

### 3000W Surface Mount Transient Voltage Suppressors - 5.0V-220V

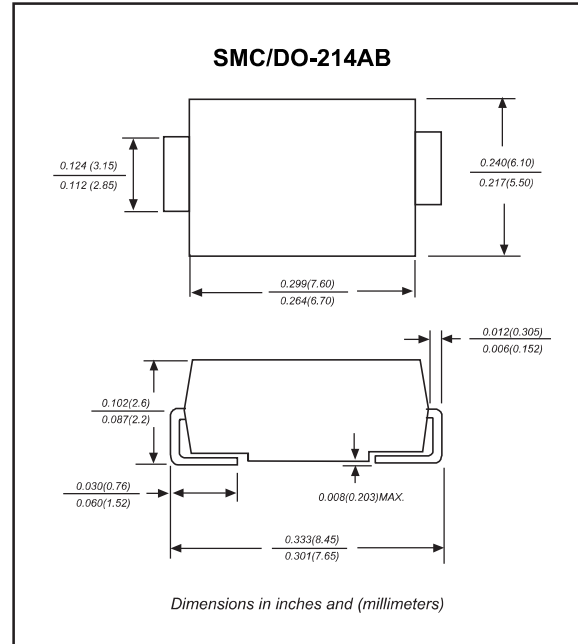
#### Features

- 3000W peak pulse power capability with a 10/1000 us waveform, repetition rate (duty cycle): 0.01%.
- Excellent clamping capability.
- Low incremental surge resistance.
- Fast response time from 0V to VBR, typically less than 1 ps for uni-directional & 5 ns for bi-directional types.
- Glass passivated chip junction.
- Lead-free parts meet RoHS requirements.
- Compliant to Halogen-free.
- Suffix "-Q1" for AEC-Q101.

#### Mechanical data

- Epoxy: UL94-V0 rated flame retardant
- Case : Molded plastic, DO-214AB / SMC
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.23 gram

#### Package outline



#### Maximum ratings (AT $T_A=25^\circ\text{C}$ unless otherwise noted)

| PARAMETER                             | CONDITIONS  | Symbol      | Value       | UNIT             |
|---------------------------------------|---|-------------|-------------|------------------|
| Peak Power Dissipation                | with a 10/1000 us waveform, Note 1, 2 & Fig. 1    | $P_{PPM}$   | 3000        | W                |
| Peak Pulse current                    | with a 10/1000 us waveform                        | $I_{PPM}$   | See Table 1 | A                |
| Steady State Power Dissipation        | at $T_L=75^\circ\text{C}$ , Note 2                | $P_{M(AV)}$ | 6.5         | W                |
| Peak Forward Surge Current            | 8.3ms Single Half Sine-Wave, Note 3               | $I_{FSM}$   | 300         | A                |
| Maximum Instantaneous Forward Voltage | at 100A<br>For Uni-Directional Types Only, Note 4 | $V_F$       | 3.5/5.0     | V                |
| Operating Temperature range           |   | $T_J$       | -55 ~ +150  | $^\circ\text{C}$ |
| Storage Temperature range             |   | $T_{STG}$   | -55 ~ +150  | $^\circ\text{C}$ |

Note 1. Non-repetitive current pulse, per Fig. 3 and derated above  $T_A=25^\circ\text{C}$  per Fig. 2

2. Mounted on copper pad area of 0.31"x0.31" (8.0x8.0 mm) per Fig 5

3. Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minute maximum

4.  $V_F < 3.5\text{V}$  for devices of  $V_{BR} < 200\text{V}$  and  $V_F < 5.0\text{V}$  for devices of  $V_{BR} > 201\text{V}$ .

### Electrical characteristics (at $T_A=25^\circ\text{C}$ unless otherwise noted)

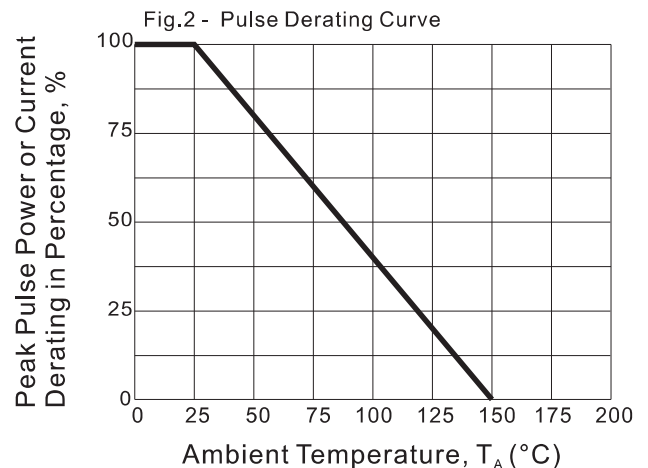
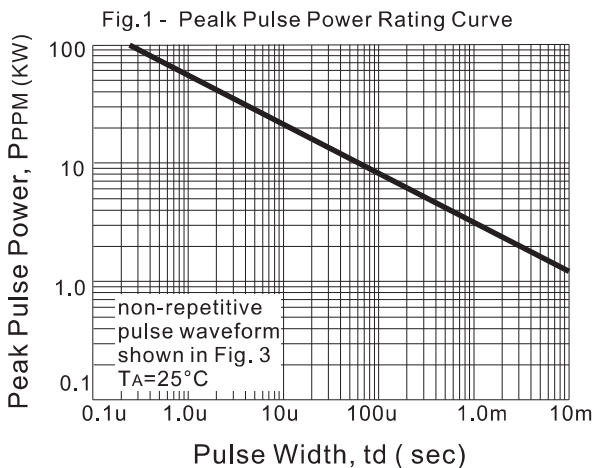
| Part No.       | Reverse Stand-off Voltage | Breakdown Voltage @ $I_T$ |              | Test Current | Maximum Clamping Voltage @ $I_{PP}$ |          | Maximum Reverse Leakage Current | Marking Code |     |
|----------------|---------------------------|---------------------------|--------------|--------------|-------------------------------------|----------|---------------------------------|--------------|-----|
|                | $V_{RWM}$                 | $V_{BR Min}$              | $V_{BR Max}$ | $I_T$        | $V_c$                               | $I_{PP}$ | $I_R@V_{RWM}$                   |              |     |
|                | Volts                     | Volts                     | Volts        | mA           | Volts                               | A        | $\mu\text{A}$                   | UNI          | BI  |
| SMDJ5.0(C)A-Q1 | 5.0                       | 6.40                      | 7.00         | 10           | 9.2                                 | 326.1    | 800                             | RDE          | DDE |
| SMDJ6.0(C)A-Q1 | 6.0                       | 6.67                      | 7.37         | 10           | 10.3                                | 291.3    | 800                             | RDG          | DDG |
| SMDJ6.5(C)A-Q1 | 6.5                       | 7.22                      | 7.98         | 10           | 11.2                                | 267.9    | 500                             | RDK          | DDK |
| SMDJ7.0(C)A-Q1 | 7.0                       | 7.78                      | 8.60         | 10           | 12.0                                | 250.0    | 200                             | PDM          | DDM |
| SMDJ7.5(C)A-Q1 | 7.5                       | 8.33                      | 9.21         | 1.0          | 12.9                                | 232.6    | 100                             | PDP          | DDP |
| SMDJ8.0(C)A-Q1 | 8.0                       | 8.89                      | 9.83         | 1.0          | 13.6                                | 220.6    | 50                              | PDR          | DDR |
| SMDJ8.5(C)A-Q1 | 8.5                       | 9.44                      | 10.4         | 1.0          | 14.4                                | 208.3    | 10                              | PDT          | DDT |
| SMDJ9.0(C)A-Q1 | 9.0                       | 10.0                      | 11.1         | 1.0          | 15.4                                | 194.8    | 5                               | PDV          | DDV |
| SMDJ10(C)A-Q1  | 10                        | 11.1                      | 12.3         | 1.0          | 17.0                                | 176.5    | 5                               | PDX          | DDX |
| SMDJ11(C)A-Q1  | 11                        | 12.2                      | 13.5         | 1.0          | 18.2                                | 164.8    | 5                               | PDZ          | DDZ |
| SMDJ12(C)A-Q1  | 12                        | 13.3                      | 14.7         | 1.0          | 19.9                                | 150.8    | 5                               | PEE          | DEE |
| SMDJ13(C)A-Q1  | 13                        | 14.4                      | 15.9         | 1.0          | 21.5                                | 139.5    | 5                               | PEG          | DEG |
| SMDJ14(C)A-Q1  | 14                        | 15.6                      | 17.2         | 1.0          | 23.2                                | 129.3    | 5                               | PEK          | DEK |
| SMDJ15(C)A-Q1  | 15                        | 16.7                      | 18.5         | 1.0          | 24.4                                | 123.0    | 5                               | PEM          | DEM |
| SMDJ16(C)A-Q1  | 16                        | 17.8                      | 19.7         | 1.0          | 26.0                                | 115.4    | 5                               | PEP          | DEP |
| SMDJ17(C)A-Q1  | 17                        | 18.9                      | 20.9         | 1.0          | 27.6                                | 108.7    | 5                               | PER          | DER |
| SMDJ18(C)A-Q1  | 18                        | 20.0                      | 22.1         | 1.0          | 29.2                                | 102.7    | 5                               | PET          | DET |
| SMDJ20(C)A-Q1  | 20                        | 22.2                      | 24.5         | 1.0          | 32.4                                | 92.6     | 5                               | PEV          | DEV |
| SMDJ22(C)A-Q1  | 22                        | 24.4                      | 26.9         | 1.0          | 35.5                                | 84.5     | 5                               | PEX          | DEX |
| SMDJ24(C)A-Q1  | 24                        | 26.7                      | 29.5         | 1.0          | 38.9                                | 77.1     | 5                               | PEZ          | DEZ |
| SMDJ26(C)A-Q1  | 26                        | 28.9                      | 31.9         | 1.0          | 42.1                                | 71.3     | 5                               | PFE          | DFE |
| SMDJ28(C)A-Q1  | 28                        | 31.1                      | 34.4         | 1.0          | 45.4                                | 66.1     | 5                               | PFG          | DFG |
| SMDJ30(C)A-Q1  | 30                        | 33.3                      | 36.8         | 1.0          | 48.4                                | 62.0     | 5                               | PFK          | DFK |
| SMDJ33(C)A-Q1  | 33                        | 36.7                      | 40.6         | 1.0          | 53.3                                | 56.3     | 5                               | PFM          | DFM |
| SMDJ36(C)A-Q1  | 36                        | 40.0                      | 44.2         | 1.0          | 58.1                                | 51.6     | 5                               | PFP          | DFP |
| SMDJ40(C)A-Q1  | 40                        | 44.4                      | 49.1         | 1.0          | 64.5                                | 46.5     | 5                               | PFR          | DFR |
| SMDJ43(C)A-Q1  | 43                        | 47.8                      | 52.8         | 1.0          | 69.4                                | 43.2     | 5                               | PFT          | DFT |
| SMDJ45(C)A-Q1  | 45                        | 50.0                      | 55.3         | 1.0          | 72.7                                | 41.3     | 5                               | PFV          | DFV |
| SMDJ48(C)A-Q1  | 48                        | 53.3                      | 58.9         | 1.0          | 77.4                                | 38.8     | 5                               | PFX          | DFX |
| SMDJ51(C)A-Q1  | 51                        | 56.7                      | 62.7         | 1.0          | 82.4                                | 36.4     | 5                               | PFZ          | DFZ |
| SMDJ54(C)A-Q1  | 54                        | 60.0                      | 66.3         | 1.0          | 87.1                                | 34.4     | 5                               | PGE          | DGE |
| SMDJ58(C)A-Q1  | 58                        | 64.4                      | 71.2         | 1.0          | 93.6                                | 32.1     | 5                               | PGG          | DGG |
| SMDJ60(C)A-Q1  | 60                        | 66.7                      | 73.7         | 1.0          | 96.8                                | 31.0     | 5                               | PGK          | DGK |
| SMDJ64(C)A-Q1  | 64                        | 71.1                      | 78.6         | 1.0          | 103.0                               | 29.1     | 5                               | PGM          | DGM |
| SMDJ70(C)A-Q1  | 70                        | 77.8                      | 86.0         | 1.0          | 113.0                               | 26.5     | 5                               | PGP          | DGP |
| SMDJ75(C)A-Q1  | 75                        | 83.3                      | 92.1         | 1.0          | 121.0                               | 24.8     | 5                               | PGR          | DGR |
| SMDJ78(C)A-Q1  | 78                        | 86.7                      | 95.8         | 1.0          | 126.0                               | 23.8     | 5                               | PGT          | DGT |
| SMDJ85(C)A-Q1  | 85                        | 94.4                      | 104          | 1.0          | 137.0                               | 21.9     | 5                               | PGV          | DGV |

### Electrical characteristics (at $T_A=25$ C unless otherwise noted)

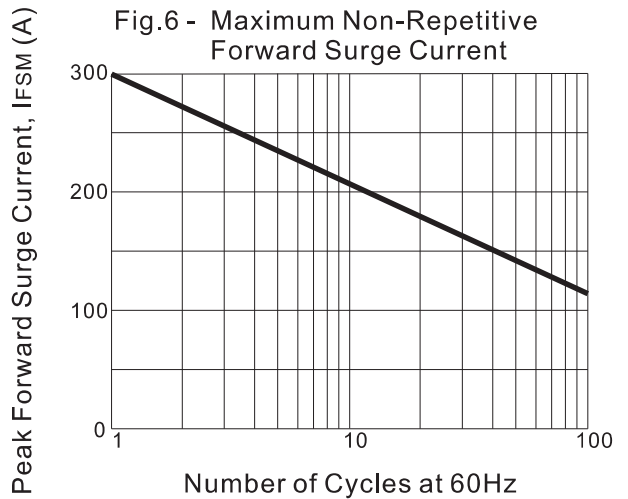
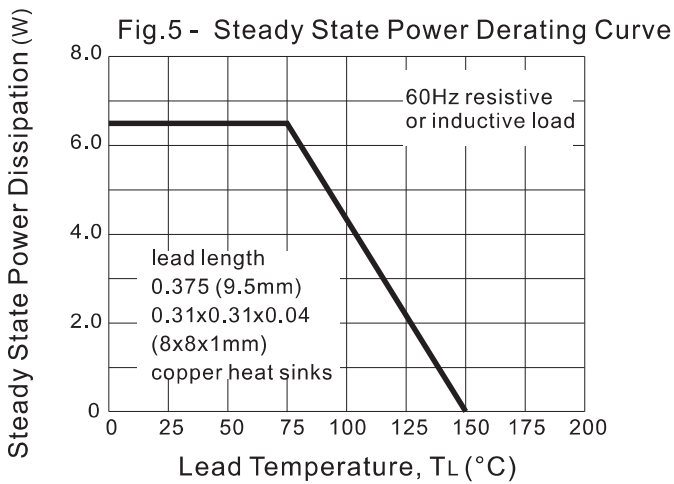
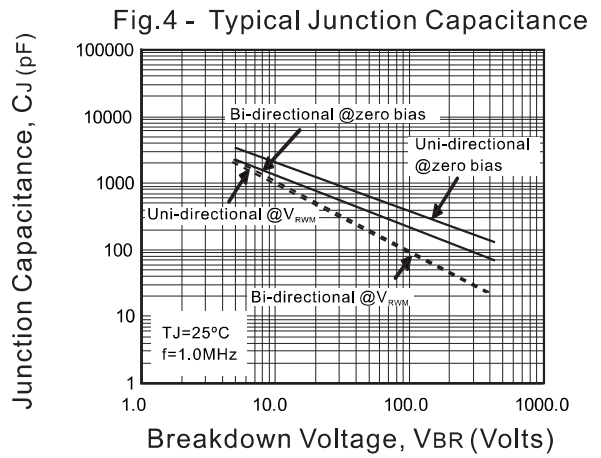
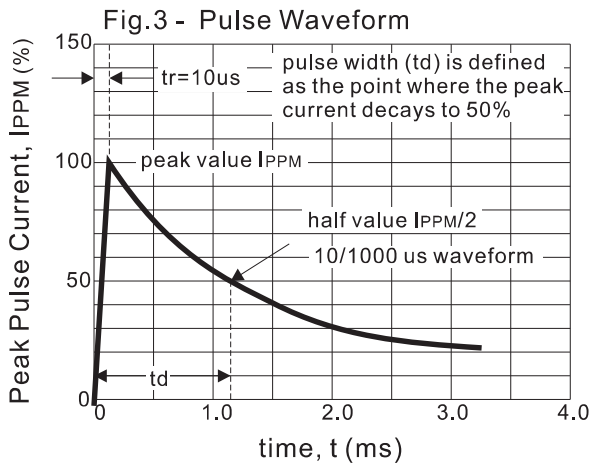
| Part No.       | Reverse Stand-off Voltage | Breakdown Voltage @ $I_T$ |              | Test Current | Maximum Clamping Voltage @ $I_{PP}$ |          | Maximum Reverse Leakage Current | Marking Code |     |
|----------------|---------------------------|---------------------------|--------------|--------------|-------------------------------------|----------|---------------------------------|--------------|-----|
|                | $V_{RWM}$                 | $V_{BR Min}$              | $V_{BR Max}$ | $I_T$        | $V_C$                               | $I_{PP}$ | $I_R@V_{RWM}$                   |              |     |
|                | Volts                     | Volts                     | Volts        | mA           | Volts                               | A        | $\mu A$                         | UNI          | BI  |
| SMDJ90(C)A-Q1  | 90                        | 100                       | 111          | 1.0          | 146.0                               | 20.5     | 5                               | PGX          | DGX |
| SMDJ100(C)A-Q1 | 100                       | 111                       | 123          | 1.0          | 162.0                               | 18.5     | 5                               | PGZ          | DGZ |
| SMDJ110(C)A-Q1 | 110                       | 122                       | 135          | 1.0          | 177.0                               | 16.9     | 5                               | PHE          | DHE |
| SMDJ120(C)A-Q1 | 120                       | 133                       | 147          | 1.0          | 193.0                               | 15.5     | 5                               | PHG          | DHG |
| SMDJ130(C)A-Q1 | 130                       | 144                       | 159          | 1.0          | 209.0                               | 14.4     | 5                               | PHK          | DHK |
| SMDJ150(C)A-Q1 | 150                       | 167                       | 185          | 1.0          | 243.0                               | 12.3     | 5                               | PHM          | DHM |
| SMDJ160(C)A-Q1 | 160                       | 178                       | 197          | 1.0          | 259.0                               | 11.6     | 5                               | PHP          | DHP |
| SMDJ170(C)A-Q1 | 170                       | 189                       | 209          | 1.0          | 275.0                               | 10.9     | 5                               | PHR          | DHR |
| SMDJ180(C)A-Q1 | 180                       | 200                       | 222          | 1.0          | 292.0                               | 10.3     | 5                               | HHT          | IHT |
| SMDJ200(C)A-Q1 | 200                       | 224                       | 247          | 1.0          | 324.0                               | 9.3      | 5                               | HHX          | IHX |
| SMDJ220(C)A-Q1 | 220                       | 246                       | 272          | 1.0          | 356.0                               | 8.4      | 5                               | HIE          | IIE |

- Note 1.  $V_{BR}$  measured after  $I_T$  applied for 300us,  $I_T$ =square wave pulse or equivalent  
 2. Surge current waveform per Fig. 3 and derated per Fig. 2  
 3. For bi-directional types having  $V_{RWM}$  of 10 volts and less, the  $I_R$  limit is doubled  
 4. Suffix 'C' denotes bi-directional devices. Suffix 'A' denotes 5% tolerance devices, no suffix denotes 10% tolerance devices.  
 5. All terms and symbols are consistent with ANS/IEEE C62.35  
 6. Transient Voltage Suppressors (TVS) are devices used to protect vulnerable circuits from electrical overstress such as that caused by electrostatic discharge, inductive load switching and induced lightning. Within the TVS, damaging voltage spikes are limited by clamping or avalanche action of a rugged silicon pn junction which reduces the amplitude of the transient to a nondestructive level. See Fig. 7 & Fig. 8

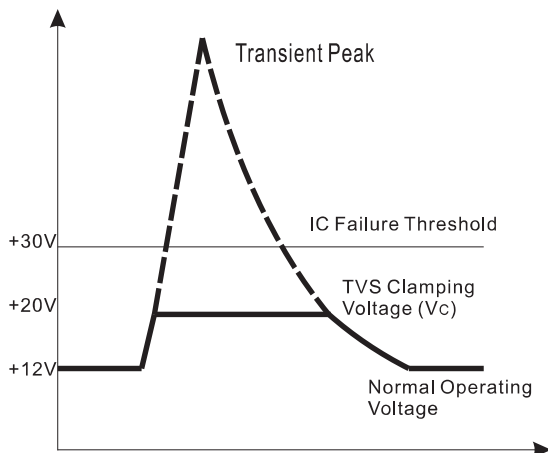
### Rating and characteristic curves (SMDJ-Q1 Series)



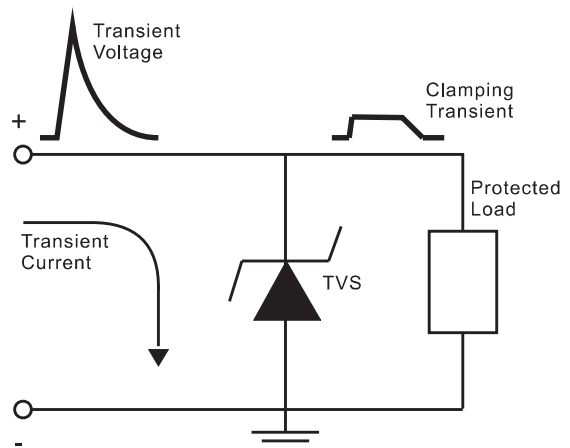
## Rating and characteristic curves (SMDJ-Q1 Series)







**Fig. 7 - Transients of several thousand volts can be clamped to a safe level by the TVS**



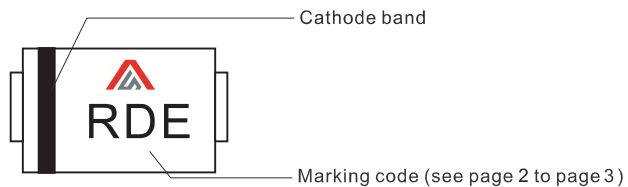

**Fig. 8 - Transient current is diverted to ground thru TVS; the voltage seen by the protected load is limited to the clamping voltage level**



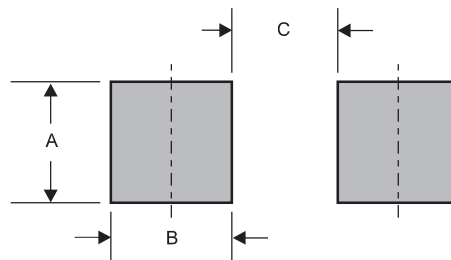
### Pinning information

| Pin   | Simplified outline   | Symbol  |
|---|--|---|
| Uni-Directional<br>Pin1 cathode<br>Pin2 anode |  |  |
| Bi-Directional                                |   |  |

### Marking

| Type number     | Example  |
|-----------------|--|
| Uni-Directional |  |
| Bi-Directional  |  |

### Suggested solder pad layout



Dimensions in inches and (millimeters)

| PACKAGE | A            | B            | C            |
|---------|--------------|--------------|--------------|
| SMC     | 0.132 (3.30) | 0.100 (2.50) | 0.176 (4.40) |