

## Transient Voltage Suppressors (TVS) Data Sheet

### Description

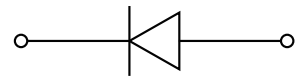
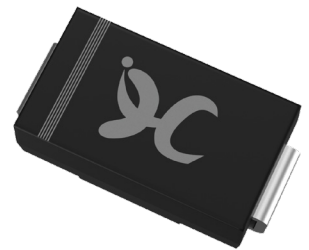
The SMBJ series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events

### Features

- For surface mounted applications in order to optimize board space
- Low leakage
- Glass passivated junction
- Low inductance
- Excellent clamping capability
- 600W peak pulse power capability at 10/1000μs waveform
- Fast response time
- Typical IR less than 5μA above 12V
- High Temperature soldering: 260°C /40 seconds at terminals
- Typical maximum temperature coefficient  $\Delta V_{BR} = 0.1\% \times V_{BR}@25^{\circ}\text{C} \times \Delta T$
- Plastic package has Underwriters Laboratory Flammability 94V-0
- Matte tin lead-free Plated
- Halogen free and RoHS compliant
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- IEC 61000-4-2 ESD 30KV(Air),30KV(contact)

**Breakdown Voltage**  
3.3 to 440 V  
**Peak Pulse Power**  
600 W

DO-214AA(SMB)



### Applications

TVS devices are ideal for the protection of I/O interfaces, VCC bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications

### Maximum Ratings (Ta=25°C Unless otherwise specified)

| PARAMETER  | SYMBOL                            | VALUE          | SYMBOL |
|--|-----------------------------------|----------------|--------|
| Peak Pulse Power Dissipation with a 10/1000μs waveform (Fig.1)(Note 1), (Note 2) | P <sub>PPM</sub>                  | 600            | W      |
| Peak Pulse Current with a 10/1000μs waveform.(Note1, Fig.3)                      | I <sub>PP</sub>                   | See Next Table | A      |
| Power Dissipation on Infinite Heat Sink at TL=75° C                              | P <sub>M(AV)</sub>                | 5.0            | W      |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)                 | I <sub>FSM</sub>                  | 100            | A      |
| Maximum Instantaneous Forward Voltage at 25A for Unidirectional Only(Note 4)     | V <sub>F</sub>                    | 3.5/5.0        | V      |
| Operating junction and Storage Temperature Range                                 | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150    | °C     |
| Typical thermal resistance junction to lead                                      | R <sub>θJ-L</sub>                 | 20             | °C /W  |
| Typical thermal resistance junction to ambient                                   | R <sub>θJ-A</sub>                 | 100            | °C /W  |

Note :

- (1) Non-repetitive current pulse, per Fig. 3 and derated above Ta = 25°C per Fig. 2.
- (2) Mounted on 5.0mm x 5.0mm (0.03mm thick) Copper Pads to each terminal.
- (3) 8.3ms single half sine-wave, or equivalent square wave, Duty cycle = 4 pulses per minutes maximum.
- (4) V<sub>F</sub><3.5V for V<sub>BR</sub><200V and V<sub>F</sub>< 6.5V for V<sub>BR</sub>>201V.

## ● Package Outline Dimensions (SMB/DO-214AA)

| Symbol | Dimensions  |       |        |       |
|--------|-------------|-------|--------|-------|
|        | Millimeters |       | Inches |       |
|        | Min.        | Max.  | Min.   | Max.  |
| A      | 1.85        | 2.21  | 0.073  | 0.087 |
| B      | 4.25        | 4.85  | 0.167  | 0.191 |
| C      | 3.30        | 3.94  | 0.130  | 0.155 |
| D      | 2.15        | 2.65  | 0.085  | 0.104 |
| E      | 0.75        | 1.52  | 0.030  | 0.060 |
| F      | -           | 0.203 | -      | 0.008 |
| G      | 5.08        | 5.59  | 0.200  | 0.220 |
| H      | 0.15        | 0.31  | 0.006  | 0.012 |
| M      | 2.26        | -     | 0.089  | -     |
| J      | 2.10        | -     | 0.085  | -     |
| K      | -           | 2.74  | -      | 0.107 |

## ● Electrical Characteristics (Ta=25°C Unless otherwise specified)

| Part Number |           | Marking |    | Reverse Stand-Off Voltage | Breakdown Voltage $V_{BR}$ (V) @ $I_T$ |       | Test Current | Maximum Clamping Voltage@ $I_{PP}$ | Peak Pulse Current | Reverse Leakage @ $V_{RWM}$ |
|-------------|-----------|---------|----|---------------------------|--|-------|--------------|------------------------------------|--------------------|-----------------------------|
| Uni         | Bi        | Uni     | Bi | $V_{RWM}$ (V)             | Min.                                   | Max.  | $I_T$ (mA)   | $V_C$ (V)                          | $I_{PP}$ (A)       | $I_R$ ( $\mu$ A)            |
| SMBJ3.3A    | SMBJ3.3CA | KD      | AD | 3.3                       | 5.20                                   | 6.50  | 10           | 8.0                                | 75.00              | 600                         |
| SMBJ5.0A    | SMBJ5.0CA | KE      | AE | 5.0                       | 6.40                                   | 7.00  | 10           | 9.2                                | 65.22              | 800                         |
| SMBJ6.0A    | SMBJ6.0CA | KG      | AG | 6.0                       | 6.67                                   | 7.37  | 10           | 10.3                               | 58.25              | 800                         |
| SMBJ6.5A    | SMBJ6.5CA | KK      | AK | 6.5                       | 7.22                                   | 7.98  | 10           | 11.2                               | 53.57              | 500                         |
| SMBJ7.0A    | SMBJ7.0CA | KM      | AM | 7.0                       | 7.78                                   | 8.60  | 10           | 12.0                               | 50.00              | 200                         |
| SMBJ7.5A    | SMBJ7.5CA | KP      | AP | 7.5                       | 8.33                                   | 9.21  | 1            | 12.9                               | 46.51              | 100                         |
| SMBJ8.0A    | SMBJ8.0CA | KR      | AR | 8.0                       | 8.89                                   | 9.83  | 1            | 13.6                               | 44.12              | 50                          |
| SMBJ8.5A    | SMBJ8.5CA | KT      | AT | 8.5                       | 9.44                                   | 10.40 | 1            | 14.4                               | 41.67              | 10                          |
| SMBJ9.0A    | SMBJ9.0CA | KV      | AV | 9.0                       | 10.00                                  | 11.10 | 1            | 15.4                               | 38.96              | 5                           |
| SMBJ10A     | SMBJ10CA  | KX      | AX | 10.0                      | 11.10                                  | 12.30 | 1            | 17.0                               | 35.29              | 5                           |
| SMBJ11A     | SMBJ11CA  | KZ      | WZ | 11.0                      | 12.20                                  | 13.50 | 1            | 18.2                               | 32.97              | 5                           |
| SMBJ12A     | SMBJ12CA  | LE      | BE | 12.0                      | 13.30                                  | 14.70 | 1            | 19.9                               | 30.15              | 5                           |
| SMBJ13A     | SMBJ13CA  | LG      | BG | 13.0                      | 14.40                                  | 15.90 | 1            | 21.5                               | 27.91              | 5                           |
| SMBJ14A     | SMBJ14CA  | LK      | BK | 14.0                      | 15.60                                  | 17.20 | 1            | 23.2                               | 25.86              | 5                           |
| SMBJ15A     | SMBJ15CA  | LM      | BM | 15.0                      | 16.70                                  | 18.50 | 1            | 24.4                               | 24.59              | 5                           |
| SMBJ16A     | SMBJ16CA  | LP      | BP | 16.0                      | 17.80                                  | 19.70 | 1            | 26.0                               | 23.08              | 5                           |
| SMBJ17A     | SMBJ17CA  | LR      | BR | 17.0                      | 18.90                                  | 20.90 | 1            | 27.6                               | 21.74              | 5                           |
| SMBJ18A     | SMBJ18CA  | LT      | BT | 18.0                      | 20.00                                  | 22.10 | 1            | 29.2                               | 20.55              | 5                           |
| SMBJ19A     | SMBJ19CA  | LB      | BB | 19.0                      | 21.10                                  | 23.30 | 1            | 30.8                               | 19.49              | 5                           |
| SMBJ20A     | SMBJ20CA  | LV      | BV | 20.0                      | 22.20                                  | 24.50 | 1            | 32.4                               | 18.52              | 5                           |
| SMBJ22A     | SMBJ22CA  | LX      | BX | 22.0                      | 24.40                                  | 26.90 | 1            | 35.5                               | 16.90              | 5                           |
| SMBJ24A     | SMBJ24CA  | LZ      | BZ | 24.0                      | 26.70                                  | 29.50 | 1            | 38.9                               | 15.42              | 5                           |
| SMBJ26A     | SMBJ26CA  | ME      | CE | 26.0                      | 28.90                                  | 31.90 | 1            | 42.1                               | 14.25              | 5                           |

● **Electrical Characteristics** (Ta=25°C Unless otherwise specified)

| Part Number |           | Marking |    | Reverse Stand-Off Voltage | Breakdown Voltage $V_{BR}$ (V) @ $I_T$ |        | Test Current | Maximum Clamping Voltage@ $I_{PP}$ | Peak Pulse Current | Reverse Leakage @ $V_{RWM}$ |
|-------------|-----------|---------|----|---------------------------|--|--------|--------------|------------------------------------|--------------------|-----------------------------|
| Uni         | Bi        | Uni     | Bi | $V_{RWM}$ (V)             | Min.                                   | Max.   | $I_T$ (mA)   | $V_C$ (V)                          | $I_{PP}$ (A)       | $I_R$ ( $\mu$ A)            |
| SMBJ28A     | SMBJ28CA  | MG      | CG | 28.0                      | 31.10                                  | 34.40  | 1            | 45.4                               | 13.22              | 5                           |
| SMBJ30A     | SMBJ30CA  | MK      | CK | 30.0                      | 33.30                                  | 36.80  | 1            | 48.4                               | 12.40              | 5                           |
| SMBJ33A     | SMBJ33CA  | MM      | CM | 33.0                      | 36.70                                  | 40.60  | 1            | 53.3                               | 11.26              | 5                           |
| SMBJ36A     | SMBJ36CA  | MP      | CP | 36.0                      | 40.00                                  | 44.20  | 1            | 58.1                               | 10.33              | 5                           |
| SMBJ40A     | SMBJ40CA  | MR      | CR | 40.0                      | 44.40                                  | 49.10  | 1            | 64.5                               | 9.30               | 5                           |
| SMBJ43A     | SMBJ43CA  | MT      | CT | 43.0                      | 47.80                                  | 52.80  | 1            | 69.4                               | 8.65               | 5                           |
| SMBJ45A     | SMBJ45CA  | MV      | CV | 45.0                      | 50.00                                  | 55.30  | 1            | 72.7                               | 8.25               | 5                           |
| SMBJ48A     | SMBJ48CA  | MX      | CX | 48.0                      | 53.30                                  | 58.90  | 1            | 77.4                               | 7.75               | 5                           |
| SMBJ51A     | SMBJ51CA  | MZ      | CZ | 51.0                      | 56.70                                  | 62.70  | 1            | 82.4                               | 7.28               | 5                           |
| SMBJ54A     | SMBJ54CA  | NE      | DE | 54.0                      | 60.00                                  | 66.30  | 1            | 87.1                               | 6.89               | 5                           |
| SMBJ58A     | SMBJ58CA  | NG      | DG | 58.0                      | 64.40                                  | 71.20  | 1            | 93.6                               | 6.41               | 5                           |
| SMBJ60A     | SMBJ60CA  | NK      | DK | 60.0                      | 66.70                                  | 73.70  | 1            | 96.8                               | 6.20               | 5                           |
| SMBJ64A     | SMBJ64CA  | NM      | DM | 64.0                      | 71.10                                  | 78.60  | 1            | 103.0                              | 5.83               | 5                           |
| SMBJ70A     | SMBJ70CA  | NP      | DP | 70.0                      | 77.80                                  | 86.00  | 1            | 113.0                              | 5.31               | 5                           |
| SMBJ75A     | SMBJ75CA  | NR      | DR | 75.0                      | 83.30                                  | 92.10  | 1            | 121.0                              | 4.96               | 5                           |
| SMBJ78A     | SMBJ78CA  | NT      | DT | 78.0                      | 86.70                                  | 95.80  | 1            | 126.0                              | 4.76               | 5                           |
| SMBJ80A     | SMBJ80CA  | NB      | DB | 80.0                      | 88.80                                  | 97.60  | 1            | 129.6                              | 4.63               | 5                           |
| SMBJ85A     | SMBJ85CA  | NV      | DV | 85.0                      | 94.40                                  | 104.00 | 1            | 137.0                              | 4.38               | 5                           |
| SMBJ90A     | SMBJ90CA  | NX      | DX | 90.0                      | 100.00                                 | 111.00 | 1            | 146.0                              | 4.11               | 5                           |
| SMBJ100A    | SMBJ100CA | NZ      | DZ | 100.0                     | 111.00                                 | 123.00 | 1            | 162.0                              | 3.70               | 5                           |
| SMBJ110A    | SMBJ110CA | PE      | EE | 110.0                     | 122.00                                 | 135.00 | 1            | 177.0                              | 3.39               | 5                           |
| SMBJ120A    | SMBJ120CA | PG      | EG | 120.0                     | 133.00                                 | 147.00 | 1            | 193.0                              | 3.11               | 5                           |
| SMBJ130A    | SMBJ130CA | PK      | EK | 130.0                     | 144.00                                 | 159.00 | 1            | 209.0                              | 2.87               | 5                           |
| SMBJ140A    | SMBJ140CA | PB      | EB | 140.0                     | 155.00                                 | 171.00 | 1            | 226.8                              | 2.65               | 5                           |
| SMBJ150A    | SMBJ150CA | PM      | EM | 150.0                     | 167.00                                 | 185.00 | 1            | 243.0                              | 2.47               | 5                           |
| SMBJ160A    | SMBJ160CA | PP      | EP | 160.0                     | 178.00                                 | 197.00 | 1            | 259.0                              | 2.32               | 5                           |
| SMBJ170A    | SMBJ170CA | PR      | ER | 170.0                     | 189.00                                 | 209.00 | 1            | 275.0                              | 2.18               | 5                           |
| SMBJ180A    | SMBJ180CA | PT      | ET | 180.0                     | 201.00                                 | 220.00 | 1            | 291.6                              | 2.06               | 5                           |
| SMBJ190A    | SMBJ190CA | PV      | EV | 190.0                     | 211.00                                 | 232.00 | 1            | 307.8                              | 1.95               | 5                           |
| SMBJ200A    | SMBJ200CA | PW      | EW | 200.0                     | 224.00                                 | 247.00 | 1            | 324.0                              | 1.85               | 5                           |
| SMBJ220A    | SMBJ220CA | PX      | EX | 220.0                     | 246.00                                 | 272.00 | 1            | 356.0                              | 1.69               | 5                           |
| SMBJ250A    | SMBJ250CA | PZ      | EZ | 250.0                     | 279.00                                 | 309.00 | 1            | 405.0                              | 1.48               | 5                           |
| SMBJ300A    | SMBJ300CA | QE      | FE | 300.0                     | 335.00                                 | 371.00 | 1            | 486.0                              | 1.23               | 5                           |
| SMBJ350A    | SMBJ350CA | QG      | FG | 350.0                     | 391.00                                 | 432.00 | 1            | 567.0                              | 1.06               | 5                           |
| SMBJ400A    | SMBJ400CA | QK      | FK | 400.0                     | 447.00                                 | 494.00 | 1            | 648.0                              | 0.93               | 5                           |
| SMBJ440A    | SMBJ440CA | QM      | FM | 440.0                     | 492.00                                 | 543.00 | 1            | 713.0                              | 0.84               | 5                           |

Note :

- (1)Suffix 'A' denotes 5% tolerance device.
- (2)Add suffix ' CA ' after part number to specify Bi-directional devices.
- (3)For Bi-Directional devices having VR of 10 volts and under, the IR limit is double.

● Ratings And Characteristics Curves ( $T_a=25^{\circ}\text{C}$  Unless otherwise specified)

