJ9.0CA | 9.0 | 10 | 10.00 | 11.10 | 1 | 15.4 | 25.98 |
| SMAJ10A | SMAJ10CA | SMAJ10A | SMAJ10CA | 10.0 | 5 | 11.10 | 12.30 | 1 | 17.0 | 23.53 |
| SMAJ11A | SMAJ11CA | SMAJ11A | SMAJ11CA | 11.0 | 1 | 12.20 | 13.50 | 1 | 18.2 | 21.98 |
| SMAJ12A | SMAJ12CA | SMAJ12A | SMAJ12CA | 12.0 | 1 | 13.30 | 14.70 | 1 | 19.9 | 20.11 |
| SMAJ13A | SMAJ13CA | SMAJ13A | SMAJ13CA | 13.0 | 1 | 14.40 | 15.90 | 1 | 21.5 | 18.61 |
| SMAJ14A | SMAJ14CA | SMAJ14A | SMAJ14CA | 14.0 | 1 | 15.60 | 17.20 | 1 | 23.2 | 17.25 |
| SMAJ15A | SMAJ15CA | SMAJ15A | SMAJ15CA | 15.0 | 1 | 16.70 | 18.50 | 1 | 24.4 | 16.40 |
| SMAJ16A | SMAJ16CA | SMAJ16A | SMAJ16CA | 16.0 | 1 | 17.80 | 19.70 | 1 | 26.0 | 15.39 |
| SMAJ17A | SMAJ17CA | SMAJ17A | SMAJ17CA | 17.0 | 1 | 18.90 | 20.90 | 1 | 27.6 | 14.50 |
| SMAJ18A | SMAJ18CA | SMAJ18A | SMAJ18CA | 18.0 | 1 | 20.00 | 22.10 | 1 | 29.2 | 13.70 |
| SMAJ20A | SMAJ20CA | SMAJ20A | SMAJ20CA | 20.0 | 1 | 22.20 | 24.50 | 1 | 32.4 | 12.35 |
| SMAJ22A | SMAJ22CA | SMAJ22A | SMAJ22CA | 22.0 | 1 | 24.40 | 26.90 | 1 | 35.5 | 11.27 |
| SMAJ24A | SMAJ24CA | SMAJ24A | SMAJ24CA | 24.0 | 1 | 26.70 | 29.50 | 1 | 38.9 | 10.29 |
| SMAJ26A | SMAJ26CA | SMAJ26A | SMAJ26CA | 26.0 | 1 | 28.90 | 31.90 | 1 | 42.1 | 9.51 |
| SMAJ28A | SMAJ28CA | SMAJ28A | SMAJ28CA | 28.0 | 1 | 31.10 | 34.40 | 1 | 45.4 | 8.82 |
| SMAJ30A | SMAJ30CA | SMAJ30A | SMAJ30CA | 30.0 | 1 | 33.30 | 36.80 | 1 | 48.4 | 8.27 |
| SMAJ33A | SMAJ33CA | SMAJ33A | SMAJ33CA | 33.0 | 1 | 36.70 | 40.60 | 1 | 53.3 | 7.51 |
| SMAJ36A | SMAJ36CA | SMAJ36A | SMAJ36CA | 36.0 | 1 | 40.00 | 44.20 | 1 | 58.1 | 6.89 |
| SMAJ40A | SMAJ40CA | SMAJ40A | SMAJ40CA | 40.0 | 1 | 44.40 | 49.10 | 1 | 64.5 | 6.21 |
| SMAJ43A | SMAJ43CA | SMAJ43A | SMAJ43CA | 43.0 | 1 | 47.80 | 52.80 | 1 | 69.4 | 5.77 |
| SMAJ45A | SMAJ45CA | SMAJ45A | SMAJ45CA | 45.0 | 1 | 50.00 | 55.30 | 1 | 72.7 | 5.51 |
| SMAJ48A | SMAJ48CA | SMAJ48A | SMAJ48CA | 48.0 | 1 | 53.30 | 58.90 | 1 | 77.4 | 5.17 |
| SMAJ51A | SMAJ51CA | SMAJ51A | SMAJ51CA | 51.0 | 1 | 56.70 | 62.70 | 1 | 82.4 | 4.86 |
| SMAJ54A | SMAJ54CA | SMAJ54A | SMAJ54CA | 54.0 | 1 | 60.00 | 66.30 | 1 | 87.1 | 4.60 |
| SMAJ58A | SMAJ58CA | SMAJ58A | SMAJ58CA | 58.0 | 1 | 64.40 | 71.20 | 1 | 93.6 | 4.28 |
| SMAJ60A | SMAJ60CA | SMAJ60A | SMAJ60CA | 60.0 | 1 | 66.70 | 73.70 | 1 | 96.8 | 4.14 |
| SMAJ64A | SMAJ64CA | SMAJ64A | SMAJ64CA | 64.0 | 1 | 71.10 | 78.60 | 1 | 103.0 | 3.89 |

Electrical Characteristics (T=25°C)

| 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 |
| SMAJ70A | SMAJ70CA | SMAJ70A | SMAJ70CA | 70.0 | 1 | 77.80 | 86.00 | 1 | 113.0 | 3.54 |
| SMAJ75A | SMAJ75CA | SMAJ75A | SMAJ75CA | 75.0 | 1 | 83.30 | 92.10 | 1 | 121.0 | 3.31 |
| SMAJ78A | SMAJ78CA | SMAJ78A | SMAJ78CA | 78.0 | 1 | 86.70 | 95.80 | 1 | 126.0 | 3.18 |
| SMAJ85A | SMAJ85CA | SMAJ85A | SMAJ85CA | 85.0 | 1 | 94.40 | 104.0 | 1 | 137.0 | 2.92 |
| SMAJ90A | SMAJ90CA | SMAJ90A | SMAJ90CA | 90.0 | 1 | 100.0 | 111.0 | 1 | 146.0 | 2.74 |
| SMAJ100A | SMAJ100CA | SMAJ100A | SMAJ100CA | 100.0 | 1 | 111.0 | 123.0 | 1 | 162.0 | 2.47 |
| SMAJ110A | SMAJ110CA | SMAJ110A | SMAJ110CA | 110.0 | 1 | 122.0 | 135.0 | 1 | 177.0 | 2.26 |
| SMAJ120A | SMAJ120CA | SMAJ120A | SMAJ120CA | 120.0 | 1 | 133.0 | 147.0 | 1 | 193.0 | 2.08 |
| SMAJ130A | SMAJ130CA | SMAJ130A | SMAJ130CA | 130.0 | 1 | 144.0 | 159.0 | 1 | 209.0 | 1.92 |
| SMAJ150A | SMAJ150CA | SMAJ150A | SMAJ150CA | 150.0 | 1 | 167.0 | 185.0 | 1 | 243.0 | 1.65 |
| SMAJ160A | SMAJ160CA | SMAJ160A | SMAJ160CA | 160.0 | 1 | 178.0 | 197.0 | 1 | 259.0 | 1.55 |
| SMAJ170A | SMAJ170CA | SMAJ170A | SMAJ170CA | 170.0 | 1 | 189.0 | 209.0 | 1 | 275.0 | 1.46 |
| SMAJ180A | SMAJ180CA | SMAJ180A | SMAJ180CA | 180.0 | 1 | 201.0 | 222.0 | 1 | 292.0 | 1.37 |
| SMAJ190A | SMAJ190CA | SMAJ190A | SMAJ190CA | 190.0 | 1 | 209.0 | 233.0 | 1 | 308.0 | 1.30 |
| SMAJ200A | SMAJ200CA | SMAJ200A | SMAJ200CA | 200.0 | 1 | 224.0 | 247.0 | 1 | 324.0 | 1.24 |
| SMAJ210A | SMAJ210CA | SMAJ210A | SMAJ210CA | 210.0 | 1 | 237.0 | 263.0 | 1 | 340.0 | 1.18 |
| SMAJ220A | SMAJ220CA | SMAJ220A | SMAJ220CA | 220.0 | 1 | 246.0 | 272.0 | 1 | 356.0 | 1.13 |
| SMAJ250A | SMAJ250CA | SMAJ250A | SMAJ250CA | 250.0 | 1 | 279.0 | 309.0 | 1 | 405.0 | 0.99 |
| SMAJ300A | SMAJ300CA | SMAJ300A | SMAJ300CA | 300.0 | 1 | 335.0 | 371.0 | 1 | 486.0 | 0.83 |
| SMAJ350A | SMAJ350CA | SMAJ350A | SMAJ350CA | 350.0 | 1 | 391.0 | 432.0 | 1 | 567.0 | 0.71 |
| SMAJ400A | SMAJ400CA | SMAJ400A | SMAJ400CA | 400.0 | 1 | 447.0 | 494.0 | 1 | 648.0 | 0.62 |
| SMAJ440A | SMAJ440CA | SMAJ440A | SMAJ440CA | 440.0 | 1 | 492.0 | 543.0 | 1 | 713.0 | 0.57 |
| SMAJ550A | SMAJ550CA | SMAJ550A | SMAJ550CA | 550.0 | 1 | 614.7 | 679.4 | 1 | 972.0 | 0.42 |

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

FIG2: Pulse Derating Curve

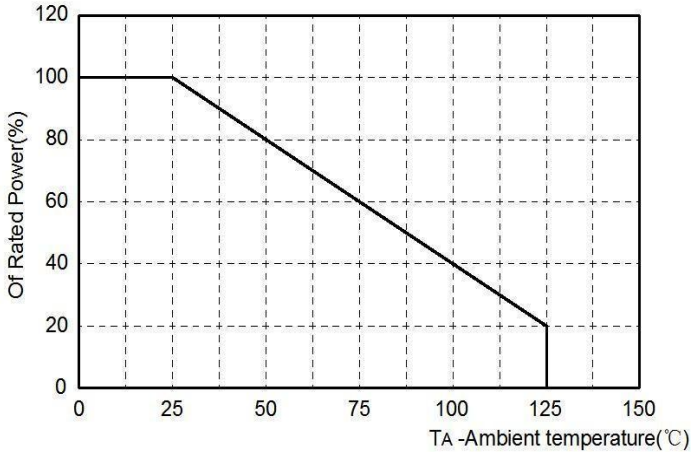


FIG3: Pulse Waveform

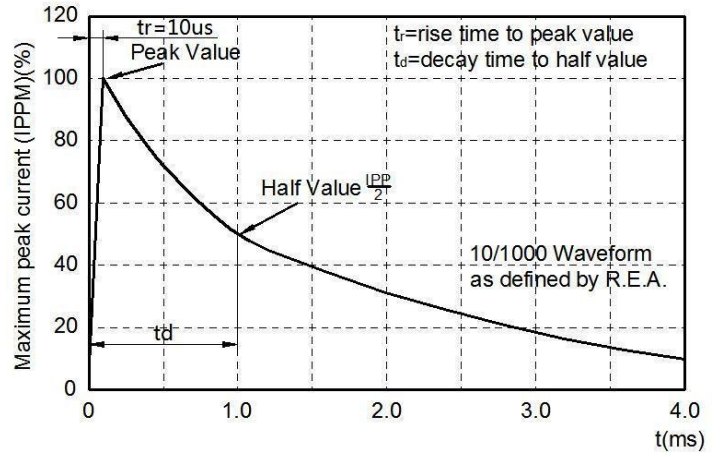


FIG4: Peak Pulse Power Rating Curve

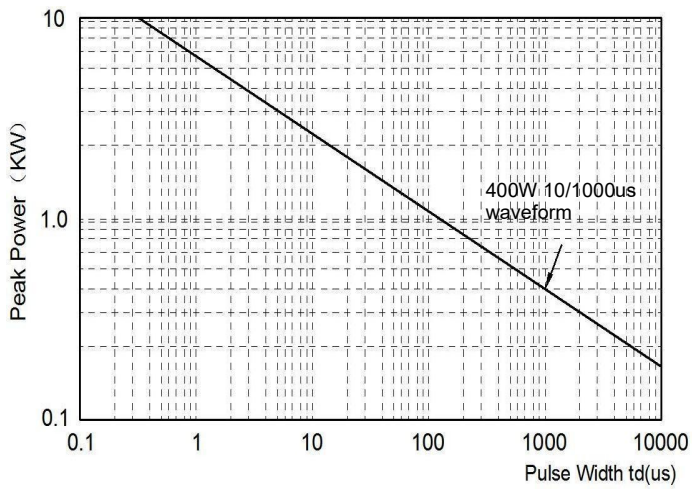
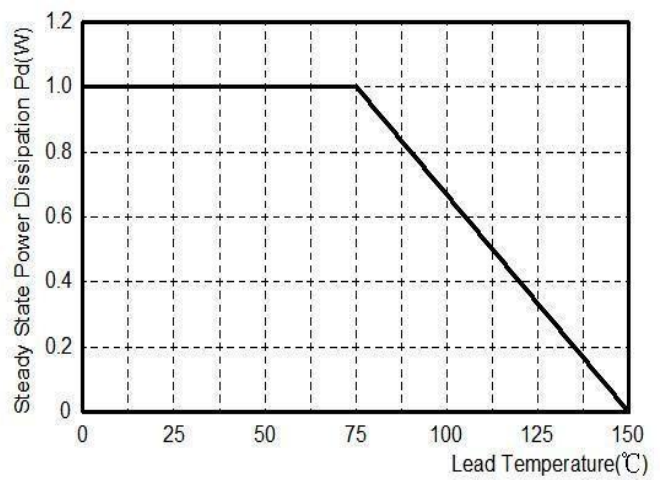
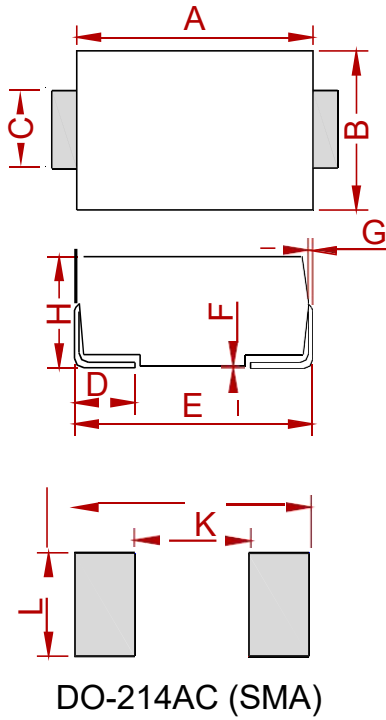


FIG5: Steady State Power Dissipation



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 | 6.50 | | 0.256 | |
| K | | 2.30 | | 0.090 |
| L | 1.70 | | 0.067 | |

REEL SPECIFICATION

| P/N | PKG | QTY |
|--------------|-----|------|
| SMAJXXXA(CA) | SMA | 2000 |

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